450DLC
Excavator
Operation and Tests

TECHNICAL MANUAL
450DLC Excavator Operation and Test

TM2361 24JUN08 (ENGLISH)

For complete service information also see:

450DLC Excavator Repair	TM2362
Undercarriage Appraisal Manual	SP326
450DLC Operator's Manual	OMT221101
JDLink™ / ZXLink™ Machine Monitoring System	CTM10006

Worldwide Construction
And Forestry Division
LITHO IN U.S.A.

Introduction

Foreword

This manual is written for an experienced technician. Essential tools required in performing certain service work are identified in this manual and are recommended for use.

Live with safety: Read the safety messages in the introduction of this manual and the cautions presented throughout the text of the manual.

⚠ This is the safety-alert symbol. When you see this symbol on the machine or in this manual, be alert to the potential for personal injury.

Technical manuals are divided in two parts: repair and operation and tests. Repair sections tell how to repair the components. Operation and tests sections help you identify the majority of routine failures quickly.

Information is organized in groups for the various components requiring service instruction. At the beginning of each group are summary listings of all applicable essential tools, service equipment and tools, other materials needed to do the job, service parts kits, specifications, wear tolerances, and torque values.

Technical Manuals are concise guides for specific machines. They are on-the-job guides containing only the vital information needed for diagnosis, analysis, testing, and repair.

Fundamental service information is available from other sources covering basic theory of operation, fundamentals of troubleshooting, general maintenance, and basic type of failures and their causes.

DX,TMIFC –19–29SEP98–1/1

Technical Information Feedback Form

We need your help to continually improve our technical publications. Please copy this page and FAX or mail your comments, ideas and improvements.

SEND TO: John Deere Dubuque Works
P.O. Box 538
Attn: Publications Supervisor, Dept. 303
Dubuque, IA 52004-0538

FAX NUMBER: 563-589-5800

Ideas, Comments (Please State Page Number): ________________

OVERALL, how would you rate the quality of this publication? (Check one)

Poor		Fair		Good		Very Good		Excellent	
1	2	3	4	5	6	7	8	9	10

Company Name: ________________

Technician Name: ________________

Address: ________________

Phone: ________________

Fax No.: ________________

Dealer Acct. No.: ________________

THANK YOU!

TX,TM,FAX –19–03JUL01–1/1

Contents

SECTION 9000—General Information
Group 01—Safety

SECTION 9001—Diagnostics
Group 10—Main Controller (MCF) Diagnostic Trouble Codes
Group 20—Engine Control Module (ECM) Diagnostic Trouble Codes
Group 30—Information Controller (ICF) Diagnostic Trouble Codes
Group 40—Air Conditioner Controller (ACF) Diagnostic Trouble Codes
Group 50—Monitor Controller (MON) Diagnostic Trouble Codes

SECTION 9005—Operational Checkout Procedure
Group 10—Operational Checkout Procedure

SECTION 9010—Engine
Group 05—Theory of Operation
Group 15—Diagnostic Information
Group 25—Tests

SECTION 9015—Electrical System
Group 05—System Information
Group 10—System Diagrams
Group 15—Sub-System Diagnostics
Group 16—Monitor Operation
Group 20—References

SECTION 9020—Power Train
Group 05—Theory of Operation
Group 15—Diagnostic Information

SECTION 9025—Hydraulic System
Group 05—Theory of Operation
Group 15—Diagnostic Information
Group 25—Tests

SECTION 9031—Heating and Air Conditioning System
Group 05—Theory Of Operation
Group 15—Diagnostic Information
Group 25—Tests

SECTION 9050—Reference Material
Group 05—Terminology Cross Reference Chart

All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

COPYRIGHT © 2008
DEERE & COMPANY
Moline, Illinois
All rights reserved
A John Deere ILLUSTRUCTION® Manual
Previous Editions
Copyright © 2006, 2007

Section 9000
General Information

Contents

Page

Group 01—Safety .9000-01-1

Group 01
Safety

Recognize Safety Information

This is the safety alert symbol. When this symbol is noticed on the machine or in this manual, be alert for the potential of personal injury.

Follow the precautions and safe operating practices highlighted by this symbol.

A signal word — DANGER, WARNING, or CAUTION — is used with the safety alert symbol. DANGER identifies the most serious hazards.

On the machine, DANGER signs are red in color, WARNING signs are orange, and CAUTION signs are yellow. DANGER and WARNING signs are located near specific hazards. General precautions are on CAUTION labels.

T133555 –UN–28AUG00

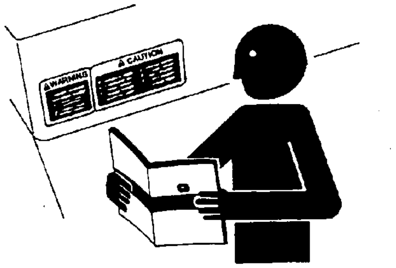
T133588 –19–28AUG00

TX03679,00016CC –19–03JAN07–1/1

Follow Safety Instructions

Read the safety messages in this manual and on the machine. Follow these warnings and instructions carefully. Review them frequently.

Be sure all operators of this machine understand every safety message. Replace operator's manual and safety labels immediately if missing or damaged.



T133556 –UN–24AUG00

TX03679,00016F9 –19–03JAN07–1/1

Operate Only If Qualified

Do not operate this machine unless the operator's manual has been read carefully, and you have been qualified by supervised training and instruction.

Operator should be familiar with the job site and surroundings before operating. Try all controls and machine functions with the machine in an open area before starting to work.

Know and observe all safety rules that may apply to every work situation and work site.

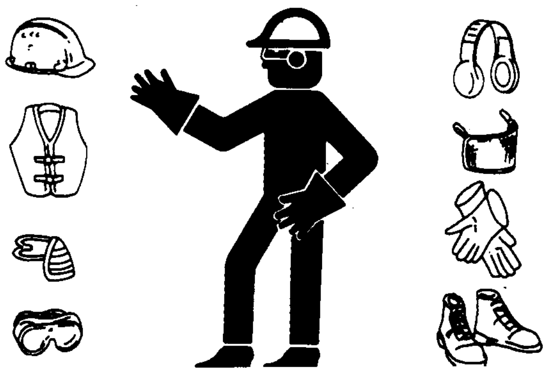
TX03679,00016FA –19–03JAN07–1/1

Wear Protective Equipment

Guard against injury from flying pieces of metal or debris; wear goggles or safety glasses.

Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear suitable hearing protection such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.



TS206 –UN–23AUG88

TX03679,00016D0 –19–03JAN07–1/1

Avoid Unauthorized Machine Modifications

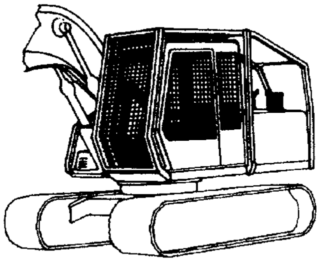
John Deere recommends using only genuine John Deere replacement parts to ensure machine performance. Never substitute genuine John Deere parts with alternate parts not intended for the application as these can create hazardous situations or hazardous performance. Non-John Deere Parts, or any damage or failures resulting from their use are not covered by any John Deere warranty.

Modifications of this machine, or addition of unapproved products or attachments, may affect machine stability or reliability, and may create a hazard for the operator or others near the machine. The installer of any modification which may affect the electronic controls of this machine is responsible for establishing that the modification does not adversely affect the machine or its performance.

Always contact an authorized dealer before making machine modifications that change the intended use, weight or balance of the machine, or that alter machine controls, performance or reliability.

AM40430,00000A9 –19–17JUL07–1/1

Add Cab Guarding for Special Uses



T133733 –UN–15SEP00

Special work situations or machine attachments may create an environment with falling or flying objects. Working near an overhead bank, doing demolition work, using a hydraulic hammer, or working in a wooded area, for example, may require added guarding to protect the operator.

Additional Level II FOPS (falling object protective structures) and special screens or guarding should be installed when falling or flying objects may enter or damage the machine. Contact your authorized dealer for information on devices intended to provide protection in special work situations.

DW90712,0000056 –19–03FEB06–1/1

Inspect Machine

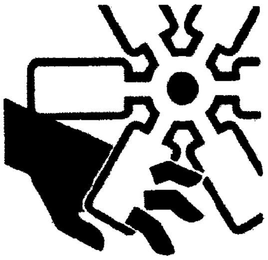
T6607AQ –UN–18OCT88

Inspect machine carefully each day by walking around it before starting.

Keep all guards and shields in good condition and properly installed. Fix damage and replace worn or broken parts immediately. Pay special attention to hydraulic hoses and electrical wiring.

TX03679,0001734 –19–03JAN07–1/1

Stay Clear of Moving Parts



T133592 –UN–12SEP01

Entanglements in moving parts can cause serious injury.

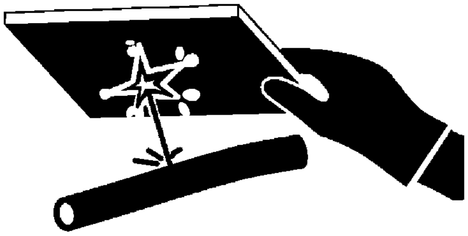
Stop engine before examining, adjusting or maintaining any part of machine with moving parts.

Keep guards and shields in place. Replace any guard or shield that has been removed for access as soon as service or repair is complete.

TX03679,00016D2 –19–03JAN07–1/1

Avoid High-Pressure Oils


T133509 –UN–17MAR06


T133840 –UN–20SEP00

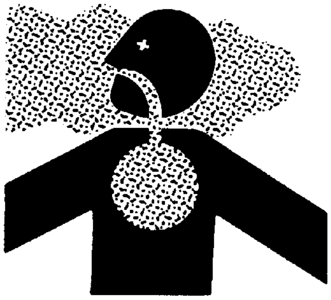
This machine uses a high-pressure hydraulic system. Escaping oil under pressure can penetrate the skin causing serious injury.

Never search for leaks with your hands. Protect hands. Use a piece of cardboard to find location of escaping oil. Stop engine and relieve pressure before disconnecting lines or working on hydraulic system.

If hydraulic oil penetrates your skin, see a doctor immediately. Injected oil must be removed surgically within hours or gangrene may result. Contact a knowledgeable medical source or the Deere & Company Medical Department in Moline, Illinois, U.S.A.

TX03679,00016D3 –19–10JAN07–1/1

Beware of Exhaust Fumes


T133546 –UN–24AUG00

Prevent asphyxiation. Engine exhaust fumes can cause sickness or death.

If you must operate in an enclosed space, provide adequate ventilation. Use an exhaust pipe extension to remove the exhaust fumes or open doors and windows to bring outside air into the area.

TX03679,00016D4 –19–03JAN07–1/1

Prevent Fires

Handle Fuel Safely: Store flammable fluids away from fire hazards. Never refuel machine while smoking or when near sparks or flame.

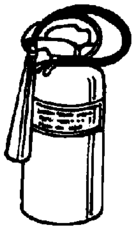
Clean Machine Regularly: Keep trash, debris, grease and oil from accumulating in engine compartment, around fuel lines, hydraulic lines, exhaust components, and electrical wiring. Never store oily rags or flammable materials inside a machine compartment.

Maintain Hoses and Wiring: Replace hydraulic hoses immediately if they begin to leak, and clean up any oil spills. Examine electrical wiring and connectors frequently for damage.

Keep A Fire Extinguisher Available: Always keep a multipurpose fire extinguisher on or near the machine. Know how to use extinguisher properly.

T133552 –UN–14SEP00

T133553 –UN–07SEP00



T133554 –UN–07SEP00

TX03679,00016F5 –19–14APR08–1/1

Prevent Battery Explosions

Battery gas can explode. Keep sparks, lighted matches, and open flame away from the top of battery.

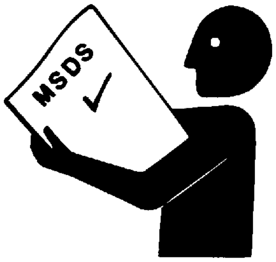
Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Do not charge a frozen battery; it may explode. Warm battery to 16°C (60°F).

TS204 –UN–23AUG88

TX03679,000174A –19–03JAN07–1/1

Handle Chemical Products Safely



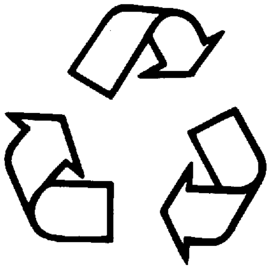
T133580 –UN–25AUG00

Exposure to hazardous chemicals can cause serious injury. Under certain conditions, lubricants, coolants, paints and adhesives used with this machine may be hazardous.

If uncertain about safe handling or use of these chemical products, contact your authorized dealer for a Material Safety Data Sheet (MSDS) or go to internet website http://www.jdmsds.com. The MSDS describes physical and health hazards, safe use procedures, and emergency response techniques for chemical substances. Follow MSDS recommendations to handle chemical products safely.

TX03679,00016D7 –19–03JAN07–1/1

Dispose of Waste Properly



T133567 –UN–25AUG00

Improper disposal of waste can threaten the environment. Fuel, oils, coolants, filters and batteries used with this machine may be harmful if not disposed of properly.

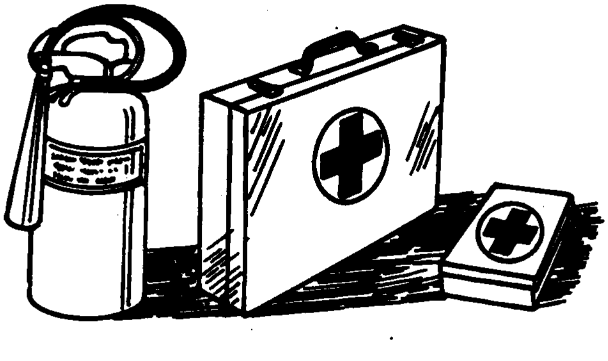
Never pour waste onto the ground, down a drain, or into any water source.

Air conditioning refrigerants can damage the atmosphere. Government regulations may require using a certified service center to recover and recycle used refrigerants.

If uncertain about the safe disposal of waste, contact your local environmental or recycling center or your authorized dealer for more information.

TX03679,0001733 –19–03JAN07–1/1

Prepare for Emergencies



TS291 –UN–23AUG88

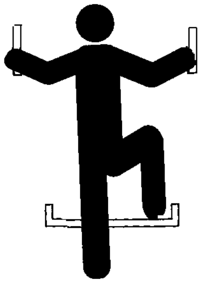
Be prepared if an emergency occurs or a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.

TX03679,000174B –19–03JAN07–1/1

Use Steps and Handholds Correctly


T133468 –UN–30AUG00

Prevent falls by facing the machine when getting on and off. Maintain 3-point contact with steps and handrails. Never use machine controls as handholds.

Use extra care when mud, snow, or moisture present slippery conditions. Keep steps clean and free of grease or oil. Never jump when exiting machine. Never mount or dismount a moving machine.

TX03679,00016F2 –19–15MAR07–1/1

Start Only From Operator's Seat


T133715 –UN–07SEP00

Avoid unexpected machine movement. Before starting engine, sit in operator's seat. Ensure park lock lever is in "lock" position.

Never attempt to start engine from the ground or tracks. Do not attempt to start engine by shorting across the starter solenoid terminals.

TX03768,0000B71 –19–28FEB06–1/1

Use and Maintain Seat Belt

T133716 –19–14SEP00

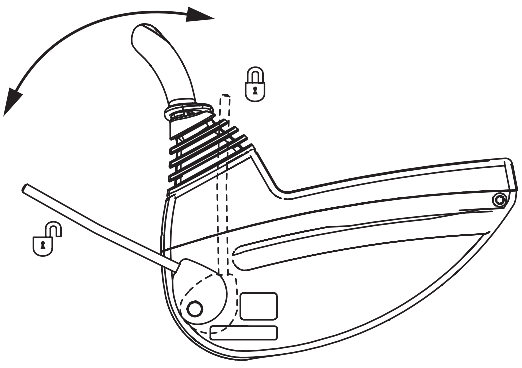
Use seat belt when operating machine. Remember to fasten seat belt when loading and unloading from trucks and during other uses.

Examine seat belt frequently. Be sure webbing is not cut or torn. Replace seat belt immediately if any part is damaged or does not function properly.

The complete seat belt assembly should be replaced every 3 years, regardless of appearance.

TX03679,00016DD –19–20MAR07–1/1

Prevent Unintended Machine Movement


T216779 –UN–22NOV05

Be careful not to accidentally actuate control levers when co-workers are present. Pull pilot shutoff lever to locked position during work interruptions. Pull pilot shutoff lever to locked position, and stop engine before allowing anyone to approach machine.

Always lower work equipment to the ground, and pull pilot shutoff lever to locked position before standing up or leaving the operator’s seat. Stop engine before exiting.

DW90712,000005B –19–03FEB06–1/1

Avoid Work Site Hazards

Avoid contact with gas lines, buried cables and water lines. Call utility line location services to identify all underground utilities before you dig.

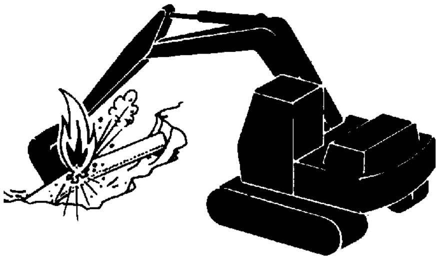
Prepare work site properly. Avoid operating near structures or objects that could fall onto the machine. Clear away debris that could move unexpectedly if run over.

Avoid boom or arm contact with overhead obstacles or overhead electrical lines. Never move any part of machine or load closer than 3 m (10 ft) plus twice the line insulator length to overhead wires.

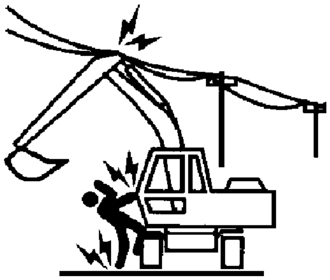
Keep bystanders clear at all times. Keep bystanders away from raised booms, attachments, and unsupported loads. Avoid swinging or raising booms, attachments, or loads over or near personnel. Use barricades or a signal person to keep vehicles and pedestrians away. Use a signal person if moving machine in congested areas or where visibility is restricted. Always keep signal person in view. Coordinate hand signals before starting machine.

Operate only on solid footing with strength sufficient to support machine. When working close to an excavation, position travel motors away from the hole.

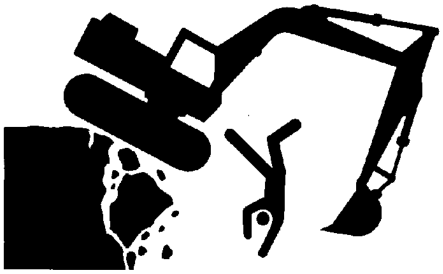
Reduce machine speed when operating with tool on or near ground when obstacles may be hidden (e.g., during snow removal or clearing mud, dirt, etc). At high speeds, hitting obstacles (rocks, uneven concrete or manholes) can cause a sudden stop. Always wear your seat belt.



T134986 –UN–31OCT00



T133650 –UN–27SEP00



T133549 –UN–24AUG00

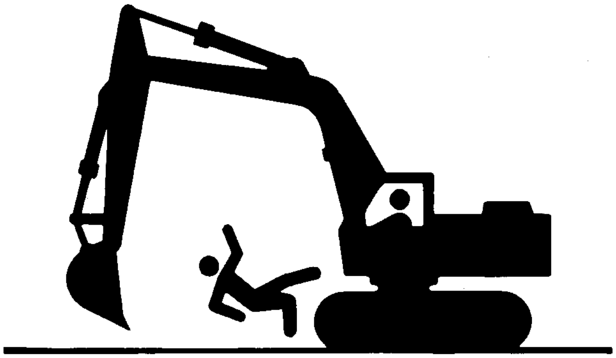
TX03679,0001748 –19–16APR08–1/1

Keep Riders Off Machine

Only allow operator on machine.

Riders are subject to injury. They may fall from machine, be caught between machine parts, or be struck by foreign objects.

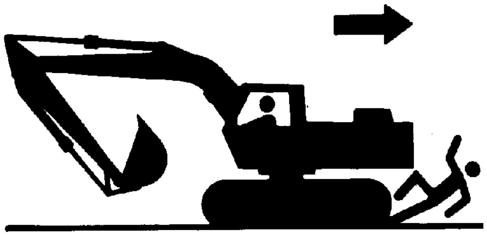
Riders may obstruct operator's view or impair his ability to operate machine safely.



T7273AH –UN–08JUN90

TX03679,0001726 –19–03JAN07–1/1

Avoid Backover Accidents



T133548 –UN–24AUG00

Before moving machine, be sure all persons are clear of both travel and swing paths. Turn around and look directly for best visibility. Use mirrors to assist in checking all around machine. Keep windows and mirrors clean, adjusted, and in good repair.

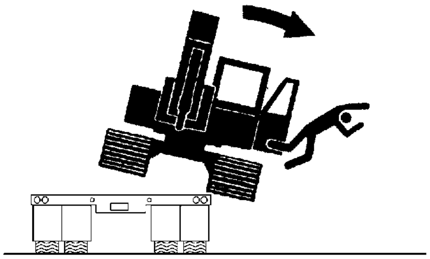
Be certain travel alarm is working properly.

Use a signal person when backing if view is obstructed or when in close quarters. Keep signal person in view at all times. Use prearranged hand signals to communicate.

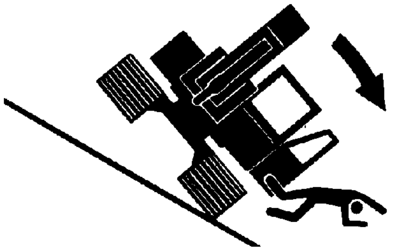
TX03679,00016F3 –19–03JAN07–1/1

Avoid Machine Tip Over

T133716 –19–14SEP00



T133545 –UN–15SEP00



T133803 –UN–27SEP00

Use seat belt at all times.

Do not jump if the machine tips. You will be unlikely to jump clear and the machine may crush you.

Load and unload from trucks or trailers carefully. Be sure truck is wide enough and on a firm level surface. Use loading ramps. Properly attach ramps to truck bed. Avoid trucks with steel beds because tracks slip more easily on steel.

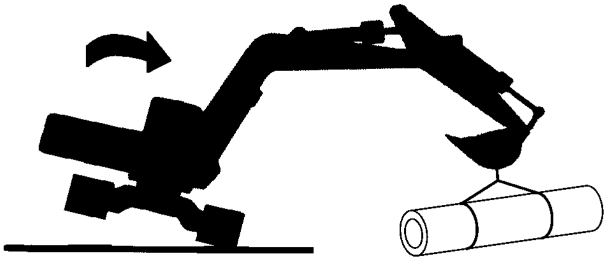
Be careful on slopes. Use extra care on soft, rocky or frozen ground. Machine may slip sideways in these conditions. When traveling up or down slopes, keep the bucket on uphill side and just above ground level.

Be careful with heavy loads. Using oversize buckets or lifting heavy objects reduces machine stability. Extending a heavy load or swinging it over side of undercarriage may cause machine to tip.

Ensure solid footing. Use extra care when operating near banks or excavations that may cave-in and cause machine to tip or fall.

TX03679,00016DF –19–24JAN07–1/1

Use Special Care When Lifting Objects



T133839 –UN–27SEP00

Never use this machine to lift people.

Never lift a load above another person. Keep bystanders clear of all areas where a load might fall if it breaks free. Do not leave the seat when there is a raised load.

Do not exceed lift capacity limits posted on machine and in this manual. Extending heavy loads too far or swinging over undercarriage side may cause machine to tip over.

Use proper rigging to attach and stabilize loads. Be sure slings or chains have adequate capacity and are in good condition. Use tether lines to guide loads and prearranged hand signals to communicate with co-workers.

TX03679,00016E1 –19–03JAN07–1/1

Add and Operate Attachments Safely

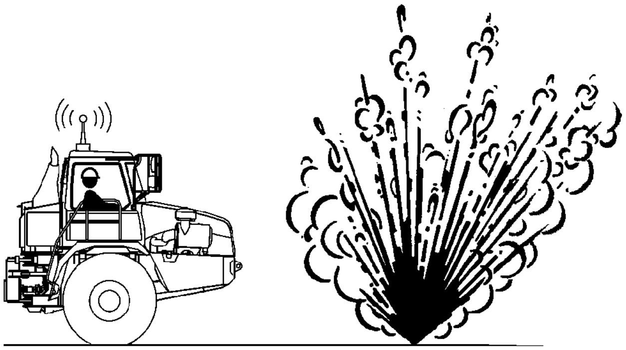
Always verify compatibility of attachments by contacting your authorized dealer. Adding unapproved attachments may affect machine stability or reliability, and may create a hazard for others near the machine.

Ensure that a qualified person is involved in attachment installation. Add guards to machine if operator protection is required or recommended. Verify that all connections are secure and attachment responds properly to controls.

Carefully read attachment manual and follow all instructions and warnings. In an area free of bystanders and obstructions, carefully operate attachment to learn its characteristics and range of motion.

TX03679,00016F0 –19–24JAN07–1/1

Prevent Unintended Detonation of Explosive Devices



TX1023216 –UN–07MAY07

Avoid serious injury or death from an explosion hazard. Deactivate all cellular or radio frequency devices on equipment stored or operating in an area, such as a blasting zone, where the use of radio transmitting devices are prohibited.

VD76477,0001543 –19–08JAN08–1/1

Park and Prepare for Service Safely

Warn others of service work. Always park and prepare your machine for service or repair properly.

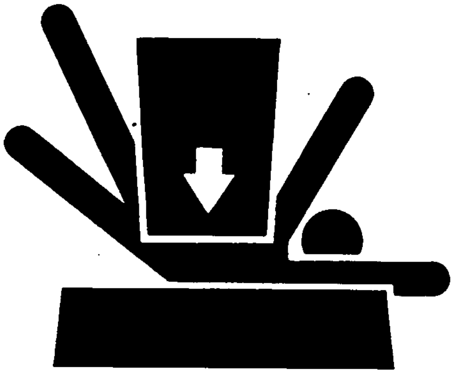
- Park machine on a level surface and lower equipment to the ground.
- Place pilot control shutoff lever in “lock” position. Stop engine and remove key.
- Attach a “Do Not Operate” tag in an obvious place in the operator’s station.

Securely support machine or equipment before working under it.

- Do not support machine with boom, arm, or other hydraulically actuated attachments.
- Do not support machine with cinder blocks or wooden pieces that may crumble or crush.
- Do not support machine with a single jack or other devices that may slip out of place.

Understand service procedures before beginning repairs. Keep service area clean and dry. Use two people whenever the engine must be running for service work.

T133332 –19–14DEC01



TS229 –UN–23AUG88

TX03679,00016E9 –19–24JAN07–1/1

Service Cooling System Safely

Explosive release of fluids from pressurized cooling system can cause serious burns.

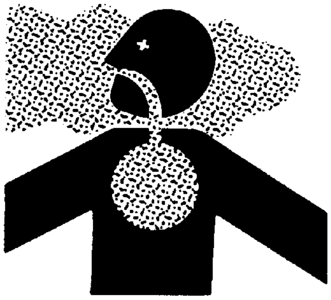
Do not service radiator through the radiator cap. Only fill through the surge tank filler cap.

Shut off engine. Only remove surge tank filler cap when cool enough to touch with bare hands. Slowly loosen cap to relieve pressure before removing completely.

TS281 –UN–23AUG88

DW90712,00003B1 –19–27NOV06–1/1

Remove Paint Before Welding or Heating



T133546 –UN–24AUG00

Hazardous fumes can be generated when paint is heated by welding or using a torch. Dust from sanding or grinding paint can also be hazardous.

Remove paint to at least 76 mm (3 in.) from area to be heated. Wear an approved respirator when sanding or grinding paint. If a solvent or paint stripper is used, wash area with soap and water. Remove solvent or paint stripper containers from work area and allow fumes to disperse at least 15 minutes before welding or heating.

Work outside or in a well-ventilated area. Dispose of waste, paint and solvents properly.

TX03679,0001732 –19–28FEB06–1/1

Make Welding Repairs Safely

T133547 –UN–31AUG00

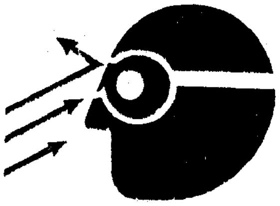
IMPORTANT: Disable electrical power before welding. Turn off main battery switch or disconnect positive battery cable. Separate harness connectors to engine and vehicle microprocessors.

Avoid welding or heating near pressurized fluid lines. Flammable spray may result and cause severe burns if pressurized lines fail as a result of heating. Do not let heat go beyond work area to nearby pressurized lines.

Remove paint properly. Do not inhale paint dust or fumes. Use a qualified welding technician for structural repairs. Make sure there is good ventilation. Wear eye protection and protective equipment when welding.

TX03679,00016D5 –19–25APR08–1/1

Drive Metal Pins Safely



T133738 –UN–14SEP00

Always wear protective goggles or safety glasses and other protective equipment before striking hardened parts. Hammering hardened metal parts such as pins and bucket teeth may dislodge chips at high velocity.

Use a soft hammer or a brass bar between hammer and object to prevent chipping.

TX03679,0001745 –19–03JAN07–1/1

Section 9001
Diagnostics

Contents

Group 10—Main Controller (MCF) Diagnostic Trouble Codes

	Page
Main Controller (MCF) Diagnostic Trouble Codes	9001-10-1
11000.02 — Abnormal EEPROM	9001-10-1
Controller Hardware Diagnostics	9001-10-1
11001.02 — Abnormal RAM	9001-10-2
Controller Hardware Diagnostics	9001-10-2
11002.02 — Abnormal A/D Conversion	9001-10-3
Controller Hardware Diagnostics	9001-10-3
11003.03 — Abnormal Sensor Voltage	9001-10-4
Harness diagnostics	9001-10-4
11004.02 — CAN Communication Error	9001-10-5
Controller Area Network (CAN) Diagnostics	9001-10-5
11101.03 — Engine Speed Dial Sensor Circuit Voltage High Input	9001-10-12
Engine Speed Dial Diagnostics	9001-10-12
11101.04 — Engine Speed Dial Sensor Circuit Voltage Low Input	9001-10-14
Engine Speed Dial Diagnostics	9001-10-14
11200.03 — Pump 1 Delivery Pressure Sensor Circuit Voltage High	9001-10-16
Pump 1 Delivery Pressure Sensor Diagnostics	9001-10-16
11200.04 — Pump 1 Delivery Pressure Sensor Voltage Low	9001-10-17
Pump 1 Delivery Pressure Sensor Diagnostics	9001-10-18
11202.03 — Pump 2 Delivery Pressure Sensor Circuit Voltage High	9001-10-19
Pump 2 Delivery Pressure Sensor Diagnostics	9001-10-20
11202.04 — Pump 2 Delivery Pressure Sensor Voltage Low	9001-10-21
Pump 2 Delivery Pressure Sensor Diagnostics	9001-10-22
11301.03 — Swing Pilot Pressure Sensor Circuit Voltage High	9001-10-23
Swing pilot pressure sensor diagnostics	9001-10-24
11301.04 — Swing Pilot Pressure Sensor Circuit Voltage Low	9001-10-25
Swing Pilot Pressure Sensor Diagnostics	9001-10-26
11302.03 — Boom Raise Pilot Pressure Sensor Circuit Voltage High	9001-10-27
Boom Up Pilot Pressure Sensor Diagnostics	9001-10-28
11302.04 — Boom Raise Pilot Pressure Sensor Circuit Voltage Low	9001-10-29
Boom Up Pilot Pressure Sensor Diagnostics	9001-10-30
11303.03 — Arm Roll-in Pilot Pressure Sensor Circuit Voltage High	9001-10-31
Arm In Pilot Pressure Sensor Diagnostics	9001-10-32
11303.04 — Arm Roll-in Pilot Pressure Sensor Circuit Voltage Low	9001-10-33
Arm In Pilot Pressure Sensor Diagnostics	9001-10-34
11400.03 — Pump 2 (5-Spool) Control Solenoid Valve Feedback Current High	9001-10-35
Pump 2 (5-Spool) Control Solenoid Diagnostics	9001-10-36
11400.04 — Pump 2 (5-Spool) Control Solenoid Valve Feedback Current Low	9001-10-37
Pump 2 (5-Spool) Control Solenoid Diagnostics	9001-10-37
11402.03 — Boom Flow Rate Solenoid (SF) Valve Feedback Current High	9001-10-38
Boom Flow Rate Solenoid (SF) Diagnostics	9001-10-38
11402.04 — Boom Flow Rate Solenoid (SF) Valve Feedback Current Low	9001-10-39
Boom Flow Rate Solenoid (SF) Diagnostics	9001-10-39
11404.03 — Power Dig Solenoid (SG) Valve Feedback Current High	9001-10-40
Power Dig Solenoid (SG) Diagnostics	9001-10-40
11404.04 — Power Dig Solenoid (SG) Valve Feedback Current Low	9001-10-41
Power Dig Solenoid (SG) Diagnostics	9001-10-41
11405.03 — Travel Speed Solenoid (SI) Valve Current Feedback High	9001-10-42
Travel Speed Solenoid (SI) Diagnostics	9001-10-42
11405.04 — Travel Speed Solenoid (SI) Valve Current Feedback Low	9001-10-43
Travel Speed Solenoid (SI) Diagnostics	9001-10-43

Continued on next page

Page

11410.03 — Pump 1 (4-Spool) Control Solenoid Valve Feedback Current High. 9001-10-44
Pump 1 (4-Spool) Control Solenoid Diagnostics 9001-10-44
11410.04 — Pump 1 (4-Spool) Control Solenoid Valve Feedback Current Low 9001-10-45
Pump 1 (4-Spool) Control Solenoid Diagnostics 9001-10-45
11412.03 — Hydraulic Fan Pump Control Solenoid Valve Feedback Current High. 9001-10-46
Hydraulic Fan Pump Control Solenoid Diagnostics 9001-10-47
11412.04 — Hydraulic Fan Pump Solenoid Valve Feedback Current Low 9001-10-47
Hydraulic Fan Pump Control Solenoid Diagnostics 9001-10-48
11802.03 — Boom Bottom Pressure Sensor Circuit Voltage High. 9001-10-48
Boom Bottom Pressure Sensor Diagnostics 9001-10-49
11802.04 — Boom Bottom Pressure Sensor Circuit Voltage Low 9001-10-50
Boom Bottom Pressure Sensor Diagnostics 9001-10-51
11901.03 — Hydraulic Oil Temperature Sensor Circuit Voltage High. 9001-10-52
Hydraulic Oil Temperature Sensor Diagnostics 9001-10-53
11901.04 — Hydraulic Oil Temperature Sensor Circuit Voltage Low 9001-10-54
Hydraulic Oil Temperature Sensor Diagnostics 9001-10-55
11910.02 — Actual Engine Speed Message Error. 9001-10-56
Controller Area Network (CAN) Diagnostics 9001-10-57
11911.02 — Security Signal Message Error 9001-10-64
Controller Area Network (CAN) Diagnostics 9001-10-64
11914.02 — Radiator Water Temperature Message Error. 9001-10-71
Controller Area Network (CAN) Diagnostics 9001-10-71
11918.02 — Work Mode Message Error . . .9001-10-78
Controller Area Network (CAN) Diagnostics 9001-10-78
11920.02 — Fuel Flow Rate Message Error 9001-10-85

Page

Controller Area Network (CAN) Diagnostics 9001-10-85
11976.03 — Auxiliary Valve 2 Feedback Current High 9001-10-92
11976.04 — Auxiliary Valve 2 Feedback Current Low. 9001-10-92
11977.03 — Auxiliary Valve 1 Feedback Current High 9001-10-93
11977.04 — Auxiliary Valve 1 Feedback Current Low. 9001-10-93
11980.03 — ATT Relief Change Valve Feedback Current High 9001-10-93
11980.04 — ATT Relief Change Valve Feedback Current Low. 9001-10-93
11981.03 — Fan Reversing Solenoid Valve 2 Feedback Current High. 9001-10-94
Fan Reversing Solenoid 2 Diagnostics 9001-10-94
11981.04 — Fan Reversing Solenoid Valve 2 Feedback Current Low 9001-10-94
Fan Reversing Solenoid 2 Diagnostics 9001-10-94
11982.03 — Fan Reversing Solenoid Valve 1 Feedback Current High. 9001-10-95
Fan Reversing Solenoid 1 Diagnostics 9001-10-95
11982.04 — Fan Reversing Solenoid Valve 1 Feedback Current Low 9001-10-96
Fan Reversing Solenoid 1 Diagnostics 9001-10-96
11983.02 — Intake Air Temperature Message Error. 9001-10-96
Controller Area Network (CAN) Diagnostics 9001-10-96
11984.02 — Boost Temperature Message Error 9001-10-104
Controller Area Network (CAN) Diagnostics 9001-10-104
11989.03 — Boom Mode Solenoid (SC) Valve Feedback Current High 9001-10-111
Boom Mode Solenoid (SC) Diagnostics. . .9001-10-111
11989.04 — Boom Mode Solenoid (SC) Valve Feedback Current Low. 9001-10-112
Boom Mode Solenoid (SC) Diagnostics. . .9001-10-112
11991.03 — Travel Right Pilot Pressure Sensor Circuit Voltage High. 9001-10-113
Travel Right Pilot Pressure Sensor Diagnostics 9001-10-113
11991.04 — Travel Right Pilot Pressure Sensor Circuit Voltage Low 9001-10-114
Travel Right Pilot Pressure Sensor Diagnostics 9001-10-115
11992.03 — Pump 2 (5-Spool) Control Pressure Sensor Circuit Voltage High. 9001-10-116

Continued on next page

Page

Pump 2 (5-Spool) Control Pressure Sensor Diagnostics 9001-10-117

11992.04 — Pump 2 (5-Spool) Control Pressure Sensor Circuit Voltage Low. . .9001-10-119

Pump 2 (5-Spool) Control Pressure Sensor Diagnostics 9001-10-119

11993.03 — Travel Left Pilot Pressure Sensor Circuit Voltage High. 9001-10-121

Travel Left Pilot Pressure Sensor Diagnostics 9001-10-121

11993.04 — Left Travel Pilot Pressure Sensor Circuit Low Input 9001-10-122

Travel Left Pilot Pressure Sensor Diagnostics 9001-10-123

11994.03 — Pump 1 (4-Spool) Control Pressure Sensor Circuit Voltage High. 9001-10-124

Pump 1 (4-Spool) Control Pressure Sensor Diagnostics 9001-10-125

11994.04 — Pump 1 (4-Spool) Control Pressure Sensor Circuit Voltage Low. . .9001-10-126

Pump 1 (4-Spool) Control Pressure Sensor Diagnostics 9001-10-127

11995.03 — Arm Roll-Out Pilot Pressure Sensor Circuit Voltage High. 9001-10-128

Arm Out Pilot Pressure Sensor Diagnostics 9001-10-129

11995.04 — Arm Roll-Out Pilot Pressure Sensor Circuit Low Input 9001-10-130

Arm Out Pilot Pressure Sensor Diagnostics 9001-10-131

11997.03 — Bucket Dump Pilot Pressure Sensor Circuit Voltage High. 9001-10-132

Bucket Dump Pilot Pressure Sensor Diagnostics 9001-10-133

11997.04 — Bucket Dump Pilot Pressure Sensor Circuit Voltage Low 9001-10-134

Bucket Dump Pilot Pressure Sensor Diagnostics 9001-10-135

11998.03 — Boom Down Pilot Pressure Sensor Circuit Voltage High. 9001-10-136

Boom Down Pilot Pressure Sensor Diagnostics 9001-10-137

11998.04 — Boom Down Pilot Pressure Sensor Circuit Voltage Low 9001-10-138

Boom Down Pilot Pressure Sensor Diagnostics 9001-10-139

11999.03 — Bucket Curl Pilot Pressure Sensor Circuit Voltage High. 9001-10-140

Bucket Curl Pilot Pressure Sensor Diagnostics 9001-10-141

11999.04 — Bucket Curl Pilot Pressure Sensor Circuit Voltage Low 9001-10-142

Bucket Curl Pilot Pressure Sensor Diagnostics 9001-10-143

Group 20—Engine Control Module (ECM) Diagnostic Trouble Codes

Engine Control Module (ECM) Diagnostic Trouble Codes. 9001-20-1

91.02 — Accelerator Sensor 1-2 Comparison (P1271) 9001-20-1

100.03 — Engine Oil Pressure Sensor Voltage Low (P0522). 9001-20-2

100.04 — Engine Oil Pressure Sensor Voltage High (P0523) 9001-20-2

102.03 — Boost Pressure Sensor Voltage Low (P0237) 9001-20-2

102.04 — Boost Pressure Sensor Voltage High (P0238). 9001-20-2

105.03 — Boost Temperature Sensor Voltage High (P1113). 9001-20-3

105.04 — Boost Temperature Sensor Voltage Low (P1112) 9001-20-3

108.03 — Barometric Pressure Sensor Voltage Low (P0107). 9001-20-3

108.04 — Barometric Pressure Sensor Voltage High (P0108) 9001-20-3

110.03 — Engine Coolant Temperature Sensor Voltage High (P0118) 9001-20-4

110.04 — Engine Coolant Temperature Sensor Voltage Low (P0117). 9001-20-4

157.00 — Common Rail Pressure—First Stage (P088) 9001-20-4

157.00 — Common Rail Pressure—Second Stage (P088) 9001-20-4

157.02 — Common Rail Pressure High (P0089) 9001-20-5

157.03 — Common Rail Pressure Sensor Voltage High (P0193) 9001-20-5

157.03 — Common Rail Pressure Sensor Voltage Low (P0192). 9001-20-5

172.03 — Intake Air Temperature Sensor Voltage High (P0113) 9001-20-6

172.04 — Intake Air Temperature Sensor Voltage Low (P0112). 9001-20-6

174.03 — Fuel Temperature Sensor Voltage High (P0183). 9001-20-6

174.04 — Fuel Temperature Sensor Voltage Low (P0182) 9001-20-6

190.00 — Engine Overspeed (P0219). 9001-20-7

628.02 — ROM Malfunction (P0601). 9001-20-7

633.07 — Pressure Limiter Open (P0601). . .9001-20-7

Continued on next page

Page

636.02 — Camshaft Position Sensor (G-Sensor) Signal Missing (P0340) 9001-20-7
636.02 — Camshaft Position Sensor (G-Sensor) Signal Mismatch (P0341). 9001-20-8
636.07 — Camshaft Position Sensor (G-Sensor) out of Phase (P1345) 9001-20-8
639.02 — CAN Communication Error (U2104) 9001-20-8
639.03 — CAN Timeout (U2106) 9001-20-8
651.03 — Open Circuit in Injection Nozzle #1 (P0201) 9001-20-9
652.03 — Open Circuit in Injection Nozzle #2 (P0202) 9001-20-9
653.03 — Open Circuit in Injection Nozzle #3 (P0203) 9001-20-9
654.03 — Open Circuit in Injection Nozzle #4 (P0204) 9001-20-9
655.03 — Open Circuit in Injection Nozzle #5 (P0205) 9001-20-10
656.03 — Open Circuit in Injection Nozzle #6 (P0206) 9001-20-10
723.02 — Crankshaft Position Sensor Signal Missing (P0335). 9001-20-10
723.02 — Crankshaft Sensor Mismatch (P0336) 9001-20-10
987.03 — Check Engine Lamp Malfunction (P0650). 9001-20-11
1077.02 — CPU Fault Malfunction (P0606) 9001-20-11
1079.02 — 5 Volt Power Supply #1 Malfunction (P1631). 9001-20-11
1080.02 — 5 Volt Power Supply #2 Malfunction (P1632). 9001-20-11
1239.01 — No Pump Pressure—First Stage (P1094) 9001-20-12
1240.01 — No Pump Pressure Feed—Second Stage (P1093) 9001-20-12
1347.00 — PCV #1 Open Circuit or Short to Ground (P0092). 9001-20-12
1347.04 — PCV #1 Short to Power (P0091) 9001-20-12
1348.00 — PCV # 2 Open Circuit or Short to Ground (P1291). 9001-20-13
1348.04 — PCV #2 Short to Power (P1292) 9001-20-13
1485.02 — Engine Control Module Relay Malfunction (P1625). 9001-20-13
10001.03 — EGR Position Sensor Malfunction (P0487). 9001-20-14
10002.02 — EGR Valve Control Malfunction (P0488) 9001-20-14
10003.02 — Injection Nozzle Common #1 Malfunction (P1261). 9001-20-14

Page

10004.02 — Injection Nozzle Common #2 Malfunction (P1262). 9001-20-14
10005.01 — Charge Circuit Malfunction—Bank 1 (P0611) 9001-20-15
10006.01 — Charge Circuit Malfunction—Bank 2 (P0612) 9001-20-15
10007.02 — CPU Monitoring IC Malfunction (P0606) 9001-20-15
10008.02 — A/D Conversion Malfunction (P1630) 9001-20-15
10009.02 — 5 Volt Power Supply #3 Malfunction (P1633). 9001-20-16
10010.02 — 5 Volt Power Supply #4 Malfunction (P1634). 9001-20-16
10011.02 — 5 Volt Power Supply #5 Malfunction (P1635). 9001-20-16
10013.02 — EEPROM Malfunction (P0603) 9001-20-16

Group 30—Information Controller (ICF) Diagnostic Trouble Codes

Information Controller (ICF) Diagnostic Trouble Codes 9001-30-1
14000.02 — Abnormal CAN Communication 9001-30-1
14001.02 — ICF: Flash Memory: Read/Write Error .9001-30-1
14002.02 — ICF: External RAM: Read/Write Error .9001-30-2
14003.02 — ICF: EEPROM: Sum Check Error 9001-30-2
14006.02 — ICF: Satellite Communication Terminal: Communication Error 9001-30-2
14008.02 — ICF: Abnormal Internal RAM . . .9001-30-2
14100.02 — Satellite Communication Terminal: Abnormal EEPROM 9001-30-3
14101.02 — Satellite Communication Terminal: Abnormal IB/OB Queue 9001-30-3
14102.02 — Satellite Communication Terminal: Abnormal Local Loop Back 9001-30-3
14103.02 — Satellite Communication Terminal: The satellite is not found. 9001-30-3
14104.02 — Satellite Communication Terminal: Fail 1 of Remote Loop Back. . . .9001-30-4
14105.02 — Satellite Communication Terminal: Fail 2 of Remote Loop Back. . . .9001-30-4
14106.02 — Satellite Communication Terminal: Sending and receiving data are mismatched 9001-30-4

Continued on next page

Group 40—Air Conditioner Controller (ACF) Diagnostic Trouble Codes

Page

Air Conditioner Controller (ACF) Diagnostic Trouble Codes 9001-40-1
E11 — Cab Air Temperature Sensor Open Circuit 9001-40-1
Harness Diagnostics 9001-40-1
E12 — Cab Air Temperature Sensor Short Circuit 9001-40-2
Harness Diagnostics 9001-40-2
E13 — Ambient Air Temperature Sensor Open Circuit 9001-40-2
Harness Diagnostics 9001-40-3
E14 — Ambient Air Temperature Sensor Short Circuit. 9001-40-3
Harness Diagnostics 9001-40-3
E15 — Coolant Temperature Sensor Open Circuit 9001-40-4
Harness Diagnostics 9001-40-4
E16 — Coolant Temperature Sensor Short Circuit. 9001-40-5
Harness Diagnostics 9001-40-5
E18 — Solar Sensor Abnormal 9001-40-6
Harness Diagnostics 9001-40-6
E21 — Freeze Control Switch Open Circuit 9001-40-7
Harness Diagnostics 9001-40-7
E22 — Freeze Control Switch Short Circuit 9001-40-8
Harness Diagnostics 9001-40-8
E43 — Abnormal Damper 9001-40-9
Harness Diagnostics 9001-40-9
E44 — Abnormal Damper 9001-40-9
Harness Diagnostics 9001-40-10
E45 — Abnormal Damper 9001-40-10
Harness Diagnostics 9001-40-10
E51 — Abnormal High/Low Pressure Switch 9001-40-11
Harness Diagnostics 9001-40-11

Group 50—Monitor Controller (MON) Diagnostic Trouble Codes

Monitor Controller (MON) Diagnostic Trouble Codes 9001-50-1
13303.02 — Abnormal Thermister Temperature 9001-50-1
Monitor Temperature Diagnostics 9001-50-1
13304.02 — Abnormal REG Input H Level 9001-50-2
Alternator Output Diagnostics 9001-50-2
13306.02 — Abnormal EEPROM 9001-50-3
Information Controller Diagnostics. 9001-50-3
13308.02 — Abnormal CAN Communication 9001-50-3
Controller Area Network (CAN) Diagnostics 9001-50-4
13310.02 — Shorted circuit in Coolant Temperature Sensor 9001-50-11
Coolant Temperature Sensor Diagnostics 9001-50-11
13311.02 — Shorted circuit in Fuel Level Sensor. 9001-50-12
Fuel Level Sensor Diagnostics 9001-50-12
13311.04 — Open circuit in Fuel Level Sensor. 9001-50-13
Fuel Level Sensor Diagnostics 9001-50-13

Main Controller (MCF) Diagnostic Trouble Codes

The main controller (MCF) diagnostic trouble codes may be viewed on the monitor, by using Dr. ZX, or by using SERVICE ADVISOR™. See the following procedures for viewing the main controller diagnostic trouble codes.

- See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.)
- See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application. (Group 9015-20.)
- See Reading Diagnostic Trouble Codes With Dr. ZX. (Group 9015-20.)

SERVICE ADVISOR is a trademark of Deere & Company

LD30992,00001CC –19–10DEC05–1/1

11000.02 — Abnormal EEPROM

MS12501,0000046 –19–14JAN06–1/1

Controller Hardware Diagnostics

– – –1/1

❶ **Code Check**	Clear and re-check diagnostic trouble codes. Is DTC 11000.02-Abnormal EEPROM still present?	**YES:** Code is still present and machine does not operate. Replace main controller (MCF). See Main Controller (MCF) Remove and Install. (Group 9015-20). **YES:** Code is still present but machine is still operable. Go to Machine Function Check. **NO:** Main controller (MCF) is OK.

– – –1/1

❷ **Machine Function Check**	Is operation of machine normal? See Operational Checkout Procedure. (Group 9005-05).	**YES:** Machine may be operated but it is recommended that the main controller (MCF) be replaced. **NO:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install. (Group 9015-20).

– – –1/1

11001.02 — Abnormal RAM

MS12501,0000047 –19–14JAN06–1/1

Controller Hardware Diagnostics

– – –1/1

❶ **Code Check**	Clear and re-check diagnostic trouble codes. Is DTC 11001.02-Abnormal EEPROM still present?	**YES:** Code is still present and machine does not operate. Replace main controller (MCF). See Main Controller (MCF) Remove and Install. (Group 9015-20). **YES:** Code is still present but machine is still operable. Go to Machine Function Check. **NO:** Main controller (MCF) is OK.

– – –1/1

❷ **Machine Function Check**	Is operation of machine normal? See Operational Checkout Procedure. (Group 9005-05).	**YES:** Machine may be operated but it is recommended that the main controller (MCF) be replaced. **NO:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install. (Group 9015-20).

– – –1/1

11002.02 — Abnormal A/D Conversion

MS12501,0000048 –19–14JAN06–1/1

Controller Hardware Diagnostics

– – –1/1

❶ **Code Check**	Clear and re-check diagnostic trouble codes. Is DTC 11002.02-Abnormal EEPROM still present?	**YES:** Code is still present and machine does not operate. Replace main controller (MCF). See Main Controller (MCF) Remove and Install. (Group 9015-20). **YES:** Code is still present but machine is still operable. Go to Machine Function Check. **NO:** Main controller (MCF) is OK.

– – –1/1

❷ **Machine Function Check**	Is operation of machine normal? See Operational Checkout Procedure. (Group 9005-05).	**YES:** Machine may be operated but it is recommended that the main controller (MCF) be replaced. **NO:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install. (Group 9015-20).

– – –1/1

11003.03 — Abnormal Sensor Voltage

MS12501,0000049 –19–14JAN06–1/1

Harness diagnostics

Other individual sensor or component diagnostic trouble codes (DTC) may also be present within this code. Engine speed dial may not function correctly when this code is present.

– – –1/1

❶ **Diagnostic Trouble Code Check**	Clear and re-check DTCs. Is DTC 11003.03-Abnormal Sensor Voltage still present?	**YES:** Go to Continuity Check. **NO:** Sensor malfunction. Replace sensor.

– – –1/1

❷ **Continuity Check**	Disconnect all connectors on main controller (MCF) and to sensors corresponding with codes displayed. Check for continuity between terminals 1 and 3 of sensor harness connector. Is there continuity between terminals 1 and 3?	**YES:** Short circuit in harness between main controller (MCF) and sensor. Check harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, see Pump Harness (W8) Wiring Diagram, or see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install (Group 9015-20).

– – –1/1

11004.02 — CAN Communication Error

MS12501,000004A –19–14JAN06–1/1

Controller Area Network (CAN) Diagnostics

– – –1/1

❶ **CAN Harness Check**	Check harness connections to controllers and between harnesses. Clear codes and re-check DTCs. Is DTC 11004.02 still present?	**YES:** Go to Continuity Check MCF and ICF. **NO:** Main controller (MCF) and harness are OK.

– – –1/1

❷ **Continuity Check MCF and ICF**	Check for continuity between main controller (MCF) pin C4 and information controller (ICF) pin C5. Check for continuity between main controller (MCF) pin C15 and information controller (ICF) pin C11. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and ECM. **NO:** Open circuit in CAN between main controller (MCF) and information controller (ICF). Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

– – –1/1

❸ **Continuity Check MCF and ECM**	Check for continuity between main controller (MCF) pin C4 and engine control module (ECM) pin 18. Check for continuity between main controller (MCF) pin C15 and engine control module (ECM) pin 37. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and Monitor Unit. **NO:** Open circuit in CAN between main controller (MCF) and engine control module (ECM). Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Continuity Check MCF and Monitor Unit**	Check for continuity between main controller (MCF) pin C4 and monitor controller pin B7. Check for continuity between main controller (MCF) pin C15 and monitor controller pin B6. Is there continuity between the connectors?	**YES:** Go to MCF Short to Ground Check. **NO:** Open circuit in CAN between main controller (MCF) and monitor controller. Repair or replace harnesses. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) – – –1/1

❺ **MCF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and main controller (MCF) pins A2, A13, B8, and B18. Check for continuity between MCF pin C15 an MCF pins A2, A13, B8, and B18. Is there continuity between the CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Ground Check. – – –1/1

❻ **ECM Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Ground Check. – – –1/1

❼ ICF Short to Ground Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C14 and C15. Check for continuity between information controller (ICF) pin C11 and pins C14 and C15. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Ground Check. – – –1/1

❽ Monitor Controller Short to Ground Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and pin B11. Check for continuity between monitor controller pin B6 and pin B11. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Power Check. – – –1/1

❾ MCF Short to Power Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and pins A1, A12, B7, and B17. Check for continuity between main controller (MCF) pin C15 and pins A1, A12, B7, and B17. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Power Check. – – –1/1

❿ ECM Short to Power Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 2 and 5 (power). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 2 and 5 (power). Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Power Check. – – –1/1

⑪ **ICF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C1 and C2. Check for continuity between information controller (ICF) pin C11 and pins C1 and C2. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Power Check. – – –1/1

⑫ **Monitor Controller Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A16. Check for continuity between monitor controller pin B6 and A16. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Key Switch Signal Check. – – –1/1

⑬ **MCF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and B16. Check for continuity between main controller (MCF) pin C15 and B16. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Key Switch Signal Check. – – –1/1

⑭ **ECM Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pin 24 (key switch signal wire). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pin 24 (key switch signal wire). Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Key Switch Signal Check. – – –1/1

⑮ **ICF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and C7. Check for continuity between information controller (ICF) pin C11 and C7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Key Switch Signal Check. – – –1/1

⑯ **Monitor Controller Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A7. Check for continuity between monitor controller pin B6 and A7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN High and Low Side Continuity Check. – – –1/1

⑰ **MCF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pins C4 and C15. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM CAN High and Low Side Continuity Check. – – –1/1

⑱ **ECM CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High and Low wires). Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF CAN High and Low Side Continuity Check. – – –1/1

⓳ **ICF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pins C5 and C11. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller CAN High and Low Side Continuity Check. – – –1/1

⓴ **Monitor Controller CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pins B6 and B7. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN Resistance Check. – – –1/1

㉑ **MCF CAN Resistance Check**	Connect all connectors except main controller (MCF) connector C (X30). Check resistance between pin C4 and C15. Is resistance between 50—70 Ω?	**YES:** Go to DTC Check. **NO:** Go to ICF CAN Resistance Check. – – –1/1

㉒ **DTC Check**	Connect connector to main controller (MCF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11004.02-Abnormal CAN Communication still present?	**YES:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to main controller (MCF). – – –1/1

㉓ **ICF CAN Resistance Check**	Connect all connectors except information controller (ICF) connector C (X34). Check resistance between pin C5 and C11. Is resistance between 50—70 Ω.	**YES:** Go to DTC Check. **NO:** Go to ECM CAN Resistance Check. – – –1/1

㉔ **DTC Check**	Connect connector to information controller (ICF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11004.02-Abnormal CAN Communication still present?	**YES:** information controller (ICF) malfunction. Replace. See Information Controller (ICF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to information controller (ICF).

– – –1/1

㉕ **ECM CAN Resistance Check**	Connect all connectors except engine control module (ECM) connector. Check resistance between pin 18 (CAN High) and pin 37 (CAN Low) wires in connector. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Go to Monitor Controller CAN Resistance Check.

– – –1/1

㉖ **DTC Check**	Connect connector to engine control module (ECM). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11004.02-Abnormal CAN Communication still present?	**YES:** Engine control module (ECM) malfunction. Replace. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to engine control module (ECM).

– – –1/1

㉗ **Monitor Controller CAN Resistance Check**	Connect all connectors except monitor controller connector B (X20). Check resistance between pins B6 and B7. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Malfunction in any controller on CAN.

– – –1/1

㉘ **DTC Check**	Connect connector to monitor controller. Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11004.02-Abnormal CAN Communication still present?	**YES:** Monitor controller malfunction. Replace. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Check the connection to monitor controller.

– – –1/1

11101.03 — Engine Speed Dial Sensor Circuit Voltage High Input

MS12501,000004B –19–08JUN06–1/1

Engine Speed Dial Diagnostics

– – –1/1

❶ **Engine Speed Dial Resistance Check**	Disconnect harness connector from switch panel. Check resistance between pins 2 and 4. Is resistance between 4.5—5.5 kΩ?	**YES:** Go to Engine Speed Dial Voltage Diagnostics Check. **NO:** Engine speed dial malfunction.

– – –1/1

❷ **Engine Speed Dial Voltage Check**	Connect harness connector to switch panel. With switch panel connected to harness, measure voltage at pin 2 of connector. Turn the engine speed dial and note voltage. Is engine speed dial voltage within specifications?	**YES:** Go to Sensor Circuit Voltage Check. **NO:** Engine speed dial malfunction.

Engine Speed Dial Voltage

Specification of Engine Speed Dial	
Slow Idle	0.3—1.0 V
Fast Idle	4.0—4.7 V

– – –1/1

❸ **Sensor Circuit Voltage Check**	Disconnect connector to switch panel. Check voltage between terminals 2 and 3 of harness connector. Is voltage between 4.5—5.5 volts? *NOTE: Key switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❹ **Open Circuit Check**	Disconnect connector to switch panel. Check continuity between main controller (MCF) connector D pin D15 and switch panel connector pin 2. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) – – –1/1

❺ **Short Circuit Check**	Disconnect connector to switch panel. Check continuity between switch panel connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace main controller. See Main Controller (MCF) Remove and Install. (Group 9015-20). – – –1/1

❻ **Harness Voltage Check**	*NOTE: Key Switch: ON* Disconnect connector to switch panel. Check voltage between switch panel connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts?	**YES:** Open circuit in harness between main controller (MCF) and engine speed dial pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and engine speed dial pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) – – –1/1

11101.04 — Engine Speed Dial Sensor Circuit Voltage Low Input

MS12501,000004C –19–21FEB06–1/1

Engine Speed Dial Diagnostics

– – –1/1

❶ Engine Speed Dial Resistance Check

Disconnect harness connector from switch panel.

Check resistance between pins 2 and 4.

Is resistance between 4.5—5.5 kΩ?

YES: Go to Engine Speed Dial Voltage Diagnostics Check.

NO: Engine speed dial malfunction.

– – –1/1

❷ Engine Speed Dial Voltage Check

Connect harness connector to switch panel.

With switch panel connected to harness, measure voltage at pin 2 of connector.

Turn the engine speed dial and note voltage.

Is engine speed dial voltage within specifications?

YES: Go to Sensor Circuit Voltage Check.

NO: Engine speed dial malfunction.

Engine Speed Dial Voltage

Specification of Engine Speed Dial	
Slow Idle	0.3—1.0 V
Fast Idle	4.0—4.7 V

– – –1/1

❸ Sensor Circuit Voltage Check

Disconnect connector to switch panel.

Check voltage between terminals 2 and 3 of harness connector.

Is voltage between 4.5—5.5 volts?

NOTE: Key switch: ON

YES: Go to Open Circuit Check.

NO: Go to Harness Voltage Check.

– – –1/1

❹ **Open Circuit Check**	Disconnect connector to switch panel. Check continuity between main controller (MCF) connector D pin D15 and switch panel connector pin 2. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

– – –1/1

❺ **Short Circuit Check**	Disconnect connector to switch panel. Check continuity between switch panel connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace main controller. See Main Controller (MCF) Remove and Install. (Group 9015-20).

– – –1/1

❻ **Harness Voltage Check**	*NOTE: Key Switch: ON* Disconnect connector to switch panel. Check voltage between switch panel connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts?	**YES:** Open circuit in harness between main controller (MCF) and engine speed dial pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and engine speed dial pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

– – –1/1

11200.03 — Pump 1 Delivery Pressure Sensor Circuit Voltage High

MS12501,000004D –19–21FEB06–1/1

Pump 1 Delivery Pressure Sensor Diagnostics

Pump 1 delivery pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **DTC Check**	Switch pump 1 delivery pressure sensor with pump 2 delivery pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow delivery pressure sensor?	**YES:** Pump 1 delivery pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector to pump 1 delivery pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect connector to pump 1 delivery pressure sensor. Check continuity between main controller (MCF) connector C pin C3 and pump 1 delivery pressure sensor pin 2. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect connector to pump 1 delivery pressure sensor. Check continuity between pump 1 delivery pressure sensor connector pin 2 and power and ground. Is there continuity between pump 1 delivery pressure sensor connector pin 2 and power or ground?	**YES:** Short in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect pump 1 delivery pressure sensor from harness. Check voltage between pump 1 delivery pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and pump 1 delivery pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and pump 1 delivery pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) – – –1/1

11200.04 — Pump 1 Delivery Pressure Sensor Voltage Low

MS12501,000004E –19–14JAN06–1/1

Pump 1 Delivery Pressure Sensor Diagnostics

Pump 1 delivery pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **DTC Check**	Switch pump 1 delivery pressure sensor with pump 2 delivery pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow delivery pressure sensor?	**YES:** Pump 1 delivery pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check. – – –1/1
❷ **Sensor Circuit Check**	Disconnect connector to pump 1 delivery pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check. – – –1/1
❸ **Open Circuit Check**	Disconnect connector to pump 1 delivery pressure sensor. Check continuity between main controller (MCF) connector C pin C3 and pump 1 delivery pressure sensor pin 2. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Short Circuit Check**	Disconnect connector to pump 1 delivery pressure sensor. Check continuity between pump 1 delivery pressure sensor connector pin 2 and power and ground. Is there continuity between pump 1 delivery pressure sensor connector pin 2 and power or ground?	**YES:** Short in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect pump 1 delivery pressure sensor from harness. Check voltage between pump 1 delivery pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and pump 1 delivery pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and pump 1 delivery pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) – – –1/1

11202.03 — Pump 2 Delivery Pressure Sensor Circuit Voltage High

MS12501,000004F –19–21FEB06–1/1

Pump 2 Delivery Pressure Sensor Diagnostics

Pump 2 delivery pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch pump 2 delivery pressure sensor with pump 1 delivery pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow delivery pressure sensor?	**YES:** Pump 2 delivery pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check. – – –1/1

❷ **Sensor Circuit Check**	Disconnect connector to pump 2 delivery pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check. – – –1/1

❸ **Open Circuit Check**	Disconnect connector to pump 2 delivery pressure sensor. Check continuity between main controller (MCF) connector C pin C12 and pump 2 delivery pressure sensor pin 2. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Short Circuit Check**	Disconnect harness from main controller (MCF) and pump 2 delivery pressure sensor. Check continuity between pump 2 delivery pressure sensor connector pin 2 and power and ground. Is there continuity between pin 2 and power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect pump 2 delivery pressure sensor from harness. Check voltage between pump 2 delivery pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and pump 2 delivery pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and pump 2 delivery pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) – – –1/1

11202.04 — Pump 2 Delivery Pressure Sensor Voltage Low

MS12501,0000050 –19–21FEB06–1/1

Pump 2 Delivery Pressure Sensor Diagnostics

Pump 2 delivery pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch pump 2 delivery pressure sensor with pump 1 delivery pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow delivery pressure sensor?	**YES:** Pump 2 delivery pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector to pump 2 delivery pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect connector to pump 2 delivery pressure sensor. Check continuity between main controller (MCF) connector C pin C12 and pump 2 delivery pressure sensor pin 2. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from main controller (MCF) and pump 2 delivery pressure sensor. Check continuity between pump 2 delivery pressure sensor connector pin 2 and power and ground. Is there continuity between pin 2 and power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect pump 2 delivery pressure sensor from harness. Check voltage between pump 2 delivery pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 Volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and pump 2 delivery pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and pump 2 delivery pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) – – –1/1

11301.03 — Swing Pilot Pressure Sensor Circuit Voltage High

MS12501,0000051 –19–21FEB06–1/1

Swing pilot pressure sensor diagnostics

Swing pilot pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch swing pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow swing pilot pressure sensor?	**YES:** Swing pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of swing pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from swing pilot pressure sensor and main controller (MCF). Check continuity between swing pilot pressure sensor connector pin 2 and main controller (MCF) connector D pin D16. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from swing pilot pressure sensor and main controller (MCF). Check continuity between swing pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

❺ **Harness Voltage Check**	Disconnect swing pilot pressure sensor from harness. Check voltage between swing pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and swing pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and swing pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.)

– – –1/1

11301.04 — Swing Pilot Pressure Sensor Circuit Voltage Low

MS12501,0000052 –19–21FEB06–1/1

Swing Pilot Pressure Sensor Diagnostics

Swing pilot pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch swing pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow swing pilot pressure sensor?	**YES:** Swing pilot pressure sensor malfunction. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of swing pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from swing pilot pressure sensor and main controller (MCF). Check continuity between swing pilot pressure sensor connector pin 2 and main controller (MCF) connector D pin D16. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from swing pilot pressure sensor and main controller (MCF). Check continuity between swing pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect swing pilot pressure sensor from harness. Check voltage between swing pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and swing pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and swing pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.) – – –1/1

11302.03 — Boom Raise Pilot Pressure Sensor Circuit Voltage High

MS12501,0000053 –19–21FEB06–1/1

Boom Up Pilot Pressure Sensor Diagnostics

Boom up pilot pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch boom up pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow boom up pilot pressure sensor?	**YES:** Boom up pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of boom up pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from boom up pilot pressure sensor and main controller (MCF). Check continuity between boom up pilot pressure sensor connector pin 2 and main controller (MCF) connector C pin C13. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from boom up pilot pressure sensor and main controller (MCF). Check continuity between boom up pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect boom up pilot pressure sensor from harness. Check voltage between boom up pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and boom up pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and boom up pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11302.04 — Boom Raise Pilot Pressure Sensor Circuit Voltage Low

MS12501,0000054 –19–21FEB06–1/1

Boom Up Pilot Pressure Sensor Diagnostics

Boom up pilot pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch boom up pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow boom up pilot pressure sensor?	**YES:** Boom up pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check. – – –1/1
❷ **Sensor Circuit Check**	Disconnect connector of boom up pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check. – – –1/1
❸ **Open Circuit Check**	Disconnect harness from boom up pilot pressure sensor and main controller (MCF). Check continuity between boom up pilot pressure sensor connector pin 2 and main controller (MCF) connector C pin C13. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Short Circuit Check**	Disconnect harness from boom up pilot pressure sensor and main controller (MCF). Check continuity between boom up pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect boom up pilot pressure sensor from harness. Check voltage between boom up pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and boom up pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and boom up pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11303.03 — Arm Roll-in Pilot Pressure Sensor Circuit Voltage High

LD30992,00002DA –19–21FEB06–1/1

Arm In Pilot Pressure Sensor Diagnostics

Arm in pilot pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch arm in pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow arm in pilot pressure sensor?	**YES:** Arm in pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of arm in pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from arm in pilot pressure sensor and main controller (MCF). Check continuity between arm in pilot pressure sensor connector pin 2 and main controller (MCF) connector C pin C23. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from arm in pilot pressure sensor and main controller (MCF). Check continuity between arm in pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install, (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect arm in pilot pressure sensor from harness. Check voltage between arm in pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and arm in pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and arm in pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11303.04 — Arm Roll-in Pilot Pressure Sensor Circuit Voltage Low

MS12501,0000055 –19–24JAN06–1/1

Arm In Pilot Pressure Sensor Diagnostics

Arm in pilot pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch arm in pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow arm in pilot pressure sensor?	**YES:** Arm in pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of arm in pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from arm in pilot pressure sensor and main controller (MCF). Check continuity between arm in pilot pressure sensor connector pin 2 and main controller (MCF) connector C pin C23. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from arm in pilot pressure sensor and main controller (MCF). Check continuity between arm in pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect arm in pilot pressure sensor from harness. Check voltage between arm in pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and arm in pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and arm in pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11400.03 — Pump 2 (5-Spool) Control Solenoid Valve Feedback Current High

MS12501,0000056 –19–21FEB06–1/1

Pump 2 (5-Spool) Control Solenoid Diagnostics

Pump 2 (5-spool) control solenoid current 920 mA or higher.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from pump 2 (5-spool) control solenoid. Check resistance of solenoid. Is resistance between 14—21 ohms?	**YES:** Go to Continuity Check. **NO:** Pump 2 (5-spool) control solenoid malfunction. Replace solenoid.

– – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and pump 2 (5-spool) control solenoid. Check for continuity between main controller (MCF) connector A pin A30 and pump 2 (5-spool) control solenoid harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A19 and pump 2 (5-spool) control solenoid harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.)

– – –1/1

❸ **Solenoid Function Check**	Switch pump 2 (5-spool) control solenoid with pump 1 (4-spool) control solenoid. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code follow pump 2 (5-spool) control solenoid? **IMPORTANT: Pump learning procedure must be performed after removing or replacing pump control solenoids.**	**YES:** Pump 2 (5-spool) control solenoid malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

11400.04 — Pump 2 (5-Spool) Control Solenoid Valve Feedback Current Low

MS12501,0000057 –19–21FEB06–1/1

Pump 2 (5-Spool) Control Solenoid Diagnostics

Pump 2 (5-spool) control solenoid current 56 mA or less.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from pump 2 (5-spool) control solenoid. Check resistance of solenoid. Is resistance between 14—21 ohms?	**YES:** Go to Continuity Check. **NO:** Pump 2 (5-spool) control solenoid malfunction. Replace solenoid.

– – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and pump 2 (5-spool) control solenoid. Check for continuity between main controller (MCF) connector A pin A30 and pump 2 (5-spool) control solenoid harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A19 and pump 2 (5-spool) control solenoid harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.)

– – –1/1

❸ **Solenoid Function Check**	Switch pump 2 (5-spool) control solenoid with pump 1 (4-spool) control solenoid. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code follow pump 2 (5-spool) control solenoid? **IMPORTANT: Pump learning procedure must be performed after removing or replacing pump control solenoids.**	**YES:** Pump 2 (5-spool) control solenoid malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

11402.03 — Boom Flow Rate Solenoid (SF) Valve Feedback Current High

MS12501,0000058 –19–14JAN06–1/1

Boom Flow Rate Solenoid (SF) Diagnostics

Boom flow rate solenoid (SF) current 920 mA or higher.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from boom flow rate solenoid (SF). Check resistance of solenoid. Is resistance between 14.8—22.2 ohms?	**YES:** Go to Continuity Check. **NO:** Boom flow rate solenoid (SF) malfunction. Replace solenoid.

– – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and boom flow rate solenoid (SF). Check for continuity between main controller (MCF) connector A pin A20 and boom flow rate solenoid (SF) harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A3 and boom flow rate solenoid (SF) harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.)

– – –1/1

❸ **Solenoid Function Check**	Switch boom flow rate solenoid (SF) harness connector with another solenoid valve in solenoid valve manifold. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code stay with boom flow rate solenoid (SF)?	**YES:** Boom flow rate solenoid (SF) malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

11402.04 — Boom Flow Rate Solenoid (SF) Valve Feedback Current Low

MS12501,0000059 –19–14JAN06–1/1

Boom Flow Rate Solenoid (SF) Diagnostics

Boom flow rate solenoid (SF) current 56 mA or less.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from boom flow rate solenoid (SF). Check resistance of solenoid. Is resistance between 14.8—22.2 ohms?	**YES:** Go to Continuity Check. **NO:** Boom flow rate solenoid (SF) malfunction. Replace solenoid. – – –1/1
❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and boom flow rate solenoid (SF). Check for continuity between main controller (MCF) connector A pin A20 and boom flow rate solenoid (SF) harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A3 and boom flow rate solenoid (SF) harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.) – – –1/1

❸ **Solenoid Function Check**	Switch boom flow rate solenoid (SF) harness connector with another solenoid valve in solenoid valve manifold. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code stay with boom flow rate solenoid (SF)?	**YES:** Boom flow rate solenoid (SF) malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

11404.03 — Power Dig Solenoid (SG) Valve Feedback Current High

MS12501,000005A –19–14JAN06–1/1

Power Dig Solenoid (SG) Diagnostics

Power dig solenoid (SG) current 920 mA or higher.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from power dig solenoid (SG). Check resistance of solenoid. Is resistance between 14.8—22.2 ohms?	**YES:** Go to Continuity Check. **NO:** Power dig solenoid (SG) malfunction. Replace solenoid.

– – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and power dig solenoid (SG). Check for continuity between main controller (MCF) connector A pin A23 and power dig solenoid (SG) harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A7 and power dig solenoid (SG) harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.)

– – –1/1

❸ **Solenoid Function Check**	Switch power dig solenoid (SG) harness connector with another solenoid valve in solenoid valve manifold. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code stay with power dig solenoid (SG)?	**YES:** Power dig solenoid (SG) malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

11404.04 — Power Dig Solenoid (SG) Valve Feedback Current Low

MS12501,000005B –19–14JAN06–1/1

Power Dig Solenoid (SG) Diagnostics

Power dig solenoid (SG) current 56 mA or less.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from power dig solenoid (SG). Check resistance of solenoid. Is resistance between 14.8—22.2 ohms?	**YES:** Go to Continuity Check. **NO:** Power dig solenoid (SG) malfunction. Replace solenoid.

– – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and power dig solenoid (SG). Check for continuity between main controller (MCF) connector A pin A23 and power dig solenoid (SG) harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A7 and power dig solenoid (SG) harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.)

– – –1/1

❸ **Solenoid Function Check**	Switch power dig solenoid (SG) harness connector with another solenoid valve in solenoid valve manifold. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code stay with power dig solenoid (SG)?	**YES:** Power dig solenoid (SG) malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

11405.03 — Travel Speed Solenoid (SI) Valve Current Feedback High

MS12501,000005C –19–14JAN06–1/1

Travel Speed Solenoid (SI) Diagnostics

Travel speed solenoid (SI) current 920 mA or higher.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from travel speed solenoid (SI). Check resistance of solenoid. Is resistance between 14.8—22.2 ohms?	**YES:** Go to Continuity Check. **NO:** Travel speed solenoid (SI) malfunction. Replace solenoid.

– – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and travel speed solenoid (SI). Check for continuity between main controller (MCF) connector A pin A11 and travel speed solenoid (SI) harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A17 and travel speed solenoid (SI) harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.)

– – –1/1

❸ **Solenoid Function Check**	Switch travel speed solenoid (SI) harness connector with another solenoid valve in solenoid valve manifold. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code stay with travel speed solenoid (SI)?	**YES:** Travel speed solenoid (SI) malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

11405.04 — Travel Speed Solenoid (SI) Valve Current Feedback Low

MS12501,000005D –19–14JAN06–1/1

Travel Speed Solenoid (SI) Diagnostics

Travel speed solenoid (SI) current 56 mA or less.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from travel speed solenoid (SI). Check resistance of solenoid. Is resistance between 14.8—22.2 ohms?	**YES:** Go to Continuity Check. **NO:** Travel speed solenoid (SI) malfunction. Replace solenoid. – – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and travel speed solenoid (SI). Check for continuity between main controller (MCF) connector A pin A11 and travel speed solenoid (SI) harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A17 and travel speed solenoid (SI) harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.) – – –1/1

❸ **Solenoid Function Check**	Switch travel speed solenoid (SI) harness connector with another solenoid valve in solenoid valve manifold. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code stay with travel speed solenoid (SI)?	**YES:** Travel speed solenoid (SI) malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

11410.03 — Pump 1 (4-Spool) Control Solenoid Valve Feedback Current High

MS12501,000005E –19–14JAN06–1/1

Pump 1 (4-Spool) Control Solenoid Diagnostics

Pump 1 (4-spool) control solenoid current 920 mA or higher.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from pump 1 (4-spool) control solenoid. Check resistance of solenoid. Is resistance between 14—21 ohms?	**YES:** Go to Continuity Check. **NO:** Pump 1 (4-spool) control solenoid malfunction. Replace solenoid.

– – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and pump 1 (4-spool) control solenoid. Check for continuity between main controller (MCF) connector A pin A22 and pump 1 (4-spool) control solenoid harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A16 and pump 1 (4-spool) control solenoid harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.)

– – –1/1

❸ **Solenoid Function Check**	Switch pump 1 (4-spool) control solenoid with pump 2 (5-spool) control solenoid. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code follow pump 1 (4-spool) control solenoid? **IMPORTANT: Pump learning procedure must be performed after removing or replacing pump control solenoids.**	**YES:** Pump 1 (4-spool) control solenoid malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

11410.04 — Pump 1 (4-Spool) Control Solenoid Valve Feedback Current Low

MS12501,000005F –19–14JAN06–1/1

Pump 1 (4-Spool) Control Solenoid Diagnostics

Pump 1 (4-spool) control solenoid current 56 mA or less.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from pump 1 (4-spool) control solenoid. Check resistance of solenoid. Is resistance between 14—21 ohms?	**YES:** Go to Continuity Check. **NO:** Pump 1 (4-spool) control solenoid malfunction. Replace solenoid. – – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and pump 1 (4-spool) control solenoid. Check for continuity between main controller (MCF) connector A pin A22 and pump 1 (4-spool) control solenoid harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A16 and pump 1 (4-spool) control solenoid harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) – – –1/1

❸ **Solenoid Function Check**	Switch pump 1 (4-spool) control solenoid with pump 2 (5-spool) control solenoid. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code follow pump 1 (4-spool) control solenoid? **IMPORTANT: Pump learning procedure must be performed after removing or replacing pump control solenoids.**	**YES:** Pump 1 (4-spool) control solenoid malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

11412.03 — Hydraulic Fan Pump Control Solenoid Valve Feedback Current High

MS12501,0000060 –19–21FEB06–1/1

Hydraulic Fan Pump Control Solenoid Diagnostics

Hydraulic fan pump control solenoid current 920 mA or higher.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from fan pump control solenoid. Check resistance of solenoid. Is resistance between 14—21 ohms?	**YES:** Go to Continuity Check. **NO:** Fan pump control solenoid malfunction. Replace solenoid.

– – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and fan pump control solenoid. Check for continuity between main controller (MCF) connector A pin A9 and fan pump control solenoid harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A15 and fan pump control solenoid harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.)

– – –1/1

❸ **Solenoid Function Check**	Switch fan pump control solenoid with pump 2 (5-spool) control solenoid. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code follow fan pump control solenoid? **IMPORTANT: Pump learning procedure must be performed after removing or replacing pump control solenoids.**	**YES:** Fan pump control solenoid malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

11412.04 — Hydraulic Fan Pump Solenoid Valve Feedback Current Low

MS12501,0000061 –19–14JAN06–1/1

Hydraulic Fan Pump Control Solenoid Diagnostics

Hydraulic fan pump control solenoid current 56 mA or less.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from fan pump control solenoid. Check resistance of solenoid. Is resistance between 14—21 ohms?	**YES:** Go to Continuity Check. **NO:** Fan pump control solenoid malfunction. Replace solenoid.

– – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and fan pump control solenoid. Check for continuity between main controller (MCF) connector A pin A9 and fan pump control solenoid harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A15 and fan pump control solenoid harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.)

– – –1/1

❸ **Solenoid Function Check**	Switch fan pump control solenoid with pump 2 (5-spool) control solenoid. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code follow fan pump control solenoid? **IMPORTANT: Pump learning procedure must be performed after removing or replacing pump control solenoids.**	**YES:** Fan pump control solenoid malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

11802.03 — Boom Bottom Pressure Sensor Circuit Voltage High

MS12501,0000062 –19–14JAN06–1/1

Boom Bottom Pressure Sensor Diagnostics

Boom bottom pressure sensor voltage 4.5 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch boom bottom pressure sensor with pump 2 delivery pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow delivery pressure sensor?	**YES:** Boom bottom pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector to boom bottom pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect connector to boom bottom pressure sensor. Check continuity between main controller (MCF) connector C pin C24 and boom bottom pressure sensor pin 2. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from main controller (MCF) and boom bottom pressure sensor. Check continuity between boom bottom pressure sensor connector pin 2 and power and ground. Is there continuity between pin 2 and power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect boom bottom pressure sensor from harness. Check voltage between boom bottom pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and boom bottom pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and boom bottom pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11802.04 — Boom Bottom Pressure Sensor Circuit Voltage Low

MS12501,0000063 –19–21FEB06–1/1

Boom Bottom Pressure Sensor Diagnostics

Boom bottom pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch boom bottom pressure sensor with pump 2 delivery pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow delivery pressure sensor?	**YES:** Boom bottom pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector to boom bottom pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect connector to boom bottom pressure sensor. Check continuity between main controller (MCF) connector C pin C24 and boom bottom pressure sensor pin 2. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from main controller (MCF) and boom bottom pressure sensor. Check continuity between boom bottom pressure sensor connector pin 2 and power and ground. Is there continuity between pin 2 and power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect boom bottom pressure sensor from harness. Check voltage between boom bottom pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and boom bottom pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and boom bottom pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11901.03 — Hydraulic Oil Temperature Sensor Circuit Voltage High

MS12501,0000064 –19–21FEB06–1/1

Hydraulic Oil Temperature Sensor Diagnostics

Hydraulic oil temperature sensor 4.10 volts or higher.

Diagnostic trouble code sets when intake air temperature is 21°C (70°F) or higher and sensor voltage is 4.10 volts or higher for more than 30 seconds.

– – –1/1

❶ **Connector Check**	Check harness connections to hydraulic oil temperature sensor, MCF and between harness. Are connectors clean and free from debris? Are pins straight and make a good connection?	**YES:** Go to Hydraulic Oil Temperature Sensor Check. **NO:** Repair or replace connector. See Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❷ **Hydraulic Oil Temperature Sensor Check**

Disconnect hydraulic oil temperature sensor from harness.

Check resistance of sensor.

Hydraulic Oil Temperature	Resistance
-20°C -4°	14.6—17.8 kΩ
0°C 32°F	5.88 kΩ
20°C 68°F	2.21—2.69 kΩ
40°C 104°F	1.14 kΩ
60°C 140°F	0.54 kΩ
80°C 176°F	0.32 kΩ

Is sensor within specifications?

YES: Go to Continuity Check.

NO: Hydraulic oil temperature sensor malfunction. Replace sensor.

– – –1/1

❸ **Continuity Check**	Connect pin 1 and pin 2 of hydraulic oil temperature sensor harness connector. Check continuity between main controller (MCF) connector D pin D2 and pin D6. Is there continuity between main controller (MCF) connector D pin D2 and pin D6?	**YES:** Go to Open Circuit Check. **NO:** Open in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Open Circuit Check**	Connect main controller (MCF) connector D pin D6 to machine ground. Check continuity between hydraulic oil temperature sensor harness connector pin 2 and machine ground. Is there continuity between main controller (MCF) connector and hydraulic oil temperature sensor connector?	**YES:** Open circuit in harness between main controller (MCF) connector D pin D2 and hydraulic oil temperature sensor connector pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) connector D pin D6 and hydraulic oil temperature sensor connector pin 2. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11901.04 — Hydraulic Oil Temperature Sensor Circuit Voltage Low

MS12501,0000065 –19–21FEB06–1/1

Hydraulic Oil Temperature Sensor Diagnostics

Hydraulic oil temperature sensor 0.23 volts or less.

Diagnostic trouble code sets when intake air temperature is 21°C (70°F) or higher and sensor voltage is less than 0.23 volts for more than 30 seconds.

– – –1/1

❶ **Connector Check**	Check harness connections to hydraulic oil temperature sensor, MCF and between harness. Are connectors clean and free from debris? Are pins straight and make a good connection?	**YES:** Go to Hydraulic Oil Temperature Sensor Check. **NO:** Repair or replace connector. See Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❷ **Hydraulic Oil Temperature Sensor Check**	Disconnect hydraulic oil temperature sensor from harness. Check resistance of sensor.	**YES:** Go to Continuity Check. **NO:** Hydraulic oil temperature sensor malfunction. Replace sensor.

Hydraulic Oil Temperature	Resistance
-20°C -4°	14.6—17.8 kΩ
0°C 32°F	5.88 kΩ
20°C 68°F	2.21—2.69 kΩ
40°C 104°F	1.14 kΩ
60°C 140°F	0.54 kΩ
80°C 176°F	0.32 kΩ

Is sensor within specifications?

– – –1/1

❸ **Continuity Check**	Connect pin 1 and pin 2 of hydraulic oil temperature sensor harness connector. Check continuity between main controller (MCF) connector D pin D2 and pin D6. Is there continuity between main controller (MCF) connector D pin D2 and pin D6?	**YES:** Go to Open Circuit Check. **NO:** Open in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Open Circuit Check**	Connect main controller (MCF) connector D pin D6 to machine ground. Check continuity between hydraulic oil temperature sensor harness connector pin 2 and machine ground. Is there continuity between main controller (MCF) connector and hydraulic oil temperature sensor connector?	**YES:** Open circuit in harness between main controller (MCF) connector D pin D2 and hydraulic oil temperature sensor connector pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) connector D pin D6 and hydraulic oil temperature sensor connector pin 2. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

11910.02 — Actual Engine Speed Message Error

NOTE: Engine speed is determined by the ECU and sent over CAN.

MS12501,0000066 –19–21FEB06–1/1

Controller Area Network (CAN) Diagnostics

– – –1/1

❶ **CAN Harness Check**	Check harness connections to controllers and between harnesses. Clear codes and re-check DTCs. Is DTC 11910.02 still present?	**YES:** Go to Continuity Check MCF and ICF. **NO:** Main controller (MCF) and harness are OK. – – –1/1

❷ **Continuity Check MCF and ICF**	Check for continuity between main controller (MCF) pin C4 and information controller (ICF) pin C5. Check for continuity between main controller (MCF) pin C15 and information controller (ICF) pin C11. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and ECM. **NO:** Open circuit in CAN between main controller (MCF) and information controller (ICF). Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) – – –1/1

❸ **Continuity Check MCF and ECM**	Check for continuity between main controller (MCF) pin C4 and engine control module (ECM) pin 18. Check for continuity between main controller (MCF) pin C15 and engine control module (ECM) pin 37. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and Monitor Unit. **NO:** Open circuit in CAN between main controller (MCF) and engine control module (ECM). Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Continuity Check MCF and Monitor Unit**	Check for continuity between main controller (MCF) pin C4 and monitor controller pin B7. Check for continuity between main controller (MCF) pin C15 and monitor controller pin B6. Is there continuity between the connectors?	**YES:** Go to MCF Short to Ground Check. **NO:** Open circuit in CAN between main controller (MCF) and monitor controller. Repair or replace harnesses. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) – – –1/1

❺ **MCF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and main controller (MCF) pins A2, A13, B8, and B18. Check for continuity between MCF pin C15 an MCF pins A2, A13, B8, and B18. Is there continuity between the CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Ground Check. – – –1/1

❻ **ECM Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Ground Check. – – –1/1

❼ **ICF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C14 and C15. Check for continuity between information controller (ICF) pin C11 and pins C14 and C15. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Ground Check. – – –1/1

❽ **Monitor Controller Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and pin B11. Check for continuity between monitor controller pin B6 and pin B11. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Power Check. – – –1/1

❾ **MCF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and pins A1, A12, B7, and B17. Check for continuity between main controller (MCF) pin C15 and pins A1, A12, B7, and B17. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Power Check. – – –1/1

❿ **ECM Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 2 and 5 (power). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 2 and 5 (power). Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Power Check. – – –1/1

⓫ ICF Short to Power Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C1 and C2. Check for continuity between information controller (ICF) pin C11 and pins C1 and C2. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Power Check. – – –1/1

⓬ Monitor Controller Short to Power Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A16. Check for continuity between monitor controller pin B6 and A16. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Key Switch Signal Check. – – –1/1

⓭ MCF Short to Key Switch Signal Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and B16. Check for continuity between main controller (MCF) pin C15 and B16. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Key Switch Signal Check. – – –1/1

⓮ ECM Short to Key Switch Signal Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pin 24 (key switch signal wire). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pin 24 (key switch signal wire). Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Key Switch Signal Check. – – –1/1

⓯ **ICF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and C7. Check for continuity between information controller (ICF) pin C11 and C7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Key Switch Signal Check. – – –1/1
⓰ **Monitor Controller Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A7. Check for continuity between monitor controller pin B6 and A7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN High and Low Side Continuity Check. – – –1/1
⓱ **MCF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pins C4 and C15. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM CAN High and Low Side Continuity Check. – – –1/1
⓲ **ECM CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High and Low wires). Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF CAN High and Low Side Continuity Check. – – –1/1

⑲ **ICF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pins C5 and C11. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller CAN High and Low Side Continuity Check. – – –1/1
⑳ **Monitor Controller CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pins B6 and B7. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN Resistance Check. – – –1/1
㉑ **MCF CAN Resistance Check**	Connect all connectors except main controller (MCF) connector C (X30). Check resistance between pin C4 and C15. Is resistance between 50—70 Ω?	**YES:** Go to DTC Check. **NO:** Go to ICF CAN Resistance Check. – – –1/1
㉒ **DTC Check**	Connect connector to main controller (MCF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11910.02-Actual Engine Speed Message Error still present?	**YES:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to main controller (MCF). – – –1/1
㉓ **ICF CAN Resistance Check**	Connect all connectors except information controller (ICF) connector C (X34). Check resistance between pin C5 and C11. Is resistance between 50—70 Ω.	**YES:** Go to DTC Check. **NO:** Go to ECM CAN Resistance Check. – – –1/1

㉔ **DTC Check**	Connect connector to information controller (ICF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11910.02-Actual Engine Speed Message Error still present?	**YES:** information controller (ICF) malfunction. Replace. See Information Controller (ICF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to information controller (ICF). – – –1/1

㉕ **ECM CAN Resistance Check**	Connect all connectors except engine control module (ECM) connector. Check resistance between pin 18 (CAN High) and pin 37 (CAN Low) wires in connector. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Go to Monitor Controller CAN Resistance Check. – – –1/1

㉖ **DTC Check**	Connect connector to engine control module (ECM). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11910.02-Actual Engine Speed Message Error still present?	**YES:** Engine control module (ECM) malfunction. Replace. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to engine control module (ECM). – – –1/1

㉗ **Monitor Controller CAN Resistance Check**	Connect all connectors except monitor controller connector B (X20). Check resistance between pins B6 and B7. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Malfunction in any controller on CAN. – – –1/1

㉘ **DTC Check**	Connect connector to monitor controller. Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11910.02-Actual Engine Speed Message Error still present?	**YES:** Monitor controller malfunction. Replace. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Check the connection to monitor controller. – – –1/1

11911.02 — Security Signal Message Error

MS12501,0000067 –19–17JAN06–1/1

Controller Area Network (CAN) Diagnostics

– – –1/1

❶ **CAN Harness Check**	Check harness connections to controllers and between harnesses. Clear codes and re-check DTCs. Is DTC 11911.02-Security Signal Message Error still present?	**YES:** Go to Continuity Check MCF and ICF. **NO:** Main controller (MCF) and harness are OK. – – –1/1

❷ **Continuity Check MCF and ICF**	Check for continuity between main controller (MCF) pin C4 and information controller (ICF) pin C5. Check for continuity between main controller (MCF) pin C15 and information controller (ICF) pin C11. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and ECM. **NO:** Open circuit in CAN between main controller (MCF) and information controller (ICF). Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) – – –1/1

❸ **Continuity Check MCF and ECM**	Check for continuity between main controller (MCF) pin C4 and engine control module (ECM) pin 18. Check for continuity between main controller (MCF) pin C15 and engine control module (ECM) pin 37. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and Monitor Unit. **NO:** Open circuit in CAN between main controller (MCF) and engine control module (ECM). Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Continuity Check MCF and Monitor Unit**	Check for continuity between main controller (MCF) pin C4 and monitor controller pin B7. Check for continuity between main controller (MCF) pin C15 and monitor controller pin B6. Is there continuity between the connectors?	**YES:** Go to MCF Short to Ground Check. **NO:** Open circuit in CAN between main controller (MCF) and monitor controller. Repair or replace harnesses. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) – – –1/1

❺ **MCF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and main controller (MCF) pins A2, A13, B8, and B18. Check for continuity between MCF pin C15 an MCF pins A2, A13, B8, and B18. Is there continuity between the CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Ground Check. – – –1/1

❻ **ECM Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Ground Check. – – –1/1

❼ **ICF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C14 and C15. Check for continuity between information controller (ICF) pin C11 and pins C14 and C15. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Ground Check. – – –1/1

❽ **Monitor Controller Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and pin B11. Check for continuity between monitor controller pin B6 and pin B11. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Power Check. – – –1/1

❾ **MCF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and pins A1, A12, B7, and B17. Check for continuity between main controller (MCF) pin C15 and pins A1, A12, B7, and B17. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Power Check. – – –1/1

❿ **ECM Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 2 and 5 (power). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 2 and 5 (power). Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Power Check. – – –1/1

⑪ **ICF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C1 and C2. Check for continuity between information controller (ICF) pin C11 and pins C1 and C2. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Power Check. – – –1/1

⑫ **Monitor Controller Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A16. Check for continuity between monitor controller pin B6 and A16. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Key Switch Signal Check. – – –1/1

⑬ **MCF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and B16. Check for continuity between main controller (MCF) pin C15 and B16. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Key Switch Signal Check. – – –1/1

⑭ **ECM Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pin 24 (key switch signal wire). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pin 24 (key switch signal wire). Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Key Switch Signal Check. – – –1/1

⑮ **ICF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and C7. Check for continuity between information controller (ICF) pin C11 and C7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Key Switch Signal Check. – – –1/1

⑯ **Monitor Controller Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A7. Check for continuity between monitor controller pin B6 and A7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN High and Low Side Continuity Check. – – –1/1

⑰ **MCF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pins C4 and C15. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM CAN High and Low Side Continuity Check. – – –1/1

⑱ **ECM CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High and Low wires). Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF CAN High and Low Side Continuity Check. – – –1/1

⑲ **ICF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pins C5 and C11. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller CAN High and Low Side Continuity Check. – – –1/1

⑳ **Monitor Controller CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pins B6 and B7. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN Resistance Check. – – –1/1

㉑ **MCF CAN Resistance Check**	Connect all connectors except main controller (MCF) connector C (X30). Check resistance between pin C4 and C15. Is resistance between 50—70 Ω?	**YES:** Go to DTC Check. **NO:** Go to ICF CAN Resistance Check. – – –1/1

㉒ **DTC Check**	Connect connector to main controller (MCF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11911.02-Security Signal Message Error still present?	**YES:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to main controller (MCF). – – –1/1

㉓ **ICF CAN Resistance Check**	Connect all connectors except information controller (ICF) connector C (X34). Check resistance between pin C5 and C11. Is resistance between 50—70 Ω.	**YES:** Go to DTC Check. **NO:** Go to ECM CAN Resistance Check. – – –1/1

㉔ **DTC Check**	Connect connector to information controller (ICF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11911.02-Security Signal Message Error still present?	**YES:** information controller (ICF) malfunction. Replace. See Information Controller (ICF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to information controller (ICF). – – –1/1
㉕ **ECM CAN Resistance Check**	Connect all connectors except engine control module (ECM) connector. Check resistance between pin 18 (CAN High) and pin 37 (CAN Low) wires in connector. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Go to Monitor Controller CAN Resistance Check. – – –1/1
㉖ **DTC Check**	Connect connector to engine control module (ECM). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11911.02-Security Signal Message Error still present?	**YES:** Engine control module (ECM) malfunction. Replace. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to engine control module (ECM). – – –1/1
㉗ **Monitor Controller CAN Resistance Check**	Connect all connectors except monitor controller connector B (X20). Check resistance between pins B6 and B7. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Malfunction in any controller on CAN. – – –1/1
㉘ **DTC Check**	Connect connector to monitor controller. Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11911.02-Security Signal Message Error still present?	**YES:** Monitor controller malfunction. Replace. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Check the connection to monitor controller. – – –1/1

11914.02 — Radiator Water Temperature Message Error

NOTE: Radiator coolant temperature is determined by the engine control module (ECM) and sent over CAN

MS12501,0000068 –19–24JAN06–1/1

Controller Area Network (CAN) Diagnostics

– – –1/1

❶ **CAN Harness Check**	Check harness connections to controllers and between harnesses. Clear codes and re-check DTCs. Is DTC 11914.02-Radiator Water Temperature Message Error still present?	**YES:** Go to Continuity Check MCF and ICF. **NO:** Main controller (MCF) and harness are OK. – – –1/1

❷ **Continuity Check MCF and ICF**	Check for continuity between main controller (MCF) pin C4 and information controller (ICF) pin C5. Check for continuity between main controller (MCF) pin C15 and information controller (ICF) pin C11. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and ECM. **NO:** Open circuit in CAN between main controller (MCF) and information controller (ICF). Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) – – –1/1

❸ **Continuity Check MCF and ECM**	Check for continuity between main controller (MCF) pin C4 and engine control module (ECM) pin 18. Check for continuity between main controller (MCF) pin C15 and engine control module (ECM) pin 37. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and Monitor Unit. **NO:** Open circuit in CAN between main controller (MCF) and engine control module (ECM). Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Continuity Check MCF and Monitor Unit**	Check for continuity between main controller (MCF) pin C4 and monitor controller pin B7. Check for continuity between main controller (MCF) pin C15 and monitor controller pin B6. Is there continuity between the connectors?	**YES:** Go to MCF Short to Ground Check. **NO:** Open circuit in CAN between main controller (MCF) and monitor controller. Repair or replace harnesses. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) – – –1/1

❺ **MCF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and main controller (MCF) pins A2, A13, B8, and B18. Check for continuity between MCF pin C15 an MCF pins A2, A13, B8, and B18. Is there continuity between the CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Ground Check. – – –1/1

❻ **ECM Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Ground Check. – – –1/1

❼ **ICF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C14 and C15. Check for continuity between information controller (ICF) pin C11 and pins C14 and C15. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Ground Check. – – –1/1

❽ **Monitor Controller Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and pin B11. Check for continuity between monitor controller pin B6 and pin B11. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Power Check. – – –1/1

❾ **MCF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and pins A1, A12, B7, and B17. Check for continuity between main controller (MCF) pin C15 and pins A1, A12, B7, and B17. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Power Check. – – –1/1

❿ **ECM Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 2 and 5 (power). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 2 and 5 (power). Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Power Check. – – –1/1
⓫ **ICF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C1 and C2. Check for continuity between information controller (ICF) pin C11 and pins C1 and C2. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Power Check. – – –1/1
⓬ **Monitor Controller Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A16. Check for continuity between monitor controller pin B6 and A16. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Key Switch Signal Check. – – –1/1
⓭ **MCF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and B16. Check for continuity between main controller (MCF) pin C15 and B16. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Key Switch Signal Check. – – –1/1

⑭ **ECM Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pin 24 (key switch signal wire). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pin 24 (key switch signal wire). Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Key Switch Signal Check. – – –1/1
⑮ **ICF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and C7. Check for continuity between information controller (ICF) pin C11 and C7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Key Switch Signal Check. – – –1/1
⑯ **Monitor Controller Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A7. Check for continuity between monitor controller pin B6 and A7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN High and Low Side Continuity Check. – – –1/1
⑰ **MCF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pins C4 and C15. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM CAN High and Low Side Continuity Check. – – –1/1

⑱ **ECM CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High and Low wires). Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF CAN High and Low Side Continuity Check. – – –1/1

⑲ **ICF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pins C5 and C11. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller CAN High and Low Side Continuity Check. – – –1/1

⑳ **Monitor Controller CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pins B6 and B7. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN Resistance Check. – – –1/1

㉑ **MCF CAN Resistance Check**	Connect all connectors except main controller (MCF) connector C (X30). Check resistance between pin C4 and C15. Is resistance between 50—70 Ω?	**YES:** Go to DTC Check. **NO:** Go to ICF CAN Resistance Check. – – –1/1

㉒ **DTC Check**	Connect connector to main controller (MCF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11914.02-Radiator Water Temperature Message Error still present?	**YES:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to main controller (MCF). – – –1/1

㉓ **ICF CAN Resistance Check**	Connect all connectors except information controller (ICF) connector C (X34). Check resistance between pin C5 and C11. Is resistance between 50—70 Ω.	**YES:** Go to DTC Check. **NO:** Go to ECM CAN Resistance Check. – – –1/1

㉔ **DTC Check**	Connect connector to information controller (ICF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11914.02-Radiator Water Temperature Message Error still present?	**YES:** information controller (ICF) malfunction. Replace. See Information Controller (ICF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to information controller (ICF). – – –1/1

㉕ **ECM CAN Resistance Check**	Connect all connectors except engine control module (ECM) connector. Check resistance between pin 18 (CAN High) and pin 37 (CAN Low) wires in connector. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Go to Monitor Controller CAN Resistance Check. – – –1/1

㉖ **DTC Check**	Connect connector to engine control module (ECM). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11914.02-Radiator Water Temperature Message Error still present?	**YES:** Engine control module (ECM) malfunction. Replace. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to engine control module (ECM). – – –1/1

㉗ **Monitor Controller CAN Resistance Check**	Connect all connectors except monitor controller connector B (X20). Check resistance between pins B6 and B7. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Malfunction in any controller on CAN. – – –1/1

㉘ **DTC Check**	Connect connector to monitor controller. Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11914.02-Radiator Water Temperature Message Error still present?	**YES:** Monitor controller malfunction. Replace. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Check the connection to monitor controller. – – –1/1

11918.02 — Work Mode Message Error

MS12501,0000069 –19–17JAN06–1/1

Controller Area Network (CAN) Diagnostics

– – –1/1

❶ **CAN Harness Check**	Check harness connections to controllers and between harnesses. Clear codes and re-check DTCs. Is DTC 11918.02-Work Mode Message Error still present?	**YES:** Go to Continuity Check MCF and ICF. **NO:** Main controller (MCF) and harness are OK. – – –1/1

❷ **Continuity Check MCF and ICF**	Check for continuity between main controller (MCF) pin C4 and information controller (ICF) pin C5. Check for continuity between main controller (MCF) pin C15 and information controller (ICF) pin C11. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and ECM. **NO:** Open circuit in CAN between main controller (MCF) and information controller (ICF). Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) – – –1/1

❸ **Continuity Check MCF and ECM**	Check for continuity between main controller (MCF) pin C4 and engine control module (ECM) pin 18. Check for continuity between main controller (MCF) pin C15 and engine control module (ECM) pin 37. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and Monitor Unit. **NO:** Open circuit in CAN between main controller (MCF) and engine control module (ECM). Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Continuity Check MCF and Monitor Unit**	Check for continuity between main controller (MCF) pin C4 and monitor controller pin B7. Check for continuity between main controller (MCF) pin C15 and monitor controller pin B6. Is there continuity between the connectors?	**YES:** Go to MCF Short to Ground Check. **NO:** Open circuit in CAN between main controller (MCF) and monitor controller. Repair or replace harnesses. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) – – –1/1

❺ **MCF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and main controller (MCF) pins A2, A13, B8, and B18. Check for continuity between MCF pin C15 an MCF pins A2, A13, B8, and B18. Is there continuity between the CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Ground Check. – – –1/1

⑥ **ECM Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Ground Check. – – –1/1
⑦ **ICF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C14 and C15. Check for continuity between information controller (ICF) pin C11 and pins C14 and C15. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Ground Check. – – –1/1
⑧ **Monitor Controller Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and pin B11. Check for continuity between monitor controller pin B6 and pin B11. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Power Check. – – –1/1
⑨ **MCF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and pins A1, A12, B7, and B17. Check for continuity between main controller (MCF) pin C15 and pins A1, A12, B7, and B17. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Power Check. – – –1/1

❿ **ECM Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 2 and 5 (power). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 2 and 5 (power). Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Power Check. – – –1/1

⓫ **ICF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C1 and C2. Check for continuity between information controller (ICF) pin C11 and pins C1 and C2. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Power Check. – – –1/1

⓬ **Monitor Controller Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A16. Check for continuity between monitor controller pin B6 and A16. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Key Switch Signal Check. – – –1/1

⓭ **MCF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and B16. Check for continuity between main controller (MCF) pin C15 and B16. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Key Switch Signal Check. – – –1/1

⑭ **ECM Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pin 24 (key switch signal wire). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pin 24 (key switch signal wire). Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Key Switch Signal Check. – – –1/1
⑮ **ICF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and C7. Check for continuity between information controller (ICF) pin C11 and C7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Key Switch Signal Check. – – –1/1
⑯ **Monitor Controller Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A7. Check for continuity between monitor controller pin B6 and A7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN High and Low Side Continuity Check. – – –1/1
⑰ **MCF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pins C4 and C15. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM CAN High and Low Side Continuity Check. – – –1/1

⑱ **ECM CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High and Low wires). Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF CAN High and Low Side Continuity Check. – – –1/1

⑲ **ICF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pins C5 and C11. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller CAN High and Low Side Continuity Check. – – –1/1

⑳ **Monitor Controller CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pins B6 and B7. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN Resistance Check. – – –1/1

㉑ **MCF CAN Resistance Check**	Connect all connectors except main controller (MCF) connector C (X30). Check resistance between pin C4 and C15. Is resistance between 50—70 Ω?	**YES:** Go to DTC Check. **NO:** Go to ICF CAN Resistance Check. – – –1/1

㉒ **DTC Check**	Connect connector to main controller (MCF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11918.02-Work Mode Message Error still present?	**YES:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to main controller (MCF). – – –1/1

㉓ **ICF CAN Resistance Check**	Connect all connectors except information controller (ICF) connector C (X34). Check resistance between pin C5 and C11. Is resistance between 50—70 Ω.	**YES:** Go to DTC Check. **NO:** Go to ECM CAN Resistance Check. – – –1/1

㉔ **DTC Check**	Connect connector to information controller (ICF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11918.02-Work Mode Message Error still present?	**YES:** information controller (ICF) malfunction. Replace. See Information Controller (ICF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to information controller (ICF). – – –1/1

㉕ **ECM CAN Resistance Check**	Connect all connectors except engine control module (ECM) connector. Check resistance between pin 18 (CAN High) and pin 37 (CAN Low) wires in connector. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Go to Monitor Controller CAN Resistance Check. – – –1/1

㉖ **DTC Check**	Connect connector to engine control module (ECM). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11918.02-Work Mode Message Error still present?	**YES:** Engine control module (ECM) malfunction. Replace. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to engine control module (ECM). – – –1/1

㉗ Monitor Controller CAN Resistance Check	Connect all connectors except monitor controller connector B (X20). Check resistance between pins B6 and B7. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Malfunction in any controller on CAN.

– – –1/1

㉘ DTC Check	Connect connector to monitor controller. Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11918.02-Work Mode Message Error still present?	**YES:** Monitor controller malfunction. Replace. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Check the connection to monitor controller.

– – –1/1

11920.02 — Fuel Flow Rate Message Error

MS12501,000006A –19–17JAN06–1/1

Controller Area Network (CAN) Diagnostics

– – –1/1

❶ CAN Harness Check	Check harness connections to controllers and between harnesses. Clear codes and re-check DTCs. Is DTC 11920.02-Fuel Flow Rate Message Error still present?	**YES:** Go to Continuity Check MCF and ICF. **NO:** Main controller (MCF) and harness are OK.

– – –1/1

❷ Continuity Check MCF and ICF	Check for continuity between main controller (MCF) pin C4 and information controller (ICF) pin C5. Check for continuity between main controller (MCF) pin C15 and information controller (ICF) pin C11. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and ECM. **NO:** Open circuit in CAN between main controller (MCF) and information controller (ICF). Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

– – –1/1

❸ **Continuity Check MCF and ECM**	Check for continuity between main controller (MCF) pin C4 and engine control module (ECM) pin 18. Check for continuity between main controller (MCF) pin C15 and engine control module (ECM) pin 37. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and Monitor Unit. **NO:** Open circuit in CAN between main controller (MCF) and engine control module (ECM). Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Continuity Check MCF and Monitor Unit**	Check for continuity between main controller (MCF) pin C4 and monitor controller pin B7. Check for continuity between main controller (MCF) pin C15 and monitor controller pin B6. Is there continuity between the connectors?	**YES:** Go to MCF Short to Ground Check. **NO:** Open circuit in CAN between main controller (MCF) and monitor controller. Repair or replace harnesses. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) – – –1/1

❺ **MCF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and main controller (MCF) pins A2, A13, B8, and B18. Check for continuity between MCF pin C15 an MCF pins A2, A13, B8, and B18. Is there continuity between the CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Ground Check. – – –1/1

❻ **ECM Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Ground Check. – – –1/1

❼ **ICF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C14 and C15. Check for continuity between information controller (ICF) pin C11 and pins C14 and C15. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Ground Check. – – –1/1

❽ **Monitor Controller Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and pin B11. Check for continuity between monitor controller pin B6 and pin B11. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Power Check. – – –1/1

❾ **MCF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and pins A1, A12, B7, and B17. Check for continuity between main controller (MCF) pin C15 and pins A1, A12, B7, and B17. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Power Check. – – –1/1

❿ **ECM Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 2 and 5 (power). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 2 and 5 (power). Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Power Check. – – –1/1
⓫ **ICF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C1 and C2. Check for continuity between information controller (ICF) pin C11 and pins C1 and C2. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Power Check. – – –1/1
⓬ **Monitor Controller Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A16. Check for continuity between monitor controller pin B6 and A16. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Key Switch Signal Check. – – –1/1
⓭ **MCF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and B16. Check for continuity between main controller (MCF) pin C15 and B16. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Key Switch Signal Check. – – –1/1

⑭ **ECM Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pin 24 (key switch signal wire). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pin 24 (key switch signal wire). Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Key Switch Signal Check. – – –1/1

⑮ **ICF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and C7. Check for continuity between information controller (ICF) pin C11 and C7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Key Switch Signal Check. – – –1/1

⑯ **Monitor Controller Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A7. Check for continuity between monitor controller pin B6 and A7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN High and Low Side Continuity Check. – – –1/1

⑰ **MCF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pins C4 and C15. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM CAN High and Low Side Continuity Check. – – –1/1

⑱ **ECM CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High and Low wires). Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF CAN High and Low Side Continuity Check. – – –1/1
⑲ **ICF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pins C5 and C11. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller CAN High and Low Side Continuity Check. – – –1/1
⑳ **Monitor Controller CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pins B6 and B7. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN Resistance Check. – – –1/1
㉑ **MCF CAN Resistance Check**	Connect all connectors except main controller (MCF) connector C (X30). Check resistance between pin C4 and C15. Is resistance between 50—70 Ω?	**YES:** Go to DTC Check. **NO:** Go to ICF CAN Resistance Check. – – –1/1

㉒ **DTC Check**	Connect connector to main controller (MCF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11920.02-Fuel Flow Rate Message Error still present?	**YES:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to main controller (MCF). – – –1/1
㉓ **ICF CAN Resistance Check**	Connect all connectors except information controller (ICF) connector C (X34). Check resistance between pin C5 and C11. Is resistance between 50—70 Ω.	**YES:** Go to DTC Check. **NO:** Go to ECM CAN Resistance Check. – – –1/1
㉔ **DTC Check**	Connect connector to information controller (ICF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11920.02-Fuel Flow Rate Message Error still present?	**YES:** information controller (ICF) malfunction. Replace. See Information Controller (ICF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to information controller (ICF). – – –1/1
㉕ **ECM CAN Resistance Check**	Connect all connectors except engine control module (ECM) connector. Check resistance between pin 18 (CAN High) and pin 37 (CAN Low) wires in connector. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Go to Monitor Controller CAN Resistance Check. – – –1/1
㉖ **DTC Check**	Connect connector to engine control module (ECM). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11920.02-Fuel Flow Rate Message Error still present?	**YES:** Engine control module (ECM) malfunction. Replace. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to engine control module (ECM). – – –1/1

㉗ **Monitor Controller CAN Resistance Check**	Connect all connectors except monitor controller connector B (X20). Check resistance between pins B6 and B7. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Malfunction in any controller on CAN. – – –1/1

㉘ **DTC Check**	Connect connector to monitor controller. Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11920.02-Fuel Flow Rate Message Error still present?	**YES:** Monitor controller malfunction. Replace. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Check the connection to monitor controller. – – –1/1

11976.03 — Auxiliary Valve 2 Feedback Current High

Diagnostic Trouble Code Not Applicable to This Machine.

MS12501,000006B –19–17JAN06–1/1

11976.04 — Auxiliary Valve 2 Feedback Current Low

Diagnostic Trouble Code Not Applicable to This Machine.

MS12501,000006C –19–17JAN06–1/1

11977.03 — Auxiliary Valve 1 Feedback Current High

Diagnostic Trouble Code Not Applicable to This Machine.

MS12501,000006D –19–17JAN06–1/1

11977.04 — Auxiliary Valve 1 Feedback Current Low

Diagnostic Trouble Code Not Applicable to This Machine.

MS12501,000006E –19–17JAN06–1/1

11980.03 — ATT Relief Change Valve Feedback Current High

Diagnostic Trouble Code Not Applicable to This Machine.

MS12501,000006F –19–17JAN06–1/1

11980.04 — ATT Relief Change Valve Feedback Current Low

Diagnostic Trouble Code Not Applicable to This Machine.

MS12501,0000070 –19–17JAN06–1/1

11981.03 — Fan Reversing Solenoid Valve 2 Feedback Current High

MS12501,0000071 –19–17JAN06–1/1

Fan Reversing Solenoid 2 Diagnostics

Hydraulic fan reversing solenoid current 920 mA or higher.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from fan reversing solenoid 2. Check resistance of solenoid. Is resistance between 40—60 ohms?	**YES:** Go to Continuity Check. **NO:** Fan reversing solenoid 2 malfunction.

– – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and fan reversing solenoid 2. Check for continuity between main controller (MCF) connector A pin A32 and fan reversing solenoid 2 harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A29 and fan reversing solenoid 2 harness connector pin 2. Is there continuity between the pins?	**YES:** Fan reversing solenoid 2 malfunction. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

– – –1/1

11981.04 — Fan Reversing Solenoid Valve 2 Feedback Current Low

MS12501,0000072 –19–17JAN06–1/1

Fan Reversing Solenoid 2 Diagnostics

Hydraulic fan reversing solenoid current 56 mA or less.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from fan reversing solenoid 2. Check resistance of solenoid. Is resistance between 40—60 ohms?	**YES:** Go to Continuity Check. **NO:** Fan reversing solenoid 2 malfunction.

– – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and fan reversing solenoid 2. Check for continuity between main controller (MCF) connector A pin A32 and fan reversing solenoid 2 harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A29 and fan reversing solenoid 2 harness connector pin 2. Is there continuity between the pins?	**YES:** Fan reversing solenoid 2 malfunction. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) – – –1/1

11982.03 — Fan Reversing Solenoid Valve 1 Feedback Current High

MS12501,0000073 –19–17JAN06–1/1

Fan Reversing Solenoid 1 Diagnostics

Hydraulic fan reversing solenoid current 920 mA or higher.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from fan reversing solenoid 1. Check resistance of solenoid. Is resistance between 40—60 ohms?	**YES:** Go to Continuity Check. **NO:** Fan reversing solenoid 1 malfunction. – – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and fan reversing solenoid 1. Check for continuity between main controller (MCF) connector A pin A31 and fan reversing solenoid 1 harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A5 and fan reversing solenoid 1 harness connector pin 2. Is there continuity between the pins?	**YES:** Fan reversing solenoid 1 malfunction. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Engine Interface Harness (W5) Wiring Diagram. (Group 9015-10.) – – –1/1

11982.04 — Fan Reversing Solenoid Valve 1 Feedback Current Low

MS12501,0000074 –19–17JAN06–1/1

Fan Reversing Solenoid 1 Diagnostics

Hydraulic fan reversing solenoid current 56 mA or less.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from fan reversing solenoid 1. Check resistance of solenoid. Is resistance between 40—60 ohms?	**YES:** Go to Continuity Check. **NO:** Fan reversing solenoid 1 malfunction.

– – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and fan reversing solenoid 1. Check for continuity between main controller (MCF) connector A pin A31 and fan reversing solenoid 1 harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A5 and fan reversing solenoid 1 harness connector pin 2. Is there continuity between the pins?	**YES:** Fan reversing solenoid 1 malfunction. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Engine Interface Harness (W5) Wiring Diagram. (Group 9015-10.)

– – –1/1

11983.02 — Intake Air Temperature Message Error

MS12501,0000075 –19–17JAN06–1/1

Controller Area Network (CAN) Diagnostics

– – –1/1

❶ **CAN Harness Check**	Check harness connections to controllers and between harnesses. Clear codes and re-check DTCs. Is DTC 11983.02-Intake Air Temperature Message Error still present?	**YES:** Go to Continuity Check MCF and ICF. **NO:** Main controller (MCF) and harness are OK. – – –1/1

❷ **Continuity Check MCF and ICF**	Check for continuity between main controller (MCF) pin C4 and information controller (ICF) pin C5. Check for continuity between main controller (MCF) pin C15 and information controller (ICF) pin C11. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and ECM. **NO:** Open circuit in CAN between main controller (MCF) and information controller (ICF). Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) – – –1/1

❸ **Continuity Check MCF and ECM**	Check for continuity between main controller (MCF) pin C4 and engine control module (ECM) pin 18. Check for continuity between main controller (MCF) pin C15 and engine control module (ECM) pin 37. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and Monitor Unit. **NO:** Open circuit in CAN between main controller (MCF) and engine control module (ECM). Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Continuity Check MCF and Monitor Unit**	Check for continuity between main controller (MCF) pin C4 and monitor controller pin B7. Check for continuity between main controller (MCF) pin C15 and monitor controller pin B6. Is there continuity between the connectors?	**YES:** Go to MCF Short to Ground Check. **NO:** Open circuit in CAN between main controller (MCF) and monitor controller. Repair or replace harnesses. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) – – –1/1

❺ **MCF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and main controller (MCF) pins A2, A13, B8, and B18. Check for continuity between MCF pin C15 an MCF pins A2, A13, B8, and B18. Is there continuity between the CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Ground Check. – – –1/1

❻ **ECM Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Ground Check. – – –1/1

❼ **ICF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C14 and C15. Check for continuity between information controller (ICF) pin C11 and pins C14 and C15. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Ground Check. – – –1/1

❽ **Monitor Controller Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and pin B11. Check for continuity between monitor controller pin B6 and pin B11. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Power Check. – – –1/1

❾ **MCF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and pins A1, A12, B7, and B17. Check for continuity between main controller (MCF) pin C15 and pins A1, A12, B7, and B17. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Power Check. – – –1/1

❿ **ECM Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 2 and 5 (power). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 2 and 5 (power). Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Power Check. – – –1/1

⓫ **ICF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C1 and C2. Check for continuity between information controller (ICF) pin C11 and pins C1 and C2. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Power Check. – – –1/1

⓬ **Monitor Controller Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A16. Check for continuity between monitor controller pin B6 and A16. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Key Switch Signal Check. – – –1/1

⓭ **MCF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and B16. Check for continuity between main controller (MCF) pin C15 and B16. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Key Switch Signal Check. – – –1/1

⓮ **ECM Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pin 24 (key switch signal wire). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pin 24 (key switch signal wire). Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Key Switch Signal Check. – – –1/1

⑮ **ICF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and C7. Check for continuity between information controller (ICF) pin C11 and C7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Key Switch Signal Check. – – –1/1

⑯ **Monitor Controller Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A7. Check for continuity between monitor controller pin B6 and A7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN High and Low Side Continuity Check. – – –1/1

⑰ **MCF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pins C4 and C15. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM CAN High and Low Side Continuity Check. – – –1/1

⑱ **ECM CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High and Low wires). Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF CAN High and Low Side Continuity Check. – – –1/1

⑲ **ICF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pins C5 and C11. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller CAN High and Low Side Continuity Check. – – –1/1

⑳ **Monitor Controller CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pins B6 and B7. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN Resistance Check. – – –1/1

㉑ **MCF CAN Resistance Check**	Connect all connectors except main controller (MCF) connector C (X30). Check resistance between pin C4 and C15. Is resistance between 50—70 Ω?	**YES:** Go to DTC Check. **NO:** Go to ICF CAN Resistance Check. – – –1/1

㉒ **DTC Check**	Connect connector to main controller (MCF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11983.02-Intake Air Temperature Message Error still present?	**YES:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to main controller (MCF). – – –1/1

㉓ **ICF CAN Resistance Check**	Connect all connectors except information controller (ICF) connector C (X34). Check resistance between pin C5 and C11. Is resistance between 50—70 Ω.	**YES:** Go to DTC Check. **NO:** Go to ECM CAN Resistance Check. – – –1/1

㉔ **DTC Check**	Connect connector to information controller (ICF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11983.02-Intake Air Temperature Message Error still present?	**YES:** information controller (ICF) malfunction. Replace. See Information Controller (ICF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to information controller (ICF). – – –1/1

㉕ **ECM CAN Resistance Check**	Connect all connectors except engine control module (ECM) connector. Check resistance between pin 18 (CAN High) and pin 37 (CAN Low) wires in connector. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Go to Monitor Controller CAN Resistance Check. – – –1/1

㉖ **DTC Check**	Connect connector to engine control module (ECM). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11983.02-Intake Air Temperature Message Error still present?	**YES:** Engine control module (ECM) malfunction. Replace. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to engine control module (ECM). – – –1/1

㉗ **Monitor Controller CAN Resistance Check**	Connect all connectors except monitor controller connector B (X20). Check resistance between pins B6 and B7. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Malfunction in any controller on CAN. – – –1/1

㉘ **DTC Check**	Connect connector to monitor controller. Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11983.02-Intake Air Temperature Message Error still present?	**YES:** Monitor controller malfunction. Replace. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Check the connection to monitor controller. – – –1/1

11984.02 — Boost Temperature Message Error

MS12501,0000076 –19–17JAN06–1/1

Controller Area Network (CAN) Diagnostics

– – –1/1

❶ **CAN Harness Check**	Check harness connections to controllers and between harnesses. Clear codes and re-check DTCs. Is DTC 11984.02-Boost Temperature Message Error still present?	**YES:** Go to Continuity Check MCF and ICF. **NO:** Main controller (MCF) and harness are OK. – – –1/1

❷ **Continuity Check MCF and ICF**	Check for continuity between main controller (MCF) pin C4 and information controller (ICF) pin C5. Check for continuity between main controller (MCF) pin C15 and information controller (ICF) pin C11. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and ECM. **NO:** Open circuit in CAN between main controller (MCF) and information controller (ICF). Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) – – –1/1

❸ **Continuity Check MCF and ECM**	Check for continuity between main controller (MCF) pin C4 and engine control module (ECM) pin 18. Check for continuity between main controller (MCF) pin C15 and engine control module (ECM) pin 37. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and Monitor Unit. **NO:** Open circuit in CAN between main controller (MCF) and engine control module (ECM). Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Continuity Check MCF and Monitor Unit**	Check for continuity between main controller (MCF) pin C4 and monitor controller pin B7. Check for continuity between main controller (MCF) pin C15 and monitor controller pin B6. Is there continuity between the connectors?	**YES:** Go to MCF Short to Ground Check. **NO:** Open circuit in CAN between main controller (MCF) and monitor controller. Repair or replace harnesses. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) – – –1/1

❺ **MCF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and main controller (MCF) pins A2, A13, B8, and B18. Check for continuity between MCF pin C15 an MCF pins A2, A13, B8, and B18. Is there continuity between the CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Ground Check. – – –1/1

❻ **ECM Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Ground Check. – – –1/1

❼ **ICF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C14 and C15. Check for continuity between information controller (ICF) pin C11 and pins C14 and C15. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Ground Check. – – –1/1
❽ **Monitor Controller Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and pin B11. Check for continuity between monitor controller pin B6 and pin B11. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Power Check. – – –1/1
❾ **MCF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and pins A1, A12, B7, and B17. Check for continuity between main controller (MCF) pin C15 and pins A1, A12, B7, and B17. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Power Check. – – –1/1
❿ **ECM Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 2 and 5 (power). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 2 and 5 (power). Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Power Check. – – –1/1

⑪ **ICF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C1 and C2. Check for continuity between information controller (ICF) pin C11 and pins C1 and C2. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Power Check. – – –1/1

⑫ **Monitor Controller Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A16. Check for continuity between monitor controller pin B6 and A16. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Key Switch Signal Check. – – –1/1

⑬ **MCF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and B16. Check for continuity between main controller (MCF) pin C15 and B16. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Key Switch Signal Check. – – –1/1

⑭ **ECM Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pin 24 (key switch signal wire). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pin 24 (key switch signal wire). Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Key Switch Signal Check. – – –1/1

⓯ **ICF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and C7. Check for continuity between information controller (ICF) pin C11 and C7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Key Switch Signal Check. – – –1/1

⓰ **Monitor Controller Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A7. Check for continuity between monitor controller pin B6 and A7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN High and Low Side Continuity Check. – – –1/1

⓱ **MCF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pins C4 and C15. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM CAN High and Low Side Continuity Check. – – –1/1

⓲ **ECM CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High and Low wires). Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF CAN High and Low Side Continuity Check. – – –1/1

⑲ **ICF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pins C5 and C11. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller CAN High and Low Side Continuity Check. – – –1/1

⑳ **Monitor Controller CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pins B6 and B7. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN Resistance Check. – – –1/1

㉑ **MCF CAN Resistance Check**	Connect all connectors except main controller (MCF) connector C (X30). Check resistance between pin C4 and C15. Is resistance between 50—70 Ω?	**YES:** Go to DTC Check. **NO:** Go to ICF CAN Resistance Check. – – –1/1

㉒ **DTC Check**	Connect connector to main controller (MCF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11984.02-Boost Temperature Message Error still present?	**YES:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to main controller (MCF). – – –1/1

㉓ **ICF CAN Resistance Check**	Connect all connectors except information controller (ICF) connector C (X34). Check resistance between pin C5 and C11. Is resistance between 50—70 Ω.	**YES:** Go to DTC Check. **NO:** Go to ECM CAN Resistance Check. – – –1/1

㉔ **DTC Check**	Connect connector to information controller (ICF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11984.02-Boost Temperature Message Error still present?	**YES:** information controller (ICF) malfunction. Replace. See Information Controller (ICF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to information controller (ICF). – – –1/1

㉕ **ECM CAN Resistance Check**	Connect all connectors except engine control module (ECM) connector. Check resistance between pin 18 (CAN High) and pin 37 (CAN Low) wires in connector. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Go to Monitor Controller CAN Resistance Check. – – –1/1

㉖ **DTC Check**	Connect connector to engine control module (ECM). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11984.02-Boost Temperature Message Error still present?	**YES:** Engine control module (ECM) malfunction. Replace. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to engine control module (ECM). – – –1/1

㉗ **Monitor Controller CAN Resistance Check**	Connect all connectors except monitor controller connector B (X20). Check resistance between pins B6 and B7. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Malfunction in any controller on CAN. – – –1/1

㉘ **DTC Check**	Connect connector to monitor controller. Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11984.02-Boost Temperature Message Error still present?	**YES:** Monitor controller malfunction. Replace. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Check the connection to monitor controller. – – –1/1

11989.03 — Boom Mode Solenoid (SC) Valve Feedback Current High

MS12501,0000077 –19–24JAN06–1/1

Boom Mode Solenoid (SC) Diagnostics

Boom mode solenoid (SC) current 920 mA or higher.

– – –1/1

❶ **Solenoid Resistance Check**	Disconnect harness connector from boom mode solenoid (SC). Check resistance of solenoid. Is resistance between 14.8—22.2 ohms?	**YES:** Go to Continuity Check. **NO:** Boom mode solenoid (SC) malfunction. Replace solenoid.

– – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and boom mode solenoid (SC). Check for continuity between main controller (MCF) connector A pin A10 and boom mode solenoid (SC) harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A6 and boom mode solenoid (SC) harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.)

– – –1/1

❸ **Solenoid Function Check**	Switch boom mode solenoid (SC) harness connector with another solenoid valve in solenoid valve manifold. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code stay with boom mode solenoid (SC)?	**YES:** Boom mode solenoid (SC) malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

11989.04 — Boom Mode Solenoid (SC) Valve Feedback Current Low

MS12501,0000078 –19–17JAN06–1/1

Boom Mode Solenoid (SC) Diagnostics

Boom mode solenoid (SC) current 56 mA or less.

– – –1/1

➊ **Solenoid Resistance Check**	Disconnect harness connector from boom mode solenoid (SC). Check resistance of solenoid. Is resistance between 14.8—22.2 ohms?	**YES:** Go to Continuity Check. **NO:** Boom mode solenoid (SC) malfunction. Replace solenoid.

– – –1/1

➋ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and boom mode solenoid (SC). Check for continuity between main controller (MCF) connector A pin A10 and boom mode solenoid (SC) harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A6 and boom mode solenoid (SC) harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.)

– – –1/1

➌ **Solenoid Function Check**	Switch boom mode solenoid (SC) harness connector with another solenoid valve in solenoid valve manifold. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code stay with boom mode solenoid (SC)?	**YES:** Boom mode solenoid (SC) malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

11991.03 — Travel Right Pilot Pressure Sensor Circuit Voltage High

MS12501,0000079 –19–17JAN06–1/1

Travel Right Pilot Pressure Sensor Diagnostics

Travel right pilot pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch travel right pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow travel right pilot pressure sensor?	**YES:** Travel right pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check. – – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of travel right pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check. – – –1/1

❸ **Open Circuit Check**	Disconnect harness from travel right pilot pressure sensor and main controller (MCF). Check continuity between travel right pilot pressure sensor connector pin 2 and main controller (MCF) connector D pin D9. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Short Circuit Check**	Disconnect harness from travel right pilot pressure sensor and main controller (MCF). Check continuity between travel right pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect travel right pilot pressure sensor from harness. Check voltage between travel right pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and travel right pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and travel right pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11991.04 — Travel Right Pilot Pressure Sensor Circuit Voltage Low

MS12501,000007A –19–17JAN06–1/1

Travel Right Pilot Pressure Sensor Diagnostics

Travel right pilot pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch travel right pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow travel right pilot pressure sensor?	**YES:** Travel right pilot pressure sensor malfunction. **NO:** Go to Sensor Circuit Check. – – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of travel right pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check. – – –1/1

❸ **Open Circuit Check**	Disconnect harness from travel right pilot pressure sensor and main controller (MCF). Check continuity between travel right pilot pressure sensor connector pin 2 and main controller (MCF) connector D pin D9. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Short Circuit Check**	Disconnect harness from travel right pilot pressure sensor and main controller (MCF). Check continuity between travel right pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect travel right pilot pressure sensor from harness. Check voltage between travel right pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and travel right pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and travel right pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11992.03 — Pump 2 (5-Spool) Control Pressure Sensor Circuit Voltage High

MS12501,000007B –19–17JAN06–1/1

Pump 2 (5-Spool) Control Pressure Sensor Diagnostics

Pump 2 (5-spool) control pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch pump 2 (5-spool) control pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow pump 2 (5-spool) control pressure sensor?	**YES:** Pump 2 (5-spool) control pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of pump 2 (5-spool) control pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from pump 2 (5-spool) control pressure sensor and main controller (MCF). Check continuity between pump 2 (5-spool) control pressure sensor connector pin 2 and main controller (MCF) connector D pin D4. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from pump 2 (5-spool) control pressure sensor and main controller (MCF). Check continuity between pump 2 (5-spool) control pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect pump 2 (5-spool) control pressure sensor from harness. Check voltage between pump 2 (5-spool) control pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and pump 2 (5-spool) control pressure sensor pin 3. Repair or replace harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and pump 2 (5-spool) control pressure sensor pin 1. Repair or replace harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) – – –1/1

11992.04 — Pump 2 (5-Spool) Control Pressure Sensor Circuit Voltage Low

MS12501,000007C –19–17JAN06–1/1

Pump 2 (5-Spool) Control Pressure Sensor Diagnostics

Pump 2 (5-spool) control pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch pump 2 (5-spool) control pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow pump 2 (5-spool) control pressure sensor?	**YES:** Pump 2 (5-spool) control pressure sensor malfunction. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of pump 2 (5-spool) control pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from pump 2 (5-spool) control pressure sensor and main controller (MCF). Check continuity between pump 2 (5-spool) control pressure sensor connector pin 2 and main controller (MCF) connector D pin D4. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from pump 2 (5-spool) control pressure sensor and main controller (MCF). Check continuity between pump 2 (5-spool) control pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect pump 2 (5-spool) control pressure sensor from harness. Check voltage between pump 2 (5-spool) control pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and pump 2 (5-spool) control pressure sensor pin 3. Repair or replace harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and pump 2 (5-spool) control pressure sensor pin 1. Repair or replace harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) – – –1/1

11993.03 — Travel Left Pilot Pressure Sensor Circuit Voltage High

MS12501,000007D –19–17JAN06–1/1

Travel Left Pilot Pressure Sensor Diagnostics

Travel left pilot pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch travel left pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow travel left pilot pressure sensor?	**YES:** Travel left pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of travel left pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from travel left pilot pressure sensor and main controller (MCF). Check continuity between travel left pilot pressure sensor connector pin 2 and main controller (MCF) connector D pin D14. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from travel left pilot pressure sensor and main controller (MCF). Check continuity between travel left pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect travel left pilot pressure sensor from harness. Check voltage between travel left pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and travel left pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and travel left pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11993.04 — Left Travel Pilot Pressure Sensor Circuit Low Input

MS12501,000007E –19–17JAN06–1/1

Travel Left Pilot Pressure Sensor Diagnostics

Travel left pilot pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch travel left pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow travel left pilot pressure sensor?	**YES:** Travel left pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of travel left pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from travel left pilot pressure sensor and main controller (MCF). Check continuity between travel left pilot pressure sensor connector pin 2 and main controller (MCF) connector D pin D14. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from travel left pilot pressure sensor and main controller (MCF). Check continuity between travel left pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

❺ **Harness Voltage Check**	Disconnect travel left pilot pressure sensor from harness. Check voltage between travel left pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and travel left pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and travel left pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

11994.03 — Pump 1 (4-Spool) Control Pressure Sensor Circuit Voltage High

MS12501,000007F –19–17JAN06–1/1

Pump 1 (4-Spool) Control Pressure Sensor Diagnostics

Pump 1 (4-spool) control pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch pump 1 (4-spool) control pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow pump 1 (4-spool) control pressure sensor?	**YES:** Pump 1 (4-spool) control pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of pump 1 (4-spool) control pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from pump 1 (4-spool) control pressure sensor and main controller (MCF). Check continuity between pump 1 (4-spool) control pressure sensor connector pin 2 and main controller (MCF) connector D pin D11. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ Short Circuit Check	Disconnect harness from pump 1 (4-spool) control pressure sensor and main controller (MCF). Check continuity between pump 1 (4-spool) control pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

❺ Harness Voltage Check	Disconnect pump 1 (4-spool) control pressure sensor from harness. Check voltage between pump 1 (4-spool) control pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and pump 1 (4-spool) control pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and pump 1 (4-spool) control pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.)

– – –1/1

11994.04 — Pump 1 (4-Spool) Control Pressure Sensor Circuit Voltage Low

MS12501,0000080 –19–17JAN06–1/1

Pump 1 (4-Spool) Control Pressure Sensor Diagnostics

Pump 1 (4-spool) control pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch pump 1 (4-spool) control pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow pump 1 (4-spool) control pressure sensor?	**YES:** Pump 1 (4-spool) control pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of pump 1 (4-spool) control pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from pump 1 (4-spool) control pressure sensor and main controller (MCF). Check continuity between pump 1 (4-spool) control pressure sensor connector pin 2 and main controller (MCF) connector D pin D11. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from pump 1 (4-spool) control pressure sensor and main controller (MCF). Check continuity between pump 1 (4-spool) control pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect pump 1 (4-spool) control pressure sensor from harness. Check voltage between pump 1 (4-spool) control pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and pump 1 (4-spool) control pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and pump 1 (4-spool) control pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram , see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) – – –1/1

11995.03 — Arm Roll-Out Pilot Pressure Sensor Circuit Voltage High

MS12501,0000081 –19–17JAN06–1/1

Arm Out Pilot Pressure Sensor Diagnostics

Arm out pilot pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch arm out pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow arm out pilot pressure sensor?	**YES:** Arm out pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check. – – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of arm out pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check. – – –1/1

❸ **Open Circuit Check**	Disconnect harness from arm out pilot pressure sensor and main controller (MCF). Check continuity between arm out pilot pressure sensor connector pin 2 and main controller (MCF) connector D pin D5. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Short Circuit Check**	Disconnect harness from arm out pilot pressure sensor and main controller (MCF). Check continuity between arm out pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect arm out pilot pressure sensor from harness. Check voltage between arm out pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and arm out pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and arm out pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11995.04 — Arm Roll-Out Pilot Pressure Sensor Circuit Low Input

MS12501,0000082 –19–17JAN06–1/1

Arm Out Pilot Pressure Sensor Diagnostics

Arm out pilot pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch arm out pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow arm out pilot pressure sensor?	**YES:** Arm out pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of arm out pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from arm out pilot pressure sensor and main controller (MCF). Check continuity between arm out pilot pressure sensor connector pin 2 and main controller (MCF) connector D pin D5. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from arm out pilot pressure sensor and main controller (MCF). Check continuity between arm out pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect arm out pilot pressure sensor from harness. Check voltage between arm out pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and arm out pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and arm out pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11997.03 — Bucket Dump Pilot Pressure Sensor Circuit Voltage High

MS12501,0000083 –19–17JAN06–1/1

Bucket Dump Pilot Pressure Sensor Diagnostics

Bucket dump pilot pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch bucket dump pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow bucket dump pilot pressure sensor?	**YES:** Bucket dump pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of bucket dump pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from bucket dump pilot pressure sensor and main controller (MCF). Check continuity between bucket dump pilot pressure sensor connector pin 2 and main controller (MCF) connector C pin C11. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from bucket dump pilot pressure sensor and main controller (MCF). Check continuity between bucket dump pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect bucket dump pilot pressure sensor from harness. Check voltage between bucket dump pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and bucket dump pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and bucket dump pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11997.04 — Bucket Dump Pilot Pressure Sensor Circuit Voltage Low

MS12501,0000084 –19–17JAN06–1/1

Bucket Dump Pilot Pressure Sensor Diagnostics

Bucket dump pilot pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch bucket dump pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow bucket dump pilot pressure sensor?	**YES:** Bucket dump pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of bucket dump pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from bucket dump pilot pressure sensor and main controller (MCF). Check continuity between bucket dump pilot pressure sensor connector pin 2 and main controller (MCF) connector C pin C11. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from bucket dump pilot pressure sensor and main controller (MCF). Check continuity between bucket dump pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect bucket dump pilot pressure sensor from harness. Check voltage between bucket dump pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and bucket dump pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and bucket dump pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11998.03 — Boom Down Pilot Pressure Sensor Circuit Voltage High

MS12501,0000085 –19–21FEB06–1/1

Boom Down Pilot Pressure Sensor Diagnostics

Boom down pilot pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch boom down pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow boom down pilot pressure sensor?	**YES:** Boom down pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check. – – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of boom down pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check. – – –1/1

❸ **Open Circuit Check**	Disconnect harness from boom down pilot pressure sensor and main controller (MCF). Check continuity between boom down pilot pressure sensor connector pin 2 and main controller (MCF) connector C pin C1. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Short Circuit Check**	Disconnect harness from boom down pilot pressure sensor and main controller (MCF). Check continuity between boom down pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.)

– – –1/1

❺ **Harness Voltage Check**	Disconnect boom down pilot pressure sensor from harness. Check voltage between boom down pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and boom down pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and boom down pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

11998.04 — Boom Down Pilot Pressure Sensor Circuit Voltage Low

MS12501,0000086 –19–21FEB06–1/1

Boom Down Pilot Pressure Sensor Diagnostics

Boom down pilot pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch boom down pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow boom down pilot pressure sensor?	**YES:** Boom down pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of boom down pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from boom down pilot pressure sensor and main controller (MCF). Check continuity between boom down pilot pressure sensor connector pin 2 and main controller (MCF) connector C pin C1. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from boom down pilot pressure sensor and main controller (MCF). Check continuity between boom down pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect boom down pilot pressure sensor from harness. Check voltage between boom down pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and boom down pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and boom down pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11999.03 — Bucket Curl Pilot Pressure Sensor Circuit Voltage High

MS12501,0000087 –19–17JAN06–1/1

Bucket Curl Pilot Pressure Sensor Diagnostics

Bucket curl pilot pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch bucket curl pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow bucket curl pilot pressure sensor?	**YES:** Bucket curl pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of bucket curl pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from bucket curl pilot pressure sensor and main controller (MCF). Check continuity between bucket curl pilot pressure sensor connector pin 2 and main controller (MCF) connector C pin C2. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from bucket curl pilot pressure sensor and main controller (MCF). Check continuity between bucket curl pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect bucket curl pilot pressure sensor from harness. Check voltage between bucket curl pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and bucket curl pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and bucket curl pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11999.04 — Bucket Curl Pilot Pressure Sensor Circuit Voltage Low

MS12501,000008B –19–17JAN06–1/1

Bucket Curl Pilot Pressure Sensor Diagnostics

Bucket curl pilot pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch bucket curl pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow bucket curl pilot pressure sensor?	**YES:** Bucket curl pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check.

– – –1/1

❷ **Sensor Circuit Check**	Disconnect connector of bucket curl pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check.

– – –1/1

❸ **Open Circuit Check**	Disconnect harness from bucket curl pilot pressure sensor and main controller (MCF). Check continuity between bucket curl pilot pressure sensor connector pin 2 and main controller (MCF) connector C pin C2. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

❹ **Short Circuit Check**	Disconnect harness from bucket curl pilot pressure sensor and main controller (MCF). Check continuity between bucket curl pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect bucket curl pilot pressure sensor from harness. Check voltage between bucket curl pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and bucket curl pilot pressure sensor pin 3.Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and bucket curl pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

Engine Control Module (ECM) Diagnostic Trouble Codes

Engine control module (ECM) diagnostic trouble codes may be viewed on the monitor, by using Dr. ZX, SERVICE ADVISOR™, or by using Tech2. See the following procedures for viewing the engine control module diagnostic trouble codes.

- See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.)
- See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application. (Group 9015-20.)
- See Reading Diagnostic Trouble Codes With Dr. ZX. (Group 9015-20.)
- See Reading Diagnostic Trouble Codes With Tech2 Diagnostic Scan Tool. (Group 9015-20.)

SERVICE ADVISOR is a trademark of Deere & Company

LD30992,000042E –19–21FEB06–1/1

91.02 — Accelerator Sensor 1-2 Comparison (P1271)

Difference in opening angle between accelerator sensors 1-2 is 45 % or more.

See Tech 2 Diagnostic Trouble Code P1271 in Isuzu Engine Trouble Shooting Manual. (1E-465)

JC89288,0000070 –19–14JAN06–1/1

100.03 — Engine Oil Pressure Sensor Voltage Low (P0522)

Voltage less than 0.1 Volts.

See Tech 2 Diagnostic Trouble Code P0522 in Isuzu Engine Trouble Shooting Manual. (1E-365.)

JC89288,0000071 –19–14JAN06–1/1

100.04 — Engine Oil Pressure Sensor Voltage High (P0523)

Voltage more than 4.85 Volts.

See Tech 2 Diagnostic Trouble Code P0523 in Isuzu Engine Trouble Shooting Manual. (1E-371.)

JC89288,0000072 –19–18JAN06–1/1

102.03 — Boost Pressure Sensor Voltage Low (P0237)

Voltage less than 0.1 Volts.

See Tech 2 Diagnostic Trouble Code P0237 in Isuzu Engine Trouble Shooting Manual. (1E-305.)

JC89288,0000073 –19–18JAN06–1/1

102.04 — Boost Pressure Sensor Voltage High (P0238)

Voltage more than 4.9 Volts.

See Tech 2 Diagnostic Trouble Code P0238 in Isuzu Engine Trouble Shooting Manual. (1E-312.)

JC89288,0000074 –19–14JAN06–1/1

105.03 — Boost Temperature Sensor Voltage High (P1113)

Voltage above 4.94 Volts.

See Tech 2 Diagnostic Trouble Code P1113 in Isuzu Engine Trouble Shooting Manual. (1E-437.)

JC89288,0000075 –19–14JAN06–1/1

105.04 — Boost Temperature Sensor Voltage Low (P1112)

Voltage less than 0.1 Volts.

See Tech 2 Diagnostic Trouble Code P1112 in Isuzu Engine Trouble Shooting Manual. (1E-429.)

JC89288,0000076 –19–14JAN06–1/1

108.03 — Barometric Pressure Sensor Voltage Low (P0107)

Voltage less than 0.5 Volts.

See Tech 2 Diagnostic Trouble Code P0107 in Isuzu Engine Trouble Shooting Manual. (1E-204.)

JC89288,0000077 –19–14JAN06–1/1

108.04 — Barometric Pressure Sensor Voltage High (P0108)

Voltage more than 3.8 Volts.

See Tech 2 Diagnostic Trouble Code P0108 in Isuzu Engine Trouble Shooting Manual. (1E-211.)

JC89288,0000078 –19–18JAN06–1/1

110.03 — Engine Coolant Temperature Sensor Voltage High (P0118)

Voltage more than 4.85 Volts.

See Tech 2 Diagnostic Trouble Code P0118 in Isuzu Engine Trouble Shooting Manual. (1E-238.)

JC89288,0000079 –19–18JAN06–1/1

110.04 — Engine Coolant Temperature Sensor Voltage Low (P0117)

Voltage less than 0.1 Volts.

See Tech 2 Diagnostic Trouble Code P0117 in Isuzu Engine Trouble Shooting Manual. (1E-232.)

JC89288,000007A –19–14JAN06–1/1

157.00 — Common Rail Pressure—First Stage (P088)

Rail pressure more than 150 MPa.

See Tech 2 Diagnostic Trouble Code P088 in Isuzu Engine Trouble Shooting Manual. (1E-183.)

JC89288,000007B –19–18JAN06–1/1

157.00 — Common Rail Pressure—Second Stage (P088)

Common Rail Pressure in first stage present with rail pressure of 155 MPa or higher.

See Tech 2 Diagnostic Trouble Code P088 in Isuzu Engine Trouble Shooting Manual. (1E-183.)

JC89288,000007C –19–18JAN06–1/1

157.02 — Common Rail Pressure High (P0089)

Actual fuel rail pressure is 10 MPa or higher than target rail pressure for 8 seconds or more, or actual fuel rail pressure is 10 MPa or higher than target rail pressure for 8 seconds or more during indication of no pressure feed.

See Tech 2 Diagnostic Trouble Code P0089 in Isuzu Engine Trouble Shooting Manual. (1E-188.)

JC89288,000007D –19–14JAN06–1/1

157.03 — Common Rail Pressure Sensor Voltage High (P0193)

Voltage more than 4.5 Volts.

See Tech 2 Diagnostic Trouble Code P0193 in Isuzu Engine Trouble Shooting Manual. (1E-266.)

JC89288,000009E –19–14JAN06–1/1

157.03 — Common Rail Pressure Sensor Voltage Low (P0192)

Voltage Less than 0.7 Volts.

See Tech 2 Diagnostic Trouble Code P0192 in Isuzu Engine Trouble Shooting Manual. (1E-260.)

JC89288,000009F –19–18JAN06–1/1

172.03 — Intake Air Temperature Sensor Voltage High (P0113)

Voltage more than 4.95 Volts.

See Tech 2 Diagnostic Trouble Code P0113 in Isuzu Engine Trouble Shooting Manual. (1E-224.)

JC89288,00000A0 –19–18JAN06–1/1

172.04 — Intake Air Temperature Sensor Voltage Low (P0112)

Voltage less than 0.1 Volts.

See Tech 2 Diagnostic Trouble Code P0112 in Isuzu Engine Trouble Shooting Manual. (1E-218.)

JC89288,00000A1 –19–18JAN06–1/1

174.03 — Fuel Temperature Sensor Voltage High (P0183)

Voltage more than 4.85 Volts

See Tech 2 Diagnostic Trouble Code P0183 in Isuzu Engine Trouble Shooting Manual. (1E-252.)

JC89288,00000A2 –19–18JAN06–1/1

174.04 — Fuel Temperature Sensor Voltage Low (P0182)

Voltage less than 0.1 Volts.

See Tech 2 Diagnostic Trouble Code P0182 in Isuzu Engine Trouble Shooting Manual. (1E-246.)

JC89288,00000A3 –19–18JAN06–1/1

190.00 — Engine Overspeed (P0219)

Engine speed more than 1970 rpm

See Tech 2 Diagnostic Trouble Code P0219 in Isuzu Engine Trouble Shooting Manual. (1E-303.)

JC89288,00000A4 –19–14JAN06–1/1

628.02 — ROM Malfunction (P0601)

ROM is malfunction.

See Tech 2 Diagnostic Trouble Code P0601 in Isuzu Engine Trouble Shooting Manual. (1E-379.)

JC89288,00000A5 –19–24JAN06–1/1

633.07 — Pressure Limiter Open (P0601)

Pressure limiter is open.

See Tech 2 Diagnostic Trouble Code P0601 in Isuzu Engine Trouble Shooting Manual. (1E-379.)

JC89288,00000A6 –19–24JAN06–1/1

636.02 — Camshaft Position Sensor (G-Sensor) Signal Missing (P0340)

Crankshaft position signal exists but camshaft position (G sensor) signal is missing.

See Tech 2 Diagnostic Trouble Code P0340 in Isuzu Engine Trouble Shooting Manual. (1E-331.)

JC89288,00000A7 –19–18JAN06–1/1

636.02 — Camshaft Position Sensor (G-Sensor) Signal Mismatch (P0341)

Camshaft position sensor (G-Sensor) signal is mismatched to crankshaft position sensor.

See Tech 2 Diagnostic Trouble Code P0341 in Isuzu Engine Trouble Shooting Manual. (1E-337.)

JC89288,00000A8 –19–18JAN06–1/1

636.07 — Camshaft Position Sensor (G-Sensor) out of Phase (P1345)

Camshaft position sensor (G-Sensor) is out of phase with crankshaft position sensor.

See Tech 2 Diagnostic Trouble Code P1345 in Isuzu Engine Trouble Shooting Manual. (1E-500.)

JC89288,00000A9 –19–18JAN06–1/1

639.02 — CAN Communication Error (U2104)

CAN Communication Error.

See Tech 2 Diagnostic Trouble Code U2104 in Isuzu Engine Trouble Shooting Manual. (1E-529.)

JC89288,00000AA –19–24JAN06–1/1

639.03 — CAN Timeout (U2106)

CAN data instruction does not complete by a set time.

See Tech 2 Diagnostic Trouble Code U2106 in Isuzu Engine Trouble Shooting Manual. (1E-534.)

JC89288,00000AB –19–18JAN06–1/1

651.03 — Open Circuit in Injection Nozzle #1 (P0201)

Injector #1 feedback signal does not exist.

See Tech 2 Diagnostic Trouble Code P0201 in Isuzu Engine Trouble Shooting Manual. (1E-273.)

JC89288,00000AC –19–14JAN06–1/1

652.03 — Open Circuit in Injection Nozzle #2 (P0202)

Injector #2 feedback signal does not exist.

See Tech 2 Diagnostic Trouble Code P0202 in Isuzu Engine Trouble Shooting Manual. (1E-278.)

JC89288,00000AD –19–18JAN06–1/1

653.03 — Open Circuit in Injection Nozzle #3 (P0203)

Injector #3 feedback signal does not exist.

See Tech 2 Diagnostic Trouble Code P0203 in Isuzu Engine Trouble Shooting Manual. (1E-283.)

JC89288,00000AE –19–18JAN06–1/1

654.03 — Open Circuit in Injection Nozzle #4 (P0204)

Injector #4 feedback signal does not exist.

See Tech 2 Diagnostic Trouble Code P0204 in Isuzu Engine Trouble Shooting Manual. (1E-288.)

JC89288,00000AF –19–24JAN06–1/1

655.03 — Open Circuit in Injection Nozzle #5 (P0205)

Injector #5 feedback signal does not exist.

See Tech 2 Diagnostic Trouble Code P0205 in Isuzu Engine Trouble Shooting Manual. (1E-293.)

JC89288,00000B0 –19–18JAN06–1/1

656.03 — Open Circuit in Injection Nozzle #6 (P0206)

Injector #6 feedback signal does not exist.

See Tech 2 Diagnostic Trouble Code P0206 in Isuzu Engine Trouble Shooting Manual. (1E-298.)

JC89288,00000B1 –19–18JAN06–1/1

723.02 — Crankshaft Position Sensor Signal Missing (P0335)

Camshaft position sensor (G sensor) signal exists but crankshaft position signal is missing.

See Tech 2 Diagnostic Trouble Code P0335 in Isuzu Engine Trouble Shooting Manual. (1E-319.)

JC89288,00000B2 –19–24JAN06–1/1

723.02 — Crankshaft Sensor Mismatch (P0336)

Crankshaft position sensor is mismatched to camshaft position sensor (G sensor).

See Tech 2 Diagnostic Trouble Code P0336 in Isuzu Engine Trouble Shooting Manual. (1E-325.)

JC89288,00000BE –19–24JAN06–1/1

987.03 — Check Engine Lamp Malfunction (P0650)

Check engine indicator lamp malfunction.

See Tech 2 Diagnostic Trouble Code P0650 in Isuzu Engine Trouble Shooting Manual. (1E-397.)

JC89288,00000B3 –19–24JAN06–1/1

1077.02 — CPU Fault Malfunction (P0606)

Controller detects CPU Malfunction.

See Tech 2 Diagnostic Trouble Code P0606 in Isuzu Engine Trouble Shooting Manual. (1E-383.)

JC89288,00000B4 –19–24JAN06–1/1

1079.02 — 5 Volt Power Supply #1 Malfunction (P1631)

5 Volt Power Supply #1 more than 5.5 Volts or less 4.5 Volts.

See Tech 2 Diagnostic Trouble Code P1631 in Isuzu Engine Trouble Shooting Manual. (1E-514.)

JC89288,00000B5 –19–24JAN06–1/1

1080.02 — 5 Volt Power Supply #2 Malfunction (P1632)

5 Volt Power Supply #2 more than 5.5 Volts or less 4.5 Volts.

See Tech 2 Diagnostic Trouble Code P1632 in Isuzu Engine Trouble Shooting Manual. (1E-517.)

JC89288,00000B7 –19–24JAN06–1/1

1239.01 — No Pump Pressure—First Stage (P1094)

Rail Pressure lower than target rail pressure (10 MPa or greater) and holds for 8 seconds or longer.

See Tech 2 Diagnostic Trouble Code P1094 in Isuzu Engine Trouble Shooting Manual. (1E-411.)

JC89288,00000BF –19–18JAN06–1/1

1240.01 — No Pump Pressure Feed—Second Stage (P1093)

Rail Pressure lower than target rail pressure (10 MPa or greater) and holds for 8 seconds or longer.

See Tech 2 Diagnostic Trouble Code P1093 in Isuzu Engine Trouble Shooting Manual. (1E-.403.)

JC89288,00000C0 –19–18JAN06–1/1

1347.00 — PCV #1 Open Circuit or Short to Ground (P0092)

PCV #1 feedback signal open circuit or short to ground.

See Tech 2 Diagnostic Trouble Code P0092 in Isuzu Engine Trouble Shooting Manual. (1E-199.)

JC89288,00000B8 –19–24JAN06–1/1

1347.04 — PCV #1 Short to Power (P0091)

PCV #1 feedback signal short to power.

See Tech 2 Diagnostic Trouble Code P0091 in Isuzu Engine Trouble Shooting Manual. (1E-193.)

JC89288,00000B9 –19–24JAN06–1/1

1348.00 — PCV # 2 Open Circuit or Short to Ground (P1291)

PVC #2 feedback signal open circuit or short to ground.

See Tech 2 Diagnostic Trouble Code P1291 in Isuzu Engine Trouble Shooting Manual. (1E-193.)

JC89288,00000BA –19–24JAN06–1/1

1348.04 — PCV #2 Short to Power (P1292)

PCV #2 feedback signal short to power.

See Tech 2 Diagnostic Trouble Code P1292 in Isuzu Engine Trouble Shooting Manual. (1E-199.)

JC89288,00000BB –19–18JAN06–1/1

1485.02 — Engine Control Module Relay Malfunction (P1625)

Power is not supplied to engine control module (ECM) when key switch is on or power in not removed from engine control module (ECM) when key switch is off.

See Tech 2 Diagnostic Trouble Code P1625 in Isuzu Engine Trouble Shooting Manual. (1E-505.)

JC89288,00000BC –19–24JAN06–1/1

10001.03 — EGR Position Sensor Malfunction (P0487)

EGR Position output signal is abnormal.

See Tech 2 Diagnostic Trouble Code P0487 in Isuzu Engine Trouble Shooting Manual. (1E-353.)

JC89288,00000BD –19–14JAN06–1/1

10002.02 — EGR Valve Control Malfunction (P0488)

Difference between target valve lift and actual position is more than 20%.

See Tech 2 Diagnostic Trouble Code P0488 in Isuzu Engine Trouble Shooting Manual. (1E-359.)

JC89288,00000C1 –19–18JAN06–1/1

10003.02 — Injection Nozzle Common #1 Malfunction (P1261)

No feedback signal for injector #1, #2, and #3.

See Tech 2 Diagnostic Trouble Code P1261 in Isuzu Engine Trouble Shooting Manual. (1E-454.)

JC89288,00000C2 –19–24JAN06–1/1

10004.02 — Injection Nozzle Common #2 Malfunction (P1262)

No feedback signal for injector #4, #5, and #6.

See Tech 2 Diagnostic Trouble Code P1262 in Isuzu Engine Trouble Shooting Manual. (1E-464.)

JC89288,00000C3 –19–24JAN06–1/1

10005.01 — Charge Circuit Malfunction—Bank 1 (P0611)

Charge circuit (bank 1) voltage inside engine control module (ECM) is low.

See Tech 2 Diagnostic Trouble Code P0611 in Isuzu Engine Trouble Shooting Manual. (1E-385.)

JC89288,00000C4 –19–18JAN06–1/1

10006.01 — Charge Circuit Malfunction—Bank 2 (P0612)

Charge circuit (bank 2) voltage inside engine control module (ECM) is low.

See Tech 2 Diagnostic Trouble Code P0612 in Isuzu Engine Trouble Shooting Manual. (1E-388.)

JC89288,00000C5 –19–18JAN06–1/1

10007.02 — CPU Monitoring IC Malfunction (P0606)

CPU malfunction in engine control module (ECM).

See Tech 2 Diagnostic Trouble Code P0606 in Isuzu Engine Trouble Shooting Manual. (1E-383.)

JC89288,00000C6 –19–24JAN06–1/1

10008.02 — A/D Conversion Malfunction (P1630)

A/D conversion malfunction in engine control module (ECM).

See Tech 2 Diagnostic Trouble Code P1630 in Isuzu Engine Trouble Shooting Manual. (1E-512.)

JC89288,00000C7 –19–24JAN06–1/1

10009.02 — 5 Volt Power Supply #3 Malfunction (P1633)

5 volt power supply #3 malfunction more than 5.5 volts or less than 4.5 volts.

See Tech 2 Diagnostic Trouble Code P1633 in Isuzu Engine Trouble Shooting Manual. (1E-520.)

JC89288,00000C8 –19–18JAN06–1/1

10010.02 — 5 Volt Power Supply #4 Malfunction (P1634)

5 volt power supply #4 malfunction more than 5.5 volts or less than 4.5 volts.

See Tech 2 Diagnostic Trouble Code P1634 in Isuzu Engine Trouble Shooting Manual. (1E-523.)

JC89288,00000C9 –19–18JAN06–1/1

10011.02 — 5 Volt Power Supply #5 Malfunction (P1635)

5 volt power supply #5 malfunction more than 5.5 volts or less than 4.5 volts.

See Tech 2 Diagnostic Trouble Code P1635 in Isuzu Engine Trouble Shooting Manual. (1E-526.)

JC89288,00000CA –19–18JAN06–1/1

10013.02 — EEPROM Malfunction (P0603)

EEPROM malfunction.

See Tech 2 Diagnostic Trouble Code P0603 in Isuzu Engine Trouble Shooting Manual. (1E-381.)

JC89288,00000CB –19–24JAN06–1/1

Information Controller (ICF) Diagnostic Trouble Codes

The information controller (ICF) diagnostic trouble codes may be viewed on the monitor, by using Dr. ZX, or by using SERVICE ADVISOR™. See the following procedures for viewing the information controller diagnostic trouble codes.

- See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.)
- See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application. (Group 9015-20.)
- See Reading Diagnostic Trouble Codes With Dr. ZX. (Group 9015-20.)

SERVICE ADVISOR is a trademark of Deere & Company

LD30992,00001CE –19–21FEB06–1/1

14000.02 — Abnormal CAN Communication

NOT APPLICABLE TO THIS MACHINE

MS12501,0000030 –19–18JAN06–1/1

14001.02 — ICF: Flash Memory: Read/Write Error

NOT APPLICABLE TO THIS MACHINE

MS12501,0000031 –19–18JAN06–1/1

14002.02 — ICF: External RAM: Read/Write Error

NOT APPLICABLE TO THIS MACHINE

MS12501,0000032 –19–18JAN06–1/1

14003.02 — ICF: EEPROM: Sum Check Error

NOT APPLICABLE TO THIS MACHINE

MS12501,0000033 –19–18JAN06–1/1

14006.02 — ICF: Satellite Communication Terminal: Communication Error

NOT APPLICABLE TO THIS MACHINE

MS12501,0000034 –19–18JAN06–1/1

14008.02 — ICF: Abnormal Internal RAM

NOT APPLICABLE TO THIS MACHINE

MS12501,0000035 –19–18JAN06–1/1

14100.02 — Satellite Communication Terminal: Abnormal EEPROM

NOT APPLICABLE TO THIS MACHINE

MS12501,0000036 –19–18JAN06–1/1

14101.02 — Satellite Communication Terminal: Abnormal IB/OB Queue

NOT APPLICABLE TO THIS MACHINE

MS12501,0000037 –19–18JAN06–1/1

14102.02 — Satellite Communication Terminal: Abnormal Local Loop Back

NOT APPLICABLE TO THIS MACHINE

MS12501,0000038 –19–18JAN06–1/1

14103.02 — Satellite Communication Terminal: The satellite is not found.

NOT APPLICABLE TO THIS MACHINE

MS12501,0000039 –19–18JAN06–1/1

14104.02 — Satellite Communication Terminal: Fail 1 of Remote Loop Back

NOT APPLICABLE TO THIS MACHINE

MS12501,000003A –19–18JAN06–1/1

14105.02 — Satellite Communication Terminal: Fail 2 of Remote Loop Back

NOT APPLICABLE TO THIS MACHINE

MS12501,000003B –19–18JAN06–1/1

14106.02 — Satellite Communication Terminal: Sending and receiving data are mismatched

NOT APPLICABLE TO THIS MACHINE

MS12501,000003C –19–18JAN06–1/1

Air Conditioner Controller (ACF) Diagnostic Trouble Codes

Air Conditioner Controller (ACF) Diagnostic Trouble Codes

Air conditioner controller (ACF) diagnostic trouble codes are read by accessing the diagnostic menu in the controller. See Air Conditioning Diagnostic Trouble Code Check to access diagnostic trouble codes. (Group 9031-15.)

AH91621,0000166 –19–21FEB06–1/1

E11 — Cab Air Temperature Sensor Open Circuit

Cab air temperature sensor open circuit.

AH91621,0000167 –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to cab air temperature sensor and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Open Circuit Check. **NO:** Repair or replace connector or pins.

– – –1/1

❷ **Open Circuit Check**	Disconnect harness from cab air temperature sensor and air conditioner and heater controller. Check continuity between pins on controller and cab air temperature sensor connector. Is there continuity on the appropriate pins?	**YES:** Cab air temperature sensor malfunction. **NO:** Repair or replace harness. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)

– – –1/1

E12 — Cab Air Temperature Sensor Short Circuit

Cab air temperature sensor short circuit.

AH91621,0000168 –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to cab air temperature sensor and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Short Circuit Check. **NO:** Repair or replace connector or pins.

– – –1/1

❷ **Short Circuit Check**	Disconnect harness from cab air temperature sensor and air conditioner and heater controller. Check continuity between appropriate pins on air conditioner and heater controller connector and machine ground. Is there continuity to ground?	**YES:** Repair or replace harness. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.) **NO:** Cab air temperature sensor malfunction.

– – –1/1

E13 — Ambient Air Temperature Sensor Open Circuit

Ambient air temperature sensor open circuit.

AH91621,0000169 –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to ambient air temperature sensor and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Open Circuit Check. **NO:** Repair or replace connector or pins.

– – –1/1

❷ **Open Circuit Check**	Disconnect harness from ambient air temperature sensor and air conditioner and heater controller. Check continuity between pins on controller and ambient air temperature sensor connector. Is there continuity on the appropriate pins?	**YES:** Ambient air temperature sensor malfunction. **NO:** Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, see Engine Interface Harness (W5) Wiring Diagram, and See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)

– – –1/1

E14 — Ambient Air Temperature Sensor Short Circuit

Ambient air temperature sensor short circuit.

AH91621,000016A –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to ambient air temperature sensor and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Short Circuit Check. **NO:** Repair or replace connector or pins. – – –1/1

❷ **Short Circuit Check**	Disconnect harness from ambient air temperature sensor and air conditioner and heater controller. Check continuity between appropriate pins on air conditioner and heater controller connector and machine ground. Is there continuity to ground?	**YES:** Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, see Engine Interface Harness (W5) Wiring Diagram, and See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.) **NO:** Ambient air temperature sensor malfunction. – – –1/1

E15 — Coolant Temperature Sensor Open Circuit

Coolant temperature sensor open circuit.

AH91621,000016B –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to coolant temperature sensor and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Open Circuit Check. **NO:** Repair or replace connector or pins. – – –1/1

❷ **Open Circuit Check**	Disconnect harness from coolant temperature sensor and air conditioner and heater controller. Check continuity between pins on controller and coolant temperature sensor connector. Is there continuity on the appropriate pins?	**YES:** Coolant temperature sensor malfunction. **NO:** Repair or replace harness. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)

– – –1/1

E16 — Coolant Temperature Sensor Short Circuit

Coolant temperature sensor short circuit.

AH91621,000016C –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to coolant temperature sensor and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Short Circuit Check. **NO:** Repair or replace connector or pins.

– – –1/1

❷ **Short Circuit Check**	Disconnect harness from coolant temperature sensor and air conditioner and heater controller. Check continuity between appropriate pins on air conditioner and heater controller connector and machine ground. Is there continuity to ground?	**YES:** Repair or replace harness. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.) **NO:** Coolant temperature sensor malfunction.

– – –1/1

E18 — Solar Sensor Abnormal

Solar sensor short circuit.

LD30992,00002DB –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to solar sensor and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Short Circuit Check. **NO:** Repair or replace connector or pins. – – –1/1
❷ **Short Circuit Check**	Disconnect harness from solar sensor and air conditioner and heater controller. Check continuity between appropriate pins on air conditioner and heater controller connector and machine ground. Is there continuity to ground?	**YES:** Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Monitor Harness (W3) Wiring Diagram, and See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.) **NO:** Go to Continuity Check. – – –1/1

❸ **Continuity Check**	Disconnect harness from solar sensor and air conditioner and heater controller. Check continuity between appropriate pins on air conditioner and heater controller connector and solar sensor. Is there continuity between air conditioner controller and solar sensor?	**YES:** Air conditioner controller malfunction. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Monitor Harness (W3) Wiring Diagram, and See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)

– – –1/1

E21 — Freeze Control Switch Open Circuit

Freeze control switch open circuit.

AH91621,000016E –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to freeze control switch and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Open Circuit Check. **NO:** Repair or replace connector or pins.

– – –1/1

❷ **Open Circuit Check**	Disconnect harness from freeze control switch and air conditioner and heater controller. Check continuity between pins on controller and freeze control switch connector. Is there continuity on the appropriate pins?	**YES:** Freeze control switch malfunction. **NO:** Repair or replace harness. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)

– – –1/1

E22 — Freeze Control Switch Short Circuit

Freeze control switch short circuit.

AH91621,000016F –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to freeze control switch and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Short Circuit Check. **NO:** Repair or replace connector or pins.

– – –1/1

❷ **Short Circuit Check**	Disconnect harness from freeze control switch and air conditioner and heater controller. Check continuity between appropriate pins on air conditioner and heater controller connector and machine ground. Is there continuity to ground?	**YES:** Repair or replace harness. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.) **NO:** Freeze control switch malfunction.

– – –1/1

E43 — Abnormal Damper

Abnormal air conditioner and heater blower port change servomotor or air conditioner and heater rear blower port change servomotor.

AH91621,0000170 –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to servomotors and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Open Circuit Check. **NO:** Repair or replace connector or pins.

– – –1/1

❷ **Open Circuit Check**	Disconnect harness from servomotors and air conditioner and heater controller. Check continuity between pins on controller and servomotor connector. Is there continuity on the appropriate pins? **IMPORTANT: Some wires between air conditioner controller and air conditioner servomotor are spliced with other control, power, and ground circuits. Use caution when checking and testing wires.**	**YES:** Air conditioner and heater blower port change servomotor or air conditioner and heater rear blower port change servomotor malfunction. **NO:** Repair or replace harness. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)

– – –1/1

E44 — Abnormal Damper

Abnormal air conditioner and heater mixer servomotor.

AH91621,0000171 –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to servomotor and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Open Circuit Check. **NO:** Repair or replace connector or pins. – – –1/1
❷ **Open Circuit Check**	Disconnect harness from servomotor and air conditioner and heater controller. Check continuity between pins on controller and servomotor connector. Is there continuity on the appropriate pins? **IMPORTANT: Some wires between air conditioner controller and air conditioner servomotor are spliced with other control, power, and ground circuits. Use caution when checking and testing wires.**	**YES:** Air conditioner and heater mixer servomotor malfunction. **NO:** Repair or replace harness. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.) – – –1/1

E45 — Abnormal Damper

Abnormal air conditioner and heater internal and external servomotor.

AH91621,0000172 –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to servomotor and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Open Circuit Check. **NO:** Repair or replace connector or pins. – – –1/1

❷ **Open Circuit Check**	Disconnect harness from servomotor and air conditioner and heater controller. Check continuity between pins on controller and servomotor connector. Is there continuity on the appropriate pins? **IMPORTANT: Some wires between air conditioner controller and air conditioner servomotor are spliced with other control, power, and ground circuits. Use caution when checking and testing wires.**	**YES:** Air conditioner and heater mixer servomotor malfunction. **NO:** Repair or replace harness. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)

– – –1/1

E51 — Abnormal High/Low Pressure Switch

Abnormal high/low pressure switch.

AH91621,0000173 –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to high/low pressure switch and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Open Circuit Check. **NO:** Repair or replace connector or pins.

– – –1/1

❷ **Open Circuit Check**	Disconnect harness from high/low pressure switch and air conditioner and heater controller. Check continuity between pins on controller and high/low pressure switch connector. Is there continuity on the appropriate pins?	**YES:** High/low pressure switch malfunction. **NO:** Repair or replace harness. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)

– – –1/1

Monitor Controller (MON) Diagnostic Trouble Codes

The monitor controller (MON) diagnostic trouble codes may be viewed on the monitor, by using Dr. ZX, or by using SERVICE ADVISOR™. See the following procedures for viewing the information controller diagnostic trouble codes.

- See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.)
- See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application. (Group 9015-20.)
- See Reading Diagnostic Trouble Codes With Dr. ZX. (Group 9015-20.)

SERVICE ADVISOR is a trademark of Deere & Company

LD30992,00004BE –19–23MAR06–1/1

13303.02 — Abnormal Thermister Temperature

MS12501,000003D –19–26MAY06–1/1

Monitor Temperature Diagnostics

Temperature in or around monitor controller is above 85°C (185°F).

– – –1/1

❶ **Temperature Check**	Check temperature around monitor controller. Is temperature high?	**YES:** Go to Screen Check. **NO:** Monitor controller malfunction. Replace controller. See Monitor Controller Remove and Install. (Group 9015-20.)

– – –1/1

❷ **Screen Check**	Cool monitor controller and observe monitor screen. Does monitor screen return to normal as monitor is cooled?	**YES:** Monitor and monitor controller are OK. **NO:** Monitor controller malfunction. Replace controller. See Monitor Controller Remove and Install. (Group 9015-20.)

– – –1/1

13304.02 — Abnormal REG Input H Level

MS12501,000003E –19–26MAY06–1/1

Alternator Output Diagnostics

Alternator output above 33.5 volts.

– – –1/1

❶ **Alternator Output Check**	Measure alternator output. Is voltage below 33.5 volts?	**YES:** Go to Harness Check. **NO:** Alternator malfunction. Repair or replace alternator.

– – –1/1

❷ **Harness Check**	Disconnect monitor controller connector and check alternator voltage at monitor pin C7. Is voltage below 33.5 volts? *NOTE: Engine must be running for this check.*	**YES:** Monitor controller malfunction. Replace controller. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Open circuit in harness between alternator and monitor controller. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Engine Interface Harness (W5) Wiring Diagram. (Group 9015-10.)

– – –1/1

13306.02 — Abnormal EEPROM

MS12501,000003F –19–26MAY06–1/1

Information Controller Diagnostics

Abnormal EEPROM in monitor controller.

– – –1/1

❶ **Diagnostic Trouble Code Re-check**	Clear codes and check for code again. Is DTC 13306.02-Abnormal EEPROM still present?	**YES:** Monitor controller malfunction. Replace controller. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Monitor controller is OK.

– – –1/1

13308.02 — Abnormal CAN Communication

MS12501,0000040 –19–26MAY06–1/1

Controller Area Network (CAN) Diagnostics

– – –1/1

❶ **CAN Harness Check**	Check harness connections to controllers and between harnesses. Clear codes and re-check DTCs. Is DTC 13308.02-Abnormal CAN Communication still present?	**YES:** Go to Continuity Check MCF and ICF. **NO:** Main controller (MCF) and harness are OK. – – –1/1

❷ **Continuity Check MCF and ICF**	Check for continuity between main controller (MCF) pin C4 and information controller (ICF) pin C5. Check for continuity between main controller (MCF) pin C15 and information controller (ICF) pin C11. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and ECM. **NO:** Open circuit in CAN between main controller (MCF) and information controller (ICF). Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) – – –1/1

❸ **Continuity Check MCF and ECM**	Check for continuity between main controller (MCF) pin C4 and engine control module (ECM) pin 18. Check for continuity between main controller (MCF) pin C15 and engine control module (ECM) pin 37. Is there continuity between the connectors?	**YES:** Go to Continuity Check MCF and Monitor Unit. **NO:** Open circuit in CAN between main controller (MCF) and engine control module (ECM). Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Continuity Check MCF and Monitor Unit**	Check for continuity between main controller (MCF) pin C4 and monitor controller pin B7. Check for continuity between main controller (MCF) pin C15 and monitor controller pin B6. Is there continuity between the connectors?	**YES:** Go to MCF Short to Ground Check. **NO:** Open circuit in CAN between main controller (MCF) and monitor controller. Repair or replace harnesses. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) – – –1/1

❺ **MCF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and main controller (MCF) pins A2, A13, B8, and B18. Check for continuity between MCF pin C15 an MCF pins A2, A13, B8, and B18. Is there continuity between the CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Ground Check. – – –1/1

❻ **ECM Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Ground Check. – – –1/1

❼ **ICF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C14 and C15. Check for continuity between information controller (ICF) pin C11 and pins C14 and C15. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Ground Check. – – –1/1
❽ **Monitor Controller Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and pin B11. Check for continuity between monitor controller pin B6 and pin B11. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Power Check. – – –1/1
❾ **MCF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and pins A1, A12, B7, and B17. Check for continuity between main controller (MCF) pin C15 and pins A1, A12, B7, and B17. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Power Check. – – –1/1
❿ **ECM Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 2 and 5 (power). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 2 and 5 (power). Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Power Check. – – –1/1

⑪ **ICF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C1 and C2. Check for continuity between information controller (ICF) pin C11 and pins C1 and C2. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Power Check. – – –1/1
⑫ **Monitor Controller Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A16. Check for continuity between monitor controller pin B6 and A16. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Key Switch Signal Check. – – –1/1
⑬ **MCF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and B16. Check for continuity between main controller (MCF) pin C15 and B16. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Key Switch Signal Check. – – –1/1
⑭ **ECM Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pin 24 (key switch signal wire). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pin 24 (key switch signal wire). Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Key Switch Signal Check. – – –1/1

⓯ **ICF Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and C7. Check for continuity between information controller (ICF) pin C11 and C7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Key Switch Signal Check. – – –1/1
⓰ **Monitor Controller Short to Key Switch Signal Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A7. Check for continuity between monitor controller pin B6 and A7. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN High and Low Side Continuity Check. – – –1/1
⓱ **MCF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pins C4 and C15. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM CAN High and Low Side Continuity Check. – – –1/1
⓲ **ECM CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High and Low wires). Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF CAN High and Low Side Continuity Check. – – –1/1

⑲ **ICF CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pins C5 and C11. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller CAN High and Low Side Continuity Check. – – –1/1

⑳ **Monitor Controller CAN High and Low Side Continuity Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pins B6 and B7. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN Resistance Check. – – –1/1

㉑ **MCF CAN Resistance Check**	Connect all connectors except main controller (MCF) connector C (X30). Check resistance between pin C4 and C15. Is resistance between 50—70 Ω?	**YES:** Go to DTC Check. **NO:** Go to ICF CAN Resistance Check. – – –1/1

㉒ **DTC Check**	Connect connector to main controller (MCF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 13308.02-Abnormal CAN Communication still present?	**YES:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to main controller (MCF). – – –1/1

㉓ **ICF CAN Resistance Check**	Connect all connectors except information controller (ICF) connector C (X34). Check resistance between pin C5 and C11. Is resistance between 50—70 Ω.	**YES:** Go to DTC Check. **NO:** Go to ECM CAN Resistance Check. – – –1/1

㉔ **DTC Check**	Connect connector to information controller (ICF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 13308.02-Abnormal CAN Communication still present?	**YES:** information controller (ICF) malfunction. Replace. See Information Controller (ICF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to information controller (ICF). – – –1/1
㉕ **ECM CAN Resistance Check**	Connect all connectors except engine control module (ECM) connector. Check resistance between pin 18 (CAN High) and pin 37 (CAN Low) wires in connector. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Go to Monitor Controller CAN Resistance Check. – – –1/1
㉖ **DTC Check**	Connect connector to engine control module (ECM). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 13308.02-Abnormal CAN Communication still present?	**YES:** Engine control module (ECM) malfunction. Replace. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to engine control module (ECM). – – –1/1
㉗ **Monitor Controller CAN Resistance Check**	Connect all connectors except monitor controller connector B (X20). Check resistance between pins B6 and B7. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Malfunction in any controller on CAN. – – –1/1
㉘ **DTC Check**	Connect connector to monitor controller. Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 13308.02-Abnormal CAN Communication still present?	**YES:** Monitor controller malfunction. Replace. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Check the connection to monitor controller. – – –1/1

13310.02 — Shorted circuit in Coolant Temperature Sensor

MS12501,0000041 –19–26MAY06–1/1

Coolant Temperature Sensor Diagnostics

Short circuit in coolant temperature sensor circuit.

– – –1/1

❶ **Coolant Temperature Sensor Resistance Check**

Disconnect coolant temperature sensor and check resistance.

Engine Coolant Temperature	Resistance (k[OHgr])
25°C 77°F	7.6
40°C 104°F	3.65—4.35
50°C 122°F	2.48—2.92
80°C 176°F	0.98
95°C 203°F	0.60
105°C 221°F	0.45
120°C 248°F	0.30

Is resistance within specification?

YES: Go to Harness Check.

NO: Coolant temperature sensor malfunction. Replace sensor.

– – –1/1

❷ **Harness Check**

Check harness between coolant temperature sensor and monitor pin C8 for short.

Is there a short to ground or short to power in harness?

YES: Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, see Monitor Harness (W3) Wiring Diagram, and see Engine Harness (W4) Wiring Diagram. (Group 9015-10.)

NO: Monitor controller malfunction. Replace controller. See Monitor Controller Remove and Install. (Group 9015-20.)

– – –1/1

13311.02 — Shorted circuit in Fuel Level Sensor

MS12501,0000042 –19–26MAY06–1/1

Fuel Level Sensor Diagnostics

Fuel Level Sensor Shorted to Ground.

– – –1/1

❶ **Resistance Check**	Disconnect fuel level sensor and check sensor resistance. Is sensor resistance within specifications?	**YES:** Go to Short to Ground Check **NO:** Fuel level sensor malfunction. Replace sensor.

Fuel Level Sensor	
Float Position	Resistance (Ohms)
Upper Limit (FULL)	6-10
3 / 4	26
1 / 2	33-43
1 / 4	53
Alarm Level	82-88
Lower Limit (EMPTY)	90-100

– – –1/1

❷ **Short to Ground Check**	Disconnect fuel level sensor and monitor from harness and check for continuity to machine ground. Is there continuity between harness and machine ground?	**YES:** Short circuit in harness between monitor controller and sensor. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to Continuity Check.

– – –1/1

❸ **Continuity Check**	Disconnect fuel level sensor and monitor from harnesses. Check continuity between fuel level sensor connector and monitor controller connector pin C2. Is there continuity between fuel level sensor and monitor controller?	**YES:** Monitor controller malfunction. Replace controller. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.)

– – –1/1

13311.04 — Open circuit in Fuel Level Sensor

MS12501,0000043 –19–26MAY06–1/1

Fuel Level Sensor Diagnostics

Fuel Level Sensor Shorted to Ground.

– – –1/1

❶ **Resistance Check**

Disconnect fuel level sensor and check sensor resistance.

Is sensor resistance within specifications?

Fuel Level Sensor	
Float Position	Resistance (Ohms)
Upper Limit (FULL)	6-10
3 / 4	26
1 / 2	33-43
1 / 4	53
Alarm Level	82-88
Lower Limit (EMPTY)	90-100

YES: Go to Short to Ground Check

NO: Fuel level sensor malfunction. Replace sensor.

– – –1/1

❷ **Short to Ground Check**	Disconnect fuel level sensor and monitor from harness and check for continuity to machine ground. Is there continuity between harness and machine ground?	**YES:** Short circuit in harness between monitor controller and sensor. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to Continuity Check. – – –1/1

❸ **Continuity Check**	Disconnect fuel level sensor and monitor from harnesses. Check continuity between fuel level sensor connector and monitor controller connector pin C2. Is there continuity between fuel level sensor and monitor controller?	**YES:** Monitor controller malfunction. Replace controller. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) – – –1/1

Section 9005

Operational Checkout Procedure

Contents

Page

Group 10—Operational Checkout Procedure

Operational Checkout 9005-10-1

Diagnostic Trouble Codes Check 9005-10-1

Operational Checks—Key Switch Off, Engine Off Checks. 9005-10-2

Operational Checks—Key Switch On, Engine Off Checks. 9005-10-3

Operational Checks—Key Switch On, Engine On Checks. 9005-10-8

Group 10
Operational Checkout Procedure

Operational Checkout

This procedure is used to check operation of the machine. It is designed so you can do a walk around inspection, check machine operation, and perform specific checks from the operator's seat.

If there is a problem with the machine, diagnostic information in this checkout will help determine the probable cause. This information may allow you to perform a simple adjustment to correct the problem. Use the table of contents to help find adjustment procedures.

A location will be required which is level and has adequate space to complete the checks. No tools are needed to perform the checkout.

Complete the usual necessary visual checks (oil levels, oil condition, external leaks, loose hardware, linkage, wiring) prior to doing the checkout. The machine must be at operating temperature for many of the checks.

Read each check completely before performing. If no problem is found, you will be instructed to go to the next check. If a problem is indicated, you will be referred to a procedure for adjustment, repair, or replacement.

The monitor can be used to perform diagnostic and operational checks. The monitor can display engine speed, pressures, and Diagnostic Trouble Codes (DTCs).

MD46667,0000057 –19–25APR06–1/1

Diagnostic Trouble Codes Check

– – –1/1

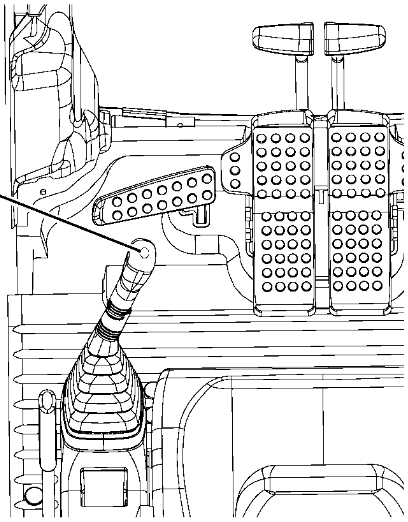
Display and Clear Trouble Diagnostic Codes	Always check for diagnostic trouble codes and correct them before performing the operational checkout. Diagnostic trouble codes can be displayed by using several methods: • Monitor Controller • With Service Advisor • With Dr. ZX *LOOK: Are diagnostic trouble codes present?*	**YES:** Correct all diagnostic trouble codes before proceeding. See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application (Group 9015-20.) or see Reading Diagnostic Trouble Codes With Monitor Display (Group 9015-20.) or see Reading Diagnostic Trouble Codes With Dr. ZX. (Group 9015-20.) **NO:** Proceed with operational checkout.

– – –1/1

Operational Checks—Key Switch Off, Engine Off Checks

– – –1/1

Horn Circuit Check



TX1001366 –UN–15DEC05

1—Horn Button

Key switch OFF.

Push horn button (1) on top of left pilot control lever.

LISTEN: Does horn sound?

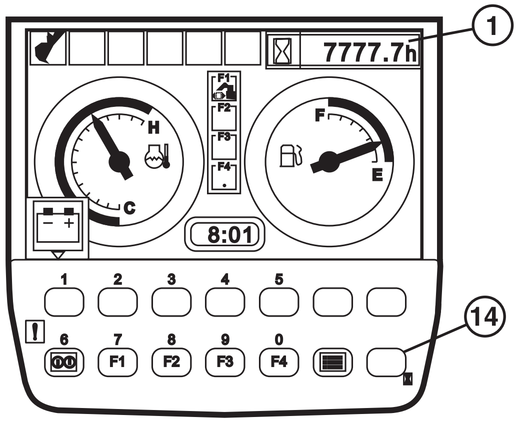
YES: Go to next check.

NO: Check horn 10 A fuse (F11) (Marked Horn). See Fuse and Relay Specifications. (Group 9015-10.)

NO: Check horn wiring harness. See Cab Harness (W1) Wiring Diagram (Group 9015-10.) and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

– – –1/1

Hour Meter and Fuel Gauge Check



TX1005661 –UN–31MAR06

1—Hour Meter
14—Hour Meter Button

Press and hold hour meter button (14) until default screen appears.

LOOK: Does hour meter (1) display machine hours?

LOOK: Does fuel gauge display correct fuel level?

YES: Go to next check.

NO: Check controller key signal switch 5A fuse (F18) (Marked POW ON). See Fuse and Relay Specifications. (Group 9015-10.)

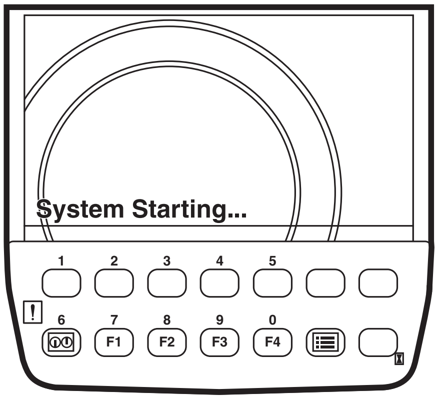
NO: Check wiring See Cab Harness (W1) Wiring Diagram (Group 9015-10.) or see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.)

– – –1/1

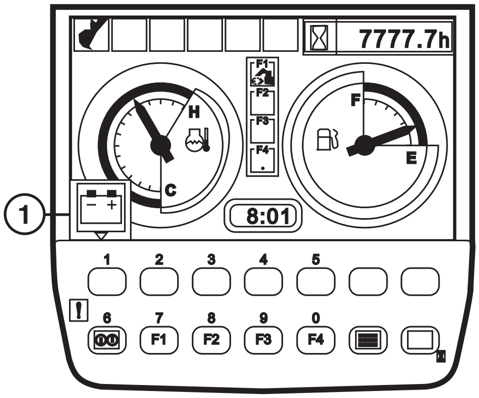
Operational Checks—Key Switch On, Engine Off Checks

– – –1/1

Monitor Start Up Check



TX1005660 –UN–06APR06



TX1005657 –UN–03APR06

1—Alternator Alarm Indicator

Turn key switch to ON position.

LOOK: Does monitor display system starting screen?

LOOK: Does default screen with hour meter appear after system starting screen disappears?

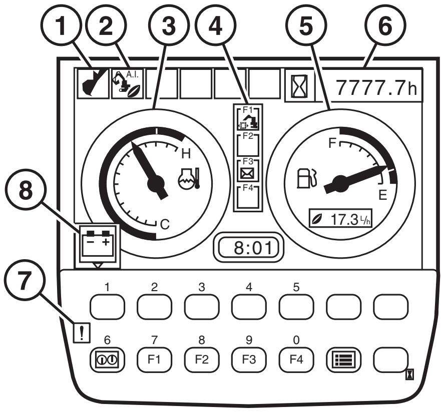
LOOK: Does alternator alarm indicator (1) appear on default screen?

YES: Go to next check.

NO: Check controller key signal switch 5A fuse (F18) (Marked POW ON). See Fuse and Relay Specifications. (Group 9015-10.)

– – –1/1

Monitor, Gauges, and Battery Relay Checks



TX1005659 –UN–31MAR06

1—Work Mode Indicator
2—Auto-Idle Indicator
3—Engine Coolant Temperature Gauge
4—F1 Function Button Indicator
5—Fuel Gauge
6—Hour Meter
7—Alarm Indicator Light
8—Alternator Alarm Indicator

NOTE: If engine coolant temperature is below 30°C (86°F) engine temperature gauge needle may not move.

Turn key switch to ON.

LISTEN: Does battery relay click?

LOOK: Does auto idle indicator (2) display then remain on?

LOOK: Does alarm indicator light (7) come on?

LOOK: Does alternator alarm indicator (8) come on?

LOOK: Does engine coolant temperature gauge (3) display correct engine coolant temperature?

LOOK: Does fuel gauge (5) display correct fuel level?

LOOK: Does hour meter (6) display machine hours?

LOOK: Does work mode indicator (1) display correct work mode (dig or attachment)?

YES: Go to next check.

NO: Monitor does not come ON. Check monitor controller key switch signal 5 A fuse (F18) (Marked POW ON). See Fuse and Relay Specifications. (Group 9015-10.)

NO: Check wiring. See Cab Harness (W1) Wiring Diagram (Group 9015-10.) or see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.)

NO: Check key switch. See Key Switch Check. (Group 9015-20.)

Check battery relay. See Battery Relay Check. (Group 9015-20.)

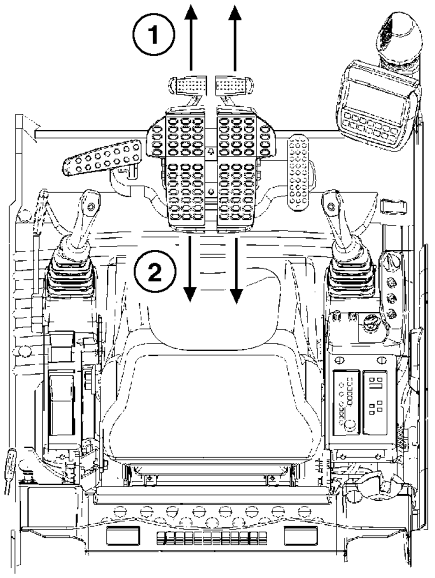
Check wiring. See Machine Harness (W2) Wiring Diagram (Group 9015-10.) and see Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

NO: Neither engine coolant temperature gauge nor fuel gauge moves. Check gauge sender and wiring. See Machine Harness (W2) Wiring Diagram (Group 9015-10.) and see Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

NO: Other than normal indicator lights remain On. Check diagnostic trouble codes. See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application (Group 9015-20.) or see Reading Diagnostic Trouble Codes With Monitor Display (Group 9015-20.) and see Reading Diagnostic Trouble Codes With Dr. ZX. (Group 9015-20.)

– – –1/1

Travel Lever and Pedal Neutral Checks



TX1005042 –UN–21MAR06

1—Forward
2—Rearward

Push both travel levers and pedals forward (1), then release.

Pull both travel levers and pedals rearward (2), then release.

FEEL: Do levers and pedals require equal effort to operate in forward and reverse?

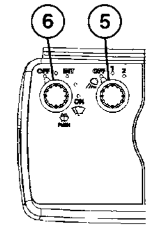
LOOK: Do levers and pedals return to neutral at the same time when released?

YES: Go to next check.

NO: Inspect, repair or replace travel pilot control valve. See Travel Pilot Control Valve Remove and Install (Group 3360.) and see Travel Pilot Control Valve Disassemble and Assemble. (Group 3360.)

– – –1/1

Light Circuit Checks



TX1000880 –UN–01DEC05

5—Work Light Switch
6—Windshield Wiper and Washer Switch

Turn work light switch (5) to first position.

LOOK: Are monitor panel back lights and drive lights on?

Turn light switch to second position.

LOOK: Do monitor panel back lights and drive lights remain on and boom work lights come on?

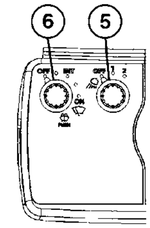
YES: Go to next check.

NO: Check work and drive lights 20 A fuse (F1) (Marked LAMP), Drive Light 20 A Fuse (F29) (Marked LIGHT 1) Drive Light 20 A Fuse (Marked LIGHT 1), and controller key switch signal 5 A fuse (F18) (Marked POW ON). See Fuse and Relay Specifications. (Group 9015-10.)

NO: Check wiring harness. See Cab Harness (W1) Wiring Diagram (Group 9015-10.) and see System Functional Schematic. (Group 9015-10.)

– – –1/1

Windshield Wiper Controls Check



TX1000880 –UN–01DEC05

5—Work Light Switch
6—Windshield Wiper and Washer Switch

NOTE: Front window must be fully closed and latched for this check.

Turn wiper switch (6) to first INT position.

LOOK: Does wiper operate intermittently?

Turn wiper switch to second INT position.

LOOK: Does wiper operate intermittently, but faster than when in first position?

Turn wiper switch to third INT position.

LOOK: Does wiper operate intermittently, but faster than when in second position?

Turn wiper switch to ON position.

LOOK: Does wiper operate continuously?

Move wiper switch to OFF position.

LOOK: Does wiper arm stop in park position at left side of windshield?

YES: Go to next check.

NO: Check that front window is fully latched and switch contacts make good contact.

NO: Check windshield wiper and washer 10 A fuse (F2) (Marked WIPER). See Fuse and Relay Specifications. (Group 9015-10.)

NO: Check Wiring See Cab Harness W1 Wiring Diagram. (Group 9015-10.)

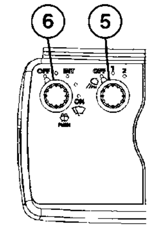
And See Windshield Wiper and Washer Circuit Theory of Operation. (Group 9015-15.)

– – –1/1

Windshield Washer and Wiper Circuit Check

IMPORTANT: Washer motor may be damaged if washer switch is held for more than 20 seconds, or continually operated with no fluid in the washer fluid tank.

NOTE: The wiper cannot operate with the upper front window open. The washer can operate with the upper front window open. When closing window, check that window upper left corner makes good contact with the cab.



TX1000880 –UN–01DEC05

5—Work Light Switch
6—Windshield Wiper and Washer Switch

NOTE: Front window must be fully closed and latched for this check.

Push washer switch (6).

LOOK: Is washer fluid supplied to windshield?

Turn windshield wiper (6) ON.

LISTEN: Does wiper circuit click?

LOOK: Does windshield wiper operate?

YES: Go to next check.

NO: Check washer fluid level. See Windshield Washer Fluid Level. (Operator's Manual.)

NO: Check that the window upper left corner is making good contact with the cab.

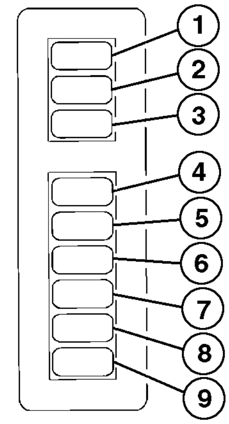
NO: Check windshield wiper and washer 10 A fuse (F2) (Marked WIPER). See Fuse and Relay Specifications. (Group 9015-10.)

NO: Check wiring harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

NO: Check washer pump. See Windshield Wiper and Washer Circuit Theory of Operation. (Group 9015-15.)

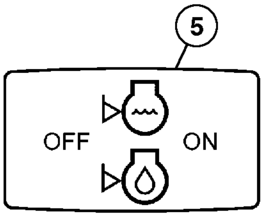
– – –1/1

Engine Oil Level/Coolant Level Switch

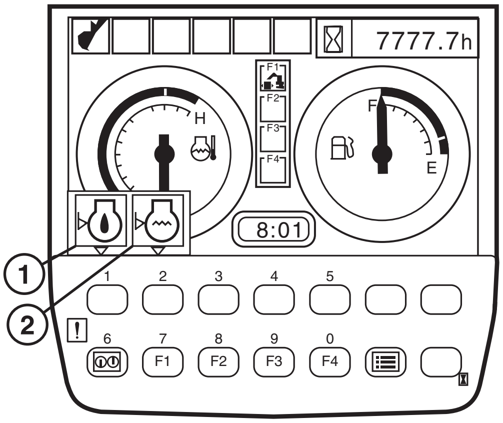


TX1005672 –UN–31MAR06

1—Travel Alarm and Travel Alarm Cancel Switch
2—Seat Heater Switch
3—Not Used
4—Boom Mode Switch
5—Engine Oil Level / Coolant Level Switch
6—Not Used
7—Rear light Switch (Optional)
8—Not Used
9—Reversing Cooling Fan Switch (Optional)



TX1005654 –UN–31MAR06



TX1005655 –UN–31MAR06

1—Engine Oil Level Indicator
2—Coolant Level Indicator
5—Engine Oil Level/Coolant Level Switch

IMPORTANT: Do not start engine if engine oil level indicator or coolant level indicator are red.

NOTE: When the indicator is red, the fluid is low. When the indicator is green, the fluid level is normal.

Press and hold the engine oil level/coolant level switch ON.

LOOK: Are the engine oil level/coolant level indicators displayed on the system default screen?

LOOK: Are both indicators green?

Release switch to OFF.

LOOK: Does display no longer show the engine oil level/coolant level indicators?

YES: Go to next check.

NO: Engine oil level indicator is red. Check engine oil level. See Check Engine Oil Level. (Operator’s Manual.)

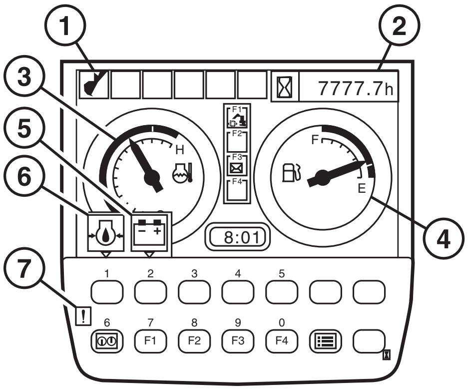
NO: Coolant level indicator is red. Check engine coolant level. See Check Radiator Coolant Level. (Operator’s Manual.)

– – –1/1

Operational Checks—Key Switch On, Engine On Checks

– – –1/1

Monitor and Gauge Circuit Checks



TX1005662 –UN–31MAR06

1—Work Mode Indicator
2—Hour Meter
3—Engine Coolant Temperature Gauge
4—Fuel Gauge
5—Alarm Indicator
6—Alarm Indicator
7—Alarm Indicator Light

IMPORTANT: Stop the engine immediately if alarm Indicator light (7) or any alarm indicators come on after engine starts.

Start engine.

LOOK: Do all alarm indicators go off and remain off after engine starts?

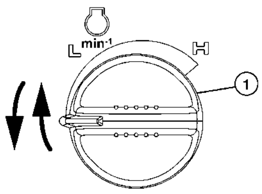
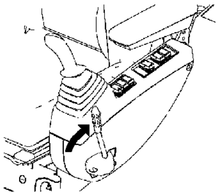
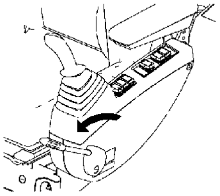
LOOK: Does engine coolant temperature gauge (3) display correct engine coolant temperature?

LOOK: Does fuel gauge (4) display correct fuel level?

YES: Go to next check.

NO: Other alarms are display. See Alarm Occurrence Screen. (Operator's Manual.)

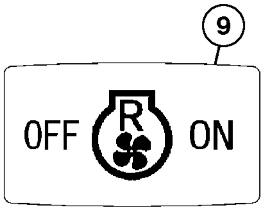
– – –1/1

Pilot Shutoff Circuit Check	  TX1000874 –UN–01DEC05 TX1000749 –UN–29NOV05 **1—Engine Speed Dial** **CAUTION: Machine may move during this check. Make sure area is clear and large enough to operate all machine functions.** Turn engine speed dial (1) to L (slow idle) position. Place pilot shutoff lever in LOCKED (rearward) position. Slowly actuate dig and travel functions. *LOOK: Do dig and travel functions operate?*	**YES:** See Pilot Shutoff Switch Harness Check. (Group 9015-20.) **YES:** Check wiring. See Pilot Shutoff Switch Harness (W11) Wiring Diagram (Group 9015-10.) and see Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **YES:** See Diagnose Pilot Circuit Malfunctions (Group 9025-15.) and see Pilot Shutoff Circuit Theory of Operation. (Group 9015-15.) **NO:** Continue check.
	 TX1000747 –UN–29NOV05 Place pilot shutoff lever in UNLOCKED (forward) position. Slowly actuate dig and travel functions. *LOOK: Do dig and travel functions operate?*	**YES:** Go to next check. **NO:** Check wiring. See Pilot Shutoff Switch Harness (W11) Wiring Diagram (Group 9015-10.) and see Cab Harness (W1) Wiring Diagram. (Group 9015-10.) or see Diagnose Pilot Circuit Malfunctions (Group 9025-15.) and see Pilot Shutoff Circuit Theory of Operation. (Group 9015-15.) and – – –1/1

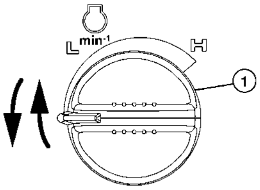
Reversing Cooling Fan Switch—If Equipped

NOTE: The pilot control shut-off lever must be in the LOCKED (rearward) position, for the reversing cooling fan to operate.

IMPORTANT: Air conditioner may be damaged if the reversing cooling fan switch is pressed when using the air conditioner. Turn air conditioned off while performing this check.



TX1005664 –UN–31MAR06



TX1000874 –UN–01DEC05

1—Engine Speed Dial
9—Reversing Cooling Fan Switch

Pilot control shut-off lever in the LOCK position.

Turn engine speed dial (1) to H fast idle with auto idle A/I OFF.

Push air conditioner switch OFF.

Press reversing cooling fan switch ON.

LISTEN: Does engine speed go to slow idle? Does fan speed slow down?

LOOK/LISTEN: After approximately 20 seconds, does engine return to fast idle, does the fan speed increase and rotate in reverse direction for approximately one minute?

LISTEN/LOOK: Does engine speed go to slow idle? Does the fan speed slow for approximately 20 seconds? Does fan direction return to normal?

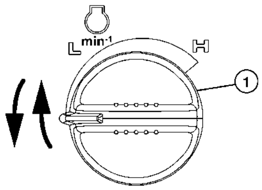
LISTEN: Does engine return to fast idle? Does fan speed increase?

YES: Go to next check.

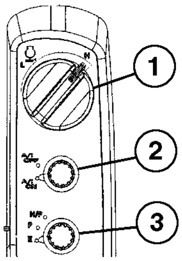
NO: See Reversing Fan Switch Harness (W16) Wiring Diagram (Group 9015-10.) and see Reversing Fan Switch Harness (W16) Component Location (Group 9015-10.) and see Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

– – –1/1

Engine Speed Dial Check



TX1000874 –UN–01DEC05



TX1000170 –UN–10NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch

Turn auto-idle switch (2) to A/I OFF.

Place pilot shutoff lever in LOCKED (rearward) position.

Turn engine speed dial (1) clockwise.

LISTEN: Does engine speed increase?

Turn engine speed dial (1) counterclockwise.

LISTEN: Does engine speed decrease?

YES: Go to next check.

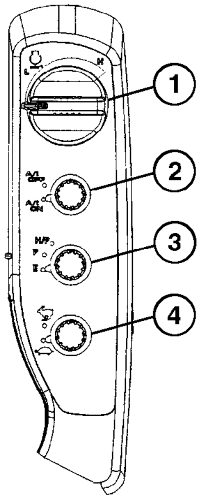
NO: Check controller key signal switch 5A fuse (F18) (Marked POW ON). See Fuse and Relay Specifications. (Group 9015-10.)

IF OK: Check engine speed dial on monitor display. See Monitor Service Menu Operation (Group 9015-16.) and see Monitor Circuit Theory of Operation. (Group 9015-15.)

IF OK: Check wiring harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

– – –1/1

E (Economy) Mode and P (Power) Mode Check



TX1000744 –UN–29NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch
4—Travel Speed Switch

Turn power mode switch (3) to P (power) mode.

Turn auto-idle switch (2) to A/I OFF.

Turn engine speed dial (1) to H (fast idle) position.

Turn power mode switch (3) to E (economy) mode.

LOOK/LISTEN: Does engine speed decrease?

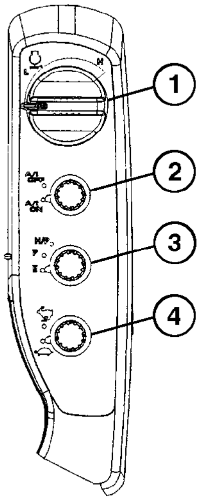
Turn power mode switch (3) to P (power) mode.

LOOK/LISTEN: Does engine speed increase?

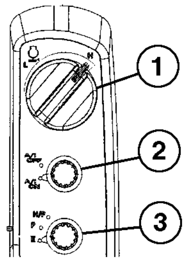
YES: Go to next check.

NO: For more information on engine speed and power mode See Engine Speed Control System Operation. (Group 9010-05.)

– – –1/1

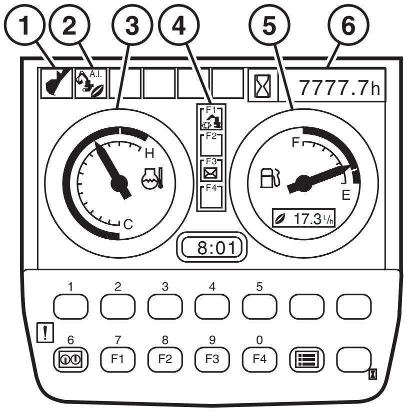
HP (High Power) Mode Check	 TX1000744 –UN–29NOV05 **1—Engine Speed Dial** **2—Auto-Idle Switch** **3—Power Mode Switch** **4—Travel Speed Switch** Turn power mode switch (3) to P (power) mode. Turn auto-idle switch (2) to A/I OFF. Turn engine speed dial (1) to H (fast idle) position. Turn power mode switch (3) to HP (high power) mode. Actuate arm in function over relief. *LOOK/LISTEN: Does engine speed increase as function goes over relief?*	**YES:** Go to next check. **NO:** Check controller key signal switch 5A fuse (F18) (Marked POW ON). See Fuse and Relay Specifications (Group 9015-20.) and see Engine Speed Control System Operation. (Group 9010-05.) **NO:** Check wiring. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** See HP (High Power) Function Does Not Operate, P (Standard) Mode Is Normal. (Group 9025-15.) – – –1/1

Auto-Idle Circuit Check



1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch

TX1000170 –UN–10NOV05



TX1005666 –UN–31MAR06

1—Work Mode Indicator
2—Auto-Idle Indicator
3—Engine Coolant Temperature Gauge
4—F1 Function Button Indicator
5—Fuel Gauge
6—Hour Meter

Turn engine speed dial (1) to H (fast idle) position.

Turn power mode switch (3) to HP (high power) mode.

Place pilot shutoff lever to UNLOCKED (forward) position.

Turn auto-idle switch (2) to A/I ON.

LOOK/LISTEN: Does auto-idle indicator (2) illuminate?

Does engine speed decrease after 4—6 seconds?

Slowly actuate dig function.

LOOK/LISTEN: Does engine speed return to fast idle?

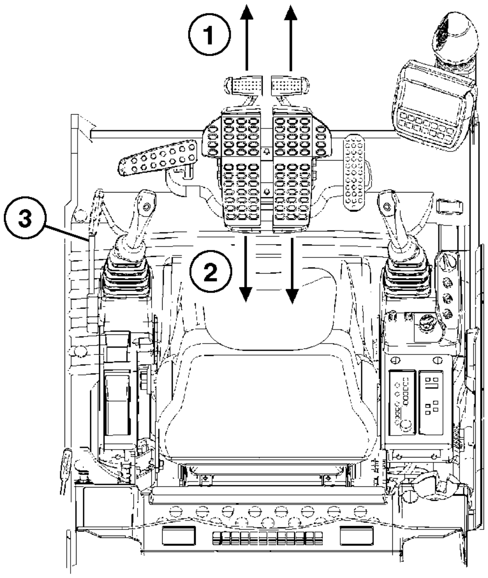
YES: Go to next check.

NO: Check solenoid 10 A fuse (F4) (Marked SOLENOID). See Fuse and Relay Specifications (Group 9015-10.) and see Cab Harness (W1) Wiring Diagram. (9010-15.)

NO: See Auto Idle Does Not Work. (Group 9010-15.)

– – –1/1

Travel Alarm Check



TX1005049 –UN–21MAR06

1—Forward
2—Rearward
3—Pilot Shutoff Lever

CAUTION: Machine will move during this check. Make sure area is clear and large enough to operate the machine.

Place pilot shutoff lever (3) to UNLOCKED (forward) position.

Slowly push travel pedals or levers forward (1).

LISTEN: Does travel alarm sound?

Slowly pull travel levers and pedals rearward (2).

LISTEN: Does travel alarm sound?

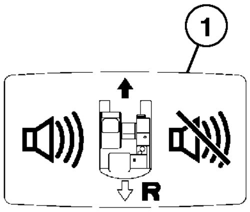
YES: Go to next check.

NO: Check travel alarm 5 A fuse (F5) (Marked OPT. 1). See Fuse and Relay Specifications. (Group 9015-10.)

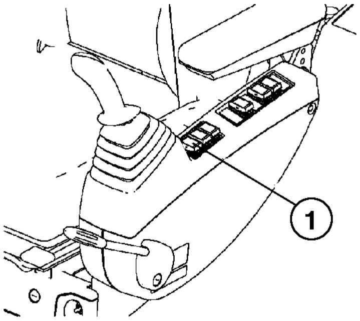
NO: Check wiring. See Cab Harness (W1) Wiring Diagram (Group 9015-10.) and see System Functional Schematic. (Group 9015-10.)

– – –1/1

Travel Alarm Cancel Switch Circuit Check



TX1005669 –UN–29MAR06



TX1000414 –UN–22NOV05

1—Travel Alarm Cancel Switch

CAUTION: Machine will move during this check. Make sure area is clear and large enough to operate the machine.

NOTE: Travel alarm must operate for this check.

Place pilot shutoff lever (1) to UNLOCKED (forward) position.

Push travel pedals or levers and allow travel alarm to operate for a minimum of 12 seconds.

LISTEN: Does travel alarm sound?

While continuing travel, push travel alarm cancel switch (1).

LISTEN: Does travel alarm stop sounding?

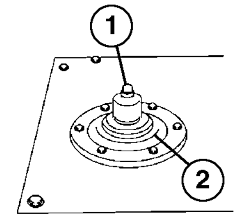
YES: Go to next check.

NO: Check travel alarm 5 A fuse (F5) (Marked OPT. 1). See Fuse Test (Group 9015-20.) and see Fuse and Relay Specifications. (Group 9015-10.)

NO: Check wiring. See Cab Harness (W1) Wiring Diagram (Group 9015-10.) and see System Functional Schematic. (Group 9015-10.)

– – –1/1

Hydraulic Oil Tank Pressurization Check



TX1000859 –UN–01DEC05

1—Hydraulic Oil Tank Pressure Release Button
2—Hydraulic Oil Tank Cover

Raise boom to full height, then lower boom to ground.

Slowly depress pressure release button on hydraulic oil tank cover.

LISTEN: Is air heard escaping from the pressure release button on hydraulic oil tank cover?

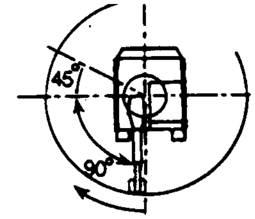
IMPORTANT: The pressurized oil tank creates pressure at the inlet to the hydraulic pumps. If tank cover does not seal, hydraulic pumps could cavitate and be damaged.

YES: Go to next check.

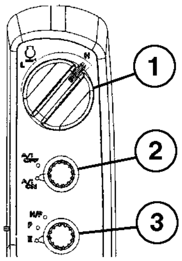
NO: Replace hydraulic oil tank cover.

– – –1/1

Swing Dynamic Braking Check



T6479AY –UN–19OCT88



TX1000170 –UN–10NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch

CAUTION: Make sure area is clear and large enough to swing extended arm and bucket. Machine must be on level ground.

Position upperstructure with boom to the front.

Move arm to the extended position, bucket to the retracted position, and bucket-to-arm pivot pin at same level as boom-to-frame pivot pin.

Turn engine speed dial (1) to H (fast idle) position.

Turn power mode switch (3) to P (power) mode.

Fully actuate swing function. Swing clockwise 90 degrees and then release lever.

LOOK: Does upperstructure stop within 45 degrees (1/8 turn) or less after releasing lever?

Position upperstructure with boom to the front.

Fully actuate swing function. Swing counterclockwise 90 degrees and then release lever.

LOOK: Does upperstructure stop within 45 degrees (1/8 turn) or less after releasing lever?

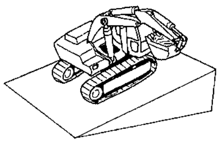
YES: Go to next check.

NO: Perform Swing Motor Leakage Test (Group 9025-25.) and perform Swing Motor Crossover Relief Valve Test and Adjustment. (Group 9025-25.)

NO: Check swing valve spool and spring. See Control Valve 5 Spool Disassemble and Assemble. (Group 3360.)

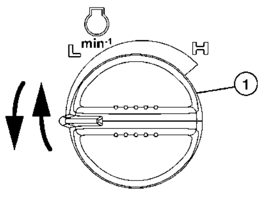
– – –1/1

Swing Park Brake and Circuit Drift Check



T140540

T140540 –UN–17MAY01



TX1000874 –UN–01DEC05

1—Engine Speed Dial

Fill the bucket with dirt.

Position machine on a hillside with a slope of approximately 25%. If a hill is not available, raise one side of machine approximately 300 mm (1 ft) with the boom and then put a block under the track.

Move arm to the fully extended position.

Raise boom so arm-to-bucket pivot pin are the same height as boom-to-frame pivot pin.

Position upperstructure with cab over travel motors, perpendicular to tracks.

Turn engine speed dial (1) to L (slow idle) position.

Wait approximately 5 minutes with all functions in neutral.

NOTE: Function does not need to be fully actuated to disengage the swing park brake.

Slowly actuate bucket load function to disengage the swing park brake. Do not hold the function over relief for more than 10 seconds.

LOOK: Does upperstructure hold position when swing park brake is engaged?

LOOK: Does upperstructure move only slightly when swing park brake is disengaged?

Swing upperstructure 180 degrees counterclockwise and repeat procedure.

Turn engine speed dial (1) to L (slow idle) position.

Wait approximately 5 minutes with all functions in neutral.

Slowly actuate bucket load function to disengage the swing park brake. Do not hold the function over relief for more than 10 seconds.

LOOK: Does upperstructure hold position when swing park brake is engaged?

LOOK: Does upperstructure move only slightly when swing park brake is disengaged?

YES: Go to next check.

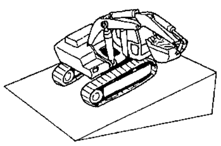
NO: Upperstructure moves when all functions are in neutral and park brake is engaged. Check for pilot oil pressure to swing park brake. See Upperstructure Drift With Swing Valve In Neutral. (Group 9025-15.)

NO: Upperstructure movement is excessive when park brake is disengaged. See Swing Motor Leakage Test. (Group 9025-25.)

NO: Check swing spool in the control valve. See Control Valve Remove and Install (Group 3360.) and see Control Valve 5 Spool Disassemble and Assemble. (Group 3360.)

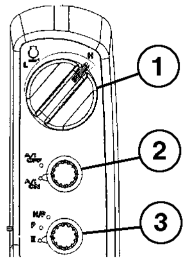
– – –1/1

Swing Power Check



T140540

T140540 –UN–17MAY01



TX1000170 –UN–10NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch

Fill the bucket with dirt.

Position machine on a hillside with a slope of approximately 25%. If a hill is not available, raise one side of machine approximately 300 mm (1 ft) with the boom and then put a block under the track.

Move arm to the fully extended position. Raise boom so arm-to-bucket pivot pin is the same height as boom-to-frame pivot pin.

Swing upperstructure clockwise so it is 90 degrees to the slope.

Turn engine speed dial (1) to H (fast idle) position.

Turn power mode switch (3) to HP (high power) mode

Actuate the swing function to swing uphill.

LOOK: Does upperstructure swing uphill?

Swing upperstructure 180 degrees counterclockwise and repeat procedure.

Turn engine speed dial (1) to H (fast idle) position.

Power mode switch (3) in HP (high power) mode.

Actuate the swing function to swing uphill.

LOOK: Does upperstructure swing uphill?

YES: Go to next check.

NO: See Swing Motor Crossover Relief Valve Test and Adjustment. (Group 9025-25.)

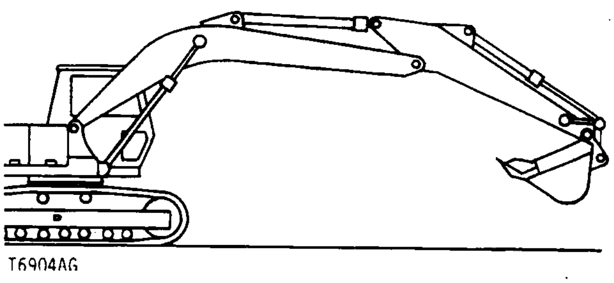
NO: Check swing motor leakage. See Swing Motor Leakage Test. (Group 9025-25.)

NO: See Diagnose Swing Circuit Malfunctions. (Group 9025-15.)

NO: Check swing spool in control valve. See Control Valve Remove and Install (Group 3360.) and see Control Valve 5 Spool Disassemble and Assemble. (Group 3360.)

– – –1/1

Dig Function Drift Check



T6904AG –UN–06DEC88

Fill the bucket with dirt.

Position bucket at maximum reach with bucket pivot pin at the same height as boom pivot pin.

Retract arm cylinder, then extend about 2 inches

Extend bucket cylinder, then retract about 2 inches.

Stop engine.

Measure amount cylinders extend or retract in 5 minutes.

Measure distance from bottom of bucket to ground.

Compare measurements to specifications.

450DLC—Specification

Boom Cylinder—Drift	15 mm 0.6 in.
Arm Cylinder—Drift	20 mm 0.8 in.
Bucket Cylinder—Drift	20 mm 0.8 in.
Bottom Of Bucket-To-Ground—Drift	100 mm 3.94 in.

LOOK: Is cylinder drift within specification?

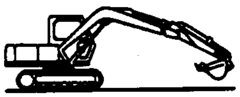
YES: Go to next check.

NO: See Load Drifts Down When Control Valve Is In Neutral Position. (Group 9025-15.)

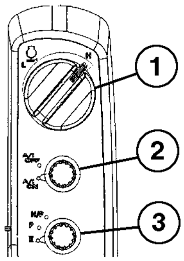
– – –1/1

Swing Priority Circuit Check

CAUTION: Perform check in an open area away from other machinery or personnel.



T6290AF –UN–19OCT88



TX1000170 –UN–10NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch

Position machine as shown.

Turn engine speed dial (1) to H (fast idle) position.

Turn power mode switch (3) to P (power) mode.

Operate swing function and record time required for three complete revolutions.

Divide that time by three to get an average time for one revolution.

Specification
Swing Function—Time—One Revolution... 6.17—7.17 seconds

IMPORTANT: Position machine as shown. Operate swing and arm in slowly a few times before attempting to perform check to ensure bucket does not contact machine or ground.

Position machine as shown, arm extended, bucket curled, and upper structure 90 degrees to tracks.

Turn engine speed dial (1) to H (fast idle) position.

Turn power mode switch (3) to P (power) mode.

Raise boom high enough so bucket does not contact the machine or ground during arm in and swing combined operation.

Operate swing function and slowly actuate arm in function when upperstructure is in line with tracks. Record time required for one complete revolution.

NOTE: Swing speed should not slow when actuating arm in.

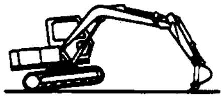
LOOK: Does swing speed remain unchanged when actuating arm in?

YES: Go to next check.

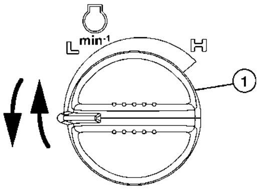
NO: Check arm 1 flow rate pilot valve. See Diagnose Swing Circuit Malfunctions (Group 9025-15.) and see Pilot Signal Manifold Operation (Group 9025-05.) and see Arm 1 (Swing Priority) Flow Rate Circuit Operation. (Group 9025-05.)

– – –1/1

Control Valve Lift Check Test



T6292AZ –UN–19OCT88



TX1000874 –UN–01DEC05

1—Engine Speed Dial

Turn engine speed dial (1) to L (slow idle) position.

Position machine as shown.

Slowly lower boom, extend arm (retract cylinder), and dump bucket (retract cylinder).

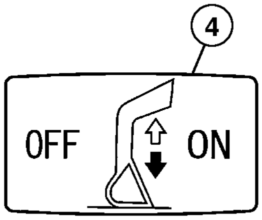
LOOK: Do functions move in opposite direction as pilot control levers are first moved, then change direction as levers are moved farther?

YES: See Load Falls When Control Valve Is Actuated To Raise Load With Engine Running At Slow Idle. (Group 9025-15.)

NO: Go to next check.

– – –1/1

Boom Mode Switch



TX1005670 –UN–29MAR06

4—Boom Mode Switch

With the boom mode switch turned ON.

LOOK/FEEL: Can the machine be raised off the ground with the front attachment?

With the boom mode switch turned OFF.

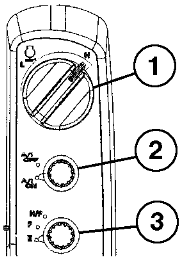
LOOK/FEEL: Does the machine remain on the ground with the front attachment activated?

YES: Go to next check.

NO: See Boom Mode Circuit Operation (Group 9025-05.) and perform Boom Mode Solenoid Valve (port SC) Test and Adjustment. (Group 9025-25.)

– – –1/1

Boom Up, Arm In, and Bucket Combined Function Operation Check



TX1000170 –UN–10NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch

Turn engine speed dial (1) to H (fast idle) position.

Turn power mode switch (3) to P (power) mode.

Actuate boom up function, arm in function, and then bucket function in combination.

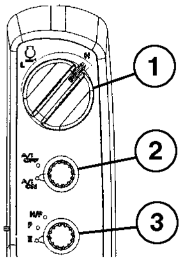
LOOK: Does boom continue to move at approximately the same speed after bucket function is actuated?

YES: Go to next check.

NO: If boom speed slows excessively, inspect bucket flow rate control valve. See Control Valve Remove and Install (Group 3360.) and see Control Valve 4 Spool Disassemble and Assemble. (Group 3360.)

– – –1/1

Boom Regenerative Valve Operation Check



TX1000170 –UN–10NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch

Turn engine speed dial (1) to H (fast idle) position.

Turn power mode switch (3) to P (power) mode.

Raise boom and extend the arm to full extension.

Actuate the boom down, then arm in and boom up functions in combined operation.

LOOK: Does the boom move smoothly through the complete cycle down and up and not hesitate when it goes past the vertical position?

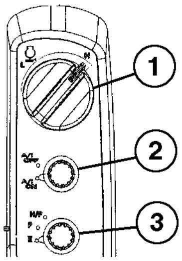
YES: Go to next check.

NO: Check pump 1 and pump 2 delivery pressure sensors (B35 and B37) and boom up pressure sensor (B30). See Pressure Sensor Test. (Group 9015-20.)

NO: Check boom regenerative valve. See Boom Regenerative Valve Circuit Operation (Group 9025-05.) and see Control Valve Remove and Install (Group 3360.) and see Control Valve 4 Spool Disassemble and Assemble. (Group 3360.)

– – –1/1

Arm Regenerative Valve Operation Check



TX1000170 –UN–10NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch

Turn engine speed dial (1) to H (fast idle) position.

Turn power mode switch (3) to P (power) mode.

Extend the arm to full extension and then lower boom so bucket is on the ground.

Actuate the boom up and arm in functions in combined operation.

LOOK: Does the arm move smoothly through the complete cycle and not hesitate when it goes through the vertical position?

YES: Go to next check.

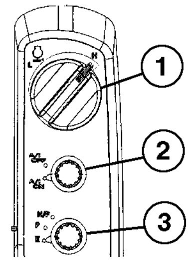
NO: Check pump 1 and pump 2 delivery pressure sensors (B35 and B37), arm in pressure sensor (B31), and boom up pressure sensor (B30). See Pressure Sensor Test. (Group 9015-20.)

NO: Check arm regenerative solenoid valve. See Arm Regenerative Valve Circuit Operation. (Group 9025-05.)

IF OK: Check arm regenerative valve. See Control Valve Remove and Install (Group 3360.) and see Control Valve 5 Spool Disassemble and Assemble. (Group 3360.)

– – –1/1

Bucket Regenerative Valve Operation Check



TX1000170 –UN–10NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch

Turn engine speed dial (1) to H (fast idle) position.

Turn power mode switch (3) to P (power) mode.

Actuate boom up, arm out and bucket dump functions.

Actuate boom down function, arm in function, and then the bucket curl function.

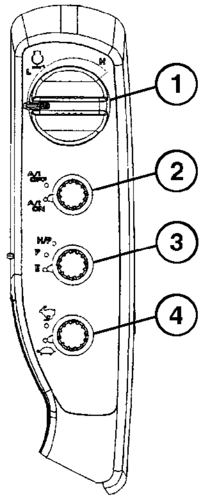
LOOK: Does the bucket move smoothly through the complete cycle and not hesitate when it goes to the curl position?

YES: Go to next check.

NO: Check bucket regenerative valve. See Bucket Regenerative Valve Circuit Operation. (Group 9025-05.)

– – –1/1

Travel Speed Selection Check



TX1000744 –UN–29NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch
4—Travel Speed Switch

Turn engine speed dial (1) to H (fast idle) position.

Turn travel speed switch (4) to slow speed (turtle) mode.

Actuate travel function to full speed.

Turn travel speed switch (4) to fast speed (rabbit) mode.

LOOK: Does machine travel speed increase?

Actuate a dig function and then return to neutral.

LOOK: Does machine travel speed decrease and then increase as dig function is actuated and then released?

Turn travel speed switch (4) to slow speed (turtle) mode.

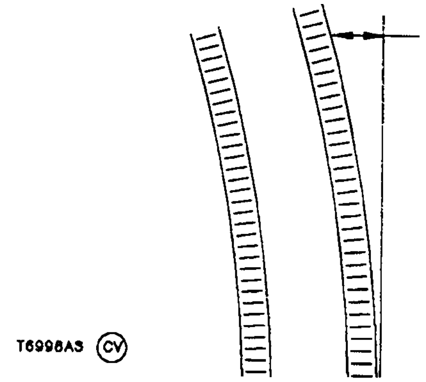
LOOK: Does machine travel speed decrease?

YES: Go to next check.

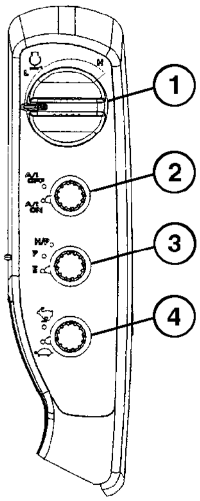
NO: Check travel pressure sensor (B34) and travel speed switch (S11). See Pressure Sensor Test (Group 9015-20.) and see Travel Motor Speed Circuit Operation. (Group 9025-05.)

– – –1/1

Travel System Tracking Check



T6998AS –UN–23MAR89



TX1000744 –UN–29NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch
4—Travel Speed Switch

Turn engine speed dial (1) to H (fast idle) position.

Turn power mode switch (3) to P (power) mode.

Turn travel speed switch (4) to fast speed (rabbit) mode.

Operate machine at full speed forward on a flat and level area about 20 m (65 ft).

Repeat procedure in reverse travel.

Observe which direction and how much the machine mistracks from a straight line.

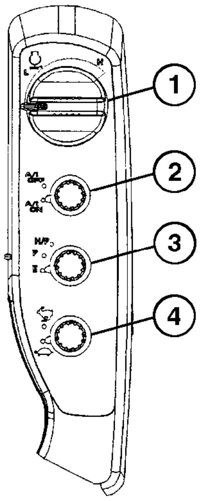
LOOK: Does machine mistrack less than 200 mm (7.88 in.)?

YES: Go to next check.

NO: Note which direction the machine mistracks. If machine mistracks left, hydraulic pump 2 circuit oil flow may be less than specification. If machine mistracks right, hydraulic pump 1 circuit oil flow may be less than specification. See Diagnose Travel System Malfunctions. (Group 9025-15.)

– – –1/1

Travel System Tracking Checks While Operating a Dig Function



TX1000744 –UN–29NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch
4—Travel Speed Switch

NOTE: Machine will slow down during this test.

Turn engine speed dial (1) to H (fast idle) position.

Turn travel speed switch (4) to fast speed (rabbit) mode.

Operate machine at full speed forward on a flat and level surface.

After machine is moving, actuate arm out from neutral to full actuation and extend the arm.

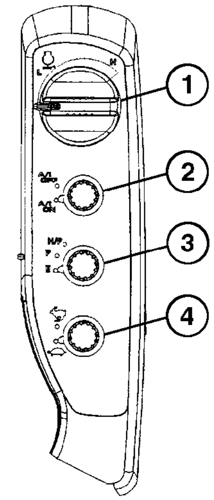
LOOK: Does machine mistrack excessively when the arm is extended?

YES: See Combined Travel And Dig Functions Slow Or No Power. (Group 9025-15.)

NO: Go to next check.

– – –1/1

Travel System Maneuverability Check



TX1000744 –UN–29NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch
4—Travel Speed Switch

Turn engine speed dial (1) to H (fast idle) position.

Turn travel speed switch (4) to fast speed (rabbit) mode.

Drive machine at full speed forward down a slope.

Turn in each direction.

LOOK: Does each track slow down in response to pedal or lever movement in order to turn?

Repeat the procedure in reverse travel.

Turn travel speed switch (4) in fast speed (rabbit) mode.

Drive machine at full speed in reverse down a slope.

Turn in each direction.

LOOK: Does each track slow down in response to pedal or lever movement in order to turn?

YES: Go to next check.

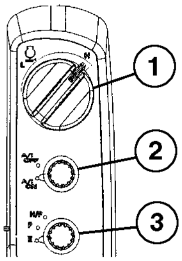
NO: See Diagnose Travel System Malfunctions. (Group 9025-15.)

– – –1/1

Cycle Times Check 450DLC

CAUTION: Prevent possible injury from unexpected machine movement. Clear all persons from the area before operating machine.

NOTE: Warm hydraulic oil to operating temperature for this check.



TX1000170 –UN–10NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch

Turn engine speed dial (1) to H (fast idle) position.

Turn auto-idle switch (2) to A/I OFF.

T6477AQ –UN–19OCT88

Boom

T7884AE –UN–10NOV92

Arm, Bucket, Swing

Move machine to position shown for each test.
Record cycle time for each function.

Specification

Boom Raise (Cylinder Extend)—Cycle Time (Seconds)	3.3—3.9
Boom Lower (Cylinder Retract)—Cycle Time (Seconds)	2.2—2.8
Arm In (Cylinder Extend)—Cycle Time (Seconds)	4.2—4.8
Arm Out (Cylinder Retract)—Cycle Time (Seconds)	2.8—3.4
Bucket Load (Cylinder Extend)—Cycle Time (Seconds)	3.2—3.8
Bucket Dump (Cylinder Retract)—Cycle Time (Seconds)	2.6—3.2
Swing Left or Right, 3 Revolutions From a Running Start—Cycle Time (Seconds)	18.5—21.5
Drive 20 m (65 ft) From A Running Start (Check In Forward And Reverse With Travel Speed Switch In FAST Position)—Cycle Time (Seconds)	11.0—15.0
Drive 20 m (65 ft) From A Running Start (Check In Forward And Reverse With Travel Speed Switch In SLOW Position)—Cycle Time (Seconds)	18.0—22.0
Track Raised For 3 Revolutions From A Running Start (Check In Forward And Reverse With Travel Mode Switch In FAST Position)—Cycle Time (Seconds)	20.0—24.0
Track Raised For 3 Revolutions From A Running Start (Check In Forward And Reverse With Travel Mode Switch In SLOW Position)—Cycle Time (Seconds)	32.0—36.0

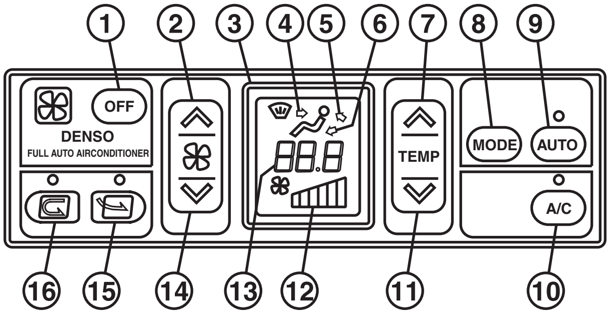
LOOK: Does machine perform within specifications?

YES: Go to next check.

NO: See Diagnose Hydraulic System Malfunctions. (Group 9025-15.)

– – –1/1

Heater and Air Conditioning Circuit Check



T145706 –UN–21SEP01

1—OFF Switch
2—Fan Speed Increase Switch
3—Display
4—Defrost Vent Indicator
5—Rear Vent Indicator
6—Under Seat Vent Indicator
7—Temperature Increase Switch
8—Mode Switch
9—Auto Switch
10—Air Conditioner ON and OFF Switch (A/C)
11—Temperature Decrease Switch
12—Fan Speed Indicator
13—Temperature Setting Indicator
14—Fan Speed Decrease Switch
15—Fresh Air Switch
16—Recirculating Air Switch

NOTE: The air conditioner and heater controller automatically adjusts vent position, fan speed, and intake air source to achieve any temperature set by the operator.

Key ON, press heater and air conditioner OFF switch (1).

Start engine.

Run engine until normal operating temperature is reached.

Press temperature increase switch (7) to maximum heat position.

FEEL: Does warm air come from the vents?

Press temperature decrease switch (11) to maximum cold position.

LISTEN: Does air conditioner compressor clutch solenoid “click”?

FEEL: Does cool air come from the vents?

YES: Check complete.

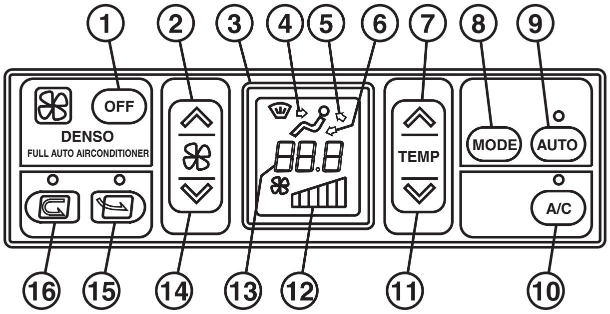
NO: Heater does not operate. Check air conditioner and heater 20 A fuse (F3) (Marked HEATER). See Fuse and Relay Specifications. (Group 9015-10.)

NO: Check system operation. See Heating and Air Conditioning Operational Checks. (Group 9031-25.)

NO: Check wiring harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

– – –1/1

Heater And Air Conditioner Controls Check (Automatic Temperature Control)



T145706 –UN–21SEP01

1—OFF Switch
2—Fan Speed Increase Switch
3—Display
4—Defrost Vent Indicator
5—Rear Vent Indicator
6—Under Seat Vent Indicator
7—Temperature Increase Switch
8—Mode Switch
9—Auto Switch
10—Air Conditioner ON and OFF Switch (A/C)
11—Temperature Decrease Switch
12—Fan Speed Indicator
13—Temperature Setting Indicator
14—Fan Speed Decrease Switch
15—Fresh Air Switch
16—Recirculating Air Switch

NOTE: The air conditioner and heater controller automatically adjusts vent position, fan speed, and intake air source to achieve any temperature set by the operator.

Key ON, press OFF switch (1).

Start engine.

Run engine until normal operating temperature is reached.

LOOK: Is one or all of the vent indicators (4), (5), or (6) ON?

(Mode switch adjusts vents with OFF switch pushed.)

LOOK: Is one air indicator (15) or (16) ON?

(Either air switch indicator can be ON when OFF switch is pushed.)

Press fan speed increase switch (2) a few times.

LOOK: Does the number of fan speed indicator bars (12) increase?

FEEL/LISTEN: Does fan speed increase?

(There may be a short delay in fan speed change.)

Press fan speed decrease switch (14) a few times.

LOOK: Does the number of fan speed indicator bars (12) decrease?

FEEL/LISTEN: Does fan speed decrease?

Push auto switch (9).

– – –1/2

LOOK: Does A/C indicator come ON?

Push temperature increase switch (7) a few times.

LOOK: Does temperature setting indicator (13) show increasing numbers?

FEEL/LISTEN: Does fan speed increase?

Push temperature decrease switch (11) a few times.

LOOK: Does temperature setting indicator show decreasing numbers?

Does air conditioner come ON automatically?

Push mode switch (8) a few times.

LOOK: Does auto switch (9) indicator go OFF?

LOOK: Does a different combination of vent indicators (4), (5), or (6) illuminate?

FEEL/LISTEN: Does air come from vents as shown by indicators (4), (5), or (6)?

Air conditioner can be controlled manually by pushing the A/C switch when operating in auto mode.

Push A/C switch (10).

LOOK: Does A/C switch indicator go OFF?

Does air conditioner stop operating? (Fan will continue to run.)

Temperature can be displayed in Celsius or Fahrenheit.

With air conditioner and heater operating, push temperature increase (7) and temperature decrease (11) switches at the same time for more than 3 seconds.

LOOK: Does temperature setting indicator (13) change from Celsius to Fahrenheit or Fahrenheit to Celsius?

YES: Check complete.

NO: Heater fan does not blow air. Check air conditioner and heater 20 A fuse (F3) (Marked HEATER). See Fuse and Relay Specifications. (Group 9015-10.)

NO: Check system operation. See Heating and Air Conditioning Operational Checks. (Group 9031-25.)

NO: Check wiring harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

–19– –2/2

Section 9010
Engine

Contents

Page

Group 05—Theory of Operation
Engine Component Location 9010-05-1
Engine Fuel System Operation 9010-05-4
Engine Cooling System Operation. 9010-05-8
Engine Lubrication System Operation 9010-05-9
Engine Intake and Exhaust System Operation. 9010-05-12
Engine Turbocharger Operation 9010-05-13
Exhaust Gas Recirculation (EGR) Operation. 9010-05-16
Quick On Start (QOS) System Operation. 9010-05-18
Engine Speed Control System Operation. 9010-05-19

Group 15—Diagnostic Information
Isuzu AH-6WG1XYSA-01 9010-15-1
Diagnose Engine Malfunctions 9010-15-1
Engine Cranks But Will Not Start 9010-15-2
Engine Cranks But Will Not Start Diagnostic Procedure 9010-15-2
Engine Misfires Or Runs Irregularly. 9010-15-5
Engine Misfires Or Runs Irregularly Diagnostic Procedure. 9010-15-5
Engine Does Not Develop Full Power 9010-15-9
Engine Does Not Develop Full Power Diagnostic Procedure. 9010-15-9
Engine Overheats 9010-15-12
Engine Overheats Diagnostics Procedure 9010-15-12
Auto-Idle Does Not Work. 9010-15-13
Auto-Idle Does Not Work Diagnostics Procedure 9010-15-13
Coolant Temperature Too Low 9010-15-15
Coolant Temperature Too Low Diagnostics Procedure 9010-15-15
Coolant in Oil or Oil in Coolant 9010-15-15
Coolant in Oil or Oil in Coolant Diagnostics Procedure 9010-15-15
Low Engine Oil Pressure. 9010-15-16
Low Engine Oil Pressure Diagnostics Procedure 9010-15-16
High Engine Oil Pressure 9010-15-17
High Engine Oil Pressure Diagnostics Procedure 9010-15-17
Engine Uses Too Much Oil 9010-15-17

Page

Engine Uses Too Much Oil Diagnostics . . .9010-15-17
Engine Uses Too Much Fuel. 9010-15-18
Engine Uses Too Much Fuel Diagnostic Procedure 9010-15-18
Engine Emits Excessive White Exhaust Smoke 9010-15-20
Engine Emits Excessive White Exhaust Smoke Diagnostic Procedure. 9010-15-20
Engine Emits Excessive Black or Gray Exhaust Smoke 9010-15-22
Engine Emits Excessive Black or Gray Exhaust Smoke Diagnostic Procedure . . .9010-15-22
Turbocharger Excessively Noisy or Vibrates 9010-15-24
Turbocharger Excessively Noisy or Vibrates Diagnostics Procedure. 9010-15-24
Oil Dripping From Turbocharger Adapter. . .9010-15-25
Oil Dripping From Turbocharger Adapter Diagnostics Procedure. 9010-15-25
Excessive Drag in Turbocharger Rotating Members 9010-15-25
Excessive Drag in Turbocharger Rotating Members Diagnostics Procedure 9010-15-26
Fuel In Oil 9010-15-26
Fuel In Oil Diagnostics Procedure 9010-15-26

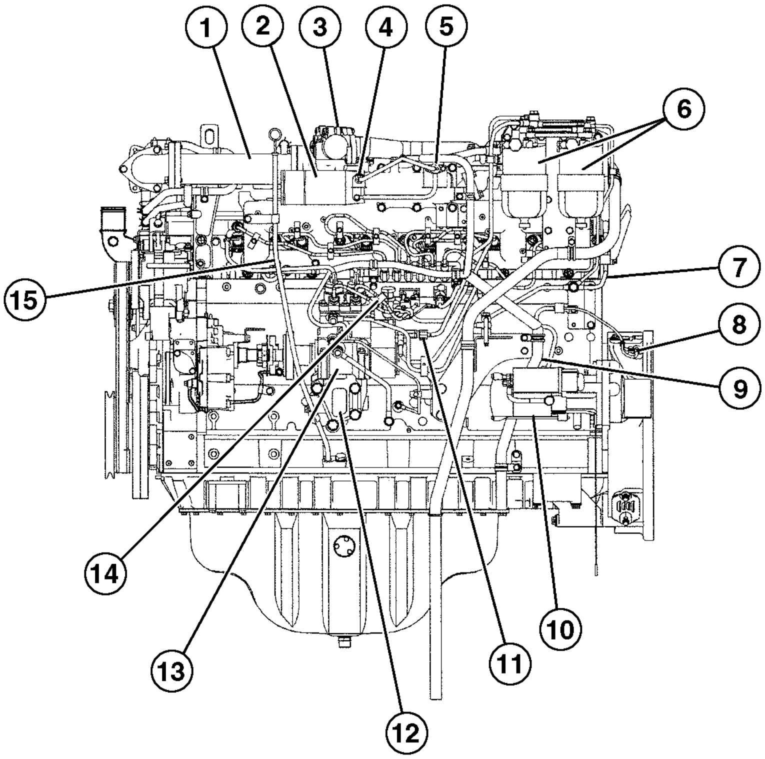
Group 25—Tests
Serpentine Belt Tension Check 9010-25-1
Check and Adjust Injection Pump Timing . . .9010-25-2
Engine Valve Lash (Clearance) Check and Adjust 9010-25-4
Engine Compression Pressure Test 9010-25-7
Air Filter Restriction Indicator Switch 9010-25-8
Air Intake System Leakage Test 9010-25-9
Engine Power Test Using Turbocharger Boost Pressure 9010-25-11
Engine Oil Pressure Test 9010-25-15
Rail Pressure Control Test 9010-25-16
Injector Balance Test (Injector Misfire Test) 9010-25-19
Injector Force Drive Test. 9010-25-22
EGR Regulating Valve Test 9010-25-24
Injector ID Code Registration 9010-25-27
Injector ID Code Upload 9010-25-36

Continued on next page

Page

Injector ID Code Download 9010-25-40

Engine Component Location



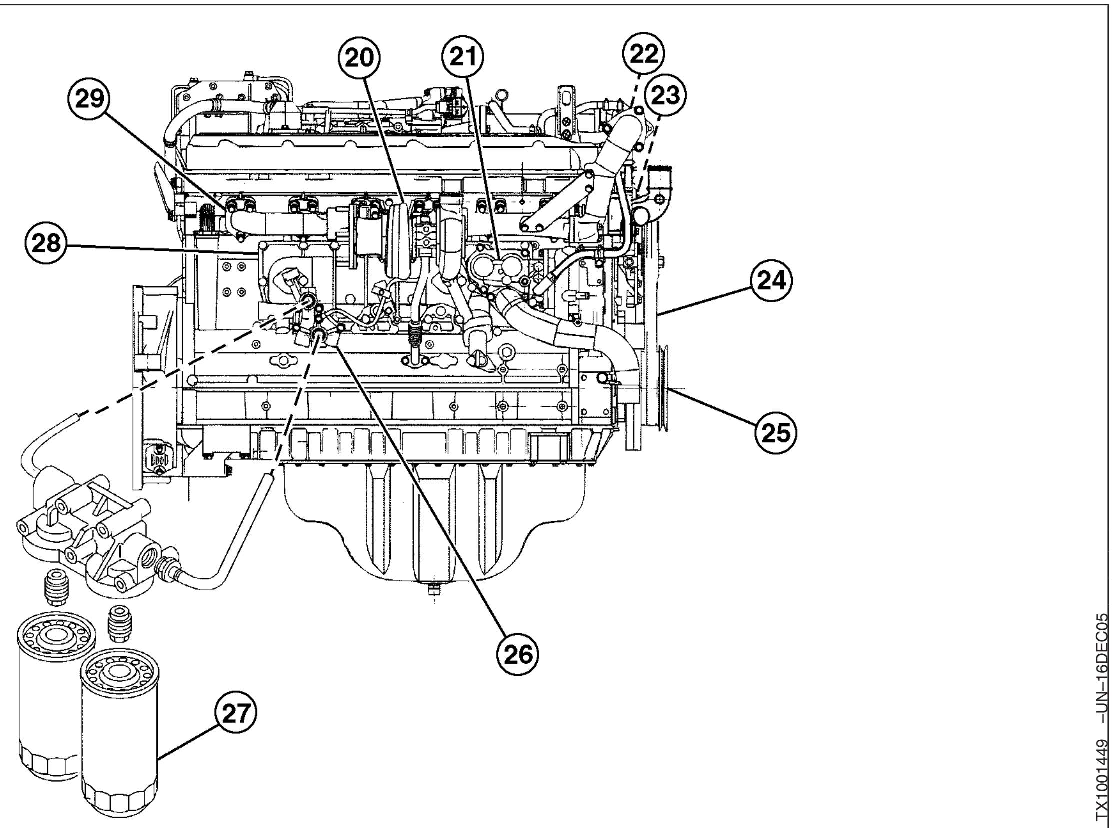
TX1001237

Engine Component Location (front)

1—Secondary Exhaust Gas Recirculation (EGR) Cooler
2—Intake Manifold
3—Exhaust Gas Recirculation (EGR) Valve
4—Boost Temperature Sensor
5—Boost Pressure Sensor
6—Fuel Filters (2 used)
7—Fuel Leak-Off Line
8—Crankshaft Position Sensor
9—Engine Oil Pressure Sensor
10—Starter Motor
11—Fuel Temperature Sensor
12—Engine Oil Port
13—High-Pressure Fuel Pump
14—Fuel Transfer Pump
15—Engine Coolant Temperature Sensor

Continued on next page

JC89288,0000036 –19–30JAN06–1/2

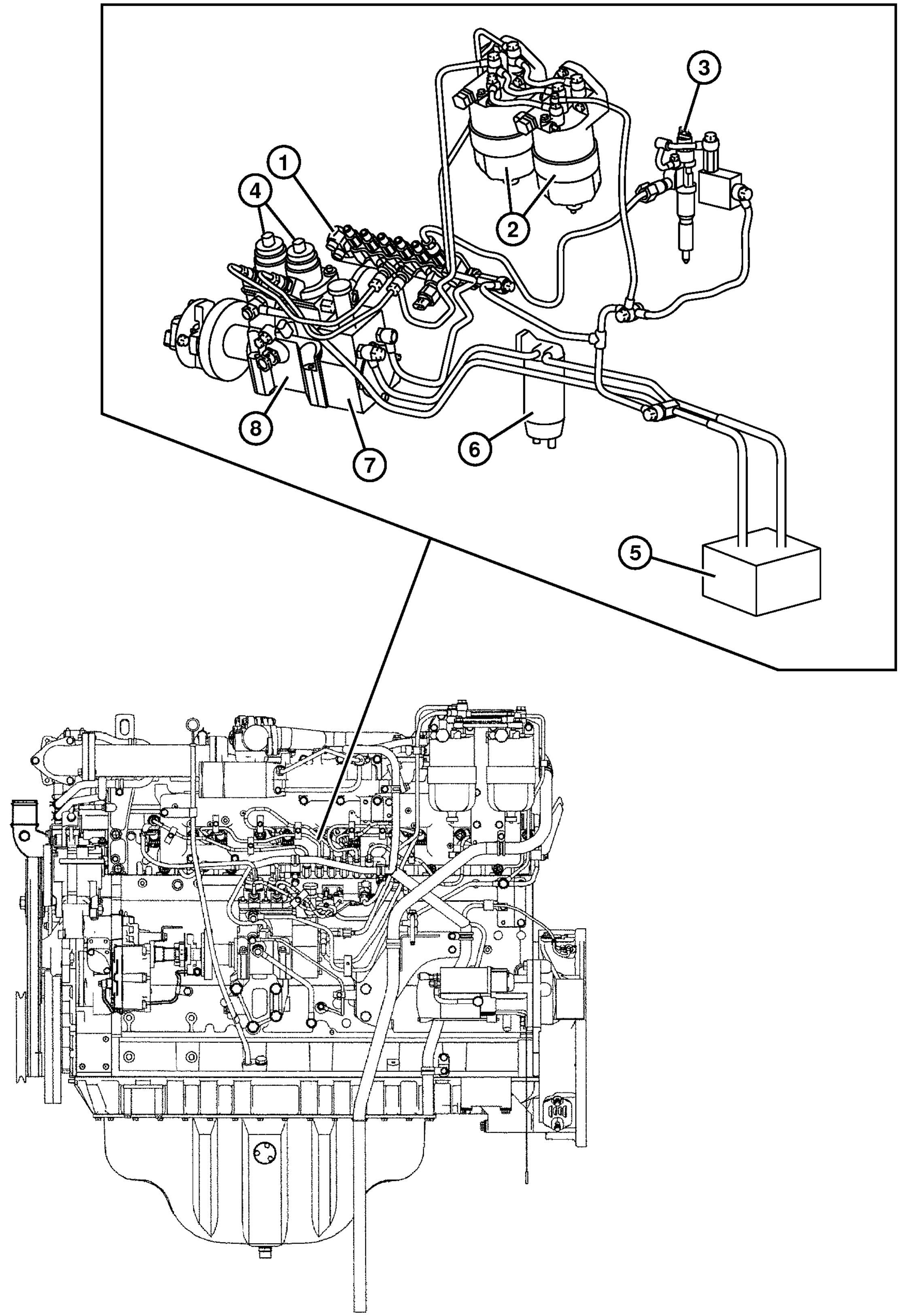


Engine Component Location (rear)

20—Turbocharger
21—Thermostat Housing
22—Primary Exhaust Gas Recirculation (EGR) Cooler
23—Water Pump
24—Serpentine Belt
25—Crankshaft Pulley
26—Oil Port
27—Oil Filter (2 used)
28—Oil Cooler
29—Exhaust Manifold

JC89288,0000036 –19–30JAN06–2/2

Engine Fuel System Operation



TX1001461

Engine Fuel System Component Location

Continued on next page

1—High Pressure Common Rail	**3—Electronic Injector (6 used)**	**5—Fuel Tank**	**7—Fuel Transfer Pump**
2—Fuel Filter (primary and secondary)	**4—Pressure Control Valve (2 used)**	**6—Water Separator**	**8—High Pressure Fuel Pump**

Fuel Supply System Operation

The fuel transfer pump (7), driven by high pressure fuel pump drive shaft, draws fuel from the fuel tank (5) through a water separator (6). The water separator removes water particles from the fuel. When the water level, which can be seen through the clear plastic body, reaches the warning line, the water separator must be drained. A self-venting drain plug is mounted on the bottom of the clear plastic sediment bowl.

