

PART NO. W4GD-E-00

HITACHI

ZW180 WHEEL LOADER WORKSHOP MANUAL

Workshop Manual

ZW 180 Wheel Loader

 **Hitachi Construction Machinery**

URL:<http://www.hitachi-c-m.com>

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Service Manual consists of the following separate Part No.
Technical Manual (Operational Principle) : Vol. No.TO4GD-E
Technical Manual (Troubleshooting) : Vol. No.TT4GD-E
Workshop Manual : Vol. No.W4GD-E

INTRODUCTION

TO THE READER

- This manual is written for an experienced technician to provide technical information needed to maintain and repair this machine.
- Be sure to thoroughly read this manual for correct product information and service procedures.
- If you have any questions or comments, at if you found any errors regarding the contents of this manual, please contact using "Service Manual Revision Request Form" at the end of this manual.
(Note: Do not tear off the form. Copy it for usage.)
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ADDITIONAL REFERENCES

- Please refer to the materials listed below in addition to this manual.
 - The Operator's Manual
 - The Parts Catalog
 - The Engine Manual
 - Parts Catalog of the Engine
 - Hitachi Training Material

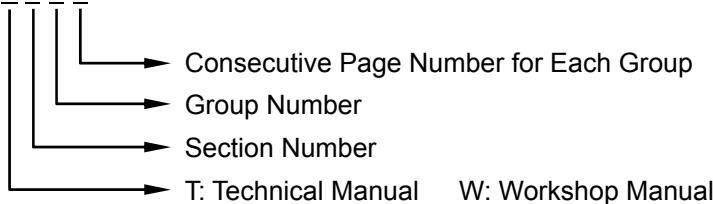
MANUAL COMPOSITION

- This manual consists of three portions: the Technical Manual (Operational Principle), the Technical Manual (Troubleshooting) and the Workshop Manual.
- Information included in the Technical Manual (Operational Principle):
technical information needed for redelivery and delivery, operation and activation of all devices and systems.
- Information included in the Technical Manual (Troubleshooting):
technical information needed for operational performance tests, and troubleshooting procedures.
- Information included in the Workshop Manual:
technical information needed for maintenance and repair of the machine, tools and devices needed for maintenance and repair, maintenance standards, and removal/installation and assemble/disassemble procedures.

PAGE NUMBER

- Each page has a number, located on the center lower part of the page, and each number contains the following information:


Example : T 1-3-5



INTRODUCTION


SAFETY ALERT SYMBOL AND HEADLINE NOTATIONS

In this manual, the following safety alert symbol and signal words are used to alert the reader to the potential for personal injury or machine damage.


 This is the safety alert symbol. When you see this symbol, be alert to the potential for personal injury. Never fail to follow the safety instructions prescribed along with the safety alert symbol.

The safety alert symbol is also used to draw attention to component/part weights.

To avoid injury and damage, be sure to use appropriate lifting techniques and equipment when lifting heavy parts.

-  **CAUTION:**
Indicated potentially hazardous situation which could, if not avoided, result in personal injury or death.

- **IMPORTANT:**
Indicates a situation which, if not conformed to the instructions, could result in damage to the machine.

-  **NOTE:**
Indicates supplementary technical information or know-how.

UNITS USED

- SI Units (International System of Units) are used in this manual. MKSA system units and English units are also indicated in parentheses just behind SI units.

Example : 24.5 MPa (250 kgf/cm², 3560 psi)

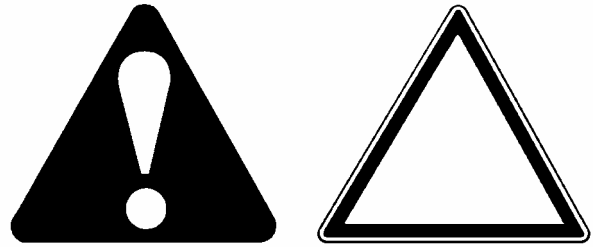
A table for conversion from SI units to other system units is shown below for reference purposes.

Quantity	To Convert From	Into	Multiply By	Quantity	To Convert From	Into	Multiply By
Length	mm	in	0.03937	Pressure	MPa	kgf/cm ²	10.197
	mm	ft	0.003281		MPa	psi	145.0
Volume	L	US gal	0.2642	Power	kW	PS	1.360
	L	US qt	1.057		kW	HP	1.341
	m ³	yd ³	1.308	Temperature	°C	°F	°C×1.8+32
Weight	kg	lb	2.205	Velocity	km/h	mph	0.6214
Force	N	kgf	0.10197		min ⁻¹	rpm	1.0
	N	lbf	0.2248	Flow rate	L/min	US gpm	0.2642
Torque	N·m	kgf·m	1.0197		mL/rev	cc/rev	1.0
	N·m	lbf·ft	0.7375				

SAFETY

RECOGNIZE SAFETY INFORMATION


- These are the **SAFETY ALERT SYMBOLS**.
 - When you see these symbols on your machine or in operator`s manual, be alert to the potential for personal injury.
 - Follow recommended precautions and safe operating practices.



001-E01A-0001

SA-688

UNDERSTAND SIGNAL WORDS

- On machine safety signs, signal words designating the degree or level of hazard - **DANGER**, **WARNING**, or **CAUTION** - are used with the safety alert symbol.
 - **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 - **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 - **CAUTION** indicates a potentially hazardous situation
 - which, if not avoided, may result in minor or moderate injury.
 - **DANGER** or **WARNING** safety signs are located near specific hazards. General precautions are listed on **CAUTION** safety signs.
 - Some safety signs don't use any of the designated signal words above after the safety alert symbol are occasionally used on this machine.
- To avoid confusing machine protection with personal safety messages, a signal word **IMPORTANT** indicates a situation which, if not avoided, could result in damage to the machine.
-  **NOTE** indicates an additional explanation for an element of information.



SA-1223

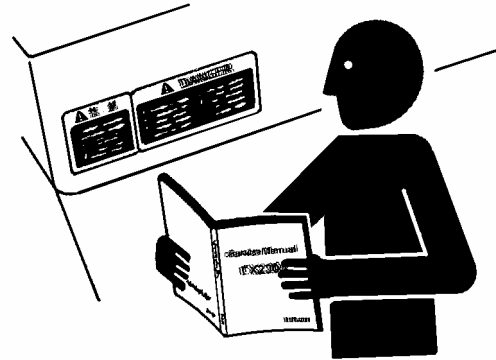
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SAFETY

FOLLOW SAFETY INSTRUCTIONS

- Carefully read and follow all safety signs on the machine and all safety messages in operator's manual.
- Safety signs should be installed, maintained and replaced when necessary.
 - If a safety sign or operator's manual is damaged or missing, order a replacement from your authorized dealer in the same way you order other replacement parts (be sure to state machine model and serial number when ordering).
- Learn how to operate the machine and its controls correctly and safely.
- Allow only trained, qualified, authorized personnel to operate the machine.
- Keep your machine in proper working condition.
 - Unauthorized modifications of the machine may impair its function and/or safety and affect machine life.
 - Do not modify any machine parts without authorization. Failure to do so may deteriorate the part safety, function, and/or service life. In addition, personal accident, machine trouble, and/or damage to material caused by unauthorized modifications will void Hitachi Warranty Policy.
 - Do not use attachments and/or optional parts or equipment not authorized by Hitachi. Failure to do so may deteriorate the safety, function, and/or service life of the machine. In addition, personal accident, machine trouble, and/or damage to material caused by using unauthorized attachments and/or optional parts or equipment will void Hitachi Warranty Policy.
- The safety messages in this SAFETY chapter are intended to illustrate basic safety procedures of machines. However it is impossible for these safety messages to cover every hazardous situation you may encounter. If you have any questions, you should first consult your supervisor and/or your authorized dealer before operating or performing maintenance work on the machine.

003-E01B-0003



SA-003

PREPARE FOR EMERGENCIES

- Be prepared if a fire starts or if an accident occurs.
 - Keep a first aid kit and fire extinguisher on hand.
 - Thoroughly read and understand the label attached on the fire extinguisher to use it properly.
 - To ensure that a fire-extinguisher can be always used when necessary, check and service the fire-extinguisher at the recommended intervals as specified in the fire-extinguisher manual.
 - Establish emergency procedure guidelines to cope with fires and accidents.
 - Keep emergency numbers for doctors, ambulance service, hospital, and fire department posted near your telephone.



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SA-437

SAFETY

WEAR PROTECTIVE CLOTHING

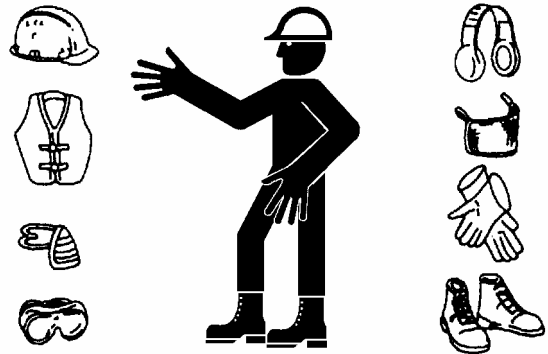
- Wear close fitting clothing and safety equipment appropriate to the job.

You may need:

- A hard hat
- Safety shoes
- Safety glasses, goggles, or face shield
- Heavy gloves
- Hearing protection
- Reflective clothing
- Wet weather gear
- Respirator or filter mask.

Be sure to wear the correct equipment and clothing for the job. Do not take any chances.

- Avoid wearing loose clothing, jewelry, or other items that can catch on control levers or other parts of the machine.
- Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating the machine.



SA-438

005-E01A-0438

PROTECT AGAINST NOISE

- Prolonged exposure to loud noise can cause impairment or loss of hearing.
 - Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortably loud noises.



006-E01A-0434

SA-434

INSPECT MACHINE

- Inspect your machine carefully each day or shift by walking around it before you start it to avoid personal injury.
 - In the walk-around inspection be sure to cover all points described in the “PRE-START INSPECTION” chapter in the operator’s manual.



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SA-435

SAFETY

GENERAL PRECAUTIONS FOR CAB

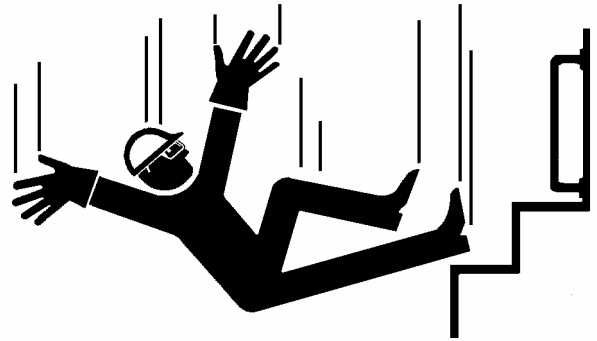
- Before entering the cab, thoroughly remove all dirt and/or oil from the soles of your work boots. If any controls such as a pedal is operated while with dirt and/or oil on the soles of the operator's work boots the operator's foot may slip off the pedal, possibly resulting in a personal accident.
- Do not leave parts and/or tools lying around the operator's seat. Store them in their specified locations.
- Avoid storing transparent bottles in the cab. Do not attach any transparent type window decorations on the windowpanes as they may focus sunlight, possibly starting a fire.
- Refrain from listening to the radio, or using music headphones or mobile telephones in the cab while operating the machine.
- Keep all flammable objects and/or explosives away from the machine.
- After using the ashtray, always cover it to extinguish the match and/or tobacco.
- Do not leave cigarette lighters in the cab. When the temperature in the cab increases, the lighter may explode.

524-E01A-0000

SAFETY

USE HANDHOLDS AND STEPS

- Falling is one of the major causes of personal injury.
 - When you get on and off the machine, always face the machine and maintain a three-point contact with the steps and handrails.
 - Do not use any controls as hand-holds.
 - Never jump on or off the machine. Never mount or dismount a moving machine.
 - Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.



008-E01A-0439

SA-439

ADJUST THE OPERATOR'S SEAT

- A poorly adjusted seat for either the operator or for the work at hand may quickly fatigue the operator leading to misoperations.
 - The seat should be adjusted whenever changing the operator for the machine.
 - The operator should be able to fully depress the pedals and to correctly operate the control levers with his back against the seat back.
 - If not, move the seat forward or backward, and check again.
 - Adjust the rear view mirror position so that the best rear visibility is obtained from the operator's seat. If the mirror is broken, immediately replace it with a new one.



SA-462

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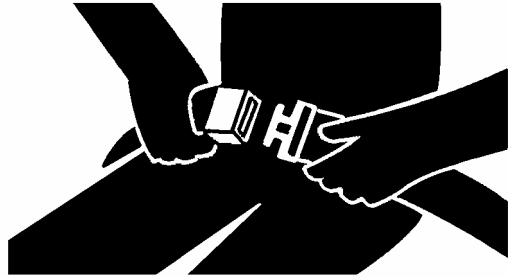
ENSURE SAFETY BEFORE RISING FROM OR LEAVING OPERATOR'S SEAT

- Before rising from the operator's seat to open/close either side window or to adjust the seat position, be sure to first lower the front attachment to the ground and then move the pilot control shut-off lever to the LOCK position. Failure to do so may allow the machine to unexpectedly move when a body part unintentionally comes in contact with a control lever, possibly resulting in serious personal injury or death.
 - Before leaving the machine, be sure to first lower the front attachment to the ground and then move the pilot control shut-off lever to the LOCK position. Turn the key switch OFF to stop the engine.
 - Before leaving the machine, close all windows, doors, and access covers and lock them up.

SAFETY

FASTEN YOUR SEAT BELT

- If the machine should overturn, the operator may become injured and/or thrown from the cab. Additionally the operator may be crushed by the overturning machine, resulting in serious injury or death.
 - Prior to operating the machine, thoroughly examine webbing, buckle and attaching hardware. If any item is damaged or worn, replace the seat belt or component before operating the machine.
 - Be sure to remain seated with the seat belt securely fastened at all times when the machine is in operation to minimize the chance of injury from an accident.
 - We recommend that the seat belt be replaced every three years regardless of its apparent condition.

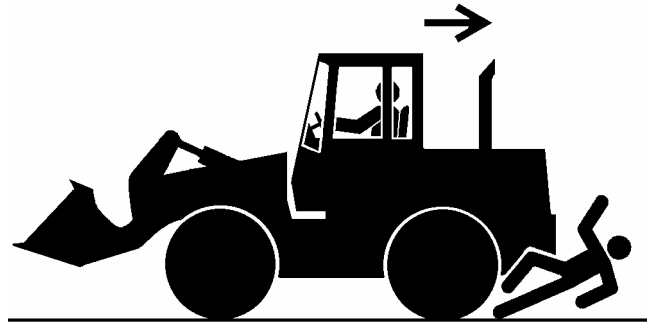


SA-237

010-E01A-0237

MOVE AND OPERATE MACHINE SAFELY

- Bystanders can be run over.
 - Take extra care not to run over bystanders. Confirm the location of bystanders before moving, or operating the machine.
 - Always keep the travel alarm and horn in working condition (if equipped). It warns people when the machine starts to move.
 - Use a signal person when moving, swinging, or operating the machine in congested areas. Coordinate hand signals before starting the machine.
 - Use appropriate illumination. Check that all lights are operable before operating the machine. If any faulty illumination is present, immediately repair it.



SA-398

011-E01A-0398

HANDLE STARTING AIDS SAFELY

Starting fluid:

- Starting fluid is highly flammable.
 - Keep all sparks and flame away when using it.
 - Keep starting fluid well away from batteries and cables.
 - Remove container from machine if engine does not need starting fluid.
 - To prevent accidental discharge when storing a pressurized container, keep the cap on the container, and store it in a cool, well-protected location.
 - Do not incinerate or puncture a starting fluid container.



SA-293

036-E01A-0293-3

SAFETY

OPERATE ONLY FROM OPERATOR'S SEAT

- Inappropriate engine starting procedures may cause the machine to runaway, possibly resulting in serious injury or death.
 - Start the engine only when seated in the operator's seat.
 - NEVER start the engine while standing on the track or on ground.
 - Do not start engine by shorting across starter terminals.
 - Before starting the engine, confirm that all control levers are in neutral.
 - Before starting the engine, confirm the safety around the machine and sound the horn to alert bystanders.

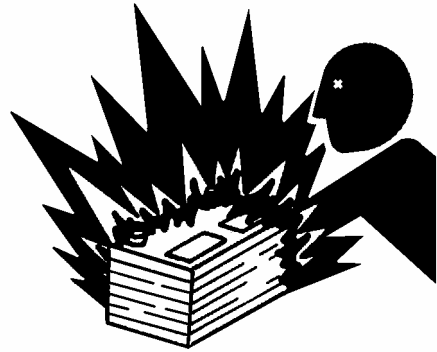


SA-431

012-E01B-0431

JUMP STARTING

- Battery gas can explode, resulting in serious injury.
 - If the engine must be jump started, be sure to follow the instructions shown in the "OPERATING THE ENGINE" chapter in the operator's manual.
 - The operator must be in the operator's seat so that the machine will be under control when the engine starts.
 - Jump starting is a two-person operation.
 - Never use a frozen battery.
 - Failure to follow correct jump starting procedures could result in a battery explosion or a runaway machine.



SA-032

S013-E01A-0032 SA-032

SAFETY

INVESTIGATE JOB SITE BEFOREHAND

- When working at the edge of an excavation or on a road shoulder, the machine could tip over, possibly resulting in serious injury or death.
 - Investigate the configuration and ground conditions of the job site beforehand to prevent the machine from falling and to prevent the ground, stockpiles, or banks from collapsing.
 - Make a work plan. Use machines appropriate to the work and job site.
 - Reinforce ground, edges, and road shoulders as necessary. Keep the machine well back from the edges of excavations and road shoulders.
 - When working on an incline or on a road shoulder, employ a signal person as required.
 - Confirm that your machine is equipped a FOPS cab before working in areas where the possibility of falling stones or debris exist.
 - When the footing is weak, reinforce the ground before starting work.
 - When working on frozen ground, be extremely alert. As ambient temperatures rise, footing becomes loose and slippery.
 - Beware the possibility of fire when operating the machine near flammable objects such as dry grass.



SA-447

015-E01B-0447

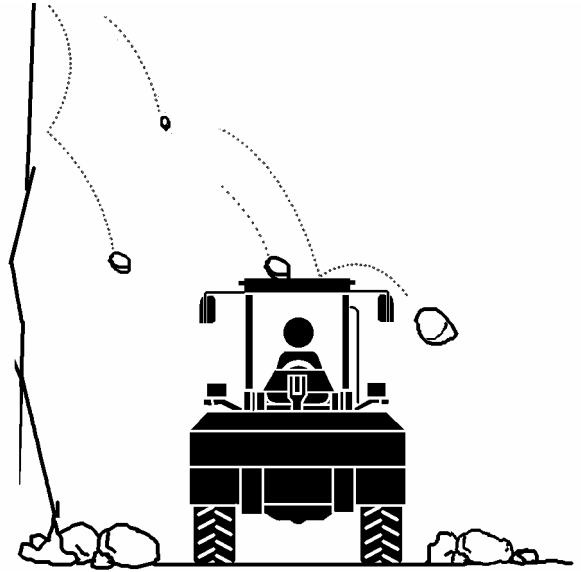
SAFETY

EQUIPMENT OF HEAD GUARD, ROPS, FOPS

In case the machine is operated in areas where the possibility of falling stones or debris exist, equip a head guard, ROPS, or FOPS according to the potential hazardous conditions. (The standard cab for this machine corresponds to ROPS and FOPS.)

ROPS: Roll-Over Protective Structure

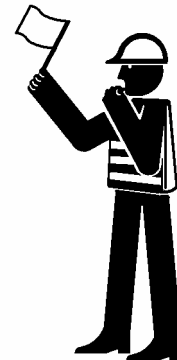
FOPS: Falling Object Protective Structure



SA-521

PROVIDE SIGNALS FOR JOBS INVOLVING MULTIPLE NUMBERS OF MACHINES

- For jobs involving multiple numbers of machines, provide signals commonly known by all personnel involved. Also, appoint a signal person to coordinate the job site. Make sure that all personnel obey the signal person's directions.



018-E01A-0481

SA-481

SAFETY

KEEP RIDERS OFF MACHINE

- Riders on machine are subject to injury such as being struck by foreign objects and being thrown off the machine.
 - Only the operator should be on the machine. Keep riders off.
 - Riders also obstruct the operator's view, resulting in the machine being operated in an unsafe manner.

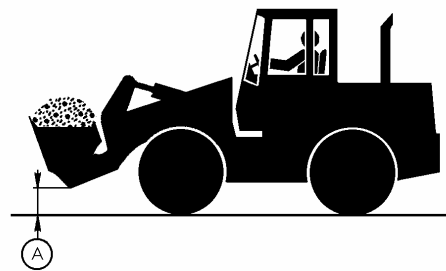


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SA-427

DRIVE SAFELY

- Beware of the possibility of slipping and/or turning over the machine when driving on a slope.
 - When driving on level ground, hold the bucket at mark (A) 400 to 500 mm above the ground as illustrated.
 - Avoid driving over any obstacles.
 - Drive the machine slowly when driving on rough terrain.
 - Avoid quick direction changes. Failure to do so may cause the machine to turn over.
 - If the engine stops while driving, the steering function becomes inoperative. Immediately stop the machine by applying the brake to prevent personal accident.

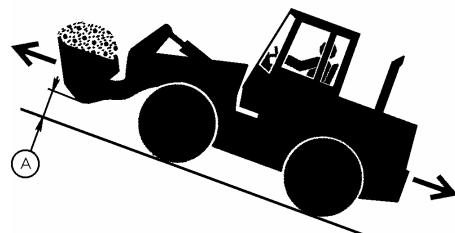


SA-448

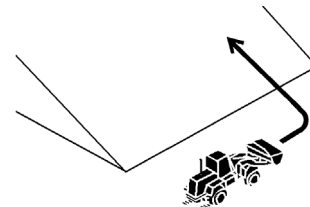
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DRIVE MACHINE SAFELY (WORK SITE)

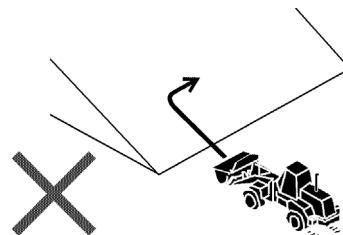
- Before driving the machine, always confirm that the steering wheel/F-N-R lever direction corresponds to the direction you wish to drive.
 - Be sure to detour around any obstructions.
- Driving on a slope may cause the machine to slip or overturn, possibly resulting in serious injury or death.
 - When driving up or down a slope, keep the bucket facing the direction of travel, approximately 200 to 300 mm (approximately 8 to 12 in) (A) above the ground.
 - If the machine starts to skid or becomes unstable, immediately lower the bucket to the ground and stop.
- Driving across the face of a slope or steering on a slope may cause the machine to skid or overturn. If the direction must be changed, move the machine to level ground, then, change the direction to ensure safe operation.



SA-449



SA-450



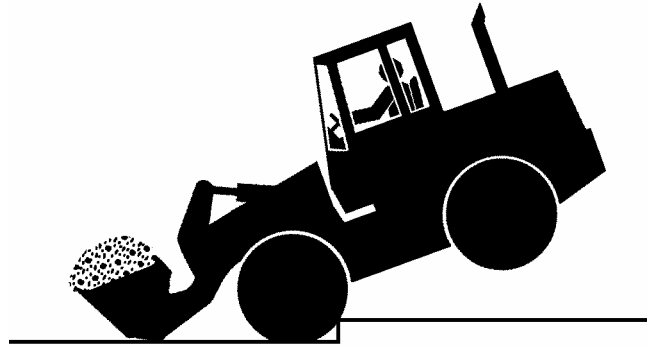
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SA-451

SAFETY

DRIVE SAFELY WITH BUCKET LOADED

- If the machine is incorrectly operated while driving with the bucket loaded, turning over of the machine may result. Be sure to follow all the instructions indicated below.
 - When driving the machine on a job site with the bucket loaded, hold the bucket as low as possible to keep the machine balanced and to have good visibility.
 - Do not exceed the rated load capacity. Always operate the machine within the rated load capacity.
 - Avoid fast starts, stops, and quick turns. Failure to do so may result in personal injury and/or death.
 - Avoid rapid drive direction changes which could possibly cause personal injury and/or death.



SA-400

051-E02A-0400

DRIVE ON SNOW SAFELY

- Beware of the possibility of slipping or turning over the machine when driving on frozen snow surfaces.
 - The machine may slip more easily than expected on frozen snow surfaces even if the inclination is small. Reduce speed when driving. Avoid fast starts, stops and quick turns.
 - Road shoulder and/or set-up utilities covered with snow are difficult to locate. Be sure where they are before removing snow.
 - Be sure to use tire chains when driving on snow.
 - Avoid applying the brake for quick stops on snow. If a quick stop is required, lower the bucket to the ground.

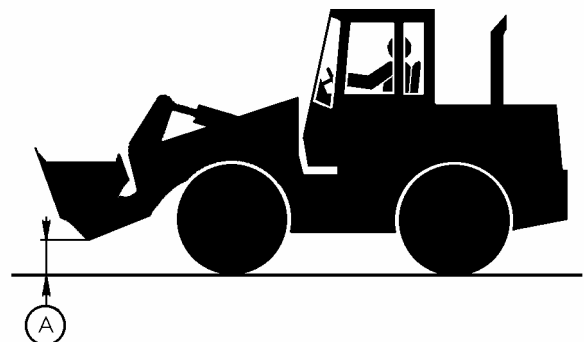


SA-452

052-E02A-0452

TRAVEL ON PUBLIC ROADS SAFELY

- This machine is not allowed to drive on public roads with the bucket loaded.
 - Be sure to empty the bucket.
 - Hold the bucket at mark (A) 400 to 500 mm above the road surface as illustrated.



053-E02A-0453

SA-453

SAFETY

AVOID INJURY FROM ROLLAWAY ACCIDENTS

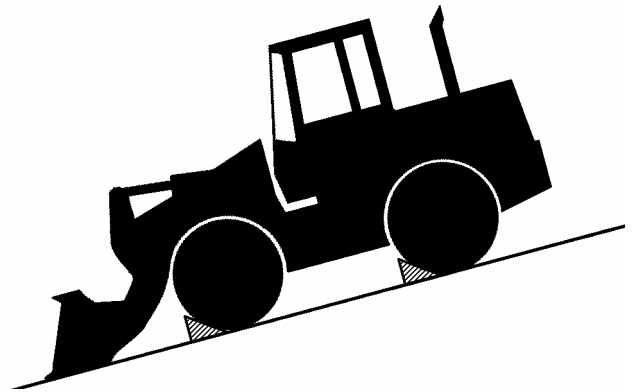
- Death or serious injury may result if you attempt to mount or stop a moving machine.

To avoid rollaways:

- Select level ground when possible to park machine.
- Do not park the machine on a grade.
- Lower the bucket to the ground.
- Place the F-N-R lever in neutral, and put the park brake switch in the ON (parking brake) position.
- Run the engine at slow idle speed without load for 5 minutes to cool down the engine.
- Stop the engine and remove the key from the key switch.
- Pull the lock lever to LOCK position.
- Block both tires and lower the bucket to the ground.
- Position the machine to prevent rolling.
- Park a reasonable distance from other machines.



SA-457



SA-458

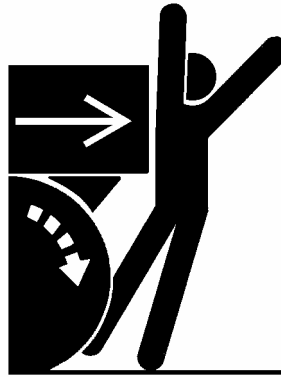
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SAFETY

AVOID ACCIDENTS FROM BACKING UP AND TURNING

- Make sure no one is working under or close to the machine before backing up or turning the machine to avoid personal injury and/or death by being run over or entangled in the machine.
 - Keep all personnel away from the machine by sounding the horn and/or using hand signals. Use extra care to be sure no one is in from the articulation area before turning the machine.
 - Keep windows, mirrors, and lights in good condition.
 - Reduce travel speed when dust, heavy rain, fog, etc., reduce the visibility.
 - In case good visibility is not obtained, use a signal person to guide you.

021-E02A-0517



SA-383



SA-312

SAFETY

AVOID POSITIONING BUCKET OVER ANYONE

- Never allow the bucket to pass over co-workers and/or the dump truck operator's cab. Falling soil from the bucket or contact with bucket may cause serious personal accidents and/or damage to the machine.
 - Avoid carrying the bucket over the co-workers to ensure safe operation.



023-E02A-0518

SA-518

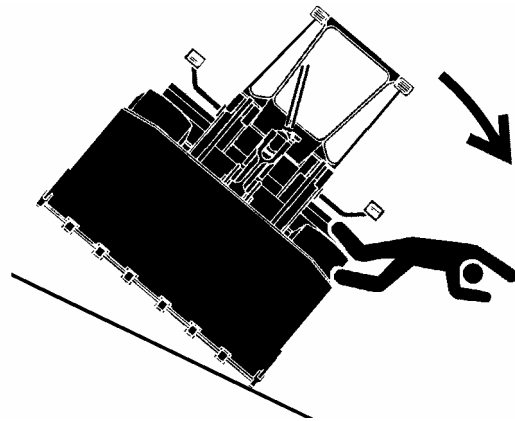
AVOID TIPPING

DO NOT ATTEMPT TO JUMP CLEAR OF TIPPING MACHINE. MACHINE WILL TIP OVER FASTER THAN YOU CAN JUMP FREE, POSSIBLY RESULTING IN SERIOUS PERSONAL INJURY OR DEATH. IF TIPPING OVER OF THE MACHINE IS PREDICTED, SECURELY HOLD THE STEERING WHEEL TO PREVENT YOUR BODY FROM BEING THROWN OUT OF THE MACHINE.

MACHINE WILL TIP OVER FASTER THAN YOU CAN JUMP FREE

FASTEN YOUR SEAT BELT

- The danger of tipping is always present when operating on a grade, possibly resulting in serious injury or death.
 - To avoid tipping:
- Be extra careful before operating on a grade.
 - Prepare machine operating area flat.
 - Keep the bucket low to the ground and close to the machine.
 - Reduce operating speeds to avoid tipping or slipping.
 - Avoid changing direction when traveling on grades.
 - NEVER attempt to travel across a grade steeper than 5 degrees if crossing the grade is unavoidable.
 - Reduce swing speed as necessary when swinging loads.
- Be careful when working on frozen ground.
 - Temperature increases will cause the ground to become soft and make ground travel unstable.



SA-463

SAFETY

NEVER UNDERCUT A HIGH BANK

- The edges could collapse or a land slide could occur causing serious injury or death.

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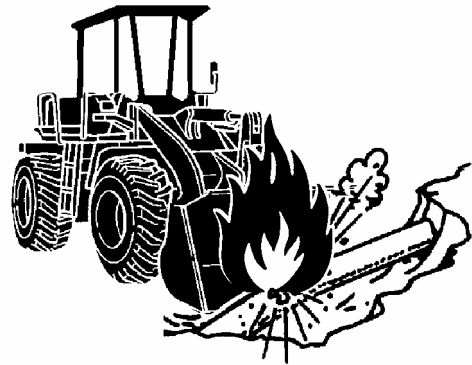


SA-519

DIG WITH CAUTION

Before digging, check the location of cables, gas lines, and water lines.

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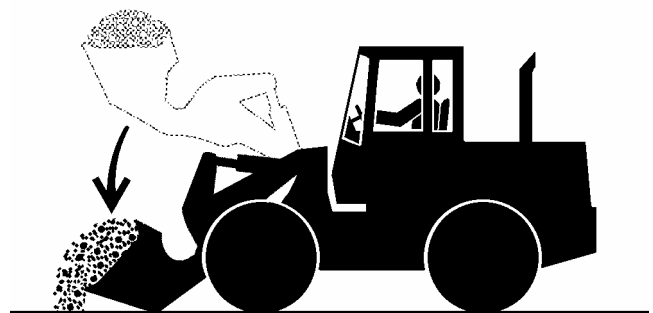


SA-396

PERFORM TRUCK LOADING SAFELY

- Do not operate the machine involuntarily. Unexpected machine movement may cause personal injury and/or death.
 - Do not lower the bucket with the loader control lever in the FLOAT position. The bucket may free fall, possibly causing personal injury and/or death.
 - Always select a level surface for truck loading.

028-E01A-397



SA-397

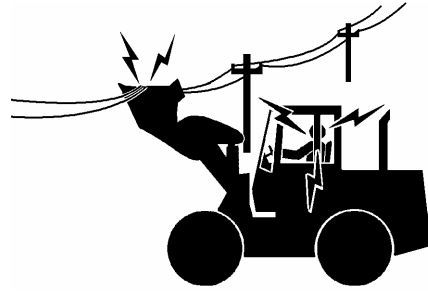
SAFETY

AVOID POWER LINES

Serious injury or death can result from contact with electric lines.

Never move any part of the machine or load closer to any electric line than 3 m (10 ft) plus twice the line insulator length.

29-E01A-0455



SA-455

PRECAUTIONS FOR OPERATION

- If the front attachment or any part of the machine comes in contact with an overhead obstacle, both the machine and the overhead obstacle may become damaged, and personal injury may result.
 - Take care to avoid coming in contact with overhead obstacles with the bucket or arm during operation.

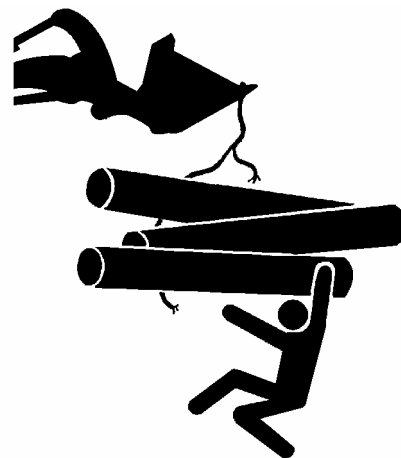
PRECAUTIONS FOR LIGHTENING

- The machine is vulnerable to lightning strikes.
 - In the event of an electrical storm, immediately stop operation, and lower the bucket to the ground. Evacuate to a safe place far away from the machine.
 - After the electrical storm has passed, check all of the machine safety devices for any failure. If any failed safety devices are found, operate the machine only after repairing them.

OBJECT HANDLING

- If a lifted load should fall, any person nearby may be struck by the falling load or may be crushed underneath it, resulting in serious injury or death.
 - When using the machine for craning operations, be sure to comply with all local regulations.
 - Do not use damaged chains or frayed cables, cables, slings, or ropes.
 - Before craning, position the upperstructure with the position of the bucket support located on the chassis at the front.
 - Move the load slowly and carefully. Never move it suddenly.
 - Keep all persons well away from the load.
 - Never move a load over a person's head.
 - Do not allow anyone to approach the load until it is safely and securely situated on supporting blocks or on the ground.
 - Never attach a sling or chain to the bucket teeth. They may come off, causing the load to fall.

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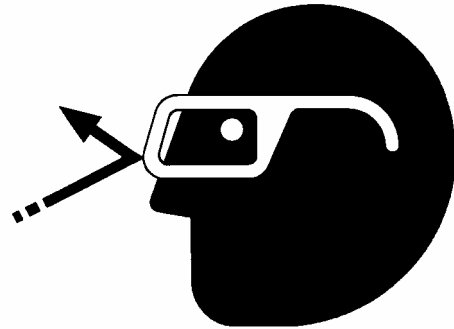


SA-132

SAFETY

PROTECT AGAINST FLYING DEBRIS

- If flying debris hit eyes or any other part of the body, serious injury may result.
 - Guard against injury from flying pieces of metal or debris; wear goggles or safety glasses.
 - Keep bystanders away from the working area before striking any object.



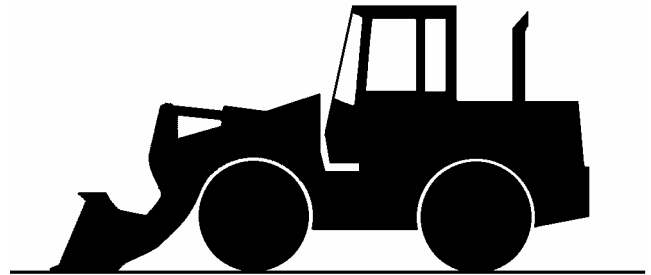
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SA-432

PARK MACHINE SAFELY

To avoid accidents:

- Park machine on a firm, level surface.
- Lower bucket to the ground.
- Place the F-N-R lever in neutral, and put the park brake switch in the ON (parking brake) position.
- Run engine at slow idle speed without load for 5 minutes.
- Turn key switch to OFF to stop engine.
- Remove the key from the key switch.
- Lower the lock lever to the LOCK position.
- Close windows, roof vent, and cab door.
- Lock all access doors and compartments.



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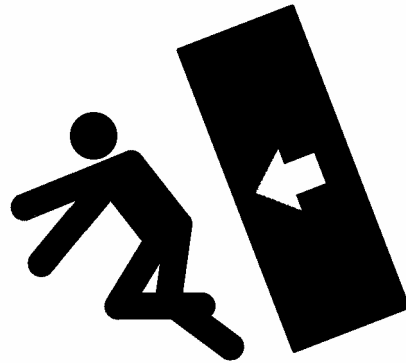
SA-456

SAFETY

STORE ATTACHMENTS SAFELY

- Stored attachments such as buckets, hydraulic hammers, and blades can fall and cause serious injury or death.
 - Securely store attachments and implements to prevent falling. Keep children and bystanders away from storage areas.

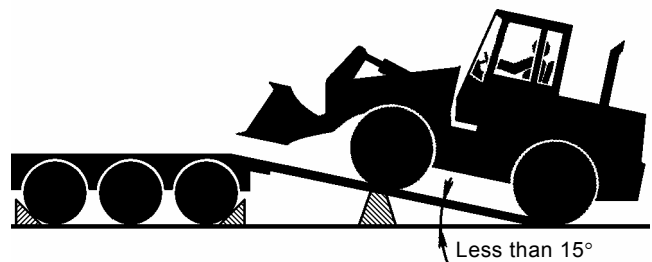
504-E01A-0034



SA-034

TRANSPORT SAFELY

- Take care the machine may turn over when loading or unloading the machine onto or off of a truck or trailer.
 - Observe the related regulations and rules for safe transportation.
 - Select an appropriate truck or trailer for the machine to be transported.
 - Be sure to use a signal person.
 - Always follow the following precautions for loading or unloading:
 1. Select solid and level ground.
 2. Always use a ramp or deck strong enough to support the machine weight.
 3. Use the low speed gear.
 4. Never steer the machine while on the ramp. If the traveling direction must be changed while the ramp, unload the machine from the ramp, reposition the machine on the ground, then try loading again.
 5. After loading, install the lock bar to securely hold the articulation mechanism.
 6. Wedge the front and rear of tires. Securely hold the machine to the truck or trailer deck with wire ropes.



SA-454

Be sure to further follow the details described in the TRANSPORTING section.

035-E07A-0454

SAFETY

HANDLE FLUIDS SAFELY-AVOID FIRES

- Handle fuel with care; it is highly flammable. If fuel ignites, an explosion and/or a fire may occur, possibly resulting in serious injury or death.
 - Do not refuel the machine while smoking or when near open flame or sparks.
 - Always stop the engine before refueling the machine.
 - Fill the fuel tank outdoors.
- All fuels, most lubricants, and some coolants are flammable.
 - Store flammable fluids well away from fire hazards.
 - Do not incinerate or puncture pressurized containers.
 - Do not store oily rags; they can ignite and burn spontaneously.
 - Securely tighten the fuel and oil filler cap.



SA-018



034-E01A-0496

SA-019

SAFETY

PRACTICE SAFE MAINTENANCE

To avoid accidents:

- Understand service procedures before starting work.
- Keep the work area clean and dry.
- Do not spray water or steam inside cab.
- Never lubricate or service the machine while it is moving.
- Keep hands, feet and clothing away from power-driven parts.

Before servicing the machine:

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.
4. Run the engine at slow idle speed without load for 5 minutes.
5. Turn the key switch to OFF to stop engine.
6. Relieve the pressure in the hydraulic system by moving the control levers several times.
7. Remove the key from the switch.
8. Attach a "Do Not Operate" tag on the control lever.
9. Lower the lock lever to the LOCK position.
10. Lock bar connects the front and rear frames.
11. Allow the engine to cool.

- If a maintenance procedure must be performed with the engine running, do not leave machine unattended.
- Never work under a machine raised by the lift arm.
- Inspect certain parts periodically and repair or replace as necessary. Refer to the section discussing that part in the "MAINTENANCE" chapter of operator's manual.
- Keep all parts in good condition and properly installed.
- Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.
- When cleaning parts, always use nonflammable detergent oil. Never use highly flammable oil such as fuel oil and gasoline to clean parts or surfaces.
- Disconnect battery ground cable (-) before making adjustments to electrical systems or before performing welding on the machine.

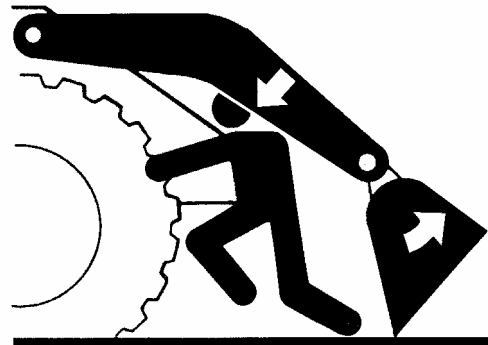
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SA-028



SA-312



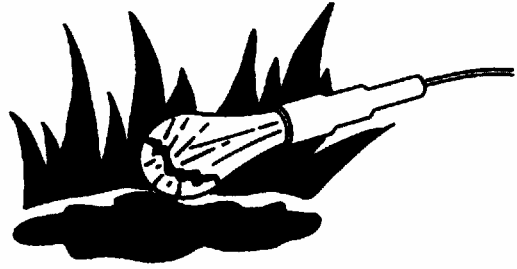
SA-134



SA-527

SAFETY

- Sufficiently illuminate the work site. Use a maintenance work light when working under or inside the machine.
- Always use a work light protected with a guard. In case the light bulb is broken, spilled fuel, oil, anti-freeze fluid, or window washer fluid may catch fire.



SA-037

WARN OTHERS OF SERVICE WORK

- Unexpected machine movement can cause serious injury.
 - Before performing any work on the machine, attach a “Do Not Operate” tag on the control lever. This tag is available from your authorized dealer.

501-E01A-0287



SS2045102

SUPPORT MACHINE PROPERLY

- Never attempt to work on the machine without securing the machine first.
 - Always lower the attachment to the ground before you work on the machine.
 - If you must work on a lifted machine or attachment, securely support the machine or attachment. Do not support the machine on cinder blocks, hollow tires, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack.

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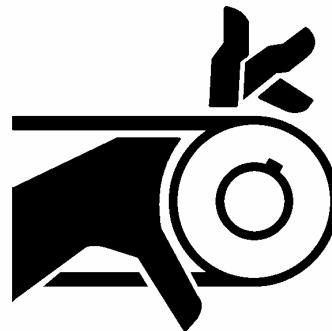


SA-527

STAY CLEAR OF MOVING PARTS

- Entanglement in moving parts can cause serious injury.
 - To prevent accidents, care should be taken to ensure that hands, feet, clothing, jewelry and hair do not become entangled when working around rotating parts.

502-E01A-0026

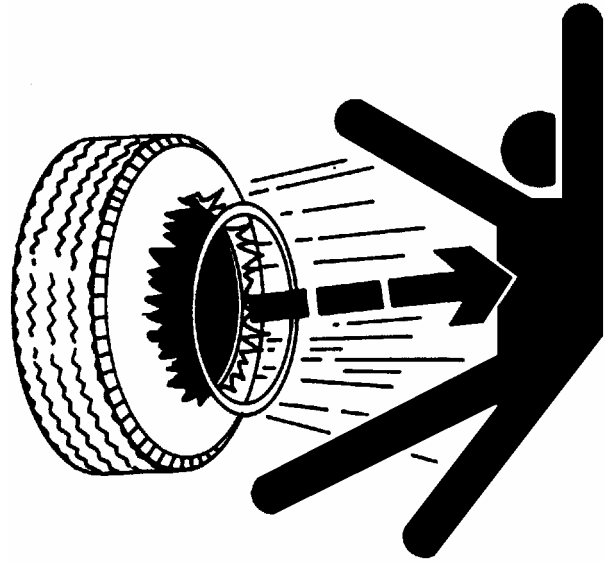


SA-026

SAFETY

SUPPORT MAINTENANCE PROPERLY

- Explosive separation of a tire and rim parts can cause serious injury or death.
 - Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job. Have it done by your authorized dealer or a qualified repair service.
 - Always maintain the correct tire pressure. DO NOT inflate tire above the recommended pressure.
 - When inflating tires, use a chip-on chuck and extension hose long enough to allow you to stand to one side and not in front of or over the tire assembly. Use a safety cage if available.
 - Inspect tires and wheels daily. Do not operate with low pressure, cuts bubbles, damaged rims, or missing lug bolts and nuts.
 - Never cut or weld on an inflated tire or rim assembly. Heat from welding could cause an increase in pressure and may result in tire explosion.

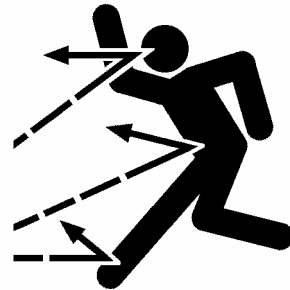


SA-249

521-E02A-0249

PREVENT PARTS FROM FLYING

- Travel reduction gears are under pressure.
 - As pieces may fly off, be sure to keep body and face away from AIR RELEASE PLUG to avoid injury.
 - GEAR OIL is hot. Wait for GEAR OIL to cool, then gradually loosen AIR RELEASE PLUG to release pressure.



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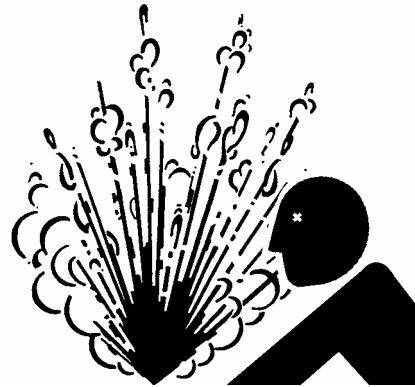
SA-344

SAFETY

PREVENT BURNS

Hot spraying fluids:

- After operation, engine coolant is hot and under pressure. Hot water or steam is contained in the engine, radiator and heater lines. Skin contact with escaping hot water or steam can cause severe burns.
 - To avoid possible injury from hot spraying water. DO NOT remove the radiator cap until the engine is cool. When opening, turn the cap slowly to the stop. Allow all pressure to be released before removing the cap.
 - The hydraulic oil tank is pressurized. Again, be sure to release all pressure before removing the cap.



SA-039

Hot fluids and surfaces:

- Engine oil, gear oil and hydraulic oil also become hot during operation. The engine, hoses, lines and other parts become hot as well.
 - Wait for the oil and components to cool before starting any maintenance or inspection work.



SA-225

505-E01B-0498

REPLACE RUBBER HOSES PERIODICALLY

- Rubber hoses that contain flammable fluids under pressure may break due to aging, fatigue, and abrasion. It is very difficult to gauge the extent of deterioration due to aging, fatigue, and abrasion of rubber hoses by inspection alone.
 - Periodically replace the rubber hoses. (See the page of "Periodic replacement of parts" in the operator's manual.)
- Failure to periodically replace rubber hoses may cause a fire, fluid injection into skin, or the front attachment to fall on a person nearby, which may result in severe burns, gangrene, or otherwise serious injury or death.



SA-019

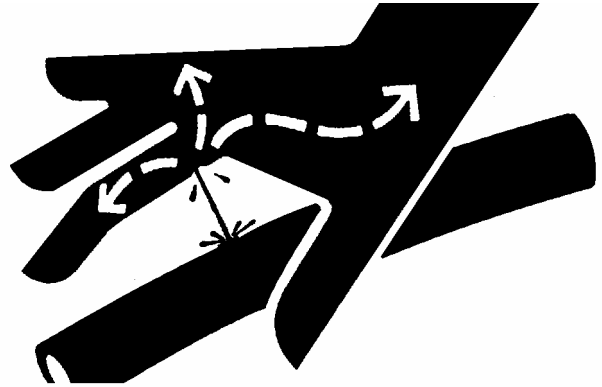
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SAFETY

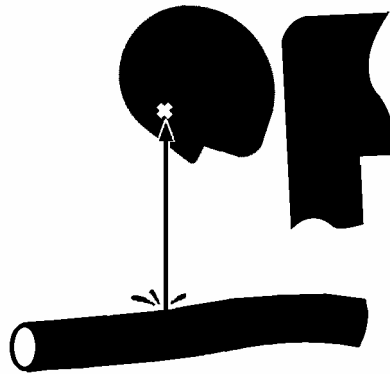
AVOID HIGH-PRESSURE FLUIDS

- Fluids such as diesel fuel or hydraulic oil under pressure can penetrate the skin or eyes causing serious injury, blindness or death.
 - Avoid this hazard by relieving pressure before disconnecting hydraulic or other lines.
 - Tighten all connections before applying pressure.
 - Search for leaks with a piece of cardboard; take care to protect hands and body from high-pressure fluids. Wear a face shield or goggles for eye protection.
 - If an accident occurs, see a doctor familiar with this type of injury immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.

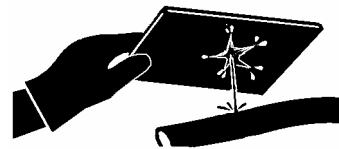
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SA-031



SA-292



SA-044

SAFETY

PREVENT FIRES

Check for Oil Leaks:

- Fuel, hydraulic oil and lubricant leaks can lead to fires.
 - Check for oil leaks due to missing or loose clamps, kinked hoses, lines or hoses that rub against each other, damage to the oil-cooler, and loose oil-cooler flange bolts.
 - Tighten, repair or replace any missing, loose or damaged clamps, lines, hoses, oil-cooler and oil-cooler flange bolts.
 - Do not bend or strike high-pressure lines.
 - Never install bent or damaged lines, pipes, or hoses.



SA-019

Check for Shorts:

- Short circuits can cause fires.
 - Clean and tighten all electrical connections.
 - Check before each shift or after eight(8) to ten(10) hours operation for loose, kinked, hardened or frayed electrical cables and wires.
 - Check before each shift or after eight(8) to ten(10) hours operation for missing or damaged terminal caps.
 - DO NOT OPERATE MACHINE if cable or wires are loose, kinked, etc..

Clean up Flammables:

- Spilled fuel and oil, and trash, grease, debris, accumulated coal dust, and other flammables may cause fires.
 - Prevent fires by inspecting and cleaning the machine daily and by removing spilled or accumulated flammables immediately.

Check Key Switch:

- If a fire breaks out, failure to stop the engine will escalate the fire, hampering fire fighting.
Always check key switch function before operating the machine every day:
 1. Start the engine and run it at slow idle.
 2. Turn the key switch to the OFF position to confirm that the engine stops.
 - If any abnormalities are found, be sure to repair them before operating the machine.

508-E02B-0019

Check Heat Shields:

- Damaged or missing heat shields may lead to fires.
 - Damaged or missing heat shields must be repaired or replaced before operating the machine.

508-E02A-0393

SAFETY

EVACUATING IN CASE OF FIRE

- If a fire breaks out, evacuate the machine in the following way:
 - Stop the engine by turning the key switch to the OFF position if there is time.
 - Use a fire extinguisher if there is time.
 - Exit the machine.

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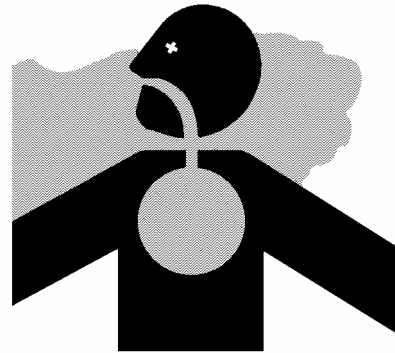


SA-393

BEWARE OF EXHAUST FUMES

- Prevent asphyxiation. Engine exhaust fumes can cause sickness or death.
 - If you must operate in a building, be sure there is adequate ventilation. Either use an exhaust pipe extension to remove the exhaust fumes or open doors and windows to bring enough outside air into the area.

509-E01A-0016



SA-016

PRECAUTIONS FOR WELDING AND GRINDING

- Welding may generate gas and/or small fires.
 - Be sure to perform welding in a well ventilated and prepared area. Store flammable objects in a safe place before starting welding.
 - Only qualified personnel should perform welding. Never allow an unqualified person to perform welding.
- Grinding on the machine may create fire hazards. Store flammable objects in a safe place before starting grinding.
- After finishing welding and grinding, recheck that there are no abnormalities such as the area surrounding the welded area still smoldering.

523-E01A-0818



SA-818

SAFETY

AVOID HEATING NEAR PRESSURIZED FLUID LINES

- Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders.
 - Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials.
 - Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area. Install temporary fireresistant guards to protect hoses or other materials before engaging in welding, soldering, etc..



SA-030

AVOID APPLYING HEAT TO LINES CONTAINING FLAMMABLE FLUIDS

- Do not weld or flame cut pipes or tubes that contain flammable fluids.
- Clean them thoroughly with nonflammable solvent before welding or flame cutting them.

510-E01B-0030

REMOVE PAINT BEFORE WELDING OR HEATING

- Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch. If inhaled, these fumes may cause sickness.
 - Avoid potentially toxic fumes and dust.
 - Do all such work outside or in a well-ventilated area. Dispose of paint and solvent properly.
 - Remove paint before welding or heating:
1. If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
 2. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.



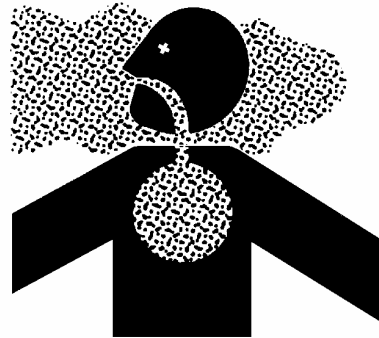
SA-029

511-E01A-0029

SAFETY

BEWARE OF ASBESTOS DUST

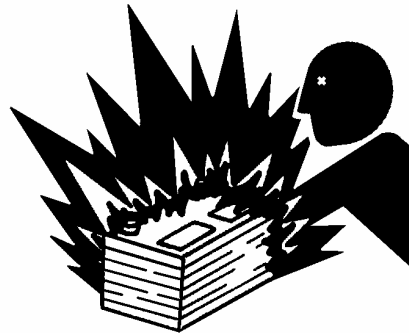
- Take care not to inhale dust produced in the work site. Inhalation of asbestos fibers may be the cause of lung cancer.
 - Depending on the work site conditions, the risk of inhaling asbestos fiber may exist. Spray water to prevent asbestos from becoming airborne. Do not use compressed air.
 - When operating the machine in a work site where asbestos might be present, be sure to operate the machine from the upwind side and wear a mask rated to prevent the inhalation of asbestos.
 - Keep bystanders out of the work site during operation.
 - Asbestos might be present in imitation parts. Use only genuine Hitachi Parts.



SA-029

PREVENT BATTERY EXPLOSIONS

- Battery gas can explode.
 - Keep sparks, lighted matches, and 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 the battery to 16 °C (60 °F) first.
 - Do not continue to use or charge the battery when electrolyte level is lower than specified. Explosion of the battery may result.
 - Loose terminals may produce sparks. Securely tighten all terminals.
- Battery electrolyte is poisonous. If the battery should explode, battery electrolyte may be splashed into eyes, possibly resulting in blindness.
 - Be sure to wear eye protection when checking electrolyte specific gravity.



SA-032

512-E01B-0032

SERVICE AIR CONDITIONING SYSTEM SAFELY

- If spilled onto skin, refrigerant may cause a cold contact burn.
 - Refer to the instructions described on the container for proper use when handling the refrigerant.
 - Use a recovery and recycling system to avoid leaking refrigerant into the atmosphere.
 - Never touch the refrigerant.



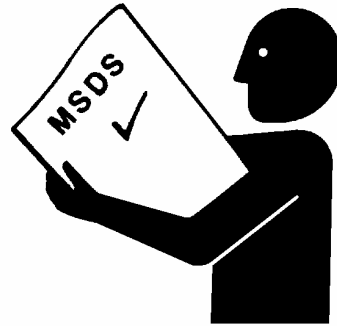
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SA-405

SAFETY

HANDLE CHEMICAL PRODUCTS SAFELY

- Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with your machine include such items as lubricants, coolants, paints, and adhesives.
 - A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.
 - Check the MSDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and use recommended equipment.
 - See your authorized dealer for MSDS's (available only in English) on chemical products used with your machine.

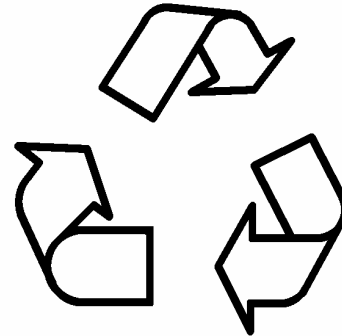


SA-309

515-E01A-0309

DISPOSE OF WASTE PROPERLY

- Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with HITACHI equipment includes such items as oil, fuel, coolant, brake fluid, filters, and batteries.
 - Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.
 - Do not pour waste onto the ground, down a drain, or into any water source.
 - Air conditioning refrigerants escaping into the air can damage the Earth's atmosphere. Government regulations may require a certified air conditioning service center to recover and recycle used air conditioning refrigerants.
 - Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your authorized dealer.



SA-226

516-E01A-0226

SAFETY

BEFORE RETURNING THE MACHINE TO THE CUSTOMER

- After maintenance or repair work is complete, confirm that:
 - The machine is functioning properly, especially the safety systems.
 - Worn or damaged parts have been repaired or replaced.



S517-E01A-0435

SA-435

SECTION AND GROUP CONTENTS

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--

Group 2 Tightening

Group 3 Painting

Group 4 Bleeding Air from Hydraulic Oil Tank
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Group 2 Counterweight

Group 3 Center Hinge

Group 4 Hood

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Group 6 Pump Device

Group 7 Control Valve

Group 8 Pilot Valve

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Group 10 Fan Pump and Motor

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Group 2 Drive Unit

Group 3 Axle

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Group 5 Brake Valve

Group 6 Charging Block

Group 7 Steering Pilot Valve

Group 8 Steering Valve

Group 9 Steering Cylinder

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Group 2 Cylinder

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

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- Group 4 Steering Pilot Valve
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- Group 9 Drive Unit
- Group 10 Axle
- Group 11 Brake Valve
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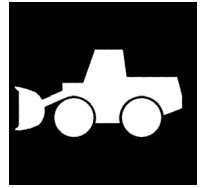
SECTION 4 OPERATIONAL PERFORMANCE TEST

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- Group 2 Standard
- Group 3 Engine Test
- Group 4 Wheel Loader Test
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SECTION 5 TROUBLESHOOTING

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Bleeding Air from Hydraulic Oil Tank	W1-4-1
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GENERAL / Precautions for Disassembling and Assembling

PRECAUTIONS FOR DISASSEMBLING AND ASSEMBLING

Precautions for Disassembling and Assembling

- Clean the Machine

Thoroughly wash the machine before bringing it into the shop. Bringing a dirty machine into the shop may cause machine components to be contaminated during disassembling/assembling, resulting in damage to machine components, as well as decreased efficiency in service work.

- Inspect the Machine

Be sure to thoroughly understand all disassembling/assembling procedures beforehand, to help avoid incorrect disassembling of components as well as personal injury. Check and record the items listed below to prevent problems from occurring in the future.

- The machine model, machine serial number, and hour meter reading.
- Reason for disassembly (symptoms, failed parts, and causes).
- Clogging of filters and oil, water or air leaks, if any.
- Capacities and condition of lubricants.
- Loose or damaged parts.

- Prepare and Clean Tools and Disassembly Area

Prepare the necessary tools to be used and the area for disassembling work.

- Precautions for Disassembling

- To prevent dirt from entering, cap or plug the removed pipes.
- Before disassembling, clean the exterior of the components and place on a work bench.
- Before disassembling, drain gear oil from the reduction gear.
- Be sure to provide appropriate containers for draining fluids.
- Use matching marks for easier reassembling.
- Be sure to use the specified special tools, when instructed.
- If a part or component cannot be removed after removing its securing nuts and bolts, do not attempt to remove it forcibly. Find the cause(s), then take the appropriate measures to remove it.
- Orderly arrange disassembled parts. Mark and tag them as necessary.
- Store common parts, such as bolts and nuts with reference to where they are to be used and in a manner that will prevent loss.
- Inspect the contact or sliding surfaces of disassembled parts for abnormal wear, sticking, or other damage.
- Measure and record the degree of wear and clearances.

GENERAL / Precautions for Disassembling and Assembling

- Precautions for Assembling

- Be sure to clean all parts and inspect them for any damage. If any damage is found, repair or replace part.
- Dirt or debris on the contact or sliding surfaces may shorten the service life of the machine. Take care not to contaminate any contact or sliding surfaces.
- Be sure to replace O-rings, backup rings, and oil seals with new ones once they are disassembled. Apply a film of grease before installing.
- Be sure that liquid-gasket-applied surfaces are clean and dry.
- If an anti-corrosive agent has been used on a new part, be sure to thoroughly clean the part to remove the agent.
- Utilize matching marks when assembling.
- Be sure to use the designated tools to assemble bearings, bushings and oil seals.
- Keep a record of the number of tools used for disassembly/assembly. After assembling is complete, count the number of tools, so as to make sure that no forgotten tools remain in the assembled machine.

Bleeding Air from Hydraulic System

When hydraulic oil is drained, the suction filter or the suction lines are replaced, or the removal and installation of the pump, swing motor, travel motor or cylinder is done, bleed air from the hydraulic system in the following procedures:

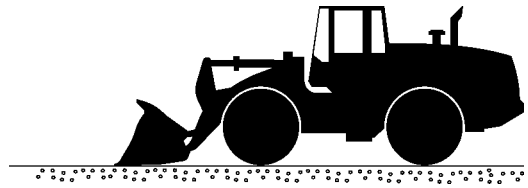
IMPORTANT: If the engine is started with air trapped in the hydraulic pump housing, damage to the pump may result. If the cylinder is operated with air trapped in the cylinder tube, damage to the cylinder may result. Be sure to bleed air before starting the engine.

- Bleeding Air from Hydraulic Pump

- Remove the air bleeding plug from the top of the pump and fill the pump housing with hydraulic oil.
- After the pump housing is filled with hydraulic oil, temporarily tighten the plug. Then, start the engine and run at slow idle speed.
- Slightly loosen the plug to bleed air from the pump housing until hydraulic oil oozes out.
- After bleeding all the air, securely tighten the plug.

GENERAL / Precautions for Disassembling and Assembling

- Bleeding Air from Hydraulic Circuit
 - After refilling hydraulic oil, start the engine. While operating each cylinder, operate the machine under light loads for 10 to 15 minutes. Slowly start each operation (never fully stroke the cylinders during initial operation stage). As the pilot oil circuit has an air bleed device, air trapped in the pilot oil circuit will be bled while performing the above operation for approx. 5 minutes.
 - Reposition the front attachment to check hydraulic oil level.
 - Stop the engine. Recheck hydraulic oil level. Replenish oil as necessary.



W4GB-01-01-001

GENERAL / Precautions for Disassembling and Assembling

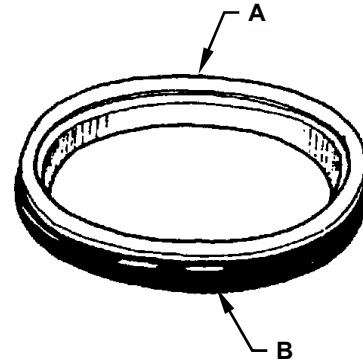
Floating Seal Precautions

1. In general, replace the floating seal with a new one after disassembling.
If the floating seal is to be reused, follow these procedures:

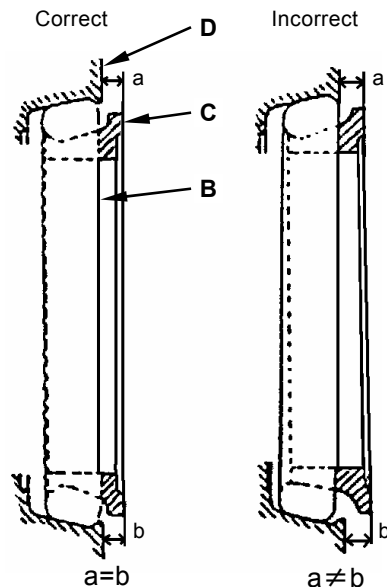
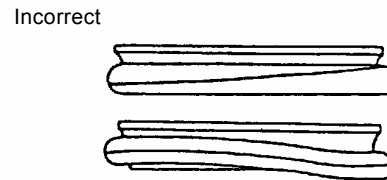
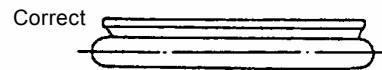
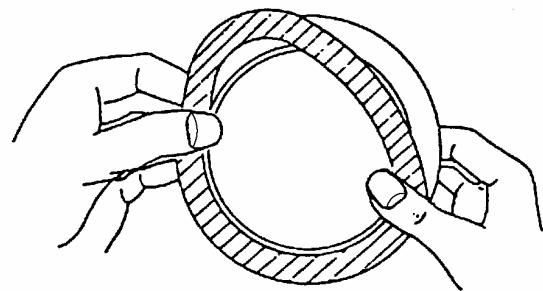
- (1) Keep seal rings together as a matched set with seal ring faces together. Insert a piece of cardboard to protect surfaces.
- (2) Check sliding surface (C) on seal ring (A) for scuffing, scoring, corrosion, deformation or uneven wear.
- (3) Check O-ring (B) for tears, breaks, deformation or hardening.

2. If incorrectly assembled, oil leakage or damage will occur. Be sure to do the following, to prevent trouble.

- (1) Clean the floating seal and seal mounting bores with cleaning solvent. Use a wire brush to remove mud, rust or dirt. After cleaning, thoroughly dry parts with compressed air.
- (2) Clean the floating seal and seal mounting bores. Check the bore surface for scuffing or scoring by touching the surface with touch.
- (3) Check that O-ring (B) is not twisted, and that it is installed correctly on seal ring (A).
- (4) After installing the floating seal, check that seal ring surface (C) is parallel with seal mating face (D) by measuring the distances (C) and (D) at point (a) and (b), as illustrated. If these distances differ, correct O-ring (B) seating.



W105-03-05-019



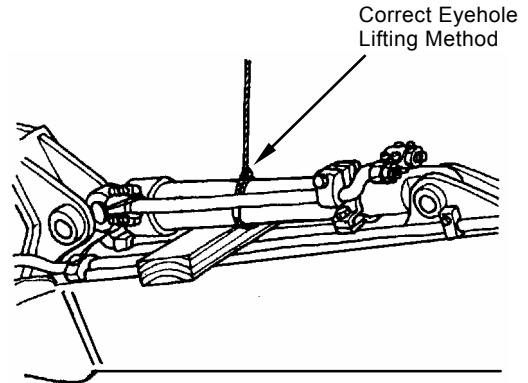
W105-03-05-020

W110-03-05-004

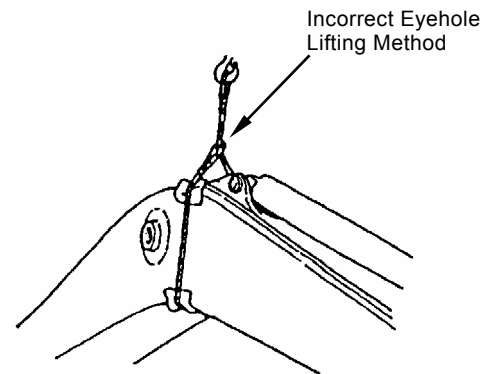
GENERAL / Precautions for Disassembling and Assembling

Precautions for Using Nylon Sling

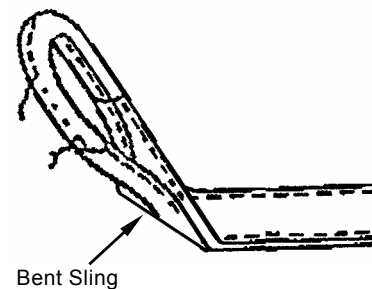
1. Follow the precautions below to use nylon slings safely.
 - Attach protectors (soft material) on the corners of the load so that the nylon sling does not directly contact the corners. This will prevent the nylon sling from being damaged and the lifted load from slipping.
 - Lower the temperature of the lifted load to lower than 100 °C (212 °F). If unavoidably lifting a load with a temperature of 100 °C (212 °F) or more, reduce the load weight.
 - Do not lift acid or alkali chemicals.
 - Take care not to allow the sling to become wet. The load may slip.
 - When required to use more than one sling, use slings with the same width and length to keep the lifted load balanced.
 - When lifting a load using an eyehole, be sure to eliminate any gaps between the sling and load. (Refer to the right illustration.) Reduce the load weight so that it is less than 80 % of the sling breaking force.
 - Avoid using twisted, bound, connected, or hitched slings.
 - Do not place any object on twisted or bent slings. (Refer to the right illustration.)
 - When removing the slings from under the load, take care not to damage the nylon slings. Avoid contact with protrusions.
 - Avoid dragging slings on the ground, throwing slings or pushing slings with a metal object.
 - When using with other types of slings (wire rope) or accessories (shackle), protect the joint so that the nylon sling is not damaged.
 - Store the nylon slings indoors so they won't deteriorate with heat, sun light, or chemicals.



W102-04-02-016



W105-04-01-008



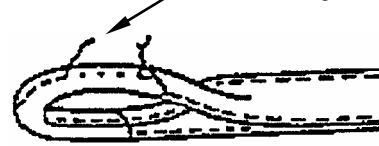
W162-01-01-009

GENERAL / Precautions for Disassembling and Assembling

CAUTION: If a load is lifted with a damaged nylon sling, serious personal injury may result. Be sure to visually check the nylon sling for any damage before using.

2. Before using a nylon sling, visually check the nylon sling for any damage corresponding to examples shown to the right. If any damage is found, cut and discard the sling. Even if no damage is found, do not use slings older than 7-years.

Damaged Appearance Broken Sewing Thread



W162-01-01-002

Scuffing



W162-01-01-003



W162-01-01-004

Broken Sewing Thread



W162-01-01-005

Broken Sewing Thread



W162-01-01-006

Scoring

Separation of Belt



W162-01-01-007

Fuzz

Scuffing

Broken Warp



W162-01-01-008

GENERAL / Precautions for Disassembling and Assembling

MAINTENANCE STANDARD TERMINOLOGY

“Standard”

1. Dimension for parts on a new machine.
2. Dimension of new components or assemblies adjusted to specification.

“Allowable Limit”

1. Normal machine performance cannot be accomplished after exceeding this limit.
2. Repair or adjustment is impossible after exceeding this limit.
3. Therefore, in consideration of operation efficiency and maintenance expense, proper maintenance shall be carried out before reaching the “Allowable Limit”.

GENERAL / Precautions for Disassembling and Assembling

(Blank)

GENERAL / Tightening


TIGHTENING TORQUE SPECIFICATIONS

Bolts and Nuts of Machine: Standard Tightening Torque Chart

	Descriptions	Bolt Dia.	Q'ty	Wrench Size (mm)	Torque N·m (kgf·m, lbf·ft)
1	Front axle mounting bolt	24	8	36	785 (80, 580)
2	Rear axle support mounting bolt	24	8	36	890 (91, 660)
3	Wheel rim mounting bolt	24	60	36	890 (91, 660)
4	Propeller shaft mounting bolt	12	20	17	**143 (15, 105)
5	Propeller shaft support bearing mounting bolt	20	2	30	206 (21, 152)
6	Transmission mounting bolt; bracket	16	8	24	**204 (21, 150)
7	Transmission mounting bolt; cushion rubber	18	4	27	315 (32, 230)
8	Engine mounting bolt; bracket	12	6	17	81.2 (8, 60)
9	Engine mounting bolt; cushion rubber	18	2	27	315 (32, 230)
10	Counterweight mounting bolt	30	4	46	1510 (154, 1110)
11	Flange above upper center pin fixing (The bolts with mark ** are located at center of flange.)	16	7	24	224 (23, 165)
12	Lower center pin stopper	16	1	24	86.9 (9, 64)
13	Loader front pin stopper	12/16	4/9	17	34.2 (3)/86.9 (9, 64)
14	Steering cylinder pin stopper	16	4	24	86.9 (9, 64)
15	Radiator frame mounting bolt	16	6	24	232 (24, 170)
16	Radiator mounting bolt	10	2	14	39 to 49 (4 to 5, 29 to 36)
17	Intercooler mounting bolt	10	2	14	39 to 49 (4 to 5, 29 to 36)
18	Oil cooler mounting bolt	14	4	22	60 to 75 (6 to 7.5, 44 to 55)
19	Torque converter mounting bolt	12	4	17	60 to 75 (6 to 7.5, 44 to 55)
20	Air conditioner condenser mounting bolt	8	4	12	12.5 (1, 9.2)
21	Air conditioner compressor mounting bolt	8	4	12	23 to 30 (2 to 3, 20 to 22)
22	Cab cushion rubber	16	4	24	**205 (21, 151)
23	Bucket teeth mounting bolt (optional)	*11/4'	16	46	1940 (198, 1430)
24	Cutting edge mounting bolt	*1'	12	37.47	1068 (109, 790)
25	Wear plate mounting bolt	*1'	4	37.47	1068 (109, 790)

As for the bolt Dia. with mark *, the dimension is indicated in inch.

As for torque with mark **, LOCTITE #262 is used.

 **NOTE:** When tightening, apply lubricant in order to reduce friction coefficient of bolts and nuts.
(Ex. white zinc B dissolved into spindle oil)
Remove rust, dirt and dust before installing fasteners.

GENERAL / Tightening

TORQUE CHART



CAUTION: Use tools appropriate for the work to be done. The make-do tools or parts are dangerous. As the incorrect size tools are slipped or removed, personal injury may be caused.



Bolt Types

Tighten the nuts or bolts correctly to the torque specifications.

As the different types and grades of bolt are used, use and tighten the correct bolts correctly when assembling the machine or components.

SA-040

Specified Tightening Torque

Bolt Dia. (mm)	Hexagon Wrench									Wrench Size mm
	4.6			8.8			10.9			
	M4GB-07-121			M4GB-07-122			M4GB-07-123			
	N·m	kgf·cm	lbf·ft	N·m	kgf·cm	lbf·ft	N·m	kgf·cm	lbf·ft	
4	1.15	11.7	0.8	3.06	31.2	2.3	4.49	45.8	3.3	7
5	2.36	24.1	1.7	6.30	64.2	4.6	9.24	94.2	6.8	8
6	3.98	40.6	2.9	10.6	108	7.8	15.6	159	11.5	10
8	9.81	100	7.2	26.1	266	19	38.3	391	28	13
10	19.5	199	14.5	52.1	531	38	76.5	780	56	17
12	34.2	349	25	91.2	930	67	133	1360	98	19
14	55.0	561	41	146	1490	108	216	2200	159	22
16	86.9	886	64	232	2370	170	341	3480	250	24
18	118	1200	87	315	3210	230	463	4720	340	27
20	171	1740	126	452	4610	330	665	6780	490	30
22	234	2390	170	624	6360	460	918	9360	680	32
24	293	2990	215	782	7970	580	1150	11700	850	36
27	436	4450	320	1160	11800	860	1720	17500	1270	41
30	588	6000	430	1570	16000	1160	2300	23500	1700	46
33	810	8260	600	2160	22000	1600	3170	32300	2340	50
36	1030	10500	760	2770	28200	2040	4060	41400	2990	55
39	1350	13800	1000	3600	36700	2660	5290	53900	3900	60

GENERAL / Tightening

Specified Tightening Torque

Bolt Dia. (mm)	Socket Bolt			Wrench Size (mm)
	N·m	kgf·cm	lbf·ft	
4	4.49	45.8	3.3	3
5	9.24	94.2	6.8	4
6	15.6	159	11.5	5
8	38.3	391	28	6
10	76.5	780	56	8
12	133	1360	98	10
14	216	2200	159	12
16	341	3480	250	14
18	463	4720	340	14
20	665	6780	490	17
22	918	9360	680	17
24	1150	11700	850	19
27	1720	17500	1270	19
30	2300	23500	1700	22
33	3170	32300	2340	24
36	4060	41400	3000	27
39	5290	53900	3900	27

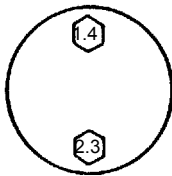
IMPORTANT: The following items are applied to both fine and coarse pitch threads.

1. When tightening, apply lubricant in order to reduce friction coefficient of bolts and nuts. (Ex. white zinc B dissolved into spindle oil)
2. Torque tolerance is $\pm 20\%$.
3. Use the bolts of correct length. The bolts that are too long cannot be tightened as the bolt tip comes into contact with the bottom of bolt hole. The bolts that are too short cannot develop sufficient tightening force.
4. The torques given in table on the previous page are for general use only. Do not use these torques if a different torque is given for a specific application.
5. Clean the nut and bolt threads and remove dirt or corrosion before installing.

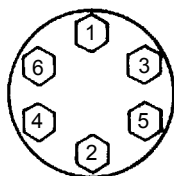
Tightening Order

When tightening two or more bolts, tighten them alternately, as shown, to ensure even tightening.

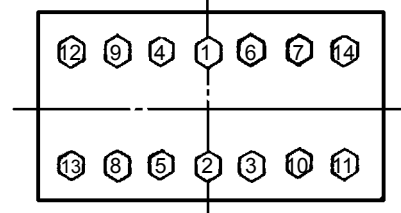
Equally tighten upper and lower alternately



Tighten diagonally



Tighten from center and diagonally

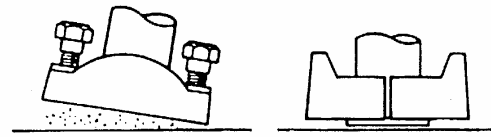


W105-01-01-003

GENERAL / Tightening

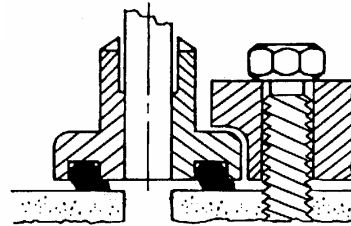
Precautions for Spilt Flange

- IMPORTANT:**
1. Clean the sealing surfaces. Check if the scratches / roughness that cause leaks and damage of O-ring are found.
 2. Use only specified O-rings. Inspect O-rings for any damage. Do not file the O-ring surfaces. When installing O-ring into a groove, use grease in order to hold O-ring in place.
 3. While tightening the bolt by hand, check that flange is installed to the port correctly. Do not pinch the O-ring.
 4. Tighten the bolts alternately and diagonally, in order to ensure even tightening to the specified torque.
 5. Do not use air wrenches. Using an air wrench often causes tightening of one bolt fully before tighten the others, resulting in damage to O-rings or uneven tightening of bolts.

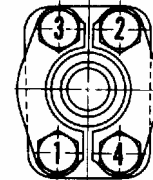


W105-01-01-015

WRONG

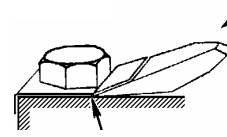


W105-01-01-016



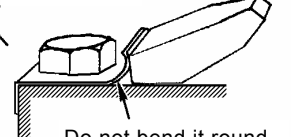
W105-01-01-008

RIGHT



Bend along edge sharply

WRONG



Do not bend it round

Nut and Bolt Locking

- Lock Plate

IMPORTANT: Do not reuse the lock plates. Do not try to bend the same point twice.

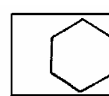
- Split Pin

IMPORTANT: Do not align the holes in the bolt and nut while loosening. Tighten and align anytime. Do not reuse the cotter pins.

- Wire

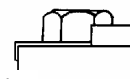
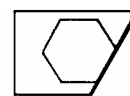
IMPORTANT: Attach a wire to bolts in the bolt-tightening direction. Do not reuse the wire.

RIGHT

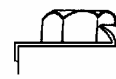
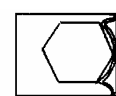


Bend along edge sharply

RIGHT



WRONG



W105-01-01-009

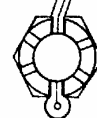
RIGHT



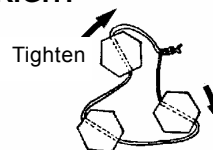
RIGHT



WRONG



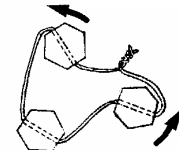
RIGHT



Tighten

Loosen

WRONG

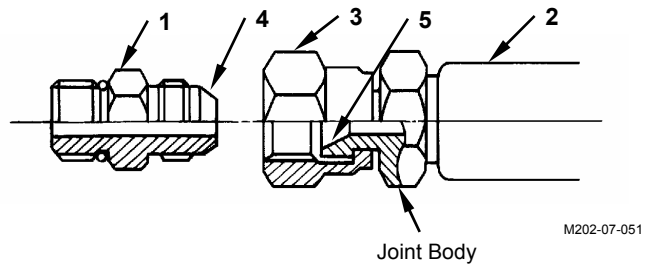


W105-01-01-010

GENERAL / Tightening

PIPING JOINT

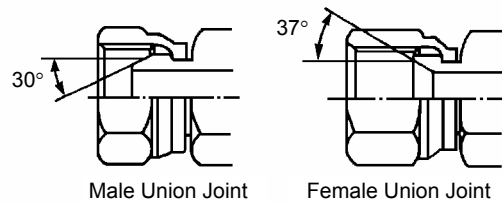
IMPORTANT: The torques given in the chart below are for general use only. Do not use these torques if a different torque is given for a specific application.



Union Joint

Metal sealing surfaces (4) and (5) of adapter (1) and hose (2) fit together to seal pressure oil. Union joints are used to join small-diameter lines.

- IMPORTANT:**
1. Do not over-tighten nut (3). Excessive force will be applied to metal sealing surfaces (4) and (5), possibly cracking adapter (1). Be sure to tighten nut (3) to specifications.
 2. Scratches or other damage to sealing surfaces (4) or (5) will cause oil leakage at the joint. Take care not to damage them when connecting/disconnecting.



W105-01-01-017

Description	Wrench Size mm	Wrench Size mm	Tightening Torque
	Union Nut	Hose Fittings	N-m (kgf-m, lbf-ft)
30° male	17	17	24.5 (2.5, 18)
	19	19	29.5 (3.0, 21.5)
	22	22	39 (4.0, 28.5)
	27	27	93 (9.5, 69)
	32	32	137 (14.0, 101)
	36	36	175 (18.0, 129)
	41	41	205 (21.0, 151)
37° female	17	14	24.5 (2.5, 18)
	19	17	29.5 (3.0, 21.5)
	22	19	39 (4.0, 28.5)
	27	22	93 (9.5, 69)
	32	27	137 (14.0, 101)
	36	32	175 (18.0, 129)
	41	36	205 (21.0, 151)

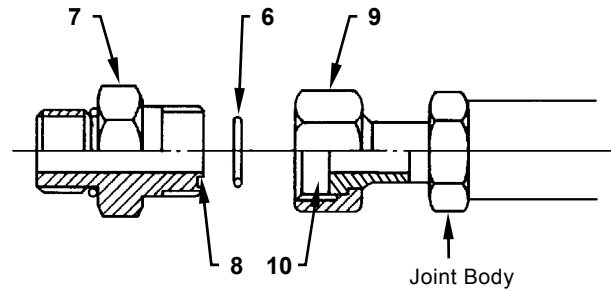
NOTE: Tightening torque of 37° male coupling without union is similar to tightening torque of 37° female.

GENERAL / Tightening

O-ring Seal Joint

O-ring (6) is installed against the end face of adapter (7) and seals pressure oil.

- IMPORTANT:**
1. Replace O-ring (6) with a new one when reinstalling.
 2. Before tightening union nut (9), confirm that O-ring (6) is seated correctly in O-ring groove (8). Tightening union nut (9) with O-ring (6) displaced will damage O-ring (6), resulting in oil leakage.
 3. Do not damage O-ring groove (8) or sealing surface (10) in adapter (7). Damage to O-ring (6) may cause oil leakage.
 4. If union nut (9) is found to be loose, causing oil leakage, do not tighten it to stop the leak. Instead, replace O-ring (6) with a new one, then tighten union nut (9) after confirming that O-ring (6) is securely seated in place.



M104-07-033

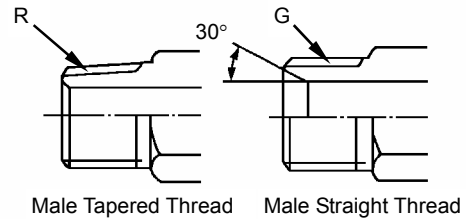
Wrench Size mm	Wrench Size mm	Tightening Torque
Union Nut	Hose Fittings	N·m (kgf·m, lbf·ft)
19	17	29.5 (3.0,21.5)
22	19	69 (7.0,51)
27	22	93 (9.5,69)
32	27	137 (14.0,101)
36	30,32	175 (18.0,129)
41	36	205 (21.0,151)
46	41	205 (21.0,151)

GENERAL / Tightening

Screw-In Connection

Depending on types of screw and sealing, different types of screw-in connection are used.

IMPORTANT: Check that the thread pitch and thread type (tapered or straight) are the correct type before using any screw-in connection.
(In general, the screw-in connection of male tapered thread is used except when measuring.)



W105-01-01-018

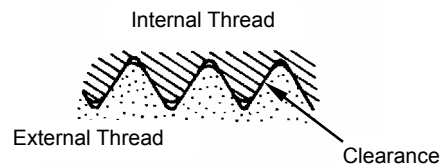
Male Tapered Thread		
Wrench Size mm	Tightening Torque N·m (kgf·m, lbf·ft)	
Hose Fittings	FC material	SS material
19	14.5 (1.5,10.5)	34 (3.5,25)
22	29.5 (3.0,21.5)	49 (5.0,36)
27	49 (5.0,36)	93 (9.5,69)
36	69 (7.0,51)	157 (16,116)
41	108 (11,80)	205 (21,151)
50	157 (16,116)	320 (33,235)
60	195 (20,144)	

Seal Tape Application

Seal tape is used in order to seal clearances between male and female threads so that any leaks between threads may be prevented. Apply just enough seal tape to fill up thread clearances. Do not overwrap.

• Application Procedure

Check that the thread surface is clean and, free of dirt or damage. Apply the seal tape around threads in order to leave one to two pitch threads uncovered. Wrap the seal tape in the same direction as the threads.



W105-01-01-019

Low-Pressure-Hose Clamp Tightening

Low-pressure-hose clamp tightening torque differs depending on the type of clamp.

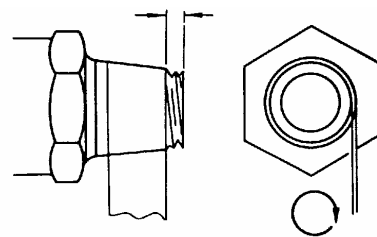
T-Bolt Type Band Clamp:

4.4 N·m (0.45 kgf·m, 3.25 lbf·ft)

Worm Gear Type Band Clamp:

5.9 to 6.9 N·m (0.6 to 0.7 kg·m, 4.3 to 5.1 lbf·ft)

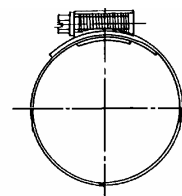
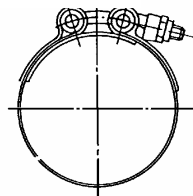
Leave one to two pitch threads uncovered



M114-07-041

T-Bolt Type Band Clamp

Worm Gear Type Band Clamp



M114-07-042

M114-07-043

GENERAL / Tightening

Connecting Hose



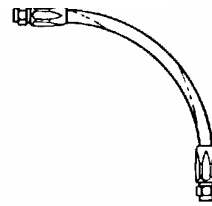
CAUTION: When replacing the hoses, use only genuine Hitachi service parts. Using hoses other than genuine Hitachi hoses may cause oil leaks, hose rupture or separation of fitting, possibly resulting in a fire on the machine.

Do not install hoses kinked. Application of high oil pressure, vibration, or an impact to a kinked hose may result in oil leaks, hose rupture or separation of fitting. Utilize the print marks on hoses when installing in order to prevent hose from being kinked.

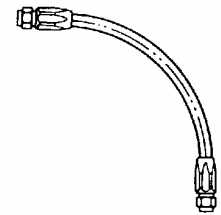
Take necessary measures to protect hoses from rubbing against each other. If the hoses rub against each other, wear to the hoses may result and lead to hose rupture.

Take care so that the hoses do not come into contact with the moving parts or sharp objects.

WRONG

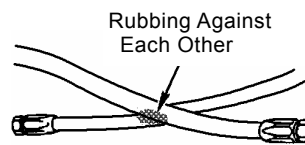


RIGHT

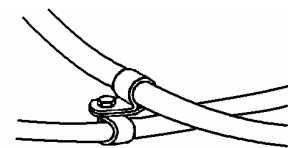


W105-01-01-011

WRONG

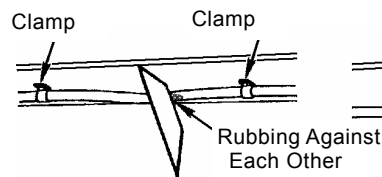


RIGHT

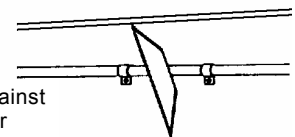


W105-01-01-012

WRONG

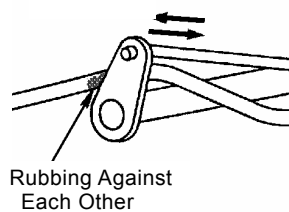


RIGHT

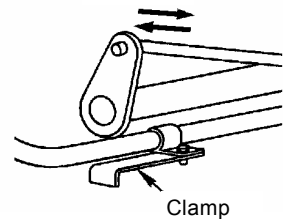


W105-01-01-013

WRONG



RIGHT



W105-01-01-014

GENERAL / Tightening

PERIODIC REPLACEMENT OF PARTS

1. Periodic Replacement Parts (1) (Safety Inspection Object)

In order to ensure safe operation, the users must conduct daily checking before starting operation and periodic inspection of the machine by law.

In order to ensure safe operation, conduct periodic replacement of the security parts below.

		Replacement Parts Name	Replacement Intervals	Replacement Cause
Engine	Fuel tank	Hose	Every 2 years	Fire breaking may occur because of fuel leakage.
Brake system	Brake valve	Seals (rubber)	Every 1 year	If oil leakage occurs when traveling, the machine cannot be controlled.
	Wet-type brake	D-ring in piston	Every 4 years	
	Brake pipe	Hose	Every 2 years	
	Stop Lamp	Switch	Every 2 years	
	Accumulator	Accumulator (3 used)	Every 2 years	
Steering system	Steering pipe	Hose (including low pressure hose)	Every 2 years	If oil leakage occurs, the steering cannot be controlled.
	Steering cylinder	Seals (rubber)	Every 4 years	
	Steering valve	Seals (rubber)	Every 2 years	

1. These parts deteriorate, fatigue and weaken with time. As it is very difficult to gauge extent of the damaged parts according to periodic inspection, replace them with the new ones regardless of defect in the interval.
2. If any of these parts are found to be defective regardless of the interval, repair or replace these parts.

GENERAL / Tightening


2. Periodic Replacement Parts (2)

In order to ensure safe operation, conduct periodic inspection of the machine. In order to ensure safe operation further, conduct periodic replacement of the parts below specially related to safety.

These parts deteriorate, fatigue and weaken with time. This may cause serious personal/impersonal hazard. As it is very difficult to gauge remnant life of these parts according to driving sensation or appearance inspection, replace them with the new ones regardless of defect in the interval.

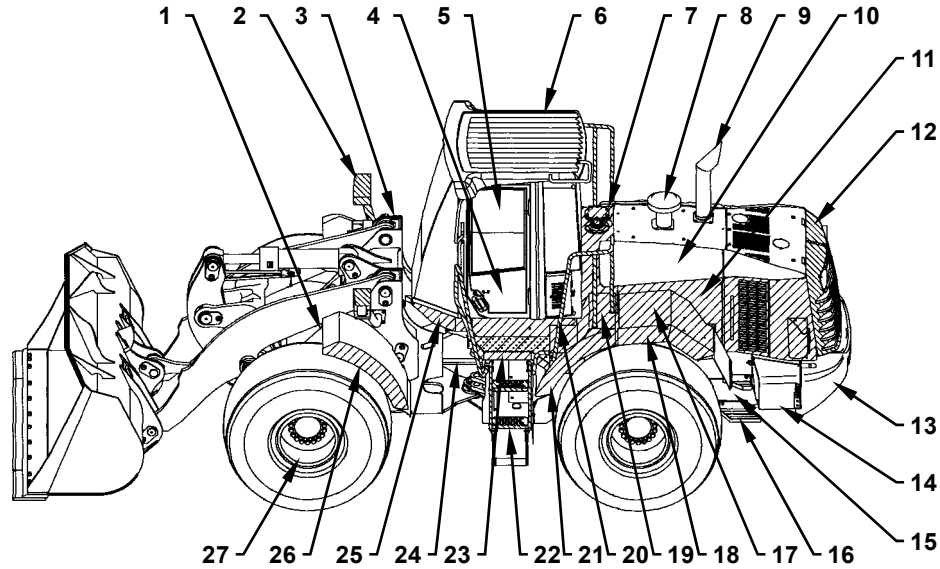
If any of these parts are found to be defective according to periodic inspection regardless of the interval, replace these parts

		Replacement Parts Name	Replacement Intervals
Hydraulic system	Pump	Suction hose Delivery hose	Every 2 years
	Working system	Bucket cylinder hose Pilot hose Lift arm cylinder line hose Hydraulic oil tank return hose Hydraulic oil cooler line hose	Every 2 years
Driver's seat	Seat belt	Seat belt	Every 3 years

 **NOTE:** Replace O-rings and the gaskets when replacing the hoses.

GENERAL / Painting

PAINTING



W4GB-01-03-001

	Surfaces to Be Painted	Painting Color		Surfaces to Be Painted	Painting Color
1	Front Fender	YR-01[TAXI Yellow]	15	Fuel Tank	YR-01[TAXI Yellow]
2	Lamp Bracket	Warm Gray	16	Rear Step	YR-01[TAXI Yellow]
3	Body	YR-01[TAXI Yellow]	17	Full Fender	HG Beige Deep
4	Cockpit and mounting parts (Valve control box and so on)	HG Beige Deep	18	Fender Cover	Not painted
5	Inside and Outside Surface of Cab	HG Beige Deep	19	Rear Fender	HG Beige Deep
6	Outside of Cab	HG Beige Deep	20	Handrail	Warm Gray
7	Oil Tank	HG Beige Deep	21	Fender Cover	Not painted
8	Pre-Cleaner	Not painted	22	Step	Warm Gray
9	Tail Pipe	Not painted	23	Deck Plate	HG Beige Deep
10	Side Cover	Not painted	24	Articulate lock Bar	Red
11	Lower Cover	HG Beige Deep	25	Cockpit Skirt	HG Beige Deep
12	Rear Grill	Not painted	26	Fender Cover	Not painted
13	Counterweight	YR-01[TAXI Yellow]	27	Rim	YR-01[TAXI Yellow]
14	Battery Box	YR-01[TAXI Yellow]			

IMPORTANT: When cleaning around front attachment or cylinder, etc. fitted with HN bushing, do not pour washing liquid directly on the bushing.
The ambient temperature should not exceed 70 °C (158 °F) when painting and drying.

GENERAL / Painting

(Blank)

GENERAL / Bleed Air From Hydraulic Oil Tank

BLEED AIR FROM HYDRAULIC OIL TANK




CAUTION: Escaping fluid under pressure may penetrate the skin and eyes, and cause serious injury. Release the pressure before removing hydraulic or other lines.

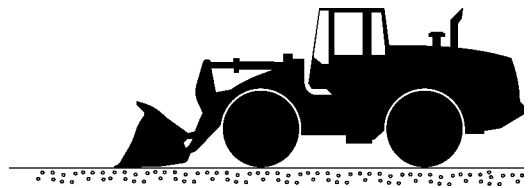
Hot hydraulic oil just after operation may spout and cause severe burns. Wait for oil in order to cool before starting any work.

Do not turn the cap on hydraulic oil tank quickly. The cap may fly off by internal pressure. Release any remaining pressure and remove the cap.

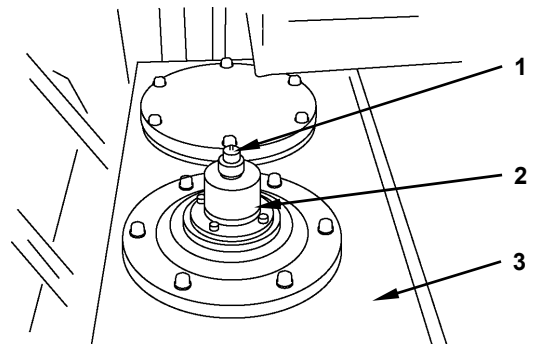
Preparation

1. Park the machine on a solid, level surface. Lower the front attachment onto the ground.
2. Stop the engine. Push valve (1) on hydraulic oil tank (3) and release any remaining pressure.
3. Remove cap (2) on hydraulic oil tank (3).
4. Install a vacuum pump to the hole without cap (2). Operate the vacuum pump and maintain negative pressure in hydraulic oil tank (3).

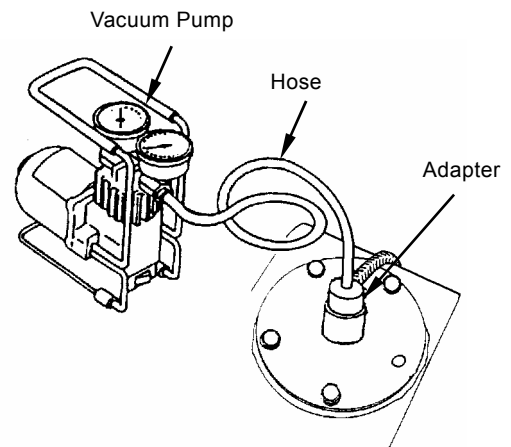
 **NOTE:** Run the vacuum pump continuously while working.



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W4GB-01-01-002



W562-02-03-008

GENERAL / Bleed Air From Hydraulic Oil Tank

(Blank)

SECTION 2 BODY (UPPERSTRUCTURE)



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Group 1 Cab

Removal and Installation of Cab W2-1-1

Group 2 Counterweight

Removal and Installation of
Counterweight W2-2-1

Group 3 Center Hinge

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Assembly of Center Hinge W2-3-6

Group 4 Hood

Removal and Installation of Hood W2-4-1

Group 5 Hydraulic Oil Tank

Removal and Installation of
Hydraulic Oil Tank W2-5-1

Group 6 Pump Device

Removal and Installation of
Pump Device W2-6-1
Removal and Installation of
Pilot Pump and Regulator W2-6-8
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Assembly of Main Pump W2-6-16
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for Additional Circuit (Optional) W2-8-32

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Pilot Shut-Off Valve W2-9-1
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Group 10 Fan Pump and Motor

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Removal and Installation of Fan Motor W2-10-3
Structure of Fan Pump W2-10-8
Fan Motor Standard W2-10-10


(Blank)


BODY (UPPERSTRUCTURE) / Cab

REMOVAL AND INSTALLATION OF CAB


Removal of Cab with Floor Plate Attached

1. Remove sems bolts (2) (12 used) from covers (1) (5 used). Remove covers (1) (5 used) from floor plate (3).


 : 14 mm

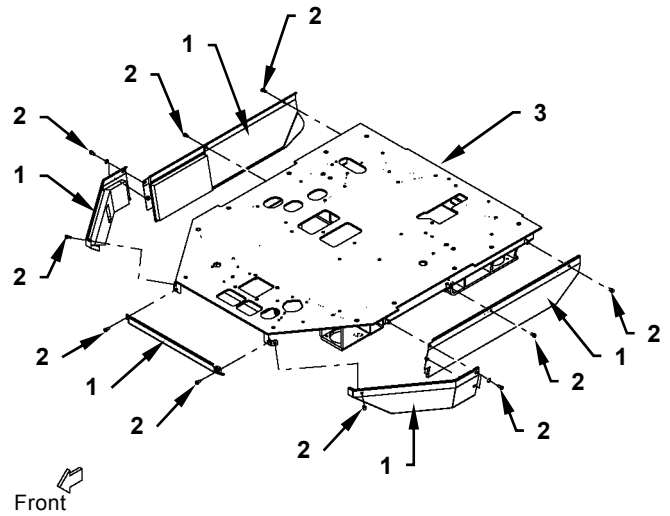
 **CAUTION:** Hydraulic pressure is accumulated in the hydraulic system by an accumulator. Reduce pressure according to the work point for each before disconnecting the main, steering and brake system hoses.

2. Disconnect hose (5) from charging block (4) and oil filter (6).

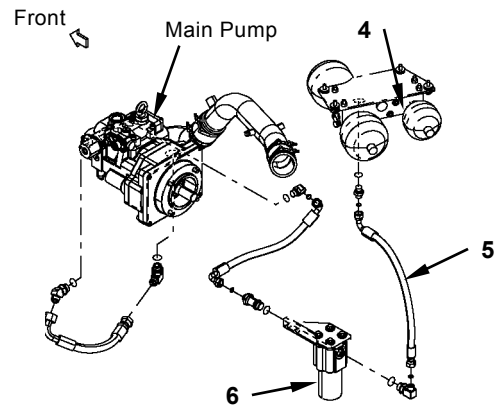
 : 27 mm, 32 mm

3. Remove sems bolts (7) (3 used) from clips (8) (3 used). Disconnect hose (9) from charging block (4) and return pipe (10). Disconnect hose (12) from main pump (11) and charging block (4).

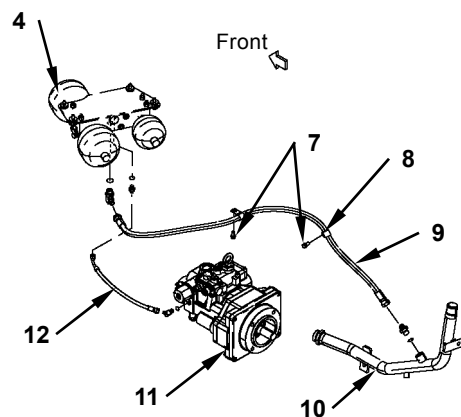
 : 14 mm, 19 mm, 22 mm, 27 mm



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W4GB-02-01-002

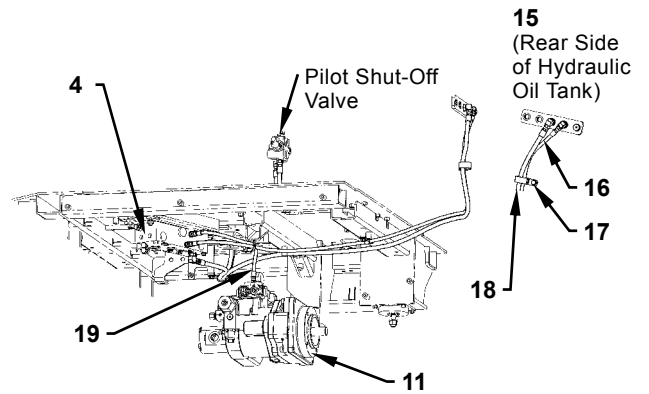


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BODY (UPPERSTRUCTURE) / Cab


4. Remove sems bolts (17) (2 used) from clips (18) (2 used). Disconnect hose (19) from charging block (4) and main pump (11). Disconnect hose (16) from charging block (4) and the rear side of hydraulic oil tank (15).

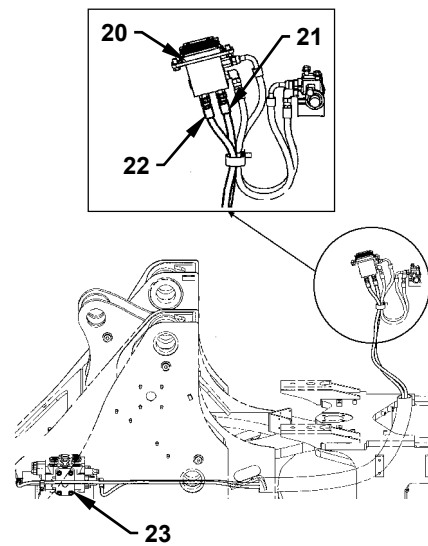
 : 14 mm, 19 mm, 22 mm



W4GB-02-01-004


5. Disconnect hoses (21, 22) from pilot valve (20) and main valve (23).

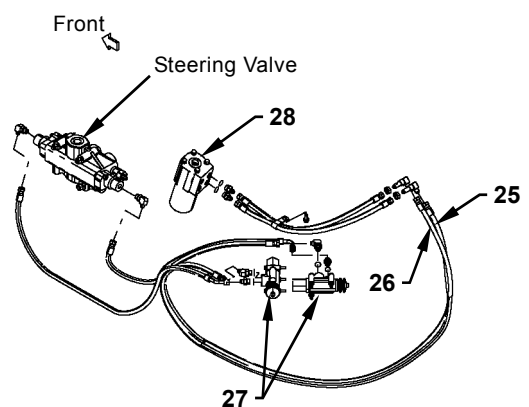
 : 19 mm, 22 mm



W4GB-02-01-005

6. Disconnect hoses (25, 26) from steering pilot valve (28) and stop valve (27).


 : 19 mm, 22 mm

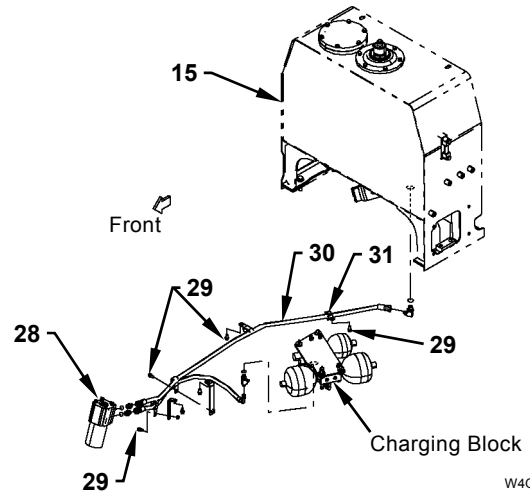


W4GB-02-01-006


BODY (UPPERSTRUCTURE) / Cab

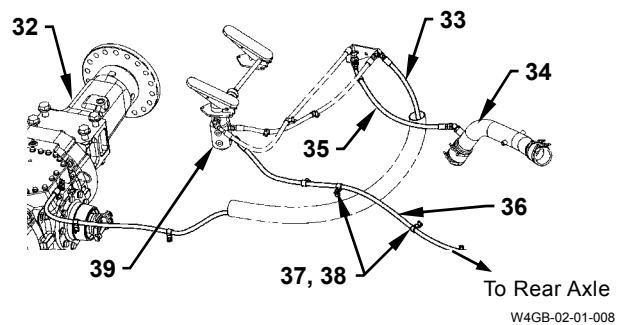
7. Remove semi bolts (29) (4 used) from clips (31) (4 used). Disconnect hose (30) from steering pilot valve (28) and hydraulic oil tank (15).

 : 14 mm, 22 mm, 27 mm




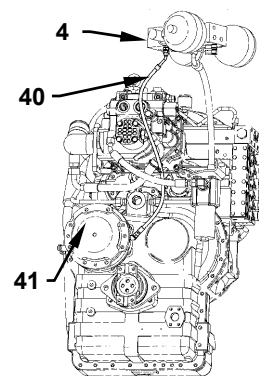
8. Remove semi bolts (38) (4 used) from clips (37) (4 used). Disconnect hose (33) from brake valve (39) and front axle (32). Disconnect hose (35) from brake valve (39) and suction tube (34). Disconnect hose (36) from brake valve (39) and the rear axle.

 : 14 mm, 19 mm, 22 mm, 27 mm




9. Disconnect hose (40) from charging block (4) and parking brake lock (41).

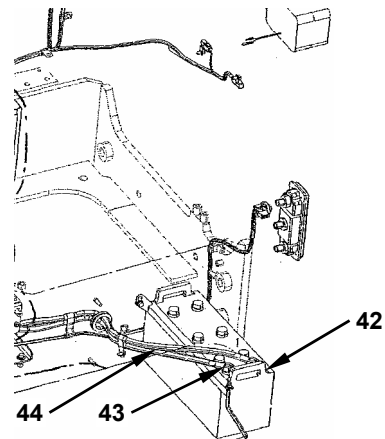
 : 19 mm



BODY (UPPERSTRUCTURE) / Cab

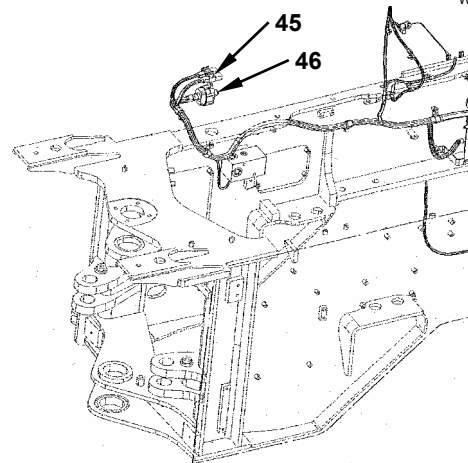
10. Remove bolt (43) for terminal minus from battery (42) either left or right side. Disconnect battery cable (44).


 : 12 mm



11. Disconnect connectors (45, 46) of the wire harness under the cab.


W4GB-02-01-010




-  **CAUTION:** This machine uses new from R134a as refrigerant. Recover all the refrigerants. Do not release them into the atmosphere.

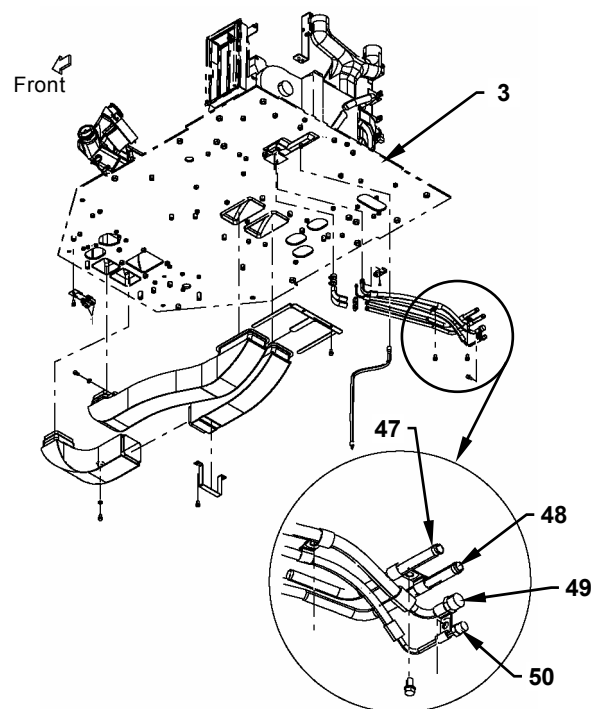
W4GB-02-01-011

12. Disconnect refrigerant hoses (49, 50) attached to the lower of cockpit (3).

 : 19 mm, 27 mm

13. Drain off coolant from the radiator. Disconnect the hose from heater pipings (47, 48).

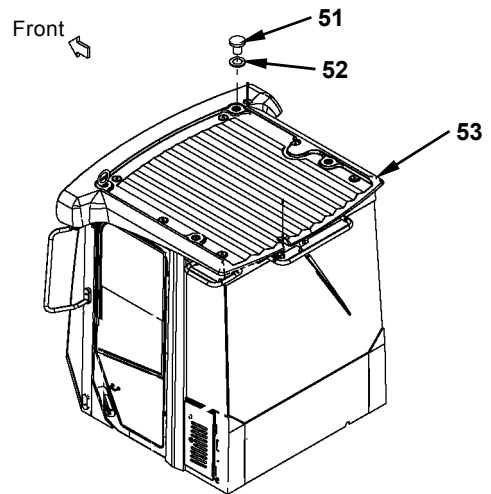
 : 17 mm, 24 mm



W4GB-02-01-012


BODY (UPPERSTRUCTURE) / Cab

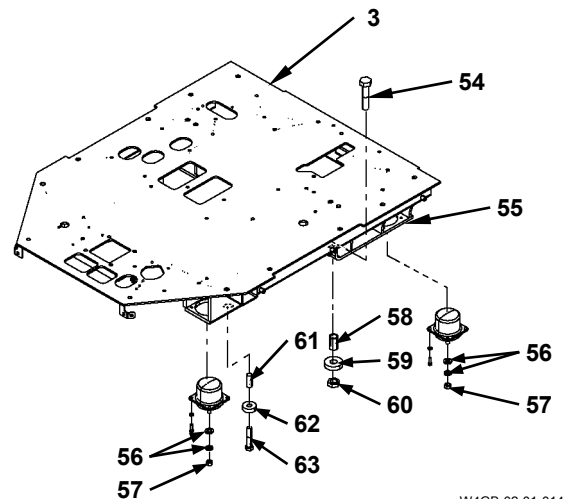
14. Remove caps (51) (4 used) and plates with the packing attached (52) (4 used) from the top of cab (53). Install eyebolts (M16, Pitch 2.0 mm) (4 used) to cab (53).




W4GB-02-01-013

15. Remove bolts (54, 63) (2 used for each), nuts (60) (2 used), (57) (4 used), plates (59, 62) (2 used for each), spacers (58, 61) (2 used for each) and washers (56) (8 used) which secure cockpit (3) and frame (55).

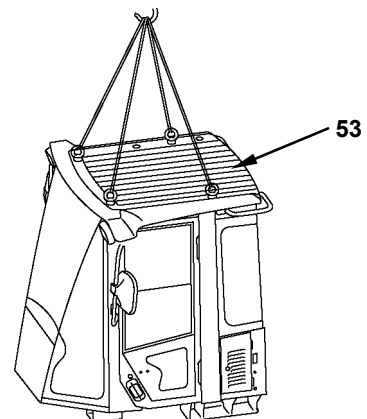
 : 14 mm, 30 mm, 46 mm



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 **CAUTION: Cab (53) weight: 1090 kg (2450 lb)**

16. Attach a nylon sling onto the eyebolt on the top of cab (53). Hoist and remove cab (53) from the cockpit.



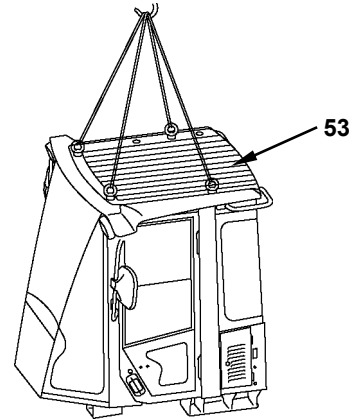
W4GB-02-01-015

BODY (UPPERSTRUCTURE) / Cab

Installation of Cab







CAUTION: Cab (53) weight: 1090 kg (2450 lb)

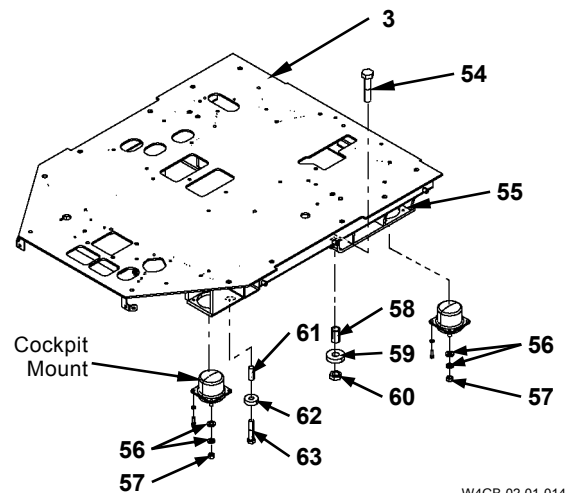
1. Attach a nylon sling onto the eyebolts on the top of cab (53). Hoist and align cab (53) with the mounting hole on the cockpit.



W4GB-02-01-015

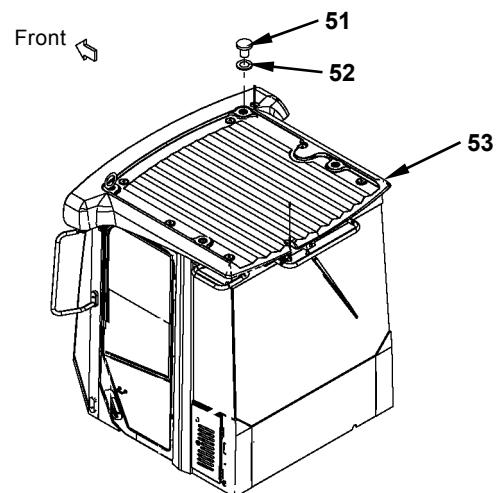
2. Install cockpit (3) to frame (55) with bolts (54, 63) (2 used for each), nuts (60) (2 used), (57) (4 used), plates (59, 62) (2 used for each), spacers (58, 61) (2 used for each) and washers (56) (8 used). At this time, install washer (56) between the cockpit mount and frame (55).

-  : 14 mm
-  : 50 N·m (5 kgf·m, 37 lbf·ft)
-  : 30 mm
-  : 137 N·m (14 kgf·m, 101 lbf·ft)
-  : 46 mm
-  : 1570 N·m (160 kgf·m, 1160 lbf·ft)



W4GB-02-01-014

2. Remove eyebolts (4 used) from the top of cab (53). Install caps (51) (4 used) and plates with the packing (52) (4 used) to cab (53).



W4GB-02-01-013

BODY (UPPERSTRUCTURE) / Cab

4. Connect refrigerant hoses (49, 50) attached to the lower of cockpit (3). Connect heater pipings (47, 48).



	: 17 mm
	: 24.5 N·m (2.5 kgf·m, 18 lbf·ft)
	: 19 mm
	: 29.4 N·m (3 kgf·m, 21.5 lbf·ft)
	: 24 mm
	: 39 N·m (4 kgf·m, 28.5 lbf·ft)
	: 27 mm
	: 78 N·m (8 kgf·m, 57.5 lbf·ft)

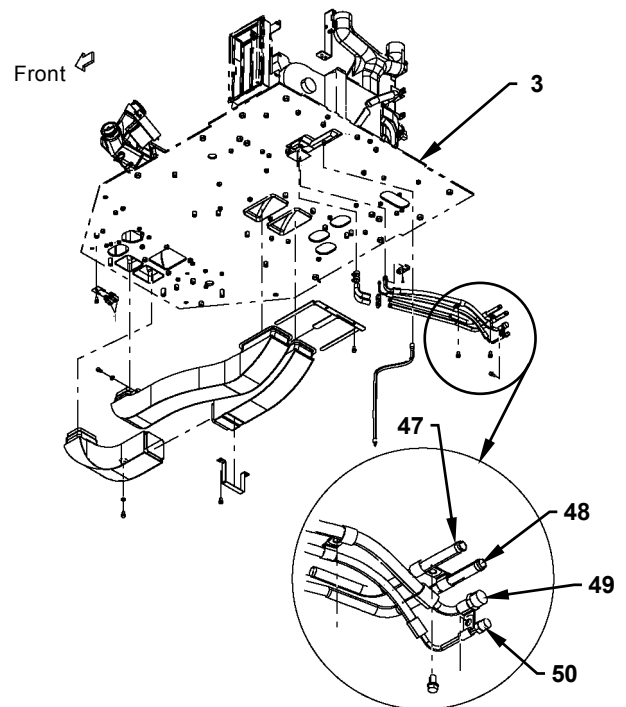
5. This machine uses new from R134a as refrigerant. Check for any gas leakage after injecting gas for the required amount.

Type	Refrigerant No.	Q'ty kg (lb)
HFC	R134a	1.05±0.05 (2.32±0.11)

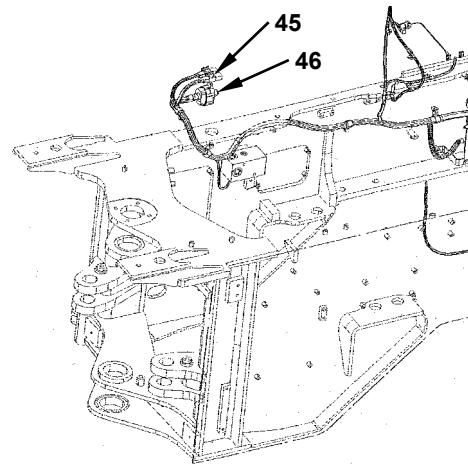
6. Connect connectors (45, 46) under the cab.

7. Connect battery cable (44) to terminal minus of battery (42) with bolt (43).

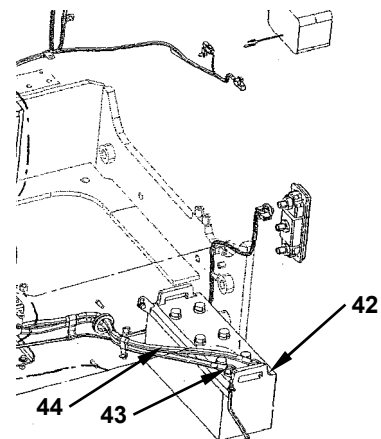
	: 12 mm
	: 10 N·m (1 kgf·m, 7.2 lbf·ft)



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W4GB-02-01-011




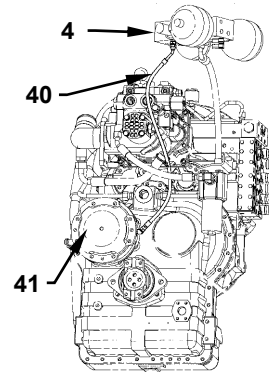
W4GB-02-01-010

BODY (UPPERSTRUCTURE) / Cab

8. Connect hose (40) to charging block (4) and parking brake lock (41).


 : 19 mm


 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)





W4GB-02-01-009


9. Connect hose (33) to brake valve (39) and front axle (32). Connect hose (35) to brake valve (39) and suction tube (34). Connect hose (36) to brake valve (39) and the rear axle. Secure clips (37) (4 used) to the frame with sems bolts (38) (4 used).


 : 14 mm


 : 20 N·m (2 kgf·m, 14.5 lbf·ft)


 : 19 mm

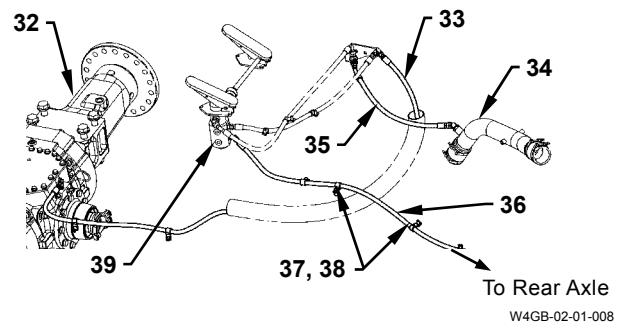
 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)

 : 22 mm

 : 39 N·m (4 kgf·m, 28.5 lbf·ft)


 : 27 mm


 : 78 N·m (8 kgf·m, 57.5 lbf·ft)





W4GB-02-01-008


10. Connect hose (30) to steering pilot valve (28) and hydraulic oil tank (15). Secure clips (31) (4 used) to the frame with sems bolts (29) (4 used).


 : 14 mm

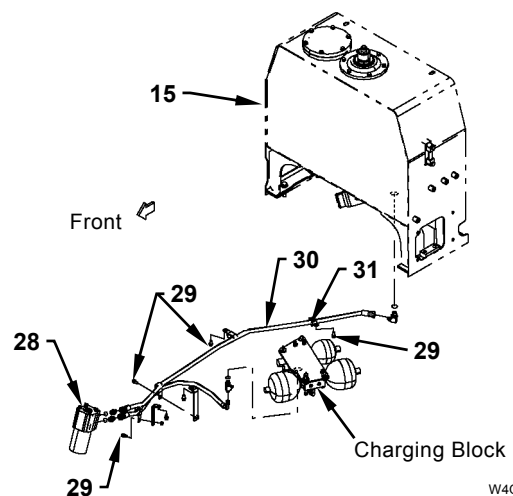
 : 20 N·m (2 kgf·m, 14.5 lbf·ft)

 : 22 mm

 : 39 N·m (4 kgf·m, 28.5 lbf·ft)

 : 27 mm





 : 78 N·m (8 kgf·m, 57.5 lbf·ft)

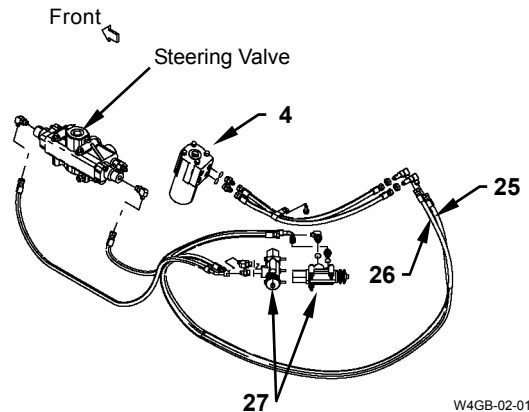


W4GB-02-01-007

BODY (UPPERSTRUCTURE) / Cab





11. Connect hoses (25, 26) to steering pilot valve (4) and stop valve (27).

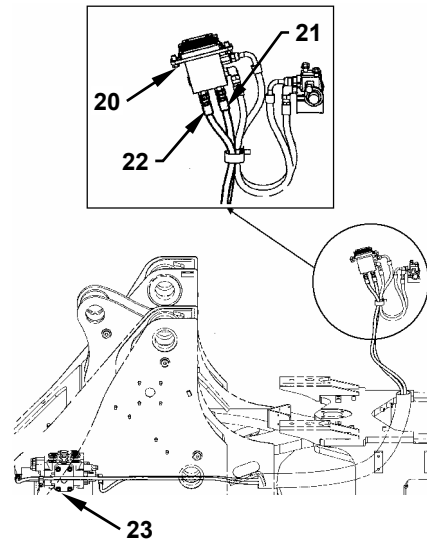
-  : 19 mm
-  : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)
-  : 22 mm
-  : 39 N·m (4 kgf·m, 28.5 lbf·ft)



W4GB-02-01-006


12. Connect hoses (21, 22) to pilot valve (20) and main valve (23).

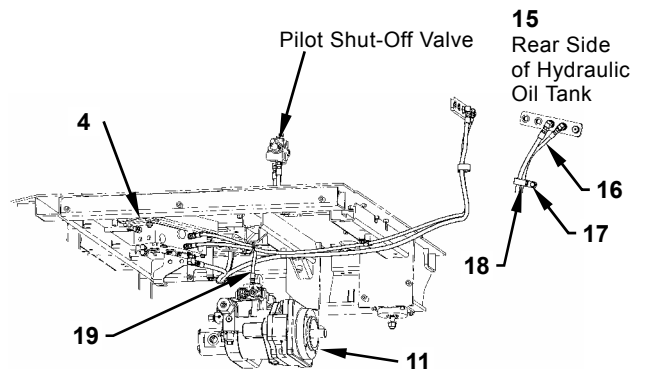
-  : 19 mm
-  : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)
-  : 22 mm
-  : 39 N·m (4 kgf·m, 28.5 lbf·ft)



W4GB-02-01-005

13. Connect hose (19) to charging block (4) and main pump (11). Connect hose (16) to charging block (4) and the rear side of hydraulic oil tank (15). Secure clips (18) (2 used) to the frame with sems bolts (17) (2 used).









-  : 14 mm
-  : 20 N·m (2 kgf·m, 14.5 lbf·ft)
-  : 19 mm
-  : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)
-  : 22 mm
-  : 39 N·m (4 kgf·m, 28.5 lbf·ft)

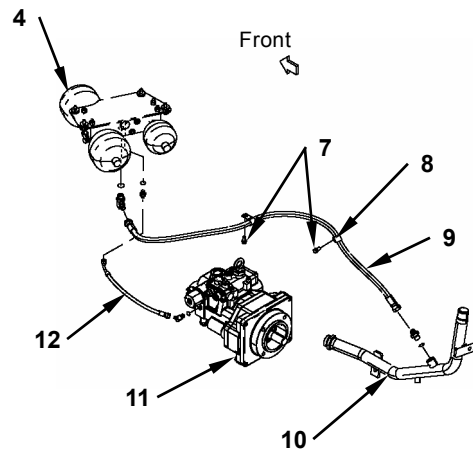


W4GB-02-01-004

BODY (UPPERSTRUCTURE) / Cab





14. Connect hose (9) to charging block (4) and return pipe (10). Secure clips (8) (3 used) to the frame with sems bolts (7) (3 used). Connect hose (12) to main pump (11) and charging block (4).

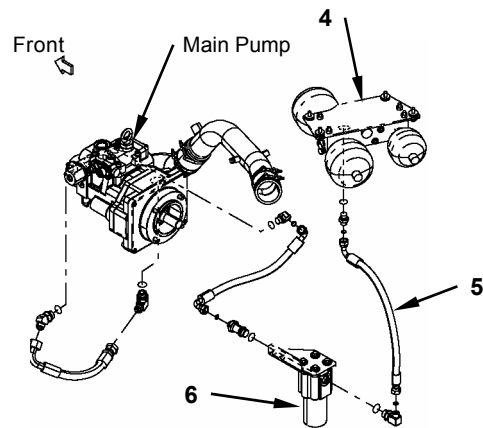
	: 14 mm
	: 20 N·m (2 kgf·m, 14.5 lbf·ft)
	: 19 mm
	: 29.5 N·m (3 kgf·m, 21.5 lbf·ft)
	: 22 mm
	: 39 N·m (4 kgf·m, 28.5 lbf·ft)
	: 27 mm
	: 78 N·m (8 kgf·m, 57.5 lbf·ft)



W4GB-02-01-003

15. Connect hose (5) to charging block (4) and oil filter (6).

	: 27 mm
	: 93 N·m (9.5 kgf·m, 69 lbf·ft)
	: 32 mm
	: 137 N·m (14 kgf·m, 101 lbf·ft)



W4GB-02-01-002





CAUTION: Wear safety goggles and gloves when checking oil leaks. Apply cardboard or laminated wood at the check point. High-pressure oil may cause serious injury to the skin and eyes.

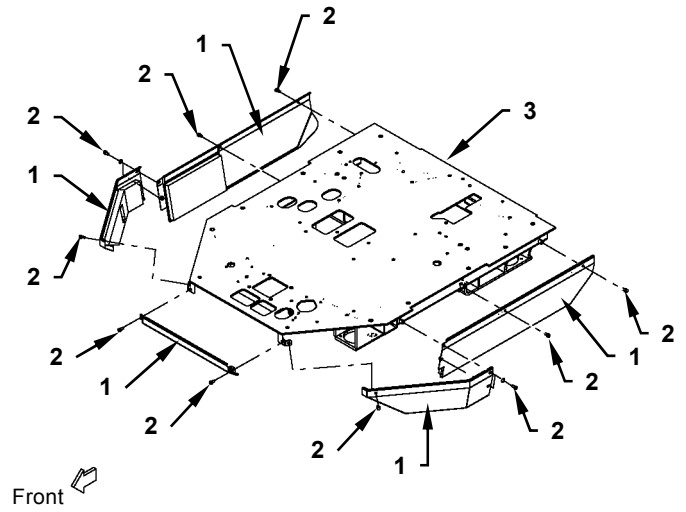
16. Add coolant to the radiator. Start the engine and the test run.
Check for any oil leakage at the hose connections.

BODY (UPPERSTRUCTURE) / Cab

17. Install covers (1) (5 used) to floor plate (3) with
sems bolts (2) (12 used).

 : 14 mm

 : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)



W4GB-02-01-001

BODY (UPPERSTRUCTURE) / Cab

(Blank)

BODY (UPPERSTRUCTURE) / Counterweight

REMOVAL AND INSTALLATION OF COUNTERWEIGHT

Removal

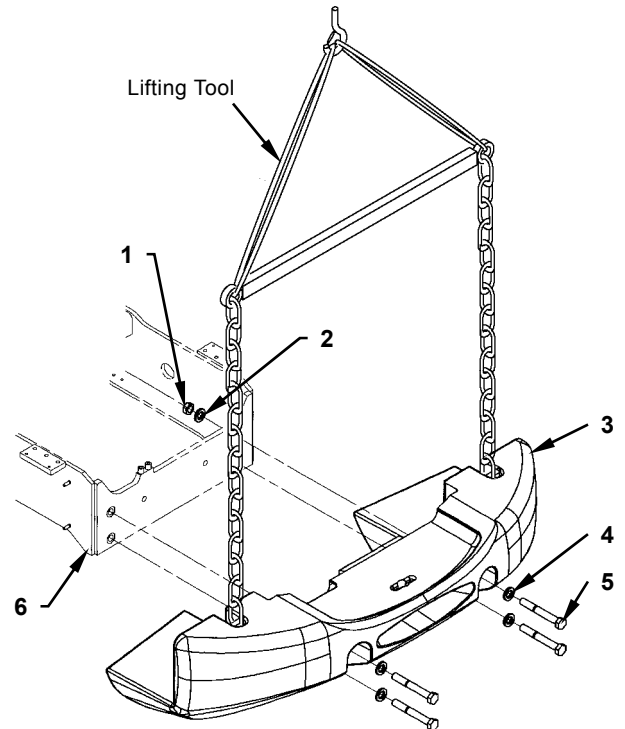
IMPORTANT: If removing counterweight (3) with the rear grill closed, the rear grill may be damaged.

1. Open the rear grill.

CAUTION: Counterweight (3) weight: 1300 kg (2900 lb)

CAUTION: When hoisting counterweight (3) too much, it difficult to remove bolt (5) and the screw part may be damaged.

2. Install a lifting tool to counterweight (3). Hold counterweight (3).
3. Remove nuts (1) (2 used) and washers (2) (2 used) from bolts (5) (2 used) on the upper side.
🔧 : 46 mm
4. Loosen bolts (5) (4 used). Remove bolts (5) (4 used) and washers (4) (4 used) from counterweight (3) while finely adjusting the hoist of counterweight (3).
🔧 : 46 mm
5. Remove counterweight (3) from frame (6).



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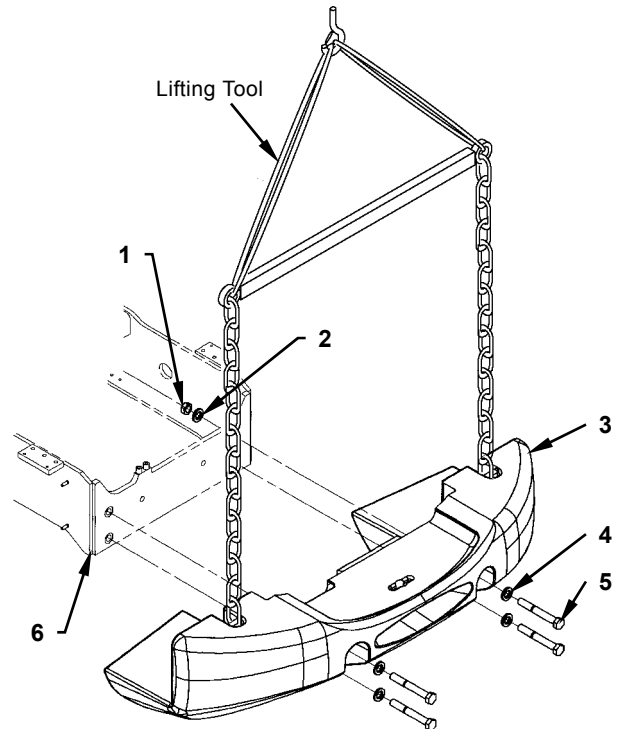
BODY (UPPERSTRUCTURE) / Counterweight

Installation

CAUTION: Counterweight (3) weight: 1300 kg (2900 lb)

CAUTION: When hoisting counterweight (3) too much, it difficult to remove bolt (5) and the screw part may be damaged.

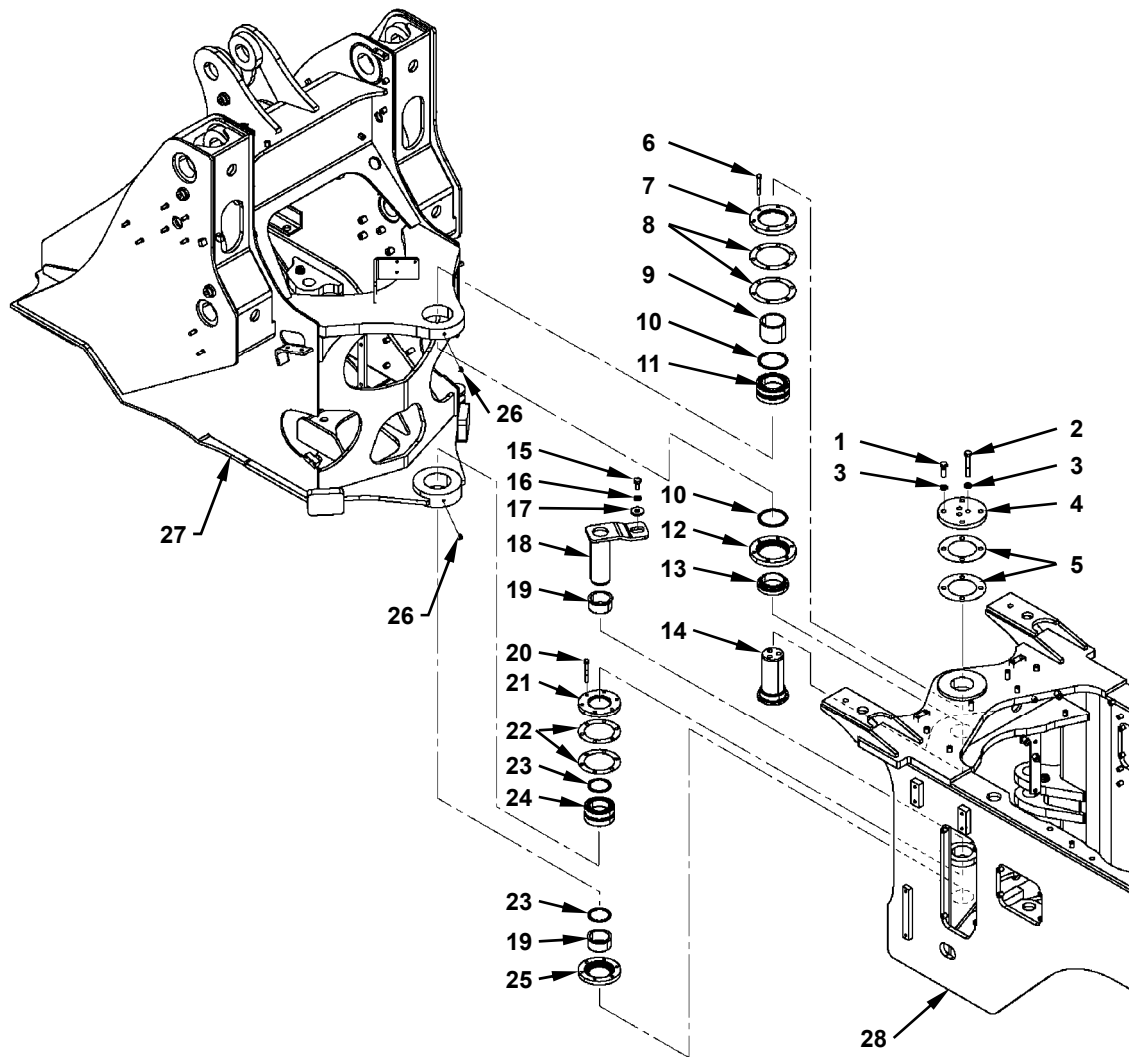
1. Hoist counterweight (3) by using a lifting tool.
2. Align counterweight (3) with the bolt (5) hole on frame (6).
3. Install counterweight (3) to frame (6) with bolts (5) (4 used) and washers (4) (4 used).
🔧 : 46 mm
🔩 : 1510 N·m (154 kgf·m, 1110 lbf·ft)
4. Install nuts (1) (2 used) and washers (2) (2 used) to bolts (5) (2 used) on the upper side.
🔧 : 46 mm
🔩 : 1510 N·m (154 kgf·m, 1110 lbf·ft)
5. Close the rear grill.



W4GB-02-02-001

BODY (UPPERSTRUCTURE) / Center Hinge

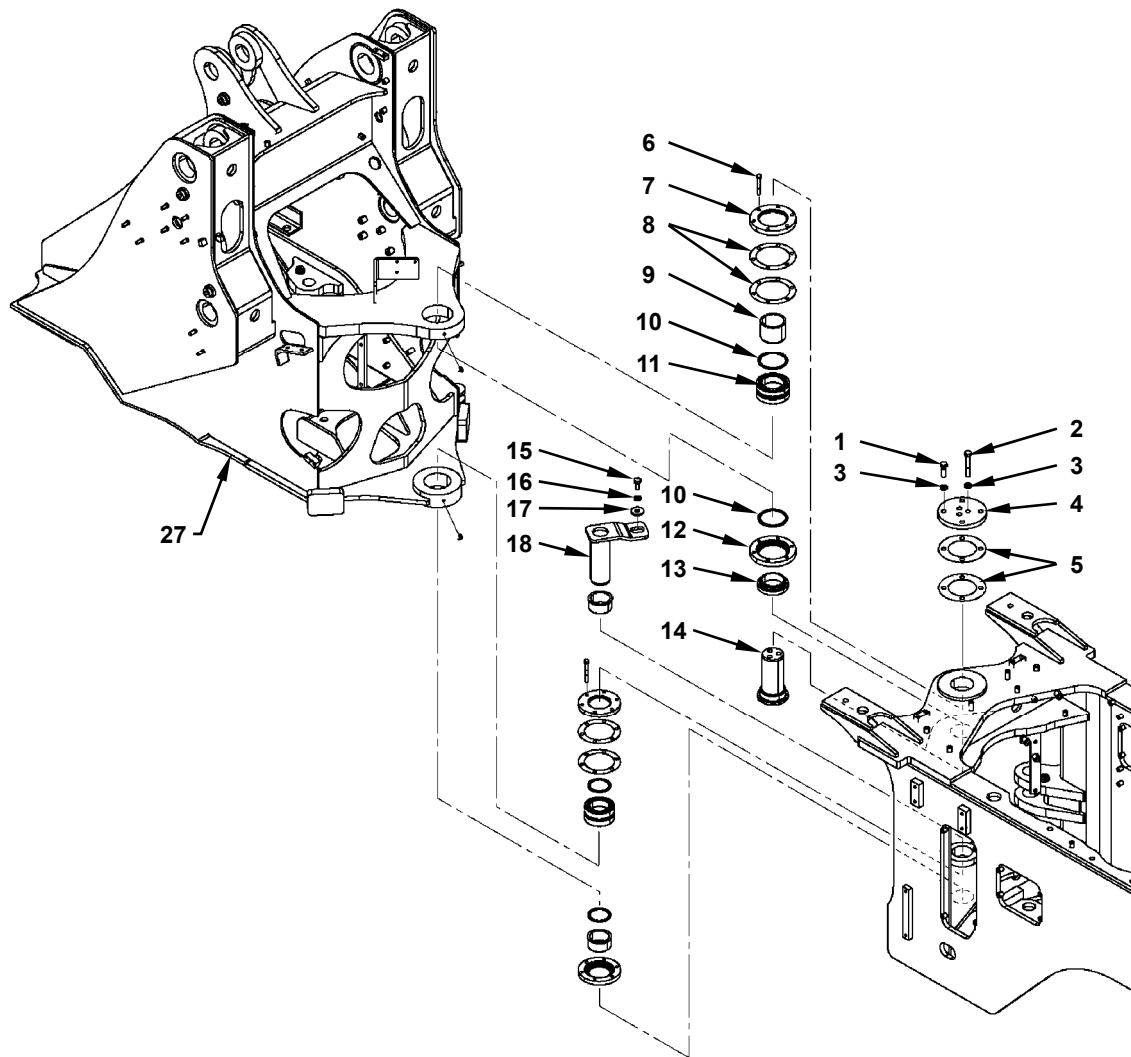
DISASSEMBLY OF CENTER HINGE



W4GD-02-03-001

- | | | | |
|---------------------|-------------------------|-----------------------|------------------------------|
| 1 - Bolt (4 Used) | 8 - Shim (2 Used) | 15 - Bolt | 22 - Shim (2 Used) |
| 2 - Bolt (3 Used) | 9 - Bushing | 16 - Washer | 23 - Dust Seal (2 Used) |
| 3 - Washer (7 Used) | 10 - Dust Seal (2 Used) | 17 - Washer | 24 - Bearing |
| 4 - Flange | 11 - Bearing | 18 - Pin | 25 - Cap |
| 5 - Shim (2 Used) | 12 - Cap | 19 - Bushing (2 Used) | 26 - Grease Fitting (2 Used) |
| 6 - Bolt (6 Used) | 13 - Bushing | 20 - Bolt (6 Used) | 27 - Front Frame |
| 7 - Cap | 14 - Pin | 21 - Cap | 28 - Rear Frame |

BODY (UPPERSTRUCTURE) / Center Hinge



W4GD-02-03-001

BODY (UPPERSTRUCTURE) / Center Hinge

Disassembly of Center Hinge



CAUTION: The center hinge is required to disassemble for the major maintenance work such as removal of the front frame from the rear frame. At this time, move the machine into the factory.

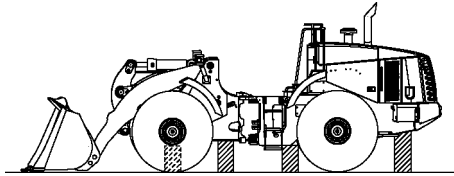
Preparation

When disassembling the center hinge, set the machine to the following conditions.

1. Remove the cap and the cockpit.
2. Remove the connecting parts between the front frame and the rear frame.
 - Propeller Shaft
 - Steering Cylinder
 - Hydraulic Hose
 - Brake Piping
 - Harness


Removal of Hinge Pin

1. Support the front frame and the rear frame by using the solid support.




W4GB-02-03-002

2. Remove bolts (2) (3 used), bolts (1) (4 used) and washers (3) (7 used) from flange (4). Remove flange (4), shims (5) (2 used) and pin (14) from rear frame (28).

 : 24 mm

3. Remove bolt (15) and washers (16, 17) from pin (18). Remove pin (18) from rear frame (28).

 : 24 mm

4. Remove bushing (9) from front frame (27). (Remove bushing (9) after cutting by gas or using arc welding.)




CAUTION: Front frame (27) weight: 1130 kg (2500 lb)

5. Attach a nylon sling onto front frame (27). Hoist front frame (27). Remove front frame (27) from rear frame (28).

6. Remove bushing (13) from front frame (27).

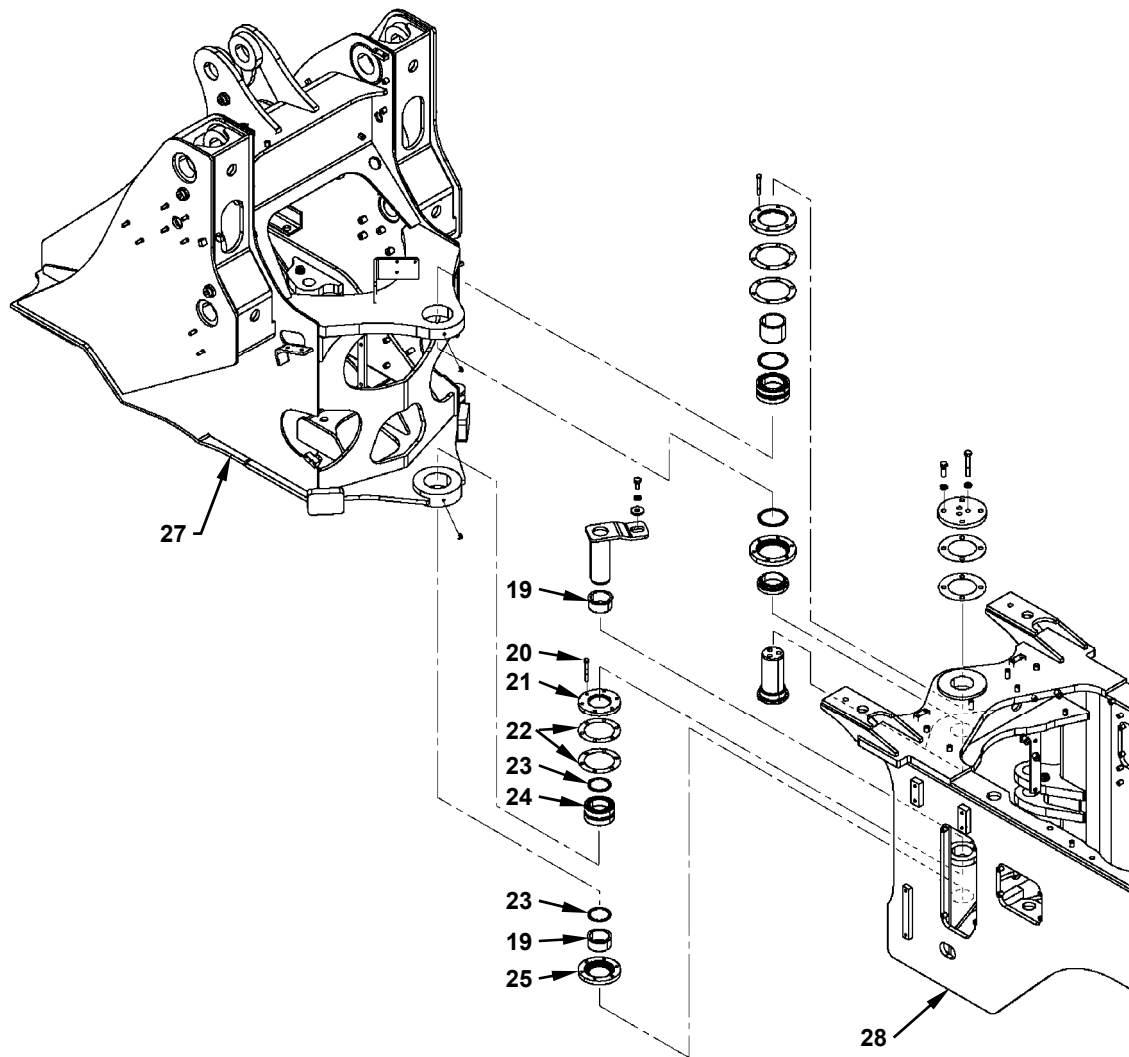
7. Remove bolts (6) (6 used) from cap (7). Remove caps (7, 12) and shims (8) (2 used) from front frame (27).

