Workshop Manual

ZAXIS **450-3** 450LC-3 470H-3 470LCH-3 500LC-3 520LCH-3 **Hydraulic Excavator**

Service Manual consists of the following separate Part No;

Technical Manual (Operational Principle) : Vol. No.TO1J1-E Technical Manual (Troubleshooting)

Workshop Manual

: Vol. No.TT1J1-E

: Vol. No.W1J1-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.):

Publications Marketing & Product Support Hitachi Construction Machinery Co. Ltd.

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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 cal 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

Consecutive Page Number for Each Group

Group Number

Section Number

T: Technical Manual W: Workshop Manual

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 of 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.

• A 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.

• PNOTE:

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 parenthheses just behind SI units.

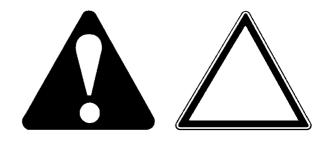
Example: 24.5 MPa (250 kgf/cm², 3560 psi)

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

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				

RECOGNIZE SAFETY INFORMATION

- These are the SAFETY ALERT SYMBOLS.
 - When you see these symbols on your machine or in this 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.

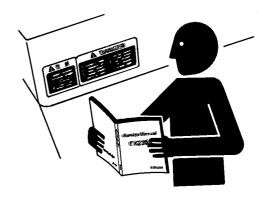


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FOLLOW SAFETY INSTRUCTIONS

- Carefully read and follow all safety signs on the machine and all safety messages in this manual.
- Safety signs should be installed, maintained and replaced when necessary.
 - If a safety sign or this 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.

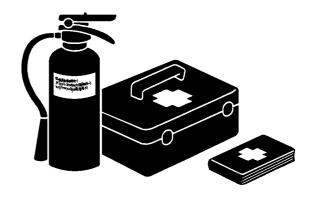


SA-003

003-E01B-0003

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.



SA-437

004-E01A-0437

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.

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 "RE-START INSPEC-TION" chapter in the operator's manual.



007-E01A-0435

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

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 mis-operations.
 - 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

009-E01A-0462

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.

FASTEN YOUR SEAT BELT

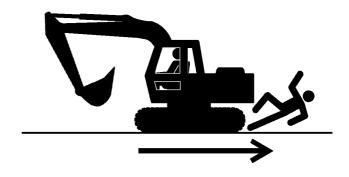
- If the machine should overturn, the operator may become injured and/or thrown from the cab. Additionally the operator may be crushed by the overturning machine, resulting in serious injury or death.
 - Prior to operating the machine, thoroughly examine webbing, buckle and attaching hardware. If any 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.





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, swinging, 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-42

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.

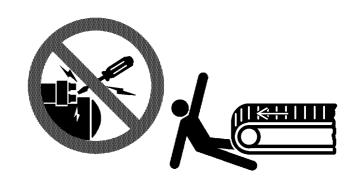


SA-293

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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-444

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

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.

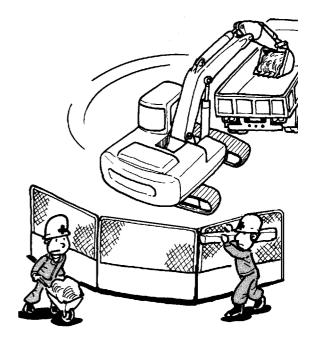
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SA-379

PRECAUTIONS FOR OPERATIONS

- Investigate the work site before starting operations.
 - Be sure to wear close fitting clothing and safety equipment appropriate for the job, such as a hard hat, etc. when operating the machine.
 - Clear all persons and obstacles from area of operation and machine movement.
 - Always beware of the surroundings while operating. When working in a small area surrounded by obstacles, take care not to hit the upperstructure against obstacles.
 - When loading onto trucks, bring the bucket over the truck beds from the rear side. Take care not to swing the bucket over the cab or over any person.



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INVESTIGATE JOB SITE BEFOREHAND

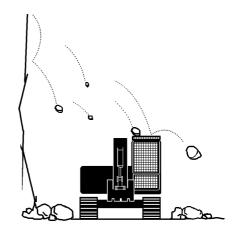
- When working at the edge of an excavation or on a road shoulder, the machine could tip over, possibly resulting in serious injury or death.
 - Investigate the configuration and ground conditions of the job site beforehand to prevent the machine from falling and to prevent the ground, stockpiles, or 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.
- Make sure the worksite has sufficient strength to firmly support the machine.
 - When working close to an excavation or at road shoulders, operate the machine with the tracks positioned perpendicular to the cliff face with travel motors at the rear, so that the machine can more easily evacuate if the cliff face collapses.
- If working on the bottom of a cliff or a high bank is required, be sure to investigate the area first and confirm that no danger of the cliff or bank collapsing exists. If any possibility of cliff or bank collapsing exists, do not work on the area.
- Soft ground may collapse when operating the machine on it, possibly causing the machine to tip over.
 When working on a soft ground is required, be sure to reinforce the ground first using large pieces of steel plates strong and firm enough to easily support the machine.
- Note that there is always a possibility of machine tipping over when working on rough terrain or on slopes. Prevent machine tipping over from occurring. When operating on rough terrain or on slopes:
 - · Reduce the engine speed.
 - · Select slow travel speed mode.
 - Operate the machine slowly and be cautious with machine movements.



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-490

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.

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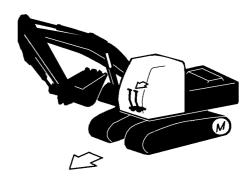


SA-481

CONFIRM DIRECTION OF MACHINE TO BE DRIVEN

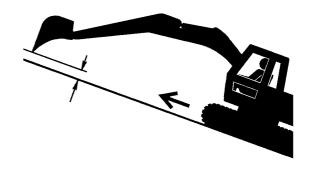
- Incorrect travel pedal/lever operation may result in serious injury death.
 - Before driving the machine, confirm the position of the undercarriage in relation to the operator's position. If the travel motors are located in front of the cab, the machine will move in reverse when travel pedals/levers are operated to the front.

017-E01A-0491

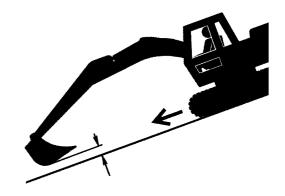


DRIVE MACHINE SAFELY

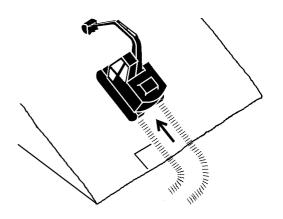
- Before driving the machine, always confirm that the travel levers/pedals direction corresponds to the direction you wish to drive.
 - Be sure to detour around any obstructions.
 - Avoid traveling over obstructions. Soil, fragments of rocks, and/or metal pieces may scatter around the machine. Don't allow personnel to stay around the machine while traveling.
- Driving on a slope may cause the machine to slip or overturn, possibly resulting in serious injury or death.
 - Never attempt to ascend or descend 35 degrees or steeper slopes.
 - · Be sure to fasten the seat belt.
 - When driving up or down a slope, keep the bucket facing the direction of travel, approximately 0.5 to 1.0 m (A) above the ground.
 - If the machine starts to skid or becomes unstable, immediately lower the bucket to the ground and stop.



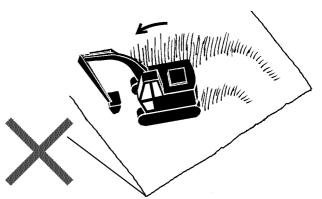
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SA-658



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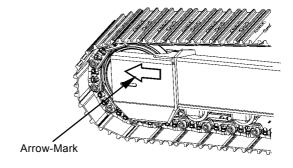


DRIVE MACHINE SAFELY

- Driving across the face of a slope or steering on a slope may cause the machine to skid or turnover.
 If the direction must be changed, move the machine to level ground, then, change the direction to ensure safe operation.
- Avoid swinging the upperstructure on slopes. Never attempt to swing the upperstructure downhill. The machine may tip over. If swinging uphill is unavoidable, carefully operate the upperstructure and boom at slow speed.
- If the engine stalls on a slope, immediately lower the bucket to the ground. Return the control levers to neutral. Then, restart the engine.
- Be sure to thoroughly warm up the machine before ascending steep slopes. If hydraulic oil has not warmed up sufficiently, sufficient performance may not be obtained.
- Use a signal person when moving, swinging or operating the machine in congested areas. Coordinate hand signals before starting the machine.
- Before moving machine, determine which way to move travel pedals/levers for the direction you want to go. When the travel motors are in the rear, pushing down on the front of the travel pedals or pushing the levers forward moves the machine forward, towards the idlers.
 - An arrow-mark seal is stuck on the inside surface of the side frame to indicate the machine front direction.
- Select a travel route that is as flat as possible.
 Steer the machine as straight as possible, making small gradual changes in direction.
- Before traveling on them, check the strengths of bridges and road shoulders, and reinforce if necessary.

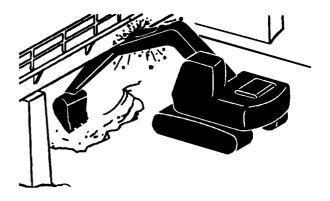


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- Use wood plates in order not to damage the road surface. Be careful of steering when operating on asphalt roads in summer.
- When crossing train tracks, use wood plates in order not to damage them.
- Do not make contact with electric wires or bridges.
- When crossing a river, measure the depth of the river using the bucket, and cross slowly. Do not cross the river when the depth of the river is deeper than the upper edge of the upper roller.
- When traveling on rough terrain, reduce engine speed. Select slow travel speed. Slower speed will reduce possible damage to the machine.
- Avoid operations that may damage the track and undercarriage components.
- During freezing weather, always clean snow and ice from track shoes before loading and unloading machine, to prevent the machine from slipping.



AVOID INJURY FROM ROLLAWAY ACCIDENTS

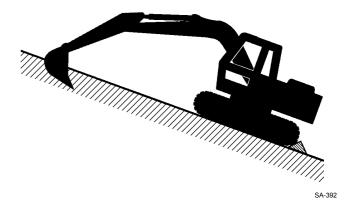
• Death or serious injury may result if you attempt to mount or stop a moving machine.

To avoid rollaways:

- Select level ground when possible to park machine
- · Do not park the machine on a grade.
- Lower the bucket and/or other work tools to the ground.
- Turn the auto-idle switch and the H/P mode switch off.
- 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 pilot control shut-off lever to LOCK position.
- Block both tracks and lower the bucket to the ground. Thrust the bucket teeth into the ground if you must park on a grade.
- Position the machine to prevent rolling.
- · Park a reasonable distance from other machines.







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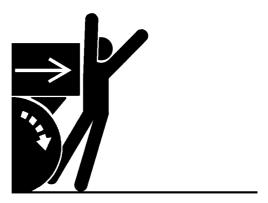
AVOID INJURY FROM BACK-OVER AND SWING ACCIDENTS

 If any person is present near the machine when backing or swinging the upperstructure, the machine may hit or run over that person, resulting in serious injury or death.

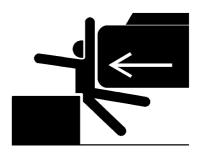
To avoid back-over and swing accidents:

- Always look around BEFORE YOU BACK UP AND SWING THE MACHINE. BE SURE THAT ALL BYSTANDERS ARE CLEAR.
- Keep the travel alarm in working condition (if equipped).
 - ALWAYS BE ALERT FOR BYSTANDERS MOVING INTO THE WORK AREA. USE THE HORN OR OTHER SIGNAL TO WARN BYSTANDERS BEFORE MOVING MACHINE.
- USE A SIGNAL PERSON WHEN BACKING UP IF YOUR VIEW IS OBSTRUCTED. ALWAYS KEEP THE SIGNAL PERSON IN VIEW.
 - Use hand signals, which conform to your local regulations, when work conditions require a signal person.
- No machine motions shall be made unless signals are clearly understood by both signalman and operator.
- Learn the meanings of all flags, signs, and markings used on the job and confirm who has the responsibility for signaling.
- Keep windows, mirrors, and lights clean and in good condition.
- Dust, heavy rain, fog, etc., can reduce visibility. As visibility decreases, reduce speed and use proper lighting.
- Read and understand all operating instructions in the operator's manual.

021-E01A-0494



SA-383



KEEP PERSON CLEAR FROM WORKING AREA

- A person may be hit severely by the swinging front attachment or counterweight and/or may be crushed against an other object, resulting in serious injury or death.
 - Keep all persons clear from the area of operation and machine movement.
 - Before operating the machine, set up barriers to the sides and rear area of the bucket swing radius to prevent anyone from entering the work area.



022-E01A-0386

SA-386

NEVER POSITION BUCKET OVER ANY-ONE

• Never lift, move, or swing bucket above anyone or a truck cab.

Serious injury or machine damage may result due to bucket load spill or due to collision with the bucket.

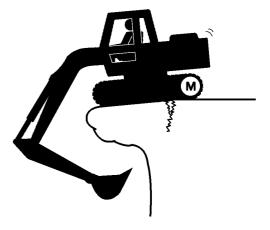


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SA-487

AVOID UNDERCUTTING

- In order to retreat from the edge of an excavation if the footing should collapse, always position the undercarriage perpendicular to the edge of the excavation with the travel motors at the rear.
 - If the footing starts to collapse and if retreat is not possible, do not panic. Often, the machine can be secured by lowering the front attachment, in such cases.



024-E01A-0488

AVOID TIPPING

DO NOT ATTEMPT TO JUMP CLEAR OF TIPPING MACHINE---SERIOUS OR FATAL CRUSHING INJURIES WILL RESULT

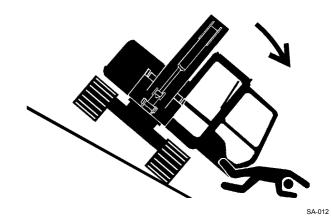
MACHINE WILL TIP OVER FASTER THAN YOU CAN JUMP FREE

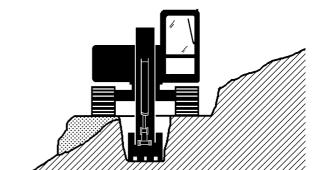
FASTEN YOUR SEAT BELT

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 15 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.





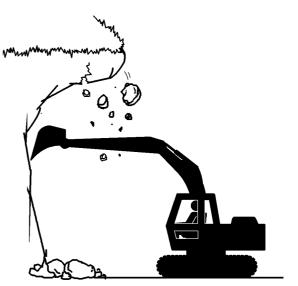
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NEVER UNDERCUT A HIGH BANK

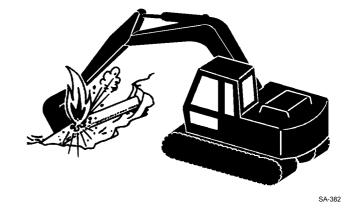
 The edges could collapse or a land slide could occur causing serious injury or death.

026-E01A-0519



DIG WITH CAUTION

- Accidental severing of underground cables or gas lines may cause an explosion and/or fire, possibly resulting in serious injury or death.
 - Before digging check the location of cables, gas lines, and water lines.
 - Keep the minimum distance required, by law, from cables, gas lines, and water lines.
 - If a fiber optic cable should be accidentally severed, do not look into the end. Doing so may result in serious eye injury.
 - Contact your local "diggers hot line" if available in your area, and/or the utility companies directly.
 Have them mark all underground utilities.



027-E01A-0382

OPERATE WITH CAUTION

- If the front attachment or any other part of the machine hits against an overhead obstacle, such as a bridge, both the machine and the overhead obstacle will be damaged, and personal injury may result as well.
 - Take care to avoid hitting overhead obstacles with the boom or arm.



SA-389

028-E01A-0389

AVOID POWER LINES

- Serious injury or death can result if the machine or front attachments are not kept a safe distance from electric lines.
 - When operating near an electric line, NEVER move any part of the machine or load closer than 3 m plus twice the line insulator length.
 - Check and comply with any local regulations that may apply.
 - Wet ground will expand the area that could cause any person on it to be affected by electric shock.
 Keep all bystanders or co-workers away from the site





C A 20

PRECAUTIONS FOR LIGHTENING

- The machine is vulnerable to lighting 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.



SA-1088

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, sables, slings, or ropes.
 - Before craning, position the upperstructure with the travel motors at the rear.
 - 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.

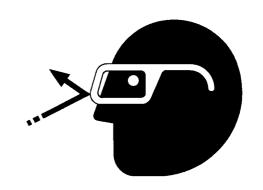
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PROTECT AGAINST FLYING DEBRIS

- 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.

031-F01A-0432



SA-432

PARK MACHINE SAFELY

To avoid accidents:

- · Park machine on a firm, level surface.
- · Lower bucket to the ground.
- · Turn auto-idle switch and H/P mode switch OFF.
- 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.
- Pull the pilot control shut-off lever to the LOCK position.
- · Close windows, roof vent, and cab door.
- · Lock all access doors and compartments.



SA-390

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.

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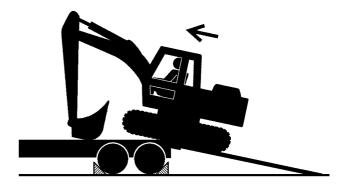


TRANSPORT SAFELY

- 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. Turn auto-idle switch OFF.
 - 4. Always select the slow speed mode with the travel mode switch.
 - 5. Never load or unload the machine onto or off a truck or trailer using the front attachment functions when driving up or down the ramp.
 - 6. 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, and then try loading again.
 - 7. The top end of the ramp where it meets the flatbed is a sudden bump. Take care when traveling over it
 - 8. Place blocks in front of and behind the tracks. Securely hold the machine to the truck or trailer deck with wire ropes.

Be sure to further follow the details described in the TRANSPORTING section in the operator's manual.





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. Pull the pilot control shut-off lever to the LOCK position.
- 10. Allow the engine to cool.

500-E02C-0520



SA-028



- If a maintenance procedure must be performed with the engine running, do not leave machine unattended.
- If the machine must be raised, maintain a 90 to 100° angle between the boom and arm. Securely support any machine elements that must be raised for service work.
- Inspect certain parts periodically and repair or replace as necessary. Refer to the section discussing that part in the "MAINTENANCE" chapter of this 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.
- 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, antifreeze 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



T1J1-01-01-001

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.



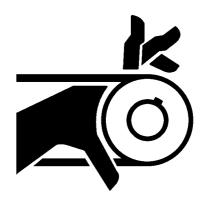
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STAY CLEAR OF MOVING PARTS

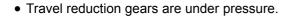
- Entanglement in moving parts can cause serious injury.
 - To prevent accidents, care should be taken to ensure that hands, feet, clothing, jewelry and hair do not become entangled when working around rotating parts.

502-E01A-0026



PREVENT PARTS FROM FLYING

- Grease in the track adjuster is under high pressure. Failure to follow the precautions below may result in serious injury, blindness, or death.
 - Do not attempt to remove GREASE FITTING or VALVE ASSEMBLY.
 - As pieces may fly off, be sure to keep body and face away from valve.
 - Never attempt to disassemble the track adjuster. Inadvertent disassembling of the track adjuster may cause the parts such as a spring to fly off, possibly resulting in severe personal injury or death.



- 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, and then gradually loosen AIR RELEASE PLUG to release pressure.



SA-344

503-E01B-0344

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



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.

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

SA-039

505-E01B-0498

REPLACE RUBBER HOSES PERIODI-CALLY

- 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

S506-E01A-0019

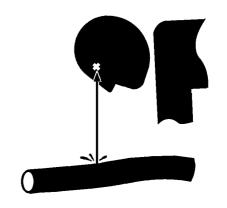
AVOID HIGH-PRESSURE FLUIDS

- 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.

507-E03A-0499



SA-031



SA-292



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.

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



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.
- In an emergency, if the cab door or front window cannot be opened, break the front or rear window panes with the emergency evacuation hammer to escape from the cab. Refer the explanation pages on the Emergency Evacuation Method in the operator's manual.

18-E02B-0393



SA-393



SS-1510

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.

SA-818

523-E01A-0818

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 fire-resistant 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.
 - 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 wok site conditions, the risk of inhaling asbestos fiber may exist. Spray water to prevent asbestos from becoming airborne. Don't 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 or start engine with frozen battery.
 - There is fear of explosion. If battery electrolyte is frozen, wait until it is liquefied completely in an atmospheric temperature room.
 - 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

SAFETY

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.

513-E01A-0405



SA-405

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.

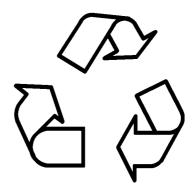


SA-309

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

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



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SA-435

	SAFETY	
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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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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 disassem-bling / assembling procedures beforehand, to help avoid incorrect disassembling of components as well as personal injury.

Be sure to 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 anv.
- · 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.

· 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
- · Before assenbling, coat all inner parts with clean hydraulic oil or gear oil. Especially coat the sliding surfaces with clean hydraulic oil or gear oil.
- · 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.
- · Check 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 hydraulic motor is operated with air trapped in the hydraulic motor housing, damage to the motor 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.
- Bleeding Air from Travel Motor / Swing Motor
 - With the drain plug / hose on travel motor / swing motor removed, fill the motor case with hydraulic oil.

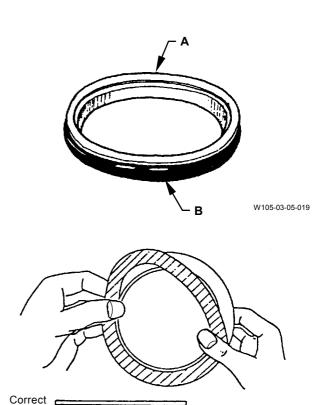
- Bleeding Air from Hydraulic Circuit
 - After refilling hydraulic oil, start the engine. While operating each cylinder, swing motor and travel motor evenly, operate the machine under light loads for 10 to 15 minutes. Slowly start each operation (never fully stroke the cylinders during initial operation 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.

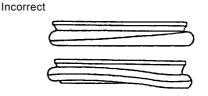


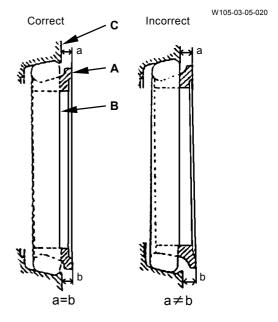
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Floating Seal Precautions

- In general, replace the floating seal with a new one after disassembling.
 If the floating seal is to be reused, follow these procedures:
 - Keep seal rings together as a matched set with seal ring faces together. Insert a piece of cardboard to protect surfaces.
 - (2) Check the slide surface 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.
 - 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 the O-ring is not twisted, and that it is installed correctly on the seal ring.
 - (4) After installing the floating seal, check that seal ring surface (A) is parallel with seal mating face (C) by measuring the distances (A) and (C) at point (a) and (b), as illustrated. If these distances differ, correct the O-ring seating.



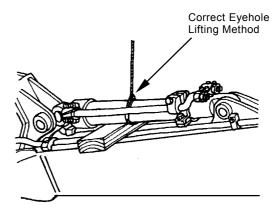




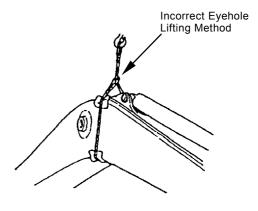
W110-03-05-004

Precautions for Using Nylon Sling

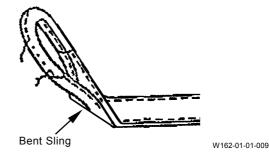
- Follow the precautions below to use nylon slings safely.
- Attach protectors (soft material) on the corners of the load so that the nylon sling does not directly contact the corners. This will prevent the nylon sling from being damaged and the lifted load from slipping.
- Lower the temperature of the 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



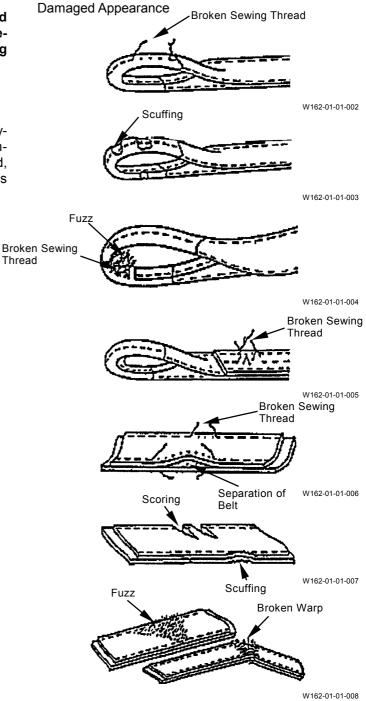
W105-04-01-008



A

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.



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.
- Therefore, in consideration of operation efficiency and maintenance expense, proper maintenance shall be carried out before reaching the "Allowable Limit".

	GENERAL / I	Precautions for	Disassembling	and Assembling	
(Blank)					

TIGHTENING TORQUE SPECIFICATION

Na	No. Descriptions		Bolt Dia	O24. r	Wrench		Torque		
INO.			mm	Q'ty	Size (mm)	N∙m	(kgf·m)	(lbf·ft)	
	Engine cushion Front		27	2	41	1050	(105)	(775)	
1	rubber mount- ing bolt	Engine - cushion rubber	22	2	32	750	(76.5)	(550)	
	ing bolt	Cushion rubber-machine	18	4	27	400	(41.0)	(295)	
2	Engine bracket mount	ing bolt	14	8	22	210	(21)	(155)	
3	Radiator mounting bol		20	4	30	550	(56)	(405)	
_ 4	Hydraulic oil tank mou	<u> </u>	16	8	24	210	(21.5)	(155)	
_ 5	Fuel tank mounting bo	<u>llt</u>	16	8	24	210	(21.5)	(155)	
6	ORS fittings for hydrau	ulic hoses and piping	_	-12UNF -12UNF	36 41	180 210	(18.0) (21.0)	(135)	
							,	(155)	
_ 7	Pump device mounting		12	12	19	98	(9.2)	(66)	
8	Fan pump mounting b		18	4	14 holes	230	(23)	(170)	
9	Fan motor mounting n		12	2	19	110	(11)	(81.0)	
10	Control valve mounting		20	4	30	400	(41.0)	(295)	
11	Control valve bracket	•	20	6	30	400	(41.0)	(295)	
12	Swing device mounting	•	22	26	32	750	(76.5)	(550)	
13	Swing motor mounting	bolt	18	24	14	300	(30.5)	(220)	
14	Battery mounting nut		12	2	19	35	(3.5)	(26)	
15	Cab mounting nut		16 22	6	24	210	(21.5)	(155)	
_16	Cab anchor bolt			2	32	550	(55)	(405)	
17		ig bolt to upperstructure	30 27	36 36	46 41	1950 1400	(195)	(1440)	
		ng bolt to undercarriage	22	48	32	750	(143)	(1030)	
18	Travel device mounting Travel motor mounting	•	18	40 8	27	300	(76.5) (30.5)	(550) (220)	
10	Sprocket mounting bo	•	22	48	32	750	(76.5)	(550)	
-		450 3 470H 3					,	- 	
19	Upper roller mounting bolt	450LC-3, 470LCH-3	18	24	27	400	(41.0)	(295)	
		500LC-3, 520LCH-3	20	24	30	550	(55)	(405)	
	Lower roller mounting	450-3, 470H-3	22	64	32	750	(76.5)	(550)	
20	bolt	450LC-3, 470LCH-3	22	72	32	750	(76.5)	(550)	
		500LC-3, 520LCH-3	24	64	36	950	(95)	(700)	
0.4		450-3, 470H-3	24	392	32	1400	(143)	(1030)	
21	Track shoe bolt	450LC-3, 470LCH-3	24	424	32	1400	(143)	(1030)	
		500LC-3, 520LCH-3	24	392	32	1400	(143)	(1030)	
		450-3, 450LC-3	22	16	32	750	(76.5)	(550)	
20	Track guard mount-	470H-3	22	28	32	750	(76.5)	(550)	
22	ing bolt	470LCH-3	22	40	32	950	(95)	(700)	
		500LC-3	22	16	36	750	(76.5)	(550)	
		520LCH-3	24 33	28 36	36 50	950 1750	(95) (178)	(700)	
23	Track mounting bolt	(LC, LCH) MT, MTH		36		2200	(178)	(1290)	
		IVII, IVII 🗆	33 8	30	50 13	2200 205 to	(224) (1.05 to	(1620) (7.7 to	
24	Low-pressure piping	Flex master coupling	0		13	12.5	1.26)	9.2)	
	•	T bolt clamp	1/4-28	3 UNF	11	10	(1.0)	(7.4)	

No.	No. Descriptions		Q'ty	Wrench	Torque			
No. Descriptions	Descriptions	mm	Qty	Size (mm)	N∙m	(kgf·m)	(lbf·ft)	
25	Counterweight mounting bolt	45	2	65	2400	(240)	(1730)	
25 Counterweight mounting	Counterweight mounting bolt	24	4	36	450	(45.0)	(325)	
26	Signal control valve mounting bolt	10	4	8 holes	50	(5.1)	(37)	
27	Front pin-retaining bolt	20	15	30	400	(41.0)	(295)	
21	Front pin-retaining nut	20	7	30	400	(41.0)	(295)	

NOTE: 1. Apply lubricant (e.g. white zinc B dissolved into spindle oil) to bolts and nuts to reduce friction coefficient of them.

2. Make sure bolt and nut threads are clean before installing.

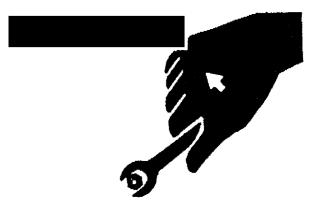
TORQUE CHART



CAUTION: Use tools appropriate for the work to be done. Makeshift tools and procedures can create safety hazards. For loosening and tightening nuts and bolts, use correct size tools. Otherwise, tightening tools may slip, potentially causing personal injury.

Bolt Types

Tighten nuts or bolts correctly to torque specifications. Make sure to employ correct bolts and tighten them correctly when assembling the machine or components.



SA-040

Hexagon T Bolt



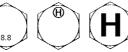
Hexagon M Bolt

Socket Bolt













W162-01-01-001

Specified Tightening Torque Chart

Bolt Dia.	Wrench	Hexagon Wrench	10.9		T	8.8		H			
	Size	Size	0	l4 D-l4	M552-07-091		N	/I552-07-090			M552-07-092
				ocket Bolt			-	:		:	
			N⋅m	(kgf⋅m)	(lbf⋅ft)	N⋅m	(kgf⋅m)	(lbf·ft)	N⋅m	(kgf⋅m)	(lbf⋅ft)
M6	10	5							3.3 to 4.2	(0.3 to 0.4)	(2.4 to 3.0)
M8	13	6	30	(3.0)	(21.5)	20	(2.0)	(14.5)	10	(1.0)	(7.2)
M10	17	8	65	(6.5)	(47)	50	(5.0)	(36)	20	(2.0)	(14.5)
M12	19	10	110	(11)	(80)	90	(9.0)	(65)	35	(3.5)	(25.5)
M14	22	12	180	(18)	(130)	140	(14)	(101)	55	(5.5)	(40)
M16	24	14	270	(27)	(195)	210	(21)	(152)	80	(8.0)	(58)
M18	27	14	400	(40)	(290)	300	(30)	(215)	120	(12)	(87)
M20	30	17	550	(55)	(400)	400	(40)	(290)	170	(17)	(123)
M22	32		750	(75)	(540)	550	(55)	(400)	220	(22)	(159)
M24	36		950	(95)	(690)	700	(70)	(510)	280	(28)	(205)
M27	41		1400	(140)	(1010)	1050	(105)	(760)	400	(40)	(290)
M30	46		1950	(195)	(1410)	1450	(145)	(1050)	550	(55)	(400)
M33	50		2600	(260)	(1880)	1950	(195)	(1410)	750	(75)	(540)
M36	55		3200	(320)	(2310)	2450	(245)	(1770)	950	(95)	(690)

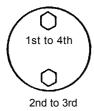
IMPORTANT: The following items are applied to both fine and coarse pitch threads.

- Apply lubricant (i. e. white zinc B dissolved Into Spindle oil) to nuts and bolts to reduce their friction coefficients.
 - The plated bolts require no lubricant.
- 2. Torque tolerance is ± 10 %.
- 3. Be sure to use bolts of correct length. Bolts that are too long cannot be tightened, as the bolt tip comes into contact with the bottom of the bolt hole. Bolts that are too short cannot develop sufficient tightening force.
- 4. The torques given in the chart are for general use only. Do not use these torques if a different torque is given for a specific application.
- Make sure that nut and bolt threads are clean before installing.
 - Remove dirt or corrosion, if any.

Bolt Tightening Order

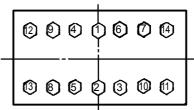
When tightening two or more bolts, tighten them alternately, as shown, to ensure even tightening.

Equally tighten upper and lower alternately Tighten diagonally





Tighten from center and diagonally



W105-01-01-003

Service Recommendations for Split Flange

IMPORTANT: 1. Be sure to clean and inspect sealing surfaces. Scratches / roughness cause leaks and seal wear.

Unevenness causes seal extrusion. If defects cannot be polished out, replace the component.

- Be sure to use only specified O-rings. Inspect O-rings for any damage. Take care not to file O-ring surfaces. When installing an O-ring into a groove, use grease to hold it in place.
- 3. While lightly tightening split flange halves, check that split is centered and perpendicular to the port. Hand-tighten bolts to hold parts in place. Take care not to pinch the O-ring.
- 4. Tighten bolts alternately and diagonally, as shown, to ensure even tightening.
- Do not use air wrenches. Using an air wrench often causes tightening of one bolt fully before tightening of the others, resulting in damage to O-rings or uneven tightening of bolts.



• Lock Plate

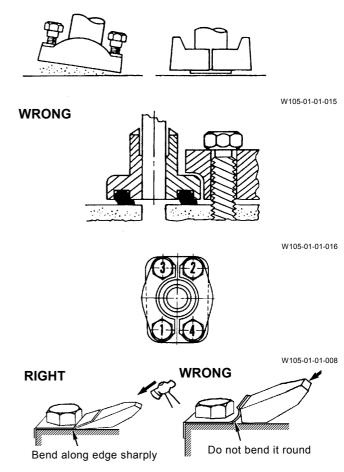
IMPORTANT: Do not reuse lock plates. Do not try to bend the same point twice.

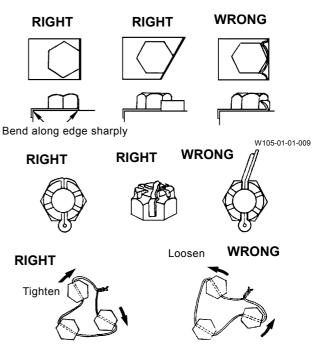
Cotter Pin

IMPORTANT: Do not reuse cotter pins. Match the holes in the bolt and nut while tightening, not while loosening.

• Lock Wire

IMPORTANT: Apply wire to bolts in the bolt-tightening direction, not in the bolt-loosening direction. Do not reuse lock wires.





PIPING JOINT

IMPORTANT: The torques given in the chart are for general use only.

Do not use these torques if a different torque is given for a specific application.

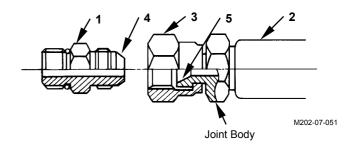
Union Joint

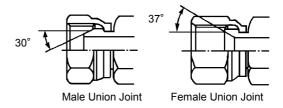
Metal sealing surfaces (4) and (5) of adapter (1) and hose (2) fit together to seal pressure oil. Union joints are used to join small-diameter lines.

IMPORTANT: 1. Do not over-tighten union nut (3).

Excessive force will be applied to metal sealing surfaces (4) and (5), possibly cracking adapter (1). Be sure to tighten union 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

	Wrench Size	Wrench Size mm	Tighte	ening Torque
Description	mm			
	Union Nut	Joint Body	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	78	(8.0, 58)
	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	78	(8.0, 58)
	32	27	137	(14.0,101)
	36	32	175	(18.0, 129)
	41	36	205	(21.0, 151)

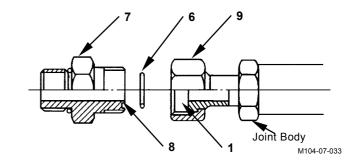
NOTE: Tightening torque of 37° male coupling without union is similar to tightening torque of 37° female.

O-ring Seal Joint

O-ring (6) seats against the end surface of adapter (7) to seal pressure oil.

IMPORTANT: 1. Be sure to replace O-ring (6) with a new one when reconnecting.

- 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.
- Take care not to damage O-ring groove (8) or sealing surface (10).
 Damage to O-ring (6) will cause oil leakage.
- 4. If union nut (9) is loose and oil is leaking, do not re-tighten union nut (9). Replace O-ring (6) with a new one and check that O-ring (6) is correctly seated in place, tighten union nut (9).

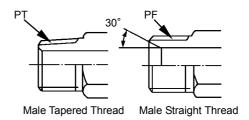


Wrench Size	Wrench Size	Tightening Torque
mm	mm	
Union Nut	Joint Body	N·m (kgf·m, lbf·ft)
19	17	29.5 (3.0, 21.5)
22	19	69 (7.0, 51)
27	22	93 (9.5, 69)
32	27	137 (14.0,101)
36	30,32	175 (18.0,129)
41	36	205 (21.0,151)
46	41	205 (21.0,151)

Screw-In Connection

Depending on types of screw and sealing, different types of screw fittings are used.

IMPORTANT: Be sure to confirm that the thread pitch and thread type (tapered or straight) are the correct type before using any screw-in connection.



W105-01-01-018

Male Tapered Thread		
Wrench Size	Tightening Torque	
mm	N⋅m (kgf⋅m, lbf⋅ft)	
Joint Body	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 to seal clearances between male and female threads, so as to prevent any leaks between threads.

Be sure to apply just enough seal tape to fill up thread clearances. Do not overwrap.

• Application Procedure

Confirm that the thread surface is clean and, free of dirt or damage.

Apply seal tape around threads as shown. Wrap seal tape in the same direction as the threads.

Low-Pressure-Hose Clamp Tightening Torque

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:

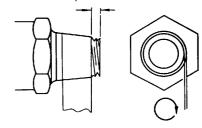
5.9 to 6.9 N·m (0.6 to 0.7 kg·m, 4.3 to 5.1 lbf·ft)



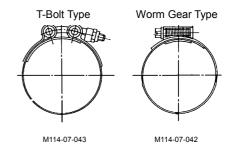


W105-01-01-019

Leave one to two pitch threads uncovered



M114-07-041



Connecting Hose

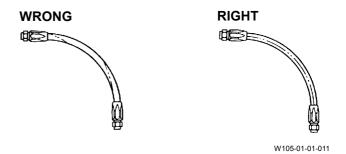


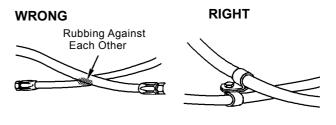
CAUTION: When replacing hoses, be sure to use only genuine Hitachi service parts. Using hoses other than genuine Hitachi hoses may cause oil leaks, hose rupture or Separation of fitting, possibly resulting in a fire on the machine.

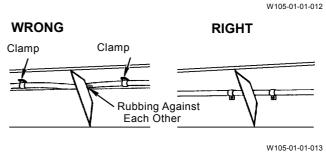
Do not install hoses kinked. Application of high oil pressure, vibration, or an impact to a kinked hose may result in oil leaks, hose rupture or separation of fitting. Utilize Print marks on hoses when installing to prevent hose from being kinked.

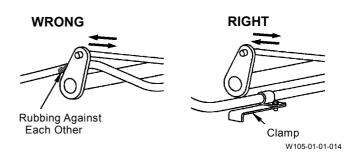
If hoses rub against each other, wear to the hoses will result, leading to hose rupture. Take necessary measures to protect hoses from rubbing against each other.

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









PERIODIC REPLACEMENT OF PARTS

The parts listed below deteriorate as the machine ages and are worn out or fatigued by repeated loads, resulting in possible severe personal injury and/or machine trouble. The service life of these parts cannot be detected through machine operation or visual inspection.

Therefore, these parts should be replaced at regular intervals even if no abnormalities are noticed. In case any abnormalities are found on a part at any time regardless of its specified replacement interval, immediately replace the part.

		Periodic Replacement Parts	Replacement Intervals
		Fuel hose (Fuel tank to filter)	Every 2 years or 6000 hours
E	Engine	Fuel hose (Fuel tank to injection pump)	Every 2 years or 6000 hours
		Heater hose (Heater to engine)	Every 2 years or 6000 hours
Basic Machine Hydraulic	Pump suction hose	Every 2 years or 6000 hours	
	Pump delivery hose	Every 2 years or 6000 hours	
	Swing hose	Every 2 years or 6000 hours	
	Travel hose	Every 2 years or 6000 hours	
System		Boom cylinder line hose	Every 2 years or 6000 hours
Front-End Attachment	Arm cylinder line hose	Every 2 years or 6000 hours	
	Bucket cylinder line hose	Every 2 years or 6000 hours	
		Pilot hose	Every 2 years or 6000 hours

NOTE: Be sure to replace seals, such as O-rings and gaskets, when replacing hoses.

GENERAL / Painting

PAINTING

Painting specification

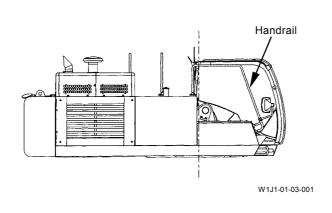
Surfaces to Be Painted	Painting Colour
Main surface of upperstructure	YR-01 [TAXI yellow]
Bed cover	YR-01[TAXI yellow]
Inner surface	Grey
Front attachment	YR-01 [TAXI yellow]
Track (undercarriage)	N1.0 [Black]
A part of rear left of cab	Shining silver

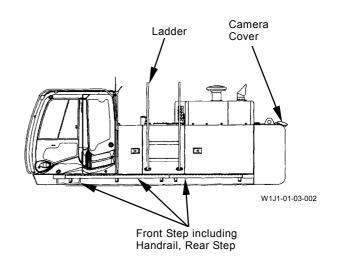
Final painted color

Inside and outside surface of cab	High Grade Beige Deep
• Right window beam, U-Bolt	[KASAI PAINT LF-113-230B
	(Charcoal series black, half glossy)]
Suspension lifter (chair bottom)	[N2.0 (Black)]
 Lever (travel, pilot shut-off, foot rest) 	High Frade Black
Floor plate	Grey [Cation]
Grid plate	Deep Black
Handrail and ladder	High Grade Beige Deep
Mirror stay	High Grade Black
Camera cover	High Grade Beige Deep

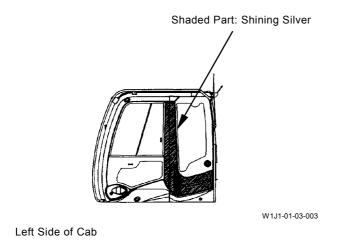
Specified masked position

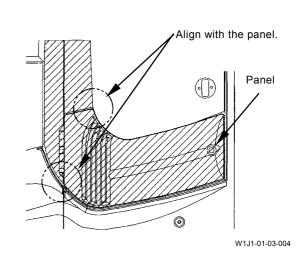
Control valve plate	Engine cover catch
Swing motor plate	Battery cable terminal cover
Pump plate (main pump / fan pump)	Air cleaner indicator

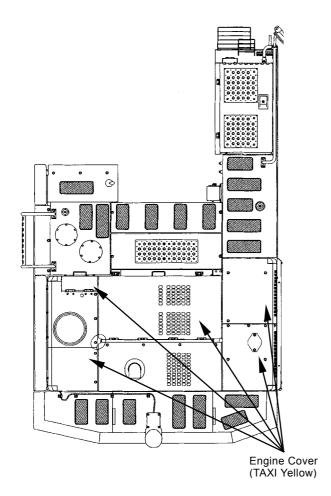


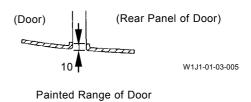


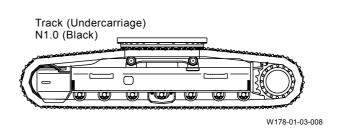
GENERAL / Painting











W1J1-01-03-006

GENERAL / Bleeding 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.

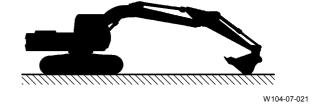
Hot hydraulic oil just after operation may spout and cause severe burns. Wait for oil in order to cool before starting any work.

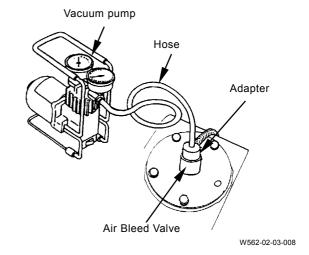
Do not turn the cap on hydraulic oil tank quickly. The cap may fly off by internal pressure. Release any remaining pressure and remove the cap.

Preparation

- 1. Park the machine on a solid, level surface. Lower the front attachment onto the ground.
- 2. Stop the engine. Push the air bleed valve on the hydraulic oil tank and release any remaining pressure in the hydraulic oil tank.
- 3. Remove the cap on the hydraulic oil tank. Install an adapter of vacuum pump to the cap mounting part in hydraulic oil tank. Operate the vacuum pump.

NOTE: Run the vacuum pump continuously while working in order to maintain negative pressure in the hydraulic oil tank.





GENERAL / Bleeding Air from Hydraulic Oil Tank (Blank)

MEMO

MEMO

SECTION 2 UPPERSTRUCTURE

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UPPERSTRUCTURE / Cab

REMOVE AND INSTALL CAB

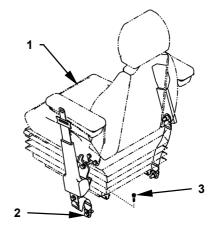
Removal



A CAUTION: Seat (1) weight: 40 kg (88 lb)

1. Remove bolts (2) (2 used). Remove the seat belt from bracket (4).

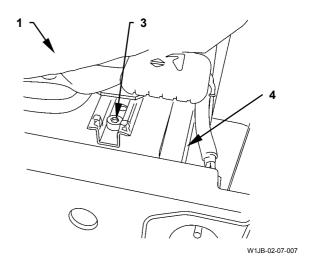
: 16 mm



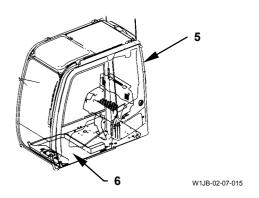
W1JB-02-01-008

2. Remove socket bolts (3) (4 used) from seat (1). Remove seat (1) from bracket (4).

: 6 mm



3. Remove mat (6) from the cab inside.



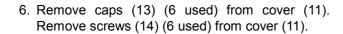
UPPERSTRUCTURE / Cab

4. Remove bolts (8) (3 used) and washers (9) (3 used) from bracket (7). Remove bracket (7) from bracket (10) and cab (5).

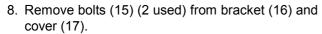
: 19 mm

5. Remove bolts (12) (2 used) from cover (11).

: 13 mm



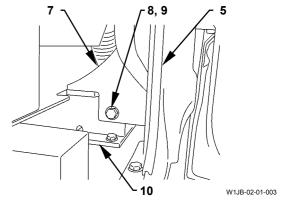
7. Remove cover (11) from cab (5).

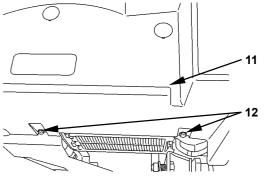


5: 13 mm

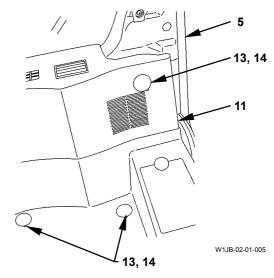
9. Remove bolts (19) (2 used) from cover (17). Remove cover (17) from bracket (18).

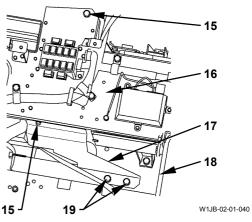
→ : 17 mm



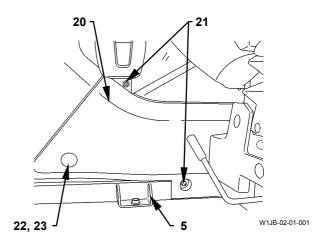


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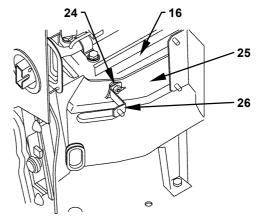


10. Remove screws (21) (2 used) from cover (20). Remove cap (22) and screw (23) from cover (20). Remove cover (20) from cab (5).



11. Remove bolt (24) from duct (25). Remove duct (25) from bracket (26).

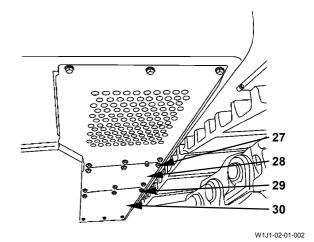
: 13 mm



W1JB-02-01-041

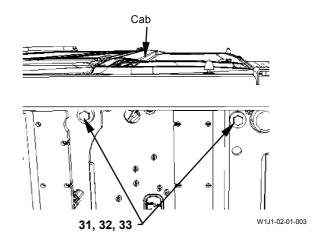
12. Remove bolts (27, 29) (6 used for each). Remove under covers (28, 30) from the main frame.

: 19 mm



13. Remove bolts (33) (2 used), washers (32) (2 used) and spacers (31) (2 used) from the cab.

: 32 mm





CAUTION: Cab (5) weight: 550 kg (1210 lb)

- 14. Attach a nylon sling onto the bracket and hold cab (5).
- 15. Remove nuts (34) (6 used) and washers (35) (6 used) from cab (5).

24 mm

- 16. Remove socket bolts (36) (6 used) from cab (5). : 8 mm
- 17. Remove bolts (37) (5 used) and washers (38) (5 used) from cab (5).

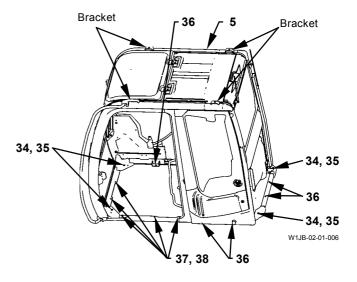
: 17 mm

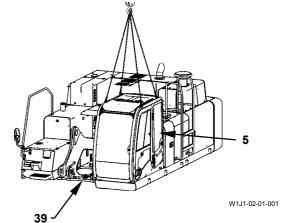
18. Remove all connectors, plugs and vinyl hoses from cab (5).



A CAUTION: Cab (5) weight: 550 kg (1210 lb)

19. Remove cab (5) from main frame (39).



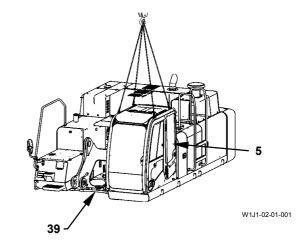


Installation



A CAUTION: Cab (5) weight: 550 kg (1210 lb)

1. Attach a nylon sling onto cab (5) and hoist cab (5). Align cab (5) with the mounting hole on main frame (39).



2. Install cab (5) to main frame (39) with bolts (34) (6 used) and washers (35) (6 used).

24 mm

== : 210 N·m (21.5 kgf·m, 155 lbf·ft)

3. Install cab (5) to main frame (39) with socket bolts (36) (6 used).

: 8 mm

■ : 50 N·m (5 kgf·m, 37 lbf·ft)

4. Install cab (5) to main frame (39) with bolts (37) (5 used) and washers (38) (5 used).

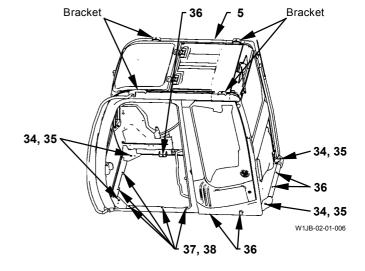
: 17 mm

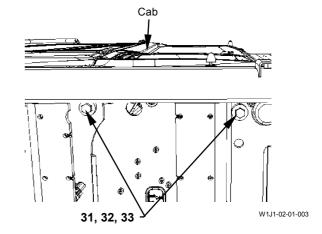
: 50 N·m (5 kgf·m, 37 lbf·ft)

5. Install cab (5) to the lower side of main frame (39) with bolts (33) (2 used), washers (32) (2 used) and spacers (31) (2 used).

: 32 mm

: 400 N·m (40.8 kgf·m, 295 lbf·ft)

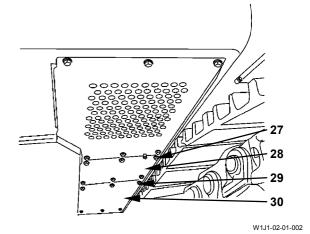




6. Install covers (28, 30) to the lower side of main frame (39) with bolts (27, 29) (6 used for each).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

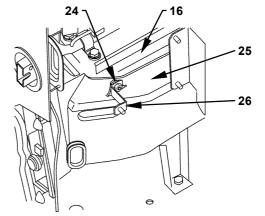


7. Install duct (25) to brackets (16, 26) with bolt (24).

→ : 13 mm

: 20 N·m (2 kgf·m, 15 lbf·ft)

8. Install the connector, plug and vinyl hose to cab (5).



- 9. Install cover (20) to cab (5) with screws (21) (2 used). Install cover (20) to cab (5) with screw (23). Install cap (22) to screw (23).
- 10. Install bracket (16) to bracket (18) with bolts (15) (2 used). Install cover (17) to bracket (18) with bolts (19) (2 used).

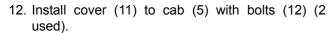
→ : 13 mm

: 20 N·m (2 kgf·m, 15 lbf·ft)

→ : 17 mm

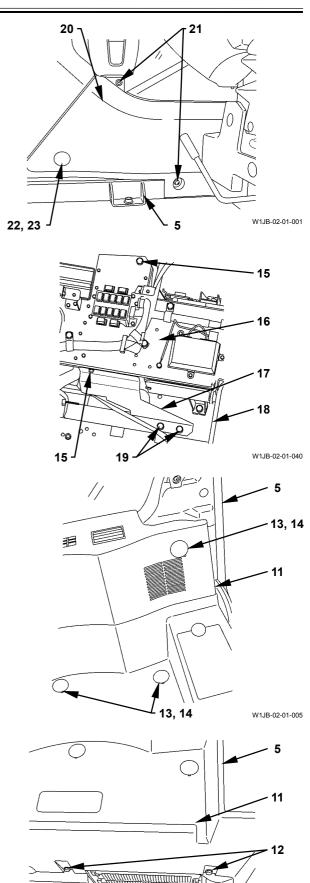
: 50 N·m (5 kgf·m, 37 lbf·ft)

11. Install cover (11) to cab (5) with bolts (14) (5 used). Install caps (13) (6 used) to screws (14) (6 used).



: 13 mm

: 20 N·m (2 kgf·m, 15 lbf·ft)

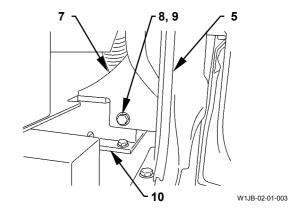


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13. Install bracket (7) to bracket (10) and cab (5) with bolts (8) (3 used) and washers (9) (3 used).

• : 19 mm

: 90 N·m (9 kgf·m, 66 lbf·ft)



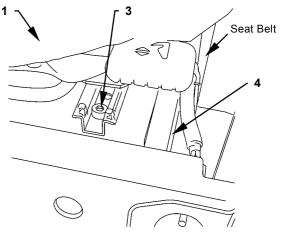


CAUTION: Seat (1) weight: 40 kg (88 lb)

14. Install seat (1) to bracket (4) with socket bolts (3) (4 used).

→ : 6 mm

: 20 N·m (2 kgf·m, 15 lbf·ft)

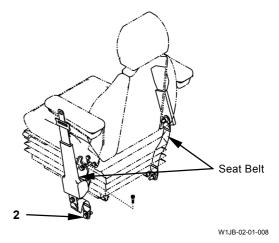


W1JB-02-07-007

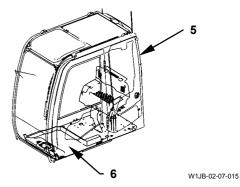
15. Install the seat belt to bracket (4) with bolts (2) (2 used).

• : 16 mm

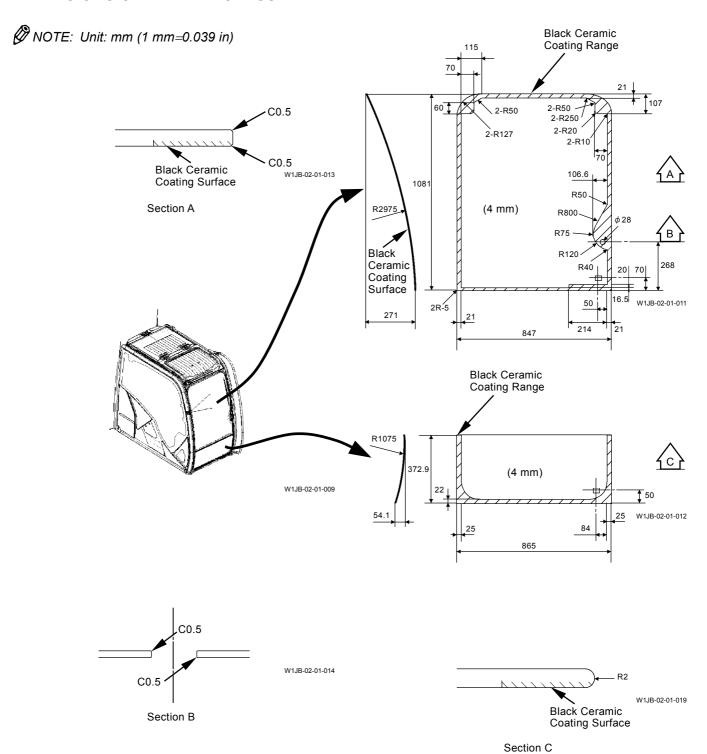
: 50 N·m (5 kgf·m, 37 lbf·ft)

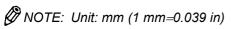


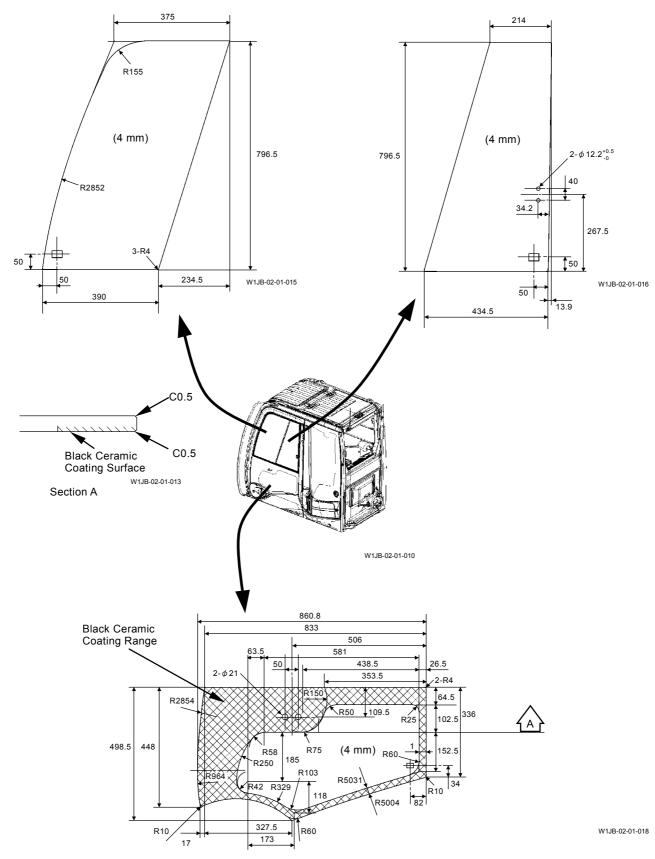
16. Install mat (6) to the cab (5) inside.