After water is removed, the fuel is delivered to the primary and secondary fuel filters (2) for removal of any solid particles that might cause abrasive damage to the injection system. After filtering, clean pressurized fuel is delivered to the high pressure fuel pump (8). An independent priming pump permits manual fuel feed for maintenance activities when engine is not running.

Fuel Injection System Operation

The high pressure fuel pump raises the pressure of the fuel to the required pressure for injection in two pumping chambers. When there is no current to the pump control valves (PCVs) (4), fuel is allowed to fill the pumping chamber. The engine control module (ECM) sends a signal to the PCVs to shut the valve to the pumping chamber. When the fuel pressure exceeds the delivery valve opening pressure, the high pressure fuel is routed to the high pressure common rail (1). The high pressure common rail evenly distributes fuel to all of the electronic injectors (3). If excess fuel pressure develops in the high pressure common rail, a pressure limiter opens and routes the fuel through a fuel return line back to the fuel tank. Excess fuel in the high pressure fuel pump is routed back to the fuel tank through a fuel return line.

The ECM controls the injection amount, the injection timing, injection pressure, and the injection rate for each injector.

The ECM controls injection amount based on both actual engine speed and target engine speed. The ECM receives actual engine speed information from the crankshaft position sensor and camshaft position sensor. The main controller (MCF) supplies target engine speed information to the ECM based on the engine speed dial, pressure sensors, and power mode switches.

The ECM calculates fuel injection timing according to engine speed and fuel injection amount.

Injection pressure is controlled through the fuel pressure in the high pressure common rail. The ECM calculates the appropriate pressure in the high pressure common rail based on engine speed, fuel injection amount, and common rail pressure. Using the timing of the PCVs opening and closing, the ECM can regulate the fuel pressure in the high pressure common rail.

The fuel injection system uses an injection rate that helps improve combustion in the cylinders. A small amount of fuel is injected first into the cylinder. After this pilot injection ignites, the main supply of fuel is injected.

Fuel Injection Nozzle Operation

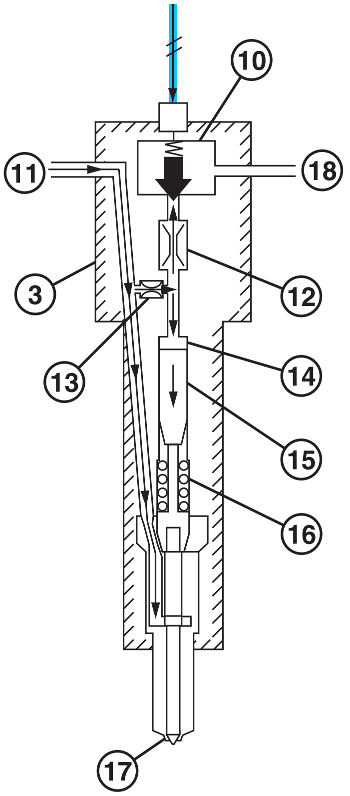
The electronic injectors are located inside the engine's cylinder head and are electrically controlled by the ECM. High pressure fuel is constantly supplied to the electronic injectors by the high pressure common rail. The opening and closing of the two-way valve within each injector by the ECM controls the injection amount, the injection timing, and the injection rate for each electronic injector.

Continued on next page

No Injection

Fuel from the high pressure common rail enters the electronic injector at the fuel inlet (11). When no current is supplied to the two-way valve (10), the valve spring (16) and hydraulic pressure of the fuel in the control chamber (14) cause the hydraulic piston (15) to push down and close the nozzle (17). High pressure fuel is held inside the nozzle until injection.

3—Electronic Injector
10—Two-Way Valve
11—Fuel Inlet
12—Orifice 1
13—Orifice 2
14—Control Chamber
15—Hydraulic Piston
16—Valve Spring
17—Nozzle
18—Fuel Leak-Off



TX1003033 –UN–25JAN06

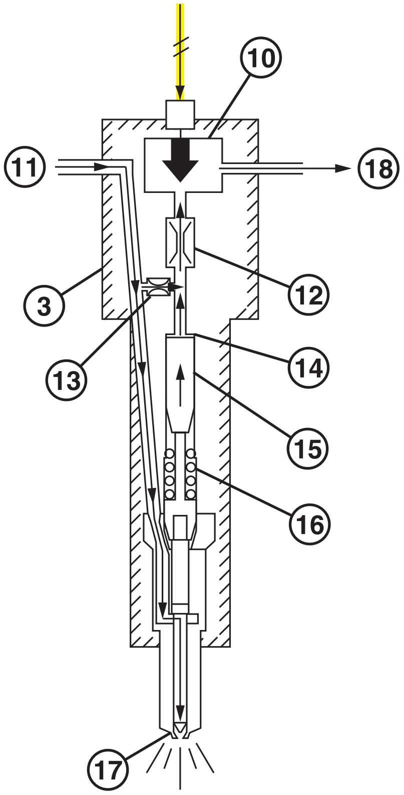
No Injection

JC89288,0000037 –19–30JAN06–3/5

Begin Injection

Injection begins when current is applied from the ECM to open the two-way valve (10). With valve open, fuel from the control chamber (14) flows through orifice 1 (12) out of the injector to the fuel leak-off line (18). The fuel is then routed back to the fuel tank. As the fuel from the control chamber exits the injector, the force is removed from the hydraulic piston (15), allowing fuel through the nozzle (17) to start the injection process.

3—Electronic Injector
10—Two-Way Valve
11—Fuel Inlet
12—Orifice 1
13—Orifice 2
14—Control Chamber
15—Hydraulic Piston
16—Valve Spring
17—Nozzle
18—Fuel Leak-Off



TX1003034 –UN–25JAN06

Begin Injection

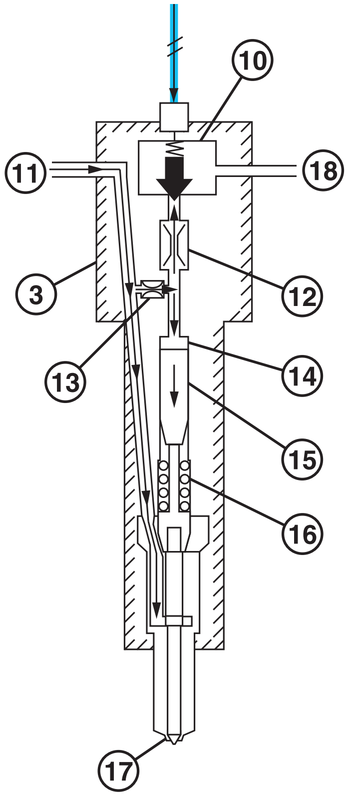
Continued on next page

JC89288,0000037 –19–30JAN06–4/5

End Injection

Injection ends when the current is removed from the two-way valve (10). The valve closes, causing fuel to fill the control chamber (14) through orifice 2 (13). The valve spring (16) and the hydraulic force from the fuel in the control chamber cause the hydraulic piston (15) to push down and close the nozzle (17). At this time the injection is complete.

3—Electronic Injector
10—Two-Way Valve
11—Fuel Inlet
12—Orifice 1
13—Orifice 2
14—Control Chamber
15—Hydraulic Piston
16—Valve Spring
17—Nozzle
18—Fuel Leak-Off

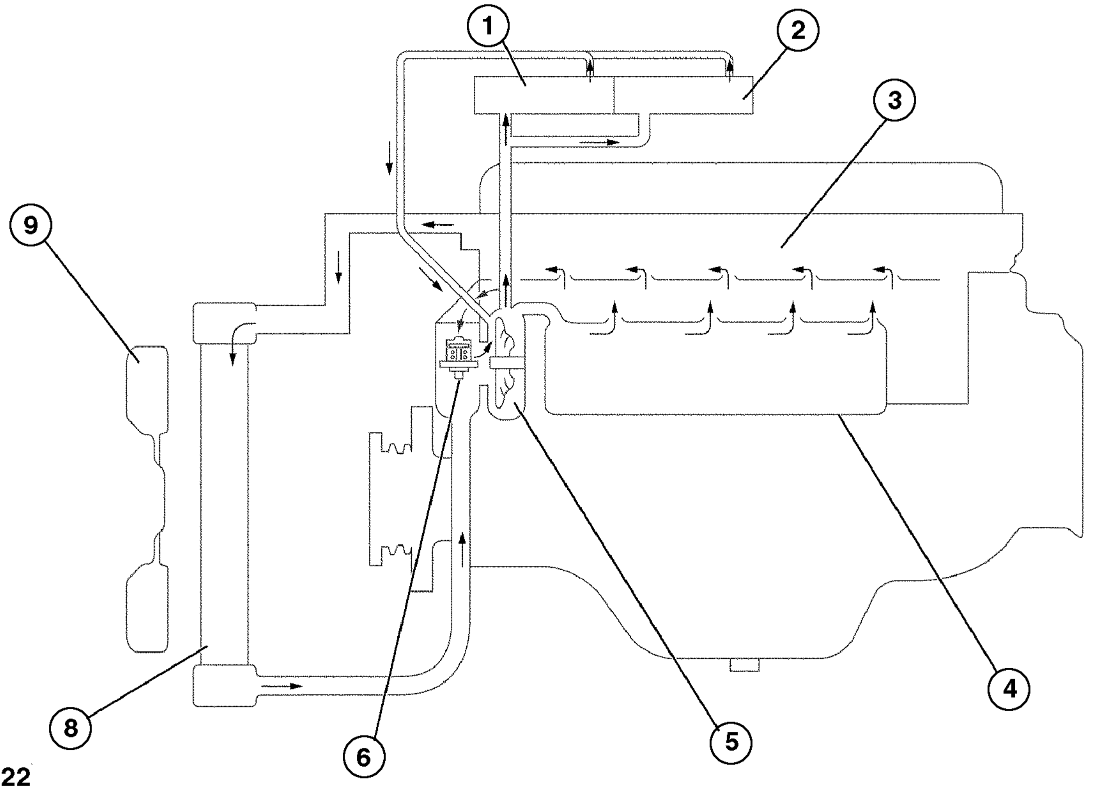


TX1003033 –UN–25JAN06

End Injection

JC89288,0000037 –19–30JAN06–5/5

Engine Cooling System Operation



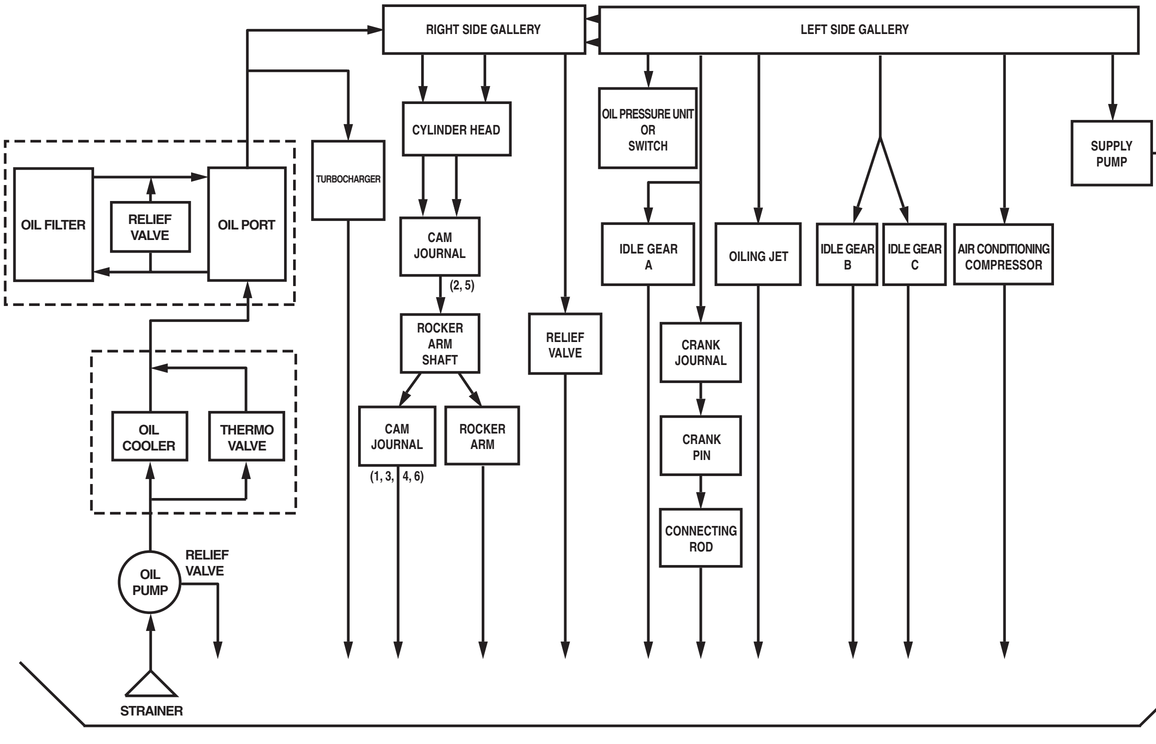
TX1001522

1—Primary EGR Cooler	**3—Cylinder Head**	**5—Coolant Pump**	**8—Radiator**
2—Secondary EGR Cooler	**4—Oil Cooler**	**6—Thermostat (2 used)**	**9—Cooling Fan**

The main parts of the cooling system consist of the radiator (8), coolant pump (5), coolant inlet and outlet pipes, and dual thermostats (6). The system is a compulsory water circulating system, pressured by a gear-driven centrifugal coolant pump and regulated by dual top-bypass type thermostats. At initial start-up, coolant is circulated from the water pump inlet through the coolant pump , oil cooler (4), cylinder head (3), primary EGR cooler (1), secondary EGR cooler (2) and back through dual top-bypass thermostats. This provides even heat distribution during rapid engine warmup. As the temperature of the engine coolant increases to 82°C (180°F), dual thermostats close the top-bypass and open the normal flow which, directs coolant to the radiator (8). As the coolant flows down through the radiator, excess heat is drawn away by the cooling fan (9). The low temperature coolant is then returned to the coolant pump inlet and the flow cycle is complete.

JC89288,000003D –19–24JAN06–1/1

Engine Lubrication System Operation



TX1001650

TX1001650 –19–22DEC05

The engine lubrication system consists of a positive displacement gear-driven oil pump, full-flow oil filters, water-cooled oil cooler, oil jets and relief valves. The oil pump pulls oil from the oil pan sump through a strainer and a suction line. The pump forces oil through the outlet tube into a vertical drilling in the cylinder block, and up to the oil cooler and to the remote-mounted filters. After flowing through the cooler and filters, oil flows into the right and left oil galleries and some is routed to the turbocharger.

The right-side oil gallery runs the length of the cylinder block and delivers oil to oil passages that feed the cylinder head, cam journal rocker arm shaft, and main bearing bushings. The left-side oil gallery runs the length of the cylinder block as well as providing oil to oil jets, supply pump, air compressor, idle gears, crank journal, crank pin, and connecting rod. From the main bearings, oil flows to the connecting rod bearings through drilled cross-passages in the crankshaft between the main journals and connecting rod journals.

Oil from the main bearing also supplies oil to the piston cooling orifices. Oil from the piston cooling orifices sprays on the underside of the piston to keep the piston crown cool. The oil spray also provides splash lubrication for the piston pin and bushing by splashing oil into a hole drilled in the top end of the connecting rod. At the rear of the cylinder block, oil flows from the rear camshaft bushing, up through the cylinder head, and into the rocker arm shaft. Oil flows through the rocker arm shaft and lubricates each of the rocker arms. Oil drips from the rocker arms to lubricate the adjusting screws, push rods, and camshaft followers. At the front of the cylinder block, oil flows from the oil passage into a machined groove in the front face of the block. This groove connects with the upper idler gear shaft to provide oil to the idler gear bushing. The lower idler gear bushing is splash lubricated.

Continued on next page

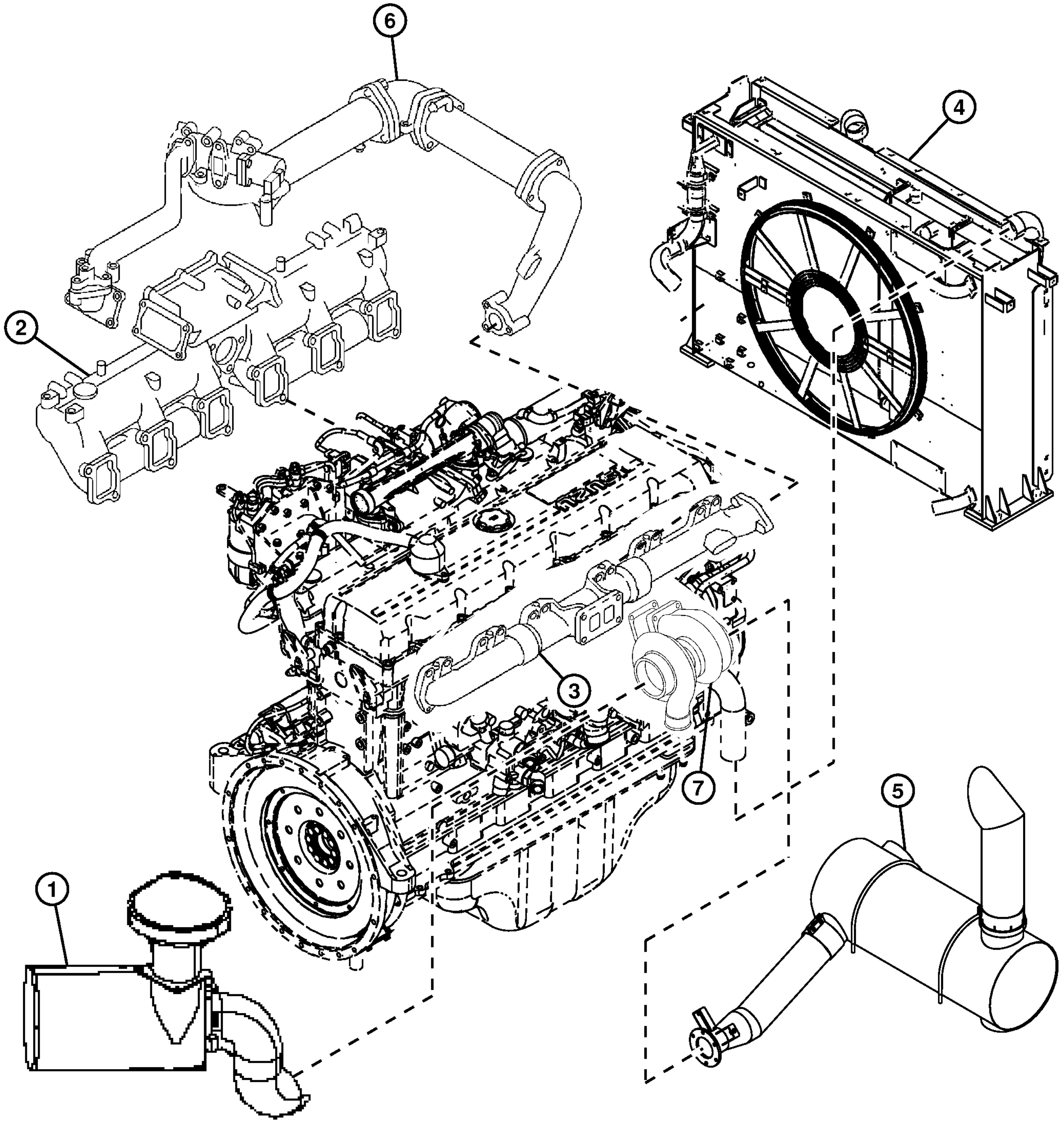
JC89288,000003E –19–30JAN06–1/2

The turbocharger oil supply line supplies oil to the turbocharger from the filtered side of oil filter adapter.

Oil returns from the turbocharger through the drain line.

JC89288,000003E –19–30JAN06–2/2

Engine Intake and Exhaust System Operation



TX1003057

Continued on next page

1—Air Filter Housing
2—Intake Manifold
3—Exhaust Manifold
4—Air-to-Air Intercooler
5—Muffler
6—EGR System
7—Turbocharger

Engine suction draws dust-laden outside air through an air inlet stack into the air filter housing (1). Air is filtered through dry-type primary and final filter elements in the air filter housing. Clean air travels through the intake air hose to the turbocharger (7), through the air-to-air intercooler (4), and into the intake manifold (2) along with some exhaust gas that is recirculated by the EGR system (6) and mixed into the intake manifold. The rest of the exhaust, as it is expelled out of the exhaust manifold (3), drives the turbocharger turbine (6) which drives the turbocharger (7), causing boost pressure to build inside of the intake tract. This enables the engine to produce more power than in normally aspirated form. The air-to-air intercooler (4) cools the turbocharger compressor discharge air by routing it through a heat exchanger before it enters the engine. The heat exchanger uses air flow produced by the fan to cool the charge air.

JC89288,000003F –19–30JAN06–2/2

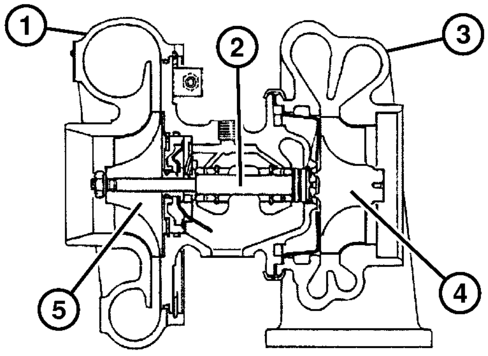
Engine Turbocharger Operation

The turbocharger, which is basically an air pump that is driven by exhaust gases, allows the engine to produce added power without increasing displacement. Turbochargers are specially matched for the power ratio requirements of each specific application.

The turbine wheel is driven by th hot engine exhaust gasses. These gases flowing through the turbine housing act on the turbine wheel, causing the shaft to turn.

Attached to the shaft is the compressor wheel, which brings in filtered air and discharges the compressed air to the intake manifold, where it is delivered to the engine cylinders.

Engine oil under pressure from the engine lubrication system is applied to lubricate and cool the shaft and bearings in the center housing.



TX1001792 –UN–03JAN06

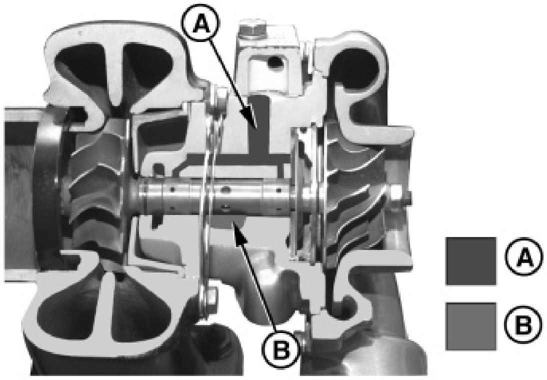
1—Compressor Housing
2—Shaft
3—Turbine
4—Turbine Wheel
5—Compressor Wheel

Continued on next page

JC89288,000019F –19–30JAN06–1/2

Turbocharger Lubrication—Engine oil under pressure from the engine lubrication system is pumped through a passage in the center housing and directed to the bearings, thrust plate, and thrust sleeve. Oil is sealed from the compressor and turbine by a piston at both ends of the center housing.

The turbocharger contains two floating bearings. These bearings have clearance between the bearing OD and the housing bore as well as clearance between the bearing ID and the shaft OD. These clearances are lubricated by the oil supply pressure oil (A) and the bearing are protected by a cushion of oil. Discharge oil drains by gravity from the center housing to the engine crankcase.



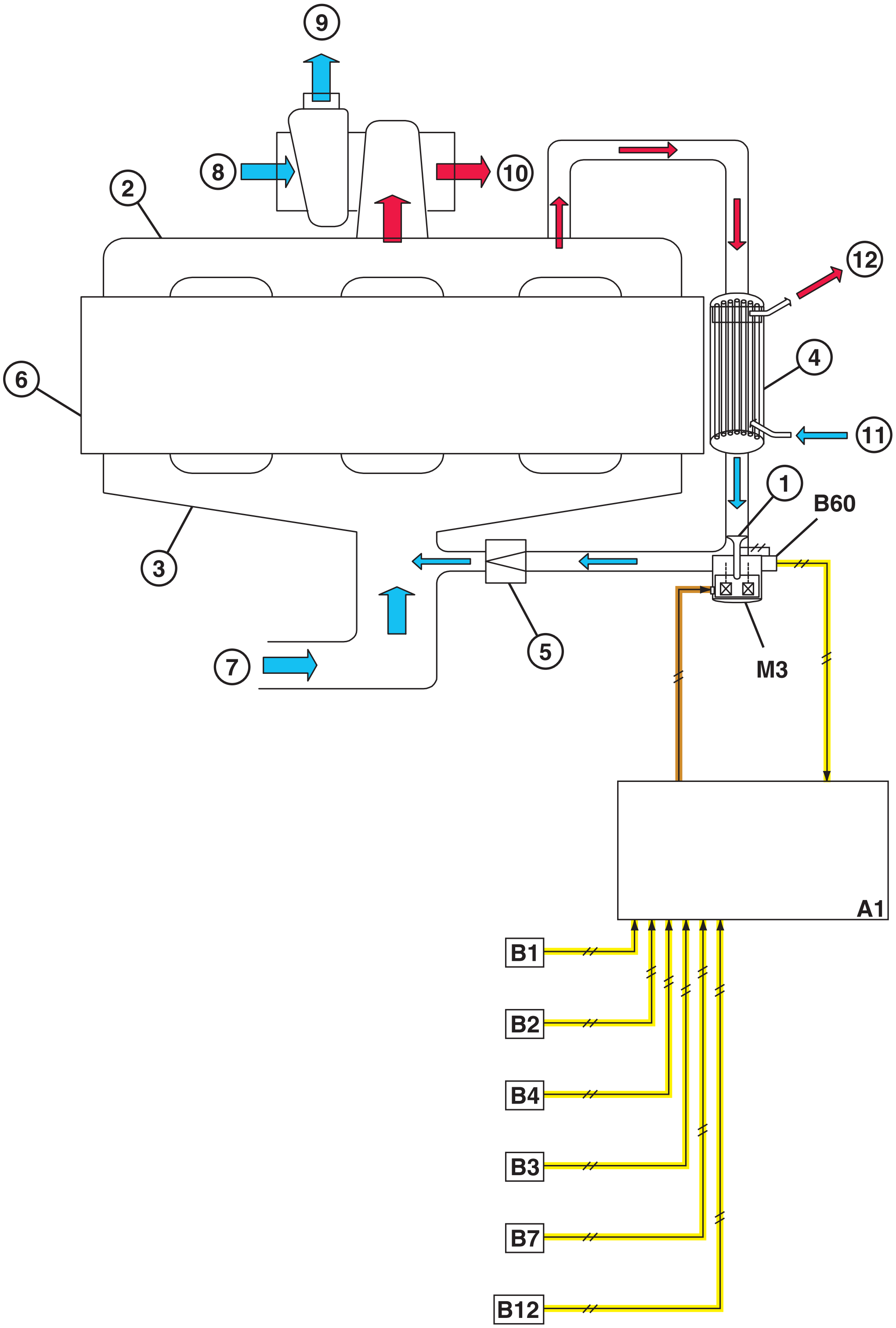
RG8099 –UN–18NOV97

Turbocharger Pressure and Discharge Oil

A—Pressure Oil
B—Discharge Oil

JC89288,000019F –19–30JAN06–2/2

Exhaust Gas Recirculation (EGR) Operation



TX1002948 –UN–24JAN06

TX1002948

Exhaust Gas Recirculation Operation

Continued on next page

1—EGR Valve
2—Exhaust Manifold
3—Intake Manifold
4—EGR Cooler
5—Lead Valve
6—Engine
7—Intake Air from Aftercooler
8—From Air Cleaner
9—To Aftercooler
10—Exhaust
11—Engine Coolant In
12—Engine Coolant Out
A1—Engine Control Module
B1—Crankshaft Position Sensor
B2—Camshaft Position Sensor
B3—Barometric Pressure Sensor
B4—Engine Coolant Temperature Sensor
B7—Intake Air Temperature Sensor
B12—Fuel Rail Temperature Sensor
B60—EGR Position Sensor
M3—EGR Valve Actuator

EGR recirculates a portion of the engine exhaust gas into the intake manifold to mix with intake air. The recirculation of exhaust gas helps lower the combustion temperature, which limits emissions of nitrogen oxide (NOx).

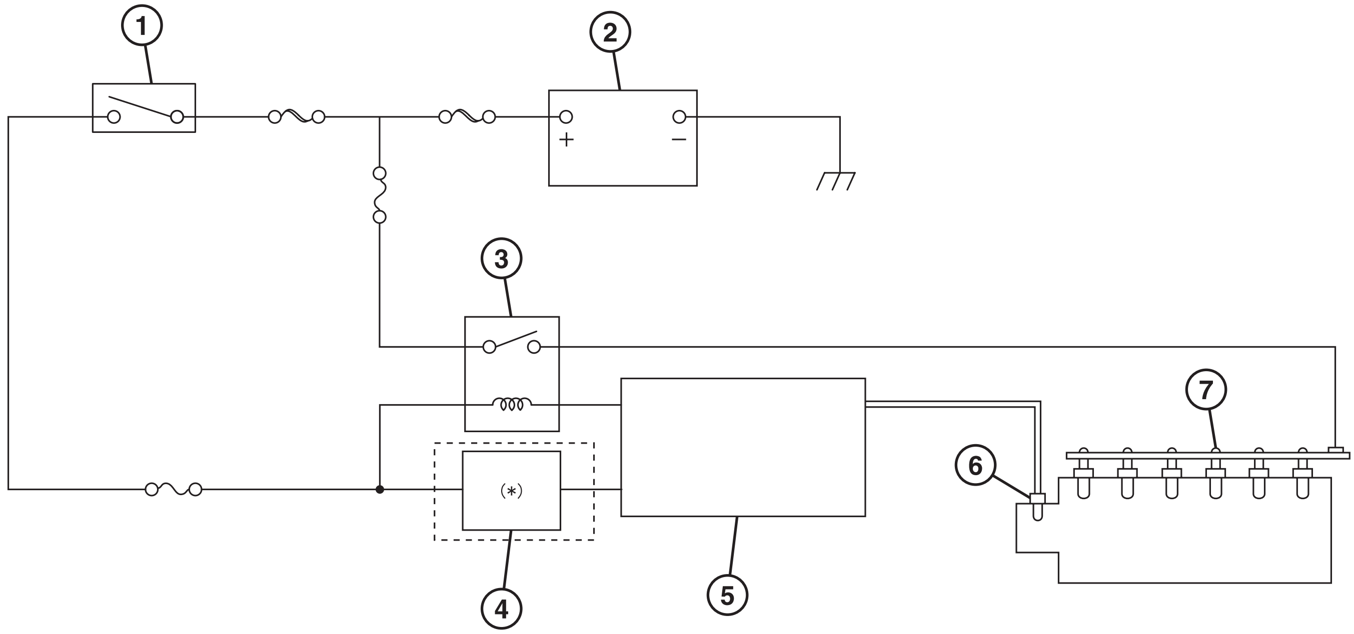
The amount of EGR is controlled by opening and closing the EGR valve (1), installed between the exhaust manifold (2) and intake manifold (3). The engine control module (ECM) (A1) operates the EGR valve based on engine speed, engine coolant temperature, intake air temperature, fuel injection amount, and barometric pressure. The ECM supplies power to the EGR valve actuator (M3) to open and close the EGR valve. The ECM uses the EGR position sensor (B60) to detect the EGR valve position.

The EGR cooler (4), through which EGR gas passes, cools down high temperature EGR gas. The cooled EGR gas mixes with intake air in the intake manifold to lower the combustion temperature, which limits NOx emissions.

The lead valve (5) in the EGR system is a check valve that stops backward flow of EGR gas and prevents intake air from entering the EGR gas passage. The valve increases the amount of EGR by keeping the EGR gas flowing in the same direction.

JC89288,0000038 –19–30JAN06–2/2

Quick On Start (QOS) System Operation



TX1001691

Quick On Start System Diagram

1—Key Switch (on)
2—Battery
3—Glow Relay
4—Glow Plug Indicator Lamp
5—Engine Control Module (ECM)
6—Engine Coolant Temperature Sensor
7—Glow Plug (6 used)

The ECM determines the period required for glow (pre-glow, glow, after-glow), and operates the glow relay and glow plug indicator lamp. The glow plug system allows easier cold weather starting and reduces white smoke and noise at starting. When turning the key switch to ON, the ECM detects the engine coolant temperature sensor and changes the period for glow so that the proper starting conditions can be achieved all the time. Also, after-glow function allows engine to stabilize idling immediately after starting.

JC89288,0000042 –19–30JAN06–1/1

Engine Speed Control System Operation

Engine Speed Specifications

Item	Measurement	Specification
Engine Speeds 450DLC		
Slow Idle	Speed	885 rpm
Fast Idle—HP Mode	Speed	1650 rpm
Fast Idle—P Mode	Speed	1650 rpm
Fast Idle—E Mode	Speed	1630 rpm
Travel HP	Speed	1750 rpm
Auto Idle	Speed	1030 rpm

Continued on next page

JC89288,0000192 –19–27JAN06–1/4

The engine speed is controlled by the following items:

- Engine Speed Dial (R15)
- HP (high power) Mode (S12)
- P (standard) Mode (S12)
- E (economy) Mode (S12)
- Travel HP Mode Control
- Auto-Idle Control (S8)

Engine Speed Dial
The purpose of the engine speed dial is to control the engine rpm via operator input.

The main controller uses these input signals to determine appropriate engine speed:

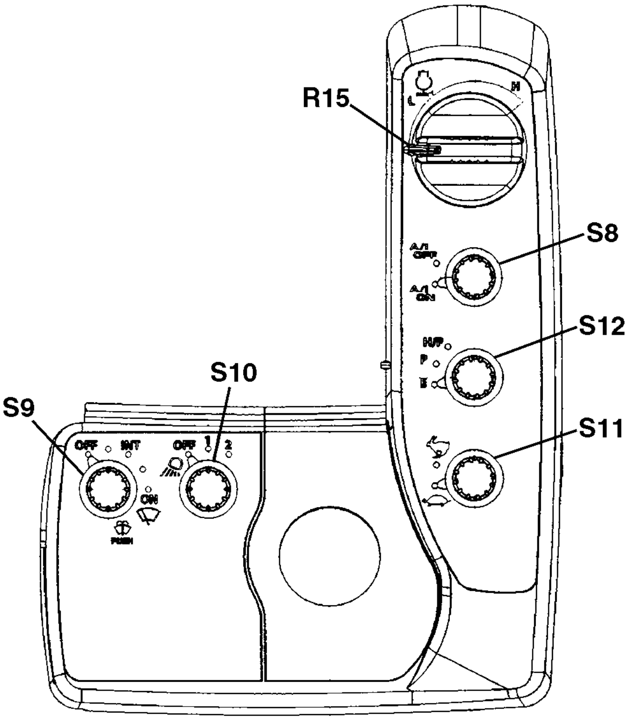
- Engine Speed Dial (R15)
- Auto/Idle Switch (S8)
- Boom Up Pressure Sensor (B52)
- Boom Down Pressure Sensor (B53)
- Arm Out Pressure Sensor (B50)
- Arm In Pressure Sensor (B51)
- Bucket Dump Pressure Sensor (B55)
- Bucket Curl Pressure Sensor (B54)
- Swing Pressure Sensor (B33)
- Travel Right Pressure Sensor (B56)
- Travel Left Pressure Sensor (B57)
- Attachment Pressure Sensor (B45)
- Counterweight Removal Pressure Sensor (B46)

The main controller then sends a signal via controller area network (CAN) to the engine control module (ECM), and the ECM then sets engine rpm.

HP (high power) Mode
The purpose of the HP mode is to increase engine speed while performing certain dig functions.

The Main Controller (MC) sends a signal to the ECM via CAN communication to raise engine rpm when the following conditions are met:

- Power mode switch is turned to the HP mode position.
- Engine speed is 1020 rpm or higher.
- Arm in, boom up, or a combination of both functions actuated.
- Pump delivery pressure high.



TX1000033 –UN–16DEC05

Switch Panel

R15—Engine Speed Dial
S8—Auto Idle Switch
S9—Windshield Wiper and Washer Switch
S10—Work Light Switch
S11—Travel Speed Switch
S12—Power Mode Switch

Continued on next page

P (standard) Mode
The function of P mode is to control the engine speed from slow idle to fast idle in response to the position of the engine speed dial.

E (economy) Mode
The purpose of E mode is to lower engine speed to reduce fuel consumption and noise level.

The main controller receives input signals from the engine speed dial, power mode switch, and the pump delivery pressure sensors, then sends a signal via CAN to the ECM to reduce engine rpm when the following conditions are met:

- Engine speed above 1580 rpm.
- Power mode switch in E mode.

Travel HP (high power) Mode Control
The purpose of Travel HP mode is to increase engine speed for faster travel.

The main controller uses these input signals from the travel right, travel left pressure sensors, and engine speed dial to determine appropriate engine speed. The main controller then sends a signal via CAN communication to the ECM to increase engine speed when the following conditions are met:

- Engine speed dial set at 1070 rpm or faster.
- Travel function is operated.

Auto-Idle Control
The purpose of auto-idle control is to lower engine speed to reduce fuel consumption and noise levels while engine is running and no hydraulic function actuated.

The main controller uses these input signals to determine appropriate engine speed:

- Engine Speed Dial (R15)
- Auto/Idle Switch (S8)
- Boom Up Pressure Sensor (B52)
- Boom Down Pressure Sensor (B53)
- Arm Out Pressure Sensor (B50)
- Arm In Pressure Sensor (B51)
- Bucket Dump Pressure Sensor (B55)

Continued on next page

- Bucket Curl Pressure Sensor (B54)
- Swing Pressure Sensor (B33)
- Travel Right Pressure Sensor (B56)
- Travel Left Pressure Sensor (B57)
- Attachment Pressure Sensor (B45)
- Counterweight Removal Pressure Sensor (B46)

Auto-idle is activated when the following conditions are met:

- Auto-idle switch is on.
- No functions activated for approximately 4 seconds.
- Engine speed is above 1030 rpm.

Auto-idle control is deactivated when the following conditions are met:

- Auto-idle control switch turned to OFF.
- A hydraulic function is actuated.
- Power mode switch is turned from E to P or P to E.
- Engine speed dial is turned to change engine speed.

When auto-idle is deactivated, the engine rpm increases to the setting of the engine speed dial.

JC89288,0000192 –19–27JAN06–4/4

Isuzu AH-6WG1XYSA-01

This is an Isuzu 15.7L Tier III four-cycle, liquid cooled, vertical inline, 6 cylinder engine. Isuzu AH-6WG1XYSA-01 is rated at 348 hp. Emissions are controlled by opening and closing the Exhaust Gas Recirculation (EGR) valve installed between the exhaust manifold and intake manifold. The Engine Control Module (ECM) determines the amount of EGR, based on the engine speed and load rate the on engine (fuel injection amount), and operates the EGR valve to control the amount of EGR. The Electronic Injectors (EI's) send pressurized fuel through a fuel line to the fuel delivery nozzles, which are located directly over the top of the piston. The EI's are electrically controlled by the ECM. The crankshaft position sensor and camshaft position sensor provide information to the ECM for precise fuel delivery by the electronic fuel system.

JC89288,0000045 –19–21APR06–1/1

Diagnose Engine Malfunctions

For more information go to the following:

1. See 305-294E 6WG1-Service Manual-6WG1 Industrial Engine.
2. See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.)
3. See Reading Diagnostic Trouble Codes With Dr. ZX. (Group 9015-20.)
4. See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application. (Group 9015-20.)
5. See Reading Diagnostic Trouble Codes With Tech 2 Diagnostic Scan Tool. (Group 9015-20.)

JC89288,0000061 –19–29APR06–1/1

Engine Cranks But Will Not Start

JC89288,000005C –19–29APR06–1/1

Engine Cranks But Will Not Start Diagnostic Procedure

NOTE: When the engine is running at low speed (below 60 rpm), the crank sensor Diagnostic Trouble Code (DTC) may not be detected. If problem is intermittent; raise engine speed to fast idle and check for DTCs related to crank sensor.

– – –1/1

❶ **Preliminary Check**	1. Check fuel quantity and quality. 2. Check intake and exhaust systems for leaks or obstructions. 3. Check electrical connections. 4. Check battery for proper voltage. Was the problem found?	**YES:** Repair or replace parts as necessary and retest. **NO:** Go to Active DTC Check. – – –1/1

❷ **Active DTC Test**	To access active DTCs see the following: See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Tech 2 Diagnostic Scan Tool. (Group 9015-20.) Are one of the following DTCs detected? P0335, P0336, P0340, P0341, P0601, P1261, and P1262.	**YES:** See Engine Diagnostic Trouble Codes (DTCs—SPN.FMI Format) for information on code (Group 9001-20.) **NO:** No active DTCs present. Go to Crank Speed Check. – – –1/1

❸ **Crank Speed Check**	Check to see if the crank speed is more then the necessary speed for the Engine Control Module (ECM) to identify engine rotation. Is the crank speed more than 60 rpm?	**NO:** Go to Starting System Check. (Group 9010-15.) **YES:** Continue Check.
	Check to see if crank speed is more than the necessary speed to start the engine (first combustion). Is the crank speed above 80 rpm? See Service ADVISOR™ Diagnostic Application. (Group 9015-20.)	**YES:** Go to Fuel System Test. (Group 9010-15.) **NO:** Go to Starting System Check. – – –1/1

❹ **Starting System Check**	Check the starting system. 1. Check fuses. 2. Battery relay check. 3. Starter (M1) solenoid check. 4. Starter (M1) motor check. 5. Battery voltage check. 6. Starter protection relay check. 7. Glow plug relay check (colder temperatures). For more information on starting system: See Starting and Charging Circuit Theory of Operation. (Group 9015-15.) See Electrical Component Checks. (Group 9015-20.) Is starting system ok?	**YES:** Go to Fuel System Test. **NO:** Repair starting system and retest. – – –1/1

❺ **Fuel System Test**	Check fuel system in the following procedure. 1. Check the high pressure line and low pressure line for leaks, kinks, or obstructions. Check in the following order. • Fuel filters (water separator and final filters). • Fuel tank (pump strainer). • Fuel system lines. 2. Check fuel lines, fuel filter, and inside of the fuel tank for freezing or waxing (cold temperatures). 3. Check the supply line inside the fuel tank for debris. Are any fuel system problems present?	**YES:** Repair and retest. **NO:** Go to Electrical Interference Check. – – –1/1

❻ **Electrical Interference Check**	Check the condition of accessory electrical equipment such as radio and lights. Does the engine start when the accessory electrical equipment is powered off?	**YES:** Repair electrical equipment. **NO:** Go to Mechanical Engine Check – – –1/1

❼ **Mechanical Engine Check**	Check the mechanical parts of the engine, and repair if needed. • Compression pressure See Engine Compression Pressure Test. (Group 9010-25.) • Valves See Check and Adjust Engine Valve Lash (Clearance). (Group 9010-25.) • Injector Injector Balance Test (Injector Misfire Test). (Group 9010-25.) Are mechanical parts of engine OK?	**YES:** Go to Engine Control Module (ECM) Check. **NO:** Repair and retest. – – –1/1

❽ **Engine Control Module (ECM) Check**	1. Check the version of ECM software. 2. Upgrade the software version or replace ECM if necessary. *NOTE: EGR valve position learning is required after replacing or rewriting the ECM. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.)* Does the engine start?	**YES:** New software repaired ECM. – – –1/1

Engine Misfires Or Runs Irregularly

JC89288,000005D –19–29APR06–1/1

Engine Misfires Or Runs Irregularly Diagnostic Procedure

Misfiring means that after starting, the engine runs with at least one cylinder functioning improperly. Vibrations, power drop and no smoke are observed. Irregular running means that abnormal vibrations, abnormal running, and black smoke are observed during acceleration at full load conditions and between 1200 to 1500 rpm.

Before using this diagnostic procedure check for any active DTCs using the application error code display system.

– – –1/1

❶ **Possible causes**	The following items could cause or be mistaken as miss/rough running: 1. Transmission problems. 2. Engine accessories such as A/C cycling on and off. 3. Electromagnetic interference (EMI) from improperly installed radios, etc. 4. Intake manifold air leaks. 5. Fuel system problems (presence of air or water). 6. Engine mechanical problems. 7. Check for excessive load applied to machine. Are any major visible signs noticed?	**YES:** Repair or replace parts as needed and retest. **NO:** Go to Recreate Conditions.

– – –1/1

❷ **Recreate Conditions**	Operate engine under conditions where miss or rough running complaint occurs. Could the problem be duplicated?	**YES:** Go to Active DTC Check. **NO:** Problem could not be duplicated. Verify complaint and try to reproduce conditions of miss/rough running again.

– – –1/1

❸ **Active DTC Check**	Perform the Active DTC Check to read Diagnostic Trouble Codes (DTCs). See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Tech 2 Diagnostic Scan Tool. (Group 9015-20.) Are any DTCs detected?	**YES:** See Engine Diagnostic Trouble Codes (DTCs—SPN.FMI Format) for information on code. (Group 9001-20.) **NO:** No active DTCs present. Go to Electrical Interference Check. (Group 9010-15.) – – –1/1

❹ **Electrical Interference Check**	Check the condition of accessory electrical equipment such as radio and lights. Does the engine start when the accessory electrical equipment is powered off?	**YES:** Repair electrical equipment. **NO:** Go to Fuel System Test. – – –1/1

❺ **Fuel System Test**	Check fuel system in the following procedure. 1. Check the high pressure line and low pressure line for leaks, kinks, or obstructions. Check in the following order. • Fuel filters (water separator and final filters). • Fuel tank (pump strainer). • Fuel system lines. 2. Check fuel lines, fuel filter, and inside of the fuel tank for freezing or waxing. (cold temperatures). 3. Check the supply line inside the fuel tank for debris. 4. Supply fuel from a container other than the fuel tank. a. Start the engine, operate the machine, and check for trouble symptoms. b. Replace the fuel in the fuel tank and lines. c. Bleed air from fuel, and check for trouble symptoms again. Are any fuel system problems present?	**YES:** Repair and replace necessary parts and retest. **NO:** Go to Injector Check. – – –1/1

❻ **Injector Check**	1. Clear the DTC. For information on how to clear DTC, See Reading Diagnostic Trouble Codes With Tech 2 Diagnostic Scan Tool (9015-20) or See Reading Diagnostic Trouble Codes With Dr. ZX. (9015-20.) 2. Start the engine. 3. Select the Actuator test from the Tech 2 menu. *NOTE: If Tech2 scan tool is not available, See Injector Balance Test (Injector Misfire Test). (Group 9010-25.) or Injector Force Drive Test. (Group 9010-25.)* 4. Select the **Injection Stop** at each injector in the common rail system. 5. Press the **OFF** soft key to stop the fuel injection in the cylinder one by one, and check the change in engine sound. Is there any cylinder of which engine vibration and engine sound did not change when it is stopped?	**YES:** Replace the injector in the cylinder of which engine sound did not change when it is stopped. **NO:** Go to Crankshaft Position Sensor Check. – – –1/1

❼ **Crankshaft Position Sensor Check**	Check for condition of the crankshaft position sensor. 1. Check to see if the sensor is loose. See Engine Component Location. (Group 9010-05.) 2. Check the signal detection condition of the crankshaft position senor. a. Connect the Tech 2. b. Crank the engine. c. Correct the data list on the Tech 2. Is the speed displayed?	**YES:** Go to Camshaft Position Sensor Check. **NO:** Repair or replace parts as necessary and retest. – – –1/1

❽ **Camshaft Position Sensor Check**	Check for condition of the crankshaft position sensor. 1. Check to see if the sensor is loose. See Engine Component Location. (Group 9010-05.) 2. Check the signal detection condition of the camshaft position senor. a. Connect the Tech 2. b. Start the engine. c. Remove the harness from the crankshaft position sensor. (The DTC is detected when this procedure is performed. Be sure to clear the DTC after repairing the machine.) Is the speed displayed?	**YES:** Go to EGR Control System Check. **NO:** Repair or replace parts as necessary and retest. – – –1/1

❾ **EGR Control System Check**	Perform EGR Control System Check. See EGR Control System Check. (Group 9010-25.) Is the EGR valve free to open and close properly?	**YES:** Go to Air Intake System Leakage Test. **NO:** Replace EGR valve and retest. – – –1/1
❿ **Air Intake System Leakage Test**	Perform Air Intake System Leakage Test See Air Intake System Leakage Test. (Group 9010-25.). Is air system ok?	**YES:** Go to Engine Compression Pressure Test. **NO:** Repair or replace parts as necessary and retest. – – –1/1
⓫ **Engine Compression Pressure Test**	Perform Engine Compression Pressure Test. See Engine Compression Pressure Test. (Group 9010-25.) Was cause of low compression found?	**YES:** Repair or replace parts as necessary and retest. **NO:** Go to Check and Adjust Engine Valve Lash (Clearance). – – –1/1
⓬ **Check and Adjust Engine Valve Lash (Clearance)**	Check valve lash. See Check and Adjust Engine Valve Lash (Clearance). (Group 9010-25) Was valve clearance on all valves within specification?	**YES:** Go to Engine Control Module (ECM) Check. **NO:** Adjust valve clearance and retest. – – –1/1
⓭ **Engine Control Module (ECM) Check**	1. Check the version of ECM software. 2. Upgrade the software version or replace ECM if necessary. *NOTE: EGR valve position learning is required after replacing or rewriting the ECM. Injector codes need to be input into ECM, when replacing. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.)* Does the engine start?	**YES:** New software repaired ECM. – – –1/1

Engine Does Not Develop Full Power

JC89288,000005E –19–21APR06–1/1

Engine Does Not Develop Full Power Diagnostic Procedure

– – –1/1

❶ **Preliminary Check**	Before using this diagnostic procedure, check the following that could cause or be mistaken as low power: 1. Ensure fuel quantity and quality are OK. 2. Check for plugged air or fuel filters. 3. Check for transmission problems. 4. Check for engine mechanical problems. 5. Check for excessive load on the engine. Was the problem found?	**YES:** Repair or replace parts as necessary and retest. **NO:** Go to Active DTC Check.

– – –1/1

❷ **Active DTC Check**	Perform the Active DTC Check to read Diagnostic Trouble Codes (DTCs). See Reading Diagnostic Trouble Codes With Tech 2 Diagnostic Scan Tool. (Group 9015-20.) Are any DTCs detected?	**YES:** See Engine Diagnostic Trouble Codes (DTCs—SPN.FMI Format) for information on code. (Group 9001-20.) **NO:** No active DTCs present. Go to Engine Coolant Temperature Check.

– – –1/1

❸ **Engine Coolant Temperature Check**	1. Make sure that the engine coolant temperature does not exceed 108°C (226°F). 2. Examine and repair the cause of overheating. 3. Lower engine coolant temperature. Make sure ECM has returned the engine back to normal output. Was engine overheating?	**YES:** Repair or replace parts as necessary and retest. **NO:** Go to Barometric Pressure Sensor Check.

– – –1/1

❹ **Barometric Pressure Sensor Check**	*NOTE: If sensor is not functioning, fuel may be injected at a lower level causing engine to lack power.* Check to see if barometric sensor is working. Is barometric sensor functioning?	**YES:** Go to Exhaust Emission Check. **NO:** Replace and retest. – – –1/1

❺ **Exhaust Emission Check**	Operate engine at full load rated speed. Does the engine emit excessive smoke?	**YES:** There is **Heavy white exhaust smoke:** See Engine Emits Excessive White Exhaust Smoke Diagnostic Procedure diagnostic procedure. (Group 9010-15.) **YES:** There is **Heavy black or gray exhaust smoke:** See Engine Emits Excessive Black or Gray Exhaust Smoke. diagnostic procedure. (Group 9010-15.) **NO:** Go to Fuel System Test. – – –1/1

❻ **Fuel System Test**	Check fuel system in the following procedure. 1. Check the high pressure line and low pressure line for leaks, kinks, or obstructions. Check in the following order. • Fuel filters (water separator and final filters). • Fuel tank (pump strainer). • Fuel system lines. 2. Check fuel lines, fuel filter, and inside of the fuel tank for freezing or waxing. (cold temperatures) 3. Check the supply line inside the fuel tank for debris. 4. Supply fuel from a container other than the fuel tank. a. Start the engine, operate the machine, and check for trouble symptoms. b. Replace the fuel in the fuel tank and lines. c. Bleed air from fuel, and check for trouble symptoms again. Are any fuel system problems present?	**YES:** Repair and replace necessary parts and retest. **NO:** Go to EGR Control System Check. – – –1/1

❼ **EGR Control System Check**	Perform EGR Control System Check. See EGR Control System Check. (Group 9010-25.) Is the EGR valve free to open and close properly?	**YES:** Go to Air Intake System Leakage Test. **NO:** Replace EGR valve and retest. – – –1/1

❽ **Air Intake System Leakage Test**	Perform Air Intake System Leakage Test See Air Intake System Leakage Test. (Group 9010-25.). Did the air system check good?	**YES:** Go to Exhaust System Check. **NO:** Repair or replace parts as necessary and retest. – – –1/1

❾ **Exhaust System Check**	Check for crush, breakage, or exhaust leakage in the exhaust pipe. Is exhaust in good condition?	**YES:** Go to Electrical Interference Check. **NO:** Repair or replace parts as necessary and retest. – – –1/1

❿ **Electrical Interference Check**	Check the condition of accessory electrical equipment such as radio and lights. Does the engine start when the accessory electrical equipment is powered off?	**YES:** Repair electrical equipment. **NO:** Go to Injector Check. – – –1/1

⓫ **Injector Check**	1. Clear the DTC. For information on how to clear DTC, See Reading Diagnostic Trouble Codes With Tech 2 Diagnostic Scan Tool (9015-20) or See Reading Diagnostic Trouble Codes With Dr. ZX. (9015-20.) 2. Start the engine. 3. Select the Actuator test from the Tech 2 menu. *NOTE: If Tech2 scan tool is not available, See Check and Adjust Fuel Injection Nozzle. (Group 9010-25.)* 4. Select the **Injection Stop** at each injector in the common rail system. 5. Press the **OFF** soft key to stop the fuel injection in the cylinder one by one, and check the change in engine sound. Is there any cylinder of which engine vibration and engine sound did not change when it is stopped?	**YES:** Replace the injector in the cylinder of which engine sound did not change when it is stopped. **NO:** Engine Control Module (ECM) Check. – – –1/1

⓬ **Engine Control Module (ECM) Check**	1. Check the version of ECM software. 2. Upgrade the software version or replace ECM if necessary. *NOTE: EGR valve position learning is required after replacing or rewriting the ECM. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.)* Does the engine start?	**YES:** New software repaired ECM. – – –1/1

⓭ **Mechanical Engine Check**	Check the mechanical parts of the engine, and repair if needed. • Compression pressure See Engine Compression Pressure Test. (Group 9010-25.) • Valves See Check and Adjust Engine Valve Lash (Clearance). (Group 9010-25.) • Injector Injector Balance Test (Injector Misfire Test). (Group 9010-25.) Are mechanical parts of engine OK?	**NO:** Repair or replace parts as necessary and retest. – – –1/1

Engine Overheats

JC89288,000004F –19–29APR06–1/1

Engine Overheats Diagnostics Procedure

– – –1/1

❶ **Preliminary Checks**	• Check coolant level. • Check that thermostat is not stuck closed or is not missing. • Check radiator screen for being plugged. • Check radiator and oil cooler cores for dirt or bent fins. • Check for shroud or baffles (foam rubber) missing. • Check that fan blade is installed properly. Was the problem found?	**YES:** Repair or replace parts as necessary and retest. **NO:** Go to Air filter Check. – – –1/1

❷ **Air filter Check**	Check for plugged air filter. Was filter plugged?	**YES:** Clean or replace elements. **NO:** Go to Electrical Check. (Group 9010-15.) – – –1/1

❸ **Electrical Check**	• Check to make sure temperature gauge is working properly. • Check engine coolant temperature sensor. Are components operating properly?	**YES:** Go to Fan Drive System Check. **NO:** Repair or replace parts as necessary and retest. – – –1/1

❹ **Fan Drive System Check**	Check fan drive system for operating speed. See Fan Drive Pump Servo Piston Minimum Flow Test and Adjustment. (Group 9025-25.) See Fan Drive Pump Servo Piston Maximum Flow Test and Adjustment. (Group 9025-25.) See Fan Drive Pump Flow Rate Test and Adjustment. (Group 9025-25.) See Fan Drive Pump Torque Control Test and Adjustment. (Group 9025-25.) Is fan drive system operating at proper speeds?	**NO:** Adjust and repair or replace parts as necessary and retest. – – –1/1

Auto-Idle Does Not Work

JC89288,000002C –19–29APR06–1/1

Auto-Idle Does Not Work Diagnostics Procedure

– – –1/1

❶ **Check Engine Speed**	Check that engine speed is set higher than 1200 rpm (auto-idle speed).	**YES:** Engine speed is above Auto-Idle speed: Go to Active DTC Test. **NO:** Set engine speed above 1200 rpm. – – –1/1

❷ **Active DTC Test**	Check for Diagnostic Trouble Codes (DTCs). See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) Does monitor display any active DTCs?	**NO:** No active DTCs present: Go to Travel Pressure Sensor Check. **YES:** Diagnose active DTCs. – – –1/1

❸ **Travel Pressure Sensor Check**	Check for travel pilot pressure. Using monitor, check travel pressure sensor. See Monitor Data Items Using the Monitor Display. (Group 9015-20.) Does monitor display pressure?	**YES:** Travel pressure is displayed: Go to Attachment Pressure Sensor Check. (Group 9010-15.) **NO:** Check travel pressure sensor circuit. See System Functional Schematic. (Group 9015-10.) – – –1/1

❹ **Attachment Pressure Sensor Check**	Check for attachment control pilot pressure. Using monitor, check front swing/front attachment control pilot pressure. See Monitor Data Items Using the Monitor Display. (Group 9015-20.) Does monitor display attachment control pilot pressure?	**YES:** Attachment control pilot pressure is displayed: Go to Auto-Idle Switch Check. (Group 9010-15.) **NO:** Check attachment pressure sensor circuit. See System Functional Schematic. (Group 9015-10.) – – –1/1

❺ **Auto-Idle Switch Check**	Turn auto-idle switch on. Is auto-idle icon displayed on monitor?	**YES:** Auto-idle icon is displayed on monitor: Inspect wire harness between switch (S8) and main controller (A3). See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Auto-idle icon is not displayed on monitor, check switch for continuity. **IF OK:** Inspect wire harness between switch and main controller and between switch and monitor. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) Also See Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) – – –1/1

Coolant Temperature Too Low

JC89288,0000053 –19–04APR06–1/1

Coolant Temperature Too Low Diagnostics Procedure

– – –1/1

❶ **Coolant Temperature Check**	Measure coolant temperature with a gauge of known accuracy to determine if coolant temperature is below normal. Is coolant temperature ok?	**YES:** Go to Thermostat Check. **NO:** Repair or replace parts as necessary and retest. – – –1/1
❷ **Thermostat Check**	Make sure thermostat is operating correctly. Is thermostat operating correctly?	**NO:** Repair and replace parts as necessary and retest. – – –1/1

Coolant in Oil or Oil in Coolant

JC89288,0000054 –19–21APR06–1/1

Coolant in Oil or Oil in Coolant Diagnostics Procedure

– – –1/1

❶ **Head Gasket Check**	Look for signs of a head gasket failure. Is head gasket in good condition?	**YES:** Go to Oil Cooler Check. **NO:** Replace and repair parts as necessary and retest. – – –1/1
❷ **Oil Cooler Check**	Remove and inspect engine oil cooler. See Oil Cooler Remove and Install. (Group 0500.) Is oil cooler in good condition?	**YES:** Go to Cylinder Liner Check. **NO:** Repair or replace oil cooler. – – –1/1

❸ **Cylinder Liner Check**	Remove and inspect cylinder liners. Are cylinder liners ok?	**YES:** Go to Cracked Cylinder Head or Block. **NO:** Replace cylinder liners. – – –1/1

❹ **Cracked Cylinder Head or Block**	Look for crack on both components. Are either components cracked?	**YES:** Repair or replace components. – – –1/1

Low Engine Oil Pressure

JC89288,0000055 –19–21APR06–1/1

Low Engine Oil Pressure Diagnostics Procedure

– – –1/1

❶ **Preliminary Checks**	1. Check to see that correct oil is in engine. 2. Check oil filter (plugged). 3. Check level of oil. Was problem found?	**YES:** Repair or replace parts as necessary and retest. **NO:** Go to Oil Pressure Switch/Sensor Check. – – –1/1

❷ **Oil Pressure Switch/Sensor Check**	Measure engine oil pressure with a mechanical gauge to verify pressure is low. See Engine Oil Pressure Test. (9010-25.) Is oil pressure at desired level?	**YES:** Repair or replace parts as necessary and retest. **NO:** Go to Oil Cooler Check. – – –1/1

❸ **Oil Cooler Check**	If oil temperature is excessive, remove and inspect engine oil cooler. See Oil Cooler Remove and Install. (Group 0500.) Is oil cooler in good condition?	**YES:** Go to Oil Pressure Regulating Valve Check. **NO:** Repair or replace parts as necessary and retest. – – –1/1

❹ **Oil Pressure Regulating Valve Check**	Remove and inspect engine oil pressure regulating valve. Is oil pressure regulating valve in good operating condition?	**YES:** Go to Oil Supply System Check. **NO:** Repair or replace parts as necessary and retest.

– – –1/1

❺ **Oil Supply System Check**	Remove oil pan and check the following components. • Pump screen (plugging) • Pickup tube (for cracks) • Engine oil supply pump • Piston oiling jets (faulty or missing) • Main or connecting rod bearing clearances Was problem found?	**YES:** Repair or replace parts as necessary and retest.

– – –1/1

High Engine Oil Pressure

JC89288,0000056 –19–21APR06–1/1

High Engine Oil Pressure Diagnostics Procedure

– – –1/1

❶ **Preliminary Checks**	• Oil viscosity wrong (too thick). • Pressure regulating valve stuck or misadjusted. • Piston cooling oil jets plugged. • Engine oil has antifreeze in it. Was Problem found?	**YES:** Repair or replace parts as necessary and retest.

– – –1/1

Engine Uses Too Much Oil

JC89288,0000057 –19–04APR06–1/1

Engine Uses Too Much Oil Diagnostics

– – –1/1

❶ **Oil Check**	Check the following • Oil type • Oil level • For any engine oil leaks Was problem found?	**YES:** Repair or replace parts as necessary and retest. **NO:** Go to Air System Check. – – –1/1

❷ **Air System Check**	• Check air filter (plugged). • Check crankcase breather for restriction. Was problem found?	**YES:** Repair or replace parts as necessary and retest. **NO:** Go to Mechanical Engine Check. – – –1/1

❸ **Mechanical Engine Check**	Check the mechanical parts of the engine, and repair if needed. • Check main or connecting rod bearing clearance • Check pistons or liners for scoring • Check crankshaft thrust bearings for wear (misaligned piston and rod) • Check valve guides or valve stems for wear. Are mechanical parts of engine OK?	**NO:** Repair or replace parts as necessary and retest. – – –1/1

Engine Uses Too Much Fuel

JC89288,0000058 –19–04APR06–1/1

Engine Uses Too Much Fuel Diagnostic Procedure

– – –1/1

❶ **Fuel System Test**	Check fuel system in the following procedure. 1. Check the system for leaks. • Fuel filters. • Fuel tank. • Fuel system lines. 2. Check fuel quality. 3. Check injection nozzles for correct calibration. Are any fuel system problems present?	**YES:** Repair and retest. **NO:** Go to Air intake Check. – – –1/1

❷ **Air intake Check**	Check and clean Intake system. Was intake system plugged or dirty?	**YES:** Clean and check fuel consumption. – – –1/1

Engine Emits Excessive White Exhaust Smoke

JC89288,000005F –19–13NOV06–1/1

Engine Emits Excessive White Exhaust Smoke Diagnostic Procedure

NOTE: This procedure should be used if the engine emits excessive white exhaust smoke. This type of smoke causes a burning sensation to the eyes. If engine emits a less heavy, bluish exhaust smoke, See Engine Uses Too Much Oil (Group 9010-15.)

– – –1/1

❶ **Preliminary Procedure**	1. Make sure oil is not mixed in intake air. 2. Check for excessive blow-by. 3. Check for excessive engine oil in blow-by. 4. Check for a clogged or crushed breather hose. 5. Inspect wear of turbocharger seal ring. 6. Ensure engine coolant level is not extremely low. Was the problem found?	**YES:** Repair or replace parts as necessary and retest. **NO:** Go to Active DTC Check.

– – –1/1

❷ **Active DTC Check**	Perform the Active DTC Check to read Diagnostic Trouble Codes (DTCs). See Reading Diagnostic Trouble Codes With Tech 2 Diagnostic Scan Tool. (Group 9015-20.) Are any DTCs present?	**YES:** See Engine Diagnostic Trouble Codes (DTCs—SPN.FMI Format) for information on code. (Group 9001-20.) **NO:** No active DTCs present. Go to Injector Check.

– – –1/1

❸ **Injector Check**	1. Clear the DTC. For information on how to clear DTC, See Reading Diagnostic Trouble Codes With Tech 2 Diagnostic Scan Tool (9015-20) or See Reading Diagnostic Trouble Codes With Dr. ZX. (9015-20.) 2. Start the engine. 3. Select the Actuator test from the Tech 2 menu. *NOTE: If Tech2 scan tool is not available, See Check and Adjust Fuel Injection Nozzle. (Group 9010-25.)* 4. Select the **Injection Stop** at each injector in the common rail system. 5. Press the **OFF** soft key to stop the fuel injection in the cylinder one by one, and check the change in engine sound. Is there any cylinder of which engine vibration and engine sound did not change when it is stopped?	**YES:** Replace the injector in the cylinder of which engine sound did not change when it is stopped. **NO:** Go to Pre-Injection Stop Test. (Group 9010-15.)

– – –1/1

❹ **Pre-Injection Stop Test**	Select Stop Pre-Injection from the Tech 2 menu to perform the test. Is ther any cylinder that vibrates and engine sound did not change when it is stopped?	**YES:** Replace the injector in the cylinder of which engine sound did not change when it is stopped. **NO:** Go to Injection Pump Coupling Check.

– – –1/1

❺ **Injection Pump Coupling Check**	Check the coupling of the supply pump for damage. Is there damage?	**YES:** Repair. **NO:** Go to Engine Control Module (ECM) Check.

– – –1/1

❻ **Engine Control Module (ECM) Check**	1. Check the version of ECM software. 2. Upgrade the software version or replace ECM if necessary. *NOTE: EGR valve position learning is required after replacing or rewriting the ECM. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.)* Does the engine start?	**YES:** New software repaired ECM.

– – –1/1

Engine Emits Excessive Black or Gray Exhaust Smoke

JC89288,0000060 –19–26MAY06–1/1

Engine Emits Excessive Black or Gray Exhaust Smoke Diagnostic Procedure

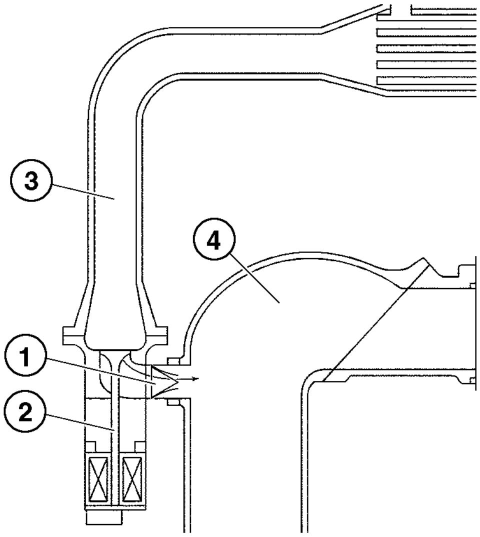
NOTE: This procedure should be used if the engine emits excessive black or gray smoke. If engine emits a less heavy, bluish exhaust smoke, See Engine Uses Too Much Oil. (Group 9010-15.)

– – –1/1

❶ **Preliminary Check**	1. Ensure fuel quantity and quality are OK. 2. Ensure engine is not excessively loaded. 3. Ensure air filter is not restricted or plugged. Was the problem found?	**YES:** Repair and retest **NO:** Go to Active DTC Check. – – –1/1
❷ **Active DTC Check**	Perform the Active DTC Check to read Diagnostic Trouble Codes (DTCs). See Reading Diagnostic Trouble Codes With Tech 2 Diagnostic Scan Tool. (Group 9015-20.) Are any DTCs detected?	**YES:** See Engine Diagnostic Trouble Codes (DTCs—SPN.FMI Format) for information on code. (Group 9001-20.) **NO:** No active DTCs present. Go to Air Intake System Leakage Test. – – –1/1
❸ **Air Intake System Leakage Test**	Perform Air Intake System Leakage Test See Air Intake System Leakage Test. (Group 9010-15.). Did the air system check good?	**YES:** Go to EGR Control System Check. **NO:** Repair or replace parts as necessary and retest. – – –1/1
❹ **EGR Control System Check**	Perform EGR Control System Check. See EGR Control System Check. (Group 9010-25.) Is the EGR valve free to open and close properly?	**YES:** Go to Reed Valve Check. **NO:** Replace EGR valve and retest. – – –1/1

❺ Reed Valve Check

Check the reed valve for deformation or breakage.



TX1002965 –UN–24JAN06

1—Reed Valve
2—EGR Valve
3—Exhaust Side
4—Intake Side

If the reed valve is broken, bypass of intake air deteriorates air-fuel ratio, resulting in output lowering.
Is reed valve (1) OK?

YES: Go to Fuel System Test.

NO: Repair or replace parts as necessary and retest.

– – –1/1

❻ Fuel System Test

Check fuel system in the following procedure.

1. Check the high pressure line and low pressure line for leaks, kinks, or obstructions.

   Check in the following order.

   - Fuel filters (water separator and final filters).
   - Fuel tank (pump strainer).
   - Fuel system lines.

2. Check fuel lines, fuel filter, and inside of the fuel tank for freezing or waxing (cold temperatures).

3. Check the supply line inside the fuel tank for debris.

4. Supply fuel from a container other than the fuel tank.

   a. Start the engine, operate the machine, and check for trouble symptoms.

   b. Replace the fuel in the fuel tank and lines.

   c. Bleed air from fuel, and check for trouble symptoms again.

Are any fuel system problems present?

YES: Repair and replace necessary parts and retest.

NO: Go to Exhaust System Check.

– – –1/1

❼ **Exhaust System Check**	Check for crush, breakage, or exhaust leakage in the exhaust pipe. Is exhaust in good condition?	**YES:** Go to Mechanical Engine Check. (Group 9010-15.) **NO:** Repair or replace parts as necessary and retest.

– – –1/1

❽ **Mechanical Engine Check**	Check the mechanical parts of the engine, and repair if needed. • Compression pressure See Engine Compression Pressure Test. (Group 9010-25.) • Valves See Check and Adjust Engine Valve Lash (Clearance). (Group 9010-25.) • Injector Injector Balance Test (Injector Misfire Test). (Group 9010-25.) Are mechanical parts of engine OK?	**YES:** Go to Engine Control Module (ECM) Check. **NO:** Repair or replace parts as necessary and retest.

– – –1/1

❾ **Engine Control Module (ECM) Check**	1. Check the version of ECM software. 2. Rewrite the software if version upgrade is necessary. 3. Replace ECM if software is not available. *NOTE: EGR valve position learning is required after replacing or rewriting the ECM. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.)* Does the engine emit less black or gray smoke?	**YES:** New software repaired ECM.

– – –1/1

Turbocharger Excessively Noisy or Vibrates

JC89288,000019B –19–04APR06–1/1

Turbocharger Excessively Noisy or Vibrates Diagnostics Procedure

– – –1/1

❶ **Check Bearings**	• Check for lubrication of bearings. • Check for wear. Was problem found?	**YES:** Repair or replace parts as necessary and retest. **NO:** Go to Intake and Exhaust Check.

– – –1/1

❷ **Intake and Exhaust Check**	Check for leaks in the intake manifold and exhaust manifold. Was a leak detected?	**YES:** Repair or replace parts as necessary and retest. **NO:** Go to Turbine Check.

– – –1/1

❸ **Turbine Check**	• Check clearance between turbine wheel and housing. • Check for broken blades on turbine. Was problem found?	**YES:** Repair or replace parts as necessary and retest.

– – –1/1

Oil Dripping From Turbocharger Adapter

JC89288,000019C –19–04APR06–1/1

Oil Dripping From Turbocharger Adapter Diagnostics Procedure

– – –1/1

❶ **Turbocharger Bearings and Seal Check**	Check for worn bearings and seals. Was the problem found?	**YES:** Repair or replace parts as necessary and retest. **NO:** Go to Crankcase Pressure Check.

– – –1/1

❷ **Crankcase Pressure Check**	Check for excessive crankcase pressure or plugged oil drain line. Was problem found?	**YES:** Repair or replace parts as necessary and retest.

– – –1/1

Excessive Drag in Turbocharger Rotating Members

JC89288,000019D –19–04APR06–1/1

❶ Excessive Drag in Turbocharger Rotating Members Diagnostics Procedure

– – –1/1

Carbon Deposit Check	Check for carbon build-up behind turbine wheel. Were there carbon deposits found?	**YES:** Remove deposits and retest. **NO:** Go to Check Bearings.

– – –1/1

Check Bearings	• Check for lubrication of bearings. • Check for wear. Was problem found?	**YES:** Repair or replace parts as necessary and retest.

– – –1/1

Fuel In Oil

JC89288,000019E –19–04APR06–1/1

❶ Fuel In Oil Diagnostics Procedure

– – –1/1

Seal Check	Inspect front seal on high pressure pump. Is seal faulty?	**YES:** Repair or replace parts as necessary and retest.

– – –1/1

Serpentine Belt Tension Check

SPECIFICATIONS	
Serpentine Belt Deflection	6-8 mm at 98 N .24-.32 in. at 22 lb-force

SERVICE EQUIPMENT AND TOOLS
JDG529 Belt Tension Gauge

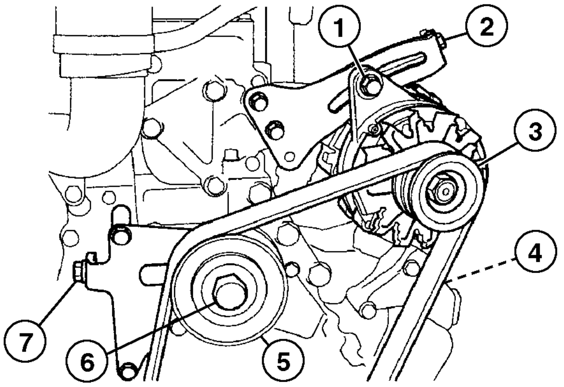
MS12501,000002F –19–24APR06–1/2

1. Check belt regularly for wear. Replace if necessary.
2. Check belt tension with belt deflection gauge at midway between tensioner pulley (6) and alternator pulley (3).

Specification

Serpentine Belt—Deflection .... 6-8 mm at 98 N
.24-.32 in. at 22 lb-force

3. If deflection is not within specification, loosen alternator lock nut (1) and tensioner pulley lock nut (5).
4. Adjust tensioner pulley adjustment bolt (7) and alternator adjustment bolt (2) until belt tension is within specification.
5. Tighten alternator lock nut (1) and tensioner pulley lock nut (5).



TX1002487 –UN–10JAN06

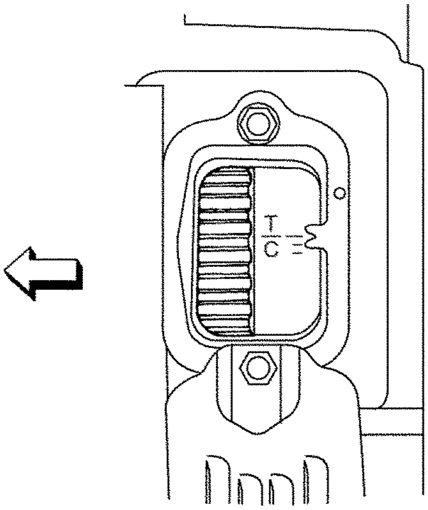
1—Lock Nut (alternator)
2—Adjustment Bolt (alternator)
3—Alternator Pulley
4—Bolt (alternator)
5—Lock Nut (tensioner pulley)
6—Tensioner Pulley
7—Adjustment Bolt (tensioner pulley)

MS12501,000002F –19–24APR06–2/2

Check and Adjust Injection Pump Timing

CAUTION: To prevent accidental starting of engine while performing check and adjust injection pump timing always disconnect Negative (-) battery terminal.

1. Rotate the crankshaft forward, normal direction, and line up the flywheel carved line with the dynamic pointer so that the number one cylinder reaches the compression top dead center.



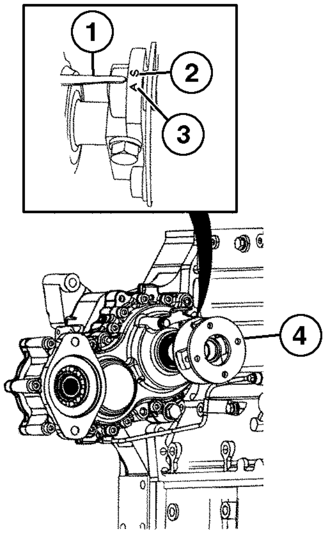
TX1006957 –UN–26APR06

MD46667,00000A7 –19–08JUN06–1/4

2. Check that the pointer and coupling mark (S) are lined up.

   If this is out of alignment, perform fuel injection pump timing adjustment.

1—Pointer
2—S mark (marking)
3—A mark (marking)
4—Coupling



TX1006958 –UN–26APR06

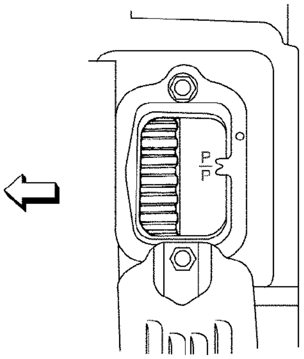
Continued on next page

MD46667,00000A7 –19–08JUN06–2/4

3. Reverse the crank shaft one time to the before top dead center 90° position.

   Next rotate it forward, normal direction, and check lineup of the flywheel carved line with the P/P mark and timing pointer line At this time.

   Check that the supply pump body carved line (3) and coupling side carved line (2) coincide.



TX1006964 –UN–26APR06

MD46667,00000A7 –19–08JUN06–3/4

4. If the carved lines (2) and (3) do not coincide, loosen the two, long hole, coupling bolts (1).

   Rotate the coupling and line up the carved lines of the supply pump body (3) and the coupling side (2).

   Then tighten the coupling bolts (1).

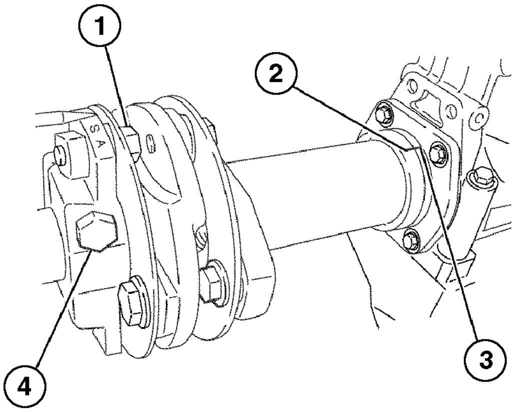
Specification

coupling bolts (1)—Torque .... 62 N•m (6.3 kgf•m)

Rotate crankshaft two turns forward, normal direction, of engine rotation.

Verify that new setting is correct fuel injection pump timing.

NOTE: Connect negative (-) battery cable.



TX1006967 –UN–26APR06

1—Coupling bolts
2—Coupling side carved line
3—Pump side carved line
4—Cotter bolt

MD46667,00000A7 –19–08JUN06–4/4

Engine Valve Lash (Clearance) Check and Adjust

CAUTION: To prevent accidental starting of engine while performing valve adjustments always disconnect negative (-) battery terminal.

1. Disconnect negative (-) battery cable.

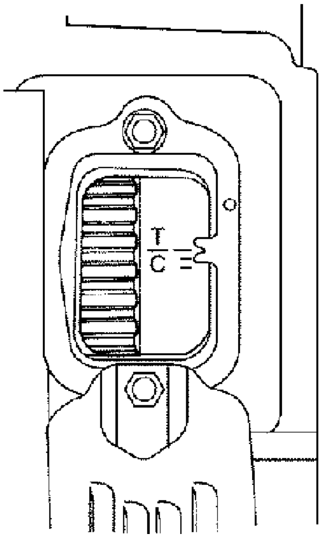
2. Remove lower valve cover from engine. See Lower Valve Cover Remove And Install. (Group 0400.)

NOTE: Glow plugs may be removed to ease crankshaft rotation.

GD61784,000005E –19–24OCT06–1/7

3. Rotate crankshaft until T/C mark on flywheel is aligned with top mark on flywheel housing.

4. Check for clearance in cylinder No. 1 or cylinder No. 6 rocker arms. The cylinder with clearance in both rocker arms is at TDC (top dead center).



TX1002653 –UN–27JAN06

Continued on next page

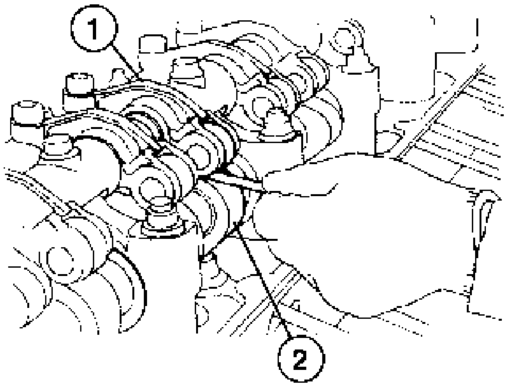
GD61784,000005E –19–24OCT06–2/7

5. Measure valve lash (clearance) at camshaft lobe and rocker arm with a feeler gauge as shown in table.

Cylinder No.	1		2		3		4		5		6	
Valve Intake (I) Exhaust (E)	I	E	I	E	I	E	I	E	I	E	I	E
Cylinder No. 1 at TDC (top dead center)	X	X	X			X	X			X		
Cylinder No. 6 at TDC (top dead center)				X	X			X	X		X	X

Specification

Intake and Exhaust Valve (Cold)—Clearance........ 0.40 mm
0.017 in.



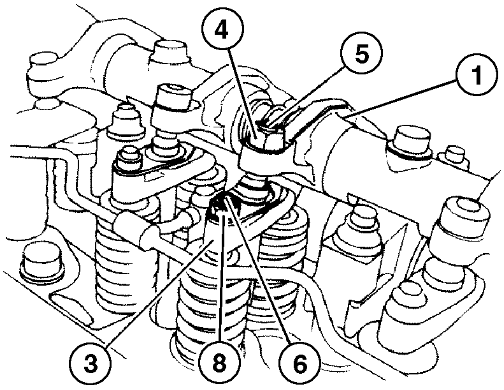
TX1011102 –UN–23AUG06

1—Rocker Arm
2—Camshaft

GD61784,000005E –19–24OCT06–3/7

6. If valve lash (clearance) needs to be adjusted, Loosen nuts (4, 8) on rocker arm and bridge adjusting screws. Loosen bridge adjusting screw (6).

1—Rocker Arm
3—Bridge
4—Rocker Arm Adjusting Screw Nut
5—Rocker Arm Adjusting Screw
6—Bridge Adjusting Screw
8—Bridge Adjusting Screw Nut



TX1011103 –UN–28AUG06

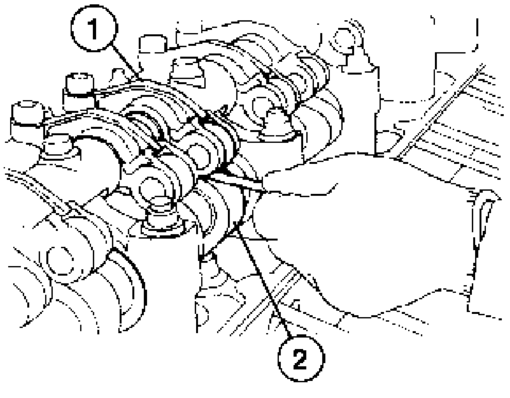
GD61784,000005E –19–24OCT06–4/7

7. Using a feeler gauge, set valve lash (clearance) by turning the rocker arm adjusting screw.

Specification

Intake and Exhaust Valve (Cold)—Clearance........ 0.40 mm
0.017 in.

1—Rocker Arm
2—Camshaft



TX1011102 –UN–23AUG06

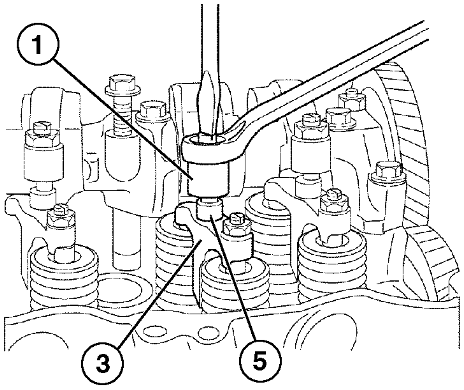
Continued on next page

GD61784,000005E –19–24OCT06–5/7

8. Hold rocker arm adjusting screw (5) and tighten rocker arm adjusting nut.

Specification

Rocker Arm Adjusting Screw Nut—Torque	78 N•m 58 lb-ft



1—Rocker Arm
3—Bridge
5—Rocker Arm Adjusting Screw

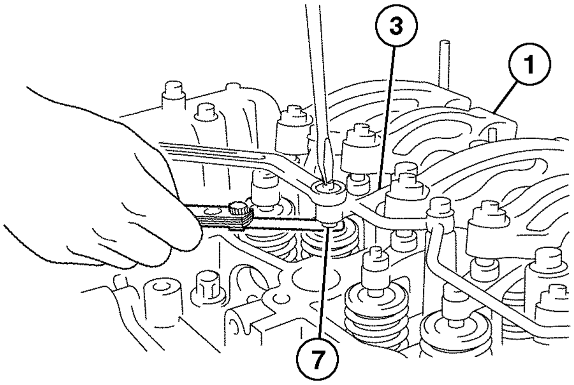
GD61784,000005E –19–24OCT06–6/7

9. Using a feeler gauge, adjust valve lash (clearance) by turning bridge adjusting screw. At this point the opposite end of the bridge should be raised.

10. Hold bridge adjusting screw and tighten bridge adjusting nut.

Specification

Intake and Exhaust Valve (Cold)—Clearance	0.40 mm 0.017 in.
Bridge Adjusting Screw Nut—Torque	78 N•m 58 lb-ft



1—Rocker Arm
3—Bridge
7—Valve Stem

11. Rotate crankshaft 360° until T/C mark on flywheel is aligned with top mark on flywheel housing. Adjust remaining valves as shown on chart.

12. Install lower valve cover from engine. See Lower Valve Cover Remove And Install. (Group 0400.)

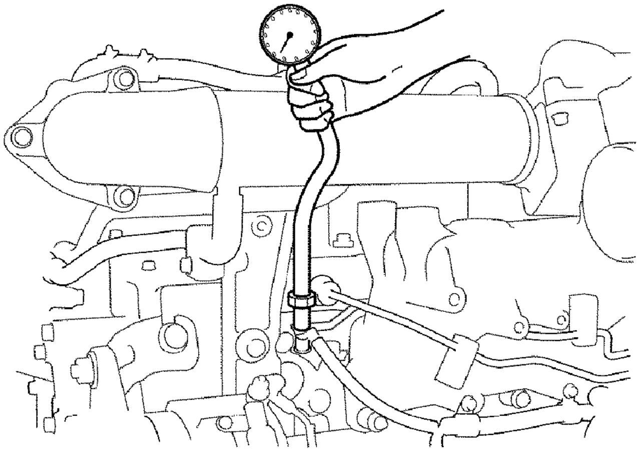
13. Connect negative (-) battery cable.

GD61784,000005E –19–24OCT06–7/7

Engine Compression Pressure Test

SPECIFICATIONS	
Engine Compression Pressure	2942 kPa 29.4 bar 427 psi

ESSENTIAL TOOLS
Isuzu Part No. 5-8840-2675-0 Compression Gauge
Isuzu Part No. 1-8531-7019-0 Adapter



TX1002645 –UN–27JAN06

1. Batteries must be fully charged.
2. Clean area around glow plugs.
3. Start engine and run until it reaches normal operating temperature.
4. Shut off engine and proceed with test.
5. Disconnect battery negative (-) terminal.
6. Shut off fuel supply.
7. Remove all glow plugs from engine.
8. Reconnect battery negative terminal.
9. Crank engine to remove any debris from glow plug bore.
10. Connect adapter to compression gauge and install in a glow plug bore.
11. Crank engine, 200 rpm minimum, until compression reading is stabilized. Perform test three times for each cylinder and record readings.

Specification

Specification	
Engine Compression—Pressure	2942 kPa 29 bar 427 psi

12. Readings should be approximately the same for each cylinder.

Continued on next page

IMPORTANT: A variation exceeding 200 kPa (2 bar) (29 psi) is not acceptable and must be corrected.

Problems possibly causing low compression:

- Worn or broken compression rings
- Worn cylinder linings
- Damaged valves
- Blown head gasket

JC89288,0000193 –19–18APR06–2/2

Air Filter Restriction Indicator Switch Test

SPECIFICATIONS	
Air Filter Restriction Indicator Must Come On At Vacuum	5.0 kPa (50 mbar) (20 in. water)

ESSENTIAL TOOLS
JT05652 (1/8 F NPT x 1/8 F NPT x 1/8 M NPT) Tee
JT03246 (1/4 F NPT x 1/4 F NPT) (Parker No. 0202-4-4) Coupler

SERVICE EQUIPMENT AND TOOLS
1/8 in. Barbed Fitting
1/4 in. Barb Fitting
0—15 kPa (0—150 mbar) (0—60 in. water) Vacuum Gauge

Continued on next page

JC89288,0000195 –19–26JAN06–1/2

1. Remove air filter restriction indicator switch (A).

2. Install parts as shown.

3. Start engine.

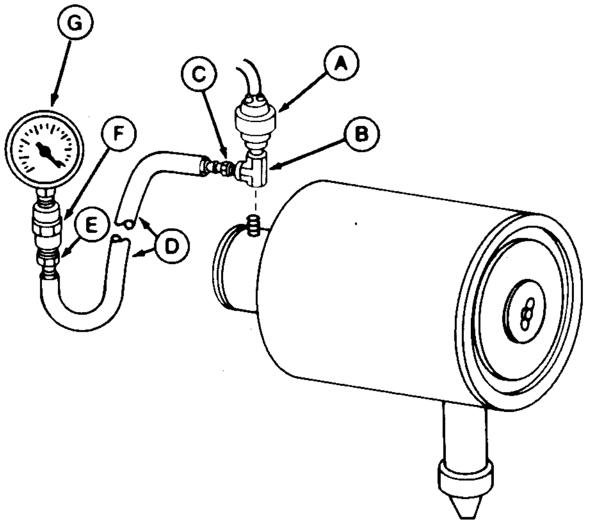
4. Slowly cover the air cleaner inlet using a piece of heavy cardboard or a board.

5. Check reading on gauge when air filter restriction indicator comes on.

Specification

Air Filter Restriction Indicator
Must Come On At—Vacuum................. 5.0 kPa (50 mbar) (20 in. water)

If reading is not within specifications, install a new indicator switch.



T7350EP

T7350EP –UN–17DEC90

A—Air Filter Restriction Indicator Switch
B—Tee
C—Barbed Fitting
D—Tube
E—Barbed Fitting
F—Coupler
G—Gauge

JC89288,0000195 –19–26JAN06–2/2

Air Intake System Leakage Test

NOTE: The following test procedure requires that the air intake be sealed off to pressurize the system. Using a plastic bag to seal the air intake filter is used as an example.

CAUTION: Do not start the engine during this test procedure. Plastic bag (or whatever material/object used to seal intake) can be sucked into engine.

T5906AP –UN–23FEB89

Continued on next page

JC89288,000006A –19–18APR06–1/2

1. Remove air cleaner cover and remove main filter element.

2. Put a plastic bag over filter element and install main element and cover.

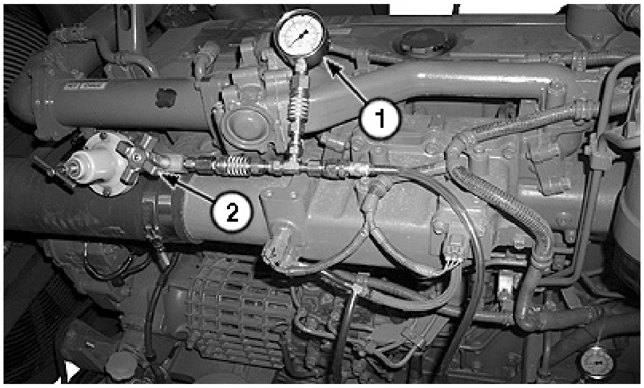
3. For four valve head engines, remove air temperature sensor from manifold.

4. Using an adapter connect a regulated air source.

5. Pressurize air intake system to 13.8—20.7 kPa, (0.13—0.21 bar), (2—3 psi).

6. Spray soap and water solution over all connections from air cleaner to the turbocharger or air inlet to check for leaks. Repair all leaks.

7. Remove plastic bag from air filter element and reinstall element and cover.



1—Gauge
2—Regulator

JC89288,000006A –19–18APR06–2/2

Engine Power Test Using Turbocharger Boost Pressure

SPECIFICATIONS	
Work Mode Switch Position	HP
Engine Rated Speed	1800 RPM
450DLC	
Turbocharger Boost Pressure	128 kPa (1.28 bar) (18 psi) using No. 2 fuel
Turbocharger Boost[a] Pressure	119 kPa (1.19 bar) (17 psi) using No. 1 fuel
650DLC	
Turbocharger Boost Pressure	128 kPa (1.28 bar) (18 psi) using No. 2 fuel
Turbocharger Boost[a] Pressure	119 kPa (1.19 bar) (17 psi) using No. 1 fuel
850DLC	
Turbocharger Boost Pressure	128 kPa (1.28 bar) (18 psi) using No. 2 fuel
Turbocharger Boost[a] Pressure	119 kPa (1.19 bar) (17 psi) using No. 1 fuel

[a] Turbocharger boost pressure is reduced by 7% if using No. 1 fuel.

SERVICE EQUIPMENT AND TOOLS
JT07248 Turbo Boost Test Kit

OTHER MATERIAL
T43512 Thread Lock and Sealer (Medium Strength)
TY9473 Canadian Thread Lock and Sealer (Medium Strength)
242 LOCTITE® Thread Lock and Sealer (Medium Strength)

This procedure must only be used as a guide to determine engine condition. One technician can perform this test if the Turbo Boost Test Kit is used.

LOCTITE is a trademark of Loctite Corp.

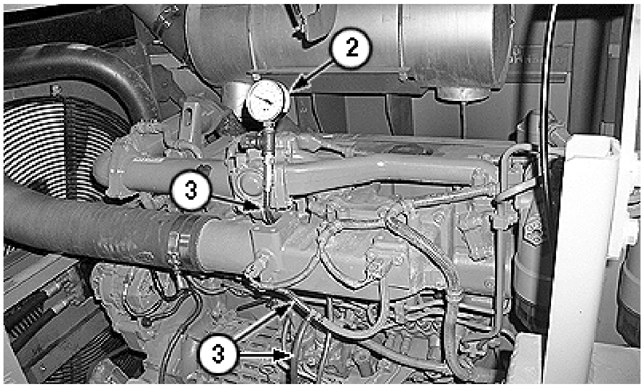
Continued on next page

1. Remove hose and install barbed fitting (1).

2. Install hose (2) and pressure gauge (3) from JT07248 Turbo Boost Test Kit.

3. Warm engine and hydraulic oil to normal operating temperature.

2—Pressure Gauge
3—Hose



TX1005974A –UN–06APR06

Continued on next page

JC89288,0000196 –19–24APR06–2/4

4. Disconnect both pump pressure sensors (1).

5. Turn engine RPM dial to fast idle.

6. Turn work mode switch to HP position.

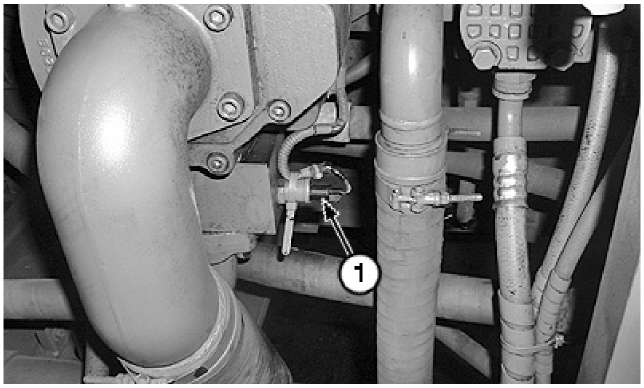
Specification

Work Mode Switch—Position .... HP

Specification

Engine Rated Speed—Speed .... 1800 RPM

NOTE: If using the JT07248 Turbo Boost Kit, a check valve at the pressure gauge inlet traps the highest reading for boost pressure and does not decrease as the pressure decreases.



TX1006587A –UN–21APR06

1—Pump Pressure Sensor (2 used)

7. Slowly actuate boom up function over relief until engine rpm pulls down from fast idle to below 1800 RPM. Record highest reading. Repeat this step at least six times.

8. Record the highest pressure reading.

9. Compare highest reading to specifications.

Specification

Turbocharger Boost—Pressure............ 128 kPa (1.28 bar) (17 psi) using No. 2 fuel

—Pressure... 110.3 kPa (1.1 bar) (16 psi) using No. 1 fuel

IMPORTANT: Pressure gauge accuracy is very critical for this test. Do not make adjustments to injection pump fuel delivery on the machine to raise or lower boost pressure.

New engine may not develop specified boost pressure. Check after 50 hours of operation.

10. If turbocharger boost pressure is low, check the following:

    - Wrong fuel.
    - Restricted air filter elements.See Air Cleaner Remove and Install. (Group 0520.)

Continued on next page

- Restricted fuel filter elements.See Fuel Filter Remove and Install. (Group 0560.)
- Restricted muffler, remove muffler and rerun test.
- Exhaust manifold leaks.
- Intake manifold leaks.
- Faulty fuel pump. See Fuel Injection Pump Remove and Install. (Group 0400.)
- Low compression pressure. Perform Engine Compression Pressure Test. (Group 9010-25.)
- Cam lobe wear (valve clearance).Perform Check and Adjust Engine Valve Lash (Clearance). (Group 9010-25.)
- Faulty fuel injectors. Perform Injector Balance Test (Injector Misfire Test). (Group 9010-25.)
- Carbon build up in turbocharger.Go To Turbocharger Excessively Noisy or Vibrates. (Group 9010-15.)
- Turbocharger compressor or turbine wheel rubbing housing.Go To Turbocharger Excessively Noisy or Vibrates. (Group 9010-15.)

11. Remove gauge and fittings.

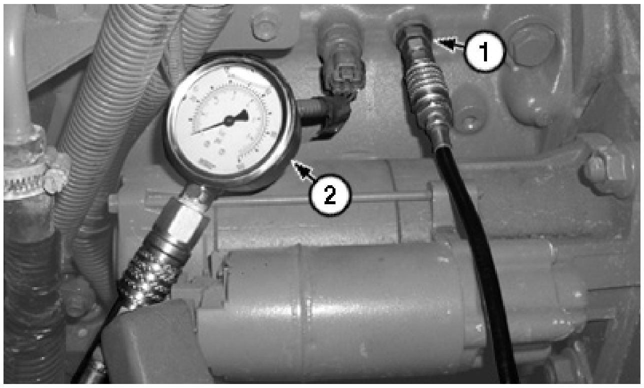
12. Apply thread lock and sealer (medium strength) to plug. Tighten plug.

JC89288,0000196 –19–24APR06–4/4

Engine Oil Pressure Test

SPECIFICATIONS	
Engine Speed	Fast Idle
Engine Oil Pressure	444 kPa at fast idle 4.44 bar at fast idle 65 psi at fast idle

SERVICE EQUIPMENT AND TOOLS
1-1/16” Crowsfoot Wrench
JT05412 Industrial Universal Pressure Test Kit
JT03115 Pressure Gauge



TX1005815A –UN–04APR06

NOTE: Before performing test, make sure oil filter is clean. A dirty oil filter will limit the flow of filtered oil.

1. Warm engine to normal operating temperature.
2. Shut off engine.
3. Remove engine oil pressure switch with 1-1/16” crowsfoot wrench.
4. Install JT03115 gauge, hose, and fitting from universal pressure test kit.
5. Start engine and run at specification.

Specification

Engine—Speed .... Fast Idle

6. Record oil pressure.

Specification

Engine Oil Pressure—Pressure .... 444 kPa at fast idle
4.44 bar at fast idle
65 psi at fast idle

JC89288,0000199 –19–18APR06–1/1

Rail Pressure Control Test

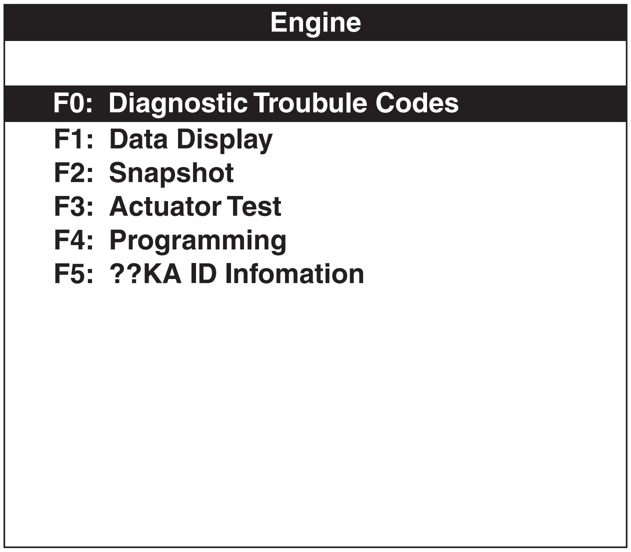
This Test is performed to check the operation of the Rail Pressure Control Valve.

1. Connect the Tech 2 to the Engine Diagnostic Connection (X6). Perform Tech 2 Diagnostic Scan Tool Connection Procedure. (Group 9015-20.)

2. Start engine and run at idle.

JC89288,00001B1 –19–24APR06–1/6

3. Select **F3 : Actuator Test** from Engine Applications Menu.



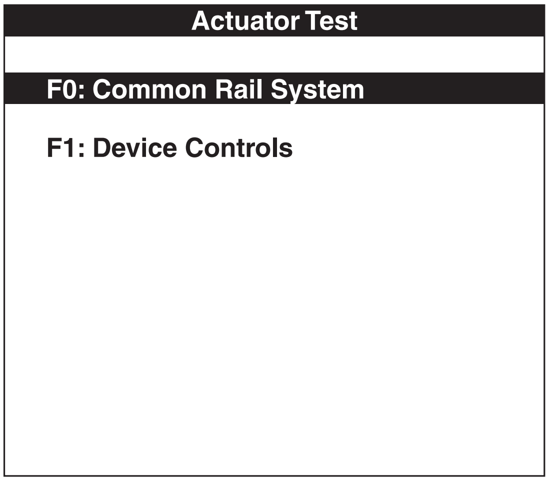
TX1005648 –19–24APR06

Engine Applications Menu

Continued on next page

JC89288,00001B1 –19–24APR06–2/6

4. Select **FO: Common Rail System** from the Actuator Test Menu.

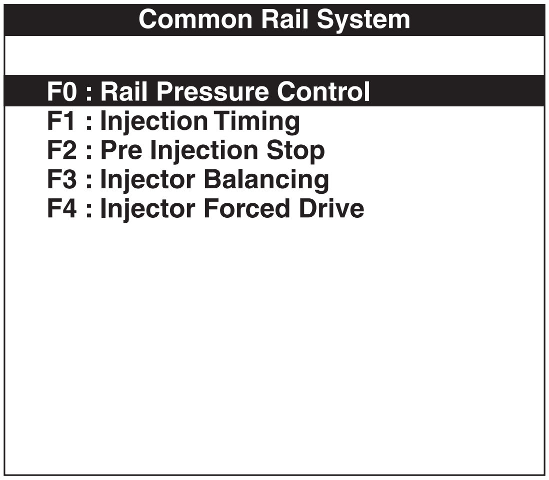


TX1006066 –19–07APR06

Actuator Test Menu

JC89288,00001B1 –19–24APR06–3/6

5. Select **FO: Rail Pressure Control** from the menu.



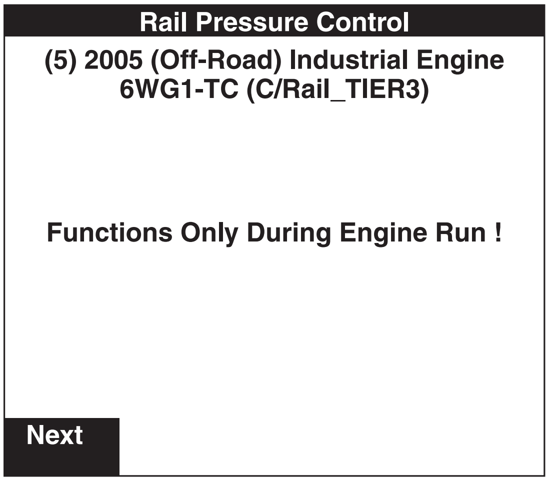
TX1006104 –19–07APR06

Common Rail System Menu

Continued on next page

JC89288,00001B1 –19–24APR06–4/6

6. Screen will appear with message **Functions Only During Engine Run!** Select next.



Rail Pressure Control

(5) 2005 (Off-Road) Industrial Engine 6WG1-TC (C/Rail_TIER3)

Functions Only During Engine Run !

TX1006067 –19–07APR06

Continued on next page

JC89288,00001B1 –19–24APR06–5/6

Screen will appear with message **Checking Preconditions**.

7. Move rail pressure by using the down and up softkeys. Compare Rail pressure to specification.

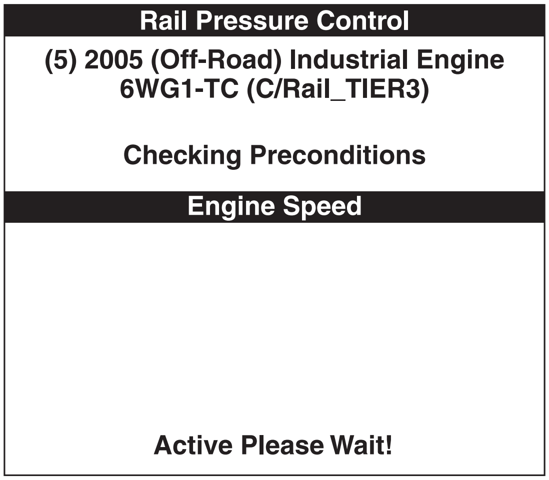
Specification

Targeted Rail Pressure—
Pressure .... 30 MPa
300 bar
30,000 kPa
4351 psi

NOTE: Common Rail Pressure Differential is calculated by taking Actual rail pressure minus Desired Rail Pressure.

Example if actual rail pressure is 29 MPa and desired is 30. The common rail pressure differential would be -1 MPa or if at actual rail pressure is 31 and desired it 30 . The common rail pressure differential would be 1 MPa.

Common Rail Pressure
Differential—Pressure.. 25—35 MPa
250—350 bar
25,000—35,000 kPa
3626-5076 psi



Rail Pressure Control

(5) 2005 (Off-Road) Industrial Engine 6WG1-TC (C/Rail_TIER3)

Checking Preconditions

Engine Speed

Active Please Wait!

TX1006068 –19–07APR06

Checking Preconditions Screen

JC89288,00001B1 –19–24APR06–6/6

Injector Balance Test (Injector Misfire Test)

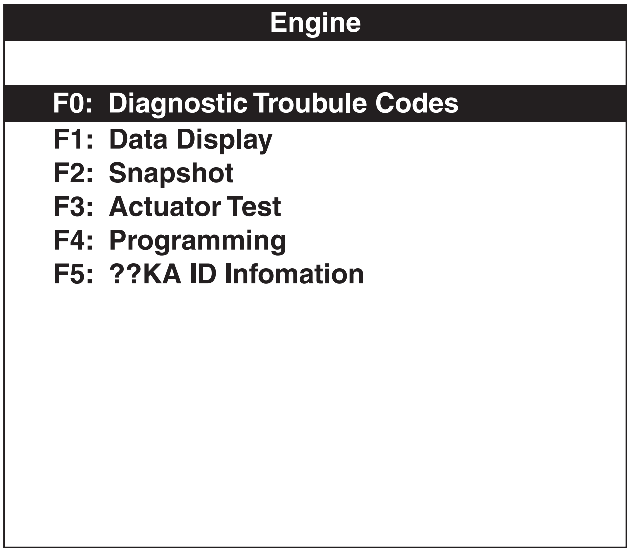
1. Connect the Tech 2 to the machine. Perform Tech2 Diagnostic Scan Tool Connection Procedure. (Group 9015-20.)

2. Start engine and run at slow idle.

Continued on next page

JC89288,00001AA –19–24APR06–1/5

3. Select**F3: Actuator Test** from the Engine Applications Menu.



Engine

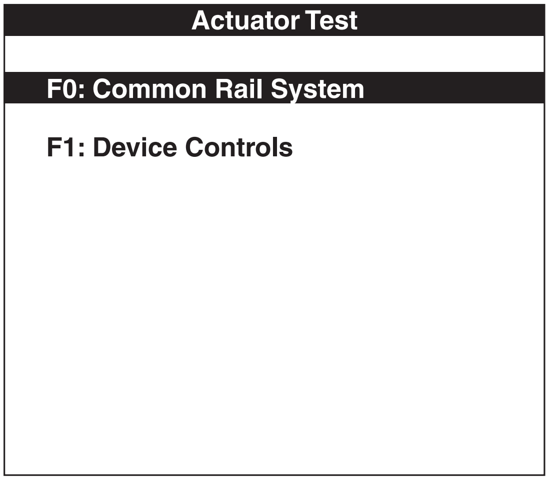
F0: Diagnostic Troubule Codes
F1: Data Display
F2: Snapshot
F3: Actuator Test
F4: Programming
F5: ??KA ID Infomation

TX1005648 –19–24APR06

Engine Applications Menu

JC89288,00001AA –19–24APR06–2/5

4. Select the **F0: Common Rail System** on the Tech 2 screen.



Actuator Test

F0: Common Rail System

F1: Device Controls

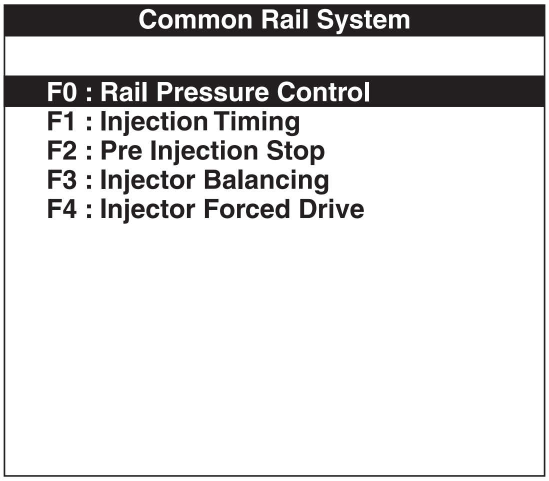
TX1006066 –19–07APR06

Actuator Test Menu

Continued on next page

JC89288,00001AA –19–24APR06–3/5

5. Select **F1: Injector Balancing** from Common Rail System Menu.



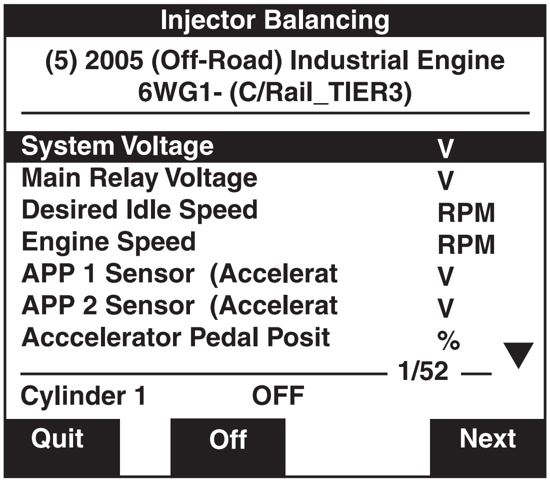
TX1006104 –19–07APR06

Common Rail System Menu

JC89288,00001AA –19–24APR06–4/5

6. Send instruction to each injector (set to OFF by soft key on Tech 2) to stop the injector, and check the variation of engine speed.

   If engine speed varies when injector stops, electrical circuit of that injector is judged as normal. If engine speed does not vary when injector stops, electrical circuit of that injector or injector body is judged as faulty.



Cylinder 1 OFF

TX1006134 –19–10APR06

Injector Balancing

JC89288,00001AA –19–24APR06–5/5

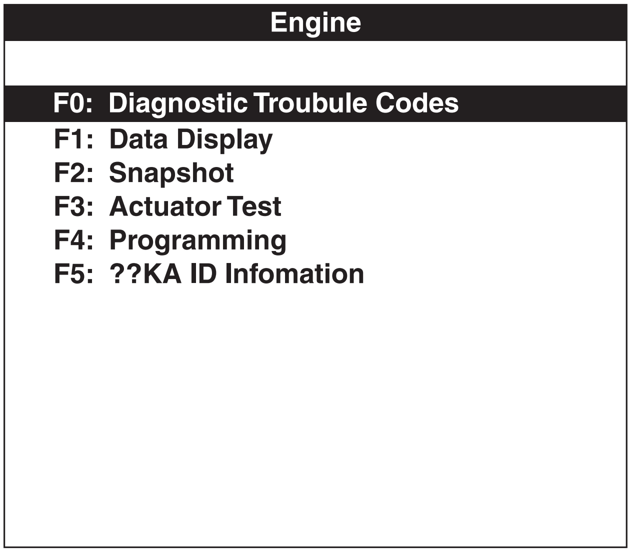
Injector Force Drive Test

1. Connect Tech 2 to the Engine Diagnostic Connection (X6). Perform Tech 2 Diagnostic Scan Tool Connection Procedure. (Group 9015-20.)

2. Turn key switch ON (**engine is off**).

JC89288,00001AB –19–24APR06–1/5

3. Select **F3 : Actuator Test** from Engine Applications Menu.



Engine

F0: Diagnostic Troubule Codes
F1: Data Display
F2: Snapshot
F3: Actuator Test
F4: Programming
F5: ??KA ID Infomation

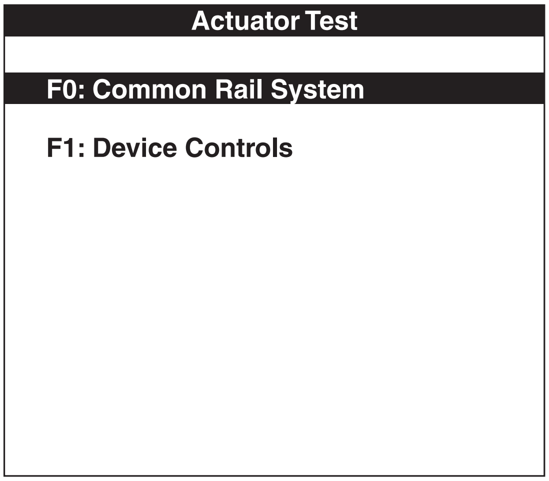
TX1005648 –19–24APR06

Engine Applications Menu

Continued on next page

JC89288,00001AB –19–24APR06–2/5

4. Select **F0: Common Rail System** from the Actuator Test Menu.

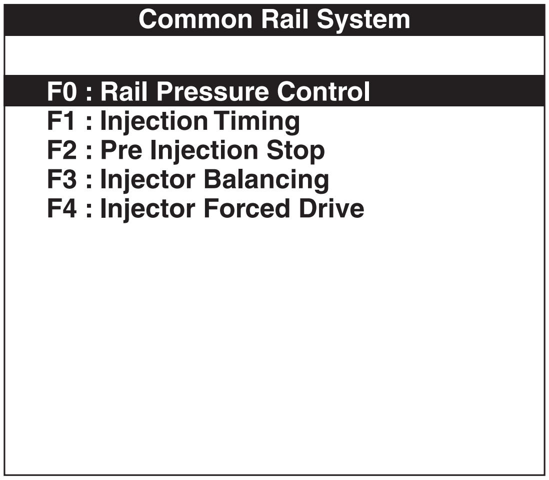


TX1006066 –19–07APR06

Actuator Test Menu

JC89288,00001AB –19–24APR06–3/5

5. Select **F3: Injector Forced Drive** from Common Rail System Menu.



TX1006104 –19–07APR06

Common Rail System Menu

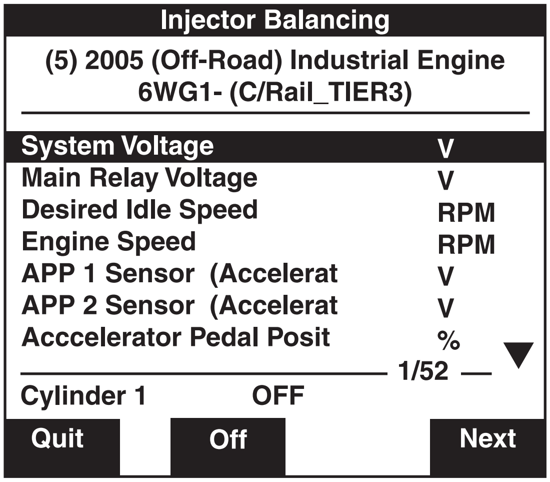
Continued on next page

JC89288,00001AB –19–24APR06–4/5

6. Send instruction to each injector (set to OFF by soft key on Tech 2) to stop the injector, and check operation sound of injector.

NOTE: After Injector Forced Drive test, key switch must be turned to OFF once to restart.

If operation sound is heard, electrical circuit of the injector is judged as normal. If the operation sound is not heard, electrical circuit of the injector or injector body is judged as faulty.



Injector Balancing

(5) 2005 (Off-Road) Industrial Engine
6WG1- (C/Rail_TIER3)

System Voltage	V
Main Relay Voltage	V
Desired Idle Speed	RPM
Engine Speed	RPM
APP 1 Sensor (Accelerat	V
APP 2 Sensor (Accelerat	V
Acccelerator Pedal Posit	%

1/52

Cylinder 1 OFF

TX1006134 –19–10APR06

Injector Balancing

JC89288,00001AB –19–24APR06–5/5

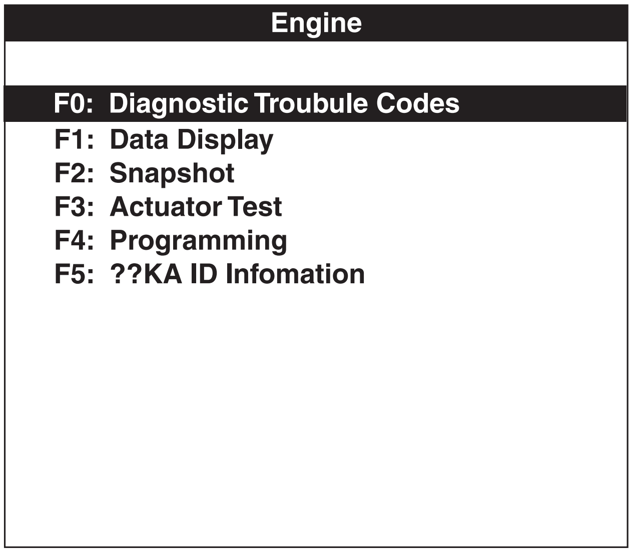
EGR Regulating Valve Test

1. Connect the Tech 2 to the machine. Perform Tech2 Diagnostic Scan Tool Connection Procedure. (Group 9015-20.)

2. Turn key to ON **(Leave engine off)**.

Continued on next page JC89288,00001AC –19–27APR06–1/6

3. Select **F3: Actuator Test** from the Engine Applications Menu.

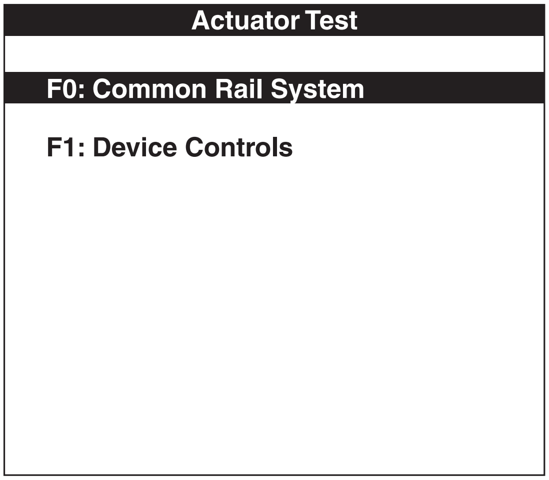


TX1005648 –19–24APR06

Engine Applications Menu

JC89288,00001AC –19–27APR06–2/6

4. Select the **F1: Device Control** on the Tech 2 screen.



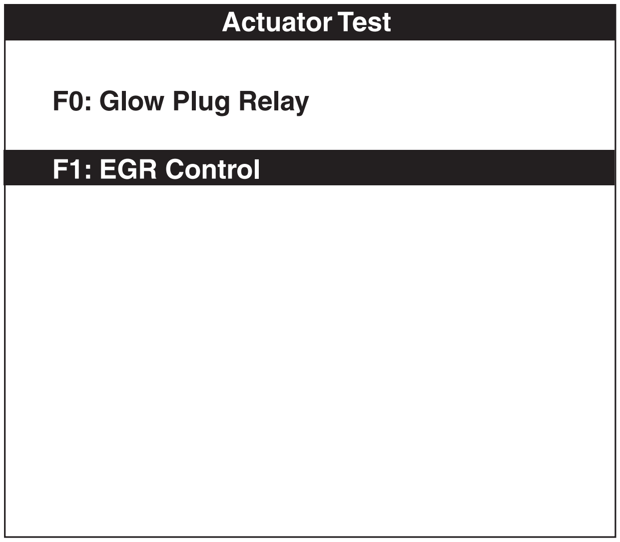
TX1006066 –19–07APR06

Actuator Test Menu

Continued on next page

JC89288,00001AC –19–27APR06–3/6

5. Select the **F1: EGR Control** from the Device Control Menu.



Actuator Test

F0: Glow Plug Relay

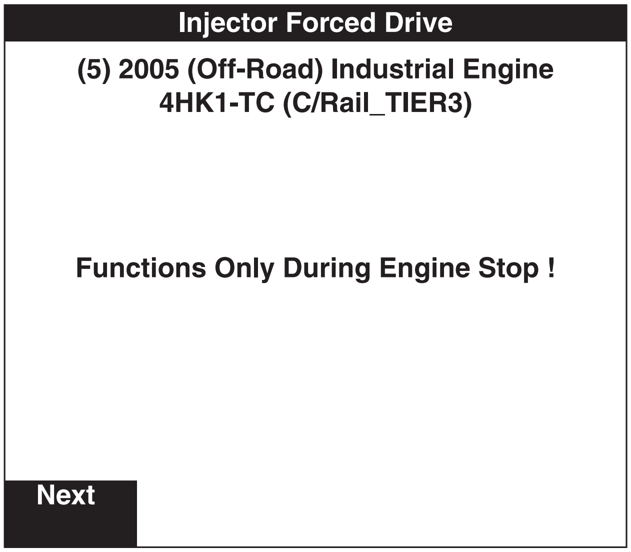
F1: EGR Control

TX1006400 –19–19APR06

Actuator Test Menu

JC89288,00001AC –19–27APR06–4/6

This screen will appear signifying that EGR Control test will only function with engine stopped.



Injector Forced Drive

(5) 2005 (Off-Road) Industrial Engine
4HK1-TC (C/Rail_TIER3)

Functions Only During Engine Stop !

TX1006170 –19–19APR06

Continued on next page

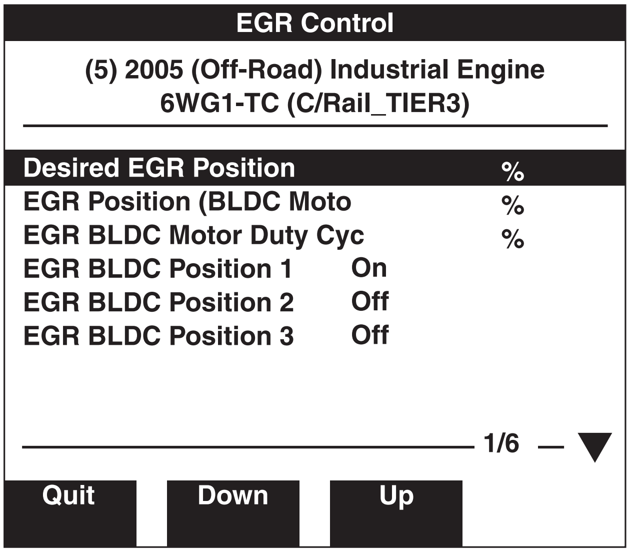
JC89288,00001AC –19–27APR06–5/6

6. Send instruction to EGR valve to increase or decrease desired position and check the data list.

   If variation of data list is of proper value, EGR valve is judged as normal.

Specification

EGR Position Variation—Position .... + or- 3% of desired position



EGR Control

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

Desired EGR Position		**%**
EGR Position (BLDC Moto		**%**
EGR BLDC Motor Duty Cyc		**%**
EGR BLDC Position 1	**On**	
EGR BLDC Position 2	**Off**	
EGR BLDC Position 3	**Off**	

TX1007103 –19–28APR06

JC89288,00001AC –19–27APR06–6/6

Injector ID Code Registration

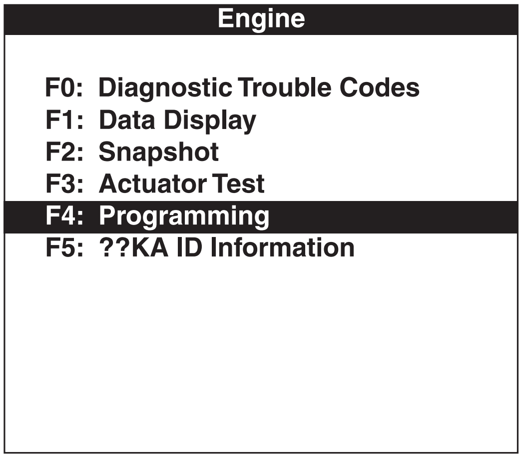
1. Connect Tech 2 and Machine. Perform Tech 2 Diagnostic Scan Tool Connection Procedure. (Group 9015-20.)

2. Refer to the following instructions for how to register Injector ID Code.

Continued on next page

JC89288,00001AD –19–24APR06–1/18

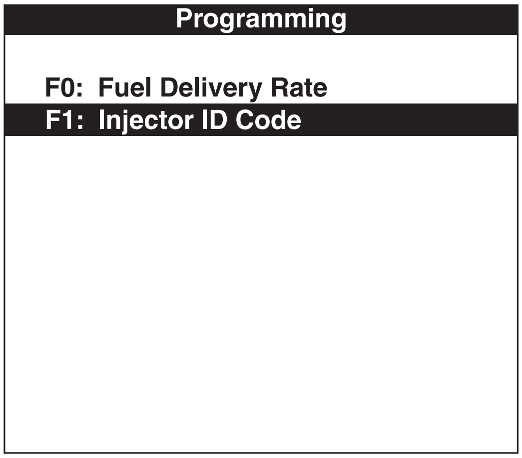
3. Choose the menu **F4: Programming** with (up/down) keys or F4 (function) key, and press ENTER.



TX1006198 –19–12APR06

JC89288,00001AD –19–24APR06–2/18

4. Select **F1: Injector ID Code** with (up/down) keys or F1 (function) key, and press ENTER.



TX1006195 –19–12APR06

Continued on next page

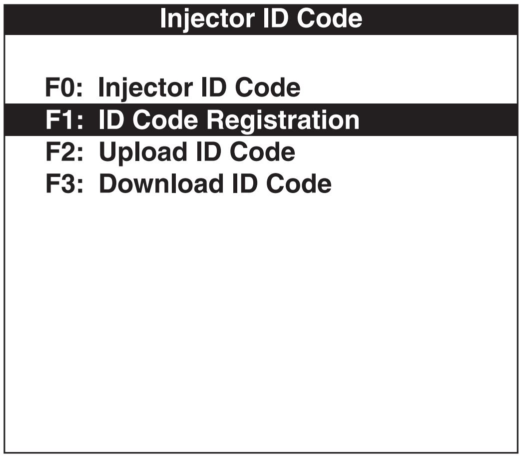
JC89288,00001AD –19–24APR06–3/18

5. Select **F1: ID Code Registration** with (up/down) keys or F1 (function) key, and press ENTER.

6. F0: Displays the Injector ID Code (hereinafter called ID Code) of cylinder 1 thru cylinder 6. Allows you to confirm the ID Code Registration.

   F2 Uploads (transfers) the ID Code (Cylinder 1 thru Cylinder 6) registered in the ECM to Tech 2 to store in its memory.

   F3: Allows you to download (batch registration) the uploaded ID codes from Tech 2 to the ECM.



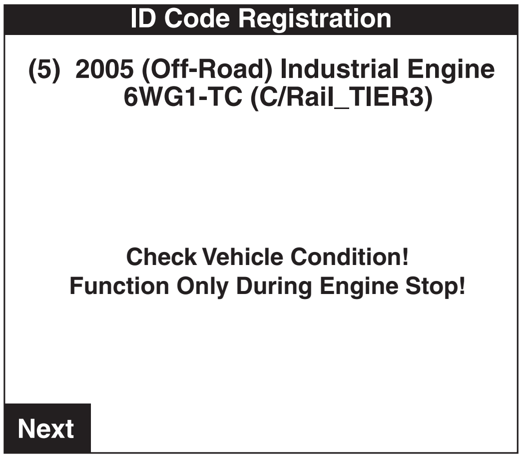
Injector ID Code

F0: Injector ID Code
F1: ID Code Registration
F2: Upload ID Code
F3: Download ID Code

TX1006196 –19–12APR06

JC89288,00001AD –19–24APR06–4/18

Press the softkey Next. As an example, the vehicle will be checked whether it is in the condition, engine stopped, that the ECM requests during ID Code Registration.



ID Code Registration

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

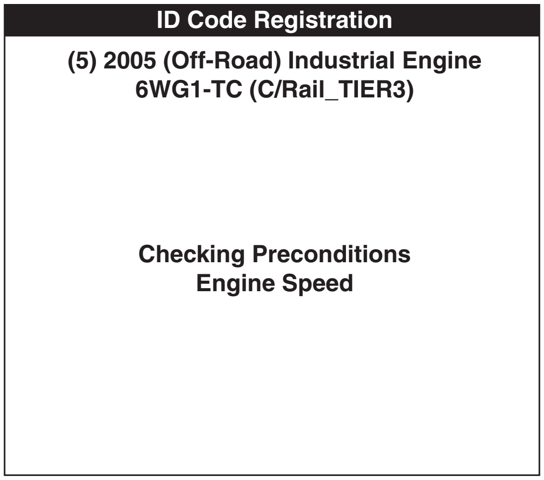
Check Vehicle Condition!
Function Only During Engine Stop!

TX1006199 –19–13APR06

Continued on next page

JC89288,00001AD –19–24APR06–5/18

The following display appears while checking if the engine speed is 0 rpm, it will take you to the next step.



ID Code Registration

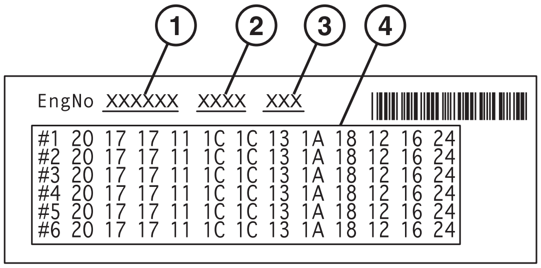
(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

Checking Preconditions
Engine Speed

TX1006203 –19–12APR06

JC89288,00001AD –19–24APR06–6/18

1—Engine Number
2—Typical Engine Model
3—Fuel Rate Adjust Information
4—Injector Information



```
EngNo XXXXXX  XXXX  XXX
#1 20 17 17 11 1C 1C 13 1A 18 12 16 24
#2 20 17 17 11 1C 1C 13 1A 18 12 16 24
#3 20 17 17 11 1C 1C 13 1A 18 12 16 24
#4 20 17 17 11 1C 1C 13 1A 18 12 16 24
#5 20 17 17 11 1C 1C 13 1A 18 12 16 24
#6 20 17 17 11 1C 1C 13 1A 18 12 16 24
```

TX1006222 –19–12APR06

Continued on next page

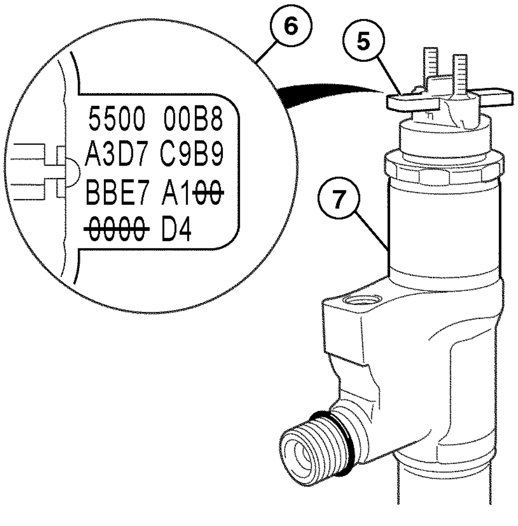
JC89288,00001AD –19–24APR06–7/18

(Injector ID Code) Cylinder 1 - Cylinder 6 cylinder registration using Tech 2

“Fuel rate adjust, Injector Code Label” is attached to the cylinder head cover. It is used for rewriting and registering the Injector ID Code.

NOTE: Do not enter the six figures “0” indicated with strike through in the illustration, of the ID Code on the Injector ID plate.

The Injector Code information is also on top of the injector. When replacing the injector, register its code.



TX1006223 –19–12APR06

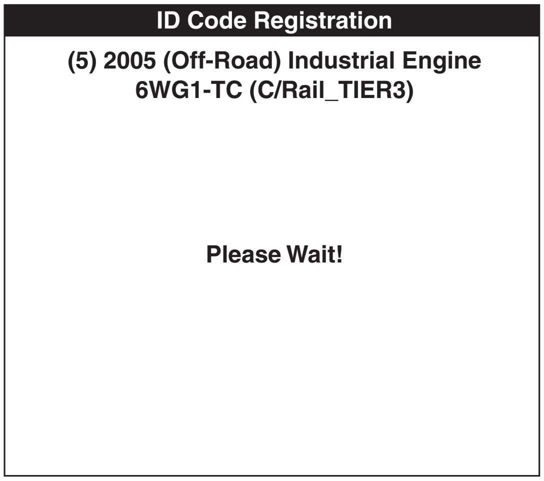
5—Injector ID Plate
6—Injector ID Code
7—Injector

JC89288,00001AD –19–24APR06–8/18

7. You need to enter the ID on the following display. ID Code is number of the year. The following conditions must be met. Press the function keys (F0—F9) to enter.

   The time setting of the Tech 2 matches the calendar.

   Press the function keys (F0—F9) to enter.



ID Code Registration

(5) 2005 (Off-Road) Industrial Engine 6WG1-TC (C/Rail_TIER3)

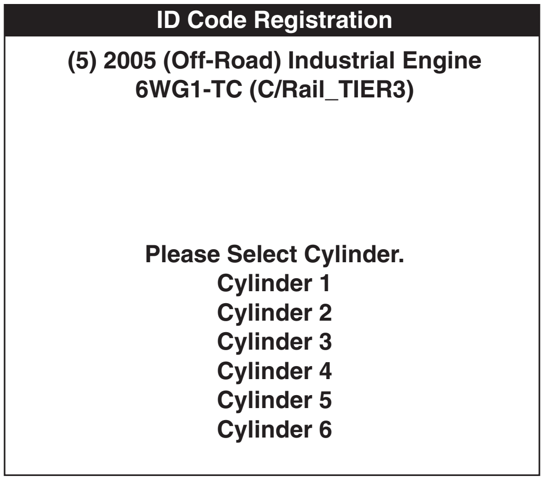
Please Wait!

TX1006204 –19–17APR06

Continued on next page

JC89288,00001AD –19–24APR06–9/18

8. Choose the cylinder (Cylinder 1 thru Cylinder 6) you want to register the ID Code with (up/down) keys or F1 (function) key, and press ENTER.



ID Code Registration

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

Please Select Cylinder.
Cylinder 1
Cylinder 2
Cylinder 3
Cylinder 4
Cylinder 5
Cylinder 6

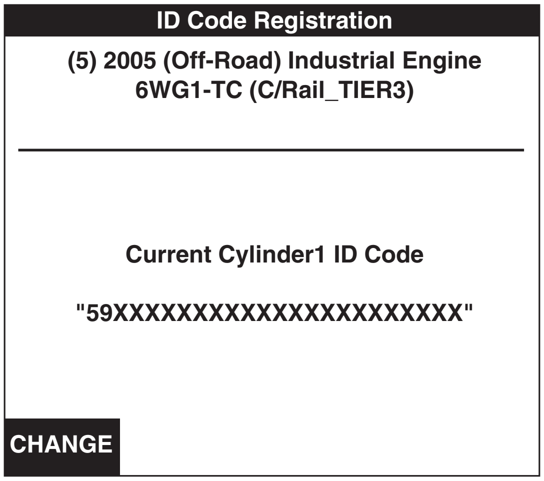
TX1006205 –19–17APR06

JC89288,00001AD –19–24APR06–10/18

9. To register the ID Code, press the softkey Change.

   ID Code registration (data entry).

   The cursor is positioned at M (model code) in the default setting (MCD0 D1D2).



ID Code Registration

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

Current Cylinder1 ID Code

"59XXXXXXXXXXXXXXXXXXXXXX"

TX1006206 –19–12APR06

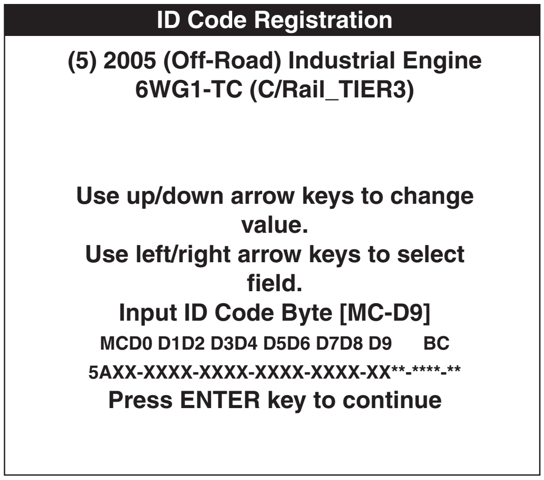
Continued on next page

JC89288,00001AD –19–24APR06–11/18

At this point enter the model code (MC) and ID Code (D0) in this order.

Entering with the function keys (D0 - F9) will automatically move the cursor to the right. However, if you enter with (up/down) keys, you need to move the cursor with the arrow (left/right) keys.

You can enter 0—9 with the function keys (F0—F9) or 0—Z with - (up/down) keys.



ID Code Registration

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

Use up/down arrow keys to change value.
Use left/right arrow keys to select field.
Input ID Code Byte [MC-D9]
MCD0 D1D2 D3D4 D5D6 D7D8 D9 BC
5AXX-XXXX-XXXX-XXXX-XXXX-XX-****-****
Press ENTER key to continue

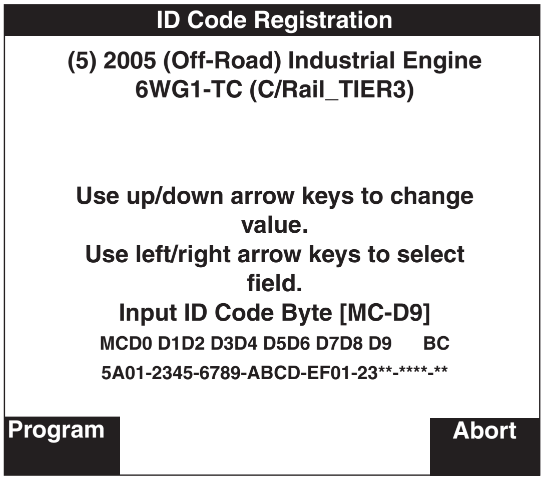
TX1006208 –19–12APR06

JC89288,00001AD –19–24APR06–12/18

10. If the ID Code you have entered is correct, press softkey Program.

    If you want to quit the program (registration), press the Softkey Abort or press EXIT key.

    Aborting the registration or pressing EXIT key returns you to step 3.



ID Code Registration

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

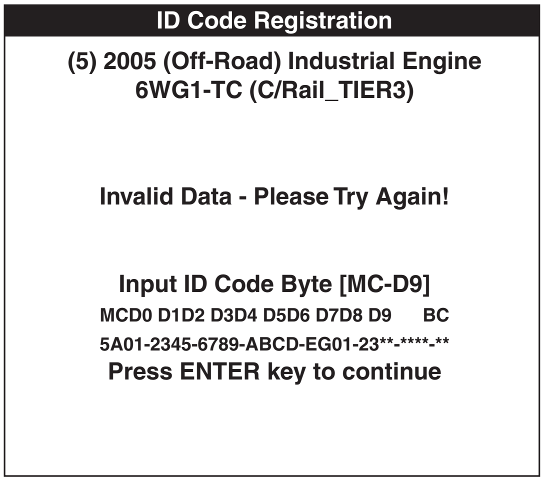
Use up/down arrow keys to change value.
Use left/right arrow keys to select field.
Input ID Code Byte [MC-D9]
MCD0 D1D2 D3D4 D5D6 D7D8 D9 BC
5A01-2345-6789-ABCD-EF01-23-****-****

TX1006209 –19–12APR06

Continued on next page

JC89288,00001AD –19–24APR06–13/18

If you entered, incorrectly, do the following. After pressing ENTER key as before press softkey Program. This causes the error message “Invalid data - Try again!” to appear.



ID Code Registration

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

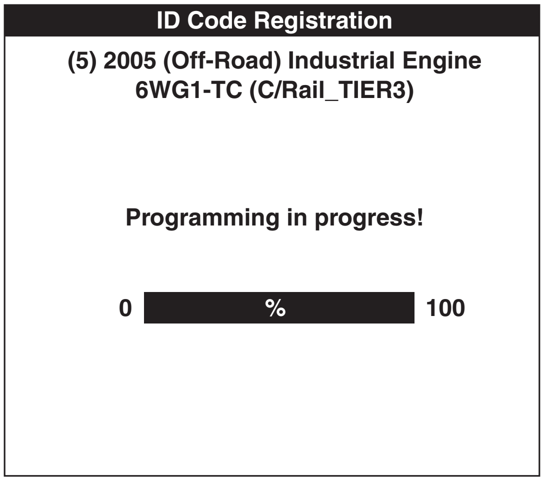
Invalid Data - Please Try Again!

Input ID Code Byte [MC-D9]
MCD0 D1D2 D3D4 D5D6 D7D8 D9 BC
5A01-2345-6789-ABCD-EG01-23-****-****
Press ENTER key to continue

TX1006210 –19–12APR06

JC89288,00001AD –19–24APR06–14/18

11. If the entered value meets the conditions in step 9 and step 10, the status display of data registration (writing) from the Tech 2 to ECM as shown below will appear.



ID Code Registration

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

Programming in progress!

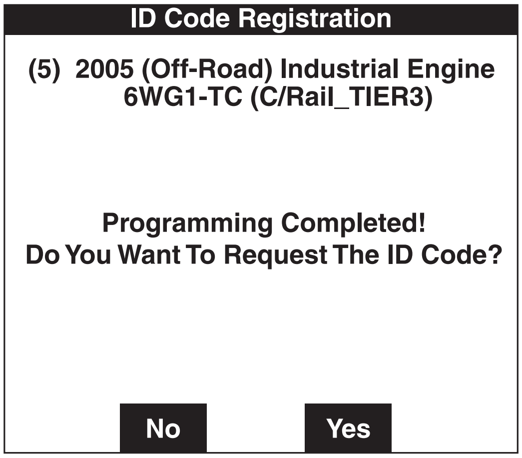
TX1006211 –19–12APR06

Continued on next page

JC89288,00001AD –19–24APR06–15/18

12. When the ID Code entered in steps 9 and 10 corresponds to that registered in the ECM, the following message will appear. Also, if you want to register ID again, press the softkey YES. This returns you to step 6, and allows you make registration as before. Pressing the softkey NO will take you to step 12. This completes the ID Code registration.

13. When the ID Code entered in steps 9 and 10 does not correspond to that registered in the ECM, the following message will appear.


ID Code Registration

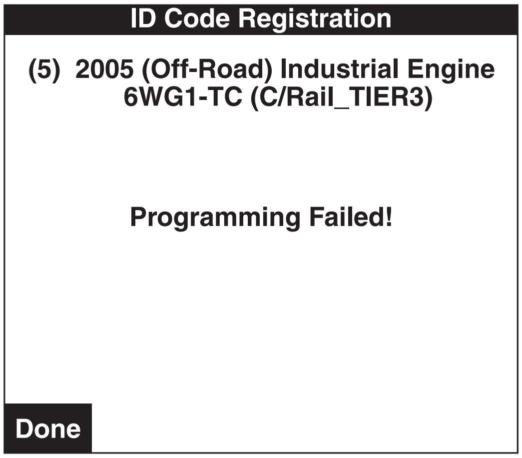
(5) 2005 (Off-Road) Industrial Engine 6WG1-TC (C/Rail_TIER3)

Programming Completed!
Do You Want To Request The ID Code?

TX1006212 –19–12APR06

JC89288,00001AD –19–24APR06–16/18

Pressing the softkey END returns you to step 3.


ID Code Registration

(5) 2005 (Off-Road) Industrial Engine 6WG1-TC (C/Rail_TIER3)

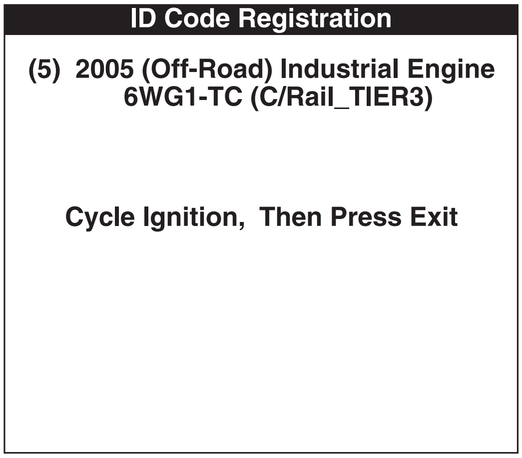
Programming Failed!

TX1006214 –19–12APR06

Continued on next page

JC89288,00001AD –19–24APR06–17/18

Pressing EXIT key returns you to step 3.



ID Code Registration

(5) 2005 (Off-Road) Industrial Engine 6WG1-TC (C/Rail_TIER3)

Cycle Ignition, Then Press Exit

TX1006213 –19–12APR06

JC89288,00001AD –19–24APR06–18/18

Injector ID Code Upload

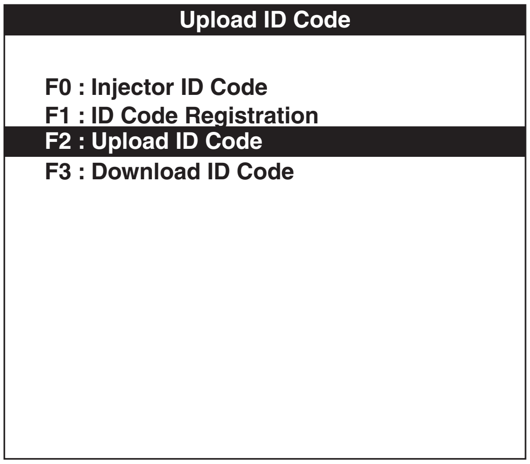
Injector ID Code Upload Tech 2

The following describes ID Code upload procedure continued from the previous injector ID Code Registration procedure.

1. This step describes ID Code Upload procedure continued from the previous injector ID Code Registration procedure.

Continued on next page

JC89288,00001AE –19–08JUN06–1/8



Upload ID Code

F0 : Injector ID Code
F1 : ID Code Registration
F2 : Upload ID Code
F3 : Download ID Code

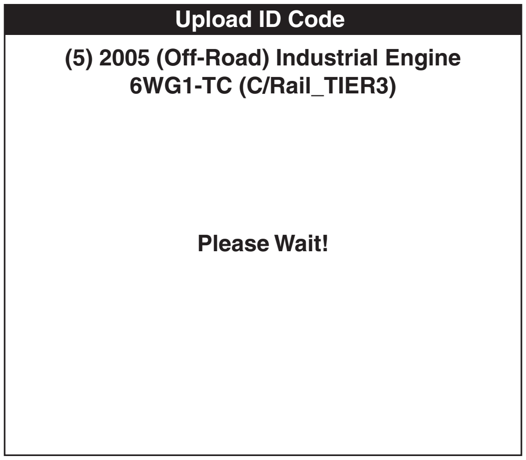
TX1006357 –19–19APR06

Choose from the menu F2: ID Code Upload (Tech 2) with the (up/down) keys or F2 (function) key, and press ENTER.

JC89288,00001AE –19–08JUN06–2/8

2. Pressing the softkey YES updates the ID Codes of cylinder 1 thru cylinder 1 stored in the ECM, to Tech 2.

   Pressing the softkey NO returns you to step No. 1 without uploading data.



Upload ID Code

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

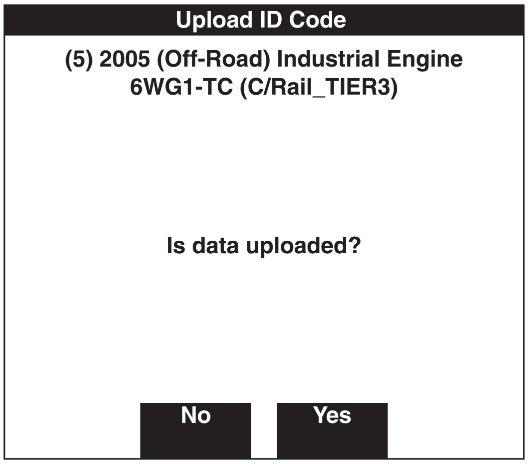
Please Wait!

TX1006358 –19–25APR06

Continued on next page

JC89288,00001AE –19–08JUN06–3/8

3. Upload is the function to transfer the ID Code Registered from ECM to Tech 2 to store data in it.



Upload ID Code

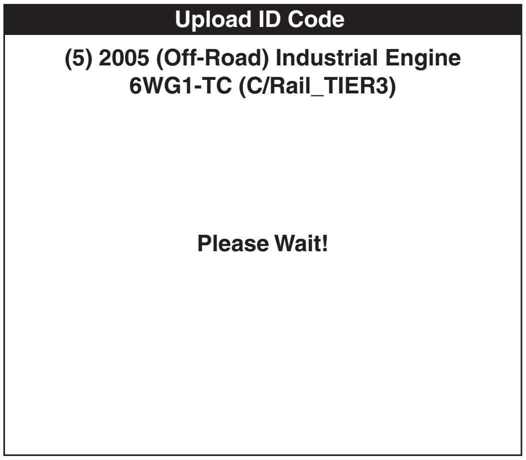
(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

Is data uploaded?

TX1006360 –19–25APR06

JC89288,00001AE –19–08JUN06–4/8

When the ID Code Registered in the ECM corresponds to that uploaded to the Tech 2, the following message will appear. Upload is completed.



Upload ID Code

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

Please Wait!

TX1006358 –19–25APR06

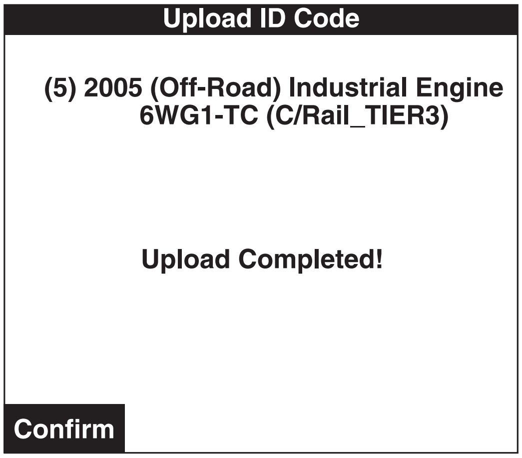
Continued on next page

JC89288,00001AE –19–08JUN06–5/8

4. Pressing the softkey Confirm returns you to step No. 1.

5. When the ID Code Registered in the ECM does not correspond to that uploaded to the Tech 2, the following message will appear.

   Pressing the softkey Confirm returns you to step No. 1.



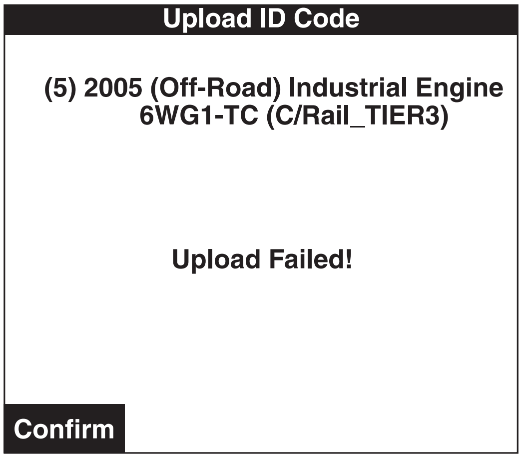
(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

Upload Completed!

TX1006362 –19–19APR06

JC89288,00001AE –19–08JUN06–6/8

In this case, the uploaded ID Code will be erased. Therefore, perform upload again. The message shown in step No.1. will appear.



(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

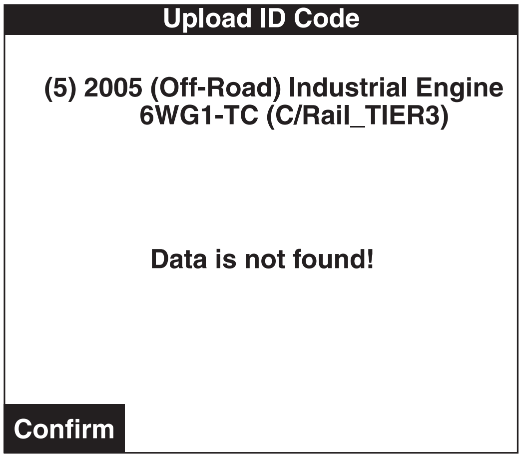
Upload Failed!

TX1006363 –19–19APR06

Continued on next page

JC89288,00001AE –19–08JUN06–7/8

6. Pressing the softkey Confirm returns you to step No. 1.



Upload ID Code

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

Data is not found!

TX1006364 –19–19APR06

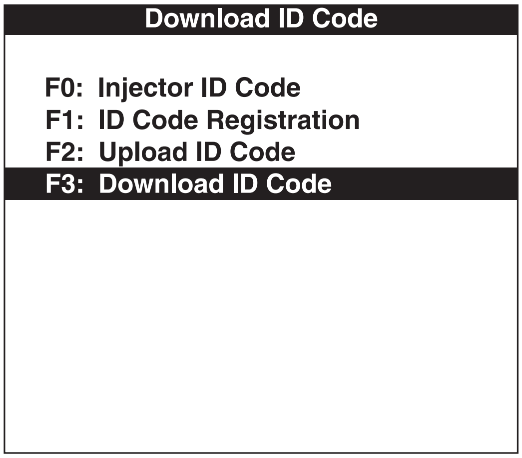
JC89288,00001AE –19–08JUN06–8/8

Injector ID Code Download

1. This step describes ID Code Registration continued from the previous step.

JC89288,00001AF –19–20APR06–1/10

Select F:3 Download ID Code ECM with (up/down) keys or F2 function key and press ENTER.



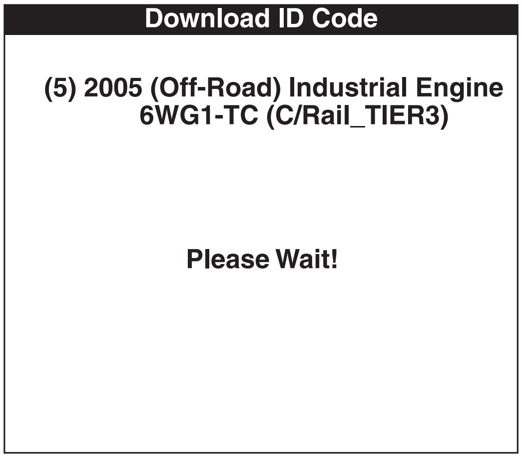
Download ID Code

TX1006467 –19–19APR06

Continued on next page

JC89288,00001AF –19–20APR06–2/10

2. Press the softkey Confirm.



Download ID Code

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

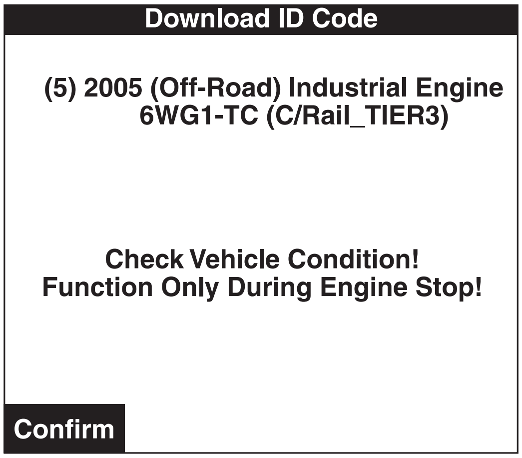
Please Wait!

TX1006469 –19–19APR06

JC89288,00001AF –19–20APR06–3/10

As an example, the vehicle will be checked whether it is in the condition engine stopped that the ECM requests during ID Code Registration.

The following display appears while checking if the engine speed is 0 rpm.



Download ID Code

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

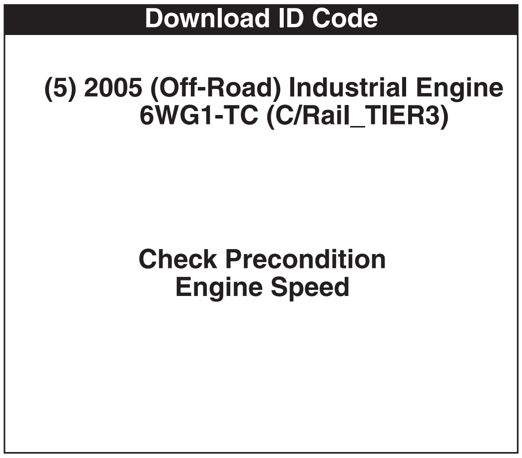
Check Vehicle Condition!
Function Only During Engine Stop!

TX1006470 –19–19APR06

Continued on next page

JC89288,00001AF –19–20APR06–4/10

When the engine speed is 0 rpm, it will take you to the step 3.



Download ID Code

(5) 2005 (Off-Road) Industrial Engine 6WG1-TC (C/Rail_TIER3)

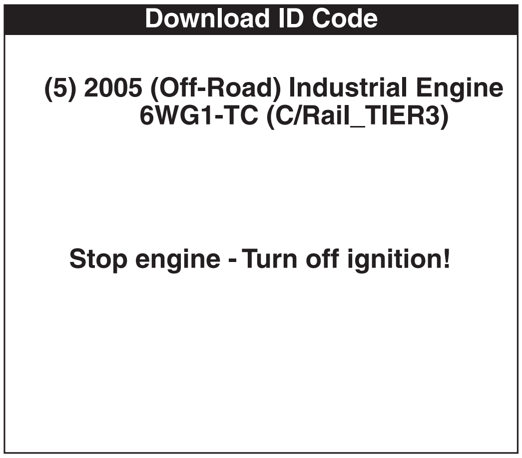
Check Precondition Engine Speed

TX1006468 –19–19APR06

JC89288,00001AF –19–20APR06–5/10

The following display appears when the engine speed is 0 rpm. In this case, stop the engine as instructed in the message, and try again from step 1.

3. Pressing the softkey YES downloads, registers, the uploaded ID codes cylinder 1 thru cylinder 6 to the ECM. Pressing the softkey NO returns you to step 1.



Download ID Code

(5) 2005 (Off-Road) Industrial Engine 6WG1-TC (C/Rail_TIER3)

Stop engine - Turn off ignition!

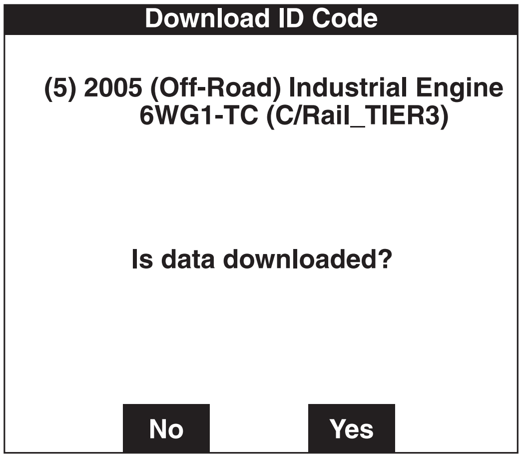
TX1006471 –19–24APR06

Continued on next page

JC89288,00001AF –19–20APR06–6/10

Download is the function to register, write, the stored, uploaded, ID codes cylinder 1 thru cylinder 6 in the Tech 2 to the ECM. ID is registered from cylinder 1 thru cylinder 6 in order.

4. Injector ID Code Registration is started from cylinder 1 (INJ. #1) to cylinder 2 (INJ. #5) and ECM in order. the status for registration, writing, of data to ECM will appear.



Download ID Code

(5) 2005 (Off-Road) Industrial Engine 6WG1-TC (C/Rail_TIER3)

Is data downloaded?

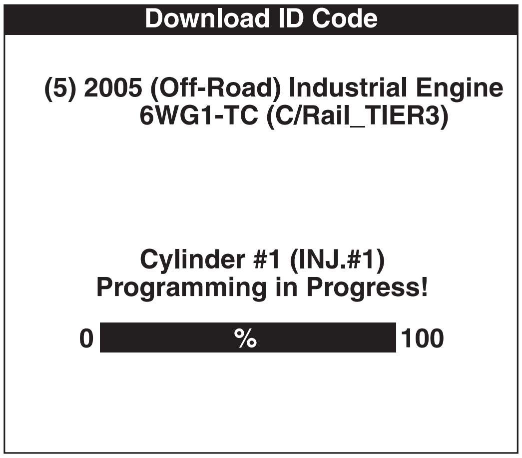
TX1006472 –19–19APR06

9010
25
43

JC89288,00001AF –19–20APR06–7/10

The message in the screen changes in the order of cylinder 1 (INJ. #1) and cylinder 2 (INJ. #5). When it is abnormal, the registration repeats 3 times.

5. When the downloaded ID code corresponds to that registered, written, in the ECM, the following message will appear. Download, registration, is completed.



Download ID Code

(5) 2005 (Off-Road) Industrial Engine 6WG1-TC (C/Rail_TIER3)

Cylinder #1 (INJ.#1) Programming in Progress!

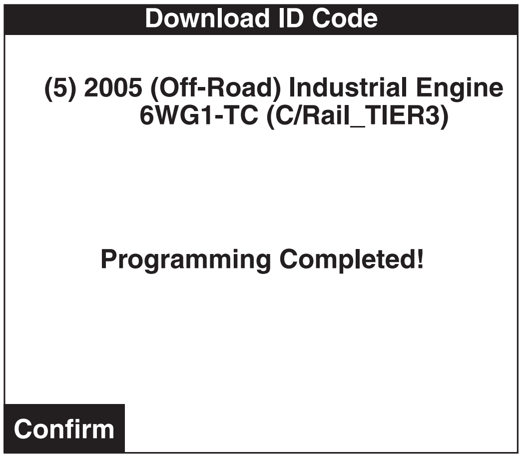
TX1006473 –19–19APR06

Continued on next page

JC89288,00001AF –19–20APR06–8/10

Pressing the softkey Confirm returns you to step 1.

When the downloaded ID code does not correspond to that registered, written, in the ECM, the following message will appear.



Download ID Code

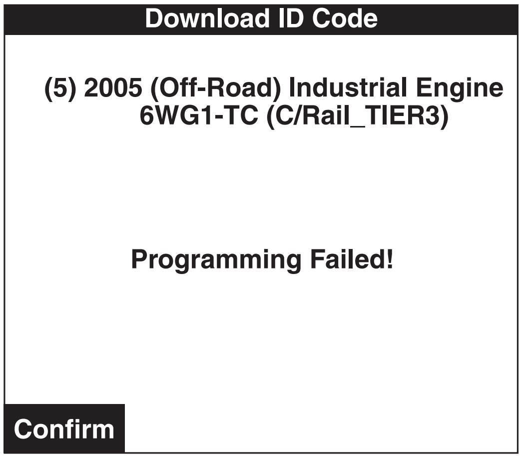
(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

Programming Completed!

TX1006474 –19–19APR06

JC89288,00001AF –19–20APR06–9/10

Pressing the softkey Confirm returns you to step 1.



Download ID Code

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

Programming Failed!

TX1006475 –19–19APR06

JC89288,00001AF –19–20APR06–10/10

Section 9015
Electrical System

Contents

Page

Group 05—System Information
Electrical Diagram Information. 9015-05-1

Group 10—System Diagrams
Explanation of Wire Markings 9015-10-1
Fuse and Relay Specifications 9015-10-2
System Functional Schematic, Wiring Diagram, and Component Location Master Legend 9015-10-6
System Functional Schematic 9015-10-12
JDLink™ System Functional Schematic—If Equipped 9015-10-20
Cab Harness (W1) Component Location . . .9015-10-22
Cab Harness (W1) Wiring Diagram 9015-10-24
Machine Harness (W2) Component Location. 9015-10-30
Machine Harness (W2) Wiring Diagram . . .9015-10-32
Monitor Harness (W3) Component Location. 9015-10-38
Monitor Harness (W3) Wiring Diagram 9015-10-40
Engine Harness (W4) Component Location. 9015-10-42
Engine Harness (W4) Wiring Diagram. 9015-10-44
Engine Interface Harness (W5) Component Location. 9015-10-46
Engine Interface Harness (W5) Wiring Diagram. 9015-10-48
Air Conditioner Harness (W6) Component Location. 9015-10-50
Air Conditioner Harness (W6) Wiring Diagram. 9015-10-52
Control Valve Harness (W7) Component Location. 9015-10-54
Control Valve Harness (W7) Wiring Diagram. 9015-10-56
Pump Harness (W8) Component Location. 9015-10-58
Pump Harness (W8) Wiring Diagram 9015-10-60
Auxiliary Fuse Box Harness (W9) Component Location. 9015-10-62
Auxiliary Fuse Box Harness (W9) Wiring Diagram. 9015-10-64
Cab Switch Harness (W10) Component Location. 9015-10-65
Cab Switch Harness (W10) Wiring Diagram. 9015-10-66

Page

Pilot Shutoff Switch Harness (W11) Component Location 9015-10-67
Pilot Shutoff Switch Harness (W11) Wiring Diagram. 9015-10-68
Heated Air Seat Harness (W12) Component Location. 9015-10-70
Heated Air Seat Harness (W12) Wiring Diagram. 9015-10-71
Seat Heater Switch Harness (W13) Component Location 9015-10-72
Seat Heater Switch Harness (W13) Wiring Diagram. 9015-10-74
Multi-Function Pilot Control Lever Harness (W14) Component Location 9015-10-76
Multi-Function Pilot Control Lever Harness (W14) Wiring Diagram 9015-10-78
Travel Alarm Cancel Switch Harness (W15) Component Location 9015-10-79
Travel Alarm Cancel Switch Harness (W15) Wiring Diagram 9015-10-79
Reversing Fan Switch Harness (W16) Component Location 9015-10-80
Reversing Fan Switch Harness (W16) Wiring Diagram. 9015-10-80
Pilot Shutoff Valve Harness (W17) Component Location 9015-10-81
Pilot Shutoff Valve Harness (W17) Wiring Diagram. 9015-10-81
JDLink™ System Harnesses (W50, W51, W52, W53, and W54) Component Location—If Equipped 9015-10-82
Machine Information Gateway (MIG) Harness (W50) Wiring Diagram—If Equipped 9015-10-84
GlobalTRACS® Terminal (GTT) Harness (W51) Wiring Diagram—If Equipped 9015-10-86
JDLink™ CAN Harness (W52) Wiring Diagram—If Equipped 9015-10-88
JDLink™ Power Harness (W53) Wiring Diagram—If Equipped 9015-10-90
JDLink™ Jumper Harness (W54) Wiring Diagram—If Equipped 9015-10-92

Group 15—Sub-System Diagnostics
Controller Area Network (CAN) Theory of Operation. 9015-15-1

Continued on next page

Page

Starting and Charging Circuit Theory of Operation. 9015-15-3
Quick On System (QOS) Preheat Circuit Theory of Operation. 9015-15-6
Monitor Circuit Theory of Operation. 9015-15-8
Engine Control Module (ECM) Circuit Theory of Operation. 9015-15-14
Main Controller (MCF) Circuit Theory of Operation. 9015-15-18
Information Controller (ICF) Theory of Operation. 9015-15-33
Travel Alarm Circuit Theory of Operation . .9015-15-35
Windshield Wiper and Washer Circuit Theory of Operation. 9015-15-37
Pilot Shutoff Circuit Theory of Operation . . .9015-15-40

Group 16—Monitor Operation
Monitor Menu Operation 9015-16-1
Monitor Service Menu Operation. 9015-16-1

Group 20—References
Monitor Data Items .9015-20-1
Monitor Data Items Using the Monitor Display. 9015-20-3
Reading Diagnostic Trouble Codes With Monitor Display .9015-20-5
JDLink™ Connection Procedure 9015-20-8
Service ADVISOR™ Diagnostic Application. 9015-20-10
Service ADVISOR™ Connection Procedure 9015-20-11
Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application. 9015-20-12
Tech 2 Diagnostic Scan Tool Connection Procedure 9015-20-15
Reading Diagnostic Trouble Codes With Tech 2 Diagnostic Scan Tool. 9015-20-22
Tech 2 Data Display 9015-20-24
Dr. ZX Diagnostic Application 9015-20-27
Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application. 9015-20-27
Reading Diagnostic Trouble Codes With Dr. ZX 9015-20-30
Main Controller (MCF) Diagnostics Using Dr. ZX 9015-20-33
Engine Controller (ECM) Diagnostics Using Dr. ZX 9015-20-50
Monitor Controller Diagnostics Using Dr. ZX 9015-20-55
Dr. ZX Password Change 9015-20-60
Pump Learning Procedure. 9015-20-63

Page

Machine Information Center (MIC) Application 9015-20-66
Information Controller (ICF) Initialization . . .9015-20-67
Information Controller (ICF) Model and Serial Number 9015-20-71
Information Controller (ICF) Date and Time 9015-20-75
Information Controller (ICF) Control Data: Initialize 9015-20-78
Information Controller (ICF) Satellite Terminal 9015-20-82
Information Controller (ICF) Data Download. 9015-20-82
Information Controller (ICF) Recorded Data. 9015-20-87
Fuse Test 9015-20-90
Relay Test. 9015-20-94
Pressure Sensor Test 9015-20-95
Solenoid Test 9015-20-97
Proportional Solenoid Test 9015-20-98
Alternator Test 9015-20-99
Electrical Component Checks 9015-20-100
Component Checks. 9015-20-100
Battery Remove and Install 9015-20-106
Rear Cover Remove and Install 9015-20-108
Main Controller (MCF) Remove and Install. 9015-20-109
Engine Control Module (ECM) Remove and Install 9015-20-110
Information Controller (ICF) Remove and Install. 9015-20-111
Monitor Controller Remove and Install. . . .9015-20-111
Key Switch Remove and Install. 9015-20-114
Switch Panel Remove and Install 9015-20-115
Travel Alarm Remove and Install 9015-20-116
Left Console Switch Remove and Install. 9015-20-117
Disconnect Tab Retainer Connectors 9015-20-117
Disconnecting Spring Wire Clip Connectors 9015-20-118
Replace DEUTSCH™ Connectors 9015-20-118
Replace DEUTSCH™ Rectangular or Triangular Connectors 9015-20-119
Install DEUTSCH™ Contact. 9015-20-120
Replace WEATHER PACK™Connector. . .9015-20-121
Install WEATHER PACK™Contact. 9015-20-122
Replace (Pull Type) Metri-Pack™ Connectors 9015-20-124
Replace (Push Type) Metri-Pack™ Connectors 9015-20-125
Replace CINCH™ Connectors 9015-20-126

Continued on next page

Page

Install CINCH™ Contact 9015-20-128
Repair 32 and 48 Way CINCH™
  Connectors 9015-20-129
Remove Connector Body from Blade
  Terminals. 9015-20-132

System Information

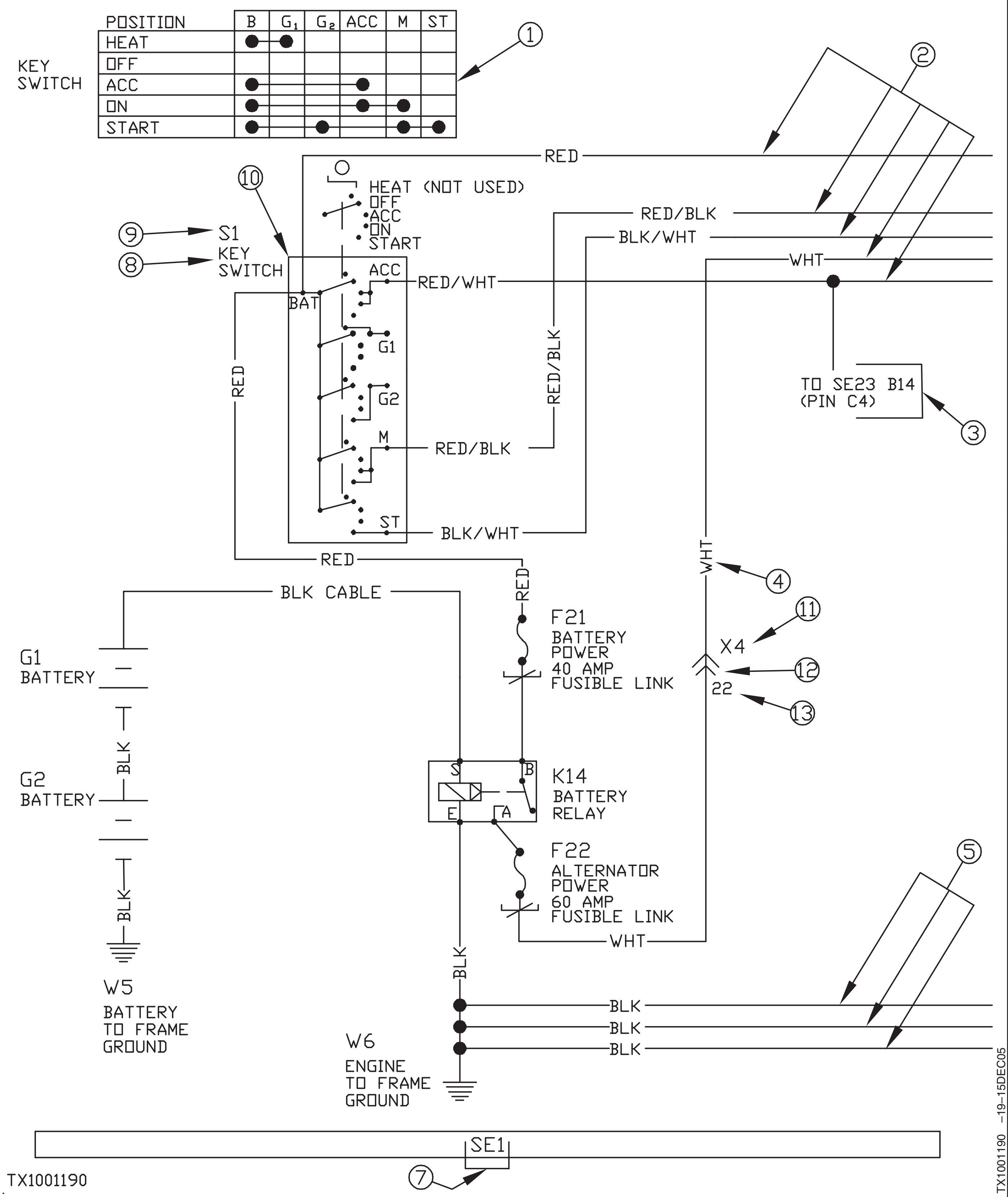
Electrical Diagram Information

NOTE: All System Functional Schematics, Circuit Schematics, and Wiring Diagrams are shown with key switch in the OFF position.

Explanation of Wire Markings

Continued on next page

LD30992,00002D8 –19–14JAN06–1/9



KEY SWITCH

POSITION	B	G1	G2	ACC	M	ST
HEAT	●	●				
OFF						
ACC	●			●		
ON	●			●	●	
START	●		●		●	●

System Functional Schematic Example

Continued on next page

LD30992,00002D8 –19–14JAN06–2/9

1—Continuity Chart
2—Power Wires
3—Routing Location Information
4—Wire Identification
5—Ground Wires
7—Section Number
8—Component Name
9—Component Identification Number
10—Component Schematic Symbol
11—Connector Identification Number
12—Connector
13—Connector Pin Information

System Functional Schematic Diagram

The System Functional Schematic is made up of equal sections to simplify searching the schematic. Each section of the System Functional Schematic is assigned a number (7). The System Functional Schematic is formatted with power supply wires (2) shown near the top of the drawing and ground wires (5) near the bottom. The schematic may contain some harness or connector information.

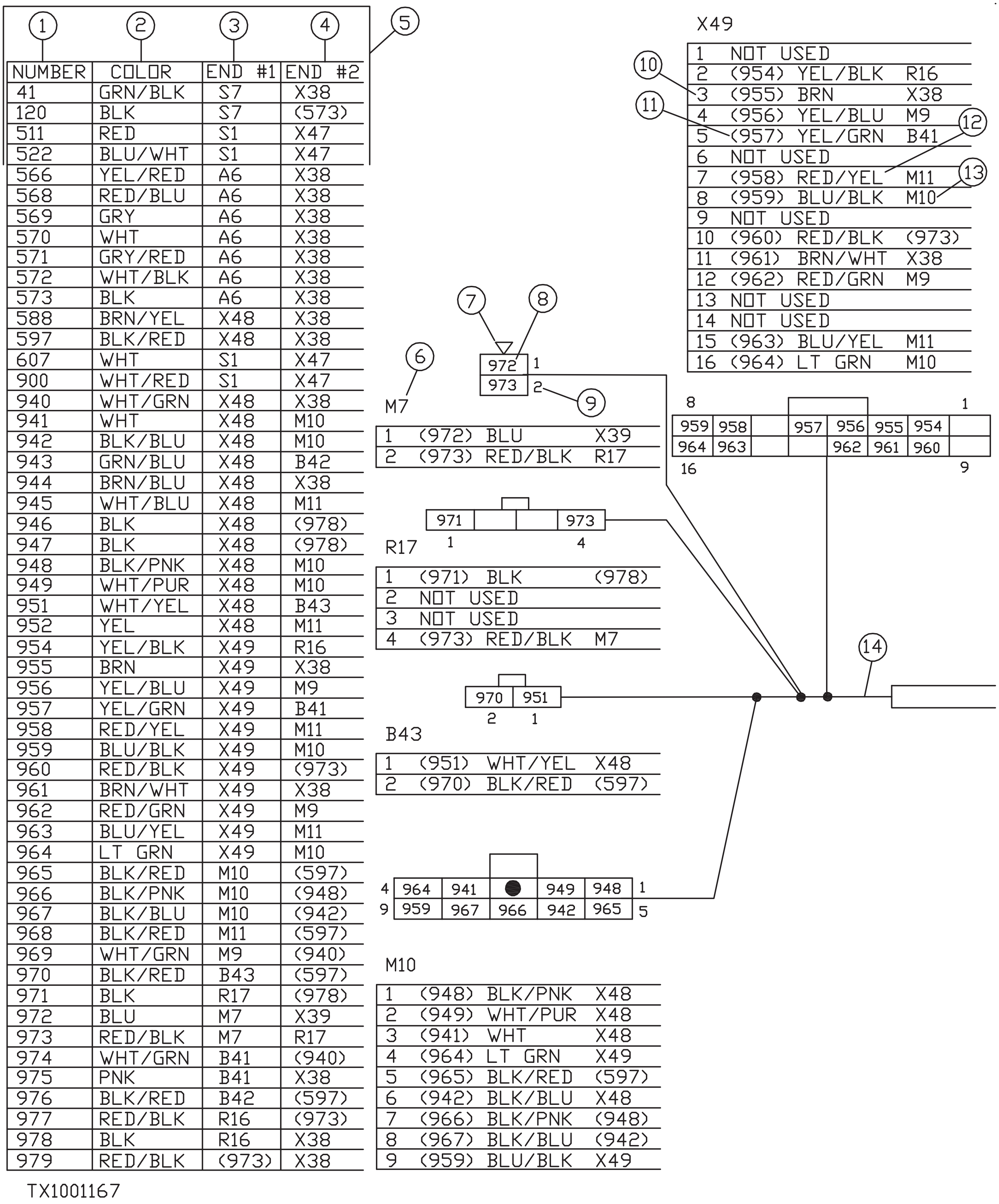
When connector information is shown, it will be displayed as a double chevron (12) with a component identification number (11) corresponding to the connector identification number. Connector pin information (13) will be displayed in a text size smaller than that of the connector identification number.

Each electrical component is shown by a schematic symbol (10), the component name (8), and a component identification number (9). A component identification number and name will remain the same throughout the Operation and Test Technical Manual. This will allow for easy cross-referencing of all electrical drawings (Schematics, Wiring Diagrams, and Component Location).

Routing location information (3) is presented to let the reader know when a wire is connected to a component in another section. TO and FROM statements identify when power is going “To” or coming “From” a component in a different location. The section and component identification number are given in the first line of information and any pin information for the component is given in parenthesis in the second line. In this example, power is going TO section 23, component B14 on pin C4.

Continued on next page

LD30992,00002D8 –19–14JAN06–3/9



NUMBER	COLOR	END #1	END #2
41	GRN/BLK	S7	X38
120	BLK	S7	(573)
511	RED	S1	X47
522	BLU/WHT	S1	X47
566	YEL/RED	A6	X38
568	RED/BLU	A6	X38
569	GRY	A6	X38
570	WHT	A6	X38
571	GRY/RED	A6	X38
572	WHT/BLK	A6	X38
573	BLK	A6	X38
588	BRN/YEL	X48	X38
597	BLK/RED	X48	X38
607	WHT	S1	X47
900	WHT/RED	S1	X47
940	WHT/GRN	X48	X38
941	WHT	X48	M10
942	BLK/BLU	X48	M10
943	GRN/BLU	X48	B42
944	BRN/BLU	X48	X38
945	WHT/BLU	X48	M11
946	BLK	X48	(978)
947	BLK	X48	(978)
948	BLK/PNK	X48	M10
949	WHT/PUR	X48	M10
951	WHT/YEL	X48	B43
952	YEL	X48	M11
954	YEL/BLK	X49	R16
955	BRN	X49	X38
956	YEL/BLU	X49	M9
957	YEL/GRN	X49	B41
958	RED/YEL	X49	M11
959	BLU/BLK	X49	M10
960	RED/BLK	X49	(973)
961	BRN/WHT	X49	X38
962	RED/GRN	X49	M9
963	BLU/YEL	X49	M11
964	LT GRN	X49	M10
965	BLK/RED	M10	(597)
966	BLK/PNK	M10	(948)
967	BLK/BLU	M10	(942)
968	BLK/RED	M11	(597)
969	WHT/GRN	M9	(940)
970	BLK/RED	B43	(597)
971	BLK	R17	(978)
972	BLU	M7	X39
973	RED/BLK	M7	R17
974	WHT/GRN	B41	(940)
975	PNK	B41	X38
976	BLK/RED	B42	(597)
977	RED/BLK	R16	(973)
978	BLK	R16	X38
979	RED/BLK	(973)	X38

X49

1	NOT USED		
2	(954)	YEL/BLK	R16
3	(955)	BRN	X38
4	(956)	YEL/BLU	M9
5	(957)	YEL/GRN	B41
6	NOT USED		
7	(958)	RED/YEL	M11
8	(959)	BLU/BLK	M10
9	NOT USED		
10	(960)	RED/BLK	(973)
11	(961)	BRN/WHT	X38
12	(962)	RED/GRN	M9
13	NOT USED		
14	NOT USED		
15	(963)	BLU/YEL	M11
16	(964)	LT GRN	M10

M7

1	(972)	BLU	X39
2	(973)	RED/BLK	R17

R17

1	(971)	BLK	(978)
2	NOT USED		
3	NOT USED		
4	(973)	RED/BLK	M7

B43

1	(951)	WHT/YEL	X48
2	(970)	BLK/RED	(597)

M10

1	(948)	BLK/PNK	X48
2	(949)	WHT/PUR	X48
3	(941)	WHT	X48
4	(964)	LT GRN	X49
5	(965)	BLK/RED	(597)
6	(942)	BLK/BLU	X48
7	(966)	BLK/PNK	(948)
8	(967)	BLK/BLU	(942)
9	(959)	BLU/BLK	X49

Wiring Diagram Example

Continued on next page

LD30992,00002D8 –19–14JAN06–4/9

1—Wire Number
2—Wire End #1 Termination Location
3—Wire Color
4—Wire End #2 Termination Location
5—Wiring Diagram Wire Legend
6—Component Identification Number
7—Connector End View
8—Wire Number
9—Connector Pin Number
10—Connector Pin Number
11—Wire Number
12—Wire Color
13—Wire Termination Location
14—Wire Harness

Wiring Diagram

Each harness on the machine is drawn showing components, connectors, and wires. Harnesses are identified by a “W” component identification number and description (W6 ENGINE HARNESS, Etc.).

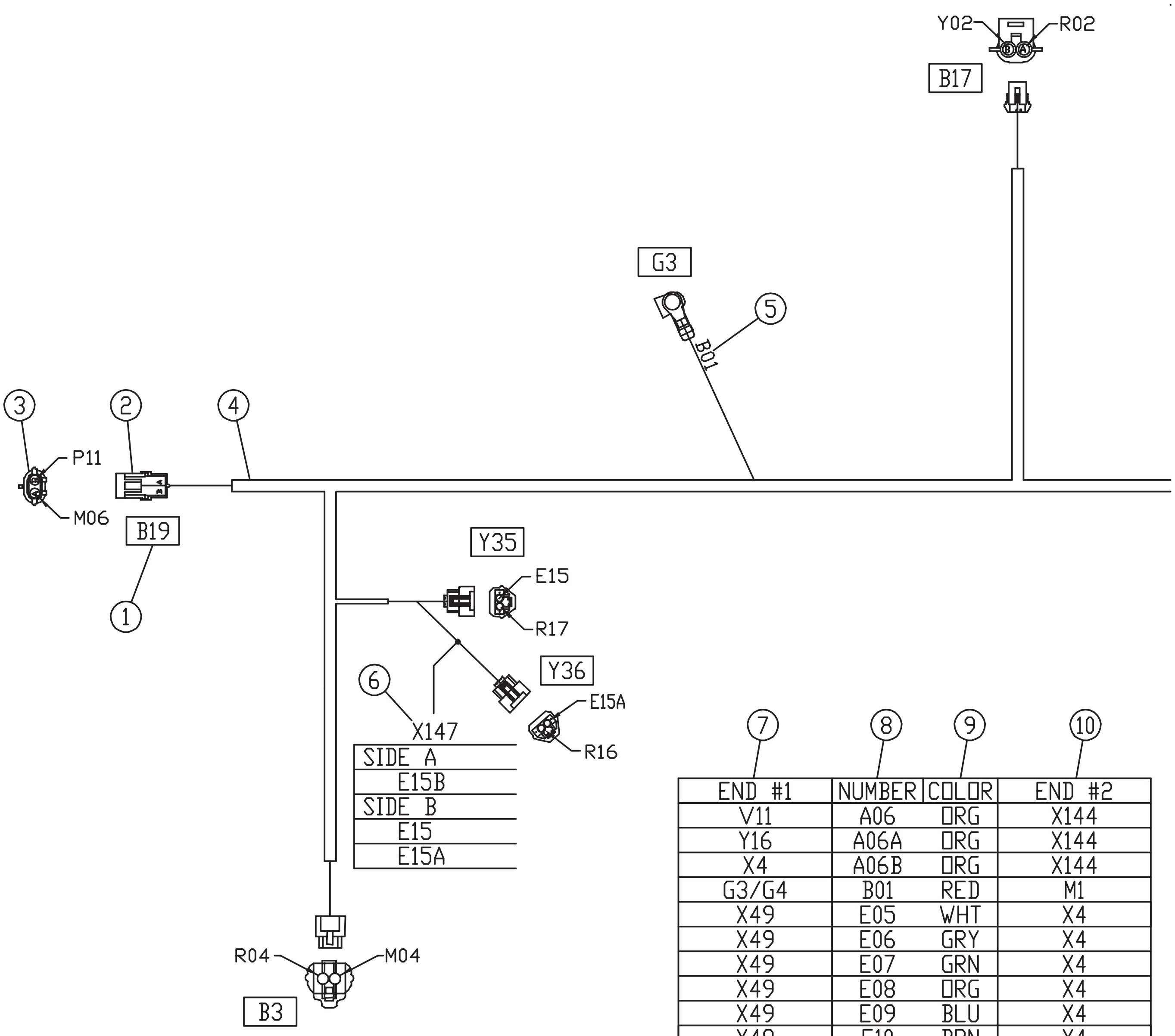
A component or connector identification number (6) identifies each component on the harness. Each harness branch (14) is terminated by an end view of the connector (7). The connector end view show pin (9) and wire number (8) information which corresponds to the component or connector wire table.

The wire table displays the component or connector pin number (10), the wire number (11), the wire color (12), and the location where the wire terminates (13).

A wire legend (5) is provided for each harness. All wires in the harness are listed in the wire legend. The wire legend contains a wire number (1), End #1 (2), wire color (3), and End #2 (4) information for each wire. The wire number and color are unique to each harness and may not match other wire numbers and colors on other harnesses. The component identification numbers or wire numbers listed in the End #1 and End #2 columns indicate where the wire terminates within the harness.

Continued on next page

LD30992,00002D8 –19–14JAN06–5/9



END #1	NUMBER	COLOR	END #2
V11	A06	ORG	X144
Y16	A06A	ORG	X144
X4	A06B	ORG	X144
G3/G4	B01	RED	M1
X49	E05	WHT	X4
X49	E06	GRY	X4
X49	E07	GRN	X4
X49	E08	ORG	X4
X49	E09	BLU	X4
X49	E10	BRN	X4
X38	E13	WHT	X4
Y35	E15	RED	X147
Y36	E15A	RED	X147
X4	E15B	RED	X147
G3/G4	G03	BLK	W27
W27	G03A	BLK	X148
V11	G03B	BLK	X148
Y16	G03C	BLK	X148
X145	G03D	BLK	W27
X37	H13	GRN	X4
G3/G4	J08	TAN	X4
B4	M03	PUR	X4
B3	M04	PUR	X4
B19	M06	PUR	X4
B23	N02	YEL	X4

T195714

T195714 –UN–30OCT03

Continued on next page

1—Component Identification Number
2—Connector
3—Connector End View
4—Wire Harness
5—Wire Number
6—Wire Splice
7—Wire End #1 Termination Location
8—Wire Number
9—Wire Color
10—Wire End #2 Termination Location

Wiring Diagram

Each harness on the machine is drawn showing connectors, wires, and splices. A “W” component identification number identifies harnesses. (W6, Etc.) The harness is drawn showing spatial arrangement of components and branches.

A component identification or connector number (1) identifies each component. The harness branch (4) is terminated by a top or side view of the connector (2). If more than one wire is supplied to the connector, a harness side connector end view (3) is provided. Each wire number is labeled for the appropriate pin. If only one wire is supplied to the connector, the wire number (5) is indicated.

An “X” component identification number of 100 or higher identifies splices (6). Each splice lists side A wires and side B wires to differentiate the side of the harness that the wires come from.

A wire legend is provided for each harness. A component identification number is listed in the “END #1” column (7) to indicate the termination location of one end of a wire. In the center, the wire number (8) and wire color (9) are listed. A component identification number in the “END #2” column (10) identifies the opposite end of the wire.

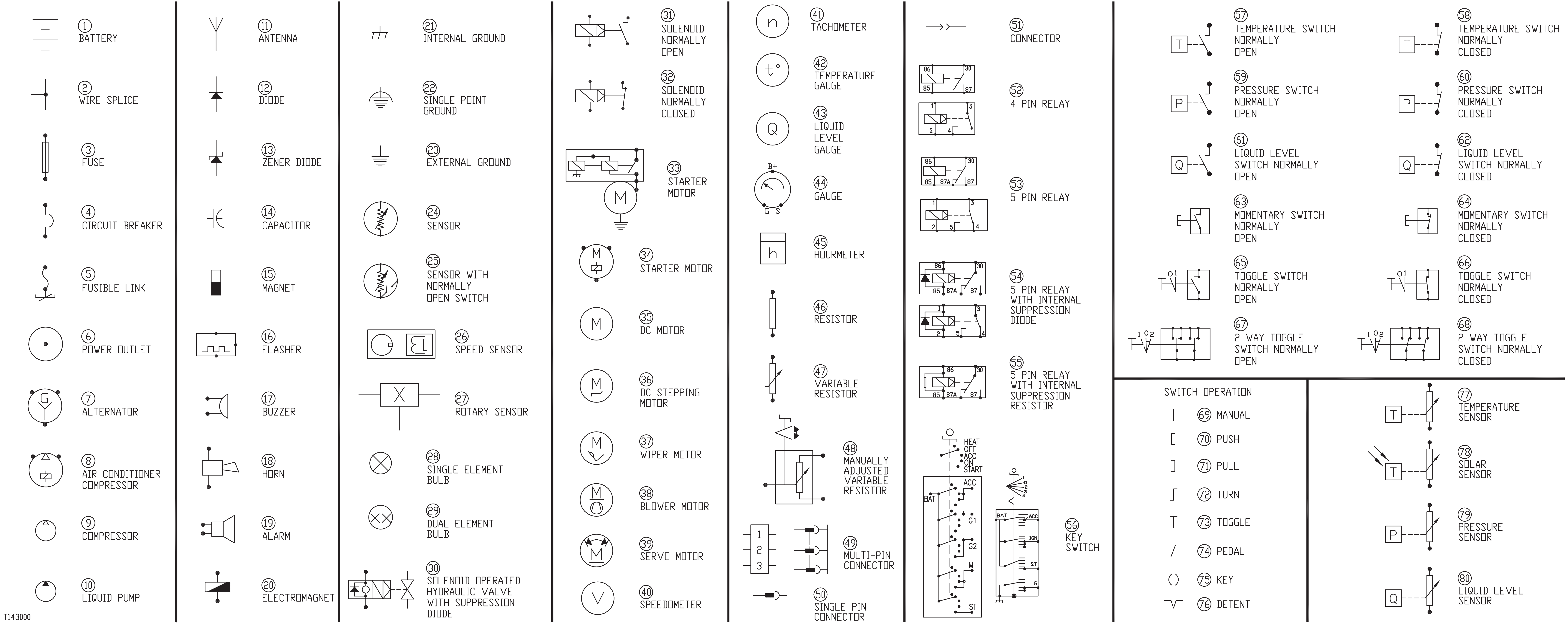
Component Location Diagram

The Component Location Diagram is a pictorial view by harness showing location of all electrical components, connectors, harness main ground locations and harness band and clamp location. Each component will be identified by the same identification letter/number and description used in the System Functional Schematic Diagram.

Connector End View Diagram

The Connector End View Diagram is a pictorial end view of the component connectors showing the number of pins in the connector and the wire color and identifier of the wire in every connector. Each component will be identified by the same identification letter/number and description used in the System Functional Schematic Diagram.

Continued on next page



T143000 –UN–21JUN01

Continued on next page

1—Battery
2—Wire Splice
3—Fuse
4—Circuit Breaker
5—Fusible Link
6—Power Outlet
7—Alternator
8—Air Conditioner Compressor
9—Compressor
10—Liquid Pump
11—Antenna
12—Diode
13—Zener Diode
14—Capacitor
15—Magnet
16—Flasher
17—Buzzer
18—Horn
19—Alarm
20—Clock
21—Internal Ground
22—Single Point Ground
23—External Ground
24—Sensor
25—Sensor with Normally Open Switch
26—Speed Sensor
27—Rotary Sensor
28—Single Element Bulb
29—Dual Element Bulb
30—Solenoid Operated Hydraulic Valve With Suppression Diode
31—Solenoid Normally Open
32—Solenoid Normally Closed
33—Starter Motor
34—Starter Motor
35—DC Motor
36—DC Stepping Motor
37—Wiper Motor
38—Blower Motor
39—Servo Motor
40—Speedometer
41—Tachometer
42—Temperature Gauge
43—Liquid Level Gauge
44—Gauge
45—Hourmeter
46—Resistor
47—Variable Resistor
48—Manually Adjusted Variable Resistor
49—Multi-Pin Connector
50—Single Pin Connector
51—Connector
52—4 Pin Relay
53—5 Pin Relay
54—5 Pin Relay With Internal Suppression Diode
55—5 Pin Relay With Internal Suppression Resistor
56—Key Switch
57—Temperature Switch Normally Open
58—Temperature Switch Normally Closed
59—Pressure Switch Normally Open
60—Pressure Switch Normally Closed
61—Liquid Level Switch Normally Open
62—Liquid Level Switch Normally Closed
63—Momentary Switch Normally Open
64—Momentary Switch Normally Closed
65—Toggle Switch Normally Open
66—Toggle Switch Normally Closed
67—2 Way Toggle Switch Normally Open
68—2 Way Toggle Switch Normally Closed
69—Manual Switch Operation
70—Push Switch Operation
71—Pull Switch Operation
72—Turn Switch Operation
73—Toggle Switch Operation
74—Pedal Switch Operation
75—Key Switch Operation
76—Detent Switch Operation
77—Temperature Sensor
78—Solar Sensor
79—Pressure Sensor
80—Liquid Level Sensor

Electrical Schematic Symbols

LD30992,00002D8 –19–14JAN06–9/9

Explanation of Wire Markings

Electrical harness wires are identified by color, with no number stamped on wire. Wire numbers are used on some connector drawings simply as reference numbers, useful in tracing wires through the harness.

Some wires are solid wire colors. These would be identified by one color name such as RED or BLK or GRN.

Other wire colors are identified with two color names. These are solid wires with a narrow stripe. For example, a wire identified as RED/WHT would be a primarily RED wire, with a WHT stripe. A wire identified as WHT/RED would be a primarily WHT wire with a RED stripe.

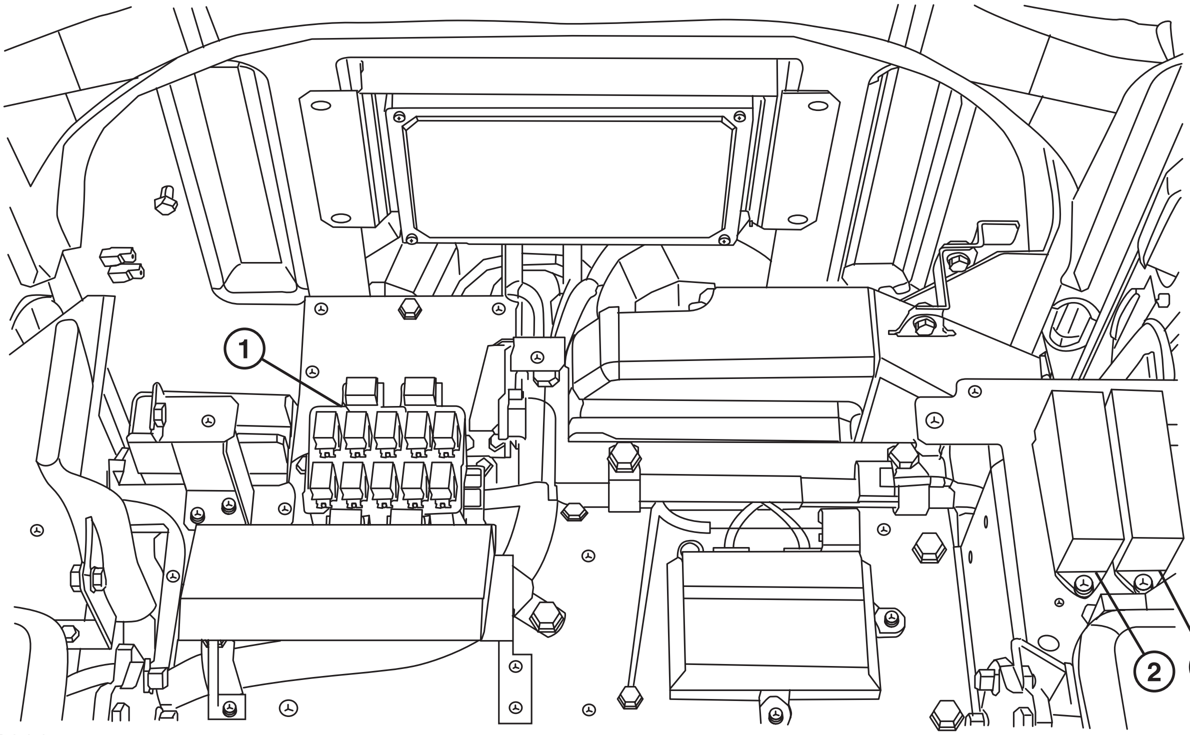
Following is a listing of wire color abbreviations used on drawings.

- BLK—Black
- BLU—Blue
- BRN—Brown
- GRN—Green
- GRY—Grey
- LTGRN—Light Green
- ORG—Orange
- PNK—Pink
- PUR—Purple
- RED—Red
- VLT—Violet
- WHT—White
- YEL—Yellow

Not all wire colors are not available at time of first production. In those cases the wire is identified by a number only. Wire color will be added as soon as it is available.

LD30992,00002D9 –19–14JAN06–1/1

Fuse and Relay Specifications



TX1001022 –UN–03DEC05

TX1001022

Relay and Fuse Block Component Location

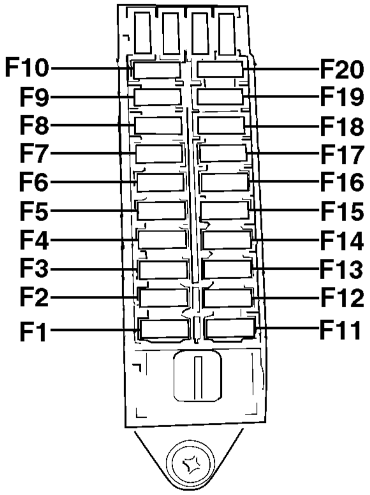
1—Relay Block **2—Fuse Block 1** **3—Fuse Block 2**

The relay block, fuse block 1 and fuse block 2 (1—3) are located behind the seat.

Continued on next page

LD30992,00001EE –19–31AUG07–1/4

Fuse Block 1



TX1000782 –UN–29NOV05

F1—Boom Lights 20 A Fuse (Marked LAMP)
F2—Windshield Wiper and Washer 10 A Fuse (Marked WIPER)
F3—Air Conditioner and Heater 20 A Fuse (Marked HEATER)
F4—Solenoid 10 A Fuse (Marked SOLENOID)
F5—Travel Alarm 5 A Fuse (Marked OPT. ALT 1)
F6—Optional Equipment 10 A Fuse (Marked OPT. 2)
F7—Lubricator 10 A Fuse (Marked LUBRICATOR)
F8—Engine Control Module (ECM) 30 A Fuse (Marked ECM)
F9—Radio Backup 5 A Fuse (Marked BACK UP)
F10—Machine Information Center and Main Controller Batter Power 5 A Fuse (Marked CU)
F11—Horn 10 A Fuse (Marked HORN)
F12—Radio and Dome Light 5 A Fuse (Marked ROOM LAMP RADIO)
F13—Lighter 10 A Fuse (Marked LIGHTER)
F14—High Pressure Fuel Pump Control Valve 15 A Fuse (Marked PCV)
F15—Cab Auxiliary Power Connector One 10 A Fuse (Marked AUXILIARY)
F16—Glow Plug Relay 5 A Fuse (Marked GLOW/RELAY)
F17—Air Conditioner and Heater 5 A Fuse (Marked AIR CON)
F18—Controller Key Switch Signal 5 A Fuse (Marked POW ON)
F19—Controller 5 A Fuse (Marked SW. BOX)
F20—Optional Equipment 10 A Fuse (Marked (OPT. BATT 3))

Continued on next page

LD30992,00001EE –19–31AUG07–2/4

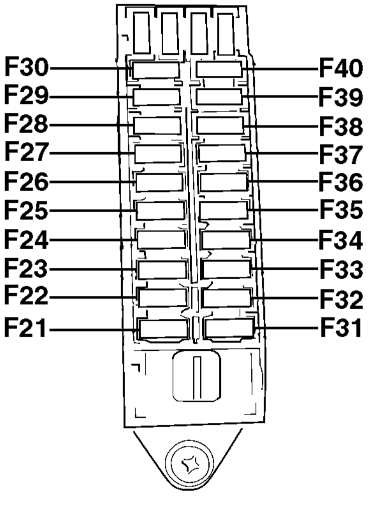
Fuse Block 2

Additional fuses located by the batteries under right battery cover:

- F60—Fusible Link 75 A
- F61—Fusible Link 45 A

JDLink™ fuses—if equipped, located outside the fuse blocks:

- F40—JDLink™ Unswitched Power 7.5 A Fuse—If Equipped (W53)
- F41—JDLink™ Switched Power 3 A Fuse—If Equipped (W53)
- F42—JDLink™ Run Signal 3 A Fuse—If Equipped (W53)
- F43—JDLink™ Ground 7.5 A Fuse—If Equipped (W53)

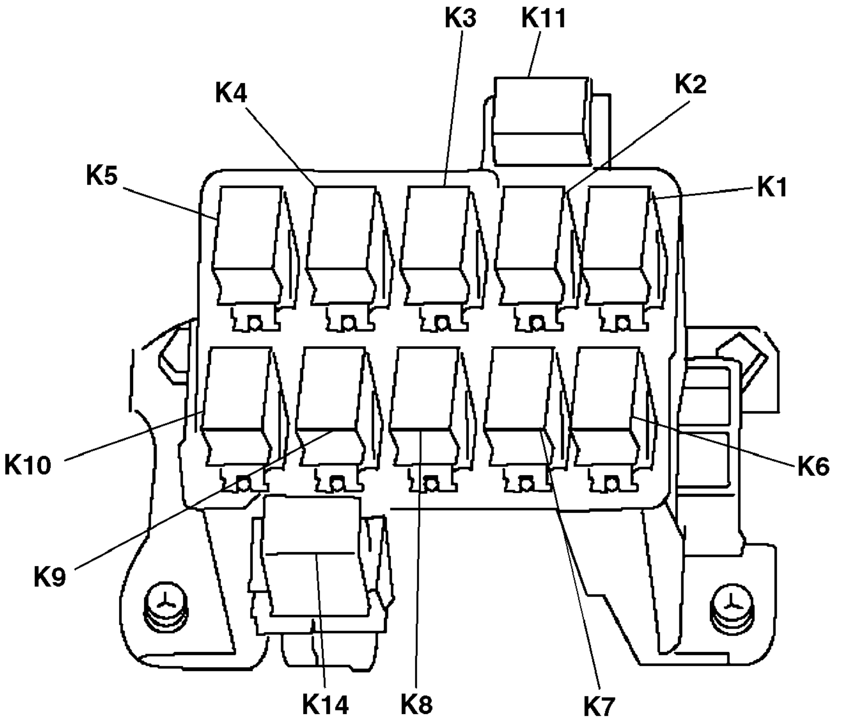


TX1000660 –UN–29NOV05

F21—Heated Air Seat 10 A Fuse (Marked SEAT HEATER)
F22—Front Cab Light One 15 A Fuse (Marked CAB LAMP FRONT)
F23—Rear Cab Light 10 A Fuse (Marked CAB LAMP REAR)
F24—12 Volt Power Unit 10 A Fuse (Marked 12V UNIT)
F25—IMOBI 5 A Fuse (Marked IMOBI)
F26—Quick Hitch 5 A Fuse (Marked QUICK HITCH)
F27—Cab Auxiliary Power Connector Three 5 A Fuse (Marked AUX.3)
F28—Not Used
F29—Drive Light 20 A Fuse (Marked LIGHT 1)
F30—Auto Lubricator 10 A Fuse (Marked AUTO LUB)
F31—Seat Compressor 10 A Fuse (Marked SEAT COMPR)
F32—Front Cab Light Two 10 A Fuse (Marked CAB LAMP FRONT+2)
F33—Warning Lamp 10 A Fuse (Marked WARNING LAMP)
F34—Cab Auxiliary Power Connector Two 10 A Fuse (Marked AUX.2)
F35—Not Used
F36—Not Used
F37—Not Used
F38—Not Used
F39—Not Used
F40—Not Used

JDLink is a trademark of Deere & Company

Continued on next page



TX1004807

TX1004807 –UN–16MAR06

Relay Block

K1—Load Dump Relay
K2—Pilot Shutoff Solenoid Relay
K3—Security Alarm Relay
K4—Starter Relay
K5—Security Relay
K6—Windshield Wiper Relay
K7—Drive Light Relay
K8—Boom Work Light Relay
K9—Windshield Washer Relay
K10—Horn Relay
K11—Automatic Lubricator Relay
K14—Engine Control Module (ECM) Relay

Relay Block

Additional relays located under the rear cover:

- K20—Seat Heater Relay (If Equipped)
- K30—Right Solenoid Relay A (If Equipped)
- K31—Right Solenoid Relay B (If Equipped)
- K32—Left Solenoid Relay A (If Equipped)
- K33—Left Solenoid Relay B (If Equipped)

Additional relays located by the batteries under right battery cover:

- K16—Glow Plug Relay
- K18—Starter Protection Relay
- K19—Battery Relay

LD30992,00001EE –19–31AUG07–4/4

System Functional Schematic, Wiring Diagram, and Component Location Master Legend

- A1—Engine Control Module (ECM) (SE13) (SE14) (SE15) (W4)
- A3—Main Controller (MCF) (SE7) (SE8) (SE9) (SE10) (SE11) (W1)
- A4—Monitor Controller (SE4) (SE5) (W3)
- A5—Information Controller (ICF) (SE3) (W1)
- A6—Radio (SE18) (W6)
- A7—Air Conditioner Controller (ACF) (SE19) (SE20) (W6)
- A8—12 Volt Power Converter (SE21) (W9)
- A9—Switch Panel (SE6) (W1)
- A10—Machine Information Gateway (MIG) Controller—If Equipped (W50)
- A11—GlobalTRACS® Terminal (GTT) Controller—If Equipped (W51)
- B1—Crankshaft Position Sensor (SE13) (W4)
- B2—Camshaft Position Sensor (G Sensor) (SE13) (W4)
- B3—Barometric Pressure Sensor (SE14) (W2)
- B4—Engine Coolant Temperature Sensor (SE14) (W4)
- B5—Fuel Temperature Sensor (SE14) (W4)
- B7—Intake Air Temperature (SE14) (W8)
- B10—Boost Temperature Sensor (SE14) (W4)
- B11—Engine Oil Pressure Sensor (SE13) (W4)
- B12—Fuel Rail Pressure Sensor (SE13) (W4)
- B13—Radiator Level Switch (SE10) (W2) (W5) (W20)
- B14—Boost Pressure Sensor (SE14) (W4)
- B15—Engine Oil Level Switch (SE10) (W5)
- B16—Air Filter Restriction Switch (SE4) (W8)
- B18—Fuel Level Sensor (SE4) (W2)
- B19—Engine Coolant Temperature Switch (105 deg C) (SE4) (W5)
- B20—Air Conditioner High/Low Pressure Switch (SE19) (W6)
- B21—Solar Sensor (SE19) (W3)
- B22—Ambient Air Temperature Sensor (SE19) (W5) (W19) (W20)
- B23—High Note Horn (SE19) (W2)
- B24—Low Note Horn (SE19) (W2)
- B25—Left Speaker (SE18) (W1)
- B26—Right Speaker (SE18) (W1)
- B27—Hydraulic Oil Filter Restriction Switch (SE4) (W2)
- B33—Swing Pressure Sensor (SE8) (W7)
- B35—Pump 1 (4-Spool) Delivery Pressure Sensor (4P) (SE9) (W8)
- B36—Pump 1 (4-Spool) Control Pressure Sensor (4P) (SE9) (W8)
- B37—Pump 2 (5-Spool) Delivery Pressure Sensor (5P) (SE9) (W8)
- B38—Pump 2 (5-Spool) Control Pressure Sensor (5P) (SE9) (W8)
- B40—Hydraulic Oil Temperature Sensor (SE9) (W2)
- B41—Air Conditioner Freeze Control Switch (SE20) (W6)
- B42—Cab Air Temperature Sensor (SE20) (W6)
- B43—Coolant Temperature Sensor (SE19) (W6)
- B45—Attachment Pressure Sensor (SE9)
- B46—Counterweight Removal Pressure Sensor (SE8) (W8)
- B50—Arm Out Pressure Sensor (SE7) (W2)
- B51—Arm In Pressure Sensor (SE7) (W2)
- B52—Boom Up Pressure Sensor (SE7) (W2)
- B53—Boom Down Pressure Sensor (SE7) (W2)
- B54—Bucket Curl Pressure Sensor (SE7) (W2)
- B55—Bucket Dump Pressure Sensor (SE8) (W2)
- B56—Travel Right Pressure Sensor (SE8) (W2)
- B57—Travel Left Pressure Sensor (SE8) (W2)
- B58—Boom Bottom Pressure Sensor (SE8) (W2)
- B60—Exhaust Gas Recirculation (EGR) Position Sensor (SE13) (W4)
- E1—Drive Light (SE16) (W2)
- E2—Boom Work Light (SE17) (W2)
- E3—Cab Dome Light (SE18) (W1)
- E5—Switch Panel Back Light (SE6) (W1)
- E7—Drive Light (Optional) (SE16) (W2)
- E8—Boom Light (Optional) (SE17) (W2)
- E9—Cab Light (SE17)
- E10—Cab Light (SE17)
- F1—Boom Lights 20 A Fuse (Marked LAMP) (SE17) (W1)

GlobalTRACS is a trademark of the Qualcomm Corporation

Continued on next page

- F2—Windshield Wiper and Washer 10 A Fuse (Marked WIPER) (SE16) (W1)
- F3—Air Conditioner and Heater 20 A Fuse (Marked HEATER) (SE19) (W1)
- F4—Solenoid 10 A Fuse (Marked SOLENOID) (SE7) (W1)
- F5—Travel Alarm 5 A Fuse (Marked OPT. 1) (SE12) (W1)
- F6—Optional Equipment 10 A Fuse (Marked OPT. ALT 2) (SE18) (W1)
- F7—Lubricator 10 A Fuse (Marked LUBRICATOR) (SE17) (W1)
- F8—Engine Control Module (ECM) 30 A Fuse (Marked ECM) (SE15) (W1)
- F9—Radio Backup 5 A Fuse (Marked BACK UP) (SE4) (W1)
- F10—Machine Information Center and Main Controller Battery Power 5 A Fuse (Marked C/U) (SE3) (W1)
- F11—Horn 10 A Fuse (Marked HORN) (SE19) (W1)
- F12—Radio and Dome Light 5 A Fuse (Marked ROOM LAMP RADIO) (SE18) (W1)
- F13—Lighter 10 A Fuse (Marked LIGHTER) (SE19) (W1)
- F14—High Pressure Fuel Pump Control Valve 15 A Fuse (Marked PCV) (SE14) (W1)
- F15—Cab Auxiliary Power Connector One 10 A Fuse (Marked AUXLIALY) (SE18) (W1)
- F16—Glow Plug Relay 5 A Fuse (Marked GLOW/RELAY) (SE1) (W1)
- F17—Air Conditioner and Heater 5 A Fuse (Marked AIRCON) (SE19) (W1)
- F18—Controller Key Switch Signal 5 A Fuse (Marked POW ON) (SE3) (W1)
- F19—Controller 5 A Fuse (Marked SW. BOX) (SE4) (W1)
- F20—Optional Equipment 10 A Fuse (Marked (OPT. BATT3)) (SE18) (W1)
- F21—Heated Air Seat 10 A Fuse (Marked SEAT HEATER) (SE21) (W9)
- F22—Front Cab Light One 15 A Fuse (Marked CAB LAMP FRONT) (SE17) (W9)
- F23—Rear Cab Light 10 A Fuse (Marked CAB LAMP REAR) (SE21) (W9)
- F24—12 Volt Power Unit 10 A Fuse (Marked 12V UNIT) (SE21) (W9)
- F25—IMOBI 5 A Fuse (Marked IMOBI) (SE21) (W9)
- F26—Quick Hitch 5 A Fuse (Marked QUICK HITCH) (SE21) (W9)
- F27—Cab Auxiliary Power Connector 3 5 A Fuse (Marked AUX. 3) (SE21) (W9)
- F29—Drive Light 20 A Fuse (Marked LIGHT 1) (SE16) (W9)
- F30—Auto Lubricator 10 A Fuse (Marked AUTO LUB) (SE17) (W9)
- F31—Seat Compressor 10 A Fuse (Marked SEAT COMPR) (SE21) (W9)
- F32—Front Cab Light Two 10 A Fuse (Marked CAB LAMP FRONT +2) (SE21) (W9)
- F33—Warning Lamp 10 A Fuse (Marked WARNING LAMP) (SE21) (W9)
- F34—Cab Auxiliary Power Connector 2 10 A Fuse (Marked AUX. 2) (SE21) (W9)
- F40—JDLink™ Unswitched Power 7 Amp Fuse—If Equipped (W53)
- F41—JDLink™ Switched Power 3 Amp Fuse—If Equipped (W53)
- F42—JDLink™ Alternator Run Signal 3 Amp Fuse—If Equipped (W53)
- F43—JDLink™ Ground 7.5 Amp Fuse—If Equipped (W53)
- F60—Fusible Link 75A (SE1) (W2)
- F61—Fusible Link 45A (SE1) (W2)
- F62—Wiper Motor Assembly Circuit Breaker (SE16) (W1)
- G1—Battery (SE1)
- G2—Battery (SE1)
- G3—Alternator (SE3) (W5)
- G5—12 Volt Power Outlet (SE21) (W9)
- H2—Security Alarm (SE5) (W1)
- H3—Monitor Warning Alarm (SE4) (W1)
- H4—Travel Alarm (SE12) (W5)
- K1—Load Dump Relay (SE2) (W1)
- K2—Pilot Shut-Off Solenoid Relay (SE2) (W1)
- K3—Security Alarm Relay (SE4) (W1)
- K4—Starter Relay (SE1) (W1)
- K5—Security Relay (SE2) (W1)
- K6—Windshield Wiper Relay (SE16) (W1)
- K7—Drive Light Relay (SE16) (W1)
- K8—Boom Work Light Relay (SE17) (W1)
- K9—Windshield Washer Relay (SE16) (W1)
- K10—Horn Relay (SE19) (W1)

Continued on next page

- K11—Automatic Lubricator Relay (SE17) (W1)
- K12—Blower Motor Relay (SE19) (W6)
- K13—Cab Light Relay (SE17)
- K14—Engine Control Module (ECM) Relay (SE14) (W1)
- K15—Air Conditioner Compressor Clutch Relay (SE19) (W6)
- K16—Glow Plug Relay (SE1) (W2)
- K18—Starter Protection Relay (SE1) (W2)
- K19—Battery Relay (SE1) (W2)
- K20—Seat Heater Relay (W12)
- K30—Right Solenoid Relay A (W14)
- K31—Right Solenoid Relay B (W14)
- K32—Left Solenoid Relay A (W14)
- K33—Left Solenoid Relay B (W14)
- M1—Starter Motor (SE1) (W5)
- M3—Exhaust Gas Recirculation (EGR) Valve Actuator (SE13) (W4)
- M5—Windshield Wiper Motor (SE16) (W1)
- M6—Windshield Washer Motor (SE16) (W2)
- M7—Air Conditioner and Heater Blower Motor (SE20) (W6)
- M9—Air Conditioner and Heater Internal and External Servomotor (SE20) (W6)
- M10—Air Conditioner and Heater Blower Port Change Servomotor (SE20) (W6)
- M11—Air Conditioner and Heater Mixer Servomotor (SE20) (W6)
- M12—Air Conditioner and Heater Rear Blower Port Change Servomotor (SE20) (W6)
- M13—Seat Air Compressor Motor (W12)
- M14—Lubricator Motor (SE17) (W2)
- R1—Glow Plug #1 (SE1) (W4)
- R2—Glow Plug #2 (SE1) (W4)
- R3—Glow Plug #3 (SE1) (W4)
- R4—Glow Plug #4 (SE1) (W4)
- R5—Glow Plug #5 (SE1) (W4)
- R6—Glow Plug #6 (SE1) (W4)
- R9—Lighter (SE19) (W1)
- R15—Engine Speed Dial (SE6) (W1)
- R17—Blower Motor Resistor (SE20) (W6)
- R18—Seat Heater (W12)
- S1—Key Switch (SE1) (W6)
- S2—Cab Dome Light Switch (SE18) (W1)
- S3—Pilot Shut-Off Switch 1 (SE2) (W11)
- S4—Pilot Shut-Off Switch 2 (SE2) (W11)
- S5—Horn Switch (SE19) (W1)
- S7—Power Dig Switch (SE10) (W6)
- S8—Auto Idle Switch (SE6) (W1)
- S9—Windshield Wiper and Washer Switch (SE6) (W1)
- S10—Work Light Switch (SE6) (W1)
- S11—Travel Speed Switch (SE6) (W1)
- S12—Power Mode Switch (SE6) (W1)
- S13—Travel Alarm Cancel Switch (SE12) (W15)
- S14—Engine Stop Switch (SE1) (W1)
- S15—Reversing Fan Switch (SE10) (W16)
- S18—Learning Switch (SE10) (W1)
- S19—Automatic Lubricator Switch (SE11)
- S20—Boom Mode Switch (SE11) (W10)
- S21—Engine Fluid Level Check Switch (SE11) (W10)
- S22—Lubricator Switch (SE17) (W2)
- S23—Heated Seat Switch (W13)
- S30—Right Switch A (W14)
- S31—Right Switch B (W14)
- S32—Left Switch A (W14)
- S33—Left Switch B (W14)
- S34—Right Enable Switch (W14)
- S35—Left Enable Switch (W14)
- V1—Glow Plug Relay Diode (SE1) (W2)
- V2—Battery Relay Diode (SE1) (W2)
- V3—Load Dump Relay Diode (SE2) (W1)
- V4—Security Diode (SE2) (W1)
- V5—Start Relay Diode (SE2) (W1)
- V6—Auxillary Power Connector Diode (SE18) (W1)
- V7—Blower Motor Diode (SE20) (W6)
- V8—Pilot Shutoff Diode (SE2) (W11)
- V10—Lubricator Motor Diode (SE17) (W2)
- V11—Blower Motor Signal Diode (SE20) (W6)
- V12—Main Controller Pilot Switch Signal Diode (SE10) (W1)
- V13—ECM Power On Signal Diode (SE3) (W1)
- W1—Cab Harness (W1)
- W2—Machine Harness (W2)
- W3—Monitor Harness (W3)
- W4—Engine Harness (W4)
- W5—Engine Interface Harness (W5)
- W6—Air Conditioner Harness (W6)
- W7—Control Valve Harness (W7)
- W8—Pump Harness (W8)
- W9—Auxiliary Fuse Box Harness (W9)

Continued on next page

LD30992,00001EF –19–31AUG07–3/6

- W10—Cab Switch Harness (W10)
- W11—Pilot Shutoff Switch Harness (W11)
- W12—Heated Air Seat Harness (W12)
- W13—Seat Heater Switch Harness (W13)
- W14—Multi-Function Pilot Control Lever Harness (W14)
- W15—Travel Alarm Cancel Switch Harness (W15)
- W16—Reversing Fan Switch Harness (W16)
- W17—Pilot Shutoff Valve Harness (W17)
- W29—Radio Antenna (SE18)
- W35—Cab Harness Ground 1 (W1)
- W36—Cab Harness Ground 2 (W1)
- W37—Cab Harness Ground 3 (W1)
- W38—Cab Harness Ground 4 (W1)
- W40—Machine Harness Ground 1 (W2)
- W41—Machine Harness Ground 2 (W2)
- W50—Machine Information Gateway (MIG) Harness—If Equipped (W50)
- W51—GlobalTRACS® Terminal (GTT) Harness—If Equipped (W51)
- W52—JDLink™ CAN Harness—If Equipped (W53)
- W53—JDLink™ Power Harness—If Equipped (W53)
- W54— JDLink™ Jumper Harness—If Equipped (W54)
- W55—GlobalTRACS® Terminal (GTT) Controller Ground—If Equipped (W51)
- W57—GlobalTRACS® Terminal (GTT) Antenna—If Equipped (W51)
- X2—Dr. ZX 6-Pin Connector (SE3) (W1)
- X3—Cab Harness-to-Machine Harness 52-Pin Connector (W1) (W2)
- X4—Cab Harness-to-Machine Harness 32-Pin Connector (W1) (W2)
- X5—Cab Harness-to-Machine Harness 12-Pin Connector (W1) (W2)
- X6—Engine Diagnostic Connector (W2)
- X7—Engine Control Module (ECM) 81-Pin Connector V (W2)
- X8—Engine Control Module (ECM) 40-Pin Connector E (W2)
- X9—Machine Harness CAN Connector (W2)
- X10—Machine Harness-to-Control Valve Harness 20-Pin Connector (W2) (W7)
- X11—Cab Harness-to-Pilot Shutoff Solenoid Valve Harness Connector (W1) (W17)
- X12—Cab Harness-to-Reversing Fan Switch Harness Connector (W1) (W16)
- X17—Cab Harness-to-Auxiliary Fuse Box Harness 4-Pin Connector (W1) (W9)
- X18—Cab Harness-to-Monitor Harness 4-Pin Connector (W1) (W3)
- X19—Monitor Controller 16-Pin Connector A (W3)
- X20—Monitor Controller 20-Pin Connector B (W3)
- X21—Monitor Controller 12-Pin Connector C (W3)
- X22—Cab Harness-to-Monitor Harness 16-Pin Connector (White) (W1) (W3)
- X23—Cab Harness-to-Monitor Harness 16-Pin Connector (Black) (W1) (W3)
- X24—Cab Harness-to-Monitor Harness 16-Pin Connector (Brown) (W1) (W3)
- X25—Auxillary Power Connectors (SE18) (W1)
- X26—Optional Connector (SE18) (W1) (W14)
- X27—Cab Harness-to-Switch Panel Connector (SE6) (W1)
- X28—Cab Harness-to-Main Controller 32-Pin Connector (W1)
- X29—Cab Harness-to-Main Controller 25-Pin Connector (W1)
- X30—Cab Harness-to-Main Controller 31-Pin Connector (W1)
- X31—Cab Harness-to-Main Controller 16-Pin Connector (W1)
- X32—Cab Harness-to-Information Controller 31-Pin Connector (W1)
- X34—Cab Harness-to-Information Controller 17-Pin Connector (W1)
- X36—Machine Information Center 20-Pin Connector (Not Used) (SE3) (W1)
- X37—Machine Information Center 16-Pin Connector (Not Used) (SE3) (W1)
- X38—Cab Harness-to-Air Conditioner Harness 16-Pin Connector (W1) (W6)
- X39—Cab Harness-to-Air Conditioner Harness 4-Pin Connector (W1) (W6)
- X40—Machine Harness-to-Pump Harness 20-Pin Connector (W2) (W8)
- X41—Cab Harness-to-Machine Harenss 2-Pin Connector 1 (W1) (W2)
- X42—Cab Harness-to-Machine Harness 2-Pin Connector 2 (W1) (W2)

Continued on next page

- X43—Auxiliary Fuse Box Connector (W1) (W9)
- X44—Optional Light Connector (W1) (W9)
- X45—Option 2 12-Pin Connector (Not Used) (W1)
- X46—Attachment Connector (Not Used) (W2)
- X47—Cab Harness-to-Air Conditioner Harness 6-Pin Connector (W1) (W6)
- X48—Air Conditioner Harness-to-Air Conditioner and Heater Controller 20-Pin Connector (W6)
- X49—Air Conditioner Harness-to-Air Conditioner and Heater Controller 16-Pin Connector (W6)
- X51—Engine 2-Pin Connector
- X52—Machine Harness-to-Hydraulic Oil Temperature Sensor Sub-Harness Connector (W2)
- X53—Machine Harness-to-Radiator Harness Connector (650DLC Only) (W2) (W19)
- X54—Machine Harness Lubricator Switch Connector (W2) (W2)
- X55—Machine Harness-to-Oil Cooler Harness Connector (850DLC Only) (W2) (W20)
- X56—Monitor Harness Connector (Not Used) (W3)
- X57—Engine Harness-to-Glow Plug Bus Bar Connector (W4)
- X58—Engine Harness-to-Injector Harness Connector 1 (W4)
- X59—Engine Harness-to-Injector Harness Connector 2 (W4)
- X60—Heated Air Seat Connector (SE21) (W9) (W12)
- X61—Rear Cab Light Connector (SE21) (W9)
- X62—12 Volt Power Unit Connector (SE21) (W9)
- X63—IMOBI Connector (SE21) (W9)
- X64—Quick Hitch Connector (SE21) (W9)
- X65—Cab Auxiliary Power Connector 3 (SE21) (W9)
- X66—Front Cab Light 2 Connector (SE21) (W9)
- X67—Warning Lamp Connector (SE21) (W9)
- X68—Cab Auxiliary Power Connector 2 (SE21) (W9)
- X69—Front Cab Light 1 Connector (W9)
- X70—Cab Harness 3-Pin Connector (Not Used) (W1)
- X71—Cab Harness-to-Auto Lubricator Switch Harness (Not Used) (W1)
- X72—Cab Harness-to-Pilot Shutoff Switch Harness Connector (W1) (W11)
- X73—Cab Harness-to-Cab Switch Harness Connector (W1) (W10)
- X74—Cab Harness-to-Travel Alarm Cancel Switch Harness Connector (W1) (W15)
- X75—Cab Switch Harness-to-Seat Heater Switch Harness Connector (W10) (W13)
- X76—Seat Heater Switch Harness-to-Heated Air Seat Harness Connector (W12) (W13)
- X77—Machine Harness-to-Pump Harness 4-Pin Camera Connector (Not Used) (W2) (W8)
- X78—Machine Harness-to-Auto Lubricator Harness Connector (W2)
- X79—Machine Harness Auxiliary Power Connector (W2)
- X80—Engine Speed Dial Main Controller Side Connector (S1) (W1)
- X81—Engine Speed Dial Switch Panel Side Connector (1) (W1)
- X82—Engine Speed Dial Ground Main Controller Side Connector (S2) (W1)
- X83—Engine Speed Dial Ground Switch Panel Side Connector (2) (W1)
- X84—Engine Control Module (ECM) Power and Signal Connector (E1) (W1)
- X85—Engine Control Module (ECM) Return Connector (E2) (W1)
- X86—Machine Harness-to-Engine Interface Harness 16-Pin Connector (A) (W2) (W5)
- X87—Machine Harness-to-Engine Interface Harness 1-Pin Connector (B) (W2) (W5)
- X88—Machine Harness-to-Engine Interface Harness 2-Pin Connector (C) (W2) (W5)
- X89—Machine Harness-to-Engine Harness 20-Pin Connector (D) (W2) (W4)
- X90—Machine Harness-to-Engine Harness 12-Pin Connector (E) (W2) (W4)
- X91—Machine Harness-to-Engine Harness 8-Pin Connector (F) (W2) (W4)
- X92—Machine Harness-to-Engine Harness 6-Pin Connector (G) (W2) (W4)
- X93—Machine Harness-to-Engine Harness 1-Pin Connector (H) (W2) (W4)
- X94—Machine Harness-to-Lubricator Harness Connector (W2)
- X95—Pump Harness-to-Camera Harness 4-Pin Connector (Not Used) (W8)

Continued on next page

LD30992,00001EF –19–31AUG07–5/6

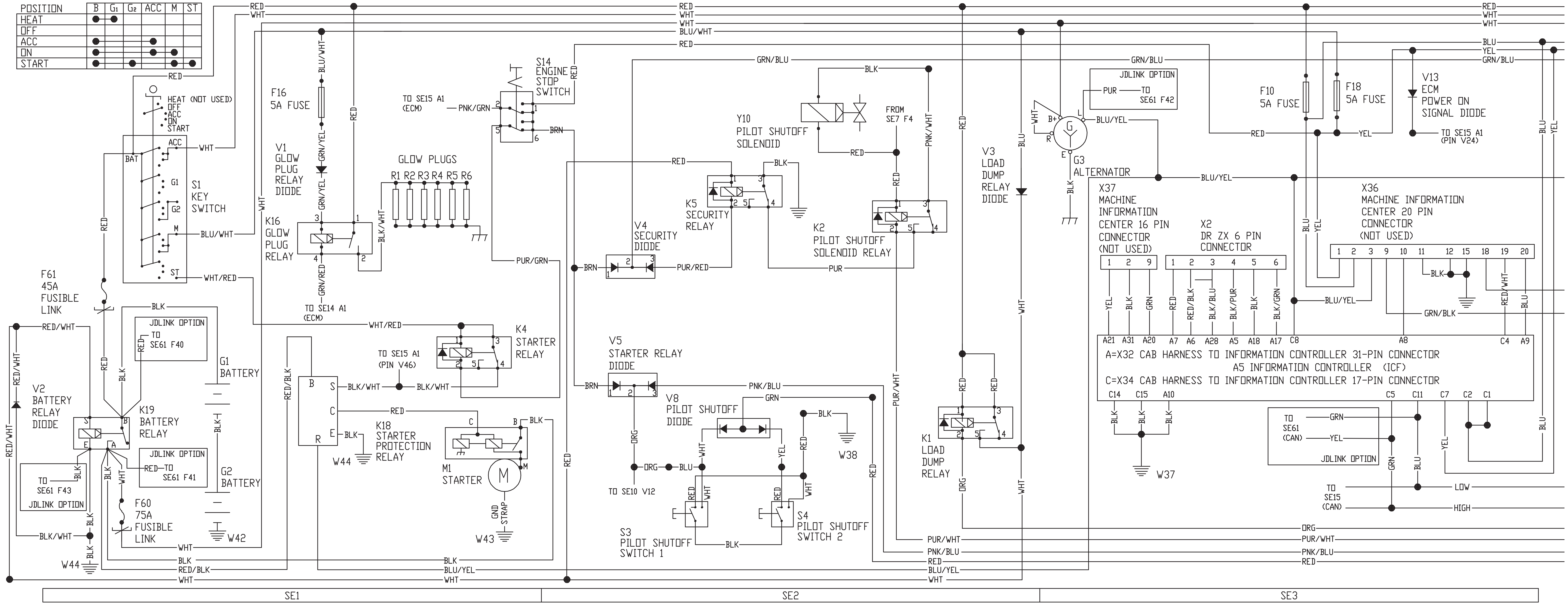
- X96—Pump Harness-to-Swing Alarm Connector (Not Used) (W8)
- X97—Control Valve Harness-to-Attachment Pressure Sensor Harness Connector (W7)
- X100—Cab Ground Splice Connector (W1)
- X101—Machine Harness Splice Connector 1 (W2)
- X102—Machine Harness Splice Connector 2 (W2)
- X103—Pump Harness Splice Connector 1 (W8)
- X104—Pump Harness Splice Connector 2 (W8)
- X135—Pilot Shutoff Switch Harness Splice 1 (W11)
- X136—Pilot Shutoff Switch Harness Splice 2 (W11)
- X137—Pilot Shutoff Switch Harness Splice 3 (W11)
- X140—Machine Information Gateway (MIG) Harness-to-JDLink™ Power Harness 4-Pin Connector—If Equipped (W50)
- X141—Machine Information Gateway (MIG) Harness-to-GlobalTRACS® Terminal (GTT) Harness 10-Pin Connector—If Equipped (W50, W51)
- X142—Machine Information Gateway (MIG) Harness-to-GlobalTRACS® Terminal (GTT) Harness 4-Pin Connector—If Equipped (W50, W51)
- X143—Machine Information Gateway (MIG) Harness-to-JDLink™ CAN Harness 8-Pin Connector—If Equipped (W50)
- X144—Machine Information Gateway (MIG) 30-Pin (L1-Y3) Connector—If Equipped (W50)
- X145—Machine Information Gateway (MIG) 30-Pin (A1-K3) Connector—If Equipped (W50)
- X146—Machine Information Gateway (MIG) Ethernet Diagnostic 4-Pin Connector—If Equipped (W50)
- X147—2-Pin Connector (Not Used)—If Equipped
- X148—GlobalTRACS® Terminal (GTT) 70-Pin Connector—If Equipped (W51)
- X149—JDLink™ Jumper Harness-to-JDLink™ Power Harness Connector—If Equipped (W54)
- X150—GT config Tool Adapter 6-Pin Connector—If Equipped (W51)
- X152—JDLink™ Jumper Harness-to-Machine Harness Connector—If Equipped (W54)
- X160—GlobalTRACS® Terminal (GTT) Shield Splice (W51)
- X164—M16 PUR Splice (W54)
- X165—M09 YEL Splice (W52)
- X166—M10 GRN Splice (W52)
- X167—R01 BLK Splice (W52)
- Y1—Electronic Injector #1 (SE13) (W4)
- Y2—Electronic Injector #2 (SE13) (W4)
- Y3—Electronic Injector #3 (SE13) (W4)
- Y4—Electronic Injector #4 (SE14) (W4)
- Y5—Electronic Injector #5 (SE13) (W4)
- Y6—Electronic Injector #6 (SE13) (W4)
- Y8—Fan Reversing Solenoid 1 (SE10) (W5) (W19) (W2)
- Y9—Fan Reversing Solenoid 2 (SE10) (W20)
- Y10—Pilot Shut-Off Solenoid (SE2) (W17)
- Y11—Air Conditioner Compressor Clutch (SE19) (W5)
- Y12—Pump 1 (4-Spool) Control Solenoid (4P) (SE9) (W8)
- Y13—Pump 2 (5-Spool) Control Solenoid (5P) (SE8) (W8)
- Y14—Fan Pump Control Solenoid (SE9) (W8)
- Y15—Fuel Pump Control Valve Solenoid 1 (SE14) (W4)
- Y16—Fuel Pump Control Valve Solenoid 2 (SE14) (W4)
- Y22—Boom Flow Rate Solenoid (SF) (SE8) (W7)
- Y23—Boom Mode Solenoid (SC) (SE7) (W7)
- Y24—Power Dig Solenoid (SG) (SE8) (W7)
- Y25—Travel Speed Solenoid (SI) (SE8) (W7)
- Y34—Right Solenoid (W14)
- Y35—Left Solenoid (W14)

JDLink is a trademark of Deere & Company

LD30992,00001EF –19–31AUG07–6/6

System Functional Schematic

TX1027480 –19–04SEP07



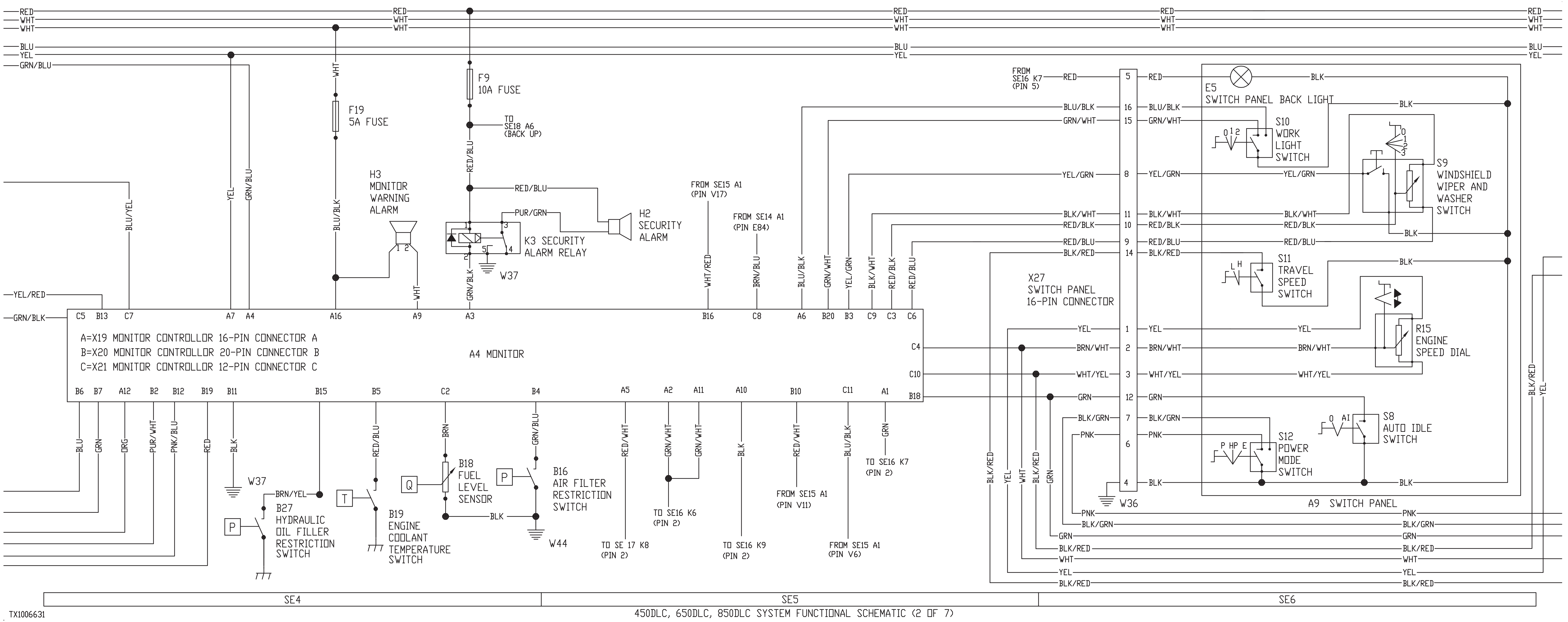
TX1027480

450DLC, 650DLC, 850DLC SYSTEM FUNCTIONAL SCHEMATIC (1 OF 7)

System Functional Schematic (1 of 7) (SE1, SE2, and SE3)

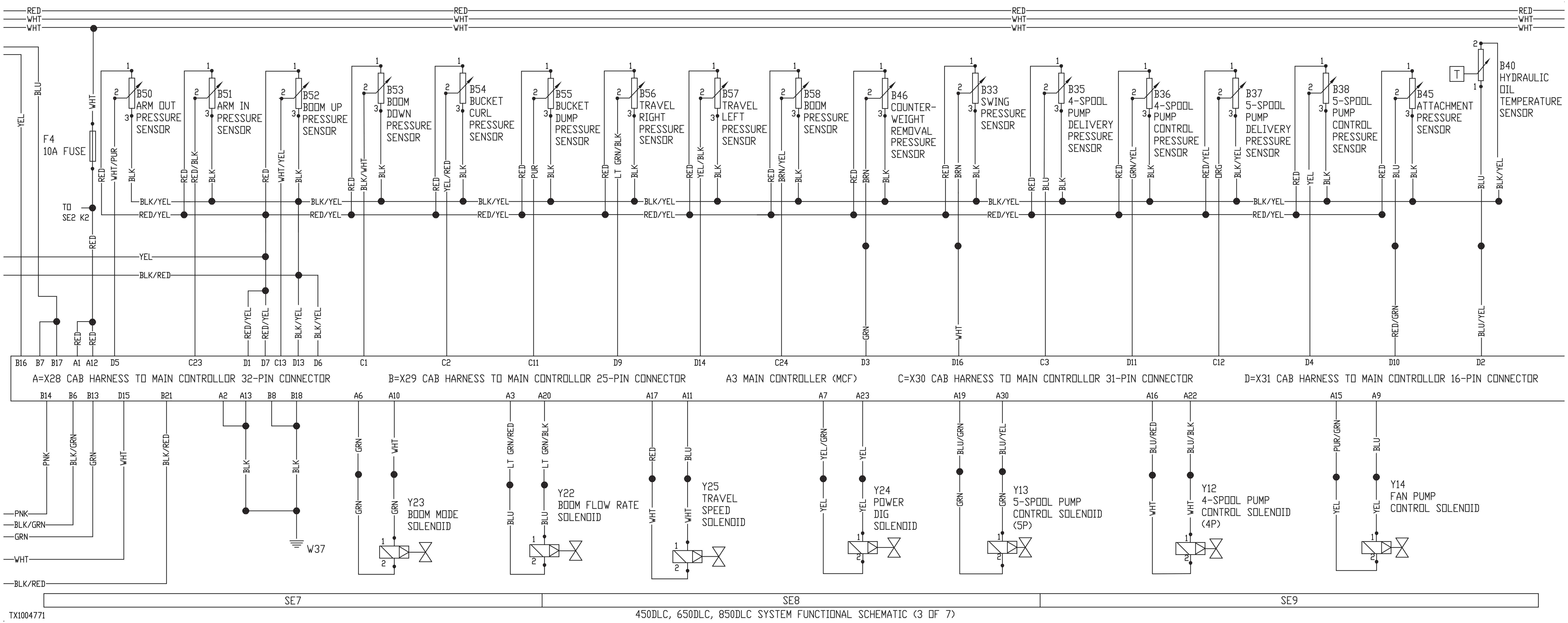
LD30992,00001F0 –19–31AUG07–1/7

TX1006631 –19–26APR06



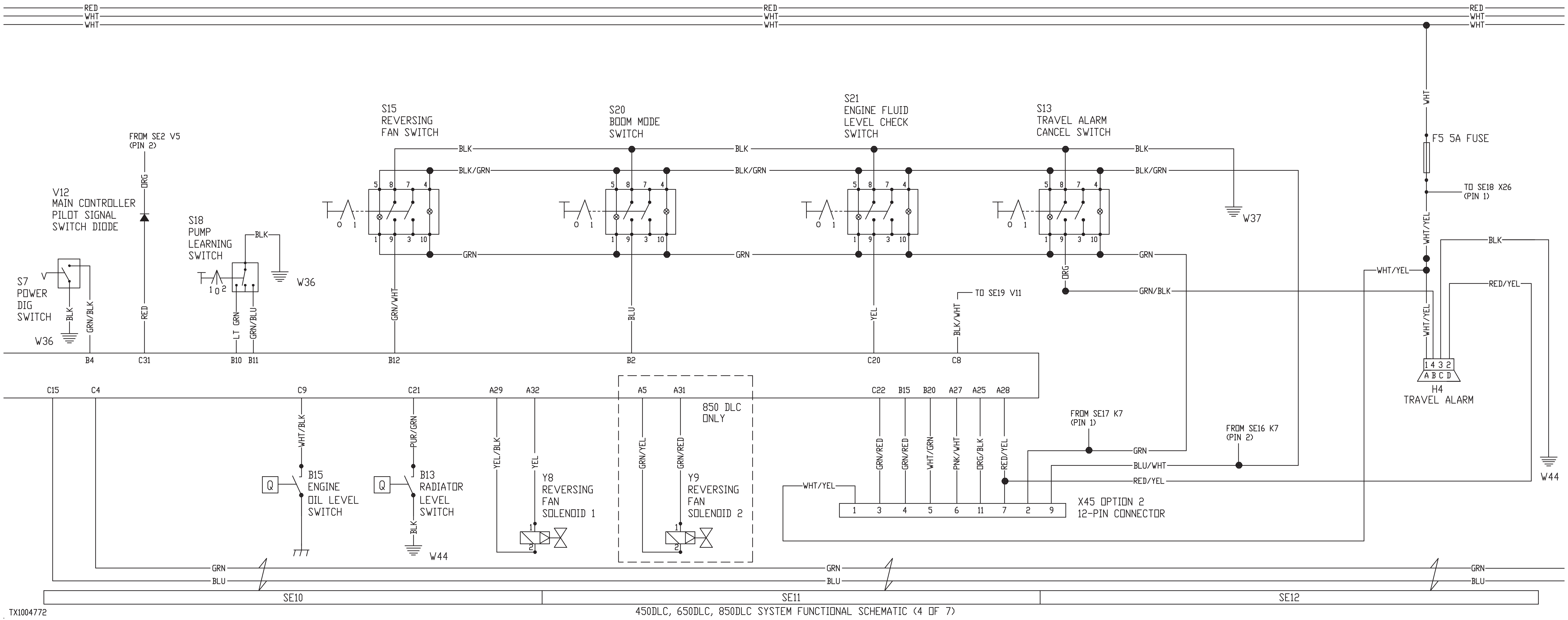
System Functional Schematic (2 of 7) (SE4, SE5, and SE6)

TX1004771 –19–24APR06



System Functional Schematic (3 of 7) (SE7, SE8, and SE9)