 : 17 mm

8. Remove dust seals (10) (2 used) from caps (7, 12).

9. Remove bearing (11) from front frame (27).


BODY (UPPERSTRUCTURE) / Center Hinge



W4GD-02-03-001

BODY (UPPERSTRUCTURE) / Center Hinge

10. Remove bolts (20) (6 used) from cap (21).
Remove caps (21, 25) and shims (22) (2 used)
from front frame (27).

 : 17 mm

11. Remove dust seals (23) (2 used) from caps (21,
25).

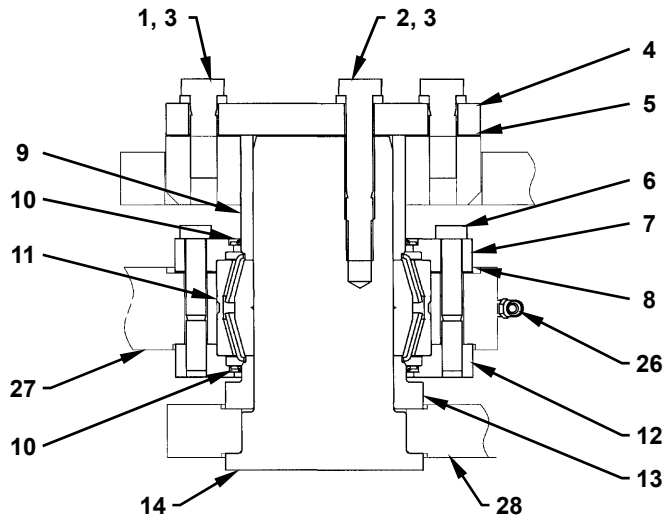
12. Remove bearing (24) from front frame (27).

13. Remove bushings (19) (2 used) from rear frame
(28).

BODY (UPPERSTRUCTURE) / Center Hinge

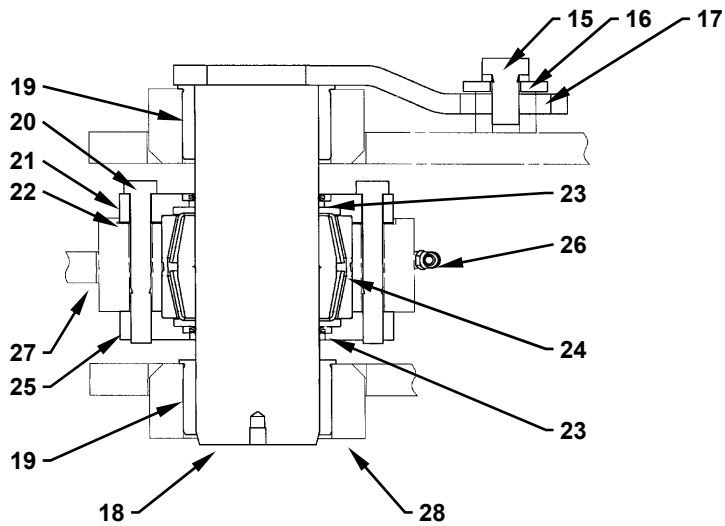
ASSEMBLY OF CENTER HINGE

Upper Hinge



W4GD-02-03-002

Lower Hinge Pin



W4GD-02-03-003

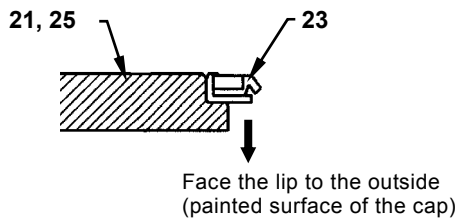
- | | | | |
|---------------------|-------------------------|-----------------------|------------------------------|
| 1 - Bolt (4 Used) | 8 - Shim (2 Used) | 15 - Bolt | 22 - Shim (2 Used) |
| 2 - Bolt (3 Used) | 9 - Bushing | 16 - Washer | 23 - Dust Seal (2 Used) |
| 3 - Washer (7 Used) | 10 - Dust Seal (2 Used) | 17 - Washer | 24 - Bearing |
| 4 - Flange | 11 - Bearing | 18 - Pin | 25 - Cap |
| 5 - Shim (2 Used) | 12 - Cap | 19 - Bushing (2 Used) | 26 - Grease Fitting (2 Used) |
| 6 - Bolt (6 Used) | 13 - Bushing | 20 - Bolt (6 Used) | 27 - Front Frame |
| 7 - Cap | 14 - Pin | 21 - Cap | 28 - Rear Frame |

BODY (UPPERSTRUCTURE) / Center Hinge

Assembly of Center Hinge

IMPORTANT: Check the direction of dust seal (23). Install dust seal (23) with the wider rubber side facing to the unpainted surface of caps (21, 25).

1. Apply LOCTITE #262 onto the outer surface of dust seals (23) (2 used). Lightly tap and insert dust seal (23) into cap (21) by using a hammer. Wipe out the stick-out LOCTITE #262 by using a waste.
Install dust seal (23) to cap (25) in the same way.

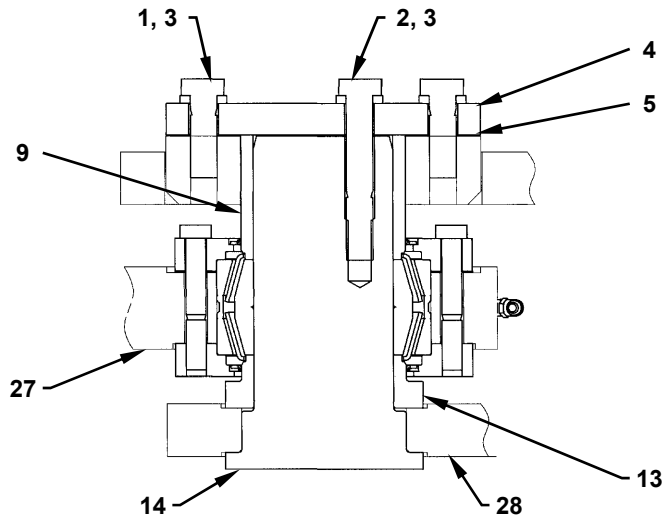


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2. Install dust seals (10) (2 used) into caps (7, 12) in the same way.
3. Insert bearing (11) into the upper hinge part of front frame (27).
4. Add grease through grease fitting (26) into the inside of bearing (11) while rotating bearing (11).
5. Insert bearing (24) into the lower hinge part of front frame (27).
6. Add grease through grease fitting (26) into the inside of bearing (24) while rotating bearing (24).
7. Install shims (8) (2 used) to the upper hinge part of front frame (27). Apply LOCTITE #262 onto bolts (6) (6 used). Install caps (7, 12) to front frame (27) with bolts (6) (6 used).
🔧 : 17 mm
🔩 : 88 N·m (9 kgf·m, 65 lbf·ft)
8. Tap the position between caps (7, 12) and dust seals (10) (2 used) by using an iron nail.
9. Install shims (22) (2 used) to the lower hinge part of front frame (27). Apply LOCTITE #262 onto bolts (20) (6 used). Install caps (21, 25) to front frame (27) with bolts (20) (6 used).
🔧 : 17 mm
🔩 : 88 N·m (9 kgf·m, 65 lbf·ft)
10. Tap the position between caps (21, 25) and dust seals (23) (2 used) by using an iron nail.

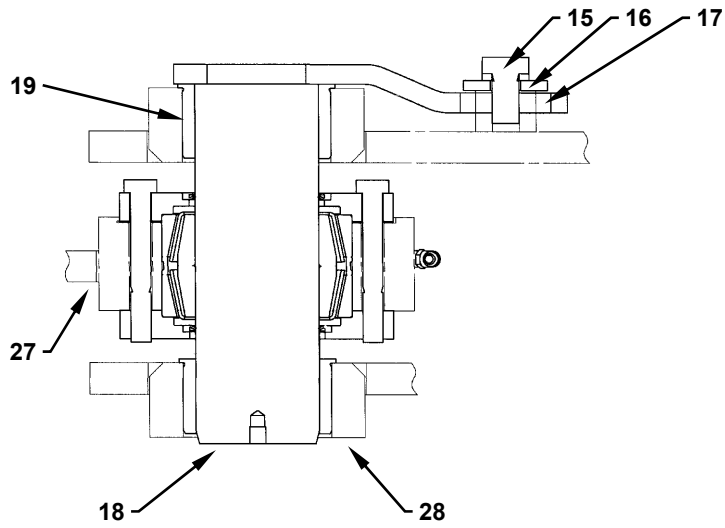
BODY (UPPERSTRUCTURE) / Center Hinge

Upper Hinge



W4GD-02-03-002

Lower Hinge Pin



W4GD-02-03-003

BODY (UPPERSTRUCTURE) / Center Hinge


11. Insert bushings (19) (2 used) into the lower hinge part of rear frame (28).




CAUTION: Front frame (27) weight: 1130 kg (2500 lb)


12. Attach a nylon sling onto front frame (27). Hoist and align front frame (27) with the pin (14, 18) holes on front frame (27) and rear frame (28).


13. Install pin (14), bushings (9, 13), shims (5) (2 used) and flange (4) to the upper hinge part. Tighten bolts (2) (3 used), bolts (1) (4 used) and washers (3) (7 used).

 : 24 mm

 : 224 N·m (23 kgf·m, 165 lbf·ft)

14. Insert pin (18) into the lower hinge part. Tighten bolt (15) and washers (16, 17).

 : 24 mm

 : 86.9 N·m (8.9 kgf·m, 64 lbf·ft)

BODY (UPPERSTRUCTURE) / Center Hinge

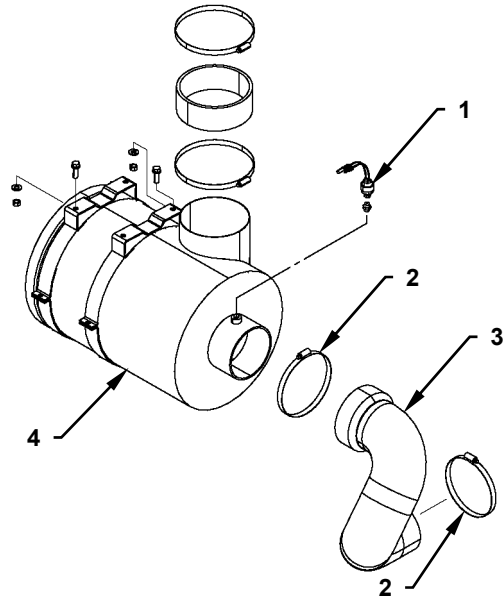
(Blank)

BODY (UPPERSTRUCTURE) / Hood

REMOVAL AND INSTALLATION OF HOOD

Removal


1. Open the right and left side covers.
2. Loosen clamps (2) (2 used) which secure intake hose (3). Disconnect intake hose (3) from the engine.
3. Disconnect the connector of sensor (1) from air cleaner (4).

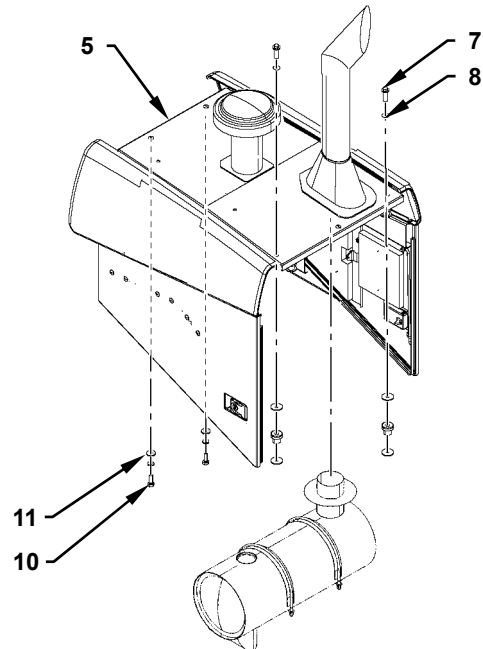


W4GD-02-04-001

⚠ CAUTION: The hood (5) assembly weight: 140 kg (310 lb)

4. Attach a nylon sling onto hood (5). Hoist and hold hood (5). Remove bolts (7) (2 used), (10) (4 used), washers (8) (2 used) and (11) (4 used) from hood (5). Hoist and remove hood (5) from the frame.

 : 17 mm, 24 mm




W4GD-02-04-002


BODY (UPPERSTRUCTURE) / Hood


Installation


CAUTION: The hood (5) assembly weight: 140 kg (310 lb)

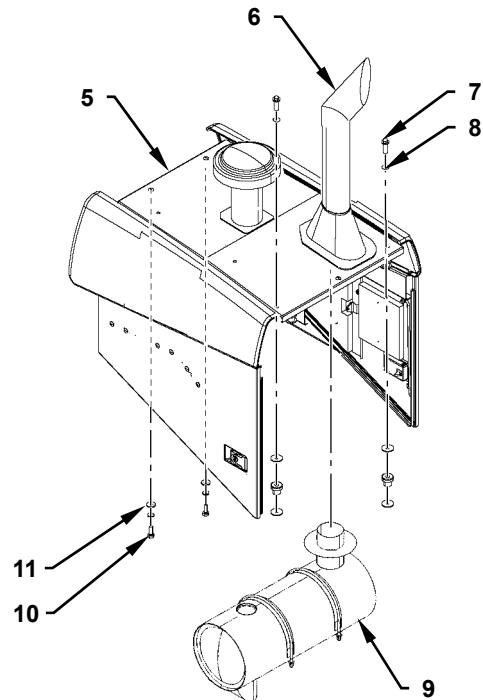
1. Attach a nylon sling onto hood (5). Hold hood (5). Align muffler tail (6) with the vent of muffler (9). Install hood (5) to the frame with bolts (7) (2 used), (10) (4 used), washers (8) (2 used) and (11) (4 used).

 : 17 mm

 : 34 N·m (3.5 kgf·m, 25 lbf·ft)

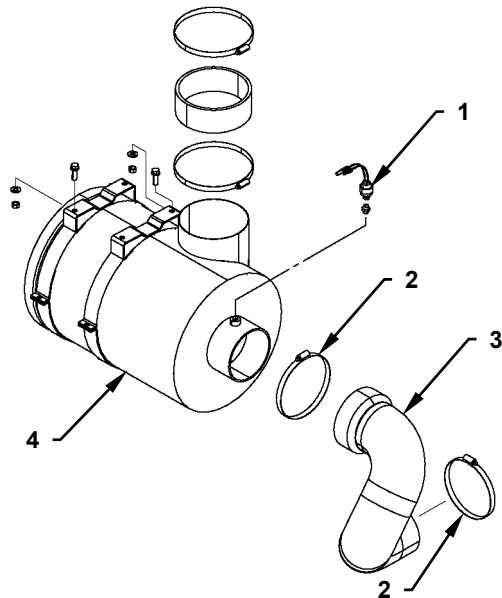
 : 24 mm

 : 235 N·m (24 kgf·m, 175 lbf·ft)



W4GD-02-04-002

2. Connect the connector of sensor (1) to air cleaner (4).
3. Connect intake hose (3) to the engine and air cleaner (4). Secure intake hose (3) with clamps (2) (2 used).
4. Close the right and left side covers.




W4GD-02-04-001

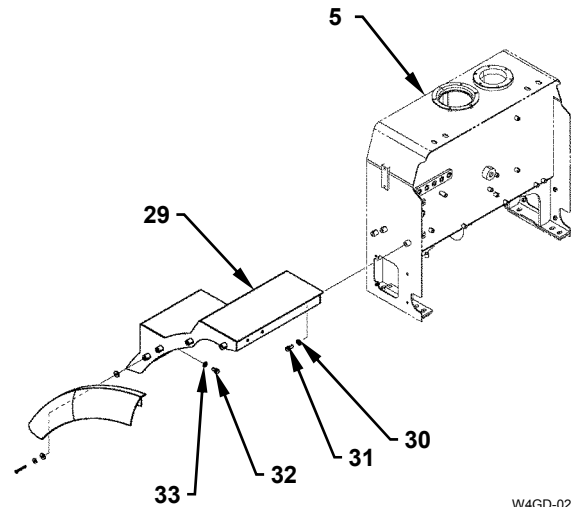
BODY (UPPERSTRUCTURE) / Hydraulic Oil Tank

REMOVAL AND INSTALLATION OF HYDRAULIC OIL TANK

Removal


1. Remove the hood. (Refer to W2-4-1.)
2. Remove bolts (31, 32) (6 used for each) and washers (30, 33) (6 used for each) from hydraulic oil tank (5). Remove fenders (29) (2 used) from hydraulic oil tank (5).

 : 17 mm

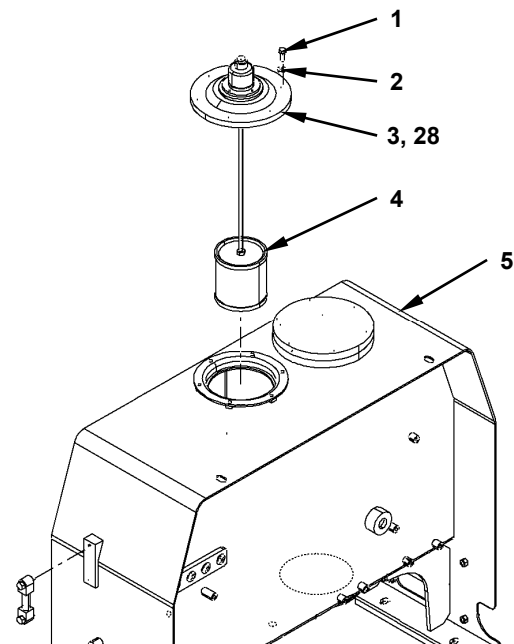


W4GB-02-05-001

3. Remove bolts (1) (6 used), washers (2) (6 used) and O-ring (28) from cover (3). Remove cover (3) and suction filter (4) from hydraulic oil tank (5).

 : 14 mm


4. Drain hydraulic oil from the cover (3) mounting part of hydraulic oil tank (5) by using a pump.




W4GB-02-03-010

BODY (UPPERSTRUCTURE) / Hydraulic Oil Tank

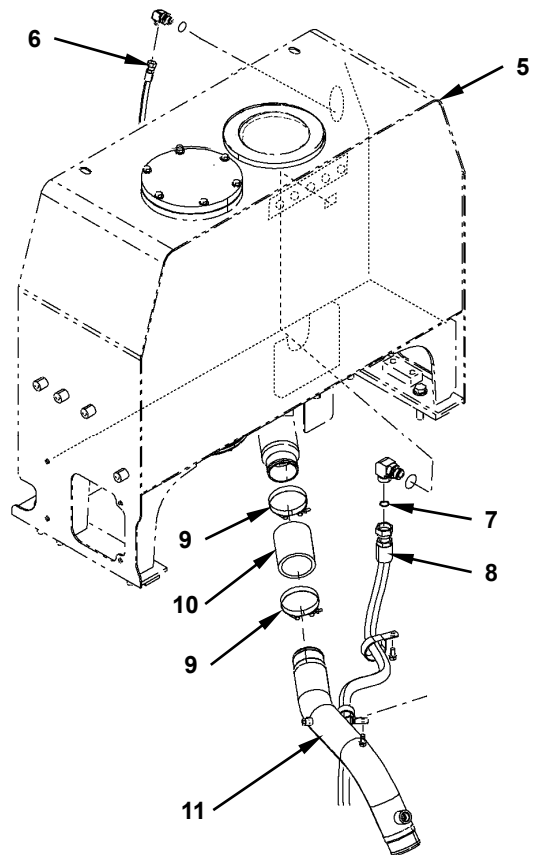
5. Disconnect hose (6) from hydraulic oil tank (5).

 : 22 mm

6. Disconnect hose (8) from hydraulic oil tank (5).
Remove O-ring (7) from hose (8).

 : 32 mm


7. Loosen clamps (9) (2 used). Remove hose (10) from hydraulic oil tank (5) and pipe (11).

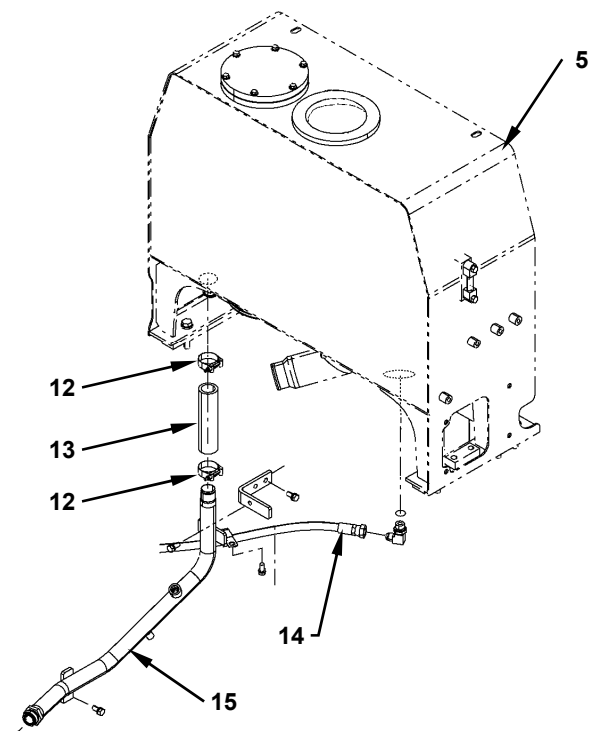


W4GB-02-03-011

8. Loosen clamps (12) (2 used). Remove hose (13) from hydraulic oil tank (5) and pipe (15).

9. Disconnect hose (14) from hydraulic oil tank (5).


 : 27 mm

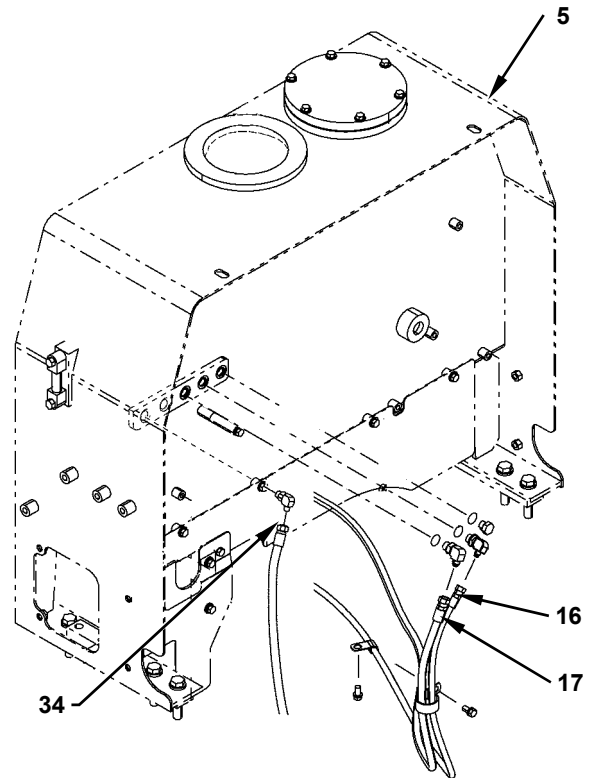


W4GB-02-03-012

BODY (UPPERSTRUCTURE) / Hydraulic Oil Tank


10. Disconnect hoses (16, 17 and 34) from hydraulic oil tank (5).

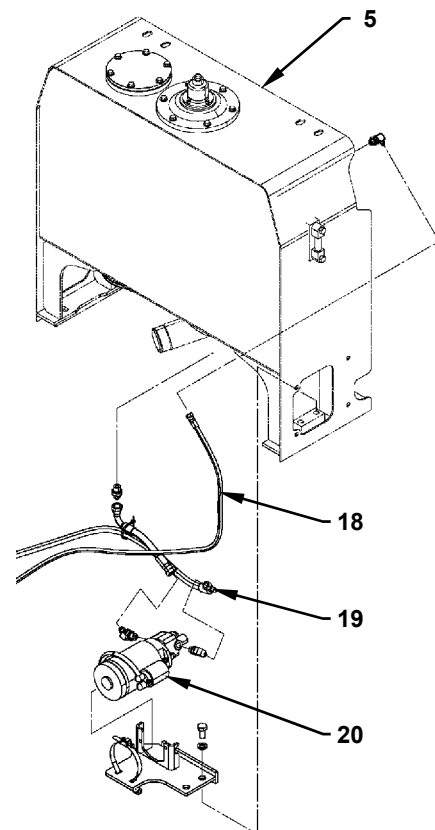
 : 19 mm, 22 mm



W4GD-02-05-002


11. When emergency steering pump (20) is installed, disconnect hose (18) from hydraulic oil tank (5). Disconnect hose (19) from emergency steering pump (20).

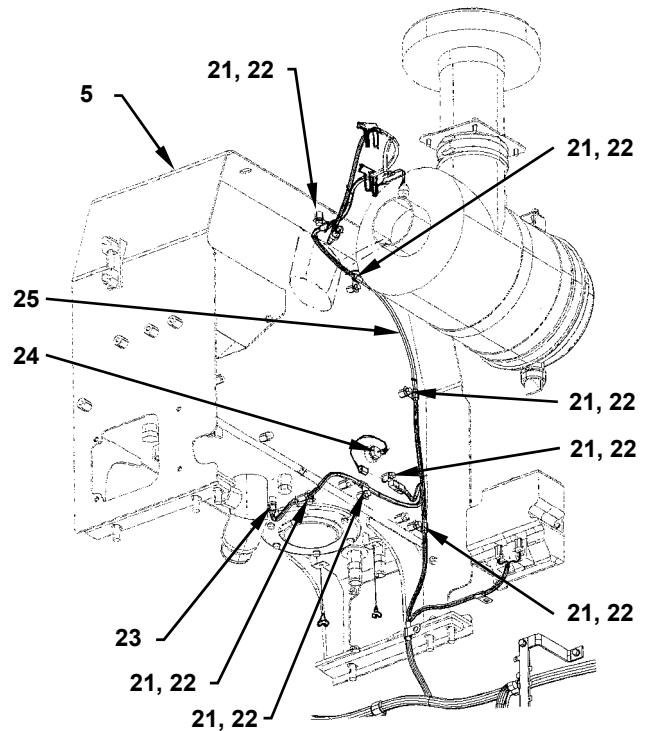
 : 22 mm




W4GD-02-05-003


BODY (UPPERSTRUCTURE) / Hydraulic Oil Tank

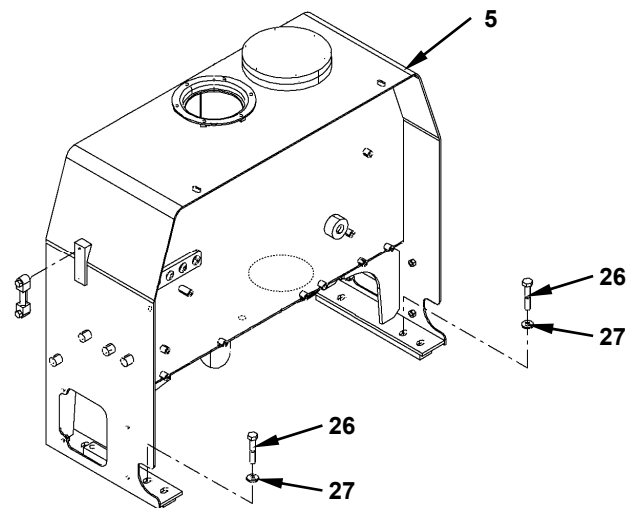
12. Disconnect the connectors of hydraulic oil temperature sensor (23) and level sensor (24).
13. Remove bolts (22) (7 used) from clips (21) (7 used). Disconnect wire harness (25) from hydraulic oil tank (5).
 : 14 mm



W4GB-02-03-015

 **CAUTION:** Hydraulic oil tank (5) weight: 135 kg (300 lb)

14. Attach a nylon sling onto hydraulic oil tank (5). Hoist and hold hydraulic oil tank (5). Remove bolts (26) (4 used) and washers (27) (4 used) from hydraulic oil tank (5).
 : 24 mm
15. Hoist and remove hydraulic oil tank (5) from the frame.



W4GB-02-03-016

BODY (UPPERSTRUCTURE) / Hydraulic Oil Tank


Installation




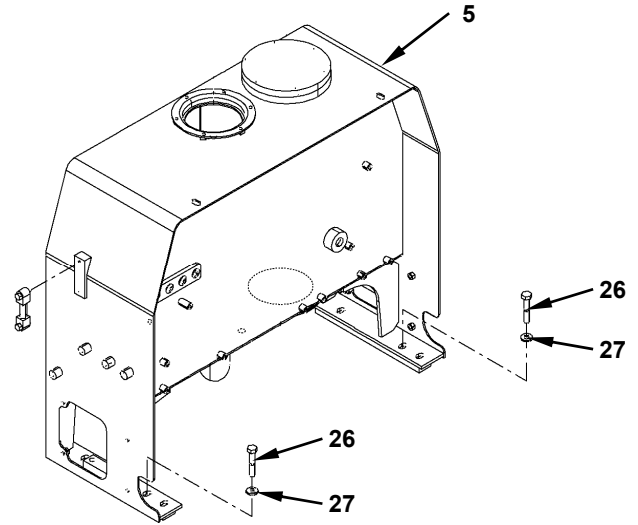
CAUTION: Hydraulic oil tank (5) weight: 135 kg (300 lb)

1. Attach a nylon sling onto hydraulic oil tank (5). Hoist and align hydraulic oil tank (5) with the mounting position in the frame.

2. Install hydraulic oil tank (5) to the frame with bolts (26) (4 used) and washers (27) (4 used).


 : 24 mm


 : 210 N·m (21.5 kgf·m, 155 lbf·ft)



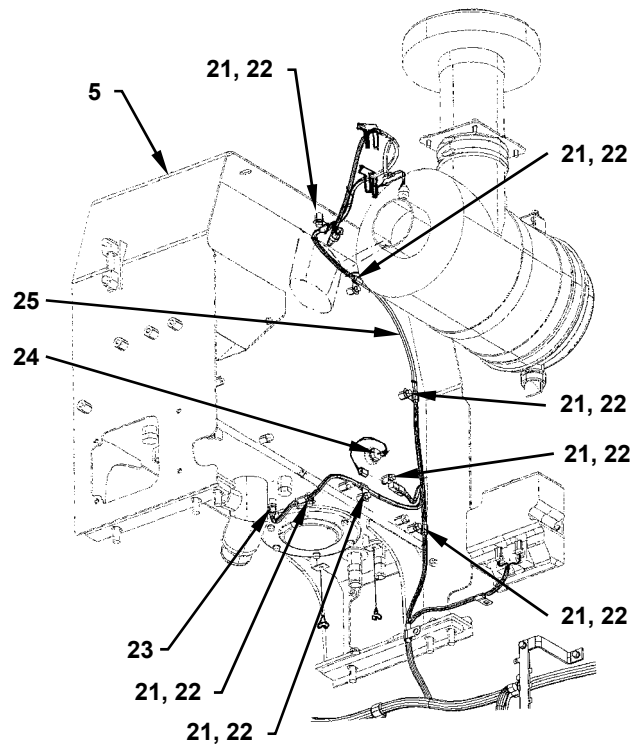
W4GB-02-03-016

3. Connect wire harness (25) to hydraulic oil tank (5) with bolts (22) (7 used) and clips (21) (7 used).

 : 14 mm

 : 20 N·m (2 kgf·m, 14.5 lbf·ft)

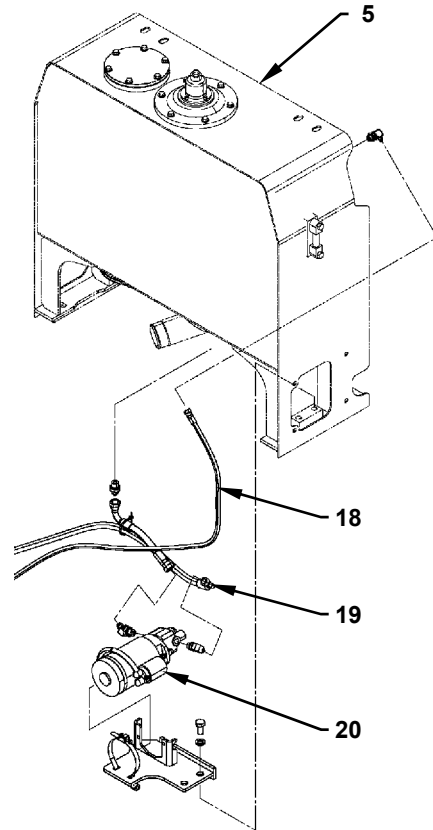
4. Connect the connectors of level sensor (24) and hydraulic oil temperature sensor (23).



W4GB-02-03-015





BODY (UPPERSTRUCTURE) / Hydraulic Oil Tank

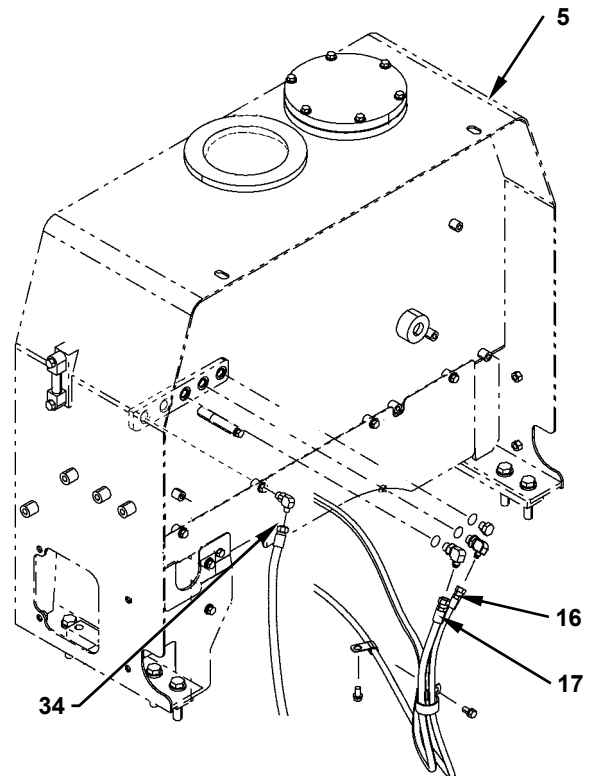
5. When emergency steering pump (20) is installed, connect hose (19) to emergency steering pump (20). Connect hose (18) to hydraulic oil tank (5).



W4GD-02-05-003

6. Connect hoses (16, 17 and 34) to hydraulic oil tank (5).


-  : 19 mm
-  : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)
-  : 22 mm
-  : 39 N·m (4 kgf·m, 28.5 lbf·ft)




W4GD-02-05-002

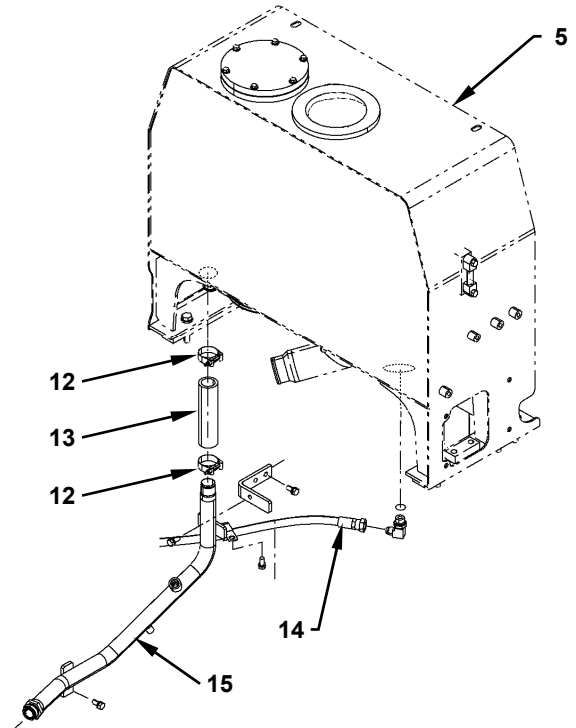
BODY (UPPERSTRUCTURE) / Hydraulic Oil Tank

7. Connect hose (14) to hydraulic oil tank (5).


 : 27 mm


 : 93 N·m (9.5 kgf·m, 69 lbf·ft)

8. Install hose (13) to hydraulic oil tank (5) and pipe (15) with clamps (12) (2 used).





9. Install hose (10) to hydraulic oil tank (5) and pipe (11) with clamps (9) (2 used).

 : 32 mm

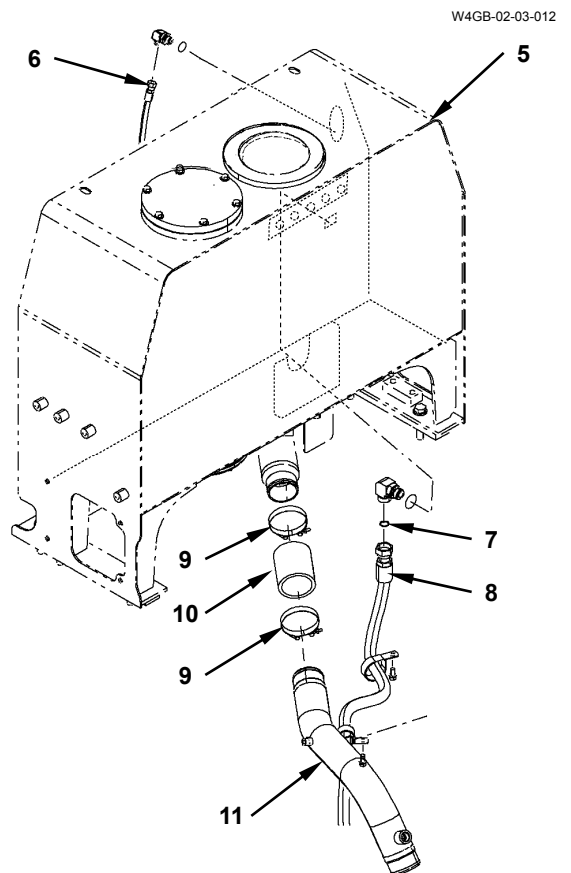
 : 137 N·m (14 kgf·m, 101 lbf·ft)

11. Connect hose (6) to hydraulic oil tank (5).

 : 22 mm

 : 39 N·m (4 kgf·m, 28.5 lbf·ft)

12. Add hydraulic oil to hydraulic oil tank (5).
Hydraulic oil amount: 100 L (26.4 US gal)





W4GB-02-03-011

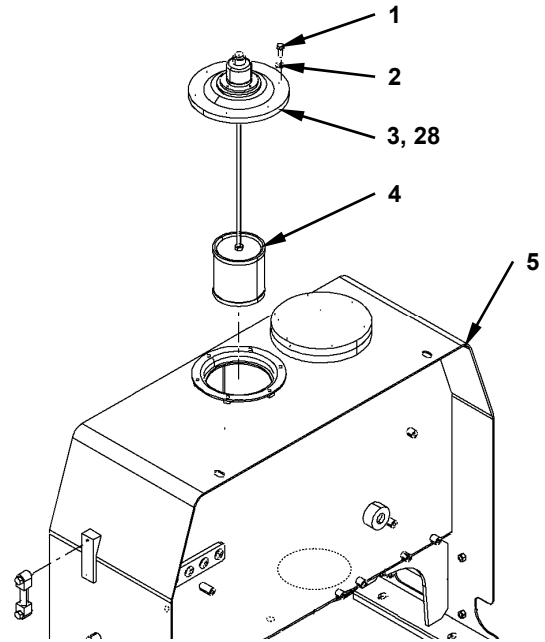
BODY (UPPERSTRUCTURE) / Hydraulic Oil Tank

13. Install suction filter (4) to hydraulic oil tank (5).

14. Install cover (3) to hydraulic oil tank (5) with bolts (1) (6 used), washers (2) (6 used) and O-ring (28).


 : 14 mm


 : 20 N·m (2 kgf·m, 14.5 lbf·ft)



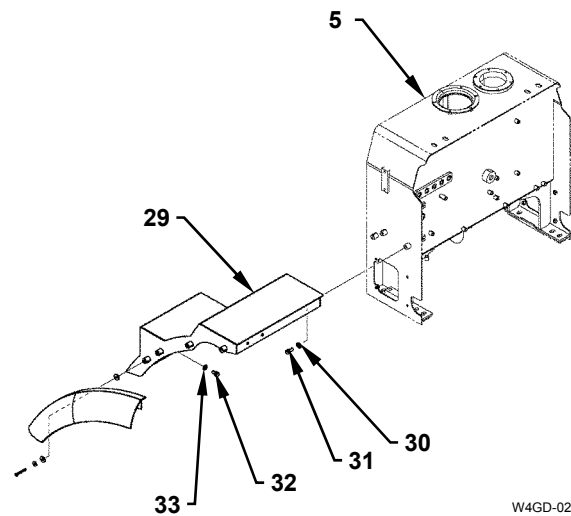
W4GB-02-03-010

15. Install fenders (29) (2 used) to hydraulic oil tank (5) with bolts (31, 32) (6 used for each) and washers (30, 33) (6 used for each).

 : 17 mm

 : 50 N·m (5.1 kgf·m, 37 lbf·ft)

16. Install the hood. (Refer to W2-4-1.)



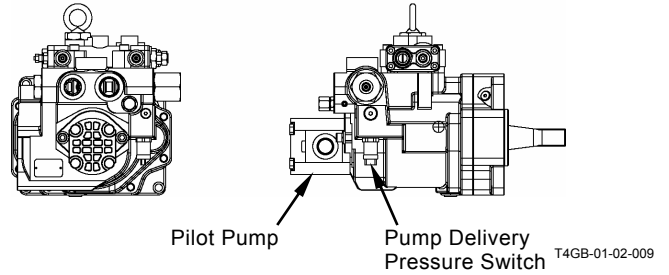
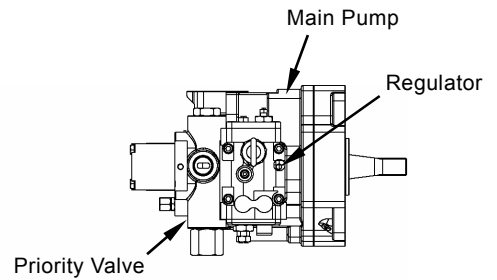
W4GD-02-05-001

BODY (UPPERSTRUCTURE) / Pump Device


REMOVAL AND INSTALLATION OF PUMP DEVICE

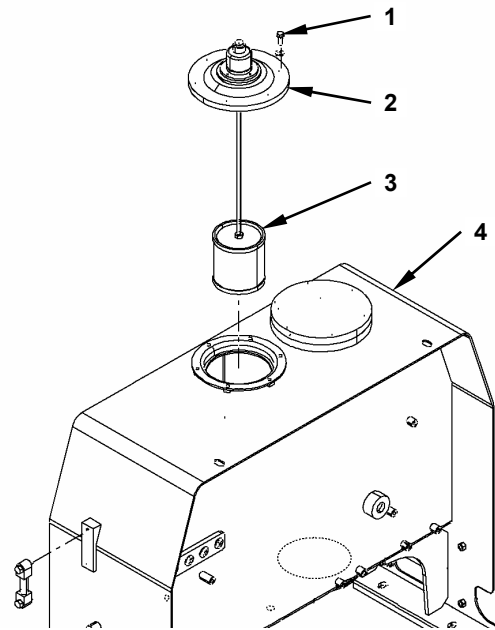
Removal

1. Remove the cab with the floor plate attached.
(Refer to REMOVAL AND INSTALLATION OF CAB in W2-1.)




2. Remove sems bolts (1) (6 used) from hydraulic oil tank (4). Remove cover (2) and suction filter (3) from hydraulic oil tank (4). Drain hydraulic oil.

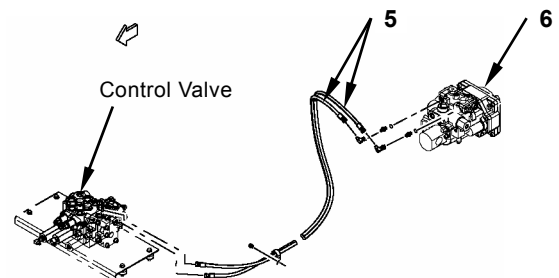
 : 14 mm



W4GB-02-03-010

3. Disconnect hoses (5) (2 used) from main pump (6). Cap the open ends. Attach an identification tag onto the disconnected hoses for assembling.


 : 19 mm, 22 mm




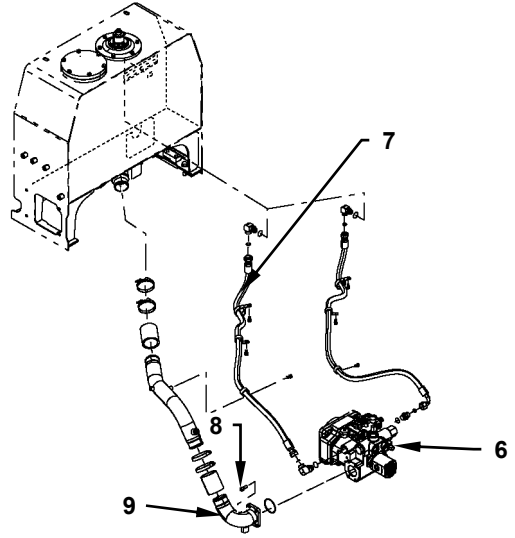
W4GB-02-04-012

BODY (UPPERSTRUCTURE) / Pump Device

4. Disconnect hose (7) from main pump (6). Cap the open ends. Remove socket bolts (8) (4 used) from pipe (9). Disconnect pipe (9) from main pump (6).


 : 32 mm

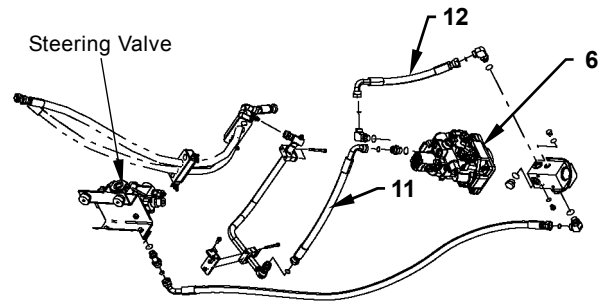
 : 10 mm



W4GB-02-04-013


5. Disconnect hoses (11, 12) from main pump (6). Cap the open ends.

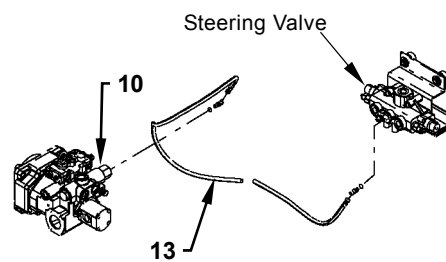
 : 32 mm, 41 mm



W4GB-02-04-014

6. Disconnect hose (13) from priority valve (10). Cap the open ends.


 : 19 mm

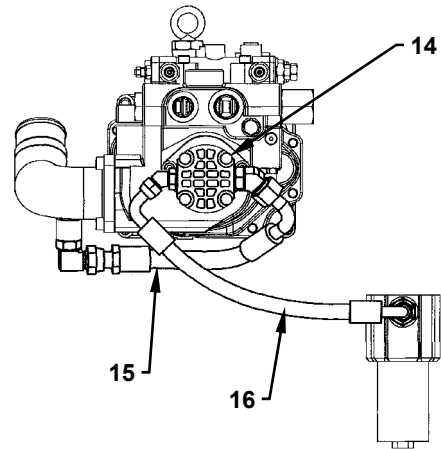


W4GB-02-04-015

BODY (UPPERSTRUCTURE) / Pump Device

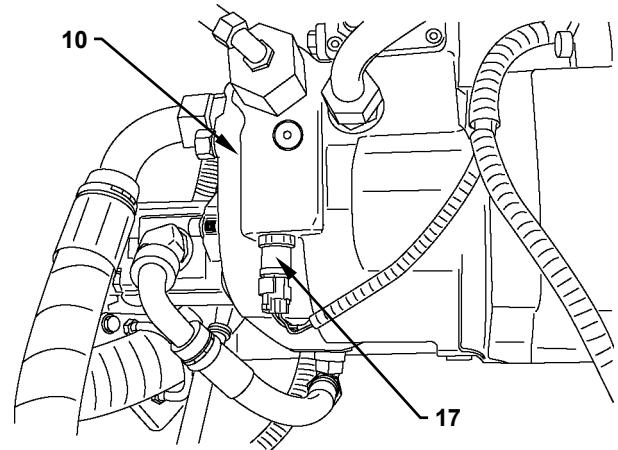
7. Disconnect hoses (15, 16) from pilot pump (14).
Cap the open ends.

 : 27 mm, 32 mm




W4GB-02-04-018

8. Disconnect the connector of pump delivery pressure switch (17) from priority valve (10).




W4GB-02-04-016

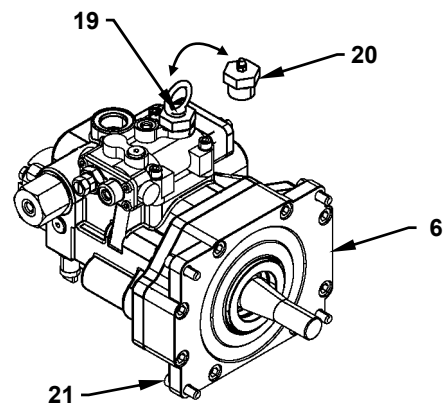
9. Remove reducer (20) from the regulator. Install plug (19) (with an eyebolt attached) (screw size: G1) to the regulator.

 : 41 mm

 **CAUTION:** Pump device weight: 92 kg (205 lb)

10. Attach a nylon sling onto the eyebolt. Hoist and hold main pump (6). Remove socket bolts (21) (4 used) from main pump (6). Hoist and remove main pump (6) from the engine.

 : 10 mm





W4GB-02-04-017


BODY (UPPERSTRUCTURE) / Pump Device


Installation

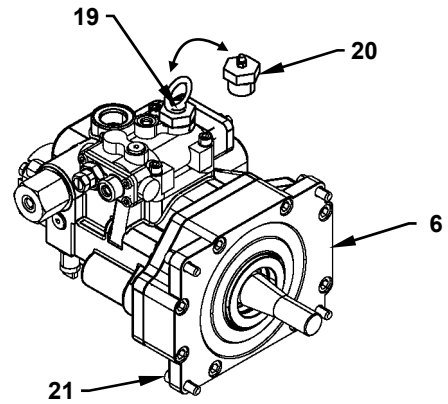
1. Attach a nylon sling onto plug (19) (with an eyebolt attached). Hoist and align main pump (6) with the mounting hole on the engine. Install main pump (6) to the engine with socket bolts (21) (4 used). Remove plug (19) (with an eyebolt attached) from the regulator. Install reducer (20).

 : 10 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

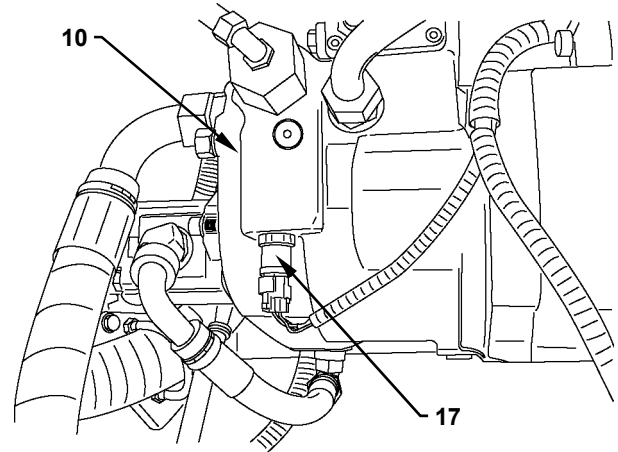
 : 41 mm

 : 81 N·m (8 kgf·m, 60 lbf·ft)




W4GB-02-04-017


2. Connect the connector of pump delivery pressure switch (17) to priority valve (10).





W4GB-02-04-016

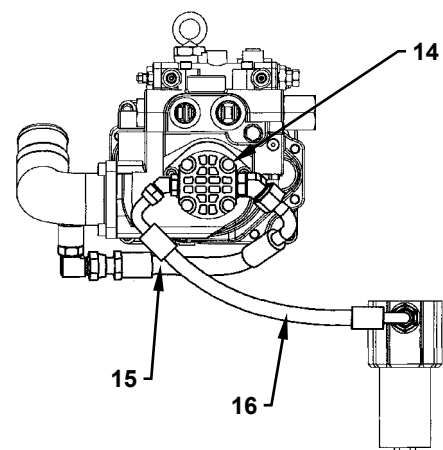
3. Connect hoses (15, 16) to pilot pump (14).

 : 27 mm

 : 78 N·m (8 kgf·m, 57.5 lbf·ft)

 : 32 mm


 : 137 N·m (14 kgf·m, 101 lbf·ft)




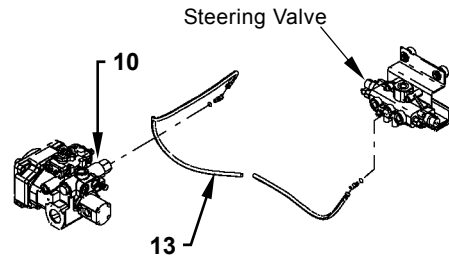
W4GB-02-04-018

BODY (UPPERSTRUCTURE) / Pump Device

4. Connect hose (13) to priority valve (10).


 : 19 mm


 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)





W4GB-02-04-015

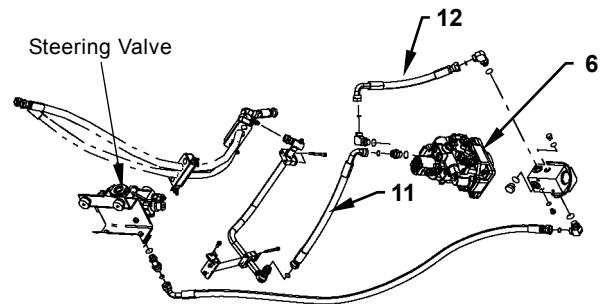
5. Connect hoses (11, 12) to main pump (6).

 : 32 mm

 : 137 N·m (14 kgf·m, 101 lbf·ft)


 : 41 mm


 : 205 N·m (21 kgf·m, 151 lbf·ft)




W4GB-02-04-014


6. Connect hose (7) to main pump (6).

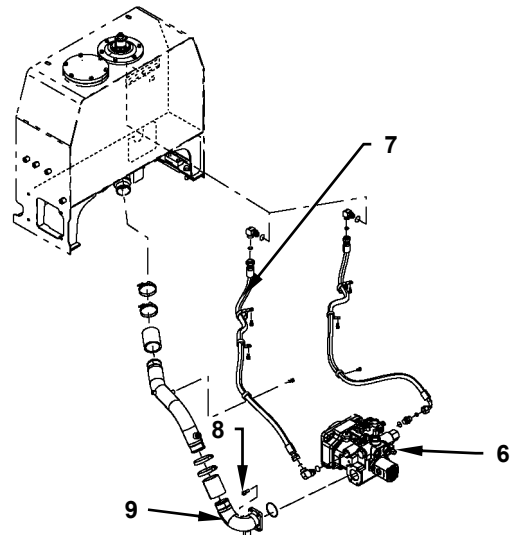
 : 32 mm

 : 137 N·m (14 kgf·m, 101 lbf·ft)

7. Connect pipe (9) to main pump (6) with socket bolts (8) (4 used).

 : 10 mm





 : 90 N·m (9 kgf·m, 66 lbf·ft)

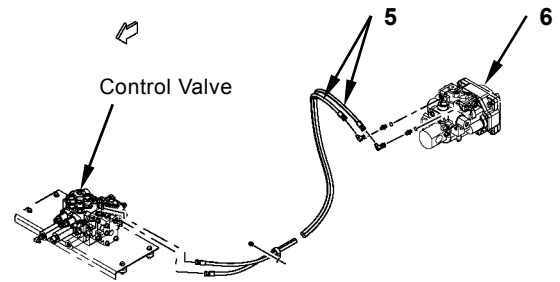


W4GB-02-04-013

BODY (UPPERSTRUCTURE) / Pump Device

8. Connect hoses (5) (2 used) to main pump (6).



-  : 19 mm
-  : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)
-  : 22 mm
-  : 39 N·m (4 kgf·m, 28.5 lbf·ft)



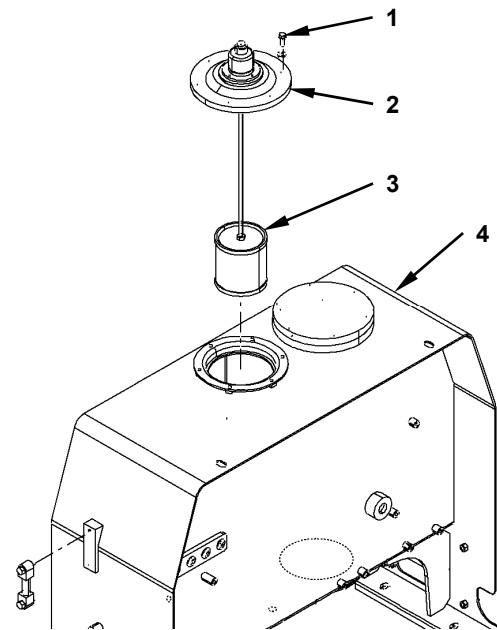
W4GB-02-04-012

9. Install suction filter (3) to hydraulic oil tank (4). Add hydraulic oil to hydraulic oil tank (4). Install cover (2) to hydraulic oil tank (4) with sems bolts (1) (6 used).

Add hydraulic oil to hydraulic oil tank (4). Loosen the breather valve with the regulator attached and bleed air from hydraulic oil tank (4).

-  : 14 mm
-  : 15 N·m (1.5 kgf·m, 11 lbf·ft)

10. Install the cab with the floor plate attached.
(Refer to REMOVAL AND INSTALLATION OF CAB in W2-1.)



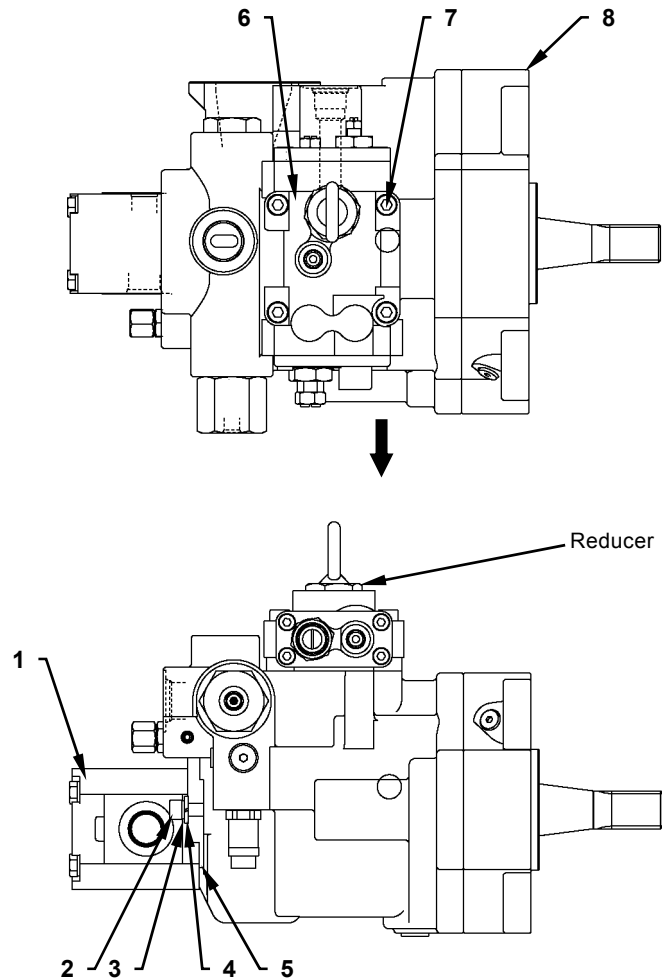
W4GB-02-03-010

BODY (UPPERSTRUCTURE) / Pump Device

(Blank)

BODY (UPPERSTRUCTURE) / Pump Device

REMOVAL AND INSTALLATION OF PILOT PUMP AND REGULATOR



T4GB-03-01-001

1 - Pilot Pump
2 - Socket Bolt (2 Used)

3 - Spring Washer (2 Used)
4 - Washer (2 Used)

5 - O-Ring
6 - Regulator

7 - Socket Bolt (4 Used)
8 - Main Pump


BODY (UPPERSTRUCTURE) / Pump Device

Removal




CAUTION: Pump device weight: 92 kg (205 lb)

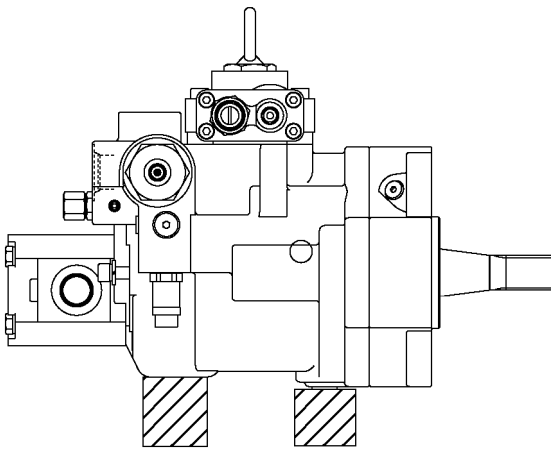
1. Remove the reducer (with the breather valve attached) of the regulator part in the pump device. Install a plug (with an eyebolt attached. Attach a nylon sling onto the plug with an eyebolt attached). Place the pump device on a wooden block (approx. 100 mm (3.94 in) square) with the regulator facing upward.

 : 41 mm

IMPORTANT: Do not drop O-ring between regulator (6) and main pump (8).


4. Remove regulator (6) from main pump (8).

 **NOTE:** When regulator (6) is floated, raise regulator (6) toward the direction of the arrow obliquely. (Refer to W2-6-8.)




W4GB-02-04-001

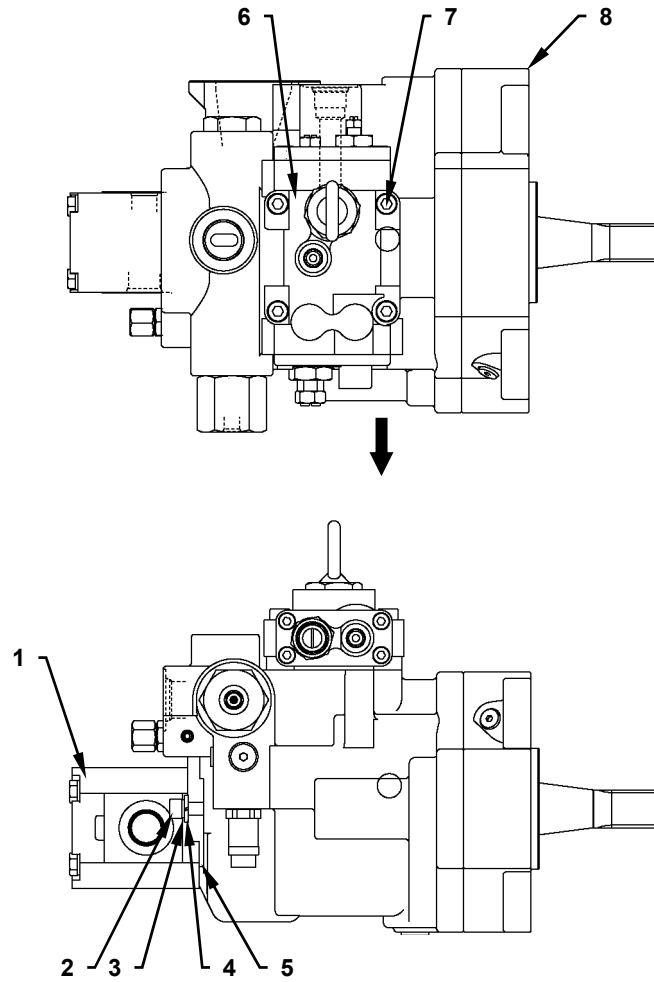
2. Remove socket bolts (2) (2 used), spring washers (3) (2 used) and washers (4) (2 used) from pilot pump (1). Remove pilot pump (1) and O-ring (5) from main pump (8).

 : 8 mm

3. Remove socket bolts (7) (4 used) from regulator (6).

 : 8 mm

BODY (UPPERSTRUCTURE) / Pump Device




T4GB-03-01-001


BODY (UPPERSTRUCTURE) / Pump Device

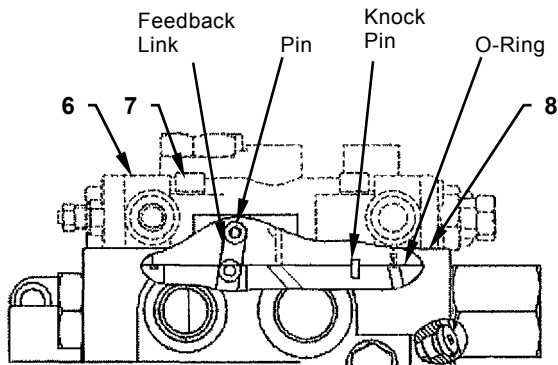
Installation

IMPORTANT: Check that O-rings (5 used) are installed to the regulator (6) mounting surface.

1. Install regulator (6) to main pump (8) as follows.
 - Adjust the sleeve position so that two grooves in the sleeve on regulator (6) are in a line.
 - Place regulator (6) on main pump (8). Install the pins for the feedback link into two grooves in the sleeve.
 - Move the position of regulator (6) so that the knock pins (2 used) extended from main pump (8) can enter regulator (6).
 - Install regulator (6) to main pump (8) with socket bolts (7) (4 used).

 : 8 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)





W4GB-02-04-002

2. Install O-ring (5) to pilot pump (1).

IMPORTANT: Set pilot pump (1) with the inlet port (the larger port diameter side) facing upward.

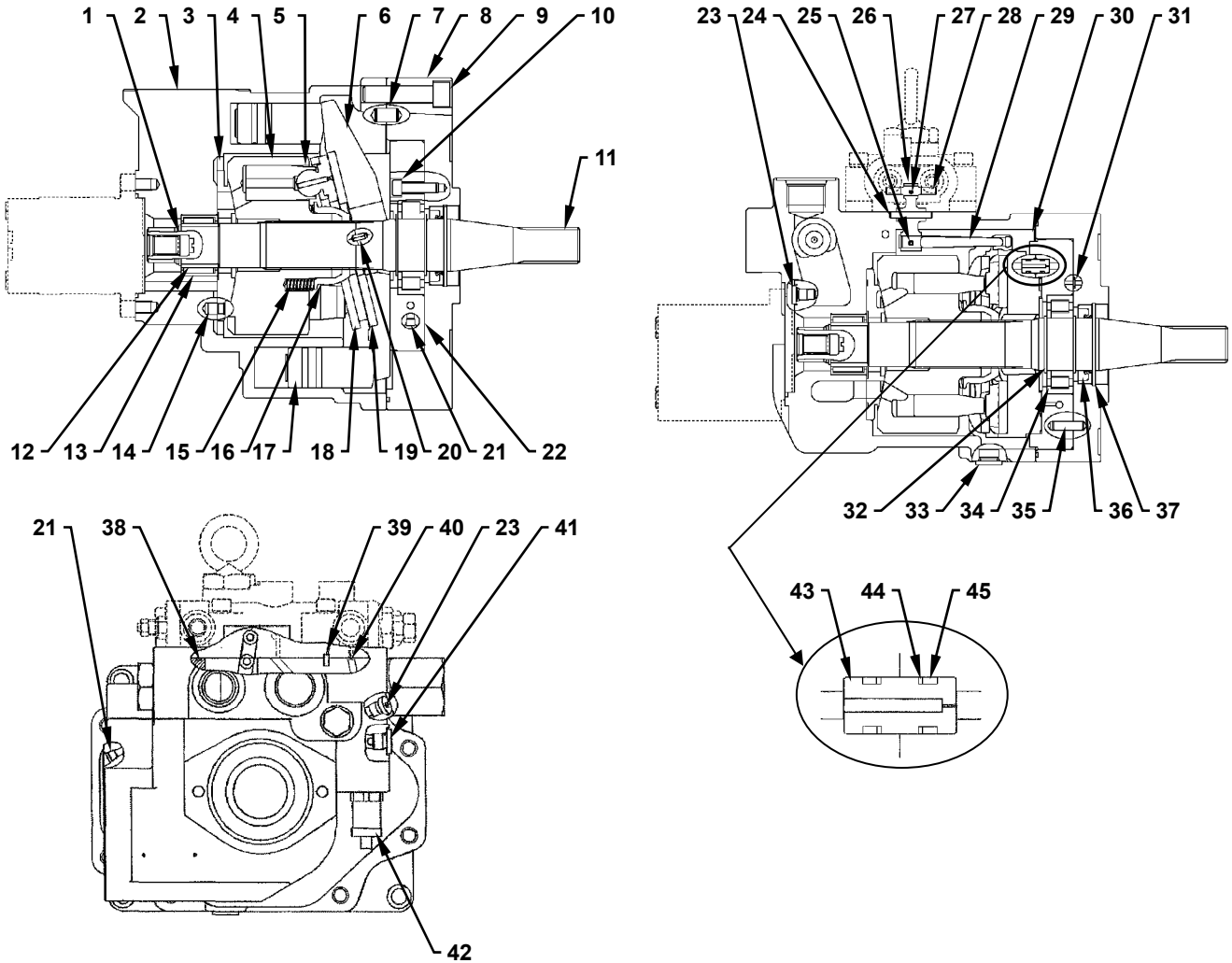
3. Install pilot pump (1) to main pump (8) with socket bolts (2) (2 used), spring washers (3) (2 used) and washers (4) (2 used).

 : 8 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

BODY (UPPERSTRUCTURE) / Pump Device

DISASSEMBLY OF MAIN PUMP



W4GB-02-04-003

- | | | | |
|---------------------------|----------------------------|------------------------------|---------------------------|
| 1 - Retaining Ring | 13 - Needle Bearing | 24 - Pin | 35 - Knock Pin |
| 2 - Pump Casing | 14 - Knock Pin | 25 - Spring Pin | 36 - Oil Seal |
| 3 - Valve Plate | 15 - Spring (7 Used) | 26 - Feedback Link | 37 - Retaining Ring |
| 4 - Rotor | 16 - Bushing | 27 - Spring Pin | 38 - O-Ring |
| 5 - Plunger (7 Used) | 17 - Servo Piston (3 Used) | 28 - Pin | 39 - Spring Pin (2 Used) |
| 6 - Swash Plate | 18 - Retainer | 29 - Link Pin | 40 - O-Ring (5 Used) |
| 7 - Knock Pin | 19 - Cam Plate | 30 - O-Ring | 41 - Plug |
| 8 - Front Casing | 20 - Knock Pin | 31 - O-Ring | 42 - Pressure Sensor |
| 9 - Socket Bolt (8 Used) | 21 - Plug (3 Used) | 32 - Retaining Ring (2 Used) | 43 - Restrictor Pin |
| 10 - Socket Bolt (4 Used) | 22 - Cradle Plate | 33 - Plug | 44 - Backup Ring (2 Used) |
| 11 - Drive Shaft | 23 - Plug | 34 - Roller Bearing | 45 - O-Ring (2 Used) |
| 12 - Inner Race | | | |

BODY (UPPERSTRUCTURE) / Pump Device

Disassembly of Main Pump




CAUTION: Pump device weight: 92 kg (205 lb)

1. Secure the pump device on a workbench with the pilot pump side facing downward.
2. Remove O-ring (38), O-rings (40) (5 used) and spring pins (39) (2 used) from pump casing (2).



CAUTION: Front casing (8) weight: 36 kg (79.5 lb)

3. Remove socket bolts (9) (8 used) from front casing (8).

 : 12 mm

IMPORTANT: Do not damage inner race (12) with drive shaft (11) attached.

4. Remove the front casing (8) assembly from pump casing (2). At this time, drive shaft (11), the rotor (4) assembly and restrictor pin (43) are removed together with front casing (8).



NOTE: When removing front casing (8), raise the pump casing (2) side a little in order to prevent rotor (4) from falling off.



NOTE: Do not remove restrictor pin (43) unless necessary. Restrictor pin (43) may be left in pump casing (2).

5. Place front casing (8) on a wooden block (120 mm (4.72 in) square or more) with the rotor (4) side facing upward.

6. Remove retaining ring (1), inner race (12) and needle bearing (13) from drive shaft (11).

IMPORTANT: The valve plate (3) side of rotor (4) is a sliding surface. Do not damage the sliding surface.

7. Put a hand on retainer (18) and remove the rotor (4) assembly from drive shaft (11). Place the rotor (4) assembly with the valve plate (3) side facing downward.

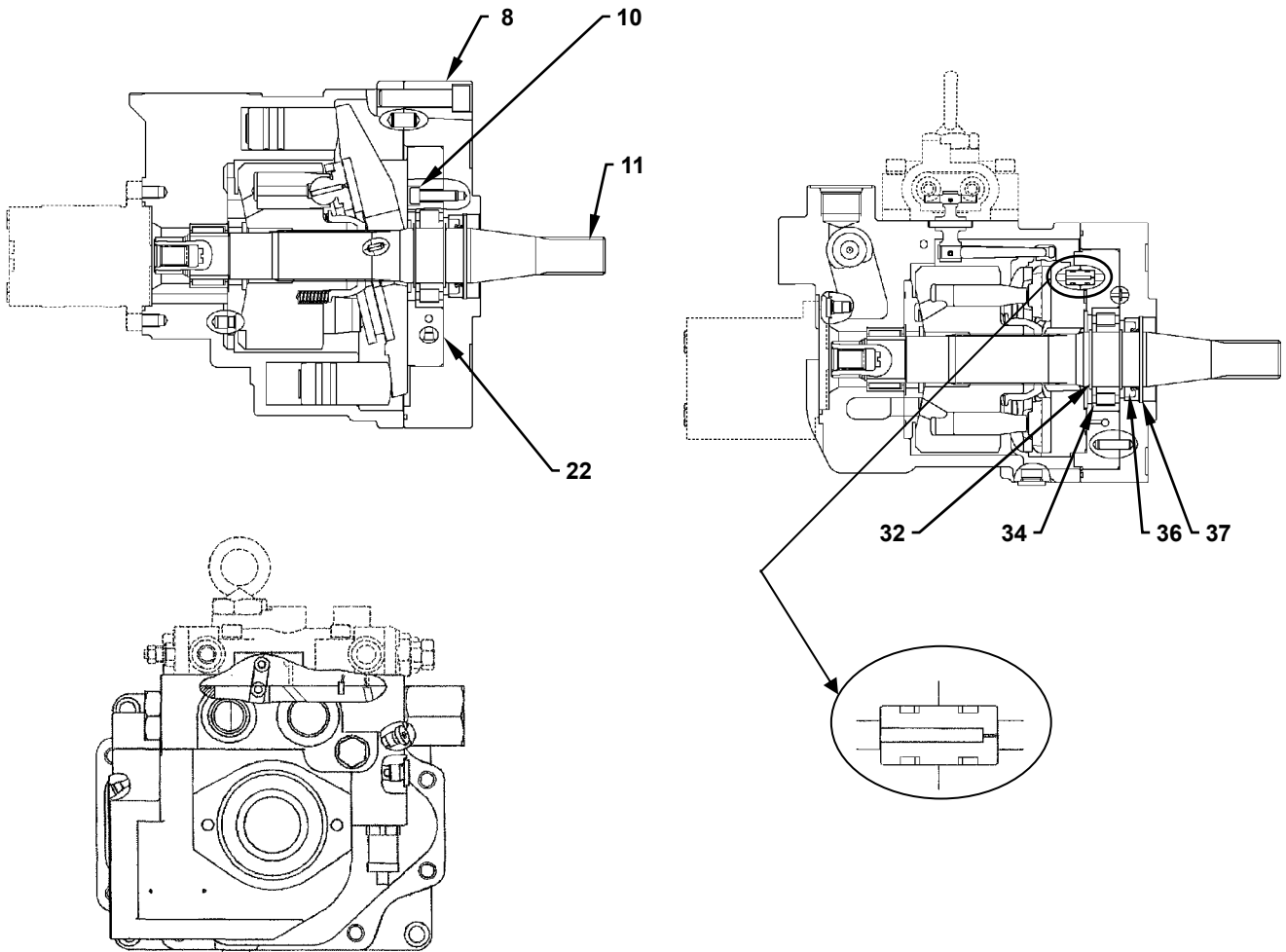
8. Put a hand under retainer (18) and remove the retainer (18) assembly from rotor (4).

9. Remove servo pistons (17) (3 used) from pump casing (2).

10. Remove bushing (16) and springs (15) (7 used) from rotor (4).

11. Remove plate (19) from swash plate (6).


BODY (UPPERSTRUCTURE) / Pump Device



W4GB-02-04-003

BODY (UPPERSTRUCTURE) / Pump Device

12. Remove socket bolts (10) (4 used) from cradle plate (22). Remove cradle plate (22) from front casing (8).

 : 6 mm

13. Remove the drive shaft (11) assembly from front casing (8).

IMPORTANT: When removing retaining ring (32), do not damage the seal lip contacting surface of drive shaft (11).

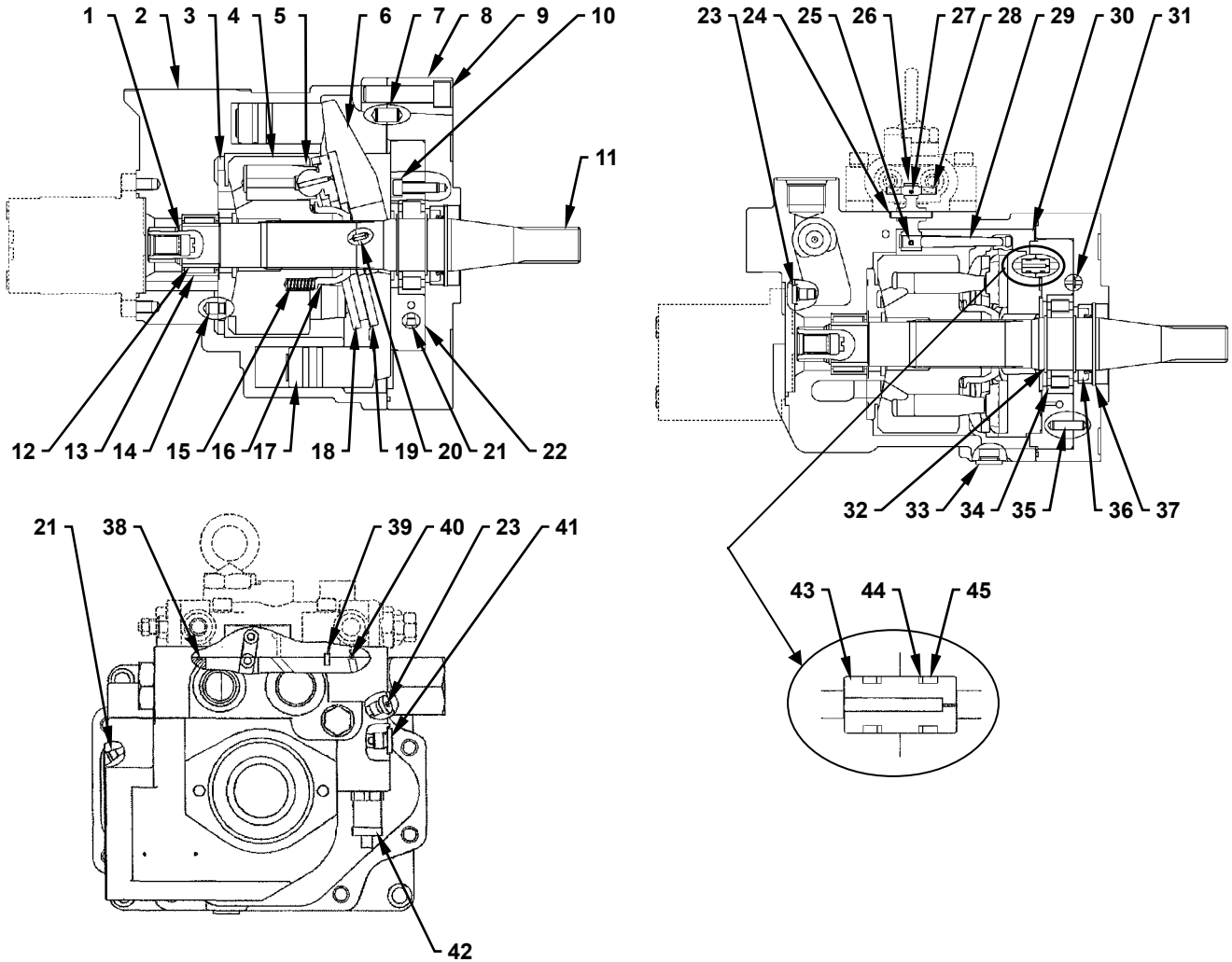
14. Remove retaining rings (32) (2 used) from drive shaft (11).

15. Remove roller bearing (34) from drive shaft (11).

16. Turn over front casing (8). Remove retaining ring (37) and oil seal (36).

BODY (UPPERSTRUCTURE) / Pump Device

ASSEMBLY OF MAIN PUMP



W4GB-02-04-003

- | | | | |
|---------------------------|----------------------------|------------------------------|---------------------------|
| 1 - Retaining Ring | 13 - Needle Bearing | 24 - Pin | 35 - Knock Pin |
| 2 - Pump Casing | 14 - Knock Pin | 25 - Spring Pin | 36 - Oil Seal |
| 3 - Valve Plate | 15 - Spring (7 Used) | 26 - Feedback Link | 37 - Retaining Ring |
| 4 - Rotor | 16 - Bushing | 27 - Spring Pin | 38 - O-Ring |
| 5 - Plunger (7 Used) | 17 - Servo Piston (3 Used) | 28 - Pin | 39 - Spring Pin (2 Used) |
| 6 - Swash Plate | 18 - Retainer | 29 - Link Pin | 40 - O-Ring (5 Used) |
| 7 - Knock Pin | 19 - Cam Plate | 30 - O-Ring | 41 - Plug |
| 8 - Front Casing | 20 - Knock Pin | 31 - O-Ring | 42 - Pressure Sensor |
| 9 - Socket Bolt (8 Used) | 21 - Plug (3 Used) | 32 - Retaining Ring (2 Used) | 43 - Restrictor Pin |
| 10 - Socket Bolt (4 Used) | 22 - Cradle Plate | 33 - Plug | 44 - Backup Ring (2 Used) |
| 11 - Drive Shaft | 23 - Plug | 34 - Roller Bearing | 45 - O-Ring (2 Used) |

BODY (UPPERSTRUCTURE) / Pump Device

Assembly of Main Pump

1. Install the outer race of needle bearing (13) to pump casing (2) with the stamped mark facing outside by using a special tool and a hammer.


IMPORTANT: Replace valve plate (3) and rotor (4) as an assembly.

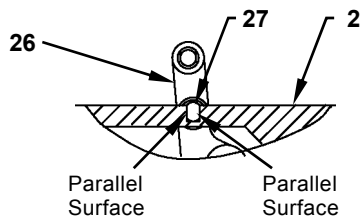
IMPORTANT: Install valve plate (3) of the rotor (4) assembly with the oval hole facing downward.

2. Apply grease onto the flat surface of valve plate (3). Install valve plate (3) to pump casing (2) while aligning with knock pin (14).
3. Install servo pistons (17) (3 used) to pump casing (2).

IMPORTANT: Check the direction to install feedback link (26).

4. Install the feedback link (26) assembly to pump casing (2) while aligning with the groove for pin (24). At this time, face link pin (29) to the front casing (8) side.


 **NOTE:** Both surfaces of spring pin (27) are parallel to each other. Install spring pin (27) while aligning the parallel surface with the groove.



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5. Assemble rotor (4) into an assembly in the following procedures.

- Place rotor (4) with the center projection part facing upward.
- Install springs (15) (7 used) to rotor (4).
- Cover rotor (4) with bushing (16).

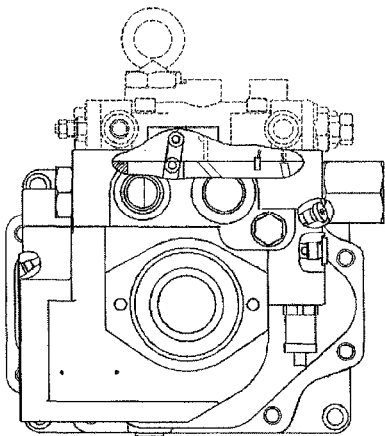
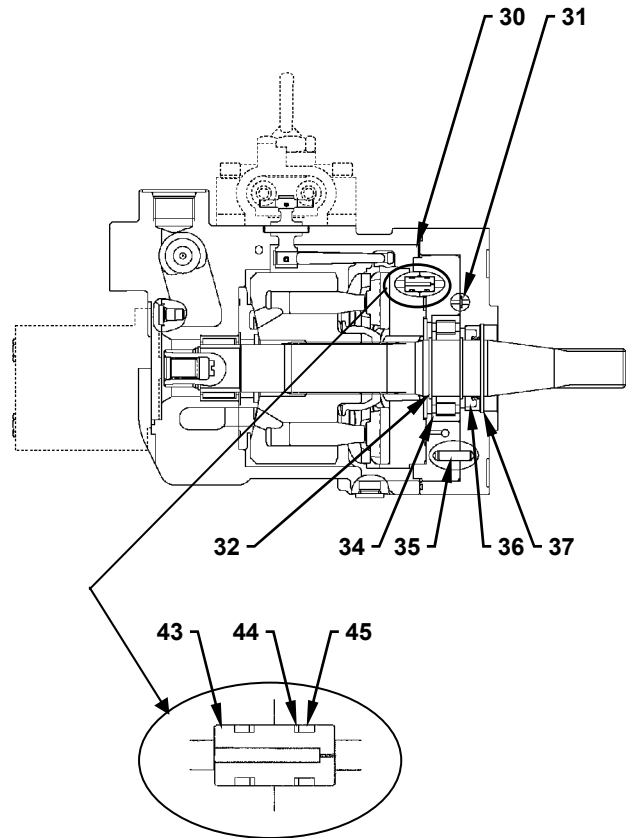
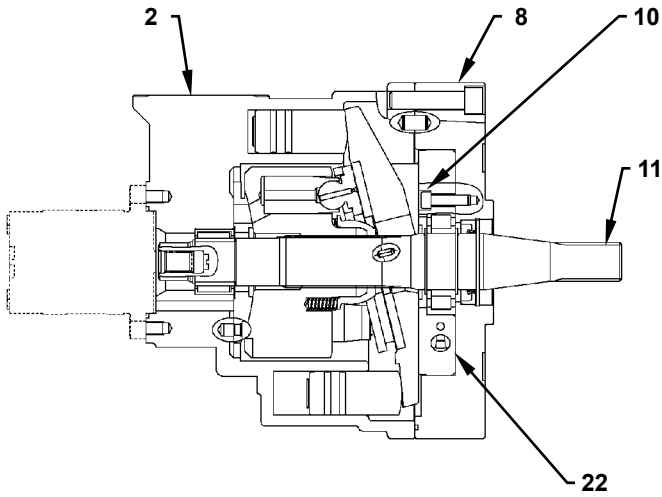
 **NOTE:** Drive shaft (11) can be easily installed if aligning the spline in bushing (16) with the spline in rotor (4) when covering with bushing (16).

- Insert plungers (5) (7 used) through the retainer (18) flat surface and install to rotor (4).

6. Evenly tap and install inner race (12) to drive shaft (11) by using a special tool and a hammer.

7. Install retaining ring (1) to drive shaft (11).

BODY (UPPERSTRUCTURE) / Pump Device

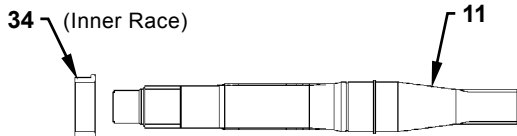


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BODY (UPPERSTRUCTURE) / Pump Device

IMPORTANT: Do not damage the oil seal (36) sliding surface of drive shaft (11).



- There are two ring grooves in drive shaft (11). Install retaining ring (32) to the ring groove closer to the end surface.
- Check the direction of the inner race of roller bearing (34). Install the inner race of roller bearing (34) to drive shaft (11).

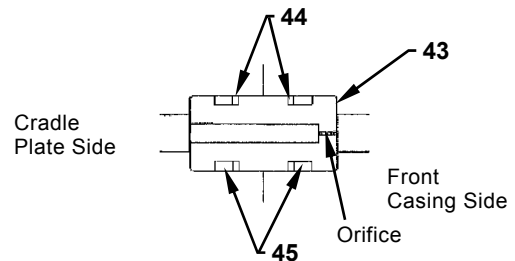


W4GB-02-04-004

- Install the outer race of roller bearing (34) to drive shaft (11) with the stamped mark facing forward.
- Install retaining ring (32) to drive shaft (11).

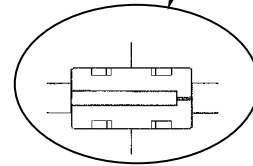
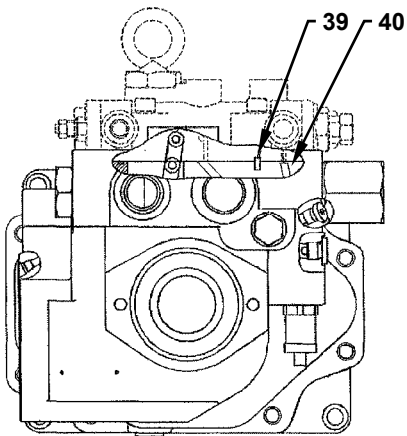
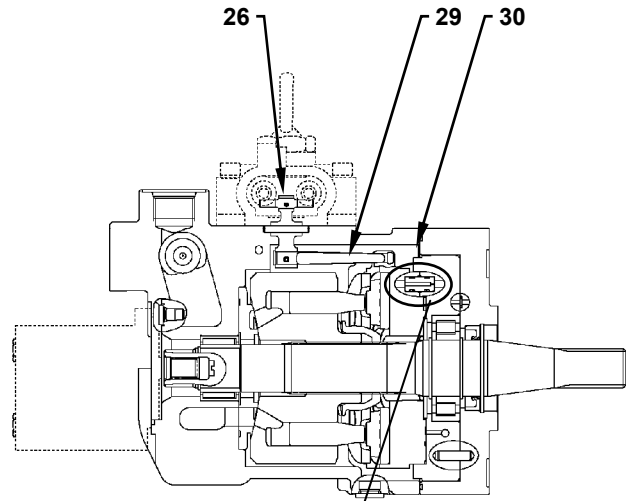
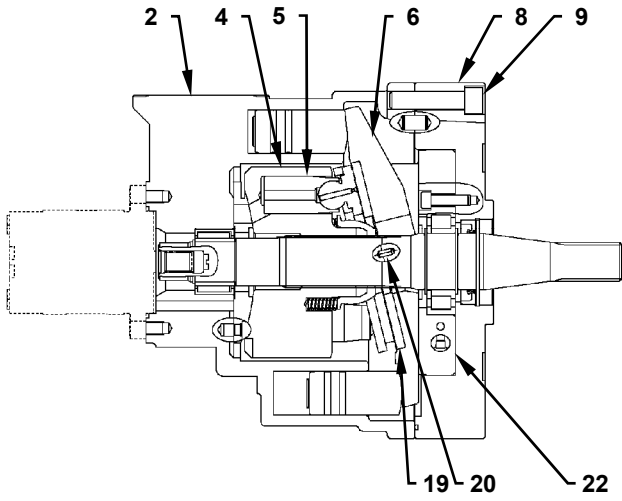
12. Assemble front casing (8) into an assembly in the following procedures.

- Place front casing (8) with the pump casing (2) side facing downward.
- Apply grease onto the inner surface of oil seal (36).
- Evenly tap and install oil seal (36) to front casing (8) by using a special tool and a plastic hammer.
- Install retaining ring (37) to front casing (8).
- Turn over front casing (8). Place front casing (8) on a wooden block (120 mm (4.72 in) square or more).
- Install O-ring (31) to front casing (8).
- Install drive shaft (11) to front casing (8). At this time, roller bearing (34) can be installed by tapping drive shaft (11) lightly by using a plastic hammer.
- Tighten cradle plate (22) to front casing (8) with socket bolts (10) (4 used) while aligning with knock pin (35).
 -  : 6 mm
 -  : 30 N·m (3.1 kgf·m, 22 lbf·ft)
- Install O-ring (30) to front casing (8).
- If restrictor pin (43) was removed, install backup rings (44) (2 used) and O-rings (45) (2 used) to restrictor pin (43). Install restrictor pin (43) to front casing (8). At this time, install restrictor pin (43) with the orifice side facing inside.



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BODY (UPPERSTRUCTURE) / Pump Device



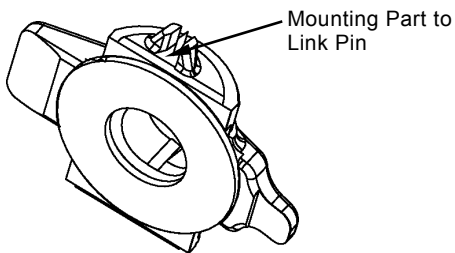
W4GB-02-04-003

BODY (UPPERSTRUCTURE) / Pump Device

13. Apply grease onto the side of the knock pin (20) hole of cam plate (19). Install cam plate (19) to swash plate (6) while aligning with knock pin (20).

IMPORTANT: Install swash plate (6) with the mounting part between swash plate (6) and link pin (29) facing upward (to the regulator mounting side).

14. Apply grease onto the cylindrical surface of swash plate (6). Install cradle plate (22) to the front casing (8) assembly while aligning with the cylindrical surface.



W176-02-04-018

15. Install the rotor (4) assembly to the front casing (8) assembly. Do not drop plunger (5) from the rotor (4) assembly.

CAUTION: The front casing (8) assembly weight: 36 kg (79.5 lb)

16. Raise and hold the front casing (8) assembly almost to the vertical position.

NOTE: As swash plate (6) may come off, do not raise the casing (8) assembly excessively.

CAUTION: The front casing (8) assembly weight: 36 kg (79.5 lb)


17. Hoist the front casing (8) assembly.


NOTE: Do not tilt the casing (8) assembly as center of gravity is at the rotor (4) side. Rotor (4) comes off.

IMPORTANT: Install the front casing (8) assembly so that link pin (29) can be inserted into the mounting concave part of swash plate (6) and feedback link (26).

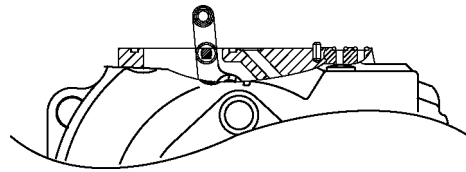
18. Install the front casing (8) assembly to pump casing (2) while aligning with the link pin (29) position.

19. Tighten front casing (8) to pump casing (2) with socket bolts (9) (8 used).

 : 12 mm

 : 180 N·m (18.5 kgf·m, 133 lbf·ft)

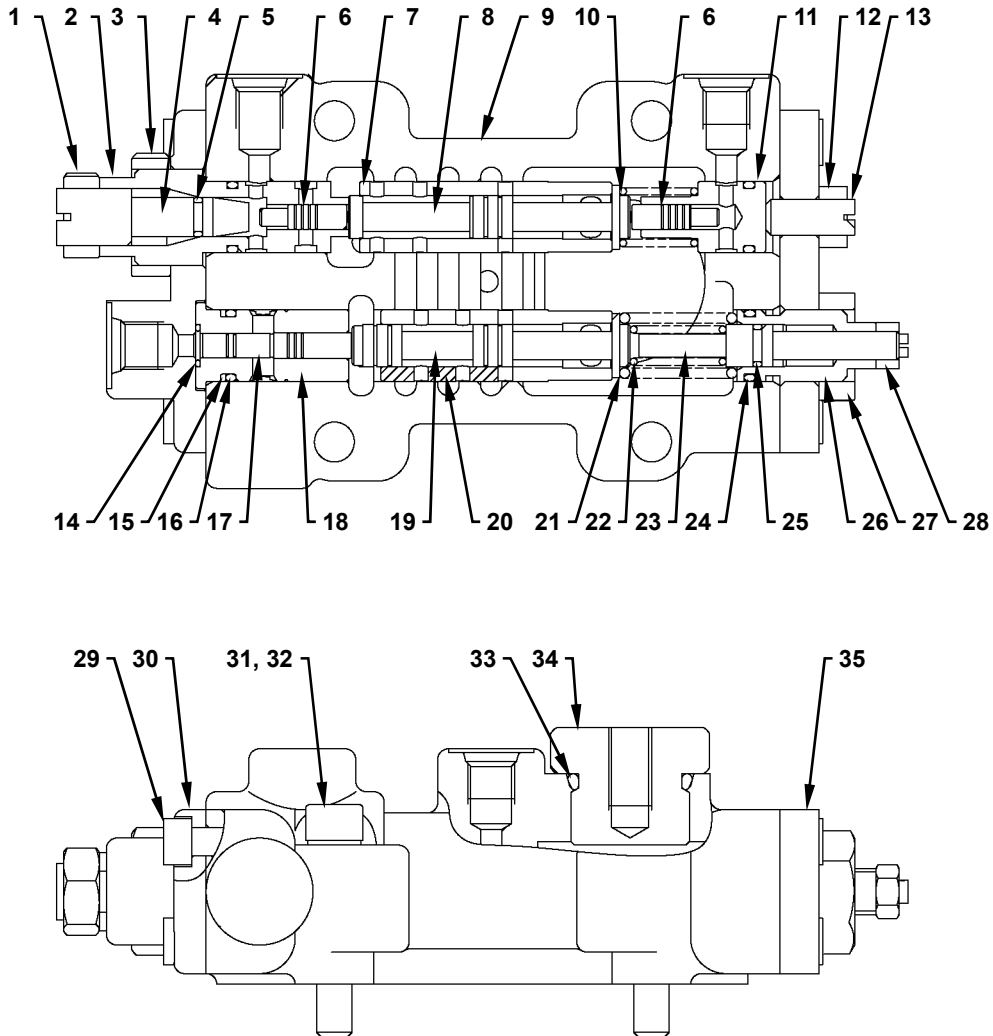
20. Install O-ring (38), O-rings (40) (5 used) and spring pins (39) (2 used) to pump casing (2).



W176-02-04-014

BODY (UPPERSTRUCTURE) / Pump Device

DISASSEMBLY OF REGULATOR



W4GB-02-04-006

- | | | | |
|---------------------|------------------|----------------------|---------------------------|
| 1 - Nut | 10 - Spring | 19 - Spool | 28 - Lock Nut |
| 2 - Cylinder | 11 - Cylinder | 20 - Sleeve | 29 - Socket Bolt (8 Used) |
| 3 - Lock Nut | 12 - Lock Nut | 21 - Spring | 30 - Cover |
| 4 - Stopper | 13 - Set Screw | 22 - Spring | 31 - Socket Bolt (4 Used) |
| 5 - O-Ring | 14 - O-Ring | 23 - Stopper | 32 - Washer (4 Used) |
| 6 - Piston (2 Used) | 15 - Backup Ring | 24 - O-Ring (3 Used) | 33 - O-Ring |
| 7 - Sleeve | 16 - O-Ring | 25 - O-Ring | 34 - Plug |
| 8 - Spool | 17 - Piston | 26 - Stopper | 35 - Cover |
| 9 - Casing | 18 - Cylinder | 27 - Lock Nut | |


BODY (UPPERSTRUCTURE) / Pump Device

Disassembly of Regulator

IMPORTANT: As the setting changes, do not disassemble regulator adjusting screw parts (1 to 4, 12, 13 and 26 to 28).

When disassembling, adjust according to the procedure of performance test after assembling.

1. Remove socket bolts (29) (4 used) from cover (35). Remove cover (35) from casing (9). At this time, set screw (13) and the stopper (23) assembly are removed with cover (35) together.

 : 6 mm

IMPORTANT: Do not turn lock nut (3) and nut (1), as the setting is changed.

2. Remove socket bolts (29) (4 used) from cover (30). Remove cover (30) from casing (9). At this time, the stopper (4) assembly is removed with cover (30) together.

 : 6 mm

3. Remove springs (21, 22) from casing (9).

4. Insert a round bar into the hole on casing (9). Push the end of spool (19) and remove cylinder (18), sleeve (20) and spool (19) from casing (9). At this time, piston (17) is removed with cylinder (18) together.

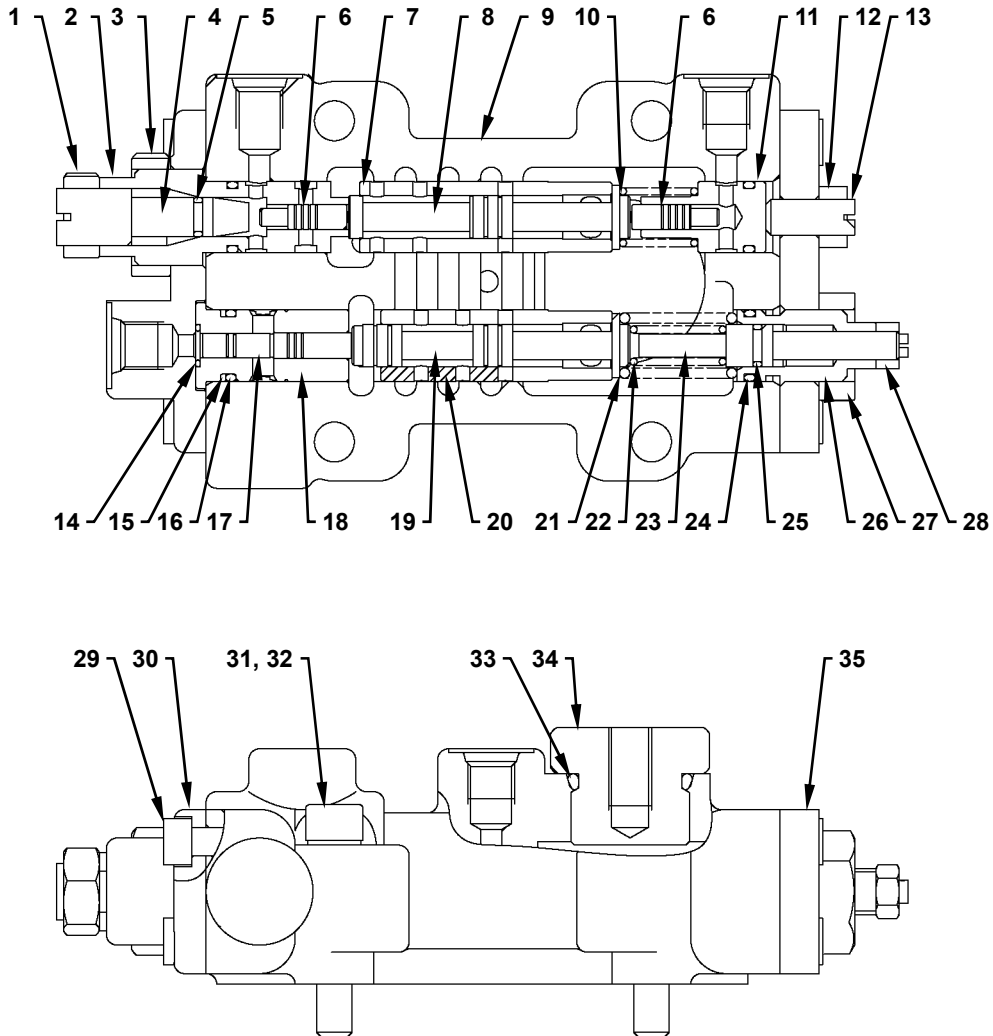
5. Remove piston (17) from cylinder (18).

6. Insert a round bar into the hole on casing (9). Push the end of spool (8) and remove cylinder (11), sleeve (7) and spool (8) from casing (9). At this time, piston (6) is removed with cylinder (11) together.

7. Remove piston (6) from cylinder (11).

BODY (UPPERSTRUCTURE) / Pump Device

ASSEMBLY OF REGULATOR



W4GB-02-04-006

- | | | | |
|---------------------|------------------|----------------------|---------------------------|
| 1 - Nut | 10 - Spring | 19 - Spool | 28 - Lock Nut |
| 2 - Cylinder | 11 - Cylinder | 20 - Sleeve | 29 - Socket Bolt (8 Used) |
| 3 - Lock Nut | 12 - Lock Nut | 21 - Spring | 30 - Cover |
| 4 - Stopper | 13 - Set Screw | 22 - Spring | 31 - Socket Bolt (4 Used) |
| 5 - O-Ring | 14 - O-Ring | 23 - Stopper | 32 - Washer (4 Used) |
| 6 - Piston (2 Used) | 15 - Backup Ring | 24 - O-Ring (3 Used) | 33 - O-Ring |
| 7 - Sleeve | 16 - O-Ring | 25 - O-Ring | 34 - Plug |
| 8 - Spool | 17 - Piston | 26 - Stopper | 35 - Cover |
| 9 - Casing | 18 - Cylinder | 27 - Lock Nut | |

BODY (UPPERSTRUCTURE) / Pump Device

Assembly of Regulator


IMPORTANT: Two holes for sleeves (7, 20) on casing (9) are the same bores. In addition, the shapes of various parts are very similar. Assemble the regulator while checking the illustration in order not to confuse.


IMPORTANT: Check the direction to install sleeve (7) and spool (8).

1. Insert spool (8) into sleeve (7). Install the sleeve (7) assembly to the center of casing (9) by using a round bar.
2. Install O-ring (24) to cylinder (11).
3. Insert piston (6) into cylinder (11). Install the cylinder (11) assembly to casing (9).


IMPORTANT: Check the direction to install sleeve (20) and spool (19).


4. Insert spool (19) into sleeve (20). Install the sleeve (20) assembly to the center of casing (9) by using a round bar.
5. Install O-rings (14, 16) and backup ring (15) to cylinder (18).
6. Insert piston (17) into cylinder (18). Install the cylinder (18) assembly to casing (9).
7. Install O-ring (5) and piston (6) to the stopper (4) assembly with cover (30) attached. Install the cover (30) assembly to casing (9) with socket bolts (29) (4 used).

 : 6 mm

 : 20 N·m (2 kgf·m, 14.5 lbf·ft)

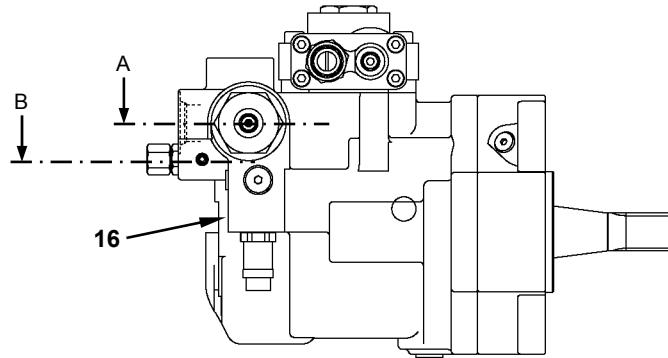
8. Install O-ring (24) and springs (21, 22) to the stopper (23) assembly with cover (35) attached. Install the cover (35) assembly to casing (9) with socket bolts (29) (4 used).

 : 6 mm

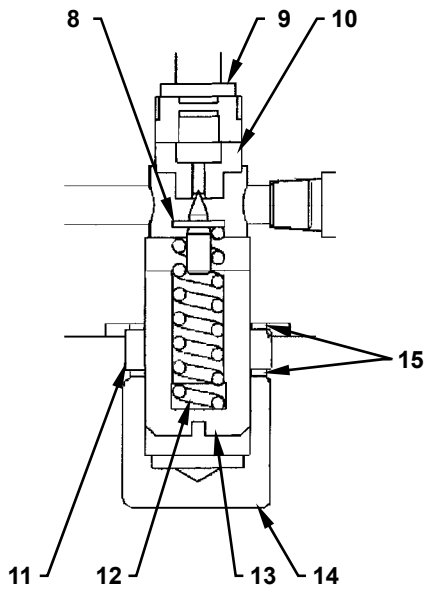
 : 20 N·m (2 kgf·m, 14.5 lbf·ft)

BODY (UPPERSTRUCTURE) / Pump Device

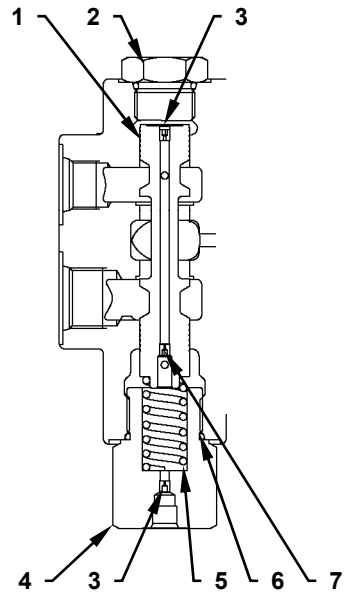
DISASSEMBLY OF PRIORITY VALVE



Section B



Section A



W4GB-02-04-007









- | | | | |
|----------------------|-------------|-------------|----------------------|
| 1 - Spool | 5 - Spring | 9 - Plug | 13 - Screw |
| 2 - Plug | 6 - O-Ring | 10 - Seat | 14 - Nut Cap |
| 3 - Orifice (2 Used) | 7 - Orifice | 11 - Nut | 15 - Gasket (2 Used) |
| 4 - Plug | 8 - Poppet | 12 - Spring | 16 - Casing |

BODY (UPPERSTRUCTURE) / Pump Device

Disassembly of Priority Valve

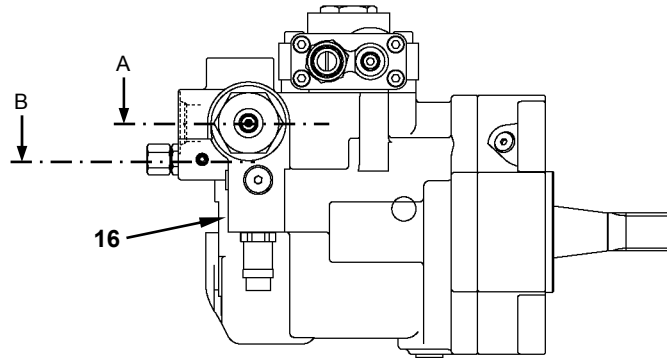


CAUTION: The priority valve is especially sensitive to dirt. When disassembling and assembling, prevent dirt from entering.

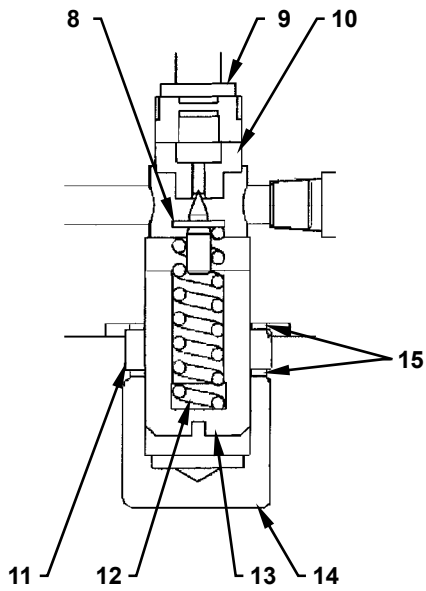
1. Remove plug (2) from casing (16).
 : 41 mm
2. Remove plug (4) and spring (5) from casing (16).
Remove O-ring (6) from plug (4).
 : 50 mm
3. Remove orifice (3) [blue-white] from plug (4).
 : 3 mm
4. Remove spool (1) from casing (16).
5. Remove orifice (3) [blue-white] and orifice (7) [red] from spool (1).
 : 3 mm
6. Remove nut cap (14) from screw (13). At this time, do not drop gasket (15).
 : 22 mm
7. Remove nut (11) from casing (16). At this time, do not drop gasket (15).
 : 22 mm
8. Remove screw (13), spring (12) and poppet (8) from casing (16).
9. Remove seat (10) from casing (16).
 : 7 mm
10. Remove plug (9) from casing (16).
 : 6 mm

BODY (UPPERSTRUCTURE) / Pump Device

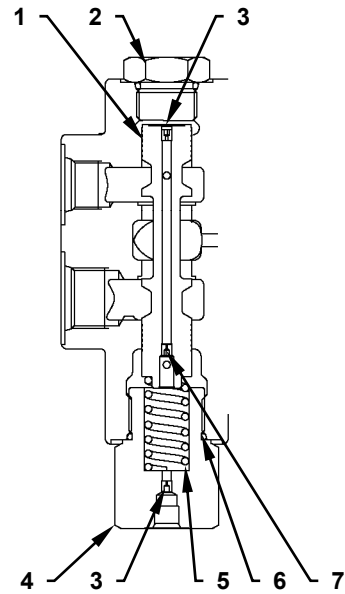
ASSEMBLY OF PRIORITY VALVE



Section B



Section A



W4GB-02-04-007


















- | | | | |
|----------------------|-------------|-------------|----------------------|
| 1 - Spool | 5 - Spring | 9 - Plug | 13 - Screw |
| 2 - Plug | 6 - O-Ring | 10 - Seat | 14 - Nut Cap |
| 3 - Orifice (2 Used) | 7 - Orifice | 11 - Nut | 15 - Gasket (2 Used) |
| 4 - Plug | 8 - Poppet | 12 - Spring | 16 - Casing |

BODY (UPPERSTRUCTURE) / Pump Device

Assembly of Priority Valve

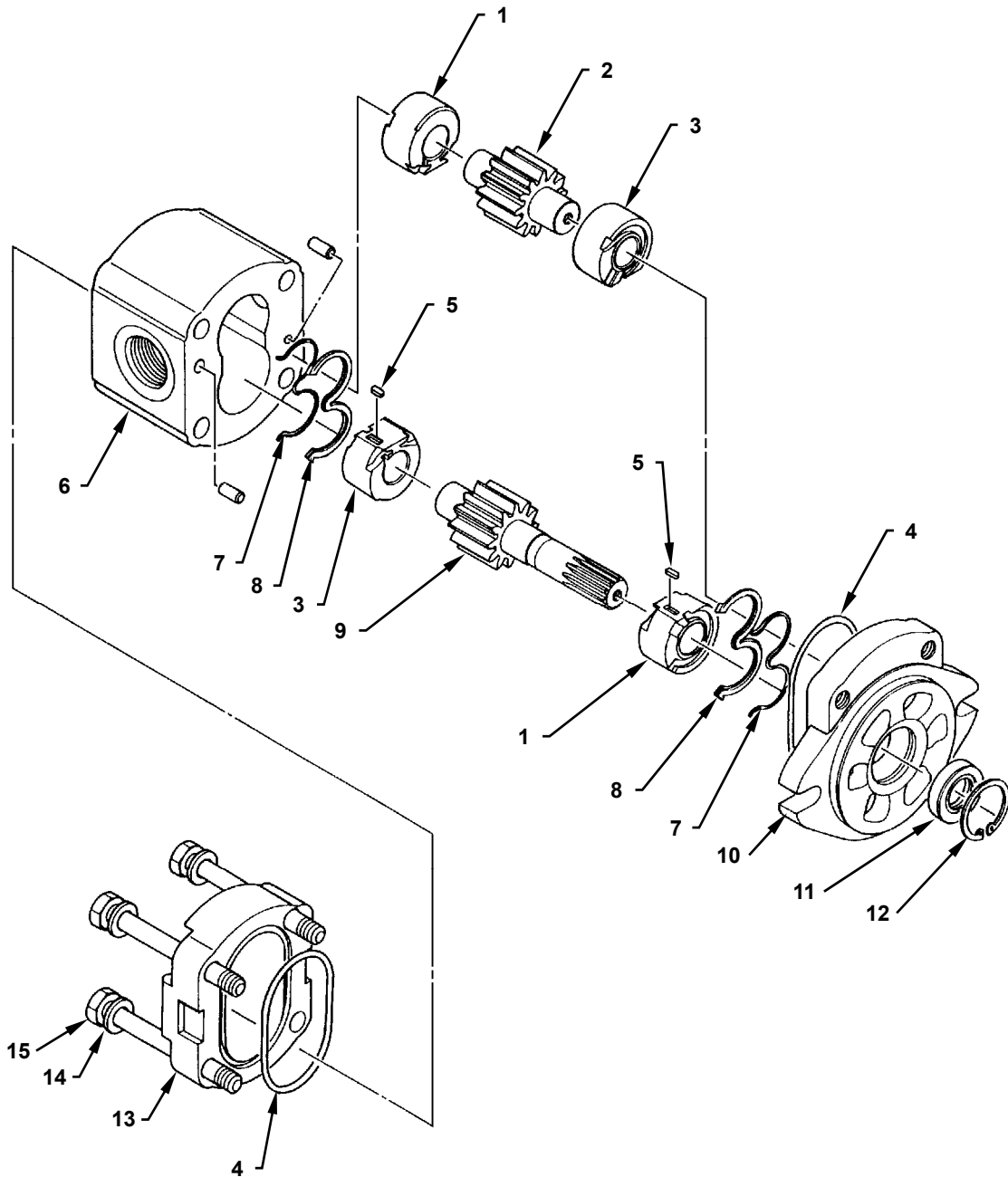


CAUTION: The priority valve is especially sensitive to dirt. When disassembling and assembling, prevent dirt from entering.

1. Install plug (9) to casing (16).
 : 6 mm
 : 15 N·m (1.5 kgf·m, 11 lbf·ft)
2. Install seat (10) to casing (16).
 : 7 mm
 : 15 N·m (1.5 kgf·m, 11 lbf·ft)
3. Install spring (12) and poppet (8) to screw (13). Install the screw (13) assembly to casing (16) so that the end of poppet (8) can be inserted into the hole on seat (10)
4. Install gasket (15) and nut (11) to screw (13).
 : 22 mm
 : 46 N·m (4.7 kgf·m, 34 lbf·ft)
5. Install orifice (3) [blue-white] and orifice (7) [red] to spool (1).
 : 3 mm
 : 3 N·m (0.3 kgf·m, 2.2 lbf·ft)
6. Insert spool (1) into casing (16). At this time, check the direction of spool (1).
7. Install orifice (3) [blue-white] to plug (4).
 : 3 mm
 : 3 N·m (0.3 kgf·m, 2.2 lbf·ft)
8. Install O-ring (6) and spring (5) to plug (4). Install the plug (4) assembly to casing (16).
 : 50 mm
 : 550 N·m (56 kgf·m, 410 lbf·ft)
9. Install plug (2) to casing (16).
 : 41 mm
 : 450 N·m (46 kgf·m, 330 lbf·ft)
-  **NOTE:** After measuring and adjusting the steering relief pressure, install nut cap (14).
10. Install gasket (15) and nut cap (14) to screw (13).
 : 22 mm
 : 37 N·m (3.7 kgf·m, 27 lbf·ft)

BODY (UPPERSTRUCTURE) / Pump Device


STRUCTURE OF PILOT PUMP



W137-02-04-034

BODY (UPPERSTRUCTURE) / Pump Device

IMPORTANT: The housing is made of aluminum.
Do not damage the housing. In addition, take extreme care in order to control the tightening torque.

No.	Part Name	Q'ty	Wrench Size (mm)	Tightening Torque			Remark
				N·m	(kgf·m)	(lbf·ft)	
1	Bushing	2					Apply hydraulic oil when assembling.
2	Gear	1					
3	Bushing	2					Apply hydraulic oil when assembling.
4	O-ring	2					Apply grease onto the lip part when assembling.
5	Key	2					
6	Housing	1					
7	Backup Ring	2					Apply grease onto the lip part when assembling.
8	Seal	2					Apply grease onto the lip part when assembling.
9	Gear	1					
10	Flange	1					
11	Oil Seal	1					Apply grease onto the lip part when assembling.
12	Retaining Ring	1					
13	Cover	1					
14	Washer	4					
15	Bolt	4	 : 17	39 to 44	(4 to 4.5)	(28.5 to 32.5)	

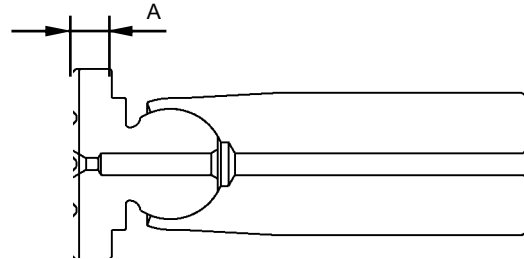
BODY (UPPERSTRUCTURE) / Pump Device

MAINTENANCE STANDARD

Pump Device

1. Plunger assembly: Shoe thickness

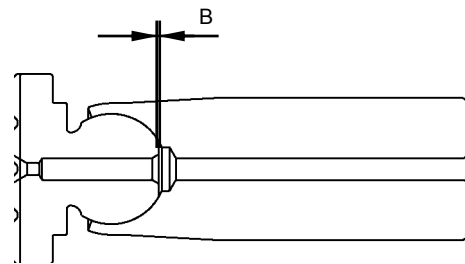
	Standard	Allowable Limit
A	8 mm (0.32 in)	7.7 mm (0.3 in)



W176-02-04-020

2. Plunger: Clearance between shoe and plunger

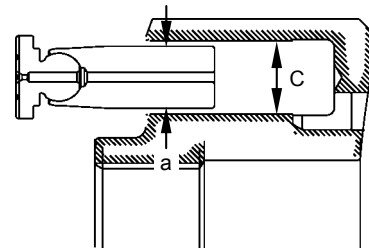
	Standard	Allowable Limit
B	0.15 mm (0.006 in)	0.4 mm (0.016 in)



W176-02-04-020

3. Rotor: Clearance between plunger outer diameter and cylinder block bore

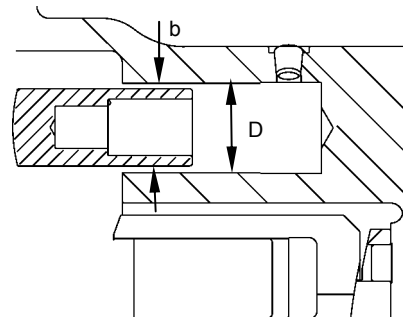
	Standard	Allowable Limit
(C-a)	0.03 mm (0.001 in)	0.07 mm (0.003 in)



W176-02-04-021

4. Clearance between housing inner diameter and servo piston outer diameter

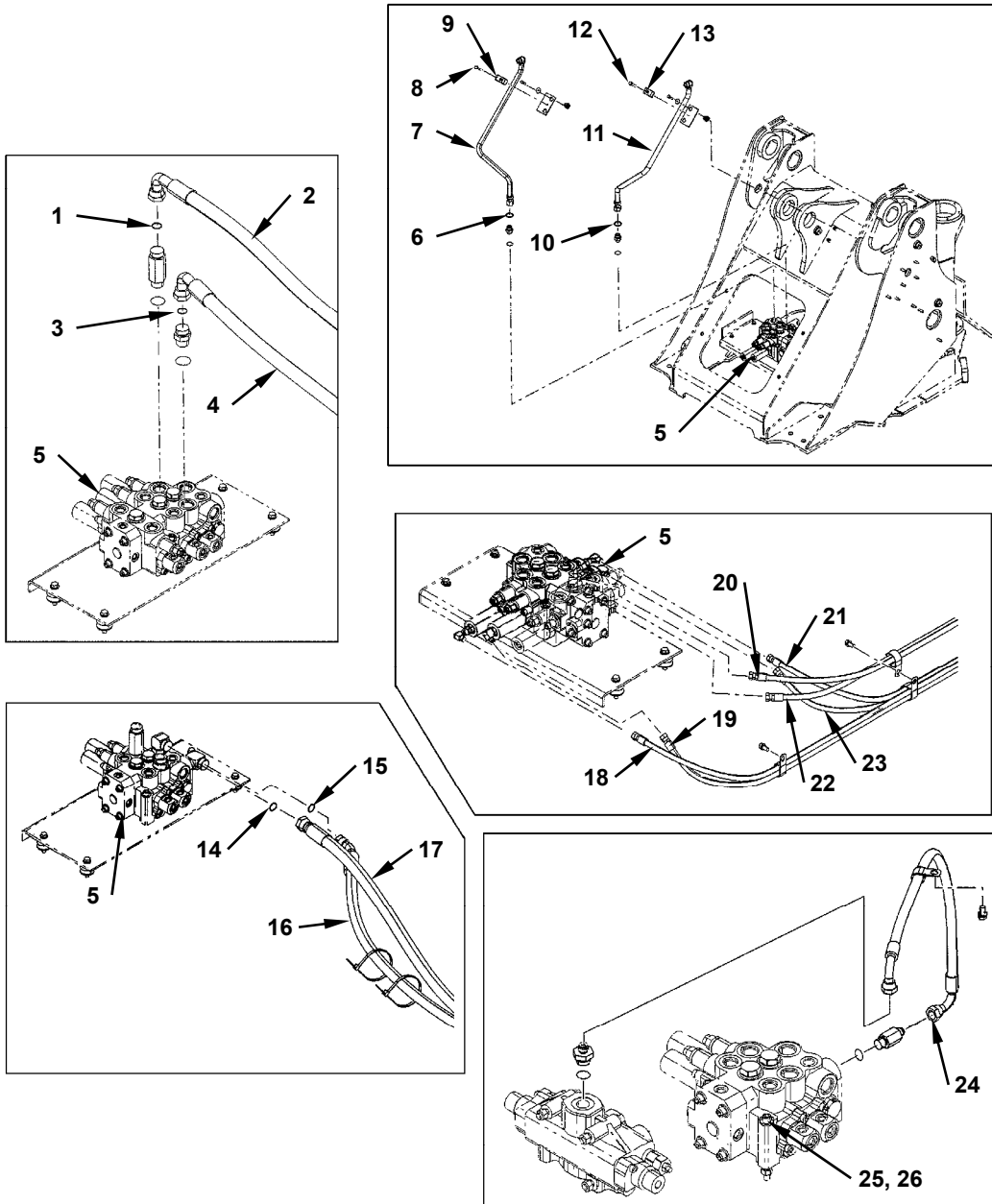
	Standard	Allowable Limit
(D-b)	0.02 mm (0.001 in)	0.04 mm (0.002 in)



W176-02-04-022

BODY (UPPERSTRUCTURE) / Control Valve

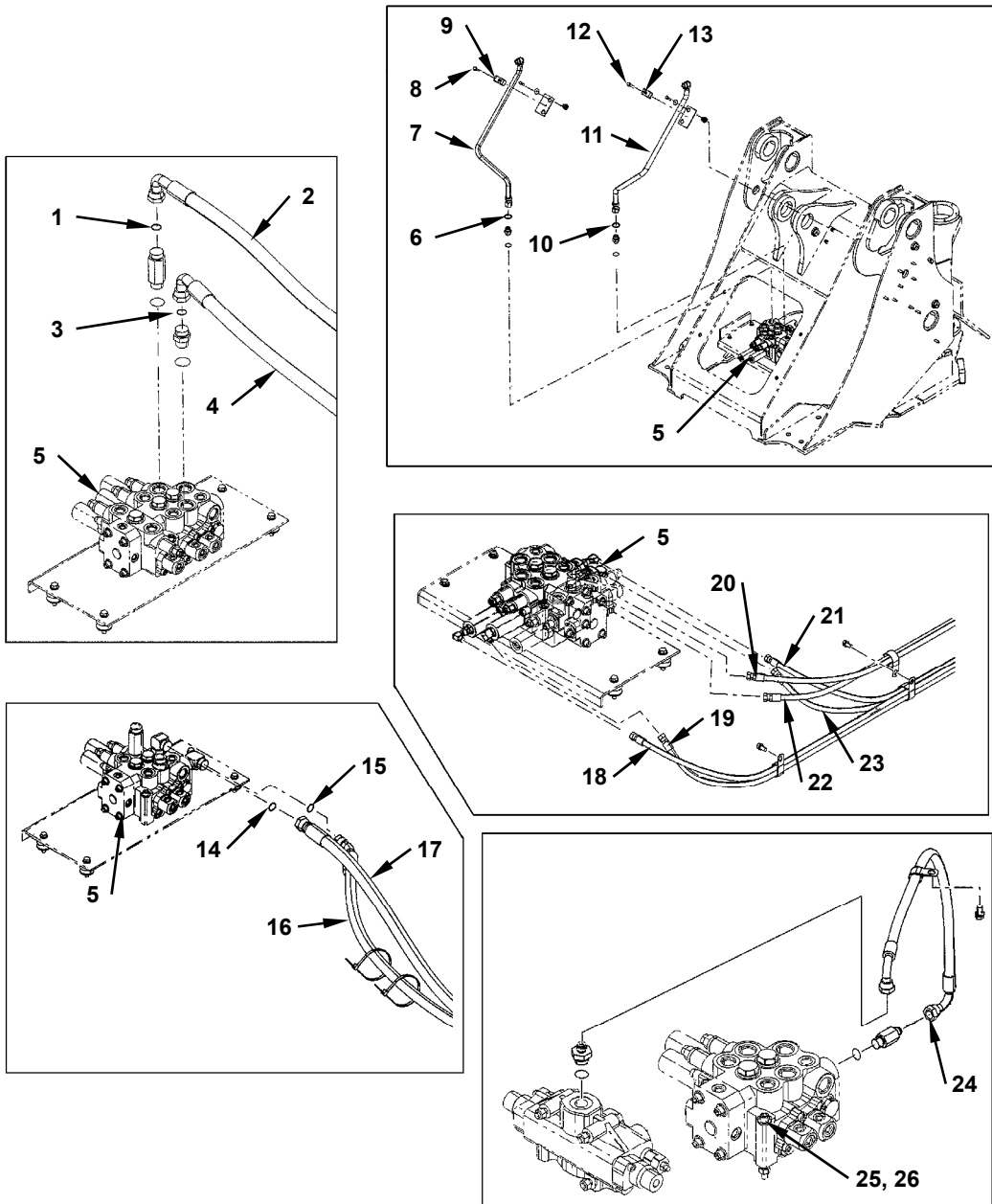
REMOVAL AND INSTALLATION OF CONTROL VALVE



W4GB-02-05-021

- | | | | |
|-------------------|----------------|-------------|---------------------------|
| 1 - O-Ring | 8 - Sems Bolt | 15 - O-Ring | 21 - Hose |
| 2 - Hose | 9 - Clamp | 16 - Hose | 22 - Hose |
| 3 - O-Ring | 10 - O-Ring | 17 - Hose | 23 - Hose |
| 4 - Hose | 11 - Piping | 18 - Hose | 24 - Hose |
| 5 - Control Valve | 12 - Sems Bolt | 19 - Hose | 25 - Socket Bolt (3 Used) |
| 6 - O-Ring | 13 - Clamp | 20 - Hose | 26 - Washer (3 Used) |
| 7 - Piping | 14 - O-Ring | | |

BODY (UPPERSTRUCTURE) / Control Valve



W4GB-02-05-021


BODY (UPPERSTRUCTURE) / Control Valve

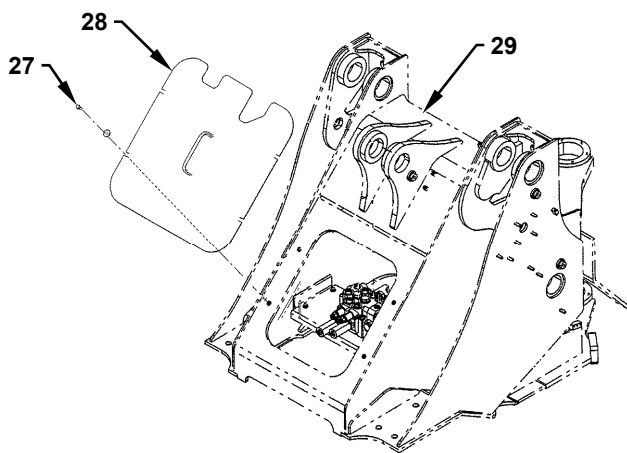
Removal

CAUTION: Bleed air from the hydraulic oil tank before doing any work. (Refer to **BLEED AIR FROM HYDRAULIC OIL TANK** on W1-4-1.)

CAUTION: Attach an identification tag onto the disconnected hose and the pipe for assembling.


1. Remove sems bolts (27) (4 used) from cover (28). Remove cover (28) from front frame (29).

 : 14 mm




W4GB-02-05-022


2. Remove sems bolt (8) from clamp (9). Remove clamp (9) from piping (7).

 : 17 mm


3. Remove sems bolt (12) from clamp (13). Remove clamp (13) from piping (11).

 : 17 mm


4. Disconnect pipings (7, 11) from control valve (5). Cap the open ends.

 : 36 mm


5. Disconnect hoses (2, 4) from control valve (5). Cap the open ends.

 : 41 mm

6. Disconnect hoses (16, 17) from control valve (5). Cap the open ends.


 : 36 mm, 41 mm

7. Disconnect hoses (18, 19, 20, 21, 22, 23 and 24) from control valve (5). Cap the open ends.

 : 19 mm, 22 mm

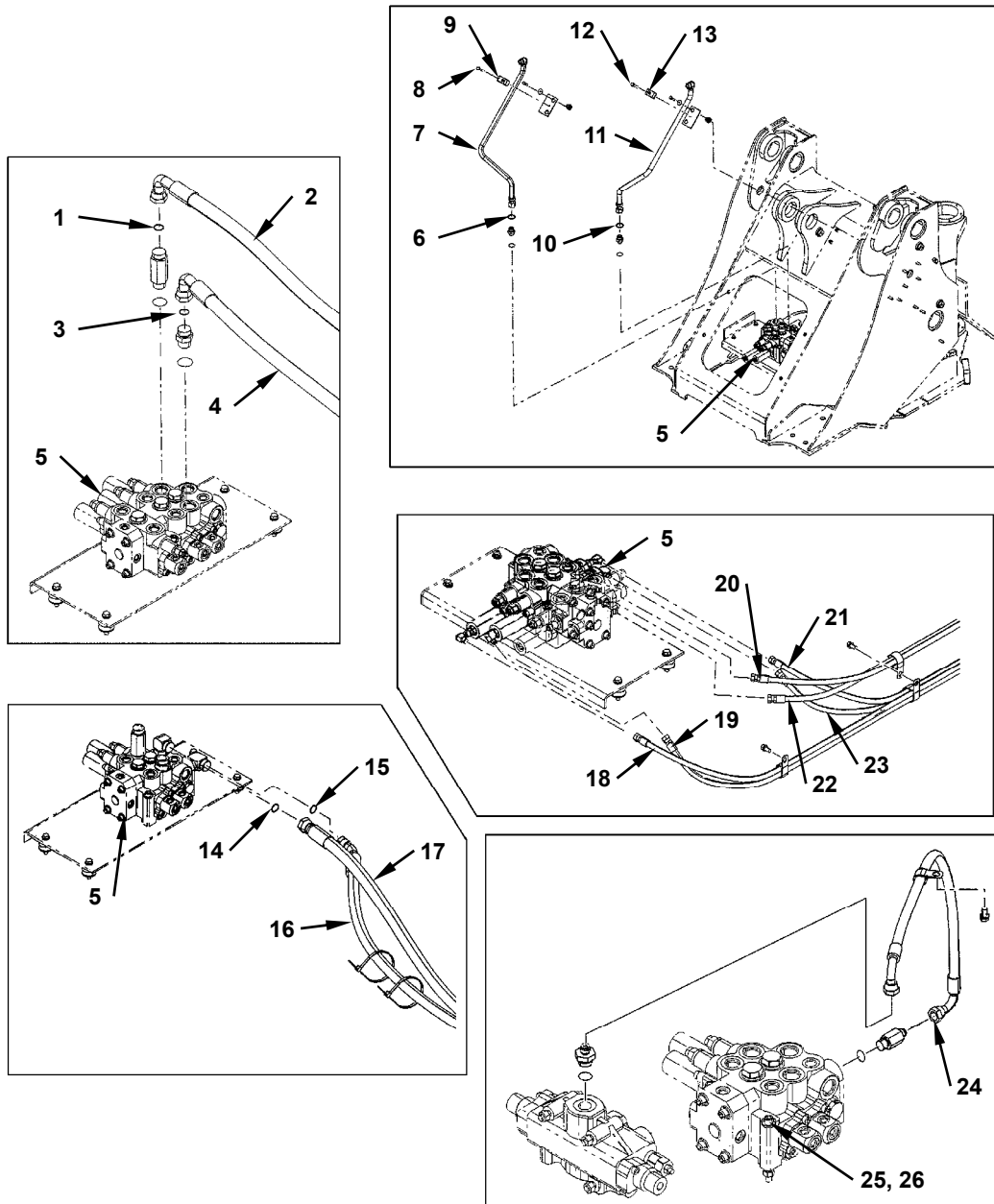
CAUTION: Control valve (5) weight: 41 kg (90.5 lb)

8. Remove socket bolts (25) (3 used) from control valve (5).

 : 10 mm

9. Attach a nylon sling onto control valve (5). Hoist and remove control valve (5) from front frame (29).

BODY (UPPERSTRUCTURE) / Control Valve



W4GB-02-05-021

- | | | | |
|-------------------|----------------|-------------|---------------------------|
| 1 - O-Ring | 8 - Sems Bolt | 15 - O-Ring | 21 - Hose |
| 2 - Hose | 9 - Clamp | 16 - Hose | 22 - Hose |
| 3 - O-Ring | 10 - O-Ring | 17 - Hose | 23 - Hose |
| 4 - Hose | 11 - Piping | 18 - Hose | 24 - Hose |
| 5 - Control Valve | 12 - Sems Bolt | 19 - Hose | 25 - Socket Bolt (3 Used) |
| 6 - O-Ring | 13 - Clamp | 20 - Hose | 26 - Washer (3 Used) |
| 7 - Piping | 14 - O-Ring | | |


BODY (UPPERSTRUCTURE) / Control Valve


Installation

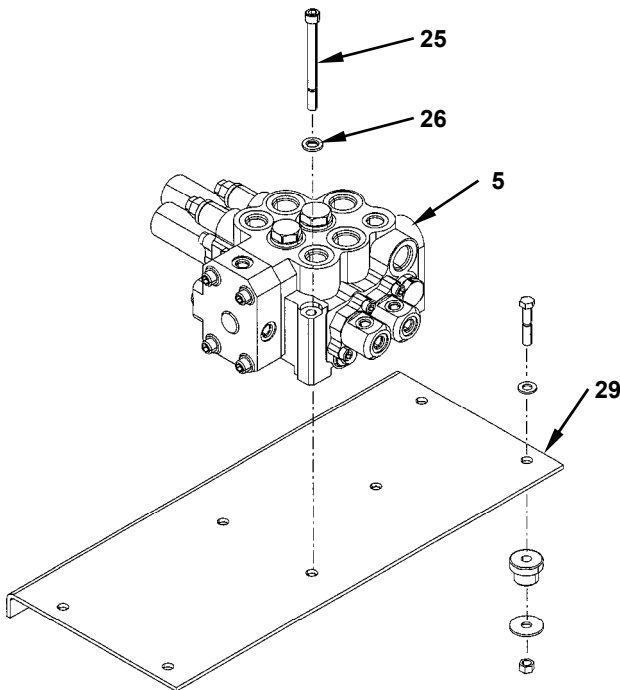
CAUTION: Control valve (5) weight: 41 kg (90.5 lb)

1. Attach a nylon sling onto control valve (5). Hoist and align control valve (5) with the mounting hole on front frame (29).

2. Secure control valve (5) to front frame (29) with socket bolts (25) (3 used) and washers (26) (3 used).


 : 10 mm


 : 133 N·m (13.5 kgf·m, 98 lbf·ft)





W4GB-02-05-023

3. Connect hoses (18, 19, 20, 21, 22, 23 and 24) to control valve (5).


 : 19 mm


 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)


 : 22 mm


 : 39 N·m (4 kgf·m, 28.5 lbf·ft)

4. Install O-rings (14, 15) and connect hoses (16, 17) to control valve (5).


 : 36 mm


 : 175 N·m (18 kgf·m, 129 lbf·ft)

 : 41 mm


 : 205 N·m (21 kgf·m, 151 lbf·ft)


5. Install O-rings (1, 3) and connect hoses (2, 4) to control valve (5).

 : 41 mm


 : 205 N·m (21 kgf·m, 151 lbf·ft)

6. Install O-rings (6, 10) and connect pipings (7, 11) to control valve (5).


 : 36 mm


 : 175 N·m (18 kgf·m, 129 lbf·ft)

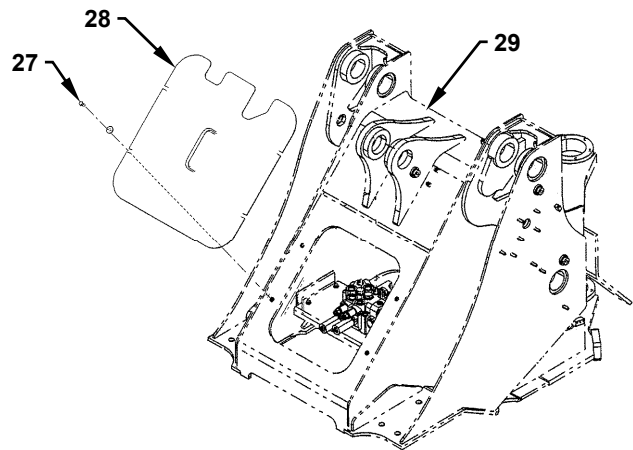
7. Secure pipings (7, 11) to front frame (29) with sems bolts (8, 12) and clamps (9, 13).

 : 17 mm

8. Install cover (28) to front frame (29) with sems bolts (27) (4 used).

 : 14 mm

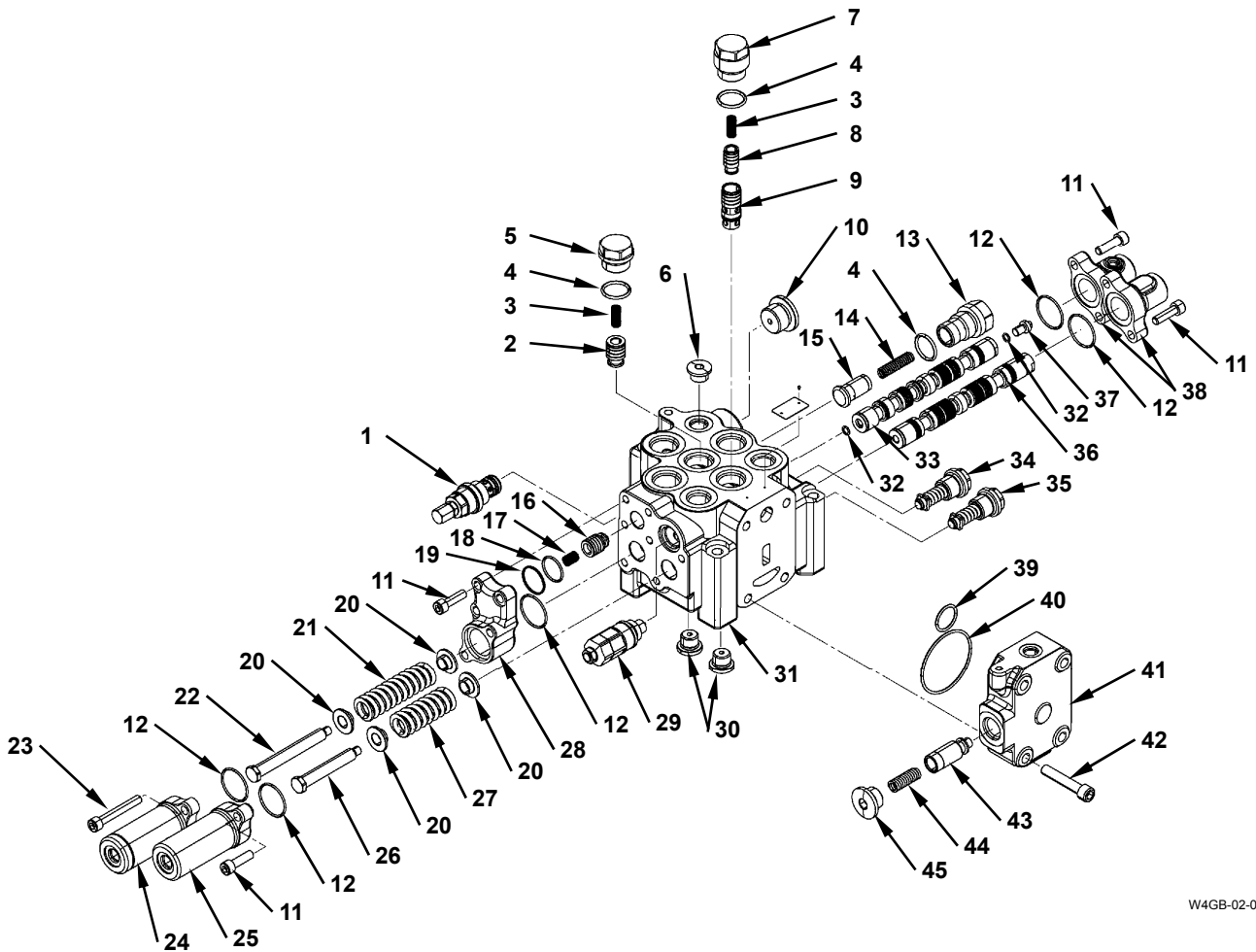
 : 50 N·m (5 kgf·m, 37 lbf·ft)



W4GB-02-05-022

BODY (UPPERSTRUCTURE) / Control Valve

DISASSEMBLY OF CONTROL VALVE




W4GB-02-05-001

- | | | | |
|---------------------------|---------------------------|----------------------|-----------------------------|
| 1 - Main Relief Valve | 13 - Plug | 25 - Pilot Housing | 37 - Plug |
| 2 - Poppet | 14 - Spring | 26 - Bolt | 38 - Pilot Housing (2 Used) |
| 3 - Spring (2 Used) | 15 - Poppet | 27 - Spring | 39 - O-Ring |
| 4 - O-Ring (3 Used) | 16 - Poppet | 28 - Pilot Housing | 40 - O-Ring |
| 5 - Plug | 17 - Spring | 29 - Relief Valve | 41 - End Plate |
| 6 - Plug | 18 - O-Ring | 30 - Plug (2 Used) | 42 - Socket Bolt (4 Used) |
| 7 - Plug | 19 - Backup Ring | 31 - Housing | 43 - Poppet |
| 8 - Poppet | 20 - Spring Seat (4 Used) | 32 - O-Ring (2 Used) | 44 - Spring |
| 9 - Poppet | 21 - Spring | 33 - Spool | 45 - Plug |
| 10 - Plug | 22 - Bolt | 34 - Relief Valve | |
| 11 - Socket Bolt (9 Used) | 23 - Socket Bolt (2 Used) | 35 - Relief Valve | |
| 12 - O-Ring (5 Used) | 24 - Pilot Housing | 36 - Spool | |


BODY (UPPERSTRUCTURE) / Control Valve

Disassembly of Control Valve

1. Remove plug (10) from housing (31).


 : 17 mm

2. Remove plug (13) from housing (31). Remove poppet (15) and spring (14) from housing (31). Remove O-ring (4) from plug (13).


 : 36 mm

IMPORTANT: Attach a spanner onto the hexagonal part of the relief valve case.


3. Remove relief valve (29) from housing (31).

 : 32 mm

4. Remove socket bolts (11) (6 used) from pilot housings (38) (2 used) and pilot housing (25). Remove pilot housing (25) and pilot housings (38) (2 used) from housing (31).

 : 8 mm

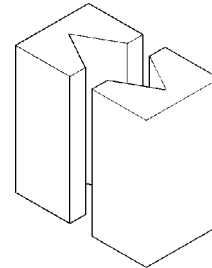
5. Remove socket bolts (23) (2 used) from pilot housing (24). Remove pilot housing (24) from pilot housing (28).

 : 8 mm

6. Remove O-rings (12) (4 used) from pilot housings (24, 25) and pilot housings (38) (2 used).


7. Slowly turn and remove spools (33, 36) from housing (31).

8. Secure spools (33, 36) in a vise by using wooden pieces as illustrated.




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9. Remove bolt (26), spring seats (20) (2 used) and spring (27) from spool (36).