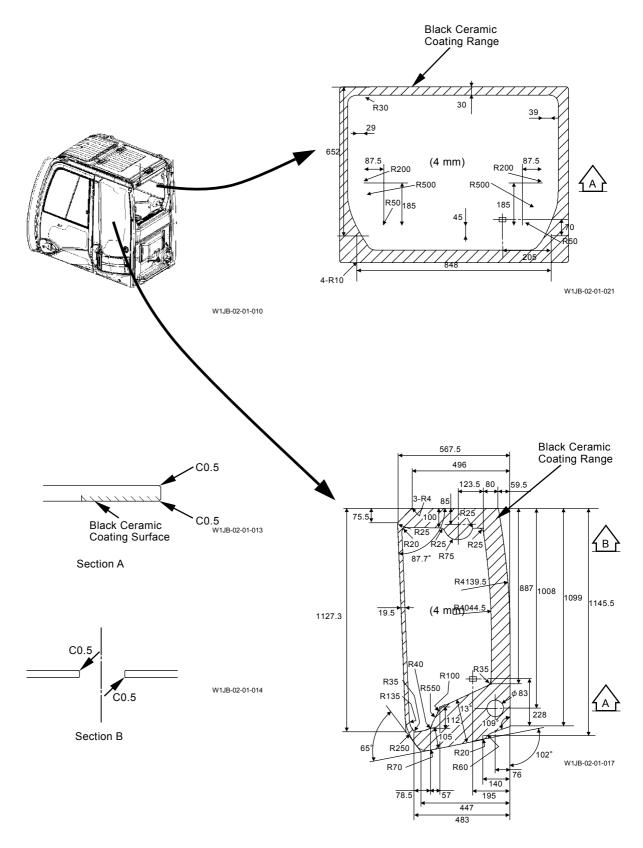
DIMENSIONS OF THE CAB GLASS

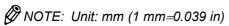


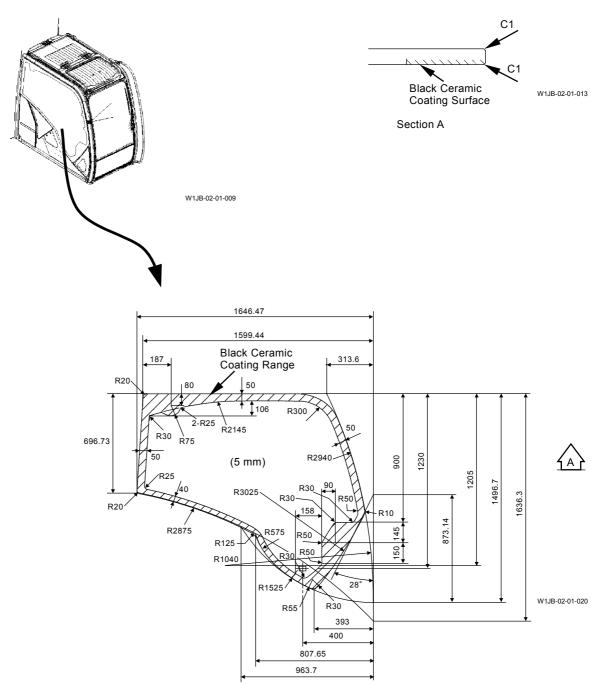




NOTE: Unit: mm (1 mm=0.039 in)







Procedure to Remove Cab Glass

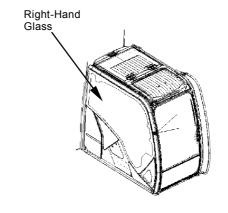
Procedures to Remove Right-Hand Glass, Rear Left Glass, Lower Door Glass and Rear Glass



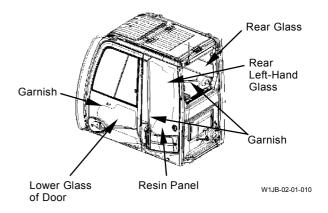
CAUTION: When removing the broken or cracked glass, the glass shards may cause serious injury.

Before removing, use the gummed tape or something like in order to paste the broken or cracked glass and reinforce them. Remove the glass pieces away.

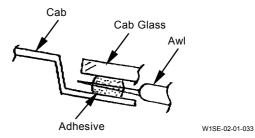
1. Remove the resin panel, garnish, spacer or etc. around the glass.



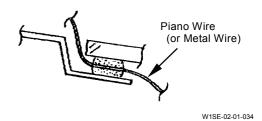
W1JB-02-01-009



2. Prick a hole in the adhesive by using an awl (or cutter knife).

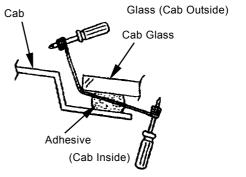


3. Pass a piano wire (or a wire) through the hole.



- 4. Wind the both ends of piano wire onto the screwdriver. Draw the wire back and forth in order to cut the adhesive between cab and glass. Remove the glass from the cab.
- NOTE: Cut off the middle of adhesive between glass and cab.

Piano wire is easily broken if a part of piano wire turns hot. Change the position and cut the adhesive.



W1SE-02-01-035

Procedure to Install Cab Glass

Procedures to Install Right-Hand Glass, Rear Left-Hand Glass, Lower Door Glass and Rear Glass

 Cut off the residual adhesive from cab side by 1 to 2 mm deep all around by using a cutter knife or similar.

NOTE: Do not damage the cab paint.

2. Clean the cutting edge of adhesive at cab side by using white spirit.

IMPORTANT: Primer should be shaken for about 1 minute and mix thoroughly before opening the cap.

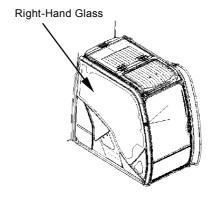
After opening Primer, apply Primer as quickly as possible and replace

the cap immediately after using.

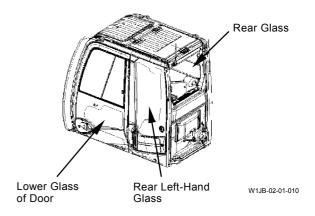
After opening Primer, all the contents should be used within 180 days (or 2 hours with the cap off).

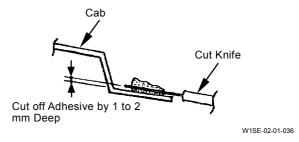
3. Apply Primer for paint (Sika Aktivator DM-1) to the cutting edge of adhesive at cab side by using a brush. Wait for about 15 minutes in order to let it dry by itself.

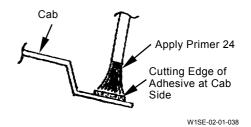
NOTE: The painting primer should be applied evenly in order to leave no blemishes.



W1JB-02-01-009







4. Clean the mating edge of new glass by using clean rag and ethylalcohol.

IMPORTANT: Primer (Sika Primer Z06G+P) should be shaken for about 1 minute and mix thoroughly before opening the cap.

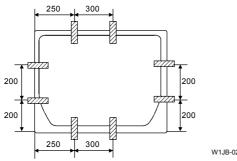
After opening Primer, apply Primer as quickly as possible and replace the cap immediately after using.

After opening Primer, all the contents should be used within 180 days (or 2 hours with the cap off).

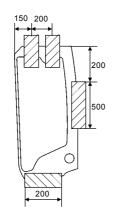
- Apply Primer for glass (Sika Primer Z06G+P) to the cutting edge of adhesive at cab side by using a brush. Wait for about 15 minutes in order to let it dry by itself.
 (As for the position to apply Primer, refer to
 - (As for the position to apply Primer, refer to W2-1-14.)
- Install the spacer with facing to the glass surface by using the instant adhesive.
 (As for the positions to install spacers A, B and C dam rubber, refer to W2-1-17.)
- Cut off the nozzle of adhesive cartridge (Sika Tack-Drive) into V-shaped by using a knife. (Refer to W2-1-17.)
- 8. Remove the seal of cartridge. Install the V-shaped nozzle.
- 9. Install the cartridge to the manual coking gun.
- 10. Apply adhesive to the adhesive position at cab side so that the bead triangle may be even.(As for the position to apply adhesive refer to W2-1-14.)
- 11. Suck, raise the glass by using sucker lifter 4355282 (refer to W2-1-17), and adhere it to the cab within 5 minutes.
- NOTE: Install the glass while aligning the spacer position on the glass. Remove all adhesive except the mounting surface, before solidifying by using white spirit.
- 12. Secure the glass by using the gummed tape until the adhesive becomes solid in order to prevent them from being mispositioned or coming off.
- NOTE: Time for adhesive (Sika Tack-Drive) to become solid: 8 hours (just for reference)

NOTE: Unit: mm (1 mm=0.039 in)

Rear Glass

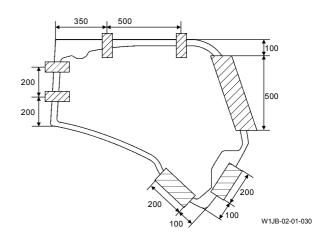


Rear Left-Hand Glass

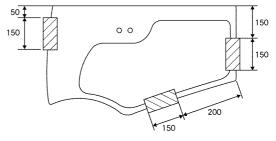


W1JB-02-01-035

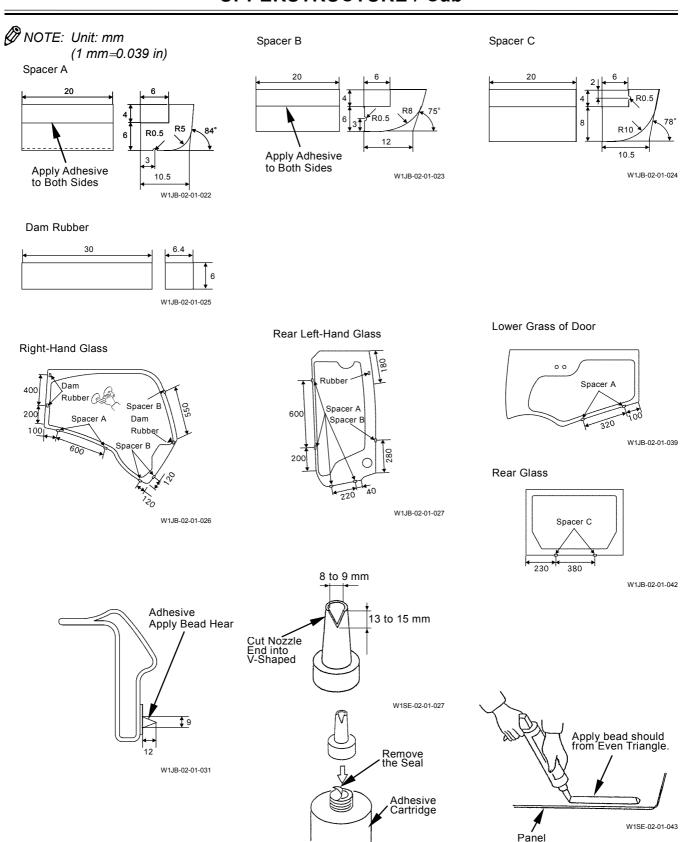
Right-Hand Glass



Lower Glass of Door



W1JB-02-01-038



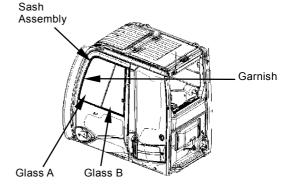
W1SE-02-01-028

13. The required amount (just for reference) of adhesive and primer

		Painted Surface or Adhesive Surface	Glass Surface	
	Adhesive Sika Tack-Drive 310 ml Cratridge	Primer Sika Aktivator DM-1 250 ml Can	Primer Sika Primer 206G+P 30 ml Bottle	
Upper Front Glass	310 ml	0.75 ml	0.67 ml	
Lower Glass of Door	150 ml	0.5 ml	0.45 ml	
Rear Left-Hand Glass	250 ml	0.65 ml	0.6 ml	
Rear Right-Hand Glass	100 ml	1 ml	0.9 ml	
Rear Glass	210 ml	0.5 ml	0.45 ml	

Procedures to Install Upper Door Glass

- 1. Before installing the glass, remove the garnish around sash assembly from the cab inside for easy removal. Push the sash assembly by hands and remove the sash outside.
- 2. Install glass A and glass B into the sash grooves.
- 3. Install the sash assembly, which the glass is installed on, onto the door from the outside of cab. Secure the sash assembly at the inside of cab by using the garnish.



W1JB-02-01-010

Procedures to Install Upper Front Glass

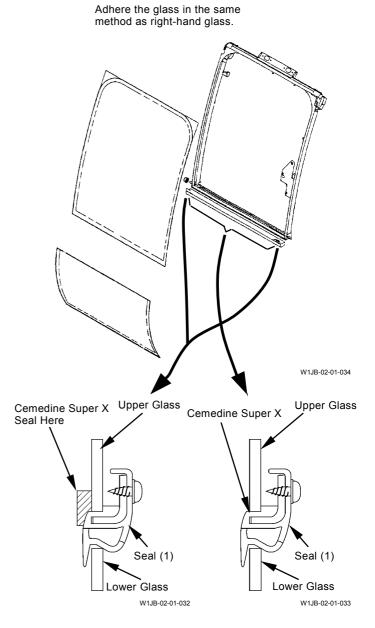
1. Stick seal (1) to the lower side of front upper glass by using Cemedine Super X.

Stick and secure both right and left ends (the thicker part) of seal (1) to the glass by using Cemedine Super X.

Stick the mating surface of seal (1) and the glass by using Cemedine Super X so that no visible undulation or boss can be found.

NOTE: Cemedine Super X Black No.8008
Glue-state adhesive, tubed

IMPORTANT: The upper front glass is arched-fringed. When replacing the glass, contact with the nearest HITACHI Office and replace it as an assembly.



UPPERSTRUCTURE / Cab								
(Blank)								

UPPERSTRUCTURE / Counterweight

REMOVE AND INSTALL COUNTERWEIGHT

Removal



CAUTION: Counterweight weight: 9150 kg (20200 lb)

1. Attach a lifting tool, wire rope and chain block to the lifting hole on counterweight in order to hold. Adjust the wire rope length by using the chain block and make the counterweight horizontal.



CAUTION: Do not stay under the lifted counterweight.

2. Remove bolts (13), spring washers (14) and washers (11) (11 used for each). Remove covers (11, 12) from the main frame.



CAUTION: When using a power wrench, do not injure hands by the reaction bar.

3. Loosen bolt (10) by using a power wrench. Remove bolts (10) (2 used), washers (9) (2 used), nuts (7) (2 used), shim (6) and washers (8) (2 used).

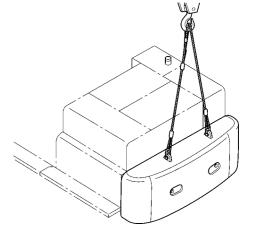
→ : 65 mm

NOTE: Shim (6) is installed in the clearance between nut (7) and the bracket.

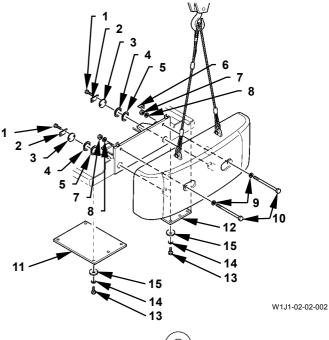
4. Remove bolts (1) (4 used), lock washers (2) (2 used), plates (3) (2 used) and shims (4, 5) from the counterweight.

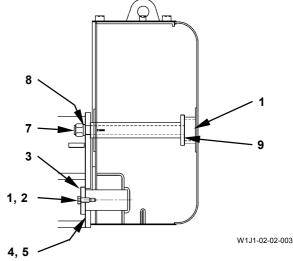
→ : 36 mm

5. Hoist and remove the counterweight from the main frame.



W1J1-02-02-001





UPPERSTRUCTURE / Counterweight

Installation



CAUTION: Counterweight weight: 9150 kg (20200 lb)

 Attach a lifting tool, wire rope and chain block to the lifting hole on counterweight in order to hoist. Adjust the wire rope length by using the chain block and make the counterweight horizontal.



CAUTION: Do not stay under the lifted counterweight.

2. Install the projection of counterweight to the hole on bracket.



CAUTION: When using a power wrench, do not injure hands by the reaction bar.

3. Apply lubricant onto bolts (10) (2 used). Install the counterweight to the main frame with bolts (10) (2 used), washers (9) (2 used), washers (8) (2 used), nuts (7) (2 used) and shims (6). Tighten bolt (10) by using a power wrench.

: 65 mm

: 2350 N·m (240 kgf·m, 1730 lbf·ft)

4. Install the counterweight to the main frame with shims (5, 4), plate (3), lock washer (2) and bolt

: 36 mm

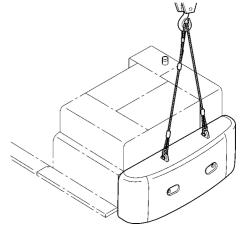
: 440 N·m (45 kgf·m, 325 lbf·ft)

NOTE: Shims (4, 5) are installed in the clearance between plate (3) and the bracket

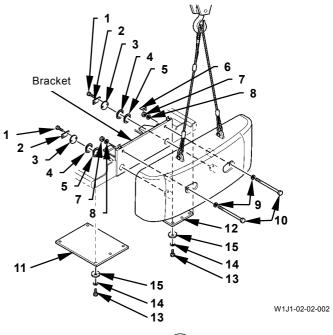
5. Install covers (11, 12) with bolts (13), spring washers (14) and washers (15) (11 used for each).

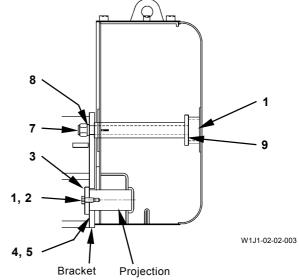
: 19 mm

: 90 N·m (9 kgf·m, 66 lbf·ft)



W1J1-02-02-001





REMOVE AND INSTALL MAIN FRAME

Removal



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



CAUTION: Cab weight: 560 kg (1235 lb)

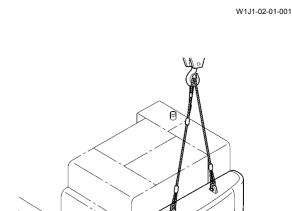
 Remove the cab from the main frame. (Refer to the Remove and Install Cab section on W2-1.)



CAUTION: Counterweight weight: 9150 kg (20200 lb)

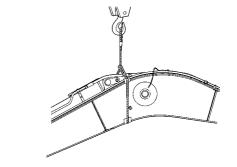
2. Hoist and remove the counterweight from the main frame.

(Refer to the Remove and Install Counterweight section on W2-2.)



0

W1J1-02-02-001



W1JB-02-03-003



CAUTION: Standard front attachment assembly weight: 7920 kg (17470 lb)

3. Remove the front attachment assembly from the main frame.

(Refer to the Remove and Install Front Attachment section on W4-1.)

4. Remove all hoses from center joint (2). Remove lock plate (1).

(Refer to the Remove and Install Center Joint section on W3-3.)



CAUTION: Upperstructure weight: 10800 kg (23800 lb)

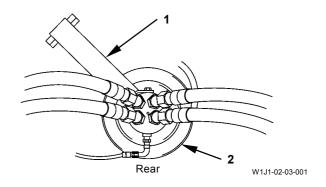
Upperstructure weight with removal / installation device: 11200 kg (24700 lb)

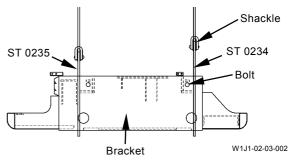
 Install special tools (ST 0234, ST 0235) to the bracket at the mounting position for counterweight with the bolts (M45, Pitch 3.0 mm) and the nuts (2 used).
 Install the shackle (for 4.8 ton) to special tools

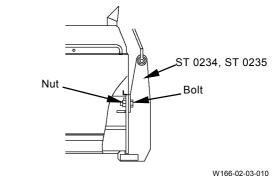
(ST 0234, ST 0235) and attach a wire rope. Attach a wire rope onto the boom bracket. Hoist

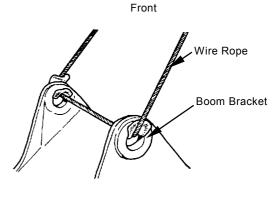
each wire rope by using a chain block.

: 70 mm



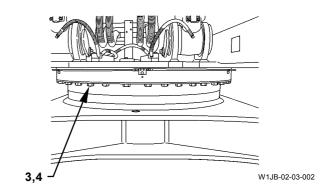


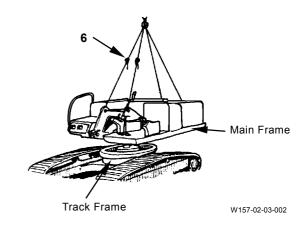




W105-02-03-005

- 6. Remove bolts (3) (29 used) and (4) (7 used) from the outer race of swing bearing.
- Adjust the wire rope length by using a chain block (6) in order to make the counterweight horizontal. Hoist and remove the main frame from the track frame.





Installation



CAUTION: Upperstructure weight: 10800 kg (23800 lb)

Upperstructure weight with removal / installation device: 11200 kg (24700 lb)

- 1. Attach a wire rope onto special tools (ST 0234, ST 0235) and the boom bracket. Adjust the wire rope length by using a chain block (6) and make the counterweight horizontal. Hoist and install the main frame to the track frame.
- 2. Hoist the main frame. Align knock pin holes (5) (2 used) on the main frame with the knock pins (2 used) of outer race in swing bearing.
- 3. Apply LOCTITE #262 to bolts (3) (29 used) and (4) (7 used). Install the main frame with bolts (3) (29 used) and (4) (7 used).

• : 46 mm

: 1950 (199 kgf·m, 1440 lbf·ft)

4. Install all hoses to the upper of center joint (2).

🗲 : 19 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)

• : 27 mm

■ : 78 N·m (8 kgf·m, 58 lbf·ft)

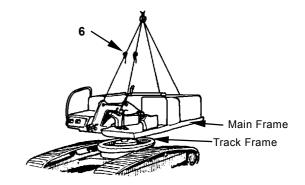
🗲 : 41 mm

: 205 N·m (21 kgf·m, 151 lbf·ft)

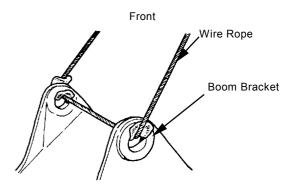
5. Install lock plate (1) to center joint (2). (Refer to the Remove and Install Center Joint section on W3-3.)

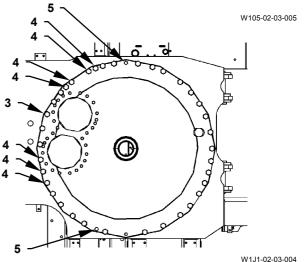
• : 22 mm

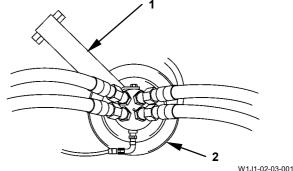
: 140 N·m (14 kgf·m, 103 lbf·ft)



W157-02-03-002



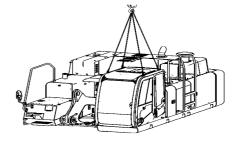






CAUTION: Cab weight: 560 kg (1235 lb)

6. Install the cab to the center frame. (Refer to the Remove and Install Cab section on W2-1.)



W1.I1-02-01-001



CAUTION: Counterweight weight: 9150 kg (20200 lb)

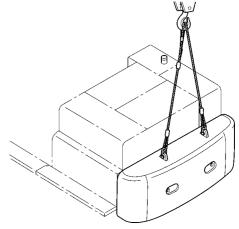
7. Install the counterweight to the main frame. (Refer to the Remove and Install Counterweight section on W2-2.)



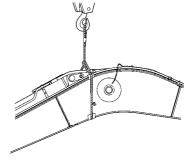
CAUTION: Front attachment assembly weight: 7920 kg (17470 lb)

8. Install the front attachment assembly to the main frame. (Refer to the Remove and Install Front Attachment section on W4-1.)

9. Add hydraulic oil into the hydraulic oil tank. Start the engine. Set the front attachment in posture for checking hydraulic oil level in its tank. Check the hydraulic oil level and any oil leakage.



W1J1-02-02-001



W1JB-02-03-003



M104-07-021

(Blank)

REMOVE AND INSTALL PUMP DEVICE



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

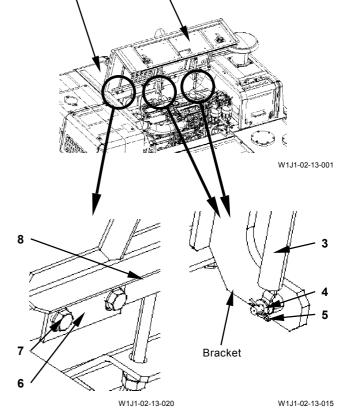
Removal

Open engine cover (2). Remove lock pins (5) (2 used) and washers (4) (2 used). Remove stays (3) (2 used) from the bracket. Lay down engine cover (2) to the muffler cover (1) side.



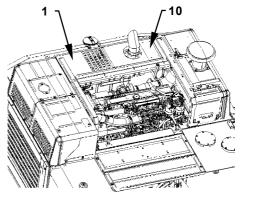
CAUTION: Engine cover (2) weight: 32kg (70 lb)

2. Remove bolts (7) (8 used) from hinges (6) (4 used). Remove engine cover (2) from bracket (8).



3. Remove bolts (10) (8 used). Remove Muffler cover (1).

: 19 mm



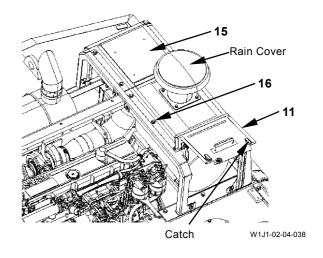
W1J1-02-13-003

A CAUTION: Cover (15) weight: 32 kg (70 lb)

4. Remove catches (2). Open cover (11). Remove bolts (16) (11 used). Remove cover (15).

: 19 mm

NOTE: Remove cover (15) with cover (11) and the rain cover attached.



5. Remove bolts (21) (4 used). Remove bracket (8) from bracket (22).

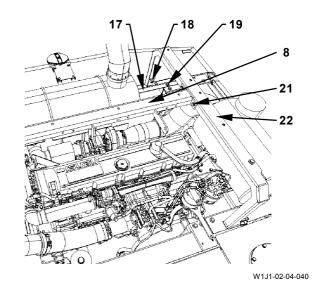
: 19 mm

6. Remove bolts (18) (3 used). Remove bracket

: 19 mm

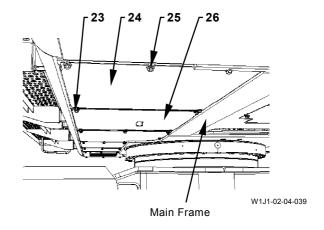
7. Remove bolts (19) (4 used). Remove bracket

🗲 : 19 mm



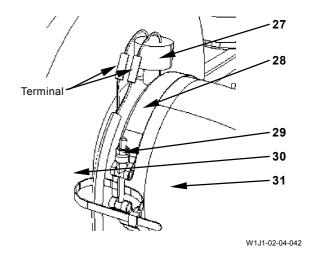
8. Remove bolts (23, 25) (5 used for each). Remove under covers (24, 26) from the main frame.

: 19 mm



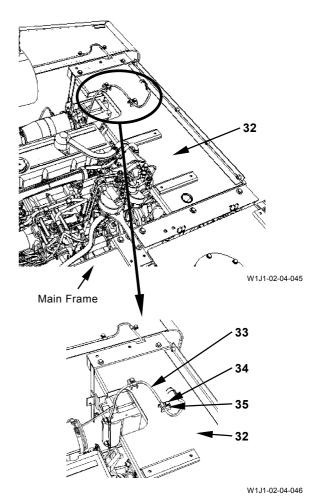
9. Loosen nut (29) and move band (28) to the center of hose (31). Remove the terminals (2 used) of contamination sensor (27). Remove hose (31) from air cleaner (30).

→ : 11 mm



10. Remove bolts (34) (2 used). Remove clamps (35) (2 used) from bracket (32).

→ : 17 mm



- 11. Open and lock the pump cover.
- 12. Remove bolts (40) (2 used). Remove the harness from cover (39).

→ : 17 mm

13. Remove bolts (37) (18 used) and (42). Remove covers (36, 38, 39, 41).

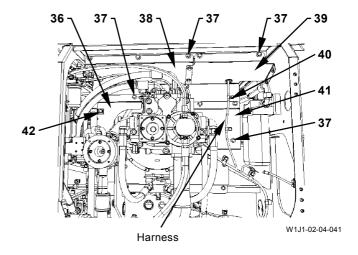
: 19 mm

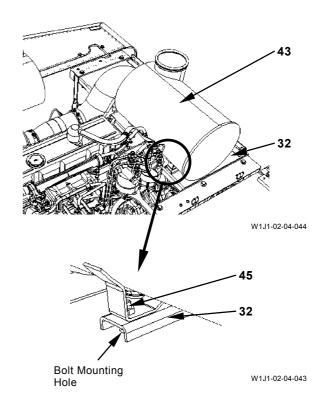


CAUTION: Air cleaner (38) weight: 35 kg (77 lb)

14. Remove bolts (45) (4 used) from the bolt mounting hole at pump space side. Attach a nylon sling onto air cleaner (43). Hoist and remove air cleaner (43) from bracket (32).

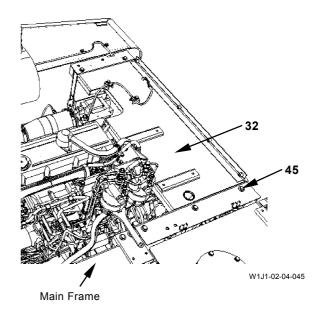
→ : 17 mm





15. Remove bolts (45) (5 used). Remove bracket (32).

: 19 mm



16. Remove socket bolts (52, 57) (4 used for each). Remove pipes (53, 58) from the pump device.

: 14 mm

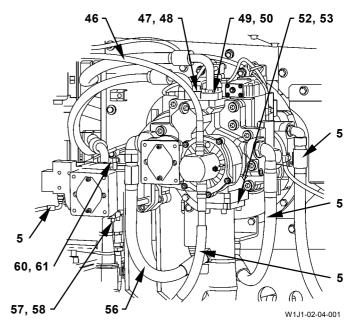
17. Remove socket bolts (47, 49, 60) (4 used for each). Remove hoses (48, 50, 61) from the pump device.

: 10 mm

18. Remove hoses (46, 51, 54, 55, 56, 59). Cap the hose and pump. Attach identification tags to the removed hoses for reassembling.

• 17 mm, 19 mm, 27 mm, 36 mm, 41 mm

19. Remove all the connectors from the pump device.





CAUTION: Pump device weight: 290 kg (640 lb)

20. Attach a wire rope onto eyebolts (2 used) in the pump device and hold the pump device.

IMPORTANT: The engine is connected to the pump device through the coupling. When removing the pump device from the engine, slide the pump device to 50 mm (2.0 in) in parallel to the shaft.

21. Put the matching marks on the mating surfaces on engine and pump device. Remove bolts (62) (8 used), (65) (2 used), spring washers (63) (10 used) and washers (64) (10 used). Hoist and remove the pump device from the engine.

: 19 mm

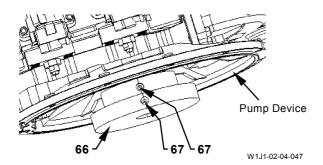
IMPORTANT: When removing the pump device from the engine, remove the coupling of engine and pump device together. Do not reuse the coupling.

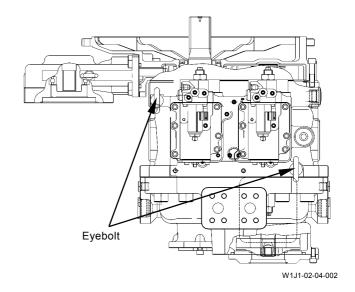
22. Remove socket bolts (67) (2 used) from coupling (66) in the pump device. Remove coupling (66) from the pump device.

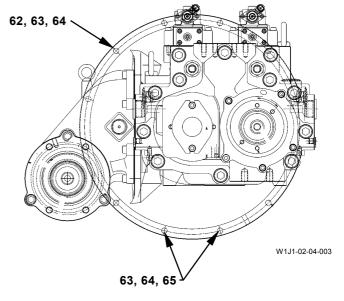
: 12 mm

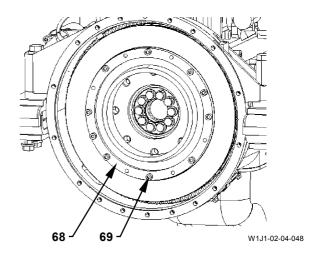
23. Remove socket bolts (69) (10 used) from coupling (68) in the engine. Remove coupling (68) from the engine.

: 8 mm









Installation

IMPORTANT: When removing the pump device from the engine, replace the coupling of engine and pump device.

Do not reuse the coupling.

1. Apply LOCTITE #262 to socket bolts (69) (10 used). Install coupling (68) to the engine with socket bolts (69) (10 used).

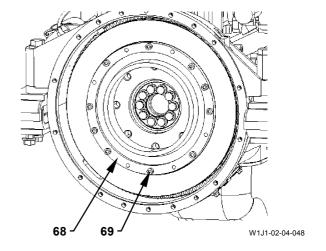
: 8 mm

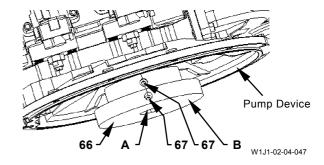
: 49 N·m (5.0 kgf·m, 36 lbf·ft)

2. Insert coupling (66) until spline end surface (A) in the pump device comes in contact with hub end surface (B) in coupling (66). Install coupling (66) to the pump device with socket bolts (67) (2 used).

: 12 mm

: 150 N·m (15.3 kgf·m, 110 lbf·ft)







CAUTION: Pump device weight: 290 kg (640 lb)

- 3. Attach a wire rope onto eyebolts (2 used) in the upper surface on pump. Hoist the pump device and insert coupling (66) in the pump device into coupling (68) in the engine. Align the matching marks made when disassembling on engine and pump device.
- 4. Apply LOCTITE #262 to socket bolts (62) (8 used) and (65) (2 used). Install the pump device to the engine with bolts (62) (8 used), (65) (2 used), spring washers (63) (10 used) and washers (64) (10 used).

: 19 mm

: 98 N·m (10 kgf·m, 72 lbf·ft)

5. Install pipes (53, 58) with socket bolts (52, 57) (4 used for each). Install hoses (48, 50, 61) with socket bolts (47, 49, 60) (4 used for each).

- : 10 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

: 14 mm

: 210 N·m (21.5 kgf·m, 155 lbf·ft)

6. Install hoses (46, 51, 54, 55, 56, 59) and the connector.

• 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

→ : 19 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)

• 27 mm

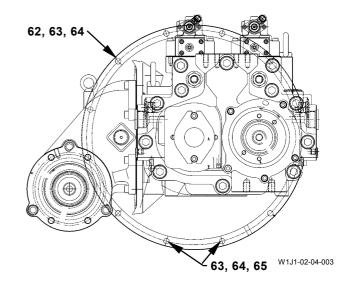
: 93 N·m (9.5 kgf·m, 69 lbf·ft)

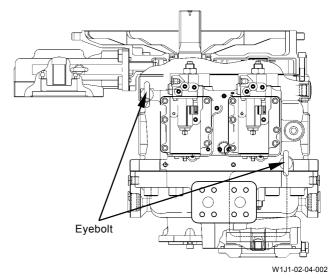
: 36 mm

: 180 N·m (18 kgf·m, 133 lbf·ft)

🕶 : 41 mm

: 210 N·m (21 kgf·m, 155 lbf·ft)



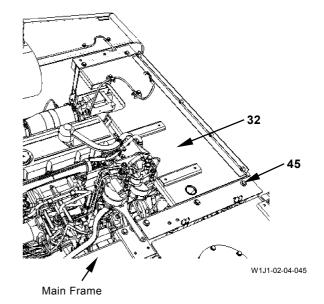


46 47, 48 49, 50 52, 53 50, 61 55 57, 58 56 W1J1-02-04-001

7. Install bracket (44) to the main frame with bolts (45) (5 used).

: 19 mm

■ : 90 N·m (9.2 kgf·m, 66 lbf·ft)



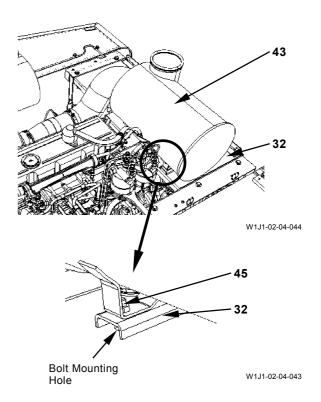
CAUTION: Air cleaner (38) weight: 35 kg (77

8. Apply LOCTITE #262 to bolts (45) (4 used). Attach a nylon sling onto air cleaner (38). Hoist and move air cleaner (38) to the mounting position for bracket (44). Install air cleaner (43) to bracket (32) with bolts (45) (4 used).

: 17 mm

=== : 50 N·m (5.1 kgf·m, 37 lbf·ft)

NOTE: Install bolts (45) (4 used) through the bolt mounting hole at pump space side.



9. Install covers (36, 38, 39, 41) with bolts (37) (18 used) and (42).

: 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

→ : 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

10. Install harness (33) and the clamps (2 used) with bolts (40) (2 used). Pass harness (33) through the hole on cover (39).

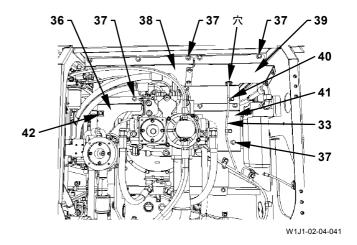
: 17 mm

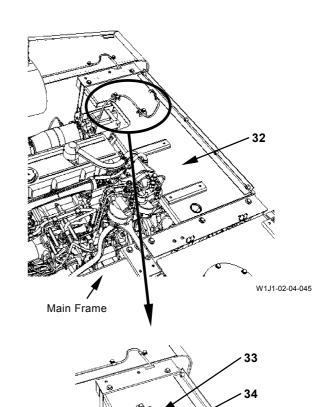
: 50 N·m (5.1 kgf·m, 37 lbf·ft)

11. Install harness (33) with clamp (35) and bolts (34) (2 used).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)





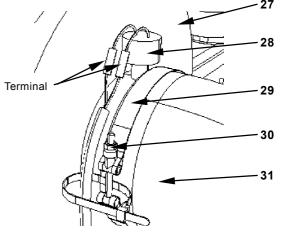


32

12. Install hose (31) to air cleaner (27). Tighten band (29) with nut (30).

: 11 mm

13. Install the terminals (2 used) of contamination sensor (28).



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14. Install bracket (17) with bolts (19) (4 used).

19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

15. Install bracket (22) with bolts (18) (3 used).

→ : 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

16. Install bracket (8) to bracket (22) with bolts (21) (4 used).

🕹 : 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

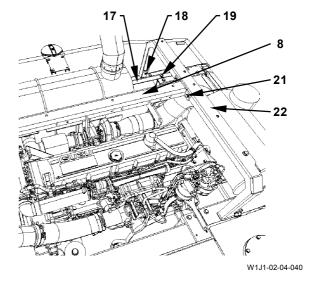
CAUTION: Cover (15) weight: 32 kg (70 lb)

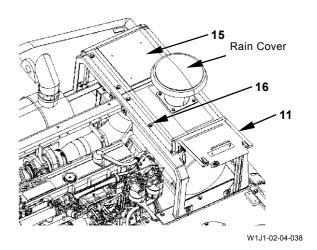
17. Install covers (11, 15) with bolts (16) (11 used).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

NOTE: Cover (11) and the rain cover are attached to cover (15).





18. Install muffler cover (1) with bolts (10) (8 used).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)



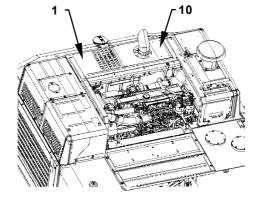
CAUTION: Engine cover (2) weight: 32 kg (70

19. Place engine cover (2) onto muffler cover (1). Install hinges (6) (4 used) to bracket (8) with bolts (7) (8 used).

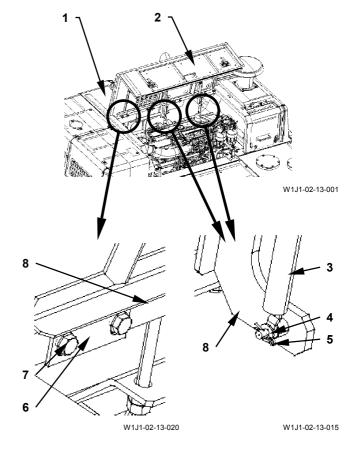
: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

20. Install stays (3) (2 used) to bracket (8) with washers (4) (2 used) and lock pins (5) (2 used).

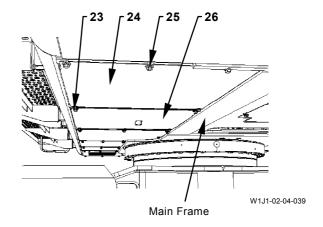


W1J1-02-13-003

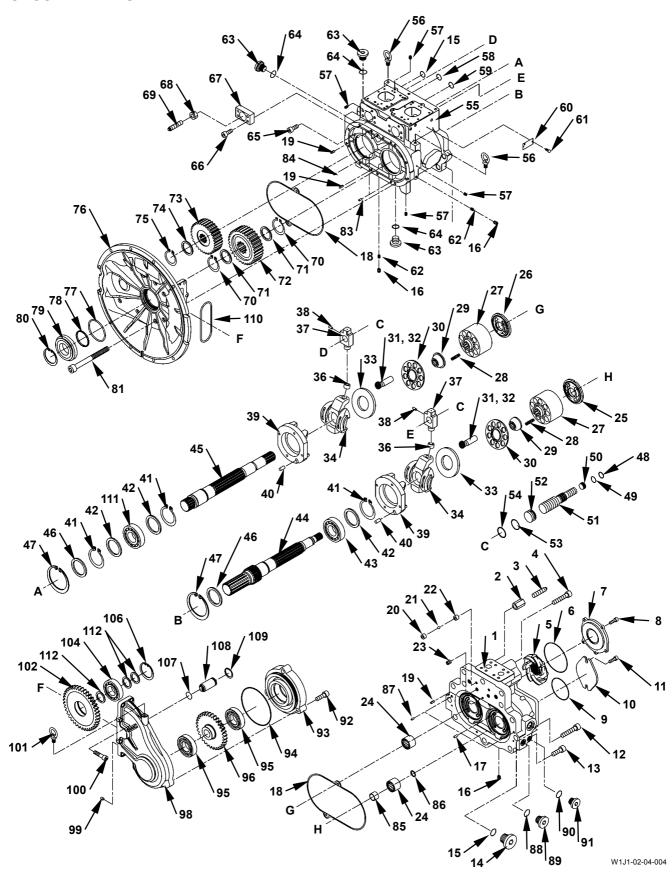


21. Install under covers (24, 26) to the main frame with bolts (23, 25) (5 used for each).

: 90 N·m (9.2 kgf·m, 66 lbf·ft)



DISASSEMBLE PUMP DEVICE



- 1 Valve Cover 2 - Nut (2 Used) 3 - Set Screw (2 Used) 4 - Socket bolt 5 - Booster 6 - O-Ring 7 - Booster Cover 8 - Socket Bolt (5 Used) 9 - O-Ring 10 - Cover
- 11 Socket Bolt (2 Used) 12 - Socket Bolt (2 Used) 13 - Socket Bolt (9 Used) 14 - Plug (2 Used) 15 - O-Ring (2 Used) 16 - Plug (12 Used) 17 - Valve Plate Pin (2 Used) 18 - Seat Packing (2 Used) 19 - Pin (4 Used) 20 - Stopper 1 (2 Used) 21 - Steel Ball (2 Used) 22 - Seat (2 Used)
- 23 Plug (2 Used) 24 - Needle Bearing (2 Used) 25 - Valve Plate R 26 - Valve Plate L 27 - Cylinder Block (2 Used) 28 - Cylinder Spring (18 Used) 29 - Spherical Bushing (2 Used) 30 - Retainer (2 Used)

32 - Plunger (18 Used) 33 - Shoe Plate (2 Used) 34 - Swash Plate (2 Used) 36 - Tilt Bushing (2 Used) 37 - Tilt Pin (2 Used) 39 - Swash Plate Stand (2 Used) 40 - Pin (2 Used)

31 - Shoe (18 Used)

- 38 Feedback Pin (2 Used) 41 - Retaining Ring (3 Used) 43 - Roller Bearing 44 - Drive Shaft 45 - Driven Shaft 47 - Retaining Ring (2 Used) 48 - Backup Ring (2 Used) 49 - O-Ring (2 Used) 50 - Stopper S (2 Used) 51 - Servo Piston (2 Used) 52 - Stopper L (2 Used) 53 - O-Ring (2 Used) 54 - Backup Ring (2 Used) 55 - Pump Casing 56 - Eyebolt (2 Used) 57 - Plug (20 Used) 58 - O-Ring (5 Used) 59 - O-Ring (2 Used) 60 - Name Plate 61 - Rivet (2 Used)
- 42 Bearing Spacer (3 Used) 46 - Bearing Spacer (2 Used)
- 62 Tapered Screw with Orifice (4 Used) 63 - Plug (3 Used) 64 - O-Ring (3 Used) 65 - Socket Bolt (8 Used) 66 - Socket Bolt (8 Used) 67 - Servo Cover (2 Used) 68 - Nut (2 Used) 69 - Set Screw (2 Used) 70 - Retaining Ring (2 Used) 71 - Spacer (2 Used) 72 - Drive Gear 73 - Driven Gear 74 - Spacer 75 - Retaining Ring 76 - Front Casing 77 - O-Ring 78 - Oil Seal 79 - Front Cover 80 - Retaining Ring 81 - Socket Bolt (11 Used) 83 - Pin (4 Used) 84 - Pin 85 - Inner Spacer

87 - Pin (4 Used)

88 - O-Ring (2 Used)

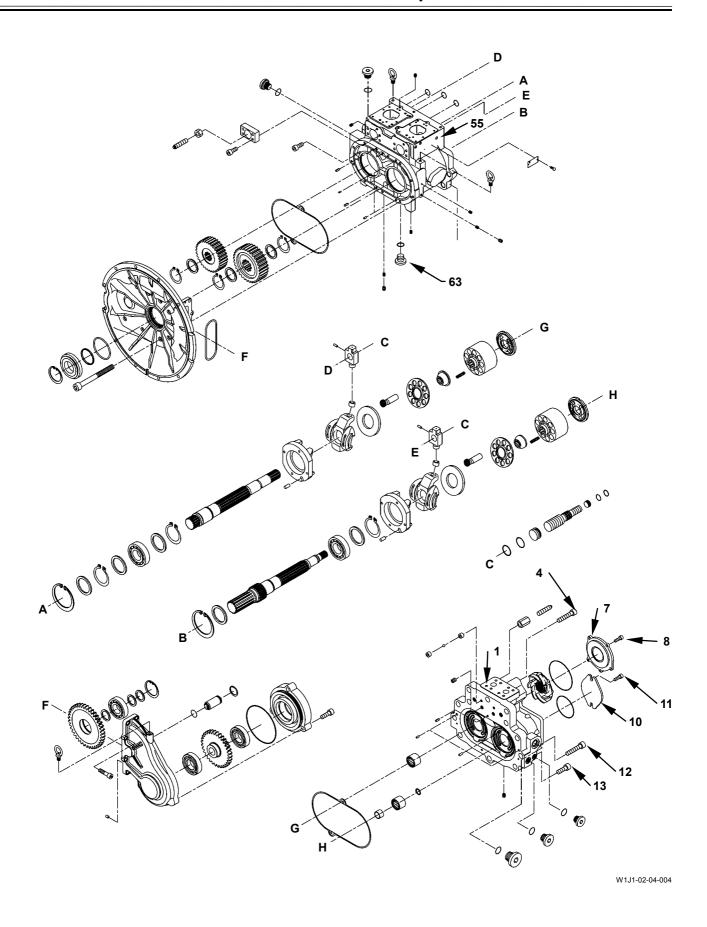
90 - O-Ring (2 Used) 91 - Plug (2 Used)

92 - Socket Bolt (3 Used)

89 - Plug (2 Used)

- 86 Stop Ring
- 93 Transmission Cover 94 - O-Ring
- 95 Needle Bearing (2 Used)
- 96 Drive Gear
- 98 Transmission Housing
- 99 Pin (2 Used)
- 100 Socket Bolt (8 Used)
- 101 Eyebolt
- 102 Relay Gear 104 - Needle Bearing 106 - Retaining Ring 107 - O-Ring 108 - Shaft 109 - Retaining Ring 110 - O-Ring 111 - Roller Bearing

112 - Bearing Spacer (3 Used)



Disassemble Pump Device



CAUTION: The pump assembly weight: 290 kg (640 lb)

- 1. Remove plug (63). Drain oil from pump casing (55).
- 2. Remove the regulators (2 used) in pumps 1, 2 from pump casing (55).
- NOTE: As for removal and disassembly of the regulator, refer to the regulator section on W2-4-39.

The structures of pumps 1, 2 are identical. Put the marks on the regulator in pumps 1,2 in order not to confuse.

- 3. Remove the gear pump (pilot pump) from booster cover (7).
- NOTE: As for removal and disassembly of the gear pump, refer to the gear pump section on W2-4-59.
 - 4. Remove socket bolts (8) (5 used). Remove booster cover (7) from valve cover (1).

: 6 mm

5. Remove socket bolts (11) (2 used). Remove cover (10) from valve cover (1).

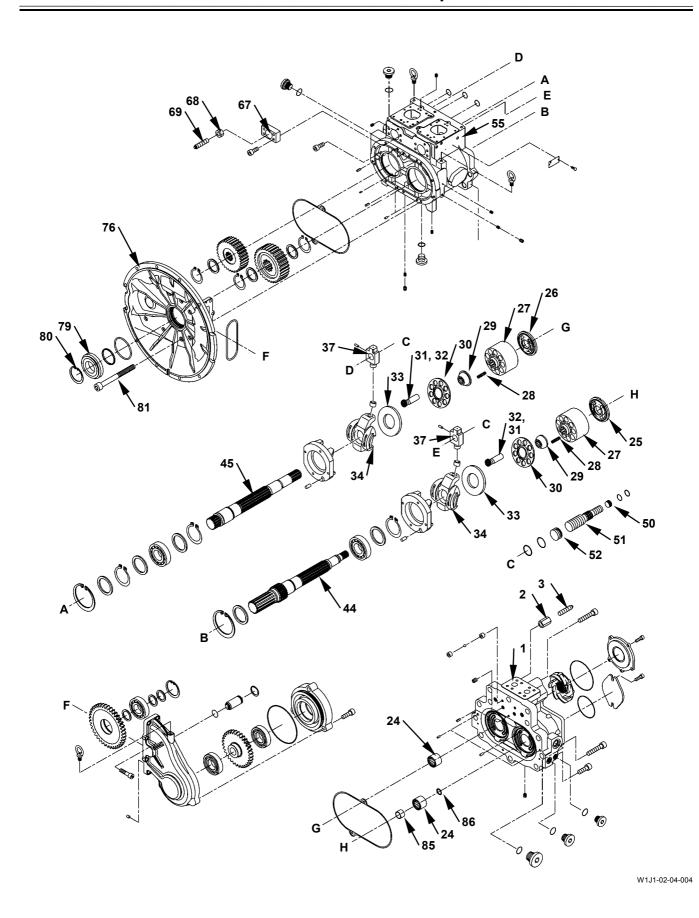
: 8 mm



CAUTION: Valve Cover (1) weight: 60 kg (130 lb)

- Install eyebolt (M12, pitch 1.75 mm) to the bolt hole on valve cover (1). Hoist and hold the eyebolt.
- 7. Remove socket bolts (4) (1 used), (12) (2 used) and (13) (9 used) from valve cover (1). Tap and remove valve cover (1) from pump casing (55) by using a plastic hammer.

: 17 mm



IMPORTANT: Do not remove needle bearing (24) unless replacing needle bearing (4).

- 8. Remove stop ring (86), inner spacer (85) and valve plate (25) from drive shaft (44). Remove valve plate (26) from driven shaft (45).
- 9. Remove plungers (32, 31), retainer (30), spherical bushing (29) and the cylinder block (27) assembly attached with cylinder spring (28) from drive shaft (44) and driven shaft (45) in pump casing (55).
- 10. Remove shoe plates (33) (2 used) from swash plates (34) (2 used).
- 11. Remove swash plates (34) (2 used) from pump casing (55).

IMPORTANT: Adhesive (THREEBOND #1305N) is applied to the mating part of tilt pin (37) and servo piston (51).

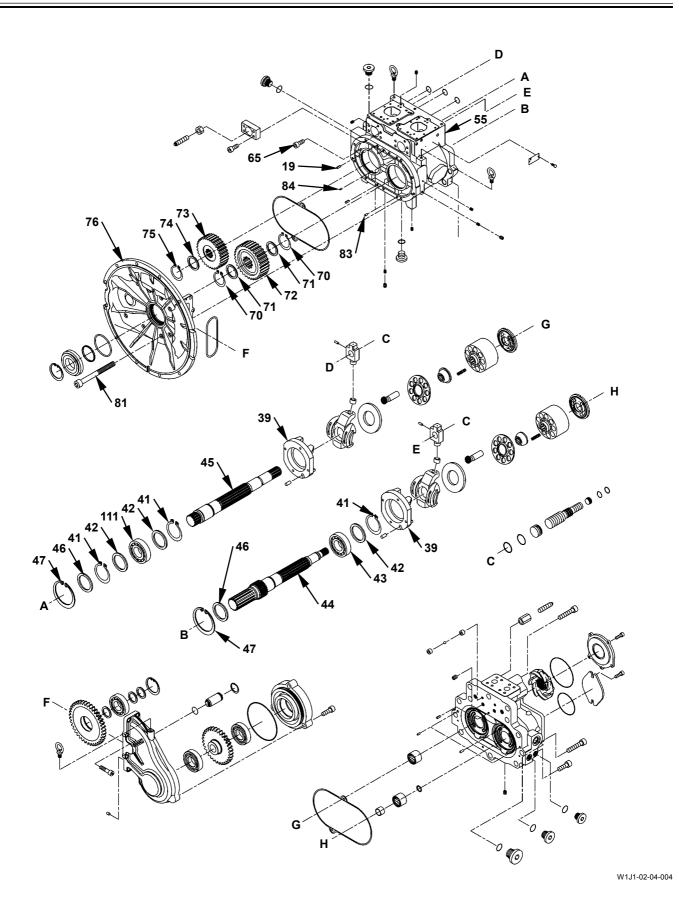
Do not loosen nuts (2, 68). When loosen nuts (2, 68) and rotating set screws (3, 69), flow rate is changed.

12. Remove stopper L (52), stopper R (50), servo piston (51), tilt pin (37) and servo cover (67) from pump casing (55).

: 10 mm

13. Remove retaining ring (80) and front cover (79) from front casing (76).

NOTE: Attach a screwdriver to the outer surface groove and pull out front cover (79).





CAUTION: Front casing (76) weight: 32 kg (70 lb)

14. Attach a lifting tool onto the bolt hole mounting the engine and hold front casing (76). Remove socket bolts (81) (12 used). Hoist and remove front casing (76) from pump casing (55).

: 10 mm

NOTE: Pins (19) (2 used), (83, 84) are located between front casing (76) and pump casing (55). When the mating part of front casing (76) and pump casing (55) is secured tight, tap and remove front casing (76) by using a plastic hammer.

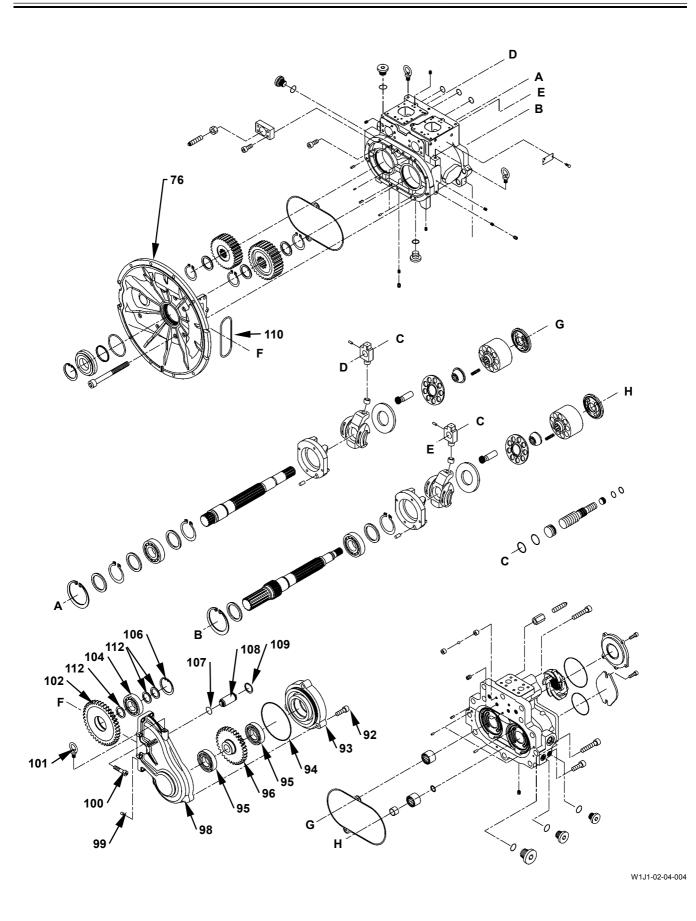
- 15. Remove retaining rings (70) (2 used), bearing spacers (71) (2 used) and drive gear (72) from drive shaft (44).
- 16. Remove retaining ring (75), bearing spacer (74) and driven gear (73) from driven shaft (45).
- 17. Remove retaining ring (47) and bearing spacer (46) from drive shaft (44). Remove retaining ring (47), bearing spacer (46), retaining ring (41) and bearing spacer (42) from driven shaft (45).
- 18. Tap the shaft end by using a plastic hammer and remove drive shaft (44) and driven shaft (45) from pump casing (55).

IMPORTANT: Do not remove roller bearings (43, 111) unless replacing roller bearings (43, 111). Attach a plate onto the outer ring of roller bearings (43, 111) and push out by using a press.

19. When replacing roller bearings (43, 111) in drive shaft (44) or driven shaft (45), remove retaining ring (41), bearing spacer (42) and roller bearing (43, 11).

20. Remove socket bolts (65) (8 used). Remove swash plate stands (39) (2 used) from pump casing (55).

: 6 mm





CAUTION: Fan pump Transmission weight:

28 kg (62 lb)

Fan pump weight: 51 kg (112 lb)

- 21. Hoist and hold eyebolt in the fan pump. Remove the socket bolts (4 used) mounting the fan pump. Remove the fan pump from transmission housing (98). (Refer to "Disassemble Fan Pump" on W2-4-49.)
- 22. Hoist and hold eyebolt (101).
- 23. Remove socket bolts (100) (8 used). Remove transmission housing (98) from front casing (76).

_____ : 10 mm

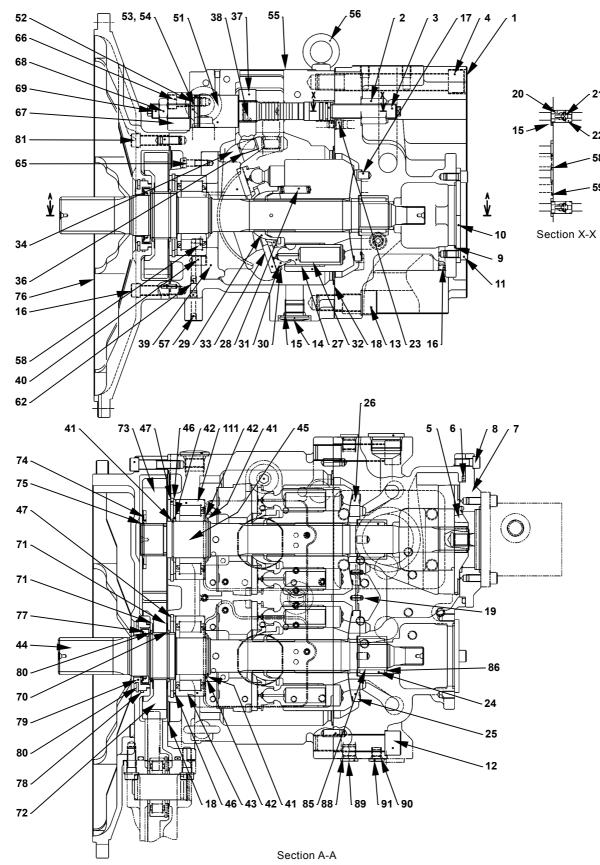
- 24. Remove retaining ring (109) and shaft (108) from transmission housing (98).
- 25. Remove the relay gear (102) assembly attached with bearing spacers (112) (3 used) and needle bearing (104) from transmission housing (98).
- 26. Remove bearing spacers (112) (3 used). Remove retaining ring (106) from relay gear (102).
- 27. Remove needle bearing (104) from relay gear (102).
- 28. Remove socket bolts (92) (3 used). Remove transmission cover (93) from transmission housing (98).