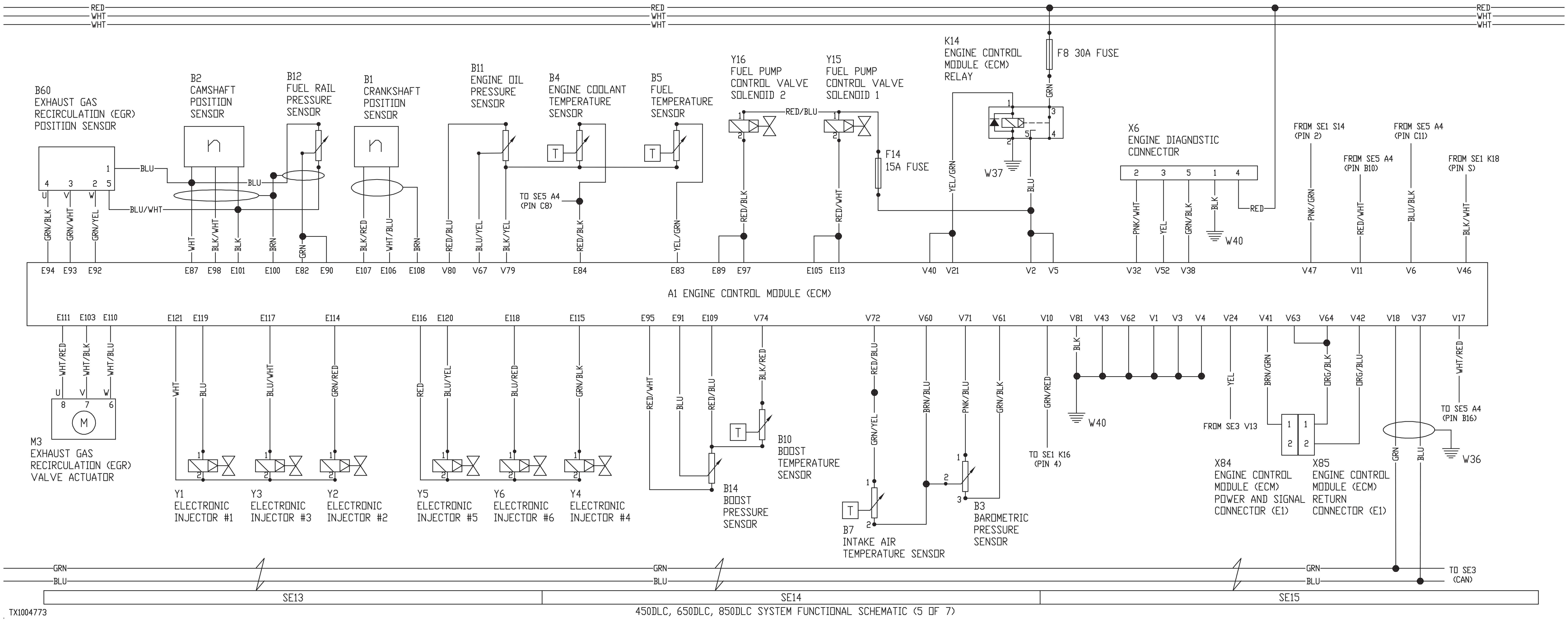
TX1004772 –19–24APR06



System Functional Schematic (4 of 7) (SE10, SE11, and SE12)

LD30992,00001F0 –19–31AUG07–4/7

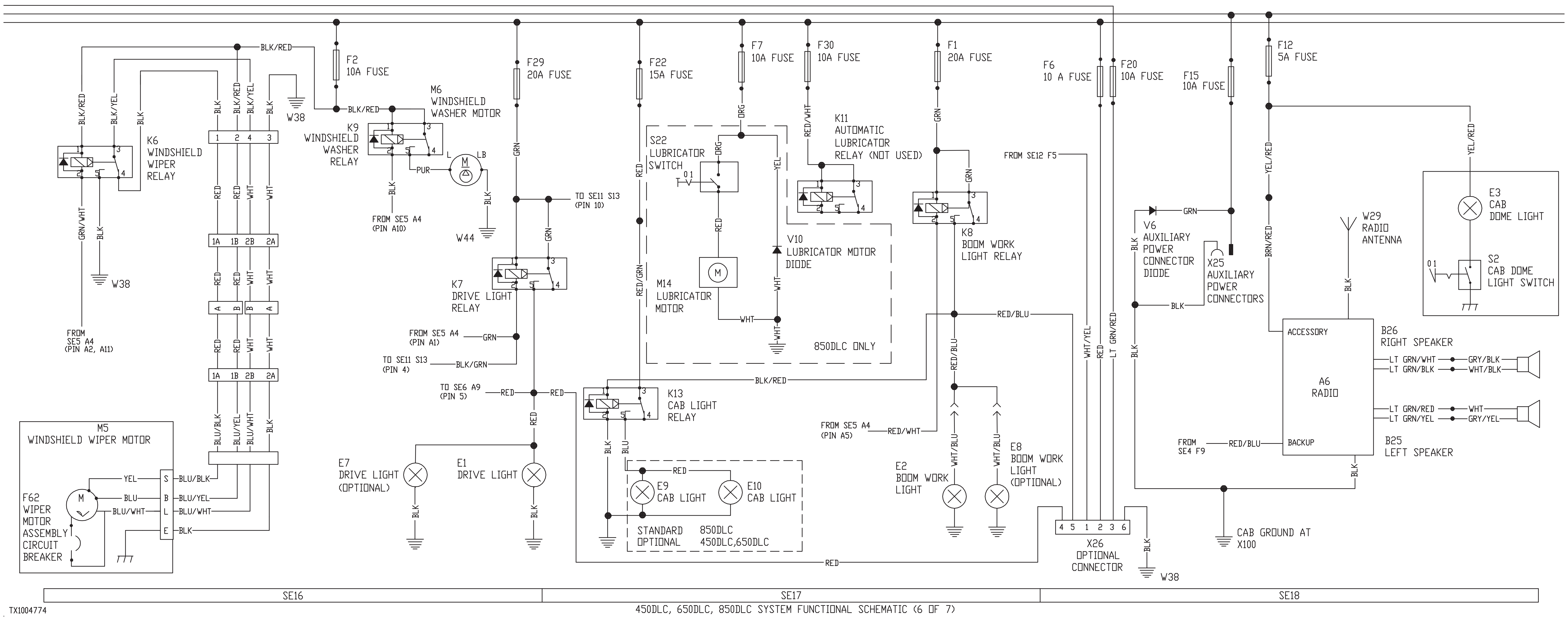
TX1004773 –19–26APR06



System Functional Schematic (5 of 7) (SE13, SE14, and SE15)

LD30992,00001F0 –19–31AUG07–5/7

TX1004774 –19–24APR06

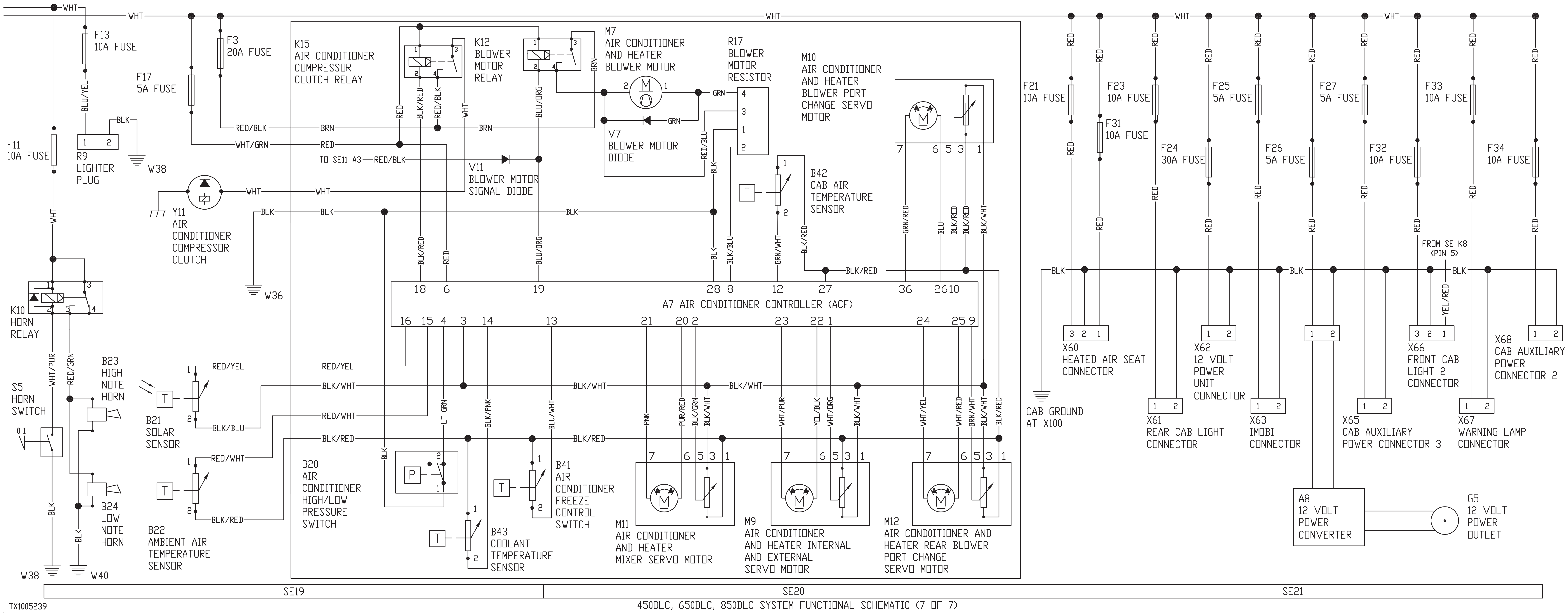


TX1004774

System Functional Schematic (6 of 7) (SE16, SE17, and SE18)

LD30992,00001F0 –19–31AUG07–6/7

TX1005239 –19–24APR06

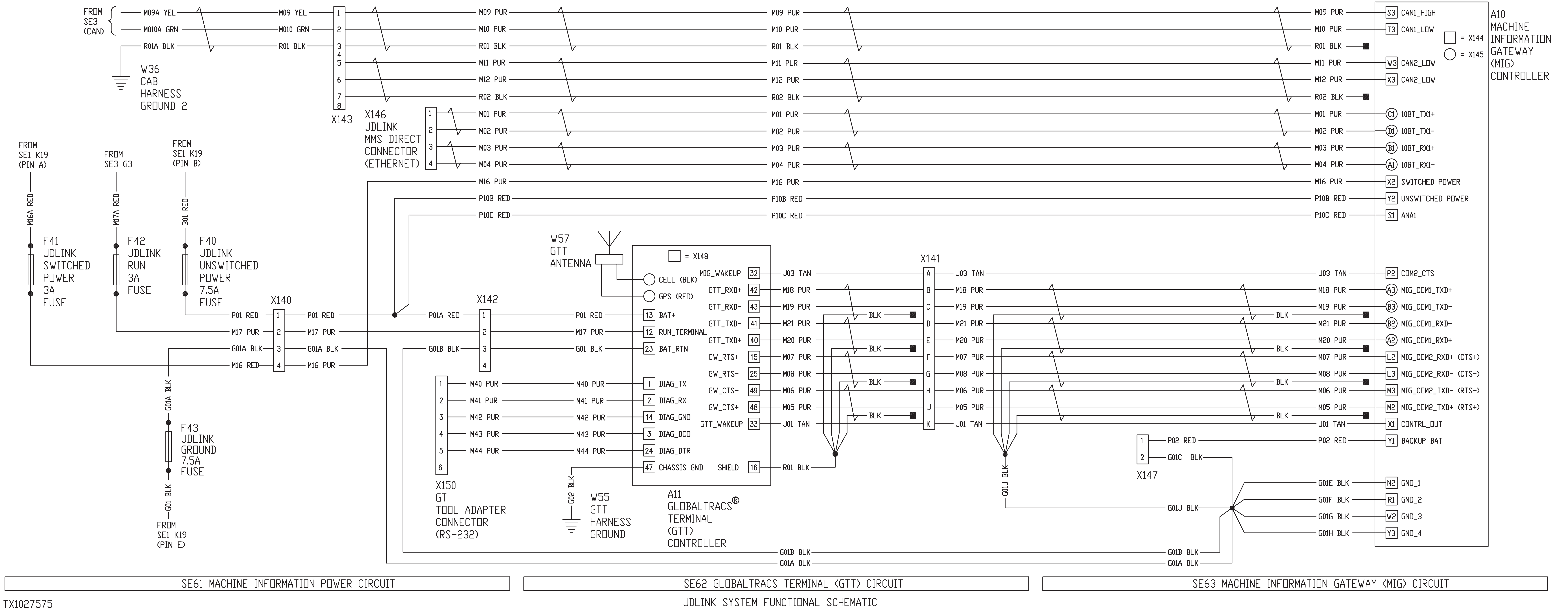


System Functional Schematic (7 of 7) (SE19, SE20, and SE21)

LD30992,00001F0 –19–31AUG07–7/7

JDLink™ System Functional Schematic—If Equipped

TX1027575 –19–31AUG07



TX1027575

JDLink™ Sub-System Schematic

AA95137,0000C3C –19–31AUG07–1/2

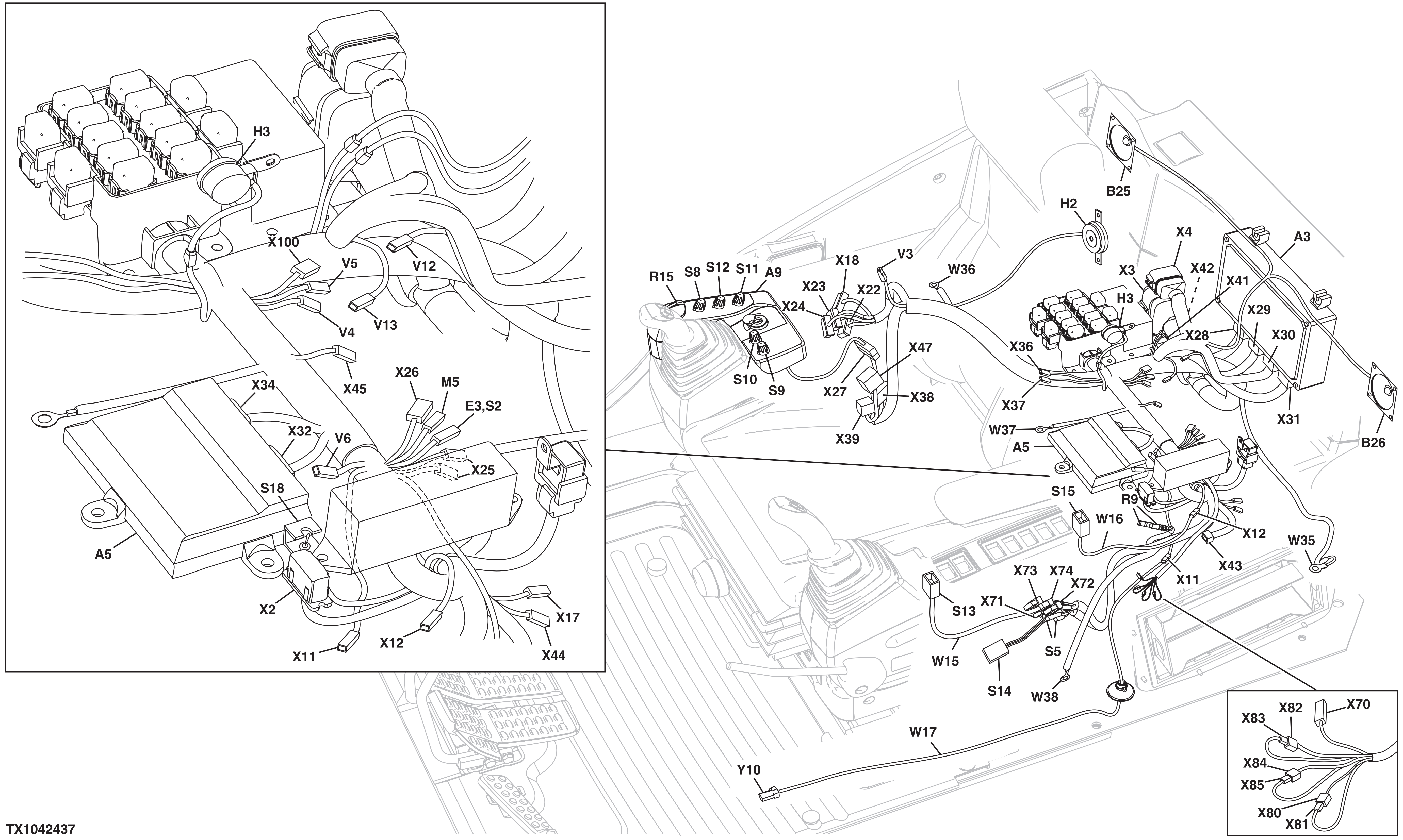
A10—Machine Information Gateway (MIG) Controller
A11—GlobalTRACS® Terminal (GTT) Controller
F40—JDLink™ Unswitched Power 7.5-Amp Fuse
F41—JDLink™ Switched Power 3-Amp Fuse
F42—JDLink™ Run 3-Amp Fuse
F43—JDLink™ Ground 7.5-Amp Fuse
W55—GlobalTRACS® Terminal (GTT) Chassis Ground
W56—JDLink™ Power Harness Ground
W57—GTT Antenna
X140—JDLink™ Power Harness-to-Machine Interface Gateway (MIG) Harness
X141—Machine Information Gateway (MIG) Harness-to-GlobalTRACS® Terminal (GTT) Harness 10-Pin Connector
X142—Machine Information Gateway (MIG) Harness-to-GlobalTRACS® Terminal (GTT) Harness 4-Pin Connector
X143—Machine Information Gateway (MIG) Harness-to-JDLink™ CAN Harness 8-Pin Connector
X144—Machine Information Gateway (MIG) 30-Pin (L1—Y3) Connector
X145—Machine Information Gateway (MIG) 30-Pin (A1—K3) Connector
X146—JDLink™ MMS Direct 4-Pin Connector (Ethernet)
X147—2-Pin Connector (not used)
X148—GlobalTRACS® Terminal (GTT) 70-Pin Connector
X150—GT Config Tool Adapter 6-Pin Connector (RS-232)

GlobalTRACS is a trademark of Qualcomm Corporate
JDLink is a trademark of Deere & Company

AA95137,0000C3C –19–31AUG07–2/2

Cab Harness (W1) Component Location

TX1042437 –UN–21MAY08



TX1042437

Cab Harness (W1) Component Location

LD30992,00001F2 –19–15MAY08–1/2

A3—Main Controller (MCF)
A5—Information Controller (ICF)
A9—Switch Panel
B25—Left Speaker
B26—Right Speaker
E3—Cab Dome Light
H2—Security Alarm
H3—Monitor Warning Alarm
M5—Windshield Wiper Motor
R9—Lighter
R15—Engine Speed Dial
S2—Cab Dome Light Switch
S5—Horn Switch
S8—Auto Idle Switch
S9—Windshield Wiper and Washer Switch
S10—Work Light Switch
S11—Travel Speed Switch
S12—Power Mode Switch
S13—Travel Alarm Cancel Switch
S14—Engine Stop Switch
S15—Reversing Fan Switch
S18—Learning Switch
V3—Load Dump Relay Diode
V4—Security Diode
V5—Start Relay Diode
V6—Auxiliary Power Connector Diode
V12—Main Controller Pilot Switch Signal Diode
V13—ECM Power On Signal Diode
W15—Travel Alarm Cancel Switch Harness
W16—Reversing Fan Switch Harness
W17—Pilot Shutoff Valve Harness
W35—Cab Harness Ground 1
W36—Cab Harness Ground 2
W37—Cab Harness Ground 3
W38—Cab Harness Ground 4
X2—Dr. ZX 6-Pin Connector
X3—Cab Harness-to-Machine Harness 52-Pin Connector
X4—Cab Harness-to-Machine Harness 32-Pin Connector
X11—Cab Harness-to-Pilot Shutoff Solenoid Valve Harness Connector
X12—Cab Harness-to-Reversing Fan Switch Harness Connector
X17—Cab Harness-to-Auxiliary Fuse Box Harness Connector
X18—Cab Harness-to-Monitor Harness 4-Pin Connector
X22—Cab Harness-to-Monitor Harness 16-Pin Connector (White)
X23—Cab Harness-to-Monitor Harness 16-Pin Connector (Black)
X24—Cab Harness-to-Monitor Harness 16-Pin Connector (Brown)
X25—Auxiliary Power Connectors
X26—Optional Connector
X27—Cab Harness-to-Switch Panel Connector
X28—Cab Harness-to-Main Controller 32-Pin Connector 1
X29—Cab Harness-to-Main Connector
X30—Cab Harness-to-Main Controller 31-Pin Connector
X31—Cab Harness-to-Main Controller 16-Pin Connector
X32—Cab Harness-to-Information Controller 31-Pin Connector
X34—Cab Harness-to-Information Controller 17-Pin Connector
X36—Machine Information Center 20-Pin Connector (Not Used)
X37—Machine Information Center 16-Pin Connector (Not Used)
X38—Cab Harness-to-Air Conditioner Harness 16-Pin Connector
X39—Cab Harness-to-Air Conditioner Harness4-Pin Connector
X41—Cab Harness-to-Machine Harness 2-Pin Connector 1
X42—Cab Harness-to-Machine Harness 2-Pin Connector 2
X43—Auxiliary Fuse Box Connector
X44—Optional Light Connector
X45—Option 2 12-Pin Connector (Not Used)
X47—Cab Harness-to-Air Conditioner Harness 6-Pin Connector
X71—Cab Harness-to-Auto Lubricator Switch Harness (Not Used)
X72—Cab Harness-to-Pilot Shutoff Switch Harness Connector
X73—Cab Harness-to-Cab Switch Harness Connector
X74—Cab Harness-to-Travel Alarm Cancel Switch Harness Connector
X100—Cab Ground Splice Connector
Y10—Pilot Shutoff Solenoid

LD30992,00001F2 –19–15MAY08–2/2

Cab Harness (W1) Wiring Diagram

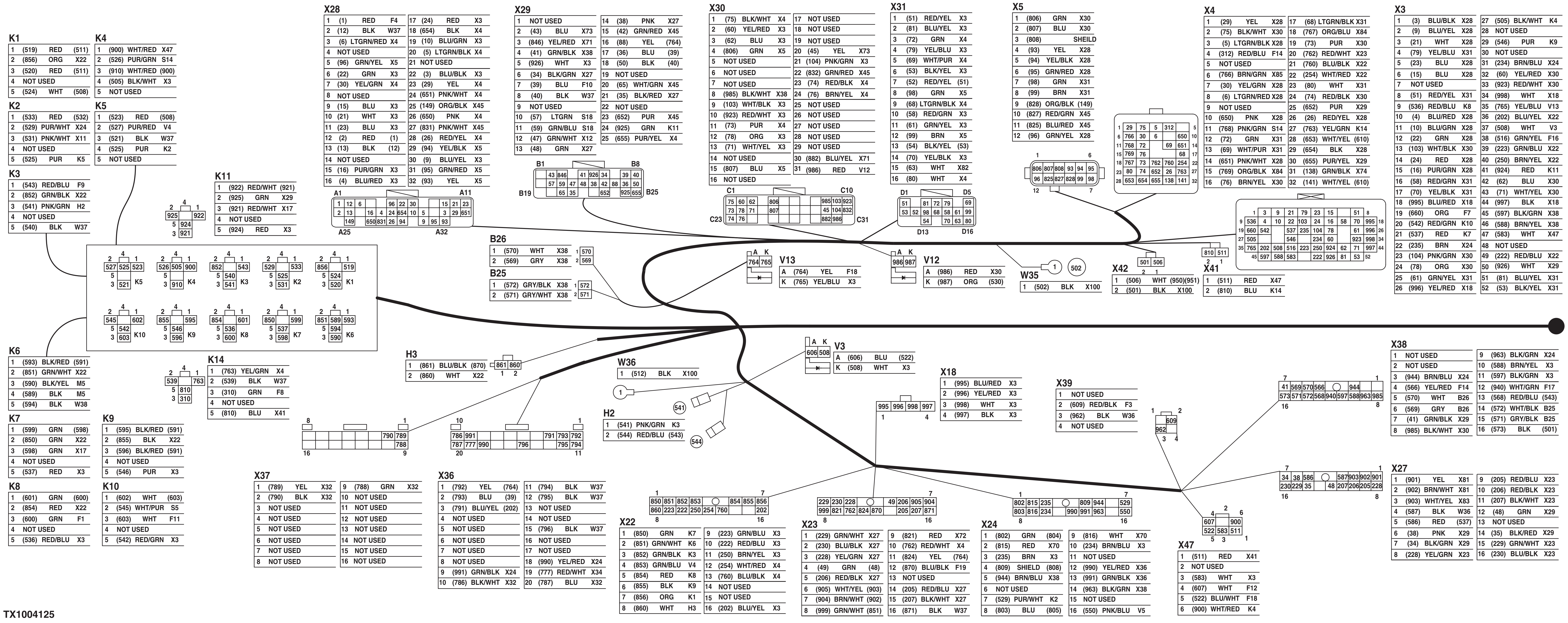
TX1003966 –UN–01MAR06

NUMBER	COLOR	END #1	END #2
1	RED	X28	F4
2	RED	X28	(1)
3	BLU/BLK	X28	X3
4	BLU/RED	X28	X3
5	LT GRN/BLK	X28	X4
6	LT GRN/RED	X28	X4
9	BLU/YEL	X28	X3
10	BLU/GRN	X28	X3
12	BLK	X28	W37
13	BLK	X28	(12)
15	BLU	X28	X3
16	PUR/GRN	X28	X3
21	WHT	X28	X3
22	GRN	X28	X3
23	BLU	X28	X3
24	RED	X28	X3
26	RED/YEL	X28	X4
28	WHT/YEL	(141)	X45
29	YEL	X28	X4
30	YEL/GRN	X28	X4
34	BLK/GRN	X29	X27
35	BLK/RED	X29	X27
36	BLU	X29	(39)
38	PNK	X29	X27
39	BLU	X29	F10
40	BLK	X29	W37
41	GRN/BLK	X29	X38
42	GRN/RED	X29	X45
43	BLU	X29	X73
45	YEL	X30	X73
46	BLK	(64)	X12
47	GRN/WHT	X29	X12
48	GRN	X29	X27
49	GRN	X23	(48)
50	BLK	X29	(40)
51	RED/YEL	X31	X3
52	RED/YEL	X31	(51)
53	BLK/YEL	X31	X3
54	BLK/YEL	X31	(53)
55	RED/YEL	(51)	X80
56	BLK/RED	(53)	X82
57	LT GRN	X29	S18
58	RED/GRN	X31	X3
59	GRN/BLU	X29	X18
60	YEL/RED	X30	X3
61	GRN/YEL	X31	X3
62	BLU	X30	X3
63	WHT	X31	X80
64	BLK	S18	W36
65	WHT/GRN	X29	X45
68	LT GRN/BLK	X31	X4
69	WHT/PUR	X31	X4
70	YEL/BLK	X31	X3
71	WHT/YEL	X30	X3
72	GRN	X31	X4
73	PUR	X30	X4
74	RED/BLK	X30	X4
75	BLK/WHT	X30	X4
76	BRN/YEL	X30	X4
78	ORG	X30	X3
79	YEL/BLU	X31	X3
80	WHT	X31	X4
81	BLU/YEL	X31	X3
88	YEL	X29	(764)
93	YEL	X28	X5
94	YEL/BLK	X28	X5
95	GRN/RED	X28	X5
96	GRN/YEL	X28	X5
98	GRN	X31	X5
99	BRN	X31	X5
103	WHT/BLK	X30	X3
104	PNK/GRN	X30	X3
138	GRN/BLK	X4	X74
141	WHT/YEL	X4	(610)
149	ORG/BLK	X28	X45
202	BLU/YEL	X3	X22
205	RED/BLU	X27	X23
206	RED/BLK	X27	X23
207	BLK/WHT	X27	X23
222	RED/BLU	X3	X22
223	GRN/BLU	X3	X22
228	YEL/GRN	X27	X23
229	GRN/WHT	X27	X23
230	BLU/BLK	X27	X23
234	BRN/BLU	X3	X24
235	BRN	X3	X24
250	BRN/YEL	X3	X22
254	WHT/RED	X4	X22
310	GRN	F8	K14
312	RED/BLU	F14	X4
313	BLU	F14	(810)
501	BLK	X42	X100
502	BLK	W35	X100
503	BLK	X45	W37
505	BLK/WHT	X3	K4
506	WHT	X42	(950)(951)
507	BLK	W38	X100
508	WHT	X3	V3
509	BLK	W37	X100
511	RED	X41	X47
512	BLK	W36	X100
516	GRN/YEL	X3	F16
517	BRN	S14	V4
519	RED	K1	(511)
520	RED	K1	(511)
521	BLK	W37	K5
522	BLU/WHT	X47	F18
523	RED	(508)	K5
524	WHT	K1	(508)
525	PUR	K2	K5
526	PUR/GRN	K4	S14
527	PUR/RED	K5	V4
528	BRN	V5	(517)
529	PUR/WHT	X24	K2
530	ORG	V5	X72
531	PNK/WHT	K2	X11
532	RED	X11	(1)
533	RED	K2	(532)
536	RED/BLU	X3	K8
537	RED	X3	K7
539	BLK	K14	W37
540	BLK	K3	W37
541	PNK/GRN	K3	H2
542	RED/GRN	X3	K10
543	RED/BLU	K3	F9
544	RED/BLU	H2	(543)
545	WHT/PUR	S5	K10
546	PUR	X3	K9
550	PNK/BLU	V5	X24
560	RED	F10	(511)
561	WHT	X43	(506)
562	BLK	X43	X100
566	YEL/RED	X38	F12
568	RED/BLU	X38	(543)
569	GRY	X38	B26
570	WHT	X38	B26
571	GRY/BLK	X38	B25
572	WHT/BLK	X38	B25
573	BLK	X38	(501)
583	WHT	X3	X47
586	RED	X27	(537)
587	BLK	X27	W36
588	BRN/YEL	X3	X38
589	BLK	M5	K6
590	BLK/YEL	M5	K6
591	BLK/RED	M5	F2
592	BLK	M5	W38
593	BLK/RED	K6	(591)
594	BLK	K6	W38
595	BLK/RED	K9	(591)
596	BLK/RED	K9	(591)
597	BLK/GRN	X3	X38
598	GRN	K7	X17
599	GRN	K7	(598)
600	GRN	K8	F1
601	GRN	K8	(600)
602	WHT	K10	(603)
603	WHT	K10	F11
604	BLK	X72	W38
605	BLK	S5	W38
606	BLU	V3	(522)
607	WHT	X47	F12
609	RED/BLK	X39	F3
610	WHT/YEL	X26	F5
611	RED	X26	F6
612	LT GRN/RED	X26	F20
615	BLK	X26	W38
616	RED	X26	(537)
617	RED/BLU	X26	(536)
631	YEL/RED	(566)	S2, E3
632	BLU/YEL	R9	F13
633	BLK	R9	W38
650	PNK	X28	X4
651	PNK/WHT	X28	X4
652	PUR	X29	X4
653	WHT/YEL	(610)	X4
654	BLK	X28	X4
655	PUR/YEL	X29	X4
660	ORG	X3	F7
661	GRN	X25	F15
662	BLK	X25	W36
666	BLK	(662)	V6
667	GRN	(661)	V6
760	BLU/BLK	X4	X22
762	RED/WHT	X4	X23
763	YEL/GRN	X4	K14
764	YEL	V13	F18
765	YEL/BLU	X3	V13
766	BRN/GRN	X4	X85
767	ORG/BLU	X4	X84
768	PNK/GRN	X4	S14
769	ORG/BLK	X4	X84
770	RED	S14	(764)
771	BLU	X34	(39)
772	BLU	X34	(39)
773	BLK	X34	W37
774	BLK	X34	W37
775	BLU/YEL	X34	(202)
776	YEL	X34	(764)
777	RED/WHT	X34	X36
779	BLK	X32	W37
780	RED	X32	X2
781	RED/BLK	X32	X2
782	BLK	X32	X2
783	BLK/GRN	X32	X2
784	BLK/BLU	X32	X2
785	BLK/PNK	X32	X2
786	BLK/WHT	X32	X36
787	BLU	X32	X36
788	GRN	X32	X37
789	YEL	X32	X37
790	BLK	X32	X37
791	BLU/YEL	X36	(202)
792	YEL	X36	(764)
793	BLU	X36	(39)
794	BLK	X36	W37
795	BLK	X36	W37
796	BLK	X36	W37
798		(808)	X30
799		(808)	W36
802	GRN	(804)	X24
803	BLU	(805)	X24
804	GRN	X34	(806)
805	BLU	X34	(807)
806	GRN	X30	X5
807	BLU	X30	X5
808		X30	X5
809		(808)	X24
810	BLU	X41	K14
815	RED	X24	X70
816	WHT	X24	X70
817	BLK	X70	W38
821	RED	X72	X23
824	YEL	X23	(764)
825	BLU/RED	X5	X45
826	GRN	(841)	X45
827	RED/GRN	X5	X45
828	ORG/BLK	X5	(149)
830	BLU/WHT	(598)	X45
831	PNK/WHT	X28	X45
832	GRN/RED	X30	X45
833	RED/YEL	(26)	X45
840	GRN	(598)	X73
841	BLK/GRN	(850)	X73
842	BLK	W37	X73
843	GRN	(840)	X74
844	BLK/GRN	(841)	X74
845	BLK	W37	X74
846	YEL/RED	X29	X71
847	GRN	(840)	X71
848	BLK/GRN	(841)	X71
849	BLK	W37	X71
850	GRN	X22	K7
851	GRN/WHT	X22	K6
852	GRN/BLK	X22	K3
853	GRN/BLU	X22	V4
854	RED	X22	K8
855	BLK	X22	K9
856	ORG	X22	K1
860	WHT	X22	H3
861	BLU/BLK	H3	(870)
870	BLU/BLK	X23	F19
871	BLK	X23	W37
882	BLU/YEL	X30	X71
900	WHT/RED	X47	K4
901	YEL	X27	X81
902	BRN/WHT	X27	X81
903	WHT/YEL	X27	X83
904	BRN/WHT	X23	(902)
905	WHT/YEL	X23	(903)
910	WHT/RED	K4	(900)
911	GRN	(598)	X12
912	BLK/GRN	(841)	X12
921	RED/WHT	X17	K11
922	RED/WHT	(921)	K11
923	RED/WHT	X30	X3
924	RED	K11	X3
925	GRN	K11	X29
926	WHT	X3	X29
940	WHT/GRN	X38	F17
944	BRN/BLU	X38	X24
950	WHT	(506)	F1
951	WHT	(506)	F4
961	RED/BLU	(536)	X44
962	BLK	X39	W36
963	BLK/GRN	X24	X38
985	BLK/WHT	X30	X38
986	RED	X30	V12
987	ORG	V12	(530)
988	RED	(560)	F11
990	YEL/RED	X24	X36
991	GRN/BLK	X24	X36
995	BLU/RED	X18	X3
996	YEL/RED	X18	X3
997	BLK	X18	X3
998	WHT	X18	X3
999	GRN/WHT	(851)	X23

TX1003966

Cab Harness (W2) Wiring Diagram (1 of 3)

TX1004125 –UN–13MAR06



K1

1	(519)	RED	(511)
2	(856)	ORG	X22
3	(520)	RED	(511)
4	NOT USED		
5	(524)	WHT	(508)

K4

1	(900)	WHT/RED	X47
2	(526)	PUR/GRN	S14
3	(910)	WHT/RED	(900)
4	(505)	BLK/WHT	X3
5	NOT USED		

K2

1	(533)	RED	(532)
2	(529)	PUR/WHT	X24
3	(531)	PNK/WHT	X11
4	NOT USED		
5	(525)	PUR	K5

K5

1	(523)	RED	(508)
2	(527)	PUR/RED	V4
3	(521)	BLK	W37
4	(525)	PUR	K2
5	NOT USED		

K3

1	(543)	RED/BLU	F9
2	(852)	GRN/BLK	X22
3	(541)	PNK/GRN	H2
4	NOT USED		
5	(540)	BLK	W37

K11

1	(922)	RED/WHT	(921)
2	(925)	GRN	X29
3	(921)	RED/WHT	X17
4	NOT USED		
5	(924)	RED	X3

X28

1	(1)	RED	F4
2	(12)	BLK	W37
3	(6)	LTGRN/RED	X4
4	NOT USED		
5	(96)	GRN/YEL	X5
6	(22)	GRN	X3
7	(30)	YEL/GRN	X4
8	NOT USED		
9	(15)	BLU	X3
10	(21)	WHT	X3
11	(23)	BLU	X3
12	(2)	RED	(1)
13	(13)	BLK	(12)
14	NOT USED		
15	(16)	PUR/GRN	X3
16	(4)	BLU/RED	X3
17	(24)	RED	X3
18	(654)	BLK	X4
19	(10)	BLU/GRN	X3
20	(5)	LTGRN/BLK	X4
21	NOT USED		
22	(3)	BLU/BLK	X3
23	(29)	YEL	X4
24	(651)	PNK/WHT	X4
25	(149)	ORG/BLK	X45
26	(650)	PNK	X4
27	(831)	PNK/WHT	X45
28	(26)	RED/YEL	X4
29	(94)	YEL/BLK	X5
30	(9)	BLU/YEL	X3
31	(95)	GRN/RED	X5
32	(93)	YEL	X5

X29

1	NOT USED		
2	(43)	BLU	X73
3	(846)	YEL/RED	X71
4	(41)	GRN/BLK	X38
5	(926)	WHT	X3
6	(34)	BLK/GRN	X27
7	(39)	BLU	F10
8	(40)	BLK	W37
9	NOT USED		
10	(57)	LTGRN	S18
11	(59)	GRN/BLU	S18
12	(47)	GRN/WHT	X12
13	(48)	GRN	X27
14	(38)	PNK	X27
15	(42)	GRN/RED	X45
16	(88)	YEL	(764)
17	(36)	BLU	(39)
18	(50)	BLK	(40)
19	NOT USED		
20	(65)	WHT/GRN	X45
21	(35)	BLK/RED	X27
22	NOT USED		
23	(652)	PUR	X45
24	(925)	GRN	K11
25	(655)	PUR/YEL	X4

X30

1	(75)	BLK/WHT	X4
2	(60)	YEL/RED	X3
3	(62)	BLU	X3
4	(806)	GRN	X5
5	NOT USED		
6	NOT USED		
7	NOT USED		
8	(985)	BLK/WHT	X38
9	(103)	WHT/BLK	X3
10	(923)	RED/WHT	X3
11	(73)	PUR	X4
12	(78)	ORG	X3
13	(71)	WHT/YEL	X3
14	NOT USED		
15	(807)	BLU	X5
16	NOT USED		
17	NOT USED		
18	NOT USED		
19	NOT USED		
20	(45)	YEL	X73
21	(104)	PNK/GRN	X3
22	(832)	GRN/RED	X45
23	(74)	RED/BLK	X4
24	(76)	BRN/YEL	X4
25	NOT USED		
26	NOT USED		
27	NOT USED		
28	NOT USED		
29	NOT USED		
30	(882)	BLU/YEL	X71
31	(986)	RED	V12

X31

1	(51)	RED/YEL	X3
2	(81)	BLU/YEL	X3
3	(72)	GRN	X4
4	(79)	YEL/BLU	X3
5	(69)	WHT/PUR	X4
6	(53)	BLK/YEL	X3
7	(52)	RED/YEL	(51)
8	(98)	GRN	X5
9	(68)	LTGRN/BLK	X4
10	(58)	RED/GRN	X3
11	(61)	GRN/YEL	X3
12	(99)	BRN	X5
13	(54)	BLK/YEL	(53)
14	(70)	YEL/BLK	X3
15	(63)	WHT	X82
16	(80)	WHT	X4

X5

1	(806)	GRN	X30
2	(807)	BLU	X30
3	(808)		SHEILD
4	(93)	YEL	X28
5	(94)	YEL/BLK	X28
6	(95)	GRN/RED	X28
7	(98)	GRN	X31
8	(99)	BRN	X31
9	(828)	ORG/BLK	(149)
10	(827)	RED/GRN	X45
11	(825)	BLU/RED	X45
12	(96)	GRN/YEL	X28

X4

1	(29)	YEL	X28
2	(75)	BLK/WHT	X30
3	(5)	LTGRN/BLK	X28
4	(312)	RED/BLU	F14
5	NOT USED		
6	(766)	BRN/GRN	X85
7	(30)	YEL/GRN	X28
8	(6)	LTGRN/RED	X28
9	NOT USED		
10	(650)	PNK	X28
11	(768)	PNK/GRN	S14
12	(72)	GRN	X31
13	(69)	WHT/PUR	X31
14	(651)	PNK/WHT	X28
15	(769)	ORG/BLK	X84
16	(76)	BRN/YEL	X30
17	(68)	LTGRN/BLK	X31
18	(767)	ORG/BLU	X84
19	(73)	PUR	X30
20	(762)	RED/WHT	X23
21	(760)	BLU/BLK	X22
22	(254)	WHT/RED	X22
23	(80)	WHT	X31
24	(74)	RED/BLK	X30
25	(652)	PUR	X29
26	(26)	RED/YEL	X28
27	(763)	YEL/GRN	K14
28	(653)	WHT/YEL	(610)
29	(654)	BLK	X28
30	(655)	PUR/YEL	X29
31	(138)	GRN/BLK	X74
32	(141)	WHT/YEL	(610)

X3

1	(3)	BLU/BLK	X28
2	(9)	BLU/YEL	X28
3	(21)	WHT	X28
4	(79)	YEL/BLU	X31
5	(23)	BLU	X28
6	(15)	BLU	X28
7	NOT USED		
8	(51)	RED/YEL	X31
9	(536)	RED/BLU	K8
10	(4)	BLU/RED	X28
11	(10)	BLU/GRN	X28
12	(22)	GRN	X28
13	(103)	WHT/BLK	X30
14	(24)	RED	X28
15	(16)	PUR/GRN	X28
16	(58)	RED/GRN	X31
17	(70)	YEL/BLK	X31
18	(995)	BLU/RED	X18
19	(660)	ORG	F7
20	(542)	RED/GRN	K10
21	(537)	RED	K7
22	(235)	BRN	X24
23	(104)	PNK/GRN	X30
24	(78)	ORG	X30
25	(61)	GRN/YEL	X31
26	(996)	YEL/RED	X18
27	(505)	BLK/WHT	K4
28	NOT USED		
29	(546)	PUR	K9
30	NOT USED		
31	(234)	BRN/BLU	X24
32	(60)	YEL/RED	X30
33	(923)	RED/WHT	X30
34	(998)	WHT	X18
35	(765)	YEL/BLU	V13
36	(202)	BLU/YEL	X22
37	(508)	WHT	V3
38	(516)	GRN/YEL	F16
39	(223)	GRN/BLU	X22
40	(250)	BRN/YEL	X22
41	(924)	RED	K11
42	(62)	BLU	X30
43	(71)	WHT/YEL	X30
44	(997)	BLK	X18
45	(597)	BLK/GRN	X38
46	(588)	BRN/YEL	X38
47	(583)	WHT	X47
48	NOT USED		
49	(222)	RED/BLU	X22
50	(926)	WHT	X29
51	(81)	BLU/YEL	X31
52	(53)	BLK/YEL	X31

B26

1	(570)	WHT	X38
2	(569)	GRY	X38

B25

1	(572)	GRY/BLK	X38
2	(571)	GRY/WHT	X38

V13

A	(764)	YEL	F18
K	(765)	YEL/BLU	X3

V12

A	(986)	RED	X30
K	(987)	ORG	(530)

W35

1	(502)	BLK	X100

X42

1	(506)	WHT	(950)(951)
2	(501)	BLK	X100

X41

1	(511)	RED	X47
2	(810)	BLU	K14

K6

1	(593)	BLK/RED	(591)
2	(851)	GRN/WHT	X22
3	(590)	BLK/YEL	M5
4	(589)	BLK	M5
5	(594)	BLK	W38

K14

1	(763)	YEL/GRN	X4
2	(539)	BLK	W37
3	(310)	GRN	F8
4	NOT USED		
5	(810)	BLU	X41

H3

1	(861)	BLU/BLK	(870)
2	(860)	WHT	X22

W36

1	(512)	BLK	X100

V3

A	(606)	BLU	(522)
K	(508)	WHT	X3

H2

1	(541)	PNK/GRN	K3
2	(544)	RED/BLU	(543)

X18

1	(995)	BLU/RED	X3
2	(996)	YEL/RED	X3
3	(998)	WHT	X3
4	(997)	BLK	X3

X39

1	NOT USED		
2	(609)	RED/BLK	F3
3	(962)	BLK	W36
4	NOT USED		

X38

1	NOT USED		
2	NOT USED		
3	(944)	BRN/BLU	X24
4	(566)	YEL/RED	F14
5	(570)	WHT	B26
6	(569)	GRY	B26
7	(41)	GRN/BLK	X29
8	(985)	BLK/WHT	X30
9	(963)	BLK/GRN	X24
10	(588)	BRN/YEL	X3
11	(597)	BLK/GRN	X3
12	(940)	WHT/GRN	F17
13	(568)	RED/BLU	(543)
14	(572)	WHT/BLK	B25
15	(571)	GRY/BLK	B25
16	(573)	BLK	(501)

K7

1	(599)	GRN	(598)
2	(850)	GRN	X22
3	(598)	GRN	X17
4	NOT USED		
5	(537)	RED	X3

K9

1	(595)	BLK/RED	(591)
2	(855)	BLK	X22
3	(596)	BLK/RED	(591)
4	NOT USED		
5	(546)	PUR	X3

K8

1	(601)	GRN	(600)
2	(854)	RED	X22
3	(600)	GRN	F1
4	NOT USED		
5	(536)	RED/BLU	X3

K10

1	(602)	WHT	(603)
2	(545)	WHT/PUR	S5
3	(603)	WHT	F11
4	NOT USED		
5	(542)	RED/GRN	X3

X37

1	(789)	YEL	X32
2	(790)	BLK	X32
3	NOT USED		
4	NOT USED		
5	NOT USED		
6	NOT USED		
7	NOT USED		
8	NOT USED		
9	(788)	GRN	X32
10	NOT USED		
11	NOT USED		
12	NOT USED		
13	NOT USED		
14	NOT USED		
15	NOT USED		
16	NOT USED		

X36

1	(792)	YEL	(764)
2	(793)	BLU	(39)
3	(791)	BLU/YEL	(202)
4	NOT USED		
5	NOT USED		
6	NOT USED		
7	NOT USED		
8	NOT USED		
9	(991)	GRN/BLK	X24
10	(786)	BLK/WHT	X32
11	(794)	BLK	W37
12	(795)	BLK	W37
13	NOT USED		
14	NOT USED		
15	(796)	BLK	W37
16	NOT USED		
17	NOT USED		
18	(990)	YEL/RED	X24
19	(777)	RED/WHT	X34
20	(787)	BLU	X32

X22

1	(850)	GRN	K7
2	(851)	GRN/WHT	K6
3	(852)	GRN/BLK	K3
4	(853)	GRN/BLU	V4
5	(854)	RED	K8
6	(855)	BLK	K9
7	(856)	ORG	K1
8	(860)	WHT	H3
9	(223)	GRN/BLU	X3
10	(222)	RED/BLU	X3
11	(250)	BRN/YEL	X3
12	(254)	WHT/RED	X4
13	(760)	BLU/BLK	X4
14	NOT USED		
15	NOT USED		
16	(202)	BLU/YEL	X3

X23

1	(229)	GRN/WHT	X27
2	(230)	BLU/BLK	X27
3	(228)	YEL/GRN	X27
4	(49)	GRN	(48)
5	(206)	RED/BLK	X27
6	(905)	WHT/YEL	(903)
7	(904)	BRN/WHT	(902)
8	(999)	GRN/WHT	(851)
9	(821)	RED	X72
10	(762)	RED/WHT	X4
11	(824)	YEL	(764)
12	(870)	BLU/BLK	F19
13	NOT USED		
14	(205)	RED/BLU	X27
15	(207)	BLK/WHT	X27
16	(871)	BLK	W37

X24

1	(802)	GRN	(804)
2	(815)	RED	X70
3	(235)	BRN	X3
4	(809)	SHIELD	(808)
5	(944)	BRN/BLU	X38
6	NOT USED		
7	(529)	PUR/WHT	K2
8	(803)	BLU	(805)
9	(816)	WHT	X70
10	(234)	BRN/BLU	X3
11	NOT USED		
12	(990)	YEL/RED	X36
13	(991)	GRN/BLK	X36
14	(963)	BLK/GRN	X38
15	NOT USED		
16	(550)	PNK/BLU	V5

X47

1	(511)	RED	X41
2	NOT USED		
3	(583)	WHT	X3
4	(607)	WHT	F12
5	(522)	BLU/WHT	F18
6	(900)	WHT/RED	K4

X27

1	(901)	YEL	X81
2	(902)	BRN/WHT	X81
3	(903)	WHT/YEL	X83
4	(587)	BLK	W36
5	(586)	RED	(537)
6	(38)	PNK	X29
7	(34)	BLK/GRN	X29
8	(228)	YEL/GRN	X23
9	(205)	RED/BLU	X23
10	(206)	RED/BLK	X23
11	(207)	BLK/WHT	X23
12	(48)	GRN	X29
13	NOT USED		
14	(35)	BLK/RED	X29
15	(229)	GRN/WHT	X23
16	(230)	BLU/BLK	X23

TX1004125

Cab Harness (W2) Wiring Diagram (2 of 3)

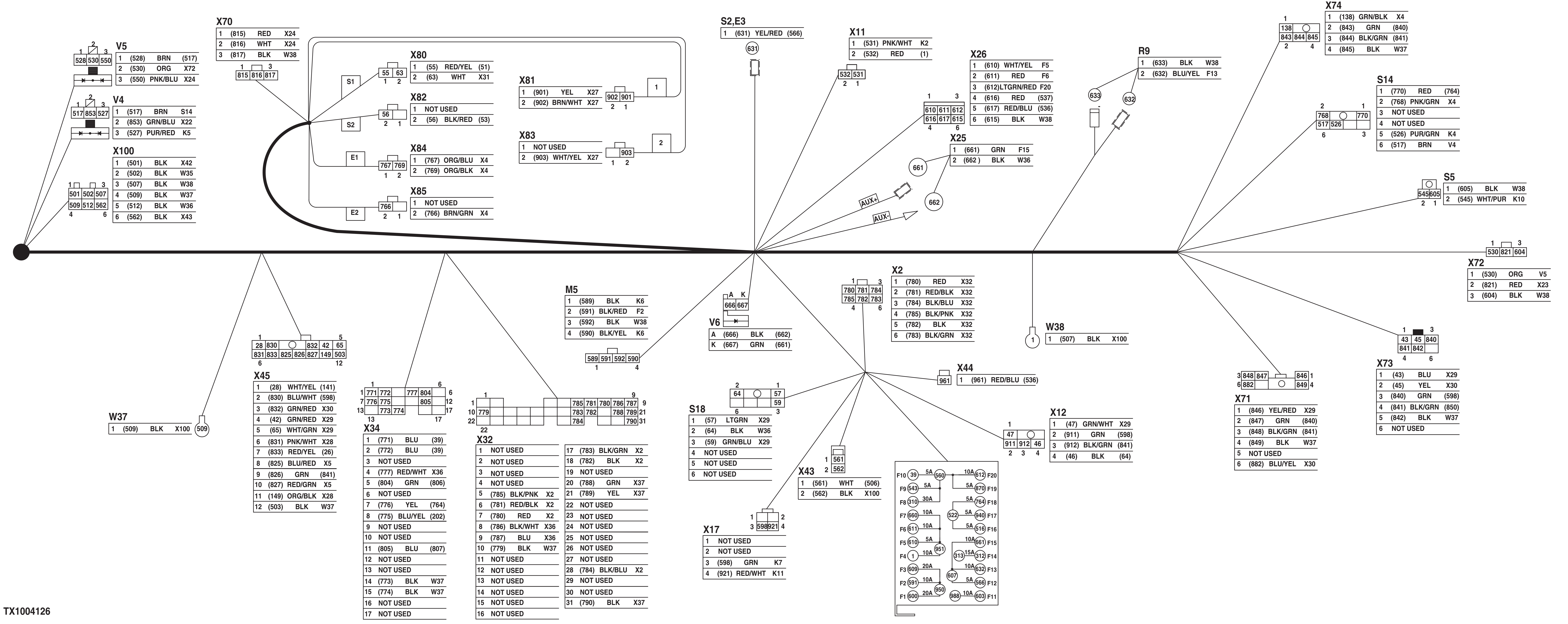
LD30992,00001F3 –19–07APR06–2/5

B25—Left Speaker
B26—Right Speaker
H2—Security Alarm
H3—Monitor Warning Alarm
K1—Load Dump Relay
K2—Pilot Shutoff Solenoid Relay
K3—Security Alarm Relay
K4—Starter Relay
K5—Security Relay
K6—Windshield Wiper Relay
K7—Drive Light Relay
K8—Boom Work Light Relay
K9—Windshield Washer Relay
K10—Horn Relay
K11—Automatic Lubricator Relay
K14—Engine Control Module (ECM) Relay
V3—Load Dump Relay Diode
V12—Main Controller Pilot Switch Signal Diode
V13—ECM Power On Signal Diode
W35—Cab Harness Ground 1
W36—Cab Harness Ground 2
X3—Cab Harness-to-Machine Harness 52-Pin Connector
X4—Cab Harness-to-Machine Harness 32-Pin Connector
X5—Cab Harness-to-Machine Harness 12-Pin Connector
X18—Cab Harness-to-Monitor Harness 4-Pin Connector
X22—Cab Harness-to-Monitor Harness 16-Pin Connector (White)
X23—Cab Harness-to-Monitor Harness 16-Pin Connector (Black)
X24—Cab Harness-to-Monitor Harness 16-Pin Connector (Brown)
X27—Cab Harness-to-Switch Panel Connector
X28—Cab Harness-to-Main Controller 32-Pin Connector
X29—Cab Harness-to-Main Controller 25-Pin Connector
X30—Cab Harness-to-Main Controller 31-Pin Connector
X31—Cab Harness-to-Main Controller 16-Pin Connector
X36—Machine Information Center 20-Pin Connector (Not Used)
X37—Machine Information Center 16-Pin Connector (Not Used)
X38—Cab Harness-to-Air Conditioner Harness 16-Pin Connector
X39—Cab Harness-to-Air Conditioner Harness 4-Pin Connector
X41—Cab Harness-to-Machine Harness 2-Pin Connector 1
X42—Cab Harness-to-Machine Harness 2-Pin Connector 2
X47—Cab Harness-to-Air Conditioner Harness 6-Pin Connector

Continued on next page

LD30992,00001F3 –19–07APR06–3/5

TX1004126 –UN–01MAR06



V5

1	(528)	BRN	(517)
2	(530)	ORG	X72
3	(550)	PNK/BLU	X24

V4

1	(517)	BRN	S14
2	(853)	GRN/BLU	X22
3	(527)	PUR/RED	K5

X100

1	(501)	BLK	X42
2	(502)	BLK	W35
3	(507)	BLK	W38
4	(509)	BLK	W37
5	(512)	BLK	W36
6	(562)	BLK	X43

X70

1	(815)	RED	X24
2	(816)	WHT	X24
3	(817)	BLK	W38

X80

1	(55)	RED/YEL	(51)
2	(63)	WHT	X31

X82

1	NOT USED		
2	(56)	BLK/RED	(53)

X84

1	(767)	ORG/BLU	X4
2	(769)	ORG/BLK	X4

X85

1	NOT USED		
2	(766)	BRN/GRN	X4

X81

1	(901)	YEL	X27
2	(902)	BRN/WHT	X27

X83

1	NOT USED		
2	(903)	WHT/YEL	X27

S2,E3

1	(631)	YEL/RED	(566)

X11

1	(531)	PNK/WHT	K2
2	(532)	RED	(1)

X26

1	(610)	WHT/YEL	F5
2	(611)	RED	F6
3	(612)	LTGRN/RED	F20
4	(616)	RED	(537)
5	(617)	RED/BLU	(536)
6	(615)	BLK	W38

X25

1	(661)	GRN	F15
2	(662)	BLK	W36

R9

1	(633)	BLK	W38
2	(632)	BLU/YEL	F13

X74

1	(138)	GRN/BLK	X4
2	(843)	GRN	(840)
3	(844)	BLK/GRN	(841)
4	(845)	BLK	W37

S14

1	(770)	RED	(764)
2	(768)	PNK/GRN	X4
3	NOT USED		
4	NOT USED		
5	(526)	PUR/GRN	K4
6	(517)	BRN	V4

S5

1	(605)	BLK	W38
2	(545)	WHT/PUR	K10

X72

1	(530)	ORG	V5
2	(821)	RED	X23
3	(604)	BLK	W38

W37

1	(509)	BLK	X100

X45

1	(28)	WHT/YEL	(141)
2	(830)	BLU/WHT	(598)
3	(832)	GRN/RED	X30
4	(42)	GRN/RED	X29
5	(65)	WHT/GRN	X29
6	(831)	PNK/WHT	X28
7	(833)	RED/YEL	(26)
8	(825)	BLU/RED	X5
9	(826)	GRN	(841)
10	(827)	RED/GRN	X5
11	(149)	ORG/BLK	X28
12	(503)	BLK	W37

X34

1	(771)	BLU	(39)
2	(772)	BLU	(39)
3	NOT USED		
4	(777)	RED/WHT	X36
5	(804)	GRN	(806)
6	NOT USED		
7	(776)	YEL	(764)
8	(775)	BLU/YEL	(202)
9	NOT USED		
10	NOT USED		
11	(805)	BLU	(807)
12	NOT USED		
13	NOT USED		
14	(773)	BLK	W37
15	(774)	BLK	W37
16	NOT USED		
17	NOT USED		

X32

1	NOT USED		
2	NOT USED		
3	NOT USED		
4	NOT USED		
5	(785)	BLK/PNK	X2
6	(781)	RED/BLK	X2
7	(780)	RED	X2
8	(786)	BLK/WHT	X36
9	(787)	BLU	X36
10	(779)	BLK	W37
11	NOT USED		
12	NOT USED		
13	NOT USED		
14	NOT USED		
15	NOT USED		
16	NOT USED		
17	(783)	BLK/GRN	X2
18	(782)	BLK	X2
19	NOT USED		
20	(788)	GRN	X37
21	(789)	YEL	X37
22	NOT USED		
23	NOT USED		
24	NOT USED		
25	NOT USED		
26	NOT USED		
27	NOT USED		
28	(784)	BLK/BLU	X2
29	NOT USED		
30	NOT USED		
31	(790)	BLK	X37

M5

1	(589)	BLK	K6
2	(591)	BLK/RED	F2
3	(592)	BLK	W38
4	(590)	BLK/YEL	K6

V6

A	(666)	BLK	(662)
K	(667)	GRN	(661)

X2

1	(780)	RED	X32
2	(781)	RED/BLK	X32
3	(784)	BLK/BLU	X32
4	(785)	BLK/PNK	X32
5	(782)	BLK	X32
6	(783)	BLK/GRN	X32

W38

1	(507)	BLK	X100

X44

1	(961)	RED/BLU	(536)

S18

1	(57)	LTGRN	X29
2	(64)	BLK	W36
3	(59)	GRN/BLU	X29
4	NOT USED		
5	NOT USED		
6	NOT USED		

X43

1	(561)	WHT	(506)
2	(562)	BLK	X100

X17

1	NOT USED		
2	NOT USED		
3	(598)	GRN	K7
4	(921)	RED/WHT	K11

X12

1	(47)	GRN/WHT	X29
2	(911)	GRN	(598)
3	(912)	BLK/GRN	(841)
4	(46)	BLK	(64)

X71

1	(846)	YEL/RED	X29
2	(847)	GRN	(840)
3	(848)	BLK/GRN	(841)
4	(849)	BLK	W37
5	NOT USED		
6	(882)	BLU/YEL	X30

X73

1	(43)	BLU	X29
2	(45)	YEL	X30
3	(840)	GRN	(598)
4	(841)	BLK/GRN	(850)
5	(842)	BLK	W37
6	NOT USED		

TX1004126

Cab Harness (W1) Wiring Diagram (3 of 3)

Continued on next page

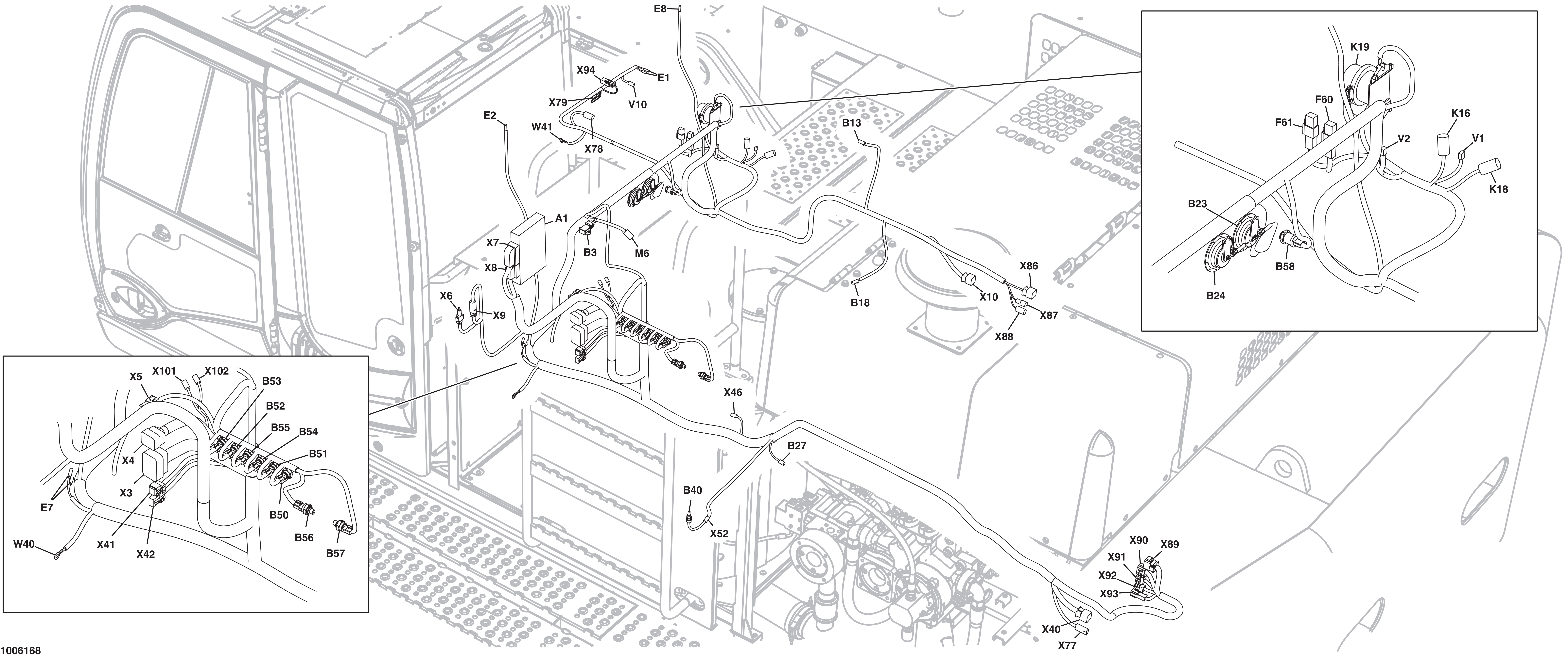
LD30992,00001F3 –19–07APR06–4/5

E3—Cab Dome Light
F1—Boom Lights 20 A Fuse
F2—Windshield Wiper and Washer 10 A Fuse
F3—Air Conditioner and Heater 20 A Fuse
F4—Solenoid 10 A Fuse
F5—Travel Alarm 5 A Fuse
F6—Optional Equipment 10 A Fuse
F7—Lubricator 10 A Fuse
F8—Engine Control Module (ECM) 30 A Fuse
F9—Radio Backup 5 A Fuse
F10—Machine Information Center and Main Controller Batter Power 5 A Fuse
F11—Horn 10 A Fuse
F12—Radio and Dome Light 5 A Fuse
F13—Lighter 10 A Fuse
F14—High Pressure Fuel Pump Control Valve 15 A Fuse
F15—Cab Auxiliary Power Connector One 10 A Fuse
F16—Glow Plug Relay 5 A Fuse
F17—Air Conditioner and Heater 5 A Fuse
F18—Controller Key Switch Signal 5 A Fuse
F19—Controller 5 A Fuse
F20—Optional Equipment 10 A Fuse
M5—Windshield Wiper Motor
R9—Lighter
S2—Cab Dome Light Switch
S5—Horn Switch
S14—Engine Stop Switch
S18—Learning Switch
V4—Security Diode
V5—Start Relay Diode
V6—Auxiliary Power Connector Diode
W37—Cab Harness Ground 3
W38—Cab Harness Ground 4
X2—Dr. ZX 6-Pin Connector
X11—Cab Harness-to-Pilot Shutoff Solenoid Valve Harness Connector
X12—Cab Harness-to-Reversing Fan Switch Harness Connector
X17—Cab Harness-to-Auxiliary Fuse Box 4-Pin Connector
X25—Auxiliary Power Connectors
X26—Optional Connector
X32—Cab Harness-to-Information Controller 31-Pin Connector
X34—Cab Harness-to-Information Controller 17-Pin Connector
X43—Auxiliary Fuse Box Connector
X44—Optional Light Connector
X45—Option 2 12-Pin Connector
X70—Cab Harness 3-Pin Connector (Not Used)
X71—Cab Harness-to-Auto Lubricator Switch Harness Connector (Not Used)
X72—Cab Harness-to-Pilot Shutoff Switch Harness Connector
X73—Cab Harness-to-Cab Switch Harness Connector
X74—Cab Harness-to-Travel Alarm Cancel Switch Harness Connector
X80—Engine Speed Dial Main Controller Side Connector (S1)
X81—Engine Speed Dial Switch Panel Side Connector (1)
X82—Engine Speed Dial Ground Main Controller Side Connector (S2)
X83—Engine Speed Dial Ground Switch Panel Side Connector (2)
X84—Engine Control Module (ECM) Power and Signal Connector (E1)
X85—Engine Control Module (ECM) Return Connector (E2)
X100—Cab Ground Splice Connector

LD30992,00001F3 –19–07APR06–5/5

Machine Harness (W2) Component Location

TX1006168 –UN–27APR06



TX1006168

Machine Harness (W2) Component Location

LD30992,00001F4 –19–28APR06–1/2

A1—Engine Control Module (ECM)
B3—Barometric Pressure Sensor
B13—Radiator Level Switch
B18—Fuel Level Sensor
B23—High Note Horn
B24—Low Note Horn
B27—Hydraulic Oil Filter Restriction Switch
B40—Hydraulic Oil Temperature Sensor
B50—Arm Out Pressure Sensor
B51—Arm In Pressure Sensor
B52—Boom Up Pressure Sensor
B53—Boom Down Pressure Sensor
B54—Bucket Curl Pressure Sensor
B55—Bucket Dump Pressure Sensor
B56—Travel Right Pressure Sensor
B57—Travel Left Pressure Sensor
B58—Boom Bottom Pressure Sensor
E1—Drive Light
E2—Boom Work Light
E7—Drive Light (Optional)
F60—Fusible Link 75A
F61—Fusible Link 45A
K16—Glow Plug Relay
K18—Starter Protection Relay
K19—Battery Relay
M6—Windshield Washer Motor
V1—Glow Plug Relay Diode
V2—Battery Relay Diode
W40—Machine Harness Ground 1
W41—Machine Harness Ground 2
X3—Cab Harness-to-Machine Harness 52-Pin Connector
X4—Cab Harness-to-Machine Harness 32-Pin Connector
X5—Cab Harness-to-Machine Harness 12-Pin Connector
X6—Engine Diagnostic Connector
X7—Engine Control Module (ECM) 81-Pin Connector V
X8—Engine Control Module (ECM) 40-Pin Connector E
X9—Machine Harness CAN Connector
X10—Machine Harness-to-Control Valve Harness 20-Pin Connector
X40—Machine Harness-to-Pump Harness 20-Pin Connector
X41—Cab Harness-to-Machine Harenss 2-Pin Connector 1
X42—Cab Harness-to-Machine Harness 2-Pin Connector 2
X46—Attachment Connector (Not Used)
X52—Machine Harness-to-Hydraulic Oil Temperature Sensor Sub-Harness Connector
X77—Machine Harness-to-Pump Harness 4-Pin Camera Connector (Not Used)
X78—Machine Harness-to-Auto Lubricator Harness Connector
X79—Machine Harness Auxiliary Power Connector
X86—Machine Harness-to-Engine Interface Harness 16-Pin Connector (A)
X87—Machine Harness-to-Engine Interface Harness 1-Pin Connector (B)
X88—Machine Harness-to-Engine Interface Harness 2-Pin Connector (C)
X89—Machine Harness-to-Engine Harness 20-Pin Connector (D)
X90—Machine Harness-to-Engine Harness 12-Pin Connector (E)
X91—Machine Harness-to-Engine Harness 8-Pin Connector (F)
X92—Machine Harness-to-Engine Harness 6-Pin Connector (G)
X93—Machine Harness-to-Engine Harness 1-Pin Connector (H)
X94—Machine Harness-to-Lubricator Harness Connector
X101—Machine Harness Splice Connector 1
X102—Machine Harness Splice Connector 2

LD30992,00001F4 –19–28APR06–2/2

Machine Harness (W2) Wiring Diagram

TX1003967 –UN–16MAR06

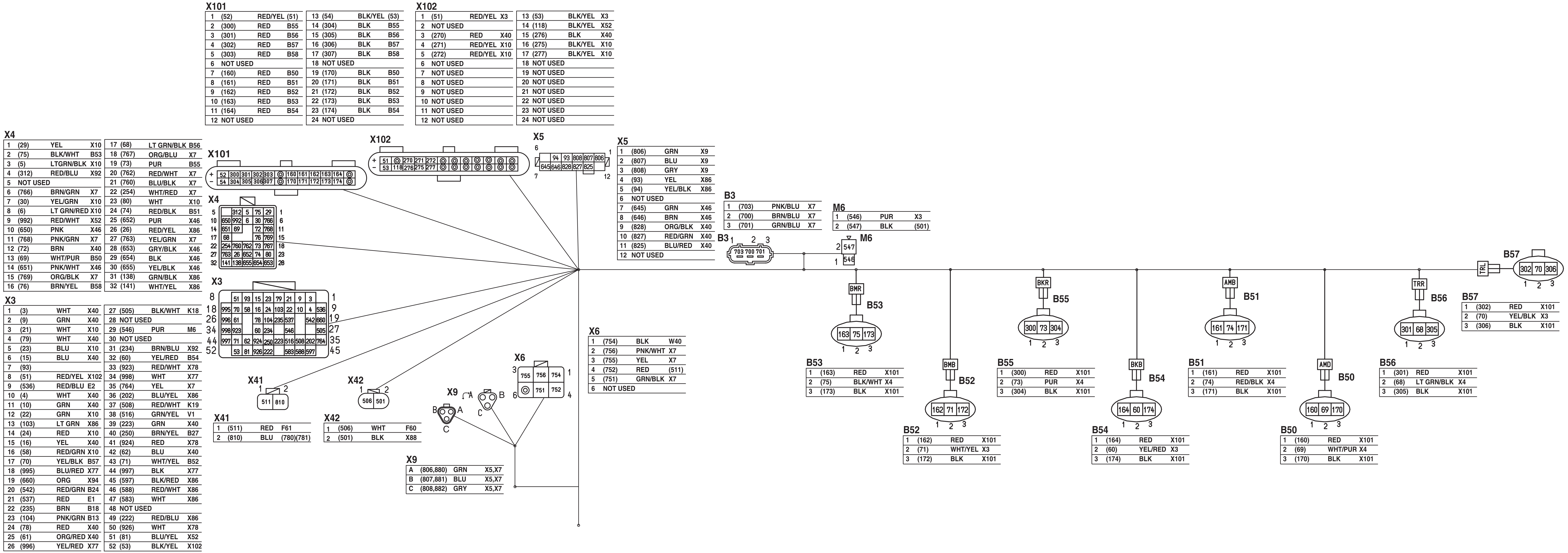
NUMBER	COLOR	END #1	END #2
3	WHT	X3	X40
4	WHT	X3	X40
5	LT GRN/BLK	X4	X10
6	LT GRN/RED	X4	X10
9	GRN	X3	X40
10	GRN	X3	X40
15	BLU	X3	X40
16	YEL	X3	X40
21	WHT	X3	X10
22	GRN	X3	X10
23	BLU	X3	X10
24	RED	X3	X10
26	RED/YEL	X4	X86
29	YEL	X4	X10
30	YEL/GRN	X4	X10
51	RED/YEL	X3	X102
52	RED/YEL	(51)	X101
53	BLK/ YEL	X3	X102
54	BLK/ YEL	(53)	X101
58	RED/GRN	X3	X10
60	YEL/RED	X3	B54
61	ORG/RED	X3	X40
62	BLU	X3	X40
68	LT GRN/BLK	X4	B56
69	WHT/PUR	X4	B50
70	YEL/BLK	X3	B57
71	WHT/YEL	X3	B52
72	BRN	X4	X40
73	PUR	X4	B55
74	RED/BLK	X4	B51
75	BLK/WHT	X4	B53
76	BRN/YEL	X4	B58
78	RED	X3	X40
79	WHT	X3	X40
80	WHT	X4	X10
81	BLU/YEL	X3	X52
93	YEL	X5	X86
94	YEL/BLK	X5	X86
103	LT GRN	X3	X86
104	PNK/GRN	X3	B13
118	BLK/YEL	X102	X52
138	GRN/BLK	X4	X86
141	WHT/YEL	X4	X86
160	RED	X101	B50
161	RED	X101	B51
162	RED	X101	B52
163	RED	X101	B53
164	RED	X101	B54
170	BLK	X101	B50
171	BLK	X101	B51
172	BLK	X101	B52
173	BLK	X101	B53
174	BLK	X101	B54
202	BLU/YEL	X3	X86
222	RED/BLU	X3	X86
223	GRN	X3	X40
224	BLK	(501)	X40
234	BRN/BLU	X3	X92
235	BRN	X3	B18
250	BRN/YEL	X3	B27
254	WHT/RED	X4	X7
255	BLK	(501)	B18
256	BLK	(501)	B13
270	RED	X102	X40
271	RED/YEL	X102	X10
272	RED/YEL	X102	X10
275	BLK/YEL	X102	X10
276	BLK	X102	X40
277	BLK/YEL	X102	X10
300	RED	X101	B55
301	RED	X101	B56
302	RED	X101	B57
303	RED	X101	B58
304	BLK	X101	B55
305	BLK	X101	B56
306	BLK	X101	B57
307	BLK	X101	B58
312	RED/BLU	X92	X4
321	BLU/YEL	X52	B40
322	BLK/YEL	X52	B40
501	BLK	X42	X88
503	BLU/YEL	(202)	K18
505	BLK/WHT	X3	K18
506	WHT	X42	F60
508	RED/WHT	X3	K19
511	RED	X41	F61
513	RED	(511)	X79
514	BLK/WHT	K16	X93
515	GRN/RED	X7	K16
516	GRN/YEL	X3	V1
520	BLK	W41	X79
521	BLK	(501)	K19
535	RED/BLU	(536)	E8
536	RED/BLU	X3	E2
537	RED	X3	E1
542	RED/GRN	X3	B24
543	BLK	W40	B24
544	BLK	(543)	B23
546	PUR	X3	M6
547	BLK	(501)	M6
583	WHT	X3	X86
584	RED	(537)	E7
585	BLK	E7	W40
588	RED/WHT	X3	X86
597	BLK/RED	X3	X86
645	GRN	X5	X46
646	BRN	X5	X46
650	PNK	X4	X46
651	PNK/WHT	X4	X46
652	PUR	X4	X46
653	GRY/BLK	X4	X46
654	BLK	X4	X46
655	YEL/BLK	X4	X46
660	ORG	X3	X94
668	WHT	W41	X94
670	RED/WHT	V2	(508)
671	BLK/WHT	V2	(521)
672	RED/GRN	(542)	B23
673	RED	X88	K18
674	RED/BLK	K19	K18
675	BLK	(501)	K18
676	BLK	E1	W41
677	RED	F61	K19
678	WHT	F60	K19
679	RED	(511)	K16
680	GRN/YEL	V1	K16
681	WHT	(506)	X87
682	YEL	V10	(660)
683	WHT	V10	(668)
700	BRN/BLU	X7	B3
701	GRN/BLK	X7	B3
702	BLU/YEL	X7	X89
703	PNK/BLU	X7	B3
704	BLK/RED	X7	X89
705	BLK/YEL	X7	X89
706	RED/BLU	X7	X89
707	RED	X8	X89
708	YEL/GRN	X8	X92
709	RED/BLK	X8	X89
710	WHT	X8	X89
711	RED/BLK	X8	X92
712	GRN	X8	(707)
713	BLU	X8	X89
714	GRN/YEL	X8	X91
715	GRN/WHT	X8	X91
716	GRN/BLK	X8	X91
717	RED/WHT	X8	X89
718	RED/BLK	X8	(711)
719	BLK	X8	X89
721	GRY	X8	X89
722	WHT	X8	X89
723	WHT/BLK	X8	X91
724	RED/WHT	X8	X92
725	BLK	X8	X89
726	WHT	X8	X89
727	GRY	X8	X89
728	RED/BLU	X8	X89
729	WHT/BLU	X8	X91
730	WHT/RED	X8	X91
731	RED/WHT	X8	(724)
732	RED	X8	X90
733	BLU/WHT	X8	X90
734	BLU/RED	X8	X90
735	BLU	X8	X90
736	BLU/YEL	X8	X90
737	WHT	X8	X90
738	GRN/RED	X8	X90
739	GRN/BLK	X8	X90
740	GRY	(721)	(721)
750	RED/BLU	X7	X40
751	GRN/BLK	X6	X7
752	RED	X6	(511)
754	BLK	X6	W40
755	YEL	X7	X6
756	PNK/WHT	X7	X6
760	BLU/BLK	X4	X7
762	RED/WHT	X4	X4
763	YEL/GRN	X4	X7
764	YEL	X3	X7
765	YEL/GRN	(763)	X7
766	BRN/GRN	X4	X7
767	ORG/BLU	X4	X7
768	PNK/GRN	X4	X7
769	ORG/BLK	X4	X7
770	ORG/BLK	(769)	X7
780	RED	X7	(810)
781	RED	X7	(810)
782	BLK	X7	(811)(812)
783	BLK	X7	(811)(812)
784	BLK	X7	(811)(812)
785	BLK	X7	(811)(812)
786	BLK	X7	(811)(812)
787	BLK/WHT	X7	(505)
788	BLK	X7	W40
790	BLK	X40	(700)
806	GRN	X9	X5
807	BLU	X9	X5
808	GRY	X9	X5
810	BLU	X41	(780)(781)
811	BLK	(501)	(782)(783)(784)(785)(786)
812	BLK	W40	(782)(783)(784)(785)(786)
825	BLU/RED	X5	X40
827	RED/GRN	X5	X40
828	ORG/BLK	X5	X40
880	GRN	X9	X7
881	BLU	X9	X7
882	GRY	X9	X7
923	RED/WHT	X3	X78
924	RED	X3	X78
926	WHT	X3	X78
929	BLK	X78	W41
992	RED/WHT	X4	X52
995	BLU/RED	X3	X77
996	YEL/RED	X3	X77
997	BLK	X3	X77
998	WHT	X3	X77

TX1003967

Machine Harness (W2) Wiring Diagram (1 of 3)

LD30992,00001F5 –19–20MAR06–1/5

TX1004430 –UN–16MAR06



X101

1	(52)	RED/YEL	(51)	13	(54)	BLK/YEL	(53)
2	(300)	RED	B55	14	(304)	BLK	B55
3	(301)	RED	B56	15	(305)	BLK	B56
4	(302)	RED	B57	16	(306)	BLK	B57
5	(303)	RED	B58	17	(307)	BLK	B58
6	NOT USED			18	NOT USED		
7	(160)	RED	B50	19	(170)	BLK	B50
8	(161)	RED	B51	20	(171)	BLK	B51
9	(162)	RED	B52	21	(172)	BLK	B52
10	(163)	RED	B53	22	(173)	BLK	B53
11	(164)	RED	B54	23	(174)	BLK	B54
12	NOT USED			24	NOT USED		

X102

1	(51)	RED/YEL	X3	13	(53)	BLK/YEL	X3
2	NOT USED			14	(118)	BLK/YEL	X52
3	(270)	RED	X40	15	(276)	BLK	X40
4	(271)	RED/YEL	X10	16	(275)	BLK/YEL	X10
5	(272)	RED/YEL	X10	17	(277)	BLK/YEL	X10
6	NOT USED			18	NOT USED		
7	NOT USED			19	NOT USED		
8	NOT USED			20	NOT USED		
9	NOT USED			21	NOT USED		
10	NOT USED			22	NOT USED		
11	NOT USED			23	NOT USED		
12	NOT USED			24	NOT USED		

X4

1	(29)	YEL	X10	17	(68)	LT GRN/BLK	B56
2	(75)	BLK/WHT	B53	18	(767)	ORG/BLU	X7
3	(5)	LTGRN/BLK	X10	19	(73)	PUR	B55
4	(312)	RED/BLU	X92	20	(762)	RED/WHT	X7
5	NOT USED			21	(760)	BLU/BLK	X7
6	(766)	BRN/GRN	X7	22	(254)	WHT/RED	X7
7	(30)	YEL/GRN	X10	23	(80)	WHT	X10
8	(6)	LT GRN/RED	X10	24	(74)	RED/BLK	B51
9	(992)	RED/WHT	X52	25	(652)	PUR	X46
10	(650)	PNK	X46	26	(26)	RED/YEL	X86
11	(768)	PNK/GRN	X7	27	(763)	YEL/GRN	X7
12	(72)	BRN	X40	28	(653)	GRY/BLK	X46
13	(69)	WHT/PUR	B50	29	(654)	BLK	X46
14	(651)	PNK/WHT	X46	30	(655)	YEL/BLK	X46
15	(769)	ORG/BLK	X7	31	(138)	GRN/BLK	X86
16	(76)	BRN/YEL	B58	32	(141)	WHT/YEL	X86

X3

1	(3)	WHT	X40	27	(505)	BLK/WHT	K18
2	(9)	GRN	X40	28	NOT USED		
3	(21)	WHT	X10	29	(546)	PUR	M6
4	(79)	WHT	X40	30	NOT USED		
5	(23)	BLU	X10	31	(234)	BRN/BLU	X92
6	(15)	BLU	X40	32	(60)	YEL/RED	B54
7	(93)			33	(923)	RED/WHT	X78
8	(51)	RED/YEL	X102	34	(998)	WHT	X77
9	(536)	RED/BLU	E2	35	(764)	YEL	X7
10	(4)	WHT	X40	36	(202)	BLU/YEL	X86
11	(10)	GRN	X40	37	(508)	RED/WHT	K19
12	(22)	GRN	X10	38	(516)	GRN/YEL	V1
13	(103)	LT GRN	X86	39	(223)	GRN	X40
14	(24)	RED	X10	40	(250)	BRN/YEL	B27
15	(16)	YEL	X40	41	(924)	RED	X78
16	(58)	RED/GRN	X10	42	(62)	BLU	X40
17	(70)	YEL/BLK	B57	43	(71)	WHT/YEL	B52
18	(995)	BLU/RED	X77	44	(997)	BLK	X77
19	(660)	ORG	X94	45	(597)	BLK/RED	X86
20	(542)	RED/GRN	B24	46	(588)	RED/WHT	X86
21	(537)	RED	E1	47	(583)	WHT	X86
22	(235)	BRN	B18	48	NOT USED		
23	(104)	PNK/GRN	B13	49	(222)	RED/BLU	X86
24	(78)	RED	X40	50	(926)	WHT	X78
25	(61)	ORG/RED	X40	51	(81)	BLU/YEL	X52
26	(996)	YEL/RED	X77	52	(53)	BLK/YEL	X102

X5

1	(806)	GRN	X9
2	(807)	BLU	X9
3	(808)	GRY	X9
4	(93)	YEL	X86
5	(94)	YEL/BLK	X86
6	NOT USED		
7	(645)	GRN	X46
8	(646)	BRN	X46
9	(828)	ORG/BLK	X40
10	(827)	RED/GRN	X40
11	(825)	BLU/RED	X40
12	NOT USED		

B3

1	(703)	PNK/BLU	X7
2	(700)	BRN/BLU	X7
3	(701)	GRN/BLU	X7

M6

1	(546)	PUR	X3
2	(547)	BLK	(501)

X6

1	(754)	BLK	W40
2	(756)	PNK/WHT	X7
3	(755)	YEL	X7
4	(752)	RED	(511)
5	(751)	GRN/BLK	X7
6	NOT USED		

X41

1	(511)	RED	F61
2	(810)	BLU	(780)(781)

X42

1	(506)	WHT	F60
2	(501)	BLK	X88

X9

A	(806,880)	GRN	X5,X7
B	(807,881)	BLU	X5,X7
C	(808,882)	GRY	X5,X7

B53

1	(163)	RED	X101
2	(75)	BLK/WHT	X4
3	(173)	BLK	X101

B52

1	(162)	RED	X101
2	(71)	WHT/YEL	X3
3	(172)	BLK	X101

B55

1	(300)	RED	X101
2	(73)	PUR	X4
3	(304)	BLK	X101

B54

1	(164)	RED	X101
2	(60)	YEL/RED	X3
3	(174)	BLK	X101

B51

1	(161)	RED	X101
2	(74)	RED/BLK	X4
3	(171)	BLK	X101

B50

1	(160)	RED	X101
2	(69)	WHT/PUR	X4
3	(170)	BLK	X101

B56

1	(301)	RED	X101
2	(68)	LT GRN/BLK	X4
3	(305)	BLK	X101

B57

1	(302)	RED	X101
2	(70)	YEL/BLK	X3
3	(306)	BLK	X101

TX1004430

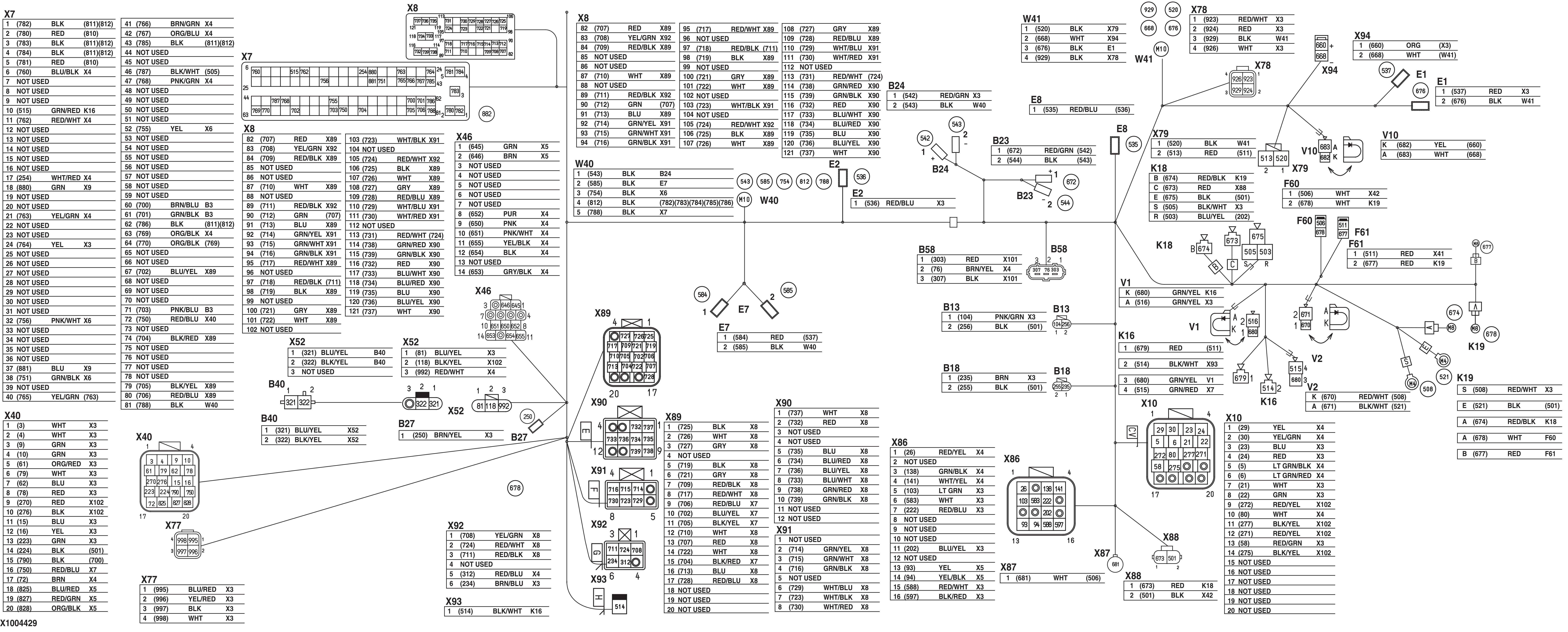
Machine Harness (W2) Wiring Diagram (2 of 3)

LD30992,00001F5 –19–20MAR06–2/5

B3—Barometric Pressure Sensor
B50—Arm Out Pressure Sensor
B51—Arm In Pressure Sensor
B52—Boom Up Pressure Sensor
B53—Boom Down Pressure Sensor
B54—Bucket Curl Pressure Sensor
B55—Bucket Dump Pressure Sensor
B56—Travel Right Pressure Sensor
B57—Travel Left Pressure Sensor
M6—Windshield Washer Motor
X3—Cab Harness-to-Machine Harness 52-Pin Connector
X4—Cab Harness-to-Machine Harness 32-Pin Connector
X5—Cab Harness-to-Machine Harness 12-Pin Connector
X6—Engine Diagnostic Connector
X9—Machine Harness CAN Connector
X41—Cab Harness-to-Machine Harness 2-Pin Connector 1
X42—Cab Harness-to-Machine Harness 2-Pin Connector 2
X101—Machine Harness Splice Connector 1
X102—Machine Harness Splice Connector 2

Continued on next page

TX1004429 –UN–16MAR06



TX1004429

X7

1	(782)	BLK	(811)(812)
2	(780)	RED	(810)
3	(783)	BLK	(811)(812)
4	(784)	BLK	(811)(812)
5	(781)	RED	(810)
6	(760)	BLU/BLK	X4
7	NOT USED		
8	NOT USED		
9	NOT USED		
10	(515)	GRN/RED	K16
11	(762)	RED/WHT	X4
12	NOT USED		
13	NOT USED		
14	NOT USED		
15	NOT USED		
16	NOT USED		
17	(254)	WHT/RED	X4
18	(880)	GRN	X9
19	NOT USED		
20	NOT USED		
21	(763)	YEL/GRN	X4
22	NOT USED		
23	NOT USED		
24	(764)	YEL	X3
25	NOT USED		
26	NOT USED		
27	NOT USED		
28	NOT USED		
29	NOT USED		
30	NOT USED		
31	NOT USED		
32	(756)	PNK/WHT	X6
33	NOT USED		
34	NOT USED		
35	NOT USED		
36	NOT USED		
37	(881)	BLU	X9
38	(751)	GRN/BLK	X6
39	NOT USED		
40	(765)	YEL/GRN	(763)
41	(766)	BRN/GRN	X4
42	(767)	ORG/BLU	X4
43	(785)	BLK	(811)(812)
44	NOT USED		
45	NOT USED		
46	(787)	BLK/WHT	(505)
47	(768)	PNK/GRN	X4
48	NOT USED		
49	NOT USED		
50	NOT USED		
51	NOT USED		
52	(755)	YEL	X6
53	NOT USED		
54	NOT USED		
55	NOT USED		
56	NOT USED		
57	NOT USED		
58	NOT USED		
59	NOT USED		
60	(700)	BRN/BLU	B3
61	(701)	GRN/BLK	B3
62	(786)	BLK	(811)(812)
63	(769)	ORG/BLK	X4
64	(770)	ORG/BLK	(769)
65	NOT USED		
66	NOT USED		
67	(702)	BLU/YEL	X89
68	NOT USED		
69	NOT USED		
70	NOT USED		
71	(703)	PNK/BLU	B3
72	(750)	RED/BLU	X40
73	NOT USED		
74	(704)	BLK/RED	X89
75	NOT USED		
76	NOT USED		
77	NOT USED		
78	NOT USED		
79	(705)	BLK/YEL	X89
80	(706)	RED/BLU	X89
81	(788)	BLK	W40

X8

82	(707)	RED	X89
83	(708)	YEL/GRN	X92
84	(709)	RED/BLK	X89
85	NOT USED		
86	NOT USED		
87	(710)	WHT	X89
88	NOT USED		
89	(711)	RED/BLK	X92
90	(712)	GRN	(707)
91	(713)	BLU	X89
92	(714)	GRN/YEL	X91
93	(715)	GRN/WHT	X91
94	(716)	GRN/BLK	X91
95	(717)	RED/WHT	X89
96	NOT USED		
97	(718)	RED/BLK	(711)
98	(719)	BLK	X89
99	NOT USED		
100	(721)	GRY	X89
101	(722)	WHT	X89
102	NOT USED		
103	(723)	WHT/BLK	X91
104	NOT USED		
105	(724)	RED/WHT	X92
106	(725)	BLK	X89
107	(726)	WHT	X89
108	(727)	GRY	X89
109	(728)	RED/BLU	X89
110	(729)	WHT/BLU	X91
111	(730)	WHT/RED	X91
112	NOT USED		
113	(731)	RED/WHT	(724)
114	(738)	GRN/RED	X90
115	(739)	GRN/BLK	X90
116	(732)	RED	X90
117	(733)	BLU/WHT	X90
118	(734)	BLU/RED	X90
119	(735)	BLU	X90
120	(736)	BLU/YEL	X90
121	(737)	WHT	X90

X46

1	(645)	GRN	X5
2	(646)	BRN	X5
3	NOT USED		
4	NOT USED		
5	NOT USED		
6	NOT USED		
7	NOT USED		
8	(652)	PUR	X4
9	(650)	PNK	X4
10	(651)	PNK/WHT	X4
11	(655)	YEL/BLK	X4
12	(654)	BLK	X4
13	NOT USED		
14	(653)	GRY/BLK	X4

X52

1	(321)	BLU/YEL	B40
2	(322)	BLK/YEL	B40
3	NOT USED		

X52

1	(81)	BLU/YEL	X3
2	(118)	BLK/YEL	X102
3	(992)	RED/WHT	X4

B40

1	(321)	BLU/YEL	X52
2	(322)	BLK/YEL	X52

B27

1	(250)	BRN/YEL	X3

X40

1	(3)	WHT	X3
2	(4)	WHT	X3
3	(9)	GRN	X3
4	(10)	GRN	X3
5	(61)	ORG/RED	X3
6	(79)	WHT	X3
7	(62)	BLU	X3
8	(78)	RED	X3
9	(270)	RED	X102
10	(276)	BLK	X102
11	(15)	BLU	X3
12	(16)	YEL	X3
13	(223)	GRN	X3
14	(224)	BLK	(501)
15	(790)	BLK	(700)
16	(750)	RED/BLU	X7
17	(72)	BRN	X4
18	(825)	BLU/RED	X5
19	(827)	RED/GRN	X5
20	(828)	ORG/BLK	X5

X77

1	(995)	BLU/RED	X3
2	(996)	YEL/RED	X3
3	(997)	BLK	X3
4	(998)	WHT	X3

X92

1	(708)	YEL/GRN	X8
2	(724)	RED/WHT	X8
3	(711)	RED/BLK	X8
4	NOT USED		
5	(312)	RED/BLU	X4
6	(234)	BRN/BLU	X3

X93

1	(514)	BLK/WHT	K16

X8

82	(707)	RED	X89
83	(708)	YEL/GRN	X92
84	(709)	RED/BLK	X89
85	NOT USED		
86	NOT USED		
87	(710)	WHT	X89
88	NOT USED		
89	(711)	RED/BLK	X92
90	(712)	GRN	(707)
91	(713)	BLU	X89
92	(714)	GRN/YEL	X91
93	(715)	GRN/WHT	X91
94	(716)	GRN/BLK	X91
95	(717)	RED/WHT	X89
96	NOT USED		
97	(718)	RED/BLK	(711)
98	(719)	BLK	X89
99	NOT USED		
100	(721)	GRY	X89
101	(722)	WHT	X89
102	NOT USED		
103	(723)	WHT/BLK	X91
104	NOT USED		
105	(724)	RED/WHT	X92
106	(725)	BLK	X89
107	(726)	WHT	X89
108	(727)	GRY	X89
109	(728)	RED/BLU	X89
110	(729)	WHT/BLU	X91
111	(730)	WHT/RED	X91
112	NOT USED		
113	(731)	RED/WHT	(724)
114	(738)	GRN/RED	X90
115	(739)	GRN/BLK	X90
116	(732)	RED	X90
117	(733)	BLU/WHT	X90
118	(734)	BLU/RED	X90
119	(735)	BLU	X90
120	(736)	BLU/YEL	X90
121	(737)	WHT	X90

W40

1	(543)	BLK	B24
2	(585)	BLK	E7
3	(754)	BLK	X6
4	(812)	BLK	(782)(783)(784)(785)(786)
5	(788)	BLK	X7

E7

1	(584)	RED	(537)
2	(585)	BLK	W40

E2

1	(536)	RED/BLU	X3

B24

1	(542)	RED/GRN	X3
2	(543)	BLK	W40

E8

1	(535)	RED/BLU	(536)

B23

1	(672)	RED/GRN	(542)
2	(544)	BLK	(543)

W41

1	(520)	BLK	X79
2	(668)	WHT	X94
3	(676)	BLK	E1
4	(929)	BLK	X78

X78

1	(923)	RED/WHT	X3
2	(924)	RED	X3
3	(929)	BLK	W41
4	(926)	WHT	X3

X94

1	(660)	ORG	(X3)
2	(668)	WHT	(W41)

E1

1	(537)	RED	X3
2	(676)	BLK	W41

X79

1	(520)	BLK	W41
2	(513)	RED	(511)

V10

K	(682)	YEL	(660)
A	(683)	WHT	(668)

K18

B	(674)	RED/BLK	K19
C	(673)	RED	X88
E	(675)	BLK	(501)
S	(505)	BLK/WHT	X3
R	(503)	BLU/YEL	(202)

F60

1	(506)	WHT	X42
2	(678)	WHT	K19

F61

1	(511)	RED	X41
2	(677)	RED	K19

B58

1	(303)	RED	X101
2	(76)	BRN/YEL	X4
3	(307)	BLK	X101

V1

K	(680)	GRN/YEL	K16
A	(516)	GRN/YEL	X3

B13

1	(104)	PNK/GRN	X3
2	(256)	BLK	(501)

K16

1	(679)	RED	(511)
2	(514)	BLK/WHT	X93
3	(680)	GRN/YEL	V1
4	(515)	GRN/RED	X7

B18

1	(235)	BRN	X3
2	(255)	BLK	(501)

V2

K	(670)	RED/WHT	(508)
A	(671)	BLK/WHT	(521)

K19

S	(508)	RED/WHT	X3
E	(521)	BLK	(501)
A	(674)	RED/BLK	K18
A	(678)	WHT	F60
B	(677)	RED	F61

X89

1	(725)	BLK	X8
2	(726)	WHT	X8
3	(727)	GRY	X8
4	NOT USED		
5	(719)	BLK	X8
6	(721)	GRY	X8
7	(709)	RED/BLK	X8
8	(717)	RED/WHT	X8
9	(706)	RED/BLU	X7
10	(702)	BLU/YEL	X7
11	(705)	BLK/YEL	X7
12	(710)	WHT	X8
13	(707)	RED	X8
14	(722)	WHT	X8
15	(704)	BLK/RED	X7
16	(713)	BLU	X8
17	(728)	RED/BLU	X8
18	NOT USED		
19	NOT USED		
20	NOT USED		

X90

1	(737)	WHT	X8
2	(732)	RED	X8
3	NOT USED		
4	NOT USED		
5	(735)	BLU	X8
6	(734)	BLU/RED	X8
7	(736)	BLU/YEL	X8
8	(733)	BLU/WHT	X8
9	(738)	GRN/RED	X8
10	(739)	GRN/BLK	X8
11	NOT USED		
12	NOT USED		

X91

1	NOT USED		
2	(714)	GRN/YEL	X8
3	(715)	GRN/WHT	X8
4	(716)	GRN/BLK	X8
5	NOT USED		
6	(729)	WHT/BLU	X8
7	(723)	WHT/BLK	X8
8	(730)	WHT/RED	X8

X86

1	(26)	RED/YEL	X4
2	NOT USED		
3	(138)	GRN/BLK	X4
4	(141)	WHT/YEL	X4
5	(103)	LT GRN	X3
6	(583)	WHT	X3
7	(222)	RED/BLU	X3
8	NOT USED		
9	NOT USED		
10	NOT USED		
11	(202)	BLU/YEL	X3
12	NOT USED		
13	(93)	YEL	X5
14	(94)	YEL/BLK	X5
15	(588)	RED/WHT	X3
16	(597)	BLK/RED	X3

X87

1	(681)	WHT	(506)

X88

1	(673)	RED	K18
2	(501)	BLK	X42

X10

1	(29)	YEL	X4
2	(30)	YEL/GRN	X4
3	(23)	BLU	X3
4	(24)	RED	X3
5	(5)	LT GRN/BLK	X4
6	(6)	LT GRN/RED	X4
7	(21)	WHT	X3
8	(22)	GRN	X3
9	(272)	RED/YEL	X102
10	(80)	WHT	X4
11	(277)	BLK/YEL	X102
12	(271)	RED/YEL	X102
13	(58)	RED/GRN	X3
14	(275)	BLK/YEL	X102
15	NOT USED		
16	NOT USED		
17	NOT USED		
18	NOT USED		
19	NOT USED		
20	NOT USED		

Machine Harness (W2) Wiring Diagram (3 of 3)

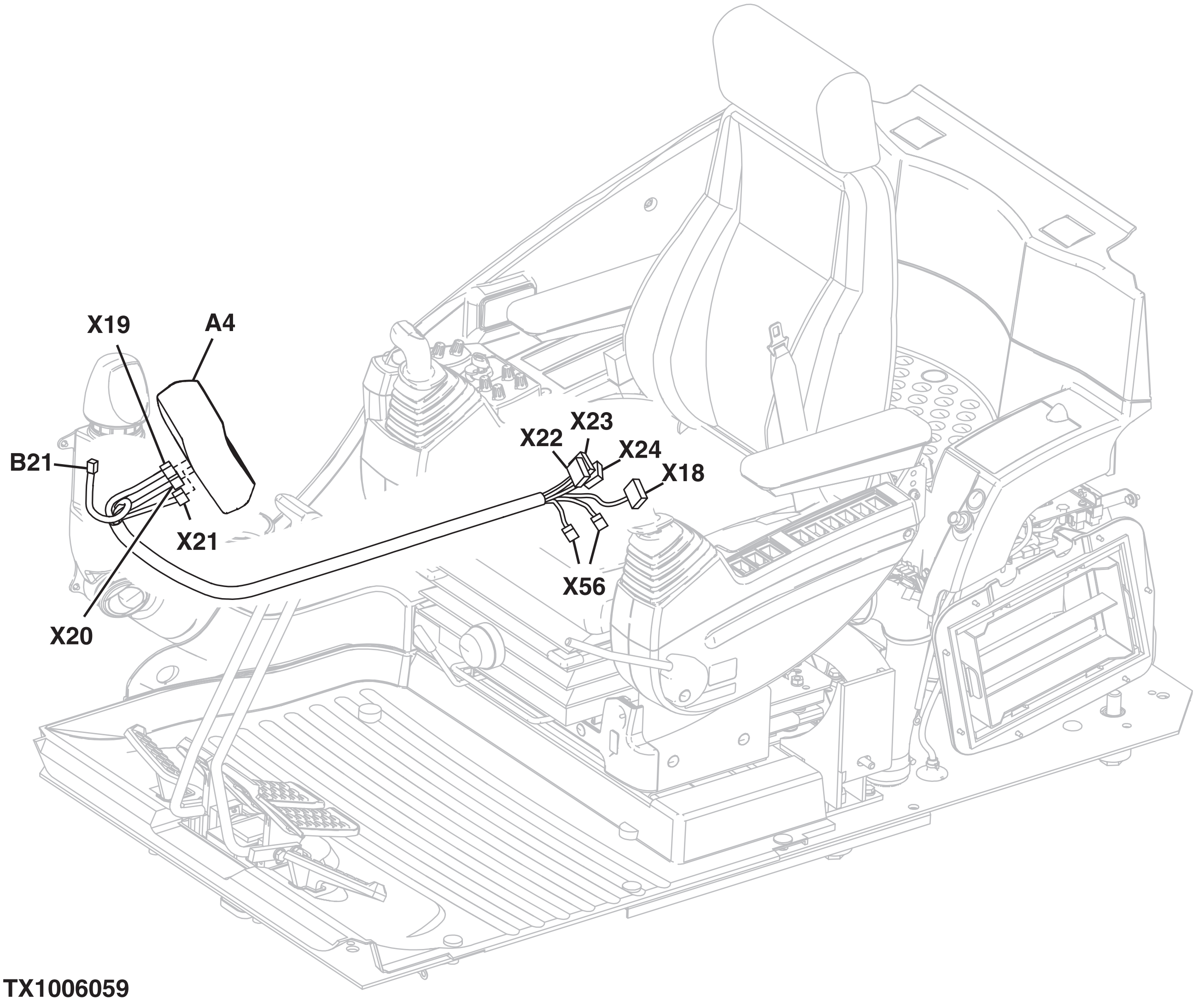
Continued on next page

LD30992,00001F5 –19–20MAR06–4/5

B13—Radiator Level Switch
B18—Fuel Level Sensor
B23—High Note Horn
B24—Low Note Horn
B27—Hydraulic Oil Filter Restriction Switch
B40—Hydraulic Oil Temperature Sensor
B58—Boom Bottom Pressure Sensor
E1—Drive Light
E2—Boom Work Light
E7—Drive Light (Optional)
E8—Boom Light (Optional)
F60—Fusible Link 75A
F61—Fusible Link 45A
K16—Glow Plug Relay
K18—Starter Protection Relay
K19—Battery Relay
V1—Glow Plug Relay Diode
V2—Battery Relay Diode
V10—Lubricator Motor Diode
W40—Machine Harness Ground 1
W41—Machine Harness Ground 2
X7—Engine Control Module (ECM) 81-Pin Connector
X8—Engine Control Module (ECM) 40-Pin Connector
X10—Machine Harness-to-Control Valve Harness 20-Pin Connector
X40—Machine Harness-to-Pump Harness Connector
X46—Attachment Connector (Not Used)
X52—Machine Harness-to-Hydraulic Oil Temperature Sensor Sub-Harness Connector
X77—Machine Harness-to-Pump Harness 4-Pin Camera Connector
X78—Machine Harness-to-Auto Lubricator Harness Connector
X79—Machine Harness Auxiliary Power Connector
X86—Machine Harness-to-Engine Interface Harness 16-Pin Connector (A)
X87—Machine Harness-to-Engine Interface Harness 1-Pin Connector (B)
X88—Machine Harness-to-Engine Interface Harness 2-Pin Connector (C)
X89—Machine Harness-to-Engine Harness 20-Pin Connector (D)
X90—Machine Harness-to-Engine Harness 12-Pin Connector (E)
X91—Machine Harness-to-Engine Harness 8-Pin Connector (F)
X92—Machine Harness-to-Engine Harness 6-Pin Connector (G)
X93—Machine Harness-to-Engine Harness 1-Pin Connector (H)
X94—Machine Harness-to-Auto Lubricator Harness Connector

LD30992,00001F5 –19–20MAR06–5/5

Monitor Harness (W3) Component Location



TX1006059

Monitor Harness (W3) Component Location

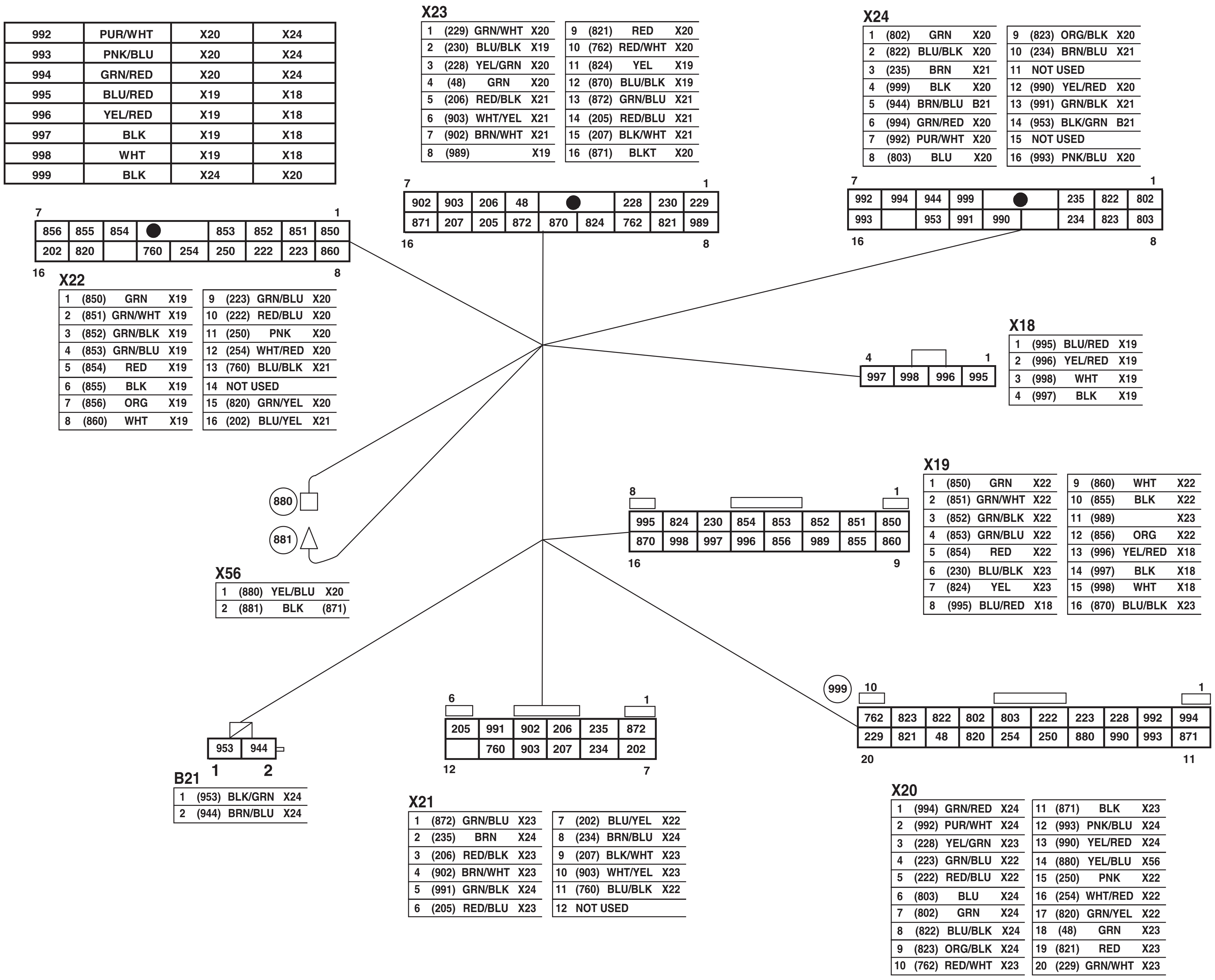
A4—Monitor Controller
B21—Solar Sensor
X18—Cab Harness-to-Monitor Harness 4-Pin Connector
X19—Monitor Controller 16-Pin Connecotr A
X20—Monitor Controller 20-Pin Connector B
X21—Monitor Controller 12-Pin Connector C
X22—Cab Harness-to-Monitor Harness 16-Pin Connector (White)
X23—Cab Harness-to-Monitor Harness 16-Pin Connector (Black)
X24—Cab Harness-to-Monitor Harness 16-Pin Connector (Brown)
X56—Monitor Harness Connector (Not Used)

LD30992,00001F6 –19–18APR06–1/1

Monitor Harness (W3) Wiring Diagram

TX1003968 –UN–10MAR06

NUMBER	COLOR	END #1	END #2
48	GRN	X20	X23
202	BLU/YEL	X21	X22
205	RED/BLU	X21	X23
206	RED/BLK	X21	X23
207	BLK/WHT	X21	X23
222	RED/BLU	X20	X22
223	GRN/BLU	X20	X22
228	YEL/GRN	X20	X23
229	GRN/WHT	X20	X23
230	BLU/BLK	X19	X23
234	BRN/BLU	X21	X24
235	BRN	X21	X24
250	PNK	X20	X22
254	WHT/RED	X20	X22
760	BLU/BLK	X21	X22
762	RED/WHT	X20	X23
802	GRN	X20	X24
803	BLU	X20	X24
820	GRN/YEL	X20	X22
821	RED	X20	X23
822	BLU/BLK	X20	X24
823	ORG/BLK	X20	X24
824	YEL	X19	X23
850	GRN	X19	X22
851	GRN/WHT	X19	X22
852	GRN/BLK	X19	X22
853	BRN/BLU	X19	X22
854	RED	X19	X22
855	BLK	X19	X22
856	ORG	X19	X22
860	WHT	X19	X22
870	BLU/BLK	X19	X23
871	BLK	X20	X23
872	GRN/BLU	X21	X23
880	YEL/BLU	X20	X56
881	BLK	X56	(871)
902	BRN/WHT	X21	X23
903	WHT/YEL	X21	X23
944	BRN/BLU	B21	X24
953	BLK/GRN	B21	X24
989	WHT	X19	X23
990	YEL/RED	X20	X24
991	GRN/BLK	X21	X24
992	PUR/WHT	X20	X24
993	PNK/BLU	X20	X24
994	GRN/RED	X20	X24
995	BLU/RED	X19	X18
996	YEL/RED	X19	X18
997	BLK	X19	X18
998	WHT	X19	X18
999	BLK	X24	X20



X23

1	(229)	GRN/WHT	X20
2	(230)	BLU/BLK	X19
3	(228)	YEL/GRN	X20
4	(48)	GRN	X20
5	(206)	RED/BLK	X21
6	(903)	WHT/YEL	X21
7	(902)	BRN/WHT	X21
8	(989)		X19
9	(821)	RED	X20
10	(762)	RED/WHT	X20
11	(824)	YEL	X19
12	(870)	BLU/BLK	X19
13	(872)	GRN/BLU	X21
14	(205)	RED/BLU	X21
15	(207)	BLK/WHT	X21
16	(871)	BLKT	X20

X24

1	(802)	GRN	X20
2	(822)	BLU/BLK	X20
3	(235)	BRN	X21
4	(999)	BLK	X20
5	(944)	BRN/BLU	B21
6	(994)	GRN/RED	X20
7	(992)	PUR/WHT	X20
8	(803)	BLU	X20
9	(823)	ORG/BLK	X20
10	(234)	BRN/BLU	X21
11	NOT USED		
12	(990)	YEL/RED	X20
13	(991)	GRN/BLK	X21
14	(953)	BLK/GRN	B21
15	NOT USED		
16	(993)	PNK/BLU	X20

X22

1	(850)	GRN	X19
2	(851)	GRN/WHT	X19
3	(852)	GRN/BLK	X19
4	(853)	GRN/BLU	X19
5	(854)	RED	X19
6	(855)	BLK	X19
7	(856)	ORG	X19
8	(860)	WHT	X19
9	(223)	GRN/BLU	X20
10	(222)	RED/BLU	X20
11	(250)	PNK	X20
12	(254)	WHT/RED	X20
13	(760)	BLU/BLK	X21
14	NOT USED		
15	(820)	GRN/YEL	X20
16	(202)	BLU/YEL	X21

X18

1	(995)	BLU/RED	X19
2	(996)	YEL/RED	X19
3	(998)	WHT	X19
4	(997)	BLK	X19

X19

1	(850)	GRN	X22
2	(851)	GRN/WHT	X22
3	(852)	GRN/BLK	X22
4	(853)	GRN/BLU	X22
5	(854)	RED	X22
6	(230)	BLU/BLK	X23
7	(824)	YEL	X23
8	(995)	BLU/RED	X18
9	(860)	WHT	X22
10	(855)	BLK	X22
11	(989)		X23
12	(856)	ORG	X22
13	(996)	YEL/RED	X18
14	(997)	BLK	X18
15	(998)	WHT	X18
16	(870)	BLU/BLK	X23

X56

1	(880)	YEL/BLU	X20
2	(881)	BLK	(871)

B21

1	(953)	BLK/GRN	X24
2	(944)	BRN/BLU	X24

X21

1	(872)	GRN/BLU	X23
2	(235)	BRN	X24
3	(206)	RED/BLK	X23
4	(902)	BRN/WHT	X23
5	(991)	GRN/BLK	X24
6	(205)	RED/BLU	X23
7	(202)	BLU/YEL	X22
8	(234)	BRN/BLU	X24
9	(207)	BLK/WHT	X23
10	(903)	WHT/YEL	X23
11	(760)	BLU/BLK	X22
12	NOT USED		

X20

1	(994)	GRN/RED	X24
2	(992)	PUR/WHT	X24
3	(228)	YEL/GRN	X23
4	(223)	GRN/BLU	X22
5	(222)	RED/BLU	X22
6	(803)	BLU	X24
7	(802)	GRN	X24
8	(822)	BLU/BLK	X24
9	(823)	ORG/BLK	X24
10	(762)	RED/WHT	X23
11	(871)	BLK	X23
12	(993)	PNK/BLU	X24
13	(990)	YEL/RED	X24
14	(880)	YEL/BLU	X56
15	(250)	PNK	X22
16	(254)	WHT/RED	X22
17	(820)	GRN/YEL	X22
18	(48)	GRN	X23
19	(821)	RED	X23
20	(229)	GRN/WHT	X23

TX1003968

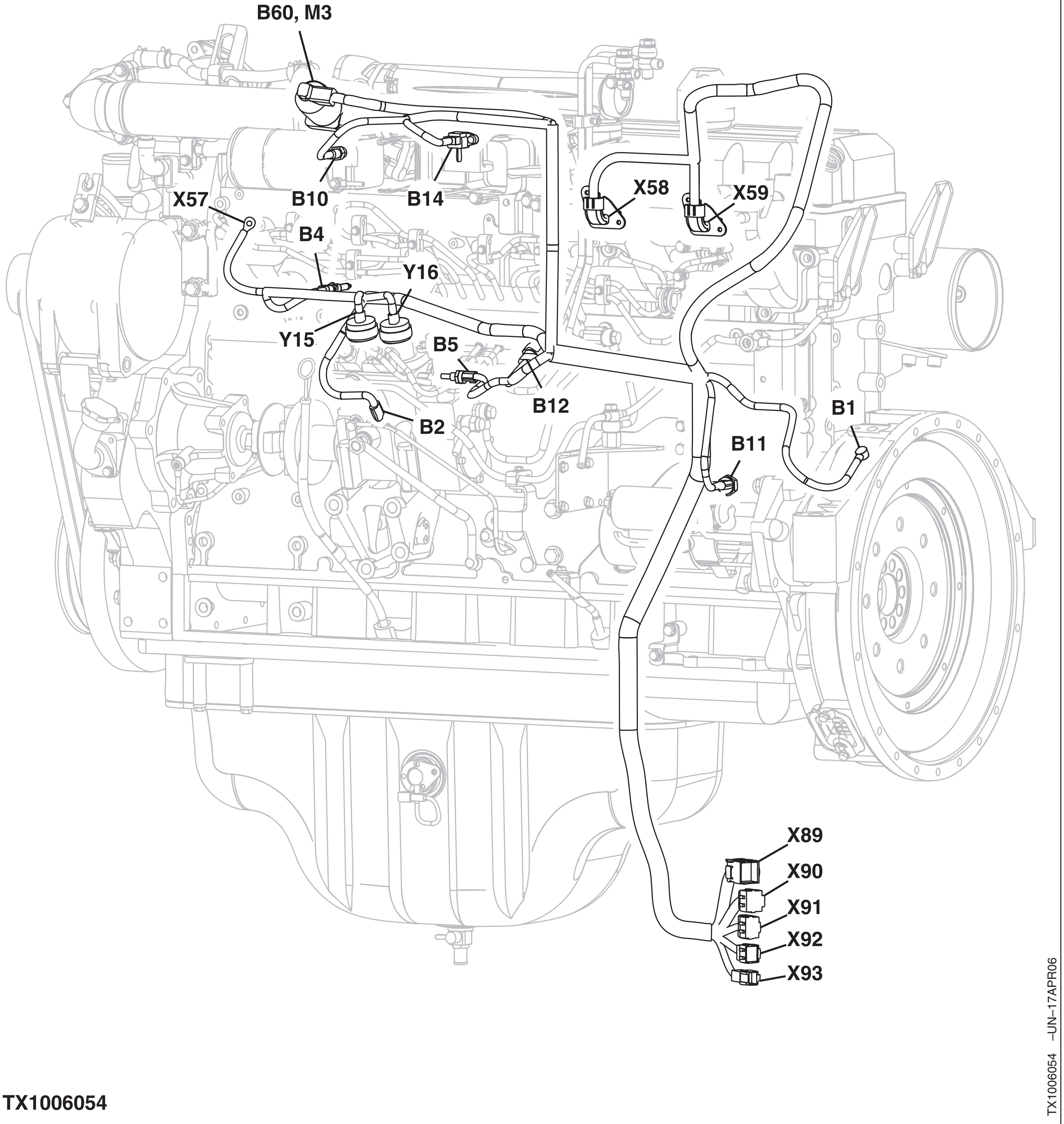
Monitor Harness (W3) Wiring Diagram

LD30992,00001F7 –19–20MAR06–1/2

B21—Solar Sensor
X18—Cab Harness-to-Monitor Harness 4-Pin Connector
X19—Monitor Controller 16-Pin Connector (A)
X20—Monitor Controller 20-Pin Connector (B)
X21—Monitor Controller 12-Pin Connector (C)
X22—Cab Harness-to-Monitor Harness 16-Pin Connector (White)
X23—Cab Harness-to-Monitor Harness 16-Pin Connector (Black)
X24—Cab Harness-to-Monitor Harness 16-Pin Connector (Brown)
X56—Monitor Harness Connector (Not Used)

LD30992,00001F7 –19–20MAR06–2/2

Engine Harness (W4) Component Location



TX1006054

Engine Harness (W4) Component Location

Continued on next page

B1—Crankshaft Position Sensor
B2—Camshaft Position Sensor (G Sensor)
B4—Engine Coolant Temperature Sensor
B5—Fuel Temperature Sensor
B10—Boost Temperature Sensor
B11—Engine Oil Pressure Sensor
B12—Fuel Rail Pressure Sensor
B14—Boost Pressure Sensor
B60—Exhaust Gas Recirculation (EGR) Position Sensor
M3—Exhaust Gas Recirculation (EGR) Valve Actuator
X57—Engine Harness-to-Glow Plug Bus Bar Connector
X58—Engine Harness-to-Injector Harness Connector 1 (Y1, Y2, Y3)
X59—Engine Harness-to-Injector Harness Connector 2 (Y4, Y5, Y6)
X89—Machine Harness-to-Engine Harness 20-Pin Connector (D)
X90—Machine Harness-to-Engine Harness 12-Pin Connector (E)
X91—Machine Harness-to-Engine Harness 8-Pin Connector (F)
X92—Machine Harness-to-Engine Harness 6-Pin Connector (G)
X93—Machine Harness-to-Engine Harness 1-Pin Connector (H)
Y15—Fuel Pump Control Valve Solenoid 1
Y16—Fuel Pump Control Valve Solenoid 2

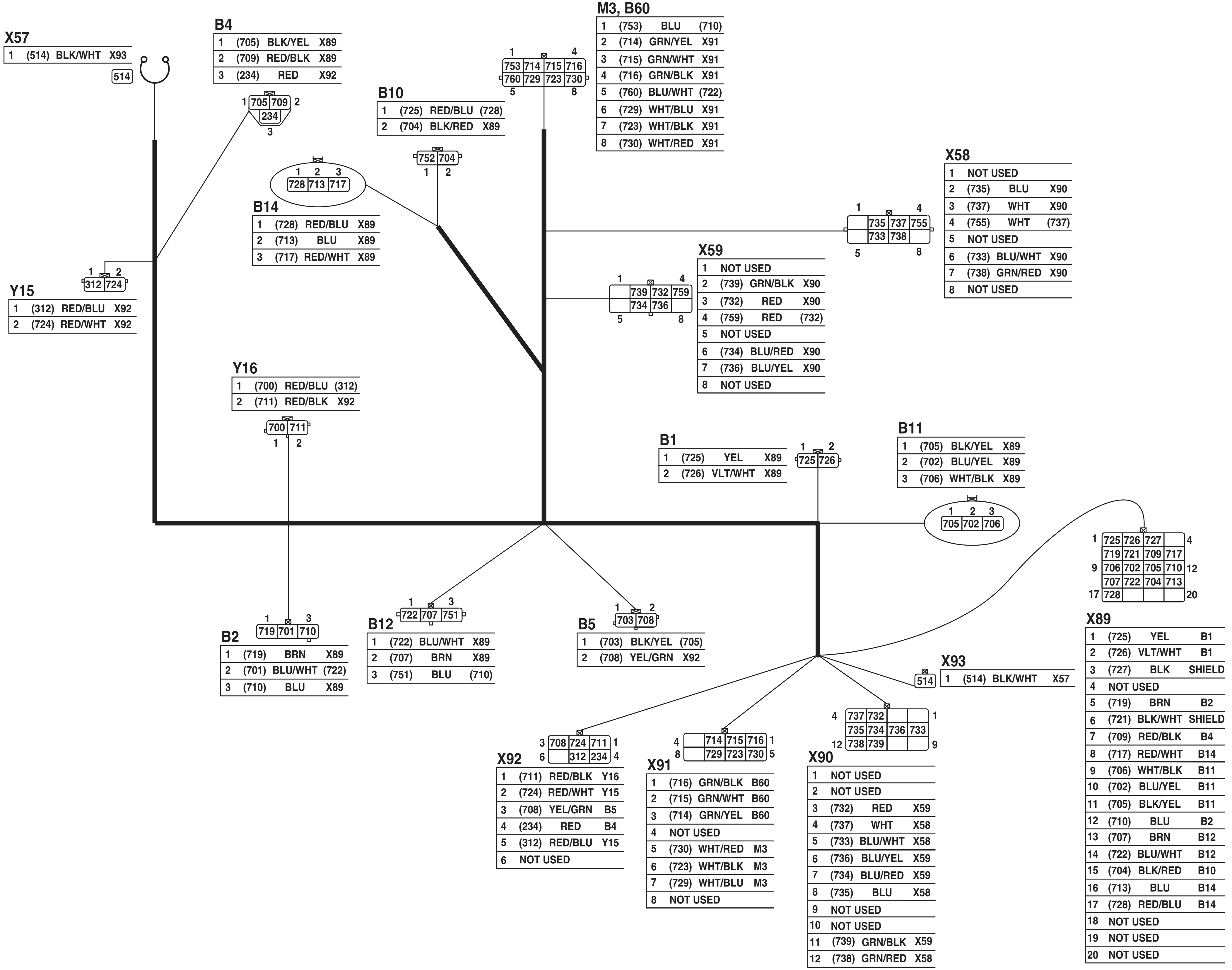
LD30992,0000413 –19–18APR06–2/2

Engine Harness (W4) Wiring Diagram

TX1003969 –UN–07APR06

NUMBER	COLOR	END #1	END#2
234	RED	X92	B4
312	RED/BLU	X92	Y15
514	BLK/WHT	X93	X57
700	RED/BLU	Y16	(312)
701	BLU/WHT	B2	(722)
702	BLU/YEL	X89	B11
703	BLK/YEL	B5	(705)
704	BLK/RED	X89	B10
705	BLK/YEL	X89	B11
706	WHT/BLK	X89	B11
707	BRN	X89	B12
708	YEL/GRN	X92	B5
709	RED/BLK	X89	B4
710	BLU	X89	B2
711	RED/BLK	X92	Y16
713	BLU	X89	B14
714	GRN/YEL	X91	B60
715	GRN/WHT	X91	B60
716	GRN/BLK	X91	B60
717	RED/WHT	X89	B14
719	BRN	X89	B2
721	BLK/WHT	X89	SHIELD
722	BLU/WHT	X89	B12
723	WHT/BLK	X91	M3
724	RED/WHT	X92	Y15
725	YEL	X89	B1
726	VLT/WHT	X89	B1
727	BLK	X89	SHIELD
728	RED/BLU	X89	B14
729	WHT/BLU	X91	M3
730	WHT/RED	X91	M3
732	RED	X90	X59
733	BLU/WHT	X90	X58
734	BLU/RED	X90	X59
735	BLU	X90	X58
736	BLU/YEL	X90	X59
737	WHT	X90	X58
738	GRN/RED	X90	X58
739	GRN/BLK	X90	X59
750	BLK/YEL	B4	(705)
751	BLU	B12	(710)
752	RED/BLU	B10	(728)
753	BLU	B60	(710)
755	WHT	X58	(737)
759	RED	X59	(732)
760	BLU/WHT	B60	(723)

TX1003969



X57

1	(514)	BLK/WHT	X93

B4

1	(705)	BLK/YEL	X89
2	(709)	RED/BLK	X89
3	(234)	RED	X92

B10

1	(725)	RED/BLU	(728)
2	(704)	BLK/RED	X89

M3, B60

1	(753)	BLU	(710)
2	(714)	GRN/YEL	X91
3	(715)	GRN/WHT	X91
4	(716)	GRN/BLK	X91
5	(760)	BLU/WHT	(722)
6	(729)	WHT/BLU	X91
7	(723)	WHT/BLK	X91
8	(730)	WHT/RED	X91

B14

1	(728)	RED/BLU	X89
2	(713)	BLU	X89
3	(717)	RED/WHT	X89

X58

1	NOT USED		
2	(735)	BLU	X90
3	(737)	WHT	X90
4	(755)	WHT	(737)
5	NOT USED		
6	(733)	BLU/WHT	X90
7	(738)	GRN/RED	X90
8	NOT USED		

X59

1	NOT USED		
2	(739)	GRN/BLK	X90
3	(732)	RED	X90
4	(759)	RED	(732)
5	NOT USED		
6	(734)	BLU/RED	X90
7	(736)	BLU/YEL	X90
8	NOT USED		

Y15

1	(312)	RED/BLU	X92
2	(724)	RED/WHT	X92

Y16

1	(700)	RED/BLU	(312)
2	(711)	RED/BLK	X92

B1

1	(725)	YEL	X89
2	(726)	VLT/WHT	X89

B11

1	(705)	BLK/YEL	X89
2	(702)	BLU/YEL	X89
3	(706)	WHT/BLK	X89

B2

1	(719)	BRN	X89
2	(701)	BLU/WHT	(722)
3	(710)	BLU	X89

B12

1	(722)	BLU/WHT	X89
2	(707)	BRN	X89
3	(751)	BLU	(710)

B5

1	(703)	BLK/YEL	(705)
2	(708)	YEL/GRN	X92

X93

1	(514)	BLK/WHT	X57

X89

1	(725)	YEL	B1
2	(726)	VLT/WHT	B1
3	(727)	BLK	SHIELD
4	NOT USED		
5	(719)	BRN	B2
6	(721)	BLK/WHT	SHIELD
7	(709)	RED/BLK	B4
8	(717)	RED/WHT	B14
9	(706)	WHT/BLK	B11
10	(702)	BLU/YEL	B11
11	(705)	BLK/YEL	B11
12	(710)	BLU	B2
13	(707)	BRN	B12
14	(722)	BLU/WHT	B12
15	(704)	BLK/RED	B10
16	(713)	BLU	B14
17	(728)	RED/BLU	B14
18	NOT USED		
19	NOT USED		
20	NOT USED		

X92

1	(711)	RED/BLK	Y16
2	(724)	RED/WHT	Y15
3	(708)	YEL/GRN	B5
4	(234)	RED	B4
5	(312)	RED/BLU	Y15
6	NOT USED		

X91

1	(716)	GRN/BLK	B60
2	(715)	GRN/WHT	B60
3	(714)	GRN/YEL	B60
4	NOT USED		
5	(730)	WHT/RED	M3
6	(723)	WHT/BLK	M3
7	(729)	WHT/BLU	M3
8	NOT USED		

X90

1	NOT USED		
2	NOT USED		
3	(732)	RED	X59
4	(737)	WHT	X58
5	(733)	BLU/WHT	X58
6	(736)	BLU/YEL	X59
7	(734)	BLU/RED	X59
8	(735)	BLU	X58
9	NOT USED		
10	NOT USED		
11	(739)	GRN/BLK	X59
12	(738)	GRN/RED	X58

Engine Harness (W4) Wiring Diagram

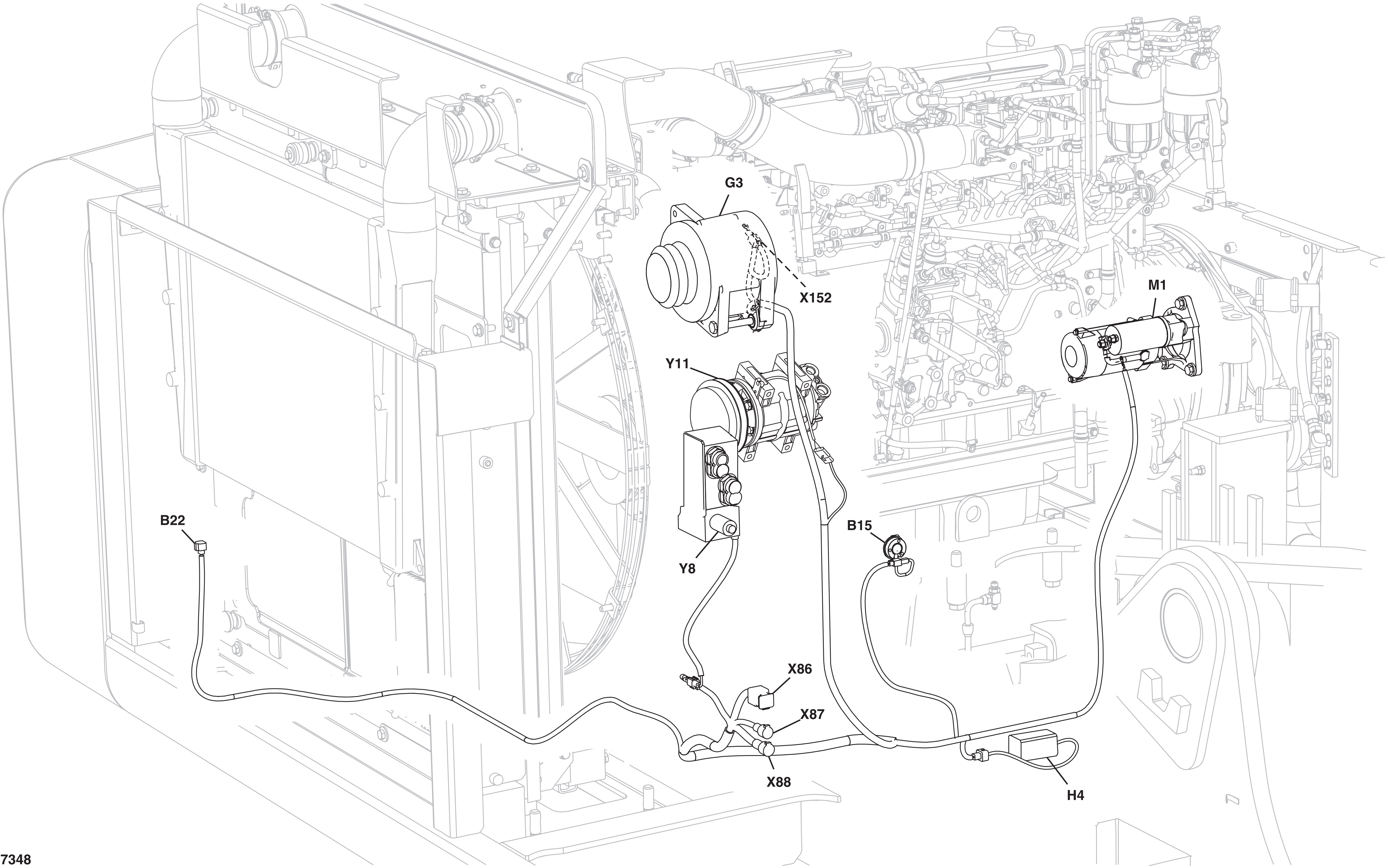
LD30992,0000414 –19–07APR06–1/2

B1—Crankshaft Position Sensor
B2—Camshaft Position Sensor (G Sensor)
B4—Engine Coolant Temperature Sensor
B5—Fuel Temperature Sensor
B10—Boost Temperature Sensor
B11—Engine Oil Pressure Sensor
B12—Fuel Rail Pressure Sensor
B14—Boost Pressure Sensor
B60—Exhaust Gas Recirculation (EGR) Position Sensor
M3—Exhaust Gas Recirculation (EGR) Valve Actuator
X57—Engine Harness-to-Glow Plug Bus Bar Connector
X58—Engine Harness-to-Injector Harness Connector 1 (Y1, Y2, Y3)
X59—Engine Harness-to-Injector Harness Connector 2 (Y4, Y5, Y6)
X89—Machine Harness-to-Engine Harness 20-Pin Connector (D)
X90—Machine Harness-to-Engine Harness 12-Pin Connector (E)
X91—Machine Harness-to-Engine Harness 8-Pin Connector (F)
X92—Machine Harness-to-Engine Harness 6-Pin Connector (G)
X93—Machine Harness-to-Engine Harness 1-Pin Connector (H)
Y15—Fuel Pump Control Valve Solenoid 1
Y16—Fuel Pump Control Valve Solenoid 2

LD30992,0000414 –19–07APR06–2/2

Engine Interface Harness (W5) Component Location

TX1027348 –UN–31JUL07



TX1027348

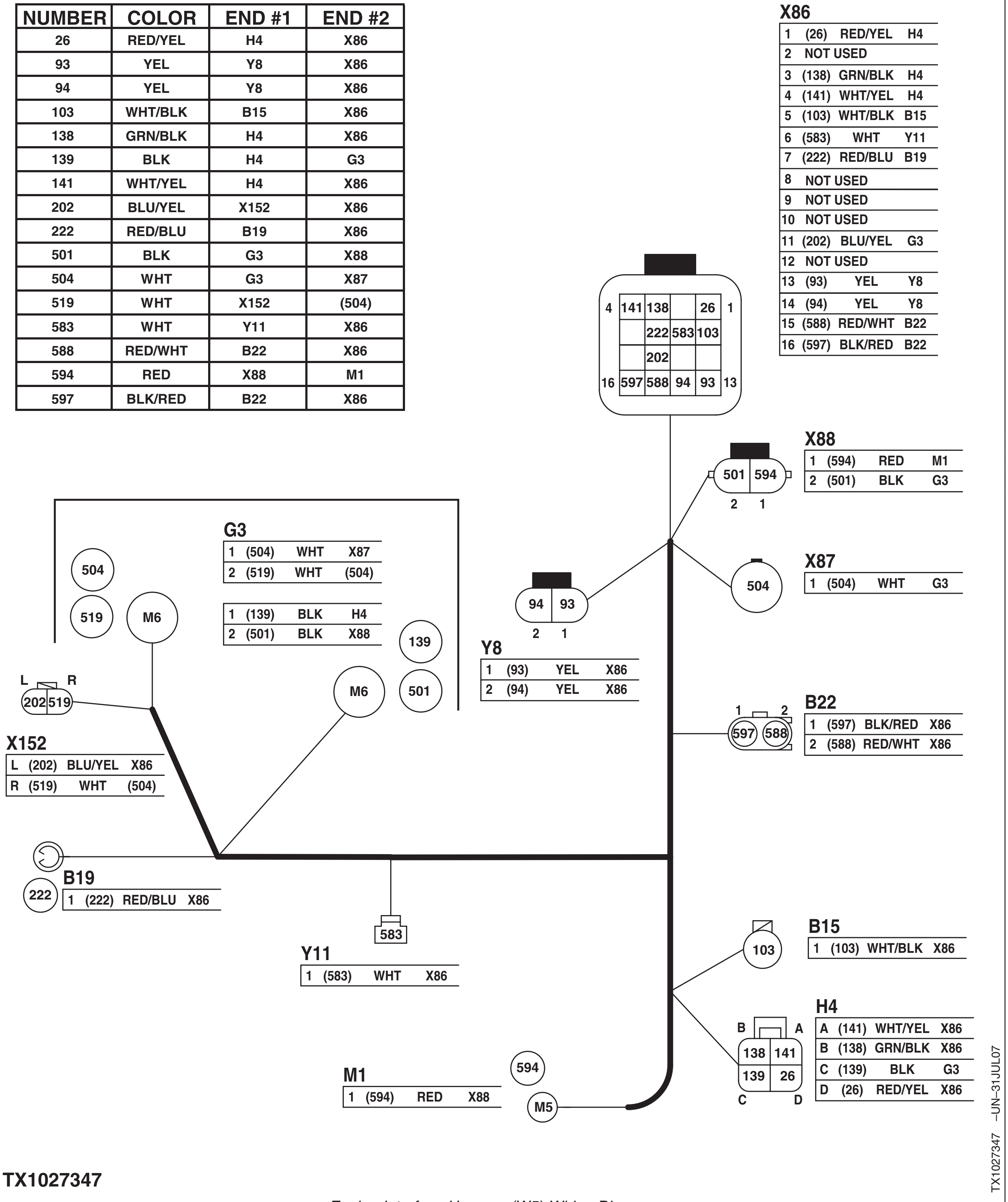
Engine Interface Harness (W5) Component Location—If Equipped

LD30992,0000415 –19–31AUG07–1/2

B15—Engine Oil Level Switch
B22—Ambient Air Temperature Sensor
G3—Alternator
H4—Travel Alarm
M1—Starter Motor
X86—Machine Harness-to-Engine Interface Harness 16-Pin Connector (A)
X87—Machine Harness-to-Engine Interface Harness 1-Pin Connector (B)
X88—Machine Harness-to-Engine Interface Harness 2-Pin Connector (C)
Y8—Fan Reversing Solenoid 1
Y11—Air Conditioner Compressor Clutch
X152—JDLink™ Jumper Harness-to-Machine Harness Connector—If Equipped

LD30992,0000415 –19–31AUG07–2/2

Engine Interface Harness (W5) Wiring Diagram



NUMBER	COLOR	END #1	END #2
26	RED/YEL	H4	X86
93	YEL	Y8	X86
94	YEL	Y8	X86
103	WHT/BLK	B15	X86
138	GRN/BLK	H4	X86
139	BLK	H4	G3
141	WHT/YEL	H4	X86
202	BLU/YEL	X152	X86
222	RED/BLU	B19	X86
501	BLK	G3	X88
504	WHT	G3	X87
519	WHT	X152	(504)
583	WHT	Y11	X86
588	RED/WHT	B22	X86
594	RED	X88	M1
597	BLK/RED	B22	X86

X86

1 (26)	RED/YEL	H4	
2	NOT USED		
3 (138)	GRN/BLK	H4	
4 (141)	WHT/YEL	H4	
5 (103)	WHT/BLK	B15	
6 (583)	WHT	Y11	
7 (222)	RED/BLU	B19	
8	NOT USED		
9	NOT USED		
10	NOT USED		
11 (202)	BLU/YEL	G3	
12	NOT USED		
13 (93)	YEL	Y8	
14 (94)	YEL	Y8	
15 (588)	RED/WHT	B22	
16 (597)	BLK/RED	B22	

X88

1 (594)	RED	M1
2 (501)	BLK	G3

X87

1 (504)	WHT	G3

G3

1 (504)	WHT	X87
2 (519)	WHT	(504)

1 (139)	BLK	H4
2 (501)	BLK	X88

Y8

1 (93)	YEL	X86
2 (94)	YEL	X86

B22

1 (597)	BLK/RED	X86
2 (588)	RED/WHT	X86

X152

L (202)	BLU/YEL	X86
R (519)	WHT	(504)

B19

1 (222)	RED/BLU	X86

Y11

1 (583)	WHT	X86

B15

1 (103)	WHT/BLK	X86

H4

A (141)	WHT/YEL	X86
B (138)	GRN/BLK	X86
C (139)	BLK	G3
D (26)	RED/YEL	X86

M1

1 (594)	RED	X88

TX1027347

Engine Interface Harness (W5) Wiring Diagram

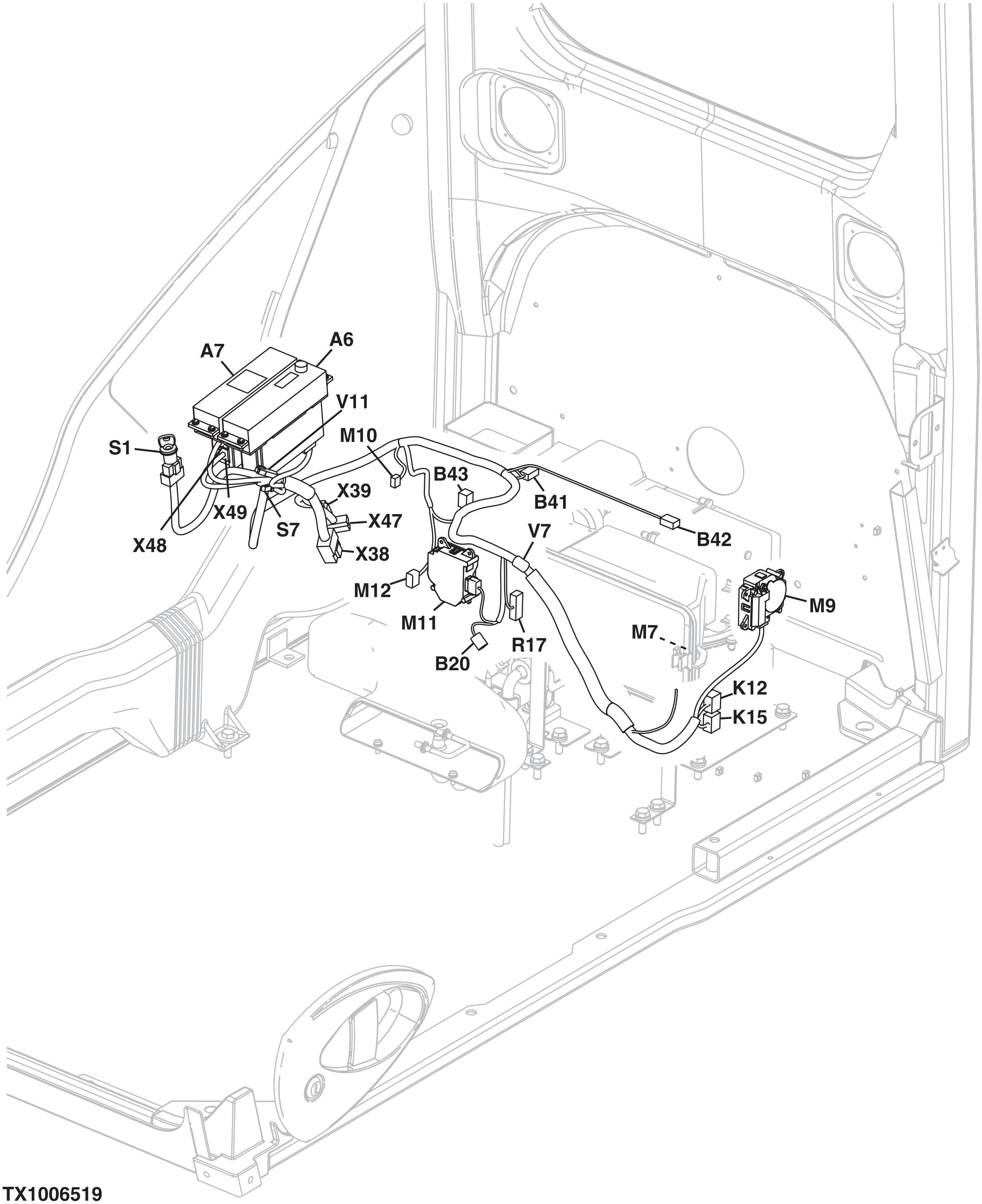
Continued on next page

LD30992,0000416 –19–31AUG07–1/2

B13—Radiator Level Switch
B15—Engine Oil Level Switch
B19—Engine Coolant Temperature Switch
G3—Alternator
H4—Travel Alarm
M1—Starter Motor
X86—Machine Harness-to-Engine Interface Harness 16-Pin Connector
X87—Machine Harness-to-Engine Interface Harness 1-Pin Connector
X88—Machine Harness-to-Engine Interface Harness 2-Pin Connector
Y11—Air Conditioner Compressor Clutch
X152—JDLink™ Jumper Harness-to-Machine Harness Connector—If Equipped

LD30992,0000416 –19–31AUG07–2/2

Air Conditioner Harness (W6) Component Location



Air Conditioner Harness (W6) Component Location

Continued on next page

A6—Radio
A7—Air Conditioner Controller (ACF)
B20—Air Conditioner High/Low Pressure Switch
B41—Air Conditioner Freeze Control Switch
B42—Cab Air Temperature Sensor
B43—Coolant Temperature Sensor
K12—Blower Motor Relay
K15—Air Conditioner Compressor Clutch Relay
M7—Air Conditioner and Heater Blower Motor
M9—Air Conditioner and Heater Internal and External Servomotor
M10—Air Conditioner and Heater Blower Port Change Servomotor
M11—Air Conditioner and Heater Mixer Servomotor
M12—Air Conditioner and Heater Rear Blower Port Change Servomotor
R17—Blower Motor Resistor
S1—Key Switch
S7—Power Dig Switch
V7—Blower Motor Diode
V11—Blower Motor Signal Diode
X38—Cab Harness-to-Air Conditioner Harness 16-Pin Connector
X39—Cab Harness-to-Air Conditioner Harness 4-Pin Connector
X47—Cab Harness-to-Air Conditioner Harness 6-Pin Connector
X48—Air Conditioner Harness-to-Air Conditioner and Heater Controller 20-Pin Connector
X49—Air Conditioner Harness-to-Air Conditioner and Heater Controller 16-Pin Connector

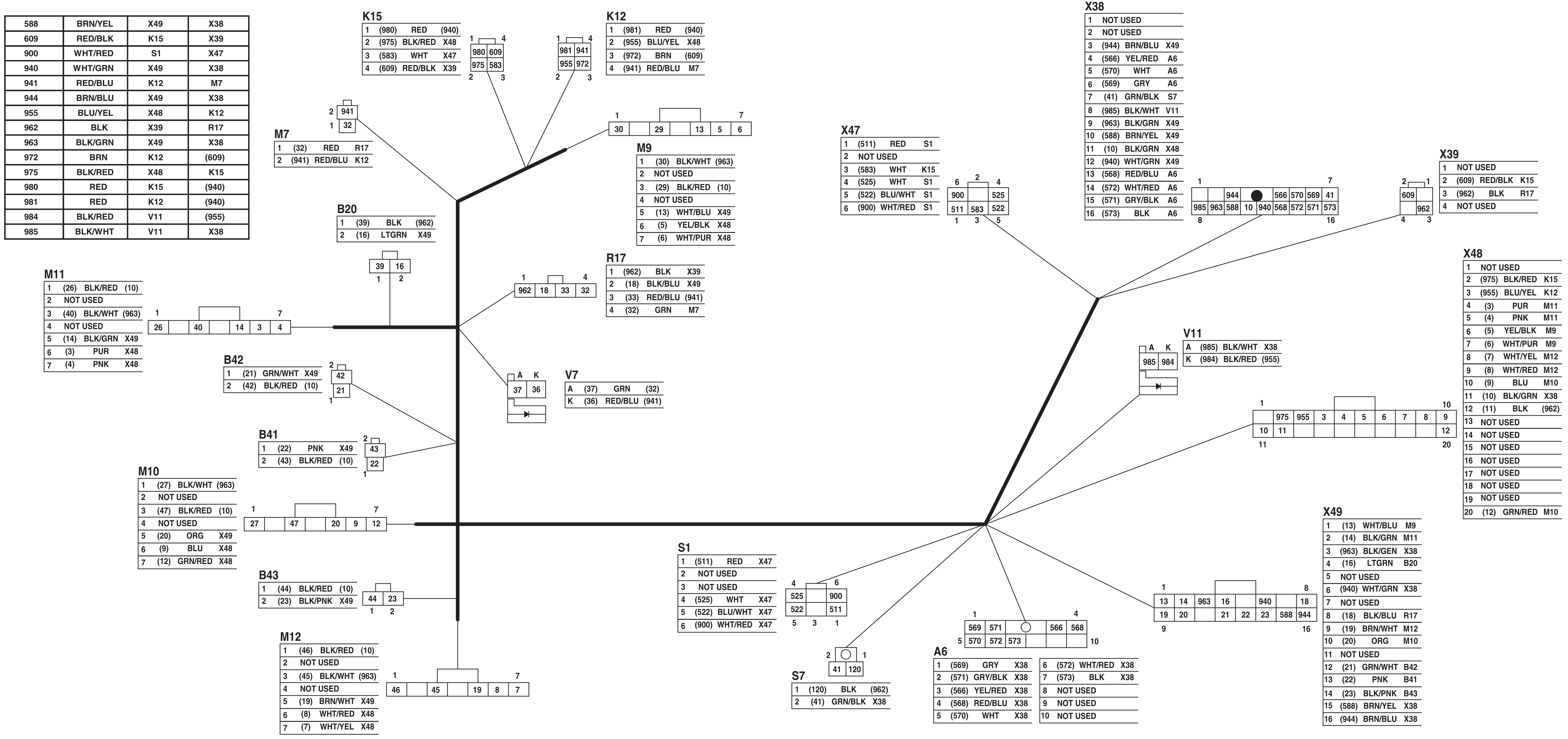
LD30992,0000417 –19–27APR06–2/2

Air Conditioner Harness (W6) Wiring Diagram

TX1003970 –UN–03MAR06

NUMBER	COLOR	END #1	END #2
3	PUR	X48	M11
4	PNK	X48	M11
5	YEL/BLK	X48	M9
6	WHT/PUR	X48	M9
7	WHT/YEL	X48	M12
8	WHT/RED	X48	M12
9	BLU	X48	M10
10	BLK/GRN	X48	X38
11	BLK	X48	(962)
12	GRN/RED	X48	M10
13	WHT/BLU	X49	M9
14	BLK/GRN	X49	M11
16	LT GRN	X49	B20
18	BLK/BLU	X49	R17
19	BRN/WHT	X49	M12
20	ORG	X49	M10
21	GRN/WHT	X49	B42
22	PNK	X49	B41
23	BLK/PNK	X49	B43
26	BLK/RED	M11	(10)
27	BLK/WHT	M10	(963)
29	BLK/RED	M9	(10)
30	BLK/WHT	M9	(963)
32	GRN	M7	R17
33	RED/BLU	R17	(941)
36	RED/BLU	V7	(941)
37	GRN	V7	(32)
39	BLK	B20	(962)
40	BLK/WHT	M11	(963)
41	GRN/BLK	S7	X38
42	BLK/RED	B42	(10)
43	BLK/RED	B41	(10)
44	BLK/RED	B43	(10)
45	BLK/WHT	M12	(963)
46	BLK/RED	M12	(10)
47	BLK/RED	M10	(10)
120	BLK	S7	(962)
511	RED	S1	X47
522	BLU/WHT	S1	X47
525	WHT	S1	X47
566	YEL/RED	A6	X38
568	RED/BLU	A6	X38
569	GRY	A6	X38
570	WHT	A6	X38
571	GRY/BLK	A6	X38
572	WHT/RED	A6	X38
573	BLK	A6	X38
583	WHT	K15	X47
588	BRN/YEL	X49	X38
609	RED/BLK	K15	X39
900	WHT/RED	S1	X47
940	WHT/GRN	X49	X38
941	RED/BLU	K12	M7
944	BRN/BLU	X49	X38
955	BLU/YEL	X48	K12
962	BLK	X39	R17
963	BLK/GRN	X49	X38
972	BRN	K12	(609)
975	BLK/RED	X48	K15
980	RED	K15	(940)
981	RED	K12	(940)
984	BLK/RED	V11	(955)
985	BLK/WHT	V11	X38

TX1003970



K15

1	(980)	RED	(940)
2	(975)	BLK/RED	X48
3	(583)	WHT	X47
4	(609)	RED/BLK	X39

K12

1	(981)	RED	(940)
2	(955)	BLU/YEL	X48
3	(972)	BRN	(609)
4	(941)	RED/BLU	M7

M7

1	(32)	RED	R17
2	(941)	RED/BLU	K12

M9

1	(30)	BLK/WHT	(963)
2	NOT USED		
3	(29)	BLK/RED	(10)
4	NOT USED		
5	(13)	WHT/BLU	X49
6	(5)	YEL/BLK	X48
7	(6)	WHT/PUR	X48

B20

1	(39)	BLK	(962)
2	(16)	LTGRN	X49

R17

1	(962)	BLK	X39
2	(18)	BLK/BLU	X49
3	(33)	RED/BLU	(941)
4	(32)	GRN	M7

M11

1	(26)	BLK/RED	(10)
2	NOT USED		
3	(40)	BLK/WHT	(963)
4	NOT USED		
5	(14)	BLK/GRN	X49
6	(3)	PUR	X48
7	(4)	PNK	X48

B42

1	(21)	GRN/WHT	X49
2	(42)	BLK/RED	(10)

V7

A	(37)	GRN	(32)
K	(36)	RED/BLU	(941)

B41

1	(22)	PNK	X49
2	(43)	BLK/RED	(10)

M10

1	(27)	BLK/WHT	(963)
2	NOT USED		
3	(47)	BLK/RED	(10)
4	NOT USED		
5	(20)	ORG	X49
6	(9)	BLU	X48
7	(12)	GRN/RED	X48

B43

1	(44)	BLK/RED	(10)
2	(23)	BLK/PNK	X49

M12

1	(46)	BLK/RED	(10)
2	NOT USED		
3	(45)	BLK/WHT	(963)
4	NOT USED		
5	(19)	BRN/WHT	X49
6	(8)	WHT/RED	X48
7	(7)	WHT/YEL	X48

X47

1	(511)	RED	S1
2	NOT USED		
3	(583)	WHT	K15
4	(525)	WHT	S1
5	(522)	BLU/WHT	S1
6	(900)	WHT/RED	S1

X38

1	NOT USED		
2	NOT USED		
3	(944)	BRN/BLU	X49
4	(566)	YEL/RED	A6
5	(570)	WHT	A6
6	(569)	GRY	A6
7	(41)	GRN/BLK	S7
8	(985)	BLK/WHT	V11
9	(963)	BLK/GRN	X49
10	(588)	BRN/YEL	X49
11	(10)	BLK/GRN	X48
12	(940)	WHT/GRN	X49
13	(568)	RED/BLU	A6
14	(572)	WHT/RED	A6
15	(571)	GRY/BLK	A6
16	(573)	BLK	A6

X39

1	NOT USED		
2	(609)	RED/BLK	K15
3	(962)	BLK	R17
4	NOT USED		

V11

A	(985)	BLK/WHT	X38
K	(984)	BLK/RED	(955)

X48

1	NOT USED		
2	(975)	BLK/RED	K15
3	(955)	BLU/YEL	K12
4	(3)	PUR	M11
5	(4)	PNK	M11
6	(5)	YEL/BLK	M9
7	(6)	WHT/PUR	M9
8	(7)	WHT/YEL	M12
9	(8)	WHT/RED	M12
10	(9)	BLU	M10
11	(10)	BLK/GRN	X38
12	(11)	BLK	(962)
13	NOT USED		
14	NOT USED		
15	NOT USED		
16	NOT USED		
17	NOT USED		
18	NOT USED		
19	NOT USED		
20	(12)	GRN/RED	M10

S1

1	(511)	RED	X47
2	NOT USED		
3	NOT USED		
4	(525)	WHT	X47
5	(522)	BLU/WHT	X47
6	(900)	WHT/RED	X47

S7

1	(120)	BLK	(962)
2	(41)	GRN/BLK	X38

A6

1	(569)	GRY	X38
2	(571)	GRY/BLK	X38
3	(566)	YEL/RED	X38
4	(568)	RED/BLU	X38
5	(570)	WHT	X38
6	(572)	WHT/RED	X38
7	(573)	BLK	X38
8	NOT USED		
9	NOT USED		
10	NOT USED		

X49

1	(13)	WHT/BLU	M9
2	(14)	BLK/GRN	M11
3	(963)	BLK/GEN	X38
4	(16)	LTGRN	B20
5	NOT USED		
6	(940)	WHT/GRN	X38
7	NOT USED		
8	(18)	BLK/BLU	R17
9	(19)	BRN/WHT	M12
10	(20)	ORG	M10
11	NOT USED		
12	(21)	GRN/WHT	B42
13	(22)	PNK	B41
14	(23)	BLK/PNK	B43
15	(588)	BRN/YEL	X38
16	(944)	BRN/BLU	X38

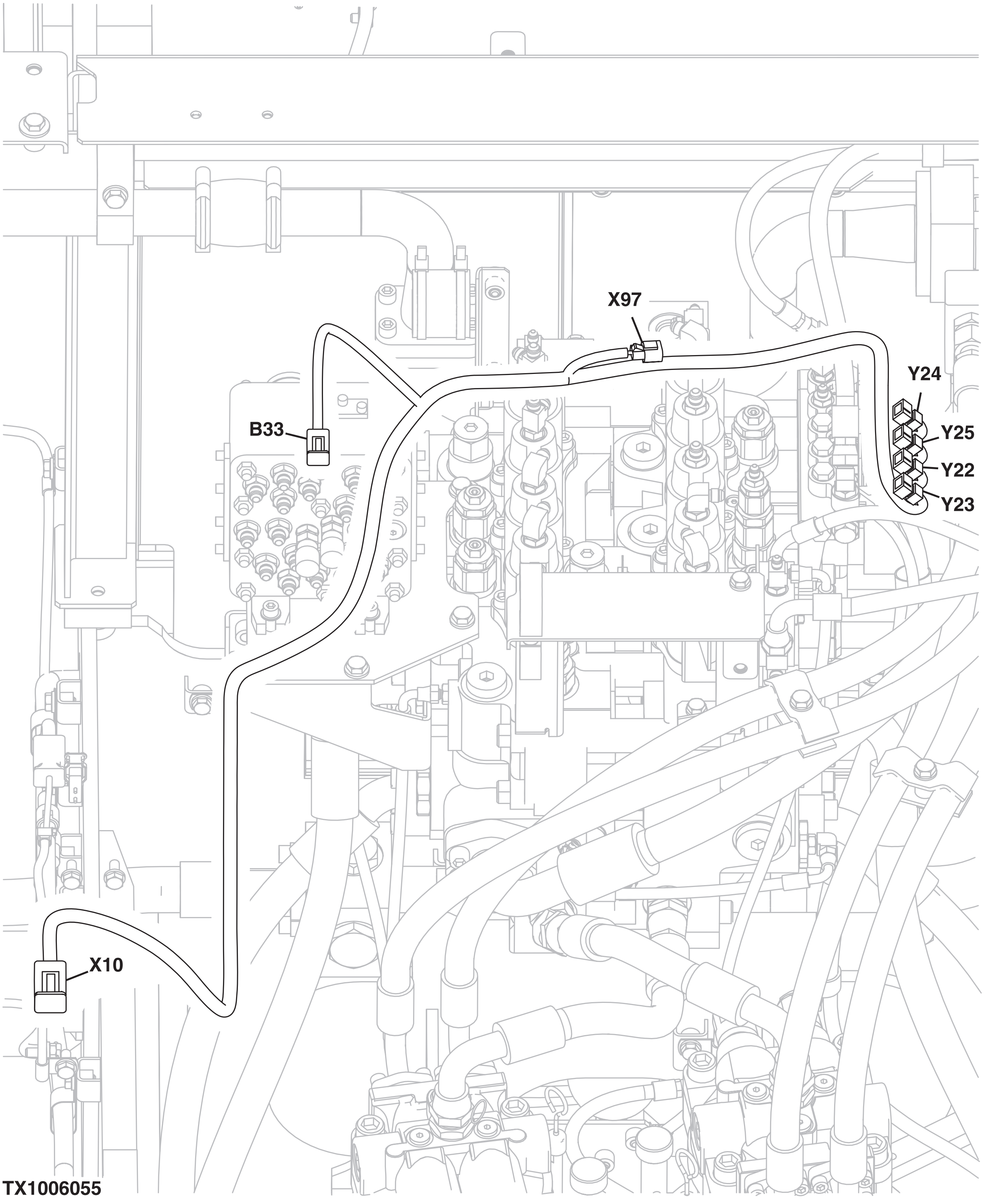
Air Conditioner Harness (W6) Wiring Diagram

LD30992,0000418 –19–20MAR06–1/2

A6—Radio
B20—Air Conditioner High/Low Pressure Switch
B41—Air Conditioner Freeze Control Switch
B42—Cab Air Temperature Sensor
B43—Coolant Temperature Sensor
K12—Blower Motor Relay
K15—Air Conditioner Compressor Clutch Relay
M7—Air Conditioner and Heater Blower Motor
M9—Air Conditioner and Heater Internal and External Servomotor
M10—Air Conditioner and Heater Blower Port Change Servomotor
M11—Air Conditioner and Heater Mixer Servomotor
M12—Air Conditioner and Heater Rear Blower Port Change Servomotor
R17—Blower Motor Resistor
S1—Key Switch
S7—Power Dig Switch
V7—Blower Motor Diode
V11—Blower Motor Signal Diode
X38—Cab Harness-to-Air Conditioner Harness 16-Pin Connector
X39—Cab Harness-to-Air Conditioner Harness 4-Pin Connector
X47—Cab Harness-to-Air Conditioner Harness 6-Pin Connector
X48—Air Conditioner Harness-to-Air Conditioner and Heater Controller 20-Pin Connector
X49—Air Conditioner Harness-to-Air Conditioner and Heater Controller 16-Pin Connector

LD30992,0000418 –19–20MAR06–2/2

Control Valve Harness (W7) Component Location



Control Valve Harness (W7) Component Location

Continued on next page

LD30992,0000419 –19–26APR06–1/2

B33—Swing Pressure Sensor **X10—Machine Harness-to-Control Valve Harness 20-Pin Connector**	**X97—Control Valve Harness-to-Attachment Pressure Sensor Harness Connector**	**Y22—Boom Flow Rate Solenoid (SF)** **Y23—Boom Mode Solenoid (SC)**	**Y24—Power Dig Solenoid (SG)** **Y25—Travel Speed Solenoid (SI)**

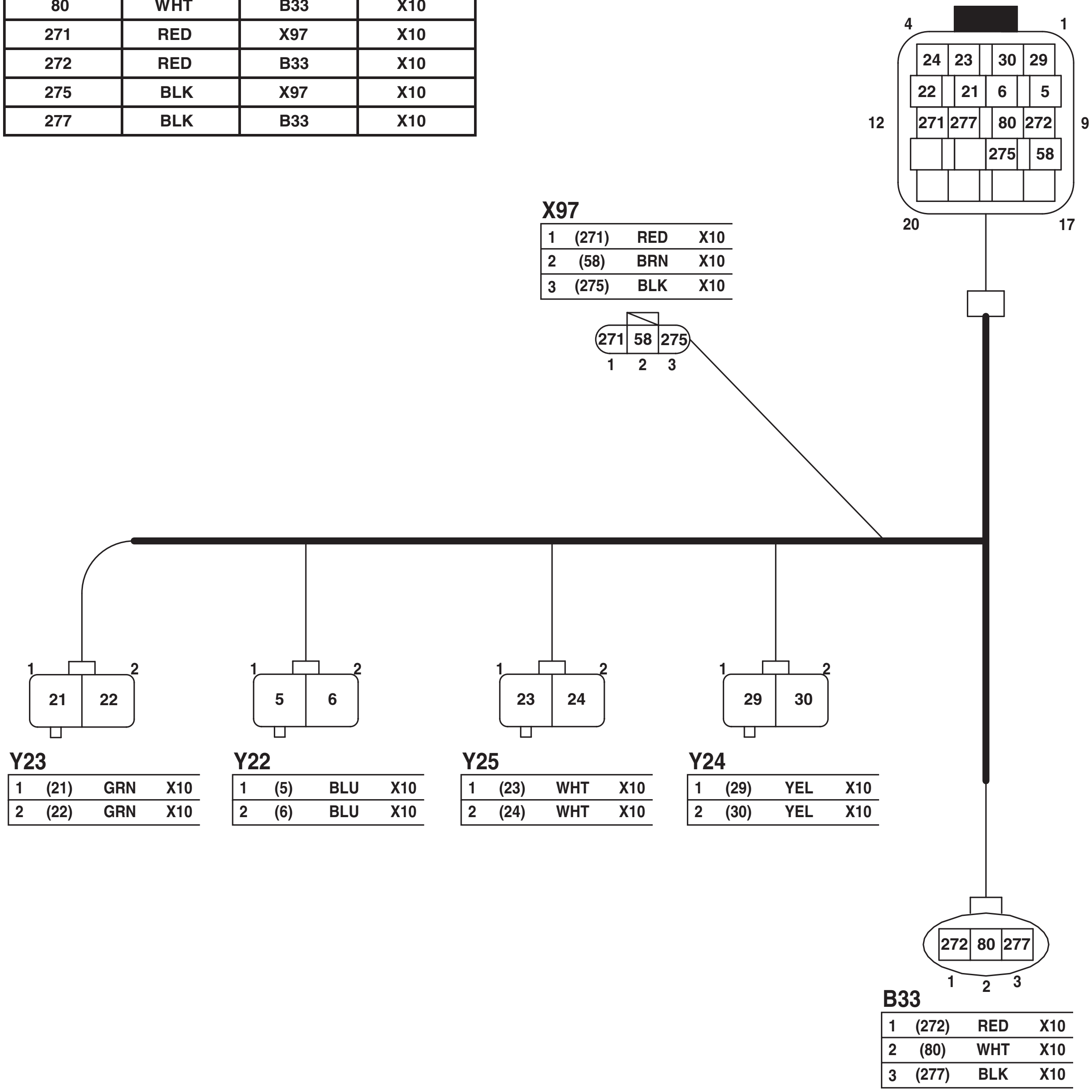
LD30992,0000419 –19–26APR06–2/2

Control Valve Harness (W7) Wiring Diagram

NUMBER	COLOR	END #1	END #2
5	BLU	Y22	X10
6	BLU	Y22	X10
21	GRN	Y23	X10
22	GRN	Y23	X10
23	WHT	Y25	X10
24	WHT	Y25	X10
29	YEL	Y24	X10
30	YEL	Y24	X10
58	BRN	X97	X10
80	WHT	B33	X10
271	RED	X97	X10
272	RED	B33	X10
275	BLK	X97	X10
277	BLK	B33	X10

X10

1	(29)	YEL	Y24
2	(30)	YEL	Y24
3	(23)	WHT	Y25
4	(24)	WHT	Y25
5	(5)	BLU	Y22
6	(6)	BLU	Y22
7	(21)	GRN	Y23
8	(22)	GRN	Y23
9	(272)	RED	B33
10	(80)	WHT	B33
11	(277)	BLK	B33
12	(271)	RED	X97
13	(58)	BRN	X97
14	(275)	BLK	X97
15	NOT USED		
16	NOT USED		
17	NOT USED		
18	NOT USED		
19	NOT USED		
20	NOT USED		



X97

1	(271)	RED	X10
2	(58)	BRN	X10
3	(275)	BLK	X10

Y23

1	(21)	GRN	X10
2	(22)	GRN	X10

Y22

1	(5)	BLU	X10
2	(6)	BLU	X10

Y25

1	(23)	WHT	X10
2	(24)	WHT	X10

Y24

1	(29)	YEL	X10
2	(30)	YEL	X10

B33

1	(272)	RED	X10
2	(80)	WHT	X10
3	(277)	BLK	X10

TX1003971 –UN–27FEB06

TX1003971

Control Valve Harness (W7) Wiring Diagram

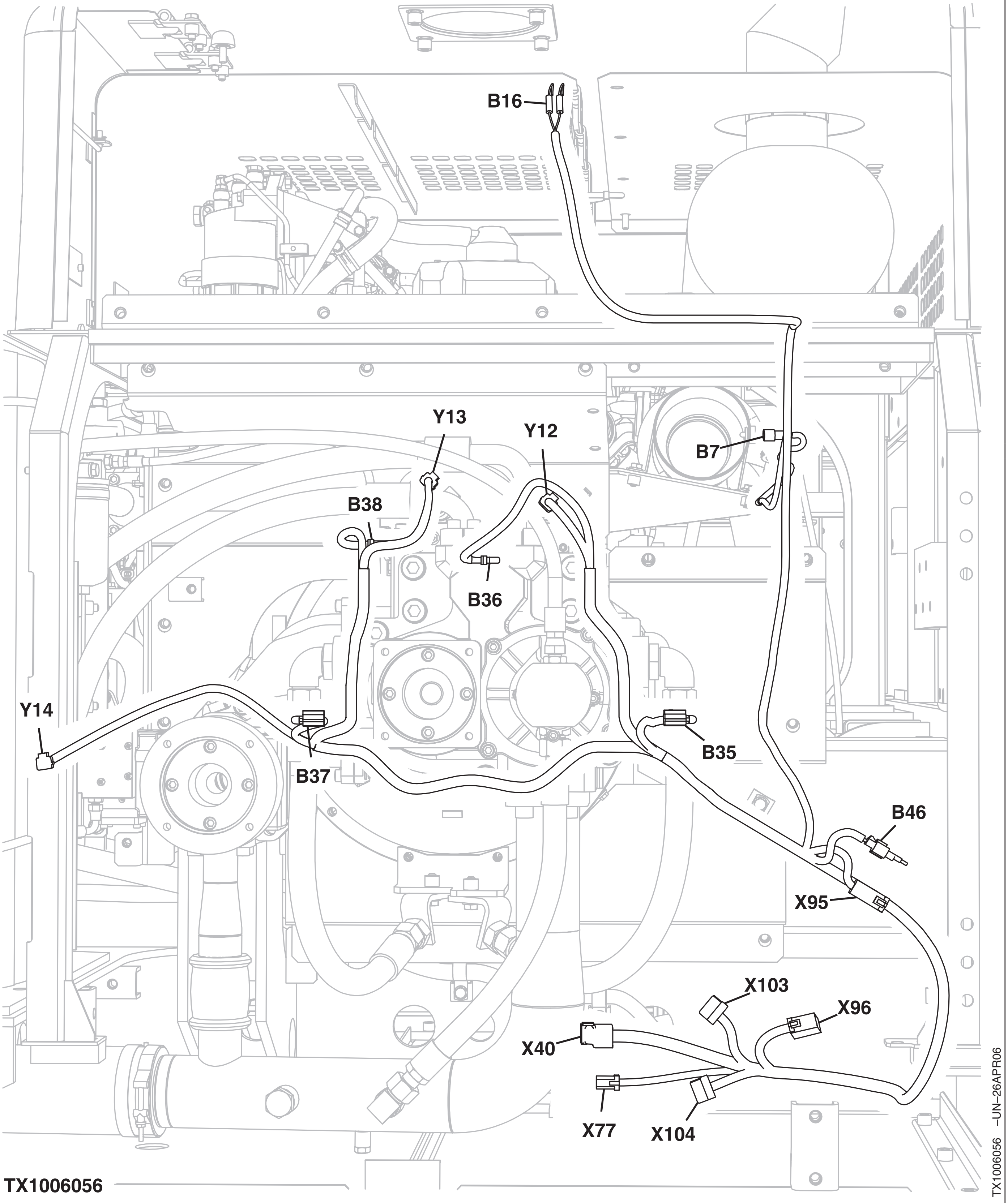
Continued on next page

LD30992,000041A –19–20MAR06–1/2

B33—Swing Pressure Sensor	**X97—Control Valve Harness-to-Attachment Pressure Sensor Harness Connector**	**Y22—Boom Flow Rate Solenoid (SF)**	**Y24—Power Dig Solenoid (SG)**
X10—Machine Harness-to-Control Valve Harness 20-Pin Connector		**Y23—Boom Mode Solenoid (SC)**	**Y25—Travel Speed Solenoid (SI)**

LD30992,000041A –19–20MAR06–2/2

Pump Harness (W8) Component Location



TX1006056

Pump Electrical Component Location

Continued on next page

B7—Intake Air Temperature
B16—Air Filter Restriction Switch
B35—Pump 1 (4-Spool) Delivery Pressure Sensor (4P)
B36—Pump 1 (4-Spool) Control Pressure Sensor (4P)
B37—Pump 2 (5-Spool) Delivery Pressure Sensor (5P)
B38—Pump 2 (5-Spool) Control Pressure Sensor (5P)
B46—Counterweight Removal Pressure Sensor
X40—Machine Harness-to-Pump Harness 20-Pin Connector
X77—Machine Harness-to-Pump Harness 4-Pin Camera Connector (Not Used)
X95—Pump Harness-to-Camera Harness 4-Pin Connector (Not Used)
X96—Pump Harness-to-Swing Alarm Connector (Not Used)
X103—Pump Harness Splice Connector 1
X104—Pump Harness Splice Connector 2
Y12—Pump 1 (4-Spool) Control Solenoid (4P)
Y13—Pump 2 (5-Spool) Control Solenoid (5P)
Y14—Fan Pump Control Solenoid

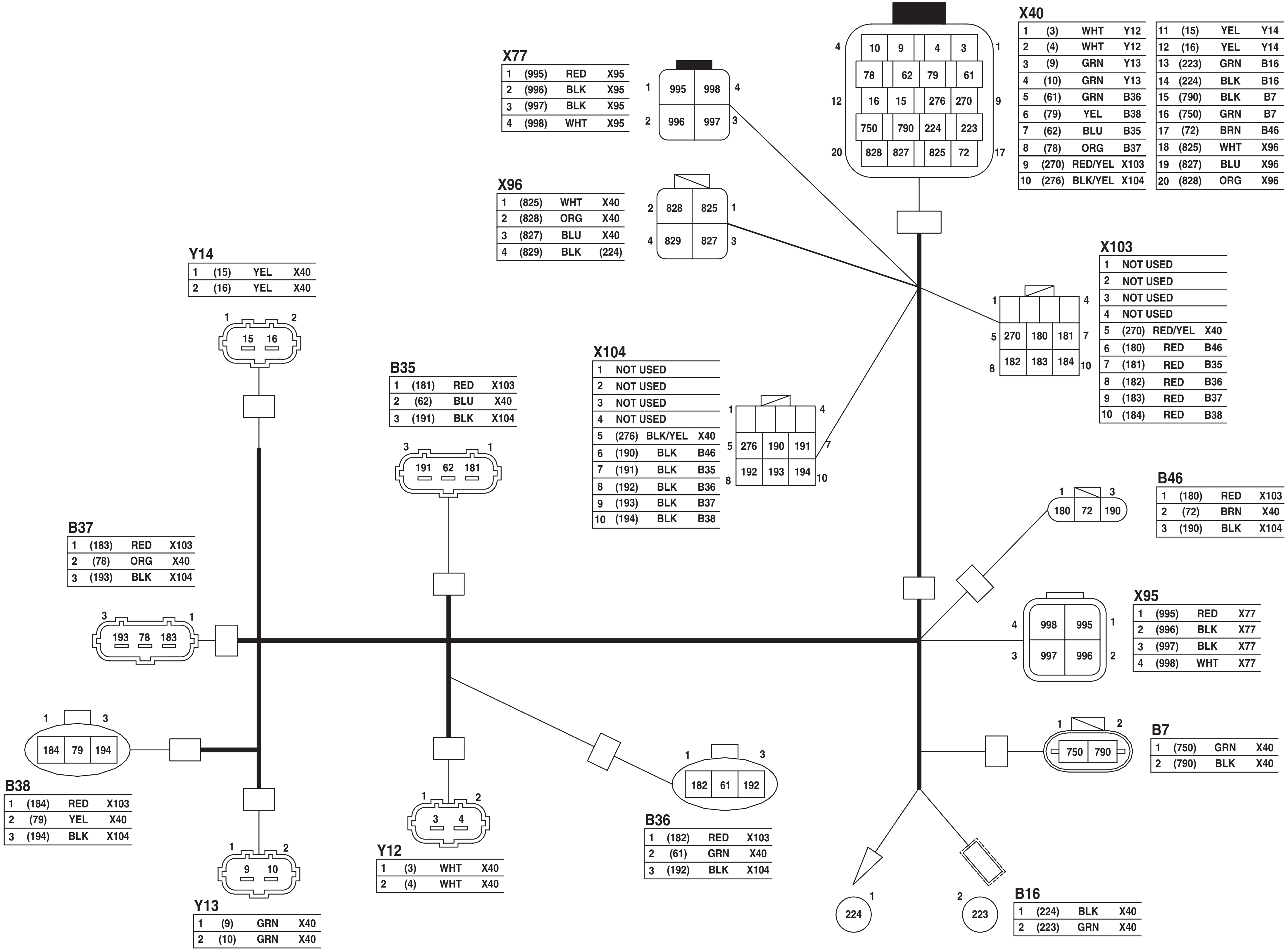
LD30992,00001F8 –19–26APR06–2/2

Pump Harness (W8) Wiring Diagram

TX1003984 –UN–09MAR06

NUMBER	COLOR	END #1	END #2
3	WHT	Y12	X40
4	WHT	Y12	X40
9	GRN	Y13	X40
10	GRN	Y13	X40
15	YEL	Y14	X40
16	YEL	Y14	X40
61	GRN	B36	X40
62	BLU	B35	X40
72	BRN	B46	X40
78	ORG	B37	X40
79	YEL	B38	X40
180	RED	X103	B46
181	RED	X103	B35
182	RED	X103	B36
183	RED	X103	B37
184	RED	X103	B38
190	BLK	X104	B46
191	BLK	X104	B35
192	BLK	X104	B36
193	BLK	X104	B37
194	BLK	X104	B38
223	GRN	B16	X40
224	BLK	B16	X40
270	RED/YEL	X103	X40
276	BLK/YEL	X104	X40
750	GRN	B7	X40
790	BLK	B7	X40
825	WHT	X96	X40
827	BLU	X96	X40
828	ORG	X96	X40
829	BLK	X96	(224)
995	RED	X77	X95
996	BLK	X77	X95
997	BLK	X77	X95
998	WHT	X77	X95

TX1003984



X40

1	(3)	WHT	Y12
2	(4)	WHT	Y12
3	(9)	GRN	Y13
4	(10)	GRN	Y13
5	(61)	GRN	B36
6	(79)	YEL	B38
7	(62)	BLU	B35
8	(78)	ORG	B37
9	(270)	RED/YEL	X103
10	(276)	BLK/YEL	X104
11	(15)	YEL	Y14
12	(16)	YEL	Y14
13	(223)	GRN	B16
14	(224)	BLK	B16
15	(790)	BLK	B7
16	(750)	GRN	B7
17	(72)	BRN	B46
18	(825)	WHT	X96
19	(827)	BLU	X96
20	(828)	ORG	X96

X77

1	(995)	RED	X95
2	(996)	BLK	X95
3	(997)	BLK	X95
4	(998)	WHT	X95

X96

1	(825)	WHT	X40
2	(828)	ORG	X40
3	(827)	BLU	X40
4	(829)	BLK	(224)

X103

1	NOT USED		
2	NOT USED		
3	NOT USED		
4	NOT USED		
5	(270)	RED/YEL	X40
6	(180)	RED	B46
7	(181)	RED	B35
8	(182)	RED	B36
9	(183)	RED	B37
10	(184)	RED	B38

X104

1	NOT USED		
2	NOT USED		
3	NOT USED		
4	NOT USED		
5	(276)	BLK/YEL	X40
6	(190)	BLK	B46
7	(191)	BLK	B35
8	(192)	BLK	B36
9	(193)	BLK	B37
10	(194)	BLK	B38

Y14

1	(15)	YEL	X40
2	(16)	YEL	X40

B35

1	(181)	RED	X103
2	(62)	BLU	X40
3	(191)	BLK	X104

B37

1	(183)	RED	X103
2	(78)	ORG	X40
3	(193)	BLK	X104

B46

1	(180)	RED	X103
2	(72)	BRN	X40
3	(190)	BLK	X104

X95

1	(995)	RED	X77
2	(996)	BLK	X77
3	(997)	BLK	X77
4	(998)	WHT	X77

B7

1	(750)	GRN	X40
2	(790)	BLK	X40

B38

1	(184)	RED	X103
2	(79)	YEL	X40
3	(194)	BLK	X104

B36

1	(182)	RED	X103
2	(61)	GRN	X40
3	(192)	BLK	X104

Y12

1	(3)	WHT	X40
2	(4)	WHT	X40

Y13

1	(9)	GRN	X40
2	(10)	GRN	X40

B16

1	(224)	BLK	X40
2	(223)	GRN	X40

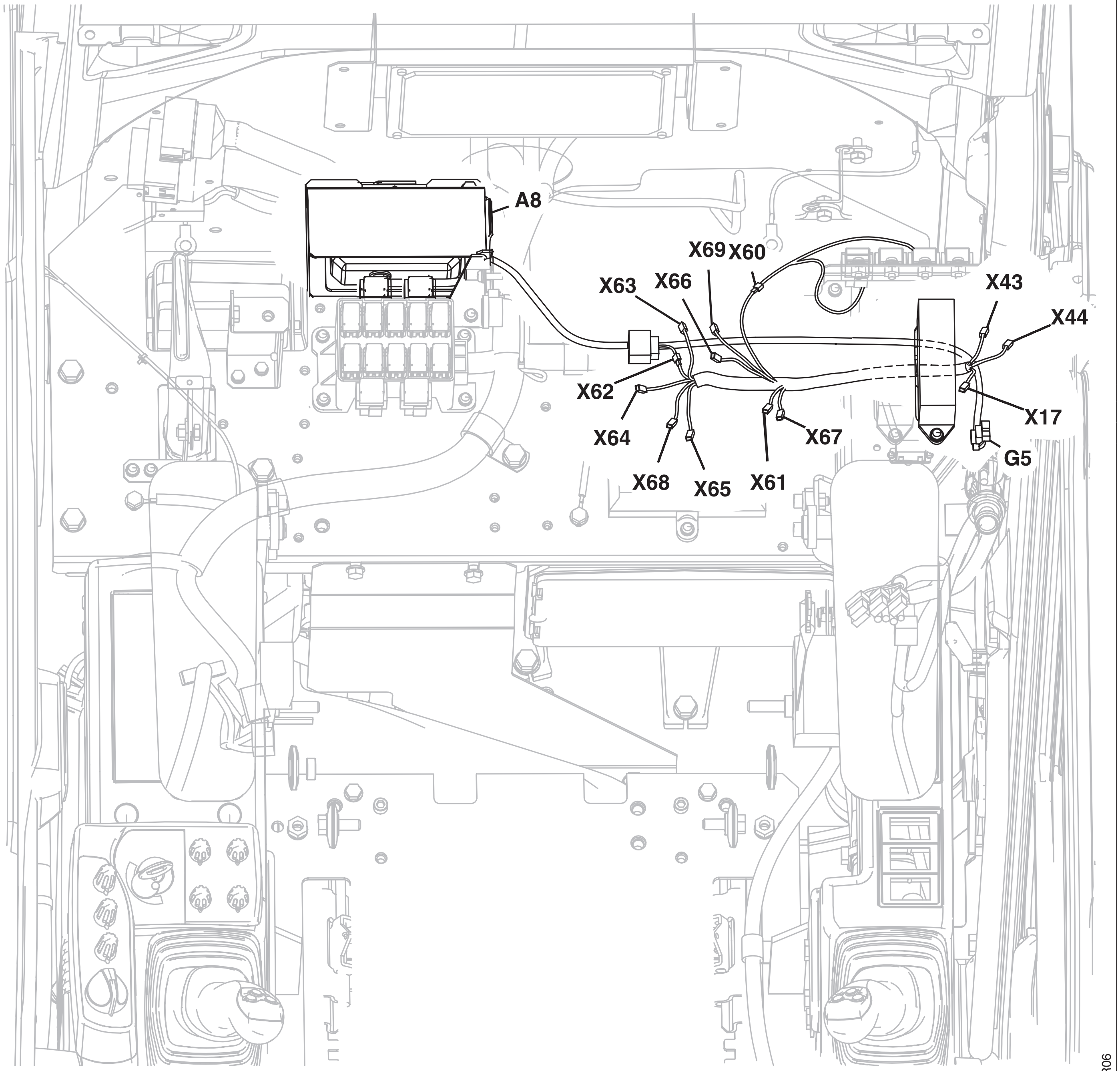
Pump Harness (W8) Wiring Diagram

LD30992,00001F9 –19–20MAR06–1/2

B7—Intake Air Temperature
B16—Air Filter Restriction Switch
B35—Pump 1 (4-Spool) Delivery Pressure Sensor (4P)
B36—Pump 1 (4-Spool) Control Pressure Sensor (4P)
B37—Pump 2 (5-Spool) Delivery Pressure Sensor (5P)
B38—Pump 2 (5-Spool) Control Pressure Sensor (5P)
B46—Counterweight Removal Pressure Sensor
X40—Machine Harness-to-Pump Harness 20-Pin Connector
X77—Machine Harness-to-Pump Harness 4-Pin Camera Connector
X95—Pump Harness-to-Camera Harness 4-Pin Connector
X96—Pump Harness-to-Swing Alarm Connector
X103—Pump Harness Splice Connector 1
X104—Pump Harness Splice Connector 2
Y12—Pump 1 (4-Spool) Control Solenoid (4P)
Y13—Pump 2 (5-Spool) Control Solenoid (5P)
Y14—Fan Pump Control Solenoid

LD30992,00001F9 –19–20MAR06–2/2

Auxiliary Fuse Box Harness (W9) Component Location



TX1006058

Auxiliary Fuse Box Harness (W9) Component Location

Continued on next page

LD30992,000041B –19–26APR06–1/2

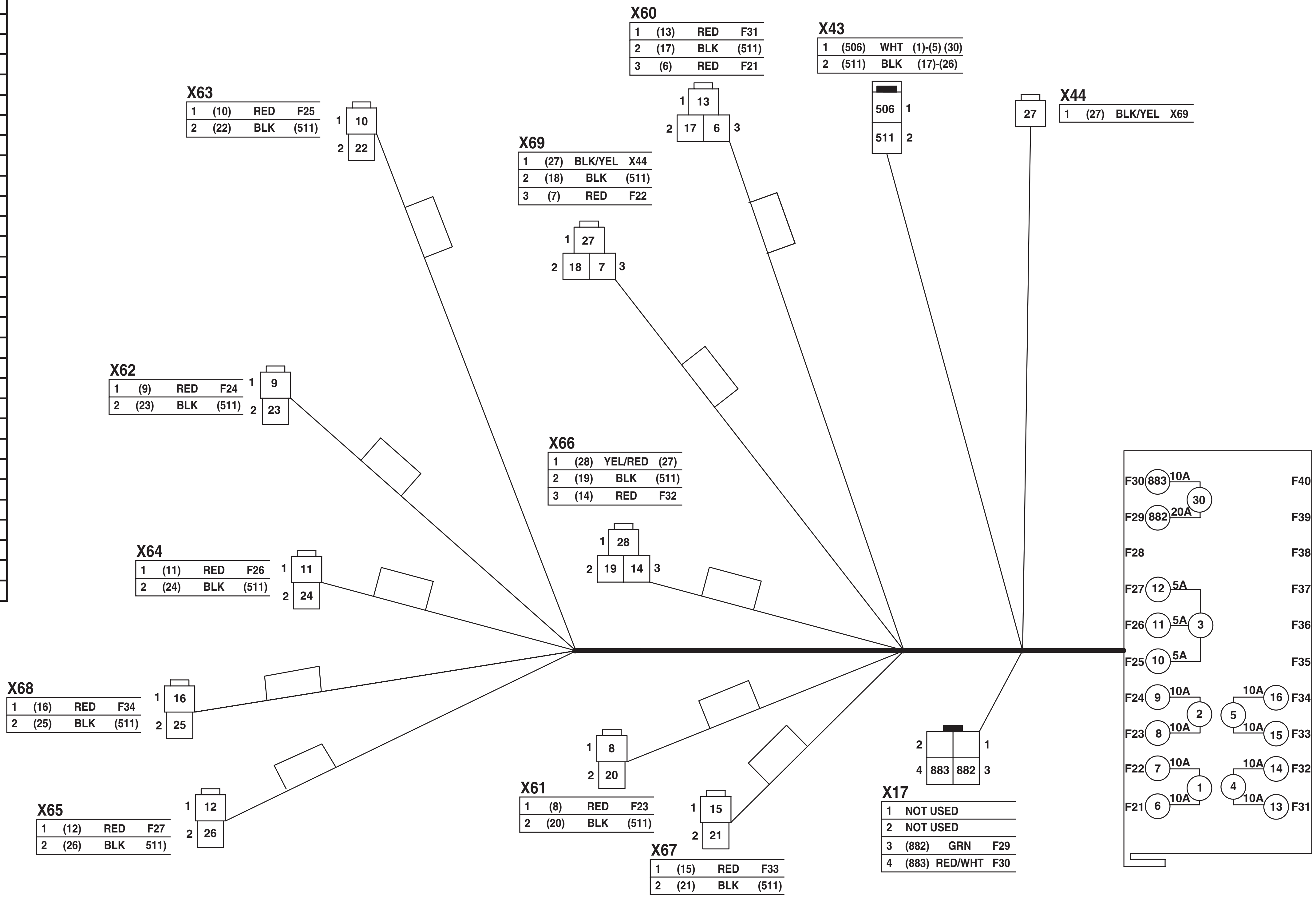
A8—12 Volt Power Converter
G5—12 Volt Power Outlet
X17—Cab Harness-to-Auxiliary Fuse Box Harness 4-Pin Connector
X43—Auxiliary Fuse Box Connector
X44—Optional Light Connector
X60—Heated Air Seat Connector
X61—Rear Cab Light Connector
X62—12 Volt Power Converter Connector
X63—IMOBI Connector
X64—Quick Hitch Connector
X65—Cab Auxiliary Power Connector 3
X66—Front Cab Light 2 Connector
X67—Warning Lamp Connector
X68—Cab Auxiliary Power Connector 2
X69—Front Cab Light 1 Connector

LD30992,000041B –19–26APR06–2/2

Auxiliary Fuse Box Harness (W9) Wiring Diagram

TX1003972 –UN–03MAR06

NUMBER	COLOR	END #1	END #2
1	WHT	F21, F22	(506)
2	WHT	F23, F24	(506)
3	WHT	F25, F26, F27	(506)
4	WHT	F31, F32	(506)
5	WHT	F33, F34	(506)
6	RED	F21	X60
7	RED	F22	X69
8	RED	F23	X61
9	RED	F24	X62
10	RED	F25	X63
11	RED	F26	X64
12	RED	F27	X65
13	RED	F31	X60
14	RED	F32	X66
15	RED	F33	X67
16	RED	F34	X68
17	BLK	X60	(511)
18	BLK	X69	(511)
19	BLK	X66	(511)
20	BLK	X61	(511)
21	BLK	X67	(511)
22	BLK	X63	(511)
23	BLK	X62	(511)
24	BLK	X64	(511)
25	BLK	X68	(511)
26	BLK	X65	(511)
27	BLK/YEL	X44	X69
28	YEL/RED	(27)	X66
30	WHT	F29, F30	(506)
506	WHT	X43	(1)-(5) (30)
511	BLK	X43	(17)-(26)
882	GRN	F29	X17
883	RED/WHT	F30	X17



TX1003972

Auxiliary Fuse Box Harness (W9) Wiring Diagram

LD30992,000041C –19–07APR06–1/2

F21—Heated Air Seat 10 A Fuse (Marked SEAT HEATER)
F22—Front Cab Light One 15 A Fuse (Marked CAB LAMP FRONT)
F23—Rear Cab Light 10 A Fuse (Marked CAB LAMP REAR)
F24—12 Volt Power Unit 10 A Fuse (Marked 12V UNIT)
F25—IMOBI 5 A Fuse (Marked IMOBI)
F26—Quick Hitch 5 A Fuse (Marked QUICK HITCH)
F27—Cab Auxiliary Power Connector Three 5 A Fuse (Marked AUX.3)
F29—Drive Light 20 A Fuse (Marked LIGHT 1)
F30—Auto Lubricator 10 A Fuse (Marked AUTO LUB)
F31—Seat Compressor 10 A Fuse (Marked SEAT COMPR)
F32—Front Cab Light Two 10 A Fuse (Marked CAB LAMP FRONT+2)
F33—Warning Lamp 10 A Fuse (Marked WARNING LAMP)
F34—Cab Auxiliary Power Connector Two 10 A Fuse (Marked AUX.2)
X17—Cab Harness-to-Auxiliary Fuse Box Harness 4-Pin Connector
X43—Auxiliary Fuse Box Connector
X44—Optional Light Connector
X60—Heated Air Seat Connector
X61—Rear Cab Light Connector
X62—12 Volt Power Unit Connector
X63—IMOBI Connector
X64—Quick Hitch Connector
X65—Cab Auxiliary Power Connector 3
X66—Front Cab Light 2 Connector
X67—Warning Lamp Connector
X68—Cab Auxiliary Power Connector 2
X69—Front Cab Light 1 Connector

LD30992,000041C –19–07APR06–2/2

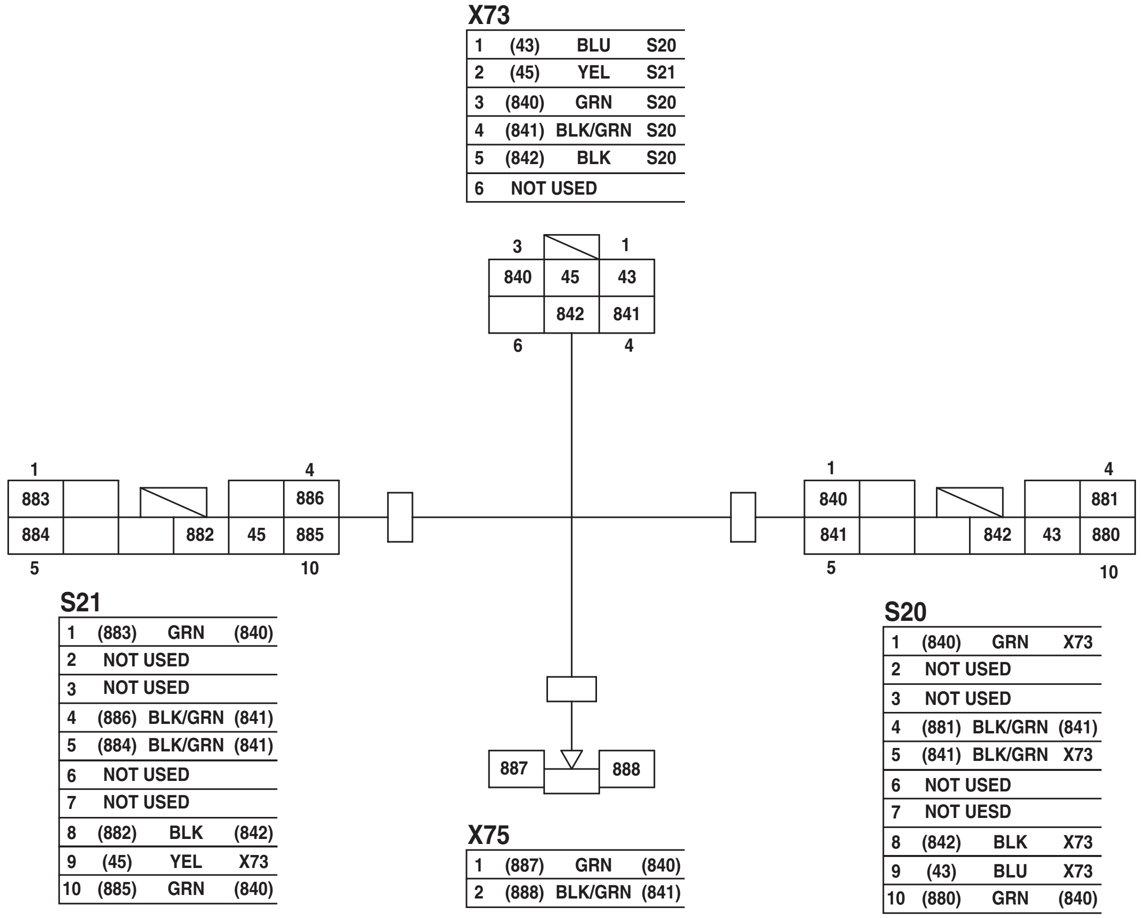
Cab Switch Harness (W10) Component Location

For Cab Switch Harness (W10) Component Location, See Heated Air Seat Harness (W12) Component Location. (Group 9015-10.)

LD30992,000041D –19–18APR06–1/1

Cab Switch Harness (W10) Wiring Diagram

NUMBER	COLOR	END #1	END #2
43	BLU	X73	S20
45	YEL	X73	S21
840	GRN	X73	S20
841	BLK/GRN	X73	S20
842	BLK	X73	S20
880	GRN	(840)	S20
881	BLK/GRN	(841)	S20
882	BLK	(842)	S21
883	GRN	(840)	S21
884	BLK/GRN	(841)	S21
885	GRN	(840)	S21
886	BLK/GRN	(841)	S21
887	GRN	(840)	X75
888	BLK/GRN	(841)	X75



X73

1	(43)	BLU	S20
2	(45)	YEL	S21
3	(840)	GRN	S20
4	(841)	BLK/GRN	S20
5	(842)	BLK	S20
6	NOT USED		

S21

1	(883)	GRN	(840)
2	NOT USED		
3	NOT USED		
4	(886)	BLK/GRN	(841)
5	(884)	BLK/GRN	(841)
6	NOT USED		
7	NOT USED		
8	(882)	BLK	(842)
9	(45)	YEL	X73
10	(885)	GRN	(840)

X75

1	(887)	GRN	(840)
2	(888)	BLK/GRN	(841)

S20

1	(840)	GRN	X73
2	NOT USED		
3	NOT USED		
4	(881)	BLK/GRN	(841)
5	(841)	BLK/GRN	X73
6	NOT USED		
7	NOT UESD		
8	(842)	BLK	X73
9	(43)	BLU	X73
10	(880)	GRN	(840)

TX1003973 –UN–03MAR06

TX1003973

Cab Switch Harness (W10) Wiring Diagram

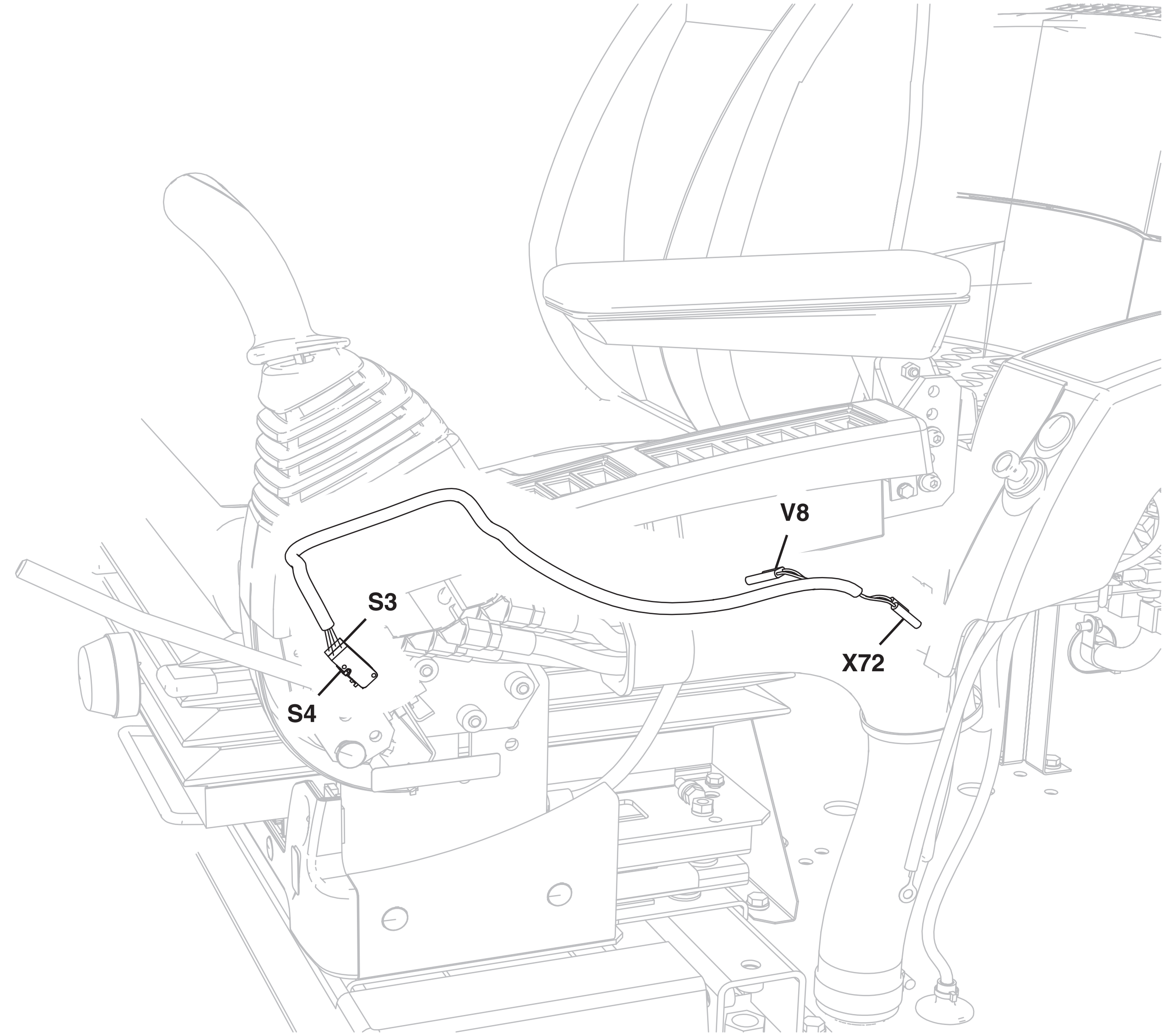
Continued on next page

LD30992,000041E –19–20MAR06–1/2

S20—Boom Mode Switch	**S21—Engine Fluid Level Check Switch**	**X73—Cab Harness-to-Cab Switch Harness Connector**	**X75—Cab Switch Harness-to-Seat Heater Switch Harness Connector**

LD30992,000041E –19–20MAR06–2/2

Pilot Shutoff Switch Harness (W11) Component Location



TX1006061

TX1006061 –UN–10APR06

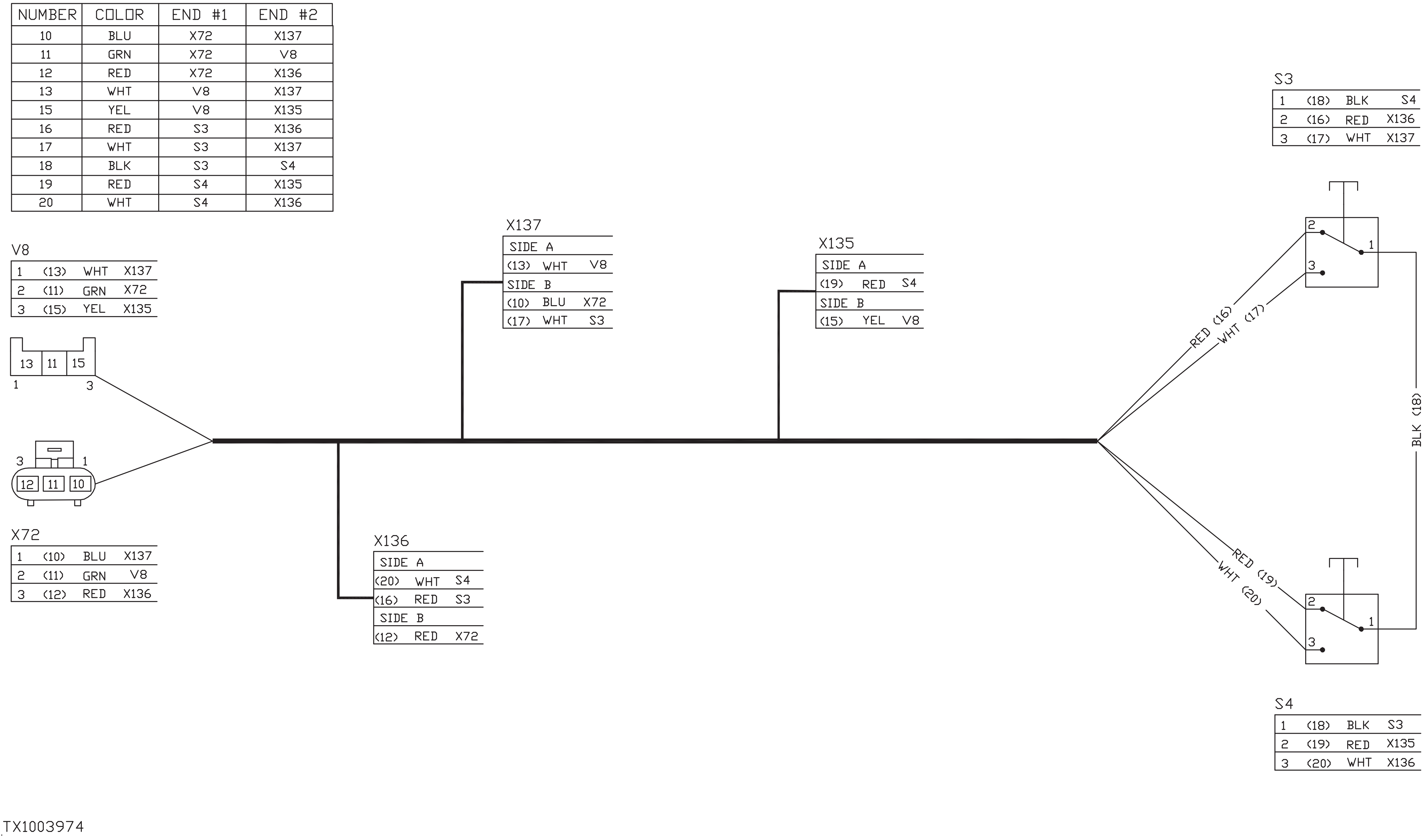
Pilot Shutoff Switch Harness (W11) Component Location

S3—Pilot Shutoff Switch 1	**S4—Pilot Shutoff Switch 2**	**V8—Pilot Shutoff Diode**	**X72—Cab Harness-to-Pilot Shutoff Switch Harness Connector**

LD30992,000041F –19–18APR06–1/1

Pilot Shutoff Switch Harness (W11) Wiring Diagram

TX1003974 –UN–28FEB06



NUMBER	COLOR	END #1	END #2
10	BLU	X72	X137
11	GRN	X72	V8
12	RED	X72	X136
13	WHT	V8	X137
15	YEL	V8	X135
16	RED	S3	X136
17	WHT	S3	X137
18	BLK	S3	S4
19	RED	S4	X135
20	WHT	S4	X136

V8

1	(13)	WHT	X137
2	(11)	GRN	X72
3	(15)	YEL	X135

X72

1	(10)	BLU	X137
2	(11)	GRN	V8
3	(12)	RED	X136

X137

SIDE A		
(13)	WHT	V8
SIDE B		
(10)	BLU	X72
(17)	WHT	S3

X135

SIDE A		
(19)	RED	S4
SIDE B		
(15)	YEL	V8

X136

SIDE A		
(20)	WHT	S4
(16)	RED	S3
SIDE B		
(12)	RED	X72

S3

1	(18)	BLK	S4
2	(16)	RED	X136
3	(17)	WHT	X137

S4

1	(18)	BLK	S3
2	(19)	RED	X135
3	(20)	WHT	X136

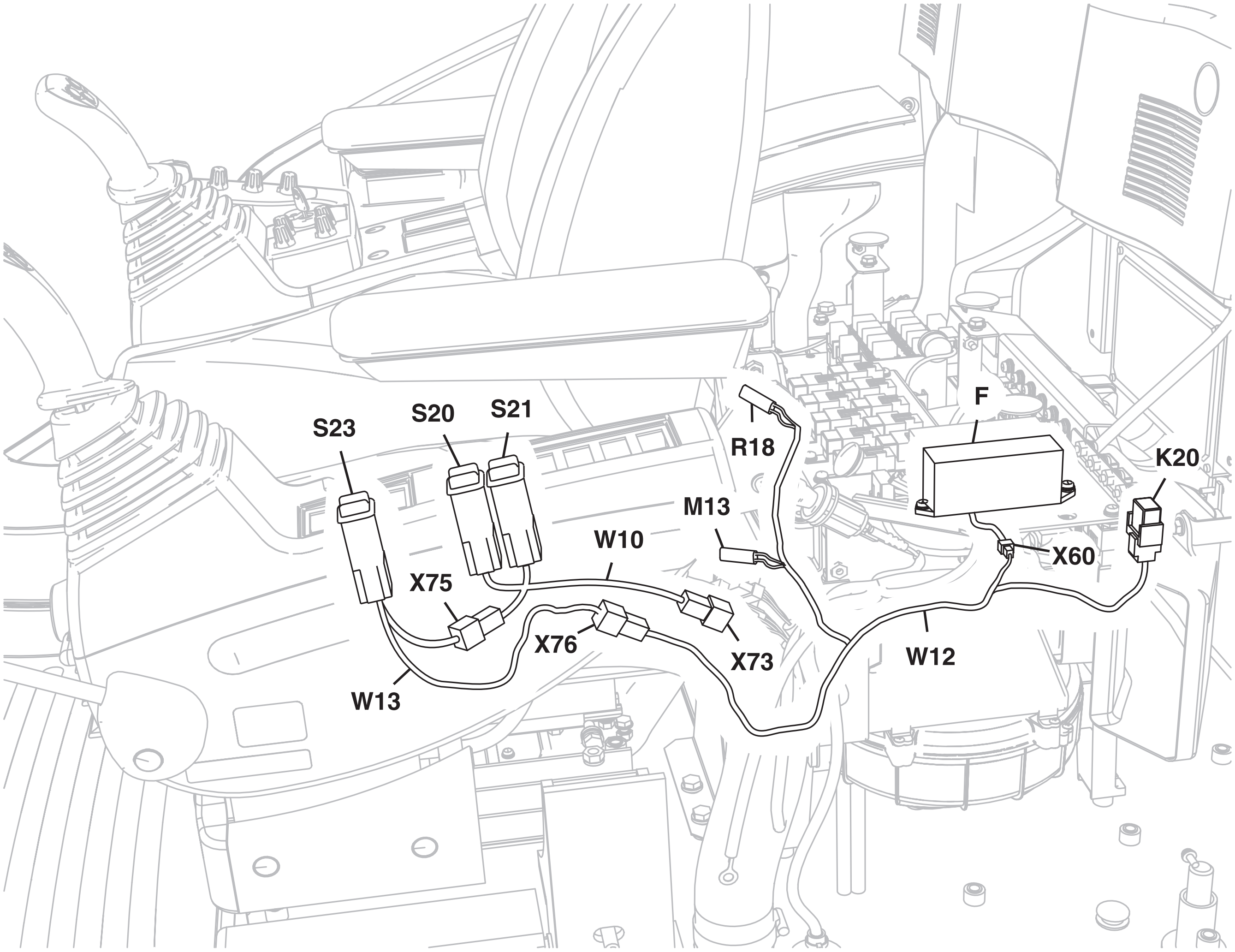
Pilot Shutoff Switch Harness (W11) Wiring Diagram

LD30992,0000420 –19–20MAR06–1/2

S3—Pilot Shutoff Switch 1
S4—Pilot Shutoff Switch 2
V8—Pilot Shutoff Switch Diode
X72—Cab Harness-to-Pilot Shutoff Switch Harness Connector
X135—Pilot Shutoff Switch Harness Splice 1
X136—Pilot Shutoff Switch Harness Splice 2
X137—Pilot Shutoff Switch Harness Splice 3

LD30992,0000420 –19–20MAR06–2/2

Heated Air Seat Harness (W12) Component Location



TX1006060

Heated Air Seat Harness (W12) Component Location

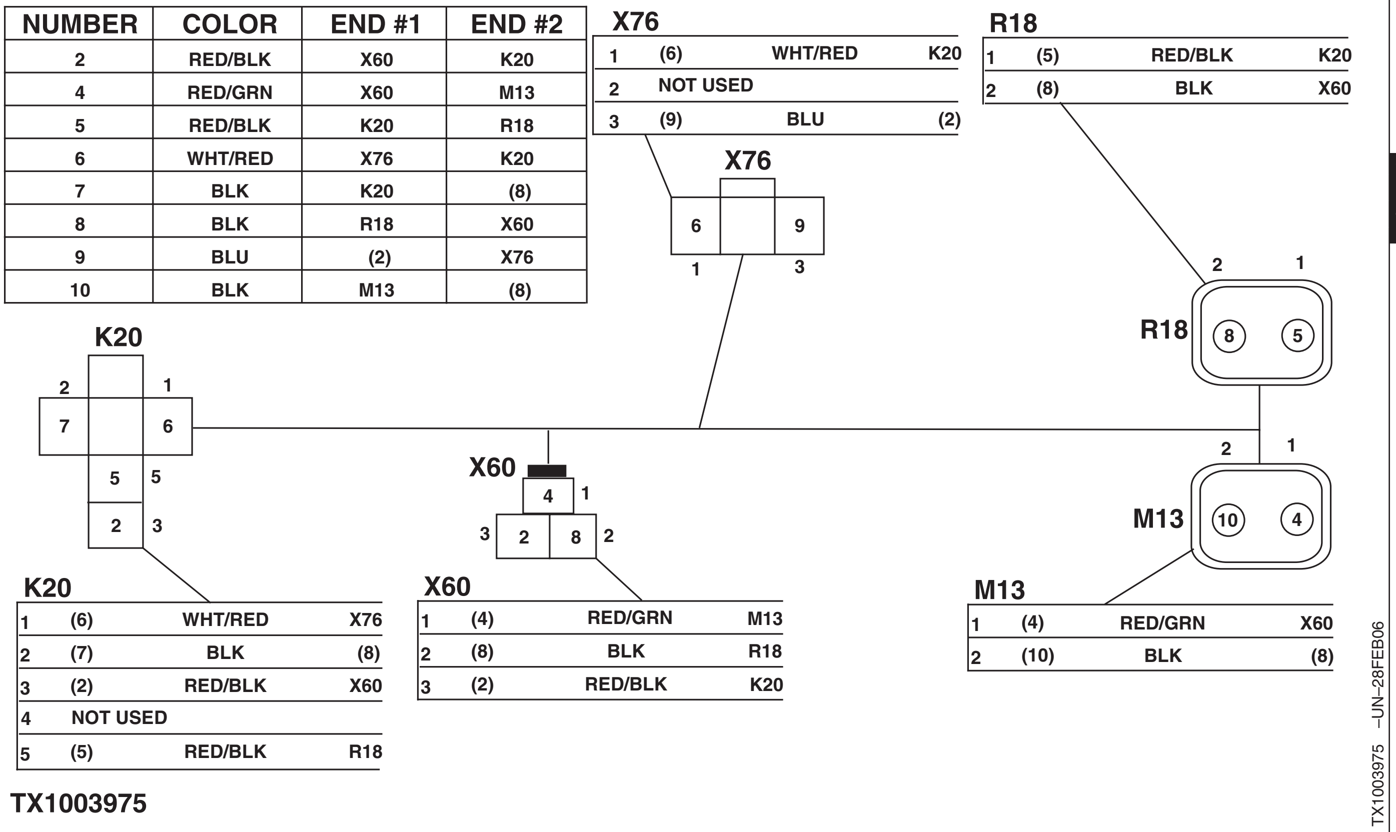
Continued on next page

LD30992,0000421 –19–18APR06–1/2

F—Auxiliary Fuse Box
K20—Seat Heater Relay
M13—Seat Air Compressor Motor
R18—Seat Heater
S20—Boom Mode Switch
S21—Engine Fluid Level Check Switch
S23—Heated Seat Switch
W10—Cab Switch Harness
W12—Heated Air Seat Harness
W13—Seat Heater Switch Harness
X60—Heated Air Seat Connector
X73—Cab Harness-to-Cab Switch Harness Connector
X75—Cab Switch Harness-to-Seat Heater Switch Harness Connector
X76—Seat Heater Switch Harness-to-Heated Air Seat Harness Connector

LD30992,0000421 –19–18APR06–2/2

Heated Air Seat Harness (W12) Wiring Diagram



NUMBER	COLOR	END #1	END #2
2	RED/BLK	X60	K20
4	RED/GRN	X60	M13
5	RED/BLK	K20	R18
6	WHT/RED	X76	K20
7	BLK	K20	(8)
8	BLK	R18	X60
9	BLU	(2)	X76
10	BLK	M13	(8)

X76

1	(6)	WHT/RED	K20
2	NOT USED		
3	(9)	BLU	(2)

R18

1	(5)	RED/BLK	K20
2	(8)	BLK	X60

K20

1	(6)	WHT/RED	X76
2	(7)	BLK	(8)
3	(2)	RED/BLK	X60
4	NOT USED		
5	(5)	RED/BLK	R18

X60

1	(4)	RED/GRN	M13
2	(8)	BLK	R18
3	(2)	RED/BLK	K20

M13

1	(4)	RED/GRN	X60
2	(10)	BLK	(8)

Heated Air Seat Harness (W12) Wiring Diagram

K20—Seat Heater Relay
M13—Seat Air Compressor Motor
R18—Seat Heater
X60—Heated Air Seat Connector
X76—Seat Heater Switch Harness-to-Heated Air Seat Harness Connector

LD30992,0000422 –19–20MAR06–1/1

Seat Heater Switch Harness (W13) Component Location

For Seat Heater Switch Harness (W13) Component Location, See Heated Air Seat Harness (W12) Component Location. (Group 9015-10.)

LD30992,0000423 –19–18APR06–1/1

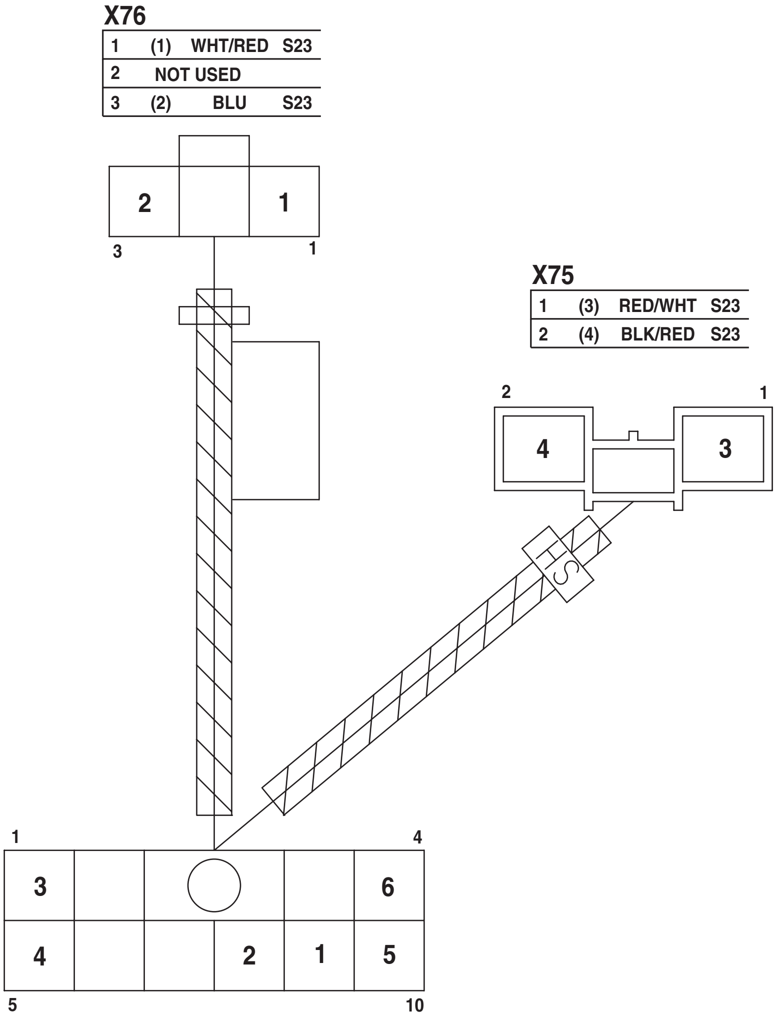
Seat Heater Switch Harness (W13) Wiring Diagram

X76

1	(1)	WHT/RED	S23
2	NOT USED		
3	(2)	BLU	S23

X75

1	(3)	RED/WHT	S23
2	(4)	BLK/RED	S23



S23

1	(3)	RED/WHT	X75
2	NOT USED		
3	NOT USED		
4	(6)	BLK/RED	(4)
5	(4)	BLK/RED	X75
6	NOT USED		
7	NOT USED		
8	(2)	BLU	X76
9	(1)	WHT/RED	X76
10	(5)	RED/WHT	(3)

NUMBER	COLOR	END #1	END #2
1	WHT/RED	X76	S23
2	BLU	X76	S23
3	RED/WHT	X75	S23
4	BLK/RED	X75	S23
5	RED/WHT	(3)	S23
6	BLK/RED	(4)	S23

TX1003976

TX1003976 –UN–21MAR06

Seat Heater Switch Harness (W13) Wiring Diagram

Continued on next page

LD30992,0000424 –19–28APR06–1/2

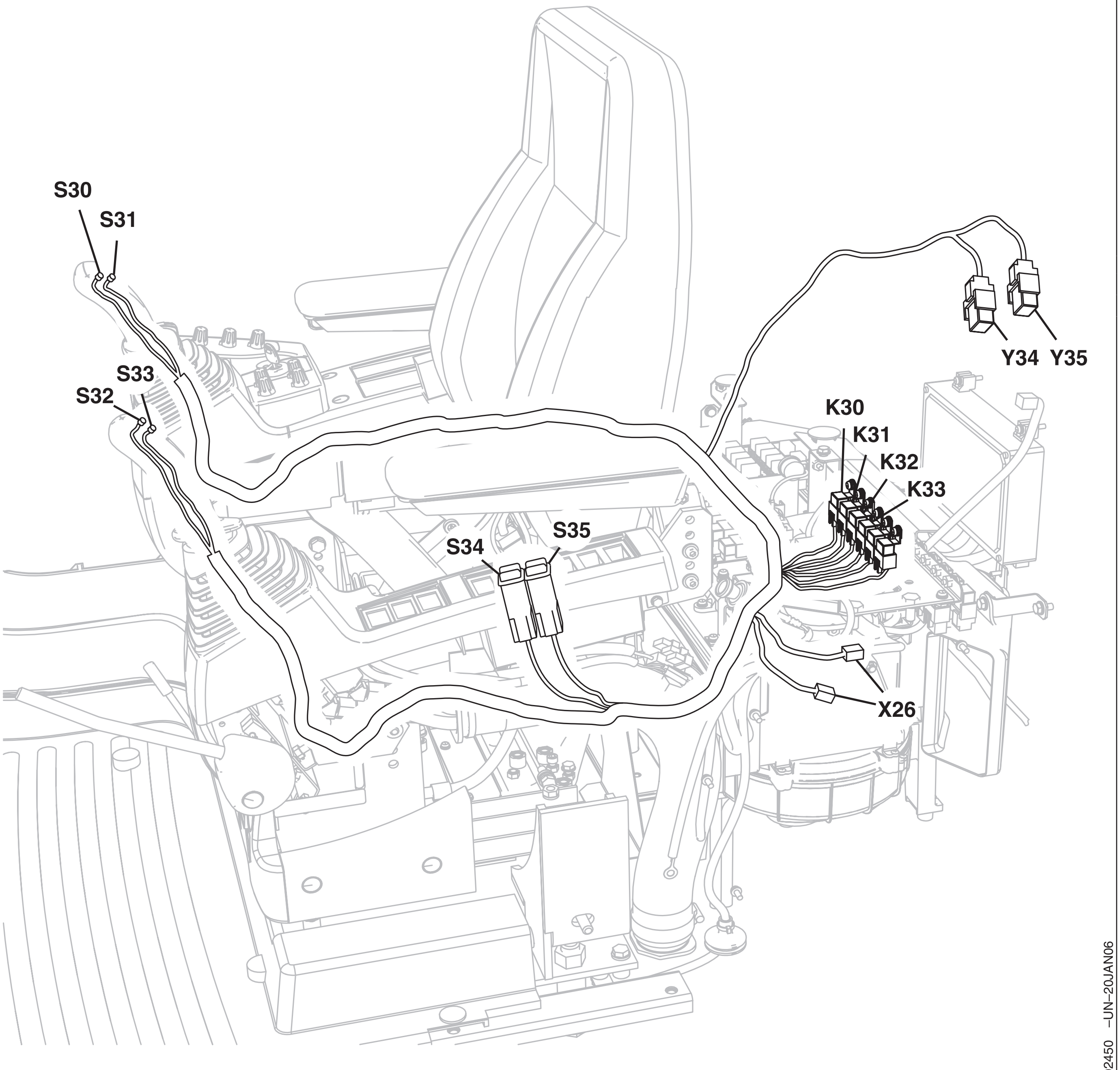
S23—Heated Seat Switch

X75—Cab Switch Harness-to-Seat Heater Switch Harness Connector

X76—Seat Heater Switch Harness-to-Heated Air Seat Harness Connector

LD30992,0000424 –19–28APR06–2/2

Multi-Function Pilot Control Lever Harness (W14) Component Location



TX1002450

Continued on next page

LD30992,0000425 –19–10APR06–1/2

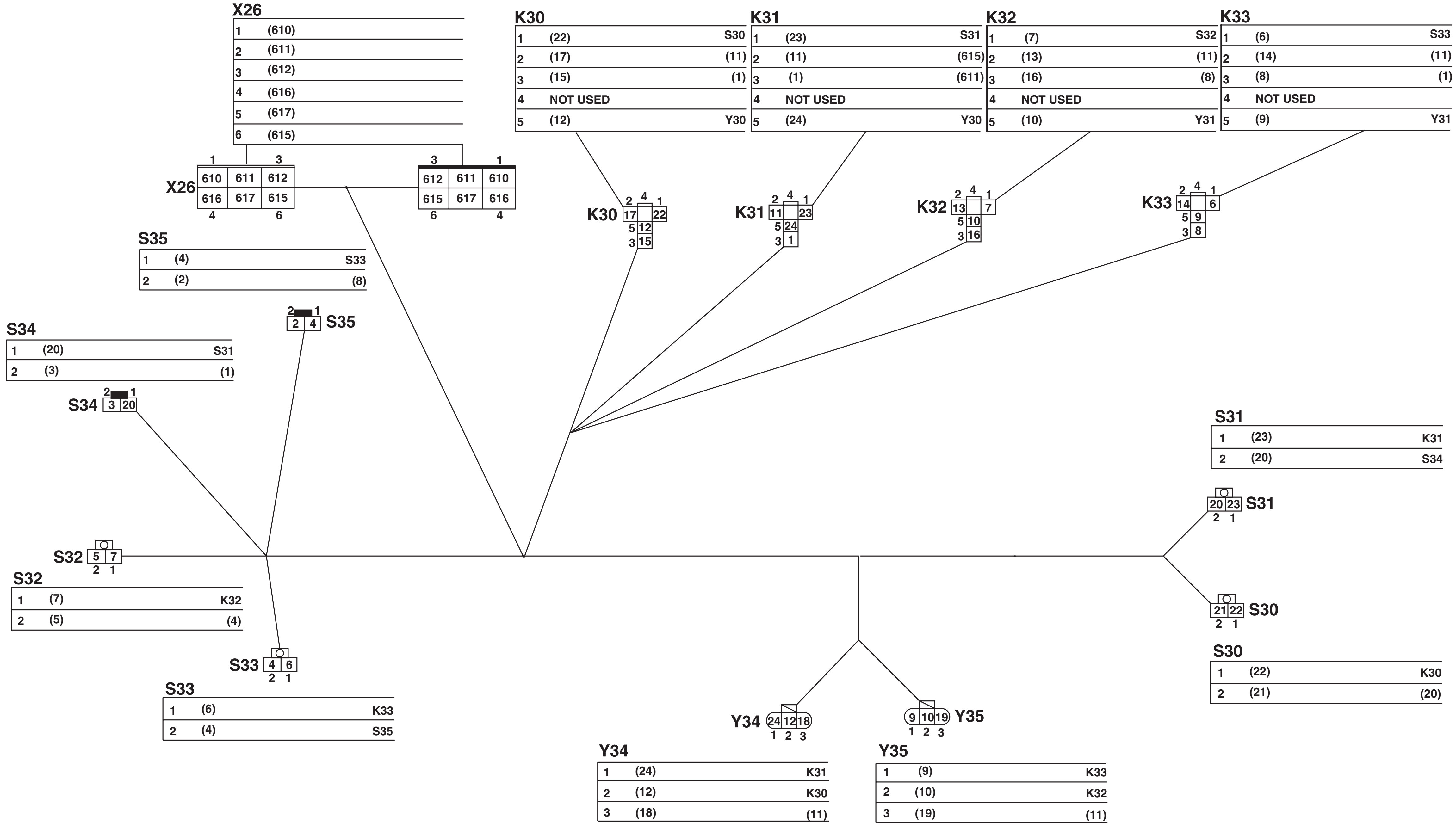
K30—Right Solenoid Relay A
K31—Right Solenoid Relay B
K32—Left Solenoid Relay A
K33—Left Solenoid Relay B
S30—Right Switch A
S31—Right Switch B
S32—Left Switch A
S33—Left Switch B
S34—Right Enable Switch
S35—Left Enable Switch
X26—Optional Connector
Y34—Right Solenoid
Y35—Left Solenoid

LD30992,0000425 –19–10APR06–2/2

Multi-Function Pilot Control Lever Harness (W14) Wiring Diagram

TX1000728 –UN–21DEC05

NUMBER	COLOR	END #1	END #2
1		(611)	K31
2		(8)	S35
3		(1)	S34
4		S35	S33
5		S32	(4)
6		S33	K33
7		S32	K32
8		(1)	K33
9		K33	Y35
10		K32	Y31
11		K31	(615)
12		K30	Y30
13		K32	(11)
14		K33	(11)
15		(1)	K30
16		(8)	K32
17		K30	(11)
18		(11)	Y30
19		(11)	Y35
20		S34	S31
21		(20)	S30
22		S30	K30
23		S31	K31
24		K31	Y30
610		X26	X26
611		X26	X26
612		X26	X26
615		X26	X26
616		X26	X26
617		X26	X26



X26

1	(610)
2	(611)
3	(612)
4	(616)
5	(617)
6	(615)

K30

1	(22)	S30
2	(17)	(11)
3	(15)	(1)
4	NOT USED	
5	(12)	Y30

K31

1	(23)	S31
2	(11)	(615)
3	(1)	(611)
4	NOT USED	
5	(24)	Y30

K32

1	(7)	S32
2	(13)	(11)
3	(16)	(8)
4	NOT USED	
5	(10)	Y31

K33

1	(6)	S33
2	(14)	(11)
3	(8)	(1)
4	NOT USED	
5	(9)	Y31

S35

1	(4)	S33
2	(2)	(8)

S34

1	(20)	S31
2	(3)	(1)

S32

1	(7)	K32
2	(5)	(4)

S33

1	(6)	K33
2	(4)	S35

S31

1	(23)	K31
2	(20)	S34

S30

1	(22)	K30
2	(21)	(20)

Y34

1	(24)	K31
2	(12)	K30
3	(18)	(11)

Y35

1	(9)	K33
2	(10)	K32
3	(19)	(11)

TX1000728

K30—Right Solenoid Relay A
K31—Right Solenoid Relay B
K32—Left Solenoid Relay A
K33—Left Solenoid Relay B
S30—Right Switch A
S31—Right Switch B
S32—Left Switch A
S33—Left Switch B
S34—Right Enable Switch
S35—Left Enable Switch
X26—Optional Connector
Y34—Right Solenoid
Y35—Left Solenoid

LD30992,0000426 –19–20MAR06–2/2

Travel Alarm Cancel Switch Harness (W15) Component Location

For Travel Alarm Cancel Switch Harness (W15) component location, See Cab Harness (W2) Component Location. (Group 9015-10.)

LD30992,0000427 –19–26APR06–1/1

Travel Alarm Cancel Switch Harness (W15) Wiring Diagram

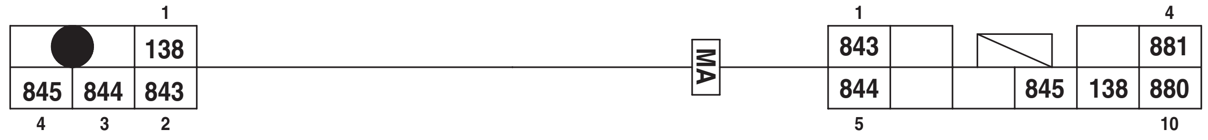
NUMBER	COLOR	END #1	END #2
138	ORG	X74	S13
843	GRN	X74	S13
844	BLK/GRN	X74	S13
845	BLK	X74	S13
880	GRN	(843)	S13
881	BLK/GRN	(844)	S13

S13

1	(843)	GRN	X74
2	NOT USED		
3	NOT USED		
4	(881)	BLK/GRN	(844)
5	(844)	BLK/GRN	X74
6	NOT USED		
7	NOT USED		
8	(845)	BLK	X74
9	(138)	ORG	X74
10	(880)	GRN	(843)

X74

1	(138)	ORG	S13
2	(843)	GRN	S13
3	(844)	BLK/GRN	S13
4	(845)	BLK	S13



TX1003977

TX1003977 –UN–10MAR06

Travel Alarm Cancel Switch Harness (W15) Wiring Diagram

S13—Travel Alarm Cancel Switch
X74—Cab Harness-to-Travel Alarm Cancel Switch Harness Connector

LD30992,0000428 –19–20MAR06–1/1

Reversing Fan Switch Harness (W16) Component Location

For Reversing Fan Switch Harness (W16) Component Location, See Cab Harness (W1) Component Location. (Group 9015-10.)

LD30992,0000429 –19–26APR06–1/1

Reversing Fan Switch Harness (W16) Wiring Diagram

NUMBER	COLOR	END #1	END #2
46	BLK	X12	S15
47	GRN/WHT	X12	S15
880	GRN	(911)	S15
881	BLK/GRN	(912)	S15
911	GRN	X12	S15
912	BLK/GRN	X12	S15

S15

1	(911)	GRN	X12
2	NOT USED		
3	NOT USED		
4	(881)	BLK/GRN	(912)
5	(912)	BLK/GRN	X12
6	NOT USED		
7	NOT USED		
8	(46)	BLK	X12
9	(47)	GRN/WHT	X12
10	(880)	GRN	(911)

X12

1	(47)	GRN/WHT	S15
2	(911)	GRN	S15
3	(912)	BLK/GRN	S15
4	(46)	BLK	S15

TX1003978

TX1003978 –UN–01MAR06

Reversing Fan Switch Harness (W16) Wiring Diagram

S15—Reversing Fan Switch

X12—Cab Harness-to-Reversing Fan Switch Harness Connector

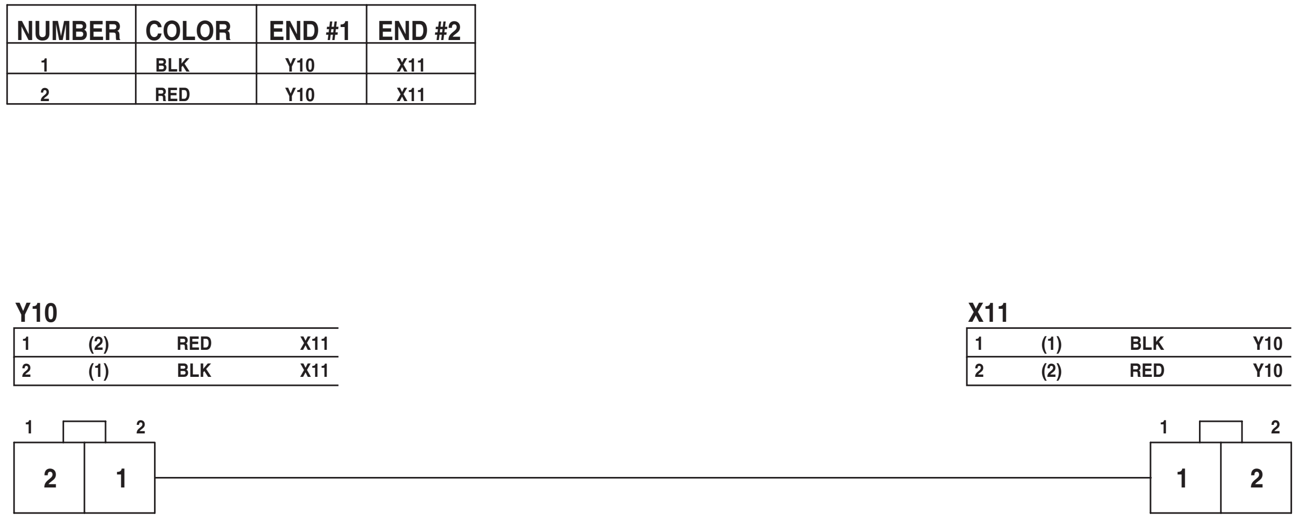
LD30992,000042A –19–20MAR06–1/1

Pilot Shutoff Valve Harness (W17) Component Location

For Pilot Shutoff Valve Harness (W17) Component Location, See Cab Harness (W1) Component Location. (Group 9015-10.)