 : 19 mm


10. Remove bolt (22), spring seats (20) (2 used) and spring (21) from spool (33).

 : 19 mm

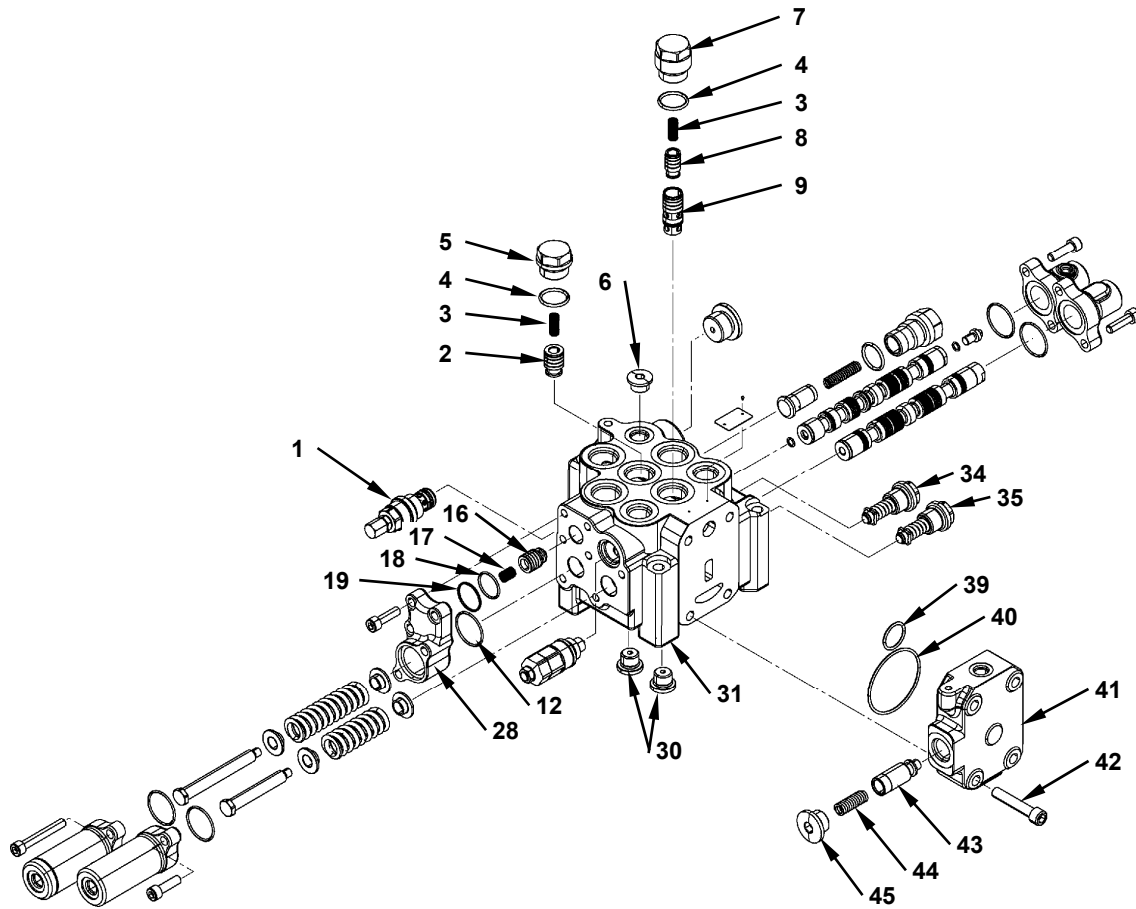
11. Remove plug (37) from spool (33). Remove O-ring (32) from plug (37).

 : 8 mm

12. Remove socket bolts (11) (3 used) from pilot housing (28). Remove pilot housing (28) from housing (31).








 : 8 mm

BODY (UPPERSTRUCTURE) / Control Valve



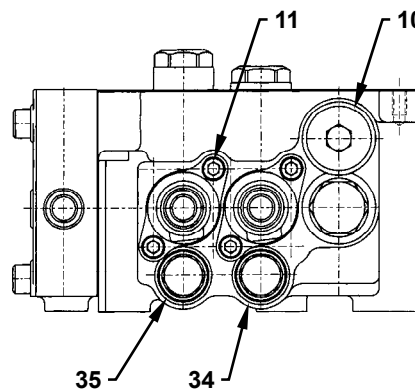
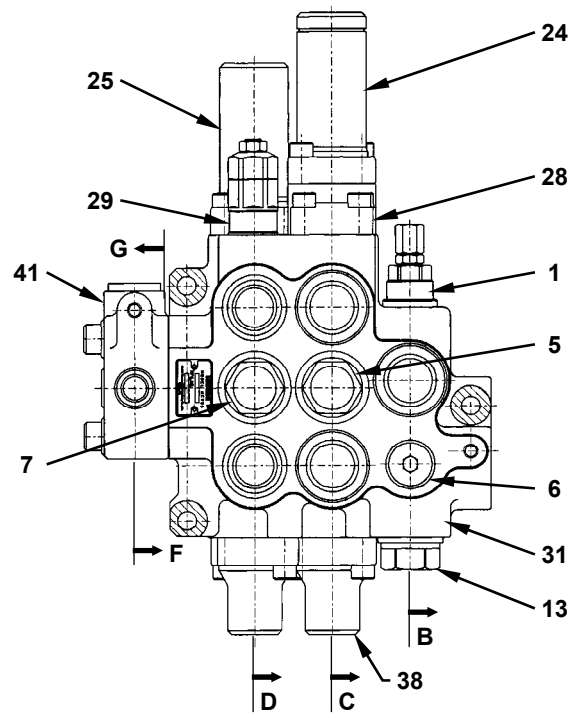
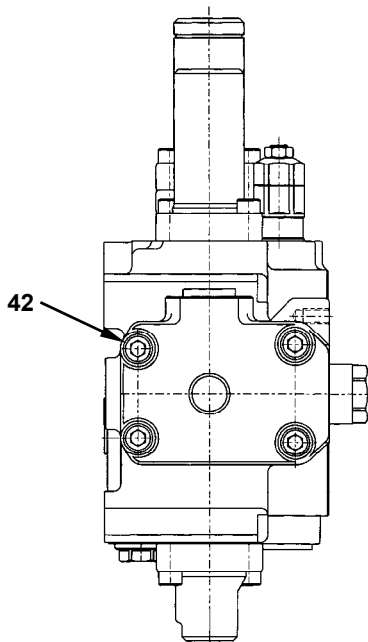
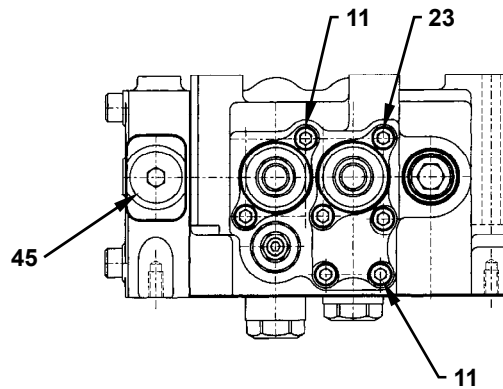
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BODY (UPPERSTRUCTURE) / Control Valve

13. Remove O-rings (12, 18) and backup ring (19) from pilot housing (28).
14. Remove spring (17) and poppet (16) from housing (31).
15. Remove plug (45), spring (44) and poppet (43) from end plate (41).
 : 12 mm
16. Remove relief valves (34, 35) from housing (31).
 : 27 mm
- IMPORTANT: Attach a spanner onto the hexagonal part of the relief valve case.**
17. Remove main relief valve (1) from housing (31).
 : 27 mm
18. Remove plug (7) from housing (31). Remove spring (3) and poppets (8, 9) from housing (31) by using a magnet. Remove O-ring (4) from plug (7).
 : 36 mm
19. Remove plug (5) from housing (31). Remove spring (3) and poppet (2) from housing (31) by using a magnet. Remove O-ring (4) from plug (5).
 : 36 mm
20. Remove socket bolts (42) (4 used) from end plate (41). Remove end plate (41) from housing (31).
 : 10 mm
21. Remove plugs (30) (2 used) and plug (6) from housing (31).
 : 10 mm
22. Remove O-rings (39, 40) from end plate (41).

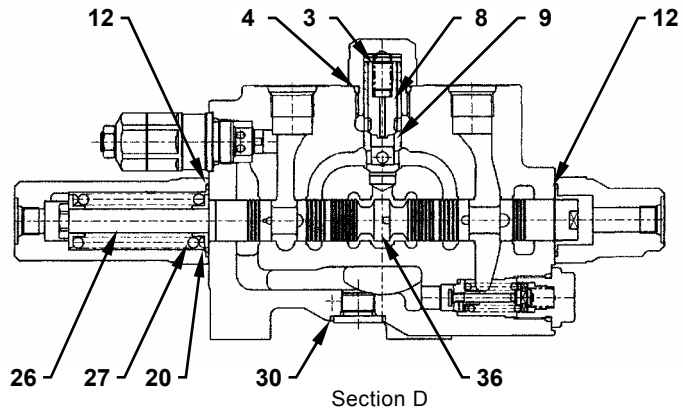
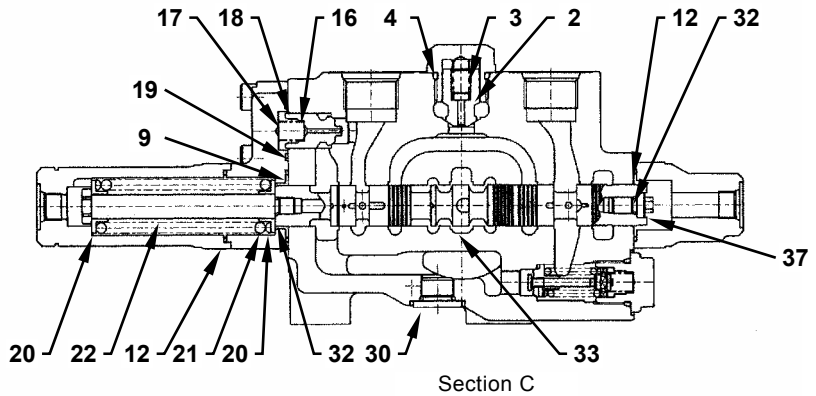
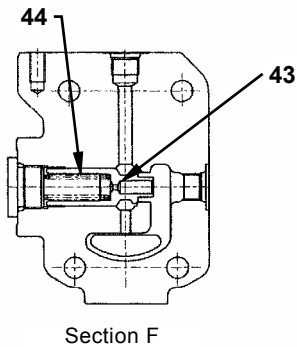
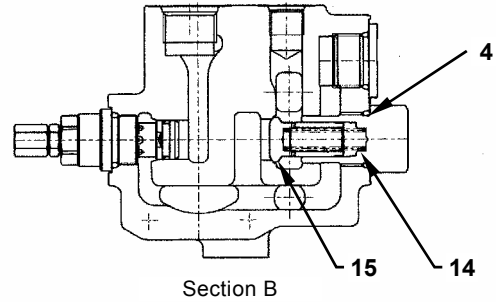
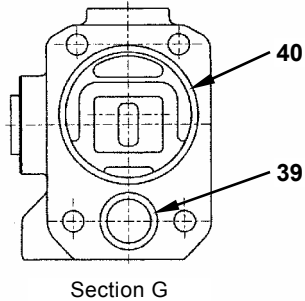
BODY (UPPERSTRUCTURE) / Control Valve

ASSEMBLY OF CONTROL VALVE



W4GB-02-05-003

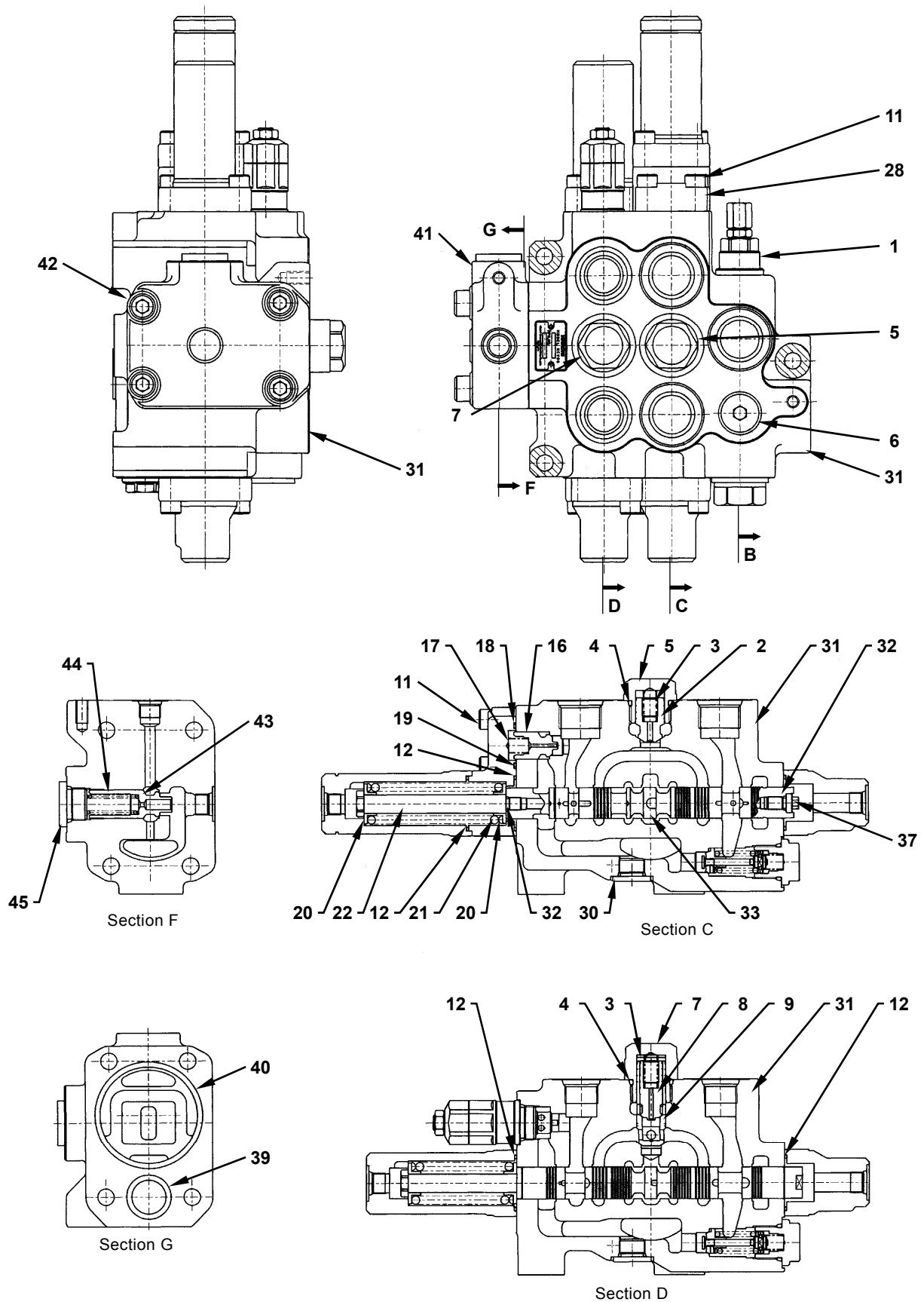
BODY (UPPERSTRUCTURE) / Control Valve



W4GB-02-05-004



















- | | | | |
|---------------------------|---------------------------|----------------------|-----------------------------|
| 1 - Main Relief Valve | 13 - Plug | 25 - Pilot Housing | 37 - Plug |
| 2 - Poppet | 14 - Spring | 26 - Bolt | 38 - Pilot Housing (2 Used) |
| 3 - Spring (2 Used) | 15 - Poppet | 27 - Spring | 39 - O-Ring |
| 4 - O-Ring (3 Used) | 16 - Poppet | 28 - Pilot Housing | 40 - O-Ring |
| 5 - Plug | 17 - Spring | 29 - Relief Valve | 41 - End Plate |
| 6 - Plug | 18 - O-Ring | 30 - Plug (2 Used) | 42 - Socket Bolt (4 Used) |
| 7 - Plug | 19 - Backup Ring | 31 - Housing | 43 - Poppet |
| 8 - Poppet | 20 - Spring Seat (4 Used) | 32 - O-Ring (2 Used) | 44 - Spring |
| 9 - Poppet | 21 - Spring | 33 - Spool | 45 - Plug |
| 10 - Plug | 22 - Bolt | 34 - Relief Valve | |
| 11 - Socket Bolt (9 Used) | 23 - Bolt (2 Used) | 35 - Relief Valve | |
| 12 - O-Ring (5 Used) | 24 - Pilot Housing | 36 - Spool | |

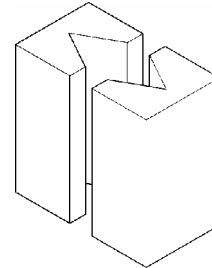
BODY (UPPERSTRUCTURE) / Control Valve



BODY (UPPERSTRUCTURE) / Control Valve

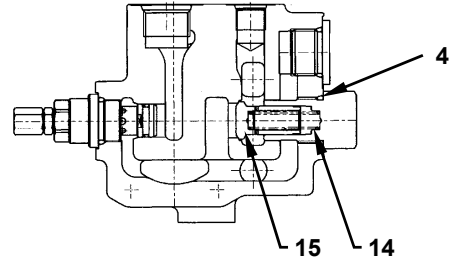
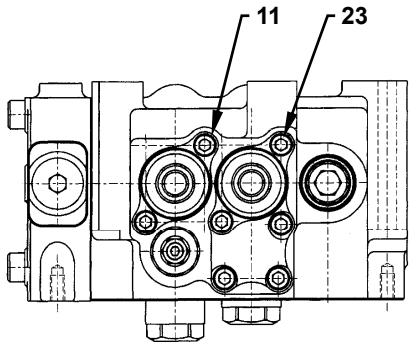
Assembly of Control Valve

1. Install O-rings (39, 40) to end plate (41).
2. Install end plate (41) to housing (31) with socket bolts (42) (4 used).
 : 10 mm
 : 88 to 93 N·m
(9 to 9.5 kgf·m, 65 to 69 lbf·ft)
3. Install plugs (30) (2 used) and plug (6) to housing (31).
 : 10 mm
 : 118 to 138 N·m
(12 to 14 kgf·m, 87 to 102 lbf·ft)
4. Install poppet (2) and spring (3) to housing (31). Install O-ring (4) to plug (5). Install plug (5) to housing (31).
 : 36 mm
 : 275 to 304 N·m
(28 to 31 kgf·m, 200 to 225 lbf·ft)
5. Install poppets (9, 8) and spring (3) to housing (31). Install O-ring (4) to plug (7). Install plug (7) to housing (31).
 : 36 mm
 : 275 to 304 N·m
(28 to 31 kgf·m, 200 to 225 lbf·ft)
6. Install main relief valve (1) to housing (31).
 : 27 mm
 : 177 to 206 N·m
(18 to 21 kgf·m, 131 to 152 lbf·ft)
7. Install poppet (43) and spring (44) to end plate (41). Install plug (45) to end plate (41).
 : 12 mm
 : 177 to 206 N·m
(18 to 21 kgf·m, 131 to 152 lbf·ft)
8. Install poppet (16) and spring (17) to housing (31).
9. Install O-rings (18, 12) and backup ring (19) to pilot housing (28). Install pilot housing (28) to housing (31) with socket bolts (11) (3 used).
 : 8 mm
 : 49 to 54 N·m
(5 to 5.4 kgf·m, 36 to 40 lbf·ft)
10. Secure spool (33) in a vise by using wooden pieces as illustrated. Install O-ring (32) to plug (37). Install O-ring (32) to the edge of the chamfered sides of spool (33).
 : 8 mm
 : 25 to 30 N·m
(2.5 to 3 kgf·m, 18.5 to 22 lbf·ft)
11. Install O-ring (32) to bolt (22). Install spring seat (20), spring (21) and spring seat (20) through bolt (22) in this order. Install the bolt (22) assembly to spool (33).
 : 19 mm
 : 25 to 30 N·m
(2.5 to 3 kgf·m, 18.5 to 22 lbf·ft)

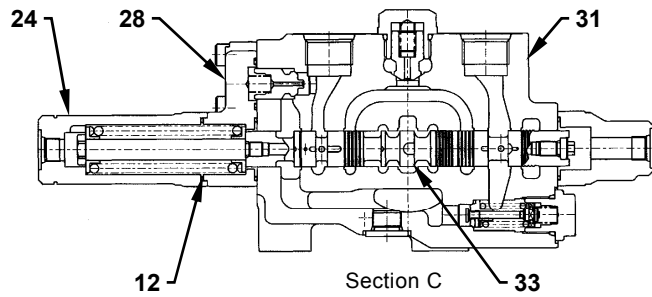
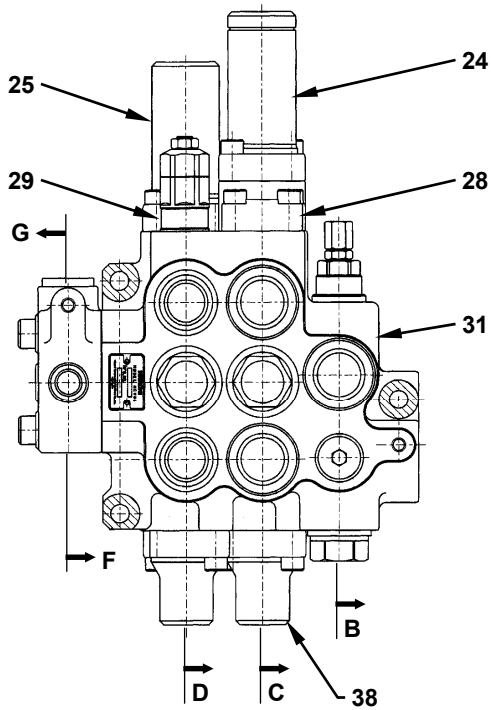


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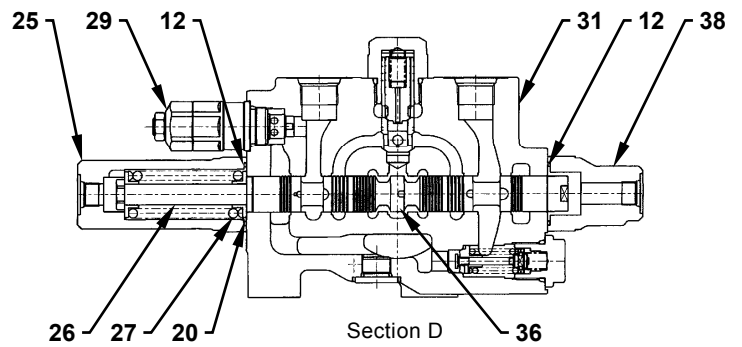
BODY (UPPERSTRUCTURE) / Control Valve



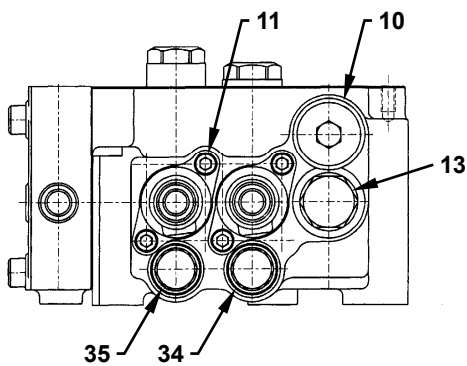
Section B



Section C




Section D



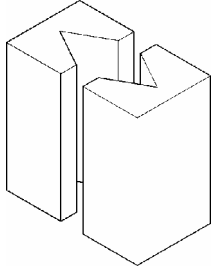
W4GB-02-05-027

BODY (UPPERSTRUCTURE) / Control Valve

12. Secure spool (36) in a vise by using wooden pieces as illustrated. Install spring seat (20), spring (27) and spring seat (20) through bolt (26) in this order. Install the bolt (26) assembly to spool (36).

 : 19 mm


 : 25 to 30 N·m
(2.5 to 3 kgf·m, 18.5 to 22 lbf·ft)




W4GB-02-05-002


13. Apply hydraulic oil onto spools (33, 36). Turn and insert spools (33, 36) into housing (31).


14. Install O-ring (12) to pilot housing (24). Install pilot housing (24) to pilot housing (28) with socket bolts (23) (2 used).

 : 8 mm


 : 49 to 54 N·m
(5 to 5.4 kgf·m, 36 to 40 lbf·ft)


15. Install O-ring (12) to pilot housing (25). Install pilot housing (25) to housing (31) with socket bolts (11) (2 used).

 : 8 mm


 : 49 to 54 N·m
(5 to 5.4 kgf·m, 36 to 40 lbf·ft)


16. Install O-rings (12) (2 used) to pilot housings (38) (2 used). Install pilot housings (38) (2 used) to housing (31) with socket bolts (11) (4 used).

 : 8 mm

 : 49 to 54 N·m
(5 to 5.4 kgf·m, 36 to 40 lbf·ft)

17. Install relief valves (34, 35) to housing (31).


 : 27 mm


 : 235 to 264 N·m
(24 to 27 kgf·m, 173 to 195 lbf·ft)




CAUTION: As the set pressure of the relief valve setting differs, check the identification code.


18. Install relief valve (29) to housing (31).

 : 32 mm


 : 83 to 88 N·m
(8.5 to 9 kgf·m, 61 to 65 lbf·ft)


19. Install poppet (15) and spring (14) to housing (31). Install O-ring (4) to plug (13). Install plug (13) to housing (31).

 : 36 mm

 : 275 to 304 N·m
(28 to 31 kgf·m, 200 to 225 lbf·ft)

20. Install plug (10) to housing (31).

 : 17 mm

 : 177 to 206 N·m
(18 to 21 kgf·m, 131 to 152 lbf·ft)

BODY (UPPERSTRUCTURE) / Control Valve

(Blank)

BODY (UPPERSTRUCTURE) / Pilot Valve


REMOVAL AND INSTALLATION OF PILOT VALVE

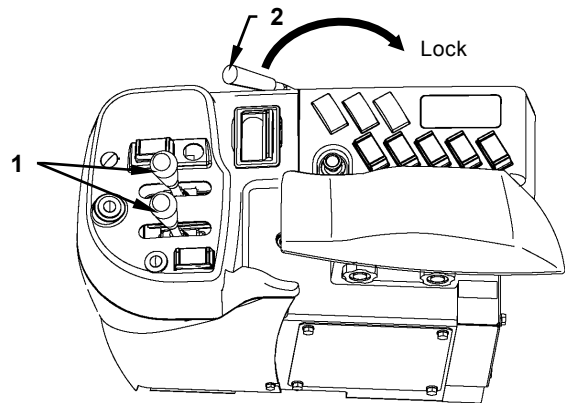
CAUTION: Before doing any work, lower the lift arm and lower the bucket on the ground. Pull control lever lock (2) backward and set in the Lock state. Release the remaining pressure by operating the control lever.

CAUTION: Bleed air from the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

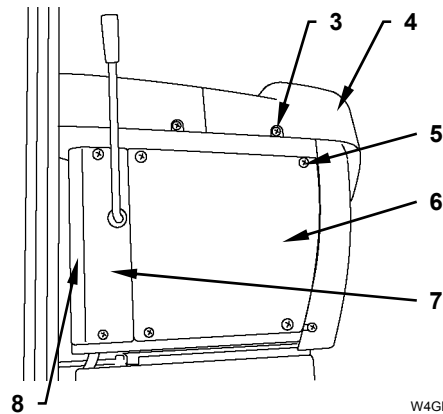
Removal

1. Remove screws (5) (6 used) from covers (6, 7).
Remove covers (6, 7) from bracket (8).
2. Remove grips (1) (2 used) of the control lever.
(In case of the multifunction lever, loosen the nut in the boot, and remove the lever and the boot.)
3. Disconnect the connector connected to pilot valve (9) and upper cover (4).
4. Remove screws (3) (4 used) from upper cover (4).
Remove upper cover (4) from bracket (8).
5. Disconnect hoses (12) (6 used) from pilot valve (9). Cap the open ends. Attach an identification tag onto the disconnected hoses for assembling.

 : 19 mm, 22 mm



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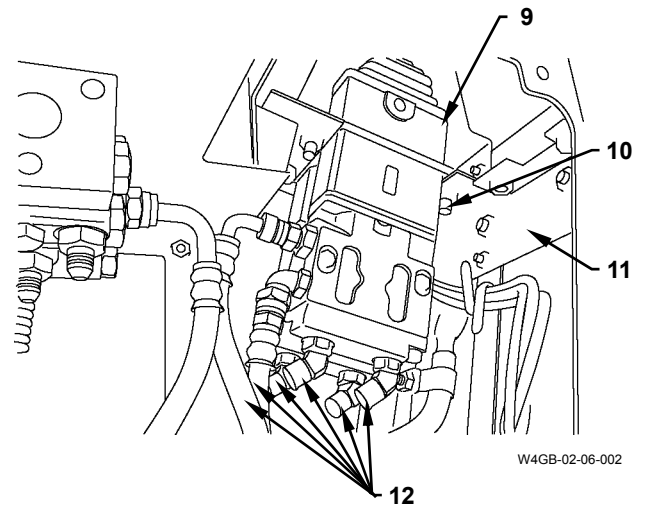
W4GB-02-06-001

BODY (UPPERSTRUCTURE) / Pilot Valve

IMPORTANT: Put the matching marks onto pilot valve (9) and bracket (11) for assembling.

1. Remove bolts (10) (4 used) from pilot valve (9).
Remove pilot valve (9) from bracket (11).







 : 8 mm



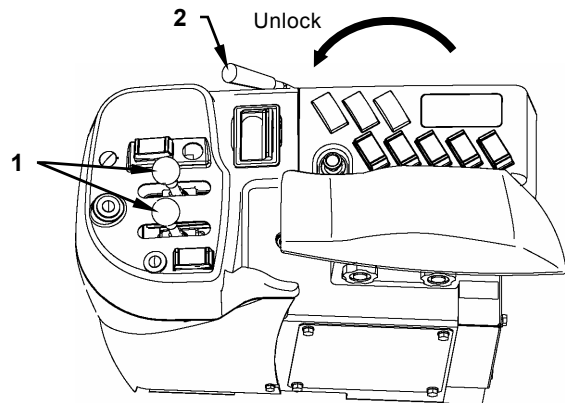
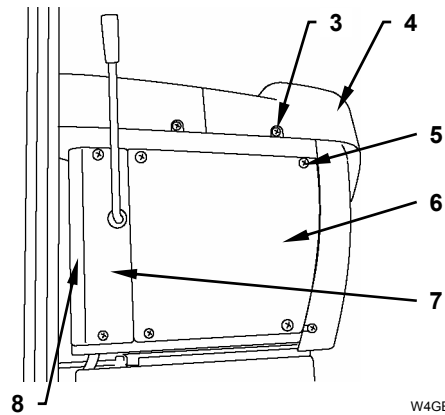
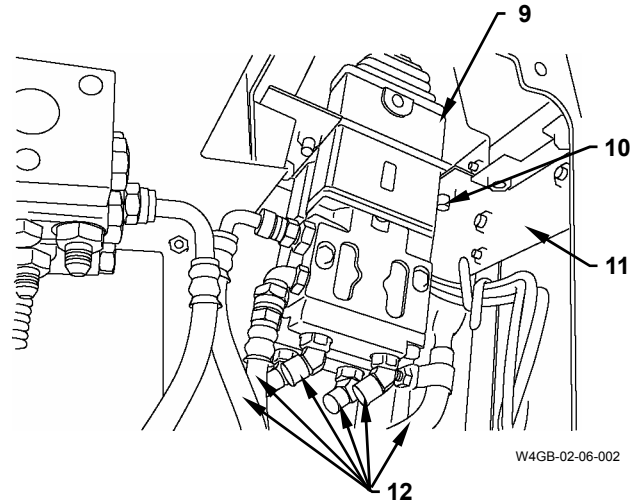
W4GB-02-06-002

BODY (UPPERSTRUCTURE) / Pilot Valve

Installation

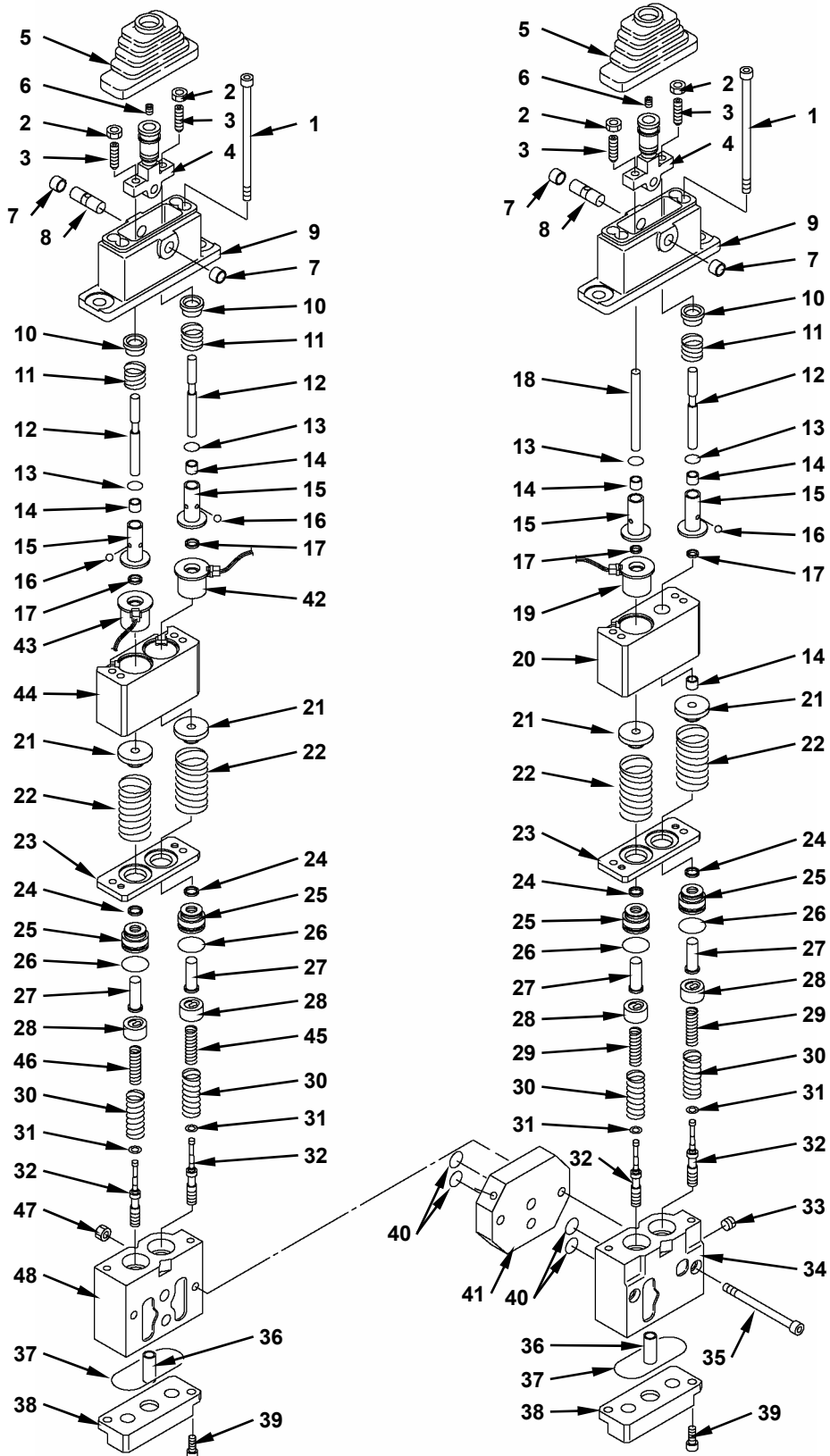
1. Align the matching marks and insert pilot valve (9) into bracket (11).
2. Install pilot valve (9) to bracket (11) with bolts (10) (2 used).
 -  : 8 mm
 -  : 50 N·m (5 kgf·m, 37 lbf·ft)
3. Connect hoses (12) (6 used) to pilot valve (9).
 -  : 19 mm
 -  : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)
 -  : 22 mm
 -  : 39 N·m (4 kgf·m, 28.5 lbf·ft)
4. Install upper cover (4) to bracket (8) with screws (3) (4 used).
5. Connect the connector to pilot valve (9) and upper cover (4).
6. Install grips (1) (2 used) of the control lever.
(In case of the multi-function lever, install the lever and the boot.)
7. Install covers (6, 7) to bracket (8) with screws (5) (6 used).

IMPORTANT: After completing the work, check the hydraulic oil level. Start the engine. Push control lever lock (2) forward and set in the Unlock state. Check for any oil leakage at each connection.



BODY (UPPERSTRUCTURE) / Pilot Valve

DISASSEMBLY OF STANDARD PILOT VALVE FOR FRONT ATTACHMENT

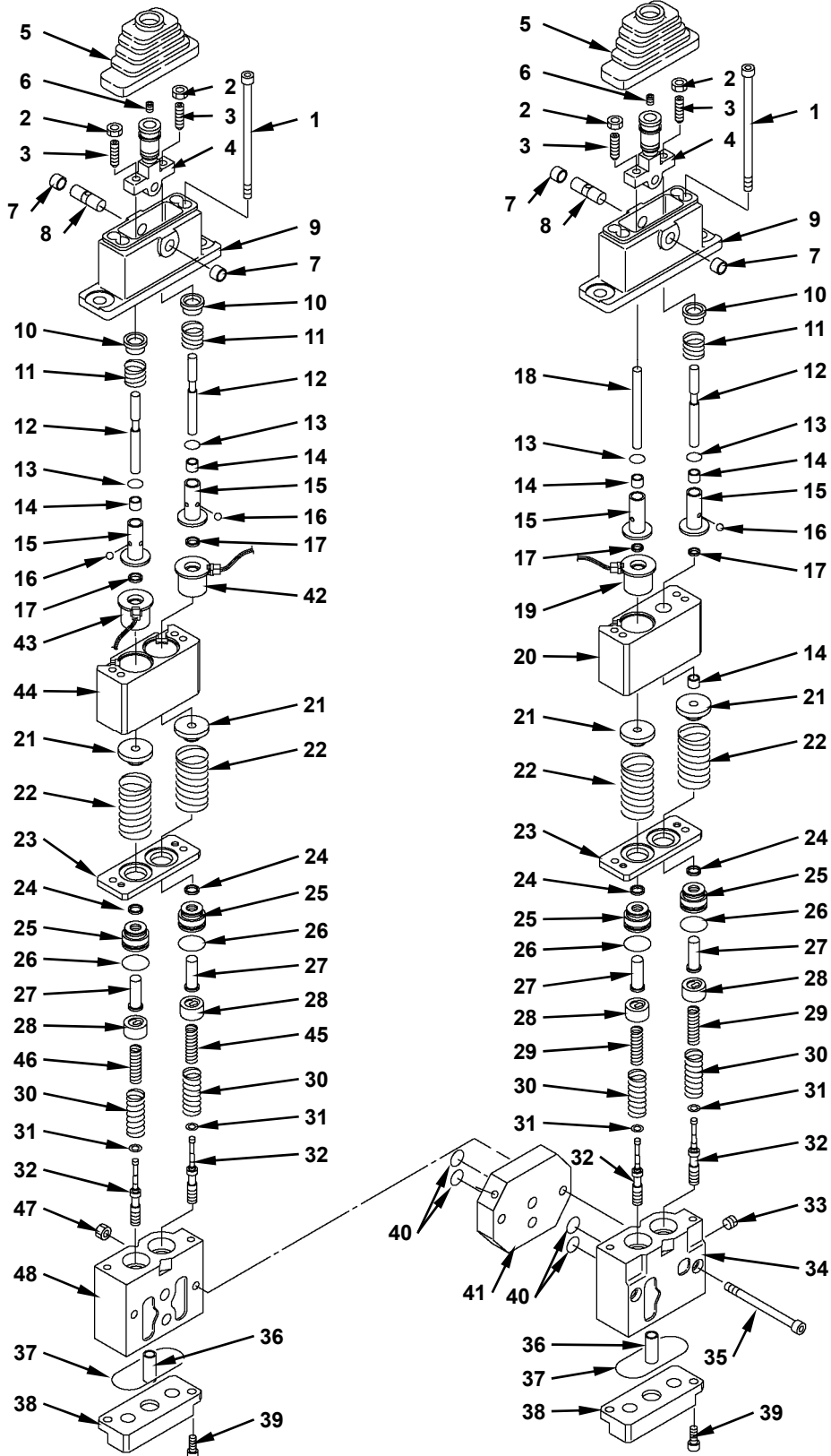


W4GB-02-06-011

BODY (UPPERSTRUCTURE) / Pilot Valve

1 - Socket Bolt (8 Used)	13 - O-Ring (4 Used)	25 - Plug (4 Used)	37 - O-Ring (2 Used)
2 - Lock Nut (4 Used)	14 - Bushing (5 Used)	26 - O-Ring (4 Used)	38 - Port Plate (2 Used)
3 - Screw (4 Used)	15 - Detent Bushing (4 Used)	27 - Push Rod (4 Used)	39 - Socket Bolt (4 Used)
4 - Lever (2 Used)	16 - Steel Ball (12 Used)	28 - Spring Seat (4 Used)	40 - O-Ring (4 Used)
5 - Boot (2 Used)	17 - Scraper (4 Used)	29 - Spring (2 Used)	41 - Sub Plate
6 - Lock Plug (2 Used)	18 - Push Rod	30 - Spring (4 Used)	42 - Solenoid
7 - Bushing (4 Used)	19 - Solenoid	31 - Washer (4 Used)	43 - Solenoid
8 - Camshaft (2 Used)	20 - Detent Casing	32 - Spool (4 Used)	44 - Detent Casing
9 - Cover (2 Used)	21 - Spring Guide (4 Used)	33 - Plug	45 - Spring
10 - Detent Ring (3 Used)	22 - Spring (4 Used)	34 - Casing	46 - Spring
11 - Spring (3 Used)	23 - Plate (2 Used)	35 - Socket Bolt (2 Used)	47 - Nut (2 Used)
12 - Push Rod (3 Used)	24 - Seal (4 Used)	36 - Bushing (2 Used)	48 - Casing

BODY (UPPERSTRUCTURE) / Pilot Valve



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
BODY (UPPERSTRUCTURE) / Pilot Valve

Disassembly of Standard Pilot Valve for Front Attachment


IMPORTANT: Install a plug to each port.

1. Secure the casing (34, 48) parts of the valve assembly in a vise by using a buffer plate.
Remove boots (5) (2 used) from covers (9) (2 used).

2. Remove socket bolts (1) (4 used) from the deeper hole on covers (9) (2 used).

 : 5 mm

3. Remove the cover (9) assemblies (2 used) from casings (34, 38).


 **NOTE:** Record the positions for casings (34, 38), detent casings (20, 44), covers (9) (2 used) and port plates (38) (2 used).

IMPORTANT: When disassembling, prevent push rods (27) (4 used) and plugs (25) (4 used) from flying out by spring (30).


4. Insert a screwdriver into the groove on plugs (25) (4 used). While holding push rod (27) by using a waste cloth, remove plugs (25) (4 used) from casings (34, 48).

5. Remove push rods (27) (4 used), the spring seat (28) assemblies (4 used) and springs (30) (4 used) from casings (34, 48) respectively.

6. When disassembling the spring seat (28) assemblies (4 used), push spring seats (28) (4 used) compress springs (29) (2 used) and (45, 46). Slide and remove spring seats (28) (4 used) from spools (32) (4 used) through the larger hole.

 **NOTE:** Do not damage the surface of spool (32). Do not push spring seats (28) (4 used) to 6 mm (0.24 in) or more.

7. Separate springs (29) (2 used), springs (45, 46) and washers (31) (4 used) from spools (32) (4 used).

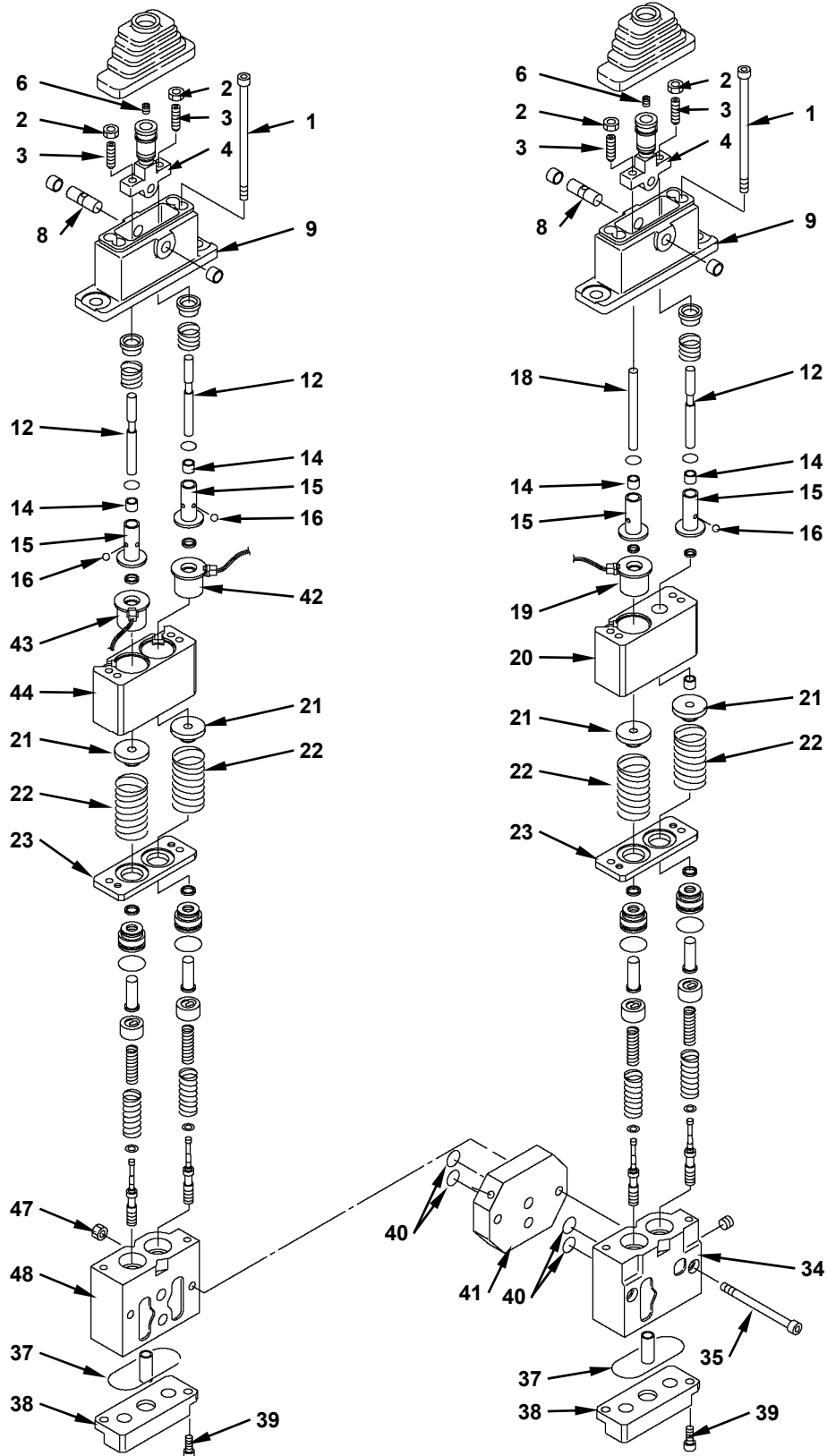
 **NOTE:** Record the installed position for spools (32) (4 used), springs (30) (2 used), springs (45, 46) and washers (31) (4 used).

8. Remove push rods (27) (4 used) from plugs (25) (4 used).

9. Remove O-rings (26) (4 used) from plugs (25) (4 used).

10. Remove seal (24) (4 used) from plugs (25) (4 used).


BODY (UPPERSTRUCTURE) / Pilot Valve



W4GB-02-06-011

BODY (UPPERSTRUCTURE) / Pilot Valve


11. Remove socket bolts (35) (2 used) and nuts (47) (2 used) from casings (34, 48). Separate casings (34, 48) and sub plate (41).

 : 6 mm

12. Remove O-rings (40) (2 used) from sub plate (41).


13. Remove O-rings (40) (2 used) from casing (34).

14. Secure casings (34, 48) in a vise. Remove socket bolts (39) (4 used) from port plates (38) (2 used).


 : 6 mm

15. Remove port plates (38) (2 used) and O-rings (37) (2 used) from casings (34, 48).

16. Secure plates (23) (2 used) in a vise. Remove socket bolts (1) (4 used) from the shallower hole on cove (9).


 : 5 mm

17. Remove covers (9) (2 used) and detent casings (20, 44) from plates (23) (2 used).


 **NOTE:** As spring guides (21) (4 used) may be installed to detent casings (20, 24) by grease, do not drop spring guides (21) (4 used).

18. Remove springs (22) (4 used) and spring guides (21) (4 used) from plates (23) (2 used).


19. Remove detent casings (20, 44) from covers (9) (2 used).

 **NOTE:** Do not drop push rod (18) which is inserted into detent bushing (15) without steel balls (16) (3 used).

20. Remove solenoids (19, 42 and 43) from detent casings (20, 44).

 **NOTE:** When removing solenoids (19, 42 and 43), do not pull a lead wire.


21. Remove lock plugs (6) (2 used) from levers (4) (2 used).

 : 3 mm

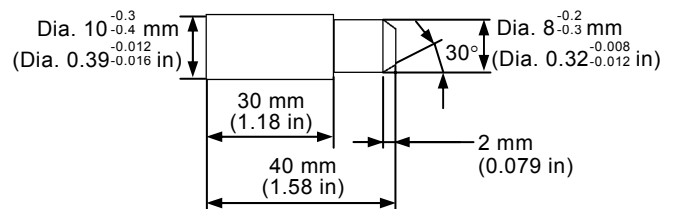
22. Remove camshafts (8) (2 used) from covers (9) (2 used).

23. Remove levers (4) (2 used) from covers (9) (2 used).

24. Remove nuts (2) (4 used) and screws (3) (4 used) from levers (4) (2 used).

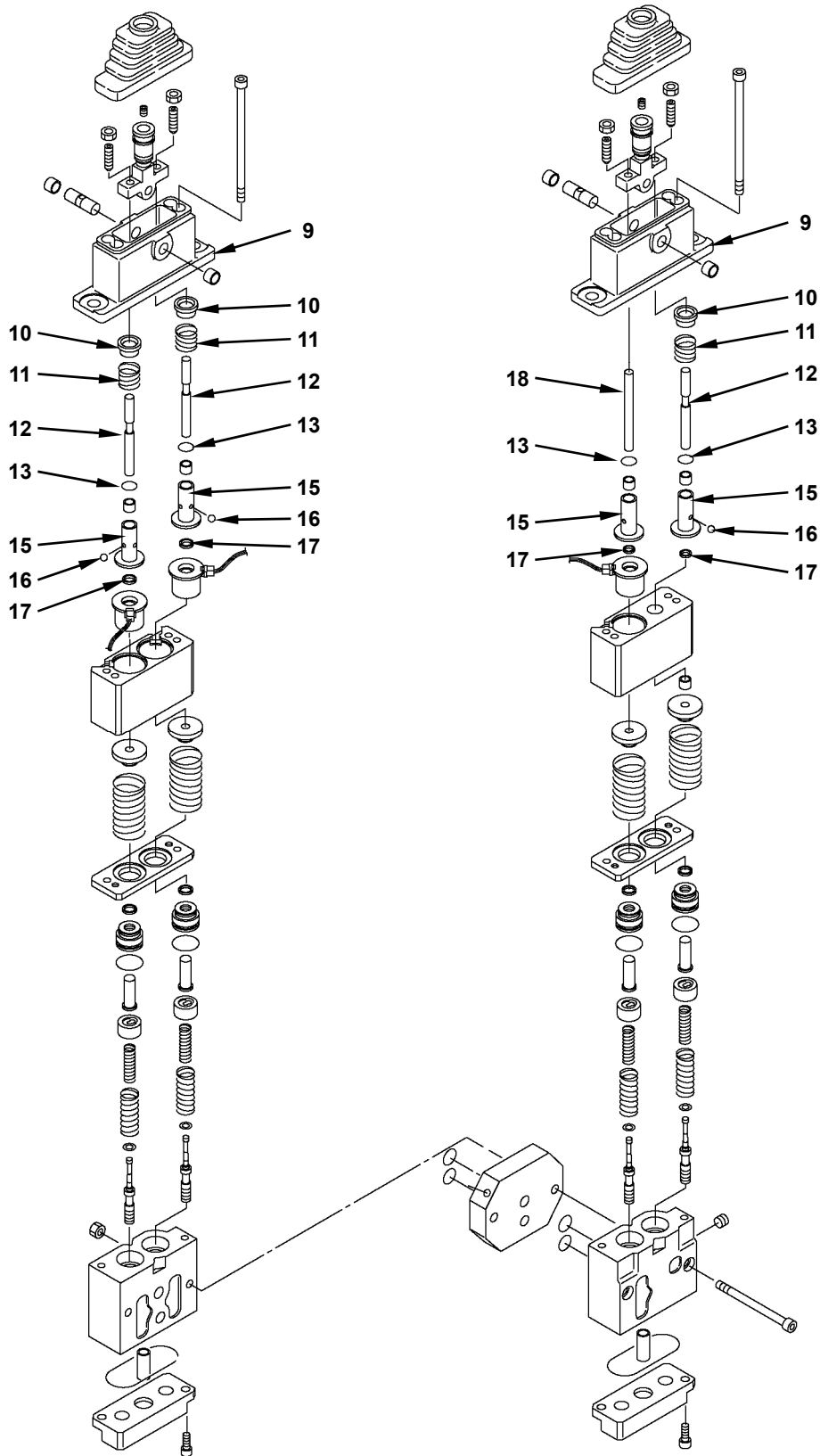
 : 13 mm

25. Remove of an assembly detent bushings (15) (4 used), push rods (12) (3 used), push rod (18) and bushings (14) (4 used) from the mounting side by using the special tool.



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BODY (UPPERSTRUCTURE) / Pilot Valve




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BODY (UPPERSTRUCTURE) / Pilot Valve

26. Remove O-rings (13) (4 used) from covers (9) (2 used).


[A port without a detent]

27. Remove push rod (18) from detent bushing (15).


 *NOTE: Record the combination of detent bushing (15) and push rod (18).*

[A port with a detent]

28. Hold detent rings (10) (3 used) and compress springs (11) (3 used). Remove steel balls (16) (12 used).


 *NOTE: Prevent steel ball (16) from falling off.*

29. Remove push rods (12) (3 used) from detent bushing (15).

 *NOTE: Record the combination of detent bushing (15) and push rod (12).*

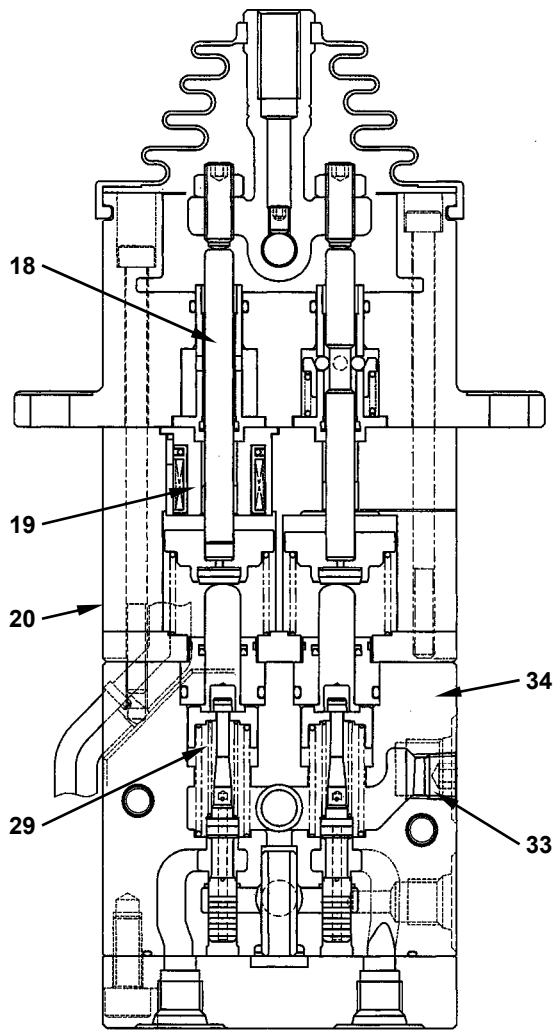
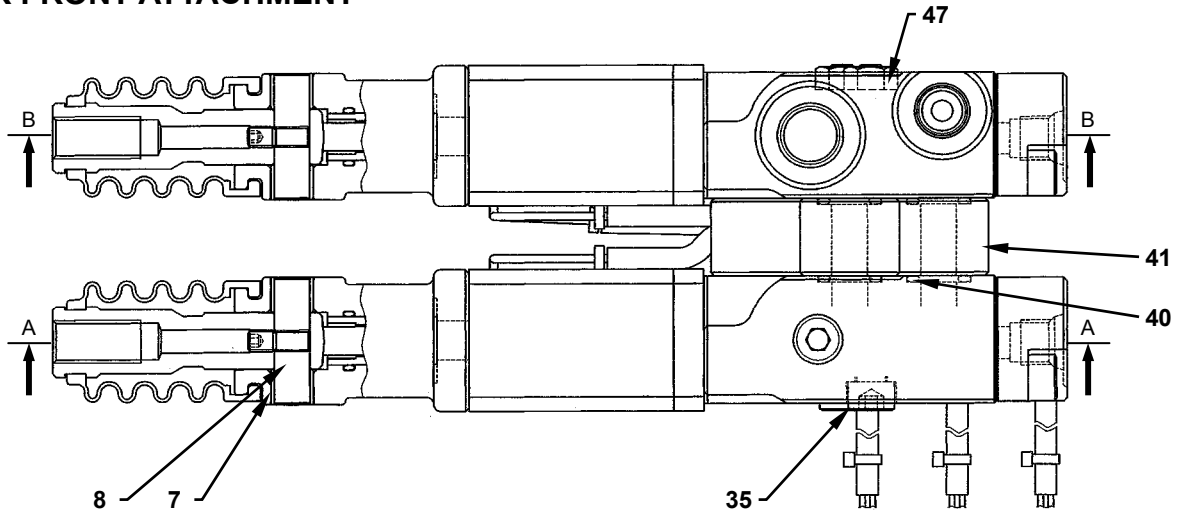
30. Remove detent rings (10) (3 used) and springs (11) (3 used) from detent bushings (15) (3 used).

31. Remove scrapers (17) (4 used) from detent bushings (15) (4 used).

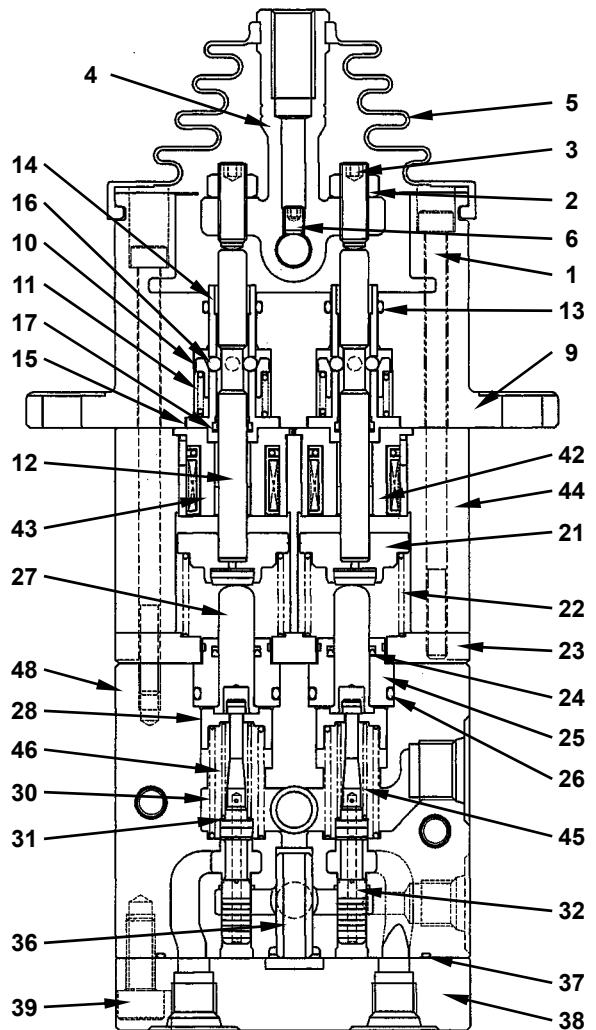
 *NOTE: When removing scraper (17), do not damage the inner surface of detent bushing (15).*

BODY (UPPERSTRUCTURE) / Pilot Valve

ASSEMBLY OF STANDARD PILOT VALVE FOR FRONT ATTACHMENT



Section A-A



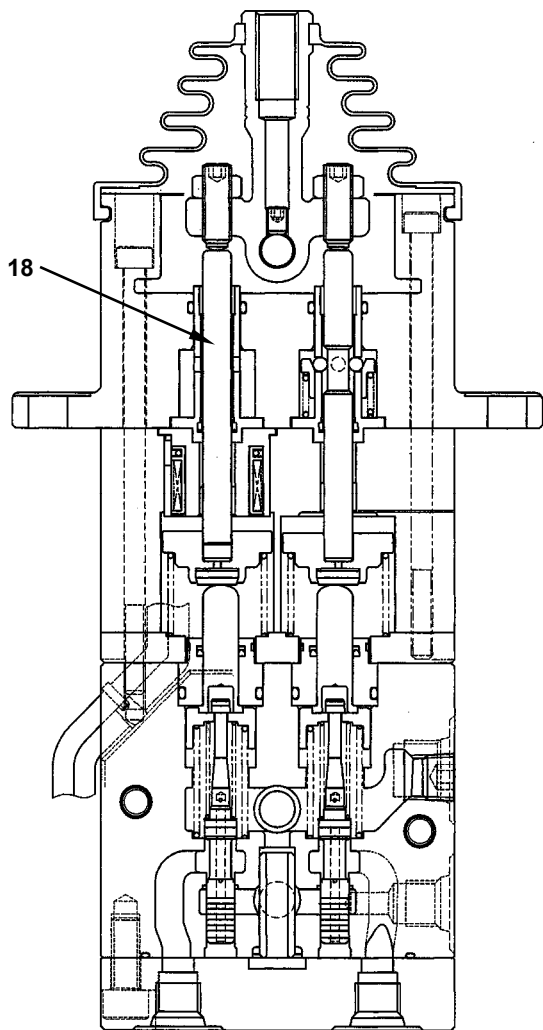
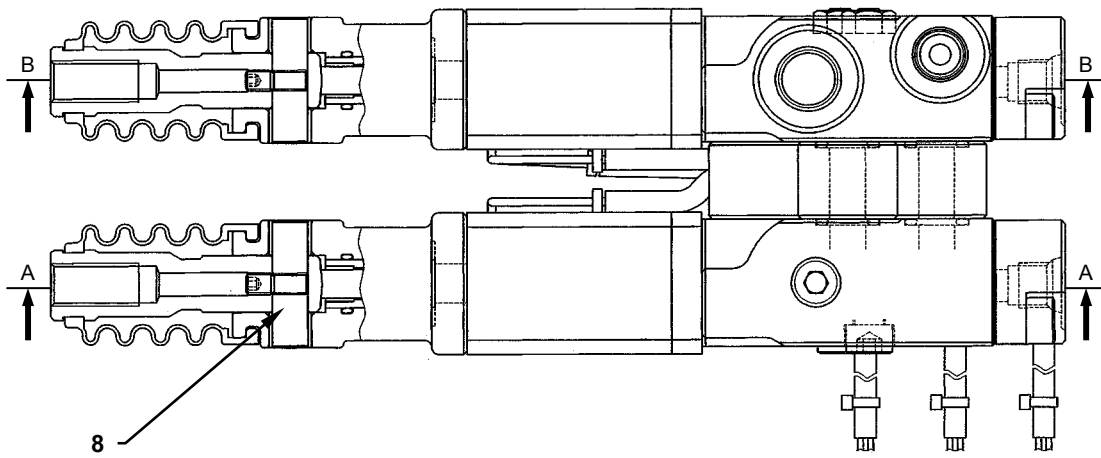
Section B-B

W4GB-02-06-013

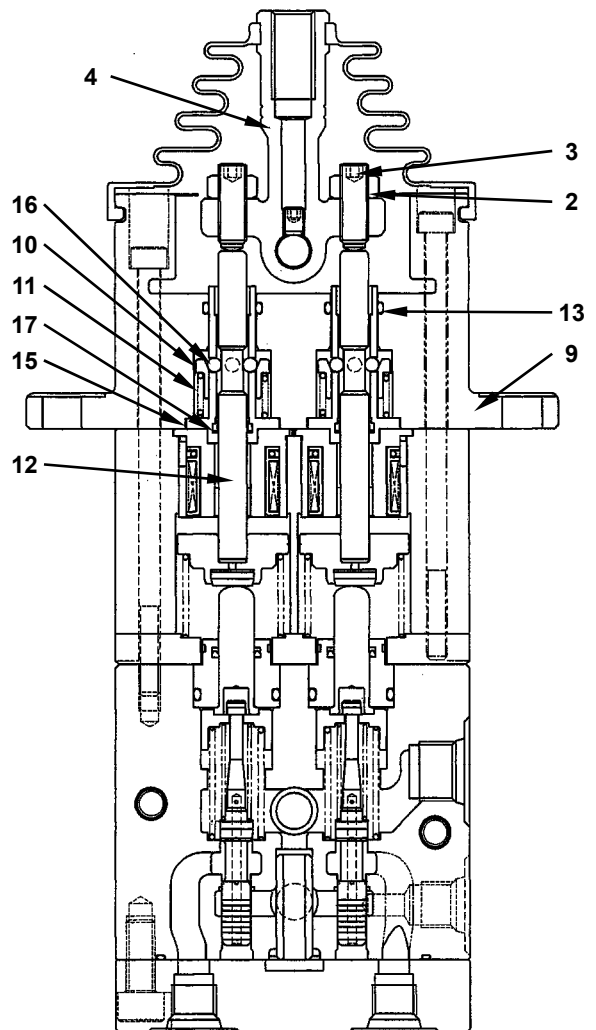
BODY (UPPERSTRUCTURE) / Pilot Valve

1 - Socket Bolt (8 Used)	13 - O-Ring (4 Used)	25 - Plug (4 Used)	37 - O-Ring (2 Used)
2 - Lock Nut (4 Used)	14 - Bushing (5 Used)	26 - O-Ring (4 Used)	38 - Port Plate (2 Used)
3 - Screw (4 Used)	15 - Detent Bushing (4 Used)	27 - Push Rod (4 Used)	39 - Socket Bolt (4 Used)
4 - Lever (2 Used)	16 - Steel Ball (12 Used)	28 - Spring Seat (4 Used)	40 - O-Ring (4 Used)
5 - Boot (2 Used)	17 - Scraper (4 Used)	29 - Spring (2 Used)	41 - Sub Plate
6 - Lock Plug (2 Used)	18 - Push Rod	30 - Spring (4 Used)	42 - Solenoid
7 - Bushing (4 Used)	19 - Solenoid	31 - Washer (4 Used)	43 - Solenoid
8 - Camshaft (2 Used)	20 - Detent Casing	32 - Spool (4 Used)	44 - Detent Casing
9 - Cover (2 Used)	21 - Spring Guide (4 Used)	33 - Plug	45 - Spring
10 - Detent Ring (3 Used)	22 - Spring (4 Used)	34 - Casing	46 - Spring
11 - Spring (3 Used)	23 - Plate (2 Used)	35 - Socket Bolt (2 Used)	47 - Nut (2 Used)
12 - Push Rod (3 Used)	24 - Seal (4 Used)	36 - Bushing (2 Used)	48 - Casing

BODY (UPPERSTRUCTURE) / Pilot Valve



Section A-A




Section B-B

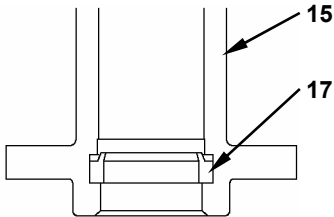
W4GB-02-06-013

BODY (UPPERSTRUCTURE) / Pilot Valve

Assembly of Standard Pilot Valve for Front Attachment

1. Apply grease onto scrapers (17) (4 used). Install scrapers (17) (4 used) to detent bushings (15) (4 used).

 **NOTE:** Check the direction to install scrapers (17) (4 used).




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2. Apply grease onto the sliding parts of detent bushings (15) (3 used) and detent rings (10) (3 used).
Install detent rings (10) (3 used) and springs (11) (3 used) to detent bushings (15) (3 used).

[A port with a detent]

3. Install push rods (12) (3 used) to detent bushings (15) (3 used). (Check the up and down directions of the rod.)

 **CAUTION:** Prevent detent rings (10) (3 used) from flying out by springs (11) (3 used).

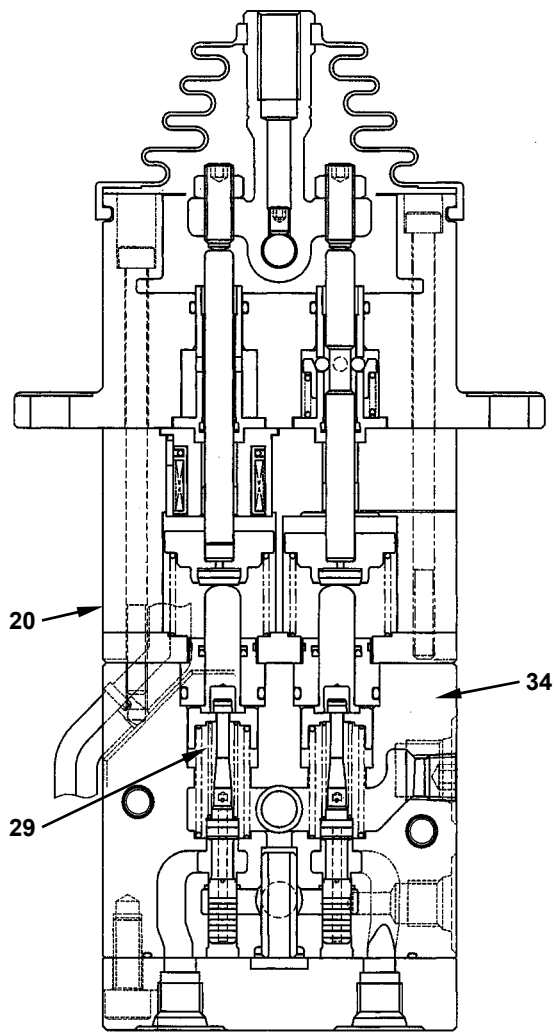
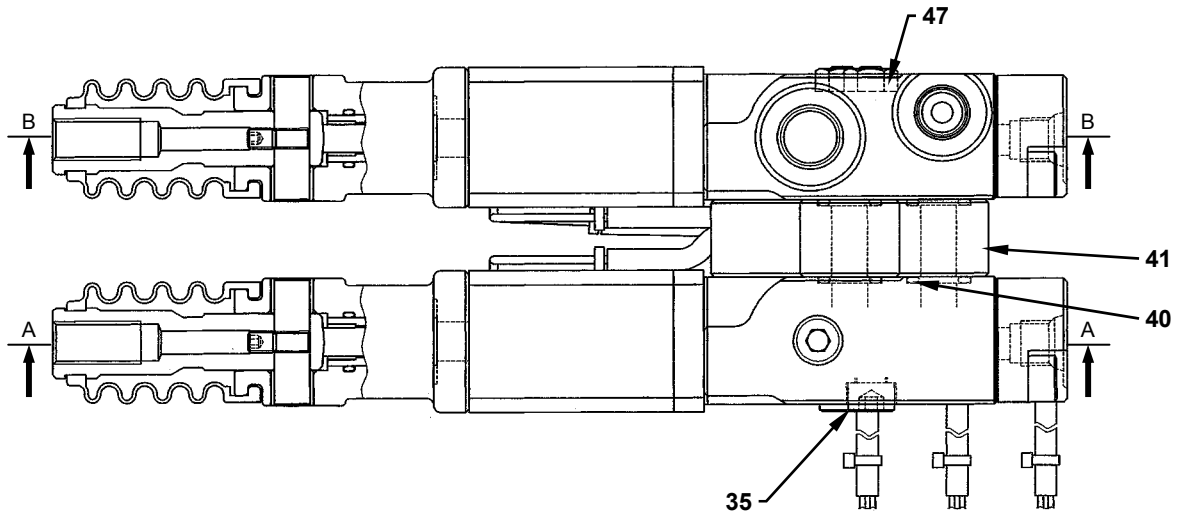
4. Hold detent rings (10) (3 used) and compress springs (11) (3 used). Install steel balls (16) (12 used).

 **NOTE:** Apply grease onto steel balls (16) (12 used). Grease prevents steel balls (16) (12 used) from falling off. Thus, the installation is carried out easily.
Adjust the positions of push rods (12) (3 used) so that the steel balls (16) (12 used) can be inserted into the constriction part of push rods (12) (3 used).

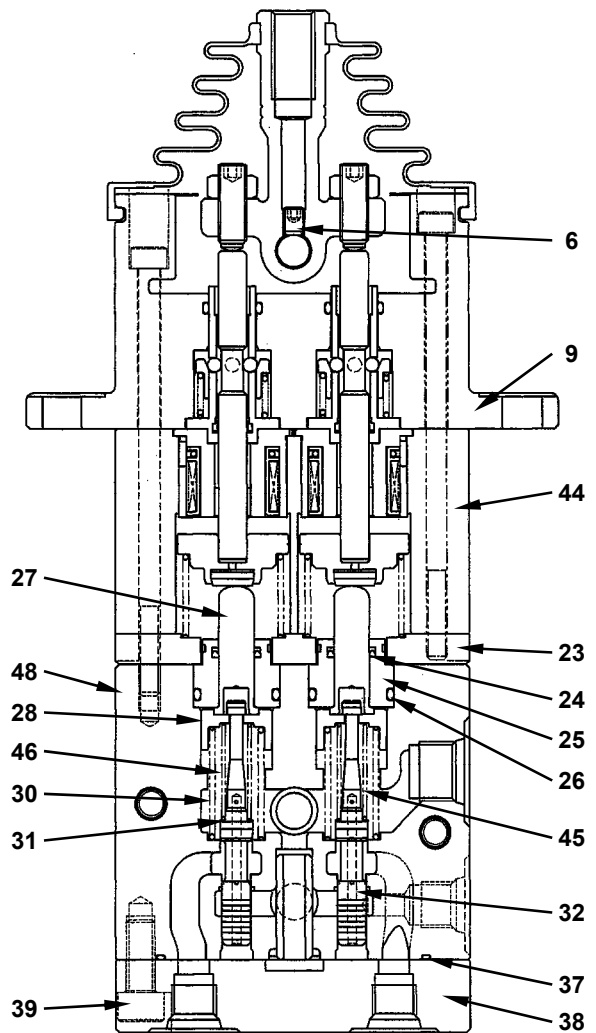
[A port without a detent]

5. Install push rod (18) to detent bushing (15). (Check the up and down directions of the rod.)
6. Install O-rings (13) (4 used) to covers (9) (2 used).
7. Install detent bushings (15) (4 used) to covers (9) (2 used) at the original position.
8. Temporarily tighten screws (3) (4 used) and nuts (2) (4 used) to levers (4) (2 used).
9. Apply grease onto the top and the bottom sides of push rods (12) (3 used) and push rod (18), the sliding part at the side surfaces of levers (4) (2 used) and the sliding parts of camshafts (8) (2 used).
Secure covers (9) (2 used) in a vise. Install levers (4) (2 used) and camshafts (8) (2 used) to covers (9) (2 used).

BODY (UPPERSTRUCTURE) / Pilot Valve



Section A-A





Section B-B

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BODY (UPPERSTRUCTURE) / Pilot Valve

10. Apply LOCTITE #241 onto lock plugs (6) (2 used).
Install lock plugs (6) (2 used) to lever (4).


 : 3 mm

 : 6.9 N·m (0.7 kgf·m, 5.1 lbf·ft)

11. Install solenoids (19, 42 and 43) to detent casings (20, 44) at the original position.

 **NOTE:** Insert the rubber bushing for the lead wire hole into the groove on the detent case.

12. Install detent casings (20, 44) to push rods (12) (3 used) and push rod (18) of cover (9).


 **NOTE:** Check the direction to install detent casings (20, 44).


13. Apply grease onto the attached surface of spring guides (21) (4 used). Install springs (22) (4 used) and the attached plate to plates (23) (2 used) at the original position.

 **CAUTION:** Prevent springs (22) (4 used) from flying out when installing covers (9) (2 used).

14. Install covers (9) (2 used) and detent casings (20, 44) to plates (23) (2 used). Insert and temporarily tighten socket bolts (1) (4 used) into the shallower hole on covers (9) (2 used).


15. Secure plates (23) (2 used) in a vise. Tighten socket bolts (1) (4 used) to the specified torque. Spray rust proof oil inside the spring chambers in detent casings (20, 44).


 : 5 mm

 : 8.8 N·m (0.9 kgf·m, 6.5 lbf·ft)

16. Install O-rings (37) (2 used) to casings (34, 48).

17. Install port plates (38) (2 used) to casings (34, 48) with socket bolts (39) (4 used).

 : 6 mm


 : 20.6 N·m (2.1 kgf·m, 15 lbf·ft)


18. Install O-rings (40) (2 used) to sub plate (41).


19. Install O-rings (40) (2 used) to casing (34).

20. Temporarily install casings (34, 48) and sub plate (41) with socket bolts (35) (2 used) and nuts (47) (2 used).

Secure the casing (34, 48) parts in a vise. Tighten socket bolts (35) (2 used).

 : 6 mm

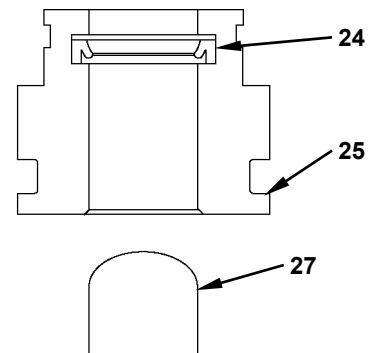
 : 20.6 N·m (2.1 kgf·m, 15 lbf·ft)

 **NOTE:** Check the mating direction of casings (34, 48) and sub plate (41).

21. Install O-rings (26) (4 used) to plugs (25) (4 used).

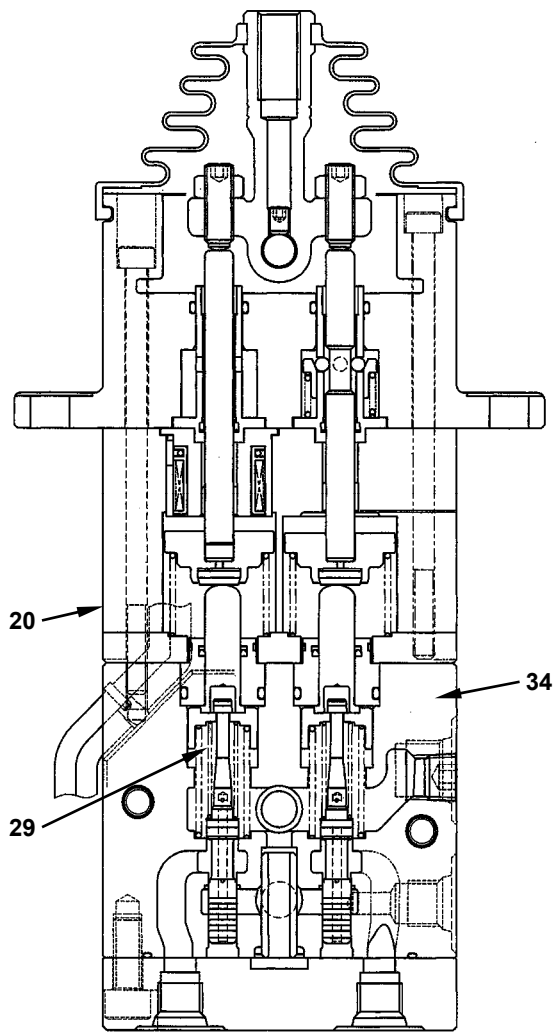
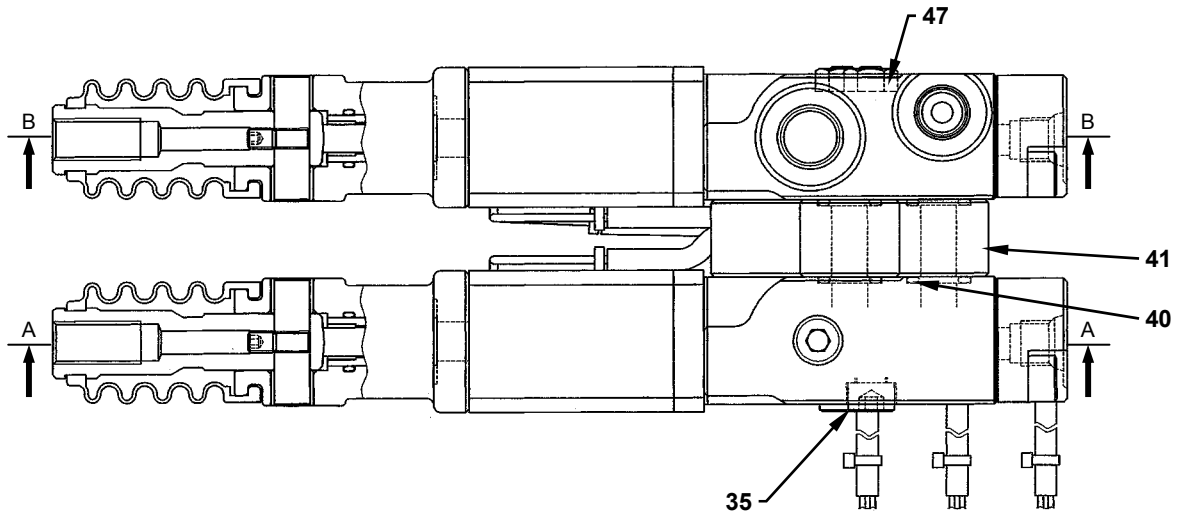
22. Install seals (24) (4 used) to plugs (25) (4 used).

 **NOTE:** Check the direction to install seal (24).

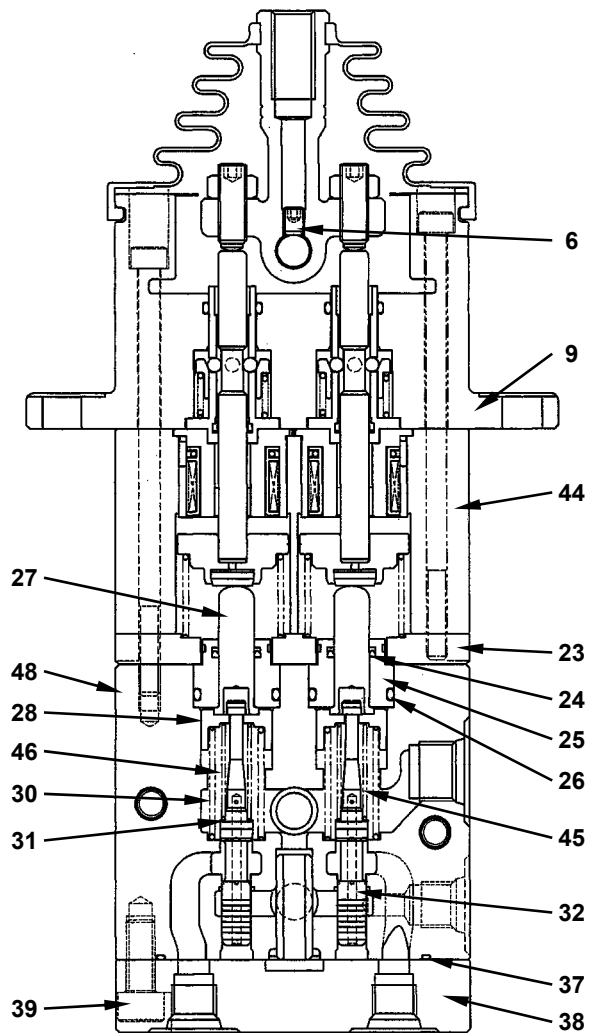


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BODY (UPPERSTRUCTURE) / Pilot Valve



Section A-A



Section B-B


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BODY (UPPERSTRUCTURE) / Pilot Valve


23. Install push rods (27) (4 used) to the plug (25) assemblies (4 used).

24. Install springs (29) (2 used), springs (45, 46) and washers (31) (4 used) to spools (32) (4 used) at the original position.


25. Insert spools (32) (4 used) through the larger hole on spring seats (28) (4 used). Push spring seats (28) (4 used), and compress springs (29) (2 used) and springs (45, 46). Slide and install spring seats (28) (4 used) to spools (32) (4 used).


 **NOTE:** Do not push spring seats (28) (4 used) to 6 mm (0.24 in) or more.


26. Install springs (30) (4 used) to casings (34, 48). Install the spool (32) assemblies (4 used) and the plug (25) assemblies (4 used) to casing (34, 48). Apply grease onto the top of push rods (27) (4 used).

 **NOTE:** Do not hit the lower ends of spools (32) (4 used) against casings (34, 48) strongly.

27. Install covers (9) (2 used) and the detent casing (20, 44) assemblies to casings (34, 48). Insert and tighten socket bolts (1) (4 used) into the deeper hole on covers (9) (2 used).

 : 5 mm

 : 8.8 N·m (0.9 kgf·m, 6.5 lbf·ft)


 **NOTE:** Check the positions to install cover (9) and the detent casing (20, 44) assemblies to casing (34).




CAUTION: When push rods (12) (3 used) and push rod (18) are pushed too much by using screws (3) (4 used), looseness may occur at the neutral position. This may cause sudden machine movement when starting the engine.


28. Adjust the heights of screws (3) (4 used). Set levers (4) (2 used) in the vertical position to the upper surface of cover (9). By rotating lever (4) clockwise and counterclockwise, check that no looseness occurs at the neutral position. Tighten screws (3) (4 used) with nuts (2) (4 used).

 : 13 mm

 : 16.7 N·m (1.7 kgf·m, 12.5 lbf·ft)

 **NOTE:** If clearance exists, it may cause looseness in the angle at beginning of control lever (4) operation. Check that no looseness found after tightening nut (2).

29. Spray rust proof oil onto the inner parts of boot (5). Insert the upper end of boot (5) into the groove on lever (4). Insert the lower end into the groove on cover (9).

 **NOTE:** Waterproof degradation may occur unless boot (5) is correctly inserted into the groove.

BODY (UPPERSTRUCTURE) / Pilot Valve

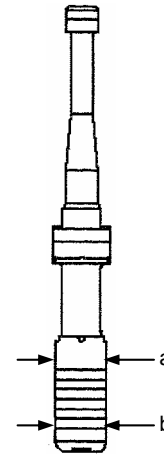
MAINTENANCE STANDARD

1. Spool (32) diameter
 Difference between diameter of non-sliding part (a) and sliding part (b)

a-b Unit: mm (in)

	Allowable Limit
	0.01 (0.0004)

NOTE: In case the value is beyond the allowable limit, replace the pilot valve assembly.



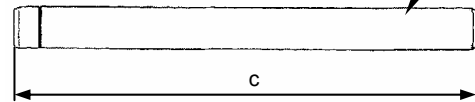
2. Push rods (12, 18, 27) length

Unit: mm (in)

	Standard	Allowable Limit
c	87.7 (3.45)	86.7 (3.41)
d	36 (1.42)	36 (1.42)

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12, 18

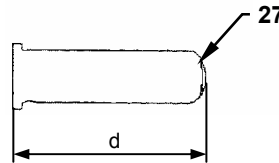


3. Bushing (14) inner diameter

e Unit: mm (in)

	Allowable Limit
Standard	8.5 (0.34)
8 (0.32)	

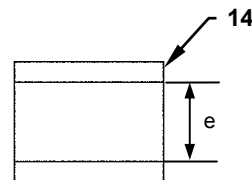
NOTE: When the bushing in the sub assembly of the solenoid is worn away, replace the solenoid valve assembly.



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4. Looseness in the control part

When looseness on the upper end of lever (4) is 2 mm (0.08 in) or more due to the wear of screw (3), camshaft (8) or DU busing (7), replace the solenoid valve assembly.



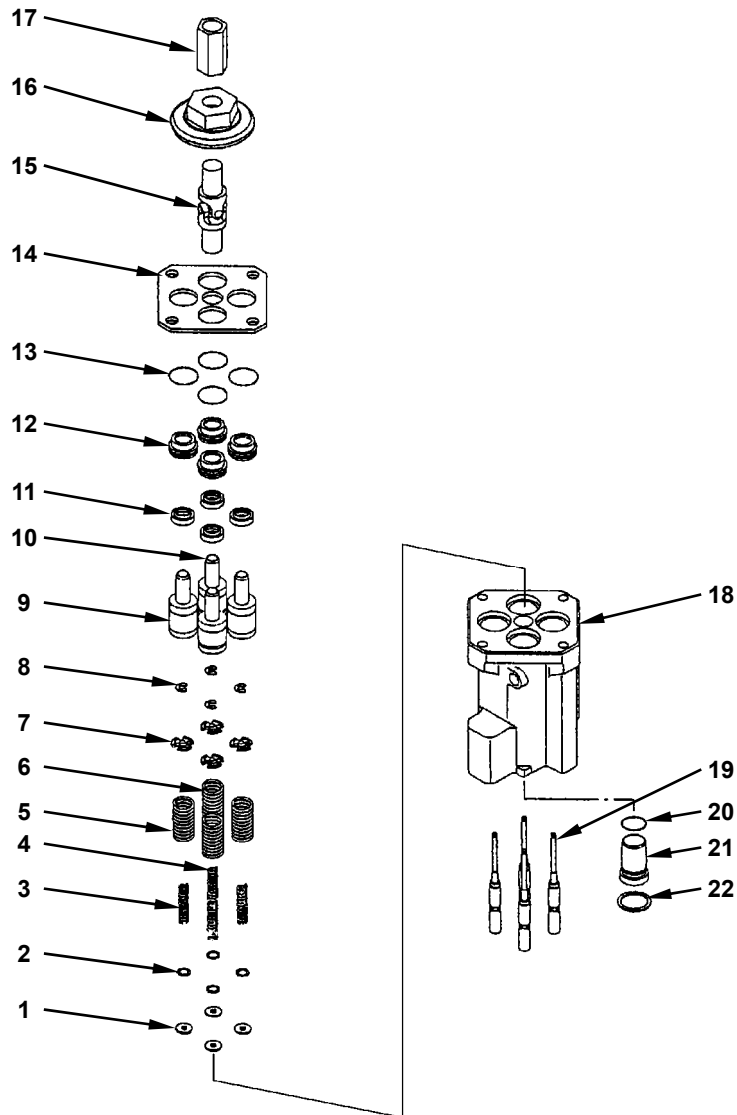
W4GD-02-08-001

BODY (UPPERSTRUCTURE) / Pilot Valve

(Blank)

BODY (UPPERSTRUCTURE) / Pilot Valve

DISASSEMBLY OF JOY-STICK TYPE PILOT VALVE FOR ADDITIONAL CIRCUIT (OPTIONAL)



W178-02-07-064

- | | | | |
|-------------------------------|-----------------------------|----------------------|---------------------|
| 1 - Spacer (4 Used) | 7 - Spring Guide (4 Used) | 13 - O-Ring (4 Used) | 18 - Casing |
| 2 - Shim (Several) | 8 - Retaining Ring (4 Used) | 14 - Plate | 19 - Spool (4 Used) |
| 3 - Balance Spring A (2 Used) | 9 - Pusher A (2 Used) | 15 - Universal Joint | 20 - O-Ring |
| 4 - Balance Spring B (2 Used) | 10 - Pusher B (2 Used) | 16 - Cam | 21 - Plug |
| 5 - Return Spring A (2 Used) | 11 - Oil Seal (4 Used) | 17 - Screw Joint | 22 - Retaining Ring |
| 6 - Return Spring B (2 Used) | 12 - Sleeve (4 Used) | | |

BODY (UPPERSTRUCTURE) / Pilot Valve


Disassembly of Joy-Stick Type Pilot Valve for Additional Circuit (Optional)

IMPORTANT: Casing (18) is made of aluminium. Too strong a force can deform or damage casing (18). Be careful while handling casing (18).


IMPORTANT: Spool (19) has been selected to match the hole of casing (18). The dimensions of balance springs A (3), B (4) and return springs A (5), B (6) as well as those of pushers A (9), B (10) are slightly different. Clearly identify port numbers disassembled parts. Port numbers are stamped on the outer surface of casing (18).

IMPORTANT: Do not remove screw joint (17) while securing casing (18) in a vise. The strong torque may act on screw joint (17).


1. Secure screw joint (17) in a vise. Rotate cam (16) by using a spanner. Remove screw joint (17).


 : 19 mm, 32 mm

2. Lightly secure the flat surface of casing (18) in a vise. Remove cam (16) from universal joint (15).

 : 32 mm

3. Attach a spanner onto the upper part of universal joint (15). Remove universal joint (15).

 : 17 mm

 **NOTE:** Universal joint (15) is secured on casing (18) by using LOCTITE #262.

4. Remove plate (14).

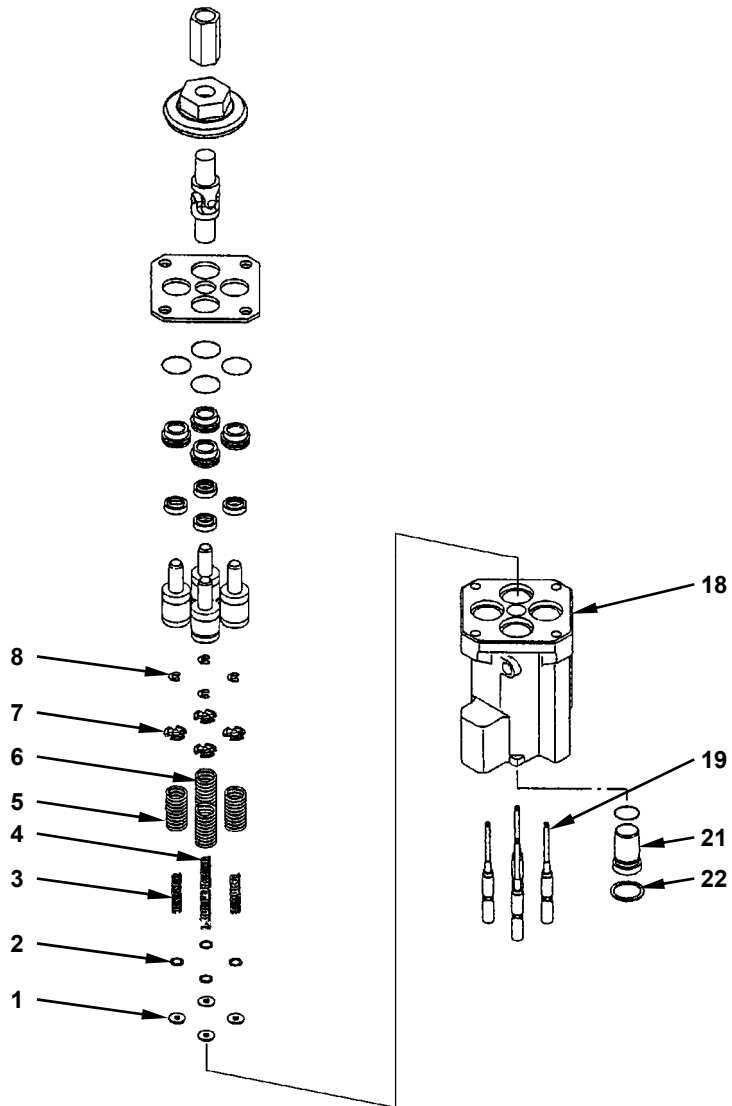
IMPORTANT: Do not damage the surface of sleeve (12). Insert a soft rubber between sleeve (12) and the tool. Oil seal (11) cannot be removed from sleeve (12). Sleeve (12) and oil seal (11) must be replaced as an assembly.

5. Remove sleeve (12) upward by clipping the side of sleeve (12) by using a pair of pliers.

IMPORTANT: The dimensions of pushers (9, 10) for ports (1, 3) and ports (2, 4) are different. Clearly identify port numbers of disassembled parts.

6. Remove pushers (9, 10) from casing (18).


BODY (UPPERSTRUCTURE) / Pilot Valve

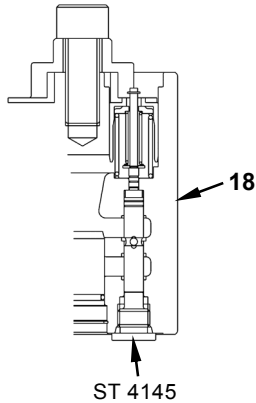


W178-02-07-064

BODY (UPPERSTRUCTURE) / Pilot Valve


7. Prevent the spool from lowering when compressing the spring. Install the special tool (ST 4145) to the port hole on casing (18) as illustrated.

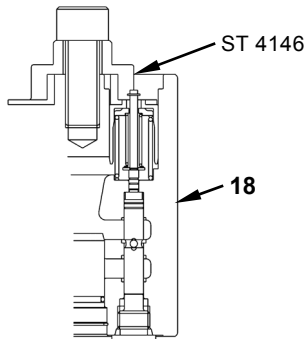
 : 6 mm



W178-02-07-048

8. Install the special tool (ST 4146) to the pusher hole on casing (18). Push the special tool and compress the spring. Tighten the special tool (ST 4146) by using a socket bolt (M14, Pitch 2.0 mm). Remove retaining rings (8) (4 used) from spools (19) (4 used) by using a screwdriver.

 : 12 mm



W178-02-07-048

IMPORTANT: The quantity of shims (2) has been determined for each port during the performance testing at the factory. Do not lose shim (2). Keep shim (2) carefully in order to install shim (2) to the original port when assembling.

9. Remove the special tool (ST 4146). Remove spring guides (7) (4 used), return springs A (5) (2 used), return springs B (6) (2 used), balance springs A (3) (2 used) and balance springs B (4) (2 used) from spools (19) (4 used).

10. Remove shim (2) and spacers (1) (4 used) from spools (19) (4 used).

IMPORTANT: Spool (19) has been selected to match the hole of casing (18). Replace spool (19) and casing (18) as an assembly.

11. Remove the special tool (ST 4145) from casing (18). Slowly rotate and remove spool (19) from casing (18).

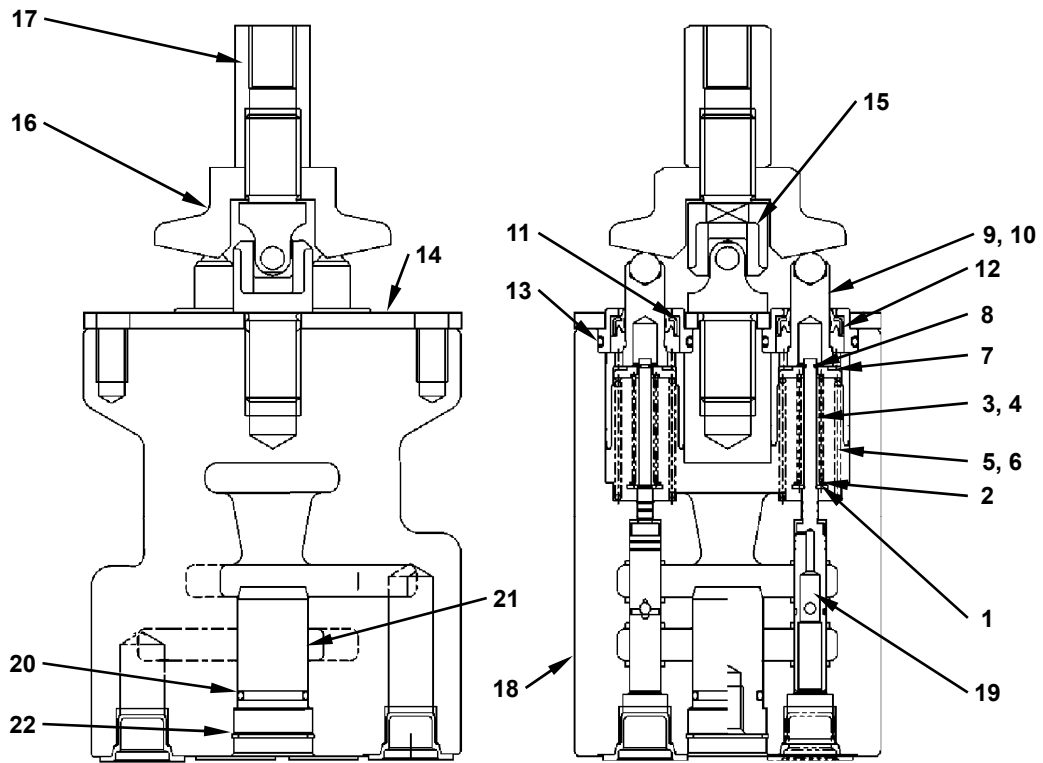
IMPORTANT: Retaining ring (22) may come off while disassembling. Prevent retaining ring (22) from falling inside casing (18). If retaining ring (22) falls inside casing (18), remove retaining ring (22) completely. Removed retaining ring (22) cannot be reused.

12. Remove retaining ring (22) from casing (18) by using a screwdriver. Install a bolt (M8, Pitch 1.25 mm) to plug (21). Remove plug (21) from casing (18).

 : 13 mm

BODY (UPPERSTRUCTURE) / Pilot Valve

ASSEMBLY OF JOY-STICK TYPE PILOT VALVE FOR ADDITIONAL CIRCUIT (OPTIONAL)




W1V1-02-07-001

- | | | | |
|-------------------------------|-----------------------------|----------------------|---------------------|
| 1 - Spacer (4 Used) | 7 - Spring Guide (4 Used) | 13 - O-Ring (4 Used) | 18 - Casing |
| 2 - Shim (Several) | 8 - Retaining Ring (4 Used) | 14 - Plate | 19 - Spool (4 Used) |
| 3 - Balance Spring A (2 Used) | 9 - Pusher A (2 Used) | 15 - Universal Joint | 20 - O-Ring |
| 4 - Balance Spring B (2 Used) | 10 - Pusher B (2 Used) | 16 - Cam | 21 - Plug |
| 5 - Return Spring A (2 Used) | 11 - Oil Seal (4 Used) | 17 - Screw Joint | 22 - Retaining Ring |
| 6 - Return Spring B (2 Used) | 12 - Sleeve (4 Used) | | |

BODY (UPPERSTRUCTURE) / Pilot Valve

Assembly of Joy-Stick Type Pilot Valve for Additional Circuit (Optional)


IMPORTANT: The pilot valve is susceptible hydraulic component to contamination. Keep the parts clean when assembling.

 **NOTE:** The table below shows the relation between each port and component. Do not confuse them when assembling.


Port No.	Spool (19)	Shim (2)	Pushers A, B (9, 10)
1	Same to the original one	Same to the original one	Outer grooves (3 used)
2			Without outer groove
3			Outer grooves (3 used)
4			Without outer groove

Port No.	Return Springs (5, 6)	Balance Springs A, B (3, 4)
1	Short	Short
2	Long	Long
3	Short	Short
4	Long	Long

1. Check the port hole number and insert spools (19) (4 used) into the original port. Install the thinner end of spool (19) into the port hole on casing (18) while slowly rotating.


 **NOTE:** Spool (19) has been selected to match the port hole. Spool (19) and casing (18) must be replaced as an assembly.

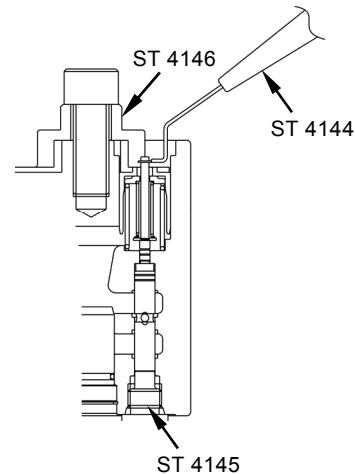
2. Install the special tool (ST 4145) to the port hole on casing (18) in order to prevent spool (19) from lowering when pushing the spring.

 : 6 mm

IMPORTANT: Refer to the table on the left in order to carry out assembling correctly.

3. Install spacers (1) (4 used), shim (2) and balance springs (3, 4) (2 used for each) to spools (19) (4 used). Install return springs (5, 6) (2 used for each) to casing (18).
4. Install spring guides (7) (4 used) to return springs (5, 6) (2 used for each) with the protrusion facing upward.
5. Install the special tool (ST 4146) to the pusher (9, 10) hole on casing (18). Push the special tool (ST 4146) and compress the spring. Tighten the special tool (ST 4146) by using a bolt (M14, Pitch 2.0 mm).

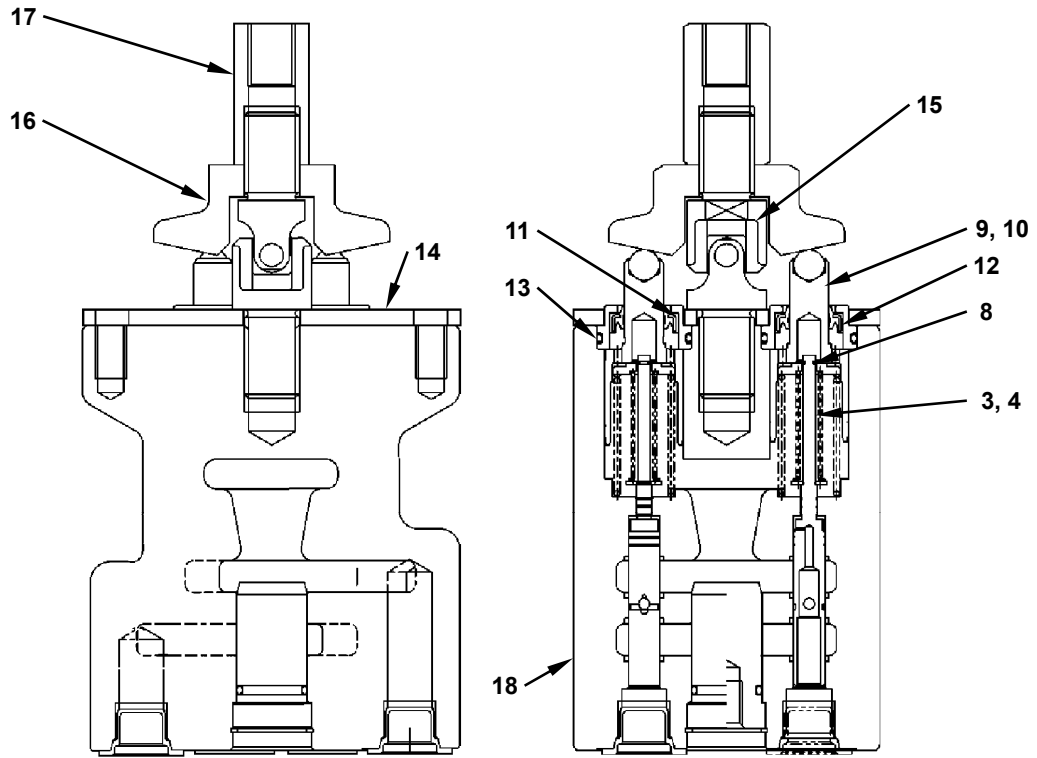
 : 12 mm



W178-02-07-049

6. Install retaining ring (8) to the ring holder (ST 4144).

BODY (UPPERSTRUCTURE) / Pilot Valve




W1V1-02-07-001

BODY (UPPERSTRUCTURE) / Pilot Valve

7. Install retaining rings (8) (4 used) attached to the ring holder (ST 4144) to the groove on the head of spool (21) extended from the special tool (ST 4146).

IMPORTANT: Check the mounting positions of pushers (9, 10) (2 used for each).


8. Install pushers (9, 10) (2 used for each).
Remove pushers (9, 10) (2 used for each) after pushing several times by hand. Check if retaining ring (8) falls off or balance springs (3, 4) (2 used for each) are located correctly.
After checking, install pushers (9, 10) (2 used for each) to casing (18).
9. Apply grease onto the ball part at the ends of pushers (9, 10) (2 used for each).
10. Apply grease onto the joint part of universal joint (15).
11. Apply grease onto the inner surface of oil seals (11) (4 used).


 **NOTE:** Sleeve (12) and oil seal (11) must be replaced as an assembly.

12. Install oil seals (11) (4 used) to sleeves (12) (4 used). Push the sleeve (12) assemblies (4 used) by hand until O-ring (13) is inserted into the hole on sleeves (12) (4 used).
13. Secure casing (18) in a vise lightly.

IMPORTANT: Align the bolt hole on plate (14) with the screw hole on casing (18).

14. Apply LOCTITE #262 onto the screw part of universal joint (15). Place plate (14) on casing (18). Install universal joint (15).


 : 17 mm


 : 24.5 N·m (2.5 kgf·m, 18 lbf·ft)

IMPORTANT: Check the tightness of cam (16).

15. Install cam (16) to universal joint (15). The clearance between cam (16) and pushers (9, 10) (2 used for each) should be 0 to 0.2 mm (0 to 0.008 in).

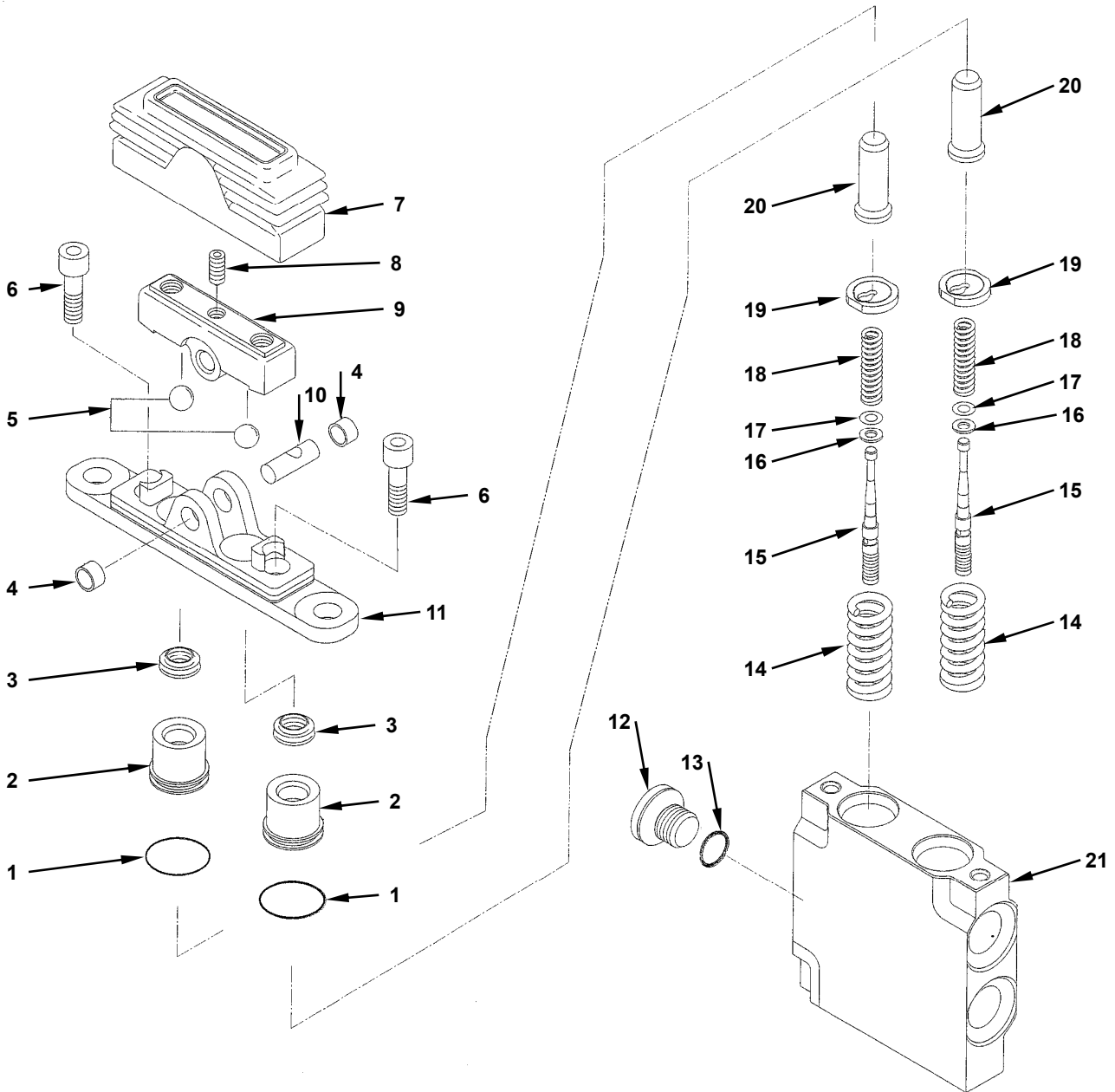
16. Secure cam (16) by using a spanner. Tighten screw joint (17) by using a spanner.

 : 19 mm, 32 mm

 : 68.4 N·m (6.98 kgf·m, 50 lbf·ft)

BODY (UPPERSTRUCTURE) / Pilot Valve

DISASSEMBLY OF 2-WAY LEVER TYPE PILOT VALVE FOR ADDITIONAL CIRCUIT (OPTIONAL)



W1LA-02-06-001

- 1 - O-Ring (2 Used)
- 2 - Bushing (2 Used)
- 3 - Packing (2 Used)
- 4 - Bushing (2 Used)
- 5 - Steel Ball (2 Used)
- 6 - Socket Bolt (2 Used)

- 7 - Boot
- 8 - Set Screw
- 9 - Cam
- 10 - Pin
- 11 - Cover

- 12 - Plug
- 13 - O-Ring
- 14 - Spring (2 Used)
- 15 - Spool (2 Used)
- 16 - Washer (2 Used)

- 17 - Shim (2 Used)
- 18 - Spring (2 Used)
- 19 - Spring Guide (2 Used)
- 20 - Pusher (2 Used)
- 21 - Casing


BODY (UPPERSTRUCTURE) / Pilot Valve


Disassembly of 2-Way Lever Type Pilot Valve for Additional Circuit (Optional)

- As spool (15) has been selected to match the hole of casing (21), the parts cannot be replaced individually.
- Clearly identify the port number of the disassembled parts.

IMPORTANT: Put the matching marks onto cam (9), pin (10), cover (11) and casing (21) before disassembling.

1. Secure the pilot valve in a vise. Remove boot (7) from cover (11).
2. Remove set screw (8) from cam (9). Remove pin (10). Remove cam (9) from cover (11).

 **NOTE:** *LOCTITE is applied onto the set screw (8) part.*

 **NOTE:** *Steel ball (5) cannot be disassembled from cam (9).*

3. Loosen and remove socket bolts (6) (2 used) alternately. Remove cover (11) from casing (21).
4. Remove the pusher (20) assemblies (2 used) from casing (21).
5. Remove bushings (2) (2 used) from the pusher (20) assembly. Remove O-rings (1) (2 used) and packings (3) (2 used) from bushings (2) (2 used).

IMPORTANT: Clearly identify the port number in order not to confuse.

6. Remove the spool (15) assemblies (2 used) and springs (14) (2 used) from casing (21).

7. Remove spring guides (19) (2 used), springs (18) (2 used), washers (16) (2 used) and shims (17) (2 used) from the spool (15) assemblies (2 used).

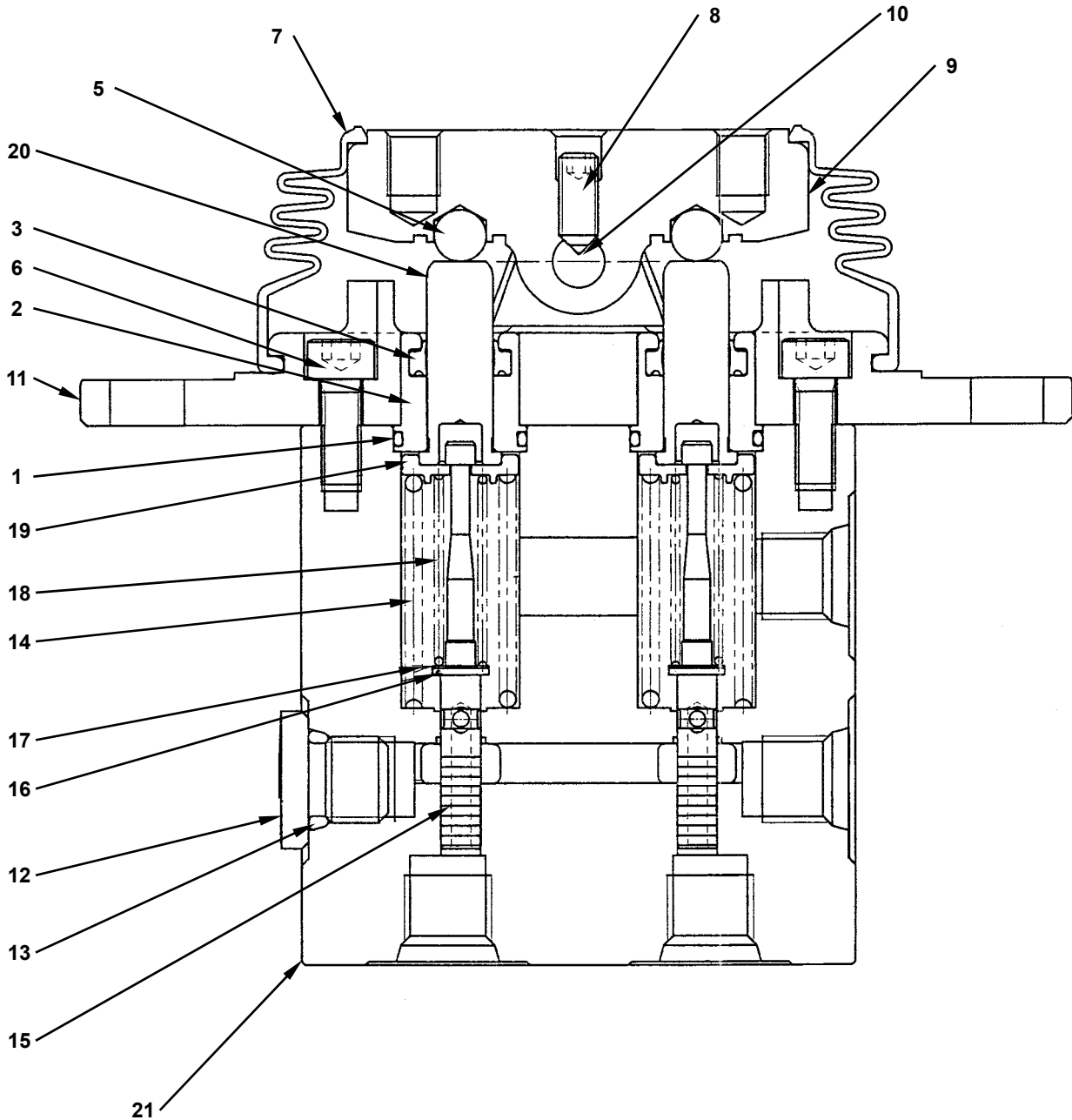
IMPORTANT: As the spool (15) assemblies (2 used) are adjusted by the pressure of shim (17), do not disassemble the spool (15) assemblies. If disassembling the spool (15) assemblies, record the quantity and thickness of shim (17) as they differ.

IMPORTANT: Do not remove bushing (4) from cover (11) unless it is damaged.

8. Remove bushings (4) (2 used) from cover (11).

BODY (UPPERSTRUCTURE) / Pilot Valve

ASSEMBLY OF 2-WAY LEVER TYPE PILOT VALVE FOR ADDITIONAL CIRCUIT (OPTIONAL)



W1LA-02-06-002

- | | | | |
|--------------------------|---------------|----------------------|----------------------------|
| 1 - O-Ring (2 Used) | 7 - Boot | 12 - Plug | 17 - Shim (2 Used) |
| 2 - Bushing (2 Used) | 8 - Set Screw | 13 - O-Ring | 18 - Spring (2 Used) |
| 3 - Packing (2 Used) | 9 - Cam | 14 - Spring (2 Used) | 19 - Spring Guide (2 Used) |
| 4 - *Bushing (2 Used) | 10 - Pin | 15 - Spool (2 Used) | 20 - Pusher (2 Used) |
| 5 - Steel Ball (2 Used) | 11 - Cover | 16 - Washer (2 Used) | 21 - Casing |
| 6 - Socket Bolt (2 Used) | | | |

NOTE: As for parts with mark *, refer to W2-8-30.

BODY (UPPERSTRUCTURE) / Pilot Valve

Assembly of 2-Way Lever Type Pilot Valve for Additional Circuit (Optional)

- Clean all parts by using cleaning fluid and place the parts by port.

1. Install bushings (4) (2 used) to cover (11).

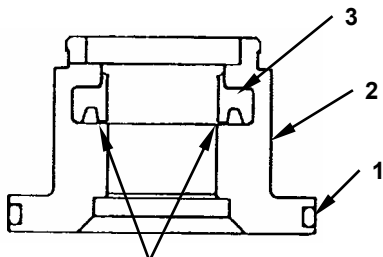
IMPORTANT: Install shim (17) with the same thickness as it was assembled.

2. Install washers (16) (2 used), shims (17) (2 used), springs (18) (2 used) and spring guides (19) (2 used) to spools (15) (2 used) in this order.

IMPORTANT: Install the spool (15) assembly into the same hole as it was disassembled.


3. Install springs (14) (2 used) to casing (21). Install the spool (15) assemblies (2 used).


4. Install O-rings (1) (2 used) and packings (3) (2 used) to bushings (2) (2 used).



5. Install pushers (20) (2 used) to the bushing (2) assemblies (2 used). Install the bushing (2) assemblies (2 used) to casing (21).


6. Secure casing (21) in a vise. Tighten cover (11) with socket bolts (6) (2 used).


 : 5 mm

 : 8.8 N·m (0.9 kgf·m, 6.5 lbf·ft)

7. Install cam (9) to cover (11) and secure with pin (10).

8. Apply LOCTITE #241 onto set screw (8). Install set screw (8) to cam (9). Secure pin (10).

 : 5 mm

 : 6.9 N·m (0.7 kgf·m, 5.1 lbf·ft)

9. Install boot (7) to cover (11).

BODY (UPPERSTRUCTURE) / Pilot Valve

(Blank)





BODY (UPPERSTRUCTURE) / Pilot Shut-Off Valve

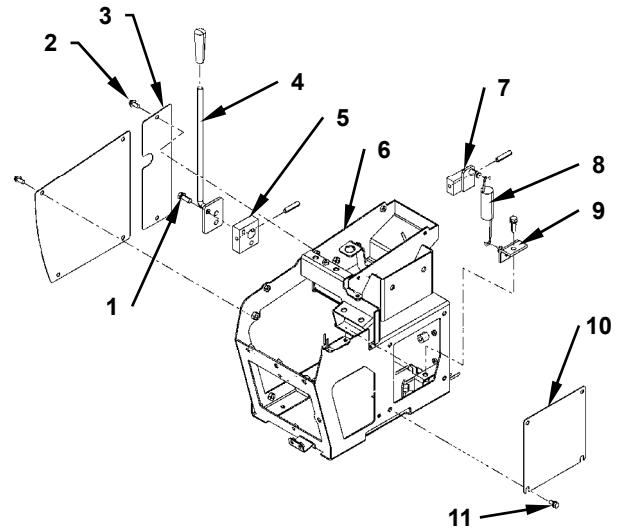
REMOVAL AND INSTALLATION OF PILOT SHUT-OFF VALVE



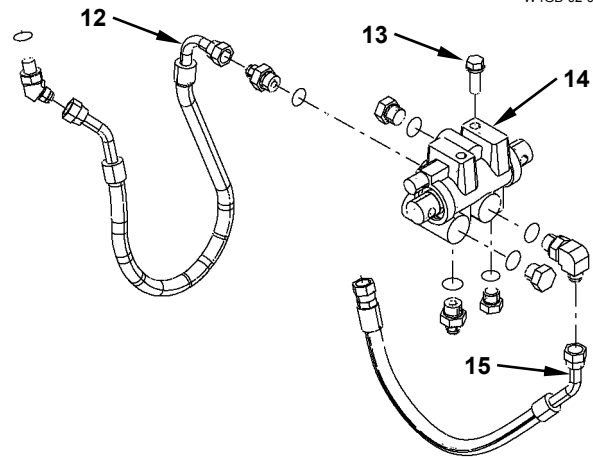
CAUTION: Bleed air from the hydraulic oil tank before doing any work. (Refer to **BLEED AIR FROM HYDRAULIC OIL TANK** on W1-4-1.)

Removal

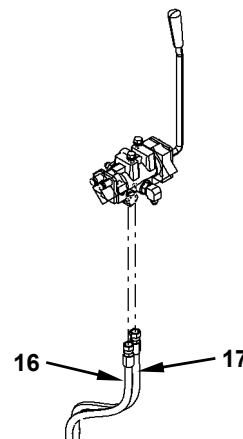
1. Remove screws (2) (2 used) from cover (3).
Remove cover (3) from bracket (6).
2. Remove sems bolts (11) (4 used) from cover (10).
Remove cover (10) from bracket (6).
 : 13 mm
3. Remove spring (8) from block (7) and bracket (9).
4. Remove bolts (1) (2 used) from lever (4). Remove lever (4) from block (5).
 : 14 mm
5. Disconnect hoses (12, 15, 16 and 17) from pilot shut-off valve (14). Cap the open ends.
 : 19 mm, 22 mm
6. Remove bolts (13) (2 used) from bracket (6).
Remove pilot shut-off valve (14) from bracket (6).
 : 17 mm



W4GB-02-07-001



W4GB-02-07-002





W4GB-02-07-003

BODY (UPPERSTRUCTURE) / Pilot Shut-Off Valve


Installation


1. Install pilot shut-off valve (14) to bracket (6) with bolts (13) (2 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

2. Connect hoses (12, 15, 16 and 17) to pilot shut-off valve (14).


 : 19 mm


 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)

 : 22 mm

 : 39 N·m (4 kgf·m, 28.5 lbf·ft)


3. Install lever (4) to block (5) with bolts (1) (2 used).


 : 14 mm

 : 30 N·m (3 kgf·m, 22 lbf·ft)

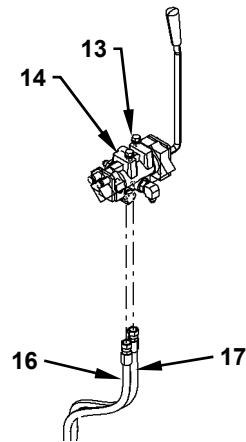
4. Install spring (8) to block (7) and bracket (9).

5. Install cover (10) to bracket (6) with sems bolts (11) (4 used).

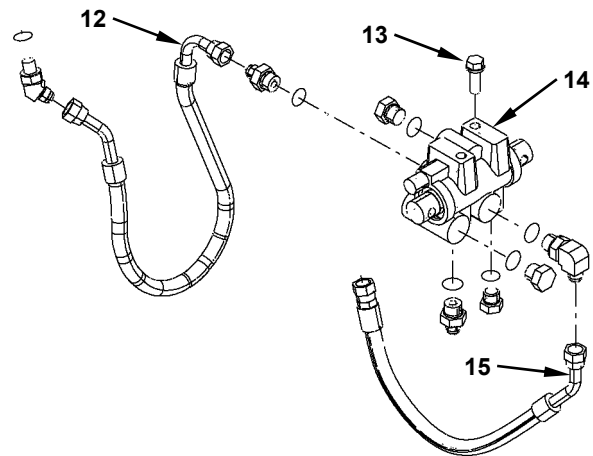
 : 13 mm

 : 20 N·m (2 kgf·m, 14.5 lbf·ft)

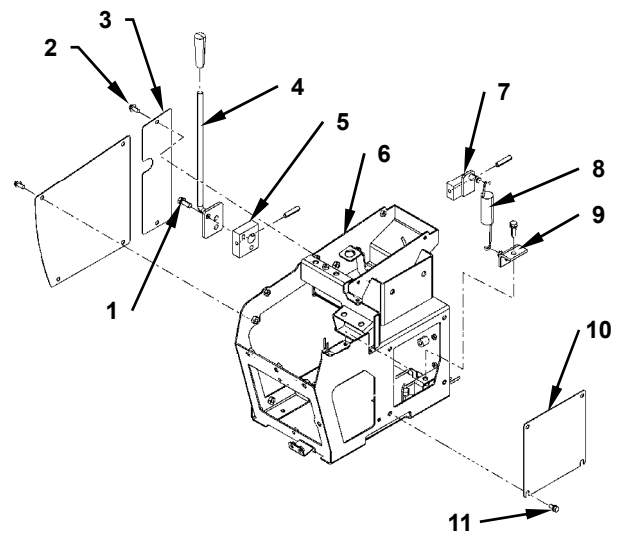
6. Install cover (3) to bracket (6) with screws (2) (2 used).



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W4GB-02-07-002



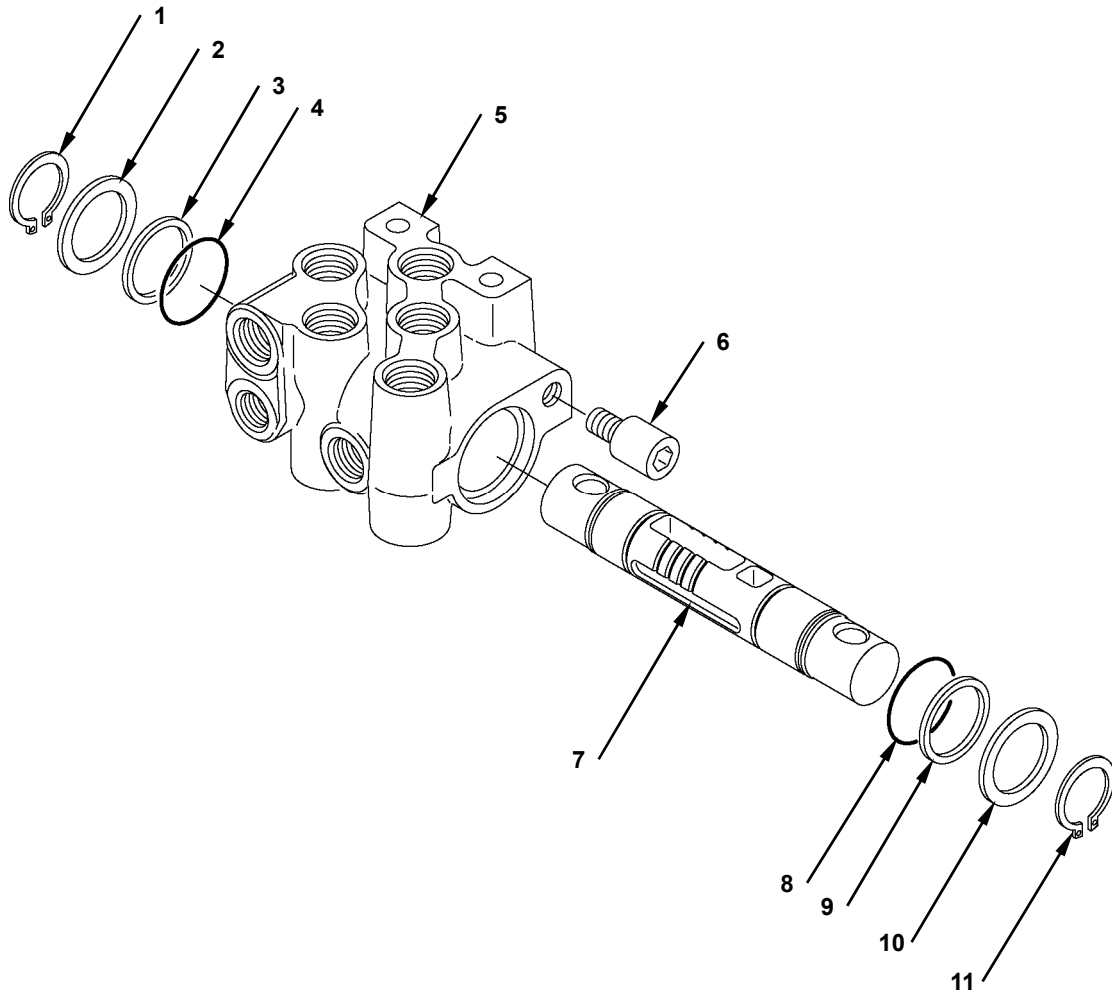
W4GB-02-07-001

BODY (UPPERSTRUCTURE) / Pilot Shut-Off Valve

(Blank)

BODY (UPPERSTRUCTURE) / Pilot Shut-Off Valve

DISASSEMBLY OF PILOT SHUT-OFF VALVE



W4GB-02-08-001

1 - Retaining Ring
2 - Washer
3 - Backup Ring

4 - O-Ring
5 - Body
6 - Socket Bolt


7 - Spool
8 - O-Ring
9 - Backup Ring

10 - Washer
11 - Retaining Ring

BODY (UPPERSTRUCTURE) / Pilot Shut-Off Valve


Disassembly of Pilot Shut-Off Valve

1. Remove retaining rings (1, 11) and washer (2) from spool (7). Remove spool (7) from body (5) to the direction of socket bolt (6).

 *NOTE: Record the direction to install spool (7).*

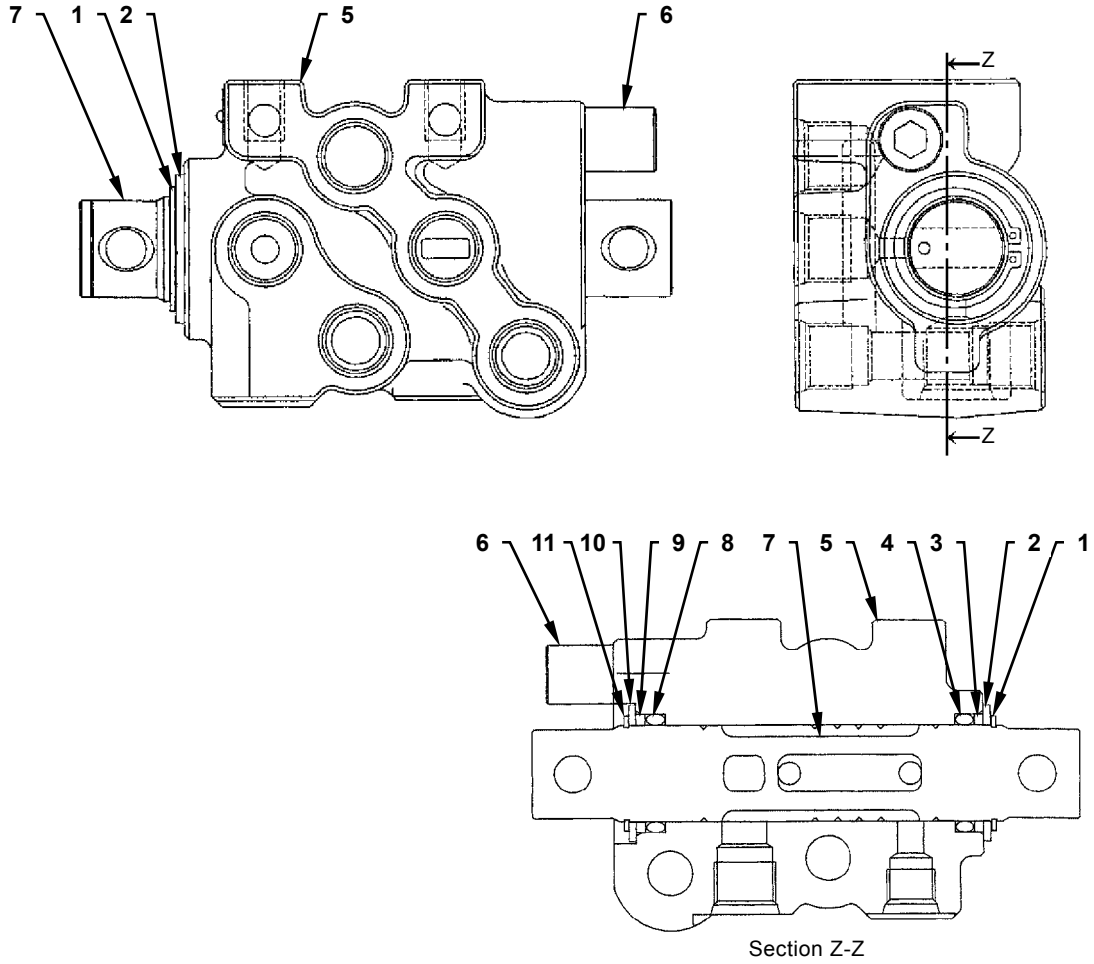
2. Remove washer (10), backup rings (3, 9) and O-rings (4, 8) from body (5).

3. Remove socket bolt (6) from body (5).

 : 6 mm

BODY (UPPERSTRUCTURE) / Pilot Shut-Off Valve

ASSEMBLY OF PILOT SHUT-OFF VALVE



W4GB-02-08-002

1 - Retaining Ring
2 - Washer
3 - Backup Ring

4 - O-Ring
5 - Body
6 - Socket Bolt


7 - Spool
8 - O-Ring
9 - Backup Ring


10 - Washer
11 - Retaining Ring

BODY (UPPERSTRUCTURE) / Pilot Shut-Off Valve

Assembly of Pilot Shut-Off Valve

1. Apply LOCTITE #262 onto socket bolt (6). Install socket bolt (6) to body (5).

 : 6 mm

 : 29.4 N·m (3.0 kgf·m, 21.5 lbf·ft)

2. Install O-ring (8), backup ring (9) and washer (10) to body (5).
3. Apply hydraulic oil onto spool (7). Install spool (7) to body (5) from the direction of socket bolt (6) by rotating. At this time, check the direction to install spool (7).
4. Install O-ring (4), backup ring (3) and washer (2) to body (5). Install retaining rings (1, 11) to spool (7).

BODY (UPPERSTRUCTURE) / Pilot Shut-Off Valve

(Blank)

BODY (UPPERSTRUCTURE) / Fan Pump and Motor


REMOVAL AND INSTALLATION OF FAN PUMP




CAUTION: Bleed air from the hydraulic oil tank before doing any work. (Refer to **BLEED AIR FROM HYDRAULIC OIL TANK** on W1-4-1.)

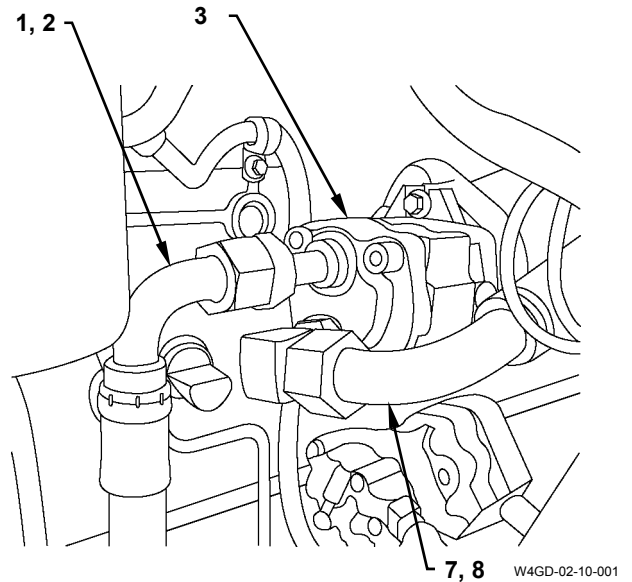
Removal

1. Disconnect hose (7) at the inlet side from fan pump (3). Remove O-ring (8).


 : 41 mm

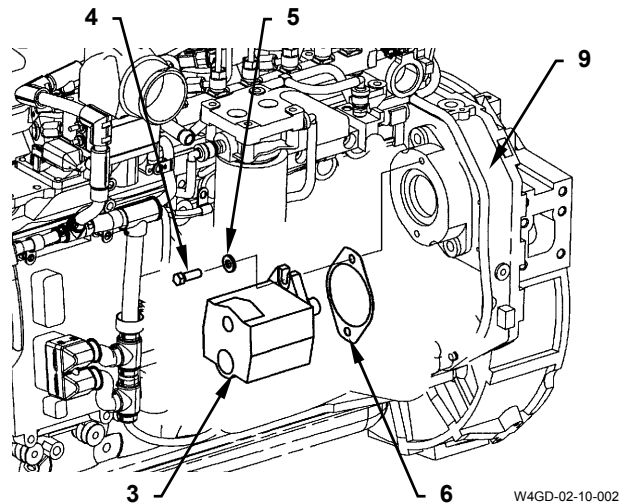
2. Disconnect hose (1) at the delivery side from fan pump (3). Remove O-ring (2).

 : 36 mm



3. Remove bolts (4) (2 used) and spring washers (5) (2 used) from fan pump (3). Remove fan pump (3) and gasket (6) from engine (9).


 : 14 mm




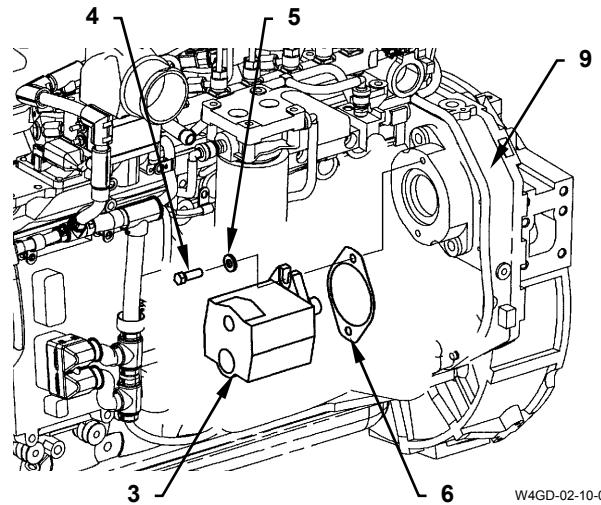
BODY (UPPERSTRUCTURE) / Fan Pump and Motor

Installation

1. Install fan pump (3) and gasket (6) to engine (9) with bolts (4) (2 used) and spring washers (5) (2 used).


 : 14 mm


 : 52 N·m (5.3 kgf·m, 38 lbf·ft)




W4GD-02-10-002


2. Connect O-ring (8) and hose (7) to fan pump (3).

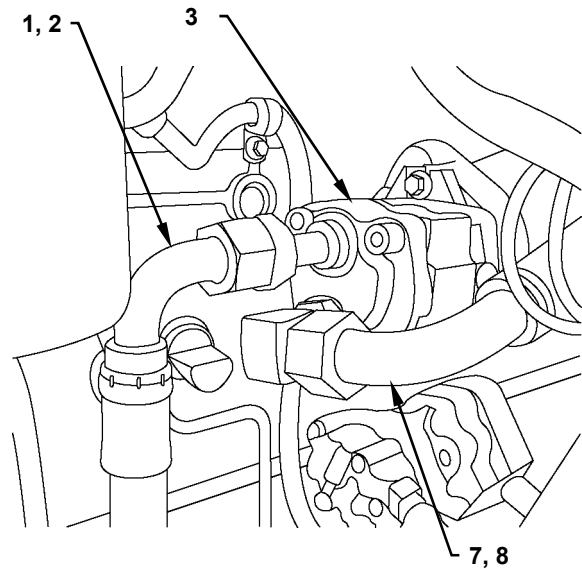
 : 41 mm

 : 108 N·m (11 kgf·m, 80 lbf·ft)

3. Connect O-ring (2) and hose (1) to fan pump (3).

 : 36 mm

 : 32 N·m (3.2 kgf·m, 23.5 lbf·ft)



W4GD-02-10-001

BODY (UPPERSTRUCTURE) / Fan Pump and Motor

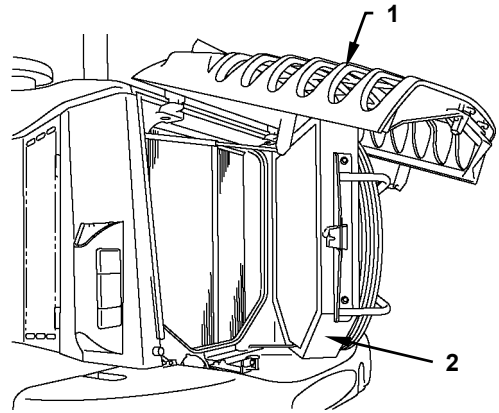
REMOVAL AND INSTALLATION OF FAN MOTOR



CAUTION: Bleed air from the hydraulic oil tank before doing any work. (Refer to **BLEED AIR FROM HYDRAULIC OIL TANK** on W1-4-1.)


Removal

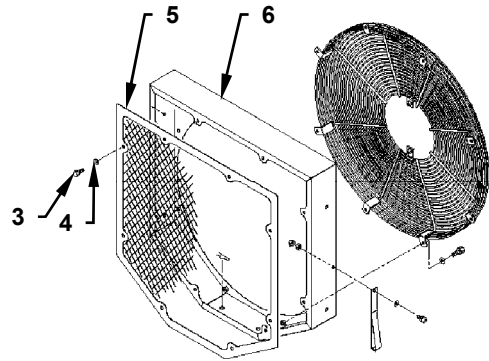
1. Open rear grill (1). Remove cooling fan (2) outward.



W4GB-02-08-300


2. Remove bolts (3) (8 used) and washers (4) (8 used) from guard (5). Remove guard (5) from cover (6).

 : 14 mm




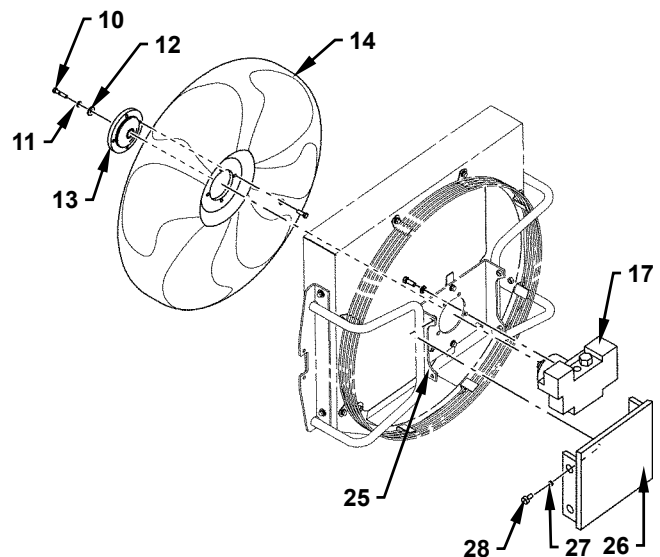
W4GB-02-08-301

3. Remove bolt (10), spring washer (11) and washer (12) from retainer (13). Remove the fan (14) assembly from fan motor (17) by using a puller.

 : 14 mm

4. Remove bolts (28) (4 used) and washers (27) (4 used) from bracket (25). Remove cover (26) from bracket (25).


 : 14 mm

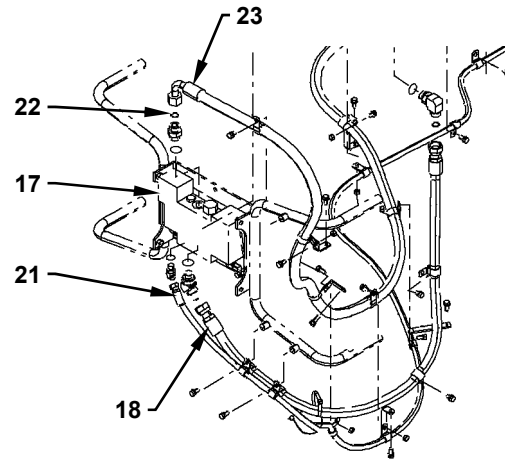


W4GD-02-10-004

BODY (UPPERSTRUCTURE) / Fan Pump and Motor

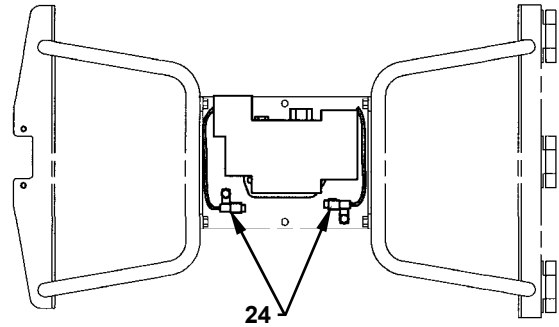
5. Disconnect hoses (18, 21 and 23) from fan motor (17). Cap the open ends. Remove O-ring (22).

 : 19 mm, 27 mm, 36 mm




W4GB-02-08-004

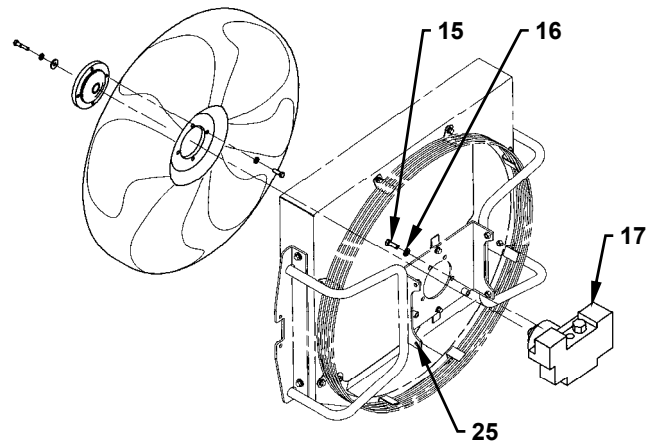
6. Disconnect connectors (24) (2 used).