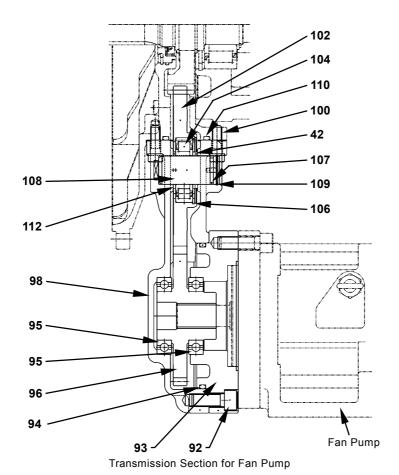
: 14 mm

IMPORTANT: Do not remove needle bearing (95) from transmission cover (93) and transmission housing (98) unless replacing.

29. Remove drive gear (96).

ASSEMBLE PUMP DEVICE





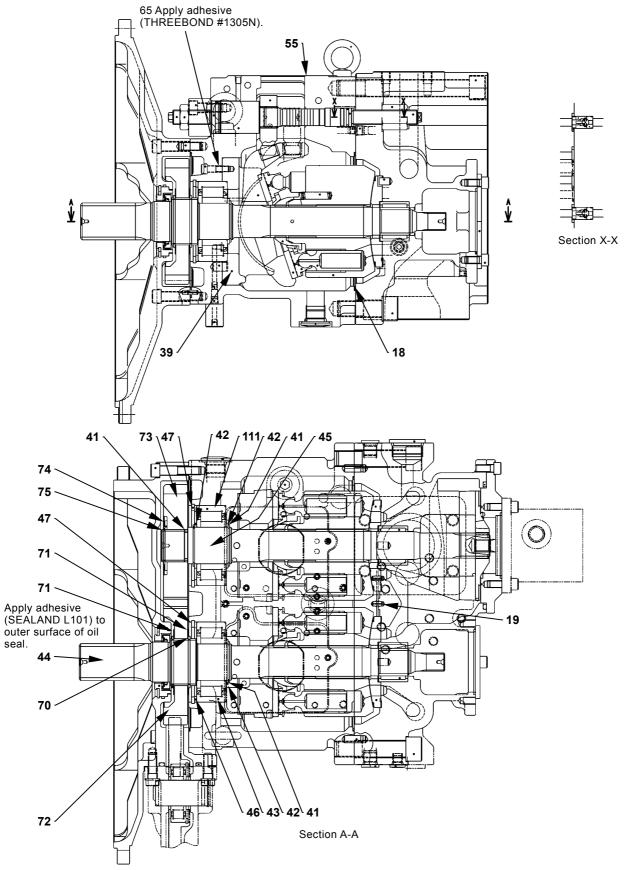
W1J1-02-04-013

- 1 Valve Cover
- Nut (2 Used)
- Set Screw (2 Used)
- Socket bolt 4 -
- 5 Booster
- 6 O-Ring
- 7 Booster Cover
- 8 Socket Bolt (5 Used)
- 9 O-Ring
- 10 Cover
- 11 Socket Bolt (2 Used)
- 12 Socket Bolt (2 Used)
- 13 Socket Bolt (9 Used)
- 14 Plug (2 Used)
- 15 O-Ring (2 Used)
- 16 Plug (12 Used)
- 17 Valve Plate (2 Used)
- 18 Seat Packing (2 Used)
- 19 Pin (4 Used)
- 20 Stopper 1 (2 Used)
- 21 Steel Ball (2 Used)
- 22 Seat (2 Used)
- 23 Plug (2 Used)
- 24 Needle Bearing (2 Used)
- 25 Valve Plate R
- 26 Valve Plate L
- 27 Cylinder Block (2 Used)
- 28 Cylinder Spring (18 Used)
- 29 Spherical Bushing (2 Used)
- 30 Retainer (2 Used)

- 31 Shoe (18 Used)
- 32 Plunger (18 Used)
- 33 Shoe Plate (2 Used)
- 34 Swash Plate (2 Used)
- 36 Tilt Bushing (2 Used)
- 37 Tilt Pin (2 Used)
- 38 Feedback Pin (2 Used) 39 - Swash Plate Stand (2 Used)
- 40 Pin (2 Used)
- 41 Retaining Ring (3 Used)
- 42 Bearing Spacer (3 Used)
- 43 Roller Bearing
- 44 Drive Shaft
- 45 Driven Shaft
- 46 Bearing Spacer (2 Used)
- 47 Retaining Ring (2 Used)
- 48 Backup Ring (2 Used)
- 49 O-Ring (2 Used)
- 50 Stopper S (2 Used)
- 51 Servo Piston (2 Used)
- 52 Stopper L (2 Used)
- 53 O-Ring (2 Used)
- 54 Backup Ring (2 Used)
- 55 Pump Casing
- 56 Eyebolt (2 Used)
- 57 Plug (20 Used) 58 - O-Ring (5 Used)
- 59 O-Ring (2 Used)
- 60 Name Plate
- 61 Rivet (2 Used)

- 62 Tapered Screw with Orifice (4 Used)
- 63 Plug (3 Used)
- 64 O-Ring (3 Used)
- 65 Socket Bolt (8 Used)
- 66 Socket Bolt (8 Used) 67 - Servo cover (2 Used)
- 68 Nut (2 Used)
- 69 Set Screw (2 Used) 70 - Retaining Ring (2 Used)
- 71 Spacer (2 Used)
- 72 Drive Gear
- 73 Driven Gear
- 74 Spacer
- 75 Retaining Ring
- 76 Front Casing
- 77 O-Ring
- 78 Oil Seal
- 79 Front Cover
- 80 Retaining Ring
- 81 Socket Bolt (11 Used)
- 83 Pin (4 Used)
- 84 Pin
- 85 Inner Spacer
- 86 Stop Ring
- 87 Pin (4 Used)
- 88 O-Ring (2 Used)
- 89 Plug (2 Used)
- 90 O-Ring (2 Used)
- 91 Plug (2 Used) 92 - Socket Bolt (3 Used)

- 93 Transmission Cover
- 94 O-Ring
- 95 Needle Bearing (2 Used)
- 96 Drive Gear
- 98 Transmission Housing
- 99 Pin (2 Used)
- 100 Socket Bolt (8 Used)
- 101 Eyebolt
- 102 Relay Gear
- 104 Needle Bearing
- 106 Retaining Ring
- 107 O-Ring
- 108 Shaft
- 109 Retaining Ring
- 110 O-Ring
- 111 Roller Bearing
- 112 Bearing Spacer (3 Used)



W1J1-02-04-005

Assemble Pump Device

- 1. Apply adhesive (THREEBOND #1305N) onto the thread part of socket bolts (65) (8 used).
- 2. Install swash plate stand (39) to pump casing (55) with socket bolts (65) (8 used).

: 6 mm

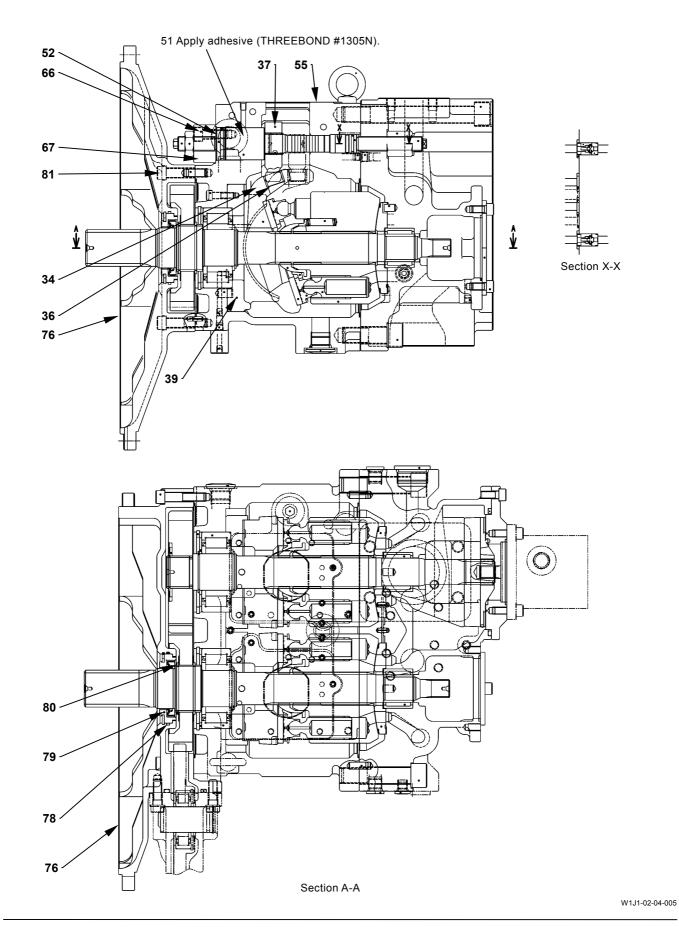
: 34 N·m (3.5 kgf·m, 25 lbf·ft)

- 3. Install roller bearing (43), bearing spacer (42) and retaining ring (41) to drive shaft (44).
- 4. Install drive shaft (44) to pump casing (55). Tap the outer ring by using a plastic hammer and install roller bearing (43) completely. Install bearing spacer (46) and retaining ring (47).
- 5. Install retaining ring (70), spacer (71), drive gear (72), bearing spacer (71) and retaining ring (70) to drive shaft (44).
- 6. Install retaining ring (41), bearing spacer (42), roller bearing (111), bearing spacer (42) and retaining ring (41) to driven shaft (45).
- 7. Install driven shaft (45) to pump casing (55). Tap the outer ring by using a plastic hammer and install roller bearing (111) completely.
- 8. Install bearing spacer (46) and retaining ring (47) to driven gear (45).
- 9. Install driven gear (73), spacer (74) and retaining ring (75) to driven shaft (45).



CAUTION: Front casing weight: 32 kg (70 lb)

- 10. Install pins (19) (2 used), (83, 84) to pump casing (55).
- 11. Apply grease onto the seat packing (18) mounting surface of pump casing (55). Install seat packing (18) to pump casing (55).

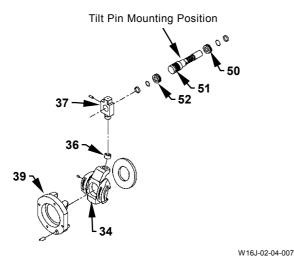


12. Install front casing (76) to pump casing (55) with socket bolts (81) (8 used).

: 10 mm

: 98 N·m (10 kgf·m, 72 lbf·ft)

- NOTE: When it is difficult to install front casing (76), tap and install front casing (76) by using a plastic hammer.
- 13. Apply grease to the lip part in oil seal (78). Install oil seal (78) to front cover (79).
- 14. Install front cover (79) and retaining ring (80) to front casing (76).
- 15. Apply adhesive (THREEBOND #1305N) to the thread part in servo piston (51).
- 16. Apply adhesive (THREEBOND #1305N) to the mounting position for tilt pin in servo piston (51).
- 17. Install servo piston (51), tilt pin (37), stopper L (52) and stopper R (50) to pump casing (55).

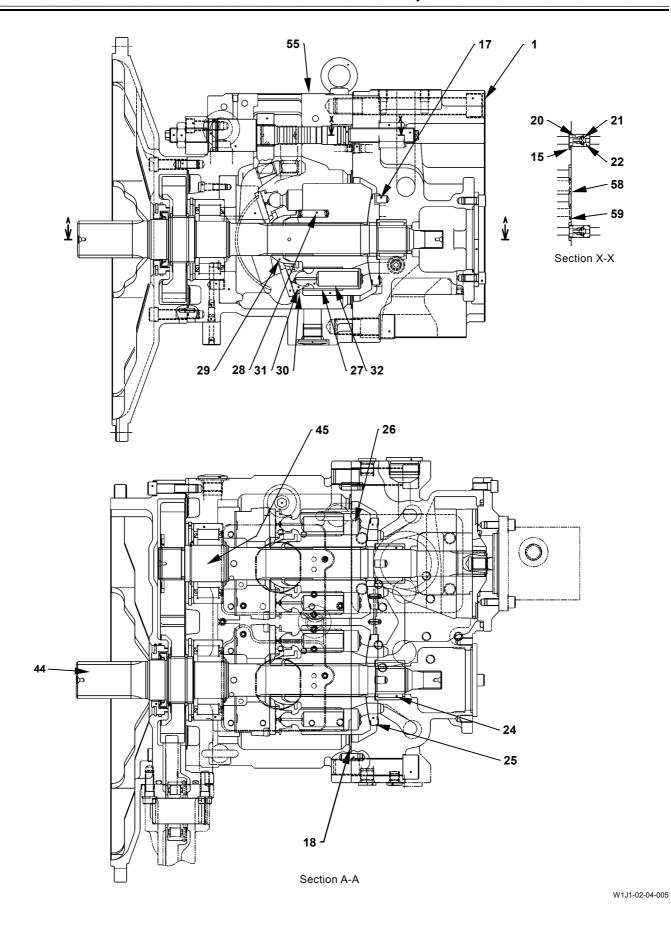


18. Install servo cover (67) onto pump casing (55) with socket bolt (66).

: 10 mm

: 98 N·m (10 kgf·m, 72 lbf·ft)

19. Install tilt bushing (36) of swash plate (34) to tilt pin (37). Install swash plate (34) onto swash plate stand (39). Check if swash plate (34) moves smoothly.

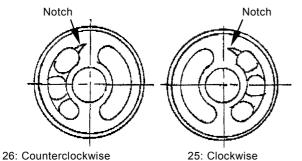


- 20. Install the plunger assemblies (31, 32), retainer (30), spherical bushing (29) and cylinder spring (28) to cylinder block (27) in drive shaft (44) and driven shaft (45).
- 21. Align the splines and install spherical bushings (29) (2 used) and the cylinder block (27) assembly to pump casing (55).

IMPORTANT: The directions to install valve plates (25, 26) at the drive shaft (44) side and driven shaft (45) side are different.

Drive side: Clockwise

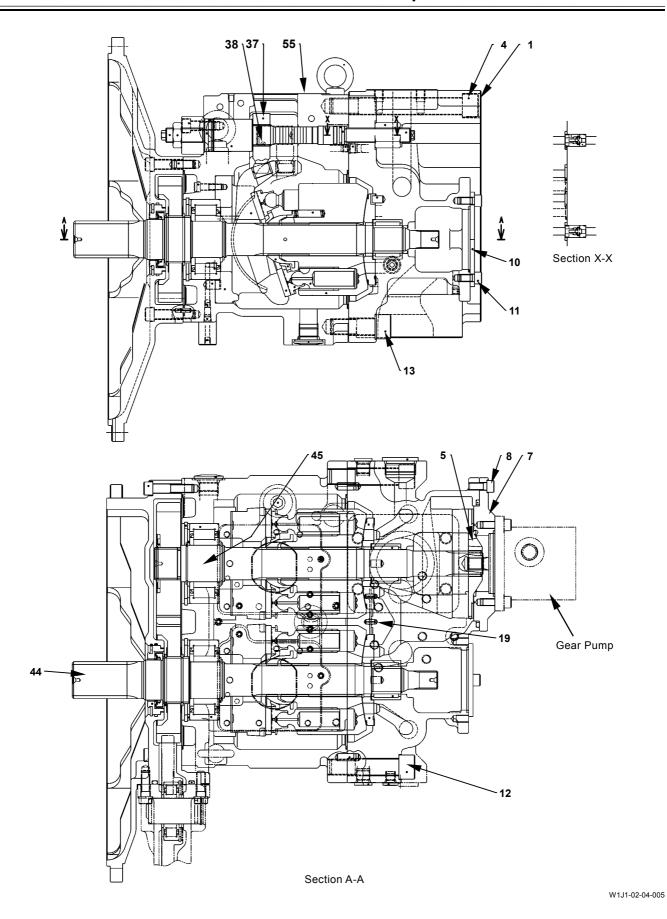
Drivenside: Counterclockwise



Valve Plate Check

W16J-02-04-015

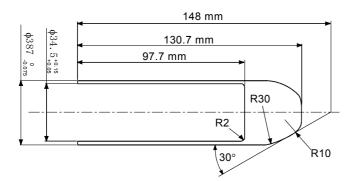
- 22. Align the valve plate pin (17) positions and install valve plates (25, 26) to valve cover (1).
- 23. Install check valves (21, 20, 22) to valve cover (1).
- 24. When replacing needle bearing (24), install needle bearing (24) to valve cover (1) in drive shaft (44) and driven shaft (45).
- 25. Install O-rings (15, 58, 59) and seat packing (18) to valve cover (1) in pump casing (55).

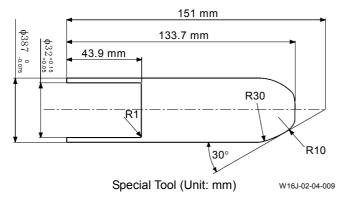




CAUTION: Valve cover (1) weight: 60 kg (130 lb)

26. Install special tool to the end of drive shaft (44) and driven shaft (45).





- 27. Install pins (19) (2 used) to valve cover (1). Tap and install valve cover (1) to pump casing (55) by using a plastic hammer.
- 28. Install valve cover (1) to pump casing (55) with socket bolts (4) (1 used), (12) (2 used) and (13) (9 used).

: 17 mm

: 630 N·m (64 kgf·m, 465 lbf·ft)

29. Install booster (5) to valve cover (1). Install O-ring (6) to booster cover (7). Install booster cover (7) to valve cover (1) with socket bolts (8) (4 used). Install O-ring (9) to cover (10). Install cover (10) to valve cover (1) with socket bolts (11) (2 used).

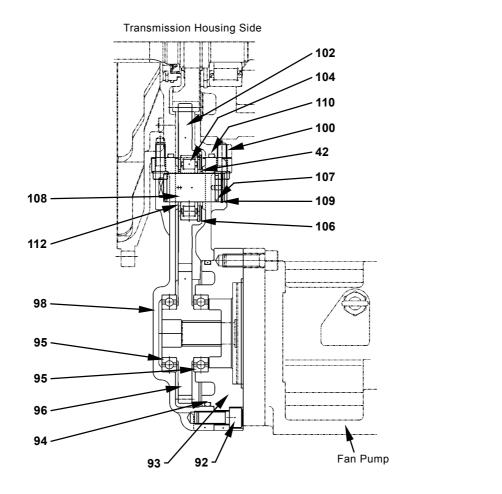
: 8 mm

. 57 N·m (5.8 kgf·m, 42 lbf·ft)

30. Install feedback pin (38) in tilt pin (37) to the feedback lever in regulator. Install the regulator to pump casing (55) with the socket bolts (8 used).

: 6 mm

: 29 N·m (3.0 kgf·m, 21 lbf·ft)



W1J1-02-04-013



CAUTION: Fan pump transmission weight: 28 kg (62 lb)

- 31. Install needle bearing (95) to transmission housing (98).
- 32. Install drive gear (96) to needle bearing (95) at the transmission housing (98) side.
- 33. Install needle bearing (95) and O-ring (94) to transmission cover (93).
- 34. Install transmission cover (93) to transmission housing (98) with socket bolts (92) (3 used).

: 14 mm : 240 N·m (24.5 kgf·m, 175 lbf·ft)

- 35. Install needle bearing (104) to relay gear (102). Insert retaining ring (106) into relay gear (102).
- 36. Install bearing spacers (112) (3 used) to relay gear (102). Install relay gear (102) to transmission housing (98).
- 37. Install O-ring (107) to shaft (108). Install shaft (108) to transmission housing (98).
- 38. Install retaining ring (109) to transmission housing (98).
- 39. Install O-ring (110) to front casing (76). Install transmission housing (98) to front casing (76) with socket bolts (100) (8 used).

: 10 mm : 98 N·m (10 kgf·m, 72 lbf·ft)



CAUTION: Fan pump weight: 51 kg (112 lb)

40. Hoist eyebolt in the fan pump and install the fan pump to transmission housing (98). Install the socket bolts (4 used).

: 14 mm

: 235 N·m (24 kgf·m, 175 lbf·ft)

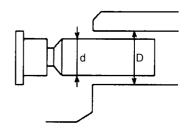
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MAINTENANCE STANDARD

Allowable Limits for vulnerable Parts

1. Clearance between plunger (32) outer diameter (d) and cylinder block (27) bore diameter (D).

D-d	Unit: mm (in)			
Standard	Allowable Limit			
0.038 (0.001)	0.078 (0.003)			



W117-02-02-009

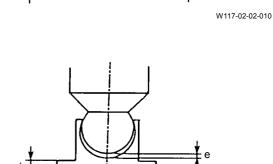
2. Free length (L) of cylinder spring (28)

L		Unit: mm (in)			
	Standard	Allowable Limit			
	40.9 (1.61)	40.1 (1.58)			

3. Clearance (e) between plunger (32) and shoe (31) bottom and shoe (31) thickness (t)

е		Unit: mm (in)
	Standard	Allowable Limit
	0 to 0.1 (0 to	0.35 (0.014)
	0.004)	

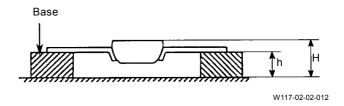
t	Unit: mm (in)			
Standard	Allowable Limit			
5.4 (0.21)	5.0 (0.20)			



W117-02-02-011

4. The difference between the surface of retainer (30) to the top of spherical bushing (29)

H-h		Unit: mm (in)			
	Standard	Allowable Limit			
	13.5 (0.53)	12.5 (0.49)			

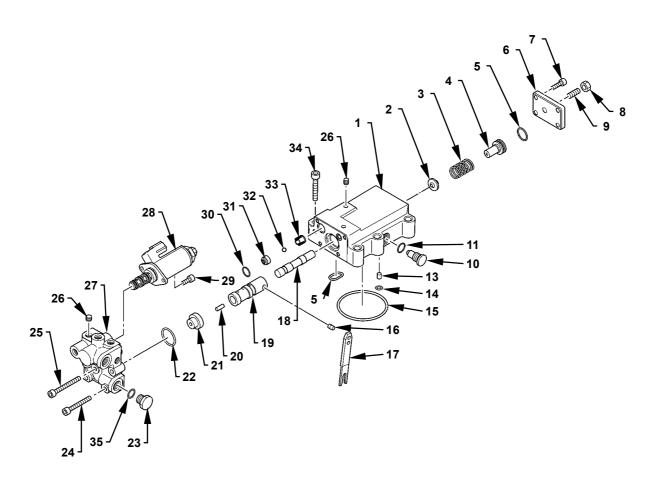


ALLOWABLE LIMITS FOR CYLINDER BLOCK

The Repair Limits for Cylinder, Valve Plate and Swash Plate (Shoe Plate)

Valve plate (sliding portion) Swash plate (shoe plate portion) Cylinder (sliding portion)	Roughness when repair is necessary	3-Z	
	Standard roughness (values after being repaired)	Less than 0.4Z (by lapping)	

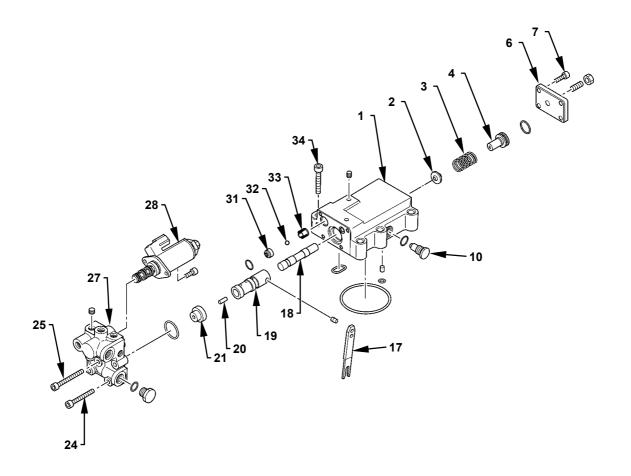
DISASSEMBLE REGULATOR



W16J-02-04-002

- 1 Regulator Casing
- 2 Spring Seat
- 3 Pilot Spring
- 4 Adjusting Disc Q
- 5 O-Ring (2 Used)
- 6 Cover
- 7 Socket Bolt (4 Used)
- 8 Nu
- 9 Adjusting Screw
- 10 Support Plug
- 11 O-Ring (2 Used)
- 13 Pin
- 14 O-Ring (5 Used)
- 15 O-Ring
- 16 Pin
- 17 Feedback Lever
- 18 Spool
- 19 Sleeve

- 20 Pilot Piston
- 21 Pf Sleeve
- 22 O-Ring
- 23 Plug
- 24 Socket Bolt (4 Used)
- 25 Socket Bolt
- 26 Plug (9 Used)
- 27 Valve Casing
- 28 Proportional Pressure Reducing Valve
- 29 Socket Bolt (2 Used)
- 30 O-Ring (2 Used)
- 31 Seat
- 32 Steel Ball
- 33 Stopper
- 34 Socket Bolt (6 Used)
- 35 O-Ring



W16J-02-04-002

Disassemble Regulator

IMPORTANT:	The same type regulator is installed						
	to	pumps	1	and	2.	As	these
	cha	racteris	tics	are	diffe	erent	each
	oth	er, do ı	not d	confus	se th	em.	These
	pro	cedures	ar	e for	the	pu	ımp 1
	reg	ulator.					

 Remove socket bolts (34) (6 used). Remove the regulator from the pump casing.

: 5 mm

2. Remove socket bolts (24, 25). Remove valve casing (27) attached with proportional pressure reducing valve (28) from casing (1).

: 6 mm

3. Remove socket bolts (7) (4 used). Remove cover (6) from casing (1).

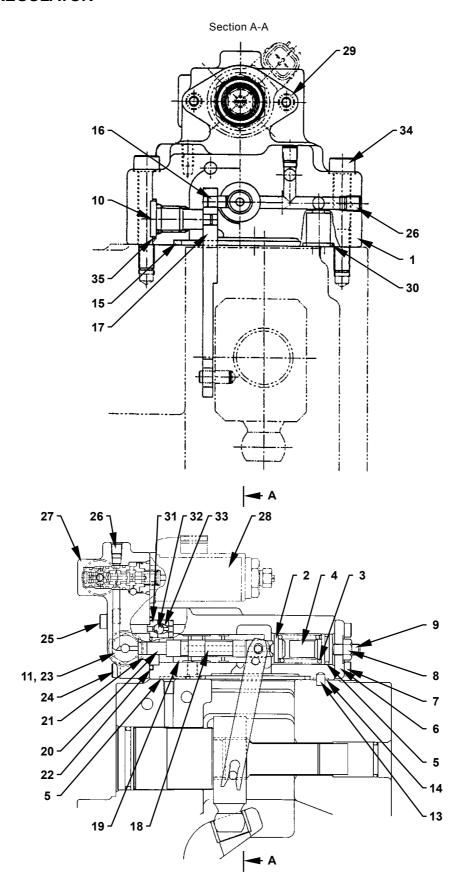
: 5 mm

- 4. Remove Pf sleeve (21) and pilot piston (20) from casing (1).
- 5. Remove support plug (10) from casing (1). Remove feedback lever (17).

: 6 mm

- 6. Remove spool (18) and sleeve (19) from casing (1).
- 7. Remove adjusting disc Q (4), pilot spring (3) and spring seat (2) from casing (1).
- NOTE: Remove adjusting disc Q (4) by using the bolt (M4).
 - 8. Remove seat (31), steel ball (32) and stopper (33) from casing (1).

ASSEMBLE REGULATOR

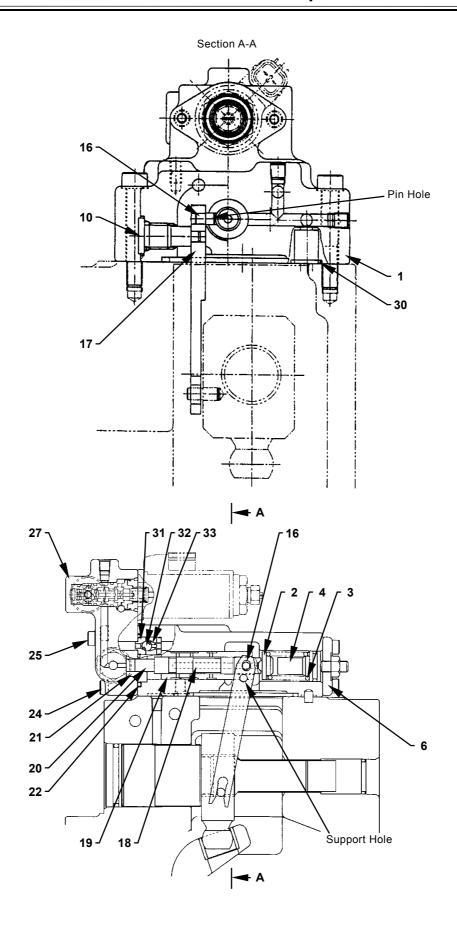


W16J-02-04-010

- 1 Regulator Casing
 2 Spring Seat
 3 Pilot Spring
 4 Adjusting Disc Q
 5 O-Ring (2 Used)
 6 Cover
 7 Speket Belt (4 Head)
- 7 Socket Bolt (4 Used)8 Nut9 Adjusting Screw
- 11 O-Ring (2 Used) 13 - Pin 14 - O-Ring (5 Used) 15 - O-Ring 16 - Pin 17 - Feedback Lever

10 - Support Plug

- 18 Spool 19 - Sleeve
- 20 Pilot Piston
 21 Pf Sleeve
 22 O-Ring
 23 Plug
 24 Socket Bolt (4 Used)
 25 Socket Bolt
 26 Plug (9 Used)
 27 Valve Casing
- 28 Proportional Pressure Reducing Valve
- 29 Socket Bolt (2 Used) 30 - O-Ring (2 Used)
- 31 Seat 32 - Steel Ball 33 - Stopper
- 34 Socket Bolt (6 Used)
- 35 O-Ring



W16J-02-04-010

Assemble Regulator

IMPORTANT: Spread the rubber sheet or cloth or etc. on the workbench in order not to damage the parts.

- 1. Install spool (18) and sleeve (19) to casing (1). Check if spool (18) and sleeve (19) move inside casing (1) smoothly.
- Insert pin (16) in feedback lever (17) into the pin hole on sleeve (19). Slide feedback lever (17) so that the support hole on feedback lever (17) can be seen through the mounting hole on support plug (10). Install support plug (10). Check if feedback lever (17) moves smoothly.

: 6 mm : 36 N·m (3.7 kgf·m, 27 lbf·ft)

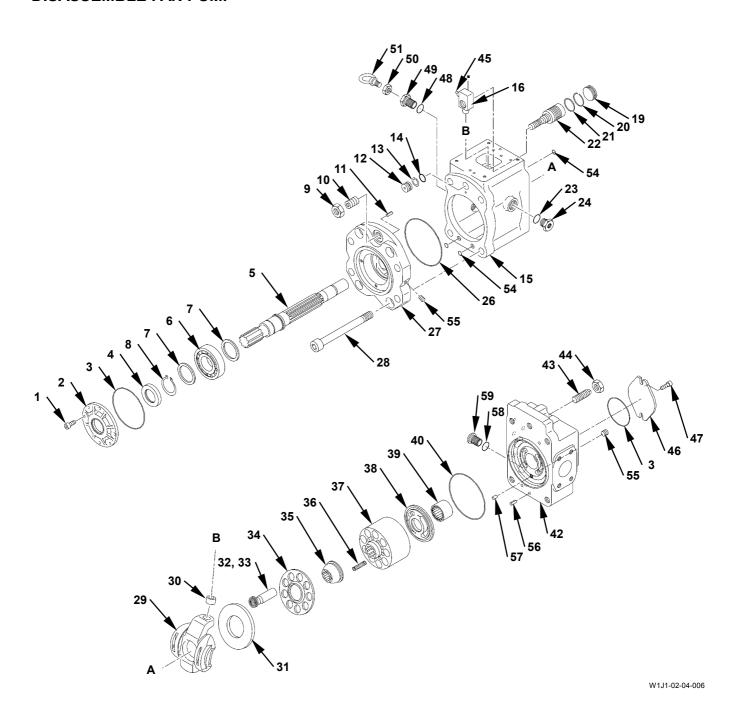
- 3. Install spring seat (2), pilot spring (3) and adjusting disc Q (4) to casing (1).
- 4. Install cover (6) to casing (1) with socket bolt (7).

: 5 mm : 12 N·m (1.2 kgf·m, 8.9 lbf·ft)

- 5. Install Pf sleeve (21), pilot piston (20) and check valve assemblies (33, 32, 31) to casing (1).
- 6. Install O-rings (30, 22) to valve casing (27). Install valve casing (27) to casing (1) with socket bolts (24, 25).

: 5 mm : 12 N·m (1.2 kgf·m, 8.9 lbf·ft)

DISASSEMBLE FAN PUMP

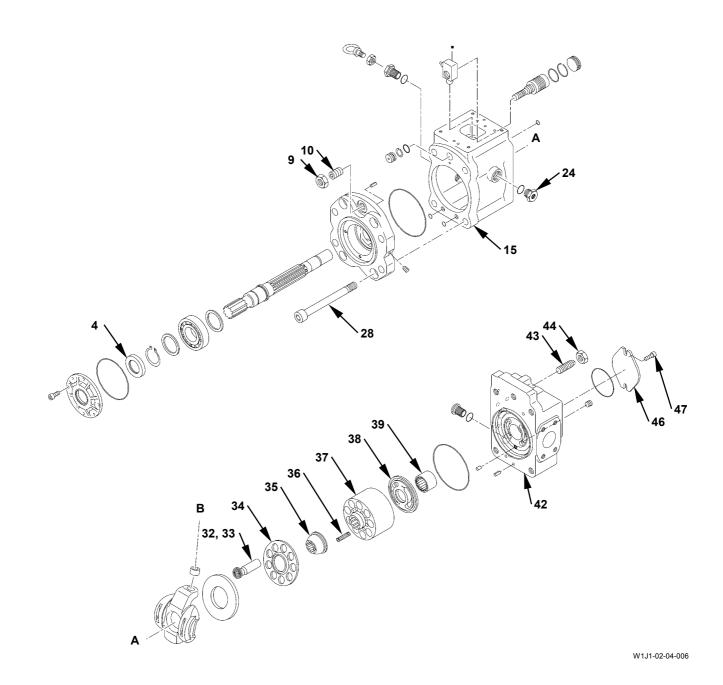


- 1 Socket Bolt (4 Used)
- 2 Cover
- 3 O-Ring (2 Used)
- 4 Oil Seal
- 5 Shaft
- 6 Bearing
- 7 Spacer (2 Used)
- 8 Retaining Ring
- 9 Nut (2 Used)
- 10 Adjusting Screw 11 - Spring Pin (2 Used)
- 12 Stopper
- 13 Backup Ring
- 14 O-Ring

- 15 Housing
- 16 Tilt Pin
- 19 Stopper L
- 20 Backup Ring 21 - O-Ring
- 22 Servo Piston
- 23 O-Ring (2 Used) 24 - Plug (2 Used)
- 26 O-Ring
- 27 Swash Plate Stand
- 28 Socket Bolt (4 Used)
- 29 Swash Plate
- 30 Bushing
- 31 Shoe Plate

- 32 Shoe (9 Used)
- 33 Plunger (9 Used)
- 34 Retainer Plate
- 35 Spherical Bushing
- 36 Spring (9 Used)
- 37 Cylinder Block
- 38 Valve Plate
- 39 Bearing
- 40 O-Ring
- 42 Cover
- 43 Adjusting Screw
- 44 Nut (2 Used)
- 45 Feedback Pin
- 46 Cover

- 47 Socket Bolt (2 Used)
- 48 O-Ring (2 Used)
- 49 Plug (2 Used)
- 50 Nut
- 51 Eyebolt
- 54 O-Ring (9 Used)
- 55 Plug (8 Used)
- 56 Pin (2 Used)
- 57 Pin
- 58 O-Ring
- 59 Plug



Disassemble Fan Pump



CAUTION: Fan pump weight: 51 kg (110 lb)

IMPORTANT: Do not remove adjusting screws (10, 43) and nuts (9, 44). If removing adjusting screws (10, 43) and nuts (9, 44), the characteristics are changed.

1. Remove plug (24) from housing (15). Drain hydraulic oil from the pump.

• : 13 mm

2. Remove the socket bolts (4 used). Remove the regulator from housing (15).

: 6 mm

3. Remove socket bolts (47) (2 used). Remove cover (46) from cover (42).

: 10 mm

IMPORTANT: Do not remove needle bearing (39) unless replacing needle bearing (39).

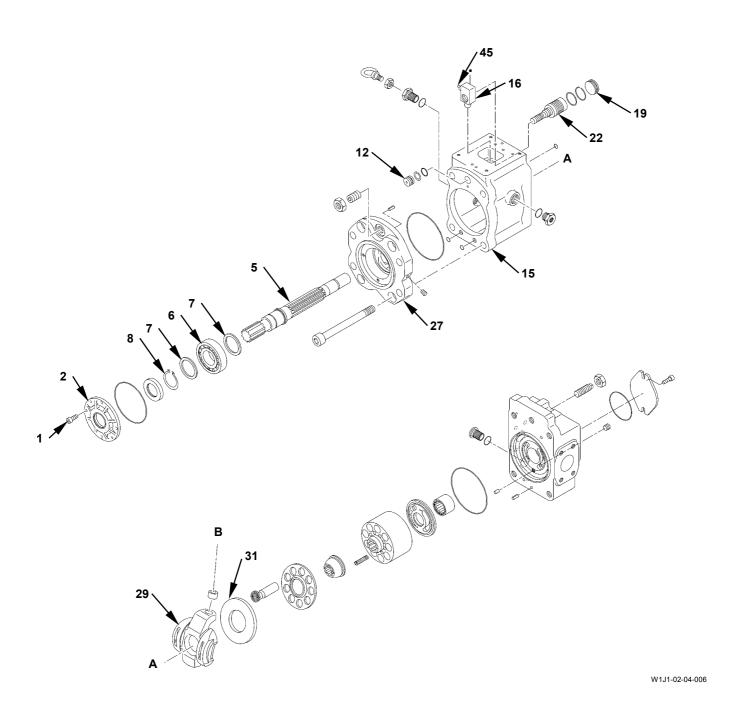
4. Remove socket bolts (28) (4 used). Remove cover (42) and valve plate (38) from housing (15).

: 17 mm

- 5. Remove the cylinder block (37) assembly attached with plungers (33) (9 used), shoes (32) (9 used), spherical bushing (35) and retainer plate (34).
- 6. Remove the retainer plate (34) assembly attached with plunger (33) (9 used) and shoes (32) (9 used).
- 7. Remove plungers (33) (9 used) and shoes (32) (9 used) from the retainer plate (34) assembly.

IMPORTANT: Do not remove oil seal (4) unless replacing oil seal (4).

8. Remove spherical bushing (35) and springs (36) (9 used) from cylinder block (37).



9. Remove socket bolts (1) (4 used). Remove cover (2) from swash plate stand (27).

: 6 mm

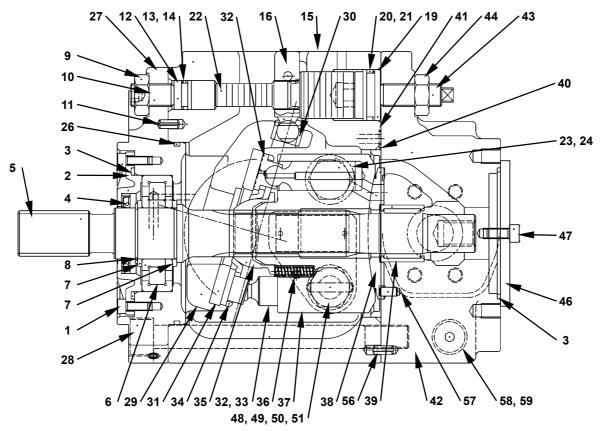
- 10. Remove swash plate stand (27) from housing (15). When swash plate stand (27) cannot be removed, tap and remove swash plate stand (27) by using a plastic hammer.
- 11. Remove swash plate (29) and shoe plate (31) from housing (15).
- 12. Remove shaft (5) from swash plate stand (27). When shaft (5) cannot be removed, tap and remove shaft (5) by using a plastic hammer.

IMPORTANT: LOCTITE has been applied onto the contacting part between tilt pin (16) and servo piston (22). When disassembling, do not damage servo piston (22).

- 13. Remove stoppers (12, 19), servo piston (22) and tilt pin (16) from housing (15).
- 14. Remove retaining ring (8), spacers (7) (2 used) and bearing (6) from shaft (5).

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ASSEMBLE FAN PUMP



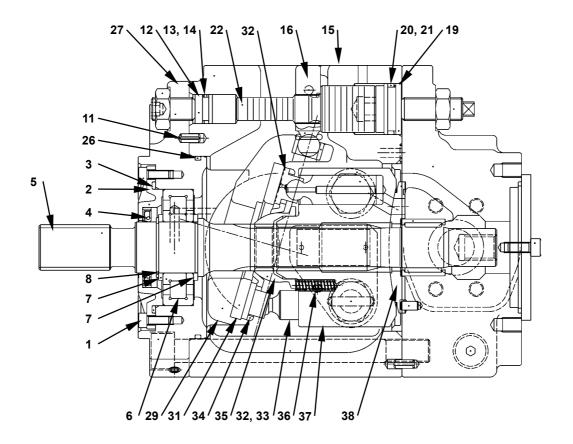
W1J1-02-04-007

- 1 Socket Bolt (4 Used)
- 2 Cover
- 3 O-Ring (2 Used)
- 4 Oil Seal
- 5 Shaft
- 6 Bearing
- 7 Spacer (2 Used)
- 8 Retaining Ring
- 9 Nut (2 Used)
- 10 Adjusting Screw
- 11 Spring Pin (2 Used)
- 12 Stopper
- 13 Backup Ring
- 14 O-Ring

- 15 Housing
- 16 Tilt Pin
- 19 Stopper L
- 20 Backup Ring
- 21 O-Ring
- 22 Servo Piston
- 23 O-Ring (2 Used)
- 24 Plug (2 Used)
- 26 O-Ring
- 27 Swash Plate Stand
- 28 Socket Bolt (4 Used)
- 29 Swash Plate
- 30 Bushing
- 31 Shoe Plate

- 32 Shoe (9 Used)
- 33 Plunger (9 Used)
- 34 Retainer Plate
- 35 Spherical Bushing
- 36 Spring (9 Used)
- 37 Cylinder Block
- 38 Valve Plate
- 39 Bearing
- 40 O-Ring
- 42 Cover
- 43 Adjusting Screw
- 44 Nut (2 Used)
- 45 Feedback Pin
- 46 Cover

- 47 Socket Bolt (2 Used)
- 48 O-Ring (2 Used)
- 49 Plug (2 Used)
- 50 Nut
- 51 Eyebolt
- 54 O-Ring (9 Used)
- 55 Plug (8 Used)
- 56 Pin (2 Used)
- 57 Pin
- 58 O-Ring
- 59 Plug



W1J1-02-04-007

Assemble Fan Pump

- 1. Apply LOCTITE onto the contacting part between servo piston (22) and tilt pin (16).
- 2. Install tilt pin (16) and servo piston (22) to housing (15).
- 3. Install O-ring (21) and backup ring (20) to stopper (19). Install stopper (19) to housing (15).
- 4. Install O-ring (13) and backup ring (14) to stopper (12). Install stopper (12) to housing (15).
- 5. Install spacer (7), bearing (6), spacer (7) and retaining ring (8) to shaft (5).
- 6. Install spring pin (11) and O-ring (26) to swash plate stand (27). Install swash plate stand (27) to housing (15).
- 7. Install shoe plate (31) to swash plate (29). Align swash plate (29) with tilt pin (16) and install swash plate (29) to housing (15). Check if swash plate (29) moves smoothly.
- 8. Install O-ring (3) and oil seal (4) to cover (2).
- 9. Install shaft (5) to swash plate stand (27). Install cover (2) to swash plate stand (27) with socket bolts (1) (4 used).

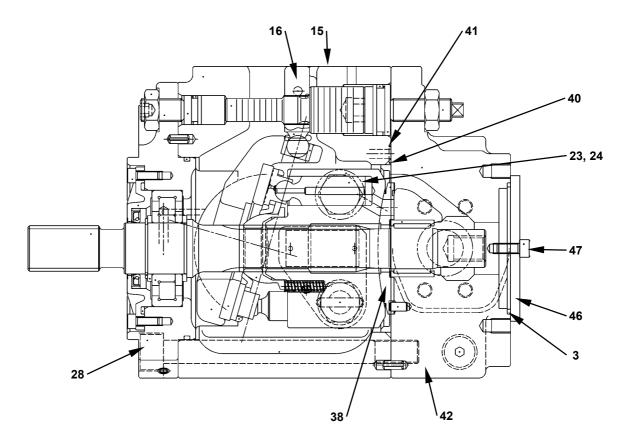
: 6 mm

: 20 N·m (2 kgf·m, 15 lbf·ft)

10. Install springs (36) (9 used) and spherical bushing (35) to cylinder block (37).

- 11. Install plungers (33) (9 used) and shoes (32) (9 used) to retainer plate (34). Install retainer plate (34) to cylinder block (37).
- 12. Install cylinder block (37) to shaft (5).

NOTE: Apply grease to valve plate (38).



W1J1-02-04-007

- 13. Install pins (56, 57) and O-ring (40) to cover (42).
- NOTE: Align the pin hole on valve plate (38) with pin (54) and install valve plate (38).
- 14. Install cover (42) to housing (15) with socket bolts (28) (4 used).

: 17 mm

: 400 N·m (41 kgf·m, 295 lbf·ft)

15. Install O-ring (3) to cover (46). Install cover (46) to cover (42) with socket bolts (47) (2 used).

: 8 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

16. Align the feedback lever in regulator with tilt pin (16). Install the regulator to housing (15) with the socket bolts (4 used).

: 6 mm

== : 20 N·m (2 kgf·m, 15 lbf·ft)

17. Install O-ring (23) to plug (24). Install plug (24) to housing (15).

: 36 mm

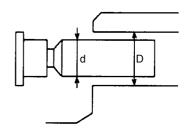
: 147 N·m (15 kgf·m, 108 lbf·ft)

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MAINTENANCE STANDARD

1. Clearance between plunger (33) outer diameter (d) and cylinder block (37) bore diameter (D).

D-d	Unit: mm (in)		
Standard	Allowable Limit		
0.028 (0.001)	0.056 (0.002)		



W117-02-02-009

2. Free length (L) of spring (36)

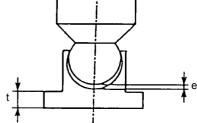
-	_	Unit: mm (in)		
	Standard	Allowable Limit		
	31.3 (1.23)	30.2 (1.19)		

3. Clearance (e) between plunger (33) and shoe (32) bottom and shoe (31) thickness (t)

е	Unit: mm (in)
Standard	Allowable Limit
0 to 0.1	0.3 (0.012)
(0 to 0.004)	
	•

t		Unit: mm (in)		
	Standard	Allowable Limit		
3.9 (0.15)		3.7 (0.14)		

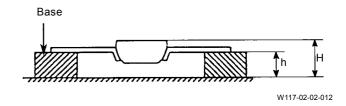
W117-02-02-010

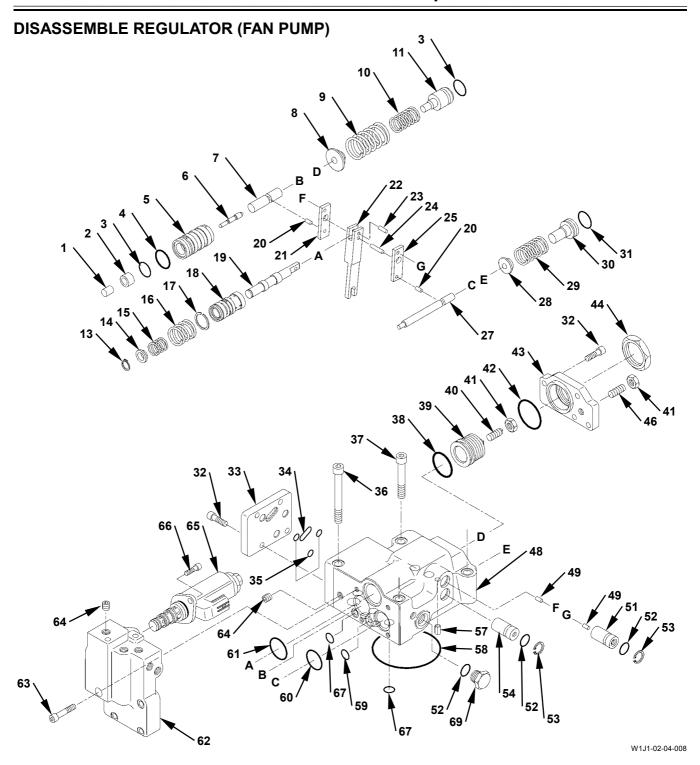


W117-02-02-011

4. The difference between the surface of retainer plate (34) to the top of spherical bushing (35)

H-h	Unit: mm (in)		
Standard	Allowable Limit		
19.0 (0.75)	18.3 (0.72)		





1 - Pin
2 - Sleeve
3 - O-Ring (2 Used)
4 - O-Ring
5 - Sleeve
6 - Compensating Piston
7 - Compensating Rod
8 - Spring Seat

7 - Compensating Rod
8 - Spring Seat
9 - Spring
10 - Spring
11 - Adjusting Disc
13 - Retaining Ring
14 - Spring Seat
15 - Spring
16 - Spring
17 - Retaining Ring

18 - Sleeve 19 - Spool 20 - Pin (2 Used) 21 - Lever 22 - Feedback Lever

23 - Pin
24 - Pin
25 - Lever
27 - Pilot Piston
28 - Spring Seat
29 - Spring
30 - Adjusting Disc
31 - O-Ring

32 - Socket Bolt (8 Used) 33 - Cover

34 - O-Ring

35 - O-Ring (3 Used) 36 - Socket Bolt (2 Used) 37 - Socket Bolt (2 Used)

38 - O-Ring 39 - Adjusting Screw

40 - Adjusting Screw 41 - Nut (2 Used) 42 - O-Ring 43 - Cover 44 - Nut

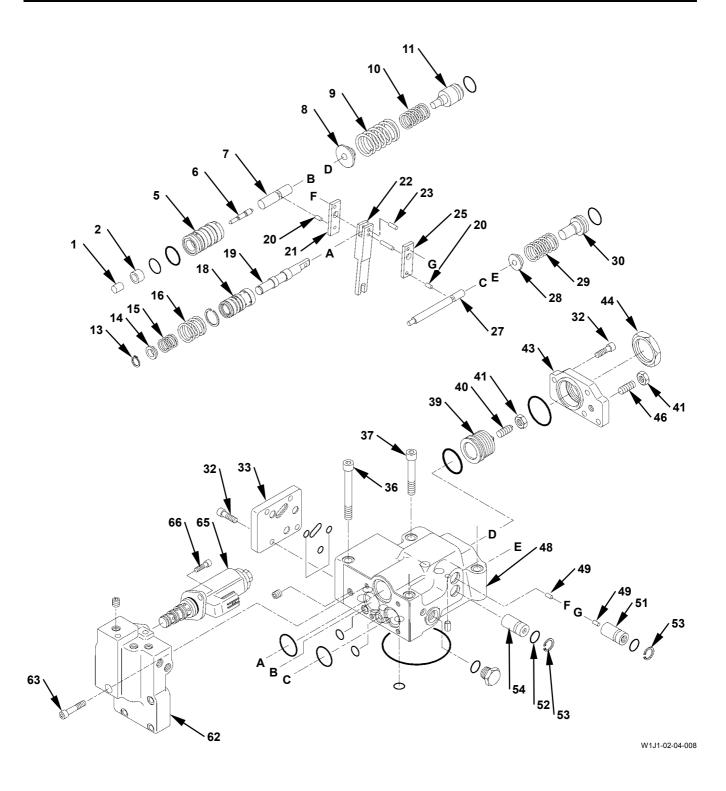
46 - Adjusting Screw 48 - Housing 49 - Pin (2 Used) 51 - Adjusting Plug

52 - O-Ring (3 Used) 53 - Retaining Ring (2 Used) 54 - Adjusting Plug

57 - Pin 58 - O-Ring 59 - O-Ring 60 - O-Ring 61 - O-Ring 62 - Cover

63 - Socket Bolt (4 Used) 64 - Plug (11 Used) 65 - Solenoid Valve 66 - Socket Bolt (2 Used) 67 - O-Ring (9 Used)

69 - Plug



Disassemble Regulator (Fan Pump)

1. Remove socket bolts (36) (2 used) and (37) (2 used). Remove housing (48) from the pump.

: 6 mm

IMPORTANT: Do not remove adjusting screws (39, 40, 46) and nuts (41) (2 used), (44). If adjusting screws (39, 40, 46) and nuts (41) (2 used), (44) are removed, the pump characteristics are changed.

2. Remove socket bolts (32) (4 used). Remove cover (33) from housing (48).

: 5 mm

3. Remove socket bolts (63) (4 used). Remove cover (62) from housing (48).

: 5 mm

- 4. Remove socket bolts (66) (2 used). Remove solenoid valve (65) from cover (62).
- 5. Remove pin (1), sleeves (2, 5) and compensating piston (6) from housing (48).
- 6. Remove retaining ring (13), spring seat (14) and springs (15, 16) from housing (48).
- 7. Remove socket bolts (32) (4 used). Remove cover (43), adjusting disc (11), springs (9, 10), spring seat (8), adjusting disc (30), spring (29) and spring seat (28) from housing (48).

: 5 mm

IMPORTANT: Do not remove pin (49) from adjusting plug (51). Put the mark on adjusting plugs (51, 54) in order not to confuse.

8. Remove retaining ring (53) from housing (48). Remove adjusting plugs (51, 54) by using the bolt (M6).

IMPORTANT: Do not remove pin (20) from lever (25).

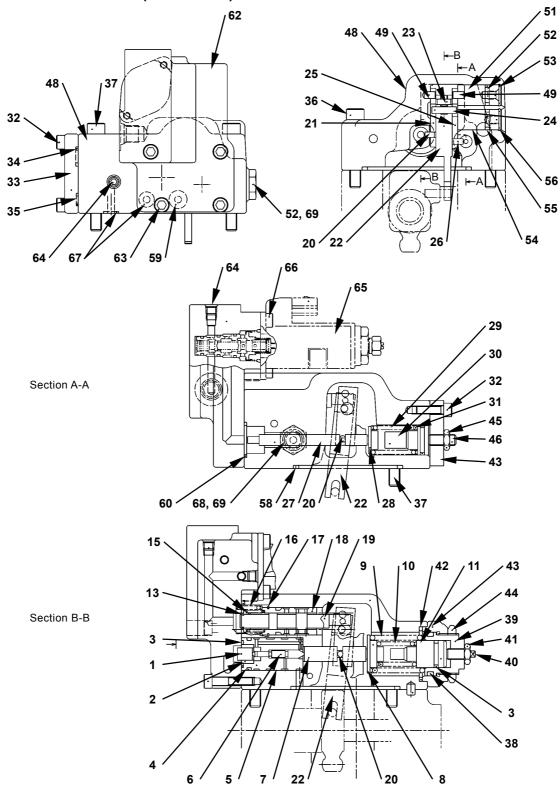
- 9. Remove lever (25) and pilot piston (27) from housing (48).
- 10. Remove pin (23) in feedback lever (22) through the mounting hole on adjusting plug (51). Remove feedback lever (22), sleeve (18) and spool (19) from housing (48).

4 mm

IMPORTANT: Do not remove pins (20, 49) from lever (21).

11. Remove lever (21) and compensating rod (7) from housing (48).

ASSEMBLE REGULATOR (FAN PUMP)



W1J1-02-04-009

1 - Pin
2 - Sleeve
3 - O-Ring (2 Used)
4 - O-Ring
5 - Sleeve
6 - Compensating Piston
7 - Compensating Rod
8 - Spring Seat

7 - Compensating Rod
8 - Spring Seat
9 - Spring
10 - Spring
11 - Adjusting Disc
13 - Retaining Ring
14 - Spring Seat
15 - Spring
16 - Spring
17 - Retaining Ring

18 - Sleeve 19 - Spool 20 - Pin (2 Used) 21 - Lever 22 - Feedback Lever 23 - Pin

23 - Pin 24 - Pin 25 - Lever 27 - Pilot Piston 28 - Spring Seat 29 - Spring 30 - Adjusting Disc 31 - O-Ring 32 - Socket Bolt (8 Used)

32 - Socket Bolt 33 - Cover 34 - O-Ring 35 - O-Ring (3 Used) 36 - Socket Bolt (2 Used) 37 - Socket Bolt (2 Used)

38 - O-Ring 39 - Adjusting Screw 40 - Adjusting Screw 41 - Nut (2 Used) 42 - O-Ring 43 - Cover

46 - Adjusting Screw 48 - Housing 49 - Pin (2 Used) 51 - Adjusting Plug

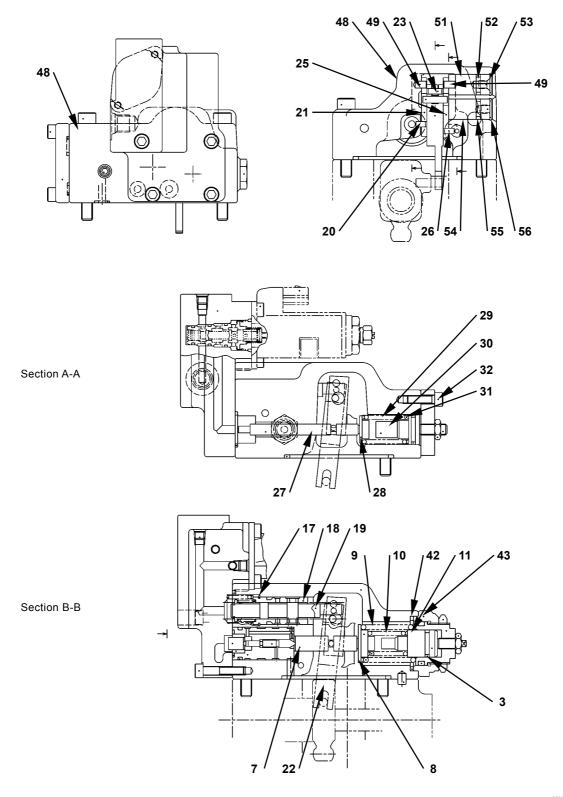
44 - Nut

52 - O-Ring (3 Used) 53 - Retaining Ring (2 Used) 54 - Adjusting Plug

57 - Pin 58 - O-Ring 59 - O-Ring 60 - O-Ring 61 - O-Ring 62 - Cover

63 - Socket Bolt (4 Used) 64 - Plug (11 Used) 65 - Solenoid Valve 66 - Socket Bolt (2 Used) 67 - O-Ring (9 Used)

69 - Plug



W1J1-02-04-009

Assemble Regulator (Fan Pump)

- 1. Insert compensating rod (7) and lever (21) into housing (48).
- 2. Align the pin (49) hole on lever (21) with the pin hole on housing (48). Align pin (20) in lever (21) with the stepped part on compensating rod (7). Install lever (21) to housing (48).
- 3. Install retaining ring (17) to sleeve (18). Install sleeve (18) and spool (19) to housing (48).
- IMPORTANT: Before installing feedback lever (22), check if spool (19) moves smoothly. Check the directions of spool (19) and feedback lever (22).
 - 4. Align the pin hole on spool (19) with that on feedback lever (22). Install pin (23) through the mounting hole of support plug (51).
 - 5. Insert pilot piston (27) and lever (25) into housing (48).