LD30992,000042B –19–26APR06–1/1

Pilot Shutoff Valve Harness (W17) Wiring Diagram



NUMBER	COLOR	END #1	END #2
1	BLK	Y10	X11
2	RED	Y10	X11

Y10

1	(2)	RED	X11
2	(1)	BLK	X11

X11

1	(1)	BLK	Y10
2	(2)	RED	Y10

TX1003979

TX1003979 –UN–01MAR06

Pilot Shutoff Valve Harness (W17) Wiring Diagram

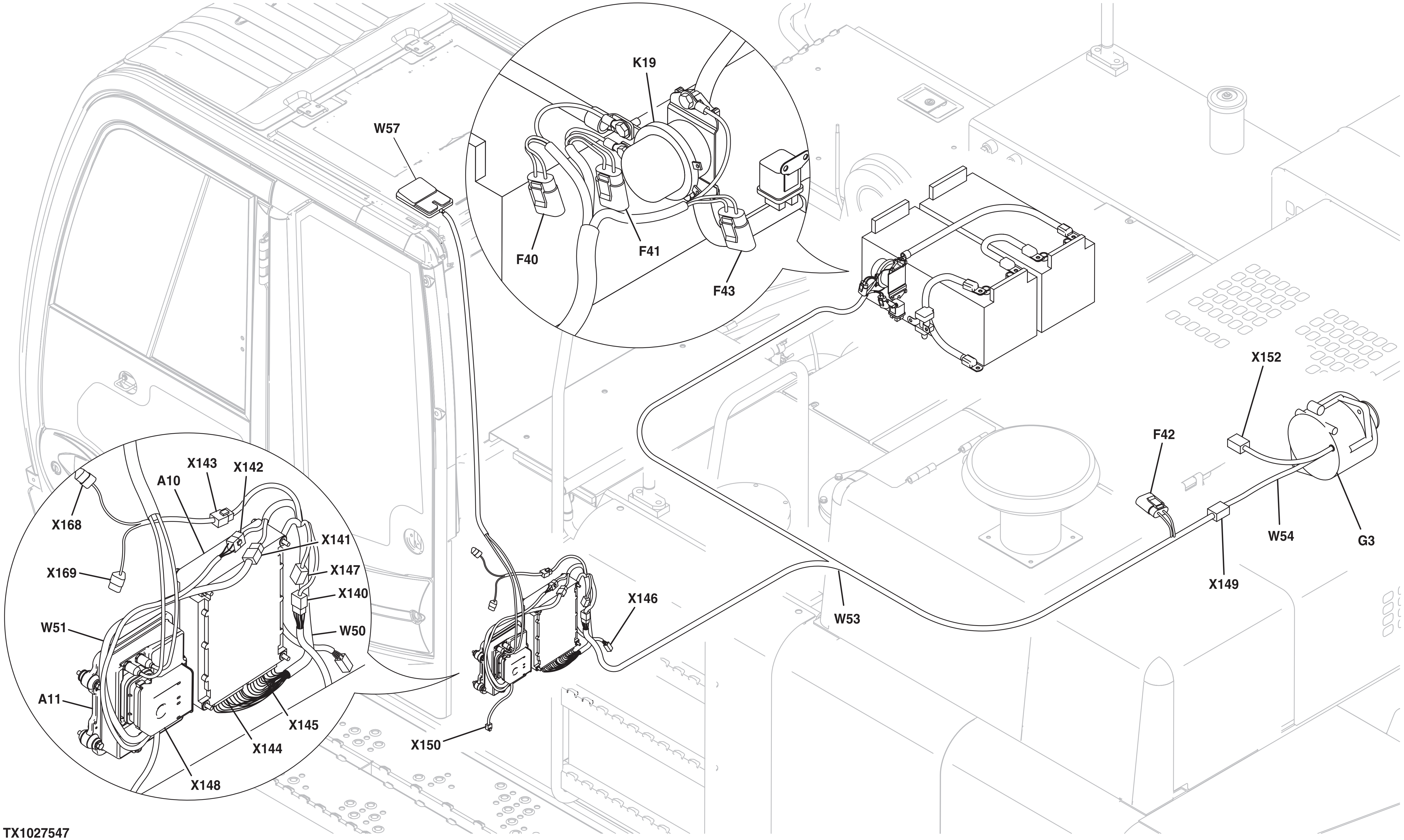
X11—Cab Harness-to-Pilot Shutoff Valve Harness Connector

Y10—Pilot Shutoff Solenoid

LD30992,000042C –19–26APR06–1/1

JDLink™ System Harnesses (W50, W51, W52, W53, and W54) Component Location—If Equipped

TX1027547 –UN–07AUG07



TX1027547

JDLink™ System Harnesses (W50, W51, W52, W53, and W54) Component Location

AA95137,0000C3E –19–31AUG07–1/2

A10—Machine Information Gateway (MIG) Controller
A11—GlobalTRACS® Terminal (GTT) Controller
F40—JDLink™ Unswitched Power 7.5-Amp Fuse
F41—JDLink™ Switched Power 3-Amp Fuse
F42—JDLink™ Alternator Run Signal 3-Amp Fuse
F43—JDLink™ Ground 7.5-Amp Fuse
G3—Alternator
K19—Battery Relay
W50—Machine Information Gateway (MIG) Harness
W51—GlobalTRACS® Terminal (GTT) Harness
W52—JDLink™ CAN Harness
W53—JDLink™ Power Harness
W54—JDLink™ Jumper Harness
W57—GlobalTRACS® Terminal (GTT) Antenna
X140—Machine Information Gateway (MIG) Harness-to-JDLink™ Power Harness 4-Pin Connector
X141—Machine Information Gateway (MIG) Harness-to-GlobalTRACS® Terminal (GTT) Harness 10-Pin Connector
X142—Machine Information Gateway (MIG) Harness-to-GlobalTRACS® Terminal (GTT) Harness 4-Pin Connector
X143—Machine Information Gateway (MIG) Harness-to-JDLink™ CAN Harness 8-Pin Connector
X144—Machine Information Gateway (MIG) 30-Pin (L1-Y3) Connector
X145—Machine Information Gateway (MIG) 30-Pin (A1-K3) Connector
X146—JDLink™ MMS Direct 4-Pin Connector (Ethernet)
X147—2-Pin Connector (Not Used)
X148—GlobalTRACS® Terminal (GTT) 70-Pin Connector
X149—JDLink™ Power Harness-to-JDLink™ Jumper Harness Connector
X150—GT Config Tool Adapter 6-Pin Connector (RS-232)
X152—JDLink™ Jumper Harness-to-Machine Harness Connector
X168—Machine Harness-to-JDLink™ CAN Harness Connector 1 (plug into female side of connector X9 on machine harness)
X169—Machine Harness-to-JDLink™ CAN Harness Connector 2 (plug into male side of connector X9 on machine harness)

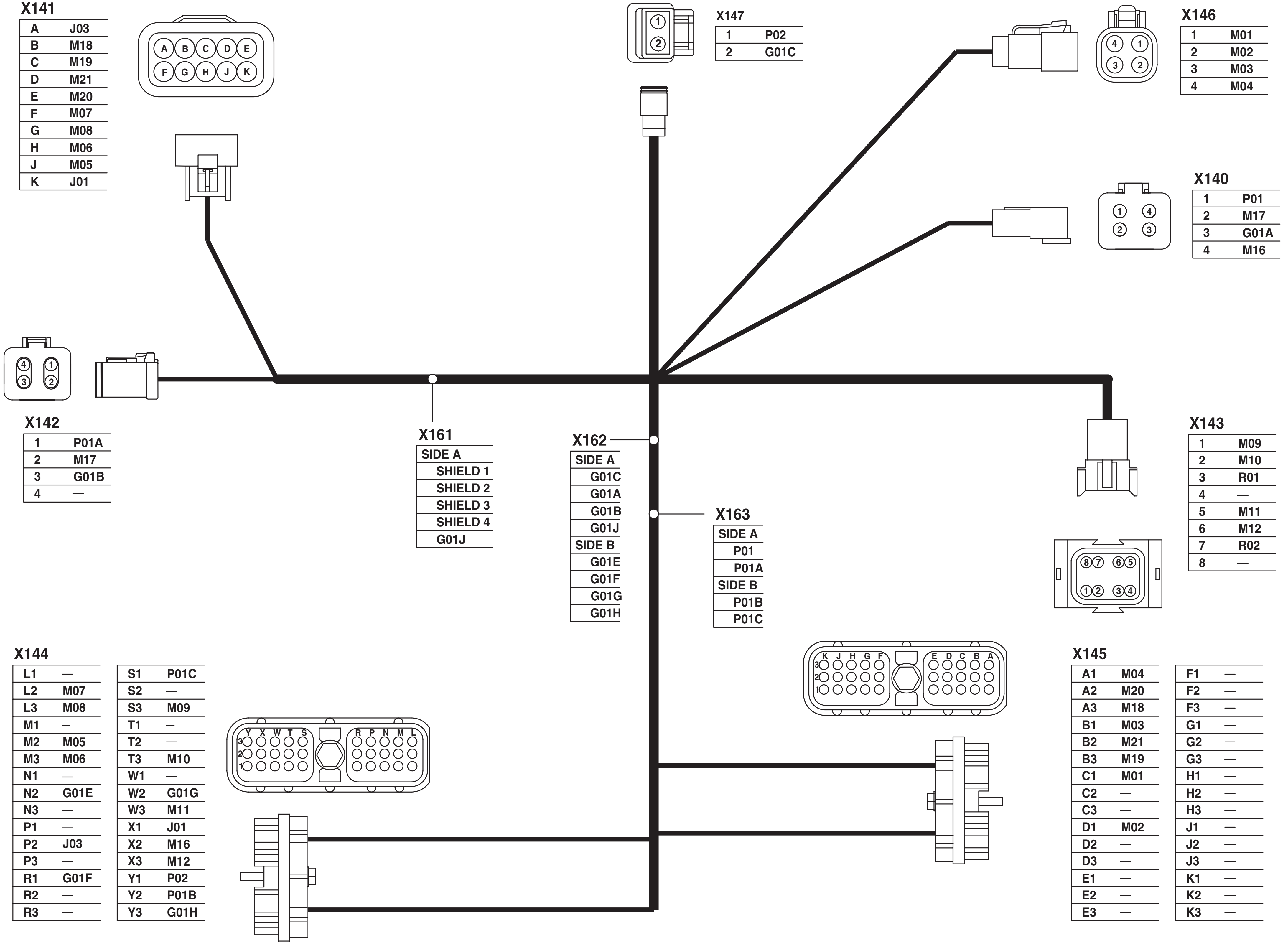
GlobalTRACS is a trademark of the Qualcomm Corporation
JDLink is a trademark of Deere & Company

AA95137,0000C3F –19–31AUG07–2/2

Machine Information Gateway (MIG) Harness (W50) Wiring Diagram—If Equipped

TX1026496 –UN–24JUL07

END #1	NUMBER	COLOR	END #2
X140	G01A	BLK	X162
X142	G01B	BLK	X162
X147	G01C	BLK	X162
X144	G01E	BLK	X162
X144	G01F	BLK	X162
X144	G01G	BLK	X162
X144	G01H	BLK	X162
X161	G01J	BLK	X162
X141	J01	TAN	X144
X141	J03	TAN	X144
X145	M01	PUR	X146
X145	M02	PUR	X146
X145	M03	PUR	X146
X145	M04	PUR	X146
X144	M05	PUR	X141
X144	M06	PUR	X141
X144	M07	PUR	X141
X144	M08	PUR	X141
X144	M09	PUR	X143
X144	M10	PUR	X143
X144	M11	PUR	X143
X144	M12	PUR	X143
X144	M16	PUR	X140
X142	M17	PUR	X140
X145	M18	PUR	X141
X145	M19	PUR	X141
X145	M20	PUR	X141
X145	M21	PUR	X141
X140	P01	RED	X163
X142	P01A	RED	X163
X144	P01B	RED	X163
X144	P01C	RED	X163
X144	P02	BLK	X147
X144	R01	BLK	X143
X144	R02	BLK	X143
X144	SHIELD 1	BLK	X161
X144	SHIELD 2	BLK	X161
X144	SHIELD 3	BLK	X161
X144	SHIELD 4	BLK	X161



X141

A	J03
B	M18
C	M19
D	M21
E	M20
F	M07
G	M08
H	M06
J	M05
K	J01

X147

1	P02
2	G01C

X146

1	M01
2	M02
3	M03
4	M04

X140

1	P01
2	M17
3	G01A
4	M16

X142

1	P01A
2	M17
3	G01B
4	—

X161

SIDE A
SHIELD 1
SHIELD 2
SHIELD 3
SHIELD 4
G01J

X162

SIDE A
G01C
G01A
G01B
G01J
SIDE B
G01E
G01F
G01G
G01H

X163

SIDE A
P01
P01A
SIDE B
P01B
P01C

X143

1	M09
2	M10
3	R01
4	—
5	M11
6	M12
7	R02
8	—

X144

L1	—	S1	P01C
L2	M07	S2	—
L3	M08	S3	M09
M1	—	T1	—
M2	M05	T2	—
M3	M06	T3	M10
N1	—	W1	—
N2	G01E	W2	G01G
N3	—	W3	M11
P1	—	X1	J01
P2	J03	X2	M16
P3	—	X3	M12
R1	G01F	Y1	P02
R2	—	Y2	P01B
R3	—	Y3	G01H

X145

A1	M04	F1	—
A2	M20	F2	—
A3	M18	F3	—
B1	M03	G1	—
B2	M21	G2	—
B3	M19	G3	—
C1	M01	H1	—
C2	—	H2	—
C3	—	H3	—
D1	M02	J1	—
D2	—	J2	—
D3	—	J3	—
E1	—	K1	—
E2	—	K2	—
E3	—	K3	—

TX1026496

Machine Information Gateway (MIG) Harness (W50) Wiring Diagram

AA95137,0000C40 –19–31AUG07–1/2

X140—Machine Information Gateway (MIG) Harness-to-JDLink™ Power Harness 4-Pin Connector
X141—Machine Information Gateway (MIG) Harness-to-GlobalTRACS® Terminal (GTT) Harness 10-Pin Connector
X142—Machine Information Gateway (MIG) Harness-to-GlobalTRACS® Terminal (GTT) Harness 4-Pin Connector
X143—Machine Information Gateway (MIG) Harness-to-JDLink™ CAN Harness 8-Pin Connector
X144—Machine Information Gateway (MIG) 30-Pin Connector (L-Y)
X145—Machine Information Gateway (MIG) 30-Pin Connector (A-K)
X146—Machine Information Gateway (MIG) Ethernet Diagnostic 4-Pin Connector
X147—2-Pin Connector (Not Used)
X161—Machine Information Gateway (MIG) Shield Splice
X162—G01 BLK Splice
X163—P01 RED Splice

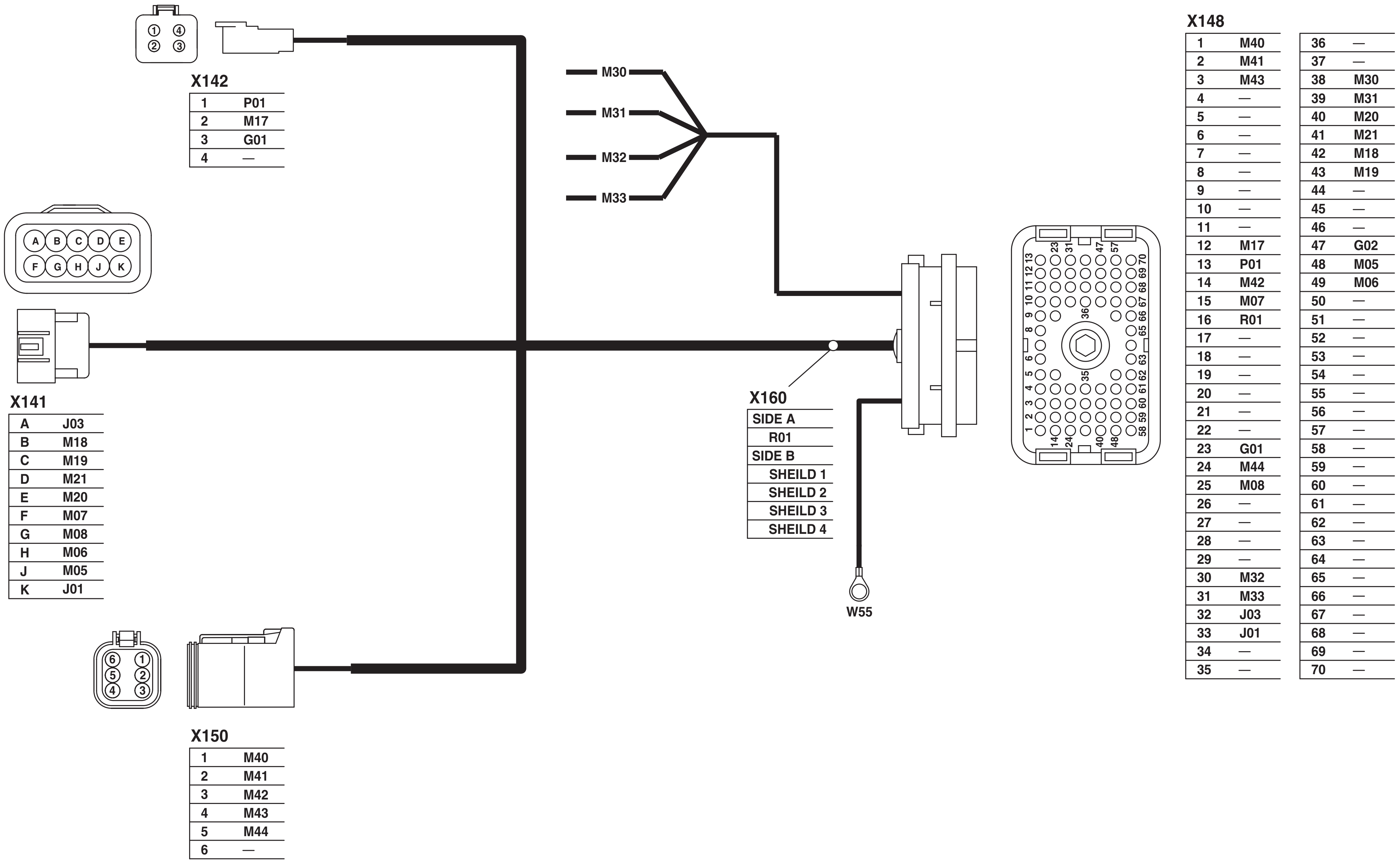
JDLink is a trademark of Deere & Company
GlobalTRACS is a trademark of the Qualcomm Corporation

AA95137,0000C40 –19–31AUG07–2/2

GlobalTRACS® Terminal (GTT) Harness (W51) Wiring Diagram—If Equipped

TX1026500 –UN–05SEP07

END #1	NUMBER	COLOR	END #2
X142	G01	BLK	X148
W55	G02	BLK	X148
X141	J01	TAN	X148
X141	J03	TAN	X148
X141	M05	PUR	X148
X141	M06	PUR	X148
X141	M07	PUR	X148
X141	M08	PUR	X148
X142	M17	PUR	X148
X141	M18	PUR	X148
X141	M19	PUR	X148
X141	M20	PUR	X148
X141	M21	PUR	X148
—	M30	PUR	X148
—	M31	PUR	X148
—	M32	PUR	X148
—	M33	PUR	X148
X150	M40	PUR	X148
X150	M41	PUR	X148
X150	M42	PUR	X148
X150	M43	PUR	X148
X150	M44	PUR	X148
X142	P01	RED	X148
X160	R01	BLK	X148
X160	SHIELD 1	BLK	X148
X160	SHIELD 2	BLK	X148
X160	SHIELD 3	BLK	X148
X160	SHIELD 4	BLK	X148



X142

1	P01
2	M17
3	G01
4	—

X141

A	J03
B	M18
C	M19
D	M21
E	M20
F	M07
G	M08
H	M06
J	M05
K	J01

X150

1	M40
2	M41
3	M42
4	M43
5	M44
6	—

X160

SIDE A
R01
SIDE B
SHEILD 1
SHEILD 2
SHEILD 3
SHEILD 4

X148

1	M40	36	—
2	M41	37	—
3	M43	38	M30
4	—	39	M31
5	—	40	M20
6	—	41	M21
7	—	42	M18
8	—	43	M19
9	—	44	—
10	—	45	—
11	—	46	—
12	M17	47	G02
13	P01	48	M05
14	M42	49	M06
15	M07	50	—
16	R01	51	—
17	—	52	—
18	—	53	—
19	—	54	—
20	—	55	—
21	—	56	—
22	—	57	—
23	G01	58	—
24	M44	59	—
25	M08	60	—
26	—	61	—
27	—	62	—
28	—	63	—
29	—	64	—
30	M32	65	—
31	M33	66	—
32	J03	67	—
33	J01	68	—
34	—	69	—
35	—	70	—

TX1026500

GlobalTRACS® Terminal (GTT) Harness (W51) Wiring Diagram

AA95137,0000C41 –19–31AUG07–1/2

W55—GlobalTRACS® Terminal (GTT) Controller Ground

X141—GlobalTRACS® Terminal (GTT) Harness-to-Machine Information Gateway (MIG) Harness 10-Pin Connector

X142—GlobalTRACS® Terminal (GTT) Harness-to-Machine Information Gateway (MIG) Harness 4-Pin Connector

X148—GlobalTRACS® Terminal (GTT) 70-Pin Connector

X150—GT config Tool Adapter 6-Pin Connector

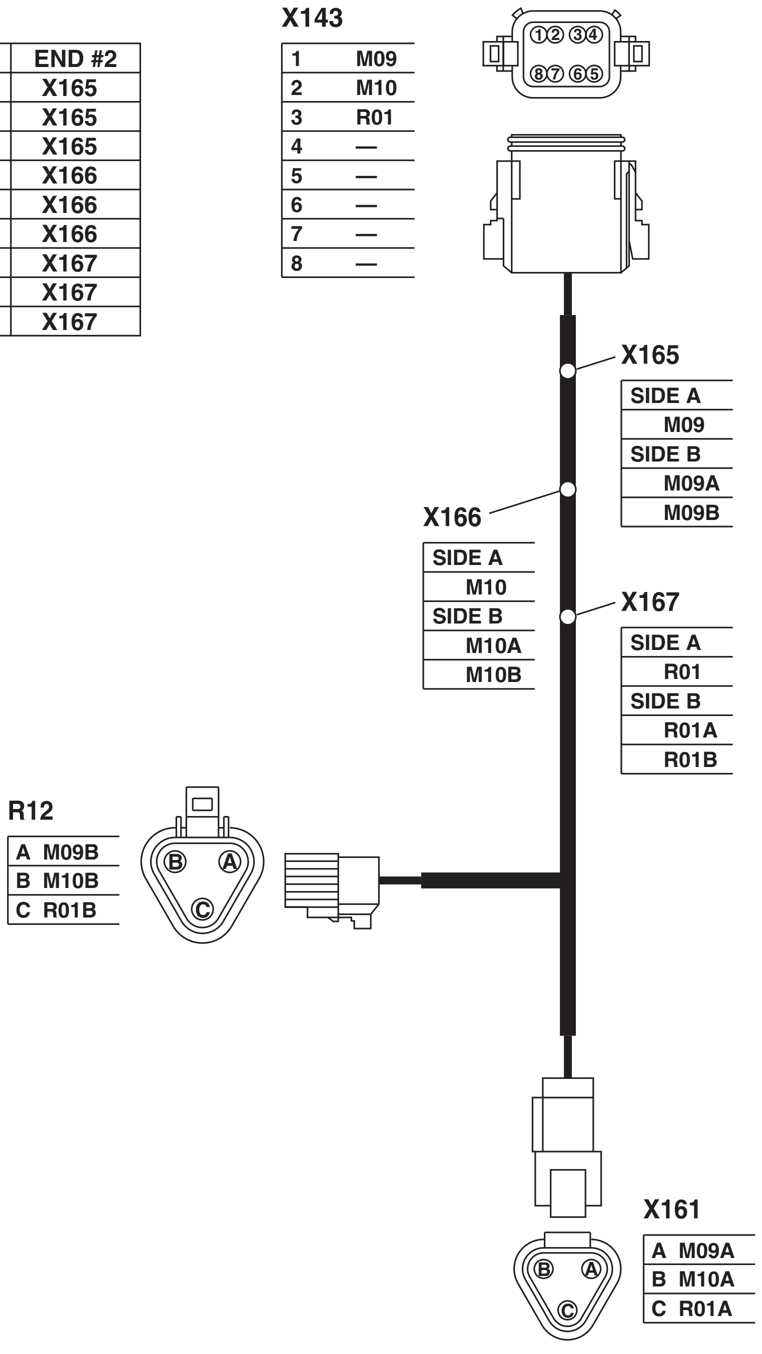
X160—GlobalTRACS® Terminal (GTT) Shield Splice

GlobalTRACS is a trademark of the Qualcomm Corporation

AA95137,0000C41 –19–31AUG07–2/2

JDLink™ CAN Harness (W52) Wiring Diagram—If Equipped

END #1	NUMBER	COLOR	END #2
X143	M09	YEL	X165
X161	M09A	YEL	X165
R12	M09B	YEL	X165
X143	M10	GRN	X166
X161	M10A	GRN	X166
R12	M10B	GRN	X166
X143	R01	BLK	X167
X161	R01A	BLK	X167
R12	R01B	BLK	X167



TX1026491

TX1026491 –UN–03AUG07

CAN Harness (W52) Wiring Diagram

Continued on next page

X143—Machine Information Gateway (MIG) Harness-to-JDLink™ CAN Harness 8-Pin Connector
X165—M09 YEL Splice
X166—M10 GRN Splice
X167—R01 BLK Splice
X168—Machine Harness-to-JDLink™ CAN Harness Connector 1
X169—Machine Harness-to-JDLink™ CAN Harness Connector 2

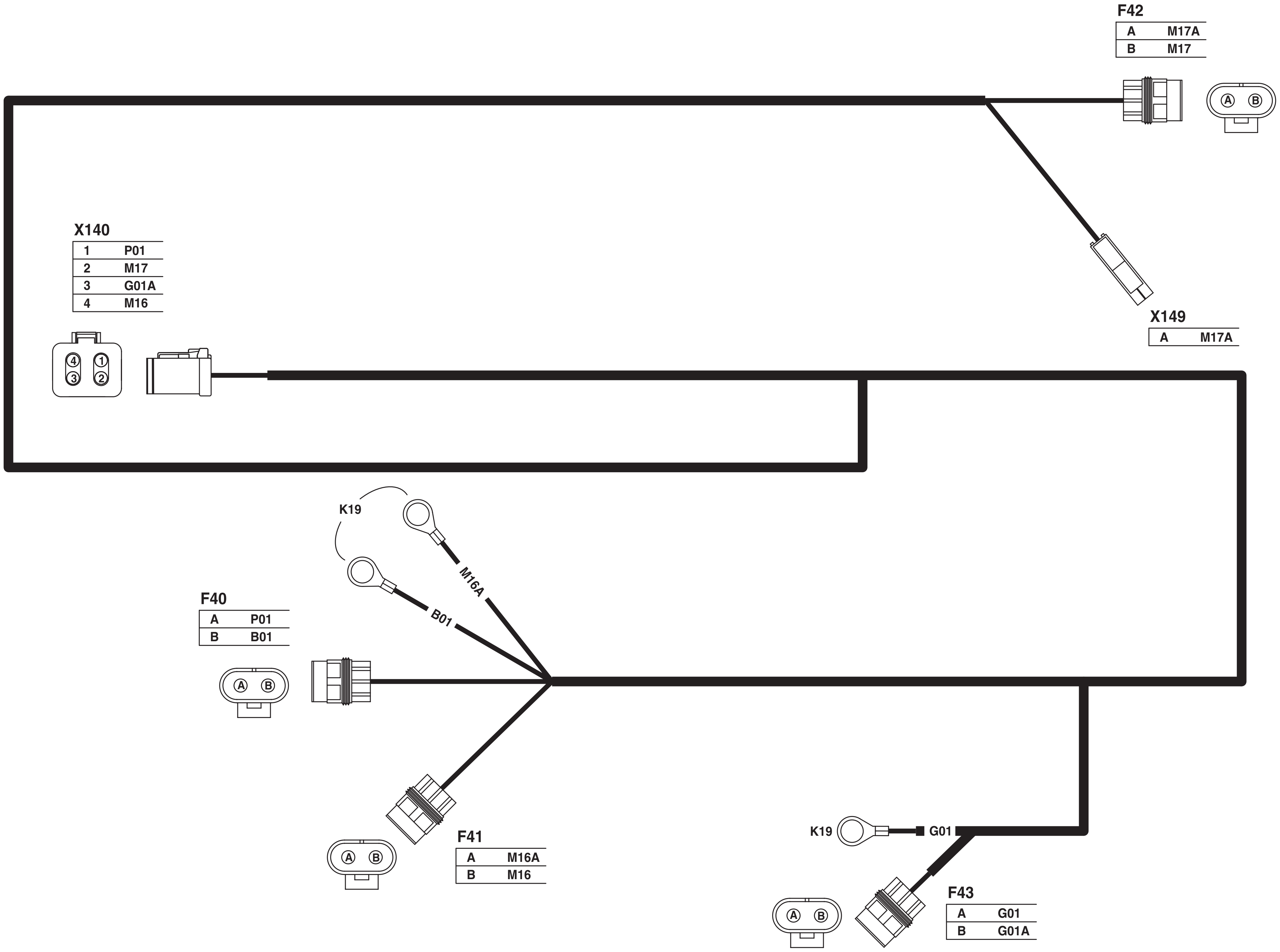
JDLink is a trademark of Deere & Company

AA95137,0000C42 –19–31AUG07–2/2

JDLink™ Power Harness (W53) Wiring Diagram—If Equipped

TX1026495 –UN–24JUL07

END #1	NUMBER	COLOR	END #2
F40	B01	RED	K19
F43	G01	BLK	K19
F43	G01A	BLK	X140
F41	M16	PUR	X140
F41	M16A	PUR	K19
F42	M17	PUR	X140
F422	M17A	PUR	X149
F40	P01	RED	X140



TX1026495

JDLink™ Power Harness (W53) Wiring Harness

AA95137,0000C43 –19–31AUG07–1/2

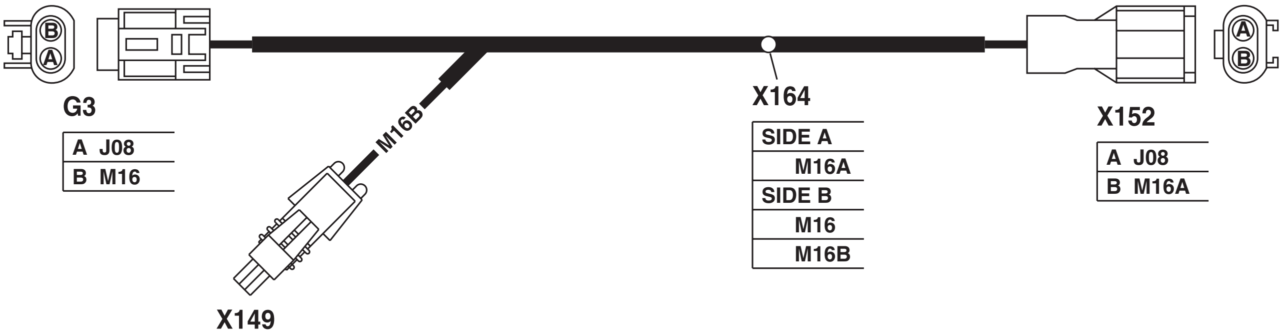
F40—JDLink™ Unswitched Power 7 Amp Fuse
F41—JDLink™ Switched Power 3 Amp Fuse
F42—JDLink™ Alternator Run Signal 3 Amp Fuse
F43—JDLink™ Ground 7.5 Amp Fuse
K19—Battery Relay
X140—Power Harness-to-Machine Information Gateway (MIG) Harness 4-Pin Connector
X149—Power Harness-to-JDLink™ Jumper Harness Connector

JDLink is a trademark of Deere & Company

AA95137,0000C43 –19–31AUG07–2/2

JDLink™ Jumper Harness (W54) Wiring Diagram—If Equipped

END #1	NUMBER	COLOR	END #2
G3	J08	TAN	X152
X164	M16	PUR	G3
X164	M16A	PUR	X152
X164	M16B	PUR	X149



TX1026492

TX1026492 –UN–30JUL07

JDLink™ Jumper Harness (W54) Wiring Diagram—If Equipped

G3—JDLink™ Jumper Harness-to-Alternator Connector

X149—JDLink™ Jumper Harness-to-JDLink™ Power Harness Connector

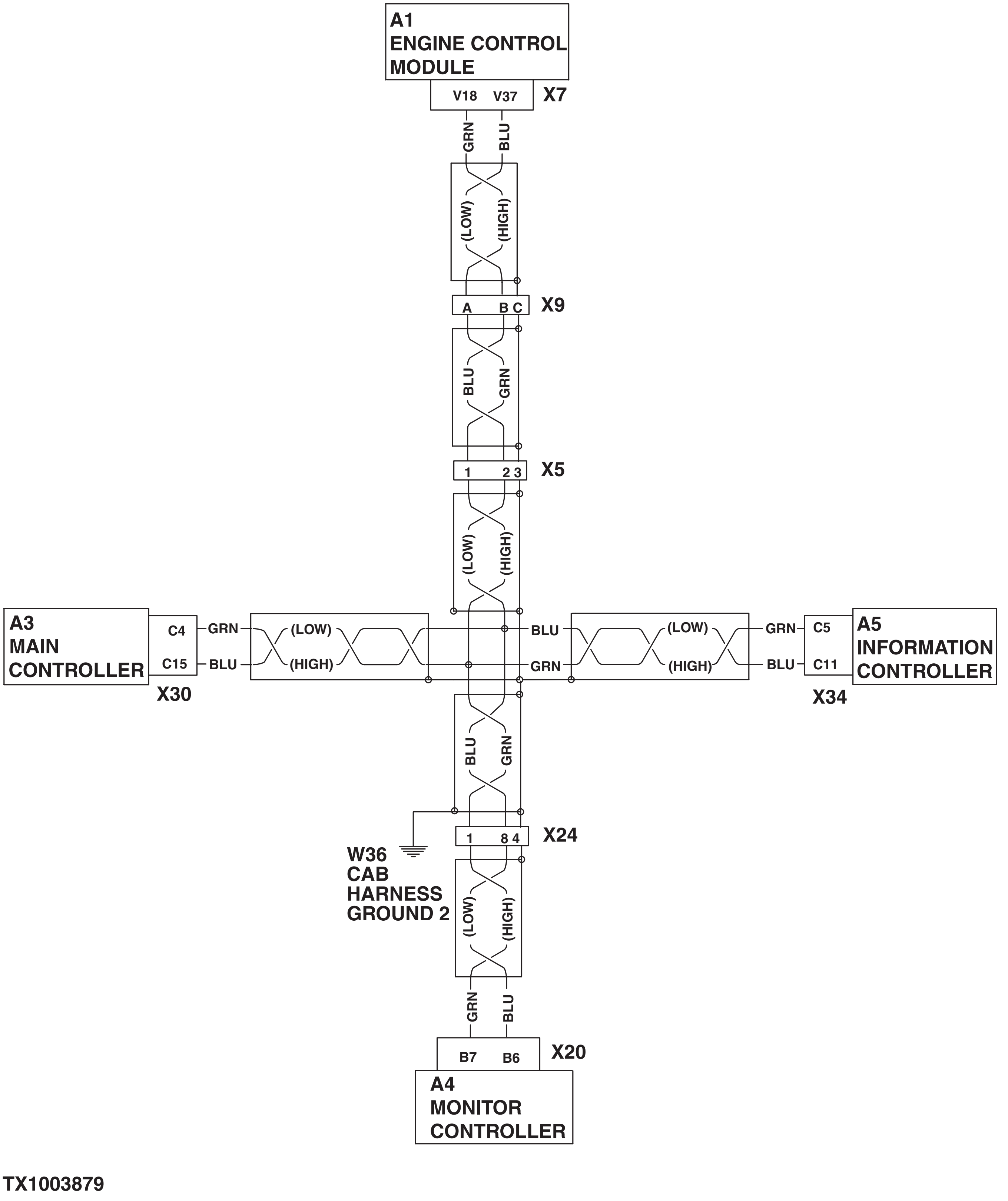
X152—JDLink™ Jumper Harness-to-Machine Harness Connector

X164—M16 PUR Splice

JDLink is a trademark of Deere & Company

AA95137,0000C44 –19–31AUG07–1/1

Controller Area Network (CAN) Theory of Operation



Controller Area Network (CAN) Circuit

Continued on next page

This machine utilizes a Controller Area Network (CAN) on which devices communicate. The Engine Control Unit (ECU), Monitor Controller, Information Controller (ICF), and Main Controller (MCF) are all connected to the CAN. Operations and functions of these individual devices are covered separately.

- See Engine Control Module (ECM) Circuit Theory of Operation. (Group 9015-15.)
- See Monitor Controller Circuit Theory of Operation. (Group 9015-15.)
- See Information Controller (ICF) Theory of Operation. (Group 9015-15.)
- See Main Controller (MCF) Circuit Theory of Operation. (Group 9015-15.)

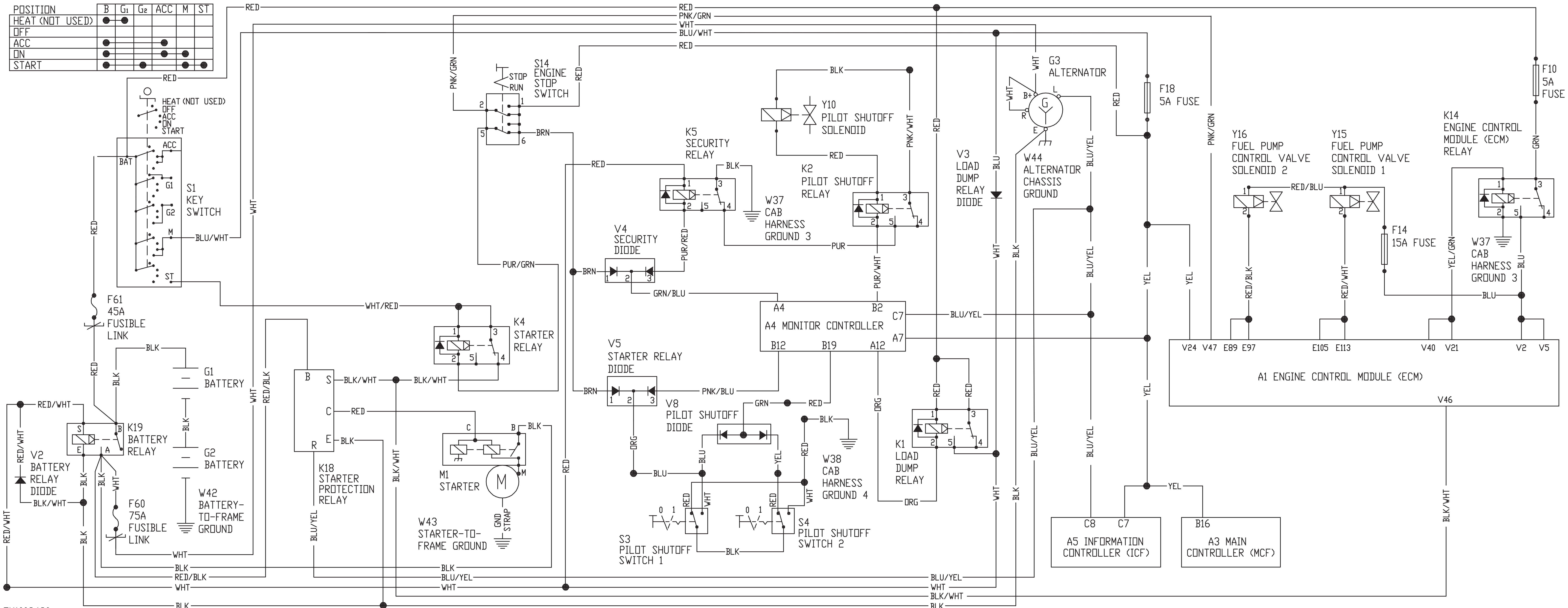
The devices on the CAN are connected via three twisted wires called a twisted triple. The twisted triple consists of a differential pair (high and low) and a shield wire. This method reduces interference and helps the devices communicate with minimal errors.

There are two CAN termination resistors used in the CAN circuit. The CAN termination resistors are 120 ohm resistors that are connected on opposite ends of the bus to avoid signal errors. Both termination resistors are contained in electrical components.

LD30992,000020C –19–15FEB06–2/2

Starting and Charging Circuit Theory of Operation

TX1003420 –19–27APR06



TX1003420

STARTING AND CHARGING CIRCUIT SCHEMATIC

LD30992,000020D –19–27APR06–1/3

Starting Circuit—The starting circuit consists of the following components:

- Batteries (G1 and G2)
- Battery relay (K19)
- Starter motor (M1)
- Key switch (S1)
- Starter relay (K4)
- Starter relay diode (V5)
- Starter protection relay (K18)
- Engine stop switch (S14)
- Security relay (K5)
- Security diode (V4)
- Pilot shutoff switches (S3 and S4)
- Pilot shutoff diode (V8)
- Engine control module (ECM) (A1)
- Engine control module (ECM) relay (K14)

When key switch (S1) is moved to the START position, power is applied from key switch terminal ST to terminals 1 and 3 of starter relay (K4). Key switch terminal M also receives power, energizing battery relay (K19). The energized battery relay supplies power to starter motor (M1) terminal B through terminals A and B on battery relay. Battery relay also supplies power to starter protection relay (K18) terminal B.

De-energized starter relay (K4) supplies power from terminal 4 to starter protection relay (K18) terminal S, energizing starter protection relay. Once energized, terminals B and C are internally connected within starter protection relay, which supplies power from terminal C to starter motor (M1) terminal C. Starter motor (M1) then cranks the engine.

Power from key switch terminal M is also supplied through fuse (F18) to main controller (MCF) (A3), monitor controller (A4), information controller (ICF) (A5), and ECM (A1). After ECM receives power, ECM energizes ECM relay (K14). With relay energized, power is supplied from batteries (G1 and G2) through fuse (F10), ECM relay (K14), and fuse (F14) to fuel pump control valve solenoids 1 and 2 (Y15 and Y16), and then to ECM.

Once the engine is running, alternator output voltage is routed to the starter protection relay (K18) terminal R. When alternator output voltage reaches 21—22 volts, the starter protection relay disconnects terminal B from terminal C, removing power from starter motor (M1). The starter motor will then stop cranking engine or prevent it from engaging if the engine is running and the alternator is producing power.

When a warning alarm or security code error is detected, the monitor controller (A4) pin A4 is connected to ground, energizing starter relay (K4) and security relay (K5). Energizing starter relay removes power from starter protection relay (K18) terminal S. With starter protection relay de-energized, current is not supplied to starter motor (M1) terminal C, preventing engine from starting.

When pilot control lever is in the forward (unlocked) position, pilot shutoff switches 1 and 2 (S3 and S4) are closed. With switches closed, starter relay (K4) terminal 2 is connected to ground, energizing starter relay and removing power from starter motor (M1) terminal C. This prevents activation of the starter motor when pilot control lever is in the down (unlocked) position.

Security diode (V4), starter relay diode (V5), and pilot shutoff diode (V8) are used to prevent backfeeding.

Charging Circuit—The charging circuit consists of batteries (G1 and G2), battery relay (K19), battery relay diode (V2), key switch (S1), alternator (G3), load dump relay (K1), load dump relay diode (V3), and monitor controller (A4).

With key switch (S1) in the ON position, battery power is applied through load dump relay diode (V3) to battery relay (K19), energizing the relay. With engine running, the alternator (G3) begins to produce output voltage. Output voltage from alternator terminal B+ is routed through the energized battery relay, charging batteries (G1 and G2).

Continued on next page

Output voltage from alternator (G3) terminal L is routed to the monitor controller (A4) pin C7, turning off the alternator indicator light. If voltage at alternator terminal L drops below operating voltage, alternator voltage indicator will illuminate. Output voltage from terminal L is also supplied to the information controller (ICF).

Alternator output voltage from terminal L is also routed to the starter protection relay (K18) terminal R. When alternator output voltage increases up to 21—22 volts, the starter protection relay disconnects terminal B from terminal C, removing power from starter motor (M1). The starter motor will then stop cranking engine or prevent it from engaging if the engine is running and the alternator is producing power.

When alternator output voltage is present at monitor controller pin C7, load dump relay (K1) is energized by a ground from the monitor controller pin A12. With load dump relay energized, battery power is supplied to battery relay (K19) pin S. This keeps the battery relay energized to ensure that output voltage from the alternator is routed to the batteries as long as the alternator is producing output voltage, even if the key switch is turned to the OFF or ACC position momentarily.

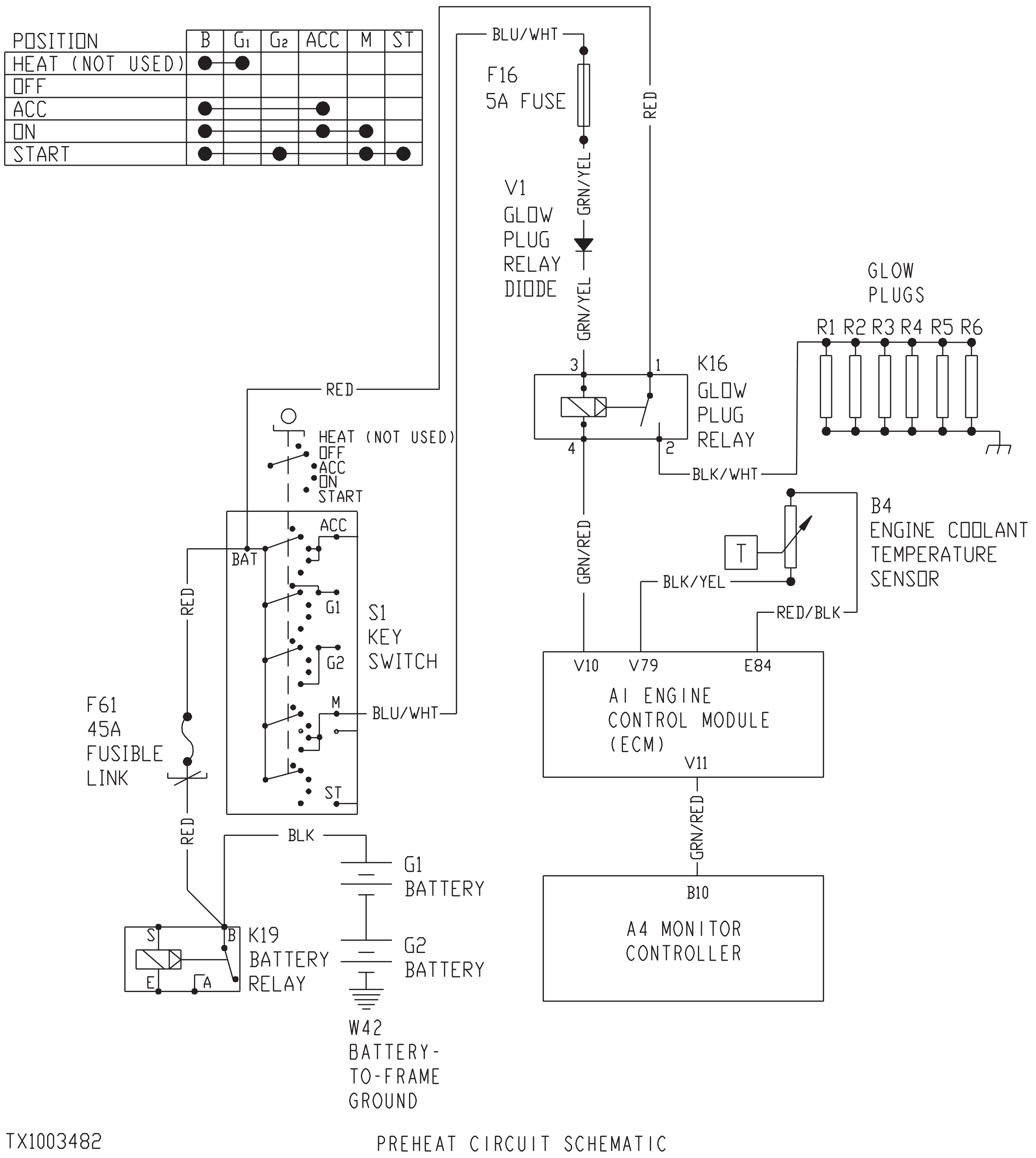
Load Dump Circuit—The load dump circuit consists of load dump relay (K1) and load dump relay diode (V3).

When the alternator (G3) is generating electricity, output voltage is sent to monitor controller (A4) pin C7. This causes monitor to ground pin A12, energizing load dump relay. With load dump relay energized, battery power is applied through terminals 3 and 5 to battery relay (K19). Monitor controller terminal A12 retains a ground path for load dump relay until alternator stops producing output voltage. This keeps the battery relay energized, providing a path to the batteries (G1 and G2) for any power produced by the alternator as the engine slows to a stop. Then the ground path is removed from load dump relay, and battery relay is de-energized.

Load dump relay diode (V3) isolates battery power at terminal 5 of load dump relay (K1) from key switch ON power circuits.

LD30992,000020D –19–27APR06–3/3

Quick On System (QOS) Preheat Circuit Theory of Operation



POSITION	B	G1	G2	ACC	M	ST
HEAT (NOT USED)	●	●				
OFF						
ACC	●			●		
ON	●			●	●	
START	●		●		●	●

PREHEAT CIRCUIT SCHEMATIC

TX1003482 –19–20APR06

Continued on next page

LD30992,000020F –19–19APR06–1/2

The preheat circuit helps with engine starting and idling during cold starting conditions. Using the preheat circuit helps reduce white smoke and engine noise when starting, and helps the engine idle upon starting. The preheat circuit consists of the following components:

- Batteries (G1 and G2)
- Battery relay (K19)
- Key switch (S1)
- Engine control module (ECM) (A1)
- Monitor controller (A4)
- Engine coolant temperature sensor (B4)
- Glow plug relay (K16)
- Glow plug relay diode (V1)
- Glow plugs (R1—R6)

The preheat system uses six glow plugs, one for each cylinder, to heat the air in the precombustion chamber of each cylinder. The preheat system is controlled by the ECM, which uses information from engine coolant temperature sensor (B4) to determine if the preheat circuit is needed. The ECM will automatically enable the preheat circuit when key switch (S1) is turned to the ON or START position and the engine coolant temperature is less than 20°C (68°F). During the time the preheat circuit is energized, the engine preheat indicator will appear on the monitor display.

Unswitched power from the battery is available at terminal 1 of glow plug relay (K16). When key switch (S1) is turned to the ON position, power becomes available to terminal 3 (coil) of the glow plug relay, through fuse (F16). If the ECM senses that the engine coolant temperature is less than 20°C (68°F), the ECM connects terminal V10 to ground, which provides a path to ground for terminal 4 (coil) of the glow plug relay, energizing the relay. With the glow plug relay energized, high current is allowed to flow directly from the batteries to glow plugs (R1—R6), causing the glow plugs to create heat.

During the time the preheat circuit is energized, the ECM sends a signal out ECM terminal V11 to the terminal B10 on the monitor controller (A4), causing the engine preheat indicator to appear on the monitor display.

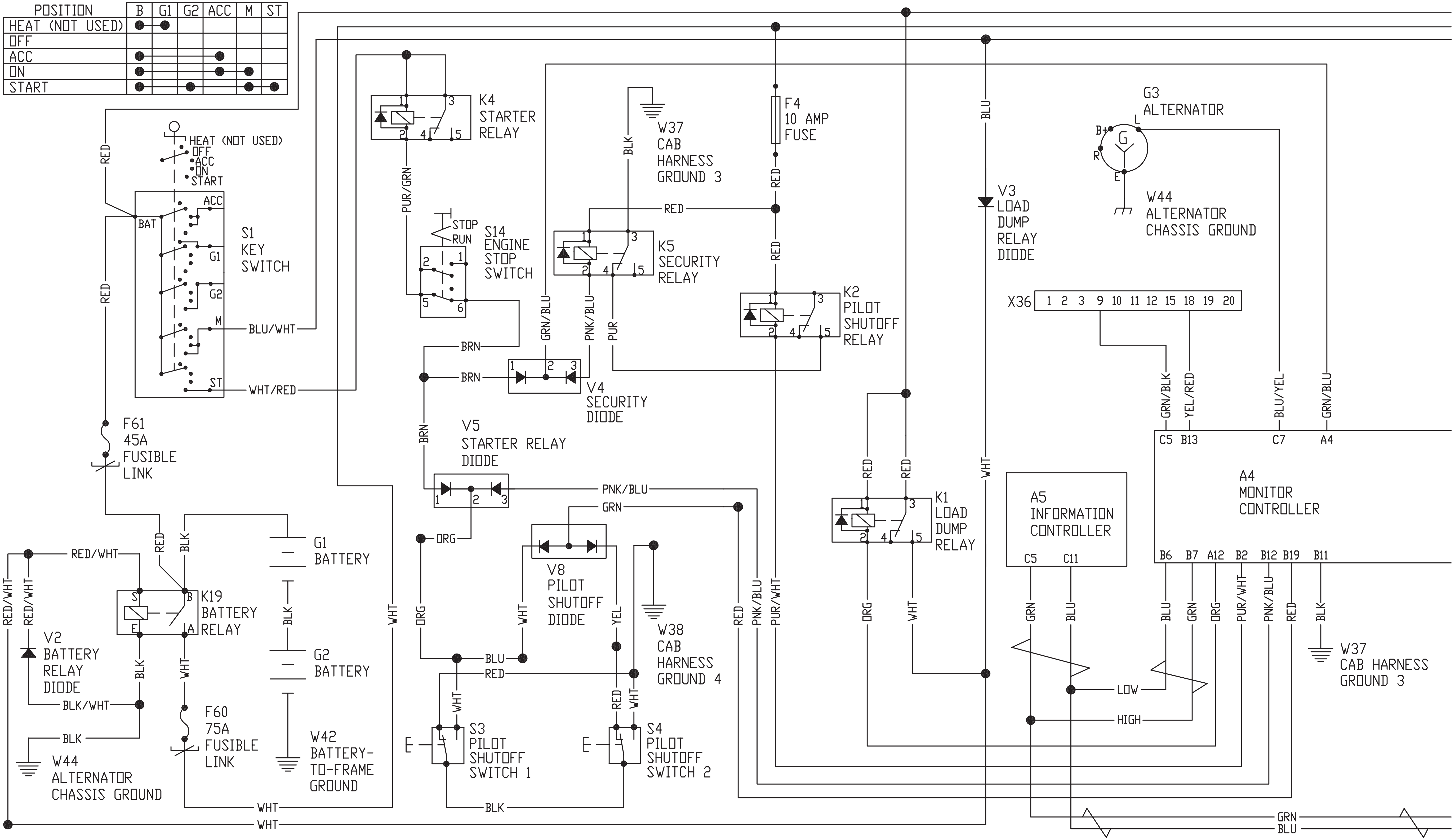
For more information on the monitor controller, see Monitor Circuit Theory of Operation. (Group 9015-15.)

For more information on the engine control module, see Engine Control Module (ECM) Theory of Operation. (Group 9015-15.)

LD30992,000020F –19–19APR06–2/2

Monitor Circuit Theory of Operation

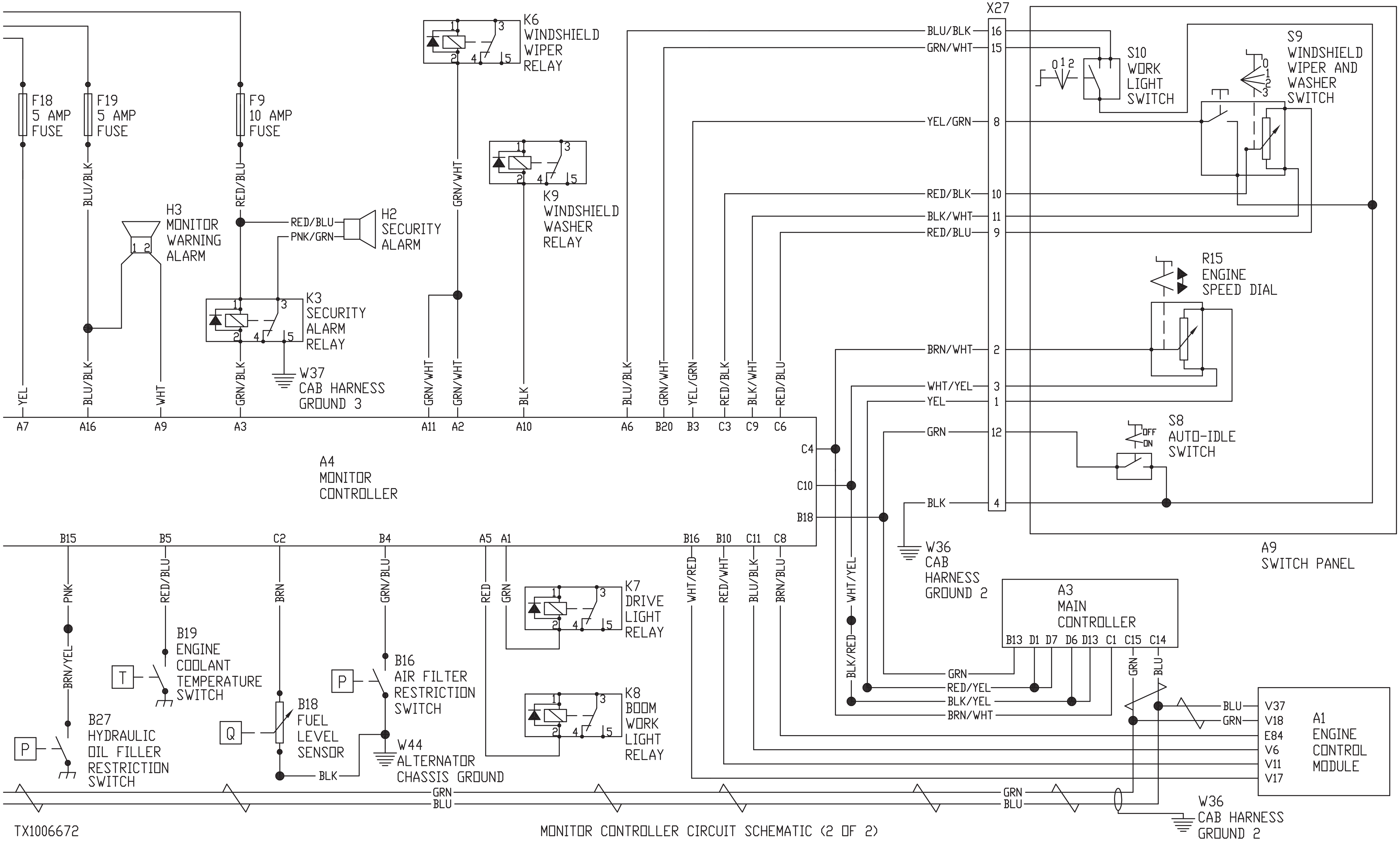
TX1006671 –19–27APR06



TX1006671

MONITOR CONTROLLER CIRCUIT SCHEMATIC (1 OF 2)

TX1006672 –19–21APR06



TX1006672

MONITOR CONTROLLER CIRCUIT SCHEMATIC (2 OF 2)

NOTE: *For monitor controller (A4) switches and indicators identification, see Monitor. (Operator's Manual.)*

For explanation of the monitor controller functions, see Monitor Functions. (Operator's Manual.)

Switched power from fuse (F19) is available at terminal A16 on monitor controller (A4).

The monitor controller receives signals from the following components:

- Engine Control Module (A1)
- Main Controller (A3)
- Information Controller (A5)
- Air Filter Restriction Switch (B16)
- Fuel Level Sensor (B18)
- Engine Coolant Temperature Switch (B19)
- Alternator (G3)
- Engine Speed Dial (R15)
- Key Switch (S1)
- Auto-Idle Switch (S8)
- Windshield Wiper and Washer Switch (S9)
- Work Light Switch (S10)

The monitor controller processes the information from these components, then activates the appropriate gauges, indicators, and audible alarms as necessary.

For additional information on the monitor controller display functions:

- See Monitor Data Items. (Group 9015-20.)
- See Monitor Data Items Using the Monitor Display. (Group 9015-20.)
- See Reading Diagnostic Trouble Codes with Monitor Display. (Group 9015-20.)

The monitor controller is connected to the controller area network (CAN) at terminals B6 and B7. The monitor controller uses the CAN for communication with the engine control module (ECM), main controller (MCF), and information controller (ICF).

NOTE: *For additional information on the controller area network (CAN), see Controller Area Network Theory of Operation. (Group 9015-15.)*

Hour Meter—The monitor controller displays hours of operation using information received from the ICF through the CAN. For additional information on the ICF, see Information Controller (ICF) Theory of Operation. (Group 9015-15.)

Engine Coolant Temperature Gauge—Engine coolant temperature sensor (B4) sends a varying signal to the monitor controller (terminal C8). The varying signal represents the varying resistance of the coolant temperature sensor corresponding to the changing engine coolant temperature. Low resistance of the sensor causes a high temperature reading on the engine coolant temperature gauge.

Specification

Engine Coolant Temperature Sensor (B4)—Resistance	7.6 kilo-ohms @ 25°C (77°F) 3.65—4.35 kilo-ohms @ 40°C (104°F) 2.484—2.916 kilo-ohms @ 50°C (122°F) 0.98 kilo-ohms @ 80°C (176°F) 0.60 kilo-ohms @ 95°C (203°F) 0.45 kilo-ohms @ 105°C (221°F) 0.30 kilo-ohms @ 120°C (248°F)

Fuel Gauge—Fuel level sensor (B18) sends a varying signal to the monitor controller (terminal C2). The varying signal represents the varying resistance of the fuel level sensor corresponding to the changing fuel level. Low resistance of the sensor causes a high reading on the fuel gauge.

Continued on next page

CS33148,00008E9 –19–21APR06–3/6

Specification

Fuel level sensor (B18)—Resistance	90—100 ohms (tank empty) 82—88 ohms (warning level) 53 ohms (tank 1/4 full) 33—43 ohms (tank 1/2 full) 26 ohms (tank 3/4 full) 6—10 ohms (tank full)

Auto-Idle Indicator—When auto-idle switch (S8) is in the ON position, terminal B18 on the monitor controller is connected to ground. This causes the auto-idle indicator to appear on the monitor display. For additional information on auto-idle, see Main Controller (MCF) Circuit Theory of Operation (Group 9015-15.) or see Engine Speed Control System Operation. (Group 9010-05.)

Preheat Indicator—When preheating is required, the ECM connects terminal B10 on the monitor controller to ground. This causes the preheat indicator to appear on the monitor display. For additional information on the preheat circuit, see Quick On System (QOS) Preheat Circuit Theory of Operation. (Group 9015-15.)

NOTE: For identification of monitor controller alarm indicators, see Alarm Occurrence Screen. (Operator's Manual.)

Overheat Indicator—When the engine coolant reaches too high a temperature, engine coolant temperature switch (B19) closes. This connects terminal B5 on the monitor controller to ground, causing the overheat indicator to appear on the monitor display.

Engine Warning Indicator—When the ECM detects an abnormality, it connects terminal C11 on the monitor controller to ground. This causes the engine warning alarm indicator to appear on the monitor display. For information on diagnosing ECM circuit malfunctions, see Engine Control Module (ECM) Diagnostic Trouble Codes. (Group 9001-20.)

Engine Oil Pressure Indicator—Engine oil pressure sensor (B11) sends a varying signal to the ECM (terminal V67). The varying signal represents the varying resistance of the engine oil pressure sensor corresponding to the changing engine oil pressure. High resistance of the sensor indicates a low pressure. When engine oil pressure is not to specification, the ECM connects terminal B16 on the monitor controller to ground. This causes the engine oil pressure indicator to appear on the monitor display. For information on diagnosing ECM circuit malfunctions, see Engine Control Module (ECM) Diagnostic Trouble Codes. (Group 9001-20.)

Alternator Indicator—Voltage from terminal L of alternator (G3) is applied to the monitor controller (at terminal C7). If the voltage is too low, or if the alternator does not generate any voltage at all, the alternator voltage indicator appears on the monitor display. For additional information on the charging system, see Starting and Charging Circuit Theory of Operation. (Group 9015-15.)

Remaining Fuel Indicator—Fuel level sensor (B18) sends a varying signal to the monitor controller (terminal C2). The varying signal represents the varying resistance of the fuel level sensor corresponding to the changing fuel level. When fuel level becomes too low, the remaining fuel indicator appears on the monitor display.

Specification

Fuel level sensor (B18)—Resistance	82—88 ohms (warning level)

Hydraulic Oil Filter Indicator—When the hydraulic oil filter is clogged, hydraulic oil filter restriction switch (B27) connects terminal B15 on the monitor controller to ground. This causes the hydraulic oil filter restriction indicator to appear on the monitor display.

Air Filter Clogged Indicator—When air filter elements are clogged, air filter restriction switch (B16) connects terminal B4 on the monitor controller to ground. This causes the air filter clogged indicator to appear on the monitor display.

Continued on next page

Work Mode Alarm Indicator—If the MCF detects a malfunction in the work mode circuit, the MCF sends a signal through the CAN to the monitor controller. When the monitor controller receives this signal, the work mode alarm indicator appears on the monitor display. For information on diagnosing MCF circuit malfunctions, see Main Controller (MCF) Diagnostic Trouble Codes. (Group 9001-20.)

Pilot Shutoff Lever Indicator—When pilot shutoff switches 1 and 2 (S3 and S4) are in the same position, terminal B19 on the monitor controller is connected to ground. If terminal B19 is not connected to ground, the pilot shutoff lever indicator appears on the monitor display. For additional information on the pilot shutoff circuit, see Pilot Shutoff Circuit Theory of Operation. (Group 9015-15.)

Engine Coolant Temperature Sensor Error Indicator—If the ECM detects a malfunction with engine coolant temperature sensor (B4) or if the connection between the sensor and the ECM is open or shorted, the ECM sends a signal through the CAN to the monitor controller. When the monitor controller receives this signal, the engine coolant temperature sensor error indicator comes on.

Fuel Sensor Error Indicator—If the ECM detects a malfunction with fuel temperature sensor (B5) or if the connection between the sensor and the ECM is open or shorted, the ECM sends a signal through the CAN to the monitor controller. When the monitor controller receives this signal, the fuel sensor error indicator comes on.

Monitor Display Alarm—Monitor warning alarm (H3) notifies the operator when certain diagnostic trouble codes or machine conditions exist which could damage the machine. Power is available from fuse (F19) at terminal 1 on the monitor warning alarm. When the monitor controller connects terminal A3 to ground, the alarm activates.

Auto-Idle Switch (S8)—When auto-idle switch (S8) is turned to the ON position, the auto-idle switch connects terminal B18 on the monitor controller and terminal B6 on the MCF to ground. This causes auto-idle mode to be selected, and the auto-idle indicator to appear on the monitor display. For additional information on auto-idle, see Main Controller (MCF) Circuit Theory of Operation (Group 9015-15.) and see Engine Speed Control System Operation. (Group 9010-05.)

Windshield Wiper and Washer Switch (S9)—Windshield wiper and washer switch (S9) is used to select intermittent or continuous windshield wiper operation and to activate the windshield washer motor. The monitor controller supplies a 5-volt reference voltage (terminal C6) and a ground (terminal C9) to the windshield wiper and washer switch. The monitor controller determines the position of the windshield wiper and washer switch from signals received at terminal C3. When the windshield wiper and washer switch is turned to the ON or one of the INT positions, the monitor controller momentarily connects terminals A2 and A11 to ground, energizing windshield wiper relay (K6).

When the windshield wiper and washer switch is pressed, terminal B3 on the monitor controller is connected to ground. This causes the monitor controller to connect terminal A10 to ground, energizing windshield washer relay (K9).

For additional information on the windshield wiper and washer circuit, see Windshield Wiper and Washer Circuit Theory of Operation. (Group 9015-15.)

Work Light Switch (S10)—When work light switch (S10) is in position 1, terminal B20 on the monitor controller is connected to ground. This causes the monitor controller to connect terminal A1 to ground, energizing drive light relay (K7). When the work light switch is turned to position 2, terminal A6 is connected to ground. This causes the monitor controller to connect terminals A1 and A5 to ground, energizing drive light relay (K7) and boom work light relay (K8).

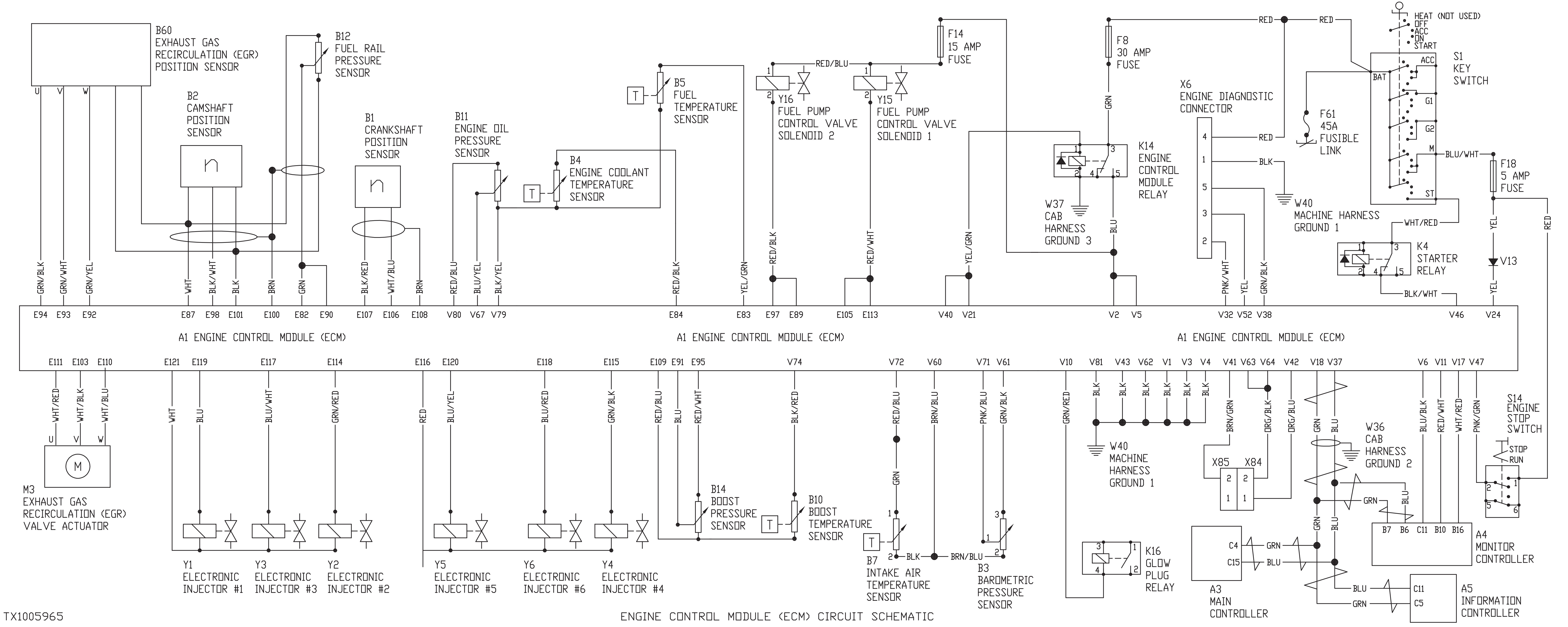
Continued on next page

Engine Speed Dial (R15)—Engine speed dial (R15) has a 5-volt reference voltage supplied by the MCF (terminal D1) and a ground reference shared with the MCF (terminal D6) and the monitor controller (terminal C10). When the engine speed dial is rotated, a corresponding signal is sent to the monitor controller (terminal C4) and the MCF (terminal C1). For additional information on engine speed control, see Main Controller (MCF) Circuit Theory of Operation (Group 9015-15.) and see Engine Speed Control System Operation. (Group 9010-05.)

CS33148,00008E9 –19–21APR06–6/6

Engine Control Module (ECM) Circuit Theory of Operation

TX1005965 –19–19APR06



Engine Control Module Circuit

CS33148,00008EA –19–21APR06–1/4

NOTE: When engine control module (A1) detects an abnormality, it connects terminal V6 to ground. This provides a ground path to terminal C11 on monitor controller (A4), causing the engine warning alarm indicator to appear on the monitor display. For information on diagnosing engine control module circuit malfunctions, see Engine Control Module (ECM) Diagnostic Trouble Codes. (Group 9001-20.)

The alarm data will be recorded in the information controller (ICF). For information on the ICF, see Information Controller (ICF) Theory of Operation. (Group 9015-15.)

Engine control module (A1) determines key switch (S1) is in the ON position when current flows from fuse (F18) to terminal V24. When the key switch is in the ON position, the ECM energizes ECM relay (K14). The energized ECM relay allows current to flow from fuse (F8) to terminals V2 and V5, providing the ECM with main power.

The ECM receives signals from the following components:

- Main Controller (A3)
- Crankshaft Position Sensor (B1)
- Camshaft Position Sensor (B2)
- Barometric Pressure Sensor (B3)
- Engine Coolant Temperature Sensor (B4)
- Fuel Temperature Sensor (B5)
- Intake Air Temperature Sensor (B7)
- Boost Temperature Sensor (B10)
- Engine Oil Pressure Sensor (B11)
- Fuel Rail Pressure Sensor (B12)
- Exhaust Gas Recirculation (EGR) Position Sensor (B60)
- Engine Stop Switch (S14)

After processing the received signals, the ECM sends signals to various components to control the following functions:

- Fuel Injection
- Preheat
- Exhaust Gas Recirculation (EGR)
- Engine Stop

NOTE: For additional information on the fuel system, see Engine Fuel System Operation. (Group 9010-05.)

Fuel Injection Control—The ECM controls fuel injection pressure, amount, and timing by sending the appropriate pulse width modulated (PWM) signals to the electronic injectors (Y1—Y6) and fuel pump control valve solenoids (Y15 and Y16).

Electronic Injectors—When the key switch is in the ON or START position, the ECM provides power electronic injectors 1—3 (Y1—Y3) at terminal E121 and to electronic injectors 4—6 (Y4—Y6) at terminal E116.

The ECM activates the electronic injectors by connecting the corresponding terminal of each injector to ground:

- Electronic injector #1 (Y1) (terminal E119)
- Electronic injector #2 (Y2) (terminal E114)
- Electronic injector #3 (Y3) (terminal E117)
- Electronic injector #4 (Y4) (terminal E115)
- Electronic injector #5 (Y5) (terminal E120)
- Electronic injector #6 (Y6) (terminal E118)

Fuel Pump Control Valve Solenoids—When ECM relay (K14) is energized, power is available to fuel pump control valve solenoids 1 and 2 (Y15 and Y16) from fuse (F14). The ECM activates fuel pump control valve solenoid 1 (Y15) by connecting terminals E105 and E113 to ground. The ECM activates fuel pump control valve solenoid 2 (Y16) by connecting terminals E89 and E97 to ground.

Position Sensors—Crankshaft position sensor (B1) detects engine speed. The crankshaft position sensor is installed on the flywheel housing and sends a signal to the ECM (terminals E106 and E107) when the convex portion of the flywheel passes the sensor.

Continued on next page

Camshaft position sensor (B2) detects TDC of cylinder #1 and provides backup for the crankshaft position sensor should it malfunction. The camshaft position sensor is installed on the high pressure fuel pump and sends a signal to the ECM (terminal E98) when the cam portion of the camshaft passes the sensor. The ECM supplies a 5-volt reference voltage (terminal E87) and ground (terminal 101) for the camshaft position sensor.

Pressure Sensors—Fuel rail pressure sensor (B12) detects fuel pressure in the common rail. The fuel rail pressure sensor is installed on the common rail and sends a varying signal to the ECM (terminals E82 and E90). The varying signal represents the varying resistance of the fuel rail pressure sensor corresponding to the common rail pressure. High resistance of the sensor indicates a low pressure. The ECM supplies a 5-volt reference voltage (terminal E87) and ground (terminal 101) to the fuel rail pressure sensor.

Barometric pressure sensor (B3) detects atmospheric pressure and sends a varying signal to the ECM (terminal V71). The varying signal represents the varying resistance of the barometric pressure sensor corresponding to the atmospheric pressure. The ECM supplies a 5-volt reference voltage (terminal V61) and ground (terminal V60) for the barometric pressure sensor.

Fuel Injection Pressure—The ECM determines the appropriate fuel injection pressure based on engine speed, fuel injection amount, and common rail pressure. The ECM controls fuel injection pressure by activating and deactivating fuel pump control valve solenoids 1 and 2 (Y15 and Y16) using pulse width modulation (PWM). When the fuel pump control valve solenoids are deactivated, fuel is allowed to flow into the pumping chambers. When the ECM activates the fuel pump control valve solenoids, the valve to the pumping chamber is closed. This prevents any fuel from flowing into the pumping chambers. The high pressure fuel pump raises the pressure of the fuel in the chamber to the required pressure for injection.

When the fuel pressure exceeds the delivery valve opening pressure, the fuel is routed to the common rail, distributing fuel to electronic injectors 1—6 (Y1—Y6).

Fuel Injection Amount—The ECM controls the fuel injection amount based on actual engine speed and target engine speed. The ECM determines actual engine speed using signals received from the crankshaft position sensor. Main controller (A3) determines target engine speed using signals received from engine speed dial (R15) and various pressure sensors and switches. The main controller uses the controller area network (CAN) to send the target engine speed information to the ECM.

NOTE: For additional information on engine speed control, see Main Controller (MCF) Circuit Theory of Operation. (Group 9015-15.)

After receiving the target engine speed information from the main controller, the ECM compares the target speed with the actual engine. The ECM varies the fuel injection amount by controlling how long electronic injectors 1—6 (Y1—Y6) are activated and deactivated.

Fuel Injection Timing—The ECM controls fuel injection timing based on engine speed and fuel injection amount. The camshaft and crankshaft position sensors allow the ECM to precisely determine piston position in relation to TDC so that the ECM can activate the correct electronic injector at the correct time.

Fuel Injection Rate—To improve combustion in the cylinders, the ECM injects a small amount of fuel (pilot injection) into the cylinder. After this pilot injection ignites, the ECM injects the main supply of fuel.

Fuel Injection Amount Correction—The ECM adjusts the fuel injection amount based on atmospheric conditions. After the engine starts, if the engine speed is less than engine start correction speed (550 rpm), the ECM adjusts the fuel injection amount. The ECM adjusts the fuel injection amount based on signals received from the barometric pressure sensor.

Continued on next page

Preheat Control—The ECM controls preheat by using glow plugs to “heat” the air in each of the engine’s precombustion chambers. After the engine has started, the ECM can maintain preheat to allow the engine to stabilize idling.

For additional information on the preheat circuit, see Quick On System (QOS) Preheat Circuit Theory of Operation. (Group 9015-15.)

Exhaust Gas Recirculation (EGR) Control—Exhaust gas recirculation (EGR) is the recirculation of engine exhaust gas into the intake manifold to mix with intake air. The recirculation of exhaust gas helps lower the combustion temperature, limiting emissions of nitrogen oxides (NOx).

The EGR consist of valve actuator (M3) and position sensor (B60).

EGR Valve Actuator—The ECM calculates the opening and closing of the EGR valve according to engine speed, fuel flow rate, engine coolant temperature, atmospheric pressure, and intake-air temperature.

The ECM sends current out terminals E103, E110, and E111 to control EGR valve actuator (M3).

EGR Position Sensor—The ECM supplies a 5-volt reference voltage at terminal E87 for EGR position sensor (B60). Terminal E101 connects the EGR position sensor to ground. The ECM calculates the position of the EGR valve using signals received from EGR position sensor at terminals E92, E93, and E94.

For additional information on EGR, see Exhaust Gas Recirculation (EGR) Operation. (Group 9010-05.)

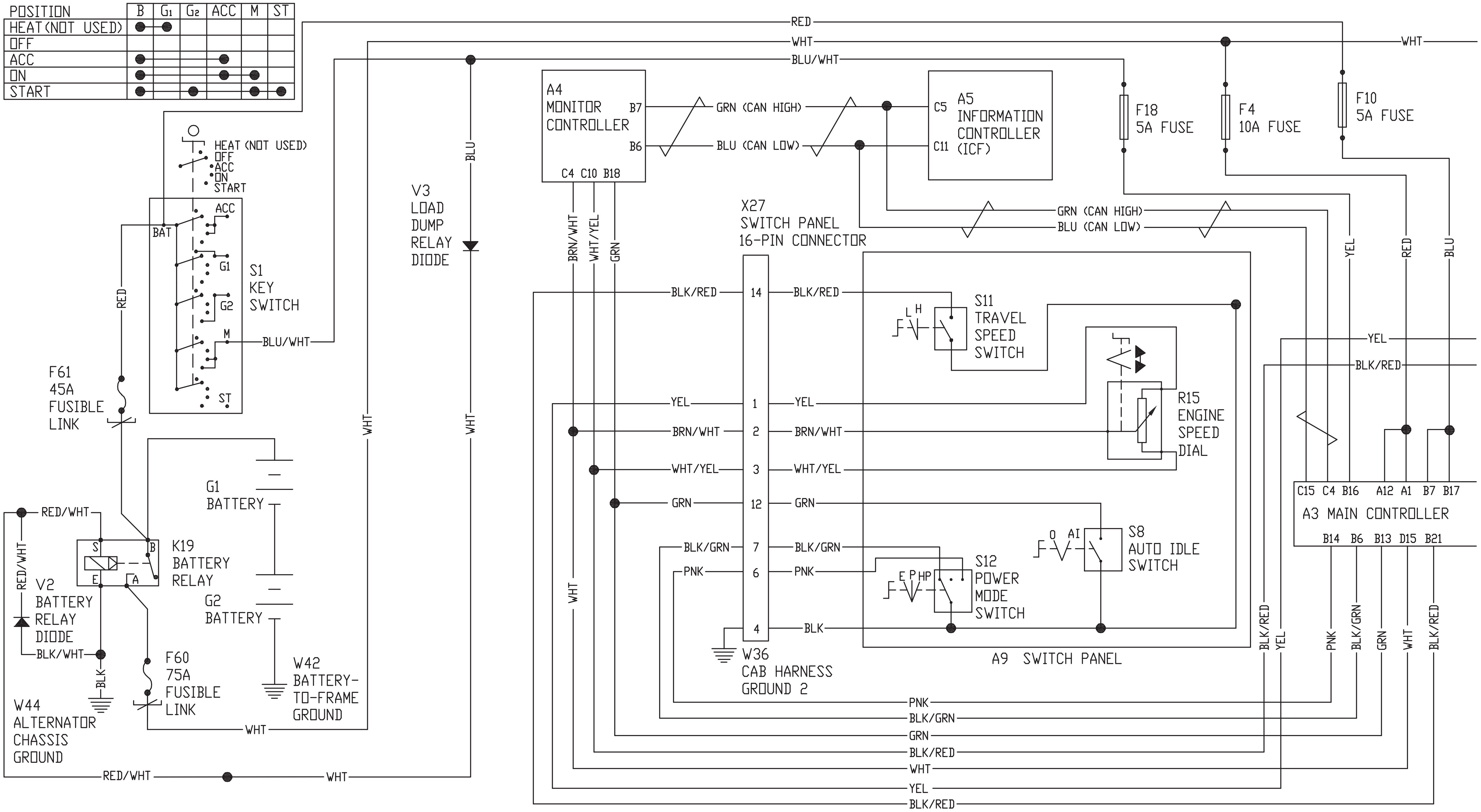
Engine Stop Control—If the engine will not stop when key switch (S1) is turned to the OFF position, moving engine stop switch (S14) to the STOP position will force the ECM to stop the engine.

The ECM determines the engine stop switch is in the STOP position when current flows from fuse (F18) to terminal V47. With current at terminal V47, the ECM removes power to the fuel injectors and fuel pump control valve solenoids, causing the engine to stop. The ECM then de-energizes ECM relay (K14), removing main power from the ECM.

CS33148,00008EA –19–21APR06–4/4

Main Controller (MCF) Circuit Theory of Operation

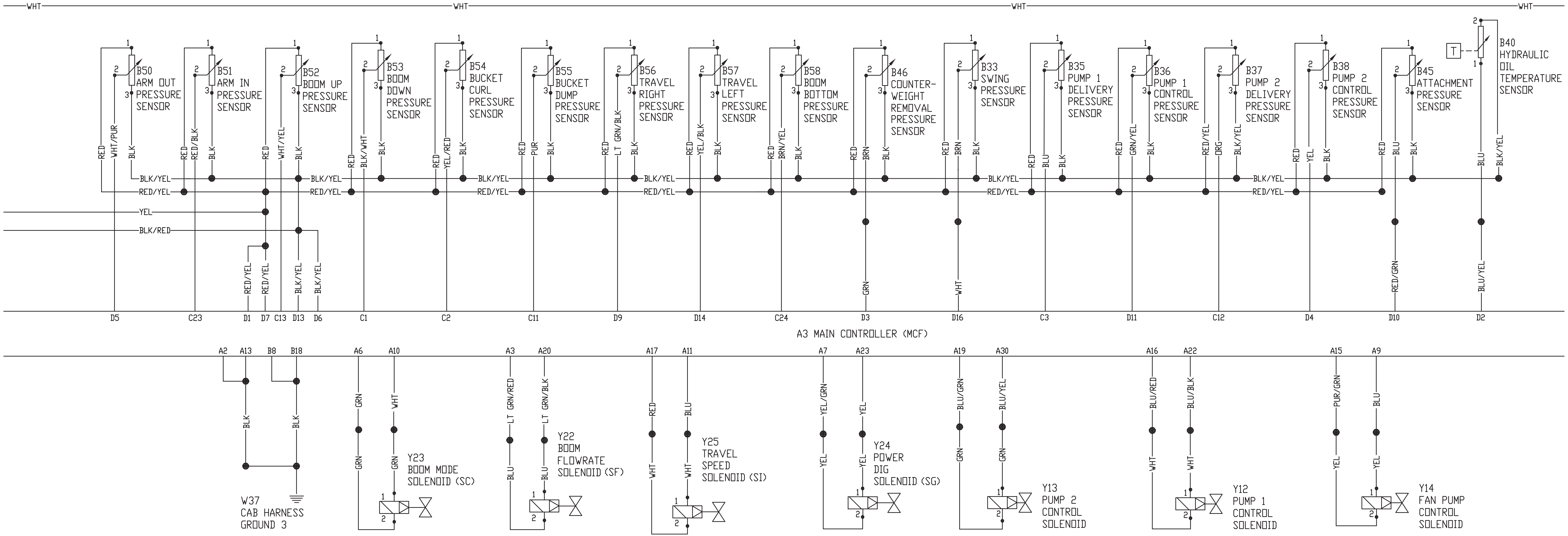
TX1006481 –19–27APR06



TX1006481

MAIN CONTROLLER CIRCUIT SCHEMATIC (SHT 1 OF 3)

TX1006482 –19–26APR06

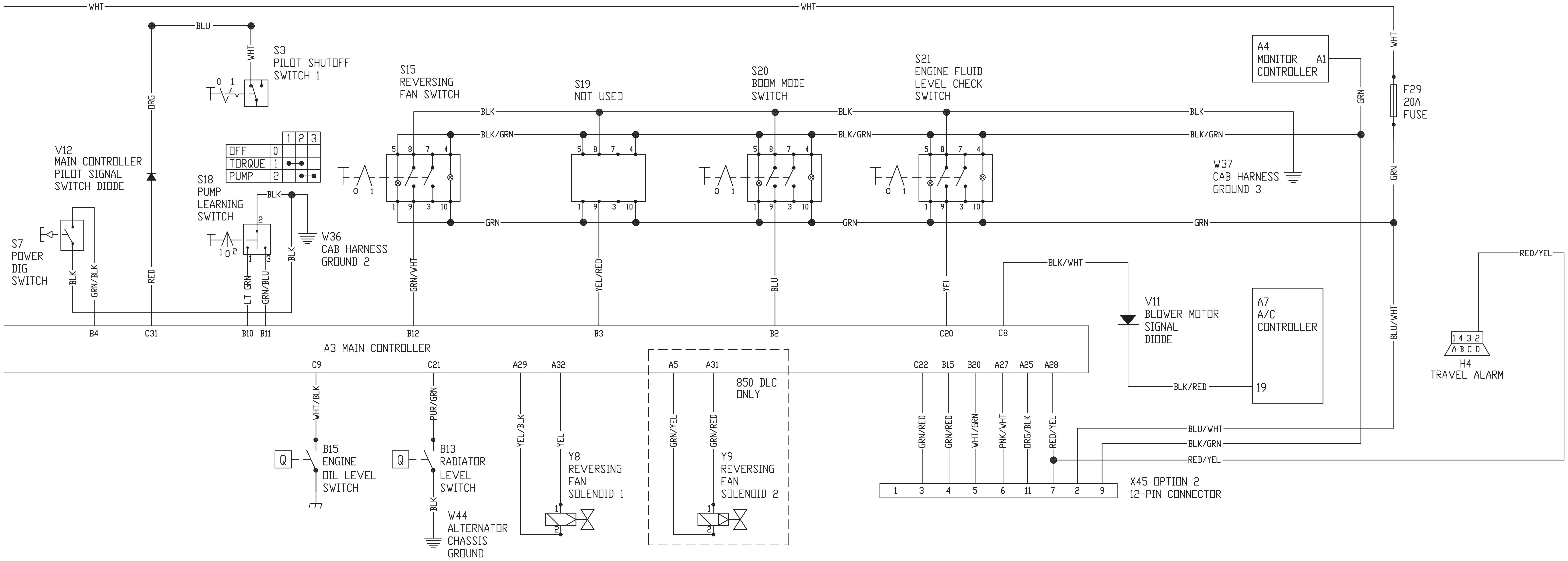


TX1006482

MAIN CONTROLLER CIRCUIT SCHEMATIC (SHT 2 OF 3)

CS33148,00008EB –19–28APR06–2/15

TX1006483 –19–26APR06



TX1006483

MAIN CONTROLLER CIRCUIT SCHEMATIC (SHT 3 OF 3)

NOTE: For information on diagnosing main controller (MCF) circuit malfunctions, see Main Controller (MCF) Diagnostic Trouble Codes (Group 9001-10.)

The main controller (MCF) (A3) is the heart of the machine electrical controls. The MCF interfaces directly with inputs (sensors and switches) and outputs (solenoids and an audible alarm). In addition, the MCF communicates information, as needed, with the engine control module (ECM) (A1), information controller (ICF) (A5), and monitor controller (A4). It does this through the CAN data link.

For information on the CAN data link, see Controller Area Network (CAN) Theory of Operation. (Group 9015-15.)

For information on the ECM, see Engine Control Module (ECM) Theory of Operation. (Group 9015-15.)

For information on the ICF, see Information Controller (ICF) Theory of Operation. (Group 9015-15.)

For information on the monitor controller, see Monitor Controller Theory of Operation. (Group 9015-15.)

The main controller (MCF) receives inputs from the MCF sensors, switches, etc., then sends the appropriate signals to the MCF outputs (solenoids, travel alarm, and ECM) to control the following major systems:

- Engine Control
- Pump Control
- Valve Control
- Miscellaneous Controls

The main controller inputs:

- A/C Controller (A7)
- Radiator Level Switch (B13)
- Engine Oil Level Switch (B15)
- Swing Pressure Sensor (B33)
- Pump 1 Delivery Pressure Sensor (B35)
- Pump 1 Control Pressure Sensor (B36)
- Pump 2 Delivery Pressure Sensor (B37)
- Pump 2 Control Pressure Sensor (B38)
- Hydraulic Oil Temperature Sensor (B40)
- Attachment Pressure Sensor (B45)
- Counterweight Removal Pressure Sensor (B46)
- Arm Out Pressure Sensor (B50)
- Arm In Pressure Sensor (B51)
- Boom Up Pressure Sensor (B52)
- Boom Down Pressure Sensor (B53)
- Bucket Curl Pressure Sensor (B54)
- Bucket Dump Pressure Sensor (B55)
- Travel Right Pressure Sensor (B56)
- Travel Left Pressure Sensor (B57)
- Boom Pressure Sensor (B58)
- Engine Speed Dial (R15)
- Pilot Shutoff Switch (S3)
- Power Dig Switch (S7)
- Auto-Idle Switch (S8)
- Travel Speed Switch (S11)
- Power Mode Switch (S12)
- Reversing Fan Switch (S15) (Optional)
- Pump Learning Switch (S18)
- Boom Mode Switch (S20)
- Engine Fluid Level Check Switch (S21)

The main controller outputs:

- Travel Alarm (H4)
- Reversing Fan Solenoid (Y8) (optional)
- Reversing Fan Solenoid (Y9) (optional; 850DLC)
- Pump 1 Control Solenoid (Y12)
- Pump 2 Control Solenoid (Y13)
- Boom flow rate solenoid (Y22) (SF)
- Boom mode solenoid (Y23) (SC)
- Power dig solenoid (Y24) (SG)
- Travel speed solenoid (Y25) (SI)

Engine Control—The engine control involves the following functions:

- Engine Speed Dial and ECO Control
- Power Mode Control
- Travel Speed Increase Control
- Auto-Idle Control
- Attachment Operation Speed Control

Continued on next page

Engine Speed Dial and ECO Control: When the engine speed dial is rotated clockwise or counterclockwise, the speed dial sends a corresponding signal that represents the target speed to terminal D15 on the MCF and terminal C4 of the monitor controller. The MCF then sends a corresponding signal through the CAN data link to the ECM. The ECM compares this information with inputs from ECM sensors and increases or decreases the actual engine speed accordingly.

NOTE: The voltage signal at terminal C4 of the monitor controller can be viewed on the monitor display by accessing the Data Items Menu on the monitor controller.

The engine speed control has a function called the ECO. When the engine speed is more than 1600 rpm and the pressure sensor inputs to the MCF indicate that all hydraulic control levers are in the neutral position for a minimum of 1 second, the MCF sends a signal to the ECM to reduce engine speed to 1600 rpm.

NOTE: When target speed set by the engine speed dial is less than 1600 rpm and hydraulic controls are not actuated for at least 1 second, the actual engine speed will remain unchanged.

Power Mode Control: The power mode control consists of the following functions:

- E Mode (Economy)
- P Mode (Standard)
- HP Mode (High Power)

E Mode—At this position, the power mode switch (S12) provides a ground to terminal B6 on the MCF. When the MCF detects this ground, the MCF sends a signal to the ECM (through the CAN data link) to limit the engine target speed to a maximum of 1580 rpm. The E mode function also reduces load on the engine by reducing the flow rate of main pumps 1 and 2 by 15 percent. For more information, see Pump Control—E Mode later in this theory of operation.

P Mode—At this position, the power mode switch (S12) does not provide ground to terminals B6 and B14. When the MCF detects no ground at both terminals, the MCF sends a signal to the ECM (through the CAN data link) to control the engine speed from slow to fast idle in response to the position of the engine speed dial.

HP Mode—At this position, the power mode switch (S12) provides a ground to terminal B14 on the MCF. When the MCF detects this ground, the MCF sends a signal to the ECM (through the CAN data link) to increase engine speed approximately 100 rpm more than the target speed (as set by the engine speed dial) when digging power is needed.

The MCF will send a signal to the ECM to increase actual engine speed more than the target speed when the following conditions occur:

- Power mode switch at HP position.
- Engine speed dial set to target speed of 1020 rpm or higher.
- MCF detects pressure as sensed by boom up pressure sensor (B52) (terminal C13) and/or arm in pressure sensor (B51) (terminal C23).
- MCF detects high average pressure as sensed by pump 1 delivery pressure sensor (B35) (terminal C3) and pump 2 delivery pressure sensor (B37) (terminal C12).

A/I (Auto-Idle) Mode: The auto-idle feature reduces engine speed when hydraulic functions are not being operated for more that 4 seconds.

When the auto-idle switch (S8) is turned to the A/I position, the switch connects terminal B18 on monitor controller (A4) to ground. When the monitor controller detects ground at terminal B18, the auto-idle indicator will appear on the monitor display. The auto-idle switch also connects MCF terminal B13 to ground to inform the MCF that auto-idle mode has been selected.

Continued on next page

When the engine speed dial is at a speed setting above auto-idle speed and the hydraulic functions are not operated for more that 4 seconds, the MCF will send a signal to the ECM (through the CAN data link) to reduce the engine speed to the auto-idle speed. If the engine speed dial is set to a speed setting below auto-idle speed, the engine speed will not increase or decrease after 4 seconds.

Auto-idle is activated when the following conditions are met:

- Auto-idle switch is at the A/I position.
- No hydraulic functions activated for at least 4 seconds.
- Engine speed more than 1030 rpm.

Auto-idle mode deactivates when any of the following conditions occur:

- Auto-idle control switch turned to OFF.
- A hydraulic function is actuated.
- Power mode switch is turned from E to P or P to E.
- Engine speed dial is turned to change engine speed.

When auto-idle is deactivated, the engine rpm increases to the setting of the engine speed dial.

Travel Speed Increase Control: When in travel mode, the MCF sends a signal to the ECM (through the CAN data link) to increase engine speed approximately 100 rpm more than the target speed (as set by the engine speed dial).

During travel operation, the MCF will also increase main relief pressure by energizing the power dig solenoid. See Valve Control—Power Dig Solenoid (Y24) (SG) later in this theory of operation. The MCF also activates travel alarm (H4). For more information, see Travel Alarm Circuit Theory of Operation. (Group 9015-15.)

The MCF will send a signal to the ECM to increase actual engine speed more than the target speed when the following conditions occur:

- Engine speed dial set to target speed of 1070 rpm or higher
- Pressure sensed by travel right pressure sensor (B56) and travel left pressure sensor (B57)

Attachment Operation Speed Control: The attachment operation speed function provides an increased or decreased maximum engine speed setting when operating in the attachment mode. The attachment operation speed setting can be adjusted (increased or decreased) using the Dr.ZX application.

The MCF will send a signal to the ECM to increase or decrease actual engine speed more or less than the target speed (as set by the engine speed dial) when the following conditions occur:

- Power mode switch at HP position
- Attachment mode selected for work mode setting
- Engine speed dial set to fast idle position
- Attachment operated [MCF detects pressure sensed by attachment pressure sensor (B45) at MCF terminal D10]

Pump Control—The pump control involves the following functions:

- Pump Flow Rate Control
- Engine Speed Sensing Control
- E Mode Control
- Horsepower Control
- Relief Flow Reducing Control
- Swing Horsepower Reducing Control
- Overheat Prevention Control
- Fan Pump Flow Control
- Pump Learning Control
- Attachment Mode Control

Continued on next page

CS33148,00008EB –19–28APR06–6/15

Pump Flow Rate Control: The pump flow rate control provides oil as needed from the main pumps to the hydraulic circuit being controlled relative to movement of the control lever. When the control lever is moved, pilot control pressure acts on the pressure sensor located in the pilot circuit being operated. The pressure sensor detects this pressure and sends a signal to the MCF.

MCF inputs involved (pilot circuit sensors):

- Swing pressure sensor (B33)
- Arm out pressure sensor (B50)
- Arm in pressure sensor (B51)
- Boom up pressure sensor (B52)
- Bucket curl pressure sensor (B54)
- Bucket dump pressure sensor (B55)
- Travel right pressure sensor (B56)
- Travel left pressure sensor (B57)

MCF inputs involved (pump pressure sensors):

- Pump 1 control pressure sensor (B36)
- Pump 2 control pressure sensor (B38)

MCF outputs involved:

- Pump 1 control solenoid (Y12)
- Pump 2 control solenoid (Y13)

The MCF determines the actual angle of the swash plates in pumps 1 and 2 by signals provided by pump 1 control pressure sensor (B36) (terminal D11) and pump 2 control pressure sensor (B38) (terminal D4).

The MCF compares the signal from pump control pressure sensors (B36 and B38) with the signal from the pressure sensor of the pilot circuit being operated to calculate the oil amount needed. The MCF then sends a pulse width modulated (PWM) signal out terminals A16 and A22 to energize pump 1 control solenoid (Y12). It also sends a PWM signal out terminals A19 and A30 to energize pump 2 control solenoid (Y13). When the MCF increases the current signal to the pump control solenoids, the pump servo piston shifts to increase the pump swash plate angle, and thus increase the pump delivery output. For hydraulic information on pump regulation, see Pump 1 and 2 Regulator Operation. (Group 9025-05.)

NOTE: When activating the boom down circuit, the MCF does not use the signal from the boom down pressure sensor (B53) to vary pump flow rate. The pump swash plate angle does not change because the boom lowers mostly by its own weight with the help of the boom regenerative valve. For information on the boom regenerative valve, see Boom Regenerative Valve Circuit Operation. (Group 9025-05.)

When the control lever is moved back to neutral, the pressure sensor of the pilot circuit that was activated detects no pressure in the pilot circuit and sends a corresponding signal back to the MCF. The MCF compares the signals from pump control pressure sensors (B36 and B38) with the signal from the pilot circuit pressure sensors to calculate the oil amount needed. Since no hydraulic circuits are being actuated at this time, the MCF sends a signal to the pump control solenoids (Y12 and/or Y13) to decrease swash plate angle to minimum, causing the pump delivery flow to go to minimum.

Engine Speed Sensing Control: With engine speed sensing control, the MCF controls pump flow rate in response to engine speed changes due to varying loads on the engine. This provides a more efficient engine output and prevents engine from stalling when operating in adverse conditions such as at high altitude.

MCF input involved: Engine speed dial (R15)

MCF outputs involved:

- Pump 1 control solenoid (Y12)
- Pump 2 control solenoid (Y13)

Continued on next page

The engine target speed is set by the engine speed dial, which sends a corresponding signal to terminal D15 on the MCF. The engine control module (ECM) communicates the actual engine speed to the MCF through the CAN data link. For information on the ECM, see Engine Control Module Theory of Operation. (Group 9015-15.)

The MCF compares the actual engine speed to the engine target speed, and if the load on the engine causes the actual engine speed to decrease less than the target speed, the MCF sends a signal to pump control solenoids (Y12 and Y13) to reduce the swash plate angle on pumps 1 and 2, which decreases the pump delivery flow rate.

As the load on the engine lessens, the actual engine speed will increase. When this happens, the MCF sends a signal to pump control solenoids (Y12 and Y13) to increase the swash plate angle on pumps 1 and 2, which increases the pump flow rate.

NOTE: If in HP mode and the actual engine speed increases to more than the target speed, the MCF will continue increasing the swash plate angle during this time. The MCF will only do this when HP mode is selected.

E Mode Control: Provides better fuel efficiency by reducing load on the engine and prevents engine from stalling when operating in adverse conditions such as at high altitude.

MCF input involved: Power mode switch (S12)

MCF outputs involved:

- Pump 1 control solenoid (Y12)
- Pump 2 control solenoid (Y13)
- ECM (through CAN)

When power mode switch (S12) is at the E position, the power mode switch provides a ground to terminal B6 on the MCF. When the MCF detects this ground, the MCF sends a signal to pump solenoids (Y12 and Y13) to reduce swash plate angle on pumps 1 and 2 by 15 percent, which in turn, decreases the pump flow rate.

When in E mode, the MCF will also send a signal to the ECM to limit the engine target speed to a maximum of 1580 rpm to reduce fuel consumption. See Engine Control—Power Mode Control previously in this theory of operation.

Horsepower Control: The MCF controls pump flow rate of pumps 1 and 2 so that the total torque of the two main pumps AND the fan pump does not exceed the engine output torque.

MCF inputs involved:

- Pump 1 delivery pressure sensor (B35)
- Pump 1 control pressure sensor (B36)
- Pump 2 delivery pressure sensor (B37)
- Pump 2 control pressure sensor (B38)

MCF outputs involved:

- Pump 1 control solenoid (Y12)
- Pump 2 control solenoid (Y13)

The MCF compares the signals from pumps 1 and 2 delivery pressure sensors (B35 and B37) (terminals C3 and C12) with the fan pump flow rate calculation (see Fan Pump Flow Control later in this theory of operation) to calculate the maximum target pump displacement (swash plate angle) on pumps 1 and 2.

NOTE: The MCF does not use horsepower control to change the fan pump swash plate angle. Fan control is done strictly by the fan pump flow rate control. See Fan Pump Flow Control later in this theory of operation.

The MCF determines actual pump displacement (swash plate angle) of pumps 1 and 2 by signals from pump control pressure sensors (B36 and B38) (terminals D11 and D4).

Continued on next page

The MCF determines which pump has the greater load by comparing signals from the delivery pressure sensors (B35 and B37). The pump with the higher delivery pressure indicates the pump with the greater load.

The MCF compares the actual pump displacement with the calculated maximum target pump displacement, then sends a signal to the pump control solenoid (Y12 or Y13) of the pump having the higher delivery pressure to decrease the flow rate of that pump, thus reducing pump load.

Relief Flow Reducing Control: Controls hydraulic energy loss and prevents hydraulic oil temperature from rising due to pressure variations caused by changing loads.

MCF inputs involved:

- Swing pressure sensor (B33)
- Pump 1 delivery pressure sensor (B35)
- Pump 1 control pressure sensor (B36)
- Pump 2 delivery pressure sensor (B37)
- Pump 2 control pressure sensor (B38)
- Travel right pressure sensor (B56)
- Travel left pressure sensor (B57)

MCF outputs involved:

- Pump 1 control solenoid (Y12)
- Pump 2 control solenoid (Y13)

The MCF determines the actual pump displacement (swash plate angle) from signals received from pump control pressure sensors (B36 and B38) (terminals D11 and D4). The MCF determines the target pump displacement (swash plate angle) from signals received from pump delivery pressure sensors (B35 and B37) (terminals C3 and C12).

The MCF continually compares signals from the pump control pressure sensors to signals from the pump delivery pressure sensors.

When pump delivery pressure reaches 30 900 kPa (309 bar) (4482 psi), the MCF sends a signal to the pump control solenoid (pump with the high delivery pressure) to decrease pump flow rate to minimum.

The MCF will cancel relief flow rate reducing control if the right or left travel pressure sensors (B56 or B57) detect travel pilot pressure or the swing pressure sensor (B33) detects swing pilot pressure.

Swing Horsepower Reducing Control: To provide better control during swing operation, the delivery flow rate of pump 1 increases and the delivery flow rate of pump 2 (which includes swing function) decreases.

MCF inputs involved:

- Swing pressure sensor (B33)
- Pump 1 delivery pressure sensor (B35)
- Pump 1 control pressure sensor (B36)
- Pump 2 delivery pressure sensor (B37)
- Pump 2 control pressure sensor (B38)

MCF outputs involved:

- Pump 1 control solenoid (Y12)
- Pump 2 control solenoid (Y13)

The MCF determines the actual swash plate angle from signals received from pump control pressure sensors (B36 and B38) (terminals D11 and D4). The MCF determines the target swash plate angle from signals received from pump delivery pressure sensors (B35 and B37) (terminals C3 and C12).

The MCF continually compares signals from the pump control pressure sensors to signals from the pump delivery pressure sensors.

When the swing function is operated, swing pressure sensor (B33) detects swing pilot pressure and sends a corresponding signal to terminal D16 on the MCF.

The MCF compares the actual swash plate angle with the target swash plate angle, then sends the appropriate amount of current to pump control solenoids (Y12 and Y13) to compensate for the difference.

Continued on next page

When any other hydraulic functions is combined with the swing function, the MCF will send more current to pump 1 control solenoid (Y12) to increase delivery flow of pump 1.

Overheat Prevention Control: When coolant and hydraulic oil temperatures reach a specified level, maximum flow rate and suction torque of the main pumps are reduced to prevent overheating.

MCF inputs involved:

- Hydraulic oil temperature sensor (B40)
- ECM (through CAN) [coolant temperature sensor (B43)]
- Pump 1 delivery pressure sensor (B35)
- Pump 1 control pressure sensor (B36)
- Pump 2 delivery pressure sensor (B37)
- Pump 2 control pressure sensor (B38)

MCF outputs involved:

- Pump 1 control solenoid (Y12)
- Pump 2 control solenoid (Y13)

The MCF determines the actual swash plate angle from signals received from pump control pressure sensors (B36 and B38) (terminals D11 and D4). The MCF determines the target swash plate angle from signals received from pump delivery pressure sensors (B35 and B37) (terminals C3 and C12).

The MCF continually compares signals from the pump control pressure sensors to signals from the pump delivery pressure sensors.

When the coolant temperature and/or hydraulic oil temperature reach the overheat (increasing) specification, as detected by coolant temperature sensor (B43) and hydraulic oil temperature sensor (B40), the MCF compares the actual swash plate angle with the target swash plate angle, then sends the appropriate amount of current to pump control solenoids (Y12 and Y13) to decrease the maximum pump flow rate and torque by 7 percent.

When the coolant temperature and/or hydraulic oil temperature decrease to less than the overheat (decreasing) specification, the MCF will increase the pump flow rate back to normal.

Specification

Coolant and Hydraulic Oil Overheat (Increasing)—Temperature	99°C 210°F
Coolant and Hydraulic Oil Overheat (Decreasing)—Temperature	95°C 203°F
Hydraulic Oil Temperature Sensor (B40)—Resistance	14 600—17 800 ohms @ -20°C (-4°F)
Hydraulic Oil Temperature Sensor (B40)—Resistance	5880 ohms (approximately) @ 0°C (32°F)
Hydraulic Oil Temperature Sensor (B40)—Resistance	2210—2696 ohms @ 20°C (68°F)
Hydraulic Oil Temperature Sensor (B40)—Resistance	1140 ohms (approximately) @ 40°C (104°F)
Hydraulic Oil Temperature Sensor (B40)—Resistance	534 ohms (approximately) @ 60°C (140°F)
Hydraulic Oil Temperature Sensor (B40)—Resistance	322 ohms (approximately) @ 80°C (176°F)

Fan Pump Flow Control: The fan pump flow circuit controls fan speed by controlling delivery flow rate of the fan pump according to boost temperature (intake air temperature passing by the intercooler), engine coolant temperature, engine intake air temperature, and hydraulic oil temperature.

MCF inputs involved:

- Engine speed dial (R15)
- Hydraulic oil temperature sensor (B40)
- A/C controller (A7) (blower motor relay control)
- ECM (through CAN)

MCF output involved: Fan pump control solenoid (Y14)

Continued on next page

The ECM receives signals from the boost temperature sensor, engine coolant temperature sensor, and engine intake air temperature sensor. The ECM then sends this information through the CAN data link to the MCF.

The MCF compares the information from the ECM with signals it receives from hydraulic oil temperature sensor (B40) (terminal D2), engine speed dial (R15) (terminal D15), and A/C controller (A7) (terminal C8).

When A/C controller (A7) is OFF, no ground is available to the MCF at terminal C8. When the MCF does not detect a ground at terminal C8, it sends an appropriate amount of current to fan pump control solenoid (Y14) to vary the fan speed as engine temperature and conditions require.

NOTE: Increasing current to the fan pump control solenoid causes the pump displacement (swash plate angle) to decrease.

When A/C controller (A7) is ON, a ground is sent to the MCF at terminal C8. When the MCF detects this ground, the fan operates similar to when the A/C controller is OFF, but the threshold speed of the fan is slightly increased.

For hydraulic fan drive system operation, see Fan Drive System Diagram and Operation. (Group 9025-05.)

For operation of fan pump, see Fan Drive Pump Regulator Operation. (Group 9025-05.)

Pump Learning Control: The pump learning procedure must be performed anytime the pump, pump regulator, or pump control solenoid valve have been replaced. The Dr.ZX diagnostic application is needed to perform the pump learning procedure. See Dr.ZX Diagnostic Application. (Group 9015-20.)

MCF inputs involved:

- Pump learning switch (S18)
- Engine control dial (R15)
- Power mode switch (S12) (HP position)
- Auto-idle switch (S8) (OFF)
- Pilot shutoff switch (S3) (lever in LOCK position)
- Hydraulic oil temperature sensor (B40)
- Pump 1 control pressure sensor (B36)
- Pump 2 control pressure sensor (B38)

MCF outputs involved:

- Pump 1 control solenoid (Y12)
- Pump 2 control solenoid (Y13)

When the pump learning switch (S18) is moved to the PUMP LEARNING position (opposite E), ground is provided to terminal B11 on the MCF. When the MCF detects ground at terminal B11 and all the conditions stated below are met, the MCF cycles the pump control solenoids (Y12 and Y13) while monitoring the current to the solenoids.

At the same time, the MCF monitors pump swash plate angle by sensing signals from pump control pressure sensors (B36 and B38). The MCF compares the current used to drive the solenoids with the signal from the pressure sensors. It then calculates for any differences and makes adjustments as needed.

The pump learning control requires the following conditions:

- Engine running at fast idle
- Hydraulic oil temperature at 50 ± 5°C (122 ± 41°F
- Auto-idle switch OFF
- HP mode enabled
- Pilot shutoff lever at rearward (LOCK) position
- Hydraulic control levers in neutral position

Attachment Mode Control: The attachment mode control limits the maximum flow rate of pump 2 and controls the appropriate flow rate for the attachment.

MCF inputs involved:

- Attachment pressure sensor (B45)
- Monitor controller (through CAN) (attachment mode selected)
- Pump 1 delivery pressure sensor (B35)
- Pump 1 control pressure sensor (B36)

Continued on next page

- Pump 2 delivery pressure sensor (B37)
- Pump 2 control pressure sensor (B38)

MCF outputs involved:

- Pump 1 control solenoid (Y12)
- Pump 2 control solenoid (Y13)

When the attachment function is operated, attachment pressure sensor (B45) detects attachment pilot pressure and sends a corresponding signal to terminal D10 on the MCF.

NOTE: When in dig mode, the maximum flow setting is 367 L/min (97 gpm).

When in attachment mode, the maximum flow depends on settings inputted in the monitor controller. See Pump 2 Flow Rate Adjustment. (Operator's Manual.)

When the MCF receives a signal from the monitor controller indicating the attachment mode has been selected, the MCF will compare the actual swash plate angle of pump 2 [by signals it receives from pump 2 control pressure sensor (B38)] with the maximum pump 2 flow rate setting selected on the monitor controller. The MCF then sends the appropriate amount of current to pump 2 control solenoid (Y13) to compensate for the difference.

During operation of the attachment, the return oil from the attachment does not flow through the oil cooler, but instead, flows directly to the hydraulic oil tank. To increase oil flow through the oil cooler and prevent overheating of the hydraulic oil during attachment operation, the MCF increases output current to pump 1 control solenoid (Y12). This increases the delivery flow rate of pump 1, which causes more oil to flow through the oil cooler.

Valve Control—The valve control involves the following solenoids:

- Boom Flow Rate Solenoid (Y22) (SF)
- Boom Mode Solenoid (Y23) (SC)
- Power Dig Solenoid (Y24) (SG)
- Travel Speed Solenoid (Y25) (SI)
- Reversing Fan Solenoid (Y8) (optional)

Boom Flow Rate Solenoid (Y22) (SF): The boom flow rate control restricts main pump pressure oil to the boom cylinder during boom lower operation when combined with any of the arm or bucket functions. When the boom is lowered, it uses its own weight and the boom regenerative circuit to assist in this operation.

MCF inputs involved:

- Boom down pressure sensor (B53)
- Arm out pressure sensor (B50)
- Arm in pressure sensor (B51)
- Bucket curl pressure sensor (B54)
- Bucket dump pressure sensor (B55)

MCF output involved: Boom flow rate solenoid (Y22)

When the MCF detects signals from boom down pressure sensor (B53) and one of the arm or bucket pressure sensors (B50, B51, B54, or B55) to indicate combined operation of boom lower and arm (or bucket), the MCF sends current out terminals A3 and A20 to boom flow rate solenoid (Y22), energizing the solenoid. With the boom flow rate solenoid energized, most of the pressure oil from the main pump is diverted to the other circuit being actuated, causing operating speed of the other actuator to increase.

For hydraulic information on this circuit, see Boom Flow Rate Circuit Operation. (Group 9025-05.)

Boom Mode Solenoid (Y23) (SC): The boom mode control reduces vibration of the machine when digging and grading. It does this by reducing the overload relief valve pressure to 11 800 kPa (118 bar) (1712 psi). The normal overload relief valve pressure is 35 300 kPa (353 bar) (5120 psi).

MCF inputs involved:

- Boom mode switch (S20)
- Swing pressure sensor (B33)
- Attachment pressure sensor (B45)

Continued on next page

- Arm out pressure sensor (B50)
- Arm in pressure sensor (B51)
- Boom up pressure sensor (B52)
- Bucket curl pressure sensor (B54)
- Bucket dump pressure sensor (B55)
- Travel right pressure sensor (B56)
- Travel left pressure sensor (B57)

MCF output involved: Boom mode solenoid (Y23)

Putting boom mode switch (S20) in the ON position provides a ground to terminal B2 on the MCF. When the MCF detects this ground, and if any of the following conditions are met, the MCF will send a current out terminals A6 and A10, energizing boom mode solenoid (Y23).

- Digging mode selected in work mode menu
- No travel operation. MCF detects NO signal from either travel pressure sensor (B56 or B57)
- Hydraulic function activated. MCF detects signal from one or more circuit pressure sensors (B33, B45, B50, B51, B52, B53, B54, or B55)

For hydraulic information on this circuit, see Boom Mode Circuit Operation. (Group 9025-05.)

Power Dig Solenoid (Y24) (SG): When energized, the power dig solenoid supplies back-pressure to the main relief valve to increase main relief pressure and provide more power for all functions. For hydraulic information,see Main Relief and Power Digging Valve Circuit Operation. (Group 9025-05.)

The power dig solenoid (Y24) is controlled by the following systems:

- Power Dig Control
- Travel Control
- Auto-Power Lift Control
- Counterweight Removal and Installation Control

Power Dig Control—Temporarily energizes the power dig solenoid to increase the main relief pressure.

MCF input involved: Power dig switch (S7)

MCF output involved: Power dig solenoid (Y24)

Pushing and holding down the momentary power dig switch (S7) connects MCF terminal B4 to ground. When the MCF detects ground this ground, the MCF sends current out terminals A7 and A23 to power dig solenoid (Y24), energizing the solenoid.

As long as the power dig switch is held down, the solenoid stays energized, but only for a maximum of 8 seconds. A timer inside the MCF limits the amount of time the power dig solenoid is energized.

Releasing the power dig switch resets the internal timer and allows the power dig solenoid to be energized for another 8 seconds maximum when the switch is pushed again.

Travel Control—The travel control automatically energizes the power dig solenoid when a travel function is operated.

MCF inputs involved:

- Travel right pressure sensor (B56)
- Travel left pressure sensor (B57)

MCF output involved: Power dig solenoid (Y24)

When travel is detected by one or both travel pressure sensors (B56 and B57), the MCF energizes power dig solenoid (Y24). At the same time, the MCF sends a signal to the ECM to increase engine speed approximately 100 rpm. See Engine Control—Travel Speed Increase Control previously in this theory of operation.

During travel operation, the MCF activates travel alarm (H4). For more information, see Travel Alarm Circuit Theory of Operation. (Group 9015-15.)

Auto-Power Lift Control—When operating the boom up function and NOT operating the arm in function will cause the MCF to temporarily energize the power dig solenoid.

Continued on next page

MCF inputs involved:

- Pump 1 delivery pressure sensor (B35)
- Arm in pressure sensor (B51)
- Boom up pressure sensor (B52)

MCF output involved: Power dig solenoid (Y24)

The auto-power lift control has the following requirements:

- Boom up function operated [pressure detected by boom up pressure sensor (B52) (terminal C13) more than 1700 kPa (17 bar) (247 psi)]
- Arm in function not operated [pressure detected by arm in pressure sensor (B51) (terminal C23) less than 500 kPa (5 bar) (73 psi)
- High pressure detected by pump 1 delivery pressure sensor (B35) (terminal C3) 29 100 kPa (291 bar) (4220 psi)

Counterweight Removal and Installation Control— Temporarily energizes the power dig solenoid and controls pump delivery flow rate during the counterweight remove and install process.

MCF inputs involved:

- Counterweight removal pressure sensor (B46)
- Pump 1 control pressure sensor (B36)
- Pump 2 control pressure sensor (B38)

MCF outputs involved:

- Power dig solenoid (Y24)
- Pump 1 control solenoid (Y12)
- Pump 2 control solenoid (Y13)

The MCF determines the actual swash plate angle from signals received from pump control pressure sensors (B36 and B38) (terminals D11 and D4). The MCF determines the target swash plate angle from signals received from pump delivery pressure sensors (B35 and B37) (terminals C3 and C12).

The MCF continually compares signals from the pump control pressure sensors to signals from the pump delivery pressure sensors.

When the counterweight control lever is moved to the raise or lower position, counterweight pressure sensor (B46) detects pilot pressure and sends a corresponding signal to terminal D3 on the MCF. When the MCF receives this signal, it activates power dig solenoid (Y24) to increase main relief pressure.

At the same time, the MCF decreases current to pump control solenoids (Y12 and Y13), causing pump displacement (and pump delivery flow rate) to go to minimum.

Travel Speed Solenoid (Y25) (SI): Selects travel mode by changing the swash plate angle on the travel motors.

MCF input involved: Travel speed switch (S11)

MCF output involved: Travel speed solenoid (Y25)

Slow speed— When travel speed switch (S11) is at the LOW (turtle) position, no ground is sent to terminal B21 on the MCF. When the MCF does not detect ground at terminal B21, the MCF de-energizes travel speed solenoid (Y25).

Fast speed— When travel speed switch (S11) is at the HI (rabbit) position, the switch provides a ground to terminal B21 on the MCF. When the MCF detects this ground, it sends current out terminals A11 and A17 to travel speed solenoid (Y25), energizing the solenoid.

For hydraulic information on this circuit, see Travel Motor Speed Circuit Operation. (Group 9025-05.)

Reversing Fan Solenoids (Y8 and Y9): The reversing fan operation requires that the pilot shut off lever be in the rearward (LOCK) position and the air conditioning OFF. The process takes approximately 100 seconds from beginning to end.

Continued on next page

MCF inputs involved:

- Reversing fan switch (S15)
- Engine speed dial (R15)
- Pilot shutoff switch (S3)
- A/C controller (A7) (blower relay control)

MCF outputs involved:

- Fan pump control solenoid (Y14)
- Reversing fan solenoid (Y8) (and Y9; 850DLC only)
- ECM (through CAN)

Pushing reversing fan switch (S15) to the ON position provides a ground to terminal B12 on the MCF. When the MCF detects this ground, and if the pilot shutoff lever is at the rearward (LOCK) position and the air conditioning is OFF, the MCF sends a signal to the ECM (through the CAN data link) to reduce engine speed—assuming the engine speed is more than slow idle. This takes approximately 20 seconds.

The MCF also reduces the cooling fan speed by increasing current to fan pump control solenoid (Y14). When the engine speed and fan speed have decreased to an acceptable level, the MCF will send current out terminals A29 and A32 to energize reversing fan solenoid (Y8) (and Y9; 850DLC only). With the reversing fan solenoid energized, oil is rerouted through the fan motor causing it to run in reverse. The MCF then increases the fan speed to maximum (in reverse) to blow dust and debris from the radiator/oil cooler/intercooler.

After approximately 60 seconds of running the fan at maximum speed, the MCF decreases the fan speed and de-energizes the reversing fan solenoid (Y8) (and Y9; 850DLC only). The MCF then resumes normal fan operation and engine speed as before.

Miscellaneous Controls—The miscellaneous controls involve the following functions:

- Work Mode Control
- Engine Oil Level Check Control
- Travel Alarm Control

Work Mode Control: The work modes are selected on the monitor controller and are communicated through the CAN data link to the MCF. The MCF can adjust pump flow rate delivery and engine speed depending on the work mode or attachment selected. Pump flow and engine speeds can be adjusted with the monitor controller or by using Dr. ZX.

Engine Oil Level Check Control: This function checks fluid levels and displays the results on the monitor controller when circuit is enabled.

MCF inputs involved:

- Engine fluid level check switch (S21)
- Coolant level switch (B13)
- Engine oil level switch (B15)

MCF outputs involved: Level indicators on monitor controller (through CAN)

Pushing engine fluid level check switch (S21) to the ON position provides a ground to terminal C20 on the MCF. When the MCF detects this ground, the MCF will monitor signals from coolant level switch (B13) (terminal C21) and engine oil level switch (B15) (terminal C9).

When the contacts of a level switch are open, the MCF sends a signal to the monitor controller (through the CAN data link), causing the corresponding level indicator to display green.

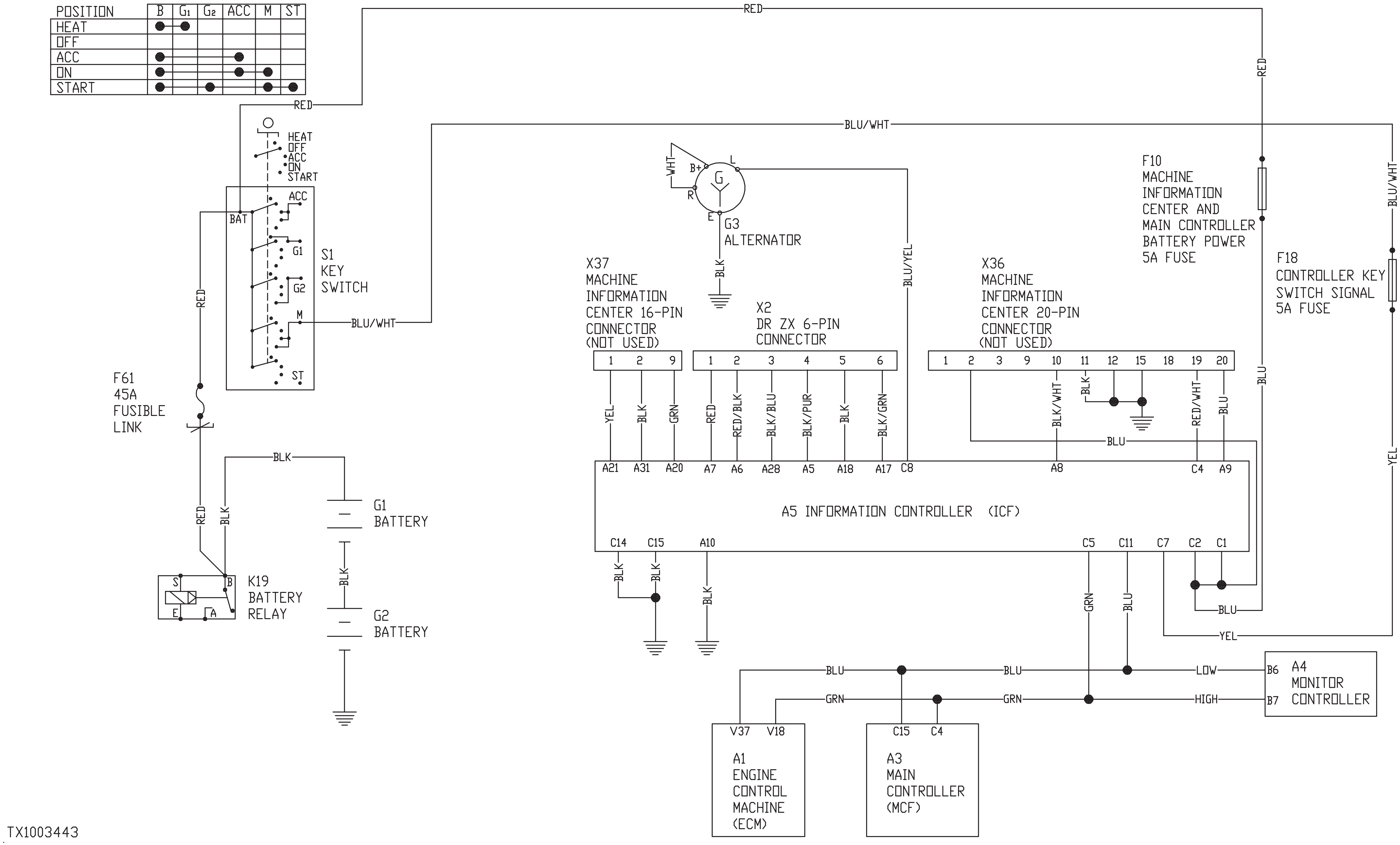
When the contacts of a level switch are closed, the MCF sends a signal to the monitor controller (through the CAN data link), causing the corresponding level indicator to display red.

Travel Alarm Control: When in travel operation, the main controller activates travel alarm (H4). For additional information, see Travel Alarm Circuit Theory of Operation. (Group 9015-15.)

CS33148,00008EB –19–28APR06–15/15

Information Controller (ICF) Theory of Operation

TX1003443 –19–22FEB06



Information Controller (ICF) Circuit

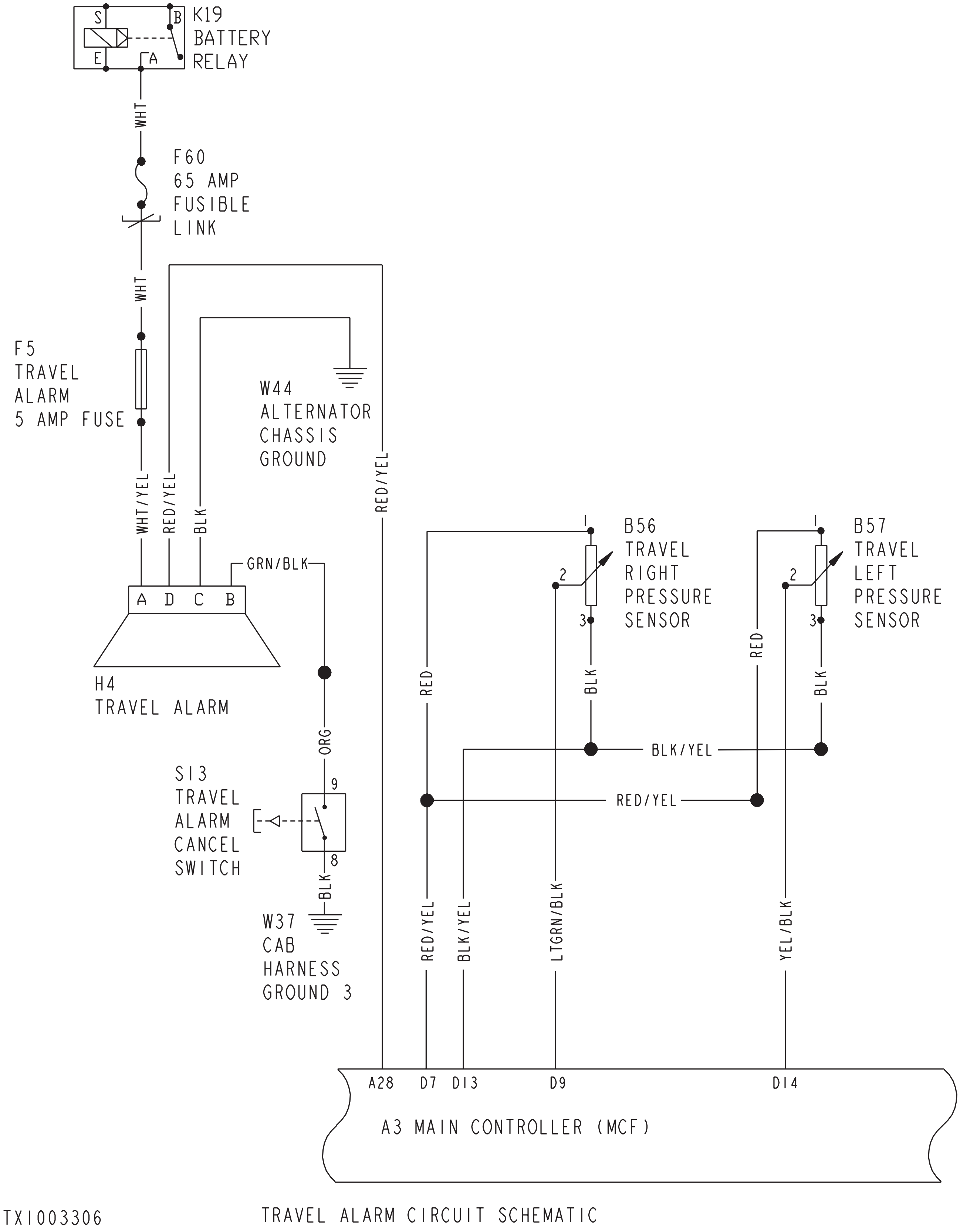
LD30992,0000213 –19–07FEB06–1/2

The information controller (ICF) stores information on machine activity. The information is obtained from various sensors and switches on the machine. The information is transferred to ICF through control area network (CAN) communication. See Control Area Network (CAN) Theory of Operation. (Group 9015-15.)

The ICF records data related to machine use, operating hours, alarm lists, and failure lists. See Information Controller (ICF) Recorded Data. (Group 9015-20.) The information can be retrieved through Dr. ZX and downloaded onto a computer. See Machine Information Center (MIC) Application. (Group 9015-20.)

LD30992,0000213 –19–07FEB06–2/2

Travel Alarm Circuit Theory of Operation



TRAVEL ALARM CIRCUIT SCHEMATIC

TX1003306 –19–20APR06

Continued on next page

LD30992,0000214 –19–19APR06–1/2

The travel alarm circuit is designed to warn bystanders of machine movement by signaling with an audible alarm any time the travel levers are moved. The travel alarm circuit consists of the following components:

- Travel right pressure sensor (B56)
- Travel left pressure sensor (B57)
- Travel alarm (H4)
- Main controller (MCF) (A3)
- Travel alarm cancel switch (S13)

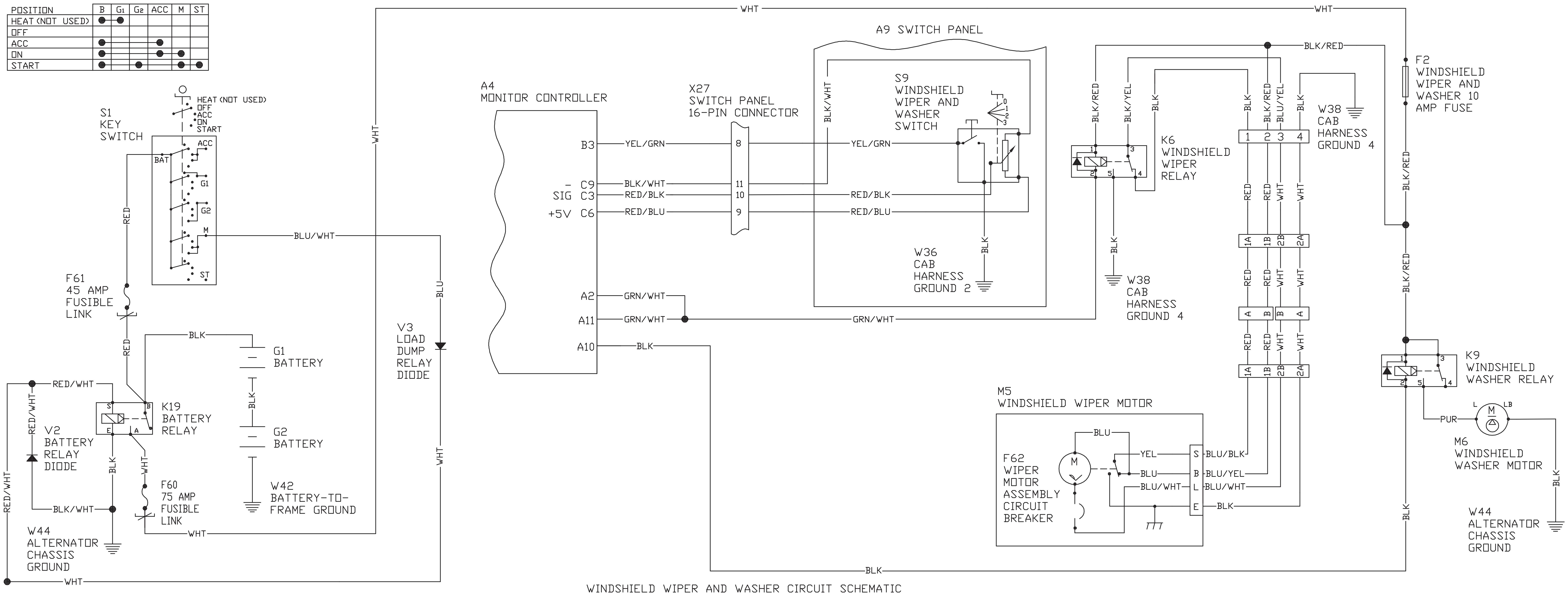
When the travel levers are moved, travel right and left pressure sensors (B56 and B57) sense pilot pressure and send signals to the MCF. The MCF then sends a signal to the travel alarm (H4), activating the alarm.

Pushing travel alarm cancel switch (S13) applies ground to pin 4 of the travel alarm. The travel alarm cancel switch must be pushed and released in order to cancel the alarm. The travel alarm will be active for a minimum of 13 seconds before the travel alarm cancel switch can deactivate it. The travel alarm is reset when the travel levers are returned to the neutral position. The travel alarm cancel switch must be pushed and released again to cancel the alarm.

LD30992,0000214 –19–19APR06–2/2

Windshield Wiper and Washer Circuit Theory of Operation

TX1003297 –19–27APR06



POSITION	B	G1	G2	ACC	M	ST
HEAT (NOT USED)	●	●				
OFF						
ACC	●			●		
ON	●			●	●	
START	●		●		●	●

WINDSHIELD WIPER AND WASHER CIRCUIT SCHEMATIC

TX1003297

LD30992,0000215 –19–27APR06–1/3

The windshield wiper and washer circuit has four modes of operation:

- Windshield wiper ON (continuous)
- Windshield wiper INT (intermittent)
- Windshield wiper OFF (park)
- Windshield wash

Operation of the windshield wiper and washer circuit is controlled by signals from monitor controller (A4) and the position of the wiper motor internal status switch.

The operation of the wiper motor internal status switch is as follows:

- Wiper at PARK position: Internal status switch connects wiper motor terminal S to wiper motor terminal B.
- Wiper NOT at PARK position: Internal status switch connects wiper motor terminal S to ground.

When key switch (S1) is turned to the ON position, power from windshield wiper and washer 10 amp fuse (F2) becomes available at the following components:

- Windshield wiper motor (M5) (terminal B)
- Windshield wiper relay (K6) (terminal 1)
- Windshield washer relay (K9) (terminals 1 and 3)

When windshield wiper and washer switch (S9) is in the OFF position, no voltage is present at terminal C3 of the monitor controller. When the monitor controller detects no voltage at terminal C3, the monitor will not connect terminals A2 and A11 to ground, and thus windshield wiper relay (K6) stays de-energized. With the windshield wiper relay de-energized and the wiper assembly at the PARK position, power is routed from the wiper motor terminal B, through the internal status switch, out terminal S of the windshield wiper motor (M5), across the normally closed contacts (terminals 3 and 4) of the windshield wiper relay, then back to the wiper motor at terminal L. This puts both sides of the wiper motor at the same voltage potential, ensuring the wiper motor does not operate until when needed.

The monitor controller (A4) provides a 5-volt reference voltage and a signal ground out terminals C6 and C9, respectively, to windshield wiper and washer switch (S9). When the windshield wiper and washer switch is turned to INT or ON position, the switch sends a voltage to terminal C3 of the monitor controller. The position of the switch dictates the strength of the voltage. The monitor controller measures the voltage, then provides the appropriate ground (intermittent or continuous) at terminals A2 and A11.

Windshield Wiper Continuous Operation—When windshield wiper and washer switch (S9) is turned to the ON position, the switch sends approximately 4.85 volts to terminal C3 of the monitor controller. When the monitor controller receives this level of voltage at terminal C3, it will connect terminals A2 and A11 to ground, and thus provide a ground for the coil of windshield wiper relay (K6). In this mode of operation, the monitor controller provides a continuous ground, thus causing the relay to stay energized.

With the windshield wiper relay energized, the ground at terminal 3 of the relay is connected to terminal L of the wiper motor, activating the wiper motor, causing the wiper blade to move back and forth continuously across the windshield.

Windshield Wiper Intermittent Operation—When the windshield wiper and washer switch is turned to one of the three INT (intermittent) positions (slow/middle/fast), the switch will send a specific voltage between approximately 1.5 and 3.5 volts to terminal C3 of the monitor controller. When the monitor controller receives the specified voltage, it will connect terminals A2 and A11 to ground for approximately one second. This gives the wiper motor enough time to move off the PARK position, whereas, the internal status switch takes over providing the ground for the wiper motor. The wiper motor completes one full cycle and returns to the PARK position. The wiper motor stays at the PARK position until the windshield wiper relay receives the next ground pulse from the monitor controller.

In this mode of operation, the monitor controller sets the amount of time delay by the amount of voltage detected at terminal C3, The time delay versus voltage at terminal C3 is as follows:

Continued on next page

- Slow = 8 second delay (1.5 volts)
- Middle = 6 second delay (2.5 volts)
- Fast = 3 second delay (3.5 volts)

Windshield Wiper Park Operation—When windshield wiper and washer switch (S9) is turned to the OFF position, the windshield wiper relay de-energizes, but the wiper motor continues to run because the internal status switch provides a ground to the wiper motor through terminals S and L and the normally closed contacts of the now de-energized wiper relay. When the wiper reaches the PARK position (far left side of the windshield), a cam in the wiper motor mechanism opens the internal status switch, which disconnects the wiper motor from ground and causes the wiper motor to stop.

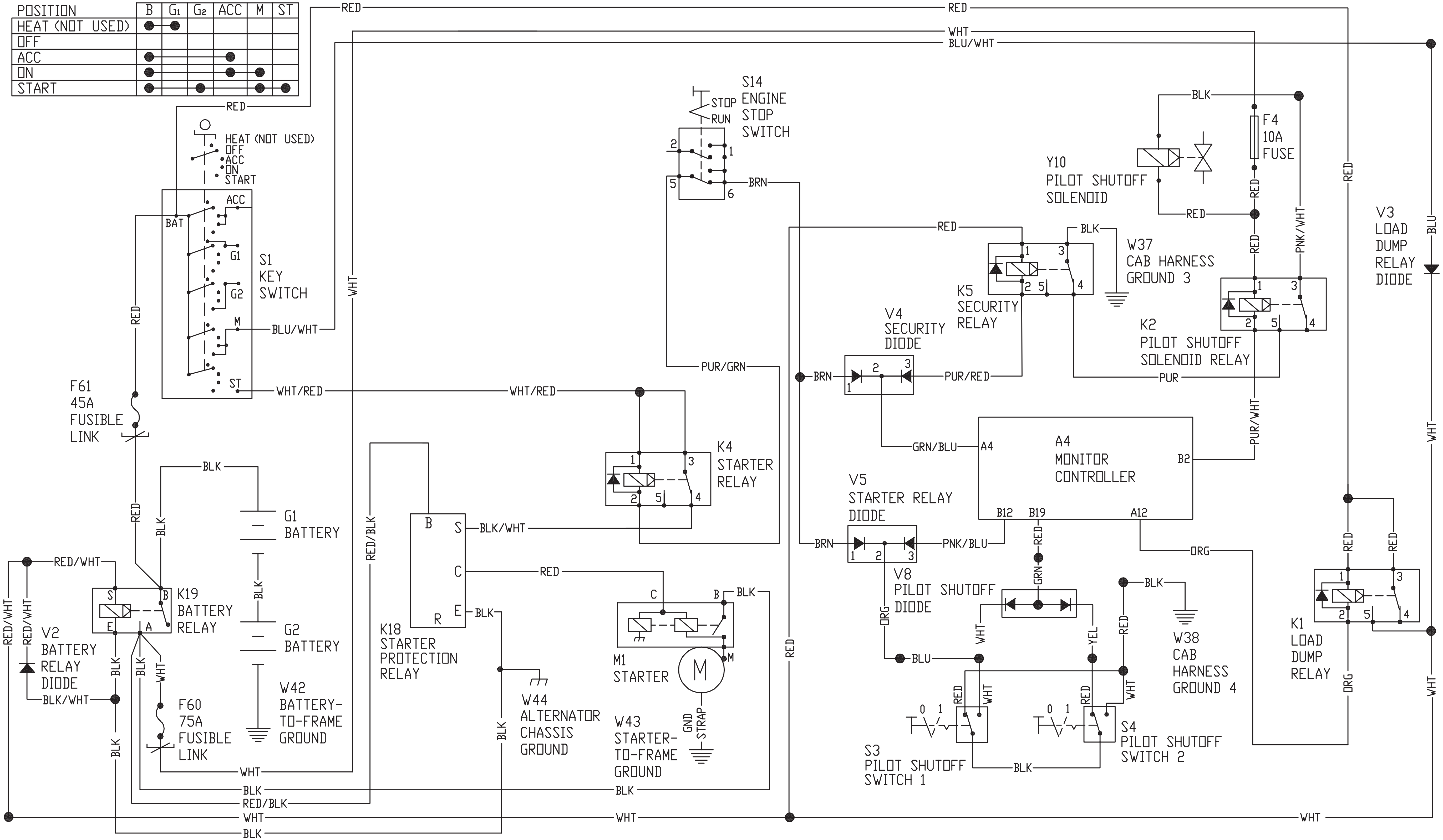
At the same time, the internal status switch connects wiper motor terminals S and L, which allows power to be routed to both sides of the wiper motor to ensure the wiper motor does not operate until when needed again.

Windshield Washer Operation—Pushing the momentary windshield wiper and washer switch (S9) sends a ground signal to terminal B3 of the monitor controller. When the monitor controller detects this signal at terminal B3, the monitor controller connects terminal A10 to ground, which energizes windshield washer relay (K9). With the windshield washer relay energized, current flows from windshield wiper and washer 10 amp fuse (F2), across the relay contacts (terminals 3 and 5) to windshield washer motor (M6), activating the motor.

LD30992,0000215 –19–27APR06–3/3

Pilot Shutoff Circuit Theory of Operation

TX1003767 –19–27APR06



POSITION	B	G1	G2	ACC	M	ST
HEAT (NOT USED)	●	●				
OFF						
ACC	●			●		
ON	●			●	●	
START	●		●		●	●

TX1003767

The pilot shutoff circuit enables or disables (unlocks or locks) the pilot oil, thus enabling or disabling the machine hydraulics. The pilot shutoff circuit consists of the following components:

- Pilot shutoff switches 1 and 2 (S3 and S4)
- Pilot shutoff diode (V8)
- Pilot shutoff solenoid (Y10
- Pilot shutoff solenoid relay (K2)
- Security relay (K5)
- Monitor controller (A4)
- Security diode (V4)
- Engine stop switch (S14)
- Starter relay (K4)
- Starter protection relay (K18)
- Starter relay diode (V5)

When the key switch is turned to the ON or START position, power is available to the following components:

- Coil of pilot shutoff solenoid relay (K2) [from battery relay (K19)]
- Pilot shutoff solenoid (Y10) [from battery relay (K19)]
- Coil of security relay (K5) (from key switch terminal M)

Pilot Shutoff Disabled (Locked)—For the pilot shutoff to be disabled, the pilot shutoff lever must be in the rearward (LOCK) position. When the pilot shutoff lever is at this position, the cam levers of both pilot shutoff switches (S3 and S4) are in the down (released) position and continuity exists across the normally closed contacts connecting the red and black wires of the pilot shutoff switches.

When continuity exists across the normally closed contacts of the pilot shutoff switches, the following occur:

—Terminal B19 of monitor controller (A4) is connected to cab harness ground 4 (W38), through pilot shutoff diode (V8) (terminals 2 and 3) and the normally closed contacts of both pilot shutoff switches. When ground is present at terminal B19, the monitor controller knows that the pilot shutoff circuit is functioning properly. If ground is not present at terminal B19, the pilot control shutoff lever alarm indicator will appear on the monitor display, alerting the operator that the pilot shutoff circuit is malfunctioning. For information on monitor alarms, see Alarm Occurrence Screen. (Operator's Manual.)

NOTE: The monitor controller must detect a ground at terminal B19 at all times, regardless of position of pilot shutoff lever.

—No ground is present at terminal B12 of the monitor controller. Terminals B2 and B12 are connected inside the monitor controller, so with no ground available at terminal B12, no ground is available to the coil of pilot shutoff solenoid relay (K2). Relay is de-energized. With the pilot shutoff solenoid relay de-energized, no ground is available to pilot shutoff solenoid (Y10). Solenoid is de-energized; pilot hydraulics are disabled.

—No ground is present at terminal C31 of main controller (MCF) (A3). With no ground available at terminal C31, the MCF knows the pilot shutoff is disabled. This input is used by the optional fan reversing circuit. For more information, see Main Controller (MCF) Theory of Operation. (Group 9015-15.)

Pilot Shutoff Enabled (Unlocked)—For the pilot shutoff to be enabled, the pilot shutoff lever must be in the forward (UNLOCK) position. When the pilot shutoff lever is at this position, the cam levers of both pilot shutoff switches (S3 and S4) are pushed up and continuity exists across the normally open contacts (now closed), connecting the white and black wires of the pilot shutoff switches.

When continuity exists across the normally open contacts of the pilot shutoff switches, the following occur:

Continued on next page

—Terminal B19 of monitor controller (A4) is connected to cab harness ground 4 (W38), through pilot shutoff diode (V8) (terminals 1 and 2) and the normally open contacts of both pilot shutoff switches. When ground is present at terminal B19, the monitor controller knows that the pilot shutoff circuit is functioning properly. If ground is not present at terminal B19, the pilot control shutoff lever alarm indicator will appear on the monitor display, alerting the operator that the pilot shutoff circuit is malfunctioning. For information on monitor alarms, see Alarm Occurrence Screen. (Operator's Manual.)

NOTE: The monitor controller must detect a ground at terminal B19 at all times, regardless of position of pilot shutoff lever.

—Terminal B12 of monitor controller is connected to cab harness ground 4 (W38), through starter relay diode (V5) (terminals 2 and 3) and the normally open contacts of both pilot shutoff switches. Terminals B2 and B12 are connected inside the monitor controller, so when ground is present at terminal B12, ground is also available at the coil of pilot shutoff solenoid relay (K2), causing the relay to energize. With pilot shutoff solenoid relay energized, and as long as security relay (K5) is de-energized, the path to ground is complete to pilot shutoff solenoid (Y10). Solenoid is energized; pilot hydraulics are enabled.

—Terminal C31 of main controller (MCF) (A3) is connected to cab harness ground 4 (W38) through the normally open contacts of both pilot shutoff switches. With ground available at terminal C31, the MCF knows the pilot shutoff is enabled. This input is used by the optional fan reversing circuit. For more information, see Main Controller (MCF) Theory of Operation. (Group 9015-15.)

—Terminal 2 (coil) of starter relay (K4) is connected to cab harness ground 4 (W38), through engine stop switch (S14) (terminals 5 and 6), starter relay diode (V5) (terminals 1 and 2), and the normally open contacts of both pilot shutoff switches. When the key switch is turned to the START position and ground is present at the coil of the starter relay, the starter relay energizes and prevents the start circuit from operating. For more information, see Starting and Charging Circuit Theory of Operation. (Group 9015-15.)

Monitor Security—When a warning alarm occurs caused by a diagnostic trouble code (DTC) or when the monitor security is active, terminal A4 of the monitor controller provides a path to ground for the coil of starter relay (K4), through security diode (V4) (terminals 1 and 2) and engine stop switch (S14) (terminals 5 and 6). A path to ground is also provided to the coil of security relay (K5), through security diode (V4) (terminals 2 and 3).

When ground is available to the coil of the starter relay, the starter relay energizes when the key switch is turned to the START position. The energized relay prevents the start circuit from operating when the monitor security system is active. For more information, see Starting and Charging Circuit Theory of Operation. (Group 9015-15.)

NOTE: For information on activation of monitor security, see Incorrect Password Entered. (Operator's Manual.)

When ground is available to the coil of the security relay, the security relay energizes, interrupting the ground path to the pilot shutoff solenoid. This causes the pilot shutoff solenoid to de-energize and prevents the pilot hydraulics from being enabled (unlocked) even if the pilot shutoff lever is in the forward (unlocked) position.

NOTE: The monitor controller provides a ground at terminal A4 for two seconds after the key switch is turned to the ON position. The temporary ground at terminal A4 prevents cranking of the engine until the monitor controller has time to fully power up.

LD30992,0000216 –19–27APR06–3/3

Monitor Operation

Monitor Menu Operation

For monitor operation, see Operation—Monitor Operation (Operator's Manual).

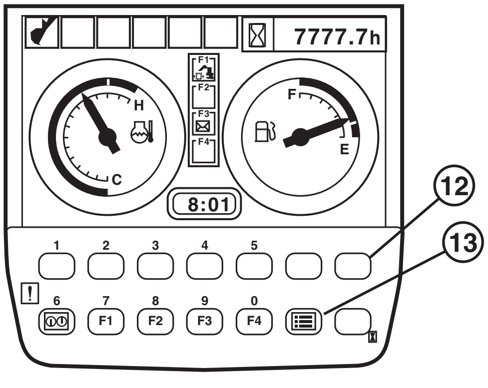
LD30992,0000248 –19–31JAN06–1/1

Monitor Service Menu Operation

Accessing the Service Menu

1. Press and hold the back button (12) and turn key switch to the ON position. This step adds the service menu option to the main menu.

12—Back Button
13—Menu Button



TX1002673 –UN–06SEP06

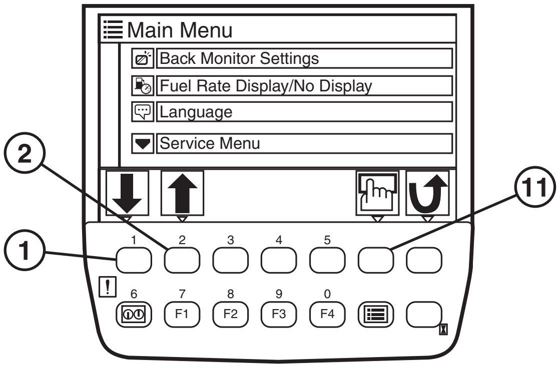
Default Screen

LD30992,0000249 –19–31JAN06–1/7

2. After the default screen displays, press the menu button (13) to display the main menu.

3. Select Service Menu from the main menu using buttons (1) and (2), then push the select button (11) to display the service menu.

1—Button 1
2—Button 2
11—Select Button



TX1002675 –19–18JAN06

Main Menu

Continued on next page

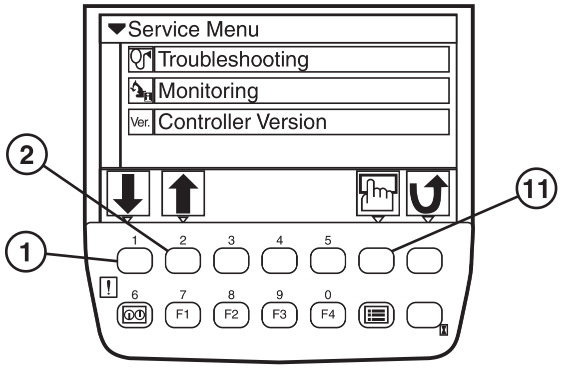
LD30992,0000249 –19–31JAN06–2/7

Service Menu

There are three options available from the service menu:

- Troubleshooting
- Monitoring
- Controller Version

Use buttons (1) and (2) to select an option from the service menu, then push the select button (11) to display the appropriate screen.



TX1002677 –19–18JAN06

Service Menu

1—Button 1
2—Button 2
11—Select Button

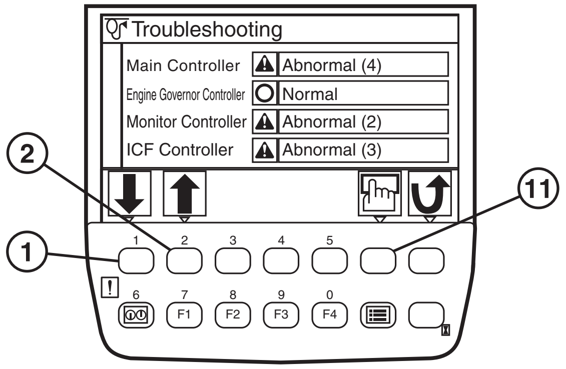
LD30992,0000249 –19–31JAN06–3/7

Troubleshooting Screen

The troubleshooting screen displays the current code status for the four main machine controllers:

- Main Controller (MCF)
- Engine Governor Controller (also known as Engine Control Module [ECM])
- Monitor Controller
- Information Controller (ICF)

See Reading Diagnostic Trouble Codes with Monitor Display. (Group 9015-20.)



TX1002678 –19–18JAN06

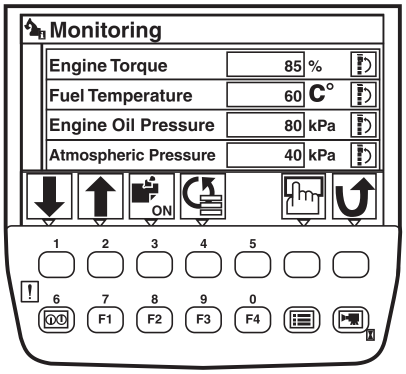
Troubleshooting Screen

1—Button 1
2—Button 2
11—Select Button

Continued on next page

LD30992,0000249 –19–31JAN06–4/7

Monitoring Screen



TX1002581 –19–14JAN06

Monitoring Screen

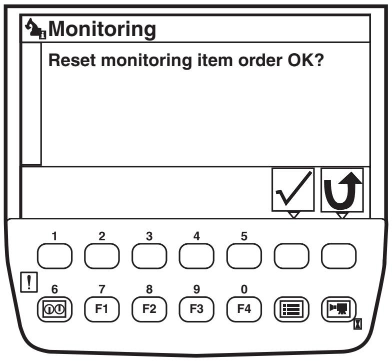
The Monitoring screen displays machine information received from each controller.See Monitor Data Items. (Group 9015-20.)

- Press button (3) to freeze current machine readings for viewing. Press button (3) again to return to live machine readings.
- Use buttons (1) and (2) to highlight an item, then press the select button (11) to bring the selected item to the top of the list. Only four items can be viewed on the screen at one time.
- Press button (4) to reset the list to the default order. The Monitoring reset screen displays.

1—Button 1
2—Button 2
3—Button 3
4—Button 4
11—Select Button

LD30992,0000249 –19–31JAN06–5/7

Press the select button (11) to reset the list to the default order.



TX1002583 –19–14JAN06

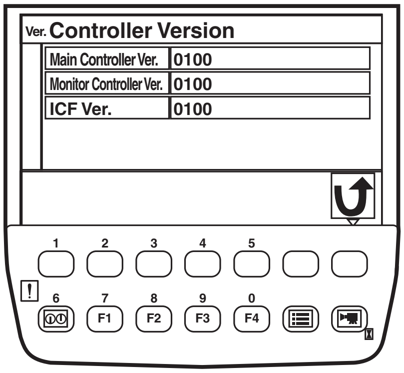
Monitoring Reset Screen

Continued on next page

LD30992,0000249 –19–31JAN06–6/7

Controller Version Screen

The Controller Version screen displays the current software version for each machine controller. The screen does not list the current ECM version.



Ver. Controller Version

Main Controller Ver.	0100
Monitor Controller Ver.	0100
ICF Ver.	0100

TX1002587 –19–13JAN06

Controller Version Screen

LD30992,0000249 –19–31JAN06–7/7

References

Monitor Data Items

The monitor data items list can be rearranged. See Monitor Service Menu Operation. (Group 9015-16.)

Continued on next page

Items	Units	Comment
Engine Torque	%	N/A
Coolant Temperature (E)	°C	Reading from Engine Coolant Temperature Sensor (B4)
Fuel Temperature	°C	Reading from Fuel Temperature Sensor (B5)
Engine Oil Pressure	kPa	Reading from Engine Oil Pressure Sensor (B11)
Atmospheric Pressure	kPa	Reading from Barometric Pressure Sensor (B3)
Intake Air Pressure	°C	Reading from Intake Air Temperature Sensor (B7)
Boost Pressure	kPa	Reading from Boost Pressure Sensor (B14)
Boost Temperature	°C	Reading from Boost Temperature Sensor (B10)
Coolant Temperature (M)	°C	N/A
Target Engine Speed	min^1	Reading from Main Controller (MCF) (A3)
Actual Engine Speed	min^1	Reading from Engine Control Module (ECM) (A1)
Pump 1 Delivery Pressure	MPa	Reading from Pump 1 Delivery Pressure Sensor (B35)
Pump 1 Pump Control Pressure	MPa	Reading from Pump 1 Control Pressure Sensor (B36)
Pump 1 Target Flow Rate	L/min	Calculated from MCF
Pump 2 Delivery Pressure	MPa	Reading from Pump 2 Delivery Pressure Sensor (B37)
Pump 2 Pump Control Pressure	MPa	Reading from Pump 2 Control Pressure Sensor (B38)
Pump 2 Target Flow Rate	L/min	Calculated from MCF
Front Pilot Pressure	MPa	Maximum pressure when operating boom, arm, bucket, swing, counterweight, auxiliary 1 and/or auxiliary 2 functions
Boom Raise Control Pilot Pressure	MPa	Reading from Boom Up Pressure Sensor (B52)
Arm Roll-In Pilot Pressure	MPa	Reading from Arm In Pressure Sensor (B51)
Swing Control Pilot Pressure	MPa	Reading from Swing Pressure Sensor (B33)
Right Travel Control Pilot Pressure	MPa	Reading from Travel Right Pressure Sensor (B56)
Left Travel Control Pilot Pressure	MPa	Reading from Travel Left Pressure Sensor (B57)
Attachment Control Pilot Pressure	MPa	Reading from Attachment Pressure Sensor (B45)
EC Dial Angle	V	Reading from Engine Speed Dial (R15)
Hydraulic Oil Temperature	°C	Reading From Hydraulic Oil Temperature Sensor (B40)
Pump Torque Proportional Valve	MPa	
Digging Regeneration Valve	MPa	Reading for Pump 1 (4-Spool) Regulator Pressure
Arm Regeneration Valve	MPa	Reading for Pump 2 (5-Spool) Regulator Pressure
Travel Mode Control Pressure	MPa	MCF calculated for Travel Speed Solenoid (SI) (Y25)
Power Digging Control Pressure	MPa	MCF calculated for Power Dig Solenoid (SG) (Y24)
Power Mode	-	Reading from Power Mode Switch (S12)
Travel Mode Switch	-	Reading from Travel Speed Switch (S11)
Power Digging Switch	-	Reading from Power Dig Switch (S7)
Radio Signal Strength	-	N/A

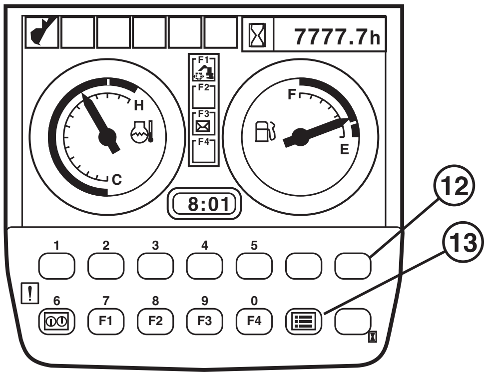
LD30992,0000217 –19–26APR06–2/2

Monitor Data Items Using the Monitor Display

1. Press and hold the back button (12) and turn key switch to the ON position. This step adds the service menu option to the main menu.

2. After the default screen displays, push the menu button (13) to display the main menu.

12—Back Button
13—Menu Button



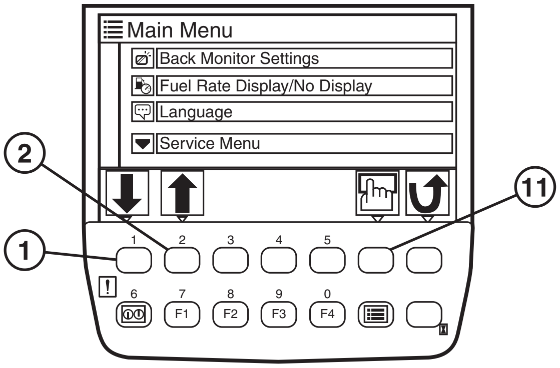
TX1002673 –UN–06SEP06

Default Screen

LD30992,0000218 –19–16MAR06–1/5

3. Select Service Menu from the main menu using buttons (1) and (2), then push the select button (11) to display the service menu.

1—Button 1
2—Button 2
11—Select Button



TX1002675 –19–18JAN06

Main Menu

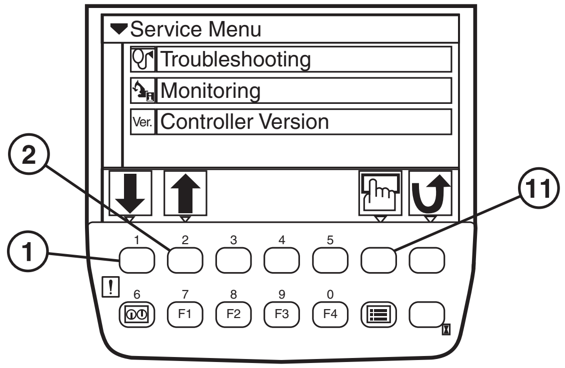
Continued on next page

LD30992,0000218 –19–16MAR06–2/5

4. Select Troubleshooting from the service menu using buttons (1) and (2), then push the select button (11) to display the Troubleshooting screen.

5. The Troubleshooting screen displays the current code status for the four main machine controllers:

   - Main Controller (MCF)
   - Engine Governor Controller (also known as engine control unit [ECU])
   - Monitor Controller
   - Information Controller (ICF)



TX1002677 –19–18JAN06

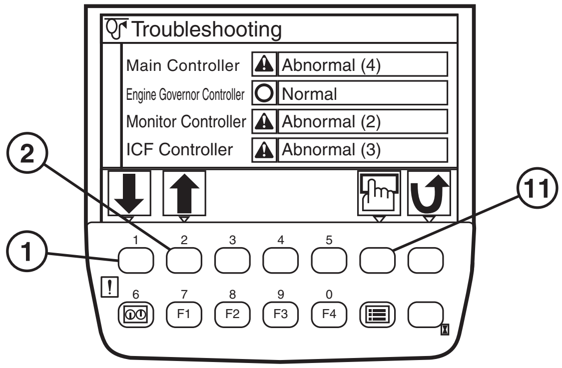
Service Menu

1—Button 1
2—Button 2
11—Select Button

LD30992,0000218 –19–16MAR06–3/5

6. Any controllers listed as abnormal have diagnostic trouble codes associated with them. Select the appropriate controller name using buttons (1) and (2), then push the select button (11) to display the Main Fault Code screen.

   1—Button 1
   2—Button 2
   11—Select Button



Main Controller	⚠	Abnormal (4)
Engine Governor Controller	○	Normal
Monitor Controller	⚠	Abnormal (2)
ICF Controller	⚠	Abnormal (3)

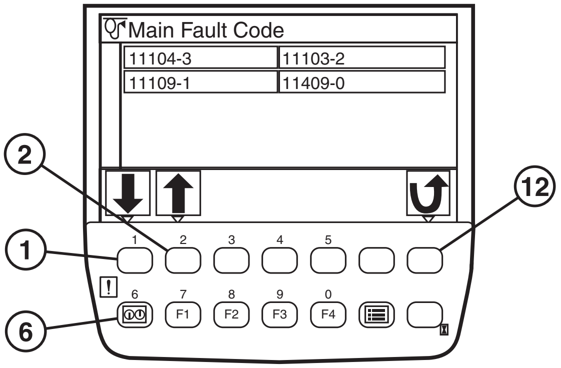
TX1002678 –19–18JAN06

Troubleshooting Screen

Continued on next page

LD30992,0000218 –19–16MAR06–4/5

NOTE: The monitor can display up to 20 diagnostic trouble codes for each controller. The Main Fault Code screen can display 10 diagnostic trouble codes at one time. If the Main Fault Code screen displays 10 codes, use the buttons (1) and (2) to view any additional codes on the next screen.



TX1002679 –19–20JAN06

Main Fault Code Screen

1—Button 1
2—Button 2
6—Return to Default Screen Button
12—Back Button

7. View the diagnostic trouble codes for the selected controller.

   See Main Controller (MCF) Diagnostic Trouble Codes. (Group 9001-10.)

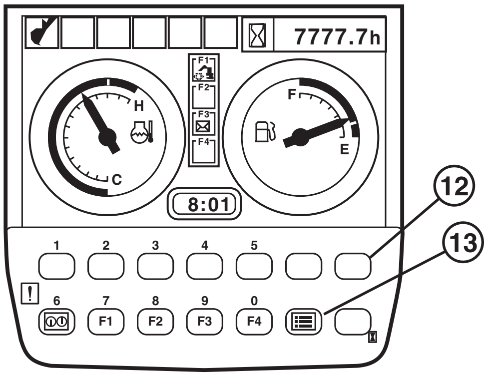
   See Engine Control Unit (ECU) Diagnostic Trouble Codes. (Group 9001-20.)

   See Information Controller (ICF) Diagnostic Trouble Codes. (Group 9001-30.) This section includes diagnostic trouble codes displayed for both the Monitor Controller and the Information Controller (ICF).

8. Press the back button (12) to return to the Troubleshooting screen and select another controller, or push the Return to Default Screen button (6) to display the default screen.

LD30992,0000218 –19–16MAR06–5/5

Reading Diagnostic Trouble Codes With Monitor Display



TX1002673 –UN–06SEP06

Default Screen

1. Press and hold the back button (12) and turn key switch to the ON position. This step adds the service menu option to the main menu.

2. After the default screen displays, push the menu button (13) to display the main menu.

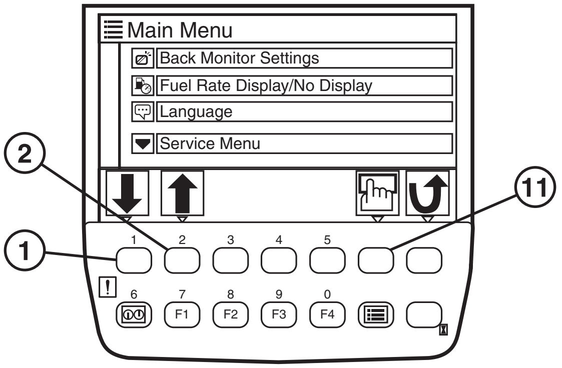
12—Back Button
13—Menu Button

Continued on next page

LD30992,0000219 –19–16MAR06–1/5

3. Select Service Menu from the main menu using buttons (1) and (2), then push the select button (11) to display the service menu.

1—Button 1
2—Button 2
11—Select Button



TX1002675 –19–18JAN06

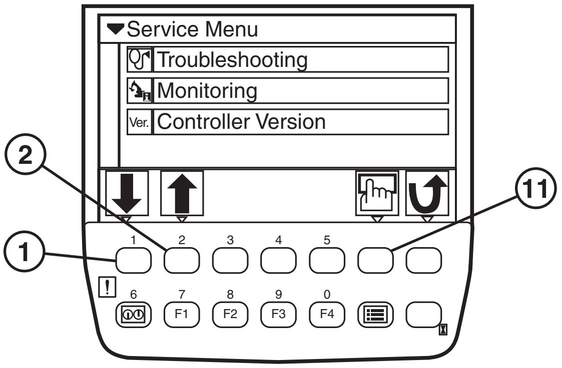
Main Menu

LD30992,0000219 –19–16MAR06–2/5

4. Select Troubleshooting from the service menu using buttons (1) and (2), then push the select button (11) to display the Troubleshooting screen.

5. The Troubleshooting screen displays the current code status for the four main machine controllers:

- Main Controller (MCF)
- Engine Governor Controller (also known as engine control unit [ECM])
- Monitor Controller
- Information Controller (ICF)



TX1002677 –19–18JAN06

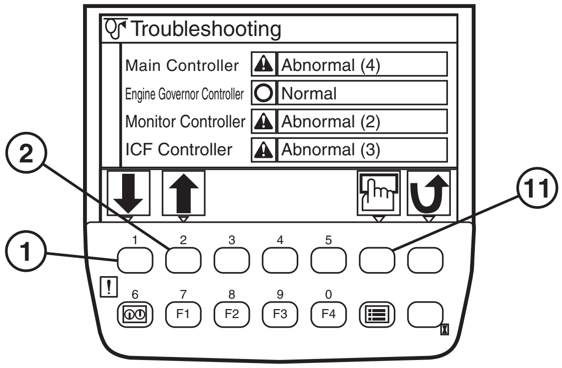
Service Menu

1—Button 1
2—Button 2
11—Select Button

Continued on next page

LD30992,0000219 –19–16MAR06–3/5

6. Any controllers listed as abnormal have diagnostic trouble codes associated with them. Select the appropriate controller name using buttons (1) and (2), then push the select button (11) to display the Main Fault Code screen.


Troubleshooting

Main Controller	⚠	Abnormal (4)
Engine Governor Controller	○	Normal
Monitor Controller	⚠	Abnormal (2)
ICF Controller	⚠	Abnormal (3)

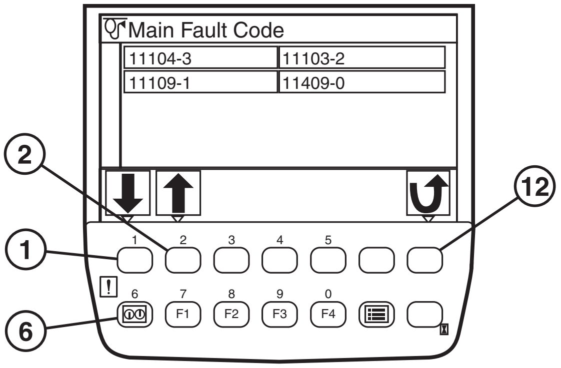
TX1002678 –19–18JAN06

Troubleshooting Screen

1—Button 1
2—Button 2
11—Select Button

LD30992,0000219 –19–16MAR06–4/5

NOTE: The monitor can display up to 20 diagnostic trouble codes for each controller. The Main Fault Code screen can display 10 diagnostic trouble codes at one time. If the Main Fault Code screen displays 10 codes, use the buttons (1) and (2) to view any additional codes on the next screen.


Main Fault Code

11104-3	11103-2
11109-1	11409-0

TX1002679 –19–20JAN06

Main Fault Code Screen

1—Button 1
2—Button 2
6—Return to Default Screen Button
12—Back Button

7. View the diagnostic trouble codes for the selected controller.

   See Main Controller (MCF) Diagnostic Trouble Codes. (Group 9001-10.)

   See Engine Control Module (ECM) Diagnostic Trouble Codes. (Group 9001-20.)

   See Information Controller (ICF) Diagnostic Trouble Codes. (Group 9001-30.) This section includes diagnostic trouble codes displayed for both the Monitor Controller and the Information Controller (ICF).

8. Press the back button (12) to return to the Troubleshooting screen and select another controller, or push the Return to Default Screen button (6) to display the default screen.

LD30992,0000219 –19–16MAR06–5/5

JDLink™ Connection Procedure

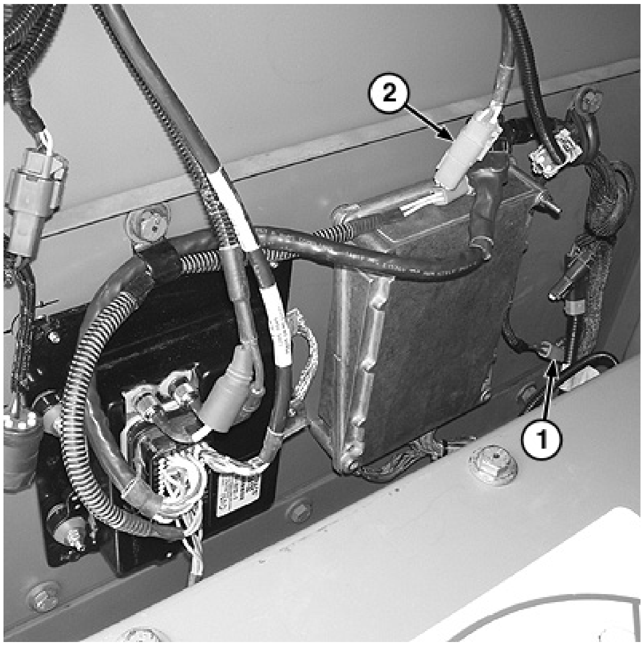
Connect to Machine Information Gateway (MIG) Controller

1. Locate JDLink™ MMS direct connector (1). For MIG controller location, see JDLink™ System Harnesses (W50, W51, W52, W53 and W54) Component Location. (Group 9015-15.)

NOTE: AT335476 JDLink™ MMS Direct Cable is included in the AT347680 JDLink™ MMS Direct Kit.

2. Connect one end of AT335476 JDLink™ MMS Direct Cable to the JDLink™ MMS direct connector (1), and connect the other end to an ethernet port on the computer.

   For more information on connecting to the MIG, see Connect PC Laptop to MIG Controller. (CTM10006.)



TX1027263A –UN–30JUL07

1—JDLink™ MMS Direct Connector
2—GT config Tool Adapter Connector

Connect to the GlobalTRACS® Terminal (GTT) Controller

1. Locate GT config tool adapter connector (3). For GTT controller location, see JDLink™ System Harnesses (W50, W51, W52, W53 and W54) Component Location. (Group 9015-15.)

NOTE: CV90-J1006 GlobalTRACS® Config Tool Cable is included in the 65-J1115-11 PC based JDLink™ Tool Kit.

2. Connect one end of CV90-J1006 GlobalTRACS® Config Tool Cable to the GT config tool adapter connector (2), and connect the other end to a COM port on the computer.

JDLink is a trademark of Deere & Company
GlobalTRACS is a registered trademark of Qualcomm Incorporated

Continued on next page

AA95137,0000C45 –19–31AUG07–1/2

NOTE: If the computer is not equipped with COM ports, a USB-to-serial adapter cable will be required to simulate a COM port for use with the GT Configuration Tool software.

For more information on connecting to the GTT, see Connect PC Laptop to GlobalTRACS® Terminal (GTT). (CTM10006.)

AA95137,0000C45 –19–31AUG07–2/2

Service ADVISOR™ Diagnostic Application

The Service ADVISOR application is what technicians use to diagnose and troubleshoot equipment. The application allows technicians to quickly and easily find information and solve equipment problems.

The Service ADVISOR application provides access to manuals, the Dealer Technical Assistance Center (DTAC), real-time diagnostics, and system readings. The application also allows technicians to perform calibrations, run tests, and program controllers, when possible.

The Connection - Readings shortcut bar within Service ADVISOR is used to connect to a machine. A connection allows a technician to take live system readings, create recordings, diagnose problems, calibrate, interactively test, and program controllers. With a connection established, the Readings menu allows a technician to add or remove a reading, set a readings baseline, and create and check recording triggers.

With Service ADVISOR connected to a machine, the Diagnostics shortcut bar can be used to read machine diagnostic trouble codes. The diagnostic codes can then be reviewed by code number for specific details. When a diagnostic trouble code is opened, code information displays in a window similar to the way a manual would. The details of a diagnostic trouble code often are in a procedural format with links so the technician can work to correct the problem with the equipment while following the step-by-step process in the diagnostic trouble code details.

See Service ADVISOR™ Connection Procedure. (Group 9015-20.)

See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application. (Group 9015-20.)

LD30992,000021A –19–31JAN06–1/1

Service ADVISOR™ Connection Procedure

1. Locate service laptop close to machine, or in the cab if diagnostics are to be performed while machine is being operated.

LD30992,000048F –19–21MAR06–1/2

2. Open left-side compartment behind cab and remove cap from diagnostic connector (1).

3. Connect service laptop to machine using appropriate cables (4 and 5). Methods for connection include:

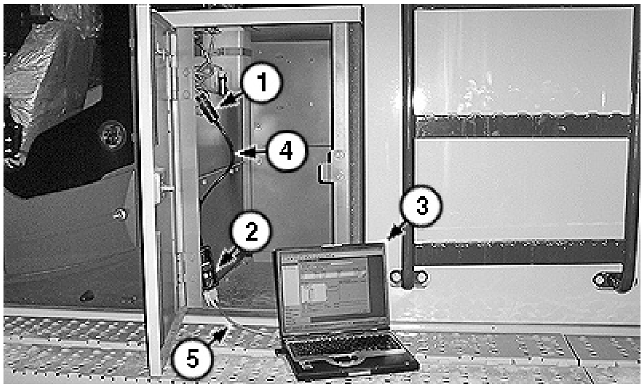
   - Electronic Data Link (EDL) Stand-Alone USB Device
   - EDL Using Bluetooth
   - Parallel Data Module (PDM)
   - PDM with USB Adaptor

4. Make sure power indicator light displays on EDL or PDM, depending on connection method. If power indicator light does not display, check fuse to diagnostic connector.

5. Turn machine key switch to ON position.

6. Refer to Service ADVISOR system instructions to log into service laptop and connect to machine.

   See Reading Diagnostic Trouble Codes with Service ADVISOR™ Diagnostic Application. (Group 9015-20.)



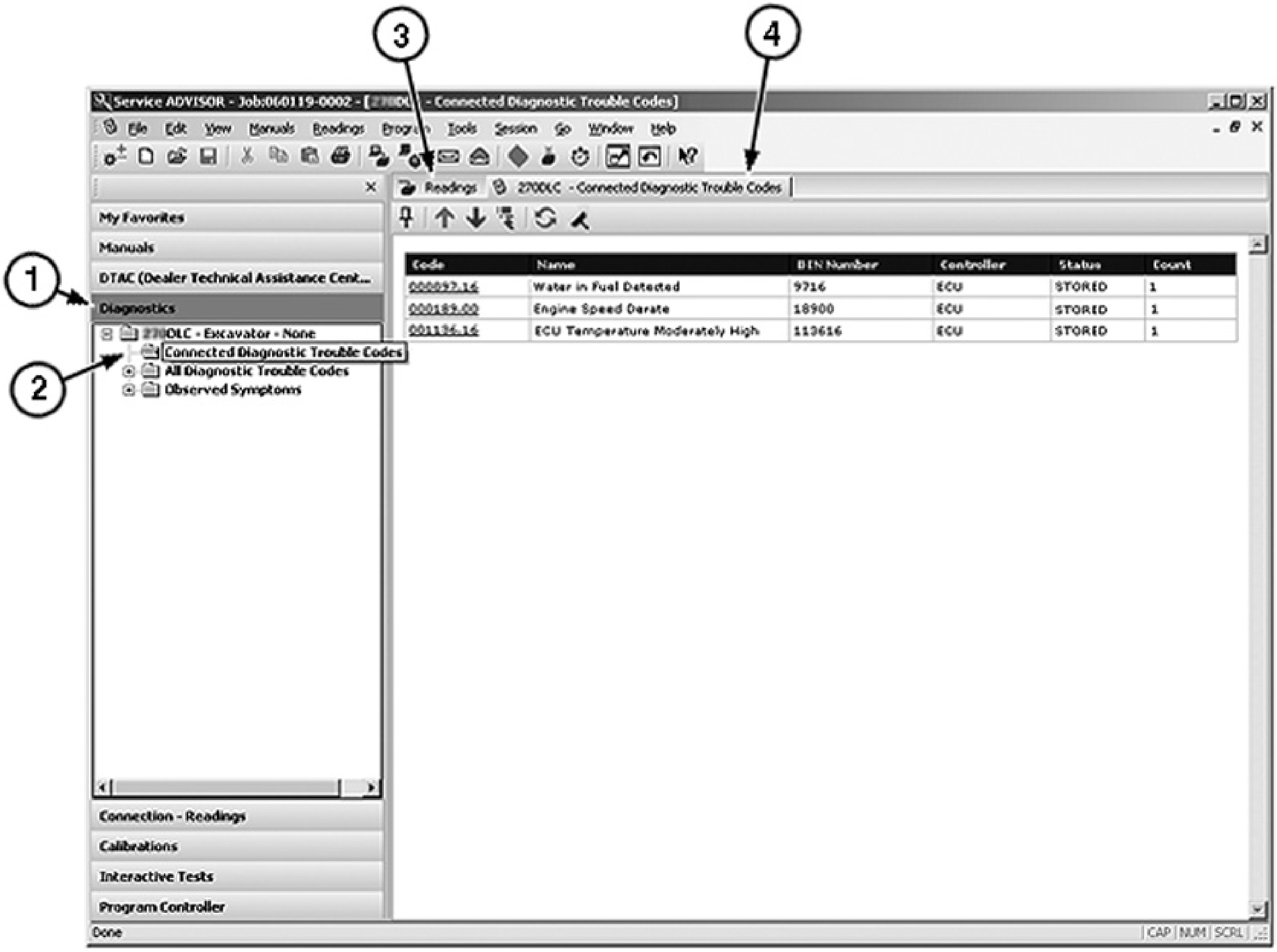
TX1005090A –UN–23MAR06

Service ADVISOR Machine Connection (PDM shown)

1—Diagnostic Connector
2—PDM
3—Service Laptop
4—PDM to Machine Cable
5—PDM to Service Laptop Cable

LD30992,000048F –19–21MAR06–2/2

Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application



Code	Name	BIN Number	Controller	Status	Count
000097.16	Water in Fuel Detected	9716	ECU	STORED	1
000189.00	Engine Speed Derate	18900	ECU	STORED	1
001136.16	ECU Temperature Moderately High	113616	ECU	STORED	1

TX1002938A —UN—26JAN06

Service ADVISOR—Diagnostic Trouble Codes

1—Diagnostics Shortcut Bar **2—Connected Diagnostic Trouble Codes Folder** **3—Readings Tab** **4—Connected Diagnostic Trouble Codes Tab**

1. Connect service laptop to machine. See Service ADVISOR™ Connection Procedure. (Group 9015-20.)

2. Open Service ADVISOR and display appropriate model information.

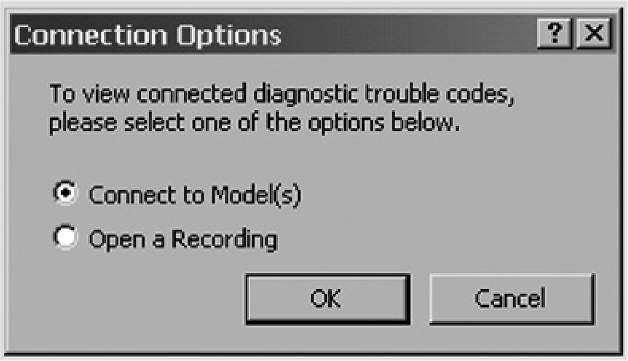
3. From the Shortcut bar, click Diagnostics to open the Diagnostics shortcut bar (1).

4. Click the Connected Diagnostic Trouble Codes folder (2).

Continued on next page

LD30992,000021C –19–16MAR06–1/3

5. Select the Connect to Model(s) radio button on the Connection Options dialog box, and click OK.



Connection Options

To view connected diagnostic trouble codes, please select one of the options below.

● Connect to Model(s)

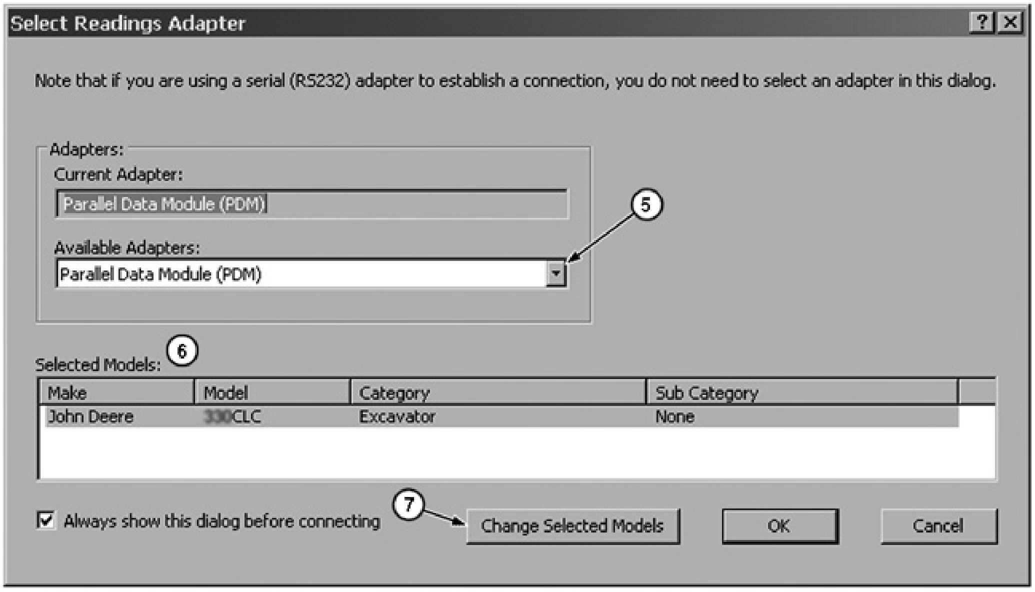
○ Open a Recording

TX1002997A –UN–26JAN06

Connection Options Dialog Box

Continued on next page

LD30992,000021C –19–16MAR06–2/3



Note that if you are using a serial (RS232) adapter to establish a connection, you do not need to select an adapter in this dialog.

Adapters:

Current Adapter: Parallel Data Module (PDM)

Available Adapters: Parallel Data Module (PDM)

Selected Models:

Make	Model	Category	Sub Category
John Deere	330CLC	Excavator	None

☑ Always show this dialog before connecting

TX1003001A –UN–26JAN06

Select Readings Adapter Dialog Box

5—Available Adaptors Drop-Down List
6—Selected Models List
7—Change Selected Models Button

6. On the Select Readings Adapter dialog box, make sure the appropriate adapter is displayed. If not, select correct adapter from drop-down list (5). Options include:

   - Electronic Data Link (EDL) Stand-alone USB Device
   - Electronic Data Link (EDL) Using Bluetooth
   - Parallel Data Module (PDM)
   - Parallel Data Module (PDM) With USB Adapter

7. Make sure correct machine to connect to displays in the Selected Models list (6). If not, click the Change Selected Models button (7).

8. Click OK to connect to machine.

9. After Service ADVISOR connects to machine, both the Readings tab (3) and Connected Diagnostic Trouble Codes tab (4) display.

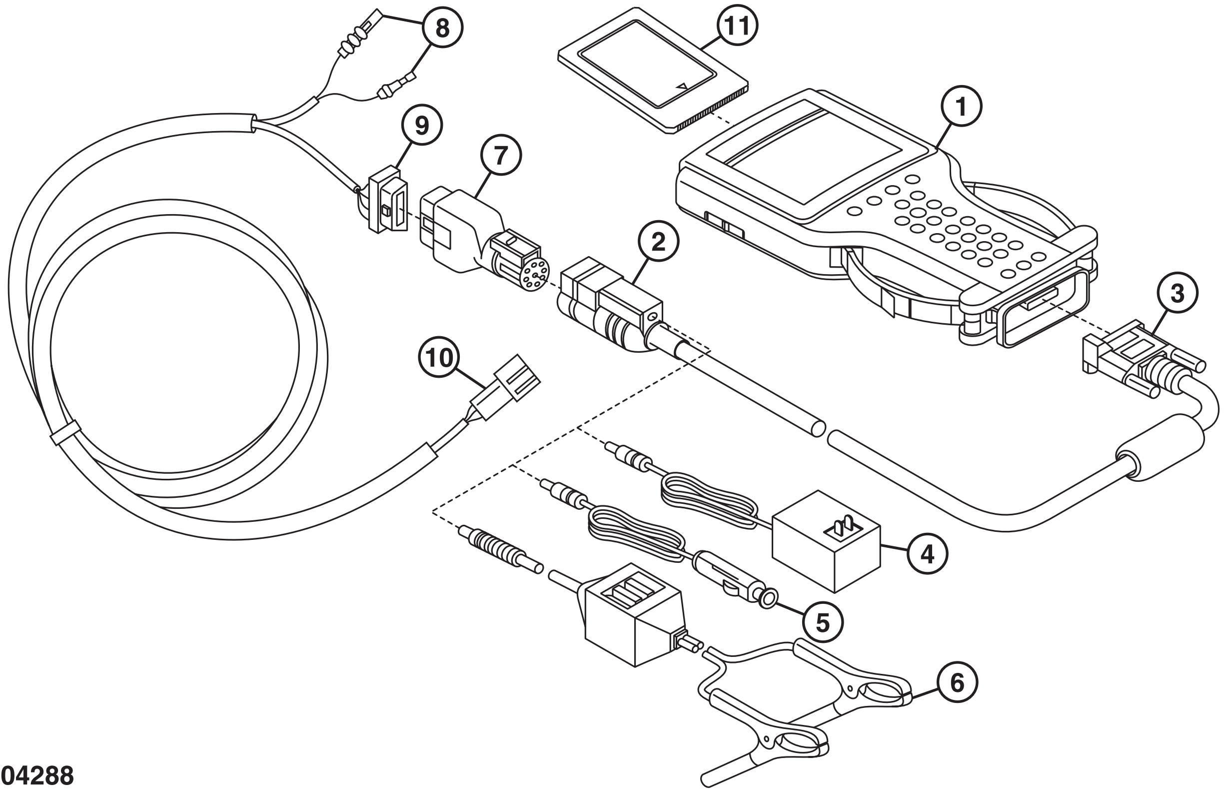
10. Double-click an underlined code on the Connected Diagnostic Trouble Codes tab to display a detailed description for servicing that diagnostic trouble code.

NOTE: Use the lock topic feature within Service ADVISOR to open multiple windows if machine is transmitting more than one diagnostic trouble code. Refer to Service ADVISOR system instructions for using this feature.

11. Click the Connected Diagnostic Trouble Codes tab (4) to select and view details for additional diagnostic trouble codes.

LD30992,000021C –19–16MAR06–3/3

Tech 2 Diagnostic Scan Tool Connection Procedure



Tech 2 Connection

1—Tech 2 Diagnostic Scan Tool
2—Power Jack Connection
3—Data Link Connector (DLC) Cable
4—AC Power Supply Cable
5—DC Power Supply Cable
6—Battery Power Supply Cable
7—SAE 16/19 Adapter (Female)
8—Diagnostic Trouble Code (DTC) Memory Clear Terminal
9—SAE 16/19 Connector (Male)
10—Tech 2 Engine Diagnostic Connector to Engine Diagnostic Connection (X6).
11—Personal Computer Memory Card Industry Association (PCMCIA)

1. Turn ignition key switch to the OFF position.

IMPORTANT: Power must be off on the Tech 2 when inserting or removing PCMCIA card. It will damage the PCMCIA card.

2. With the Tech 2 Diagnostic Scan Tool (1) powered down. Insert the PCMCIA (11) card with the latest version of Isuzu software into the Tech 2 (1).

3. Connect the SAE 16/19 adapter (female) (7) into DLC cable.

4. Connect the Data Link Connector (DLC) (3) to the Tech 2 (1).

5. Connect the SAE 16/19 (female) (7) adapter to SAE 16/19 connector (male) (9).

6. Connect engine diagnostic connector (10) to engine diagnostic connection (X6).

Continued on next page

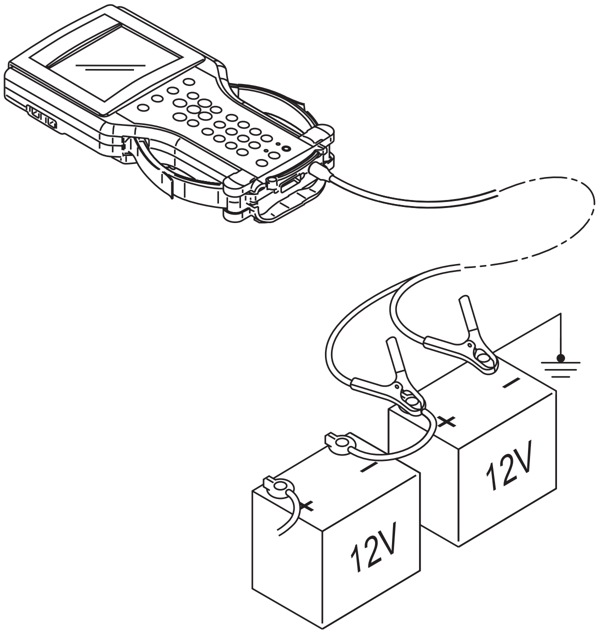
IMPORTANT: Do not plug power cable into 24-Volt power supply. This will damage the Tech 2 diagnostic scan tool.

7. Connect one of the following power supplies to Power Jack Connection (2).

   - AC Power Supply Cable
   - DC Power Supply Cable
   - Battery Power Supply Cable

8. Turn ignition key switch to the ON position.

9. Press the “PWR” button on the Tech 2 diagnostic scan tool (1) and check to make sure display screen comes on. Ok the Tech 2 is powered up.



TX1006048 –UN–10APR06

Battery Connection

10. Press **ENTER**.

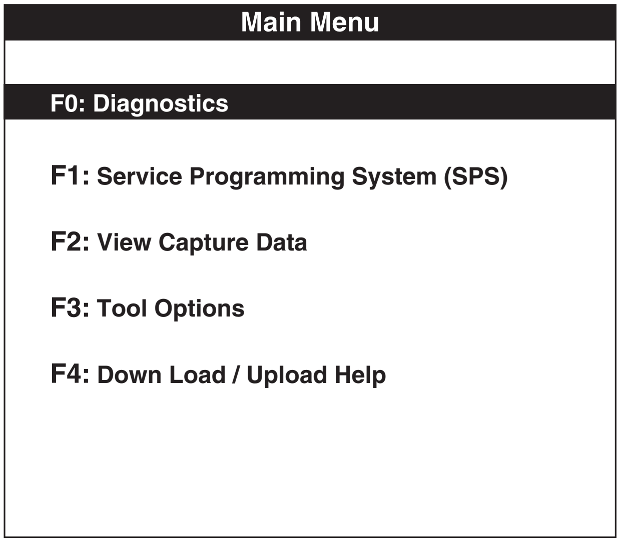
Press [ENTER] to continue
Software Version: 11.100
Isuzu 1996-2006

TX1004445 –19–10MAR06

Start Up Screen

Continued on next page

11. Using arrow keys scroll up or down and press ENTER to select **FO : Diagnostics** on the Main Menu screen.



Main Menu

F0: Diagnostics

F1: Service Programming System (SPS)

F2: View Capture Data

F3: Tool Options

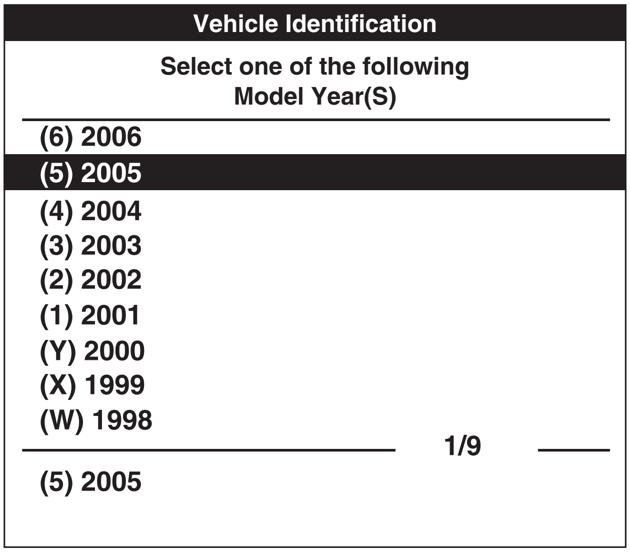
F4: Down Load / Upload Help

TX1004446 –19–09MAR06

Main Menu

JC89288,00001A1 –19–21APR06–4/13

12. Select the **Model Year** corresponding to the engine, on the Vehicle Identification screen.



Vehicle Identification

Select one of the following
Model Year(S)

(6) 2006
(5) 2005
(4) 2004
(3) 2003
(2) 2002
(1) 2001
(Y) 2000
(X) 1999
(W) 1998

1/9

(5) 2005

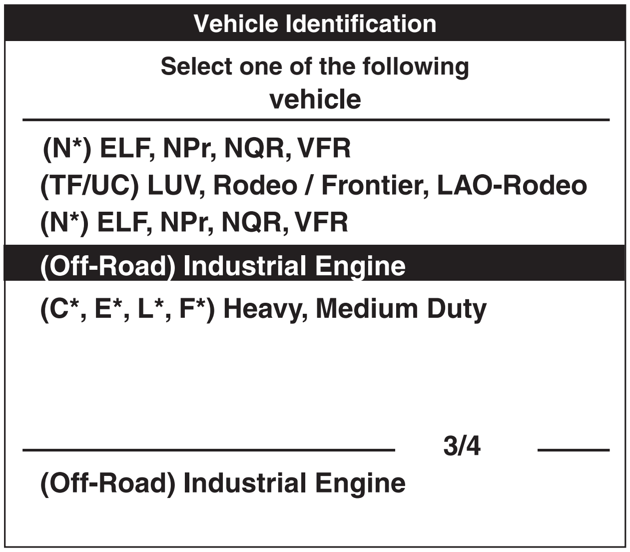
TX1004450 –19–09MAR06

Vehicle Identification (Model Year)

Continued on next page

JC89288,00001A1 –19–21APR06–5/13

13. Select the engine type **(Off-Road) Industrial Engine** on the Vehicle Identification screen.



Vehicle Identification

Select one of the following vehicle

(N*) ELF, NPr, NQR, VFR
(TF/UC) LUV, Rodeo / Frontier, LAO-Rodeo
(N*) ELF, NPr, NQR, VFR
(Off-Road) Industrial Engine
(C*, E*, L*, F*) Heavy, Medium Duty

3/4

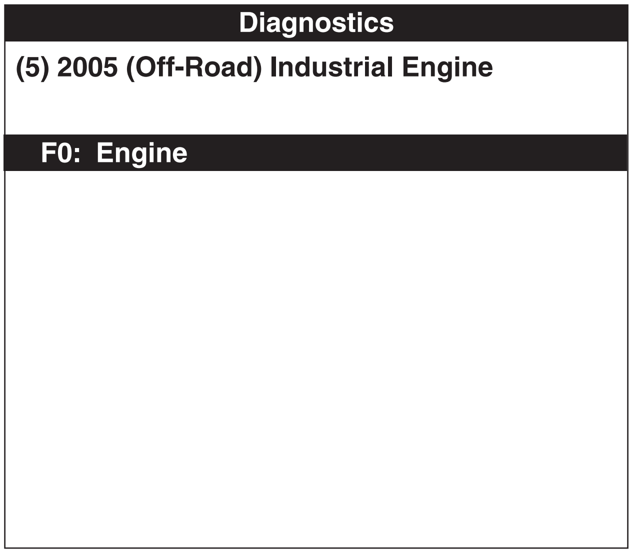
(Off-Road) Industrial Engine

TX1004455 –19–09MAR06

Vehicle Identification (engine)

JC89288,00001A1 –19–21APR06–6/13

14. Select **FO : Engine** on the Diagnostics Screen.



Diagnostics

(5) 2005 (Off-Road) Industrial Engine

F0: Engine

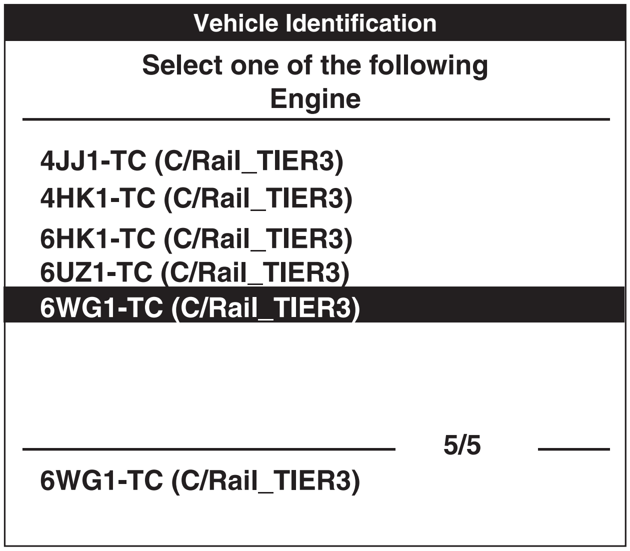
TX1004456 –19–09MAR06

Diagnostics Screen

Continued on next page

JC89288,00001A1 –19–21APR06–7/13

15. Select engine model **6WG-TC (C/Rail_TIER3)** on the Vehicle Identification (Engine Model) screen.



Vehicle Identification

Select one of the following Engine

4JJ1-TC (C/Rail_TIER3)
4HK1-TC (C/Rail_TIER3)
6HK1-TC (C/Rail_TIER3)
6UZ1-TC (C/Rail_TIER3)
6WG1-TC (C/Rail_TIER3)

5/5

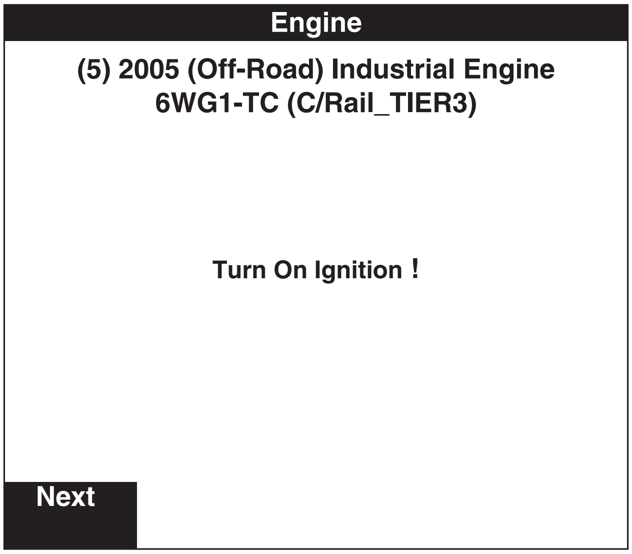
6WG1-TC (C/Rail_TIER3)

TX1004457 –19–09MAR06

Vehicle Identification (Engine Model)

JC89288,00001A1 –19–21APR06–8/13

16. Next screen will prompt to **Turn On Ignition**. Ensure ignition key is in the ON position and select **Next** using the softkeys.



Engine

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

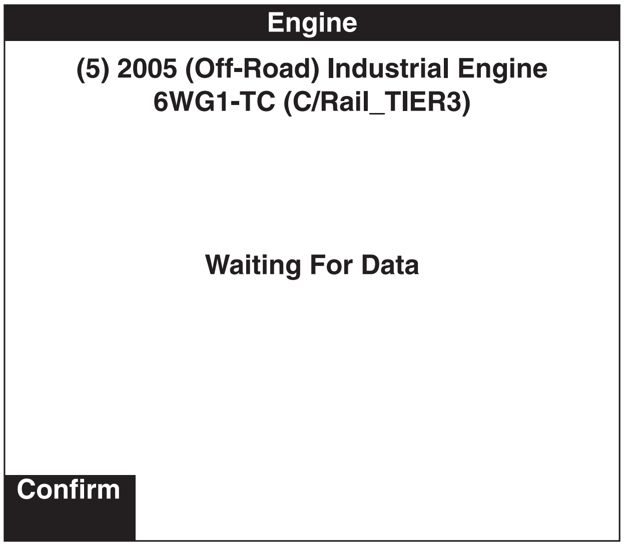
Turn On Ignition !

TX1004458 –19–09MAR06

Continued on next page

JC89288,00001A1 –19–21APR06–9/13

17. The following illustration shows the state in which the Tech 2 is waiting for communication with the machine controller. If **Confirm** is selected with the ignition key in the OFF position this display will stay forever.



Engine

(5) 2005 (Off-Road) Industrial Engine
6WG1-TC (C/Rail_TIER3)

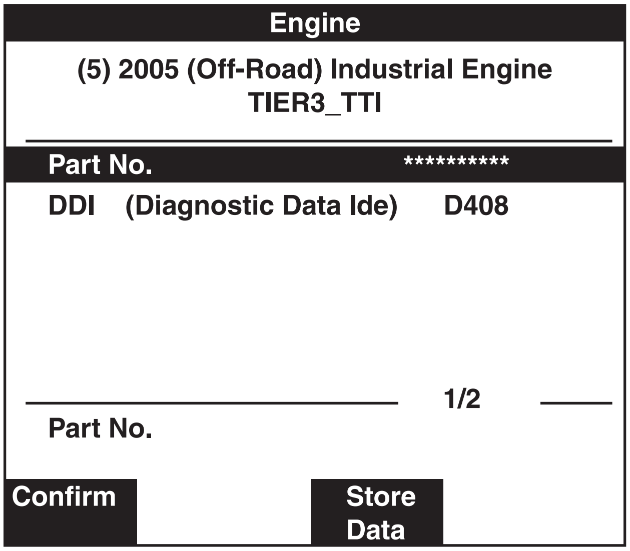
Waiting For Data

TX1004459 –19–09MAR06

JC89288,00001A1 –19–21APR06–10/13

NOTE: If a mistake was made in the selection of the vehicle type, despite the fact that the communication is enabled, a message to that effect will appear, flashing. If this occurs, check the vehicle type again and redo the connection procedure.

18. Once communication is established, the display will show the **Part No.** and **Diagnostic Data Identification (DDI)** (which varies from system to system). Select **Confirm**.



Engine

(5) 2005 (Off-Road) Industrial Engine
TIER3_TTI

Part No. **********

DDI (Diagnostic Data Ide) D408

1/2

Part No.

TX1004460 –19–09MAR06

System Information Screen

Continued on next page

JC89288,00001A1 –19–21APR06–11/13

19. Engine Applications Menu will appear. See list of functions of Tech 2.

    For **FO: Diagnostic Trouble Codes** See Reading Diagnostic Trouble Codes With Tech 2 Diagnostic Scan Tool. (Group 9015-20) See list of functions of Tech 2.

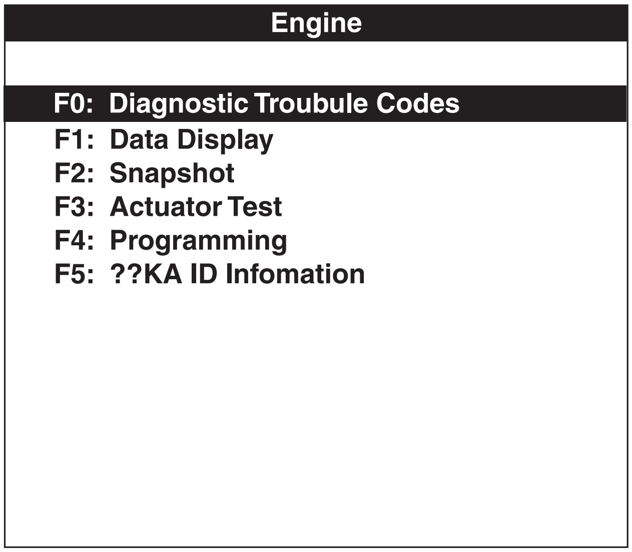
    For **F1: Data Display** See Tech 2 Data Display. (Group 9015-20) See list of functions of Tech 2.

    The **F2: Snapshot** will save information received by the machine controller. Tech 2 can only hold data from two different snapshots. This data is saved on a first-in, first-out basis. If a third snapshot is taken the data from the first snapshot will be overwritten. If the data must be saved, highlight the data and select "Write Protect" using the softkeys. Highlight the data and select "Clear" with the softkeys to cancel the protect. See list of functions of Tech 2.

    The **F3: Actuator Test** enables access to common rail system tests, and device control tests. See Rail Pressure Control Test, or See Injector Balance Test (Injector Misfire Test), or See Injector Force Drive Test , or See EGR Regulating Valve Test. (Group 9010-25). See list of functions of Tech 2.

    For **F4: Programming**See Injector ID Code Registration (Group 9010-25) See lists of functions of Tech 2.

    The **F5: ID Information** displays ID information. See list of functions of Tech 2.



Engine

F0: Diagnostic Troubule Codes
F1: Data Display
F2: Snapshot
F3: Actuator Test
F4: Programming
F5: ??KA ID Infomation

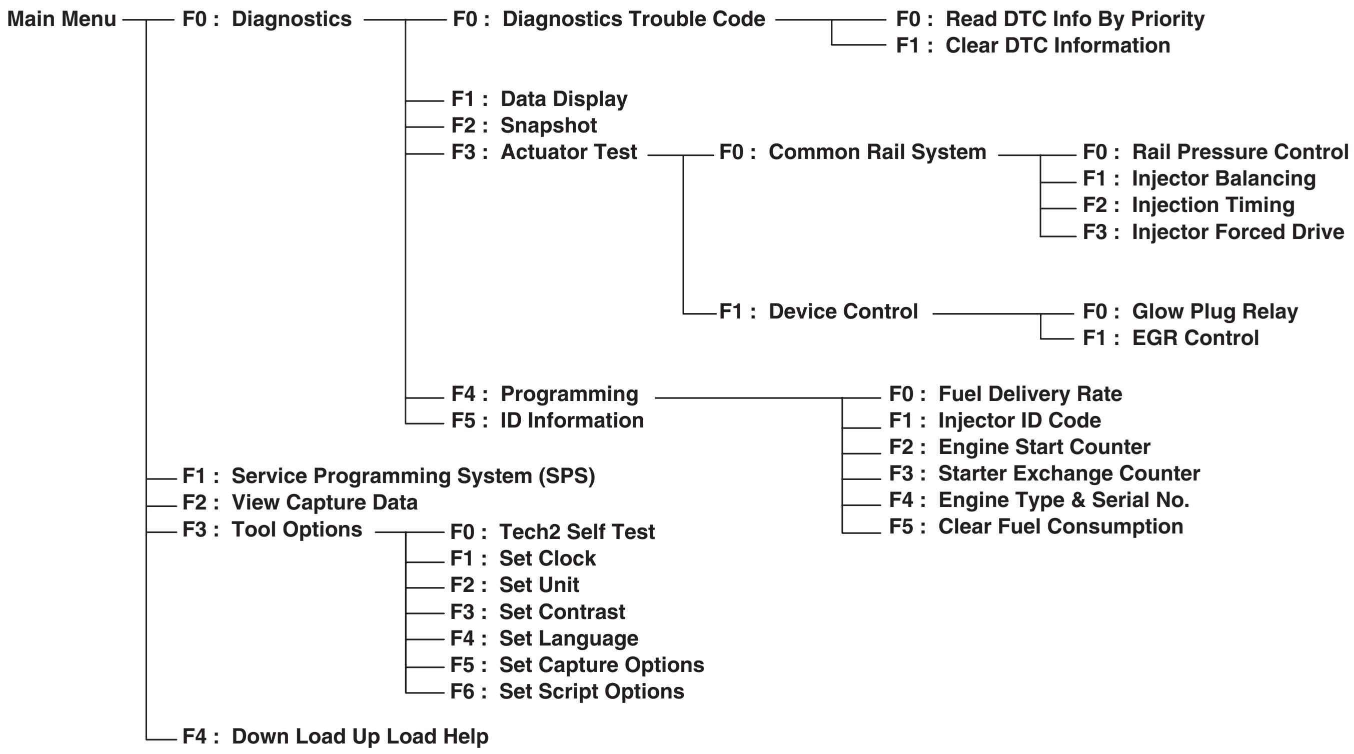
TX1005648 –19–24APR06

Engine Applications Menu

Continued on next page

JC89288,00001A1 –19–21APR06–12/13

References



TX1006850

TX1006850 –19–26APR06

List of Functions of Tech 2

JC89288,00001A1 –19–21APR06–13/13

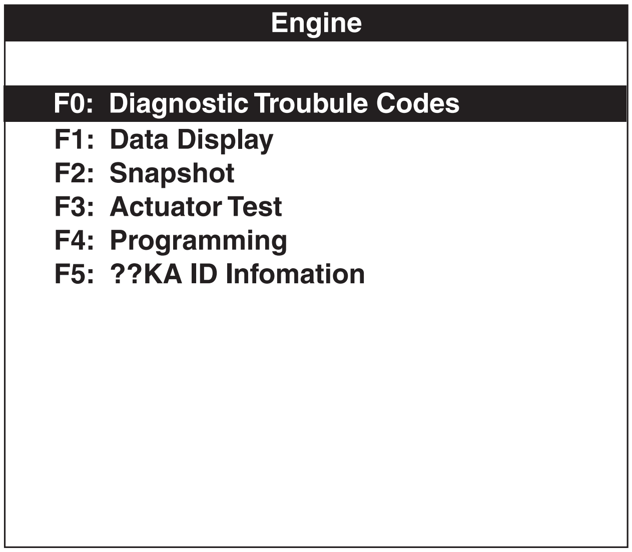
Reading Diagnostic Trouble Codes With Tech 2 Diagnostic Scan Tool

1. Connect Tech 2 to machine. See Tech 2 Diagnostic Scan Tool Connection Procedure. (9015-20.)

Continued on next page

JC89288,00001A2 –19–06APR06–1/4

2. Select FO: Diagnostic Trouble Codes on the Engine Applications Menu.



Engine

F0: Diagnostic Troubule Codes
F1: Data Display
F2: Snapshot
F3: Actuator Test
F4: Programming
F5: ??KA ID Infomation

TX1005648 –19–24APR06

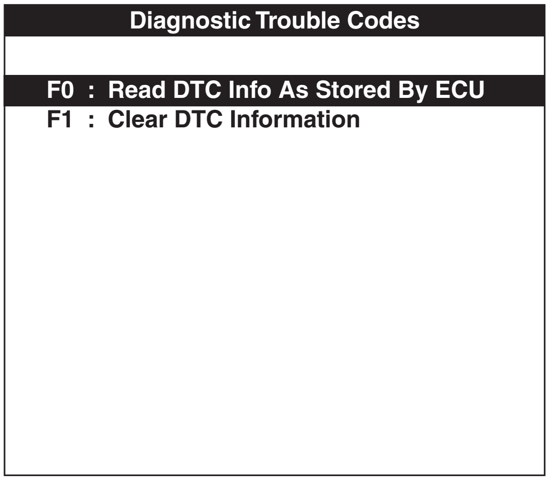
Engine Applications Menu

JC89288,00001A2 –19–06APR06–2/4

3. Choosing FO: Diagnostic Trouble Codes, the following menu is displayed:

FO: DTC-loads the DTC information stored in the machine controller in a priority order.

F1: DTC Clear-Clears the DTC by connecting DTC (Diagnostic Trouble Code) Memory Clear Terminal (8) needs to be connected to ground.



Diagnostic Trouble Codes

F0 : Read DTC Info As Stored By ECU
F1 : Clear DTC Information

TX1005837 –19–11APR06

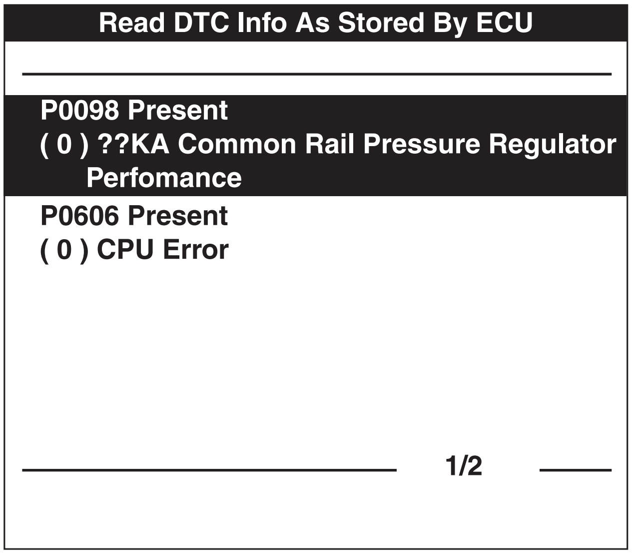
Diagnostic Trouble Codes Screen

Continued on next page

JC89288,00001A2 –19–06APR06–3/4

References

4. This screen list current DTC's by priority that are stored in the ECM.



Read DTC Info As Stored By ECU

P0098 Present
(0) ??KA Common Rail Pressure Regulator Perfomance

P0606 Present
(0) CPU Error

1/2

TX1005646 –19–29MAR06

DTC Stored Menu

JC89288,00001A2 –19–06APR06–4/4

Tech 2 Data Display

1. Connect Tech 2 diagnostic scan tool to machine See Tech 2 Diagnostic Scan Tool Connection Procedure. (Group 9015-20.)

Continued on next page

JC89288,00001A8 –19–01MAY06–1/3

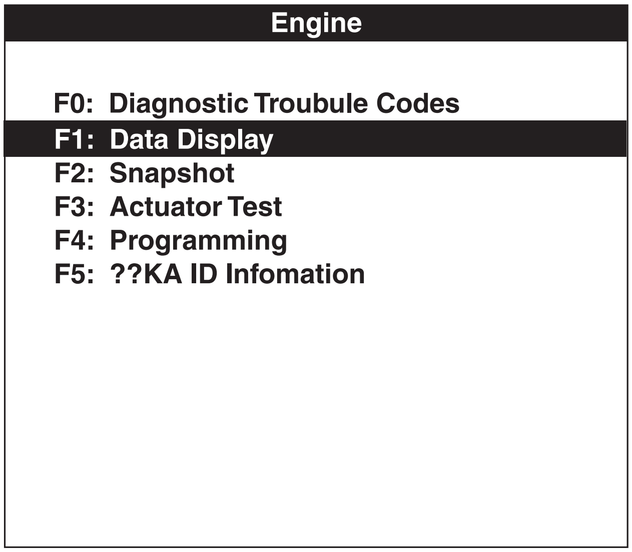
2. Select **F1: Data Display** from on the Engine Applications Menu. See chart below for data available for display in this option.

3. Display fixed parameters

   0 to 5 (Max.) Data parameters can be fixed on the “Data Display” Screen. Once fixed these parameters will remain at the upper part of the screen until manually removed, even when scrolling. To fix parameters, press the softkey “Select Items” then move the highlight bar over the desired parameter and press “Enter”. The selected parameter will be shown with an asterisk (*). Move the highlight bar with the arrow up or down keys to select the parameters you want fixed then press the softkey “Accept”. To change fixed parameters press the softkey “Select Items”, move the highlight bar with the arrow up or down keys to select the parameter you want to change and press “Enter”. That parameter will be cleared. Pressing the softkey “Clear All” will clear all fixed parameters.

4. Change units

   To change units from SI/metric to Standard/English use softkey “more” then select “values”, this will toggle between SI/metric and Standard/English press again and it toggles back.



Engine

F0: Diagnostic Troubule Codes
F1: Data Display
F2: Snapshot
F3: Actuator Test
F4: Programming
F5: ??KA ID Infomation

TX1006490 –19–20APR06

Engine Application Menu

Tech 2 Data			
	Read out		
Item	Measured in	Engine off, key on	Engine on, key on
System Voltage	V	24.8 V	27.0 V
Main Relay Voltage	V	24.5 V	27.0 V
Desired Engine Speed	rpm	499 rpm	499 rpm
Engine Speed	rpm	0 rpm	900 rpm
Accelerator Pedal Position 1 Sensor	V	0.0 V	0.0 V
Accelerator Pedal Position 2 Sensor	V	0.0 V	0.0 V
Accelerator Pedal Position Signal	%	0.0%	0.0%
Fuel Rail Pressure Difference (Actual—Desired)	MPa	-50 MPa	0-1 MPa
Fuel Rail Pressure Sensor	V	0.9 V	2.0 V
Rail Pressure Feedback Mode		Wait Mode	Feedback Mode
Coolant Temperature Sensor	V	1.4 V	1.5 V
Coolant Temperature	°C	*°C	*°C

Continued on next page

Intake Air Temperature Sensor	V	2.3 V	2.4 V
Intake Air Temperature	°C	*°C	?*°C
Fuel Temperature Sensor	V	1.7 V	2.0 V
Fuel Temperature	°C	*°C	*°C
Barometric Pressure Sensor	V	1.9 V	1.9 V
Barometric Pressure	kPa	* kPa	* kPa
EGR Temperature Sensor (Exhaust Gas Recirculation)	V	0.0 V	0.0 V
EGR Temperature	°C	* °C	* °C
EGR Position Difference	%	0%	0%
EGR BLDC Motor Duty Cycle (Brush Less DC motor)	%	0%	0%
EGR BLDC Position 1	on/off	on	on
EGR BLDC Position 2	on/off	off	off
EGR BLDC Position 3	on/off	on	on
MAP Sensor (Manifold Absolute Pressure)	V	0.9 V	0.9 V
MAP Sensor	kPa	97 kPa	96 kPa
PCV Feedback (Pressure Control Valve)	mA	0 mA	0 mA
PCV Duty Cycle	%	15%	15%
Engine Oil Pressure Sensor	V	0.4 V	2.3 V
Engine Oil Pressure	kPa	0 kPa	456 kPa
Boost Temperature Sensor	V	4.3 V	4.4 V
Boost Temperature	°C	29 °C	? °C
Desired Injection Quantity	cm^3/st	0 cm^3/st	30 cm^3/st
Main Injection Quantity	cm^3/st	0 cm^3/st	24 cm^3/st
Pre Injection Quantity	cm^3/st	0 cm^3/st	4 cm^3/st
Main Injection Start	°CA	0 °CA	0 °CA
Engine Mode		Wait Mode	Fuel mode
Ignition Switch	on/off	on	on
Starter Switch	on/off	off	off
Idle Manual Switch		Auto	Auto
Idle Up Switch	on/off	off	off
Idle Down Switch	on/off	off	off
Low Oil Level	on/off	off	off
Glow Time Lamp	on/off	off	off
Glow Time Relay	on/off	off	off
Diagnostic Switch	on/off	on	on
Fuel Delivery Res. No. 1		11	11
Fuel Delivery Res. No. 2		5	5
Fuel Delivery Res. No. 3		10	10
Engine Start Counts	#	#	#
Engine Start Counts (Starter Exchange)	#	#	#
*NOTE: * These values are dependant upon outside sources (Examples: weather, ambient temperature, and machine use.) and are not listed.*			

Dr. ZX Diagnostic Application

Dr. ZX is an application that helps technicians diagnose and troubleshoot machines. Dr. ZX provides access to machine diagnostic trouble codes, their descriptions and limited troubleshooting procedures. Dr. ZX can also display and record live readings for the different controllers on the machine. Special functions in certain controllers may also be manipulated with Dr. ZX. The special functions available to manipulate vary by controller and by machine model. Dr. ZX is also used to set up some controllers after a controller has been replaced or after other work has been done to the machine regarding a controller.

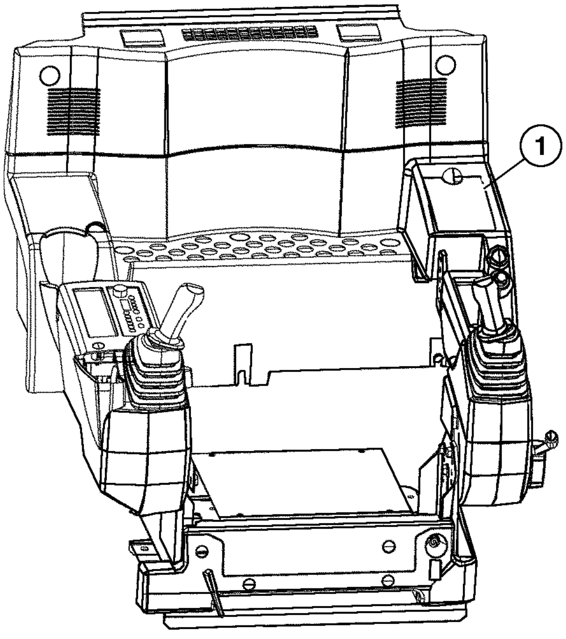
To launch the Dr. ZX diagnostic application, connect the Personal Data Assistant (PDA) to the diagnostic connector in the cab. See Personal Digital Assistant (PDA) Connection to Excavator Using Dr. ZX Application. (Group 9015-20.)

LD30992,000021D –19–25APR06–1/1

Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application

1. Remove fuse panel cover (1).

1—Fuse Panel Cover



TX1002681 –UN–13JAN06

Fuse Panel Cover

Continued on next page

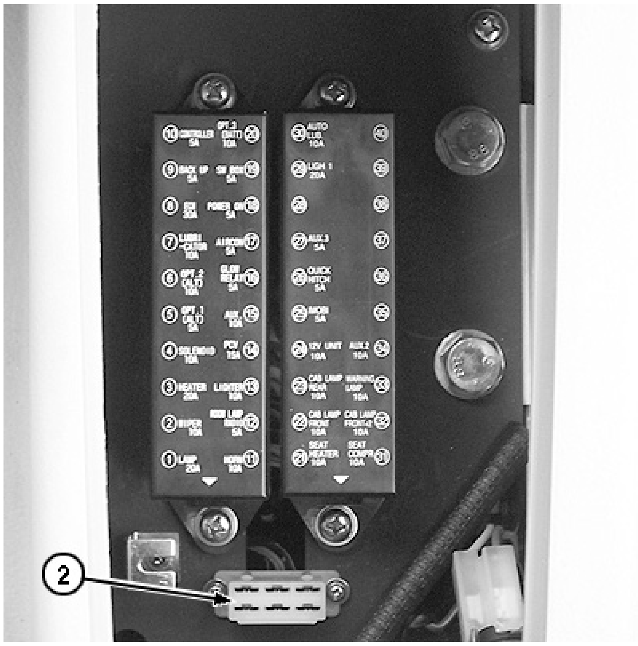
LD30992,000021E –19–26APR06–1/5

2. Connect Dr. ZX diagnostic connector (5) to machine diagnostic connector (2).

3. Turn key switch to the on position.

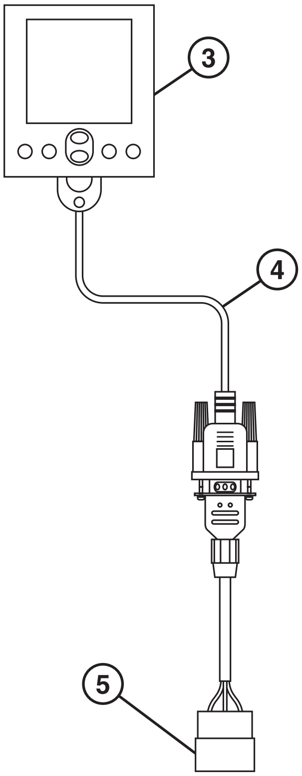
4. Turn on Personal Digital Assistant (PDA).

2—Machine Diagnostic Connector
3—Personal Digital Assistant (PDA)
4—Serial download cable
5—Dr. ZX Diagnostic Connector



TX1003205A –UN–07FEB06

Machine Connection



TX1001795 –UN–07FEB06

Dr. ZX Connector

Continued on next page

5. Select Dr. ZX icon on the main menu.

PDA Home Screen

TX1003216A –UN–07FEB06

LD30992,000021E –19–26APR06–3/5

6. Select ZX—3 Large from the menu.

NOTE: Screen will display the word “Communicating” while sending and receiving data.

ZX—3 Large Selection Screen

TX1003213A –UN–07FEB06

Continued on next page

LD30992,000021E –19–26APR06–4/5

7. Select an option.

NOTE: If the PDA displays a Communication Error, check connection between machine diagnostic connector and Dr. ZX connector.

For Self Diagnostic results,

- See Reading Diagnostic Trouble Codes With Dr. ZX. (Group 9015-20.)

For Select Controller,

- See Main Controller (MCF) Diagnostics Using Dr. ZX. (Group 9015-20.)
- See Monitor Controller Diagnostics Using Dr. ZX. (Group 9015-20.)
- See Information Controller (ICF) Diagnostics Using Dr. ZX. (Group 9015-20.)

TX1003217A –UN–07FEB06

Select Function Screen

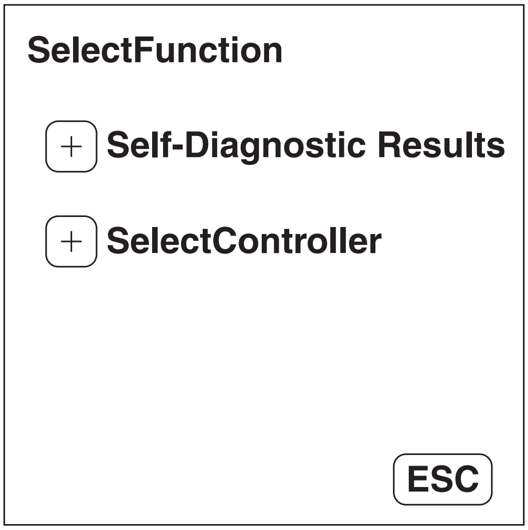
LD30992,000021E –19–26APR06–5/5

Reading Diagnostic Trouble Codes With Dr. ZX

1. **Self Diagnosis** — After connecting with Dr. ZX, select Self-Diagnostic Results.

   For connection procedure to machine, See Personal Digital Assistant (PDA) Connection to Excavator Using DR. ZX Application. (Group 9015-20.)

NOTE: Screen will display “Communicating” while sending and receiving data.



TX1002912 –19–24JAN06

Function Selection Screen

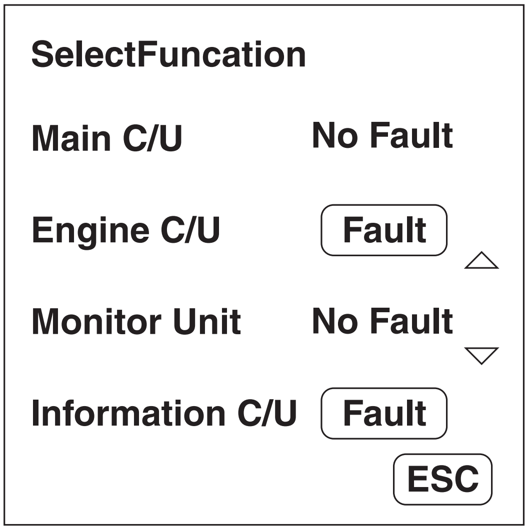
Continued on next page

LD30992,000021F –19–25APR06–1/5

2. PDA will display all controllers on the machine. Any controller with a diagnostic trouble code will have a fault button after its name.

   Select Fault button to display diagnostic trouble codes.

   ESC will return to Function Selection screen.



SelectFuncation

Main C/U No Fault

Engine C/U Fault

Monitor Unit No Fault

Information C/U Fault

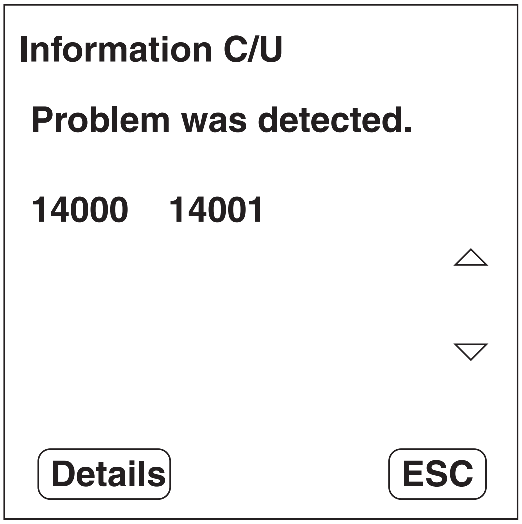
TX1002914 –19–24JAN06

Controller Self Diagnostic Screen

LD30992,000021F –19–25APR06–2/5

3. Select the Details button for diagnostic trouble code information and corrective action.

   ESC will go to Retry B Screen.



Information C/U

Problem was detected.

14000 14001

TX1003053 –19–25JAN06

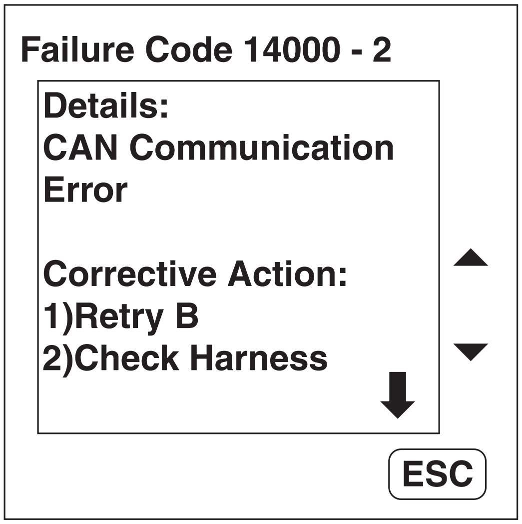
Diagnostic Trouble Codes

Continued on next page

LD30992,000021F –19–25APR06–3/5

References

4. Select ESC after viewing diagnostic trouble code details and corrective action.



Failure Code 14000 - 2

Details:
CAN Communication Error

Corrective Action:
1)Retry B
2)Check Harness

TX1003054 –19–25JAN06

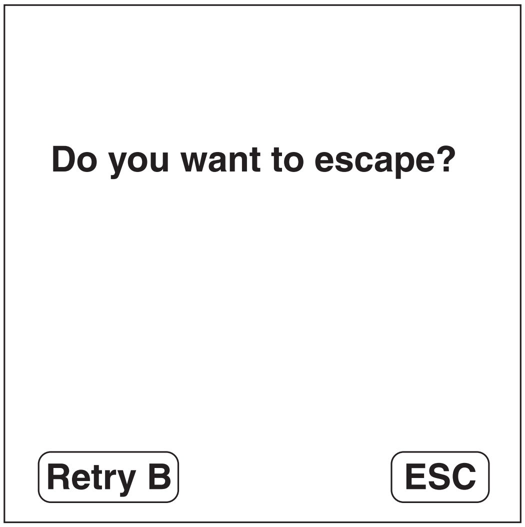
Diagnostic Trouble Code Details

LD30992,000021F –19–25APR06–4/5

5. Dr. ZX will prompt to escape or Retry B. Retry B will clear the code and check controller again for codes.

   Select Retry B to return to the Controller Self Diagnostic Screen after clearing and rechecking controller for diagnostic trouble codes.

   Select ESC to return to Controller Self Diagnostic Screen.



Do you want to escape?

TX1003055 –19–25JAN06

Retry B Screen

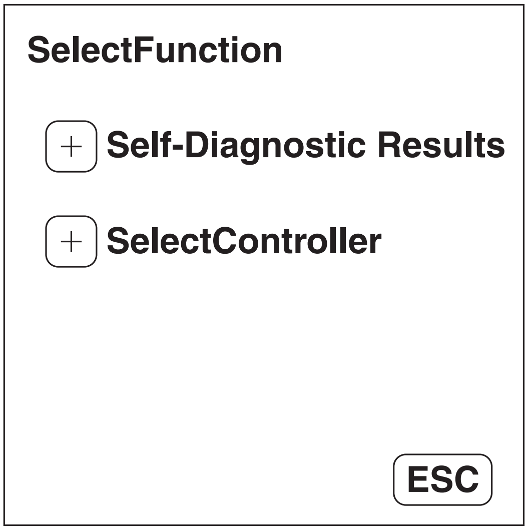
LD30992,000021F –19–25APR06–5/5

Main Controller (MCF) Diagnostics Using Dr. ZX

1. Start Dr. ZX and select Select Controller.

   For connection procedure to machine, See Personal Digital Assistant (PDA) Connection to Excavator Using DR. ZX Application. (Group 9015-20.)

NOTE: Screen will display “Communicating” while sending and receiving data.



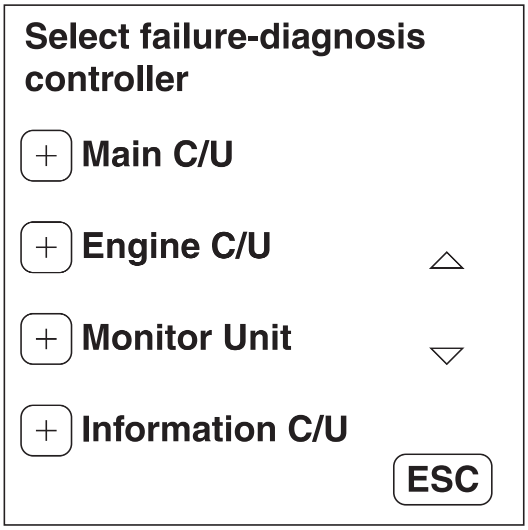
TX1002912 –19–24JAN06

Function Selection Screen

LD30992,0000220 –19–25APR06–1/30

2. Select Main C/U for main controller diagnostics.

   ESC will return to Function Selection Screen.



TX1002915 –19–24JAN06

Controller Selection Screen

Continued on next page

LD30992,0000220 –19–25APR06–2/30

References

3. Select Start to enter the service program.

   Back will return to Function Selection Screen.

   Disp.Record will display any recordings made and stored with Dr. ZX.

   Password will allow the user to change the Dr. ZX password. See Dr. ZX Password Change. (Group 9015-20.)

   Op. Manual is not available for this machine.

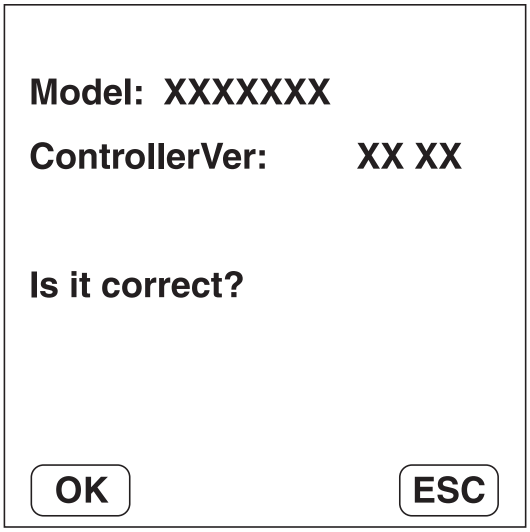
Dr.ZX ServiceSoft
(C) Hitachi Construction
Machinery Co., ltd

Dr. ZX Start Screen

LD30992,0000220 –19–25APR06–3/30

4. Dr. ZX will display main controller information. Select OK to continue.

   ESC will return to Function Selection Screen.



Model: XXXXXXX

ControllerVer: XX XX

Is it correct?

Controller Information Screen

Continued on next page

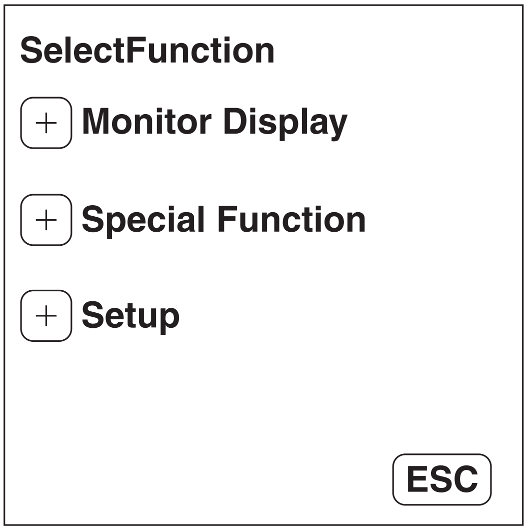
LD30992,0000220 –19–25APR06–4/30

5. Monitor Display will show the status of switches, sensors, and controller signals on the machine. See **Monitor Display** later in this procedure.

   Special Function will allow control over some functions of the machine. See **Special Function** later in this procedure.

   Setup adjusts parameters of machine operation. See **Setup** later in this procedure.

   ESC will return to Dr. ZX start screen.



SelectFunction

TX1002951 –19–25JAN06

Main Controller Select Function Screen

LD30992,0000220 –19–25APR06–5/30

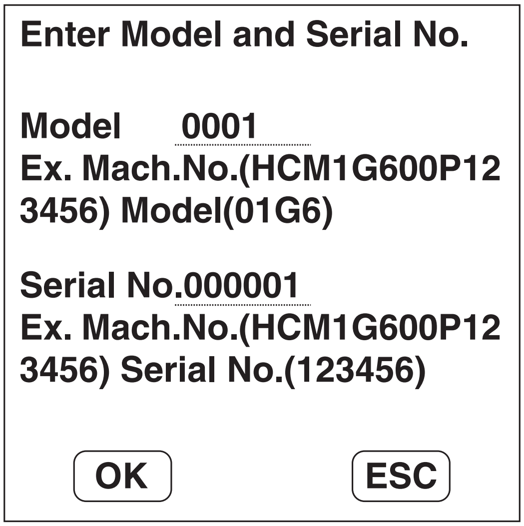
1. **Monitor Display**

   After selecting Monitor Display, enter the model and serial number of the machine.

   Select OK to continue after entering model and serial number.

   ESC will return to Main Controller Select Function Screen.

NOTE: Model and serial numbers are not necessary to proceed. Model and serial numbers will be necessary if a recording is to be taken.



Enter Model and Serial No.

Model 0001

Ex. Mach.No.(HCM1G600P123456) Model(01G6)

Serial No.000001

Ex. Mach.No.(HCM1G600P123456) Serial No.(123456)

TX1002998 –19–25JAN06

Enter Model and Serial Number Screen

Continued on next page

LD30992,0000220 –19–25APR06–6/30

References

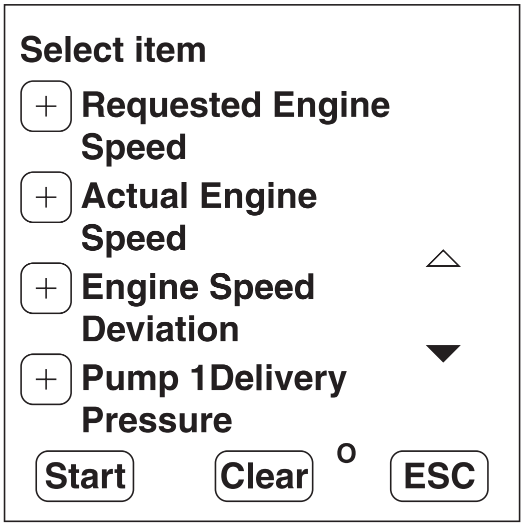
2. The Monitoring Select Item Screen displays a list of items that may be monitored. Select up to four items to display.

   A number to the upper right of the Clear button will indicate the number of items selected.

   Start will display the selected items.

   Clear will clear all selected items.

   ESC will return to Main Controller Select Function Screen.



TX1004220 –19–07MAR06

Monitoring Select Item Screen

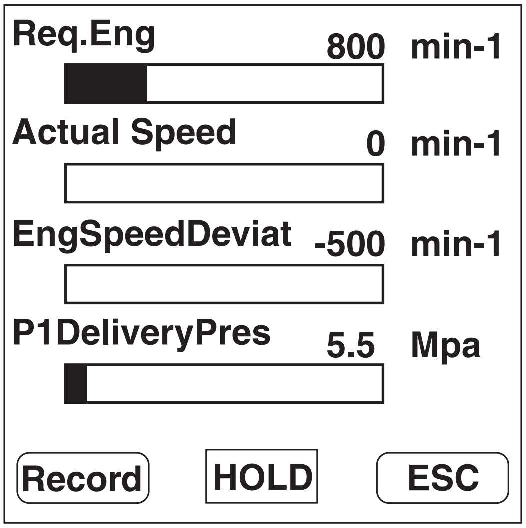
LD30992,0000220 –19–25APR06–7/30

3. The Monitoring Screen will display the parameters selected in the previous screen.

   Hold will temporarily freeze the data, selecting Hold a second time will unfreeze the data.

   ESC will return to the Monitoring Select Item Screen.

   Record will make a recording of the data being displayed. Screen will display 'Now Recording' when a recording is being taken.



Req.Eng 800 min-1

Actual Speed 0 min-1

EngSpeedDeviat -500 min-1

P1DeliveryPres 5.5 Mpa

TX1002953 –19–25JAN06

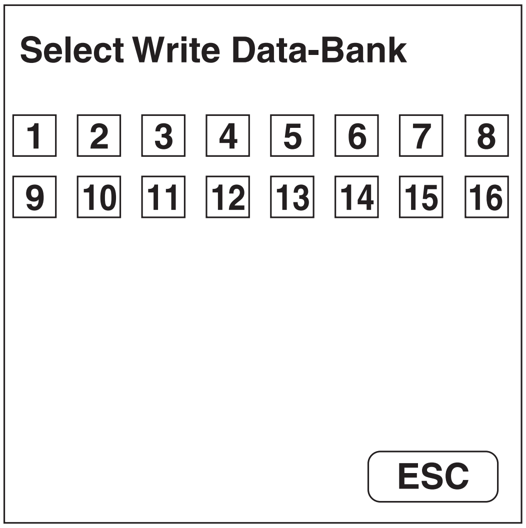
Monitoring Screen

Continued on next page

LD30992,0000220 –19–25APR06–8/30

4. After a recording has been made, Dr. ZX will prompt for a data storage location. Select a write data-bank to store the recording in.

   ESC will return to the Monitoring Screen.



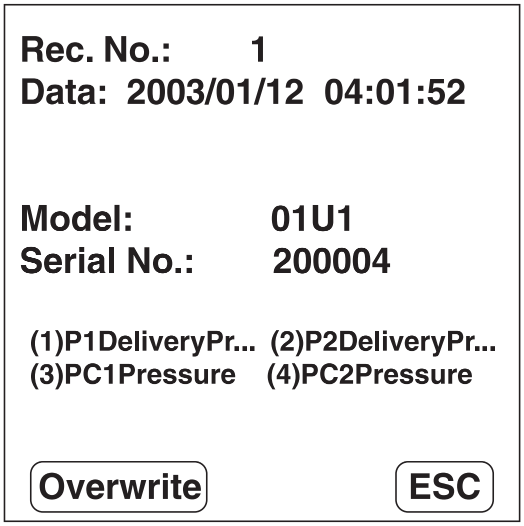
Select Write Data-Bank Screen

LD30992,0000220 –19–25APR06–9/30

5. After a storage location has been selected, Dr. ZX will prompt to overwrite the information in that storage location.

   Select Overwrite to overwrite and save the data.

   ESC will return to the Select Data-Bank Screen.


Rec. No.: 1
Data: 2003/01/12 04:01:52

Model: 01U1
Serial No.: 200004

(1)P1DeliveryPr... (2)P2DeliveryPr...
(3)PC1Pressure (4)PC2Pressure

Data Bank Overwrite Screen

Continued on next page

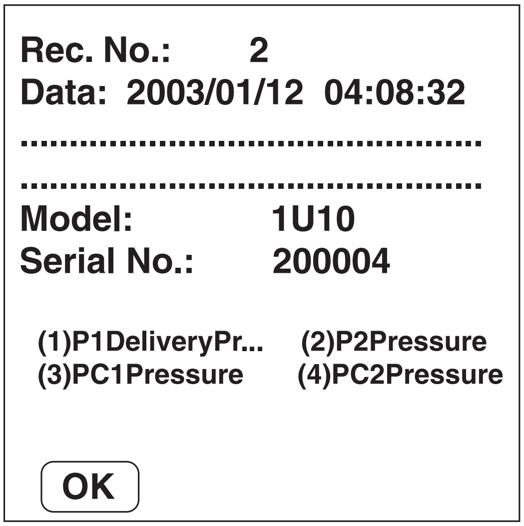
LD30992,0000220 –19–25APR06–10/30

6. Once the data has been stored, comments or additional information may be added to the recording.

   Select Comment to add a comment to the reading.

   ESC will return to the Monitoring Screen.

7. Following the comment screen, Dr. ZX will allow corrections to the comment by selecting Re-Input.



Rec. No.: 2
Data: 2003/01/12 04:08:32
....
....
Model: 1U10
Serial No.: 200004

(1)P1DeliveryPr... (2)P2Pressure
(3)PC1Pressure (4)PC2Pressure

TX1002972 –19–25JAN06

Data Bank Comment Screen

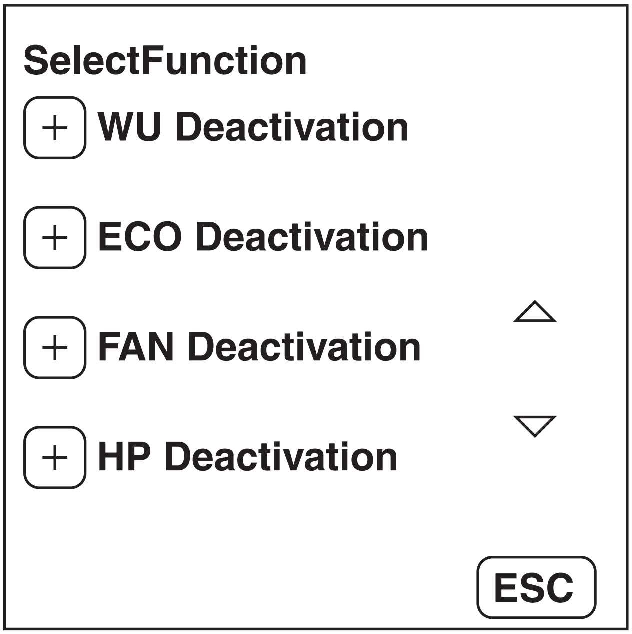
LD30992,0000220 –19–25APR06–11/30

1. **Special Function**

   After selecting Special Function, Dr. ZX will display a list of functions that can be deactivated.

   Select a function to deactivate.

   ESC will return to Main Controller Select Function Screen.



TX1006973 –19–26APR06

Special Function Select Function Screen

Continued on next page

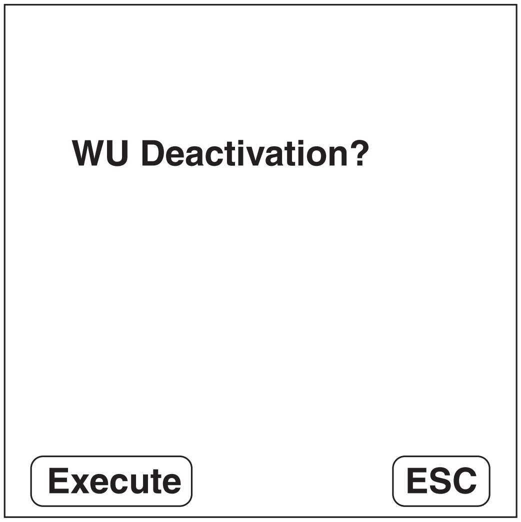
LD30992,0000220 –19–25APR06–12/30

References

2. After selecting a function to deactivate, Dr. ZX will prompt the user to execute or escape.

   Select Execute to deactivate the function.

   ESC will return to Main Controller Function Selection Screen.



WU Deactivation?

TX1002931 –19–24JAN06

Special Function Execution Screen

LD30992,0000220 –19–25APR06–13/30

3. Dr. ZX will indicate when a function has been deactivated.

   ESC will return to Main Controller Function Selection Screen.

WU Control Deactivated

TX1002932 –19–24JAN06

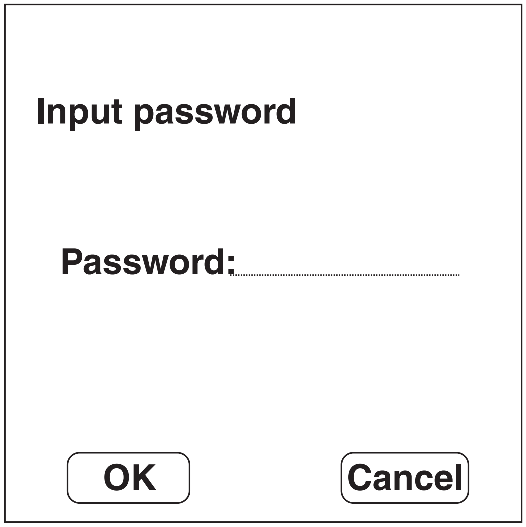
Special Function Deactivated

Continued on next page

LD30992,0000220 –19–25APR06–14/30

1. **Setup—**After selecting Setup, Dr. ZX will prompt for a password. Enter the password and select OK to enter the main controller setup menu.

   Cancel will return to Main Controller Select Function Screen.



Input password

Password:

TX1002980 –19–25JAN06

Main Controller Setup Password Screen

LD30992,0000220 –19–25APR06–15/30

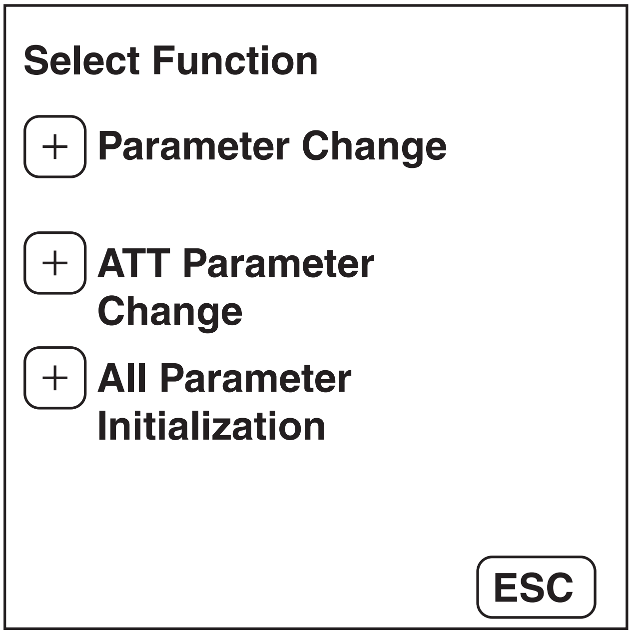
2. Dr. ZX will display a list of areas where parameters may be changed.

   Parameter Change allows adjustments to main controller functions.

   ATT Parameter Change allows input of attachment information and machine control adjustment for attachments.

   All Parameter Initialize will reset the main controller to factory defaults.

   ESC will return to Main Controller Select Function Screen.



Select Function

TX1006974 –19–26APR06

Main Controller Parameter Change

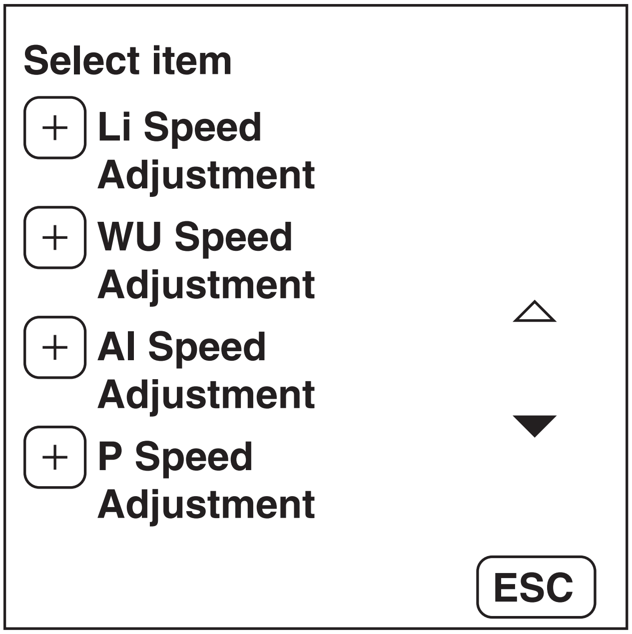
Continued on next page

LD30992,0000220 –19–25APR06–16/30

a. **Parameter Change—**In the parameter change screen, Dr. ZX will display a list of parameters that may be adjusted.

Select a parameter to change.

ESC will return to Main Controller Parameter Change screen.


Select item

+ Li Speed Adjustment

+ WU Speed Adjustment

+ AI Speed Adjustment

+ P Speed Adjustment

List of Main Controller Parameters

Continued on next page LD30992,0000220 –19–25APR06–17/30

Item	Data	Unit	Min. Adjustment Value	Adjustable Range	Standard Adjustment
Parameter Change					
Li Speed Adjustment	Adjustment of minimum engine speed	min^{-1}	10 min^{-1}	0—150 min^{-1}	0 min^{-1}
WU Speed Adjustment	Adjustment of warming up engine speed	min^{-1}	10 min^{-1}	0—150 min^{-1}	0 min^{-1}
AI Speed Adjustment	Adjustment of auto-idle engine speed	min^{-1}	10 min^{-1}	-180—500 min^{-1}	0 min^{-1}
E Speed Adjustment	Adjustment of E mode engine speed	min^{-1}	10 min^{-1}	-200—200 min^{-1}	0 min^{-1}
P Speed Adjustment	Adjustment of P mode engine speed	min^{-1}	10 min^{-1}	-200—100 min^{-1}	0 min^{-1}
HP Speed Adjustment	Adjustment of HP mode engine speed	min^{-1}	10 min^{-1}	-200—0 min^{-1}	0 min^{-1}
Pump PQ Torque Adjustment	Adjustment of P-Q curve	N•m	10 N•m	-1000—120 N•m	0 N•m
Pump P1 Torque Adjustment	Adjustment of 1P-Q curve	N•m	10 N•m	-1000—0 N•m	0 N•m
Pump P2 Torque Adjustment	Adjustment of 2P-Q curve	N•m	10 N•m	-1000—0 N•m	0 N•m
ATT Speed Increase Down Waiting Time	Setting time required for engine speed decrease	ms	40 ms	0—3000 ms	3000 ms
ATT Torque Down ON/OFF	ON/OFF of torque down control when a front attachment is operated	ON, OFF	—	—	OFF
ECO Control Selection	ON/OFF of ECO control	ON, OFF	—	—	ON
HP Control Selection	ON/OFF of HP control	ON, OFF	—	—	ON
Engine Control Theft Prevention Selection	ON/OFF of engine control theft prevention	ON, OFF	—	—	OFF
Pump Control Theft Prevention Selection	ON/OFF of pump control theft prevention	ON, OFF	—	—	OFF
Min. Boom CYL. Bottom Pressure Over Balance	Setting of minimum boom cylinder bottom pressure over balance	MPa	0.1 MPa	-10.0—10.0 MPa	0.0 MPa
Adjustment of Auto-lubrication interval	Adjustment of Auto-lubrication interval	min	1 min	6—253 min	50 min

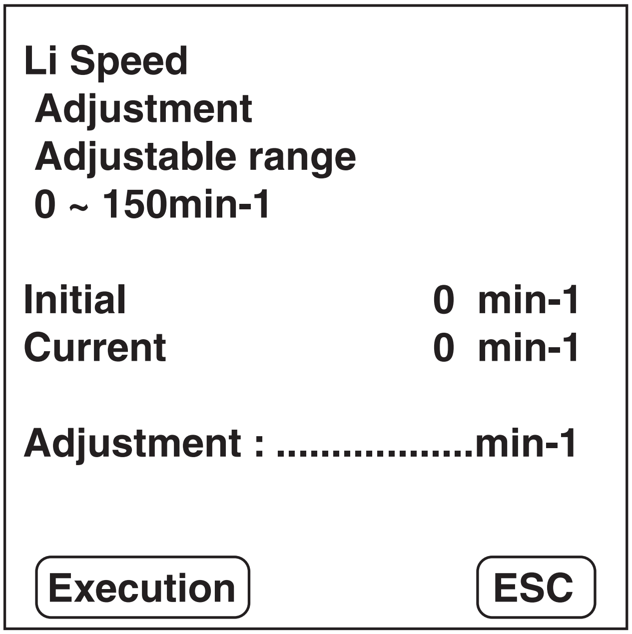
Continued on next page

Adjustment of Pump 1 Min. Capacity	Adjustment of Pump 1 delivery flow rate	cm^3	2.5 cm^3	0.0—140.0 cm^3	0.0 cm^3
Adjustment of Pump 2 Min. Capacity	Adjustment of Pump 2 delivery flow rate	cm^3	2.5 cm^3	0.0—140.0 cm^3	0.0 cm^3
Adjustment of Pump Cut-off Pressure	Adjustment of relief oil flow decrease control	MPa	0.1 MPa	-10.0—0.0 MPa	0.0 MPa
Adjustment of Pump 1 Regulator Pressure Offset Pressure	Adjustment of pump 1 delivery flow rate	MPa	0.006 MPa	-0.102—0.102 MPa	0.000 MPa
Adjustment of Pump 2 Regulator Pressure Offset Pressure	Adjustment of pump 2 delivery flow rate	MPa	0.006 MPa	-0.102—0.102 MPa	0.000 MPa
Adjustment of Boom Oil Flow Control Electric Circuit	Adjustment of solenoid valve unit (SF)	mA	5 mA	-640—0 mA	0 mA
ATT Mode Memory ON/OFF Switch	ON/OFF of ATT mode memory	ON, OFF	—	—	OFF

LD30992,0000220 –19–25APR06–19/30

b. Each parameter will list a range in which the parameter can be adjusted, an initial setting and a current setting. Enter a number to change the current setting and select Execution to advance to the confirmation screen.