W4GB-02-08-005

7. Remove bolts (15) (4 used) and washers (16) (4 used) from bracket (25). Remove fan motor (17) from bracket (25).

 : 17 mm





W4GB-02-08-003

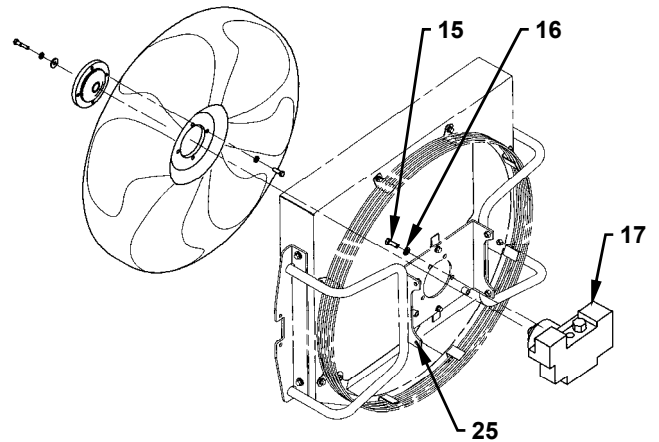
BODY (UPPERSTRUCTURE) / Fan Pump and Motor

Installation

1. Install fan motor (17) to bracket (25) with washers (16) (4 used) and bolts (15) (4 used).

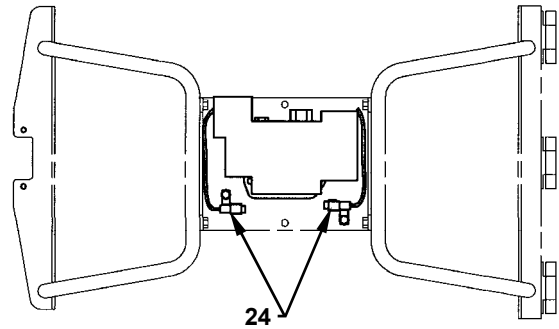
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)




W4GB-02-08-003


2. Connect connectors (24) (2 used).





W4GB-02-08-005

3. Connect hoses (18, 21) to fan motor (17).

 : 19 mm


 : 70 N·m (7.1 kgf·m, 52 lbf·ft)


 : 27 mm

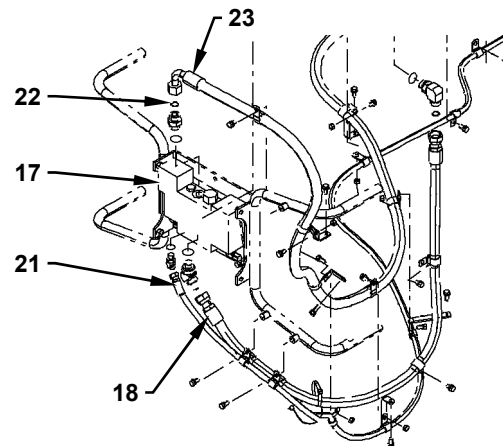
 : 93 N·m (9.5 kgf·m, 69 lbf·ft)

IMPORTANT: Before connecting hose (23), add 0.12 to 0.2 L (0.032 to 0.053 US gal.) of hydraulic oil through port P in fan motor (17).

4. Install O-ring (22) and connect hose (23) to fan motor (17).

 : 36 mm


 : 175 N·m (18 kgf·m, 129 lbf·ft)




W4GB-02-08-004

BODY (UPPERSTRUCTURE) / Fan Pump and Motor

5. Install cover (26) to bracket (25) with bolts (28) (4 used) and washers (27) (4 used).


 : 14 mm


 : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)

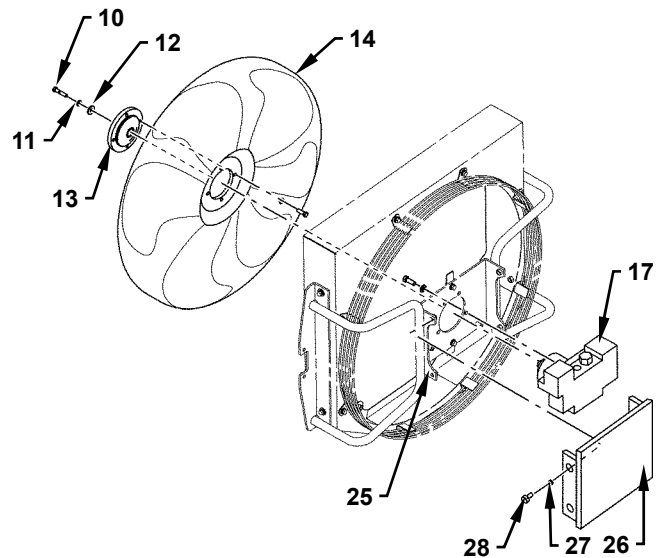


CAUTION: Degrease and clean the taper parts of fan motor (17) and fan (14) in order to prevent contamination from sticking.

6. Install the fan (14) assembly to fan motor (17) with bolt (10), spring washer (11) and washer (12).


 : 14 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

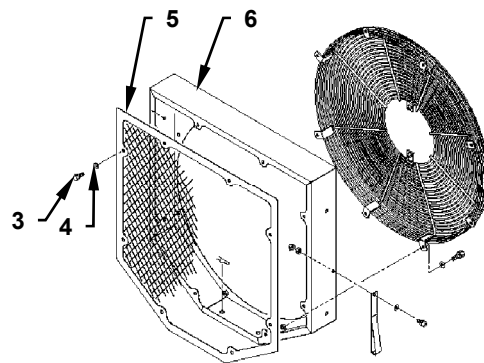


W4GD-02-10-004

7. Install guard (5) to cover (6) with bolts (3) (8 used) and washers (4) (8 used).

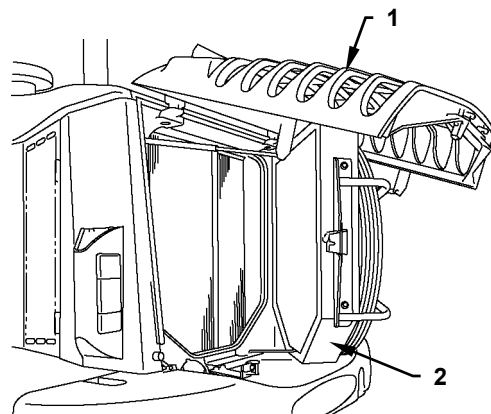
 : 14 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



W4GB-02-08-301

8. Shut cooling fan (2) and rear grill (1).



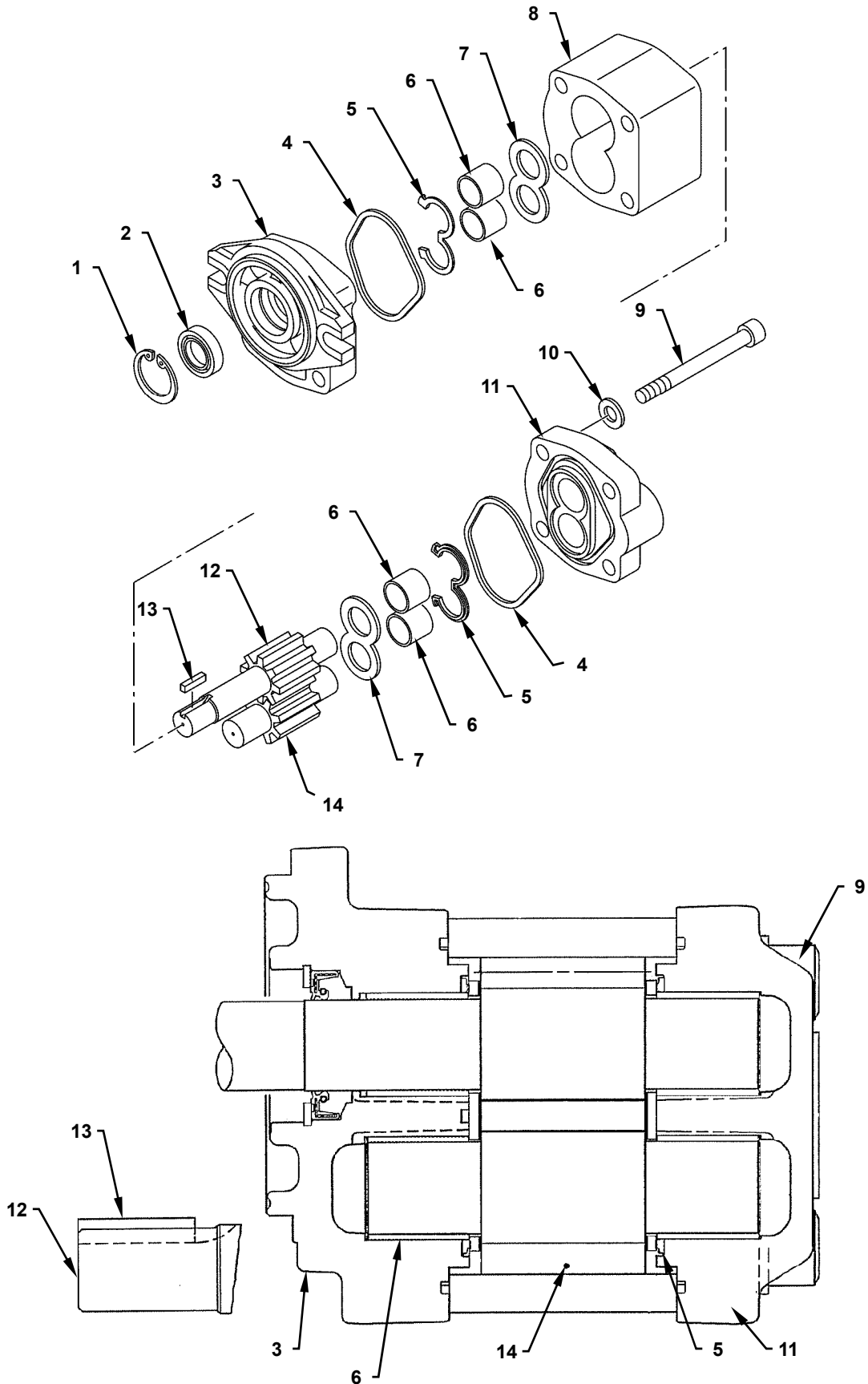
W4GB-02-08-300

BODY (UPPERSTRUCTURE) / Fan Pump and Motor

(Blank)

BODY (UPPERSTRUCTURE) / Fan Pump and Motor


STRUCTURE OF FAN PUMP



W4GD-02-10-005

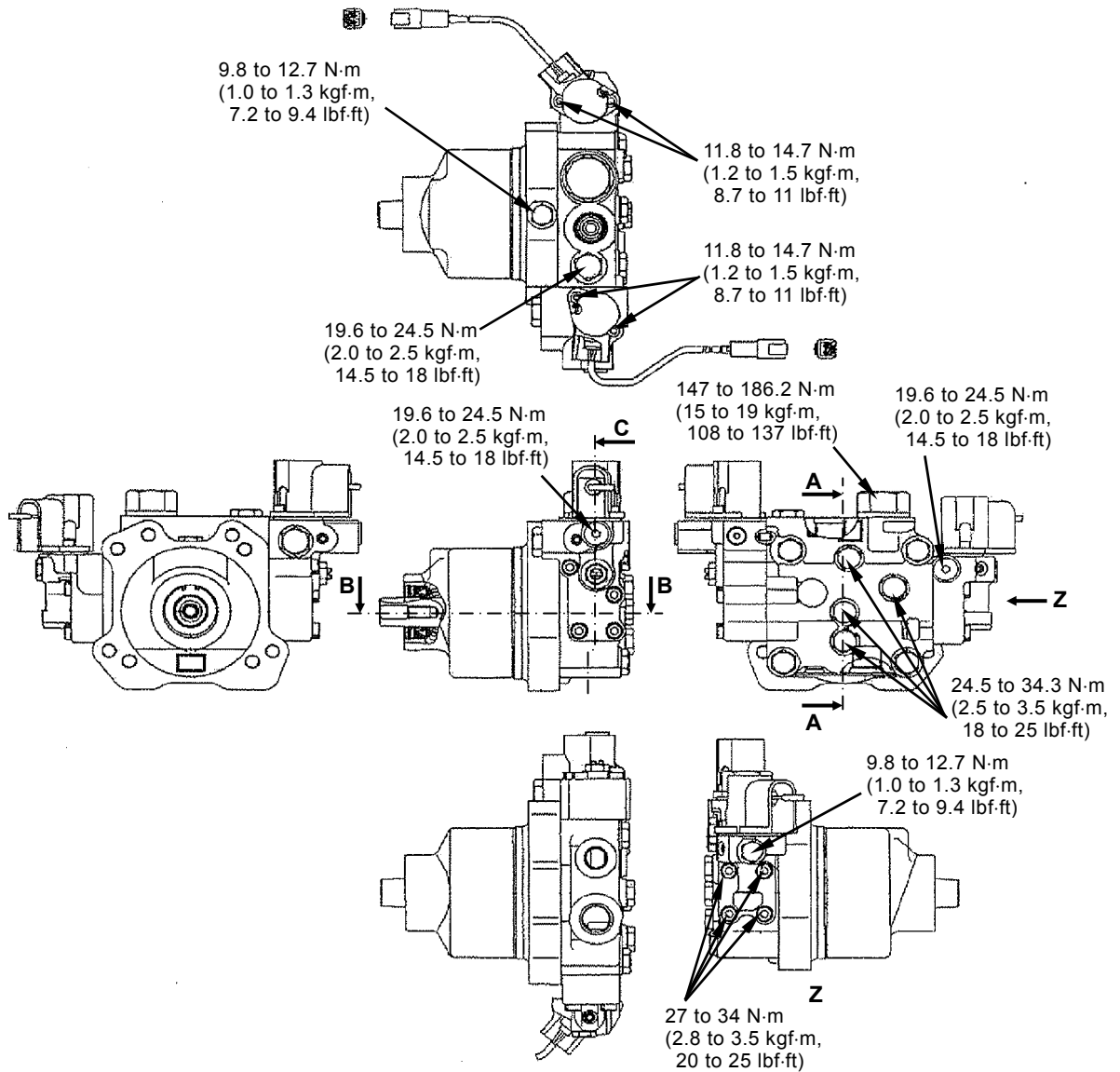
W4GD-02-10-006

BODY (UPPERSTRUCTURE) / Fan Pump and Motor

No.	Part Name	Q'ty	Wrench Size (mm)	Tightening Torque			Remark
				N·m	(kgf·m)	(lbf·ft)	
1	Retaining Ring	1					
2	Oil Seal	1					Apply grease onto the lip part when assembling.
3	Front Cover	1					
4	Gasket	2					Apply grease when assembling.
5	Gasket	2					Apply grease when assembling.
6	Bushing	4					Apply hydraulic oil when assembling.
7	Side Plate	2					
8	Body	1					
9	Bolt	4	 : 10	90	(9.0)	(66)	
10	Washer	4					
11	Rear Cover	1					
12	Drive Gear	1					
13	Key	1					
14	Driven Gear	1					

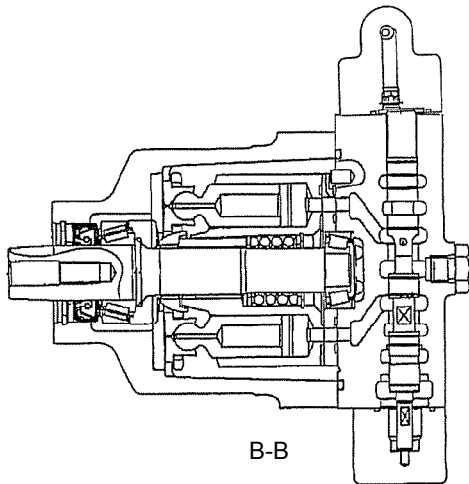
BODY (UPPERSTRUCTURE) / Fan Pump and Motor

FAN MOTOR STANDARD

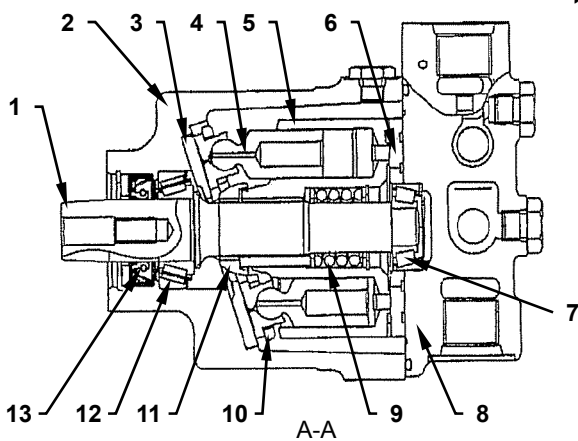


W4GB-02-08-020

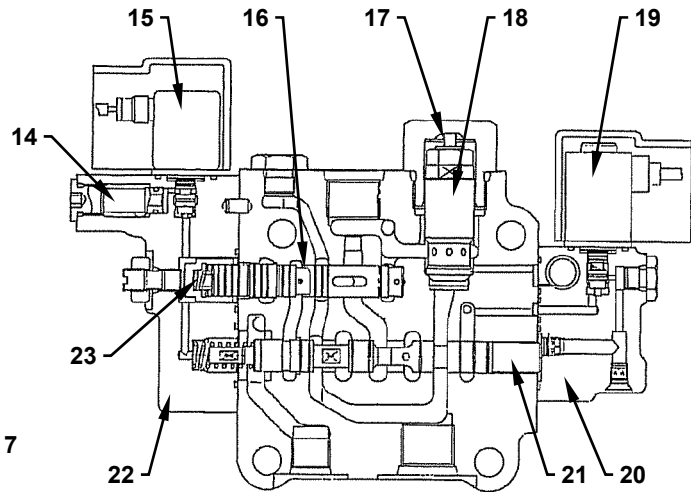
BODY (UPPERSTRUCTURE) / Fan Pump and Motor



B-B



A-A



C-C

W4GB-02-08-021

- | | | | |
|--------------------|---------------------|--|---|
| 1 - Shaft | 7 - Sub Bearing | 13 - Oil Seal | 19 - Reverse Rotation Control Solenoid Valve |
| 2 - Case | 8 - End Cover | 14 - Filter | 20 - Forward / Reverse Rotation Selection Pilot Valve |
| 3 - Thrust Plate | 9 - Center Spring | 15 - Flow Rate Adjustment Solenoid Valve | 21 - Reverse Rotation Spool |
| 4 - Piston | 10 - Retainer Shoe | 16 - Flow Rate Control Valve | 22 - Variable Flow Rate Control Pilot Valve |
| 5 - Cylinder Block | 11 - Retainer Guide | 17 - Spring | 23 - Spring for Flow Rate Control Valve |
| 6 - Valve Plate | 12 - Main Bearing | 18 - Relief Valve | |

No.	Item	Evaluation Standard				Remedy
		Standard		Allowable Limit		
		Free Length x Outer Diameter	Mounting Length	Mounting Load	Free Length	Mounting Load
17	Spring	29.3 x 6.5 mm (1.15 x 0.26 in)	18.2 mm (0.72 in)	3.33 N (0.34 kg, 2.5 lbf-ft)	-	2.65 N (0.27 kg, 2 lbf-ft)
						If the spring is damaged or deformed, replace the spring.

BODY (UPPERSTRUCTURE) / Fan Pump and Motor

(Blank)

MEMO

A series of horizontal dotted lines for writing a memo.

SECTION 3 BODY (TRAVEL SYSTEM)



— CONTENTNS —

Group 1 Tire

Removal and Installation of Tire..... W3-1-1

Group 2 Drive Unit

Removal and Installation of Drive Unit..... W3-2-1
Disassembly of Drive Unit..... W3-2-14
Disassembly of Torque Converter Wheel . W3-2-36
Assembly of Torque Converter Wheel W3-2-40
Disassembly of Clutch Shaft
(Forward Clutch and Reverse Clutch) W3-2-42
Assembly of Clutch Shaft
(Forward Clutch and Reverse Clutch) W3-2-44
Disassembly of Clutch Shaft
(1-Speed/2-Speed Clutch and
3-Speed/4-Speed Clutch)..... W3-2-46
Assembly of Clutch Shaft
(1-Speed/2-Speed Clutch and
3-Speed/4-Speed Clutch)..... W3-2-48
Disassembly and Assembly of Idler Shaft. W3-2-50
Disassembly of Control Valve W3-2-52
Assembly of Control Valve W3-2-54
Disassembly of Regulator Valve W3-2-56
Assembly of Regulator Valve W3-2-58
Assembly of Drive Unit..... W3-2-60

Group 3 Axle

Removal and Installation of Axle..... W3-3-1
Disassembly of Axle..... W3-3-11
Assembly of Axle..... W3-3-29

Group 4 Propeller Shaft

Removal and Installation of
Propeller Shaft..... W3-4-1

Group 5 Brake Valve

Removal and Installation of Brake Valve..... W3-5-1
Disassembly of Brake Valve W3-5-4
Assembly of Brake Valve..... W3-5-10
Maintenance Standard W3-5-20

Group 6 Charging Block

Removal and Installation of
Charging Block W3-6-1
Disassembly of Charging Block..... W3-6-4
Assembly of Charging Block W3-6-9

Group 7 Steering Pilot Valve

Removal and Installation of
Steering Pilot Valve..... W3-7-1
Disassembly of Steering Pilot Valve W3-7-4
Assembly of Steering Pilot Valve W3-7-8

Group 8 Steering Valve

Removal and Installation of
Steering Valve W3-8-1
Disassembly of Steering Valve W3-8-4
Assembly of Steering Valve W3-8-6

Group 9 Steering Cylinder

Removal and Installation of
Steering Cylinder W3-9-1
Disassembly of Steering Cylinder..... W3-9-6
Assembly of Steering Cylinder W3-9-12

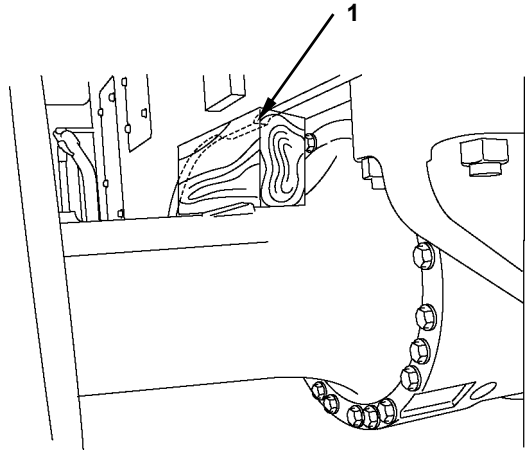
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BODY (TRAVEL SYSTEM) / Tire

REMOVAL AND INSTALLATION OF TIRE


Removal


1. Secure the front and the rear frames with the safety link and the pin.
2. When removing the rear tires, insert wooden block (1) between the rear frame and the rear axle on both left and right sides in order to prevent the cradle from moving.



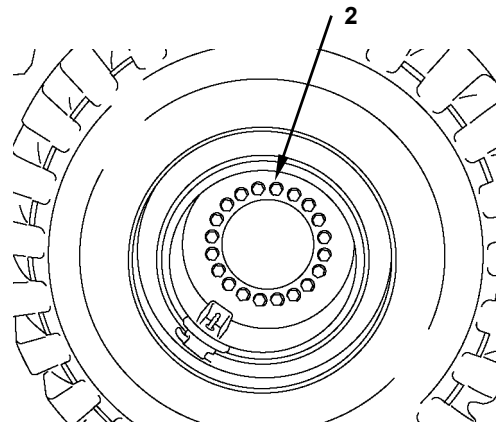
W4GB-03-01-001

3. Loosen wheel bolts (2) (15 used) of tire (3) to be removed about one turn.


 : 36 mm

 **CAUTION: Machine weight: 14500 kg (32000 lb)**

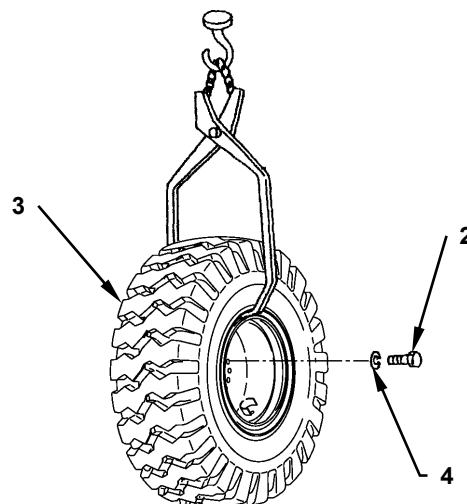
4. Raise the machine until tire (3) to be removed slightly gets away from the road surface. Support the machine securely by using the blocks.



W4GB-03-01-002

 **CAUTION: Tire (3) and rim weight: 350 kg (775 lb)**

5. Attach a lifting tool to tire (3). Hold tire (3).
6. Remove wheel bolts (2) (15 used) and washers (4) (15 used). Remove tire (3) from the axle.



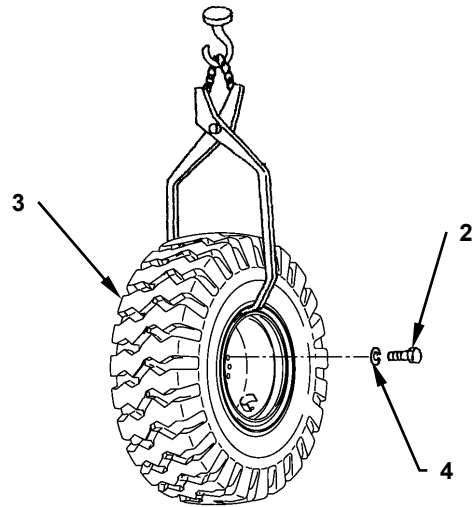
W4GB-03-01-003

BODY (TRAVEL SYSTEM) / Tire

Installation


CAUTION: Tire (3) and rim weight: 350 kg (775 lb)


1. Hoist and install tire (3) to the axle with the air valve side facing outside.
2. Install and lightly tighten wheel bolts (2) (15 used) and washers (4) (15 used) to tire (3).

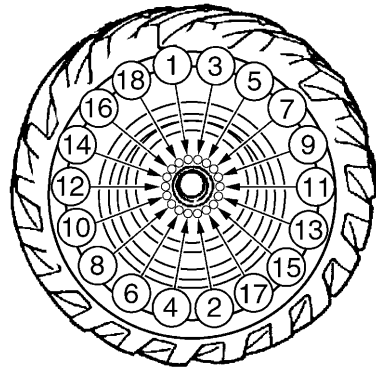


W4GB-03-01-003

3. Lower the machine. Tighten wheel bolts (2) according to the order as illustrated in the right.

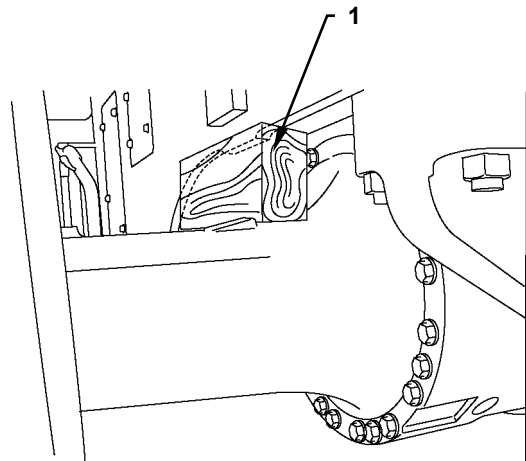
 : 36 mm

 : 890 N·m (91 kgf·m, 660 lbf·ft)



M4GB-07-102

4. Remove wooden block (1) between the rear frame and the rear axle on both left and right sides.




W4GB-03-01-001


BODY (TRAVEL SYSTEM) / Drive Unit

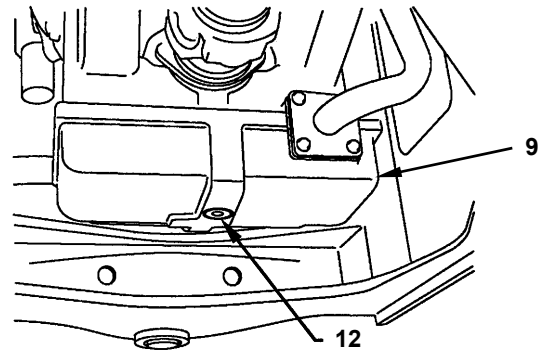
REMOVAL AND INSTALLATION OF DRIVE UNIT

Removal

1. Remove the cab. (Refer to W2-1.)
2. Remove the hood. (Refer to W2-4.)
3. Remove the hydraulic oil tank. (Refer to W2-5.)
4. Disconnect the hose from the main pump. (Refer to W2-6.)
5. Remove the propeller shaft. (Refer to W3-4.)
6. Remove drain plug (12) from drive unit (9). Drain transmission oil.


 : 17 mm

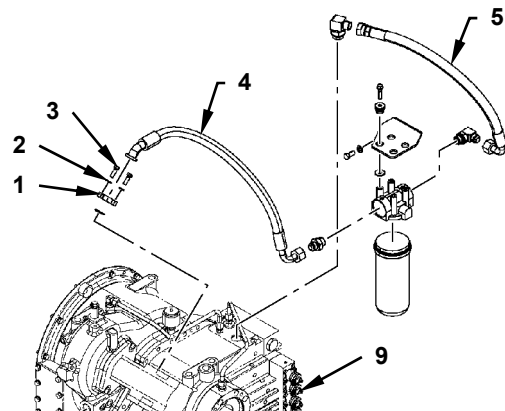
 **NOTE:** Provide a 50 L (13.2 US gal.) container in order to collect oil, and process waste oil appropriately.



W4GC-03-02-181


7. Remove bolts (3) (4 used) from split flanges (1) (2 used). Remove split flanges (1) (2 used) and washers (2) (8 used) from drive unit (9). Disconnect hose (4) from drive unit (9). Cap the open ends.

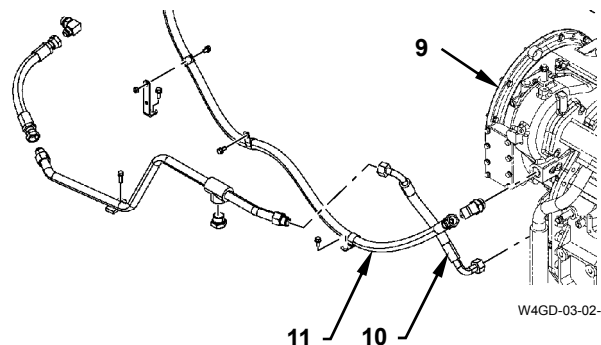
 : 14 mm



W4GD-03-02-001

8. Disconnect hoses (5, 10 and 11) from drive unit (9). Cap the open ends.


 : 27 mm

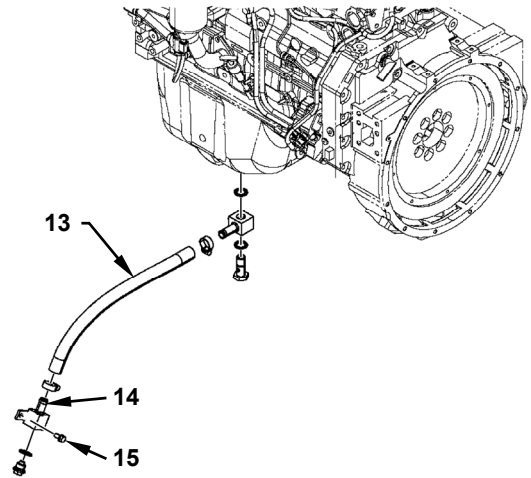


W4GD-03-02-026

BODY (TRAVEL SYSTEM) / Drive Unit

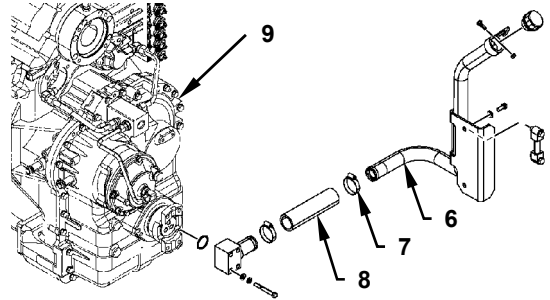
9. Remove bolts (15) (2 used) from adapter (14). Disconnect hose (13) and remove adapter (14) from the main frame.

 : 14 mm



W4GD-03-02-002

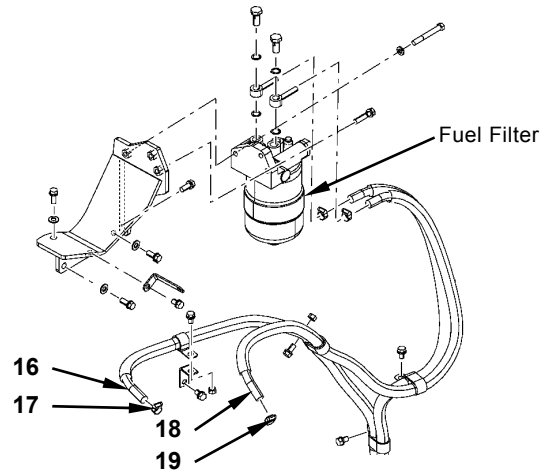
10. Loosen clamps (7) (2 used). Disconnect hose (8) from drive unit (9) and filler tube (6).



W4GD-03-02-027

11. Loosen clips (17, 19). Disconnect hoses (16, 18) from the engine.

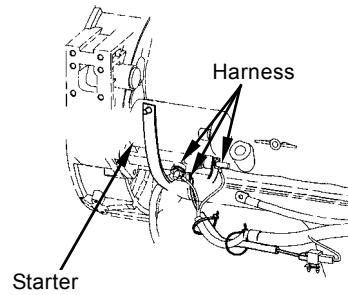
12. Disconnect all harnesses at the connector part from the engine.



W4GC-03-02-183

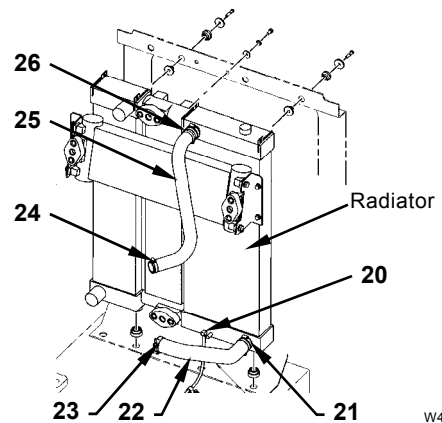
BODY (TRAVEL SYSTEM) / Drive Unit

13. Disconnect the harnesses (3 used) from the starter.




W4GD-03-02-025

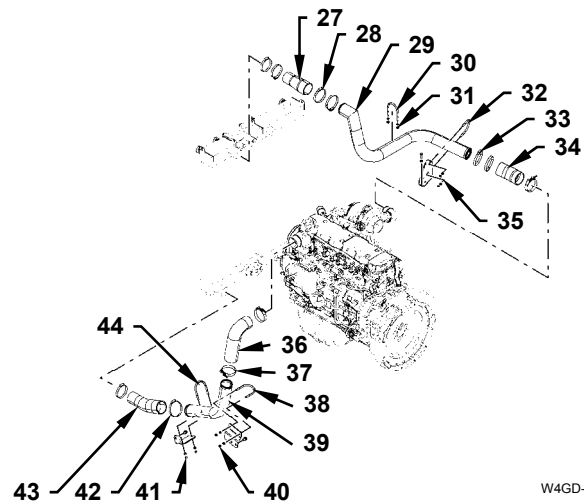
14. Loosen drain plug (20) of the radiator.
Drain coolant from the radiator.
15. Loosen clamps (21, 23, 24 and 26) from hoses (22, 25). Disconnect hoses (22, 25) from the engine.



W4GD-03-02-003

16. Loosen clamps (28, 33) (2 used for each) and clamps (37, 42) from hoses (27, 34, 36 and 43).
17. Remove U-bolts (30, 32, 38, 44) and nuts (31, 35, 40, 41) (4 used for each) from pipes (29, 39). Disconnect pipes (29, 39) from hoses (27, 34, 36 and 43).

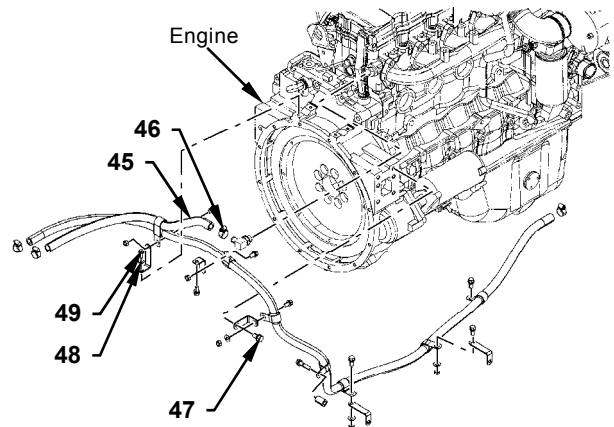
 : 14 mm




W4GD-03-02-004

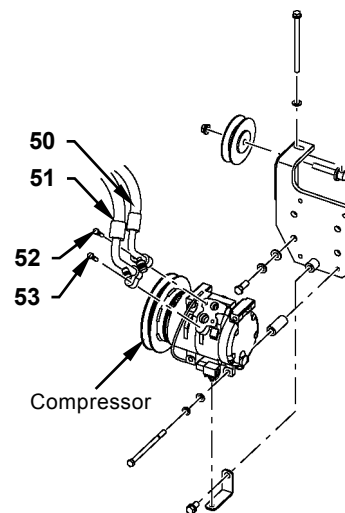
BODY (TRAVEL SYSTEM) / Drive Unit

- Loosen clip (46) from hose (45). Disconnect hose (45) from the engine. Cap the open ends.
- Remove bolts (47, 49) and washer (48) from the engine.



W4GD-03-02-005

- Remove bolts (52, 53) from hoses (50, 51). Disconnect hoses (50, 51) from the compressor. Cap the open ends.
 : 10 mm



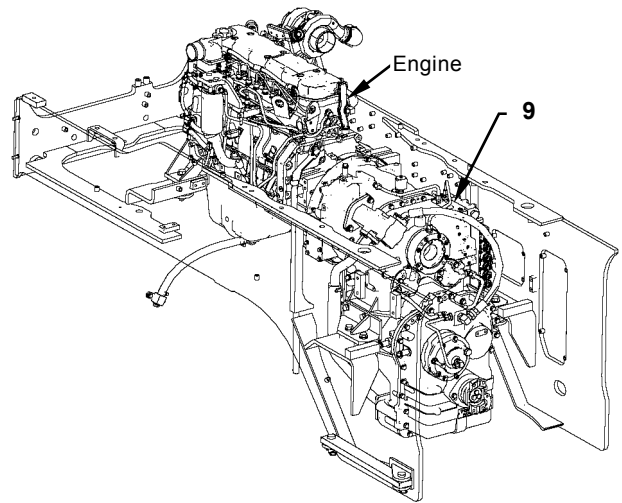
W4GD-03-02-006

BODY (TRAVEL SYSTEM) / Drive Unit




CAUTION: Engine weight: 540 kg (1200 lb)
Drive unit (9) weight: 710 kg (1600 lb)

21. Attach a nylon sling onto the engine and drive unit (9). Hold the engine and drive unit (9).




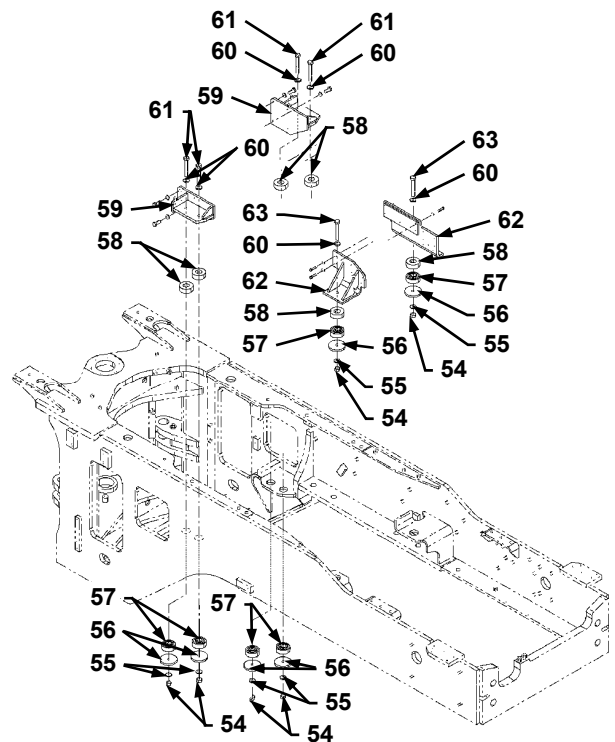
W4GD-03-02-007

22. Remove nuts (54) (6 used), washers (55) (6 used), plates (56) (6 used) and rubbers (57, 58) (6 used for each) from bolts (61) (4 used) and (63) (2 used).

 : 27 mm

23. Remove bolts (61) (4 used), (63) (2 used) and washers (60) (6 used) from brackets (59, 62) (2 used for each).

 : 27 mm

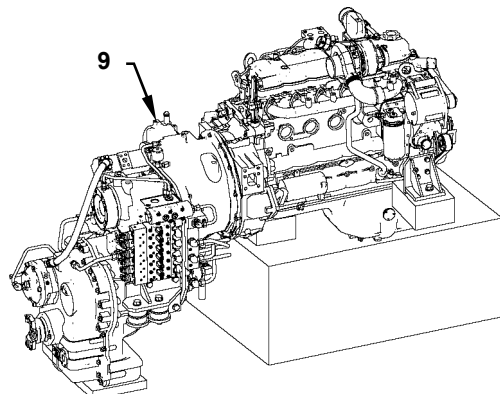


Detail A

W4GC-03-02-230

24. Remove the engine and drive unit (9) from the main frame.


25. Support the engine and drive unit (9) by using a stable stand.



W4GD-03-02-008


BODY (TRAVEL SYSTEM) / Drive Unit

26. Remove bolts (66) (8 used) from cover (67) in the torque converter (68) housing. Remove cover (67) from the torque converter (68) housing.


 : 14 mm

IMPORTANT: Remove the gasket from the mounting surface.

27. Remove bolts (64) (12 used) from the drive unit (9) assembly.

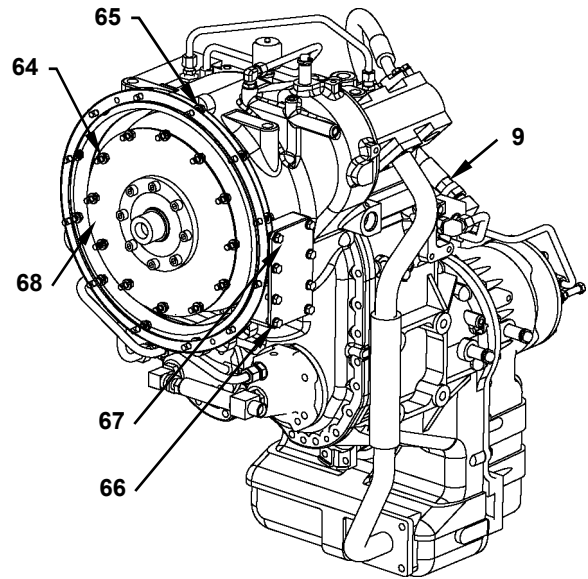
 : 14 mm

28. Hold drive unit (9). Remove bolts (65) (12 used) from the torque converter (68) housing and the flywheel housing in the engine.

 : 14 mm

29. Remove drive unit (9) from the engine.

IMPORTANT: Remove the gasket from the mounting surface.



W4GD-03-02-009

BODY (TRAVEL SYSTEM) / Drive Unit


Installation


1. Install the gasket to the engine mounting position of the torque converter (68) housing.




**CAUTION: Engine weight: 540 kg (1200 lb)
Drive unit (9) weight: 710 kg (1600 lb)**


1. Attach a nylon sling onto drive unit (9). Hold drive unit (9).
2. Install the flywheel housing in the engine and the torque converter (68) housing with bolts (65) (12 used).

 : 14 mm


 : 36 N·m (3.7 kgf·m, 26.5 lbf·ft)


3. Apply LOCTITE #262 onto bolts (64) (12 used). Install the input plate and the engine flywheel in torque converter (68) with bolts (64) (12 used).

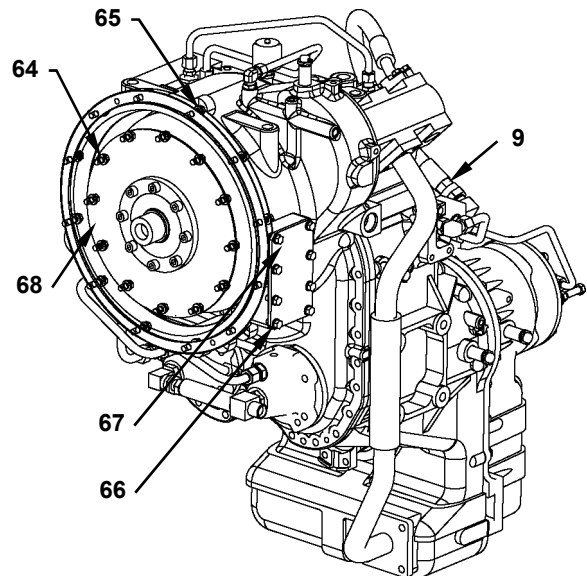
 : 14 mm

 : 46 N·m (4.7 kgf·m, 34 lbf·ft)

4. Apply liquid gasket onto cover (67). Install cover (67) to the torque converter (68) housing with bolts (66) (8 used).

 : 14 mm

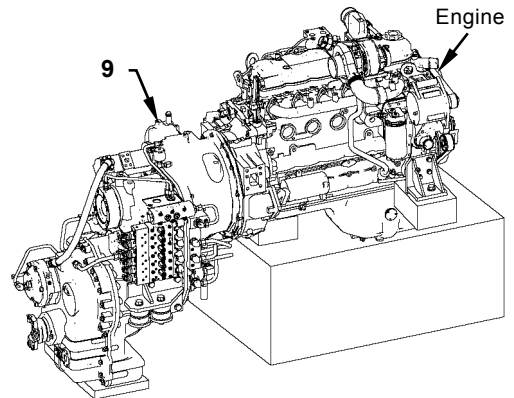
 : 41 N·m (4.2 kgf·m, 30 lbf·ft)



W4GD-03-02-009

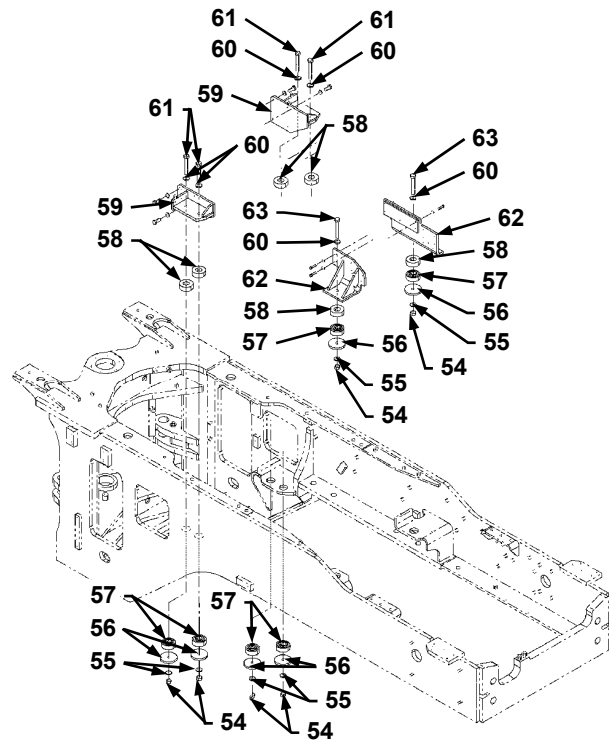
BODY (TRAVEL SYSTEM) / Drive Unit

- Attach a nylon sling onto the engine and drive unit (9). Hold the engine and drive unit (9).



W4GD-03-02-008

- Set rubbers (57, 58) (6 used for each) and plates (56) (6 used) to the main frame by aligning the hole center.
- Pass bolts (61) (4 used) and bolts (63) (2 used) to brackets (59, 62) (2 used for each) through washers (60) (6 used). Lower the engine and drive unit (9) while aligning the mounting hole center on the mount part.
- Install washers (55) (6 used) and nuts (54) (6 used) to bolts (63) (2 used) and (61) (4 used).
🔧 : 27 mm
🔩 : 315 N·m (32 kgf·m, 230 lbf·ft)





Detail A

W4GC-03-02-230

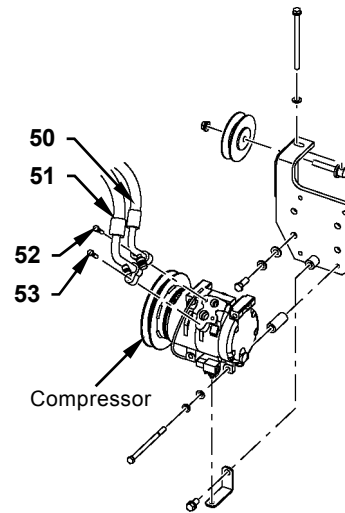
BODY (TRAVEL SYSTEM) / Drive Unit

10. Connect hoses (50, 51) to the compressor with bolts (52, 53).

 : 10 mm

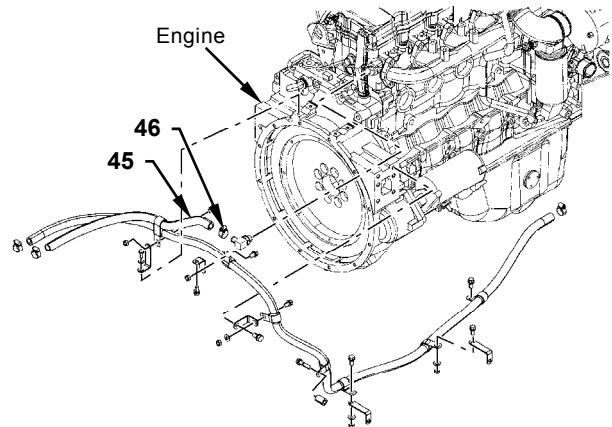
 : 7.8 to 11.8 N·m

(0.8 to 1.2 kgf·m, 5.8 to 8.7 lbf·ft)



W4GD-03-02-006


11. Secure hose (45) to the engine with clip (46).




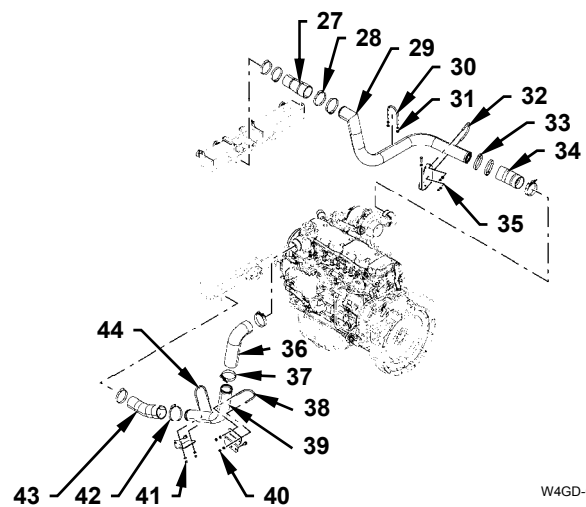
W4GD-03-02-005

12. Connect pipes (29, 39) to hoses (27, 34, 36 and 43). Secure hoses (27, 34, 36 and 43) with clamps (28, 33) (2 used for each) and clamps (37, 42).

13. Install U-bolts (30, 32, 38, 44) and nuts (31, 35, 40, 41) (4 used for each) to pipes (29, 39).

 : 14 mm

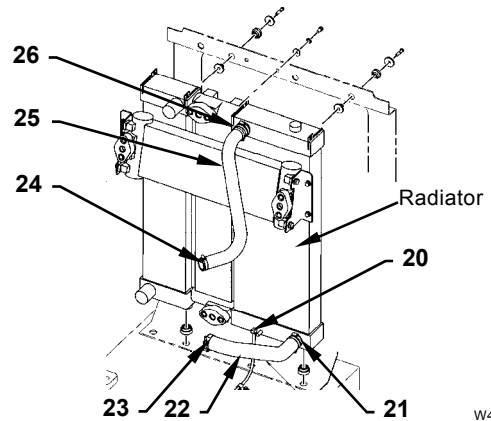
 : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)



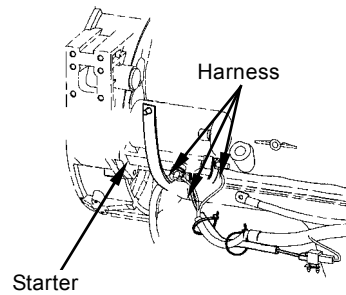
W4GD-03-02-004

BODY (TRAVEL SYSTEM) / Drive Unit

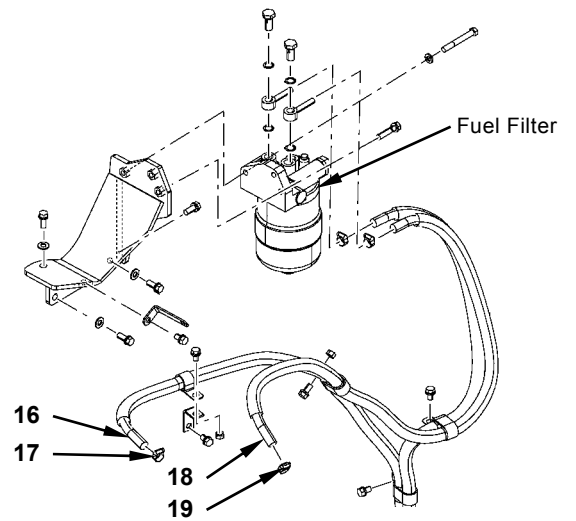
14. Connect hoses (22, 25) to the engine and the radiator. Secure hoses (22, 25) to the engine and the radiator with clamps (21, 23, 24 and 26).
15. Tighten drain plug (20) in the radiator.



16. Connect the harnesses (3 used) to the starter.
17. Connect all harnesses at the connector part to the engine.

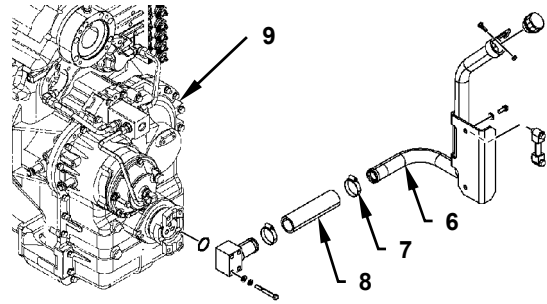


18. Connect hoses (16, 18) to the engine. Secure hoses (16, 18) to the engine with clips (17, 19).




BODY (TRAVEL SYSTEM) / Drive Unit


19. Connect hose (8) to drive unit (9) and filler tube (6). Secure hose (8) with clamps (7) (2 used).

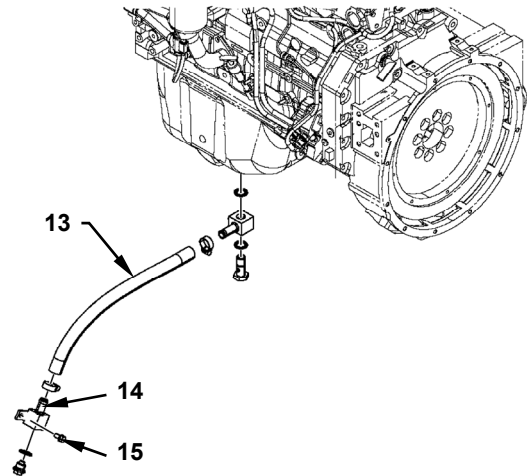


W4GD-03-02-027

20. Connect hose (13) and install adapter (14) to the main frame with bolts (15) (2 used).


 : 14 mm


 : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)

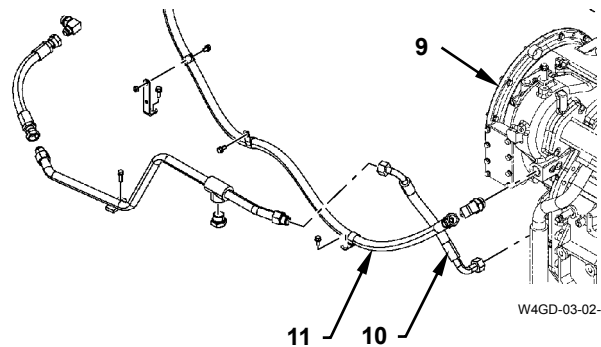


W4GD-03-02-002

21. Connect hoses (5, 10 and 11) to drive unit (9).


 : 27 mm


 : 132 N·m (13.5 kgf·m, 97 lbf·ft)

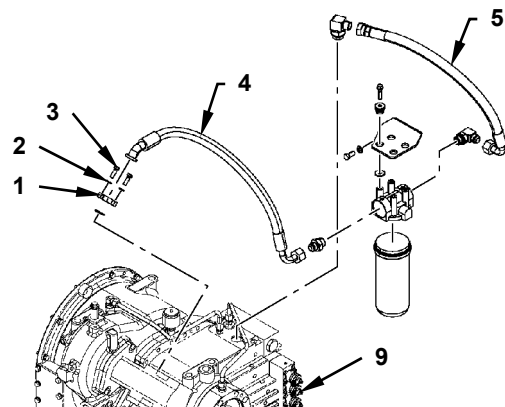


W4GD-03-02-026

22. Connect hose (4) to drive unit (9). Secure hose (4) to drive unit (9) with split flanges (1) (2 used) and bolts (3) (4 used).

 : 14 mm

 : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)





W4GD-03-02-001

BODY (TRAVEL SYSTEM) / Drive Unit

23. Install drain plug (12) to drive unit (9). Add transmission oil.

Oil amount: 25 L (6.6 US gal.)

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

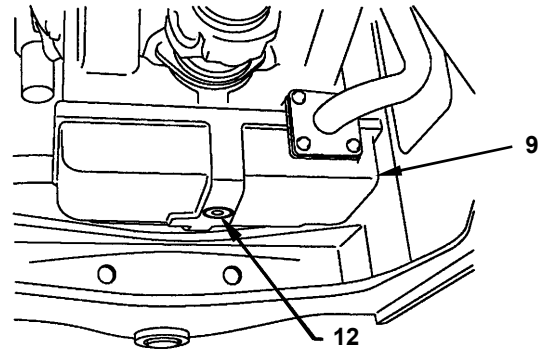
24. Install the propeller shaft. (Refer to W3-4.)

25. Connect the hose to the main pump.
(Refer to W2-6.)

26. Install the hydraulic oil tank. (Refer to W2-5.)

27. Install the hood. (Refer to W2-4.)

28. Install the cab. (Refer to W2-1.)



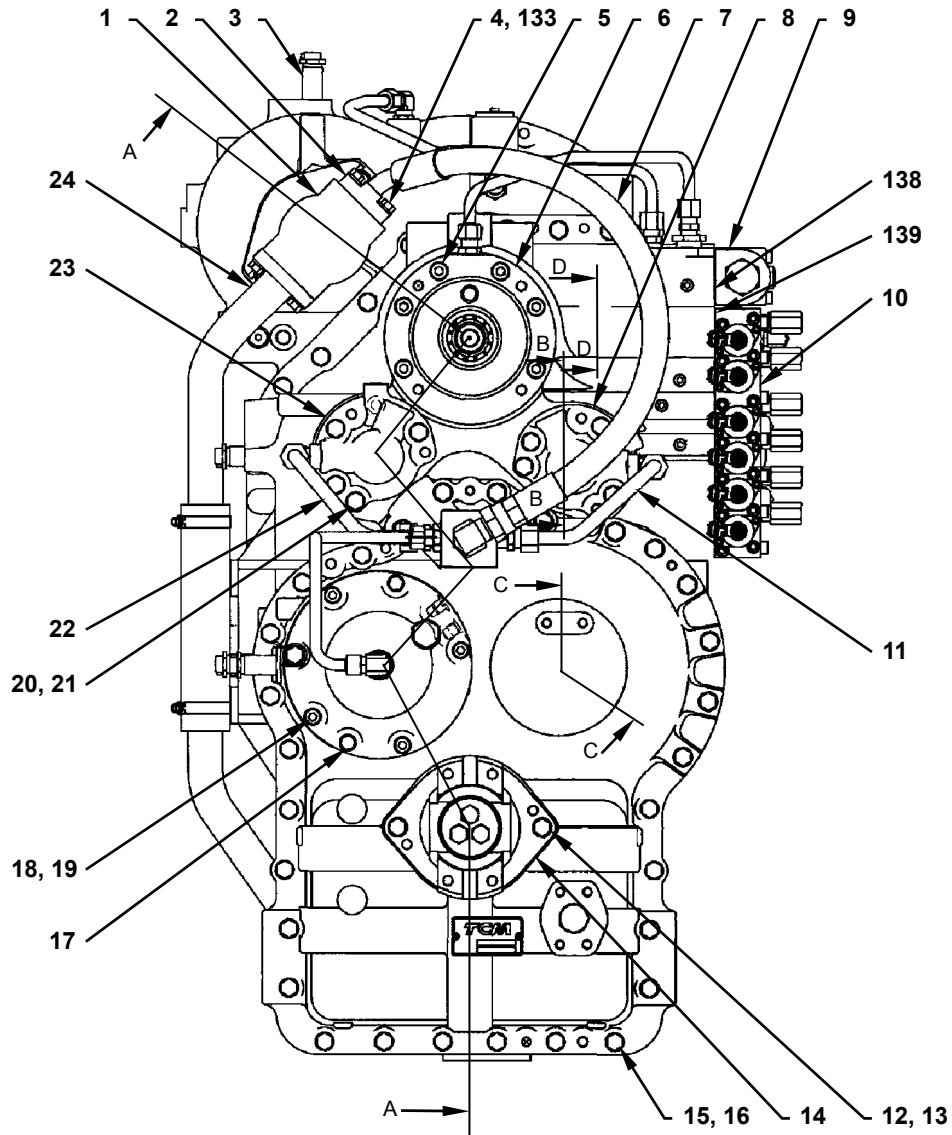
W4GC-03-02-181

BODY (TRAVEL SYSTEM) / Drive Unit

(Blank)

BODY (TRAVEL SYSTEM) / Drive Unit

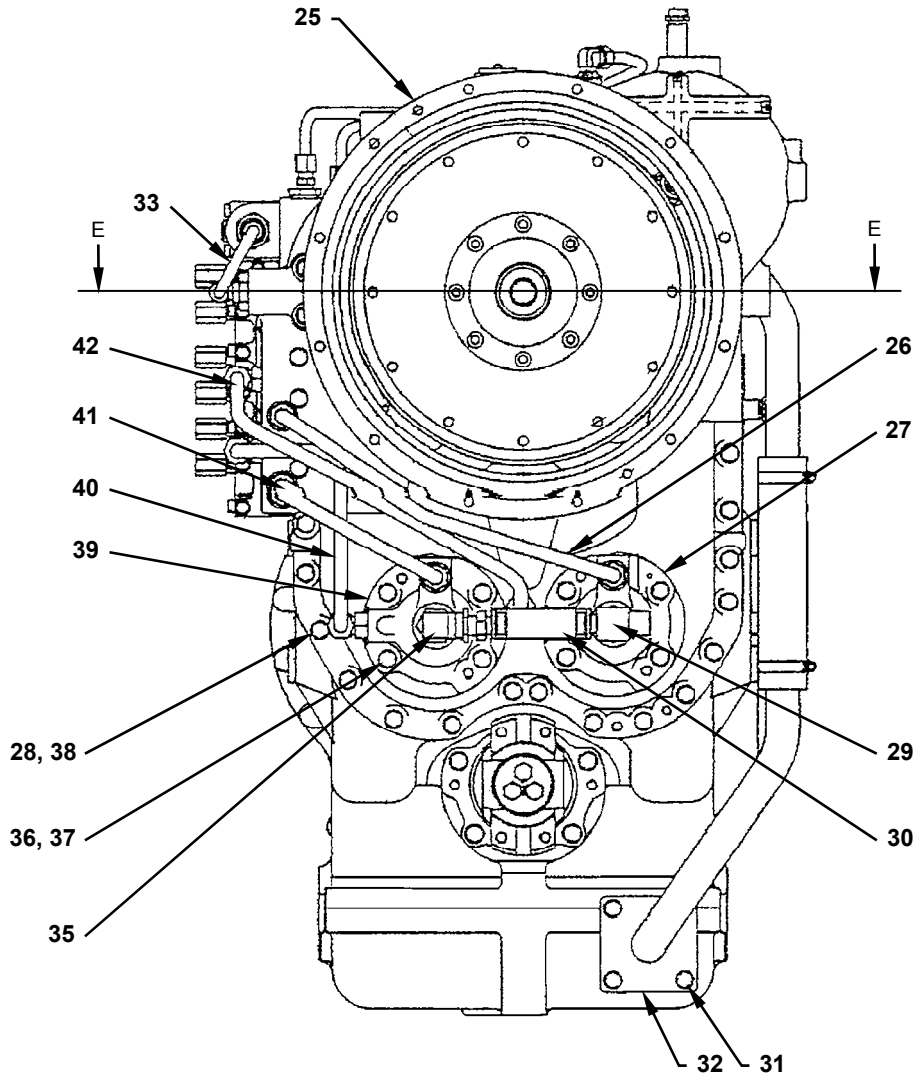
DISASSEMBLY OF DRIVE UNIT



W4GD-03-02-010

- | | | | |
|---------------------------|----------------------|---------------------------|-----------------------|
| 1 - Charging Pump | 8 - Distributor Cap | 15 - Bolt (29 Used) | 22 - Pipe |
| 2 - Split Flange (2 Used) | 9 - Regulator Valve | 16 - Washer (14 Used) | 23 - Distributor Cap |
| 3 - Sensor | 10 - Control Valve | 17 - Bolt (2 Used) | 24 - Suction Tube |
| 4 - Bolt (8 Used) | 11 - Pipe | 18 - Socket Bolt (4 Used) | 133 - Washer (8 Used) |
| 5 - Socket Bolt (6 Used) | 12 - Bolt (2 Used) | 19 - Washer (4 Used) | 138 - Gasket |
| 6 - Pump Spacer | 13 - Washer (2 Used) | 20 - Bolt (8 Used) | 139 - Gasket |
| 7 - Hose | 14 - Seal Retainer | 21 - Washer (8 Used) | |

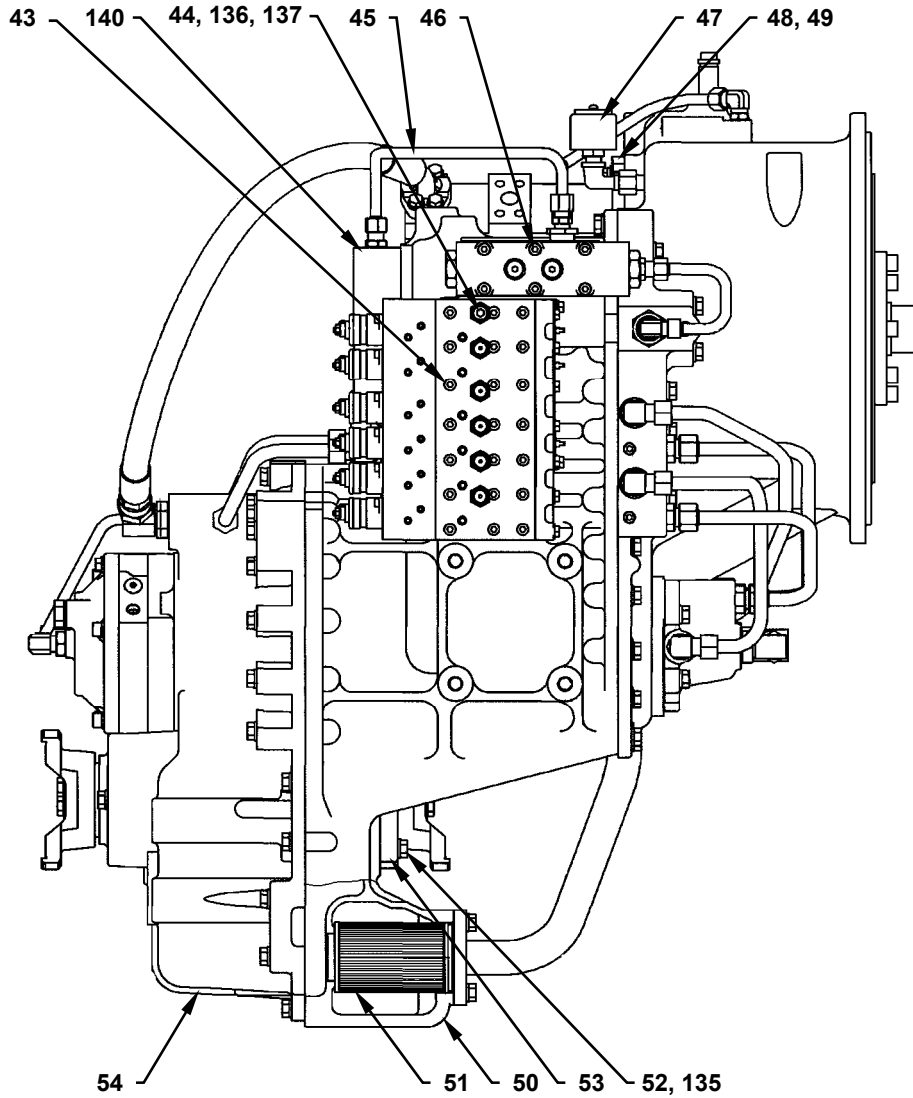
BODY (TRAVEL SYSTEM) / Drive Unit



W4GD-03-02-012

- | | | | |
|-------------------------------|--------------------|----------------------|----------------------|
| 25 - Torque Converter Housing | 30 - Hose | 35 - Elbow | 39 - Distributor Cap |
| 26 - Pipe | 31 - Bolt (4 Used) | 36 - Bolt (8 Used) | 40 - Pipe |
| 27 - Distributor Cap | 32 - Gasket | 37 - Washer (8 Used) | 41 - Pipe |
| 28 - Washer (6 Used) | 33 - Pipe | 38 - Bolt (31 Used) | 42 - Pipe |
| 29 - Three Way | | | |

BODY (TRAVEL SYSTEM) / Drive Unit



W4GD-03-02-014

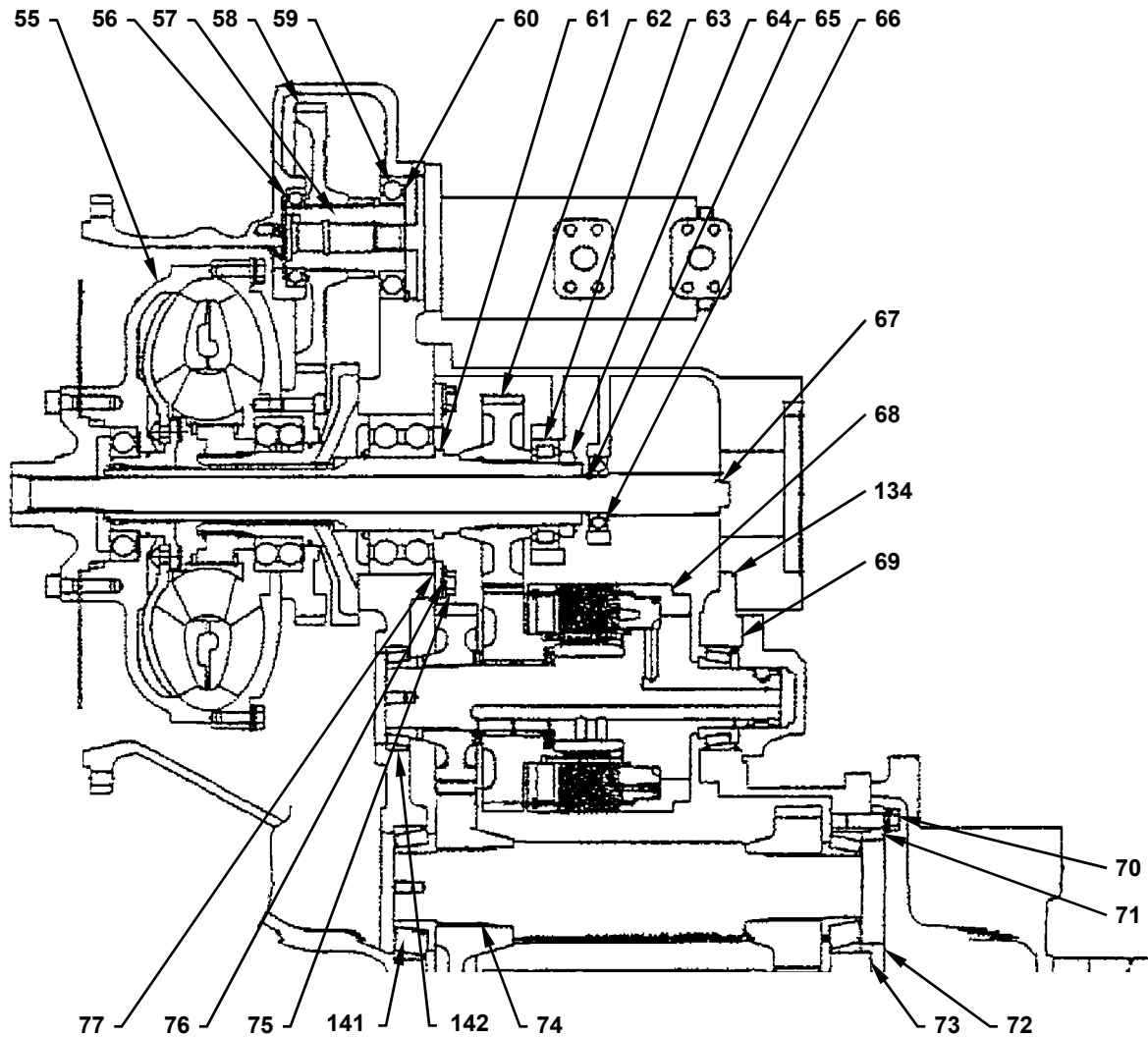
43 - Socket Bolt (21 Used)
 44 - Connector (6 Used)
 45 - Pipe
 46 - Socket Bolt (6 Used)

47 - Air Breather
 48 - Bolt (2 Used)
 49 - Washer (2 Used)
 50 - Transmission Case

51 - Strainer
 52 - Bolt (4 Used)
 53 - Seal Retainer
 54 - Rear Case

135 - Washer (4 Used)
 136 - Plug (6 Used)
 137 - O-Ring (6 Used)
 140 - Orifice

BODY (TRAVEL SYSTEM) / Drive Unit

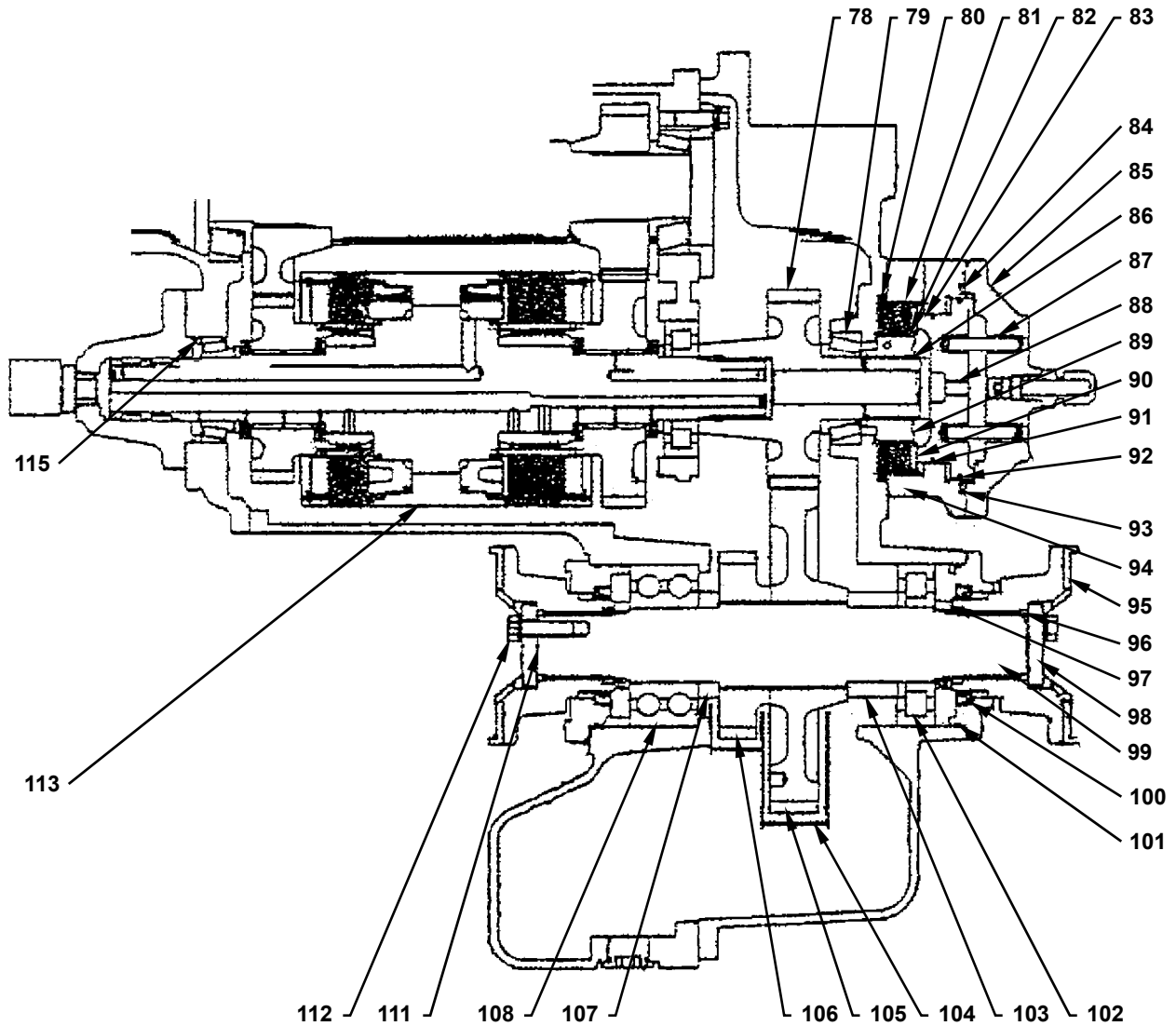


Upper Part of Section A-A

W4GD-03-02-016

- | | | | |
|--------------------------|-----------------------|----------------------|----------------------|
| 55 - Torque Converter | 62 - Gear | 69 - Shim | 75 - Bolt (9 Used) |
| 56 - Ball Bearing | 63 - Bearing | 70 - Bolt (3 Used) | 76 - Washer (9 Used) |
| 57 - Charging Pump Shaft | 64 - U-Nut | 71 - Washer (3 Used) | 77 - Retainer |
| 58 - Charging Pump Gear | 65 - Snap Ring | 72 - Idler Cap | 134 - O-Ring |
| 59 - Ball Bearing | 66 - Bearing | 73 - Shim | 141 - Bearing |
| 60 - Retaining Ring | 67 - Pump Drive Shaft | 74 - Idler Shaft | 142 - Bearing |
| 61 - Shaft | 68 - Forward Clutch | | |

BODY (TRAVEL SYSTEM) / Drive Unit

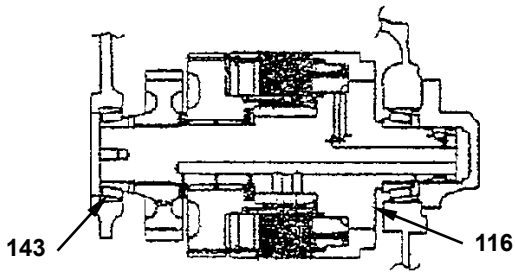


Lower Part of Section A-A

W4GD-03-02-018

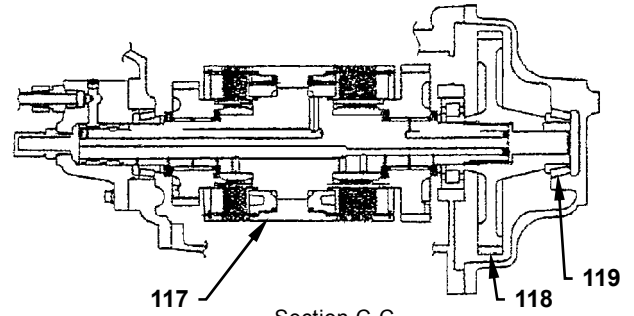
78 - Low Gear	85 - Cap	92 - D-Ring	99 - Output Shaft	106 - Gear
79 - Bearing	86 - Retaining Ring	93 - O-Ring	100 - Seal (2 Used)	107 - Spacer
80 - O-Ring	87 - Spring (24 Used)	94 - Brake Housing	101 - O-Ring (2 Used)	108 - Bearing
81 - Plate (7 Used)	88 - Piston	95 - Flange (2 Used)	102 - Bearing	111 - Shim (13 Used)
82 - Disc (6 Used)	89 - Disc Hub	96 - O-Ring (2 Used)	103 - Spacer	112 - Bolt (6 Used)
83 - O-Ring	90 - End Plate	97 - Spacer (2 Used)	104 - Oil Baffle	113 - 1-Speed/2-Speed Clutch
84 - Piston Housing	91 - D-Ring	98 - Retainer Plate (2 Used)	105 - Gear	115 - O-Ring

BODY (TRAVEL SYSTEM) / Drive Unit



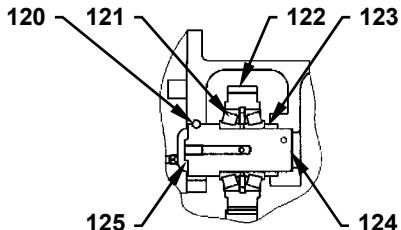
Section B-B

W4GD-03-02-021



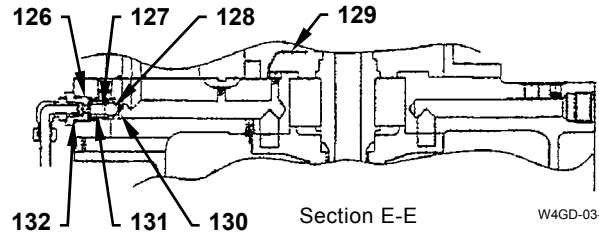
Section C-C

W4GD-03-02-022



Section D-D

W4GD-03-02-023

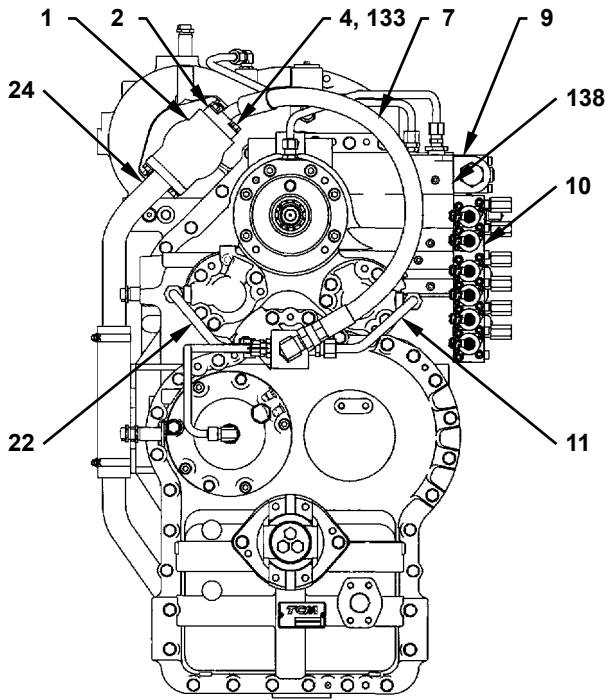


Section E-E

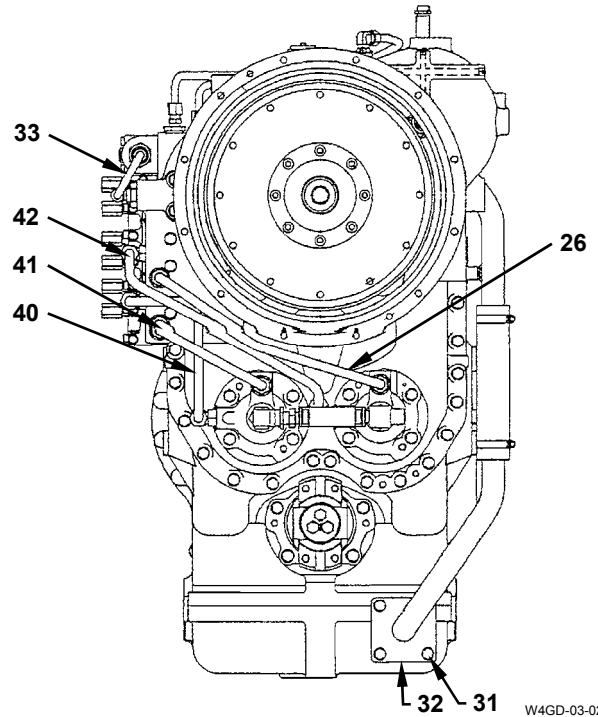
W4GD-03-02-020

- | | | | |
|------------------------------|--------------------|---------------|-------------------|
| 116 - Reverse Clutch | 121 - Bearing | 126 - O-Ring | 130 - Seat |
| 117 - 3-Speed/4-Speed Clutch | 122 - Reverse Gear | 127 - Spring | 131 - Spring Seat |
| 118 - High Gear | 123 - Spacer | 128 - Ball | 132 - Plug |
| 119 - Bearing | 124 - Shaft | 129 - Bracket | 143 - Bearing |
| 120 - Ball | 125 - Shim | | |

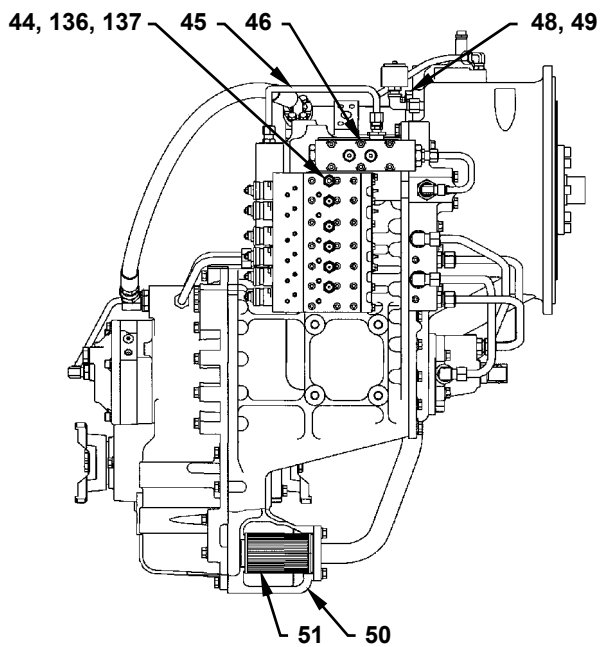
BODY (TRAVEL SYSTEM) / Drive Unit



W4GD-03-02-011



W4GD-03-02-013



W4GD-03-02-015

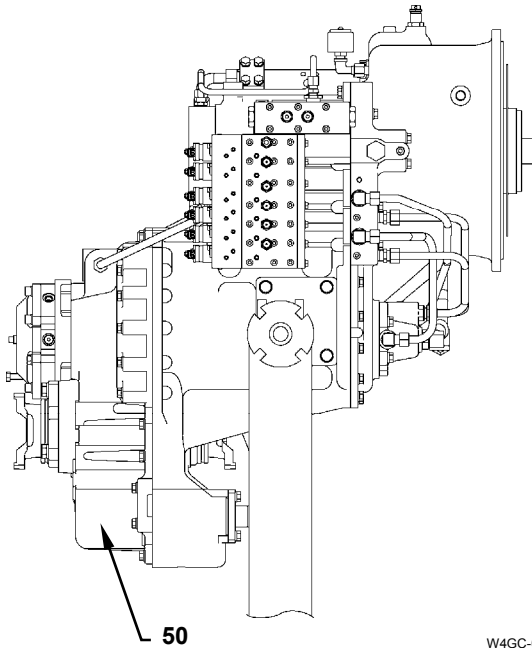
BODY (TRAVEL SYSTEM) / Drive Unit

Disassembly of Torque Converter


Removal of Charging Pump

CAUTION: Drive unit weight: 710 kg (1600 lb)


1. Secure the drive unit on a workbench.




2. Remove bolts (31) (4 used) from suction tube (24). Remove gasket (32) and strainer (51) from transmission case (50).

 : 17 mm

3. Remove bolts (4) (8 used) and washers (133) (8 used) from charging pump (1). Disconnect suction tube (24), hose (7) and remove split flanges (2) (2 used) from charging pump (1).

 : 14 mm

4. Remove bolts (48) (2 used) and washers (49) (2 used) from charging pump (1).

 : 17 mm


5. Remove charging pump (1) from transmission case (50) by using a plastic hammer.

6. Disconnect pipes (11, 22, 26, 33, 40, 41, 42 and 45) from transmission case (50).


 : 27 mm, 36 mm

Removal of Control Valve

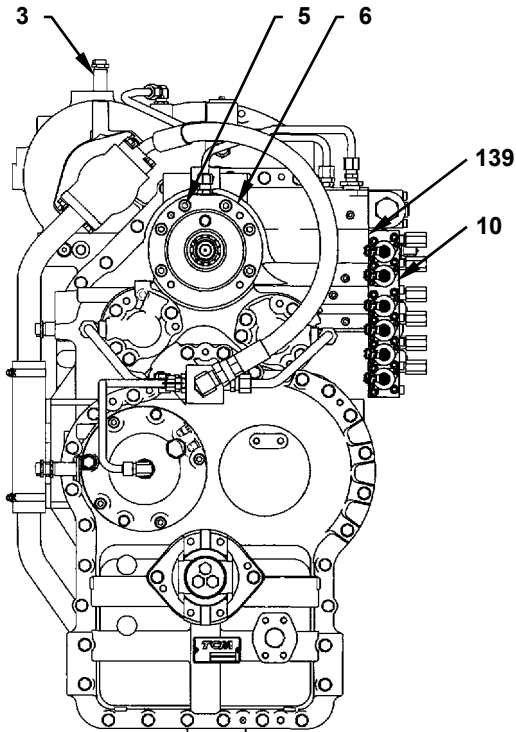
7. Remove socket bolts (46) (6 used) from regulator valve (9). Remove regulator valve (9) and gasket (138) from transmission case (50).

 : 6 mm

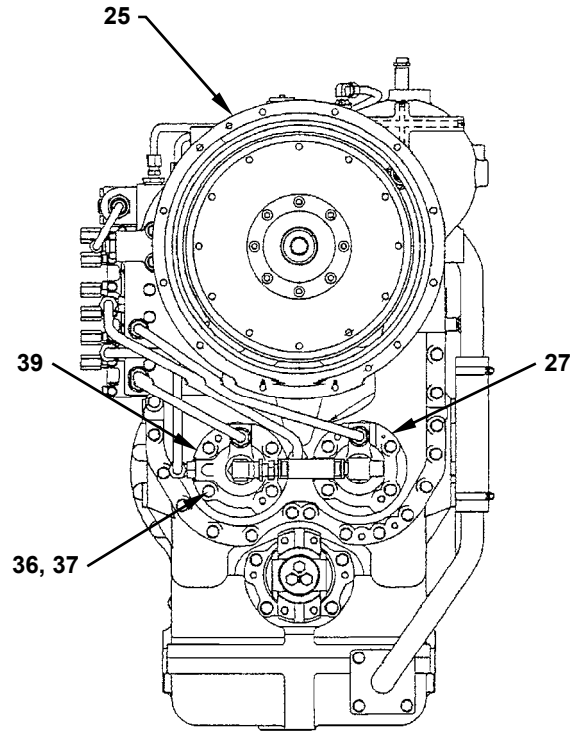
8. Disconnect connectors (44) (6 used) from control valve (10). Disconnect plugs (136) (6 used) and remove O-rings (137) (6 used) from connectors (44) (6 used).

 : 21 mm

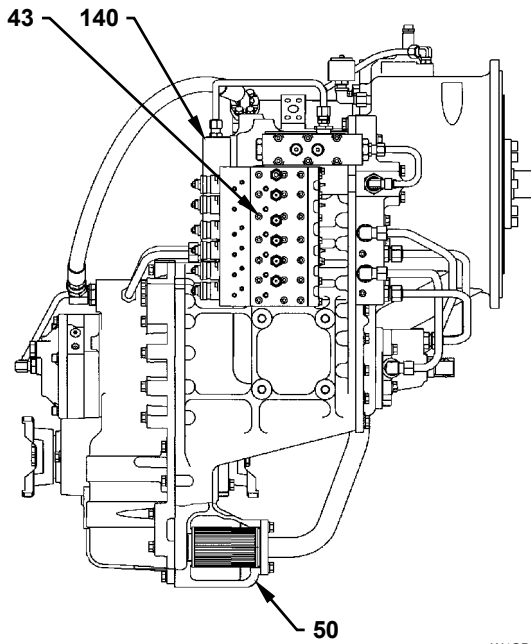
BODY (TRAVEL SYSTEM) / Drive Unit



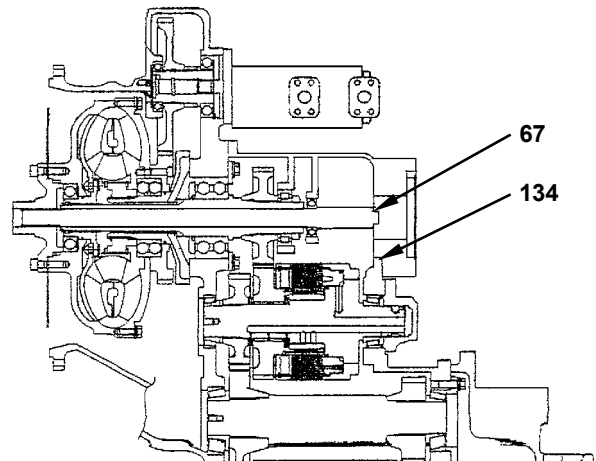
W4GD-03-02-011



W4GD-03-02-013



W4GD-03-02-015




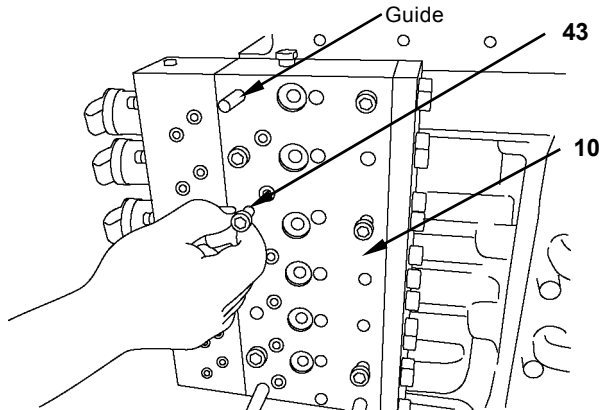
Upper Part of Section A-A

W4GD-03-02-017

BODY (TRAVEL SYSTEM) / Drive Unit

9. Remove socket bolts (43) (4 used) at the four corners from control valve (10). Install the guides (4 used) (mounting hole: M8) at that position.

 : 6 mm




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CAUTION: Control valve (10) weight: 25 kg (60 lb)

10. Remove socket bolts (43) (17 used) from control valve (10). Remove control valve (10) and gasket (139) from transmission case (50).

 : 6 mm


Removal of Sensor

11. Remove sensors (3) (4 used) from transmission case (50).

 : 27 mm

Removal of Pump Spacer

12. Remove socket bolts (5) (6 used) from pump spacer (6). Remove pump spacer (6) from transmission case (50). Remove orifice (140) from pump spacer (6).

 : 10 mm


13. Remove O-ring (134) from transmission case (50).

14. Remove pump drive shaft (67) from torque converter housing (25).

Removal of Speed Shift Distributor Cap

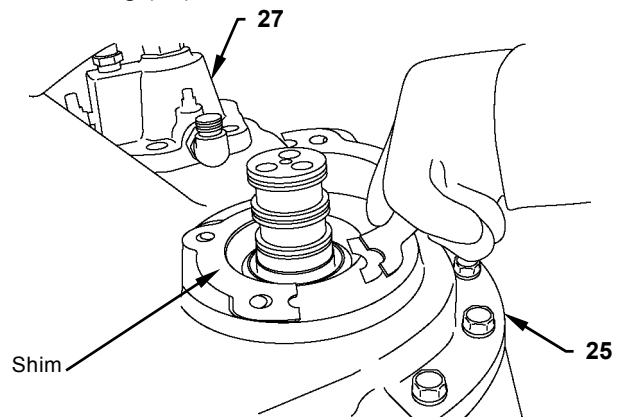
15. Secure transmission case (50) on a workbench with the torque converter side facing upward.

16. Remove bolts (36) (4 used) and washers (37) (4 used) from 3-speed/4-speed distributor cap (39). Remove distributor cap (39) from transmission case (50) by using a pulling-out bolt.

 : 17 mm

IMPORTANT: Do not damage the shim.

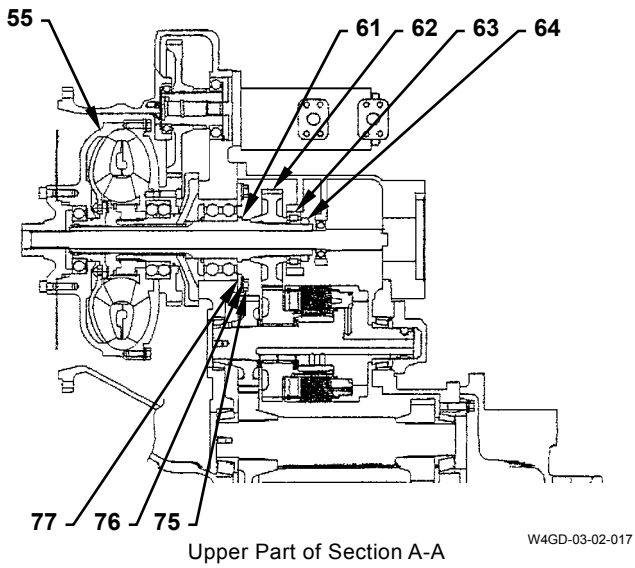
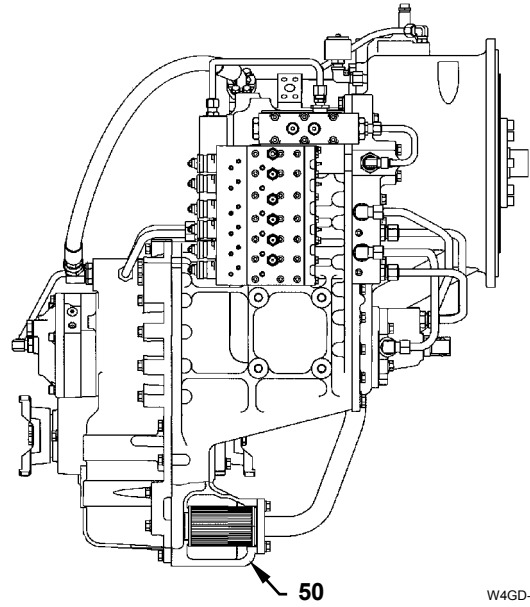
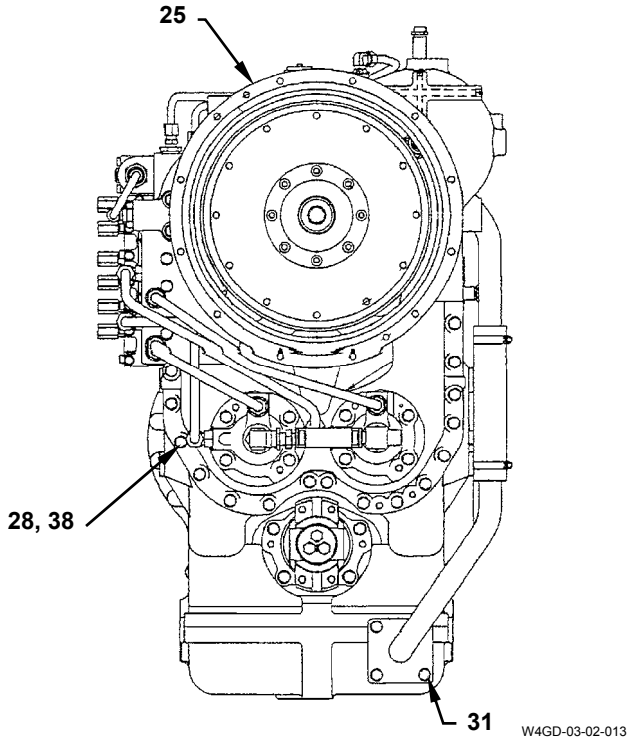
17. Remove shims (10 used) from torque converter housing (25).



W4GC-03-02-018

18. Remove 1-speed/2-speed distributor cap (27) in the same way as 3-speed/4-speed speeds distributor cap (39).

BODY (TRAVEL SYSTEM) / Drive Unit




BODY (TRAVEL SYSTEM) / Drive Unit

Removal of Torque Converter Housing




CAUTION: Torque converter housing (25) assembly weight: 175 kg (390 lb)

19. Attach a nylon sling onto the torque converter housing (25) assembly. Hold the torque converter housing (25) assembly. Remove bolts (38) (31 used) and washers (28) (6 used) from torque converter housing (25).

 : 17 mm

20. Remove torque converter housing (25) from transmission case (50) by using a pulling-out bolt.


 : 19 mm

Removal of Torque Converter

21. Secure torque converter housing (25) on a workbench with the open part facing upward. Remove U-nut (64) from shaft (61).

22. Remove bearing (63) and gear (62) from shaft (61) by using a bearing puller.

23. Remove bolts (75) (9 used) and washers (76) (9 used) from retainer (77). Remove retainer (77) from torque converter housing (25).

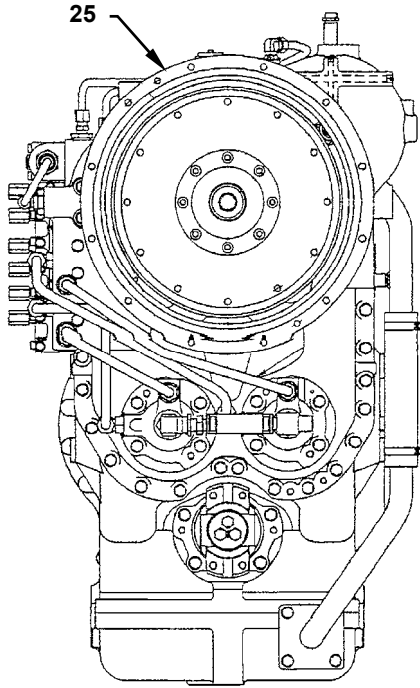
 : 17 mm



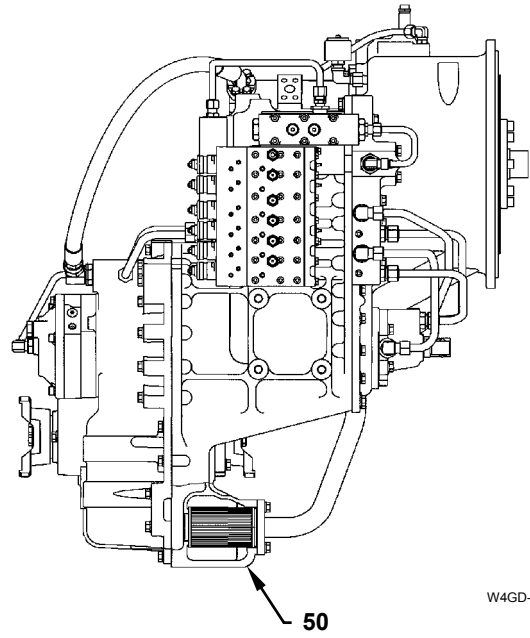
CAUTION: Torque converter (55) weight: 70 kg (155 lb)

24. Turn over torque converter housing (25). Attach a wire rope onto torque converter (55). Hold torque converter (55). Remove torque converter (55) from torque converter housing (25) by using a plastic hammer.

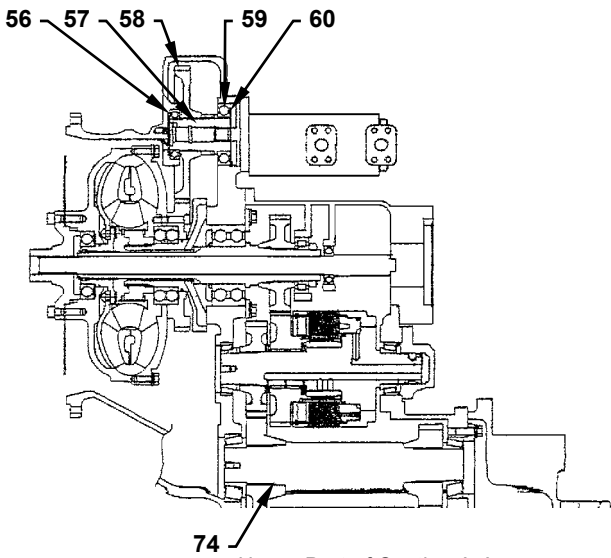
BODY (TRAVEL SYSTEM) / Drive Unit



W4GD-03-02-013

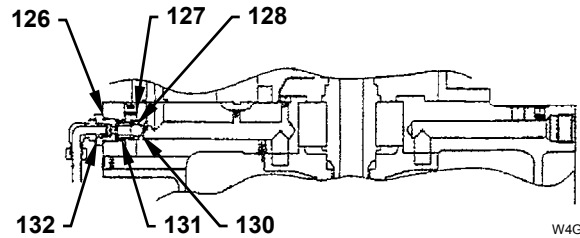


W4GD-03-02-015



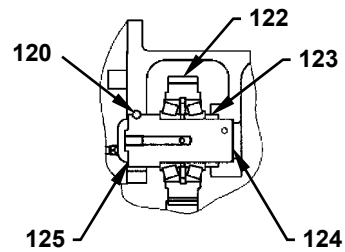
Upper Part of Section A-A

W4GD-03-02-017



Section E-E

W4GD-03-02-020



Section D-D

W4GD-03-02-023

BODY (TRAVEL SYSTEM) / Drive Unit

Removal of Pump Drive Gear

25. Secure torque converter housing (25) on a workbench with the side where charging pump (1) was removed facing upward. Remove retaining ring (60) from torque converter housing (25).
26. Turn over torque converter housing (25). Remove charging pump shaft (57), charging pump gear (58) and ball bearings (56, 59) from torque converter housing (25) by using a bar and a hammer.

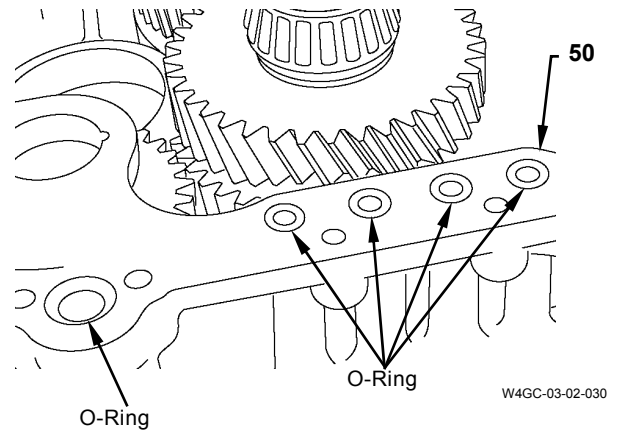
Removal of Safety Valve

27. Remove plug (132) from torque converter housing (25).
🔧 : 36 mm
28. Remove spring (127), spring seat (131) and ball (128) from torque converter housing (25). Remove O-ring (126) from plug (132). At this time, do not remove seat (130) of ball (128) unless any abnormality is found. When removing ball (128), do not drop ball (128) inside torque converter housing (25).

Disassembly of Transmission

Removal of Clutch Shaft

29. Remove shim (125) of shaft (124) from transmission case (50).
30. Remove O-rings (5 used) from transmission case (50).

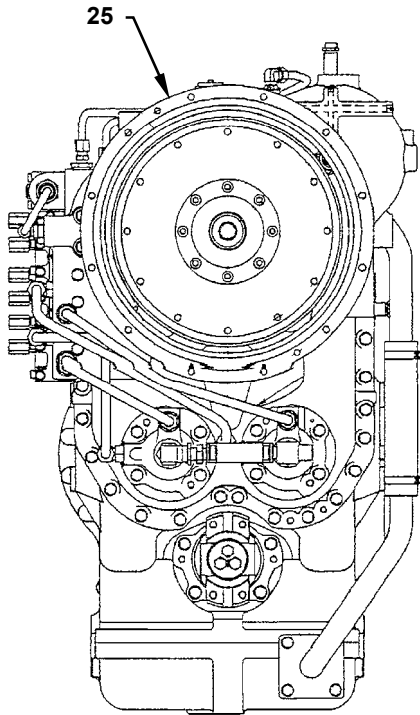


31. Remove the idler shaft (74) assembly from transmission case (50).

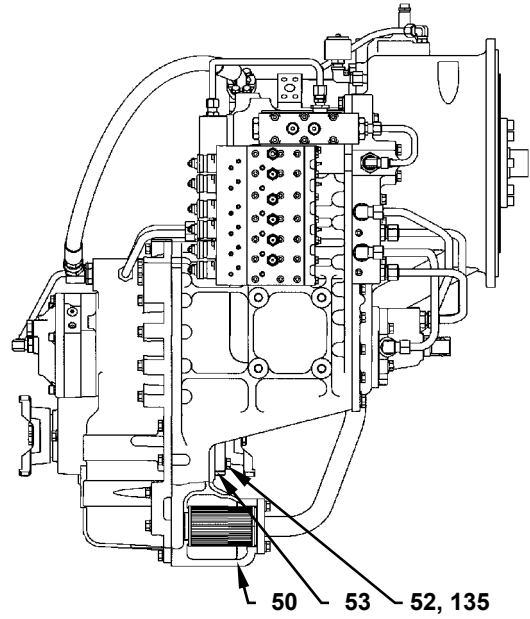
IMPORTANT: Do not lose ball (120).

32. Attach a lifting tool onto shaft (124). Remove the shaft (124) assembly from transmission case (50) by using a plastic hammer. Remove reverse gear (122), ball (120) and spacer (123) from shaft (124).

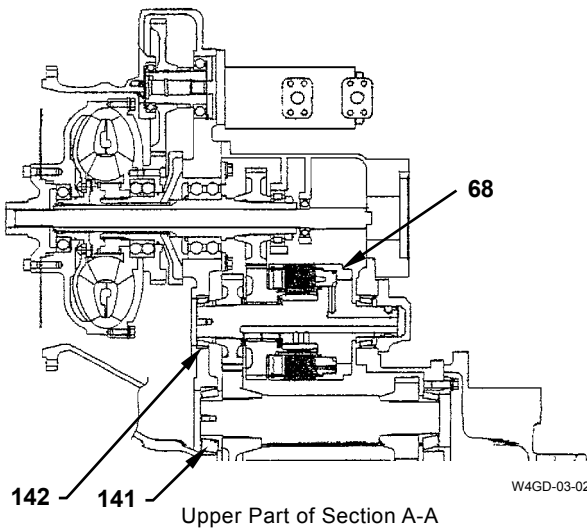
BODY (TRAVEL SYSTEM) / Drive Unit



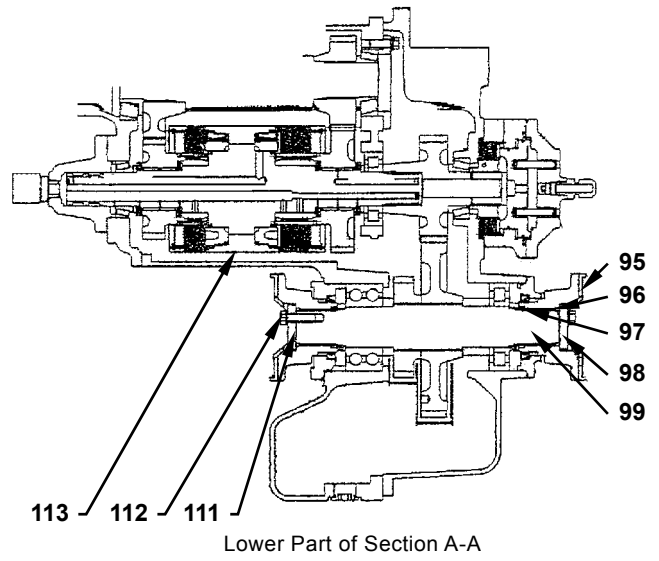
W4GD-03-02-013



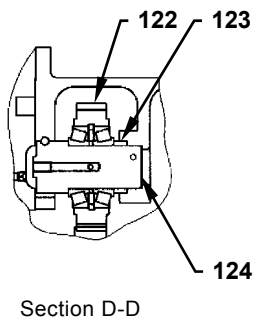
W4GD-03-02-015



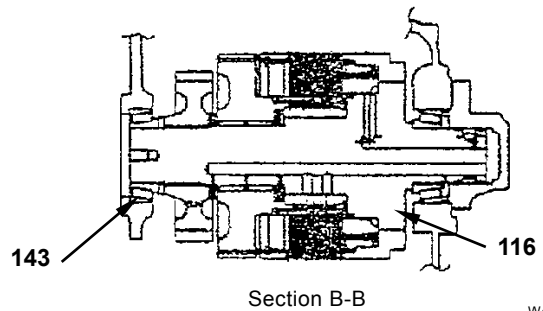
W4GD-03-02-017



W4GD-03-02-019



W4GD-03-02-023



W4GD-03-02-021

BODY (TRAVEL SYSTEM) / Drive Unit



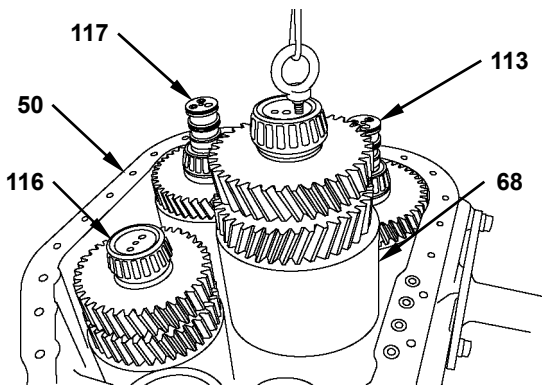
CAUTION: The forward clutch (68) assembly and the reverse clutch (116) assembly: weight: 35 kg (80 lb) for each

33. Install an eyebolt (M10, Pitch 1.25 mm) to the shaft of forward clutch (68) and reverse clutch (116). Attach a nylon sling onto the eyebolt. Remove forward clutch (68) and reverse clutch (116) from transmission case (50).



CAUTION: The 1-speed/2-speed clutch (113) assembly and the 3-speed/4-speed clutch (117) assembly: weight: 55 kg (125 lb) for each


34. Remove 1-speed/2-speed clutch (113) and 3-speed/4-speed clutch (117) from transmission case (50) in the same way.




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35. Remove reverse gear (122) and spacer (123) where shaft (124) was removed from transmission case (50).

36. Remove bolts (112) (3 used) from retainer plate (98) at the transmission case (50) side. Remove flange (95), retainer plate (98), O-ring (96) and shims (111) (7 used) from output shaft (99).

 : 19 mm

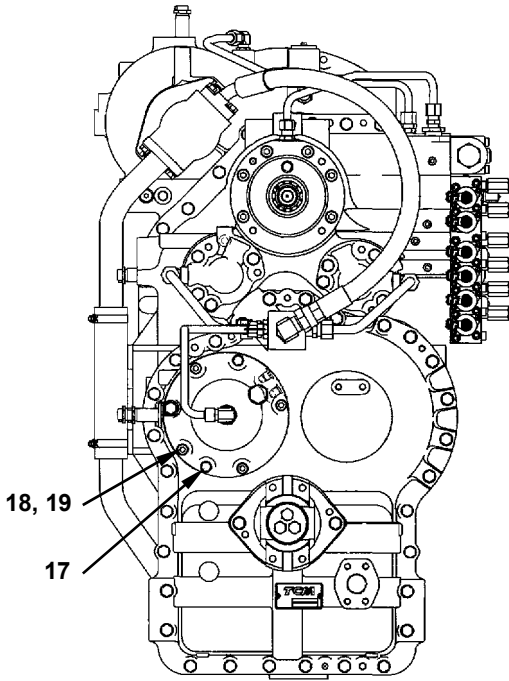
37. Remove bolts (52) (4 used) and washers (135) (4 used) from seal retainer (53). Remove seal retainer (53) from transmission case (50).

 : 17 mm

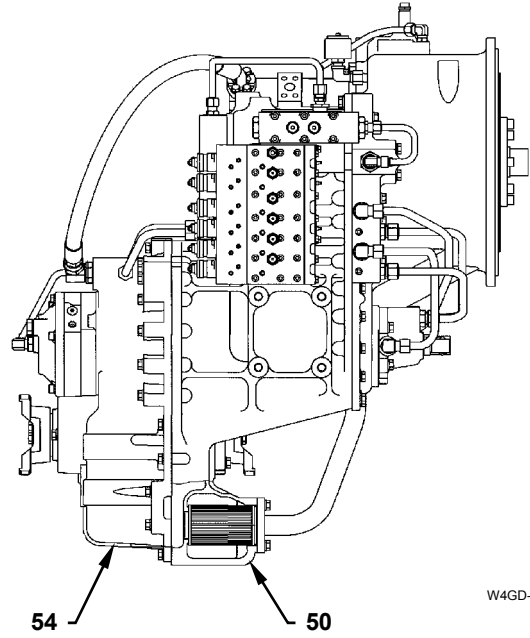
38. Remove spacer (97) from output shaft (99).

39. Remove the outer races of bearings (141, 142 and 143) from torque converter housing (25).

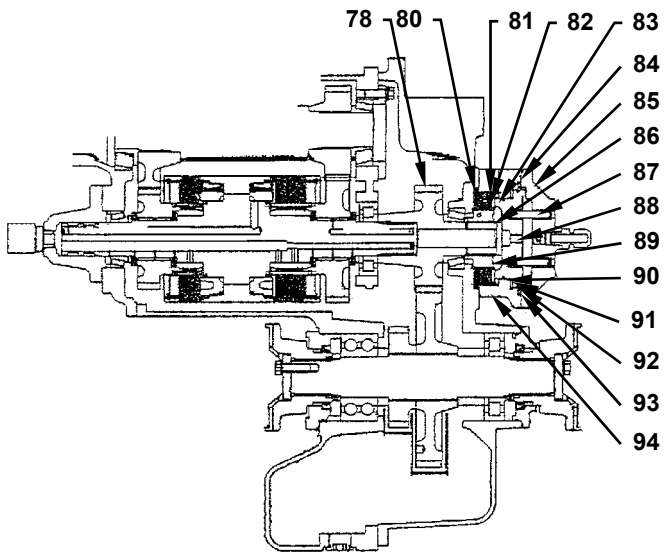
BODY (TRAVEL SYSTEM) / Drive Unit



W4GD-03-02-011



W4GD-03-02-015




W4GD-03-02-019

Lower Part of Section A-A


BODY (TRAVEL SYSTEM) / Drive Unit

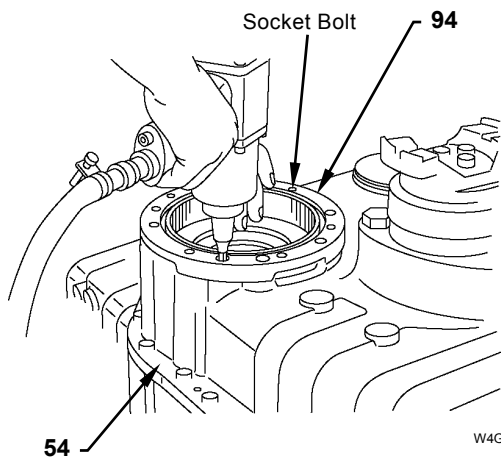
Removal of Parking Brake

40. Secure transmission case (50) on a workbench with the open part facing downward. Remove socket bolts (18) (4 used) and washers (19) (4 used) from cap (85). Remove the piston housing (84) assembly from brake housing (94).

 : 8 mm


- 41. Remove O-ring (83) from brake housing (94).
- 42. Remove retaining ring (86) from low gear (78).
- 43. Remove disc hub (89) from low gear (78). Remove end plate (90), plates (81) (7 used) and discs (82) (6 used) from brake housing (94).
- 44. Remove socket bolts (2 used) from brake housing (94).

 : 8 mm




W4GC-03-02-042

45. Remove brake housing (94) from rear case (54) by using a pry bar. Remove O-ring (80) from brake housing (94).

 **CAUTION: As the strong spring is built in, loosen bolt (17) until the spring force disappears.**

46. Secure the piston housing (84) assembly on a workbench. Remove bolts (17) (2 used) from cap (85). Remove cap (85) from piston housing (84).

 : 14 mm

47. Remove springs (87) (24 used) from piston (88).

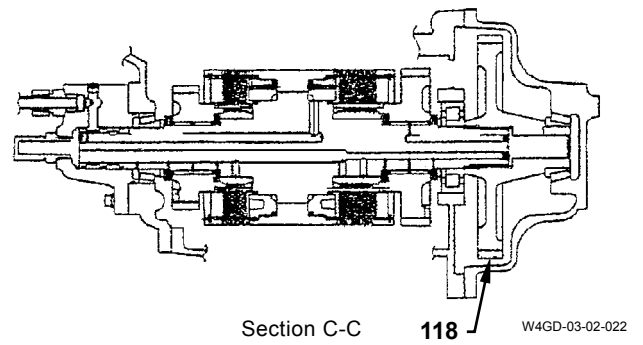
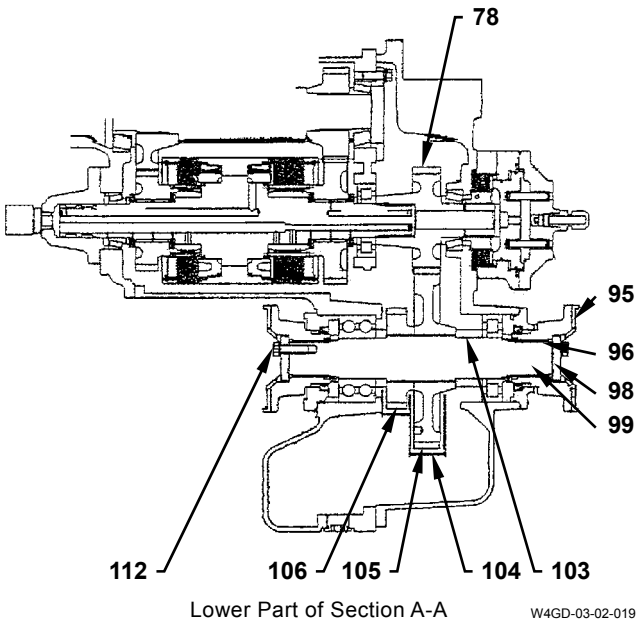
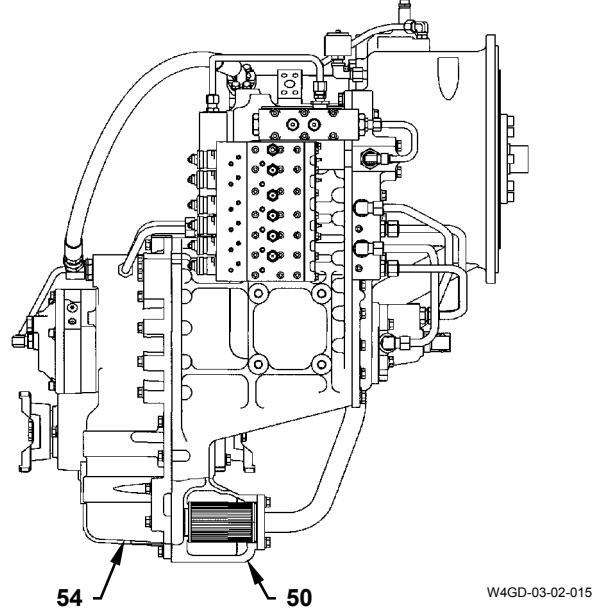
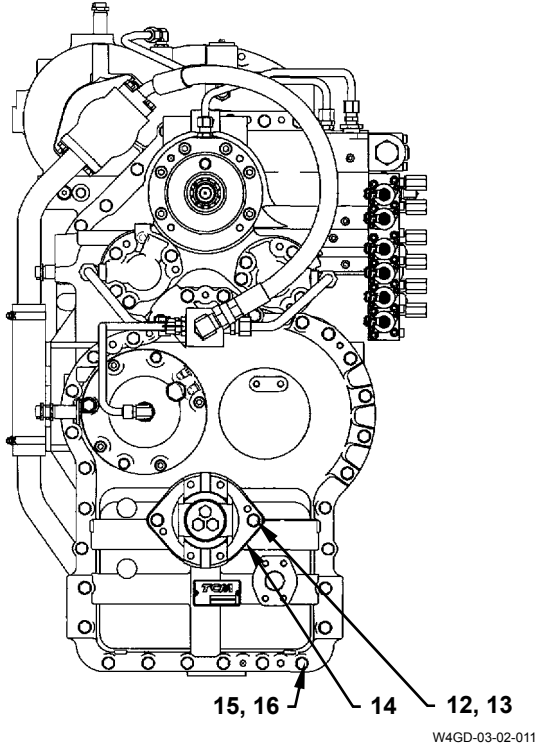
IMPORTANT: Put the matching marks onto piston (88) and piston housing (84).

48. Remove O-ring (93) from piston housing (84).

49. Remove piston (88) from piston housing (84) by using a plastic hammer.

50. Remove D-rings (91, 92) from piston (88).


BODY (TRAVEL SYSTEM) / Drive Unit




BODY (TRAVEL SYSTEM) / Drive Unit

Removal of Rear Case

51. Remove bolts (112) (3 used) from flange (95) at the rear case (54) side. Remove flange (95), retainer plate (98) and O-ring (96) from output shaft (99).

 : 19 mm

52. Remove bolts (12) (2 used) and washers (13) (2 used) from seal retainer (14). Remove seal retainer (14) from rear case (54) by using the pulling-out bolts (M12, Pitch 1.75 mm) (3 used).


 : 17 mm



CAUTION: Ring case (54) weight: 50 kg (115 lb)


IMPORTANT: When output shaft (99) is pulled together with rear case (54), oil baffle (104) may be damaged.

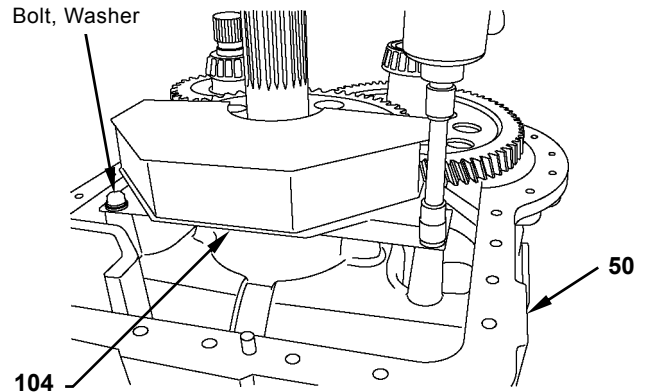
53. Attach a wire rope onto rear case (54). Hold rear case (54). Remove bolts (15) (29 used) and washers (16) (14 used) from rear case (54). Remove rear case (54) from transmission case (50) by using the pulling-out bolt (M12, Pitch 1.75 mm).

 : 17 mm

Removal of Gear and Shaft

54. Remove bolts (2 used) and washers (2 used) from oil baffle (104). Remove oil baffle (104) from transmission case (50).

 : 17 mm



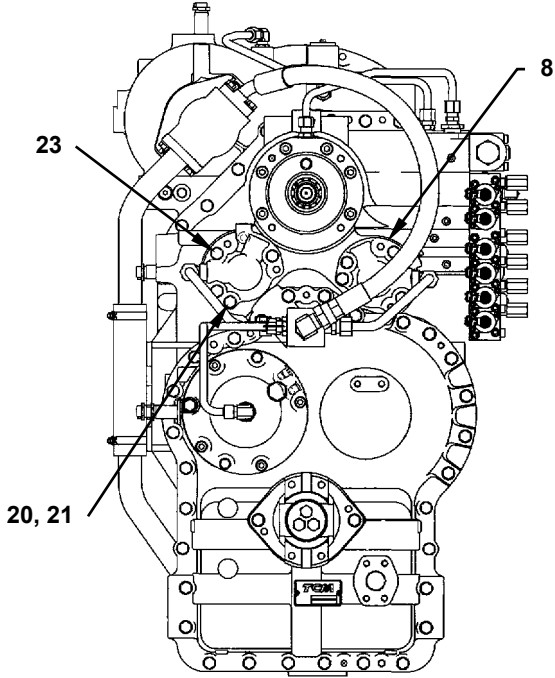
55. Remove low gear (78) from transmission case (50).

56. Remove spacer (103) from output shaft (99).

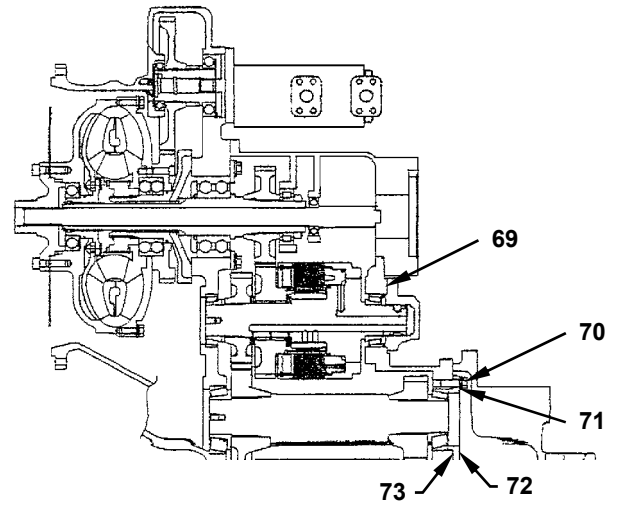
57. Remove gears (105, 106) from output shaft (99).

58. Remove high gear (118) from transmission case (50).

BODY (TRAVEL SYSTEM) / Drive Unit

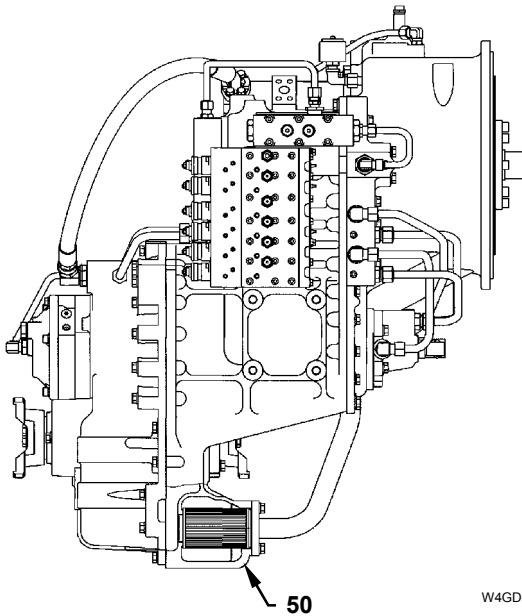


W4GD-03-02-011

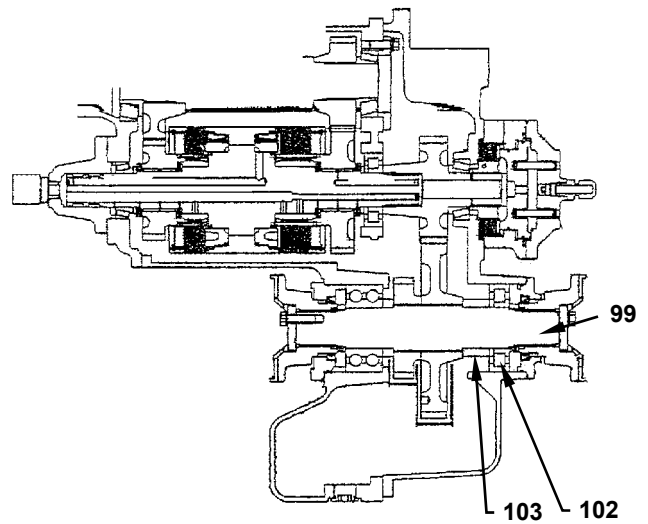


Upper Part of Section A-A

W4GD-03-02-017



W4GD-03-02-015




Lower Part of Section A-A

W4GD-03-02-019

BODY (TRAVEL SYSTEM) / Drive Unit


59. Remove output shaft (99) from transmission case (50). Remove bearing (102) and spacer (103) from output shaft (99).

60. Remove bolts (70) (3 used) and washers (71) (3 used) from idler cap (72). Remove idler cap (72) and shim (73) from transmission case (50).

 : 17 mm

Removal of Forward and Reverse Distributor Caps

61. Remove bolts (20) (4 used) and washers (21) (4 used) from forward distributor cap (23). Remove distributor cap (23) from transmission case (50) by using the pulling-out bolts (M12, Pitch 1.75 mm) (2 used), a plastic hammer and a pry bar.

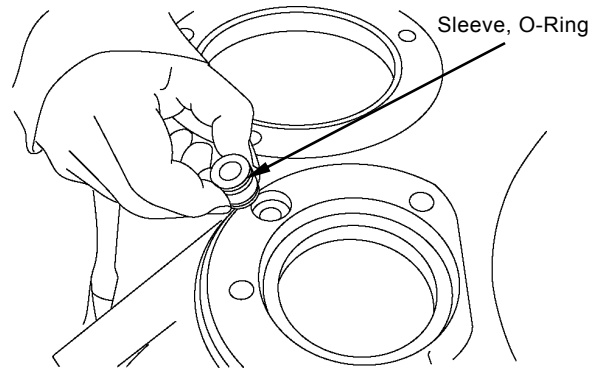
 : 17 mm



CAUTION: Do not damage shim (69).

62. Remove shims (69) (8 used) from transmission case (50).

63. Remove sleeves (2 used) from transmission case (50).



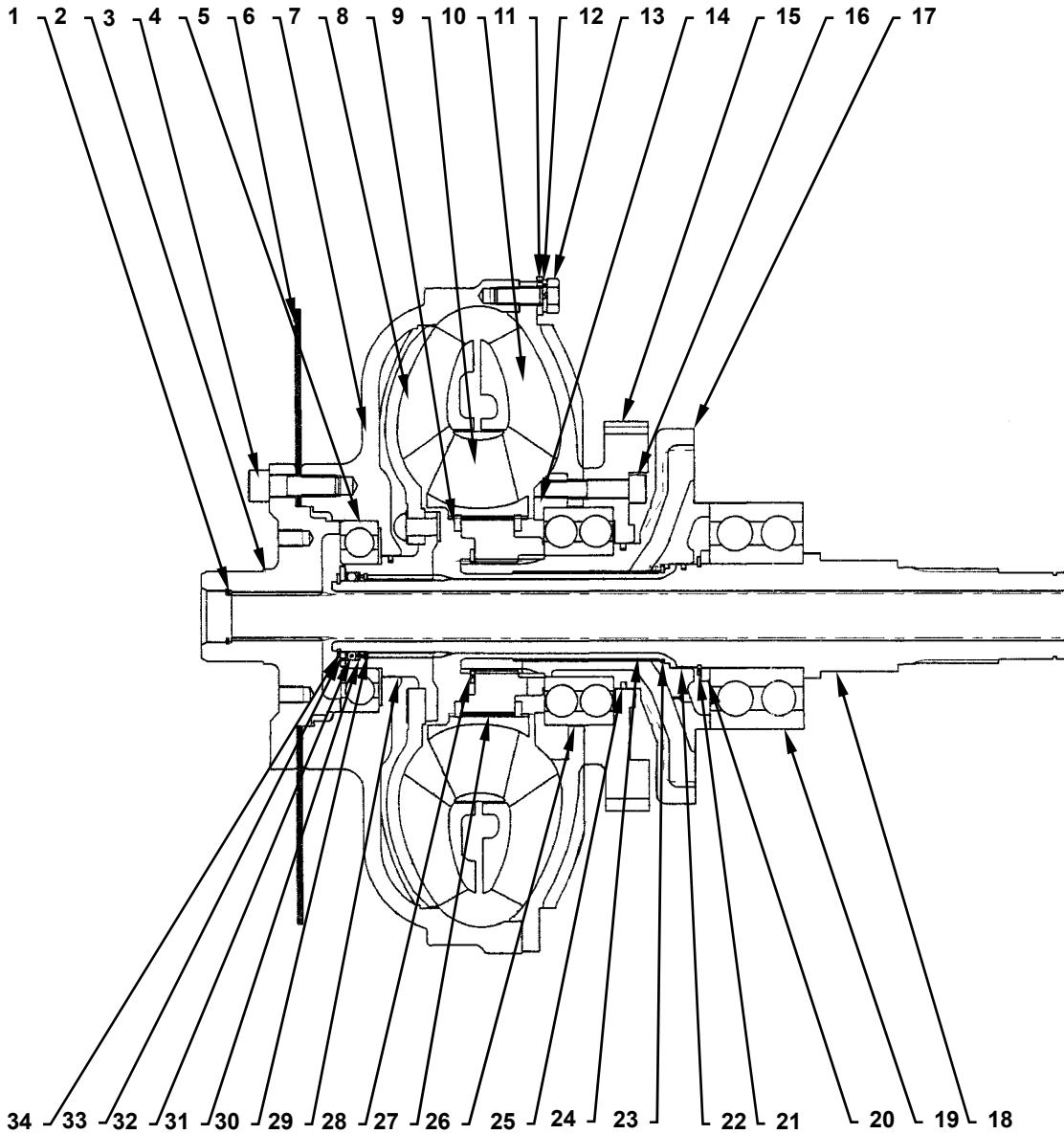
W4GC-03-02-058

64. Remove O-rings (2 used) from the sleeves (2 used).

65. Remove reverse distributor cap (8) in the same way.

BODY (TRAVEL SYSTEM) / Drive Unit

DISASSEMBLY OF TORQUE CONVERTER WHEEL




W4GC-03-02-059

- | | | | |
|-----------------------------|------------------------------|---------------------|---------------------|
| 1 - Retaining Ring | 10 - Impeller Wheel | 19 - Bearing | 28 - Retaining Ring |
| 2 - Input Guide | 11 - Washer (24 Used) | 20 - Washer | 29 - Oil Seal Ring |
| 3 - Socket Bolt (15 Used) | 12 - Spring Washer (24 Used) | 21 - Retaining Ring | 30 - Retaining Ring |
| 4 - Bearing | 13 - Bolt (24 Used) | 22 - Oil Seal Ring | 31 - Spacer |
| 5 - Input Plate | 14 - Impeller Hub | 23 - Retaining Ring | 32 - O-Ring |
| 6 - Cover Wheel | 15 - Pump Drive Gear | 24 - Sleeve | 33 - Spacer |
| 7 - Turbine Wheel | 16 - Socket Bolt (8 Used) | 25 - Oil Seal Ring | 34 - Retaining Ring |
| 8 - Retaining Ring (2 Used) | 17 - Stator Holder | 26 - Bearing | |
| 9 - Stator Wheel | 18 - Turbine Shaft | 27 - Stator Hub | |


BODY (TRAVEL SYSTEM) / Drive Unit

Disassembly of Torque Converter Wheel

Removal of Turbine Shaft

1. Place the torque converter vertically with input plate (5) facing upward. Secure the torque converter on a workbench.
2. Remove socket bolts (3) (15 used) from input guide (2). Remove input guide (2) from cover wheel (6).
 : 10 mm
3. Remove input plate (5) from cover wheel (6).
4. Remove retaining ring (34), spacers (31, 33) and O-ring (32) from turbine shaft (18).
5. Remove the turbine shaft (18) assembly from stator holder (17).
6. Remove oil seal ring (22), retaining ring (21), washer (20) and bearing (19) from turbine shaft (18).

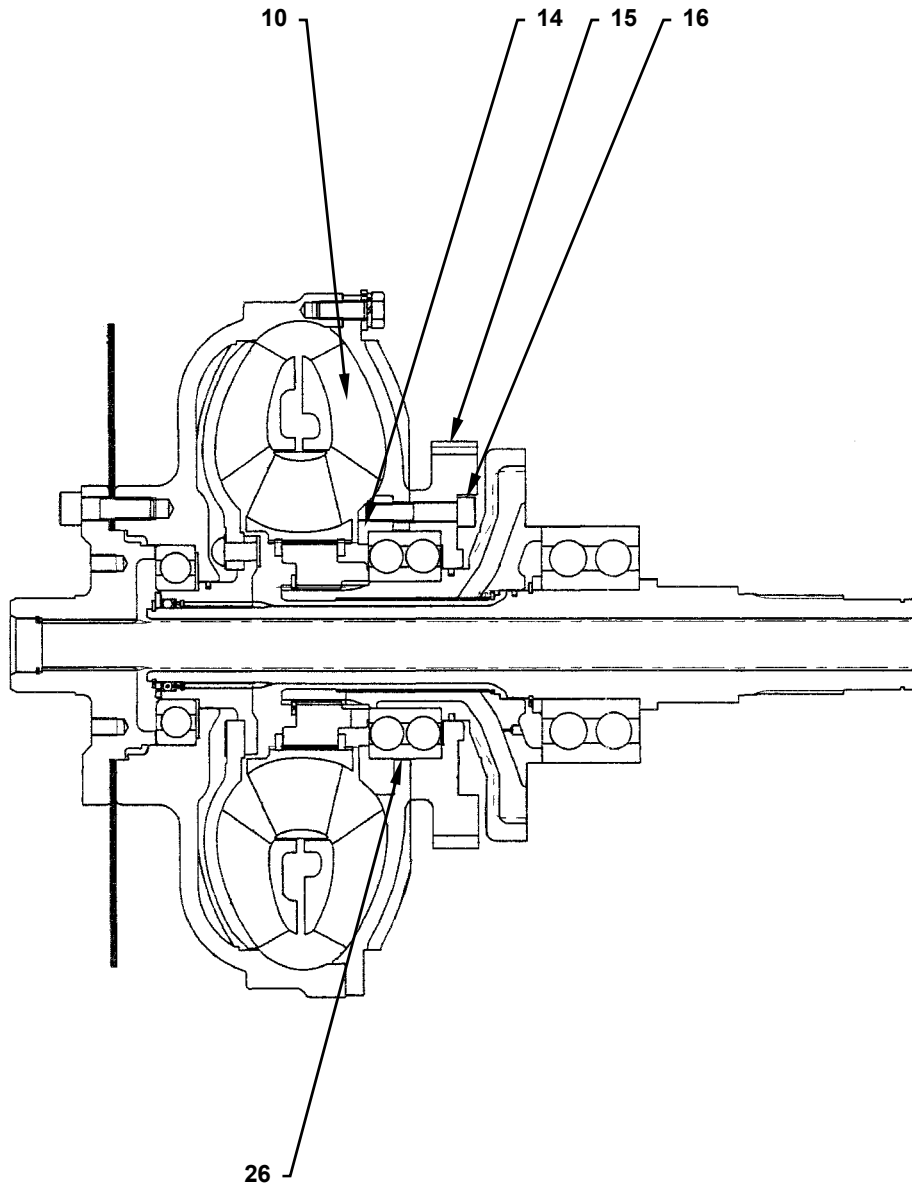
Disassembly of Cover Wheel

7. Turn over the torque converter. Remove bolts (13) (24 used), spring washers (12) (24 used) and washers (11) (24 used) from impeller wheel (10). Remove the stator holder (17) assembly from cover wheel (6).
 : 14 mm
8. Remove turbine wheel (7) and bearing (4) from cover wheel (6).
9. Remove oil seal ring (29) from turbine wheel (7).

Disassembly of Stator Holder

10. Remove retaining ring (28) from stator holder (17).
11. Remove stator holder (17) from stator hub (27).
12. Remove oil seal ring (25) from stator holder (17).
13. Remove stator wheel (9) from impeller wheel (10).
14. Remove retaining rings (8) (2 used) and stator hub (27) from stator wheel (9).


BODY (TRAVEL SYSTEM) / Drive Unit



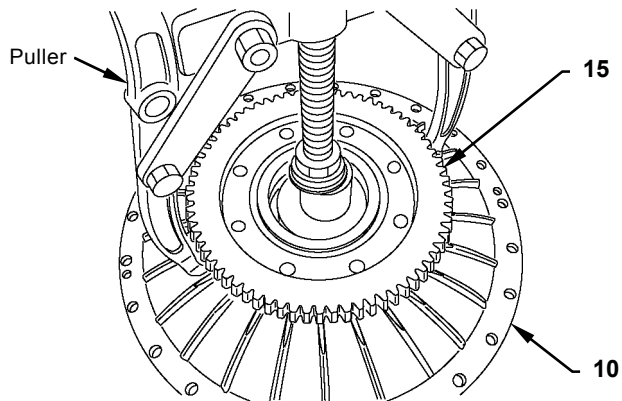
W4GC-03-02-059

BODY (TRAVEL SYSTEM) / Drive Unit

15. Remove socket bolts (16) (8 used) from pump drive gear (15).

 : 8 mm

16. Remove pump drive gear (15) from impeller wheel (10) by using a puller.



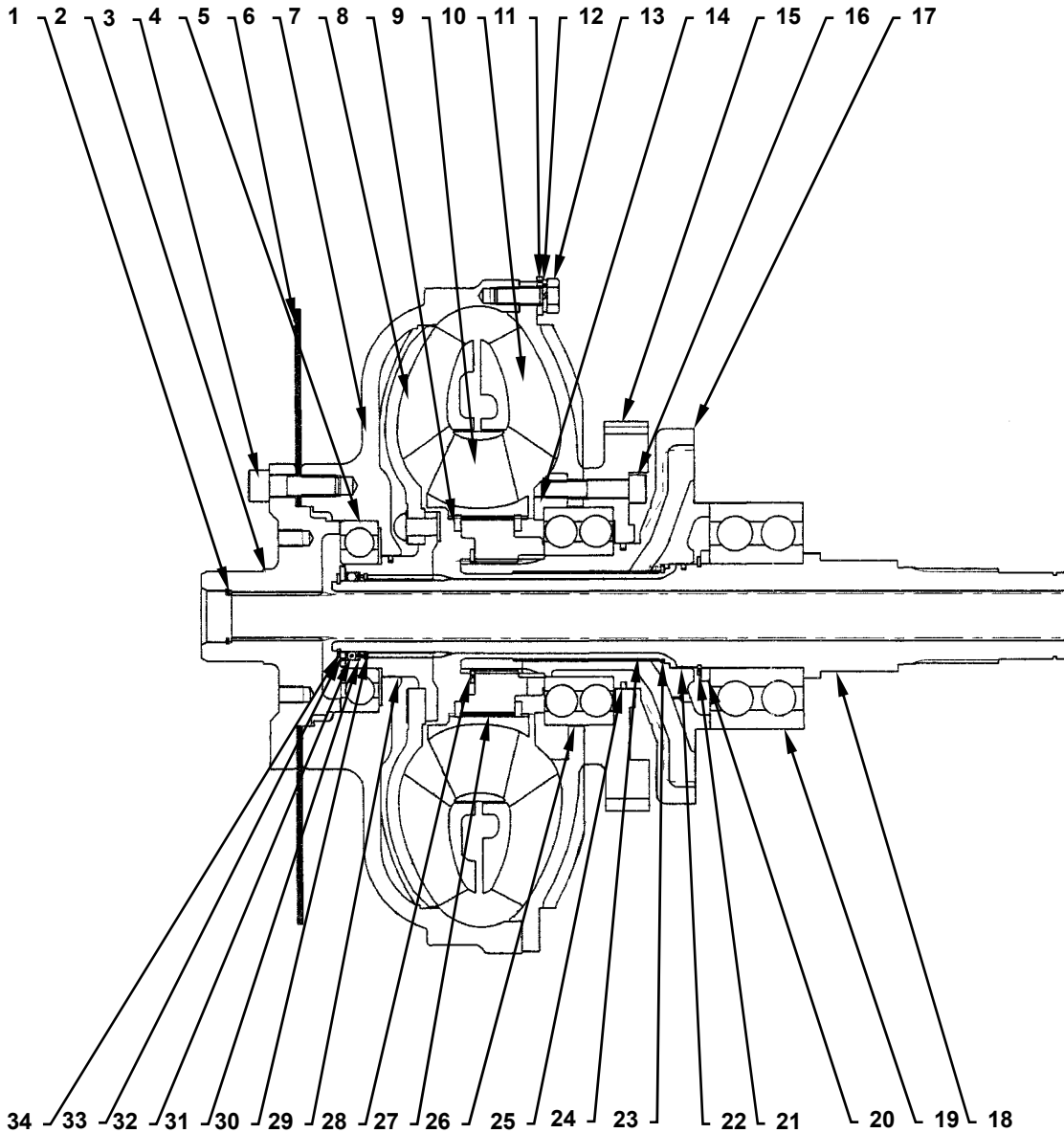
W4GC-03-02-075

17. Remove the impeller hub (14) assembly from impeller wheel (10).

18. Remove bearing (26) from impeller hub (14).

BODY (TRAVEL SYSTEM) / Drive Unit

ASSEMBLY OF TORQUE CONVERTER WHEEL





W4GC-03-02-059

- | | | | |
|-----------------------------|------------------------------|---------------------|---------------------|
| 1 - Retaining Ring | 10 - Impeller Wheel | 19 - Bearing | 28 - Retaining Ring |
| 2 - Input Guide | 11 - Washer (24 Used) | 20 - Washer | 29 - Oil Seal Ring |
| 3 - Socket Bolt (15 Used) | 12 - Spring Washer (24 Used) | 21 - Retaining Ring | 30 - Retaining Ring |
| 4 - Bearing | 13 - Bolt (24 Used) | 22 - Oil Seal Ring | 31 - Spacer |
| 5 - Input Plate | 14 - Impeller Hub | 23 - Retaining Ring | 32 - O-Ring |
| 6 - Cover Wheel | 15 - Pump Drive Gear | 24 - Sleeve | 33 - Spacer |
| 7 - Turbine Wheel | 16 - Socket Bolt (8 Used) | 25 - Oil Seal Ring | 34 - Retaining Ring |
| 8 - Retaining Ring (2 Used) | 17 - Stator Holder | 26 - Bearing | |
| 9 - Stator Wheel | 18 - Turbine Shaft | 27 - Stator Hub | |

BODY (TRAVEL SYSTEM) / Drive Unit

Assembly of Torque Converter Wheel

Assembly of Stator Holder

1. Install bearing (26) to impeller hub (14).
2. Install pump drive gear (15) and impeller hub (14) to impeller wheel (10) with socket bolts (16) (8 used).
 -  : 8 mm
 -  : 51.1 to 58.3 N·m
(5.21 to 5.95 kgf·m, 38 to 43 lbf·ft)
3. Install stator hub (27) to stator wheel (9) with retaining rings (8) (2 used).
4. Install oil seal ring (25) to stator holder (17).
5. Install stator holder (17) to impeller wheel (10).