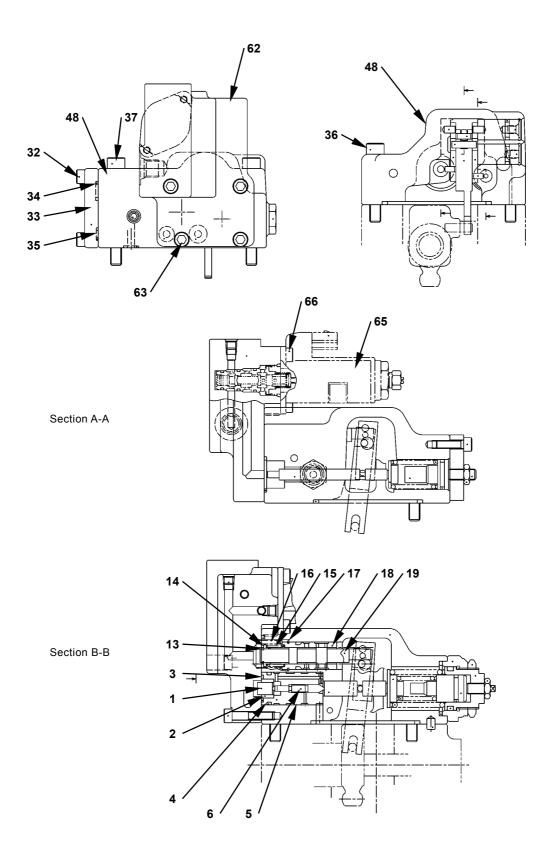
IMPORTANT: Before installing lever (25), check if pilot piston (27) moves smoothly.

- 6. Align pin (26) in lever (25) with the stepped part on pilot piston (27) and install lever (25).
- 7. Install O-ring (52) and pin (49) to adjusting plug (51).
- 8. Align pin (49) in adjusting plug (51) with the pin hole on lever (25) and install adjusting plug (51). Install retaining ring (53) to housing (48).

- 9. Install O-ring (55) to adjusting plug (54). Install adjusting plug (54) to housing (48). Install retaining ring (56) to housing (48).
- 10. Install O-ring (31) to stopper (30).
- 11. Install spring seat (28), spring (29) and stopper (30) to housing (48).
- 12. Install O-ring (3) to stopper (11).
- 13. Install O-ring (42) to housing (48). Install spring seat (8), springs (9, 10) and stopper (11) to housing (48). Install cover (43) to housing (48) with socket bolts (32) (4 used).

: 5 mm

: 12 N·m (1.2 kgf·m, 8.9 lbf·ft)



W1J1-02-04-009

- 14. Install spring (15), spring seat (14) and retaining ring (13) to spool (19).
- 15. Install O-ring (4) to sleeve (5). Install sleeve (5), compensating piston (6), O-ring (3), sleeve (2) and pin (1) to housing (48).
- 16. Install spring (16) and O-rings (59, 60, 61) to housing (48). Install cover (62) with socket bolts (63) (4 used).

: 5 mm : 12 N·m (1.2 kgf·m, 8.9 lbf·ft)

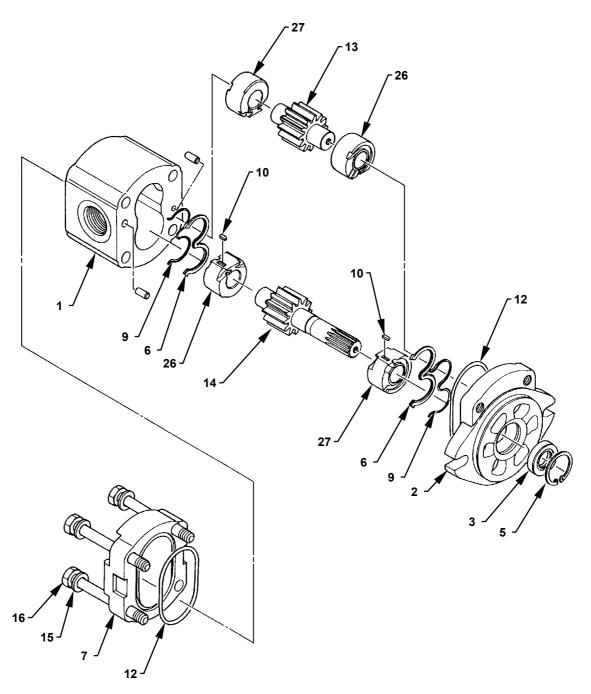
- 17. Install O-rings (34) and (35) (3 used) to cover (33).
- 18. Install cover (33) to housing (48) with socket bolts (32) (4 used).

: 5 mm : 12 N·m (1.2 kgf·m, 8.9 lbf·ft)

- 19. Install solenoid valve (65) to cover (62) with socket bolts (66) (2 used).
- 20. Install the regulator to the pump with socket bolts (36) (2 used) and (37) (2 used).

: 6 mm : 20 N·m (2 kgf·m, 15 lbf·ft)

STRUCTURE OF PILOT PUMP



W137-02-04-034

Item	Part Name	Q'ty	Wrench Size	Tightening Torque			Remarks
			(mm)	N⋅m	(kgf·m)	(lbf⋅ft)	Romano
1	Housing	1					
2	Flange	1					
3	Oil Seal	1					Apply grease to the oil seal lip when installing
5	Retaining Ring	1					
6	Seal	2					Apply grease to seal when installing
7	Cover	1					
9	Backup Ring	2					Apply grease to backup ring when installing
10	Key	2					
12	O-Ring	2					Apply grease to O-ring when installing
13	Gear	1					
14	Gear	1					
15	Washer	2					
16	Bolt	2	5—6 : 17	39 to 44	(4 to 4.5)	(29 to 33)	
26	Bushing	4					Apply a film of hydraulic oil to bushing when installing
27	Bushing	4					Apply a film of hydraulic oil to bushing when installing

(Blank)

REMOVE AND INSTALL CONTROL VALVE

Removal

A CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL **TANK on W1-4-1.)**

1. Remove bolts (2) (4 used) from covers (1) (2 used). Remove covers (1) (2 used) from the main frame.

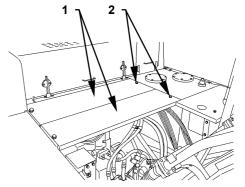
: 19 mm

- 2. Remove solenoid valve (3) and signal control valve (4) from control valve (5). Move solenoid valve (3) and signal control valve (4) outside the space for removal and installation of control valve (5). (Refer to "Remove and Install Solenoid Valve" on W2-9 and "Remove and Install Signal Control Valve" on W2-10.)
- 3. Remove all hoses and connectors from control valve (5). Cap the hoses and control valve (5). Attach identification tags to the removed hoses for reassembling.

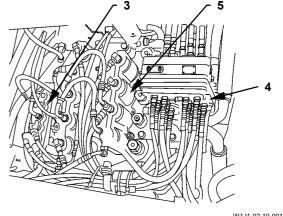
: 17 mm, 19 mm, 36 mm

': 8 mm, 10 mm

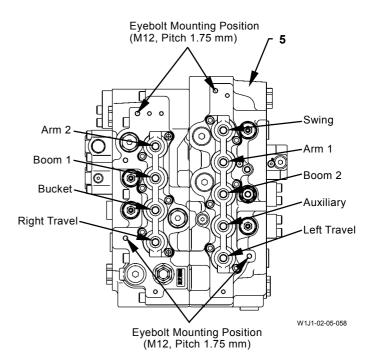
4. Install eyebolts (M12, Pitch 1.75 mm) (4 used) to control valve (5).



W1J1-02-05-061







5. Remove bolts (6) (4 used) and spacers (7) (4 used) from control valve (5).

: 30 mm



CAUTION: Control valve (5) weight: 400 kg (880 lb)

6. Hoist and remove control valve (5) from the main frame.

Installation

1. Install eyebolts (M12, Pitch 1.75 mm) (4 used) to control valve (5).



CAUTION: Control valve (5) weight: 400 kg (880 lb)

- 2. Hoist and align control valve (5) with the mounting position.
- 3. Apply LOCTITE #262 to bolts (6) (4 used). Install control valve (5) to the main frame with bolts (6) (4 used) and spacers (7) (4 used).

: 30 mm

- 400 N⋅m (41 kgf⋅m, 295 lbf⋅ft)

- 4. Remove eyebolts (M12, Pitch 1.75 mm) (4 used) from control valve (5).
- 5. Install all hoses and connectors to control valve (5).

: 17 mm

: 39 N·m (4.0 kgf·m, 29 lbf·ft)

: 19 mm

: 29.5 N·m (3.0 kgf·m, 22 lbf·ft)

→ : 36 mm

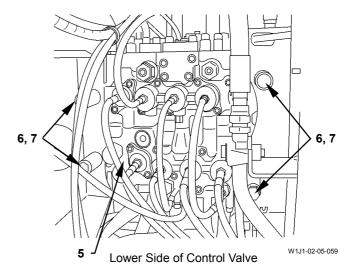
: 175 N·m (18.0 kgf·m, 130 lbf·ft)

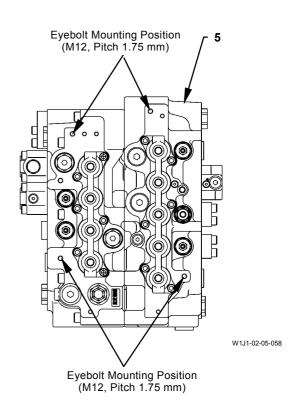
: 8 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

: 10 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)





Upper Side of Control Valve

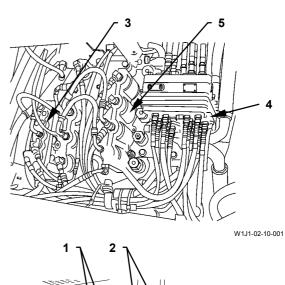
6. Install solenoid valve (3) and signal control valve (4). (Refer to "Remove and Install Solenoid Valve" on W2-9 and "Remove and Install Signal Control Valve" on W2-10.)

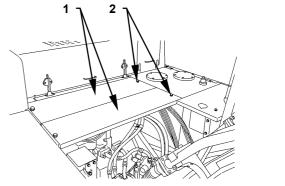
7. Install covers (1) (2 used) to the main frame with bolts (2) (4 used).

: 19 mm

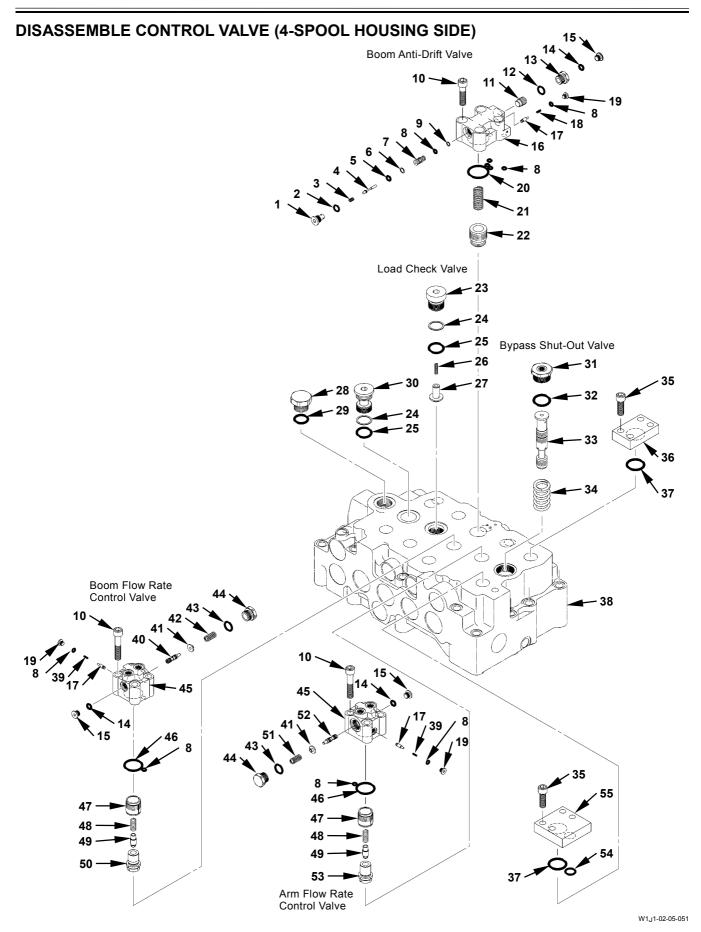
: 90 N·m (9.2 kgf·m, 66 lbf·ft)

IMPORTANT: After completing the work, check the oil level. Start the engine and check for any oil leaks.





W1J1-02-05-061

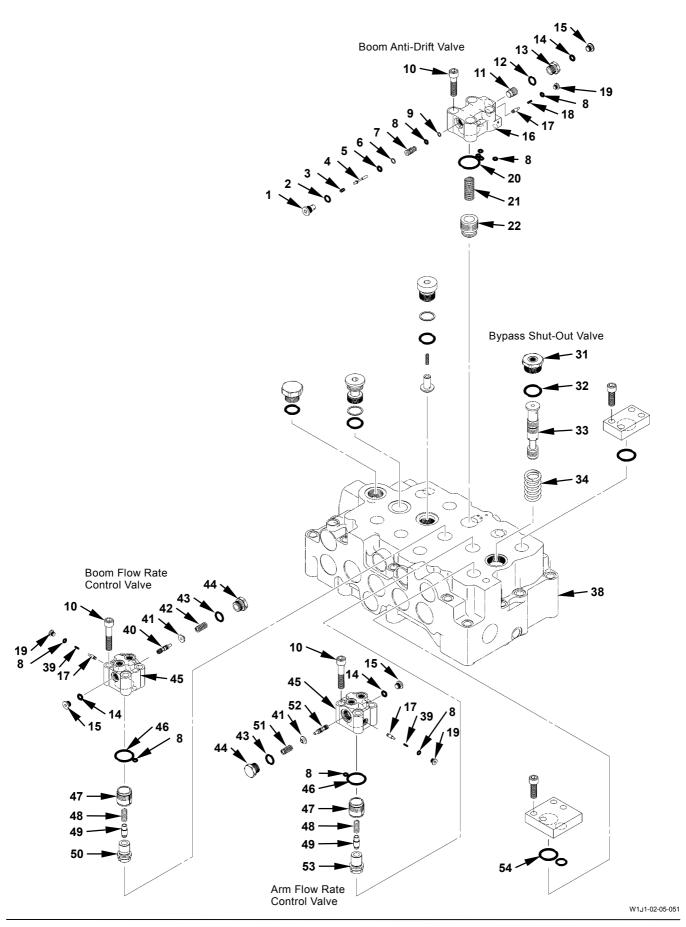


43 - O-Ring (2 Used) 1 - Cap 15 - Cap (2 Used) 29 - O-Ring 2 - O-Ring 16 - Cover 30 - Cap 44 - Cap (2 Used) 17 - Check Valve (3 Used) 3 - Spring 31 - Cap 45 - Cover (2 Used) 32 - O-Ring 4 - Poppet 18 - Spring 46 - O-Ring (2 Used) 5 - O-Ring 19 - Cap (3 Used) 33 - Spool 47 - Piston (2 Used) 6 - Backup Ring 34 - Spring 48 - Spring (2 Used) 20 - O-Ring 21 - Spring 22 - Poppet 7 - Sleeve 35 - Socket Bolt (8 Used) 49 - Check Valve (2 Used) 8 - O-Ring (10 Used) 36 - Flange 50 - Poppet 9 - Backup Ring 23 - Cap 37 - O-Ring (2 Used) 51 - Spring 10 - Socket Bolt (12 Used) 24 - Backup Ring (2 used) 38 - Housing (4-Spool Side) 52 - Spool 25 - O-Ring (2 Used) 11 - Piston 39 - Spring (2 Used) 53 - Poppet 26 - Spring 27 - Check Valve 12 - O-Ring 40 - Spool 54 - O-Ring 13 - Cap 55 - Flange 41 - Guide (2 Used)

42 - Spring

28 - Cap

14 - O-Ring (3 Used)



Disassemble Control Valve (4-Spool Housing Side)

- Disassemble Bypass Shut-Out Valve
- 1. Remove cap (31) from housing (38).

• : 46 mm

- 2. Remove spool (33) and spring (34) from housing (38).
- · Disassemble Arm Flow Rate Control Valve
- Remove socket bolts (10) (4 used). Remove cover (45) and O-rings (8, 46) from housing (38).

: 12 mm

- 4. Remove piston (47), spring (48), check valve (49) and poppet (53) from housing (38).
- 5. Remove cap (44), spring (51), guide (41) and spool (52) from cover (45).

: 30 mm

6. Remove cap (19), spring (39) and check valve (17) from cover (45).

: 5 mm

- Disassemble Boom Flow Rate Control Valve
- 7. Remove socket bolts (10) (4 used). Remove cover (45) and O-rings (8, 46) from housing (38).

: 12 mm

- 8. Remove piston (47), spring (48), check valve (49) and poppet (50) from housing (38).
- 9. Remove cap (44), spring (42), guide (41) and spool (40) from cover (45).

: 30 mm

10. Remove cap (19), spring (39) and check valve (17) from cover (45).

: 5 mm

- Disassemble Boom Anti-Drift Valve
- 11. Remove socket bolts (10) (4 used). Remove cover (16) and O-rings (8) (4 used), (20) from housing (38).

: 12 mm

- 12. Remove spring (21) and poppet (22) from housing (38).
- 13. Remove cap (1), spring (3) and poppet (4) from cover (16).

: 8 mm

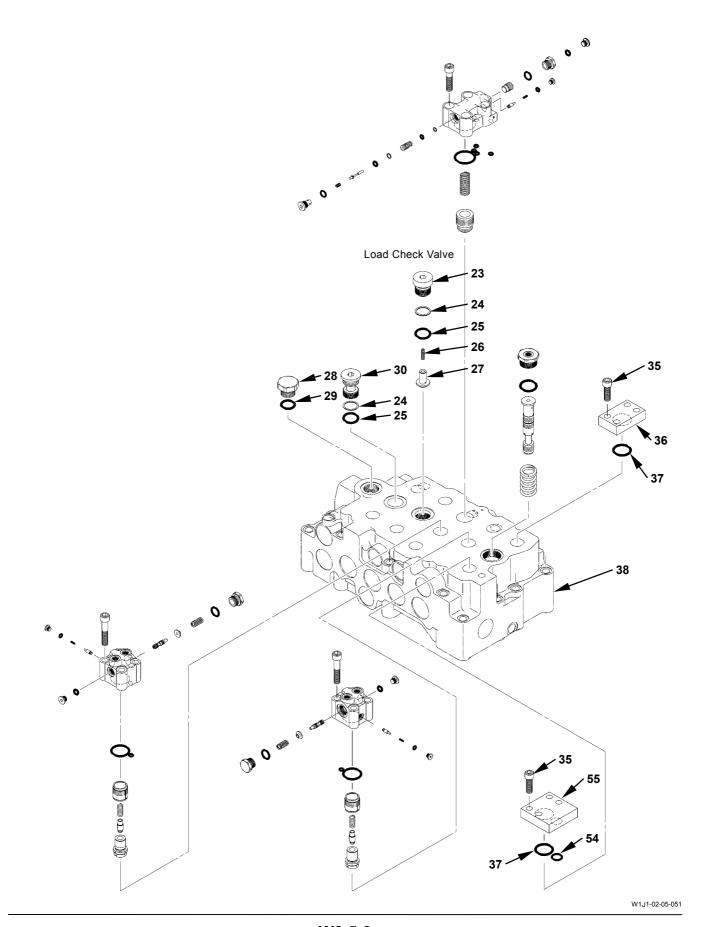
14. Remove cap (13) and piston (11) from cover (16).

→ : 30 mm

NOTE: When replacing O-ring (14), remove cap (15) from cap (13).

- 15. Insert the pipe (inner dia.: 7 mm, outer dia.: 10 mm, length: 15 mm) into the hole on cap (13). Tap and remove sleeve (7) through the hole on cap (1).
- 16. Remove cap (19), spring (18) and check valve (17) from cover (16).

: 5 mm

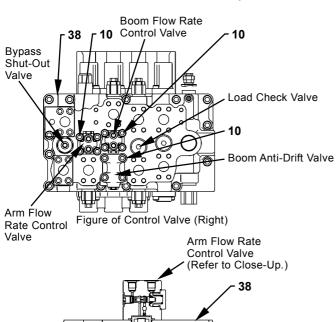


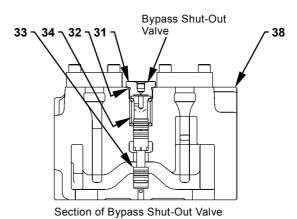
- Disassemble Load Check Valve
- 17. Remove cap (23), spring (26) and check valve (27) from housing (38).

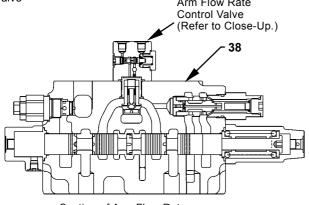
: 14 mm

- 18. When replacing O-ring (25), remove cap (30) from housing (38).
- 19. When replacing O-ring (29), remove cap (28) from housing (38).
- 20. When replacing O-rings (37, 54), remove flanges (36, 55) from housing (38).

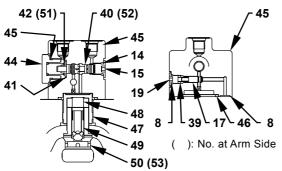
ASSEMBLE CONTROL VALVE (4-SPOOL HOUSING SIDE)



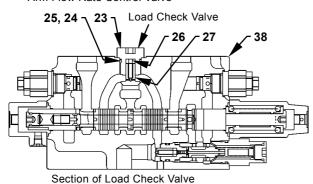


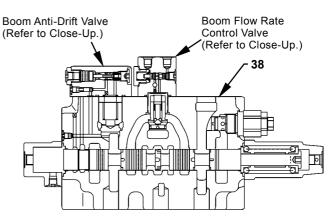


Section of Arm Flow Rate Control Valve

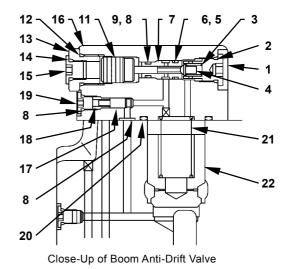


Close-Up of Boom Flow Rate Control Valve, Arm Flow Rate Control Valve



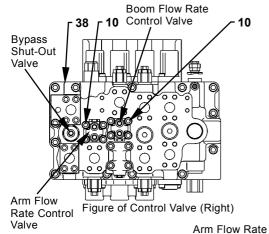


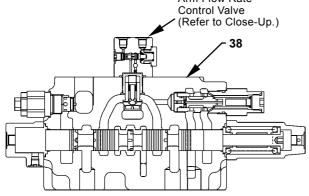
Section of Boom Flow Rate Control Valve, Boom Anti-Drift Valve



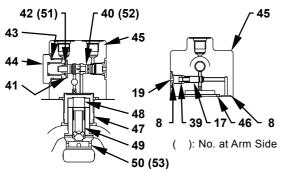
W1J1-02-05-044

1 - Cap 2 - O-Ring 3 - Spring 4 - Poppet 5 - O-Ring 6 - Backup Ring 7 - Sleeve 8 - O-Ring (10 Used) 9 - Backup Ring 10 - Socket Bolt (12 Used) 11 - Piston 12 - O-Ring 13 - Cap	15 - Cap (2 Used) 16 - Cover 17 - Check Valve (3 Used) 18 - Spring 19 - Cap (3 Used) 20 - O-Ring 21 - Spring 22 - Poppet 23 - Cap 24 - Backup Ring (2 used) 25 - O-Ring (2 Used) 26 - Spring 27 - Check Valve	29 - O-Ring 30 - Cap 31 - Cap 31 - Cap 32 - O-Ring 33 - Spool 34 - Spring 35 - Socket Bolt (8 Used) 36 - Flange 37 - O-Ring (2 Used) 38 - Housing (4-Spool Side) 39 - Spring (2 Used) 40 - Spool 41 - Guide (2 Used)	43 - O-Ring (2 Used) 44 - Cap (2 Used) 45 - Cover (2 Used) 46 - O-Ring (2 Used) 47 - Piston (2 Used) 48 - Spring (2 Used) 49 - Check Valve (2 Used) 50 - Poppet 51 - Spring 52 - Spool 53 - Poppet 54 - O-Ring 55 - Flange
•		· •	•

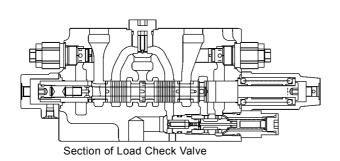


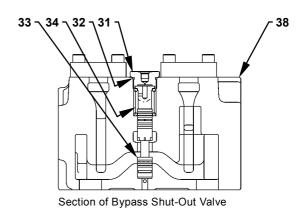


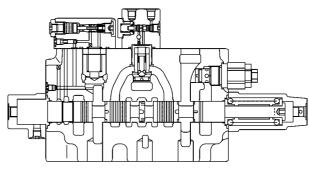
Section of Arm Flow Rate Control Valve



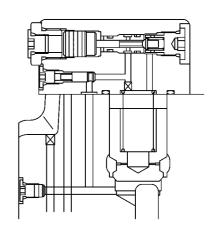
Close-Up of Boom Flow Rate Control Valve, Arm Flow Rate Control Valve







Section of Boom Flow Rate Control Valve, Boom Anti-Drift Valve



Close-Up of Boom Anti-Drift Valve

W1J1-02-05-044

Assemble Control Valve (4-Spoo Housing Side)

- Assemble Bypass Shut-Out Valve
 - 1. Install spool (33) and spring (34) to housing (38).
 - 2. Install O-ring (32) to cap (31). Install cap (31) to housing (38).

→ : 46 mm

: 250 N·m (25.5 kgf·m, 185 lbf·ft)

- Assemble Arm Flow Rate Control Valve
 - 3. Install poppet (53), check valve (49), spring (48) and piston (47) to housing (38).
 - 4. Install O-ring (43) to cap (44). Install spool (52), guide (41), spring (51) and cap (44) to cover (45).

→ : 30 mm

: 60 N·m (6.1 kgf·m, 44 lbf·ft)

5. Install O-ring (8) to cap (19). Install check valve (17), spring (39) and cap (19) to cover (45).

: 5 mm

: 20 N·m (2.0 kgf·m, 15 lbf·ft)

6. Install O-rings (46, 8) to cover (45). Install cover (45) to housing (38) with socket bolts (10) (4 used).

: 12 mm

: 180 N·m (18.3 kgf·m, 130 lbf·ft)

- Assemble Boom Flow Rate Control Valve
 - 7. Install poppet (50), check valve (49), spring (48) and piston (47) to housing (38).
- 8. Install O-ring (43) to cap (44). Install spool (40), guide (41), spring (42) and cap (44) to cover (45).

→ : 30 mm

: 60 N·m (6.1 kgf·m, 44 lbf·ft)

9. Install O-ring (8) to cap (19). Install check valve (17), spring (39) and cap (19) to cover (45).

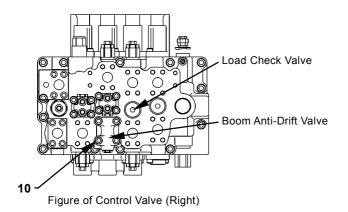
: 5mm

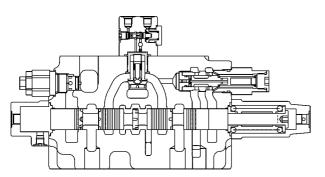
: 20 N·m (2.0 kgf·m, 15 lbf·ft)

10. Install O-rings (46, 8) to cover (45). Install cover (45) to housing (38) with socket bolts (10) (4 used).

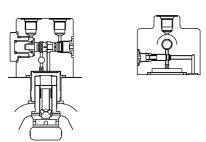
= : 12 mm

: 180 N·m (18.3 kgf·m, 130 lbf·ft)

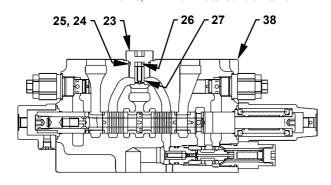




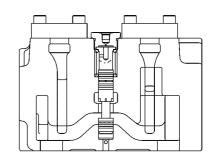
Section of Arm Flow Rate Control Valve



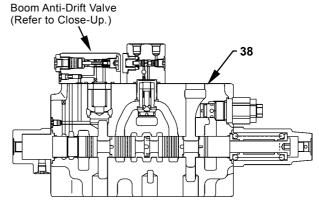
Close-Up of Boom Flow Rate Control Valve, Arm Flow Rate Control Valve



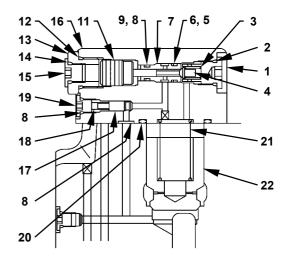
Section of Load Check Valve



Section of Bypass Shut-Out Valve



Section of Boom Flow Rate Control Valve



Close-Up of Boom Anti-Drift Valve

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- Assemble Boom Anti-Drift Valve
- 11. Install poppet (22) and spring (21) to housing (38).
- 12. Install O-rings (8, 5) and backup rings (9, 6) to sleeve (7). Install sleeve (7) to cover (16).
- 13. Install O-ring (2) to cap (1). Install poppet (4), spring (3) and cap (1) to cover (16).

: 8 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

14. Install O-ring (12) to cap (13). Install piston (11) and cap (13) to cover (16).

30 mm

: 60 N·m (6.1 kgf·m, 44 lbf·ft)

15. Install O-ring (8) to cap (19). Install check valve (17), spring (18) and cap (19) to cover (16).

: 5 mm

: 20 N·m (2 kgf·m, 15 lbf·ft)

16. Install O-rings (20) and (8) (4 used) to cover (16). Install cover (16) to housing (38) with socket bolts (10) (4 used).

: 12 mm

: 180 N·m (18.3 kgf·m, 130 lbf·ft)

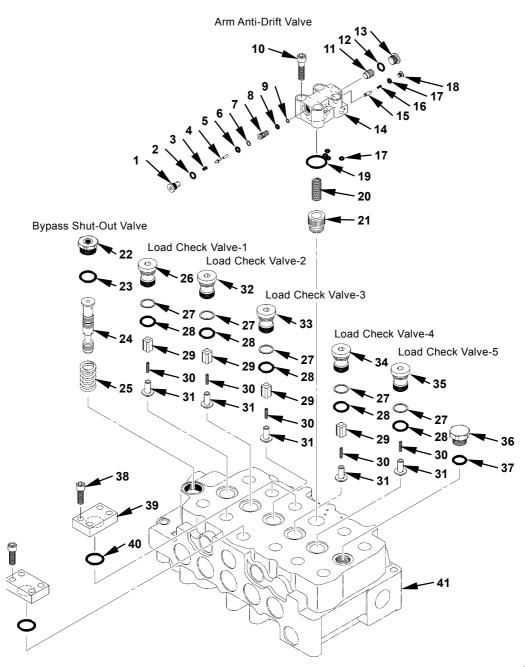
- Assemble Load Check Valve
- 17. Install O-ring (25) and backup ring (24) to cap (23). Install check valve (27), spring (26) and cap (23) to housing (38).

: 14 mm

: 350 N·m (36 kgf·m, 260 lbf·ft)

DISASSEMBLE CONTROL (5-SPOOL HOUSING SIDE)

VALVE



1-02-05-052ل W1

 1 - Cap
 12 - O-Ring
 23 - O-Ring
 34 - Cap

 2 - O-Ring
 13 - Cap
 24 - Spool
 35 - Cap

 3 - Spring
 14 - Cover
 25 - Spring
 36 - Cap

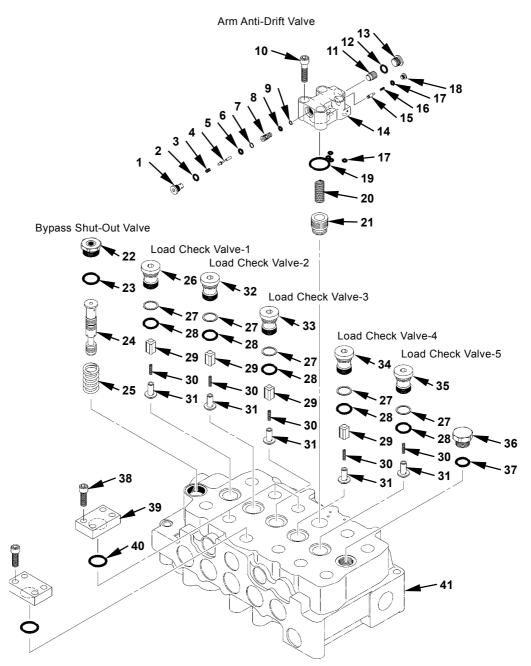
 4 - Poppet
 15 - Check Valve
 26 - Cap
 37 - O-Ring

16 - Spring 5 - O-Ring 27 - Backup Ring (5 Used) 38 - Socket Bolt (16 Used) 17 - O-Ring (5 Used) 28 - O-Ring (5 Used) 39 - Flange (4 Used) 6 - Backup Ring 7 - Sleeve 18 - Cap 29 - Check Valve (4 Used) 40 - O-Ring (4 Used) 8 - O-Ring 30 - Spring (5 Used) 19 - O-Ring 41 - Housing (5-Spool Side)

 9 - Backup Ring
 20 - Spring
 31 - Check Valve (5 Used)

 10 - Socket Bolt (4 Used)
 21 - Poppet
 32 - Cap

 11 - Piston
 22 - Cap
 33 - Cap



1-02-05-052ل W1

Disassemble Control Valve (5-Spool Housing Side)

- Disassemble Bypass Shut-Out Valve
 - 1. Remove cap (22) from housing (41).

→ : 46 mm

- 2. Remove spool (24) and spring (25) from housing (41).
- Disassemble Load Check Valve-1
 - 3. Remove cap (26), check valve (29), spring (30) and check valve (31) from housing (41).

: 14 mm

- Disassemble Load Check Valve-2
 - 4. Remove cap (32), check valve (29), spring (30) and check valve (31) from housing (41).

: 14 mm

- Disassemble Load Check Valve-3
 - 5. Remove cap (33), check valve (29), spring (30) and check valve (31) from housing (41).

: 14 mm

- Disassemble Load Check Valve-4
 - 6. Remove cap (34), check valve (29), spring (30) and check valve (31) from housing (41).

: 14 mm

- Disassemble Load Check Valve-5
 - 7. Remove cap (35), spring (30) and check valve (31) from housing (41).

: 14 mm

- Disassemble Arm Anti-Drift Valve
 - 8. Remove socket bolts (10) (4 used). Remove cover (14), O-rings (17) (4 used), (19) from housing (41).

: 12 mm

- 9. Remove spring (20) and poppet (21) from housing (41).
- 10. Remove cap (1), spring (3) and poppet (4) from cover (14).

: 8 mm

11. Remove cap (13) and piston (11) from cover (14).

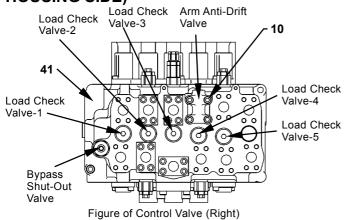
30 mm

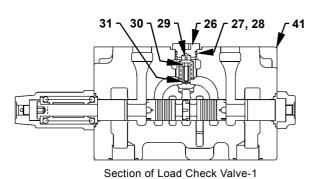
- 12. Insert the pipe (inner dia.: 7 mm, outer dia.: 10 mm, length: 15 mm) into the hole on cap (13). Tap and remove sleeve (7) through the hole on cap (1).
- 13. Remove cap (18), spring (16) and check valve (15) from cover (14).

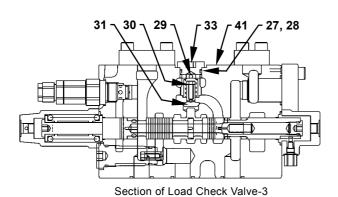
: 5 mm

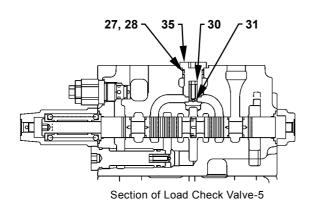
- 14. When replacing O-rings (40) (4 used), remove socket bolts (38) (16 used) from flanges (39) (4 used).
- 15. When replacing O-ring (37), remove cap (36) from housing (41).

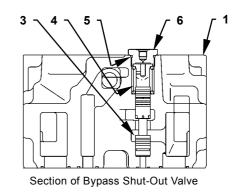
ASSEMBLE CONTROL VALVE (5-SPOOL HOUSING SIDE)

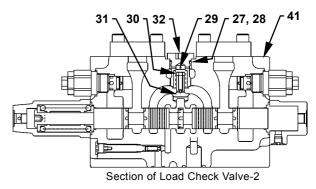


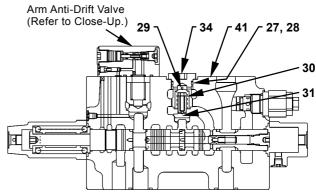




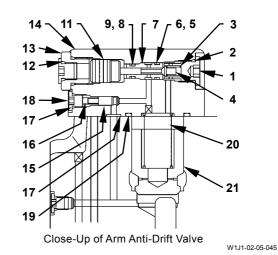










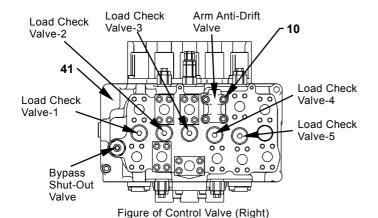


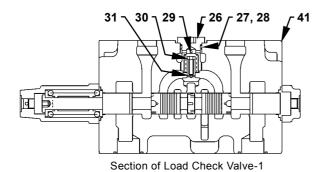
1 -	Сар
2 -	O-Ring
3 -	Spring
4 -	Poppet
5 -	O-Ring
6 -	Backup Ring
7 -	Sleeve
8 -	O-Ring
9 -	Backup Ring
10 -	Socket Bolt (4 Used)
11 -	Piston

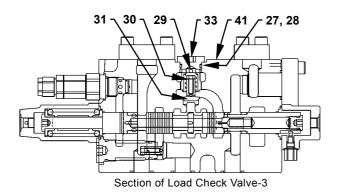
12 - O-Ring 13 - Cap 14 - Cover 15 - Check Valve 16 - Spring 17 - O-Ring (5 Used) 18 - Cap 19 - O-Ring 20 - Spring 21 - Poppet 22 - Cap 23 - O-Ring 24 - Spool 25 - Spring 26 - Cap 27 - Backup Ring (5 Used) 28 - O-Ring (5 Used) 29 - Check Valve (4 Used) 30 - Spring (5 Used)

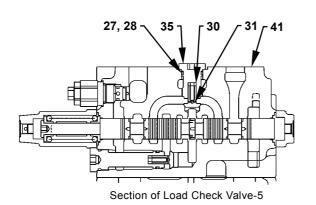
31 - Check Valve (5 Used) 32 - Cap 33 - Cap 34 - Cap 35 - Cap 36 - Cap 37 - O-Ring 38 - Socket Bolt (16 Used)

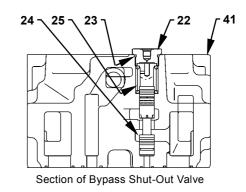
39 - Flange (4 Used) 40 - O-Ring (4 Used) 41 - Housing (5-Spool Side)

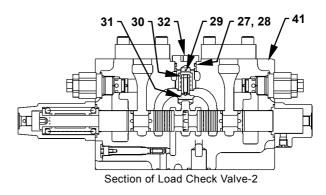


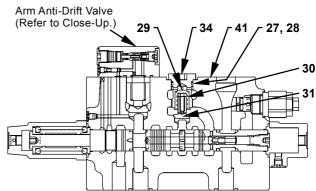




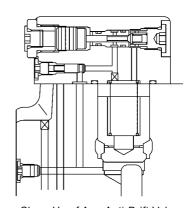








Section of Arm Anti-Drift Valve, Load Check Valve-4



Close-Up of Arm Anti-Drift Valve

W1J1-02-05-045

Assemble Control Valve (5-Spool Housing Side)

- Assemble Bypass Shut-Out Valve
 - 1. Install spool (24) and spring (25) to housing (41).
 - 2. Install O-ring (23) to cap (22). Install cap (22) to housing (41).

→ : 46 mm

: 250 N·m (25.5 kgf·m, 185 lbf·ft)

- Assemble Load Check Valve-1
 - 3. Install O-ring (28) and backup ring (27) to cap (26). Install check valves (31, 29), spring (30) and cap (26) to housing (41).

: 14 mm

: 350 N·m (35.7 kgf·m, 260 lbf·ft)

- Assemble Load Check Valve-2
 - 4. Install O-ring (28) and backup ring (27) to cap (32). Install check valves (31, 29), spring (30) and cap (32) to housing (41).

: 14 mm

: 350 N·m (35.7 kgf·m, 260 lbf·ft)

- Assemble Load Check Valve-3
 - 5. Install O-ring (28) and backup ring (27) to cap (33). Install check valves (31, 29), spring (30) and cap (33) to housing (41).

: 14 mm

: 350 N·m (35.7 kgf·m, 260 lbf·ft)

- Assemble Load Check Valve-4
 - 6. Install O-ring (28) and backup ring (27) to cap (34). Install check valves (31, 29), spring (30) and cap (34) to housing (41).

: 14 mm

: 350 N·m (35.7 kgf·m, 260 lbf·ft)

- Assemble Load Check Valve-5
 - 7. Install O-ring (28) and backup ring (27) to cap (35). Install check valve (31), spring (30) and cap (35) to housing (41).

: 14 mm

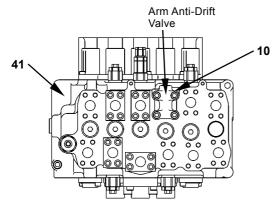
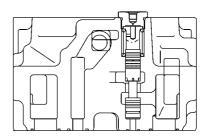
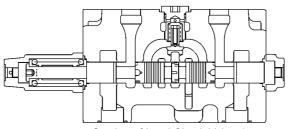


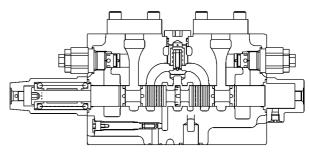
Figure of Control Valve (Right)



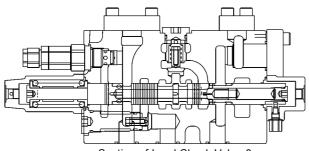
Section of Bypass Shut-Out Valve



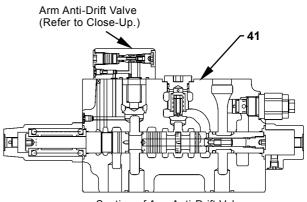
Section of Load Check Valve-1



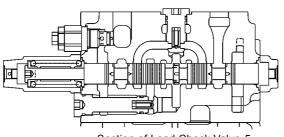
Section of Load Check Valve-2



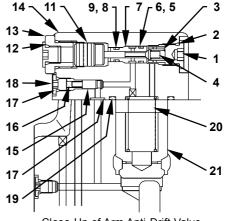
Section of Load Check Valve-3



Section of Arm Anti-Drift Valve



Section of Load Check Valve-5



Close-Up of Arm Anti-Drift Valve

W1J1-02-05-045

- Assemble Arm Anti-Drift Valve
 - 8. Install poppet (21) and spring (20) to housing (41).
 - 9. Install O-rings (8, 5) and backup rings (9, 6) to sleeve (7). Install sleeve (7) to cover (14).
- 10. Install O-ring (2) to cap (1). Install poppet (4), spring (3) and cap (1) to cover (14).

: 8 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

11. Install O-ring (12) to cap (13). Install piston (11) and cap (13) to cover (14).

: 30 mm

: 60 N·m (6.1 kgf·m, 44 lbf·ft)

12. Install O-ring (17) to cap (18). Install check valve (15), spring (16) and cap (18) to cover (14).

: 5 mm

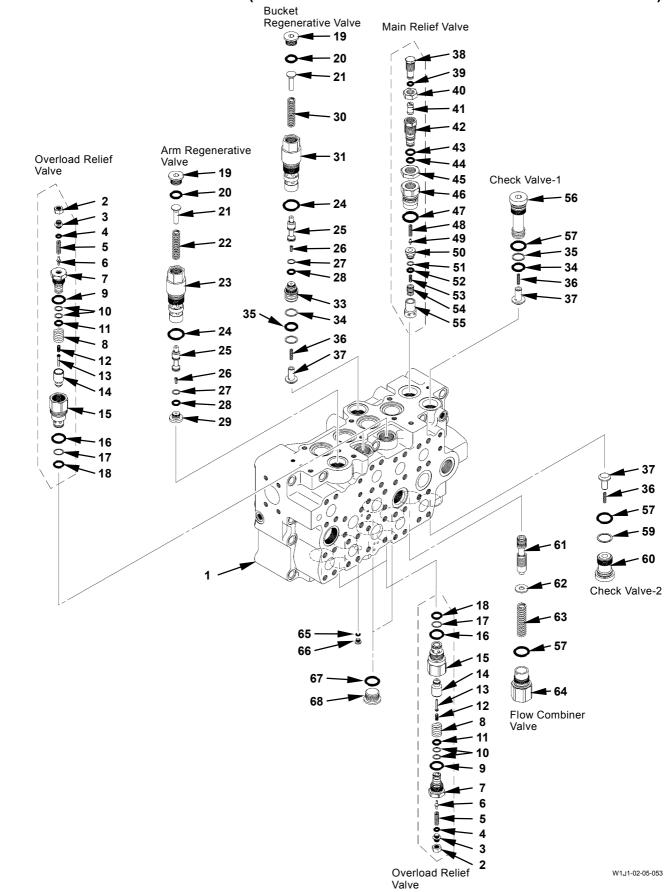
: 20 N·m (2 kgf·m, 15 lbf·ft)

13. Install O-rings (19) and (17) (4 used) to cover (14). Install cover (14) to housing (41) with socket bolts (10) (4 used).

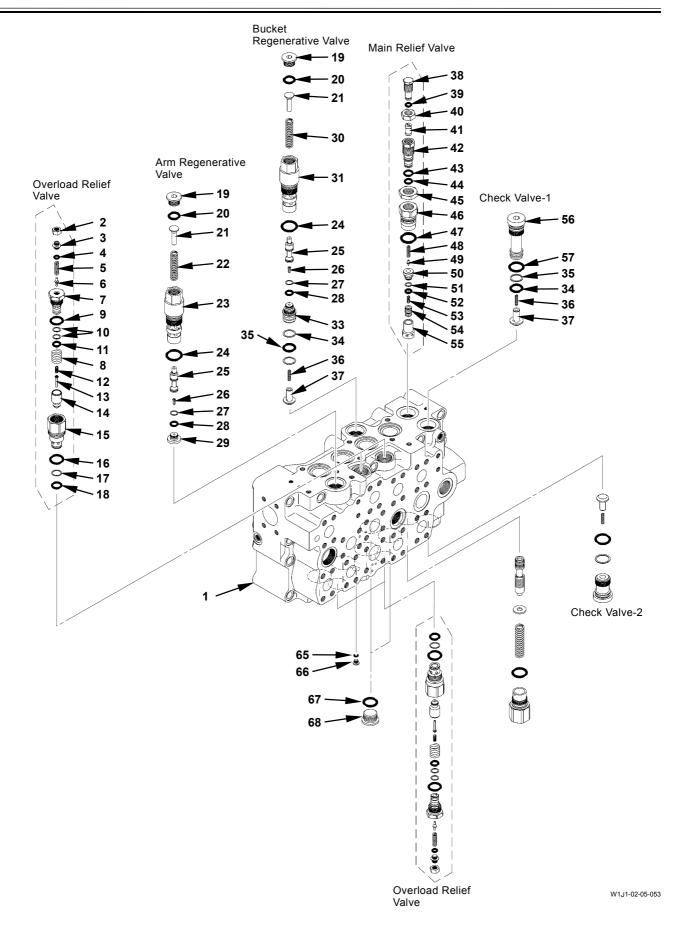
: 12 mm

: 180 N·m (18.3 kgf·m, 130 lbf·ft)

DISASSEMBLE CONTROL VALVE (4-SPOOL HOUSING UPPER AND LOWER SURFACES)



3 - Adjusting Screw (4 Used) 20 - O-Ring (2 Used) 38 - Adjusti 4 - O-Ring (4 Used) 21 - Spring Seat (2 Used) 39 - O-Ring 5 - Spring (4 Used) 22 - Spring 40 - Lock N 6 - Pilot Poppet (4 Used) 23 - Sleeve 41 - Piston 7 - Seat (4 Used) 24 - O-Ring (2 Used) 42 - Sleeve 8 - Spring (4 Used) 25 - Spool (2 Used) 43 - O-Ring 9 - O-Ring (4 Used) 26 - Piston (2 Used) 44 - O-Ring 10 - Backup Ring (8 Used) 27 - Backup Ring (2 Used) 45 - Lock N 11 - O-Ring (4 Used) 28 - O-Ring (2 Used) 46 - Cap 12 - Spring (4 Used) 29 - Sleeve 47 - O-Ring 13 - Piston (4 Used) 30 - Spring 48 - Spring 14 - Main Poppet (4 Used) 31 - Sleeve 49 - Pilot Potent Seeve (4 Used) 32 - Sleeve 50 - Pilot St. 14 - Rackup Ring (2 Used) 51 - Rackup Ring (4 Used) 51 - Rackup Ring (5 Used) 51 - Rackup Ring (5 Used) 51 - Rackup Ring (5 Used) 51 - Rackup Ring (6 Used) 51 - Rackup Ring (7	58 - Backup Ring 59 - Cap 60 - Spool 61 - Spacer 62 - Spring 63 - Cap 64 - O-Ring 65 - Cap 66 - O-Ring 66 - O-Ring 67 - Cap
15 - Sleeve (4 Used) 32 - Sleeve 50 - Pilot So 16 - O-Ring (4 Used) 33 - Backup Ring (2 Used) 51 - Backup 17 - Backup Ring (4 Used) 34 - O-Ring (3 Used) 52 - O-Ring	Ring



Disassemble Control Valve (4-Spool Housing Upper and Lower Surfaces)

• Disassemble Overload Relief Valve

IMPORTANT: Do not disassemble the overload relief valve. When the overload relief valve is disassembled, pressure must be adjusted.

1. Remove the sleeve (15) assembly (2 to 18) from housing (1).

: 41mm

2. Clamp sleeve (15) into a vise. Remove the seat assembly (2 to 7, 9, 10) from sleeve (15). Remove springs (8, 12), piston (13) and poppet (14) from sleeve (15).

→ : 36 mm

IMPORTANT: Put the matching marks on adjusting screw (3) and seat (7). Record the rotation number of adjusting screw (3).

3. Loosen lock nut (2). Remove adjusting screw (3), spring (5) and pilot poppet (6) from seat (7).

: 19 mm : 6 mm, 10 mm

- Disassemble Arm Regenerative Valve
- 4. Remove the sleeve (23) assembly (19 to 29) from housing (1).

3 : 46 mm

5. Clamp sleeve (23) into a vise. Remove cap (19).

: 14 mm

- NOTE: Cap (19) is pushed outside by spring (22).
 While pushing cap (19) to sleeve (23),
 remove cap (19).
 - 6. Remove spring seat (21), spring (22) and spool (25) from sleeve (23).
 - 7. Remove sleeve (29) and piston (26) from sleeve (23).

- Disassemble Bucket Regenerative Valve
- 8. Remove the sleeve (31) assembly (19 to 37) from housing (1).

: 36 mm

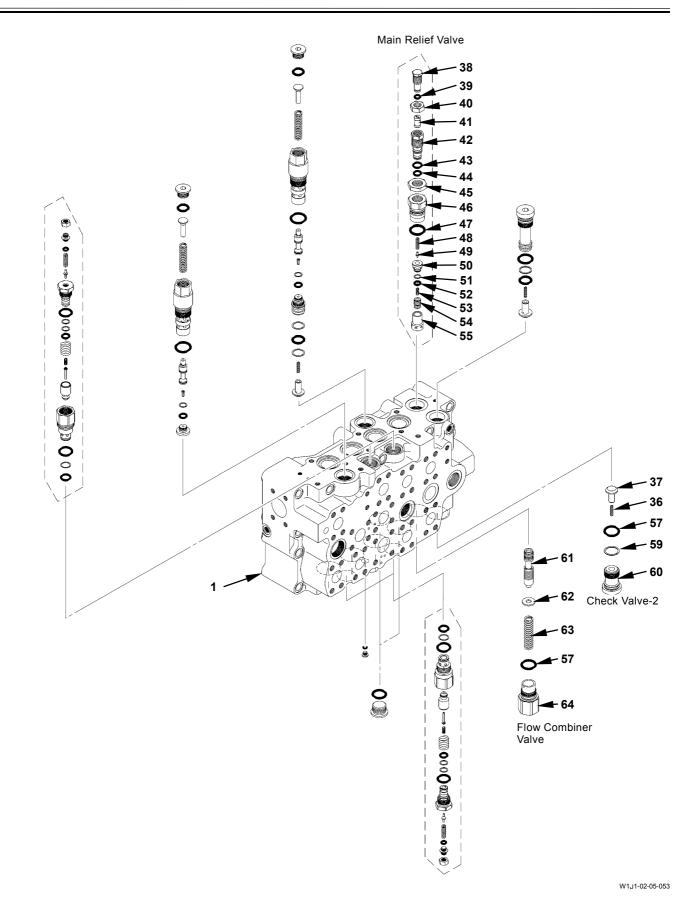
9. Clamp sleeve (31) into a vise. Remove cap (19).

: 14 mm

NOTE: Cap (19) is pushed outside by spring (30). While pushing cap (19) to sleeve (31), remove cap (19).

- 10. Remove spring seat (21), spring (30) and spool (25) from sleeve (31).
- Remove sleeve (33) from housing (1) by using special tool (ST 1489).
 Remove piston (26) from sleeve (33).
- 12. Remove check valve (37) and spring (36) from sleeve (33).
- Disassemble Check Valve-1
- 13. Remove cap (56), check valve (37) and spring (36) from housing (1).

: 14 mm



- Disassemble Check Valve-2
- 14. Remove cap (60), check valve (37) and spring (36) from housing (1).

: 14 mm

• Disassemble Main Relief Valve

IMPORTANT: Do not disassemble the main relief valve. When the main relief valve is disassembled, pressure must be adjusted.

15. Remove the cap (46) assembly (38 to 55) from housing (1).

• : 41mm

IMPORTANT: As pilot seat (50) is installed to cap (46), do not disassemble pilot seat (50).

16. Remove sleeve (55) from cap (46). Remove spring (53) and main poppet (54) from sleeve (55).

IMPORTANT: Put the matching marks on adjusting screw (38), lock nut (40) and sleeve (42). Record the rotation number of adjusting screw (38).

17. Loosen lock nut (40). Remove adjusting screw (38) from sleeve (42). Remove piston (41), spring (48) and poppet (49) from sleeve (42).

: 30 mm, 22 mm

IMPORTANT: Put the matching marks on sleeve (42), lock nut (45) and cap (46). Record the rotation number of sleeve (42).

18. Loosen lock nut (45). Remove sleeve (42) from cap (46).

• : 41 mm

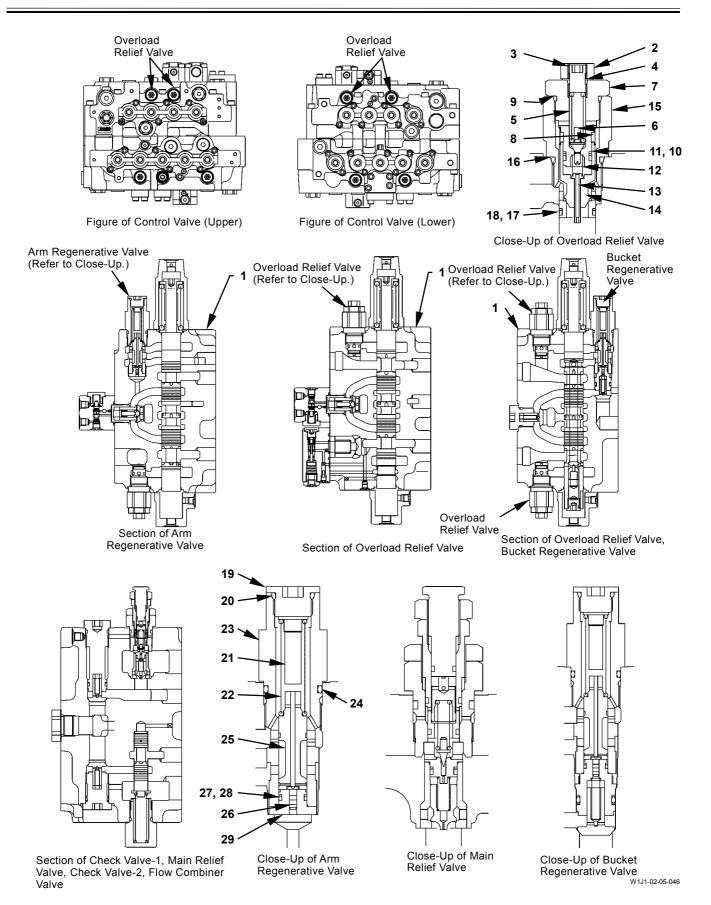
- Disassemble Flow Combiner Valve
- 19. Remove cap (64), spring (63), spacer (62) and spool (61) from housing (1).

→ : 46 mm

ASSEMBLE CONTROL VALVE (4-SPOOL HOUSING UPPER AND LOWER SURFACES) Flow Combiner Overload Check Overload Check Regenerative Valve Relief Valve Valve-1 Relief Valve Valve-2 Valve Main Relief Valve 6 Bucket 11, 10 Regenerative Valve 12 13 Figure of Control Valve (Upper) 18, 17 Figure of Control Valve (Lower) Arm Regenerative Close-Up of Overload Relief Valve Bucket Valve Overload (Refer to Close-Up.) Overload Regenerative Valve Relief Valve Relief Valve (Refer to Close-Up.) Overload Overload Relief Valve Relief Valve Section of Arm Section of Bucket Regenerative Section of Overload Relief Valve Regenerative Valve Valve, Overload Relief Valve Main Relief Valve (Refer to Close-Up.) 19 38 19 Check Valve-1 20 23 31 -57 21 21 39 36 30 41 34, 35 22 25 37 48 44 49 25 37 27, 28 36 50 26 62 53 51, 52 57, 59 27, 28 34, 35 60 Check Valve-2 29 37 Flow Combiner Close-Up of Bucket Close-Up of Main Close-Up of Arm Valve Relief Valve Regenerative Valve Regenerative Valve W1J1-02-05-046 Section of Check Valve-1, Main Relief Valve, Check Valve-2, Flow Combiner

Valve

1 - Housing (4-Spool Side) 2 - Lock Nut (4 Used) 3 - Adjusting Screw (4 Used) 4 - O-Ring (4 Used) 5 - Spring (4 Used) 6 - Pilot Poppet (4 Used) 7 - Seat (4 Used) 8 - Spring (4 Used) 9 - O-Ring (4 Used) 10 - Backup Ring (8 Used) 11 - O-Ring (4 Used) 12 - Spring (4 Used) 13 - Piston (4 Used) 14 - Main Poppet (4 Used) 15 - Sleeve (4 Used) 16 - O-Ring (4 Used) 17 - Backup Ring (4 Used)	18 - O-Ring (4 Used) 19 - Cap (2 Used) 20 - O-Ring (2 Used) 21 - Spring Seat (2 Used) 22 - Spring 23 - Sleeve 24 - O-Ring (2 Used) 25 - Spool (2 Used) 26 - Piston (2 Used) 27 - Backup Ring (2 Used) 28 - O-Ring (2 Used) 29 - Sleeve 30 - Spring 31 - Sleeve 32 - Sleeve 33 - Backup Ring (2 Used) 34 - O-Ring (3 Used)	36 - Spring (3 Used) 37 - Check Valve (3 Used) 38 - Adjusting Screw 39 - O-Ring 40 - Lock Nut 41 - Piston 42 - Sleeve 43 - O-Ring 44 - O-Ring 45 - Lock Nut 46 - Cap 47 - O-Ring 48 - Spring 49 - Pilot Poppet 50 - Pilot Seat 51 - Backup Ring 52 - O-Ring	53 - Spring 54 - Main Poppet 55 - Sleeve 56 - Cap 57 - O-Ring (3 Used) 58 - Backup Ring 59 - Cap 60 - Spool 61 - Spacer 62 - Spring 63 - Cap 64 - O-Ring 65 - Cap 66 - O-Ring 67 - Cap
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Assemble Control Valve (4-Spool Housing Upper and Lower Surfaces)

Assemble Overload Relief Valve

IMPORTANT: Align the matching marks and tighten adjusting screw (3) to the same turns when disassembling.