   ESC will return to List of Main Controller Parameters screen.



Li Speed
Adjustment
Adjustable range
0 ~ 150min-1

Initial 0 min-1
Current 0 min-1

Adjustment : min-1

TX1007020 –19–26APR06

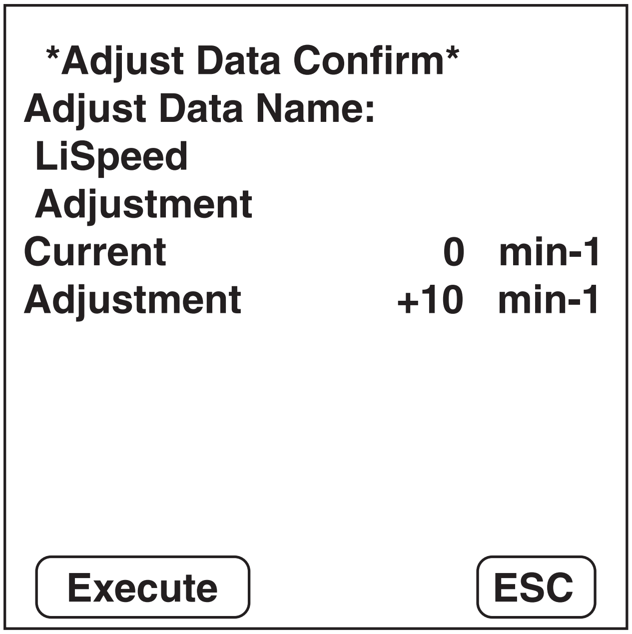
Main Controller Parameter Adjustment Range

Continued on next page

LD30992,0000220 –19–25APR06–20/30

c. Dr. ZX will confirm the data entered in the previous screen. Select Execute to change the parameter.

ESC will return to List of Main Controller Parameters screen.



Adjust Data Confirm
Adjust Data Name:
LiSpeed
Adjustment
Current 0 min-1
Adjustment +10 min-1

TX1007021 –19–26APR06

Main Controller Parameter Adjustment Confirmation

LD30992,0000220 –19–25APR06–21/30

d. Dr. ZX will indicate when the data has been changed. Select ESC to return to List of Main Controller Parameters screen.

Data has changed

TX1007022 –19–26APR06

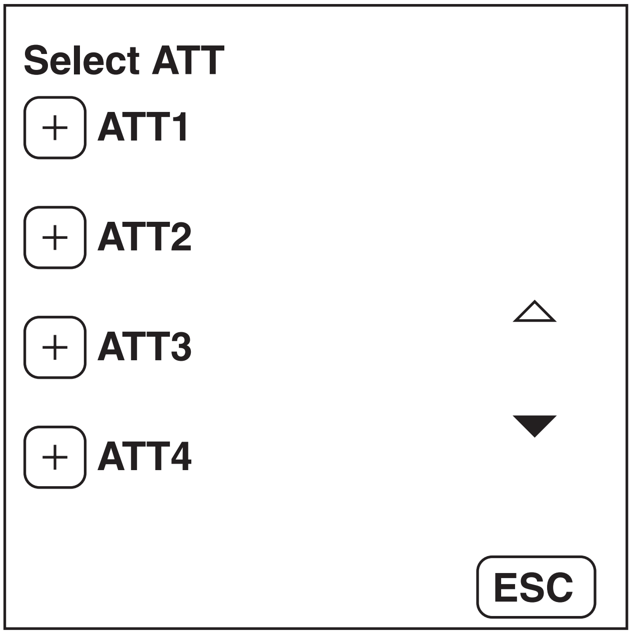
Data Changed

Continued on next page

LD30992,0000220 –19–25APR06–22/30

a. **ATT Parameter Change—**After selecting ATT Parameter Change, Dr. ZX will display a list of attachments which parameters can be changed. Select an attachment to change the parameters.

   ESC will return to Main Controller Parameter Change screen.

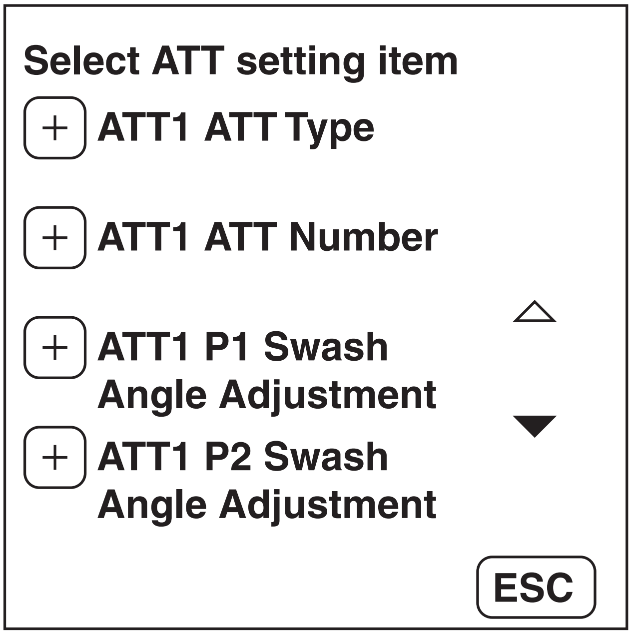


Attachment Selection

LD30992,0000220 –19–25APR06–23/30

b. Each attachment has a list of parameters that may be changed. Select a parameter to change.

   ESC will return to Attachment Selection Screen.



Attachment Parameter Change List

Continued on next page

LD30992,0000220 –19–25APR06–24/30

Item	Data	Unit	Min. Adjustment Value	Adjustable Range	Standard Adjustment
ATT1					
ATT1 ATT Type	Attachment selection	BR, PU, CR, VI, Un, Non	—	BR, PU, CR, VI, Un, Non	BR
ATT1 ATT No.	Attachment setting number selection	1, 2, 3, 4, 5	—	1 to 5	1
ATT1 P1 Max Swash Angle Adjustment	Adjustment of lower limit of maximum pump 1 flow rate when using attachment	L/min	0.5 L/min	100—367 L/min	367 L/min
ATT1 P2 Max Swash Angle Adjustment	Adjustment of lower limit of maximum pump 2 flow rate when using attachment	L/min	0.5 L/min	100—367 L/min	200 L/min
ATT1 Engine Speed Increase/Decrease	Adjustment of engine speed when using attachment	min^{-1}	10 min^{-1}	-500—100 min^{-1}	0 min^{-1}
ATT1 Secondary Pilot Relief Pressure Selection	Secondary pilot relief valve ON/OFF selection	ON, OFF	—	ON/OFF	Unregistered
ATT1 Selector Valve Selection	Selector valve ON/OFF selection	ON, OFF	—	C/V or 0/T	Unregistered
ATT1 Accumulator Selection	Accumulator ON/OFF selection	ON, OFF	—	ON/OFF	Unregistered
ATT1 2-Speed Selection	2-Speed selection ON/OFF selection	ON, OFF	—	ON/OFF	Off
ATT2					
ATT2 ATT Type	Attachment selection	BR, PU, CR, VI, Un, Non	—	BR, PU, CR, VI, Un, Non	BR
ATT2 ATT No.	Attachment setting number selection	1, 2, 3, 4, 5	—	1 to 5	2
ATT2 P1 Max Swash Angle Adjustment	Adjustment of lower limit of maximum pump 1 flow rate when using attachment	L/min	0.5 L/min	100—367 L/min	367 L/min
ATT2 P2 Max Swash Angle Adjustment	Adjustment of lower limit of maximum pump 2 flow rate when using attachment	L/min	0.5 L/min	100—367 L/min	250 L/min
ATT2 Engine Speed Increase/Decrease	Adjustment of engine speed when using attachment	min^{-1}	10 min^{-1}	-500—100 min^{-1}	0 min^{-1}

Continued on next page

LD30992,0000220 –19–25APR06–25/30

ATT2 Secondary Pilot Relief Pressure Selection	Secondary pilot relief valve ON/OFF selection	ON, OFF	—	ON/OFF	Unregistered
ATT2 Selector Valve Selection	Selector valve ON/OFF selection	ON, OFF	—	C/V or 0/T	Unregistered
ATT2 Accumulator Selection	Accumulator ON/OFF selection	ON, OFF	—	ON/OFF	Unregistered
ATT2 2-Speed Selection	2-Speed selection ON/OFF selection	ON, OFF	—	ON/OFF	Off
ATT3					
ATT3 ATT Type	Attachment selection	BR, PU, CR, VI, Un, Non	—	BR, PU, CR, VI, Un, Non	BR
ATT3 ATT No.	Attachment setting number selection	1, 2, 3, 4, 5	—	1 to 5	3
ATT3 P1 Max Swash Angle Adjustment	Adjustment of lower limit of maximum pump 1 flow rate when using attachment	L/min	0.5 L/min	100—367 L/min	367 L/min
ATT3 P2 Max Swash Angle Adjustment	Adjustment of lower limit of maximum pump 2 flow rate when using attachment	L/min	0.5 L/min	100—367 L/min	280 L/min
ATT3 Engine Speed Increase/Decrease	Adjustment of engine speed when using attachment	min^{-1}	10 min^{-1}	-500—100 min^{-1}	0 min^{-1}
ATT3 Secondary Pilot Relief Pressure Selection	Secondary pilot relief valve ON/OFF selection	ON, OFF	—	ON/OFF	Unregistered
ATT3 Selector Valve Selection	Selector valve ON/OFF selection	ON, OFF	—	C/V or 0/T	Unregistered
ATT3 Accumulator Selection	Accumulator ON/OFF selection	ON, OFF	—	ON/OFF	Unregistered
ATT3 2-Speed Selection	2-Speed selection ON/OFF selection	ON, OFF	—	ON/OFF	Off
ATT4					
ATT4 ATT Type	Attachment selection	BR, PU, CR, VI, Un, Non	—	BR, PU, CR, VI, Un, Non	Unregistered
ATT4 ATT No.	Attachment setting number selection	1, 2, 3, 4, 5	—	1 to 5	Unregistered
ATT4 P1 Max Swash Angle Adjustment	Adjustment of lower limit of maximum pump 1 flow rate when using attachment	L/min	0.5 L/min	100—367 L/min	367 L/min

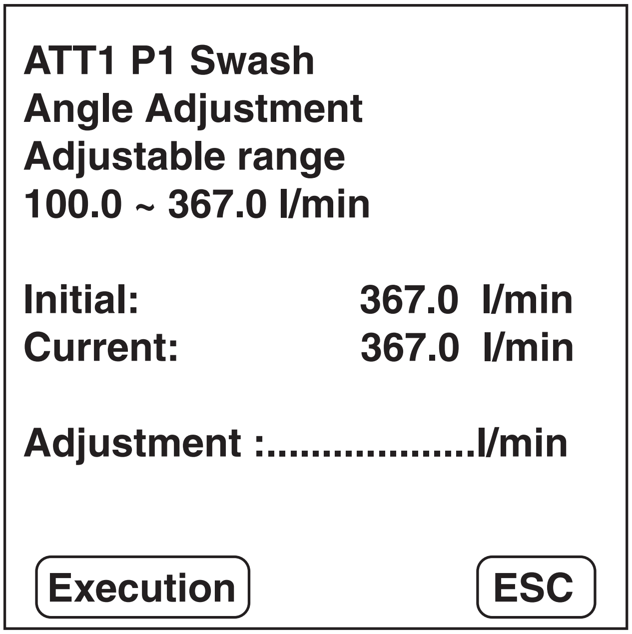
Continued on next page

ATT4 P2 Max Swash Angle Adjustment	Adjustment of lower limit of maximum pump 2 flow rate when using attachment	L/min	0.5 L/min	100—367 L/min	367 L/min
ATT4 Engine Speed Increase/Decrease	Adjustment of engine speed when using attachment	min^{-1}	10 min^{-1}	-500—100 min^{-1}	0 min^{-1}
ATT4 Secondary Pilot Relief Pressure Selection	Secondary pilot relief valve ON/OFF selection	ON, OFF	—	ON/OFF	Unregistered
ATT4 Selector Valve Selection	Selector valve ON/OFF selection	ON, OFF	—	C/V or 0/T	Unregistered
ATT4 Accumulator Selection	Accumulator ON/OFF selection	ON, OFF	—	ON/OFF	Unregistered
ATT4 2-Speed Selection	2-Speed selection ON/OFF selection	ON, OFF	—	ON/OFF	Off
ATT5					
ATT5 ATT Type	Attachment selection	BR, PU, CR, VI, Un, Non	—	BR, PU, CR, VI, Un, Non	Unregistered
ATT5 ATT No.	Attachment setting number selection	1, 2, 3, 4, 5	—	1 to 5	Unregistered
ATT5 P1 Max Swash Angle Adjustment	Adjustment of lower limit of maximum pump 1 flow rate when using attachment	L/min	0.5 L/min	100—367 L/min	367 L/min
ATT5 P2 Max Swash Angle Adjustment	Adjustment of lower limit of maximum pump 2 flow rate when using attachment	L/min	0.5 L/min	100—367 L/min	367 L/min
ATT5 Engine Speed Increase/Decrease	Adjustment of engine speed when using attachment	min^{-1}	10 min^{-1}	-500—100 min^{-1}	0 min^{-1}
ATT5 Secondary Pilot Relief Pressure Selection	Secondary pilot relief valve ON/OFF selection	ON, OFF	—	ON/OFF	Unregistered
ATT5 Selector Valve Selection	Selector valve ON/OFF selection	ON, OFF	—	C/V or 0/T	Unregistered
ATT5 Accumulator Selection	Accumulator ON/OFF selection	ON, OFF	—	ON/OFF	Unregistered
ATT5 2-Speed Selection	2-Speed selection ON/OFF selection	ON, OFF	—	ON/OFF	Off

Continued on next page

c. Each parameter will list a range in which the parameter can be adjusted, an initial setting and a current setting. Enter a number to change the current setting and select Execution to advance to the confirmation screen.

   ESC will return to Attachment Parameter Change List screen.



ATT1 P1 Swash
Angle Adjustment
Adjustable range
100.0 ~ 367.0 l/min

Initial: 367.0 l/min
Current: 367.0 l/min

Adjustment :..................l/min

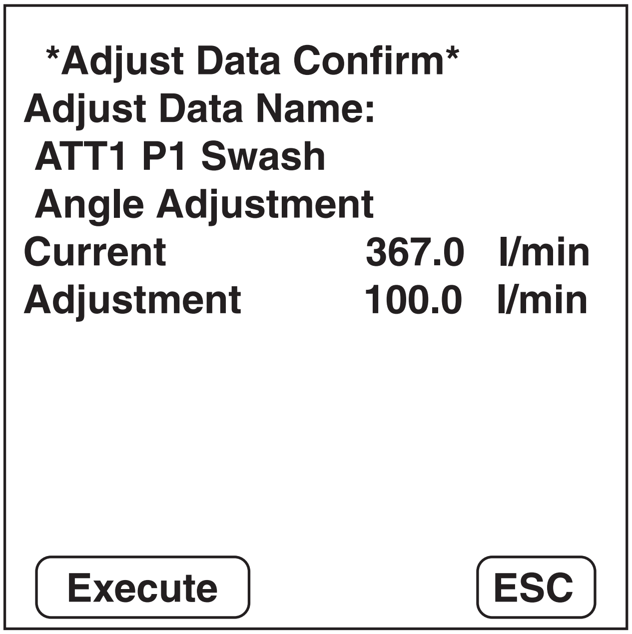
TX1007025 –19–26APR06

Attachment Parameter Range

LD30992,0000220 –19–25APR06–28/30

d. Dr. ZX will confirm the data entered in the previous screen. Select Execute to change the parameter.

   ESC will return to Attachment Parameter Change List screen.



Adjust Data Confirm
Adjust Data Name:
ATT1 P1 Swash
Angle Adjustment
Current 367.0 l/min
Adjustment 100.0 l/min

TX1007026 –19–26APR06

Attachment Parameter Change Confirmation

Continued on next page

LD30992,0000220 –19–25APR06–29/30

e. Dr. ZX will indicate when the data has been changed. Select ESC to return to Attachment Parameter Change List screen.

a. **All Parameter Initialize—**This will reset all the parameters to the factory default settings.

b. Select OK to reset parameters.

ESC will return to Main Controller Parameter Change screen.

Data has changed

TX1007022 –19–26APR06

Data Changed

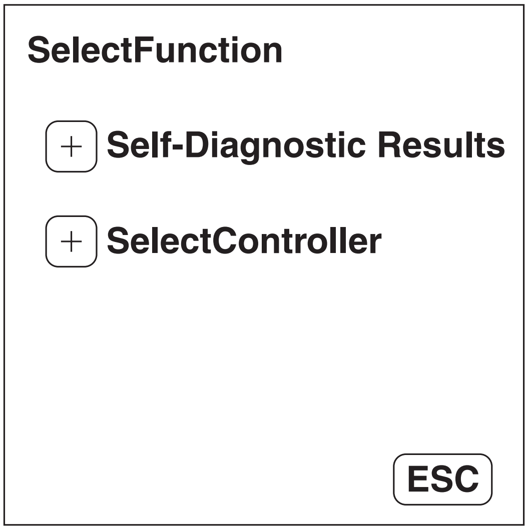
LD30992,0000220 –19–25APR06–30/30

Engine Controller (ECM) Diagnostics Using Dr. ZX

1. Start Dr. ZX and select Select Controller.

   For connection procedure to machine, See Personal Digital Assistant (PDA) Connection to Excavator Using DR. ZX Application. (Group 9015-20.)

NOTE: Screen will display “Communicating” while sending and receiving data.



TX1002912 –19–24JAN06

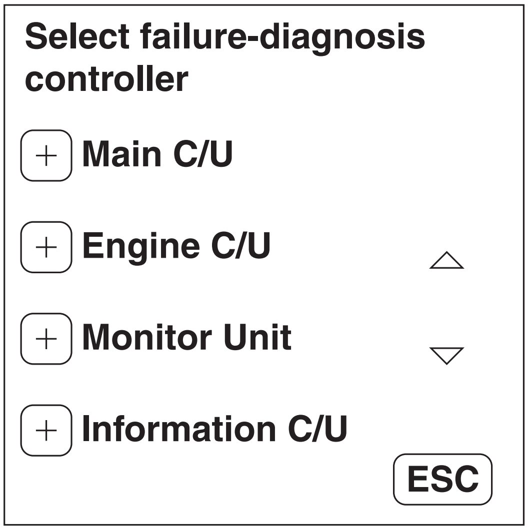
Function Selection Screen

Continued on next page

LD30992,0000221 –19–25APR06–1/10

2. Select Engine C/U for main controller diagnostics.

   ESC will return to Function Selection Screen.



Select failure-diagnosis controller

TX1002915 –19–24JAN06

Controller Selection Screen

LD30992,0000221 –19–25APR06–2/10

3. Select Start to enter the service program.

   Back will return to Function Selection Screen.

   Disp.Record will display any recordings made and stored with Dr. ZX.

   Password will allow the user to change the Dr. ZX password. See Dr. ZX Password Change. (Group 9015-20.)

   Op. Manual is not available for this machine.

Dr.ZX ServiceSoft
(C) Hitachi Construction
Machinery Co., ltd

TX1004219 –19–07MAR06

Dr. ZX Start Screen

Continued on next page

LD30992,0000221 –19–25APR06–3/10

4. Dr. ZX will display the controller information. Select OK to continue.

   ESC will return to Function Selection Screen.

ControllerVer:
*AH6WG1XYSA01
0*400037*8980
089521

TX1006968 –19–26APR06

Engine Controller Information

LD30992,0000221 –19–25APR06–4/10

5. **Monitor Display** will show the status of switches, sensors, and controller signals on the machine.

   Special Function will allow control over some functions of the machine.

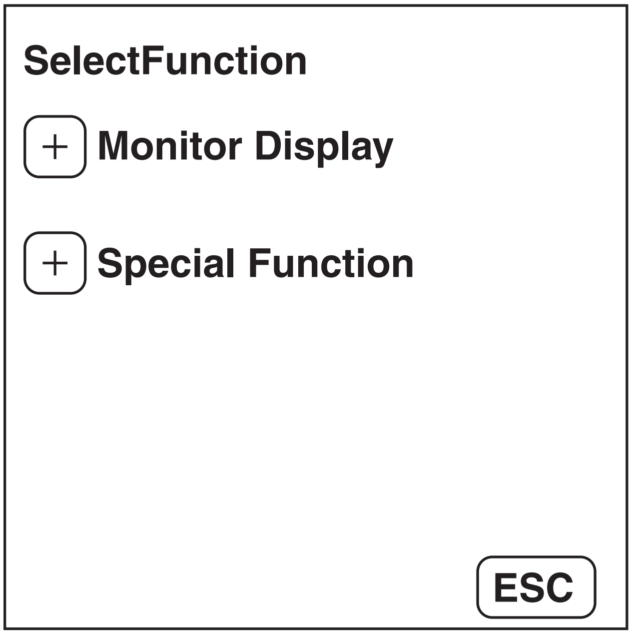
1. **Monitor Display**

   After selecting Monitor Display, enter the model and serial number of the machine.

   Select OK to continue after entering model and serial number.

   ESC will return to Engine Select Function Screen.

NOTE: Model and serial numbers are not necessary to proceed. Model and serial numbers will be necessary if a recording is to be taken.



TX1006971 –19–26APR06

Engine Select Function Screen

Continued on next page

LD30992,0000221 –19–25APR06–5/10

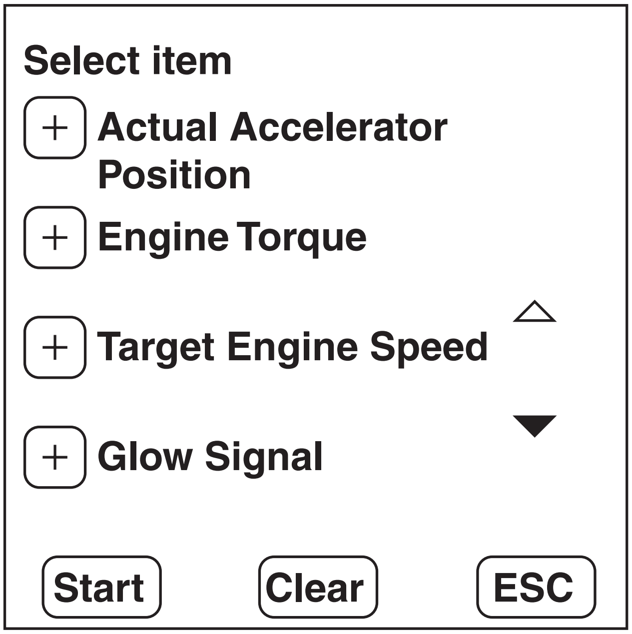
2. The Monitoring Select Item Screen displays a list of items that may be monitored. Select up to four items to display.

   A number to the upper right of the Clear button will indicate the number of items selected.

   Start will display the selected items.

   Clear will clear all selected items.

   ESC will return to Main Controller Select Function Screen.



TX1006969 —19—26APR06

Monitoring Select Item Screen

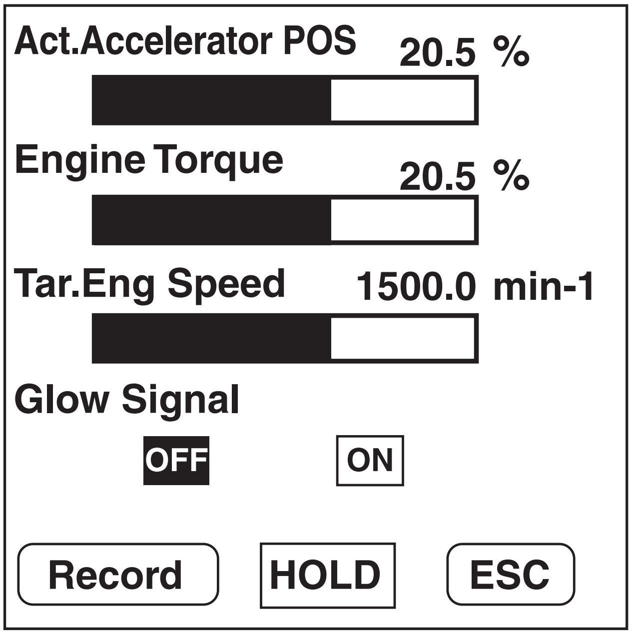
LD30992,0000221 —19—25APR06—6/10

3. The Monitoring Screen will display the parameters selected in the previous screen.

   Hold will temporarily freeze the data, selecting Hold a second time will unfreeze the data.

   ESC will return to the Monitoring Select Item Screen.

   Record will make a recording of the data being displayed. Screen will display 'Now Recording' when a recording is being taken.



Act.Accelerator POS 20.5 %

Engine Torque 20.5 %

Tar.Eng Speed 1500.0 min-1

Glow Signal OFF ON

TX1006970 —19—26APR06

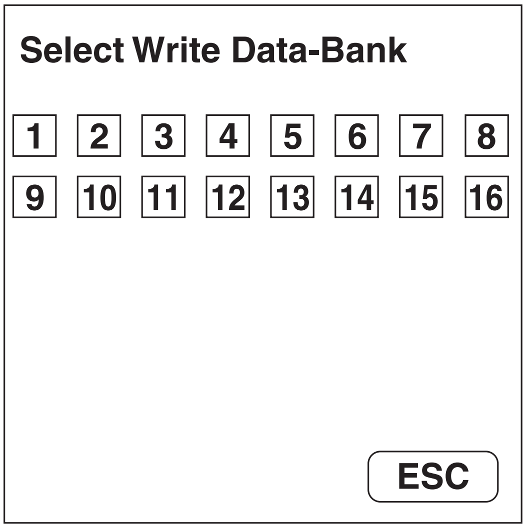
Monitoring Screen

Continued on next page

LD30992,0000221 —19—25APR06—7/10

4. After a recording has been made, Dr. ZX will prompt for a data storage location. Select a write data-bank to store the recording in.

   ESC will return to the Monitoring Screen.



Select Write Data-Bank

TX1002967 –19–25JAN06

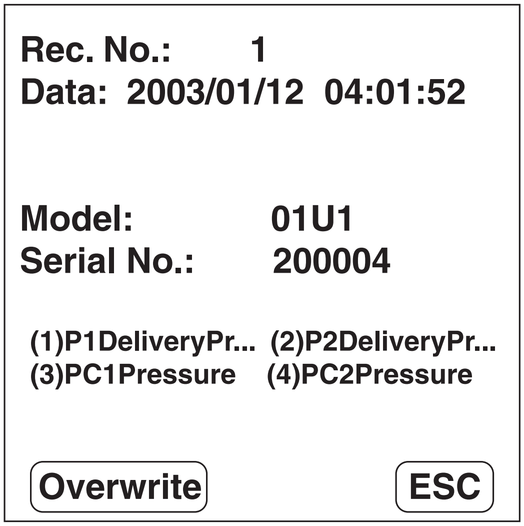
Select Write Data-Bank Screen

LD30992,0000221 –19–25APR06–8/10

5. After a storage location has been selected, Dr. ZX will prompt to overwrite the information in that storage location.

   Select Overwrite to overwrite and save the data.

   ESC will return to the Select Data-Bank Screen.



Rec. No.: 1
Data: 2003/01/12 04:01:52

Model: 01U1
Serial No.: 200004

(1)P1DeliveryPr... (2)P2DeliveryPr...
(3)PC1Pressure (4)PC2Pressure

TX1002969 –19–25JAN06

Data Bank Overwrite Screen

Continued on next page

LD30992,0000221 –19–25APR06–9/10

References

6. Once the data has been stored, comments or additional information may be added to the recording.

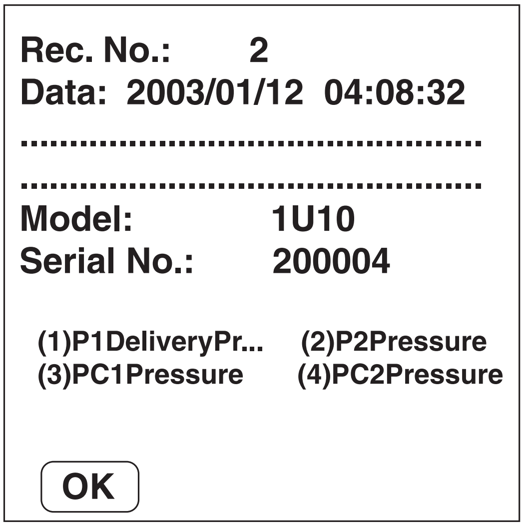
   Select Comment to add a comment to the reading.

   ESC will return to the Monitoring Screen.

7. Following the comment screen, Dr. ZX will allow corrections to the comment by selecting Re-Input.

Special Function

Engine Special Function is not available at this time.



Rec. No.: 2
Data: 2003/01/12 04:08:32
....
....
Model: 1U10
Serial No.: 200004

(1)P1DeliveryPr... (2)P2Pressure
(3)PC1Pressure (4)PC2Pressure

TX1002972 –19–25JAN06

Data Bank Comment Screen

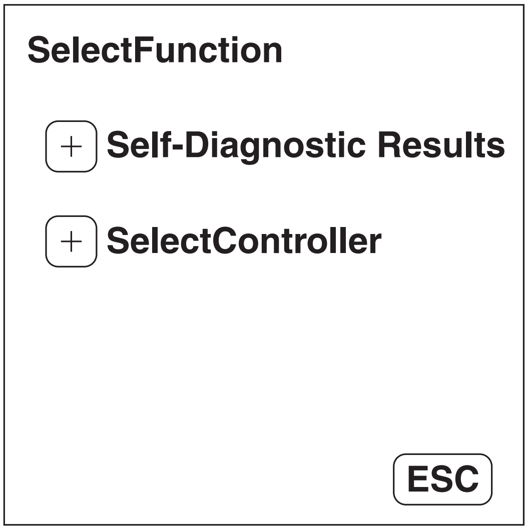
LD30992,0000221 –19–25APR06–10/10

Monitor Controller Diagnostics Using Dr. ZX

1. Start Dr. ZX and select Select Controller.

   For connection procedure to machine, See Personal Digital Assistant (PDA) Connection to Excavator Using DR. ZX Application. (Group 9015-20.)

NOTE: Screen will display “Communicating” while sending and receiving data.



TX1002912 –19–24JAN06

Function Selection Screen

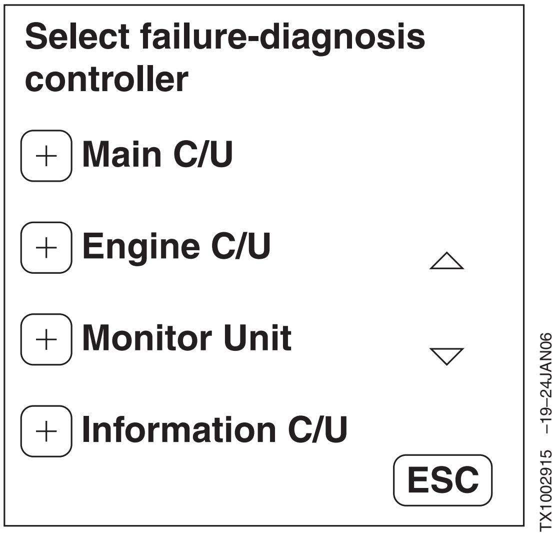
Continued on next page

LD30992,0000222 –19–26APR06–1/9

References

2. Select Monitor Unit for monitor controller diagnostics.

   ESC will return to Function Selection Screen.



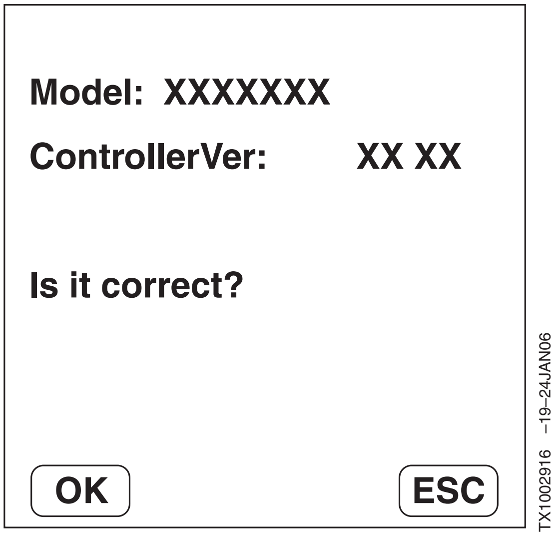
Select failure-diagnosis controller

Controller Selection Screen

LD30992,0000222 –19–26APR06–2/9

3. Dr. ZX will display monitor controller information. Select OK to continue.

   ESC will return to Function Selection Screen.



Model: XXXXXXX

ControllerVer: XX XX

Is it correct?

Controller Information Screen

Continued on next page

LD30992,0000222 –19–26APR06–3/9

4. Select Start to proceed into the service program.

   Back will return to Function Selection Screen.

   Password will allow the user to change the Dr. ZX password. See Dr. ZX Password Change. (Group 9015-20.)

TX1002985 –19–25JAN06

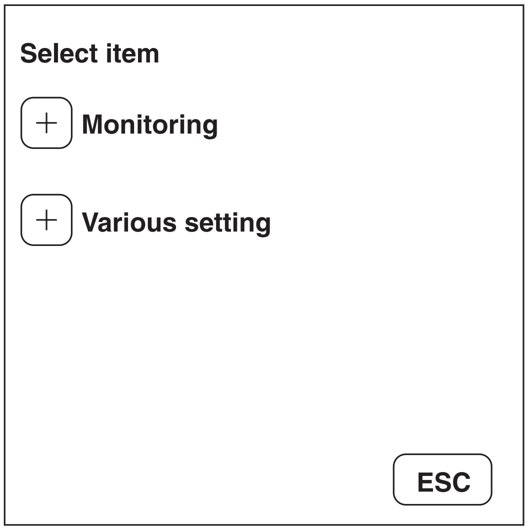
Dr. ZX Start Screen

LD30992,0000222 –19–26APR06–4/9

5. Monitoring will display the status of various switches, sensors and controller signals on the machine. See **Monitoring** later in this procedure.

   Various Settings configures how the monitor controller displays data on the monitor controller display. See **Various Settings** later in this procedure.

   ESC will return to Dr. ZX start screen.



TX1003251 –19–30AUG06

Monitoring and Various Settings Selection Screen

Continued on next page

LD30992,0000222 –19–26APR06–5/9

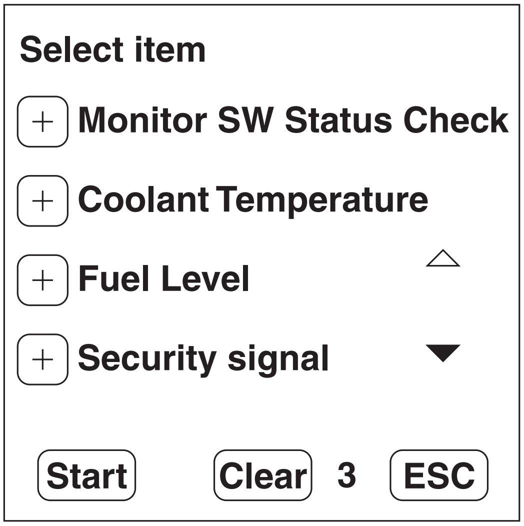
1. **Monitoring—** After selecting Monitoring button, Dr. ZX will display a list of items that may be viewed. Select up to four items to display.

NOTE: A number just to the upper right of the Clear button will indicate how many items have been selected.

Start will display selected items.

Clear will clear all selected items.

ESC will return to Monitoring and Various Settings Selection Screen.



Monitoring Select Item Screen

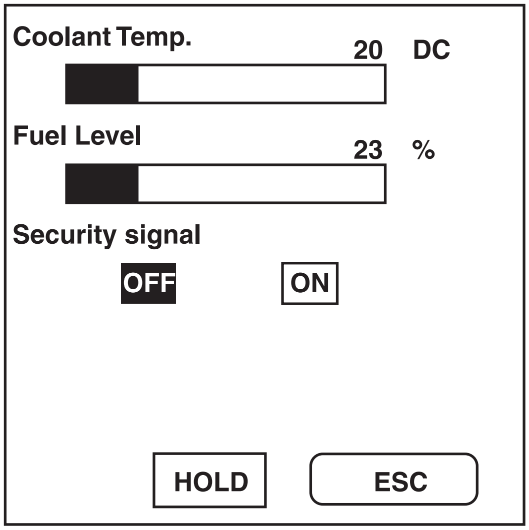
Monitor Controller Monitoring Items List

Item		Unit	Data
Selecting	Monitoring		
Monitor Switch Condition Check	Monitor Button Condition	ON=Dark OFF=Light	Switch state of monitor unit
Radiator Coolant Temperature	Coolant Temperature	°C	Input signal from coolant temperature sensor
Fuel Level	Fuel Level	%	Input signal from fuel sensor
Security Signal	Security Signal	OFF, ON	Communication from monitor unit
Mail Switch	Mail Switch	OFF, Fuel, Forwarding, Repair, General	Operating state of mail

LD30992,0000222 –19–26APR06–6/9

2. Monitor controller readings may be temporarily frozen by selecting the Hold button. Selecting the Hold button a second time will unfreeze the readings.

   ESC will return to Monitor Item Selection Screen.


Coolant Temp. 20 DC

Fuel Level 23 %

Security signal OFF ON

Selected Items Monitoring Display Screen

Continued on next page

LD30992,0000222 –19–26APR06–7/9

Various Setup Items List

	1.Item		Unit
Optional Function	M1 (Optional Function 1 Allocate)		Set/Unset: Work Mode Function ML Crane Function Mail Function Auto Lubrication Function Collision Prevention Function
	M2 (Optional Function 2 Allocate)		
	M3 (Optional Function 3 Allocate)		
	M4 (Optional Function 4 Allocate)		
	M5 (Optional Function 5 Allocate)		
	M6 (Optional Function 6 Allocate)		
	M7 (Optional Function 7 Allocate)		
	M8 (Optional Function 8 Allocate)		
	M9 (Optional Function 9 Allocate)		
Overload Alarm Enable/Disable			Enable/Disable
Back Monitor Setup	Back Monitor Function Enable/Disable		Enable/Disable
	Back Monitor Display Normal/Flip Vertical		Flip Vertical/Normal
Operating Condition Enable/Disable			Enable/Disable
Time Set Func Enable/Disable			Enable/Disable
Maintenance Setup	Maintenance Function Enable/Disable		Enable/Disable
	Notification Function Enable/Disable		Enable/Disable
	Maintenance Display Item ON/OFF		
		Engine Oil	OFF/ON
		Engine Oil Filter	OFF/ON
		Hydraulic Oil	OFF/ON
		Hydraulic Oil Pilot Filter	OFF/ON
		Hydraulic Oil Full-Flow Filter	OFF/ON
		Pump Transmission	OFF/ON
		Swing Bearing Grease	OFF/ON
		Travel Device Oil	OFF/ON
		Swing Device Oil	OFF/ON
		Air Cleaner Filter	OFF/ON
		Engine/Air Conditioner V-Belt	OFF/ON
		Air Conditioner Filter	OFF/ON
		Fuel Filter	OFF/ON
Change Memory Status	ML Crane		Store/Not Store

Continued on next page

References

Inner Hour Meter Sync.	—
Fuel Consumption Gauge Display ON/OFF Selection	Enable/Disable

Various Settings—After selecting Various Settings button, Dr. ZX will display a list of items that may be configured in the monitor controller.

2. Select an item to change how the monitor controller displays information.

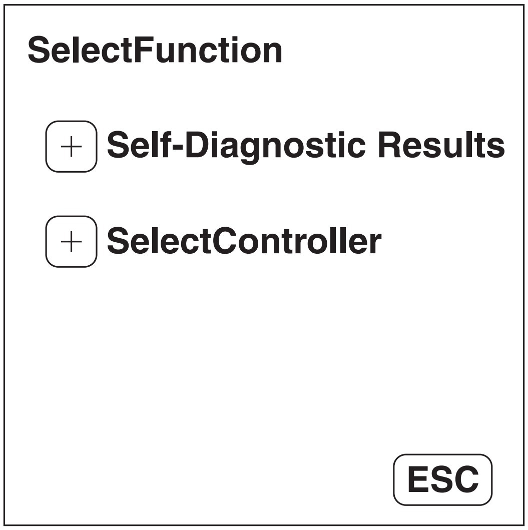
LD30992,0000222 –19–26APR06–9/9

Dr. ZX Password Change

1. Start Dr. ZX and select Select Controller.

   Password change can be preformed by selecting any of the controllers under the select controller function.

   ESC will return to Large—3 Selection Screen.



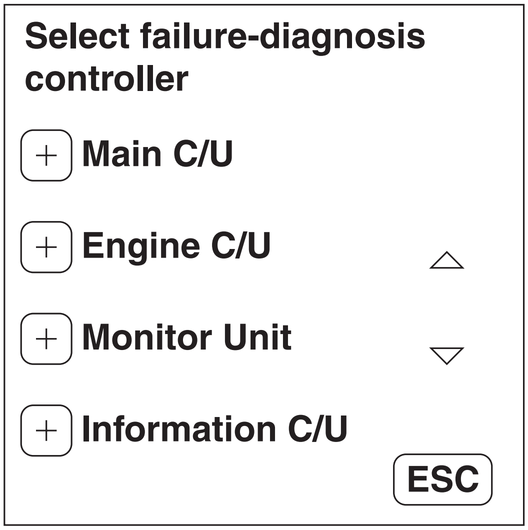
TX1002912 –19–24JAN06

Function Selection Screen

LD30992,00004C3 –19–08JUN06–1/6

2. Select MainC/U.

   ESC will return to Function Selection Screen.



TX1002915 –19–24JAN06

Controller Selection Screen

Continued on next page

LD30992,00004C3 –19–08JUN06–2/6

3. Select Password.

   Back will return to Function Selection Screen.

   Disp.Record will display stored data from the Write Data Bank.

   Start will go to Monitor Display, Special Function and Setup Select Function Screen.

   Op.Manual is not available at this time.

Dr.ZX ServiceSoft
(C) Hitachi Construction
Machinery Co., ltd

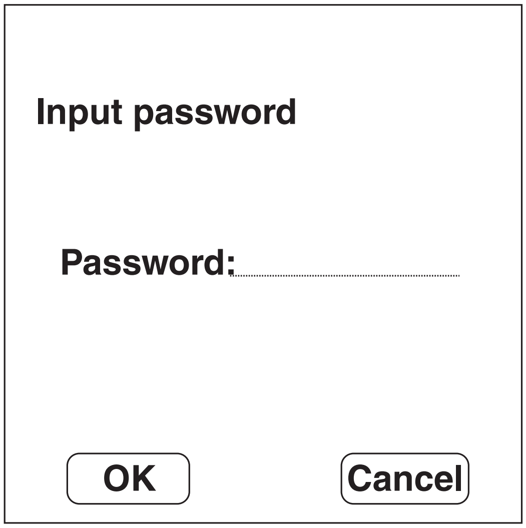
TX1002917 –19–24JAN06

Dr. ZX Start Screen

LD30992,00004C3 –19–08JUN06–3/6

4. Input the current password and select OK.

   Cancel will return to Dr. ZX Start Screen.



Input password

Password:

TX1002980 –19–25JAN06

Input Password Screen

Continued on next page

LD30992,00004C3 –19–08JUN06–4/6

5. Input the new password, then re-input the password again and select OK.

   Cancel will return to Dr. ZX Start Screen.

Input new password

New Password: ******

Re-Input ******

Password Verification Screen

LD30992,00004C3 –19–08JUN06–5/6

6. Select OK to return to the Dr. ZX Start Screen.

Password has set

Password Set Screen

LD30992,00004C3 –19–08JUN06–6/6

Pump Learning Procedure

The pump learning procedure uses inputs from the pump control pressure sensors while monitoring the output to the pump control solenoids to determine the pump swash plate position.

IMPORTANT: Pump learning procedure must be performed if the hydraulic pump, hydraulic pump regulator, hydraulic pump control solenoid or main controller (MCF) are replaced.

IMPORTANT: If pump learning procedure fails, new data is not stored. Main controller (MCF) will use previous pump learning data.

Machine must meet the following criteria to perform pump learning procedure:

- No diagnostic trouble codes
- Engine speed dial: fast idle
- Auto-idle switch: Off
- Power mode switch: HP
- Pressure sensor: Zero output (pilot control lever in neutral)
- Hydraulic oil temperature: 45—55°C (81—163°F)
- Pilot shutoff lever: LOCK position
- Learning switch: OFF

1. Connect to machine with Dr. ZX. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX. (Group 9015-20.)

2. Under Main Controller: Monitor Display, select:

   - Pump Regulator Learning SW
   - Pump 1 Regulator Learning Condition
   - Pump 2 Regulator Learning Condition
   - Pump 1&2 Regulator Learning Status

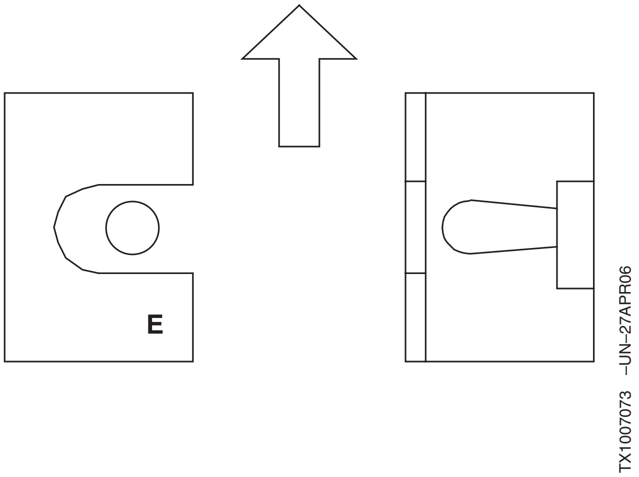
   Select Start to view selected items.

Continued on next page

3. Turn learning switch to ON position (the position away from “E”). Learning switch is located under the fuse cover.

4. Monitor the pump learning procedure status with Dr. ZX.

   - Pump Regulator Learning SW: Displays status of learning switch
   - Pump 1 Regulator Learning Condition: Displays regulator learning condition after pump learning procedure has been performed.
   - Pump 2 Regulator Learning Condition: Displays regulator learning condition after pump learning procedure has been performed.
   - Pump 1&2 Regulator Learning Status:
     - 1In, 2In—Display when a new main controller is installed and learning procedure has not been performed.
     - 1Su, 2Su—Display when pump learning procedure is successful.
     - 1Fa, 2Fa—Display when pump learning procedure has failed.
     - 1Le, 2Le—Display when pump learning procedure is in progress.



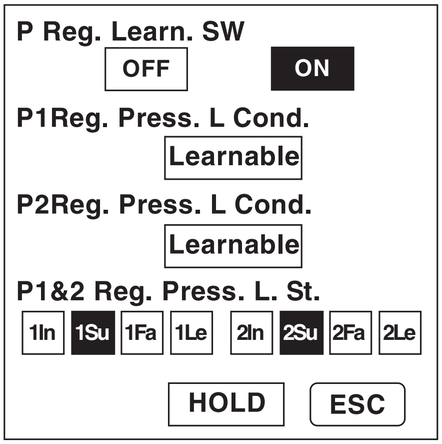
Learning Switch

1—Learning Switch

Continued on next page

LD30992,00004C8 –19–08JUN06–2/4

5. When “1Su” and “2Su” are displayed, pump learning procedure is complete. If “1Fa” or “2Fa” is displayed, pump learning procedure has failed. See diagnostic table below.



P Reg. Learn. SW
OFF [✓ ON]

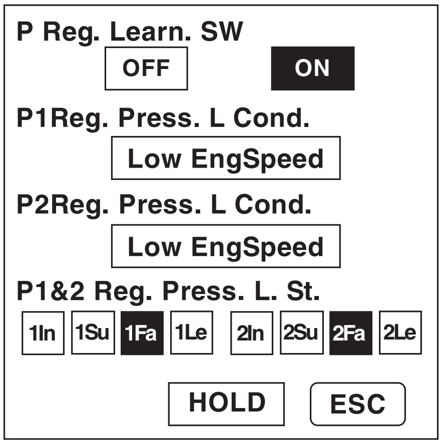
P1Reg. Press. L Cond.
Learnable

P2Reg. Press. L Cond.
Learnable

P1&2 Reg. Press. L. St.
1In [✓ 1Su] 1Fa 1Le 2In [✓ 2Su] 2Fa 2Le

TX1007071 –19–27APR06

Pump Learning Success



P Reg. Learn. SW
OFF [✓ ON]

P1Reg. Press. L Cond.
Low EngSpeed

P2Reg. Press. L Cond.
Low EngSpeed

P1&2 Reg. Press. L. St.
1In 1Su [✓ 1Fa] 1Le 2In 2Su [✓ 2Fa] 2Le

TX1007072 –19–27APR06

Pump Learning Failure

Continued on next page LD30992,00004C8 –19–08JUN06–3/4

NOTE: Pump learning procedure takes approximately 40 seconds to complete.

Learning Status	Cause	Corrective Action
Low Eng Speed	Actual engine speed less than 500 rpm Abnormal CAN Communication	Check for diagnostic trouble codes Increase engine speed to 1600 rpm or more
Gate Lock Awaked	Pilot shutoff lever moved from LOCKED position	Move pilot shutoff lever to LOCKED position
Signal Over Range	Pump regulator pressure sensor or harness malfunction Pump control solenoid valve or harness malfunction	Check for diagnostic trouble codes
Save Failed	Main controller malfunction	Repeat procedure three more times. If main controller continues to fail saving data, replace controller
Learnable	Normal	—

LD30992,00004C8 –19–08JUN06–4/4

Machine Information Center (MIC) Application

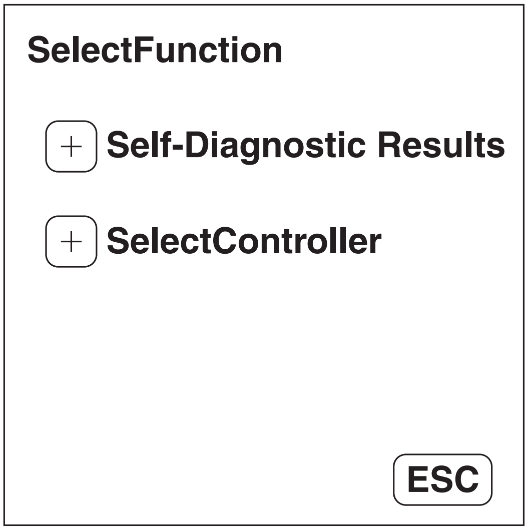
Machine Information Center (MIC) Application is a program that allow dealers and technicians to view and analyze data downloaded from the machine. The Information Controller (ICF) records various data points and stores them for download at a later time. After the data has been downloaded to the Personal Digital Assistant (PDA) it can be transferred to a computer to be analyzed.

LD30992,0000224 –19–25APR06–1/1

Information Controller (ICF) Initialization

1. Start Dr. ZX, and select Select Controller.

   ESC will return to ZX—3 Large Screen.



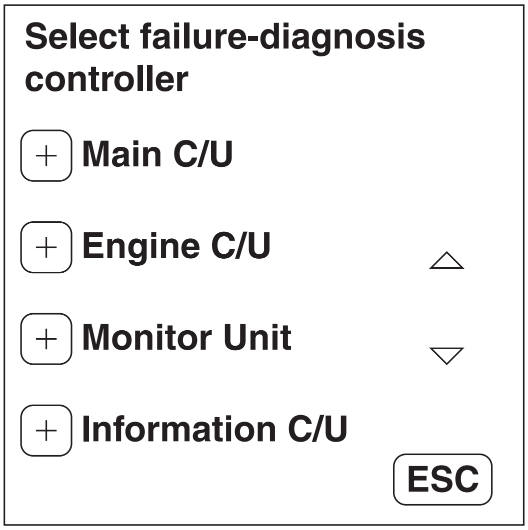
TX1002912 –19–24JAN06

Function Selection Screen

LD30992,0000225 –19–08JUN06–1/8

2. Select Information C/U.

   ESC will return to Function Selection Screen.



TX1002915 –19–24JAN06

Controller Selection Screen

Continued on next page

LD30992,0000225 –19–08JUN06–2/8

3. Select OK.

   ESC will return to Function Selection Screen.

NOTE: Satellite Terminal is not available on this equipment.

ICF

ControllerVer: 01 01

Satellite Terminal

ControllerVer:

Is it correct?

Information Controller (ICF) Version Verification Screen

LD30992,0000225 –19–08JUN06–3/8

4. Select Start.

   Back will return to Function Selection Screen.

   Password allows the user to change the password. See Dr. ZX Password Change. (Group 9015-20.)

Dr.ZX ServiceSoft
(C) Hitachi Construction
Machinery Co., ltd

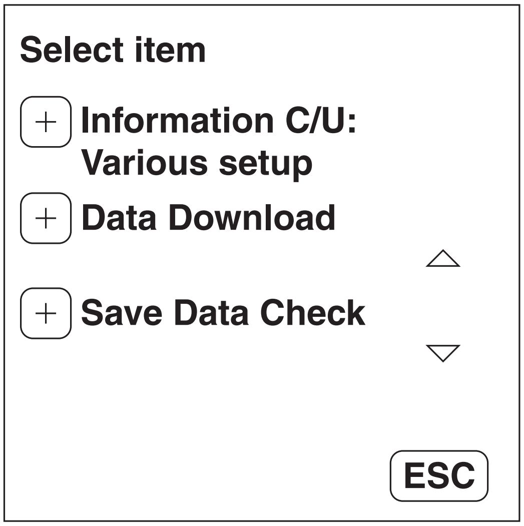
Dr. ZX Start Screen

Continued on next page

LD30992,0000225 –19–08JUN06–4/8

5. Select Information C/U: Various setup.

   ESC will return to Dr. ZX Start Screen.



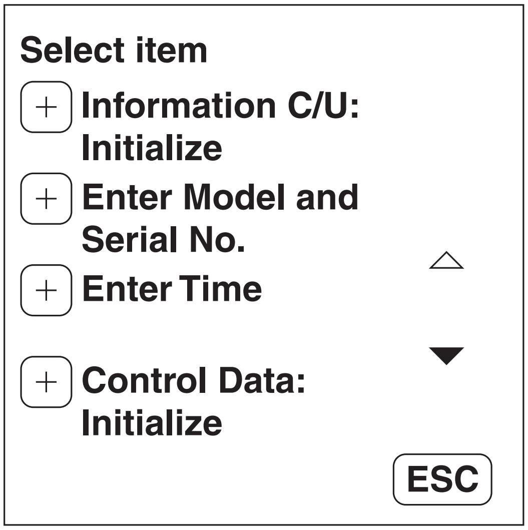
TX1002988 –19–25JAN06

Information Controller Setup Screen

LD30992,0000225 –19–08JUN06–5/8

6. Select Information C/U Initialize.

   ESC will return to Information Controller Setup Screen.



TX1002990 –19–25JAN06

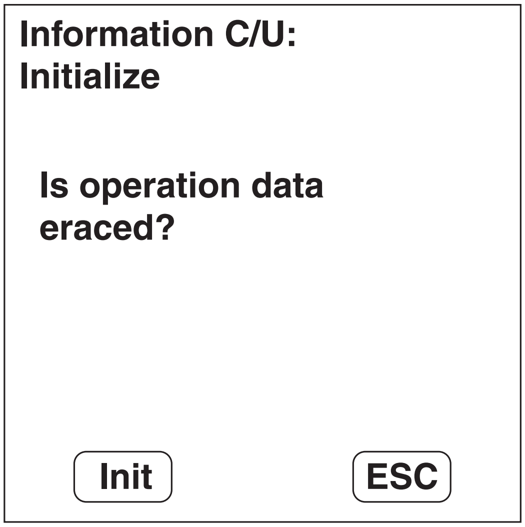
Information C/U Various Setup Screen

Continued on next page

LD30992,0000225 –19–08JUN06–6/8

7. Select Init and the controller operating data is initialized.

   Select ESC to return to the Information C/U: Various Setup Screen without initializing the information controller.



Information C/U: Initialize

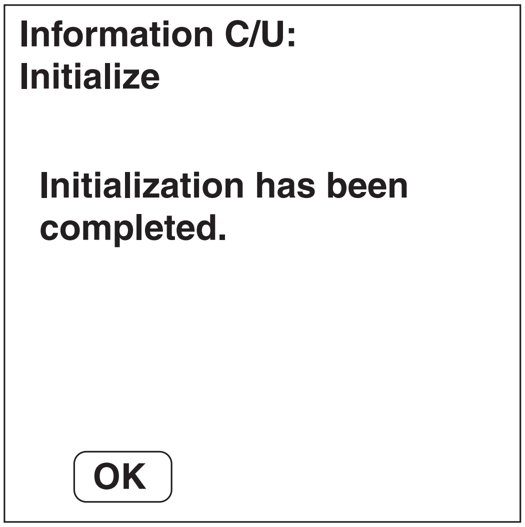
Is operation data eraced?

TX1002992 –19–25JAN06

Information C/U: Initialize Screen

LD30992,0000225 –19–08JUN06–7/8

8. Push OK and return to Information C/U Various setup screen.



Information C/U: Initialize

Initialization has been completed.

TX1002994 –19–25JAN06

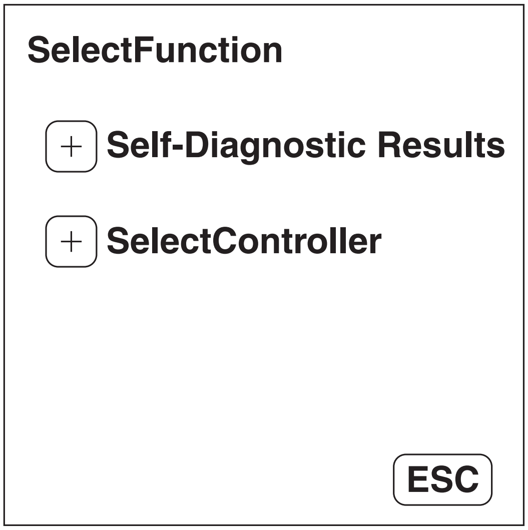
Information C/U: Initialization Completed Screen

LD30992,0000225 –19–08JUN06–8/8

Information Controller (ICF) Model and Serial Number

1. Start Dr. ZX and select Select Controller.

   ESC will return to ZX—3 Large Screen.



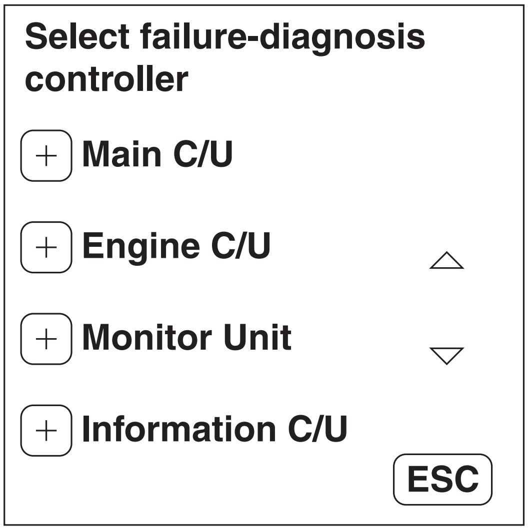
TX1002912 –19–24JAN06

Function Selection Screen

LD30992,00004C4 –19–08JUN06–1/8

2. Select Information C/U.

   ESC will return to Function Selection Screen.



TX1002915 –19–24JAN06

Controller Selection Screen

Continued on next page

LD30992,00004C4 –19–08JUN06–2/8

3. Select OK.

   ESC will return to Function Selection Screen.

ICF

ControllerVer: 01 01

Satellite Terminal

ControllerVer:

Is it correct?

TX1002984 –19–25JAN06

Information Controller (ICF) Version Verification Screen

LD30992,00004C4 –19–08JUN06–3/8

4. Select Start.

   Back will return to Function Selection Screen.

   Password allows the user to change the password. See Dr. ZX Password Change. (Group 9015-20.)

Dr.ZX ServiceSoft
(C) Hitachi Construction
Machinery Co., ltd

TX1002985 –19–25JAN06

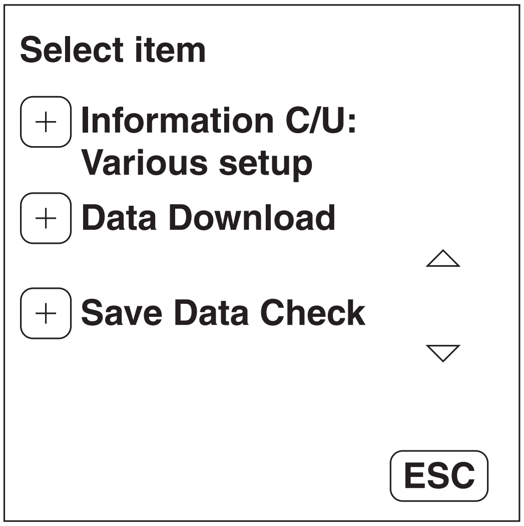
Dr. ZX Start Screen

Continued on next page

LD30992,00004C4 –19–08JUN06–4/8

5. Select Information C/U: Various setup.

   ESC will return to Dr. ZX Start Screen.

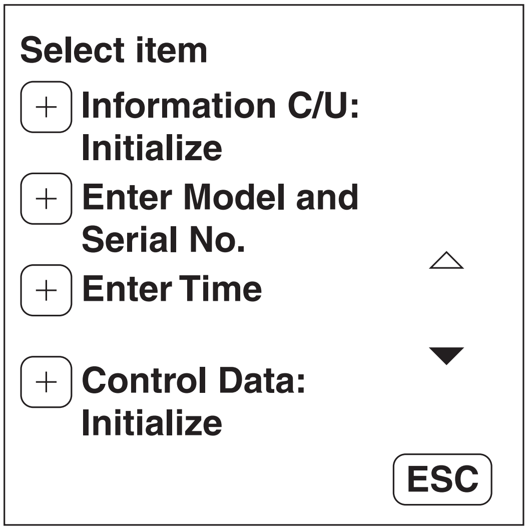


Information Controller Setup Screen

LD30992,00004C4 –19–08JUN06–5/8

6. Select Enter Model and Serial No.

   ESC will return to Information Controller Setup Screen.



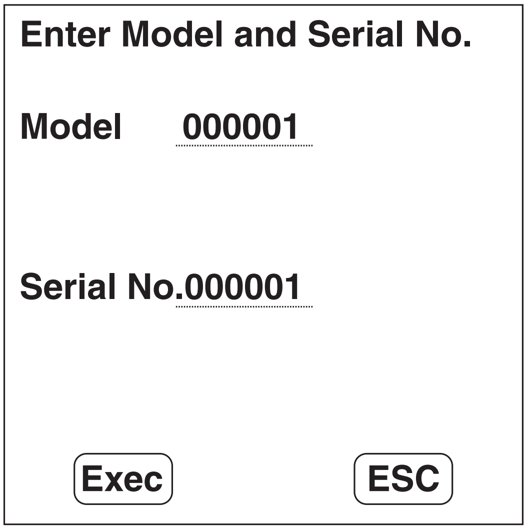
Information C/U: Various Setup Screen

Continued on next page

LD30992,00004C4 –19–08JUN06–6/8

7. Enter Model and Serial number and select Exec to proceed.

   Select ESC to return to Information C/U: Various Setup Screen without changing the model or serial number.



Enter Model and Serial No.

Model 000001

Serial No.000001

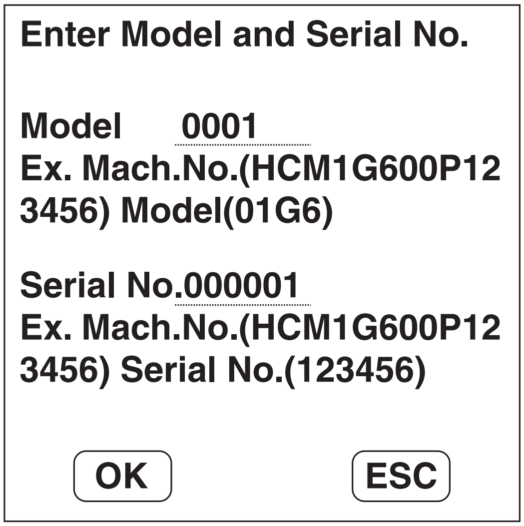
TX1002996 –19–25JAN06

Enter Model and Serial Number Screen

LD30992,00004C4 –19–08JUN06–7/8

8. After verifying model and serial number select OK to continue.

   ESC will return to Information C/U: Various Setup Screen.



Enter Model and Serial No.

Model 0001
Ex. Mach.No.(HCM1G600P123456) Model(01G6)

Serial No.000001
Ex. Mach.No.(HCM1G600P123456) Serial No.(123456)

TX1002998 –19–25JAN06

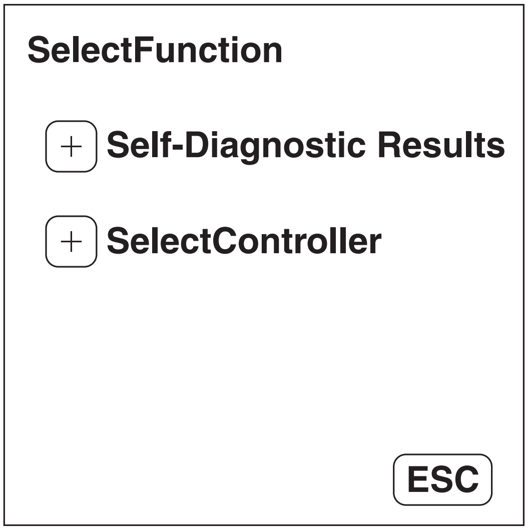
Enter Model and Serial Number Screen

LD30992,00004C4 –19–08JUN06–8/8

Information Controller (ICF) Date and Time

1. Start Dr. ZX and select Select Controller.

   ESC will return ZX—3 Large Screen.



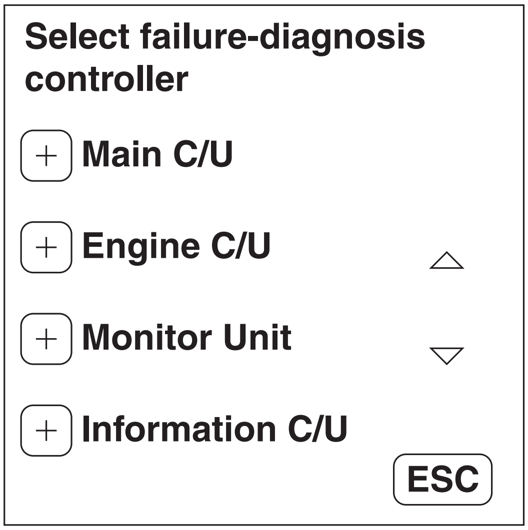
TX1002912 –19–24JAN06

Function Selection Screen

LD30992,00004C5 –19–08JUN06–1/7

2. Select Information C/U.

   ESC will return to Function Selection Screen.



TX1002915 –19–24JAN06

Controller Selection Screen

Continued on next page

LD30992,00004C5 –19–08JUN06–2/7

3. Verify controller version and select OK.

   ESC will return to Function Selection Screen

ICF

ControllerVer: 01 01

Satellite Terminal

ControllerVer:

Is it correct?

Information Controller Version Screen

LD30992,00004C5 –19–08JUN06–3/7

4. Select Start.

   Back will return to Function Selection Screen.

   Password allows the user to change the password. See Dr. ZX Password Change. (Group 9015-20.)

Dr.ZX ServiceSoft
(C) Hitachi Construction
Machinery Co., ltd

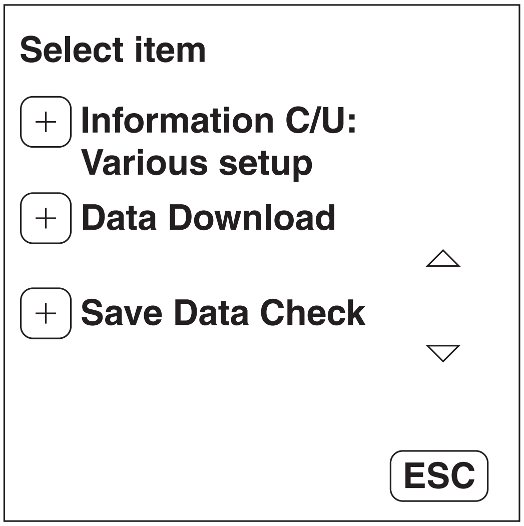
Dr. ZX Start Screen

Continued on next page

LD30992,00004C5 –19–08JUN06–4/7

5. Select Information C/U: Various setup.

   ESC will return to Dr. ZX Start Screen.



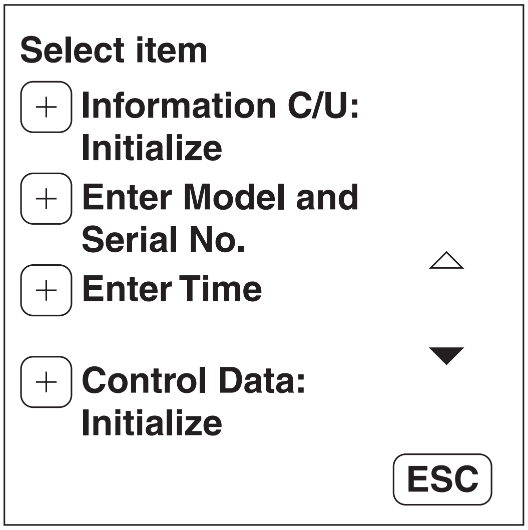
TX1002988 –19–25JAN06

Information Controller Setup Screen

LD30992,00004C5 –19–08JUN06–5/7

6. Select Enter Time.

   ESC will return to Information Controller Setup Screen.



TX1002990 –19–25JAN06

Information C/U: Various Setup Screen

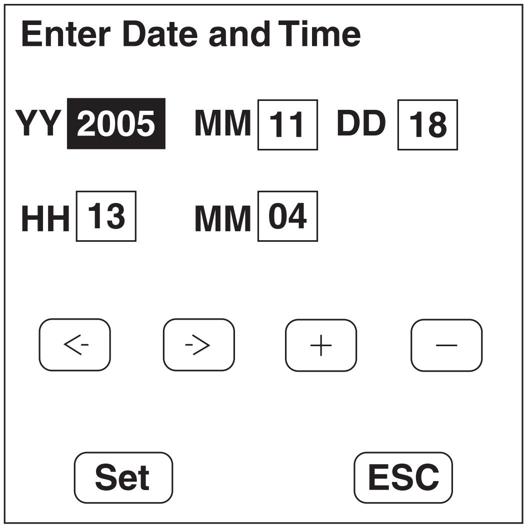
Continued on next page

LD30992,00004C5 –19–08JUN06–6/7

7. Use the right and left arrow keys to select a field, then use the + and - keys to change the value within the selected field.

   Select Set to set time and return to Information Controller Setup Screen.

   ESC will return to Information Controller Setup Screen.



Enter Date and Time

YY 2005 MM 11 DD 18

HH 13 MM 04

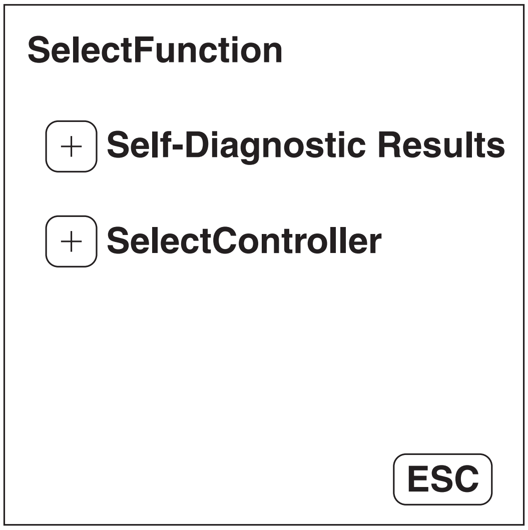
Enter Date and Time Screen

LD30992,00004C5 –19–08JUN06–7/7

Information Controller (ICF) Control Data: Initialize

1. Start Dr. ZX and select Select Controller.

   ESC will return to ZX—3 Large screen.



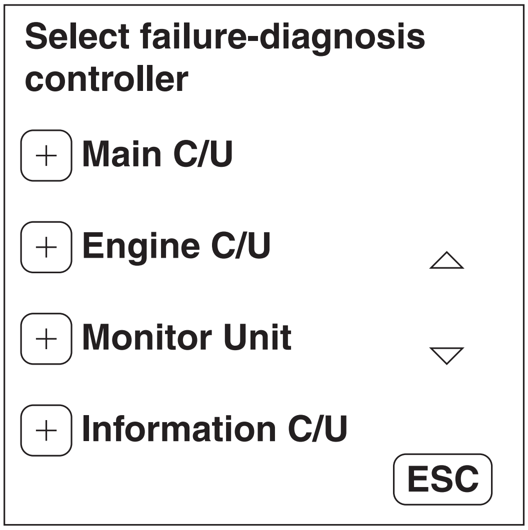
Function Selection Screen

Continued on next page

LD30992,00004C6 –19–08JUN06–1/8

2. Select Information C/U.

   ESC returns to Function Selection Screen.



Select failure-diagnosis controller

TX1002915 –19–24JAN06

Controller Selection Screen

LD30992,00004C6 –19–08JUN06–2/8

3. Select OK.

   ESC will return to Function Selection Screen.

ICF

ControllerVer: 01 01

Satellite Terminal

ControllerVer:

Is it correct?

TX1002984 –19–25JAN06

Information Controller (IFC) Version Verification Screen

Continued on next page

LD30992,00004C6 –19–08JUN06–3/8

4. Select Start.

   Back will return to Function Selection Screen.

   Password allows the user to change the password. See Dr. ZX Password Change. (Group 9015-20.)

Dr.ZX ServiceSoft
(C) Hitachi Construction
Machinery Co., ltd

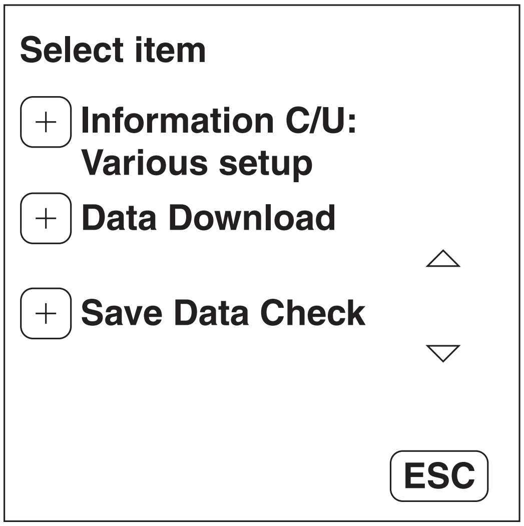
TX1002985 –19–25JAN06

Dr. ZX Start Screen

LD30992,00004C6 –19–08JUN06–4/8

5. Select Information C/U: Various setup.

   ESC will return to Dr. ZX Start Screen.



TX1002988 –19–25JAN06

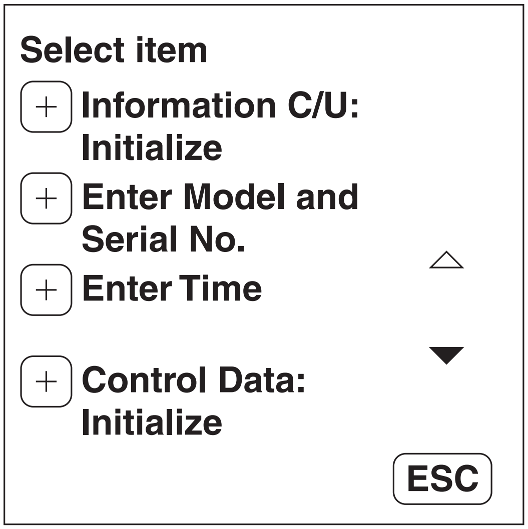
Information Controller Setup Screen

Continued on next page

LD30992,00004C6 –19–08JUN06–5/8

6. Select Control Data Initialize.

   ESC will return to Information Controller Setup Screen.



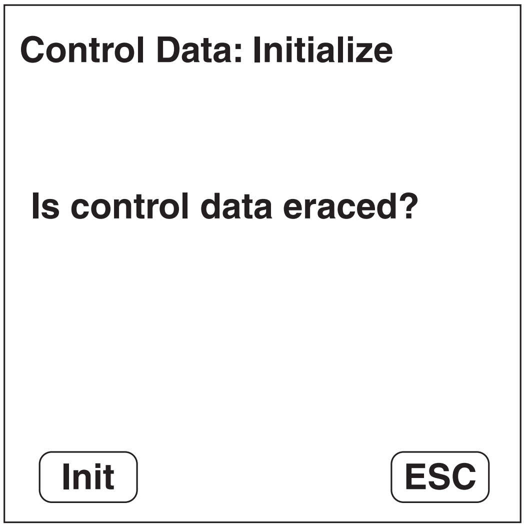
TX1002990 –19–25JAN06

Information C/U: Various Setup Screen

LD30992,00004C6 –19–08JUN06–6/8

7. Select Init to start initialization.

   ESC will return to Information C/U: Various Setup Screen.



Control Data: Initialize

Is control data eraced?

TX1003000 –19–25JAN06

Control Data: Initialize Screen

Continued on next page

LD30992,00004C6 –19–08JUN06–7/8

8. Select OK and return to information C/U: Various Setup screen.

Control Data: Initialize

Initialization has been completed.

Control Data Initialization Confirmation

LD30992,00004C6 –19–08JUN06–8/8

Information Controller (ICF) Satellite Terminal

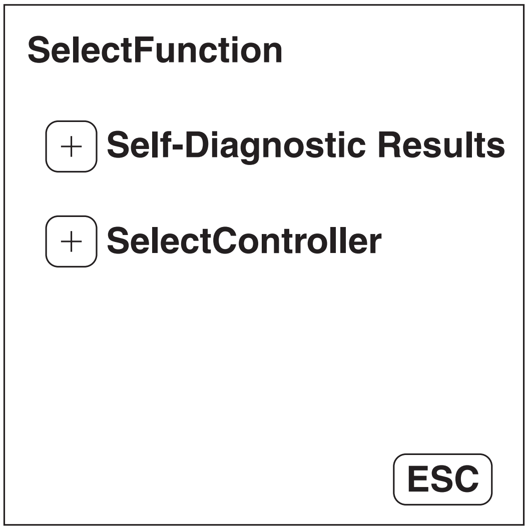
The information controller (ICF) satellite terminal is not available for this machine.

LD30992,00004C7 –19–25APR06–1/1

Information Controller (ICF) Data Download

1. Start Dr. ZX and select Select Controller.

   ESC will return to ZX—3 Large Screen.



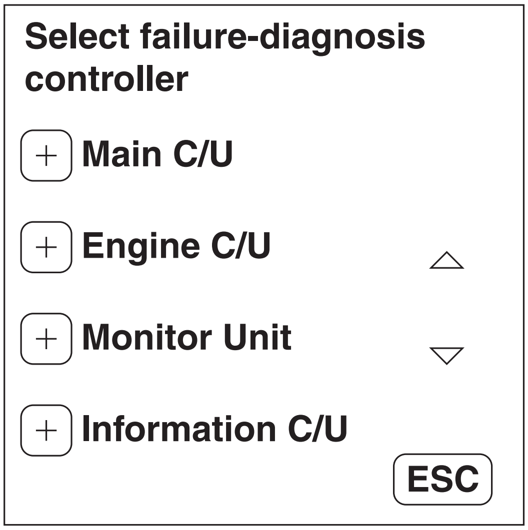
Function Selection Screen

Continued on next page

LD30992,0000226 –19–08JUN06–1/7

2. Select Information C/U.

   ESC will return to Select Function Screen.



Select failure-diagnosis controller

TX1002915 –19–24JAN06

Controller Selection Screen

LD30992,0000226 –19–08JUN06–2/7

3. Verify controller version and select OK.

   ESC returns to Function Selection Screen.

ICF

ControllerVer: 01 01

Satellite Terminal

ControllerVer:

Is it correct?

TX1002984 –19–25JAN06

Information Controller (IFC) Version Verification Screen

Continued on next page

LD30992,0000226 –19–08JUN06–3/7

4. Select Start.

   Back will return to Function Selection Screen.

   Password allows the user to change the password. See Dr. ZX Password Change. (Group 9015-20.)

Dr.ZX ServiceSoft
(C) Hitachi Construction
Machinery Co., ltd

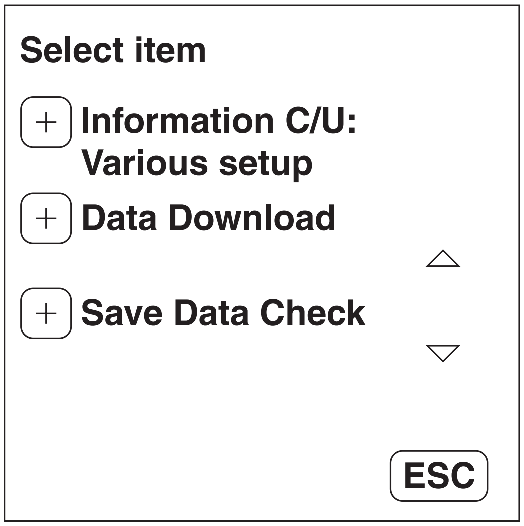
TX1002985 –19–25JAN06

Dr. ZX Start Screen

LD30992,0000226 –19–08JUN06–4/7

5. Select Data Download.

   ESC will return to Dr. ZX Start Screen.



TX1002988 –19–25JAN06

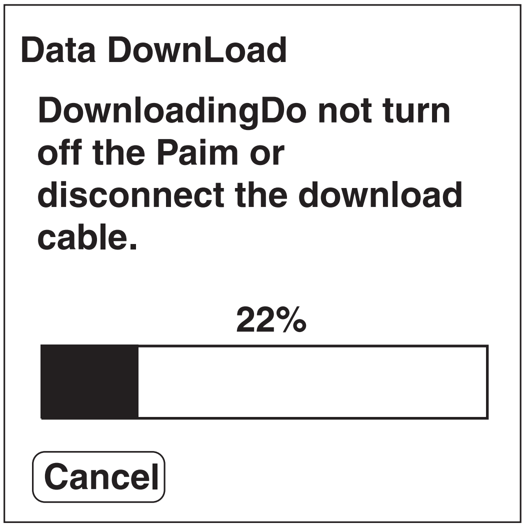
Information Controller Setup Screen

Continued on next page

LD30992,0000226 –19–08JUN06–5/7

6. The download screen is displayed while data is transferred.

   Cancel will terminate download and return to Information Controller Setup Screen.



Data DownLoad

DownloadingDo not turn off the Paim or disconnect the download cable.

22%

TX1003003 –19–25JAN06

Data Download Screen

Continued on next page

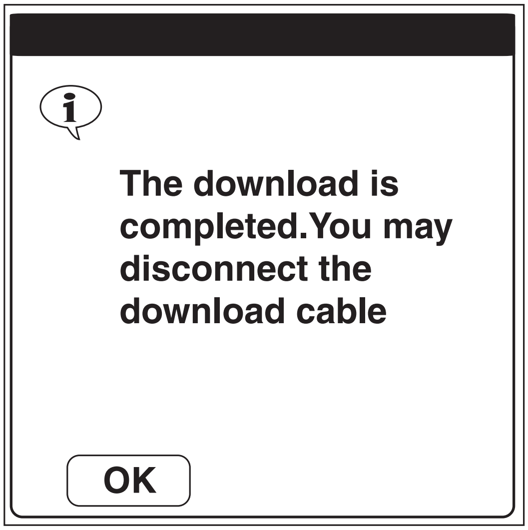
LD30992,0000226 –19–08JUN06–6/7

7. If the data transfer is interrupted, this screen will be displayed. Check connection and select data download from the Main Menu screen again.

The download has been interrupted.No data has been transferred to the Dr.ZX

TX1003005 –19–25JAN06

Download Interrupted Screen



The download is completed.You may disconnect the download cable

TX1003004 –19–26APR06

Download Completed Screen

LD30992,0000226 –19–08JUN06–7/7

Information Controller (ICF) Recorded Data

The Information Controller (ICF) records and saves data from the various sensors and switches on the machine.

The information controller records:

- Daily Report Data List
- Frequency Distribution List
- Cumulative Operating Hour List

The data may be downloaded to a computer or sent via satellite (if equipped). See Information Controller (ICF) Initialization Download. (Group 9015-20.)

Daily Report Data List

Continued on next page LD30992,0000227 –19–25APR06–1/3

Item		Details
Date		Date of daily report data.
Start Time		Time when key switch is first turned ON during daily operation. (Recorded by key switch ON signal.)
Stop Time		Time when key switch is last turned OFF during daily operation. (Recorded by key switch ON signal.)
Fuel Level		Level of fuel at the end of daily operation. (Recorded by the fuel sensor from the monitor.)
Fuel Usage		Amount of fuel used during a day. (Calculated from Engine Control Unit (ECU))
Machine Hour Meter		Cumulative machine hours. (Recorded from hour meter on monitor.)
	HP Mode Hours	Hours operated in HP mode per day. (Recorded from power mode switch information from Main Controller (MCF))
Engine Operating Hours	P Mode Hours	Hours operated in P mode per day. (Recorded from power mode switch information from Main Controller (MCF))
	E Mode Hours	Hours operated in E mode per day. (Recorded from power mode switch information from Main Controller (MCF))
Auto-Idle Switch ON Time		Hours operated with auto-idle switch ON per day. (Recorded from auto-idle switch information from Main Controller (MCF))
Travel Operating Hours	Fast Travel Hours	Hours operated in fast travel mode per day. (Recorded from travel speed switch information from Main Controller (MCF))
	Slow Travel Hours	Hours operated in slow travel mode per day. (Recorded from travel speed switch information from Main Controller (MCF))
Swing Operating Hours		Hours operated swinging per day. (Recorded from swing pressure sensor information from the Main Controller (MCF))
Digging Operating Hours		Hours operated digging per day. (Recorded from front attachment information from the Main Controller (MCF))
	Breaker Operating Hours	Hours operated with breaker selected per day. (Recorded from attachment information from Main Controller (MCF))
	Secondary Crusher Operating Hours	Hours operated with secondary crusher selected per day. (Recorded from attachment information from Main Controller (MCF))
Attachment Operating Hours	Primary Crusher Operating Hours	Hours operated with primary crusher selected per day. (Recorded from attachment information from Main Controller (MCF))
	Vibrating Hammer Operating Hours	Hours operated with vibrating hammer selected per day. (Recorded from attachment information from Main Controller (MCF))
	Bucket Operating Hours	Hours operated with bucket selected per day. (Recorded from attachment information from Main Controller (MCF))
No Load Time		Hours machine is not operated per day. (Recorded from all pressure sensors from Main Controller (MCF))
Radiator Coolant Temperature		Highest radiator coolant temperature per day. (Recorded from monitor)
Hydraulic Oil Temperature		Highest hydraulic oil temperature per day. (Recorded from Main Controller (MCF))
Intake Air Temperature		Highest intake air temperature per day. (Recorded from Engine Control Unit (ECU))
Engine Operating Hour Distribution Data		Operating hour distribution for engine per day. (Recorded when alternator output signal is available for more than 10 min.)
Loaded Time Distribution Data		Operating hour distribution for machine per day. (Recorded when operating pressure is continuously detected for more than 5 min. with engine running)

Continued on next page

Frequency Distribution Data List

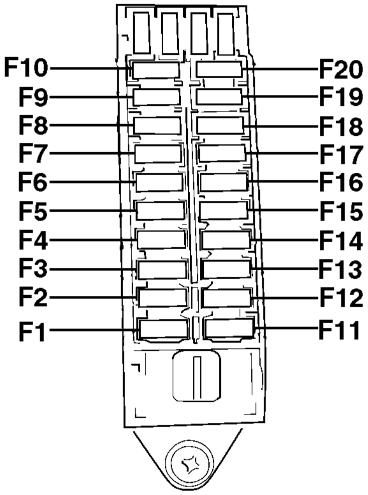
Item	Details
Fuel Temperature	Frequency distribution of fuel temperature.
Pump Load	Frequency distribution of average pump delivery pressure of pumps 1 and 2.
Average Pump Delivery Pressure in Digging Operation	Frequency distribution of average pump delivery pressure from pumps during digging operation.
Average Pump Delivery Pressure in Travel Operation	Frequency distribution of average pump delivery pressure from pumps during travel operation.
Radiator Coolant Temperature	Frequency information of coolant temperature.
Hydraulic Oil Temperature	Frequency information of hydraulic oil temperature.
Radiator Coolant Temperature—Intake Air Temperature	Frequency information on temperature in which intake air temperature is pulled from coolant temperature.
Hydraulic Oil Temperature—Intake Air Temperature	Frequency information on temperature in which intake air temperature is pulled from hydraulic oil temperature.
Pump Load Rate	Frequency information of engine speed and average load rate. (average of pump 1 load rate and pump 2 load rate)
Engine Load Rate	Frequency information of engine speed and engine torque.
Radiator Coolant Temperature/Intake Air Temperature	Frequency information of coolant temperature and intake air temperature.
Hydraulic Oil Temperature/Intake Air Temperature	Frequency information of hydraulic oil temperature and intake air temperature.

Cumulative Operation Hour List

Item		Details
Inner Hour Meter		Hour meter's value accumulated inside Information Controller (ICF).
Machine Hour Meter		Hour meter's value accumulated inside machine's monitor.
	HP Mode Hours	Total engine operating hours in HP mode.
Engine Operation Hours	P Mode Hours	Total engine operating hours in P mode.
	E Mode Hours	Total engine operating hours in E mode.
Auto-Idle Switch ON Time		Hours when auto-idle switch is turned ON.
Travel Operation Hours	Fast Travel Speed Hours	Total operating hours in fast travel mode.
	Slow Travel Speed Hours	Total operating hours in slow travel mode.
Swing Operation Hours		Total swing operating hours.
Front Attachment Operating Hours		Total front attachment operating hours.
	Breaker Operating Hours	Total operating hours with breaker selected per day.
Attachment Operation Hours	Secondary Crusher Operating Hours	Total operating hours with secondary crusher selected per day.
	Vibrating Hammer Operating Hours	Total operating hours with vibrating hammer selected per day.
	Bucket Operating Hours	Total operating hours with bucket selected per day.
No Load Time		Total of machine's waiting hours.

Fuse Test

Some symptoms may indicate an expensive component failure, when in fact a fuse has failed. Machine functions can be performed without test equipment to determine if fuses have failed. If certain circuits or components operate, fuses are considered to be OK.



TX1000782 –UN–29NOV05

F1—Boom Lights 20 A Fuse (Marked LAMP)
F2—Windshield Wiper and Washer 10 A Fuse (Marked WIPER)
F3—Air Conditioner and Heater 20 A Fuse (Marked HEATER)
F4—Solenoid 10 A Fuse (Marked SOLENOID)
F5—Travel Alarm 5 A Fuse (Marked OPT. ALT 1)
F6—Optional Equipment 10 A Fuse (Marked OPT. 2)
F7—Lubricator 10 A Fuse (Marked LUBRICATOR)
F8—Engine Control Module (ECM) 30 A Fuse (Marked ECM)
F9—Radio Backup 5 A Fuse (Marked BACK UP)
F10—Machine Information Center and Main Controller Batter Power 5 A Fuse (Marked CU)
F11—Horn 10 A Fuse (Marked HORN)
F12—Radio and Dome Light 5 A Fuse (Marked ROOM LAMP RADIO)
F13—Lighter 10 A Fuse (Marked LIGHTER)
F14—High Pressure Fuel Pump Control Valve 15 A Fuse (Marked PCV)
F15—Cab Auxiliary Power Connector One 10 A Fuse (Marked AUXILIARY)
F16—Glow Plug Relay 5 A Fuse (Marked GLOW/RELAY)
F17—Air Conditioner and Heater 5 A Fuse (Marked AIR CON)
F18—Controller Key Switch Signal 5 A Fuse (Marked POW ON)
F19—Controller 5 A Fuse (Marked SW. BOX)
F20—Optional Equipment 10 A Fuse (Marked (OPT. BATT 3))

Continued on next page

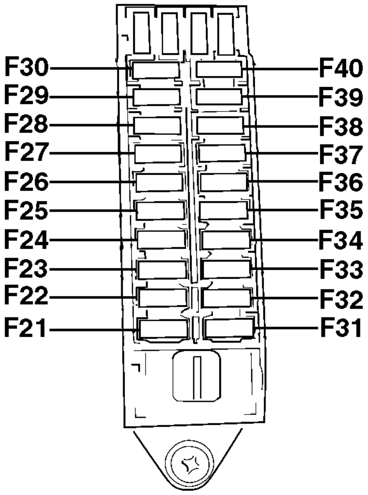
LD30992,0000228 –19–07APR06–1/5

Fuse Test		
Fuse	Test	Results of Fuse Failure
F1—Boom Lights 20 A Fuse (Marked LAMP)	Turn key switch ON. Turn light switch to first or second position. If boom lights operate, fuse is OK.	Boom lights will not operate.
F2—Windshield Wiper and Washer 10 A Fuse (Marked WIPER)	Turn key switch ON. Turn windshield wiper ON. If wiper or washer operates, fuse is OK.	Windshield wiper and washer will not operate.
F3—Air Conditioner and Heater 20 A Fuse (Marked HEATER)	Turn key switch ON. Push blower speed switch. If blower operates in any speed, fuse is OK.	Air conditioner or heater blower will not operate.
F4—Solenoid 10 A Fuse (Marked SOLENOID)	If hydraulic system functions normally, fuse is OK.	Travel and hydraulic functions will not operate.
F5—Travel Alarm 5 A Fuse (Marked OPT. ALT 1)	If travel alarm sounds while traveling, fuse is OK.	Travel alarm will not operate.
F6—Optional Equipment 10 A Fuse (Marked OPT. 2)	Check with multimeter.	Optional equipment will not operate.
F7—Lubricator 10 A Fuse (Marked LUBRICATOR)	Check with multimeter.	Lubricator will not operate.
F8—Engine Control Module (ECM) 30 A Fuse (Marked ECM)	Turn key switch to START. If engine starts, fuse is OK.	Engine will crank, but will not start. Alarm indicators will appear on monitor display.
F9—Radio Backup 5 A Fuse (Marked BACK UP)	Turn key switch ON. If radio keeps time and presets, fuse is OK.	Radio clock will reset and radio will not keep preset stations.
F10—Machine Information Center and Main Controller Batter Power 5 A Fuse (Marked CU)	Turn key switch ON. If monitor displays time and fuel usage meter (if option is enabled), fuse is OK.	Monitor will not display time or fuel usage meter.
F11—Horn 10 A Fuse (Marked HORN)	Press horn button. If horn sounds, fuse is OK.	Horn will not operate.
F12—Radio and Dome Light 5 A Fuse (Marked ROOM LAMP RADIO)	Turn key switch ON. Turn on dome light or radio. If radio or dome light operates, fuse is OK.	Radio and dome light will not operate.
F13—Lighter 10 A Fuse (Marked LIGHTER)	Check with multimeter.	Lighter will not operate.
F14—High Pressure Fuel Pump Control Valve 15 A Fuse (Marked PCV)	Turn key to START position. If engine starts, fuse is OK.	Engine will crank but not start.
F15—Cab Auxiliary Power Connector One 10 A Fuse (Marked AUXILIARY)	Check with multimeter	Optional equipment will not operate.
F16—Glow Plug Relay 5 A Fuse (Marked GLOW/RELAY)	Check with multimeter	Glow plugs will not operate.
F17—Air Conditioner and Heater 5 A Fuse (Marked AIR CON)	Turn key switch ON. If air conditioner and heater controller operates, fuse is OK.	Air conditioner and heater controller and display will not operate.
F18—Controller Key Switch Signal 5 A Fuse (Marked POW ON)	Turn key switch ON. If monitor display works, fuse is OK.	Monitor display will not work, engine will not crank.

Continued on next page

F19—Controller 5 A Fuse (Marked SW. BOX)	Push Hour Meter button with key switch OFF.	Fuel and hour check function will not operate with key switch OFF.
F20—Optional Equipment 10 A Fuse (Marked (OPT. BATT 3))	Check with multimeter.	Optional equipment will not operate.

LD30992,0000228 –19–07APR06–3/5



TX1000660 –UN–29NOV05

F21—Heated Air Seat 10 A Fuse (Marked SEAT HEATER)
F22—Front Cab Light One 15 A Fuse (Marked CAB LAMP FRONT)
F23—Rear Cab Light 10 A Fuse (Marked CAB LAMP REAR)
F24—12 Volt Power Unit 10 A Fuse (Marked 12V UNIT)
F25—IMOBI 5 A Fuse (Marked IMOBI)
F26—Quick Hitch 5 A Fuse (Marked QUICK HITCH)
F27—Cab Auxiliary Power Connector Three 5 A Fuse (Marked AUX.3)
F28—Not Used
F29—Drive Light 20 A Fuse (Marked LIGHT 1)
F30—Auto Lubricator 10 A Fuse (Marked AUTO LUB)
F31—Seat Compressor 10 A Fuse (Marked SEAT COMPR)
F32—Front Cab Light Two 10 A Fuse (Marked CAB LAMP FRONT+2)
F33—Warning Lamp 10 A Fuse (Marked WARNING LAMP)
F34—Cab Auxiliary Power Connector Two 10 A Fuse (Marked AUX.2)
F35—Not Used
F36—Not Used
F37—Not Used
F38—Not Used
F39—Not Used
F40—Not Used

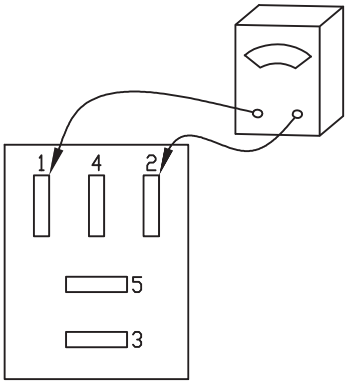
Continued on next page

LD30992,0000228 –19–07APR06–4/5

Fuse Test		
Fuse	Test	Results of Fuse Failure
F21—Heated Air Seat 10 A Fuse (Marked SEAT HEATER)	Check with multimeter.	Seat heater will not operate.
F22—Front Cab Light One 15 A Fuse (Marked CAB LAMP FRONT)	Check with multimeter.	Optional front cab light will not operate.
F23—Rear Cab Light 10 A Fuse (Marked CAB LAMP REAR)	Check with multimeter.	Optional rear cab light will not operate.
F24—12 Volt Power Unit 30 A Fuse (Marked 12V UNIT)	Check with multimeter.	12 volt power outlet will not operate.
F25—IMOBI 5 A Fuse (Marked IMOBI)	Check with multimeter.	Optional equipment will not operate.
F26—Quick Hitch 5 A Fuse (Marked QUICK HITCH)	Check with multimeter.	Optional equipment will not operate.
F27—Cab Auxiliary Power Connector Three 5 A Fuse (Marked AUX.3)	Check with multimeter.	Optional equipment will not operate.
F29—Drive Light 20 A Fuse (Marked LIGHT 1)	Turn key switch ON. If drive light operates, fuse is OK.	Drive light will not operate.
F30—Auto Lubricator 10 A Fuse (Marked AUTO LUB)	Check with multimeter.	Optional equipment will not operate.
F31—Seat Compressor 10 A Fuse (Marked SEAT COMPR)	Turn key switch ON. Press seat compressor button. If compressor operates, fuse is OK.	Seat compressor will not operate.
F32—Front Cab Light Two 10 A Fuse (Marked CAB LAMP FRONT+2)	Check with multimeter.	Optional equipment will not operate.
F33—Warning Lamp 10 A Fuse (Marked WARNING LAMP)	Check with multimeter.	Optional equipment will not operate.
F34—Cab Auxiliary Power Connector Two 10 A Fuse (Marked AUX.2)	Check with multimeter.	Optional equipment will not operate.

LD30992,0000228 –19–07APR06–5/5

Relay Test



T141788 –UN–27APR01

For location of relays see Cab Harness (W1) Component Location. (Group 9015-10.)

Connect a multimeter to terminals 1 and 2.

About 420—460 ohms must be measured. If not, relay has failed.

Connect multimeter to terminals 3 and 4.

Less than 0.4 ohms must be measured. If not, relay has failed.

Connect multimeter to terminals 3 and 5, then 4 and 5.

Multimeter must read open in both connections. If not, relay has failed.

⚠ **CAUTION: Do not connect relay directly to battery. Use a fused power source such as auxiliary power connector (X25) in cab or external power supply.**

Connect 24 volts (+) to terminal 1, ground (-) terminal 2.

Connect multimeter to terminals 3 and 5.

Multimeter must read less than 0.4 ohms. If not, relay has failed.

LD30992,0000229 –19–14MAR06–1/1

Pressure Sensor Test

Pressure Sensor Resistance Test

1. A suspect pressure sensor can be checked by switching positions with a known good sensor. If the problem follows the suspect pressure sensor, it has failed.

   If the problem remains, the harness has failed.

2. To check a pressure sensor using a multimeter, remove it from the machine.

NOTE: Resistance values for pump 1 delivery pressure sensor (B35) and pump 2 delivery pressure sensor (B37) may vary widely. To verify the sensor's functionality, use the on-board monitor or check for diagnostic trouble codes and to monitor the sensor's output. See Monitor Data Items. (Group 9015-20.) See SERVICE ADVISOR™ Diagnostic Application . (Group 9015-20.) See Dr. ZX Diagnostic Application. (Group 9015-20.)

3. Measure resistance as indicated. Resistance may vary from one sensor to another.

Pressure Sensor Resistance Ranges—Specification

Pump 1 (4-Spool) Control Pressure Sensor (B36)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Pump 2 (5-Spool) Control Pressure Sensor (B38)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Swing Pressure Sensor (B33)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Counterweight Removal Pressure Sensor (B46)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Arm Out Pressure Sensor (B50)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Arm In Pressure Sensor (B51)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Boom Up Pressure Sensor (B52)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)

Continued on next page

References

Boom Down Pressure Sensor (B53)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Bucket Curl Pressure Sensor (B54)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Bucket Dump Pressure Sensor (B55)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Travel Right Pressure Sensor (B56)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Travel Left Pressure Sensor (B57)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)

For location of pressure sensors, See Pump Harness (W8) Component Location and See Machine Harness (W2) Component Location. (Group 9015-10.)

Pressure Sensor Voltage Test

1. No voltage at pressure sensors will generate diagnostic trouble codes. Disconnect harness connector from a pressure sensor.

2. With key switch ON, measure voltage between terminals 1 and 3 of pressure sensor harness connector.

Pressure Sensor Voltage Ranges—Specification

Pump 1 (4-Spool) Control Pressure Sensor (B36)—Voltage	4.5—5.5 volts
Pump 2 (5-Spool) Control Pressure Sensor (B38)—Voltage	4.5—5.5 volts
Swing Pressure Sensor (B33)—Voltage	4.5—5.5 volts
Counterweight Removal Pressure Sensor (B46)—Voltage	4.5—5.5 volts
Arm Out Pressure Sensor (B50)—Voltage	4.5—5.5 volts
Arm In Pressure Sensor (B51)—Voltage	4.5—5.5 volts
Boom Up Pressure Sensor (B52)—Voltage	4.5—5.5 volts
Boom Down Pressure Sensor (B53)—Voltage	4.5—5.5 volts
Bucket Curl Pressure Sensor (B54)—Voltage	4.5—5.5 volts
Bucket Dump Pressure Sensor (B55)—Voltage	4.5—5.5 volts

Continued on next page

Travel Right Pressure Sensor
(B56)—Voltage .... 4.5—5.5 volts
Travel Left Pressure Sensor
(B57)—Voltage .... 4.5—5.5 volts

3. If voltage is lower or no voltage is present, check wiring. See Machine Harness (W2) Wiring Diagram, See Control Valve Harness (W7) Wiring Diagram, and See Pump Harness (W8) Wiring Diagram. (Group 9015-10.)

LD30992,000022A –19–14MAR06–3/3

Solenoid Test

1. A suspect solenoid can be checked by switching positions with a known good solenoid. If the problem follows the suspect solenoid, it has failed.

   If the problem remains, the harness has failed.

2. To check a solenoid using an ohmmeter, remove it from the machine.

3. Measure resistance as indicated. Resistance may vary from one solenoid to another.

Specification
Pilot Shut-Off Solenoid (Y10)—
Resistance .... 42—58 ohms

LD30992,000022B –19–14MAR06–1/1

Proportional Solenoid Test

1. A suspect solenoid can be checked by switching positions with a known good solenoid. If the problem follows the suspect solenoid, it has failed.

   If the problem remains, the harness has failed.

2. To check a solenoid using an ohmmeter, remove it from the machine.

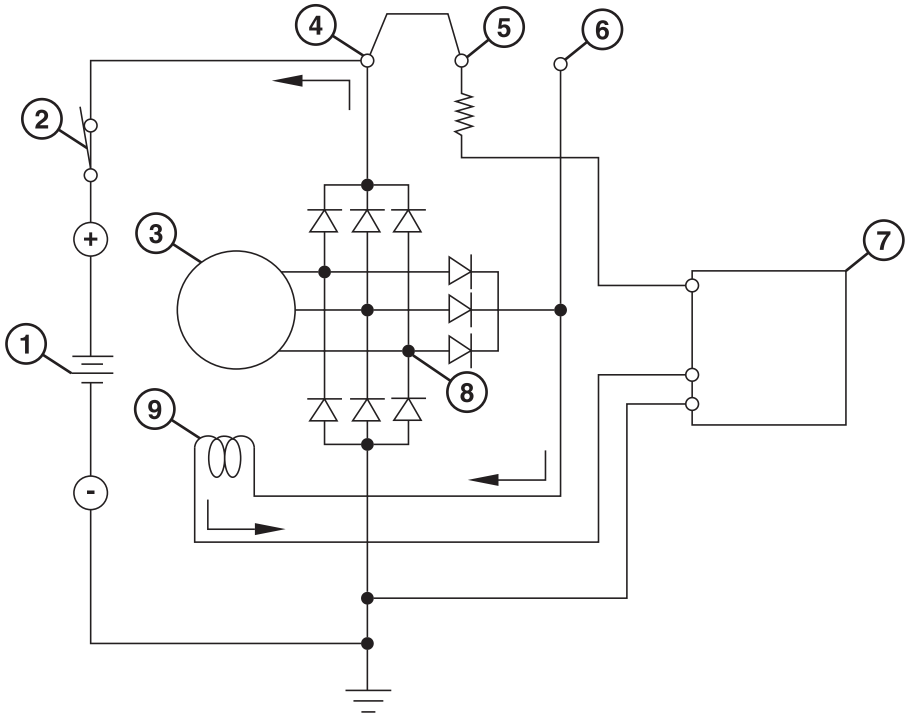
3. Measure resistance as indicated. Resistance may vary from one solenoid to another.

Main Controller Solenoids—Specification

Boom Flow Rate Solenoid (Y22) (SF)—Resistance	20—30 ohms
Boom Mode Solenoid (Y23) (SC)—Resistance	20—30 ohms
Power Dig Solenoid (Y24) (SG)—Resistance	20—30 ohms
Travel Speed Solenoid (Y25) (SI)—Resistance	20—30 ohms
Pump 1 (4-Spool) Control Solenoid—Resistance	14—21 ohms
Pump 2 (5-Spool) Control Solenoid—Resistance	14—21 ohms
Fan Pump Control Solenoid—Resistance	14—21 ohms

LD30992,000022C –19–17APR06–1/1

Alternator Test



TX1005683

Alternator Circuit

1—Battery	**4—B+ Terminal**	**6—L Terminal**	**8—Rectifier Bridge**
2—Battery Relay	**5—R Terminal**	**7—Regulator**	**9—Field Coil**
3—Stator Coil			

1. **24 V System** — With engine running at slow idle, check **DC** voltage between terminal **R** (5) and ground. Voltage should be **27.5 VDC** or greater[1].

2. With engine running at slow idle, check **DC** voltage between terminal **B+** (4) and ground. Voltage should be **27.5 VDC** or greater[1].

3. If voltage from previous steps is below 27.5 VDC[1], check excitation by disconnecting the **L** (6) and **R** (5) connector and place a jumper wire between the **B+** (4) terminal and the alternator side of the **R** (5) terminal with the engine running.

4. With jumper wire in place between **B+** & **R**, check voltage on **B+** terminal.

   If alternator voltage increases, check for problem in excitation circuit.

5. Disconnect **L** & **R** connector.

6. Check voltage on pin **L** (6) of the alternator side. Voltage should be **27.5 VDC** or greater.

7. Repeat above steps with lights on to load the alternator.

---

[1] *Note: For 24 V systems with maintenance free batteries, R and B+ voltage should be 28.2 VDC or greater.*

Continued on next page

References

8. If alternator fails to produce specified voltage, check for worn brushes or regulator. Repair or replace parts as necessary. If Alternator still fails to produce specified voltage, replace alternator. If alternator tests OK, check indicator light circuit.

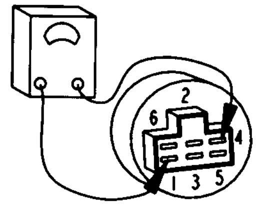
LD30992,000022F –19–28APR06–2/2

Electrical Component Checks

LD30992,000042F –19–18APR06–1/1

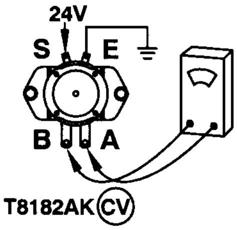
❶ Component Checks

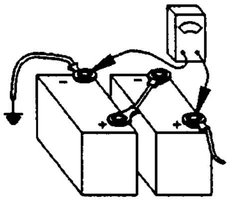
– – –1/1

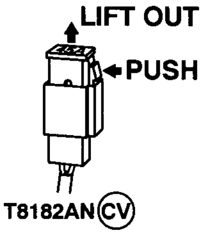
Key Switch Check	 T8357AK –UN–09NOV94 **1—B Terminal** **2—G1 Terminal** **3—G2 Terminal** **4—ACC Terminal** **5—M Terminal** **6—ST Terminal** Remove harness from key switch. Turn key switch to the ACC position. Measure continuity between key switch terminals 1 to 4. Turn key switch to the ON position. Measure continuity between key switch terminals 1 to 5 and 1 to 4. Turn key switch to the START position. Measure continuity between key switch terminals 1 to 6, 1 to 5, and 1 to 3. *LOOK: Is continuity measured between terminals?*	**YES:** Key switch is OK. Check the wiring harness. See Right Console Harness (W11) Wiring Diagram. (Group 9015-10.) **NO:** Key switch has failed. Replace the key switch. See Key Switch Remove and Install. (Group 9015-20.)

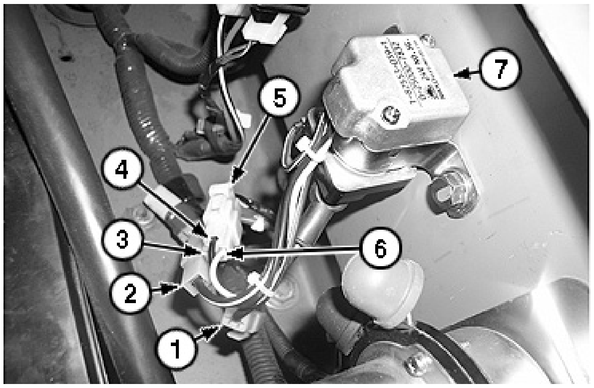
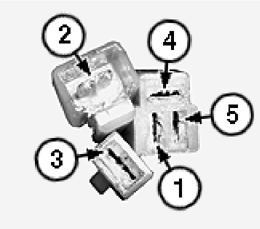
– – –1/1

References

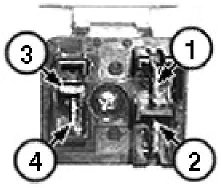
Battery Relay Check	 T8182AK –UN–03MAR94	See Machine Harness (W2) Component Location. (Group 9015-10.) Disconnect harness from relay. Connect 24 volts to small terminal S and ground small terminal E. *LISTEN: Does the relay click?* Connect the multimeter to large terminals A and B. *LOOK: Is continuity measured?*	**YES:** Relay is OK. Check the wiring harness. See Machine Harness (W2) wiring Diagram. (Group 9015-10.) **NO:** Relay has failed. Replace the relay. – – –1/1

Battery Voltage Check	 T7487AF –UN–20MAR91	Measure battery voltage by connecting a multimeter to (-) negative battery terminal grounded to frame and (+) positive battery terminal connected to machine harness. *LOOK: Are 24 to 28 volts measured?*	**YES:** Batteries are OK. **NO:** Batteries are undercharged. Charge batteries. See Using a Battery Charger. (Operator's Manual.) – – –1/1

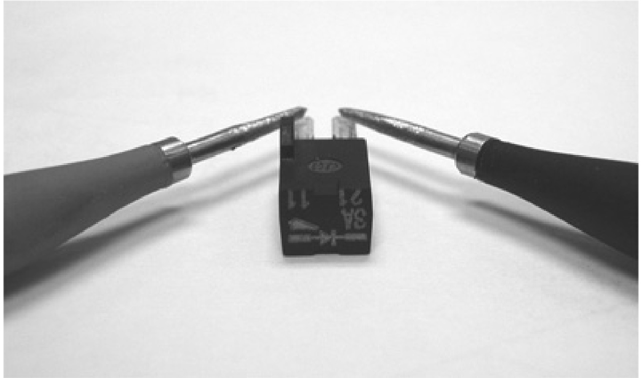
Fusible Link Check	–  T8182AN –19–03MAR94	Press locking tab on side of fusible link and lift from holder. Connect a multimeter to female terminals inside fusible link. *LOOK: Does the multimeter read continuity?*	**YES:** Fusible link is OK. Check the wiring harness. See Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Fusible link has failed. Replace the fusible link. See Fuse and Relay Specifications. (Group 9015-10.) – – –1/1

Starter Protection Relay Check	 TX1005690A –UN–30MAR06 *Starter Protection Relay*  TX1005798A –UN–04APR06 **1—C Terminal** **2—B Terminal** **3—R Terminal** **4—E Terminal** **5—S Terminal** **6—3 Wire Connector** **7—Starter Protection Relay** Turn key switch ON. Measure voltage on pin B (2). Is battery voltage present?	**YES:** Continue checkout. **NO:** Check battery relay. See Battery Relay Check. (Group 9015-20.) Check wiring to relay. See Machine Harness (W2) Wiring Diagram. (Group 9015-10.)
	NOTE: Disconnecting wire connector (6) will keep the engine from starting. Disconnect starter protection relay from harness at connector (6). Turn and hold key switch in START position. Measure voltage on pin S (5). Is battery voltage present with the key switch held in the START position?	**YES:** Continue checkout. **NO:** Check starter relay. See Relay Test. (Group 9015-20.) Check wiring to starter protection relay. See Machine Harness (W2) Wiring Diagram. (Group 9015-10.) See Cab Harness (W1) Wiring Diagram. (Group 9015-10.)
	Disconnect wire connector (6) from relay. Turn key switch to the ON position. Measure voltage at pin R (3). Is battery voltage present?	**YES:** Check for short to power. See Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Continue checkout. – – –1/2

	Reconnect wire connector (6). Start engine Disconnect wire connector (6) from relay with engine running. Measure voltage at pin R (3). Is voltage approximately 24 volts or higher?	**YES:** Continue checkout. **NO:** Check alternator output. See Alternator Test. (Group 9015-20.) Check wiring between relay and alternator. See Machine Harness (W2) Wiring Diagram. (Group 9015-10.) See Engine Interface Harness (W5) Wiring Harness. (Group 9015-10.)
	Turn key switch to the OFF position. Measure for continuity between pin E (4) connector side and machine ground. Is there continuity?	**YES:** Starter protection relay malfunction, replace relay. **NO:** Check wiring. See Machine Harness (W2) Wiring Diagram. (Group 9015-10.) –19– –2/2

Glow Plug Relay Check	 TX1005783A –UN–04APR06 *Glow Plug Relay* **1—Pin 1** **2—Pin 2** **3—Pin 3** **4—Pin 4** Remove glow plug relay from machine. See Machine Harness (W2) Component Location. (Group 9015-10.) Measure for continuity between pins 1 and 2. Is there continuity?	**YES:** Glow plug relay malfunction, replace relay. **NO:** Continue checkout.
	Measure resistance between pins 3 and 4. Is there approximately 98 ohms?	**YES:** Continue checkout. **NO:** Glow plug relay malfunction, replace relay.
	Connect 24 volts to pin 1 and ground pin 2. *LISTEN: Does the relay click?*	**YES:** Relay is good. **NO:** Glow plug relay malfunction, replace relay. – – –1/1

Diode Check



T164619B –UN–27JAN03

Remove diode from connector.

Test diode using diode test function of multimeter.

LISTEN: Does the multimeter beep?

Reverse multimeter probes.

LISTEN: Does the multimeter beep?

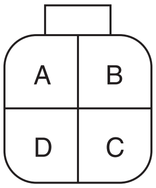
YES: If multimeter beeps in both checks, diode has failed in a shorted mode. Replace the diode.

NO: If multimeter does not beep in either check, diode has failed in an open mode. Replace the diode.

NO: If multimeter beeps in one check and not the other, diode is OK.

– – –1/1

Travel Alarm Check



T158291 –UN–08AUG02

Disconnect travel alarm harness connector.

Connect multimeter to travel alarm connector pin B and machine ground.

Turn key switch to ON position.

LOOK: Is battery voltage measured?

Connect multimeter to travel alarm connector pin D and machine ground.

LOOK: Is continuity measured?

Connect multimeter to travel alarm connector pin A and machine ground.

LOOK: Is continuity measured when the travel alarm cancel switch is pressed?

YES: Harness is OK. Check travel alarm F5 5A fuse. See Fuse and Relay Specifications. (Group 9015-10.) Travel alarm has failed. Replace the travel alarm. See Travel Alarm Remove and Install. (Group 9015-20.)

See Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

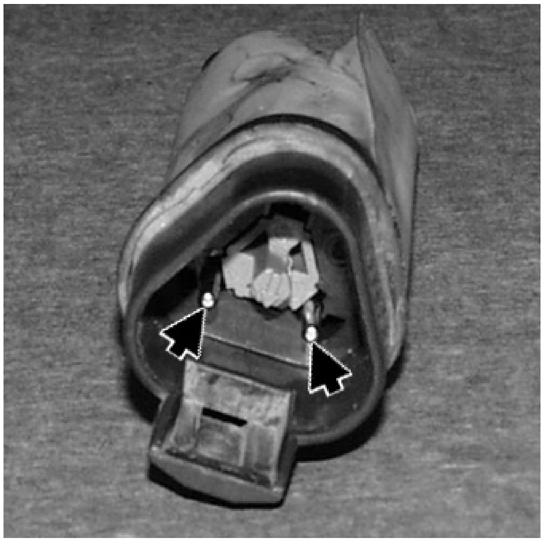
NO: Check the travel alarm cancel switch harness. Check travel alarm cancel switch. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

– – –1/1

CAN Bus Terminator Check

Turn key switch (S1) OFF.

Disconnect harness from CAN bus terminator. See Engine Interface Harness (W6) Component Location. (Group 9015-10.)



T140697B –UN–29MAR01

Measure resistance across terminator pins.

LOOK: Does the multimeter read 105—135 ohms?

YES: CAN bus terminator is OK.

NO: CAN bus terminator has failed. Replace the CAN bus terminator.

– – –1/1

Pilot Shutoff Switch Harness Check

Disconnect harness from cab.

Remove diode from harness.

With the positive lead on the center terminal of the diode, there should be continuity when you probe the two outer terminals with the negative lead.

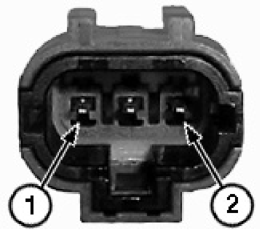
Switch the leads and put the negative lead on the center terminal, there should not be continuity when you probe the two outer terminals with the positive lead.

Is there continuity one way and not the other?

YES: Diode is good, reinstall the diode into the harness.

Continue checkout.

NO: Replace the diode.



TX1005243A –UN–28MAR06

Pilot Shutoff Switch Connector

1—Blue Wire
2—Red Wire

With the positive lead on the red wire (2), and the negative lead on the blue wire (1), check for continuity with the pilot shutoff switch handle in the forward position.
Bring the handle back to the rearward position, and check for continuity.

Is there continuity with the handle in the forward position and not in the rearward position?

YES: Harness is good.

NO: Replace the pilot shutoff switch harness.

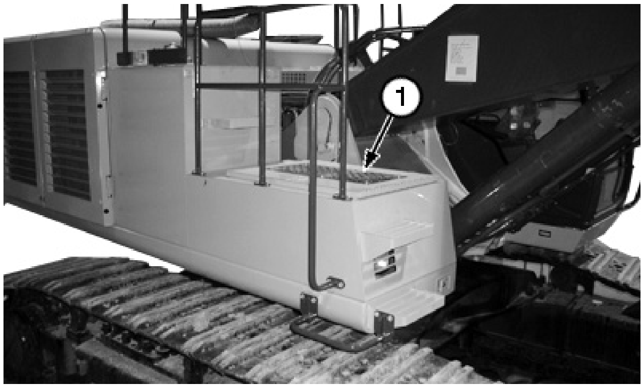
– – –1/1

Battery Remove and Install

CAUTION: Prevent personal injury from exploding battery. Keep sparks and flames away from battery.


TS204 –UN–23AUG88

1. Open battery access cover.



TX1005910A –UN–05APR06

Battery Access

1—Battery Access

Continued on next page

2. Remove cap screws (2).

3. Remove battery brackets (1).

4. Disconnect negative (-) battery cable (4).

5. Disconnect positive (+) battery cable (5).

6. Disconnect jumper cable (3).

CAUTION: Heavy component; use a hoist.

Specification

Battery—Weight.. 41 kg approximate
90 lb approximate

7. Remove batteries.

8. Check cables and clamps for wear or corrosion. Make sure batteries are fully charged.

IMPORTANT: If one battery in a 24-volt system has failed, replace both batteries.

9. Install batteries.

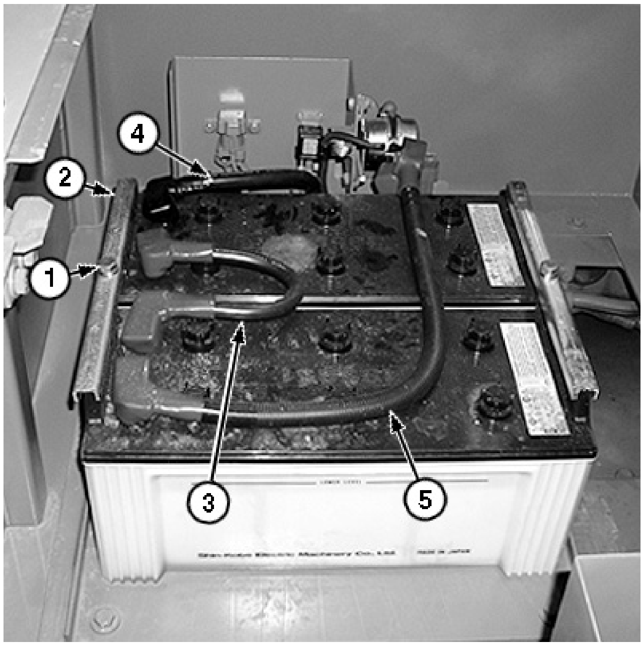
10. Connect jumper cable (3).

11. Connect positive (+) battery cable (5).

12. Connect negative (-) battery cable (4).

13. Install battery hold down brackets (2).

14. Install cap screws (1) and tighten.

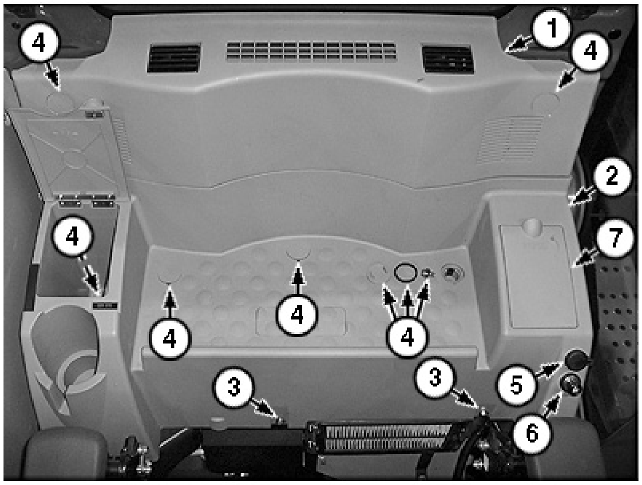


Batteries

1—Cap Screw (2 used)
2—Battery Hold Down Bracket (2 used)
3—Jumper Cable
4—Negative (-) Battery Cable
5—Positive (+) Battery Cable

AH91621,00002A5 –19–28APR06–2/2

Rear Cover Remove and Install



Rear Cover

1—Diffuser
2—Rear Cover
3—Cap Screw (2 used)
4—Plug, O-ring, and Screw (6 used)
5—Power Outlet
6—Lighter
7—Fuse Cover

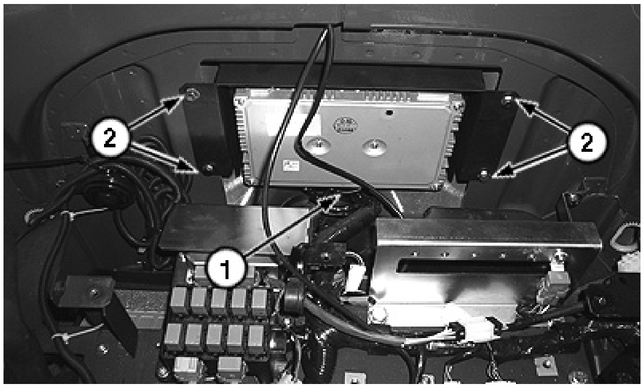
1. Remove fuse cover (7).
2. Loosen cap screws (3) at bottom of rear cover.
3. Remove plugs, o-rings, and screws (4).
4. Lift and remove diffuser (1).
5. Disconnect electrical connections to power outlet (5) and lighter (6).
6. Lift and remove rear cover (2).
7. Repair or replace parts as necessary.
8. Install rear cover.
9. Connect electrical connections.
10. Install diffuser.
11. Install cap screws, plugs, o-rings, and screws.
12. Install fuse cover.

LD30992,0000430 –19–27MAR06–1/1

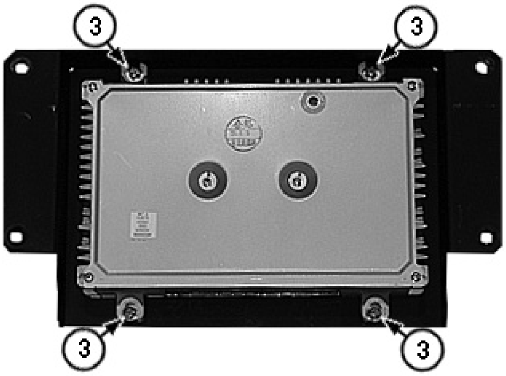
Main Controller (MCF) Remove and Install

1. Disconnect battery ground (-) cable.
2. Remove rear cover. See Rear Cover Remove and Install. (Group 9015-20.)
3. Disconnect electrical connectors (1).
4. Remove cap screws (2).
5. Remove main controller and mounting bracket.
6. Remove screws (3).
7. Replace as necessary.

1—Electrical Connectors
2—Cap Screw (4 used)
3—Screw (4 used)



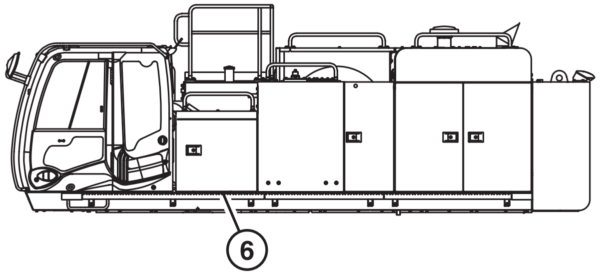
Main Controller



Main Controller

LD30992,0000233 –19–16MAR06–1/1

Engine Control Module (ECM) Remove and Install



ECM Location

1. Disconnect battery ground (-) cable.

2. Remove cap screws (1) and ECM cover (2).

3. Disconnect electrical connectors (3).

4. Remove cap screws (4) and remove ECM (5) from mounting bracket.

5. Replace parts as necessary.

IMPORTANT: When replacing engine control unit, new software must be loaded before installation.

6. Place ECM (5) in mounting bracket. Install cap screws and tighten to specifications.

Specification

Mounting Bracket Cap Screw— Torque	1—1.24 N•m 9—11 lb-in.

7. Reconnect electrical connectors (3) to ECM.

8. Install ECM cover. Install cap screws and tighten to specifications.

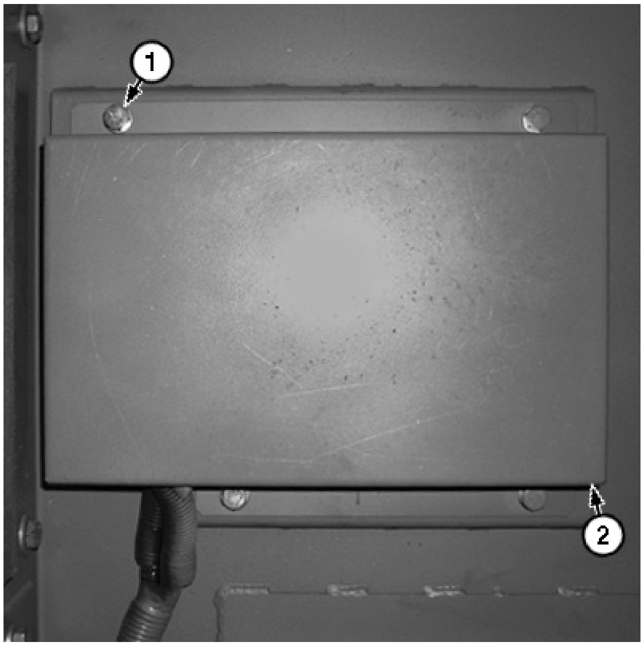
Specification

Mounting Bracket Cap Screw— Torque	1—1.24 N•m 9—11 lb-in.

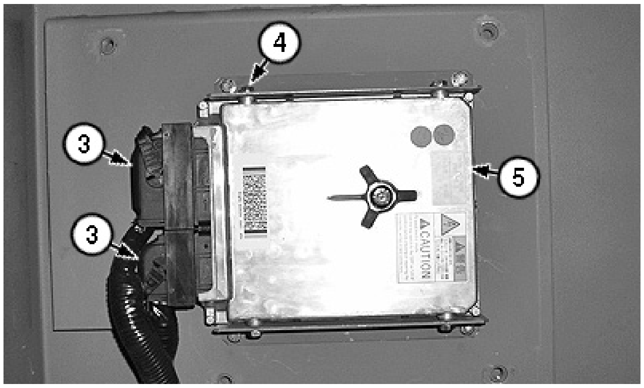
9. Connect battery ground (-) cable.

10. Program injectors. See Injector ID Code Registration. (Group 9010-25.)

1—Cap Screw (4 used)
2—ECM Cover
3—Connectors
4—Cap Screw (4 used)
5—Engine Controller (ECM)
6—ECM Location



ECM Cover



ECM

Continued on next page

References

NOTE: Failure to perform the EGR valve position learning may result in detection of DTC for EGR.

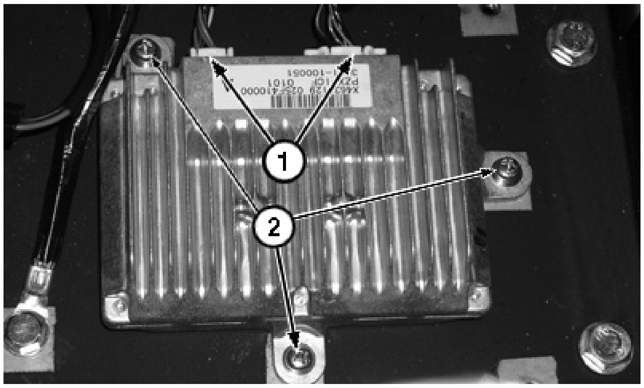
11. Turn key switch to the ON position for at least 10 seconds, then turn key switch to the OFF position for at least 10 seconds.

    Machine is ready to be used.

AH91621,00002A8 –19–01MAY06–2/2

Information Controller (ICF) Remove and Install

1. Disconnect battery ground (-) cable.
2. Remove rear cover. See Rear Cover Remove and Install. (Group 9015-20.)
3. Disconnect electrical connectors (1).
4. Remove screws (2).
5. Replace information controller as necessary. See Information Controller Initialization. (Group 9015-20.) See Information Controller Download. (Group 9015-20.)



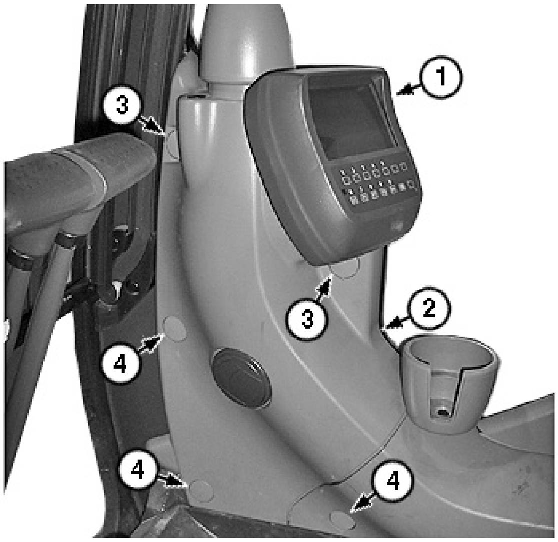
1—Electrical Connector (2 used)
2—Screw (3 used)

LD30992,0000235 –19–16MAR06–1/1

Monitor Controller Remove and Install

1. Remove plugs and cap screws (3) and plugs and screws (4).

1—Monitor Controller
2—Side Cover
3—Plug and Cap Screw (2 used)
4—Plug and Screw (3 used)



Monitor Controller and Side Cover

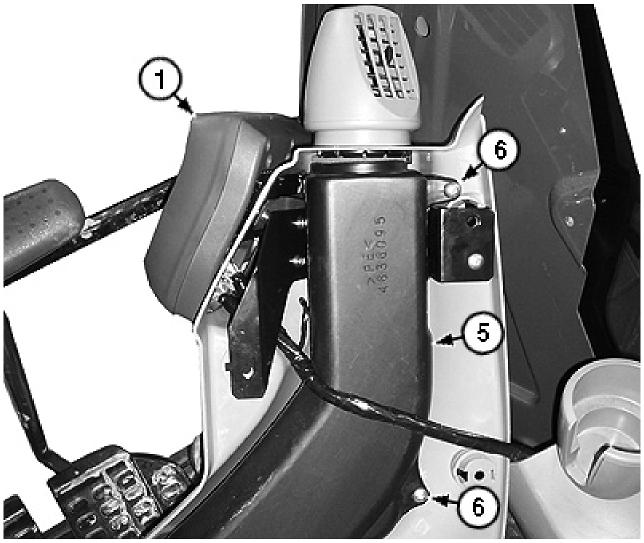
Continued on next page

LD30992,0000431 –19–21MAR06–1/4

2. Rotate side cover and monitor controller to expose air duct (5).

3. Remove screws (6) from air duct.

1—Monitor Controller
5—Air Duct
6—Screw (2 used)



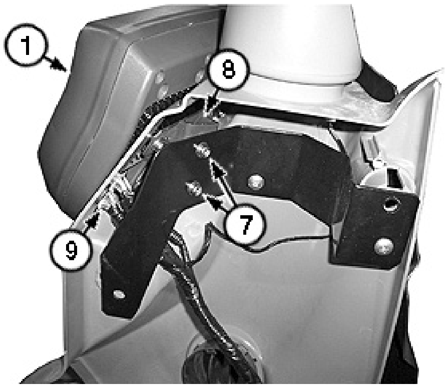
Side Cover Air Duct

LD30992,0000431 –19–21MAR06–2/4

4. Remove screws (7) to disconnect monitor controller and mounting plate from side cover.

5. Disconnect harness connectors (9).

1—Monitor Controller
7—Screw (2 used)
8—Mounting Plate
9—Harness Connectors (3 used)



Monitor Controller Mounting Plate and Harness Connection

Continued on next page

LD30992,0000431 –19–21MAR06–3/4

6. Remove screws (10) and remove mounting plate (8).

7. Repair or replace parts as necessary.

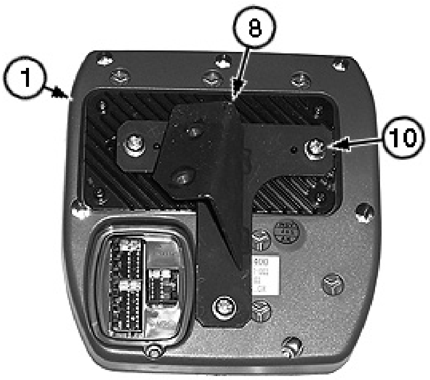
8. Install screws and mounting plate to monitor controller.

9. Route harness through opening in side cover and connect harness connectors to monitor controller.

10. Install monitor controller to side cover.

11. Install air duct to side cover.

12. Install side cover to machine.



TX1005154A –UN–23MAR06

Monitor Controller and Mounting Plate

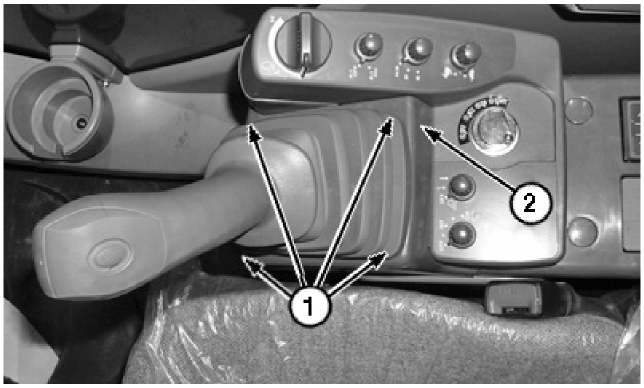
1—Monitor Controller
8—Mounting Plate
10—Screw (2 used)

LD30992,0000431 –19–21MAR06–4/4

Key Switch Remove and Install

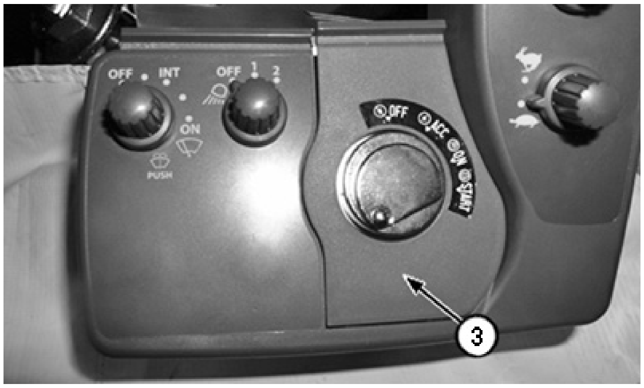
1. Disconnect battery ground (-) cable.
2. Remove screws (1).
3. Remove cover (2).
4. Remove key switch cover (3).
5. Remove screws (4).
6. Disconnect electrical connector.
7. Replace key switch as necessary.

1—Screw (4 used)
2—Cover
3—Key Switch Cover
4—Screw (3 used)



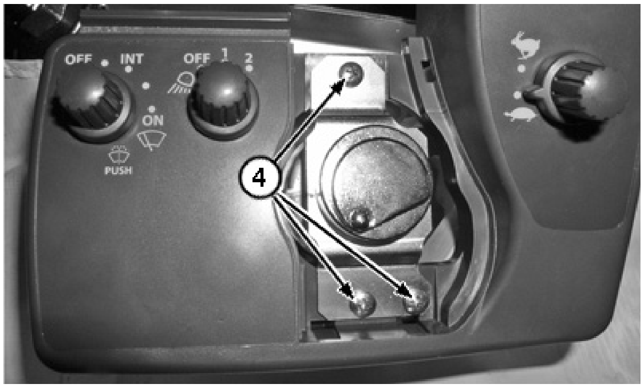
TX1000507A –UN–17NOV05

Pilot Control Lever Boot



TX1000512A –UN–01DEC05

Key Switch Cover

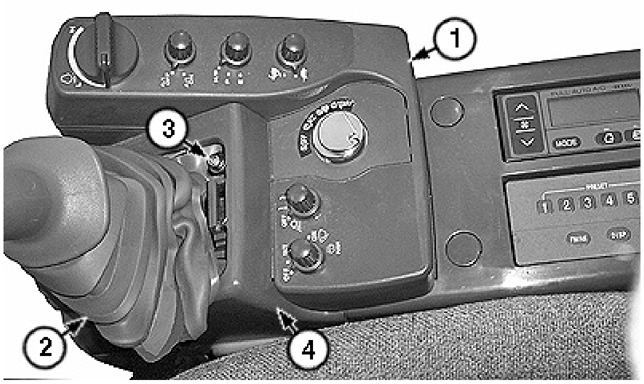


TX1000513A –UN–01DEC05

Key Switch

LD30992,0000237 –19–16MAR06–1/1

Switch Panel Remove and Install

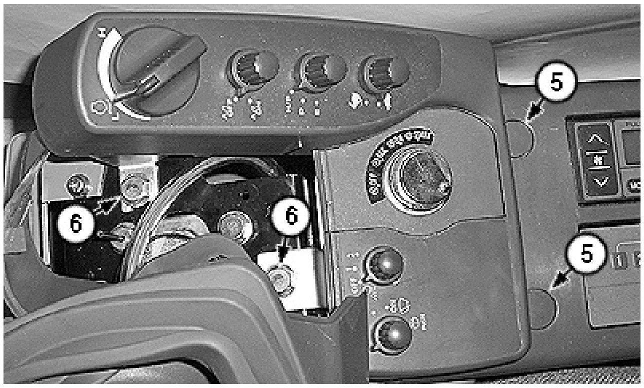


Pilot Control Lever Boot

1. Lift pilot control lever boot (2) and remove screws and spacers (3).
2. Pull up pilot control lever boot and console cover.

1—Switch Panel
2—Pilot Control Lever Boot
3—Screw and Spacer (4 used)
4—Console Cover

LD30992,0000432 –19–23MAR06–1/3



Switch Panel Cap Screws

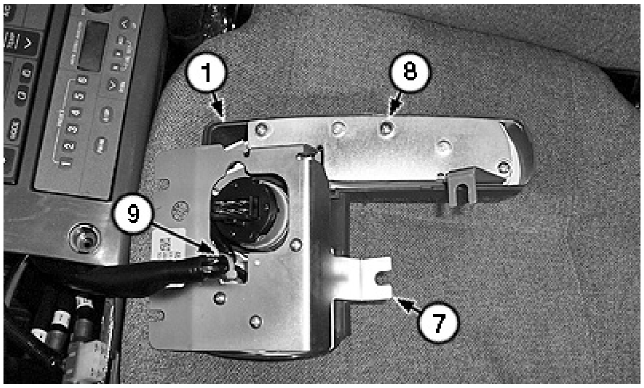
3. Remove plugs and screws (5) and remove cap screws (6).
4. Pull switch panel assembly forward and gently tilt back. Disconnect harness connector to key switch.

5—Plug and Screw (2 used)
6—Cap Screw (2 used)

Continued on next page

LD30992,0000432 –19–23MAR06–2/3

5. Remove tie band (9) and screws (8) from switch panel mounting plate (7).
6. Repair or replace parts as necessary.
7. Install mounting place, screws, and tie band.
8. Connect harness to key switch.
9. Install switch panel, cap screws, screws and plugs.
10. Install console cover, pilot control lever boot and screws.



Switch Panel Mounting Plate

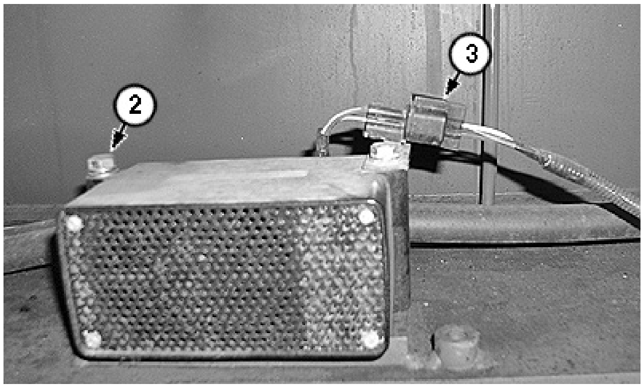
1—Switch Panel
7—Mounting Plate
8—Screw (6 used)
9—Tie Band

LD30992,0000432 –19–23MAR06–3/3

Travel Alarm Remove and Install

1. Remove access cover (1).
2. Disconnect electrical connector (3).
3. Remove cap screws (2).
4. Remove travel alarm.
5. Replace alarm as necessary.
6. Install travel alarm and tighten cap screws (2).
7. Connect electrical connector (3).
8. Install access cover (1).

1—Cover
2—Cap Screws (2 used)
3—Electrical Connector



Travel Alarm

LD30992,0000239 –19–18APR06–1/1

Left Console Switch Remove and Install

1. Lift pilot control lever boot (1) and remove screws and spacers (2).

2. Remove cap screw (4).

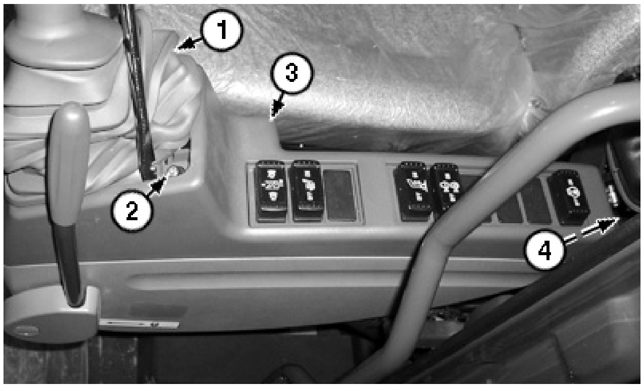
3. Lift left console (3) and disconnect harness to switch.

4. Repair or replace parts as necessary.

5. Install switch and connect harness.

6. Install left console and cap screw.

7. Install pilot control lever boot, screws, and spacers.



Left Console Switches

1—Pilot Control Lever Boot
2—Screw and Spacer (4 used)
3—Left Console
4—Cap Screw

LD30992,0000433 –19–23MAR06–1/1

Disconnect Tab Retainer Connectors

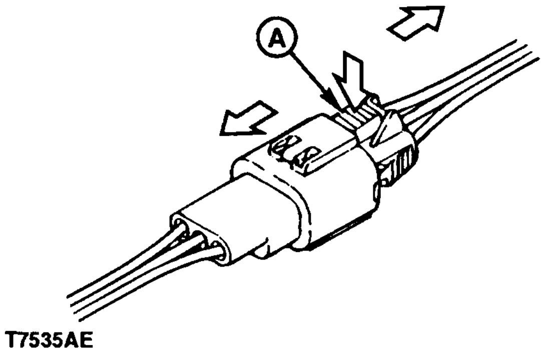
IMPORTANT: Do not disconnect electrical connectors while the engine is running. Damage to controllers or other components may result. Disconnect connectors only when instructed during a test or check.

DO NOT pull on wires to disconnect connector or damage to wires or connector may result. Grasp both halves of the connector to pull connector apart.

1. Push retainer tab (A).

2. While holding tab in, grasp other half of connector and pull connector halves apart.

3. To connect, push connector halves together until retainer “clicks”.



A—Retainer Tab

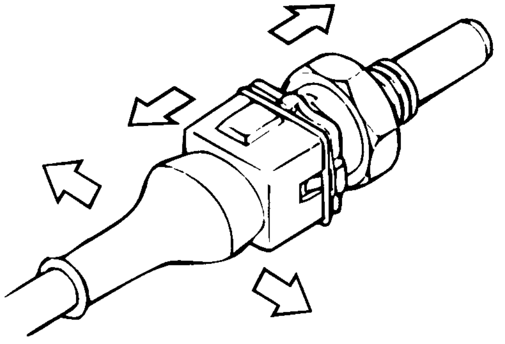
LD30992,000023B –19–31MAR06–1/1

Disconnecting Spring Wire Clip Connectors

1. Remove wire clip from connector.

   Grasp connector; move connector halves from side-to-side as they're being pulled apart. Do not pull on wiring leads.

2. To reconnect, install wire clip on connector half, push connector halves together until wire retainer "clicks" over tabs.



T8197AO (CV)

T8197AO –UN–14MAR94

LD30992,000023C –19–31MAR06–1/1

Replace DEUTSCH™ Connectors

1. Select correct size extractor tool for size of wire to be removed:

   - JDG361 Extractor Tool for 12 to 14 gauge wire.
   - JDG362 Extractor Tool for 16 to 18 gauge wire.
   - JDG363 Extractor Tool for 20 gauge wire.

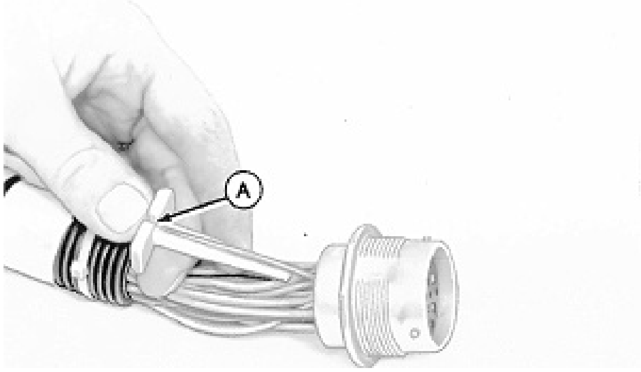
2. Start correct size extractor tool over wire at handle (A).

3. Slide extractor tool rearward along wire until tool tip snaps onto wire.

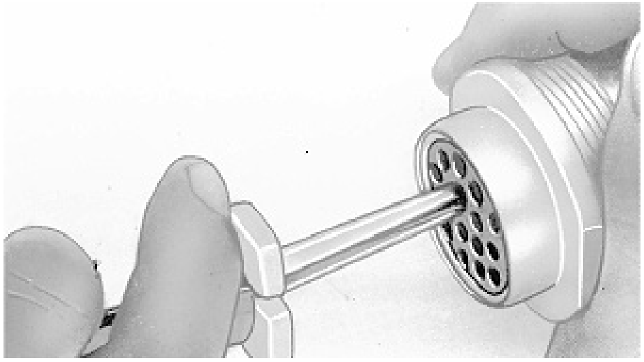
IMPORTANT: Do NOT twist tool when inserting in connector.

4. Slide extractor tool along wire into connector body until it is positioned over terminal contact.

5. Pull wire out of connector body, using extractor tool.



TS0124 –UN–23AUG88



TS120 –UN–23AUG88

DEUTSCH is a trademark of the Deutsch Co.

Continued on next page

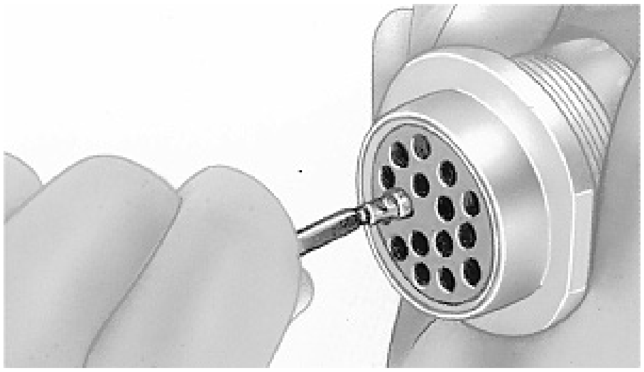
LD30992,000023D –19–31MAR06–1/2

IMPORTANT: Install contact in proper location using correct size grommet.

6. Push contact straight into connector body until positive stop is felt.

7. Pull on wire slightly to be certain contact is locked in place.

8. Transfer remaining wires to correct terminal in new connector.



TS122 –UN–23AUG88

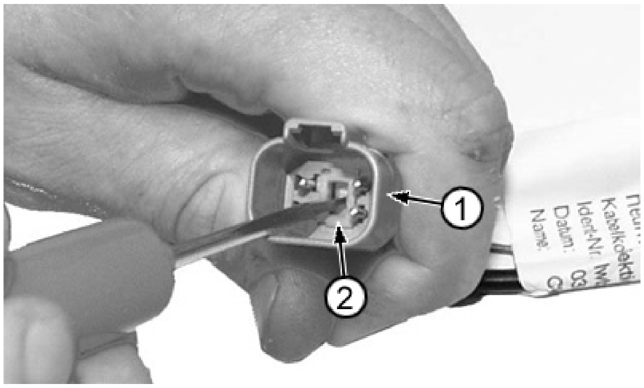
LD30992,000023D –19–31MAR06–2/2

Replace DEUTSCH™ Rectangular or Triangular Connectors

NOTE: Connector shown is the female half or a 4-pin square connector. Other similar styles of Deutsch connectors can be serviced using the same procedure.

1. Pull connector (1) apart. Inspect and clean connector seal and contacts.

2. Remove locking wedge (2) from connector using hook on JDG1383 service tool.



T130688B –UN–01MAY00

1—Connector
2—Locking Wedge

DEUTSCH is a trademark of Deutsch Co.

Continued on next page

LD30992,000023E –19–31MAR06–1/2

3. Release primary locking latch (3) next to the pin to be removed using screwdriver on JDG1383 service tool.

4. Gently pull wire out from back of connector.

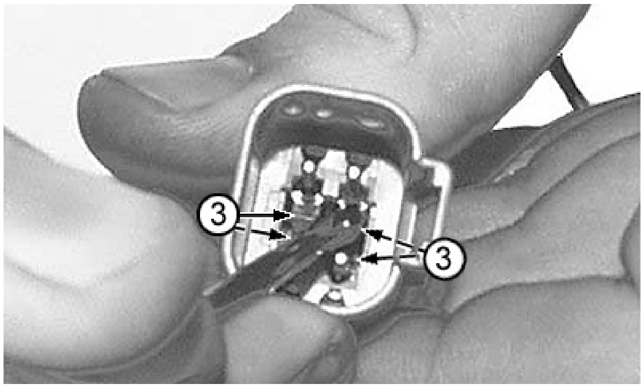
5. Replace connector contact as necessary. (See Install Connector Contact procedure.)

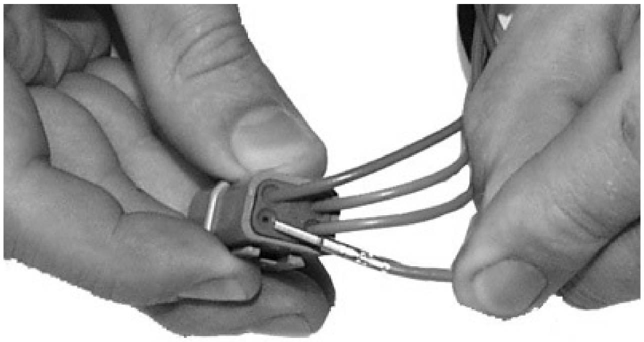
6. Install wire terminal back into connector until it clicks into place.

NOTE: Locking wedge in 2-pin connector is not symmetrical. Position latch shoulder next to terminals.

7. Install locking wedge until it snaps into place.

3—Primary Locking Latches





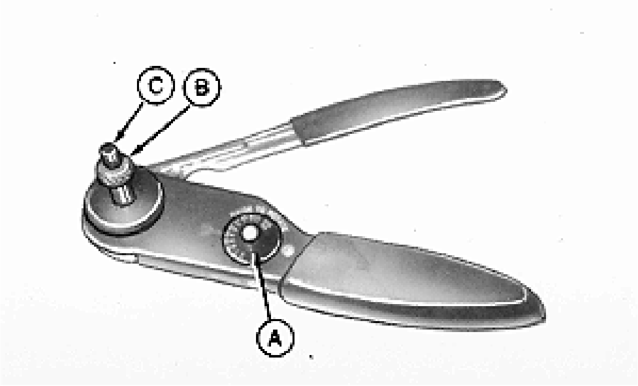
LD30992,000023E –19–31MAR06–2/2

Install DEUTSCH™ Contact

1. Strip 6 mm (1/4 in.) insulation from wire.

2. Adjust selector (A) on JDG360 Crimper for correct wire size.

3. Loosen lock nut (B) and turn adjusting screw (C) in until it stops.



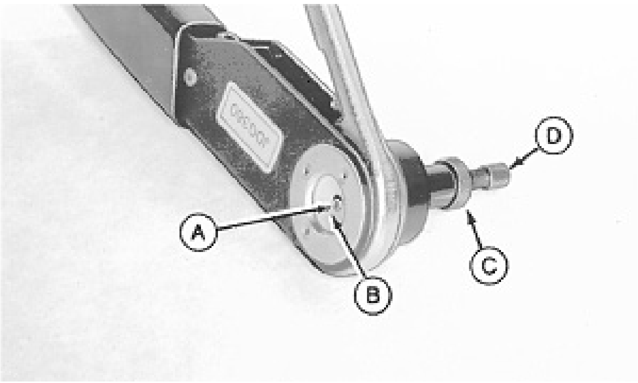
DEUTSCH is a trademark of the Deutsch Co.

LD30992,000023F –19–31MAR06–1/4

IMPORTANT: Select proper size contact "sleeve" or "pin" to fit connector body.

4. Insert contact (A) and turn adjusting screw (D) until contact is flush with cover (B).

5. Tighten lock nut (C).



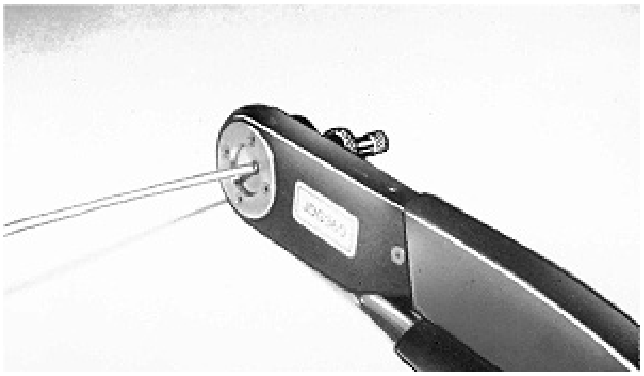
Continued on next page

LD30992,000023F –19–31MAR06–2/4

IMPORTANT: Contact must remain centered between indentors while crimping.

6. Insert wire in contact and crimp until handle touches stop.

7. Release handle and remove contact.



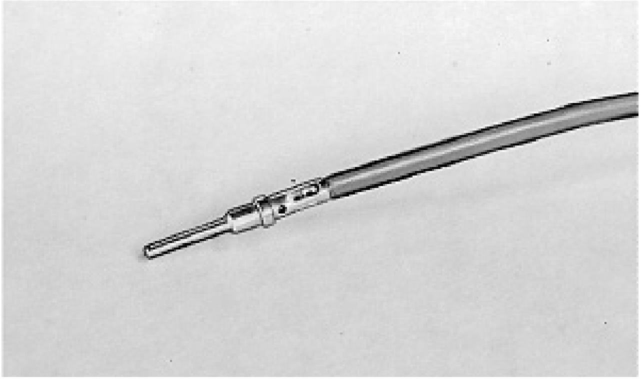
TS118 –UN–23AUG88

LD30992,000023F –19–31MAR06–3/4

IMPORTANT: If all wire strands are not crimped into contact, cut off wire at contact and repeat contact installation procedures.

NOTE: Readjust crimping tool for each crimping procedure.

8. Inspect contact to be certain all wires are in crimped barrel.



TS0135 –UN–23AUG88

LD30992,000023F –19–31MAR06–4/4

Replace WEATHER PACK™Connector

IMPORTANT: Identify wire color locations with connector terminal letters.

1. Open connector body.

2. Insert JDG364 Extraction Tool over terminal contact in connector body.

3. Hold extractor tool fully seated and pull wire from connector body.

NOTE: If terminal cannot be removed, insert wire or nail through extractor tool handle and push terminal contact from connector.

TS0128 –UN–23AUG88

WEATHER PACK is a trademark of Packard Electric.

Continued on next page

LD30992,0000240 –19–31MAR06–1/2

IMPORTANT: Carefully spread contact lances to assure good seating on connector body.

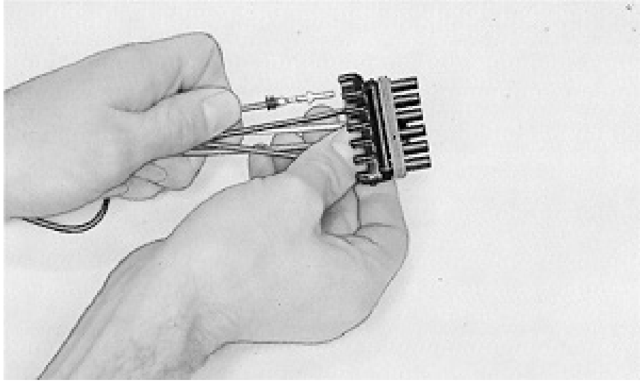
NOTE: Connector bodies are "keyed" for proper contact mating. Be sure contacts are in proper alignment.

4. Push contact into new connector body until fully seated.

5. Pull on wire slightly to be certain contact is locked in place.

6. Transfer remaining wires to correct terminal in new connector.

7. Close connector body.



TS0130 –UN–23AUG88

LD30992,0000240 –19–31MAR06–2/2

Install WEATHER PACK™Contact

NOTE: Cable seals are color coded for three sizes of wire:

- *Green - 18 to 20 gauge wire*
- *Gray - 14 to 16 gauge wire*
- *Blue - 10 to 12 gauge wire*

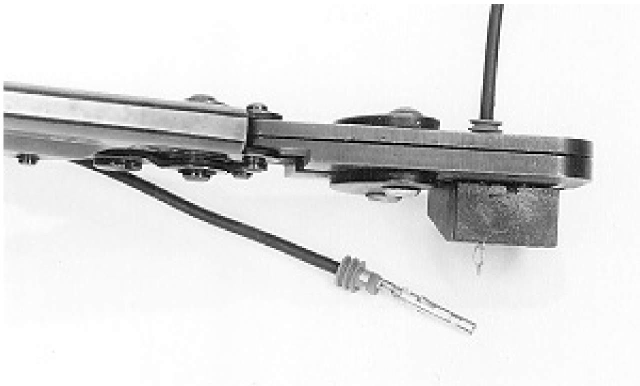
1. Slip correct size cable seal on wire.

2. Strip insulation from wire to expose 6 mm (1/4 in.) and align cable seal with edge of insulation.

NOTE: Contacts have numbered identification for two sizes of wire: a) #15 for 14 to 16 gauge wire b) #19 for 18 to 20 gauge wire

3. Put proper size contact on wire and crimp in place with a "W" type crimp, using JDG783 Terminal Applicator.

TS0136 –UN–23AUG88



TS1623 –UN–02NOV94

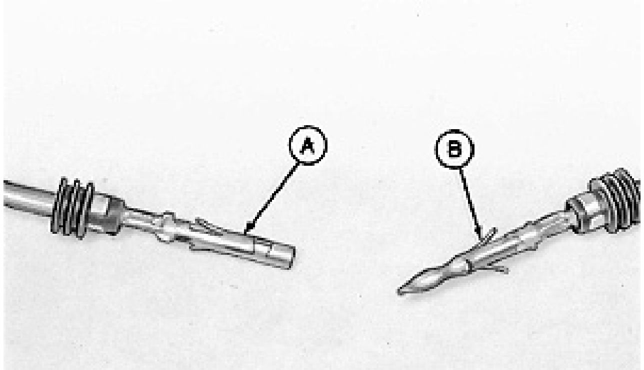
WEATHER PACK is a trademark of Packard Electric.

Continued on next page

LD30992,0000241 –19–31MAR06–1/2

IMPORTANT: Proper contact installation for "sleeve" (A) and "pin" (B) is shown.

4. Secure cable seal to contact as shown, using JDG783 Terminal Applicator.



TS0139 –UN–02DEC88

LD30992,0000241 –19–31MAR06–2/2

Replace (Pull Type) Metri-Pack™ Connectors

Disconnect the Metri-Pack[1] connector (A). Remove tie bands and tape.

Insert a "T" pin (B) 6.4 mm (1/4 in.) into connector body socket (C).

NOTE: Use JDG777[2] Terminal Extraction Tool or "T" pin to remove terminals.

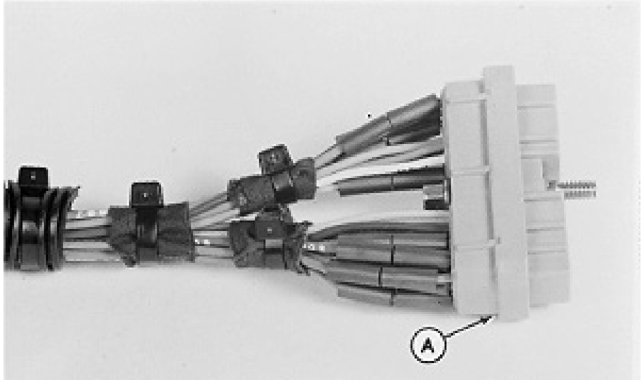
Angle "T" pin so pin tip slides close to the plastic socket edge pushing terminal locking tab (D) inward.

Remove "T" pin and push terminal (E) out of socket.

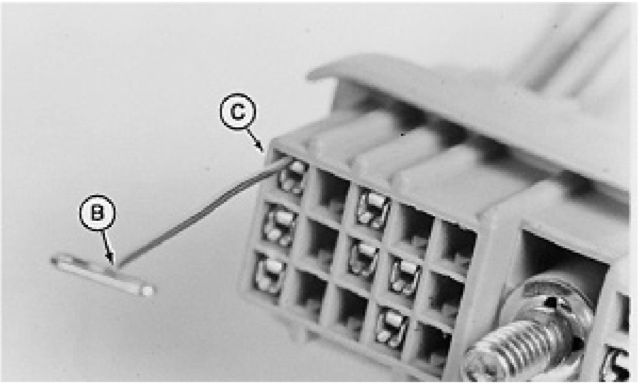
Remove terminal, cut strip and crimp wire through connector.

Check to make sure locking tab on new terminal is in outward position, then pull on wire until terminal locks in connector body socket.

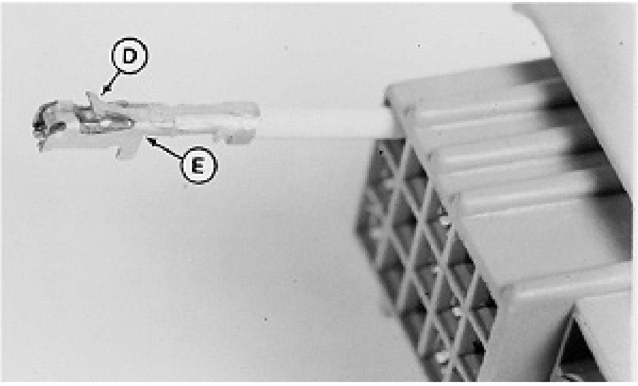
NOTE: Terminal will seat only one way. If terminal does not pull into the connector body socket, check to make sure terminal is aligned correctly.



RW16933 –UN–26APR89



RW16934 –UN–26APR89



RW16935 –UN–26APR89

A—Connector
B—"T" Pin
C—Body Socket
D—Locking Tab
E—Push Terminal

---

[1] *Metri-Pack is a trademark of Packard Electric*

[2] *Included in JT07195A Electrical Repair Kit*

LD30992,0000242 –19–31MAR06–1/1

Replace (Push Type) Metri-Pack™ Connectors

Disconnect the Metri-Pack[1] connector. Remove the tie bands and tape.

Remove the connector lock (A), and mark wire colors for identification.

Identify wire color locations with connector terminal letters.

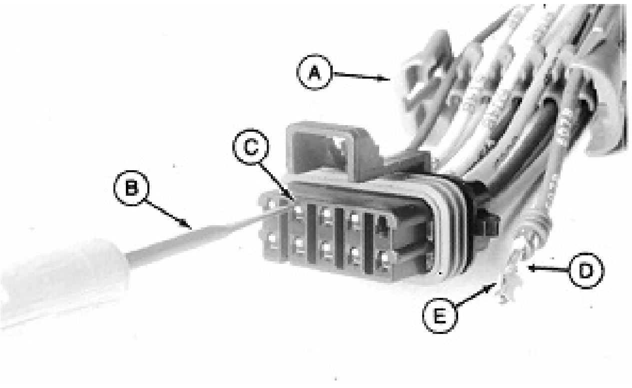
Insert JDG776 or JDG777[2] Terminal Extraction Tool (B) into connector body socket (C) pushing the terminal locking tab inward.

NOTE: Use JDG776 Extraction Tool with 56, 280 and 630 series METRI-PACK terminals. Use JDG777 Extraction Tool with 150 series METRI-PACK terminals.

Remove extraction tool and pull terminal (D) out of the socket.

Replace terminal. Make sure locking tab (E) on the new terminal is in the outward position.

Push terminal into connector body socket until terminal locks.



RW21325 –UN–29JUN92

A—Connector Lock
B—Extraction Tool JDG777
C—Connector Body Socket
D—Terminal
E—Locking Tab

---

[1] *Metri-Pack is a trademark of Packard Electric*

[2] *Included in JT07195A Electrical Repair Kit*

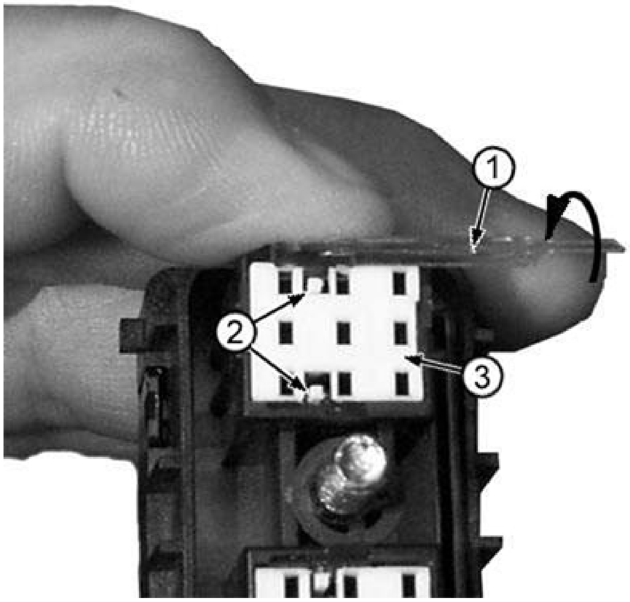
LD30992,0000243 –19–31MAR06–1/1

Replace CINCH™ Connectors

1. Remove extraction tool (1) from the loading side of connector.

2. Insert blade of extraction tool into locking tabs (2) of secondary lock (3). Rotate tool away from the connector to pry one side of the secondary lock out of the locked position. Repeat this step for the other locking tab.

NOTE: After unlocking one side of the secondary lock, a screw driver or similar device may need to be used to hold it in the unlocked position while unlocking the second locking tab.



T132105B –UN–29JUN00

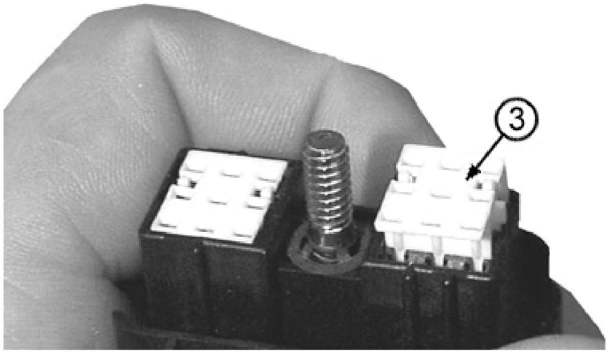
1—Extraction Tool
2—Secondary Lock Locking Tabs
3—Secondary Lock

CINCH is a trademark of the Cinch Co.

LD30992,0000244 –19–31MAR06–1/3

3. Remove secondary lock (3).

3—Secondary Lock

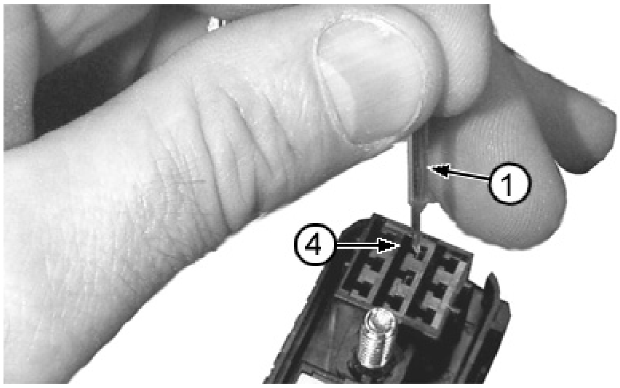


T132301B –UN–29JUN00

Continued on next page

LD30992,0000244 –19–31MAR06–2/3

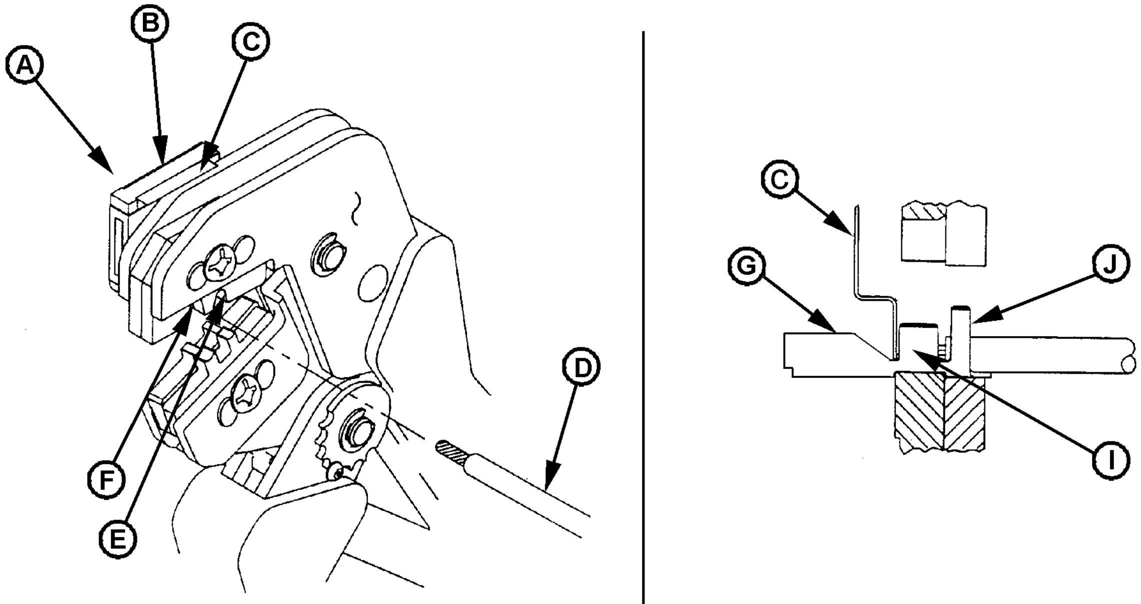
4. Insert pointed side of extraction tool into the contact cavity so that the flat side of tool faces secondary lock cavity (4). This will release the primary contact locking tab.
5. Gently pull wire out of the connector.
6. Repair/Replace terminals as necessary using procedure in this group.
7. Insert contact and wire into connector until it clicks.
8. Install secondary lock.



T132107B –UN–29JUN00

LD30992,0000244 –19–31MAR06–3/3

Install CINCH™ Contact



T138057

T138057 –UN–14FEB01

A—Top of Tool
B—Contact Support
C—Locator
D—Wire
E—Micro Timer Slot
F—Junior Timer Slot
G—Contact
I—Wire Tab
J—Insulation Tab

1. Hold JDG708 crimping tool so that the tool is facing you as shown (left side of graphic). Squeeze tool handles together and allow them to open fully.

IMPORTANT: Make sure that both sides of the insulation barrel are started evenly into the crimping section. Do NOT attempt to crimp an improperly positioned contact.

2. Position the contact so that the mating end of the contact (G) is on the locator side of the tool (C). Wire and insulation tabs (I and J) should point to top of tool (A). Butt wire tab (I) against the movable locator (C).
3. Hold the contact in position and squeeze the tool handles together until ratchet engages sufficiently to hold the contact in position. Do NOT deform wire and insulation tabs (I and J).
4. Insert stripped wire into contact insulation and wire tabs until it is butted against locator (C).
5. Hold the wire in place. Squeeze tool handles together until ratchet releases. Allow tool handles to open and remove crimped contact.
6. Install contact into connector. (Go to procedure in this group.)

CINCH is a trademark of the Cinch Co.

LD30992,0000245 –19–31MAR06–1/1

Repair 32 and 48 Way CINCH™ Connectors

CINCH is a trademark of the Cinch Co.

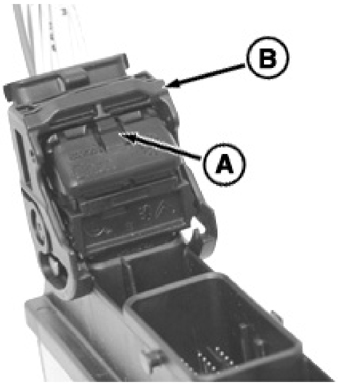
LD30992,0000246 –19–31MAR06–1/5

1. Press tab (A) and rotate locking cam (B) 90° to disconnect connector from flexbox.

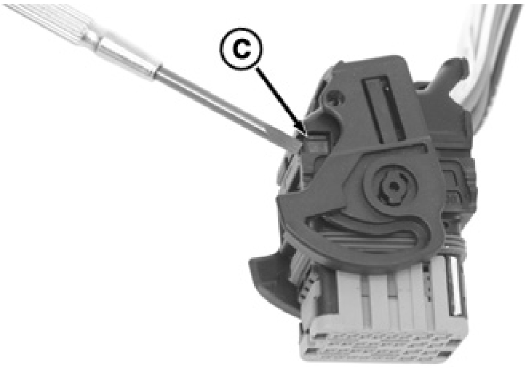
2. Move cover locks (C) slightly outward with a small screwdriver.

3. Remove cover (D) away from wires.

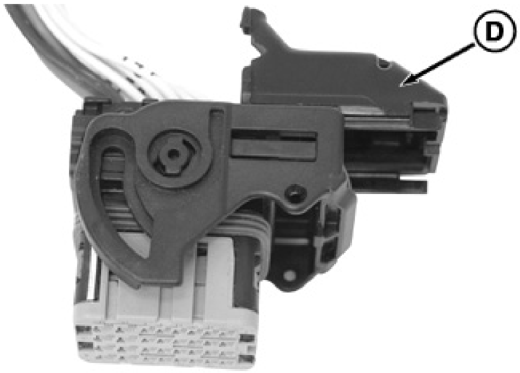
A—Tab
B—Locking Cam
C—Cover Locks
D—Cover



RXA0070459 –UN–10SEP03



RXA0070462 –UN–10SEP03



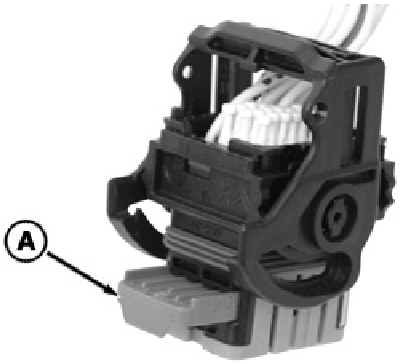
RXA0070463 –UN–10SEP03

Continued on next page

LD30992,0000246 –19–31MAR06–2/5

4. Pull terminal lock (A) out as far as it will go, but do not force its removal.

A—Terminal Lock



RXA0070464 –UN–10SEP03

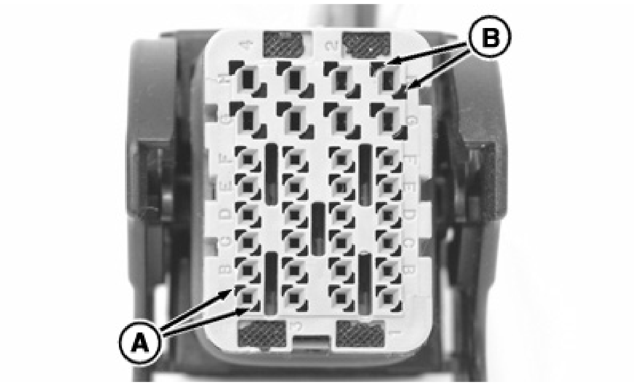
LD30992,0000246 –19–31MAR06–3/5

NOTE: JDG1725 Terminal Extractor Tool has two different sizes of pins, 0.6 for smaller 20 gauge holes (A), and 1.5 for larger 16 and 18 gauge holes (B).

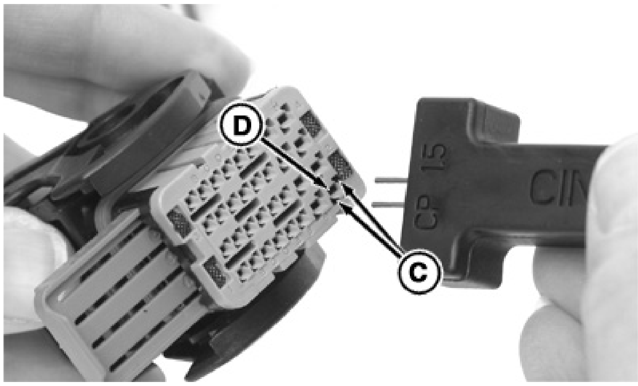
5. Insert JDG1725 Terminal Extractor Tool into holes (C) next to terminal opening (D) to unlock terminal.

6. Pull wire and terminal (E) from connector body.

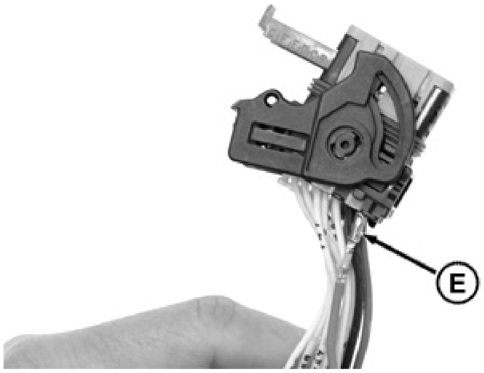
A—20 Gauge Holes
B—16 & 18 Gauge Holes
C—Holes
D—Terminal Hole
E—Terminal



RXA0070471 –UN–10SEP03



RXA0070472 –UN–10SEP03



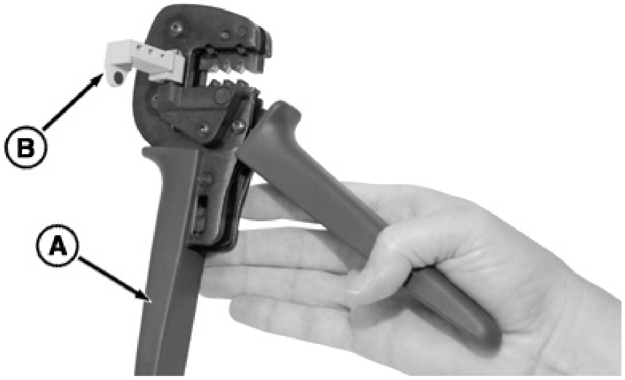
RXA0070473 –UN–10SEP03

Continued on next page

LD30992,0000246 –19–31MAR06–4/5

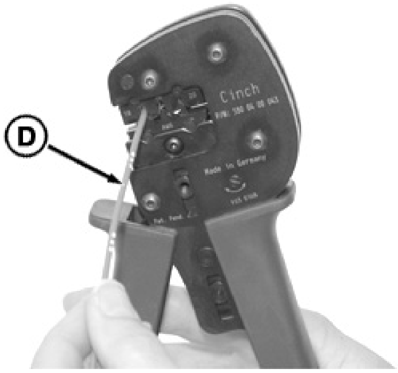
7. Remove old terminal and strip 4.85 mm (0.191 in.) of insulation from wire.
8. Grip JDG1727 Terminal Crimping Tool (A) securely, and squeeze ratcheting mechanism until it bottoms out. Then allow it to open completely
9. With tool in ready position (open handle), open terminal receptacle (B).
10. Insert terminal (C) into proper wire gauge window, crimp wings facing up.
11. Close terminal receptacle (B).
12. Squeeze handle until two clicks are heard.
13. Insert stripped wire (D) into terminal.
14. Hold wire stationary and squeeze tool together until ratchet releases.
15. Remove terminated wire from tool.
16. Push terminal into connector body until fully seated. Pull on wire slightly to ensure terminal is locked in position.
17. Push terminal lock closed.
18. Install cover.
19. Install connector to controller and close connector body locking cam.

A—CINCH Terminal Crimping Tool
B—Terminal Receptacle
C—Terminal
D—Wire



RXA0070479 –UN–10SEP03

RXA0070480 –UN–10SEP03



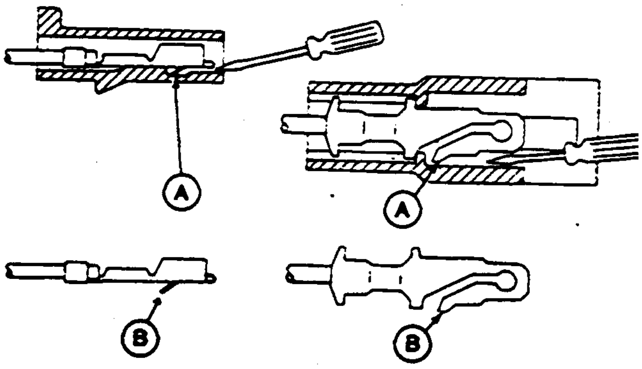
RXA0070481 –UN–10SEP03

LD30992,0000246 –19–31MAR06–5/5

Remove Connector Body from Blade Terminals

1. Depress locking tang (A) on terminal, using a small screw driver. Slide connector body off.

2. Be sure to bend locking tang back to its original position (B) before installing connector body.



RW4218 –UN–23AUG88

LD30992,0000247 –19–31MAR06–1/1

Section 9020
Power Train

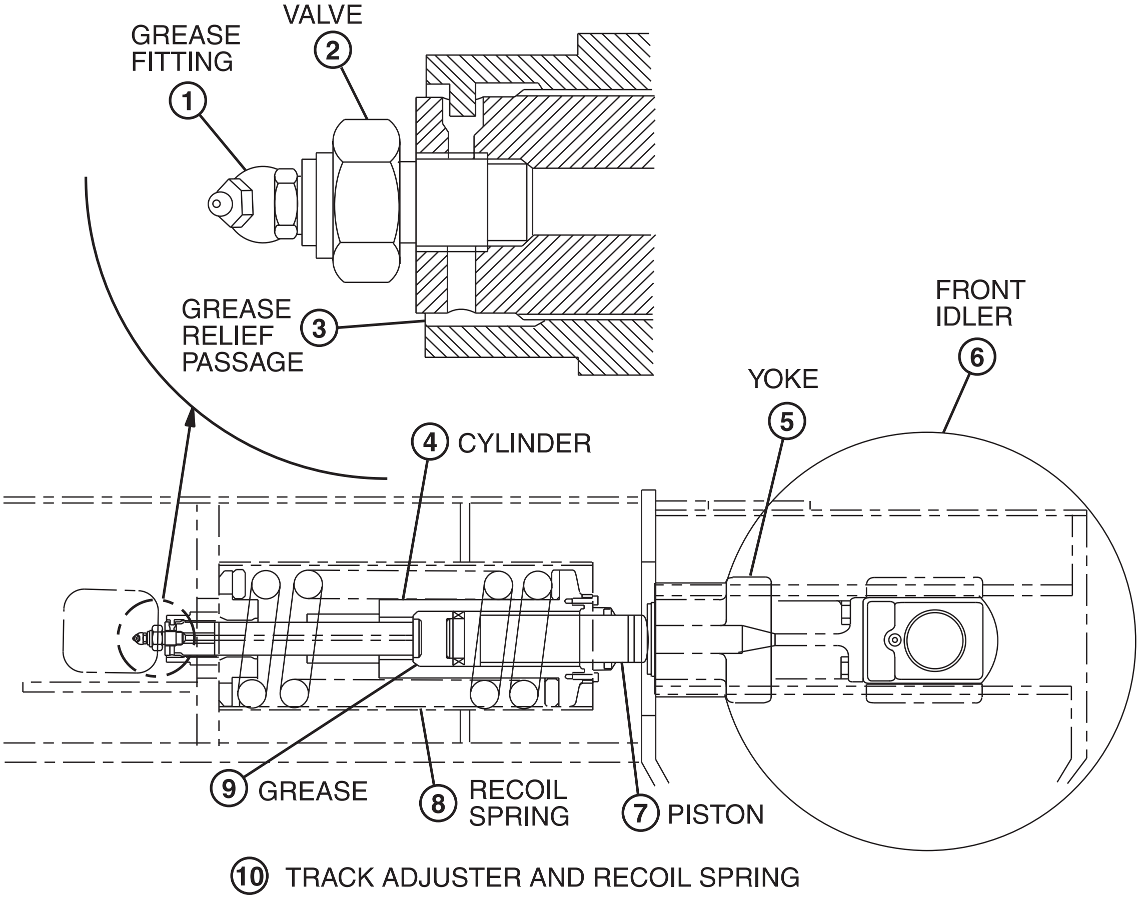
Contents

Page

Group 05—Theory of Operation
Track Adjuster and Recoil Spring Operation. 9020-05-1
Travel Gearbox Operation 9020-05-2

Group 15—Diagnostic Information
Diagnose Undercarriage Components Malfunctions 9020-15-1
Noisy or Loose Track Chain Diagnostic Procedure 9020-15-1
Tight Track Chain Diagnostic Procedure 9020-15-2
Frequent Track Chain Sag Adjustment Required Diagnostic Procedure 9020-15-2
Excessive Oil Leakage From Front Idler, Track Rollers, or Carrier Rollers Diagnostic Procedure 9020-15-2
Bent Track Shoes Diagnostic Procedure 9020-15-3
“Popping” Of Track Diagnostic Procedure . . .9020-15-4
Cracked Track Link Diagnostic Procedure. . .9020-15-4
Chipped Link Rails Diagnostic Procedure . . .9020-15-5
Individual Undercarriage Component Wear Diagnostic Procedure. 9020-15-6
Measure Swing Bearing Wear. 9020-15-6

Track Adjuster and Recoil Spring Operation



T140036

T140036 –19–17MAY01

1—Grease Fitting
2—Valve
3—Grease Relief Passage
4—Cylinder
5—Yoke
6—Front Idler
7—Piston
8—Recoil Spring
9—Grease
10—Track Adjuster and Recoil Spring

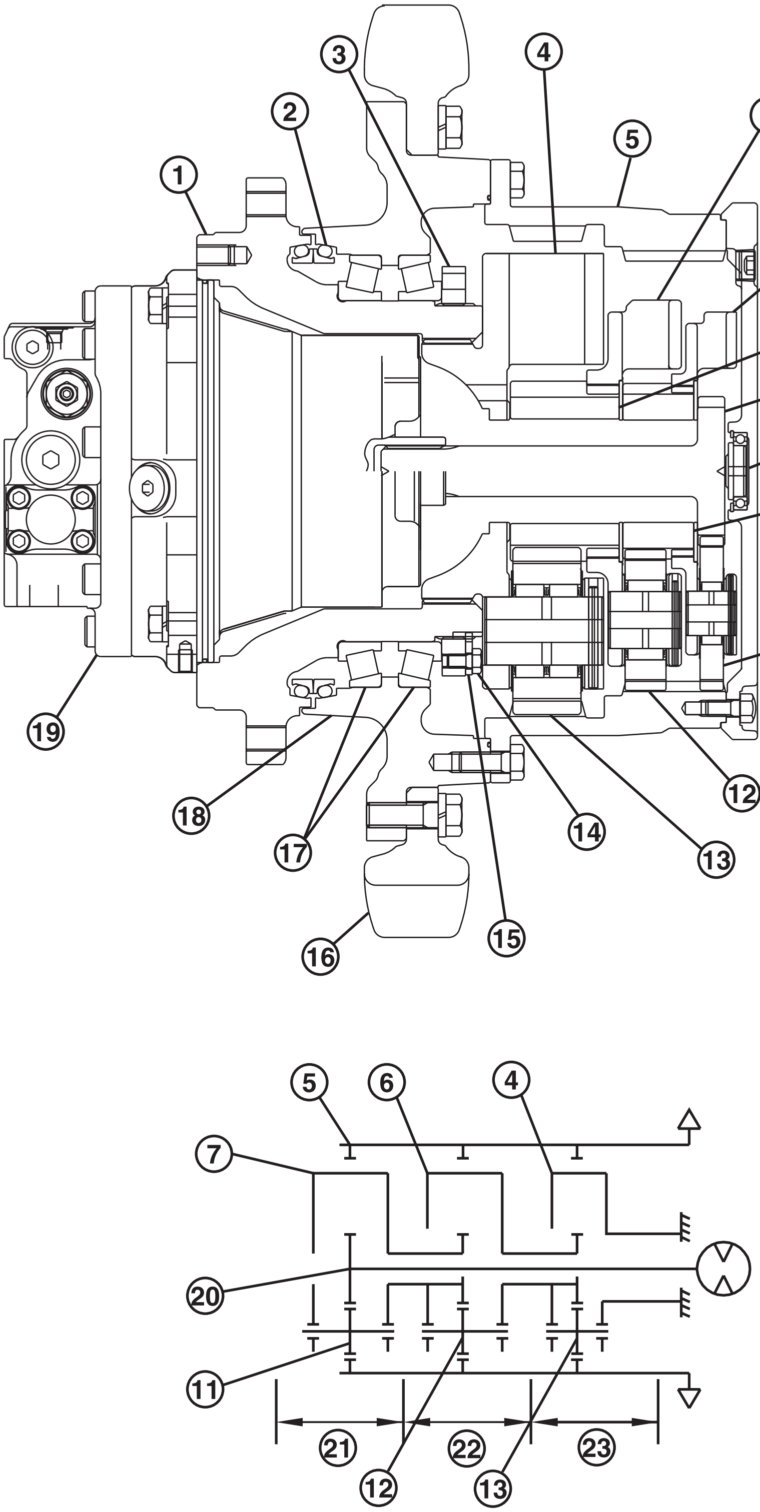
The track adjuster and recoil spring (10) is supported by the track frame. Shock loads on the track and front idler (6) are absorbed by the recoil spring (8).

To decrease track sag, grease (9) is pumped into the cylinder (4) through the grease fitting (1). The grease pushes the piston (7) against the yoke moving the front idle out, reducing track sag. The grease fitting (1) is protected from excess pressure by a check ball.

Increasing track sag is accomplished by loosening the valve (2) to release grease from the cylinder through the grease relief passage (3). When releasing grease from the cylinder, only loosen the valve (2).

MR50960,00000FF –19–27APR06–1/1

Travel Gearbox Operation



T153001

T153001 –UN–25MAR02

Travel Gearbox

Continued on next page

MR50960,0000100 –19–27APR06–1/2

1—Housing
2—Seal
3—Nut
4—Third Stage Carrier
5—Ring Gear
6—Second Stage Carrier
7—First Stage Carrier
8—Third Stage Sun Gear
9—Thrust Bearing
10—Second Stage Sun Gear
11—First Stage Planet Gear
12—Second Stage Planet Gear
13—Third Stage Planet Gear
14—Cap Screw
15—Lock Plate
16—Sprocket
17—Bearing
18—Drum
19—Travel Motor
20—First Stage Sun Gear (Input Shaft)
21—First Stage
22—Second Stage
23—Third Stage

The travel gearbox is a three stage planetary drive. The gearbox is interchangeable from the right to the left side of machine. The housing (1) is fastened to the track frame.

The travel motor (19) is connected to and drives the first stage sun gear (20). Rotary motion is transferred from the first stage sun gear through the gearbox planetaries to the ring gear (5). The ring gear turns the drum (18) and sprocket (16). The third stage carrier (4) is locked to the housing (1) and can not rotate.

Power flows through the gearbox components in the following order: travel motor (19), first stage sun gear (20), first stage planet gears (11), first stage carrier (7), second stage sun gear (10), second stage planet gears (12), second stage carrier (6), third stage sun gear (8), third stage planet gears (13) and ring gear (5).

MR50960,0000100 –19–27APR06–2/2

Diagnose Undercarriage Components Malfunctions

NOTE: Diagnose malfunction charts are arranged from most probable and simplest to verify, to least likely and most difficult to verify.

TX19495,0000001 –19–27APR06–1/1

Noisy or Loose Track Chain Diagnostic Procedure

– – –1/1

❶ **Track Sag Check**	Check track sag. See Check and Adjust Track Sag. (Operator's Manual.) Is track sag within specification?	**YES:** Go to Track Shoe Check. **NO:** Adjust track sag. – – –1/1
❷ **Track Shoe Check**	Inspect track shoes for missing or loose cap screws. See Check Track Shoe Hardware. (Operator's Manual.) Are all track shoes cap screws in place and tight?	**YES:** Go to Track Adjuster Check. **NO:** Remove loose track shoes to clean material from between shoe and link. Install track shoes and tighten cap screws in proper sequence. See Track Shoe Remove and Install. (Group 0130.) – – –1/1
❸ **Track Adjuster Check**	Inspect if grease fitting and valve are tight and not leaking grease or oil. Are grease fitting, valve and seal properly installed?	**YES:** Diagnostic procedure complete. **NO:** Replace grease fitting or valve. To replace seals, see Track Adjuster Cylinder Disassemble and Assemble. (Group 0130.) – – –1/1

Tight Track Chain Diagnostic Procedure

– – –1/1

❶ **Sprocket Check**	Check sprocket for packed material and rocks. Is sprocket free of excess material?	**YES:** Go to Track Sag Check. **NO:** Clean excess material from sprocket.

– – –1/1

❷ **Track Sag Check**	Check track sag. See Check and Adjust Track Sag. (Operator's Manual.) Is track sag within specification?	**YES:** Diagnostic procedure complete. **NO:** Adjust track sag.

– – –1/1

Frequent Track Chain Sag Adjustment Required Diagnostic Procedure

– – –1/1

❶ **Track Adjuster Check**	Check that grease fitting and valve are tight and not leaking grease or oil. Are grease fitting, valve and seal properly installed?	**YES:** Diagnostic procedure complete. **NO:** Replace grease fitting or valve. To replace seals, see Track Adjuster Cylinder Disassemble and Assemble. (Group 0130.)

– – –1/1

Excessive Oil Leakage From Front Idler, Track Rollers, or Carrier Rollers Diagnostic Procedure

– – –1/1

❶ **Front Idler, Track Rollers, or Carrier Rollers Check**	Check for oil leakage caused by loose, worn or damaged plug, O-ring, or metal faced seal. Are plug, O-ring, and metal faced seal properly installed?	**YES:** Diagnostic procedure complete. **NO:** Tighten plug. Replace O-ring or metal face seal. Replace seals. See Front Idler Remove and Install. (Group 0130.) Replace seals. See Track Roller Remove and Install. (Group 0130.) Replace seals. See Track Carrier Roller Remove and Install. (Group 0130.)

– – –1/1

Bent Track Shoes Diagnostic Procedure

– – –1/1

❶ **Track Shoe Check**	Inspect track shoes for missing or loose cap screws. See Check Track Shoe Hardware. (Operator's Manual.) Are all track shoes cap screws in place and tight?	**YES:** Go to Track Shoe Wear Check. **NO:** Remove loose track shoes to clean material from between shoe and link. Install track shoes and tighten cap screws in proper sequence. See Track Shoe Remove and Install. (Group 0130.)

– – –1/1

❷ **Track Shoe Wear Check**	Measure grouser height and compare to specification for rebuilding or replacing track shoes. See Percent Worn Charts. (SP326 Undercarriage Appraisal Manual.) Is grouser height above specification?	**YES:** Go to Machine Operating Condition Check. **NO:** Repair or replace track shoes. See Track Shoe Remove and Install. (Group 0130.)

– – –1/1

❸ **Machine Operating Condition Check**	Inspect worksite and interview machine operator. • Check if machine is operated on rough and rocky terrain. • Check if operator ever uses the slow speed (turtle) mode. Does operator understand how machine damage can be reduced?	**YES:** Diagnostic procedure complete. **NO:** Instruct operator on the correct operating procedures of traveling in slow speed (turtle) mode on rough and rocky terrain. See Operator's Daily Machine Check Before Starting. (Operator's Manual.) – – –1/1

"Popping" Of Track Diagnostic Procedure

– – –1/1

❶ **Machine Operating Condition Check**	Inspect worksite and interview machine operator. • Check if machine is operated at high speed in reverse. • Check if operator ever uses the slow speed (turtle) mode. Does operator understand that traveling in reverse should be minimized?	**YES:** Go to Sprocket Check. **NO:** Instruct operator that high travel loads in reverse can cause the recoil spring to retract allowing sprocket to slip in chain and make this noise. – – –1/1
❷ **Sprocket Check**	Check sprocket for packed material and rocks. Is sprocket free of excess material?	**YES:** Diagnostic procedure complete. **NO:** Clean material from sprocket. – – –1/1

Cracked Track Link Diagnostic Procedure

– – –1/1

❶ **Machine Operating Condition Check**	Repair or replace cracked track link. See Track Chain Repair. (Group 0130.) or See Track Chain Remove and Install. (Group 0130.) Inspect worksite and interview machine operator. • Check if machine is operated on rough and rocky terrain. • Check if operator ever uses the slow speed (turtle) mode. Does operator understand how machine damage can be reduced?	**YES:** Go to Track Shoe Width Check. **NO:** Instruct operator on the correct operating procedures of traveling in slow speed (turtle) mode on rough and rocky terrain. See Operator's Daily Machine Check Before Starting. (Operator's Manual.) – – –1/1

❷ **Track Shoe Width Check**	Check machine and operating ground conditions. Are the narrowest shoes possible for required flotation being used?	**YES:** Diagnostic procedure complete. **NO:** Install the narrowest shoes possible for required flotation. See Track Shoe Remove and Install. (Group 0130.) – – –1/1

Chipped Link Rails Diagnostic Procedure

– – –1/1

❶ **Track Sag Check**	Check track sag. See Check and Adjust Track Sag. (Operator's Manual.) Is track sag within specification?	**YES:** Diagnostic procedure complete. **NO:** Adjust track sag. – – –1/1

❷ **Track Chain Check**	Inspect machine and worksite to determine cause of repeated high impacts of roller tread on flanges. Check machine for following: • Check track chain pitch specification, see Percent Worn Charts (SP326 Undercarriage Appraisal Manual.) • Check if machine has loose or snaky track. • Check if machine is operated on rough and rocky terrain. Are the correct track components installed on machine and do they meet specifications?	**YES:** Go to Track Shoe Width Check. **NO:** Install correct track components to specifications. – – –1/1

❸ **Track Shoe Width Check**	Check machine and operating ground conditions. Are the narrowest shoes possible for required flotation being used?	**YES:** Diagnostic procedure complete. **NO:** Install the narrowest shoes possible for required flotation. See Track Shoe Remove and Install. (Group 0130.)

– – –1/1

Individual Undercarriage Component Wear Diagnostic Procedure

– – –1/1

❶ **Undercarriage Component Check**	Some component wear is normal. See Percent Worn Charts (SP326 Undercarriage Appraisal Manual.) to determine if components need rebuilding or replacement. Measure components. Is component wear within specification?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace components as necessary.

– – –1/1

Measure Swing Bearing Wear

SPECIFICATIONS	
Swing Bearing	
Swing Bearing Play	0.6—1.85 mm new 0.024—0.073 in. new 3.1—4.35 mm maximum allowable 0.122—0.171 in maximum allowable

SERVICE EQUIPMENT AND TOOLS
Dial Indicator

Continued on next page

MR50960,00000FC –19–27APR06–1/3

CAUTION: Stay clear of moving parts. Position dial indicator so it can be seen while the operator can see you.

NOTE: Two people are needed to take the measurement. One to operate the machine and one to take the readings.

1. Check that swing bearing-to-main frame cap screws are tightened to specification. See Upperstructure Remove and Install. (Group 4350.)

2. Check that swing bearing is lubricated with the specified grease. See Track Adjuster, Working Tool Pivot, Swing Bearing, And Swing Bearing Gear Grease. (Operator's Manual.)

3. Check that bearing rotation is smooth and without noise.

NOTE: Readings vary depending on the location of dial indicator base with respect to the swing bearing support tower. To obtain an accurate reading, the base for dial indicator must be attached to the support tower or as close to it as possible.

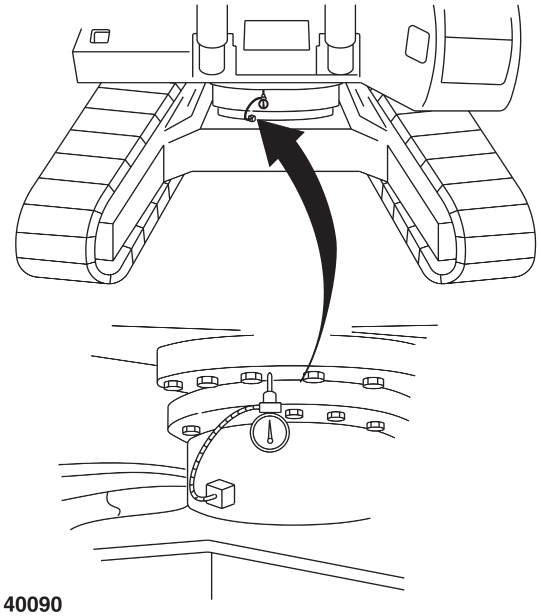
4. Install dial indicator with needle point contacting bottom face of bearing outer race and base attached to the swing bearing support tower or as close to it as possible.

5. Move boom and arm to the position shown with bucket off the ground. Bucket must be empty.

6. Turn dial indicator to zero.

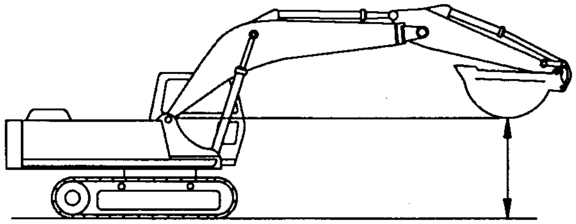
7. Lower the boom to raise front idlers off the ground approximately 500 mm (20 in.).

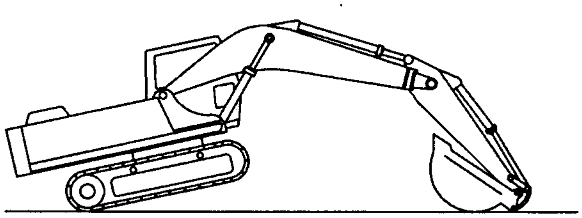
8. Record dial indicator reading.



T140090

T140090 –UN–17MAY01





T7886AJ CV

T7886AJ –UN–23NOV92

Swing Bearing—Specification

Swing Bearing—Play .... 0.6—1.85 mm new
0.024—0.073 in. new
3.1—4.35 mm maximum allowable
0.122—0.171 in maximum allowable

Continued on next page

MR50960,00000FC –19–27APR06–2/3

If play is more than specified, check for wear to balls, spacers, and bearing race. See Swing Bearing Remove and Install. (Group 4350.)

MR50960,00000FC –19–27APR06–3/3

Section 9025
Hydraulic System

Contents

Page

Group 05—Theory of Operation

Hydraulic System Diagram and Operation. . . 9025-05-2
Fan Drive System Diagram and Operation. 9025-05-3
Pilot System Diagram and Operation 9025-05-4
Pilot Pump, Pressure Regulating Valve, and Filter Operation 9025-05-6
Pilot Check Valve Manifold and Accumulator Operation. 9025-05-7
Boom Lowering With Engine Stopped Circuit Operation. 9025-05-7
Pilot Shutoff Solenoid Valve Operation 9025-05-7
Pilot Control Valve Operation 9025-05-10
Travel Pilot Control Valve Operation 9025-05-12
Boom Up Shockless Valve Operation 9025-05-14
Pilot Signal Manifold Operation 9025-05-15
Pilot Operation of Control Valve Operation. 9025-05-26
Pump 1 and 2, Fan Drive Pump, and Gearbox Operation 9025-05-30
Pump 1 and 2 Regulator Operation. 9025-05-34
Fan Drive Pump Regulator Operation 9025-05-38
Control Valve Operation 9025-05-48
Control Valve Check Valves Identification and Operation. 9025-05-62
Main Relief and Power Digging Valve Circuit Operation. 9025-05-66
Circuit Relief and Anticavitation Valve Operation. 9025-05-72
Arm Make-Up Check Valve Operation. 9025-05-73
Travel Flow Combiner Valve Circuit Operation. 9025-05-74
Boom Regenerative Valve Circuit Operation. 9025-05-77
Arm Regenerative Valve Circuit Operation. 9025-05-79
Bucket Regenerative Valve Circuit Operation. 9025-05-81
Boom and Arm Reduced Leakage Valves Operation. 9025-05-83
Boom Flow Rate Circuit Operation 9025-05-87
Arm 2 Flow Rate Circuit Operation 9025-05-94
Boom Mode Circuit Operation 9025-05-97
Counterweight Removal Circuit Operation. 9025-05-97
Swing Gearbox Operation 9025-05-98
Swing Motor and Park Brake Circuit Operation. 9025-05-99
Swing Motor Park Brake Release Circuit Operation. 9025-05-103
Center Joint Operation 9025-05-104
Travel Motor and Park Brake Circuit Operation. 9025-05-105
Travel Motor Speed Circuit Operation 9025-05-107
Boom, Arm, and Bucket Cylinder Operation. 9025-05-109
Counterweight Removal Cylinder Operation. 9025-05-110
Return Filter Operation 9025-05-111

Group 15—Diagnostic Information

Diagnose No Hydraulics Malfunctions 9025-15-1
No Hydraulic Functions Diagnostic Procedure 9025-15-1
Diagnose All Hydraulics Slow Malfunctions 9025-15-3
All Hydraulic Functions Slow Diagnostic Procedure 9025-15-3
Poor Combined Operation Diagnostic Procedure 9025-15-6
Diagnose All Hydraulic Functions Too Fast Malfunctions 9025-15-7
Hydraulic Function Speed Too Fast Diagnostic Procedure. 9025-15-7
Diagnose Hydraulic Overheating Malfunctions 9025-15-8
Hydraulic Oil Overheats Diagnostic Procedure 9025-15-8
Diagnose Fan Drive Hydraulic System Malfunctions 9025-15-10
Cooling Fan Remains At Maximum Speed Diagnostic Procedure. 9025-15-10
Diagnose Pilot Circuit Malfunctions 9025-15-11
All Functions Cannot Be Operated Diagnostic Procedure 9025-15-11
Function Does Not Stop When Control Lever Released Diagnostic Procedure . . . 9025-15-13
Some Functions Cannot Be Operated, All Others Are Normal Diagnostic Procedure 9025-15-13

Continued on next page

Page

All Functions Slow Diagnostic Procedure . . 9025-15-15
Function Moves in Opposite Direction Diagnostic Procedure. 9025-15-16
Diagnose Dig Circuit Malfunctions. 9025-15-16
All Hydraulic Functions Low Power Diagnostic Procedure 9025-15-16
Boom Raise Power Is Low During Digging Diagnostic Procedure. 9025-15-17
Some Functions Cannot Be Operated or Are Slow, Travel And Swing Are Normal Diagnostic Procedure 9025-15-18
Arm Or Bucket Speeds Are Slow During Combined Function With Boom Lower Diagnostic Procedure 9025-15-19
During Combined Functions, Boom Raise Speed Is Slow And Arm-In Is Jerky Diagnostic Procedure 9025-15-20
Boom Mode Switch Off, Boom Will Not Raise Machine Off Ground Diagnostic Procedure 9025-15-22
Load Falls When Control Valve Is Actuated To Raise Load With Engine Running At Slow Idle Diagnostic Procedure 9025-15-23
Load Drifts Down When Control Valve Is In Neutral Position Diagnostic Procedure 9025-15-25
Dig Function Speed Is Slow During Combined Operation With Swing Diagnostic Procedure 9025-15-27
HP (High Power) Function Does Not Operate, P (Standard) Mode Is Normal Diagnostic Procedure 9025-15-29
Diagnose Swing Circuit Malfunctions. 9025-15-31
Swing Speed Slow In Both Directions Diagnostic Procedure. 9025-15-31
Swing Speed Slow or Does Not Operate In One Direction Diagnostic Procedure 9025-15-33
Swing Is Too Fast Diagnostic Procedure. . . 9025-15-35
Upperstructure Drift With Swing Valve In Neutral Diagnostic Procedure 9025-15-36
Swing Function Does Not Operate Diagnostic Procedure 9025-15-36
Diagnose Travel Circuit Malfunctions 9025-15-37
Left Travel Does Not Move During Single Travel Operation Diagnostic Procedure 9025-15-38
Right Travel Does Not Move During Single Travel Operation Diagnostic Procedure 9025-15-40
Both Tracks Do Not Rotate Or Move Slowly In Either Direction Diagnostic Procedure 9025-15-41

Page

One Track Does Not Rotate Or Moves Slowly Diagnostic Procedure. 9025-15-42
Machine Mistracks During Combined Operation With Dig Functions Diagnostic Procedure 9025-15-45
Travel Mode Will Not Switch From Slow To Fast Speed Diagnostic Procedure . . . 9025-15-47
Travel Park Brakes Do Not Apply Diagnostic Procedure 9025-15-48
Track Will Not Move In One Direction Diagnostic Procedure. 9025-15-49
Track Will Not Move In Either Direction Diagnostic Procedure. 9025-15-50
Machine Mistracks At All Speeds In Both Directions Diagnostic Procedure 9025-15-52
Slow Travel Speed Or Low Power Diagnostic Procedure 9025-15-54
Combined Travel And Dig Functions Slow Or No Power Diagnostic Procedure 9025-15-56
Travel Is “Jerky” Diagnostic Procedure 9025-15-56
Machine Will Not Hold Back And Park Brakes Engage And Disengage When Traveling Down An Incline Diagnostic Procedure 9025-15-57
Machine Will Not Turn Smoothly In One Direction Or Park Brake Grabs Diagnostic Procedure 9025-15-57
Diagnose Counterweight Removal System Malfunctions 9025-15-58
Counterweight Removal / Installation Device Does Not Operate Or Low Power Diagnostic Procedure 9025-15-58
Counterweight Removal / Installation Speed Is Too Fast Diagnostic Procedure 9025-15-59
Diagnose Auto Lubrication System Malfunctions 9025-15-61
Auto Lubrication Does Not Operate Diagnostic Procedure. 9025-15-61
Auto Lubrication Does Not Stop Diagnostic Procedure 9025-15-63
Auto Lubrication Alarm Is Displayed Diagnostic Procedure. 9025-15-64
Pump 1, Pump 2 and Pilot Pump Line Identification 9025-15-65
Control Valve Line Identification 9025-15-66
Swing Motor Line Identification 9025-15-70
Control Lever Pattern Conversion 9025-15-71
Pilot Control Valve-to-Pilot Signal Manifold Component Location—Excavator Pattern. 9025-15-76

Continued on next page

Page

Pilot Control Valve-to-Pilot Signal Manifold Component Location—Backhoe Pattern 9025-15-78
Pilot Signal Manifold-to-Control Valve Line Connections 9025-15-80
Travel Hydraulic System Component Location 9025-15-82
Travel Hydraulic System Line Connection 9025-15-84
Fan Drive Hydraulic System Component Location 9025-15-86
Fan Drive Hydraulic System Line Connections 9025-15-88
Hydraulic System Component Location 9025-15-90
Hydraulic System Line Connections 9025-15-92
Counterweight Removal Hydraulic System Component Location 9025-15-93
Counterweight Removal Hydraulic System Line Connections 9025-15-93
Hydraulic System Schematic 9025-15-94

Group 25—Tests

Hydraulic Test Port Location 9025-25-1
JT05800 Digital Thermometer Installation . . . 9025-25-1
JT02156A Digital Pressure/Temperature Analyzer 9025-25-2
Hydraulic Oil Cleanup Procedure Using Portable Filter Caddy 9025-25-3
Hydraulic Oil Warm-Up Procedure 9025-25-4
Pilot Pressure Regulating Valve Test and Adjustment 9025-25-7
Control Valve Spool Actuating Pilot Pressure Test 9025-25-11
Power Dig Solenoid Valve (port SG) Test and Adjustment 9025-25-14
Travel Speed Solenoid Valve (port SI) Test and Adjustment 9025-25-19
Boom Mode Solenoid Valve (port SC) Test and Adjustment 9025-25-24
Solenoid Valve
  Boom Flow Rate (port SF) Test and Adjustment 9025-25-28
Main Relief and Power Digging Valve Test and Adjustment 9025-25-32
Circuit Relief Valve Test and Adjustment 9025-25-37
Boom Mode Relief Valve Test and Adjustment 9025-25-42
Pump Servo Piston
  Minimum Flow Test and Adjustment 9025-25-46
  Maximum Flow Test and Adjustment 9025-25-48

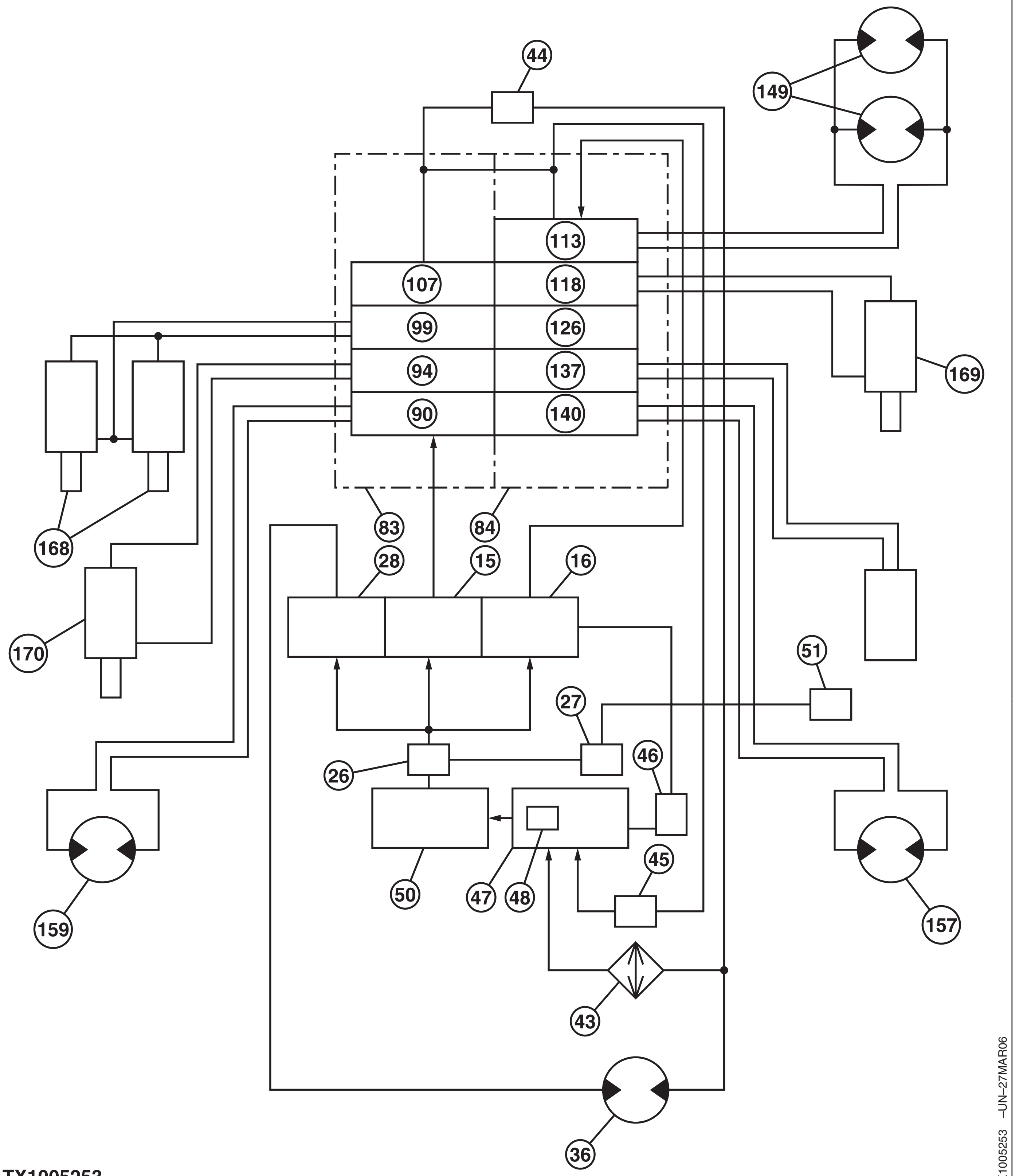
Page

Pump
  Flow Rate (Displacement) Test and Adjustment 9025-25-51
Swing Motor Crossover Relief Valve Test and Adjustment 9025-25-52
Travel Motor Crossover Relief Valve Test and Adjustment 9025-25-56
Swing Motor Leakage Test 9025-25-60
Travel Motor Leakage Test 9025-25-64
Cylinder Drift Test—Arm, Boom, and Bucket 9025-25-67
Pump Flow Test 9025-25-69
Fan Drive
  System Relief Valve Test and Adjustment 9025-25-74
Fan Drive Pump Servo Piston
  Minimum Flow Test and Adjustment 9025-25-77
  Minimum Flow Test and Adjustment 9025-25-78
Pump
  Flow Rate (Displacement) Test and Adjustment 9025-25-79
Fan Drive Pump
  Torque Control Test and Adjustment 9025-25-80
Fan Drive Pump Flow Test 9025-25-82

Group 05

Theory of Operation

Hydraulic System Diagram and Operation



TX1005253

Continued on next page

15—Pump 1
16—Pump 2
26—Charge Pump
27—Pilot Pump
28—Fan Drive Pump
36—Fan Drive Motor
43—Hydraulic Oil Cooler
44—Restriction Valve
45—Hydraulic Oil Cooler Bypass Valve
46—Pump Case Drain Filter and Bypass Valve
47—Hydraulic Oil Tank
48—Return Filter Element
50—Suction Screen
51—Pilot Filter and Pressure Regulating Valve
83—Right Control Valve (4-spool side)
84—Left Control Valve (5-spool side)
90—Right Travel Spool
94—Bucket Spool
99—Boom 1 Spool
107—Arm 2 Spool
113—Swing Spool
118—Arm 1 Spool
126—Boom 2 Spool
137—Auxiliary Spool
140—Left Travel Spool
149—Swing Motor (2 used)
157—Left Travel Motor
159—Right Travel Motor
168—Boom Cylinder (2 used)
169—Arm Cylinder
170—Bucket Cylinder

The main hydraulic system is an open-center hydraulic system.

Hydraulic oil flows from the hydraulic oil tank (47) through the suction screen (50) to the charge pump (26), hydraulic pump 1 (15), hydraulic pump 2 (16), and the fan pump (28). Hydraulic pump 1 delivers supply oil to the right control valve (83) (4-spool side) and hydraulic pump 2 delivers supply oil to the left control valve (84) (5-spool side). Oil travels from the fan pump (28) and turns the fan motor (36). Supply oil is routed to the left and right travel motors (157 and 159), cylinders (168—170) and both swing motors (149) by the valve spool(s) of their respective valve section (90, 94, 99, 107, 113, 118, 126, 137, and 140). The hydraulic oil tank is pressurized to create a head of oil to ensure oil flows from the tank, through the suction line, and into the pumps.

Return oil from the motor(s) and cylinder(s) is routed into the return passages in the control valve by the valve spools. From the return passages, return oil flows out of the control valve, through the restriction valve (44), oil cooler (43), and return filter (48).

If the oil is cold (high viscosity), or there is a surge of return oil, or the hydraulic oil cooler becomes plugged, the hydraulic oil cooler bypass valve (45) routes return oil around the hydraulic oil cooler and directly to the hydraulic tank (47) when oil flow resistance becomes too high through the hydraulic cooler.

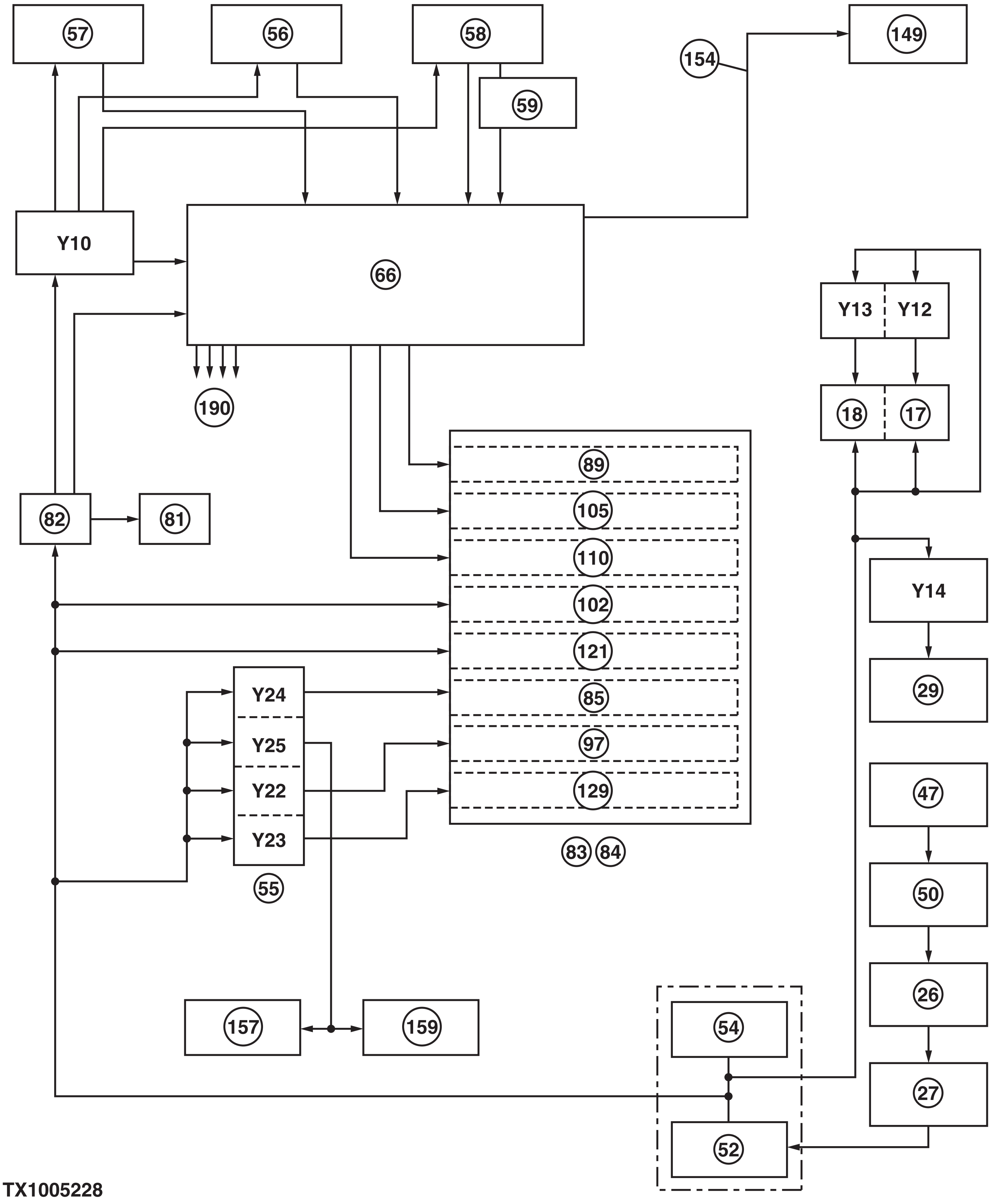
LD30992,000024E –19–25APR06–2/2

Fan Drive System Diagram and Operation

Information not available at the time of release.

OUT3035,000001A –19–08JUN06–1/1

Pilot System Diagram and Operation



TX1005228

Continued on next page

17—Pump 1 Regulator
18—Pump 2 Regulator
26—Charge Pump
27—Pilot Pump
29—Fan Drive Pump Regulator
47—Hydraulic Oil Tank
50—Suction Screen
52—Pilot Filter Element
54—Pilot Pressure Regulating Valve
55—Solenoid Valve Manifold
56—Travel Pilot Control Valve
57—Left Pilot Control Valve
58—Right Pilot Control Valve
59—Boom Up Shockless Valve
66—Pilot Signal Manifold
81—Accumulator
82—Pilot Check Valve Manifold
83—Right Control Valve
84—Left Control Valve
85—Main Relief and Power Digging Valve
89—Travel Flow Combiner Valve
97—Boom Flow Rate Control Valve—Switch Valve
102—Boom Reduced Leakage Valve—Switch Valve
105—Arm 2 Flow Rate Control Valve—Switch Valve
110—Bypass Shutoff Valve (4-spool)
121—Arm Reduced Leakage Valve—Switch Valve
129—Boom Mode Relief Control Valve
149—Swing Motor
154—Swing Park Brake Release
157—Left Travel Motor
159—Right Travel Motor
190—To Control Valve Pilot Caps
Y10—Pilot Shutoff Solenoid Valve
Y12—Pump 1 Control Solenoid Valve
Y13—Pump 2 Control Solenoid Valve
Y14—Fan Drive Pump Solenoid Valve
Y22—Boom Flow Rate Solenoid Valve (SF)
Y23—Boom Mode Relief Solenoid Valve (SC)
Y24—Power Dig Solenoid Valve (SG)
Y25—Travel Speed Solenoid Valve (SI)

The pilot system is used to operate the control circuits of the machine. The pilot pump (27) is mounted on the end of main hydraulic pump 1. Oil is drawn from the hydraulic tank (47) by the charge pump (26). This charge oil is then drawn into the pilot pump and out to the pilot filter (52) and pilot pressure regulating valve (54).

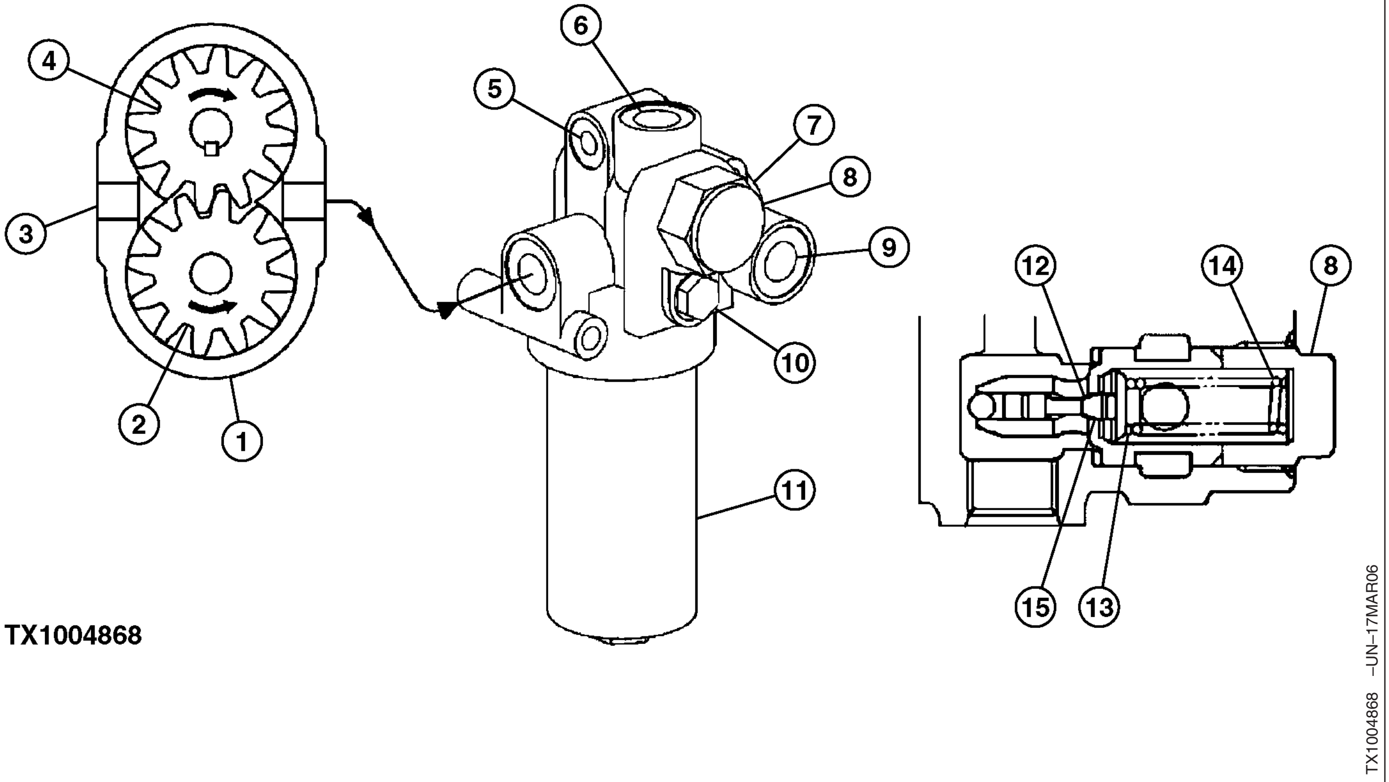
The filtered oil then flows to the fan drive pump solenoid (Y14), fan drive pump regulator (29), pump 1 regulator (17), pump 2 regulator (18), pump 1 control solenoid valve (Y12), and pump 2 control solenoid valve (Y13).

From the filter, oil is also routed to the solenoid valve manifold (55), which controls power dig (SG), travel speed (SI), boom flow rate (SF), and boom mode relief (SC). Pilot oil is routed directly to the control valve to facilitate the functioning of the arm reduced leakage valve (121) and the boom reduced leakage valve (102).

The pilot oil continues on to the pilot check valve manifold (82), where it is divided off to the accumulator (81), the pilot signal manifold (66), and the pilot shutoff solenoid valve (Y10). From the pilot shutoff solenoid valve, pilot oil flows to the travel pilot control valve (56), left pilot control valve (57), right pilot control valve (58), and to the pilot signal manifold’s warm-up circuit.

Pilot oil from the right pilot control valve flows through the boom up shockless valve (59) to the pilot signal manifold. Pilot oil from the pilot signal manifold flows to the swing park brake release (154) of the swing motor (149) and to the control valve pilot caps (190).

Pilot Pump, Pressure Regulating Valve, and Filter Operation



Pilot Pump, Pressure Regulating Valve and Filter

1—Pilot Pump
2—Drive Gear
3—From Hydraulic Pump Suction Line
4—Drive Gear
5—Regulated Pilot Oil to Hydraulic Pump
6—Return Oil to Hydraulic Return Manifold
7—Pilot Filter Bypass Valve
8—Pilot Pressure Regulating Valve
9—Regulated Pilot Oil to Solenoid Valve Manifold
10—Test Port
11—Filter Element
12—Pilot Pressure Regulating Valve Spool
13—Shim(s)
14—Spring
15—Orifice

Pilot filter and pilot pressure regulating valve are incorporated into one assembly.

Pilot filter bypass valve (7) will sense differential pressure between inlet side and outlet side of filter element (11). During normal operation, the bypass valve is held closed by a spring as oil flows through filter element (11) to pilot pressure regulating valve (8). If filter element becomes plugged, pressure on inlet side increases, forcing bypass valve open. Pilot oil will now bypass the filter element, and unfiltered oil will flow to the pilot pressure regulating valve spool (12).

Pilot pressure regulating valve spool is a bypass flow regulating valve and is used to regulate pilot oil pressure in pilot oil circuit. Pilot oil flows through an orifice (15) to the end of pilot pressure regulating valve spool. When pressure in pilot circuit increases to pressure setting of spring (14), the spool will push against the spring. Regulated pilot oil flows from port PD to solenoid valve manifold (9) and from port PC to pump servo pistons and regulators. Oil is not needed to maintain pressure in pilot circuit. Oil flows out port TA to hydraulic return manifold (6).

Pilot Check Valve Manifold and Accumulator Operation

Information not available at the time of release.

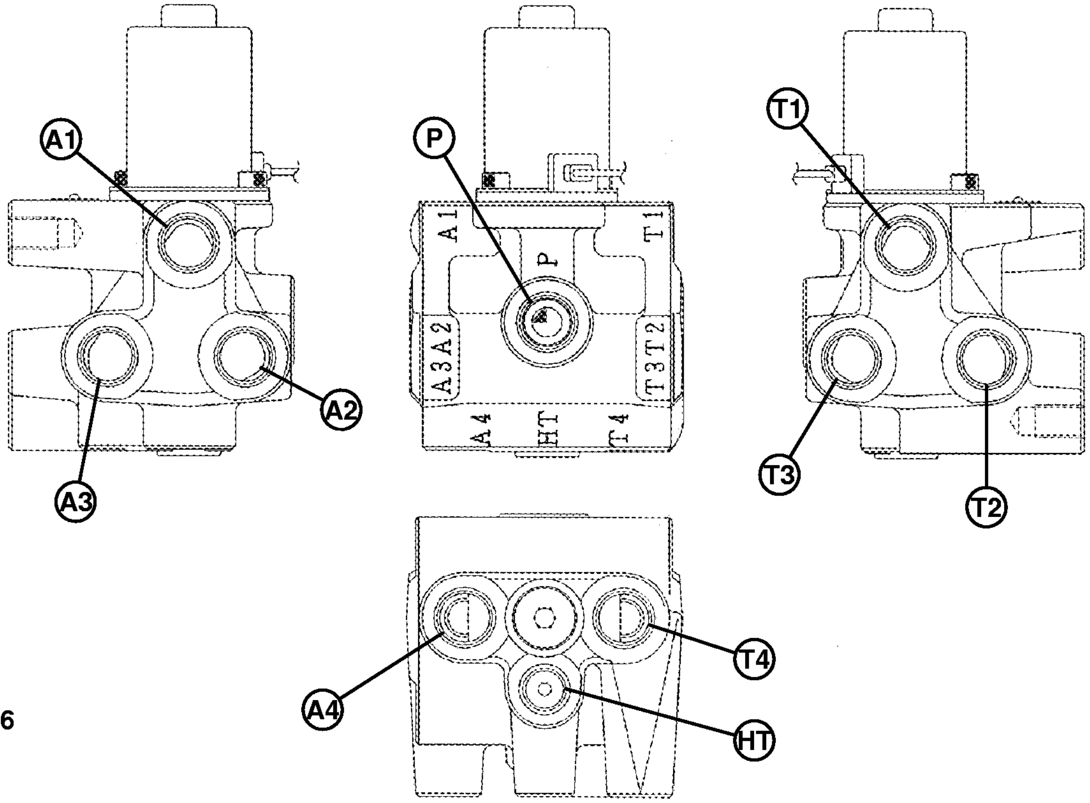
OUT3035,000001B –19–08JUN06–1/1

Boom Lowering With Engine Stopped Circuit Operation

Information not available at the time of release.

OUT3035,000001C –19–08JUN06–1/1

Pilot Shutoff Solenoid Valve Operation



TX1000386

TX1000386 –UN–13DEC05

Pilot Control Shutoff Valve Port Locations

A1—To Travel Pilot Control Valve
A2—To Right Pilot Control Valve
A3—To Left Pilot Control Valve
A4—Unused
HT—To Pilot Signal Manifold Port PH
P—Pilot Oil from Pilot Pump
T1—From Travel Pilot Control Valve
T2—From Right Pilot Control Valve
T3—From Left Pilot Control Valve
T4—Return to Hydraulic Oil Tank

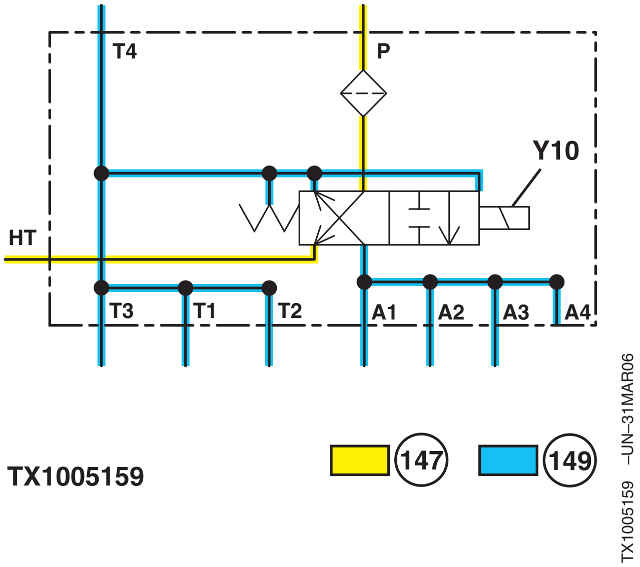
The pilot shutoff solenoid valve is electrically operated by the pilot control shutoff lever.

Continued on next page

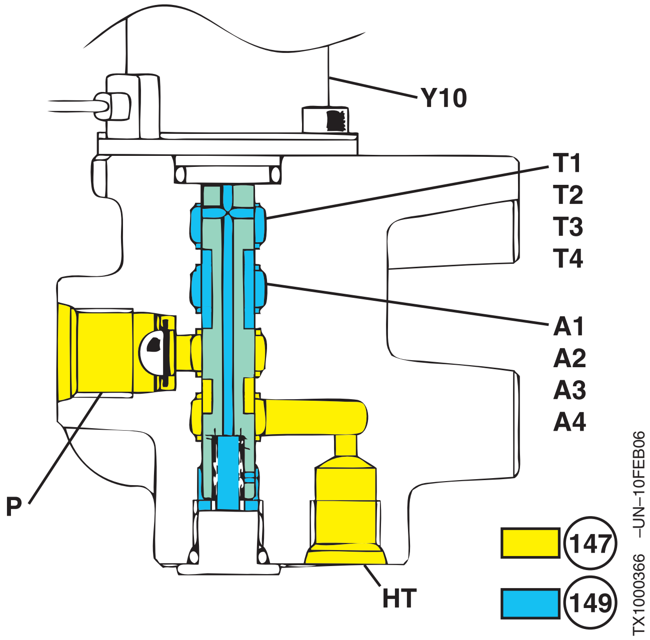
LD30992,0000251 –19–25APR06–1/3

De-Energized—With the pilot control shutoff lever in the locked position, the lever is pulled rearward. The pilot shutoff valve solenoid is de-energized. Pilot pressure oil from the pilot pump port (P) flows to port (HT). Ports (A1—A3) are connected to the return to hydraulic oil tank. See Pilot Shutoff Circuit Theory of Operation. (Group 9015-15.)

A1—To Travel Pilot Control Valve
A2—To Right Pilot Control Valve
A3—To Left Pilot Control Valve
A4—Unused
HT—To Pilot Signal Manifold Port PH
P—Pilot Oil from Pilot Pump
T1—From Travel Pilot Control Valve
T2—From Right Pilot Control Valve
T3—From Left Pilot Control Valve
T4—Return to Hydraulic Oil Tank
Y10—Solenoid
147—Pilot Oil
149—Return Oil



De-Energized Pilot Shutoff Solenoid Valve Schematic

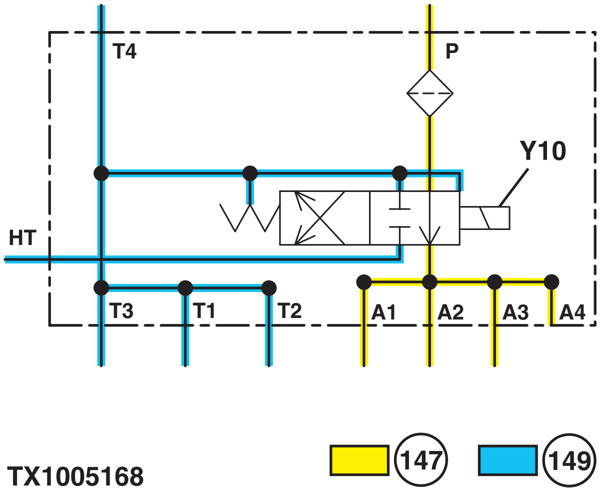


De-Energized Pilot Shutoff Solenoid Valve Section

Continued on next page

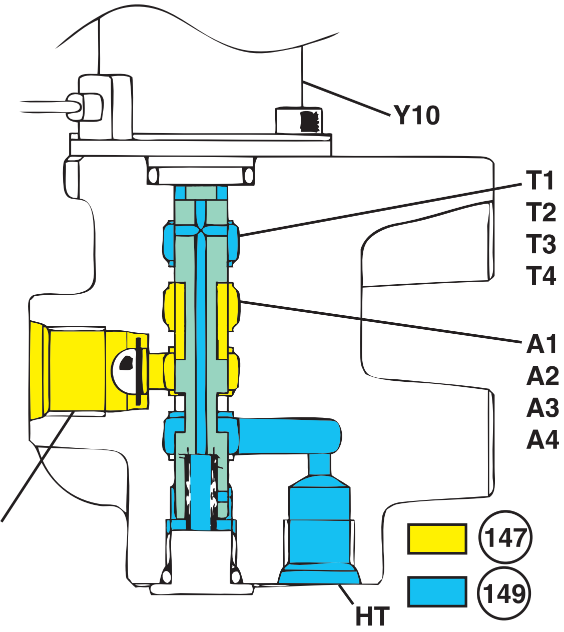
Energized—With the pilot control shutoff lever in the unlocked position, the lever is pushed forward. The pilot shutoff valve solenoid is energized. Pilot pressure oil from the pilot pump is connected to the pilot valve ports. Pilot oil pressure to port (HT) is blocked.

A1—To Travel Pilot Control Valve
A2—To Right Pilot Control Valve
A3—To Left Pilot Control Valve
A4—Unused
HT—To Pilot Signal Manifold Port PH
P—Pilot Oil from Pilot Pump
T1—From Travel Pilot Control Valve
T2—From Right Pilot Control Valve
T3—From Left Pilot Control Valve
T4—Return to Hydraulic Oil Tank
Y10—Solenoid
147—Pilot Oil
149—Return Oil



TX1005168 –UN–31MAR06

Energized Pilot Shutoff Solenoid Valve Schematic

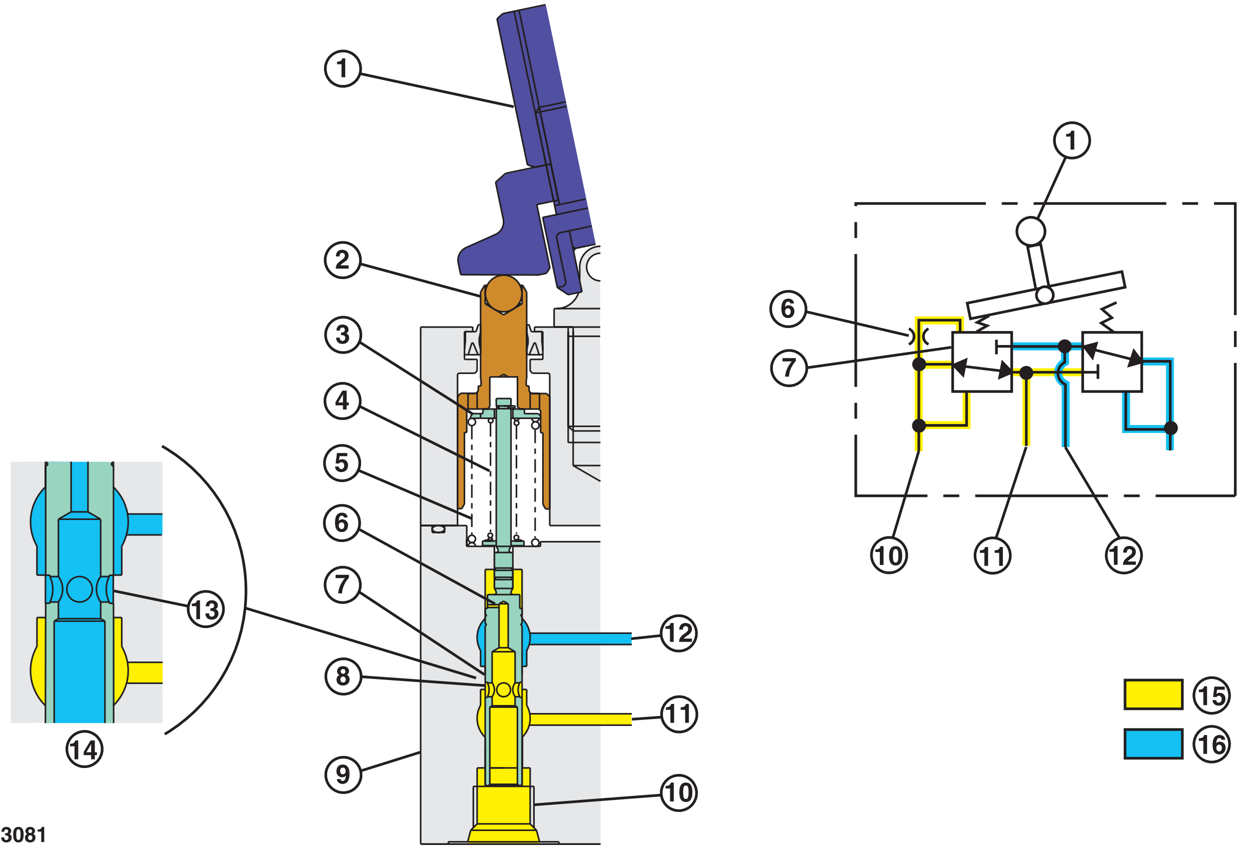


TX1000367 –UN–10FEB06

Energized Pilot Shutoff Solenoid Valve Section

LD30992,0000251 –19–25APR06–3/3

Pilot Control Valve Operation



T143081

T143081 –UN–05SEP01

Metering and Full Stroke

1—Control Lever
2—Plunger
3—Spring Guide
4—Balance Spring
5—Return Spring
6—Orifice
7—Spool
8—Hole (4 used)
9—Housing
10—Work Port 1, 2, 3, or 4 to Control Valve Pilot Caps
11—Port P from Pilot Shutoff Solenoid Valve
12—Port T to Pilot Shutoff Solenoid Valve
13—Deadband Area
14—Initial Movement
15—Pilot Oil
16—Return Oil

The left and right pilot control valves regulate the pilot oil (15) pressure to actuate the pilot valves in the pilot signal manifold and to shift the control valve spools to actuate the dig functions. See Pilot Signal Manifold Operation for pilot valve operation andsee Pilot Operation of Control Valve Operation for control valve operation. (Group 9025-05).

Each pilot control valve contains four valves, one for each dig function. The ports (10, 11, and 12) in housing (9) are identified by numbers and letters next to each port. The valves are pressure-reducing valves controlled by movement of the control lever (1) and plunger (2).