IMPORTANT: Align the matching marks on the lubrication oil passages of stator hub (27) and stator holder (17).

6. Install stator hub (27) to stator holder (17).
7. Install stator hub (27) to stator holder (17) with retaining ring (28).

Assembly of Cover Wheel

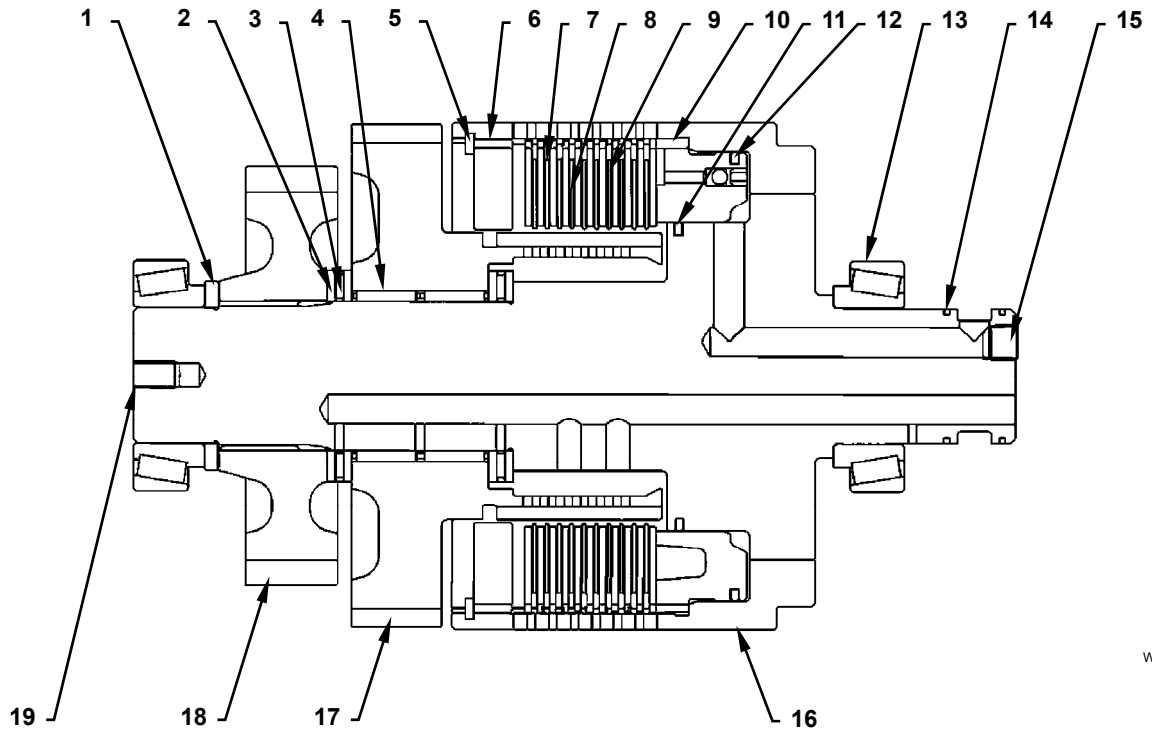
8. Install oil seal ring (29) to turbine wheel (7). Install bearing (4) to cover wheel (6).
9. Install turbine wheel (7) to cover wheel (6).

Assembly of Turbine Shaft

10. Install cover wheel (6) to impeller wheel (10) with bolts (13) (24 used), spring washers (12) (24 used) and washers (11) (24 used).
 -  : 14 mm
 -  : 39 to 45 N·m
(4.0 to 4.6 kgf·m, 28.5 to 33 lbf·ft)
11. Install bearing (19), washer (20), retaining ring (21) and oil seal ring (22) to turbine shaft (18).
12. Install turbine shaft (18) to stator holder (17).
13. Install spacers (31, 33), O-ring (32) and retaining ring (34) to turbine shaft (18).
14. Install input plate (5) and input guide (2) to cover wheel (6) with socket bolts (3) (15 used).
 -  : 10 mm
 -  : 97 to 111 N·m
(9.9 to 11.5 kgf·m, 72 to 82 lbf·ft)

BODY (TRAVEL SYSTEM) / Drive Unit

DISASSEMBLY OF CLUTCH SHAFT (FORWARD CLUTCH AND REVERSE CLUTCH)



W4GD-03-02-024

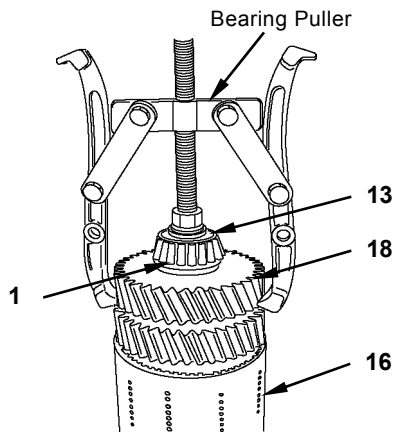
- | | | | |
|-----------------------------|-----------------------------|-------------------------|-----------------|
| 1 - Spacer | 6 - End Plate | 11 - Seal Ring | 16 - Drum Shaft |
| 2 - Thrust Washer (4 Used) | 7 - Return Spring (10 Used) | 12 - Seal Ring | 17 - Gear |
| 3 - Thrust Bearing (2 Used) | 8 - Disc (10 Used) | 13 - Bearing (2 Used) | 18 - Gear |
| 4 - Needle Bearing (2 Used) | 9 - Plate (11 Used) | 14 - Seal Ring (2 Used) | 19 - Plug |
| 5 - Retaining Ring | 10 - Piston | 15 - Plug | |

BODY (TRAVEL SYSTEM) / Drive Unit

Disassembly of Clutch Shaft

Disassembly of Forward and Reverse Clutches

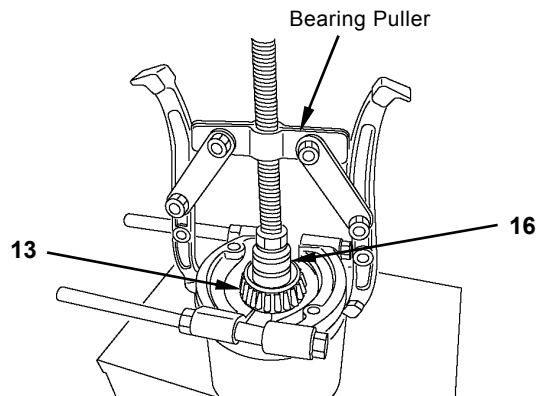
1. Place the clutch shaft vertically with the gear side facing upward. Secure the clutch shaft on a workbench.
2. Remove bearing (13), spacer (1) and upper gear (18) from drum shaft (16) by using a bearing puller. Remove thrust washers (2) (2 used) and thrust bearing (3) from drum shaft (16).



W4GC-03-02-079

3. Remove gear (17) from drum shaft (16). Remove needle bearings (4) (2 used), thrust washers (2) (2 used) and thrust bearing (3) from drum shaft (16).
4. Hold end plate (6) by using a press. Remove retaining ring (5) from drum shaft (16) by using a screwdriver.
5. After loosening the press, remove end plate (6), plates (9) (11 used), discs (8) (10 used) and return springs (7) (10 used) from drum shaft (16).

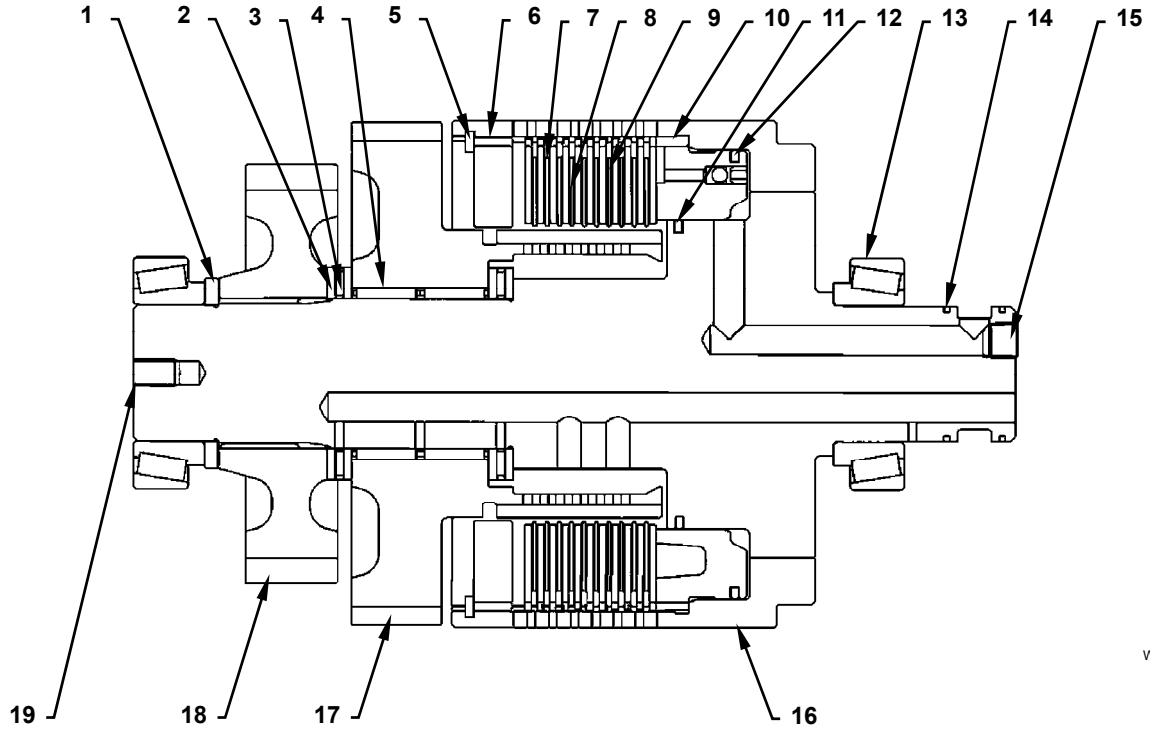
6. Turn over drum shaft (16). Apply air to the forward clutch hydraulic hole. Remove piston (10) from drum shaft (16).
7. Remove seal ring (12) from piston (10). Remove seal ring (11) from drum shaft (16).
8. Turn over drum shaft (16). Remove seal rings (14) (2 used) from the drum shaft (16) end.
9. Remove bearing (13) from drum shaft (16) by using a bearing puller.



W4GC-03-02-086

BODY (TRAVEL SYSTEM) / Drive Unit

ASSEMBLY OF CLUTCH SHAFT (FORWARD CLUTCH AND REVERSE CLUTCH)



W4GD-03-02-024

- | | | | |
|-----------------------------|-----------------------------|-------------------------|-----------------|
| 1 - Spacer | 6 - End Plate | 11 - Seal Ring | 16 - Drum Shaft |
| 2 - Thrust Washer (4 Used) | 7 - Return Spring (10 Used) | 12 - Seal Ring | 17 - Gear |
| 3 - Thrust Bearing (2 Used) | 8 - Disc (10 Used) | 13 - Bearing (2 Used) | 18 - Gear |
| 4 - Needle Bearing (2 Used) | 9 - Plate (11 Used) | 14 - Seal Ring (2 Used) | 19 - Plug |
| 5 - Retaining Ring | 10 - Piston | 15 - Plug | |

BODY (TRAVEL SYSTEM) / Drive Unit

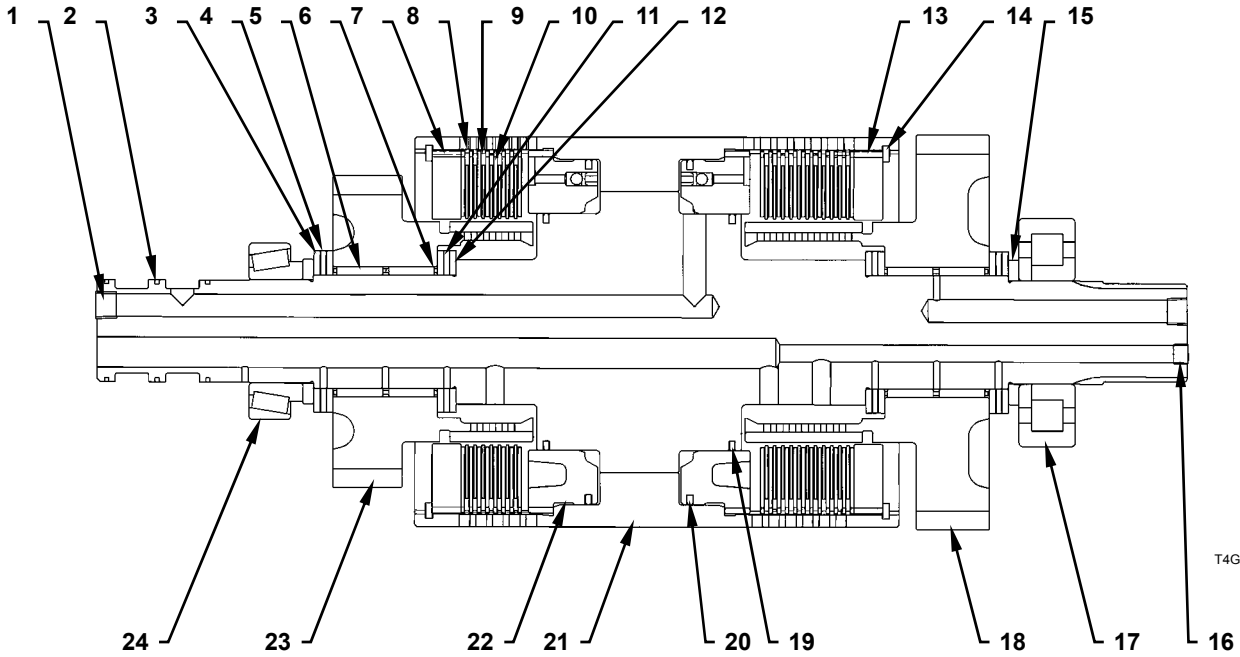
Assembly of Clutch Shaft

Assembly of Forward and Reverse Clutches

1. Secure drum shaft (16) vertically on a workbench with the open part facing downward. Install bearing (13) to drum shaft (16). After installing bearing (13), install seal rings (14) (2 used) to drum shaft (16).
2. Turn over drum shaft (16). Apply grease onto seal ring (11). Install seal ring (11) to drum shaft (16).
3. Apply grease onto seal ring (12). Install seal ring (12) to piston (10).
4. Install piston (10), plates (9) (11 used), return springs (7) (10 used), discs (8) (10 used) and end plate (6) to drum shaft (16).
5. Install retaining ring (5) to drum shaft (16).
6. Install thrust washers (2) (2 used) and thrust bearing (3) to drum shaft (16).
7. Install gear (17) to drum shaft (16).
8. Install needle bearings (4) (2 used) to gear (17).
9. Install thrust washers (2) (2 used) and thrust bearing (3) to drum shaft (16).
10. Install spacer (1) and bearing (13) to drum shaft (16).

BODY (TRAVEL SYSTEM) / Drive Unit

DISASSEMBLY OF CLUTCH SHAFT (1-SPEED/2-SPEED CLUTCH AND 3-SPEED/4-SPEED CLUTCH)



T4GD-03-09-007

- | | | | |
|-----------------------------|------------------------------|------------------------------|-------------------------|
| 1 - Plug | 7 - End Plate | 13 - End Plate | 19 - Seal Ring (2 Used) |
| 2 - Seal Ring (3 Used) | 8 - Return Spring (18 Used) | 14 - Retaining Ring (2 Used) | 20 - Seal Ring (2 Used) |
| 3 - Thrust Washer (4 Used) | 9 - Disc (18 Used) | 15 - Spacer | 21 - Drum Shaft |
| 4 - Thrust Bearing (2 Used) | 10 - Plate (20 Used) | 16 - Orifice | 22 - Piston (2 Used) |
| 5 - Needle Bearing (4 Used) | 11 - Thrust Bearing (2 Used) | 17 - Bearing | 23 - Gear |
| 6 - Spacer (2 Used) | 12 - Thrust Washer (4 Used) | 18 - Gear | 24 - Bearing |

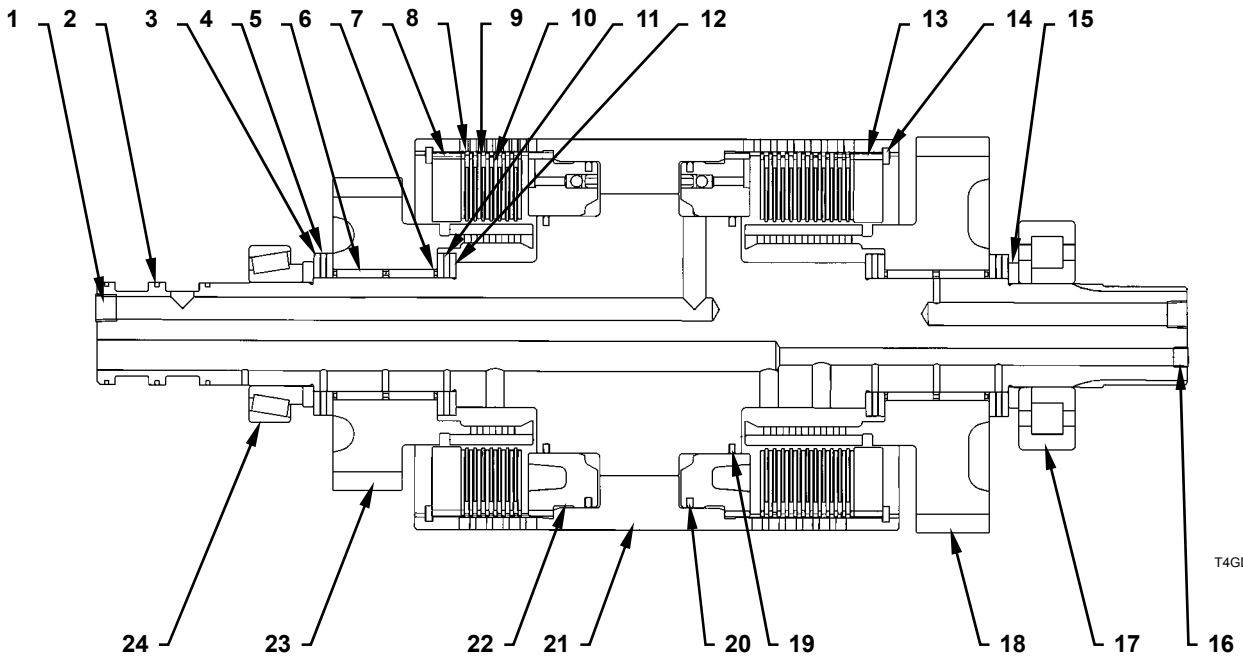
BODY (TRAVEL SYSTEM) / Drive Unit

Disassembly of 1-Speed/2-Speed Clutch and 3-Speed/4-Speed Clutch

Disassemble 1-speed/2-speed clutch and 3-speed/4-speed clutch in the same way as the forward and reverse clutches.

BODY (TRAVEL SYSTEM) / Drive Unit

ASSEMBLY OF CLUTCH SHAFT (1-SPEED/2-SPEED CLUTCH AND 3-SPEED/4-SPEED CLUTCH)



T4GD-03-09-007

- | | | | |
|-----------------------------|------------------------------|------------------------------|-------------------------|
| 1 - Plug | 7 - End Plate | 13 - End Plate | 19 - Seal Ring (2 Used) |
| 2 - Seal Ring (3 Used) | 8 - Return Spring (18 Used) | 14 - Retaining Ring (2 Used) | 20 - Seal Ring (2 Used) |
| 3 - Thrust Washer (4 Used) | 9 - Disc (18 Used) | 15 - Spacer | 21 - Drum Shaft |
| 4 - Thrust Bearing (2 Used) | 10 - Plate (20 Used) | 16 - Orifice | 22 - Piston (2 Used) |
| 5 - Needle Bearing (4 Used) | 11 - Thrust Bearing (2 Used) | 17 - Bearing | 23 - Gear |
| 6 - Spacer (2 Used) | 12 - Thrust Washer (4 Used) | 18 - Gear | 24 - Bearing |

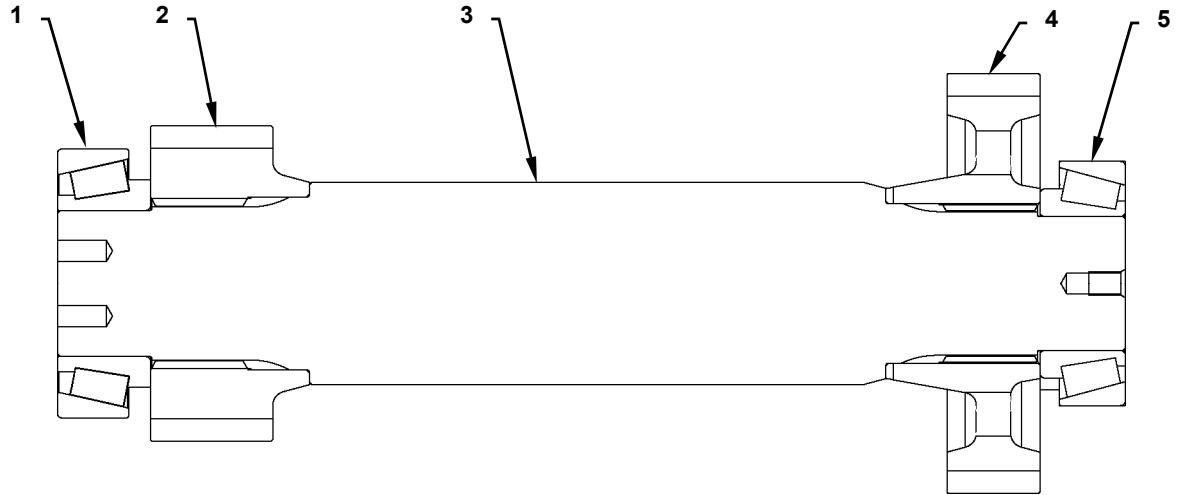
BODY (TRAVEL SYSTEM) / Drive Unit

Assembly of Clutch Shaft (1-Speed/2-Speed Clutch and 3-Speed/4-Speed Clutch)

Assemble 1-speed/2-speed clutch and 3-speed/4-speed clutch in the same way as the forward and reverse clutches.

BODY (TRAVEL SYSTEM) / Drive Unit

DISASSEMBLY AND ASSEMBLY OF IDLER SHAFT



W4GC-03-02-088

1 - Bearing
2 - Gear

3 - Shaft

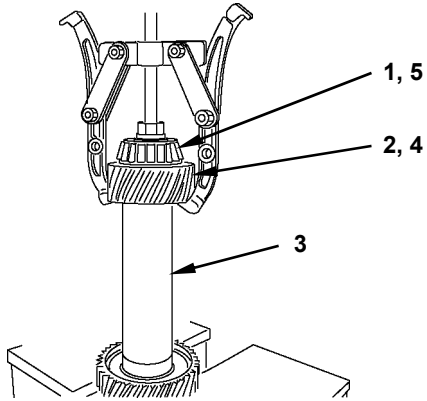
4 - Gear

5 - Bearing

BODY (TRAVEL SYSTEM) / Drive Unit

Disassembly of Idler Shaft

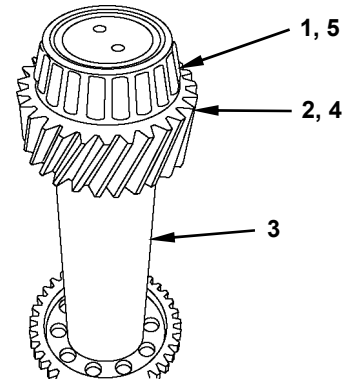
1. Secure shaft (3) vertically on a workbench.
2. Remove gears (2, 4) and bearings (1, 5) from shaft (3) by using a bearing puller.



W4GC-03-02-089

Assembly of Idler Shaft

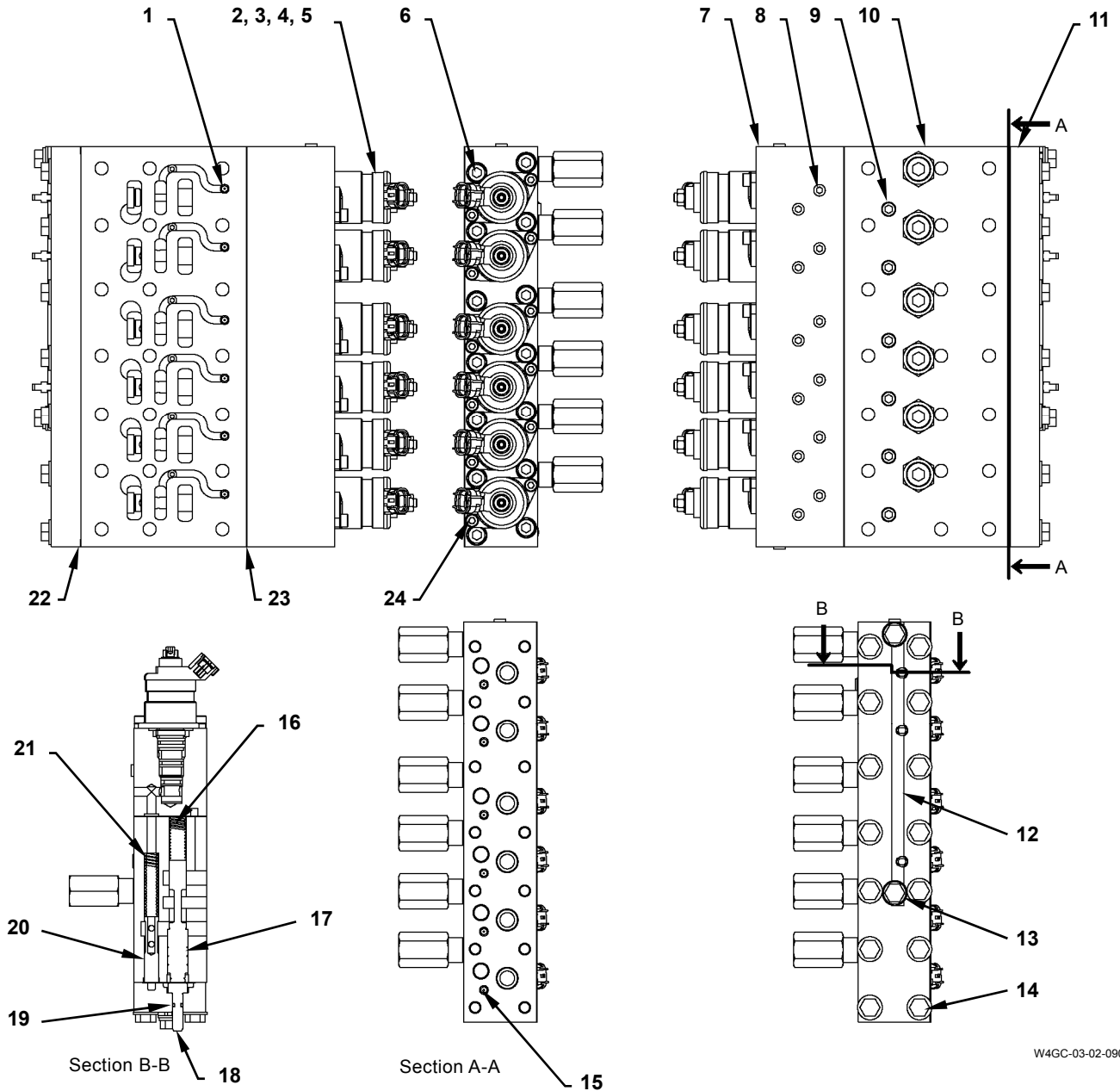
1. Secure shaft (3) vertically on a workbench.
2. Install gears (2, 4) and bearings (1, 5) to shaft (3).



W4GC-03-02-122

BODY (TRAVEL SYSTEM) / Drive Unit

DISASSEMBLY OF CONTROL VALVE










W4GC-03-02-090

- | | | | |
|-----------------------------|-------------------------|-----------------------|----------------------------|
| 1 - Orifice (6 Used) | 7 - Solenoid Valve Body | 13 - Bolt (2 Used) | 19 - O-Ring (3 Used) |
| 2 - Solenoid Valve (6 Used) | 8 - Plug (14 Used) | 14 - Bolt (14 Used) | 20 - Piston (6 Used) |
| 3 - O-Ring (6 Used) | 9 - Plug (6 Used) | 15 - Orifice (6 Used) | 21 - Spring (6 Used) |
| 4 - Plate (6 Used) | 10 - Valve Body | 16 - Spring (6 Used) | 22 - Gasket |
| 5 - Wave Spring (6 Used) | 11 - Valve Cover | 17 - Spool (6 Used) | 23 - Gasket |
| 6 - Socket Bolt (14 Used) | 12 - Plate | 18 - Rod (3 Used) | 24 - Socket Bolt (12 Used) |

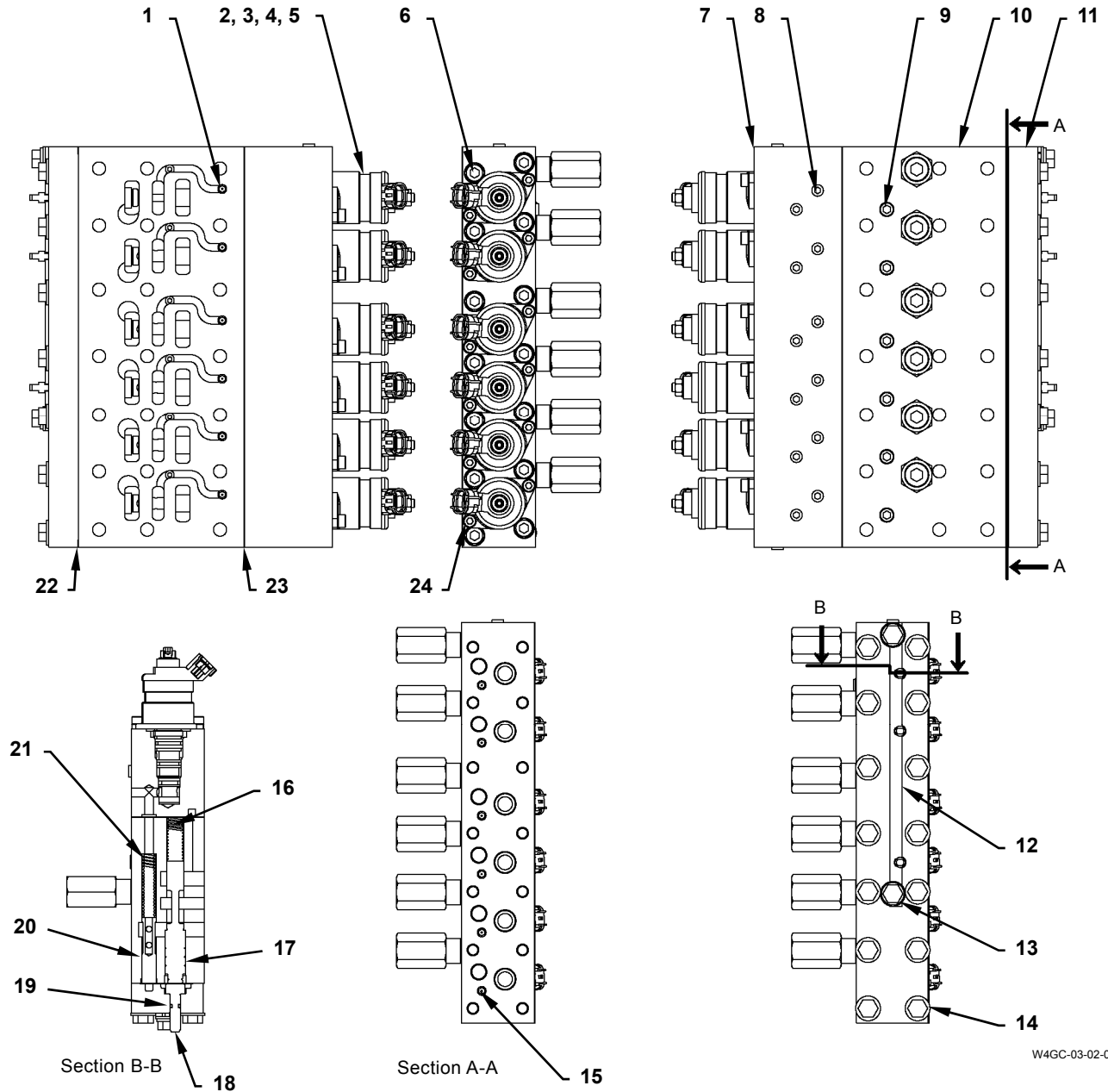
BODY (TRAVEL SYSTEM) / Drive Unit

Disassembly of Control Valve

1. Remove socket bolts (24) (12 used) from solenoid valves (2) (6 used). Remove solenoid valves (2) (6 used) from solenoid valve body (7).
 : 4 mm
2. Remove O-rings (3) (6 used), plates (4) (6 used) and wave springs (5) (6 used) from solenoid valve body (7).
3. Turn over solenoid valve body (7). Remove bolts (14) (14 used) from valve cover (11). Remove valve cover (11) and gasket (22) from valve body (10).
 : 12 mm
4. Remove bolts (13) (2 used) from plate (12). Remove plate (12) from valve cover (11).
 : 12 mm
5. Remove rods (18) (3 used) from valve cover (11). Remove O-rings (19) (3 used) from rods (18) (3 used).
6. Remove spools (17) (6 used) and pistons (20) (6 used) from valve body (10). Remove springs (16, 21) (6 used for each) from valve body (10) by using a magnet.
7. Turn over valve body (10). Remove socket bolts (6) (14 used) from solenoid valve body (7). Remove solenoid valve body (7) and gasket (23) from valve body (10).
 : 6 mm
8. Remove plugs (8) (14 used) from solenoid valve body (7).
 : 4 mm
9. Put the matching marks onto orifices (1, 15) (6 used for each). Remove orifices (1, 15) (6 used for each) from valve body (10).
 : 4 mm
10. Remove plugs (9) (6 used) from valve body (10).
 : 5 mm

BODY (TRAVEL SYSTEM) / Drive Unit

ASSEMBLY OF CONTROL VALVE













W4GC-03-02-090

- | | | | |
|-----------------------------|-------------------------|-----------------------|----------------------------|
| 1 - Orifice (6 Used) | 7 - Solenoid Valve Body | 13 - Bolt (2 Used) | 19 - O-Ring (3 Used) |
| 2 - Solenoid Valve (6 Used) | 8 - Plug (14 Used) | 14 - Bolt (14 Used) | 20 - Piston (6 Used) |
| 3 - O-Ring | 9 - Plug (6 Used) | 15 - Orifice (6 Used) | 21 - Spring (6 Used) |
| 4 - Plate (6 Used) | 10 - Valve Body | 16 - Spring (6 Used) | 22 - Gasket |
| 5 - Wave Spring (6 Used) | 11 - Valve Cover | 17 - Spool (6 Used) | 23 - Gasket |
| 6 - Socket Bolt (14 Used) | 12 - Plate | 18 - Rod (3 Used) | 24 - Socket Bolt (12 Used) |

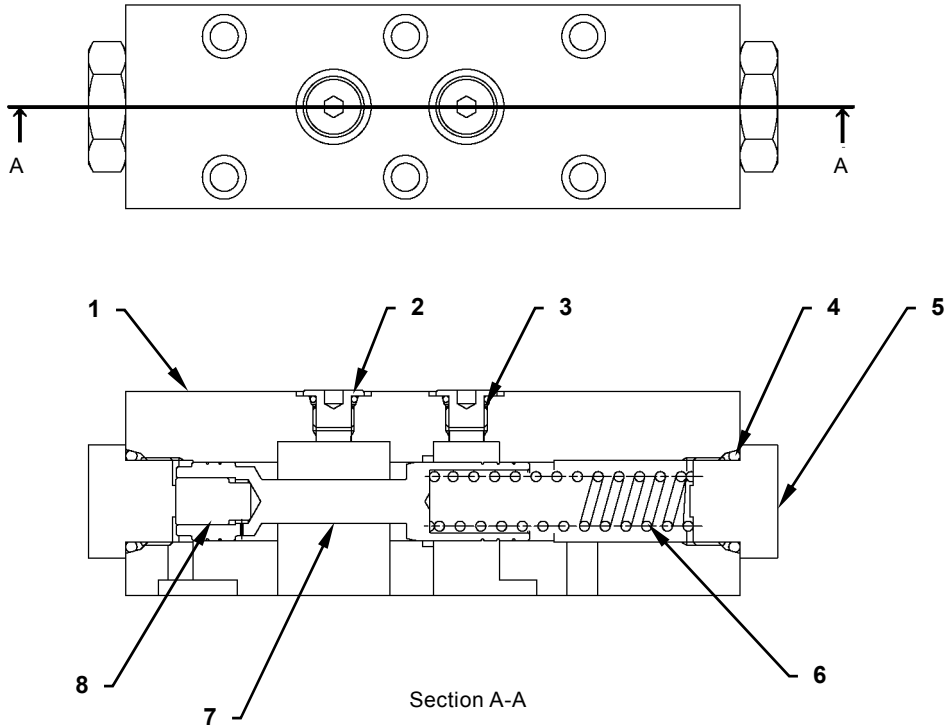
BODY (TRAVEL SYSTEM) / Drive Unit

Assembly of Control Valve

1. Apply LOCTITE #572 onto plugs (9) (6 used).
Install plugs (9) (6 used) to valve body (10).
 : 5 mm
2. Install orifices (1, 15) (6 used for each) to valve body (10).
 : 4 mm
3. Apply LOCTITE #572 onto plugs (8) (14 used).
Install plugs (8) (14 used) to solenoid valve body (7).
 : 4 mm
4. Install solenoid valve body (7) and gasket (23) to valve body (10) with socket bolts (6) (14 used).
 : 6 mm
 : 10 N·m (1 kgf·m, 7.4 lbf·ft)
5. Turn over valve body (10). Install springs (16, 21) (6 used for each), spools (17) (6 used) and pistons (20) (6 used) to valve body (10).
6. Install O-rings (19) (3 used) to rods (18) (3 used).
Install rods (18) (3 used) to valve cover (11).
7. Install rods (18) (3 used) to valve cover (11) with plate (12). Install plate (12) to valve cover (11) with bolts (13) (2 used).
 : 12 mm
 : 10 N·m (1 kgf·m, 7.4 lbf·ft)
8. Install valve cover (11) and gasket (22) to valve body (10) with bolts (14) (14 used).
 : 12 mm
 : 10 N·m (1 kgf·m, 7.4 lbf·ft)
9. Turn over valve body (10). Install wave springs (5) (6 used), plates (4) (6 used) and O-rings (3) (6 used) to solenoid valve body (7).
10. Install solenoid valves (2) (6 used) to solenoid valve body (7) with socket bolts (24) (12 used).
 : 4 mm

BODY (TRAVEL SYSTEM) / Drive Unit

DISASSEMBLY OF REGULATOR VALVE



W4GC-03-02-098

1 - Valve Body
2 - Plug (2 Used)



3 - O-Ring (2 Used)
4 - O-Ring (2 Used)

5 - Plug (2 Used)
6 - Spring

7 - Spool
8 - Piston

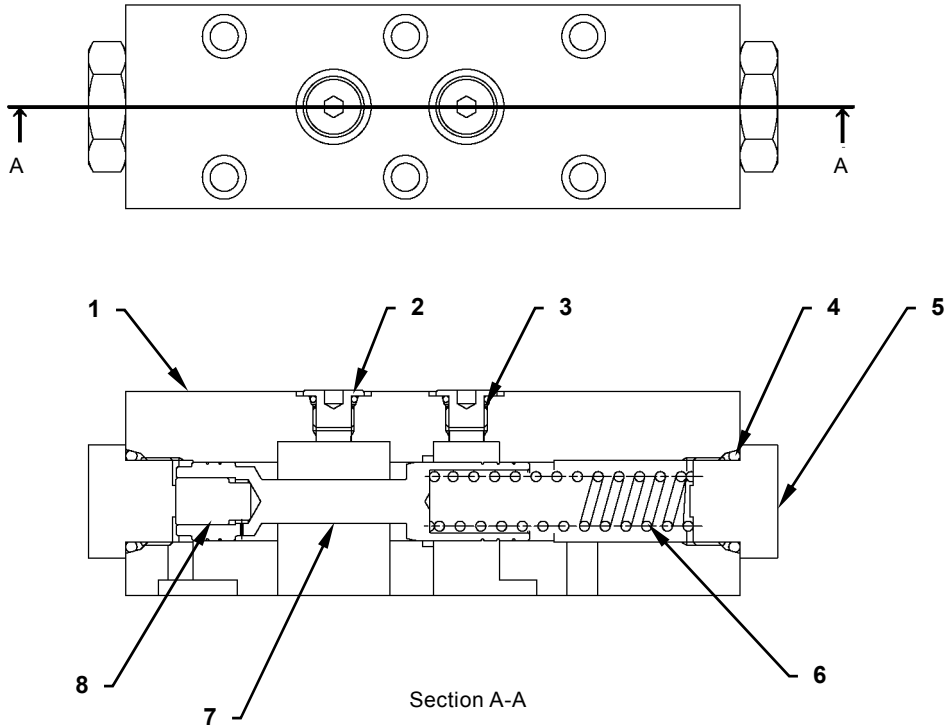
BODY (TRAVEL SYSTEM) / Drive Unit

Disassembly of Regulator Valve

1. Remove plugs (2) (2 used) from valve body (1).
 : 6 mm
2. Remove plugs (5) (2 used) from valve body (1).
 : 36 mm
3. Remove O-rings (3, 4) (2 used for each) from plugs (2, 5) (2 used for each).
4. Remove piston (8), spool (7) and spring (6) from valve body (1).

BODY (TRAVEL SYSTEM) / Drive Unit

ASSEMBLY OF REGULATOR VALVE



W4GC-03-02-098

1 - Valve Body
2 - Plug (2 Used)





3 - O-Ring (2 Used)
4 - O-Ring (2 Used)

5 - Plug (2 Used)
6 - Spring

7 - Spool
8 - Piston

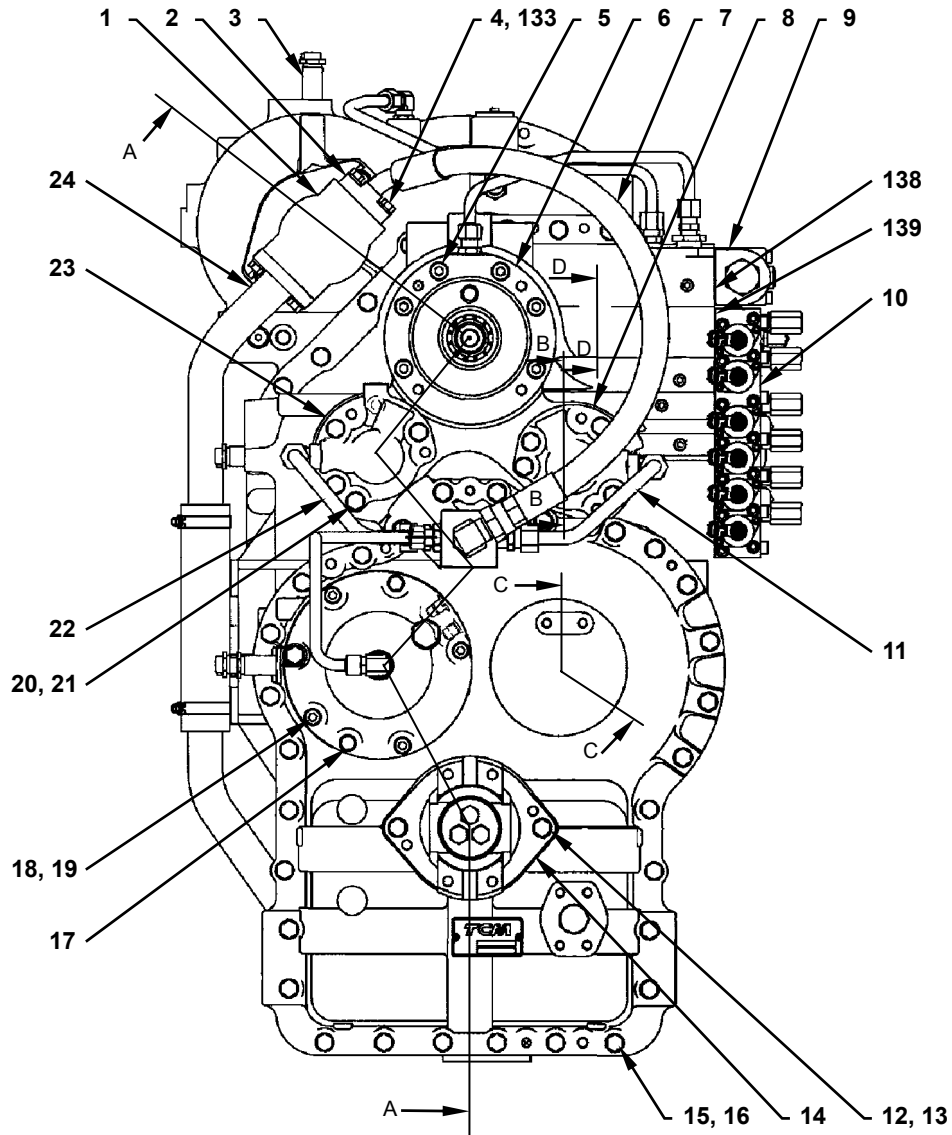
BODY (TRAVEL SYSTEM) / Drive Unit

Assembly of Regulator Valve

1. Install spool (7), piston (8) and spring (6) to valve body (1).
2. Install O-rings (3, 4) (2 used for each) to plugs (2, 5) (2 used for each).
3. Install plugs (5) (2 used) to valve body (1).
 : 36 mm
 : 175 N·m (18 kgf·m, 129 lbf·ft)
4. Install plugs (2) (2 used) to valve body (1).
 : 6 mm
 : 20 N·m (2 kgf·m, 14.5 lbf·ft)

BODY (TRAVEL SYSTEM) / Drive Unit

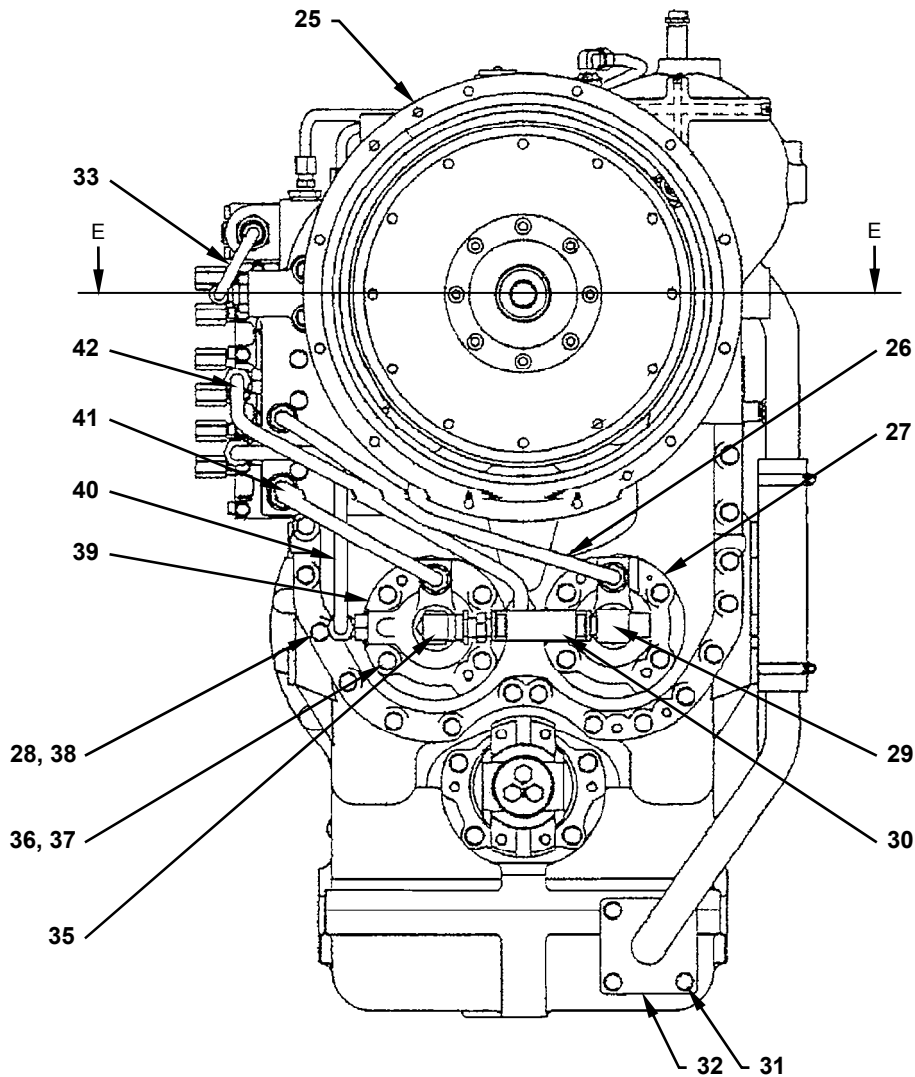
ASSEMBLY OF DRIVE UNIT



W4GD-03-02-010

- | | | | |
|---------------------------|----------------------|---------------------------|-----------------------|
| 1 - Charging Pump | 8 - Distributor Cap | 15 - Bolt (29 Used) | 22 - Pipe |
| 2 - Split Flange (2 Used) | 9 - Regulator Valve | 16 - Washer (14 Used) | 23 - Distributor Cap |
| 3 - Sensor | 10 - Control Valve | 17 - Bolt (2 Used) | 24 - Suction Tube |
| 4 - Bolt (8 Used) | 11 - Pipe | 18 - Socket Bolt (4 Used) | 138 - Washer (8 Used) |
| 5 - Socket Bolt (6 Used) | 12 - Bolt (2 Used) | 19 - Washer (4 Used) | 139 - Gasket |
| 6 - Pump Spacer | 13 - Washer (2 Used) | 20 - Bolt (8 Used) | 139 - Gasket |
| 7 - Hose | 14 - Seal Retainer | 21 - Washer (8 Used) | |

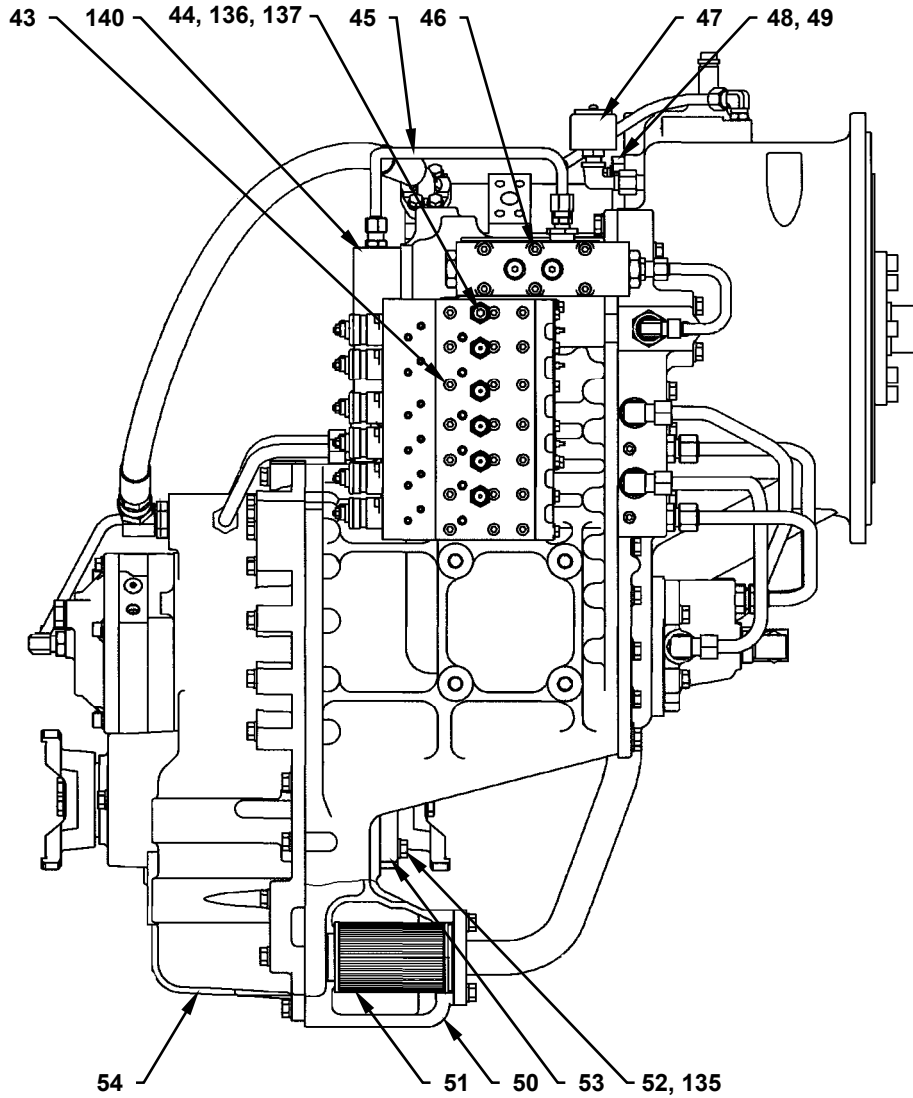
BODY (TRAVEL SYSTEM) / Drive Unit



W4GD-03-02-012

- | | | | |
|-------------------------------|--------------------|----------------------|----------------------|
| 25 - Torque Converter Housing | 30 - Hose | 35 - Elbow | 39 - Distributor Cap |
| 26 - Pipe | 31 - Bolt (4 Used) | 36 - Bolt (8 Used) | 40 - Pipe |
| 27 - Distributor Cap | 32 - Gasket | 37 - Washer (8 Used) | 41 - Pipe |
| 28 - Washer (6 Used) | 33 - Pipe | 38 - Bolt (31 Used) | 42 - Pipe |
| 29 - Three Way | | | |

BODY (TRAVEL SYSTEM) / Drive Unit



W4GD-03-02-014

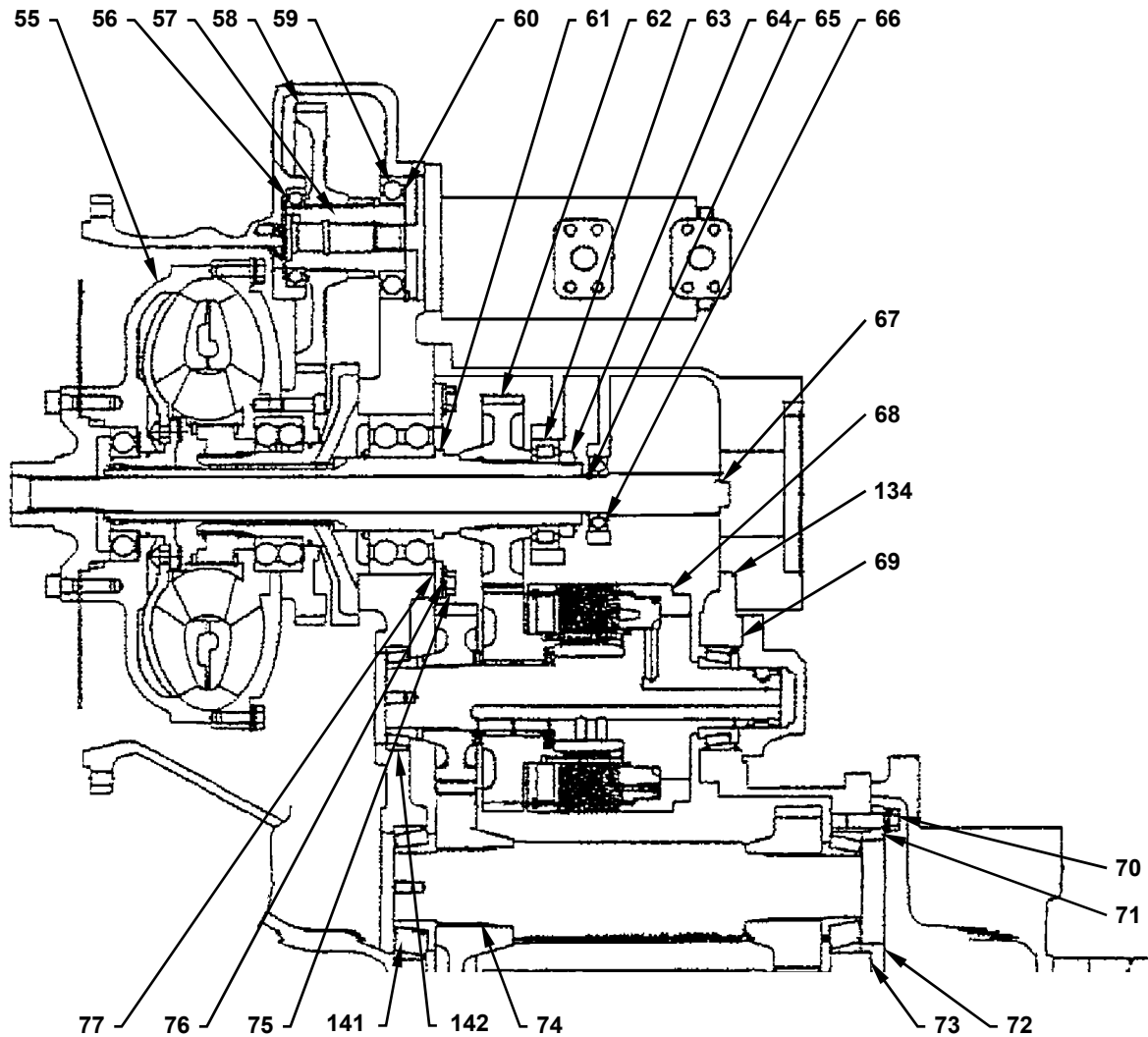
43 - Socket Bolt (21 Used)
 44 - Connector (6 Used)
 45 - Pipe
 46 - Socket Bolt (6 Used)

47 - Air Breather
 48 - Bolt (2 Used)
 49 - Washer (2 Used)
 50 - Transmission Case

51 - Strainer
 52 - Bolt (4 Used)
 53 - Seal Retainer
 54 - Rear Case

135 - Washer (4 Used)
 136 - Plug (6 Used)
 137 - O-Ring (6 Used)
 140 - Orifice

BODY (TRAVEL SYSTEM) / Drive Unit

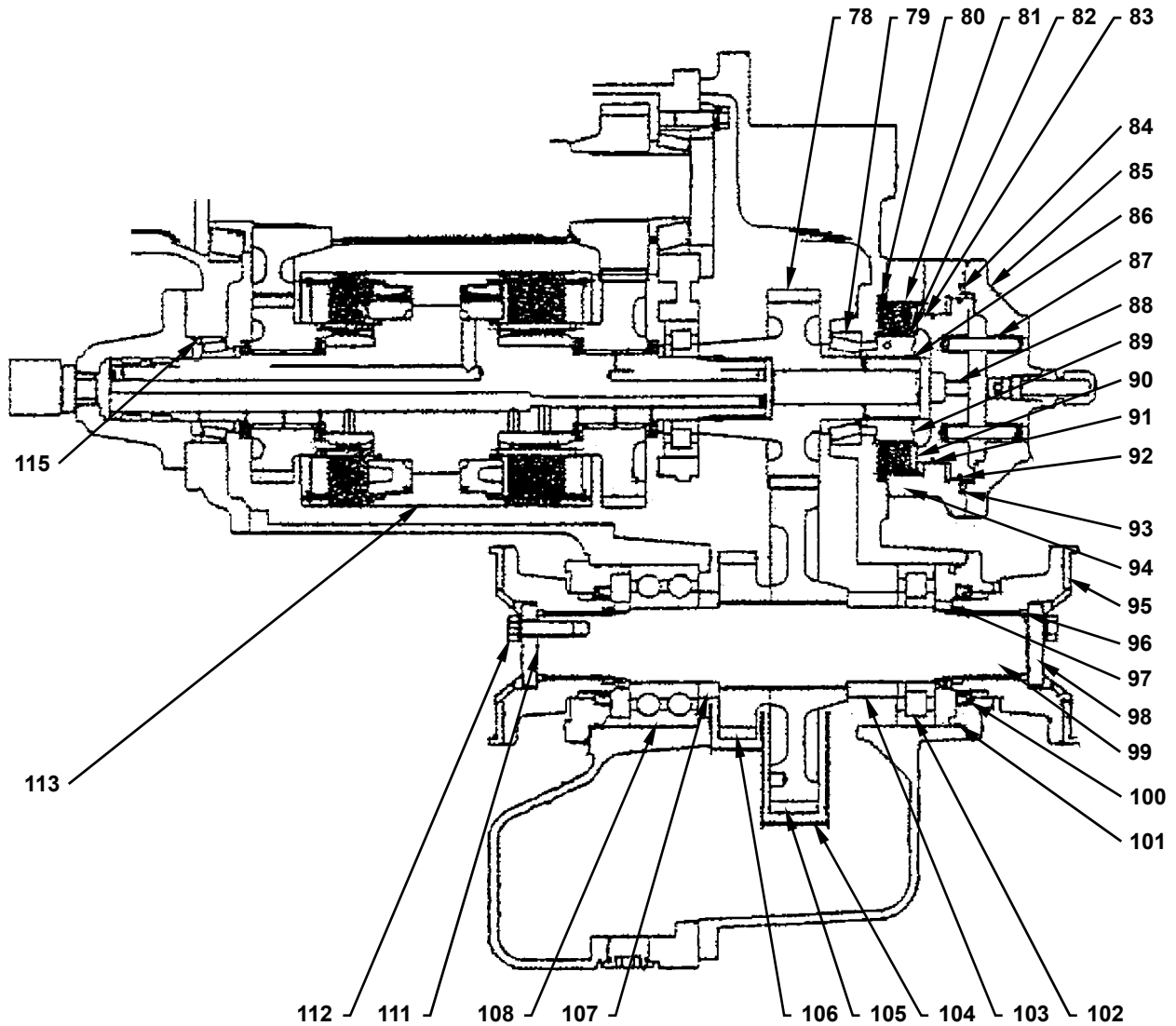


Upper Part of Section A-A

W4GD-03-02-016

- | | | | |
|--------------------------|-----------------------|----------------------|----------------------|
| 55 - Torque Converter | 62 - Gear | 69 - Shim | 75 - Bolt (9 Used) |
| 56 - Ball Bearing | 63 - Bearing | 70 - Bolt (3 Used) | 76 - Washer (9 Used) |
| 57 - Charging Pump Shaft | 64 - U-Nut | 71 - Washer (3 Used) | 77 - Retainer |
| 58 - Charging Pump Gear | 65 - Snap Ring | 72 - Idler Cap | 134 - O-Ring |
| 59 - Ball Bearing | 66 - Bearing | 73 - Shim | 141 - Bearing |
| 60 - Retaining Ring | 67 - Pump Drive Shaft | 74 - Idler Shaft | 142 - Bearing |
| 61 - Shaft | 68 - Forward Clutch | | |

BODY (TRAVEL SYSTEM) / Drive Unit

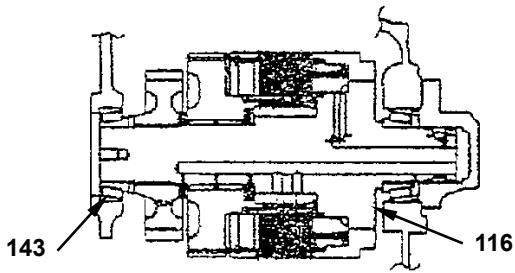


Lower Part of Section A-A

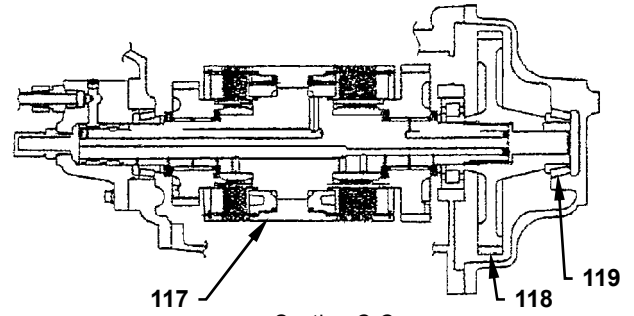
W4GD-03-02-018

78 - Low Gear	85 - Cap	92 - D-Ring	99 - Output Shaft	106 - Gear
79 - Bearing	86 - Retaining Ring	93 - O-Ring	100 - Seal (2 Used)	107 - Spacer
80 - O-Ring	87 - Spring (24 Used)	94 - Brake Housing	101 - O-Ring (2 Used)	108 - Bearing
81 - Plate (7 Used)	88 - Piston	95 - Flange (2 Used)	102 - Bearing	111 - Shim (13 Used)
82 - Disc (6 Used)	89 - Disc Hub	96 - O-Ring (2 Used)	103 - Spacer	112 - Bolt (6 Used)
83 - O-Ring	90 - End Plate	97 - Spacer (2 Used)	104 - Oil Baffle	113 - 1-Speed/2-Speed Clutch
84 - Piston Housing	91 - D-Ring	98 - Retainer Plate (2 Used)	105 - Gear	115 - O-Ring

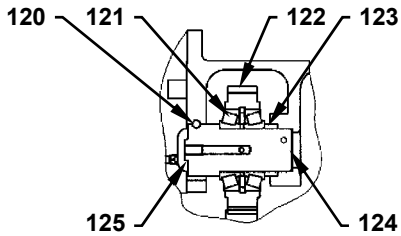
BODY (TRAVEL SYSTEM) / Drive Unit



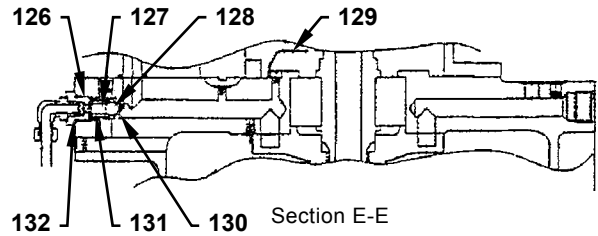
W4GD-03-02-021



W4GD-03-02-022



W4GD-03-02-023



W4GD-03-02-020

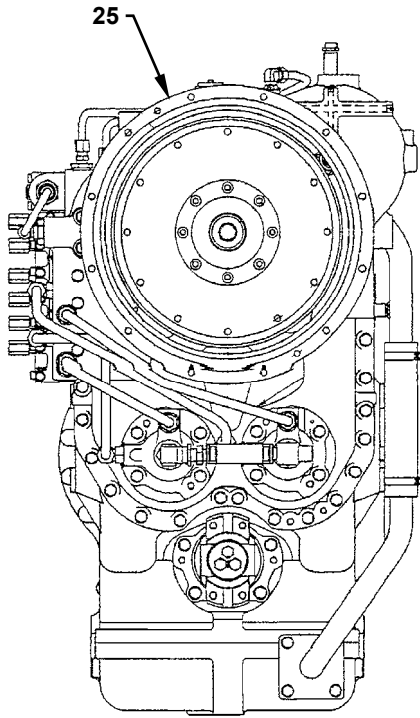
- 116 - Reverse Clutch
- 117 - 3-Speed/4-Speed Clutch
- 118 - High Gear
- 119 - Bearing
- 120 - Ball

- 121 - Bearing
- 122 - Reverse Gear
- 123 - Spacer
- 124 - Shaft
- 125 - Shim

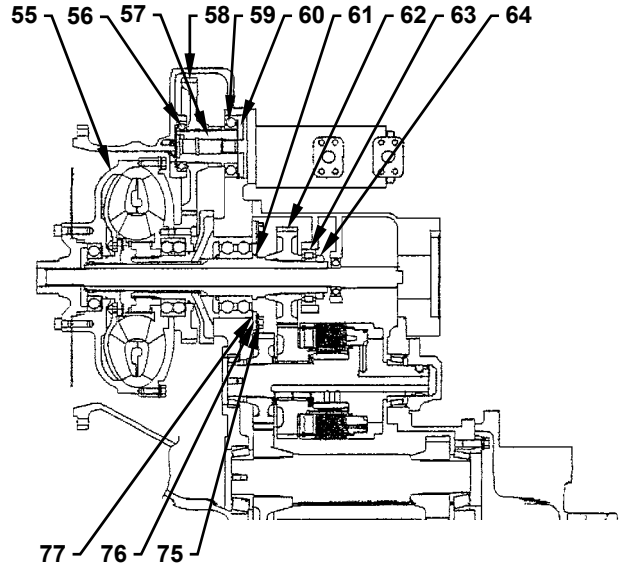
- 126 - O-Ring
- 127 - Spring
- 128 - Ball
- 129 - Bracket

- 130 - Seat
- 131 - Spring Seat
- 132 - Plug
- 143 - Bearing

BODY (TRAVEL SYSTEM) / Drive Unit

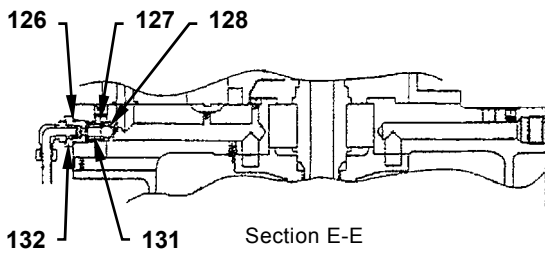


W4GD-03-02-013



Upper Part of Section A-A

W4GD-03-02-017



W4GD-03-02-020

BODY (TRAVEL SYSTEM) / Drive Unit

Assembly of Transmission

Installation of Pump Drive Gear


1. Install ball bearings (56, 59) and charging pump gear (58) and charging pump shaft (57) to torque converter housing (25).
2. Install retaining ring (60) to torque converter housing (25).


Installation of Torque Converter



CAUTION: Torque converter (55) weight: 70 kg (155 lb)

3. Hoist and install torque converter (55) to torque converter housing (25) by using a plastic hammer.
4. Apply LOCTITE #262 onto bolts (75) (9 used). Install retainer (77) to torque converter housing (25) with bolts (75) (9 used) and washers (76) (9 used).

 : 17 mm

 : 92 N·m (9.5 kgf·m, 68 lbf·ft)


5. Install gear (62) and bearing (63) to shaft (61).


6. Install U-nut (64) to shaft (61).

Assembly of Safety Valve

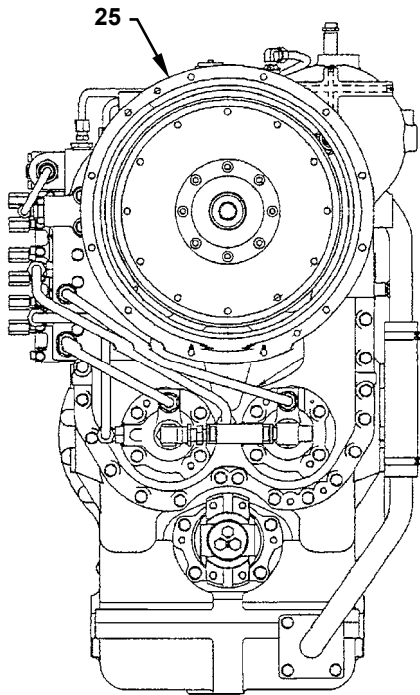
7. Install ball (128), spring seat (131) and spring (127) to torque converter housing (25).

8. Install O-ring (126) to plug (132). Install plug (132) to torque converter housing (25).

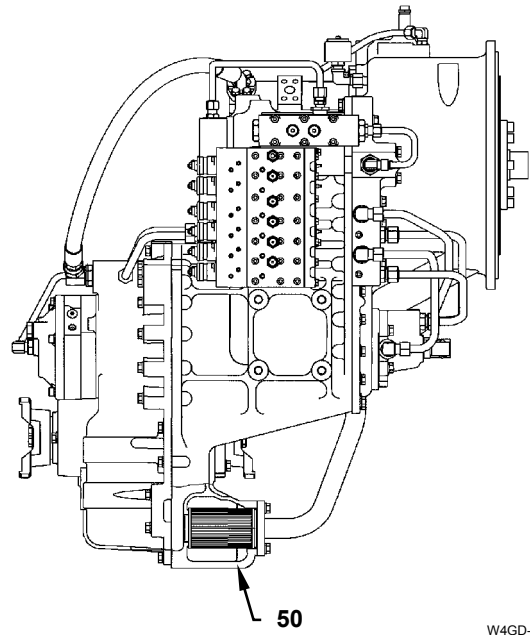
 : 36 mm

 : 175 N·m (18 kgf·m, 129 lbf·ft)

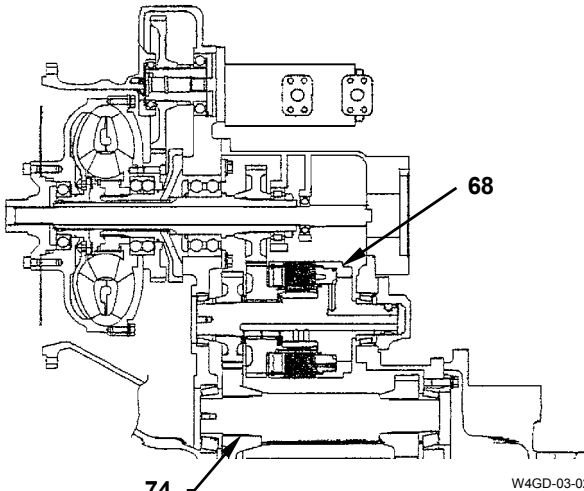
BODY (TRAVEL SYSTEM) / Drive Unit



W4GD-03-02-013

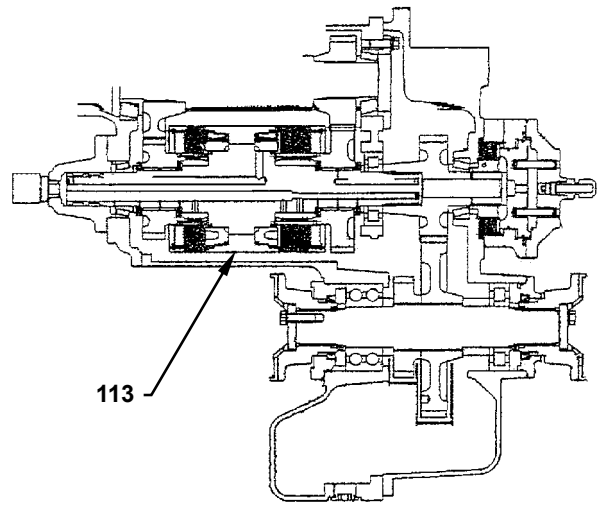


W4GD-03-02-015



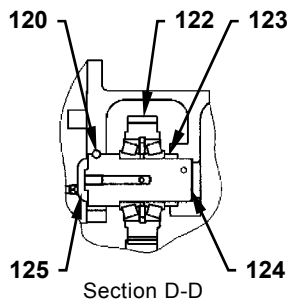
W4GD-03-02-017

Upper Part of Section A-A

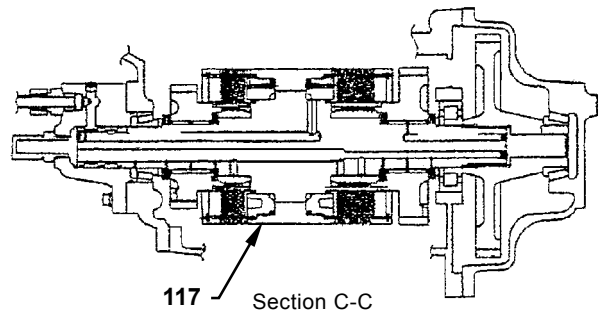


Lower Part of Section A-A

W4GD-03-02-019



W4GD-03-02-023

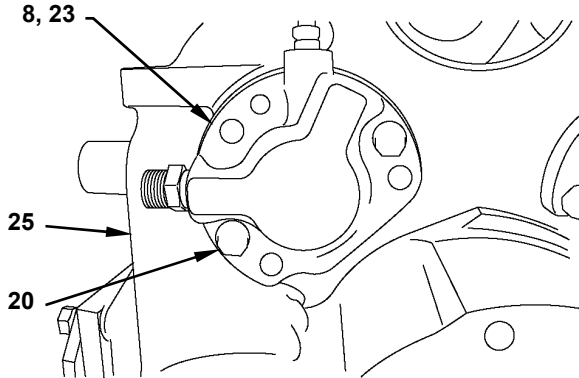


W4GD-03-02-022

BODY (TRAVEL SYSTEM) / Drive Unit

Installation of Clutch Shaft

- Temporarily install forward and reverse distributor caps (8, 23) to torque converter housing (25) with bolts (20) (4 used).

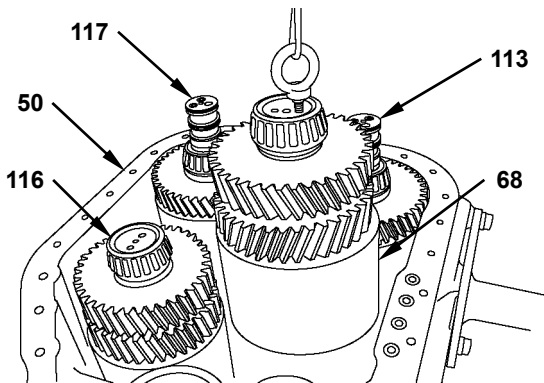


W4GC-03-02-130

- Secure transmission case (50) on a workbench with the torque converter housing (25) mounting surface facing upward.

CAUTION: The forward clutch (68) assembly and the reverse clutch (116) assembly:
weight: 35 kg (80 lb) for each

- Hoist and install forward clutch (68) and reverse clutch (116) to transmission case (50).



W4GC-03-02-131

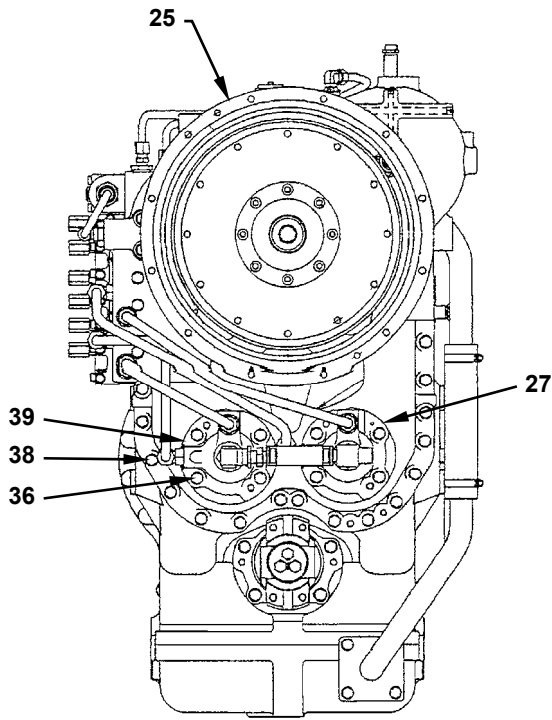
CAUTION: The 1-speed/2-speed clutch (113) assembly and the 3-speed/4-speed clutch (117) assembly:
weight: 55 kg (125 lb) for each

- Hoist and install 1-speed/2-speed clutch (113) and 3-speed/4-speed clutch (117) to transmission case (50).
- Install idler shaft (74) to transmission case (50).
- Install spacer (123) to shaft (124) in transmission case (50).
- Install reverse gear (122) to transmission case (50). Install shaft (124) with ball (120) attached to transmission case (50).

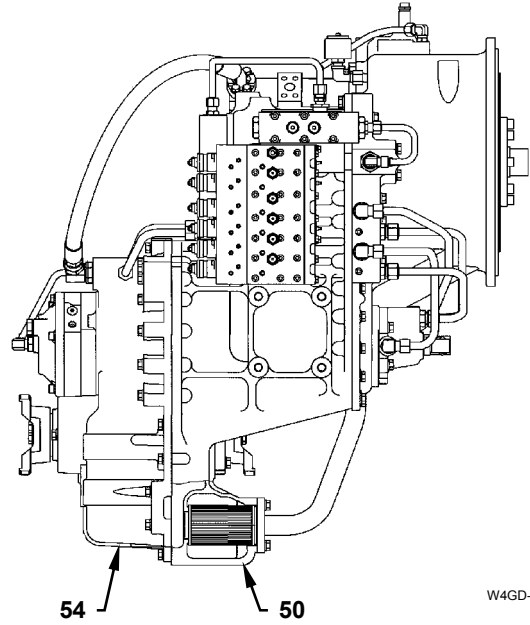
Installation of Torque Converter Housing

- Adjust the shim of reverse gear (124). Measure step dimension X between transmission case (50) and shaft (124) without the shim. Install shim (125) so that the step is between (X-0.01) and (X-0.1).

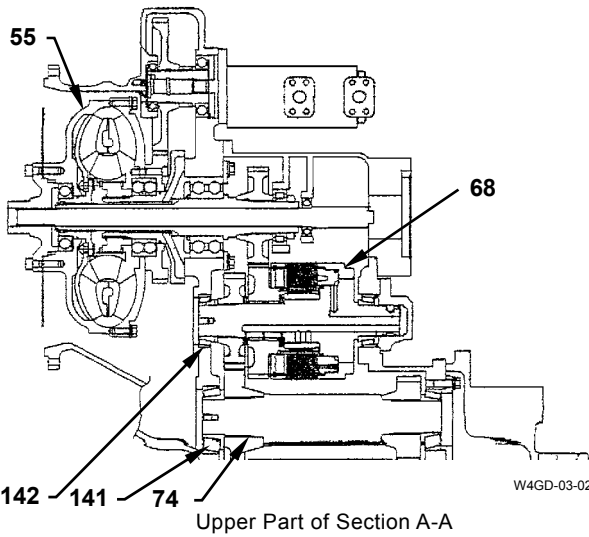
BODY (TRAVEL SYSTEM) / Drive Unit



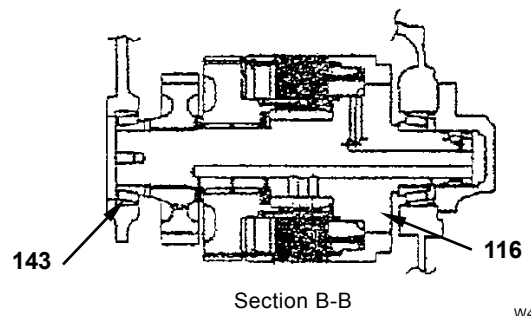
W4GD-03-02-013



W4GD-03-02-015



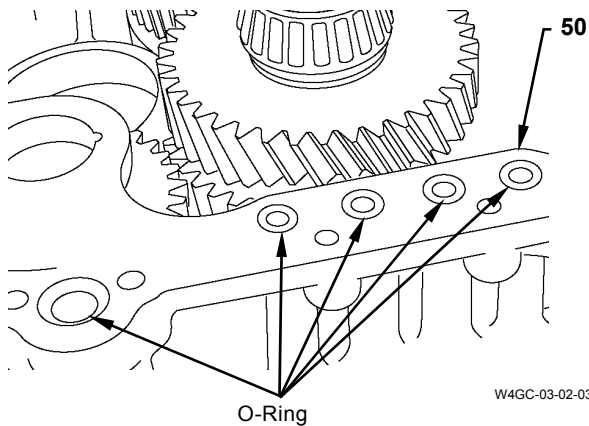
W4GD-03-02-017



W4GD-03-02-021

BODY (TRAVEL SYSTEM) / Drive Unit

17. Install O-rings (5 used) to transmission case (50).





18. Install the outer races of bearings (141, 142 and 143) to the torque converter housing (25) case.

19. Apply LOCTITE FMD-127 onto the mating surface on transmission case (50).

CAUTION: The torque converter housing (25) assembly weight: 175 kg (390 lb)

20. Hoist and install torque converter housing (25) to transmission case (50) with bolts (38) (31 used).

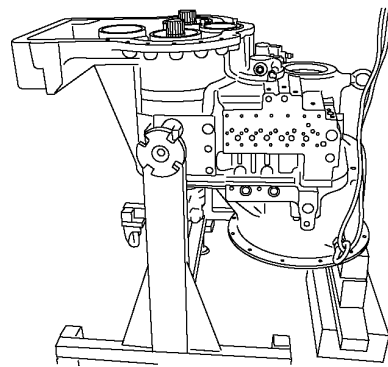
 : 17 mm

 : 34 N·m (3.5 kgf·m, 25 lbf·ft)

Rolling Torque Adjustment of Idler Shaft

21. Temporarily install 1-speed/2-speed and 3-speed/4-speed distributor caps (27, 39) to torque converter housing (25) with bolts (36) (4 used).

22. Turn over transmission case (50).



23. Install a handle to idler shaft (74). Adjust the shim between 1-speed/2-speed and 3-speed/4-speed distributor caps (27, 39) and rear case (54) so that the rolling torque within the specified range is applied to idler shaft (74).

Idler only : 8.8 to 11.2 N·m

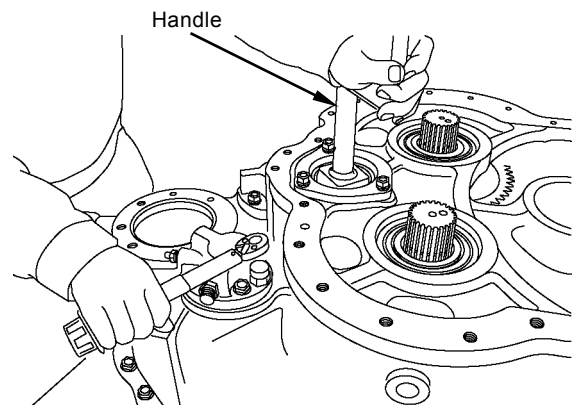
(0.90 to 1.14 kgf·m, 6.5 to 8.3 lbf·ft)

Idler + F : 13.8 to 16.2 N·m

(1.41 to 1.65 kgf·m, 10 to 12 lbf·ft)

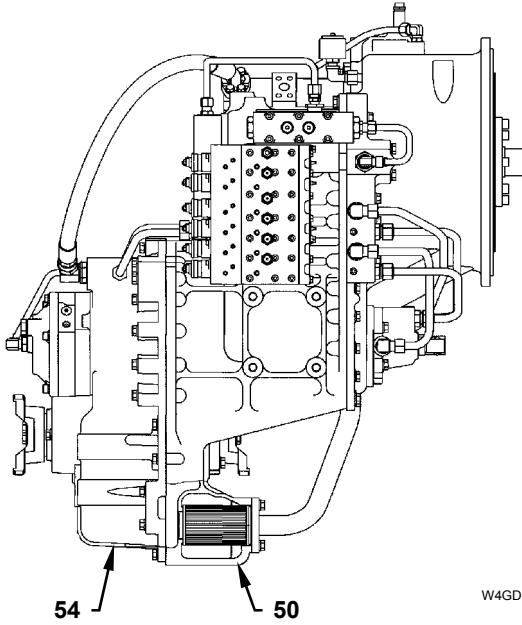
Idler + F + R: 20.0 to 24.0 N·m

(2.04 to 2.45 kgf·m, 14.5 to 17.5 lbf·ft)

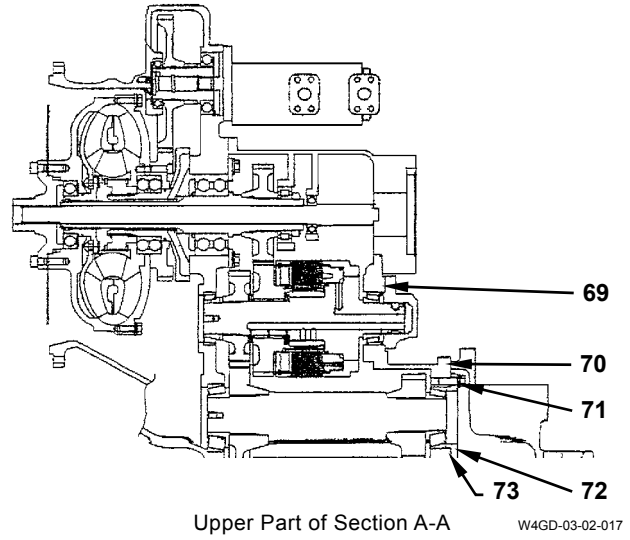


24. Remove 1-speed/2-speed and 3-speed/4-speed distributor caps (27, 39) which are installed temporarily from transmission case (50).

BODY (TRAVEL SYSTEM) / Drive Unit

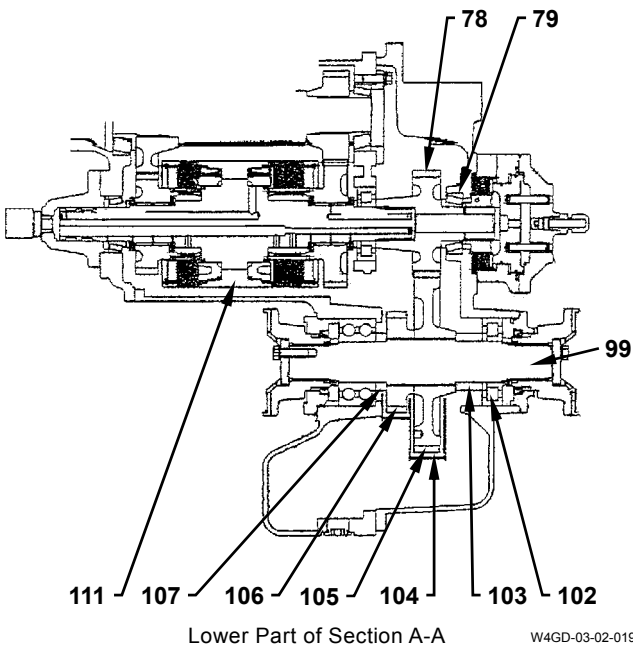


W4GD-03-02-015



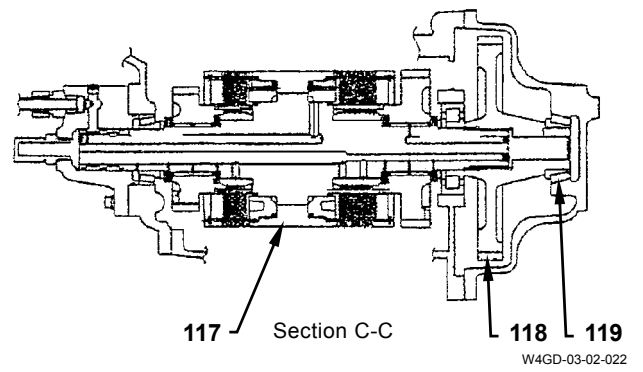
Upper Part of Section A-A

W4GD-03-02-017



Lower Part of Section A-A

W4GD-03-02-019



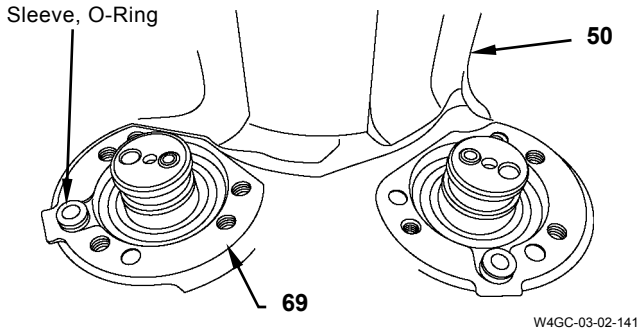
Section C-C

W4GD-03-02-022


BODY (TRAVEL SYSTEM) / Drive Unit


Installation of Forward and Reverse Distributor Caps

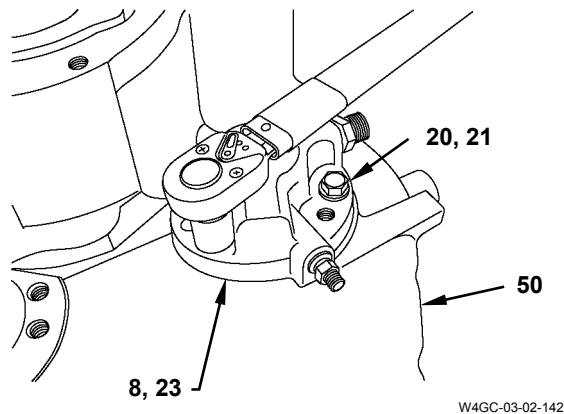
25. Install O-rings (2 used) to sleeves (2 used). Apply grease onto the sleeves (2 used). Install the sleeves (2 used) and adjusted shim (69) to transmission case (50).



26. Install forward and reverse distributor caps (8, 23) to transmission case (50) with bolts (20) (8 used) and washers (21) (8 used).

 : 19 mm

 : 34 N·m (3.5 kgf·m, 25 lbf·ft)



Installation of Gear and Shaft

27. Install idler cap (72) and shim (73) to transmission case (50). Install bolts (70) (3 used) and washers (71) (3 used) to idler cap (72).

28. Install output shaft (99) to transmission case (50).


29. Install spacers (102, 103) to output shaft (99).


30. Install high gear (118) to 3-speed/4-speed clutch (117).

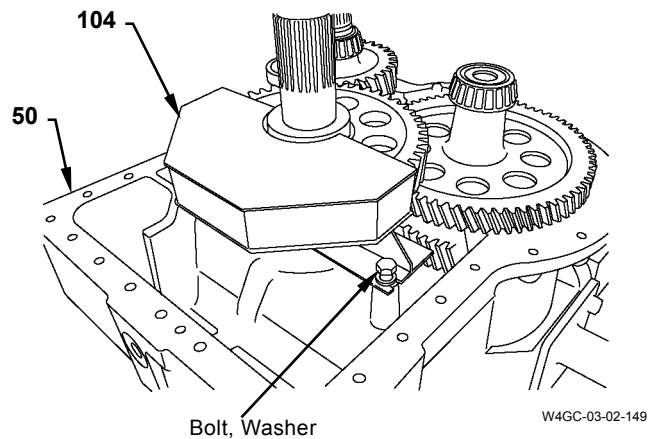
31. Install spacer (107), gear (106) and gear (105) to output shaft (99).

32. Install low gear (78) to 1-speed/2-speed clutch (113).

33. Install oil baffle (104) to transmission case (50) with bolts (2 used) and washers (2 used).

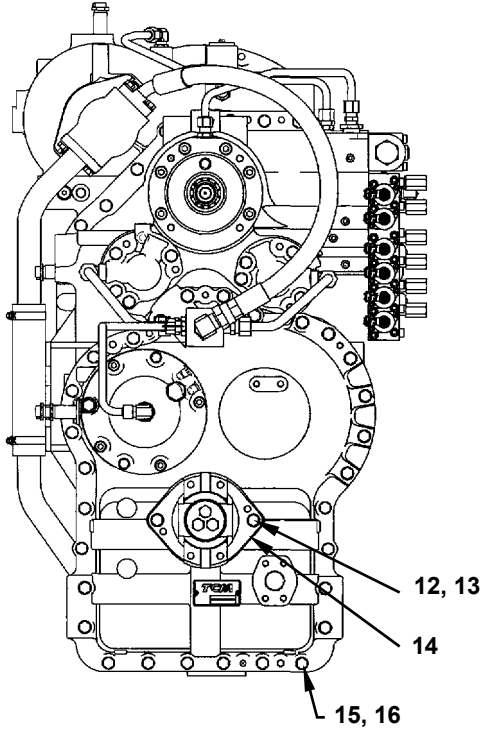
 : 17 mm

 : 34 N·m (3.5 kgf·m, 25 lbf·ft)

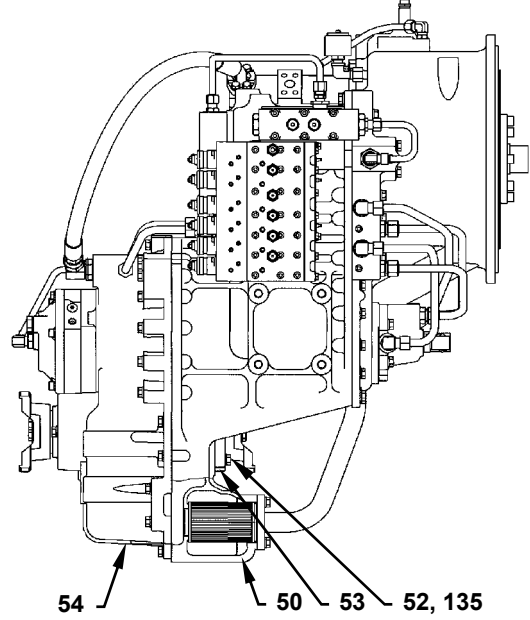


34. Install the outer races of bearings (79, 119) of low gear (78) and high gear (118) to the inside of rear case (54).

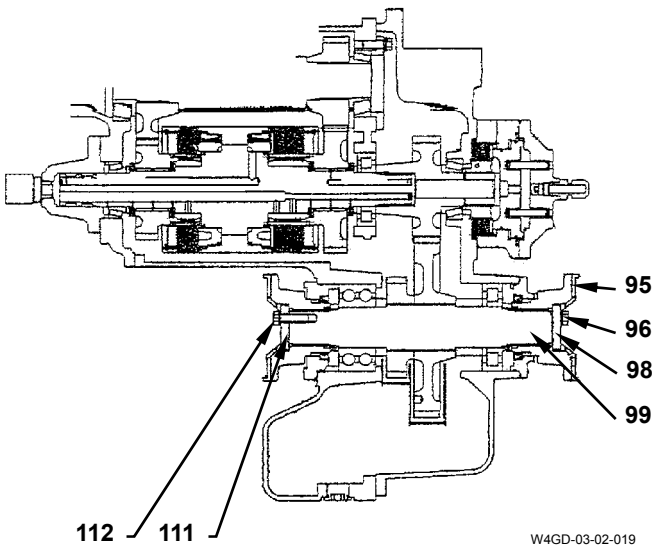
BODY (TRAVEL SYSTEM) / Drive Unit



W4GD-03-02-011



W4GD-03-02-015



Lower Part of Section A-A

W4GD-03-02-019

BODY (TRAVEL SYSTEM) / Drive Unit


Installation of Rear Case


35. Apply LOCTITE FMD-127 onto the mating surface on transmission case (50).



CAUTION: Rear case (54) weight: 50 kg (115 lb)


36. Hoist and install rear case (54) to transmission case (50) with bolts (15) (29 used) and washes (16) (14 used).


 : 17 mm

 : 34 N·m (3.5 kgf·m, 25 lbf·ft)

Shim Adjustment of Output Shaft

37. Install seal retainer (14) to rear case (54) with bolts (12) (2 used) and washers (13) (2 used).

 : 17 mm


 : 34 N·m (3.5 kgf·m, 25 lbf·ft)


38. Install flange (95) to output shaft (99).

39. Temporarily install retainer plate (98) to output shaft (99) with bolts (112) (3 used). Raise output shaft (99) from rear case (54).

40. Adjust the shim of output shaft (99). Measure step dimension X between flange (95) and output shaft (99) without the shim. Install shim (111) so that the step is between (X+0.09) and (X±0).


41. Apply LOCTITE #262 onto bolts (112) (3 used). Install O-ring (96) to output shaft (99). Install retainer plate (98) to output shaft (99) with bolts (112) (3 used).


 : 19 mm

 : 135 N·m (14 kgf·m, 100 lbf·ft)

42. Turn over transmission case (50).

43. Install seal retainer (53) to transmission case (50) with bolts (52) (4 used) and washers (135) (4 used).


 : 17 mm


 : 91 N·m (9.3 kgf·m, 67 lbf·ft)

44. Install flange (95) to output shaft (99).

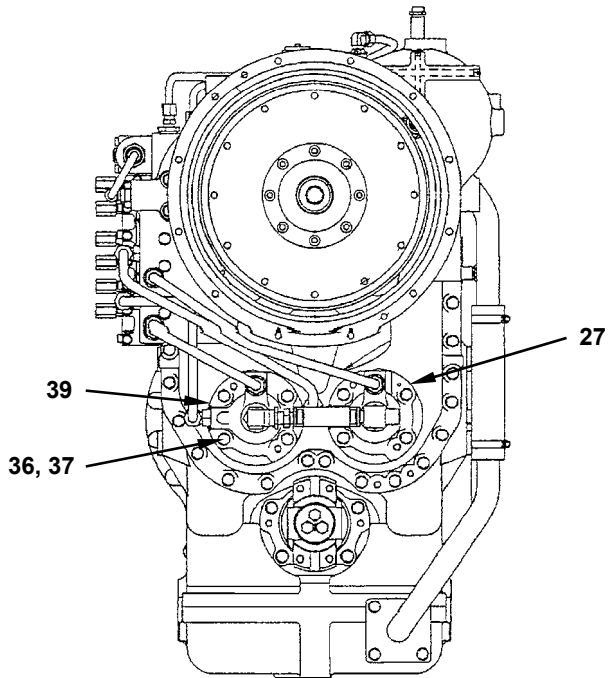
45. Adjust the shim of output shaft (99). Measure step dimension X between flange (95) and shaft (99) without the shim. Install shim (111) so that the step is between (X+0.09) and (X±0).

46. Install O-ring (96) to output shaft (99). Install retainer plate (98) to output shaft (99) with bolts (52) (4 used) and washers (135) (4 used).

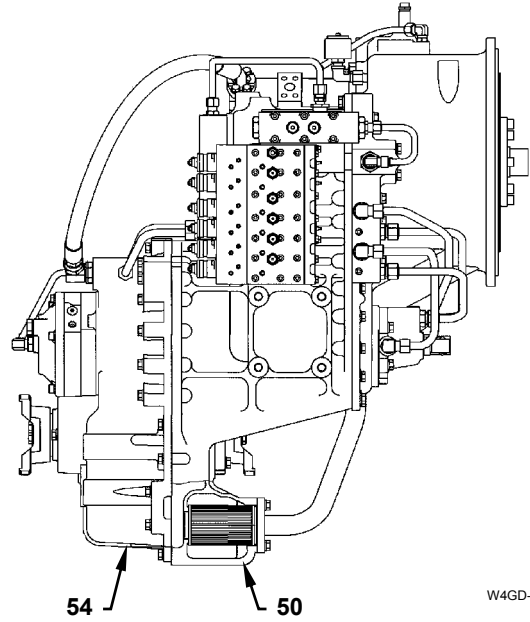
 : 19 mm

 : 135 N·m (14 kgf·m, 100 lbf·ft)

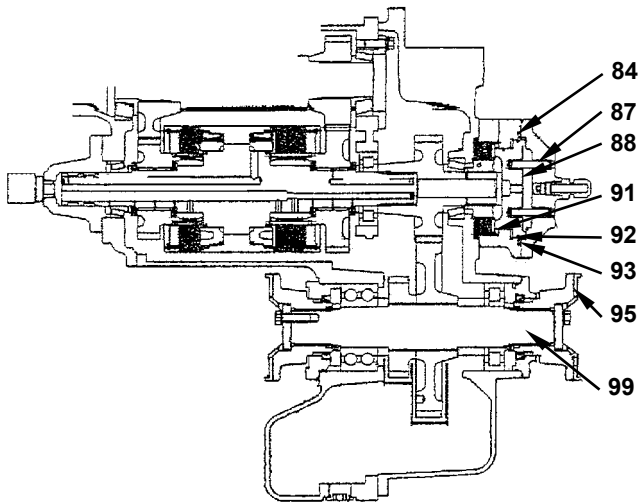
BODY (TRAVEL SYSTEM) / Drive Unit



W4GD-03-02-013



W4GD-03-02-015



Lower Part of Section A-A

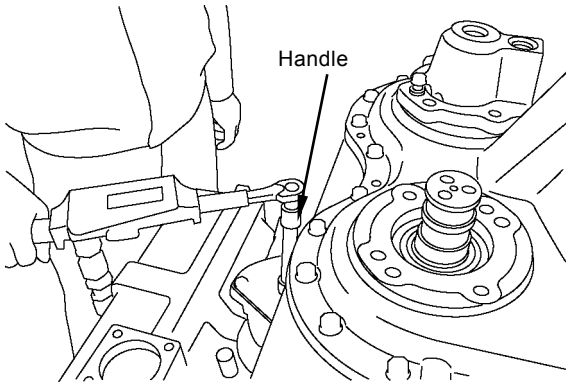
W4GD-03-02-019

BODY (TRAVEL SYSTEM) / Drive Unit

47. Install a handle to flange (95). Adjust the shim between 1-speed/2-speed and 3-speed/4-speed distributor caps (27, 39) and rear case (54) so that the rolling torque within the specified range is applied to output shaft (99).

3-speed/4-speed clutch: 8.0 to 10.0 N·m
(0.8 to 1.0 kgf·m, 5.9 to 7.4 lbf·ft)


1-speed/2-speed clutch: 20.0 to 24.0 N·m
(2.0 to 2.4 kgf·m, 14.5 to 17.5 lbf·ft)




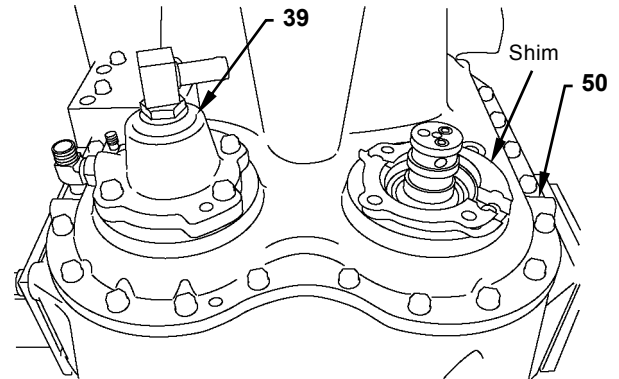
W4GC-03-02-156

Installation of Speed Shift Distributor Cap

48. Install the adjusted shims to 1-speed/2-speed and 3-speed/4-speed distributor caps (27, 39). Install 1-speed/2-speed and 3-speed/4-speed distributor caps (27, 39) to transmission case (50) with bolts (36) (8 used) and washers (37) (8 used).

 : 17 mm

 : 34 N·m (3.5 kgf·m, 25 lbf·ft)



W4GC-03-02-157

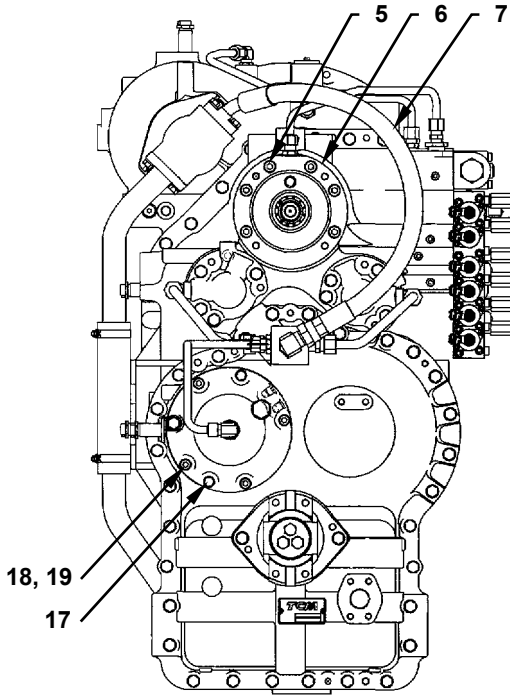
Installation of Parking Brake

49. Install D-rings (91, 92) to piston (88). Install piston (88) to piston housing (84) while aligning the matching marks.

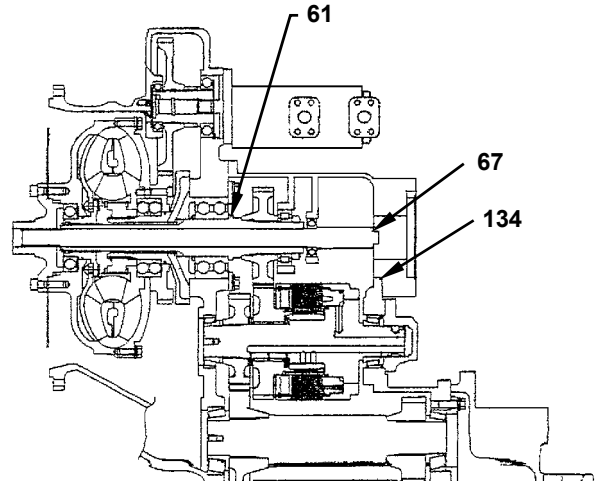
50. Install O-ring (93) to piston housing (84).

51. Install springs (87) (24 used) to piston (88).

BODY (TRAVEL SYSTEM) / Drive Unit

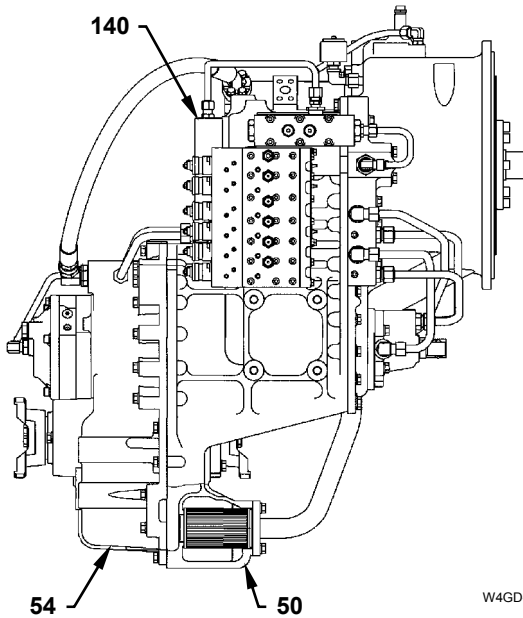


W4GD-03-02-011

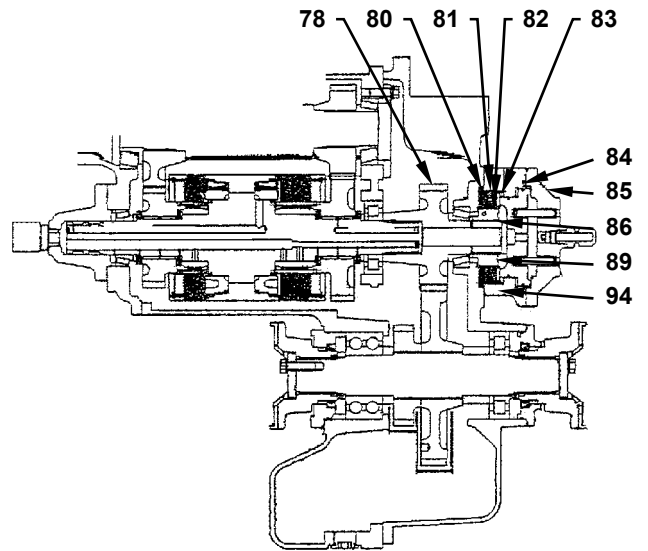


Upper Part of Section A-A

W4GD-03-02-017



W4GD-03-02-015





Lower Part of Section A-A

W4GD-03-02-019

BODY (TRAVEL SYSTEM) / Drive Unit


52. Install cap (85) to piston housing (84) with bolts (17) (2 used).


 : 14 mm

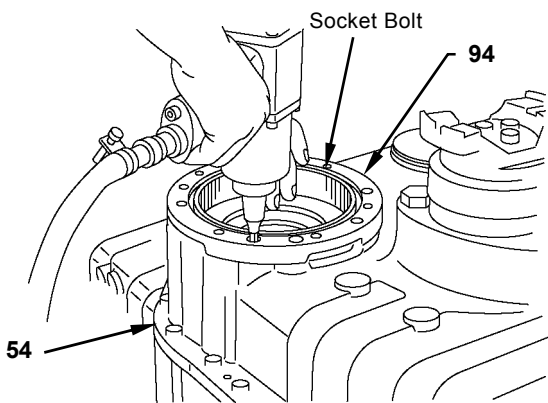
 : 52 N·m (5 kgf·m, 38 lbf·ft)

53. Install disc hub (89) to low gear (78). Install retaining ring (86) to low gear (78).

54. Install O-rings (80, 83) to brake housing (94). Install brake housing (94) to rear case (54) with socket bolts (2 used).

 : 8 mm


 : 52 N·m (5 kgf·m, 38 lbf·ft)




W4GC-03-02-042

55. Install plates (81) (7 used) and discs (82) (6 used) to brake housing (94) alternately. Install end plate (63) to brake housing (94).

56. Install piston housing (84) to rear case (54) with socket bolts (18) (6 used) and washers (19) (6 used).

 : 8 mm


 : 91 N·m (9.3 kgf·m, 67 lbf·ft)


Installation of Pump Spacer

57. Install pump drive shaft (67) to shaft (61).

58. Install O-ring (134) to pump spacer (6).

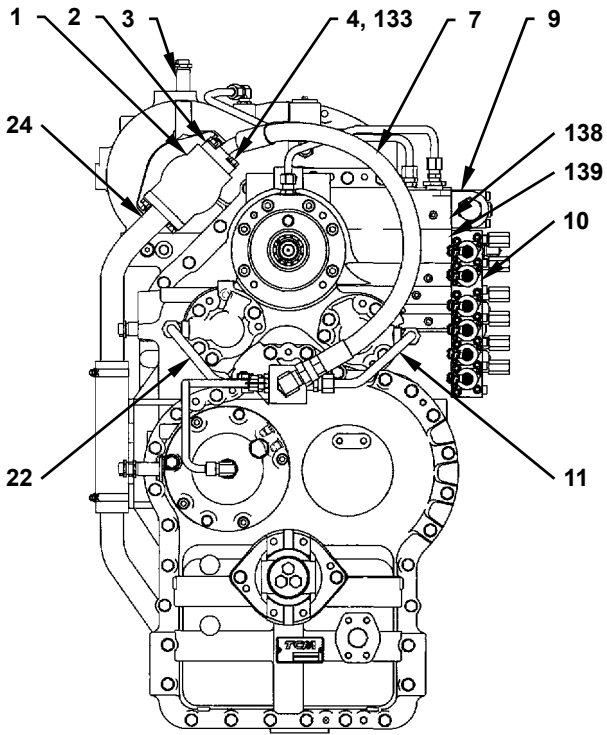
59. Install pump spacer (6) to transmission case (50) with socket bolts (5) (6 used).

 : 10 mm

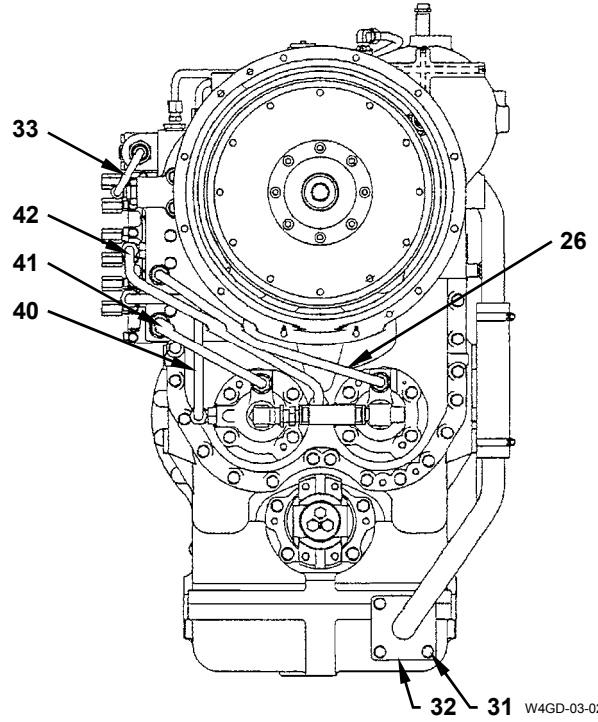
 : 91 N·m (9.3 kgf·m, 67 lbf·ft)

60. Apply LOCTITE #572 onto orifice (140). Install orifice (140) to pump spacer (7).

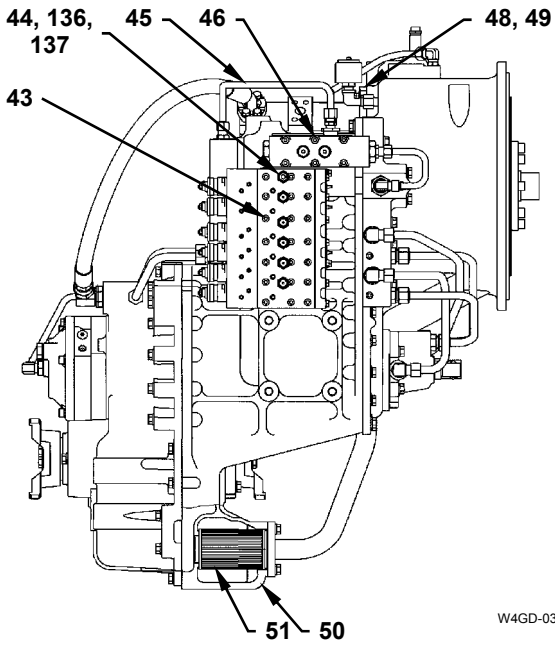
BODY (TRAVEL SYSTEM) / Drive Unit



W4GD-03-02-011



W4GD-03-02-013





W4GD-03-02-015









BODY (TRAVEL SYSTEM) / Drive Unit

Installation of Charging Pump

61. Apply LOCTITE FMD-127 onto the mating surface on charging pump (1). Install charging pump (1) to transmission case (50) with bolts (48) (2 used) and washers (49) (2 used).

 : 17 mm

 : 34 N·m (3.5 kgf·m, 25 lbf·ft)

62. Install strainer (51) to transmission case (50).
63. Install suction tube (24) and gasket (32) to transmission case (50) with bolts (31) (4 used).
-  : 17 mm
-  : 34 N·m (3.5 kgf·m, 25 lbf·ft)
64. Connect hose (7) and suction tube (24) to charging pump (1) with split flanges (2) (2 used), washers (133) (8 used) and bolts (4) (8 used).
-  : 14 mm
-  : 21 N·m (2.1 kgf·m, 15.5 lbf·ft)
65. Connect pipes (11, 22, 26, 33, 40, 41, 42 and 45) to transmission case (50).
-  : 27 mm
-  : 93 N·m (9.5 kgf·m, 69 lbf·ft)
-  : 36 mm
-  : 157 N·m (16 kgf·m, 116 lbf·ft)


Installation of Control Valve


66. Install gasket (139) to control valve (10).




CAUTION: Control valve (10) weight: 25 kg (60 lb)


67. Install control valve (10) to transmission case (50) with socket bolts (43) (21 used).

 : 6 mm

 : 9.8 N·m (1 kgf·m, 7.2 lbf·ft)


68. Apply LOCTITE #572 onto plug (136) in connector (44). Connect plug (136) and install O-ring (137) to connectors (44) (6 used). Connect connector (44) (6 used) to control valve (10).


 : 21 mm

 : 9.8 N·m (1 kgf·m, 7.2 lbf·ft)

69. Install gasket (138) to regulator valve (9).


70. Install regulator valve (9) to transmission case (50) with socket bolts (46) (6 used).

 : 6 mm

 : 9.8 N·m (1 kgf·m, 7.2 lbf·ft)

Installation of Sensor

71. Apply LOCTITE #572 onto sensor (3). Install sensors (3) (4 used) to transmission case (50). Secure sensor (3) at the position returned to 2 turns after attaching sensor (3) to the gear.

 : 27 mm

BODY (TRAVEL SYSTEM) / Drive Unit

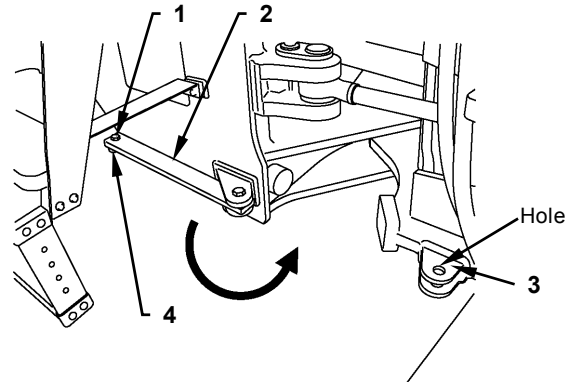
(Blank)

BODY (TRAVEL SYSTEM) / Axle

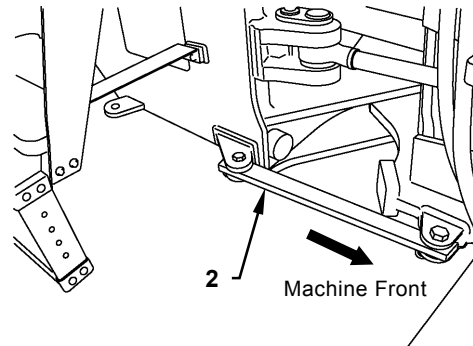
REMOVAL AND INSTALLATION OF AXLE

Preparation for Removal of Front Axle

1. Secure articulate lock bar (2) to the hole on front frame (3) with set pin (1) and β (beta) pin (4).



M4GB-01-135

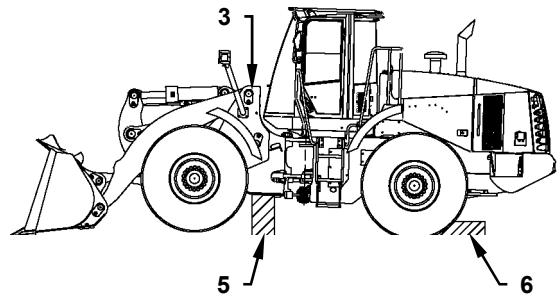


M4GB-01-136



CAUTION: Machine weight: 14500 kg (32000 lb)

2. Place a hydraulic jack on both sides of front frame (3). Raise front frame (3). Insert stand (5) under front frame (3). Set wheel stopper (6) to the rear wheel. Lower the bucket end on the ground. Stop the engine.




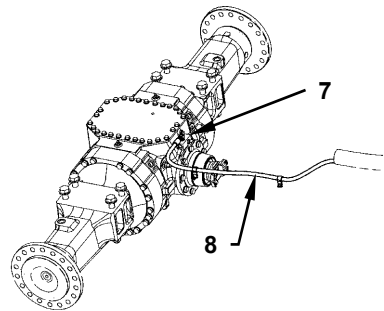
W4GB-03-03-101

BODY (TRAVEL SYSTEM) / Axle

Removal of Front Axle

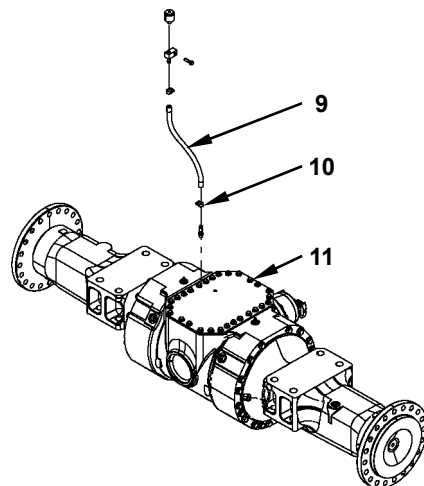
CAUTION: As the accumulator is installed to the brake hydraulic circuit, depress the brake pedal at least 50 strokes in order to reduce the pressure.

1. Remove the front tires (2 used). (Refer to W3-1.)
2. Remove the propeller shaft. (Refer to W3-4.)
3. Disconnect hose (8) from block (7).
 : 19 mm



W4GB-03-03-102

4. Remove clip (10) from hose (9). Disconnect hose (9) from front axle (11).

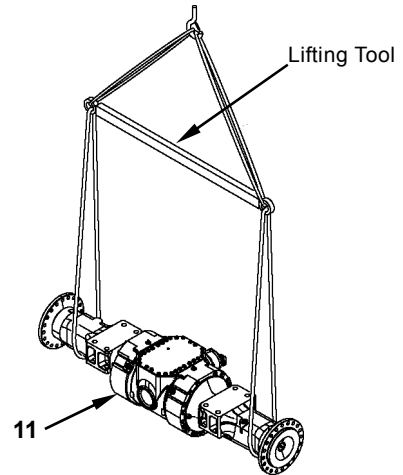


W4GB-03-03-103

BODY (TRAVEL SYSTEM) / Axle


CAUTION: Front axle (11) weight: 760 kg (1700 lb)

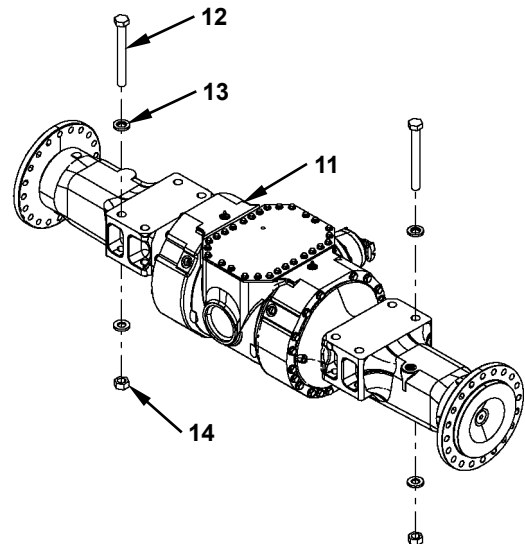
5. Hoist and hold front axle (11) by using a lifting tool.



W4GB-03-03-104

6. Remove nuts (14) (8 used), washers (13) (16 used) and bolts (12) (8 used) from front axle (11) and front frame (3).

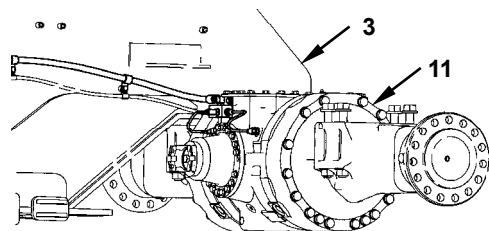
 : 36 mm



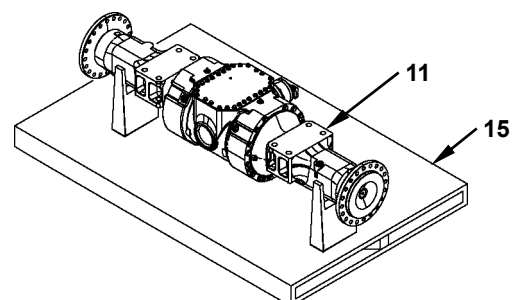
W4GB-03-03-105

7. Remove front axle (11) from front frame (3). Place front axle (11) on stand (15). Remove front axle (11) from the machine.

CAUTION: When leaving front axle (11) removed for prolonged time, place stand (15) to the front axle (11) secured position of front frame (3) in order to stabilize the machine.



W4GD-03-03-001

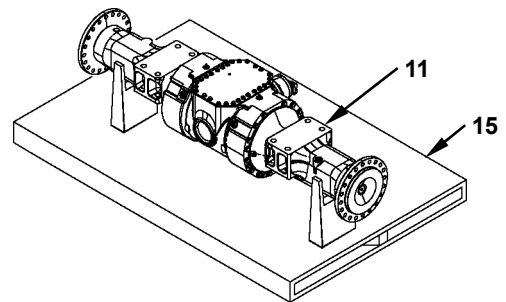


W4GB-03-03-106

BODY (TRAVEL SYSTEM) / Axle

Installation of Front Axle

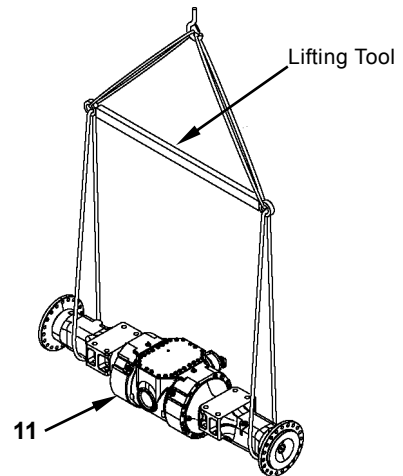
1. Place front axle (11) on stand (15). Push front axle (11) to the mounting position in front frame (3).



CAUTION: Front axle (11) weight: 760 kg (1700 lb)


W4GB-03-03-106


2. Hoist front axle (11) to the mounting part in front frame (3) by using a lifting tool.

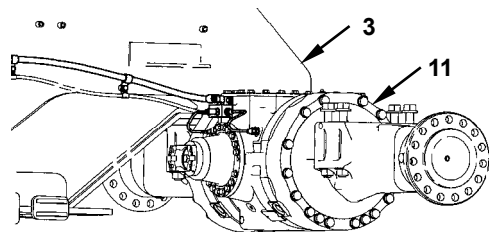


W4GB-03-03-104

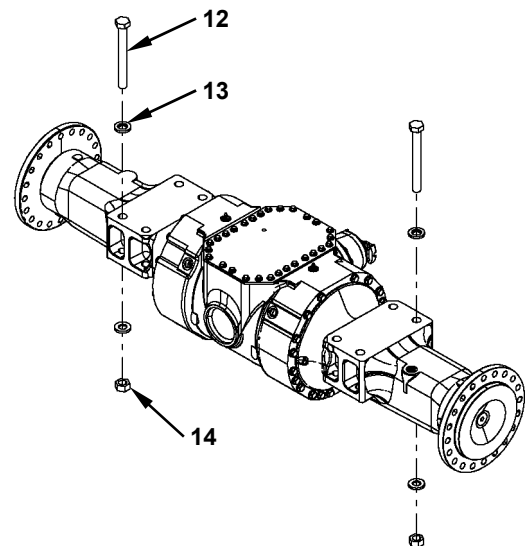
3. Install front axle (11) to front frame (3) with bolts (12) (8 used), washers (13) (16 used) and nuts (14) (8 used).

 : 36 mm

 : 785 N·m (80 kgf·m, 580 lbf·ft)



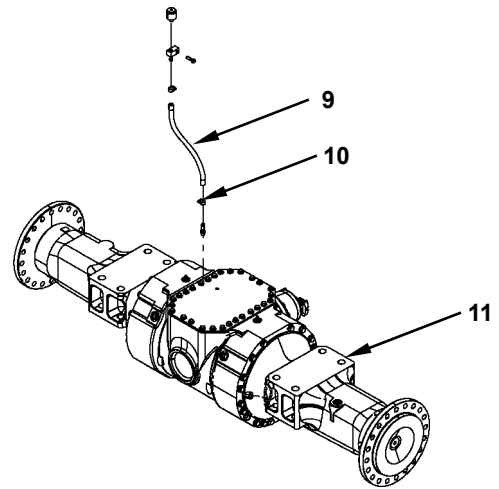
W4GD-03-03-001



W4GB-03-03-105


BODY (TRAVEL SYSTEM) / Axle


4. Connect hose (9) to front axle (11) with clip (10).

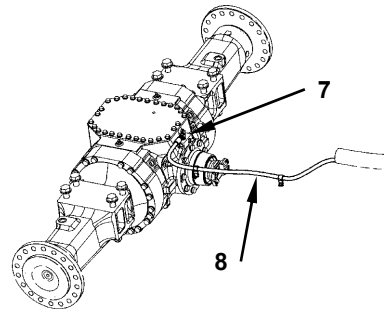


W4GB-03-03-103

5. Connect hose (8) to block (7).

 : 19 mm

 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)



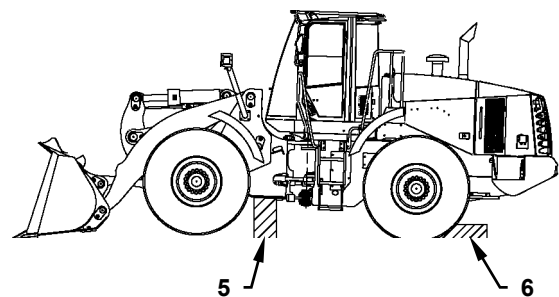
W4GB-03-03-102

6. Install the propeller shaft. (Refer to W3-4.)

7. Install the front tires (2 used). (Refer to W3-1.)

 **CAUTION: Machine weight: 14500 kg (32000 lb)**

8. After completing the work, check the hydraulic oil level. Start the engine and check for any oil leaks. Bleed air from the brake circuit. (Refer to T5-6 in Technical Manual.) Raise the bucket. Set a hydraulic jack on both sides of the front frame. Raise the front frame side. Remove stand (5) and rear wheel stopper (6).

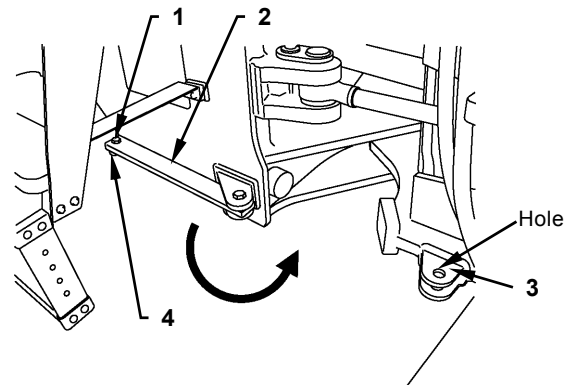


W4GB-03-03-101

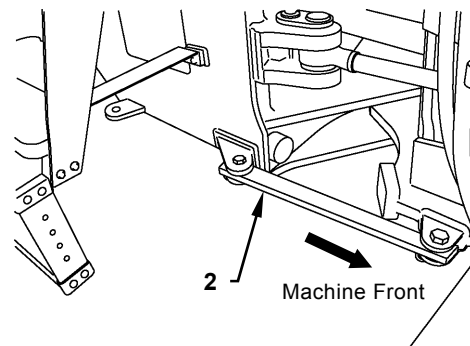
BODY (TRAVEL SYSTEM) / Axle

Preparation for Removal of Rear Axle

1. Secure articulate lock bar (2) to the hole on front frame (3) with set pin (1) and β (beta) pin (4).



M4GB-01-135

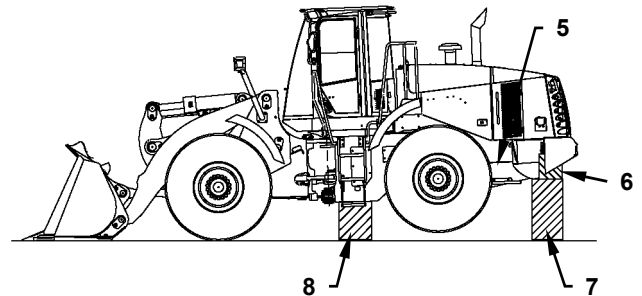


M4GB-01-136



CAUTION: Machine weight: 14500 kg (32000 lb)

2. Place a hydraulic jack on both sides of rear frame (5). Raise rear frame (5). Insert stand (8) under rear frame (5). Check for the looseness of the counterweight mounting bolt. Place stands (6, 7) fitted to the V-shaped weight in order not to apply the machine weight excessively. Lower the bucket on the ground. Stop the engine.




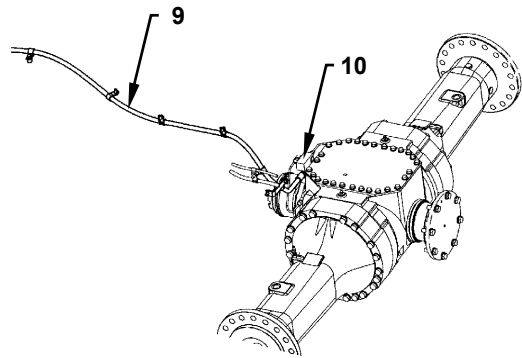
W4GB-03-03-107

BODY (TRAVEL SYSTEM) / Axle

Removal of Rear Axle

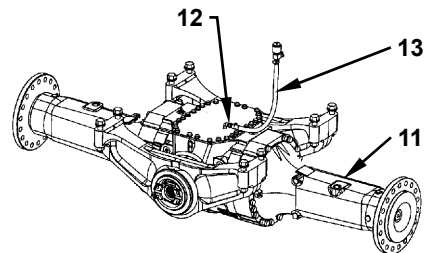
CAUTION: As the accumulator is installed to the brake hydraulic circuit, depress the brake pedal at least 50 strokes in order to reduce the pressure.

1. Remove the rear tires (2 used). (Refer to W3-1.)
2. Remove the propeller shaft. (Refer to W3-4.)
3. Disconnect hose (9) from block (10).
 : 19 mm



W4GB-03-03-109

4. Remove clip (12) from hose (13). Disconnect hose (13) from rear axle (11).

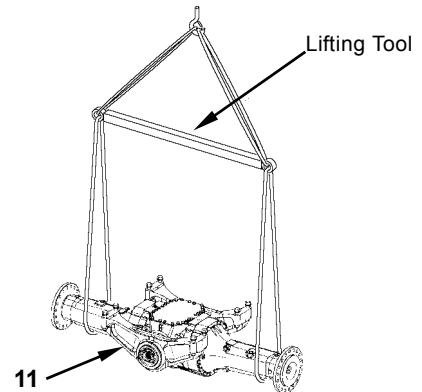


W4GB-03-03-110

BODY (TRAVEL SYSTEM) / Axle


CAUTION: Rear axle (11) weight: 725 kg (1600 lb)

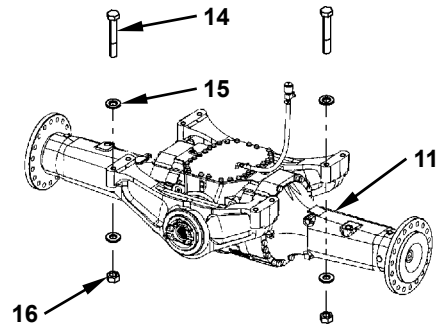
5. Hoist and hold rear axle (11) by using a lifting tool.



W4GB-03-03-111

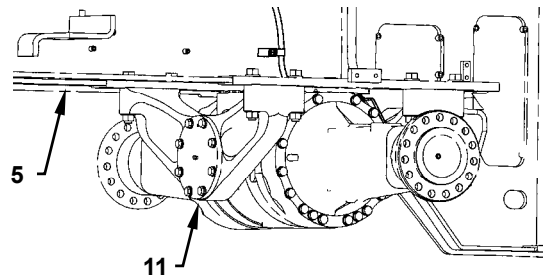
6. Remove nuts (16) (8 used), washers (15) (16 used) and bolts (14) (8 used) from rear axle (11) and rear frame (5).

 : 36 mm

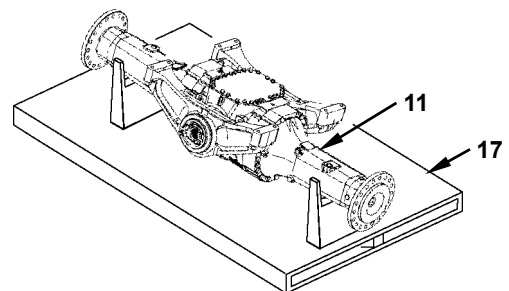


W4GB-03-03-112

7. Remove rear axle (11) from rear frame (5). Place rear axle (11) on stand (17). Remove rear axle (11) from the machine.



W4GD-03-03-002

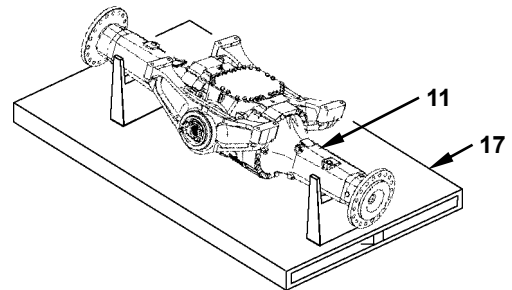


W4GB-03-03-113

BODY (TRAVEL SYSTEM) / Axle

Installation of Rear Axle

1. Place rear axle (11) on stand (17). Push rear axle (11) to the mounting position in rear frame (5).

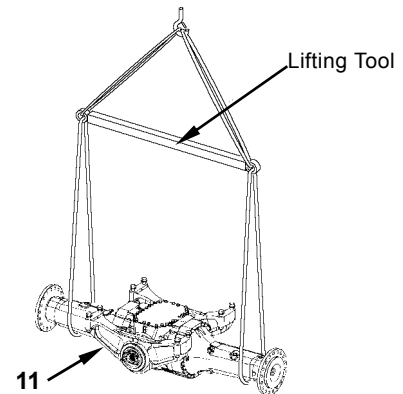


W4GB-03-03-113




CAUTION: Rear axle (11) weight: 725 kg (1600 lb)


2. Hoist rear axle (11) to the mounting part in rear frame (5) by using a lifting tool.

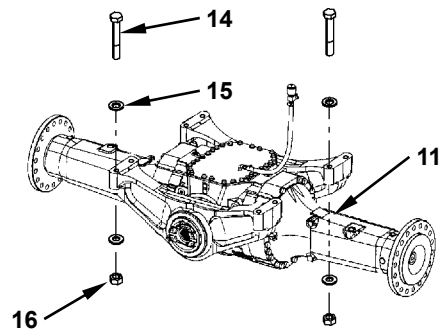


W4GB-03-03-111

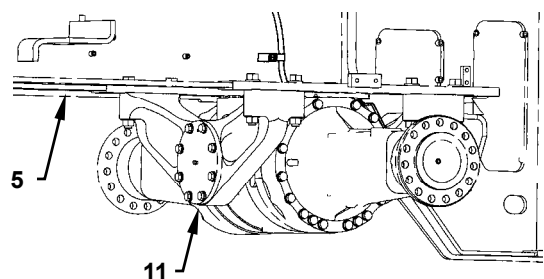
3. Install rear axle (11) to rear frame (5) with bolts (14) (8 used), washers (15) (16 used) and nuts (16) (8 used).

 : 36 mm

 : 890 N·m (91 kgf·m, 660 lbf·ft)



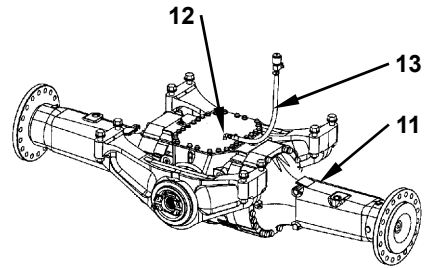
W4GB-03-03-112



W4GD-03-03-002


BODY (TRAVEL SYSTEM) / Axle


4. Connect hose (13) to rear axle (11) with clip (12).

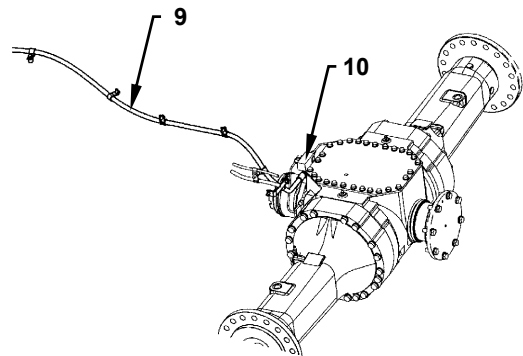


W4GB-03-03-110

5. Connect hose (9) to block (10).

 : 19 mm

 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)



W4GB-03-03-109

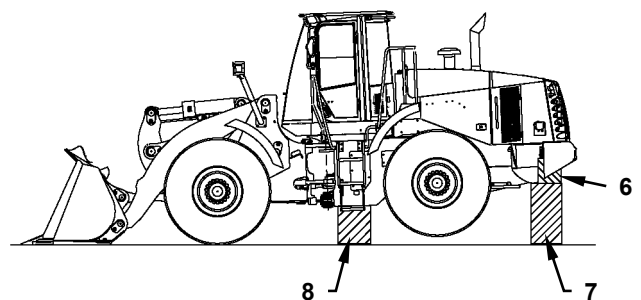
6. Install the propeller shaft. (Refer to W3-4.)

7. Install the rear tires (2 used). (Refer to W3-1.)



CAUTION: Machine weight: 14500 kg (32000 lb)

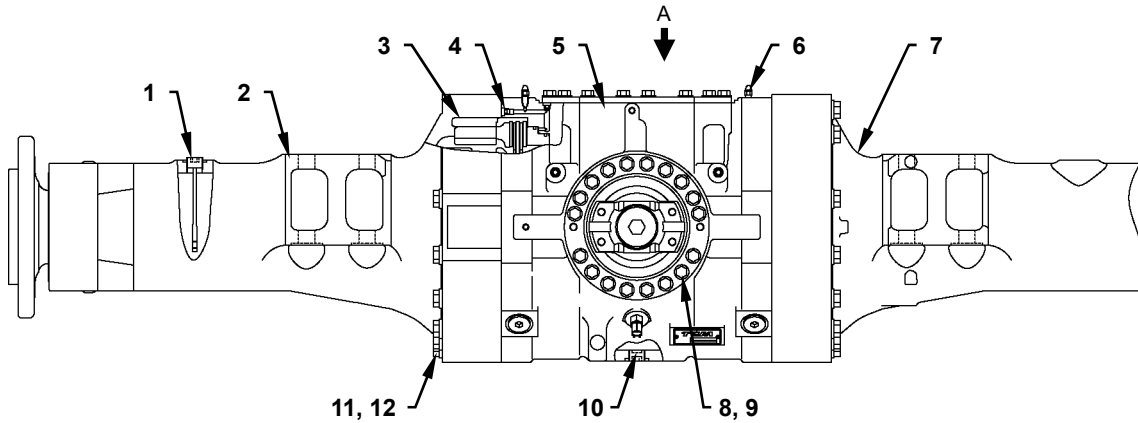
8. After completing the work, check the oil level. Start the engine and check for any oil leaks. Bleed air from the brake circuit. (Refer to T5-6 in Technical Manual.) Raise the bucket. Set a hydraulic jack on both sides of the rear frame. Raise the rear frame side. Remove stands (6, 7 and 8).