- Install pilot poppet (6), spring (5), adjusting screw
 and lock nut (2) to seat (7).
- 2. Install O-ring (16), backup ring (17) and O-ring (18) to sleeve (15).
- 3. Install piston (13) to main poppet (14). Install main poppet (14) to sleeve (15).
- 4. Clamp sleeve (15) into a vise. Install springs (8, 12) to the seat (7) assembly. Install the seat (7) assembly to sleeve (15).

→ : 36 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

IMPORTANT: Install the overload relief valve to the original position before disassembling. Adjust pressure of the overload relief valve by using a test bench.

(Refer to the Operational Performance Test section / TROUBLESHOOTING in the separated volume, T/M.)

5. Install the overload relief valves (4 used) to housing (1).

2 : 41 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

NOTE: Tighten the hexagonal part of sleeve (15).

- Assemble Arm Regenerative Valve
 - 6. Install O-ring (28) and backup ring (27) to sleeve (29). Install piston (26) and sleeve (29) to sleeve (23).
- 7. Install spool (25), spring (22) and spring plate (21) to sleeve (23).

IMPORTANT: Cap (19) is pushed outside by spring (22). While pushing cap (19) to sleeve (23), install cap (19).

8. Install O-ring (20) to cap (19). Clamp sleeve (23) into a vise. Install cap (19) to sleeve (23).

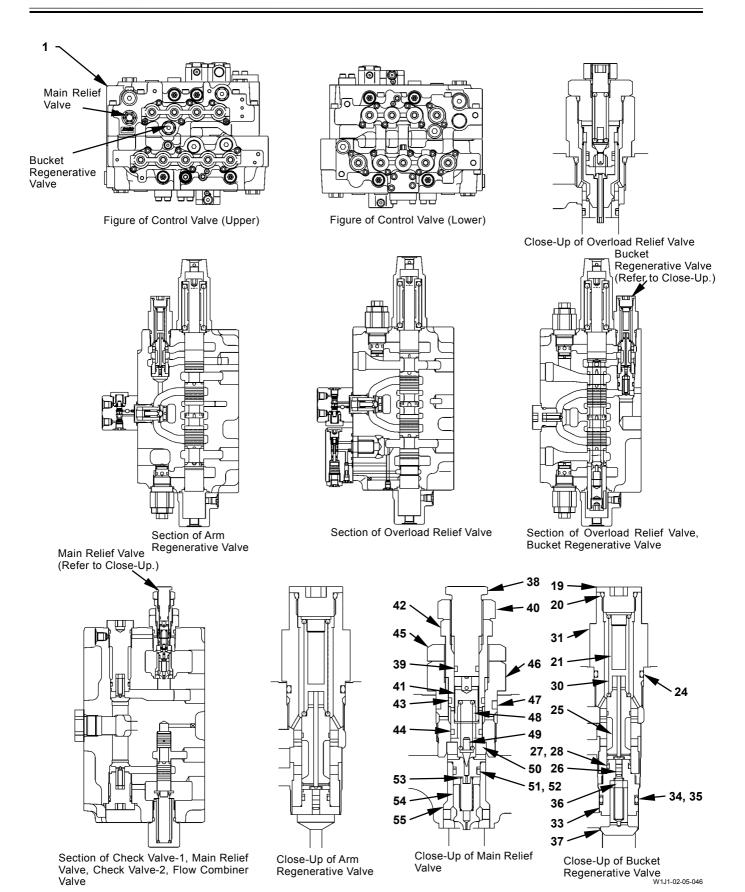
: 14 mm

: 180 N·m (18.3 kgf·m, 133 lbf·ft)

9. Install O-ring (24) to sleeve (23). Install sleeve (23) to housing (1).

→ : 46 mm

180 N·m (18.3 kgf·m, 133 lbf·ft)



- Assemble Bucket Regenerative Valve
- 10. Install piston (26), spring (36) and check valve (37) to sleeve (33).
- 11. Install O-rings (28, 35) and backup rings (27, 34) to sleeve (33). Install sleeve (33) to sleeve (31).
- 12. Install spool (25), spring (30) and spring seat (21) to sleeve (31).

IMPORTANT: Cap (19) is pushed outside by spring (30). While pushing cap (19) to sleeve (31), install cap (19).

13. Install O-ring (20) to cap (19). Clamp sleeve (31) into a vise. Install cap (19) to sleeve (31).

: 14 mm

🖚 : 180 N·m (18.3 kgf·m, 133 lbf·ft)

14. Install O-ring (24) to sleeve (31). Install sleeve (31) to housing (1).

: 36 mm

: 180 N·m (18.3 kgf·m, 133 lbf·ft)

• Assemble Main Relief Valve

IMPORTANT: Align the matching marks and tighten sleeve (42) to the same turns when disassembling.

15. Install lock nut (45) and O-rings (43, 44) to sleeve (42). Install sleeve (42) to cap (46). Tighten lock nut (45).

→ : 41 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

16. Install poppet (49), spring (48) and piston (41) to cap (46).

IMPORTANT: Align the matching marks and tighten adjusting screw (38) to the same turns when disassembling.

17. Install lock nut (40) and O-ring (39) to adjusting screw (38). Install adjusting screw (38) to sleeve (42). Tighten lock nut (40).

: 30 mm

: 60 N·m (6 kgf·m, 44 lbf·ft)

- 18. Install backup ring (51) and O-ring (52) to pilot seat (50).
- 19. Install main poppet (54) and spring (53) to sleeve (55).
- 20. Install the sleeve (55) assembly to cap (46).
- 21. Install O-ring (47) to cap (46).

IMPORTANT: Adjust pressure of the main relief valve. (Refer to the Operational Performance Test section / TROUBLESHOOTING in the separated volume, T/M.)

22. Install the main relief valve to housing (1).

→ : 41 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

NOTE: Tighten the hexagonal part of cap (46).

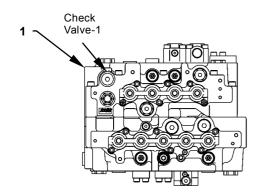


Figure of Control Valve (Upper)

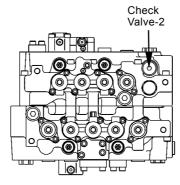
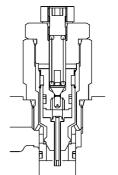
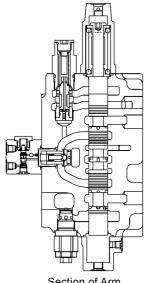


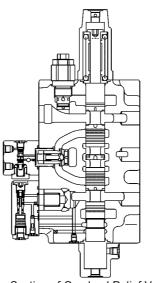
Figure of Control Valve (Lower)



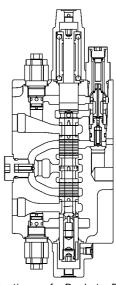
Close-Up of Overload Relief Valve



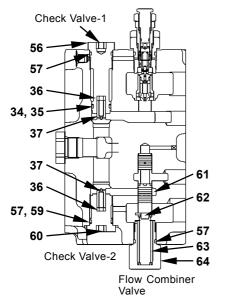
Section of Arm Regenerative Valve



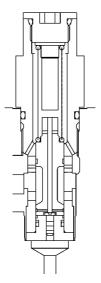
Section of Overload Relief Valve



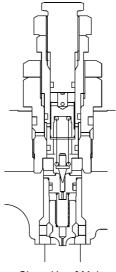
Section of Bucket Regenerative Valve, Overload Relief Valve



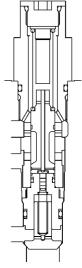
Section of Check Valve-1, Check Valve-2, Flow Combiner Valve



Close-Up of Arm Regenerative Valve



Close-Up of Main Relief Valve



Close-Up of Bucket Regenerative Valve W1J1-02-05-046

- Assemble Flow Combiner Valve
- 23. Install O-ring (57) to cap (64). Install spool (61), spacer (62), spring (63) and cap (64) to housing (1).

→ : 46 mm

: 250 N·m (26 kgf·m, 184 lbf·ft)

- Assemble Check Valve-1
- 24. Install O-rings (57, 34) and backup ring (35) to cap (56). Install spring (36), check valve (37) and cap (56) to housing (1).

: 14 mm

: 350 N·m (35.7 kgf·m, 258 lbf·ft)

- Assemble Check Valve-2
- 25. Install O-ring (57) and backup ring (59) to cap (60). Install spring (36), check valve (37) and cap (60) to housing (1).

: 14 mm

: 350 N·m (35.7 kgf·m, 258 lbf·ft)

DISASSEMBLE CONTROL VALVE (5-SPOOL HOUSING UPPER AND LOWER SURFACES) Overload Relief Valve-1 **— 46** Overload Relief Valve-2 **– 47** - 48 - 49 Check Valve-3 Check Valve-2 ---- 38 - 24 - 39 Check Valve-1 ~ 55 10 - 32 - 33 - 12 - 37 - 34 - 28 - 35 - 29 - 30 - 34 35 22 23 - 30 - 29 - 28 - 56 - 55 - 59 - 54 23 24 52 - 51 50 49 Overload Relief Valve-1

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1 -	Cap
2 -	O-Ring
3 -	Piston
4 -	Sleeve
5 -	Backup Ring (2 Used)
6 -	O-Ring (2 Used)
7 -	Poppet
8 -	Spring
9 -	Spring Seat
10 -	Spring
11 -	Pilot Poppet
12 -	Lock Nut
13 -	Backup Ring
14 -	O-Ring
15 -	Sleeve

16 - O-Ring

19 - Pilot Seat 20 - Spring 21 - Spring 22 - Piston 23 - O-Ring (4 Used) 24 - Backup Ring (10 Used) 25 - Main Poppet 26 - Sleeve 27 - O-Ring (5 Used) 28 - Backup Ring (5 Used) 29 - O-Ring (5 Used) 30 - Cap 31 - O-Ring (2 Used) 32 - Backup Ring (2 Used) 33 - Spring (2 Used) 34 - Check Valve (2 Used)

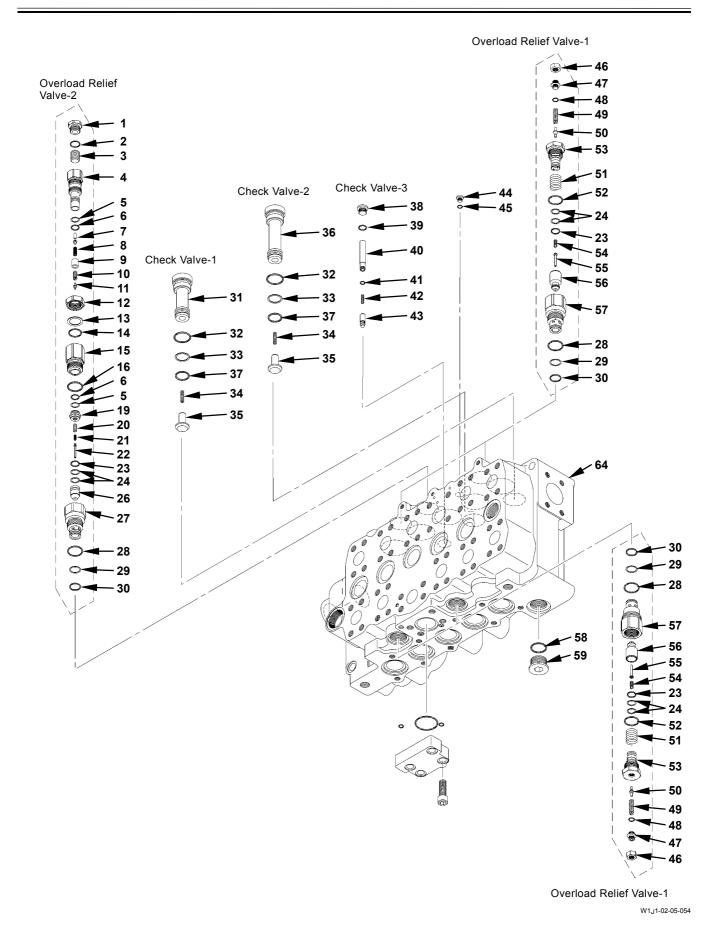
36 - Cap 37 - O-Ring 38 - Cap 39 - O-Ring 40 - Spacer 41 - O-Ring 42 - Spring 43 - Check Valve 44 - Cap 45 - O-Ring 46 - Lock Nut (4 Used)

47 - Adjusting Screw (4 Used) 48 - O-Ring (4 Used) 49 - Spring (4 Used) 50 - Pilot Poppet (4 Used) 51 - Spring (4 Used) 52 - O-Ring (4 Used) 53 - Seat (4 Used) 54 - Spring (4 Used) 55 - Piston (4 Used) 56 - Main Poppet (4 Used) 57 - Sleeve (4 Used) 58 - O-Ring 59 - Cap

61 - O-Ring (2 Used) 62 - Flange 63 - Socket Bolt (4 Used)

60 - O-Ring

63 - Socket Bolt (4 Used) 64 - Housing (5-Spool Side)



Disassemble Control Valve (5-Spool Housing Upper and Lower Surfaces)

• Disassemble Overload Relief Valve-1

IMPORTANT: Do not disassemble the overload relief valve. When the overload relief valve is disassembled, pressure must be adjusted.(Refer to the Operational Performance Test section / TROUBLESHOOTING in the separated volume, T/M.)

Attach the identification tag onto the overload relief valves (4 used) in order to install to the original position.

1. Loosen sleeve (57). Remove overload relief valves-1 from housing (64).

• : 41 mm

2. Clamp the hexagonal part of sleeve (57) into a vise. Loosen the hexagonal part of seat (53). Remove the seat assembly (46 to 50, 52, 23, 24). Remove springs (51, 54), piston (55) and poppet (56) from sleeve (57).

→ : 36 mm

IMPORTANT: Put the matching marks on adjusting screw (47) and seat (53). Record the rotation number of adjusting screw (47).

3. Remove lock nut (46). Remove adjusting screw (47), spring (49) and pilot poppet (50) from seat (53).

: 19 mm : 6 mm

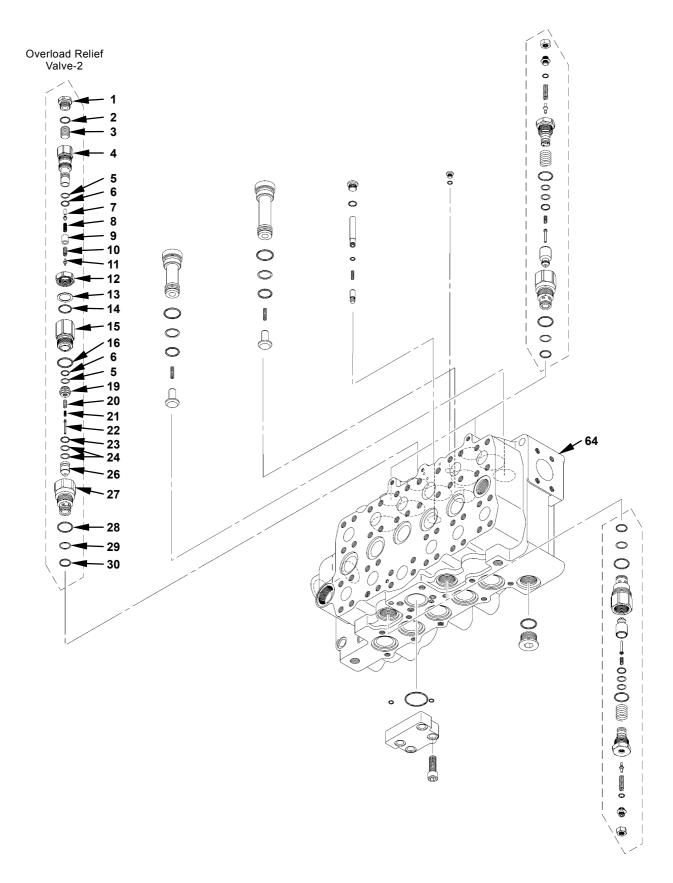
- Disassemble Check Valve-1, Check Valve-2
 - 4. Remove caps (31, 36), check valve (35) and spring (34) from housing (64).

: 14 mm

- Disassemble Check Valve-3
 - 5. Remove cap (38), spacer (40), spring (42) and check valve (43) from housing (64).

: 8 mm

- 6. When replacing O-ring (58), remove cap (59) from housing (64).
- 7. When replacing O-ring (45), remove cap (44) from housing (64).



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• Disassemble Overload Relief Valve-2

IMPORTANT: Do not disassemble the overload relief valve. When the overload relief valve is disassembled, pressure must be adjusted. Refer to the Operational Performance Test section / TROUBLESHOOTING in the separated volume, T/M.)

8. Rotate sleeve (27) and remove the overload relief valve assembly (1 to 30) from housing (64).

→ : 41 mm

IMPORTANT: Put the matching marks on sleeves (27, 15). Record the rotation number of adjusting sleeve (15).

9. Clamp sleeve (27) into a vise. Loosen sleeve (15). Remove the sleeve (15) assembly (1 to 14) from sleeve (27).

→ : 36 mm

10. Remove spring seat (9), spring (10), pilot poppet (11), pilot seat (19), springs (21, 20), piston (22) and main poppet (26) from sleeve (27).

NOTE: Push and remove main poppet (26) from the housing (64) side in sleeve (27) by using a round bar.

11. Remove spring (8) and poppet (7) from sleeve (15).

IMPORTANT: Put the matching marks on sleeves (4, 15) and lock nut (12). Record the rotation number of sleeve (4).

12. Clamp sleeve (15) into a vise. Loosen lock nut (12). Remove sleeve (4) and lock nut (12) from sleeve (15).

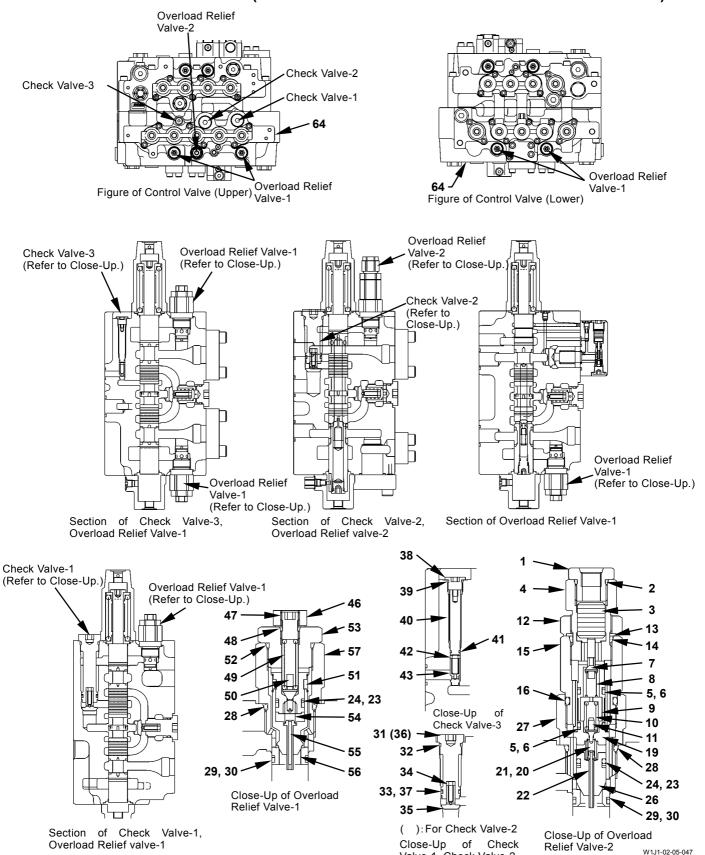
36 mm

13. Clamp sleeve (4) into a vise. Remove cap (1). Remove piston (3) from sleeve (4).

27 mm

NOTE: Push a round bar (Dia.: 3 mm) into the poppet (7) hole on sleeve (4) and remove piston (3).

ASSEMBLE CONTROL VALVE (5-SPOOL HOUSING UPPER AND LOWER SURFACES)



Valve-1, Check Valve-2

1 -	Сар	1
2 -	O-Ring	2
3 -	Piston	2
4 -	Sleeve	2
5 -	Backup Ring (2 Used)	2
6 -	O-Ring (2 Used)	2
7 -	Poppet	2
8 -	Spring	2
9 -	Spring Seat	2
10 -	Spring	2
11 -	Pilot Poppet	2
12 -	Lock Nut	3
13 -	Backup Ring	3
14 -	O-Ring	3

15 - Sleeve 16 - O-Ring

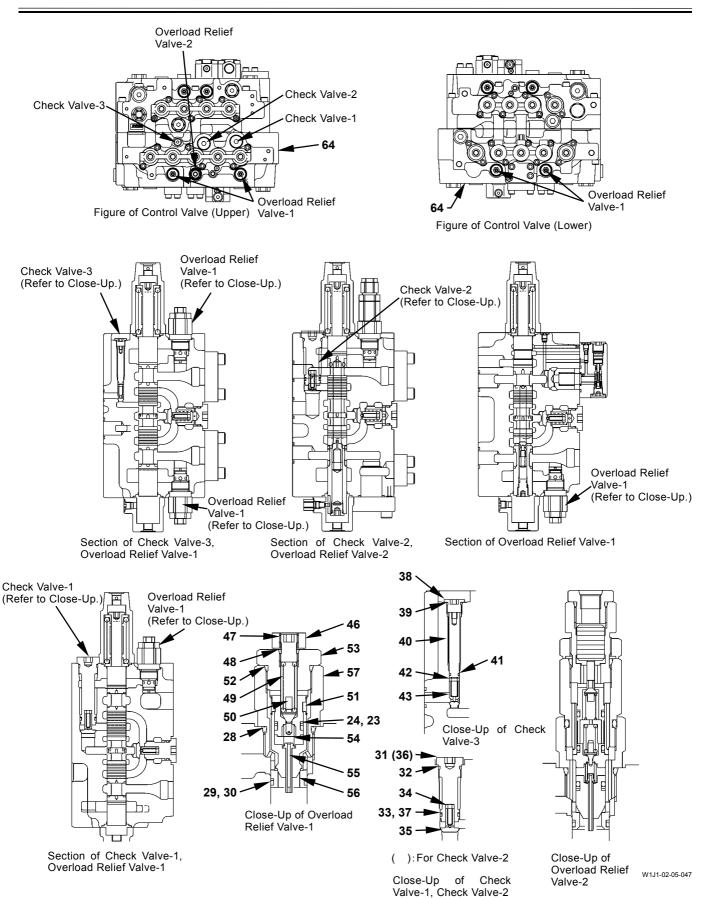
19 -	Pilot Seat
20 -	Spring
21 -	Spring
22 -	Piston
23 -	O-Ring (4 Used)
24 -	Backup Ring (10 Used)
25 -	Main Poppet
26 -	Sleeve
27 -	O-Ring (5 Used)
28 -	Backup Ring (5 Used)
29 -	O-Ring (5 Used)
30 -	Сар
31 -	O-Ring (2 Used)
32 -	Backup Ring (2 Used)
33 -	Spring (2 Used)
34 -	Check Valve (2 Used)

36 -	Сар
37 -	O-Ring
38 -	Сар
39 -	O-Ring
40 -	Spacer
41 -	O-Ring
42 -	Spring
43 -	Check Valve
44 -	Сар
45 -	O-Ring
46 -	Lock Nut (4 Used)

47 - Adjusting Screw (4 Used) 48 - O-Ring (4 Used) 49 - Spring (4 Used) 50 - Pilot Poppet (4 Used) 51 - Spring (4 Used) 52 - O-Ring (4 Used)
53 - Seat (4 Used)
54 - Spring (4 Used)
55 - Piston (4 Used)
56 - Main Poppet (4 Used)
57 - Sleeve (4 Used)
58 - O-Ring
59 - Cap
60 - O-Ring

61 - O-Ring (2 Used) 62 - Flange 63 - Socket Bolt (4 Used)

64 - Housing (5-Spool Side)



Assemble Control Valve (5-Spool Housing Upper and Lower Surfaces)

- Assemble Overload Relief Valve-1
 - 1. Install O-ring (52), backup rings (24) (2 used) and O-ring (23) to seat (53). Install O-ring (48) to adjusting screw (47).

IMPORTANT: Align the matching marks and tighten adjusting screw (47) to the same turns when disassembling.

- 2. Install pilot poppet (50), spring (49), adjusting screw (47) and lock nut (46) to seat (53).
- 3. Install O-ring (28), backup ring (29) and O-ring (30) to sleeve (57).
- 4. Install piston (55) to main poppet (56). Install main poppet (56) to sleeve (57).
- 5. Install springs (54, 51) to the seat (53) assembly. Install the seat (53) assembly to sleeve (57).

: 36 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

IMPORTANT: Install overload relief valve-1 to the original position before disassembling.

Adjust pressure of the overload relief valve by using a test bench.

(Refer to the Operational Performance Test section /

Performance Test section / TROUBLESHOOTING in the separated volume, T/M.)

6. Install overload relief valves-1 (4 used) to housing (64).

• : 41 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

NOTE: Tighten the hexagonal part of sleeve (57).

- Assemble Check Valve-1, Check Valve-2
 - 7. Install O-rings (32, 37) and backup ring (33) to cap (check valve-1: 31, check valve-2: 36). Install spring (34), check valve (35) and cap (check valve-1: 31, check valve-2: 36) to housing (64).

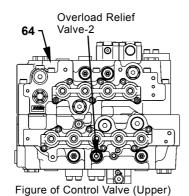
= : 14 mm

: 350 N·m (36 kgf·m, 258 lbf·ft)

- Assemble Check Valve-3
 - 8. Install O-ring (39) to cap (38). Install O-ring (41) to spacer (40). Install check valve (43), spring (42), spacer (40) and cap (38) to housing (64).

: 8 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)



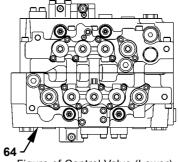
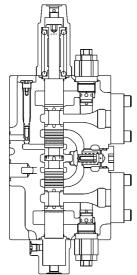
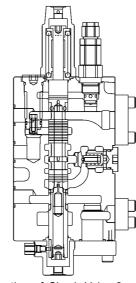


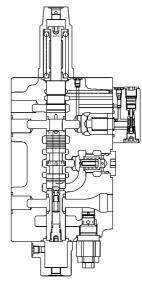
Figure of Control Valve (Lower)



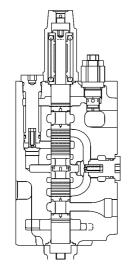
Section of Check Valve-3, Overload Relief Valve-1



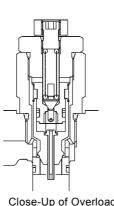
Section of Check Valve-2, Overload Relief Valve-2



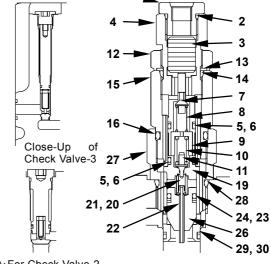
Section of Overload Relief Valve-1



Section of Check Valve-1, Overload Relief Valve-1



Close-Up of Overload Relief Valve-1



(): For Check Valve-2 Close-Up of Check Valve-1, Check Valve-2

Close-Up of Overload Relief Valve-2 W1J1-02-05-047

- Assemble Overload Relief Valve-2
- 9. Install O-ring (2) to cap (1). Install piston (3) and cap (1) to sleeve (4).

27 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

10. Install lock nut (12), backup ring (13) and O-ring (14) to sleeve (4). Install backup ring (5), O-ring (6) and poppet (7) to sleeve (4).

IMPORTANT: Align the matching marks and tighten sleeve (4) to the same turns when disassembling.

11. Install the sleeve (4) assembly to sleeve (15). Tighten lock nut (12).

: 36 mm

: 80 N·m (8 kgf·m, 59 lbf·ft)

- 12. Install O-ring (16), spring (8), spring seat (9) and spring (10) to the sleeve (15) assembly.
- 13. Install O-rings (28, 30) and backup ring (29) to sleeve (27).
- 14. Install backup rings (24) (2 used), O-ring (23) and piston (22) to main poppet (26).
- 15. Install the main poppet (26) assembly to sleeve (27).
- 16. Install backup ring (5) and O-ring (6) to pilot seat (19).

- 17. Install springs (21, 20) to main poppet (26). Install pilot seat (19) to sleeve (27). Install pilot poppet (11) to pilot seat (19).
- 18. Align the sleeve (15) assembly with the sleeve (27) assembly before temporarily tightening. Clamp sleeve (27) into a vise. Tighten sleeve (15).

→ : 36 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

IMPORTANT: Install overload relief valve-2 to the original position before disassembling. Adjust pressure of overload relief valve-2 by using a test bench. Operational (Refer to the **Performance** Test section 1 **TROUBLESHOOTING** in the separated volume, T/M.)

19. Install overload relief valve-2 to housing (64).

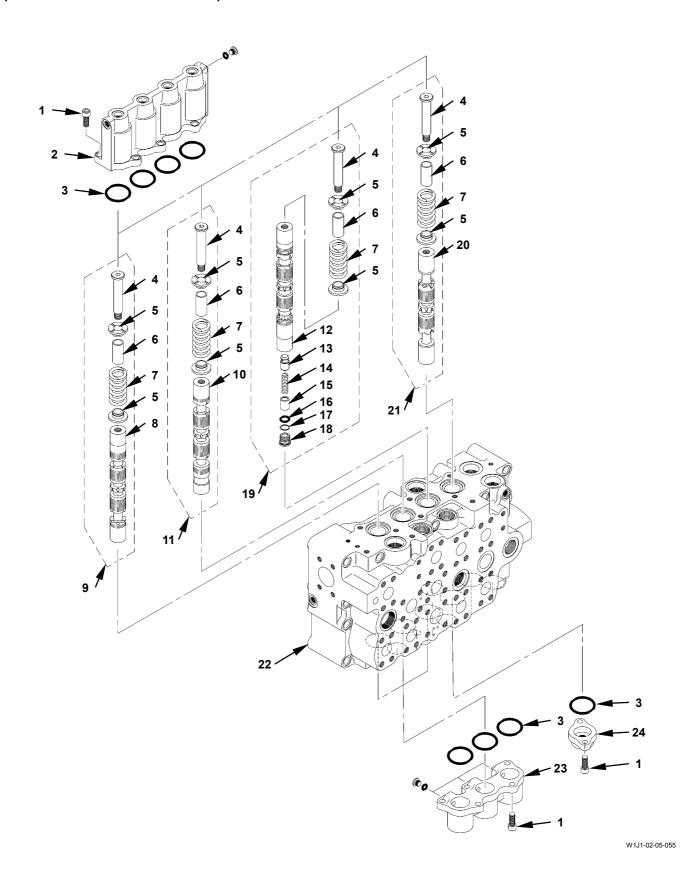
→ : 41 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

NOTE: Tighten the hexagonal part of sleeve (27).

DISASSEMBLE CONTROL (4-SPOOL CONTROL VALVE)

VALVE



1 -	Socket Bolt (13 Used)	7 -	Spring (4 Used)	13 - Check Valve	19 - Spool (Bucket)
2 -	Cover	8 -	Spool	14 - Spring	20 - Spool
3 -	O-Ring (8 Used)	9 -	Spool (Arm 2)	15 - Spacer	21 - Spool (Travel)

22 - Housing (4-Spool Side) 23 - Cover 24 - Cover

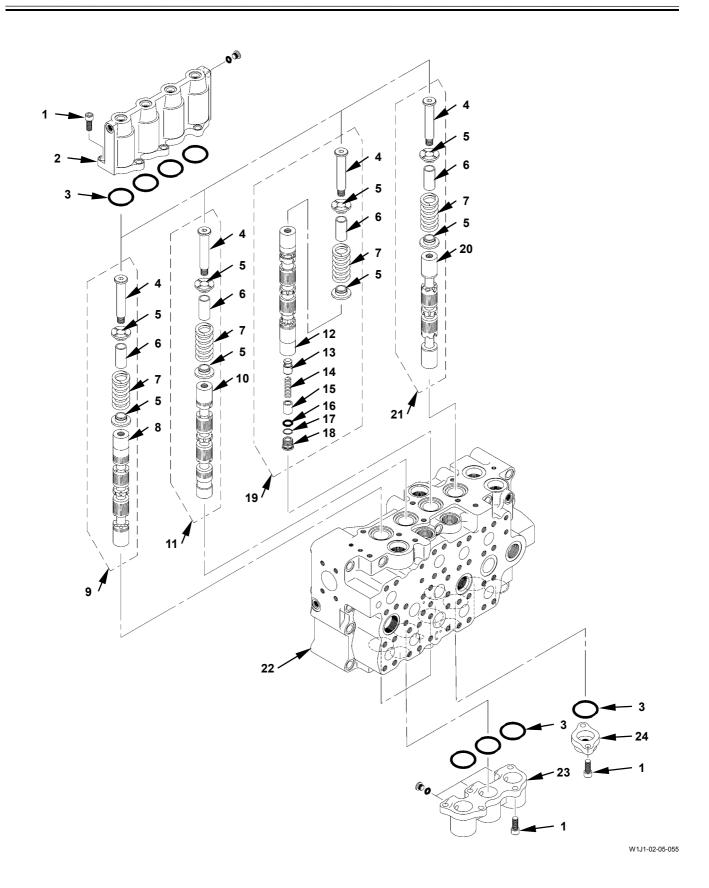
 3 - O-Ring (8 Used)
 9 - Spool (Arm 2)

 4 - Cap (4 Used)
 10 - Spool

 5 - Spring Guide (8 Used)
 11 - Spool (Boom 2)

 6 - Sleeve (4 Used)
 12 - Spool

 16 - O-Ring 17 - Backup Ring 18 - Cap



Disassemble Control Valve (4-Spool Control Valve)

- Disassemble Spool
 - 1. Remove socket bolts (1) (6 used) from cover (2). Remove cover (2) and O-rings (3) (4 used) from housing (22).

: 10 mm

2. Remove socket bolts (1) (7 used) from covers (23, 24). Remove covers (23, 24) and O-rings (3) (4 used) from housing (22).

: 10 mm

IMPORTANT: Rotate and remove spool (9, 11, 19, 21) assemblies.

Do not disassemble spool (9, 11, 19, 21) assemblies unless necessary.

- 3. Remove spool (9, 11, 19, 21) assemblies from housing (22).
- 4. Remove bolts (4) (4 used), spring guide (12) (4 used), springs (7) (4 used), sleeves (6) (4 used) and spring guides (5) (4 used) from spools (8, 10, 12, 20).

: 10 mm

5. Remove cap (18), spacer (15), spring (14) and check valve (13) from spool (12).

: 10 mm

ASSEMBLE CONTROL VALVE (4-SPOOL **CONTROL VALVE)**

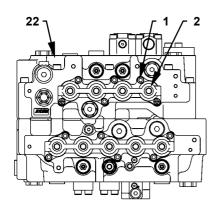


Figure of Control Valve (Upper)

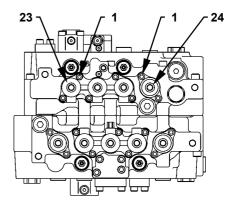
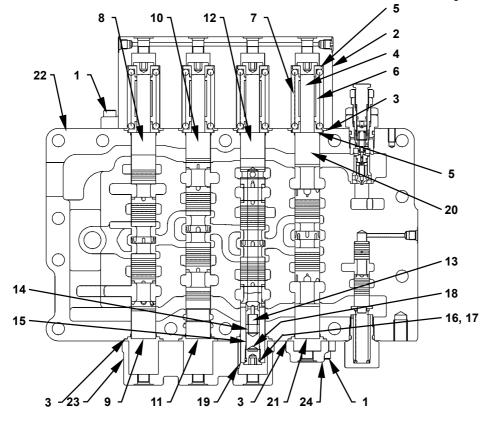


Figure of Control Valve (Lower)



Section of 4-Spool

1 - Socket Bolt (13 Used)

3 - O-Ring (8 Used)

4 - Bolt (4 Used)

5 - Spring Guide (8 Used)

6 - Sleeve (4 Used)

7 - Spring (4 Used)

8 - Spool

9 - Spool (Arm 2)

10 - Spool

11 - Spool (Boom 2)

12 - Spool

13 - Check Valve

14 - Spring 15 - Spacer

16 - O-Ring 17 - Backup Ring

18 - Cap

19 - Spool (Bucket)

20 - Spool

21 - Spool (Travel)

22 - Housing (4-Spool Side) 23 - Cover

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24 - Cover

Assemble Control Valve (4-Spool Control Valve)

1. Install O-rings (3) (8 used) to housing (22). Install cover (24) to housing (22) with socket bolts (1) (2 used). Install cover (23) to housing (22) with socket bolts (1) (5 used).

: 10 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

2. Apply LOCTITE #262 to the thread part of bolts (4) (4 used). Install spring guide (5), sleeve (6), spring (7) and spring guide (5) to spools (20, 12, 10, 8) with bolt (4) respectively.

: 10 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

3. Install O-ring (16) and backup ring (17) to cap (18). Install check valve (13), spring (14) and spacer (15) to spool (12). Install cap (18) to spool (12).

: 10 mm

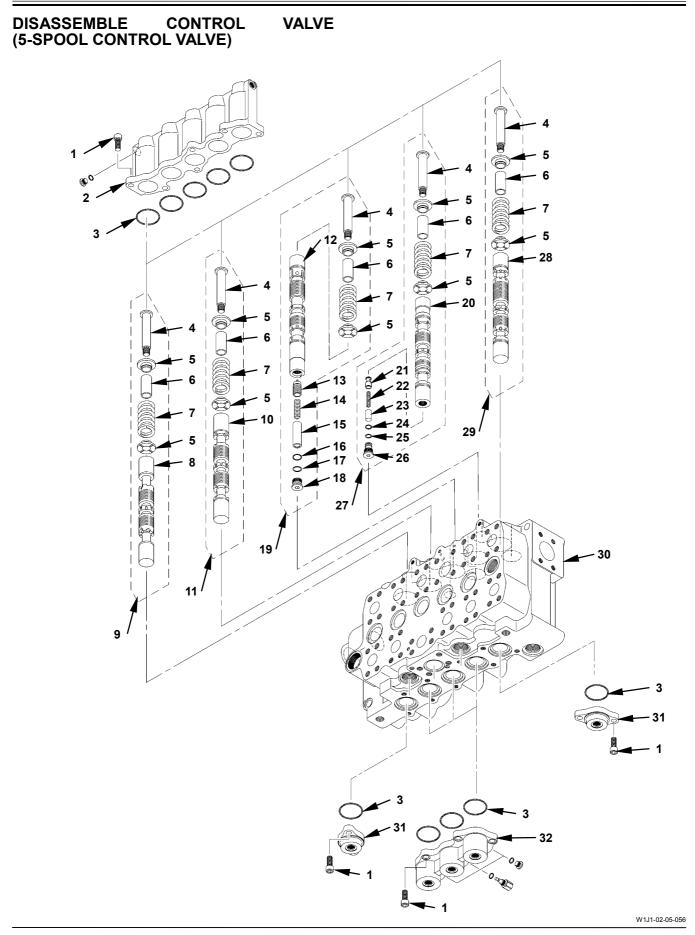
: 80 N·m (8 kgf·m, 59 lbf·ft)

IMPORTANT: Apply hydraulic oil onto the surface of spools (9, 11, 19, 21).

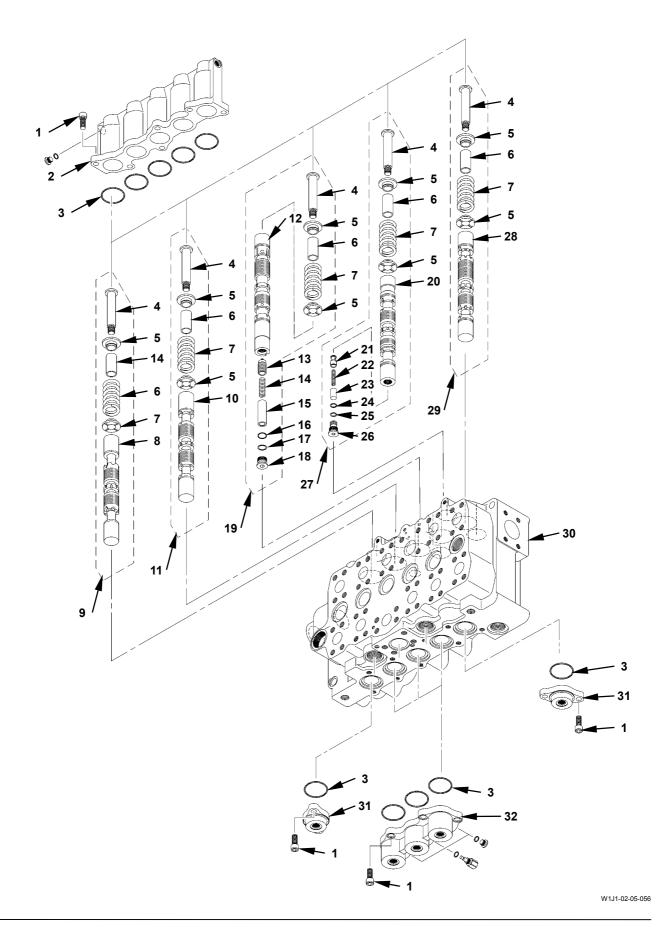
- 4. Rotate and install spools (8, 10, 12, 20) to housing (22) slowly.
- 5. Install O-rings (3) (8 used) to housing (22). Install cover (2) to housing (22) with bolts (1) (6 used).

: 10 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)



1 -	Socket Bolt (15 Used)	9 - Spool (Travel)	17 - Backup Ring	25 - Backup Ring
2 -	Cover	10 - Spool	18 - Cap	26 - Cap
3 -	O-Ring (10 Used)	11 - Spool (Auxiliary)	19 - Spool (Boom 2)	27 - Spool (Arm 2)
4 -	Bolt (5 Used)	12 - Spool	20 - Spool	28 - Spool
5 -	Spring Guide (10 Used)	13 - Check Valve	21 - Check Valve	29 - Spool (Swing)
6 -	Sleeve (5 Used)	14 - Spring	22 - Spring	30 - Housing (5-Spool Side)
7 -	Spring (5 Used)	15 - Spacer	23 - Spacer	31 - Cover (2 Used)
8 -	Spool	16 - O-Ring	24 - O-Ring	32 - Cover



Disassemble Control Valve (5-Spool Control Valve)

Disassemble Spools (6 to 10)

1. Remove socket bolts (1) (6 used) from cover (2). Remove cover (2) and O-rings (3) (5 used) from housing (30).

: 10 mm

2. Remove socket bolts (1) (9 used) from covers (31) (2 used) and (32). Remove covers (31) (2 used) and (32) from housing (30).

: 10 mm

IMPORTANT: Slowly rotate and straightly remove spool (9, 11, 19, 27, 29) assemblies.

Do not disassemble the spool (9, 11, 19, 27, 29) assemblies unless necessary.

- 3. Remove spool (9, 11, 19, 27, 29) assemblies from housing (30).
- 4. Remove bolt (4), spring guide (5), spring (7), sleeve (6) and spring guide (5) from spools (9, 11, 19, 27, 29).

: 10 mm

5. Remove cap (18), spacer (15), spring (14) and check valve (13) from spool (12).

: 10 mm

6. Remove cap (26), spacer (23), spring (22) and check valve (21) from spool (20).

: 8 mm

ASSEMBLE CONTROL VALVE (5-SPOOL **CONTROL VALVE)**

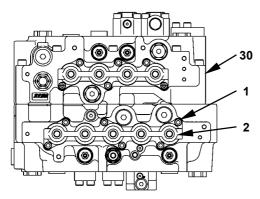


Figure of Control Valve (Upper)

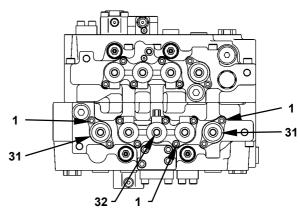
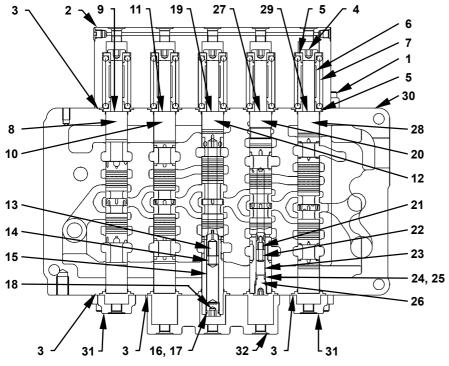


Figure of Control Valve (Lower)



W1J1-02-05-049

- Section of 5-Spool
- 1 Socket Bolt (15 Used)
- 2 Cover
- 3 O-Ring (10 Used)
- 4 Cap (5 Used)
- 5 Spring Guide (10 Used)
- 6 Sleeve (5 Used)
- 7 Spring (5 Used)
- 8 Spool

- 9 Spool (Travel)
- 10 Spool
- 11 Spool (Auxiliary)
- 12 Spool
- 13 Check Valve
- 14 Spring
- 15 Spacer
- 16 O-Ring

- 17 Backup Ring
- 18 Cap
- 19 Spool (Boom 2)
- 20 Spool
- 21 Check Valve
- 22 Spring 23 - Spacer
- 24 O-Ring

- 25 Backup Ring
- 26 Cap
- 27 Spool (Arm 2)
- 28 Spool
- 29 Spool (Swing)
- 30 Housing (5-Spool Side)
- 31 Cover (2 Used) 32 Cover

Assemble Control Valve (5-Spool Control Valve)

1. Install O-rings (3) (5 used) to housing (30). Install covers (31) (2 used) and (32) to housing (30) with socket bolts (1) (9 used).

: 10 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

IMPORTANT: Apply LOCTITE #262 to the thread part of bolt (4).

2. Install spring guide (5), sleeve (6), spring (7) and spring guide (5) to spools (8, 10, 12, 20, 28) with bolt (4).

: 10 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

3. Install O-ring (16) and backup ring (17) to cap (18). Install check valve (13), sleeve (15) and spring (14) to spool (12). Install cap (18) to spool (12).

: 10 mm

: 80 N·m (8 kgf·m, 59 lbf·ft)

4. Install O-ring (24) and backup ring (25) to cap (26). Install check valve (21), sleeve (23) and spring (22) to spool (20). Install cap (26) to spool (20).

: 8 mm

: 80 N·m (8 kgf·m, 59 lbf·ft)

IMPORTANT: Apply hydraulic oil onto the surface of the spool (8, 10, 12, 20, 28) assemblies.

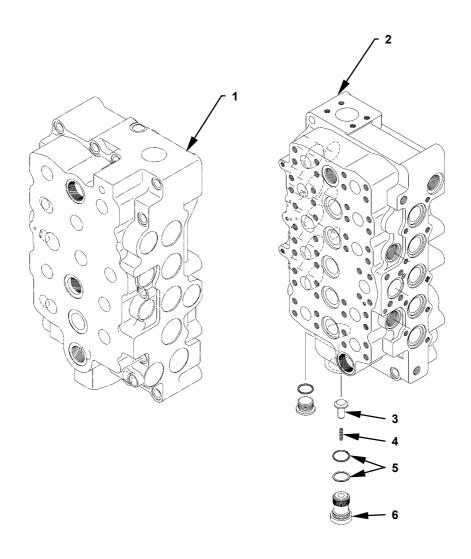
5. Rotate and install spools (8, 10, 12, 20, 28) to housing (30) slowly.

6. Install O-rings (3) (5 used) to housing (30). Install cover (2) to housing (30) with bolts (1) (6 used).

: 10 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

DISASSEMBLE CONTROL **VALVE** (HOUSING SURFACES) **REAR FRONT AND**



W1J1-02-05-062

- 1 Housing (4-Spool Side)2 Housing (5-Spool Side)
- 3 Check Valve
- 4 Spring
- 5 O-Ring, Backup Ring
- 6 Cap

Disassemble Control Valve (Housing Front and Rear Surfaces)

1. Remove cap (6), spring (4) and check valve (3) from housing (2).
: 14 mm

ASSEMBLE CONTROL VALVE (HOUSING FRONT AND REAR SURFACES)

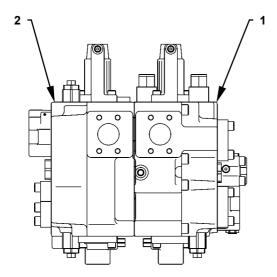


Figure of Control Valve (Rear)

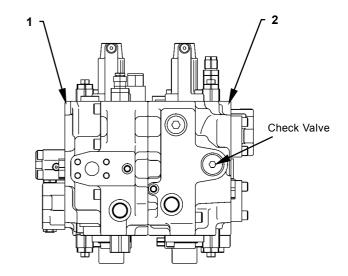


Figure of Control Valve (Front)

6

Section of Check Valve

W1J1-02-05-050

1 - Housing (4-Spool Side)

3 - Check Valve

2 - Housing (5-Spool Side) 4 - Spring

5 - O-Ring, Backup Ring

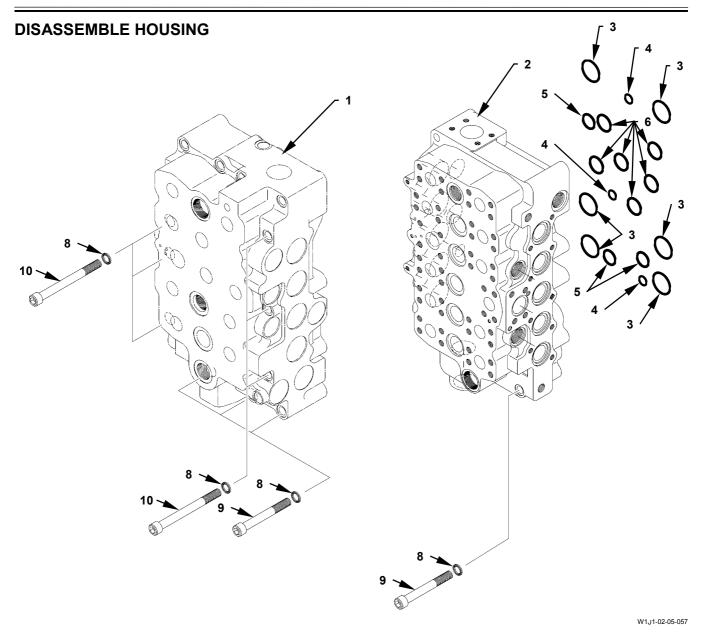
6 - Cap

Assemble Control Valve (Housing Front and Rear Surfaces)

1. Install O-ring and backup ring (5) to cap (6). Install check valve (3), spring (4) and cap (6) to housing (2).

: 14 mm

: 350 N·m (36 kgf·m, 258 lbf·ft)



- 1 Housing (4-Spool Side)2 Housing (5-Spool Side)3 O-Ring (6 Used)

- 4 O-Ring (3 Used) 5 O-Ring (3 Used) 6 O-Ring (6 Used)
- 8 Washer (14 Used)
- 9 Socket Bolt (8 Used) 10 Socket Bolt (6 Used)

Disassemble Housing

1. Remove all valves from the upper and lower surfaces at 5-spool side and 4-spool side.



CAUTION: Control valve weight: 400 kg (880 lb)

IMPORTANT: When placing housing (2) at 5-spool side or housing (1) at 4-spool side on the workbench, use the cloth in order not to damage.

- Install eyebolts (M12, Pitch 1.75 mm) (2 used) into the hole on control valve. Hoist and place the control valve onto the workbench with housing (1) facing downward.
- 3. Remove socket bolt (9) and washer (8) from housing (2).

: 14 mm



CAUTION: Control valve weight: 400 kg (880 lb)

- 4. Hoist and place the control valve onto the workbench with housing (2) facing downward.
- 5. Remove socket bolts (9) (7 used), (10) (6 used) and washers (8) (13 used) from housing (1).

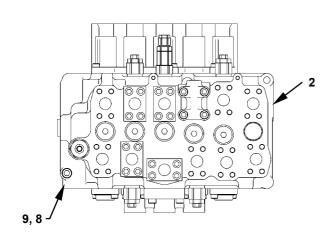
: 14 mm

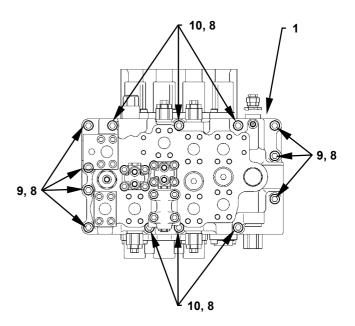


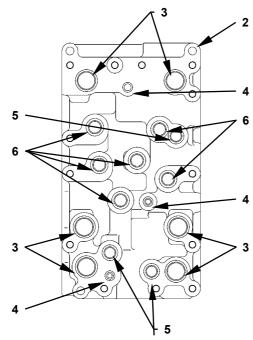
CAUTION: Housing (1) weight: 200 kg (440 lb)

- 6. Install eyebolts (M12, Pitch 1.75 mm) (2 used) into the hole on housing (1). Hoist and remove housing (1) from housing (2) slowly.
- 7. Remove O-rings (3) (6 used), (4) (6 used), (5) (3 used) and (9) (3 used) from housing (2 or 1).

ASSEMBLE HOUSING







W1J1-02-05-060

- 1 Housing (4-Spool Side)
- 2 Housing (5-Spool Side)3 O-Ring (6 Used)
- 4 O-Ring (3 Used)
- 5 O-Ring (3 Used) 6 O-Ring (6 Used)
- 8 Washer (14 Used)
- 9 Socket Bolt (8 Used)
- 10 Socket Bolt (6 Used)

Assemble Housing

IMPORTANT: When placing housing (2) or housing (1) on the workbench, use the cloth in order not to damage.



CAUTION: Housing (2) weight: 200 kg (440 lb)

- Install eyebolts (M12, Pitch 1.75 mm) (2 used) into the hole (2 places) on housing (2). Hoist and place housing (2) onto the workbench with the side facing downward.
- Apply grease to O-rings (6) (6 used), (7) (6 used), (8) (3 used) and (9) (3 used). Install O-rings (6) (6 used), (7) (6 used), (8) (3 used) and (9) (3 used) to housing (2).



CAUTION: Housing (1) weight: 200 kg (440 lb)

3. Install eyebolts (M12, Pitch 1.75 mm) (2 used) into the hole on housing (1). Hoist and install housing (1) to housing (2). Install housing (1) to housing (2) with socket bolts (3) (7 used), (5) (6 used) and washers (4) (13 used).

: 14 mm : 250 N·m (25.5 kgf·m, 184 lbf·ft)

- 4. Hoist and place the control valve onto the workbench with the side of housing (1) facing downward.
- 5. Install socket bolt (3) and washer (4) to housing (2).

: 14 mm : 250 N·m (25.5 kgf·m, 184 lbf·ft)

(Blank)

REMOVE AND INSTALL SWING DEVICE

There are swing devices (9, 10). These procedures are for swing device (9). Swing device (10) can be removed and installed in the same procedures.



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

Removal

1. Remove bolts (2) (4 used). Remove covers (1) (2 used) from the main frame.

: 19 mm

2. Remove socket bolts (4) (8 used) from swing device (9). Remove hoses (5, 6).

: 8 mm

3. Remove hoses (3, 7, 8) from swing device (9). Cap the hoses and swing device (9).

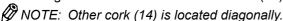
: 17 mm, 19 mm, 27 mm, 36 mm

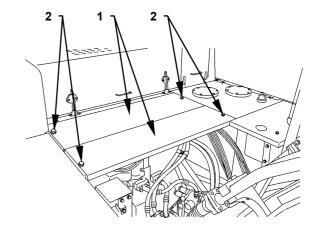
4. Put the matching marks on housing (13) in swing device (9) and the main frame.

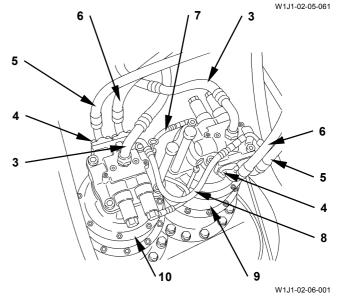
Remove adapter (15), bolts (11) (13 used) and washers (12) (13 used).

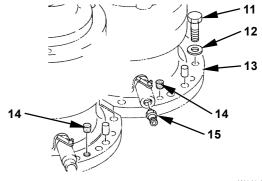
Adapter: PT1/2 : 32 mm

5. Remove corks (14) (2 used) from housing (13) by using a screwdriver. Do not reuse cork (14).









W1J1-02-06-002



CAUTION: Swing device (9) weight: 230 kg (510 lb)

- 1. Install the bolts (M20, Pitch 2.5 mm) (2 used) to the hole (2 places) for cork (14). Attach a nylon sling onto the motor outer surface in swing device (9).
- 2. Rotate the bolt and raise off swing device (9) from the main frame. Hoist and remove swing device (9) from the main frame.

→ : 30 mm

Installation

1. Apply liquid packing (THREEBOND #1215) to the mounting surface for main frame in swing device (9).



CAUTION: Swing device (9) weight: 230 kg (510 lb)

2. Align the matching marks on main frame and the knock pin (15) position. Install swing device (9). Tap and install knock pins (15) (2 used) to the main frame.

NOTE: Other knock pin (15) is located diagonally.

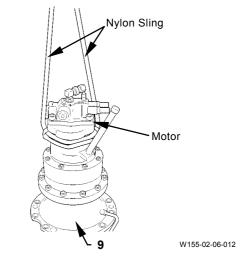
3. Install swing device (9) to the main frame with bolts (11) (13 used) and washers (12) (13 used). Install new corks (14) (2 used) to the pulling-out hole. Install adapter (15).

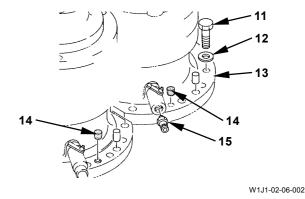
5 : 32 mm

: 750 N·m (76.5 kgf·m, 555 lbf·ft)

Adapter: PT1/2

: 50.5 N·m (5 kgf·m, 37 lbf·ft)





4. Install hoses (5, 6) to swing device (9) with socket bolts (4) (8 used).

: 8 mm

: 57 N·m (5.8 kgf·m, 42 lbf·ft)

5. Install hoses (3, 7, 8) to swing device (9).

→ : 17 mm

: 24.5 N·m (2.5 kgf·m, 18 lbf·ft)

: 19 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)

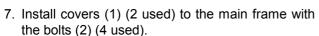
→ : 27 mm

: 93 N·m (9.5 kgf·m, 69 lbf·ft)

→ : 36 mm

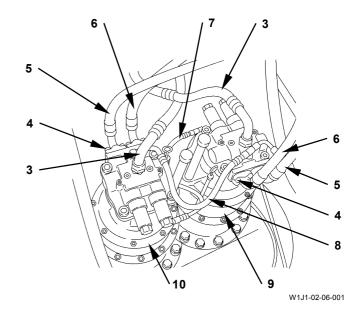
: 175 N·m (18 kgf·m, 130 lbf·ft)

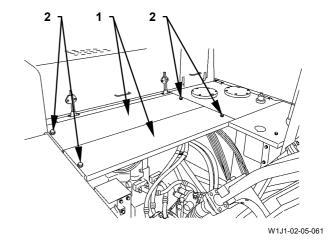
6. Release any pressure in the pump device. (Refer to W1-1.) Check the hydraulic oil level. Start the engine and check for any oil leaks.