Continued on next page

LD30992,0000252 –19–31MAR06–1/2

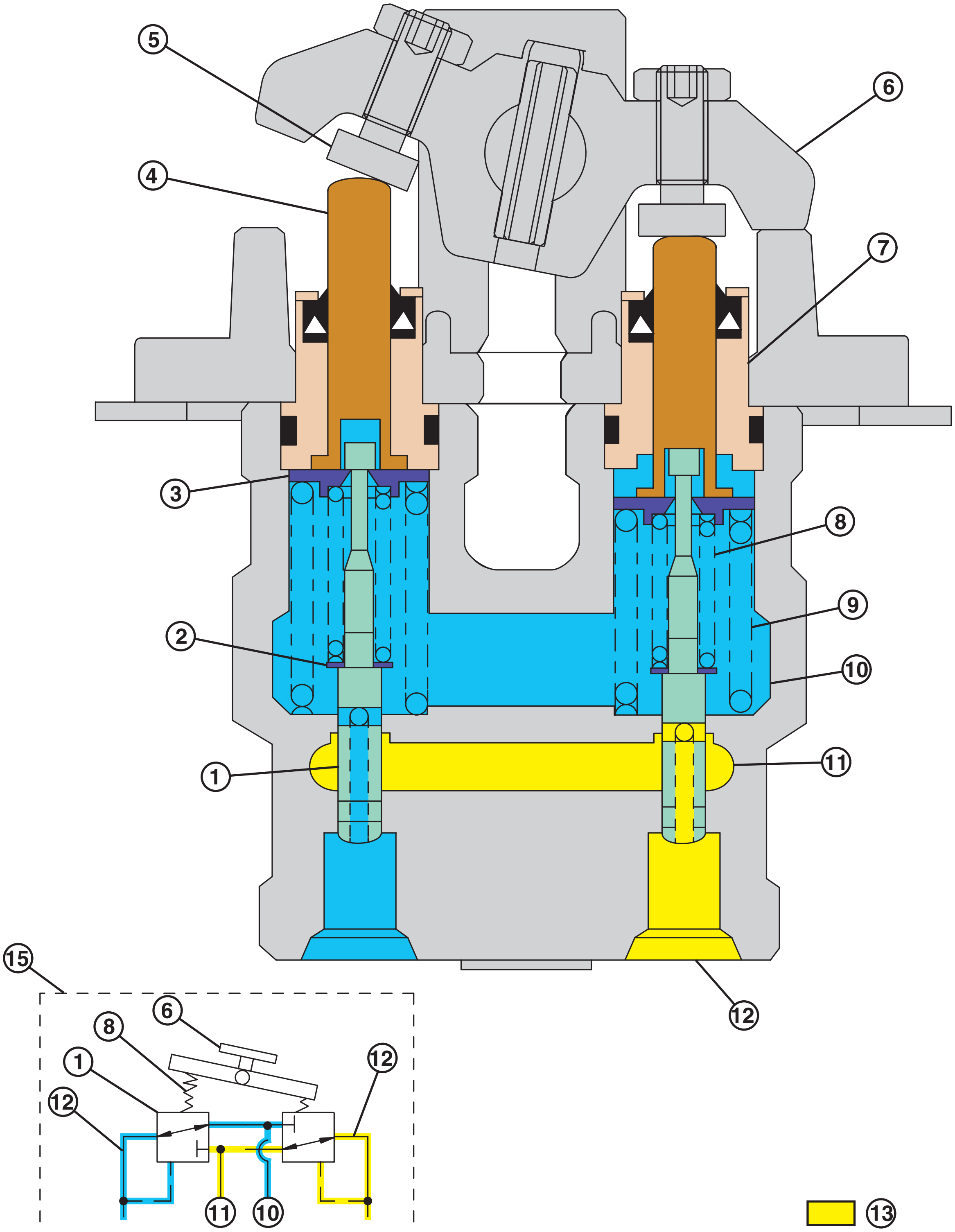
Moving the control lever to actuate a function pushes the plunger and spring guide (3) against the balance spring (4), which moves the spool (7) down. During the initial movement (14), there is a deadband area (13) where the flow of return oil (16) through the holes (8) to port T is blocked before pilot oil can flow from port P through the spool to the work port and out to the control valve pilot caps (10). Pilot oil pressure also flows through the orifice (6) to the top of the spool to dampen the upward movement of the spool. Pilot oil pressure increases until it is equal to the pressure of the balance spring pushing the spool up until the oil flow through the holes is blocked in the deadband area. With the oil flow blocked, the control valve spool is held stationary until the control lever is again actuated.

When the control lever is actuated to full stroke, the plunger contacts the spool, pushing it down until the plunger contacts a shoulder in the housing. Oil pressure to the control valve pilot caps is now approximately equal to pilot system pressure.

When the control lever is returned to neutral, the spool is pulled up by the return spring (5), pushing the plunger up. The return spring holds the control lever in the center position. With the spool up, the passage to the control valve pilot cap is open to port T and pilot oil from port P is blocked.

LD30992,0000252 –19–31MAR06–2/2

Travel Pilot Control Valve Operation



TX1000485 –UN–17NOV05

TX1000485

Travel Pilot Control Valve Operation

Continued on next page

1—Spool
2—Washer
3—Spring Guide
4—Plunger
5—Adjustment Screw
6—Cam and Pedal
7—Sleeve
8—Balance Spring
9—Return Spring
10—To Hydraulic Oil Tank
11—From Pilot Shutoff Solenoid Valve
12—To Control Valve Pilot Cap
13—Pilot Oil
14—Return Oil
15—Travel Pilot Control Valve—Full Stroke

The travel pilot control valve regulates the pilot oil (13) pressure to actuate the pilot valves in the pilot signal manifold and to shift the control valve spools to actuate the travel functions. See Pilot Signal Manifold Operation for pilot valve operation andsee Pilot Operation of Control Valve Operation for control valve operation. (Group 9025-05.)

One pilot control valve is used to control the travel functions. The pilot control valve contains four valve assemblies, one for each direction of travel for each track.

The pilot control valve consists of the cam and pedal (6), plunger (4), sleeve (7), spring guide (3), spool (1), balance spring (8), and return spring (9).

In neutral, the spool is pushed up by the return spring to block pilot oil from the pilot shutoff solenoid valve (11). With the spool up, the passage to the control valve pilot cap (12) is connected to the hydraulic oil tank (10) by the passage through the spool.

When the pedal is pushed to move the machine, the cam pushes the plunger and spring guide down against the return spring and balance spring. The balance spring pushes the spool down. As the spool is pushed down, the passage from the control valve pilot cap to the hydraulic oil tank is closed and then is opened to the pilot oil from pilot shutoff solenoid valve. When the pilot oil pressure to the control valve pilot cap is equal to the force applied by the balance spring, the spool moves up, trapping the oil to the pilot cap.

When the pedal and cam is moved to full stroke, the plunger is pushed down farther by the balance spring opening the passage through the spool to full pilot oil pressure. When pressure to the control valve pilot cap is equal to the force applied by the balance spring, the spool moves up until it contacts the plunger. The plunger holds the spool down so the passage through the spool remains open to full pilot oil pressure. Oil pressure to the control valve pilot cap now equals pilot oil pressure.

MS12501,0000013 –19–24APR06–2/2

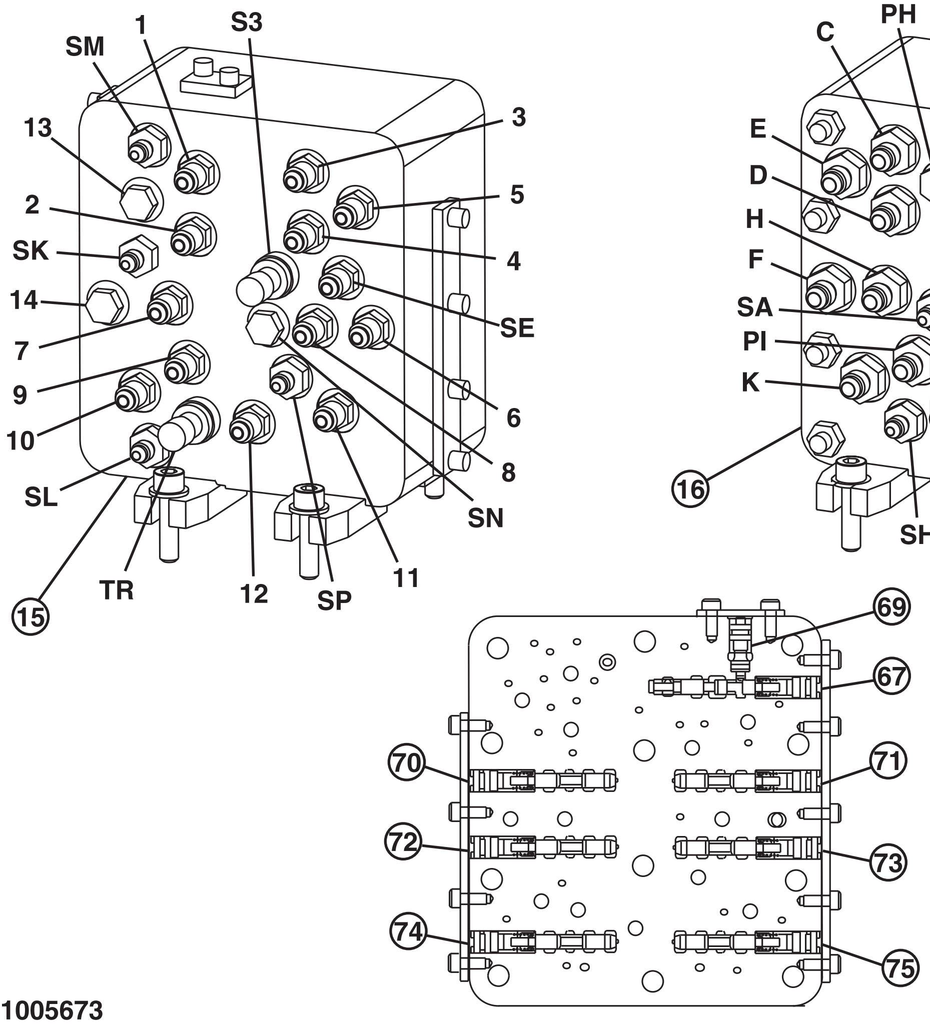
Boom Up Shockless Valve Operation

The Boom Up Shockless Valve Operation—The boom up shockless valve is provided in the boom raise circuit and functions when returning the boom raise control lever suddenly.

During The Boom Raising Operation—Supply oil routed into port A and acts on the spool. Immediately after operation is started, supply oil flows and acts on a spring within the spool. Then forces it though an orifice within the spool. At the same time, supply oil flows to port 1. When supply oil pressure increases, pressure in the spring chamber increases, and the spool pushes the opposite spring in the spool. As the spool is moved, port A is connected to port 1 and pressure in port 1 increase, so that the spool in control valve is moved.

LD30992,0000254 –19–25APR06–1/1

Pilot Signal Manifold Operation



TX1005673

TX1005673 –UN–25APR06

1, A—Boom Up
2, B—Boom Down
3, C—Arm Out
4, D—Arm In
5, E—Swing Left
6, F—Swing Right
7, G—Bucket Curl
8, H—Bucket Dump
9, I—Left Travel Forward
10, J—Left Travel Reverse
11, K—Right Travel Forward
12, L—Right Travel Reverse
13, M—Plug (auxiliary)
14, N—Plug (auxiliary)
15—Control Valve Side of Pilot Signal Manifold
16—Pilot Control Valve Side of Pilot Signal Manifold
67—Boom Down Shockless Valve
69—Orifice
70—Pilot Valve (port SE) (not used, plug installed)
71—Arm 2 Flow Rate Pilot Valve (port SK)
72—Pump 1 Flow Rate Pilot Valve (port SA) (not used, plug installed)
73—Pump 2 Flow Rate Pilot Valve (port SB) (not used, plug installed)
74—Swing Park Brake Release Pilot Valve (port SH)
75—Travel Flow Combiner Pilot Valve (port SL)
DF—To Hydraulic Oil Tank
TR—B56 and B57 Travel Pressure Sensor
S3—B33 Swing Pressure Sensor
SA—From Pump 1 Flow Rate Pilot Valve Remote Control Spool (not used, plug installed)
SB—From Pump 2 Flow Rate Pilot Valve Remote Control Spool (not used, plug installed)
SE—To Pilot Valve (port SE) (not used, plug installed)
SH—To Swing Park Brake (port SH)
SK—To Arm Flow Rate Control Valve—Switch Valve
SL—To Travel Flow Combiner Valve
SM—To Hydraulic Oil Tank
SN—Plug (not used)
SP—To Solenoid Valve Manifold (port SP)
PH—From Pilot Shutoff Solenoid Valve
PI—From Pilot Check Valve Manifold

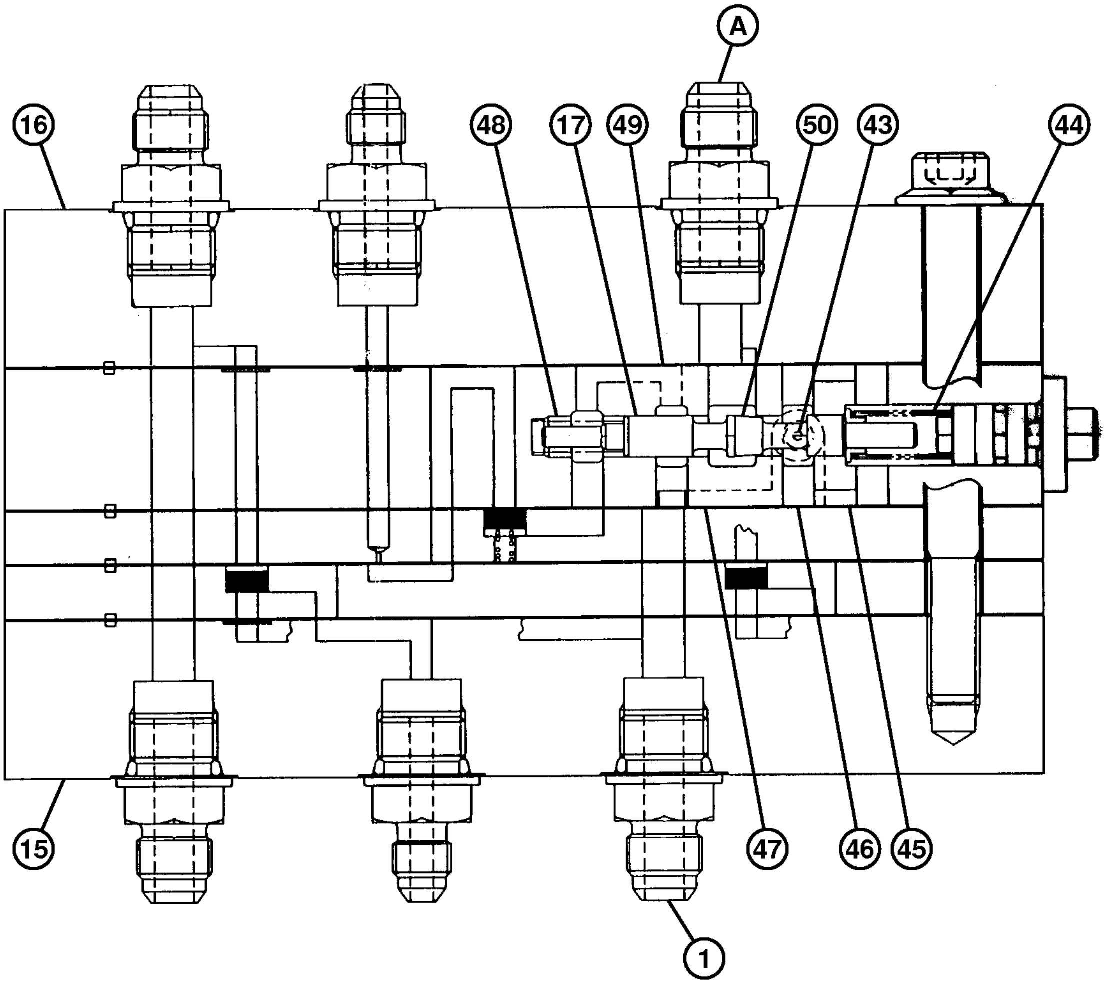
Continued on next page

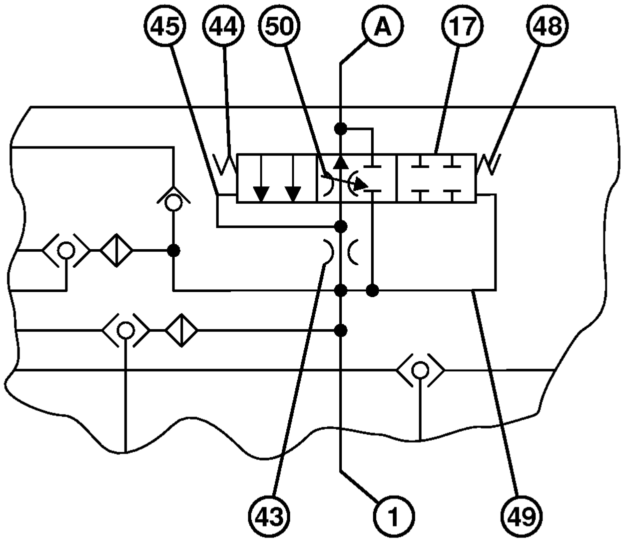
NOTE: The numbers 1—14 and letters A—N, DF, TR, S3, SA, SB, SE, SH, SK, SL, SM, SN, SP, PH, and PI are next to the respective ports on the pilot signal manifold.

The pilot signal manifold is in the pilot system between the pilot control valves and the control valve and regulators. The manifold receives a pilot signal from the pilot control valves and sends the signal on multiple paths. One path is used to shift the spools in the control valve and the other sends a signal to the regulators through pump 2. This is done simultaneously so there is little lag between operation of the pilot control valves, pump stroke, and function movement. The manifold also houses additional pilot valves that provide pilot oil for various other functions.

See Hydraulic System Schematic. (Group 9025-05.)

Continued on next page





TX1002435

Boom Down Shockless Valve

Continued on next page

MM61211,0001519 –19–16MAY08–3/10

A—From Pilot Control Valve—Boom Up
1—To Bottom Pilot Cap
15—Control Valve Side of Pilot Signal Manifold
16—Pilot Control Valve Side of Pilot Signal Manifold
17—Boom Down Shockless Valve
43—Orifice
44—Spring B
45—Passage 3
46—Oil Chamber
47—Passage 2
48—Spring A
49—Passage 1
50—Tapered Land

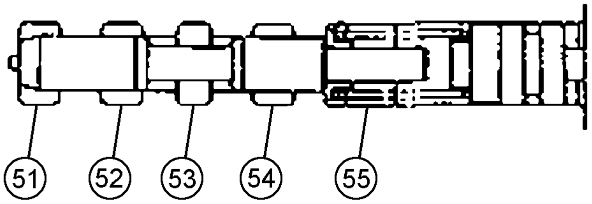
Boom Down Shockless Valve—The boom down shockless valve regulates the return oil flow from the pilot cap during boom down operation. Regulating the return oil flow controls the movement of boom 1 and boom 2 spools to provide precise control of boom down function.

Actuating boom up sends pilot oil to pilot signal manifold port A. Pilot oil flows past the tapered land (50) on the boom down shockless valve (17) spool and into the oil chamber (46). The tapered land acts as a variable orifice between the spool and manifold as the spool is shifted back and forth. Pilot oil flows from the oil chamber, through the orifice (43), into passage 2 (47), and out port 1 to the control valve pilot cap. Pilot oil also flows through passage 3 (45) into spring B (44) cavity and passage 1 (49) into spring A (48) cavity. Because spring B is the larger spring, the increasing pilot oil pressure shifts the valve spool to the left, opening the passage from port A to port 1 and allowing pilot oil to flow unrestricted to the pilot cap shifting the boom 1 and boom 2 valve spools.

Actuating boom down sends return oil from the pilot cap to port 1. From port 1 pilot oil flows through passage 1 (49) to spring A (48) cavity and through passage 2 (47), through the orifice (43), and into the oil chamber (46). From the oil chamber return oil flows through passage 3 (45) to spring B (44) cavity and past the tapered land to port A. Because of the pressure drop across the orifice, the return oil pressure in the oil chamber and spring B cavity is less than the return oil pressure in spring A cavity. The increasing return oil pressure shifts the valve spool to the right, causing the tapered land to restrict and then block the flow of return oil from port 1 to port A. When the tapered land blocks the return oil flow, the pressure increases in the oil chamber and spring B cavity. The valve spool now shifts to the left, allowing return oil to flow past the tapered land to port A. The opening and closing continues until the return oil is gradually returned through port A, controlling the movement of the boom 1 and boom 2 spools.

MM61211,0001519 –19–16MAY08–4/10

Arm 2 Flow Rate Pilot Valve (SK)—Arm 2 flow rate pilot valve is shifted by the pilot oil pressure (51) from arm in to port D and through the shuttle valves. The pilot valve routes pilot oil pressure from boom up (port A) (54) to the arm 2 flow rate valve in the control valve. The arm 2 flow rate valve restricts the flow of supply oil to the arm spool during arm in and boom up operation to ensure a flow of supply oil to the boom 1 spool.



T149303 –UN–19DEC01

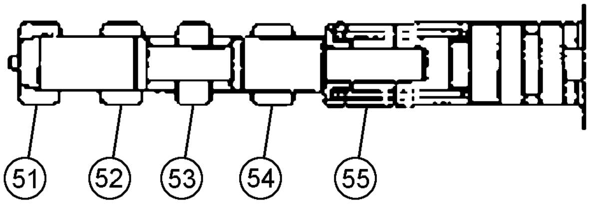
Arm 2 Flow Rate Pilot Valve

51—Pilot Oil Pressure
52—To Hydraulic Oil Tank
53—To Arm 2 Flow Rate Valve
54—Pilot Oil Pressure from Boom Up
55—Spring

Continued on next page

MM61211,0001519 –19–16MAY08–5/10

Travel Flow Combiner Pilot Valve (SL)—Travel flow combiner pilot valve is shifted by pilot oil pressure (51) from right travel to port L (right reverse) or port K (right forward) and through the shuttle valves. The pilot valve then routes control pressure pilot oil (54) from the swing park brake release pilot valve to the travel flow combiner valve in the control valve. The control pressure pilot oil is from the pilot shutoff solenoid valve port A4 to the pilot signal manifold through port PI. See Travel Flow Combiner Valve Operation. (Group 9025-05.)



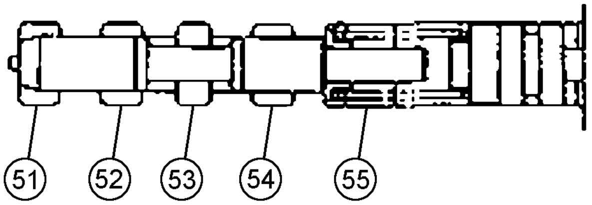
T149303 –UN–19DEC01

Travel Flow Combiner Pilot Valve

51—Pilot Oil Pressure
52—To Hydraulic Oil Tank
53—To Travel Flow Combiner Valve
54—Control Pressure Pilot Oil
55—Spring

MM61211,0001519 –19–16MAY08–6/10

Swing Park Brake Release Pilot Valve (SH)—Swing park brake release pilot valve is shifted by pilot oil pressure (51) from boom up to port A, boom down to port B, arm out to port C, arm in to port D, bucket curl to port G, bucket dump to port H, or auxiliary to port M or N and through the shuttle valves. The pilot valve routes control pressure pilot oil (54) out port SH to the swing motor park brake piston through port SH. The control pressure pilot oil is from the pilot shutoff solenoid valve port A4 to the pilot signal manifold through port PI. See Swing Motor Park Brake Release Circuit Operation. (Group 9025-05.)



T149303 –UN–19DEC01

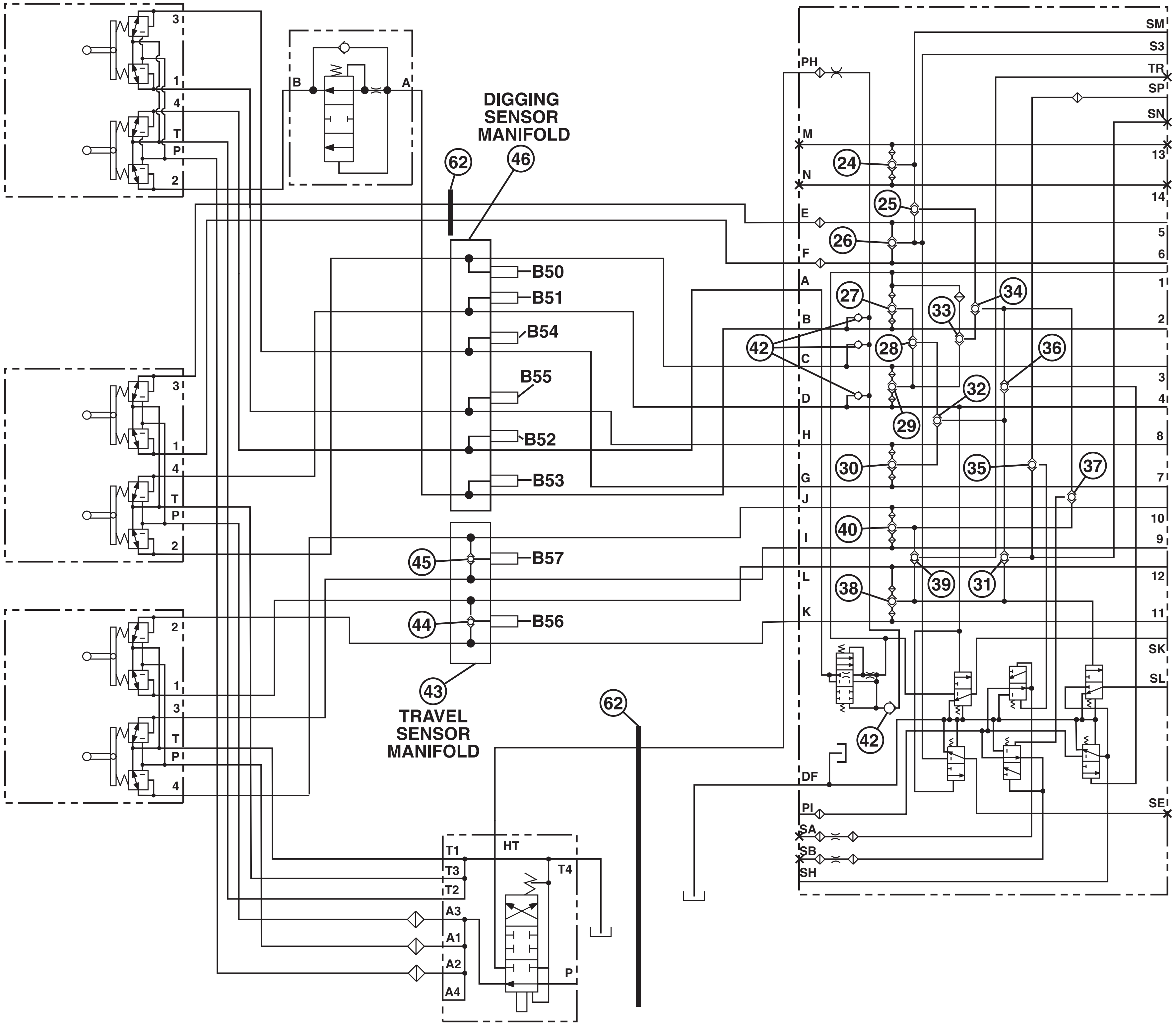
Swing Park Brake Release Pilot Valve

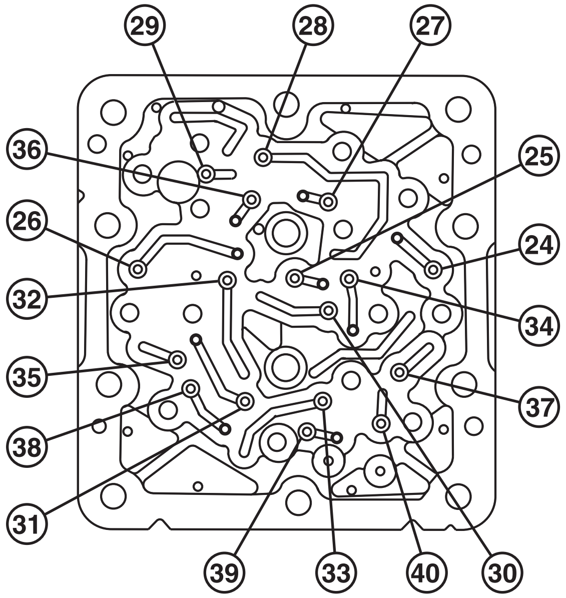
51—Pilot Oil Pressure
52—To Hydraulic Oil Tank
53—To Travel Flow Combiner Valve
54—Control Pressure Pilot Oil
55—Spring

Continued on next page

MM61211,0001519 –19–16MAY08–7/10

TX1005691 –19–17APR06





TX1005691

Continued on next page

MM61211,0001519 –19–16MAY08–8/10

24—Auxiliary (Not used)
25—Swing and Auxiliary
26—Swing
27—Boom
28—Arm, Boom Up
29—Arm
30—Bucket
31—Boom, Arm, Bucket, Right Travel
32—Arm, Boom, Bucket
33—Arm, Boom
34—Boom, Arm, Swing, Auxiliary
35—Boom, Arm, Bucket, Right Travel,
36—Boom, Arm, Swing, Auxiliary
37—Boom, Arm, Left Travel Swing Auxiliary
38—Right Travel
39—Left Travel, Right Travel
40—Left Travel
42—Check Valve (4 used)
43—Travel Sensor Manifold
44—Right Travel Sensor Shuttle Valve
45—Left Travel Sensor Shuttle Valve
46—Digging Sensor Manifold
62—Bulkhead

Shuttle Valves (24—40, 44, 45)—Pilot oil pressure from the actuated travel pilot control valves and the left and right function pilot control valves is routed by the shuttle valves (24—40, 44, 45) to shift the respective pilot valves and actuate the travel pressure sensor port TR and swing pressure sensor port S3 in the pilot signal manifold.

Continued on next page MM61211,0001519 –19–16MAY08–9/10

Actuated Function To Shift Pilot Valve						
Function and Pilot Signal Manifold Ports	Pump 1 Flow Rate Pilot Valve	Pump 2 Flow Rate Pilot Valve	Travel Flow Combiner Valve Pilot Valve	Pilot Valve (port SE)	Swing Park Brake Release Pilot Valve	Arm 2 Flow Rate Pilot Valve
Boom Up, A	X	X			X	X
Boom Down, B	X	X			X	
Arm In, D	X	X			X	
Arm Out, C	X	X			X	
Bucket Curl, G	X				X	
Bucket Dump, H	X				X	
Right Swing, F		X		X	X	
Left Swing, E		X		X	X	
Right Travel, L, K	X		X			
Left Travel, I, J		X				
Auxiliary, N, M		X			X	

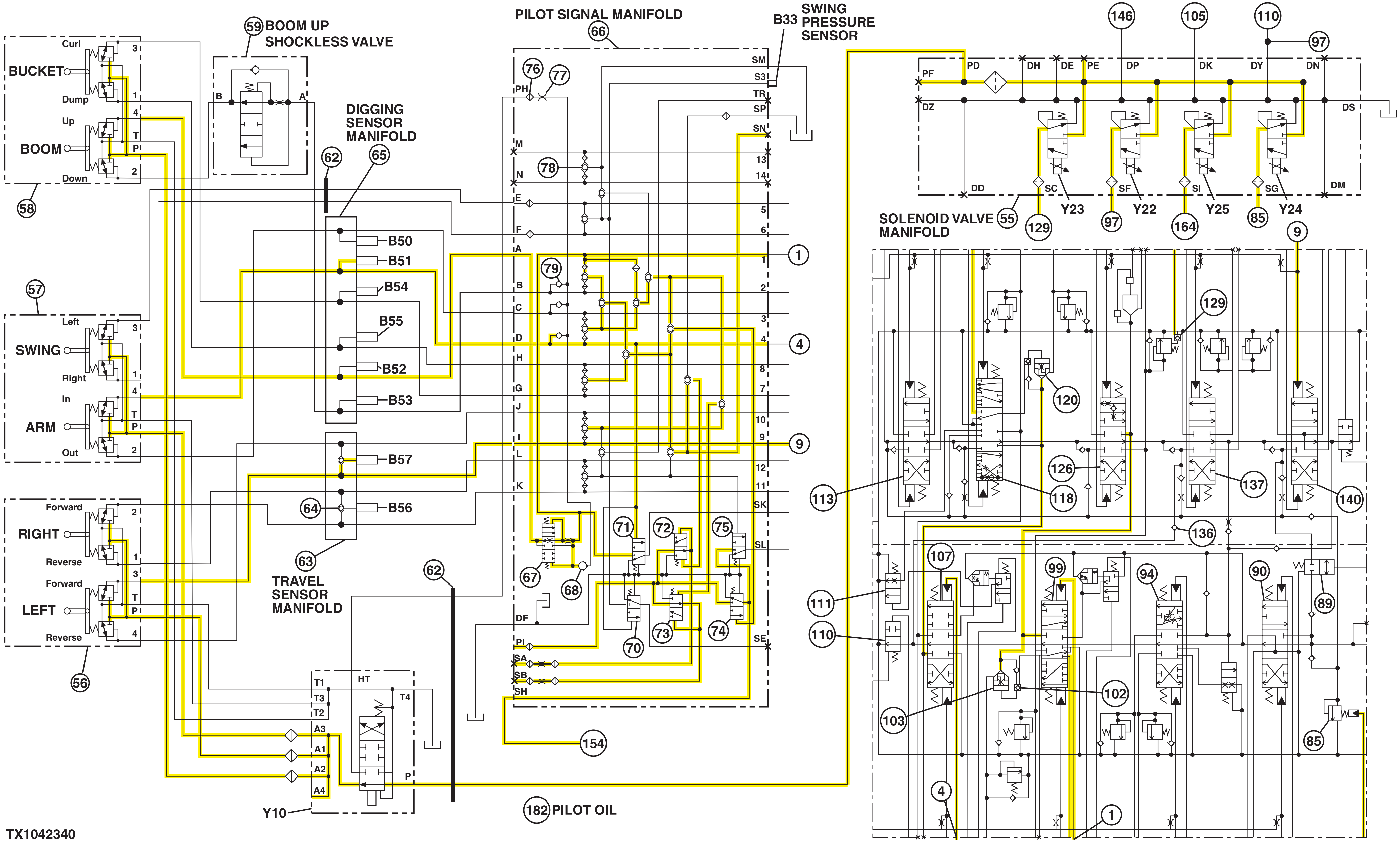
There are six outputs of the pilot signal manifold other than providing passages for pilot oil to shift control valve spools.

Four Outputs of Pilot Signal Manifold		
Output	Input Number 1	Input Number 2
Travel Flow Combiner (SL)	Any Dig or Swing Function	Right Travel
Arm 2 Flow Rate Control (SK)	Arm In	Boom Up
Pilot Valve Flow Rate Control (SE)	Arm In	Swing
Release Swing Brake (SH)	Any Dig or Swing Function	
Pump 1 Flow Rate Control (SA)	Right Travel, Boom, Arm	
Pump 2 Flow Rate Control (SB)	Left Travel, Boom, Arm, Swing	

Warm-Up Circuit Operation.—When the pilot control shutoff valve is in the LOCK position and the engine is running, pilot oil flows from the pilot control shutoff valve port HT to the pilot signal manifold port PH. The oil is heated as it flows through an orifice at the inlet to manifold. The warm-up oil from pilot control shutoff valve flows through the warm-up oil passage, through the check valves and out to the left and right pilot controllers and top pilot caps on the control valve to warm the pilot circuit. At the pilot controllers, the warm-up oil flows through the pilot controllers, out the return port, through the pilot control shutoff valve port T4 to the hydraulic oil tank. At the pilot caps, warm-up oil flows through orifices into a return passage in the pilot caps and then to the hydraulic oil tank.

Pilot Operation of Control Valve Operation

TX1042340 –19–19MAY08



Pilot Operation of Control Valve Operation

LD30992,0000255 –19–25JUN08–1/4

B33—Swing Pressure Sensor
B50—Arm Out Pressure Sensor
B51—Arm In Pressure Sensor
B52—Boom Up Pressure Sensor
B53—Boom Down Pressure Sensor
B54—Bucket Curl Pressure Sensor
B55—Bucket Dump Pressure Sensor
B56—Travel Right Pressure Sensor (port TR)
B57—Travel Left Pressure Sensor (port TR)
Y22—Boom Flow Rate Solenoid Valve (SF)
Y23—Boom Mode Solenoid Valve (SC)
Y24—Power Dig Solenoid Valve (SG)
Y25—Travel Speed Solenoid Valve (SI)
1—Boom Up Function
4—Arm In Function
11—Right Travel Forward Function
27—Pilot Pump
59—Boom Up Shockless Valve
62—Bulkhead
63—Travel Sensor Manifold
65—Digging Sensor Manifold
66—Pilot Signal Manifold
67—Boom Down Shockless Valve
71—Arm 2 Flow Rate Pilot Valve (port SK)
75—Travel Flow Combiner Valve Pilot Valve (port SL)
85—Main Relief and Power Digging Valve
89—Travel Flow Combiner Valve
90—Right Travel Spool
94—Bucket Spool
99—Boom 1 Spool
102—Boom Reduced Leakage Valve—Switch Valve
103—Boom Reduced Leakage Valve—Check Valve
104—Check Valve
107—Arm 2 Spool
110—Bypass Shutoff Valve
111—Arm Regenerative Valve—Switch Valve
113—Swing Spool
118—Arm 1 Spool
119—Check Valve
120—Arm Reduced Leakage Valve—Check Valve
121—Arm Reduced Leakage Valve—Switch Valve
126—Boom 2 Spool
136—Auxiliary Function Flow Combiner Valve
137—Auxiliary Spool
140—Left Travel Spool
154—Swing Park Brake Pilot Valve (port SH)
164—To Travel Speed Selector Valve
182—Pilot Oil

The pilot valves control pressure oil from the pilot pump and operates the control valve spools. The pilot control valve and travel pilot control valves are connected to the control valve by lines through the pilot signal manifold (66). Actuating a pilot control valve routes pilot oil (147) through the pilot signal manifold to the control valve pilot cap to shift a spool. Pilot oil also flows through the shuttle valves in the pilot signal manifold and shifts the pilot valves. The boom up shockless valve (59) is built in the signal control valve and dampens quick spool movement. The boom down shockless valve (67) located between the right pilot valve and the signal control valve, also dampens quick spool movement. Boom up function (1), arm in function (4), and right travel forward function (142) are shown.

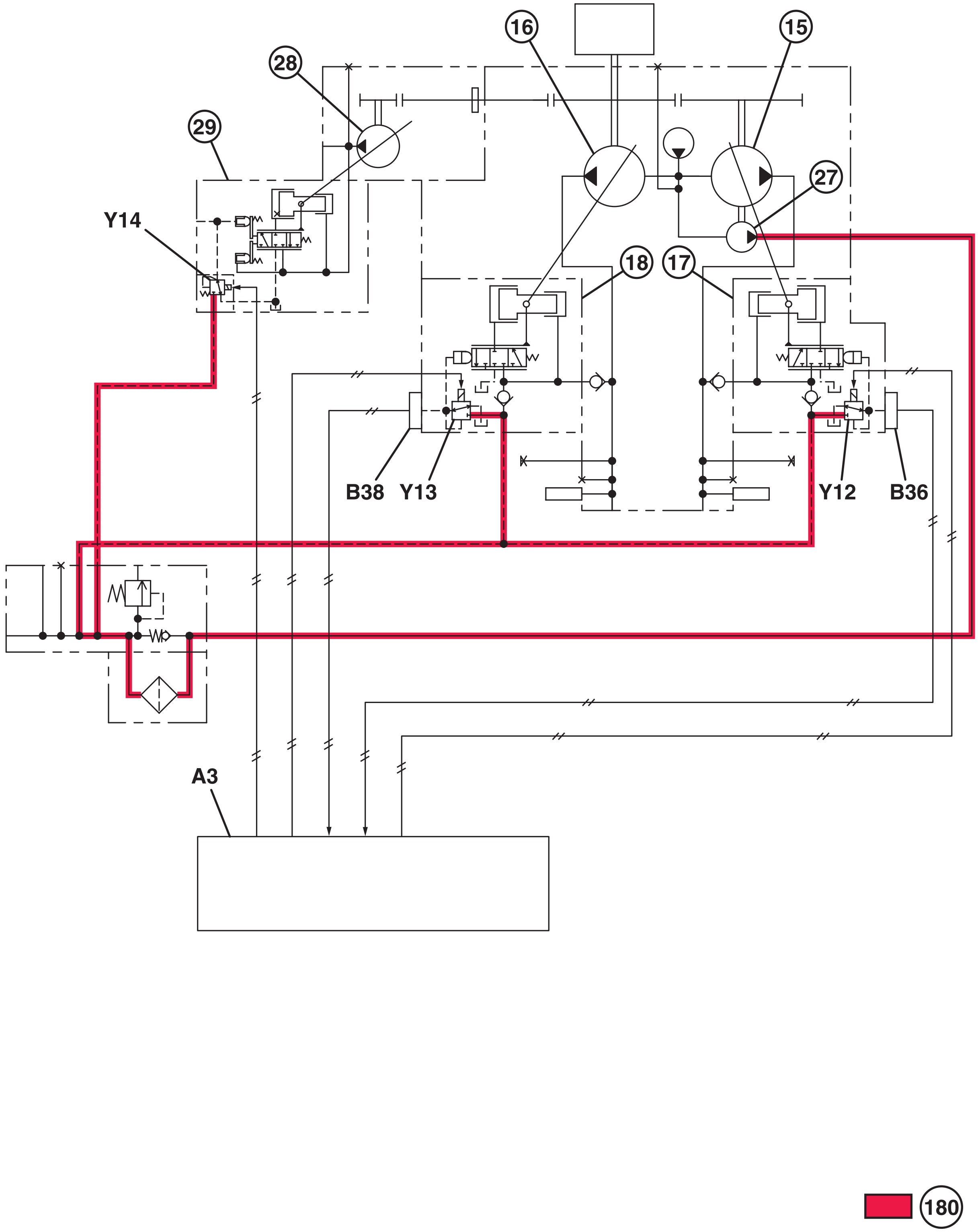
The solenoid valves (Y22—Y25) in the solenoid valve manifold control the main relief and power digging valve, boom flow rate solenoid valve (SF), and boom mode solenoid valve (SC) in the control valve and the travel speed selector valve (164) in the left and right travel motors.

The following valves in the control valve are controlled by pilot oil from the pilot control valves and pilot valves in the pilot signal manifold:

Valve Control Circuit

- Auxiliary Flow Combiner Check Valve (136)
- Right and Left Travel Valve Spools (90 and 140)
- Bucket Spool (94)
- Boom 1 and Boom 2 Valve Spools (99 and 126)
- Arm In Pressure Sensor (B51)
- Boom Reduced Leakage Valve—Switch Valve (102)
- Boom Reduced Leakage Valve—Check Valve (103)
- Arm 1 and Arm 2 Spools (107 and 118)
- Bypass Shutoff Valve (110)
- Swing Spool (113)
- Arm Regenerative Valve (111)
- Arm Reduced Leakage Valve—Check Valve (120)
- Boom Up Pressure Sensor (B52)
- Auxiliary Spool (137)
- Travel Flow Combiner Valve (89)

Continued on next page



TX1005836

TX1005836 –UN–07APR06

Continued on next page

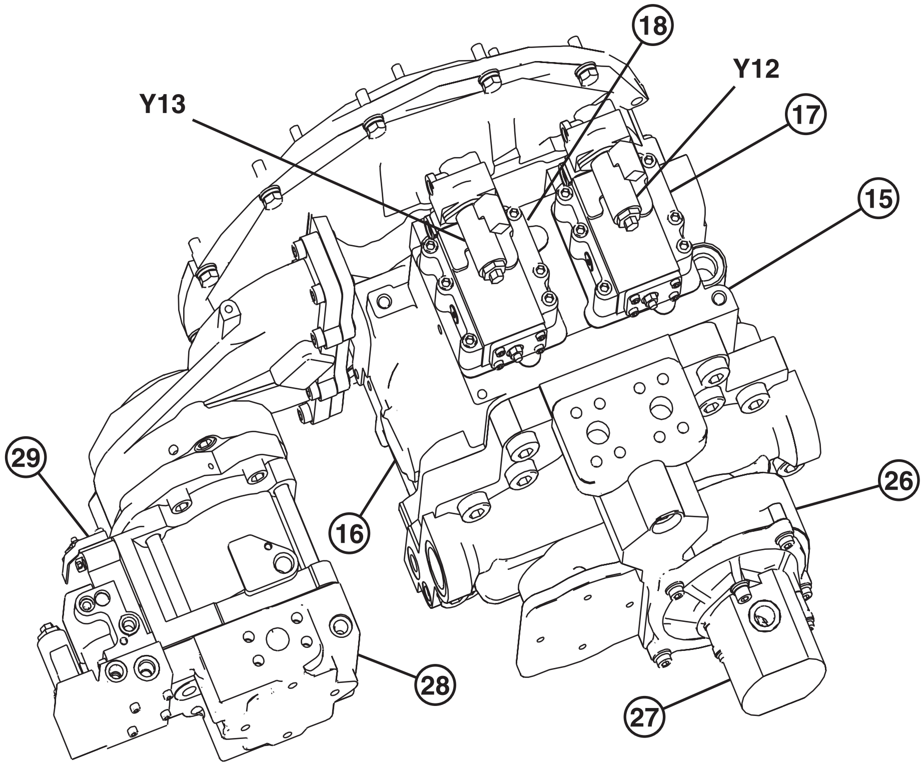
A1—Main Controller (MCF)
B36—Pump 1 Control Pressure Sensor
B38—Pump 2 Control Pressure Sensor
Y12—Pump 1 Control Solenoid
Y13—Pump 2 Control Solenoid
Y14—Fan Pump Control Solenoid
15—Pump 1
16—Pump 2
17—Pump 1 Regulator
18—Pump 2 Regulator
27—Pilot Pump
28—Fan Drive Pump
29—Fan Drive Pump Regulator
180—Supply Oil

Main Pump Delivery Flow Rate Control Pressure oil from the pilot pump (27) flows to the pump control solenoid valves (Y12 and Y13) in pump 1 and 2 regulator (17 and 18). The pilot sensors (B36 and B38) in the controlled circuit sends a signal to MCF (A3). The MCF will send the signals to each pump control solenoid valve (Y12 and Y13) which controls the pump flow rate within each valve.

Fan Pump Delivery Flow Rate Control Pressure oil from the pilot pump (27) flows to the fan pump control solenoid valve (Y14) in the fan pump regulator (29), MCF (A3) activates the fan pump control solenoid valve and controls delivery flow rate of the fan pump (28) in order to adjust temperatures in oil cooler, radiator and intercooler properly.

LD30992,0000255 –19–25JUN08–4/4

Pump 1 and 2, Fan Drive Pump, and Gearbox Operation



Hydraulic Pump Locations

15—Pump 1
16—Pump 2
17—Pump 1 Regulator
18—Pump 2 Regulator
26—Charge Pump
27—Pilot Pump
28—Fan Drive Pump
29—Fan Drive Pump Regulator
Y12—Pump 1 Control Solenoid Valve
Y13—Pump 2 Control Solenoid Valve

Pump 1 (15), pump 2 (16), charge pump (26), pilot pump (27), and fan drive pump (28) are driven by the engine via the engine flywheel-to-pump 2 coupling.

Pump 2 is driven at a 1:1 ratio with the engine and carries the drive gear of the pump drive gearbox. Pump 1 is driven by the pump 2 drive gear at a 1:32/31 ratio. The charge pump and the pilot pump, driven off the end of the pump 1 drive shaft, are also driven at a 1:32/31 ratio. The fan drive pump, driven by an idler gear driven off the pump 2 drive gear, is at a 1:1 ratio.

The charge pump is a centrifugal type pump, which supplies positive oil pressure to the input ports of pump 1, pump 2, and the pilot pump to prevent pump cavitation.

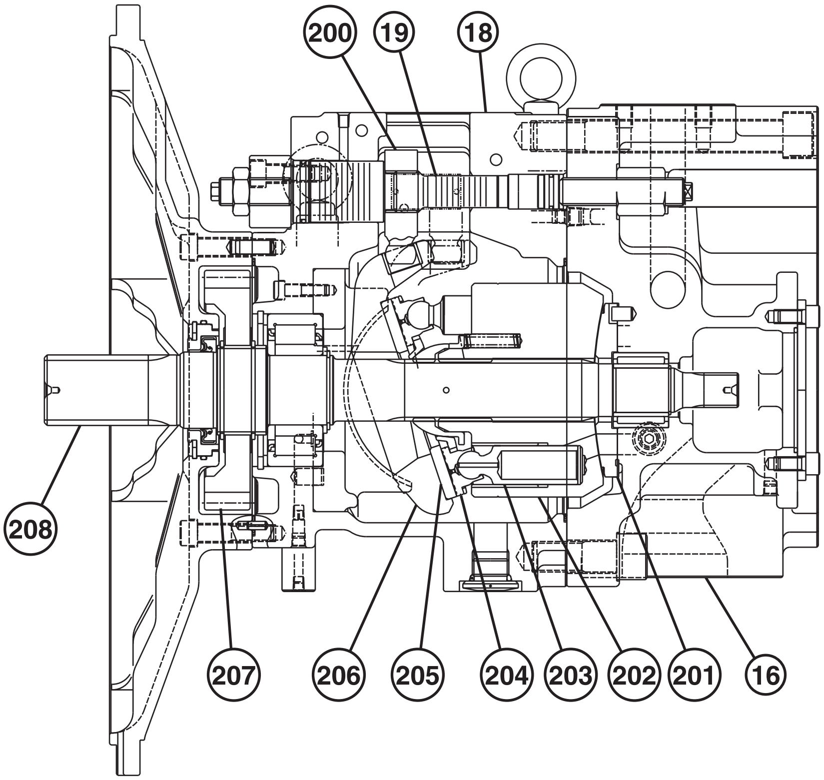
Pumps 1 and 2 are variable displacement, piston type pumps; these parallel-arranged pumps supply high-pressure oil to the machine's working circuits.

The pilot pump is a gear type pump, which supplies pilot oil to the machine's control circuits.

The fan drive pump is a variable displacement, piston type pump, which supplies pressure oil to the fan motor of the machine's cooling system.

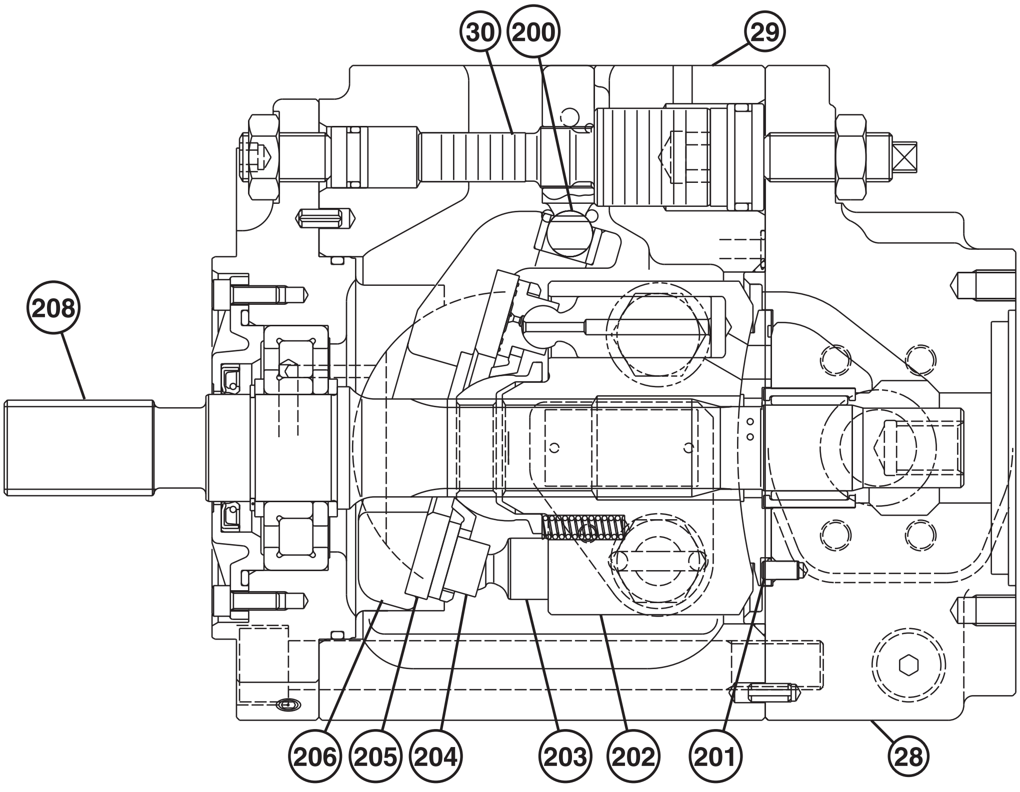
Pump 1 is controlled by the pump 1 regulator (17), pump 2 is controlled by the pump 2 regulator (18), and the fan drive pump is controlled by the fan drive pump regulator (29).

Continued on next page



TX1005681

Pump 2 Cross Section



TX1005682

Fan Drive Pump Cross Section

Continued on next page

LD30992,0000257 –19–11APR06–2/3

16—Pump 2
18—Pump 2 Regulator
19—Servo Piston
28—Fan Drive Pump
29—Fan Drive Pump Regulator
30—Servo Piston
200—Tilt Pin
201—Valve Plate
202—Cylinder Block
203—Piston
204—Shoe
205—Shoe Plate
206—Swash Plate
207—Drive Gear
208—Drive Shaft

Pump 1, pump 2, and fan drive pump operation is the same except as noted. Pump 2 and fan drive pump are shown. Pump 2 operation is given.

NOTE: Pump 1 drive shaft carries the driven gear while pump 2 drive shaft carries the drive gear, which drives pump 1 and the fan drive pump. The pilot pump is driven off the end of pump 1 drive shaft.

The pump 2 regulator (18) is attached to the top of the pump housing. The regulator controls the movement of the servo piston (19) by sending or releasing oil from the large end of the piston. The servo piston moves the tilt pin (200) and swash plate (206), changing the pump displacement.

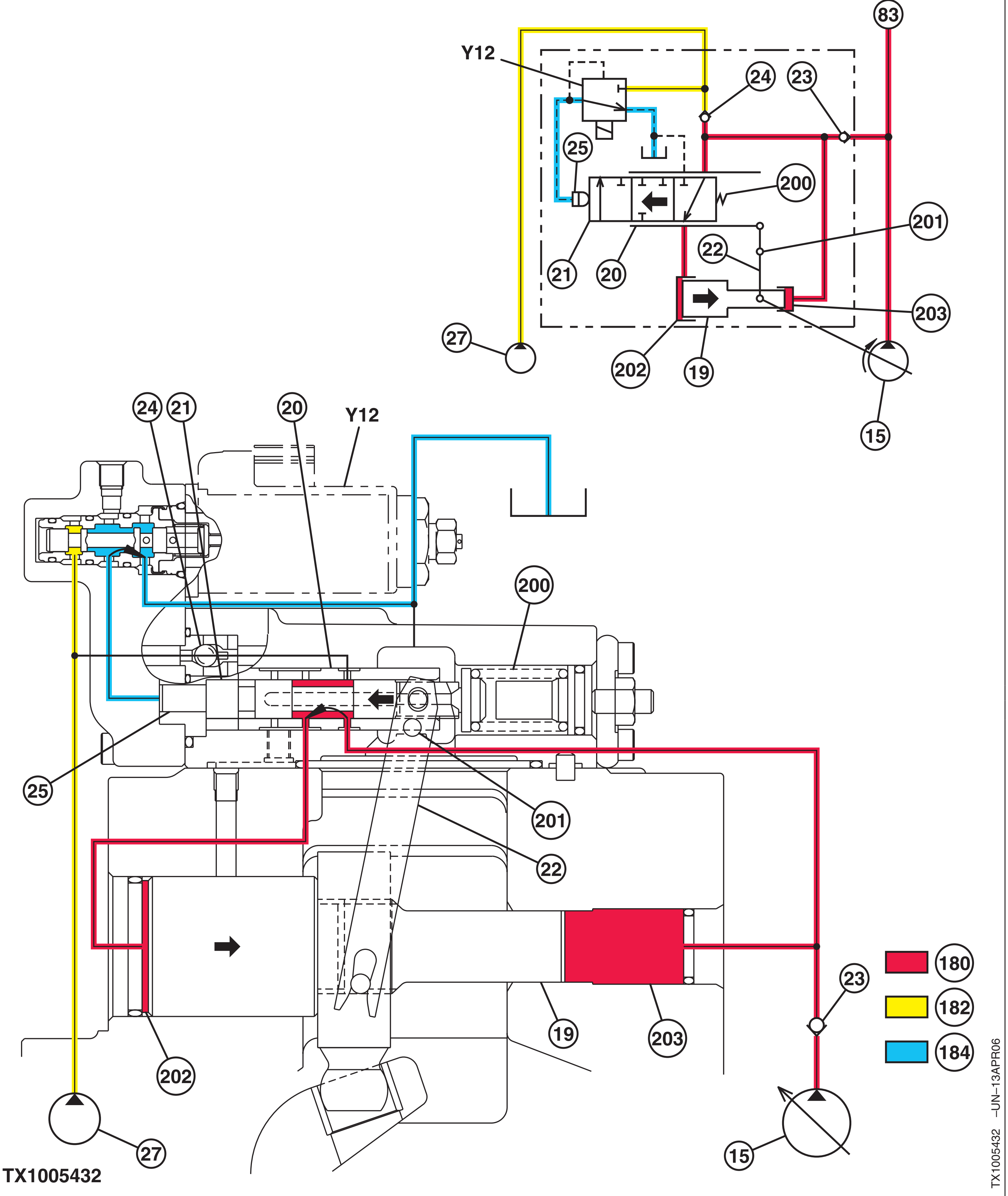
The pump displacement (pump flow rate) is varied by changing the angle of the swash plate with respect to the drive shaft (208). Increasing the angle increases the distance that each piston (203) travels into and out of the bore of the cylinder block (202), which increases pump displacement. Decreasing the angle reduces the distance that each piston travels into and out of the bore of the cylinder block, which decreases pump displacement.

An attenuator hose is connected from each pump discharge port to a blocking plate attached to the machine frame. The pump 1 and pump 2 attenuator hoses help reduce pump noise and vibration during operation.

For more information, see Pump 1, Pump 2, and Fan Drive Pump Regulator Schematic. See Hydraulic System Schematic. (Group 9025-15.) See Pump 1 and Pump 2 Regulator Operation. See Fan Drive Pump Regulator Operation. (Group 9025-05.)

LD30992,0000257 –19–11APR06–3/3

Pump 1 and 2 Regulator Operation



TX1005432

Pump Regulator Schematic and Cross Section—Decreasing Flow Rate

Continued on next page

LD30992,0000258 –19–11APR06–1/4

15—Pump 1
19—Servo Piston
20—Load Sleeve
21—Load Spool
22—Feedback Link
23—Check Valve
24—Check Valve
25—Pilot Piston
27—Pilot Pump
83—To Right Control Valve
180—Supply Oil
182—Pilot Oil
184—Return Oil
200—Spring
201—Pivot Pin
202—Large Chamber
203—Small Chamber
Y12—Pump 1 Control Solenoid Valve

Operation of pump 1 regulator and pump 2 regulator is the same. Pump 1 regulator is discussed throughout.

The pump regulators are located at the top of each pump and are responsible for the control of the pump delivery flow rate. The pump control solenoid valve (Y12) regulates the pilot control pressure according to signals received from the main controller (MCF). As pilot control pressure increases, the pump delivery flow rate increases. For more information on the MCF and the pump control circuit, see Main Controller (MCF) Circuit Theory of Operation. (Group 9015-15.)

Supply oil (180) is routed through check valve (23) to load spool (21) and to the small chamber (203) of the servo piston (19).

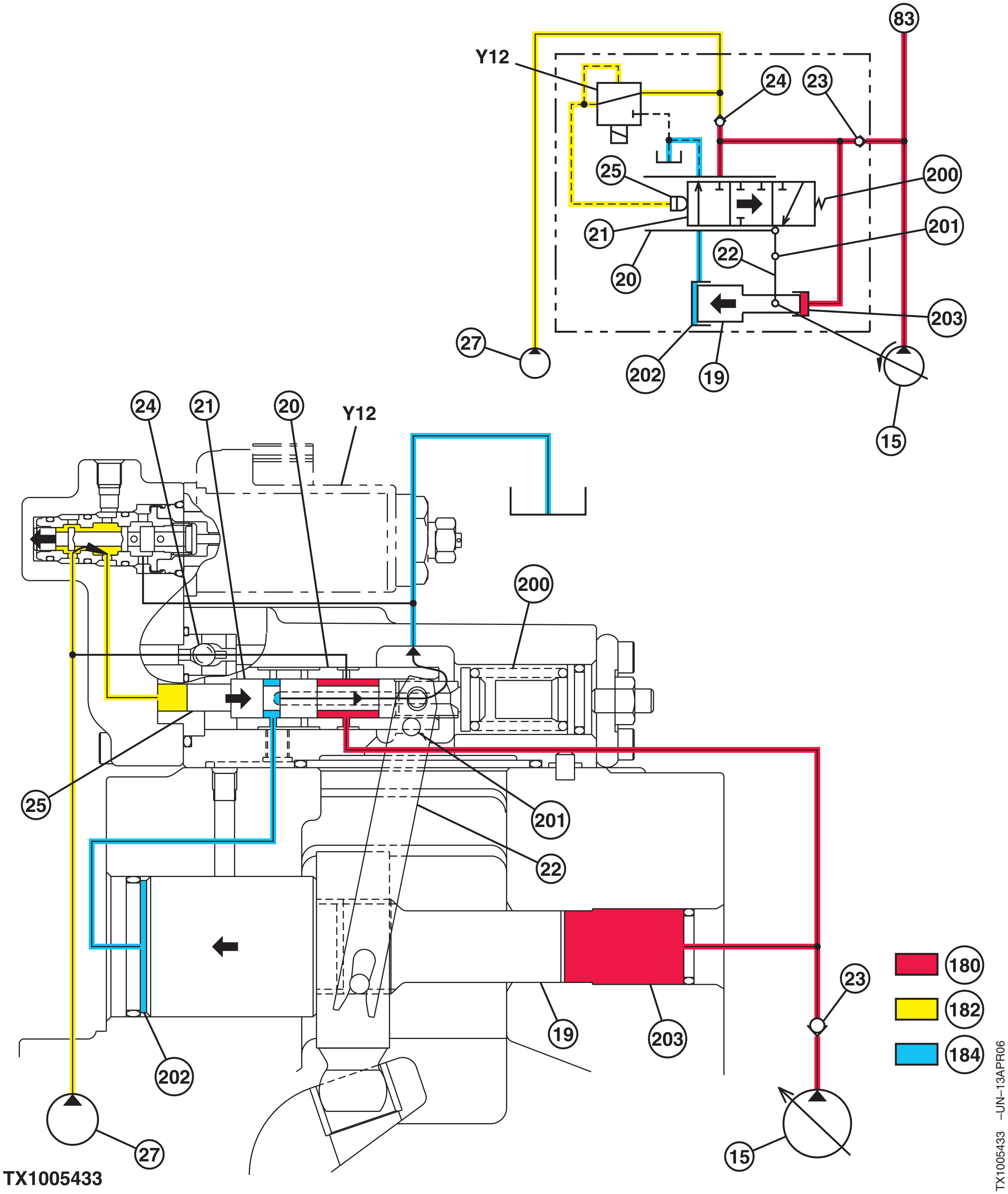
Pilot oil (182) from the pump control solenoid valve acts on the pilot piston (25), moving the load spool back and forth against the spring (200). Pilot oil can also be combined with the supply oil through check valve (24) if the supply oil pressure becomes lower than the pilot oil pressure.

Regulator Operation at Minimum Flow Rate—With pump 1 control solenoid valve open to the tank, the load spool is shifted to the left by the spring. With the spool in this position, supply oil is routed to the large chamber (202) of the servo piston. With supply oil at both ends of the servo piston, the servo piston will move to the right, due to the difference in surface areas on either end.

When the servo piston moves to the right, the feedback link (22) will rotate counterclockwise, moving the load sleeve (20) to the left. The servo piston will continue to move to the right until the oil passages on the load sleeve and load spool are completely closed. With the servo piston in this position, the pump swash plate is moved to minimum displacement; thus the pump will deliver minimum flow rate.

Continued on next page

LD30992,0000258 –19–11APR06–2/4



Pump Regulator Schematic and Cross Section—Increasing Flow Rate

Continued on next page

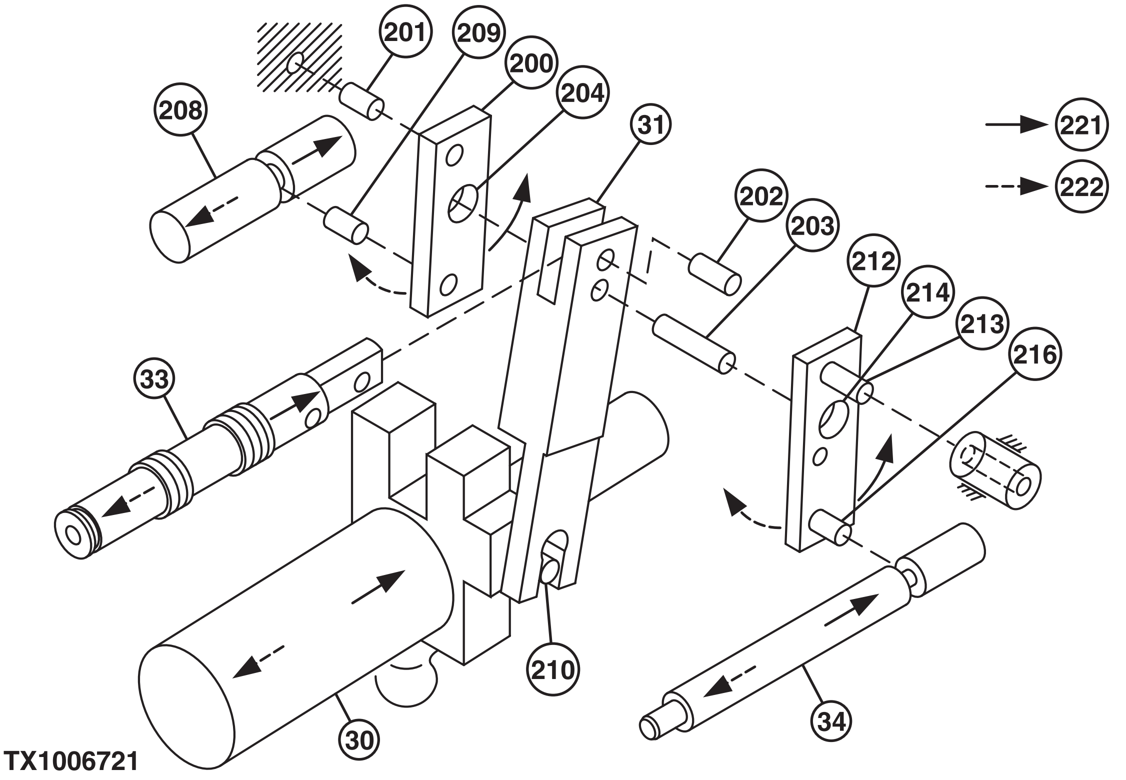
15—Pump 1
19—Servo Piston
20—Load Sleeve
21—Load Spool
22—Feedback Link
23—Check Valve
24—Check Valve
25—Pilot Piston
27—Pilot Pump
83—To Right Control Valve
180—Supply Oil
182—Pilot Oil
184—Return Oil
200—Spring
201—Pivot Pin
202—Large Chamber
203—Small Chamber
Y12—Pump 1 Control Solenoid Valve

Regulator Operation with Flow Rate Increasing— With pump 1 control solenoid (Y12) actuated, pilot oil controlled by the pump 1 control solenoid acts on the pilot piston (25), moving the load spool (21) to the right against the force of the spring (200). With the load spool in this position, the large chamber (202) of the servo piston (19) is open to the tank.

Supply oil moving into the small chamber (203) moves the servo piston to the left, causing the feedback link (22) to rotate clockwise, moving the load sleeve (20) to the right. The servo piston will continue to move to the left until the oil passages on the load sleeve and load spool are completely closed. With the servo piston in this position, the pump swash plate is moved toward maximum displacement; thus the pump flow rate will increase. The pump delivery flow rate will increase or decrease proportional to the pilot control pressure from the pump 1 control solenoid valve.

LD30992,0000258 –19–11APR06–4/4

Fan Drive Pump Regulator Operation



Fan Drive Pump Regulator Linkage Components

30—Servo Piston
31—Feedback Link
33—Load Spool
34—Pilot Piston
200—Lever
201—Pin
202—Pin
203—Pin
204—Hole
208—Compensating Rod
209—Pin
210—Pin
212—Lever
213—Pin
214—Hole
216—Pin
221—Decrease Flow Rate
222—Increase Flow Rate

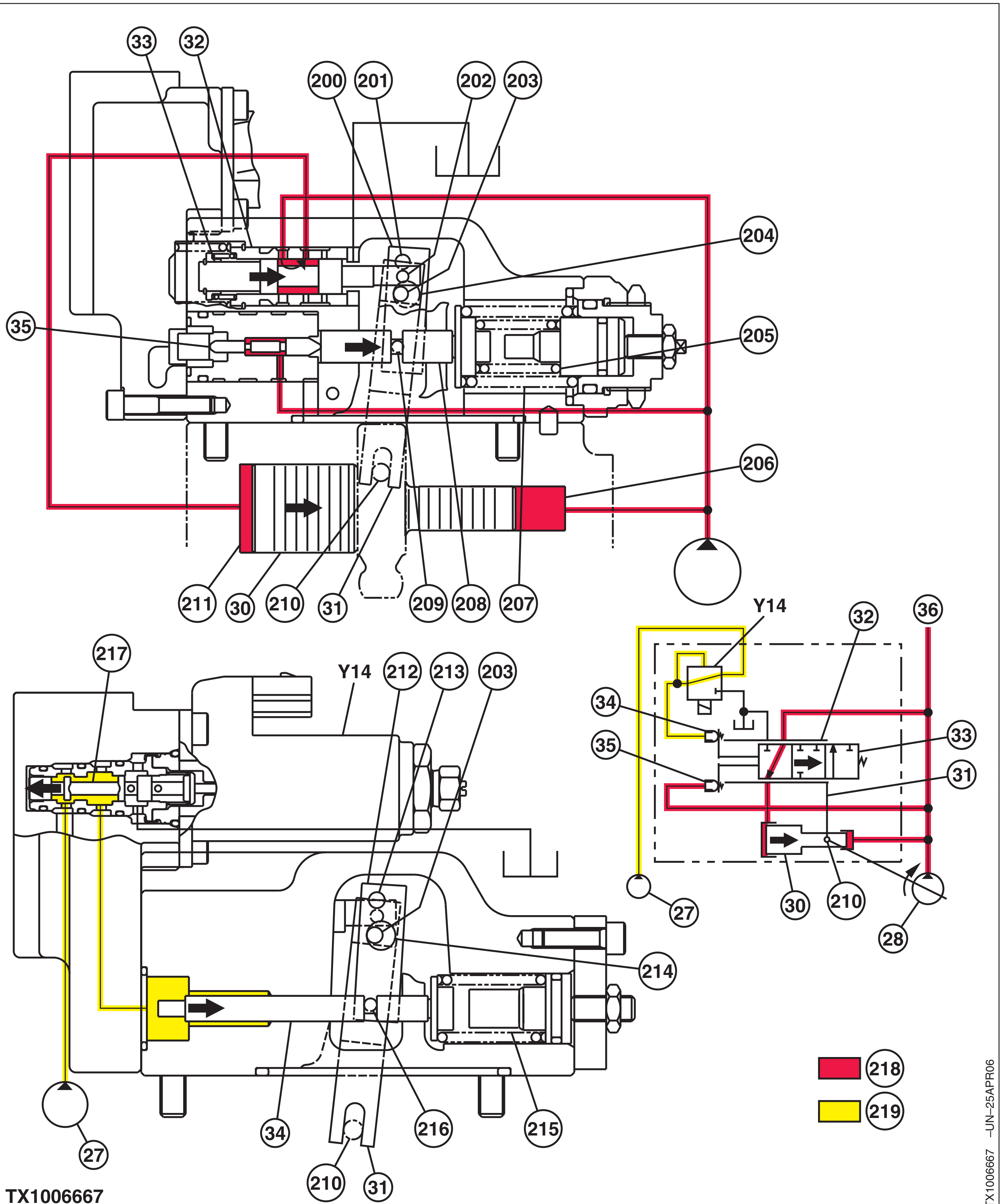
Fan Drive Pump Regulator Operation—The fan drive pump regulator is located at the top of the fan drive pump, and is responsible for the control of the pump delivery flow rate. The pump control solenoid valve regulates the pilot control pressure according to signals received from the main controller (MCF). As pilot control pressure increases, the pump delivery flow rate decreases. For more information on the MCF and the fan drive system, see Main Controller (MCF) Circuit Theory of Operation (Group 9015-15) and see Fan Drive System Diagram and Operation. (Group 9025-05.)

Supply oil from the fan drive pump is routed to the small chamber of the servo piston (30), compensating piston (35), and the load spool (33).

The pilot piston (34) moves against the spring (215) in response to pilot oil pressure from the pump control solenoid valve.

Continued on next page

OUT3035,000001D –19–27APR06–1/9



Fan Drive Pump Regulator—Decreasing Flow Rate

Continued on next page

27—Pilot Pump
28—Fan Pump
30—Servo Piston
31—Feedback Link
32—Load Sleeve
33—Load Spool
34—Pilot Piston
35—Compensating Piston
36—To Fan Drive Motor
200—Lever
201—Pin
202—Pin
203—Pin
204—Hole
205—Inner Spring
206—Small Chamber
207—Outer Spring
208—Compensating Rod
209—Pin
210—Pin
211—Large Chamber
212—Lever
213—Pin
214—Hole
215—Spring
216—Pin
217—Solenoid Valve Spool
218—Supply Oil
219—Pilot Oil
Y14—Pump Control Solenoid Valve

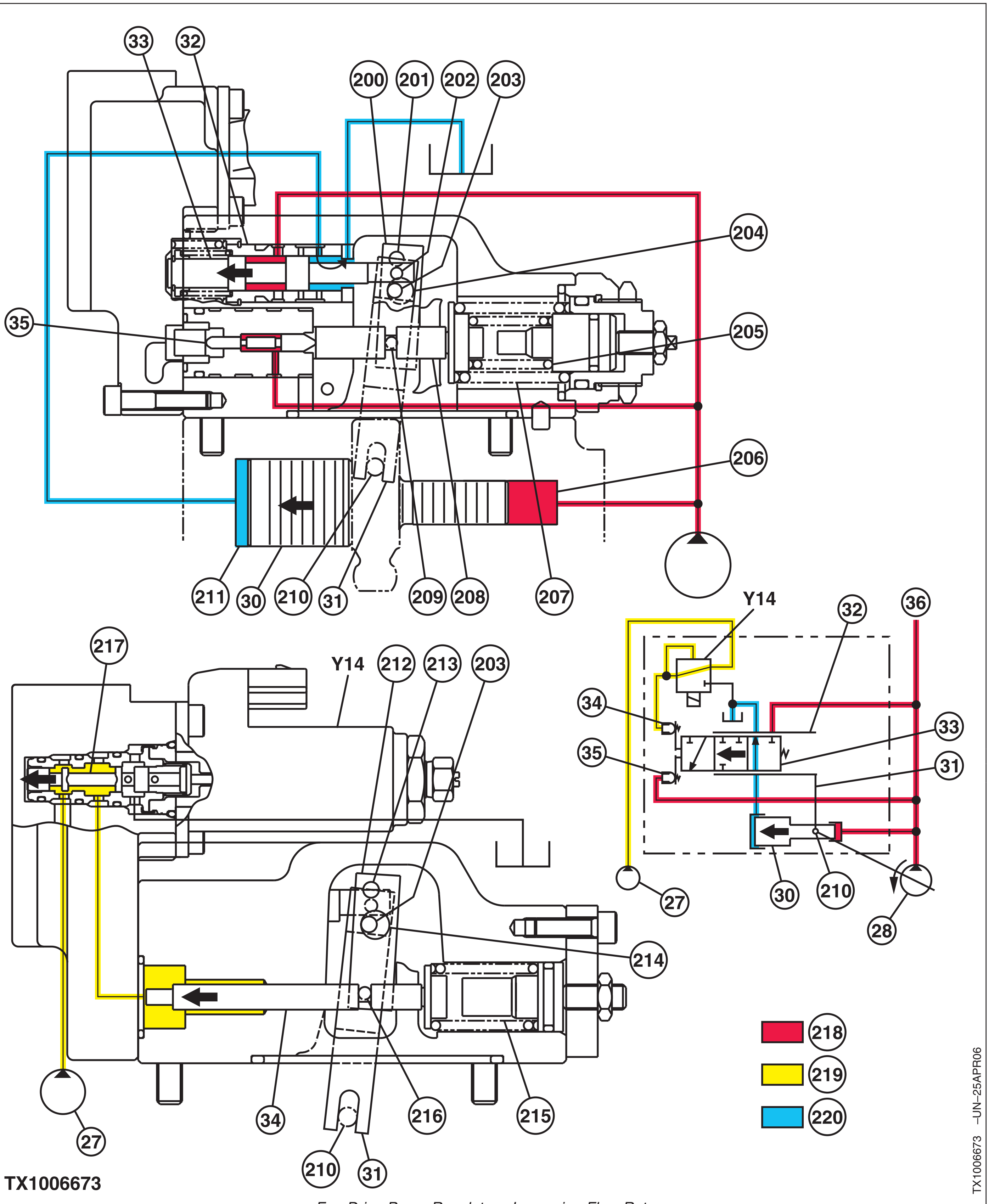
Regulator Control by Pilot Control Pressure (Decreasing Flow Rate)—When fan drive pump control solenoid valve (Y14) is actuated, pilot oil (219) as regulated by the solenoid valve, is routed to the pilot piston (34). When the pilot oil pressure increases beyond the force of the spring (215), the pilot piston will move to the right, in turn pushing the lever (212) to the right (counterclockwise) around the pin (213).

The pin (203), which is attached to the feedback link (31), pulls the feedback link and the load spool (33) to the right, as the feedback link pivots clockwise around the pin (210).

With the load spool in this position, supply oil (218) is routed to the large chamber (211) of the servo piston (30). With supply oil being routed to both ends of the servo piston, the servo piston will move to the right, due to the larger surface area of the large chamber side. When the servo piston moves to the right, the feedback link (31) will rotate counterclockwise around the pin (203), in turn moving the load spool (33) to the left.

The servo piston will continue to move to the right until the oil passages on the load spool and the load sleeve (32) are completely closed. With the servo piston in this position, the pump swash plate will move to minimum displacement in response to the increase of pilot control pressure at the pilot piston (34).

Continued on next page



TX1006673

Fan Drive Pump Regulator—Increasing Flow Rate

Continued on next page

27—Pilot Pump
28—Fan Drive Pump
30—Servo Piston
31—Feedback Link
32—Load Sleeve
33—Load Spool
34—Pilot Piston
35—Compensating Piston
36—To Fan Drive Motor
200—Lever
201—Pin
202—Pin
203—Pin
204—Hole
205—Inner Spring
206—Small Chamber
207—Outer Spring
208—Compensating Rod
209—Pin
210—Pin
211—Large Chamber
212—Lever
213—Pin
214—Hole
215—Spring
216—Pin
217—Solenoid Valve Spool
218—Supply Oil
219—Pilot Oil
220—Return Oil
Y14—Pump Control Solenoid Valve

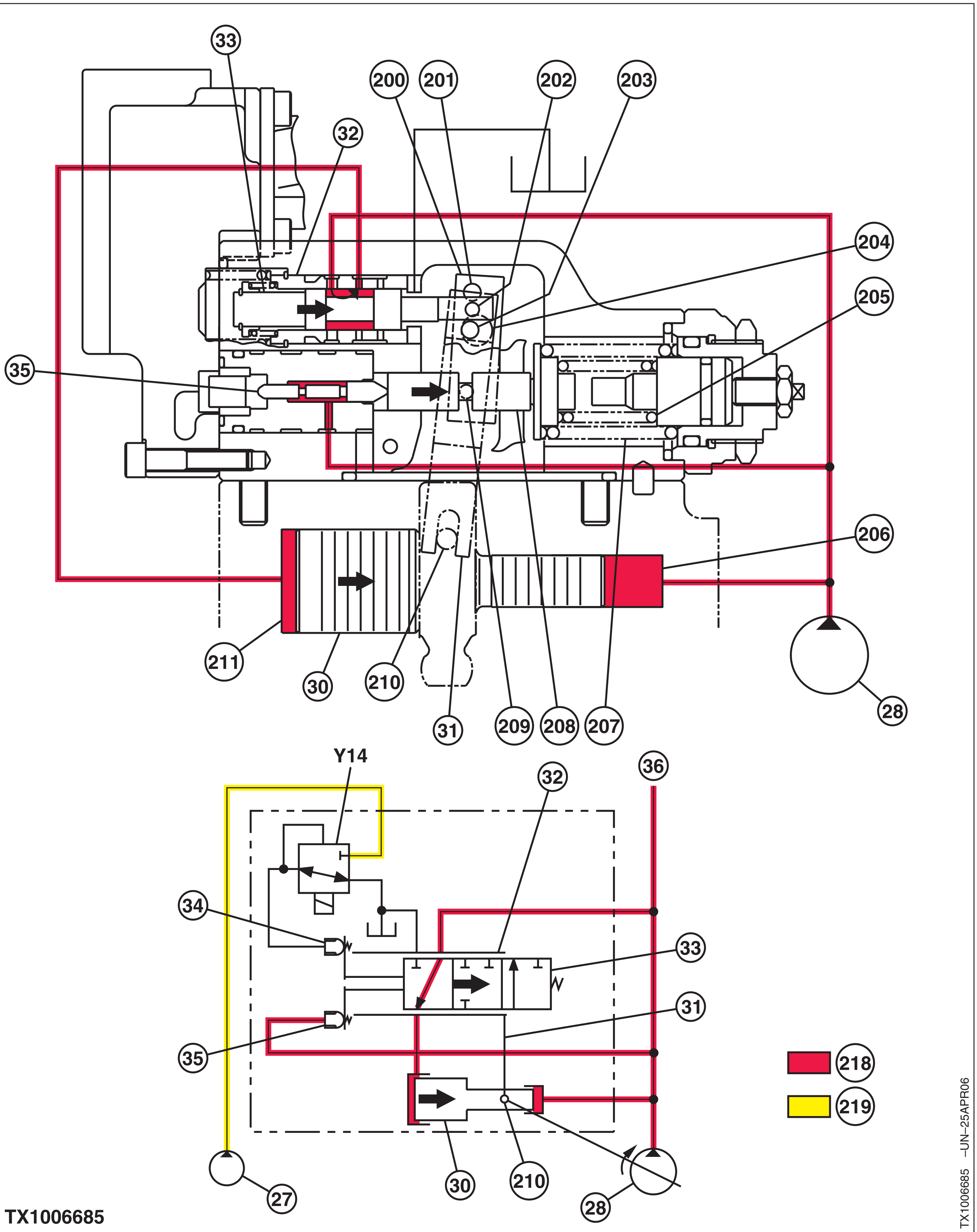
Regulator Control by Pilot Control Pressure (Increasing Flow Rate)—When the fan drive pump control solenoid valve (Y14) is actuated, pilot oil (219) as regulated by the solenoid valve, is routed to the pilot piston (34). When the pilot oil pressure decreases, the force of the spring (215) will move the pilot piston to the left until the spring force equals the force of the pilot oil pressure. The movement of the pilot piston pushes the lever (212) to the left (clockwise) around the pin (213).

The pin (203), which is attached to the feedback link (31), pulls the feedback link and the load spool (33) to the left, as the feedback link pivots counterclockwise around the pin (210).

With the load spool in this position, the large chamber (211) of the servo piston (30) is open to the tank. With supply oil constantly being routed to the small chamber (206) of the servo piston, the servo piston will now move to the left. When the servo piston moves to the left, the feedback link (31) will rotate clockwise around the pin (203), moving the load spool (33) to the right.

The servo piston will continue to move to the left until the oil passages on the load spool and the load sleeve (32) are completely closed. With the servo piston in this position, the pump swash plate will move to maximum displacement in response to the decrease of pilot control pressure at the pilot piston (34).

Continued on next page



TX1006685

Fan Drive Pump Regulator—Decreasing Flow Rate

Continued on next page

27—Pilot Pump
28—Fan Drive Pump
30—Servo Piston
31—Feedback Link
32—Load Sleeve
33—Load Spool
34—Pilot Piston
35—Compensating Piston
36—To Fan Drive Motor
200—Lever
201—Pin
202—Pin
203—Pin
204—Hole
205—Inner Spring
206—Small Chamber
207—Outer Spring
208—Compensating Rod
209—Pin
210—Pin
211—Large Chamber
212—Lever
213—Pin
214—Hole
215—Spring
216—Pin
217—Solenoid Valve Spool
218—Supply Oil
219—Pilot Oil
Y14—Pump Control Solenoid Valve

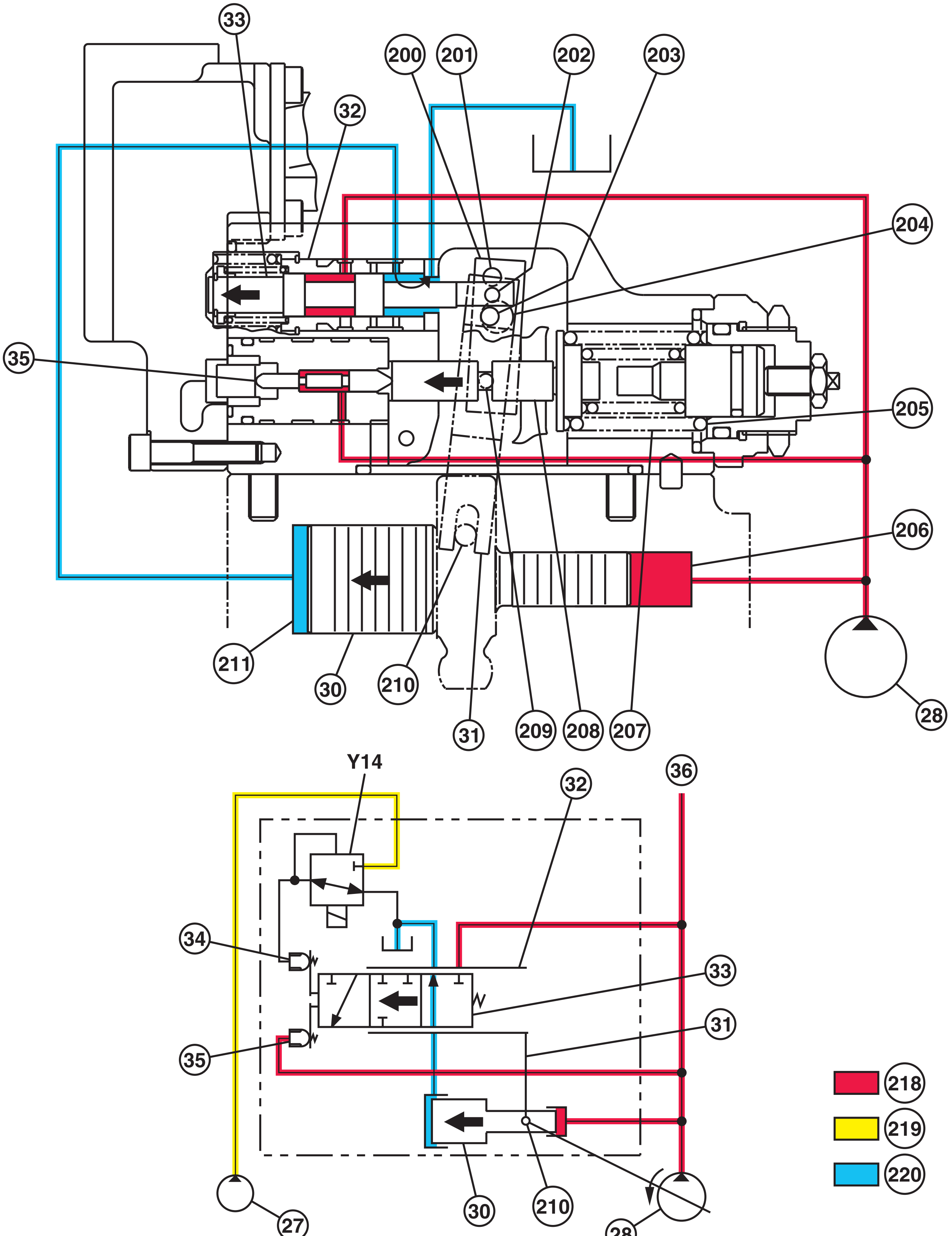
Regulator Control by Fan Drive Pump Delivery Pressure (Decreasing Flow Rate)—The regulator controls the fan drive pump in this manner if engine speed (fan drive pump speed) increases beyond the rated speed during startup. When fan drive pump delivery pressure increases beyond the force of the inner spring (205) and the outer spring (207), the compensating piston (35) will move the compensating rod (208) to the right, in turn moving the lever (200) to the right (counterclockwise), around the pin (201), which is fixed to the housing.

The pin (203), which is attached to the feedback link (31), pulls the feedback link and the load spool (33) to the right, as the feedback link pivots clockwise around the pin (210).

With the load spool in this position, supply oil (218) is routed to the large chamber (211) of the servo piston (30). With supply oil being routed to both ends of the servo piston, the servo piston will move to the right, due to the larger surface area of the large chamber side. When the servo piston moves to the right, the feedback link (31) will rotate counterclockwise around the pin (203), moving the load spool (33) to the left.

The servo piston will continue to move to the right until the oil passages on the load spool and the load sleeve (32) are completely closed. With the servo piston in this position, the pump swash plate will move to minimum displacement, decreasing the flow rate of the pump.

Continued on next page



TX1006723

Fan Drive Pump Regulator—Increasing Flow Rate

TX1006723 –UN–25APR06

Continued on next page

27—Pilot Pump
28—Fan Drive Pump
30—Servo Piston
31—Feedback Link
32—Load Sleeve
33—Load Spool
34—Pilot Piston
35—Compensating Piston
36—To Fan Drive Motor
200—Lever
201—Pin
202—Pin
203—Pin
204—Hole
205—Inner Spring
206—Small Chamber
207—Outer Spring
208—Compensating Rod
209—Pin
210—Pin
211—Large Chamber
212—Lever
213—Pin
214—Hole
215—Spring
216—Pin
217—Solenoid Valve Spool
218—Supply Oil
219—Pilot Oil
220—Return Oil
Y14—Pump Control Solenoid Valve

Regulator Control by Fan Drive Pump Delivery Pressure (Increasing Flow Rate)—When the fan drive pump delivery pressure at the compensating piston (35) decreases, the force of the inner spring (205) and the outer spring (207), will move the compensating rod (208) to the left, in turn moving the lever (200) to the left (clockwise), around the pin (201) which is fixed to the housing.

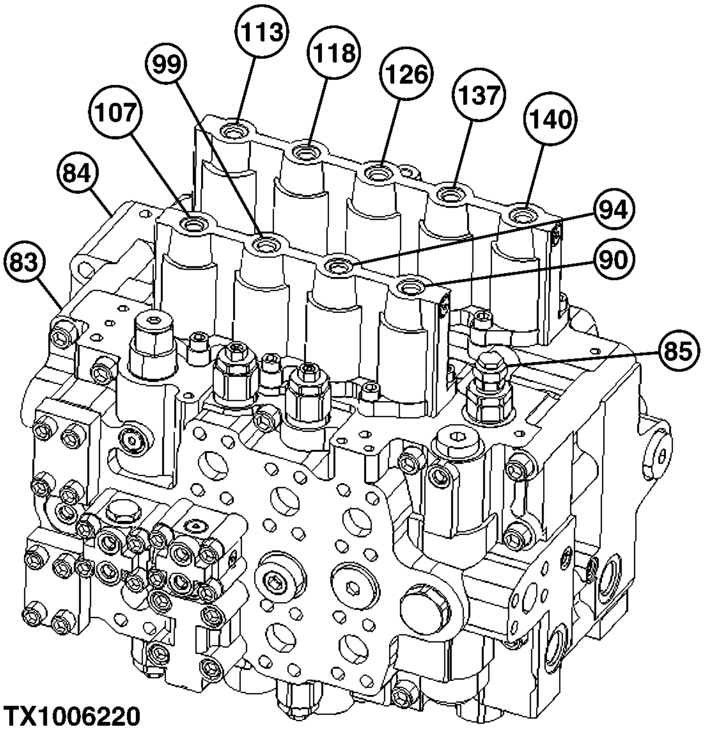
The pin (203), which is attached to the feedback link (31), pulls the feedback link and the load spool (33) to the left, as the feedback link pivots counterclockwise around the pin (210).

With the load spool in this position, the large chamber (211) of the servo piston (30) is open to the tank. With supply oil constantly being routed to the small chamber (206) of the servo piston, the servo piston will now move to the left. When the servo piston moves to the left, the feedback link (31) will rotate clockwise around the pin (203), moving the load spool (33) to the right.

The servo piston will continue to move to the left until the oil passages on the load spool and the load sleeve (32) are completely closed. With the servo piston in this position, the pump swash plate will move to maximum displacement, increasing the flow rate of the pump.

OUT3035,000001D –19–27APR06–9/9

Control Valve Operation



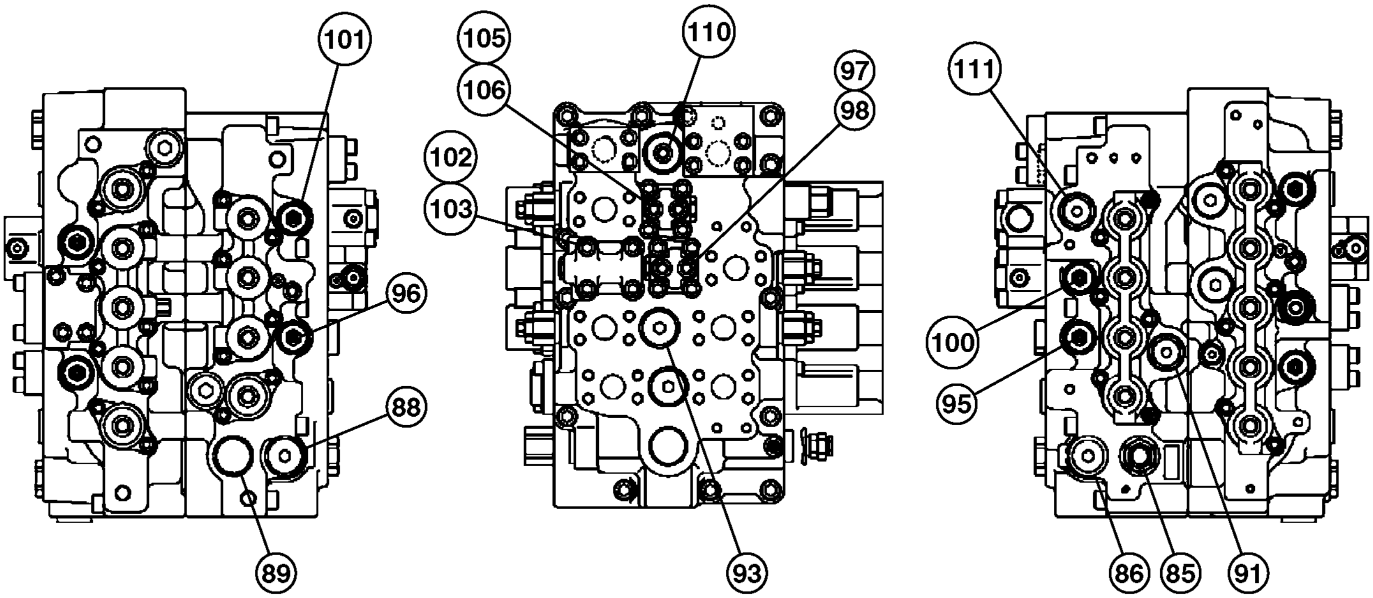
TX1006220 –UN–11APR06

Component Identification

83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
85—Main Relief and Power Digging Valve
90—Right Travel Spool
94—Bucket Spool
99—Boom 1 Spool
107—Arm 2 Spool
113—Swing Spool
118—Arm 1 Spool
126—Boom 2 Spool
137—Auxiliary Spool
140—Left Travel Spool

Continued on next page

MM61211,0001522 –19–15MAY08–1/15



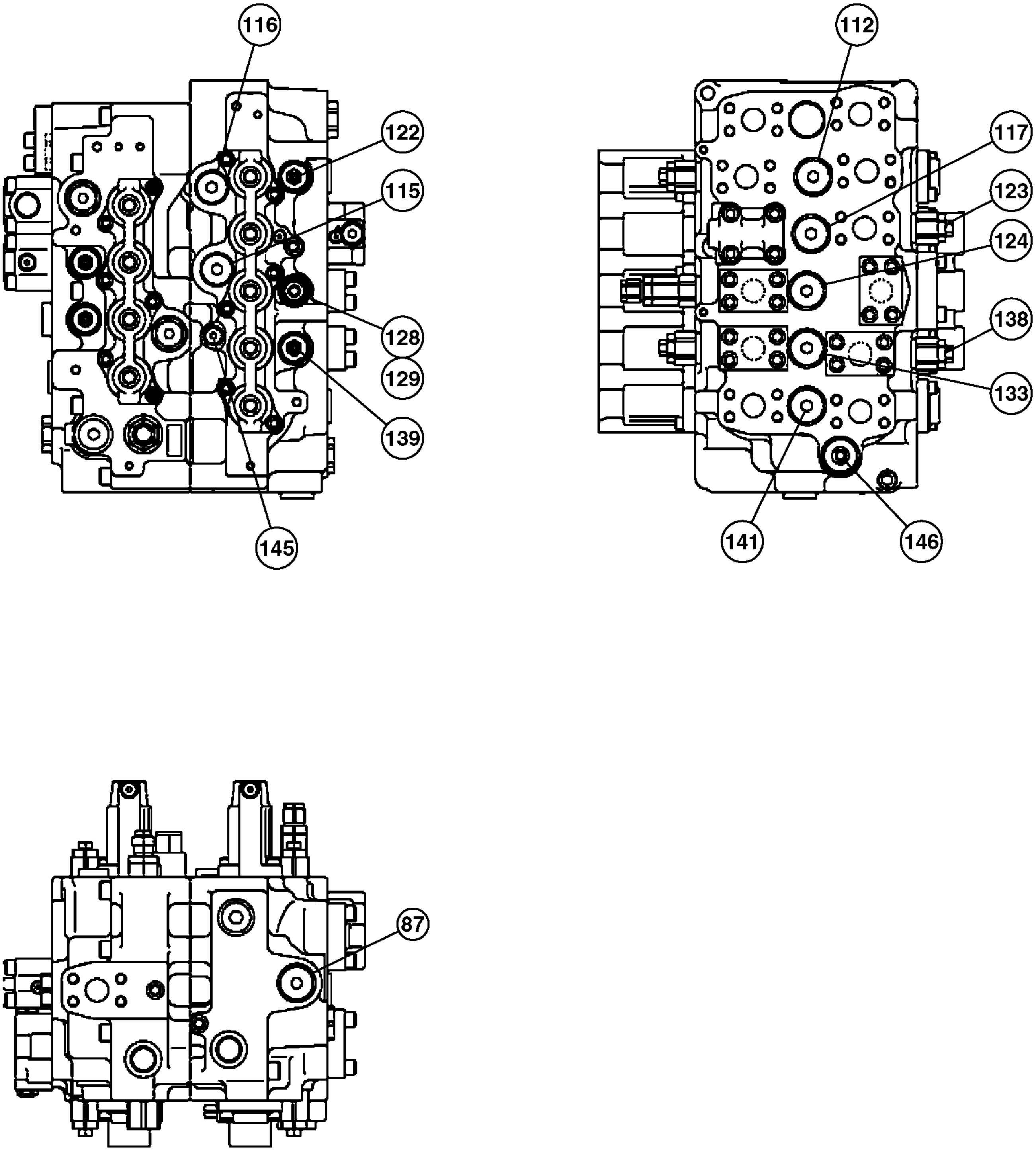
TX1006221

Component Identification 4-Spool Section—Bottom, Side, and Top Views

85—Main Relief and Power Digging Valve
86—Main Relief Valve Isolation Check Valve (4-spool)
88—Check Valve
89—Travel Flow Combiner Valve
91—Bucket Regenerative Switch Valve
93—Power Passage Check Valve (bucket lift check valve)
95—Bucket Dump Circuit Relief and Anticavitation Valve
96—Bucket Curl Circuit Relief and Anticavitation Valve
97—Boom Flow Rate Control Valve—Switch Valve
98—Boom Flow Rate Control Valve—Poppet Valve
100—Boom Down Circuit Relief and Anticavitation Valve
101—Boom Up Circuit Relief and Anticavitation Valve
102—Boom Reduced Leakage Valve—Switch Valve
103—Boom Reduced Leakage Valve—Check Valve
105—Arm 2 Flow Rate Control Valve—Switch Valve
106—Arm 2 Flow Rate Control Valve—Poppet Valve
111—Arm Regenerative Valve—Switch Valve
110—Bypass Shutoff Valve (4-spool)

Continued on next page

MM61211,0001522 –19–15MAY08–2/15



TX1006324 –UN–12APR06

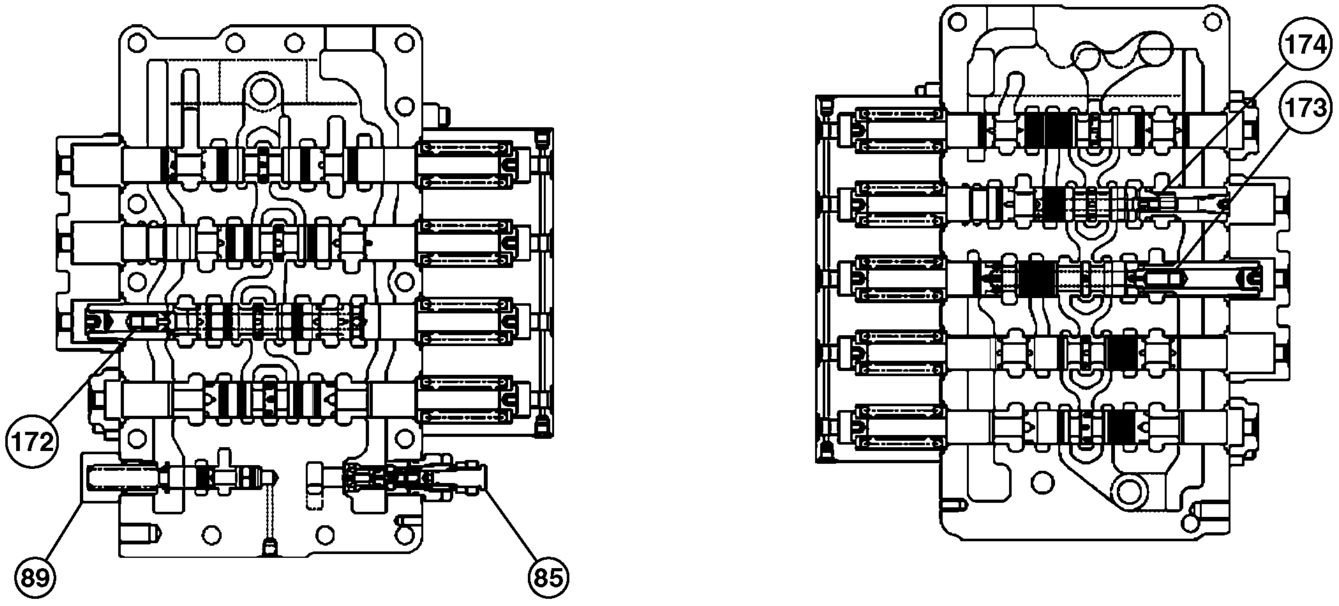
TX1006324

Component Identification 5-Spool Section—Top, Side, and End Views

Continued on next page

87—Main Relief Valve Isolation Check Valve (5-spool)
112—Neutral Passage Check Valve (swing lift check)
115—Power Passage Check Valve (arm 1 in function lift check)
116—Power Passage Check Valve (arm 1 out function lift check)
117—Neutral Passage Check Valve (arm 1 in function lift check)
122—Arm In Circuit Relief and Anticavitation Valve
123—Arm Out Circuit Relief and Anticavitation Valve
124—Neutral Passage Check Valve (boom 2 lift check)
128—Boom Mode Relief Valve
129—Boom Mode Relief Control Valve
133—Check Valve (lift check)
138—Auxiliary Circuit Relief and Anticavitation Valve
139—Auxiliary Circuit Relief and Anticavitation Valve
141—Neutral Passage Check Valve (left travel lift check)
145—Left Travel and Bucket Flow Combining Circuit Check Valve
146—Bypass Shutoff (Bucket Flow Combiner) Valve (5-spool)

MM61211,0001522 –19–15MAY08–4/15



TX1006458

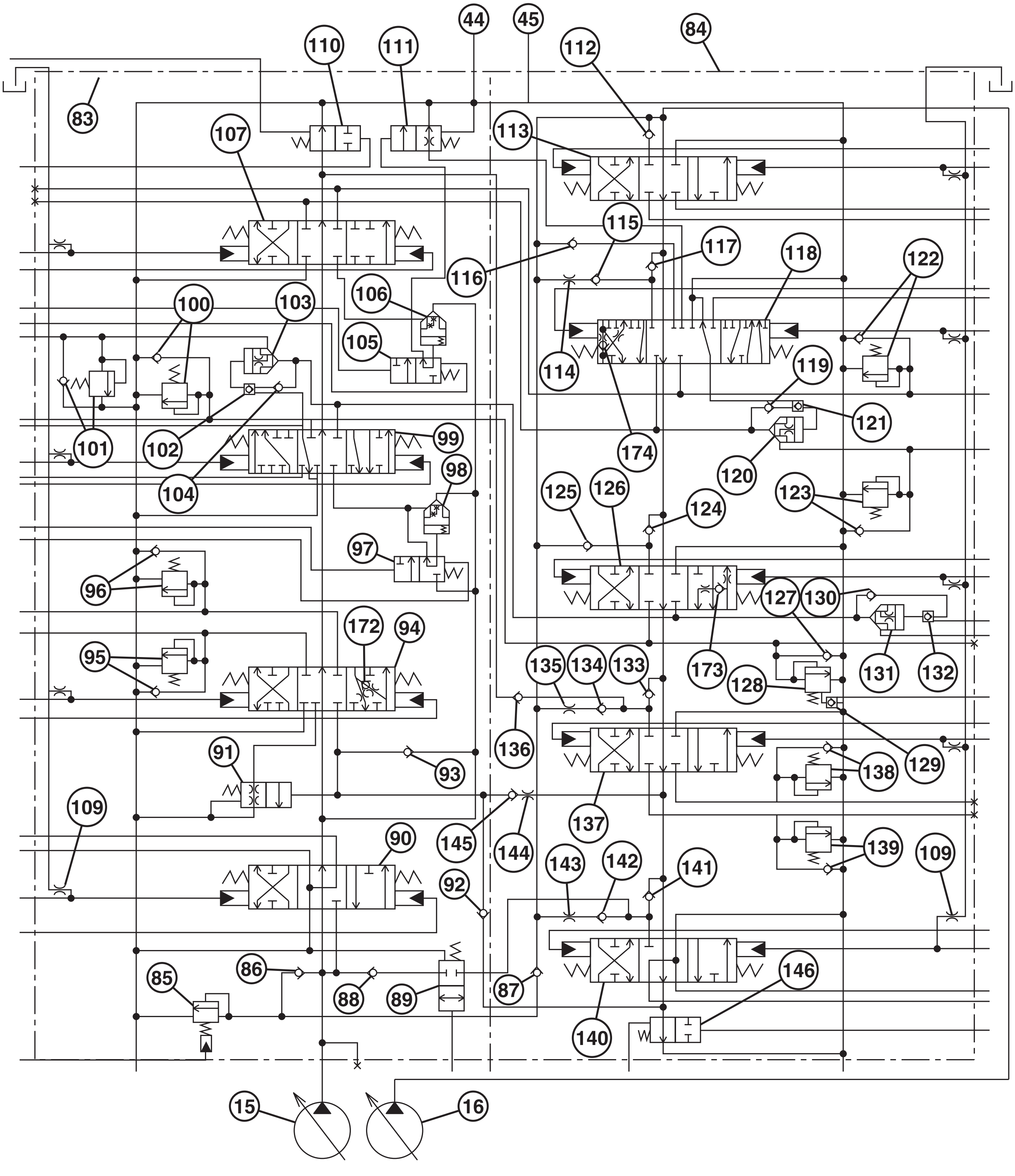
TX1006458 –UN–17APR06

4 and 5-Spool Cross Section

85—Main Relief and Power Digging Valve
89—Travel Flow Combiner Valve
172—Bucket Regenerative Valve
173—Boom 2 Regenerative Valve
174—Arm 1 Regenerative Valve

Continued on next page

MM61211,0001522 –19–15MAY08–5/15



TX1042343 –UN–19MAY08

TX1042343

Control Valve Circuit

Continued on next page

83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
85—Main Relief and Power Digging Valve
86—Main Relief Valve Isolation Check Valve (4-spool)
87—Main Relief Valve Isolation Check Valve (5-spool)
88—Check Valve
89—Travel Flow Combiner Valve
91—Bucket Regenerative Switch Valve
92—Bucket Flow Combiner Circuit Check Valve
93—Power Passage Check Valve (bucket lift check)
95—Bucket Dump Circuit Relief and Anticavitation Valve
96—Bucket Curl Circuit Relief and Anticavitation Valve
97—Boom Flow Rate Control Valve—Switch Valve
98—Boom Flow Rate Control Valve—Poppet Valve
100—Boom Down Circuit Relief and Anticavitation Valve
101—Boom Up Circuit Relief and Anticavitation Valve
102—Boom Reduced Leakage Valve—Switch Valve
103—Boom Reduced Leakage Valve—Check Valve
104—Check Valve
105—Arm 2 Flow Rate Control Valve—Switch Valve
106—Arm 2 Flow Rate Control Valve—Poppet Valve
110—Bypass Shutoff Valve (right control valve, 4-spool)
111—Arm Regenerative Valve—Switch Valve
112—Neutral Passage Check Valve (swing lift check)
115—Power Passage Check Valve (arm 1 in function lift check)
116—Power Passage Check Valve (arm 1 out function lift check)
117—Neutral Passage Check Valve (arm 1 in function lift check)
120—Arm Reduced Leakage Valve—Check Valve
121—Arm Reduced Leakage Valve—Switch Valve
122—Arm In Circuit Relief and Anticavitation Valve
123—Arm Out Circuit Relief and Anticavitation Valve
124—Neutral Passage Check Valve (boom 2 lift check)
125—Power Passage Check Valve (boom 2 lift check)
128—Boom Mode Relief Valve
129—Boom Mode Relief Control Valve
133—Check Valve (lift check)
134—Power Passage Check Valve (auxiliary lift check)
136—Auxiliary Flow Combiner Circuit Check Valve
138—Auxiliary Circuit Relief and Anticavitation Valve
139—Auxiliary Circuit Relief and Anticavitation Valve
141—Neutral Passage Check Valve (left travel lift check)
142—Power Passage Check Valve (left travel lift check)
145—Left Travel and Bucket Flow Combining Circuit Check Valve
146—Bypass Shutoff (bucket flow combiner) Valve (5-spool)
173—Boom 2 Regenerative Valve
174—Arm 1 Regenerative Valve

Main Control Valve—The main control valve consists of two rows of valves referred to as the left control valve (84) (5-spool) and right control valve (83) (4-spool). The major parts are main relief and power digging valve (85), flow combiner valves and spools, which are operated by pilot oil pressure. The right control valve (4-spool) and left control valve (5-spool) are mounted back-to-back so the oil passages in the valves are connected. The spools are selectively fitted. There is a spool in each valve to control the boom, arm, and travel functions. All other functions are supplied by a single spool in one or the other of the valves. Check valves are used as lift checks and to route supply oil between the right control valve (4-spool) and left control valve (5-spool) for combined operation. The control valve is an open-center type valve. Each valve section controls the flow rate and direction for its hydraulic circuit.

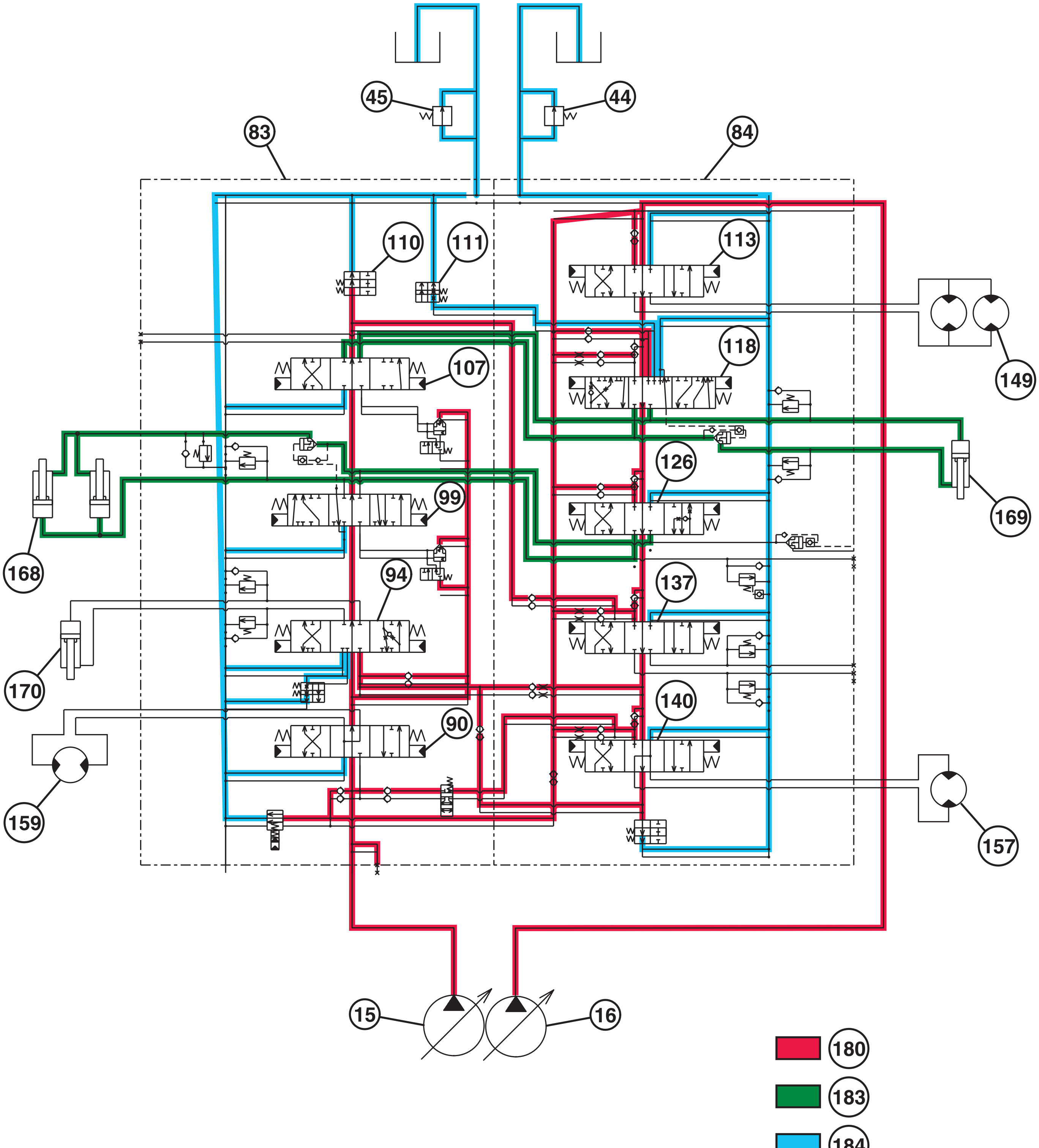
Boom Mode Relief—The boom mode relief control valve (129) is provided in the boom lower circuit of boom 2. The boom mode relief valve decreases relief set pressure of the relief valve and reduces vibration of machine during boom lowering operation.

For more information, see Hydraulic System Schematic. (Group 9025-05.)

All valves are accessible from the outside of control valve by removing a plug, cover, or the pilot caps. See Control Valve Line Identification. (Group 9025-15.)

Solenoid Valve Manifold—The solenoid valve manifold which contains the power dig, arm regenerative, swing priority, and travel speed solenoid valves, is also located on the right control valve.

Continued on next page



TX1042342

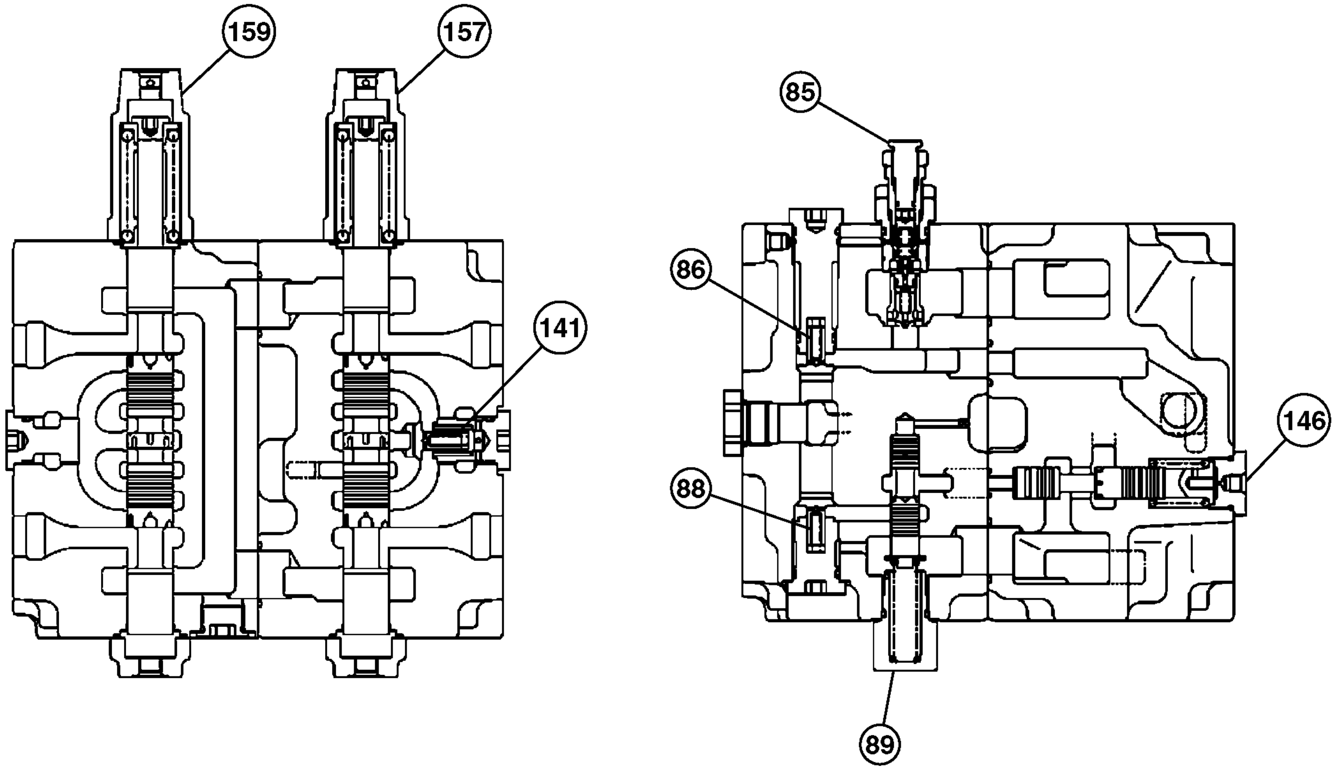
Neutral and Power Passages Operation

Continued on next page

15—Pump 1
16—Pump 2
44—Restriction Valve
45—Oil Cooler Bypass Valve
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
90—Right Travel Spool
94—Bucket Spool
99—Boom 1 Spool
107—Arm 2 Spool
110—Bypass Shutoff (auxiliary flow combiner) Valve
111—Arm Regenerative Valve—Switch Valve
113—Swing Spool
118—Arm 1 Spool
126—Boom 2 Spool
137—Auxiliary Spool
140—Left Travel Spool
149—Swing Motor
157—Left Travel Motor
158—Right Travel Motor
168—Boom Cylinder (2 used)
170—Bucket Cylinder
169—Arm Cylinder
180—Neutral and Power Passages
183—Combiner Passage
184—Return Passage

Supply oil from pump 1 (15) flows to the right control valve (83). Supply oil from pump 2 (16) flows to the left control valve (84). When all functions are in neutral, supply oil flows through the neutral and power passages (180) for each valve spool section and then into the return passage (184). Neutral and power passages in the left and right control valves are used to route supply oil for the combined operation of functions. Arm 1 and 2 spools (107 and 118), and the boom 1 and 2 spools (99 and 126), are connected by combiner passages (183) so supply oil from both pump 1 and pump 2 flows to the cylinders during a single operation. Supply oil from pump 2 can be combined with supply oil from pump 1 by the auxiliary combiner power passage to supply the auxiliary spool (137).

MM61211,0001522 –19–15MAY08–9/15



TX1006460

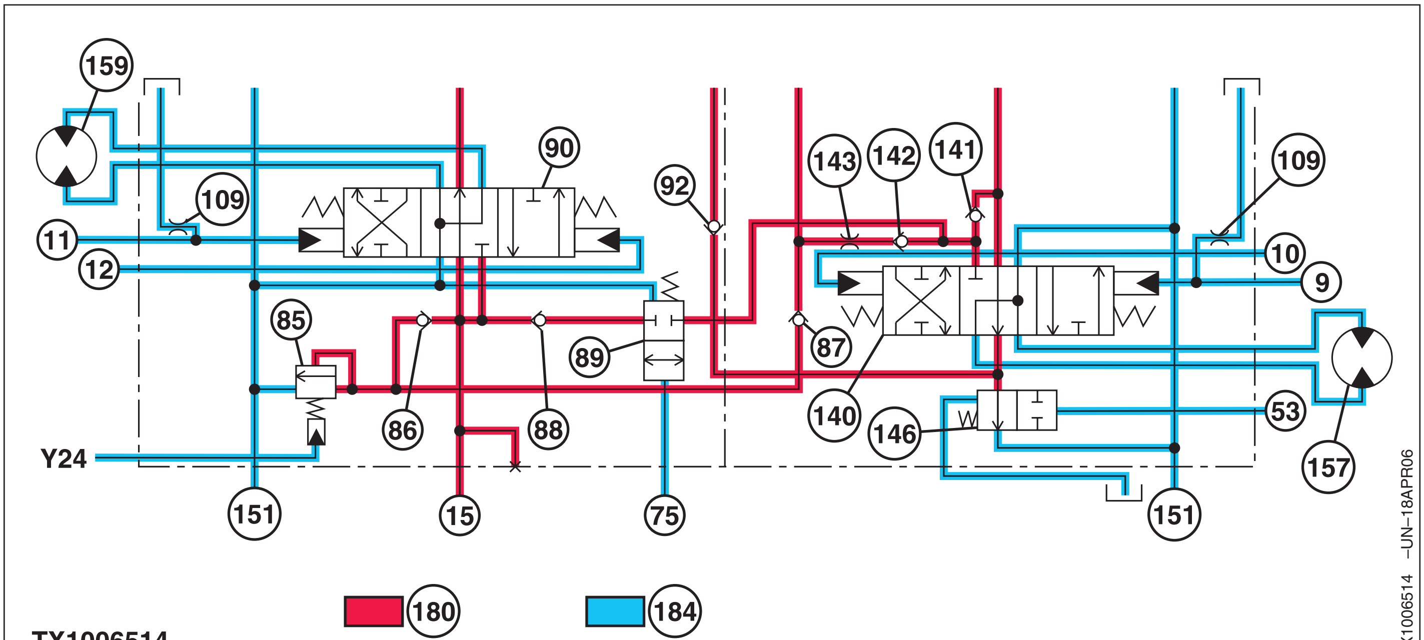
TX1006460 –UN–17APR06

Right and Left Travel Valve Cross Sections

85—Main Relief and Power Digging Valve
86—Main Relief Valve Isolation Check Valve (4-spool)
88—Check Valve
89—Travel Flow Combiner Valve
141—Neutral Passage Check Valve (left travel lift check)
146—Bypass Shutoff (bucket flow combiner) Valve (5-spool)
157—Left Travel Spool
159—Right Travel Spool

Continued on next page

MM61211,0001522 –19–15MAY08–10/15

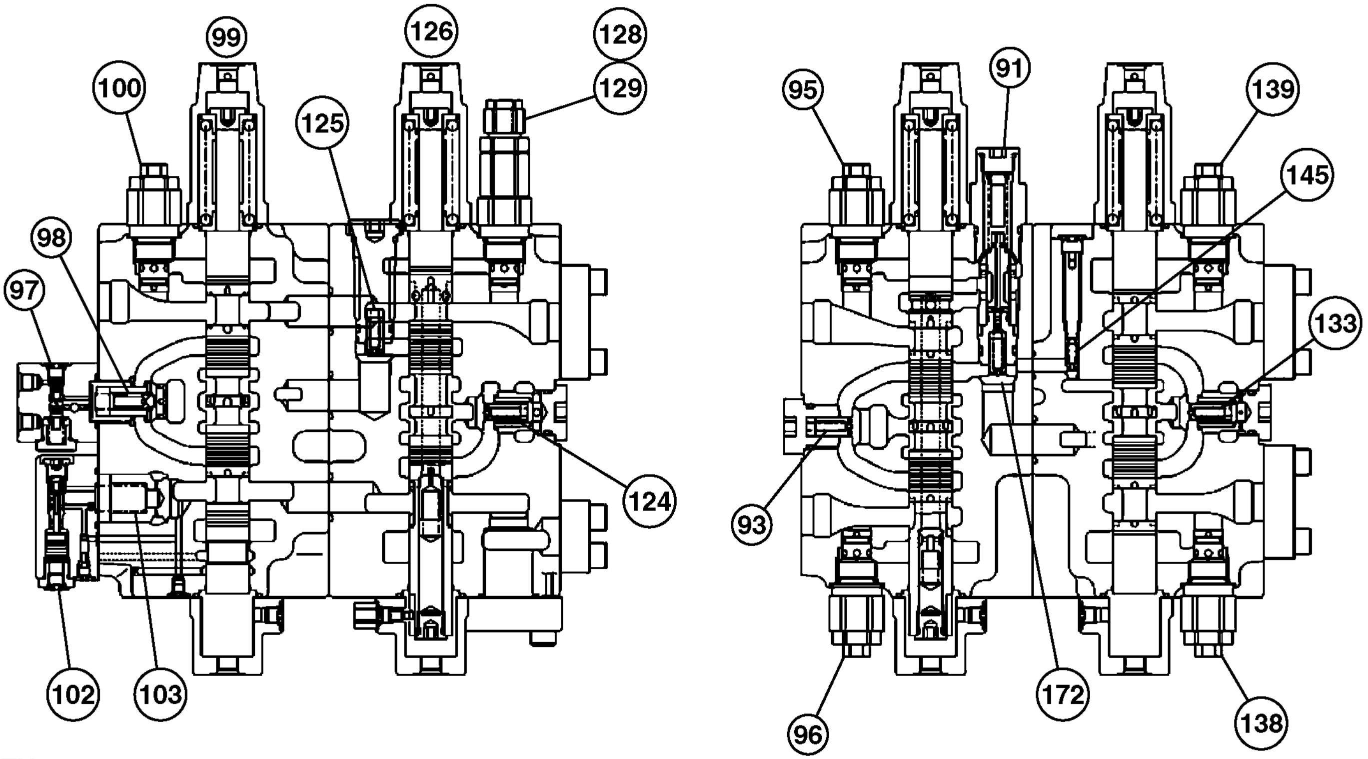


Right and Left Travel Valve Circuit

9—Left Travel Forward (pilot)
10—Left Travel Reverse (pilot)
11—Right Travel Forward (pilot)
12—Right Travel Reverse (pilot)
15—From Pump 1
53—To Solenoid Valve Manifold Port (DP)
75—From Travel Flow Combiner Valve
85—Main Relief and Power Digging Valve
86—Main Relief Valve Isolation Check Valve (4-spool)
87—Main Relief Valve Isolation Check Valve (5-spool)
88—Check Valve
89—Travel Flow Combiner Valve
90—Right Travel Spool
92—Bucket Flow Combiner Circuit Check Valve
109—Orifice—Warm-Up Circuit
141—Neutral Passage Check Valve (left travel lift check)
142—Power Passage Check Valve (left travel lift check)
143—Left Travel Power Passage Orifice
146—Bypass Shutoff (bucket flow combiner) Valve (5-spool)
157—Left Travel Motor
159—Right Travel Motor

Continued on next page

MM61211,0001522 –19–15MAY08–11/15



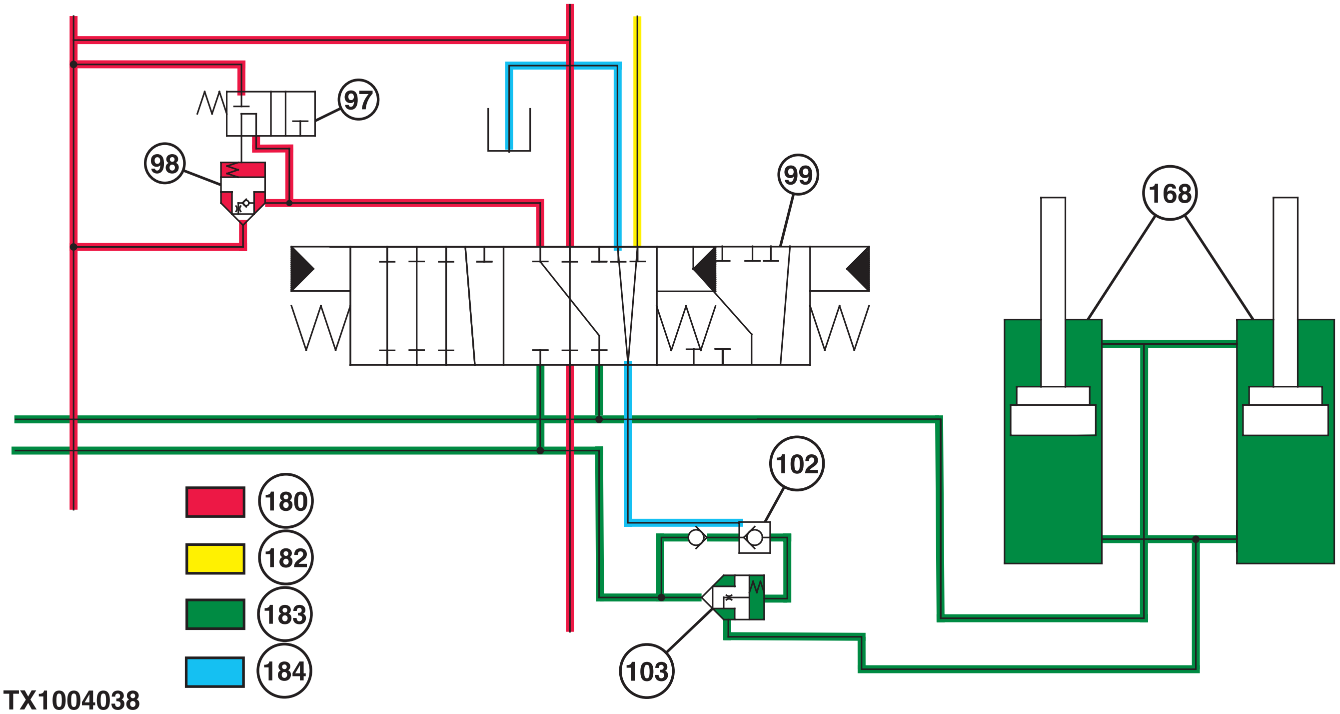
TX1006459

Boom, Bucket and Auxiliary Valves Cross Sections

91—Bucket Regenerative Switch Valve
93—Power Passage Check Valve (bucket lift check)
95—Bucket Dump Circuit Relief and Anticavitation Valve
96—Bucket Curl Circuit Relief and Anticavitation Valve
97—Boom Flow Rate Control Valve—Switch Valve
98—Boom Flow Rate Control Valve—Poppet Valve
99—Boom 1 Spool
100—Boom Down Circuit Relief and Anticavitation Valve
102—Boom Reduced Leakage Valve—Switch Valve
103—Boom Reduced Leakage Valve—Check Valve
124—Neutral Passage Check Valve (boom 2 lift check)
125—Power Passage Check Valve (boom 2 lift check)
126—Boom 2 Spool
128—Boom Mode Relief Valve
129—Boom Mode Relief Control Valve
133—Check Valve (lift check)
138—Auxiliary Circuit Relief and Anticavitation Valve
139—Auxiliary Circuit Relief and Anticavitation Valve

Continued on next page

MM61211,0001522 –19–15MAY08–12/15



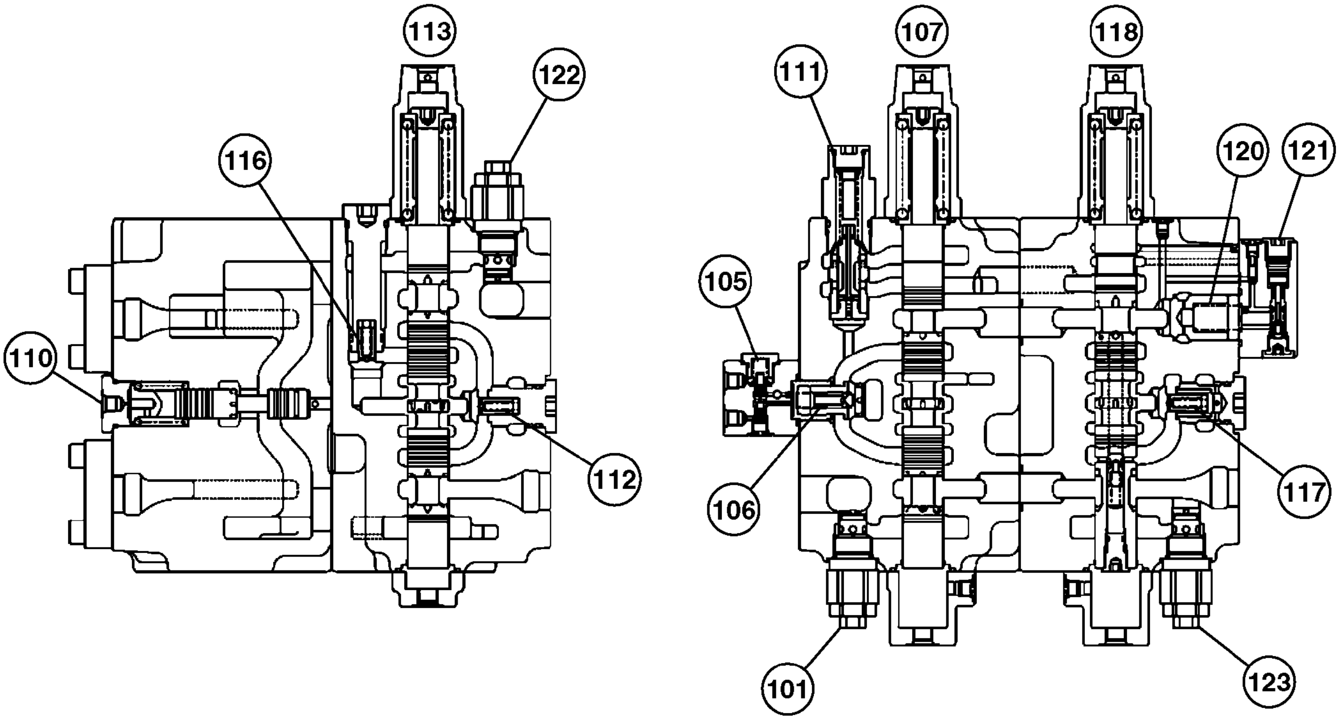
TX1004038

TX1004038 –UN–03MAR06

Boom Neutral Schematic

97—Boom Flow Rate Control Valve—Switch Valve
98—Boom Flow Rate Control Valve—Poppet Valve
99—Boom 1 Spool
102—Boom 1 Reduced Leakage Valve—Switch Valve
103—Boom 1 Reduced Leakage Valve—Poppet Valve
168—Boom Cylinder (2 used)
180—Supply Oil
182—Pilot Oil
183—Trapped Oil
184—Return Oil

Continued on next page

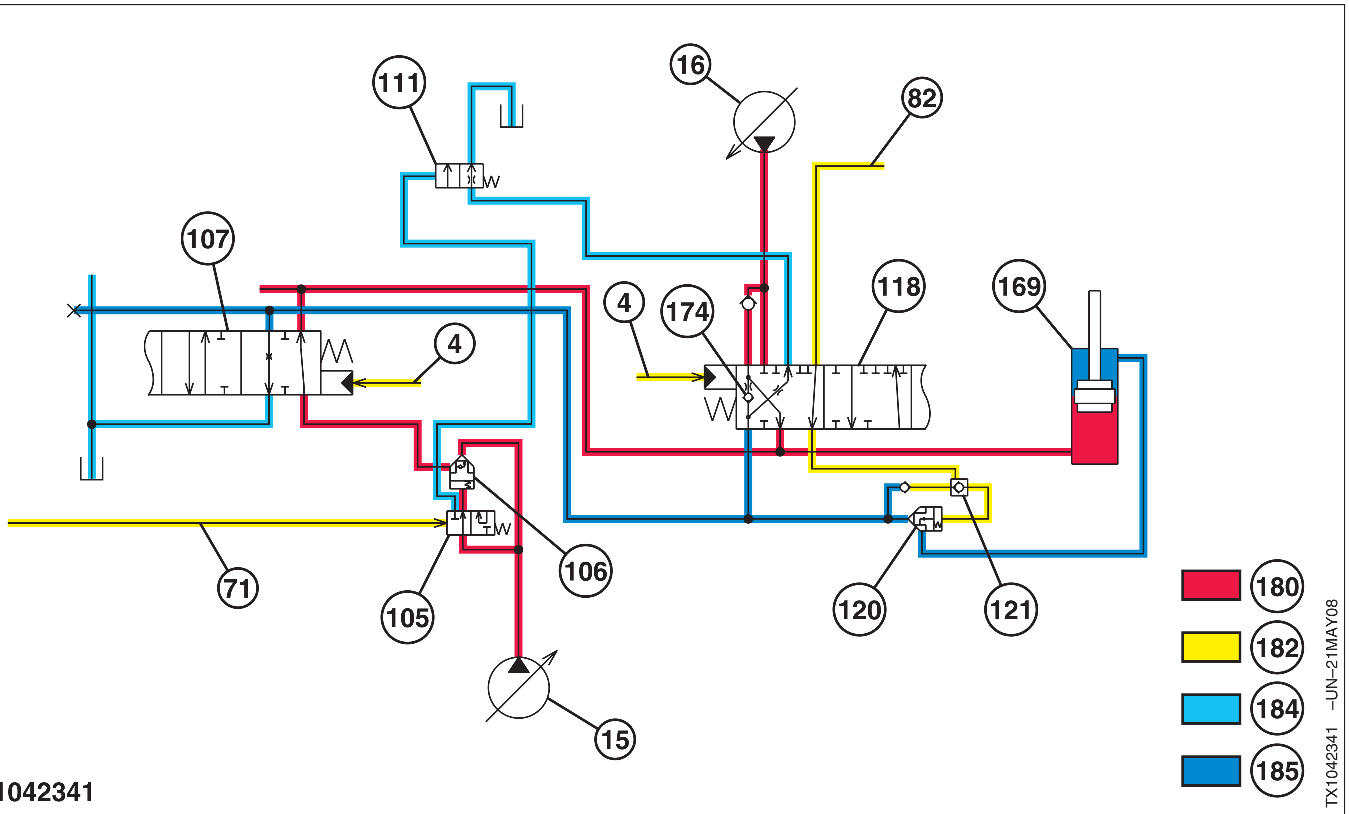


TX1006461

Swing Valve, Arm 1 and Arm 2 Valve Cross Section

105—Arm 2 Flow Rate Control Valve—Switch Valve
106—Arm 2 Flow Rate Control Valve—Poppet Valve
107—Arm 2 Spool
110—Bypass Shutoff Valve (right control valve, 4-spool)
111—Arm Regenerative Valve—Switch Valve
112—Neutral Passage Check Valve (swing lift check)
113—Swing Spool
116—Power Passage Check Valve (arm 1 out function lift check)
117—Neutral Passage Check Valve (arm 1 in function lift check)
118—Arm 1 Spool
120—Arm Reduced Leakage Valve—Check Valve
121—Arm Reduced Leakage Valve—Switch Valve
122—Arm In Circuit Relief and Anticavitation Valve
123—Arm Out Circuit Relief and Anticavitation Valve

Continued on next page



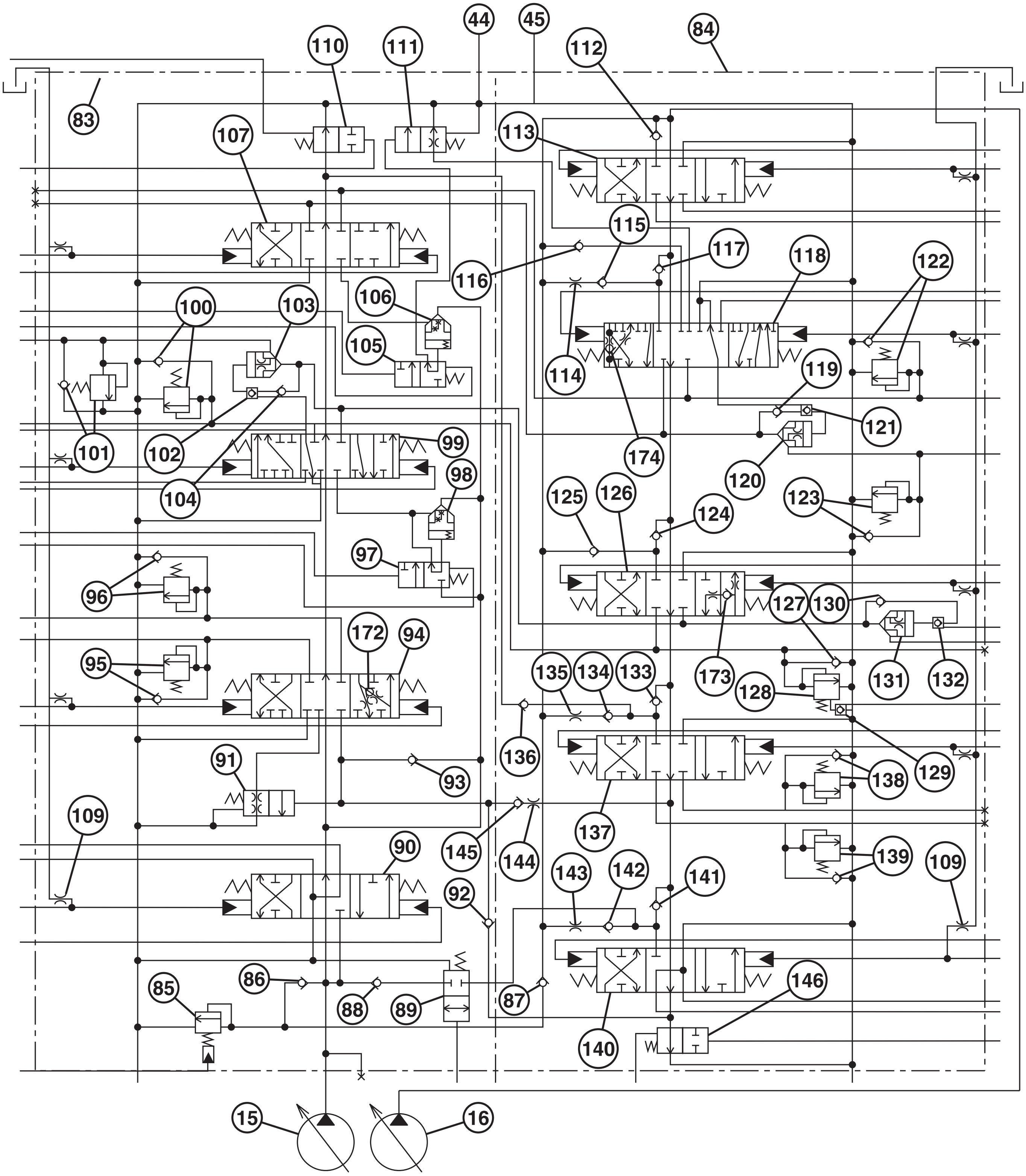
TX1042341

Arm Circuit Schematic

4—From Arm In Pilot Valve
15—Pump 1
16—Pump 2
71—From Arm 2 Flow Rate Pilot Valve (port SK)
82—From Pilot Check Valve Manifold (port B)
105—Arm 2 Flow Rate Switch Valve
106—Arm 2 Flow Rate Poppet Valve
107—Arm 2 Spool
111—Arm Regenerative Switch Valve
118—Arm 1 Spool
120—Arm Reduced Leakage Check Valve
121—Arm Reduced Leakage Switch Valve
169—Arm Cylinder
174—Arm 1 Regenerative Check Valve
180—Supply Oil
182—Pilot Oil
184—Return Oil
185—Regenerative Oil

MM61211,0001522 –19–15MAY08–15/15

Control Valve Check Valves Identification and Operation



TX1042343

Control Valve Check Valves

Continued on next page

15—Pump 1
16—Pump 2
44—To Restriction Valve
45—To Hydraulic Oil Cooler Bypass Valve
83—Right Control Valve
84—Left Control Valve
85—Main Relief and Power Digging Valve
86—Main Relief Valve Isolation Check Valve (4-spool)
87—Main Relief Valve Isolation Check Valve (5-spool)
88—Travel Flow Combiner Circuit Check Valve
89—Travel Flow Combiner Valve
90—Right Travel Spool
91—Bucket Regenerative Switch Valve
92—Bucket Flow Combiner Circuit Check Valve
93—Power Passage Check Valve (bucket lift check)
94—Bucket Spool
95—Bucket Dump Circuit Relief and Anticavitation Valve
96—Bucket Curl Circuit Relief and Anticavitation Valve
97—Boom Flow Rate Control Valve—Switch Valve
98—Boom Flow Rate Control Valve—Poppet Valve
99—Boom 1 Spool
100—Boom Down Circuit Relief and Anticavitation Valve
101—Boom Up Circuit Relief and Anticavitation Valve
102—Boom Reduced Leakage Valve—Switch Valve
103—Boom Reduced Leakage Valve—Check Valve
104—Check Valve
105—Arm 2 Flow Rate Control Valve—Switch Valve
106—Arm 2 Flow Rate Control Valve—Poppet Valve
107—Arm 2 Spool
109—Orifice—Warm-Up Circuit (9 used)
110—Bypass Shutoff Valve (right control valve)
111—Arm Regenerative Valve—Switch Valve
112—Neutral Passage Check Valve (swing lift check)
113—Swing Spool
114—Power Passage Orifice (arm 1 in function lift check)
115—Power Passage Check Valve (arm 1 in function lift check)
116—Power Passage Check Valve (arm 1 out function lift check)
117—Neutral Passage Check Valve (arm 1 in function lift check)
118—Arm 1 Spool
119—Check Valve
120—Arm Reduced Leakage Valve—Check Valve
121—Arm Reduced Leakage Valve—Switch Valve
122—Arm In Circuit Relief and Anticavitation Valve
123—Arm Out Circuit Relief and Anticavitation Valve
124—Neutral Passage Check Valve (boom 2 lift check)
125—Power Passage Check Valve (boom 2 lift check)
126—Boom 2 Spool
127—Anticavitation Check Valve (boom down)
128—Boom Mode Relief Valve
129—Boom Mode Relief Control Valve
130—Boom 2 Reduced Leakage Valve—Switch Valve (not used on 450DLC)
131—Boom 2 Reduced Leakage Valve—Check Valve (not used on 450DLC)
132—Check Valve (not used on 450DLC)
133—Check Valve (lift check)
134—Power Passage Check Valve (auxiliary lift check)
135—Power Passage Orifice (auxiliary power passage)
136—Auxiliary Flow Combiner Circuit Check Valve
137—Auxiliary Spool
138—Auxiliary Circuit Relief and Anticavitation Valve
139—Auxiliary Circuit Relief and Anticavitation Valve
140—Left Travel Spool
141—Neutral Passage Check Valve (left travel lift check)
142—Power Passage Check Valve (left travel lift check)
143—Power Passage Orifice (left travel power passage)
144—Left Travel and Bucket Flow Combiner Circuit Orifice
145—Left Travel and Bucket Flow Combiner Circuit Check Valve
146—Bypass Shutoff (bucket flow combiner) Valve (left control valve)
172—Bucket Regenerative Valve
173—Boom 2 Regenerative Valve
174—Arm 1 Regenerative Valve

See Control Valve Operation for location of check valves and orifices in the left and right control valves (83 and 84). (Group 9025-05.)

Check Valves (112, 117, 124, 133, and 141)—Are lift checks in the neutral passages.

Check Valves (93, 115, 116, 125, 134, and 142)—Are lift checks in the power passages.

Bucket Regenerative Valve (check valve) (172)— During bucket curl regenerative operation, the bucket regenerative switch valve (91) is closed. Bucket regenerative check valve (172) is opened when return oil pressure from the rod end of bucket cylinder becomes greater than the supply oil pressure. Return oil combines with the supply oil flow to the head end of bucket cylinder, preventing cavitation. See Bucket Regenerative Valve Circuit Operation. (Group 9025-05.)

Continued on next page

Boom 2 Regenerative Valve (check valve) (173)— During boom down operation, the boom 2 regenerative check valve (173) is opened when return oil pressure from the head end of the boom cylinder becomes greater than the pump 1 supply oil pressure. Return oil combines with the pump 1 supply oil flow to the rod end of boom cylinder, preventing cavitation. See Boom Regenerative Valve Circuit Operation. (Group 9025-05.)

Arm 1 Regenerative Valve (check valve) (174)— During arm in regenerative operation the arm regenerative switch valve (111) is closed, arm regenerative check valve (174) is opened when return oil pressure from the rod end of arm cylinder becomes greater than the supply oil pressure. Return oil combines with the supply oil flow to the head end of arm cylinder, preventing cavitation. See Arm Regenerative Valve Circuit Operation. (Group 9025-05.)

Main Relief Valve Isolation Check Valve (4 Spool) (86)—A higher pump 2 pressure closes the check valve so it cannot flow to the lower pressure side of control valve. The higher pressure is sensed by the main relief and power digging valve (85). See Main Relief and Power Digging Valve Circuit Operation. (Group 9025-05.)

Main Relief Valve Isolation Check Valve (5 Spool) (87)—A higher pump 1 pressure closes the check valve against the lower pressure so it cannot flow to the lower pressure side of control valve. The higher pressure is sensed by the main relief and power digging valve (85). See Main Relief and Power Digging Valve Circuit Operation. (Group 9025-05.)

Auxiliary Flow Combiner Circuit Check Valve (136)—When auxiliary function is actuated, bypass shutoff valve (110) closes and hydraulic pump 1 supply oil flows from the 4-spool neutral passage through the auxiliary flow combiner check valve to the auxiliary spool (137). The bypass shutoff valve is shifted by an external pilot line from the auxiliary spool pilot cap. Check valve will close if pressure in the 5-spool neutral and power passages is higher than the pump 1 supply oil. See Bypass Shutoff (Auxiliary Flow Combiner) Valve Circuit Operation. (Group 9025-05.)

Travel Flow Combiner Circuit Check Valve (88)— Blocks a higher supply oil pressure in the left control valve (84) from flowing to the right control valve (83) in travel flow combiner circuit. Travel flow combiner valve (89) is opened by a pilot signal from travel flow combiner pilot valve (75) in the pilot signal manifold. See Travel Flow Combiner Valve Circuit Operation. (Group 9025-05.)

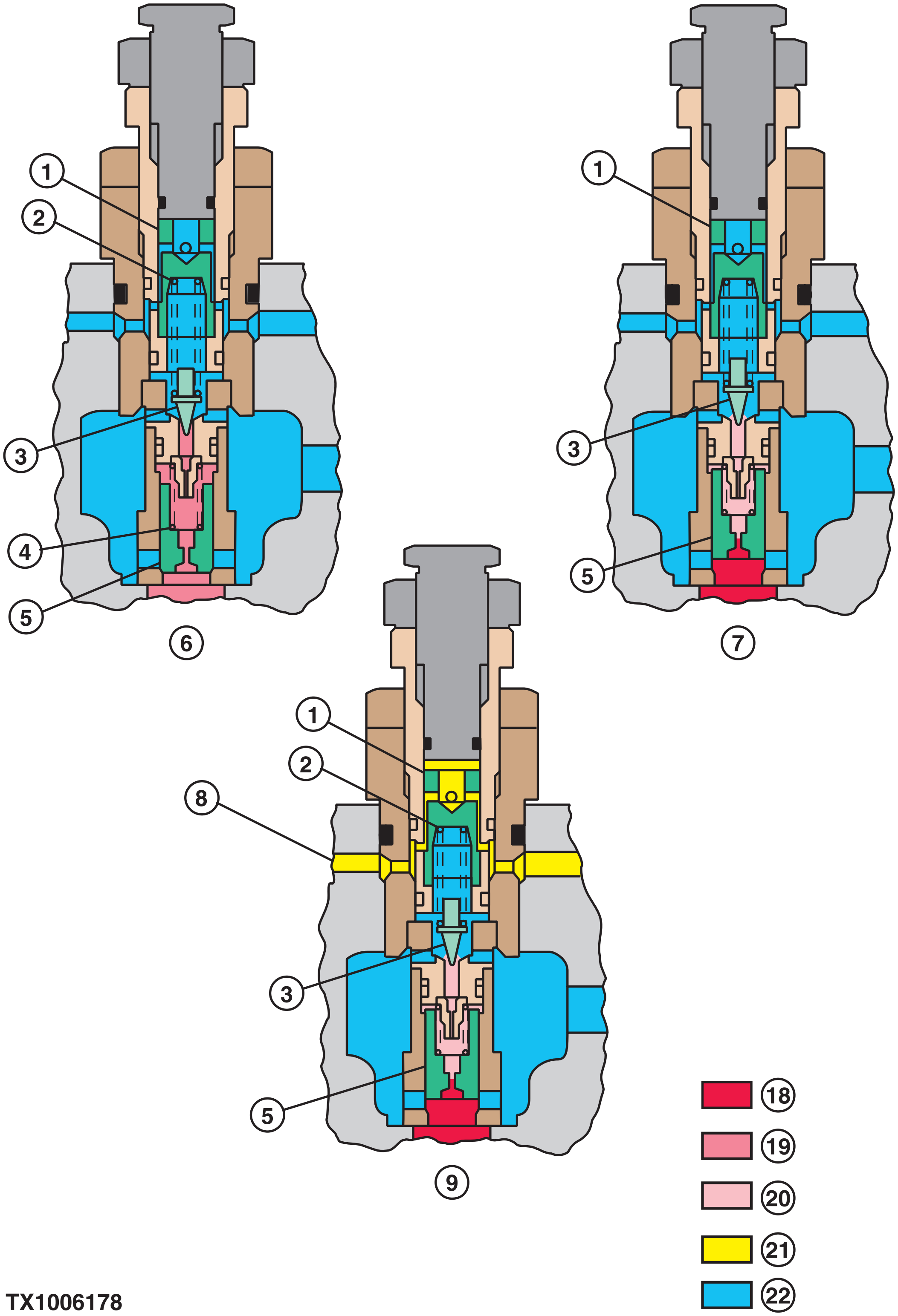
Bucket Flow Combiner Circuit Check Valve (92) and Left Travel and Bucket Flow Combiner Circuit Check Valve (145)—Blocks a higher supply oil pressure in the right control valve (83) from flowing to the left control valve (84) in bucket flow combiner circuit. Bucket flow combiner valve (146) is closed by a pilot signal from the solenoid valve manifold port DP. See Bypass Shutoff (Bucket Flow Combiner) Valve Circuit Operation. (Group 9025-05.)

Circuit Relief and Anticavitation Valves (95, 96, 100, 101, 122, 123, 127, 138, and 139)—The anticavitation valve opens when return oil pressure becomes greater than supply oil pressure to provide make-up oil to prevent cavitation in the cylinder. See Circuit Relief and Anticavitation Valve Operation. (Group 9025-05.)

Boom Reduced Leakage Check Valve (103) and Arm Reduced Leakage Check Valve (120)—A reduced leakage valve is located on the boom cylinder head end circuit and the arm cylinder rod end circuit to prevent boom or arm from drifting down while control lever is in neutral. See Boom and Arm Reduced Leakage Valves Operation. (Group 9025-05.)

LD30992,000025B –19–15MAY08–3/3

Main Relief and Power Digging Valve Circuit Operation



TX1006178

TX1006178 –UN–12APR06

Main Relief and Power Digging Valve Operation

Continued on next page

1—Piston
2—Spring
3—Pilot Poppet
4—Spring
5—Main Poppet
6—Normal Operation
7—Relief Operation
8—From Power Dig Solenoid Valve SG
9—Power Dig Operation
18—Relief Pressure Oil
19—Supply Oil
20—Reduced Pressure Oil
21—Pilot Oil
22—Return Oil

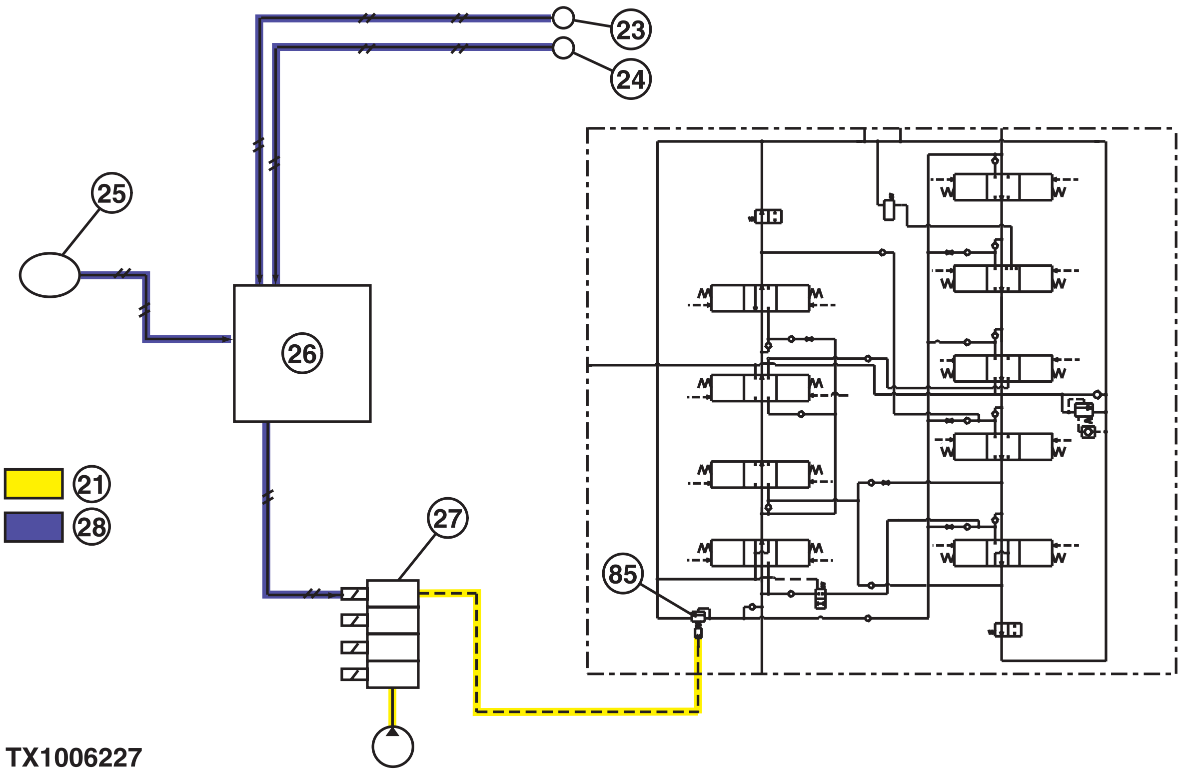
Main Relief and Power Dig Valve—The main relief and power dig valve limits the maximum pressure of the hydraulic system.

During normal operation (6), supply oil (19) flows through the center of the main poppet (5) and, with the force of spring (4), holds the poppet closed.

During relief operation (7), the relief pressure oil (18) unseats pilot poppet (3). As the pilot poppet opens, oil behind the main poppet is routed to return. As pressure behind the main poppet decreases, the relief pressure on the face of the main poppet opens the poppet, routing relief pressure oil to return. As the pressure decreases below the pressure setting, the pilot poppet is closed by the force of spring (2). Pressure behind the main poppet increases and, along with the spring force, closes the main poppet.

During power dig operation (9), pilot oil (21) from power dig solenoid valve SG (8) is routed to the top of the piston (1), pushing it down against the spring (2), increasing the main relief pressure setting.

Continued on next page



TX1006227

TX1006227 –UN–12APR06

Power Dig Circuit Operation

21—Pilot Oil
23—Travel Right
24—Travel Left
25—Power Dig Switch
26—Main Controller (MCF)
27—Power Dig Solenoid Valve SG
28—Voltage
85—Main Relief and Power Dig Valve

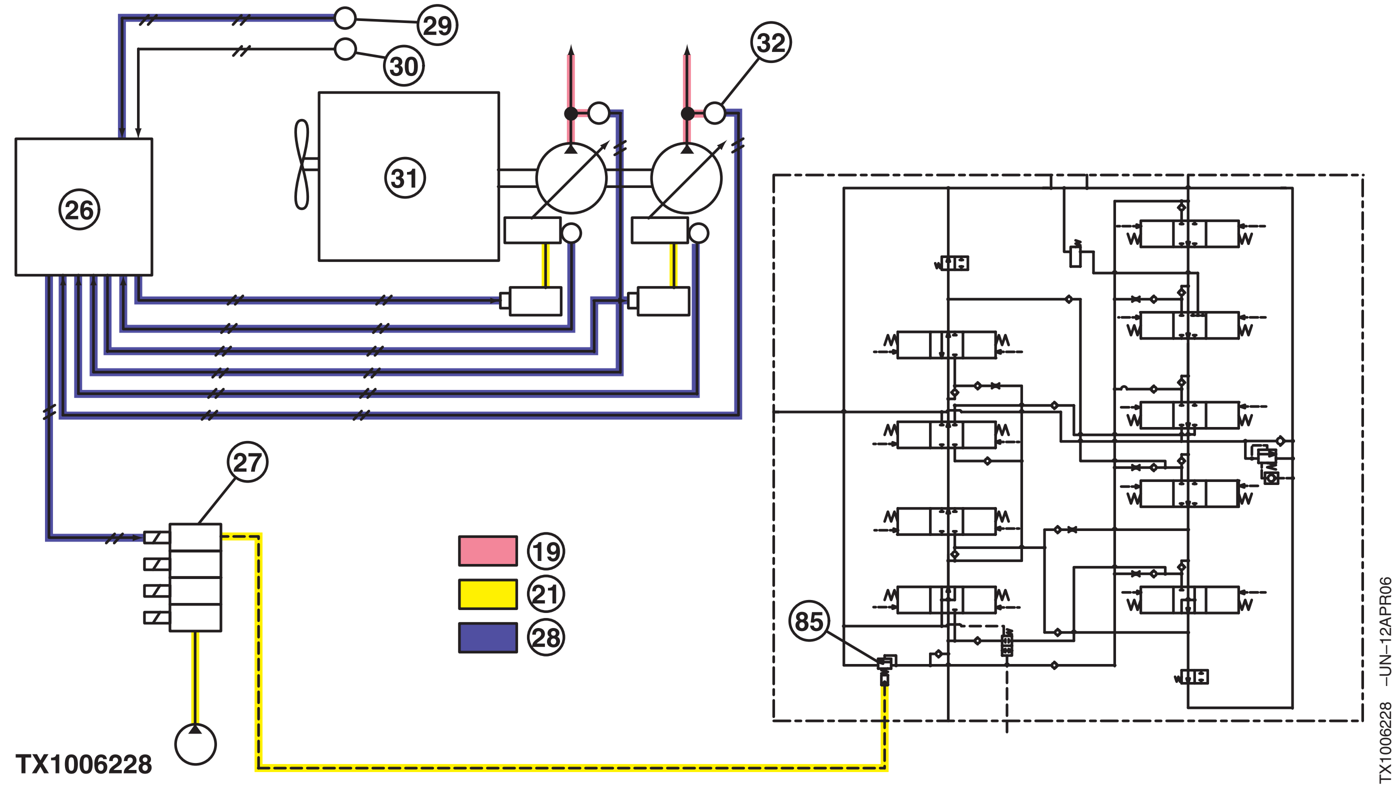
Power Dig Circuit Operation—The function of the power dig control circuit is to temporarily increase the main hydraulic system operating pressure by increasing the main relief and power dig valve (85) pressure setting.

When the power dig switch (25) is pushed and held or when a travel function (23 or 24) is actuated, the main controller (MCF) (26) sends an electrical signal to energize the power dig solenoid valve SG (27). The pilot oil pressure signal from the power dig solenoid valve SG pushes the piston in the main relief and power dig valve down, increasing the pressure setting.

The main hydraulic system can now operate at a higher operating pressure for approximately 8 seconds as long as the power dig switch is held down. If the switch is released before 8 seconds, the power dig function is turned off. After 8 seconds, the switch must be released and pushed again to actuate the power dig function. The length of time the power dig function is actuated is controlled by a timer circuit in the MCF.

Continued on next page

LD30992,000025C –19–13APR06–3/6



Auto-Power Lift Operation

19—Supply Oil
21—Pilot Oil
26—Main Controller (MCF)
27—Power Dig Solenoid Valve SG
28—Voltage
29—Boom Up Pressure Sensor
30—Arm In Pressure Sensor
31—Engine
32—Hydraulic Pump 1 Delivery Pressure Sensor
85—Main Relief and Power Dig Valve

Auto-Power Lift Operation—The function of the auto-power lift control circuit is to increase the main hydraulic system operating pressure by temporarily increasing the main relief and power dig valve (85) pressure setting for boom up operation.

NOTE: Auto-power lift is activated during combined boom up operations, except arm in.

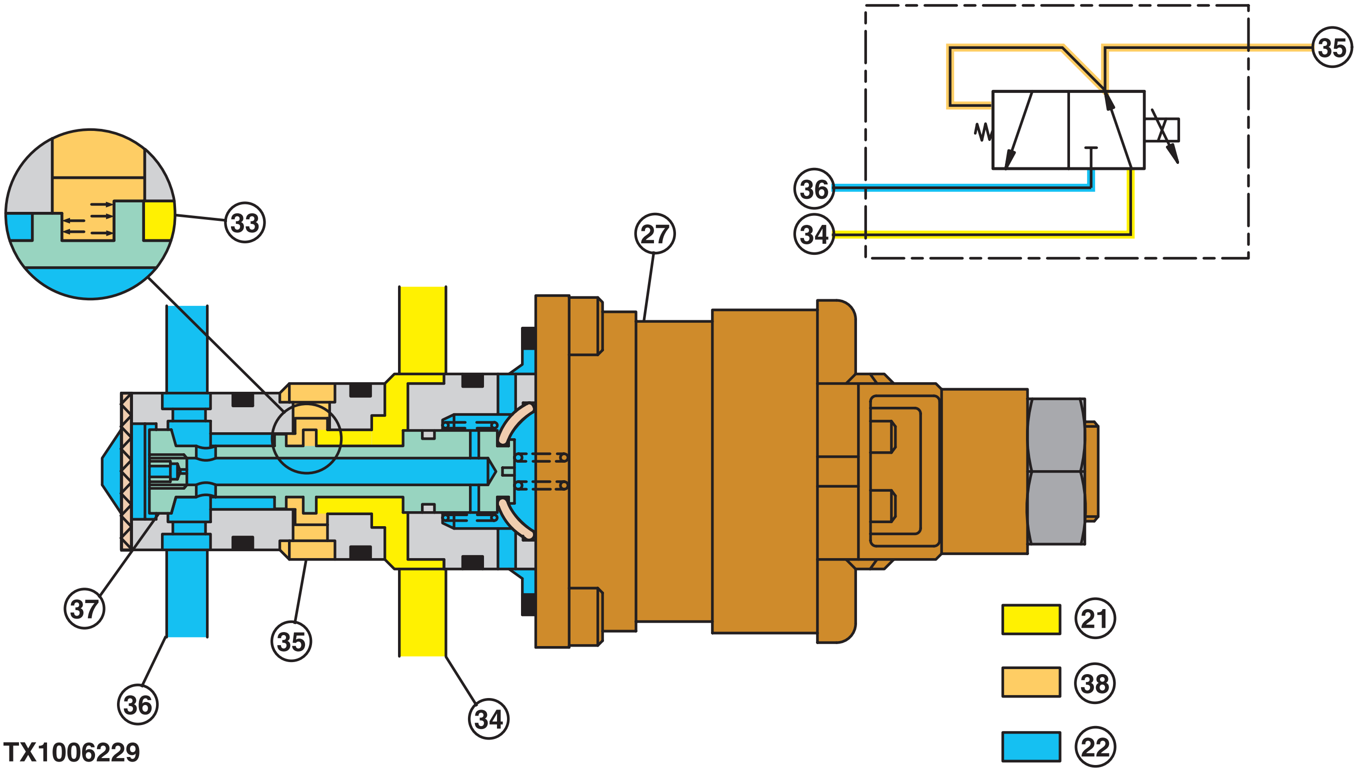
During a boom up operation, when the MCF (26) receives an electrical signal from the boom up pressure sensor (29) and hydraulic pump 1 delivery pressure sensor (32) and zero output signal from the arm in pressure sensor (30), the MCF sends an electrical signal to energize the power dig solenoid valve SG (27). The pilot oil (21) pressure signal from the power dig solenoid valve SG (27) pushes the piston in the main relief and power dig valve down, increasing the pressure setting. The main hydraulic system can now operate at a higher operating pressure.

Counterweight Removal Circuit Operation—The function of the counterweight removal circuit is to increase the main hydraulic system operating pressure by temporarily increasing the main relief and power dig valve (85) pressure setting during counterweight removal operation.

Continued on next page

During counterweight removal operation, when the MCF (26) receives an electrical signal from the counterweight pressure sensor, the MCF sends an electrical signal to energize the power dig solenoid valve SG (27). The pilot oil (21) pressure signal from the power dig solenoid valve SG pushes the piston in the main relief valve and power dig valve down, increasing the pressure setting. The main hydraulic system can now operate at a higher operating pressure. The MCF receives signals from pump 1 and pump 2 regulator pressure sensors. The MCF then sends signals to pump 1 and pump 2 control solenoid valves reducing the pump's flow rates.

Continued on next page



TX1006229

TX1006229 –UN–12APR06

Power Dig Solenoid Valve SG Operation

21—Pilot Oil
22—Return Oil
27—Power Dig Solenoid Valve SG
33—Flange on the Right Is Larger
34—From Pilot Filter and Pressure Regulating Valve
35—Valve Function Port
36—To Hydraulic Oil Tank
37—Valve Spool
38—Reduced Pilot Oil

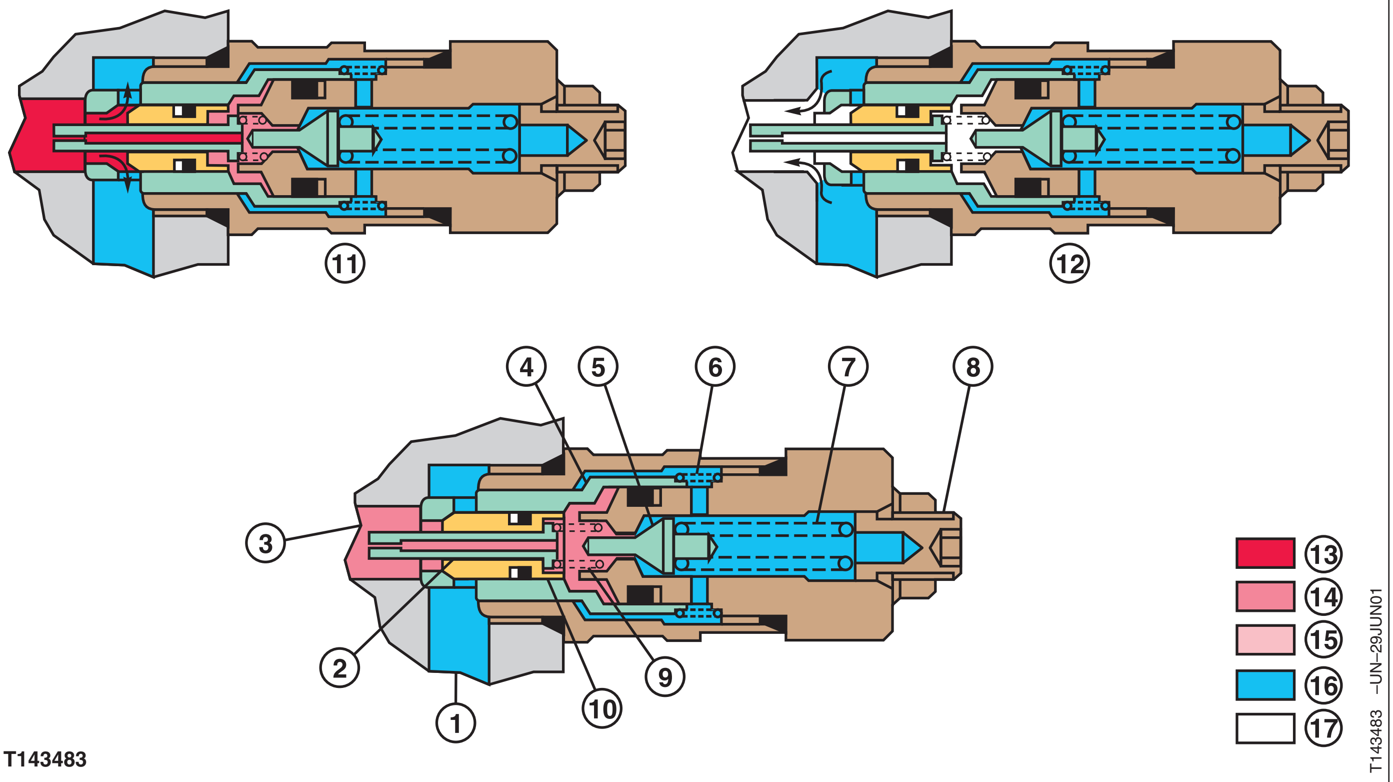
Power Dig Solenoid Valve SG Operation—The power dig solenoid valve SG (27) is a proportional solenoid valve type. The solenoid valve is activated by an electrical signal from the MCF.

When de-energized, the spool (37) is pushed to the right by a spring. The valve function port (35) is then connected to the hydraulic oil tank (36).

When energized, the magnetic force shifts the spool left against the spring. Pilot oil (21) flows past the spool flange and out the valve function port as reduced pilot oil (38) to the main relief and power dig valve. Because the flange on the right is larger (33) than the flange on the left, the spool is pushed to the right against the magnetic force as the electrical signal to the solenoid increases. When the reduced pilot oil pressure becomes equal to or greater than the magnetic force, the spool is pushed to the right, closing the passage. The spool is moving constantly to maintain the reduced pilot oil pressure to the main relief and power dig valve in response to the electrical signal to the solenoid.

LD30992,000025C –19–13APR06–6/6

Circuit Relief and Anticavitation Valve Operation



T143483

T143483 –UN–29JUN01

Circuit Relief Valve with Anticavitation

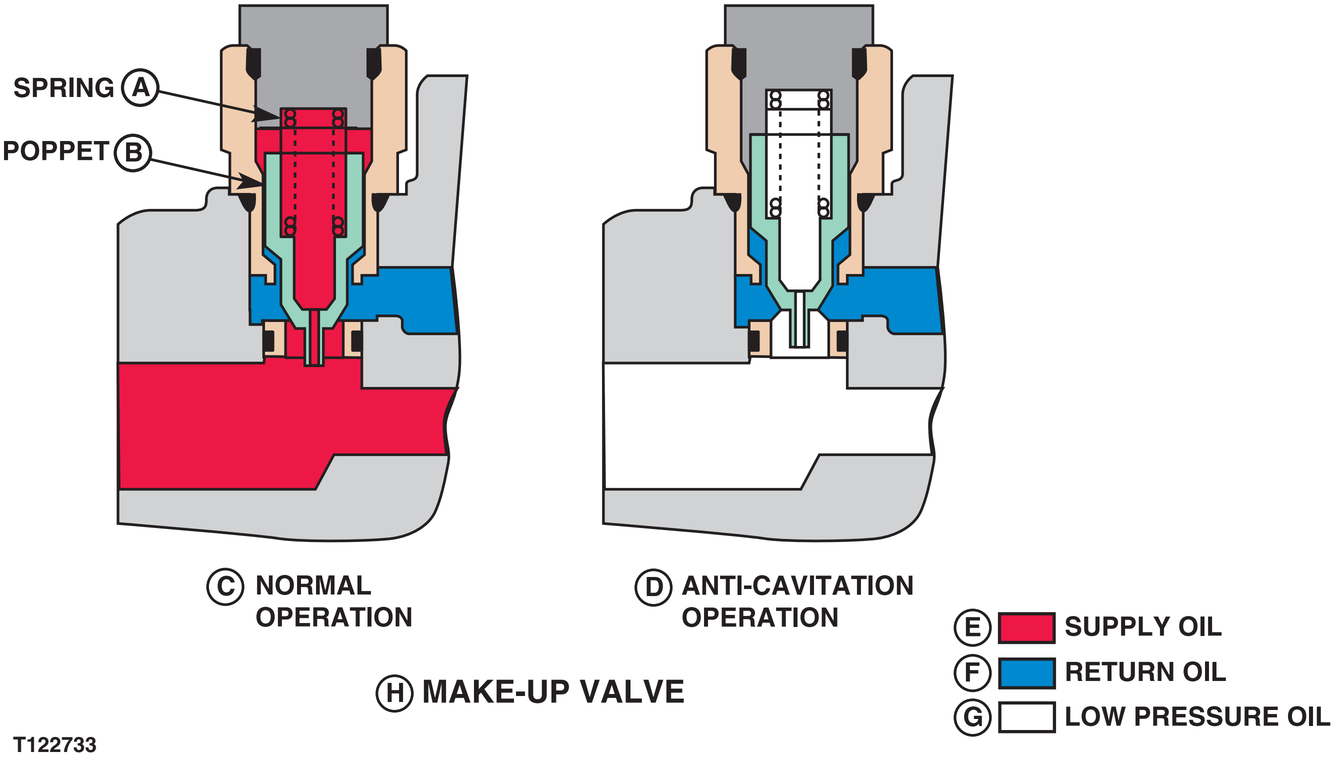
1—To Return
2—Piston
3—From Work Circuit
4—Check Valve
5—Pilot Poppet
6—Check Valve Spring
7—Pilot Poppet Spring
8—Screw
9—Piston Spring
10—Main Poppet
11—Relief Operation
12—Anticavitation Operation
13—Relief Pressure Oil
14—Operating Pressure Oil
15—Reduced Pressure Oil
16—Return Oil
17—Low Pressure Oil (cavitation)

At pressures below the circuit relief setting, the main poppet (10) remains closed. In relief operation (11), the relief valve opens in three steps. In the first step, the pilot poppet (5) is opened. Flow restriction through the hollow piston (2) causes the pressure in the cavity behind the main poppet to decrease. In the second step of relief operation, the piston seats against the pilot poppet (5). This further reduces oil flow into the cavity and greatly decreases the pressure against the back side of main poppet. The main poppet opens in the third step of relief operation.

During anticavitation operation (12), the check valve (4) retracts to allow oil to flow from the return passage into the work circuit. During normal operation, the operating pressure oil (14) on the inner shoulder holds the check valve against its seat. This pressure decreases as pressure in the work circuit decreases. The return oil (16) on the outer shoulder moves the check valve, main poppet, and piston against the springs to open the valve.

LD30992,000025D –19–01MAR06–1/1

Arm Make-Up Check Valve Operation



T122733 –19–23JUL99

A—Spring
B—Poppet
C—Normal Operation
D—Anti-Cavitation Operation
E—Supply Oil
F—Return Oil
G—Low Pressure Oil

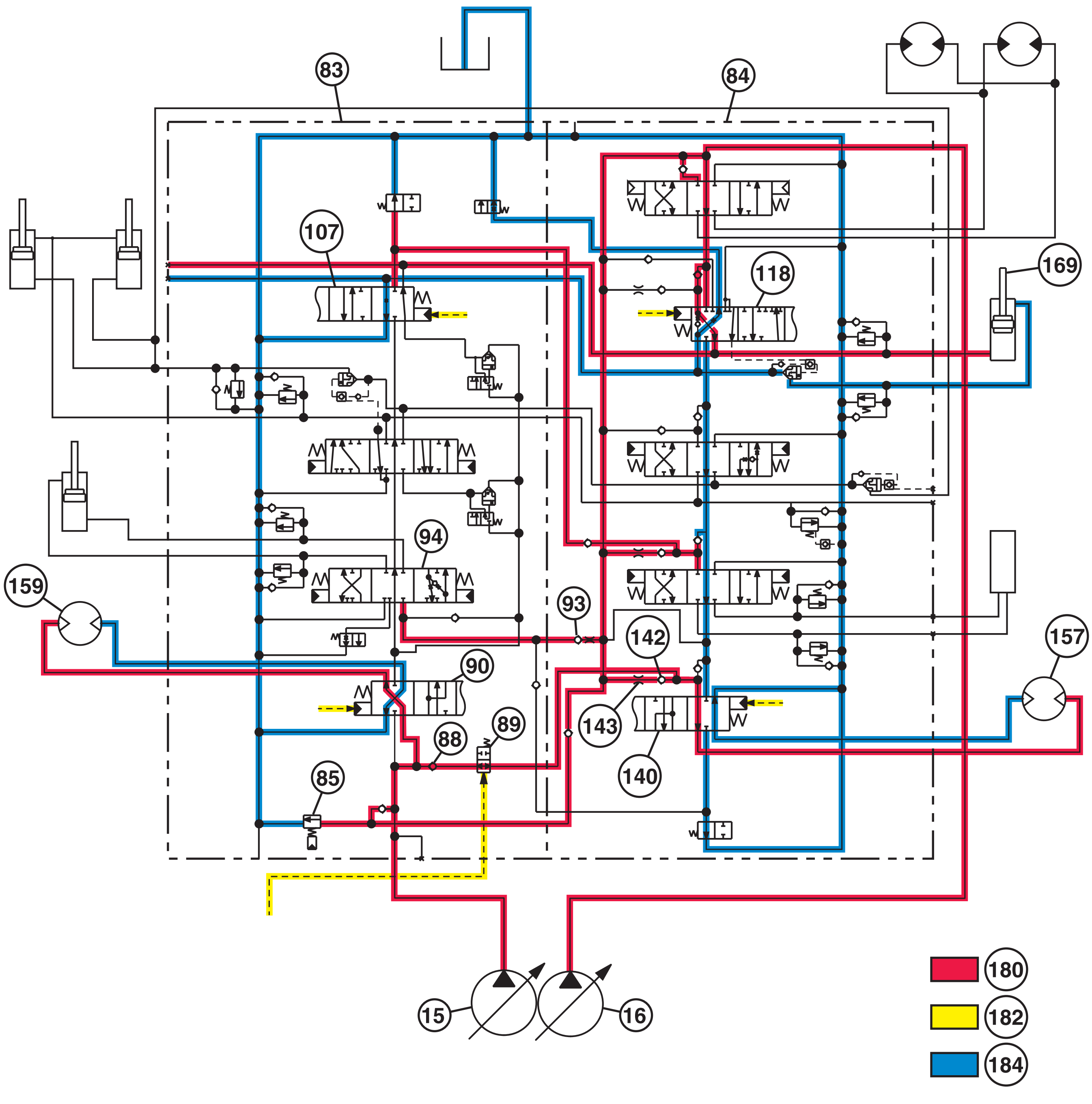
Make-up valves are used in boom 2 and arm 2 control valves to assist the circuit relief valves during anti-cavitation operation.

During normal operation (C), supply oil (E) is routed behind poppet (B). Supply oil and spring (A) force hold the poppet seated.

During anti-cavitation operation (D), return oil pressure (F) is higher than low pressure oil (G). Return oil pressure forces poppet to open and return flow is routed to the function to prevent cavitation.

OUT3035,000001E –19–25APR06–1/1

Travel Flow Combiner Valve Circuit Operation



TX1042338

Travel and Arm In Functions

Continued on next page

MM61211,0001531 –19–15MAY08–1/3

15—Pump 1
16—Pump 2
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
85—Main Relief and Power Digging Valve
88—Check Valve—Travel Flow Combiner Valve Circuit
89—Travel Flow Combiner Valve
90—Right Travel Spool
94—Bucket Spool
107—Arm 2 Spool
118—Arm 1 Spool
140—Left Travel Spool
142—Check Valve (lift check)—Bucket
143—Orifice—Bucket Power Passage
157—Left Travel Motor
159—Right Travel Motor
169—Arm Cylinder
180—Supply Oil
182—Pilot Oil
184—Return Oil

When travel only is actuated, supply oil (180) from pump 2 (16) flows through the neutral passage of arm 1 (118), boom 2, and auxiliary spools, then through the left travel spool (140) and out to the left travel motor (157). Supply oil from pump 1 (15) flows through the right travel spool (90) and out to the right travel motor (159). Right travel spool blocks the flow of supply oil through the neutral passage of bucket (94), boom 1, and arm 2.

When dig functions are actuated at the same time as travel, the travel flow combiner valve (89) is shifted by pilot oil from the travel flow combiner pilot valve (port SL) in the pilot signal manifold. See Pilot Signal Manifold Operation for operation of pilot valves. (Group 9025-05.)

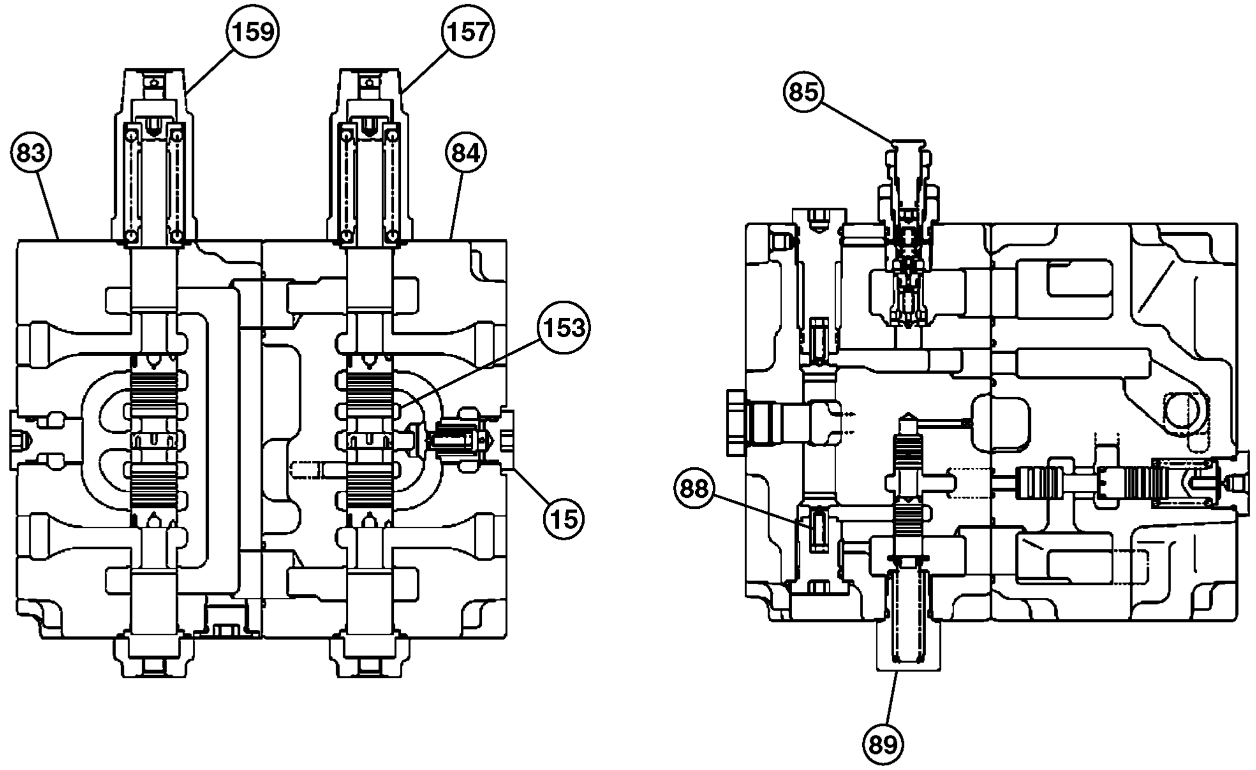
Supply oil (180) from pump 1 (15) flows to right travel spool and now through the travel flow combiner valve to the left travel spool and bucket spool (90). Supply oil flow from pump 1 to both left and right travel motors prevents mistracking.

When travel is not actuated, return oil and spring force keep the travel flow combiner valve closed.

Supply oil from pump 2 (16) is used for the swing, arm, and boom functions and, when connected, the auxiliary function.

Continued on next page

MM61211,0001531 –19–15MAY08–2/3



TX1006626 –UN–19APR06

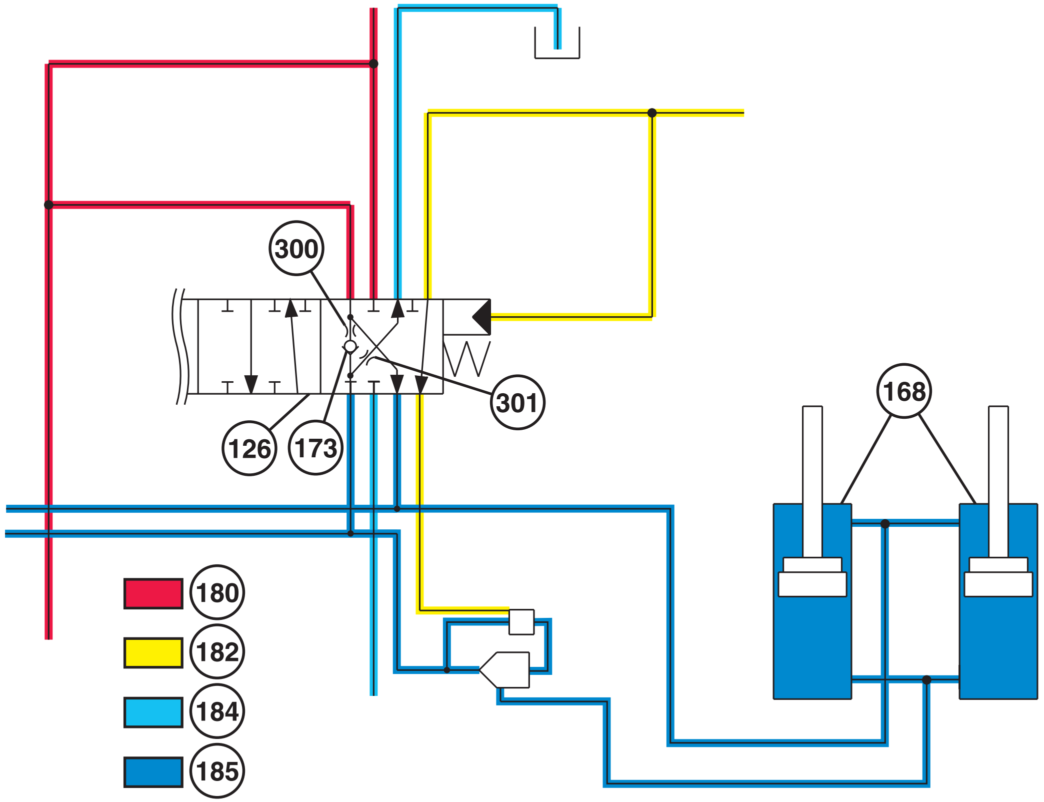
TX1006626

Travel Flow Combiner Valve and Check Valve

15—From Pump 1 (4-spool)	**85—Main Relief and Power Digging Valve**	**89—Travel Flow Combiner Valve**	**157—Left Travel Motor**
83—Right Control Valve (4-spool)	**88—Check Valve—Travel Flow Combiner Valve Passage**	**153—To Left Travel Spool By Combiner Passage**	**159—Right Travel Motor**
84—Left Control Valve (5-spool)			

MM61211,0001531 –19–15MAY08–3/3

Boom Regenerative Valve Circuit Operation



TX1006647

TX1006647 –UN–20APR06

Boom Regenerative Valve Circuit Schematic

126—Boom 2 Spool
168—Boom Cylinder (2 used)
173—Regenerative Valve
180—Supply Oil
182—Pilot Oil
184—Return Oil
185—Regenerative Oil
300—Orifice
301—Orifice

The boom regenerative valve (173) is located inside the boom 2 spool (126). The boom regenerative valve improves boom control and prevents boom cylinder cavitation during boom down operation.

Under the following operating conditions, low delivery pressure from pump 2 and pilot oil pressure to the pilot cap for boom down, the weight of boom, arm, and bucket causes the boom to lower faster than the pump can supply oil to the boom cylinder rod end.

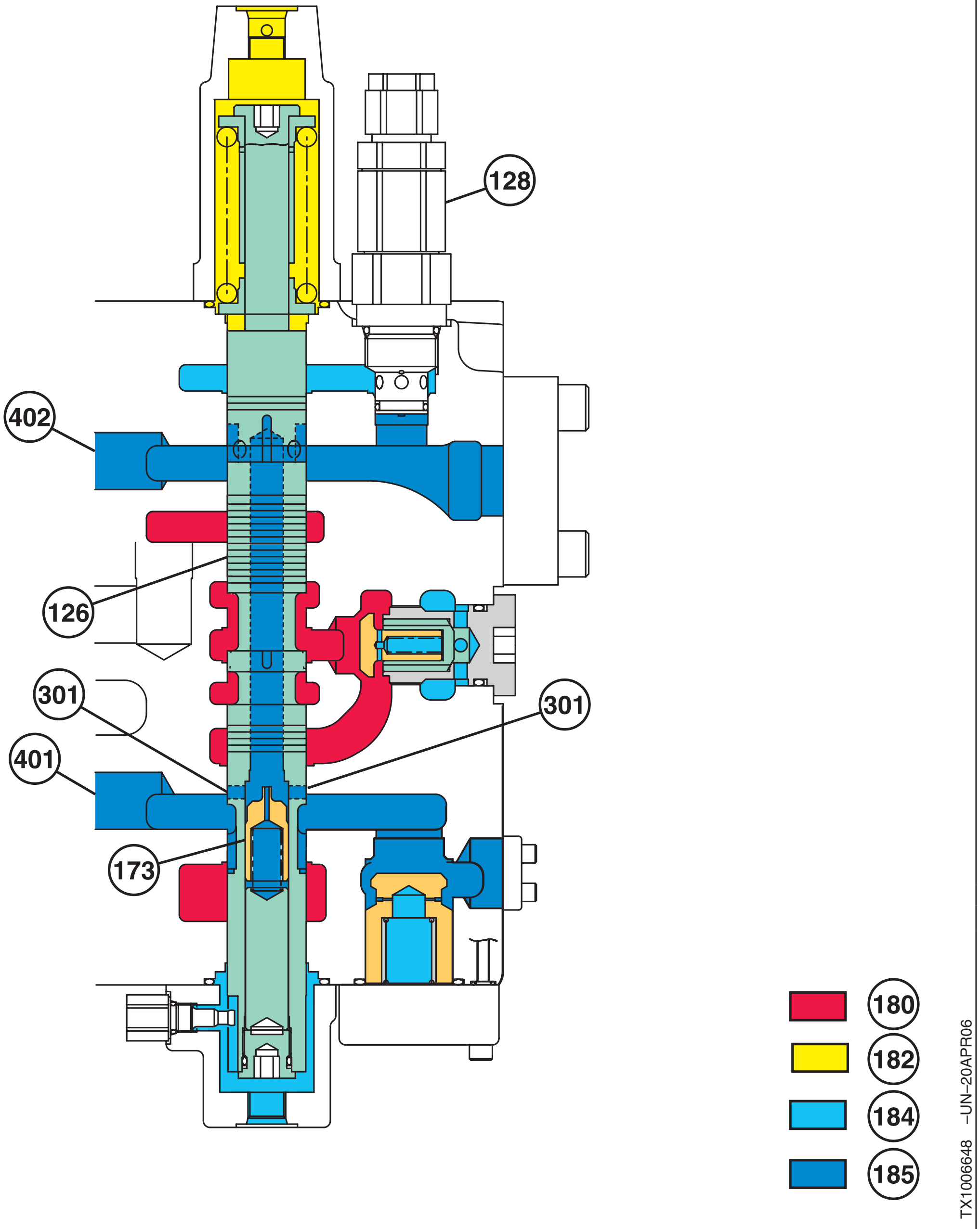
Boom down pilot oil shifts the boom 2 spool to the lower position. Oil can then flow from the head end of the boom cylinders to the boom 2 spool. At the boom 2 spool, oil flows to the boom regenerative valve (173).

When regenerative return oil (185) pressure is more than pump 2 supply oil (180) pressure, the boom regenerative valve is open. Regenerative return oil is combined with pump 2 supply oil and both are supplied to the boom cylinders rod end.

When pump 2 supply oil pressure is more than regenerative return oil pressure, the boom regenerative valve is closed. Pump 1 supply oil only flows to the boom cylinders rod end. Regenerative return oil passes through an orifice (301) and on to the oil tank.

Continued on next page

MM61211,0001532 –19–24APR06–1/2



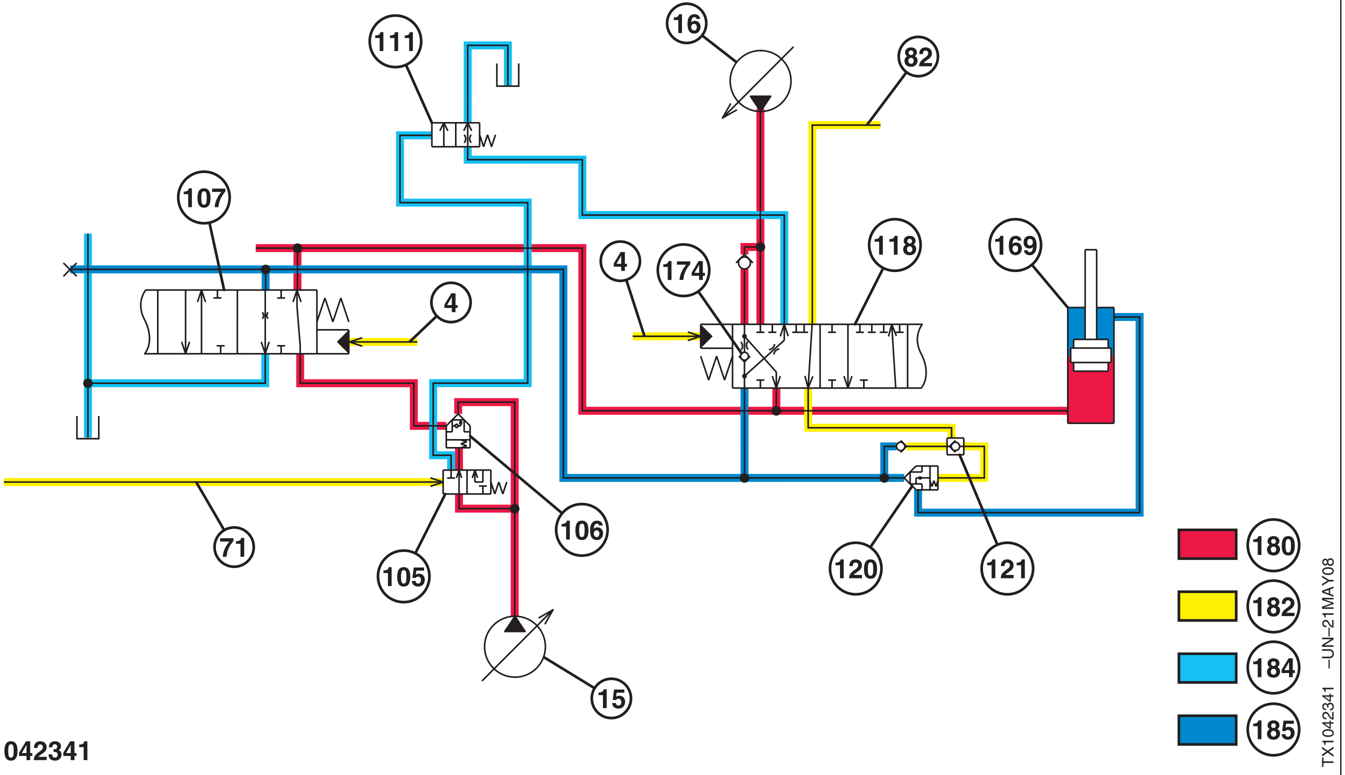
TX1006648

Boom Regenerative Valve Section

126—Boom 2 Spool
128—Boom Mode Relief Valve
173—Boom Regenerative Valve
180—Supply Oil
182—Pilot Oil
184—Return Oil
185—Regenerative Return Oil
301—Orifice
401—To Boom Cylinder Head End
402—To Boom Cylinder Rod End

MM61211,0001532 –19–24APR06–2/2

Arm Regenerative Valve Circuit Operation



TX1042341

Arm Regenerative Circuit Schematic

4—From Arm In Pilot Valve
15—Pump 1
16—Pump 2
71—From Arm 2 Flow Rate Pilot Valve (port SK)
82—From Pilot Check Valve Manifold (port B)
105—Arm 2 Flow Rate Switch Valve
106—Arm 2 Flow Rate Poppet Valve
107—Arm 2 Spool
111—Arm Regenerative Switch Valve
118—Arm 1 Spool
120—Arm Reduced Leakage Check Valve
121—Arm Reduced Leakage Switch Valve
169—Arm Cylinder
174—Arm 1 Regenerative Check Valve
180—Supply Oil
182—Pilot Oil
184—Return Oil
185—Regenerative Oil

The arm regenerative valve improves arm control and increases cylinder speed during arm in operation by combining the regenerative oil (185) (high-pressure return oil) from arm cylinder rod end with the pump supply oil (180) flowing to the arm cylinder head end.

Pilot oil pressure from the arm in pilot valve (4) shifts the arm 1 spool (118) and arm 2 spool (107). The arm 2 flow rate switch valve (105) is actuated by pilot oil pressure from arm 2 flow rate pilot valve (port SK) (71). With the arm 2 flow rate switch valve shifted, the arm 2 flow rate poppet valve (106) is closed and supply oil from pump 1 (15) is blocked from flowing to the arm 2 spool.

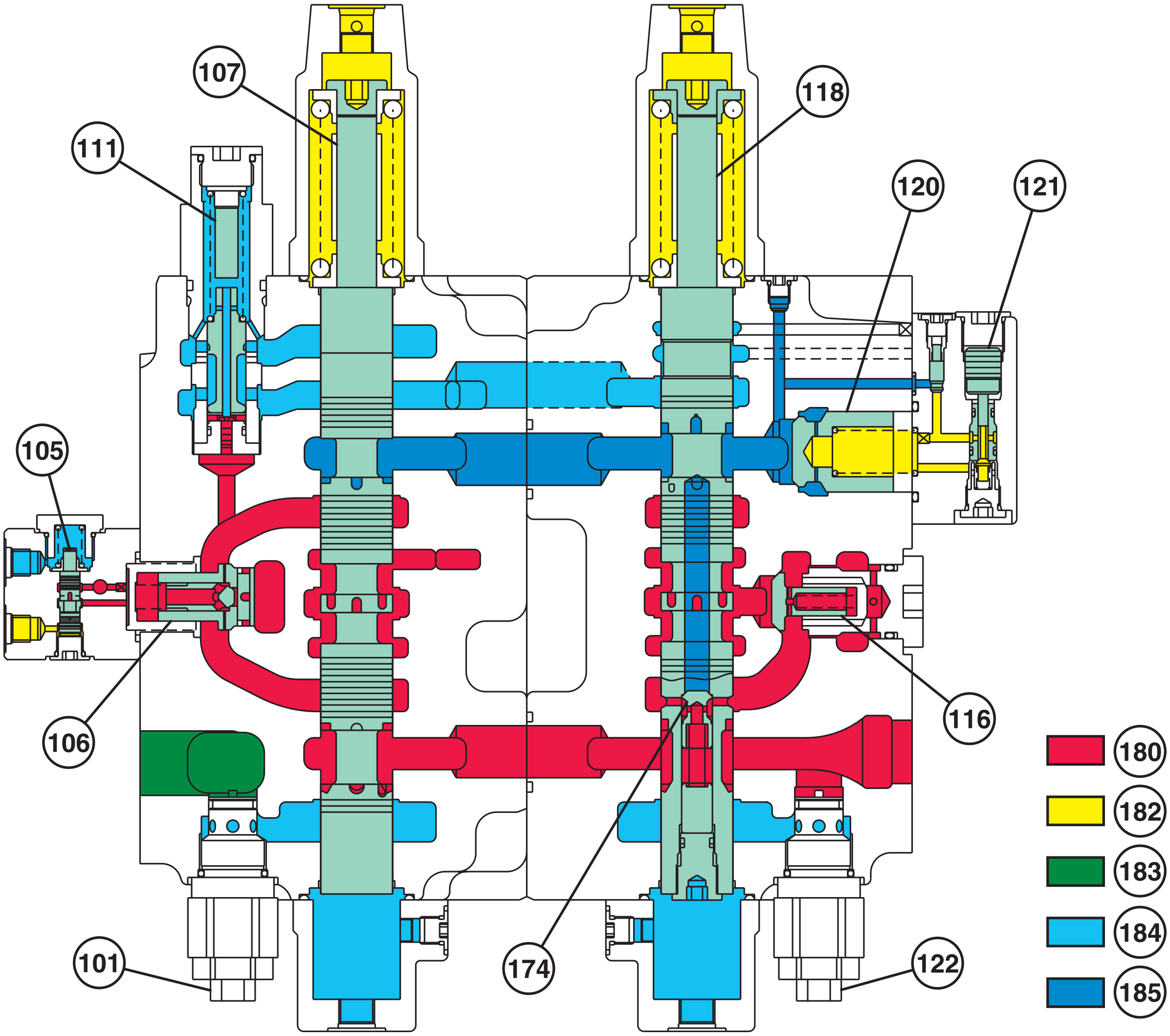
With the arm 1 spool shifted completely to the right, pilot oil from pilot check valve manifold (port B) (82) is allowed to shift the arm reduced leakage switch valve (121). This pilot oil then enters the spring side of arm reduced leakage check valve (120), where the pilot oil pressure plus the spring pressure hold the arm reduced leakage check valve closed.

With the weight of the arm helping to push the return oil out of the arm cylinder, the oil pressure in the rod end increases. This return oil then flows back through the arm 1 spool to the arm regenerative switch valve (111), where it is allowed to return to the tank.

Continued on next page

If the arm cylinder return oil pressure becomes higher than the pump 2 supply oil pressure, the arm 1 regenerative check valve (174) will open, allowing the regenerative oil to combine with the pump 2 (16) supply oil. This regenerative charged supply oil is then sent to the head end of the arm cylinder, increasing the cylinder speed.

OUO1020,0001554 –19–15MAY08–2/3



Arm Spool Valve Cross Section—Regenerative Operation

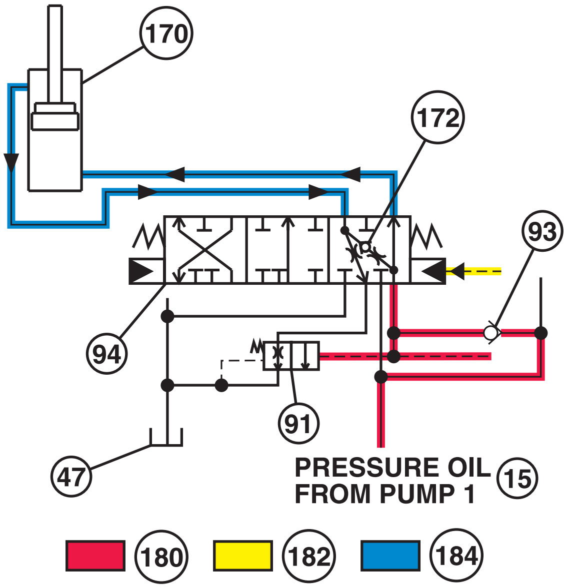
101—Boom Up Circuit Relief and Anticavitation Valve
105—Arm 2 Flow Rate Switch Valve
106—Arm 2 Flow Rate Poppet Valve
107—Arm 2 Spool
111—Arm Regenerative Switch Valve
116—Power Passage Check Valve (arm in function lift check)
118—Arm 1 Spool
120—Arm Reduced Leakage Check Valve
121—Arm Reduced Leakage Switch Valve
122—Arm In Circuit Relief and Anticavitation Valve
174—Regenerative Check Valve
180—Supply Oil
182—Pilot Oil
183—Trapped Oil
184—Return Oil
185—Regenerative Oil

OUO1020,0001554 –19–15MAY08–3/3

Bucket Regenerative Valve Circuit Operation

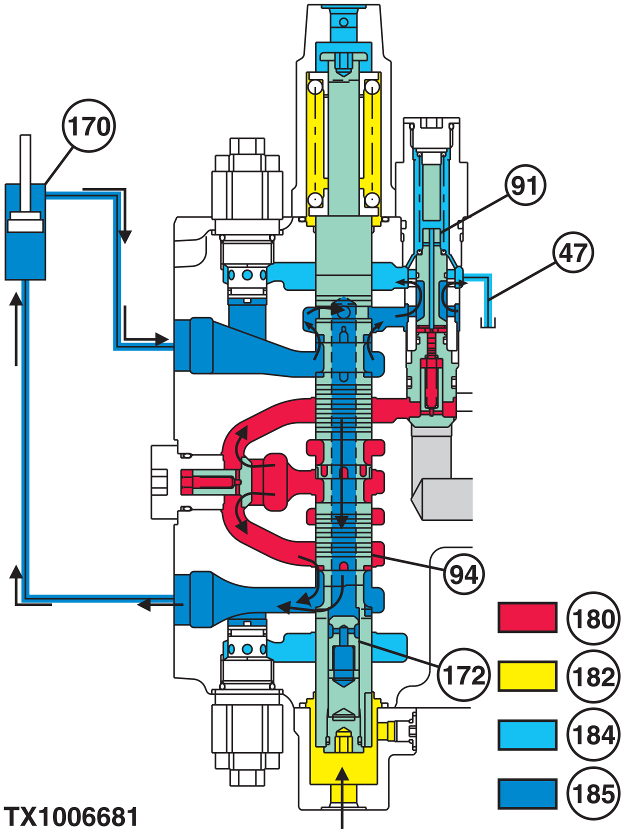
During bucket digging operation, return oil (184) from the bucket cylinder (170) flows to the hydraulic oil tank (47). Return oil (184) from the bucket cylinder (170) enters the spool (94) and acts on the bucket regenerative check valve (172) inside the spool (94). When digging operation is done with the bucket rolled-out, the bucket moves faster as compared with supply oil (180) from the pump (15). Therefore, pressure in the circuit between pump (15) and bottom of the bucket cylinder (170) decreases. When pressure in the bottom of bucket cylinder becomes lower than that of the top side, the bucket regenerative check valve (172) opens. Therefore, regenerative return oil (185) from the top of the bucket cylinder (170) flows to the bottom side of the bucket cylinder and is combined with supply oil (180) from the pump (15). Consequently, the regenerative operation is done and speed of the cylinder increases.

15—From Pump 1
47—Hydraulic Oil Tank
91—Bucket Regenerative Switch Valve
93—Power Passage Check Valve (bucket lift check)
94—Bucket Spool
170—Bucket Cylinder
172—Bucket Regenerative Valve
180—Supply Oil
182—Pilot Oil
184—Return or Pressure-Free Oil
185—Regenerative Return Oil



TX1006656

TX1006656 –19–19APR06



TX1006681

TX1006681 –UN–20APR06

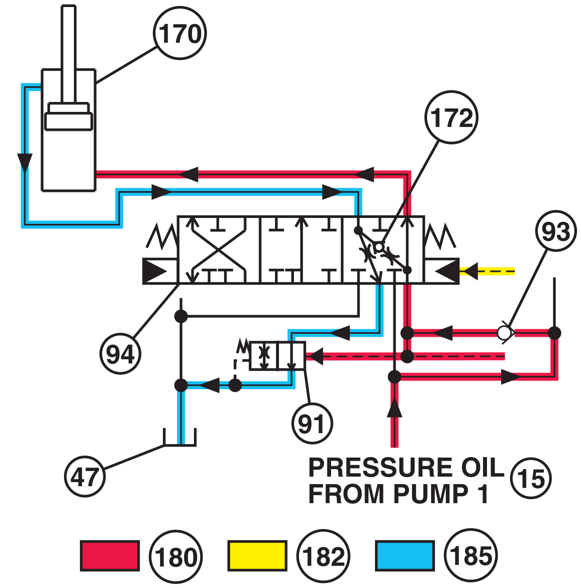
During Regenerative Operation

Continued on next page

LD30992,0000261 –19–26APR06–1/2

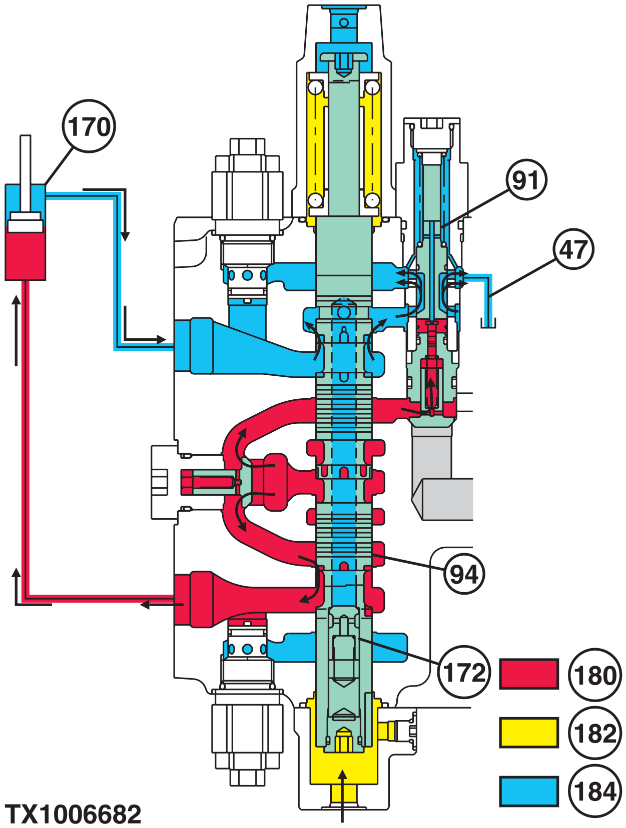
During Normal Operation—The bucket regenerative check valve (172) is closed and the regenerative operation stops. As pressure increases in the bottom side of the bucket cylinder (170), the piston of the bucket regenerative switch valve (91) pushes a plunger. As speed of the bucket cylinder increases, the amount of return oil (184) flow is determined from the top side of the bucket cylinder to the hydraulic oil tank (47).

15—From Pump 1
47—Hydraulic Oil Tank
91—Bucket Regenerative Switch Valve
93—Power Passage Check Valve (bucket lift check)
94—Bucket Spool
170—Bucket Cylinder
172—Bucket Regenerative Valve
180—Supply Oil
182—Pilot Oil
184—Return or Pressure-Free Oil
185—Regenerative Return Oil



TX1006657

TX1006657 –19–19APR06



TX1006682

TX1006682 –UN–20APR06

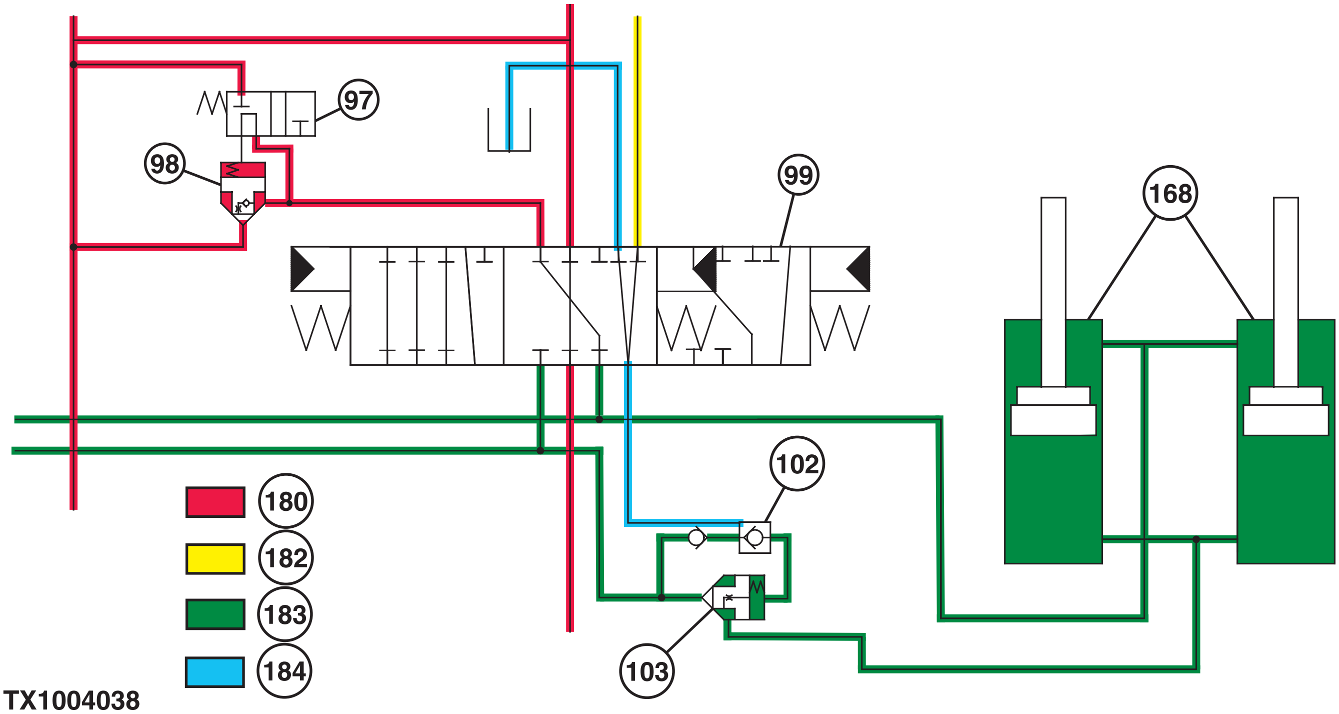
During Normal Operation

LD30992,0000261 –19–26APR06–2/2

Boom and Arm Reduced Leakage Valves Operation

Reduced leakage valves are used in the boom head end circuit and arm rod end circuit. The function of a reduced leakage valve is to reduce cylinder drift by stopping leakage from the cylinder back through the control valve.

LD30992,0000262 –19–26APR06–1/5



TX1004038

TX1004038 –UN–03MAR06

Neutral Schematic

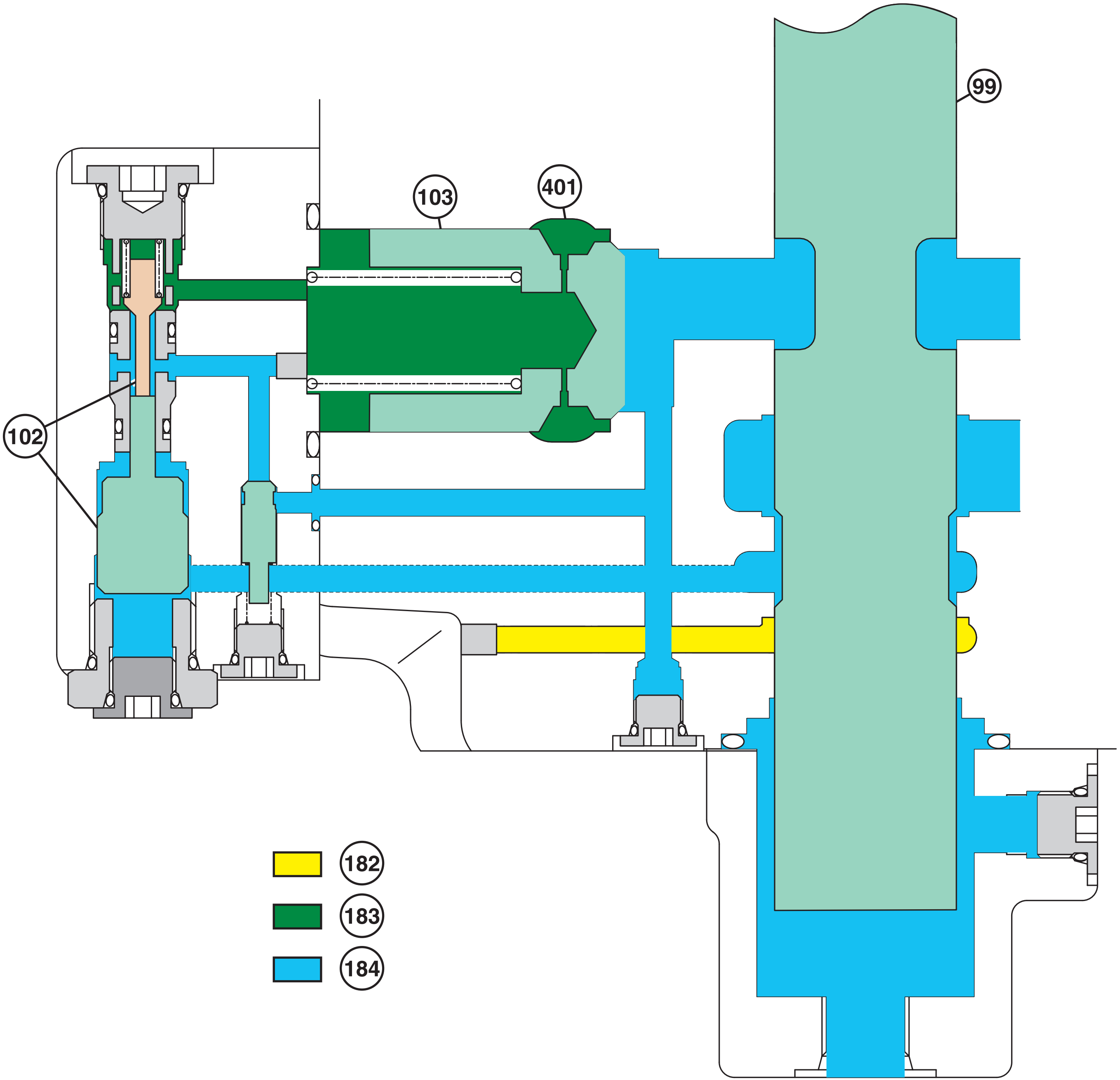
97—Boom Flow Rate Control Valve—Switch Valve
98—Boom Flow Rate Control Valve—Poppet Valve
99—Boom 1 Spool
102—Boom 1 Reduced Leakage Valve—Switch Valve
103—Boom 1 Reduced Leakage Valve—Poppet Valve
168—Boom Cylinder (2 used)
180—Supply Oil
182—Pilot Oil
183—Trapped Oil
184—Return Oil

NOTE: The operational principles of the boom and arm reduced leakage valves are identical. Therefore, boom reduced leakage valve operation is used as an example.

Neutral Position—When the control valve is in neutral, the oil pressure generated by the load on the cylinders is applied to the spring end of boom reduced leakage valve—poppet valve (102) through the boom reduced leakage valve—switch valve (102). The check valve is held closed against the seat in housing, trapping the oil from the cylinders at the work port.

Continued on next page

LD30992,0000262 –19–26APR06–2/5



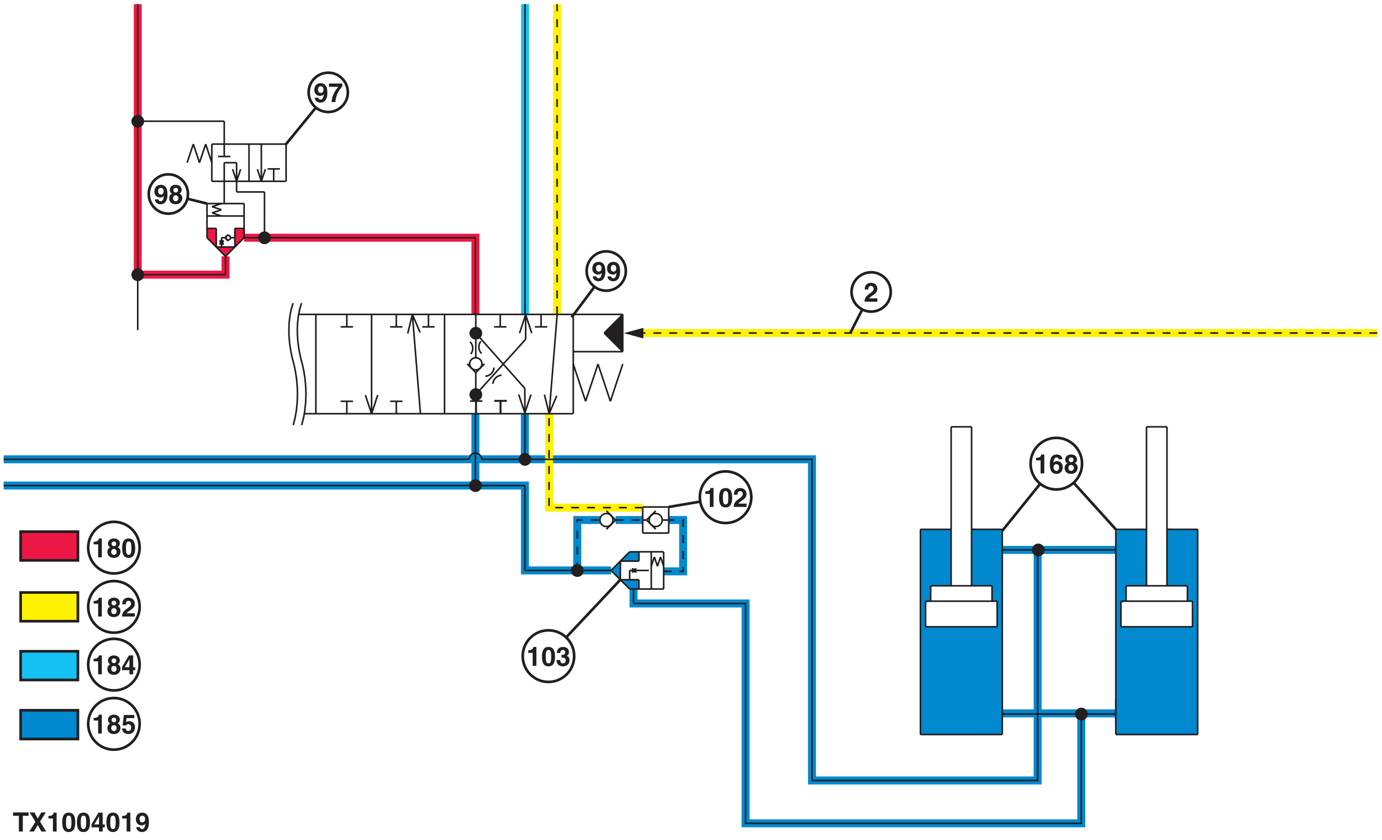
TX1004098

TX1004098 –UN–03MAR06

Neutral Section

99—Boom 1 Spool
102—Boom 1 Reduced Leakage Valve—Switch Valve
103—Boom 1 Reduced Leakage Valve—Poppet Valve
182—Pilot Oil
183—Trapped Oil
184—Return Oil
401—From Boom Cylinder Head End

Continued on next page

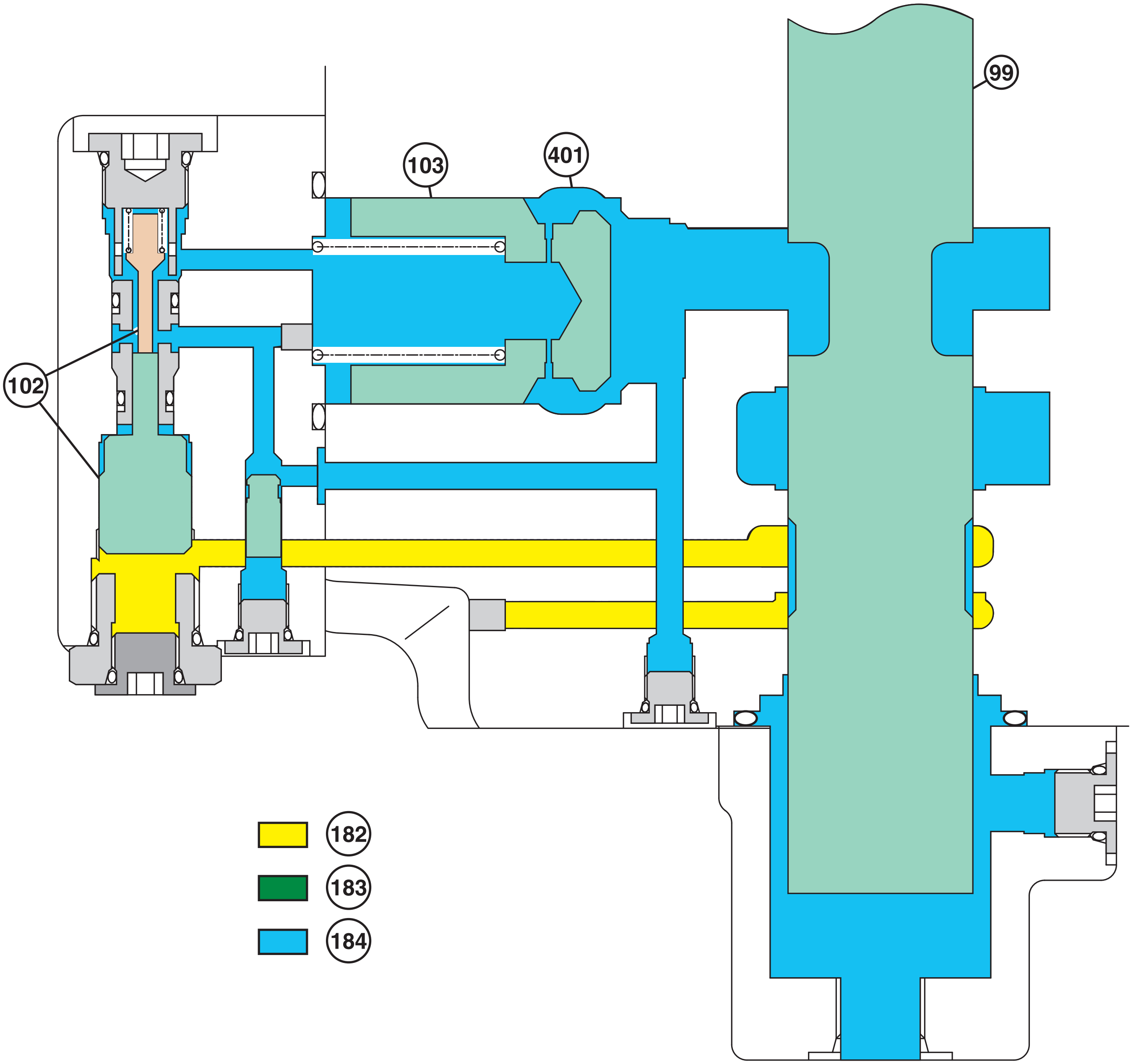


Boom Down Schematic

97—Boom Flow Rate Control Valve—Switch Valve
98—Boom Flow Rate Control Valve—Poppet Valve
99—Boom 1 Spool
102—Boom 1 Reduced Leakage Valve—Switch Valve
103—Boom 1 Reduced Leakage Valve—Poppet Valve
168—Boom Cylinder (2 used)
180—Supply Oil
182—Pilot Oil
183—Trapped Oil
184—Return Oil

Boom Down Position—When a function is actuated, the boom 1 spool (99) allows pilot oil to shift the boom 1 reduced leakage valve—switch valve (102). The switch valve allows oil on the spring side of the boom 1 reduced leakage valve—poppet valve (103) to flow to return oil. The poppet valve opens allowing oil from the boom cylinder head end (401) to flow past the boom 1 spool to return oil (184).

Continued on next page



TX1004099 –UN–03MAR06

TX1004099

Boom Down Section

99—Boom 1 Spool
102—Boom 1 Reduced Leakage Valve—Switch Valve
103—Boom 1 Reduced Leakage Valve—Poppet Valve
182—Pilot Oil
183—Trapped Oil
184—Return Oil
401—From Boom Cylinder Head End

LD30992,0000262 –19–26APR06–5/5

Boom Flow Rate Circuit Operation

The boom flow rate control valve restricts oil flow rate in the circuit during combined operations, and will give priority to other actuators.

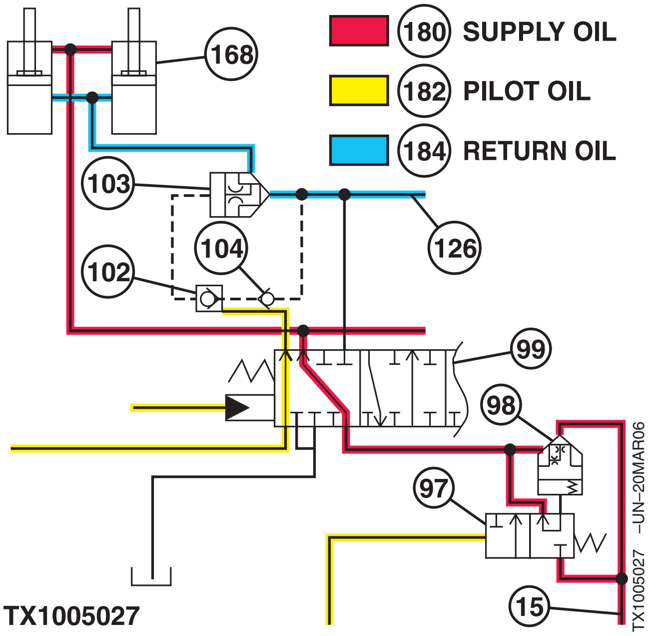
Each flow rate control valve is operated during a combined operation as shown.

Flow Rate Control Valve	Combined Operation
Boom	Boom Lower (operation with the front attachment above ground [high pressure at the bottom side])
Arm	Boom Raise and Arm Roll-In

LD30992,0000263 –19–26APR06–1/7

Flow Rate Control Valve Normal Operation—High pressure supply oil (180) flows to the 4-spool side of the parallel circuit from pump 1, (15) and is split into two directions. One direction high pressure supply oil (180) acts on the check valve in the boom flow rate control valve—poppet valve (98). In the other direction high pressure supply oil (180) pushes to open the check valve in the boom flow rate control valve—switch valve (97).

High pressure supply oil from pump 1, (15) is blocked at the boom flow rate control valve—switch valve (97) when kept closed, which will push the check valve in the boom flow rate control valve—poppet valve (98) open to allow high pressure supply oil (180) flow to boom 1 spool (99).



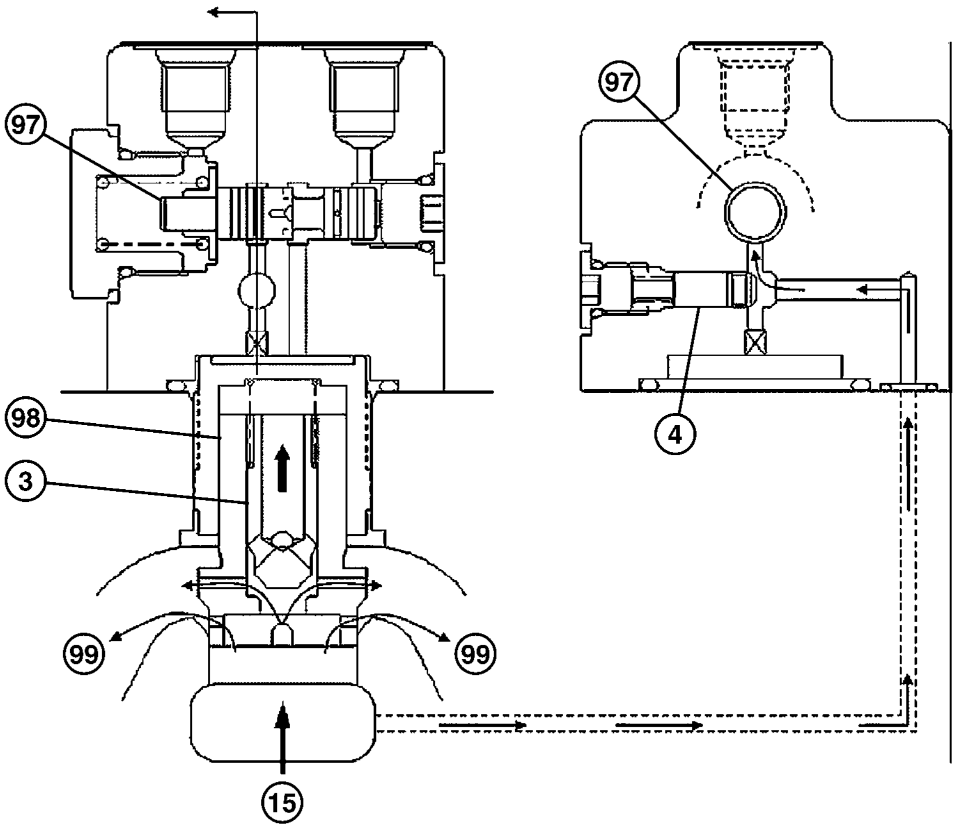
TX1005027

Flow Rate Control Valve Normal Operation

15—From Pump 1
97—Boom Flow Rate Control Valve—Switch Valve
98—Boom Flow Rate Control Valve—Poppet Valve
99—Boom 1 Spool
102—Boom Reduced Leakage Valve—Switch Valve
103—Boom Reduced Leakage Valve—Check Valve
104—Check Valve
126—To Boom 2 Spool
168—Boom Cylinder (2 used)
180—Supply Oil
182—Pilot Oil
184—Return or Pressure-Free Oil

Continued on next page

LD30992,0000263 –19–26APR06–2/7



TX1005054

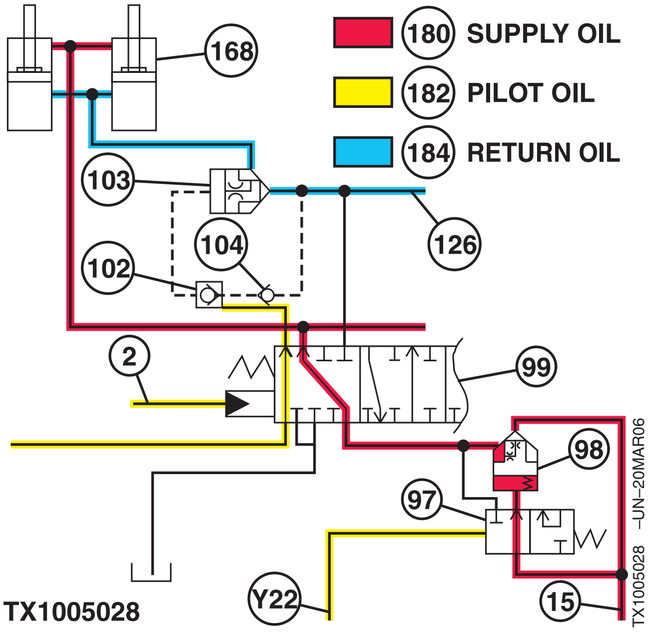
Normal Valve Operation

TX1005054 –UN–21MAR06

Continued on next page

LD30992,0000263 –19–26APR06–3/7

Flow Rate Control Valve Activated—Pilot oil (182) pressure from boom flow rate solenoid valve (Y22) will shift the boom flow rate control valve—switch valve (97). As high pressure supply oil (180) from pump 1 (15) pushes the piston in the boom flow rate control valve—poppet valve (98). Back pressure in the poppet valve increases and will force the valve closed, as a result the poppet valve restricts flow rate to boom 1 spool (99) and high pressure supply oil is supplied to other actuators that have higher load pressure.

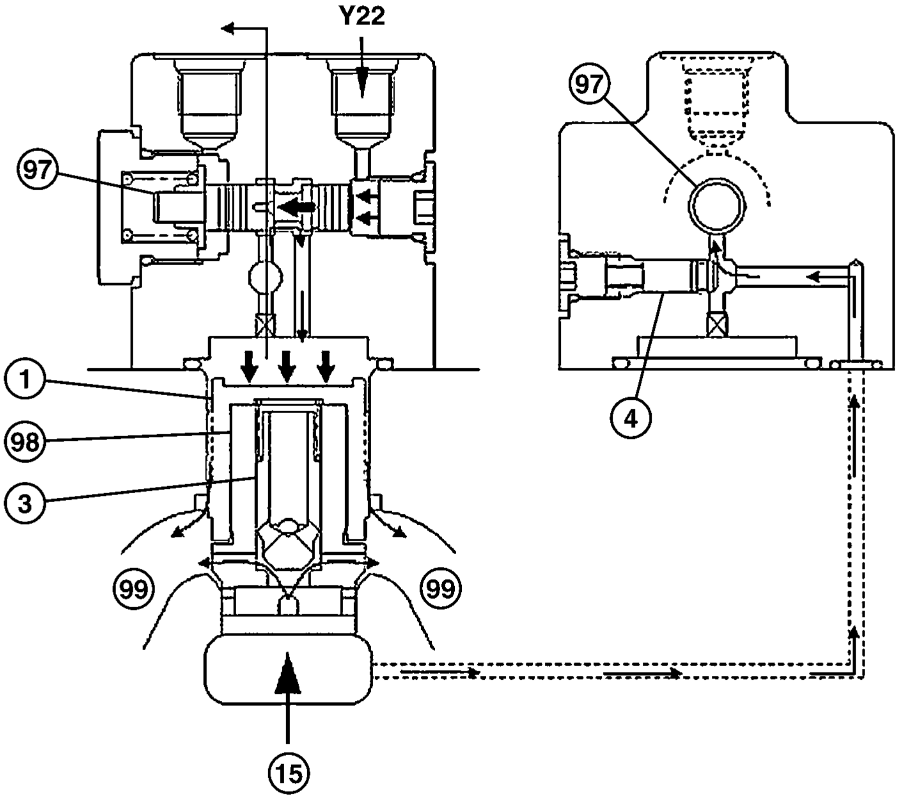


Flow Rate Control Valve Activated

Y22—From Boom Flow Rate Solenoid Valve
2—Boom Down
3—Poppet—Check Valve
4—Boom Flow Rate Control Valve—Check Valve
15—From Pump 1
97—Boom Flow Rate Control Valve—Switch Valve
98—Boom Flow Rate Control Valve—Poppet Valve
99—Boom 1 Spool
102—Boom Reduced Leakage Valve—Switch Valve
103—Boom Reduced Leakage Valve—Check Valve
104—Check Valve
126—To Boom 2 Spool
168—Boom Cylinder (2 used)
168—Boom Cylinder (2 used)
180—Supply Oil
182—Pilot Oil
184—Return or Pressure-Free Oil

Continued on next page

LD30992,0000263 –19–26APR06–4/7



TX1005055

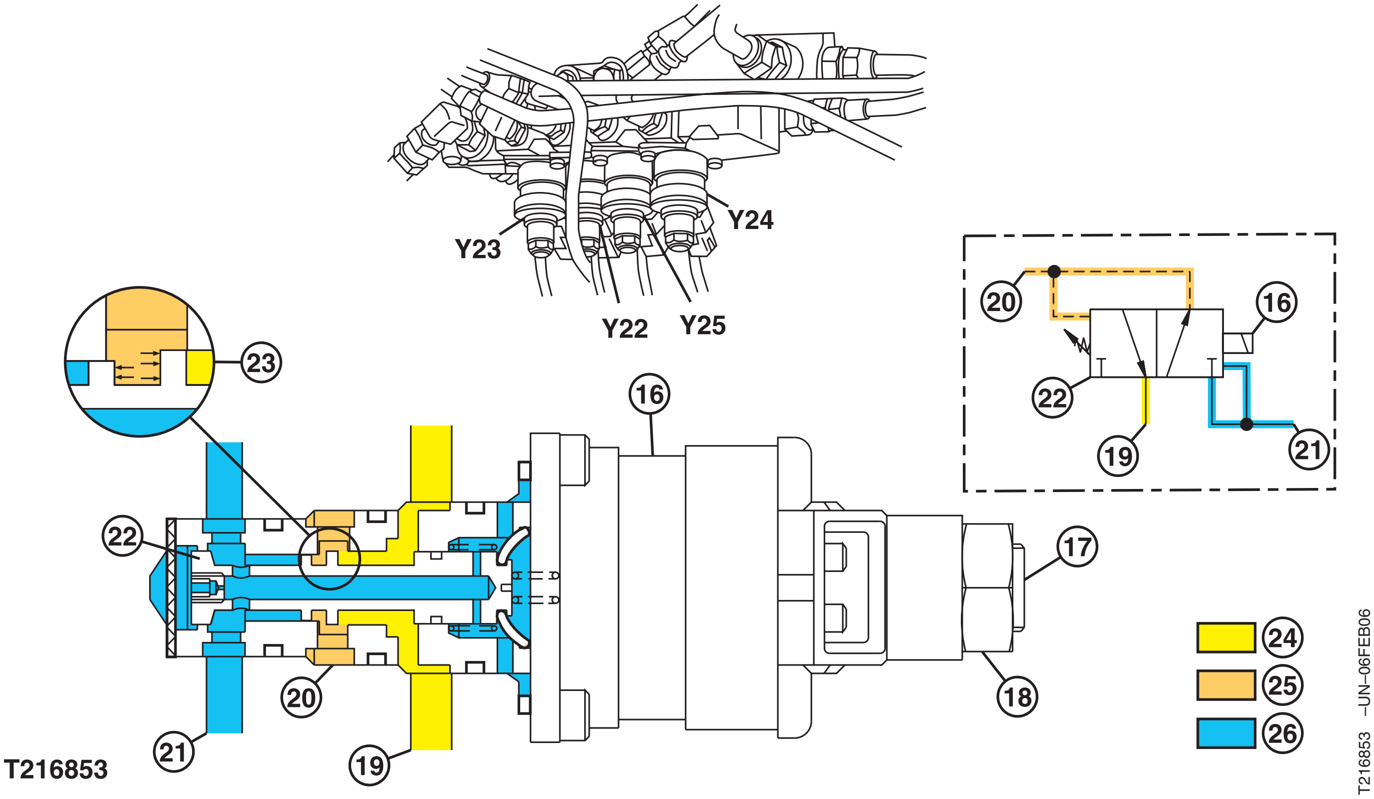
TX1005055 –UN–22MAR06

Flow Rate Control Valve Activated

Y22—From Boom Flow Rate Solenoid Valve
1—Poppet—Piston
3—Poppet—Check Valve
4—Boom Flow Rate Control Valve—Check Valve
15—From Pump 1
97—Boom Flow Rate Control Valve—Switch Valve
98—Boom Flow Rate Control Valve—Poppet Valve
99—To Boom 1 Spool

Continued on next page

LD30992,0000263 –19–26APR06–5/7



Boom Flow Rate Solenoid Valve, (port SF)

Y22—Boom Flow Rate Solenoid Valve, (port SF)
Y23—Boom Mode Solenoid Valve (port SC)
Y24—Power Digging Solenoid Valve (port SG)
Y25—Travel Speed Solenoid Valve (port SI)
16—Solenoid Coil
17—Adjusting Screw
18—Nut
19—From Pilot Shutoff Solenoid Valve
20—Boom Flow Rate Control Valve—Switch Valve
21—To Hydraulic Oil Tank
22—Spool
23—Pressure Equals Magnetic Force
24—Pilot Oil
25—Reduced Pilot Oil
26—Return Oil

Boom Flow Rate Solenoid Valve, (port SF) Operation— Boom flow rate solenoid valve (Y22) is a proportional solenoid valve type. The solenoid valve is activated by an electrical signal from the main controller (MCF). The electrical signal is DC voltage that is turned on and off to form a pulse-width modulated signal. Solenoid coil (16) reacts to the average voltage to create a magnetic force to shift the spool (22) left against a spring. When shifted left, reduced pilot oil (25) is sent to the boom flow rate control valve—switch valve (20). The pressure of reduced pilot oil is in proportion to the electrical signal to the solenoid coil.

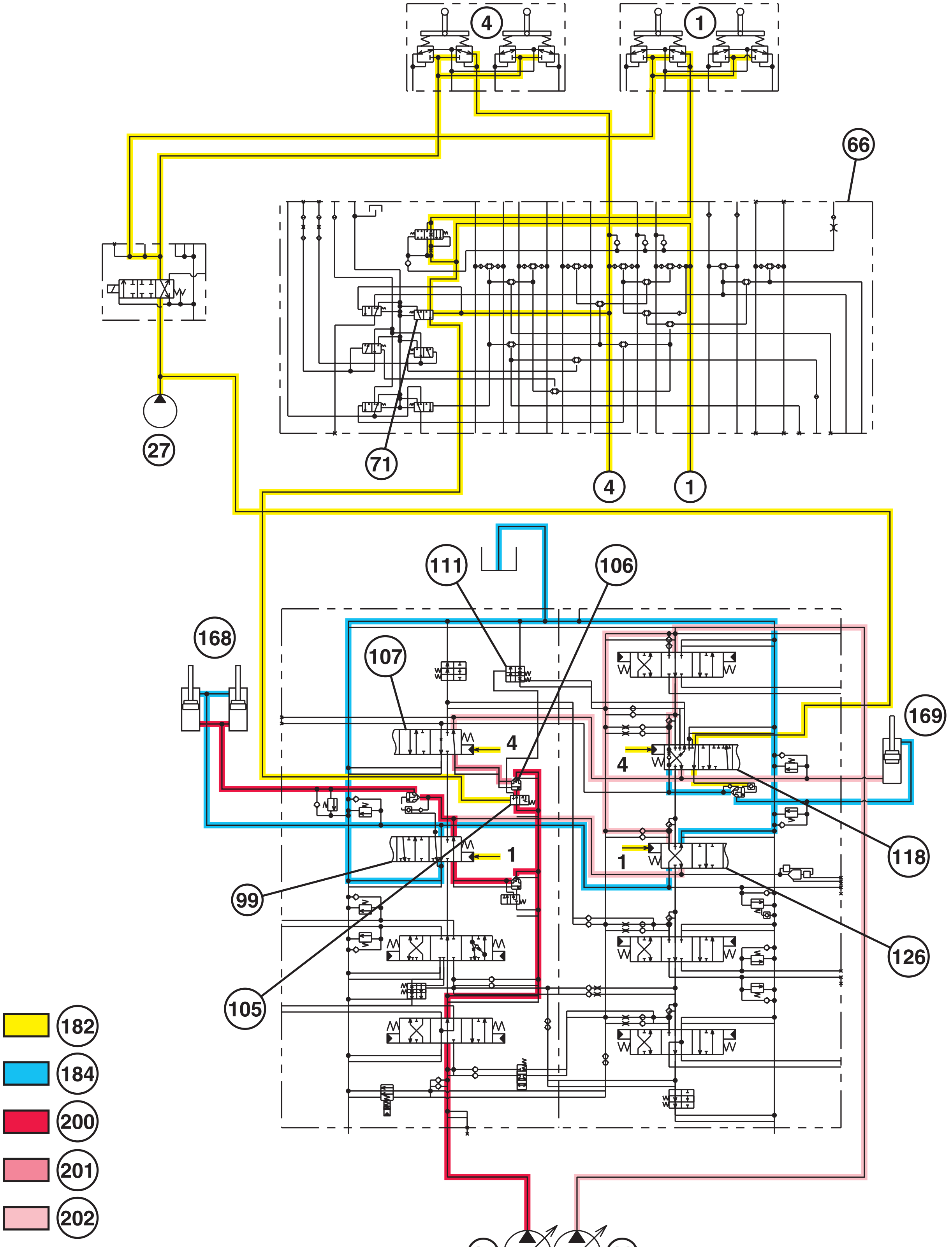
De-energized—When de-energized, the spool is pushed to the right by a spring. The boom flow rate control valve—switch valve is then connected to the hydraulic oil tank (21) through the spool.