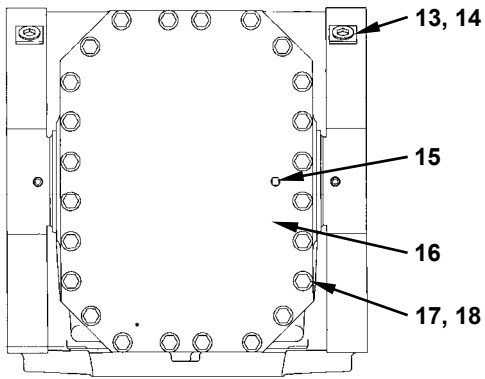
W4GB-03-03-107

BODY (TRAVEL SYSTEM) / Axle

DISASSEMBLY OF AXLE



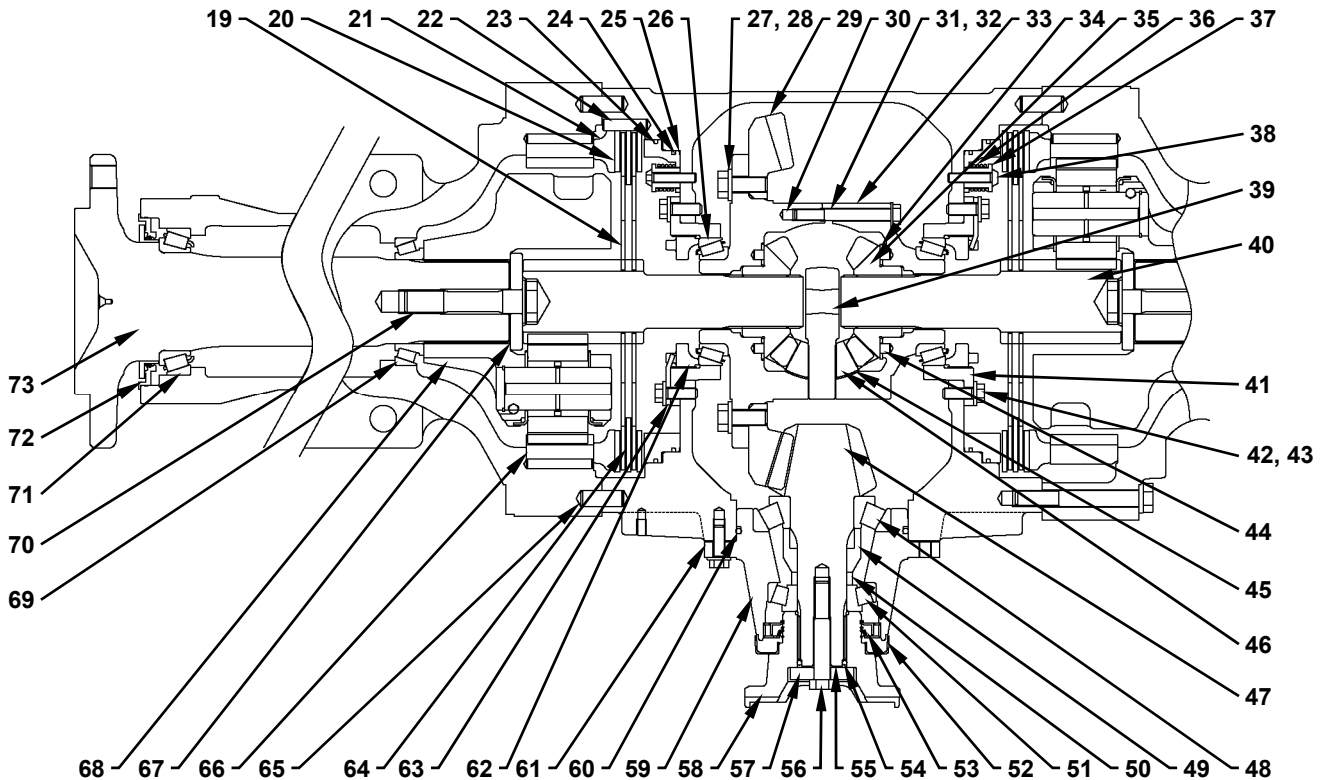
W4GD-03-03-008



View A

W4GD-03-03-003

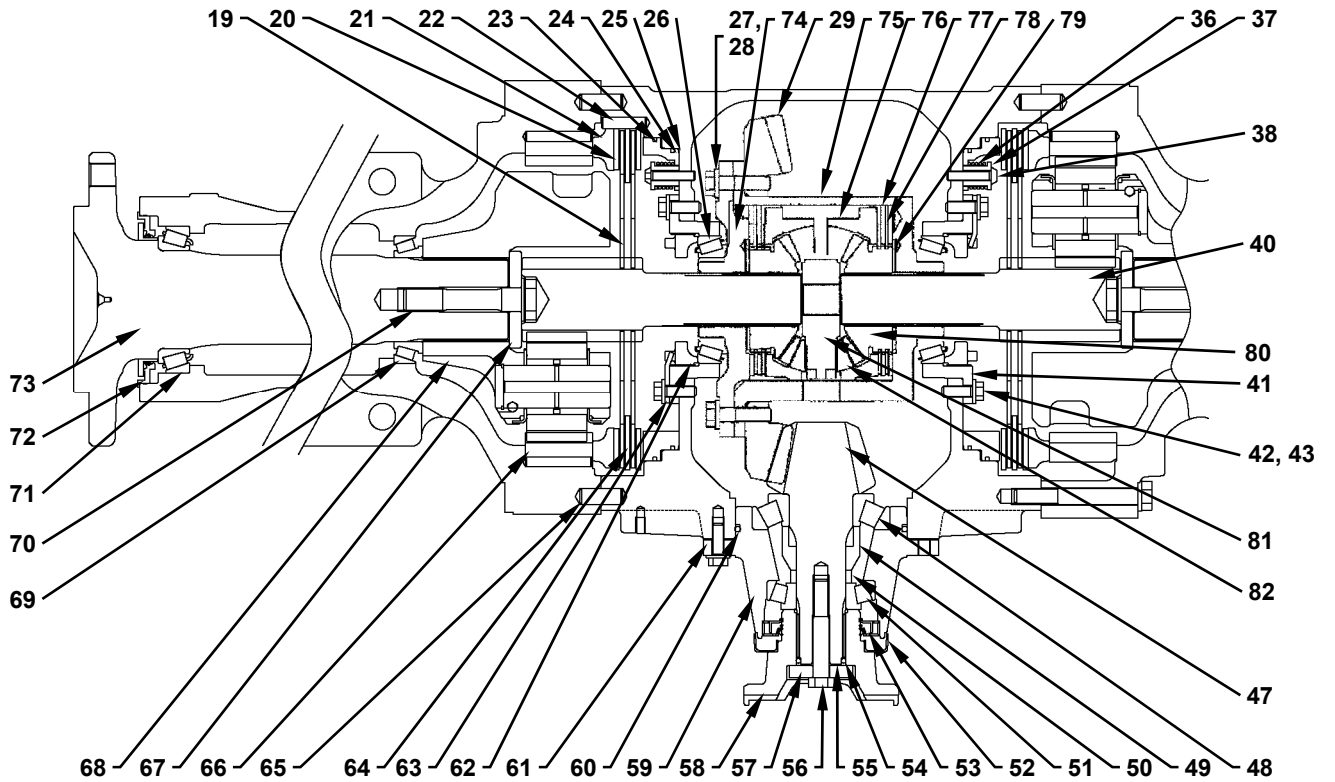
- Axle with TPD attached



W4GD-03-03-004

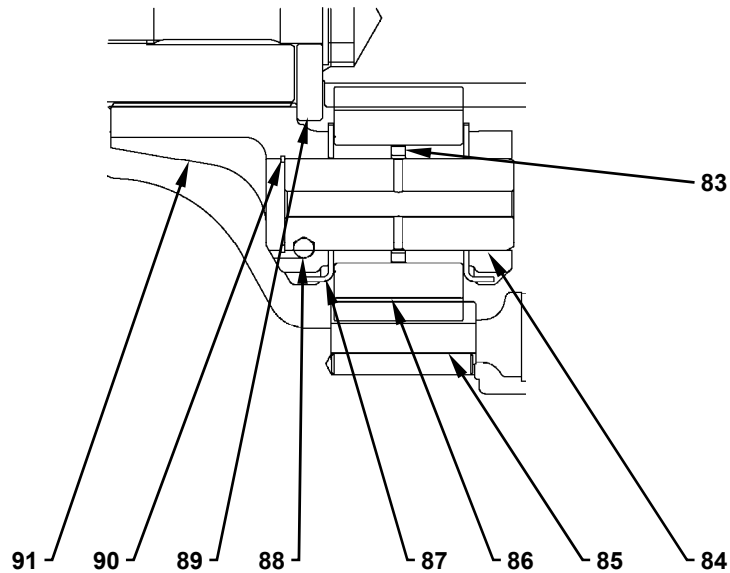
BODY (TRAVEL SYSTEM) / Axle

- Axle with LSD attached



W4GD-03-03-005

- Planet Carrier Assembly (68)

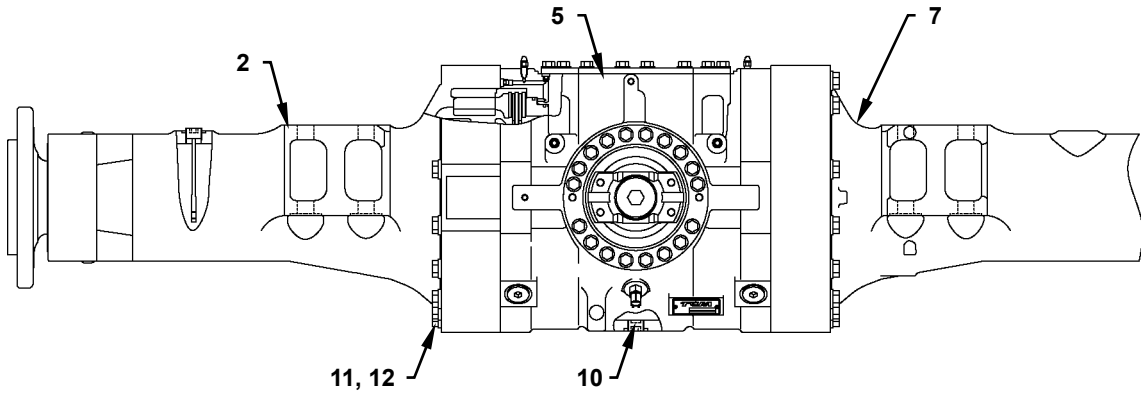


W4GD-03-03-006

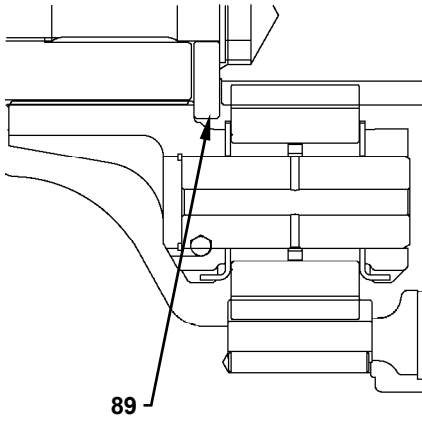
BODY (TRAVEL SYSTEM) / Axle

1 - Level Gauge	24 - D-Ring	47 - Pinion Gear	70 - Bolt (2 Used)
2 - Axle Tube	25 - Brake Piston	48 - Bearing	71 - Bearing (2 Used)
3 - Pin (8 Used)	26 - Bearing (2 Used)	49 - Spacer	72 - Oil Seal (2 Used)
4 - Plug	27 - Bolt (20 Used)	50 - Spacer	73 - Axle Shaft (2 Used)
5 - Differential Gear Body	28 - Washer (20 Used)	51 - Bearing	74 - Case A
6 - Bleeder Valve (2 Used)	29 - Ring Gear	52 - Dust Cover	75 - Case B
7 - Axle Tube	30 - Flange Half Case	53 - Oil Seal	76 - Pressure Ring (2 Used)
8 - Bolt (18 Used)	31 - Bolt (12 Used)	54 - O-Ring	77 - Plate (4 Used)
9 - Washer (18 Used)	32 - Washer (12 Used)	55 - Shim	78 - Disc (4 Used)
10 - Drain Plug	33 - Plane Half Case	56 - Bolt	79 - Plate (2 Used)
11 - Bolt (40 Used)	34 - Thrust Washer (2 Used)	57 - Washer	80 - Side Gear (2 Used)
12 - Washer (40 Used)	35 - Side Gear (2 Used)	58 - Flange	81 - Spider
13 - Plug	36 - Spring (16 Used)	59 - Bearing Cage	82 - Pinion Gear (4 Used)
14 - O-Ring	37 - Adapter (16 Used)	60 - O-Ring	83 - Collar (6 Used)
15 - Plug	38 - Button Bolt (16 Used)	61 - Shim (8 Used)	84 - Planet Shaft (6 Used)
16 - Cover	39 - Spider	62 - Adjusting Nut (2 Used)	85 - Planet Gear (6 Used)
17 - Bolt (28 Used)	40 - Shaft (2 Used)	63 - Lock Plate (2 Used)	86 - Bearing (12 Used)
18 - Washer (28 Used)	41 - Bearing Retainer (2 Used)	64 - Brake Ring (2 Used)	87 - Thrust Washer (12 Used)
19 - Brake Disc (4 Used)	42 - Bolt (20 Used)	65 - Pin (4 Used)	88 - Steel Ball (6 Used)
20 - Brake Ring (2 Used)	43 - Washer (20 Used)	66 - Ring Gear (2 Used)	89 - Retainer Plate (2 Used)
21 - End Plate (2 Used)	44 - Knock Pin (4 Used)	67 - Shim (12 Used)	90 - Retaining Ring
22 - Pin (16 Used)	45 - Thrust Washer (4 Used)	68 - Planet Carrier Assembly	91 - Planet Carrier
23 - D-Ring	46 - Pinion Gear	69 - Bearing (2 Used)	

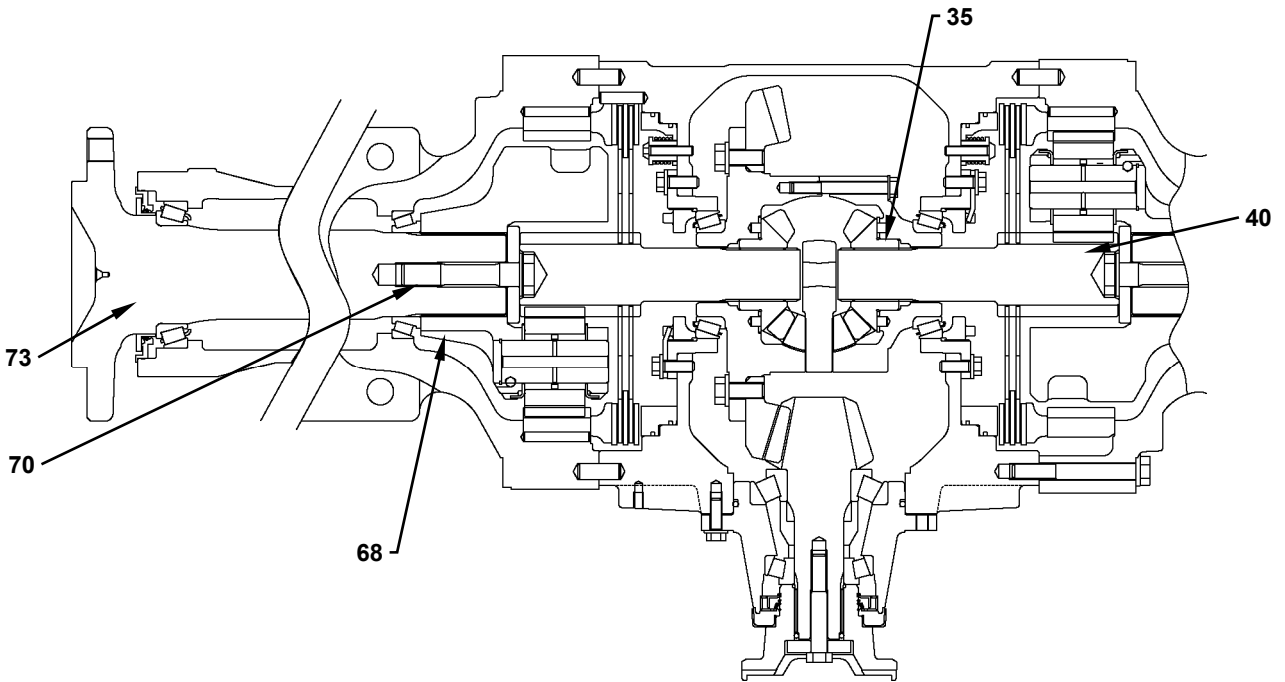
BODY (TRAVEL SYSTEM) / Axle



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BODY (TRAVEL SYSTEM) / Axle

Disassembly of Axle



CAUTION: The axle assembly weight:

TPD front axle : 760 kg (1700 lb)


TPD rear axle : 725 kg (1600 lb)

LSD front axle : 765 kg (1700 lb)

LSD rear axle : 730 kg (1650 lb)


Removal of Axle Tubes (2, 7)

1. Remove drain plug (10) from differential gear body (5). Drain gear oil from differential gear body (5).

 : 14 mm

Gear oil amount: 28 L (7.4 US gal.)

2. Remove bolts (11) (20 used) and washers (12) (20 used) from axle tube (2).

 : 24 mm

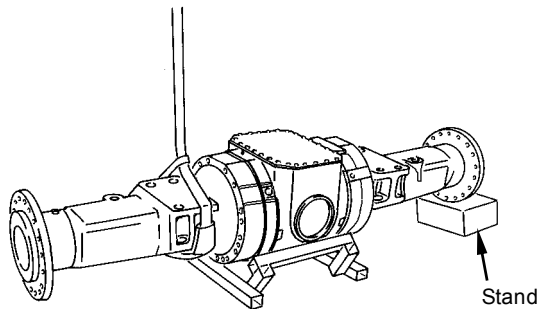


CAUTION: The axle tube (2, 7) assembly weight:

Front axle : 235 kg (520 lb)

Rear axle : 215 kg (475 lb)

3. Attach a nylon sling onto axle tube (2). Hold axle tube (2). Place axle tube (2) onto a stand in order not to lower axle tube (7) on the opposite side.



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4. Remove axle tube (2) from differential gear body (5) by using a plastic hammer.


5. Remove the shaft (40) assembly from side gear (35).

6. Remove axle tube (7) and the shaft (40) assembly on the opposite side in the same way.

Disassembly of Axle Tube (2)

7. Secure axle tube (2) on a workbench with the differential gear body (5) side of axle tube (2) facing upward.

8. Remove bolt (70) and retainer plate (89) from axle shaft (73).

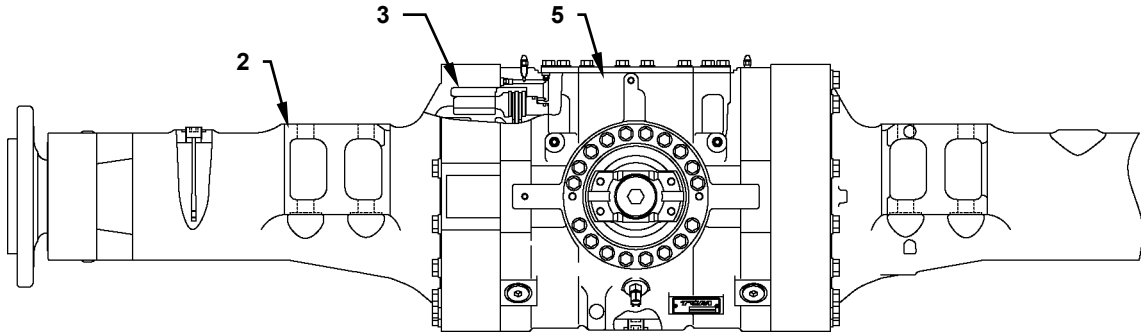
 : 36 mm



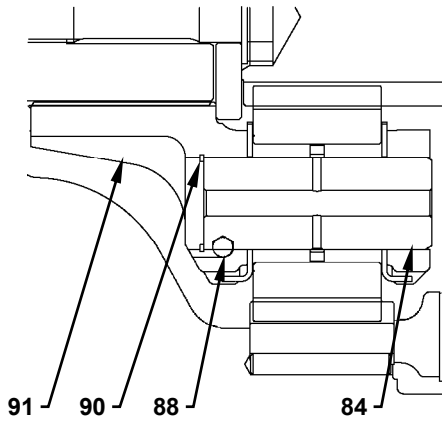
CAUTION: Planet carrier assembly (68) weight: 40 kg (90 lb)

9. Remove planet carrier assembly (68) from axle shaft (73) by using a pry bar.

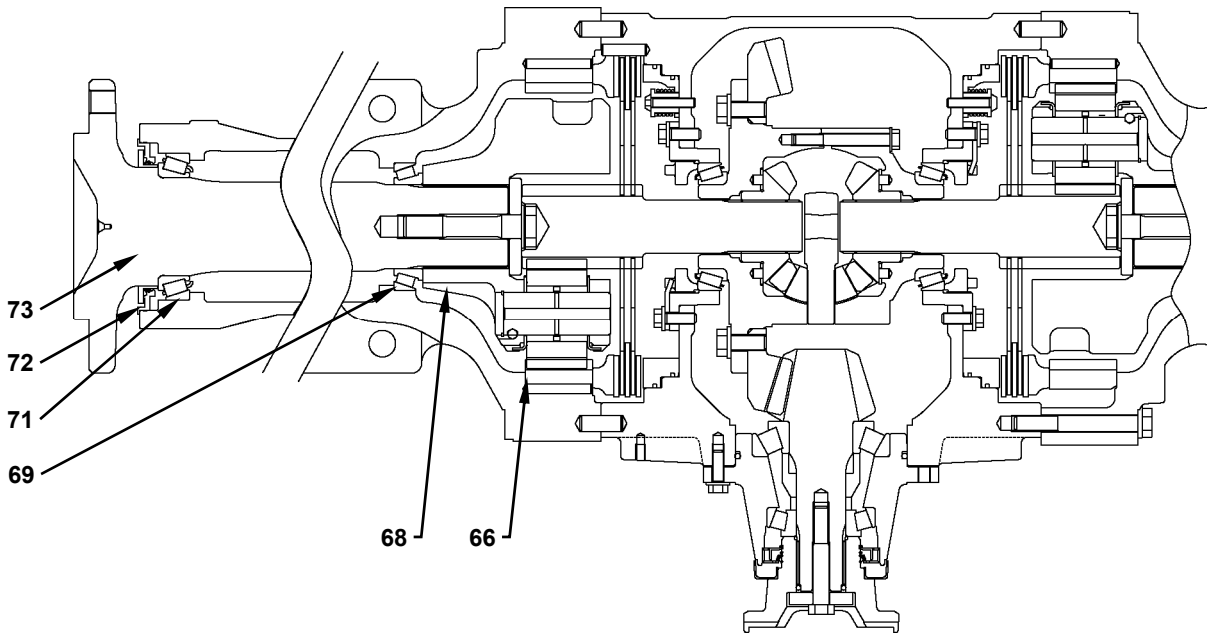
BODY (TRAVEL SYSTEM) / Axle



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W4GD-03-03-006



W4GD-03-03-004

BODY (TRAVEL SYSTEM) / Axle

10. Place axle tube (2) horizontally. Remove oil seal (72) from axle tube (2).

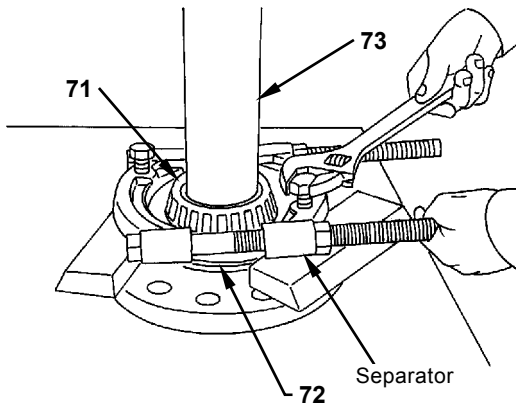
11. Remove the inner race of bearing (69) from axle tube (2).



CAUTION: Axle tube (2) weight:
Front axle : 125 kg (280 lb)
Rear axle : 105 kg (235 lb)

12. Hoist axle tube (2) with the differential gear body (5) side of axle tube (2) facing upward. Remove axle shaft (73) from axle tube (2).

13. Remove the inner race of bearing (71) and oil seal (72) from axle shaft (73) by using a separator.

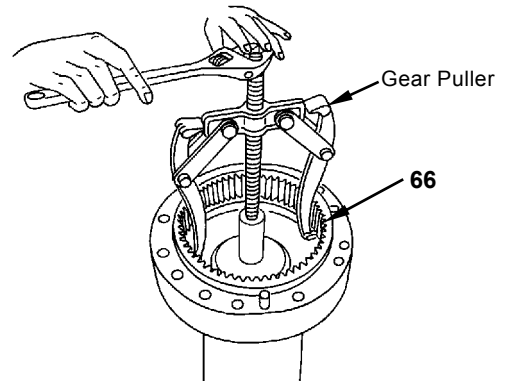


W4GB-03-03-010

14. Remove the outer races of bearings (69, 71) from axle tube (2).

IMPORTANT: Do not lose pins (3) (4 used).

15. When replacing ring gear (66), remove ring gear (66) from axle tube (2) by using a gear puller.



W4GB-03-03-011

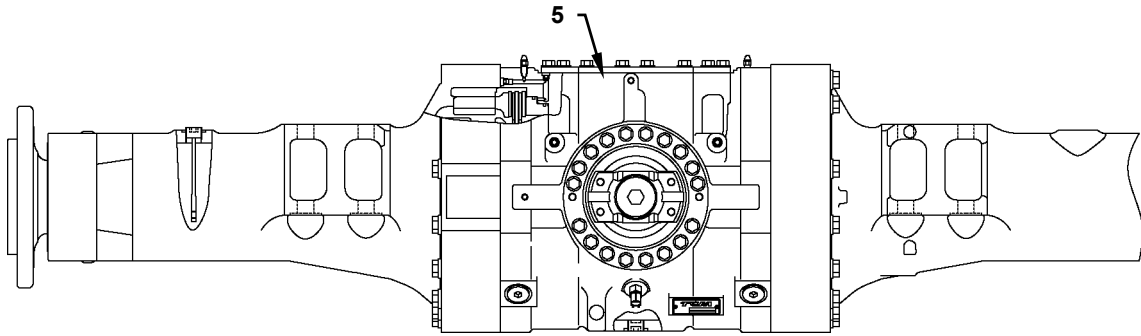
Disassembly of Planet Carrier Assembly (68)

16. Remove retaining ring (90) from planet carrier (91).

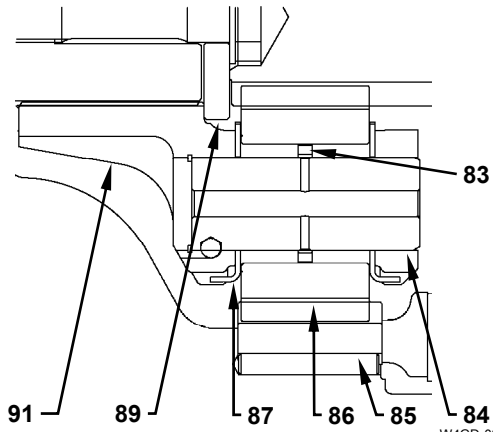
IMPORTANT: Do not lose steel ball (88).

17. Remove planet shaft (84) from planet carrier (91).

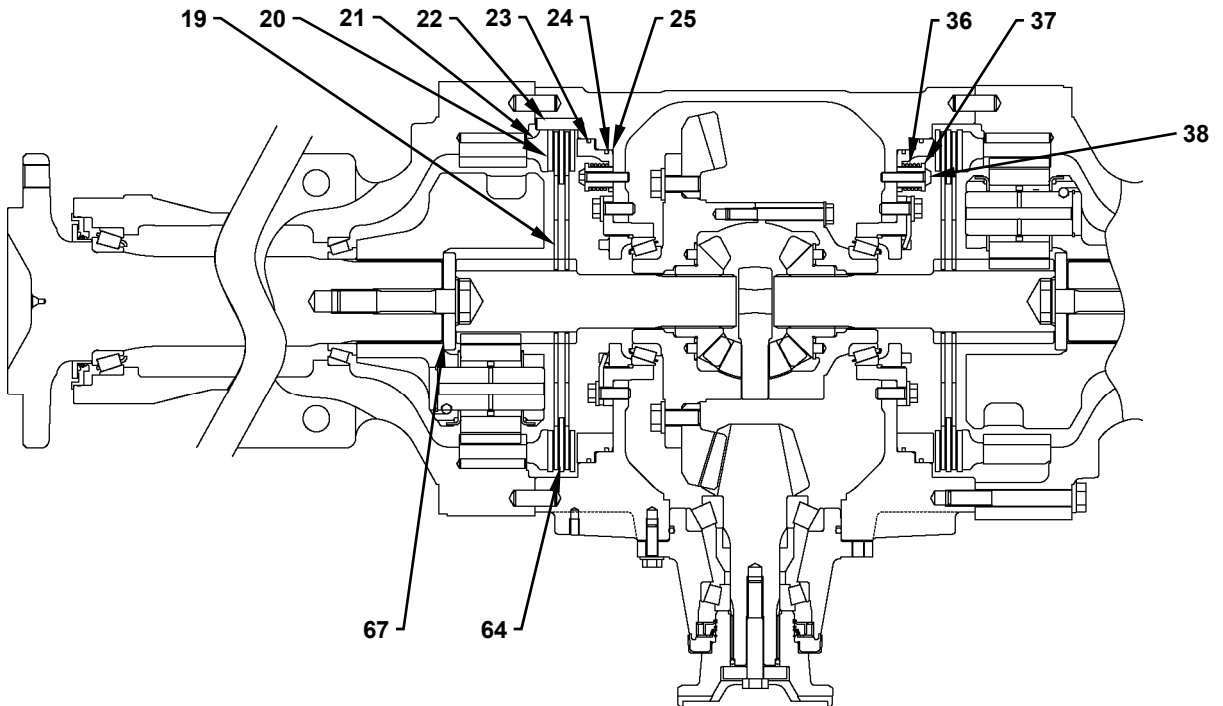
BODY (TRAVEL SYSTEM) / Axle



W4GD-03-03-008



W4GD-03-03-006

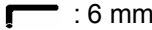


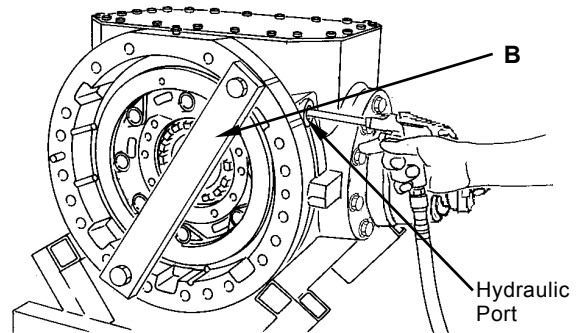
W4GD-03-03-004

BODY (TRAVEL SYSTEM) / Axle

18. Remove the planet gear (85) assembly and thrust washers (87) (2 used) from planet carrier (91).
19. Remove bearings (86) (2 used) and collar (83) from planet gear (85).
20. Disassemble other planet shafts (84) (2 used) in the same way.
21. Remove retainer plate (89) and shims (67) (6 used) from planet carrier (91).

Removal of Brake

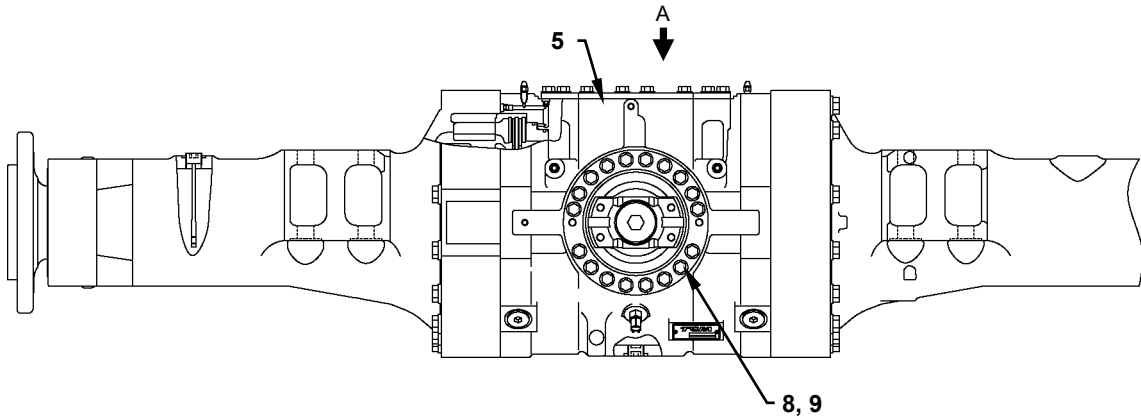
22. Remove end plate (21), brake rings (20) (2 used), brake discs (19) (2 used) and brake ring (64) from differential gear body (5). Remove pins (22) (8 used) from differential gear body (5).
23. Remove button bolts (38) (8 used), adapters (37) (8 used) and springs (36) (8 used) from brake piston (25).
 : 6 mm
24. Install stopper (B) to prevent the piston from flying off by using the tube mounting surface on differential gear body (5).



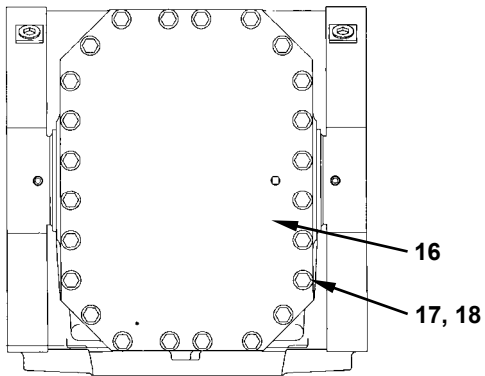
W4GB-03-03-017

25. Add compressed air through the hydraulic port. Remove brake piston (25) from differential gear body (5).
26. Remove D-rings (23, 24) from brake piston (25).
27. Remove the brake on the opposite side in the same way.

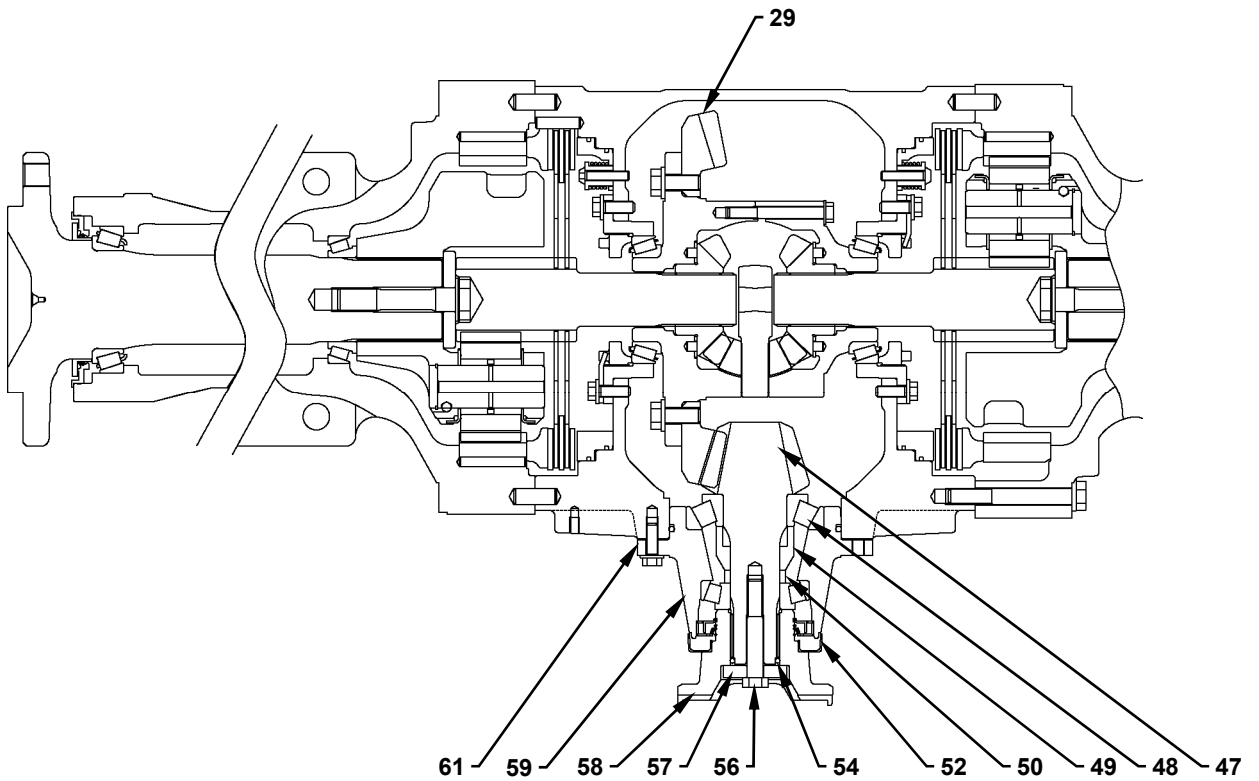
BODY (TRAVEL SYSTEM) / Axle



W4GD-03-03-008



W4GD-03-03-003




W4GD-03-03-004

BODY (TRAVEL SYSTEM) / Axle


Removal of the Bearing Cage (59) Assembly

28. Remove bolts (17) (28 used) and washers (18) (28 used) from cover (16). Remove cover (16) from differential gear body (5).


 : 17 mm

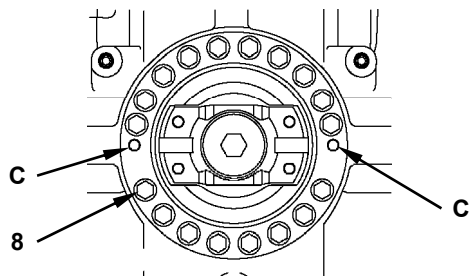
29. Put the matching marks onto the gear teeth contact condition and the backlash of ring gear (29).


30. Remove bolts (8) (18 used) and washers (9) (18 used) from bearing cage (59).

 : 17 mm

31. Install bolts (8) (2 used) to thread part (C) for the puller of bearing cage (59). Tighten bolts (8) (2 used). Remove the bearing cage (59) assembly.

 **NOTE:** Halved shims (61) (8 used) are located between differential gear body (5) and bearing cage (59).




 : 17 mm

W4GD-03-03-007

Disassembly of the Bearing Cage (59) Assembly

32. Secure bearing cage (59) on a workbench with the flange (58) side facing upward. Remove bolt (56) and washer (57) from flange (58).

 : 24 mm

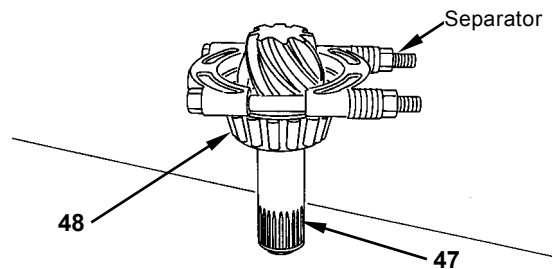
33. Remove washer (57) and O-ring (54) from flange (58).

34. Remove flange (58) from pinion gear (47). Remove dust cover (52) from flange (58).

35. Remove pinion gear (47) from bearing cage (59) by using a press.

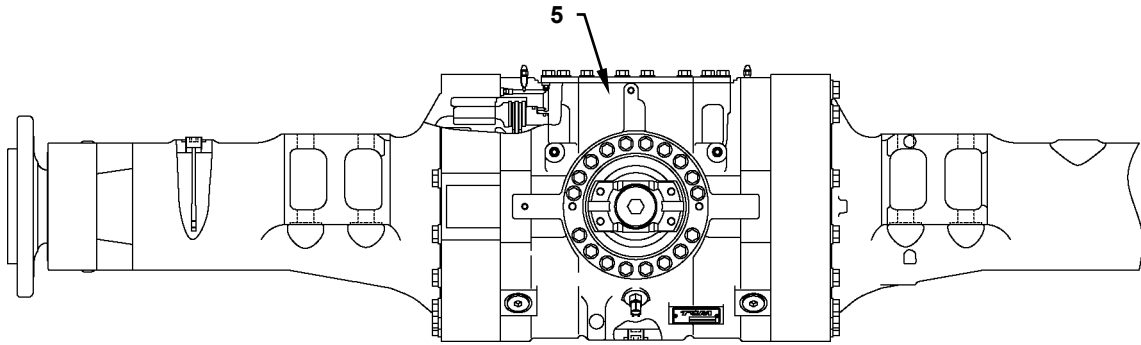
36. Remove spacers (49, 50) from pinion gear (47).

37. Remove the inner race of bearing (48) from pinion gear (47) by using a separator.

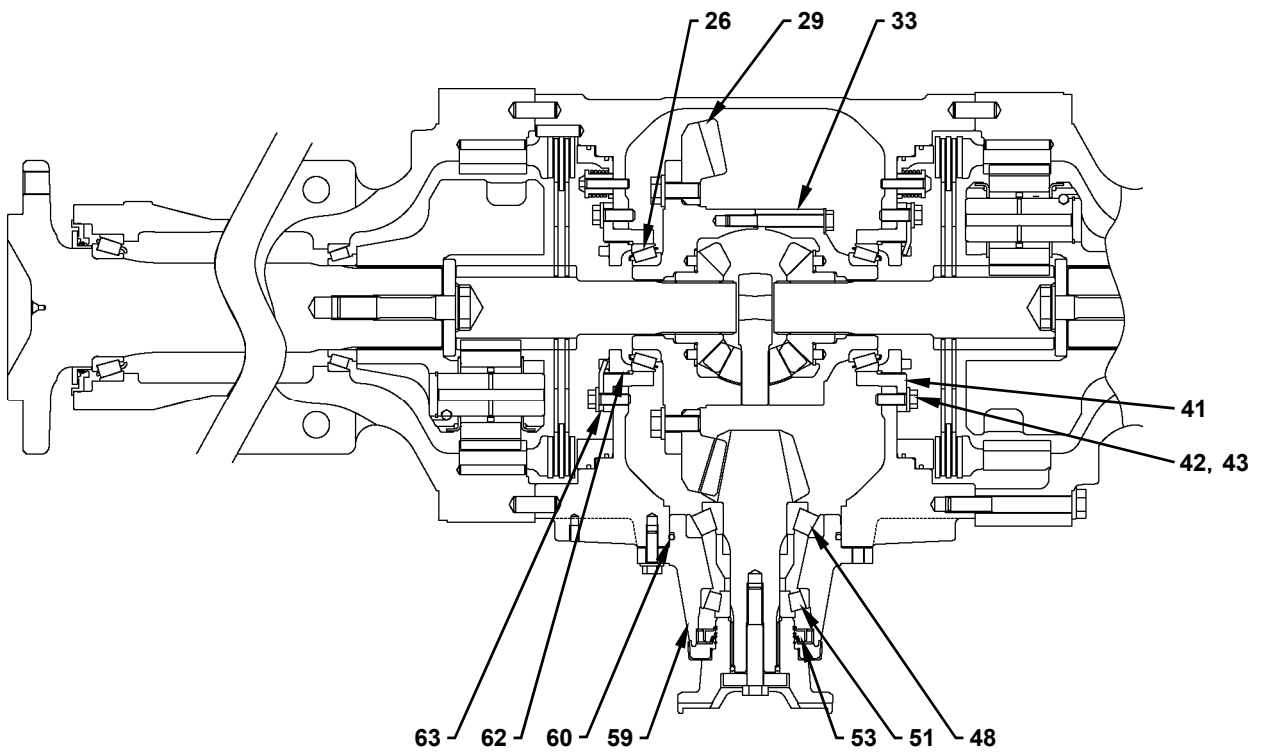


W4GB-03-03-020

BODY (TRAVEL SYSTEM) / Axle



W4GD-03-03-008



W4GD-03-03-004

BODY (TRAVEL SYSTEM) / Axle


38. Remove oil seal (53) and the inner race of bearing (51) from bearing cage (59).

39. Remove the outer races of bearings (48, 51) from bearing cage (59).

40. Remove O-ring (60) from bearing cage (59).

41. Hold differential gear body (5) by using a lifting tool.

42. Remove bolts (42) (20 used), washers (43) (20 used) and lock plate (63) from bearing retainer (41).

 : 17 mm

43. Install bolts (42) (2 used) to the screw hole for the puller on bearing retainer (41). Tighten bolts (42) (2 used). Remove bearing retainer (41) from plane half case (33).

44. Remove adjusting nut (62) and the outer race of bearing (26) from bearing retainer (41).

45. Remove bearing retainer (41) on the opposite side in the same way.



CAUTION: The differential assembly weight:

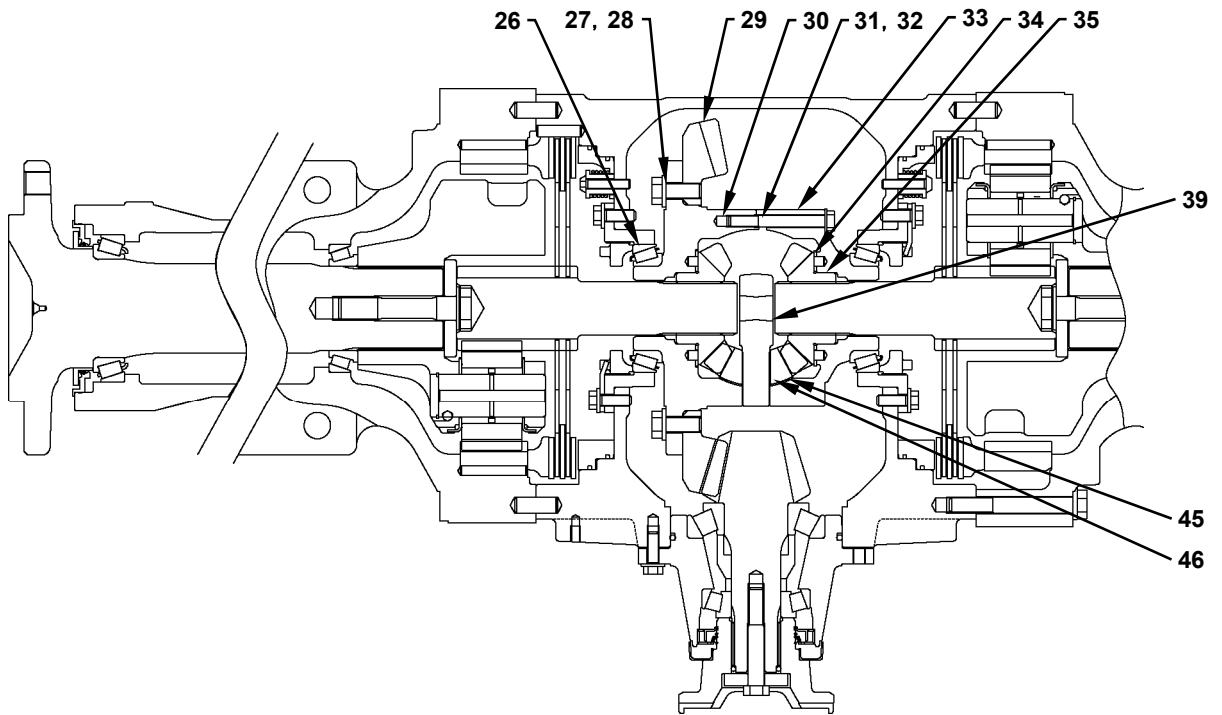
TPD: 65 kg (145 lb)

LSD: 65 kg (145 lb)

46. Remove ring gear (29) and the differential assembly from differential gear body (5).

BODY (TRAVEL SYSTEM) / Axle

- Axle with TPD attached




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BODY (TRAVEL SYSTEM) / Axle

Disassembly of Differential Case (only Axle with TPD attached)

47. Remove bolts (27) (20 used) and washers (28) (20 used) from flange half case (30). Remove ring gear (29) from flange half case (30).

 : 24 mm

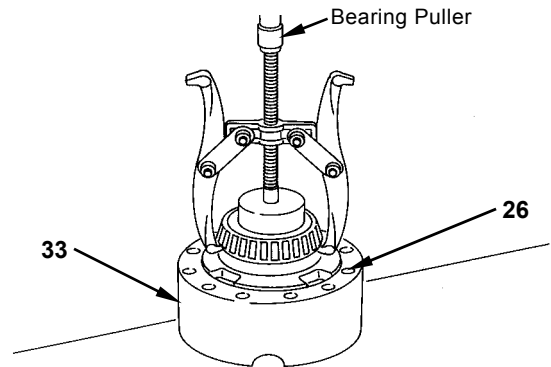
48. Turn over the differential case. Remove bolts (31) (12 used) and washers (32) (12 used) from plane half case (33).

 : 17 mm

49. Put the matching marks onto plane half case (33). Remove plane half case (33) from flange half case (30).

50. Remove side gears (35) (2 used), spider (39), pinion gears (46) (4 used), thrust washers (34) (2 used) for the guide gear and pinion gear thrust washers (45) (4 used) for the guide gear from flange half case (30) and plane half case (33).

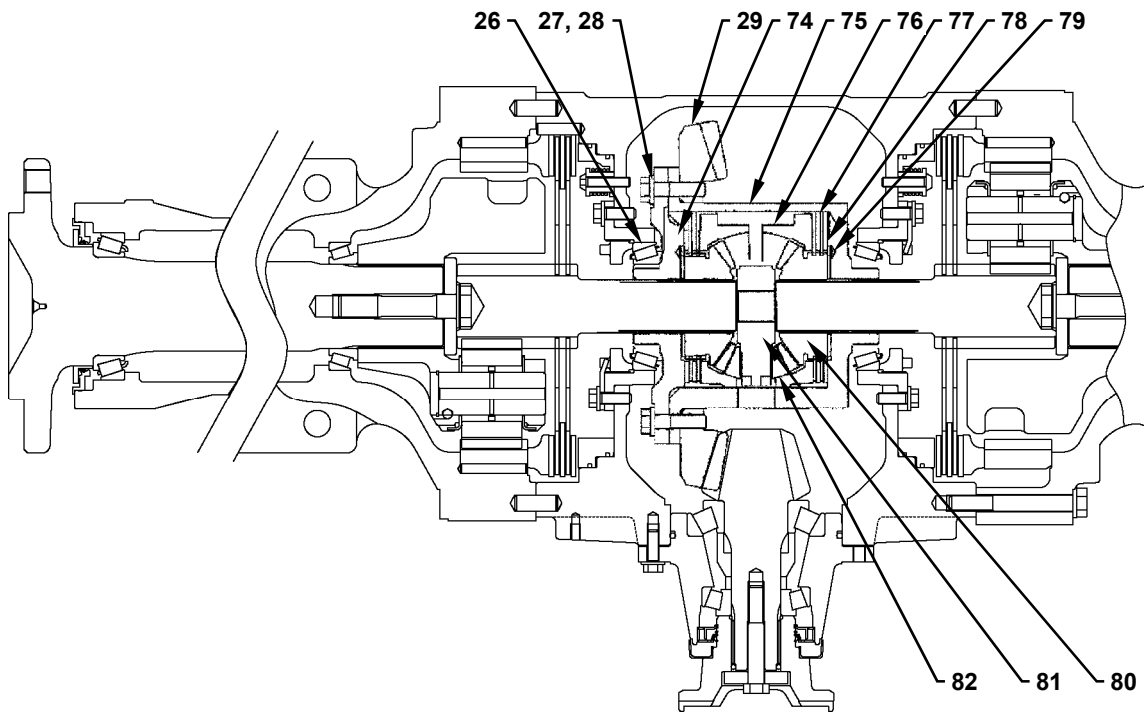
51. Remove the inner race of bearing (26) from plane half case (33) and flange half case (30) by using a bearing puller.



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BODY (TRAVEL SYSTEM) / Axle

- Axle with LSD attached




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BODY (TRAVEL SYSTEM) / Axle

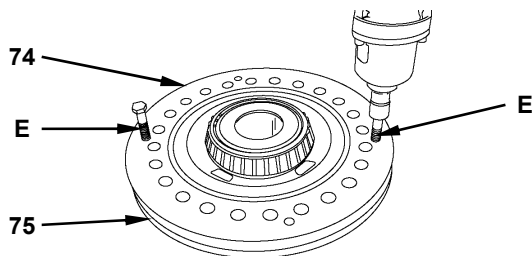
Disassembly of Differential Case (only Axle with LSD attached)

52. Remove bolts (27) (20 used) and washers (28) (20 used) from case A (74). Remove ring gear (29) from case A (74).

 : 24 mm

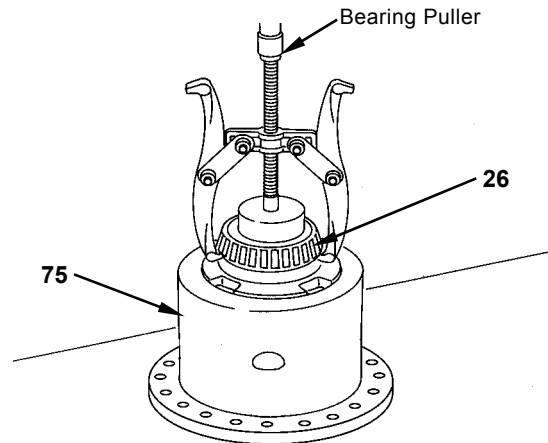
53. Install pulling-out bolts (M12, Pitch 1.25 mm) (2 used) to thread part (E) for the puller of case A (74). Tighten bolts (M12, Pitch 1.25 mm) (2 used). Remove case A (74) from case B (75).

 : 17 mm



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56. Remove the inner races of bearings (26) (2 used) from case B (75) and case A (74) by using a bearing puller.



W4GB-03-03-032

54. Remove plate (79), plates (77) (2 used), discs (78) (2 used), pressure ring (76) and side gear (80) from case B (75).

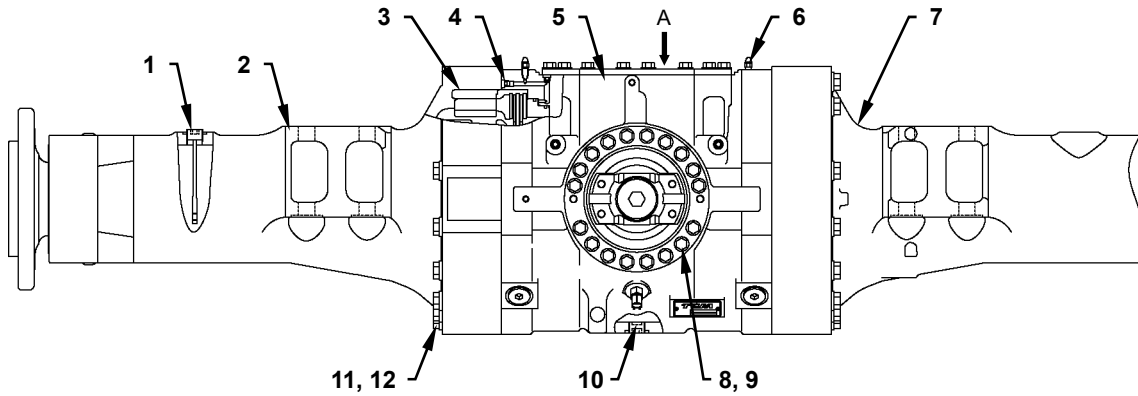
55. Remove spider (81), pinion gears (82) (4 used), side gear (80), pressure ring (76), discs (78) (2 used), plates (77) (2 used) and plate (79) from case B (75).

BODY (TRAVEL SYSTEM) / Axle

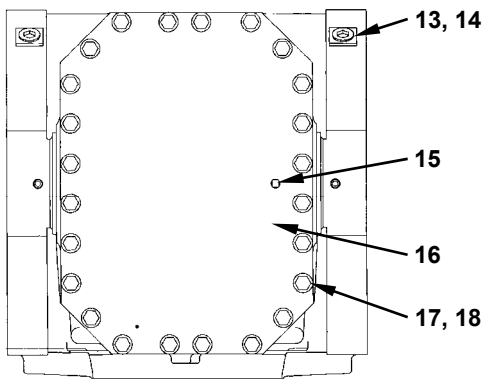
(Blank)

BODY (TRAVEL SYSTEM) / Axle

ASSEMBLY OF AXLE



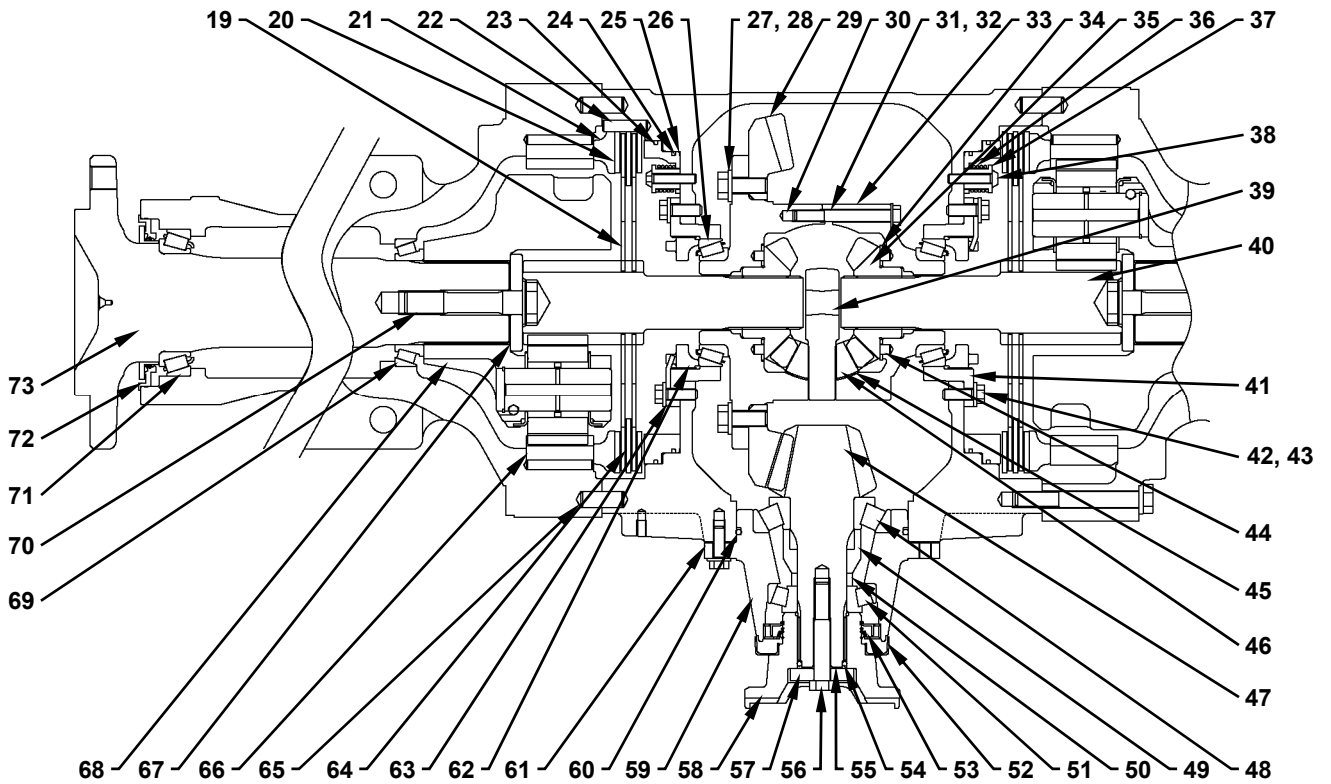
W4GD-03-03-008



View A

W4GD-03-03-003

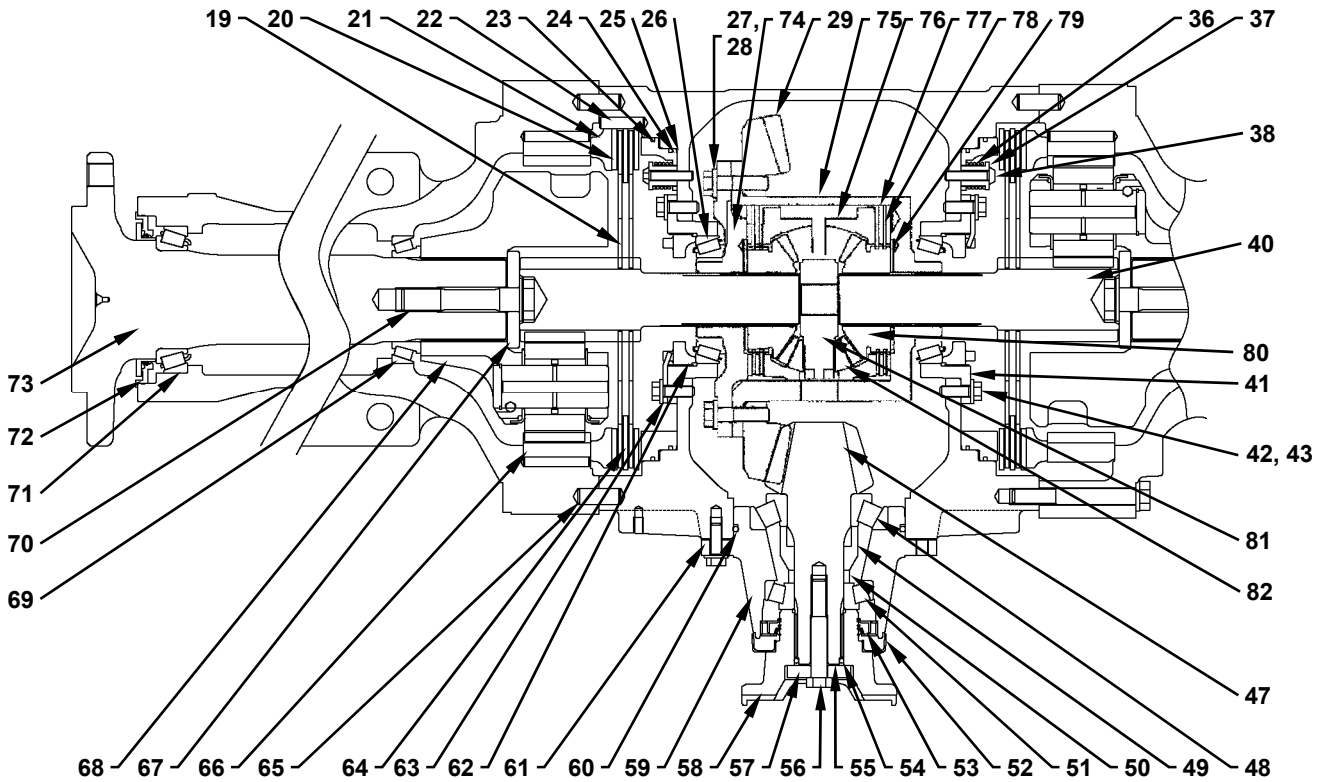
- Axle with TPD attached



W4GD-03-03-004

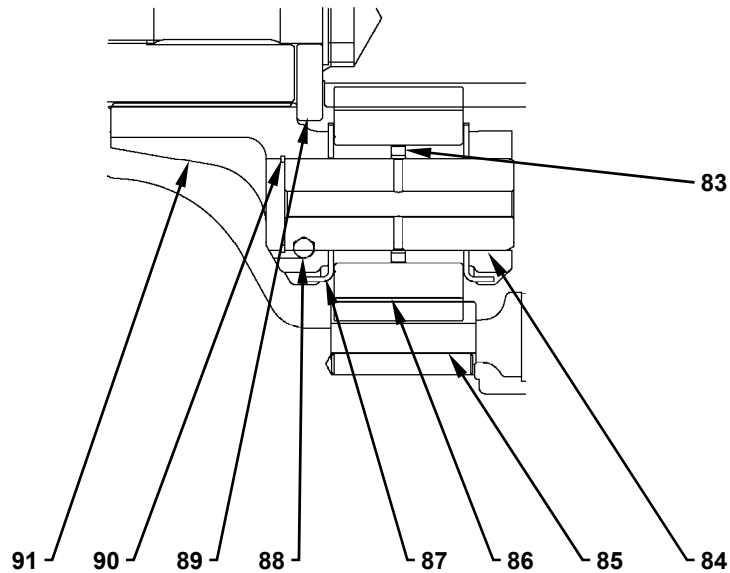
BODY (TRAVEL SYSTEM) / Axle

- Axle with LSD attached



W4GD-03-03-005

- Planet Carrier Assembly (68)



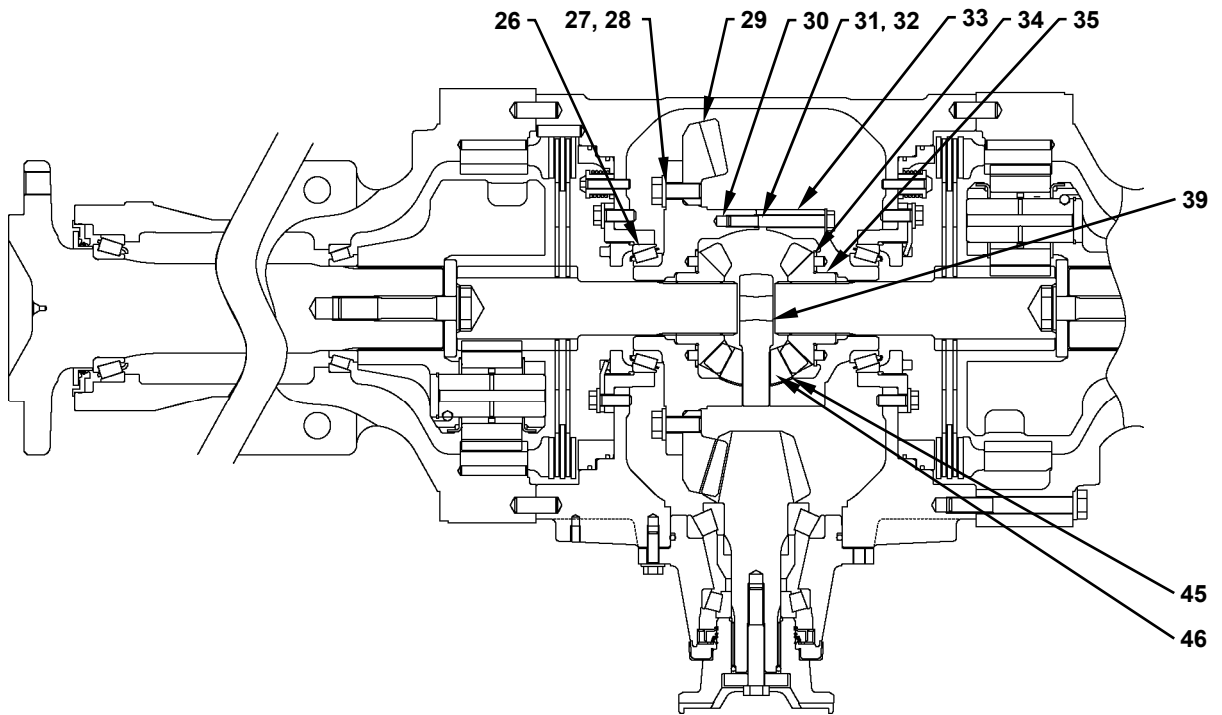
W4GD-03-03-006

BODY (TRAVEL SYSTEM) / Axle

1 - Level Gauge	24 - D-Ring	47 - Pinion Gear	70 - Bolt (2 Used)
2 - Axle Tube	25 - Brake Piston	48 - Bearing	71 - Bearing (2 Used)
3 - Pin (8 Used)	26 - Bearing (2 Used)	49 - Spacer	72 - Oil Seal (2 Used)
4 - Plug	27 - Bolt (20 Used)	50 - Spacer	73 - Axle Shaft (2 Used)
5 - Differential Gear Body	28 - Washer (20 Used)	51 - Bearing	74 - Case A
6 - Bleeder Valve (2 Used)	29 - Ring Gear	52 - Dust Cover	75 - Case B
7 - Axle Tube	30 - Flange Half Case	53 - Oil Seal	76 - Pressure Ring (2 Used)
8 - Bolt (18 Used)	31 - Bolt (12 Used)	54 - O-Ring	77 - Plate (4 Used)
9 - Washer (18 Used)	32 - Washer (12 Used)	55 - Shim	78 - Disc (4 Used)
10 - Drain Plug	33 - Plane Half Case	56 - Bolt	79 - Plate (2 Used)
11 - Bolt (40 Used)	34 - Thrust Washer (2 Used)	57 - Washer	80 - Side Gear (2 Used)
12 - Washer (40 Used)	35 - Side Gear (2 Used)	58 - Flange	81 - Spider
13 - Plug	36 - Spring (16 Used)	59 - Bearing Cage	82 - Pinion Gear (4 Used)
14 - O-Ring	37 - Adapter (16 Used)	60 - O-Ring	83 - Collar (6 Used)
15 - Plug	38 - Button Bolt (16 Used)	61 - Shim (8 Used)	84 - Planet Shaft (6 Used)
16 - Cover	39 - Spider	62 - Adjusting Nut (2 Used)	85 - Planet Gear (6 Used)
17 - Bolt (28 Used)	40 - Shaft (2 Used)	63 - Lock Plate (2 Used)	86 - Bearing (12 Used)
18 - Washer (28 Used)	41 - Bearing Retainer (2 Used)	64 - Brake Ring (2 Used)	87 - Thrust Washer (12 Used)
19 - Brake Disc (4 Used)	42 - Bolt (20 Used)	65 - Pin (4 Used)	88 - Steel Ball (6 Used)
20 - Brake Ring (2 Used)	43 - Washer (20 Used)	66 - Ring Gear (2 Used)	89 - Retainer Plate (2 Used)
21 - End Plate (2 Used)	44 - Knock Pin (4 Used)	67 - Shim (12 Used)	90 - Retaining Ring
22 - Pin (16 Used)	45 - Thrust Washer (4 Used)	68 - Planet Carrier Assembly	91 - Planet Carrier
23 - D-Ring	46 - Pinion Gear	69 - Bearing (2 Used)	

BODY (TRAVEL SYSTEM) / Axle

- Axle with TPD attached







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BODY (TRAVEL SYSTEM) / Axle

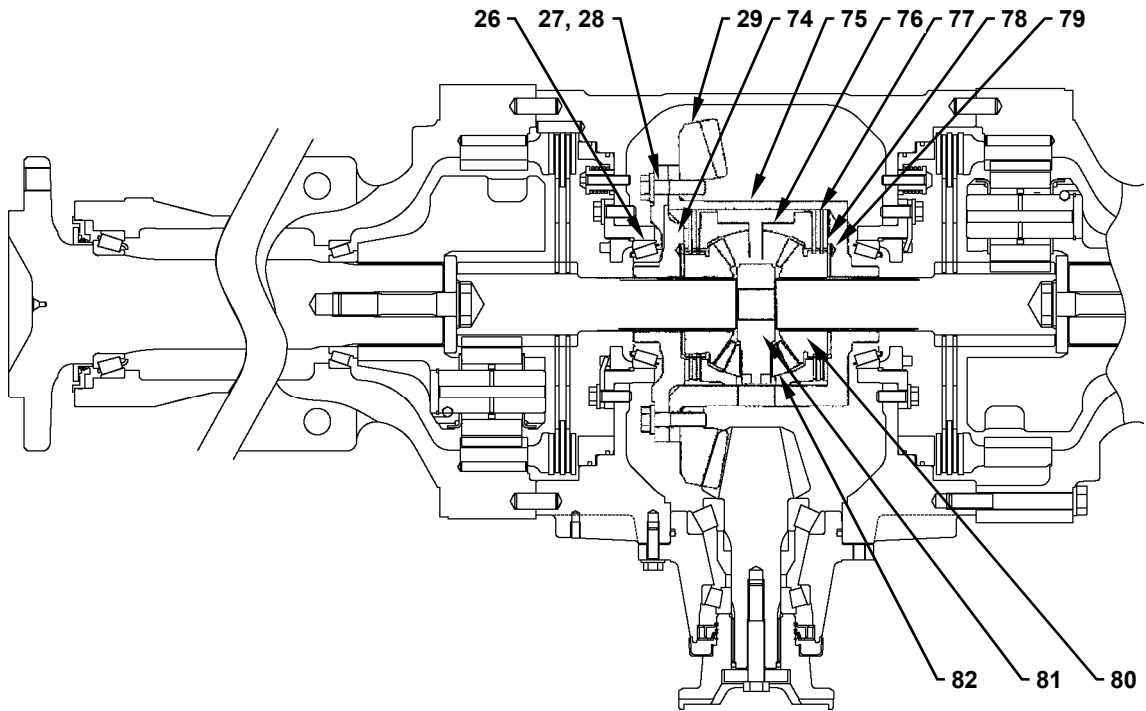
Assembly of Axle

Assembly of Differential Case (only Axle with TPD attached)

1. Install the inner race of bearing (26) to flange half case (30) by using a press.
2. Turn over flange half case (30). Align the thrust washer (34) hole (2 places) with knock pins (44) (2 used). Install thrust washer (34) to flange half case (30).
3. Install side gear (35), pinion gears (46) (4 used), thrust washers (45) (4 used) and spider (39) to flange half case (30).
Spider (39) should be pushed onto flange half case (30) by using a plastic hammer.
4. Install the inner race of bearing (26) to plane half case (33) by using a press.
5. Turn over plane half case (33). Apply grease onto thrust washer (34). Align the thrust washer (34) hole (2 places) with knock pins (44) (2 used). Install thrust washer (34) to plane half case (33).
6. Align side gear (35) with pinion gears (46) of flange half case (30). Install flange half case (30) and plane half case (33) by using a plastic hammer while aligning the matching marks.
7. Apply LOCTITE #262 onto bolts (31) (12 used). Install plane half case (33) to flange half case (30) with bolts (31) (12 used) and washers (32) (12 used).
 : 17 mm
 : 98 N·m (10 kgf·m, 72 lbf·ft)
8. Install ring gear (29) to flange half case (30) by using a plastic hammer. Temporarily tighten the flange half case (30) assembly with washers (28) (2 used) and bolts (27) (2 used) from the bottom of the flange half case (30) assembly.
9. Turn over the flange half case (30) assembly. Apply LOCTITE #262 onto bolts (27) (20 used). Install ring gear (29) to flange half case (30) with bolts (30) (20 used) and washers (28) (20 used).
 : 24 mm
 : 225 N·m (23 kgf·m, 166 lbf·ft)

BODY (TRAVEL SYSTEM) / Axle




- Axle with LSD attached



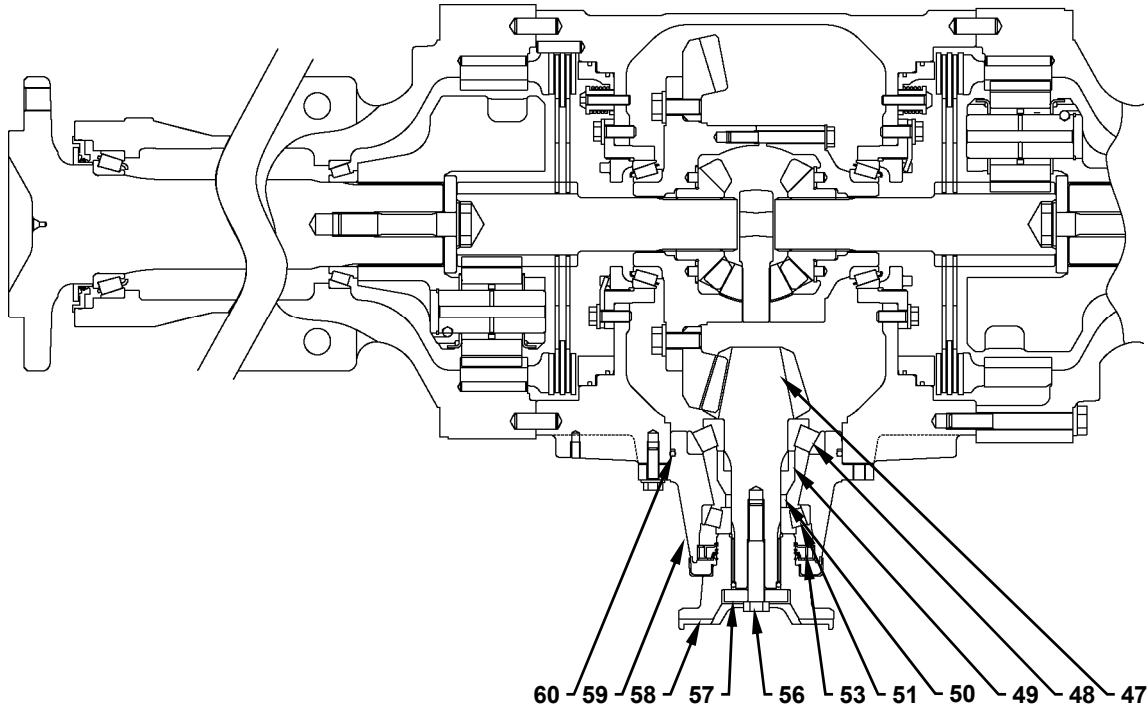
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BODY (TRAVEL SYSTEM) / Axle

Assembly of Differential Case (only Axle with LSD attached)

10. Install the inner race of bearing (26) to case A (74) and case B (75) by using a press.
11. Install plate (79), plates (77) (2 used), discs (78) (2 used), pressure ring (76) and side gear (80) to case B (75).
12. Install pinion gears (82) (4 used) to spider (81). Install the pinion gears (82) (4 used) assembly to side gear (80) by using a plastic hammer.
13. Install side gear (80) to pinion gears (82) (4 used).
14. Install pressure ring (76), discs (78) (2 used) and plates (77) (2 used) to case B (75).
15. Install plate (79) to case A (74). Apply grease onto plate (79). The groove surface on plate (79) faces to the side gear (80) side.)
16. Install case A (74) to case B (75). Temporarily install case B (75) and case A (74) by using a bolt (M10, Pitch 1.5 mm) for case A (74).
 : 17 mm
17. Turn over the case A (74) assembly. Install the case A (74) assembly to ring gear (29) by using a plastic hammer. Temporarily tighten the case A (74) assembly with bolts (27) (2 used) and washers (28) (2 used) from the bottom of the case A (74) assembly.
18. Apply LOCTITE #262 onto bolts (27) (2 used). Turn over the case A (74) assembly. Install ring gear (74) to case A (74) and case B (75) with bolts (27) (20 used) and washers (28) (20 used).
 : 24 mm
 : 225 N·m (23 kgf·m, 166 lbf·ft)

BODY (TRAVEL SYSTEM) / Axle





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BODY (TRAVEL SYSTEM) / Axle


Assembly of Bearing Cage (59)

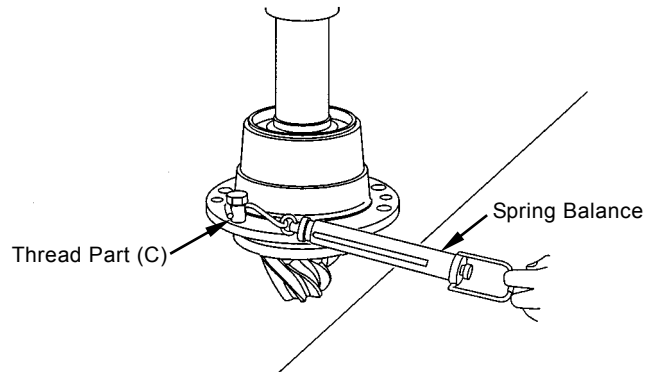
19. Install the outer races of bearings (48, 51) to bearing cage (59) by using a press.
20. Install O-ring (60) to bearing cage (59).
21. Install the inner race of bearing (48) to pinion gear (47).
22. Install spacers (49, 50) to pinion gear (47).
23. Install bearing cage (59) to pinion gear (47).
Install the inner race of bearing (51) to pinion gear (47).
24. After installing the bearing, apply load to the inner race of bearing (51) by using a hydraulic press. Measure the rotational resistance by using a spring balance. Use thread part (C) for the puller for measurement. Use a press which can provide at approx. 78 kN (7950 kgf, 57530 lbf-ft).

 : 24 mm

 **NOTE:** The rotational resistance can also be measured by temporarily tightening flange (58) and washer (57) with bolt (56) instead of applying load by using a press.

 : 24 mm

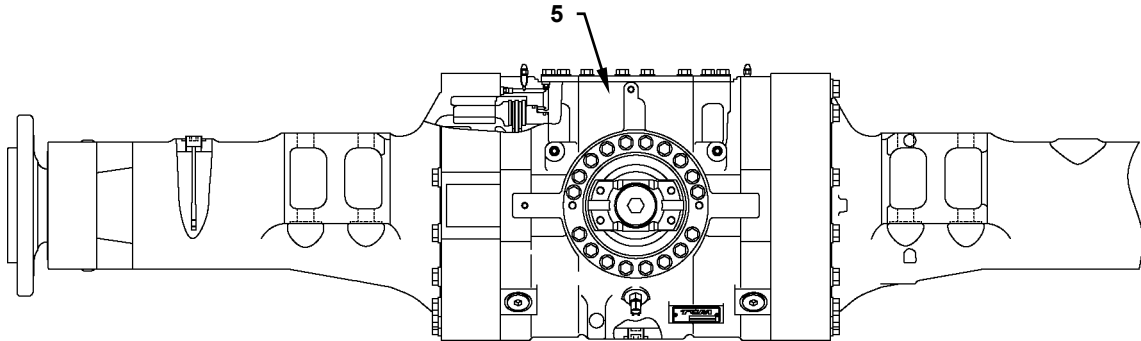
 : 225 N·m (23 kgf·m, 166 lbf·ft)



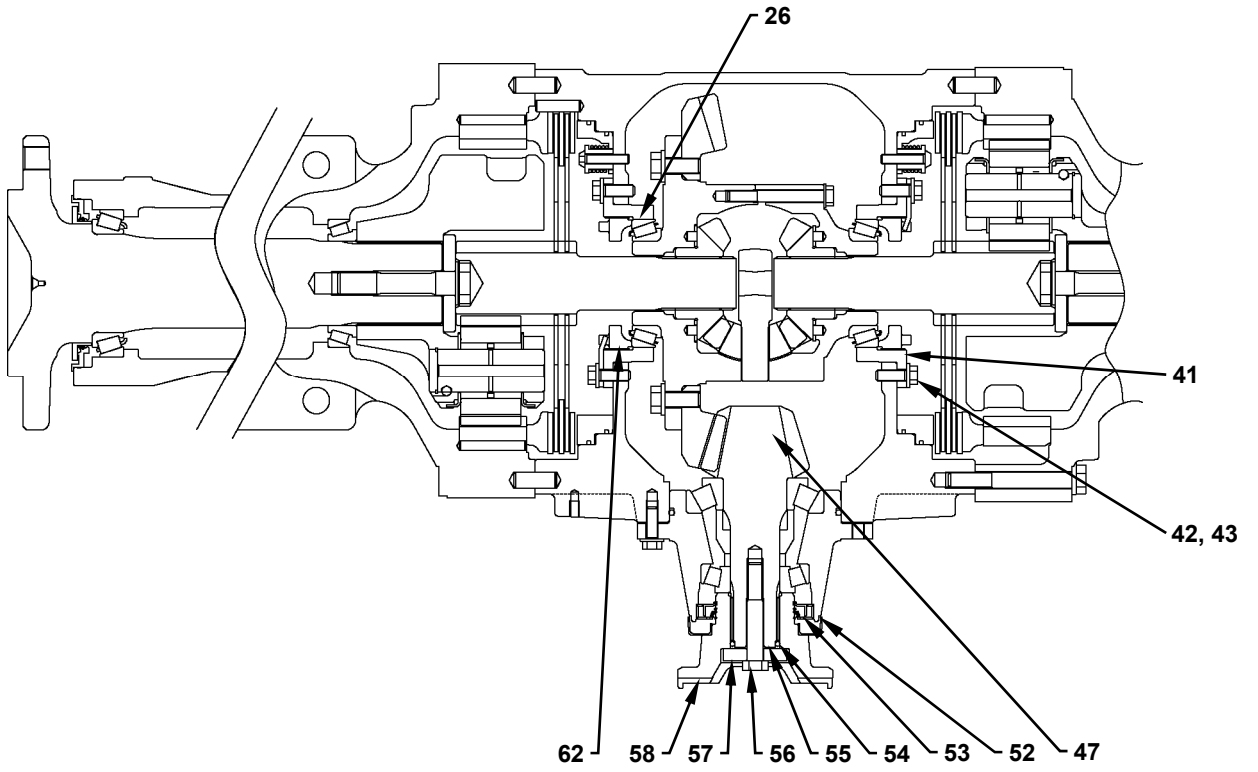
W4GB-03-03-045

25. If the rotational resistance value is below the standard value, remove pinion gear (47). Adjust the rotational resistance value by grinding spacer (50).
Rotational resistance standard value: 14.5 to 24 N·m (1.5 to 2.4 kgf·m, 10.5 to 17.5 lbf·ft)
26. Apply LOCTITE #262 onto oil seal (53). Install oil seal (53) to bearing cage (59).
27. Apply grease onto the lip part in oil seal (53).

BODY (TRAVEL SYSTEM) / Axle



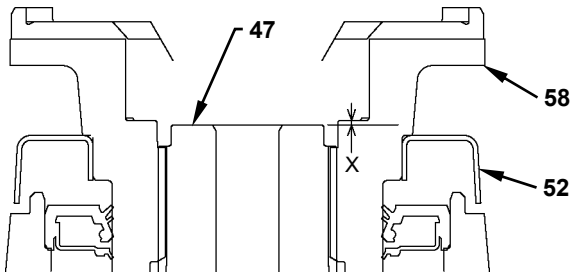
W4GD-03-03-008





W4GD-03-03-004

BODY (TRAVEL SYSTEM) / Axle

28. Install dust cover (52) to flange (58). Install flange (58) to pinion gear (47). Turn flange (58) and reduce deformation of the lip part in oil seal (53).
29. Measure step (x) between flange (58) and the end of pinion gear (47).
Adjust shim (55) so that this step (x) is within 0.05 to 0.1 mm (0.002 to 0.004 in).



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30. Install O-ring (54) to pinion gear (47).
31. Apply LOCTITE #262 onto bolt (56). Install washer (57) to pinion gear (47) with bolt (56) by using a nut runner.
Check that pinion gear (47) rotates smoothly.
-  : 24 mm
-  : 225 N·m (23 kgf·m, 166 lbf·ft)

Installation of Differential Case

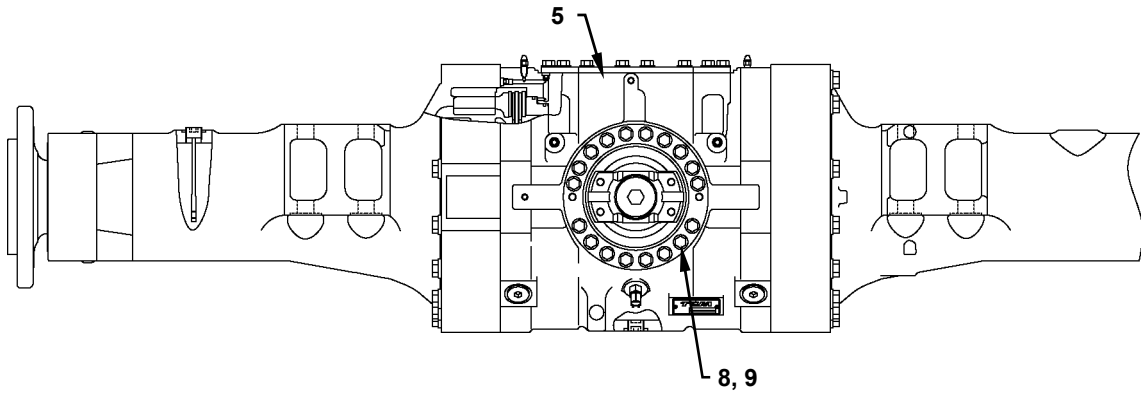
32. Install the outer race of bearing (26) to bearing retainers (41) (2 used).
33. Install adjusting nuts (62) (2 used) to bearing retainers (41) (2 used).



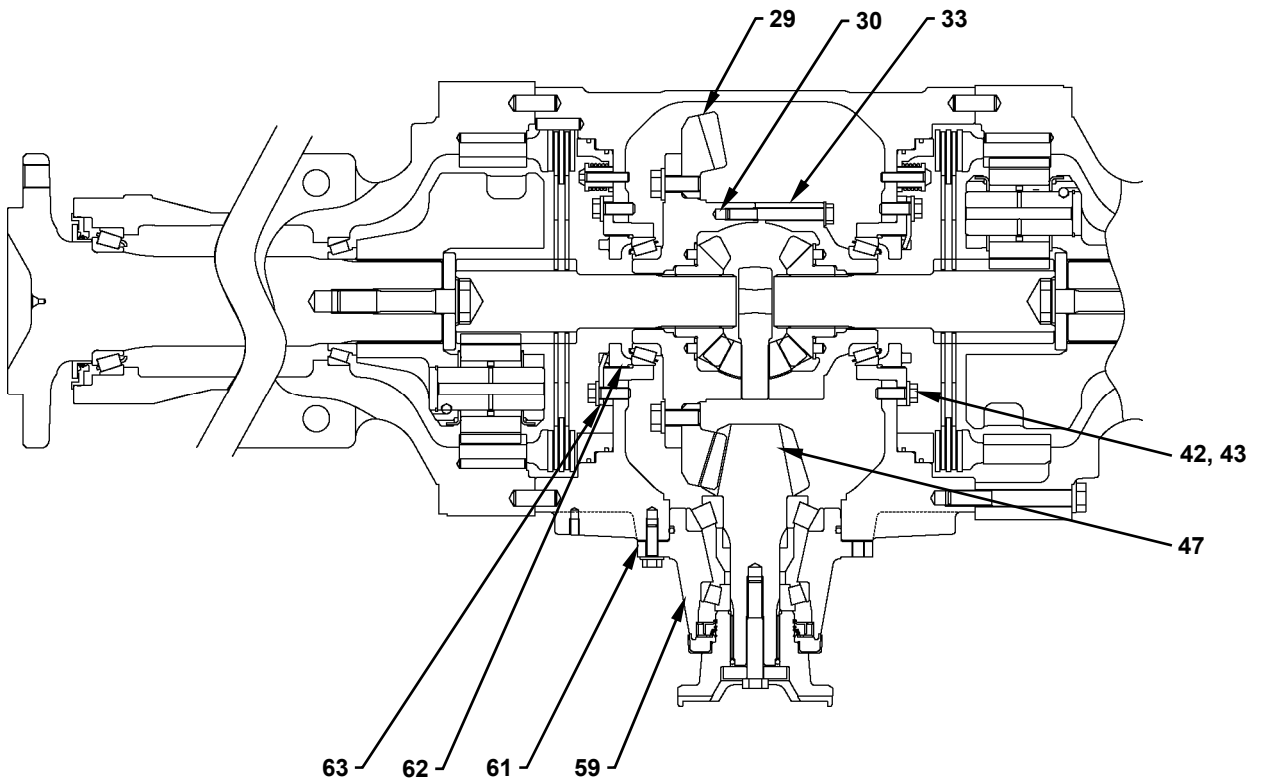
CAUTION: The differential assembly weight:
TPD: 65 kg (145 lb)
LSD: 65 kg (145 lb)

34. Hoist and install the differential case to differential gear body (5).
35. Apply LOCTITE #262 onto bolts (42) (20 used). Install bearing retainers (41) (2 used) to differential gear body (5) with bolts (42) (20 used) and washers (43) (20 used).
-  : 17 mm
-  : 98 N·m (10 kgf·m, 72 lbf·ft)

BODY (TRAVEL SYSTEM) / Axle



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BODY (TRAVEL SYSTEM) / Axle

Installation of Bearing Cage (59)


36. Install to shims (61) (8 used) differential gear body (5). Install the bearing cage (59) assembly to differential gear body (5).

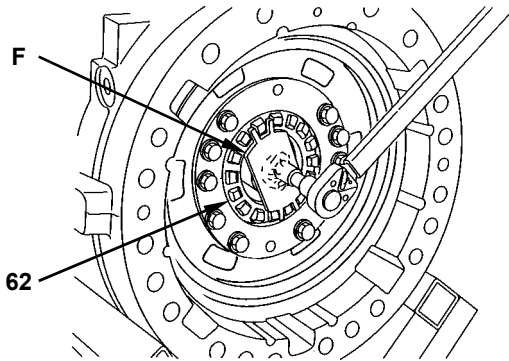
37. Apply LOCTITE #262 onto bolts (8) (18 used). Install the bearing cage (59) assembly to differential gear body (5) with bolts (8) (18 used) and washers (9) (18 used).

 : 17 mm

 : 98 N·m (10 kgf·m, 72 lbf·ft)

38. Tighten adjusting nut (62) by using the special tool (F).

 : 120 N·m (12 kgf·m, 89 lbf·ft)

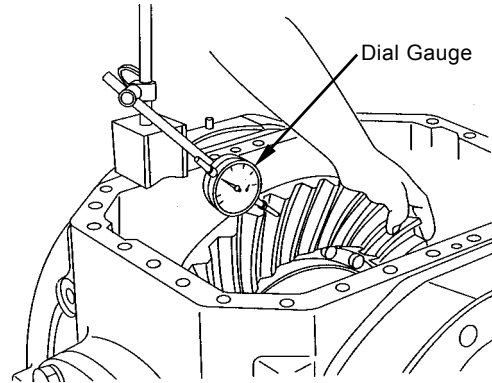


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Adjustment of Ring Gear Backlash and Ring Gear Teeth Contact Condition

39. After adjustment, secure adjusting nuts (62) (2 used) with lock plates (63) (2 used), bolts (42) (2 used) and washers (43) (2 used).

40. Set a dial gauge onto the teeth outer end of ring gear (29).



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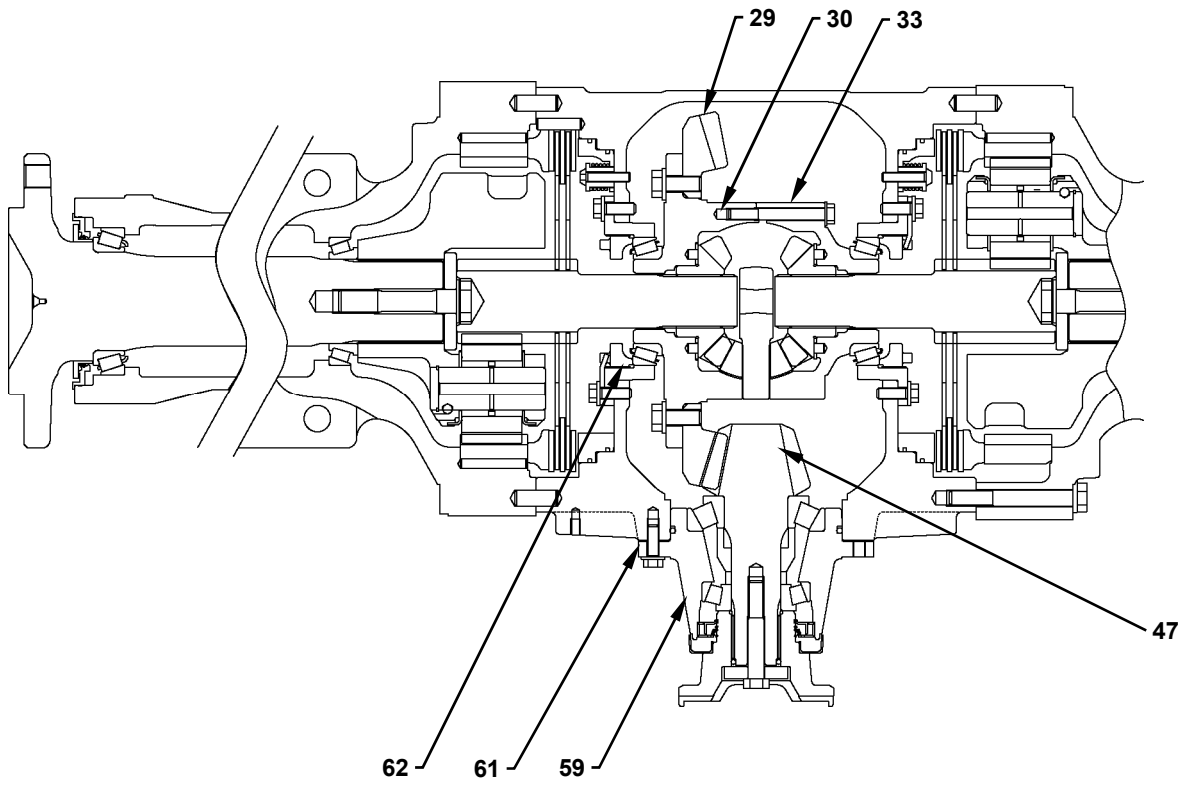
41. Secure pinion gear (47). Turn ring gear (29) forward and backward. Measure the backlash.

42. If the backlash is beyond the standard value, loosen adjusting nut (62) at the plain flange half case (33) side. Tighten adjusting nut (62) at the flange half case (30) side. Move ring gear (29) close to pinion gear (47). If the backlash is less than the standard value, adjust them in the contrary way.

- Ring gear (29) backlash
0.25 to 0.36 mm (0.01 to 0.014 in)

43. Apply red lead primer onto 3 to 4 teeth of ring gear (29). Check the teeth contact condition while turning ring gear (29) forward and backward by hand.

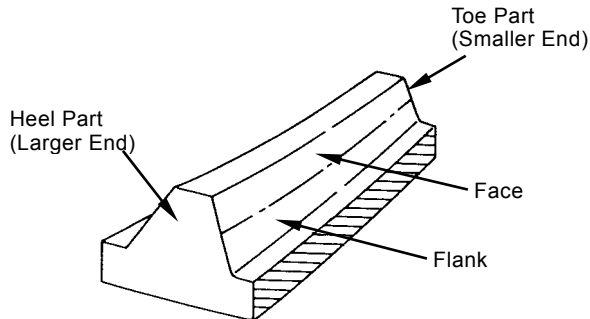
BODY (TRAVEL SYSTEM) / Axle



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BODY (TRAVEL SYSTEM) / Axle

44. As for the teeth contact condition adjustment, refer to the following steps a to e.
After adjusting the teeth contact condition to the normal conditions, check the backlash again.



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a. Normal Teeth Contact Condition

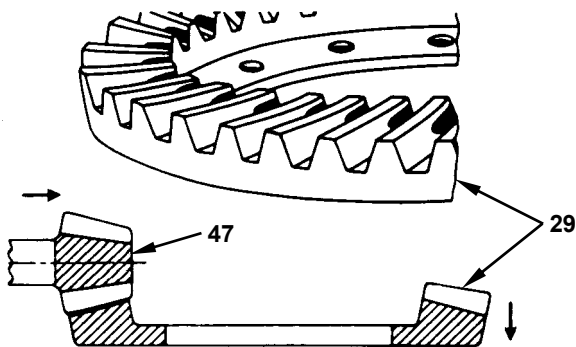
The normal teeth contact condition is started from the toe part and is approx. 80 % length of teeth to the direction of the heel part.

The adjustments of the following steps b to e are the inspections for the convex surface side of the teeth. The contact conditions are reversed on the concave side.

b. Toe Part Contact Condition

When adjusting, loosen adjusting nut (62) at the flange half case (30) side. Tighten adjusting nut (62) at the plane half case (33) side. Move ring gear (29) away from pinion gear (47).

Reduce the thickness of shim (61) in bearing cage (59). Move pinion gear (47) close to ring gear (29).

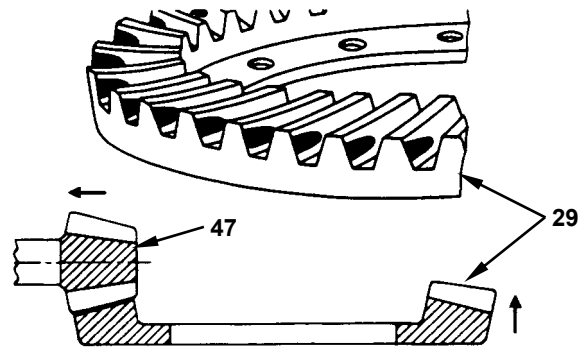


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c. Heel Part Contact Condition

When adjusting, loosen adjusting nut (62) at the plane half case (33) side. Tighten adjusting nut (62) at the flange half case (30) side. Move ring gear (29) close to pinion gear (47).

Increase the thickness of shim (61) in bearing cage (59). Move pinion gear (47) away from ring gear (29).

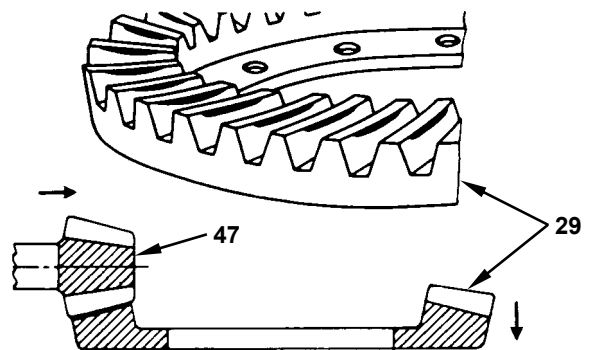


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d. Face Part Contact Condition

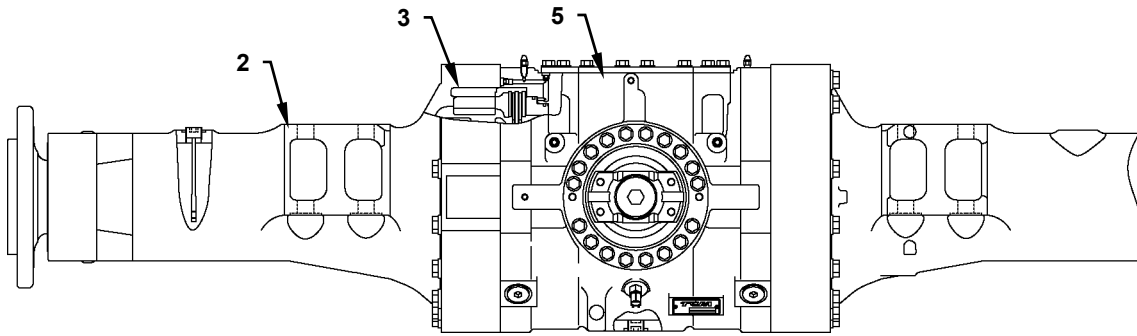
When adjusting, reduce the thickness of shim (61) in bearing cage (59). Move pinion gear (47) close to ring gear (29).

Loosen adjusting nut (62) at the flange half case (30) side. Tighten adjusting nut (62) at the plane half case (33) side. Move ring gear (29) away from pinion gear (47).

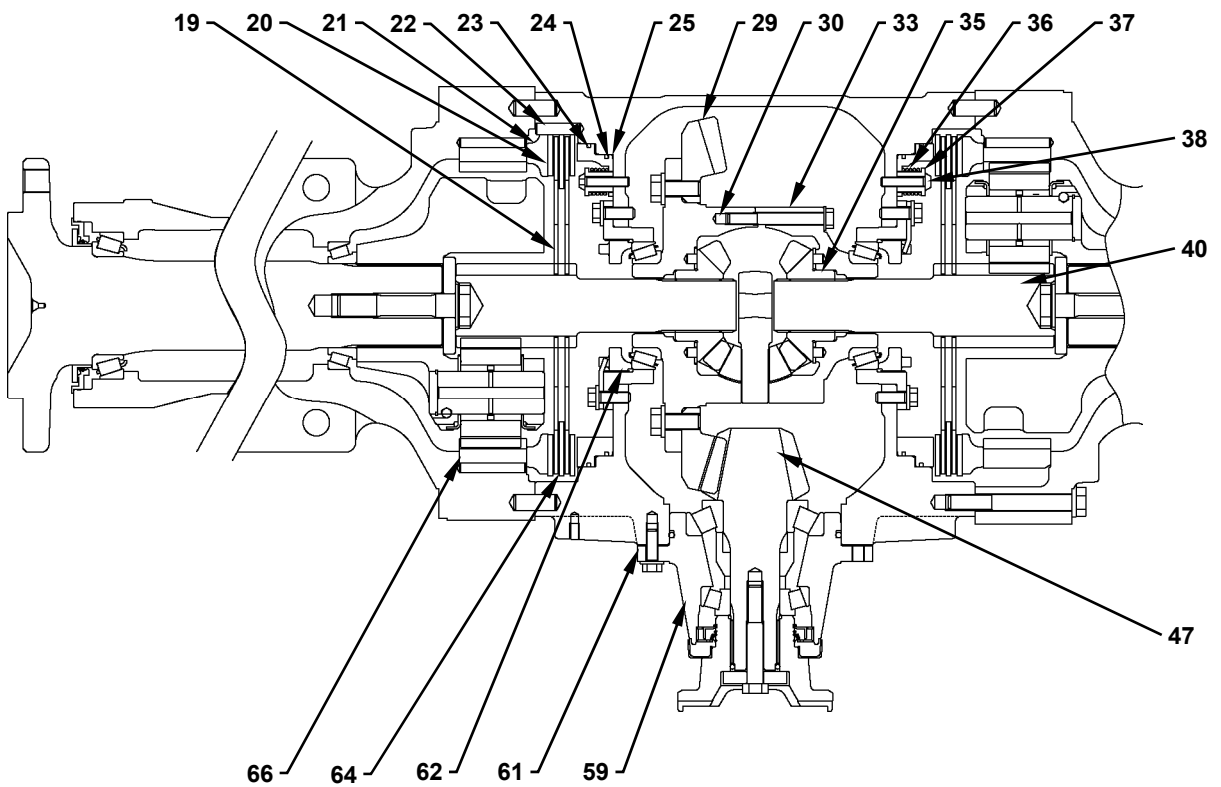


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BODY (TRAVEL SYSTEM) / Axle



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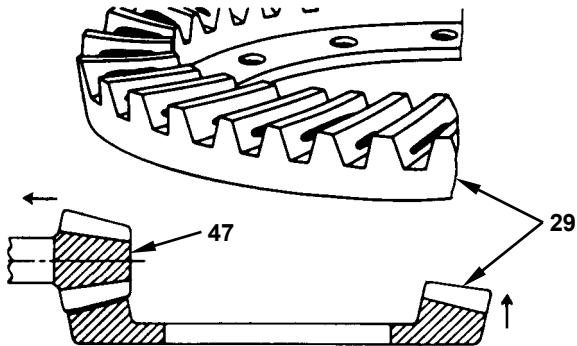
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BODY (TRAVEL SYSTEM) / Axle

e. Frank Part Contact Condition

When adjusting, increase the thickness of shim (61) in bearing cage (59). Move pinion gear (47) away from ring gear (29).

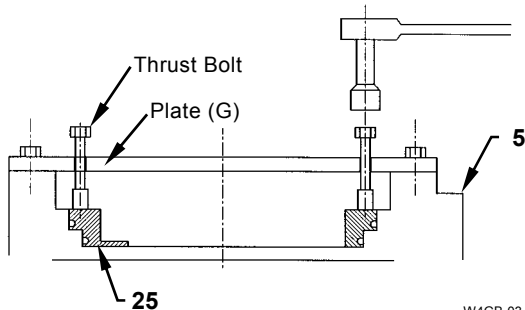
Loosen adjusting nut (62) at the plane half case (33) side. Tighten adjusting nut (62) at the flange half case (30) side. Move ring gear (29) close to pinion gear (47).



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Installation of Brake


45. Install D-rings (23, 24) to brake piston (25).
46. Install brake piston (25) to differential gear body (5) with a thrust bolt by using plate (G).



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47. Apply LOCTITE #262 onto button bolts (38) (8 used). Install springs (36) (8 used), adapters (37) (8 used) and button bolts (38) (8 used) to differential gear body (5).

 : 6 mm

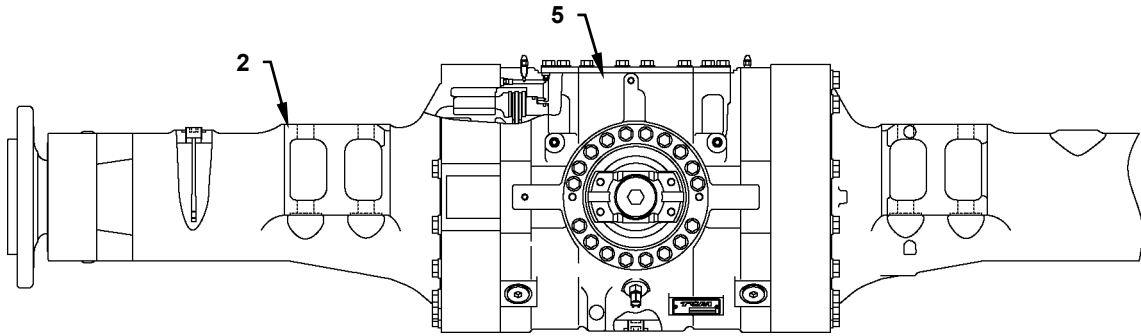
 : 49 N·m (5 kgf·m, 108 lbf·ft)

48. Install shaft (40) to side gear (35).
49. Install pins (22) (2 used) to the lower part of differential gear body (5). Install brake ring (20) while aligning with pins (22) (2 used).
50. Install brake disc (19) and brake ring (64) to differential gear body (5).
51. Install second brake disc (19) so that the open hole of second brake disc (19) is aligned with the open hole of first brake disc (19).
52. Install brake ring (20) and end plate (21) to differential gear body (5) in this order.
53. Install pins (22) (6 used) to differential gear body (5) by using a plastic hammer.
54. Install the brake on the opposite side in the same way.

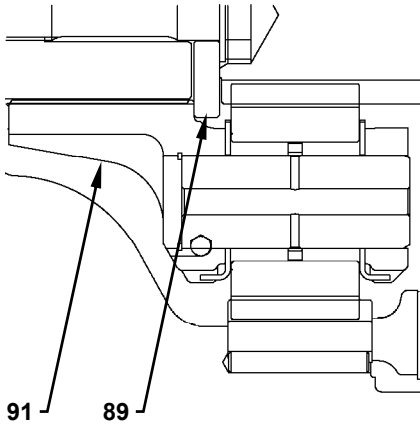
Assembly of Axle Tube

55. When replacing ring gear (66), install ring gear (66) to axle tube (2) with pins (3) (4 used) by using a plastic hammer.

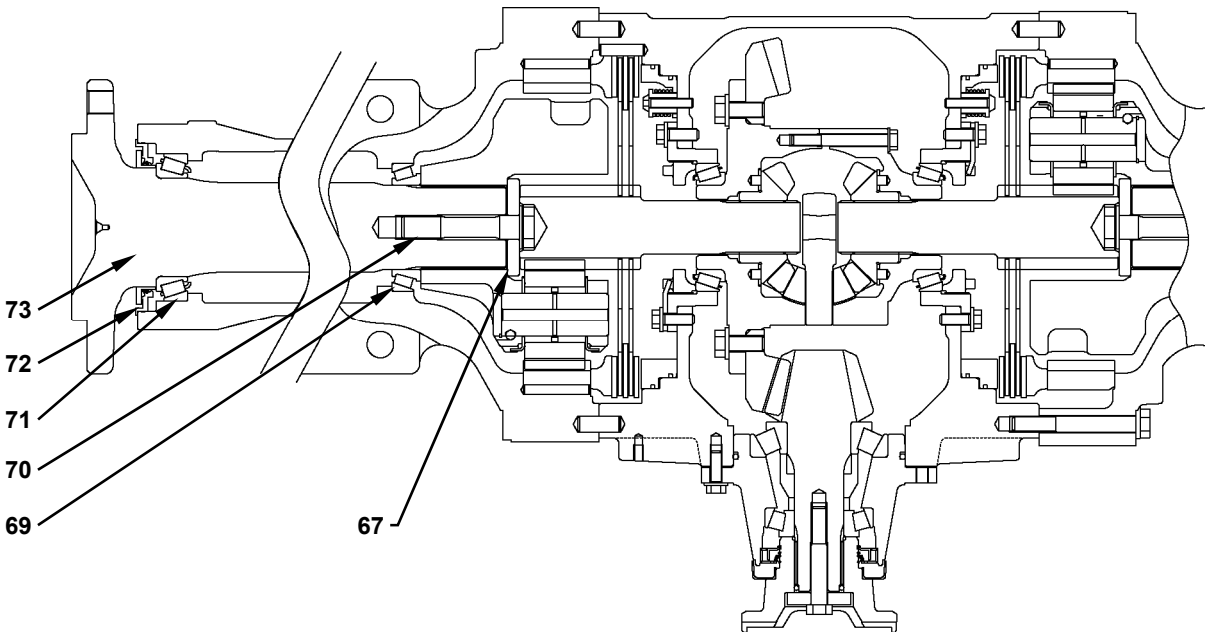
BODY (TRAVEL SYSTEM) / Axle



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BODY (TRAVEL SYSTEM) / Axle

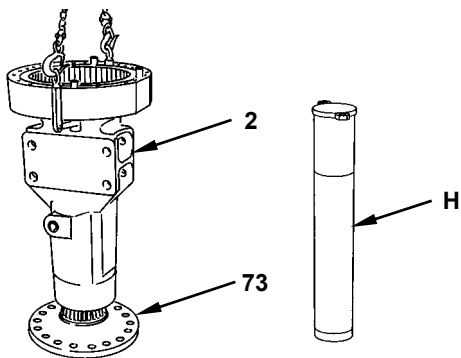
56. Secure axle tube (2) on a workbench with the wheel side facing upward. Install the outer race and the inner race of bearing (71) to axle tube (2).

57. Apply grease onto the lip part in oil seal (72). Install oil seal (72) to axle tube (2).

CAUTION: Axle tube (2) weight:
Front axle : 125 kg (280 lb)
Rear axle : 105 kg (235 lb)

58. Turn over axle tube (2). Hoist axle tube (2) with the differential gear body (5) side facing upward. Install axle tube (2) to raised axle shaft (73).

59. Cover axle shaft (73) with special tool (H). Install oil seal (72) and bearing (71) at the wheel side to axle shaft (73).



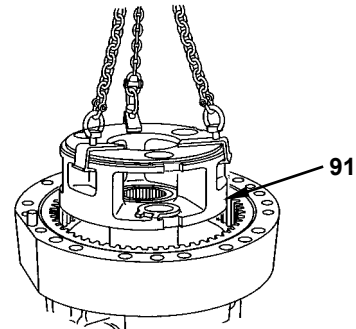
W4GB-03-065

60. Install the outer race of bearing (69) to axle tube (2).

Preload Adjustment of Axle Shaft (73) Bearing (69) (Shim Adjustment)

CAUTION: Planet carrier (85) weight: 25 kg (60 lb)

61. Install planet carrier (91) without installing gear the to axle shaft (73) in order to adjust the preload.



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62. Install retainer plate (89) to planet carrier (91). Install the inner race of bearing (69) to axle shaft (73) with bolt (70). At this time, install axle tube (2) by turning.

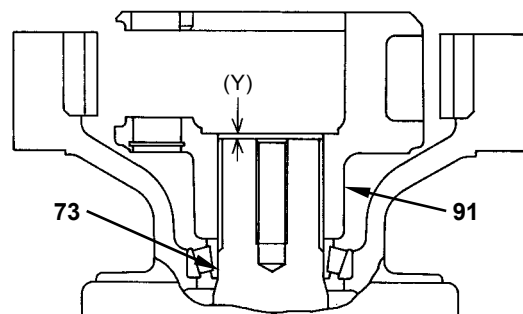
: 36 mm

: 49 N·m (5 kgf·m, 36 lbf·ft)

63. Remove bolt (70) and retainer plate (89) from axle shaft (73). Measure step (Y) between axle shaft (73) and planet carrier (91).

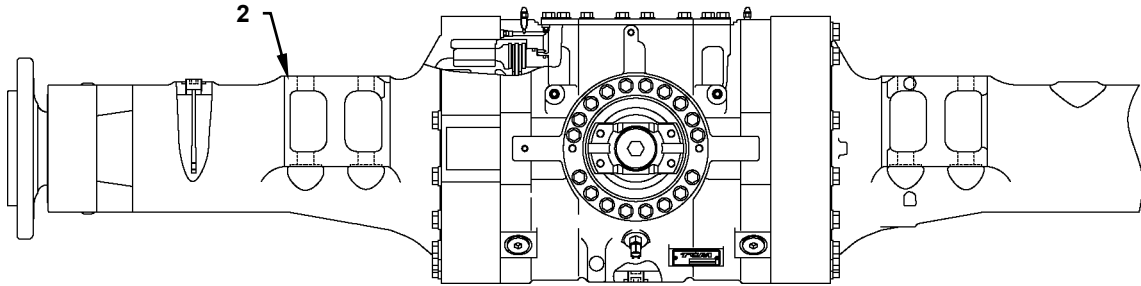
Select shim (67) which is 0.03 to 0.10 mm (0.001 to 0.004 in) thicker than step (Y).

: 36 mm

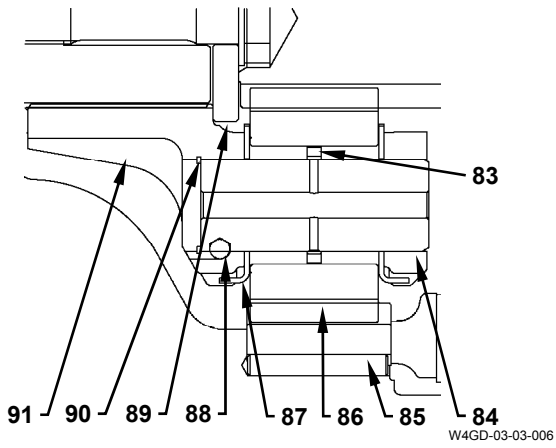


W4GB-03-067

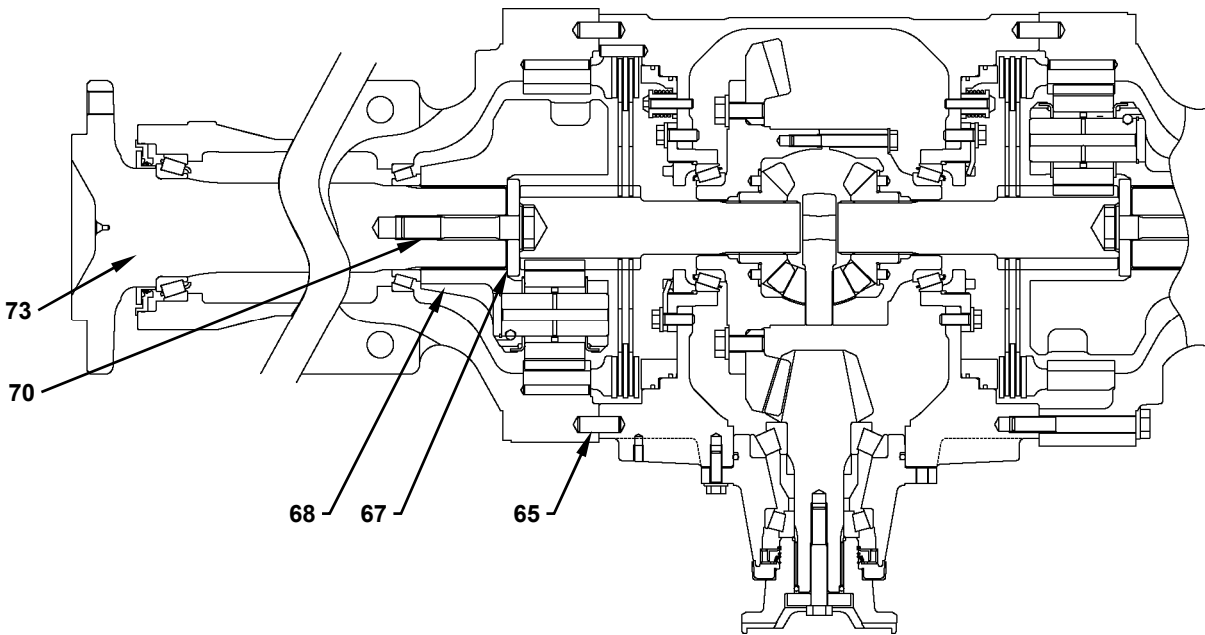
BODY (TRAVEL SYSTEM) / Axle



W4GD-03-03-008




W4GD-03-03-006




W4GD-03-03-004

BODY (TRAVEL SYSTEM) / Axle

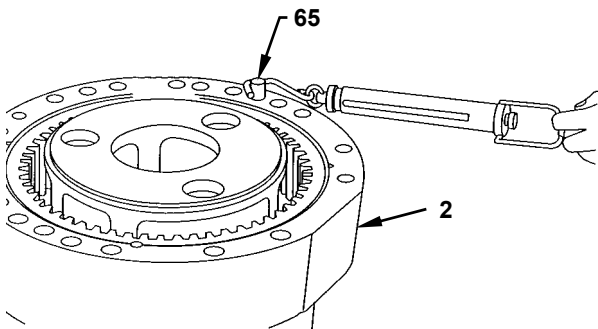
64. Install selected shim (67) and retainer plate (89) to axle shaft (73). Install retainer plate (89) to axle shaft (73) with bolt (70).

 : 36 mm

 : 49 N·m (5 kgf·m, 36 lbf·ft)


65. Attach a spring balance onto knock pin (65) of axle tube (2). Pull a spring balance on the mounting pitch circle and measure the rotational resistance of bearing (69).

If the measurement value is out of the range from 20 to 39 N (2 to 4 kgf, 4.5 to 8.78 lbf), perform the shim adjustment again. If the measurement value is less than the range, reduce the shim thickness. On the contrary, if the measurement value is beyond the range, increase the shim thickness.



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66. Remove retainer plate (89) and bolt (70). Remove planet carrier (91) from axle tube (2).

 : 36 mm



CAUTION: Planet carrier (85) weight: 25 kg (60 lb)

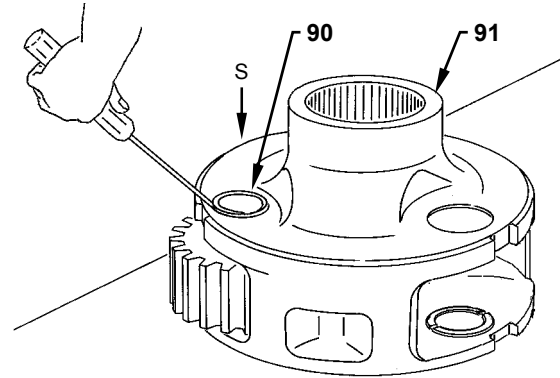
Assembly of Planet Carrier Assembly (68)

67. Install the outer race of bearings (86) (2 used) to planet gear (85). Install collar (83) and the inner race of bearing (86) to planet gear (85).

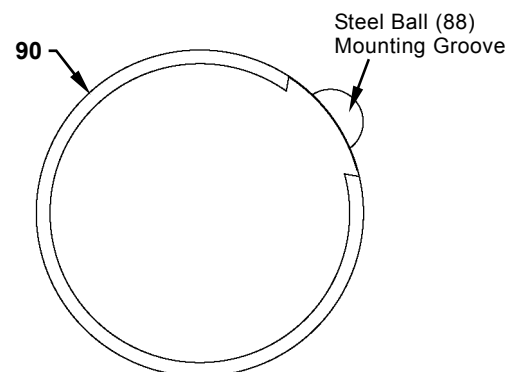
68. Install thrust washers (87) (2 used) to planet carrier (91). At this time, set the stopper of thrust washer (87) to the groove on the outer surface of planet carrier (91).

69. Install steel ball (88) to planet shaft (84). Install planet shaft (84) to planet carrier (91).

70. Align the notch of retaining ring (90) and the steel ball (88) mounting groove. Install retaining ring (90) to the groove on planet carrier (91).



W4GB-03-03-073

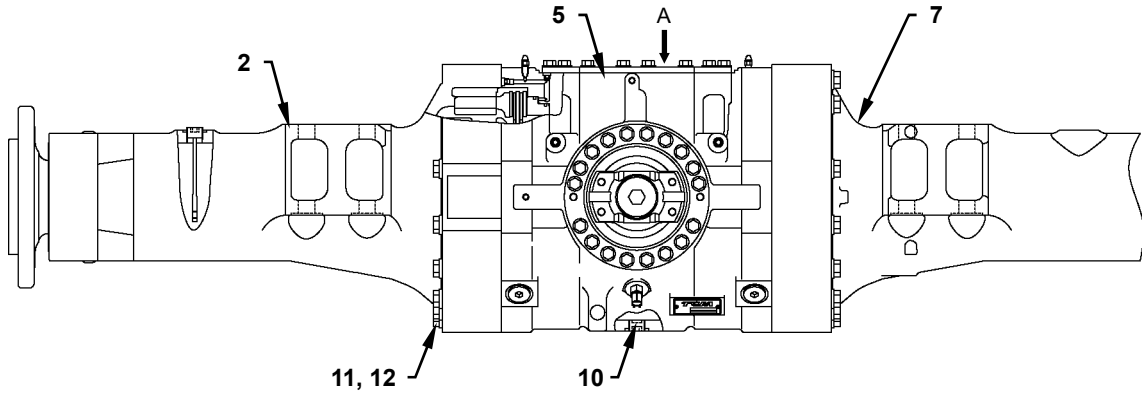


Viwe S

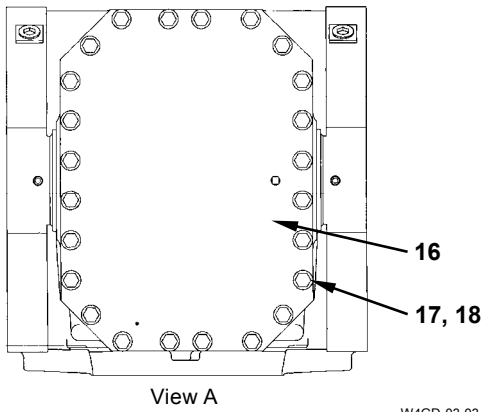
W4GB-03-03-074

71. Install retainer plate (89) to planet carrier (91). Install other planet gears (85) (2 used) to planet carrier (91) in the same way.

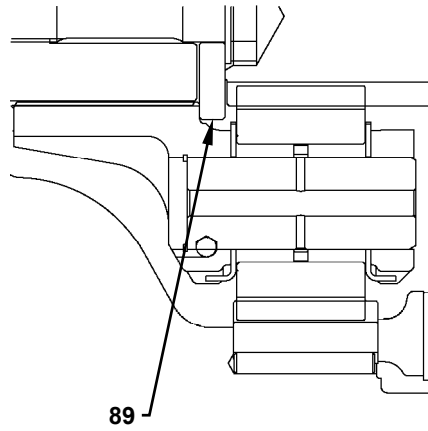
BODY (TRAVEL SYSTEM) / Axle



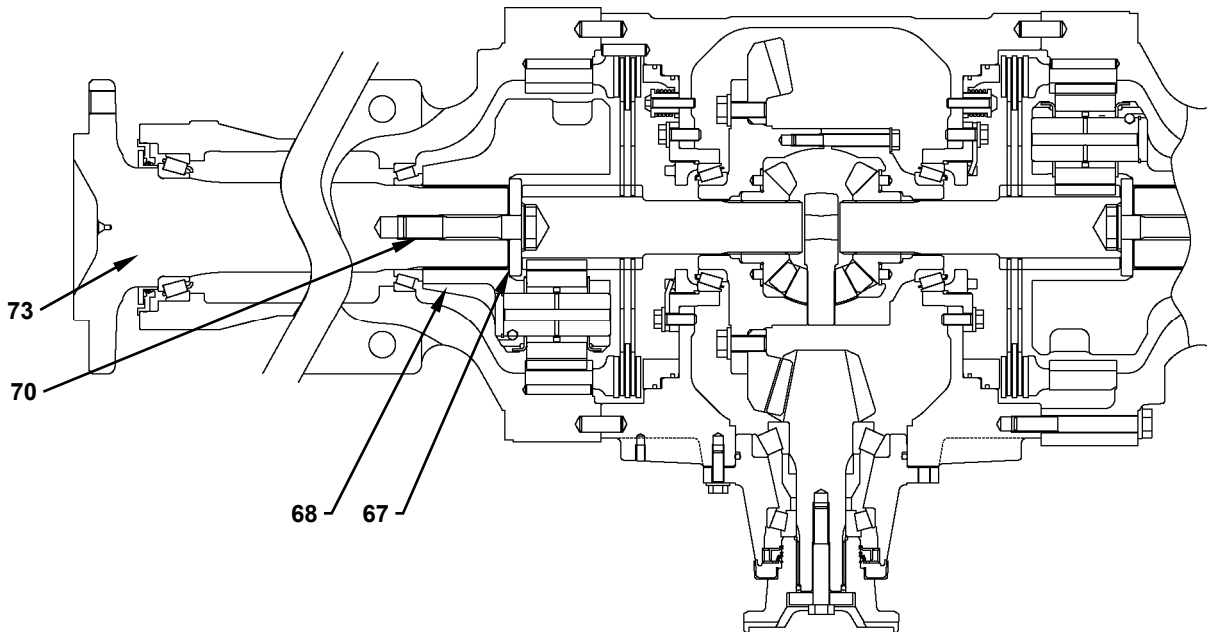
W4GD-03-03-008



W4GD-03-03-003



W4GD-03-03-006





W4GD-03-03-004

BODY (TRAVEL SYSTEM) / Axle



**CAUTION: Planet carrier assembly (68)
weight: 40 kg (90 lb)**

72. Install selected shim (67) and planet carrier assembly (68) to axle shaft (73).
73. Apply LOCTITE #262 onto bolt (70). Install retainer plate (89) and planet carrier assembly (68) to axle shaft (73) with bolt (70).
Install the other side in the same way.
-  : 36 mm
-  : 1090 N·m (111 kgf·m, 810 lbf·ft)



Installation of Axle Tube (2)

IMPORTANT: Apply LOCTITE onto the inside of the bolt (11) hole line in order not to intermit on the bead. Bead width is 2 to 3 mm (0.079 to 0.12 in).





74. Apply LOCTITE FMD-127 onto the mating surface on differential gear body (5) for axle tube (2).



**CAUTION: Axle tube (2, 7)
assembly weight:
Front axle : 235 kg (520 lb)
Rear axle : 215 kg (475 lb)**

75. Apply LOCTITE #262 onto bolt (11).
Hoist the axle tube (2) assembly. Install the axle tube (2) assembly to differential gear body (5) with bolts (11) (20 used) and washers (12) (20 used).
Install the axle tube (7) assembly on the opposite side in the same way.
-  : 24 mm
-  : 225 N·m (23 kgf·m, 166 lbf·ft)

IMPORTANT: Apply LOCTITE onto the inside of the bolt (17) hole line in order not to intermit on the bead.

76. Apply LOCTITE FMD-127 onto the cover (16) mounting surface on differential gear body (5).
77. Apply LOCTITE #572 onto drain plug (10). Install drain plug (10) to differential gear body (5). Add gear oil to differential gear body (5).
-  : 14 mm
-  : 70 N·m (7 kgf·m, 52 lbf·ft)
Gear oil amount: 28 L (7.4 US gal.)
78. Install cover (16) to differential gear body (5) with bolts (17) (28 used) and washers (18) (28 used).
-  : 17 mm
-  : 98 N·m (10 kgf·m, 72 lbf·ft)

BODY (TRAVEL SYSTEM) / Axle

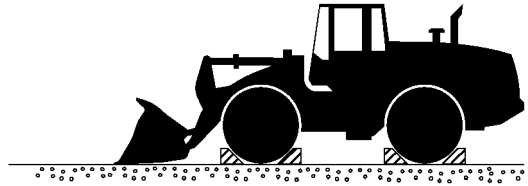
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BODY (TRAVEL SYSTEM) / Propeller Shaft

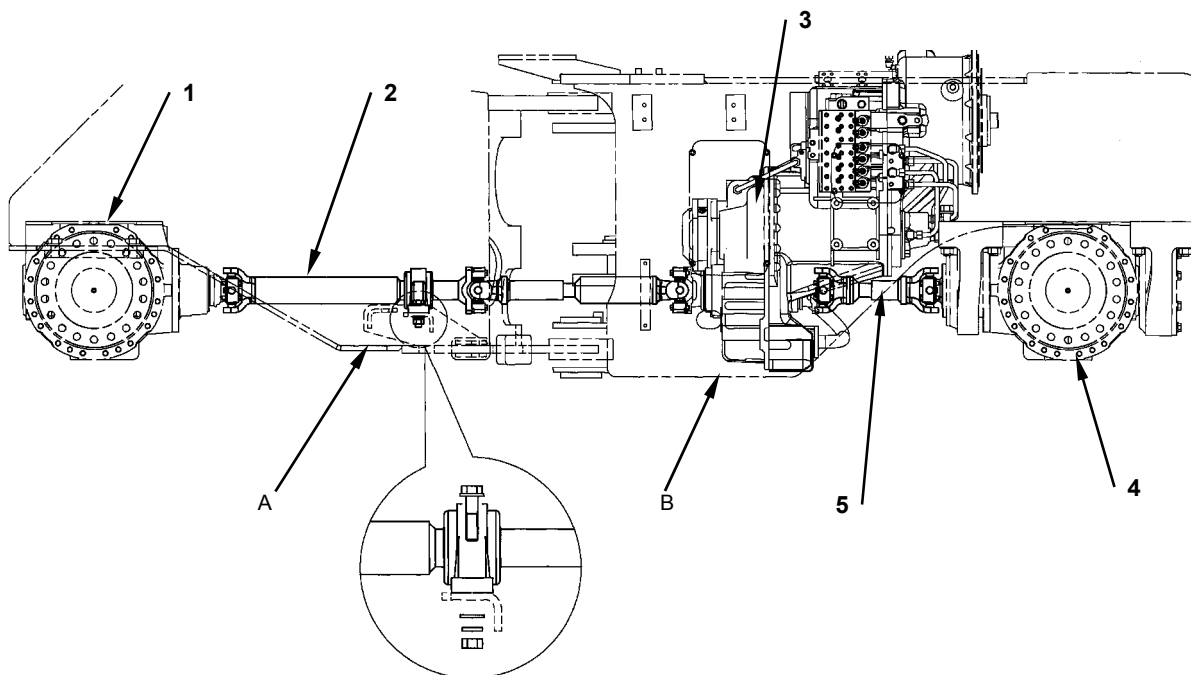
REMOVAL AND INSTALLATION OF PROPELLER SHAFT

Preparation

1. Park the machine on a solid and level surface.
Lower the bucket onto the ground horizontally.
2. Place a block in front of and behind the axle in order to secure the machine.



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W4GB-03-04-002

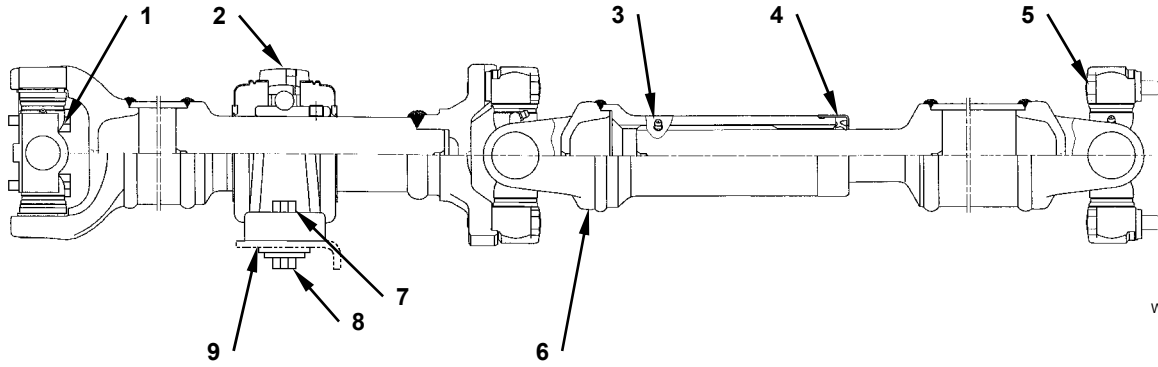
- 1 - Front Axle
- 2 - Propeller Shaft (Front)
- 3 - Transmission

- 4 - Rear Axle
- 5 - Propeller Shaft (Rear)

- A - Lower Part of Front Frame (Position of Stand)
- B - Lower Part of Rear Frame (Position of Stand)

BODY (TRAVEL SYSTEM) / Propeller Shaft

Propeller Shaft (Front)



W4GD-03-04-001

1 - Bolt (4 Used)
2 - Support Bearing
3 - Grease Fitting

4 - Spline Seal
5 - Bolt (4 Used)

6 - Propeller Shaft Assembly
7 - Bolt (2 Used)

8 - Nut (2 Used)
9 - Washer (4 Used)


BODY (TRAVEL SYSTEM) / Propeller Shaft

Removal of Propeller shaft (Front)


1. Remove grease fitting (3) in order to drain the internal grease.

IMPORTANT: Do not separate and remove propeller shaft assembly (6). If separating and removing it, spline seal (4) may be damaged. Remove it as an assembly.

2. Remove bolts (1, 5) (4 used for each) from propeller shaft assembly (6).

 : 17 mm

3. Remove bolts (7) (2 used), nuts (8) (2 used) and washers (9) (4 used) from support bearing (2).

 : 30 mm



**CAUTION: Propeller shaft assembly (6)
weight: 47 kg (105 lb)**


4. Remove propeller shaft assembly (6) from the body.

Installation of Propeller Shaft (Front)

IMPORTANT: Align the flanges of the propeller shafts at the front and the rear. Install the propeller shafts at the front and the rear with the grease fitting surfaces facing to the same side. At this time, raise the body so that the tires can be rotated. (Refer to W3-4-1.)


1. Install support bearing (2) to the body with bolts (7) (2 used), nuts (8) (2 used) and washers (9) (4 used).


 : 30 mm

 : 196.2 to 215.8 N·m
(20 to 22 kgf·m, 145 to 159 lbf·ft)

2. Apply LOCTITE #262 onto bolts (1, 5) (4 used for each).

3. Install bolts (1, 5) (4 used for each) to propeller shaft assembly (6).

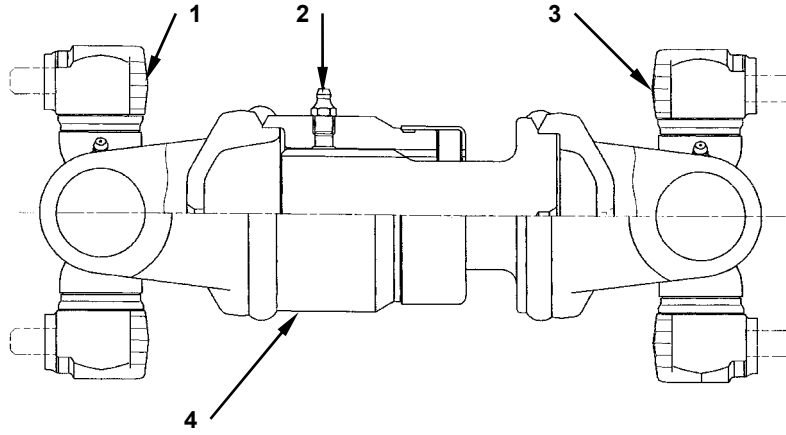
 : 17 mm

 : 143 N·m (15 kgf·m, 105 lbf·ft)

4. Install grease fitting (3). Apply grease.

BODY (TRAVEL SYSTEM) / Propeller Shaft

Propeller Shaft (Rear)



W4GD-03-04-002

1 - Bolt (4 Used)


2 - Grease Fitting

3 - Bolt (4 Used)

4 - Propeller Shaft Assembly

BODY (TRAVEL SYSTEM) / Propeller Shaft

Removal of Propeller Shaft (Rear)

1. Remove grease fitting (2) in order to drain the internal grease.
2. Remove bolts (1, 3) (4 used for each) from propeller shaft assembly (4).
 : 17 mm



**CAUTION: Propeller shaft assembly (4)
weight: 16 kg (12 lb)**

3. Remove propeller shaft assembly (4) from the body.


Installation of Propeller Shaft (Rear)


IMPORTANT: Apply LOCTITE #262 onto the mounting bolts.

IMPORTANT: Align the flanges of the propeller shafts at the front and the rear. Install the propeller shafts at the front and the rear with the grease fitting surfaces facing to the same side. At this time, raise the body so that the tires can be rotated. (Refer to W3-4-1.)

IMPORTANT: Install propeller shaft assembly (4) with the spline shaft side facing to the transmission side.

1. Install bolts (1, 3) (4 used for each) to propeller shaft assembly (4).

 : 17 mm

 : 143 N·m (15 kgf·m, 105 lbf·ft)

2. Install grease fitting (2). Apply grease.

BODY (TRAVEL SYSTEM) / Propeller Shaft

(Blank)


BODY (TRAVEL SYSTEM) / Brake Valve

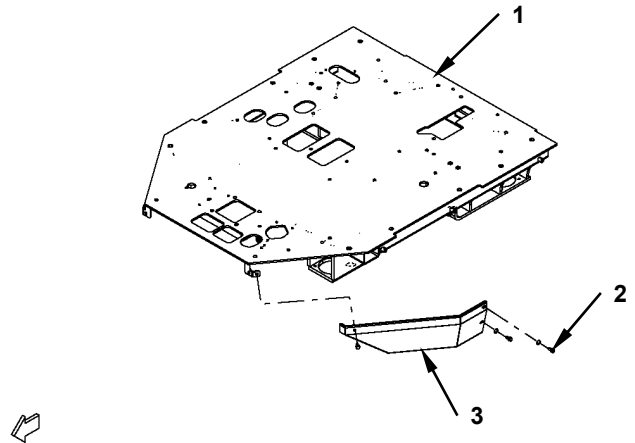
REMOVAL AND INSTALLATION OF BRAKE VALVE

CAUTION: Before doing any work, stop the engine and depress/release the brake pedal about 80 times in order to release the pressure in the service brake circuit. (The pedal can be depressed lightly when the pressure is released.)

Removal


1. Remove sems bolts (2) (3 used) from cover (3). Remove cover (3) from floor plate (1).

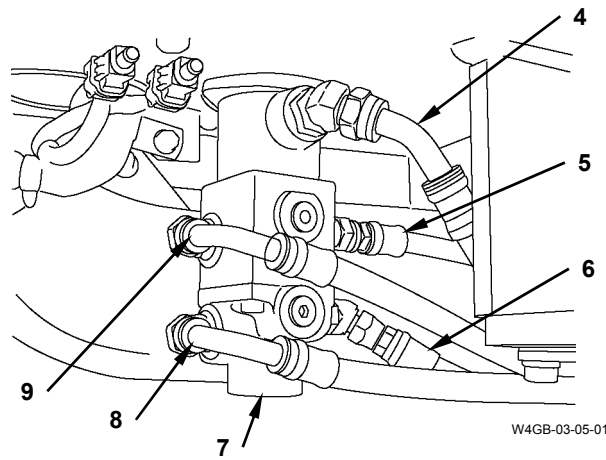
 : 14 mm



W4GB-03-05-013


2. Disconnect hoses (4 to 6, 8 and 9) from brake valve (7).

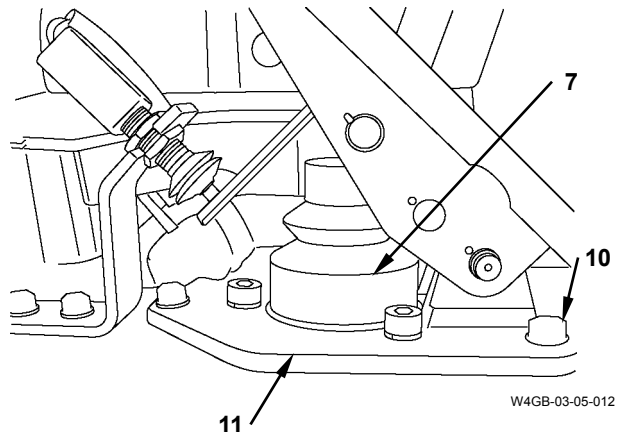
 : 22 mm, 27 mm



W4GB-03-05-011

3. Remove bolts (10) (3 used) from mounting plate (11). Remove brake valve (7) from mounting plate (11).

 : 12 mm





W4GB-03-05-012

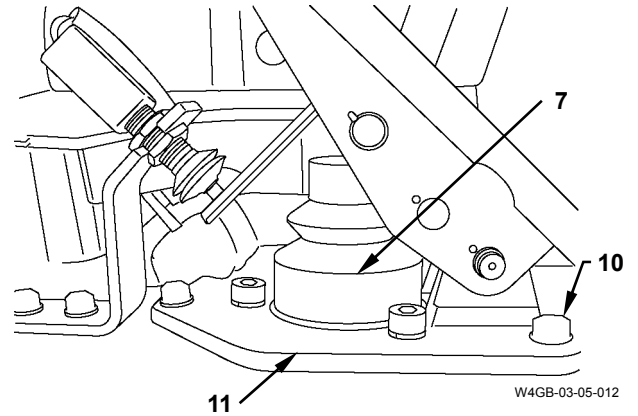
BODY (TRAVEL SYSTEM) / Brake Valve

Installation


1. Install brake valve (7) to mounting plate (11) with bolts (10) (3 used).


 : 12 mm


 : 9.5 N·m (1 kgf·m, 7 lbf·ft)




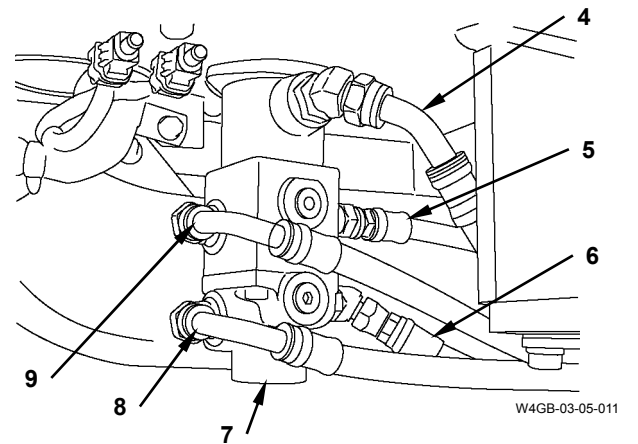
2. Connect hoses (4 to 6, 8 and 9) to brake valve (7).

 : 22 mm

 : 39 N·m (4 kgf·m, 28.5 lbf·ft)

 : 27 mm

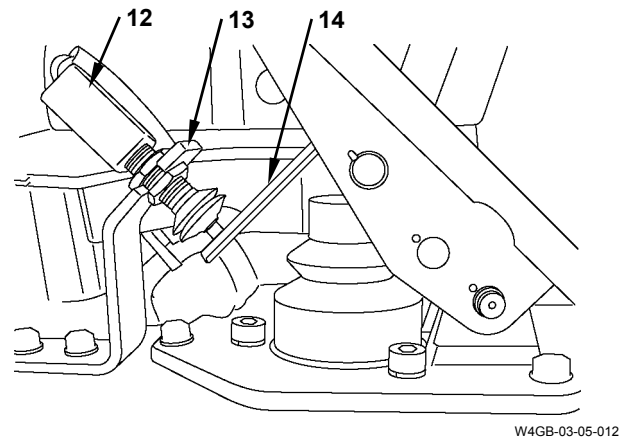
 : 93 N·m (9.5 kgf·m, 69 lbf·ft)




3. After installing brake valve (7), adjust the position of switch (12) in the following procedures.


- When switch (12) is removed and the pedal is free, adjust the position of bracket (14) so that bracket (14) is parallel to the switch (12) mounting part of bracket (13).

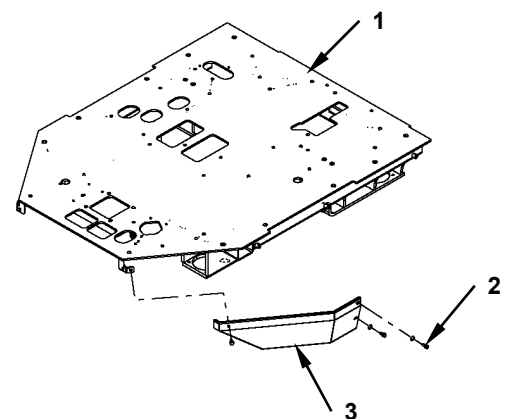
- Push the end of switch (12) onto bracket (14) to 4 to 5 mm (0.16 to 0.2 in). Secure switch (12). At this time, check that the pedal returns to the original position when moving and releasing the pedal. Check the sound "tick, tick" when switch (12) is operated.



4. Install cover (3) to floor plate (1) with sems bolts (2) (3 used).

 : 14 mm

 : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)

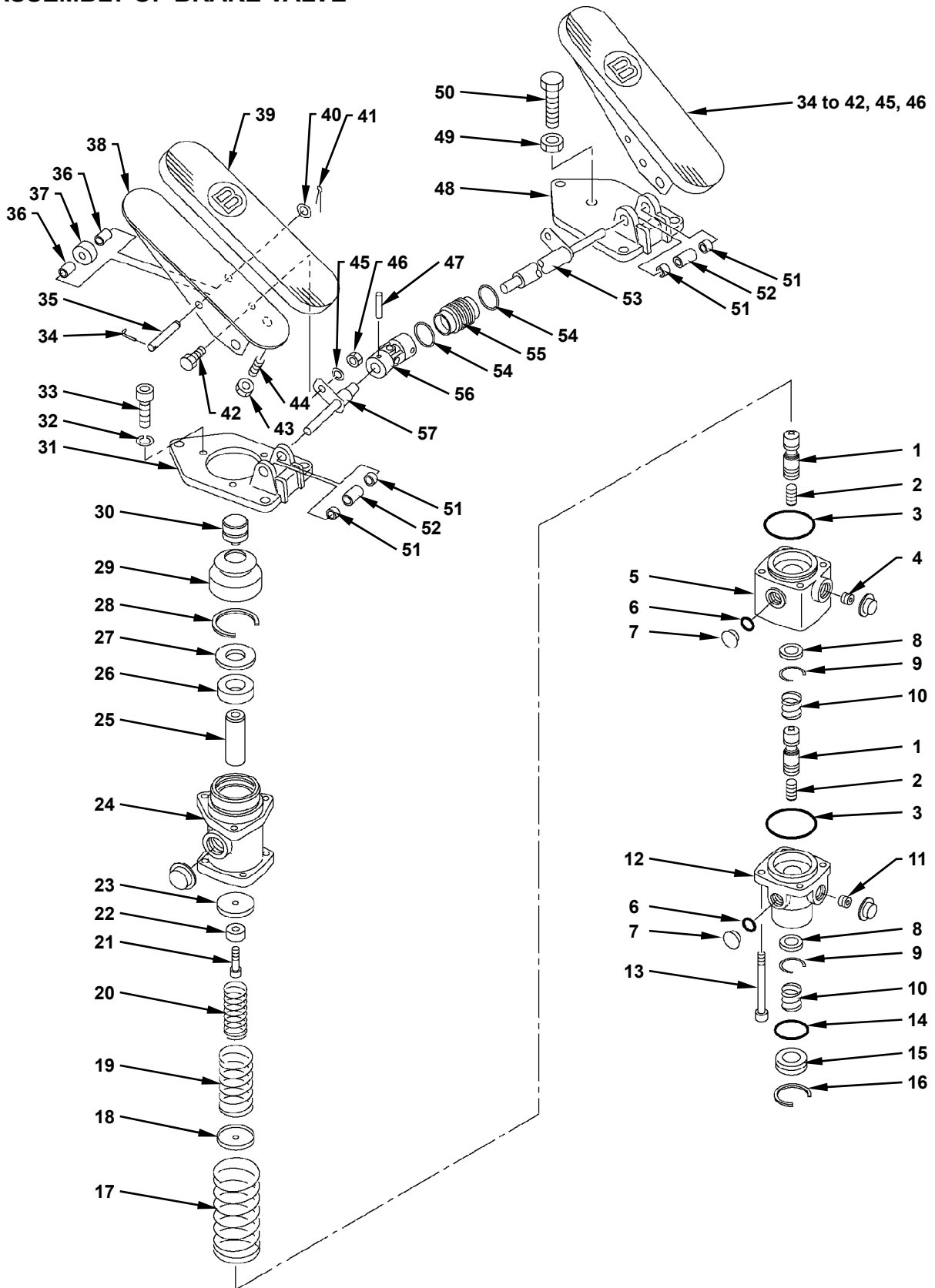


BODY (TRAVEL SYSTEM) / Brake Valve

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BODY (TRAVEL SYSTEM) / Brake Valve

DISASSEMBLY OF BRAKE VALVE







W4GB-03-05-001

BODY (TRAVEL SYSTEM) / Brake Valve

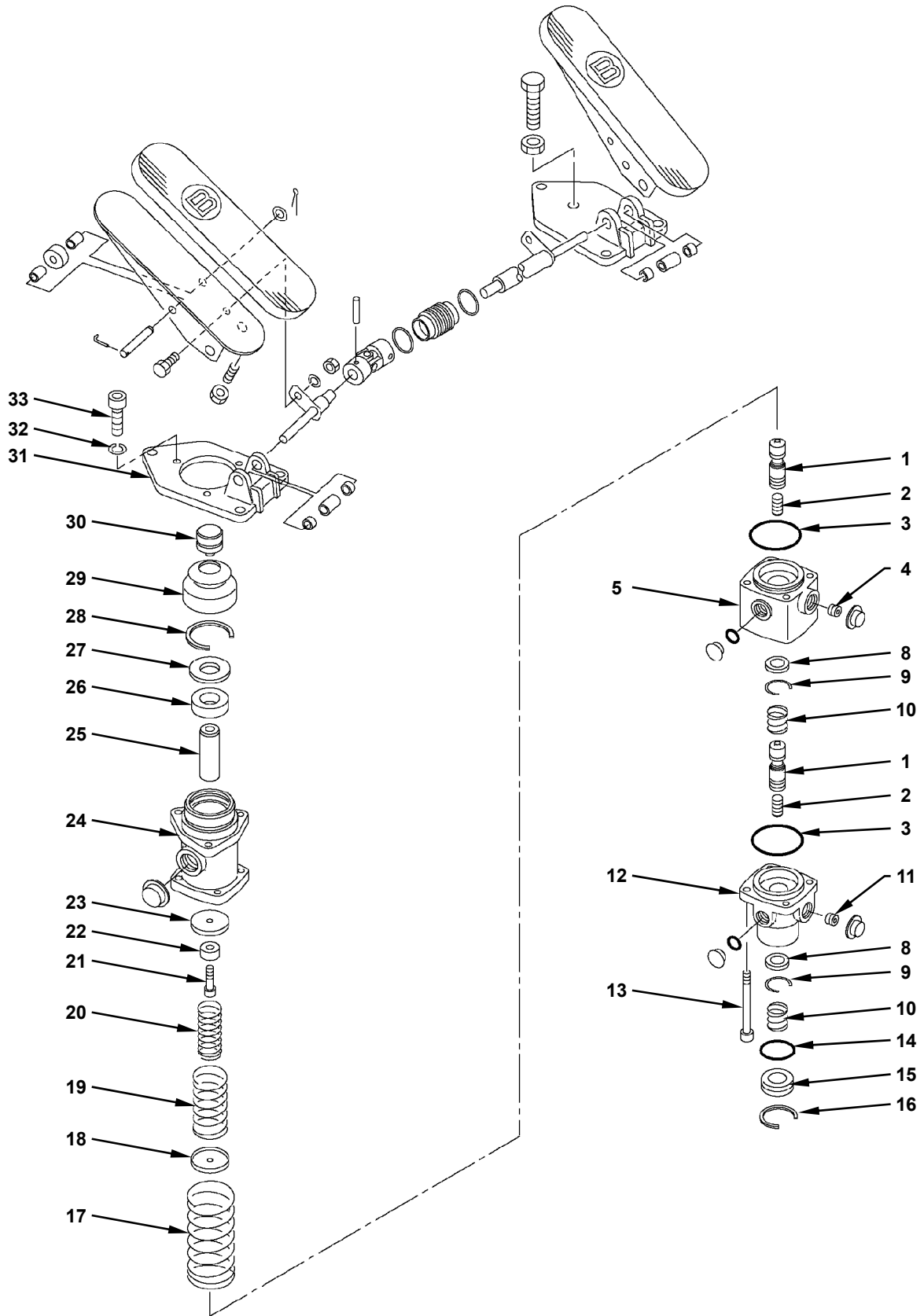
1 - Spool (2 Used)	16 - C-Ring	31 - Mounting Plate	46 - Nut (2 Used)
2 - Plunger (2 Used)	17 - Spring	32 - Washer (3 Used)	47 - Pin (2 Used)
3 - O-Ring (2 Used)	18 - Spring Seat	33 - Socket Bolt (3 Used)	48 - Mounting Plate
4 - Orifice	19 - Spring	34 - L Pin (2 Used)	49 - Nut
5 - Body	20 - Spring	35 - Pin (2 Used)	50 - Bolt
6 - O-Ring (2 Used)	21 - Socket Bolt	36 - Collar (4 Used)	51 - Bushing (4 Used)
7 - Plug (2 Used)	22 - Retainer	37 - Roller (2 Used)	52 - Collar (2 Used)
8 - Spring Seat (2 Used)	23 - Spring Seat	38 - Pedal (2 Used)	53 - Shaft
9 - Retaining Ring (2 Used)	24 - Cover	39 - Cover (2 Used)	54 - Retaining Ring (2 Used)
10 - Spring (2 Used)	25 - Input Spool	40 - Washer	55 - Boot
11 - Orifice	26 - Oil Seal	41 - Pin (2 Used)	56 - Joint
12 - Body	27 - Stopper	42 - Bolt (2 Used)	57 - Shaft
13 - Socket Bolt (4 Used)	28 - C-Ring	43 - Nut	
14 - O-Ring	29 - Dust Cover	44 - Screw	
15 - Plug	30 - Seat	45 - Washer (2 Used)	

BODY (TRAVEL SYSTEM) / Brake Valve

Disassembly of Brake Valve

1. Remove cover (39) from pedal (38) at the right side. Remove nut (46) and washer (45) from bolt (42). Remove bolt (42) from pedal (38).
 : 14 mm
2. Remove shaft (53), pedal (38) and collar (52) from mounting plate (48).
Remove bushings (51) (2 used) from mounting plate (48).
3. Remove pin (41) from pin (35). Remove roller (37), collars (36) (2 used), pin (35), L pin (34) and washer (40) from pedal (38).
4. Loosen nut (49). Remove bolt (50) from mounting plate (48).
 : 19 mm
5. Remove cover (39) from pedal (38) at the left side. Remove nut (46) and washer (45) from bolt (42). Remove bolt (42) from pedal (38).
 : 14 mm
6. Loosen nut (43). Remove screw (44) from pedal (38).
 : 12 mm
7. Remove shaft (57), pedal (38) and collar (52) from mounting plate (31).
Remove bushings (51) (2 used) from mounting plate (31).
8. Remove pin (41) from pin (35). Remove roller (37), collars (36) (2 used), pin (35), L pin (34) and washer (40) from pedal (38).
9. Remove retaining rings (54) (2 used) from boot (55). Remove boot (55) from joint (56).
10. Remove pins (47) (2 used) from joint (56).
Remove shafts (53, 57) from joint (56).