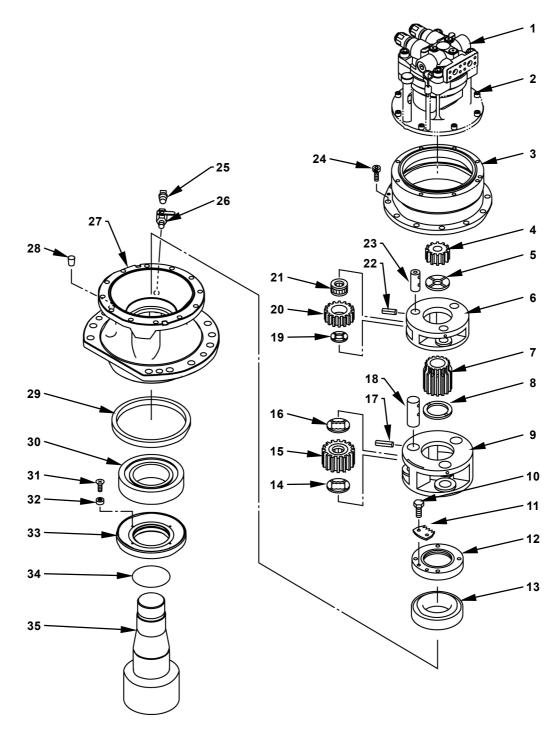
→ : 19 mm

: 90 N·m (9 kgf·m, 66 lbf·ft)





DISASSEMBLE SWING DEVICE



W16J-02-06-001

- 1 Motor
- 2 Socket Bolt (8 Used)
- Ring Gear
- 4 First Stage Sun Gear
- Thrust Plate
- 6 First Stage Carrier
- 7 Second Stage Sun Gear
- 8 Thrust Plate
- 9 Second Stage Carrier
- 10 Bolt (2 Used)
- 11 Lock Plate
- 12 Bearing Nut
- 13 Roller Bearing
- 14 Thrust Plate (3 used)
- 15 Planetary Gear (3 Used)

- 16 Thrust Plate (3 used)
- 17 Spring Pin (3 Used)
- 18 Pin (3 Used)

- 19 Thrust Plate (3 used)
- 20 Planetary Gear (3 Used)
- 21 Needle Bearing (3 Used)
- 22 Spring Pin (3 Used)
- 23 Pin (3 Used)
- 24 Socket Bolt (12 Used)
- 25 Drain Plug
- 26 Cock
- 27 Housing

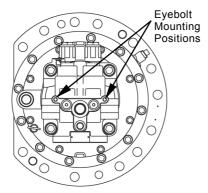
- 28 Cork (2 Used)
- 29 Oil Seal
- 30 Roller Bearing
- 31 Screw (4 Used)
- 32 Magnet (4 Used)
- 33 Sleeve
- 34 O-Ring
- 35 Shaft

Disassemble Swing Device



CAUTION: Swing device weight: 230 kg (510 lb)

- 1. Install bracket (ST 5101) onto the workbench.
- 2. Attach a nylon sling onto the swing device and hoist the swing device.

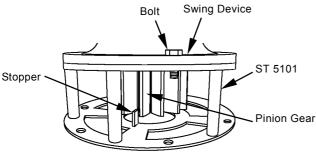


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W178-02-06-012

3. Install the swing device to bracket (ST 5101) so that the stopper of bracket (ST 5101) can be inserted between the teeth in pinion gear in the swing device. Install the swing device to bracket (ST 5101) with the bolts (M20) (2 used).





- Remove drain plug (25). Rotate cock (25) and drain oil in the swing device. Plug: PT1/2
- 5. Put the matching marks on the mating part between motor (1) and ring gear (3), between ring gear (3) and housing (27).



CAUTION: Swing motor (1) weight: 50 kg (110 lb)

6. Remove socket bolts (2) (8 used). Remove motor (1) from ring gear (3).

: 10 mm

NOTE: THREEBOND is applied to the mating surfaces on ring gear (3) and motor (1). Insert a screwdriver into the notch in mating part and raise off motor (1).

- 7. Remove first stage sun gear (4) from first stage carrier (6).
- 8. Remove the first stage carrier (6) assembly from ring gear (3).
- 9. Remove socket bolts (24) (12 used) from ring gear (3).

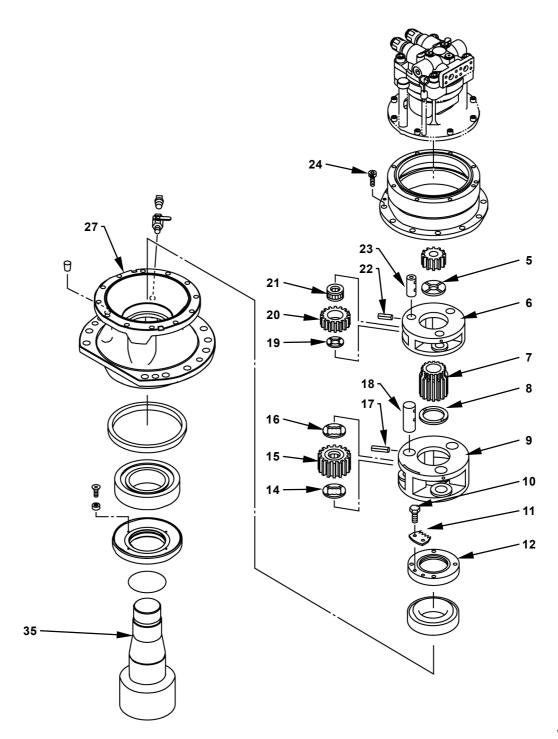
: 14 mm



CAUTION: Ring gear (3) weight: 22.5 kg (50 lb)

- 10. Install eyebolt (M12, Pitch 1.75 mm) into the socket bolt hole (2 places) on ring gear (3). Hoist and remove ring gear (3) from housing (27).
- NOTE: THREEBOND is applied to the mating surfaces on ring gear (3) and housing (27).

 Insert a screwdriver into the notch in mating part and raise off ring gear (3).



W16J-02-06-001

11. Remove second stage sun gear (7) from second stage carrier (9).

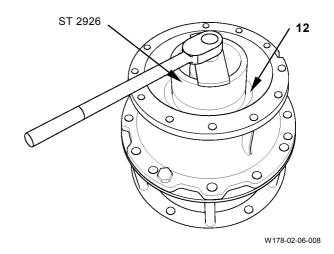


CAUTION: The second stage carrier (9) assembly weight: 23 kg (51 lb)

- 12. Remove the second stage carrier (9) assembly from shaft (35).
- 13. Remove spring pins (22) (3 used) from first stage carrier (6) by using special tool (ST 1462).
- 14. Remove pins (23) (3 used), planetary gears (20) (3 used), needle bearings (21) (3 used) and thrust plates (19) (3 used) from first stage carrier (6).
- 15. Remove thrust plate (5) from first stage carrier (6).
- Remove the second stage carrier (9) assembly in the same procedures as steps 11 to 14.
 Special tool when removing spring pin (17): ST 1463
- NOTE: The needle bearing is not used for second stage carrier (9). Thrust plates (14, 16) (3 used for each) are located above and under planetary gear (15).
- 17. Remove bolts (10) (2 used). Remove lock plate (11) from bearing nut (12).

: 17 mm

18. Remove bearing nut (12) from shaft (35) by using special tool (ST 2926).

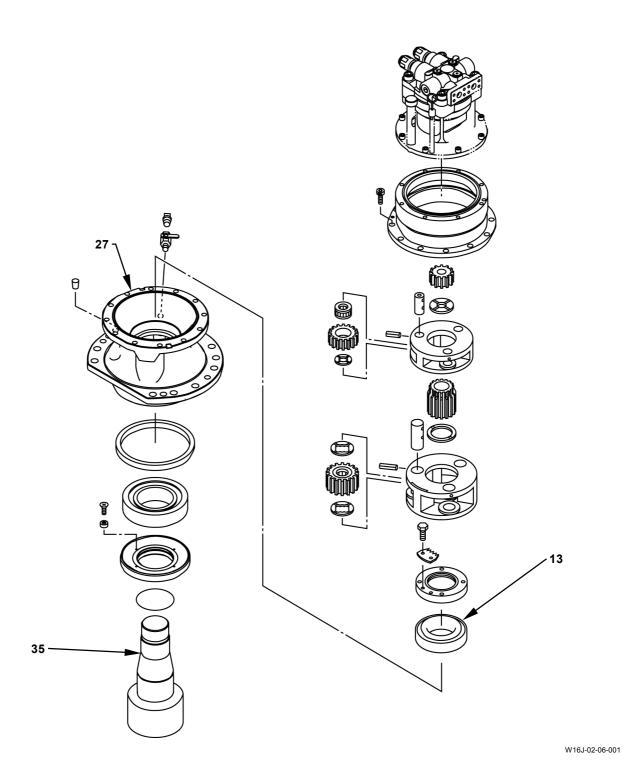


A

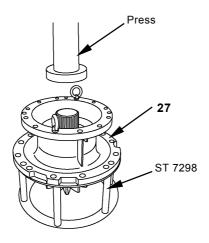
CAUTION: The housing (27) assembly weight: 120 kg (265 lb)

19. Install eyebolt (M16, Pitch 2.0 mm) into the socket bolt (24) hole (2 places) on housing (27). Remove the bolts (M20) (2 used) securing housing (27) and bracket (ST 5101). Hoist and remove housing (27) from bracket (ST 5101).

: 30 mm



20. Install the housing (27) assembly to bracket (ST 7298). Set the housing (27) assembly to the press.



W178-02-06-006

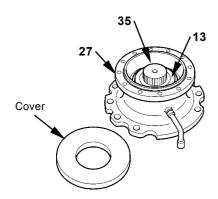
A

CAUTION: When pressing shaft (35), cover housing (27) with the cover (outer dia.: 290 mm (11.4 in), inner dia.: 90 mm (3.5 in), thickness: 25 to 30 mm (1.0 to 1.2 in)).

When housing (27) and/or roller bearing (13) are broken and flown off without the cover, the metal fragments may result in personal injury.

Press at 30 ton or less.

Degrease the housing (27) inside before heating roller bearing (13). Failure to degrease may cause a fire.

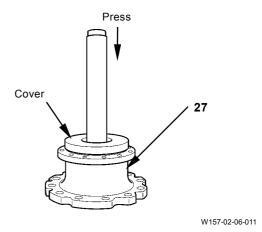


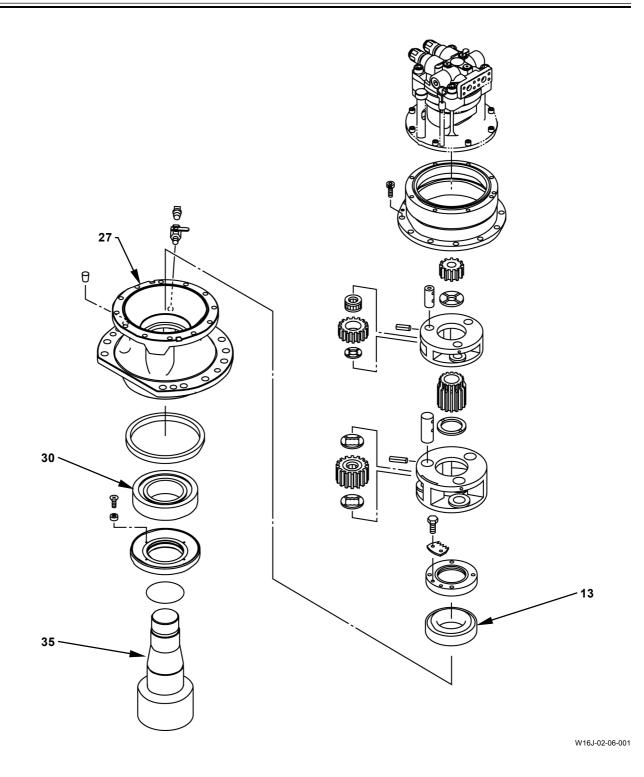
W157-02-06-010



CAUTION: The shaft (35) assembly weight: 50 kg (110 lb)

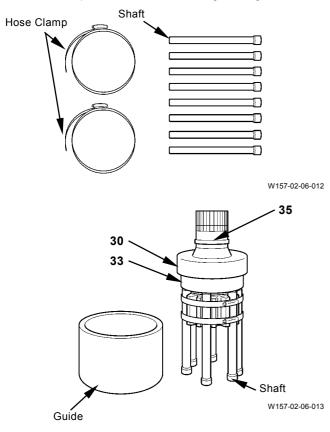
21. Remove the shaft (35) assembly from housing (27) by using a press.





22. Install the shaft (35) assembly to the guide.

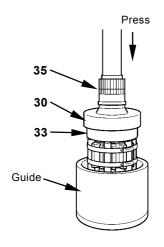
Special Tool when Removing Bearing



NOTE: Use the following parts as special tools for removing roller bearing (30).

removing rener bearing (ee):			
Part	Specification		
Shaft	Length: 270 mm (10.6 in)		
(Bolt)	Diameter: 19 mm (0.7 in)		
	Number: 8 used (All should be in same		
	length with no wear and deformation on		
	both ends)		
	Material: S35C		
Hose	Standard Diameter: 8-1/2		
Clamp	Tightening Range: 185 to 215 mm		
	(7.3 to 8.5 in)		
	Number: 2 used		
Guide	Height: 230 mm (9.1 in)		
	Outer Dia. : 230 mm (9.1 in)		
	Inner Dia. : 210 mm (8.3 in)		

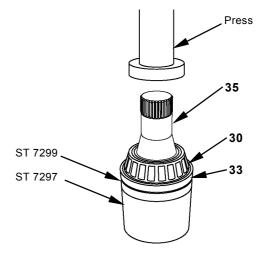
23. Set shaft (35) to the press.



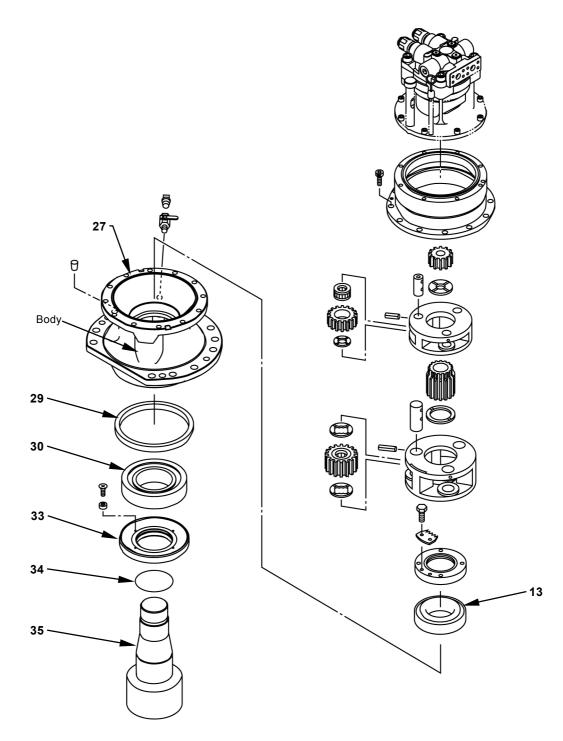
W157-02-06-014

NOTE: Remove roller bearing (30) by using special tools (ST 7297, ST 7299).

Place special tool (ST 7299) onto the stepped part of special tool (ST 7297). Insert the pinion gear of shaft (35) into the tooth-hole of special tool (ST 7299). Push shaft (35) by using the press and remove roller bearing (30) from shaft (35).



W178-02-06-009



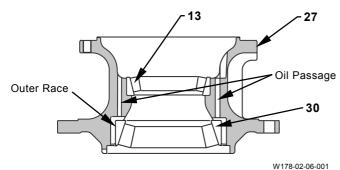
W16J-02-06-001

- 24. Remove the inner race of roller bearing (30) and sleeve (33) from shaft (35).
- 25. Remove O-ring (34), screws (30) (4 used) and magnets (31) (4 used) from sleeve (33).

IMPORTANT: Do not remove roller bearings (13, 30) and the outer race from housing (27) unless replacing the parts.

26. Remove the inner race of roller bearing (13) from housing (27).

Insert a round bar into the oil passage in housing (27). Tap by using a hammer and remove the outer race of roller bearing (30).

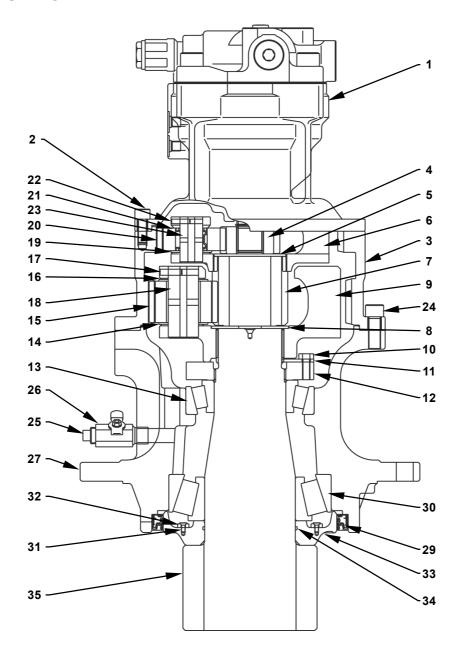


A

CAUTION: Housing (27) weight: 70 kg (155 lb)

- 27. Attach a nylon sling onto the body of housing (27). Hoist and place housing (27) with the pinion gear of shaft (35) facing upward.
- 28. Insert a screwdriver into the notch on housing (27) where oil seal (29) is mounted. Remove oil seal (29).
- NOTE: Oil seal (29) is secured by using THREEBOND. Do no reuse oil seal (29).
- 29. Remove roller bearing (13) from housing (27). Attach a bar, tap the outer race by using a hammer and remove roller bearing (13).

ASSEMBLE SWING DEVICE



W16J-02-06-002

1 - Motor

2 - Socket Bolt (8 Used)

3 - Ring Gear

4 - First Stage Sun Gear

5 - Thrust Plate

6 - First Stage Carrier

7 - Second Stage Sun Gear

8 - Thrust Plate

9 - Second Stage Carrier

10 - Bolt (2 Used)

11 - Lock Plate

12 - Bearing Nut

13 - Roller Bearing

14 - Thrust Plate (3 used)

15 - Planetary Gear (3 Used)

16 - Thrust Plate (3 used) 17 - Spring Pin (3 Used)

18 - Pin (3 Used)

19 - Thrust Plate (3 used)

20 - Planetary Gear (3 Used)

21 - Needle Bearing (3 Used)

22 - Spring Pin (3 Used)

23 - Pin (3 Used)

24 - Socket Bolt (12 Used)

25 - Drain Plug 26 - Cock

27 - Housing

28 - *Cork (2 Used)

29 - Oil Seal

30 - Roller Bearing

31 - Screw (4 Used)

32 - Magnet (4 Used)

33 - Sleeve

34 - O-Ring 35 - Shaft

NOTE: As for the item with * mark, refer to W2-6-1.

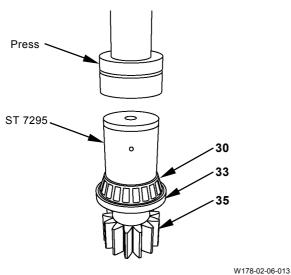
Assemble Swing Device

1. Apply LOCTITE to screws (30) (4 used). Install magnets (31) (4 used) to sleeve (33) with screws (30) (4 used). Install O-ring (34) to sleeve (33).



CAUTION: Shaft (35) weight: 36 kg (80 lb)

 Install sleeve (33) and the inner race of roller bearing (30) to shaft (35). Install sleeve (33) and the inner race by using special tool (ST 7295) and a press.



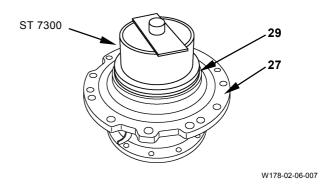


CAUTION: Housing (27) weight: 70 kg (130 lb)

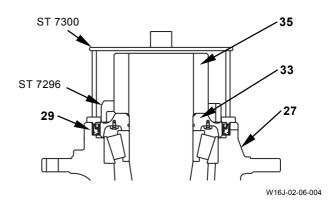
- 3. Attach a nylon sling onto the body of housing (27). Hoist and place housing (27) with the sleeve (33) mounting side facing upward.
- 4. Tap and install the outer race of roller bearing (30) by using a bar and hammer to housing (27).

IMPORTANT: Apply THREEBOND #1215 to the outer surface of oil seal (29) and grease to the lip part respectively. Install oil seal (29) with the lip part facing to the motor side.

5. Install oil seal (29) to housing (27) by using special tool (ST 7300).

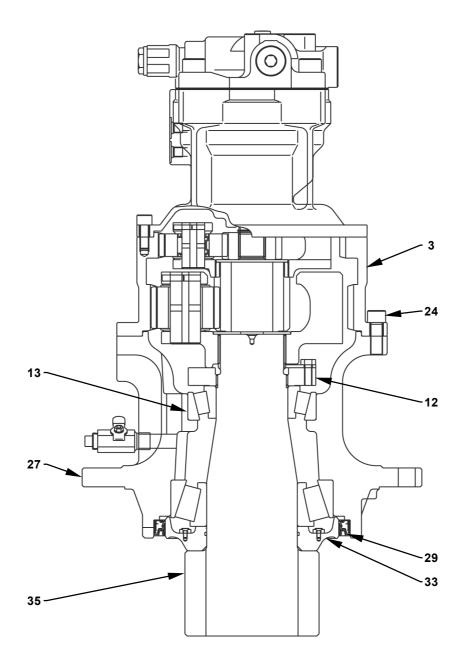


NOTE: When replacing oil seal (29), install oil seal (29) by using special tools (ST 7300, ST 7296).



6. Apply grease to the inner surface of oil seal (29) and the outer surface of sleeve (33).

NOTE: Grease prevents the lip from curling.



W16J-02-06-002



CAUTION: The housing (27) assembly weight: 90 kg (200 lb)

- 7. Attach a nylon sling onto the body of housing (27). Hoist and place housing (27) with the ring gear (3) side facing upward.
- 8. Tap by using a bar and hammer and install the outer race of roller bearing (13) to housing (27).



CAUTION: The housing (27) assembly weight: 95 kg (210 lb)

IMPORTANT: Check and align carefully in order to prevent the oil seal (29) lip from curling.

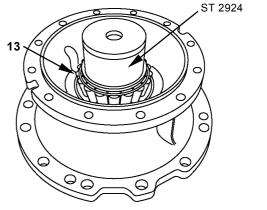
- 9. Install eyebolt (M16, Pitch 2.0 mm) into the socket bolt (24) hole (2 places) on housing (27). Hoist and install housing (27) to shaft (35).
- Install the inner race of roller bearing (13) to shaft (35) by using a bar and hammer. Tap the inner race until two threads of shaft (35) for bearing nut (12) appear.
- 11. Install bearing nut (12) to shaft (35).

NOTE: Bearing nut (12) prevents shaft (35) from falling off.

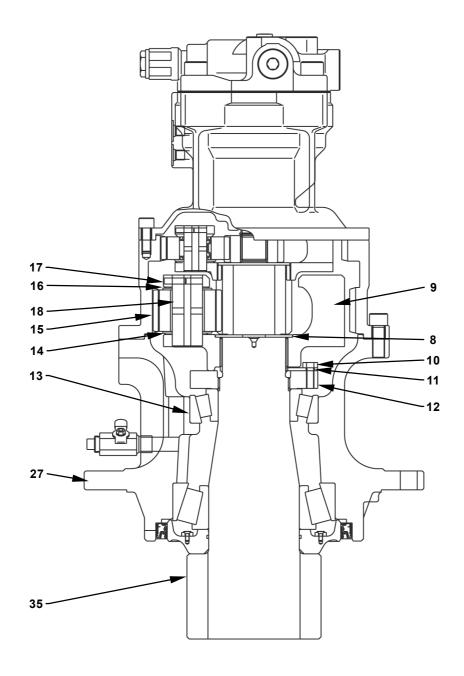


CAUTION: The housing (27) assembly weight: 130 kg (290 lb)

- 12. Install eyebolt (M16, Pitch 2.0 mm) into the socket bolt (24) hole (2 places) on housing (27). Hoist and place housing (27) on a press.
- 13. Remove bearing nut (12) from shaft (35).
- 14. Install the inner race of roller bearing (13) to housing (27) by using special tool (ST 2924) and a press.



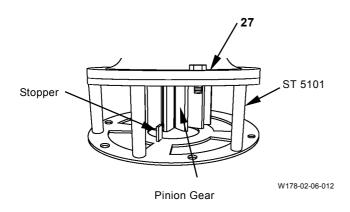
W178-02-06-011



W16J-02-06-002

15. Secure bracket (ST 5101) on a workbench. Place the housing (27) assembly on bracket (ST 5101) so that the stopper in bracket (ST 5101) is inserted between the teeth of pinion gear. Install the housing (27) assembly to bracket (ST 5101) with bolts (M20) (2 used).

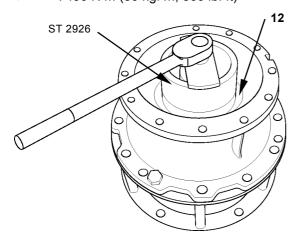
• 30 mm



IMPORTANT: Install bearing nut (12) with the stepped side facing to the roller bearing (13) side.

16. Apply grease to the thread part of bearing nut (12). Install bearing nut (12) to shaft (35). Tighten bearing nut (12) to the specified torque by using special tool (ST 2926).

: 490 N·m (50 kgf·m, 360 lbf·ft)



W178-02-06-008

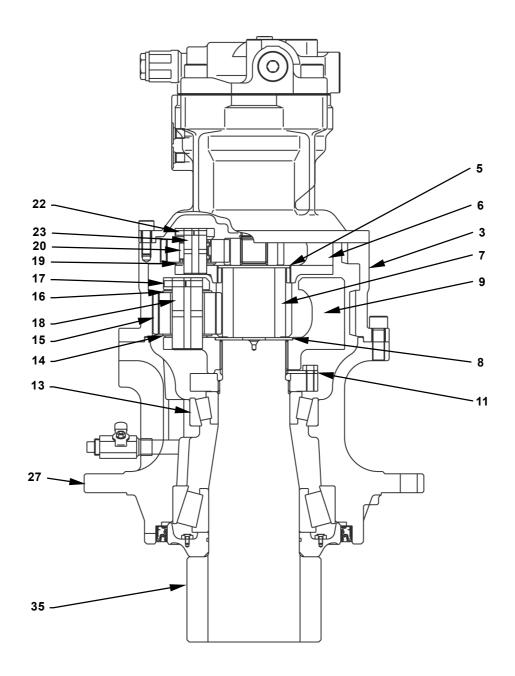
17. Apply LOCTITE to the thread part of bolts (10) (2 used). Install lock plate (11) to bearing nut (12) with bolts (10) (2 used). If the spline in lock plate (11) is not aligned with that in shaft (35), tighten bearing nut (12) until the splines are aligned.

>→ : 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

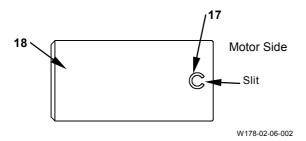
- 18. Install thrust plate (8) to second stage carrier (9) with the oil groove side facing to the outside.
- 19. Apply grease onto the upper and lower sides of planetary gear (15). Install thrust plates (14, 16). Install planetary gear (15) to second stage carrier (9).
- 20. Install pin (18) to second stage carrier (9).

NOTE: Align the spring pin (17) holes on second stage carrier (9) and pin (18).



W16J-02-06-002

- 21. Install spring pin (17) into the hole on second stage carrier (9) by using special tool (ST 1463).
- NOTE: Install spring pin (17) with the slit facing to the motor side.

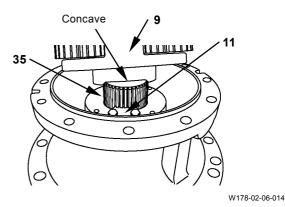


- 22. Install planetary gears (15) (2 used), thrust plates (14) (2 used), (16) (2 used), pins (18) (2 used) and spring pins (17) (2 used) to other hole (2 places) on second stage carrier (9) in the same procedures as steps 19, 20.
- 23. Install thrust plate (5) to first stage carrier (6) with the oil groove side facing upward.
- 24. Install needle bearings (21) (3 used) to planetary gears (20) (3 used). Install planetary gear (20), thrust plates (19) (3 used), pins (23) (3 used) and spring pins (22) (3 used) to first stage carrier (6) in the same procedures as steps 19 to 22.
- NOTE: When removing and installing spring pin (22), use special tool (ST 1462).

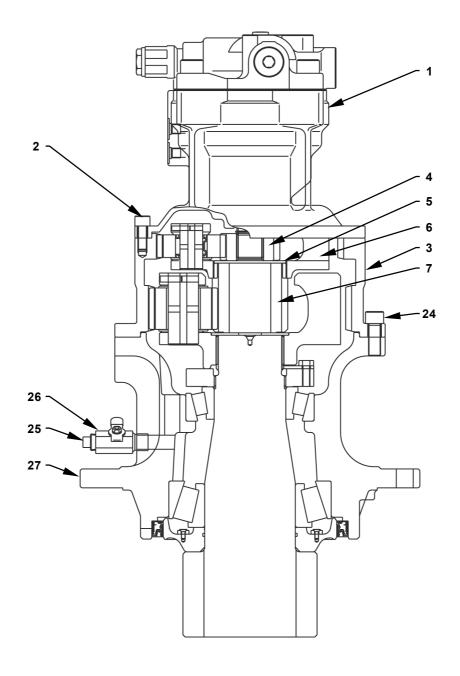


CAUTION: The second stage carrier (9) assembly weight: 23 kg (51 lb)

25. Install the second stage carrier (9) assembly to the spline in shaft (35).



- 26. Install second stage sun gear (7) to the second stage carrier (9) assembly. Install second stage sun gear (7) with the thinner side facing upward (the motor side).
- 27. Remove old adhesive and clean housing (27) and the ring gear (3) mounting surface. Apply THREEBOND #1215 onto this surface.



W16J-02-06-002



CAUTION: Ring gear (3) weight: 22.5 kg (50 lb)

28. Install eyebolt (M12, Pitch 1.75 mm) into the socket bolt (2) hole (2 places) on ring gear (3). Align the matching marks made when disassembling and install ring gear (3). Install ring gear (3) to housing (27) with socket bolts (24) (12 used).

: 14 mm

: 205 N·m (21 kgf·m, 150 lbf·ft)

- 29. Align with the spline of second stage sun gear (7) and install the first stage carrier (6) assembly.
- NOTE: Install first stage sun gear (4) with the stepped side facing downward (the thrust plate (5) side).
- 30. Install first stage sun gear (4) to the first stage carrier (6) assembly.
- 31. Install cock (26) to housing (27). Place the handle of cock (26) horizontally and close the port hole.
- 32. Wind the seal tape onto drain plug (25) and install drain plug (25) to cock (26).

Plug: PT1/2

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

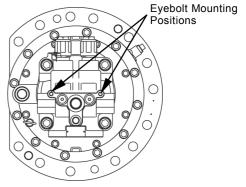
- 33. Add gear oil #90 (6.7 L (1.8 US gal.)) into ring gear (3).
- 34. Remove old adhesive and clean ring gear (3) and the motor (1) mounting surface. Apply THREEBOND #1212 onto this surface.



CAUTION: Swing motor weight: 50 kg (110 lb)

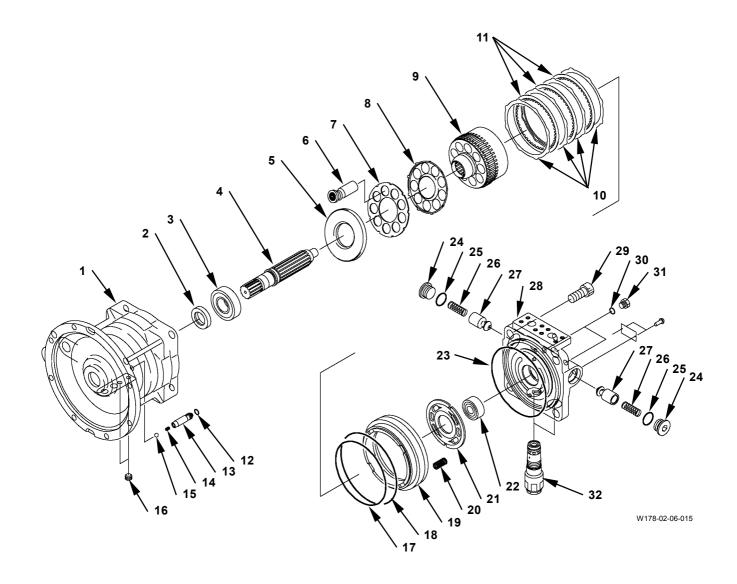
35. Install eyebolts (M10, Pitch 1.5 mm) (2 used) to motor (1). Align the matching marks made when disassembling. Hoist and install motor (1). Install motor (1) to ring gear (3) with socket bolts (2) (8 used).

: 10 mm



W16J-02-06-003

DISASSEMBLE SWING MOTOR



- 1 Casing Oil Seal
- Bearing 4 - Shaft
- 5 Shoe Plate
- 6 Plunger (9 Used)
- 7 Plate
- 8 Retainer

- 9 Rotor
- 10 Plate (4 Used)
- 11 Friction Plate (3 Used)
- 12 O-Ring
- 13 Piston
- 14 Spring
- 15 Ball
- 16 Plug (2 Used)
- 17 O-Ring
- 18 O-Ring
- 19 Brake Piston
- 20 Spring (24 Used)
- 21 Valve Plate
- 22 Bearing
- 23 O-Ring
- 24 Plug (2 Used)
- 25 O-Ring (2 Used) 26 Spring (2 Used)
- 27 Poppet (2 Used)
- 28 Valve Casing
- 29 Socket Bolt (4 Used)
- 30 O-Ring (2 Used)
- 31 Plug (2 Used)
- 32 Relief Valve (2 Used)

Disassemble Swing Motor



CAUTION: Swing motor weight: 50 kg (110 lb)

IMPORTANT: Do not disassemble relief valve (32).

1. Remove relief valves (32) (2 used) from valve casing (28).

: 41 mm

2. Remove plugs (24) (2 used) from valve casing (28).

: 14 mm

3. Remove springs (26) (2 used) and poppets (27) (2 used) from valve casing (28).

IMPORTANT: Record the clearance dimension between valve casing (28) and casing (1).

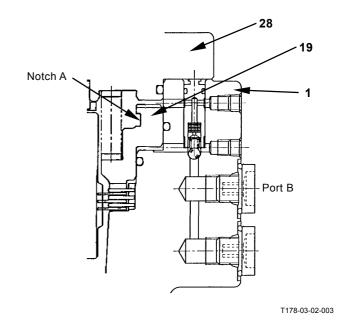
4. Put the matching marks at the jointed surfaces between valve casing (28) and casing (1). Remove socket bolts (29) (4 used).

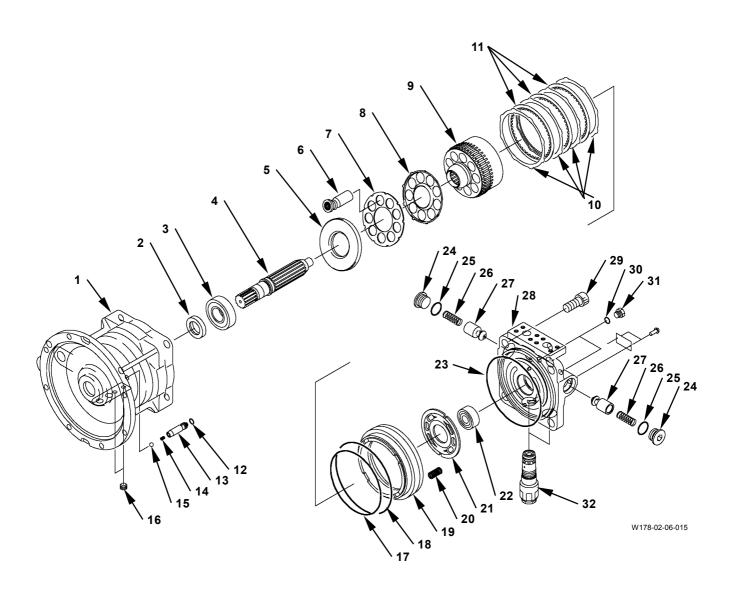
: 17 mm

5. Remove valve casing (28) from casing (1).

NOTE: Valve plate (21) may be removed with valve casing (28) together. Do not drop valve plate (21).

- 6. Remove valve plate (21) and springs (20) (24 used) from rotor (9).
- 7. Install special tool (ST 1468) to notch A and remove brake piston (19) from casing (1).
- 8. Remove O-rings (17, 18) from casing (1).





- 9. Hoist and set casing (1) horizontally. Remove rotor (9), retainer (8), plate (7) and plungers (6) (9 used) from shaft (4).
- 10. Remove plates (10) (4 used) and friction plates (11) (3 used) from casing (1).
- 11. Remove shoe plate (5) from casing (1).
- 12. Remove shaft (4) from casing (1) by using a plastic hammer.
- 13. Remove oil seal (2) from casing (1) by using a bar and hammer.
- 14. Remove the outer race of bearing (3) from casing (1) by using a bar and hammer.
- 15. Remove the inner race of roller bearing (3) from shaft (4) by using a press.

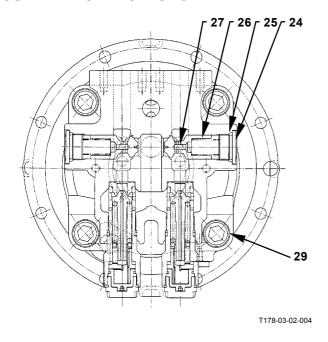
IMPORTANT: The filter and orifice are installed to piston (13). Do not disassemble piston (13) unless they are clogged or deformed.

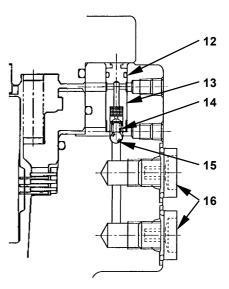
When replacing the inner parts,

When replacing the inner parts replace them as an assembly.

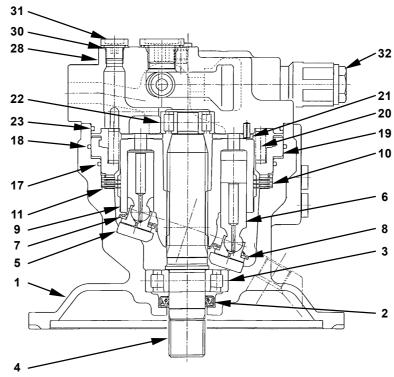
- 16. Remove piston (13) from casing (1) by using a pair of pliers.
- 17. Remove spring (14) and ball (15) from casing (1).

ASSEMBLE SWING MOTOR





T178-03-02-003



T178-03-02-002

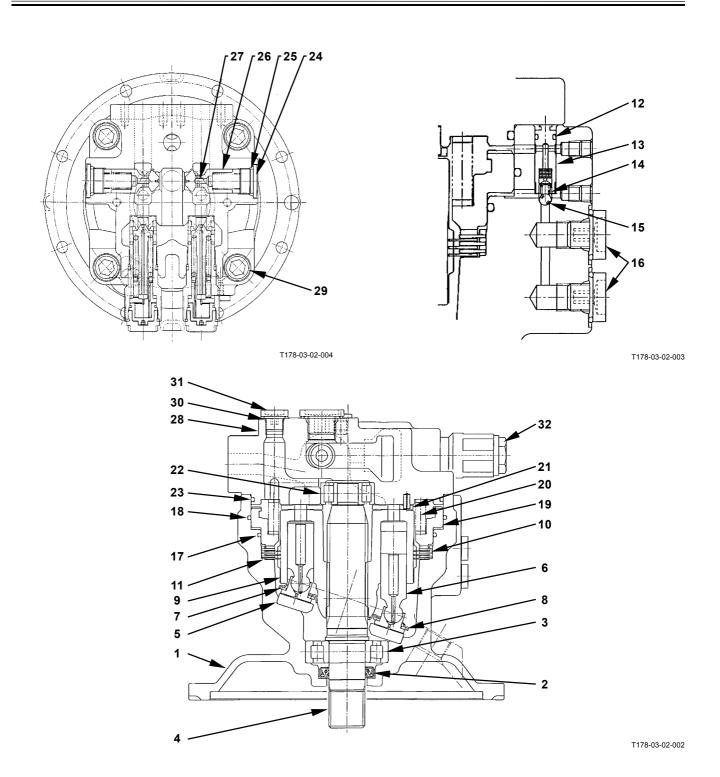
- 1 Casing
- Oil Seal
- 3 Bearing
- 4 Shaft
- 5 Shoe Plate
- 6 Plunger (9 Used)
- 7 Plate
- 8 Retainer

- 9 Rotor
- 10 Plate (4 Used)
- 11 Friction Plate (3 Used)
- 12 O-Ring
- 13 Piston
- 14 Spring 15 Ball
- 16 Plug (2 Used)
- 17 O-Ring
- 18 O-Ring
- 19 Brake Piston
- 20 Spring (24 Used)
- 21 Valve Plate
- 22 Bearing 23 - O-Ring
- 24 Plug (2 Used)
- 25 O-Ring (2 Used)
- 26 Spring (2 Used)
- 27 Poppet (2 Used)
- 28 Valve Casing
- 29 Socket Bolt (4 Used)
- 30 O-Ring (2 Used) 31 - Plug (2 Used)
- 32 Relief Valve (2 Used)

Assemble Swing Motor

- IMPORTANT: Install the inner race of bearing (3) with the flange facing to the stepped side of shaft (4).
 - Install the inner races of bearings (3, 22) to shaft
 by using a press.
- IMPORTANT: Install oil seal (2) with the lip part facing upward (the rotor (9) side).
 - 2. Install oil seal (2) to casing (1) by using a plate.
 - 3. Install the outer race of bearing (3) to casing (1) by using a bar and hammer.
- IMPORTANT: Wind the tape onto the spline at the end of shaft (4) in order not to damage oil seal (2).
 - 4. Install shaft (4) with casing (1) in horizontal.
 - 5. Hoist valve casing (28) and set casing (1) vertically with the mounting surface facing upward. Install shoe plate (5) to casing (1) with the chamfered side of inside facing inside.
- IMPORTANT: Install retainer (8) to plunger (6) with the notch on retainer (8) facing to the shoe plate (5) side.
 - 6. Align the notch and install retainer (8) to plate (7). Install plungers (6) (9 used).
- IMPORTANT: After applying hydraulic oil to the plunger hole on rotor (9), install plunger (6).
 - 7. Install the plunger (6) assemblies (9 used) to rotor (9).

- 8. Hoist and set casing (1) horizontally. Install the rotor (9) assembly to shaft (4).
- IMPORTANT: There are four notches on the outer side of plate (10) and on the spline side of friction plate (11) respectively. Align each notch at the same place when installing.
 - 9. Hoist and set casing (1) vertically. Alternately install plates (10) (4 used) and friction plates (11) (3 used) to casing (1) and rotor (9).
- 10. Install O-rings (17, 18) to casing (1).
- 11. Align the matching mark and install brake piston (19) into casing (1).
- NOTE: If it is difficult to install brake piston (19), tap brake piston (19) by using a plastic hammer evenly.
- 12. Install springs (20) (24 used) to brake piston (19).



IMPORTANT: When replacing the inner parts in piston (13), replace them as an assembly.

Install so that the ends of piston (13) and casing (1) may be in the same position.

13. Install ball (15), spring (14) and piston (13) to casing (1).

IMPORTANT: Tap the type indicated surface on bearing (22) by using a plastic hammer.

14. Install the outer race of bearing (22) to valve casing (28) by using a plastic hammer.

IMPORTANT: Install valve plate (21) with the notch on port facing to the rotor (9) side.

- 15. Install O-ring (23) to valve casing (28). Apply grease to valve plate (21). Install valve plate (21) to valve casing (28).
- 16. Apply grease to the needle part of bearing (22).

IMPORTANT: Check that the clearance between valve casing (28) and casing (1) is equal to that before disassembling. If the clearance is larger than that before disassembling, repeat the installation from step 5.

- 17. Align the matching marks and install valve casing (28) to casing (1).
- 18. Install valve casing (28) to casing (1) with socket bolts (29) (4 used).

: 17 mm

: 430 N·m (44 kgf·m, 320 lbf·ft)

19. Install poppets (27) (2 used) and springs (26) (2 used) to valve casing (28). Install O-ring (25). Install plug (24) to valve casing (28).

: 14 mm

: 330 N·m (34 kgf·m, 245 lbf·ft)

20. Install relief valves (32) (2 used) to valve casing (28).

: 41 mm

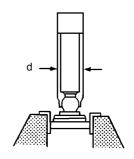
: 175 N·m (18 kgf·m, 130 lbf·ft)

MAINTENANCE STANDARD

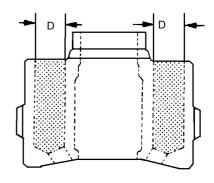
Swing Motor

1. Clearance between plunger outer diameter and rotor inner bore

D-d	Unit: mm (in)
Standard	Allowable Limit
0.027 (0.0011)	0.052 (0.0020)



W107-02-06-138

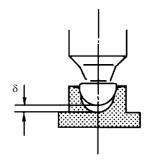


W107-02-06-139

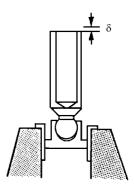
2. Clearance (δ) between plunger and shoe bottom

Uni	t: 1	nn	า (in)
-----	------	----	-----	-----

	/
Standard	Allowable Limit
0 (0)	0.3 (0.0118)



W107-02-06-140

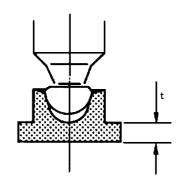


W107-02-06-141

3. Shoe thickness

Unit: mm (in)

	/
Standard	Allowable Limit
5.5 (0.22)	5.3 (0.21)

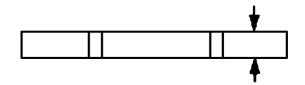


W107-02-06-142

4. Friction plate thickness

Unit: mm (in)

Standard	Allowable Limit
2.0 (0.08)	1.8 (0.07)



W107-02-06-143

(Blank)

REMOVE AND INSTALL PILOT VALVE



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

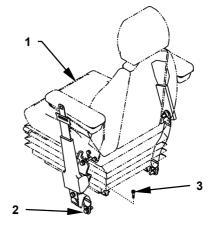
Remove Left Pilot Valve



CAUTION: Seat (1) weight: 40 kg (88 lb)

1. Remove bolts (2) (2 used).

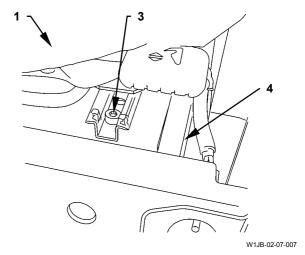
: 16 mm



W1JB-02-01-008

2. Remove socket bolts (3) (4 used). Remove seat (1) from bracket (4).

: 6 mm

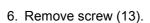


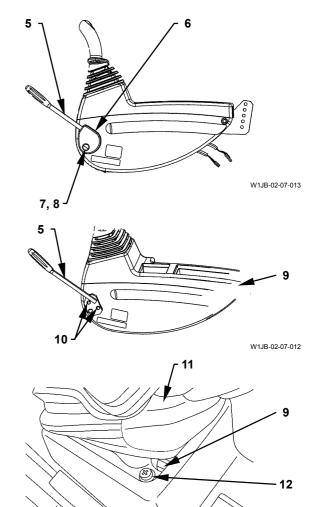
3. Remove cap (7) from lever (5). Remove screw (8). Remove cover (6) from lever (5).

4. Remove bolts (10) (2 used). Remove lever (5) from bracket (9).

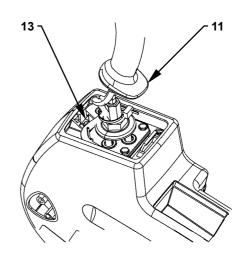
: 13 mm

5. Remove screws (12) (4 used). Move boot (11) up from bracket (9).





W1JB-02-07-002



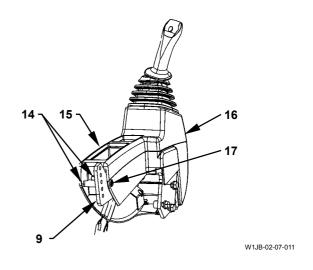
W1JB-02-07-014

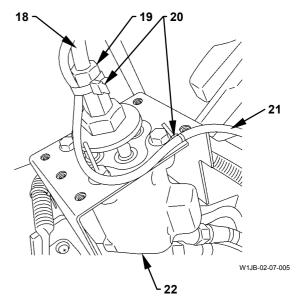
7. Remove bolts (14) (2 used) and screw (17). Remove covers (15, 16) from bracket (9).

: 10 mm

- 8. Remove clip bands (20) (2 used). Disconnect the connector of wire (21).
- 9. Loosen lock nut (19). Remove the lever (18) assembly from pilot valve (22).

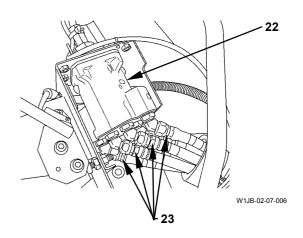
• : 19 mm, 22 mm



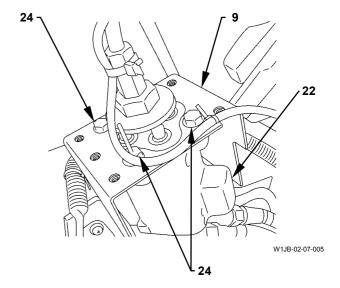


10. Remove hoses (23) (6 used) from pilot valve (22). Attach an identification tag onto the removed hoses for assembling. Cap the open ends.

: 19 mm



11. Remove bolt (24). Remove pilot valve (22) from bracket (9).

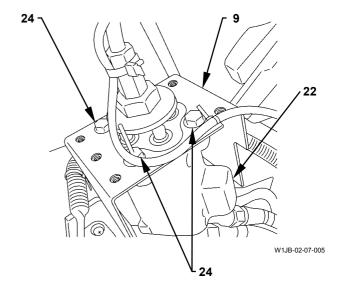


Install Left Pilot Valve

1. Install pilot valve (22) to bracket (9) with bolts (24) (4 used).

: 13 mm

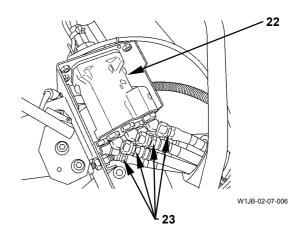
: 20 N·m (2 kgf·m, 15 lbf·ft)



2. Install hoses (23) (6 used) onto pilot valve (22).

: 19 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)

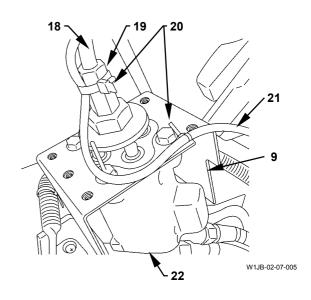


3. Install the lever (18) assembly to pilot valve (22). Secure the lever (18) assembly to pilot valve (22) with lock nut (19).

5 : 22 mm

: 55 N·m (5.5 kgf·m, 41 lbf·ft)

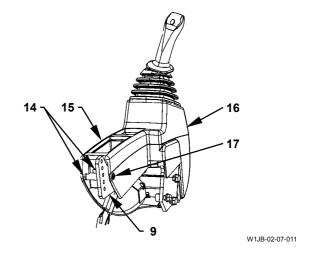
- 4. Connect the connector of wire (21).
- 5. Install wire (21) to bracket (9) in pilot valve (22) with clip bands (20) (2 used).



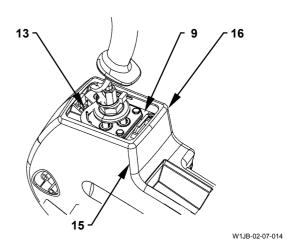
6. Install covers (15, 16) to bracket (9) with bolts (14) (2 used) and screw (17).

: 10 mm : 3.3 to 4.2 N·m

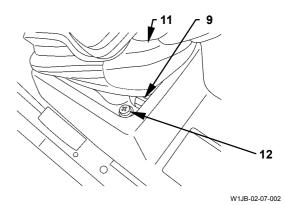
(0.3 to 0.4kgf·m, 2.4 to 3.1 lbf·ft)



7. Install covers (15, 16) to bracket (9) with screw (13).



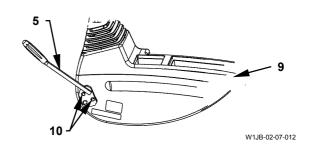
8. Install boot (11) to bracket (9) with screws (12) (4 used).



9. Install lever (5) to bracket (9) with bolts (10) (2 used).

: 13 mm

: 20 N·m (2 kgf·m, 15 lbf·ft)



10. Install cover (6) to lever (5) with screw (8). Attach cap (7) to cover (6).



A CAUTION: Seat (1) weight: 40 kg (88 lb)

11. Install seat (1) to bracket (4) with socket bolts (3) (4 used).

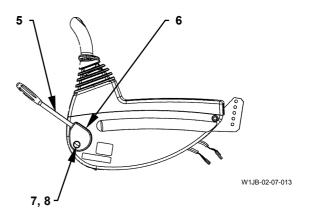
: 6 mm

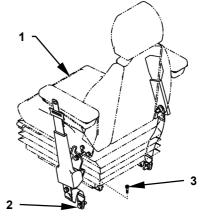
■ : 20 N·m (2 kgf·m, 15 lbf·ft))

12. Install the seat belt to bracket (4) with bolts (2) (2 used).

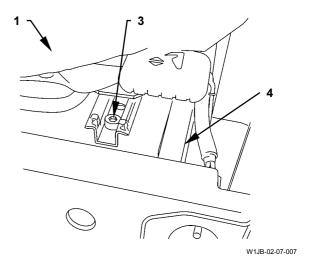
← : 16 mm

■ : 50 N·m (5 kgf·m, 37 lbf·ft)





W1JB-02-01-008

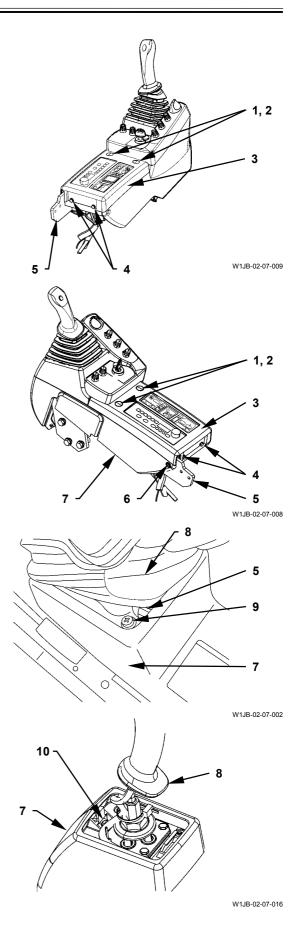


Remove Right Pilot Valve

- 1. Remove the seat. (Refer to W2-7-1.)
- 2. Remove caps (1) (2 used). Remove screws (2, 4) (2 used for each). Remove cover (3) from bracket (5).

3. Remove screw (6).

- 4. Remove screws (9) (4 used). Move boot (8) up from bracket (5). Remove screw (10).
- 5. Remove cover (7) from bracket (5).



- 6. Remove clip bands (13) (2 used). Disconnect the connector of wire (14).
- 7. Loosen lock nut (12). Remove the lever (11) assembly from pilot valve (15).

• : 19 mm, 22 mm

8. Remove bolts (17) (3 used). Remove the bracket (5) assembly from stand (16). Lay down the bracket (5) assembly with the bracket (5) assembly facing downward.

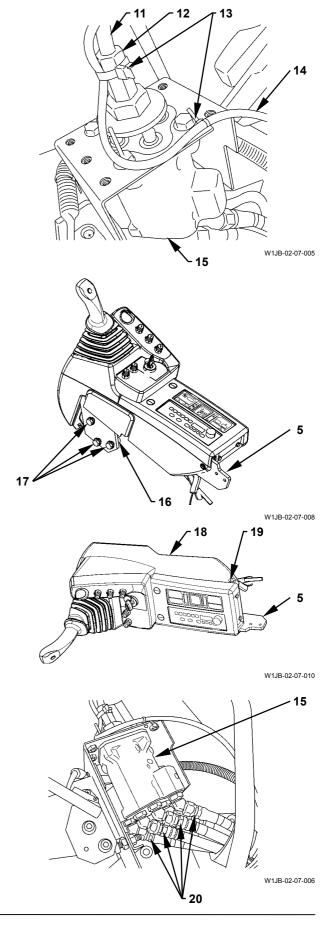
→ : 17 mm

9. Remove bolt (19). Remove cover (18) from bracket (5).

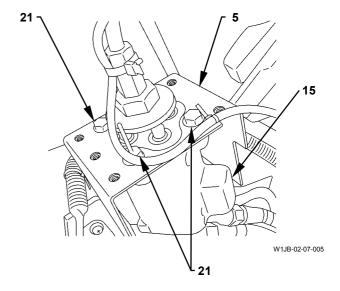
→ : 10 mm

10. Remove hoses (20) (6 used) from pilot valve (15). Attach an identification tag onto the removed hoses for reassembling. Cap the open ends.

: 19 mm



11. Remove bolts (21) (4 used). Remove pilot valve (15) from bracket (5).

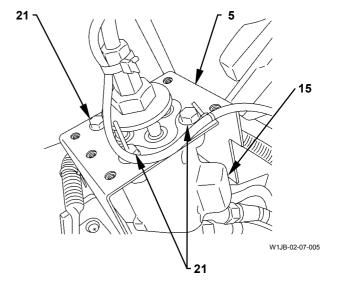


Install Right Pilot Valve

1. Install pilot valve (15) to bracket (5) with bolts (21) (4 used).

: 13 mm

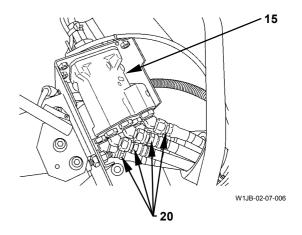
: 20 N·m (2 kgf·m, 15 lbf·ft)



2. Install hoses (20) (6 used) to pilot valve (15).

→ : 19 mm

: 29.5 N·m (3 kgf·m, 220 lbf·ft)

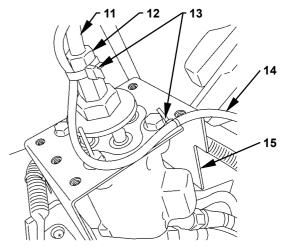


3. Install the lever (11) assembly to pilot valve (15). Secure the lever (11) assembly to pilot valve (15) with lock nut (12).

→ : 22 mm

: 55 N·m (5.5 kgf·m, 41 lbf·ft)

- 4. Connect the connector of wire (14).
- 5. Install wire (14) to pilot valve (15) and bracket (5) with clip bands (13) (2 used).



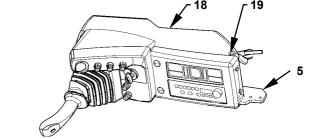
W1JB-02-07-005

6. Install cover (18) to bracket (5) with bolt (19).

→ : 10 mm

: 3.3 to 4.2 N·m

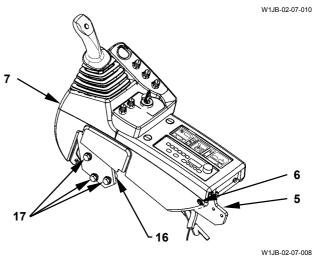
(0.3 to 0.4 kgf·m, 2.4 to 3.1 lbf·ft)



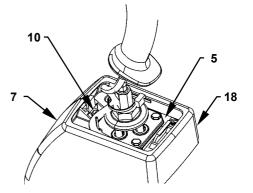
- 7. Install cover (7) to bracket (5) with screw (6).
- 8. Install the bracket (5) assembly to stand (16) with bolts (17)(3 used).

: 17 mm

: 50 N·m (5 kgf·m, 37 lbf·ft)



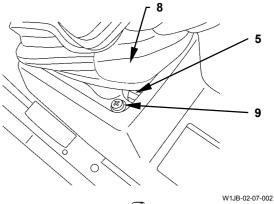
9. Install covers (18, 7) to bracket (5) with screw (10).

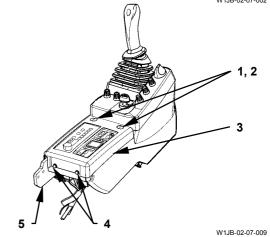


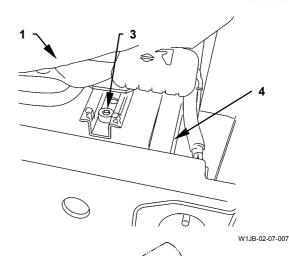
W1JB-02-07-016

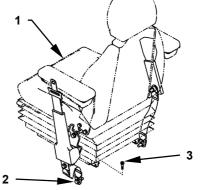
10. Install boot (8) to bracket (5) with screws (9) (4 used).

11. Install cover (3) to bracket (5) with screws (2, 4) (2 used for each). Attach caps (1) (2 used) to cover (3).









W1JB-02-01-008

A CAUTION: Seat (1) weight: 40 kg (88 lb)

12. Install seat (1) to bracket (4) with socket bolts (3) (4 used).

— : 6 mm

■ : 20 N·m (2 kgf·m, 15 lbf·ft)

13. Install the seat belt to bracket (4) with bolts (2) (2 used).

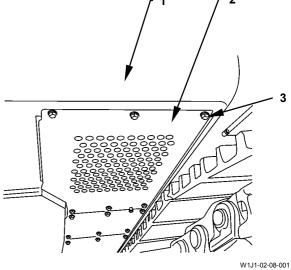
- € : 16 mm

■ : 50 N·m (5 kgf·m, 37 lbf·ft)

Remove Travel Pilot Valve

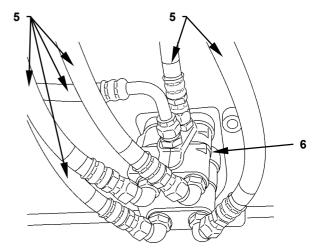
1. Remove bolts (3) (7 used). Remove cover (2) from main frame (1).