Continued on next page

Energized—When energized, the magnetic force shifts the spool left against the spring. Pilot oil (24) flows past the spool flange and out the port as a reduced pilot oil to the boom flow rate control valve—switch valve (20). Because the flange on the right is larger than the flange on the left, the spool is pushed to the right against the magnetic force as the electrical signal to the solenoid increases. When the reduced pilot oil pressure becomes equal to or greater than the magnetic force (23), the spool is pushed to the right closing the passage. The reduced pilot oil to the boom flow rate control valve—switch valve is trapped. The spool is moving constantly to maintain the reduced pilot oil pressure in response to the electrical signal to the solenoid coil.

LD30992,0000263 –19–26APR06–7/7

Arm 2 Flow Rate Circuit Operation



TX1042339

Arm 2 Flow Rate Circuit Arm In/Boom Up Combined Operation

Continued on next page

1—Boom Up (pilot)
4—Arm In (pilot)
15—Pump 1
16—Pump 2
27—Pilot Pump
66—Pilot Signal Manifold
71—Arm 2 Flow Rate Pilot Valve (port SK)
99—Boom 1 Spool
105—Arm 2 Flow Rate Control Valve—Switch Valve
106—Arm 2 Flow Rate Control Valve—Poppet Valve
107—Arm 2 Spool
111—Arm Regenerative Valve—Switch Valve
118—Arm 1 Spool
126—Boom 2 Spool
168—Boom Cylinders
169—Arm Cylinder
182—Pilot Oil
184—Return Oil
200—Pump 1 Supply Oil
201—Reduced Flow Pump 1 Supply Oil
202—Pump 2 Supply Oil

Normal Operation—During normal operation, pump 1 supply oil (200) is routed to the boom 1 spool (99) and the arm 2 spool (107) through the 4-spool power circuit, and pump 2 supply oil (202) is routed to the arm 1 spool (118) and the boom 2 spool (126) through the 5-spool power circuit.

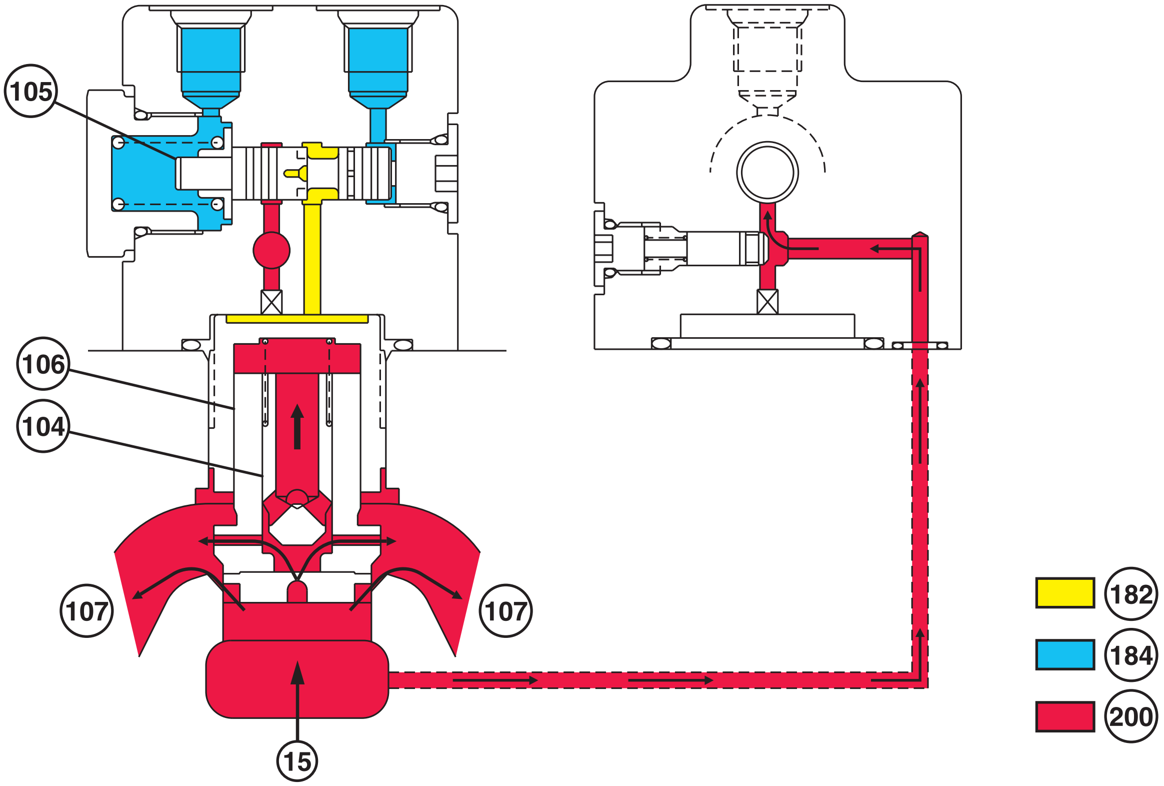
Combined Operation—During combined operation of boom up (1) and arm in (4), arm in pilot pressure shifts the arm 2 flow rate pilot valve (71), allowing boom up pilot oil to flow to, and shift, the arm 2 flow rate control valve—switch valve (105). For arm 2 flow rate pilot valve information, see Pilot Signal Manifold Operation. (Group 9025-05.)

With the switch valve shifted, the pump 1 supply oil (200) is routed to the back side of the arm 2 flow rate control valve—poppet valve (106), where it can push on the poppet valve reducing the flow of pump 1 supply oil (201) to the arm 2 spool (107). Consequently, more pump 1 supply oil is available to the boom 1 spool (99), allowing the boom up speed to be maintained.

During this combined operation the arm function will be maintained by the pump 2 supply oil (202) and the arm 1 spool regenerative circuit. See Regenerative Valve Circuit Operation. (Group 9025-05.)

Continued on next page

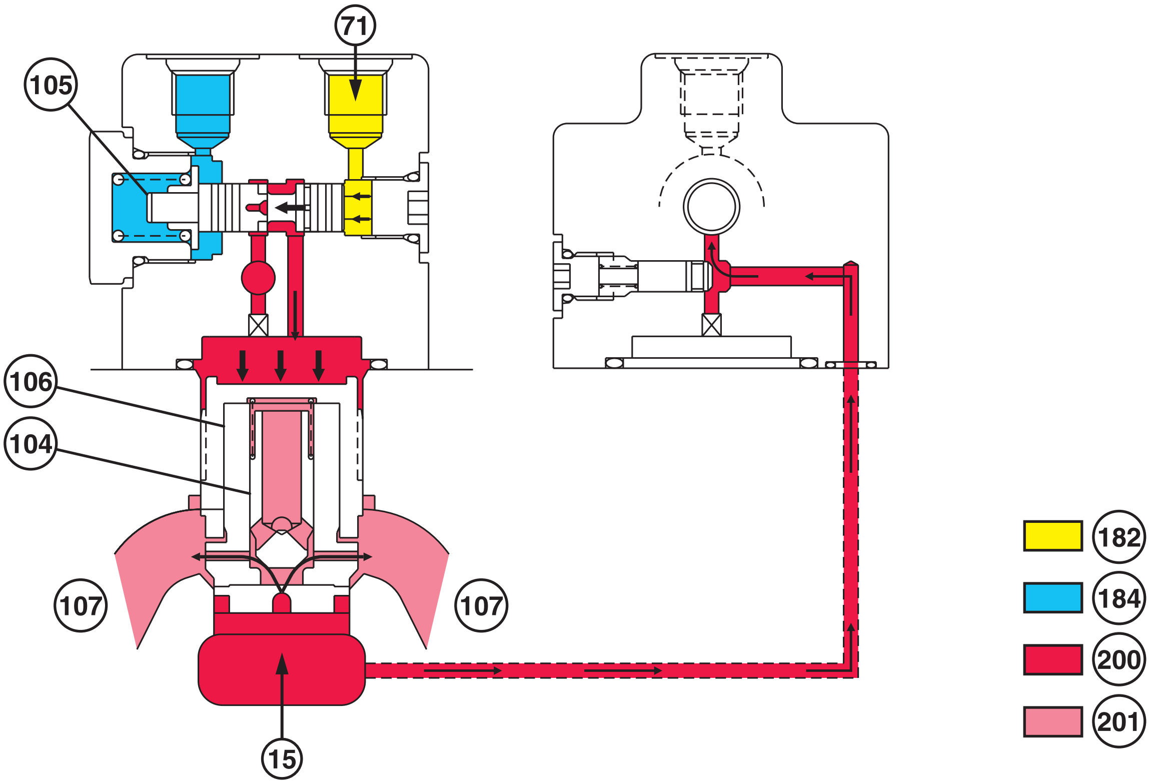
LD30992,0000259 –19–15MAY08–2/4



TX1007036

TX1007036 –UN–27APR06

Arm 2 Flow Rate Control Valve—Normal Operation



TX1007037

TX1007037 –UN–27APR06

Arm 2 Flow Rate Control Valve—Flow Rate Control Operation

Continued on next page

15—From Pump 1
71—From Arm 2 Flow Rate Pilot Valve (port SK)
104—Arm 2 Flow Rate Control Valve—Check Valve
105—Arm 2 Flow Rate Control Valve—Switch Valve
106—Arm 2 Flow Rate Control Valve—Poppet Valve
107—To Arm 2 Spool
182—Pilot Oil
184—Return Oil
200—Pump 1 Supply Oil
201—Reduced Flow Pump 1 Supply Oil

LD30992,0000259 –19–15MAY08–4/4

Boom Mode Circuit Operation

Information not available at the time of release.

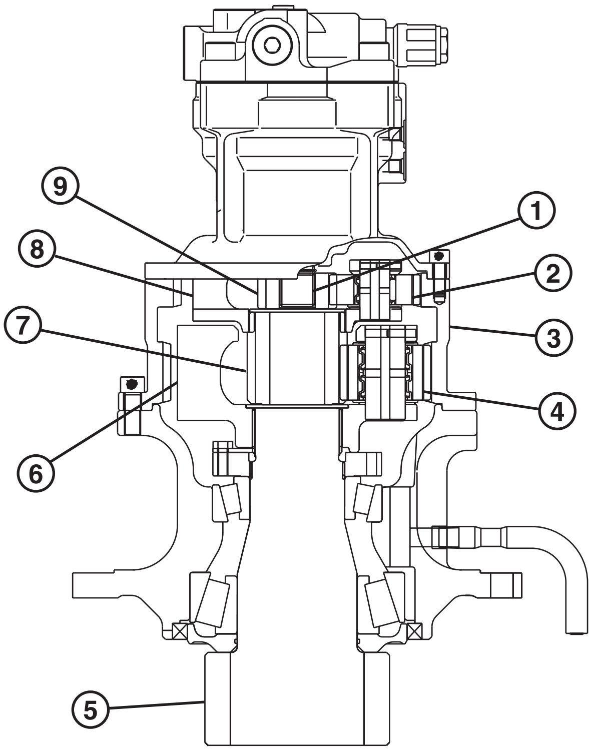
LD30992,0000264 –19–08JUN06–1/1

Counterweight Removal Circuit Operation

For information on Counterweight Removal Circuit, see Main Relief and Power Digging Valve Circuit Operation (9025-05).

OUT3035,0000021 –19–26APR06–1/1

Swing Gearbox Operation



T153004

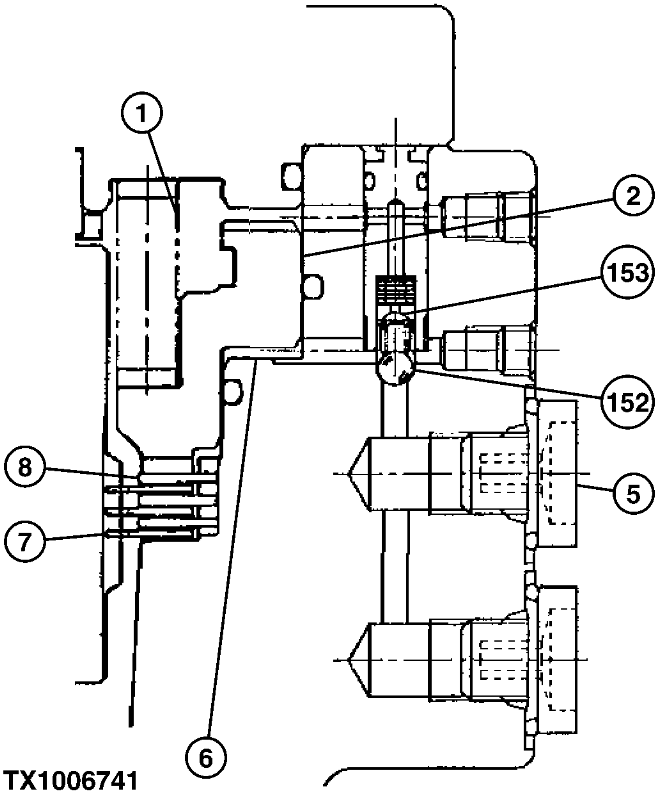
Swing Gearbox

1—Swing Motor Shaft
2—First Stage Planet Gear
3—Ring Gear
4—Second Stage Planet Gear
5—Shaft
6—Second Stage Carrier
7—Second Stage Sun Gear
8—First Stage Carrier
9—First Stage Sun Gear

Swing Gearbox Operation—The swing gearbox is a two stage reduction planetary gear type. The ring gear (3) is formed on the internal surface of the housing so that they are integrated. Because the housing is bolted on the upperstructure, the ring gear doesn't rotate. The swing motor shaft (1) rotates the first stage sun gear (9). Its torque is transmitted to the second stage sun gear (7) via the first stage planet gears (2) and first stage carrier (8). The second stage sun gear rotates the shaft (5) via the second stage planet gears (4) and second stage carrier (6). The shaft meshes with the swing bearing internal gear secured to the undercarriage, causing the upperstructure to rotate.

LD30992,0000265 –19–23FEB06–1/1

Swing Motor and Park Brake Circuit Operation



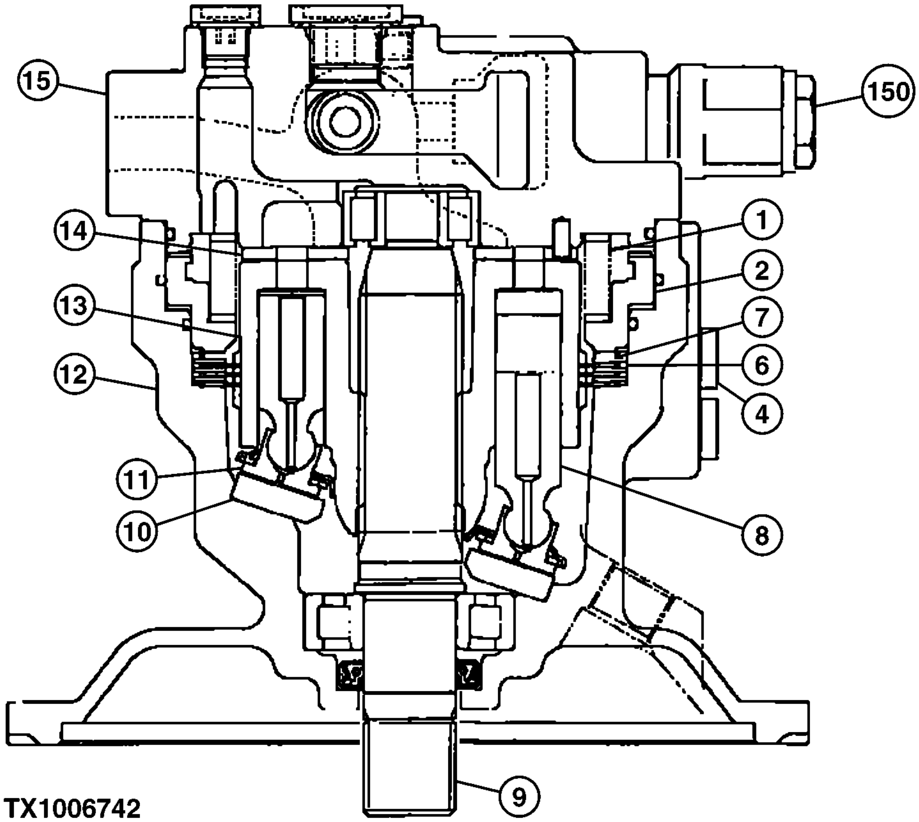
TX1006741 –UN–25APR06

1—Spring
2—Brake Piston
5—Port SH (brake release pressure)
6—Brake Piston-Chamber
7—Plate
8—Friction Plate
152—Check Valve
153—Orifice

The swing motor park brake—The swing motor park brake is a wet-type multi-disc brake system.

The brake is released when brake release pressure enters into the brake piston chamber (6) (negative brake type). Brake release pressure is supplied from the pilot pump during a front attachment and/or swing operation. During operations other than swing and/or front attachment or while the engine is stopped, brake release pressure is returned to the hydraulic oil tank so that the brake is automatically applied by spring.

Continued on next page



TX1006742

TX1006742 –UN–25APR06

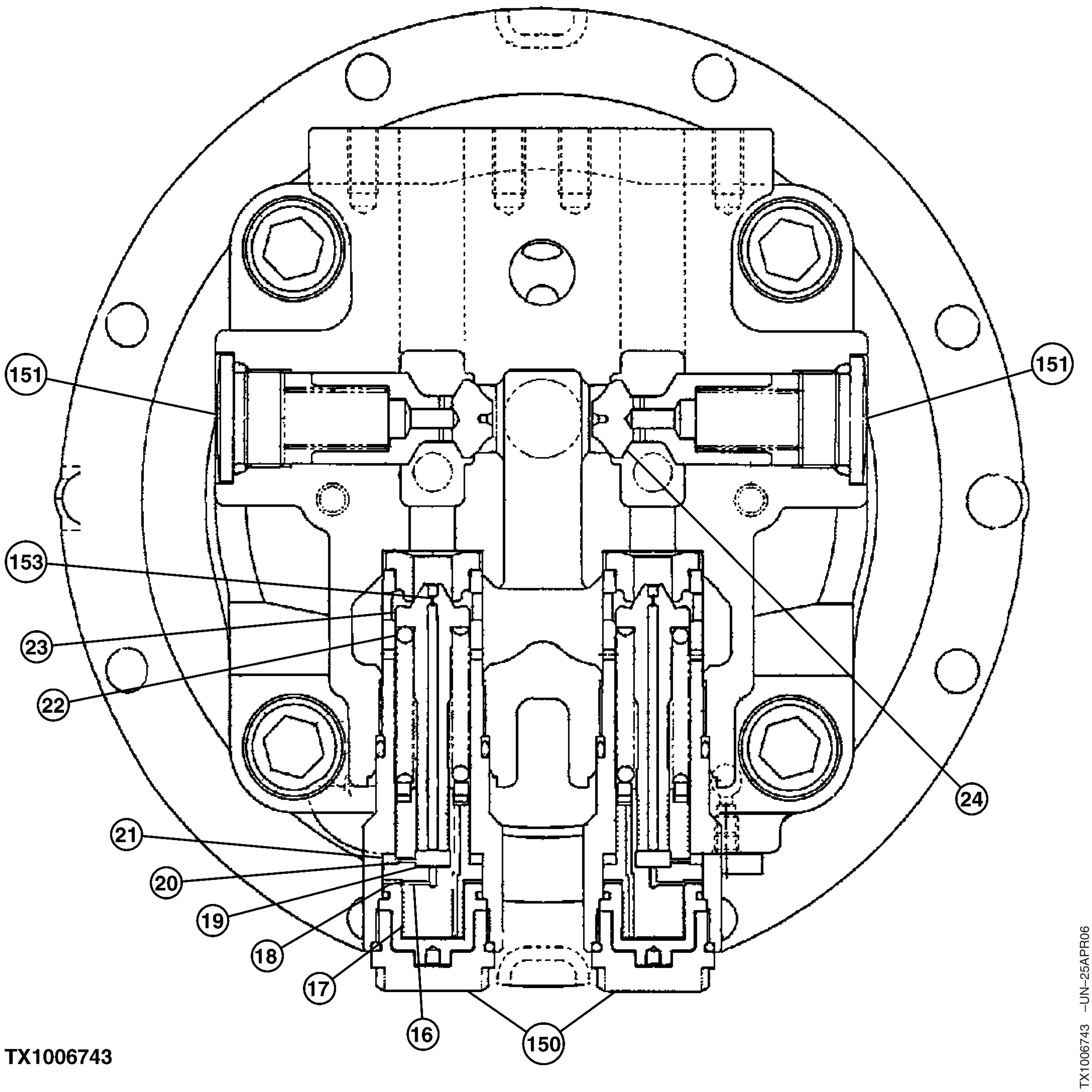
1—Spring	6—Plate	10—Swash Plate	14—Valve Plate
2—Brake Piston	7—Friction Plate	11—Slipper	15—Cover
4—Port SH (Brake Release Pressure)	8—Swash Plate Piston	12—Housing	150—Crossover Relief Valve
	9—Shaft	13—Cylinder Block	

Swing Motor—The swing motor is a fixed displacement axial piston motor.

The swing motor components consists of the swash plate piston (8), swash plate (10), cylinder block (13), valve plate (14), and a housing (12). The park brake components are; springs (1), brake piston (2), plates (6) and friction plates (7). The Shaft (9) is splined to the cylinder block (13) which the swash plate piston (8) is inserted. When pressure oil is applied from the pumps, the swash plate piston (8) is pushed. Slipper (11) at the top of swash plate piston slides over swash plate (10) so that swash plate piston rotates. The top of shaft (9) is splined to the first stage sun gear of swing gearbox. Therefore, the rotation of shaft (9) is transmitted to the swing gearbox.

Continued on next page

MM61211,0001539 –19–26APR06–2/4



16—Passage	**19—Cavity**	**22—Spring**	**150—Crossover Relief Valve**
17—Piston	**20—Passage**	**23—Poppet**	**151—Make-Up Check Valve**
18—Cavity	**21—Cavity**	**24—Poppet**	**153—Orifice**

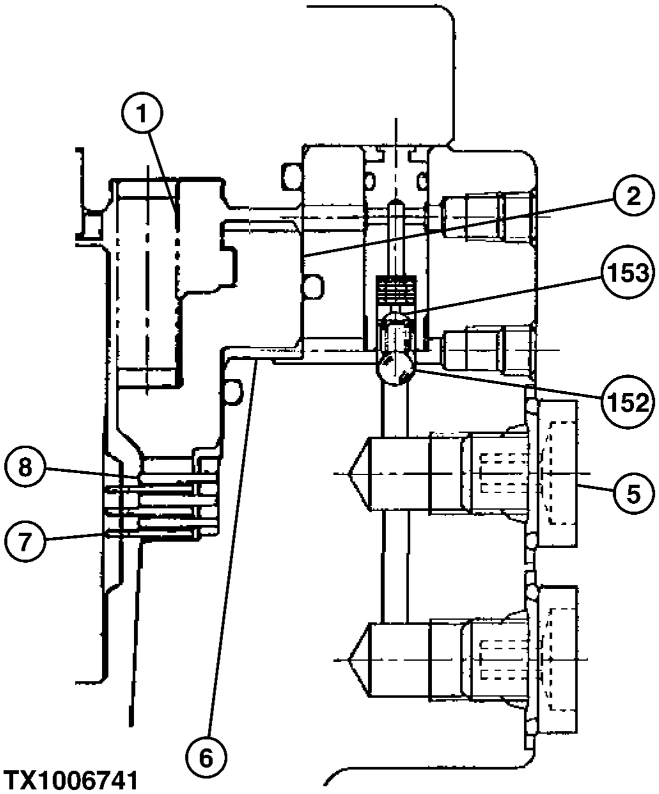
Continued on next page

Swing Motor Crossover Relief Valve—The swing motor crossover relief valves are direct acting relief valves with a shock reducing function. The piston (17) allows the spring force on the poppet (23) to be reduced. Additionally, as oil flows through the orifice (153) and moves the piston, a pressure difference is created from one side of the poppet to the other. The reduced spring force and the pressure difference on the poppet allow the poppet to open below set pressure to reduce pressure spikes. As the piston moves, spring force on the poppet is increased. Once the piston reaches full stroke, the pressure difference is eliminated and the pressure in the swing circuit will reach set pressure.

Swing Motor Make-Up Check Valve—When the swing control lever is returned to the neutral position while the upperstructure is in motion, the weight of the upperstructure will continue to turn the swing motor which causes it to act like a pump. The flow caused by the pumping action of the swing motor cannot flow through the control valve because the work ports are blocked by the valve spool. The high pressure oil is forced through the crossover relief valve. The make-up check valve (151) provides oil to the low pressure side of the swing motor to prevent cavitation.

MM61211,0001539 –19–26APR06–4/4

Swing Motor Park Brake Release Circuit Operation



Swing Park Brake Release Circuit Operation

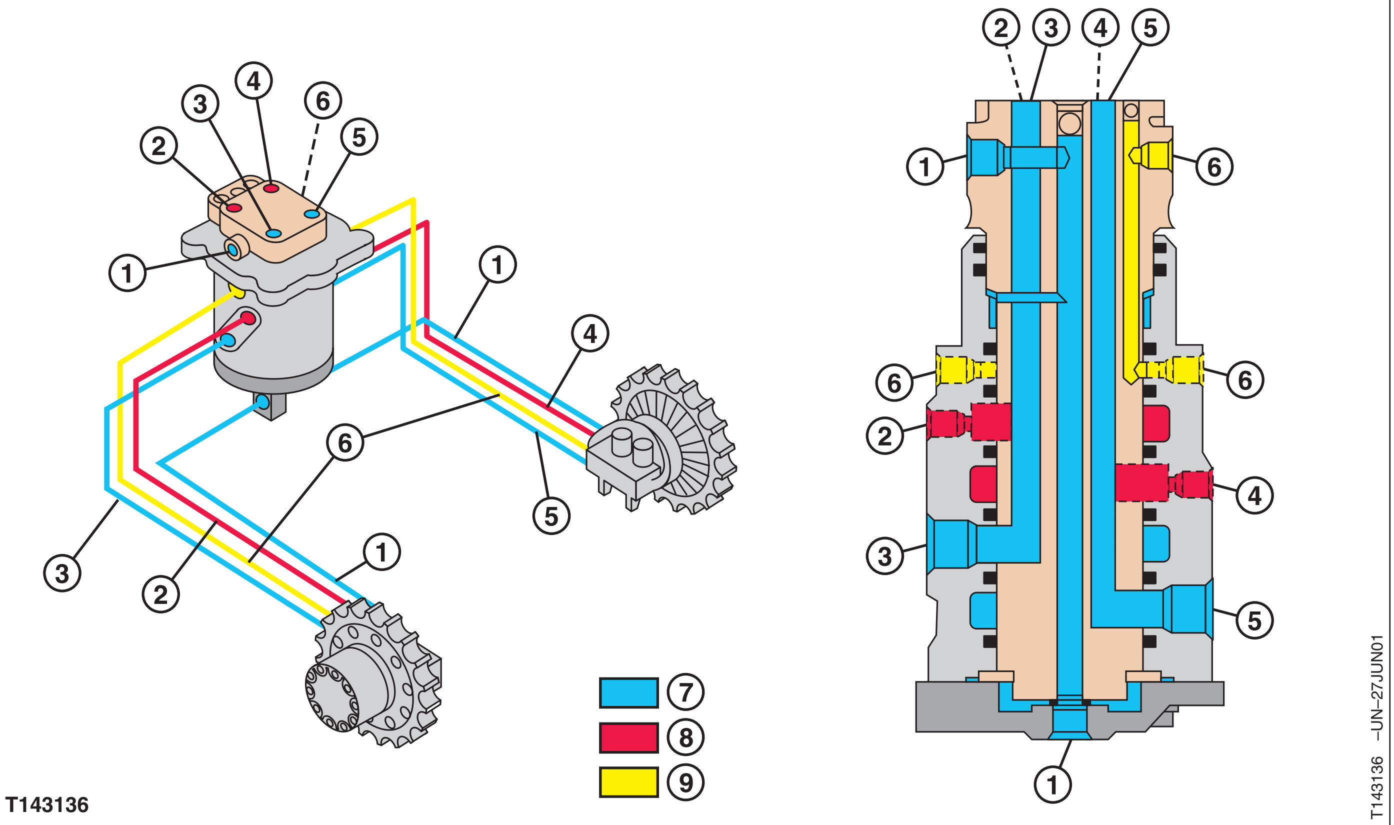
1—Spring
2—Brake Piston
5—Port SH (brake release pressure)
6—Brake Piston-Chamber
7—Plate
8—Friction Plate
152—Check Valve
153—Orifice

Applying Brake— When the dig or swing control lever is returned to neutral, the swing park brake release pilot valve stops the flow of pilot oil to the swing motor. The spring (1) pushes the brake piston (2) down, forcing the oil through the orifice (153) into the swing motor case. The orifice (153) prevents the brake piston (2) from moving quickly and delays the application of the swing park brake until the upperstructure is stopped or nearly stopped. The force of spring (1) on the brake piston engages the friction plate (8), which acts on the cylinder block, and the plate (7), which acts on the inside of the swing motor housing, securing the upperstructure from moving.

Releasing Brake— When any dig or swing function is operated, the swing park brake release pilot valve is shifted allowing pilot pressure oil through check valve (152) to move brake piston (2). As brake piston moves, plate (7) and friction plate (8) disengage, which releases the swing park brake.

MM61211,0001538 –19–26APR06–1/1

Center Joint Operation



Center Joint

1—Drain
2—Left Travel Forward
3—Left Travel Reverse
4—Right Travel Forward
5—Right Travel Reverse
6—Travel Speed Change
7—Return Oil
8—Supply Oil
9—Pilot Oil

Center Joint Operation—The center joint is a 360° rotary manifold. It allows oil to flow to and from the travel motors without twisting hoses when the upper structure is rotated.

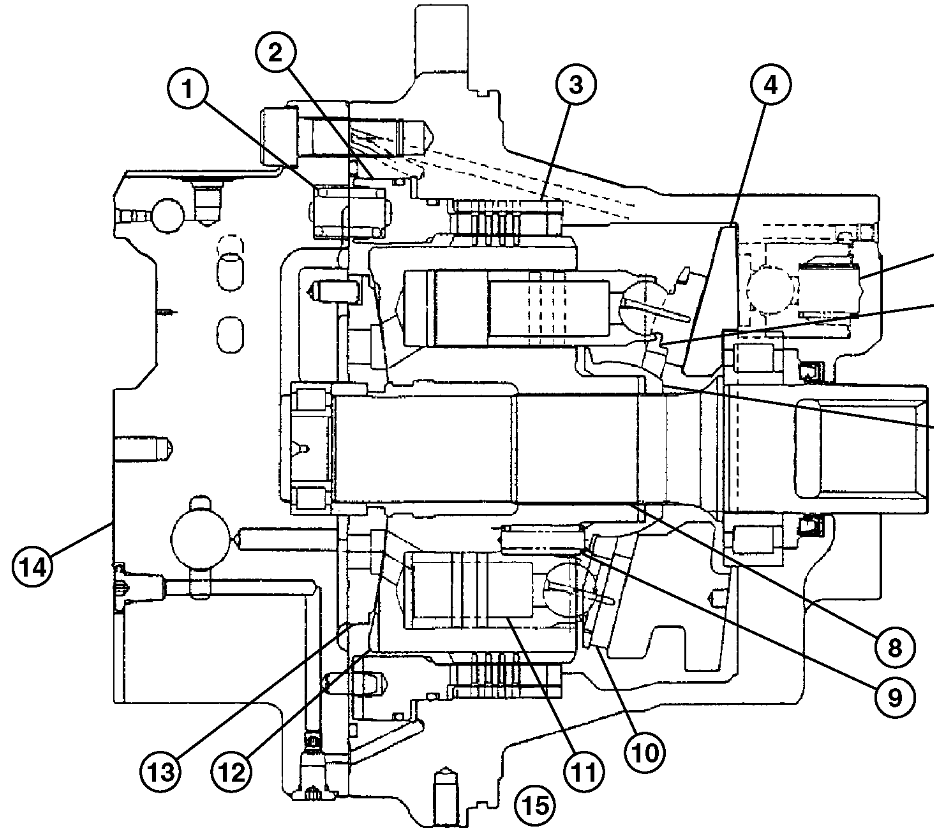
The inner spindle is connected to the upper structure and the housing is connected to the undercarriage.

The housing rotates about the spindle during swing operation.

Oil flows into and through the spindle to passages in the housing, and then out of the housing to the travel motors. Sealing rings stop oil from leaking between the spindle and housing into adjacent passages.

LD30992,0000268 –19–27FEB06–1/1

Travel Motor and Park Brake Circuit Operation



TX1006976

Travel Motor

TX1006976 –UN–25APR06

1—Brake Spring
2—Brake Piston
3—Travel Park Brake
4—Swashplate
5—Swashplate Piston
6—Retainer
7—Ball Guide
8—Output Shaft
9—Spring
10—Slipper
11—Piston
12—Cylinder Block
13—Valve Plate

Travel Motor Components—The travel motor is a two speed, axial piston, swash plate type motor which includes the park brake.

The travel motor and park brake valve assembly is composed of counterbalance valve, crossover relief valves, speed selector valve, and check valves.

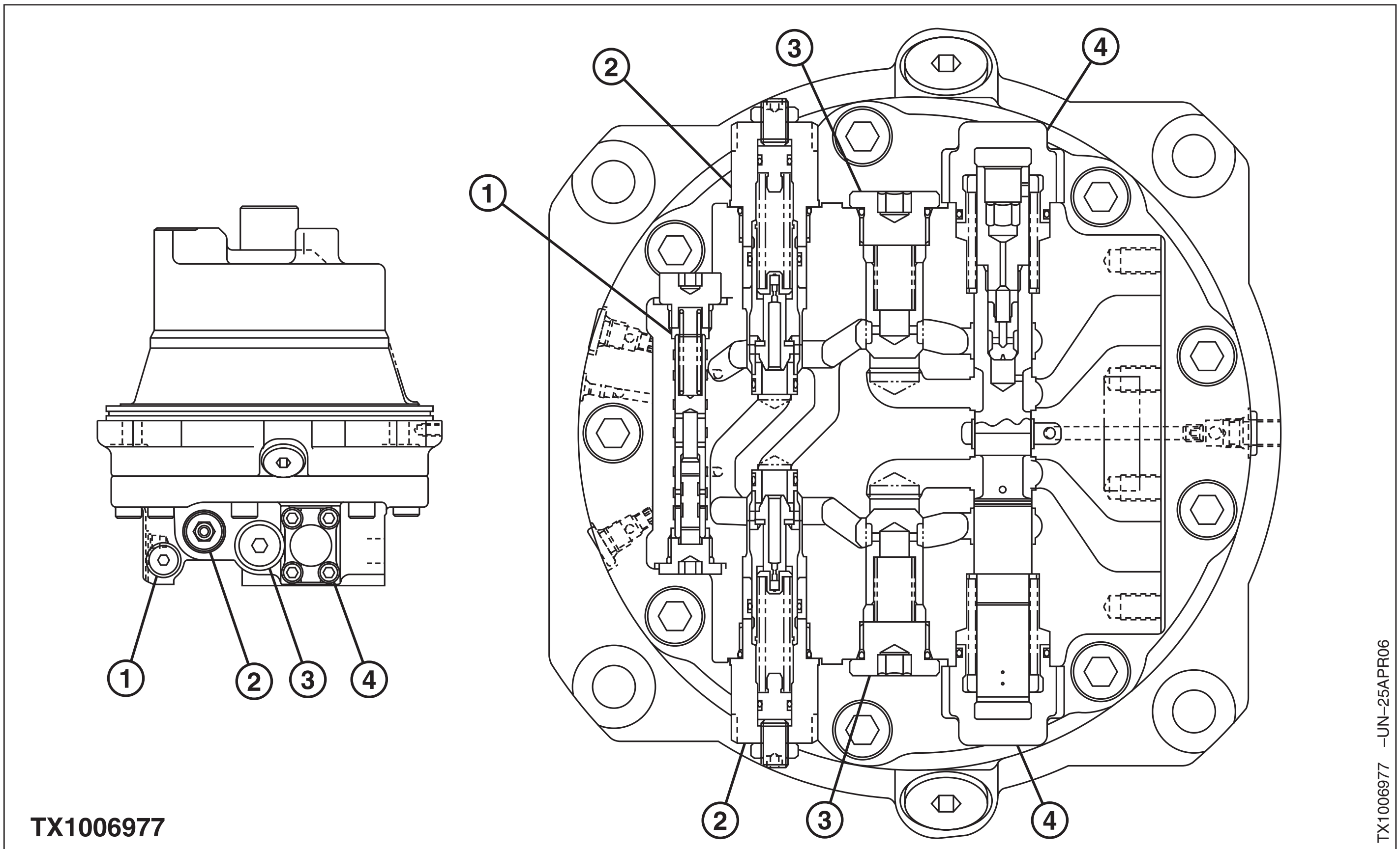
Pressure oil flows through valve plate (13) forcing the pistons against the angled swashplate (4) in one half of the cylinder block (12). Because the swashplate is fixed, the piston slippers slide down the angled face turning the cylinder block and output shaft (8). The valve plate (13) is held stationary by a pin. Retainer (6) holds the slippers against the swash plate by force from ball guide (7) and springs (9). As the cylinder block and output shaft rotate, the pistons move out of their bores. The pistons in the other half of the cylinder block move back into their bores to discharge oil.

The cylinder block is preloaded against the valve plate by springs (9), ball guide (7) and retainer (6) to prevent leakage during starting or low pressure operation. As pressure in the cylinder block bores increase, the force holding the cylinder block against the valve plate and pistons also increase.

Pressure oil flows through the center of each piston to the balljoint and to the face of each slipper for lubrication.

Swashplate pistons (5) control the angle of the swashplate (4) to change motor displacement.

Continued on next page



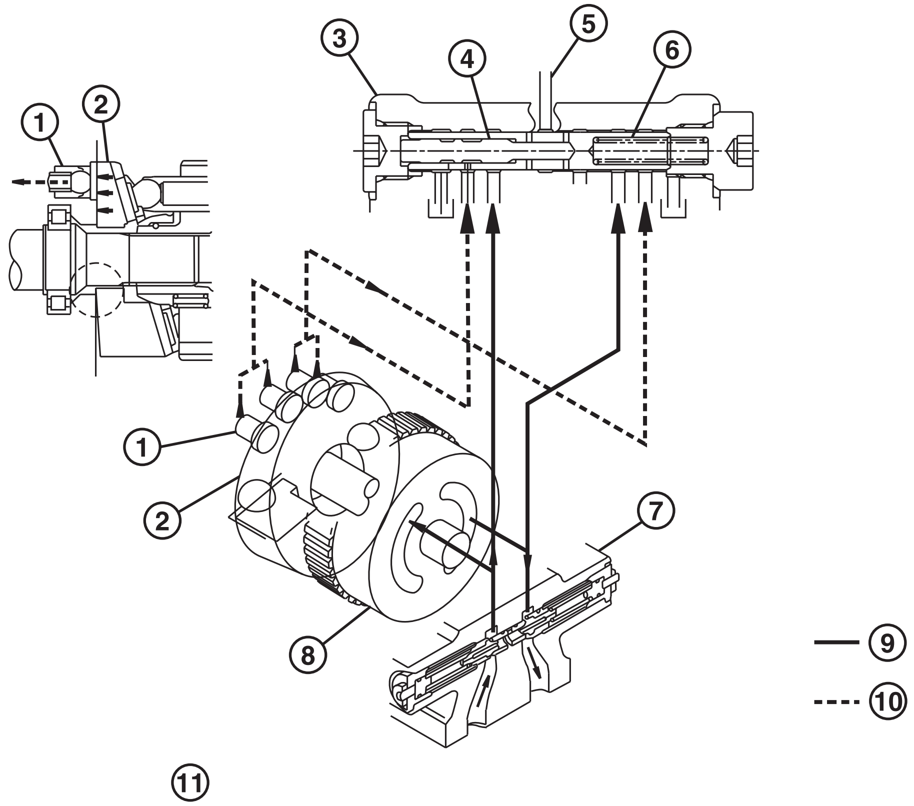
Travel Motor and Park Brake Valve Assembly

1—Travel Speed Change Selector Valve **2—Crossover Relief Valve** **3—Check Valve** **4—Counterbalance Valve**

Travel Motor and Park Brake Valve Assembly Components—The travel brake valve is located on the travel motor head and consists of the following valves. Crossover relief valve (2) which prevents the occurrence of overload and surge pressure in the motor circuit. The counterbalance valve (4) makes starting and stopping travel operations smooth and prevents the machine from running away while descending slopes. Check Valve (3) will assists the counterbalance valve operation and prevents cavitation in the motor circuit. And the travel speed change selector valve (1) which controls the tilt piston when selecting travel mode.

LD30992,0000269 –19–25APR06–2/2

Travel Motor Speed Circuit Operation



TX1006978

TX1006978 –UN–25APR06

Travel Motor Slow Speed Operation

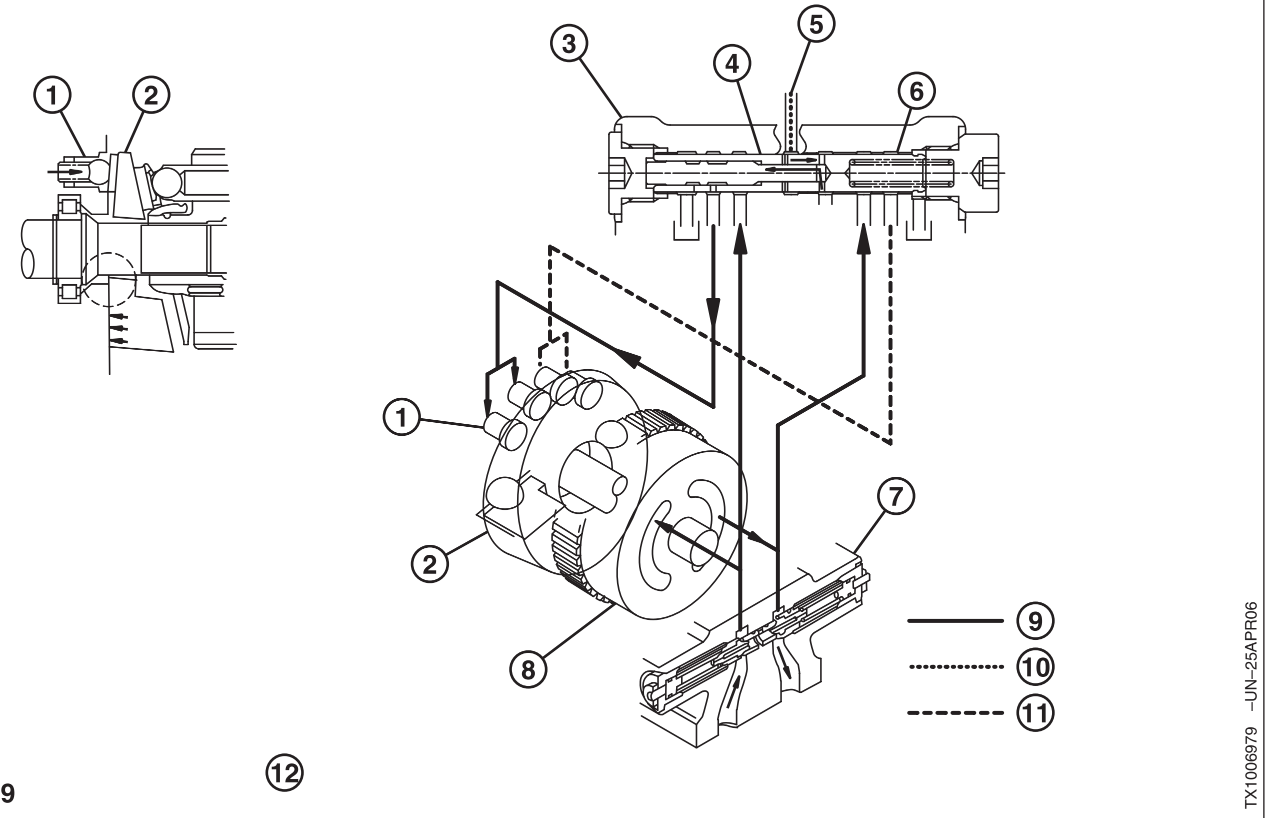
1—Swashplate Piston
2—Swashplate
3—Travel Speed Selector Valve
4—Spool
5—From Travel Speed Solenoid Valve (SB)
6—Spool
7—Counterbalance Valve
8—Cylinder Block
9—Supply Oil
10—Return Oil

Travel Motor Slow Speed Operation—When slow speed travel (turtle) mode is selected, the pump and valve controller sends a control signal to the power boost solenoid to increase system relief pressure setting but does not send a control signal to the travel speed solenoid valve (SB).

When the travel speed change solenoid is de-energized pilot oil is not routed to the travel speed selector valve (3) spools (4 and 6). Springs hold the spools in slow speed travel (turtle) position, and the oil acting on the swashplate pistons (1) is routed to return through the center of the travel speed selector valve spools. The swashplate (2) is fixed at maximum displacement. At maximum displacement the motor turns at slow speed with high torque.

Continued on next page

LD30992,000026A –19–25APR06–1/2



Travel Motor Fast Speed Operation

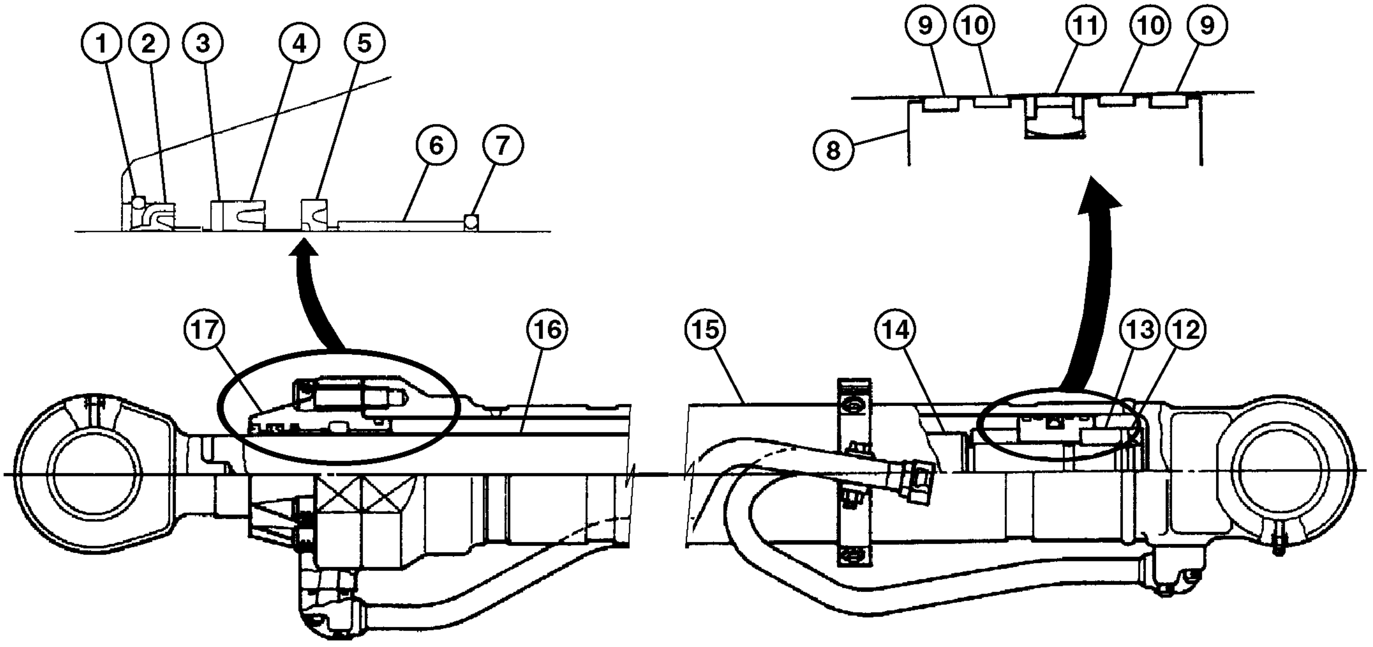
1—Swashplate Piston
2—Swashplate
3—Travel Speed Selector Valve
4—Spool
5—From Travel Speed Solenoid Valve (SB)
6—Spool
7—Counterbalance Valve
8—Cylinder Block
9—Supply Oil
10—Pilot Oil
11—Return Oil

Travel Motor Fast Speed Operation—When fast speed travel (rabbit) mode is selected, the pump and valve controller sends a control signal to the power boost solenoid to increase system relief pressure setting and to travel speed solenoid valve (SB).

When energized by the pump and valve controller control signal, the travel speed solenoid valve (SB) routes pilot oil (10) to the travel speed selector valve (3). Pilot oil pressure moves the spools (4 and 6) to route supply oil to the swashplate pistons (1). The swash plate pistons then move the swashplate (2) to minimum position. The reduced swashplate angle causes the motors to turn at a faster speed with reduced torque.

LD30992,000026A –19–25APR06–2/2

Boom, Arm, and Bucket Cylinder Operation



TX1007001 –UN–25APR06

TX1007001

Cylinder Operation

1—Snap Ring
2—Wiper Seal
3—Back-Up Ring
4—U-Cup Seal
5—Buffer Ring
6—Wear Ring
7—Snap Ring
8—Piston
9—Buffer Ring (2 used)
10—Wear Ring (2 used)
11—Cap Seal
12—Set Screw
13—Nut
14—Cushion
15—Barrel
16—Cylinder Rod
17—Rod Guide

Boom, Arm, and Bucket Cylinders—

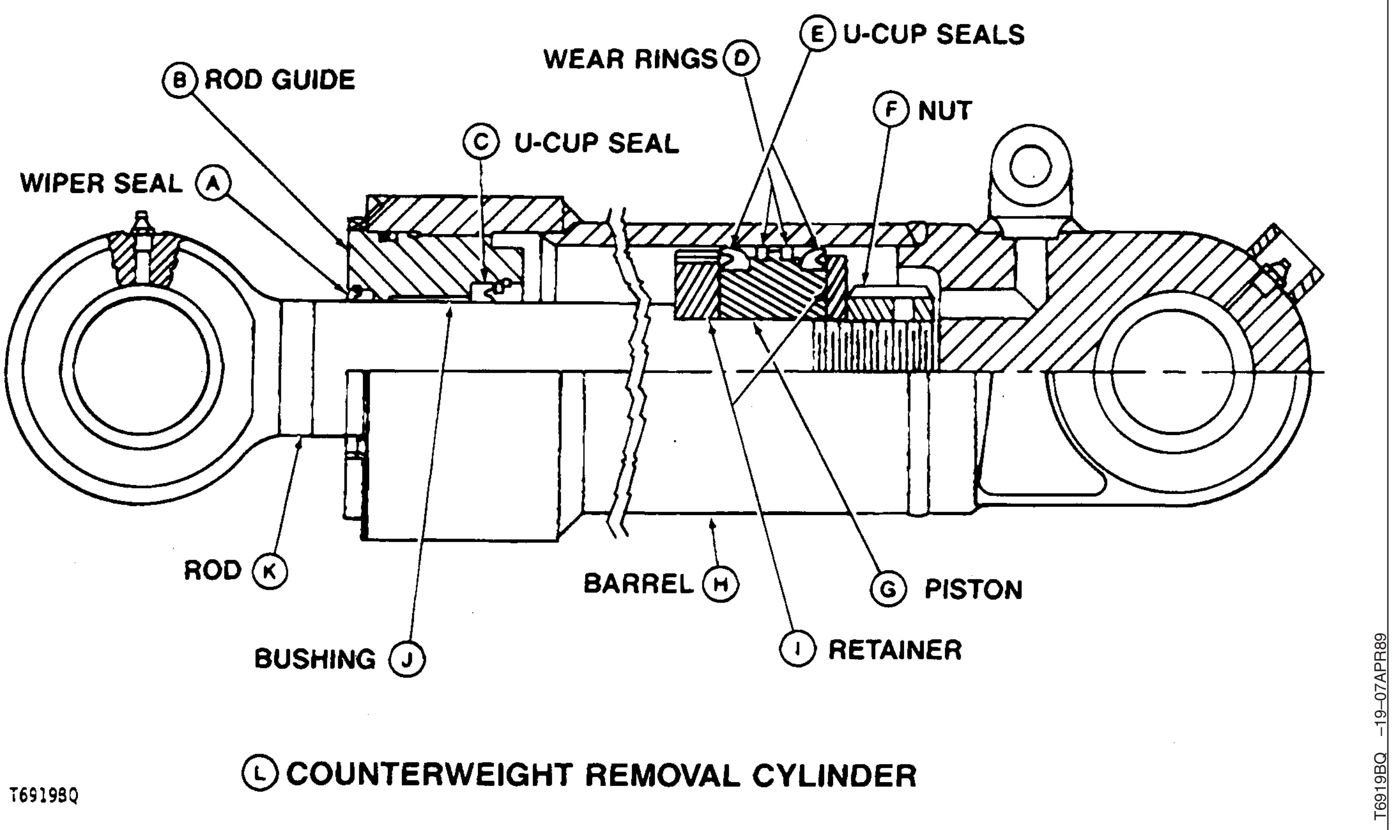
The boom, arm, and bucket cylinders are similar in design. The bucket cylinder is illustrated. The rod guide (17) is fastened to the cylinder barrel with cap screws and is fitted with a wear ring (6) held in place by a snap ring (7). A buffer ring (5), U-cup seal (4), back-up ring (3), and wiper seal (2) are used in the rod guide. A snap ring (1) is used to help hold wiper seal in place. The U-cup seal (4) is protected against high pressure by the buffer ring (5) and stops the small amount of oil that may pass by the buffer ring.

The piston (8) is a slip fit on the cylinder rod (16) and is retained with a nut (13). A set screw (12) prevents loosening of the nut. The piston is fitted with a cap seal (11), wear rings (10), and buffer rings (9).

Boom, bucket, and arm cylinders have a cushion (14) in front of the piston to provide cushioning action in cylinder extension. As the cylinder nears the end of its stroke, the cushion enters a bore in the rod guide. The remaining return oil ahead of the piston must flow through a small clearance between the cushion and rod guide. Only the arm cylinder is cushioned in retraction. The end of the rod enters a bore in the head end of cylinder. The remaining return oil ahead of the piston and nut must flow through this small clearance as the cylinder bottoms out in this direction.

LD30992,000026B –19–25APR06–1/1

Counterweight Removal Cylinder Operation



A—Wiper Seal
B—Rod Guide
C—U-Cup Seal
D—Wear Rings
E—U-Cup Seals
F—Nut
G—Piston
H—Barrel
I—Retainer
J—Bushing
K—rod
L—Counterweight Removal Cylinder

The counterweight removal cylinder has a threaded rod guide (B). An O-ring seal between the cylinder barrel (H) and the rod guide. Bushing (J) is held in the rod guide by a U-cup seal (C) and a retaining ring. The wiper seal (A) cleans the rod (K) when the cylinder is retracting.

The piston (G) and retainers (I) are held on the rod by a nut (F). The piston has two wear rings (D) and two U-cup seals (E).

OUT3035,0000022 –19–25APR06–1/1

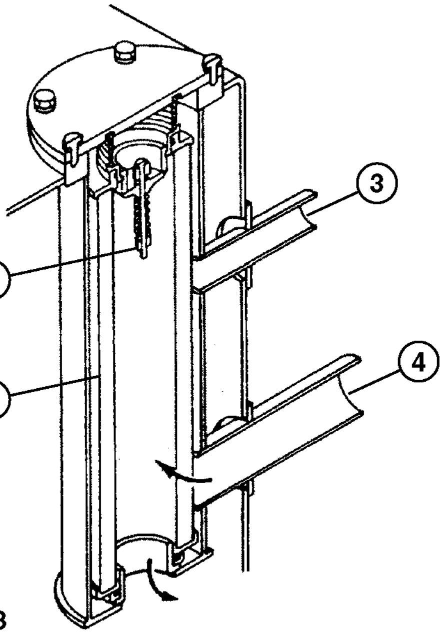
Return Filter Operation

Return Filter Operation—The filter element (1) is located in a chamber inside the hydraulic oil tank. O-rings are used at each end of the filter element to prevent leakage. A spring holds the filter element on its seat.

Return oil from the oil cooler (3) and the control valve (4) flow through the filter element from the outside to the center. Filtered oil flows out the bottom of filter into the hydraulic oil tank.

Bypass Valve—A bypass valve (2) is located at the top of the filter. The bypass valve opens to protects the filter element (1) against pressure surges in the return circuit and allows a path for return oil if the filter element becomes plugged. During bypass operation, oil flows into the chamber faster than it can flow through the filter element causing the pressure to increase. The higher pressure forces the bypass valve open allowing oil to flow down the center of the filter element and into the hydraulic oil tank. The bypass valve closes when the pressure decreases below the pressure setting of the bypass valve.

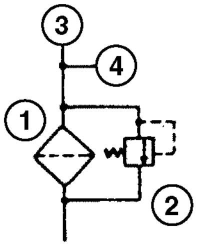
1—Filter Element
2—Bypass Valve
3—From Oil Cooler
4—From Control Valve

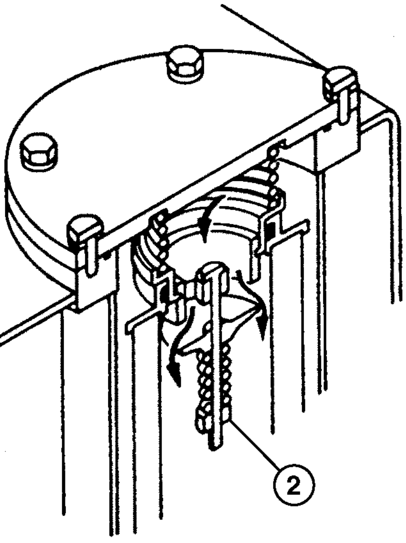


TX1007018

TX1007018 –UN–25APR06

Return Filter Operation





TX1007019

TX1007019 –UN–25APR06

Bypass Operation

LD30992,000026C –19–25APR06–1/1

Group 15

Diagnostic Information

Diagnose No Hydraulics Malfunctions

MR50960,00000F5 –19–21APR06–1/1

No Hydraulic Functions Diagnostic Procedure

IMPORTANT: Check hydraulic oil level. See Check Hydraulic Tank Oil Level. (Operator's Manual.)

– – –1/1

❶ **Pilot Shutoff Lever Switch Check**	Key on, listen as pilot shutoff lever is moved from **locked to unlocked** positions. Repeat lever movement **locked to unlocked** several times. Does pilot shutoff switch **click** each time lever is moved from **locked to unlocked** position?	**YES:** Go to Security Switch Relay Check. **NO:** Go to Pilot Shutoff Relay Check. – – –1/1

❷ **Pilot Shutoff Relay Check**	See System Functional Schematic. (Group 9015-10.) Switch pilot shutoff relay K2 with other similar relay. Run engine with pilot shutoff lever in **unlocked** position and operate hydraulic functions. Do hydraulics operate?	**YES:** Install new pilot shutoff relay K2 and return other one to correct position. **NO:** Go to Security Relay Check. – – –1/1

❸ **Security Relay Check**	See System Functional Schematic. (Group 9015-10.) Switch security relay K5 with other similar relay. Run engine with pilot shutoff lever in **unlocked** (forward) position and operate hydraulic functions. Do hydraulics operate?	**YES:** Install new security shutoff relay K5 and return other one to correct position. **NO:** Go to Pilot Shutoff Solenoid Check. – – –1/1

❹ **Pilot Shutoff Solenoid Check**	See System Functional Schematic. (Group 9015-10.) Remove connector from pilot shutoff solenoid valve. Key on, test voltage on terminal #2 at the harness end connector. Does terminal #2 measure approximately 24 volts?	**YES:** Go to Solenoid Continuity Check. **NO:** Failed fuse #4 or open circuit in harness between fusible link 75A and pilot shutoff solenoid valve. – – –1/1

❺ **Solenoid Continuity Check**	See System Functional Schematic. (Group 9015-10.) Remove connector from pilot shutoff solenoid valve. Check for continuity between terminals #1 and #2 of the solenoid valve harness connector. Is continuity measured?	**YES:** Go to Wiring Connector Check. (Group 9025-15.) **NO:** Replace pilot shutoff solenoid valve. – – –1/1

❻ **Pump Drive Check**	See Dampener Drive (Flex Coupling) Remove and Install. (Group 0752.) Check dampener drive coupling. Does dampener drive (flex coupling) drive pumps?	**YES:** Go to Hydraulic Oil Tank Suction Screen Check. **NO:** Repair or replace dampener drive (flex coupling). – – –1/1

❼ **Hydraulic Oil Tank Suction Screen Check**	See Change Hydraulic Tank Oil, Clean Suction Screen. (Operator's Manual.) Inspect hydraulic oil tank suction screen. Is hydraulic oil tank suction screen free of restriction?	**YES:** Go to Wiring Connector Check. **NO:** Clean or replace hydraulic oil tank suction screen. See Change Hydraulic Tank Oil, Clean Suction Screen. (Operator's Manual) – – –1/1

⑧ **Wiring Connector Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Inspect hydraulic control wiring. *NOTE: Most wiring problems should generate a DTC, check for DTC's before tracing wiring.* Are all the connectors in good condition?	**YES:** Replace monitor unit. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Repair or replace connectors.

– – –1/1

Diagnose All Hydraulics Slow Malfunctions

IMPORTANT: Make sure hydraulic oil level, condition, and type of oil is checked before doing this procedure.

- **Hydraulic oil temperature, cold oil can slow hydraulic functions.**
- **Low oil level can cause pump cavitation, see Check Hydraulic Tank Oil Level. (Operator's Manual.)**
- **Suction side air leaks will cause oil to foam or become aerated. Inspect site glass oil condition.**
- **Wrong viscosity oil can cause pump cavitation, see Hydraulic Oil. (Operator's Manual.)**

9025
15
3

TX19495,0000004 –19–26APR06–1/1

All Hydraulic Functions Slow Diagnostic Procedure

NOTE: Reduction in pump 1 and 2 flow rate due to other reasons or faulty pilot system may cause this problem. If unloaded function speed is satisfactory, diagnose low power problem, see All Hydraulic Functions Low Power Diagnostic Procedure. (Group 9025-15.).

– – –1/1

❶ **Pilot Pressure Regulating Valve Check**	Use monitor service menu to display Arm-In Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: To test with remote gauge, perform Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.)* Run at fast idle and move arm-in function full travel and hold over relief. Record pressure. Is the pilot pressure above 3.7 MPa on monitor when function is held over relief?	**YES:** Go to Engine Speed Check. **NO:** Go to Pilot Regulating Valve Inspection. – – –1/1
❷ **Pilot Regulating Valve Inspection**	See Pilot Pressure Regulating Valve Remove and Install. (Group 3360.) Remove and inspect pilot pressure regulating valve. Is the pilot valve in good condition?	**YES:** Adjust pilot pressure regulating valve. Perform Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.) **NO:** Go to Pilot Filter Check. – – –1/1
❸ **Pilot Filter Check**	Remove and inspect pilot filter. Is pilot filter clogged or contain excessive metallic debris?	**YES:** If non-metallic debris, clean filter. If excessive metallic debris, remove and inspect pilot pump. **NO:** Diagnostic procedure complete. – – –1/1
❹ **Engine Speed Check**	Key on, use monitor service menu to display EC Dial Angle voltage. See Monitor Service Menu Operation. (Group 9015-16.) Start engine and turn auto idle off. Observe monitor as engine speed as dial is moved from slow to fast idle. Does E C dial angle voltage change from approximately 0.5—4.4 volts and does engine speed increase to fast idle?	**YES:** Go to Main Relief Valve Check. **NO:** See Engine Speed Control System Operation. (Group 9010-05.) – – –1/1

❺ **Main Relief Valve Check**	Key on, use monitor service menu to display Pump 1 and Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: To test with remote gauge, Perform Main Relief and Power Digging Valve Test and Adjustment. (Group 9025-25.)* Set power mode at HP. Run engine at fast idle and operate boom raise function. Observe pump 1 and 2 delivery pressure when boom raise is held over relief. Are both pumps delivery pressure in 30.4—32.9 MPa range?	**YES:** Go to Cycle Time Check. **NO:** Adjust or replace main relief and power digging valve. Perform Main Relief and Power Digging Valve Test and Adjustment. (Group 9025-25.) – – –1/1
❻ **Cycle Time Check**	Perform Cycle Times Check. (Group 9005-10.) Check travel cycle times. Are travel cycle times at specifications?	**YES:** Diagnostic procedure complete. **NO:** Go to Restricted Hydraulic Oil Tank Suction Screen Check. – – –1/1
❼ **Restricted Hydraulic Oil Tank Suction Screen Check**	Inspect hydraulic oil tank suction screen. See Change Hydraulic Tank Oil, Clean Suction Screen. (Operator's Manual.) Is hydraulic oil tank suction screen free of restriction?	**YES:** Go to Hydraulic Pump Check. **NO:** Clean or replace hydraulic oil tank suction screen. – – –1/1
❽ **Hydraulic Pump Check**	Perform Pump Flow Test. (Group 9025-25.) Check pump flow. Does pump flow meet specification?	**YES:** Go to Wiring Connector Check. **NO:** Repair or replace pump. See Pump Remove and Install. (Group 3360.) – – –1/1
❾ **Wiring Connector Check**	See Pilot Shutoff Switch Harness (W11) Component Location. (Group 9015-10.) Inspect hydraulic control wiring. *NOTE: Most wiring problems should generate a DTC, check for DTC's before tracing wiring.* Are all the connectors in good condition?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace connectors. – – –1/1

Poor Combined Operation Diagnostic Procedure

– – –1/1

❶ **Pump Delivery Pressure Check**	Key on, use monitor service menu to display Pump 1 and Pump 2 Delivery Pressure on monitor. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: To test with remote gauge, Perform Main Relief and Power Digging Valve Test and Adjustment. (Group 9025-25.)* Set power mode at HP. Run engine at fast idle and operate boom raise function. Observe pump 1 and 2 delivery pressure when boom raise is held over relief. Are both pumps delivery pressure in 30.4—32.9 MPa range?	**YES:** Go to Actuating Pilot Pressure Check. **NO:** Adjust or replace main relief and power digging valve. Perform Main Relief and Power Digging Valve Test and Adjustment. (Group 9025-25.) – – –1/1

❷ **Actuating Pilot Pressure Check**	Key on, use monitor service menu to display Swing / Attachment Control Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Run engine at fast idle and operate problem function. Observe pressure when function held over relief. Is pilot pressure above 3.70 MPa?	**YES:** Go to Pump Flow Rate Check Valve. **NO:** If pressure is low, adjust or replace valve. Perform Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.) See Pilot Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

❸ **Pump Flow Rate Check Valve**	See Control Valve Check Valves Identification And Operation. (Group 9025-05.) Inspect check valves. Do check valves operate correctly?	**YES:** Go to Pump Flow Rate Pilot Valve Spool Check. **NO:** Repair or replace check valve. See Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

❹ **Pump Flow Rate Pilot Valve Spool Check**	See Pilot Signal Manifold Operation. (Group 9025-05.) Inspect pump 1 or pump 2 flow rate pilot valves. Do flow rate pilot valves operate correctly?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace flow rate pilot valve. See Pilot Signal Manifold Disassemble and Assemble. (Group 3360.) – – –1/1

Diagnose All Hydraulic Functions Too Fast Malfunctions

MR50960,00000F6 –19–25APR06–1/1

Hydraulic Function Speed Too Fast Diagnostic Procedure

IMPORTANT: All of the below symptoms must be present to use this diagnostic procedure. This problem occurs when pump 1 and 2 flow rate is maximized by a malfunction.

- Function speed is faster than normal.
- Machine mistracks when travel lever operated at half stroke.
- Precision control of hydraulic function cannot be performed.

– – –1/1

❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Do any DTC exist?	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Pump Flow Rate Valve Spool Check. – – –1/1

❷ **Pump Flow Rate Valve Spool Check**	See Pilot Signal Manifold Operation. (Group 9025-05.) Remove and inspect pump 1 or pump 2 flow rate pilot valves. Do flow rate pilot valve spools move freely?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace pilot signal manifold flow rate pilot valve spool. See Pilot Signal Manifold Disassemble and Assemble. (Group 3360.)

– – –1/1

Diagnose Hydraulic Overheating Malfunctions

MR50960,00000F1 –19–26MAY06–1/1

Hydraulic Oil Overheats Diagnostic Procedure

IMPORTANT: Wrong viscosity oil can cause overheating, check oil for correct temperature range. See Hydraulic Oil. (Operator's Manual.)

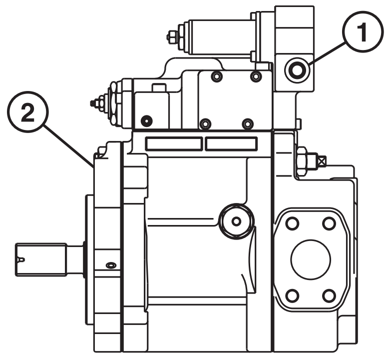
– – –1/1

❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Are any of the following DTC displayed? • 11004.02 See CAN Communication Error. (Group 9001-10.) • 11412.03 See Hydraulic Fan Pump Control Solenoid Valve Feedback Current High. (Group 9001-10.) • 11412.04 See Hydraulic Fan Pump Control Solenoid Valve Feedback Current Low. (Group 9001-10.) • 11901.03 See Hydraulic Oil Temperature Sensor Circuit Voltage High. (Group 9001-10.) • 11901.04 See Hydraulic Oil Temperature Sensor Circuit Voltage Low. (Group 9001-10.) • 110.03 See Engine Coolant Temperature Sensor Voltage High (P0118). (Group 9001-10.)	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Fan Speed Control Check.

– – –1/1

❷ **Fan Speed Control Check**	Run engine at slow idle and remove harness connector at fan control solenoid on top of fan pump. Does fan increase to maximum speed?	**YES:** Go to Oil Cooler Bypass Valve Check. **NO:** Go to Fan Drive Control Pressure Check.

– – –1/1

❸ Fan Drive Control Pressure Check	 TX1006258 –UN–12APR06 *Fan Pump* **1—Fan System Control Pressure Hose** **2—Fan Pump** Perform Fan Drive Pump Torque Control Test and Adjustment. (Group 9025-25.) Remove control pressure hose (1). Install tee and pressure gauge control pressure hose. Run engine at fast idle with harness connector removed from fan control solenoid valve Is fan drive pressure at test specifications?	**YES:** Repair or replace fan pump control solenoid. See Fan Drive Remove and Install. (Group 3360.). **NO:** Go to Fan Pump Flow Check. – – –1/1
❹ Fan Pump Flow Check	Perform Fan Pump Flow Test. (Group 9025-25.) Measure fan pump flow. Does fan pump flow meet test specification?	**YES:** If fan pump flow is ok and fan speed still slow, replace fan motor. See Fan Motor Remove and Install. (Group 3360) **NO:** Inspect and repair fan drive pump. See Fan Drive Pump Remove and Install. (Group 3360.) – – –1/1
❺ Oil Cooler Bypass Valve Check	See Oil Cooler Bypass Valve Remove and Install. (Group 3360.) Inspect oil cooler bypass valve. Does oil cooler bypass valve operate correctly?	**YES:** Go to Machine Lift Capacity Check. **NO:** Replace oil cooler bypass valve. – – –1/1
❻ Machine Lift Capacity Check	Check machine lift capacity, see Operator's Manual lift charts. Is amount of weight being lifted within machine lift capacity?	**YES:** Go to Main Relief and Power Digging Valve Setting Check. **NO:** Reduce amount of weight being lifted. – – –1/1

❼ **Main Relief and Power Digging Valve Setting Check**	Key on, use monitor service menu to display Pump 1 and Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: To test with remote gauge, Perform Main Relief and Power Digging Valve Test and Adjustment. (Group 9025-25.)* Run engine at fast idle and operate boom raise function. Observe pump 1 and 2 delivery pressure when boom raise is held over relief. Are both pumps delivery pressure in 30.4—32.9 MPa range?	**YES:** Go to Pump Regulator Check **NO:** Replace main relief and power digging valve. See Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

❽ **Pump Regulator Check**	Key on, use monitor service menu to display Target Pump 1 and Pump 2 Flow Rate. See Monitor Service Menu Operation. (Group 9015-16.) Check if pumps are stuck at maximum displacement. Observe flow rate on each pump as boom raise function is operated, slow to fast speed Do pump 1 or pump 2 target flow rates start low and increase with boom speed?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace pump 1 or pump 2 regulator. Perform Pump Regulator Test and Adjustment—Minimum Flow. (Group 9025-25.) – – –1/1

Diagnose Fan Drive Hydraulic System Malfunctions

MR50960,00000F3 –19–26APR06–1/1

Cooling Fan Remains At Maximum Speed Diagnostic Procedure

IMPORTANT: If all hydraulic function speed are slow, perform All Hydraulic Functions Slow Diagnostic Procedure (Group 9025-15.) instead of this procedure.

NOTE: If the sensor controlling the fan pump flow rate control is disconnect or failed, fan speed defaults to maximum speed.

– – –1/1

Diagnostic Information

❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Do any DTC exist?	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Fan Pressure Check. – – –1/1

❷ **Fan Drive Pressure Check**	Perform Fan Drive System Relief Valve Test and Adjustment Install pressure gauge. Turn A/C switch to on and run engine at slow idle. Watch pressure gauge as you increase engine speed to fast idle. Does the fan drive pressure meet test specifications?	**YES:** Check fan flow to determine if problem is in pump or pump regulator. Perform Fan Pump Flow Test. (Group 9025-25.) **NO:** Repair stuck or sticking fan pump control solenoid valve. – – –1/1

Diagnose Pilot Circuit Malfunctions

TX19495,0000005 –19–26APR06–1/1

All Functions Cannot Be Operated Diagnostic Procedure

– – –1/1

❶ **Pilot Shutoff Lever Switch Check**	Key on, listen as pilot shutoff lever is moved from **locked to unlocked** positions. Repeat lever movement **locked to unlocked** several times. Does pilot shutoff switch **click** each time lever is moved from **locked to unlocked** position?	**YES:** Go to Security Switch Relay Check. **NO:** Go to Pilot Shutoff Relay Check. – – –1/1

❷ **Pilot Shutoff Relay Check**	See System Functional Schematic. (Group 9015-10.) Switch pilot shutoff relay K2 with other similar relay. Run engine with pilot shutoff lever in **unlocked** position and operate hydraulic functions. Do hydraulics operate?	**YES:** Install new pilot shutoff relay K2 and return other one to correct position. **NO:** Replace pilot shutoff switch. – – –1/1

❸ **Security Switch Relay Check**	See System Functional Schematic. (Group 9015-10.) Switch security relay K5 with other similar relay. Run engine with pilot shutoff lever in **unlocked** (forward) position and operate hydraulic functions. Do hydraulics operate?	**YES:** Install new security shutoff relay K5 and return other one to correct position. **NO:** Go to Pilot Shutoff Solenoid Check. – – –1/1

❹ **Pilot Shutoff Solenoid Check**	See System Functional Schematic. (Group 9015-10.) Remove connector from pilot shutoff solenoid valve. Key on, test voltage on terminal #2 at the harness end connector. Does terminal #2 measure approximately 24 volts?	**YES:** Go to Solenoid Continuity Check. **NO:** Failed fuse #4 or open circuit in harness between fusible link 75A and pilot shutoff solenoid valve. – – –1/1

❺ **Solenoid Continuity Check**	See System Functional Schematic. (Group 9015-10.) Remove connector from pilot shutoff solenoid valve. Check for continuity between terminals #1 and #2 of the solenoid valve harness connector. Is continuity measured?	**YES:** Go to Wiring Connector Check. (Group 9025-15.) **NO:** Replace pilot shutoff solenoid valve. – – –1/1

❻ Actuating Pilot Pressure Check	Key on, use monitor service menu to display Swing / Attachment Control Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Run engine at fast idle and operate problem function. Observe pressure when function held over relief. Is pilot pressure above 3.70 MPa?	**YES:** Diagnostic procedure complete. **NO:** If pressure is low, adjust or replace valve. Perform Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.) – – –1/1

Function Does Not Stop When Control Lever Released Diagnostic Procedure

– – –1/1

❶ Pilot Shutoff Lever Check	Run engine at slow idle with pilot shutoff lever to down position. Activate problem function, then move lever to raised position. Does function stops when pilot shutoff lever is raised?	**YES:** Go to Pilot Control Valve Check. **NO:** Go to Control Valve Spool Stuck Check. – – –1/1

❷ Control Valve Spool Stuck Check	See Control Valve Disassemble and Assemble. (Group 3360.) Inspect control valve spool. Does control valve spool move freely?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace control valve components as necessary. – – –1/1

❸ Pilot Control Valve Check	See Control Valve Operation. (Group 9025-05.) Inspect pilot control valve for sticking spool. Does pilot control valve spool move freely?	**YES:** Diagnostic procedure complete. **NO:** Inspect, repair or replace pilot control valve. See Pilot Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

Some Functions Cannot Be Operated, All Others Are Normal Diagnostic Procedure

– – –1/1

Diagnostic Information

❶ **Pilot Cap Check**	See Control Valve Disassemble and Assemble. (Group 3360.) Inspect pilot cap for leakage or damage. Check torque on attaching cap screws. Do is pilot cap free of leaks and attaching cap screws torqued?	**YES:** Go to Pilot Control Valve Check. **NO:** Repair or replace control valve components as necessary. See Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1
❷ **Pilot Control Valve Check**	Inspect pilot control valve or hydraulic hoses for function that can not be operated. Check for leaks or damage. Are components free of damage?	**YES:** Go to Pump 1 or Pump 2 Flow Rate Pilot Valve Check **NO:** Inspect, repair or replace pilot control valve. See Pilot Control Valve Disassemble and Assemble. (Group 3360.) **NO:** Inspect, repair or replace hydraulic line. – – –1/1
❸ **Pump 1 or Pump 2 Flow Rate Pilot Valve Check**	See Pilot Signal Manifold Operation. (Group 9025-05.) Inspect pump 1 or pump 2 flow rate pilot valves. Do flow rate pilot valve spools move freely?	**YES:** Go to Control Valve Spool Check. **NO:** Repair or replace pilot signal manifold flow rate pilot valve spool. See Pilot Signal Manifold Disassemble and Assemble. (Group 3360.) – – –1/1
❹ **Control Valve Spool Check**	See Control Valve Disassemble and Assemble. (Group 3360.) Inspect control valve spool for sticking. Does control valve spool move freely?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace control valve components as necessary. See Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

All Functions Slow Diagnostic Procedure

– – –1/1

❶ **Restricted Pilot Filter Check**	Inspect pilot filter. Is pilot filter free of restriction?	**YES:** Go to Actuating Pilot Pressure Check. **NO:** Replace pilot filter. See Replace Pilot System Oil Filter. (Operator's Manual.)

– – –1/1

❷ **Actuating Pilot Pressure Check**	Key on, use monitor service menu to display Swing / Attachment Control Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Run engine at fast idle and operate problem function. Observe pressure when function held over relief. Is pilot pressure above 3.70 MPa?	**YES:** Go to Pilot Shutoff Solenoid Valve Check. **NO:** Adjust, repair or replace pilot pressure regulating valve. See Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.) **NO:** Pilot pump worn. Inspect, repair or replace pilot pump. See Pilot Pump Remove and Install. (Group 3360.)

– – –1/1

❸ **Pilot Shutoff Solenoid Valve Check**	Inspect pilot shutoff solenoid valve for restriction. Is pilot shutoff solenoid valve free of restriction?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace pilot shutoff solenoid valve. See Pilot Shutoff Solenoid Valve Disassemble and Assemble. (Group 3360.)

– – –1/1

Function Moves in Opposite Direction Diagnostic Procedure

– – –1/1

❶ **Pilot Hose Routing Check**	See Control Lever Pattern Conversion. (Operator's Manual.) Check pilot control hose connections at pilot valve, pilot signal manifold and hydraulic valve. See Pilot Control Valve-to-Pilot Signal Manifold Component Location—Excavator Pattern. (Group 9025-15.) or See Pilot Control Valve-to-Pilot Signal Manifold Component Location—Backhoe Pattern. (Group 9025-15.) Are pilot control hoses connected correctly?	**YES:** Diagnostic procedure complete. **NO:** Correct pilot control hose connections.

– – –1/1

Diagnose Dig Circuit Malfunctions

NOTE: If function operating speeds are very slow also, perform All Hydraulic Functions Slow Diagnostic Procedure first. (Group 9025-15.)

IMPORTANT: Make sure hydraulic oil level, condition, and type of oil is checked before doing this procedure.

- **Hydraulic oil temperature, cold oil can slow hydraulic functions.**
- **Low oil level can cause pump cavitation, see Check Hydraulic Tank Oil Level. (Operator's Manual.)**
- **Suction side air leaks will cause oil to foam or become aerated. Inspect site glass oil condition.**
- **Wrong viscosity oil can cause pump cavitation, see Hydraulic Oil. (Operator's Manual.)**

MR50960,00000F7 –19–26APR06–1/1

All Hydraulic Functions Low Power Diagnostic Procedure

– – –1/1

❶ **Pump 1 or Pump 2 Delivery Pressure Check**	Key on, use monitor service menu to display Pump 1 or Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put power mode switch on HP and work mode on digging. Run engine at fast idle and take boom raise over relief. Record pressure. Is pump 1 or 2 delivery pressure below 30.4 MPa?	**YES:** Adjust main relief valve. See Main Relief and Power Digging Valve Test and Adjustment. (Group 9025-25.) **NO:** Main relief valve pressure is ok. Diagnostic procedure complete.

– – –1/1

Boom Raise Power Is Low During Digging Diagnostic Procedure

NOTE: If function operating speeds are very slow also, perform All Hydraulic Functions Slow Diagnostic Procedure first. (Group 9025-15.)

– – –1/1

❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Are any of the following DTC displayed? • 11302.03 See Boom Raise Pilot Pressure Sensor Voltage High. (Group 9001-10.) • 11302.04 See Boom Raise Pilot Pressure Sensor Voltage Low. (Group 9001-10.) • 11404.03 See Power Dig Solenoid (SG) Valve Feedback Current High. (Group 9001-10.) • 11404.04 See Power Dig Solenoid (SG) Valve Feedback Current Low. (Group 9001-10.)	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Power Digging Switch Check.

– – –1/1

❷ **Power Digging Switch Check**	Key on, use monitor service menu to display Power Digging Switch. See Monitor Service Menu Operation. (Group 9015-16.) Push power dig switch on control lever and observe monitor. Does power digging switch indicator change from off to on?	**YES:** Go to Power Boost Pressure Check. **NO:** Replace power digging switch or wiring.

– – –1/1

❸ **Power Boost Pressure Check**	Key on, use monitor service menu to display Pump 1 or Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put power mode switch on HP and work mode on digging. Run engine at fast idle and take arm-in function over relief. Record pressure. Push and hold power dig switch on control lever and observe monitor. Does pump 1 and 2 delivery pressure increase approximately 2.5 MPa when power dig switch held on?	**YES:** Diagnose problem in main controller. See Main Controller (MCF) Diagnostics Using Dr. ZX. (Group 9015-20.) **NO:** Replace or adjust main relief valve. See Main Relief and Power Digging Valve Test and Adjustment. (Group 9025-25.)

– – –1/1

Some Functions Cannot Be Operated or Are Slow, Travel And Swing Are Normal Diagnostic Procedure

NOTE: If travel and swing are normal, the pilot pump pressure is assumed to be normal in this diagnostic procedure.

– – –1/1

❶ **Actuating Pilot Pressure Check**	Key on, use monitor service menu to display Swing / Attachment Control Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Run engine at fast idle and operate problem function. Observe pressure when function held over relief. Is pilot pressure above 3.70 MPa?	**YES:** Go to Pump Control Pressure Check. **NO:** If boom operation is abnormal, repair pilot valve or shockless valve spool. See Pilot Signal Manifold Disassemble and Assemble. (Group 3360.)

– – –1/1

❷ **Pump Control Pressure Check**	Key on, use monitor service menu to display Pump 1 and Pump 2 Control Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Run at fast idle and observe pressure on monitor as problem function control lever is moved slowly. Does pump control pressure change smoothly when lever is slowly moved?	**YES:** Go to Circuit Relief Valve Check. **NO:** Repair shuttle valve in pilot signal manifold. See Pilot Signal Manifold Disassemble and Assemble. (Group 3360.)

– – –1/1

❸ **Circuit Relief Valve Check**	Key on, use monitor service menu to display Pump 1 or Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put power mode switch on HP and work mode on digging. Run engine at fast idle and operate each digging function over relief. Record pressure. Do all circuit relief valve above 30.4 MPa?	**YES:** Go to Control Valve Spool Check. **NO:** Adjust or repair circuit relief. Perform Circuit Relief Valve Test and Adjustment. (Group 9025-25.) – – –1/1

❹ **Control Valve Spool Check**	Inspect control valve spool for sticking or contamination. See Control Valve 5-Spool Disassemble and Assemble. (Group 3360.) Does control valve spool move freely?	**YES:** Go to Cylinder Drift Check **NO:** Clean and repair valve spool. See Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

❺ **Cylinder Drift Check**	Perform Cylinder Drift Test—Boom, Arm, and Bucket. (Group 9025-25.) Do cylinders pass drift test?	**YES:** Diagnostic procedure completed. **NO:** Repair cylinder seals. – – –1/1

Arm Or Bucket Speeds Are Slow During Combined Function With Boom Lower Diagnostic Procedure

– – –1/1

❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Are any of the following DTC displayed? • 11303.03 See Arm Roll-in Pilot Pressure Continued Sensor Circuit Voltage High. . (Group 9001-10.) • 11303.04 See Arm Roll-in Pilot Pressure Continued Sensor Circuit Voltage Low. (Group 9001-10.) • 11402.03. See Boom Flow Rate Solenoid (SF) Valve Feedback Current High. (Group 9001-10.) • 11402.04 See Boom Flow Rate Solenoid (SF) Valve Feedback Current Low. (Group 9001-10.) • 11995.03 See Arm Roll-Out Pilot Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11995.04 See Arm Roll-Out Pilot Pressure Sensor Circuit Voltage Low. (Group 9001-10.) • 11997.03 See Bucket Dump Pilot Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11997.04 See Bucket Dump Pilot Pressure Sensor Circuit Voltage Low. (Group 9001-10.) • 11998.03 See Boom Down Pilot Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11998.04 See Boom Down Pilot Pressure Sensor Circuit Voltage Low. (Group 9001-10.) • 11999.03 See Bucket Curl Pilot Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11999.04 See Bucket Curl Pilot Pressure Sensor Circuit Voltage Low. (Group 9001-10.)	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Boom Control Pressure Check. – – –1/1

❷ **Boom Control Pilot Pressure Check.**	Key on, use monitor service menu to display Swing / Front Attachment Control Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Record control pilot pressure while doing a combined function of each problem circuit. Is maximum control pilot pressure approximately 3.9 MPA?	**YES:** Repair pump flow rate pilot valve in signal manifold. See Pilot Signal Manifold Operation. (Group 9025-05.) **NO:** Diagnose problem in main controller. See Main Controller (MCF) Diagnostics Using Dr. ZX. (Group 9015-20.). – – –1/1

During Combined Functions, Boom Raise Speed Is Slow And Arm-In Is Jerky Diagnostic Procedure

– – –1/1

❶ Actuating Pilot Pressure Check

Key on, use monitor service menu to display Swing / Attachment Control Pilot Pressure.

See Monitor Service Menu Operation. (Group 9015-16.)

NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)

Run engine at fast idle and operate problem function.

Observe pressure when function held over relief.

Is pilot pressure above 3.70 MPa?

YES: Go to Combined Function Control Pressure Check.

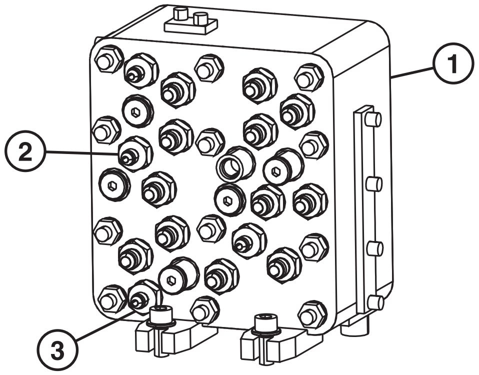
NO: If boom operation is abnormal, repair pilot valve or shockless valve spool.

See Pilot Signal Manifold Disassemble and Assemble. (Group 3360.)

– – –1/1

❷ Combined Function Control Pressure Check.

Install pressure gauge on bucket flow rate control valve port (2).



TX1006257 –UN–12APR06

1—Pilot Signal Manifold
2—To Bucket Flow Rate Control Valve
3—To Travel Flow Combiner Valve

Run engine at fast idle and operate boom raise and arm-in over relief.

Is pressure approximately 3.9 MPa, (3 900 kPa) (39 bar) (570 psi)?

YES: Go to Arm Regenerative Valve Check.

NO: Repair or replace pilot valve.

– – –1/1

❸ Arm Regenerative Valve Check.

See Control Valve Operation. (Group 9025-05.)

Inspect arm regenerative valve.

Is valve bound or scored?

YES: Repair or replace arm regenerative valve.

NO: Repair arm control valve spool.

See Control Valve 5-Spool Disassemble and Assemble. (Group 3360.)

– – –1/1

Boom Mode Switch Off, Boom Will Not Raise Machine Off Ground Diagnostic Procedure

NOTE: If boom mode switch, under left armrest is in on position, it is normal that boom will not raise machine. Check position of this switch before starting this diagnostic procedure.

– – –1/1

❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Are any of the following DTC displayed? • 11989.03 See Boom Mode Solenoid (SC) Valve Feedback Current High. (Group 9001-10.) • 11989.04 See Boom Mode Solenoid (SC) Valve Feedback Current Low. (Group 9001-10.)	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Actuating Pilot Pressure Check. – – –1/1
❷ **Actuating Pilot Pressure Check**	Key on, use monitor service menu to display Swing / Attachment Control Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: To use gauge to check pressure, see Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Run engine at fast idle and lower boom to raise one side of excavator off ground. Monitor pilot pressure. Is maximum pilot pressure approximately 3.9 MPa?	**YES:** Go to Boom Mode Selector Switch Check. **NO:** Diagnose pilot pressure problem at pump or valve. If pilot pressure is low, adjust or replace valve. Perform Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.) – – –1/1
❸ **Boom Mode Selector Switch Check**	Key on, use monitor service menu to display Pump 1 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put boom mode switch in off position. Run engine at fast idle and lower boom to raise one track off ground. Record maximum pressure. Does delivery pressure exceed 31.0 MPa?	**YES:** Diagnostic procedure complete. **NO:** Go to Boom Overload Relief Check. – – –1/1

❹ **Boom Overload Relief Check**	Key on, use monitor service menu to display Pump 1 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put boom mode switch in **on** position. Run engine at fast idle and lower boom to raise one track off ground. Record maximum pressure. Does delivery pressure stop at approximately 14.0 MPa?	**YES:** Diagnostic procedure complete. **NO:** Go to Boom Mode Switch Exchange Check. (Group 9025-15.) – – –1/1

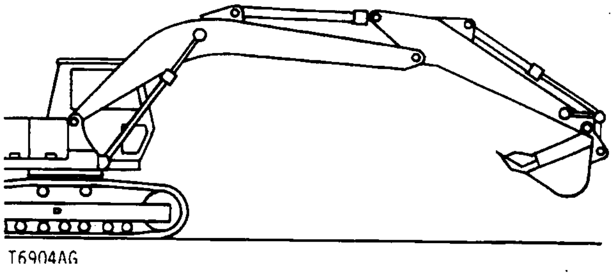
❺ **Boom Mode Switch Exchange Check**	See System Functional Schematic. (Group 9015-10.) Swap boom mode switch S20 with engine fluid level check switch S21. Does machine now raise off ground?	**YES:** Replace boom mode selector switch. **NO:** Go to Continuity Check. – – –1/1

❻ **Continuity Check**	See System Functional Schematic. (Group 9015-10.) Disconnect boom mode switch and connector B in main controller. Check for continuity between terminal #9 harness end connector and terminal #2 of harness and end connector B at main controller. Is continuity measured?	**YES:** Diagnose problem in main controller. See Main Controller (MCF) Diagnostics Using Dr. ZX. (Group 9015-20.). **NO:** Open circuit in harness, replace or repair as required. – – –1/1

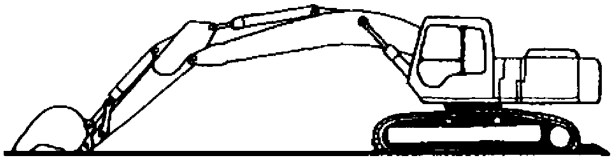
❼ **Circuit Relief Valve Check**	Key on, use monitor service menu to display Pump 1 or Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put power mode switch on HP and work mode on digging. Run engine at fast idle and operate each digging function over relief. Record pressure. Do all circuit relief valve above 30.4 MPa?	**YES:** Diagnostic procedure complete. **NO:** Adjust or repair circuit relief. Perform Circuit Relief Valve Test and Adjustment. (Group 9025-25.) – – –1/1

Load Falls When Control Valve Is Actuated To Raise Load With Engine Running At Slow Idle Diagnostic Procedure

– – –1/1

❶ **Control Valve Lift Check**	Auto idle off. run at slow idle.  T6904AG –UN–06DEC88 *Lift Check Test* Perform Control Valve Lift Check Test. (Group 9005-10.) Check each lift check function. Does load drop during lift check test?	**YES:** Go to Lift Check Valve Inspection. **NO:** Diagnostic procedure complete. – – –1/1

❷ **Lift Check Valve Inspection**	See Control Valve Check Valves Identification And Operation. (Group 9025-05.) See Control Valve Operation. (Group 9025-05.) Inspect control valve check valves for leakage. Are check valves in good working condition?	**YES:** Go to Boom Circuit Leakage Check. **NO:** Repair or replace control valve components as necessary. See Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

❸ **Boom Circuit Leakage Check**	 TX1006310 –UN–12APR06 *Leakage Test Position* Position bucket and arm as shown with bucket cylinder fully retracted. 1. Relieve hydraulic pressure from boom circuit. 2. Remove rod end hoses from both boom cylinders. 3. Drain oil from hoses and cap hose ends with high pressure plugs. 4. Leave cylinder rod end ports open and place container under them to catch any excess oil. 5. Start engine and slowly retract arm cylinder so bucket is approximately 300 mm (12 in.) off ground Does oil leak out of rod end of boom cylinder?	**YES:** Repair boom cylinder piston seals. **NO:** If boom lowers and no oil leaks out of rod end ports, the control valve is leaking. Inspect and repair control valve spool. Look for broken spring or loose spool end. – – –1/1

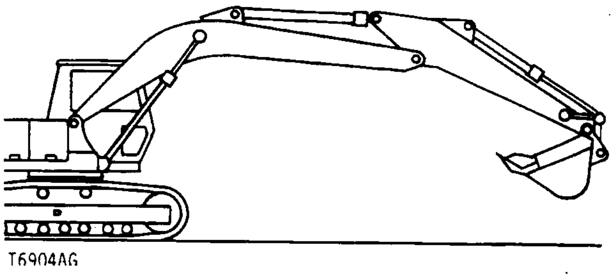
Load Drifts Down When Control Valve Is In Neutral Position Diagnostic Procedure

– – –1/1

❶ Drift Check

Auto idle off, run at slow idle.

Perform Dig Function Drift Check. (Group 9005-10.)



T6904AG –UN–06DEC88

Drift Check Position

Check each dig function per checkout procedure.

Does drift meet checkout specifications?

YES: Diagnostic procedure complete.

NO: Go to Pilot Shutoff Lever Valve Check.

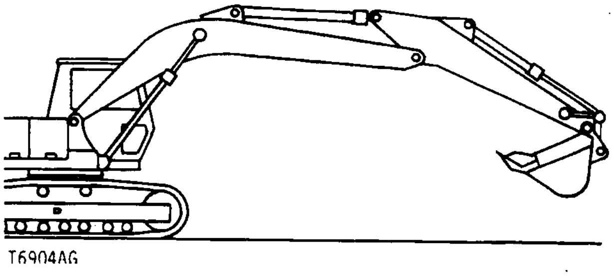
– – –1/1

❷ Pilot Shutoff Lever Valve Check

Auto idle off, run at slow idle.

Check if function drifts when pilot shutoff lever is raised.

Perform Dig Function Drift Check. (Group 9005-10.)



T6904AG –UN–06DEC88

Drift Check Position

Does function drift stop when pilot shutoff lever is raised?

YES: Repair or replace pilot shutoff valve.

NO: Go to Circuit Relief Valve Check.

– – –1/1

❸ Circuit Relief Valve Check

Key on, use monitor service menu to display Pump 1 or Pump 2 Delivery Pressure.

See Monitor Service Menu Operation. (Group 9015-16.)

Put power mode switch on HP and work mode on digging.

Run engine at fast idle and operate each digging function over relief.

Record pressure.

Do all circuit relief valve above 30.4 MPa?

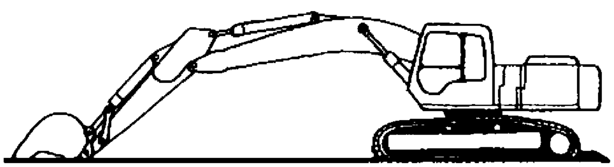
YES: Go to Boom Circuit Leakage Check.

NO: Adjust or repair circuit relief.

Perform Circuit Relief Valve Test and Adjustment. (Group 9025-25.)

– – –1/1

❹ Boom Circuit Leakage Check



TX1006310 –UN–12APR06

Leakage Test

Position bucket and arm as shown with bucket cylinder fully retracted.

1. Relieve hydraulic pressure from boom circuit.
2. Remove rod end hoses from both boom cylinders.
3. Drain oil from hoses and cap hose ends with high pressure plugs.
4. Leave cylinder rod end ports open and place container under them to catch any excess oil.
5. Start engine and slowly retract arm cylinder so bucket is approximately 300 mm (12 in.) off ground

Does oil leak out of rod end of boom cylinder?

YES: Repair boom cylinder piston seals.

NO: If boom lowers and no oil leaks out of rod end ports, the control valve is leaking. Inspect and repair control valve.

See Control Valve Disassemble and Assemble. (Group 3360.)

– – –1/1

Dig Function Speed Is Slow During Combined Operation With Swing Diagnostic Procedure

– – –1/1

Diagnostic Information

❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Are any of the following DTC displayed? • 11200.03 See Pump 1 Delivery Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11200.04 See Pump 1 Delivery Pressure Sensor Circuit Voltage Low. (Group 9001-10.) • 11301.03 See Swing Pilot Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11301.04 See Swing Pilot Pressure Sensor Circuit Voltage Low. (Group 9001-10.) • 11410.03 See Pump 1 (4-Spool) Control Solenoid Valve Feedback Current High. (Group 9001-10.) • 11410.04 See Pump 1 (4-Spool) Control Solenoid Valve Feedback Current Low. (Group 9001-10.) • 11994.04 See Pump 1 (4-Spool) Control Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11994.03 See Pump 1 (4-Spool) Control Pressure Sensor Circuit Voltage Low. (Group 9001-10.)	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Wiring Connector Check.

– – –1/1

❷ **Wiring Connector Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Are all the connectors in good condition?	**YES:** Diagnose problem in main controller. See Main Controller (MCF) Diagnostics Using Dr. ZX. (Group 9015-20.).. **NO:** Repair or replace connectors.

– – –1/1

Dig Function Speed Is Slow During Combined Operation With Swing Diagnostic Procedure

– – –1/1

Diagnostic Information

❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Are any of the following DTC displayed? • 11200.03 See Pump 1 Delivery Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11200.04 See Pump 1 Delivery Pressure Sensor Circuit Voltage Low. (Group 9001-10.) • 11301.03 See Swing Pilot Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11301.04 See Swing Pilot Pressure Sensor Circuit Voltage Low. (Group 9001-10.) • 11400.03 See Pump 2 (5-Spool) Control Solenoid Valve Feedback Current High. (Group 9001-10.) • 11400.04 See Pump 2 (5-Spool) Control Solenoid Valve Feedback Current Low. (Group 9001-10.)	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Boom Mode Selector Switch Check. (Group 9025-15.) – – –1/1

❷ **Boom Mode Selector Switch Check**	Key on, use monitor service menu to display Pump 1 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put boom mode switch in off position. Run engine at fast idle and lower boom to raise one track off ground. Record maximum pressure. Does delivery pressure exceed 31.0 MPa?	**YES:** Diagnostic procedure complete. **NO:** Adjust circuit reliefs. See Circuit Relief Valve Test and Adjustment. (Group 9025-25.) – – –1/1

HP (High Power) Function Does Not Operate, P (Standard) Mode Is Normal Diagnostic Procedure

– – –1/1

❶ **Power Mode Switch Check**	Key on, use monitor service menu to display Power Mode and Actual Engine Speed. See Monitor Service Menu Operation. (Group 9015-16.) Engine off, turn power mode switch to E, P and HP positions and observe monitor. Does monitor display correspond with each switch position?	**YES:** Go to HP Engine Speed Check. **NO:** Check wiring harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) – – –1/1

❷ **HP Engine Speed Check**	Key on, use monitor service menu to display Actual Engine Speed and Power Mode. See Monitor Service Menu Operation. (Group 9015-16.) Put power mode switch on P and work mode on digging. Run engine at fast idle and take arm-in function over relief. Record engine speed. Turn power mode switch to HP position. Does engine speed increase approximately 100 rpm when switch is moved to HP?	**YES:** Go to Power Boost Pressure Check. **NO:** Select correct engine speed and power mode setting. See Engine Speed Control System Operation. (Group 9010-05.) – – –1/1

❸ **Power Boost Pressure Check**	Key on, use monitor service menu to display Pump 1 or Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put power mode switch on HP and work mode on digging. Run engine at fast idle and take arm-in function over relief. Record pressure. Push power dig switch on control lever and observe monitor. Does pump 1 and 2 delivery pressure increase approximately 2.5 MPa when power dig switch held on?	**YES:** Diagnose problem in main controller. See Main Controller (MCF) Diagnostics Using Dr. ZX. (Group 9015-20.). **NO:** Replace or adjust main relief valve. See Main Relief and Power Digging Valve Test and Adjustment. (Group 9025-25.) – – –1/1

❹ **Pressure Sensor Check**	Key on, use monitor service menu to display following pressure sensors. • Pump 1 Delivery Pressure • Pump 2 Delivery Pressure • Boom Up Pilot Pressure • Arm-In Pilot Pressure See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: To use gauge to check pressure, See Main Relief and Power Digging Valve Test and Adjustment or see Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Actuate arm in or boom up function to view reading. Put power mode switch on HP and work mode on digging. Run engine at fast idle and operate arm-in or boom up functions over relief. Record pressure. Do all pump 1 and 2 delivery pressures go above 30.4 MPa? Is maximum pilot pressure approximately 3.9 MPa?	**YES:** Diagnostic procedure complete. **NO:** Replace pressure sensors as required. For pump 1 and pump 2 pressure sensor locations, see Pump Harness (W8) Component Location. (Group 9015-10.) For boom up and arm in pressure sensor locations, see Machine Harness (W2) Component Location. (Group 9015-10.) **NO:** Check wiring harness. For pump 1 and pump 2 pressure sensors, see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) For boom up and arm in pressure sensors, see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

Diagnose Swing Circuit Malfunctions

TX19495,0000007 –19–24APR06–1/1

Swing Speed Slow In Both Directions Diagnostic Procedure

– – –1/1

❶ **Slow Engine Speed**	Key on, use monitor service menu to display Actual Engine Speed. See Monitor Service Menu Operation. (Group 9015-16.) Check engine speed. See Engine Speed Control System Operation. (Group 9010-05.) Does engine speed meet specification?	**YES:** Go to Swing Motor Crossover Relief Valve Check. **NO:** Select correct engine speed. – – –1/1
❷ **Swing Motor Crossover Relief Valve Check**	Perform Swing Motor Crossover Relief Valve Test and Adjustment. (Group 9025-25.) Test swing motor crossover relief valve. Does swing motor crossover relief valve meet specification?	**YES:** Go to Control Valve Leakage Check. **NO:** Repair or replace swing motor crossover relief valve. See Crossover Relief Valve and Make-Up Check Valve Remove and Install. (Group 4360.) – – –1/1
❸ **Control Valve Leakage Check**	See Control Valve Operation. (Group 9025-05.) Inspect swing valve spool in control valve for leakage. Is swing valve spool OK?	**YES:** Go to Swing Motor Leakage Check. **NO:** Repair or replace control valve components as necessary. See Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1
❹ **Swing Motor Leakage Check**	Perform Swing Motor Leakage Test. (Group 9025-25.) Test swing motor for leakage. Does swing motor meet specification?	**YES:** Go to Flow Rate Pilot Valve Check. **NO:** Repair or replace swing motor. See Swing Motor and Park Brake Disassemble. (Group 4360.) – – –1/1

❺ **Flow Rate Pilot Valve Check**	See Pilot Signal Manifold Operation. (Group 9025-05.) Inspect pump 1 or pump 2 flow rate pilot valves. Do flow rate pilot valve spools move freely?	**YES:** Go to Pump 2 Flow Check. **NO:** Repair or replace pilot signal manifold flow rate pilot valve spool. See Pilot Signal Manifold Disassemble and Assemble. (Group 3360.)

– – –1/1

❻ **Pump 2 Flow Check**	Perform Cycle Times Check. (Group 9005-10.) Check travel cycle times. Slow travel cycle times may indicate worn pump. If travel cycle times do not meet specification, check pump flow. Perform Pump Flow Test. (Group 9025-25.) Do travel cycle times and pump flow meet specification?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace pump. See Pump Remove and Install. (Group 3360.)

– – –1/1

Swing Speed Slow or Does Not Operate In One Direction Diagnostic Procedure

IMPORTANT: If dig and travel functions normally, the pilot pump is considered to be ok. If all functions are slow, perform All Hydraulic Functions Slow Diagnostic Procedure first. (Group 9025-15.)

– – –1/1

❶ **Actuating Pilot Pressure Check**	Key on, use monitor service menu to display Swing / Attachment Control Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Run engine at fast idle and operate problem function. Observe pressure when function held over relief. Is pilot pressure above 3.70 MPa?	**YES:** Go to Park Brake Release Pressure Check. (Group 9025-15.) **NO:** Go to Pilot Valve Check.

– – –1/1

❷ Pilot Valve Check

Check combined function swing speed.

Is swing speed still slow or inoperative?

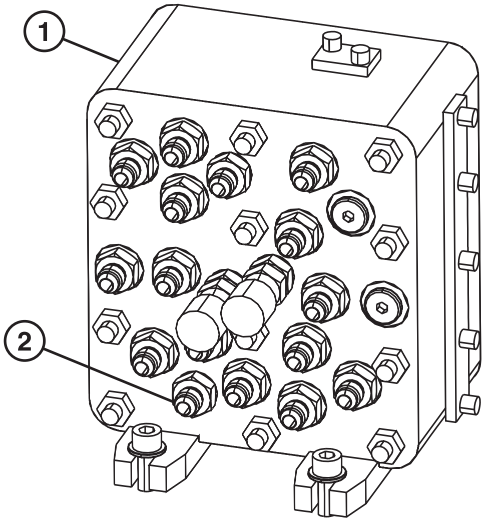
YES: Inspect and repair swing pilot valve.

See Pilot Signal Manifold Operation. (Group 9025-05.)

NO: Diagnostic procedure complete.

– – –1/1

❸ Park Brake Release Pressure Check



TX1006370 –UN–17APR06

1—Signal Pilot Manifold
2—To Swing Park Brake

Remove park brake hose and install pressure gauge in port (2).
Measure parking brake release pressure while holding arm function over relief.

Is pressure between 3.4—4.9 MPa?

YES: Go to Swing Motor Parking Brake Check.

NO: Repair or replace swing park brake release valve in signal control valve.

See Pilot Signal Manifold Disassemble and Assemble. (Group 3360.)

– – –1/1

❹ Swing Motor Parking Brake Check

Inspect swing motor parking brake release valve.

Is valve bound or scored?

YES: Repair or replace release valve.

See Swing Motor and Park Brake Disassemble. (Group 4360.)

NO: Go to Circuit Relief Check.

– – –1/1

❺ **Circuit Relief Valve Check**	Perform Circuit Relief Valve Test and Adjustment. (Group 9025-25.) Check swing relief pressure. Do circuit relief valves meet test specifications?	**YES:** Go to Swing Motor Case Drain Check. **NO:** Adjust or repair circuit relief. – – –1/1

❻ **Swing Motor Case Drain Check**	Perform Swing Motor Leakage Test. (Group 9025-25.) Check if swing case drain leakage is normal. Does case drain leakage meet specification?	**YES:** Remove and repair motor. **NO:** Inspect swing reduction gear. See Swing Gearbox Disassemble and Assemble. (Group 4350.) – – –1/1

❼ **Control Valve Check**	See Control Valve Operation. (Group 9025-05.) Inspect control valve for sticking spool. For component location. Does control valve spool move freely?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace control valve components as necessary. See Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

Swing Is Too Fast Diagnostic Procedure

– – –1/1

❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Are any of the following DTC displayed? • 11301.03 See Swing Pilot Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11301.04 See Swing Pilot Pressure Sensor Circuit Voltage Low. (Group 9001-10.)	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Swing Pressure Sensor Check. – – –1/1

❷ **Swing Pressure Sensor Check**	Operate swing with control lever partially moved and note speed. Move swing control lever full travel and note swing speed. Does swing speed slow when control lever is fully activated?	**YES:** Replace swing pressure sensor. **NO:** Swing horsepower reducing control is malfunctioning. See Main Controller (MCF) Diagnostics Using Dr. ZX. (Group 9015-20.) – – –1/1

Upperstructure Drift With Swing Valve In Neutral Diagnostic Procedure

– – –1/1

❶ **Swing Park Brake Check**	See Swing Motor Park Brake Release Circuit Operation. (Group 9025-05.) See Swing Motor and Park Brake Disassemble. (Group 4360.) Inspect park brake. Is park brake OK?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace park brake. See Swing Motor and Park Brake Disassemble. (Group 4360.) – – –1/1

Swing Function Does Not Operate Diagnostic Procedure

– – –1/1

❶ **Actuating Pilot Pressure Check**	Key on, use monitor service menu to display Swing / Attachment Control Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Run engine at fast idle and operate problem function. Observe pressure when function held over relief. Is pilot pressure above 3.70 MPa?	**YES:** Go to Park Brake Release Pressure Check. (Group 9025-15.) **NO:** If pressure is low, adjust or replace valve. Perform Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.) – – –1/1

❷ **Flow Rate Pilot Valve Check**	See Pilot Signal Manifold Operation. (Group 9025-05.) Inspect pump 1 or pump 2 flow rate pilot valves. Do flow rate pilot valve spools move freely?	**YES:** Go to Control Valve Check. **NO:** Repair or replace pilot signal manifold flow rate pilot valve spool. See Pilot Signal Manifold Disassemble and Assemble. (Group 3360.) – – –1/1

❸ **Control Valve Check**	See Control Valve Operation. (Group 9025-05.) Inspect control valve for sticking spool. For component location. Does control valve spool move freely?	**YES:** Go to Swing Motor And Gearbox Check. **NO:** Repair or replace control valve components as necessary. See Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

❹ **Swing Motor And Gearbox Check**	Inspect swing motor and gearbox. Are swing motor and gearbox OK?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace swing motor and gearbox. See Swing Gearbox Disassemble and Assemble. (Group 4350.) See Swing Motor and Park Brake Disassemble. (Group 4360.) – – –1/1

Diagnose Travel Circuit Malfunctions

TX19495,0000008 –19–26APR06–1/1

Left Travel Does Not Move During Single Travel Operation Diagnostic Procedure

NOTE: Pressure oil from pump 1 is also routed to the arm and boom cylinders, so these functions can move at slightly slower speed during single operation. In level crowd operation, pressure oil is routed to the boom before the arm, so arm speed can become very slow. The following item can also cause this problem.

- *The pump 2 flow rate is minimized due to a malfunction. This will cause the left travel motor and swing motors to be very slow.*

IMPORTANT: All of the below symptoms must occur at same time to use this diagnostic procedure.

- Single swing operation speed is slow.
- Arm is slightly slow during arm level crowding operation.
- Precision control of hydraulic function cannot be performed.

– – –1/1

❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Do any DTC exist?	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Swing Operation Check.

– – –1/1

❷ **Swing Operation Check**	Key on, use monitor service menu to display Swing / Attachment Control Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Perform Cycle Times Check. (Group 9005-10.) Check swing speed. Is swing speed normal?	**YES:** Go to Pump 2 Pressure Check. **NO:** Check monitor and see if swing pilot pressure is at 0 while swing is in neutral. If pressure is above 0 in neutral, locate source of leakage in circuit.

– – –1/1

❸ **Pump 2 Delivery Pressure Check**	Key on, use monitor service menu to display Pump 1 or Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Monitor pump 2 delivery pressure on monitor while doing all hydraulic functions except right travel and bucket. Does pump 2 delivery pressure change when control lever is moved?	**YES:** Go to Pump 2 Control Pressure Check. **NO:** Go to Left Travel Check. – – –1/1

❹ **Left Travel Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Switch pump 2 delivery sensor with pump 1 delivery sensor. Is does left track now move?	**YES:** Replace pump 2 delivery sensor. **NO:** Flow check pump 2. Perform Pump Flow Test. (Group 9025-25.) – – –1/1

❺ **Pump 2 Control Pressure Check**	Key on, use monitor service menu to display Pump 2 Control Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Jack up left track so track is free to rotate without ground resistance. Monitor pump 2 control pressure on monitor while fully engaging left track control lever. Does the control pressure change when travel control lever is moved?	**YES:** Go to Pump 2 Pressure Sensor Swap Check. **NO:** Replace pump 2 regulator. – – –1/1

❻ **Pump 2 Pressure Sensor Swap Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Switch pump 2 regulator sensor with pump 1 regulator sensor. Fully engaging left track control lever. Is does left track now move?	**YES:** Replace regulator pressure sensor. **NO:** Go to Pump 2 Control Solenoid Valve Check. – – –1/1

❼ **Pump 2 Control Solenoid Valve Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Inspect pump 2 control solenoid for sticking. Is control solenoid in good working condition?	**YES:** Diagnostic procedure complete. **NO:** Replace pump 2 control solenoid valve.

– – –1/1

Right Travel Does Not Move During Single Travel Operation Diagnostic Procedure

NOTE: Pressure oil from pump 1 is also routed to the arm and boom cylinders, so these functions can move at slightly slower speed during single operation. In level crowd operation, pressure oil is routed to the arm before the boom, so that boom raise becomes very slow if at all. The following item can also cause this problem.

- *The pump 1 flow rate is minimized due to a malfunction. This will cause the right travel motor and bucket cylinder to be very slow.*

IMPORTANT: All of the below symptoms must occur at same time to use this diagnostic procedure.

- Single bucket operation speed is slow.
- Boom will not raised properly during arm level crowding operation.
- Precision control of hydraulic function cannot be performed.

– – –1/1

❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Do any DTC exist?	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Pump 1 Delivery Pressure Check.

– – –1/1

❷ **Pump 1 Delivery Pressure Check**	Key on, use monitor service menu to display Pump 1 or Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Monitor pump 1 delivery pressure on monitor while doing all hydraulic functions except left travel and swing. Does pump 1 delivery pressure change when control lever is moved?	**YES:** Go to Pump 1 Control Pressure Check. **NO:** Go to Right Travel Check.

– – –1/1

❸ **Right Travel Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Switch pump 1 delivery sensor with pump 2 delivery sensor. Is does right track now move?	**YES:** Replace pump 1 delivery sensor. **NO:** Flow check pump 1. Perform Pump Flow Test. (Group 9025-25.) – – –1/1
❹ **Pump 1 Control Pressure Check**	Key on, use monitor service menu to display Pump 1 Control Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Jack up right track so track is free to rotate without ground resistance. Monitor pump 1 control pressure on monitor while fully engaging right track control lever. Does the control pressure change when travel control lever is moved?	**YES:** Go to Pump 1 Pressure Sensor Swap Check. **NO:** Replace pump 1 pressure regulator. – – –1/1
❺ **Pump 1 Pressure Sensor Swap Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Switch pump 1 regulator sensor with pump 2 regulator sensor. Fully engaging right track control lever. Is does right track now move?	**YES:** Replace regulator pressure sensor. **NO:** Go to Pump 1 Control Solenoid Valve Check. – – –1/1
❻ **Pump 1 Control Solenoid Valve Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Inspect pump 1 control solenoid for sticking. Is control solenoid in good working condition?	**YES:** Diagnostic procedure complete. **NO:** Replace pump 1 control solenoid valve. – – –1/1

Both Tracks Do Not Rotate Or Move Slowly In Either Direction Diagnostic Procedure

IMPORTANT: If dig and swing function normally, the pilot pump is considered to be ok. If all functions are slow, perform All Hydraulic Functions Slow Diagnostic Procedure first. (Group 9025-15.)

– – –1/1

❶ **Actuating Pilot Pressure Check**	Key on, use monitor service menu to display Travel Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Run engine at fast idle and raise problem track off ground. Observe pressure when operating lever full travel. Is pilot pressure above 3.70 MPa?	**YES:** Go to Circuit Relief Valve Check. **NO:** If pressure is low, adjust or replace valve. Perform Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.) – – –1/1

❷ **Circuit Relief Valve Check**	Key on, use monitor service menu to display Pump 1 or Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put power mode switch on HP and work mode on digging. Run engine at fast idle and operate each track over relief. Record pressure. Do all circuit relief valve above 30.4 MPa?	**YES:** Diagnostic procedure complete. **NO:** Adjust or repair circuit relief. Perform Circuit Relief Valve Test and Adjustment. (Group 9025-25.) – – –1/1

One Track Does Not Rotate Or Moves Slowly Diagnostic Procedure

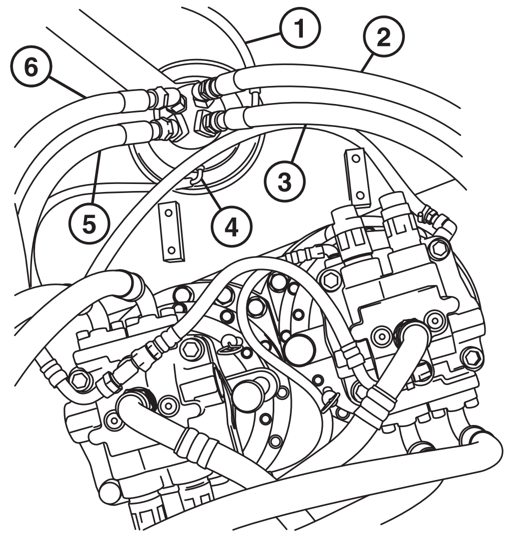
– – –1/1

❶ **Track Sag Check**	Check track sag. See Check and Adjust Track Sag. (Operator's Manual.) Is track sag within specification on both tracks?	**YES:** Go to Actuating Pilot Pressure Check. **NO:** Adjust track sag. – – –1/1

❷ **Actuating Pilot Pressure Check**	Key on, use monitor service menu to display Travel Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Run engine at fast idle and raise problem track off ground. Observe pressure when operating lever full travel. Is pilot pressure above 3.70 MPa?	**YES:** Go to Circuit Relief Valve Check. **NO:** If pressure is low, adjust or replace valve. Perform Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.) – – –1/1

❸ **Circuit Relief Valve Check**	Key on, use monitor service menu to display Pump 1 or Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put power mode switch on HP and work mode on digging. Run engine at fast idle and operate each travel function over relief. Record pressure. Do all circuit relief valve above 30.4 MPa?	**YES:** Go to Hose Swap Check. **NO:** Go to Travel Relief Swap. – – –1/1

❹ **Travel Relief Swap**	Swap travel forward and reverse circuit reliefs and check if symptom changes. Does symptom move to other track?	**YES:** Repair seal in rotary manifold. **NO:** Replace circuit relief that can not be adjusted to specifications. Perform Circuit Relief Valve Test and Adjustment. (Group 9025-25.) – – –1/1

❺ **Hose Swap Check**	 TX1006354 –UN–19APR06 *Rotary Manifold* **1—Drain Hose** **2—Right Travel—Forward** **3—Right Travel—Reverse** **4—Pilot Speed Change Hose** **5—Left Travel—Reverse** **6—Left Travel—Forward** Swap the right travel hoes (2 and 3) with left travel hoses (5 and 6) at top of rotary manifold. Does symptom switch to other track?	**YES:** Inspect and repair bound control valve spool. **NO:** Go to Travel Motor Leakage Check. – – –1/1

❻ **Travel Motor Leakage Check**	Perform Travel Motor Leakage Test. (Group 9025-25.) Do travel motors meet leakage specifications?	**YES:** Go to Travel Motor Crossover Relief Check. **NO:** Inspect and repair travel motor. – – –1/1

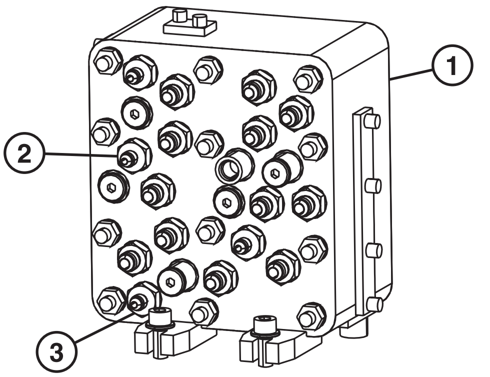
❼ **Travel Motor Crossover Relief Check**	See Travel Motor Crossover Relief Valve Test and Adjustment. (Group 9025-25.) Inspect travel motor crossover relief valves. Are travel motor crossover relief valves OK?	**YES:** Go to Servo Piston Shuttle Valve Check. **NO:** Repair or replace travel motor crossover relief valve. See Travel Motor Cover Disassemble and Assemble. (0260.) – – –1/1

❽ **Servo Piston Shuttle Valve Check**	See Park Brake Valve Housing Disassemble and Assemble. (Group 0260. Inspect servo piston shuttle valve. Does shuttle valve operate correctly?	**YES:** Inspect travel reduction gear. **NO:** Repair or replace motor swash plate angle control. See Travel Motor Cover Disassemble and Assemble. (0260.) – – –1/1

Machine Mistracks During Combined Operation With Dig Functions Diagnostic Procedure

– – –1/1

❶ **Flow Combiner Valve Check**	See Control Valve Operation. (Group 9025-05.) Remove and inspect flow combiner valve in control valve. Is valve in good working condition?	**YES:** Go to Flow Combiner Signal Pressure Check. **NO:** Repair or replace flow combiner valve. See Control Valve 5-Spool Disassemble and Assemble. (Group 3360.) – – –1/1

❷ **Flow Combiner Signal Pressure Check**	 TX1006257 –UN–12APR06 **1—Pilot Signal Manifold** **2—To Bucket Flow Rate Control Valve** **3—To Travel Flow Combiner Valve** Disconnect travel flow combiner hose from port (3) and install pressure gauge. Run engine at fast idle and record signal pressure. Is pressure approximately 3.9 MPa, (3900 kPa) (39 bar) (570 psi)?	**YES:** Repair or replace flow combiner valve control spool in signal control valve. See Pilot Signal Manifold Disassemble and Assemble. (Group 3360.) **NO:** Go to Load Check Valve. – – –1/1
❸ **Load Check Valve**	See Control Valve Operation. (Group 9025-05.) Inspect load check valve for damage. Is load check in good working condition?	**YES:** Go to Travel Motor Leakage Check **NO:** Repair or replace load check valve. See Control Valve 5-Spool Disassemble and Assemble. (Group 3360.) – – –1/1
❹ **Travel Motor Leakage Check**	Perform Travel System Tracking Check. (Group 9005-10.) Check tracking while descending a hill. If tracking is within specification when descending a hill, but not when on the level or going up hill, travel motor leakage is indicated. If tracking does not meet specification, check travel motor leakage. Perform Travel Motor Leakage Test. (Group 9025-25.) Does tracking and motor leakage meet specification?	**YES:** Go to Rotary Manifold Leakage Check. **NO:** If travel motor leakage does not meet specification, repair or replace travel motor. See Travel Motor and Park Brake Disassemble and Assemble. (Group 0260.) – – –1/1

❺ Rotary Manifold Leakage Check	Perform Rotary Manifold Air Test. (Group 0260.) Inspect rotary manifold for leakage. Is rotary manifold OK?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace rotary manifold. See Rotary Manifold Disassemble and Assemble. (Group 0260.)

– – –1/1

Travel Mode Will Not Switch From Slow To Fast Speed Diagnostic Procedure

– – –1/1

❶ DTC Check	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Are any of the following DTC displayed? • 11405.03 See Travel Speed Solenoid (SI) Valve Current Feedback High. (Group 9001-10.) • 11405.04 See Travel Speed Solenoid (SI) Valve Current Feedback Low. (Group 9001-10.) • 11991.03 See Travel Right Pilot Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11991.04 See Travel Right Pilot Pressure Sensor Circuit Voltage Low. (Group 9001-10.) • 11993.03 See Travel Left Pilot Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11993.04 See Travel Left Pilot Pressure Sensor Circuit Voltage Low. (Group 9001-10.)	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Travel Mode Selector Switch Check.

– – –1/1

❷ Travel Mode Selector Switch Check	Key on, use monitor service menu to display Travel Mode Switch. See Monitor Service Menu Operation. (Group 9015-16.) Turn the high speed mode on and check if display indicator is on. Does indicator change from L to H?	**YES:** Go to Motor Speed Control Pressure Check.. (Group 9025-15.) **NO:** Go to Harness Check.

– – –1/1

❸ **Harness Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Check for open in harness between switch and main controller. Does harness have open wire?	**YES:** Repair or replace harness. **NO:** Replace travel mode switch. – – –1/1

❹ **Motor Speed Control Pressure Check**	Key on, use monitor service menu to display Travel Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Set travel to fast mode observe travel pilot pressure on monitor. Is maximum pressure approximately 3.9 MPa?	**YES:** Go to Servo Piston Shuttle Valve Check **NO:** Diagnose monitor controller. See Main Controller (MCF) Diagnostics Using Dr. ZX. (Group 9015-20.) – – –1/1

❺ **Servo Piston Shuttle Valve Check**	See Park Brake Valve Housing Disassemble and Assemble. (Group 0260.) Inspect servo piston shuttle valve. Does shuttle valve operate correctly?	**YES:** Inspect Travel Reduction Gear Check. **NO:** Repair or replace motor swash plate angle control. See Travel Motor Cover Disassemble and Assemble. (0260.) – – –1/1

❻ **Travel Reduction Gear Check**	See Travel Gearbox Disassemble and Assemble. (Group 0250.) Inspect travel reduction gear. Is reduction gear in good condition?	**YES:** Remove and inspect travel motor for damage. **NO:** Replace gear. – – –1/1

Travel Park Brakes Do Not Apply Diagnostic Procedure

– – –1/1

❶ **Counterbalance Valve Spool Check**	See Travel Motor Cover Disassemble and Assemble. (0260.) Inspect counterbalance valve. Is counterbalance valve spool move freely release oil from piston cavity?	**YES:** Go to Travel Motor and Gearbox Check. **NO:** Repair or replace counterbalance valve. See Travel Motor Cover Disassemble and Assemble. (0260.) – – –1/1

❷ **Travel Motor and Gearbox Check**	See Travel Motor and Park Brake Disassemble and Assemble. (Group 0260.) See Travel Gearbox Disassemble and Assemble. (Group 0250.) Inspect travel motor and gearbox for mechanical failure. Is travel motor and gearbox OK?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace travel motor or gearbox. – – –1/1

Track Will Not Move In One Direction Diagnostic Procedure

– – –1/1

❶ **Pilot Circuit Check**	Perform Diagnose Pilot Circuit Malfunctions. (Group 9025-15.) Is pilot circuit OK?	**YES:** Go to Travel Motor Crossover Relief Valve Check. **NO:** Repair or replace pilot circuit malfunction. – – –1/1

❷ **Travel Motor Crossover Relief Valve Check**	Perform Travel Motor Crossover Relief Valve Test and Adjustment. (Group 9025-25.) Inspect travel motor crossover relief valve. Is travel motor crossover relief valve OK?	**YES:** Go to Control Valve Check. **NO:** Repair or replace travel motor crossover relief valve. See Travel Motor Cover Disassemble and Assemble. (0260.) – – –1/1

❸ **Control Valve Check**	See Control Valve Operation. (Group 9025-05.) Inspect for stuck travel valve spool in control valve. Does travel valve spool move freely?	**YES:** Go to Counterbalance Valve Spool Check. **NO:** Repair or replace control valve components as necessary. See Control Valve Disassemble and Assemble. (Group 3360.)

– – –1/1

❹ **Counterbalance Valve Spool Check**	See Travel Motor and Park Brake Valve Operation. (Group 9025-05.) Inspect counterbalance valve. Does counterbalance valve spool move freely?	**YES:** Go to Rotary Manifold Leakage Check. **NO:** Repair or replace counterbalance valve. See Travel Motor Cover Disassemble and Assemble. (0260.)

– – –1/1

❺ **Rotary Manifold Leakage Check**	Perform Rotary Manifold Air Test. (Group 0260.) Inspect rotary manifold for leakage. Is rotary manifold OK?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace rotary manifold. See Rotary Manifold Disassemble and Assemble. (Group 0260.)

– – –1/1

Track Will Not Move In Either Direction Diagnostic Procedure

– – –1/1

❶ **Pilot Circuit Check**	Perform Diagnose Pilot Circuit Malfunctions. (Group 9025-15.) Is pilot circuit OK?	**YES:** Go to Travel Motor Crossover Relief Valve Check. **NO:** Repair or replace pilot circuit malfunction.

– – –1/1

❷ **Travel Motor Crossover Relief Valve Check**	Perform Travel Motor Crossover Relief Valve Test and Adjustment. (Group 9025-25.) Inspect travel motor crossover relief valve. Is travel motor crossover relief valve OK?	**YES:** Go to Control Valve Check. **NO:** Repair or replace travel motor crossover relief valve. See Travel Motor Cover Disassemble and Assemble. (0260.) – – –1/1

❸ **Control Valve Check**	See Control Valve Operation. (Group 9025-05.) Inspect for stuck travel valve spool in control valve. Does travel valve spool move freely?	**YES:** Go to Counterbalance Valve Spool Check. **NO:** Repair or replace control valve components as necessary. See Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

❹ **Counterbalance Valve Spool Check**	See Travel Motor and Park Brake Valve Operation. (Group 9025-05.) Inspect counterbalance valve. Does counterbalance valve spool move freely?	**YES:** Go to Rotary Manifold Leakage Check. **NO:** Repair or replace counterbalance valve. See Travel Motor Cover Disassemble and Assemble. (0260.) – – –1/1

❺ **Rotary Manifold Leakage Check**	Perform Rotary Manifold Air Test. (Group 0260.) Inspect rotary manifold for leakage. Is rotary manifold OK?	**YES:** Go to Travel Motor Check. **NO:** Repair or replace rotary manifold. See Rotary Manifold Disassemble and Assemble. (Group 0260.) – – –1/1

❻ **Travel Motor And Gearbox Check**	See Travel Motor and Park Brake Disassemble and Assemble. (Group 0260.) See Travel Gearbox Disassemble and Assemble. (Group 0250.) Inspect travel motor and gearbox for mechanical failure. Is travel motor and gearbox OK?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace travel motor or gearbox. – – –1/1

Machine Mistracks At All Speeds In Both Directions Diagnostic Procedure

– – –1/1

❶ **Track Sag Check**	Check track sag. See Check and Adjust Track Sag. (Operator's Manual.) Is track sag within specification?	**YES:** Go to Actuating Pilot Pressure Check. **NO:** Adjust track sag. – – –1/1
❷ **Actuating Pilot Pressure Check**	Key on, use monitor service menu to display Travel Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Run engine at fast idle and raise problem track off ground. Observe pressure when operating lever full travel. Is pilot pressure above 3.70 MPa?	**YES:** Go to Travel Motor Crossover Relief Valve Check. **NO:** If pressure is low, adjust or replace valve. Perform Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.) – – –1/1
❸ **Travel Motor Crossover Relief Valve Check**	Perform Travel Motor Crossover Relief Valve Test and Adjustment. (Group 9025-25.) Test travel motor crossover relief valve. Is travel motor crossover relief valve OK?	**YES:** Go to Servo Piston Shuttle Valve Check. **NO:** Repair or replace travel motor crossover relief valve. See Travel Motor Cover Disassemble and Assemble. (0260.) – – –1/1

❹ **Servo Piston Shuttle Valve Check**	See Park Brake Valve Housing Disassemble and Assemble. (Group 0260. Inspect servo piston shuttle valve. Does shuttle valve operate correctly?	**YES:** Go to Travel Motor Leakage Check. **NO:** Repair or replace motor swash plate angle control. See Travel Motor Cover Disassemble and Assemble. (0260.) – – –1/1

❺ **Travel Motor Leakage Check**	Check tracking while descending a hill. Perform Travel System Tracking Check. (Group 9005-10.) If tracking does not meet specification, check travel motor leakage. Perform Travel Motor Leakage Test. (Group 9025-25.) If tracking is within specification when descending a hill, but not when on the level or going up hill, travel motor leakage is indicated. Does tracking and motor leakage meet specification?	**YES:** Go to Rotary Manifold Leakage Check. **NO:** If travel motor leakage does not meet specification, repair or replace travel motor. See Travel Motor and Park Brake Disassemble and Assemble. (Group 0260.) – – –1/1

❻ **Rotary Manifold Leakage Check**	Perform Rotary Manifold Air Test. (Group 0260.) Inspect rotary manifold for leakage. Is rotary manifold OK?	**YES:** Go to Pump 1 or Pump 2 Regulator Check. **NO:** Repair or replace rotary manifold. See Rotary Manifold Disassemble and Assemble. (Group 0260.) – – –1/1

❼ **Pump 1 or Pump 2 Regulator Check**	Perform Pump Regulator Test and Adjustment—Minimum Flow. (Group 9025-25.) Perform Pump Regulator Test and Adjustment—Maximum Flow. (Group 9025-25.) Test pump 1 or pump 2 regulators. Does pump 1 or pump 2 regulator meet specification?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace pump 1 or pump 2 regulator. See Pump Regulator Disassemble and Assemble. (Group 3360.) – – –1/1

Slow Travel Speed Or Low Power Diagnostic Procedure

– – –1/1

❶ **Track Sag Check**	Check track sag. See Check and Adjust Track Sag. (Operator's Manual.) Is track sag within specification?	**YES:** Go to Travel Motor Crossover Relief Valve Check. **NO:** Adjust track sag.

– – –1/1

❷ **Travel Motor Crossover Relief Valve Check**	Perform Travel Motor Crossover Relief Valve Test and Adjustment. (Group 9025-25.) Test travel motor crossover relief valves. Are travel motor crossover relief valves OK?	**YES:** Go to Travel Park Brake Check. **NO:** Repair or replace travel motor crossover relief valve. See Travel Motor Cover Disassemble and Assemble. (0260.)

– – –1/1

❸ **Travel Park Brake Check**	See Travel Motor and Park Brake Disassemble and Assemble. (Group 0260.) Inspect travel park brake. Is travel park brake OK?	**YES:** Go to Travel Motor Leakage Check. **NO:** Repair or replace travel park brake.

– – –1/1

❹ **Travel Motor Leakage Check**	Check tracking while descending a hill. Perform Travel System Tracking Check. (Group 9005-10.) If tracking is within specification when descending a hill, but not when on the level or going up hill, travel motor leakage is indicated. If tracking does not meet specification, check travel motor leakage. Perform Travel Motor Leakage Test. (Group 9025-25.) Does tracking and motor leakage meet specification?	**YES:** Go to Rotary Manifold Leakage Check. **NO:** If travel motor leakage does not meet specification, repair or replace travel motor. See Travel Motor and Park Brake Disassemble and Assemble. (Group 0260.)

– – –1/1

❺ **Rotary Manifold Leakage Check**	Perform Rotary Manifold Air Test. (Group 0260.) Inspect rotary manifold for leakage. Is rotary manifold OK?	**YES:** Go to Hydraulic Pump Check. **NO:** Repair or replace rotary manifold. See Rotary Manifold Disassemble and Assemble. (Group 0260.) – – –1/1

❻ **Hydraulic Pump Check**	Perform Cycle Times Check. (Group 9005-10.) Slow travel cycle times may indicate worn pump. If travel cycle times do not meet specification, check pump flow. Perform Pump Flow Test. (Group 9025-25.) Do travel cycle times and pump flow meet specification?	**YES:** Go to HP Engine Speed Check. **NO:** Repair or replace pump. See Pump Remove and Install. (Group 3360.) – – –1/1

❼ **HP Engine Speed Check**	Key on, use monitor service menu to display Actual Engine Speed and Power Mode. See Monitor Service Menu Operation. (Group 9015-16.) Put power mode switch on P and work mode on digging. Run engine at fast idle and take arm-in function over relief. Record engine speed. Turn power mode switch to HP position. Does engine speed increase approximately 100 rpm when switch is moved to HP?	**YES:** Go to Power Boost Pressure Check. **NO:** Select correct engine speed and power mode setting. See Engine Speed Control System Operation. (Group 9010-05.) – – –1/1

❽ **Power Boost Pressure Check**	Key on, use monitor service menu to display Pump 1 or Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put power mode switch on HP and work mode on digging. Run engine at fast idle and take arm-in function over relief. Record pressure. Push power dig switch on control lever and observe monitor. Does pump 1 and 2 delivery pressure increase approximately 2.5 MPa when power dig switch held on?	**YES:** Diagnostic procedure complete. **NO:** Replace or adjust main relief valve. See Main Relief and Power Digging Valve Test and Adjustment. (Group 9025-25.) – – –1/1

Combined Travel And Dig Functions Slow Or No Power Diagnostic Procedure

– – –1/1

❶ **Travel Flow Combiner Valve Check**	See Pilot Signal Manifold Disassemble and Assemble. (Group 3360.) Inspect travel flow combiner pilot valve (SL) in pilot signal manifold for stuck spool. See Travel Flow Combiner Valve Operation. (Group 9025-05.) Inspect travel flow combiner valve. See Control Valve Disassemble and Assemble. (Group 3360.) Is travel flow combiner valve circuit OK?	**YES:** Go to Control Valve Check. **NO:** Repair or replace travel flow combiner valve circuit components. – – –1/1
❷ **Control Valve Check**	See Control Valve Operation. (Group 9025-05.) Inspect for stuck travel valve spool in control valve. For component location, Does travel valve spool move freely?	**YES:** Go to Travel Is “Jerky” Diagnostic Procedure. (Group 9025-15.) **NO:** Repair or replace control valve components as necessary. See Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

Travel Is “Jerky” Diagnostic Procedure

– – –1/1

Track Sag Check	Check track sag. See Check and Adjust Track Sag. (Operator’s Manual.) Is track sag within specification?	**YES:** Go to Track Roller Check. **NO:** Adjust track sag. – – –1/1
Track Roller Check	See Disassemble and Assemble Track Roller. (Group 0130.) Inspect rollers oil level. Is oil level to specification?	**YES:** Go to Travel Park Brake Check. **NO:** Add oil as required. – – –1/1

Travel Park Brake Check	See Travel Motor and Park Brake Disassemble and Assemble. (Group 0260.) Inspect travel park brake. Is travel park brake OK?	**YES:** Go to Travel Motor Leakage Check. **NO:** Repair or replace travel park brake.

– – –1/1

Travel Motor And Gearbox Check	See Travel Motor and Park Brake Disassemble and Assemble. (Group 0260.) See Travel Gearbox Disassemble and Assemble. (Group 0250.) Inspect travel motor and gearbox for mechanical failure. Is travel motor and gearbox OK?	**YES:** Go to Undercarriage Components Check. **NO:** Repair or replace travel motor or gearbox.

– – –1/1

Undercarriage Components Check	See SP326 Undercarriage Appraisal Manual. Inspect undercarriage components. Do undercarriage components meet specification?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace undercarriage components.

– – –1/1

Machine Will Not Hold Back And Park Brakes Engage And Disengage When Traveling Down An Incline Diagnostic Procedure

– – –1/1

❶ **Counterbalance Valve Spool Check**	See Travel Motor Cover Disassemble and Assemble. (0260.) Inspect counterbalance valve. Does counterbalance valve spool move freely?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace counterbalance valve.

– – –1/1

Machine Will Not Turn Smoothly In One Direction Or Park Brake Grabs Diagnostic Procedure

– – –1/1

❶ **Counterbalance Valve Spool Check**	See Travel Motor Cover Disassemble and Assemble. (0260.) Inspect counterbalance valve. Does counterbalance valve spool move freely?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace counterbalance valve.

– – –1/1

Diagnose Counterweight Removal System Malfunctions

MR50960,00000F8 –19–25APR06–1/1

Counterweight Removal / Installation Device Does Not Operate Or Low Power Diagnostic Procedure

– – –1/1

❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Are any of the following DTC displayed? • 11404.03 See Power Dig Solenoid (SG) Valve Feedback Current High. (Group 9001-10.) • 11404.04 See Power Dig Solenoid (SG) Valve Feedback Current Low. (Group 9001-10.)	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Wiring Connector Check.

– – –1/1

❷ **Actuating Pilot Pressure Check**	Key on, use monitor service menu to display Attachment Control Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Record actuating pilot pressure for counterweight release function. Is pilot pressure above 3.70 MPa?	**YES:** Go to All Hydraulic Functions Low Power Diagnostic Procedure. (Group 9025-15.) **NO:** Go to Pressure Sensor Swap Check.

– – –1/1

❸ **Pressure Sensor Swap Check**	Switch counterweight sensor with other pilot pressure sensor. Does symptom go away?	**YES:** Replace counterweight sensor. **NO:** Go to Voltage Check

– – –1/1

❹ **Voltage Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Remove pressure sensor connector and measure voltage on terminal #1 with key on. Does terminal #1 measure 4.5—5.5 V?	**YES:** Go to Harness Check. **NO:** Repair or replace harness to repair open.

– – –1/1

❺ Harness Check	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Remove harness connector (D) from main controller. Connect terminal #3 of connector (D) to machine. Check for continuity between terminal #2 of harness end of connector of pressure counterweight sensor and machine. Is continuity measured?	**YES:** Go to Control Valve Spool Check. **NO:** Repair or replace harness – – –1/1

❻ Control Valve Spool Check	See Control Valve Operation. (Group 9025-05.) Inspect control valve spools. Are control valve spools in good working condition?	**YES:** Replace pilot valve for counterweight. **NO:** Repair or replace spools in control valve See Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

Counterweight Removal / Installation Speed Is Too Fast Diagnostic Procedure

IMPORTANT: If all other dig functions are fast, perform All Hydraulic Function Too Fast Diagnostic Procedure before doing this procedure. (Group 9025-15.)

– – –1/1

❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Are any of the following DTC displayed? • 11200.03 . See Pump 1 Delivery Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11200.04 . See Pump 1 Delivery Pressure Sensor Circuit Voltage Low. (Group 9001-10.) • 11202.03 See Pump 2 Delivery Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11202.04 See Pump 2 Delivery Pressure Sensor Circuit Voltage Low. (Group 9001-10.) • 11400.03 See Pump 2 (5-Spool) Control Solenoid Valve Feedback Current High. (Group 9001-10.) • 11400.04 See Pump 2 (5-Spool) Control Solenoid Valve Feedback Current Low. (Group 9001-10.) • 11410.03 See Pump 1 (4-Spool) Control Solenoid Valve Feedback Current High. (Group 9001-10.) • 11410.04 See Pump 1 (4-Spool) Control Solenoid Valve Feedback Current High. (Group 9001-10.) • 11992.03 See Pump 2 (5-Spool) Control Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11992.04 See Pump 2 (5-Spool) Control Pressure Sensor Circuit Voltage Low. (Group 9001-10.) • 11994.03 See Pump 1 (4-Spool) Control Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11994.04 See Pump 1 (4-Spool) Control Pressure Sensor Circuit Voltage Low. (Group 9001-10.)	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Actuating Pilot Pressure Check. – – –1/1

❷ **Actuating Pilot Pressure Check**	Key on, use monitor service menu to display Attachment Control Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Record actuating pilot pressure for counterweight release function. Is pilot pressure above 3.70 MPa?	**YES:** Go to Harness Check. **NO:** Go to Pressure Sensor Swap Check. – – –1/1

❸ **Pressure Sensor Swap Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Switch counterweight sensor with other pilot pressure sensor. Does symptom go away?	**YES:** Replace counterweight pressure sensor. **NO:** Go to Harness Check – – –1/1

④ **Harness Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Remove harness connector from pressure sensor and main controller. Check for continuity between terminal #1 wire of harness. Is continuity measured?	**YES:** Go to Pilot Valve Check. **NO:** Repair or replace harness. If harness ok diagnose main controller. See Main Controller (MCF) Diagnostics Using Dr. ZX. (Group 9015-20.) – – –1/1

⑤ **Pilot Valve Check**	See Pilot Signal Manifold Operation. (Group 9025-05.) Inspect pilot valve. Is pilot valve in good working condition?	**YES:** Diagnostic procedure complete. **NO:** Adjust or replace pilot valve. Perform Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.) – – –1/1

Diagnose Auto Lubrication System Malfunctions

MR50960,00000F9 –19–12APR06–1/1

Auto Lubrication Does Not Operate Diagnostic Procedure

NOTE: The maximum interval between auto lubrication is 90 minutes. The interval setting can be adjusted from 10 to 90 minutes. The lubricating cycle time takes 5 minutes.

– – –1/1

① **Wiring Connector Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Are all the connectors in good condition?	**YES:** Go to Auto Lubrication Mode Switch Check. **NO:** Repair or replace connectors. – – –1/1

② **Auto Lubrication Mode Switch Check**	Turn auto lubrication mode on and check if display indicates auto. Is **auto** displayed?	**YES:** Go to Lubrication Pump Status Check. **NO:** Go to Harness Check. – – –1/1

❸ **Lubrication Pump Status Check**	Check pump lubrication status on monitor when auto lubrication switch is on. Is **Comp** displayed?	**YES:** Go to Proximity Switch Check. **NO:** Go to Relay Swap Check. – – –1/1

❹ **Harness Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Remove connector form switch and main controller. Check for continuity between open in harness between terminal #9 at switch end and terminal #83 at end. Is continuity measured?	**YES:** Repair or replace auto lubrication switch. **NO:** Repair or replace harness. – – –1/1

❺ **Relay Swap Check.**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Swap auto lubrication relay K11 with another similar relay. Does symptom go away?	**YES:** Replace auto lubrication relay K11. **NO:** Go to Continuity Check. – – –1/1

❻ **Continuity Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Disconnect harness from auto lubrication relay and from main controller. Check for continuity between terminal #2 harness relay end connector and terminal #B24 of harness end connector at main controller. Is continuity measured?	**YES:** Replace fuse #30 or open circuit between fuse #30 and auto lubrication relay K11. **NO:** Open circuit in harness between K11 and , replace or repair as required. – – –1/1

❼ **Proximity Switch Check**	Check if auto lubrication is counting SW while switch is on. Is **on / off** switched and is it alternately displayed on monitor?	**YES:** Repair damaged pipes on front attachments. **NO:** Go to Grease Pump Check. – – –1/1

❽ **Grease Pump Check**	Inspect grease pump. Is grease pump operating?	**YES:** Check the following items in this order: No grease, refill grease cartridge. Repair damaged piping between pump and distribution valve. Replace distribution valve. **NO:** Go to Grease Pump Harness Check.

– – –1/1

❾ **Grease Pump Harness Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Disconnect harness connector at pump and check voltage on terminal #2. Turn key and auto lubrication switch on. Does harness terminal #2 measure 24 V?	**YES:** Go to Proximity Switch Harness Check **NO:** Repair or replace open wire in harness between relay K11 and pump.

– – –1/1

❿ **Proximity Switch Harness Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Remove harness from proximity switch. Turn key and auto lubrication switch on. Measure voltage at switch end connector terminal #3. Does terminal # 3 measure 24 V?	**YES:** Replace proximity switch or repair open circuit in harness between switch and ground. **NO:** Repair open circuit in harness between relay K11 and proximity switch.

– – –1/1

Auto Lubrication Does Not Stop Diagnostic Procedure

– – –1/1

❶ **Auto Lubrication Switch Check**	Turn auto lubrication switch to off. Does auto lubrication stop?	**YES:** Replace auto lubrication relay K11. **NO:** Go to Harness Check. – – –1/1

❷ **Harness Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Disconnect harness connector B from main controller. Does auto lubrication stop?	**YES:** Replace . **NO:** Repair short in harness K11 and / or replace. – – –1/1

Auto Lubrication Alarm Is Displayed Diagnostic Procedure

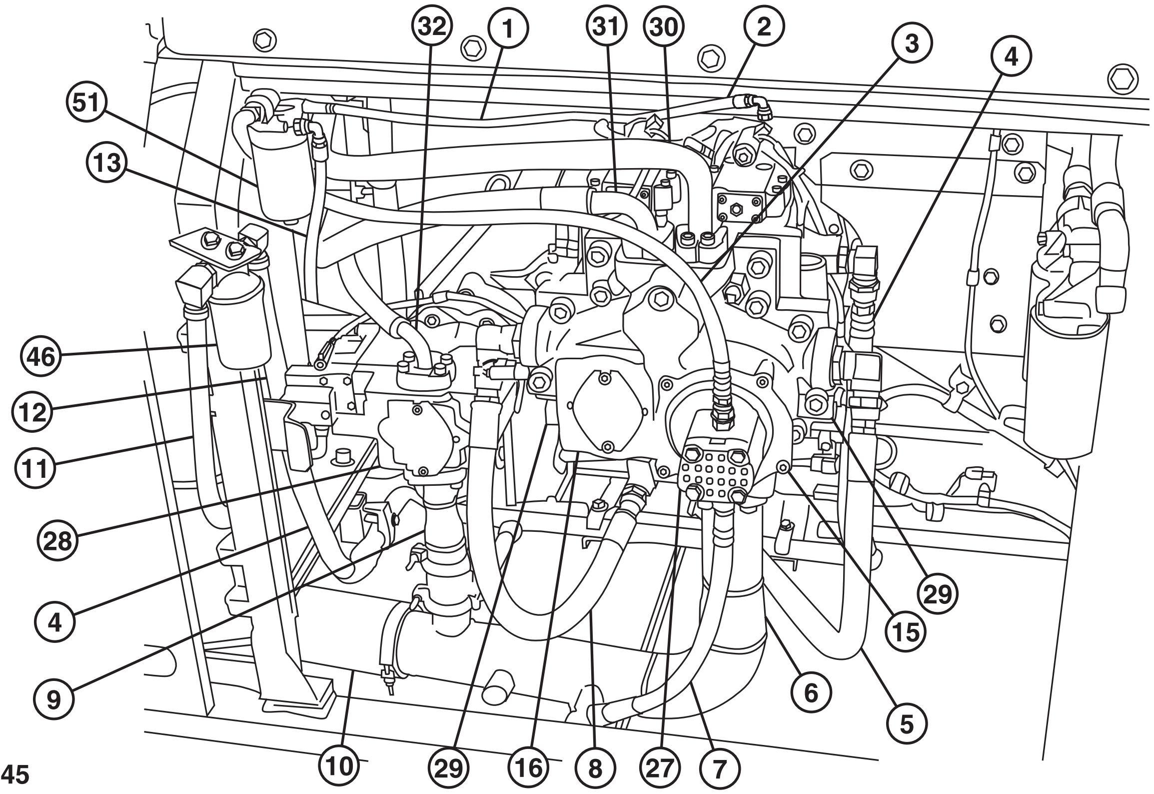
NOTE: If auto lubrication alarm is displayed when auto lubrication stops, the problem may be no grease or proximity switch malfunction.

– – –1/1

❶ **Auto Lubrication Grease Check**	Check for following problems: • No grease in cartridge. • Air mixed in grease circuit. • Plug sealing grease cartridge. Is grease supply in good condition?	**YES:** Replace proximity switch. See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) **NO:** Diagnostic procedure complete. – – –1/1

❷ **Harness Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Disconnect harness connector B from main controller. Does auto lubrication stop?	**YES:** Replace . **NO:** Repair short in harness K11 and main controller. – – –1/1

Pump 1, Pump 2 and Pilot Pump Line Identification

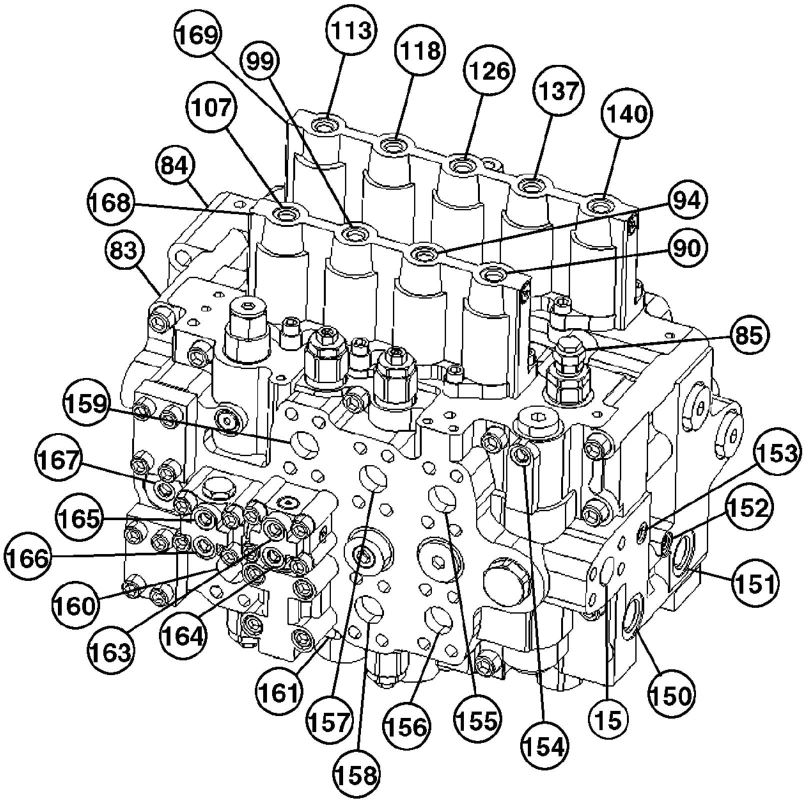


TX1008445 –UN–06JUN06

1—Pilot Filter Line-to-Pump 2 Regulator
2—Pilot Line From Pump 2 Regulator Valve-to-Pump 1
3—Pilot Pump-to-Pilot Filter Line
4—Pump 1 Case Drain Line-to-Pump Case Drain Filter and Bypass Valve
5—Pump 1 Attenuator Hose
6—Pump 1 and 2 Suction Line
7—Pilot Pump Suction Line
8—Pump 2 Attenuator Hose
9—Fan Drive Pump Suction Line
10—Suction Tube
11—Case Drain Hose Filter-to-Hydraulic Oil Tank
12—Case Drain Tube Pumps-to-Filter
13—Pilot Filter Hose-to-Fan Drive Pump Regulator Valve
15—Pump 1 (4 spool)
16—Pump 2 (5 spool)
27—Pilot Pump
28—Fan Drive Pump
29—Test Port (hydraulic pump delivery)
30—Pump 1 Delivery Line
31—Pump 2 Delivery Line
32—Fan Drive Pump Delivery Line
46—Case Drain Filter
51—Pilot Filter

TX04577,00000FF –19–08JUN06–1/1

Control Valve Line Identification



TX1008725

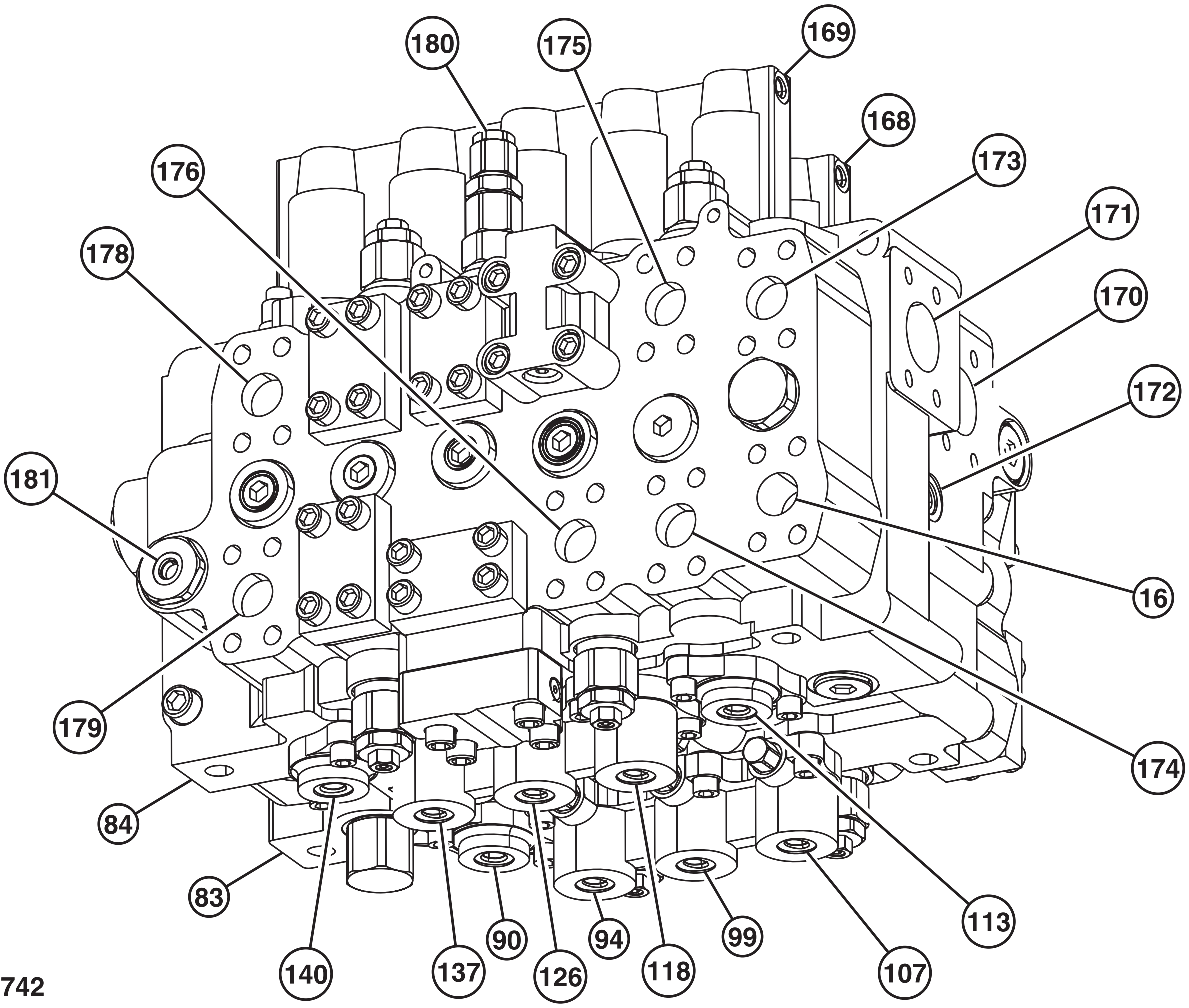
Right Control Valve

Continued on next page

15—Pump 1 Outlet-to-Right Control Valve (5-spool)
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
85—Main Relief and Power Digging Valve
90—Right Travel Spool
94—Bucket Spool
99—Boom 1 Spool
107—Arm 2 Spool
113—Swing Spool
118—Arm 1 Spool
126—Boom 2 Spool
137—Auxiliary Spool
140—Left Travel Spool
150—To Swing Motor Make-Up Check Valve (left side)
151—To Swing Motor Make-Up Check Valve (right side)
152—Bypass Shutoff (bucket flow combiner) Valve (spring cavity)-to-Warm-Up Circuit (right control valve)-to-Hydraulic Oil Tank
153—Pilot Signal Manifold (port SL)-to-Travel Flow Combiner Valve
154—From Power Dig Solenoid Valve (port SG)
155—Right Travel Forward-to-Center Joint (top right front)
156—Right Travel Reverse-to-Center Joint (top right rear)
157—Bucket Dump-to-Bucket Cylinder Rod End
158—Bucket Curl-to-Bucket Cylinder Head End
159—Boom Down-to-Manifold-to-Boom Cylinder Rod End
160—Boom Up-to-Manifold-to-Boom Cylinder Head End
161—Pilot Check Valve Manifold (port B)-to-Boom 1 Spool (right control valve), Pilot Accumulator and Fan Drive Reversing Control Valve (PP port)
163—Boom Flow Rate Solenoid Valve (port SF)-to-Boom Flow Rate Control Valve—Switch Valve
164—Boom Flow Rate Control Valve—Switch Valve (spring cavity)-to-Solenoid Valve Manifold (port DY)
165—Arm 2 Flow Rate Control Valve—Switch Valve (spring cavity)-to-Solenoid Valve Manifold (port DK)
166—Pilot Signal Manifold (port SK)-to-Arm 2 Flow Rate Control Valve—Switch Valve
167—Bypass Shutoff (auxiliary flow combiner) Valve-to-Solenoid Valve Manifold (port DY)
168—Warm-Up Circuit (right control valve)-to-Hydraulic Oil Tank
169—Warm-Up Circuit (left control valve)-to-Hydraulic Oil Tank

Continued on next page

OUT3035,000003C –19–31MAY06–2/3



TX1008742

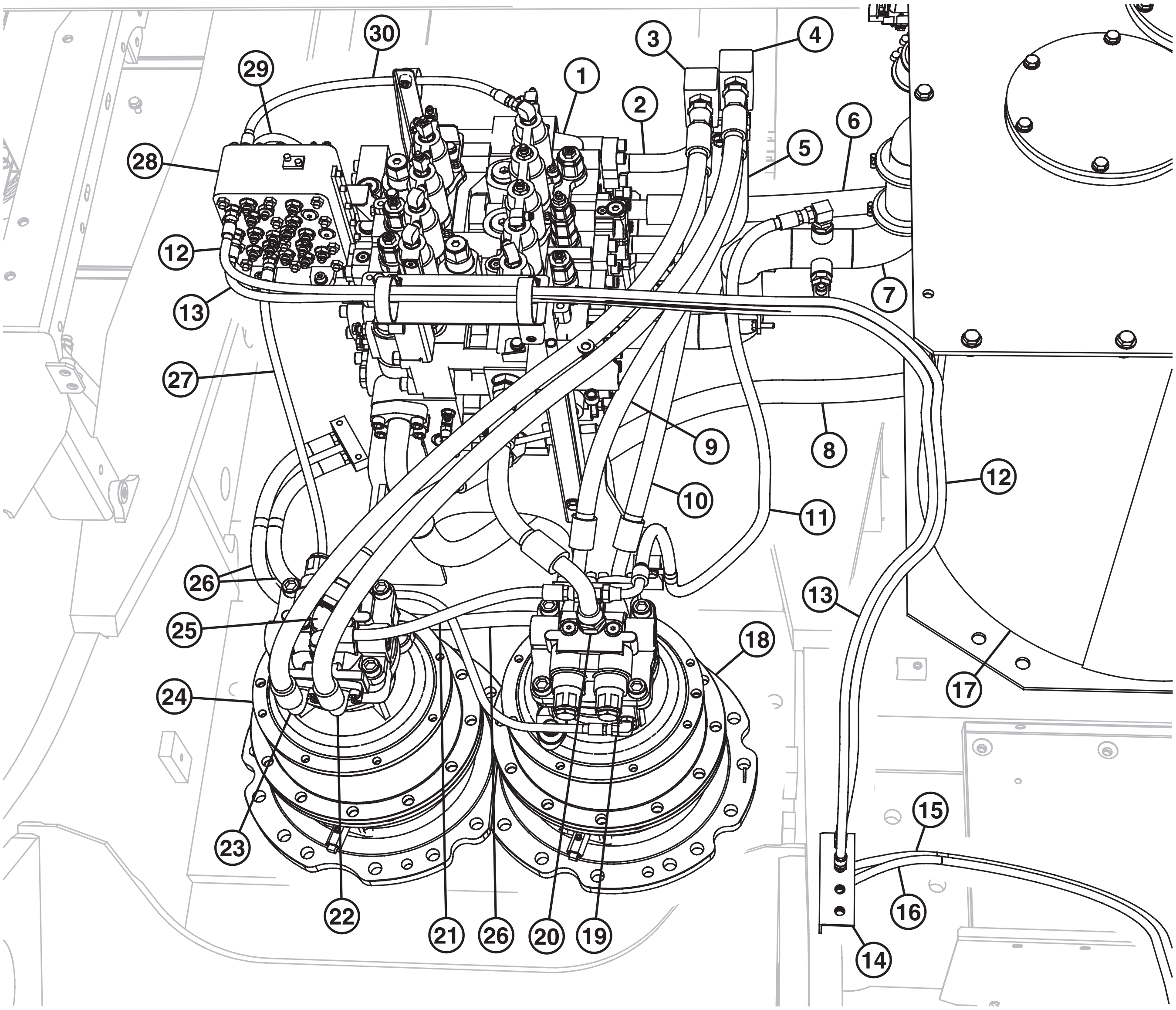
TX1008742 –UN–02JUN06

Left Control Valve

16—Pump 2 Outlet-to-Left Control Valve (4-spool)
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
90—Right Travel Spool
94—Bucket Spool
99—Boom 1 Spool
107—Arm 2 Spool
113—Swing Spool
118—Arm 1 Spool
126—Boom 2 Spool
137—Auxiliary Spool
140—Left Travel Spool
168—Warm-Up Circuit (right control valve)-to-Hydraulic Oil Tank
169—Warm-Up Circuit (left control valve)-to-Hydraulic Oil Tank
170—Control Valve Return Passage-to-Restriction Valve and Hydraulic Oil Cooler
171—Control Valve Return Passage-to-Hydraulic Oil Cooler Bypass Valve and Hydraulic Oil Tank
172—Bypass Shutoff (auxiliary flow combiner) Valve Spring Cavity-to-Solenoid Valve Manifold (port DY)
173—Swing Right-to-Swing Motors (port B)
174—Swing Left-to-Swing Motors (port A)
175—Arm In-to-Arm Cylinder (head end)
176—Arm Out-to-Arm Cylinder (rod end)
178—Left Travel Reverse-to-Center Joint (top left front)
179—Left Travel Forward-to-Center Joint (top left rear)
180—Boom Mode Solenoid Valve (port SC)-to-Boom Mode Relief Control Valve
181—Bypass Shutoff (bucket flow combiner) Valve-to-Solenoid Valve Manifold (DP port)

OUT3035,000003C –19–31MAY06–3/3

Swing Motor Line Identification



TX1007452

Swing Motor Line Identification

Continued on next page

1—Left Control Valve (5-spool)
2—Left Control Valve (swing spool) Top Port (right swing)-to-Manifold—Right Side
3—Manifold—Right Side
4—Manifold—Left Side
5—Left Control Valve (swing spool) Bottom Port (left swing)-to-Manifold—Left Side
6—Pump 2-to-Left Control Valve Inlet Port
7—Hydraulic Oil Cooler-to-Hydraulic Oil Tank Return
8—Pump 1-to-Right Control Valve Inlet Port
9—Manifold—Left Side Bottom Port-to-Swing Motor—Left Side (port A, left swing)
10—Manifold—Right Side Bottom Port-to- Swing Motor—Left Side (port B, right swing)
11—Swing Motor—Left Side-to-Hydraulic Oil Tank Return
12—Bulkhead-to-Pilot Signal Manifold (port E, swing left)
13—Bulkhead-to-Pilot Signal Manifold (port F, swing right)
14—Bulkhead
15—Left Pilot Control Valve (port 3, swing left)-to-Bulkhead
16—Left Pilot Control Valve (port 1, swing right)-to-Bulkhead
17—Hydraulic Oil Tank
18—Swing Motor—Left Side
19—Swing Motor—Right Side-to-Swing Motor—Left Side Park Brake Release
20—Left Control Valve-to-Left Side Swing Motor Make-Up Oil Line
21—Swing Motor—Right Side-to-Swing Motor—Left Side Case Drain Line
22—Manifold—Left Side Top Port-to- Swing Motor—Right Side (port A, left swing)
23—Right Side Manifold Top Port-to-Right Side Swing Motor (port B, right swing)
24—Swing Motor—Right Side
25—Left Control Valve-to-Right Side Swing Motor Make-Up Oil Line
26—Swing Gearbox—Left and Right Side Drain Lines
27—Pilot Signal Manifold (port SH)-to-Swing Motor—Right Side Park Brake Release
28—Pilot Signal Manifold
29—Pilot Signal Manifold (port 6, right swing)-to-Left Control Valve (swing spool) Bottom Pilot Cap
30—Pilot Signal Manifold (port 5, left swing)-to-Left Control Valve (swing spool) Top Pilot Cap

LD30992,0000276 –19–01JUN06–2/2

Control Lever Pattern Conversion

1. Lower bucket to the ground.

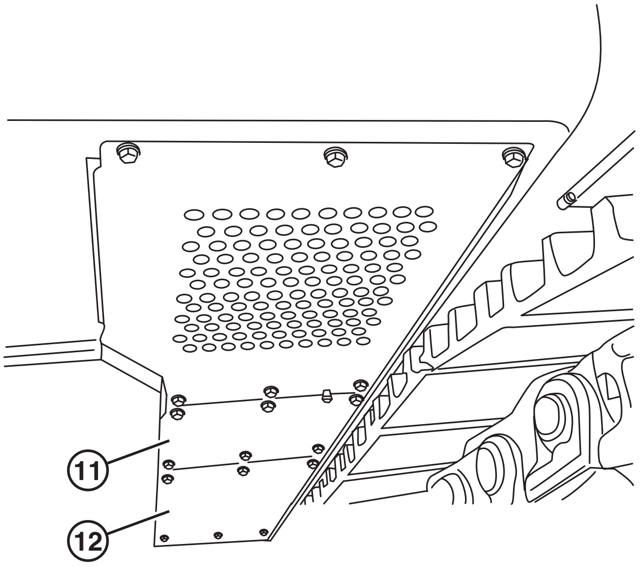
2. Stop the engine. Remove the key from switch.

Continued on next page

GD61784,0000058 –19–26OCT06–1/6

3. Remove covers (11 and 12) from main frame under cab.

11—Cover
12—Cover

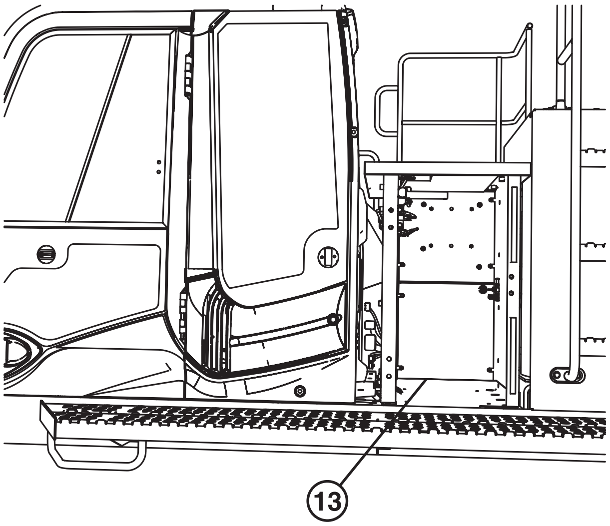


TX1013201 –UN–17OCT06

GD61784,0000058 –19–26OCT06–2/6

4. Remove cover (13).

13—Cover



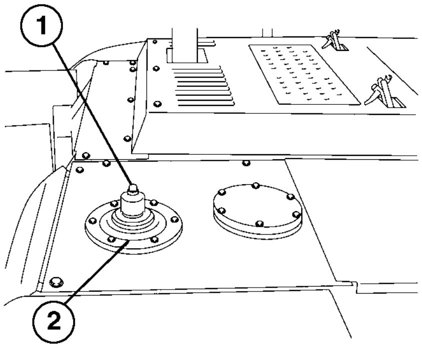
TX1013437 –UN–24OCT06

Continued on next page

GD61784,0000058 –19–26OCT06–3/6

CAUTION: High pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure by pushing pressure release button.

5. Push pressure release button (1).

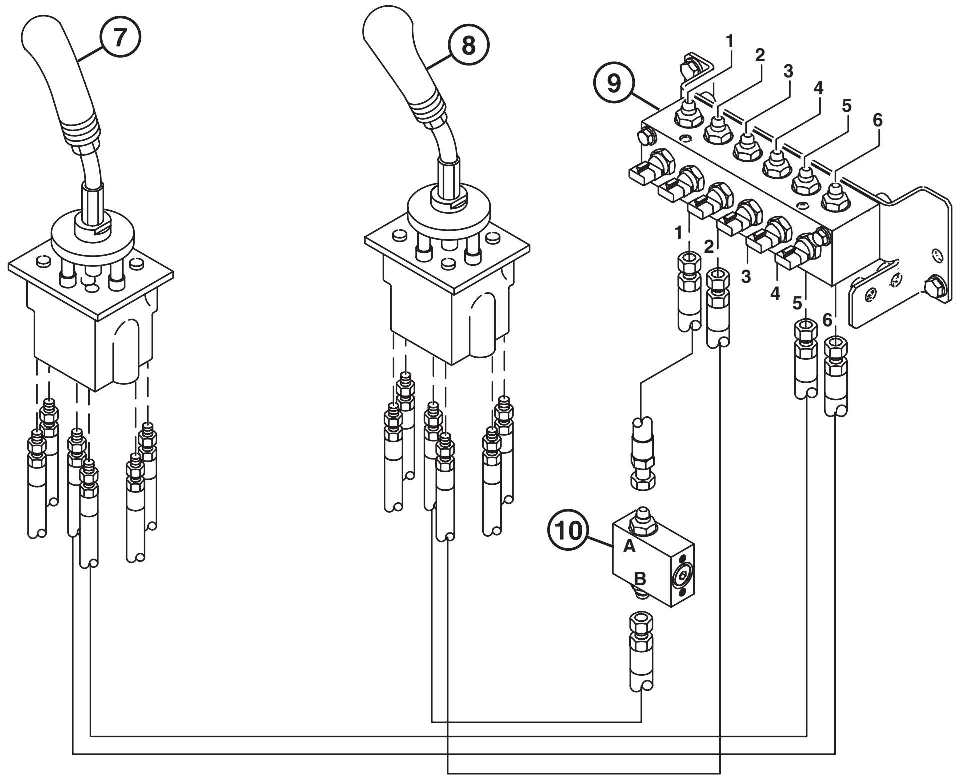


T214924 –UN–17NOV05

1—Pressure Release Button
2—Hydraulic Oil Tank Cover

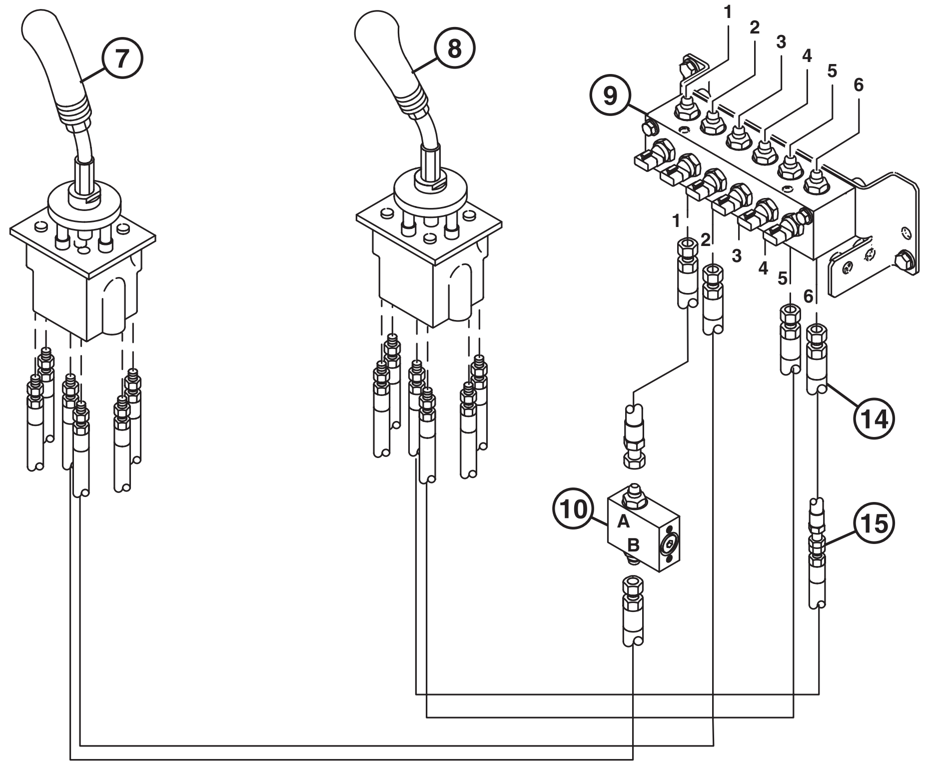
Continued on next page

GD61784,0000058 –19–26OCT06–4/6



TX1013016

Excavator Pattern



TX1013015

Backhoe Pattern

7—Left Control Lever
8—Right Control Lever
9—Digging Sensor Manifold
10—Boom Up Shockless Valve
14—Fabricated Hose
15— -6 M 37° x -6 M 37° Union

Continued on next page

GD61784,0000058 –19–26OCT06–5/6

NOTE: DO NOT use manufacturer's hose tags or markings on hose ends to identify hoses for this conversion procedure. The conversion must be done on the side of digging sensor manifold that is connected to the pilot control valves.

Port numbers on digging sensor manifold are given from front to rear of machine and are not marked on manifold.

6. Switch pilot lines connected to port 2 and 5 at digging sensor manifold (9).

7. Disconnect pilot line from port B of the boom shockless valve (10).

8. Use the following table to fabricate the hydraulic hose needed.

Part Number	Description	Assembly Quantity
X10643-6-6	Fittings	2
X421-6	Hydraulic Hose, No Skive	1905 mm (75 in.)
Left Fitting: X10643-6-6 (Parker No. 10643-6-6) Right Fitting: X10643-6-6 (Parker No. 10643-6-6) Hydraulic Hose: X421-6 (Parker No. 421-6) Cut Length: 1885.4 mm (74.23 in.) Crimp Dies: 43-6 (YEL) Die Ring: Silver Length: 1949.9 mm (76.77 in.)		

9. Install a -6 M 37° x -6 M 37° union to fabricated hose. Connect union to pilot line disconnected from the shockless valve

10. Route fabricated hose to digging sensor manifold.

11. Disconnect pilot line from port 6.

12. Connect fabricated hose to port 6.

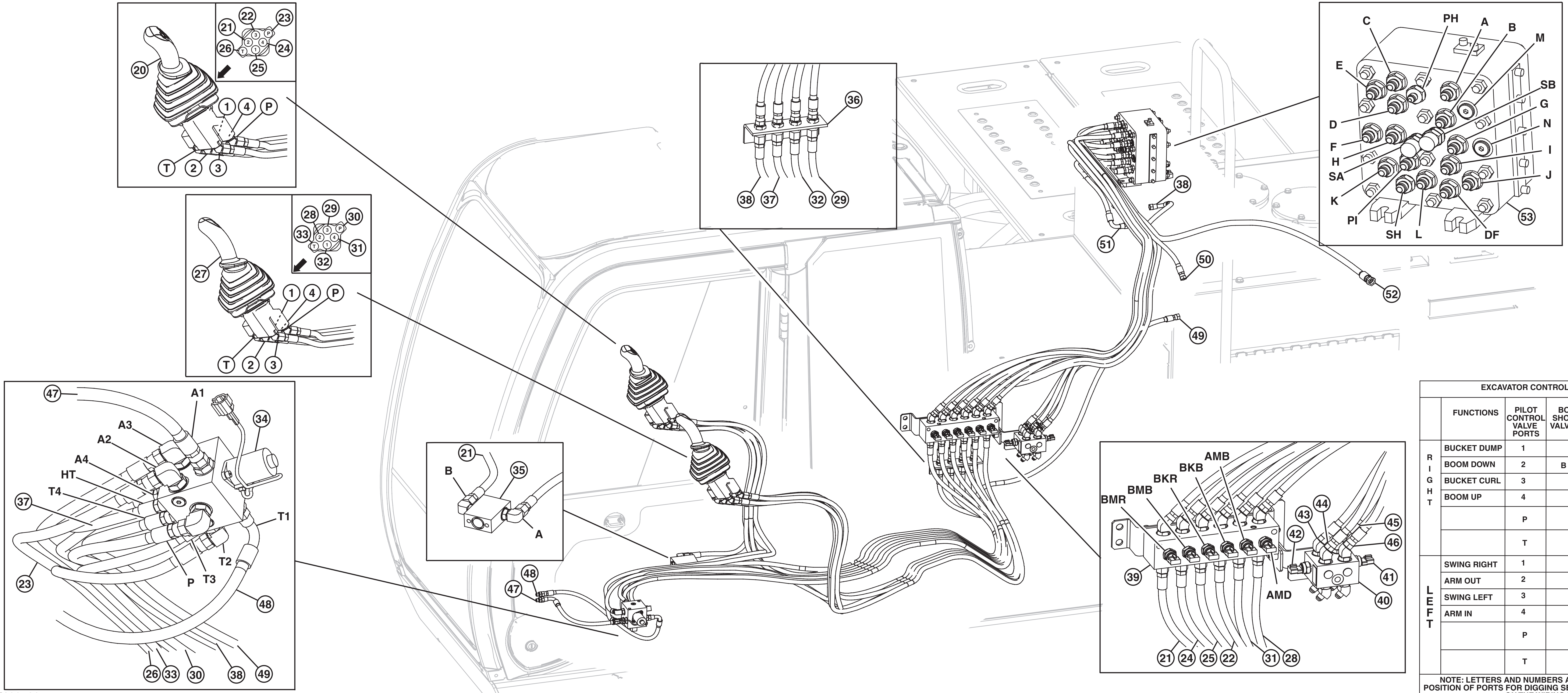
13. Route pilot line disconnected from port 6 to the shockless valve. Connect line to port B.

14. Install covers.

GD61784,0000058 –19–26OCT06–6/6

Pilot Control Valve-to-Pilot Signal Manifold Component Location—Excavator Pattern

TX1007835 –19–02JUN06



TX1007835

EXCAVATOR CONTROL PATTERN PILOT HOSE CONNECTION

	FUNCTIONS	PILOT CONTROL VALVE PORTS	BOOM UP SHOCKLESS VALVE PORTS	DIGGING SENSOR MANIFOLD POSTIONS	PILOT SIGNAL MANIFOLD PORTS	
					PILOT CONTROL VALVE SIDE	CONTROL VALVE SIDE
RIGHT	BUCKET DUMP	1		BKR	H	8
	BOOM DOWN	2	B to A	BMR	B	2
	BUCKET CURL	3		BKB	G	7
	BOOM UP	4		BMB	A	1
		P			PILOT SHUTOFF SOLENOID VALVE A2	
		T			PILOT SHUTOFF SOLENOID VALVE T2	
LEFT	SWING RIGHT	1		BULKHEAD	F	6
	ARM OUT	2		AMD	C	3
	SWING LEFT	3		BULKHEAD	E	5
	ARM IN	4		AMB	D	4
		P			PILOT SHUTOFF SOLENOID VALVE A3	
		T			PILOT SHUTOFF SOLENOID VALVE T3	

NOTE: LETTERS AND NUMBERS ARE ON THE HOUSINGS NEXT TO THE PORTS. POSITION OF PORTS FOR DIGGING SENSOR MANIFOLD ARE IDENTIFIED BY THE TAGS ON THE WIRING HARNESS TO THE SENSORS

Pilot Control Valve-to-Pilot Signal Manifold Component Location—Excavator Pattern

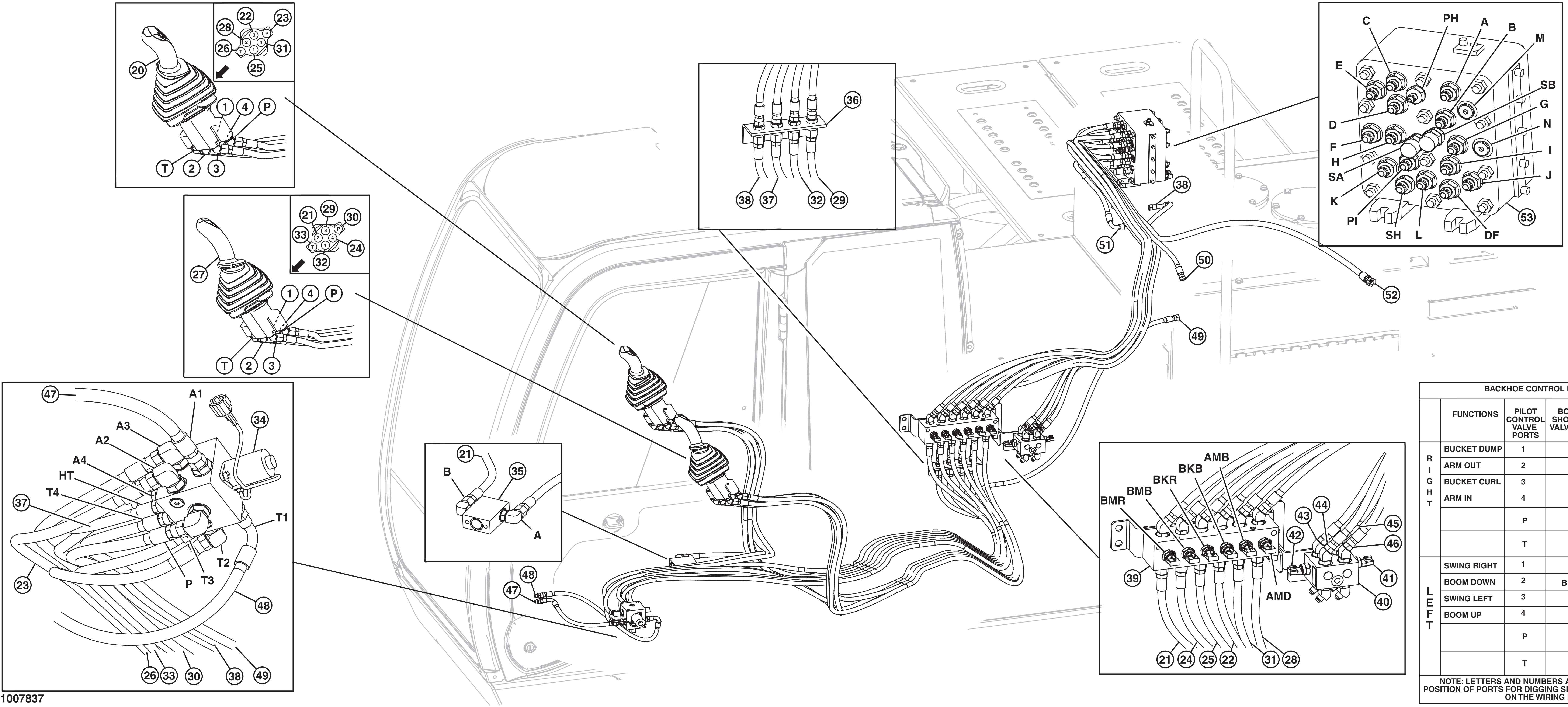
LD30992,0000277 –19–01JUN06–1/2

20—Right Pilot Control Valve
21—2-to-B to A-to-BMR-to-B
22—3-to-BKB-to-G
23—P-to-A2
24—4-to-BMB-to-B
25—1-to-BKR-to-H
26—T-to-T2
27—Left Pilot Control Valve
28—2-to-AMD-to C
29—3-to-Bulkhead-to E
30—P-to-A3
31—4-to-AMB-to-D
32—1-to-Bulkhead-to-F
33—T-to-T3
34—Pilot Shutoff Solenoid Valve
35—Boom Up Shockless Valve
36—Bulkhead
37—HT-to-Bulkhead-to PH
38—Pilot Check Valve Manifold (port A)-to-P
39—Digging Sensor Manifold
40 —Travel Sensor Manifold
41—Travel Left Pressure Sensor (TRL)
42—Travel Right Pressure Sensor (TRR)
43—Travel Pilot Control Valve (port 1)-to-Travel Sensor Manifold-to-L (right reverse)
44—Travel Pilot Control Valve (port 2)-to-Travel Sensor Manifold-to-K (right forward)
45—Travel Pilot Control Valve (port 4)-to-Travel Sensor Manifold-to-J (left reverse)
46—Travel Pilot Control Valve (port 3)-to-Travel Sensor Manifold-to-I (left forward)
47—A1-to-Travel Pilot Control Valve (port P)
48—From Travel Pilot Control Valve (port T)-to-T1
49—T4-to-Hydraulic Oil Tank
50—DF-to-Hydraulic Oil Tank
51—PI-to-Pilot Check Valve Manifold (port C)
52—Pilot Filter and Pressure Regulating Valve (port PG)-to-Pilot Check Valve Manifold (port P)
53—Pilot Signal Manifold
54—Pilot Check Valve Manifold

LD30992,0000277 –19–01JUN06–2/2

Pilot Control Valve-to-Pilot Signal Manifold Component Location—Backhoe Pattern

TX1007837 –19–02JUN06



TX1007837

BACKHOE CONTROL PATTERN PILOT HOSE CONNECTION						
	FUNCTIONS	PILOT CONTROL VALVE PORTS	BOOM UP SHOCKLESS VALVE PORTS	DIGGING SENSOR MANIFOLD POSTIONS	PILOT SIGNAL MANIFOLD PORTS	
					PILOT CONTROL VALVE SIDE	CONTROL VALVE SIDE
RIGHT	BUCKET DUMP	1		BKR	H	8
	ARM OUT	2		AMD	C	3
	BUCKET CURL	3		BKB	G	7
	ARM IN	4		AMB	D	4
		P			PILOT SHUTOFF SOLENOID VALVE A2	
		T			PILOT SHUTOFF SOLENOID VALVE T2	
LEFT	SWING RIGHT	1		BULKHEAD	F	6
	BOOM DOWN	2	B to A	BMR	B	2
	SWING LEFT	3		BULKHEAD	E	5
	BOOM UP	4		BMB	A	1
		P			PILOT SHUTOFF SOLENOID VALVE A3	
		T			PILOT SHUTOFF SOLENOID VALVE T3	
NOTE: LETTERS AND NUMBERS ARE ON THE HOUSINGS NEXT TO THE PORTS. POSITION OF PORTS FOR DIGGING SENSOR MANIFOLD ARE IDENTIFIED BY THE TAGS ON THE WIRING HARNESS TO THE SENSORS						

Pilot Control Valve-to-Pilot Signal Manifold Component Location—Backhoe Pattern

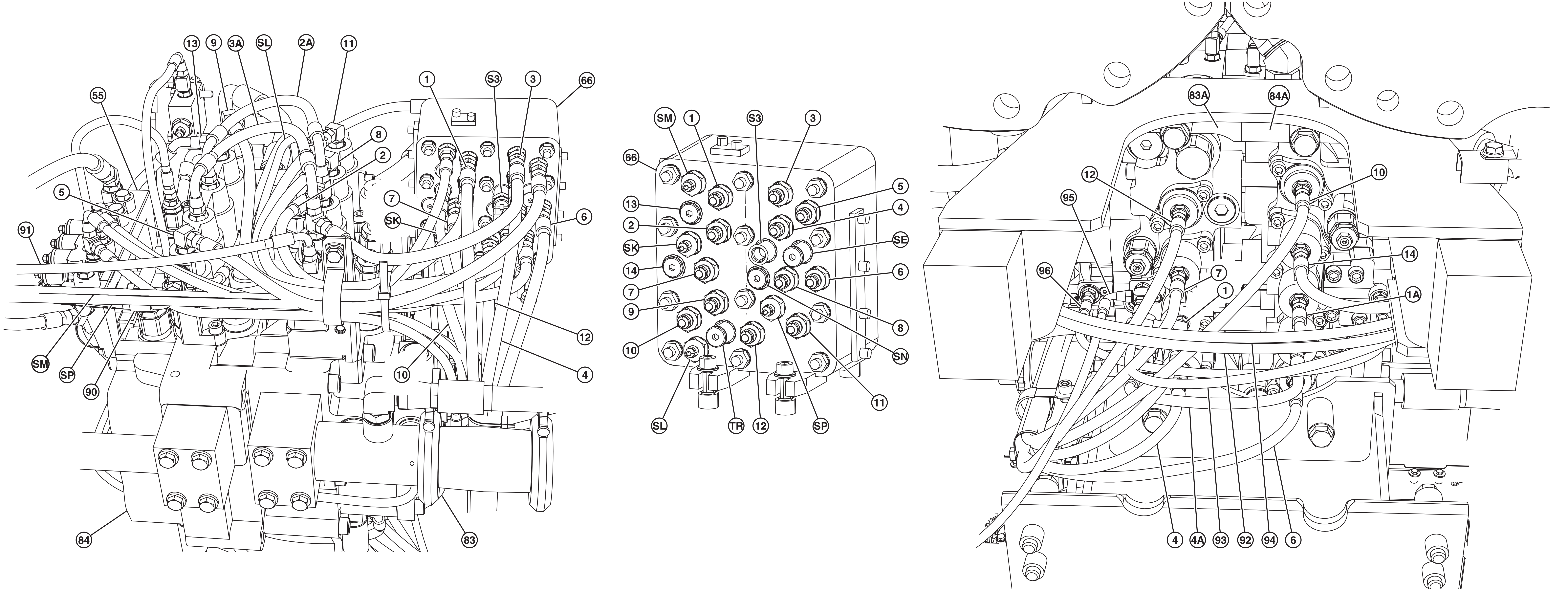
LD30992,0000278 –19–01JUN06–1/2

20—Right Pilot Control Valve
21—2-to-B to A-to-BMR-to-B
22—3-to-BKB-to-G
23—P-to-A2
24—4-to-BMB-to-B
25—1-to-BKR-to-H
26—T-to-T2
27—Left Pilot Control Valve
28—2-to-AMD-to C
29—3-to-Bulkhead-to E
30—P-to-A3
31—4-to-AMB-to-D
32—1-to-Bulkhead-to-F
33—T-to-T3
34—Pilot Shutoff Solenoid Valve
35—Boom Up Shockless Valve
36—Bulkhead
37—HT-to-Bulkhead-to PH
38—Pilot Check Valve Manifold (port A)-to-P
39—Digging Sensor Manifold
40 —Travel Sensor Manifold
41—Travel Left Pressure Sensor (TRL)
42—Travel Right Pressure Sensor (TRR)
43—Travel Pilot Control Valve (port 1)-to-Travel Sensor Manifold-to-L (right reverse)
44—Travel Pilot Control Valve (port 2)-to-Travel Sensor Manifold-to-K (right forward)
45—Travel Pilot Control Valve (port 4)-to-Travel Sensor Manifold-to-J (left reverse)
46—Travel Pilot Control Valve (port 3)-to-Travel Sensor Manifold-to-I (left forward)
47—A1-to-Travel Pilot Control Valve (port P)
48—From Travel Pilot Control Valve (port T)-to-T1
49—T4-to-Hydraulic Oil Tank
50—DF-to-Hydraulic Oil Tank
51—PI-to-Pilot Check Valve Manifold (port C)
52—Pilot Filter and Pressure Regulating Valve (port PG)-to-Pilot Check Valve Manifold (port P)
53—Pilot Signal Manifold
54—Pilot Check Valve Manifold

LD30992,0000278 –19–01JUN06–2/2

Pilot Signal Manifold-to-Control Valve Line Connections

TX1042344 –UN–25JUN08



TX1042344

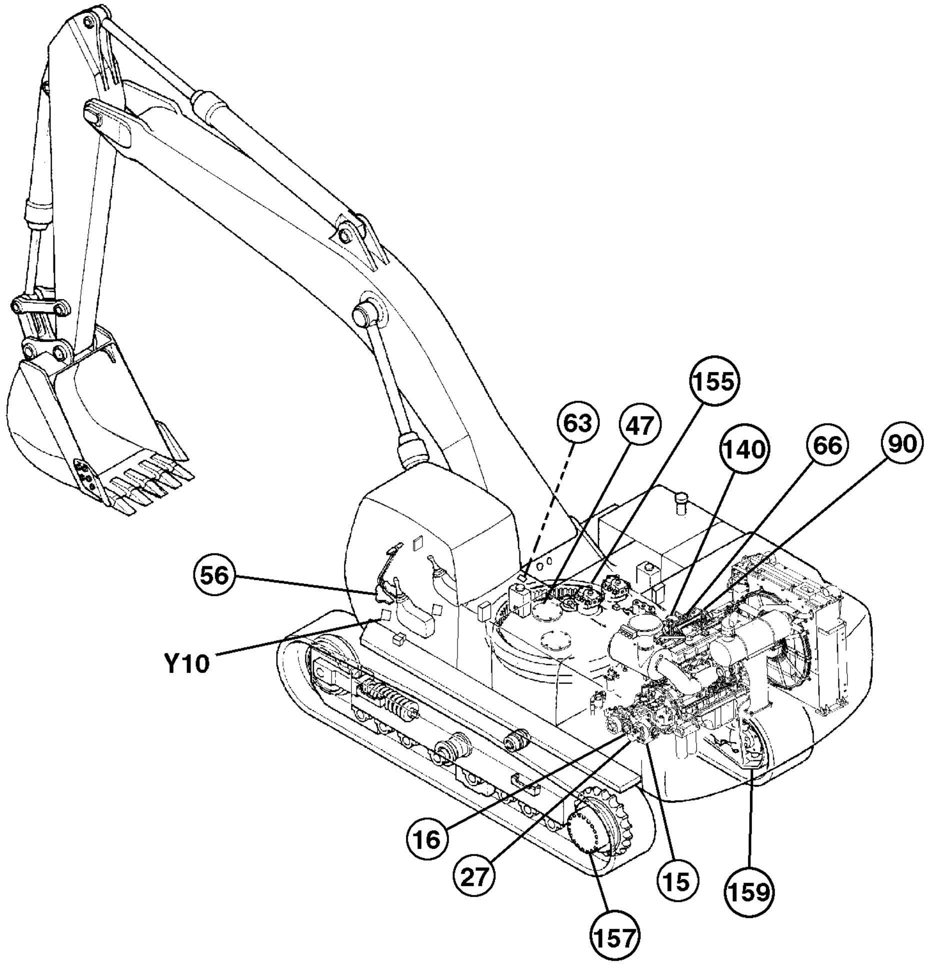
Pilot Signal Manifold-to-Control Valve Line Connection

LD30992,0000279 –19–15MAY08–1/2

1—1-to-Right Control Valve—Bottom (boom up)
1A—Right (boom 1)-to-Left Control Valve (boom 2, boom up)
2—2-to-Right Control Valve—Top (boom down)
2A—Right (boom 1)-to Left Control Valve (boom 2, boom down)
3—3-to-Right Control Valve—Top (arm out)
3A—Right (arm 2)-to-Left Control Valve (arm 1, arm out)
4—4-to-Right Control Valve—Bottom (arm in)
4A—Right (arm 2)-to-Left Control Valve (arm 1, arm in)
5—5-to-Left Control Valve—Top (swing left)
6—6-to-Left Control Valve—Bottom (swing right)
7—7-to-Right Control Valve—Bottom (bucket curl)
8—8-to-Right Control Valve—Top (bucket dump)
9—9-to-Left Control Valve—Top (left travel forward)
10—10-to-Left Control Valve—Bottom (left travel reverse)
11—11-to-Right Control Valve—Top (right travel forward)
12—12-to-Right Control Valve—Bottom (right travel reverse)
13—13 (not used) For Auxiliary in Left Control Valve
14—14 (not used) For Auxiliary in Left Control Valve
55—Solenoid Valve Manifold
66—Pilot Signal Manifold
83—Right Control Valve (4-spool)—Top
83A—Right Control Valve (4-spool)—Bottom
84—Left Control Valve (5-spool)—Top
84A—Left Control Valve (5-spool)—Bottom
90—Warm-Up Circuit (left control valve)-to-Hydraulic Oil Tank
91—Warm-Up Circuit (right control valve)-to-Hydraulic Oil Tank
92—Boom Flow Rate Solenoid Valve (port SF)-to-Boom Flow Rate Control Valve—Switch Valve (right control valve)
93—Pilot Check Valve Manifold (port B)-to-Boom 1 Spool (right control valve)
94—Power Dig Solenoid Valve (port SG)-to-Main Relief and Power Digging Valve (right control valve)
95—Boom 1 Spool (right control valve)-to-Pilot Accumulator
96—Boom 1 Reduced Leakage Valve—Switch Valve (right control valve)-to-Boom 2 Reduced Leakage Valve—Switch Valve (left control valve) (650DLC and 850DLC only)
S3—Swing Pressure Sensor
SE—SE (not used)
SK—SK-to-Arm Flow Rate Control Valve—Switch Valve (right control valve)
SL—SL-to-Travel Flow Combiner Valve (right control valve, front)
SM—SM-to-Hydraulic Oil Tank
SN—SN (not used)
SP—SP-to-Hydraulic Oil Tank
TR—TR (not used)

LD30992,0000279 –19–15MAY08–2/2

Travel Hydraulic System Component Location



TX1008723

TX1008723 –UN–07JUN06

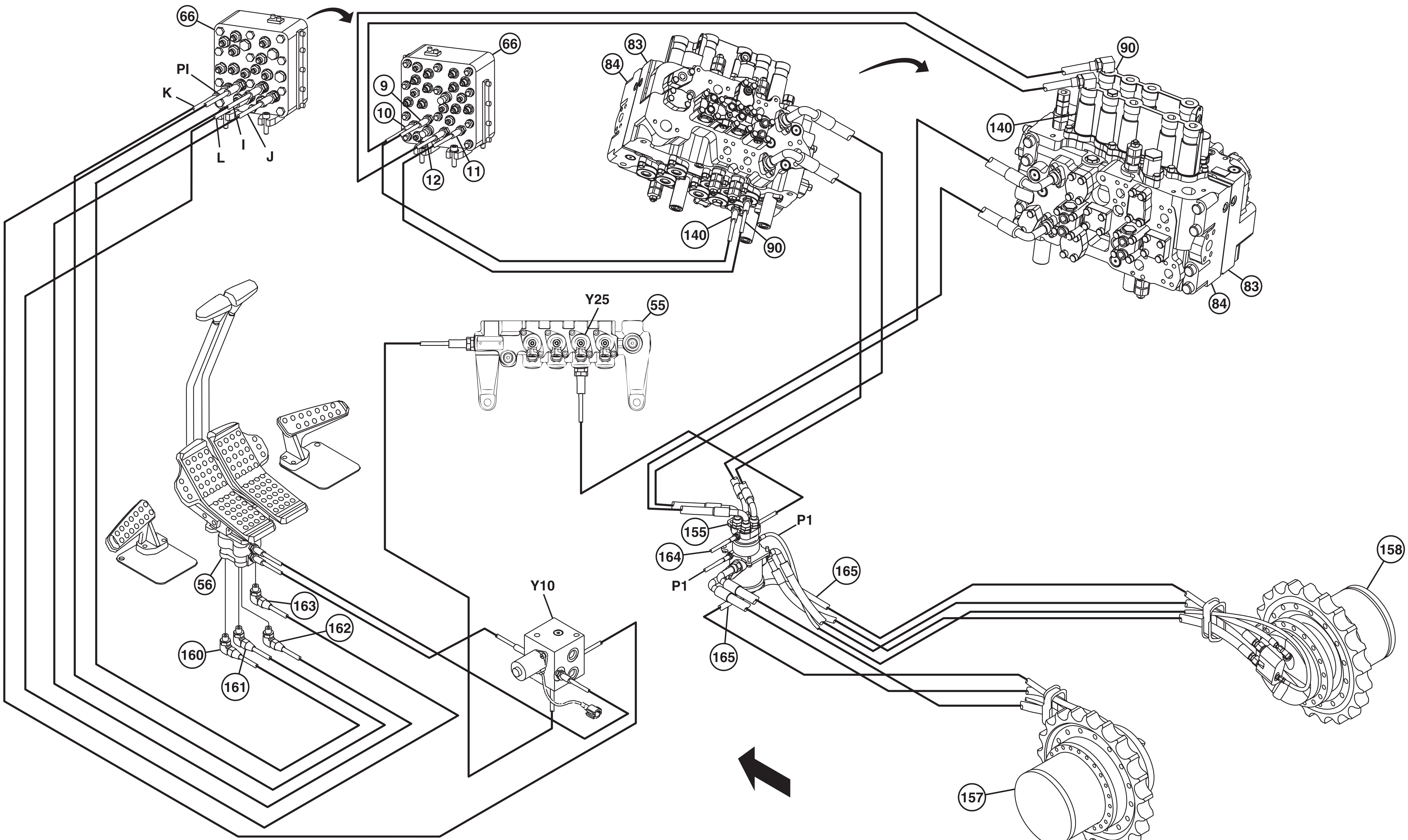
Travel Hydraulic System Component Location

15—Pump 1 (4 spool)
16—Pump 2 (5 spool)
27—Pilot Pump
47—Hydraulic Tank
56—Travel Pilot Control Valve
63—Travel Sensor Manifold
66—Pilot Signal Manifold
90—Right Travel Spool
140—Left Travel Spool
155—Center Joint
157—Left Travel Motor
159—Right Travel Motor
Y10—Pilot Shut Off Solenoid

LD30992,000027A –19–08JUN06–1/1

Travel Hydraulic System Line Connection

TX1028755 –UN–06SEP07



TX1028755

Travel Hydraulic System Line Connection

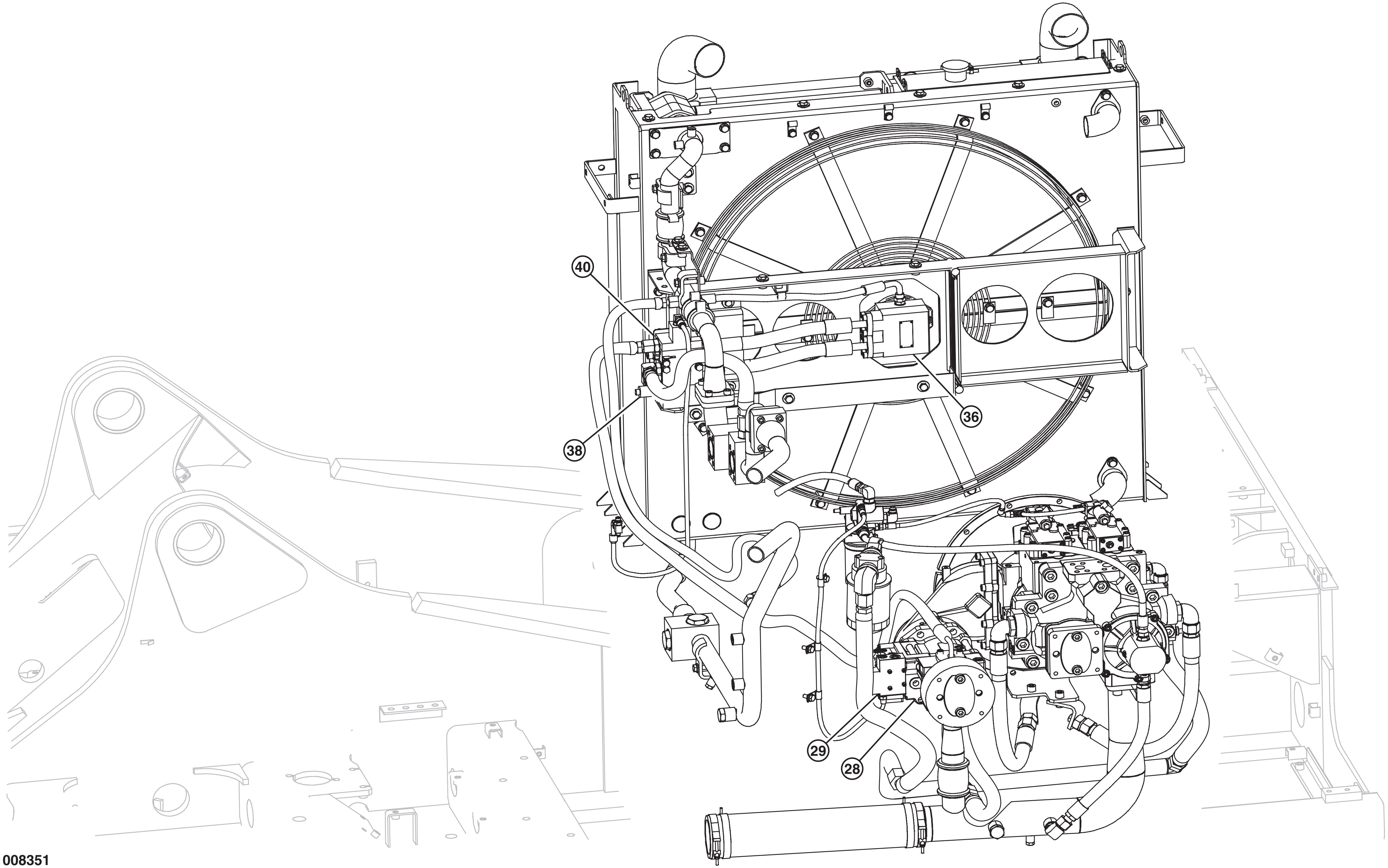
TX04577,0000105 –19–05SEP07–1/2

9—Left Travel Forward (pilot)
10—Left Travel Reverse (pilot)
11—Right Travel Forward (pilot)
12—Right Travel Reverse (pilot)
55—Solenoid Valve Manifold
56—Travel Pilot Control Valve
66—Pilot Signal Manifold
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
90—Right Travel Spool
140—Left Travel Spool
155—Center Joint
158—Right Travel Motor
157—Left Travel Motor
160—Left Travel Forward
161—Right Travel Forward
162—Left Travel Reverse
163—Right Travel Reverse
164—Return Line to Hydraulic Oil Tank
165—Case Drain Lines
Y10—Pilot Shutoff Solenoid Valve
Y25—Travel Speed Solenoid Valve (SI)
I—Left Travel Forward (pilot)
J—Left Travel Reverse (pilot)
K—Right Travel Forward (pilot)
L—Right Travel Reverse (pilot)
PI—From Pilot Shutoff Solenoid Valve

TX04577,0000105 –19–05SEP07–2/2

Fan Drive Hydraulic System Component Location

TX1008351 –UN–06JUN06



TX1008351

Fan Drive Hydraulic System Component Location

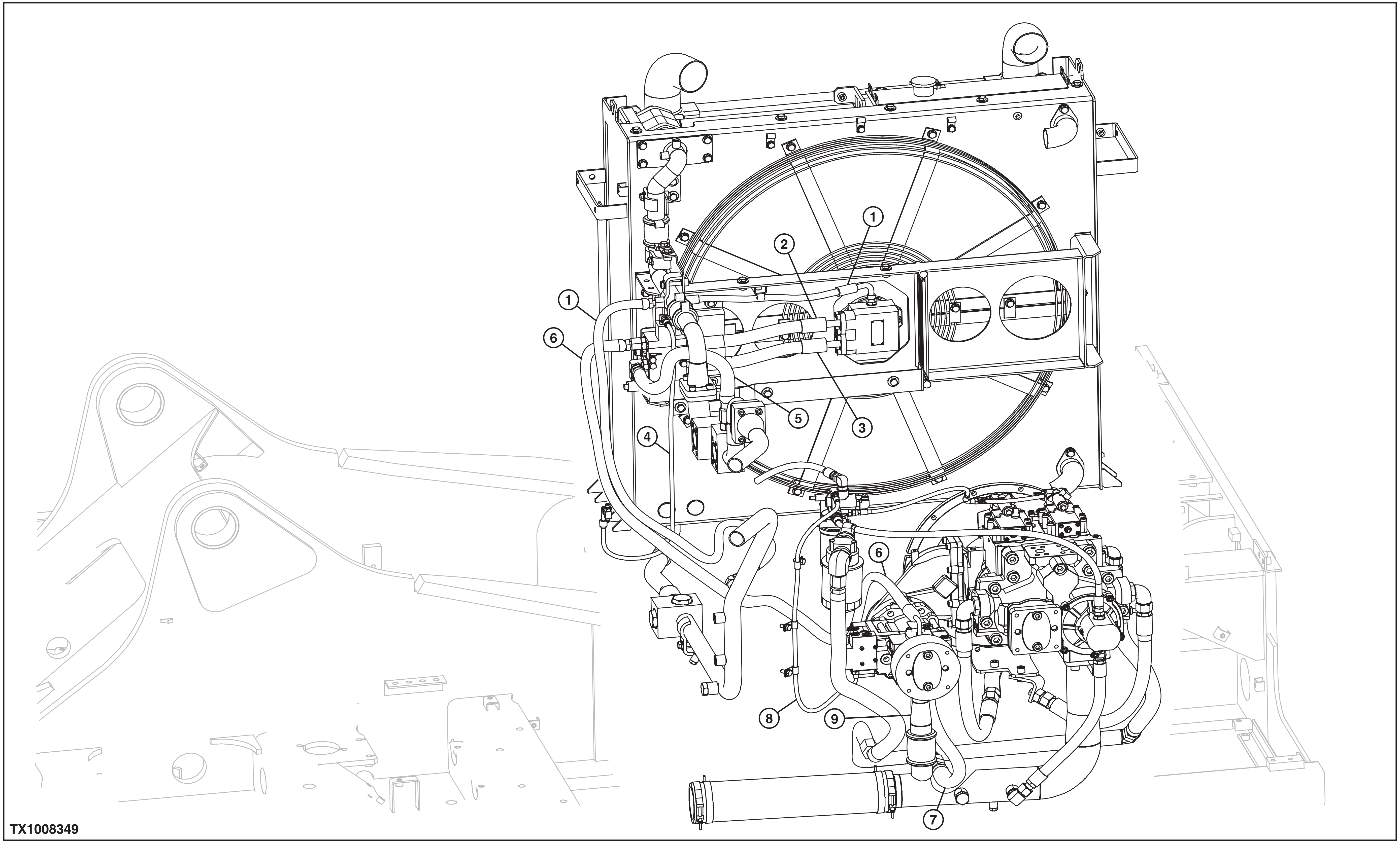
TX04577,0000101 –19–08JUN06–1/2

28—Fan Drive Pump
29—Fan Drive Pump Regulator
36—Fan Drive Motor
38—Fan Drive Relief Valve
40—Fan Drive (Reversing) Control Valve

TX04577,0000101 –19–08JUN06–2/2

Fan Drive Hydraulic System Line Connections

TX1008349 –UN–06JUN06



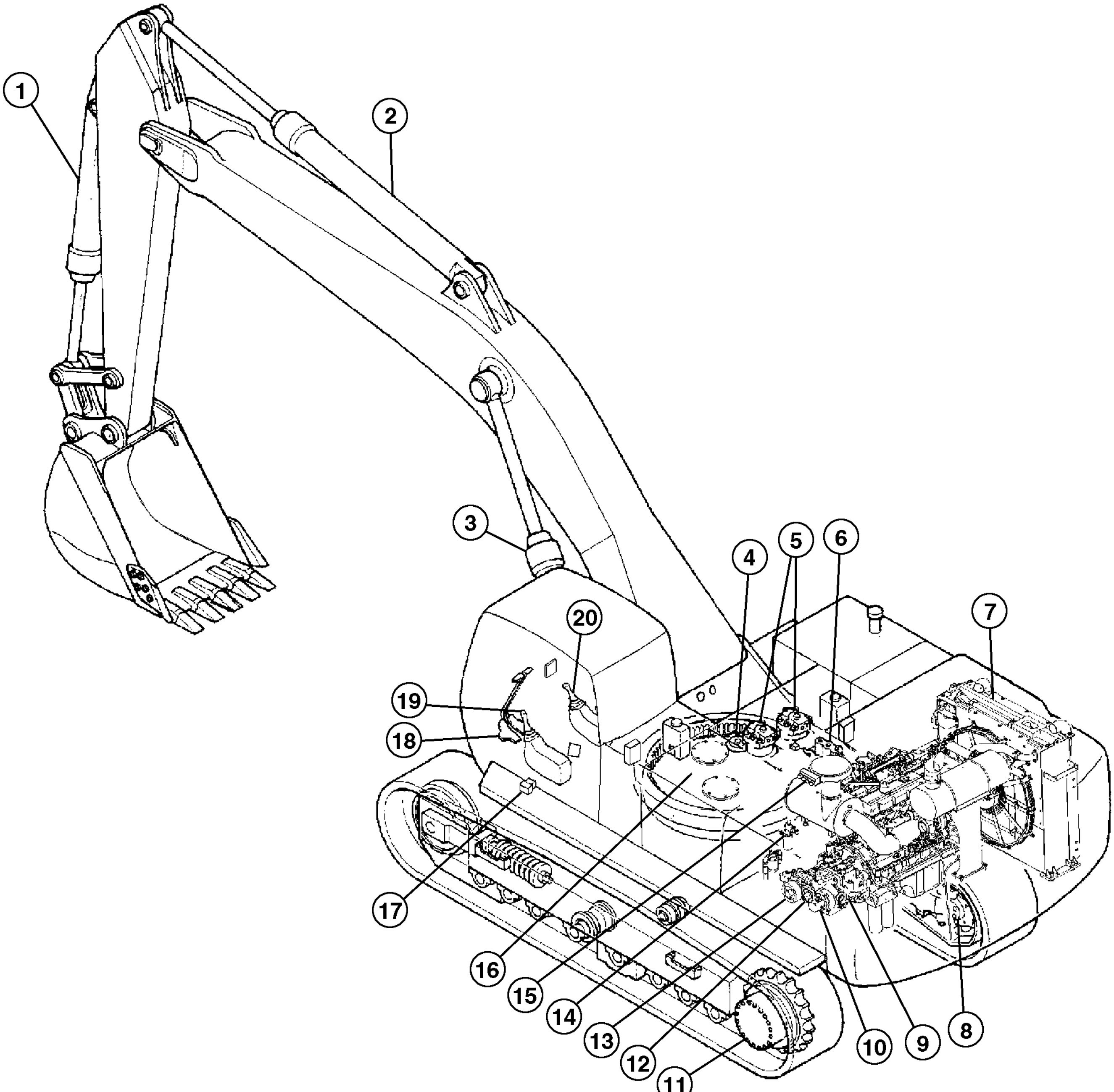
Fan Drive Hydraulic System Line Connections

TX04577,0000100 –19–06JUN06–1/2

1—Case Drain Line—Motor-to-Return Manifold
2—Motor-to-Fan Drive Control Valve Line
3—Motor-to-Fan Drive Control Valve Line
4—Pilot Oil Line—Tee Fitting-to-Fan Drive Control Valve
5—Return Line—Fan Drive Control Valve-to-Control Valve Manifold
6—Pressure Line—Fan Drive Pump-to-Fan Drive Control Valve
7—Case Drain Line—Fan Drive Pump-to-Hydraulic Case Drain Filter Tube
8—Pilot Line—Pilot Filter Line-to-Fan Drive Pump Regulator
9—Suction Line—Fan Drive Pump-from-Manifold

TX04577,0000100 –19–06JUN06–2/2

Hydraulic System Component Location



TX1003463

TX1003463 –UN–10FEB06

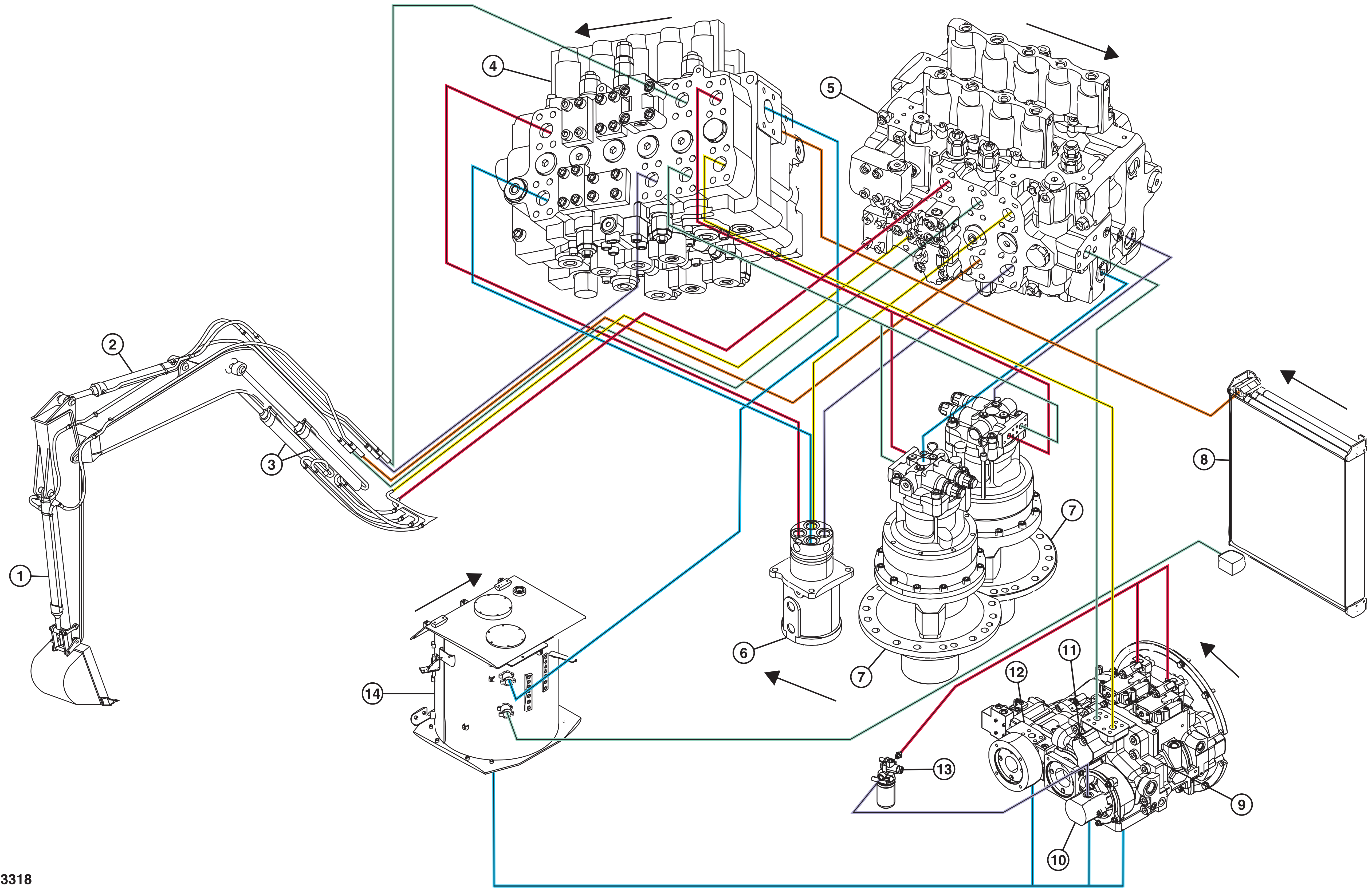
Hydraulic System Component Location

1—**Bucket Cylinder**
2—**Arm Cylinder**
3—**Boom Cylinder (2 used)**
4—**Center Joint**
5—**Swing Motor (2 used)**
6—**Control Valve**
7—**Hydraulic Oil Cooler**
8—**Right Travel Motor**
9—**Pump 2**
10—**Pilot Pump**
11—**Left Travel Motor**
12—**Pump 1**
13—**Fan Drive Pump**
14—**Pilot Pressure Regulating Valve**
15—**Solenoid Valve Manifold**
16—**Hydraulic Oil Tank**
17—**Pilot Shutoff Solenoid Valve**
18—**Travel Pilot Control Valve**
19—**Left Pilot Control Valve**
20—**Right Pilot Control Valve**

LD30992,000027D –19–02MAY06–1/1

Hydraulic System Line Connections

TX1003318 –UN–17FEB06



TX1003318

1—Bucket Cylinder
2—Arm Cylinder
3—Boom Cylinder (2 used)
4—Left Control Valve (5-spool)
5—Right Control Valve (4-spool)
6—Center Joint
7—Swing Motor and Gearbox (2 used)
8—Hydraulic Oil Cooler
9—Pump 1
10—Pilot Pump
11—Pump 2
12—Fan Drive Pump
13—Pilot Pressure Regulating Valve
14—Hydraulic Oil Tank

OUT3035,000002E –19–07JUN06–2/2

Counterweight Removal Hydraulic System Component Location

Information not available at the time of release.

OUT3035,000002F –19–28APR06–1/1

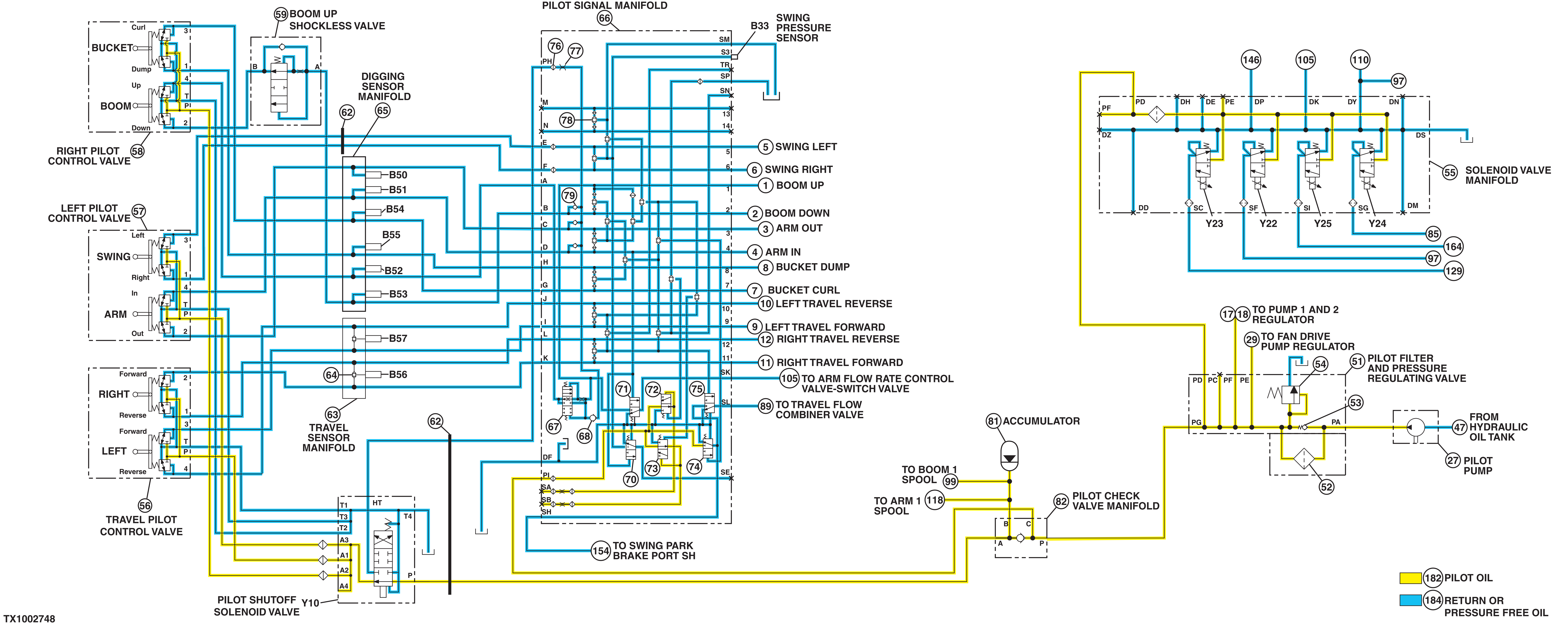
Counterweight Removal Hydraulic System Line Connections

Information not available at the time of release.