BODY (TRAVEL SYSTEM) / Brake Valve



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BODY (TRAVEL SYSTEM) / Brake Valve

11. Remove socket bolts (33) (3 used) and spring washers (32) (3 used) from mounting plate (31). Remove mounting plate (31) from cover (24).

 : 6 mm


12. Remove dust cover (29) and seat (30) from input spool (25).

13. Remove socket bolts (13) (4 used) from body (12). Divide into bodies (5, 12) and cover (24). Remove springs (10, 17, 19) and spring seat (18) from bodies (5, 12).

 : 6 mm

14. Place body (12) on a stand with the body (5) side facing downward. Remove C-ring (16), plug (15) and spring (10) from body (12). Remove O-ring (14) from plug (15).

15. Remove spools (1) (2 used) from bodies (5, 12). Remove plungers (2) (2 used), retaining ring (9) (2 used), spring seats (8) (2 used), orifices (4, 11) and O-rings (3) (2 used) from bodies (5, 12).


 : 5 mm

16. Remove input spool (25) with the spring attached from cover (24).

17. Place cover (24) on the stand with the body (5) side facing downward. Remove C-ring (28) from cover (24). Remove stopper (27) and oil seal (26) from cover (24).

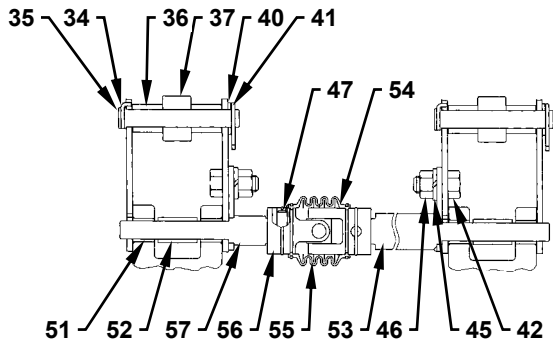
IMPORTANT: When input spool (25) is secured in a vise, prevent the outer diameter of input spool (25) from damaging by using a protective material.

18. Remove socket bolt (21) from input spool (25). Remove retainer (22), spring (20) and spring seat (23) from cover (24).

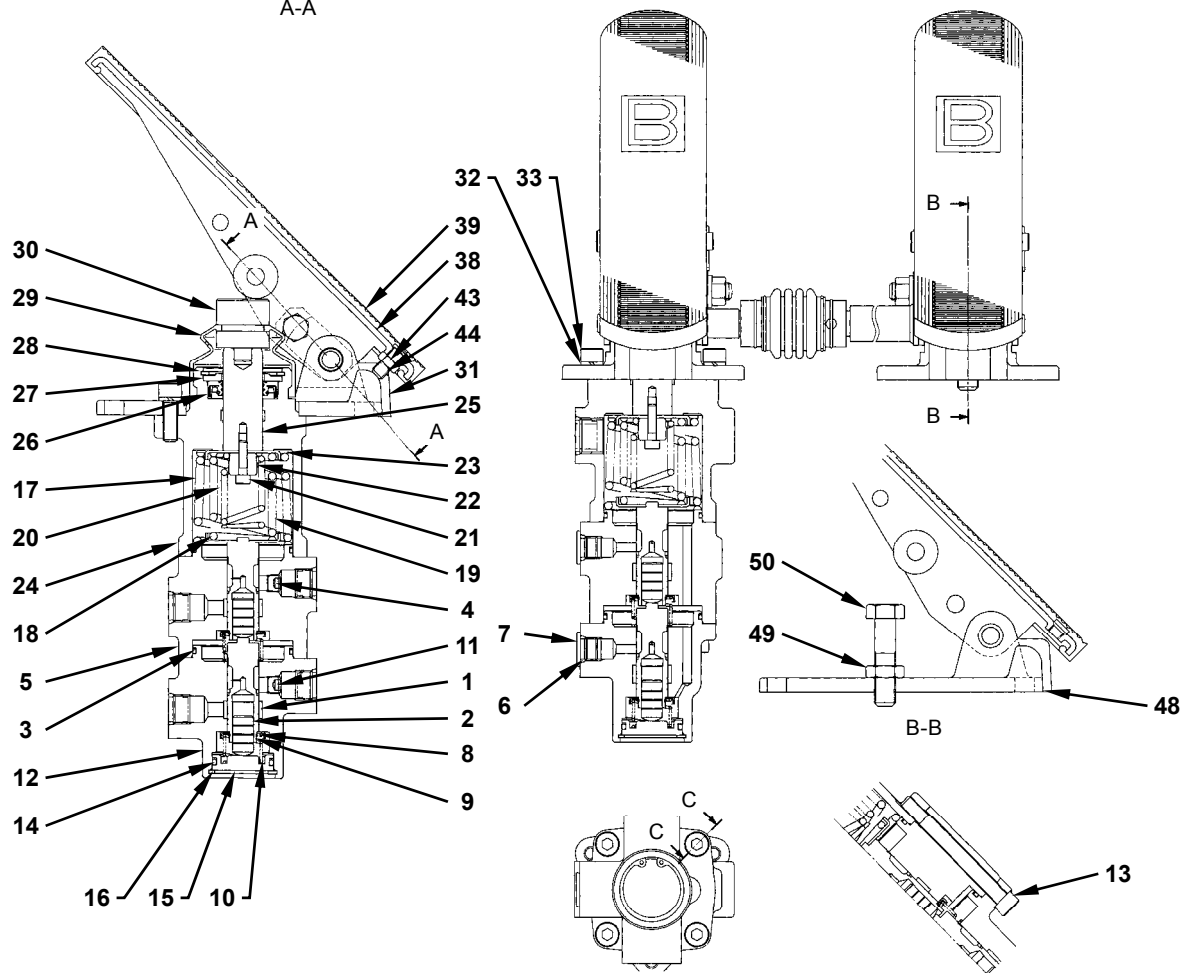
 : 4 mm

BODY (TRAVEL SYSTEM) / Brake Valve

ASSEMBLY OF BRAKE VALVE



A-A



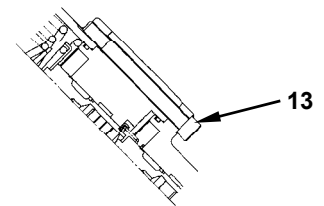
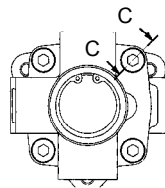
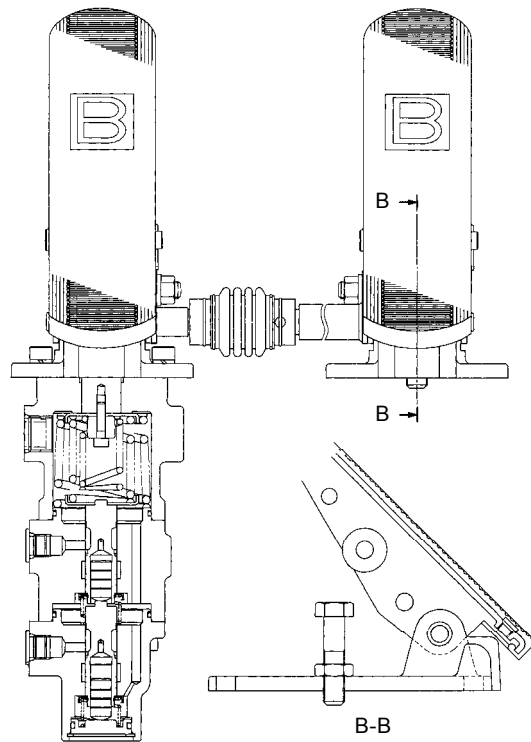
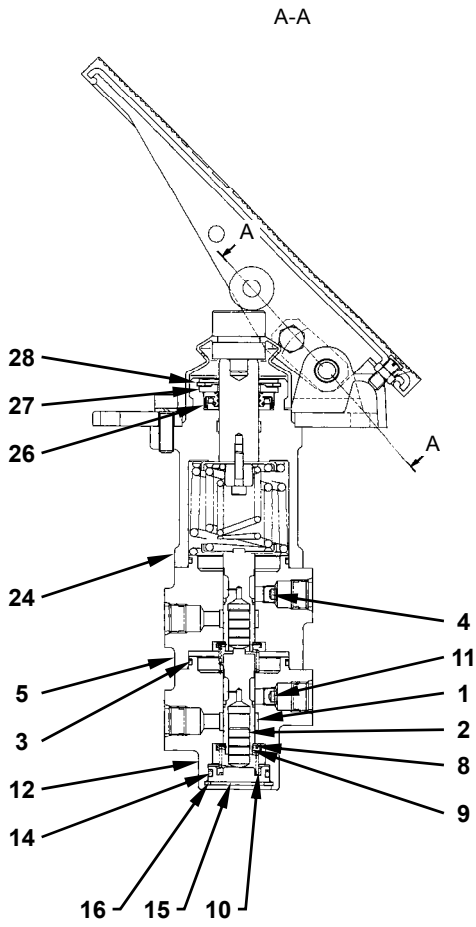
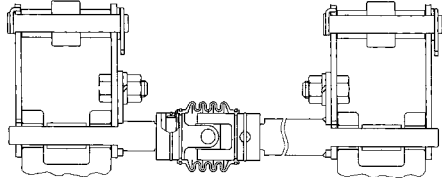
C-C

W4GB-03-05-002

BODY (TRAVEL SYSTEM) / Brake Valve

1 - Spool (2 Used)	16 - C-Ring	31 - Mounting Plate	46 - Nut (2 Used)
2 - Plunger (2 Used)	17 - Spring	32 - Washer (3 Used)	47 - Pin (2 Used)
3 - O-Ring (2 Used)	18 - Spring Seat	33 - Socket Bolt (3 Used)	48 - Mounting Plate
4 - Orifice	19 - Spring	34 - L Pin (2 Used)	49 - Nut
5 - Body	20 - Spring	35 - Pin (2 Used)	50 - Bolt
6 - O-Ring (2 Used)	21 - Socket Bolt	36 - Collar (4 Used)	51 - Bushing (4 Used)
7 - Plug (2 Used)	22 - Retainer	37 - Roller (2 Used)	52 - Collar (2 Used)
8 - Spring Seat (2 Used)	23 - Spring Seat	38 - Pedal (2 Used)	53 - Shaft
9 - Retaining Ring (2 Used)	24 - Cover	39 - Cover (2 Used)	54 - Retaining Ring (2 Used)
10 - Spring (2 Used)	25 - Input Spool	40 - Washer (2 Used)	55 - Boot
11 - Orifice	26 - Oil Seal	41 - Pin (2 Used)	56 - Joint
12 - Body	27 - Stopper	42 - Bolt (2 Used)	57 - Shaft
13 - Socket Bolt (4 Used)	28 - C-Ring	43 - Nut	
14 - O-Ring	29 - Dust Cover	44 - Screw	
15 - Plug	30 - Seat	45 - Washer (2 Used)	

BODY (TRAVEL SYSTEM) / Brake Valve




C-C


W4GB-03-05-002

BODY (TRAVEL SYSTEM) / Brake Valve

Assembly of Brake Valve

1. Install orifice (11) to body (12). Install orifice (4) to body (5).

 : 5 mm

 : 9.8 to 14.7 N·m
(1 to 1.5 kgf·m, 7.2 to 11 lbf·ft)

2. Install spring seats (8) (2 used) and retaining rings (9) (2 used) to spools (1) (2 used).
3. Insert plungers (2) (2 used) into spools (1) (2 used).
4. Insert spools (1) (2 used) into bodies (5, 12) respectively.
5. Install O-ring (14) to plug (15).

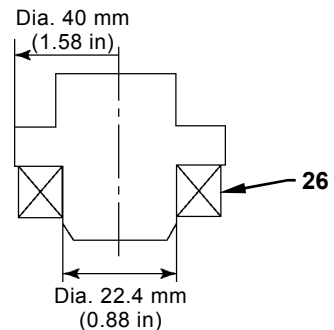
IMPORTANT: Check that spring (10) is completely installed in the hole on spring seat (8) and plug (15).

6. Install spring (10), plug (15) and C-ring (16) to body (12).
7. Install O-rings (3) (2 used) to bodies (5, 12).

8. Insert socket bolts (13) (4 used) into body (12). Place body (12) on a level stand. Install spring (10) to spool (1).

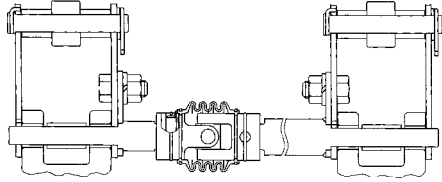
9. After checking the port direction, install body (5) to body (12) while inserting body (5) into socket bolts (13) (4 used).

10. Apply grease onto the lip inner surface, the outer surface of oil seal (26) and the inner surface of the oil seal groove. Install oil seal (26) to cover (24). Install stopper (27) and C-ring (28) to cover (24).

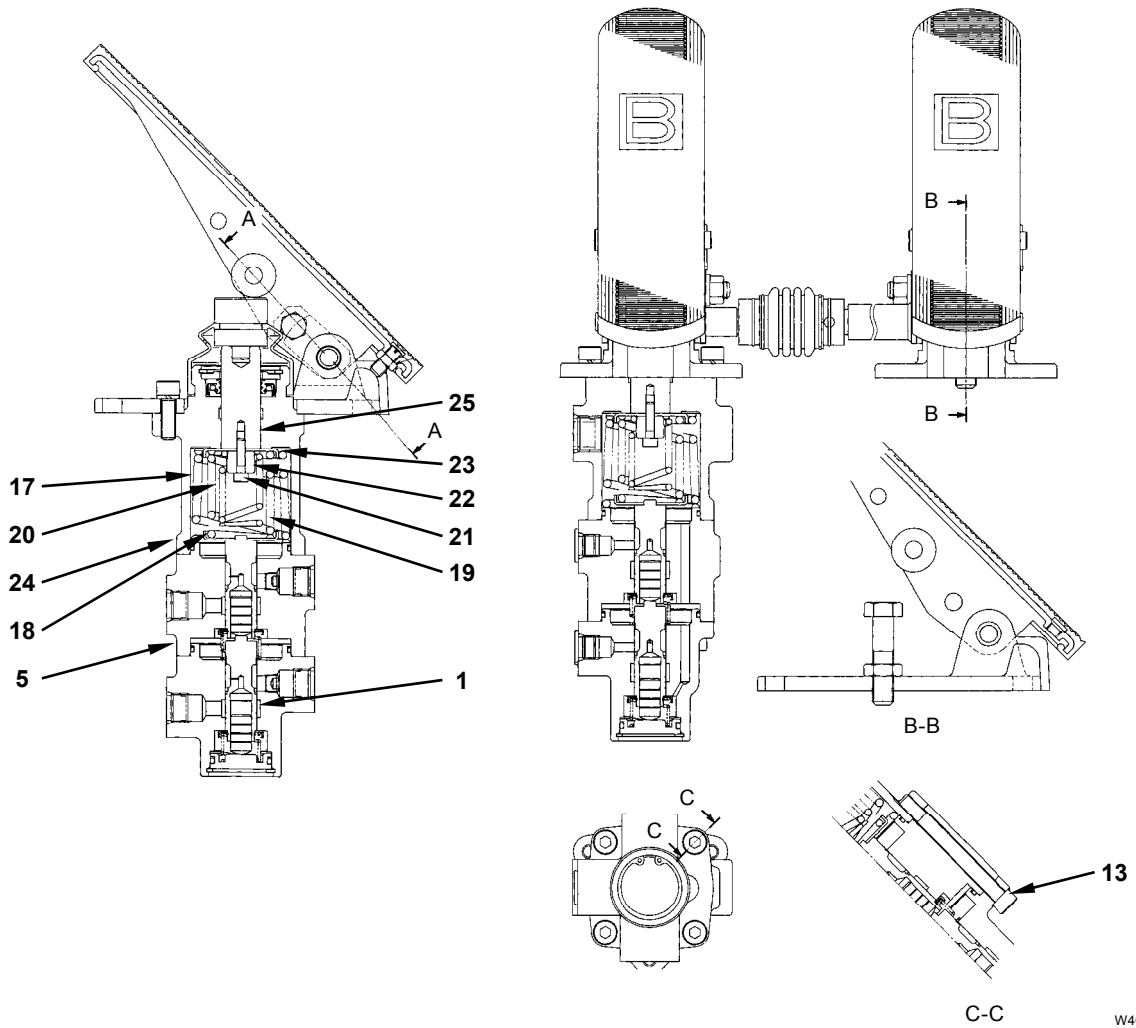


W4GB-03-05-003

BODY (TRAVEL SYSTEM) / Brake Valve



A-A





W4GB-03-05-002

BODY (TRAVEL SYSTEM) / Brake Valve

IMPORTANT: When input spool (25) is secured in a vise, prevent the outer diameter of input spool (25) from damaging by using a protective material.

11. Install spring seat (23), spring (20) and retainer (22) to input spool (25) with socket bolt (21).
At this time, install spring (20) with the small diameter side facing to the retainer (22) side.

 : 4 mm


 : 6.86 to 8.83 N·m
(0.7 to 0.9 kgf·m, 5.1 to 6.5 lbf·ft)


12. Apply grease onto the outer surface of input spool (25). Insert input spool (25) into cover (24).

IMPORTANT: Check that spool (1) is completely installed in the hole on spring seat (18).

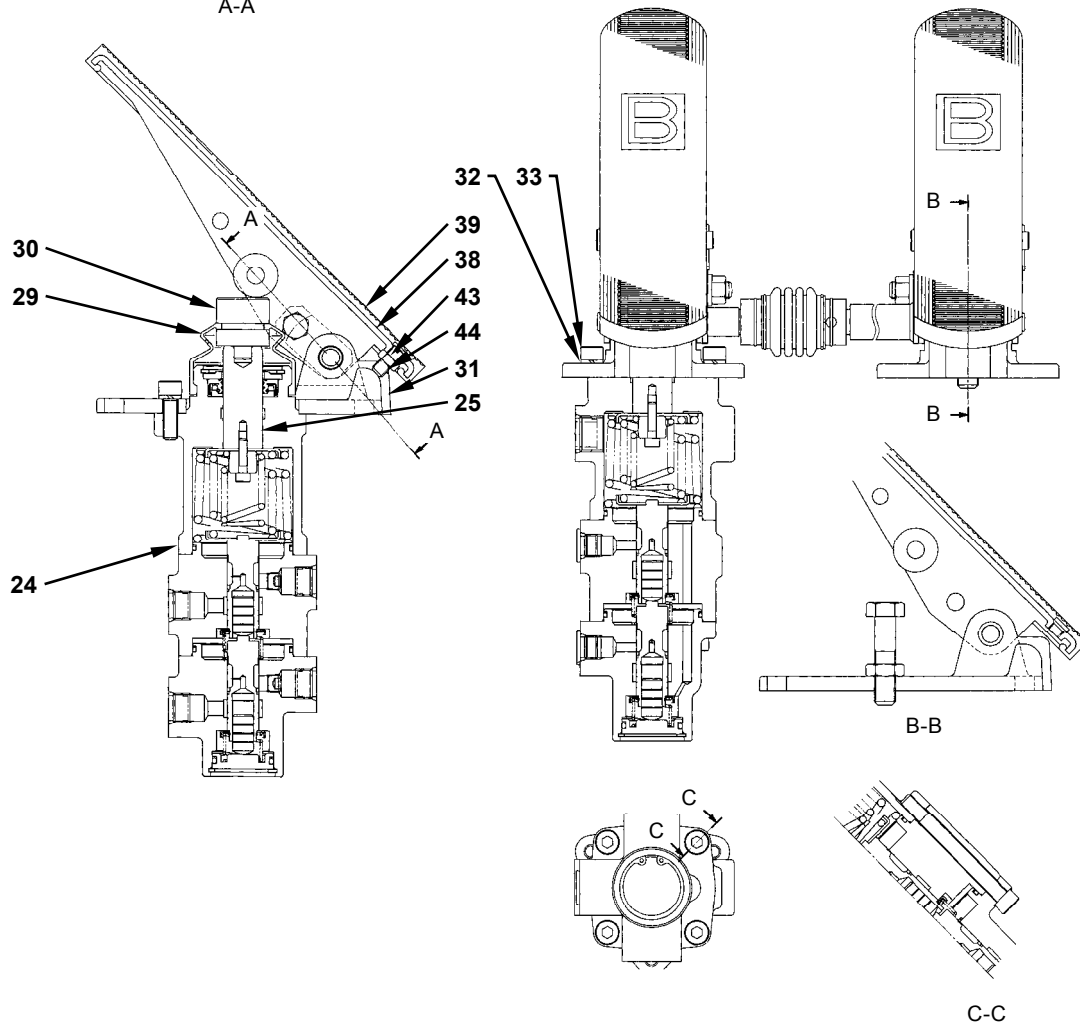
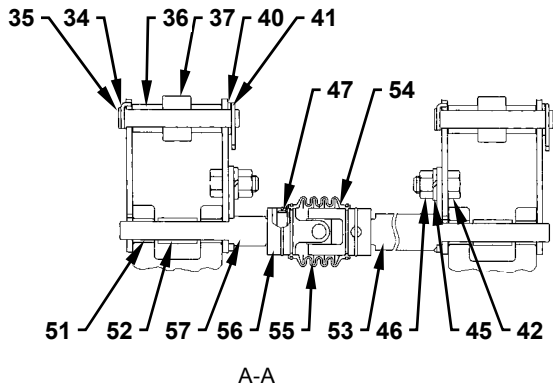
Insert spring (19) into the hole on spring seats (18, 23) and spring (17) into the hole on bodies (5) and spring seat(23).

13. Install springs (17, 19) and spring seat (18) to cover (24). Check the port direction and install the cover (24) assembly to body (5) with socket bolts (13) (4 used).







 : 6 mm

 : 19.6 to 25.5 N·m
(2 to 2.6 kgf·m, 14.5 to 19 lbf·ft)

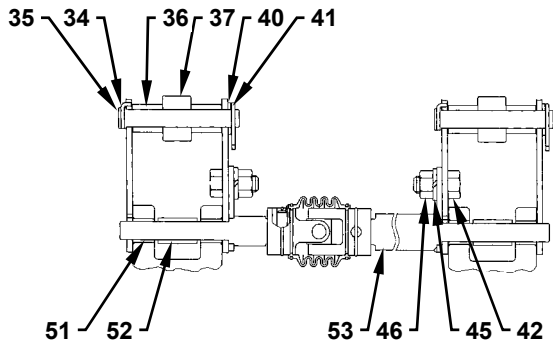
BODY (TRAVEL SYSTEM) / Brake Valve



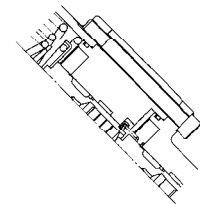
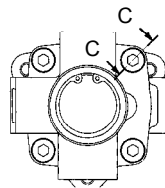
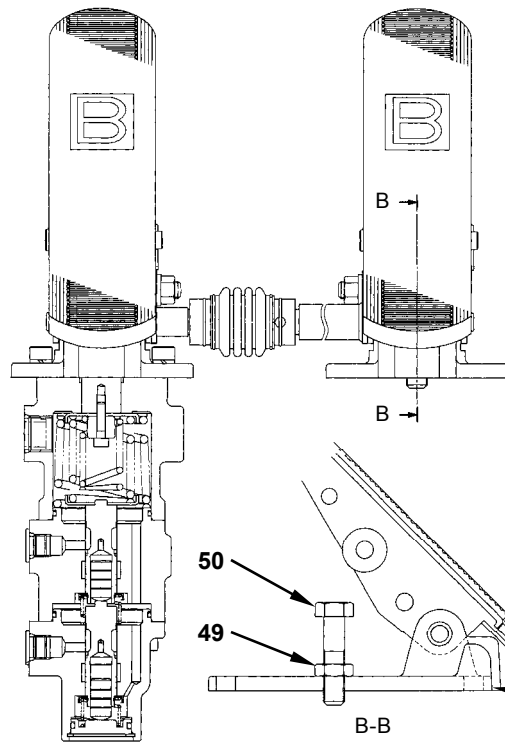
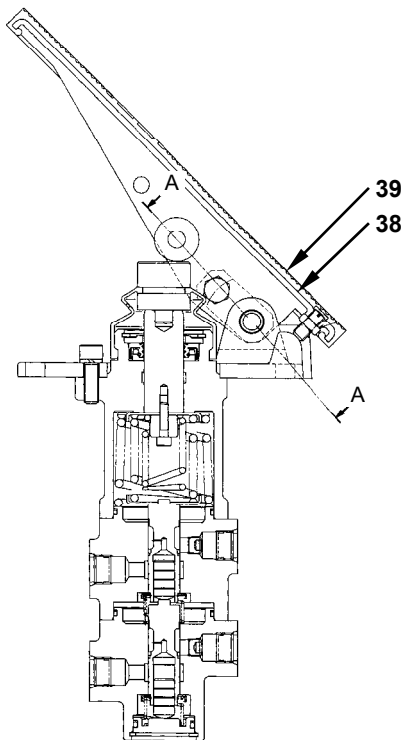
BODY (TRAVEL SYSTEM) / Brake Valve

14. Install seat (30) and dust cover (29) to input spool (25).
15. Install mounting plate (31) to cover (24) with socket bolts (33) (3 used) and washers (32) (3 used).
 -  : 6 mm
 -  : 19.6 to 25.5 N·m
(2 to 2.6 kgf·m, 14.5 to 19 lbf·ft)
16. Install shafts (53, 57) to joint (56) with pins (47) (2 used).
17. Apply molybdenum disulfide grease onto joint (56). Install boot (55) to joint (56) with retaining rings (54) (2 used).
18. Apply grease onto the inner surface of roller (37) and the outer surface of pin (35). Install roller (37), collars (36) (2 used), pin (35), L pin (34), washer (40) and pin (41) to pedal (38) at the left side.
19. Apply grease onto the inner surface of bushings (51) (2 used) and the outer surface of shaft (57). Install bushings (51) (2 used) to mounting plate (31). Install pedal (38) at the left side, collar (52) and shaft (57) to mounting plate (31) with bolt (42), washer (45) and nut (46).
 -  : 14 mm
 -  : 29.4 to 34.3 N·m
(3 to 3.5 kgf·m, 21.5 to 25 lbf·ft)
20. Temporarily install screw (44) and nut (43) to pedal (38) at the left side.
21. Apply grease onto the contacting surface between seat (30) and roller (37). As for pedal (38) at the left side, adjust screw (44) and tighten nut (43) so that the clearance between seat (30) and roller (37) is 0.5 mm (0.02 in) or less.
 -  : 12 mm
 -  : 7.85 to 11.8 N·m
(0.8 to 1.2 kgf·m, 5.8 to 8.7 lbf·ft)
22. Install cover (39) to pedal (38) at the left side.

BODY (TRAVEL SYSTEM) / Brake Valve



A-A




C-C


W4GB-03-05-002

BODY (TRAVEL SYSTEM) / Brake Valve

23. Apply grease onto the inner surface of roller (37) and the outer surface of pin (35). Install roller (37), collars (36) (2 used), pin (35), L pin (34), washer (40) and pin (41) to pedal (38) at the right side.


24. Apply grease onto the inner surface of bushings (51) (2 used) and the outer surface of shaft (53). Install bushings (51) (2 used) to mounting plate (48). Install pedal (38) at the right side, collar (52) and shaft (53) to mounting plate (48) with bolt (42), washer (45) and nut (46).


 : 14 mm

 : 29.4 to 34.3 N·m
(3 to 3.5 kgf·m, 21.5 to 25 lbf·ft)

25. Install cover (39) to pedal (38) at the right side.

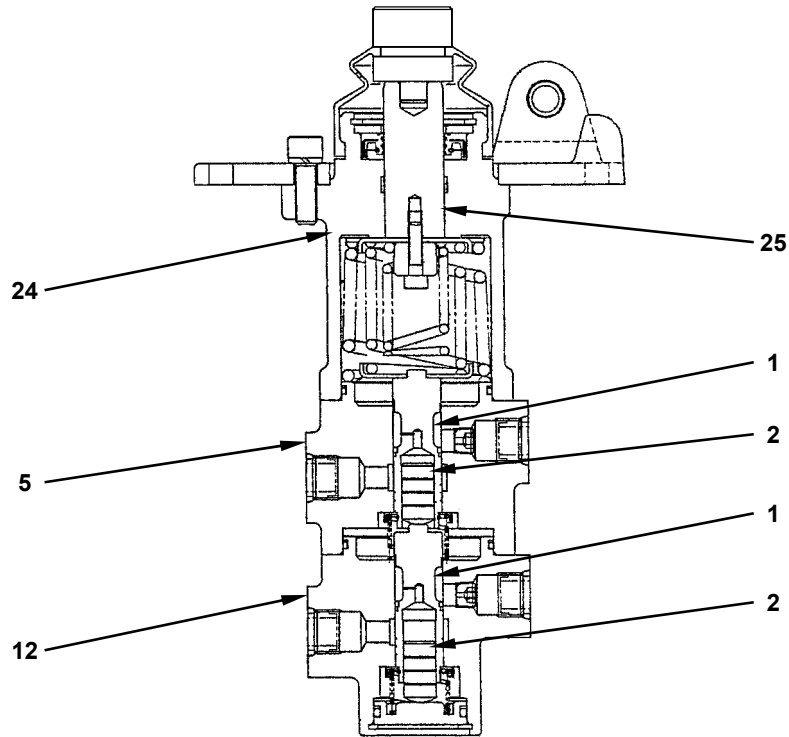
26. Install bolt (50) and nut (49) to mounting plate (48). While operating pedal (38) at the right side to full stroke, adjust bolt (50) and tighten nut (49) so that the clearance between bolt (50) and roller (37) is 1.7 to 2.0 mm (0.067 to 0.079 in) or less.

 : 19 mm

 : 44.1 to 58.8 N·m
(4.5 to 6.0 kgf·m, 32.5 to 43 lbf·ft)

BODY (TRAVEL SYSTEM) / Brake Valve

MAINTENANCE STANDARD



W4GB-03-05-004

1. Clearance between input spool (25) and cover (24)

Unit: mm

Standard	Allowable Limit
0.020 to 0.086	0.096

2. Clearance between spool (1) and bodies (5, 12)


Unit: mm

Standard	Allowable Limit
0.005 to 0.012	0.014

3. Clearance between plunger (2) and spool (1)

Unit: mm

Standard	Allowable Limit
0.005 to 0.018	0.020

 NOTE: 1 mm = 0.039 in


BODY (TRAVEL SYSTEM) / Charging Block

REMOVAL AND INSTALLATION OF CHARGING BLOCK


CAUTION: Before doing any work, stop the engine and depress/release the brake pedal about 80 times in order to release the brake pressure. Move the front attachment control lever in all directions several times in order to release the pilot pressure. Turn the steering wheel to the right and the left several times in order to release the pressure in the circuit.

Removal

1. Remove sems bolts (3) (5 used) from covers (2, 4). Remove covers (2, 4) from floor plate (1).


 : 14 mm

2. Disconnect hoses (6, 7, 11, 12, 14, 15, 18, 19, 20, 21) and the connectors of pressure sensors (9, 17) from charging block (10).


 : 19 mm, 22 mm, 27 mm

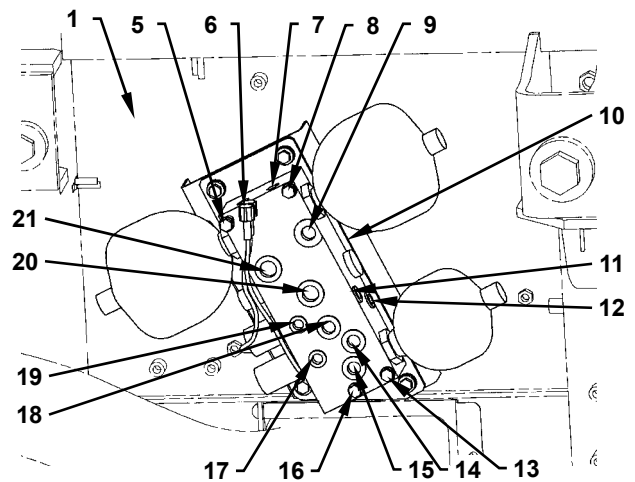
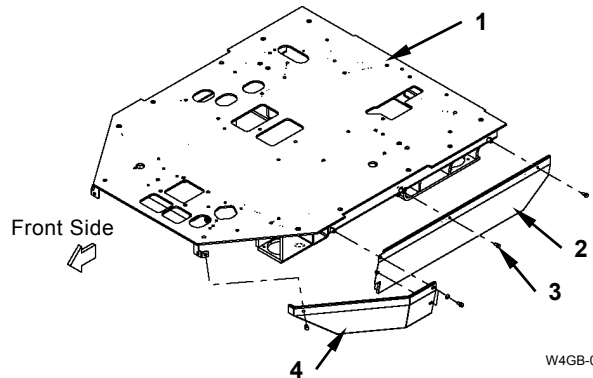
CAUTION: The charging block (10) assembly weight: 30 kg (70 lb)

3. Remove bolts (5, 8, 13 and 16) from charging block (10). Remove charging block (10) from floor plate (1).

 : 14 mm

4. Remove pressure sensors (9, 17) from charging block (10).

 : 24 mm, 27 mm




BODY (TRAVEL SYSTEM) / Charging Block


Installation





CAUTION: The charging block (10) assembly weight: 30 kg (70 lb)

1. Install pressure sensors (9, 17) to charging block (10).


 : 24 mm


 : 16 N·m (1.6 kgf·m, 12 lbf·ft)

 : 27 mm


 : 100 N·m (10 kgf·m, 73.5 lbf·ft)


2. Align charging block (10) with the mounting hole on floor plate (1) by using a forklift. Install charging block (10) to floor plate (1) with bolts (5, 8, 13 and 16).


 : 14 mm


 : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)


3. Connect hoses (6, 7, 11, 12, 14, 15, 18, 19, 20, 21) and the connectors of pressure sensors (9, 14) to charging block (10).


 : 19 mm

 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)


 : 22 mm


 : 39 N·m (4 kgf·m, 28.5 lbf·ft)

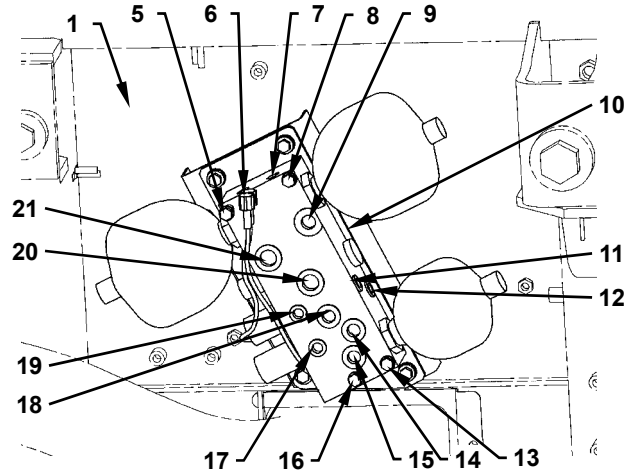
 : 27 mm

 : 78 N·m (8 kgf·m, 57.5 lbf·ft)

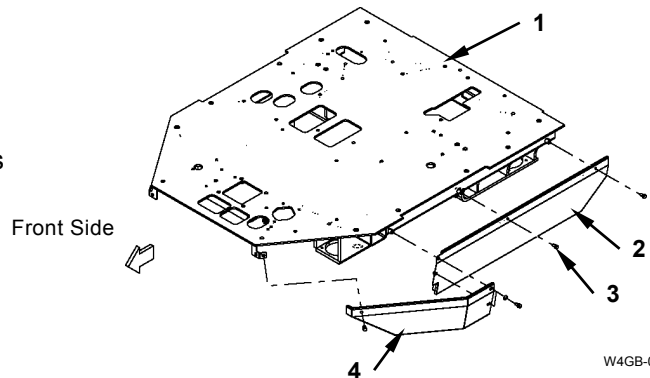
4. Install covers (2, 4) to floor plate (1) with sems bolts (3) (5 used).

 : 14 mm

 : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)



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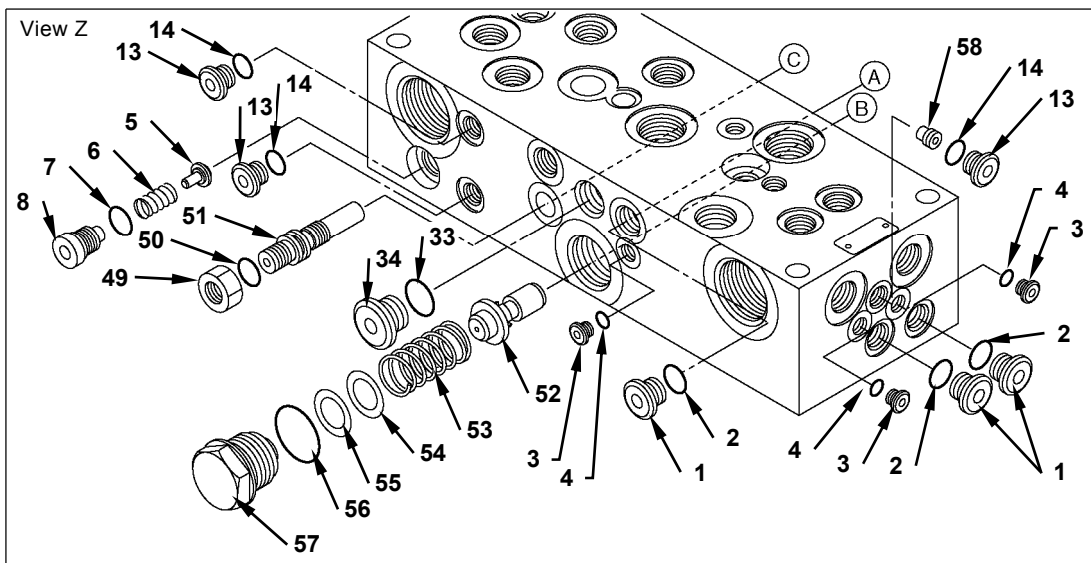
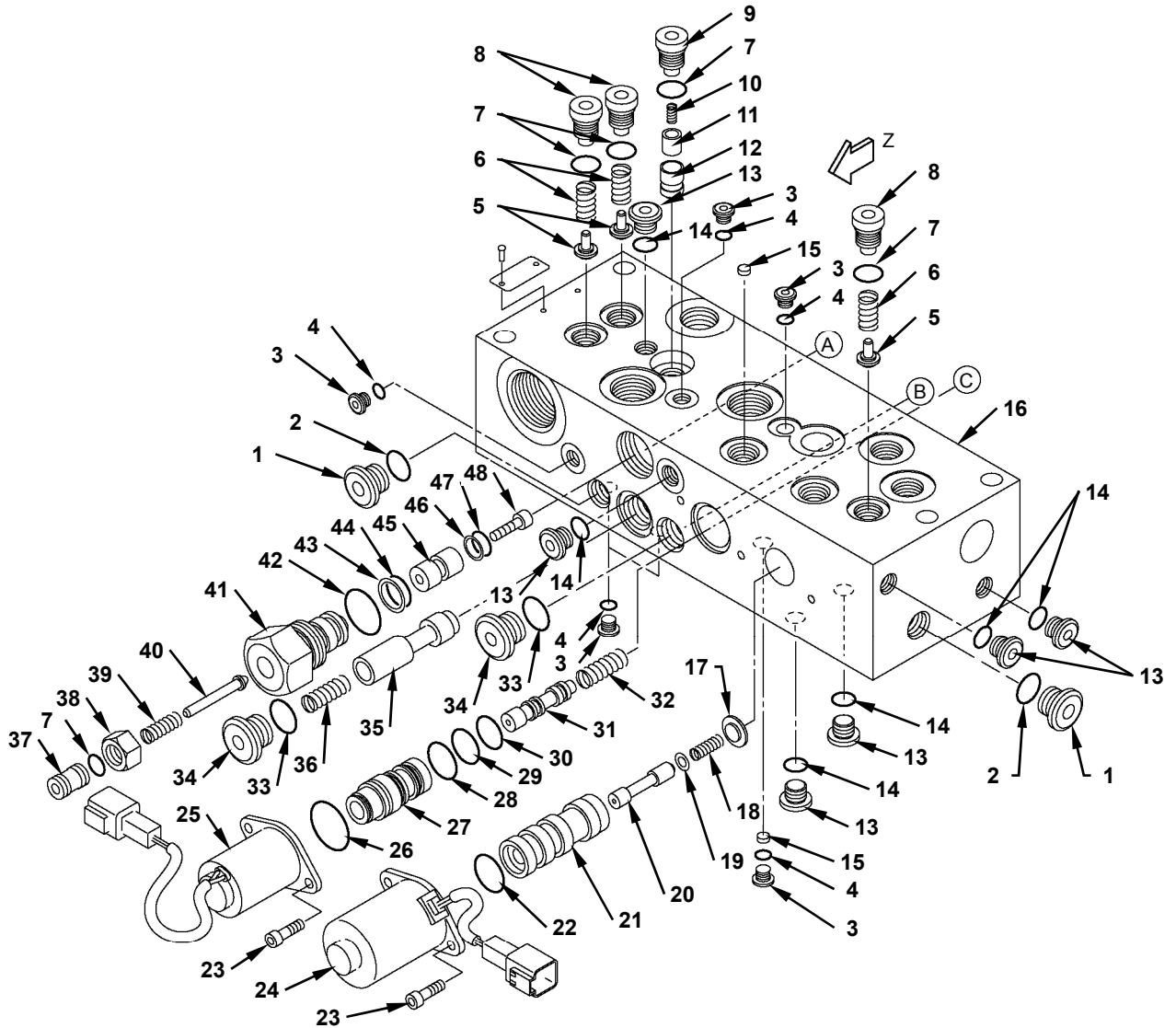
W4GB-03-06-011

BODY (TRAVEL SYSTEM) / Charging Block

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BODY (TRAVEL SYSTEM) / Charging Block

DISASSEMBLY OF CHARGING BLOCK

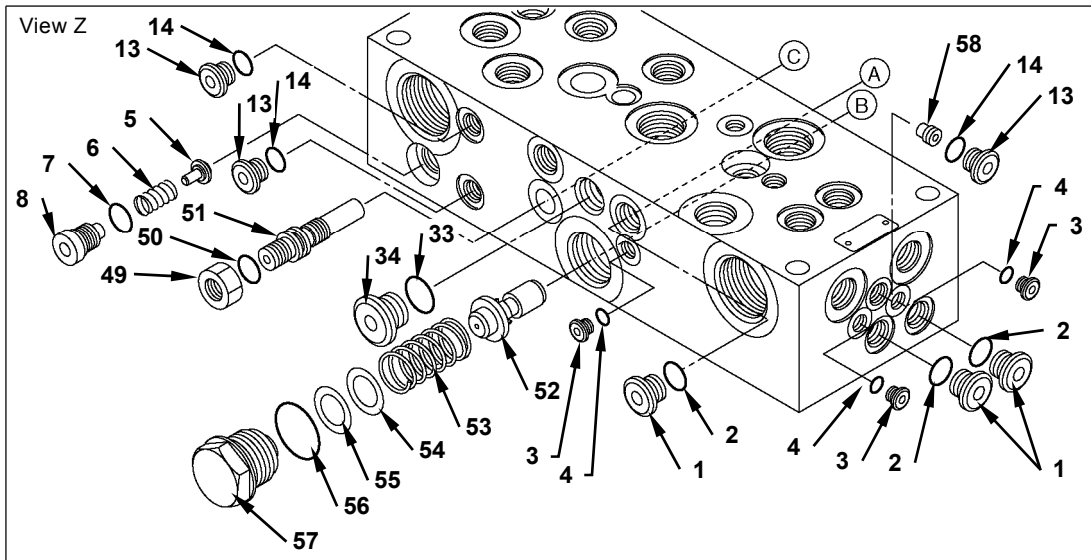
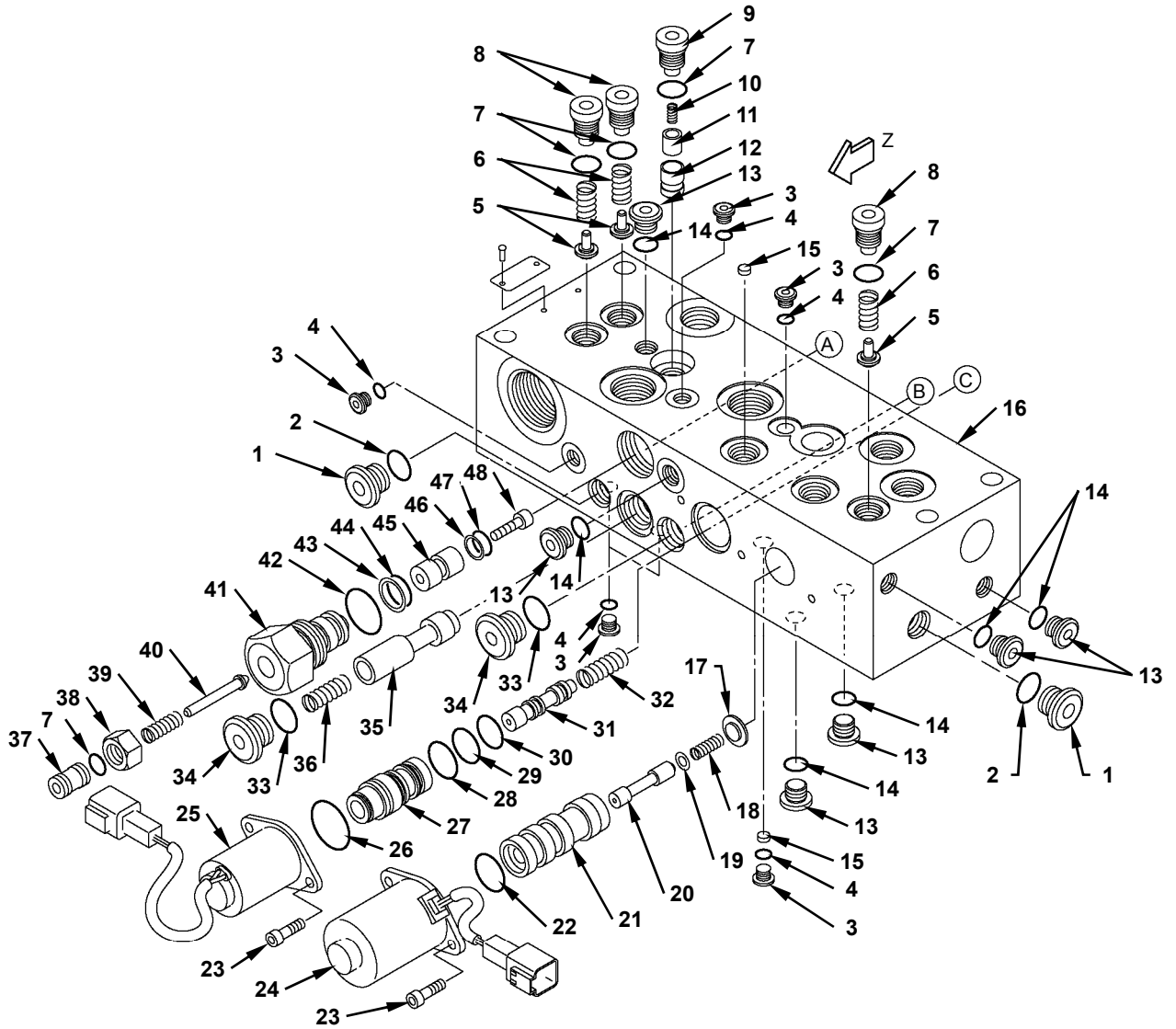


W4GD-03-06-001

BODY (TRAVEL SYSTEM) / Charging Block

1 - Plug (5 Used)	16 - Body	31 - Spool	46 - Backup Ring
2 - O-Ring (5 Used)	17 - Stopper	32 - Spring	47 - O-Ring
3 - Plug (9 Used)	18 - Spring	33 - O-Ring (3 Used)	48 - Piston
4 - O-Ring (9 Used)	19 - Washer	34 - Plug (3 Used)	49 - Nut
5 - Plunger (4 Used)	20 - Spool	35 - Plunger	50 - O-Ring
6 - Spring (4 Used)	21 - Sleeve	36 - Spring	51 - Adjusting Screw
7 - O-Ring (6 Used)	22 - O-Ring	37 - Screw	52 - Poppet
8 - Plug (4 Used)	23 - Socket Bolt (4 Used)	38 - Nut	53 - Spring
9 - Plug	24 - Solenoid	39 - Spring	54 - Shim
10 - Spring	25 - Solenoid	40 - Needle Valve	55 - Shim
11 - Plunger	26 - O-Ring	41 - Body	56 - O-Ring
12 - Sleeve	27 - Sleeve	42 - O-Ring	57 - Plug
13 - Plug (9 Used)	28 - O-Ring	43 - Backup Ring	58 - Orifice
14 - O-Ring (9 Used)	29 - O-Ring	44 - O-Ring	
15 - Filter (2 Used)	30 - O-Ring	45 - Sleeve	

BODY (TRAVEL SYSTEM) / Charging Block




W4GD-03-06-001


BODY (TRAVEL SYSTEM) / Charging Block

Disassembly of Charging Block


1. Remove plug (9), O-ring (7), spring (10), plunger (11) and sleeve (12) from body (16).

 : 6 mm


2. Remove plugs (13) (9 used), O-rings (14) (9 used) and orifice (58) from body (16).

 : 5 mm


3. Remove plugs (8) (4 used), O-rings (7) (4 used), springs (6) (4 used) and plungers (5) (4 used) from body (16).


 : 6 mm

4. Remove plugs (34) (3 used), O-rings (33) (3 used), spring (36) and plunger (35) from body (16).


 : 8 mm

5. Remove the body (41) assembly from body (16).


 : 32 mm

 **NOTE:** As the set pressure changes, do not disassemble the body (41) assembly unless necessary.


6. Remove plug (57), O-ring (56), shims (54, 55), spring (53) and poppet (52) from body (16).

 : 30 mm


7. Remove socket bolts (23) (2 used) from body (16). Remove solenoid (25), O-ring (26), sleeve (27) and O-rings (28, 29, 30) from body (16). Remove spool (31) and spring (32) from body (16).


 : 4 mm

8. Remove nut (49), O-ring (50) and spool (51) from body (16).


 : 17 mm

9. Remove socket bolts (23) (2 used) from body (16). Remove solenoid (24), O-ring (22) and the sleeve (21) assembly from body (16). Remove spool (20) from sleeve (21).

 : 4 mm

 **NOTE:** As stopper (17) is installed in sleeve (21), spring (18) and washer (19) cannot be disassembled.

10. Remove plugs (1) (5 used), (3) (9 used), O-rings (2) (5 used), (4) (9 used) and filters (15) (2 used) from body (16).

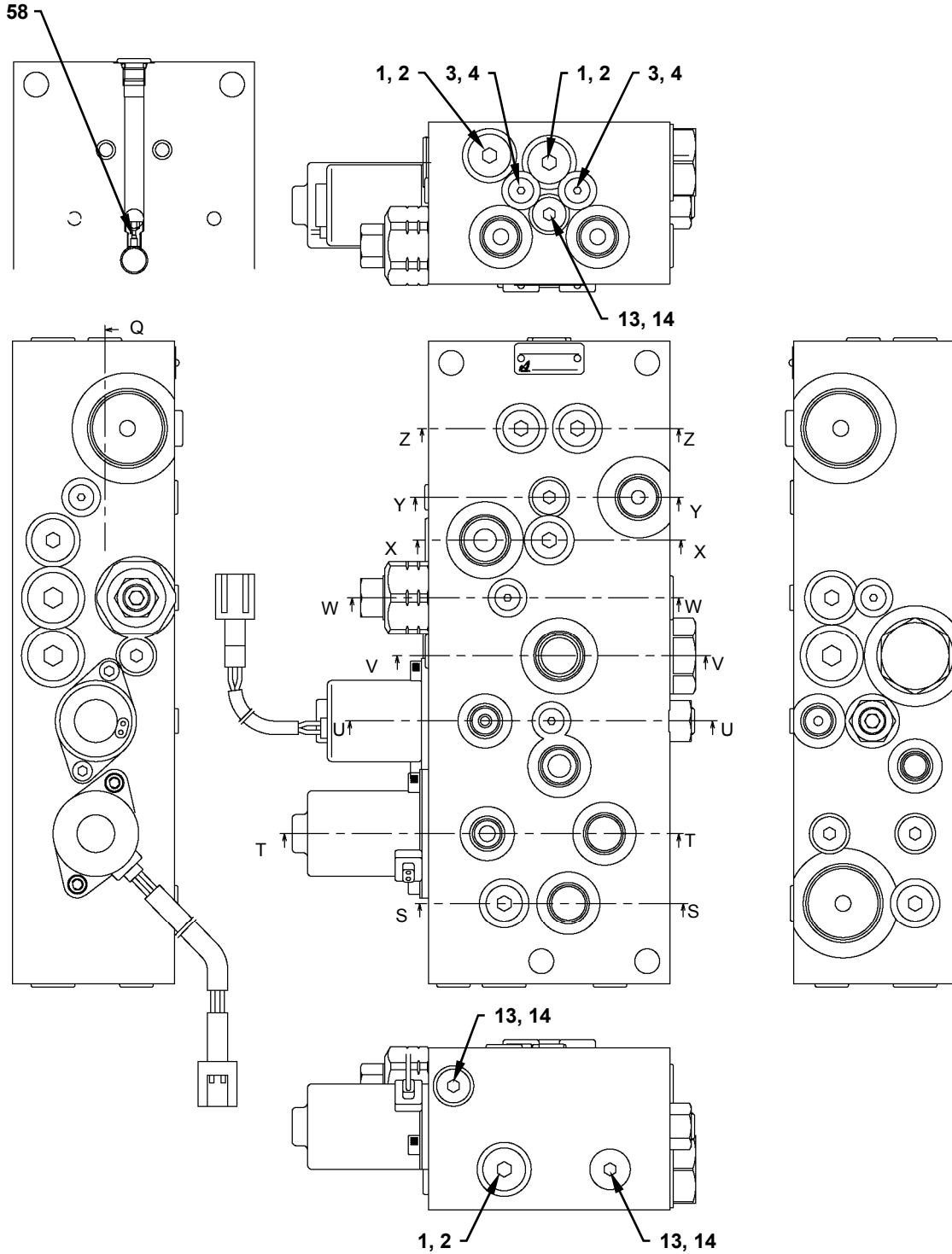
 : 1/8 inch, 6 mm

BODY (TRAVEL SYSTEM) / Charging Block

(Blank)

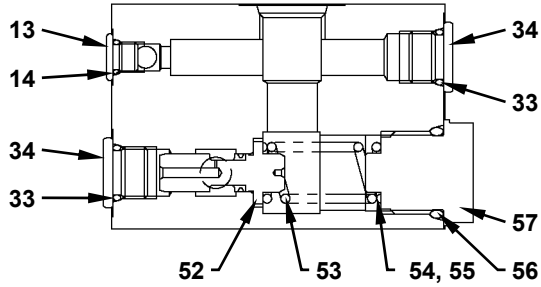
BODY (TRAVEL SYSTEM) / Charging Block

ASSEMBLY OF CHARGING BLOCK

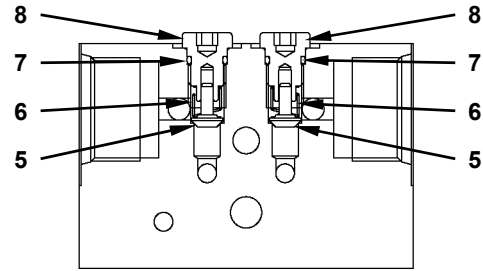


W4GB-03-06-002

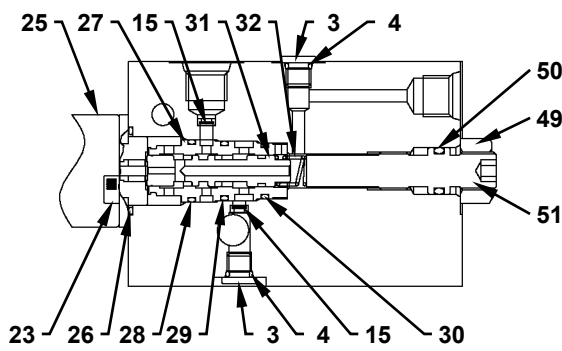
BODY (TRAVEL SYSTEM) / Charging Block



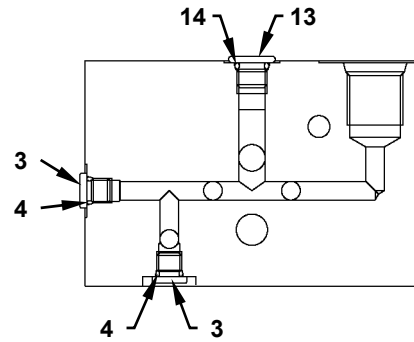
Section V-V



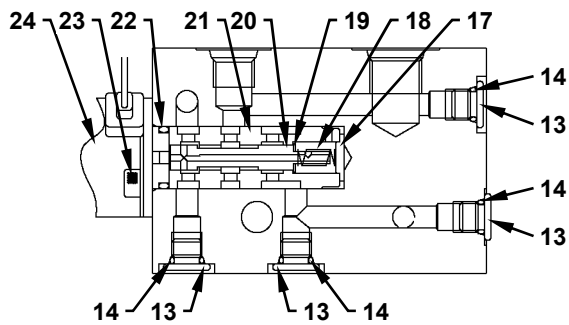
Section Z-Z



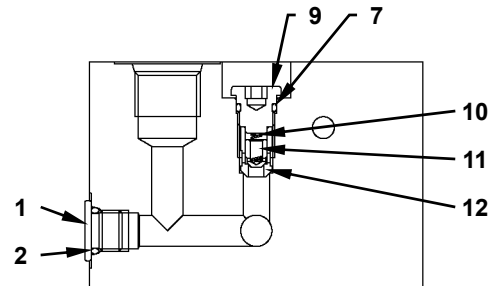
Section U-U



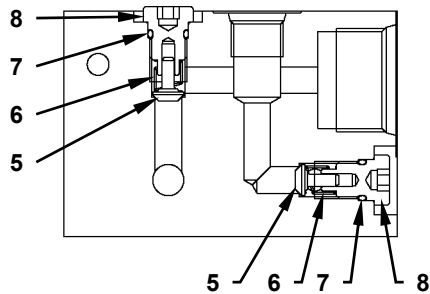
Section Y-Y



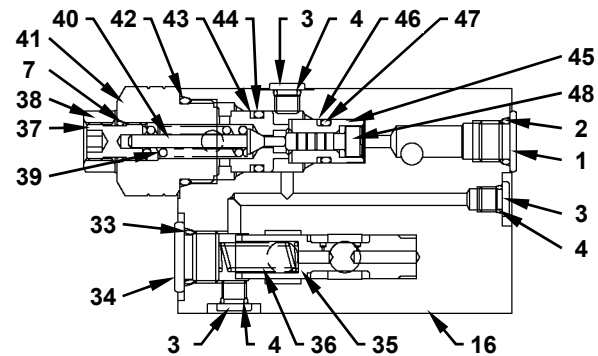
Section T-T



Section X-X



Section S-S



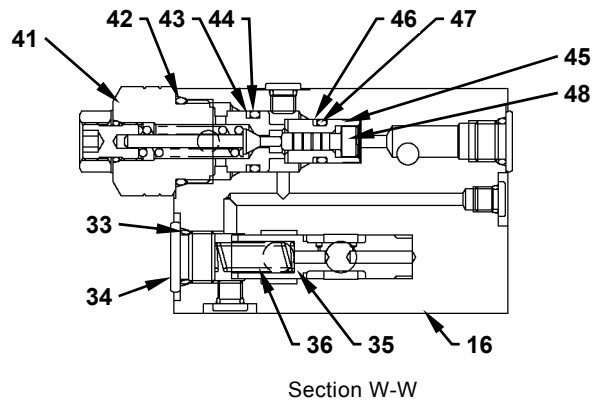
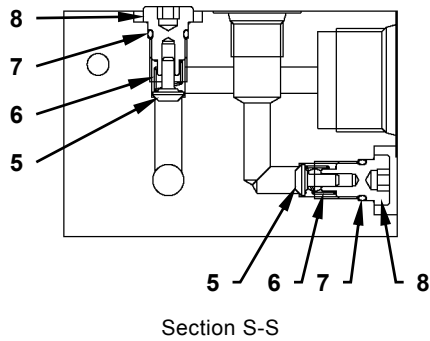
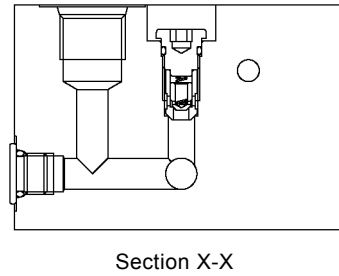
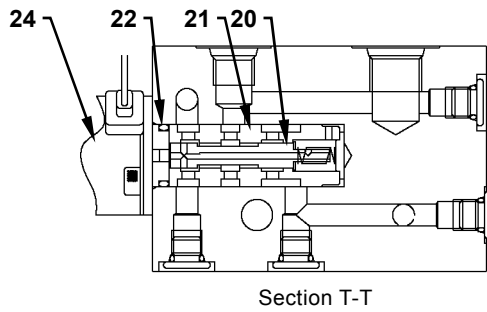
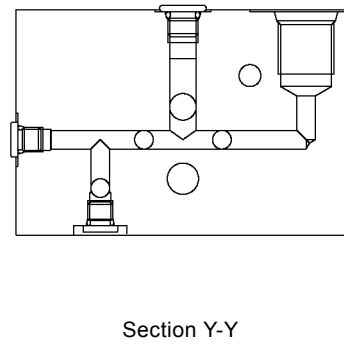
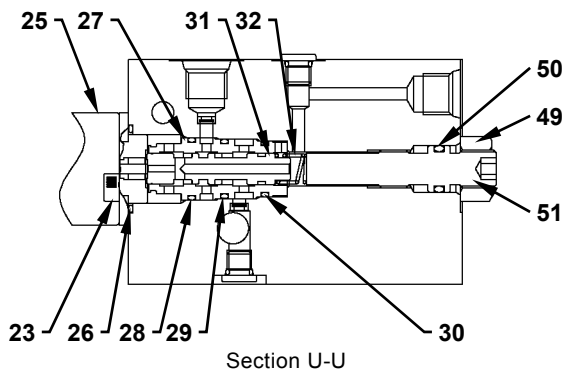
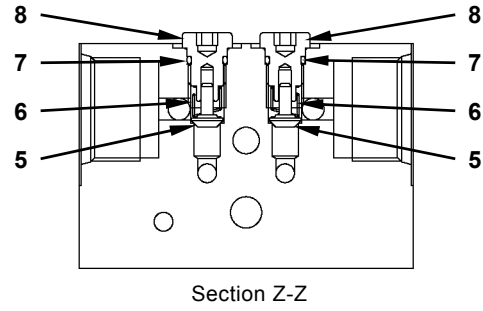
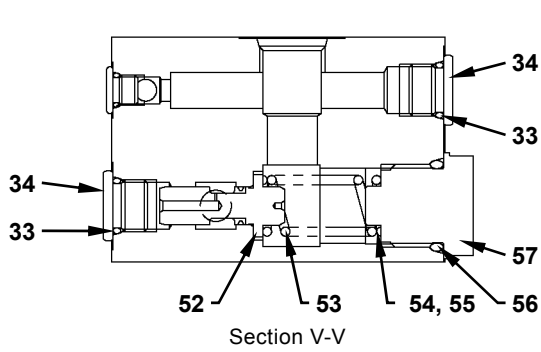
Section W-W

W4GB-03-06-003

BODY (TRAVEL SYSTEM) / Charging Block

1 - Plug (5 Used)	16 - Body	31 - Spool	46 - Backup Ring
2 - O-Ring (5 Used)	17 - Stopper	32 - Spring	47 - O-Ring
3 - Plug (9 Used)	18 - Spring	33 - O-Ring (3 Used)	48 - Piston
4 - O-Ring (9 Used)	19 - Washer	34 - Plug (3 Used)	49 - Nut
5 - Plunger (4 Used)	20 - Spool	35 - Plunger	50 - O-Ring
6 - Spring (4 Used)	21 - Sleeve	36 - Spring	51 - Adjusting Screw
7 - O-Ring (6 Used)	22 - O-Ring	37 - Screw	52 - Poppet
8 - Plug (4 Used)	23 - Socket Bolt (4 Used)	38 - Nut	53 - Spring
9 - Plug	24 - Solenoid	39 - Spring	54 - Shim
10 - Spring	25 - Solenoid	40 - Needle Valve	55 - Shim
11 - Plunger	26 - O-Ring	41 - Body	56 - O-Ring
12 - Sleeve	27 - Sleeve	42 - O-Ring	57 - Plug
13 - Plug (9 Used)	28 - O-Ring	43 - Backup Ring	58 - Orifice
14 - O-Ring (9 Used)	29 - O-Ring	44 - O-Ring	
15 - Filter (2 Used)	30 - O-Ring	45 - Sleeve	

















BODY (TRAVEL SYSTEM) / Charging Block



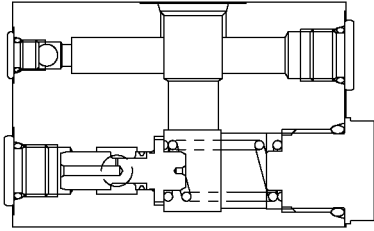
W4GB-03-06-003

BODY (TRAVEL SYSTEM) / Charging Block

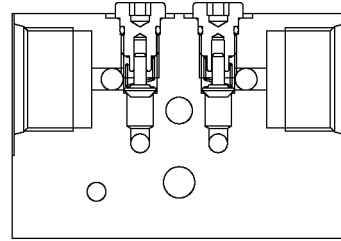
Assembly of Charging Block

1. Install O-rings (4) (9 used) to plugs (3) (9 used).
Install O-rings (2) (5 used) to plugs (1) (5 used).
Install plugs (1) (5 used), (3) (9 used) and filters (15) (2 used) to body (16).
 : 1/8 inch
 : 4.9 N·m (0.5 kgf·m, 3.6 lbf·ft)
 : 6 mm
 : 26.5 N·m (2.7 kgf·m, 19.5 lbf·ft)
2. Install spool (20) to sleeve (21). Install sleeve (21) to body (16).
Install O-ring (22) to solenoid (24). Install solenoid (24) to body (16) with socket bolts (23) (2 used).
 : 4 mm
 : 3.92 N·m (0.4 kgf·m, 2.9 lbf·ft)
3. Install O-ring (50) to adjusting screw (51). Install adjusting screw (51) to body (16) with nut (49).
 : 17 mm
 : 19.6 N·m (2 kgf·m, 14.5 lbf·ft)
4. Install O-rings (28, 29 and 30) to sleeve (27).
Insert spool (31) into sleeve (27).
Install spring (32), the sleeve (27) assembly, O-ring (26) and solenoid (25) to body (16) in this order. Install solenoid (25) to body (16) with socket bolts (23) (2 used).
 : 4 mm
 : 3.92 N·m (0.4 kgf·m, 2.9 lbf·ft)
5. Install O-ring (56) to plug (57). Install poppet (52), spring (53), shims (54, 55) and plug (57) to body (16).
 : 30 mm
 : 98 N·m (10.0 kgf·m, 72 lbf·ft)
6. Install O-ring (47) and backup ring (46) to sleeve (45).
Install O-rings (42, 44) and backup ring (43) to the body (41) assembly.
Install piston (48), sleeve (45) and the body (41) assembly to body (16).
 : 32 mm
 : 58.8 N·m (6.0 kgf·m, 43 lbf·ft)
7. Install O-rings (33) (3 used) to plugs (34) (3 used).
Install plunger (35) and spring (36) to body (16).
Install plugs (34) (3 used) to body (16).
 : 8 mm
 : 48.5 N·m (5.0 kgf·m, 36 lbf·ft)

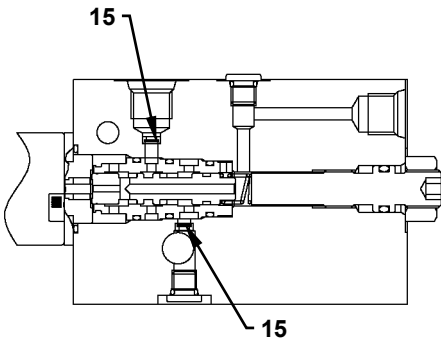
BODY (TRAVEL SYSTEM) / Charging Block



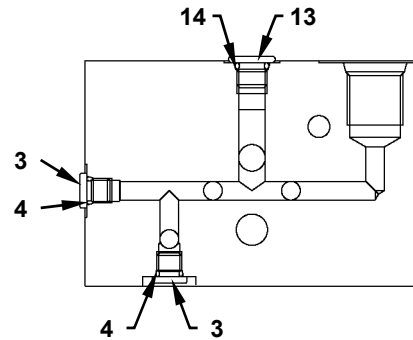
Section V-V



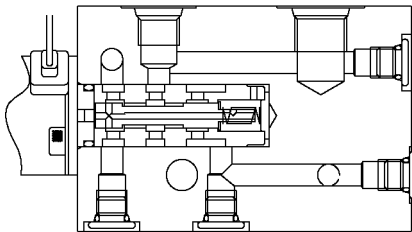
Section Z-Z



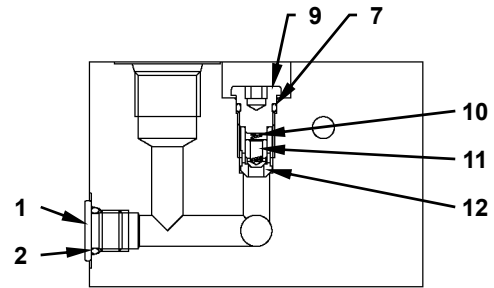
Section U-U



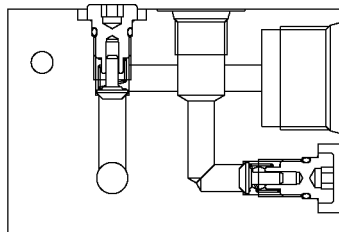
Section Y-Y



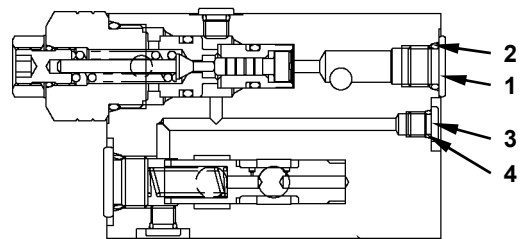
Section T-T



Section X-X



Section S-S





Section W-W

W4GB-03-06-003


BODY (TRAVEL SYSTEM) / Charging Block


8. Install O-rings (7) (4 used) to plugs (8) (4 used).
Install plungers (5) (4 used) and springs (6) (4 used) to body (16). Install plugs (8) (4 used) to body (16).


 : 6 mm


 : 21.6 N·m (2.2 kgf·m, 16 lbf·ft)


9. Apply LOCTITE #242 onto the thread part of orifice (58). Install orifice (58) to body (16).
Install O-rings (14) (9 used) to plugs (13) (9 used).
Install plugs (13) (9 used) to body (16).

 : 4 mm


 : 5.9 N·m (0.6 kgf·m, 4.4 lbf·ft)


 : 5 mm

 : 98 N·m (10.0 kgf·m, 72 lbf·ft)

 **NOTE:** As for orifice (58), refer to W3-6-9.

10. Install O-ring (7) to plug (9). Install sleeve (12), plunger (11), spring (10) and plug (9) to body (16).

 : 6 mm

 : 21.0 N·m (2.14 kgf·m, 15.5 lbf·ft)

BODY (TRAVEL SYSTEM) / Charging Block

(Blank)

BODY (TRAVEL SYSTEM) / Steering Pilot Valve

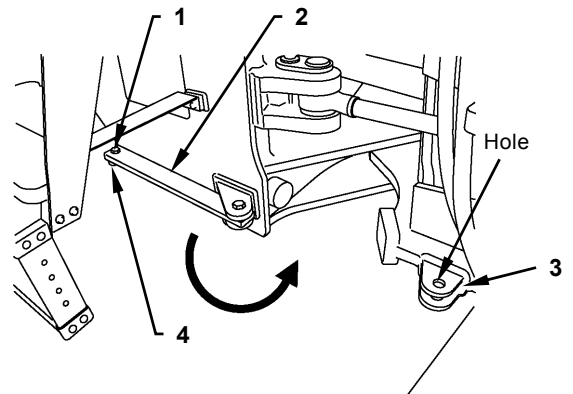
REMOVAL AND INSTALLATION OF STEERING PILOT VALVE



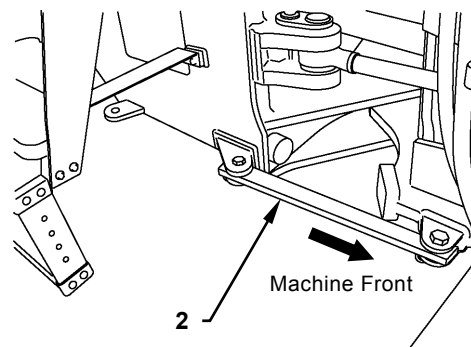
CAUTION: In order to release the hydraulic pressure in the steering pilot hydraulic circuit, stop the engine and turn the steering wheel to the right and the left several times. The steering wheel turns heavily when the hydraulic pressure is released.

Preparation

1. Park the machine on a level and solid surface. Lower the bucket onto the ground horizontally.
2. Stop the engine and release the hydraulic pressure.
3. Secure articulation lock bar (2) in the hole on front frame (3) with set pin (1) and β (beta) pin (4).



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M4GB-01-136


BODY (TRAVEL SYSTEM) / Steering Pilot Valve

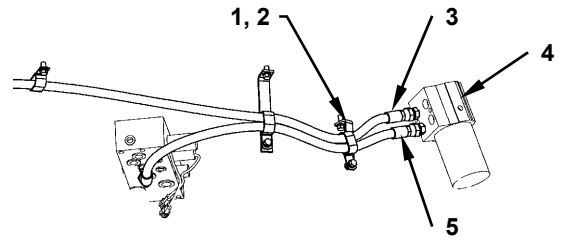
Removal

1. Remove bolts (2) (4 used) from clips (1) (2 used).

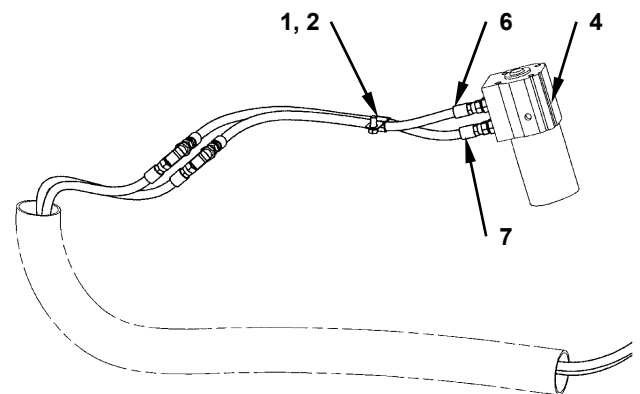
 : 14 mm

2. Disconnect hoses (3, 5, 6 and 7) from steering pilot valve (4).

 : 22 mm




W4GB-03-07-011



W4GB-03-07-012


3. Remove bolts (10) (3 used) from mounting plate (8) of brake pedal (9) at the right side.

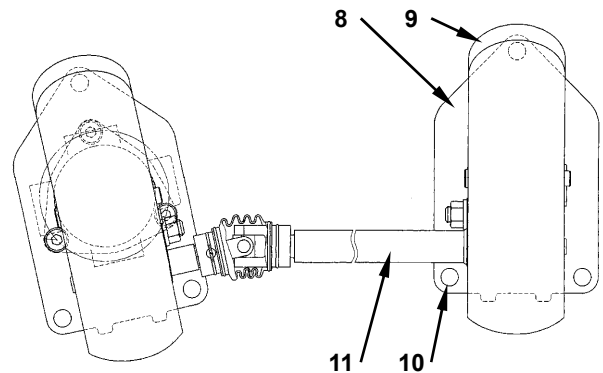
 : 12 mm

4. Float the mounting plate (8) assembly.

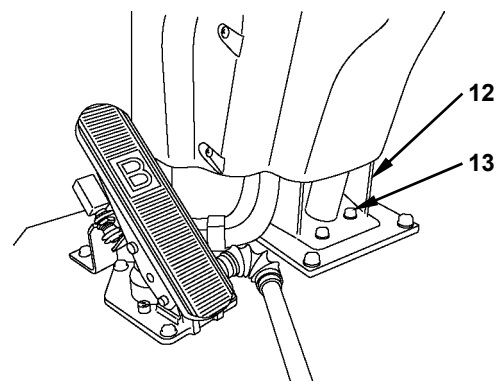
5. Bend shaft (11) forward. Move the mounting plate (8) assembly to the near side.

6. Remove bolts (13) (4 used) from steering wheel column (12). Remove steering pilot valve (4) from steering wheel column (12).

 : 14 mm



W4GB-03-07-013





W4GB-03-07-014

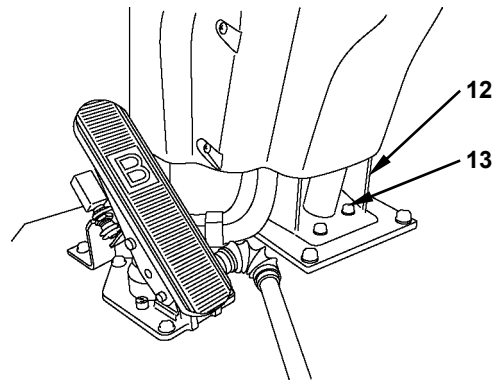
BODY (TRAVEL SYSTEM) / Steering Pilot Valve

Installation

1. Install steering pilot valve (4) to steering wheel column (12) with bolts (13) (4 used).


 : 14 mm


 : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)

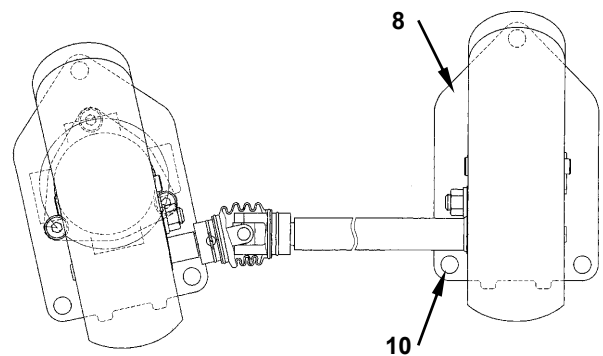


W4GB-03-07-014

2. Install the mounting plate (8) assembly with bolts (10) (3 used).


 : 12 mm


 : 9.5 N·m (1 kgf·m, 7 lbf·ft)

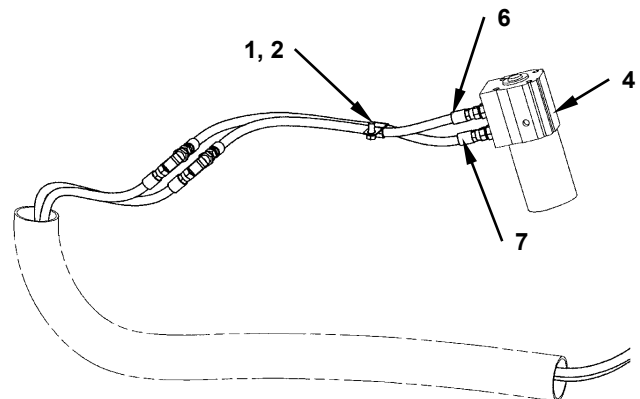


W4GB-03-07-013

3. Connect hoses (3, 5, 6 and 7) to steering pilot valve (4).


 : 22 mm


 : 39 N·m (4 kgf·m, 28.5 lbf·ft)

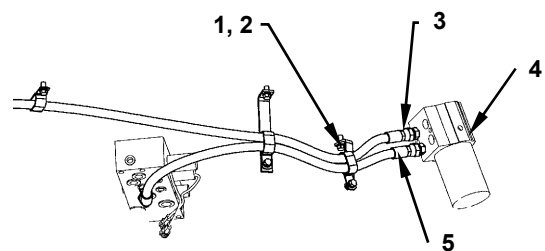


W4GB-03-07-012

4. Install clips (1) (2 used) to hoses (3, 5, 6 and 7) with bolts (2) (4 used).

 : 14 mm

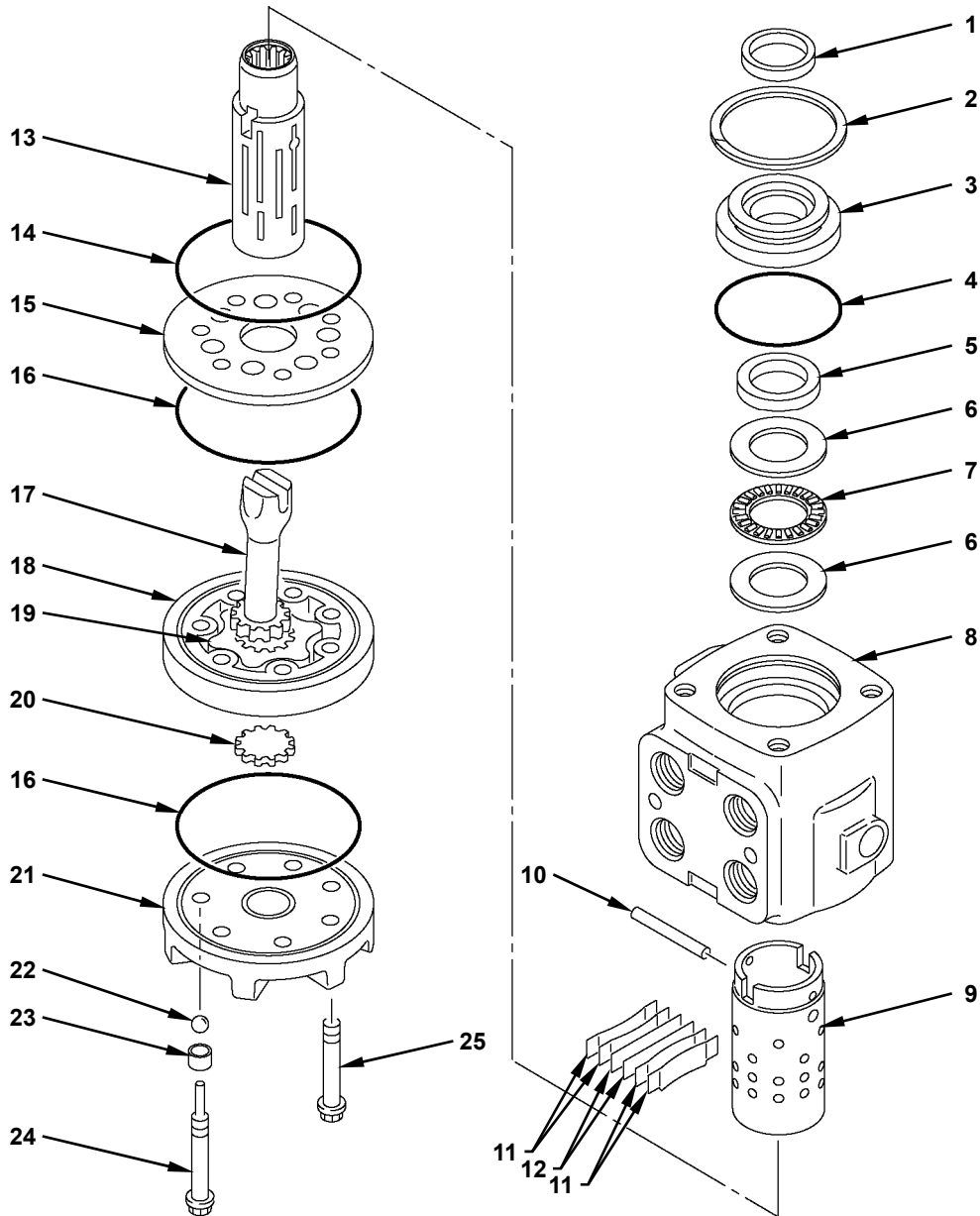
 : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)



W4GB-03-07-011

BODY (TRAVEL SYSTEM) / Steering Pilot Valve

DISASSEMBLY OF STEERING PILOT VALVE



W4GB-03-07-001

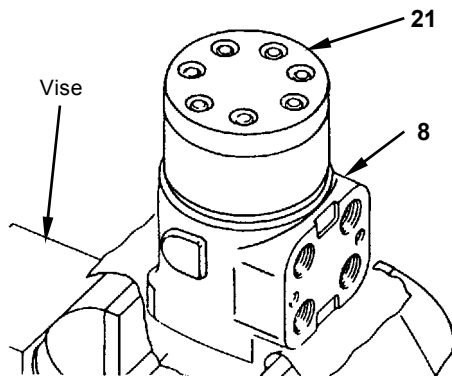
- | | | | |
|---------------------------|-----------------------------|----------------------|---------------------|
| 1 - Dust Seal | 8 - Housing | 15 - Plate | 22 - Ball |
| 2 - Retaining Ring | 9 - Sleeve | 16 - O-Ring (2 Used) | 23 - Screw |
| 3 - Bushing | 10 - Pin | 17 - Drive | 24 - Screw |
| 4 - O-Ring | 11 - Center Spring (4 Used) | 18 - Rotor | 25 - Screw (6 Used) |
| 5 - Seal | 12 - Flat Spring (2 Used) | 19 - Star | |
| 6 - Bearing Race (2 Used) | 13 - Spool | 20 - Spacer | |
| 7 - Thrust Needle | 14 - O-Ring | 21 - Cap | |

BODY (TRAVEL SYSTEM) / Steering Pilot Valve

Disassembly of Steering Pilot Valve


IMPORTANT: Attach a cloth to the open end of a vise and hold the steering pilot valve lightly. Do not hold it too strong.

1. Secure housing (8) with the cap (21) side facing upward in a vise.




W202-02-14-002

2. Remove screws (25) (6 used) and screw (24) from cap (21). Remove cap (21) from housing (8). Remove O-ring (16) from cap (21).

 : 5/16 inch


3. Remove rotor (18) from housing (8). Remove O-ring (16) and spacer (20) from rotor (18).

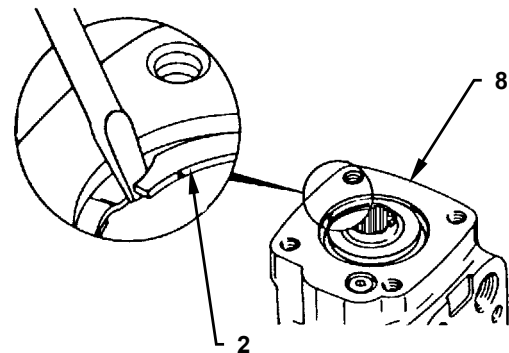
 **NOTE:** Do not drop star (19) when removing rotor (18).

4. Remove drive (17) and plate (15) from housing (8). Remove O-ring (14) from housing (8). Remove screw (23) from housing (8) by using a screwdriver.

IMPORTANT: Wear a pair of protective glasses as retaining ring (2) may fly out from housing (8).

5. Remove housing (8) from the vise. Turn over housing (8). Remove ball (22). Place the housing (8) assembly on a clean cloth in order not to damage the finished surface. Remove retaining ring (2) from housing (8) by using a screwdriver.

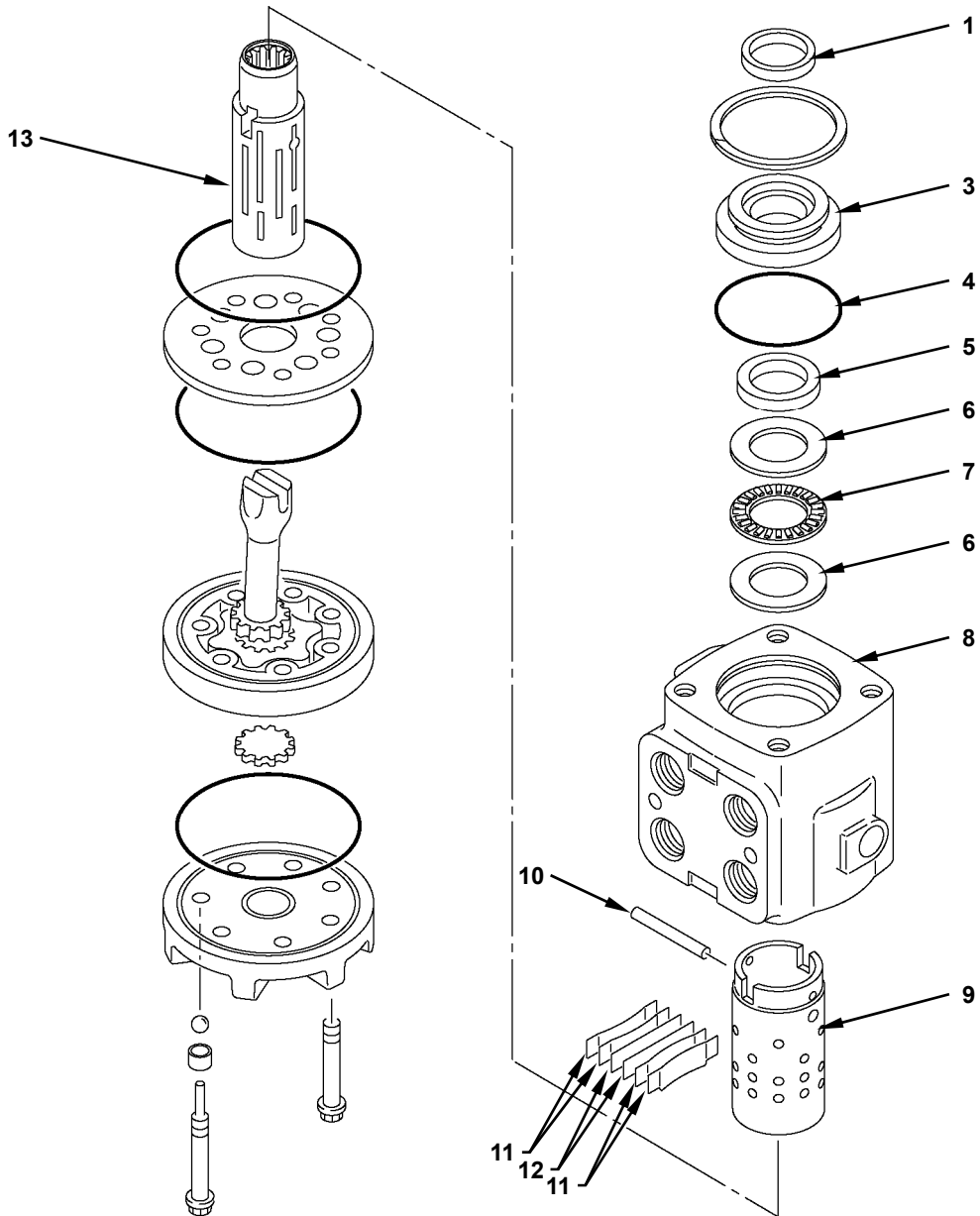
 **NOTE:** Do not drop or lose ball (22). Check the hole position where ball (22) was installed.



W202-02-14-006

6. Rotate spool (13) and sleeve (9), and set pin (10) horizontally. Push spool (13) and sleeve (9) from the cap (21) side. Remove bushing (3) from housing (8).


BODY (TRAVEL SYSTEM) / Steering Pilot Valve



W4GB-03-07-001


BODY (TRAVEL SYSTEM) / Steering Pilot Valve

7. Remove seal (5) and dust seal (1) from bushing (3).


 **NOTE:** Do not damage bushing (3) when removing seal (5).

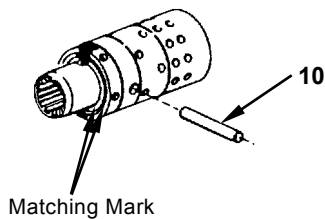
8. Remove bearing races (6) (2 used) and thrust needle (7) from spool (13).

9. Remove spool (13) and the sleeve (9) assembly from housing (8).

 **NOTE:** Remove the sleeve (9) assembly from housing (8) by rotating in order not to get sleeve (9) caught in housing (8).

10. Remove pin (10) from the sleeve (9) assembly.

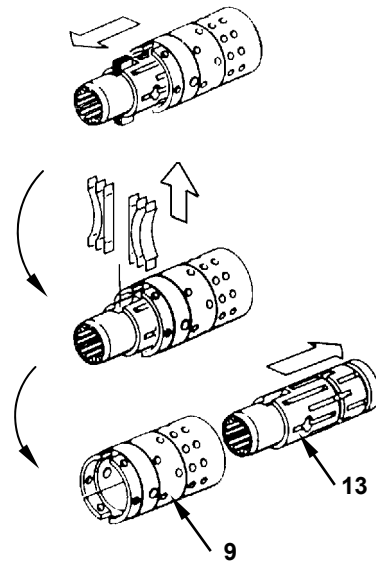
 **NOTE:** Put the matching marks onto the sleeve (9) assembly by using an oil-based pen before removing pin (10).



W202-02-14-021

IMPORTANT: Wear a pair of protective glasses as center spring (11) and flat spring (12) may fly out.

11. Push spool (13) in sleeve (9) forward. Remove center springs (11) (4 used) and flat springs (12) (2 used) from spool (13).



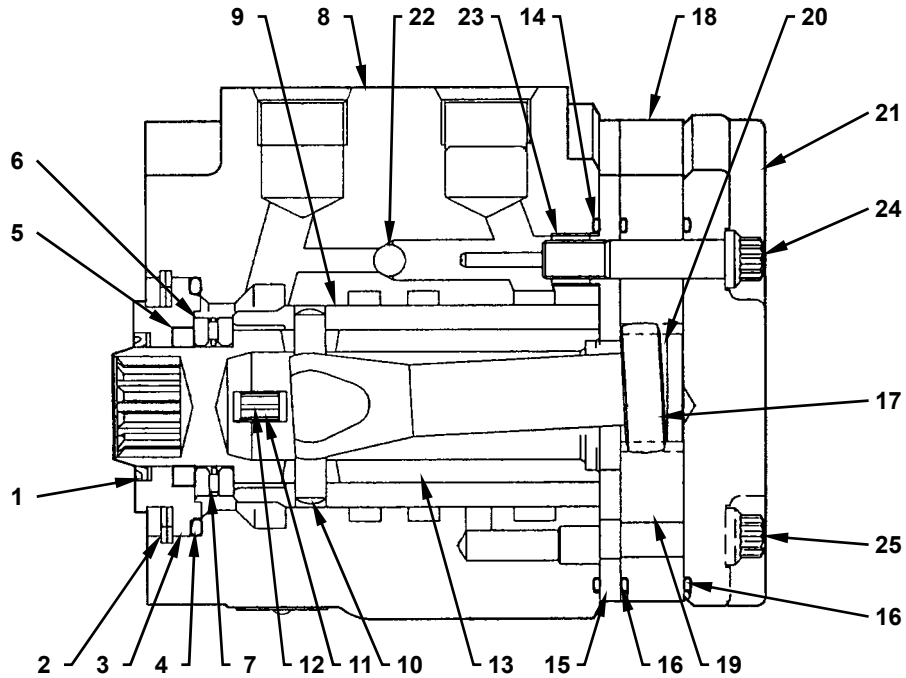
W4GB-03-07-002

12. Remove spool (13) from sleeve (9) by rotating.

13. Remove O-ring (4) from housing (8).

BODY (TRAVEL SYSTEM) / Steering Pilot Valve

ASSEMBLY OF STEERING PILOT VALVE



T1F3-03-07-002

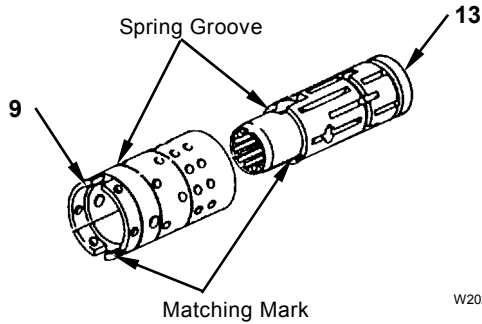
- | | | | |
|---------------------------|-----------------------------|----------------------|---------------------|
| 1 - Dust Seal | 8 - Housing | 15 - Plate | 22 - Ball |
| 2 - Retaining Ring | 9 - Sleeve | 16 - O-Ring (2 Used) | 23 - Screw |
| 3 - Bushing | 10 - Pin | 17 - Drive | 24 - Screw |
| 4 - O-Ring | 11 - Center Spring (4 Used) | 18 - Rotor | 25 - Screw (6 Used) |
| 5 - Seal | 12 - Flat Spring (2 Used) | 19 - Star | |
| 6 - Bearing Race (2 Used) | 13 - Spool | 20 - Spacer | |
| 7 - Thrust Needle | 14 - O-Ring | 21 - Cap | |

BODY (TRAVEL SYSTEM) / Steering Pilot Valve

Assembly of Steering Pilot Valve

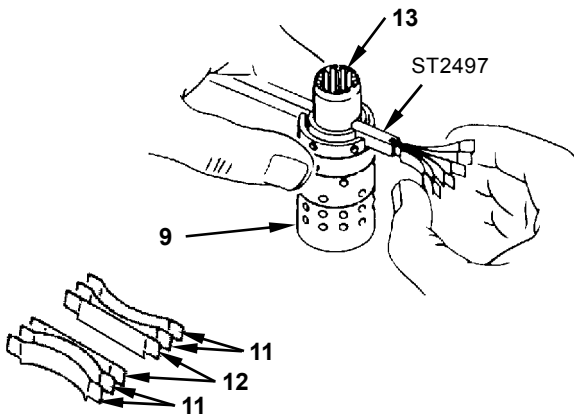
IMPORTANT: Set the spring grooves on spool (13) and sleeve (9) to the same side.

1. Install spool (13) to sleeve (9) by rotating. Align the matching marks on spool (13) and sleeve (9).

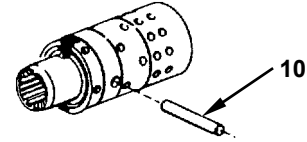


IMPORTANT: Wear a pair of protective glasses as center spring (11) and flat spring (12) may fly out.

2. Align the spring groove positions of spool (13) and sleeve (9), and place them on a flat plate. Set center springs (11) (2 used for each) back-to-back. Set flat springs (12) (2 used) at the center position. Install center springs (11) (4 used) and flat springs (12) (2 used) to the special tool (ST 2497). Install center springs (11) (4 used) and flat springs (12) (2 used) to the spring grooves on spool (13) and sleeve (9) by using the special tool (ST 2497).



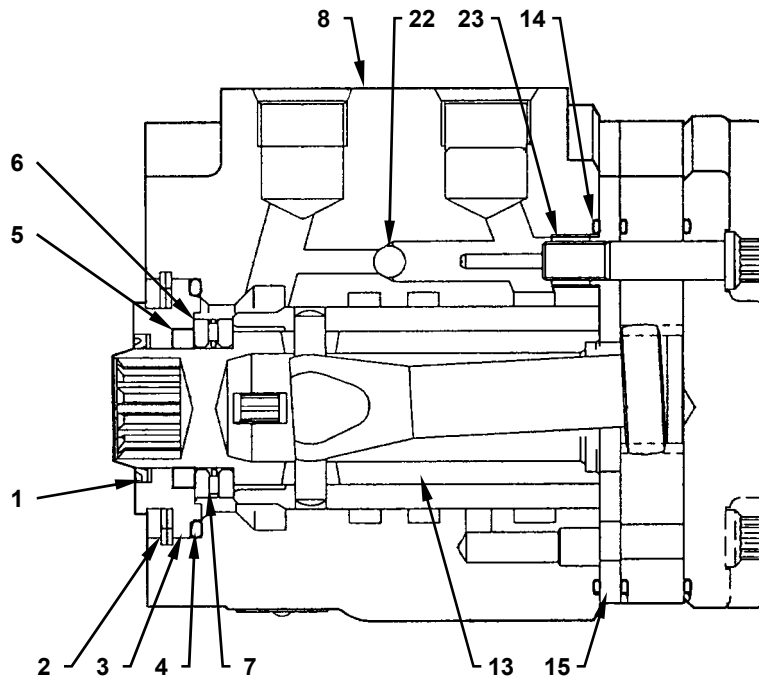
3. Insert pin (10) into the holes on spool (13) and sleeve (9). Align both ends of pin (10) with the outer diameter surface of sleeve (9).



4. Insert the sleeve (9) assembly from the cap (21) side of housing (8).

NOTE: When inserting the sleeve (9) assembly, do not get caught in housing (8). Rotate pin (10) to the right and the left while holding pin (10) horizontally. Insert pin (10) until both rear end surfaces of the sleeve (9) assembly and housing (8) are located at the same position.

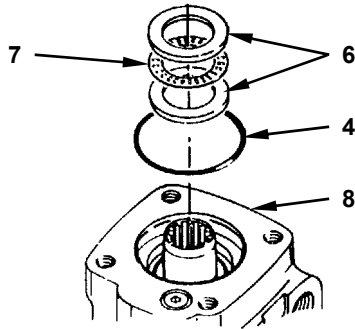
BODY (TRAVEL SYSTEM) / Steering Pilot Valve



T1F3-03-07-002

BODY (TRAVEL SYSTEM) / Steering Pilot Valve


5. Install O-rings (4), bearing races (6) (2 used) and thrust needle (7) to housing (8).




W202-02-14-023

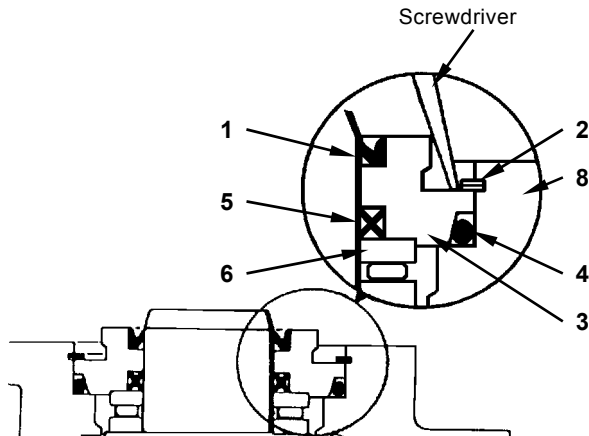
6. Install dust seal (1) and seal (5) to bushing (3).

7. Insert bushing (3) into spool (13) by tapping lightly by using a plastic hammer.


 **NOTE:** Check that bushing (3) comes in contact with bearing race (6) horizontally.

8. Install retaining ring (2) to housing (8).

 **NOTE:** After installing retaining ring (2), extend the inner diameter of retaining ring (2) by using a screwdriver in order to install retaining ring (2) correctly to the groove on housing (8).




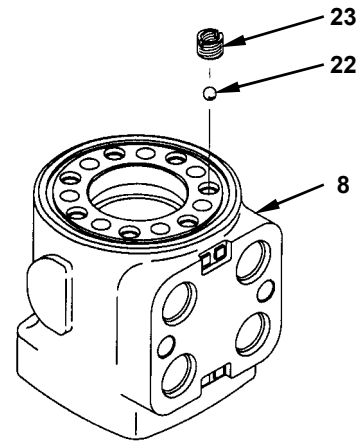
W212-02-14-002

 **CAUTION:** Wear a pair of protective glasses as retaining ring (2) may fly out from housing (8).

9. Secure housing (8) in a vise lightly.

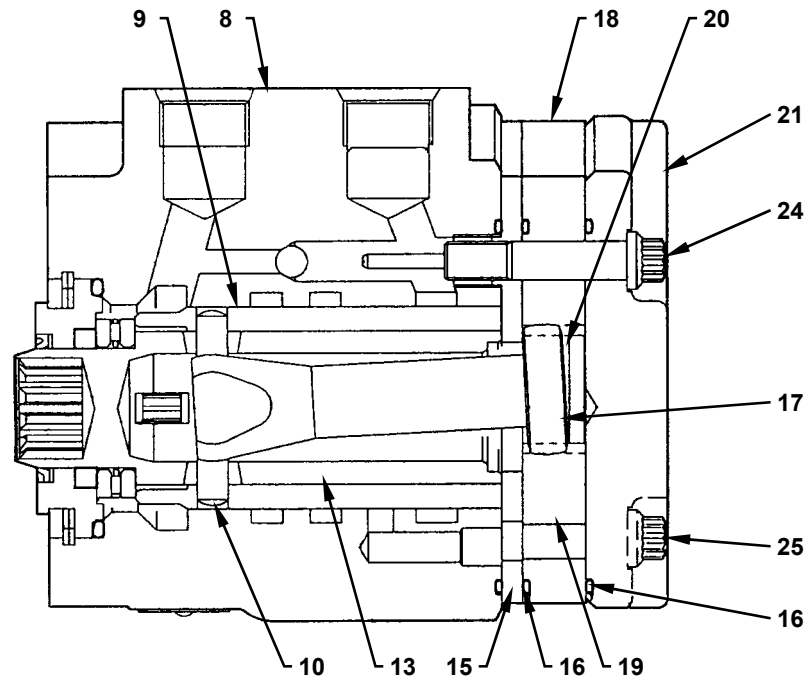
10. Install O-ring (14) to housing (8). Install ball (22) and screw (23) to housing (8) as illustrated below. Place plate (15) to housing (8).

 **NOTE:** Do not drop or lose ball (22).



W487-03-08-004

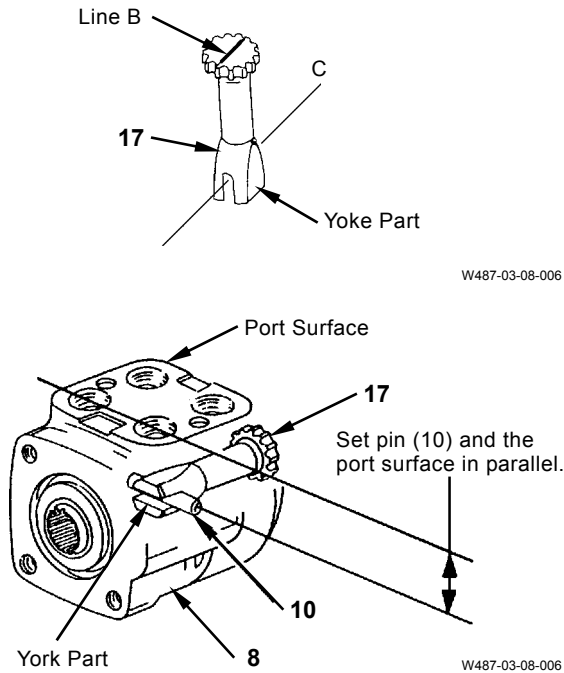
BODY (TRAVEL SYSTEM) / Steering Pilot Valve



T1F3-03-07-002


BODY (TRAVEL SYSTEM) / Steering Pilot Valve


11. Rotate the sleeve (9) assembly and set pin (10) and the port surface of housing (8) in parallel. Put line B onto the spline side end so that line B is parallel to line C on the yoke part of drive (17). Insert drive (17). Assemble the yoke part of drive (17) and pin (10). Set line B on the spline side end in drive (17) and the port surface of housing (8) in parallel.

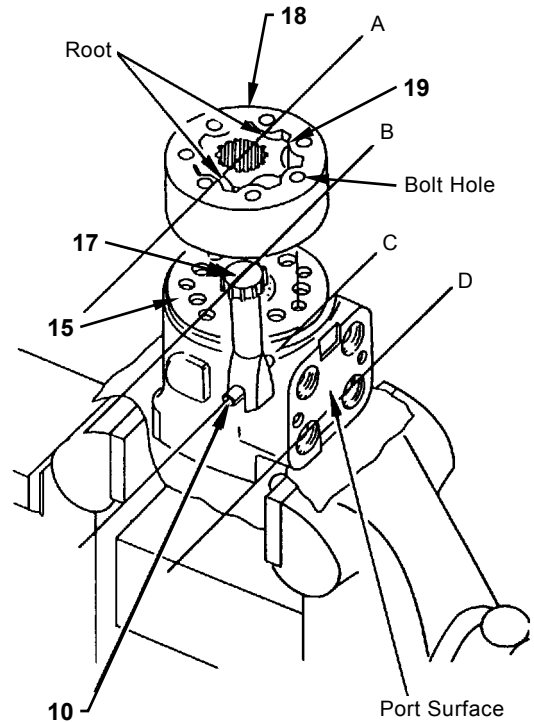


14. Insert spacer (20) into rotor (18). Install O-ring (16) to cap (21). Place cap (21) on rotor (18).

15. Install cap (21) to housing (8) with screws (25) (6 used) and screw (24).

 : 5/16 inch

 : 23 N·m (2.3 kgf·m, 17 lbf·ft)



12. Install O-ring (16) to rotor (18).

13. Face the O-ring (16) side of rotor (18) to the plate (15) side. Install star (19) while aligning the splines of star (19) and drive (17) so that line A connecting the concave parts of star (19) is parallel to line B on drive (17). Check that the lines A, B, C and D are in parallel as illustrated in the right. Align the bolt holes on rotor (18) while mating drive (17) and star (19).

BODY (TRAVEL SYSTEM) / Steering Pilot Valve

(Blank)

BODY (TRAVEL SYSTEM) / Steering Valve

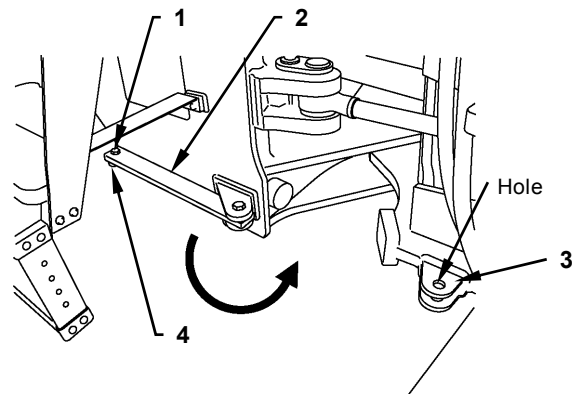
REMOVAL AND INSTALLATION OF STEERING VALVE

CAUTION: Bleed air from the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

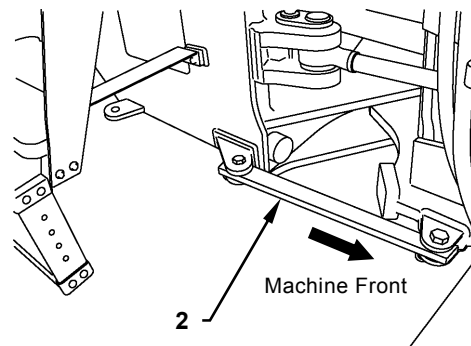
CAUTION: In order to release the hydraulic pressure in the steering hydraulic circuit, stop the engine and turn the steering wheel to the right and the left several times. The steering wheel turns heavily when the hydraulic pressure is released.

Preparation

1. Park the machine on a level and solid surface. Lower the bucket onto the ground horizontally.
2. Stop the engine and release the hydraulic pressure.
3. Secure articulation lock bar (2) in the hole on front frame (3) with set pin (1) and β (beta) pin (4).



M4GB-01-135




M4GB-01-136


BODY (TRAVEL SYSTEM) / Steering Valve

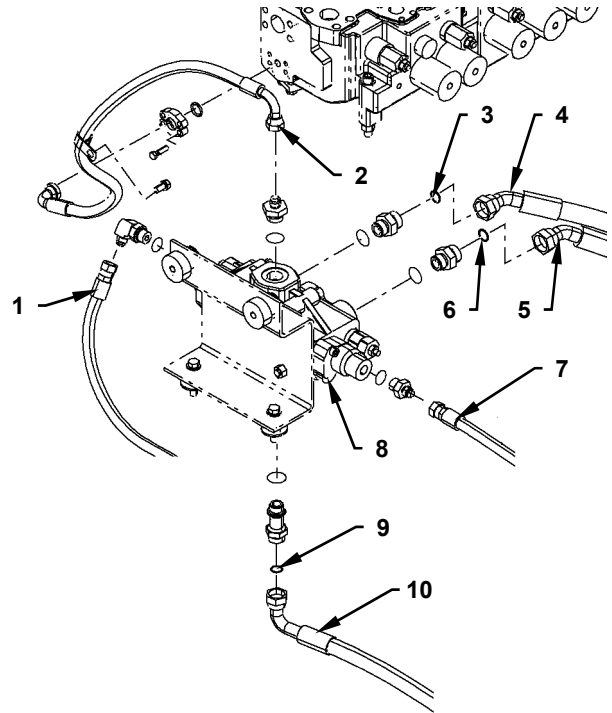
Removal

1. Disconnect hoses (1, 2, 4, 5, 7, 10, 11 and 12) from steering valve (8). Remove O-rings (3, 6, 9) from hoses (4, 5, 10).

 : 19 mm, 22 mm, 32 mm

2. Remove socket bolts (15) (2 used), socket bolt (16) and washers (14) (3 used) from steering valve (8). Remove steering valve (8) from bracket (13).


 : 12 mm




W4GB-03-08-005

Installation


1. Install steering valve (8) to bracket (13) with socket bolts (15) (2 used), socket bolt (16) and washers (14) (3 used).


 : 12 mm


 : 133 N·m (14 kgf·m, 98 lbf·ft)


2. Install O-rings (3, 6, 9) to hoses (4, 5, 10).


3. Connect hoses (1, 2, 4, 5, 7, 10, 11 and 12) to steering valve (8).


 : 19 mm

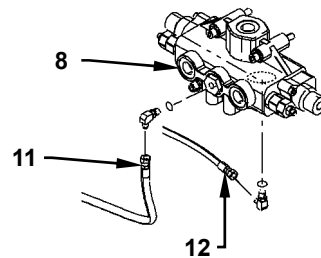
 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)

 : 22 mm

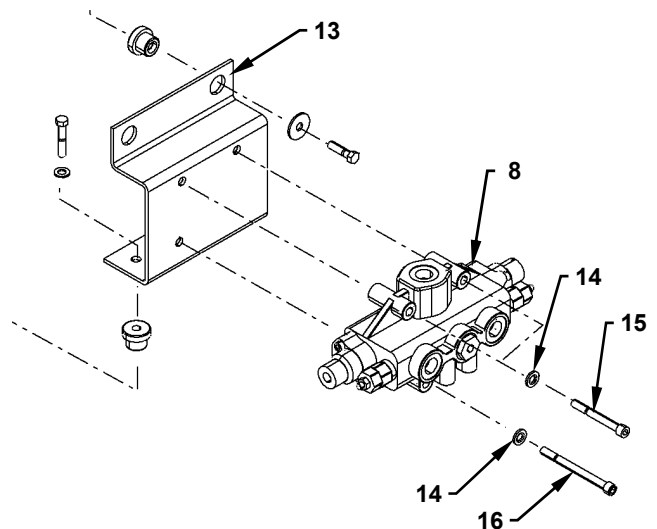
 : 39 N·m (4 kgf·m, 28.5 lbf·ft)

 : 32 mm

 : 137 N·m (14 kgf·m, 101 lbf·ft)



W4GB-03-08-006



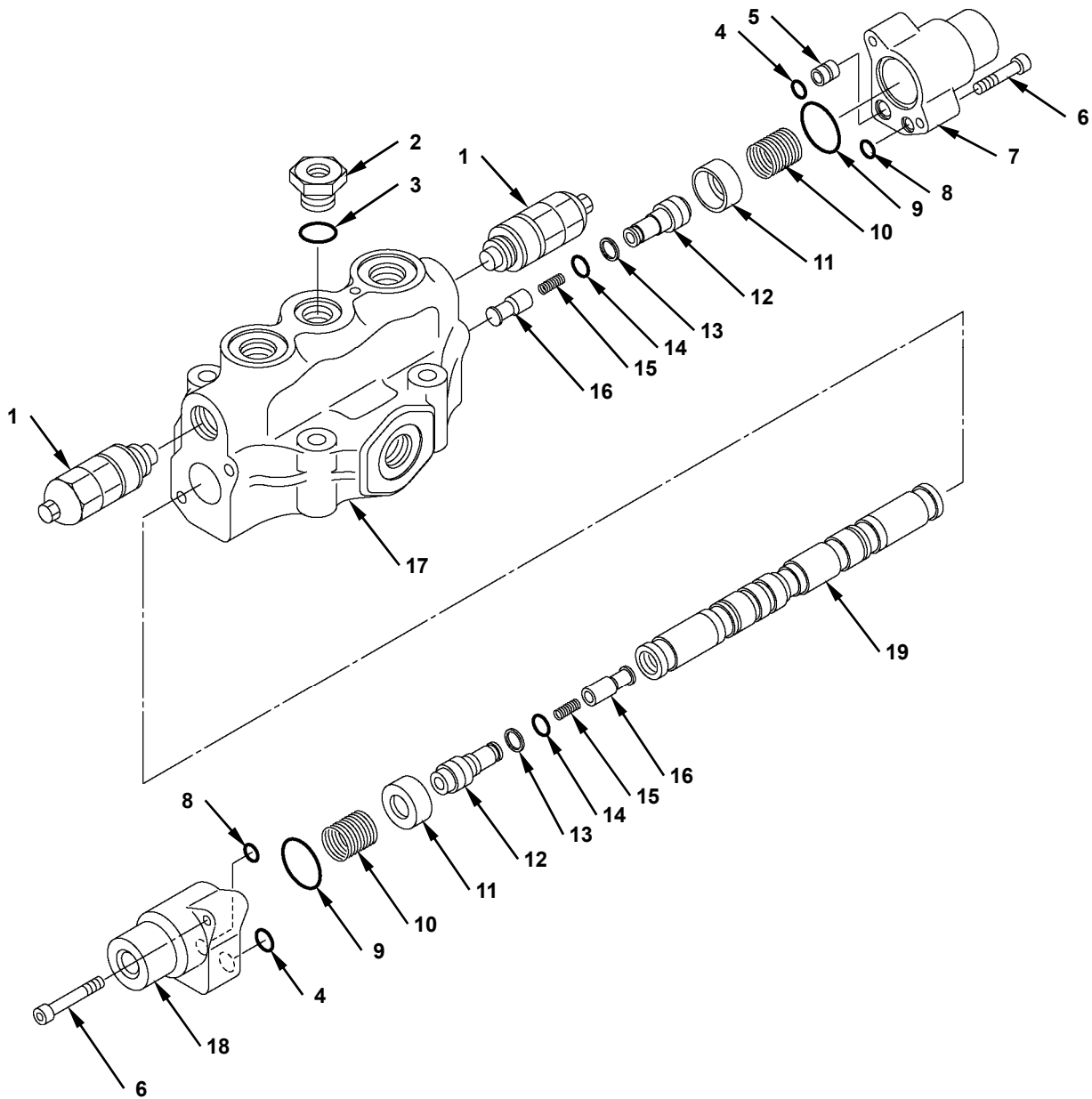
W4GB-03-08-007

BODY (TRAVEL SYSTEM) / Steering Valve

(Blank)

BODY (TRAVEL SYSTEM) / Steering Valve

DISASSEMBLY OF STEERING VALVE



W4GB-03-08-001


- | | | | |
|---------------------------|--------------------------|---------------------------|----------------------|
| 1 - Relief Valve (2 Used) | 6 - Socket Bolt (4 Used) | 11 - Spring Seat (2 Used) | 16 - Poppet (2 Used) |
| 2 - Plug | 7 - Cap Assembly | 12 - Cap Screw (2 Used) | 17 - Valve Housing |
| 3 - O-Ring | 8 - O-Ring (2 Used) | 13 - Backup Ring (2 Used) | 18 - Cap |
| 4 - O-Ring (2 Used) | 9 - O-Ring (2 Used) | 14 - O-Ring (2 Used) | 19 - Spool |
| 5 - Sleeve Assembly | 10 - Spring (2 Used) | 15 - Spring (2 Used) | |

BODY (TRAVEL SYSTEM) / Steering Valve


Disassembly of Steering Valve

IMPORTANT: Do not disassemble relief valve (1) as relief valve (1) has been set at the set pressure.

1. Remove relief valves (1) (2 used) from valve housing (17).


 : 32 mm

2. Remove plug (2) from valve housing (17). Remove O-ring (3) from plug (2).

 : 36 mm

IMPORTANT: When removing cap (18) and cap assembly (7), prevent spring (10) from flying out. As the steel ball is installed to cap assembly (7), replace as an assembly. As sleeve assembly (5) is installed by crimping the filter, replace as an assembly.


3. Remove socket bolts (6) (4 used) from cap (18) and cap assembly (7). Remove cap (18), cap assembly (7), springs (10) (2 used) and spring seats (11) (2 used) from valve housing (17). Remove O-rings (9, 8, 4) from cap (18). Remove O-rings (9, 8, 4) and sleeve assembly (5) from cap assembly (7).

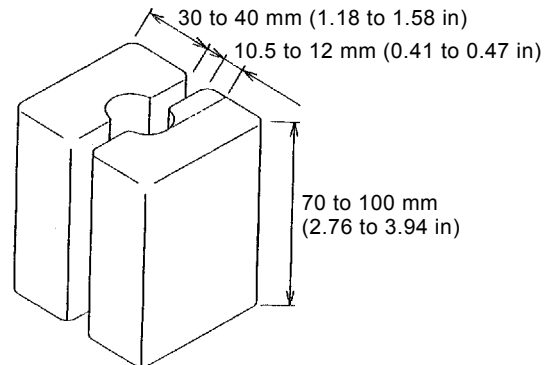
 : 6 mm

IMPORTANT: Do not damage spool (19) when removing. Put the matching marks in order not to confuse the inserting direction when assembling.

4. Remove the spool (19) assembly from valve housing (17) by rotating.

5. Secure the spool (19) assembly by using wooden pieces in a vise in order not to damage the outer surface of the spool (19) assembly. Remove cap screws (12) (2 used), springs (15) (2 used) and poppets (16) (2 used) from the spool (19) assembly.

 : 17 mm

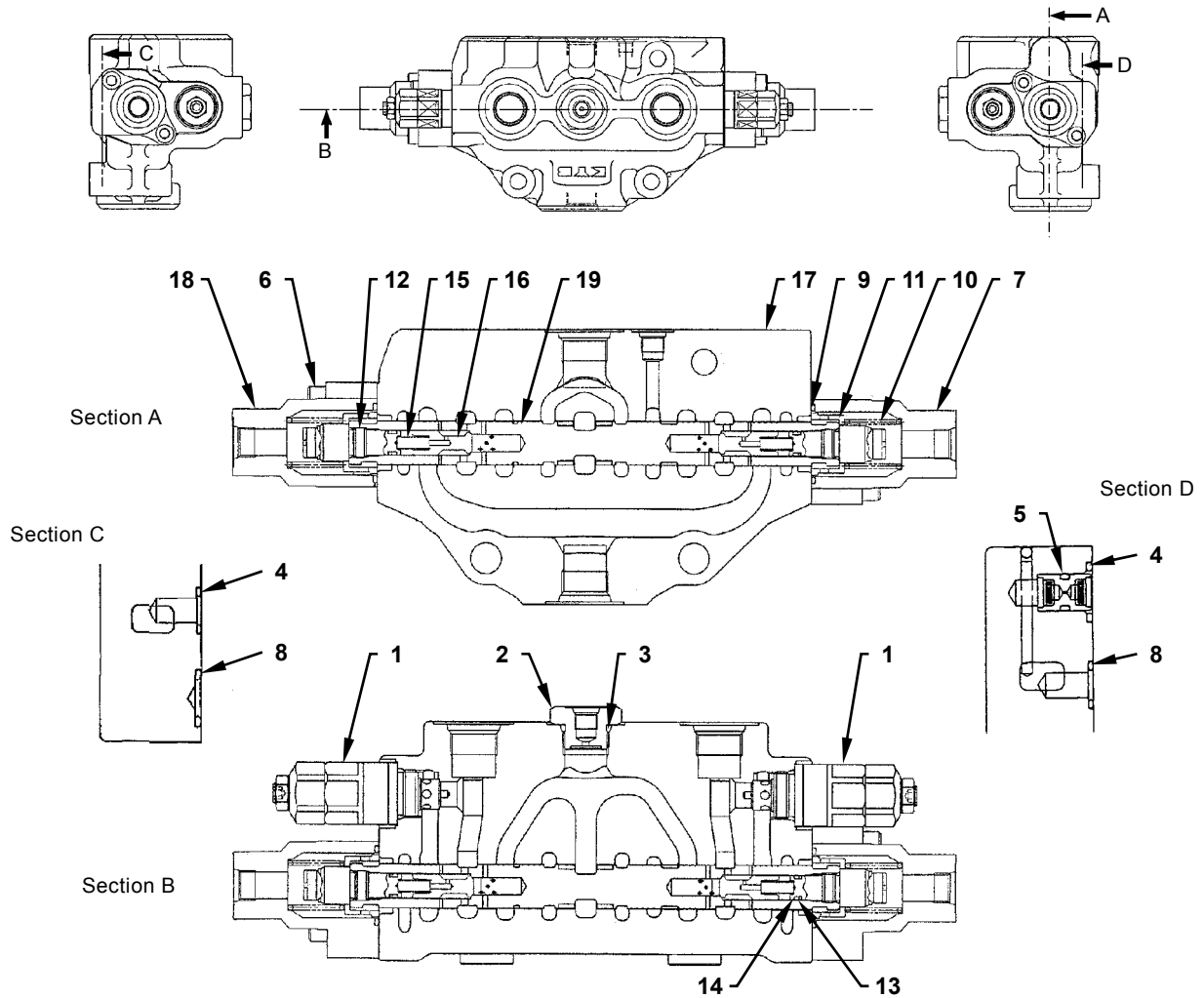


W4GB-03-08-002

6. Remove O-rings (14) (2 used) and backup rings (13) (2 used) from cap screws (12) (2 used).

BODY (TRAVEL SYSTEM) / Steering Valve

ASSEMBLY OF STEERING VALVE











W4GB-03-08-003

- | | | | |
|---------------------------|--------------------------|---------------------------|----------------------|
| 1 - Relief Valve (2 Used) | 6 - Socket Bolt (4 Used) | 11 - Spring Seat (2 Used) | 16 - Poppet (2 Used) |
| 2 - Plug | 7 - Cap Assembly | 12 - Cap Screw (2 Used) | 17 - Valve Housing |
| 3 - O-Ring | 8 - O-Ring (2 Used) | 13 - Backup Ring (2 Used) | 18 - Cap |
| 4 - O-Ring (2 Used) | 9 - O-Ring (2 Used) | 14 - O-Ring (2 Used) | 19 - Spool |
| 5 - Sleeve Assembly | 10 - Spring (2 Used) | 15 - Spring (2 Used) | |

BODY (TRAVEL SYSTEM) / Steering Valve

Assembly of Steering Valve

1. Install backup rings (13) (2 used) and O-rings (14) (2 used) to cap screws (12) (2 used).
2. Secure spool (19) by using wooden pieces (Refer to W3-8-5.) in a vise. Install poppets (16) (2 used), springs (15) (2 used) and cap screws (12) (2 used) to spool (19).
 : 17 mm
 : 39.2 to 41.2 N·m
(4.0 to 4.2 kgf·m, 29 to 30.5 lbf·ft)
3. Insert the spool (19) assembly into valve housing (17) by rotating.
4. Install sleeve assembly (5) to cap assembly (7).
5. Install spring seats (11) (2 used), springs (10) (2 used) and O-rings (4, 8, 9) (2 used for each) to cap (18) and cap assembly (7). Install cap (18) and cap assembly (7) to valve housing (17) with socket bolts (6) (4 used).
 : 6 mm
 : 39 to 44 N·m
(4.0 to 4.5 kgf·m, 28.5 to 32.5 lbf·ft)
6. Install O-ring (3) to plug (2). Install plug (2) to valve housing (17).
 : 36 mm
 : 206 to 225 N·m
(21 to 23 kgf·m, 152 to 166 lbf·ft)
7. Install relief valves (1) (2 used) to valve housing (17).
 : 32 mm
 : 78 to 88 N·m
(8 to 9 kgf·m, 57.5 to 65 lbf·ft)

BODY (TRAVEL SYSTEM) / Steering Valve

(Blank)

BODY (TRAVEL SYSTEM) / Steering Cylinder

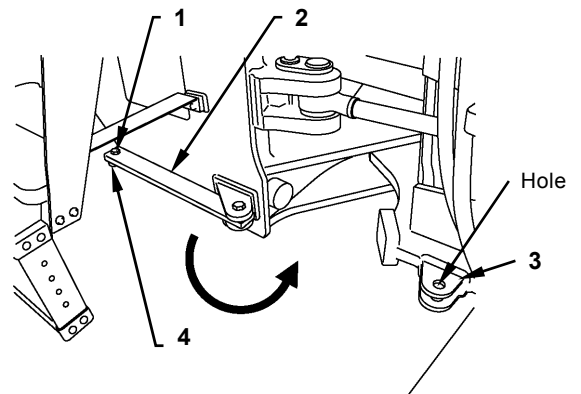
REMOVAL AND INSTALLATION OF STEERING CYLINDER

⚠ CAUTION: Bleed air from the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

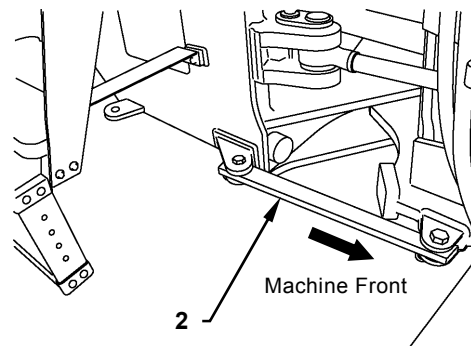
⚠ CAUTION: In order to release the hydraulic pressure in the steering hydraulic circuit, stop the engine and turn the steering wheel to the right and the left several times. The steering wheel turns heavily when the hydraulic pressure is released.

Preparation

1. Park the machine on a level and solid surface. Lower the bucket onto the ground horizontally.
2. Stop the engine and release the hydraulic pressure.
3. Secure articulation lock bar (2) in the hole on front frame (3) with set pin (1) and β (beta) pin (4).

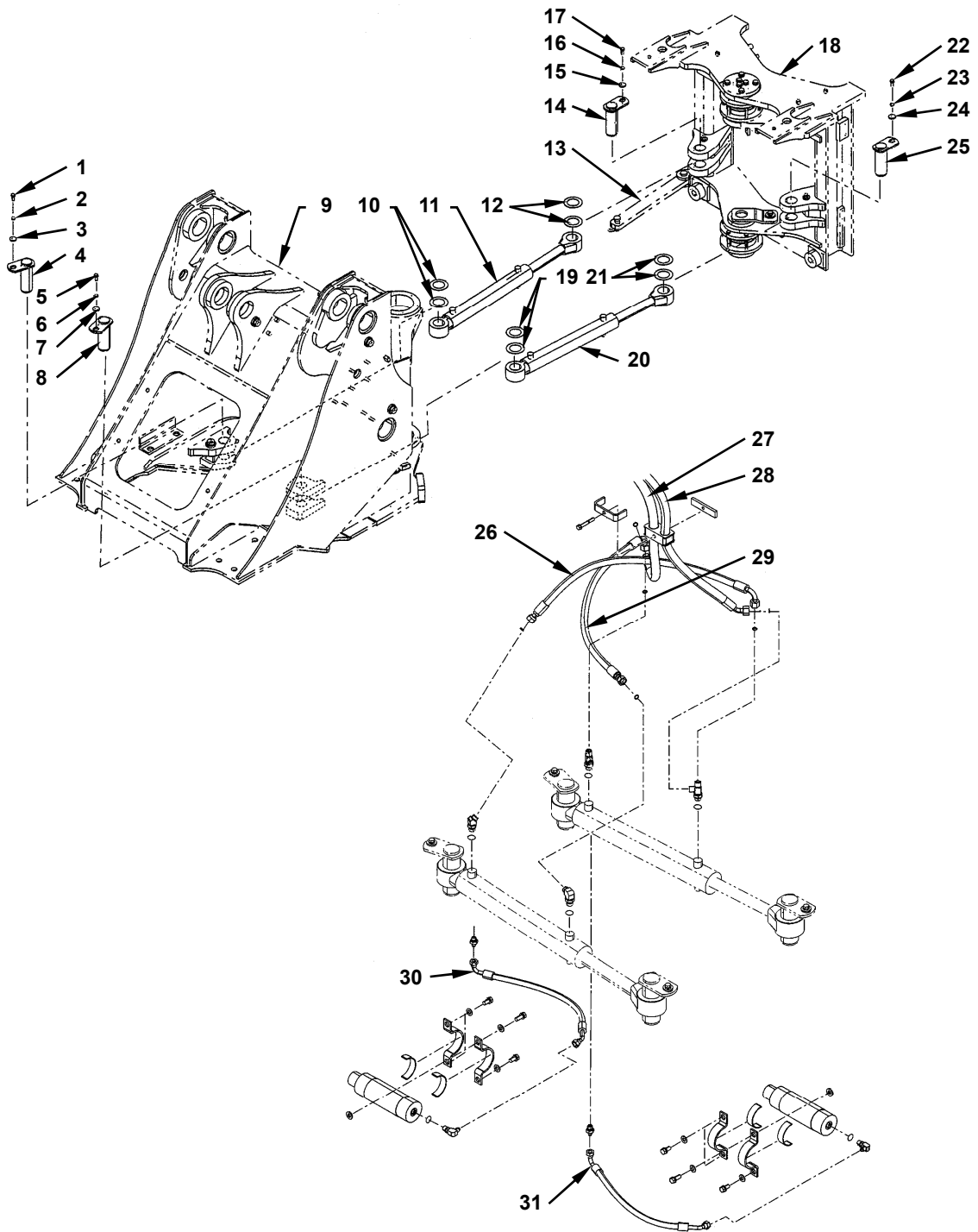


M4GB-01-135



M4GB-01-136

BODY (TRAVEL SYSTEM) / Steering Cylinder




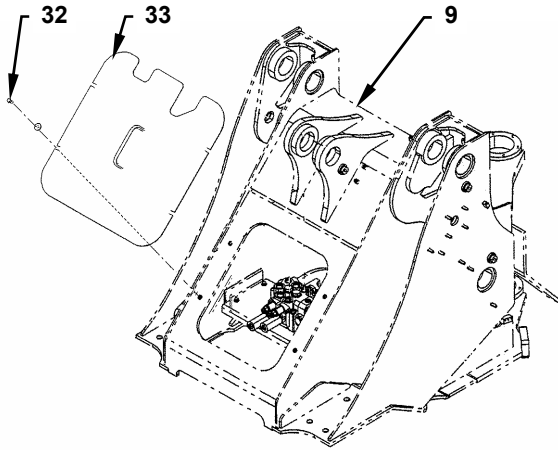
W4GB-03-09-020

BODY (TRAVEL SYSTEM) / Steering Cylinder

Removal


1. Remove semi bolts (32) (4 used) from cover (33).
Remove cover (33) from front frame (9).

 : 14 mm




W4GB-02-05-022


2. Disconnect hoses (26 to 31) from steering cylinders (11, 20). Cap the open ends.

 : 22 mm, 27 mm

3. Disconnect the lubrication pipes (2 used) from pins (4, 8).

 : 14 mm


4. Remove bolts (1, 5) and washers (2, 3, 6, 7) from pins (4, 8). Remove pins (4, 8) from front frame (9).

 : 17 mm



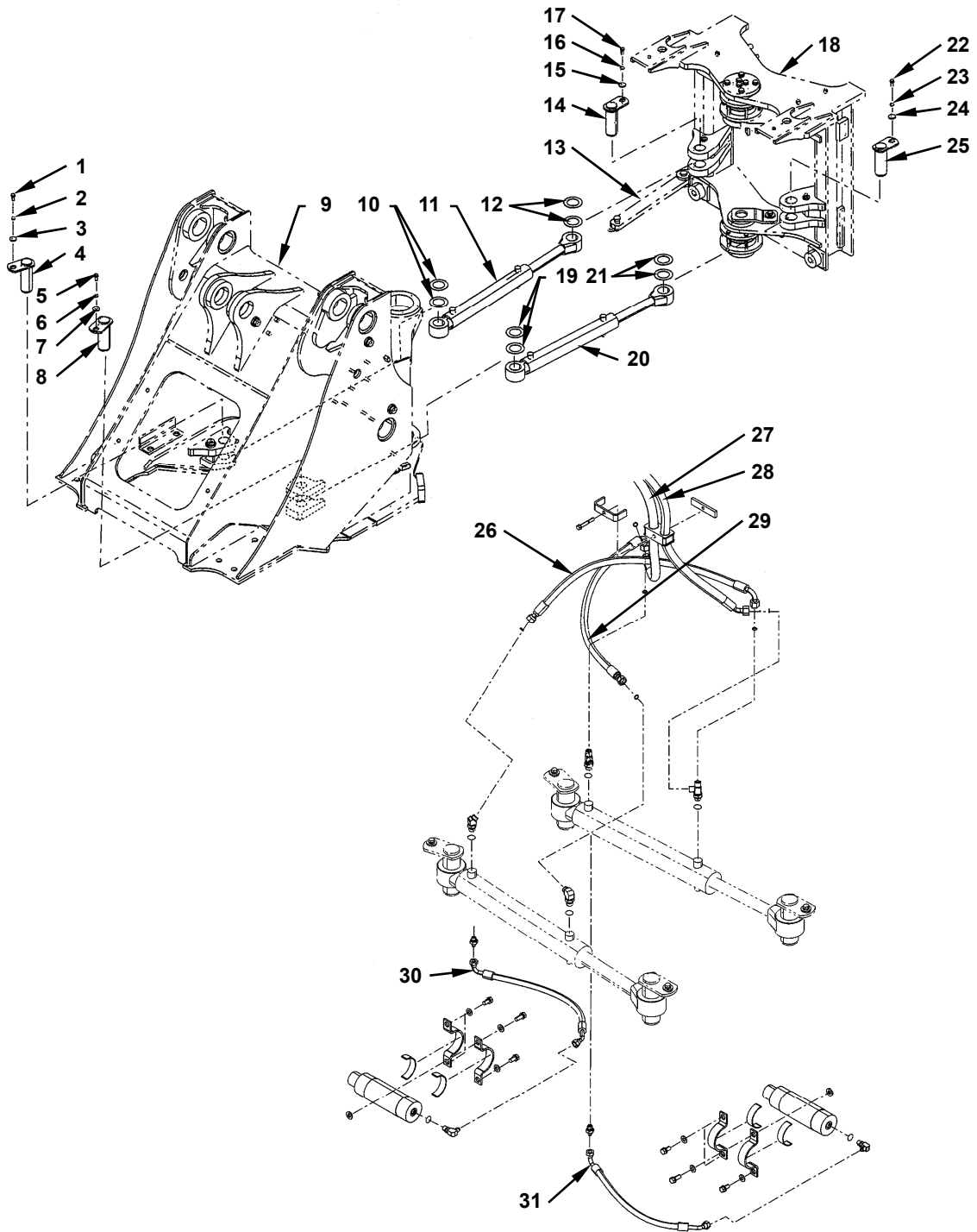
CAUTION: Steering cylinders (11, 20) weight: 24 kg (55 lb)

5. Attach a nylon sling onto steering cylinders (11, 20). Hold steering cylinders (11, 20). Remove bolts (17, 22) and washers (15, 16, 23, 24) from pins (14, 25). Remove pins (14, 25) from rear frame (18). Remove shims (10, 12, 19, 21) (2 used for each) from steering cylinders (11, 20).

 : 17 mm

6. Remove steering cylinders (11, 20) from rear frame (18).

BODY (TRAVEL SYSTEM) / Steering Cylinder















W4GB-03-09-020

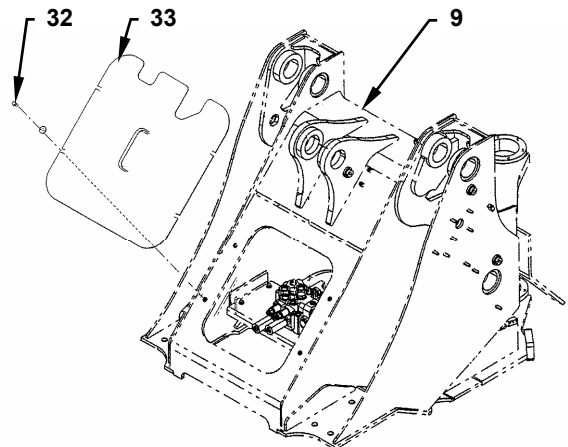
BODY (TRAVEL SYSTEM) / Steering Cylinder

Installation



CAUTION: Steering cylinders (11, 20) weight: 24 kg (55 lb)

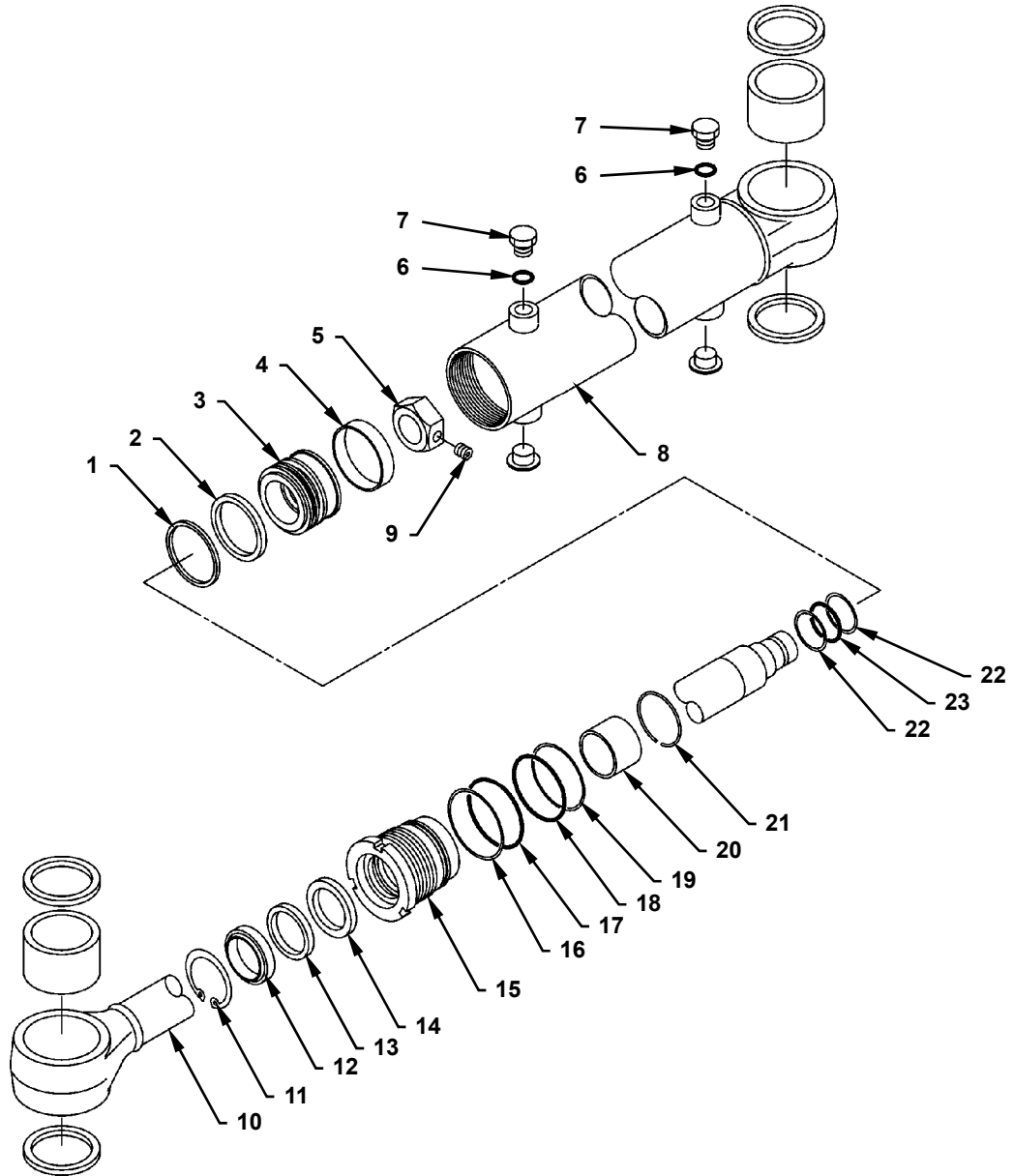
1. Attach a nylon sling onto steering cylinders (11, 20). Hold steering cylinders (11, 20).
2. Align the pin (4, 8) holes on steering cylinders (11, 20) and front frame (9). Install shims (10, 19) (2 used for each) to the upper surface at the bottom side of steering cylinders (11, 20).
3. Install pins (4, 8) to front frame (9) with washers (2, 3, 6, 7) and bolts (1, 5).
 : 17 mm
 : 50 N·m (5 kgf·m, 37 lbf·ft)
4. Align the pin (14, 15) holes on rear frame (18) and the rod side of steering cylinders (11, 20). Install shims (12, 21) (2 used for each) to the upper surface at the rod side of steering cylinders (11, 20).
5. Install pins (14, 25) to rear frame (18) with washers (15, 16, 23, 24) and bolts (17, 22).
 : 17 mm
 : 50 N·m (5 kgf·m, 37 lbf·ft)
6. Connect the lubrication pipes (2 used) to pins (4, 8).
 : 14 mm
 : 24.5 N·m (2.5 kgf·m, 18 lbf·ft)
7. Connect hoses (26 to 31) to steering cylinders (11, 20).
 : 27 mm
 : 93 N·m (9.5 kgf·m, 69 lbf·ft)
 : 22 mm
 : 69 N·m (7 kgf·m, 51 lbf·ft)
8. Install cover (33) to front frame (9) with sems bolts (32) (4 used).
 : 14 mm
 : 50 N·m (5 kgf·m, 37 lbf·ft)



W4GB-02-05-022

BODY (TRAVEL SYSTEM) / Steering Cylinder

DISASSEMBLY OF STEERING CYLINDER



W4GB-03-09-001

- 1 - Dust Ring (2 Used)
- 2 - Packing
- 3 - Piston
- 4 - Wear Ring
- 5 - Piston Nut
- 6 - O-Ring (2 Used)

- 7 - Plug (2 Used)
- 8 - Cylinder Tube
- 9 - Set Screw
- 10 - Piston Rod
- 11 - Retaining Ring
- 12 - Dust Seal

- 13 - U-Packing
- 14 - Buffer Seal
- 15 - Rod Cover
- 16 - Lock Washer
- 17 - O-Ring
- 18 - O-Ring

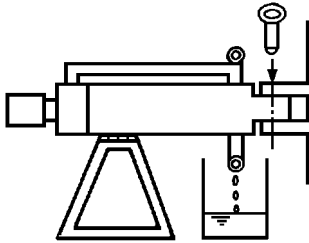
- 19 - Backup Ring
- 20 - Rod Bushing
- 21 - Retaining Ring
- 22 - Backup Ring (2 Used)
- 23 - O-Ring

BODY (TRAVEL SYSTEM) / Steering Cylinder

Disassembly of Steering Cylinder

CAUTION: Steering cylinder weight: 24 kg (55 lb)

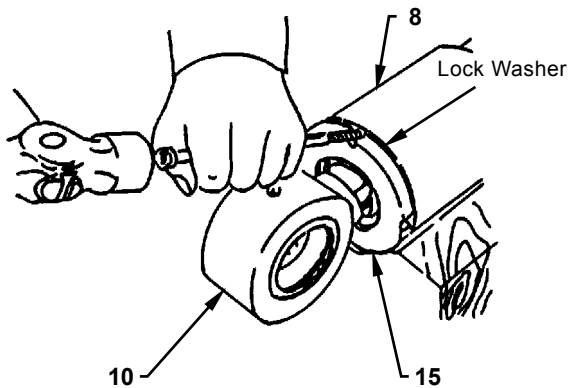
1. Hoist and secure the cylinder on a workbench horizontally. Drain hydraulic oil from the cylinder.