: 19 mm



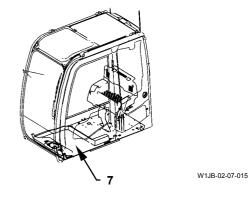
2. Remove hoses (5) (6 used) from pilot valve (6). Attach identification tags to the removed hoses for reassembling. Attach a cap onto pilot valve (6) and hoses (5) (6 used).

• : 17 mm, 19 mm



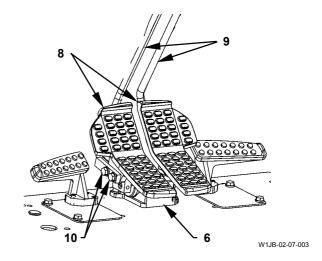
W1JB-02-07-001

3. Remove floor mat (7) from the cab.

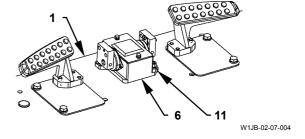


4. Remove bolts (10) (4 used). Remove levers (9) (2 used) and pedals (8) (2 used) from pilot valve (6).

→ : 17 mm



5. Remove socket bolts (11) (2 used). Remove pilot valve (6) from main frame (1).
: 8 mm



Install Travel Pilot Valve

1. Install pilot valve (6) to main frame (1) with socket bolts (11) (2 used).

: 8 mm

■ : 50 N·m (5 kgf·m, 37 lbf·ft)

2. Install levers (9) (2 used) and pedals (8) (2 used) to pilot valve (6) with bolts (10) (4 used).

: 17 mm

: 50 N·m (5 kgf·m, 37 lbf·ft)

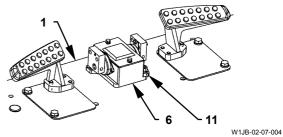


-€ : 17 mm

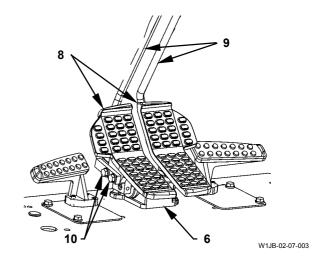
: 24.5 N·m (2.5 kgf·m, 18 lbf·ft)

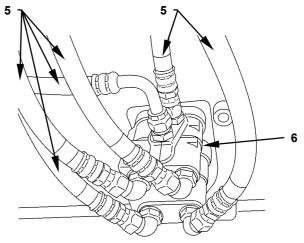
4 : 19 mm

■ : 29.5 N·m (3 kgf·m, 22 lbf·ft)





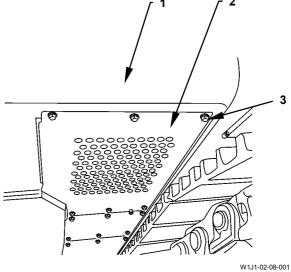




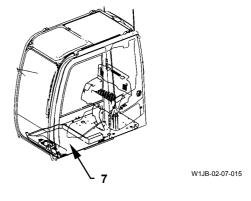
W1JB-02-07-001

4. Install cover (2) onto main frame (1) with bolts (3) (7 used).

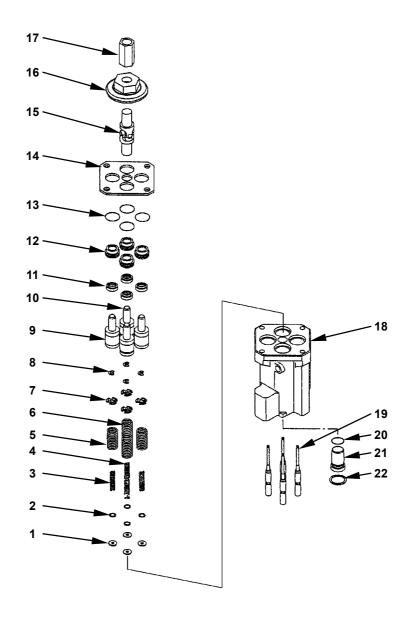
■ : 90 N·m (9 kgf·m, 66 lbf·ft)



5. Install floor mat (7) to the cab.



DISASSEMBLE RIGHT AND LEFT PILOT VALVES



W178-02-07-064

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

Disassemble Right and Left Pilot Valves

IMPORTANT: Casing (18) is made of aluminium.

Too strong a force can deform or
damage them. Be careful while

handling them.

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 different. Indicate the port number from which it is removed. Port numbers are stamped on the outer surface of casing (18).

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

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

: 19 mm, 32 mm

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

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

→ : 17 mm

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

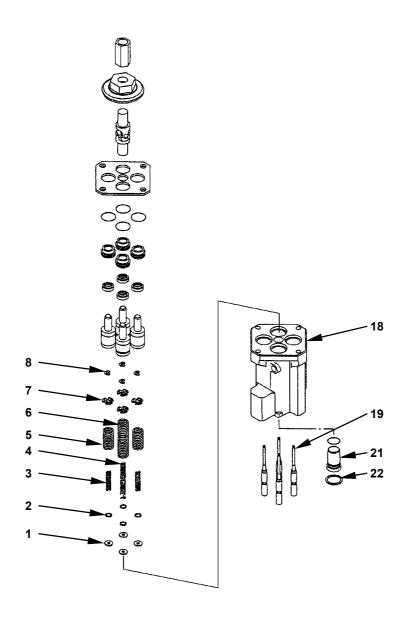
4. Remove plate (14).

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. Pull out sleeve (12) upward by using a pair of pliers.

IMPORTANT: The dimensions of pushers (9, 10) for ports (1, 3) and ports (2, 4) are different. Indicate the port number from which it is removed in order to keep by the port number.

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



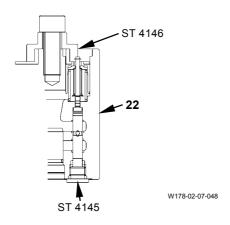
W178-02-07-064

7. When compressing the spring, do not lower the spool. Install special tool (ST 4145) to the port hole on casing (18) as illustrated.

: 6 mm

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

: 12 mm



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

- Remove special tool (ST4146). Remove spring guides (7)(4 used), return springs A (5) (2 used),
 B (6) (2 used), balance springs A (3) (2 used),
 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.

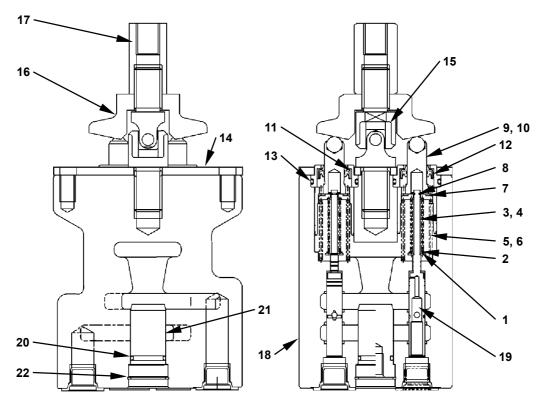
11. Remove special tool (ST4145) from casing (18). Slowly turn and remove spool (19) from casing (18).

IMPORTANT: Retaining ring (22) may come off while disassembling. Do not drop retaining ring (22) inside the casing. If retaining ring (22) falls inside the casing, remove retaining ring (22) completely. Retaining ring (22) cannot be reused.

12. Remove retaining ring (22) by using a screwdriver. Install the bolt (M8, Pitch 1.25 mm) to plug (21) in order to pull out.

→ : 13 mm

ASSEMBLE RIGHT AND LEFT PILOT VALVES



W1V1-02-07-001

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

Assemble Right and Left Pilot Valves

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

NOTE: Table below shows the relations between each port and the components. Do not confuse them when assembling.

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

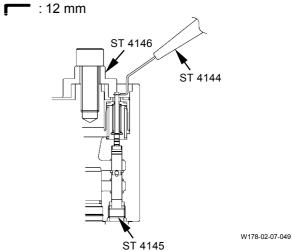
Port No.	Return Springs (5, 6)	Balance Springs A, B (3, 4)		
1	Short	Short		
2	Long	Long		
3	Short	Short		
4	Long	Long		

- 1. Insert same spools (19) (4 used) before disassembling to the port hole (4 places) on casing (18).
- NOTE: Spool (19) and casing (18) must be replaced as an assembly.
 - 2. Install special tool (ST 4145) to the port hole on casing (18).

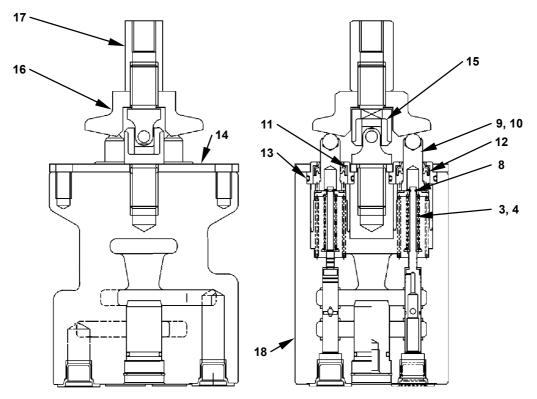
→ : 6 mm

IMPORTANT: Refer to the table in left in order to assemble them 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) onto return springs (5, 6) (2 used for each) with the protrusion facing upward.
- 5. Install special tool (ST 4146) to the pusher (9, 10) hole on casing (18). Secure special tool (ST 4146) by using the bolts (M14, Pitch 2.0 mm).



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



W1V1-02-07-001

 Install retaining rings (8) (4 used) to ring holder (ST 4144). Install retaining rings (8) (4 used) to the groove on the head of spool (21) out of 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).
 After pushing pushers (9, 10) (2 used for each) by hand, remove them. 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 to the ball at the ends of pushers (9, 10) (2 used for each).
- 10. Apply grease to the joint part of universal joint (15).
- 11. Apply grease to the inner surface of oil seals (11) (4 used).
- NOTE: Spool (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 sleeves (12) (4 used) assembly by hand until O-ring (13) is inserted into the hole on sleeves (12) (4 used).
- 13. Clamp 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 to the thread part of universal joint (15). Place plate (14) on casing (18) and install universal joint (15).

• : 17 mm

: 24.5 N·m (2.5 kgf·m, 18 lbf·ft)

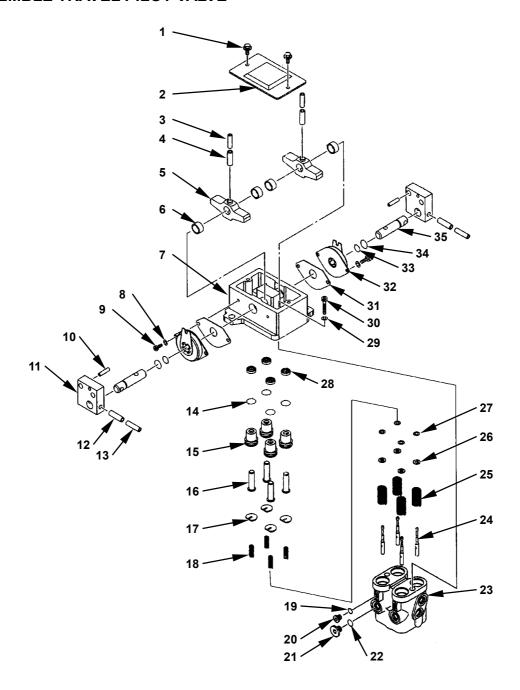
IMPORTANT: Check the tightness of cam (16).

- 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)

DISASSEMBLE TRAVEL PILOT VALVE



W178-02-07-063

Cover Spring Pin (2 Used) Spring Pin (2 Used) 5 - Cam (2 Used) 6 - Bushing (4 Used) 7 - Holder

1 - Bolt (2 Used)

9 - Socket Bolt (4 Used)

8 - Spring Washer (4 Used)

16 - Pusher (4 Used) 17 - Spring Guide (16 Used)

10 - Spring Pin

11 - Bracket (2 Used)

14 - O-Ring (4 Used)

15 - Bushing (4 Used)

12 - Spring Pin (2 Used)

13 - Spring Pin (2 Used)

18 - Balance Spring (4 Used)

19 - O-Ring (2 Used)

20 - Plug (2 Used)

21 - Plug (2 Used)

22 - O-Ring (2 Used)

23 - Casing

24 - Spool

25 - Return Spring (4 Used)

26 - Spacer (4 Used)

27 - Shim (12 Used)

28 - Oil Seal (4 Used)

29 - Spring Washer (2 Used)

30 - Socket Bolt (2 Used)

31 - Rubber Seat (2 Used)

32 - Damper (2 Used)

33 - O-Ring (2 Used)

34 - O-Ring (2 Used)

35 - Pin

Disassemble Travel Pilot Valve

IMPORTANT: Casing (23) is made of aluminium.

Too strong a force can deform or
damage them. Be careful while
handling them.

IMPORTANT: Spool (24) has been selected to match the hole of casing (23).

Indicate the port number from which it is removed.

Port numbers are stamped on the outer surface of casing (23).

1. Clamp casing (23) in a vise. Remove bolts (1) (2 used). Remove cover (2) from holder (7).

→ : 10 mm

2. Remove bolts (30) (2 used) and spring washers (29) (2 used). Remove the holder (7) assembly from casing (23).

: 8 mm

- 3. Pull out the pusher (16) assemblies (4 used) from casing (23).
- Remove pushers (16) (4 used) from bushings (15) (4 used). By using a bamboo spatula, remove oil seals (28) (4 used) and O-rings (14) (4 used) from bushings (15) (4 used).

IMPORTANT: Put the mark on spools (24) (4 used) in order to easily install spool (24) into the original hole.

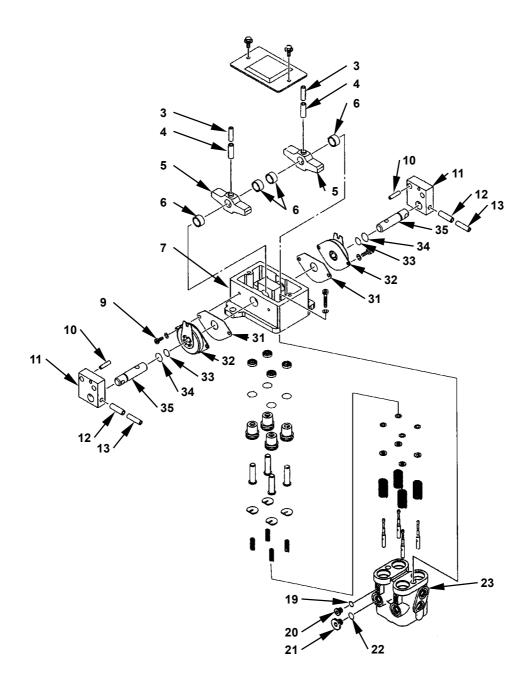
5. Turn and remove the spools (24) (4 used) assembly from casing (23).

Spring guides (17) (4 used), balance springs (18) (4 used), shims (27) (12 used) and spacers (26) (4 used) are removed with spools (24) (4 used) together.

NOTE: Spool (24) has been selected to match the hole of casing (23). Replace spool (24) and casing (23) as an assembly.

IMPORTANT: The quantity of shim has been determined during the performance testing at the factory. Keep the shim together with the spool.

- 6. Push balance spring (18). Remove spring guides (17) (4 used), balance springs (18) (4 used), shims (27) (12 used) and spacers (26) (4 used) from spools (24) (4 used).
- 7. Remove return springs (25) (4 used) from casing (23).



W178-02-07-063

IMPORTANT: Place the stand under bracket (11) and form the reaction force. If holder (7) bears the reaction force, a strong force acts on pin (35) and pin (35) may be deformed.

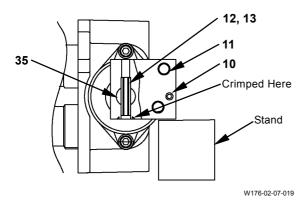
8. Place a stand under bracket (11).

The hole insides of spring pins (12, 13) (2 used for each) in bracket (11) are in stepped-shape. The spring pin can only be removed in one direction.

Remove both spring pins (12, 13) (2 used for each) from bracket (11) at the same time by using special tool (ST 1237). Remove bracket (11) from pin (35).

Do not remove spring pin (10) attached with bracket (11) unless necessary.

The outside end of spring pin (10) has been crimped.



 Remove socket bolts (9) (4 used) and spring washers (8) (4 used). Remove dampers (32) (2 used) and rubber seats (31) (2 used) from pin (35). O-rings (34) (2 used) are removed together.

: 5 mm

- 10. Remove O-rings (33) (2 used) from pin (35).
- 11. Place holder (7) with the casing (23) mounting surface facing upward.

12. Remove spring pins (3, 4) (2 used for each) from cams (5) (2 used) at the same time by using special tool (ST 1237).

The hole insides of spring pins (3, 4) (2 used for each) in cam (5) are in stepped-shape. Tap the bottom of cam (5). As the holes of spring pins (3, 4) (2 used for each) are crimped, spring pins (3, 4) may feel tight when removing.

13. Remove pin (35) by using a bar and hammer. At the same time cams (5) (2 used) are also removed.

Do not remove bushings (6) (4 used) in holder (7) unless necessary. When removing, tap bushings (6) (4 used) by using special tool (ST 7256).

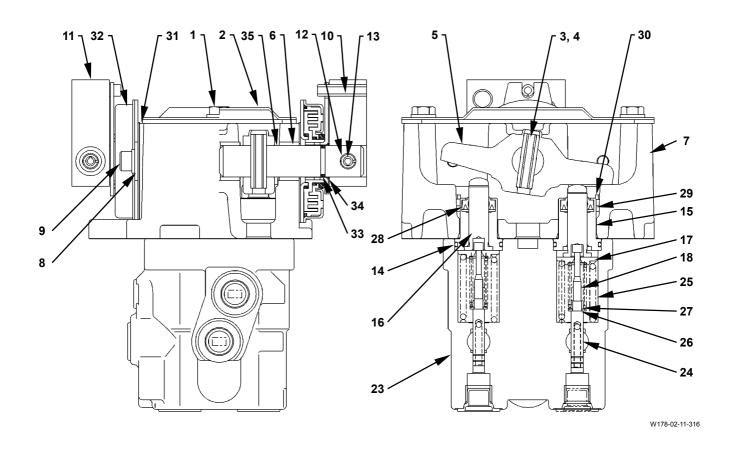
14. Remove plugs (20) (2 used) from casing (23). O-rings (19) (2 used) are removed with plugs (20) (2 used) together.

: 5 mm

15. Remove plugs (21) (2 used) from casing (23). O-rings (22) (2 used) are removed with plugs (21) (2 used) together.

: 6 mm

ASSEMBLE TRAVEL PILOT VALVE



1 - Bolt (2 Used)

2 - Cover

3 - Spring Pin (2 Used)

4 - Spring Pin (2 Used)

5 - Cam (2 Used)

6 - Bushing (4 Used)

7 - Holder

8 - Spring Washer (4 Used)

9 - Socket Bolt (4 Used)

10 - Spring Pin

11 - Bracket (2 Used)

12 - Spring Pin (2 Used)

13 - Spring Pin (2 Used)

14 - O-Ring

15 - Bushing (4 Used)

16 - Pusher (4 Used)

17 - Spring Guide (16 Used)

18 - Balance Spring (4 Used)

19 - *O-Ring (2 Used)

20 - *Plug (2 Used)

21 - *Plug (2 Used) 22 - *O-Ring (2 Used)

23 - Casing

24 - Spool (4 Used)

25 - Return Spring (4 Used)

26 - Spacer (4 Used)

27 - Shim (12 Used)

28 - Oil Seal (4 Used)

29 - Spring Washer (2 Used)

30 - Socket Bolt (2 Used)

31 - Rubber Seat (2 Used)

32 - Damper (2 Used)

33 - O-Ring (2 Used) 34 - O-Ring (2 Used)

35 - Pin

NOTE: As for the parts with mark *, refer to W2-7-24.

Assemble Travel Pilot Valve

IMPORTANT: Check the direction to install spring guide (17).

- 1. Assemble spools (24) (4 used) into the assembly.
- Insert spacers (26) (2 used), shims (27) (12 used) and balance springs (18) (4 used) into spools (24) (4 used) in this order. Install the shim as the same condition before disassembling.
- Push balance springs (18) (4 used) by hand.
 Install spring guides (17) (4 used) to spools (24) (4 used) with the stepped-end facing downward.

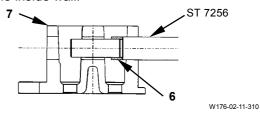
IMPORTANT: Before inserting the parts into holder (7) and casing (23), apply hydraulic oil onto the parts.

- 2. Insert return springs (25) (4 used) into casing (23).
- 3. Insert the spool (24) assembly into the former port before disassembling. Turn and install the spools (24) (4 used) assembly into casing (23).
- 4. Assemble pushers (16) (4 used) into the assembly.
- Install oil seals (28) (4 used) to bushings (15) (4 used).
- Apply grease to the inner surface of oil seals (28) (4 used).
- Install O-rings (14) (4 used) to bushings (15) (4 used).
- Insert pushers (16) (4 used) into bushings (15) (4 used).
- Apply grease to the head of pushers (16) (4 used).
- 5. Insert the pushers (16) (4 used) assembly into casing (23).
- 6. If bushing (6) has been removed from holder (7), install bushings (6) (4 used) to holder (7) by using special tool (ST 7256) in the following procedures.

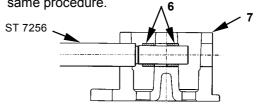
NOTE: Bushings (6)(4 used) are identical.

Insert bushings (6) (4 used) into special tool (ST 7256). Tap special tool (ST 7256) and install bushing (6) into the hole of holder (7) by using a hammer.

Stop tapping when the bushing (6) end is flush with the inside wall.

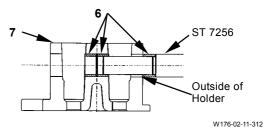


• Install bushing (6) on the opposite side in the same procedure.

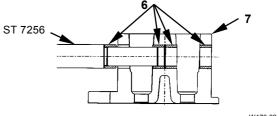


W176-02-11-311

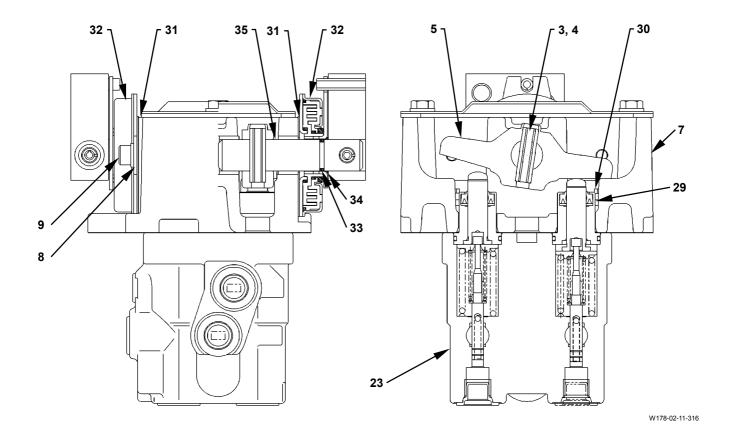
 Install bushing (6) in near side as illustrated. Stop tapping when the bushing (6) end is flush with the outside of holder (7).



 Install bushing (6) in the near and opposite side as illustrated.



W176-02-11-313

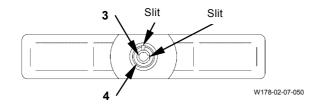


7. Install O-rings (33) (2 used) to pin (35).
Apply grease to O-rings (33) (2 used). Assemble pin (35) and cams (5) (2 used) to holder (7).

IMPORTANT: Check the direction to install spring pins (3, 4) (2 used for each).

Install spring pins (3, 4) (2 used for each) to cams (5) (2 used) by using special tool (ST 1237). Secure cams (5) (2 used) and pin (35). At this time, spring pins (3, 4) (2 used for each) should be displaced with their slits at 90°.

Tap and install spring pins (3, 4) (2 used for each) until spring pins (3, 4) make contact with the stepped part in the hole.



- 9. Crimp the hole edge (2 places) of cams (5) (2 used), where spring pins (3, 4) are inserted, by using a punch.
- Place holder (7) on the casing (23) assembly.
 Install holder (7) to casing (23) with socket bolts (30) (2 used) and spring washers (29) (2 used).
 Check the mark direction and install holder (7).

: 8 mm : 49 N·m (5 kgf·m, 36 lbf·ft)

11. Install rubber seats (31) (2 used) to pin (35).

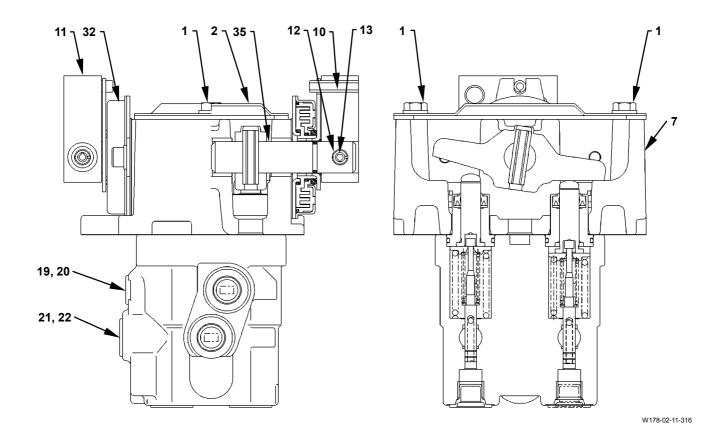
IMPORTANT: Check the direction of damper (32).

The inner bore of damper (32) is edged-shape. If damper (32) is pried when installing, O-ring (33) will be damaged.

- 12. Install dampers (32) (2 used) to pin (35) with the lever facing upward.
- 13. Secure damper (32) and rubber seat (31) to holder (7) with socket bolts (9) (4 used) and spring washers (8) (4 used).

: 5 mm : 6.9 N·m (0.7 kgf·m, 5.1 lbf·ft)

14. Apply grease to O-ring (34). Push O-rings (34) (2 used) to the endmost of pin (35).

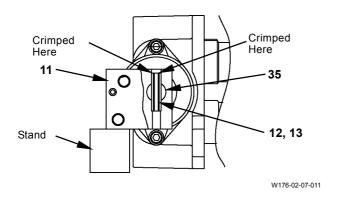


15. As for the direction to install bracket (11), refer to the figure in the disassemble section. Install bracket (11) to pin (35). Align the inserting holes of spring pins (12, 13) (2 used for each).

IMPORTANT: Place a stand under bracket (11) and form a reaction force. If holder (7) bears the reaction force, a strong force acts on pin (35) and pin (35) may be deformed.

16. Place a stand under bracket (11).

Tap spring pins (12, 13) into bracket (11) until spring pins (12, 13) come to the stepped end by using special tool (ST 1237). The spring pins (2 used) are displaced with their slits in 90°.



- 17. Crimp the hole edge of bracket (11), where spring pins (12, 13) are inserted, by using a punch.
- 18. Install bracket (11) on the opposite side to pin (35) in the same procedures as steps 16, 17.
- 19. Install cover (2) to holder (7) with bolts (1) (2 used).

• 10 mm

: 4.9 N·m (0.5 kgf·m, 3.6 lbf·ft)

20. Apply grease to the spring pin (10) contact part of dampers (32) (2 used).

21. Install O-rings (19) (2 used) to plugs (20) (2 used). Install plugs (20) (2 used) to casing (23).

→ : 5 mm

: 10 N·m (1 kgf·m, 7.4 lbf·ft)

22. Install O-rings (22) (2 used) to plugs (21) (2 used). Install plugs (21) (2 used) to casing (23).

: 6 mm

: 19.6 N·m (2 kgf·m, 14.5 lbf·ft)

(Blank)

UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve

REMOVE AND INSTALL PILOT SHUT-OFF SOLENOID VALVE

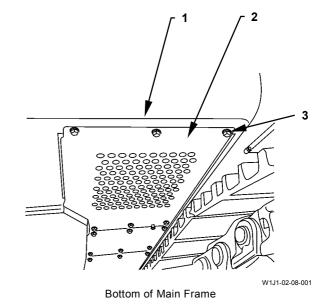


CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

Removal

1. Remove bolts (3) (7 used) from cover (2). Remove cover (2) from main frame (1).

: 19 mm

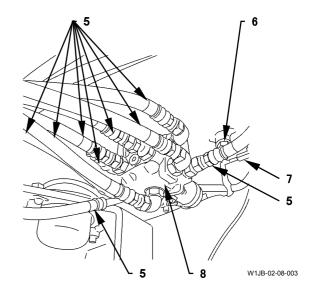


2. Remove bolt (6). Remove wiring connector (7).

→ : 17 mm

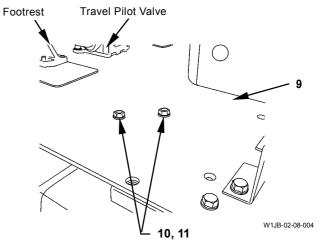
3. Remove hoses (5) (9 used) from pilot shut-off solenoid valve (8). Attach identification tags to the removed hoses for reassembling. Cap hose (5) and pilot shut-off solenoid valve (8).

: 17mm, 19 mm



4. Remove bolts (10) (2 used) and washers (11) (2 used) from plate (9). Remove pilot shut-off solenoid valve (8) from plate (9).

→ : 17 mm



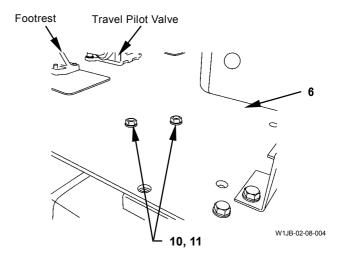
UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve

Installation

1. Install pilot shut-off solenoid valve (8) to plate (9) with bolts (10) (2 used) and washers (11) (2 used).

→ : 17 mm

: 50 N·m (5 kgf·m, 36 lbf·ft)



2. Install hoses (5) (9 used) to pilot shut-off solenoid valve (8).

5 : 17 mm

: 24.5 N·m (2.5 kgf·m, 18 lbf·ft)

• : 19 mm

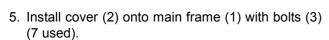
: 29.5 N·m (3 kgf·m, 22 lbf·ft)

3. Install wiring connector (7).

4. Install bolt (6).

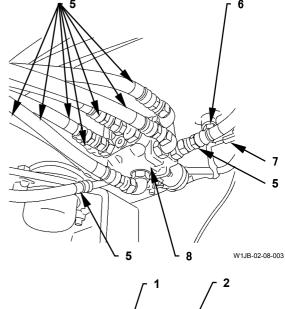
: 17 mm

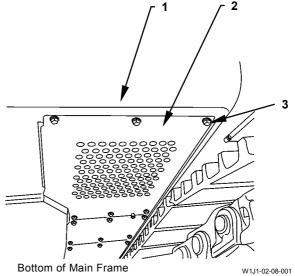
: 50 N·m (5 kgf·m, 66 lbf·ft)



: 19 mm

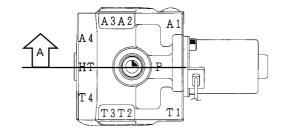
: 90 N·m (9 kgf·m, 66 lbf·ft)



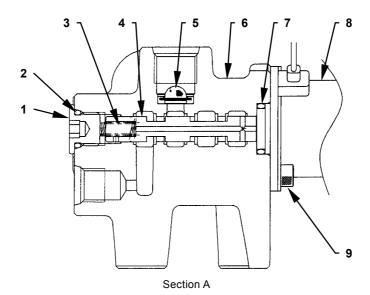


UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve

STRUCTURE OF PILOT SHUT-OFF SOLENOID VALVE



W1JB-02-08-001



W1JB-02-08-002

Item	Part Name	Q'ty	Wrench Size (mm)		Tightening Torque			Remark
					N⋅m	(kgf·m)	(lbf·ft)	
1	Plug	1	L	: 6	26.5	(2.7)	(19.5)	
2	O-Ring	1						(1B P11)
3	Spring	1						
4	Spool	1						
5	Filter	1						
6	Body	1						
7	O-Ring	1						(1A P16)
8	Solenoid	1						
9	Socket bolt	2		: 4	3.92	(0.4)	(2. 9)	

UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve (Blank)

REMOVE AND INSTALL SOLENOID VALVE

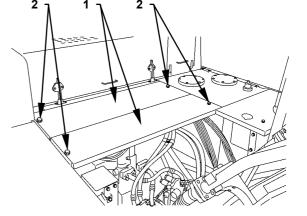


CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

Removal

1. Remove bolts (2) (4 used). Remove covers (1) (2 used) from the main frame.

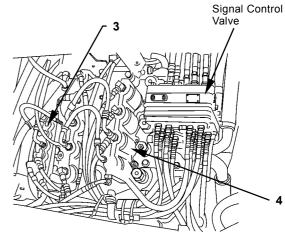
: 19 mm



W1J1-02-05-061

2. Remove all hoses, pipes and connectors (5) (4 used) from solenoid valve (3). Attach an identification tag onto the removed hoses for assembling. Cap the hose and solenoid valve (3).

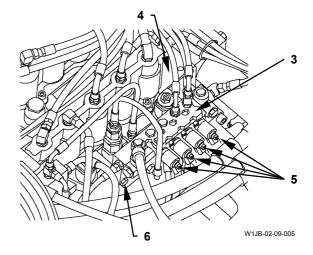
••• : 17 mm, 19 mm



W1J1-02-10-001

3. Remove bolts (6) (2 used). Remove solenoid valve (3) from control valve (4).

: 17 mm

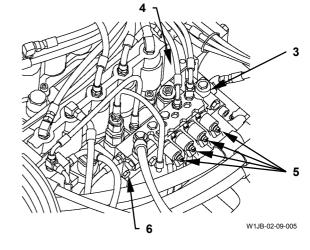


Installation

1. Install solenoid valve (3) to control valve (4) with bolts (6) (2 used).

→ : 17 mm

: 50 N·m (5 kgf·m, 36 lbf·ft)



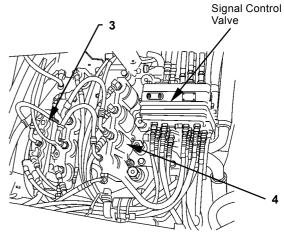
2. Install all hoses, pipes and connectors (5) (4 used) to solenoid valve (3).

: 17 mm

: 24.5 N·m (2.5 kgf·m, 18 lbf·ft)

: 19 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)

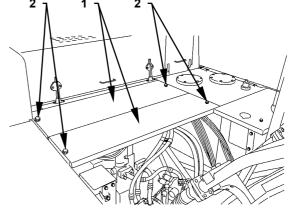


W1J1-02-10-001

3. Install covers (1) (2 used) onto the main frame with bolts (2) (4 used).

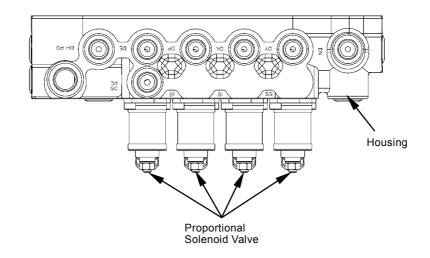
: 19 mm

: 90 N·m (9 kgf·m, 66 lbf·ft)

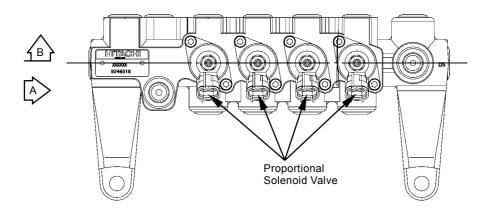


W1J1-02-05-061

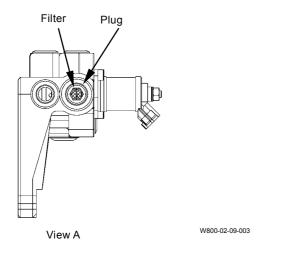
STRUCTURE OF SOLENOID VALVE

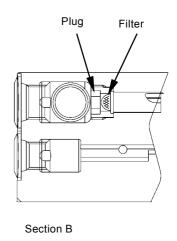


W800-02-09-001



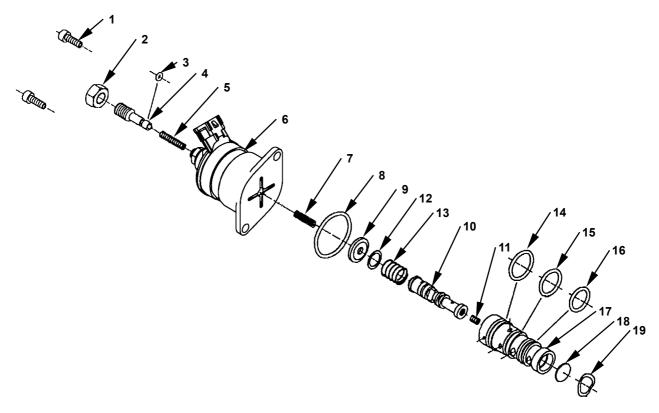
W800-02-09-002



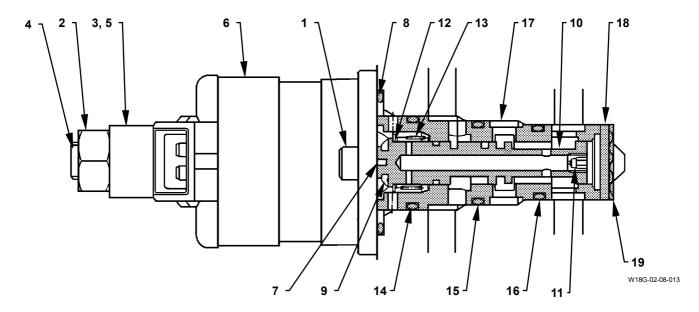


W800-02-09-004

DISASSEMBLE AND **ASSEMBLE** PROPOTIONAL SOLENOID VALVE



W18G-02-08-012



- 1 Socket Bolt (2 Used)
- 2 Lock Nut
- 3 O-Ring
- 4 Adjusting Bolt5 Spring

- 6 Solenoid
- 7 Spring
- 8 O-Ring
- 9 Diaphragm 10 Spool

- 11 Orifice
- 12 Washer
- 13 Spring
- 14 O-Ring
- 15 O-Ring
- 16 O-Ring
- 17 Sleeve
- 18 Plate
- 19 Wave Spring

Disassemble Proportional Solenoid Valve

IMPORTANT: Do not disassemble lock nut (2) and adjusting bolt (4) for pressure adjustment.

1. Remove socket bolts (1) (2 used). Remove solenoid (6) and O-ring (8) from the housing.

: 4 mm

- 2. Remove spool (10), diaphragm (9), washer (12) and spring (13) from sleeve (17).
- 3. Remove sleeve (17), plate (18) and wave spring (19) from the housing.

IMPORTANT: Do not remove orifice (11) from sleeve (17).

4. Remove O-rings (14, 15, 16) from sleeve (17).

Assemble Proportional Solenoid Valve

- 1. Install wave spring (19) and plate (18) to the housing.
- 2. Install O-rings (14, 15, 16) on sleeve (17). Insert sleeve (17) into the housing.

IMPORTANT: When inserting spool (10) into sleeve (17), do not damage the edge inside sleeve (17).

After inserting spool (10), push spool (10) by 3 to 5 mm. Check if spool (10) moves smoothly.

- 3. Install diaphragm (9), washer (12) and spring (13) to spool (10). Install spool (10) to sleeve (17).
- 4. Install spring (7) to solenoid (6). Install solenoid (6) to the housing with socket bolts (1) (2 used).

→ : 4 mm

+: 5^{+2}_{-0} N·m (0.5 $^{+0.2}_{-0}$ kgf·m, 3.7 $^{+0.15}_{-0}$ lbf·ft)

(Blank)

REMOVE AND INSTALL SIGNAL CONTROL VALVE

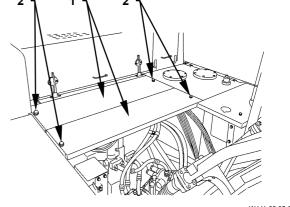
A

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

Removal

1. Remove bolts (2) (4 used). Remove covers (1) (2 used) from the main frame.

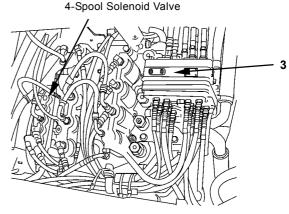
→ : 19 mm



W1J1-02-05-061

2. Remove all hoses and the connectors (2 used) from signal control valve (3). Attach an identification tag onto the removed hoses for assembling. Cap signal control valve (3) and the hose.

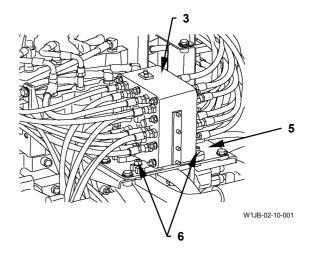
: 17 mm, 19 mm



W1JB-02-05-004

3. Remove socket bolts (6) (4 used). Remove signal control valve (3) from bracket (5).

: 8 mm

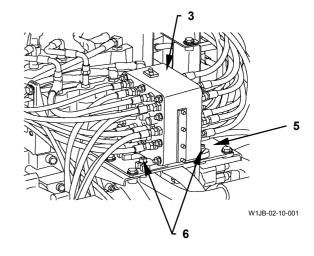


Installation

1. Install signal control valve (3) to bracket (5) with socket bolts (6) (4 used).

: 8 mm

: 50 N·m (5 kgf·m, 36 lbf·ft)



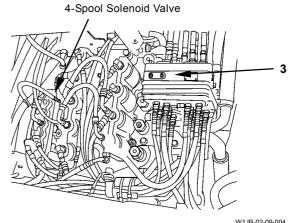
2. Install all hoses and the connector to signal control valve (3).

→ : 17 mm

: 24.5 N·m (2.5 kgf·m, 18 lbf·ft)

: 19 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)

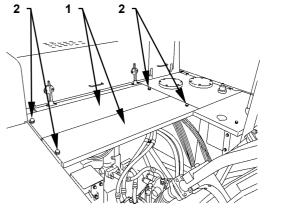


W1JB-02-09-004

3. Install covers (1) (2 used) onto the main frame with bolts (2) (4 used).

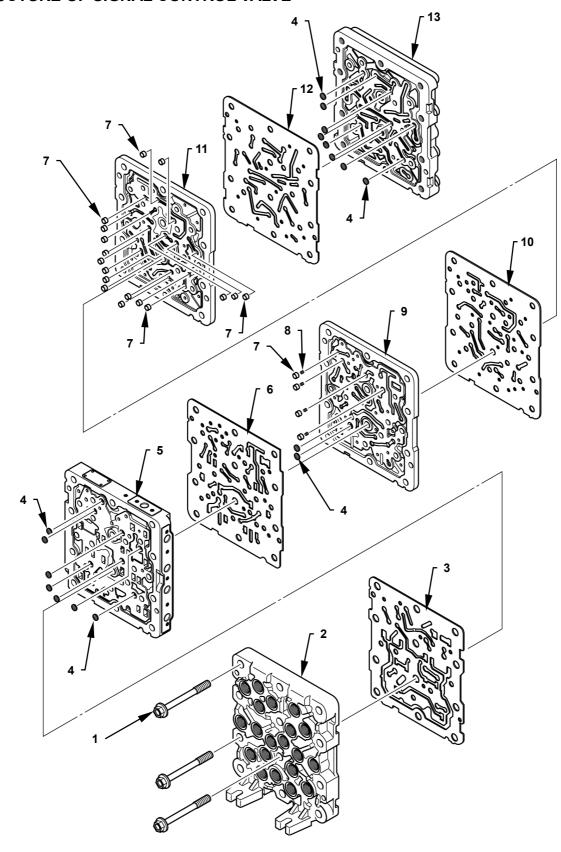
🕶 : 19 mm

: 90 N·m (9 kgf·m, 66 lbf·ft)

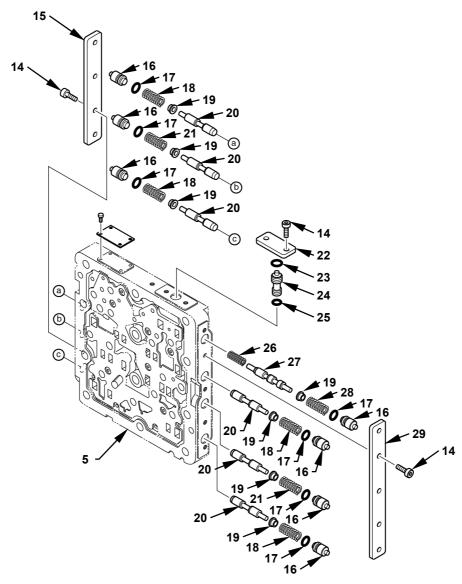


W1J1-02-05-061

STRUCTURE OF SIGNAL CONTROL VALVE



W1JB-02-10-002



W1JB-02-10-003

Detail of Body 2

1 - Bolt (3 Used)
2 - Body 1
3 - Gasket
4 - Filter (17 Used)
5 - Body 2
6 - Gasket
7 - Shuttle Valve (2 Used)
8 - Spring (4 Used)

9 - Body 3 10 - Gasket 11 - Body 4 12 - Gasket 13 - Body 5 14 - Socket Bolt

14 - Socket Bolt (11 Used) 15 - Plate 16 - Plug (7 Used) 17 - O-Ring (7 Used) 18 - Spring (4 Used) 19 - Spring Guide (7 Used) 20 - Spool (6 Used) 21 - Spring (2 Used) 22 - Plate 23 - O-Ring 24 - Shuttle Valve

25 - O-Ring 26 - Spring 27 - Spool 28 - Spring 29 - Plate

REMOVE AND INSTALL SHOCKLESS VALVE

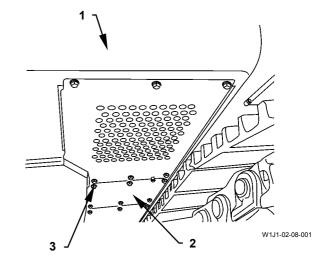


CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

Removal

1. Remove bolts (3) (6 used). Remove cover (2) from main frame (1).

: 19 mm

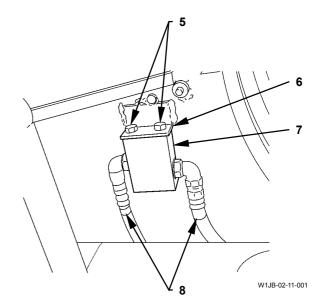


2. Remove hoses (8) (2 used) from shockless valve (7). Cap hose (8) and shockless valve (7).

: 19 mm

3. Remove bolts (5) (2 used). Remove shockless valve (7) from bracket (6).

: 13 mm



Installation

 Install shockless valve (7) to bracket (6) with bolts (5) (2 used).

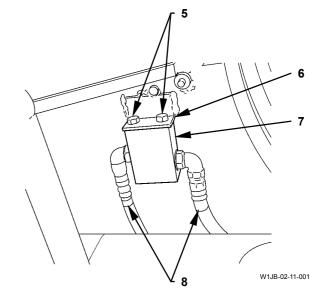
: 13 mm

: 20 N·m (2 kgf·m, 15 lbf·ft)

2. Install hoses (8) (2 used) to shockless valve (7).

: 19 mm

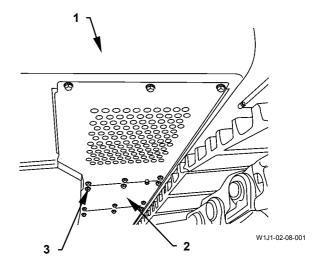
: 29.5 N·m (3 kgf·m, 22 lbf·ft)



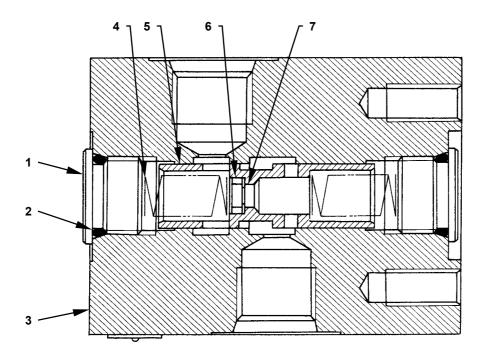
3. Install cover (2) onto main frame (1) with bolts (3) (6 used).

→ : 19 mm

: 90 N·m (9 kgf·m, 66 lbf·ft)



STRUCTURE OF SHOCKLESS VALVE



T183-03-07-008

Item	Part Name	Q'ty	Wrench Size	Tightening Torque			Remark
			(mm)	N⋅m	(kgf·m)	(lbf·ft)	Remark
1	Plug	2	: 8	39	(4)	(29)	
2	O-Ring	2					
3	Body	1					
4	Spring	2					
5	Plunger	1					
6	Ring	1					
7	Orifice	1					

(Blank)

REMOVE AND INSTALL FAN VALVE

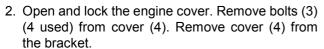


CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL **TANK on W1-4-1.)**

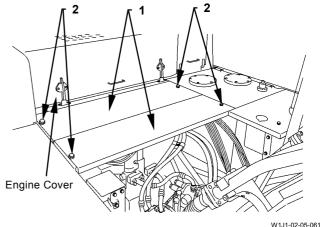
Removal

1. Remove bolts (2) (4 used). Remove covers (1) (2 used) from the main frame.

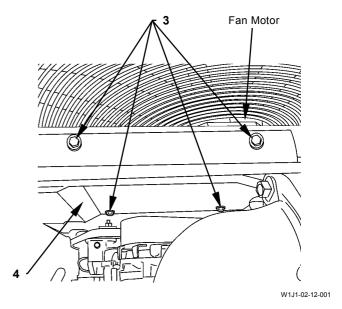
: 19 mm



: 19 mm

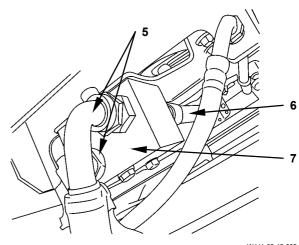


W1J1-02-05-061



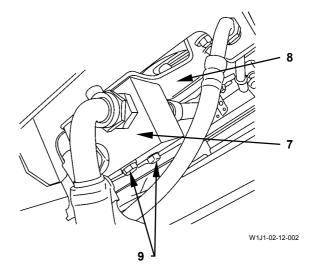
3. Remove hoses (5) (2 used) and (6) (2 used) from fan valve (7). Cap fan valve (7) and hoses (5, 6).

→ : 36 mm



W1J1-02-12-002

4. Remove bolts (9) (2 used) from fan valve (7). Remove fan valve (7) from bracket (8).



Installation

1. Install fan valve (7) to bracket (8) with bolts (9) (2 used).

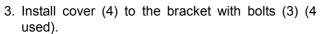
: 17 mm

: 50 N·m (5 kgf·m, 36 lbf·ft)

2. Install hoses (5) (2 used) and (6) (2 used) to fan valve (7).

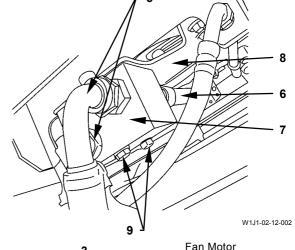
: 36 mm

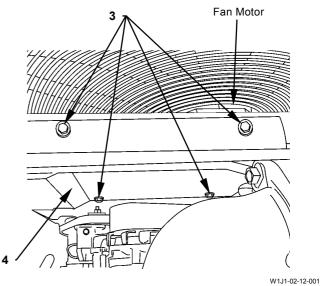
: 175 N·m (18 kgf·m, 129 lbf·ft)



→ : 19 mm

: 90 N·m (9 kgf·m, 66 lbf·ft)

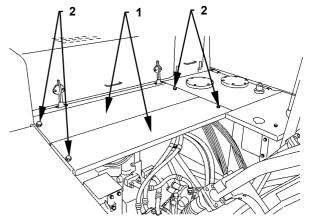




4. Install covers (1) (2 used) to the main frame with bolts (2) (4 used).

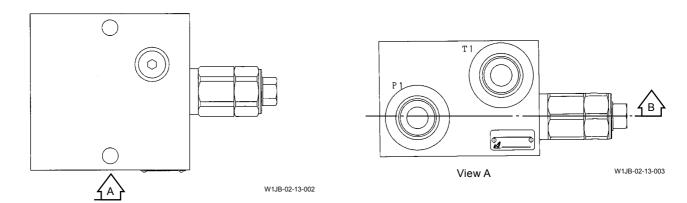
: 19 mm

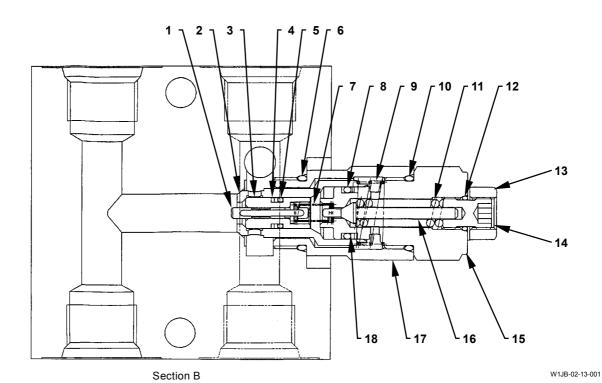
: 90 N·m (9 kgf·m, 66 lbf·ft)



W1J1-02-05-061

STRUCTURE OF FAN VALVE





Item	Part Name	Q'ty	Wrench Size (mm)	Item	Part Name	Q'ty	Wrench Size (mm)
1	Pin	2		10	O-Ring	1	
2	Poppet	2		11	Spring	1	
3	Poppet	1		12	O-Ring	1	
4	Backup Ring	2		13	Lock Nut	1	: 17
5	O-Ring	1		14	Screw	1	
6	O-Ring	1		15	Body	1	: 32
7	Spring	1		16	Poppet	1	
8	O-Ring	1		17	Adapter	1	: 32
9	Spring	1		18	Backup Ring	2	

REMOVE AND INSTALL FAN MOTOR



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

Removal

 Drain half of hydraulic oil through the oil filler on hydraulic oil tank by using a pump. Remove plug (4). Drain hydraulic oil in the hydraulic oil cooler (16 L, 4.2 US gal.) and drain pipe. After draining hydraulic oil, install plug (4).

: 19 mm

: 30 N·m (3 kgf·m, 22 lbf·ft)

2. Remove bolts (6) (6 used) and the washers (6 used). Remove cover (5) from the main frame.

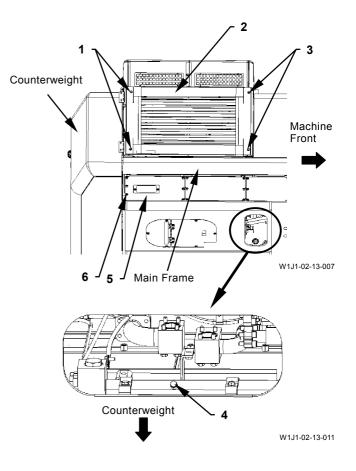
: 19 mm

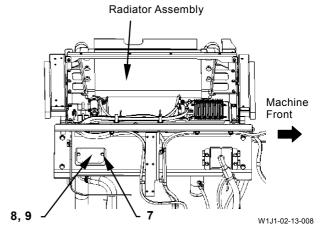
3. Remove bolts (7) (2 used). Remove cover (8) from the radiator.

: 19 mm

- 4. Remove the radiator cap. Open valve (9) and drain coolant (15 L, 4.2 US gal.) from the radiator. After draining coolant, install the radiator cap and close valve (9).
- 5. Remove bolts (1, 3) (2 used for each) and the washers (4 used). Open and secure dust cover (2).

: 19 mm





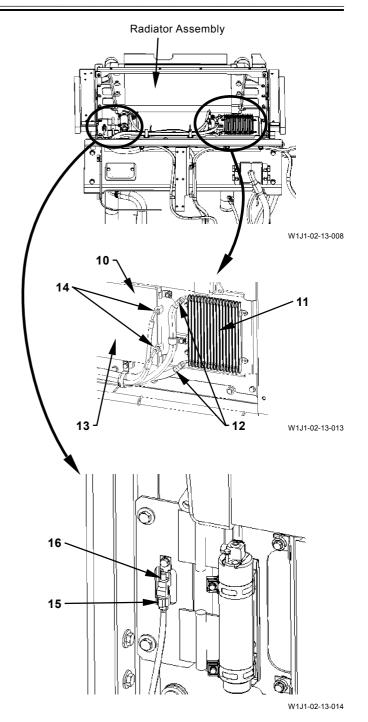
Valve (9) is located behind cover (8).

 Remove refrigerant in the air conditioner. Remove hoses (14) (2 used) from condenser (10). Cap the adapter in condenser and hose (14). As for the procedures to remove refrigerant, refer to the operator's manual.

: 19 mm

7. Remove the bands (2 used) from hoses (12) (2 used). Remove hoses (12) (2 used) from fuel cooler (11). Drain fuel in the hoses between engine and fuel cooler (11) and between fuel cooler (11) and fuel tank. Cap fuel cooler (11) and hose (12).

8. Remove connector (15) from fresh air temperature sensor (16).



IMPORTANT: Insert the protective material between engine cover (18) and muffler cover (17) in order not to damage the cover.

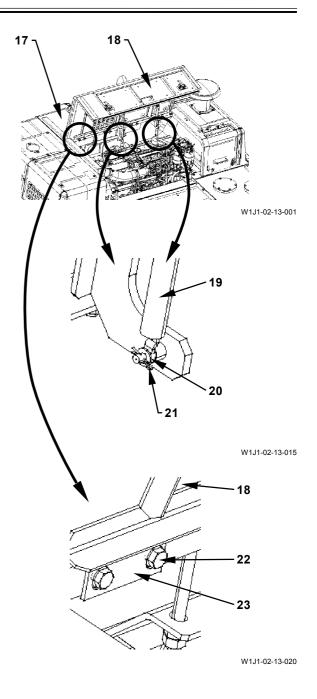
9. Open and hold engine cover (18). Remove lock pins (21) (2 used) and washers (20) (2 used) from stays (19) (2 used). Lay down engine cover (18) to the muffler cover (17) side.



CAUTION: Engine cover (18) weight: 32 kg (70 lb)

10. Remove bolts (22) (8 used) from hinges (23) (4 used). Remove engine cover (18) from the main frame.

: 17 mm



11. Remove bolts (28) (18 used). Remove radiator covers 1, 2 (24, 29) from the main frame.

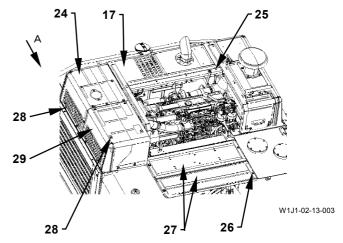
• 19 mm

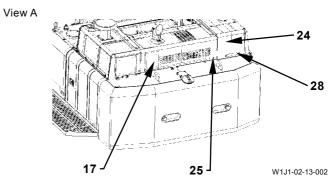
12. Remove bolts (25) (8 used). Remove muffler cover (17) from the main frame.

: 19 mm

13. Remove bolts (26) (4 used). Remove covers (27) (2 used) from the main frame.

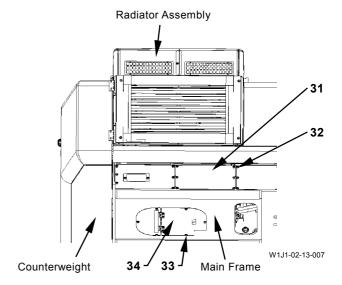
: 19 mm





14. Remove bolts (32, 33) (6 used for each). Remove covers (31, 34) from the main frame.

: 19 mm



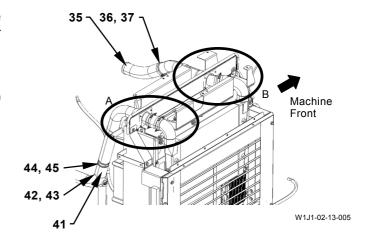
15. Loosen nuts (42, 44, 46) (2 used for each). Move bands (43, 45, 48) (2 used for each) to the center of hoses (41, 47).