OUT3035,0000030 –19–28APR06–1/1

Hydraulic System Schematic

TX1002748 –19–31JAN06



TX1002748

Pilot Control Valves and Pilot Signal Manifold—Excavator Control Pattern

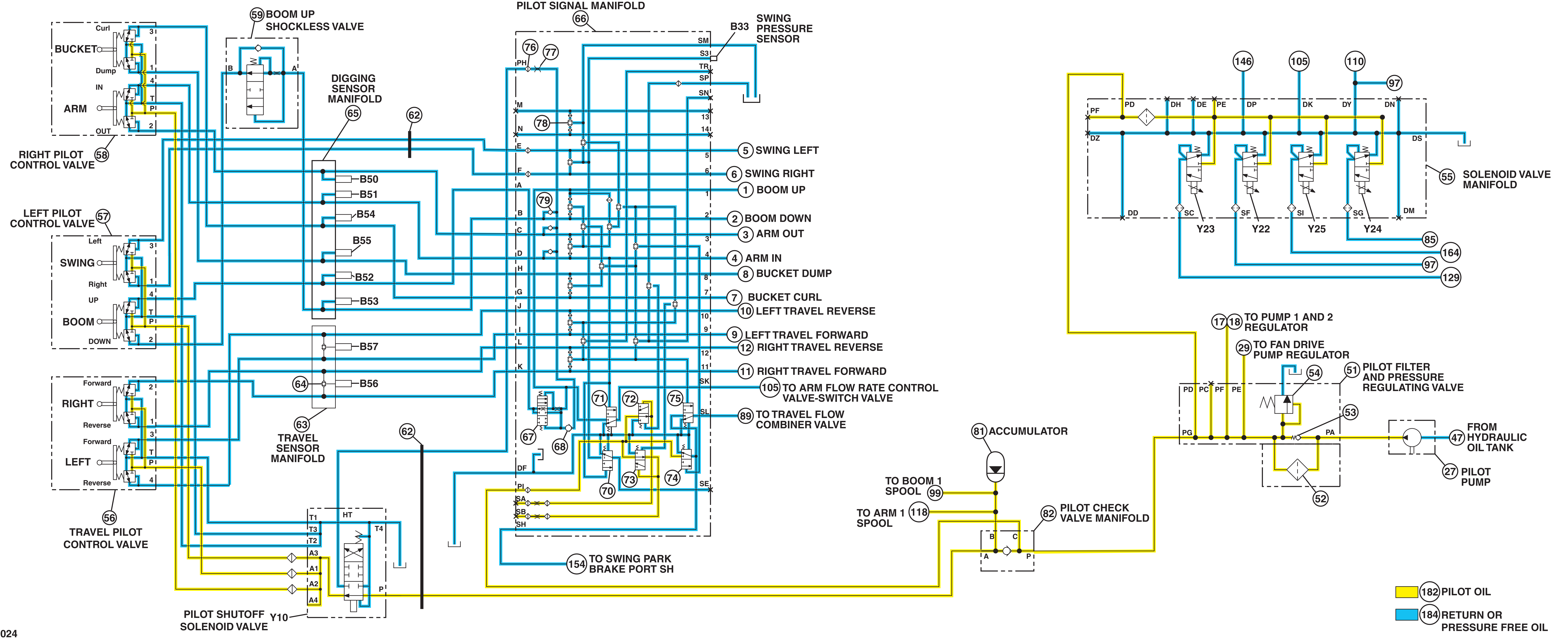
LD30992,000027C –19–01MAY06–1/16

1—Boom Up (pilot)
2—Boom Down (pilot)
3—Arm Out (pilot)
4—Arm In (pilot)
5—Swing Left (pilot)
6—Swing Right (pilot)
7—Bucket Curl (pilot)
8—Bucket Dump (pilot)
9—Left Travel Forward (pilot)
10—Left Travel Reverse (pilot)
11—Right Travel Forward (pilot)
12—Right Travel Reverse (pilot)
13—Plug—Auxiliary (pilot)
14—Plug—Auxiliary(pilot)
17—To Pump 1 Regulator
18—To Pump 2 Regulator
27—Pilot Pump
29—To Fan Drive Pump Regulator
47—From Hydraulic Oil Tank
51—Pilot Filter and Pressure Regulating Valve
52—Pilot Filter Element
53—Pilot Filter Bypass Valve
54—Pilot Pressure Regulating Valve
55—Solenoid Valve Manifold
56—Travel Pilot Control Valve
57—Left Pilot Control Valve (swing and arm)
58—Right Pilot Control Valve (bucket and boom)
59—Boom Up Shockless Valve
62—Bulkhead
63—Travel Sensor Manifold
64—Shuttle Valve (2 used)
65—Digging Sensor Manifold
66—Pilot Signal Manifold
67—Boom Down Shockless Valve
68—Check Valve—Warmup Circuit
70—Pilot Valve (port SE) (not used, plug installed)
71—Arm 2 Flow Rate Pilot Valve (port SK)
72—Pump 1 Flow Rate Pilot Valve (port SA) (not used, plug installed)
73—Pump 2 Flow Rate Pilot Valve (port SB) (not used, plug installed)
74—Swing Park Brake Release Pilot Valve (port SH)
75—Travel Flow Combiner Pilot Valve (port SL)
76—Filter (18 used)
77—Orifice—Warmup Circuit
78—Shuttle Valve (17 used)
79—Check Valve—Warmup Circuit (3 used)
81—Accumulator
82—Pilot Check Valve Manifold
85—To Main Relief and Power Digging Valve
89—To Travel Flow Combiner Valve
97—To Boom Flow Rate Control Valve—Switch Valve
— From Boom Flow Rate Control Valve—Spring Cavity of Switch Valve
99—To Boom 1 Spool
105—To Arm 2 Flow Rate Control Valve—Switch Valve
—From Arm 2 Flow Rate Control Valve—Spring Cavity of Switch Valve
110—From Bypass Shutoff (auxiliary flow combiner) Valve (4-spool)
118—To Arm 1 Spool
129—To Boom Mode Relief Control Valve
146—From Bypass Shutoff Valve (5-spool)
154—To Swing Park Brake (port SH)
164—To Travel Speed Selector Valve
B33—Swing Pressure Sensor
B50—Arm Out Pressure Sensor
B51—Arm In Pressure Sensor
B52—Boom Up Pressure Sensor
B53—Boom Down Pressure Sensor
B54—Bucket Curl Pressure Sensor
B55—Bucket Dump Pressure Sensor
B56—Travel Right Pressure Sensor
B57—Travel Left Pressure Sensor
Y10—Pilot Shutoff Solenoid Valve
Y22—Boom Flow Rate Solenoid Valve (port SF)
Y23—Boom Mode Solenoid Valve (port SC)
Y24—Power Dig Solenoid Valve (port SG)
Y25—Travel Speed Solenoid Valve (port SI)
182—Pilot Oil
184—Return or Pressure-Free Oil

Continued on next page

LD30992,000027C –19–01MAY06–2/16

TX1005024 –19–21MAR06



TX1005024

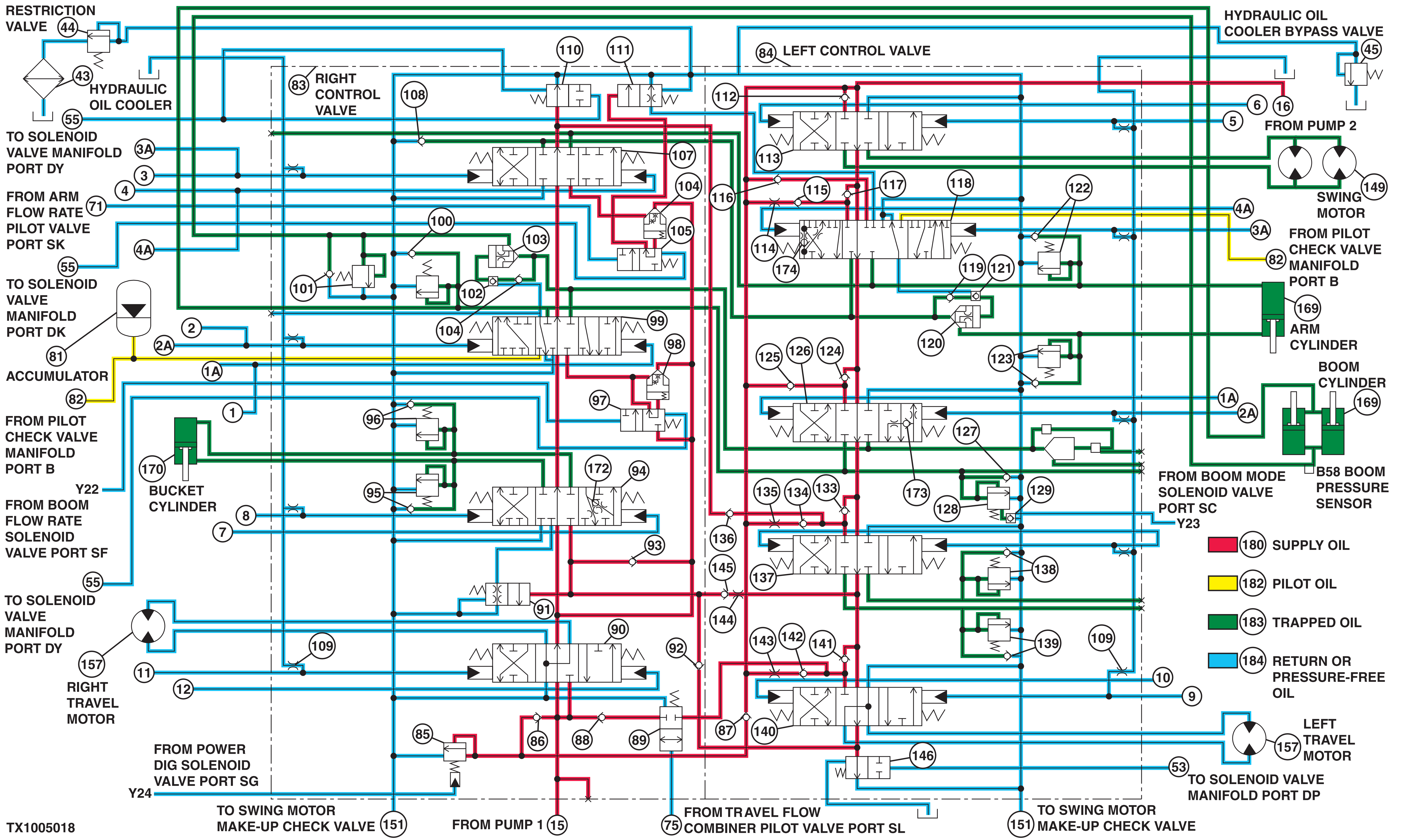
Pilot Control Valves and Pilot Signal Manifold—Backhoe Control Pattern

Continued on next page

1—Boom Up (pilot)
2—Boom Down (pilot)
3—Arm Out (pilot)
4—Arm In (pilot)
5—Swing Left (pilot)
6—Swing Right (pilot)
7—Bucket Curl (pilot)
8—Bucket Dump (pilot)
9—Left Travel Forward (pilot)
10—Left Travel Reverse (pilot)
11—Right Travel Forward (pilot)
12—Right Travel Reverse (pilot)
13—Plug—Auxiliary (pilot)
14—Plug—Auxiliary(pilot)
17—To Pump 1 Regulator
18—To Pump 2 Regulator
27—Pilot Pump
29—To Fan Drive Pump Regulator
47—From Hydraulic Oil Tank
51—Pilot Filter and Pressure Regulating Valve
52—Pilot Filter Element
53—Pilot Filter Bypass Valve
54—Pilot Pressure Regulating Valve
55—Solenoid Valve Manifold
56—Travel Pilot Control Valve
57—Left Pilot Control Valve (swing and boom)
58—Right Pilot Control Valve (bucket and arm)
59—Boom Up Shockless Valve
62—Bulkhead
63—Travel Sensor Manifold
64—Shuttle Valve (2 used)
65—Digging Sensor Manifold
66—Pilot Signal Manifold
67—Boom Down Shockless Valve
68—Check Valve—Warmup Circuit
70—Pilot Valve (port SE) (not used, plug installed)
71—Arm 2 Flow Rate Pilot Valve (port SK)
72—Pump 1 Flow Rate Pilot Valve (port SA) (not used, plug installed)
73—Pump 2 Flow Rate Pilot Valve (port SB) (not used, plug installed)
74—Swing Park Brake Release Pilot Valve (port SH)
75—Travel Flow Combiner Pilot Valve (port SL)
76—Filter (18 used)
77—Orifice—Warmup Circuit
78—Shuttle Valve (17 used)
79—Check Valve—Warmup Circuit (3 used)
81—Accumulator
82—Pilot Check Valve Manifold
85—To Main Relief and Power Digging Valve
89—To Travel Flow Combiner Valve
97—To Boom Flow Rate Control Valve—Switch Valve
— From Boom Flow Rate Control Valve—Spring Cavity of Switch Valve
99—To Boom 1 Spool
105—To Arm 2 Flow Rate Control Valve—Switch Valve
—From Arm 2 Flow Rate Control Valve—Spring Cavity of Switch Valve
110—From Bypass Shutoff (auxiliary flow combiner) Valve (4-spool)
118—To Arm 1 Spool
129—To Boom Mode Relief Control Valve
146—From Bypass Shutoff Valve (5-spool)
154—To Swing Park Brake (port SH)
164—To Travel Speed Selector Valve
B33—Swing Pressure Sensor
B50—Arm Out Pressure Sensor
B51—Arm In Pressure Sensor
B52—Boom Up Pressure Sensor
B53—Boom Down Pressure Sensor
B54—Bucket Curl Pressure Sensor
B55—Bucket Dump Pressure Sensor
B56—Travel Right Pressure Sensor
B57—Travel Left Pressure Sensor
Y10—Pilot Shutoff Solenoid Valve
Y22—Boom Flow Rate Solenoid Valve (port SF)
Y23—Boom Mode Solenoid Valve (port SC)
Y24—Power Dig Solenoid Valve (port SG)
Y25—Travel Speed Solenoid Valve (port SI)
182—Pilot Oil
184—Return or Pressure-Free Oil

Continued on next page

TX1005018 –19–21MAR06



Control Valve Schematic

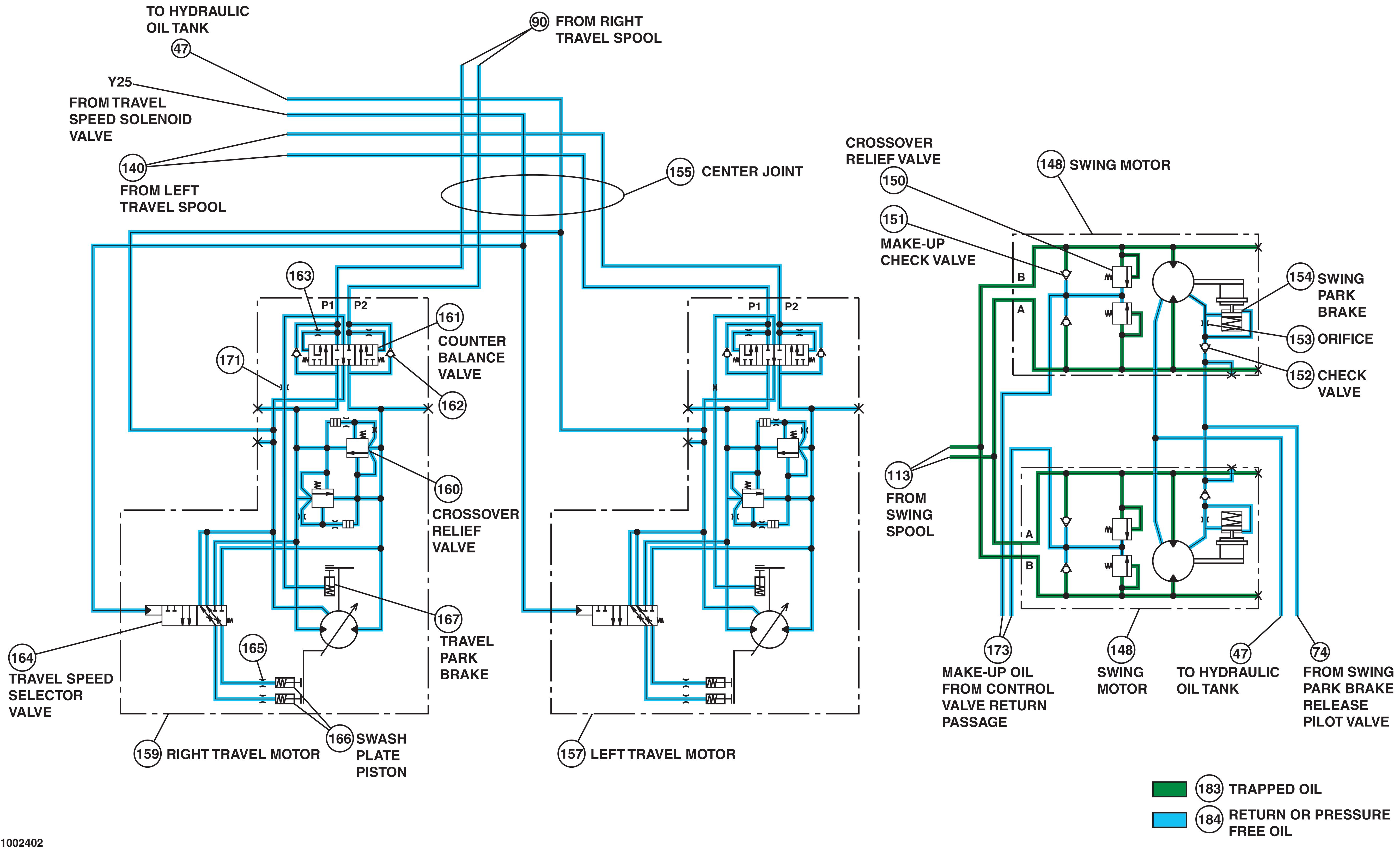
Continued on next page

1—Boom Up (pilot)
1A—Boom Up to Left Pilot Cap
2—Boom Down (pilot)
2A—Boom Down to Left Pilot Cap
3—Arm Out (pilot)
3A—Arm Out to Left Pilot Cap
4—Arm In (pilot)
4A—Arm In to Left Pilot Cap
5—Swing Left (pilot)
6—Swing Right (pilot)
7—Bucket Curl (pilot)
8—Bucket Dump (pilot)
9—Left Travel Forward (pilot)
10—Left Travel Reverse (pilot)
11—Right Travel Forward (pilot)
12—Right Travel Reverse (pilot)
15—From Pump 1
16—From Pump 2
43—Hydraulic Oil Cooler
44—Restriction Valve
45—Hydraulic Oil Cooler Bypass Valve
53—To Solenoid Valve Manifold (port DP)
55—To Solenoid Valve Manifold (port DK)
—To Solenoid Valve Manifold (port DY)
71—From Arm 2 Flow Rate Pilot Valve (port SK)
75—From Travel Flow Combiner Pilot Valve (port SL)
81—Accumulator
82—From Pilot Check Valve Manifold (port B)
83—Right Control Valve
84—Left Control Valve
85—Main Relief and Power Digging Valve
86—Main Relief Valve Isolation Check Valve (4-spool)
87—Main Relief Valve Isolation Check Valve (5-spool)
88—Check Valve
89—Travel Flow Combiner Valve
90—Right Travel Spool
91—Bucket Regenerative Switch Valve
92—Bucket Flow Combiner Circuit Check Valve
93—Power Passage Check Valve (bucket lift check)
94—Bucket Spool
95—Bucket Dump Circuit Relief and Anticavitation Valve
96—Bucket Curl Circuit Relief and Anticavitation
97—Boom Flow Rate Control Valve—Switch Valve
98—Boom Flow Rate Control Valve—Poppet Valve
99—Boom 1 Spool
100—Boom Down Circuit Relief and Anticavitation Valve
101—Boom Up Circuit Relief and Anticavitation Valve
102—Boom Reduced Leakage Valve—Switch Valve
103—Boom Reduced Leakage Valve—Check Valve
104—Check Valve
105—Arm 2 Flow Rate Control Valve—Switch Valve
106—Arm 2 Flow Rate Control Valve—Poppet Valve
107—Arm 2 Spool
108—Arm Make-Up Check Valve
109—Orifice—Warm-Up Circuit (9 used)
110—Bypass Shutoff (auxiliary flow combiner) Valve (4-spool)
111—Arm Regenerative Valve—Switch Valve
112—Neutral Passage Check Valve (swing lift check)
113—Swing Spool
114—Power Passage Orifice (arm 1 in function lift check)
115—Power Passage Check Valve (arm 1 in function lift check)
116—Power Passage Check Valve (arm 1 out function lift check)
117—Neutral Passage Check Valve (arm 1 in function lift check)
118—Arm 1 Spool
119—Check Valve
120—Arm Reduced Leakage Valve—Check Valve
121—Arm Reduced Leakage Valve—Switch Valve
122—Arm In Circuit Relief and Anticavitation Valve
123—Arm Out Circuit Relief And Anticavitation Valve
124—Neutral Passage Check Valve (boom 2 lift check)
125—Power Passage Check Valve (boom 2 lift check)
126—Boom 2 Spool
127—Anticavitation Check Valve (boom down)
128—Boom Mode Relief Valve
129—Boom Mode Relief Control Valve
133—Neutral Passage Check Valve (auxiliary lift check)
134—Power Passage Check Valve (auxiliary lift check)
135—Power Passage Orifice (auxiliary power passage)
136—Auxiliary Flow Combiner Circuit Check Valve
137—Auxiliary Spool
138—Auxiliary Circuit Relief and Anticavitation Valve
139—Auxiliary Circuit Relief and Anticavitation Valve
140—Left Travel Spool
141—Neutral Passage Check Valve (left travel lift check)
142—Power Passage Check Valve (left travel lift check)
143—Power Passage Orifice (left travel power passage)
144—Left Travel and Bucket Flow Combining Circuit Orifice
145—Left Travel and Bucket Flow Combining Circuit Check Valve
146—Bypass Shutoff (Bucket Flow Combiner) Valve (5-spool)
149—Swing Motor (2 used)
151—To Swing Motor Make-Up Check Valve
157—Left Travel Motor
159—Right Travel Motor
168—Boom Cylinder (2 used)
169—Arm Cylinder
170—Bucket Cylinder
172—Bucket Regenerative Valve
173—Boom 2 Regenerative Valve
174—Arm 1 Regenerative Valve
B58—Boom Pressure Sensor
Y22—From Boom Flow Rate Solenoid Valve (port SF)
Y23—From Boom Mode Solenoid Valve (port SC)
Y24—From Power Dig Solenoid Valve (port SG)
180—Supply Oil
182—Pilot Oil
183—Trapped Oil
184—Return or Pressure-Free Oil

Continued on next page

LD30992,000027C –19–01MAY06–6/16

TX1002402 –19–31JAN06



TX1002402

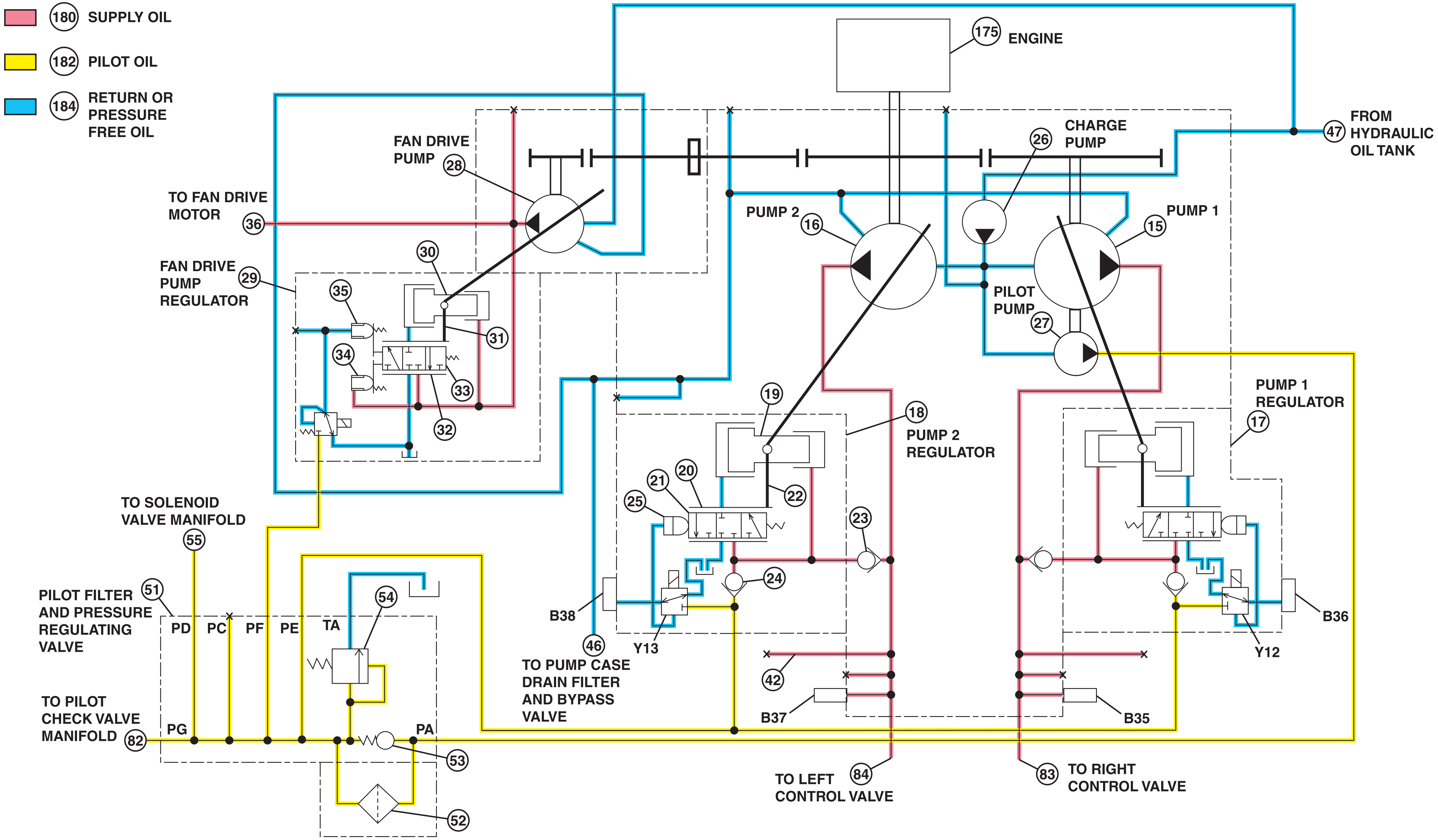
Travel and Swing Motors Schematic

Continued on next page

47—To Hydraulic Oil Tank
74—From Swing Park Brake Release Pilot Valve (port SH)
90—From Right Travel Spool
113—From Swing Spool
140—From Left Travel Spool
148—Swing Motor (2 used)
—Port A—Swing Left
—Port B—Swing Right
150—Crossover Relief Valve
151—Make-Up Check Valve
152—Check Valve
153—Orifice
154—Swing Park Brake
155—Center Joint
157—Left Travel Motor
159—Right Travel Motor
160—Crossover Relief Valve
161—Counterbalance Valve
162—Check Valve
163—Orifice
164—Travel Speed Selector Valve
165—Orifice
166—Swash Plate Piston (4 used)
167—Travel Park Brake
171—Orifice
173—Make-Up Oil From Control Valve Return Passage
Y25—From Travel Speed Solenoid Valve (port SI)
183—Trapped Oil
184—Return or Pressure-Free Oil

Continued on next page

TX1002424 –19–18JAN06



TX1002424

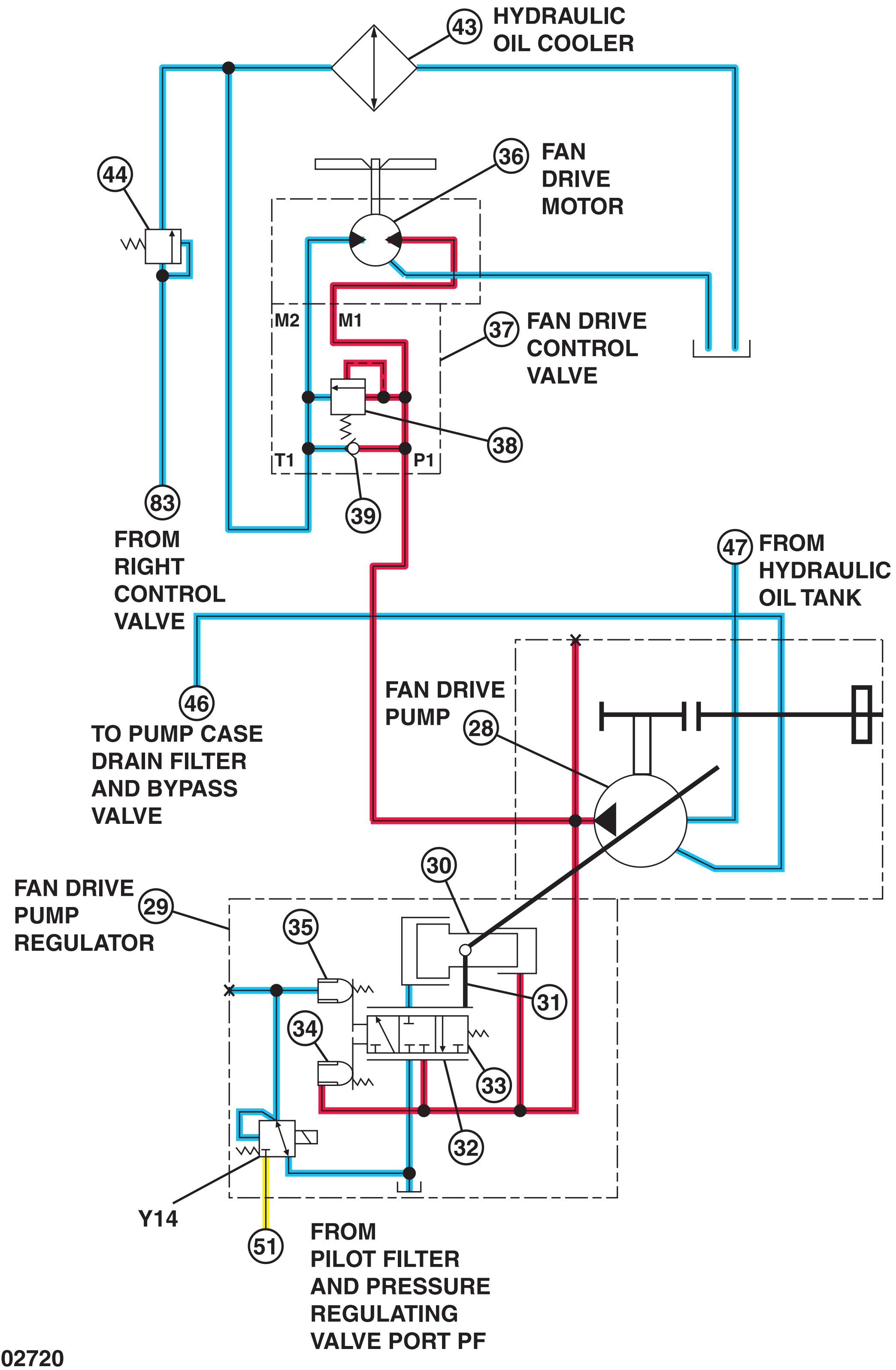
Pump 1, Pump 2, and Fan Drive Pump Regulator Schematic

Continued on next page

15—Pump 1
16—Pump 2
17—Pump 1 Regulator
18—Pump 2 Regulator
19—Servo Piston
20—Load Sleeve
21—Load Spool
22—Feedback Link
23—Check Valve
24—Check Valve
25—Pilot Piston
26—Charge Pump
27—Pilot Pump
28—Fan Drive Pump
29—Fan Drive Pump Regulator
30—Servo Piston
31—Feedback Link
32—Load Sleeve
33—Load Piston
34—Pilot Piston
35—Compensating Piston
36—To Fan Drive Motor
42—Attenuator Hose
46—To Pump Case Drain Filter and Bypass Valve
47—From Hydraulic Oil Tank
51—Pilot Filter and Pressure Regulating Valve
52—Pilot Filter Element
53—Pilot Filter Bypass Valve
54—Pilot Pressure Regulating Valve
55—To Solenoid Valve Manifold
82—To Pilot Check Valve Manifold
83—To Right Control Valve
84—To Left Control Valve
175—Engine
B35—Pump 1 (4-Spool) Delivery Pressure Sensor (4P)
B36—Pump 1 (4-Spool) Control Pressure Sensor (4P)
B37—Pump 2 (5-Spool) Delivery Pressure Sensor (5P)
B38—Pump 2 (5-Spool) Control Pressure Sensor (5P)
Y12—Pump 1 (4-Spool) Control Solenoid Valve (4P)
Y13—Pump 2 (5-Spool) Control Solenoid Valve (5P)
180—Supply Oil
182—Pilot Oil
184—Return or Pressure-Free Oil

Continued on next page

TX1002720 –19–18JAN06

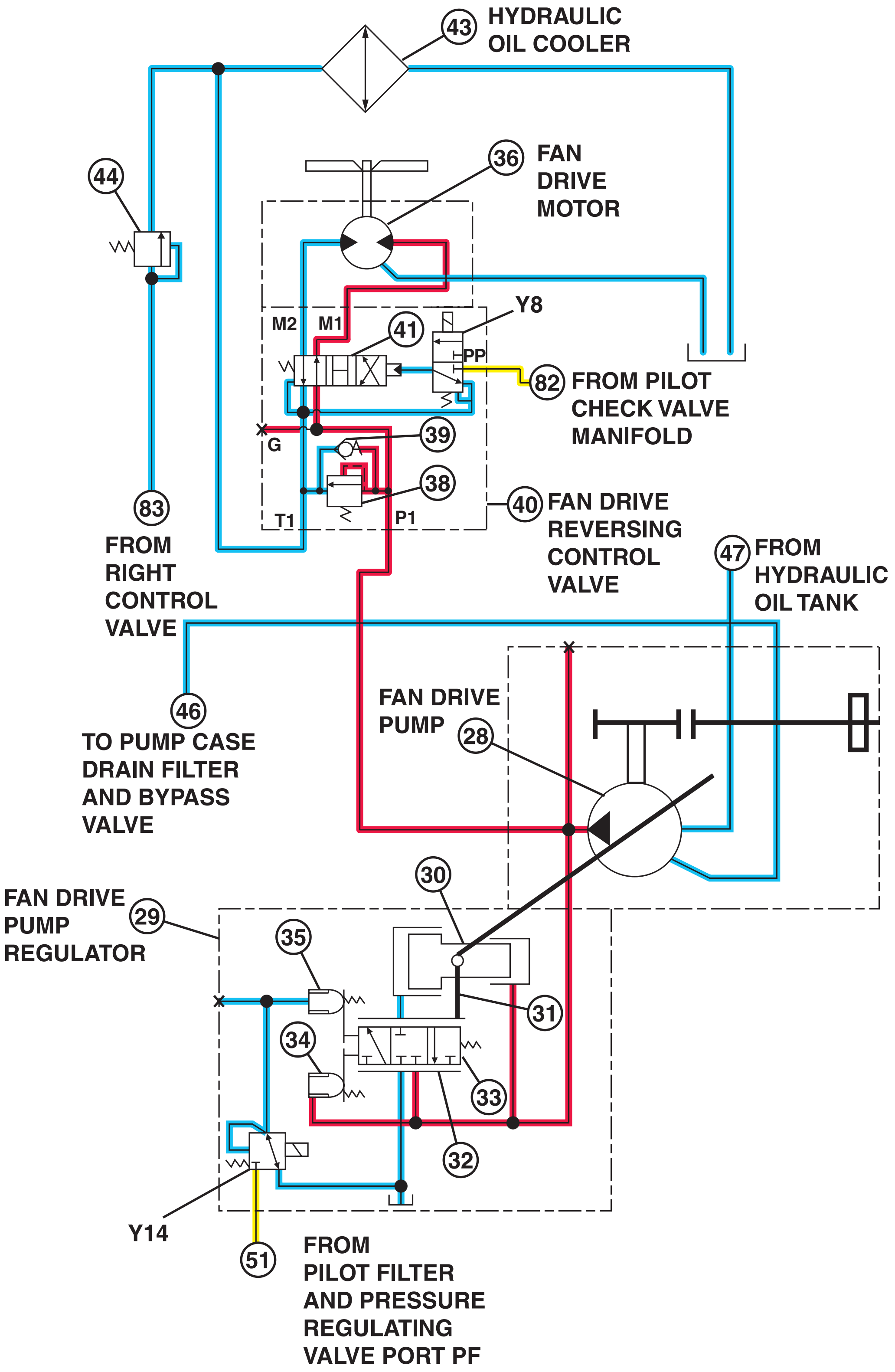


TX1002720

🟥 (180) SUPPLY OIL

🟨 (182) PILOT OIL

🟦 (184) RETURN OR PRESSURE FREE OIL



Fan Drive Schematic

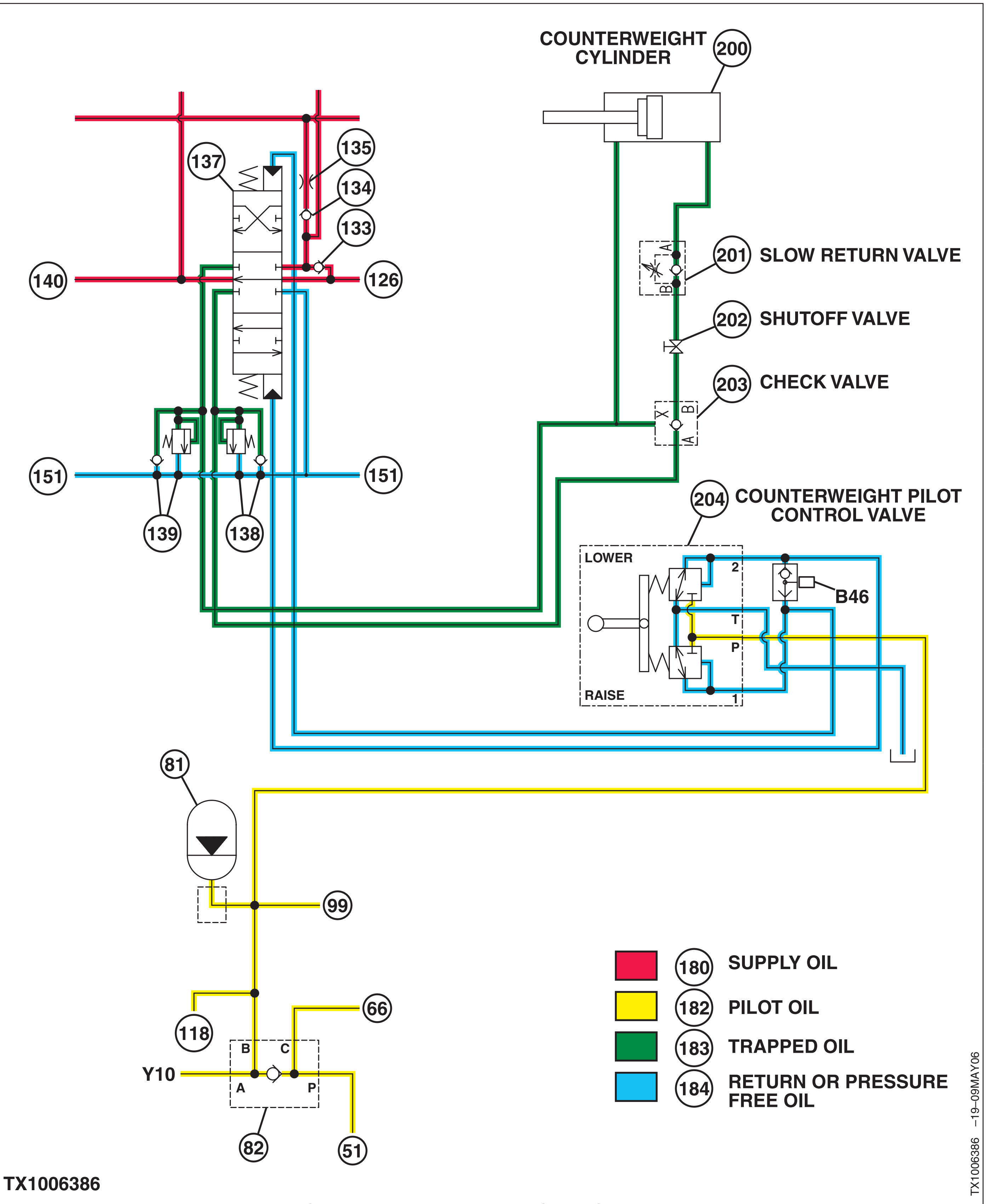
Continued on next page

LD30992,000027C –19–01MAY06–11/16

28—Fan Drive Pump
29—Fan Drive Pump Regulator
30—Servo Piston
31—Feedback Link
32—Load Sleeve
33—Load Piston
34—Pilot Piston
35—Compensating Piston
36—Fan Drive Motor
37—Fan Drive Control Valve (standard)
38—Fan Drive Relief Valve
39—Make-Up Check Valve
40—Fan Drive Reversing Control Valve
41—Fan Drive Reversing Spool
43—Hydraulic Oil Cooler
44—Restriction Valve
46—To Pump Case Drain Filter and Bypass Valve
47—From Hydraulic Oil Tank
51—From Pilot Filter and Pressure Regulating Valve (port PF)
82—From Pilot Check Valve Manifold
83—From Right Control Valve
Y8—Fan Reversing Solenoid Valve 1
Y14—Fan Pump Control Solenoid Valve
180—Supply Oil
182—Pilot Oil
184—Return or Pressure-Free Oil

Continued on next page

LD30992,000027C –19–01MAY06–12/16



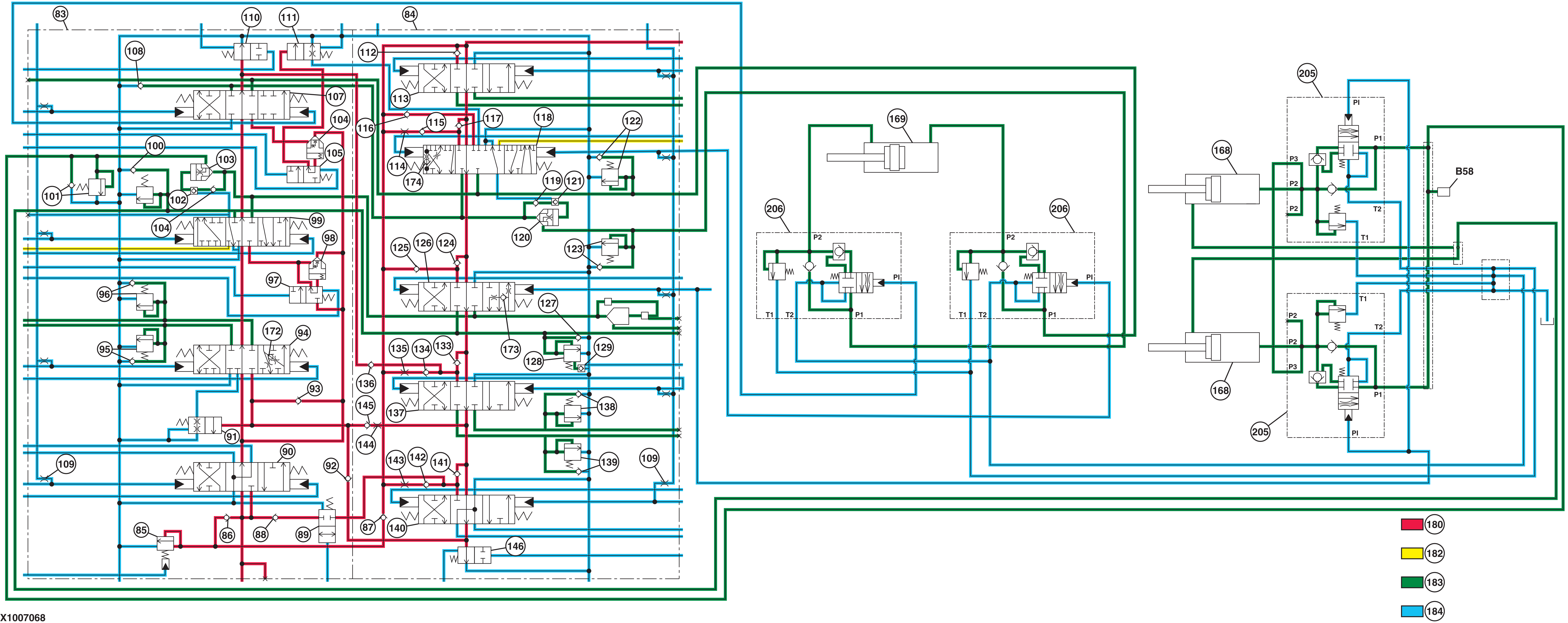
TX1006386

Counterweight Removal Hydraulic System Schematic

Continued on next page

51—From Pilot Filter and Pressure Regulating Valve (port PF)
66—To Pilot Signal Manifold
81—Accumulator
82—Pilot Check Valve Manifold
99—To Boom 1 Spool
118—To Arm 1 Spool
126—From Boom 2 Spool
133—Neutral Passage Check Valve (auxiliary lift check)
134—Power Passage Check Valve (auxiliary lift check)
135—Power Passage Orifice (auxiliary power passage)
137—Auxiliary Spool
138—Auxiliary Circuit Relief and Anticavitation Valve
139—Auxiliary Circuit Relief and Anticavitation Valve
140—To Left Travel Spool
180—Supply Oil
182—Pilot Oil
183—Trapped Oil
184—Return or Pressure-Free Oil
200—Counterweight Cylinder
201—Slow Return Valve
202—Shutoff Valve
203—Check Valve
204—Counterweight Pilot Control Valve
B46—Counterweight Removal Pressure Sensor
Y10—Pilot Shutoff Solenoid Valve

Continued on next page



TX1007068 –UN–28APR06

TX1007068

Load Lowering Control Valves Schematic

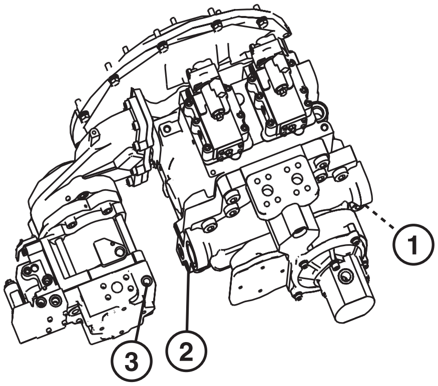
Continued on next page

83—Right Control Valve
84—Left Control Valve
85—Main Relief and Power Digging Valve
86—Main Relief Valve Isolation Check Valve (4-spool)
87—Main Relief Valve Isolation Check Valve (5-spool)
88—Check Valve
89—Travel Flow Combiner Valve
90—Right Travel Spool
91—Bucket Regenerative Switch Valve
92—Bucket Flow Combiner Circuit Check Valve
93—Power Passage Check Valve (bucket lift check)
94—Bucket Spool
95—Bucket Dump Circuit Relief and Anticavitation Valve
96—Bucket Curl Circuit Relief and Anticavitation
97—Boom Flow Rate Control Valve—Switch Valve
98—Boom Flow Rate Control Valve—Poppet Valve
99—Boom 1 Spool
100—Boom Down Circuit Relief and Anticavitation Valve
101—Boom Up Circuit Relief and Anticavitation Valve
102—Boom Reduced Leakage Valve—Switch Valve
103—Boom Reduced Leakage Valve—Check Valve
104—Check Valve
105—Arm 2 Flow Rate Control Valve—Switch Valve
107—Arm 2 Spool
108—Arm Make-Up Check Valve
109—Orifice—Warm-Up Circuit (9 used)
110—Bypass Shutoff (auxiliary flow combiner) Valve (4-spool)
111—Arm Regenerative Valve—Switch Valve
112—Neutral Passage Check Valve (swing lift check)
113—Swing Spool
114—Power Passage Orifice (arm 1 in function lift check)
115—Power Passage Check Valve (arm 1 in function lift check)
116—Power Passage Check Valve (arm 1 out function lift check)
117—Neutral Passage Check Valve (arm 1 in function lift check)
118—Arm 1 Spool
119—Check Valve
120—Arm Reduced Leakage Valve—Check Valve
121—Arm Reduced Leakage Valve—Switch Valve
122—Arm In Circuit Relief and Anticavitation Valve
123—Arm Out Circuit Relief And Anticavitation Valve
124—Neutral Passage Check Valve (boom 2 lift check)
125—Power Passage Check Valve (boom 2 lift check)
126—Boom 2 Spool
127—Anticavitation Check Valve (boom down)
128—Boom Mode Relief Valve
129—Boom Mode Relief Control Valve
133—Neutral Passage Check Valve (auxiliary lift check)
134—Power Passage Check Valve (auxiliary lift check)
135—Power Passage Orifice (auxiliary power passage)
136—Auxiliary Flow Combiner Circuit Check Valve
137—Auxiliary Spool
138—Auxiliary Circuit Relief and Anticavitation Valve
139—Auxiliary Circuit Relief and Anticavitation Valve
140—Left Travel Spool
141—Neutral Passage Check Valve (left travel lift check)
142—Power Passage Check Valve (left travel lift check)
143—Power Passage Orifice (left travel power passage)
144—Left Travel and Bucket Flow Combining Circuit Orifice
145—Left Travel and Bucket Flow Combining Circuit Check Valve
146—Bypass Shutoff (bucket flow combiner) Valve (5-spool)
168—Boom Cylinder (2 used)
169—Arm Cylinder
172—Bucket Regenerative Valve
173—Boom 2 Regenerative Valve
174—Arm 1 Regenerative Valve
180—Supply Oil
182—Pilot Oil
183—Trapped Oil
184—Return or Pressure-Free Oil
205—Boom Load Lowering Control Valve (2 used)
206—Arm Load Lowering Control Valve (2 used)
B58—Boom Bottom Pressure Sensor

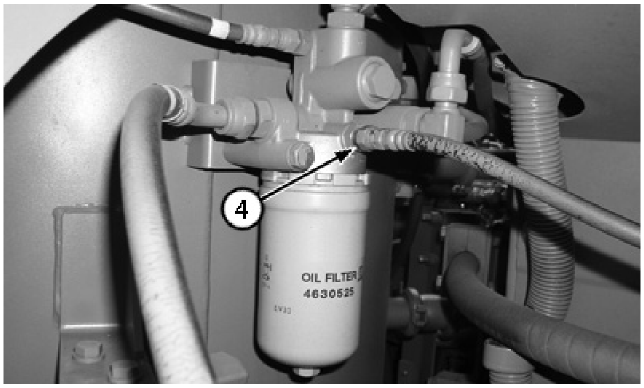
LD30992,000027C –19–01MAY06–16/16

Hydraulic Test Port Location

1—Pump 1 Test Port Location
2—Pump 2 Test Port Location
3—Fan Drive Pump Test Port
4—Pilot Oil Test Port (hose removal required)



Test Port Locations



Test Port Location—Pilot Oil

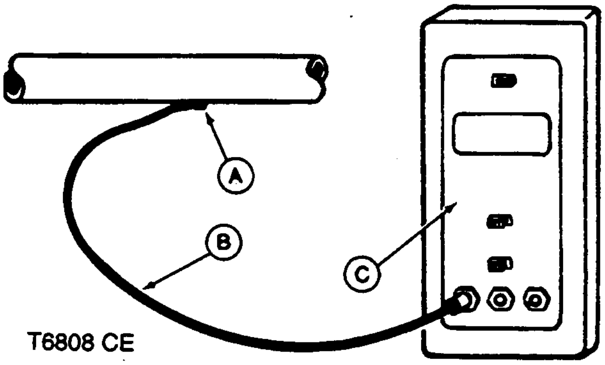
TX04577,00000E9 –19–27MAR06–1/1

JT05800 Digital Thermometer Installation

SERVICE EQUIPMENT AND TOOLS
JT05800 Digital Thermometer

1. Fasten temperature probe (A) to a bare metal hydraulic line using a tie band.
2. Wrap temperature probe and line with a shop towel.

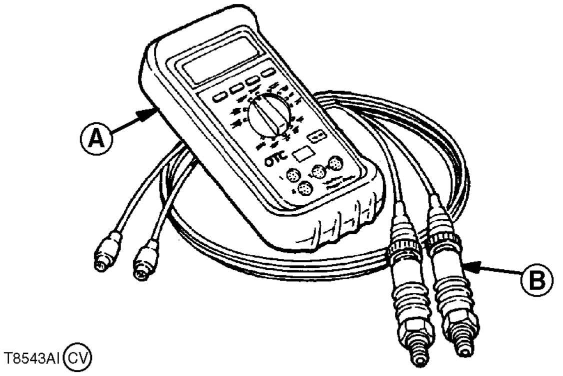
A—Temperature Probe
B—Cable
C—JT05800 Digital Thermometer



CED,TX08227,2895 –19–19NOV97–1/1

JT02156A Digital Pressure/Temperature Analyzer Installation

SERVICE EQUIPMENT AND TOOLS
JT02156A Digital Pressure/Temperature Analyzer
JT02158 Digital Pressure/Temperature Analyzer
JT02159 20 ft Cable with Couplers
JT02161 500 psi Transducer
JT02162 5000 psi Transducer
JT05969 Thermo-Coupler
312883 Carry Case
JT02160 10,000 psi Transducer (Optional, Order Separately)



T8543AI –UN–25AUG95

A—Digital Pressure/Temperature Analyzer
B—3 400 kPa (35 bar) (500 psi) Transducer
—34 000 kPa (350 bar) (5000 psi) Transducer
—70 000 kPa (700 bar) (10,000 psi Transducer

Use the digital pressure/temperature analyzer (A), and transducers (B) in place of analog gauges and a separate temperature reader.

Transducers are temperature sensitive. Allow transducer to warm to system temperature. After transducer is warmed and no pressure applied, push sensor zero button for one second to set the true zero point.

When using for different pressures, turn selector to OFF for two seconds and then to the pressure range. Readings are inaccurate if proper range for transducer is not used.

CED,TX08227,2896 –19–02JUL01–1/1

Hydraulic Oil Cleanup Procedure Using Portable Filter Caddy

SPECIFICATIONS	
Hydraulic Oil Tank Capacity	321 L approximate 85 gal approximate
Hydraulic Oil Tank Filtering Time	30 minutes approximate
Hydraulic System Capacity	560 L approximate 148 gal approximate
Hydraulic System Filtering Time	90 minutes approximate

SERVICE EQUIPMENT AND TOOLS
JDG1724A Super Caddy
JT05679 Hose 3.7 m (12 ft) x 3/4 in. ID 100R1 Hose with 3/4 M NPT Ends (2 used)
JTO5751A Suction Wand
JTO5750A Discharge Wand

1. Install new return filter elements.

NOTE: *For a failure that creates a lot of debris, remove access cover from hydraulic tank. Drain hydraulic tank. Connect filter caddy suction line to drain port. Add a minimum of 19 L (5 gal) of oil to reservoir. Operate filter caddy and wash out the hydraulic tank.*

IMPORTANT: The minimum ID for a connector is 13 mm (1/2 in.) to prevent cavitation of filter caddy pump.

2. Put filter caddy suction and discharge wands into hydraulic tank filler hole so ends are as far apart as possible to obtain a thorough cleaning of oil.

3. Start the filter caddy. Check to be sure oil is flowing through the filters.

   Operate filter caddy until all the oil in hydraulic tank has been circulated through the filter a minimum of four times.

Specification

Hydraulic Oil Tank—Capacity .... 321 L approximate
85 gal approximate
Hydraulic Oil Tank—Filtering Time .... 30 minutes approximate

NOTE: *Filtering time for hydraulic tank is 0.089 minute x number of liters (0.33 minutes x number of gallons).*

4. Leave filter caddy operating for the next step.

5. Start the engine and run it at fast idle.

IMPORTANT: For the most effective results, cleaning procedure must start with the smallest capacity circuit then proceed to the next larger capacity circuit.

6. Starting with the smallest capacity circuit, operate each function through a complete cycle.

   Repeat procedure until the total system capacity has circulated through filter caddy seven times. Each function must go through a minimum of three complete cycles for a thorough cleaning of oil.

Specification

Hydraulic System—Capacity .... 560 L approximate
148 gal approximate
Hydraulic System—Filtering Time .... 90 minutes approximate

NOTE: *Filtering time for complete hydraulic system is 0.158 minute x number of liters (0.6 minute x number of gallons). Filtering time for machines with auxiliary hydraulic functions must be increased because system capacity is larger.*

7. Stop the engine. Remove the filter caddy.

8. Install new return filter elements.

9. Check hydraulic oil level. See Check Hydraulic Oil Level. (Operator's Manual.)

Hydraulic Oil Warm-Up Procedure

SPECIFICATIONS	
Engine Speed	1/2 Speed if below -18°C 1/2 Speed if below 0°F Fast Idle if above -18°C Fast Idle if above 0°F
Power Mode Switch Position	E Mode (Economy) if below -18°C E Mode (Economy) if below 0°F HP Mode (High Power) if above -18°C HP Mode (High Power) if above 0°F
Work Mode Switch Position	Dig Mode
Auto Idle Switch Position	OFF
Travel Speed Switch Position	Slow (Turtle)
Hydraulic Oil Temperature	45—55°C 110—130°F

IMPORTANT: If machine temperature is below -18°C (0°F), start procedure in the E power mode (economy). Failure to do this could cause pump cavitation. Once oil temperature is above -18°C (0°F), the power mode can be switched to HP mode (high power).

Below -18°C (0°F) an extended warm-up period may be necessary. Hydraulic functions will move slowly and lubrication of parts may not be adequate with cold oil. Do not attempt normal machine operation until hydraulic functions move at or close to normal cycle times.

Operate functions slowly and avoid sudden movements until engine and hydraulic oils are thoroughly warmed. Operate a function by moving it a short distance in each direction. Continue operating the function increasing the distance traveled in each cycle until full stroke is reached.

For faster warm-up, restrict air flow through oil cooler using cardboard or other similar material. Use correct viscosity oil to minimize warm-up period.

Continued on next page

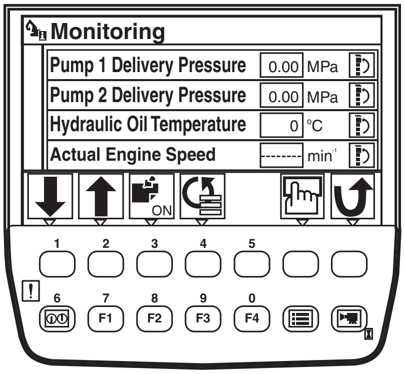
TX04577,00000E7 –19–05JUN06–1/4

1. Connect one of the following test equipment to perform test:

    1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
       Access Hydraulic Warm-Up.
       Or select the following items from the menu:
        - Coolant Temperature
        - Hydraulic Oil Temperature
        - Actual Engine Speed

    2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
       Select the following items from the Monitor Display:
        - Coolant Temperature
        - Hydraulic Oil Temperature
        - Actual Engine Speed

    3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-20.)
       Select the following items from Monitoring list:
        - Coolant Temperature
        - Hydraulic Oil Temperature
        - Actual Engine Speed


Monitoring

Pump 1 Delivery Pressure 0.00 MPa

Pump 2 Delivery Pressure 0.00 MPa

Hydraulic Oil Temperature 0 °C

Actual Engine Speed -------- min⁻¹

TX1003295 –19–03MAR06

Monitor

CAUTION: Avoid possible serious injury from machine movement during warm-up procedure. Clear the area of all bystanders before doing the warm-up procedure.

2. Clear the area of all bystanders to allow for machine movement.

3. Start engine. Run engine at approximately 1/2 speed for approximately 5 minutes before operating any functions.

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

TX04577,00000E7 –19–05JUN06–2/4

4. Run machine at specification.

Specification

Engine—Speed	1/2 Speed if below -18°C 1/2 Speed if below 0°F Fast Idle if above -18°C Fast Idle if above 0°F
Power Mode Switch—Position	E Mode (Economy) if below -18°C E Mode (Economy) if below 0°F HP Mode (High Power) if above -18°C HP Mode (High Power) if above 0°F
Work Mode Switch—Position	Dig Mode
Auto Idle Switch—Position	OFF
Travel Speed Switch—Position	Slow (Turtle)

5. Slowly turn upperstructure so boom is to the side.

⚠ **CAUTION: Avoid possible serious injury from machine sliding backwards. Keep angle between boom and arm at 90—110°.**

6. Keeping the angle between boom and arm at 90—110°, lower boom to raise track off the ground.

7. Operate travel function for approximately 5 minutes.

8. When oil temperature is above -18°C (0°F), increase engine speed to fast idle and turn power mode switch to HP (high power).

IMPORTANT: Holding a function over relief for more than 10 seconds can cause damage due to hot spots in the control valve.

9. Operate the travel function (side with track off the ground). Also operate the bucket curl function over relief for 10 seconds and then stop for 5 seconds. Repeat the cycle until oil is heated to specifications.

10. Stop periodically and operate all hydraulic functions to distribute the heated oil.

11. Continue procedure until oil temperature is within specifications.

Continued on next page

Specification

Hydraulic Oil—Temperature .... 45—55°C
110—130°F

TX04577,00000E7 –19–05JUN06–4/4

Pilot Pressure Regulating Valve Test and Adjustment

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle and Slow Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	P (Standard) Mode
Auto-Idle Switch Position	Off
Pilot System Pressure	3.7—4.6 MPa at Slow Idle 3200—4600 kPa at Slow Idle 37—46 bar at Slow Idle 540—668 psi at Slow Idle
Pilot System Pressure	3.9—4.1 MPa at Fast Idle 3900—4100 kPa at Fast Idle 39.0—41.0 bar at Fast Idle 569—594 psi at Fast Idle
Pilot Pressure Regulating Valve Shim Pressure Change	0.16 MPa approximate per 0.5 mm (0.020 in.) 160 kPa approximate per 0.5 mm (0.020 in.) 1.6 bar approximate per 0.5 mm (0.020 in.) 23 psi approximate per 0.5 mm (0.020 in.)
Plug to Pilot Pressure Regulating Valve Housing Torque	25 N•m 220 lb-in.

SERVICE EQUIPMENT AND TOOLS
203836 (9/16-18 F Sw 37° x 7/16-20 M 37° x 9/16-18 M 37°) Tee
JT02162 Transducer 35 000 kPa (350 bar) (5000 psi)
JT02156A Digital Pressure/Temperature Analyzer
JT05471 Gauge 7000 kPa (70 bar) (1000 psi)

Purpose of test is to ensure there is enough pilot pressure to operate all the pilot system functions and to adjust the pressure as necessary. The pilot pressure regulating valve is used to regulate the pilot system pressure.

Continued on next page

TX04577,00000EB –19–05JUN06–1/4

NOTE: The monitor can be used to make a quick check of the pilot system pressure using the arm in function. Monitor arm in pilot pressure with the engine at fast idle and then actuate arm in function over relief. The pressure reading displayed is from the arm in pilot pressure sensor located on the digging sensor manifold.

Before making any adjustments, check the pilot pressure at the pilot filter housing using a pressure gauge. For pilot filter and pressure regulating valve location see Hydraulic System Component Location. (9025-15.)

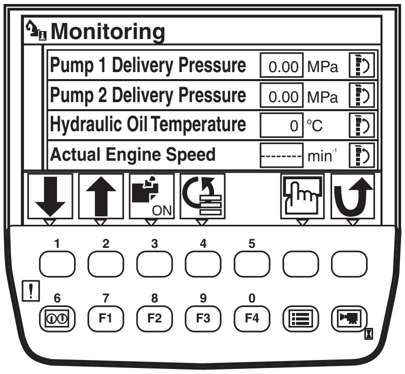
1. Connect one of the following test equipment to perform test:

    1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
       Access Pilot Pressure Regulating Valve Test.
       Or select the following items from the menu:
        - Arm In Pilot Pressure
        - Hydraulic Oil Temperature
        - Actual Engine Speed

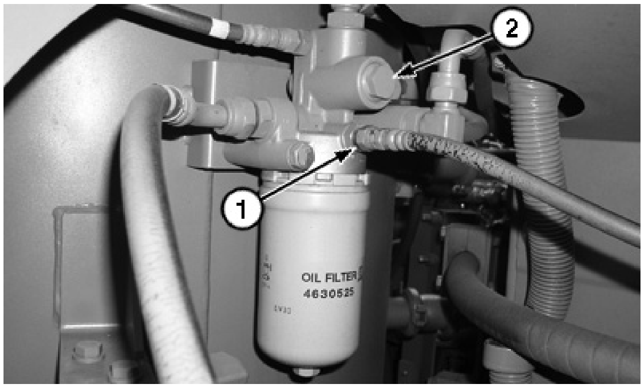
    2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
       Select the following items from the Monitor Display:
        - Arm In Pilot Pressure
        - Hydraulic Oil Temperature
        - Actual Engine Speed

    3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-20.)
       Select the following items from Monitoring list:
        - Arm In Pilot Pressure
        - Hydraulic Oil Temperature
        - Actual Engine Speed

       Release hydraulic oil tank pressure by pushing pressure release button on top of hydraulic oil tank.


Monitoring
Pump 1 Delivery Pressure 0.00 MPa
Pump 2 Delivery Pressure 0.00 MPa
Hydraulic Oil Temperature 0 °C
Actual Engine Speed -------- min⁻¹

Monitor



Pilot Pressure Regulating Valve and Test Port Location

1—Test Port Location
2—Pilot Pressure Regulating Valve

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

Remove pilot hose at test port location (1) at filter housing.

Install 203836 tee in-line.

Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02160 35 000 kPa (350 bar) (5000 psi) transducer or a 70 000 kPa (700 bar) (10,000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation for instruction.

2. Warm hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

3. Run machine at specification:

Specification

Hydraulic Oil—Temperature	45—55°C 110—130°F
Engine—Speed	Fast Idle and Slow Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	P (Standard) Mode
Auto-Idle Switch—Position	Off

4. Operate arm in to full stroke with engine speed at slow idle. Record monitor and gauge pressure readings.

5. Operate arm in to full stroke with engine speed at fast idle. Record monitor and gauge pressure readings.

6. Compare pressure readings to specifications.

Specification

Pilot System—Pressure	3.7—4.6 MPa at Slow Idle 3700—4600 kPa at Slow Idle 37—46 bar at Slow Idle 540—668 psi at Slow Idle
Pilot System—Pressure	3.7— 4.1 MPa at Fast Idle 3772—4118 kPa at Fast Idle 37.7—41.2 bar at Fast Idle 526—594 psi at Fast Idle

Continued on next page

TX04577,00000EB –19–05JUN06–3/4

7. If pressure is not to specification and adjustment is necessary, remove pilot pressure regulating valve (2). Add shims (3) to increase pressure. Remove shims (3) to decrease pressure.

Specification

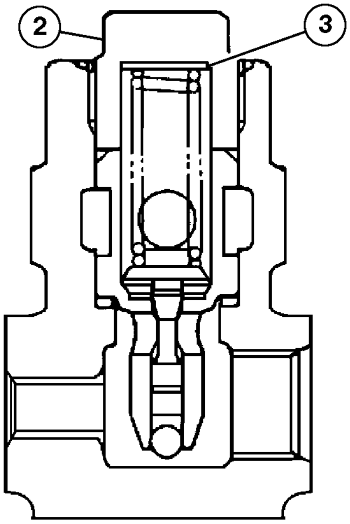
Pilot Pressure Regulating Valve Shim—Pressure Change	0.16 MPa approximate per 0.5 mm (0.020 in.) 160 kPa approximate per 0.5 mm (0.020 in.) 1.6 bar approximate per 0.5 mm (0.020 in.) 23 psi approximate per 0.5 mm (0.020 in.)

8. Tighten plug to specification.

Specification

Plug to Pilot Pressure Regulating Valve Housing—Torque	25 N•m 220 lb-in.

9. Check the pressure settings again.



Pilot Pressure Regulating Valve and Shim

2—Pilot Pressure Regulating Valve
3—Shim

TX04577,00000EB –19–05JUN06–4/4

Control Valve Spool Actuating Pilot Pressure Test

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Slow Idle and Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	P (Standard) Mode
Auto Idle Switch Position	Off
Travel Speed Switch Position	Fast Speed (Rabbit)
Minimum Valve Spool Actuating Pressure	3.33 MPa 3334 kPa 33.3 bar 483 psi

SERVICE EQUIPMENT AND TOOLS
203836 (9/16-18 F Sw 37° x 7/16-20 M 37° x 9/16-18 M 37°) Tee
JT05471 Gauge 7000 kPa (70 bar) (1000 psi)
JT02162 Transducer 35 000 kPa (350 bar) (5000 psi)
JT02156A Digital Pressure/Temperature Analyzer

Purpose of test is to ensure that the pilot pressure to the valve spools is enough to completely shift the spools.

Continued on next page

MS12501,0000096 –19–05JUN06–1/3

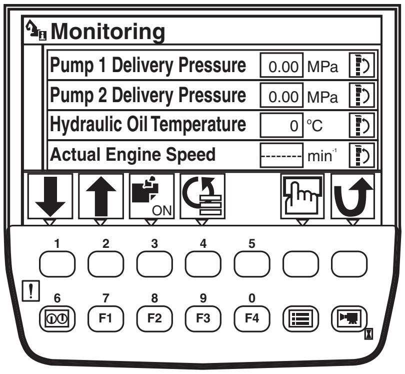
1. Connect one of the following test equipment to perform test:

    1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
       Access Control Valve Spool Actuating Pilot Pressure Test.
       Or select the following items from the menu:
        - Arm In Pilot Pressure
        - Hydraulic Oil Temperature
        - Actual Engine Speed

    2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
       Select the following items from the Monitor Display:
        - Arm In Pilot Pressure
        - Hydraulic Oil Temperature
        - Actual Engine Speed

    3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-16.)
       Select the following items from Monitoring list:
        - Arm In Pilot Pressure
        - Hydraulic Oil Temperature
        - Actual Engine Speed

    4. Push the pressure release button on top of hydraulic oil tank to relieve pressure.
       Remove pilot line of choice at control valve end cap.
       Install 203836 tee in pilot line for function being tested.
       Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02162 35 000 kPa (350 bar) (5000 psi) transducer or a 7000 kPa (70 bar) (1000 psi) gauge.See JT02156A Digital Pressure /Temperature Analyzer Installation. (Group 9025-25.



Monitoring

Pump 1 Delivery Pressure 0.00 MPa

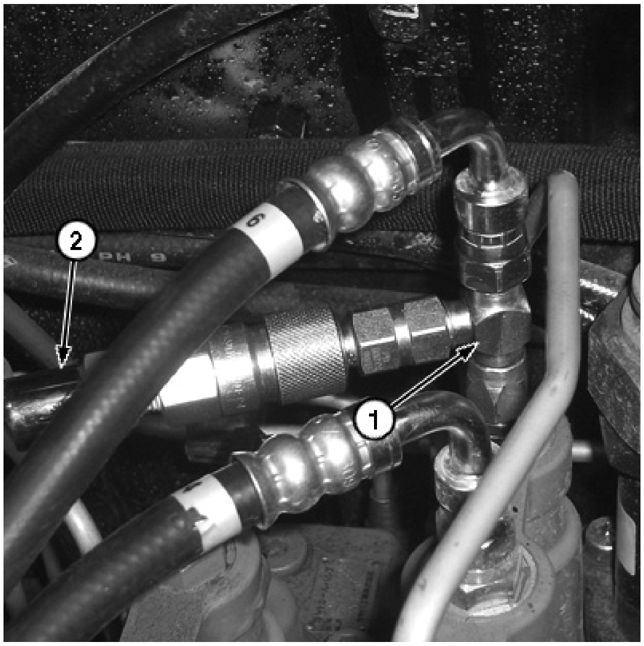
Pump 2 Delivery Pressure 0.00 MPa

Hydraulic Oil Temperature 0 °C

Actual Engine Speed -------- min⁻¹

TX1003295 –19–03MAR06

Monitor



TX1002098A –UN–07JAN06

Control Valve Spool Actuating Pilot Pressure Test

1—Tee
2—Transducer

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function.

Spool actuating pressure for boom up, arm in, left and right swing, and all travel functions can also be measured with the monitor.

2. Heat hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

3. Run machine at specifications.

Specification	
Hydraulic Oil—Temperature	45—55°C 110—130°F
Engine—Speed	Slow Idle and Fast Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	P (Standard) Mode
Auto Idle Switch—Position	Off
Travel Speed Switch—Position	Fast Speed (Rabbit)

4. Actuate the function control lever to full stroke at slow idle.

5. Record pressure.

6. Compare pressure to specifications.

Specification	
Minimum Valve Spool Actuating—Pressure	3.33 MPa 3334 kPa 33.3 bar 483 psi

If valve spool actuating pressure is not to specification check pilot system pressure. See Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.)

If pilot system pressure is to specification then check pressure at the solenoid valve manifold, pilot control shutoff valve, pilot controllers, and pilot signal manifold.

MS12501,0000096 –19–05JUN06–3/3

Power Dig Solenoid Valve (port SG) Test and Adjustment

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	HP (High Power) Mode
Auto Idle Switch Position	OFF
Power Dig Switch Position	ON
Power Dig Solenoid Valve (port SG) Pressure	Monitor Reading ± 0.2 MPa Monitor Reading ± 200 kPa Monitor Reading ± 2.0 bar Monitor Reading ± 29.0 psi Actual Reading From Gauge Must Be Within Pressure Range of Monitor Reading and Tolerance.
Solenoid Valve Adjusting Screw Pressure Change	0.069 MPa approximate per 1/4 turn 69 kPa approximate per 1/4 turn 0.69 bar approximate per 1/4 turn 10 psi approximate per 1/4 turn
End of Adjusting Screw-to-Nut Length	2 mm maximum 0.079 in. maximum
Solenoid Valve Adjusting Screw-to-Housing Nut Torque	3.0 N•m 27 lb-in.

SERVICE EQUIPMENT AND TOOLS
JT03191 (7/16-20 M 37° x 7/16-20 F 37° x 7/16-20 M 37°) (Parker No. 063T-4-4) Tee
JT02156A Digital Pressure/Temperature Analyzer
JT02162 Transducer 35 000 kPa (350 bar) (5000 psi)
Gauge 7 MPa (7000 kPa) (70 bar) (1000 psi)

Purpose of test is to check that the output pressure from the power dig solenoid valve to the power digging valve is within the specified pressure range.

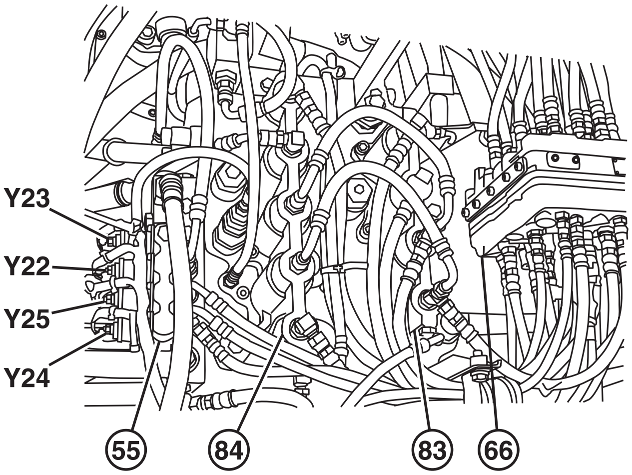
Continued on next page

LD30992,00002B1 –19–05JUN06–1/5

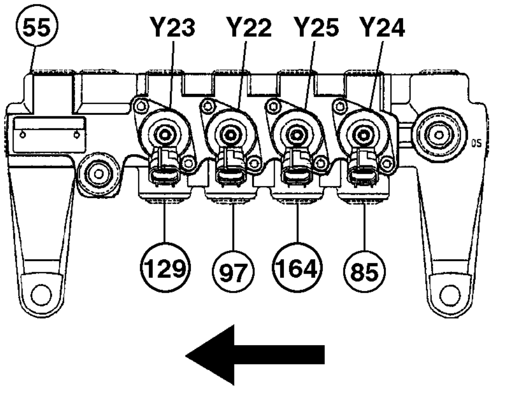
NOTE: Pressure reading displayed on the monitor is calculated pressure from an electrical signal in the main controller (MCF). The reading does not change when valve adjustment is made. The actual pressure to the power digging valve must be measured using a gauge.

1. Release pressure from hydraulic oil tank by pushing pressure release button at top of hydraulic oil tank.
2. Disconnect line for power dig solenoid valve (Y24) to main relief and power digging valve (85) from elbow at the bottom of solenoid valve manifold (55).

   Install a JT03191 Tee in the line.
3. Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02162 Transducer or a 7 MPa (7000 kPa) (70 bar) (1000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation.



Solenoid Valve Manifold Location



Power Dig Solenoid Valve (port SG)

Y22—Boom Flow Rate Solenoid Valve (port SF)
Y23—Boom Mode Solenoid Valve (port SC)
Y24—Power Dig Solenoid Valve (port SG)
Y25—Travel Speed Solenoid Valve (port SI)
55—Solenoid Valve Manifold
66—Pilot Signal Manifold
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
85—To Main Relief and Power Digging Valve
97—To Boom Flow Rate Control Valve—Switch Valve
129—To Boom Mode Relief Control Valve
164—To Travel Speed Selector Valve (left and right travel motors)

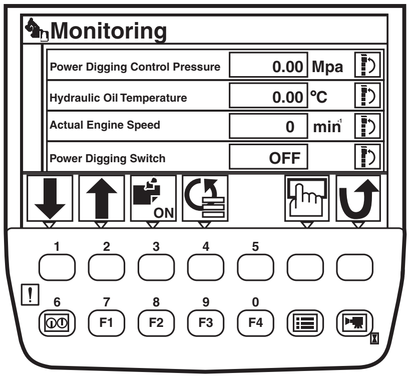
Continued on next page LD30992,00002B1 –19–05JUN06–2/5

4. Use one of the following test equipment to display the calculated pressure:

   1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
      Access Power Dig Solenoid Valve Test.
      Or select the following items from the menu:
      - Power Dig Solenoid Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed
      - Power Digging Switch

   2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
      Select the following items from the Monitor Display:
      - Power Digging Control Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed
      - Power Digging Switch

   3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-20.)
      Select the following items from Monitoring list:
      - Power Digging Control Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed
      - Power Dig Switch



Monitoring

Power Digging Control Pressure 0.00 Mpa

Hydraulic Oil Temperature 0.00 °C

Actual Engine Speed 0 min-1

Power Digging Switch OFF

TX1003493 –19–09FEB06

Monitor Display Shown

5. Warm hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification

Hydraulic Oil—Temperature	45—55°C 110—130°F

6. Run machine at specification.

Specification

Engine—Speed	Fast Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	HP (High Power) Mode
Auto Idle Switch—Position	OFF
Power Dig Switch—Position	ON

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

LD30992,00002B1 –19–05JUN06–3/5

7. Push the power dig switch.

   Record pressure readings from monitor and gauge.

8. Calculate the pressure range using the calculated reading from monitor and the specify tolerance.

   Check that the actual reading from gauge is within the pressure range.

Specification

Power Dig Solenoid Valve (port SG)—Pressure	Monitor Reading ± 0.2 MPa Monitor Reading ± 200 kPa Monitor Reading ± 2.0 bar Monitor Reading ± 29.0 psi Actual Reading From Gauge Must Be Within Pressure Range of Monitor Reading and Tolerance.

Example of Calculated Reading From Monitor

	Actuated	**Neutral**
Example of Calculated Reading From Monitor	2.15 MPa 2150 kPa 21.5 bar 312.0 psi	0.50 MPa 500 kPa 5.0 bar 73 psi

Continued on next page

9. Adjust the solenoid valve (H) as needed.

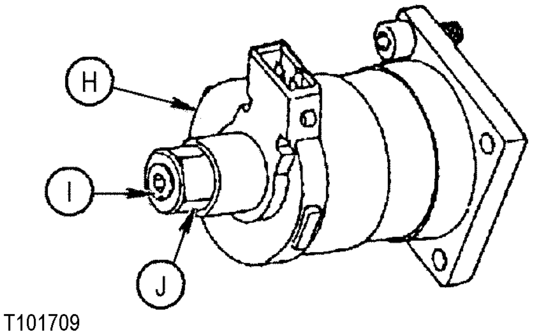
   a. Loosen nut (J).

IMPORTANT: Turning adjusting screw out too far may cause oil leakage because the O-ring has come off its seat.

   b. Turn adjusting screw (I) in to increase pressure setting; turn adjusting screw out to decrease pressure setting. The length from end of adjusting screw to nut must not exceed the specified length.

Specification

Solenoid Valve Adjusting Screw—Pressure Change	0.069 MPa approximate per 1/4 turn 69 kPa approximate per 1/4 turn 0.69 bar approximate per 1/4 turn 10 psi approximate per 1/4 turn
End of Adjusting Screw-to-Nut—Length	2 mm maximum 0.079 in. maximum



T101709 –UN–20JUN96

H—Solenoid Valve
I—Adjusting Screw
J—Nut

   c. Hold adjusting screw and tighten nut.

Specification

Solenoid Valve Adjusting Screw-to-Housing Nut—Torque	3.0 N•m 27 lb-in.

10. Check the pressure setting again.

LD30992,00002B1 –19–05JUN06–5/5

Travel Speed Solenoid Valve (port SI) Test and Adjustment

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	HP (High Power) Mode
Auto Idle Switch Position	OFF
Travel Speed Switch Position	Fast (Rabbit)
Travel Speed Solenoid Valve (port SI) Pressure	Monitor Reading ± 0.2 MPa Monitor Reading ± 200 kPa Monitor Reading ± 2.0 bar Monitor Reading ± 29.0 psi Actual Reading From Gauge Must Be Within Pressure Range of Monitor Reading and Tolerance.
Solenoid Valve Adjusting Screw Pressure Change	0.069 MPa approximate per 1/4 turn 69 kPa approximate per 1/4 turn 0.69 bar approximate per 1/4 turn 10 psi approximate per 1/4 turn
End of Adjusting Screw-to-Nut Length	2 mm maximum 0.079 in. maximum
Solenoid Valve Adjusting Screw-to-Housing Nut Torque	3.0 N•m 27 lb-in.

SERVICE EQUIPMENT AND TOOLS
203836 (9/16-18 M 37° x 9/16-18 F 37° Sw x 7/16-20 M 37°) Tee
JT02156A Digital Pressure/Temperature Analyzer
JT02162 Transducer 35 000 kPa (350 bar) (5000 psi)
Gauge 7 MPa (7000 kPa) (70 bar) (1000 psi)

Purpose of test is to check that the output pressure from the travel speed solenoid valve to the travel speed selector valve in the left and right travel motors is within the specified pressure range.

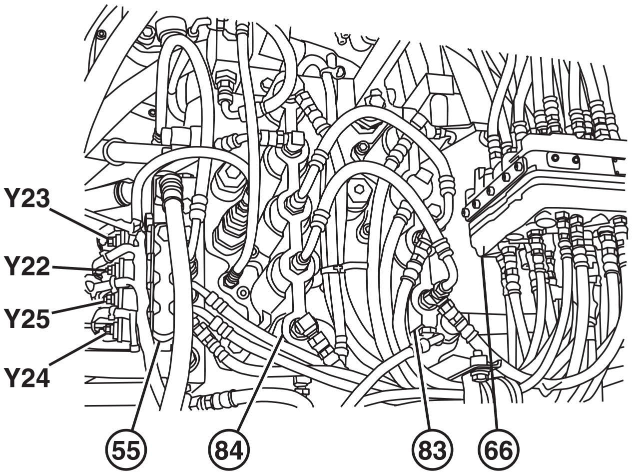
Continued on next page

LD30992,00002B2 –19–05JUN06–1/5

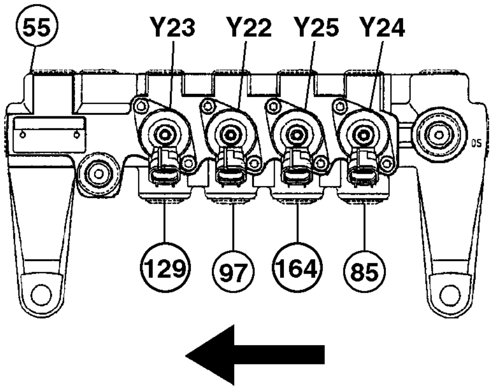
NOTE: Pressure reading displayed on the monitor is a calculated pressure from an electrical signal in the main controller (MCF). The reading does not change when valve adjustment is made. The actual pressure to the travel speed selector valves must be measured using a gauge.

1. Release pressure from hydraulic oil tank by pushing pressure release button on top of hydraulic oil tank.
2. Disconnect line for travel speed solenoid valve (Y25) to travel speed selector valves (164) from elbow at the bottom of solenoid valve manifold (55).

   Install 203836 tee.
3. Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02162 Transducer or a 7 MPa (7000 kPa) (70 bar) (1000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation.



Solenoid Valve Manifold Location



Travel Speed Solenoid Valve (port SI)

Y22—Boom Flow Rate Solenoid Valve (port SF)
Y23—Boom Mode Solenoid Valve (port SC)
Y24—Power Dig Solenoid Valve (port SG)
Y25—Travel Speed Solenoid Valve (port SI)
55—Solenoid Valve Manifold
66—Pilot Signal Manifold
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
85—To Main Relief and Power Digging Valve
97—To Boom Flow Rate Control Valve—Switch Valve
129—To Boom Mode Relief Control Valve
164—To Travel Speed Selector Valve (left and right travel motors)

Continued on next page

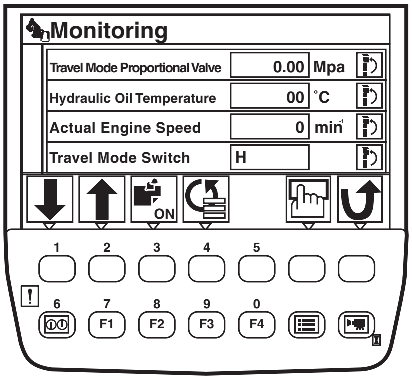
LD30992,00002B2 –19–05JUN06–2/5

4. Use one of the following test equipment to display the calculated pressure:

    1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
    Access Travel Speed Solenoid Valve Test.
    Or select the following items from the menu:
        - Travel Mode Solenoid Pressure
        - Hydraulic Oil Temperature
        - Actual Engine Speed
        - Travel Speed Switch

    2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
    Select the following items from the Monitor Display:
        - Travel Mode Proportional Valve
        - Hydraulic Oil Temperature
        - Actual Engine Speed
        - Travel Mode Switch

    3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-20.)
    Select the following items from Monitoring list:
        - Travel Mode Proportional Valve
        - Hydraulic Oil Temperature
        - Actual Engine Speed
        - Travel Mode Switch



Monitoring

Travel Mode Proportional Valve 0.00 Mpa

Hydraulic Oil Temperature 00 °C

Actual Engine Speed 0 min^{-1}

Travel Mode Switch H

Monitor Display Shown

TX1003888 –19–16FEB06

5. Warm hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification

Hydraulic Oil—Temperature	45—55°C 110—130°F

6. Run machine at specification.

Specification

Engine—Speed	Fast Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	HP (High Power) Mode
Auto Idle Switch—Position	OFF
Travel Speed Switch—Position	Fast (Rabbit)

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

7. Actuate travel function to full forward or reverse.

   Record pressure readings from monitor and gauge.

8. Calculate the pressure range using the calculated reading from monitor and the specify tolerance.

   Check that the actual reading from gauge is within the pressure range.

Specification

Travel Speed Solenoid Valve (port SI)—Pressure	Monitor Reading ± 0.2 MPa Monitor Reading ± 200 kPa Monitor Reading ± 2.0 bar Monitor Reading ± 29.0 psi Actual Reading From Gauge Must Be Within Pressure Range of Monitor Reading and Tolerance.

Example of Calculated Reading From Monitor		
	Actuated	**Neutral**
Example of Calculated Reading From Monitor	3.92 MPa 3920 kPa 39.2 bar 569.0 psi	0.00 MPa 0000 kPa 00.0 bar 000 psi

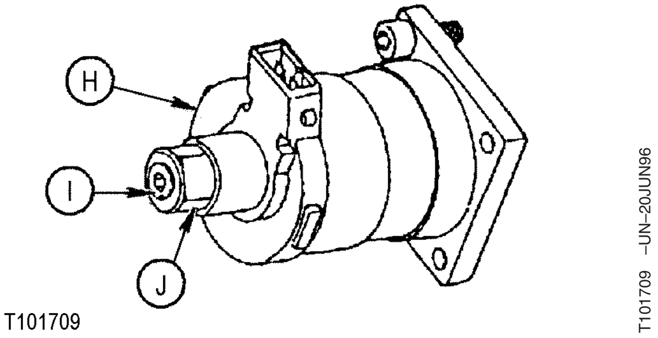
Continued on next page

9. Adjust the solenoid valve (H) as needed.

IMPORTANT: Turning adjusting screw out too far may cause oil leakage because the O-ring has come off its seat.

a. Loosen nut (J).

b. Turn adjusting screw (I) in to increase pressure setting; turn adjusting screw out to decrease pressure setting. The length from end of adjusting screw to nut must not exceed the specified length.



H—Solenoid Valve
I—Adjusting Screw
J—Nut

Specification

Solenoid Valve Adjusting Screw—Pressure Change	0.069 MPa approximate per 1/4 turn 69 kPa approximate per 1/4 turn 0.69 bar approximate per 1/4 turn 10 psi approximate per 1/4 turn
End of Adjusting Screw-to-Nut—Length	2 mm maximum 0.079 in. maximum

c. Hold adjusting screw and tighten nut.

Specification

Solenoid Valve Adjusting Screw-to-Housing Nut—Torque	3.0 N•m 27 lb-in.

10. Check the pressure setting again.

LD30992,00002B2 –19–05JUN06–5/5

Boom Mode Solenoid Valve (port SC) Test and Adjustment

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	HP (High Power) Mode
Auto Idle Switch Position	OFF
Boom Mode Switch Position	ON
Boom Mode Solenoid Valve (port SC) Pressure	Monitor Reading ± 0.2 MPa Monitor Reading ± 200 kPa Monitor Reading ± 2.0 bar Monitor Reading ± 29.0 psi Actual Reading From Gauge Must Be Within Pressure Range of Monitor Reading and Tolerance.
Solenoid Valve Adjusting Screw Pressure Change	0.069 MPa approximate per 1/4 turn 69 kPa approximate per 1/4 turn 0.69 bar approximate per 1/4 turn 10 psi approximate per 1/4 turn
End of Adjusting Screw-to-Nut Length	2 mm maximum 0.079 in. maximum
Solenoid Valve Adjusting Screw-to-Housing Nut Torque	3.0 N•m 27 lb-in.

SERVICE EQUIPMENT AND TOOLS
JT03191 (7/16-20 M 37° x 7/16-20 F 37° x 7/16-20 M 37°) (Parker No. 063T-4-4) Tee
JT02156A Digital Pressure/Temperature Analyzer
JT02162 Transducer 35 000 kPa (350 bar) (5000 psi)
Gauge 7 MPa (7000 kPa) (70 bar) (1000 psi)

Purpose of test is to check that the output pressure from the boom mode solenoid valve to the boom mode relief control valve is within the specified range.

Continued on next page

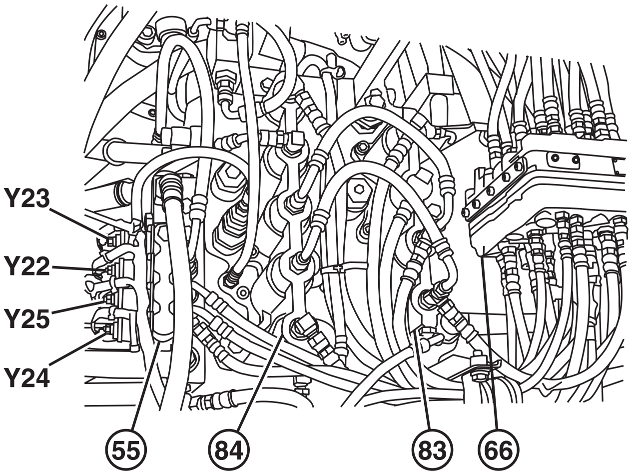
LD30992,00002B0 –19–05JUN06–1/5

NOTE: Pressure reading displayed on the monitor is calculated from an electrical signal in the main controller (MCF). The reading does not change when valve adjustment is made. The actual pressure to the boom mode relief control valve must be measured using a gauge.

The calculated pressure reading for boom mode solenoid valve does not displayed on the monitor in cab.

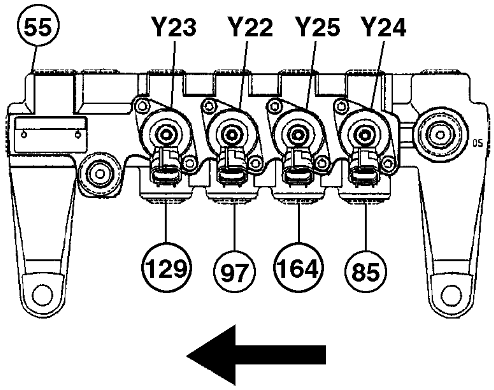
1. Release pressure from hydraulic oil tank by pushing pressure release button at top of hydraulic oil tank.
2. Disconnect line for boom mode solenoid valve (Y23) to boom mode relief control valve (129) from elbow at the bottom of solenoid valve manifold (55).

   Install a JT03191 Tee in the line.
3. Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02162 Transducer or a 7 MPa (7000 kPa) (70 bar) (1000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation.
4. Use one of the following test equipment to display the calculated pressure:
   1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
      Access Boom Mode Solenoid Valve Test.
      Or select the following items from the menu:
      - Hydraulic Oil Temperature
      - Actual Engine Speed
      - Boom Mode Switch
   2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
      Select the following items from the Monitor Display:
      - Boom Mode Control Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed
      - Boom Mode Switch



TX1003387 –UN–10FEB06

Solenoid Valve Manifold Location



TX1003386 –UN–13FEB06

Boom Mode Solenoid Valve (port SC)

Y22—Boom Flow Rate Solenoid Valve (port SF)
Y23—Boom Mode Solenoid Valve (port SC)
Y24—Power Dig Solenoid Valve (port SG)
Y25—Travel Speed Solenoid Valve (port SI)
55—Solenoid Valve Manifold
66—Pilot Signal Manifold
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
85—To Main Relief and Power Digging Valve
97—To Boom Flow Rate Control Valve—Switch Valve
129—To Boom Mode Relief Control Valve
164—To Travel Speed Selector Valve (left and right travel motors)

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

NOTE: The calculated pressure reading for boom mode solenoid valve does not displayed on the monitor in cab. Use the SERVICE ADVISOR application or Dr. ZX application.

5. Warm hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification	
Hydraulic Oil—Temperature	45—55°C 110—130°F

6. Run machine at specification.

Specification	
Engine—Speed	Fast Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	HP (High Power) Mode
Auto Idle Switch—Position	OFF
Boom Mode Switch—Position	ON

7. Slowly actuate boom down function. The machine will lift slightly and then stop as boom mode relief valve opens.

   Record pressure readings from monitor and gauge.

8. Calculate the pressure range using the calculated reading from monitor and the specify tolerance.

   Check that the actual reading from gauge is within the pressure range.

Specification	
Boom Mode Solenoid Valve (port SC)—Pressure	Monitor Reading ± 0.2 MPa Monitor Reading ± 200 kPa Monitor Reading ± 2.0 bar Monitor Reading ± 29.0 psi Actual Reading From Gauge Must Be Within Pressure Range of Monitor Reading and Tolerance.

Continued on next page

Example of Calculated Reading From Monitor		
	Actuated	**Neutral**
Example of Calculated Reading From Monitor	3.23 MPa 3230 kPa 32.3 bar 468 psi	0.0 MPa 00 kPa 0.0 bar 00 psi

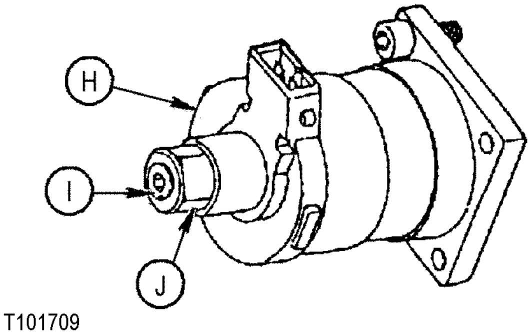
LD30992,00002B0 –19–05JUN06–4/5

9. Adjust the solenoid valve (H) as needed.

   a. Loosen nut (J).

IMPORTANT: Turning adjusting screw out too far may cause oil leakage because the O-ring has come off its seat.

   b. Turn adjusting screw (I) in to increase actual pressure reading; turn adjusting screw out to decrease pressure reading. The length from end of adjusting screw to nut must not exceed the specified length.



T101709 –UN–20JUN96

H—Solenoid Valve
I—Adjusting Screw
J—Nut

Specification

Solenoid Valve Adjusting Screw—
Pressure Change.................................... 0.069 MPa approximate per 1/4 turn
69 kPa approximate per 1/4 turn
0.69 bar approximate per 1/4 turn
10 psi approximate per 1/4 turn
End of Adjusting Screw-to-Nut—
Length... 2 mm maximum
0.079 in. maximum

   c. Hold adjusting screw and tighten nut.

Specification

Solenoid Valve Adjusting
Screw-to-Housing Nut—Torque .... 3.0 N•m
27 lb-in.

10. Check the pressure setting again.

LD30992,00002B0 –19–05JUN06–5/5

Boom Flow Rate Solenoid Valve (port SF) Test and Adjustment

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	HP (High Power) Mode
Auto Idle Switch Position	OFF
Boom Flow Rate Solenoid Valve (port SF) Pressure	Monitor Reading ± 0.2 MPa Monitor Reading ± 200 kPa Monitor Reading ± 2.0 bar Monitor Reading ± 29.0 psi Actual Reading From Gauge Must Be Within Pressure Range of Monitor Reading and Tolerance.
Solenoid Valve Adjusting Screw Pressure Change	0.069 MPa approximate per 1/4 turn 69 kPa approximate per 1/4 turn 0.69 bar approximate per 1/4 turn 10 psi approximate per 1/4 turn
End of Adjusting Screw-to-Nut Length	2 mm maximum 0.079 in. maximum
Solenoid Valve Adjusting Screw-to-Housing Nut Torque	3.0 N•m 27 lb-in.

SERVICE EQUIPMENT AND TOOLS
JT03191 (7/16-20 M 37° x 7/16-20 F 37° x 7/16-20 M 37°) (Parker No. 063T-4-4) Tee
JT02156A Digital Pressure/Temperature Analyzer
JT02162 Transducer 35 000 kPa (350 bar) (5000 psi)
Gauge 7 MPa (7000 kPa) (70 bar) (1000 psi)

Purpose of test is to check that the output pressure from the boom flow rate solenoid valve to the boom flow rate control valve—switch valve is within the specified range.

Continued on next page

LD30992,00002AF –19–25MAY06–1/4

NOTE: Pressure reading displayed on the monitor is calculated from an electrical signal in the main controller (MCF). The reading does not change when valve adjustment is made. The actual pressure to the boom flow rate control valve—switch valve must be measured using a gauge.

The calculated pressure reading for boom flow rate solenoid valve does not displayed on the monitor in cab.

1. Release pressure from hydraulic oil tank by pushing pressure release button at top of hydraulic oil tank.

2. Disconnect line for boom flow rate solenoid valve (Y22) to boom flow rate control valve—switch valve (97) from elbow at the bottom of solenoid valve manifold (55).

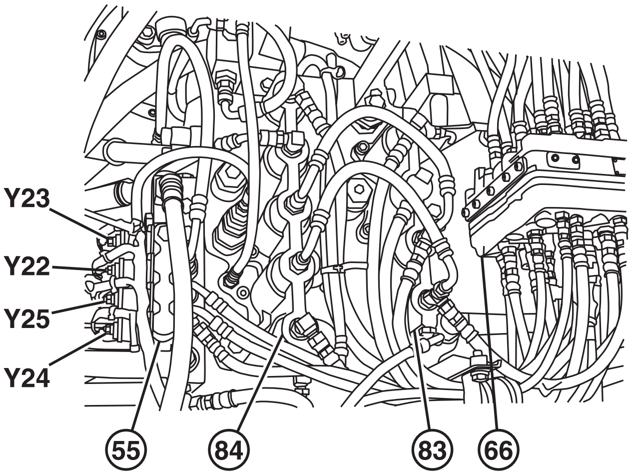
   Install a JT03191 Tee in the line.

3. Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02162 Transducer or a 7 MPa (7000 kPa) (70 bar) (1000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation.

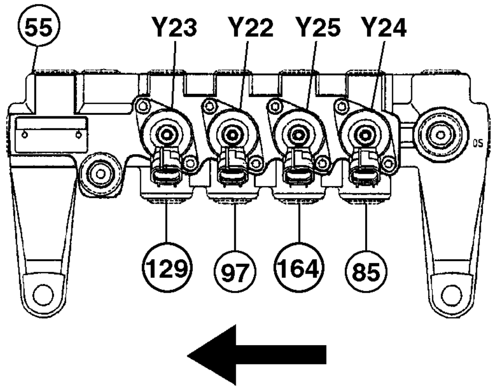
4. Use one of the following test equipment to display the calculated pressure:

   1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
      Access Boom Flow Rate Solenoid Valve Test.
      Or select the following items from the menu:
      - Hydraulic Oil Temperature
      - Actual Engine Speed

   2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
      Select the following items from the Monitor Display:
      - Boom Flow Rate Control Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed
      - Boom Down Pressure



Solenoid Valve Manifold Location



Boom Flow Rate Solenoid Valve (port SF)

Y22—Boom Flow Rate Solenoid Valve (port SF)
Y23—Boom Mode Solenoid Valve (port SC)
Y24—Power Dig Solenoid Valve (port SG)
Y25—Travel Speed Solenoid Valve (port SI)
55—Solenoid Valve Manifold
66—Pilot Signal Manifold
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
85—To Main Relief and Power Digging Valve
97—To Boom Flow Rate Control Valve—Switch Valve
129—To Boom Mode Relief Control Valve
164—To Travel Speed Selector Valve (left and right travel motors)

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

NOTE: The calculated pressure reading for boom flow rate solenoid valve does not display on the monitor in cab. Use the or Dr. ZX application.

5. Warm hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification

Hydraulic Oil—Temperature .... 45—55°C
110—130°F

6. Run machine at specification.

Specification

Engine—Speed .... Fast Idle
Work Mode Switch—Position .... Dig Mode
Power Mode Switch—Position .... HP (High Power) Mode
Auto Idle Switch—Position .... OFF

7. Actuate boom down function in combined operation with arm in.

8. Calculate the pressure range using calculated reading from the monitor and specify tolerance.

   Check that the actual reading from gauge is within the pressure range.

Specification

Boom Flow Rate Solenoid Valve
(port SF)—Pressure .... Monitor Reading ± 0.2 MPa
Monitor Reading ± 200 kPa
Monitor Reading ± 2.0 bar
Monitor Reading ± 29.0 psi
Actual gauge reading must be
within the pressure range

Example of Calculated Reading		
	Actuated	**Neutral**
Example of Calculated Reading	3.92 MPa 3920 kPa 39.2 bar 568 psi	0.0 MPa 00 kPa 0.0 bar 00 psi

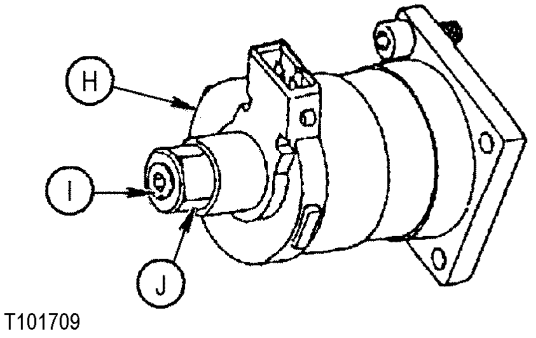
Continued on next page

9. Adjust the solenoid valve (H) as needed.

   a. Loosen nut (J).

IMPORTANT: Turning adjusting screw out too far may cause oil leakage because the O-ring has come off its seat.

   b. Turn adjusting screw (I) in to increase actual pressure reading; turn adjusting screw out to decrease pressure reading. The length from end of adjusting screw to nut must not exceed the specified length.



H—Solenoid Valve
I—Adjusting Screw
J—Nut

Specification	
Solenoid Valve Adjusting Screw—Pressure Change	0.069 MPa approximate per 1/4 turn 69 kPa approximate per 1/4 turn 0.69 bar approximate per 1/4 turn 10 psi approximate per 1/4 turn
End of Adjusting Screw-to-Nut—Length	2 mm maximum 0.079 in. maximum

   c. Hold adjusting screw and tighten nut.

Specification	
Solenoid Valve Adjusting Screw-to-Housing Nut—Torque	3.0 N•m 27 lb-in.

10. Check the pressure setting again.

Main Relief and Power Digging Valve Test and Adjustment

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	HP (High Power) Mode
Auto Idle Switch Position	Off
Boom Mode Switch Position	Off
Main Relief Valve Pressure	30.4—32.9 MPa 30 400—32 900 kPa 304—329 bar 4410—4770 psi
Power Digging Valve Pressure	32.8—35.3 MPa 32 800—35 300 kPa 328—353 bar 4770—5120 psi
Second Adjusting Plug Pressure Change	4.5 MPa approximate per 1/4 turn 4500 kPa approximate per 1/4 turn 45 bar approximate per 1/4 turn 655 psi approximate per 1/4 turn
41 mm Nut Torque	98 N•m 70 lb-ft
First Adjusting Plug Pressure Change	4.5 MPa approximate per 1/4 turn 4500 kPa approximate per 1/4 turn 45 bar approximate per 1/4 turn 655 psi approximate per 1/4 turn
30 mm Nut Torque	59 N•m 45 lb-ft

SERVICE EQUIPMENT AND TOOLS
JT02156A Digital Pressure/Temperature Analyzer
JT02160 Transducer, 70 000 kPa (700 bar) (10,000 psi)
4200465 (1/4 M BSPP ORB x 7/16-20 M 37°) Adapter
70 000 kPa (700 bar) (10,000 psi) Gauge

The purpose of main relief valve is to limit the maximum system pressure in the hydraulic system. Power digging is a temporary increase of system pressure. The valve is checked and adjusted to protect components from damage caused by excessive pressures.

Continued on next page

LD30992,0000280 –19–05JUN06–1/6

1. Connect one of the following test equipment to perform test:

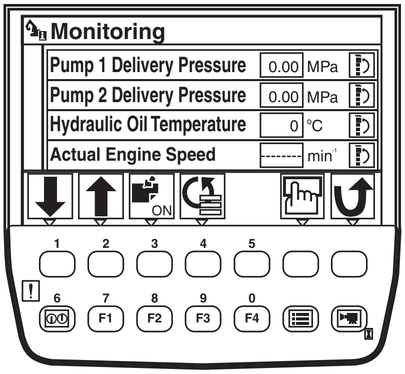
    1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
       Access Main Relief and Power Digging Valve Test.
       Or select the following items from the menu:
        - Pump 1 Delivery Pressure
        - Pump 2 Delivery Pressure
        - Hydraulic Oil Temperature
        - Actual Engine Speed

    2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
       Select the following items from the Monitor Display:
        - Pump 1 Delivery Pressure
        - Pump 2 Delivery Pressure
        - Hydraulic Oil Temperature
        - Actual Engine Speed

    3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-20.)
       Select the following items from Monitoring list:
        - Pump 1 Delivery Pressure
        - Pump 2 Delivery Pressure
        - Hydraulic Oil Temperature
        - Actual Engine Speed

    4. Connected a gauge to test port in pump 1 and/or pump 2.
       Push the pressure release button on top of hydraulic oil tank to relieve pressure before removing plug from test port.
       Install the 4200465 Adapter (A).
       Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02160 Transducer or a 70 000 kPa (700 bar) (10,000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation for instruction.

2. Heat hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

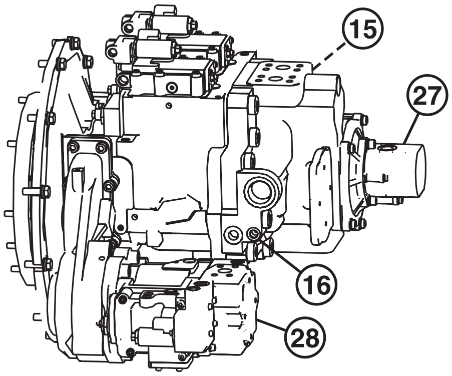


Monitoring

Pump 1 Delivery Pressure	0.00	MPa
Pump 2 Delivery Pressure	0.00	MPa
Hydraulic Oil Temperature	0	°C
Actual Engine Speed	--------	min⁻¹

TX1003295 –19–03MAR06

Monitor Display



TX1003196 –UN–01FEB06

Pump 1 and 2 Test Ports

15—Pump 1 Test Port
16—Pump 2 Test Port
27—Pilot Pump
28—Fan Drive Pump

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

Specification

Hydraulic Oil—Temperature .... 45—55°C
110—130°F

3. Install a pin or round bar stock (D) between the sprockets and track frames to stall travel motors to check power digging pressure setting.

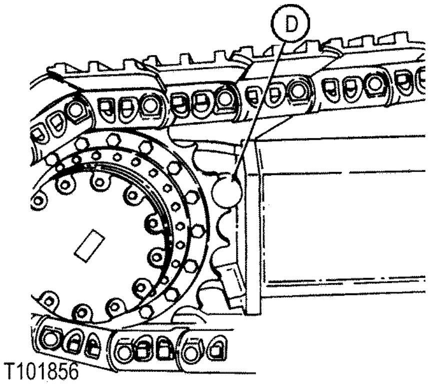
4. Run machine at specification.

Specification

Engine—Speed .... Fast Idle
Work Mode Switch—Position .... Dig Mode
Power Mode Switch—Position .... HP (High Power) Mode
Auto Idle Switch—Position .... Off
Boom Mode Switch—Position .... Off

5. Actuate arm in function over relief. Record main relief pressure setting.

6. Actuate travel function over relief. Record power digging pressure reading.



T101856 –UN–02JUL96

D—Pin or Round Bar Stock

Continued on next page

NOTE: A pressure setting that cannot be raised can be caused by a low pressure setting of the circuit relief valve. Use boom up and the other propel function for adjusting the main relief and power digging valve. See Circuit Relief Valve Test and Adjustment to check the circuit relief valve that is low. (Group 9025-25.)

7. Adjust the main relief and power digging valve pressure setting as needed.

Specification

Main Relief Valve—Pressure	30.4—32.9 MPa 30 400—32 900 kPa 304—329 bar 4410—4770 psi

Specification

Power Digging Valve—Pressure	32.8—35.3 MPa 32 800—35 300 kPa 328—353 bar 4770—5120 psi

8. Loosen the 30 mm nut (2).

9. Turn first adjusting plug (1) in until piston (5) is against shoulder (6) in second adjusting plug (3). Tighten nut finger tight.

10. Loosen the 41 mm nut (4).

11. Actuate the propel function over relief.

12. Turn second adjusting plug (3) in to increase power digging relief pressure; turn adjusting plug out to decrease pressure.

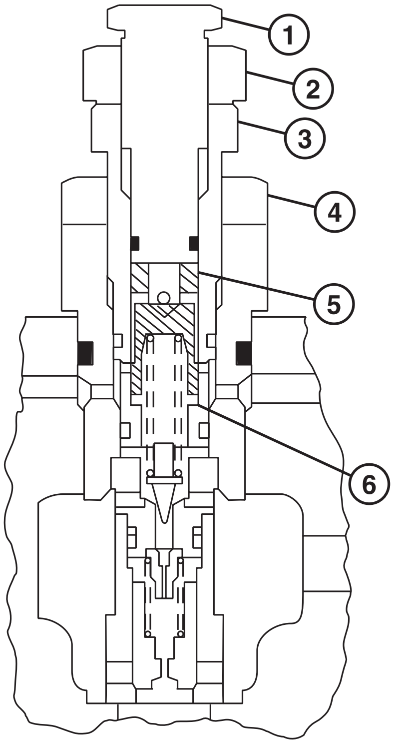
Specification

Second Adjusting Plug—Pressure Change	4.5 MPa approximate per 1/4 turn 4500 kPa approximate per 1/4 turn 45 bar approximate per 1/4 turn 655 psi approximate per 1/4 turn

13. Hold second adjusting plug. Tighten 41 mm nut to specification.

Specification

41 mm Nut—Torque	98 N•m 70 lb-ft



TX1003242 –UN–01FEB06

Main Relief and Power Digging Valve

1—First Adjusting Plug
2—30 mm Nut
3—Second Adjusting Plug
4—41 mm Nut
5—Piston
6—Shoulder

Continued on next page

14. Loosen 30 mm nut (2).

15. Actuate the arm in function over relief.

16. Turn the first adjusting plug (1) out to decrease pressure to get the specified pressure for main relief valve.

Specification

First Adjusting Plug—Pressure Change	4.5 MPa approximate per 1/4 turn 4500 kPa approximate per 1/4 turn 45 bar approximate per 1/4 turn 655 psi approximate per 1/4 turn

17. Hold first adjusting plug. Tighten 30 mm nut to specification.

Specification

30 mm Nut—Torque	59 N•m 45 lb-ft

18. Check the pressure settings again.

LD30992,0000280 –19–05JUN06–6/6

Circuit Relief Valve Test and Adjustment

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	1300 rpm approximate
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	HP (High Power) Mode
Auto Idle Switch Position	Off
Boom Mode Switch Position	Off
Boom, Arm, and Bucket Circuit Relief Valves Pressure	35.3—36.3 MPa 35 300—36 300 kPa 353—363 bar 5120—5260 psi
Auxiliary Circuit Relief Valve (Top Work Port) Pressure	35.3—36.3 MPa 35 300—36 300 kPa 353—363 bar 5120—5260 psi
Auxiliary Circuit Relief Valve (Bottom Work Port) Pressure	27.9—28.9 MPa 27 900—28 900 kPa 279—289 bar 4045—4190 psi
Circuit Relief Valve Adjusting Screw Pressure Change	5 MPa approximate per 1/4 turn 5000 kPa approximate per 1/4 turn 50 bar approximate per 1/4 turn 725 psi approximate per 1/4 turn
Adjusting Screw-to-Circuit Relief Valve Cartridge Nut Torque	31.5 N•m 23 lb-ft

SERVICE EQUIPMENT AND TOOLS
JT02156A Digital Pressure/Temperature Analyzer
JT02160 Transducer, 70 000 kPa (700 bar) (10,000 psi)
4200465 (1/4 M BSPP ORB x 7/16-20 M 37°) Adapter
70 000 kPa (700 bar) (10,000 psi) Gauge
19 mm Combination Wrench
6 mm Hex Key Wrench

The purpose of circuit relief valves is to relieve high pressure spikes caused by external forces when functions are in neutral. Circuit relief valves also limit circuit pressures when power digging is actuated. The relief valves are checked and adjusted to specification to protect components from damage.

Continued on next page

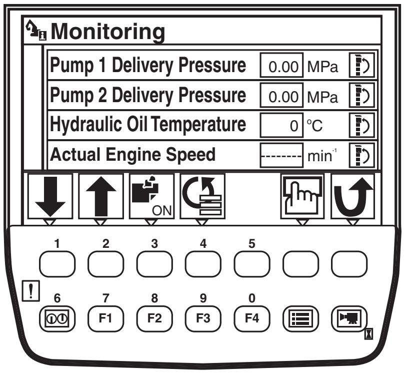
1. Connect one of the following test equipment to perform test:

   1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
      Access Circuit Relief Valve Test.
      Or select the following items from the menu:
      - Pump 1 Delivery Pressure
      - Pump 2 Delivery Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed

   2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
      Select the following items from the Monitor Display:
      - Pump 1 Delivery Pressure
      - Pump 2 Delivery Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed

   3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-20.)
      Select the following items from Monitoring list:
      - Pump 1 Delivery Pressure
      - Pump 2 Delivery Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed

   4. Use a pressure gauge connected to pump 1 test port (15) and pump 2 test port (16).
      Push the pressure release button on top of hydraulic oil tank to relieve pressure before removing plug from test port.
      Install the 4200465 Adapter.
      Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02160 Transducer or a 70 000 kPa (700 bar) (10,000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation for instruction.



Monitoring

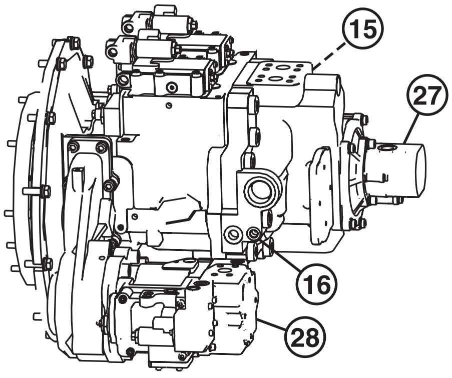
Pump 1 Delivery Pressure 0.00 MPa

Pump 2 Delivery Pressure 0.00 MPa

Hydraulic Oil Temperature 0 °C

Actual Engine Speed -------- min⁻¹

Monitor Display



Pump 1 and 2 Test Ports

15—Pump 1 Test Port
16—Pump 2 Test Port
27—Pilot Pump
28—Fan Drive Pump

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

2. Turn second adjusting plug of main relief and power digging valve in 1/2 turn to increase pressure setting. See Main Relief and Power Digging Valve Test and Adjustment for adjustment procedure. (Group 9025-25.)

3. Heat hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification	
Hydraulic Oil—Temperature	45—55°C 110—130°F

4. Run machine at specification.

Specification	
Engine—Speed	1300 rpm approximate
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	HP (High Power) Mode
Auto Idle Switch—Position	Off
Boom Mode Switch—Position	Off

Continued on next page

LD30992,0000281 –19–15MAY08–3/5

NOTE: When a pressure reading is fluctuating, increase engine speed slightly.

5. Actuate the function over relief for circuit relief valve being check. Record the pressure reading.

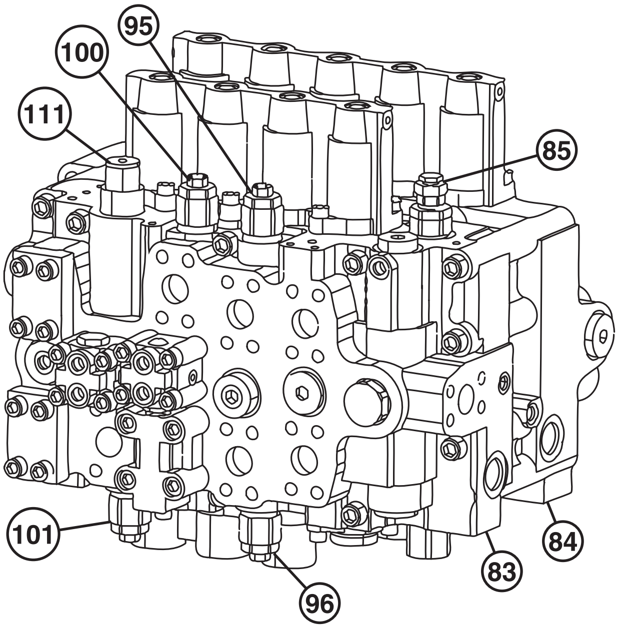
6. Adjust pressure setting of circuit relief valves to specification as needed.

Specification

Boom, Arm, and Bucket Circuit Relief Valves—Pressure	35.3—36.3 MPa 35 300—36 300 kPa 353—363 bar 5120—5260 psi
Auxiliary Circuit Relief Valve (Top Work Port)—Pressure	35.3—36.3 MPa 35 300—36 300 kPa 353—363 bar 5120—5260 psi
Auxiliary Circuit Relief Valve (Bottom Work Port)—Pressure	27.9—28.9 MPa 27 900—28 900 kPa 279—289 bar 4045—4190 psi

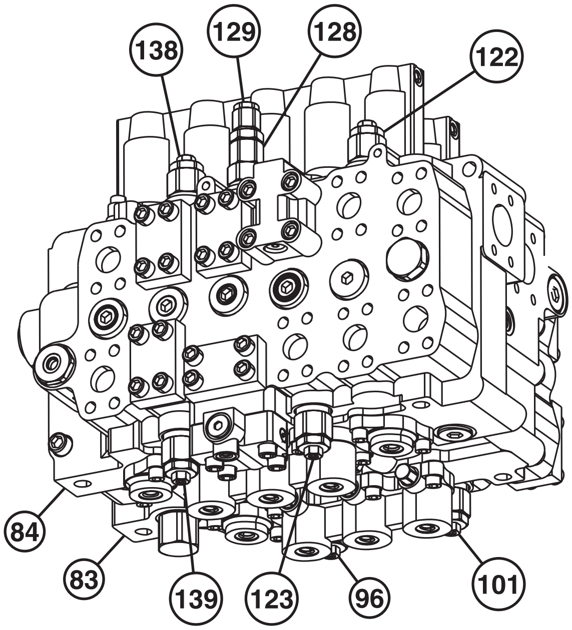
7. Loosen nut using a 19 mm combination wrench. Turn adjusting screw using a 6 mm hex key wrench.

83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
85—Main Relief and Power Digging Valve
95—Bucket Dump Circuit Relief and Anticavitation Valve
96—Bucket Curl Circuit Relief and Anticavitation Valve
100—Boom Down Circuit Relief and Anticavitation Valve
101—Boom Up Circuit Relief and Anticavitation Valve
111—Arm Regenerative Valve—Switch Valve
122—Arm Out Circuit Relief and Anticavitation Valve
123—Arm In Circuit Relief and Anticavitation Valve
128—Boom Mode Relief Valve
129—Boom Mode Relief Control Valve
138—Auxiliary Circuit Relief and Anticavitation Valve
139—Auxiliary Circuit Relief and Anticavitation Valve



TX1004119 –UN–03MAR06

Circuit Relief Valves For Right Control Valve (4-spool)



TX1004211 –UN–06MAR06

Circuit Relief Valves For Left Control Valve (5-spool)

Continued on next page

Turn adjusting screw in to increase pressure setting; turn adjusting screw out to decrease pressure setting.

Specification

Circuit Relief Valve Adjusting Screw—Pressure Change	5 MPa approximate per 1/4 turn 5000 kPa approximate per 1/4 turn 50 bar approximate per 1/4 turn 725 psi approximate per 1/4 turn
Adjusting Screw-to-Circuit Relief Valve Cartridge Nut—Torque	31.5 N•m 23 lb-ft

8. Check the pressure setting again.

9. Turn second adjusting plug of main relief and power digging valve out to its original pressure setting.

LD30992,0000281 –19–15MAY08–5/5

Boom Mode Relief Valve Test and Adjustment

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	HP (High Power) Mode
Auto Idle Switch Position	Off
Boom Mode Switch Position	On
Boom Mode Relief Valve Pressure	12—13 MPa 12 000—13 000 kPa 120—130 bar 1740—1885 psi
Boom Mode Relief Valve Adjusting Plug Pressure Change	2.1 MPa approximate per 1/4 turn 2100 kPa approximate per 1/4 turn 21 bar approximate per 1/4 turn 300 psi approximate per 1/4 turn

SERVICE EQUIPMENT AND TOOLS
JT02156A Digital Pressure/Temperature Analyzer
JT02160 Transducer, 70 000 kPa (700 bar) (10,000 psi)
4200465 (1/4 M BSPP ORB x 7/16-20 M 37°) Adapter
70 000 kPa (700 bar) (10,000 psi) Gauge

The purpose of boom mode relief valve is to limit the boom down force so front of machine is only lifted slightly off the ground during grading operation. The purpose of test and adjustment is to test the pressure setting of boom mode relief valve and adjust it to the specified pressure.

See Boom Mode Circuit Operation for more information. (Group 9025-05.)

Continued on next page

OUT3035,0000008 –19–06JUN06–1/4

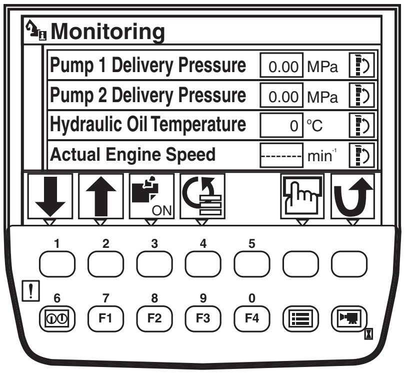
1. Connect one of the following test equipment to perform test:

   1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
      Access Boom Mode Circuit Relief Valve Test.
      Or select the following items from the menu:
      - Pump 1 Delivery Pressure
      - Pump 2 Delivery Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed
      - Boom Mode Switch

   2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
      Select the following items from the Monitor Display:
      - Pump 1 Delivery Pressure
      - Pump 2 Delivery Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed

   3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-20.)
      Select the following items from Monitoring list:
      - Pump 1 Delivery Pressure
      - Pump 2 Delivery Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed

   4. Connect a gauge to test port in pump 1 and/or pump 2.
      Push the pressure release button on top of hydraulic oil tank to relieve pressure before removing plug from test port.
      Install the 4200465 Adapter (A).
      Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02160 Transducer or a 70 000 kPa (700 bar) (10,000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation for instruction. (Group 9025-25.)


Monitoring

Pump 1 Delivery Pressure 0.00 MPa

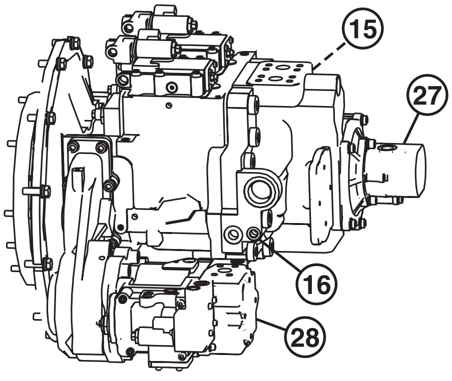
Pump 2 Delivery Pressure 0.00 MPa

Hydraulic Oil Temperature 0 °C

Actual Engine Speed -------- min⁻¹

Monitor Display

TX1003295 –19–03MAR06



Pump 1 and 2 Test Ports

TX1003196 –UN–01FEB06

15—Pump 1 Test Port
16—Pump 2 Test Port
27—Pilot Pump
28—Fan Drive Pump

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

2. Heat hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification

Hydraulic Oil—Temperature	45—55°C 110—130°F

3. Run machine at specification.

Specification

Engine—Speed	Fast Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	HP (High Power) Mode
Auto Idle Switch—Position	Off
Boom Mode Switch—Position	On

NOTE: When a pressure reading is fluctuating, increase engine speed slightly.

4. Actuate boom down over relief.

   Record the pressure reading.

Specification

Boom Mode Relief Valve—Pressure	12—13 MPa 12 000—13 000 kPa 120—130 bar 1740—1885 psi

Continued on next page

5. Adjust the boom mode relief valve (128) as needed.

   Disconnect pilot line from relief valve.

   Loosen nut (2).

   Turn adjusting plug (1) in to increase pressure setting; turn adjusting plug out to decrease pressure setting.

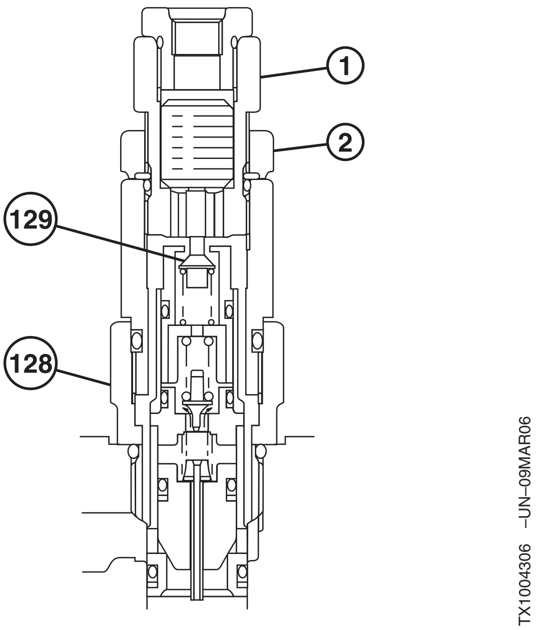
   Hold adjusting plug and then tighten nut.

Specification

Boom Mode Relief Valve
Adjusting Plug—Pressure Change....... 2.1 MPa approximate per 1/4 turn
2100 kPa approximate per 1/4 turn
21 bar approximate per 1/4 turn
300 psi approximate per 1/4 turn

6. Connect pilot line.

7. Check the pressure setting.



Boom Mode Relief Valve

1—Adjusting Plug
2—Nut
128—Boom Mode Relief Valve
129—Boom Mode Relief Control Valve

OUT3035,0000008 –19–06JUN06–4/4

Pump Servo Piston Minimum Flow Test and Adjustment

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	P Mode
Auto Idle Switch Position	Off
Boom Mode Switch Position	Off
Travel Speed Switch Position	Slow (Turtle)
Pump Servo Piston Minimum Flow Cycle Time	48—52 sec. at slow speed with track raised for one revolution from a running start
Pump Servo Piston Minimum Flow Cycle Time Change	4 sec. approximate per 1/4 turn
Pump 1 Servo Piston Minimum Flow Using a Flow Meter Flow Rate Change	6.9 L/min approximate per 1/4 turn 1.79 gpm approximate per 1/4 turn
Pump 2 Servo Piston Minimum Flow Using a Flow Meter Flow Rate Change	6.7 L/min approximate per 1/4 turn 1.77 gpm approximate per 1/4 turn

The purpose of check is to test and adjust the minimum flow rate of pumps using the cycle time for travel as an indicator of pump flow rate. See Pump 1 and 2 Regulator Operation for operation of regulator and servo piston. (Group 9025-05.)

Minimum flow rate can also be check using a flow meter. See Pump Flow Test for instruction to connect flow meter to the pumps. (Group 9025-25.)

1. Adjust track sag to specification. See Check and Adjust Track Sag. (Operator's Manual.)

2. Heat hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification

Hydraulic Oil—Temperature .... 45—55°C
110—130°F

Continued on next page

3. Disconnect wiring harness at pump 1 (4-Spool) control solenoid (3) and pump 2 (5-Spool) control solenoid (4).

4. Raise right track off the ground for pump 1 or left track for pump 2.

5. Run machine at specifications.

Specification

Engine—Speed	Fast Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	P Mode
Auto Idle Switch—Position	Off
Boom Mode Switch—Position	Off
Travel Speed Switch—Position	Slow (Turtle)

6. Actuate the travel function to full speed. Record the cycle time for one revolution.

Specification

Pump Servo Piston Minimum Flow—Cycle Time	48—52 sec. at slow speed with track raised for one revolution from a running start

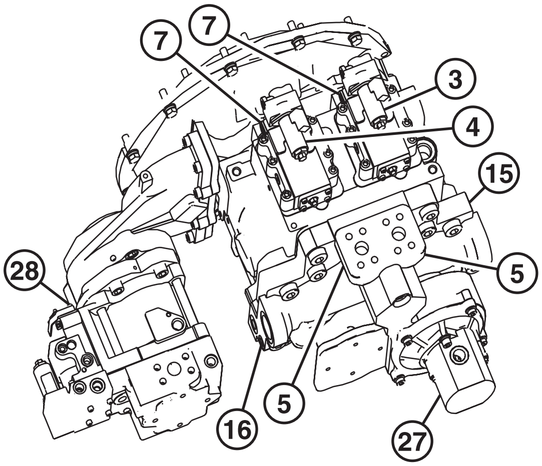
7. Adjust servo piston minimum flow adjusting screw (5) for pump 1 (15) and pump 2 (16) as needed.

   Loosen nut (6). Turn adjusting screw in to decrease the cycle time by increasing pump flow; turn adjusting screw out to increase the cycle time by decreasing pump flow.

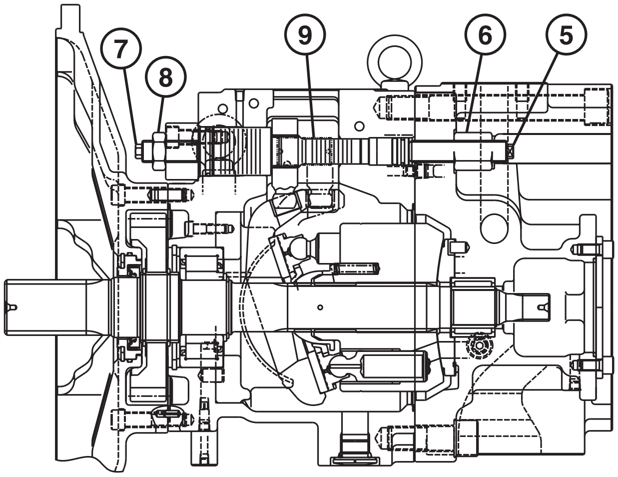
Specification

Pump Servo Piston Minimum Flow—Cycle Time Change	4 sec. approximate per 1/4 turn
Pump 1 Servo Piston Minimum Flow Using a Flow Meter—Flow Rate Change	6.9 L/min approximate per 1/4 turn 1.79 gpm approximate per 1/4 turn
Pump 2 Servo Piston Minimum Flow Using a Flow Meter—Flow Rate Change	6.7 L/min approximate per 1/4 turn 1.77 gpm approximate per 1/4 turn

NOTE: The flow rate change for pump 1 is greater because pump 1 turns at 1.03 times engine speed.



Pump Servo Piston Minimum and Maximum Adjusting Screws



Pump Servo Piston Minimum Flow Adjusting Screw

3—Pump 1 (4-Spool) Control Solenoid
4—Pump 2 (5-Spool) Control Solenoid
5—Servo Piston Minimum Flow Adjusting Screw
6—Nut
7—Servo Piston Maximum Flow Adjusting Screw
8—Nut
9—Servo Piston
15—Pump 1
16—Pump 2
27—Pilot Pump
28—Fan Drive Pump

Pump Servo Piston Maximum Flow Test and Adjustment

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	HP (High Power) Mode
Auto Idle Switch Position	Off
Boom Mode Switch Position	Off
Travel Speed Switch Position	Slow (Turtle)
Pump Servo Piston Maximum Flow Cycle Time	32—36 sec. at slow (turtle) speed with track raised for three revolution from a running start
Pump Servo Piston Maximum Flow Cycle Time Change	0.3 sec. approximate per 1/4 turn
Pump 1 Servo Piston Maximum Flow Using a Flow Meter Flow Rate Change	6.9 L/min approximate per 1/4 turn 1.79 gpm approximate per 1/4 turn
Pump 2 Servo Piston Maximum Flow Using a Flow Meter Flow Rate Change	6.7 L/min approximate per 1/4 turn 1.77 gpm approximate per 1/4 turn

The purpose of check is to test and adjust the maximum flow rate of pumps using the cycle time for travel as and indicator of pump flow rate. See Pump 1 and 2 Regulator Operation for operation of regulator and servo piston. (Group 9025-05.)

Maximum flow rate can also be check using a flow meter. See Pump Flow Test for instruction to connect flow meter to the pumps. (Group 9025-25.)

1. Adjust track sag to specification. See Check and Adjust Track Sag. (Operator's Manual.)

2. Heat hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification

Hydraulic Oil—Temperature .... 45—55°C
110—130°F

3. Raise right track off the ground for pump 1 or left track for pump 2.

Continued on next page

4. Run machine at specifications.

Specification

Engine—Speed	Fast Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	HP (High Power) Mode
Auto Idle Switch—Position	Off
Boom Mode Switch—Position	Off
Travel Speed Switch—Position	Slow (Turtle)

5. Actuate the travel function to full speed. Record the cycle time for three revolution.

Specification

Pump Servo Piston Maximum Flow—Cycle Time	32—36 sec. at slow (turtle) speed with track raised for three revolution from a running start

Continued on next page

LD30992,0000288 –19–22MAR06–2/3

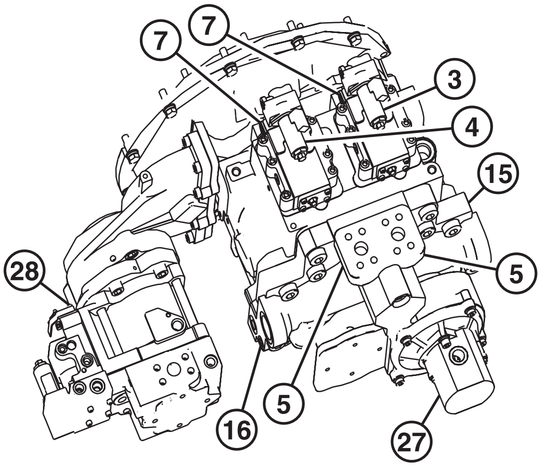
6. Adjust servo piston maximum flow adjusting screw (7) for pump 1 (15) and pump 2 (16) as needed.

   Loosen nut (8). Turn adjusting screw in to increase the cycle time by decreasing pump flow; turn adjusting screw out to decrease the cycle time by increasing pump flow.

Specification

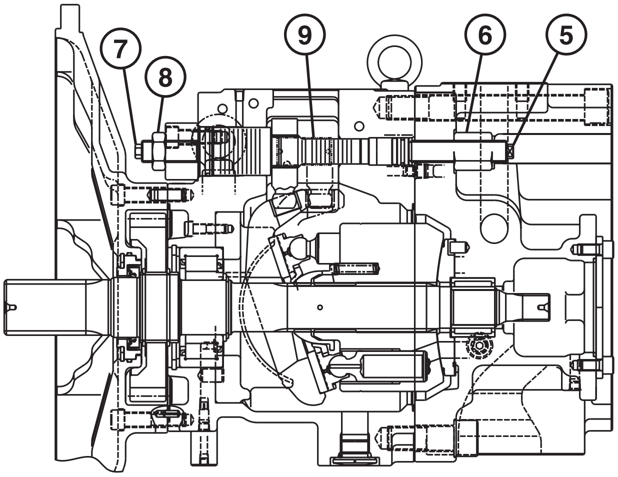
Pump Servo Piston Maximum Flow—Cycle Time Change	0.3 sec. approximate per 1/4 turn
Pump 1 Servo Piston Maximum Flow Using a Flow Meter—Flow Rate Change	6.9 L/min approximate per 1/4 turn 1.79 gpm approximate per 1/4 turn
Pump 2 Servo Piston Maximum Flow Using a Flow Meter—Flow Rate Change	6.7 L/min approximate per 1/4 turn 1.77 gpm approximate per 1/4 turn

NOTE: The flow rate change for pump 1 is greater because pump 1 turns at 1.03 times engine speed.



TX1004087 –UN–23MAR06

Pump Servo Piston Minimum and Maximum Adjusting Screws



TX1004088 –UN–23MAR06

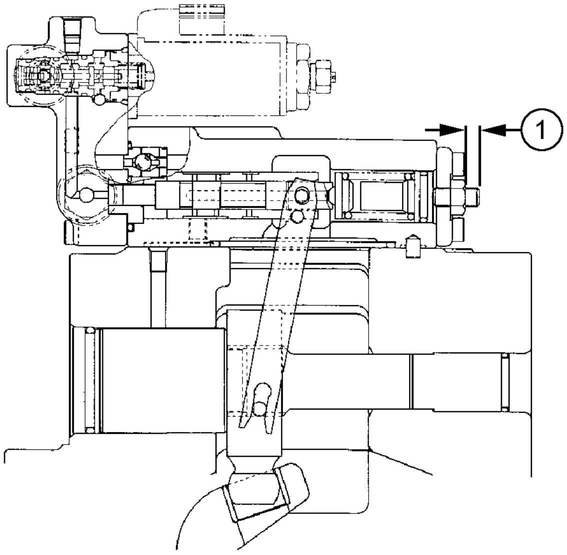
Pump Servo Piston Maximum Flow Adjusting Screw

3—Pump 1 (4-Spool) Control Solenoid
4—Pump 2 (5-Spool) Control Solenoid
5—Servo Piston Minimum Flow Adjusting Screw
6—Nut
7—Servo Piston Maximum Flow Adjusting Screw
8—Nut
9—Servo Piston
15—Pump 1
16—Pump 2
27—Pilot Pump
28—Fan Drive Pump

LD30992,0000288 –19–22MAR06–3/3

Pump Flow Rate (Displacement) Test and Adjustment

SPECIFICATIONS	
Pump 1 Flow Rate (Displacement) Flow Rate Change	38 L/min approximate per 1/4 turn 10 gpm approximate per 1/4 turn
Pump 2 Flow Rate (Displacement) Flow Rate Change	36.9 L/min approximate per 1/4 turn 9.7 gpm approximate per 1/4 turn



T141997 –UN–08MAY01

Pump Flow Rate Control Adjusting Screw

1—Pump Flow Rate Control Adjusting Screw

Pump flow rate (displacement) is controlled by a pilot oil signal from the solenoid valve to the pilot piston and load spool in proportion to the current signal to the solenoid. See System Functional Schematic for pump 1 (4-Spool) control solenoid and pump 2 (5-Spool) control solenoid. (Group 9015-10.)

Pump flow rate control adjusting screw (1) is used to adjust the response of pilot piston and load spool in proportion to the pilot oil signal by changing the spring force. See Pump 1 and 2 Regulator Operation for more information.

1. Check the maximum and minimum flow rates. See Pump Flow Test for instruction to connect flow meter.
2. Turn adjusting screw in to decrease flow rate; turn adjusting screw out to increase flow rate.

Specification	
Pump 1 Flow Rate (Displacement)—Flow Rate Change	38 L/min approximate per 1/4 turn 10 gpm approximate per 1/4 turn
Pump 2 Flow Rate (Displacement)—Flow Rate Change	36.9 L/min approximate per 1/4 turn 9.7 gpm approximate per 1/4 turn

NOTE: The flow rate change for pump 1 is greater because pump 1 turns at 1.03 times engine speed.

LD30992,0000284 –19–24APR06–1/1

Swing Motor Crossover Relief Valve Test and Adjustment

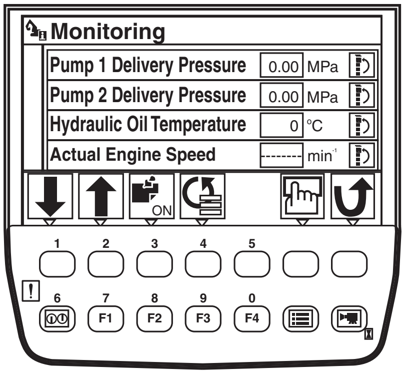
SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	1300 rpm approximate
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	HP (High Power) Mode
Auto Idle Switch Position	Off
Swing Motor Crossover Relief Valve Pressure	28.4—30.4 MPa
Swing Motor Crossover Relief Valve	28 441—30 400 kPa
Swing Motor Crossover Relief Valve	284—304 bar
Swing Motor Crossover Relief Valve	4125—4409 psi
Swing Relief Valve Adjustment Pressure Change	10 MPa approximate per 1/4 turn 10 000 kPa approximate per 1/4 turn 100 bar 1451 psi approximate per 1/4 turn
Crossover Relief Valve Lock Nut Torque	118 N•m 90 lb-ft

SERVICE EQUIPMENT AND TOOLS
4200465 (1/4 M BSPP ORB x 7/16-20 M 37°) Adapter
70 000 kPa (700 bar) (10,000 psi) Gauge
JT02156A Digital Pressure/Temperature Analyzer
JT02160 Transducer, 70 000 kPa (700 bar) (10,000 psi)

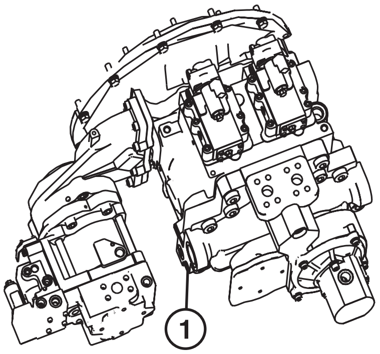
This procedure is performed to check that the swing motor crossover relief valve pressures are within specification.

The swing motor crossover relief valves limit system pressure in the swing circuit. They protect swing components from high stresses generated during the starting and stopping of upperstructure. They also protect the components from pressure spikes from external forces when the control valve is in neutral.

1. Connect one of the following test equipment to perform test:.



Monitor



Pump 2 Test Port

1—Pump 2 Test Port

Continued on next page

1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
   Access Swing Motor Crossover Relief Valve Test.
   Or select the following items from the menu:
   - Pump 1 Delivery Pressure
   - Pump 2 Delivery Pressure
   - Hydraulic Oil Temperature
   - Actual Engine Speed

2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
   Select the following items from the Monitor Display:
   - Pump 1 Delivery Pressure
   - Pump 2 Delivery Pressure
   - Hydraulic Oil Temperature
   - Actual Engine Speed

3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-16.)
   Select the following items from Monitoring list:
   - Pump 1 Delivery Pressure
   - Pump 2 Delivery Pressure
   - Hydraulic Oil Temperature
   - Actual Engine Speed

   Push the pressure release button on top of the hydraulic oil tank to relieve pressure.

   Install 4200465 adapter into test port (1) on pump two.

   Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02160 Transducer or a 70 000 kPa (700 bar) (10,000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation for instruction.

2. Warm hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

3. Run machine at specification.

Specification

Hydraulic Oil—Temperature	45—55°C 110—130°F
Engine—Speed	1300 rpm approximate
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	HP (High Power) Mode
Auto Idle Switch—Position	Off

4. Actuate and stall swing function over relief. Record pressure reading. Repeat for opposite direction.

Specification

Swing Motor Crossover Relief Valve—Pressure	28.4—30.4 MPa 28 441—30 400 kPa 284—304 bar 4125—4409 psi

5. Take readings and check to specification.

Continued on next page

TX04577,00000ED –19–05JUN06–3/4

6. If adjustment is required loosen lock nut (6) on swing relief valve (5). Turning in increases pressure and out decreases pressure.

Specification

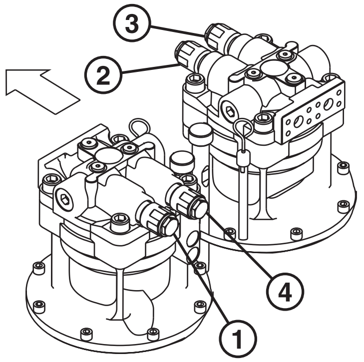
Swing Relief Valve Adjustment—Pressure Change	10 MPa approximate per 1/4 turn 10 000 kPa approximate per 1/4 turn
100 bar approximate per 1/4 turn	1451 psi approximate per 1/4 turn

7. Tighten plug (1) to specification.

Specification

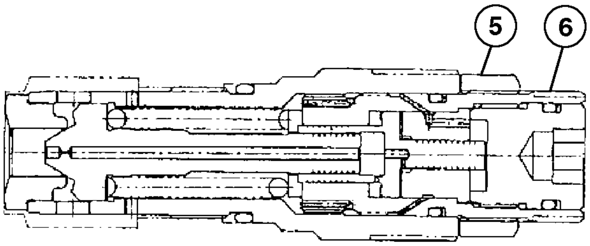
Crossover Relief Valve Lock Nut—Torque	118 N•m 90 lb-ft

8. Actuate the swing function over relief to check adjustment.



TX1005796 –UN–04APR06

Crossover Relief Valve Locations



TX1005797 –UN–04APR06

Crossover Relief Valve Cross Section

1—Left Swing Crossover Relief Valve—Left Swing Motor
2—Right Swing Crossover Relief Valve—Left Swing Motor
3—Left Swing Crossover Relief Valve—Right Swing Motor
4—Right Swing Crossover Relief Valve—Right Swing Motor
5—Swing Crossover Relief Valve
6—Lock Nut

TX04577,00000ED –19–05JUN06–4/4

Travel Motor Crossover Relief Valve Test and Adjustment

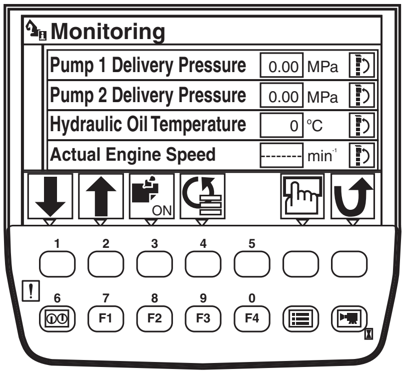
SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	1300 rpm approximate
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	HP (High Power) Mode
Auto Idle Switch Position	Off
Travel Motor Crossover Relief Valve Pressure	32.8—35.3 MPa 32 800—35 300 kPa 328—353 bar 4760—5120 psi
Travel Motor Crossover Relief Valve Pressure Change (per 1/4 turn)	1.96 MPa 1960 kPa 19.6 bar 285 psi
19 mm Nut Torque	44 N•m 32 lb-ft

SERVICE EQUIPMENT AND TOOLS
4200465 (1/4 M BSPP ORB x 7/16-20 M 37°) Adapter
70 000 kPa (700 bar) (10,000 psi) Gauge
JT02156A Digital Pressure/Temperature Analyzer
JT02160 Transducer, 70 000 kPa (700 bar) (10,000 psi)

This procedure is to check that the travel motor crossover relief valve pressure is within specification.

1. Use one of the following test equipment to perform test.

    1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
    Access Travel Motor Crossover Relief Valve Test.
    Or select the following items from the menu:
        - Pump 1 Delivery Pressure
        - Pump 2 Delivery Pressure
        - Hydraulic Oil Temperature
        - Actual Engine Speed



Monitoring

Pump 1 Delivery Pressure 0.00 MPa

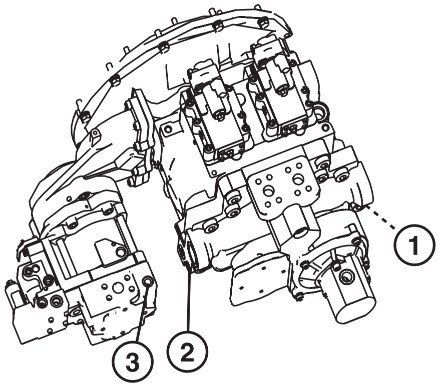
Pump 2 Delivery Pressure 0.00 MPa

Hydraulic Oil Temperature 0 °C

Actual Engine Speed -------- min⁻¹

TX1003295 –19–03MAR06

Monitor



TX1005025 –UN–24MAR06

Pump 1 and Pump 2 Test Ports

1—Pump 1 Test Port
2—Pump 2 Test Port
3—Fan Drive Pump Test Port

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
   Select the following items from the Monitor Display:
   - Pump 1 Delivery Pressure
   - Pump 2 Delivery Pressure
   - Hydraulic Oil Temperature
   - Actual Engine Speed

3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-16.)
   Select the following items from Monitoring list:
   - Pump 1 Delivery Pressure
   - Pump 2 Delivery Pressure
   - Hydraulic Oil Temperature
   - Actual Engine Speed

   Install 4200465 adapter into test port (1 or 2) for right or left travel circuit.

   Connect a 70 000 kPa (700 bar) (10,000 psi) gauge or the JT02156A Digital Pressure/Temperature Analyzer and JT02160 Transducer.

2. Turn second adjusting plug of main relief and power digging valve in 1/2 turn to increase pressure setting. See Main Relief and Power Digging Valve Test and Adjustment for adjustment procedure. (Group 9025-25.)

3. Warm hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Continued on next page

TX04577,00000F0 –19–05JUN06–2/4

4. Install round bar stock (1) between the sprockets and track frames to stall travel motors.

5. Run machine at specification.

Specification

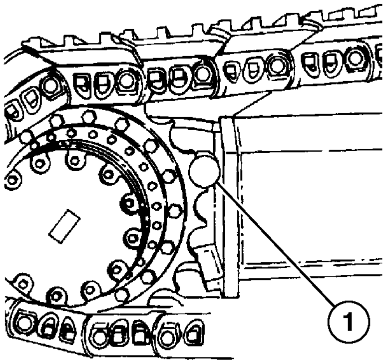
Hydraulic Oil—Temperature	45—55°C 110—130°F
Engine—Speed	1300 rpm approximate
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	HP (High Power) Mode
Auto Idle Switch—Position	Off

6. Hold power dig switch and slowly actuate the travel function for the crossover relief valve being checked.

   Record the pressure reading.

Specification

Travel Motor Crossover Relief Valve—Pressure	32.8—35.3 MPa 32 800—35 300 kPa 328—353 bar 4760—5120 psi



TX1006119 –UN–11APR06

Round Bar Stock

1—Round Bar Stock

Continued on next page

TX04577,00000F0 –19–05JUN06–3/4

7. If adjustment is necessary loosen nut and turn adjusting screw on relief valve (1 or 2) to change pressure to specification.

Specification

Travel Motor Crossover Relief Valve—Pressure Change (per 1/4 turn)	1.96 MPa 1960 kPa 19.6 bar 285 psi

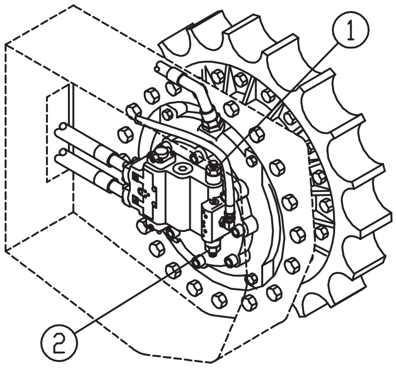
8. Tighten nut to specification.

Specification

19 mm Nut—Torque	44 N•m 32 lb-ft

9. Hold power dig switch and actuate the travel function at stall to check adjustment.

10. Adjust main relief and power digging valve back to original position by turning the second adjusting plug of main relief and power digging valve back out 1/2 turn to decrease pressure setting. See Main Relief and Power Digging Valve Test and Adjustment. (Group 9025-25.)



T141669 –UN–23APR01

Travel Motor Crossover Relief Valves

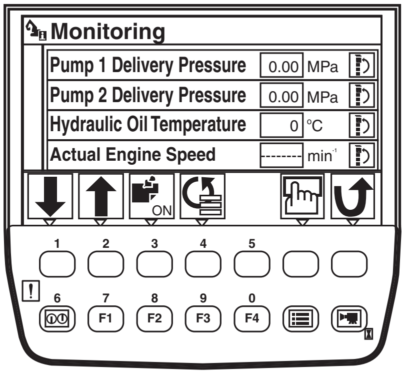
1—Reverse Crossover Relief Valve
2—Forward Crossover Relief Valve

TX04577,00000F0 –19–05JUN06–4/4

Swing Motor Leakage Test

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	HP (High Power) Mode
Auto Idle Switch Position	Off
Boom Mode Switch Position	Off
New Swing Motor—Swinging Leakage	0.2—0.3 L/min 6.8—10.2 oz/min

SERVICE EQUIPMENT AND TOOLS
Vacuum Pump
Test Hose with 3/4-16 M 37° fittings
JT03221 (3/4-16 M 37°) (Parker No. 03CP-8) Plug
Calibrated Container
JT03037 (3/4-16 M 37° x 3/4-16 M 37°) (Parker No. 0303-8-8) Union
JT03025 (3/4-16 M 37°) (Parker No. 06CP-8) Cap
Calibrated Container



TX1003295 –19–03MAR06

Monitor

Purpose of test is to check the efficiency of swing motor. Leakage can occur between the cylinder block and valve plate and or the slippers and swash plate when parts are worn or damaged. The motor must be checked in more than one position in order to check all pistons and the total circumference of valve plate and swash plate.

1. Connect one of the following test equipment to perform test:

    1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
       Access Swing Motor Leakage Test.
       Or select the following items from the menu:
       - Hydraulic Oil Temperature
       - Actual Engine Speed

    2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
       Select the following items from the Monitor Display:

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

- Hydraulic Oil Temperature
- Actual Engine Speed

3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-16.)
   Select the following items from monitor list:
   - Hydraulic Oil Temperature
   - Actual Engine Speed

2. Heat hydraulic oil to specification. Perform Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification

Hydraulic Oil—Temperature .... 45—55°C
110—130°F

Continued on next page

3. **To check right side swing motor:**

NOTE: To minimize the loss of oil until plug can be installed, connect a vacuum pump to hydraulic reservoir.

   a. Connect a vacuum pump to hydraulic reservoir.

   b. Disconnect drain line (2) and install JT03221 (3/4-16 M 37°) (Parker No. 03CP-8) plug (1) in line.

   c. Connect test hose (4) to swing motor. Put other end in calibrated container (3).

4. Run machine at specifications.

Specification

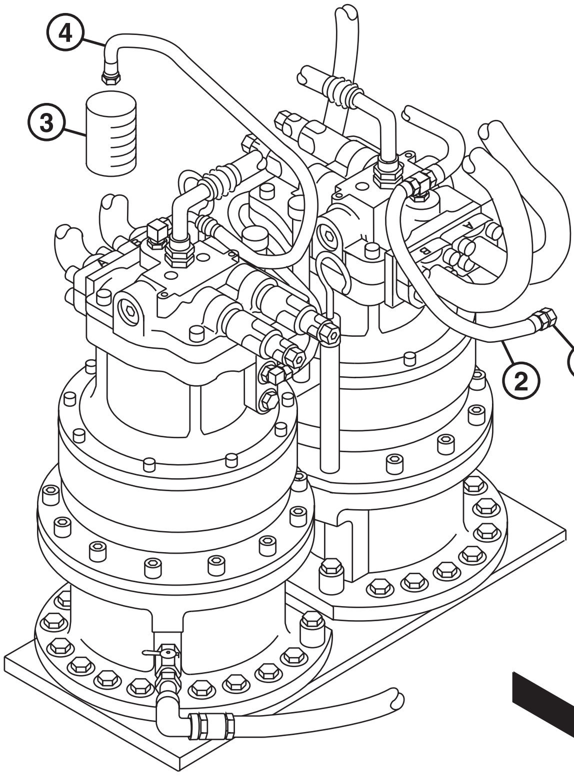
Engine—Speed	Fast Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	HP (High Power) Mode
Auto Idle Switch—Position	Off
Boom Mode Switch—Position	Off

CAUTION: Move machine to an area with a level surface and enough room to swing the upperstructure. Clear area of all bystanders before performing test to avoid personnel injury.

5. Actuate swing function for one minute. Compare amount of leakage to specified amount. Repeat for swing in opposite direction.

Specification

New Swing Motor—Swinging—Leakage	0.2—0.3 L/min 6.8—10.2 oz/min



T142021 –UN–09MAY01

Right Side Swing Motor Leakage Check Lines

1—Plug
2—Drain Line
3—Calibrated Container
4—Test Hose

Continued on next page

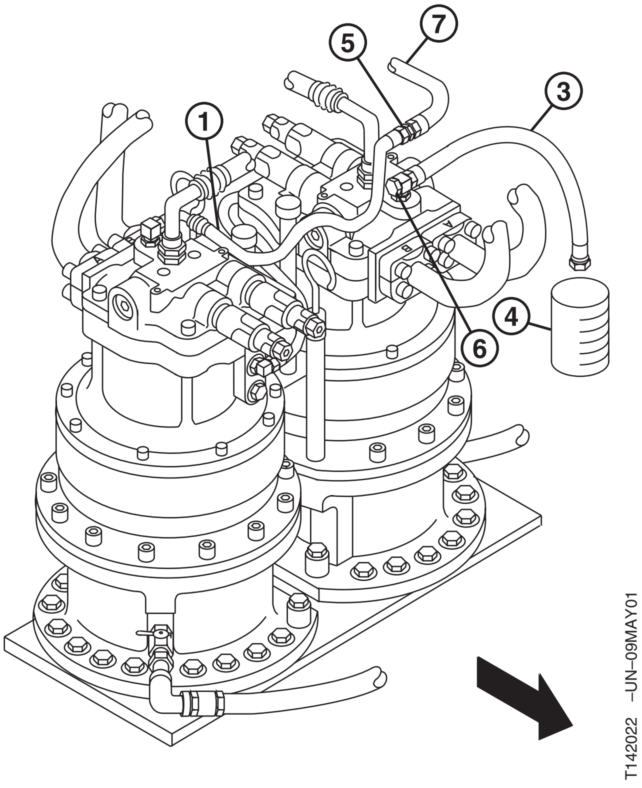
6. **To check left side swing motor:**

   a. Disconnect drain lines (1 and 7) from tee fitting and connect them using JT03037 (3/4-16 M 37° x 3/4-16 M 37°) (Parker No. 0303-8-8) union (5). Install JT03025 (3/4-16 M 37°) (Parker No. 06CP-8) cap (6) on tee.

   b. Connect test hose (3) to tee fitting. Put other end in calibrated container (4).

CAUTION: Move machine to an area with a level surface and enough room to swing the upperstructure. Clear area of all bystanders before performing test to avoid personnel injury.

7. Actuate swing function for one minute. Compare amount of leakage to specified amount. Repeat for swing in opposite direction.



Left Side Swing Motor Leakage Check Lines

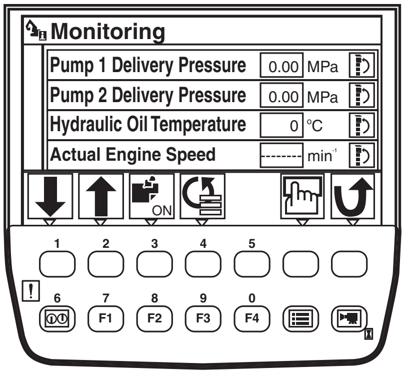
1—Drain Line
3—Test Hose
4—Calibrated Container
5—Union
6—Cap
7—Drain Line

LD30992,000028B –19–05JUN06–4/4

Travel Motor Leakage Test

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	HP (High Power) Mode
Auto Idle Switch Position	Off
Precision Mode Switch Position	Off
Boom Mode Switch Position	Off
Travel Speed Switch Position	Fast (Rabbit)
Travel Motor Leakage	5 L/min typical new 1.32 gpm typical new 10 L/min maximum used 2.64 gpm maximum used

SERVICE EQUIPMENT AND TOOLS
Vacuum Pump
Calibrated Container
Test Hose with 3/4-16 M 37° fitting one end
JT03221 (3/4-16 M 37°) (Parker No. 03CP-8) Plug



TX1003295 –19–03MAR06

Monitor

1. Connect one of the following test equipment to perform test:

    1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
    Access Travel Motor Leakage Test.
    Or select the following items from the menu:
        - Hydraulic Oil Temperature
        - Actual Engine Speed

    2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
    Select the following items from the Monitor Display:
        - Hydraulic Oil Temperature
        - Actual Engine Speed

    3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-16.)

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

TX04577,00000F7 –19–05JUN06–1/3

Select the following items from monitor list:

- Hydraulic Oil Temperature
- Actual Engine Speed

2. Heat hydraulic oil to specification. Perform Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification

Hydraulic Oil—Temperature.. 45—55°C
110—130°F

3. Stop engine. Release hydraulic oil tank pressure by pushing pressure release button on top of hydraulic oil tank.

NOTE: To minimize the loss of oil until plug can be installed, connect a vacuum pump to hydraulic oil tank.

Continued on next page

TX04577,00000F7 –19–05JUN06–2/3

4. Disconnect drain line (1) at fitting (5) on motor and install JT03221 3/4-16 M 37° plug in drain line.

5. Connect line (3) to fitting (5) on motor. Place other end of line into calibrated container (4).

6. Raise track off the ground for the motor being checked.

7. Run machine at specifications.

Specification

Engine—Speed	Fast Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	HP (High Power) Mode
Auto Idle Switch—Position	Off
Precision Mode Switch—Position	Off
Boom Mode Switch—Position	Off
Travel Speed Switch—Position	Fast (Rabbit)

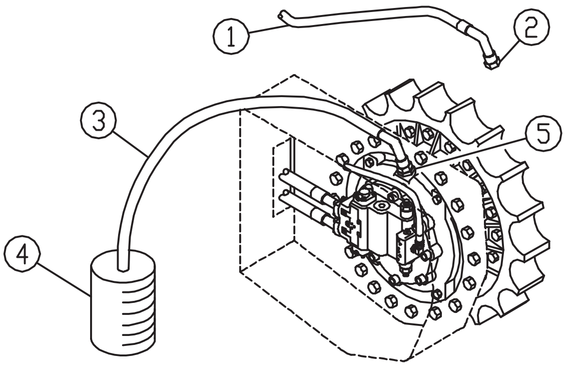
8. Actuate travel function in forward, for motor being checked, for 1 minute. Record the leakage.

9. Repeat for reverse.

10. If leakage is more than specified, repair or replace motor. If leakage is more in one direction than the other, a seal in manifold may be leaking.

Specification

Travel Motor—Leakage	5 L/min typical new 1.32 gpm typical new 10 L/min maximum used 2.64 gpm maximum used



Travel Motor Leakage Test

1—Drain Line
2—Plug
3—Test Hose
4—Container
5—Fitting

TX04577,00000F7 –19–05JUN06–3/3

Cylinder Drift Test—Arm, Boom, and Bucket

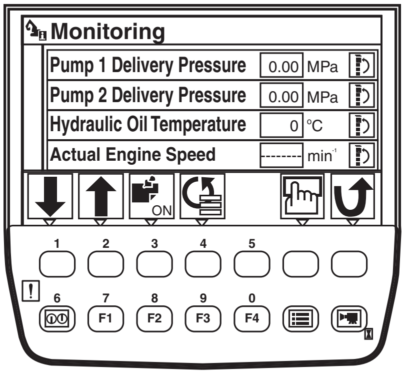
SPECIFICATIONS	
Cylinder Drift Test—Arm, Boom, and Bucket	
Hydraulic Oil Temperature	45—55°C 110—130°F
Bucket Load Weight	2850 kg approximate 6280 lb approximate
Test Time	5 minutes
Boom Cylinder Drift	15 mm maximum 0.6 in. maximum
Arm Cylinder Drift	20 mm maximum 0.8 in. maximum
Bucket Cylinder Drift	20 mm maximum 0.8 in. maximum
Bucket Bottom to Ground Drift	100 mm maximum 3.9 in.

The following test is used to check the leakage past the cylinder piston seals and past the spools in the control valve.

1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
   Access Cylinder Drift Test.
   Or select the following items from the menu:
   - Hydraulic Oil Temperature
   - Actual Engine Speed

2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
   Select the following items from the Monitor Display:
   - Hydraulic Oil Temperature
   - Actual Engine Speed

3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-20.)
   Select the following items from monitor list:
   - Hydraulic Oil Temperature
   - Actual Engine Speed


Monitoring

Pump 1 Delivery Pressure 0.00 MPa

Pump 2 Delivery Pressure 0.00 MPa

Hydraulic Oil Temperature 0 °C

Actual Engine Speed -------- min⁻¹

Monitor

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

1. Heat hydraulic oil to specification. Perform Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification

Hydraulic Oil—Temperature	45—55°C 110—130°F

2. Fill bucket with specified load.

Specification

Bucket Load—Weight	2850 kg approximate 6280 lb approximate

3. Position machine as shown with bucket cylinder fully extended and arm cylinder fully retracted.

4. Turn engine off

5. Measure movement of boom, arm and bucket cylinders after 5 minutes.

Specification

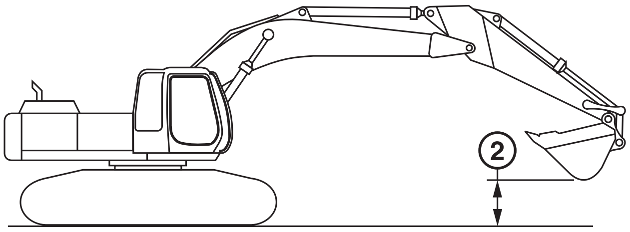
Test—Time	5 minutes

TX04577,00000F8 –19–15MAY08–2/3

6. Compare measurement with specification.

Cylinder Drift Test—Arm, Boom, and Bucket—Specification

Boom Cylinder—Drift	15 mm maximum 0.6 in. maximum
Arm Cylinder—Drift	20 mm maximum 08 in. maximum
Bucket Cylinder—Drift	20 mm maximum 0.8 in. maximum
Bucket Bottom to Ground—Drift	100 mm 3.9 in.



Cylinder Drift Test Position

2—100 mm (3.9 in.)

TX04577,00000F8 –19–15MAY08–3/3

Pump Flow Test

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	P Mode
Auto Idle Switch Position	Off
Pump 1 or Pump 2 Flow Rate—New	360.0 L/min at 13.8 MPa and 1850 rpm 360.0 L/min at 13 790 kPa and 1850 rpm 360.0 L/min at 137.9 bar and 1850 rpm 95.1 gpm at 2000 psi and 1850 rpm
Pump 1 or Pump 2 Flow Rate—New	348.6 L/min at 20.7 MPa and 1850 rpm 348.6 L/min at 20 685 kPa and 1850 rpm 348.6 L/min at 206.8 bar and 1850 rpm 92.1 gpm at 3000 psi and 1850 rpm
Pump 1 or Pump 2 Flow Rate—Minimum Allowable	305.9 L/min at 13.8 MPa and 1850 rpm 305.9 L/min at 13 790 kPa and 1850 rpm 305.9 L/min at 137.9 bar and 1850 rpm 80.8 gpm at 2000 psi and 1850 rpm
Pump 1 or Pump 2 Flow Rate—Minimum Allowable	294.5 L/min at 20.7 MPa and 1850 rpm 294.5 L/min at 20 685 kPa and 1850 rpm 294.5 L/min at 206.8 bar and 1850 rpm 77.8 gpm at 3000 psi and 1850 rpm

SERVICE EQUIPMENT AND TOOLS
Flowmeter, 380 L/min (100 gpm)
JT03452 Split Flange Connector Plate Kit
-16 Hose with -16 Split Flange Connector, Code 62
JT03391 Plug (9/16-18 M 37°)
JT02156A Digital Pressure/Temperature Analyzer
JT02160 Transducer, 70 000 kPa (700 bar) (10,000 psi)
4200465 (1/4 M BSPP ORB x 7/16-20 M 37°) Adapter
70 000 kPa (700 bar) (10,000 psi) Gauge

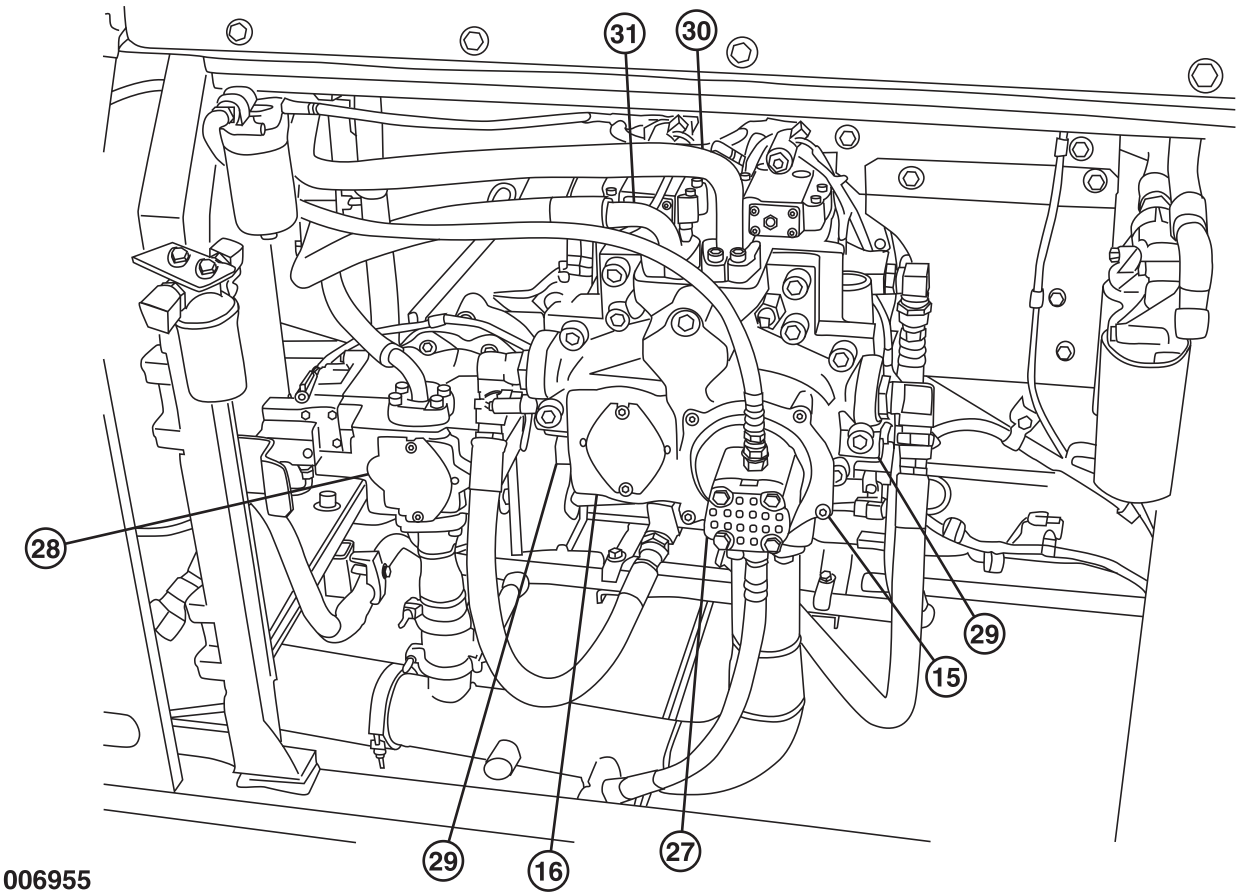
NOTE: Flow rate specification given is for one pump.

Test is used to determine pump condition and should be performed only if a comparison of actual machine cycle times to specified cycle times indicates low pump flow. See Cycle Times Check. (Group 9005-10.)

1. Release pressure from hydraulic oil tank by pushing pressure release button on top of hydraulic oil tank.

2. Connect a vacuum pump to hydraulic oil tank to minimize oil loss.

Continued on next page



TX1006955

15—Pump 1 (4-spool)	**27—Pilot Pump**	**29—Test Port**	**31—Pump 2 Delivery Line**
16—Pump 2 (5-spool)	**28—Fan Drive Pump**	**30—Pump 1 Delivery Line**	

3. Disconnect the pump 1 or pump 2 delivery line (30 or 31) from pump 1 (15) or pump 2 (16) delivery port.

4. Connect delivery line to the outlet of flowmeter using the JT03452 Split Flange Connector Plate Kit.

5. Connect the flow meter to pump delivery port using a -16 hose with -16 split flange fitting, Code 62 (31).

Continued on next page

LD30992,000028A –19–05JUN06–2/5

6. Disconnect the pilot lines (9 and 11) for left and right travel forward. Install plugs in the lines. Leave fitting in pilot caps open.

NOTE: Pilot lines are disconnected so travel function can be used to put pump 1 or pump 2 into stroke and not turn the tracks.

7. Disconnect the vacuum pump.

8. Check that flowmeter loading valve is open.

9. Connect one of the following test equipment to monitor pump 1 and pump 2 delivery pressure, engine speed and hydraulic oil temperature.

    1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
       Access Pump Flow Test.
       Or select the following items from the menu:

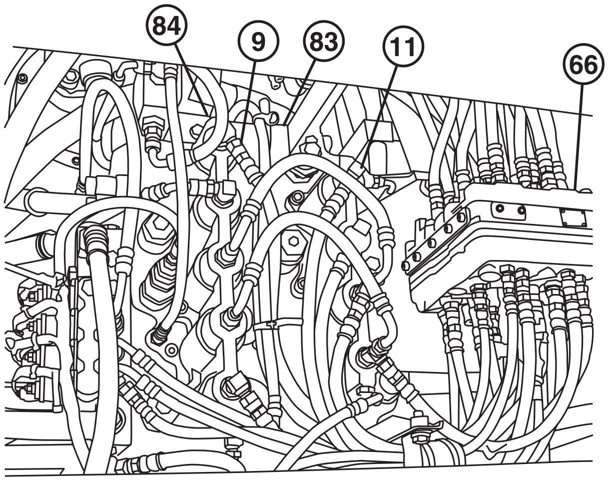
NOTE: Pump 1 and 2 control pressure and pump 1 and pump 2 flow control output signal can also be monitored. The signals must increase to increase pump displacement and flow rate.

- Pump 1 Delivery Pressure
- Pump 2 Delivery Pressure
- Hydraulic Oil Temperature
- Actual Engine Speed

    2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
       Select the following items from the Monitor Display:

NOTE: Pump 1 and 2 control pressure and pump 1 and 2 proportional solenoid valve electric current signals can also be monitored. The signals must increase to increase pump displacement and flow rate.

- Pump 1 Delivery Pressure
- Pump 2 Delivery Pressure
- Hydraulic Oil Temperature



TX1006836 –UN–26APR06

Travel Forward Pilot Lines

9—Left Travel Forward Pilot Line
11—Right Travel Forward Pilot Line
66—Pilot Signal Manifold
83—Right Control Valve
84—Left Control Valve

9025
25
71

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

- Actual Engine Speed

3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-20.)
   Select the following items from Monitoring list:

NOTE: Pump 1 and 2 pump control pressure can also be monitored. The signal must increase to increase pump displacement and flow rate.

  - Pump 1 Delivery Pressure
  - Pump 2 Delivery Pressure
  - Hydraulic Oil Temperature
  - Actual Engine Speed

4. Connected a gauge to test port in pump 1 and/or pump 2.
   Push the pressure release button on top of hydraulic oil tank to relieve pressure before removing plug from test port.
   Install the 4200465 Adapter (A).
   Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02160 Transducer or a 70 000 kPa (700 bar) (10,000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation for instruction.

10. Heat hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification	
Hydraulic Oil—Temperature	45—55°C 110—130°F

11. Run machine at specifications.

Specification	
Engine—Speed	Fast Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	P Mode
Auto Idle Switch—Position	Off

12. Actuate right travel for pump 1 or left travel for pump 2 to full actuation.

Continued on next page

13. Slowly close the loading valve on flowmeter to obtain the specified pressures. Record flow rate at each pressure.

Specification

Pump 1 or Pump 2—Flow Rate—New	360.0 L/min at 13.8 MPa and 1850 rpm 360.0 L/min at 13 790 kPa and 1850 rpm 360.0 L/min at 137.9 bar and 1850 rpm 95.1 gpm at 2000 psi and 1850 rpm
Pump 1 or Pump 2—Flow Rate—New	348.6 L/min at 20.7 MPa and 1850 rpm 348.6 L/min at 20 685 kPa and 1850 rpm 348.6 L/min at 206.8 bar and 1850 rpm 92.1 gpm at 3000 psi and 1850 rpm
Pump 1 or Pump 2—Flow Rate—Minimum Allowable	305.9 L/min at 13.8 MPa and 1850 rpm 305.9 L/min at 13 790 kPa and 1850 rpm 305.9 L/min at 137.9 bar and 1850 rpm 80.8 gpm at 2000 psi and 1850 rpm
Pump 1 or Pump 2—Flow Rate—Minimum Allowable	294.5 L/min at 20.7 MPa and 1850 rpm 294.5 L/min at 20 685 kPa and 1850 rpm 294.5 L/min at 206.8 bar and 1850 rpm 77.8 gpm at 3000 psi and 1850 rpm

14. Open loading valve. Stop the engine.

    Pump flow rate can be increased some by adjusting the pump servo piston maximum flow adjusting screw. See Pump Servo Piston Maximum Flow Test and Adjustment. (Group 9025-25.)

Fan Drive System Relief Valve Test and Adjustment

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	HP (High Power) Mode
Auto Idle Switch Position	Off
Fan Drive System Relief Valve Pressure	26.2 MPa 26 200 KPa 262 bar 3800 psi.
Fan Drive System Relief Valve Pressure Change	1.7 MPa approximate per 1/4 turn 1723 kPa approximate per 1/4 turn 17.2 bar approximate per 1/4 turn 250 psi approximate per 1/4 turn

SERVICE EQUIPMENT AND TOOLS
4200465 (1/4 M BSPP ORB x 7/16-20 M 37°) Adapter
JT02156A Digital Pressure/Temperature Analyzer
JT02162 Transducer, 35 000 kPa (350 bar) (5000 psi)
35 000 kPa (350 bar) (5000 psi) Gauge
X12FNL-S (Parker No. 12FNL-S) (-12 F ORFS) Cap

The purpose of fan drive system relief valve is to limit the maximum system pressure in the fan drive hydraulic system. The relief valve is checked and adjusted to protect components from damage caused by excessive pressure.

1. Connect one of the following test equipment to monitor hydraulic oil temperature and actual engine speed.

    1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
       Access Fan Drive System Relief Valve Test.
       Or select the following items from the menu:
        - Hydraulic Oil Temperature
        - Actual Engine Speed

    2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
       Select the following items from the Monitor Display:
        - Hydraulic Oil Temperature
        - Actual Engine Speed

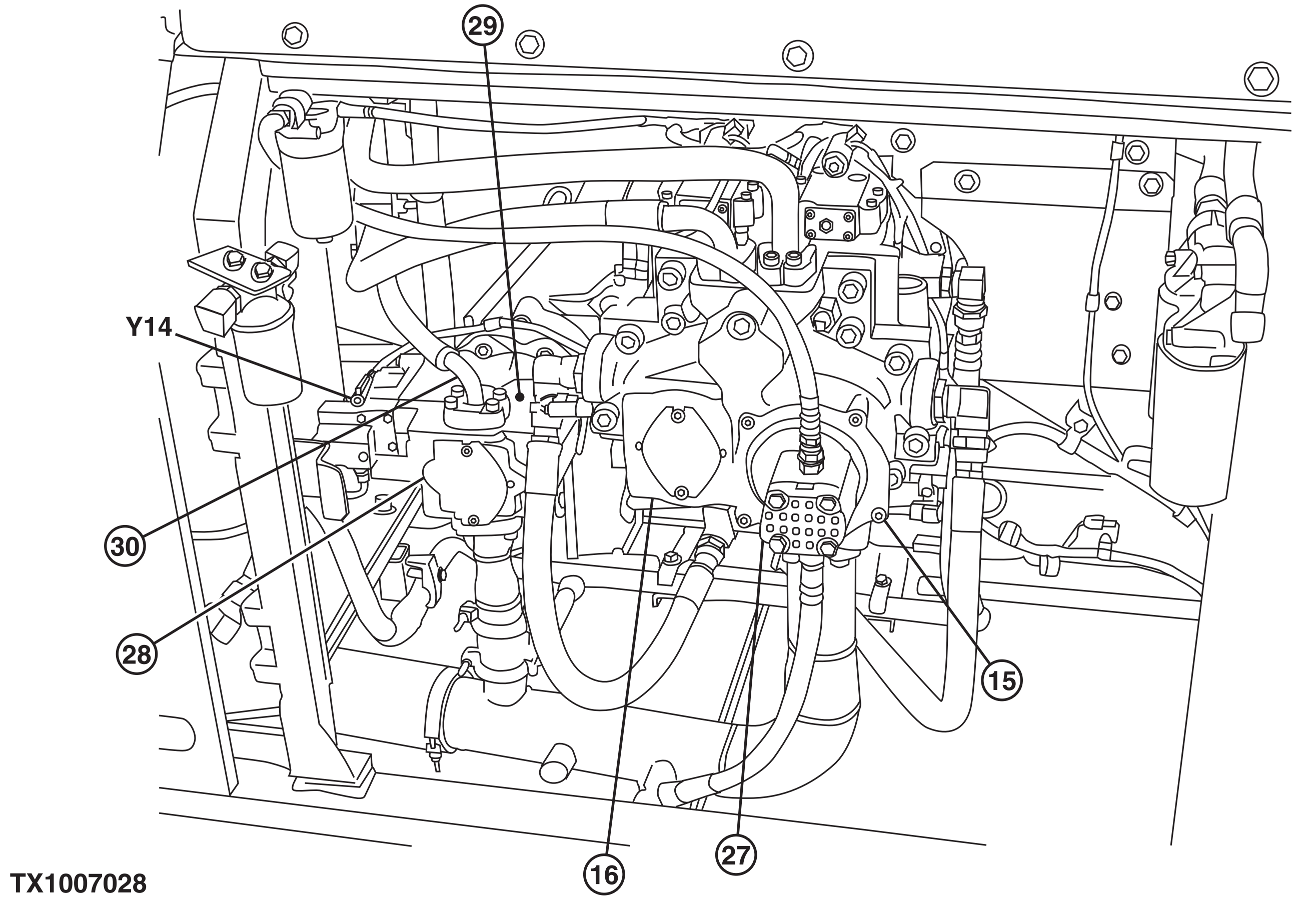
    3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-20.)
       Select the following items from Monitoring list:
        - Hydraulic Oil Temperature
        - Actual Engine Speed

2. Push the pressure release button on top of hydraulic oil tank to relieve pressure.

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

LD30992,0000285 –19–16MAY08–1/3



Fan Drive Pump Test Port

15—Pump 1	**27—Pilot Pump**	**29—Test Port**	**Y14—Fan Pump Control Solenoid Valve**
16—Pump 2	**28—Fan Drive Pump**	**30—Delivery Line**	

3. Remove plug from fan drive pump test port (29).

   Install the 4200465 Adapter (A).

4. Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02162 Transducer or a 35 000 kPa (350 bar) (5000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation for instruction.

5. Heat hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification

Hydraulic Oil—Temperature	45—55°C 110—130°F

6. Stop the engine.

7. Push the pressure release button on top of hydraulic oil tank to relieve pressure.

Continued on next page

LD30992,0000285 –19–16MAY08–2/3

NOTE: Hose connection for standard fan drive control valve and motor is shown. Hose connection for the fan drive reversing control valve and motor is similar.

8. Disconnect the hoses (10) for fan drive motor (36) at the adapter fittings (8) in fan drive control valve (37).

   Install X12FNL-S (Parker No. 12FNL-S) (-12 F ORFS) caps on fittings.

9. Disconnect wiring harness to the fan pump control solenoid so fan drive pump goes to maximum displacement.

10. Run machine at specification.

Specification

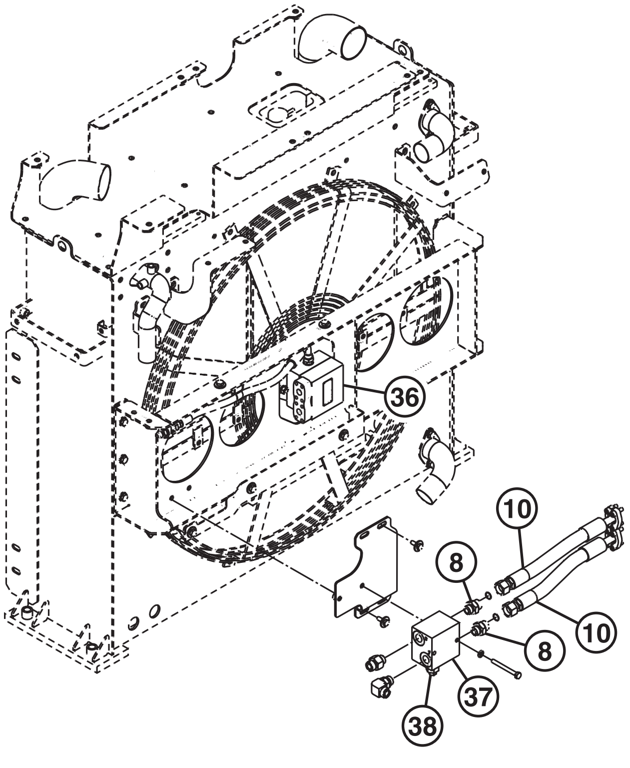
Engine—Speed	Fast Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	HP (High Power) Mode
Auto Idle Switch—Position	Off

11. Record the pressure reading.

Specification

Fan Drive System Relief Valve—Pressure	Information not available at the time of release.

12. Turn the adjusting screw for fan drive system relief valve (38) in to increase pressure setting; turn adjusting screw out to decrease pressure setting.



Fan Drive Control Valve-to-Motor Hoses

8—Adapter Fitting (2 used)
10—Hoses (2 used)
36—Fan Drive Motor
37—Fan Drive Control Valve
38—Fan Drive System Relief Valve

LD30992,0000285 –19–16MAY08–3/3

Fan Drive Pump Servo Piston Minimum Flow Test and Adjustment

SPECIFICATIONS	
Fan Drive Pump Servo Piston Minimum Flow Rate Change	2.8 L/min approximate per 1/4 turn 0.75 gpm approximate per 1/4 turn

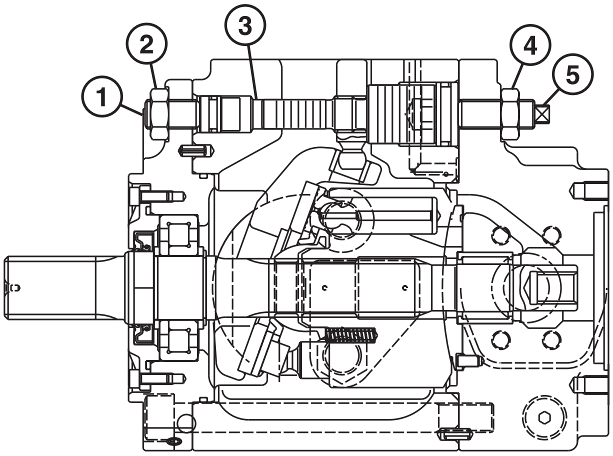
The purpose of check is to test and adjust the minimum flow rate of the fan drive pump. See Fan Drive Pump Regulator Operation for operation of regulator and servo piston. (Group 9025-05.)

1. Minimum flow rate is checked by using a flow meter. See Fan Drive Pump Flow Test for instruction to connect flow meter to the pump. (Group 9025-25.)

2. Loosen nut (2). Turn adjusting screw (1). Turning screw out decreases pump flow and turning in increases flow.

Specification

Fan Drive Pump Servo Piston Minimum—Flow Rate Change .... 2.8 L/min approximate per 1/4 turn
0.75 gpm approximate per 1/4 turn



TX1006814 –UN–27APR06

Fan Drive Pump Servo Piston Flow Adjusting Screw

1—Servo Piston Minimum Flow Adjusting Screw
2—Nut
3—Servo Piston
4—Nut
5—Servo Piston Maximum Flow Adjusting Screw

TX04577,00000FB –19–27APR06–1/1

Fan Drive Pump Servo Piston Maximum Flow Test and Adjustment

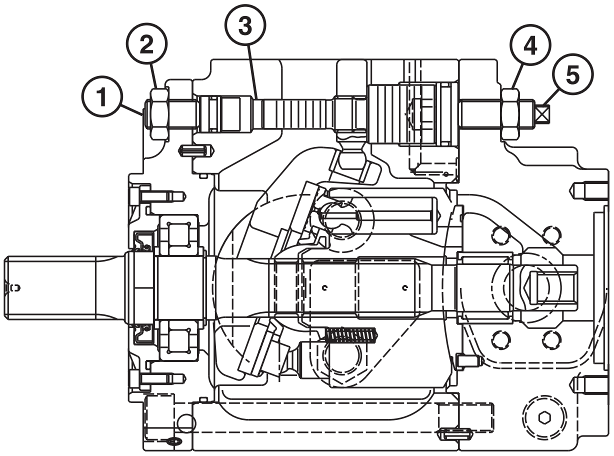
SPECIFICATIONS	
Fan Drive Pump Servo Piston Maximum Flow Rate Change	2.8 L/min approximate per 1/4 turn 0.75 gpm approximate per 1/4 turn

The purpose of check is to test and adjust the maximum flow rate of the fan drive pump. See Fan Drive Pump Regulator Operation for operation of regulator and servo piston. (Group 9025-05.)

1. Maximum flow rate is checked by using a flow meter. See Fan Drive Pump Flow Test for instruction to connect flow meter to the pump. (Group 9025-25.)
2. Loosen nut (4). Turn adjusting screw (5). Turning screw out decreases pump flow and turning in increases flow.

Specification

Fan Drive Pump Servo Piston Maximum—Flow Rate Change .... 2.8 L/min approximate per 1/4 turn
0.75 gpm approximate per 1/4 turn



TX1006814 –UN–27APR06

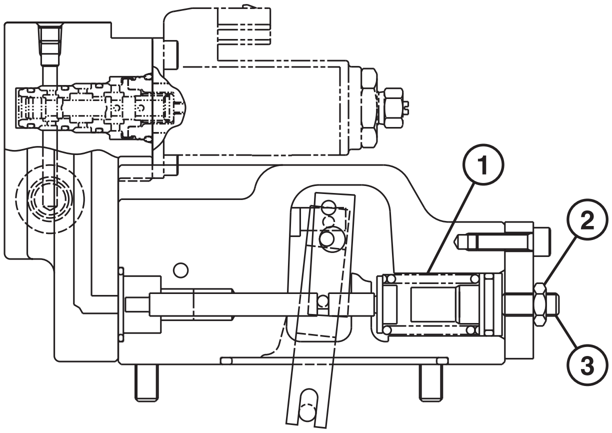
Fan Drive Pump Servo Piston Flow Adjusting Screw

1—Servo Piston Minimum Flow Adjusting Screw
2—Nut
3—Servo Piston
4—Nut
5—Servo Piston Maximum Flow Adjusting Screw

TX04577,00000FC –19–27APR06–1/1

Fan Drive Pump Flow Rate Test and Adjustment

SPECIFICATIONS	
Fan Drive Pump Flow Rate Flow Rate Change	6.5 L/min approximate per 1/4 turn 1.7 gpm approximate per 1/4 turn



TX1007050 –UN–26APR06

Fan Pump Flow Rate Control Adjusting Screw

1—Spring
2—Nut
3—Pump Flow Rate Control Adjusting Screw

Fan pump flow rate is controlled by a pilot oil signal from the fan pump control solenoid valve to the pilot piston and load on spool in proportion to the current signal to the solenoid. See System Functional Schematic for fan drive pump control solenoid. (Group 9015-10.)

Fan pump flow rate control adjusting screw (3) is used to adjust the response of pilot piston and load spool in proportion to the pilot oil signal by changing the spring (1) force. See Fan Drive Pump Regulator Operation for more information. (Group 9025-05).

1. Check the maximum and minimum flow rates. See Fan Drive Pump Flow Test. (Group 9025-25.)

2. Loosen nut (2). Turn adjusting screw (3) in to increase flow rate; turn adjusting screw out to decrease flow rate.

Specification

Fan Drive Pump Flow Rate—
Flow Rate Change...................................... 6.5 L/min approximate per 1/4 turn
1.7 gpm approximate per 1/4 turn

TX04577,00000FD –19–27APR06–1/1

Fan Drive Pump Torque Control Test and Adjustment

SPECIFICATIONS	
Fan Drive Pump Regulator Outer Spring Flow Rate Change	8.9 L/min approximate per 1/4 turn 2.4 gpm approximate per 1/4 turn
Fan Drive Pump Regulator Outer Spring Pressure Change	1.9 MPa approximate per 1/4 turn 1900 kPa approximate per 1/4 turn 19 bar approximate per 1/4 turn 276 psi approximate per 1/4 turn
Fan Drive Pump Regulator Outer Spring Engine Torque Change	15.1 N•m approximate per 1/4 turn 11.1 lb-ft approximate per 1/4 turn

Fan drive pump torque control is performed by pump delivery pressure. Therefore, the torque constant control is adjusted by changing the spring force of inner spring (31) and outer spring (30). See Fan Drive Pump Regulator Operation for more information. (Group 9025-05).

1. Check the fan drive pump maximum and minimum flow rates. See Fan Drive Pump Flow Test. (Group 9025-25.)

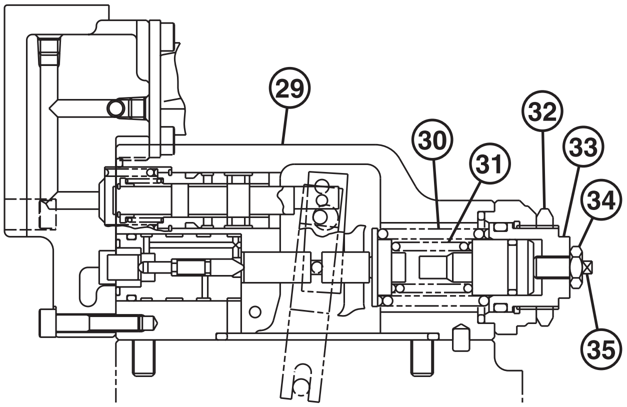
2. Make a mark on the ends adjusting screw (35) and adjusting plug (34) with respect to fan drive pump regulator (29) housing to record the original position.

IMPORTANT: When the 24 mm adjusting plug is adjusted, the inner spring force also changes. Therefore, the 4 mm adjusting screw for the inner spring must be turned in the opposite direction to keep the inner spring force unchanged.

3. Loosen 36 mm nut (32).

   Turn 24 mm adjusting plug (33) for outer spring (30) in to increase flow rate; turn adjusting plug out to decrease flow rate.

4. Loosen 13 mm nut (34).



TX1007097 –UN–28APR06

Fan Drive Pump Torque Control Adjusting Screw and Plug

29—Fan Drive Pump Regulator
30—Outer Spring
31—Inner Spring
32—36 mm Nut
33—24 mm Adjusting Plug
34—13 mm Nut
35—4 mm Adjusting Screw

Continued on next page

Turn 4 mm adjusting screw (35) in the opposite direction 2.24 times the turns of adjusting plug so inner spring (31) force is unchanged.

Specification

Fan Drive Pump Regulator Outer Spring—Flow Rate Change	8.9 L/min approximate per 1/4 turn 2.4 gpm approximate per 1/4 turn
Pressure Change	1.9 MPa approximate per 1/4 turn 1900 kPa approximate per 1/4 turn 19 bar approximate per 1/4 turn 276 psi approximate per 1/4 turn
Engine Torque Change	15.1 N•m approximate per 1/4 turn 11.1 lb-ft approximate per 1/4 turn

OUT3035,0000039 –19–27APR06–2/2

Fan Drive Pump Flow Test

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Switch Position	P Mode
Auto Idle Switch Position	Off
Fan Drive Pump Flow Rate—New	61.3 L/min at 7.9 MPa and 1750 rpm 61.3 L/min at 7930 kPa and 1750 rpm 61.3 L/min at 79.3 bar and 1750 rpm 16.2 gpm at 1150 psi and 1750 rpm
Fan Drive Pump Flow Rate—New	57.5 L/min at 23.3 MPa and 1750 rpm 57.5 L/min at 23 305 kPa and 1750 rpm 57.5 L/min at 233.1 bar and 1750 rpm 15.2 gpm at 3380 psi and 1750 rpm
Fan Drive Pump Flow Rate—New	82.5 L/min at 26.3 MPa and 1750 rpm 82.5 L/min at 26 270 kPa and 1750 rpm 82.5 L/min at 262.7 bar and 1750 rpm 13.3 gpm at 3810 psi and 1750 rpm
Fan Drive Pump Flow Rate—Minimum Allowable	50.3 L/min at 7.9 MPa and 1750 rpm 50.3 L/min at 7930 kPa and 1750 rpm 50.3 L/min at 79.3 bar and 1750 rpm 13.8 gpm at 1150 psi and 1750 rpm

Continued on next page

SPECIFICATIONS	
Fan Drive Pump Flow Rate—Minimum Allowable	48.4 L/min at 23.3 MPa and 1750 rpm 48.4 L/min at 23 305 kPa and 1750 rpm 48.4 L/min at 233.1 bar and 1750 rpm 12.8 gpm at 3380 psi and 1750 rpm
Fan Drive Pump Flow Rate—Minimum Allowable	42.8 L/min at 26.3 MPa and 1750 rpm 42.8 L/min at 26 270 kPa and 1750 rpm 42.8 L/min at 262.7 bar and 1750 rpm 11.3 gpm at 3810 psi and 1750 rpm

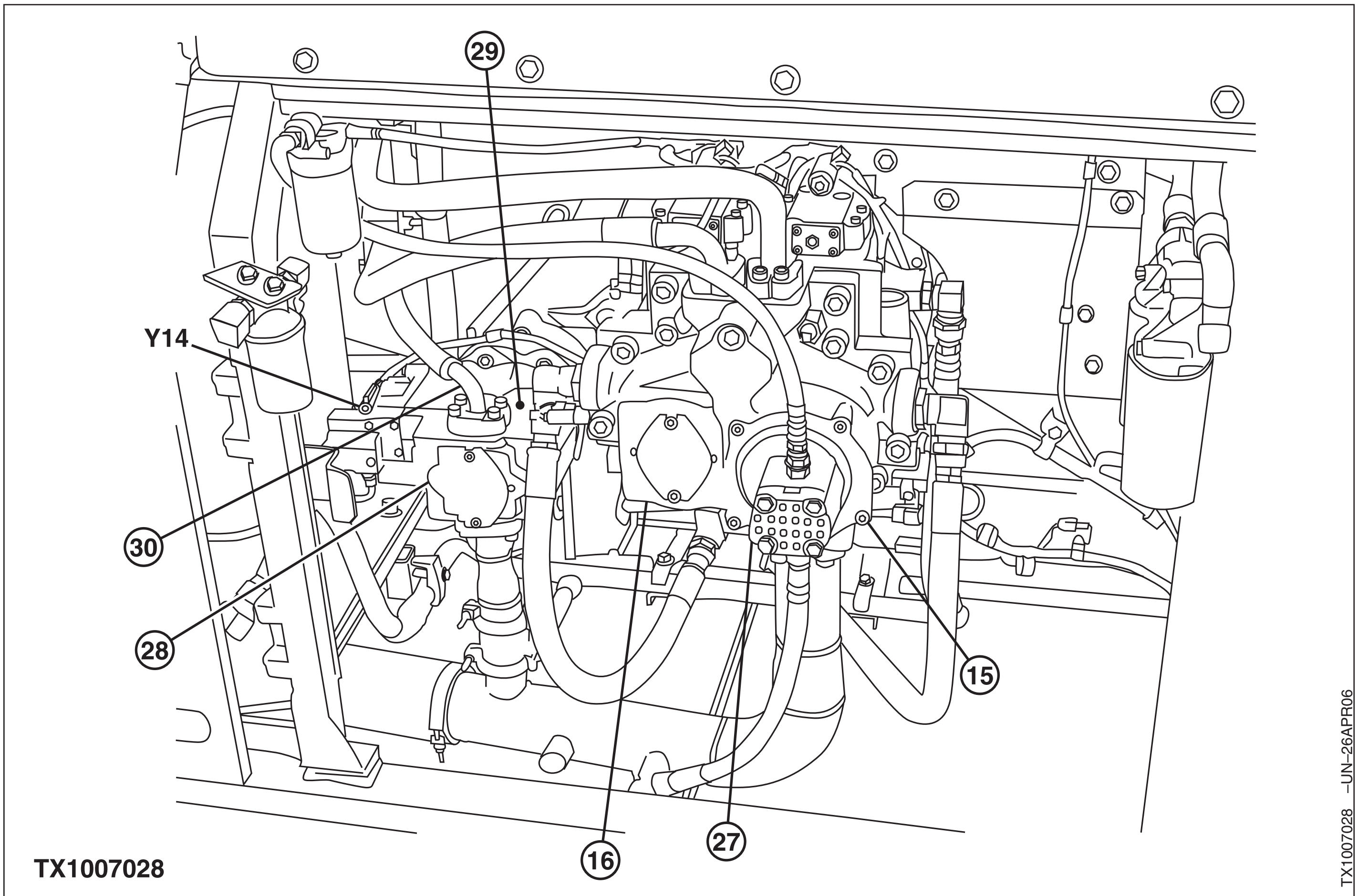
SERVICE EQUIPMENT AND TOOLS
Flowmeter, 380 L/min (100 gpm)
JT03452 Split Flange Connector Plate Kit
-12 Hose with -12 Split Flange Connector, Code 62

The purpose of test is to check the condition of fan drive pump.

1. Release pressure from hydraulic oil tank by pushing pressure release button on top of hydraulic oil tank.

2. Connect a vacuum pump to hydraulic oil tank to minimize oil loss.

Continued on next page



15—Pump 1
16—Pump 2
27—Pilot Pump
28—Fan Drive Pump
29—Test Port
30—Delivery Line
Y14—Fan Pump Control Solenoid

3. Disconnect delivery line (30) from fan drive pump (28). Connect delivery line to the outlet of flow meter using JT03452 Split Flange Connector Plate Kit.

4. Connect the flow meter to pump delivery port using a -12 hose with -12 split flange fitting, Code 62.

5. Disconnect wiring harness to the fan pump control solenoid (Y14) so fan drive pump goes to maximum displacement.

Continued on next page

OUT3035,000000D –19–05JUN06–3/6

6. Remove cover over the control valve for access to the fan drive system relief valve (38).

   Turn adjusting screw for relief valve out one full turn.

NOTE: Relief valve is turned out to decrease system pressure so pump flow can be checked at the lower pressure.

7. Use one of the following test equipment to display oil temperature and engine speed:

   1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
      Access Fan Drive Pump Flow Test.
      Or select the following items from the menu:
      - Hydraulic Oil Temperature
      - Actual Engine Speed

   2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
      Select the following items from the Monitor Display:
      - Hydraulic Oil Temperature
      - Actual Engine Speed

   3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-20.)
      Select the following items from Monitoring list:
      - Hydraulic Oil Temperature
      - Actual Engine Speed

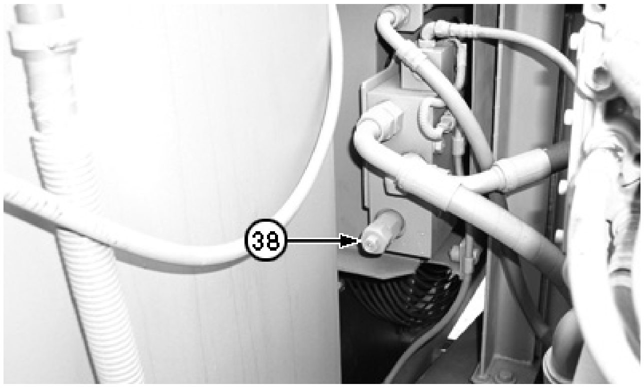
8. Disconnect the vacuum pump.

9. Check that flowmeter loading valve is open.

10. Heat hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

Specification

Hydraulic Oil—Temperature .... 45—55°C
110—130°F



Fan Drive System Relief Valve

38—Fan Drive System Relief Valve

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

11. Run engine at specification.

Specification

Engine—Speed	Fast Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	P Mode
Auto Idle Switch—Position	Off

12. Slowly close the loading valve on flowmeter to obtain the specified pressures.

    Record pump flow rate at each pressure.

Specification

Fan Drive Pump—Flow Rate—New	61.3 L/min at 7.9 MPa and 1750 rpm 61.3 L/min at 7930 kPa and 1750 rpm 61.3 L/min at 79.3 bar and 1750 rpm 16.2 gpm at 1150 psi and 1750 rpm
Fan Drive Pump—Flow Rate—New	57.5 L/min at 23.3 MPa and 1750 rpm 57.5 L/min at 23 305 kPa and 1750 rpm 57.5 L/min at 233.1 bar and 1750 rpm 15.2 gpm at 3380 psi and 1750 rpm
Fan Drive Pump—Flow Rate—New	82.5 L/min at 26.3 MPa and 1750 rpm 82.5 L/min at 26 270 kPa and 1750 rpm 82.5 L/min at 262.7 bar and 1750 rpm 13.3 gpm at 3810 psi and 1750 rpm
Fan Drive Pump—Flow Rate—Minimum Allowable	50.3 L/min at 7.9 MPa and 1750 rpm 50.3 L/min at 7930 kPa and 1750 rpm 50.3 L/min at 79.3 bar and 1750 rpm 13.8 gpm at 1150 psi and 1750 rpm

Continued on next page

Specification

Fan Drive Pump—Flow Rate—Minimum Allowable	48.4 L/min at 23.3 MPa and 1750 rpm 48.4 L/min at 23 305 kPa and 1750 rpm 48.4 L/min at 233.1 bar and 1750 rpm 12.8 gpm at 3380 psi and 1750 rpm
Fan Drive Pump—Flow Rate—Minimum Allowable	42.8 L/min at 26.3 MPa and 1750 rpm 42.8 L/min at 26 270 kPa and 1750 rpm 42.8 L/min at 262.7 bar and 1750 rpm 11.3 gpm at 3810 psi and 1750 rpm

13. Open loading valve. Stop the engine.

    Pump flow rate can be increased some by adjusting the pump servo piston maximum flow adjusting screw. See Fan Drive Pump Servo Piston Maximum Flow Test and Adjustment. (Group 9025-25.)

14. Turn adjusting screw for fan drive system relief valve back to its original setting.

OUT3035,000000D –19–05JUN06–6/6

Section 9031
Heating and Air Conditioning System
Contents

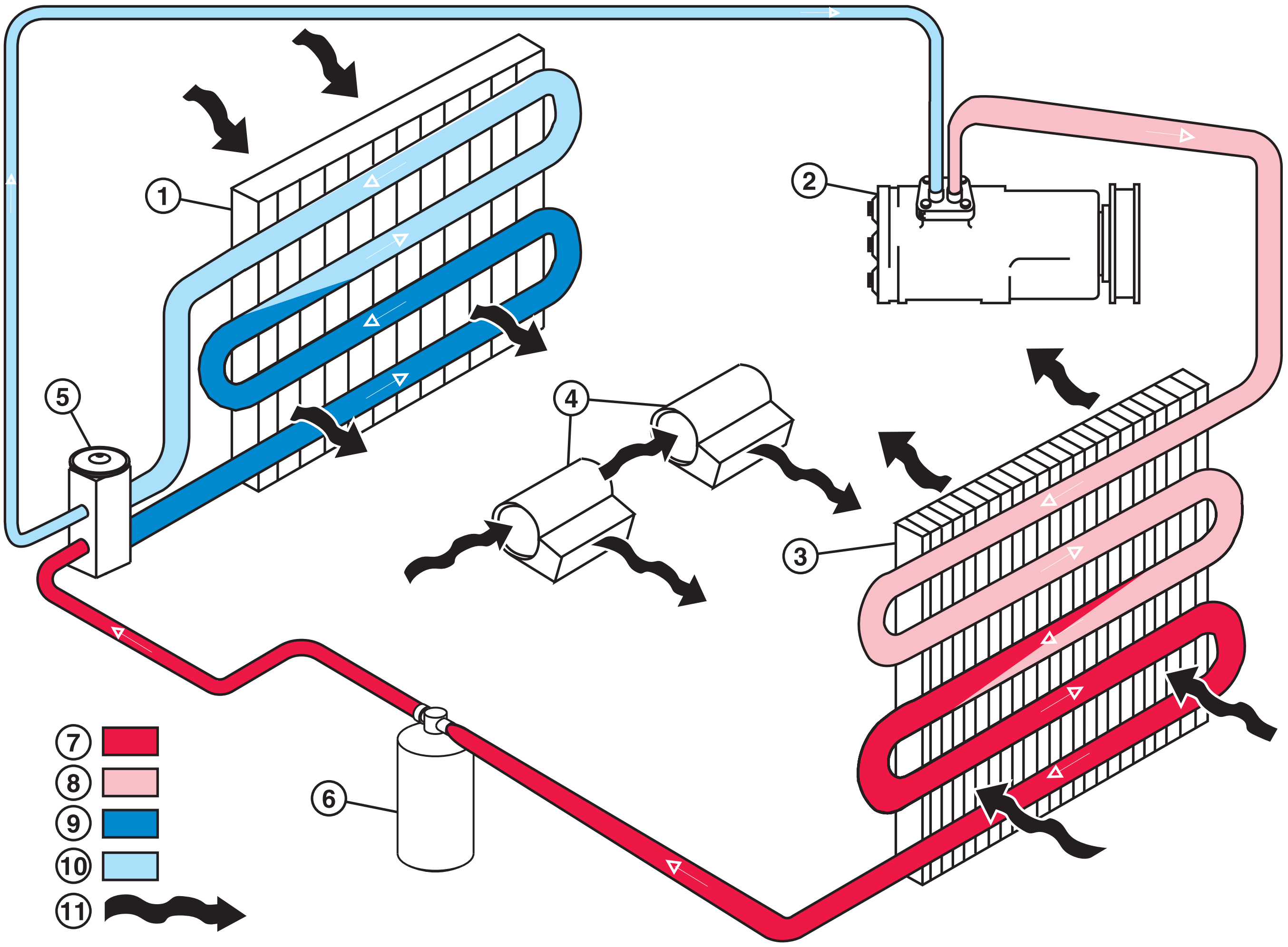
Page

Group 05—Theory Of Operation
Air Conditioning System Cycle of Operation. 9031-05-1

Group 15—Diagnostic Information
Diagnose Air Conditioning System Malfunctions 9031-15-1
Diagnose Heating System Malfunctions 9031-15-5
Air Conditioner and Heater Diagnostic Trouble Code Check 9031-15-7
Heater and Air Conditioner Component Location. 9031-15-8

Group 25—Tests
Refrigerant Cautions and Proper Handling 9031-25-1
Heating and Air Conditioning Operational Checks 9031-25-2
Visual Inspection of Components 9031-25-2
R134a Air Conditioning System Test. 9031-25-4
Air Conditioner Compressor Clutch Test 9031-25-5
Refrigerant Leak Test 9031-25-5
Refrigerant Hoses and Tubing Inspection . . .9031-25-6
Air Conditioner Compressor Belt Check and Adjustment. 9031-25-6
Operating Pressure Diagnostic Chart 9031-25-7

Air Conditioning System Cycle of Operation



T142307

1—Evaporator
2—Compressor
3—Condenser
4—Circulation Fan Motor
5—Expansion Valve
6—Receiver/Dryer
7—High Pressure Liquid
8—High Pressure Gas
9—Low Pressure Liquid
10—Low Pressure Gas
11—Air Flow

The compressor is belt driven and engaged by an electro-magnetic clutch. The air conditioning circuit automatically controls compressor engagement or disengagement when system is in operation.

Compressor draws low pressure gas from evaporator and compresses it into high pressure gas. This causes temperature of refrigerant to rise higher than that of outside air.

High pressure gas leaves compressor and flows through condenser where heat is removed and transferred to outside air being drawn through condenser core by engine fan. Cooling refrigerant causes it to condense and refrigerant leaves condenser as high pressure liquid.

Continued on next page

High pressure liquid flows into receiver-dryer where moisture and contaminants (acid, solids, etc.) are removed. Receiver-dryer contains a color moisture indicator. (Blue) indicates no moisture is present. (Pink) indicates moisture is present. Should moisture be combined with refrigerant, hydrofluoric and hydrochloric acids are formed. These acids are very corrosive to metal surfaces and leakage will eventually develop. Receiver-dryer also stores refrigerant allowing a longer period of time before additional refrigerant is needed. Refrigerant hoses will allow a small amount of refrigerant to migrate through their walls.

Refrigerant flows from receiver-dryer through expansion valve to evaporator. Expansion valve senses refrigerant temperature and pressure to modulate refrigerant flow. Expansion valve changes refrigerant to low pressure liquid entering evaporator.

Actual cooling and drying of cab air takes place at evaporator. Heat absorbed by evaporator and transferred to refrigerant causes refrigerant to vaporize into low pressure gas. Low pressure gas is drawn from evaporator by compressor and cycle is repeated.

A freeze control switch senses temperature of evaporator coil through a capillary tube. This prevents the evaporator from becoming cold enough to freeze moisture that condenses on evaporator coil. Condensed moisture is drained away through drain tubes connected to drain pan under evaporator.

System pressure is monitored by the high and low pressure switch, located at the receiver-dryer. If pressure becomes too high or too low the switch opens and stops compressor, interrupting the cycle.

MD46667,0000005 –19–09FEB06–2/2

Diagnose Air Conditioning System Malfunctions

NOTE: Diagnostic charts are arranged from most probable and simplest to verify, to least likely more difficult to verify.

NOTE: Prior to diagnosis and component tests Perform Heating and Air Conditioning System Checks. (Group 9031-25.) These conditions may affect diagnostic and test results.

Symptom	Problem	Solution
Air Conditioning System Does Not Operate	Air conditioner and heater 5 amp fuse (F17)	Replace fuse. See Fuse and Relay Specifications. (Group 9015-10.)
	Air conditioner and heater 20 amp fuse (F3)	Replace fuse. See Fuse and Relay Specifications. (Group 9015-10.)
	Fan motor malfunction or operating too slow	Check fan motor resistor. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)
		Check fan motor for obstructions. See Heater and Air Conditioner Component Location. (Group 9031-15.)
		Check fan motor. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)
	Air conditioner high/low pressure switch malfunction	Check wiring. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)

Continued on next page

LD30992,0000496 –19–23MAR06–1/4

Symptom	Problem	Solution
	Compressor clutch	Check compressor clutch. See Air Conditioner Compressor Clutch Test. (Group 9031-25.) Check compressor clutch wiring. See Cab Harness (W1) Wiring Diagram, See Machine Harness (W2) Wiring Diagram, See Engine Interface Harness (W5) Wiring Diagram, and See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)
	Air conditioner freeze control switch malfunction	Check freeze control switch. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)
	Air conditioner and heater mixer servomotor door open	Check door for obstructions and test servo motor.
	Heater and air conditioner controller malfunction	Check air conditioner diagnostic trouble codes. See Air Conditioner Diagnostic Trouble Code Check. (Group 9031-15.)
Air Conditioner Does Not Cool Interior of Cab	Fresh air filter restricted	Clean or replace filter. See Clean Cab Fresh Air and Recirculation Air Filter. (Operator's Manual.)
	Recirculating air filter restricted	Clean or replace filter. See Clean Cab Fresh Air and Recirculation Air Filter. (Operator's Manual.)
	Condenser fins restricted with debris	Clean condenser fins. See Heater and Air Conditioner Component Location. (Group 9031-15.)
	Compressor belt loose	Check compressor belt tension. See Air Conditioner Belt Check and Adjustment. (Operator's Manual.)

Continued on next page

LD30992,0000496 –19–23MAR06–2/4

Symptom	Problem	Solution
	Refrigerant hose kinked, pinched, or collapsed	Re-route or re-index hoses. Replace collapsed hoses. See Heater and Air Conditioner Component Location. (Group 9031-15.) See Refrigerant Hoses and Tubing Inspection. (Group 9031-25.)
	Heater or evaporator fins restricted with dirt or dust	Clean heater or evaporator fins. See Heater and Air Conditioner Component Location. (Group 9031-15.) See Heater and Air Conditioner Remove and Install. (Group 1830.)
	Air conditioner and heater mixer servomotor door open	Check door for obstructions and test servomotor. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)
	Compressor clutch slipping or failed	Check compressor clutch. Perform Air Conditioner Compressor Clutch Test. (Group 9031-25.)
	Warm outside air leaking into cab	Inspect, repair, or replace door and window seals. See Windowpanes Repair. (Group 1810.) and See Sliding Window Repair. (Group 1810.)
	System refrigerant (R134a) charge low	Perform R134a Air Conditioning System Test. (Group 9031-25.) and Perform Refrigerant Leak Test. (Group 9031-25.)
	Evaporator fins frosting or freezing	Freeze control switch not positioned correctly in evaporator core. Reposition switch in evaporator core. See Heater and Air Conditioner Component Location. (Group 9031-15.)
	Heater and air conditioner controller malfunction	Check air conditioner diagnostic trouble codes. See Air Conditioner Diagnostic Trouble Code Check. (Group 9031-15.)

Continued on next page

Symptom	Problem	Solution
Air Conditioner Runs Constantly, Too Cold	Freeze control switch not positioned in evaporator properly	Reposition freeze control switch in evaporator core. See Air Conditioner Component Location. (Group 9031-25.)
Interior Windows Continue to Fog	Air conditioning system off	Push A/C switch to turn air conditioning on. See Cab Heater And Air Conditioner. (Operator's Manual.)
	Fresh air filter restricted	Clean or replace filter. See Clean Cab Fresh Air and Recirculation Air Filter. (Operator's Manual.)

LD30992,0000496 –19–23MAR06–4/4

Diagnose Heating System Malfunctions

NOTE: Diagnostic charts are arranged from most probable and simplest to verify, to least likely more difficult to verify.

NOTE: Prior to diagnosis and component tests Perform Air Conditioner and Heater Operational Checks. (Group 9031-25.) These conditions may affect diagnostic and test results.

Symptom	Problem	Solution
Heater System Does Not Operate	Air conditioner and heater 5 amp fuse (F17)	Replace fuse. See Fuse and Relay Specifications. (Group 9015-10.)
	Air conditioner and heater 20 amp fuse (F3)	Replace fuse. See Fuse and Relay Specifications. (Group 9015-10.)
	Fan motor malfunction or operating too slowly	Check fan motor resistor. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.) Check fan motor for obstructions. See Heater and Air Conditioner Component Location. (Group 9031-15.) Check fan motor. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)
	Heater and air conditioner controller malfunction	Check air conditioner diagnostic trouble codes. See Air Conditioner Diagnostic Trouble Code Check. (Group 9031-15.)
Heater Does Not Warm Interior of Cab	Fresh air filter restricted	Clean or replace filter. See Clean Cab Fresh Air and Recirculating Air Filter. (Operator's Manual.)
	Recirculating air filter restricted	Clean or replace filter. See Clean Cab Fresh Air and Recirculating Air Filter. (Operator's Manual.)

Continued on next page

Symptom	Problem	Solution
	Heater hose kinked, pinched or collapsed	Re-route or re-index hoses. Replace collapsed hoses. See Refrigerant Hoses and Tubing Inspection. (Group 9031-25.) See Heater and Air Conditioner Component Location. (Group 9031-15.)
	Heater core fins clogged with dirt or dust	Clean heater fins. See Heater and Air Conditioner Component Location. (Group 9031-15.)
Interior Windows Continue to Fog	Air conditioning system OFF	Put A/C and heater ON/OFF switch to A/C position. See Cab Heater and Air Conditioner. (Operator's Manual.)
	Fresh air filter restricted	Clean or replace filter. See Clean Cab Fresh Air and Recirculating Air Filter. (Operator's Manual.)

LD30992,00004BC –19–23MAR06–2/2

Air Conditioner and Heater Diagnostic Trouble Code Check

Display Diagnostic Trouble Codes

Turn key switch on. Press the blower fan OFF switch. Press both “^” and “v” temperature control switches at the same time and hold for 3 seconds. A buzzer will sound after this operation is complete. For a list of air conditioner and heater diagnostic trouble codes, See Air Conditioner Controller (ACF) Diagnostic Trouble Codes. (Group 9001-40.)

Change Displayed Diagnostic Trouble Code

In case more than one fault is detected, press either “^” or “v” temperature control switch to display the fault code on the monitor in order. Each time the displayed fault code is changed, a buzzer will sound.

Delete Displayed Diagnostic Trouble Code

Press and hold both the circulation air switch and the fresh air switch at the same time for more than 3 seconds to delete the displayed diagnostic trouble code. After the diagnostic trouble code is deleted, a buzzer will sound. After all diagnostic trouble codes have been deleted, the LCD will display “E00.”

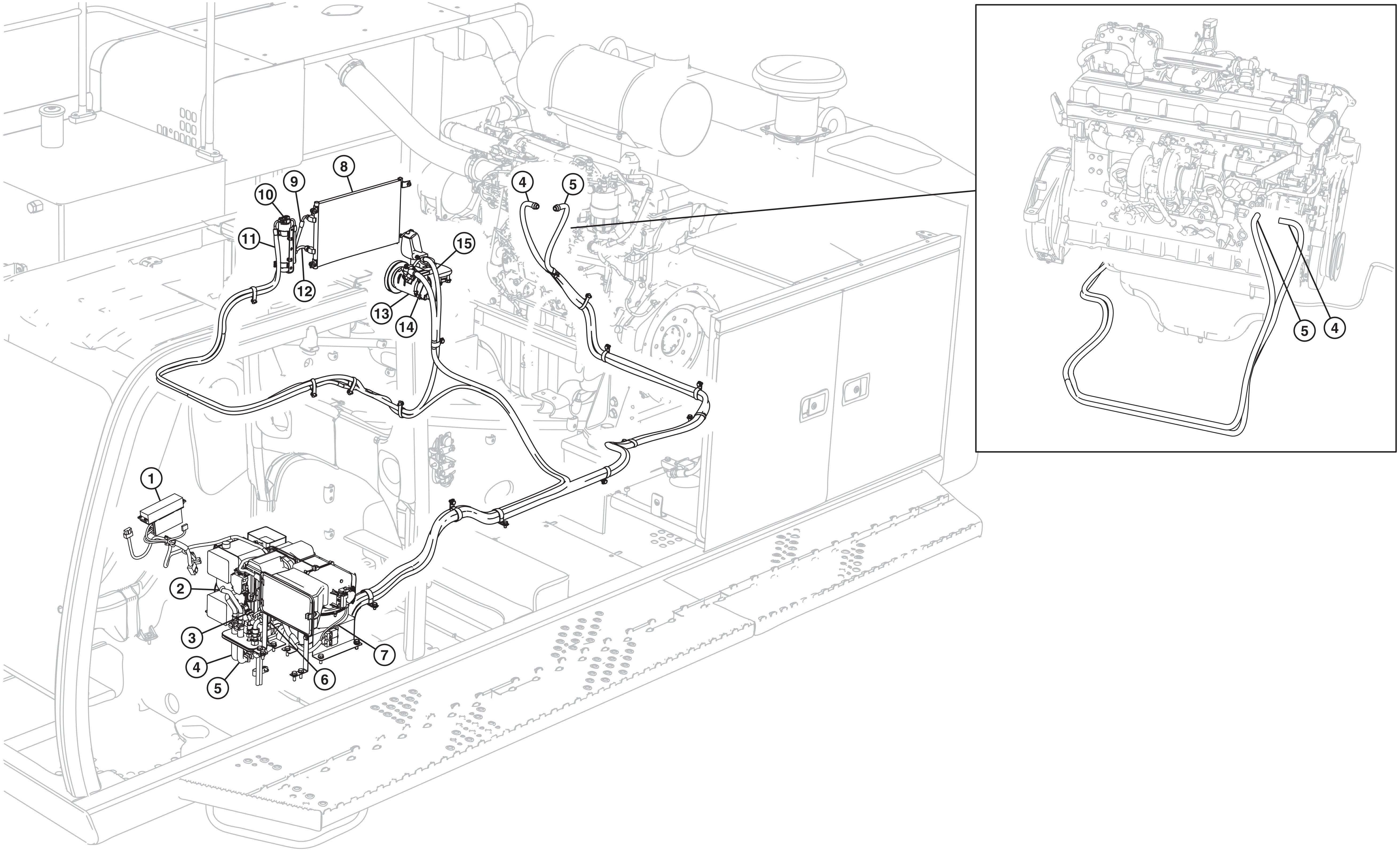
End Diagnostic Trouble Code Display

Press the fan OFF switch to exit the self-diagnostic mode.

LD30992,0000497 –19–23MAR06–1/1

Heater and Air Conditioner Component Location

TX1007229 –UN–07JUN06



TX1007229

Heater and Air Conditioner Component Location

1—Air Conditioner and Heater Controller
2—Heater Core
3—Air Conditioner High/Low Pressure Switch
4—Heater Hot Coolant Return Line
5—Heater Hot Coolant Supply Line
6—Air Conditioner Evaporator
7—Air Conditioner and Heater Blower Motor
8—Air Conditioner Condenser
9—Air Conditioner-to-Receiver-Dryer Line
10—Receiver-Dryer
11—Receiver-Dryer-to-Air Conditioner Evaporator Line
12—Air Conditioner-to-Air Conditioner Condenser Line
13—Air Conditioner Compressor
14—Air Conditioner Evaporator-to-Air Conditioner Compressor Line

LD30992,0000498 –19–22MAY06–2/2

Refrigerant Cautions and Proper Handling

CAUTION: DO NOT allow liquid refrigerant to contact eyes or skin. Liquid refrigerant will freeze eyes or skin on contact. Wear goggles, gloves and protective clothing.

If liquid refrigerant contacts eyes or skin, DO NOT rub the area. Splash large amounts of COOL water on affected area. Go to a physician or hospital immediately for treatment.

DO NOT allow refrigerant to contact open flames or very hot surfaces such as electric welding arc, electric heating element and lighted smoking materials.

DO NOT heat refrigerant over 52°C (125°F) in a closed container. Heated refrigerant will develop high pressure, which can burst the container.

Keep refrigerant containers away from heat sources. Store refrigerant in a cool place.

DO NOT handle damp refrigerant container with your bare hands. Skin may freeze to container. Wear gloves.

If skin freezes to container, pour COOL water over container to free the skin. Go to a physician or hospital immediately for treatment.

IMPORTANT: To meet government standards relating to the use of refrigerants, R134a is used in the air conditioning system. Because it does not contain chlorine, R134a is not detrimental to the ozone in the atmosphere. However, it is illegal to discharge any refrigerant into the atmosphere. It must be recovered using the appropriate recovery stations.

Use correct refrigerant recovery, recycling and charging stations. Never mix refrigerants, hoses, fittings, components or refrigerant oils.

Use only John Deere approved R134a refrigerant products. Mixing of products not compatible will cause system damage and contaminate recovery, recycling and charging station equipment. Care must be taken to identify and use equipment, refrigerant oil and refrigerant designed only for R134a refrigerant systems. Refrigerant should be tested for type and purity before recovery, recycling or charging of system. JT02167A refrigerant test instrument should be used before any testing or repair to system is performed.

Continued on next page

LD30992,000049F –19–23MAR06–1/2

Prism Pro Refrigerant Identification Instrument JT02167A

To safely identify type and check purity of refrigerant prior to recovery, recycling and recharging of A/C systems.

LD30992,000049F –19–23MAR06–2/2

Heating and Air Conditioning Operational Checks

LD30992,0000499 –19–23MAR06–1/1

➊ Visual Inspection of Components

– – –1/1

Lines and Hoses Check	Inspect all lines and hoses. *LOOK/FEEL: Are all lines and hoses straight and in good condition, NOT kinked, worn from rubbing, or “weather checked”?* *LOOK/FEEL: Are hose and line connections clean and NOT showing signs of leakage, such as dirt, oil, or refrigerant dye?* *LOOK/FEEL: Are all hose and line clamps in place and tight, with cushions or rubber inserts in place to prevent crushing or scuffing hoses or lines?*	**YES:** Go to next check. **NO:** Reposition hoses and lines. Replace any hoses or lines that require replacement. Adjust and tighten clamps as necessary.

– – –1/1

Air Conditioner Compressor Check	Inspect compressor. *LOOK/FEEL: Is belt properly tensioned on pulley?* *LOOK/FEEL: Is belt in good condition, NOT frayed, worn, or glazed?* *LOOK/FEEL: Is belt tensioner in good condition, NOT worn or damaged?* *LOOK/FEEL: Is compressor pulley in good condition and properly aligned with belt drive pulley on engine?* *LOOK/FEEL: Are compressor mounting brackets in good condition, and is mounting hardware properly tightened?* *LOOK/FEEL: Are electrical connections to compressor clean and tight? Is wiring in good condition?*	**YES:** Go to next check. **NO:** Repair or replace components as necessary. – – –1/1

Condenser Check	Inspect condenser core. *LOOK/FEEL: Is core free of dirt and debris?* *LOOK/FEEL: Is core NOT showing signs of leakage, such as dirt, oil, or refrigerant dye?* *LOOK/FEEL: Are fins of core straight, NOT bent or damaged?*	**YES:** Go to next check. **NO:** Clean and straighten fins. Repair or replace components as necessary. – – –1/1

Engine Fan Check	Inspect engine fan. *LOOK/FEEL: Are fan blades in good condition, NOT worn, bent, broken, or missing?* *LOOK/FEEL: Is fan securely installed?*	**YES:** Go to next check. **NO:** Repair or replace components as necessary. – – –1/1

Heater/Evaporator Core Check	Inspect heater / evaporator core. *LOOK/FEEL: Is core free of dirt and debris?* *LOOK/FEEL: Is core NOT showing signs of leakage, such as dirt, oil, or refrigerant dye?* *LOOK/FEEL: Are fins of core straight, NOT bent or damaged?* *LOOK/FEEL: Is condensation drain tube attached and in good condition, NOT kinked, damaged, or clogged?*	**YES:** Go to next check. **NO:** Clean and straighten fins. Repair or replace components as necessary. – – –1/1

Freeze Control Switch Capillary Tube Check	Inspect freeze control switch capillary tube. *LOOK/FEEL: Is capillary tube straight, NOT kinked or broken?* *LOOK/FEEL: Is capillary tube properly positioned and securely inserted in evaporator core?*	**YES:** Go to next check. **NO:** If capillary tube is kinked or broken, replace freeze control switch. **NO:** If capillary tube is improperly positioned, test freeze control switch. See Air Conditioner Freeze Control Switch Test. (Group 9031-25.) – – –1/1

Cab Air Filter Check	Inspect cab air filter. *LOOK/FEEL: Is filter clean and free of debris?*	**YES:** Go to next check. **NO:** Clean or replace cab air filters.See Clean Cab Fresh Air and Recirculating Air Filters. (Operator's Manual.) – – –1/1

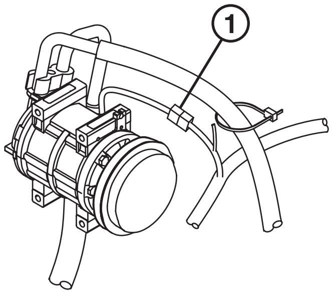
Cab Door and Windows Check	Open and close cab door and windows. Inspect seals. *LOOK/FEEL: Are seals present, properly installed, and in good condition?* *LOOK/FEEL: Do door and windows contact seals evenly?*	**YES:** Check complete. **NO:** Adjust door and windows. Repair or replace components as necessary. – – –1/1

R134a Air Conditioning System Test

Information not available at the time of release.

LD30992,000049A –19–08JUN06–1/1

Air Conditioner Compressor Clutch Test



T144993 –UN–28AUG01

1—Connector

1. Disconnect connector (1) from clutch.
2. Connect battery voltage to clutch connector.
3. Clutch solenoid should engage and will “click”.
4. If clutch solenoid does not engage repair or replace compressor. See Compressor Remove and Install (Group 1830.) and see Compressor Clutch Disassemble and Assemble. (Group 1830.)
5. If clutch solenoid engages check harness. See Air Conditioning Harness (W6) Wiring Diagram. (Group 9015-10.)

LD30992,000049B –19–23MAR06–1/1

Refrigerant Leak Test

1. Inspect all lines, fittings, and components for oily or dusty spots. When refrigerant leaks from the system, a small amount of oil is carried out with it.
2. A soap and water solution can be sprayed on the components in the system to form bubbles at the source of the leak.
3. If a leak detector is used, move the leak detector probe under the hoses and around the connections at a rate of 25 mm (1 in.) per second.
4. Some refrigerant manufacturers add dye to refrigerant to aid in leak detection.

TX,9031,UU3168 –19–13AUG96–1/1

Refrigerant Hoses and Tubing Inspection

IMPORTANT: Hose used for air conditioning systems contains special barriers in its walls to prevent migration of refrigerant gas.

DO NOT use hydraulic hoses as replacement hoses in the air conditioning system. Use ONLY certified hose meeting SAE J51B requirements.

When a component is disconnected from the system, special care should be given to inspecting hoses and tubing for moisture, grease, dirt, rust, or other foreign material. If such contamination is present in hoses, tubing, or fittings and cannot be removed by cleaning, then replace parts.

Fittings that have grease or dirt on them should be wiped clean with a cloth dampened with alcohol. Chlorinated solvents (such as trichloroethylene) are contaminants, and must not be used for cleaning.

To assist in making leak-proof joints, use a small amount of clean correct viscosity refrigerant oil on all hose and tube connections. Dip O-rings in correct viscosity oil before assembling.

LD30992,000049C –19–23MAR06–1/1

Air Conditioner Compressor Belt Check and Adjustment

See Check and Adjust A/C Belt. (Operator’s Manual.)

LD30992,000049D –19–23MAR06–1/1

Operating Pressure Diagnostic Chart

Condition	Low-side kPa (bar) (psi)	High-side kPa (bar) (psi)	Sight Glass	Suction Line	Receiver-Dryer	Liquid Line	Discharge Line	Discharge Air
Lack of Refrigerant	Very Low	Very Low	Clear	Slightly Cool	Slightly Warm	Slightly Warm	Slightly Warm	Warm
Loss of Refrigerant	Low	Low	Bubbles	Cool	Warm to Hot	Warm	Warm to Hot	Slightly Cool
High-side Restriction	Low	Low	Clear	Cool	Cool, Sweating or Frosting	Cool, Sweating or Frosting	Hot to Point of Restriction	Slightly Cool
Expansion Valve Closed	Low	Low	Clear	Cold, Sweating or Frosting Heavily at Valve Outlet	Warm	Warm	Hot	Slightly Cool
Loose Belt or Compressor Failure	High	Low	Clear	Cool	Warm	Warm	Warm	Slightly Cool
Condenser Malfunction	High	High	Clear to Occasional Bubbles	Slightly Cool to Warm	Hot	Hot	Hot	Warm
Refrigerant Contaminated and Air in System	High	High	Bubbles	Warm to Hot	Warm	Warm	Hot	Warm
Expansion Valve Open	High	High	Clear	Cold, Sweating or Frosting Heavily	Warm	Warm	Hot	Slightly Cool
Plugged Condenser, Overcharge of Refrigerant	Normal	High	Clear	Cool	Warm	Warm	Hot	Slightly Cool
Moisture in System	Normal (May Drop)	Normal (May Drop)	Clear	Cool	Warm	Warm	Hot	Cool to Warm
Heater Valve Stuck Open	Normal	Normal	Clear	Cool	Warm	Warm	Hot	Warm
Lack of Refrigerant and Air in System	Normal (No Drop)	Normal	Occasional Bubbles	Warm to Hot	Warm	Warm	Warm	Slightly Cool

LD30992,000049E –19–23MAR06–1/1

Section 9050
Reference Material

Contents

Page

Group 05—Terminology Cross Reference Chart
Terminology Cross Reference Chart 9050-05-1

Terminology Cross Reference Chart

Terminology Cross Reference Chart	
John Deere Service Information Term	**Alternate Term Used**
Air Filter Restriction Switch	Air Cleaner Restriction Switch
Ambient Air Temperature Sensor	Outdoor Ambient Temperature Sensor
Arm In Circuit Relief and Anticavitation Valve	Overload Relief Valve with Make-Up Function (Arm: Bottom Side)
Arm Out Circuit Relief and Anticavitation Valve	Overload Relief Valve with Make-Up Function (Arm: Rod Side)
Attenuator Hose	Tail Hose
Boom Down Circuit Relief and Anticavitation Valve	Overload Relief Valve with Make-Up Function (Boom: Rod Side)
Boom Down Shockless Valve	Shockless Valve
Boom Up Circuit Relief and Anticavitation Valve	Overload Relief Valve with Make-Up Function (Boom: Bottom Side)
Boom Up Pressure Sensor	Boom Raise Pressure Sensor
Bucket Curl Circuit Relief and Anticavitation Valve	Overload Relief Valve with Make-Up Function (Bucket: Bottom Side)
Bucket Dump Circuit Relief and Anticavitation Valve	Overload Relief Valve with Make-Up Function (Bucket: Rod Side)
Cab Air Temperature Sensor	In Cab Ambient Temperature Sensor
Center Joint	Rotary Manifold
Check Valve (lift check)	Load Check Valve
Diagnostic Trouble Codes	Error Codes, Fault Codes, Failure Codes
Engine Control Unit (ECU)	Engine Control Module (ECM)
Engine Speed Dial	Engine Control Dial or Engine RPM Dial
Front Attachment Pressure Sensor	Dig and Swing Pressure Sensor
Hydraulic Pumps (pump 1, pump 2, pilot pump)	Pump Device
Information Controller (ICF)	ICX or ICF
Intercooler	Charge Air Cooler
Light	Lamp
Main Controller (MCF)	MC, MCX
Main Relief and Power Digging Valve	Main Relief Valve, System Relief Valve
Pilot Control Lever, Right/Left	Control Lever, Right/Left
Pilot Shutoff Lever	Pilot Control Shut-Off Lever
Pilot Pressure Regulating Valve	Relief Valve, Pilot Relief Valve
Pilot Shutoff Solenoid Valve	Pilot Shut-off Valve
Pilot Signal Manifold	Power Boost Switch, Signal Control Valve
Power Dig Switch	Power Digging Switch
Pump 2 Flow Rate Limit Solenoid Valve	Maximum Pump 2 Flow Rate Control Solenoid
Solar Sensor	Solar Radiation Sensor
Solenoid Valve Manifold	4-Spool Solenoid Valve Unit
Starter Relay	Starter Cut Relay
Swing Gearbox and Swing Motor	Swing Device, Swing Reduction Gear
Swing Motor Make-Up Check Valve	Make-Up Valve (Swing Device)
Switch Panel	Switch Box

Continued on next page

Terminology Cross Reference Chart	
John Deere Service Information Term	**Alternate Term Used**
Travel Flow Combiner Pilot Valve	Flow Combiner Valve Spool
Travel Motor Crossover Relief Valve	Overload Relief Valve (Travel)
Travel Motor, Travel Park Brake, Travel Device	Travel Device
Travel Park Brake	Parking Brake
Travel Speed Switch	Propel Speed Switch

AH91621,00002A0 –19–09MAR06–2/2

Index

Page

A

- A/I (auto-idle) circuit
  - Operational check 9005-10-14
- Air conditioner
  - Component location 9031-15-8
  - Compressor clutch belt check and adjustment. 9031-25-6
  - Diagnostic trouble code check 9031-15-7
  - Operating pressure diagnostic chart 9031-25-7
  - Operational checks 9031-25-2
- Air conditioner compressor clutch
  - Test 9031-25-5
- Air conditioner harness (W6)
  - Component location 9015-10-50
  - Wiring diagram 9015-10-52
- Air conditioning
  - Diagnose malfunctions 9031-15-1
  - Hoses and tubing inspection 9031-25-6
  - Refrigerant cautions and proper handling. 9031-25-1
  - Refrigerant leak test 9031-25-5
  - R134a system test 9031-25-4
  - System cycle of operation 9031-05-1
- Air Intake
  - System leakage test 9010-25-9
- Alarm
  - Travel, remove and install 9015-20-116
- All hydraulic functions slow
  - Diagnose malfunctions 9025-15-3
- All hydraulic functions too fast
  - Diagnose malfunctions 9025-15-7
- Alternator
  - Test 9015-20-99
- Anticavitation valve
  - Operation 9025-05-72
- Arm
  - Cylinder drift test 9025-25-67
- Arm reduced leakage valve
  - Operation 9025-05-83
- Arm regenerative valve
  - Operation 9025-05-79
  - Operational check 9005-10-23
- Arm 1 flow rate, pilot valve
  - Operation 9025-05-15
- Arm 2
  - Flow rate circuit operation 9025-05-94
- Arm 2 flow rate pilot valve
  - Operation 9025-05-15
- Attachments
  - Adding safely 9000-01-11
  - Operating safely 9000-01-11
- Auto idle control
  - Control auto idle 9010-05-19
- Auto lubrication system
  - Diagnose malfunctions 9025-15-61
- Auto-Idle Does Not Work
  - Diagnostics 9010-15-13
- Auto-idle switch
  - Remove and install 9015-20-115
- Auxiliary fuse box harness (W9)
  - Component location 9015-10-62
  - Wiring diagram 9015-10-64

B

- Backover accidents
  - Avoiding 9000-01-10
- Battery
  - Remove and install 9015-20-106
- Battery explosions
  - Prevent 9000-01-5
- Battery relay
  - Check 9015-20-101
- Battery voltage
  - Check 9015-20-101
- Belt
  - Air conditioner compressor check and adjustment. 9031-25-6
- Boom
  - Cylinder drift test 9025-25-67
  - Mode switch check 9005-10-22
  - Regenerative valve operation check . . . 9005-10-23
  - Up, arm in, and bucket combined function check. 9005-10-22
- Boom down shockless valve
  - Operation 9025-05-15
- Boom flow rate solenoid valve
  - Test and adjustment 9025-25-28
- Boom light switch
  - Remove and install 9015-20-115
- Boom mode
  - Relief valve test and adjustment 9025-25-42
- Boom mode solenoid valve
  - Test and adjustment 9025-25-24
- Boom mode switch
  - Remove and install 9015-20-117
- Boom reduced leakage valve
  - Operation 9025-05-83
- Boom regenerative valve
  - Operation 9025-05-77
- Bucket
  - Cylinder drift test 9025-25-67

Page

Bucket regenerative valve
  Operation 9025-05-81
  Operational check 9005-10-24

C

Cab
  Rear cover remove and install 9015-20-108
Cab Guarding 9000-01-3
Cab harness (W1)
  Component location 9015-10-22
  Wiring diagram 9015-10-24
Cab switch harness (W10)
  Component location 9015-10-65
  Wiring diagram 9015-10-66
CAN bus terminator
  Check 9015-20-105
Center joint
  Operation 9025-05-104
Charging circuit
  Theory of operation. 9015-15-3
Check
  Serpentine belt tension 9010-25-1
Check and adjust
  Engine valve lash 9010-25-4
  Injection pump timing 9010-25-2
Check valves
  Control valve, identification and
    operation 9025-05-62
Chemical products
  Handling 9000-01-6
Cinch connector
  Install contact 9015-20-128, 9015-20-129
Cinch connector (32 and 48 Way)
  Repair. 9015-20-129
Cinch connectors
  Replace Connector 9015-20-126
Circuit
  Windshield wiper and washer, theory of
    operation 9015-15-37
Circuit relief valve
  Operation 9025-05-72
  Test and adjustment 9025-25-37
Component location
  Air conditioner. 9031-15-8
  Air conditioner harness (W6). 9015-10-50
  Auxiliary fuse box harness (W9) 9015-10-62
  Cab harness (W1). 9015-10-22
  Cab swtich harness (W10) 9015-10-65
  Control valve harness (W7). 9015-10-54

Page

  Electrical, GlobalTRACS® terminal (GTT) harness
    (W51) 9015-10-82
  Electrical, JDLink™ CAN harness
    (W52) 9015-10-82
  Electrical, JDLink™ jumper harness
    (W54) 9015-10-82
  Electrical, JDLink™ power harness
    (W53) 9015-10-82
  Electrical, machine information gateway (MIG)
    harness (W50). 9015-10-82
  Engine 9010-05-1
  Engine harness (W4) 9015-10-42
  Engine interface harness (W5) 9015-10-46
Component Location
  Fan drive system 9025-15-86
Component location
  Heated air seat harness (W12) 9015-10-70
  Heater. 9031-15-8
  Hydraulic system. 9025-15-90
  Information 9015-05-1
  Machine harness (W2) 9015-10-30
  Master legend .9015-10-6
  Monitor harness (W3) 9015-10-38
  Multi-function pilot control lever harness
    (W14) 9015-10-76
  Pilot control valve-to-pilot signal manifold—
    backhoe pattern. 9025-15-78
  Pilot control valve-to-pilot signal manifold—
    excavator pattern 9025-15-76
  Pilot shutoff switch harness (W11) 9015-10-67
  Pilot shutoff vlave harness (W17) 9015-10-81
  Pump harness (W8) 9015-10-58
  Reversing fan switch harness (W16). . .9015-10-80
  Seat heater switch harness (W13) 9015-10-72
  Travel alarm cancel switch harness
    (W15) 9015-10-79
Component Location
  Travel hydraulic system 9025-15-82
Compressor
  Air conditioner, belt check and
    adjustment. .9031-25-6
Compressor clutch
  Air conditioner, test 9031-25-5
Connection Procedure
  JDLink™ 9015-20-8
Control area network (CAN)
  Theory of operation. 9015-15-1
Control data: initialize
  Information controller (ICF) 9015-20-78
Control lever
  Pattern conversion 9025-15-71

Page

Control valve
  Check valves identification and
    operation 9025-05-62
  Line identification 9025-15-66
  Operation 9025-05-48
  Pilot operation. 9025-05-26
  Pilot, operation 9025-05-10, 9025-05-12
  Schematic, hydraulic. 9025-15-94
Control valve harness (W7)
  Component location 9015-10-54
  Wiring diagram 9015-10-56
Control valve lift check valve
  Operational check. 9005-10-22
Cooling fan circuit
  Diagnostics 9025-15-10
Cooling system operation
  Engine 9010-05-8
Counterweight
  Removal cylinder 9025-05-110
Counterweight circuit
  Diagnose malfunctions 9025-15-58
Cover
  Cab rear, remove and install. 9015-20-108
Crossover relief valve
  Swing motor, test and adjustment 9025-25-52
Cumulative operating hour list
  Information controller (ICF) 9015-20-87
Cycle times check
  Operational check. 9005-10-27
Cylinder
  Boom, arm, and bucket, operation . . .9025-05-109
Cylinder drift
  Test, arm, boom, and bucket 9025-25-67

D

Daily report data list
  Information controller (ICF) 9015-20-87
Data download
  Information controller (ICF) 9015-20-82
Date and time
  Information controller (ICF) 9015-20-75
Diagnostic application
  Tech 2 diagnostic scan tool, Data
    display. 9015-20-24
Diagnostic connection
  Service ADVISOR. 9015-20-11
Diagnostic trouble code
  Check, air conditioner and heater 9031-15-7
Diagnostic trouble codes
  Display and clear trouble codes 9005-10-1
  Reading with Dr. ZX 9015-20-30
  Reading, monitor display. . . .9015-20-3, 9015-20-5
  Reading, Service ADVISOR 9015-20-12
Diagnostic Trouble Codes
  Service ADVISOR. 9015-20-10
Diagnostic trouble codes
  Trouble codes check. 9005-10-1
Diagnostics
  Auto lubrication system malfunctions . .9025-15-61
  Auto-Idle Does Not Work 9010-15-13
  Counterweight circuit malfunctions 9025-15-58
  Dig circuit malfunctions 9025-15-16
  Hydraulic function speed too fast 9025-15-7
  Hydraulic oil overheats 9025-15-8
  Observable
    Engine emits excessive black or gray exhaust
      smoke 9010-15-22
  Pilot circuit malfunctions 9025-15-11
  Slow Hydraulics 9025-15-3
  Swing circuit malfunctions. 9025-15-31
  Travel circuit malfunctions. 9025-15-37
  Undercarriage components
    malfunctions .9020-15-1
  White Exhaust Smoke. 9010-15-20
Dig circuit
  Diagnose malfunctions 9025-15-16
Dig function drift
  Operational check. 9005-10-20
Digital pressure/temperature analyzer
  Installation. 9025-25-2
Digital thermometer installation. 9025-25-1
Diode
  Check 9015-20-104
Display
  Monitor, remove and install. 9015-20-111
Download injector ID code
  Tech 2 9010-25-40
Dr. ZX
  Password change 9015-20-60
  Personal digital assistant (PDA) connection to
    excavator. .9015-20-27
  Reading diagnostic trouble codes 9015-20-30
Driving metal pins. 9000-01-14

E

E (economy) mode
  Operational check. 9005-10-12
ECM
  Remove and install 9015-20-110

Page

Economy mode
  Mode economy 9010-05-19
Electrical
  Monitor data items 9015-20-1
  Schematic, wiring diagram, and component location information 9015-05-1
  Spring wire retainer connector 9015-20-118
  Tab retainer connector 9015-20-117
Electrical Component
  Checks 9015-20-100
Electrical component
  Master legend 9015-10-6
Electrical diagnostic procedures
  Key switch check 9015-20-100
Electrical schematic 9015-10-12
Emergency preparation 9000-01-6
Engine
  Component location 9010-05-1
  Compression pressure test 9010-25-7
  Cooling system operation 9010-05-8
  Fuel system operation. 9010-05-4
  Isuzu AH-6WG1XYSA-01 9010-15-1
  Lubrication system operation. 9010-05-9
  Oil pressure test 9010-25-15
  Power test using turbocharger boost pressure 9010-25-11
  Speed control system 9010-05-19
  Turbocharger operation. 9010-05-13
Engine control
  Theory of operation. 9015-15-18
Engine control module
  Remove and install 9015-20-110
Engine control module circuit
  Theory of operation. 9015-15-14
Engine controller (ECM)
  Diagnostics using Dr. ZX. 9015-20-50
Engine Emits
  Excessive White Exhaust Smoke 9010-15-20
Engine emits excessive black or gray exhaust smoke. 9010-15-22
Engine fluid level switch
  Remove and install 9015-20-117
Engine harness (W4)
  Component location 9015-10-42
  Wiring diagram 9015-10-44
Engine intake
  Exhaust system. 9010-05-12
Engine interface harness (W5)
  Component location 9015-10-46
  Wiring diagram 9015-10-48
Engine malfunctions
  Diagnose. 9010-15-1

Page

Engine oil level / coolant level switch
  Operational check. 9005-10-8
Engine preheat circuit
  Theory of operation. 9015-15-6
Engine speed dial
  Operational check. 9005-10-12
  Remove and install 9015-20-115
Engine valve lash
  Check and adjust 9010-25-4
Exhaust fumes 9000-01-4
Exhaust gas recirculation
  Operation 9010-05-16
Exhaust Smoke
  Black. 9010-15-22
  Gray 9010-15-22
Exhaust system
  Engine intake
    Operation 9010-05-12
Explosion
  Battery 9000-01-5

F

Fan drive
  Pump regulator operation 9025-05-38
  Schematic, hydraulic. 9025-15-94
  System relief valve test and adjustment. 9025-25-74
Fan drive hydraulic system
  Diagnose malfunctions 9025-15-10
Fan drive pump
  Flow test. 9025-25-82
  Torque control test and adjustment. . . .9025-25-80
Fan Drive System
  Component location 9025-15-86
Filter
  Pilot, operation .9025-05-6
  Return, operation 9025-05-111
Fire prevention 9000-01-5
Flow rate circuit
  Arm 2, operation 9025-05-94
Frequency distribution list
  Information controller (ICF) 9015-20-87
Fuel gauge
  Operational check. 9005-10-3
Fuel system
  Component location 9010-05-4
  Fuel injector operation. 9010-05-4
  Operation 9010-05-4
Fuse
  Specifications .9015-10-2

Page

Fusible link
  Check 9015-20-101

G

Gearbox
  Swing, operation 9025-05-98
  Travel, operation 9020-05-2
GlobalTRACS® terminal (GTT) harness (W51)
  Component location 9015-10-82
  Wiring diagram 9015-10-86
Glow plug preheat circuit
  Theory of operation. 9015-15-6
Glow plug relay
  Check 9015-20-103

H

Handhold use 9000-01-7
Hazards
  Avoiding 9000-01-9
Heated air seat harness (W12)
  Component location 9015-10-70
  Wiring diagram 9015-10-71
Heated seat switch
  Remove and install 9015-20-117
Heater
  Component location 9031-15-8
  Diagnostic trouble code check 9031-15-7
  Operational checks 9031-25-2
Heater and air conditioner
  Controls check 9005-10-29
Heater and air conditioning
  Circuit check .9005-10-28
Heating
  Remove paint .9000-01-13
Heating system
  Diagnose malfunctions 9031-15-5
High power mode
  Mode high power 9010-05-19
High-pressure oils
  Avoid 9000-01-4
Horn circuit
  Operational check 9005-10-2
Hoses and tubing inspection
  Air conditioning 9031-25-6
Hour meter
  Operational check 9005-10-3
HP (high power) mode
  Operational check 9005-10-13

Page

Hydraulic oil
  Cleanup procedure using portable filter
    caddy 9025-25-3
  Overheats 9025-15-8
  Warmup procedure 9025-25-4
Hydraulic oil tank pressurization
  Operational check 9005-10-17
Hydraulic schematic
  Control valve. .9025-15-94
  Counterweight removal hydraulic system
    schematic 9025-15-94
  Fan drive. 9025-15-94
  Load lowering control valves
    schematic 9025-15-94
  Pilot control valve—backhoe control
    pattern. 9025-15-94
  Pilot control valve—excavator control
    pattern. 9025-15-94
  Pilot signal manifold—backhoe control
    pattern. 9025-15-94
  Pilot signal manifold—excavator control
    pattern. 9025-15-94
  Pump and regulator 9025-15-94
  Swing motor 9025-15-94
  Travel motor 9025-15-94
Hydraulic system
  Component location 9025-15-90
  Diagnose malfunctions 9025-15-3
  Line connections. 9025-15-92
  Schematic, hydraulic. 9025-15-94

I

Idle speed up control
  Control idle speed up 9010-05-19
Information controller (ICF)
  Control data: initialize 9015-20-78
  Cumulative operating hour list. 9015-20-87
  Daily report data list 9015-20-87
  Data download 9015-20-82
  Date and time .9015-20-75
  Frequency distribution list 9015-20-87
  Initialization. .9015-20-67
  Model and serial number 9015-20-71
  Recorded data 9015-20-87
Information controller (ICF) circuit
  Theory of operation. 9015-15-33
Initialization
  Information controller (ICF) 9015-20-67
Injection pump timing
  Check and adjust 9010-25-2

Page

Injector balance test (injector misfire test)
  Tech 2 9010-25-19
Inspect machine 9000-01-3

J

JDLink™ CAN harness (W52)
  Component location 9015-10-82
  Wiring diagram 9015-10-88
JDLink™ jumper harness (W54)
  Component location 9015-10-82
  Wiring diagram 9015-10-92
JDLink™ power harness (W53)
  Component location 9015-10-82
  Wiring diagram 9015-10-90
JDLink™ system
  Component location 9015-10-82
  Connection procedure. 9015-20-8
  Functional schematic 9015-10-20
  GlobalTRACS® terminal (GTT) harness (W51)
    wiring diagram. 9015-10-86
  JDLink™ CAN harness (W52) wiring
    diagram. 9015-10-88
  JDLink™ jumper harness (W54) wiring
    diagram. 9015-10-92
  JDLink™ power harness (W53) wiring
    diagram. 9015-10-90
  Machine information gateway (MIG) harness (W50)
    wiring diagram. 9015-10-84
JT02156A digital pressure/temperature analyzer
  Installation. 9025-25-2
JT05800 digital thermometer installation. . .9025-25-1

K

Key switch
  Check 9015-20-100
  Switch off, engine off, checks 9005-10-2
  Switch on, engine off, check 9005-10-3
  Switch on, engine on, checks 9005-10-8

L

Left console switch
  Remove and install 9015-20-117
Legend
  Master, system functional schematic, wiring
    diagram, and component location 9015-10-6

Page

Lifting objects
  Special care 9000-01-11
Light circuit
  Operational check. 9005-10-6
Line connection
  Pilot signal manifold-to-control valve . . .9025-15-80
Line Connection
  Travel hydraulic system 9025-15-84
Line connections
  Hydraulic system. 9025-15-92
Line identification
  Control valve. .9025-15-66
  Swing motor 9025-15-70
Load dump circuit
  Theory of operation. 9015-15-3
Lubrication system operation
  Engine 9010-05-9

M

Machine harness (W2)
  Component location 9015-10-30
  Wiring diagram 9015-10-32
Machine information center (MIC)
  application. 9015-20-66
Machine information gateway (MIG) harness (W50)
  Component location 9015-10-82
  Wiring diagram 9015-10-84
Machine inspection. 9000-01-3
Machine modifications
  Avoid 9000-01-2
Machine Movement
  Unintended 9000-01-8
Machine tip over
  Avoiding 9000-01-10
Main controller
  Theory of operation. 9015-15-18
Main controller (MCF)
  Diagnostics using Dr. ZX. 9015-20-33
Main relief
  Power digging valve operation 9025-05-66
Main relief valve
  Test and adjustment 9025-25-32
Make-up valve
  Operation 9025-05-73
Malfunctions heating
  Diagnose heating 9031-15-5
Manifold
  Pilot signal, operation 9025-05-15

Page

Master legend
  System functional schematic, wiring diagram, and component location 9015-10-6
Menu operation
  Monitor 9015-16-1
Metal pins. 9000-01-14
Model and serial number
  Information controller (ICF) 9015-20-71
Monitor
  Data items 9015-20-1
  Gauges and battery disconnect relay checks. 9005-10-5
  Menu operation. 9015-16-1
  Monitor and gauge circuit checks 9005-10-9
  Reading diagnostic trouble codes 9015-20-3, 9015-20-5
  Service menu operation 9015-16-1
  Start up check. 9005-10-4
Monitor controller
  Diagnostics using Dr. ZX. 9015-20-55
  Remove and install 9015-20-111
  Theory of operation. 9015-15-8
  Theory of operation, alarm indicators . . .9015-15-8
  Theory of operation, hour meter and gauges 9015-15-8
  Theory of operation, status indicators . . .9015-15-8
Monitor harness (W3)
  Component location 9015-10-38
  Wiring diagram 9015-10-40
Monitor security
  Circuit theory of operation. 9015-15-40
Motor
  Swing crossover relief valve test and adjustment. .9025-25-52
  Swing, line identification 9025-15-70
  Swing, operation 9025-05-99
  Travel, fast speed operation 9025-05-107
  Travel, slow speed operation 9025-05-107
Moving parts
  Safety 9000-01-3
  Servicing. 9000-01-3
Multi-function pilot control lever harness (W14)
  Component location 9015-10-76
  Wiring diagram 9015-10-78

N

No hydraulic function
  Diagnostics 9025-15-1
No hydraulic functions
  Diagnose malfunctions 9025-15-1

Page

O

Operating pressure diagnostic chart
  Air conditioner. 9031-25-7
Operation
  Exhaust gas recirculation 9010-05-16
  Quick On Start System 9010-05-18
Operation qualification 9000-01-1
Operational check
  A/I (auto idle) circuit 9005-10-14
  Arm regenerative valve 9005-10-23
  Boom mode switch 9005-10-22
  Boom regenerative valve 9005-10-23
  Boom up, arm in, and bucket combined function 9005-10-22
  Bucket regenerative valve. 9005-10-24
  Control valve lift check valve. 9005-10-22
  Cycle times check. 9005-10-27
  Diagnostic trouble codes. 9005-10-1
  Dig function drift 9005-10-20
  Display and clear trouble codes 9005-10-1
  Dynamic braking 9005-10-17
  E (economy) mode 9005-10-12
  Engine oil level / coolant level switch . . .9005-10-8
  Engine speed dial 9005-10-12
  Fuel gauge 9005-10-3
  Heater and air conditioner controls 9005-10-29
  Heater and air conditioning circuit. 9005-10-28
  Horn circuit 9005-10-2
  Hour meter 9005-10-3
  HP (high power) mode 9005-10-13
  Hydraulic oil tank pressurization 9005-10-17
  Key switch off, engine off 9005-10-2
  Key switch on, engine off 9005-10-3
  Key switch on, engine on 9005-10-8
  Light circuit 9005-10-6
  Monitor and gauge circuit 9005-10-9
  Monitor start up. 9005-10-4
  Monitor, gauges, and battery disconnect relay 9005-10-5
  Pilot shutoff circuit. 9005-10-10
  Reversing cooling fan switch. 9005-10-11
  Swing park brake and circuit drift 9005-10-18
  Swing power .9005-10-19
  Swing priority circuit 9005-10-21
  Travel alarm .9005-10-15
  Travel alarm cancel switch circuit 9005-10-16
  Travel lever and pedal neutral checks. . .9005-10-6
  Travel speed selection 9005-10-24
  Travel system maneuverability 9005-10-26
  Travel system tracking 9005-10-25
  Travel system tracking while operating a dig function 9005-10-25

Page

Windshield washer circuit 9005-10-7
Windshield wiper controls 9005-10-7
Operator’s seat
Starting machine 9000-01-7

P

Park brake
Swing motor, release operation. 9025-05-103
Password change
Dr. ZX. 9015-20-60
Pattern conversion
Control 9025-15-71
Personal digital assistant (PDA) connection to excavator using dr. zx. 9015-20-27
Pilot
System diagram and operation 9025-05-4
Pilot circuit
Diagnose malfunctions 9025-15-11
Pilot control
Operation 9025-05-10
Pilot control valve
Schematic, hydraulic—backhoe control pattern. 9025-15-94
Schematic, hydraulic—excavator control pattern. 9025-15-94
Travel operation 9025-05-12
Pilot filter
Operation 9025-05-6
Pilot pressure regulating valve
Operation 9025-05-6
Test and adjustment 9025-25-7
Pilot shutoff
Circuit theory of operation. 9015-15-40
Pilot shutoff circuit
Operational check 9005-10-10
Pilot Shutoff Lever 9000-01-8
Pilot shutoff solenoid valve
Operation 9025-05-7
Pilot shutoff switch harness
Check 9015-20-105
Pilot shutoff switch harness (W11)
Component location 9015-10-67
Wiring diagram 9015-10-68
Pilot shutoff valve harness (W17)
Component location 9015-10-81
Wiring diagram 9015-10-81
Pilot signal manifold
Operation 9025-05-15
Port identification 9025-05-15

Page

Schematic, hydraulic—backhoe control pattern. 9025-15-94
Schematic, hydraulic—excavator control pattern. 9025-15-94
Portable filter caddy
Hydraulic oil cleanup procedure 9025-25-3
Power dig solenoid valve
Test and adjustment 9025-25-14
Power digging
Main relief valve operation 9025-05-66
Power digging valve
Test and adjustment 9025-25-32
Power mode
Mode power .9010-05-19
Power mode switch
Remove and install 9015-20-115
Preheat circuit, engine
Theory of operation. 9015-15-6
Prevent unintended detonation of explosive devices 9000-01-11
Propel motor
Leakage test .9025-25-64
Protective equipment 9000-01-2
Pump
Fan drive regulator operation 9025-05-38
Fan drive, flow test 9025-25-82
Fan drive, operation 9025-05-30
Fan drive, torque control test and adjustment. 9025-25-80
Flow rate (displacement) test and adjustment. 9025-25-51, 9025-25-79
Flow test 9025-25-69
Line identification 9025-15-65
Servo piston maximum flow test and adjustment. 9025-25-48
Servo piston minimum flow test and adjustment. 9025-25-46
1 and 2, operation. 9025-05-30
Pump and regulator
Schematic, hydraulic 9025-15-94
Pump control
Theory of operation. 9015-15-18
Pump flow rate pilot valve
Operation 9025-05-15
Pump harness (W8)
Component location 9015-10-58
Wiring diagram 9015-10-60
Pump 1 and 2
Regulator operation. 9025-05-34

Q

Quick On Start System
Operation 9010-05-18

Page

Quick on time (QOS) circuit
  Theory of operation. 9015-15-6

R

Reading diagnostic trouble codes
  Service ADVISOR. 9015-20-12
  Tech 2 diagnostic scan tool 9015-20-22
  Using Dr. ZX. .9015-20-30
Rear cover
  Remove and install 9015-20-108
Recorded data
  Information controller (ICF) 9015-20-87
Refrigerant cautions and proper handling
  Air conditioning .9031-25-1
Registration injector ID code
  Tech 2 9010-25-27
Regulator
  Fan drive pump, operation 9025-05-38
  Pump 1 and 2, operation. 9025-05-34
Relay
  Battery, check. 9015-20-101
  Specifications .9015-10-2
  Test 9015-20-94
Relief
  Main and power digging operation 9025-05-66
Return filter
  Operation 9025-05-111
Reversing cooling fan switch
  Operational check. 9005-10-11
Reversing fan switch
  Remove and install 9015-20-117
Reversing fan switch harness (W16)
  Component location 9015-10-80
  Wiring diagram 9015-10-80
Riding machine. 9000-01-9
R134a air conditioning
  System test. 9031-25-4

S

Safety equipment .9000-01-2
Safety information
  Recognizing 9000-01-1
Safety instructions 9000-01-1
Safety symbols. 9000-01-1
Schematic
  Electrical, JDLink™ system
    functional. .9015-10-20
  Electrical, system functional 9015-10-12

Page

  Information 9015-05-1
Seat belt
  Use and maintenance 9000-01-7
Seat heater switch harness (W13)
  Component location 9015-10-72
  Wiring diagram 9015-10-74
Serpentine belt
  Tensioner check 9010-25-1
Service ADVISOR
  Connection procedure. 9015-20-11
  Overview. 9015-20-10
  Reading diagnostic trouble codes 9015-20-12
Service menu operation
  Monitor 9015-16-1
Servicing machine safely 9000-01-12
Servo piston
  Fan Drive Pump minimum flow test and
    adjustment. 9025-25-77, 9025-25-78
  Pump maximum flow test and
    adjustment. .9025-25-48
  Pump minimum flow test and
    adjustment. .9025-25-46
Shuttle valve
  Operation 9025-05-15
Solenoid valve
  Boom flow rate, test and adjustment . . .9025-25-28
  Boom mode, test and adjustment 9025-25-24
  Power dig, test and adjustment. 9025-25-14
  Travel speed, test and adjustment 9025-25-19
Speed control system
  Engine 9010-05-19
Spool
  Valve, actuating pilot pressure test 9025-25-11
Starter protection relay
  Check 9015-20-102
Starting circuit
  Theory of operation. 9015-15-3
Starting machine .9000-01-7
Steps use. 9000-01-7
Swing
  Dynamic braking check. 9005-10-17
  Park brake and circuit drift check 9005-10-18
  Power check .9005-10-19
  Priority circuit check 9005-10-21
Swing bearing
  Measure wear. .9020-15-6
Swing circuit
  Diagnose malfunctions 9025-15-31
Swing gearbox
  Operation 9025-05-98
Swing motor
  Crossover relief valve test and
    adjustment. .9025-25-52

Page

Line identification 9025-15-70
Operation 9025-05-99
Park brake release operation 9025-05-103
Schematic, hydraulic. 9025-15-94
Swing park brake release pilot valve
Operation 9025-05-15
Switch
Air filter restriction indicator test 9010-25-8
Switch panel
Remove and install 9015-20-115
System
Pilot, diagram and operation 9025-05-4
System cycle of operation
Air conditioning .9031-05-1
System functional schematic 9015-10-12
Information 9015-05-1
Master legend. .9015-10-6
System relief valve
Fan drive, test and adjustment 9025-25-74

T

Tech 2
EGR regulating valve test 9010-25-24
Injector balance test (injector misfire test). 9010-25-19
Injector force drive test 9010-25-22
Injector ID code download. 9010-25-40
Injector ID code plate 9010-25-30
Injector ID code registration 9010-25-27
Injector ID code upload. 9010-25-36
Injector ID code upload completed . . . 9010-25-39, 9010-25-44
Programming failed. 9010-25-44
Q adjust injector code label. 9010-25-30
Rail pressure control test 9010-25-16
Upload failed. .9010-25-39
Tech 2 diagnostic scan tool
Connection procedure. 9015-20-15
Diagnostic application, Data display . . .9015-20-24
Reading diagnostic trouble codes 9015-20-22
Test
Air filter restriction indicator switch 9010-25-8
Air intake system leakage 9010-25-9
EGR regulating valve 9010-25-24
Engine compression pressure. 9010-25-7
Engine oil pressure 9010-25-15
Engine power using turbocharger boost pressure 9010-25-11
Injector force drive 9010-25-22
Rail pressure control. 9010-25-16

Page

Relay 9015-20-94
Theory of operation
Charging circuit. 9015-15-3
Control area network (CAN) 9015-15-1
Engine control. 9015-15-18
Engine control module 9015-15-14
Engine control module, engine stop . . .9015-15-14
Engine control module, exhaust gas recirculation (EGR) 9015-15-14
Engine control module, fuel injection. . .9015-15-14
Engine control module, preheat 9015-15-14
Engine preheat circuit 9015-15-6
Information controller (ICF) circuit 9015-15-33
Load dump circuit 9015-15-3
Main controller 9015-15-18
Misc MCF system controls 9015-15-18
Monitor controller circuit 9015-15-8
Monitor controller, alarm indicators 9015-15-8
Monitor controller, hour meter and gauges 9015-15-8
Monitor controller, status indicators. 9015-15-8
Monitor secuity circuit 9015-15-40
Pilot shutoff circuit. 9015-15-40
Pump control. 9015-15-18
Starting circuit. 9015-15-3
Travel alarm circuit 9015-15-35
Valve control. 9015-15-18
Windshield wiper and washer circuit . . .9015-15-37
Thermometer installation, digital 9025-25-1
Tip over
Avoiding 9000-01-10
Track
Adjuster and recoil spring operation 9020-05-1
Track adjuster and recoil spring
Operation 9020-05-1
Travel
Alarm cancel switch circuit check 9005-10-16
Alarm check .9005-10-15
Lever and pedal neutral checks 9005-10-6
Motor, operation 9025-05-105
Speed selection check 9005-10-24
System maneuverability check 9005-10-26
System tracking check 9005-10-25
System tracking checks while operating a dig function 9005-10-25
Travel alarm
Check 9015-20-104
Remove and install 9015-20-116
Travel alarm cancel switch
Remove and install 9015-20-117
Travel alarm cancel switch harness (W15)
Component location 9015-10-79
Wiring diagram 9015-10-79

Page

Travel alarm circuit
  Theory of operation. 9015-15-35
Travel circuit
  Diagnose malfunctions 9025-15-37
Travel flow combiner pilot valve
  Operation 9025-05-15
Travel flow combiner valve
  Operation 9025-05-74
Travel gearbox
  Operation 9020-05-2
Travel high power mode
  Mode travel high power. 9010-05-19
Travel Hydraulic System
  Component location 9025-15-82
  Line connection. 9025-15-84
Travel motor
  Fast speed operation 9025-05-107
  Operation 9025-05-105
  Schematic, hydraulic. 9025-15-94
  Slow speed operation 9025-05-107
Travel pilot control valve
  Operation 9025-05-12
Travel speed solenoid valve
  Test and adjustment 9025-25-19
Travel speed switch
  Remove and install 9015-20-115
Turbocharger operation
  Engine 9010-05-13

U

Undercarriage
  Diagnose components malfunctions 9020-15-1
Upload injector ID code
  Tech 2 9010-25-36

V

Valve
  Anticavitation operation. 9025-05-72
  Arm reduced leakage, operation 9025-05-83
  Arm regenerative, operation 9025-05-79
  Boom flow rate solenoid test and
    adjustment. 9025-25-28
  Boom mode relief test and
    adjustment. 9025-25-42
  Boom mode solenoid test and
    adjustment. 9025-25-24
  Boom reduced leakage, operation. 9025-05-83
  Boom regenerative, operation 9025-05-77
  Bucket regenerative, operation 9025-05-81
  Circuit relief operation 9025-05-72
  Circuit relief test and adjustment 9025-25-37
  Control, line identification 9025-15-66
  Control, operation 9025-05-48
  Fan drive system relief test and
    adjustment. 9025-25-74
  Main relief and power digging, test and
    adjustment. 9025-25-32
  Make-up, operation 9025-05-73
  Pilot control valve-to-pilot signal manifold
    component location—backhoe
    pattern 9025-15-78
  Pilot control valve-to-pilot signal manifold
    component location—excavator
    pattern 9025-15-76
  Pilot operation of control 9025-05-26
  Pilot pressure regulating, operation. 9025-05-6
  Pilot pressure regulating, test and
    adjustment. .9025-25-7
  Pilot shutoff solenoid, operation 9025-05-7
  Pilot signal manifold-to-control valve line
    connection .9025-15-80
  Power dig solenoid test and
    adjustment. 9025-25-14
  Swing motor crossover relief, test and
    adjustment. 9025-25-52
  Travel flow combiner, operation 9025-05-74
  Travel speed solenoid test and
    adjustment. 9025-25-19
Valve control
  Theory of operation. 9015-15-18
Valve spool
  Actuating pilot pressure test 9025-25-11
Voltage
  Battery, check. 9015-20-101

W

Warm-up circuit
  Operation 9025-05-15
Warmup procedure
  Hydraulic oil 9025-25-4
Waste disposal. .9000-01-6
Welding
  Remove paint 9000-01-13
Welding repairs 9000-01-13
Windshield
  Washer circuit check. 9005-10-7
  Wiper controls check. 9005-10-7

Page

Windshield washer switch
  Remove and install 9015-20-115
Windshield wiper and washer circuit
  Theory of operation. 9015-15-37
Windshield wiper switch
  Remove and install 9015-20-115
Wire markings 9015-10-1
Wiring diagram
  Air conditioner harness (W6). 9015-10-52
  Auxiliary fuse box harness (W9) 9015-10-64
  Cab harness (W1). 9015-10-24
  Cab switch harness (W10) 9015-10-66
  Control valve harness (W7). 9015-10-56
  Engine harness (W4) 9015-10-44
  Engine interface harness (W5) 9015-10-48
  GlobalTRACS® terminal (GTT) harness
    (W51) 9015-10-86
  Heated air seat harness (W12) 9015-10-71
  Information 9015-05-1
  JDLink™ CAN harness (W52) 9015-10-88
  JDLink™ jumper harness (W54) 9015-10-92
  JDLink™ power harness (W53) 9015-10-90
  Machine harness (W2) 9015-10-32
  Machine information gateway (MIG) harness
    (W50) 9015-10-84
  Master legend. 9015-10-6
  Monitor harness (W3) 9015-10-40
  Multi-function pilot control lever harness
    (W14) 9015-10-78
  Pilot shutoff switch harness (W11) 9015-10-68
  Pilot shutoff valve harness (W17) 9015-10-81
  Pump harness (W8) 9015-10-60
  Reversing fan switch harness (W16). . . 9015-10-80
  Seat heater switch harness (W13) 9015-10-74
  Travel alarm cancel switch harness
    (W15) 9015-10-79
Work light switch
  Remove and install 9015-20-115
Work site hazards
  Avoid 9000-01-9