W102-04-02-027

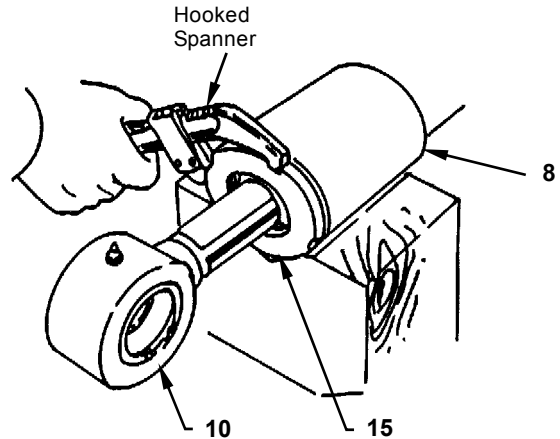
IMPORTANT: The lock washer forms an integral part with cylinder tube (8). Do not damage cylinder tube (8) and rod cover (15) when extending the lock washer.

2. Pull out piston rod (10) about 50 mm (1.97 in) from cylinder tube (8). Install a protective cover to piston rod (10). Extend the lock washer in rod cover (15) by using a chisel and a hammer.



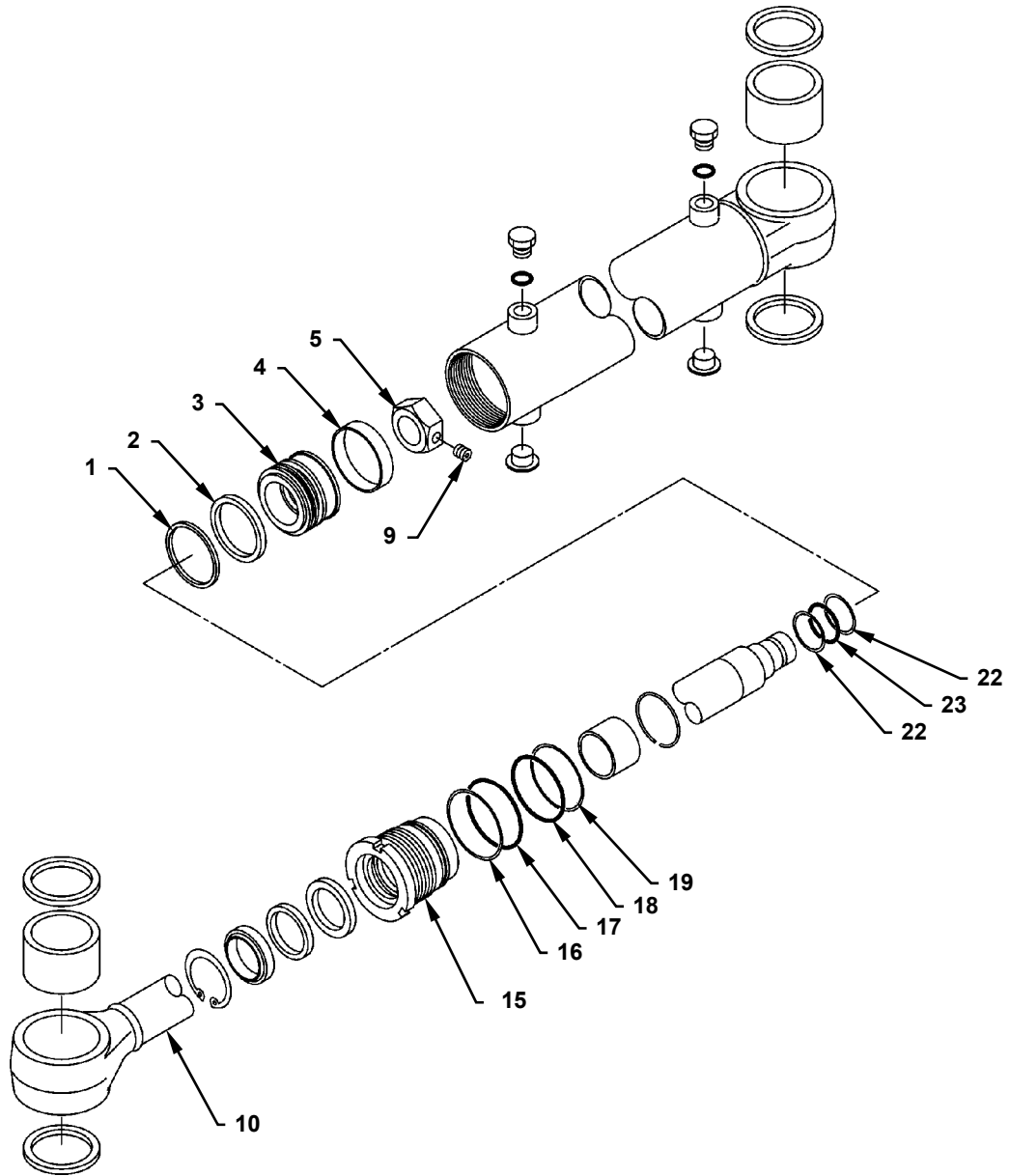
W506-04-02-003

3. Loosen rod cover (15) by using a hooked spanner. Remove the piston rod (10) assembly from cylinder tube (8).
Rod cover (15) diameter: 84 mm (3.3 in)



W506-04-02-004

BODY (TRAVEL SYSTEM) / Steering Cylinder




W4GB-03-09-001

BODY (TRAVEL SYSTEM) / Steering Cylinder

IMPORTANT: Loosen set screw (9) after cutting the crimped part (2 places) by using a hand drill.


- Secure piston rod (10) horizontally. Remove set screw (9) from piston nut (5).

 : 4 mm

- Remove piston nut (5) from piston rod (10) by using a special tool.

 **NOTE:** As for the special tool, refer to W3-9-20.

- Install the pins (Diameter 8 mm, Length 25 mm) in to the end (2 places) of piston (3). Remove piston (3) from piston rod (10) by using the special tool.

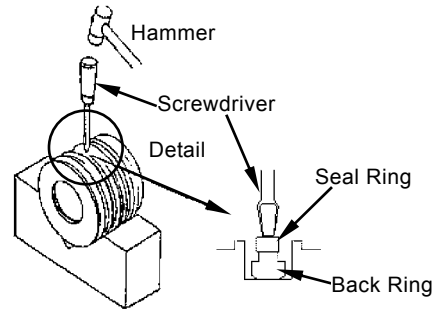
 **NOTE:** As for the special tool, refer to W3-9-20.

- Remove rod cover (15) from piston rod (10).
- Remove wear ring (4) and dust ring (1) from piston (3).

IMPORTANT: Do not damage the seal groove by a cutting tool.

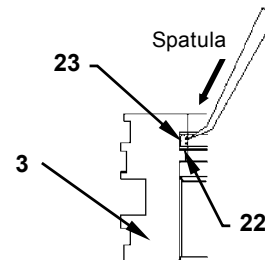
- Place piston (3) on a stable V-shaped stand. Remove the backup rings at both sides of packing (2) from piston (3).

Cut and remove the seal ring and the back ring in the center part of packing (2) by using a hammer and a screwdriver.



W4GB-04-02-004

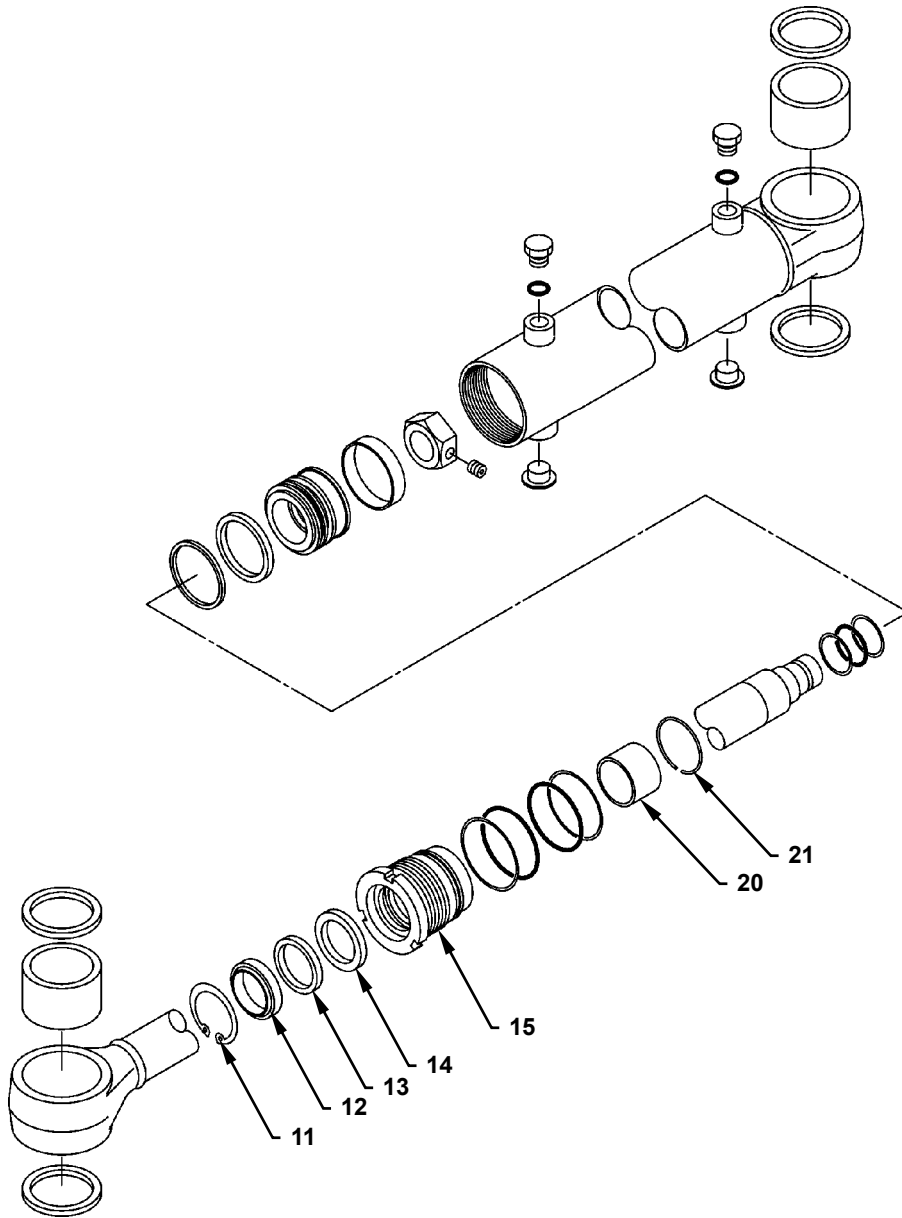
- Remove O-ring (23) and backup rings (22) (2 used) in piston (3) by using a spatula.



W4GB-04-02-005

- Place rod cover (15) on the workbench which is covered with an anti-skid waste cloth.
- Remove O-rings (17, 18), backup ring (19) and lock washer (16) from rod cover (15).

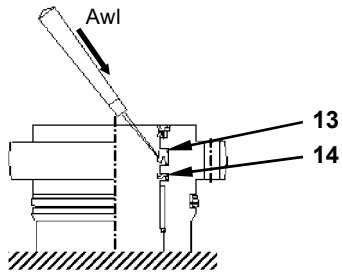
BODY (TRAVEL SYSTEM) / Steering Cylinder



W4GB-03-09-001

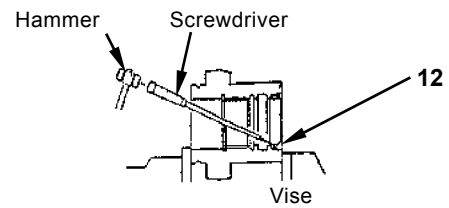
BODY (TRAVEL SYSTEM) / Steering Cylinder

13. Remove U-packing (13) and buffer seal (14) from rod cover (15) by using an awl.



W4GB-04-02-007

15. Remove dust seal (12) from rod cover (15).



W4GB-04-02-009

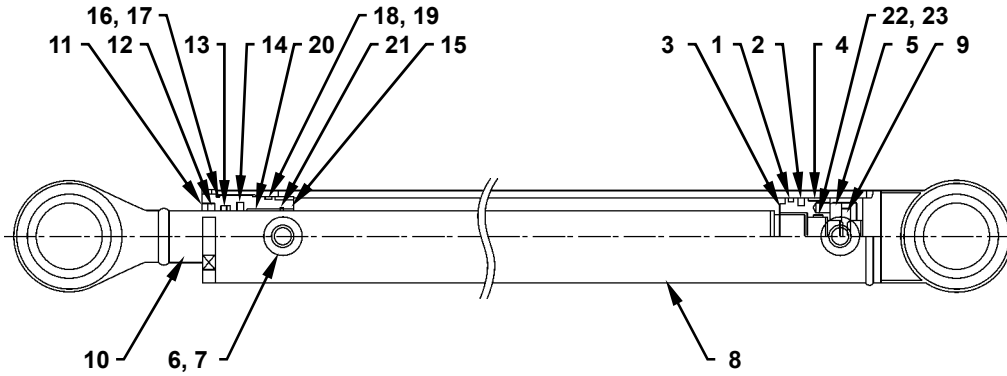
IMPORTANT: Do not remove rod bushing (20) unless necessary.

16. Remove rod bushing (20) from rod cover (15).

14. Remove retaining ring (11) from rod cover (15).

BODY (TRAVEL SYSTEM) / Steering Cylinder

ASSEMBLY OF STEERING CYLINDER




W4GD-03-09-001

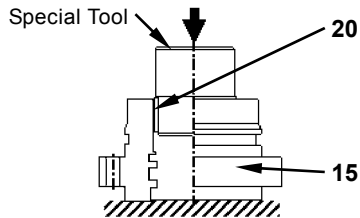
- | | | | |
|------------------------|---------------------|------------------|---------------------------|
| 1 - Dust Ring (2 Used) | 7 - Plug (2 Used) | 13 - U-Packing | 19 - Backup Ring |
| 2 - Packing | 8 - Cylinder Tube | 14 - Buffer Seal | 20 - Rod Bushing |
| 3 - Piston | 9 - Set Screw | 15 - Rod Cover | 21 - Retaining Ring |
| 4 - Wear Ring | 10 - Piston Rod | 16 - Lock Washer | 22 - Backup Ring (2 Used) |
| 5 - Piston Nut | 11 - Retaining Ring | 17 - O-Ring | 23 - O-Ring |
| 6 - O-Ring (2 Used) | 12 - Dust Seal | 18 - O-Ring | |

BODY (TRAVEL SYSTEM) / Steering Cylinder

Assembly of Steering Cylinder

1. Install rod bushing (20) to rod cover (15) by using a special tool and a press.

 NOTE: As for the special tool, refer to W3-9-22.



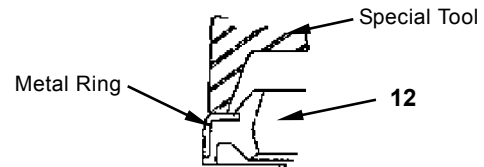
W4GB-04-02-012

2. Install retaining ring (21) to rod cover (15).

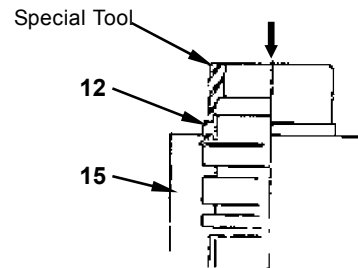
IMPORTANT: Keep the special tool evenly in contact with the metal ring of dust seal (12).

3. Install dust seal (12) to rod cover (15) by using the special tool and a hammer.

 NOTE: As for the special tool, refer to W3-9-23.



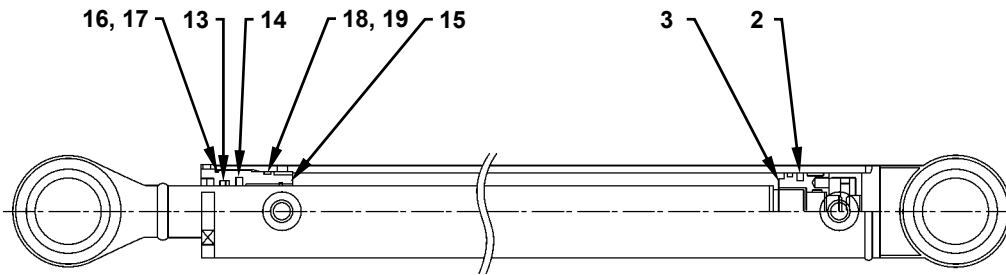
W4GB-04-02-014



W4GB-04-02-013

4. Install retaining ring (11) to rod cover (15).

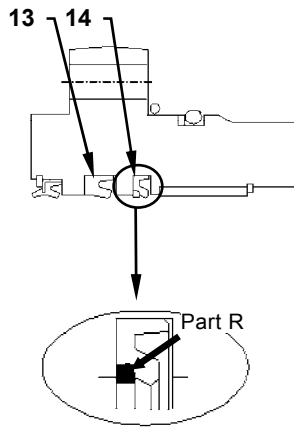
BODY (TRAVEL SYSTEM) / Steering Cylinder



W4GD-03-09-001

BODY (TRAVEL SYSTEM) / Steering Cylinder

5. Install U-packing (13) and buffer seal (14) to rod cover (15).




W4GB-04-02-016

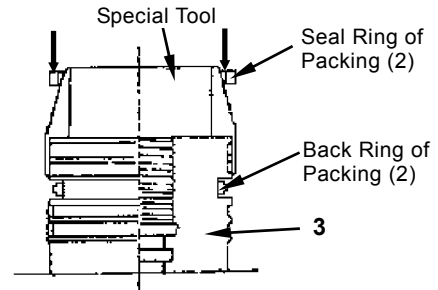
Mounting Direction Detail of Backup Ring for Buffer Seal

W4GB-04-02-017

6. Install O-ring (18) and backup ring (19) to rod cover (15).
7. Install lock washer (16) and O-ring (17) to rod cover (15).

8. Install the special tool to piston (3). Install the back ring of packing (2) to piston (3).

 **NOTE:** As for the special tool, refer to W3-9-21.



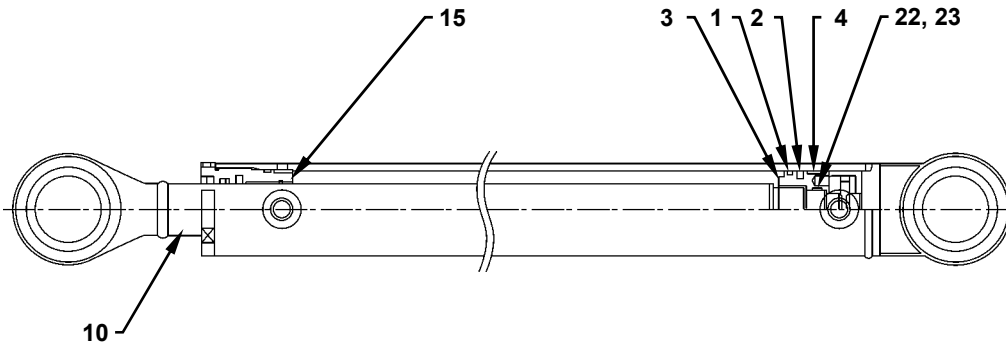
W4GB-04-02-018



CAUTION: Warm up the seal ring of packing (2) by using oil heated by an electric heater. Avoid direct heating by using fire.

9. Warm up the seal ring of packing (2) to 150 to 180 °C (302 to 356 °F). Install the seal ring of packing (2) to the seal groove on piston (3).

BODY (TRAVEL SYSTEM) / Steering Cylinder

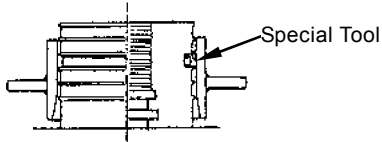


W4GD-03-09-001

BODY (TRAVEL SYSTEM) / Steering Cylinder

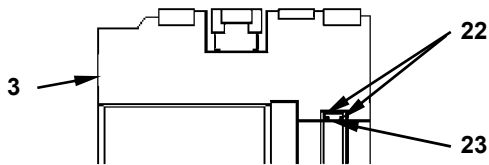
10. Adjust the seal ring of extended packing (2) by using the special tool.

 **NOTE:** As for the special tool, refer to W3-9-21.



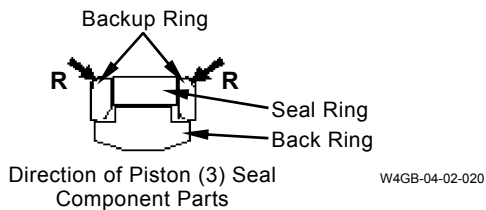
W4GB-04-02-019

11. Install O-ring (23) and backup rings (22) (2 used) to piston (3).



W4GB-04-02-021


12. Install the backup ring of packing (2) to both sides of the seal ring of packing (2).

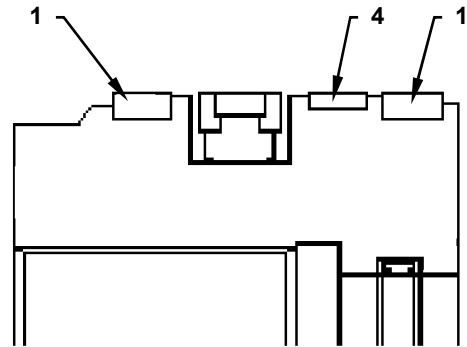


W4GB-04-02-020

13. Secure piston rod (10) on a workbench horizontally.


14. Install wear ring (4) and dust rings (1) (2 used) to piston (3). Apply hydraulic oil onto piston (3).

 **NOTE:** Do not drop wear ring (4) and dust rings (1) (2 used).

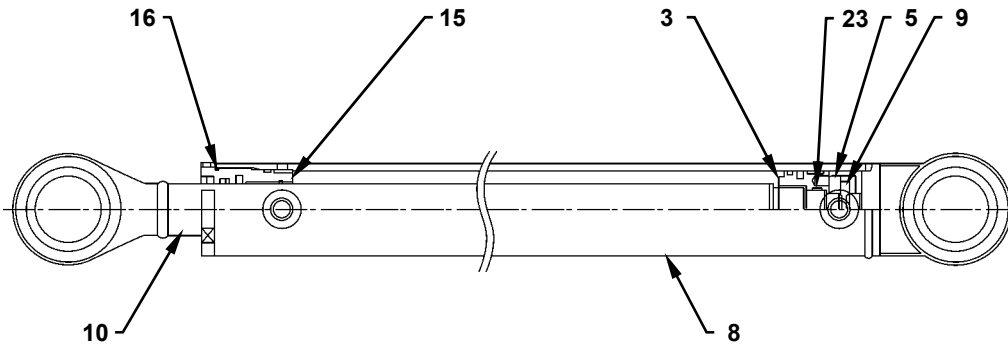


W4GB-04-02-021

15. Apply hydraulic oil onto the special tool and the piston rod (10) surface. Install rod cover (15) to piston rod (10) by using the special tool.

 **NOTE:** As for the special tool, refer to W3-9-23.


BODY (TRAVEL SYSTEM) / Steering Cylinder




W4GD-03-09-001


BODY (TRAVEL SYSTEM) / Steering Cylinder


16. Apply hydraulic oil onto O-ring (23) and the thread part of the piston (3) bore part. Install the pin (Diameter 8 mm, Length 25 mm) to the screw hole on the piston (3) end. Install piston (3) to piston rod (10) by using the special tool.

 : 490±49 N·m (50±5 kgf·m, 360±36 lbf·ft)


 **NOTE:** As for the special tool, refer to W3-9-20.


17. Apply hydraulic oil onto the thread part of piston nut (5). Install piston nut (5) to rod (10) by using the special tool.

 : 490±49 N·m (50±5 kgf·m, 360±36 lbf·ft)

 **NOTE:** As for the special tool, refer to W3-9-20.

18. Apply LOCTITE #242 onto the thread part of set screw (9). Install set screw (9) to piston nut (5). Crimp set screw (9) by using a punch (2 places).


 : 4 mm

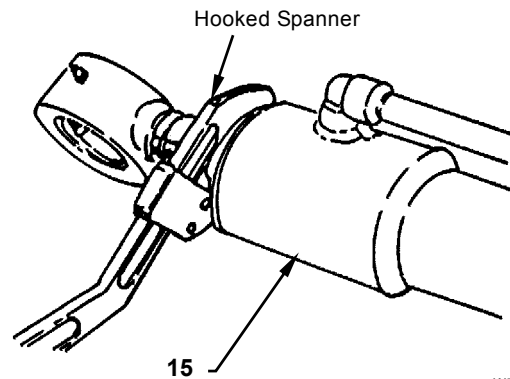
 : 15±1.5 N·m (1.5±0.15 kgf·m, 11±1.1 lbf·ft)

19. Apply hydraulic oil onto the packing parts. Secure cylinder tube (8) in a vise horizontally. Insert piston rod (10) into cylinder tube (8).

20. Apply hydraulic oil onto the packing parts. Tighten rod cover (15) to cylinder tube (8) by using a hooked spanner. Bend the lock washer in order not to loosen.

Lock cover (15) diameter: 84 mm (3.31 in)

 : 490±49 N·m (50±5 kgf·m, 360±36 lbf·ft)



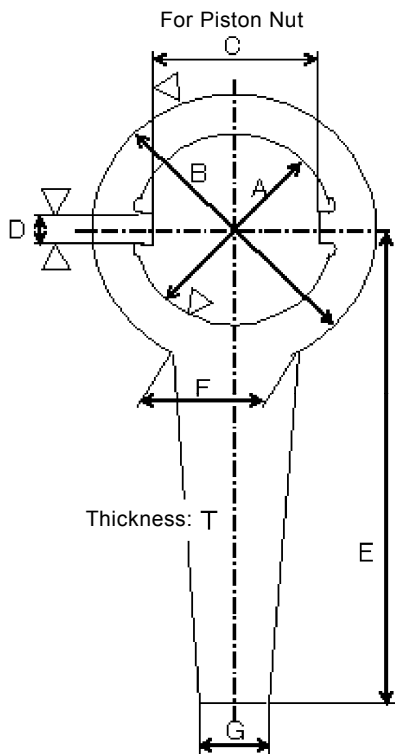
W506-04-02-019

BODY (TRAVEL SYSTEM) / Steering Cylinder

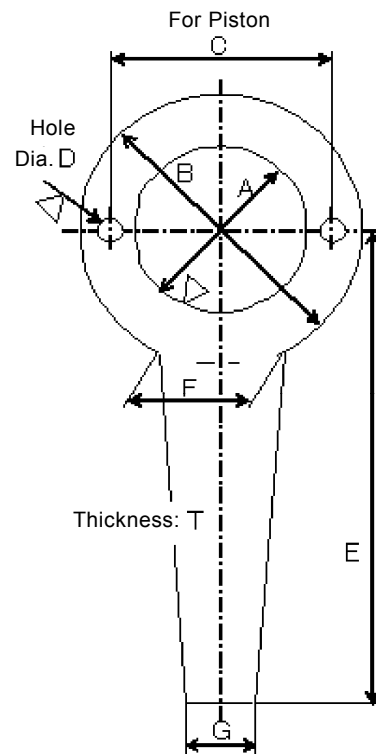
Special Wrench

Unit: mm

	Cylinder	A	B	C	D	E	F	G	T	Remark
For Piston Nut	Bucket	99	169	91	14	300	70	40	12 to 15	
	Lift Arm	89	169	91						
	Steering	63	113	53						
For Piston	Bucket	80	160	120	14	300	70	40	12 to 15	M12 x 30 (2 used)
	Lift Arm	66	126	96	12					M10 x 25 (2 used)
	Steering	38	82	52	8.1					250



W4GB-03-09-004



W4GB-03-09-005

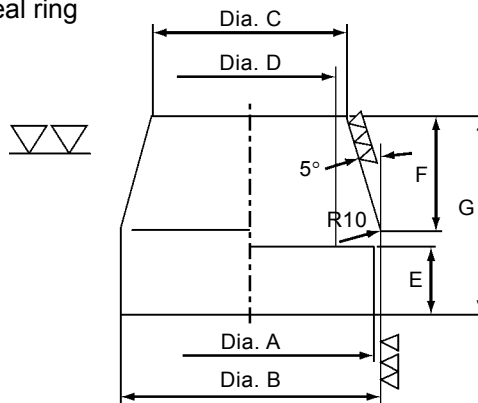
BODY (TRAVEL SYSTEM) / Steering Cylinder

Special Tools When Assembling and Adjusting Seal Ring

Unit: mm

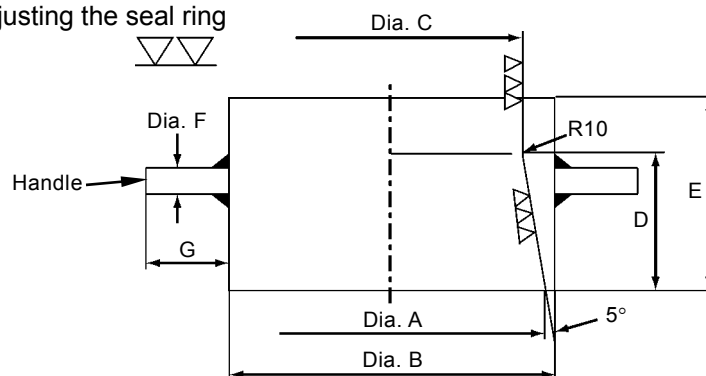
	Cylinder	A	B	C	D	E	F	G
When Assembling	Bucket	147±0.1	150±0.1	140	130	25	30	66
	Lift Arm	123±0.1	125±0.1	120	115			
	Steering	68±0.1	71±0.1	60	50	15	63	83
When Adjusting	Bucket	180	170	151±0.1	46	75	10 to 15	100
	Lift Arm	155	145	126±0.1				
	Steering	78	88	72±0.1	34	60		

Special tool when assembling the seal ring



W4GB-03-09-006

Special tool when adjusting the seal ring



W4GB-03-09-007

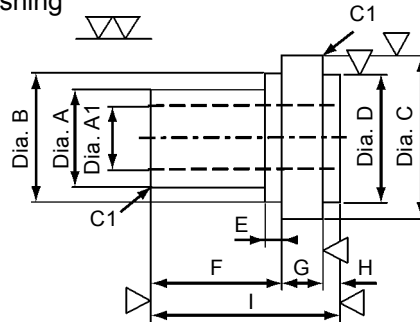
BODY (TRAVEL SYSTEM) / Steering Cylinder

Special Tools When Installing Pin Bushing

Unit: mm

Cylinder	A	B	C	D	E	F	G	H	I
Bucket	84.5 0 to -0.1	99.5 ± 0.1	120	100	6.5 ± 0.1	55	20	10	85
Lift Arm									
Steering	59.5 0 to 0.1	74.5 ± 0.1	90	75	5 ± 0.1				

Special tool when installing the pin bushing



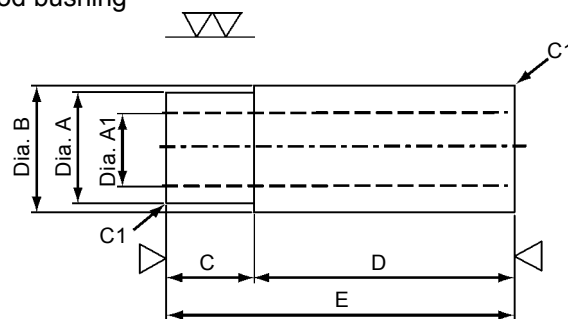
W4GB-03-09-008

Special Tool When Installing Rod Bushing

Unit: mm

Cylinder	A	B	C	D	E
Bucket	85 0 to 0.1	89.8 ± 0.1	30	40	70
Lift Arm	75 0 to 0.1	79.8 ± 0.1			
Steering	45 0 to 0.1	49.8 ± 0.1	25	25	50

Special tool when installing the rod bushing



Inner Diameter: Dia. A, = Dia. A-20
(No need for a hole of dia. A)

W4GB-03-09-009

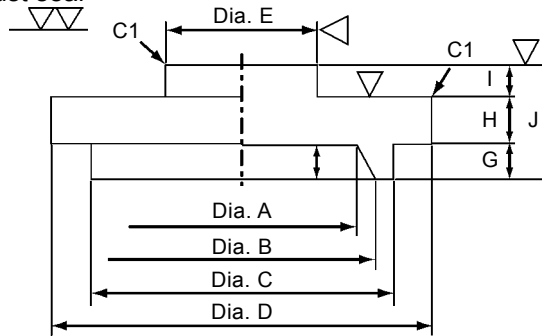
BODY (TRAVEL SYSTEM) / Steering Cylinder

Special Tool When Installing Dust Seal

Unit: mm

Cylinder	A	B	C	D	E	F	G	H	I	J
Bucket	90	93	98	118	80	5	5	15	5	25
Lift Arm	80	83	88	108						
Steering	49	52	56	76	60	5	3.5	15	5	23.5

Special tool when installing the dust seal



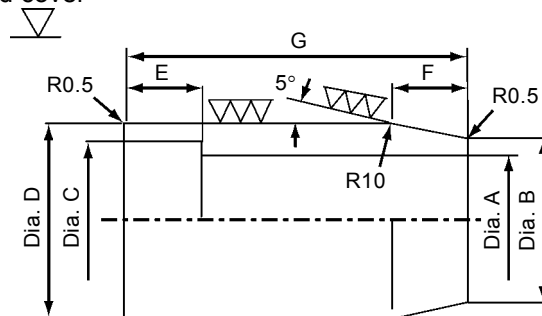
W4GB-03-09-010

Special Tool When Inserting Rod Cover

Unit: mm

Cylinder	A	B	C	D	E	F	G
Bucket	70.5	80	80.3±0.1	85 _{0 to 0.1}	60	28.5	127
Lift Arm	60.5	70	70.3±0.1	75 _{0 to 0.1}	41		95
Steering	35.5	40	42.3±0.1	45 _{0 to 0.1}	31		80

Special tool when inserting the rod cover

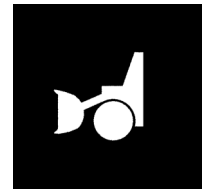


W4GB-03-09-011

BODY (TRAVEL SYSTEM) / Steering Cylinder

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SECTION 4 FRONT ATTACHMENT



— CONTENTS —

Group 1 Front Attachment

Removal and Installation of
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Group 2 Cylinder

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Assembly of Lift Cylinder W4-2-10
Disassembly of Bucket Cylinder W4-2-16
Assembly of Bucket Cylinder W4-2-20
Maintenance Standard..... W4-2-26

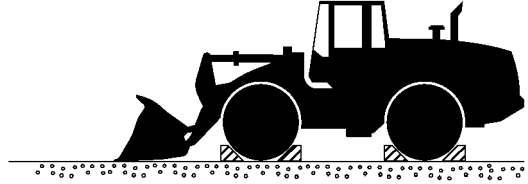
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FRONT ATTACHMENT / Front Attachment

REMOVAL AND INSTALLATION OF FRONT ATTACHMENT

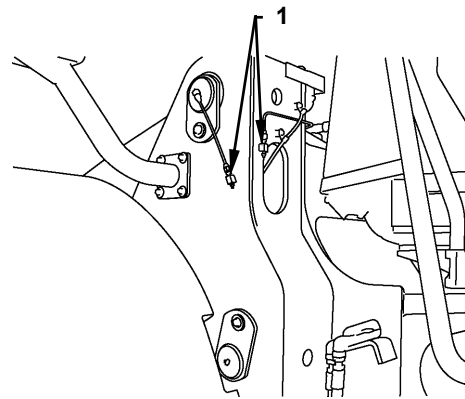
Preparation

1. Park the machine on a solid and level surface.
Lower the bucket onto the ground.
2. Place the blocks in front of and behind the axle in order to secure the machine.

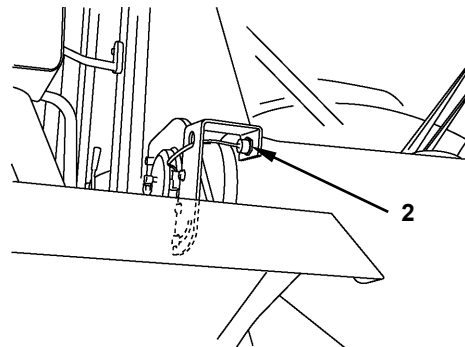


W4GB-03-04-001

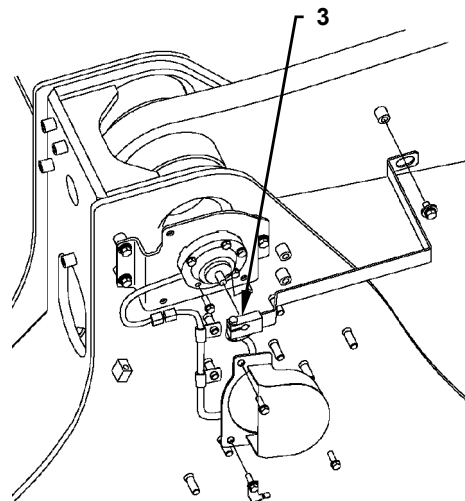
- Disconnect remote pipe (1) in the grease fitting from the front attachment.
- Remove lift arm proximity switch (2).
- Remove angle sensor (3) from the machine with lift arm auto leveler attached.
- Remove lift arm proximity switch (2) and disconnect the harness of angle sensor (3).



W4GB-04-01-020

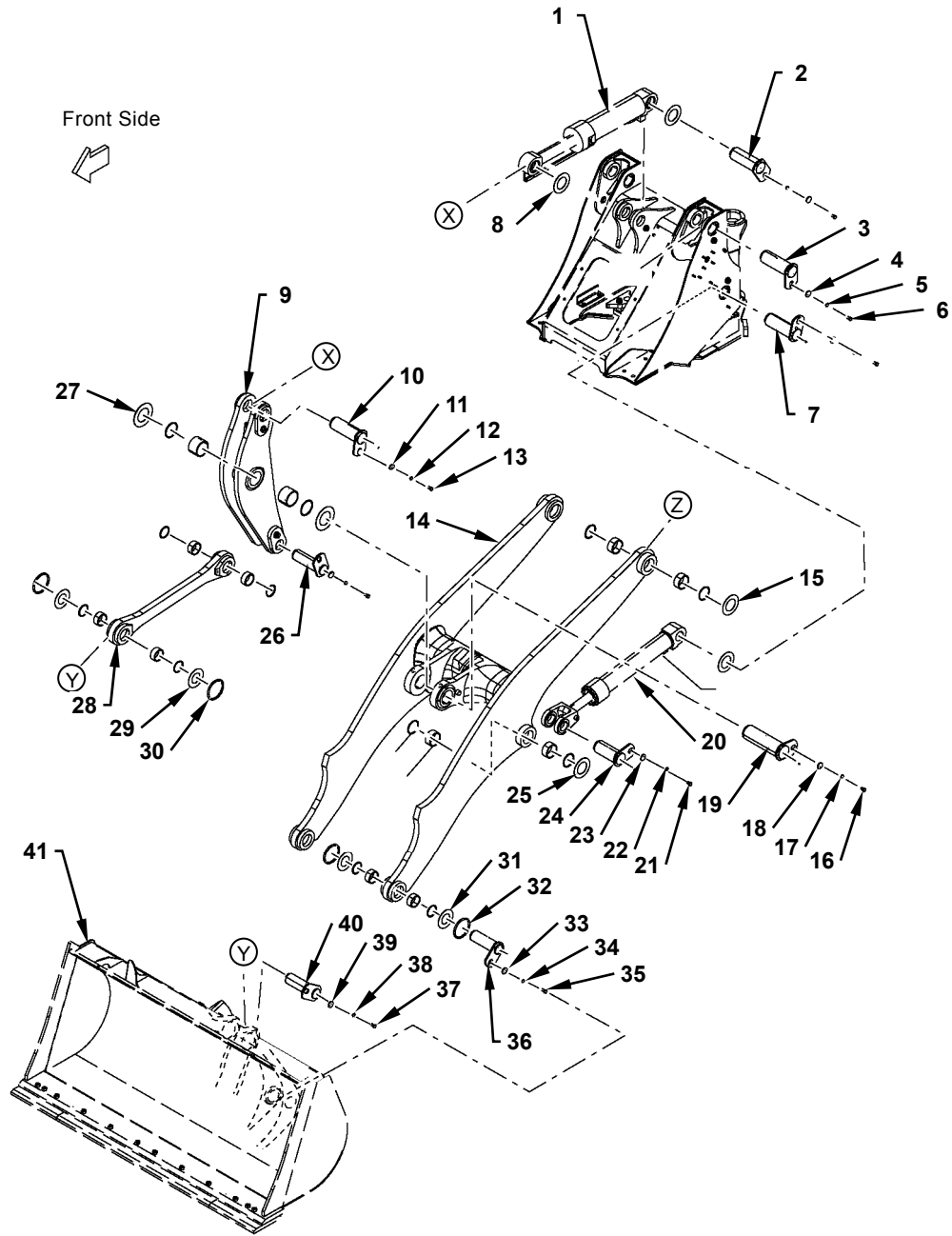


W4GB-04-01-021



W4GB-04-01-019

FRONT ATTACHMENT / Front Attachment



W4GB-04-01-001

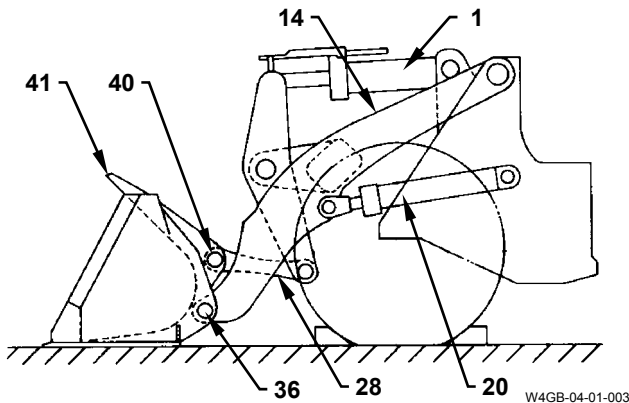
- | | | | |
|---------------------|---------------------------------|----------------------|----------------------|
| 1 - Bucket Cylinder | 12 - Spring Washer | 22 - Spring Washer | 32 - O-Ring (2 Used) |
| 2 - Pin | 13 - Bolt | 23 - Washer | 33 - Washer |
| 3 - Pin | 14 - Lift Arm | 24 - Pin (2 Used) | 34 - Spring Washer |
| 4 - Washer | 15 - Spacer (2 Used) | 25 - Spacer (2 Used) | 35 - Bolt (2 Used) |
| 5 - Spring Washer | 16 - Bolt | 26 - Pin | 36 - Pin (2 Used) |
| 6 - Bolt (2 Used) | 17 - Spring Washer | 27 - Spacer (2 Used) | 37 - Bolt |
| 7 - Pin | 18 - Washer | 28 - Bucket Link | 38 - Spring Washer |
| 8 - Spacer (2 Used) | 19 - Pin | 29 - Spacer (2 Used) | 39 - Washer |
| 9 - Bell Crank | 20 - Lift Arm Cylinder (2 Used) | 30 - O-Ring (2 Used) | 40 - Pin |
| 10 - Pin | 21 - Bolt | 31 - Spacer (2 Used) | 41 - Bucket |
| 11 - Washer | | | |

FRONT ATTACHMENT / Front Attachment

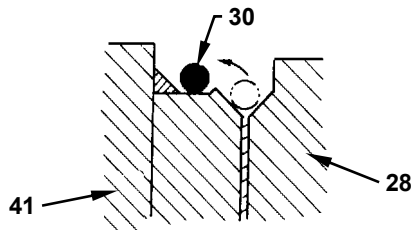
Removal

CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.


1. Operate the bucket control lever and the lift arm control lever. Release the remaining pressure in bucket cylinder (1) and lift arm cylinder (20).



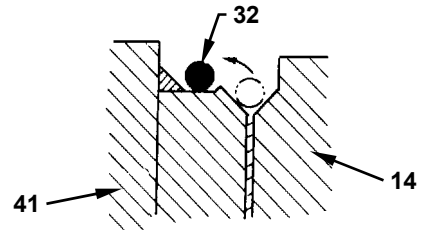
2. Move O-rings (30) (2 used) of the bucket (41) and bucket link (28) connection part to the bucket (41) side.




3. Remove bolt (37), washer (39) and spring washer (38) from bucket (41). Remove pin (40) from bucket (41). Remove spacers (29) (2 used) from bucket link (28).

 : 17 mm

4. Move O-rings (32) (4 used) of the bucket (41) and lift arm (14) connection part to the bucket (41) side.

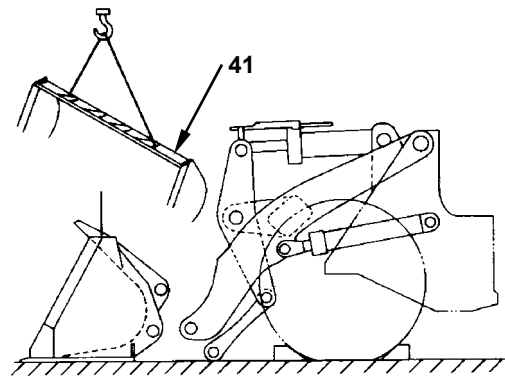


5. Remove bolts (35) (2 used), washers (33) (2 used) and spring washers (34) (2 used) from bucket (41). Remove pins (36) (2 used) from bucket (41). Remove spacers (31) (4 used) from lift arm (14).

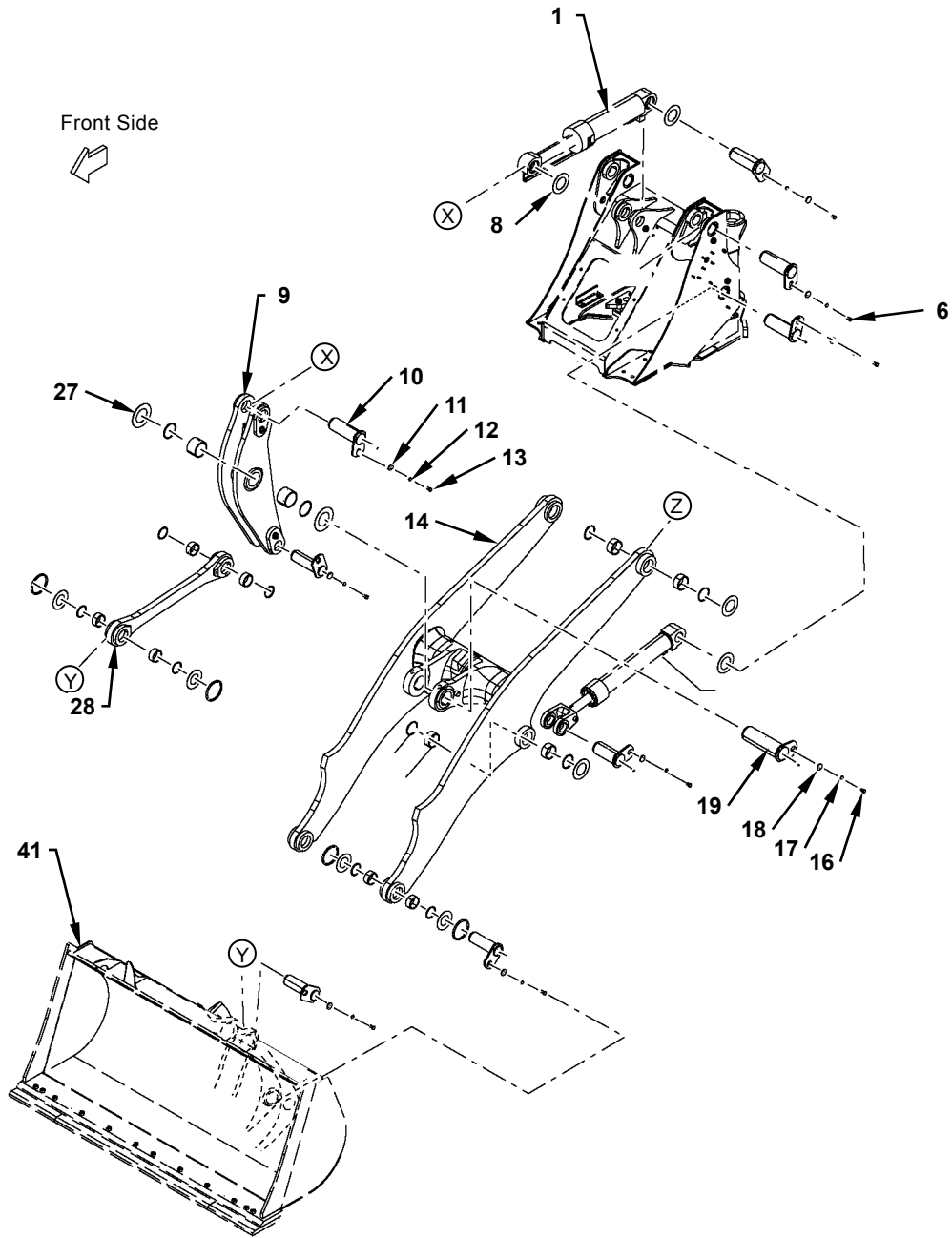
 : 17 mm

CAUTION: Bucket (41) weight (3 m³ bolt-on cutting edge): 1380 kg (3050 lb)

6. Attach a wire rope onto the spill guard of bucket (41). Hold bucket (41).



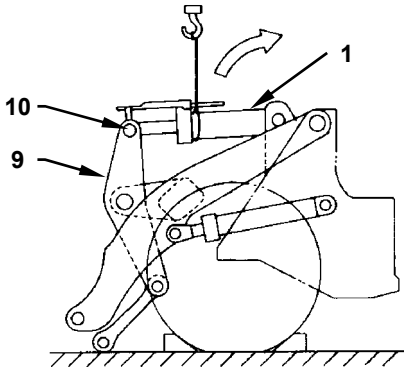
FRONT ATTACHMENT / Front Attachment




W4GB-04-01-001

FRONT ATTACHMENT / Front Attachment

- Remove bucket (41) from lift arm (14).
- Attach a nylon sling onto bucket cylinder (1). Hold bucket cylinder (1).



- Remove bolt (13), washer (11) and spring washer (12) from bell crank (9). Remove pin (10) from bell crank (9). Remove spacers (8) (2 used) from bucket cylinder (1).

 : 24 mm

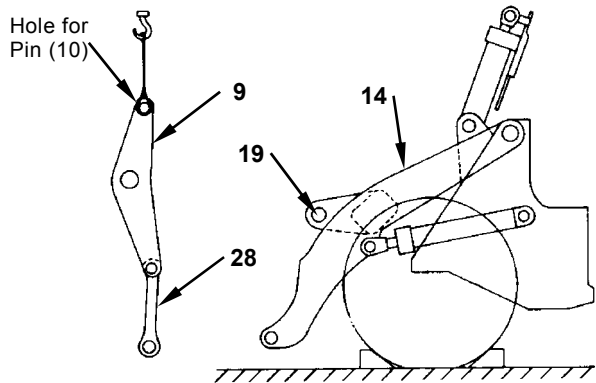
- Lay down bucket cylinder (1) to the cab side.




CAUTION: Bell crank (9) weight: 240 kg (530 lb)

Bucket link (28) weight: 55 kg (125 lb)

- Install pin (10) to the pin (10) hole on bell crank (9). Attach a nylon sling onto pin (10). Hold bell crank (9).

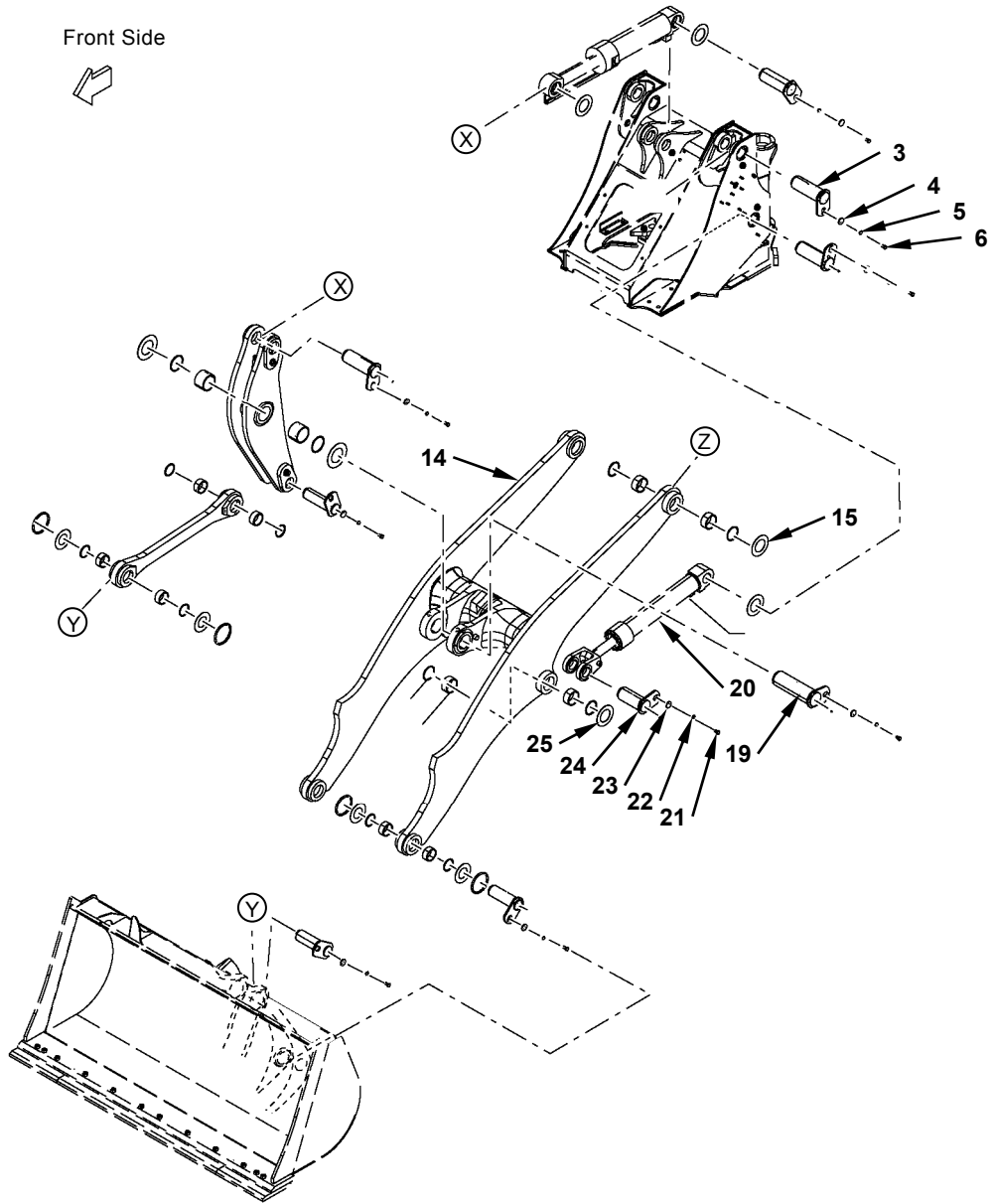


- Remove bolt (16), washer (18) and spring washer (17) from lift arm (14). Remove pin (19) from bell crank (9). Remove spacers (27) (2 used) from bell crank (9).

 : 24 mm

- Remove bell crank (9) and bucket link (28) from lift arm (14).

FRONT ATTACHMENT / Front Attachment



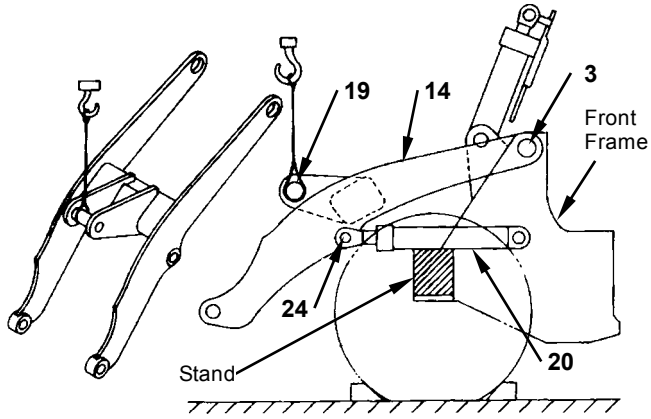
W4GB-04-01-001

FRONT ATTACHMENT / Front Attachment




CAUTION: Lift arm (14) weight: 1150 kg (2550 lb)

14. Start and stop the engine. Install pin (19) to the pin (19) hole on lift arm (14). Attach a nylon sling onto pin (19). Hold lift arm (14).



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18. Remove bolts (6) (2 used), washers (4) (2 used) and spring washers (5) (2 used) from the front frame. Remove pins (3) (2 used) from lift arm (14). Remove spacers (15) (4 used) from lift arm (14).


 : 24 mm

19. Attach a nylon sling onto lift arm (14). Hold lift arm (14). Remove lift arm (14) from the front frame.

15. Raise lift arm (14) until lift arm cylinder (20) is located at horizontal position.

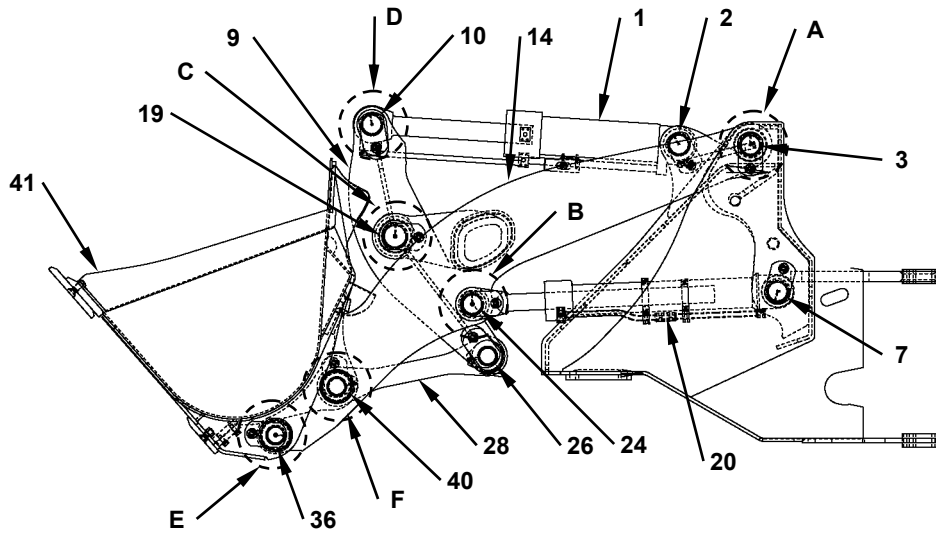
16. Place a stand under lift arm cylinders (20) (2 used).

17. Remove bolts (21) (2 used), washers (23) (2 used) and spring washers (22) (2 used) from lift arm cylinder (20). Remove pins (24) (2 used) from lift arm (14). Remove spacers (25) (4 used) from lift arm (14).

 : 24 mm

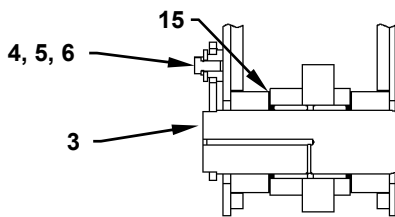
FRONT ATTACHMENT / Front Attachment

Installation



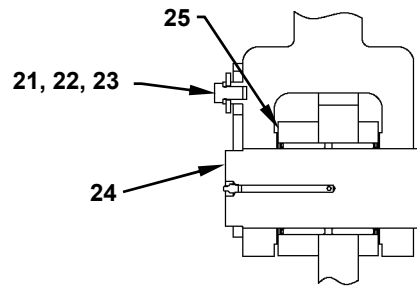
W4GB-04-01-008

Section A



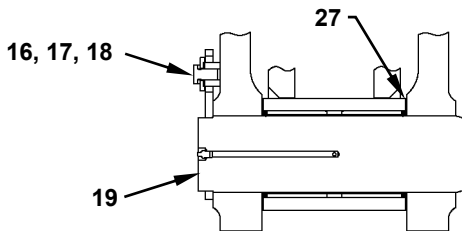
W4GB-04-01-009

Section B



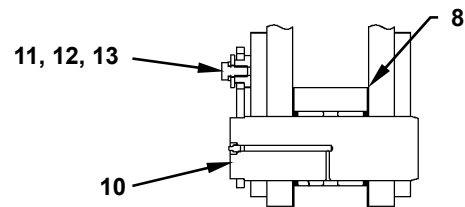
W4GB-04-01-010

Section C



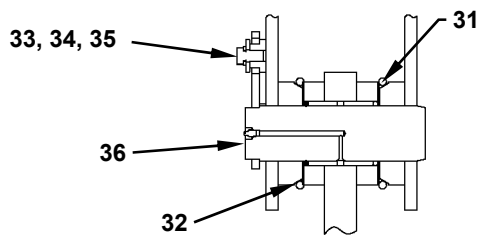
W4GB-04-01-011

Section D



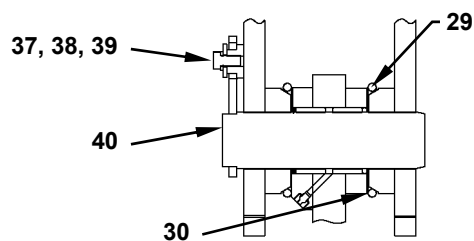
W4GB-04-01-012

Section E



W4GB-04-01-013

Section F



W4GB-04-01-014

- | | | | |
|---------------------|---------------------------------|----------------------|----------------------|
| 1 - Bucket Cylinder | 12 - Spring Washer | 22 - Spring Washer | 32 - O-Ring (2 Used) |
| 2 - Pin | 13 - Bolt | 23 - Washer | 33 - Washer |
| 3 - Pin | 14 - Lift Arm | 24 - Pin (2 Used) | 34 - Spring Washer |
| 4 - Washer | 15 - Spacer (2 Used) | 25 - Spacer (2 Used) | 35 - Bolt (2 Used) |
| 5 - Spring Washer | 16 - Bolt | 26 - Pin | 36 - Pin (2 Used) |
| 6 - Bolt (2 Used) | 17 - Spring Washer | 27 - Spacer (2 Used) | 37 - Bolt |
| 7 - Pin | 18 - Washer | 28 - Bucket Link | 38 - Spring Washer |
| 8 - Spacer (2 Used) | 19 - Pin | 29 - Spacer (2 Used) | 39 - Washer |
| 9 - Bell Crank | 20 - Lift Arm Cylinder (2 Used) | 30 - O-Ring (2 Used) | 40 - Pin |
| 10 - Pin | 21 - Bolt | 31 - Spacer (2 Used) | 41 - Bucket |
| 11 - Washer | | | |

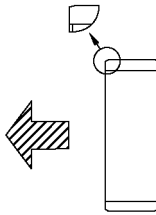
FRONT ATTACHMENT / Front Attachment

CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

IMPORTANT: Check for the outer and inner diameters, wear and damage of all pins and bushings before installation. If any damage is found, replace the parts. (Refer to OPERATIONAL PERFORMANCE TEST.)

IMPORTANT: When installing the pin, apply grease onto the inside of the bushing and the dust seal. Apply the rust-inhibiting oil onto the inside of the boss.

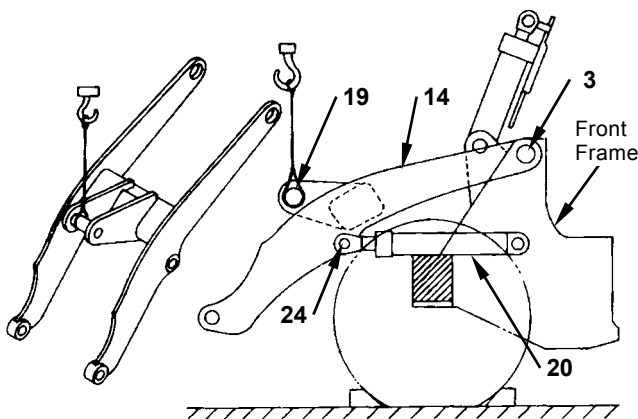
IMPORTANT: Install the bushing as illustrated below.



W4GB-04-01-018


CAUTION: Lift arm (14) weight: 1150 kg (2550 lb)


1. Hoist and align pin (19) in lift arm (14) with the pin (3) hole on the front frame.



W4GB-04-01-007


2. Install spacers (15) (4 used) to the pin (3) hole on lift arm (14). Install pins (3) (2 used) to the front frame with spring washers (5) (2 used), washers (4) (2 used) and bolts (6) (2 used).


 : 24 mm

 : 87 N·m (8.9 kgf·m, 64 lbf·ft)

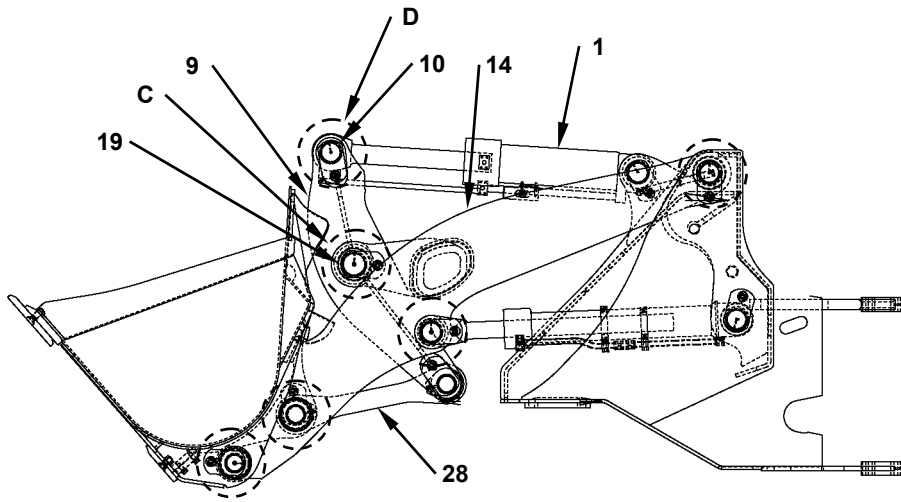
3. Hoist lift arm (14). Align the pin (24) holes on lift arm (14) and lift arm cylinder (20).

4. Install spacers (25) (4 used) to the pin (24) holes (2 used) on lift arm (14). Install pins (24) (2 used) to lift arm cylinder (20) with spring washers (22) (2 used), washers (23) (2 used) and bolts (21) (2 used).

 : 24 mm

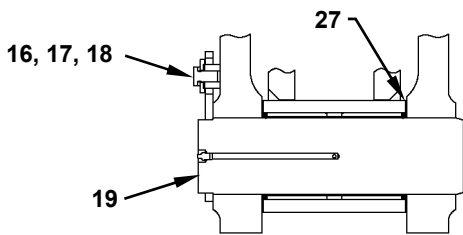
 : 87 N·m (8.9 kgf·m, 64 lbf·ft)

FRONT ATTACHMENT / Front Attachment

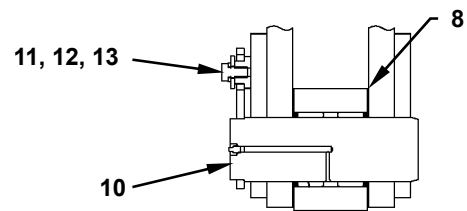


W4GB-04-01-008

Section C



Section D



W4GB-04-01-011

W4GB-04-01-012

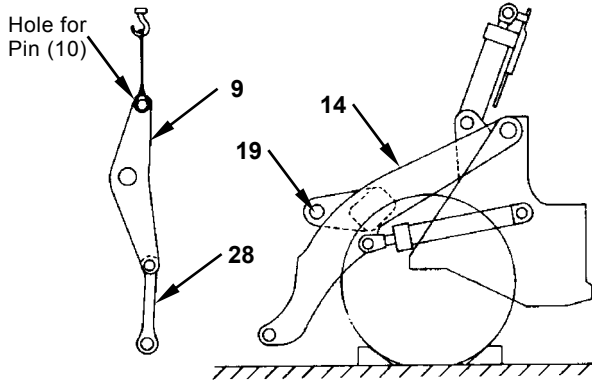
FRONT ATTACHMENT / Front Attachment



CAUTION: Bell crank (9) weight: 240 kg (530 lb)


Bucket link (28) weight: 55 kg (125 lb)


5. Hoist pin (10) in bell crank (9). Align the pin (19) holes on bell crank (9) and lift arm (14).



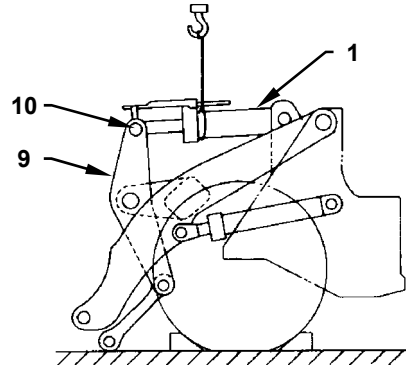
W4GB-04-01-006

6. Install spacers (27) (2 used) to the pin (19) hole on bell crank (9). Install pin (19) to lift arm (14) with spring washer (17), washer (18) and bolt (16).

 : 24 mm


 : 87 N·m (8.9 kgf·m, 64 lbf·ft)


7. Hoist bucket cylinder (1). Align the pin (10) holes on bucket cylinder (1) and bell crank (9).



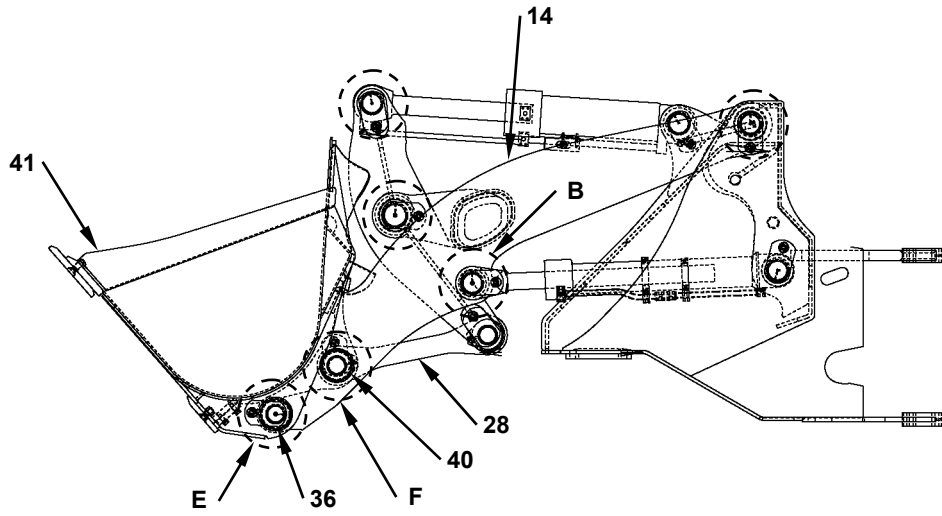
W4GB-04-01-005

8. Install spacers (8) (2 used) to the pin (10) hole on bucket cylinder (1). Install pin (10) to bell crank (9) with spring washer (12), washer (11) and bolt (13).

 : 24 mm

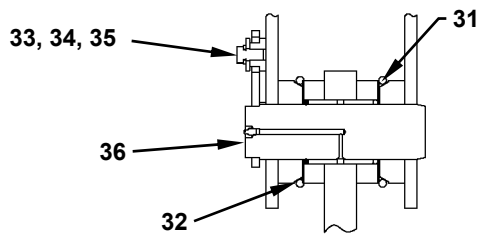
 : 87 N·m (8.9 kgf·m, 64 lbf·ft)

FRONT ATTACHMENT / Front Attachment



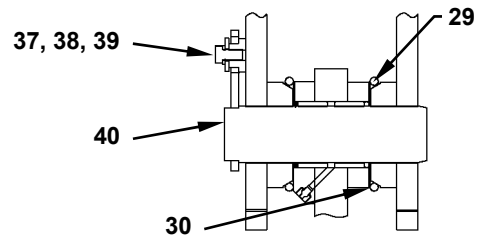
W4GB-04-01-008

Section E



W4GB-04-01-013

Section F



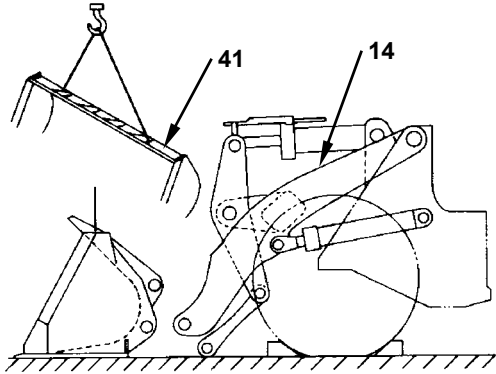
W4GB-04-01-014

FRONT ATTACHMENT / Front Attachment

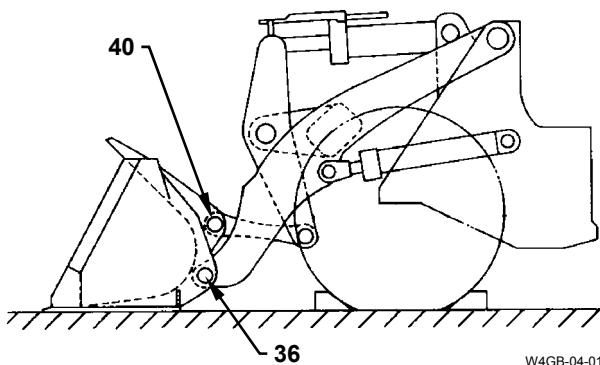


CAUTION: Bucket (41) weight (3 m³ bolt-on cutting edge): 1380 kg (3050 lb)

9. Hoist bucket (41). Align the pin (36) holes on bucket (41) and lift arm (14).





W4GB-04-01-004



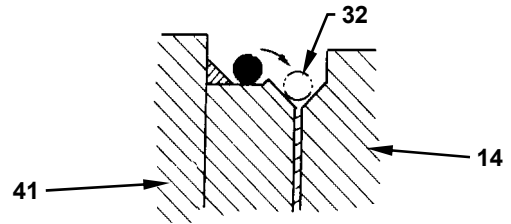
W4GB-04-01-003

10. Install spacers (31) (4 used) to the pin (36) holes (2 used) on lift arm (14). Install pins (36) (2 used) to bucket (41) with spring washers (34) (2 used), washers (33) (2 used) and bolts (35) (2 used).

 : 17 mm


 : 91 N·m (9.3 kgf·m, 67 lbf·ft)


11. Move O-rings (32) (4 used) which were moved to the bucket (41) side to the bucket (41) and lift arm (14) connection part.



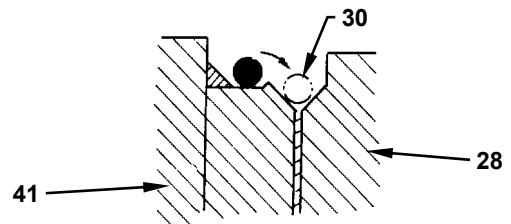
W183-04-01-004

12. Install spacers (29) (2 used) to the pin (40) hole on bucket link (28). Install pin (40) to bucket (41) with spring washer (38), washer (39) and bolt (37).

 : 17 mm

 : 91 N·m (9.3 kgf·m, 67 lbf·ft)

13. Move O-rings (30) (2 used) which were moved to the bucket (41) side to the bucket (41) and bucket link (28) connection part.



W183-04-01-004

14. Apply grease through the grease fitting. Connect the remote pipe, the harness and install the switch to the grease fitting.

FRONT ATTACHMENT / Front Attachment

(Blank)

FRONT ATTACHMENT / Cylinder

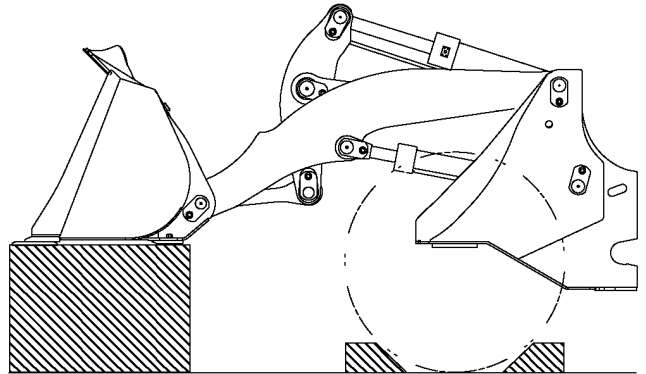
REMOVAL AND INSTALLATION OF CYLINDER



CAUTION: Bleed air from the hydraulic oil tank before doing any work. (Refer to **BLEED AIR FROM HYDRAULIC OIL TANK** on W1-4-1.)

Preparation

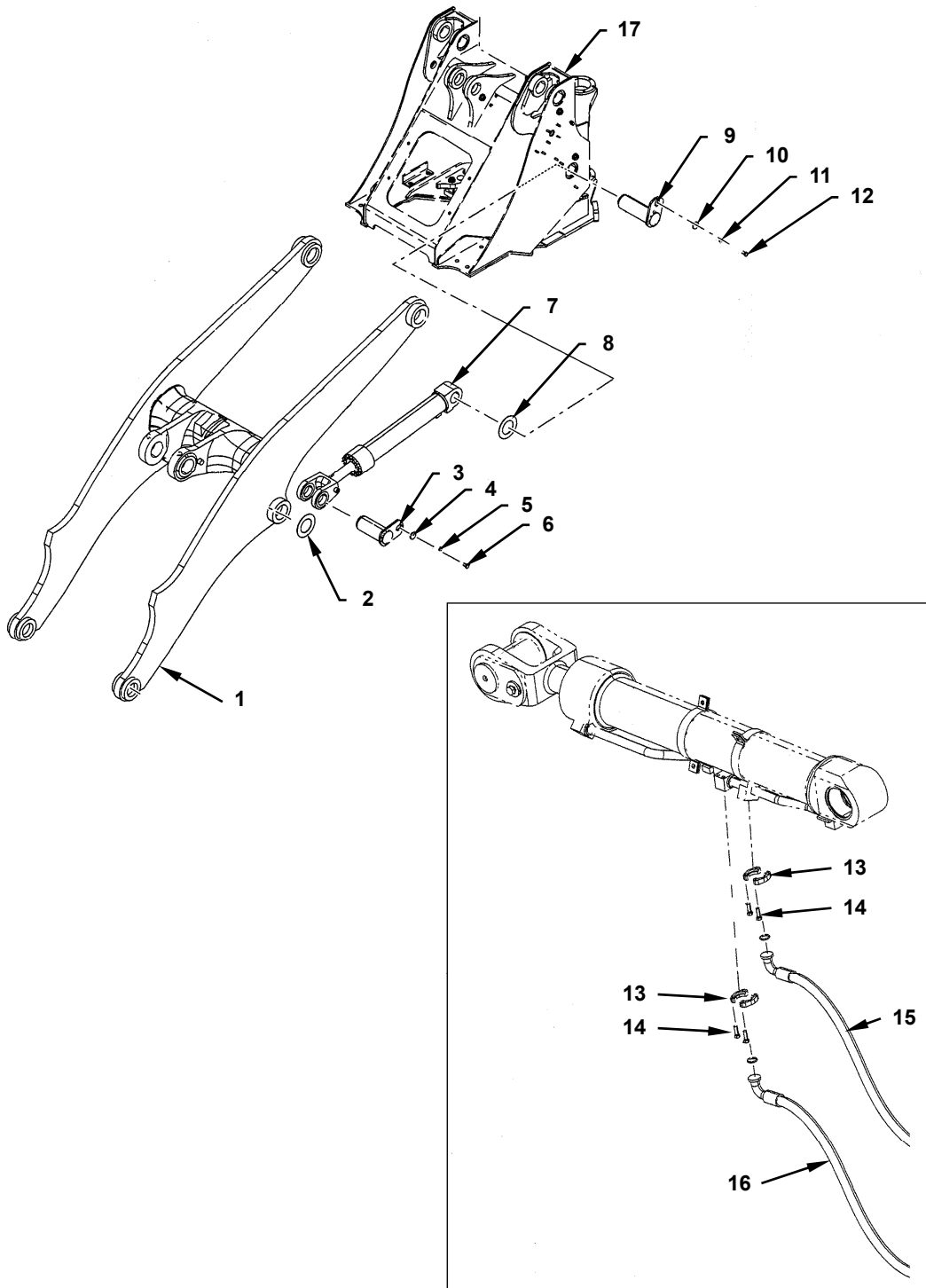
1. Park the machine on a solid and level surface. Place the bucket on a stand of 500 to 800 mm (19.7 to 31.5 in) height.
2. Place the blocks in front of and behind the axle in order to secure the machine.



W4GB-04-02-032

FRONT ATTACHMENT / Cylinder

Lift Cylinder






- | | | | |
|----------------------------|----------------------------|-----------------------------|---------------------|
| 1 - Lift Arm | 6 - Bolt (2 Used) | 10 - Washer (2 Used) | 14 - Bolt (16 Used) |
| 2 - Spacer (4 Used) | 7 - Lift Cylinder (2 Used) | 11 - Spring Washer (2 Used) | 15 - Hose (2 Used) |
| 3 - Pin (2 Used) | 8 - Spacer (4 Used) | 12 - Bolt (2 Used) | 16 - Hose (2 Used) |
| 4 - Washer (2 Used) | 9 - Pin (2 Used) | 13 - Split Flange (8 Used) | 17 - Front Frame |
| 5 - Spring Washer (2 Used) | | | |

W4GB-04-02-031

FRONT ATTACHMENT / Cylinder







Removal of Lift Cylinder

 **CAUTION: Lift cylinder (7) weight: 140 kg (310 lb)**

1. Attach a nylon sling onto lift cylinders (7) (2 used). Hold lift cylinders (7) (2 used).
2. Remove bolts (14) (16 used) from split flanges (13) (8 used). Remove split flanges (13) (8 used) from lift cylinders (7) (2 used). Disconnect hoses (15, 16) (2 used for each) from lift cylinders (7) (2 used). Cap the open ends.
 : 14 mm
3. Remove bolts (6) (2 used), spring washers (5) (2 used) and washers (4) (2 used) from pins (3) (2 used).
 : 24 mm
4. Remove pins (3) (2 used) from lift cylinders (7) (2 used).
5. Remove bolts (12) (2 used), spring washers (11) (2 used) and washers (10) (2 used) from pins (9) (2 used).
 : 24 mm
6. Remove pins (9) (2 used) from front frame (17).
7. Remove lift cylinders (7) (2 used) and spacers (2, 8) (4 used for each) from lift arm (1) and front frame (17).

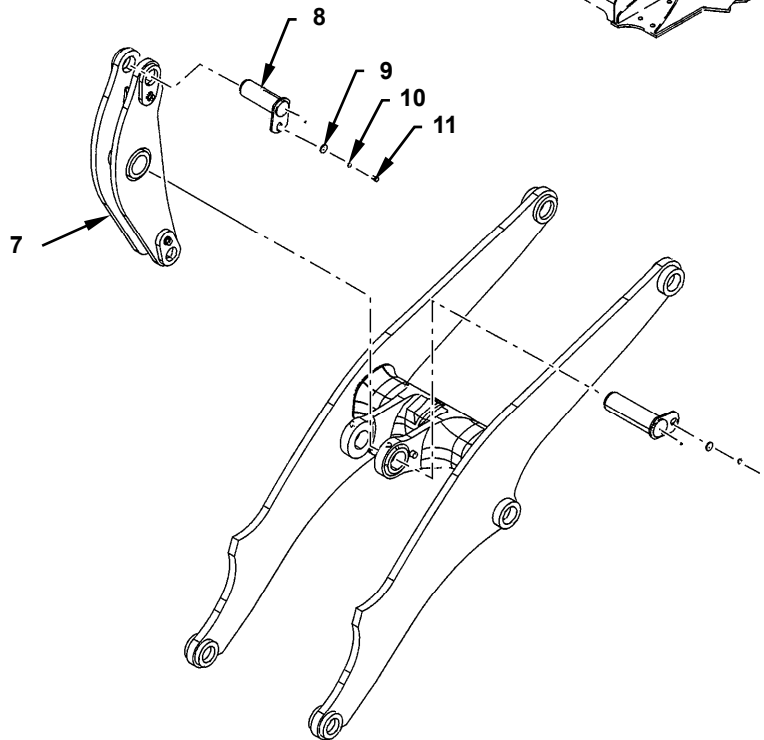
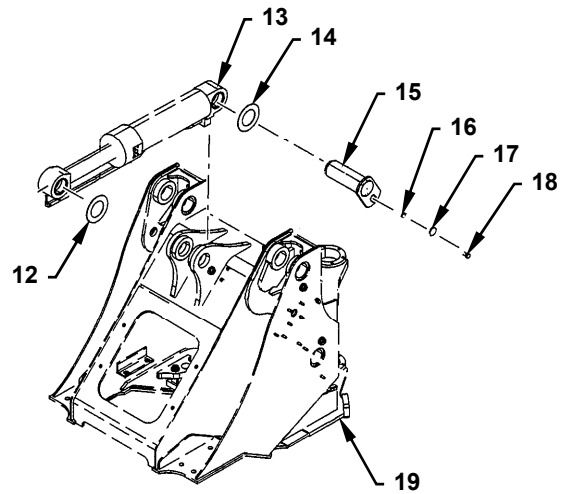
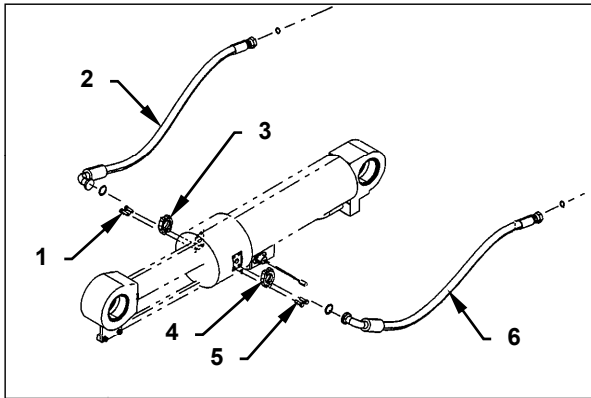
Installation of Lift Cylinder

 **CAUTION: Lift cylinder (7) weight: 140 kg (310 lb)**

1. Attach a nylon sling onto lift cylinders (7) (2 used). Hold lift cylinders (7) (2 used).
2. Align the pin (9) (2 used) holes on the bottom side and on the front frame (17) side of lift cylinders (7) (2 used). Install spacers (8) (4 used) to the bottom side of lift cylinders (7) (2 used).
3. Install pins (9) (2 used) to front frame (17) with washers (10) (2 used), spring washers (11) (2 used) and bolts (12) (2 used).
 : 24 mm
 : 87 N·m (8.9 kgf·m, 64 lbf·ft)
4. Connect hoses (15, 16) (2 used for each) to lift cylinders (7) (2 used) with split flanges (13) (8 used) and bolts (14) (16 used).
 : 14 mm
 : 52 N·m (5.3 kgf·m, 38 lbf·ft)
5. Start the engine. Extend the piston rod of lift cylinders (7) (2 used). Align the pin (3) holes on lift cylinders (7) (2 used) and lift arm (1). Install spacers (2) (4 used) to the rod side of lift cylinders (7) (2 used).
6. Install pins (3) (2 used) to lift cylinders (7) (2 used) with washers (4) (2 used), spring washers (5) (2 used) and bolts (6) (2 used).
 : 24 mm
 : 87 N·m (8.9 kgf·m, 64 lbf·ft)

FRONT ATTACHMENT / Cylinder

Bucket Cylinder



W4GB-04-02-034




- | | | | |
|---------------------------|--------------------|----------------------|--------------------|
| 1 - Bolt (4 Used) | 6 - Hose | 11 - Bolt | 16 - Washer |
| 2 - Hose | 7 - Bell Crank | 12 - Spacer (2 Used) | 17 - Spring Washer |
| 3 - Split Flange (2 Used) | 8 - Pin | 13 - Bucket Cylinder | 18 - Bolt |
| 4 - Split Flange (2 Used) | 9 - Washer | 14 - Spacer (2 Used) | 19 - Front Frame |
| 5 - Bolt (4 Used) | 10 - Spring Washer | 15 - Pin | |

FRONT ATTACHMENT / Cylinder

Removal of Bucket Cylinder









CAUTION: Bucket cylinder (13) weight: 140 kg (310 lb)

1. Attach a nylon sling onto bucket cylinder (13). Hold bucket cylinder (13).
2. Remove bolts (1, 5) (8 used) from split flanges (3, 4) (2 used for each). Remove split flanges (3, 4) (2 used for each) from bucket cylinder (13). Disconnect hoses (2, 6) from bucket cylinder (13). Cap the open ends.
 : 14 mm
3. Remove bolt (11), spring washer (10) and washer (9) from pin (8).
 : 24 mm
4. Remove pin (8) from bell crank (7).
5. Remove bolt (18), spring washer (17) and washer (16) from pin (15).
 : 24 mm
6. Remove pin (15) from front frame (19).
7. Remove bucket cylinder (13) and spacers (12, 14) (2 used for each) from bell crank (7) and front frame (19).

Installation of Bucket Cylinder

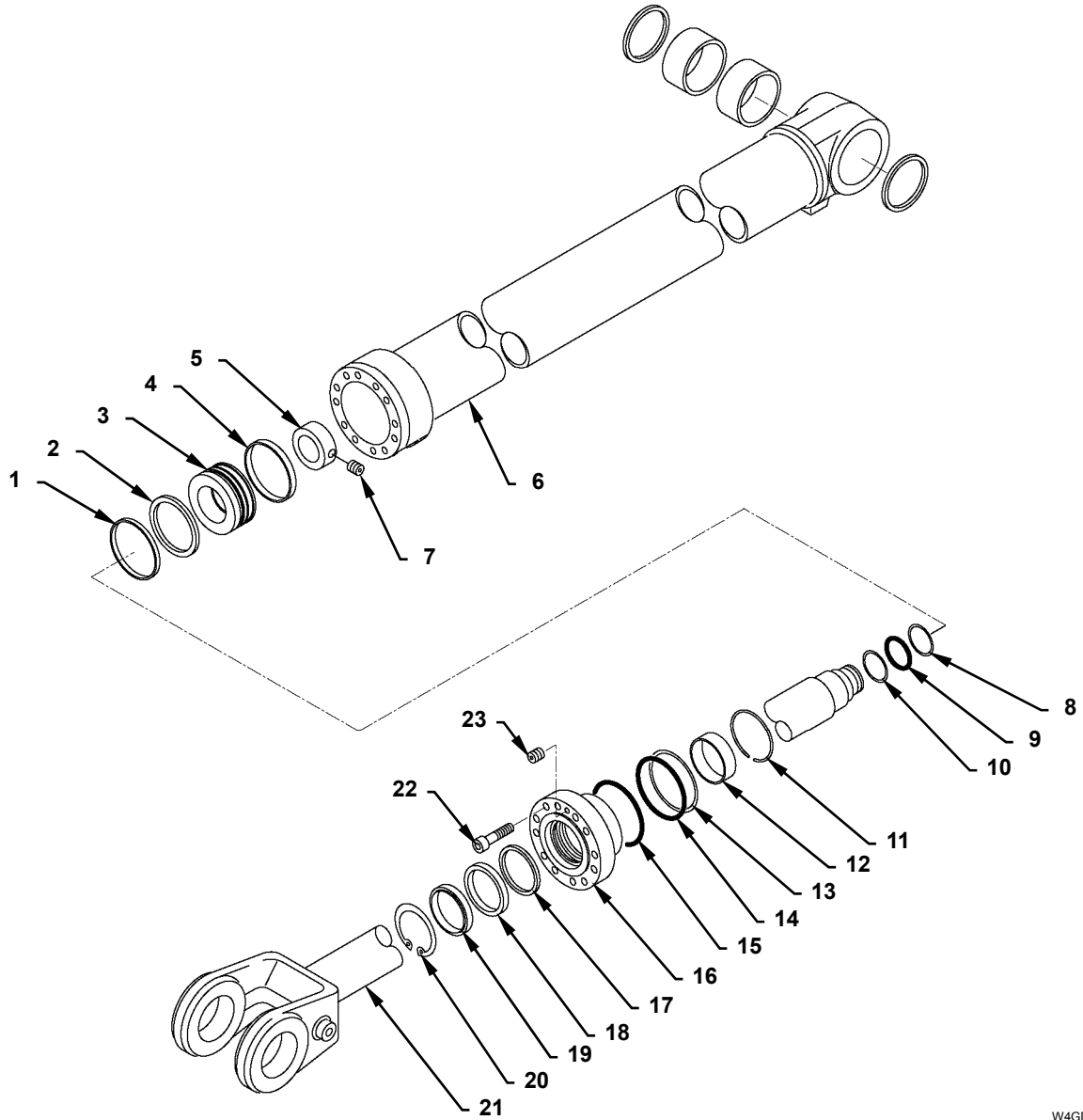


CAUTION: Bucket cylinder (13) weight: 140 kg (310 lb)

1. Attach a nylon sling onto bucket cylinder (13). Hold bucket cylinder (13).
2. Align the pin (15) holes on bucket cylinder (13) and front frame (19).
3. Align the pin (15) holes on the bottom side and the front frame (19) side of bucket cylinder (13). Install spacers (14) (2 used) to the bottom side of bucket cylinder (13).
4. Install pin (15) to front frame (19) with washer (16), spring washer (17) and bolt (18).
 : 24 mm
 : 87 N·m (8.9 kgf·m, 64 lbf·ft)
5. Connect hoses (2, 6) to bucket cylinder (13) with split flanges (3, 4) (2 used for each) and bolts (1, 5) (4 used for each).
 : 14 mm
 : 52 N·m (5.3 kgf·m, 38 lbf·ft)
6. Start the engine. Extend the piston rod of bucket cylinder (13). Align the pin (8) holes on bucket cylinder (13) and bell crank (7). Install spacers (12) (2 used) to the rod side of bucket cylinder (13).
7. Install pin (8) to bell crank (7) with washer (9), spring washer (10) and bolt (11).
 : 24 mm
 : 87 N·m (8.9 kgf·m, 64 lbf·ft)

FRONT ATTACHMENT / Cylinder

DISASSEMBLY OF LIFT CYLINDER



W4GD-04-02-003

- | | | | |
|-------------------|---------------------|------------------|----------------------------|
| 1 - Dust Ring | 7 - Set Screw | 13 - Backup Ring | 19 - Dust Seal |
| 2 - Packing | 8 - Backup Ring | 14 - O-Ring | 20 - Retaining Ring |
| 3 - Piston | 9 - O-Ring | 15 - O-Ring | 21 - Piston Rod |
| 4 - Wear Ring | 10 - Backup Ring | 16 - Rod Cover | 22 - Socket Bolt (12 Used) |
| 5 - Piston Nut | 11 - Retaining Ring | 17 - Buffer Seal | 23 - Set Screw |
| 6 - Cylinder Tube | 12 - Rod Bushing | 18 - U-Packing | |

FRONT ATTACHMENT / Cylinder

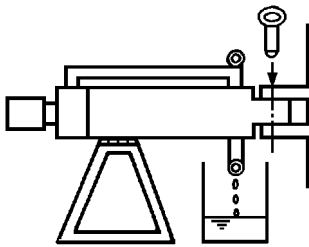
Disassembly of Lift Cylinder

- The disassembling procedure starts on the premise that the hydraulic piping and the bands securing the piping have been removed.




CAUTION: Lift cylinder weight: 140 kg (310 lb)

1. Hoist and place the cylinder on a workbench horizontally. Drain hydraulic oil from the cylinder.




W102-04-02-027

2. Remove socket bolts (22) (12 used) from rod cover (16).

 : 12 mm

3. Tighten set screw (23) installed to the flange part of rod cover (16) and make clearance between the mating surfaces.


Remove rod cover (16) from cylinder tube (6) by using a screwdriver.

 : 6 mm

4. Remove the piston rod (21) assembly from cylinder tube (6).

IMPORTANT: Loosen set screw (7) after cutting the crimped part (2 places) by using a hand drill.

5. Secure piston rod (21) horizontally. Remove set screw (7) from piston nut (5).

 : 4 mm

6. Remove piston nut (5) from piston rod (21) by using a special tool.

 **NOTE:** As for the special tool, refer to W3-9-20.

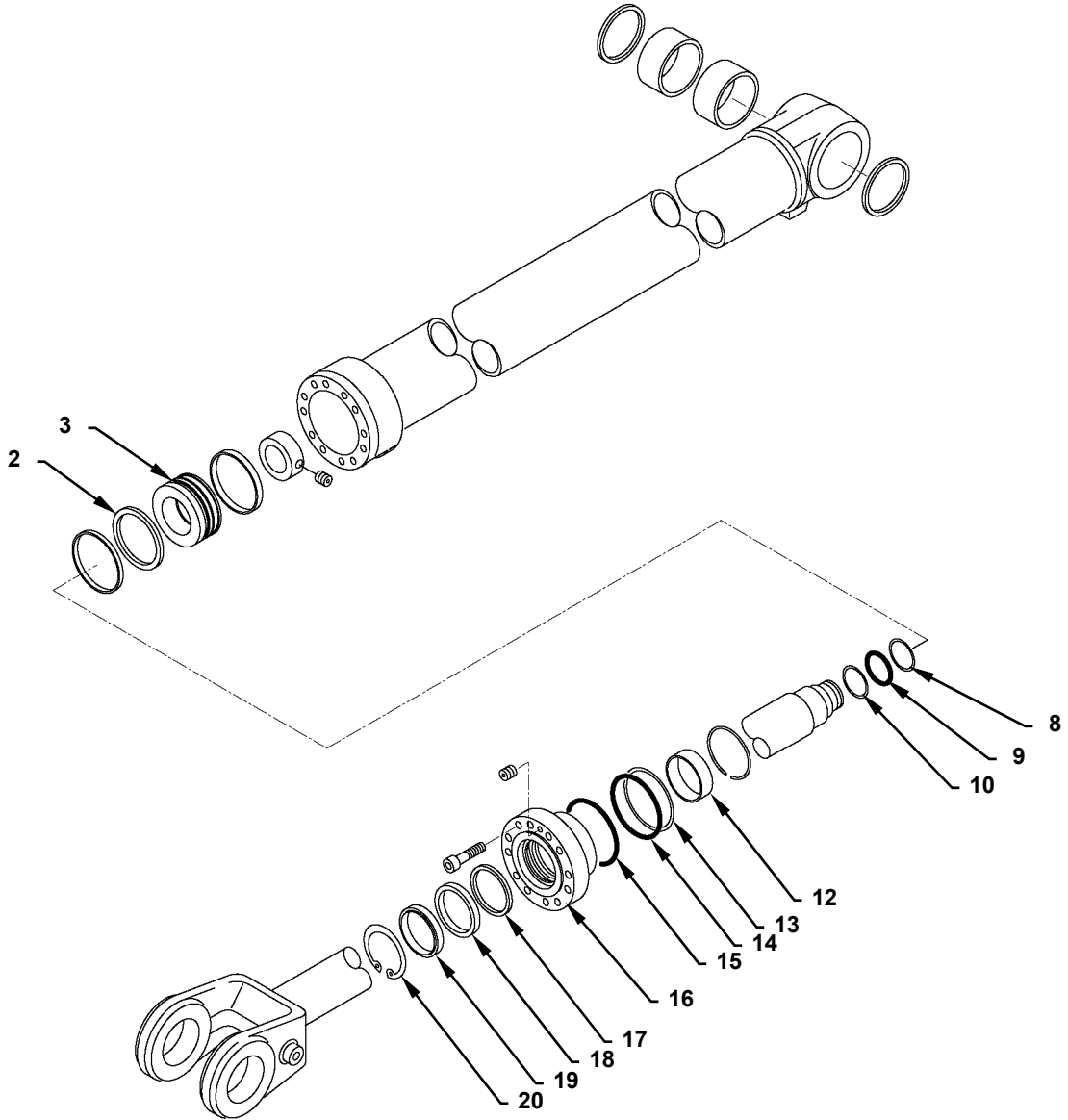
7. Install a bolt (M10, Pitch 1.5 mm) to the piston (3) end (2 places). Remove piston (3) from piston rod (21) by using a special tool.

 **NOTE:** As for the special tool, refer to W3-9-20.

8. Remove rod cover (16) from piston rod (21).

9. Remove wear ring (4) and dust ring (1) from piston (3).

FRONT ATTACHMENT / Cylinder

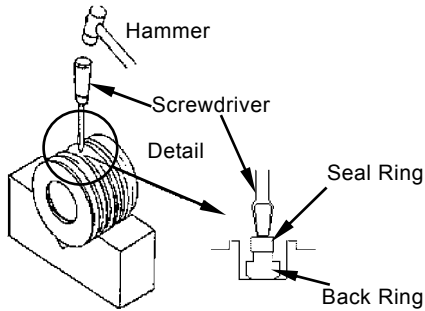


W4GD-04-02-003

FRONT ATTACHMENT / Cylinder

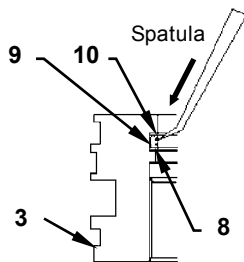
IMPORTANT: Do not damage the seal groove by a cutting tool.

10. Place piston (3) on a V-shaped stable stand. Remove the backup rings at both sides of packing (2) from piston (3). Cut and remove the seal ring and the back ring in the center part of packing (2).



W4GB-04-02-004

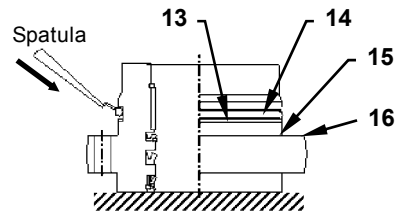
11. Remove O-ring (9) and backup rings (8, 10) from piston (3) by using a spatula.



W4GB-04-02-005

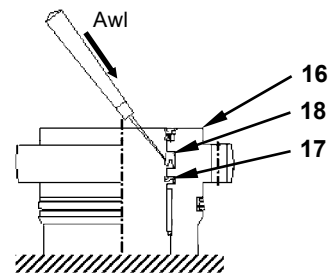
12. Place rod cover (16) on the workbench which is covered with an anti-skid waste cloth.

13. Remove O-rings (14, 15) and backup ring (13) from rod cover (16).



W4GB-04-02-006

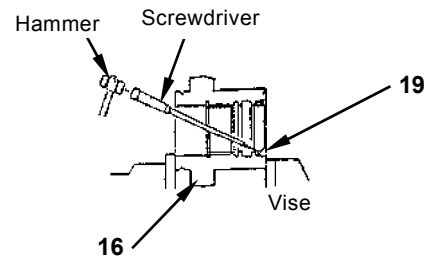
14. Remove U-packing (18) and buffer seal (17) from the inside of rod cover (16) by using an awl.



W4GB-04-02-007

15. Remove retaining ring (20) from rod cover (16).

16. Remove dust seal (19) from rod cover (16).



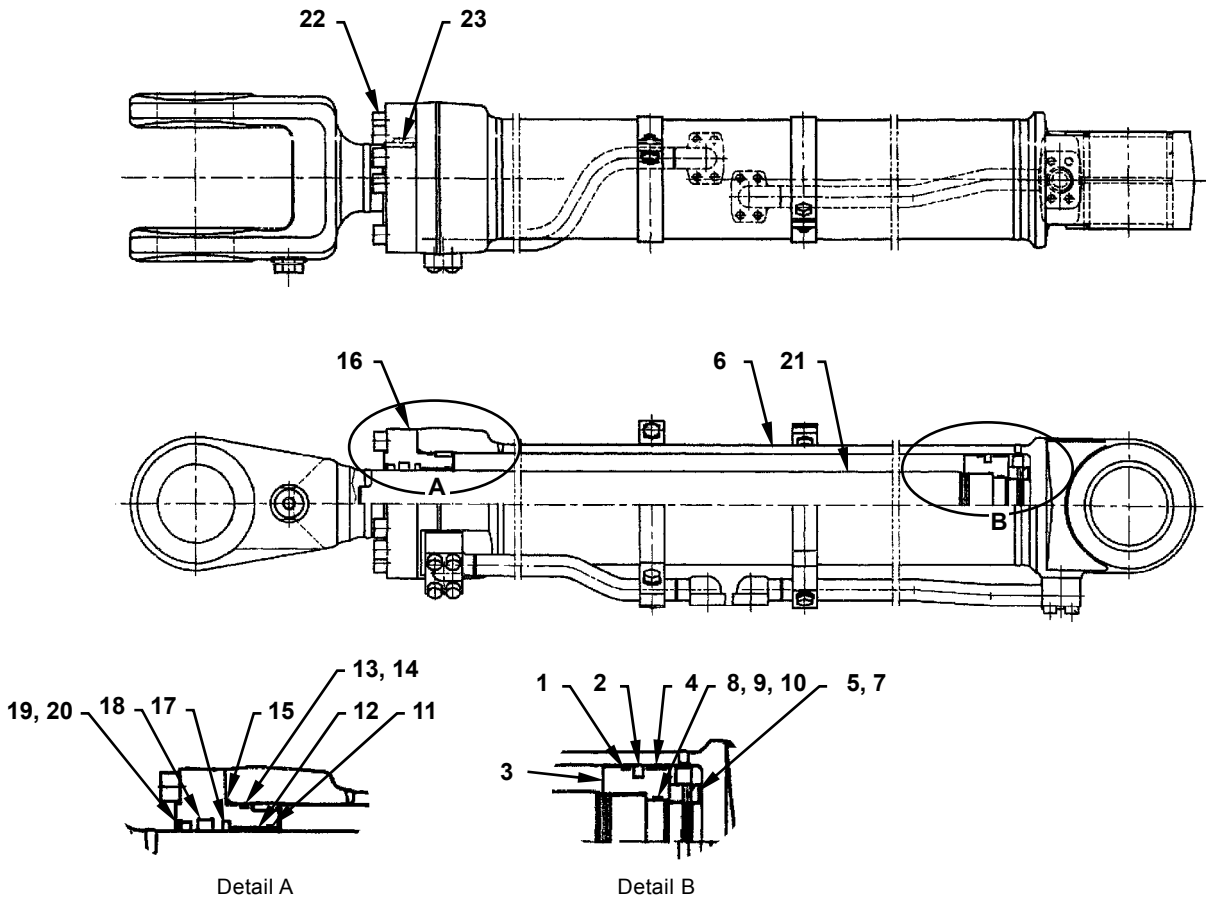
W4GB-04-02-009

IMPORTANT: Do not remove rod bushing (12) unless necessary.

17. Remove retaining ring (11) and rod bushing (12) from rod cover (16).

FRONT ATTACHMENT / Cylinder

ASSEMBLY OF LIFT CYLINDER




W4GD-04-02-004

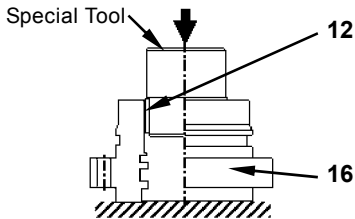
- | | | | |
|-------------------|---------------------|------------------|----------------------------|
| 1 - Dust Ring | 7 - Set Screw | 13 - Backup Ring | 19 - Dust Seal |
| 2 - Packing | 8 - Backup Ring | 14 - O-Ring | 20 - Retaining Ring |
| 3 - Piston | 9 - O-Ring | 15 - O-Ring | 21 - Piston Rod |
| 4 - Wear Ring | 10 - Backup Ring | 16 - Rod Cover | 22 - Socket Bolt (12 Used) |
| 5 - Piston Nut | 11 - Retaining Ring | 17 - Buffer Seal | 23 - Set Screw |
| 6 - Cylinder Tube | 12 - Rod Bushing | 18 - U-Packing | |

FRONT ATTACHMENT / Cylinder

Assembly of Lift Cylinder

1. Install rod bushing (12) to rod cover (16) by using a special tool and a press.

 **NOTE:** As for the special tool, refer to W3-9-22.



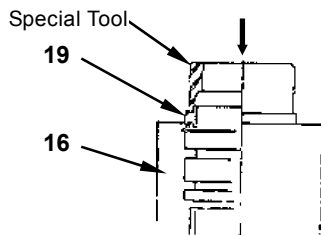
W4GB-04-02-012

2. Install retaining ring (11) to rod cover (16).

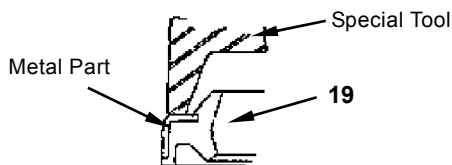
IMPORTANT: Keep a special tool evenly in contact with the metal part of the dust seal.

3. Install dust seal (19) to rod cover (16) by using the special tool and a hammer.

 **NOTE:** As for the special tool, refer to W3-9-23.



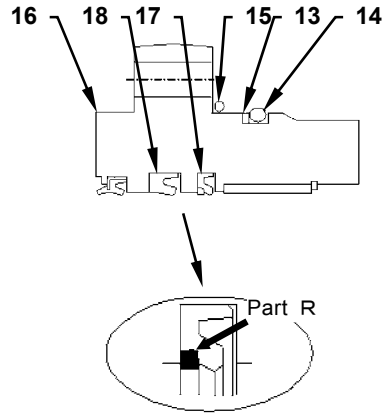
W4GB-04-02-013



W4GB-04-02-014

4. Install retaining ring (20) to rod cover (16).

5. Install U-packing (18) and buffer seal (17) to rod cover (16).



W4GB-04-02-016

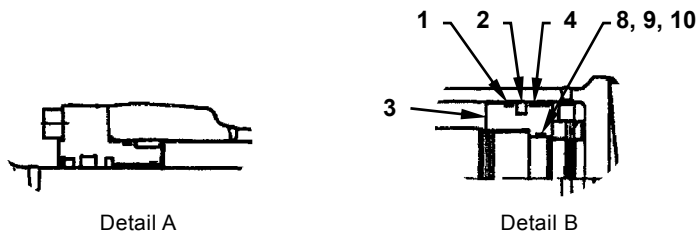
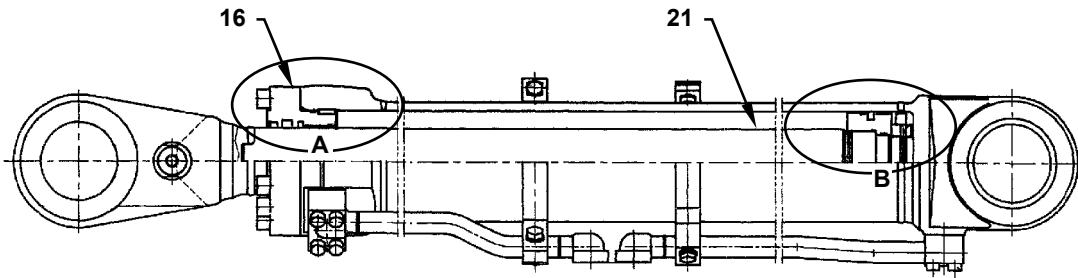
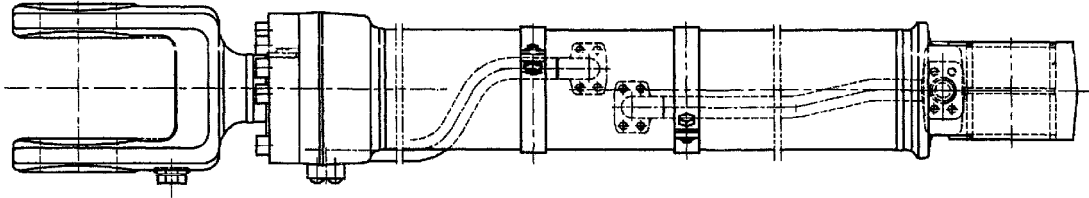
Detailed Mounting Direction of Backup Ring for Buffer Seal

W4GB-04-02-017

6. Install O-ring (14) and backup ring (13) to rod cover (16).

7. Install O-ring (15) to rod cover (16).


FRONT ATTACHMENT / Cylinder

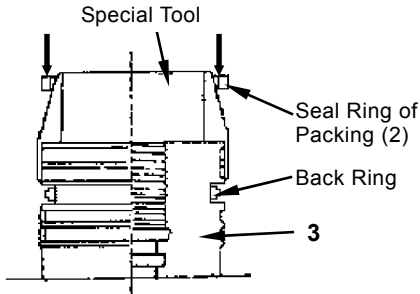


W4GD-04-02-004

FRONT ATTACHMENT / Cylinder

8. Install a special tool to piston (3). Install the back ring of packing (2) to piston (3).

 **NOTE:** As for the special tool, refer to W3-9-21.



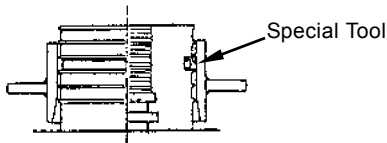
W4GB-04-02-018

IMPORTANT: Warm up the seal ring of packing (2) in the oil heated by an electric air heater. Avoid direct-heating by fire.

9. Warm up the seal ring of packing (2) to 150 to 180 °C (300 to 370 °F). Install the seal ring of packing (2) to the seal groove on piston (3).

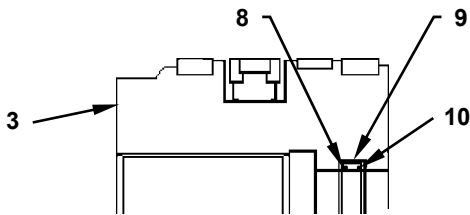
10. Adjust the extended seal ring of packing (2) by using a special tool.

 **NOTE:** As for the special tool, refer to W3-9-21.



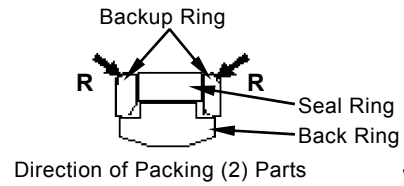
W4GB-04-02-019

11. Install O-ring (9) and backup rings (8, 10) to piston (3).



W4GD-04-02-005


12. Install the backup ring to both sides of the seal ring of packing (2).

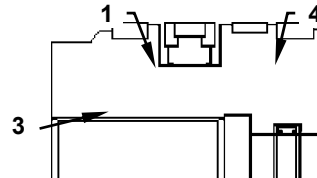


W4GB-04-02-020

13. Secure piston rod (21) on a workbench horizontally.


14. Install wear ring (4) and dust ring (1) to piston (3). Apply hydraulic oil onto piston (3).

 **NOTE:** Do not drop wear ring (4) and dust ring (1).

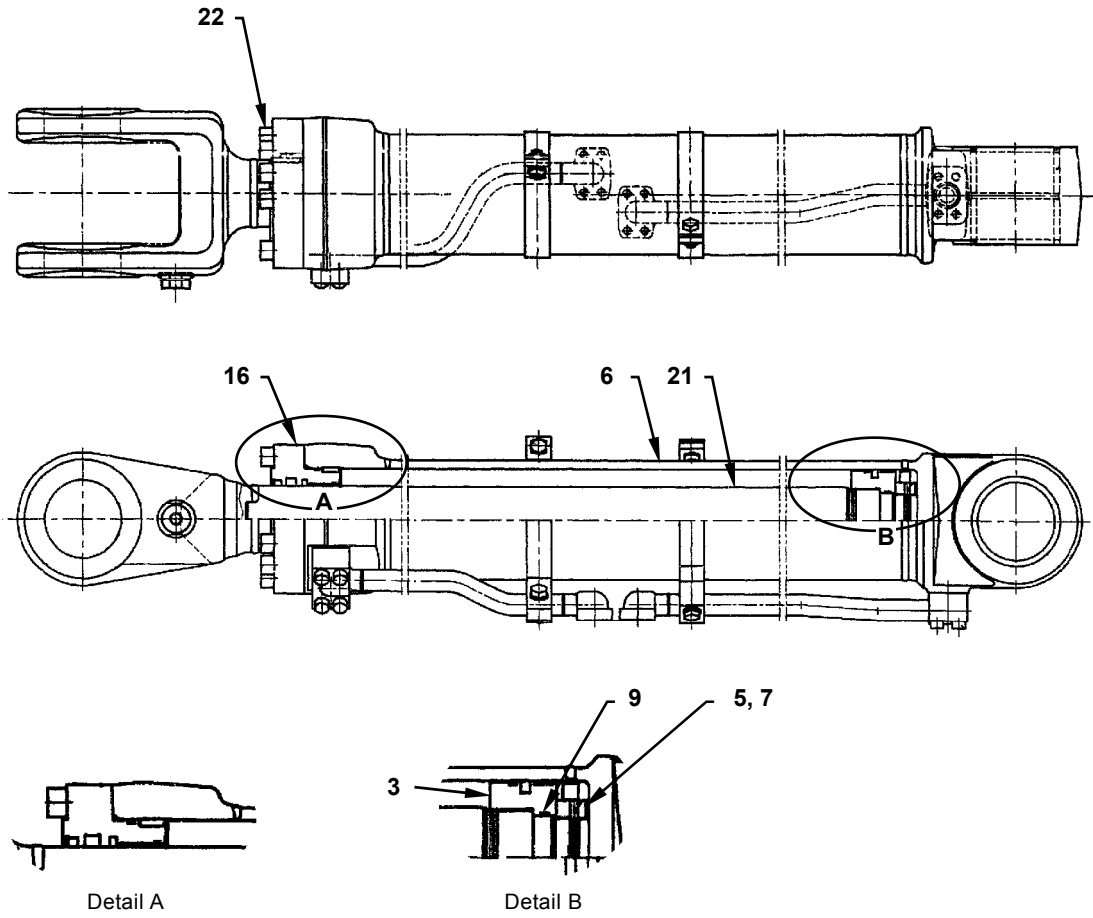


W4GD-04-02-005

15. Apply hydraulic oil onto a special tool and the piston rod (21) surface. Install rod cover (16) to piston rod (21) by using the special tool.

 **NOTE:** As for the special tool, refer to W3-9-23.


FRONT ATTACHMENT / Cylinder




W4GD-04-02-004


FRONT ATTACHMENT / Cylinder


16. Apply hydraulic oil onto O-ring (9) and the thread part of piston (3). Install a bolt (M10, Length 20 mm) to the screw hole on the piston (3) end. Install piston (3) to piston rod (21) by using a special tool.

 : 980±98 N·m
(100±10 kgf·m, 720±7.2 lbf·ft)



 *NOTE: As for the special tool, refer to W3-9-20.*

17. Apply hydraulic oil onto the thread part of piston nut (5). Install piston nut (5) to piston rod (21) by using a special tool.

 : 1860±186 N·m
(190±19 kgf·m, 1370±137 lbf·ft)



 *NOTE: As for the special tool, refer to W3-9-20.*

18. Apply LOCTITE #242 onto the thread part of set screw (7). Install set screw (7) to piston nut (5). Crimp set screw (7) by using a punch (2 places).

 : 4 mm
 : 15±1.5 N·m
(1.5±0.15 kgf·m, 11±1.1 lbf·ft)

19. Secure cylinder tube (6) in a vise horizontally. Insert piston rod (21) into cylinder tube (6).

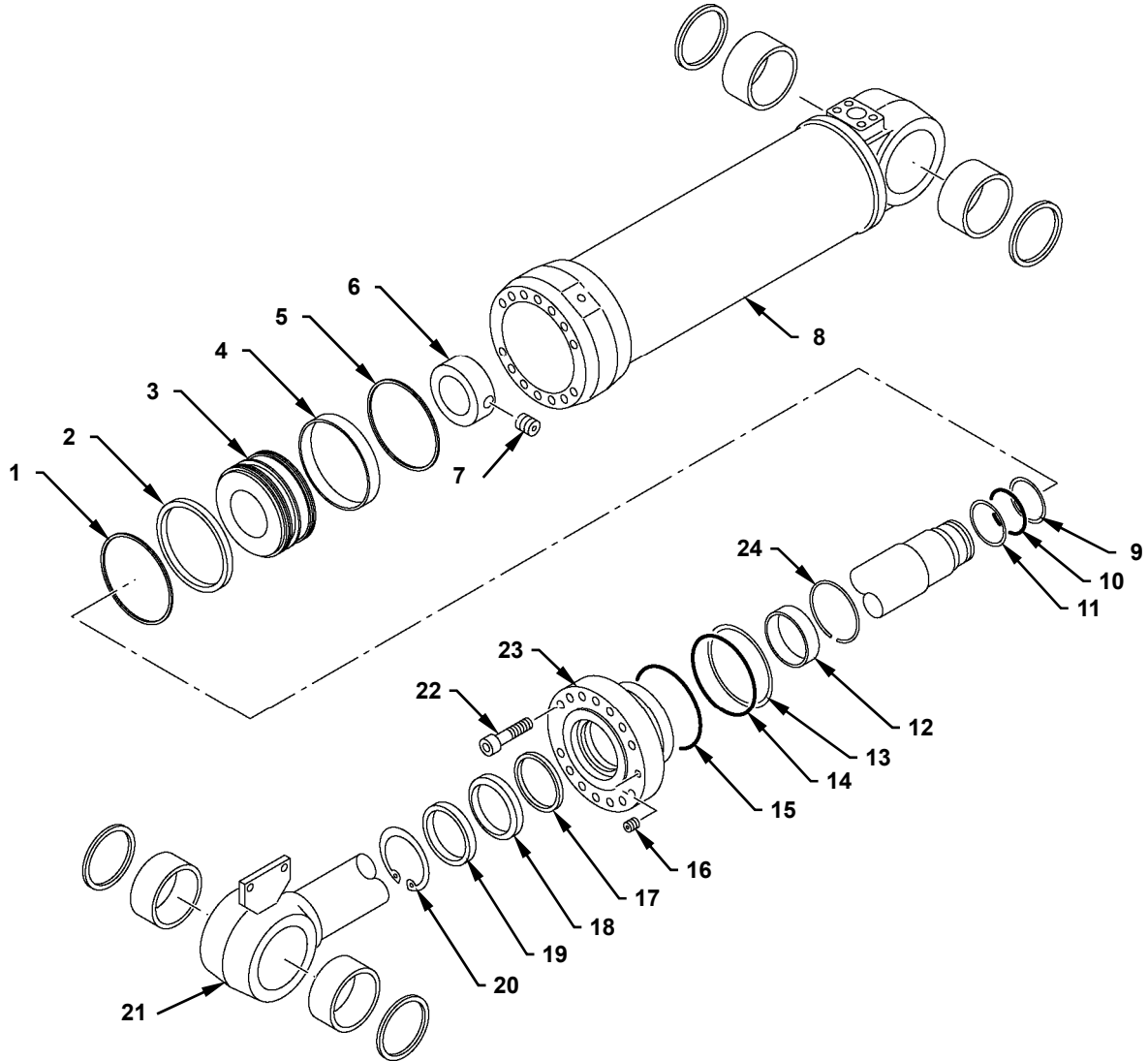
20. Apply LOCTITE #242 onto the thread part of socket bolts (22) (12 used). Install rod cover (16) to cylinder tube (6) with socket bolts (22) (12 used).

 : 12 mm
 : 225 to 235 N·m
(23 to 24 kgf·m, 166 to 175 lbf·ft)

21. Add the low-pressure air to the port in the piston rod (21) side of cylinder tube (6). Retract piston rod (21).

FRONT ATTACHMENT / Cylinder

DISASSEMBLY OF BUCKET CYLINDER



W4GD-04-02-001

- | | | | |
|----------------|-------------------|------------------|----------------------------|
| 1 - O-Ring | 7 - Set Screw | 13 - Backup Ring | 19 - Dust Seal |
| 2 - Packing | 8 - Cylinder Tube | 14 - O-Ring | 20 - Retaining Ring |
| 3 - Piston | 9 - Backup Ring | 15 - O-Ring | 21 - Piston Rod |
| 4 - Wear Ring | 10 - O-Ring | 16 - Set Screw | 22 - Socket Bolt (14 Used) |
| 5 - O-Ring | 11 - Backup Ring | 17 - Buffer Seal | 23 - Rod Cover |
| 6 - Piston Nut | 12 - Rod Bushing | 18 - U-Packing | 24 - Retaining Ring |

FRONT ATTACHMENT / Cylinder

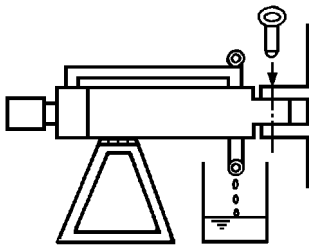
Disassembly of Bucket Cylinder

- The disassembling procedure starts on the premise that the hydraulic piping and the bands securing the piping have been removed.



CAUTION: Bucket cylinder weight: 140 kg (310 lb)

1. Hoist and place the cylinder on a workbench horizontally. Drain hydraulic oil from the cylinder.



W102-04-02-027

2. Remove socket bolts (22) (14 used) from rod cover (23).
┌ : 14 mm

3. Tighten set screw (16) installed to the flange part of rod cover (23) and make clearance between the mating surfaces.
Remove rod cover (23) from cylinder tube (8) by using a screwdriver.
┌ : 6 mm

4. Remove the piston rod (21) assembly from cylinder tube (8).

IMPORTANT: Loosen set screw (16) after cutting the crimped part (2 places) by using a hand drill.

5. Secure piston rod (21) horizontally. Remove set screw (7) from piston nut (6).

┌ : 4 mm

6. Remove piston nut (6) from piston rod (21) by using a special tool.

NOTE: As for the special tool, refer to W3-9-20.

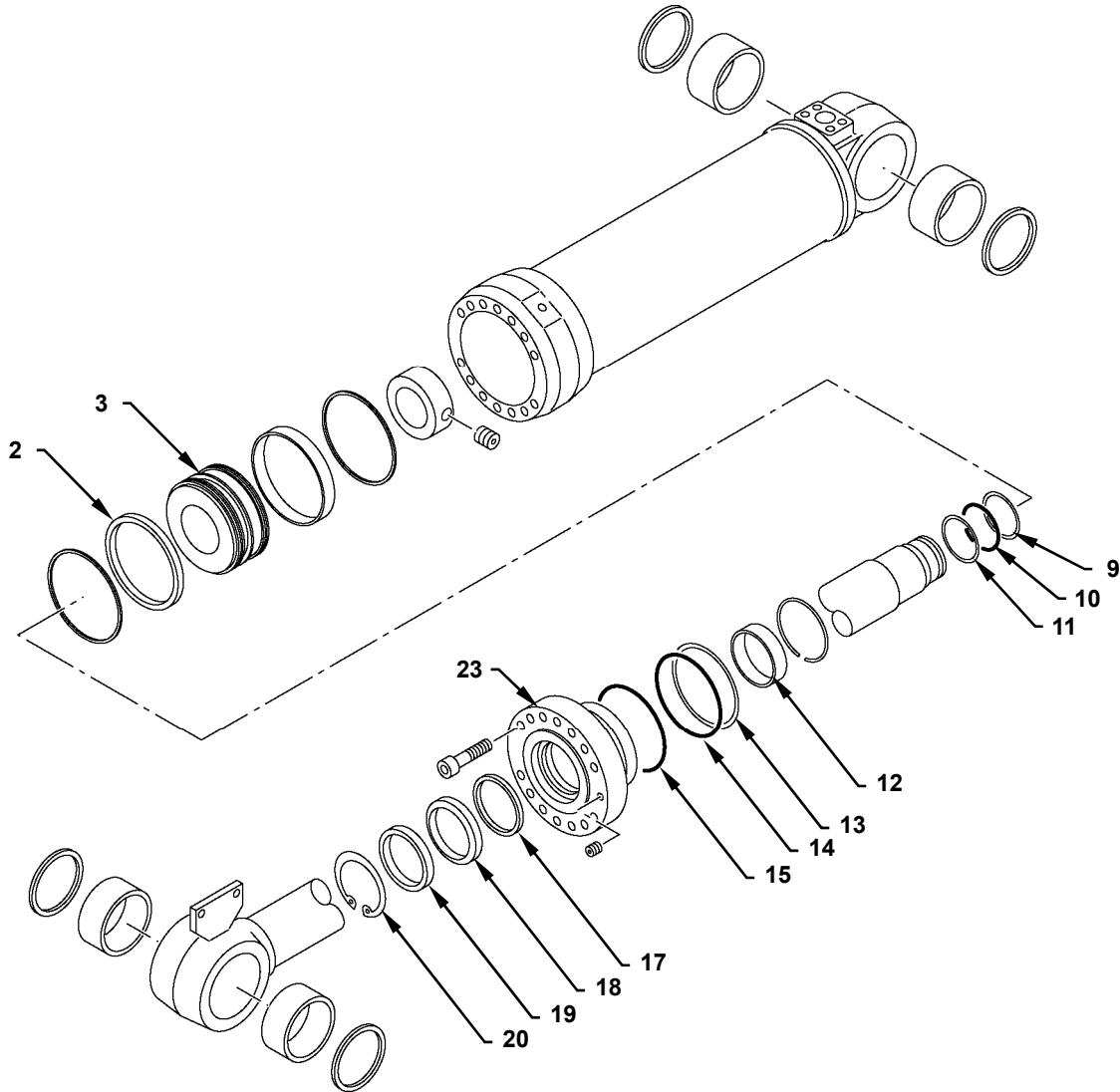
7. Install a bolt (M12, Pitch 1.75 mm) to the piston (3) end (2 places). Remove piston (3) from piston rod (21) by using a special tool.

NOTE: As for the special tool, refer to W3-9-20.

8. Remove rod cover (23) from piston rod (21).

9. Remove wear ring (4) and O-ring (5) from piston (3).

FRONT ATTACHMENT / Cylinder

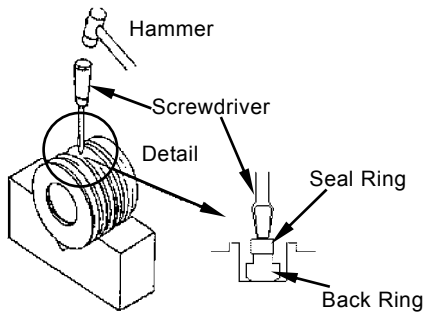


W4GD-04-02-001

FRONT ATTACHMENT / Cylinder

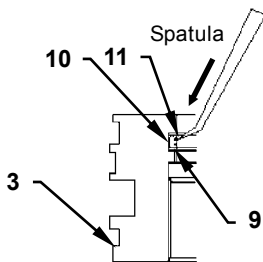
IMPORTANT: Do not damage the seal groove by a cutting tool.

10. Place piston (3) on a V-shaped stable stand. Remove the backup rings at both sides of packing (2) from piston (3). Cut and remove the seal ring and the back ring in the center part of packing (2).



W4GB-04-02-004

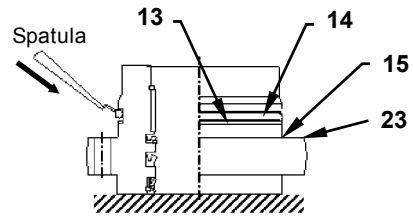
11. Remove O-ring (10) and backup rings (9, 11) from piston (3) by using a spatula.



W4GB-04-02-005

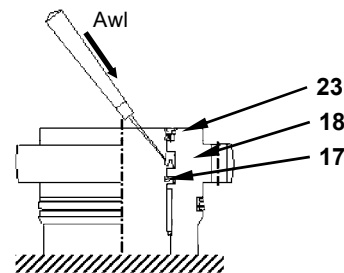
12. Place rod cover (23) on the workbench which is covered with an anti-skid waste cloth.

13. Remove O-rings (14, 15) and backup ring (13) from rod cover (23).



W4GB-04-02-006

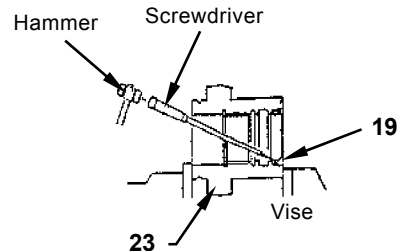
14. Remove U-packing (18) and buffer seal (17) from rod cover (23) by using an awl.



W4GB-04-02-007

15. Remove retaining ring (20) from rod cover (23).

16. Remove dust seal (19) from rod cover (23).



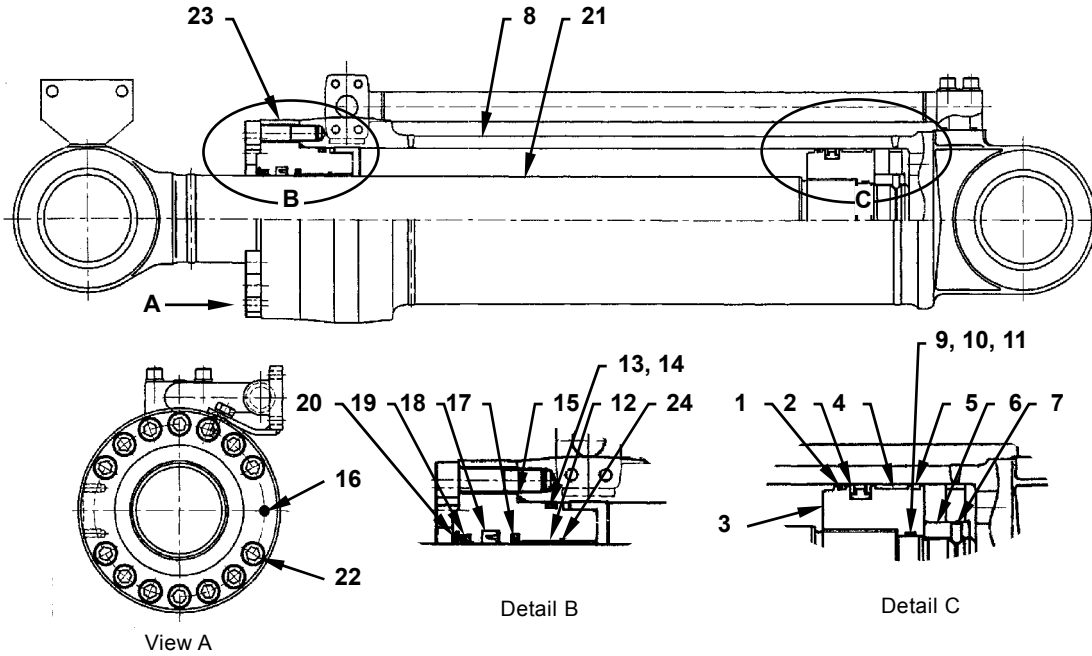
W4GB-04-02-009

IMPORTANT: Do not remove rod bushing (12) unless necessary.

17. Remove retaining ring (24) and rod bushing (12) from rod cover (23).

FRONT ATTACHMENT / Cylinder

ASSEMBLY OF BUCKET CYLINDER




W4GD-04-02-002

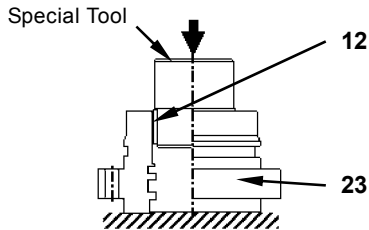
- | | | | |
|----------------|-------------------|------------------|----------------------------|
| 1 - O-Ring | 7 - Set Screw | 13 - Backup Ring | 19 - Dust Seal |
| 2 - Packing | 8 - Cylinder Tube | 14 - O-Ring | 20 - Retaining Ring |
| 3 - Piston | 9 - Backup Ring | 15 - O-Ring | 21 - Piston Rod |
| 4 - Wear Ring | 10 - O-Ring | 16 - Set Screw | 22 - Socket Bolt (14 Used) |
| 5 - O-Ring | 11 - Backup Ring | 17 - Buffer Seal | 23 - Rod Cover |
| 6 - Piston Nut | 12 - Rod Bushing | 18 - U-Packing | 24 - Retaining Ring |

FRONT ATTACHMENT / Cylinder

Assembly of Bucket Cylinder

1. Install rod bushing (12) to rod cover (23) by using a special tool and a press.

 **NOTE:** As for the special tool, refer to W3-9-22.



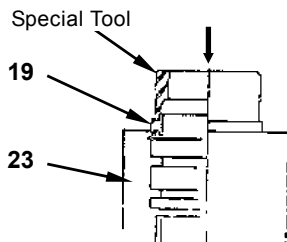
W4GB-04-02-012

2. Install retaining ring (24) to rod cover (23).

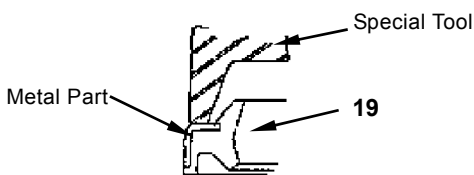
IMPORTANT: Keep a special tool evenly in contact with the metal part of the dust seal (19).

3. Install dust seal (19) to rod cover (23) by using the special tool and a hammer.

 **NOTE:** As for the special tool, refer to W3-9-23.



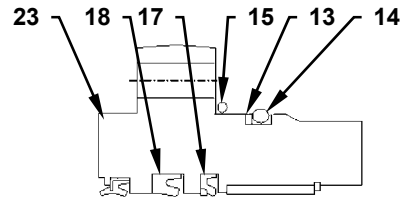
W4GB-04-02-013



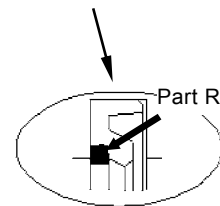
W4GB-04-02-014

4. Install retaining ring (20) to rod cover (23).

5. Install U-packing (18) and buffer seal (17) to rod cover (23).



W4GB-04-02-016



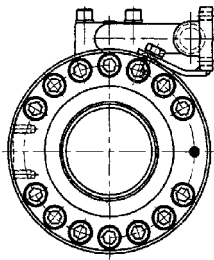
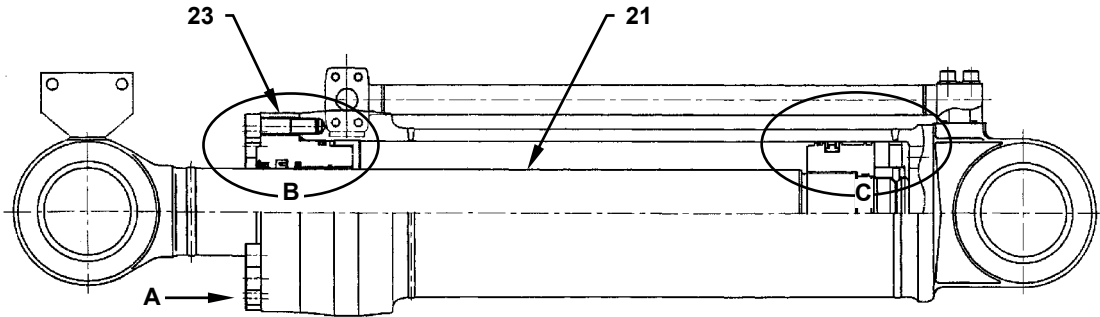
Detailed Mounting Direction of Backup Ring for Buffer Seal

W4GB-04-02-017

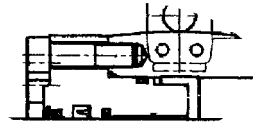
6. Install O-ring (14) and backup ring (13) to rod cover (23).

7. Install O-ring (15) to rod cover (23).

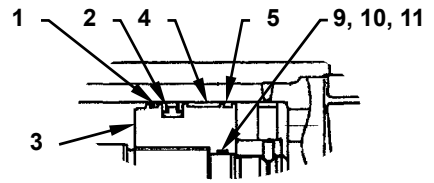
FRONT ATTACHMENT / Cylinder



View A



Detail B




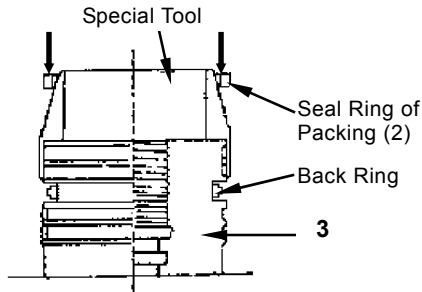
Detail C

W4GD-04-02-002

FRONT ATTACHMENT / Cylinder

8. Install a special tool to piston (3). Install the back ring of packing (2) to piston (3).

 **NOTE:** As for the special tool, refer to W3-9-21.



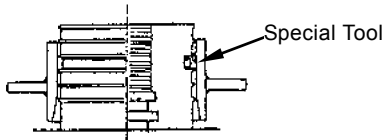
W4GB-04-02-018

IMPORTANT: Warm up the seal ring of packing (2) in the oil heated by an electric air heater. Avoid direct-heating by fire.

9. Warm the seal ring of packing (2) to 150 to 180 °C (300 to 370 °F). Install the seal ring of packing (2) to the seal groove on piston (3).

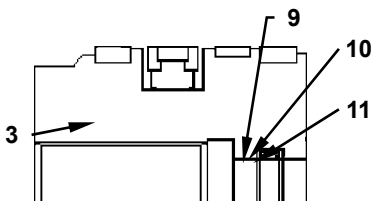
10. Adjust the extended seal ring of packing (2) by using a special tool.

 **NOTE:** As for the special tool, refer to W3-9-21.



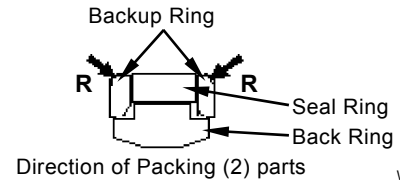
W4GB-04-02-019

11. Install O-ring (10) and backup rings (9, 11) to piston (3).



W4GD-04-02-005


12. Install the backup ring to the both sides of the seal ring of packing (2).

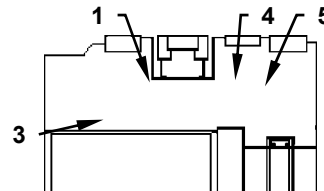


W4GB-04-02-020

13. Secure piston rod (21) on a workbench horizontally.


14. Install wear ring (4) and O-rings (1, 5) to piston (3). Apply hydraulic oil onto piston (3).

 **NOTE:** Do not drop wear ring (4) and O-rings (1, 5).

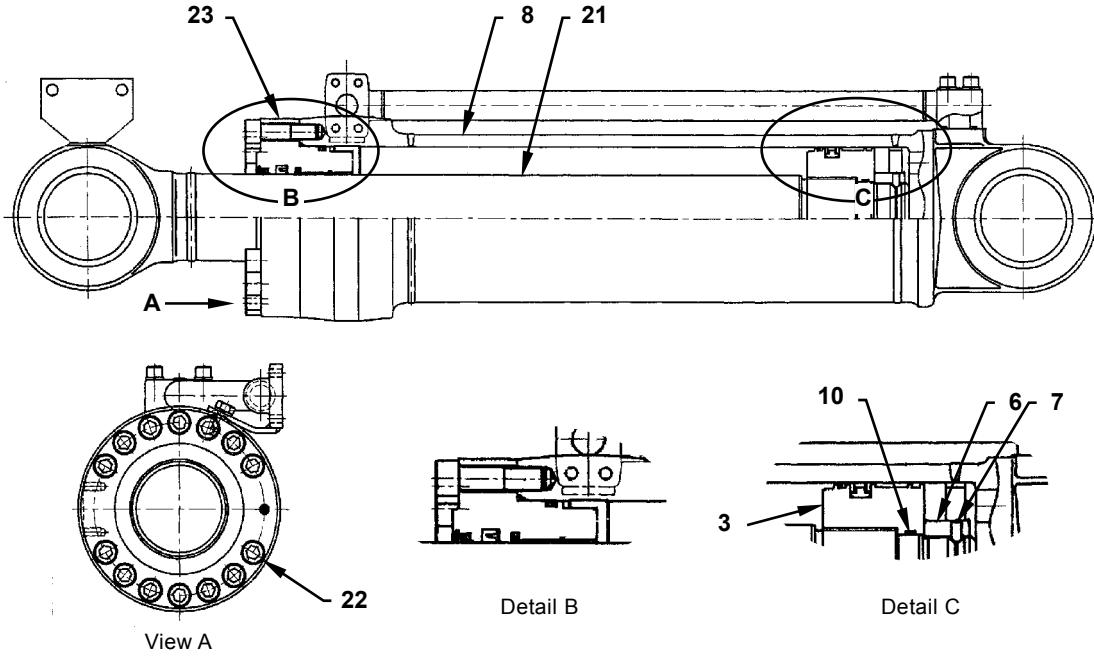


W4GD-04-02-005

15. Apply hydraulic oil onto a special tool and the piston rod (21) surface. Install rod cover (23) to piston rod (21) by using the special tool.

 **NOTE:** As for the special tool, refer to W3-9-23.


FRONT ATTACHMENT / Cylinder




W4GD-04-02-002


FRONT ATTACHMENT / Cylinder


16. Apply hydraulic oil onto O-ring (10) and the thread part of piston (3). Install a bolt (M12, Length 25 mm) to the screw hole on the piston (3) end. Install piston (3) to piston rod (21) by using a special tool.

 : 980±98 N·m
(100±10 kgf·m, 720±7.2 lbf·ft)



 *NOTE: As for the special tool, refer to W3-9-20.*

17. Apply hydraulic oil onto the thread part of piston nut (6). Install piston nut (6) to piston rod (21) by using a special tool.

 : 1860±186 N·m
(190±19 kgf·m, 1370±137 lbf·ft)



 *NOTE: As for the special tool, refer to W3-9-20.*

18. Apply LOCTITE #242 onto the thread part of set screw (7). Install set screw (7) to piston nut (6). Crimp set screw (7) by using a punch (2 places).

 : 4 mm
 : 15±1.5 N·m
(1.5±0.15 kgf·m, 11±1.1 lbf·ft)

19. Secure cylinder tube (8) in a vise horizontally. Insert piston rod (21) into cylinder tube (8).

20. Apply LOCTITE #242 onto the thread part of socket bolts (22) (14 used). Install rod cover (23) to cylinder tube (8) with socket bolts (22) (14 used).

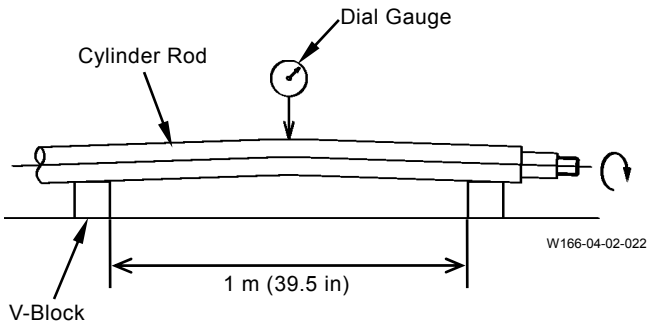
 : 14 mm
 : 340 to 360 N·m
(35 to 37 kgf·m, 250 to 265 lbf·ft)

21. Add the low-pressure air to the port in the rod side of cylinder tube (8). Retract piston rod (21).

FRONT ATTACHMENT / Cylinder

MAINTENANCE STANDARD

Rod Bend and Run Out



Unit: mm (in)

Bend	Run Out	Remedy
0.5 (0.02)	1.0 (0.039)	Repair
1.0 (0.039)	2.0 (0.079)	Replace

MEMO

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