→ : 11 mm

16. Remove bolts (49, 53). Remove clamps (50, 52) from pipe (51).

→ : 17 mm

17. Remove pipe (51) from hoses (41, 47).



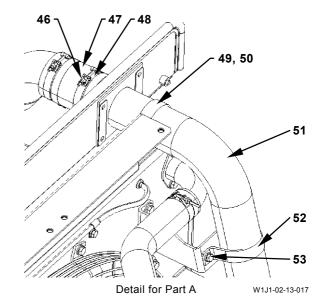
18. Loosen nuts (36, 54) (2 used for each). Move bands (37, 56) (2 used for each) to the center of hoses (35, 55).

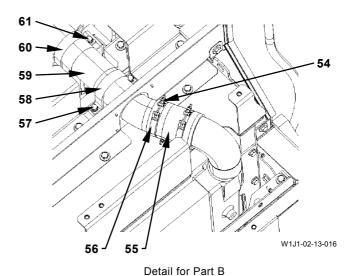
: 11 mm

19. Remove bolts (57, 61). Remove clamps (58, 60) from pipe (59).

→ : 17 mm

20. Remove pipe (59) from hoses (35, 55).



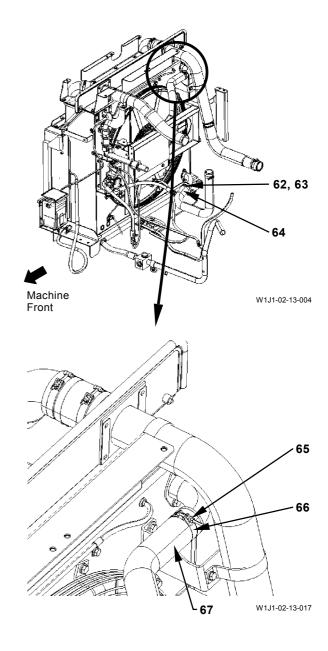


21. Loosen nuts (65) (2 used). Move bands (66) (2 used) to the center of hose (67). Remove hose (67) from the radiator.

→ : 11 mm

22. Loosen nuts (62) (2 used). Move bands (63) (2 used) to the center of hose (64). Remove hose (64) from the radiator.

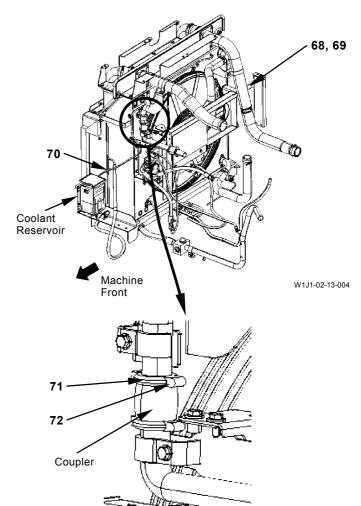
: 11 mm



23. Remove bolts (68) (4 used). Remove bracket (69) from the main frame.

: 19 mm

24. Remove hose (70) from the coolant reservoir.



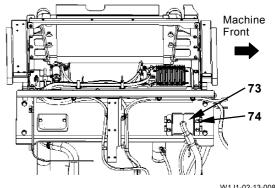
25. Remove bolt (72). Remove coupler holder (71) from the coupler.

→ : 11 mm

W1J1-02-13-018

26. Remove bolts (74) (4 used) from flange (73).

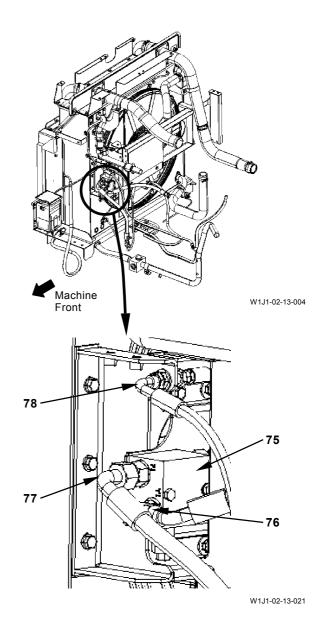




W1J1-02-13-008

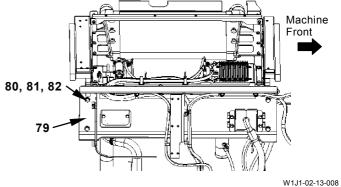
27. Remove hoses (76 to 78) from fan valve (75).

• : 27 mm, 36 mm



28. Remove bolts (80) (4 used), washers (81) (4 used) and nuts (82) (4 used).

: 30 mm



29. Close dust cover (2). Temporarily tighten dust cover (2) with bolts (3) (2 used) and the washers (2 used).

→ : 19 mm

NOTE: While hoisting radiator, do not open dust cover (2).



CAUTION: The radiator assembly weight: 570 kg (1260 lb)

- 30. Attach a wire rope onto the lifting hole on radiator assembly and hold the radiator assembly.
- 31. Hoist the radiator assembly and check if the hydraulic hose is removed. Place the radiator assembly onto the flat place. Cap the hydraulic oil cooler and hose.
- 32. Remove bolts (90) (6 used). Remove cover (89) from bracket (88).

: 19 mm

33. Remove bolts (86) (8 used) from fan guard (87).

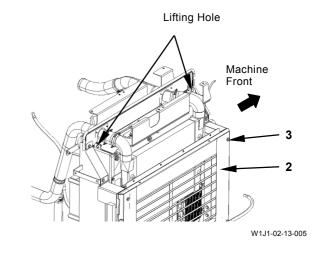
: 19 mm

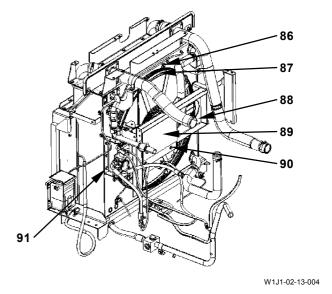


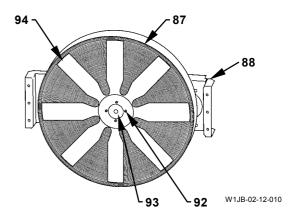
CAUTION: The bracket (88) assembly weight: 90 kg (200 lb)

34. Attach a nylon sling onto the hole on bracket (88) and hold bracket (88). Remove bolts (91) (6 used) from bracket (88). Hoist and remove the bracket (88) assembly from the radiator. Place the bracket (88) assembly onto the flat place with fan (94) facing upward.

→ : 19 mm







35. Remove socket bolts (92) (4 used). Remove fan (94) from coupling (93).

: 8 mm

36. Remove lock pin (95) and nut (96) from the shaft in fan motor (98).

24 mm

IMPORTANT: Key (97) is attached with the shaft in fan motor (98). Do not lose key (97).

37. Remove coupling (93) and fan guard (87) from the shaft in fan motor (98).

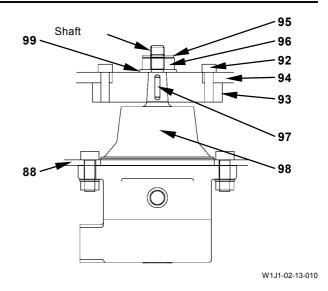
NOTE: When it is difficult to remove coupling (93), use special tool when removing the bearing.

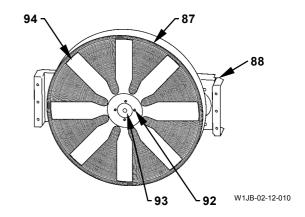


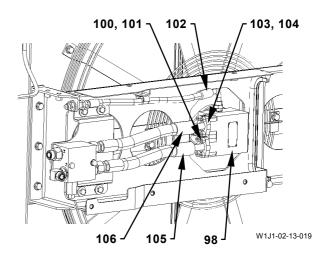
CAUTION: The bracket (88) assembly weight: 70 kg (155 lb)

- 38. Hoist and place the bracket (88) assembly with the shaft in fan motor (98) facing downward.
- 39. Remove socket bolts (101, 104) (8 used for each). Remove hoses (105, 106) from fan motor (98). Remove hose (102) from fan motor (98).

: 8 mm : 36 mm

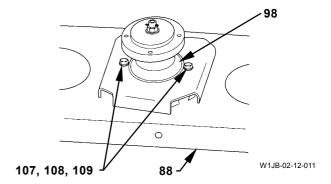






40. Remove bolts (107) (2 used), washers (108) (2 used) and nuts (109) (2 used). Remove fan motor (98) from bracket (88).

NOTE: Replace fan motor (98) with the assembly.



Installation



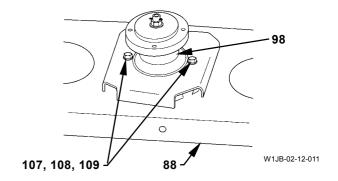
CAUTION: Bracket (88) weight: 41 kg (90 lb)

1. Attach a nylon sling onto the hole on bracket (88). Hoist and place bracket (88) with the mounting surface for fan motor (98) facing downward.

2. Install fan motor (98) to bracket (88) with bolts (107) (2 used), washers (108) (2 used) and nuts (109) (2 used).

• : 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)



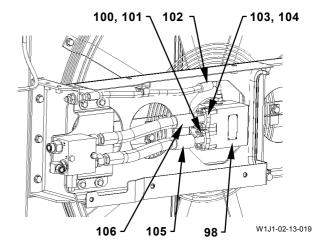
3. Install hoses (105, 106) to fan motor (98) with socket bolts (101, 104) (4 used for each). Install hose (102) to fan motor (98).

36 mm

: 175 N·m (18 kgf·m, 130 lbf·ft)

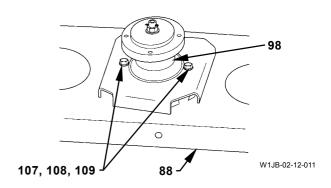
- : 8 mm

■ : 50 N·m (5 kgf·m, 37 lbf·ft)



CAUTION: The bracket (88)assembly weight: 70 kg (155 lb)

4. Hoist and place the bracket (88) assembly with the shaft in fan motor (98) facing upward.

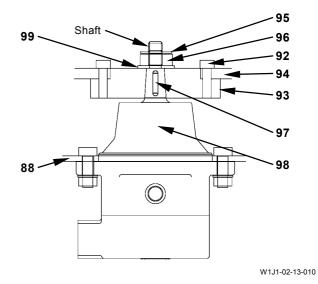


5. Apply LOCTITE #262 to nut (96). Install key (97), coupling (93), washer (99), nut (96) and lock pin (95) to the shaft in fan motor (98).

24 mm

6. Apply LOCTITE #262 to socket bolt (92). Install fan guard (87) between bracket (88) and coupling (93). Install fan (94) to coupling (93) with socket bolts (92) (4 used).

: 8 mm



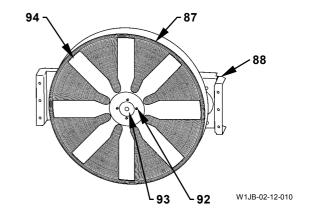
A

CAUTION: The bracket (88) assembly weight: 90 kg (200 lb)

7. Hoist and install bracket (88) to the radiator with bolts (91) (6 used).

: 19 mm

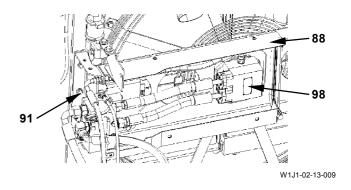
: 90 N·m (9.2 kgf·m, 66 lbf·ft)



8. Install cover (89) onto bracket (88) with bolts (90) (6 used).

→ : 19 mm

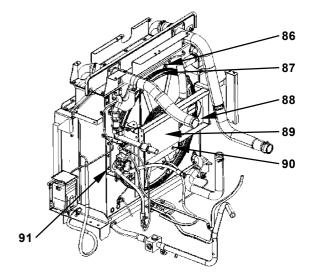
: 90 N·m (9.2 kgf·m, 66 lbf·ft)



9. Install fan guard (87) to the radiator with bolts (86) (8 used).

→ : 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)



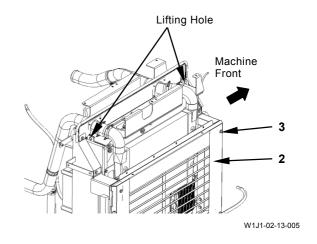
W1J1-02-13-004

A

CAUTION: The radiator assembly weight: 570 kg (1260 lb)

IMPORTANT: Before installing the radiator assembly to the main frame, check the connections in hydraulic oil cooler and hoses.

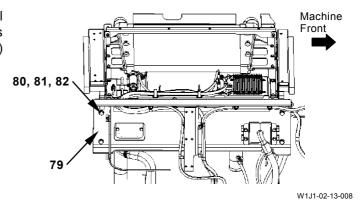
10. Temporarily tighten dust cover (2) with bolts (3) (2 used). Attach a wire rope to the lifting hole on the radiator assembly. Hoist and move the radiator assembly to the mounting position for radiator in the main frame.



11. Apply LOCTITE #262 to bolts (80) (4 used). Install the radiator assembly to bracket (79) with bolts (80) (4 used), washers (81) (4 used) and nuts (83) (4 used).

: 30 mm

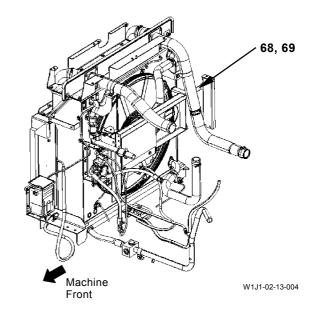
: 550 N·m (56 kgf·m, 405 lbf·ft)



12. Apply LOCTITE #262 to bolt (68). Install bracket (69) to the main frame with bolts (68) (4 used).

→ : 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)



13. Install hoses (76 to 78) to fan valve (75).

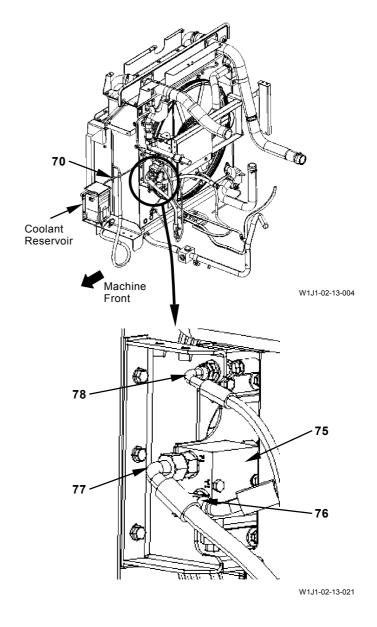
27 mm

: 137 N·m (14 kgf·m, 100 lbf·ft)

36 mm

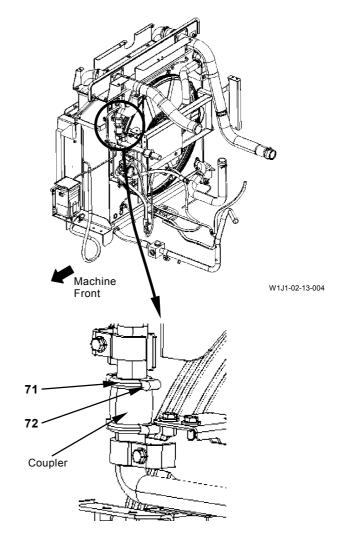
: 175 N·m (18 kgf·m, 130 lbf·ft)

14. Install hose (70) to the coolant reservoir.



15. Install coupler holder (71) with bolt (72).

: 11 mm

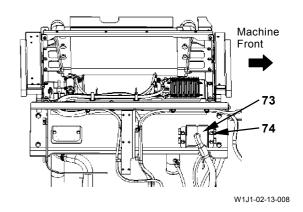


16. Install flange (73) with bolts (74) (4 used).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)



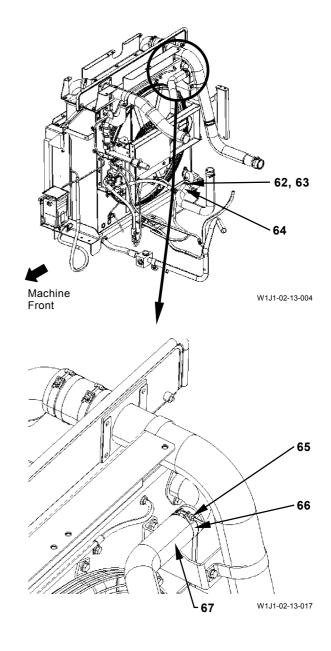


17. Install hose (67) to the radiator. Tighten bands (66) (2 used) with nuts (65) (2 used).

→ : 11 mm

18. Install hose (64) to the radiator. Tighten bands (63) (2 used) with nuts (62) (2 used).

: 11 mm



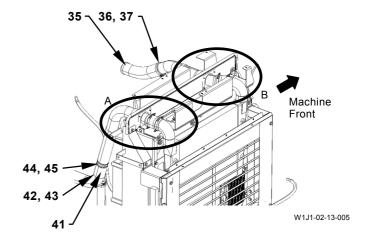
19. Install pipe (51) to hose (47). Install hose (41) to pipe (56). Tighten bands (43, 45, 48) (2 used for each) with nuts (42, 44, 46) (2 used for each).

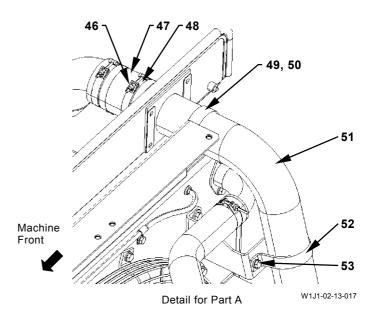
: 11 mm

20. Install clamps (50, 52) to pipe (51) with bolts (49, 53).

: 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)





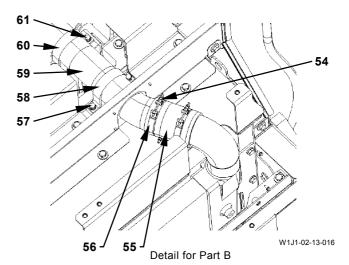
21. Install pipe (59) to hose (35). Install hose (55) to pipe (59). Tighten bands (37, 56) (2 used for each) with nuts (36, 54) (2 used for each).

5 : 11 mm

22. Install clamps (58, 60) to pipe (59) with bolts (57, 61).

: 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)



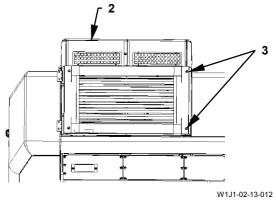
23. Remove bolts (3) (2 used). Open and secure dust cover (2) to the counterweight side.

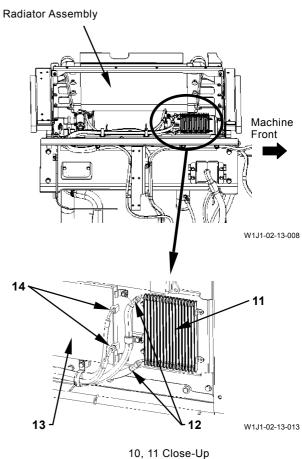
: 19 mm

- 24. Install hoses (12) (2 used) to fuel cooler (11). Secure hoses (12) (2 used) with the bands (2 used).
- 25. Install hoses (14) (2 used) to condenser (13).

→ : 19 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)



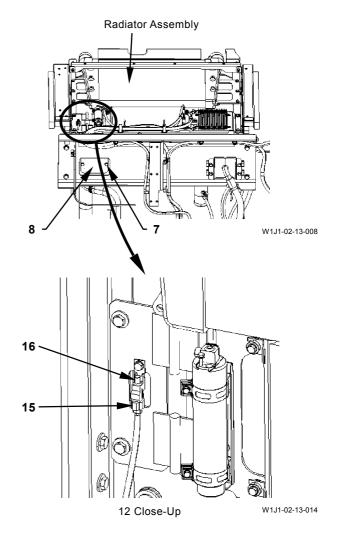


26. Install cover (8) to the radiator with bolts (7) (2 used).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

27. Install connector (15) to fresh air temperature sensor (16).



View A

28. Install covers (27) (2 used) to the main frame with the bolts (26) (4 used).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

29. Install radiator covers (24, 29) to the main frame with the bolts (28) (18 used).

→ : 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

30. Install muffler cover (17) to the main frame with bolts (25) (8 used).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

31. Install covers (5, 31, 34) to the main frame with bolts (6, 32, 33) (6 used for each) and the washers (24 used).

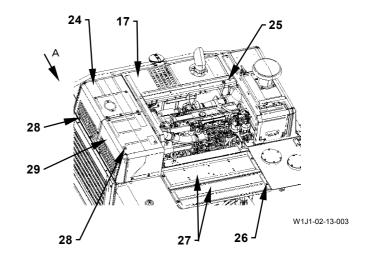
→ : 19 mm

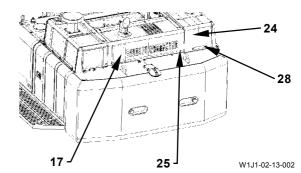
: 90 N·m (9.2 kgf·m, 66 lbf·ft)

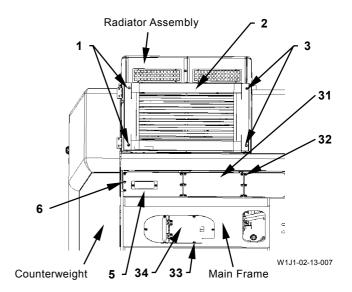
32. Shut dust cover (2). Install dust cover (2) with bolts (1, 3) (2 used for each) and the washers (4 used).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)





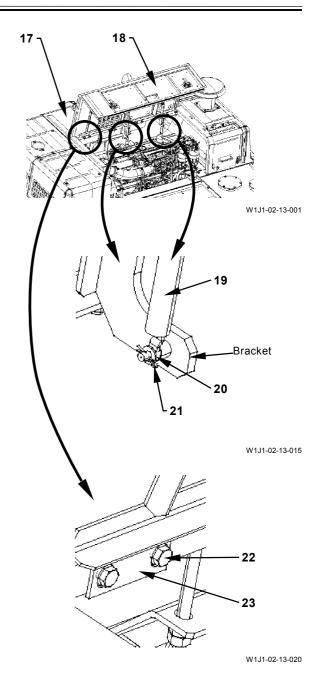


33. Place engine cover (18) onto muffler cover (17). Install engine cover (18) to the main frame with hinges (23) (4 used) and bolts (22) (8 used).

→ : 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

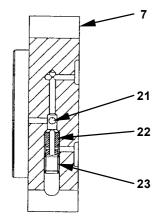
34. Insert the end of stays (19) (2 used) in engine cover (18) into the bracket and install with washers (20) (2 used) and lock pin (21).



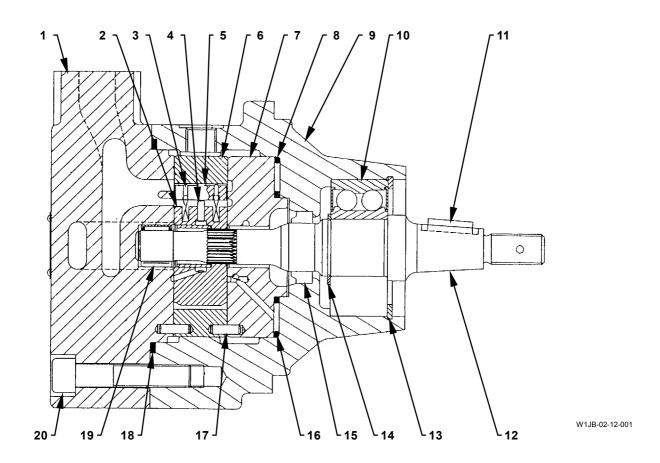
- 35. Add coolant into the radiator.
- 36. Add refrigerant in the air conditioner.
- NOTE: As for type and amount of refrigerant, refer to the operator's manual.
- 37. Add hydraulic oil into the hydraulic oil tank. Release any pressure in the main pump and fan pump.
- 38. Start the engine. Keep the engine idling for several minutes in order to circulate the coolant and hydraulic oil.
- 39. Stop the engine. Check coolant in coolant reservoir. Add coolant to the specification.
- 40. Check hydraulic oil in the hydraulic oil tank. If hydraulic oil is lack, release any pressure and add hydraulic oil.

UPPERSTRUCTURE / Fan Motor

STRUCTURE OF FAN MOTOR



W1JB-02-12-002



- 1 End Cap
- 2 Rotor Insert Assembly
- 3 Vane Spring (24 Used)
- 4 Mount (12 Used)
- 5 Vane (12 Used)
- 6 Cam Ring
- 7 Pressure Port Plate
- 8 O-Ring
- 9 Housing
- 10 Ball Bearing
- 11 Key
- 12 Shaft

- 13 Retaining Ring
- 14 Retaining Ring
- 15 Seal
- 16 Seal
- 17 Pin (2 Used)
- 18 Seal

- 19 Needle Bearing
- 20 Socket Bolt (4 Used)
- 21 Ball 22 Valve
- 23 Screw

NOTE: Tightening Torque

20- Socket bolt 100 N·m (10 kgf·m, 75 lbf·ft)

23- Screw 11.5 to 12.6 N·m (1.2 to 1.3 kgf·m, 8.5 to 9.3 lbf·ft)

UPPERSTRUCTURE / Fan Motor

(Blank)

REMOVE AND INSTALL ENGINE



CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4.)Remove the grounding wire from the battery.

Removal

1. Drain off coolant (max. 55 L (14.5 US gal)) from the radiator.

: 19 mm

2. Open engine cover (2). Remove lock pins (5) (2 used) and washers (4) (2 used) from the stay and cylinder (3). Lay down engine cover (2) to the muffler cover (1) side.



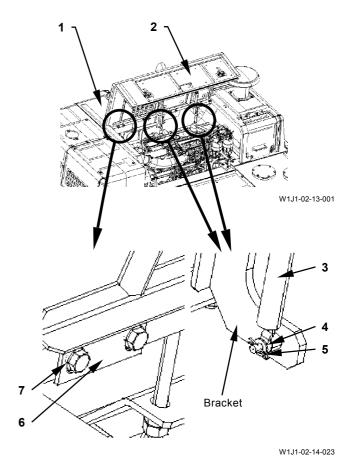
CAUTION: Engine cover (2) weight: 32 kg (71

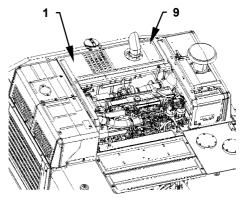
3. Remove bolts (7) (8 used) from hinges (6) (4 used). Attach a nylon sling to engine cover (2). Hoist and remove engine cover (2).

→ : 17 mm

4. Remove bolts (9) (8 used). Remove muffler cover

: 19 mm





W1J1-02-13-003

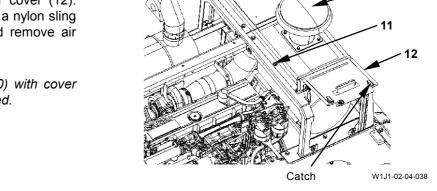


CAUTION: Air cleaner cover (10) weight: 32 kg (71 lb)

5. Unlock the catch. Open air cleaner cover (12). Remove bolts (11) (11 used). Attach a nylon sling to air cleaner cover (10). Hoist and remove air cleaner cover (10).

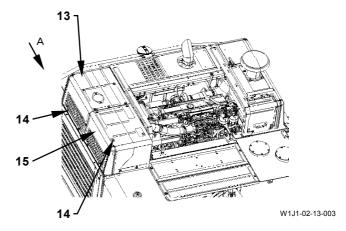
: 19 mm

NOTE: Remove air cleaner cover (10) with cover (12) and the rain cover attached.



6. Remove bolts (14) (18 used). Remove radiator covers (13, 15).

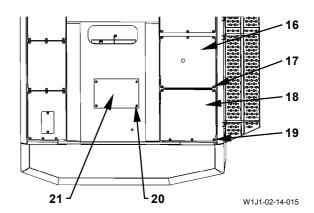
: 19 mm



Rain Cover

7. Remove bolts (17, 19) (5 used for each) and (20) (4 used). Remove under covers (16, 18, 21) from the main frame.

2 : 19 mm





CAUTION: Bracket (24) weight: 21 kg (46 lb)

8. Remove bolts (23) (4 used) from both ends of bracket (24). Attach a nylon sling to bracket (24). Hoist and remove bracket (24).

: 19 mm

9. Remove bolts (27) (2 used). Remove bracket (22).

: 19 mm

10. Remove bolts (26) (3 used). Remove bracket (25).

: 19 mm



CAUTION: Muffler (28) weight: 31 kg (68 lb)

11. Remove bolts (32) (4 used) and washers (33) (4 used) from exhaust pipe (31). Remove nuts (35) (8 used) and washers (34) (4 used) from U-bolts (30) (2 used). Remove U-bolts (30) (2 used) from muffler (28). Attach a nylon sling to muffler (28). Hoist and remove muffler (28).

: 17 mm, 19mm



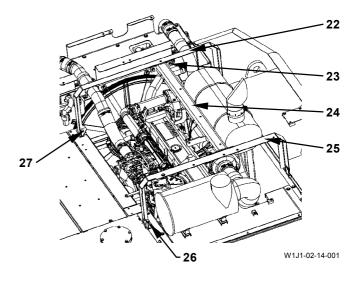
CAUTION: Bracket (27A) weight: 30 kg (66 lb)

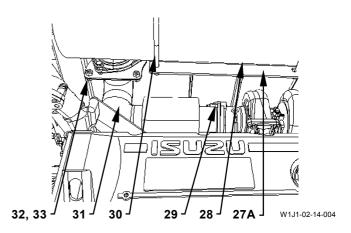
12. Attach a nylon sling to bracket (27A) and hold bracket (27A). Remove bolts (36) (4 used). Hoist and remove bracket (27A).

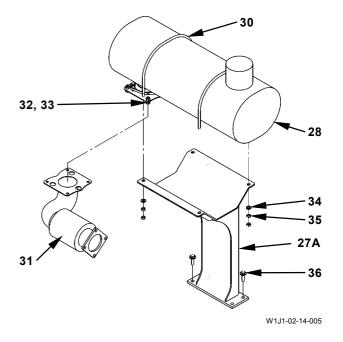
: 19 mm

13. Remove nuts (29) (8 used). Remove exhaust pipe (31) from the engine.

: 19 mm





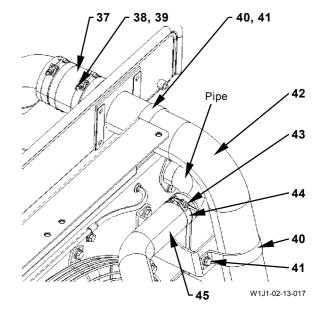


14. Loosen nuts (38) (2 used) in bands (39) (2 used). Remove bolts (41) (4 used) from clamps (40) (2 used). Remove pipe (42) from hose (37).

• : 11 mm, 17 mm

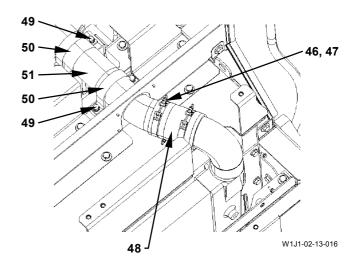
15. Loosen nuts (43) (2 used) in bands (44) (2 used). Remove hose (45) from the pipe in radiator.

→ : 11 mm

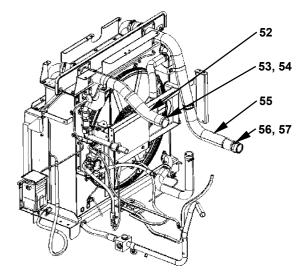


16. Loosen nuts (47) (2 used) in bands (46) (2 used). Remove bolts (49) (4 used) from clamps (50) (2 used). Remove pipe (51) from hose (48).

: 11 mm, 17 mm



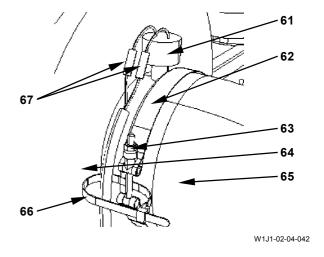
- 17. Loosen nuts (54) (2 used) in bands (53) (2 used). Remove hose (52) from the pipe in engine.
- 18. Loosen nuts (57) (2 used) in bands (56) (2 used). Remove hose (55) from the pipe in engine.



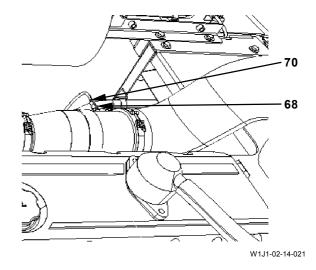
W1J1-02-13-004

19. Remove terminals (67) (2 used) from air cleaner restriction switch (61). Remove clip (66). Loosen nut (63) in band (62).

→ : 11 mm



20. Disconnect connector (70) from intake-air temperature sensor (68).

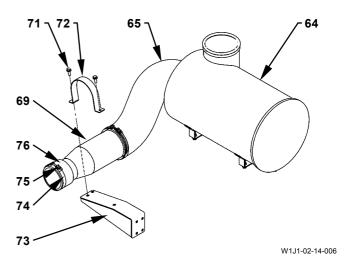


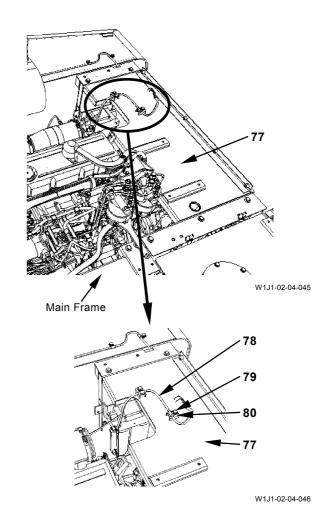
21. Remove bolts (71) (2 used). Remove clamp (72) from bracket (73).

→ : 17 mm

21. Loosen nut (75) in band (74). Remove the hose/pipe assembly (76, 69, 65) from the pipe in engine.

5 : 11 mm





23. Remove bolts (79) (2 used).

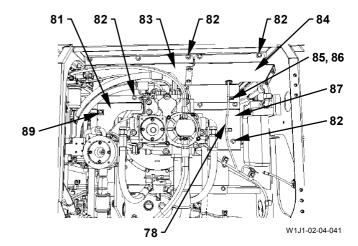
→ : 17 mm

24. Open and lock the pump cover. Remove bolts (85) (2 used). Pull out harness (78) to the pump space from cover (84).

: 17 mm

25. Remove bolts (82) (18 used) and (89). Remove covers (81, 83, 84, 87).

• : 17 mm, 19 mm





CAUTION: Air cleaner (64) weight: 30 kg (66

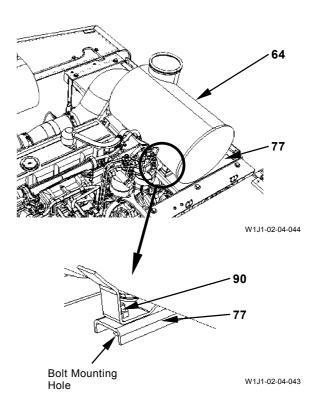
26. Remove bolts (90) (4 used). Attach a nylon sling onto air cleaner (64). Hoist and remove air cleaner (64).

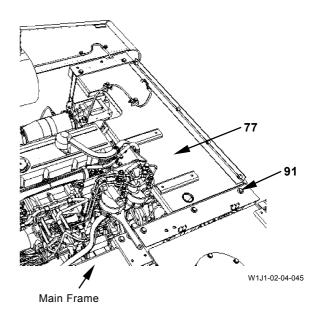
→ : 17 mm

NOTE: Remove bolts (90) (4 used) from the mounting hole on pump space.

27. Remove bolts (91) (4 used). Remove bracket

: 19 mm





28. Remove nut (93). Remove harness (92) from overheat switch (94).

→ : 6.6 mm

29. Disconnect connector (97). Attach a nylon sling to air compressor (99) and hold air compressor (99). Loosen bolt (96) fully. Remove bolts (100) (4 used). Remove air compressor (99) from the engine.

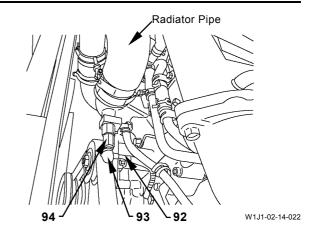
: 12 mm, 13 mm

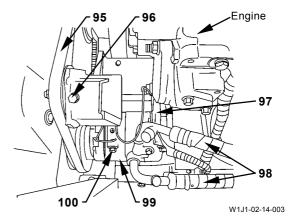
NOTE: Remove and install the engine with air compressor (99) hoisted inside the machine. Do not remove hose (98).

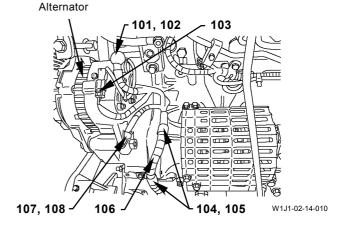
30. Remove terminal covers (101, 107). Remove nut (102) and screw (108) from the terminal in alternator. Disconnect connector (103). Remove bolts (104) (2 used) from clamps (105) (2 used) in harness (106). Remove harness (106).

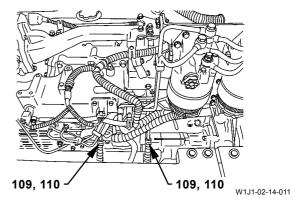
: 12 mm, 13 mm, 17 mm

31. Loosen bands (109) (2 used). Close the cock in fuel pipe. Remove fuel hoses (110) (2 used) from the pipe in engine. Cap the open ends of hose and pipe.





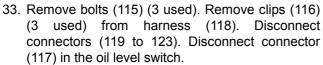




IMPORTANT: Before removing nut (111) from the terminal in starter motor (112), remove the grounding wire in battery. If the work is continued with the grounding wire connected, the circuit may be shorted.

32. Remove nuts (111) (2 used). Remove harness (114) from the terminal in starter motor (112). Remove nut (113). Remove the grounding wire from the bracket.

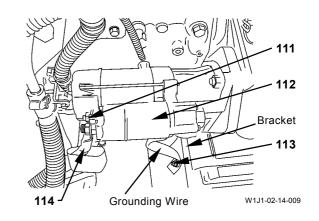
• : 17 mm, 22 mm

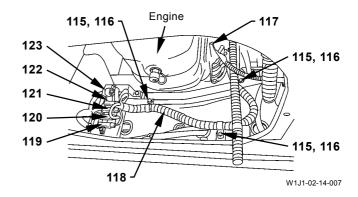


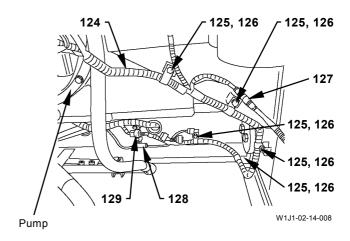
: 17 mm

34. Remove bolts (125) (5 used). Remove clips (126) (5 used) from harness (124). Disconnect connectors (127, 128, 129).

→ : 17 mm







35. Loosen nuts (130) (2 used) in bands (131) (2 used). Remove hose (132) from the pipe in engine.

: 11 mm

36. Remove hoses (133) (2 used) from the engine. Cap the open ends of hose and pump. Attach an identification tag to the hose.

: 41 mm

37. Remove socket bolts (140, 144) (4 used for each). Remove pipes (141, 145) from the pump device. Cap the open ends of hose and pump. Attach an identification tag to the hose.

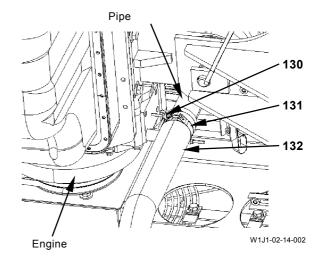
: 14 mm

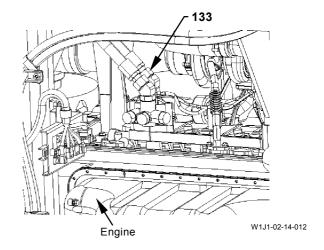
38. Remove socket bolts (136, 138, 146) (4 used for each). Remove hoses (137, 139, 147) from the pump device. Cap the open ends of hose and pump. Attach an identification tag to the hose.

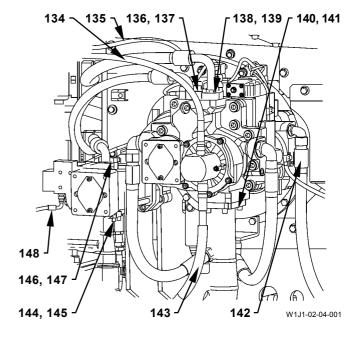
: 10 mm

39. Remove hoses (134, 135, 142, 143, 148) from the pump device. Cap the open ends of hose and pump. Attach an identification tag to the hose.

• 17 mm, 19 mm, 27 mm, 36 mm, 41 mm



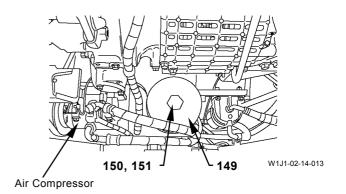


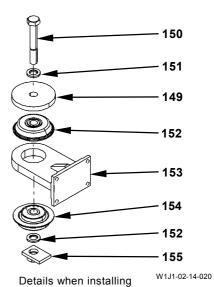


40. Remove bolts (150) (2 used), washers (151) (4 used), plates (149) (2 used), cushions (152) (2 used) and nuts (155) (2 used) from brackets (153) (2 used).

: 41 mm

NOTE: After removing the engine from the main frame, remove cushions (154) (2 used).

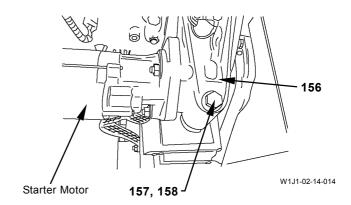




41. Remove bolts (157) (2 used) and washer (158) or the spacer from brackets (156) (2 used).

: 32 mm

NOTE: The spacer instead of washer (158) is installed to bolt (157) at the muffler side.



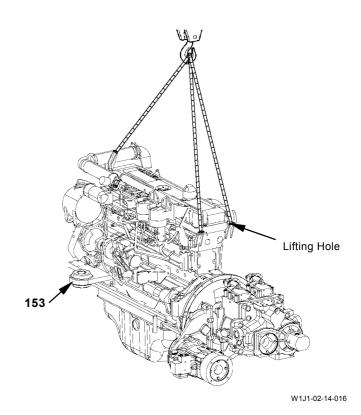


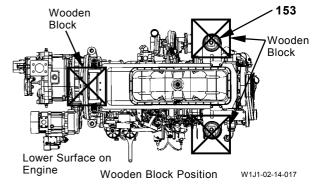
CAUTION: Engine/pump weight: 1630 kg (3590 lb)

42. Attach a wire rope to the lifting hole (3 places) on engine. Hoist and remove the engine.

IMPORTANT: Secure the wooden block in order to attach on the engine. Place the engine horizontally. Hold the engine in order not to fall down.

43. After placing the wooden blocks (300 mm×600 mm, 11.8 in×23.6 in) (2 used) under brackets (153) (2 used) at the engine radiator side and the wooden block (300 mm×300 mm, 11.8 in×11.8 in) under the pump device, place the engine.





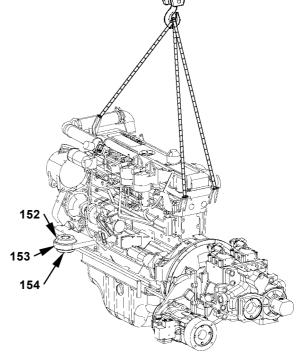
Installation

1. Install cushion (154) to the place for brackets (153) (2 used) in the main frame.



CAUTION: Engine/pump weight: 1630 kg (3590 lb)

2. Attach a wire rope to the lifting hole (3 places) on engine. Hoist and move the engine to the mounting position for engine in the main frame.

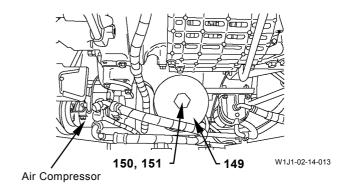


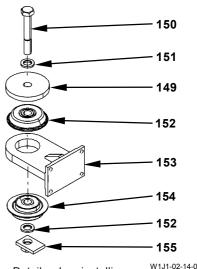
W1J1-02-14-016

3. Install brackets (153) (2 used) which are installed to the engine with bolts (150) (2 used), washers (151) (4 used), plates (149) (2 used), cushions (152) (2 used) and nuts (155) (2 used).

41 mm

: 1050 N·m (107 kgf·m, 774 lbf·ft)



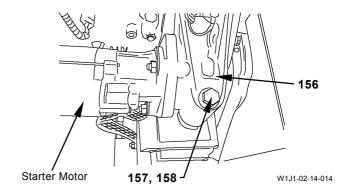


W1J1-02-14-020

4. Install brackets (156) (2 used) with bolts (157) (2 used), washer (158) or the spacer. Install the spacer instead of washer (158) to bracket (156) at the muffler side.

→ : 32 mm

- : 750N⋅m (77 kgf⋅m, 553 lbf⋅ft)



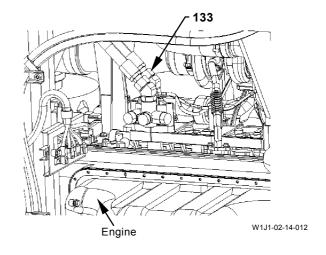
5. Install hoses (133) (2 used) to the engine.

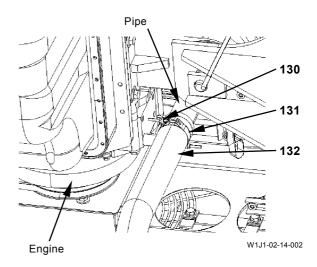
: 41 mm

: 300 N·m (31 kgf·m, 221 lbf·ft)

6. Tighten nuts (130) (2 used). Tighten hose (132) to the pipe in engine with bands (131) (2 used).

5 : 11 mm





7. Install bracket (77) with bolts (91) (4 used).

→ : 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)



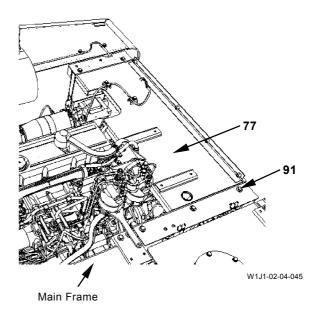
CAUTION: Air cleaner (64) weight: 30 kg (66 lb)

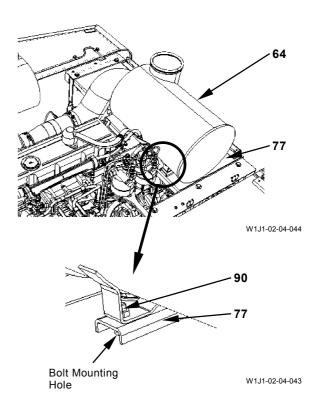
8. Attach a nylon sling onto air cleaner (64). Hoist and move air cleaner (64) to the mounting position on bracket (77). Apply LOCTITE #262 to bolts (90) (4 used). Install air cleaner (64) with bolts (90) (4 used).

→ : 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

NOTE: Install bolts (90) (4 used) to the bolt mounting hole on pump space.



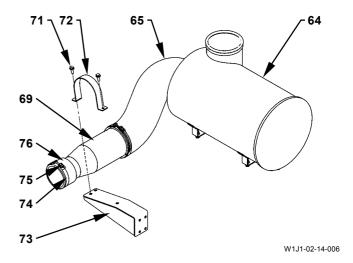


9. Install hose (76) to the pipe in engine. Tighten nut (75). Tighten hose (76) with band (74). Install pipe (69) to bracket (73) with clamp (72) and bolts (71) (2 used).

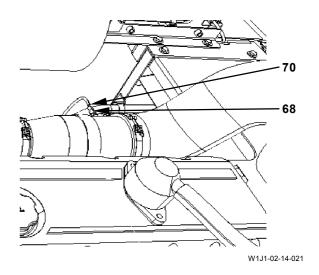
→ : 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

>−−€ : 11 mm



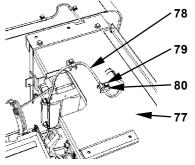
10. Install connector (70) to intake-air temperature sensor (68).



11. Pull in harness (78) through the pump space. Install clips (80) (2 used) in harness (78) to bracket (77) with bolts (79) (2 used).

→ : 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

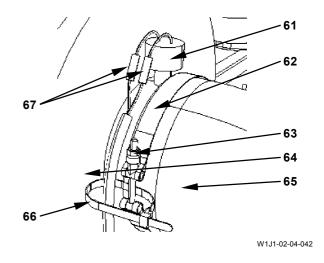


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12. Install hose (65) to the pipe in air cleaner (64). Tighten nut (63). Tighten hose (65) with band (62). Install clip (66).

→ : 11 mm

13. Connect terminals (67) (2 used) in air cleaner restriction switch (61).



14. Install covers (81, 83, 84, 87) with bolts (82) (18 used) and (89).

: 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

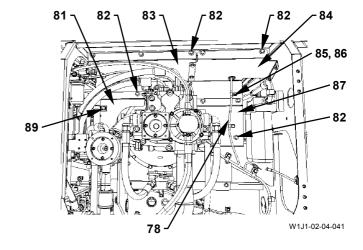
: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

15. Install clips (86) (2 used) in harness (78) with bolts (85) (2 used).

: 17 mm

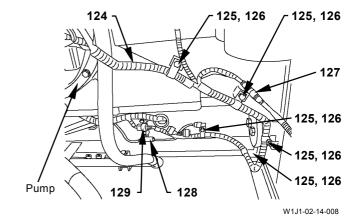
: 50 N·m (5.1 kgf·m, 37 lbf·ft)



16. Install clips (126) (5 used) in harness (124) with bolts (125) (5 used). Install connectors (127, 128, 129).

>− : 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)



17. Install pipes (141, 145) to the pump device with socket bolts (140, 144) (4 used for each). Install hoses (137, 139, 147) to the pump device with socket bolts (136, 138, 146) (4 used for each).

: 10 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

: 14 mm

: 210 N·m (21.5 kgf·m, 155 lbf·ft)

18. Install hoses (134, 135, 142, 143, 148) to the pump device.

: 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

: 19 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)

>→ : 27 mm

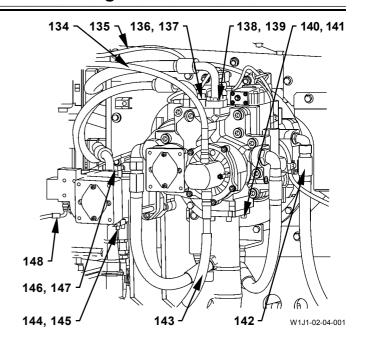
: 93 N·m (9.5 kgf·m, 69 lbf·ft)

→ : 36 mm

: 180 N·m (18 kgf·m, 133 lbf·ft)

• : 41 mm

: 210 N·m (21 kgf·m, 155 lbf·ft)

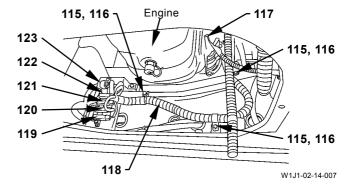


19. Install clips (116) (3 used) in the harness with bolts (115) (3 used). Install connectors (119 to 123).

5 : 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

20. Install connector (117) in the engine oil level switch.

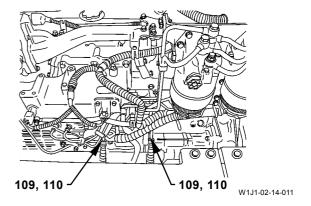


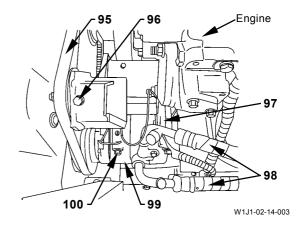
21. Install hoses (110) (2 used) to the fuel pipes (2 used) in engine. Tighten hoses (110) (2 used) with bands (109) (2 used) by using a screwdriver.

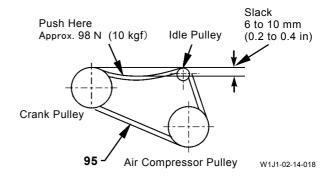
22. Install air compressor (99) to the engine with bolts (100) (4 used). Adjust a slack in belt (95) by using bolt (96).

: 13 mm

: 20 N·m (2 kgf·m, 15 lbf·ft)







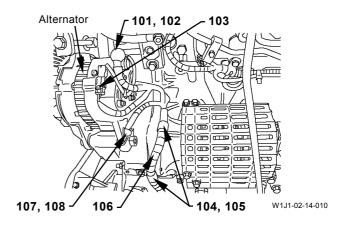
23. Install harness (106) to the terminals (2 used) in alternator with nut (102) and screw (108). Install terminal covers (101, 107). Install connector (103). Install clips (104) (2 used) in harness (106) with bolts (105) (2 used).

: 12 mm : 13 mm

: 20 N·m (2 kgf·m, 15 lbf·ft)

→ : 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)



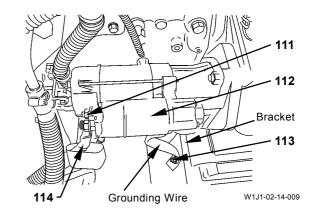
- IMPORTANT: Before installing harness (114) to the terminal in starter motor (112), remove the grounding wire in battery. If the work is continued with the grounding wire connected, the circuit may be shorted.
- 24. Install harness (114) to the terminals (2 used) in starter motor (112) with nuts (111) (2 used). Install the grounding wire to the bracket with nut (113). Connect the grounding wire in battery.

: 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

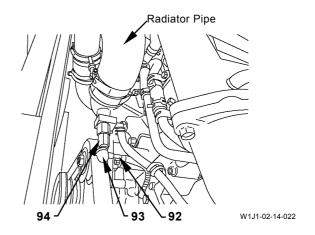
22 mm

: 140 N·m (14.3 kgf·m, 103 lbf·ft)



25. Install harness (92) to overheat switch (94) with nut (93).

→ : 6.6 mm



26. Install hose (55) to the pipe in engine. Tighten nuts (56) (2 used). Tighten hose (55) with bands (57) (2 used).

: 11mm

27. Install hose (52) to the pipe in engine. Tighten nuts (53) (2 used). Tighten hose (52) with bands (54) (2 used).

: 11mm

28. Install pipe (42) to hose (37). Tighten nuts (38) (2 used). Tighten hose (37) with bands (39) (2 used).

: 11mm

29. Secure pipe (42) with clamps (40) (2 used) and bolts (41) (4 used).

: 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

30. Install hose (45) to the pipe in radiator. Tighten nut (43). Tighten hose (45) with bands (44) (2 used).

→ : 11mm

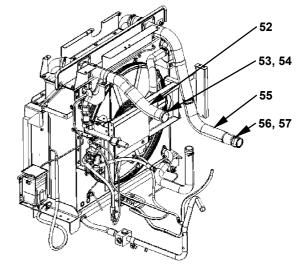
31. Install pipe (51) to hose (48). Tighten nuts (46) (2 used). Tighten hose (48) with bands (47) (2 used).

• : 11 mm

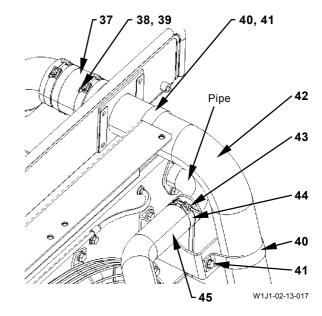
32. Install pipe (51) with clamps (50) (2 used) and bolts (49) (4 used).

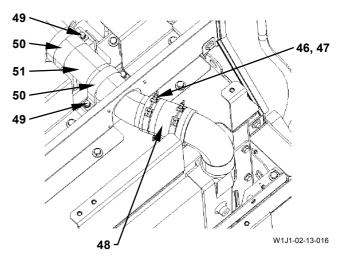
→ : 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)



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33. Install exhaust pipe (31) to the engine with nuts (29) (8 used).

→ : 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

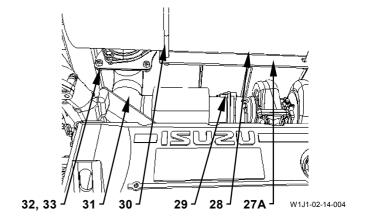


CAUTION: Bracket (27A) weight: 30 kg (66 lb)

34. Hoist and hold bracket (27A). Install bracket (27A) to the main frame with bolts (36) (4 used).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)





CAUTION: Muffler (28) weight: 30 kg (66 lb)

35. Hoist and place muffler (28) onto bracket (27). Install the pipe in muffler (28) to exhaust pipe (31) with bolts (32) (4 used) and washers (33) (4 used).

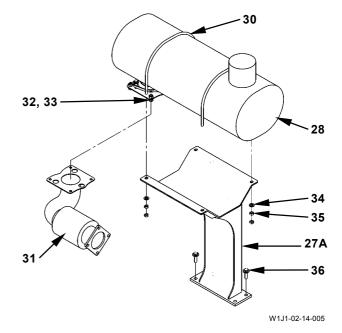
5 : 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

36. Install muffler (28) to bracket (27A) with U-bolts (30) (2 used), washers (34) (4 used) and nuts (35) (8 used).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)



37. Install bracket (22) with bolts (27) (2 used).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

38. Install bracket (25) with bolts (26) (3 used).

→ : 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

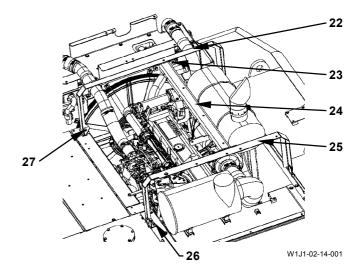
A

CAUTION: Bracket (24) weight: 21 kg (46 lb)

39. Hoist and hold bracket (24). Install bracket (24) to brackets (22, 25) with bolts (23) (4 used).

→ : 19 mm

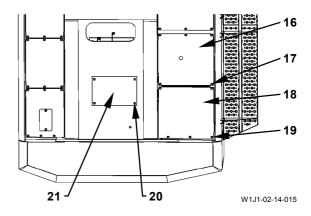
: 90 N·m (9.2 kgf·m, 66 lbf·ft)



40. Install covers (16, 18, 21) with bolts (17, 19) (5 used for each) and (20) (4 used).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)



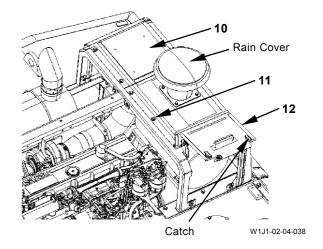


CAUTION: Air cleaner cover (10) weight: 32 kg (71 lb)

41. Hoist and move air cleaner cover (10) to the mounting position. Install air cleaner cover (10) with bolts (11) (11 used).

: 19 mm

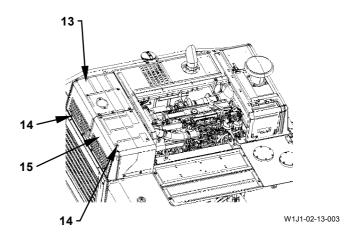
: 90 N·m (9.2 kgf·m, 66 lbf·ft)



42. Install radiator covers (13, 15) with bolts (14) (18 used).

: 19 mm

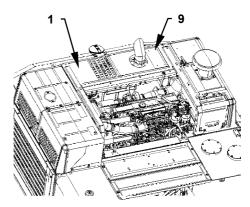
: 90 N·m (9.2 kgf·m, 66 lbf·ft)



43. Install muffler cover (1) with bolts (9) (8 used).

: 19 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)



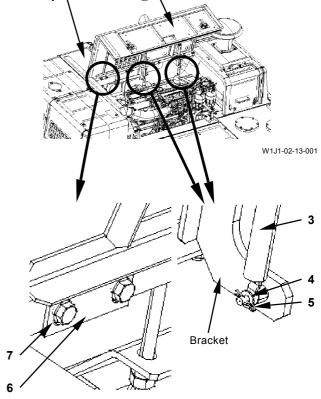
W1J1-02-13-003

44. Hoist and place engine cover (2) onto muffler cover (1). Install hinges (6) (4 used) in engine cover (2) with bolts (7) (8 used).

: 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

45. Insert the end of stay and cylinder (3) into the bracket and install with washers (4) (2 used) and lock pins (5) (2 used).



W1J1-02-14-023

- 46. Connect the grounding wire to the negative terminal in battery.
- 47. Add coolant (max. 55 L, 14.5 US gal.) into the radiator.
- 48. Open the cock in fuel pipe.

UPPERSTRUCTURE / Engine							
(Blank)							

MEMO

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SECTION 3 UNDERCARRIAGE



- CONTENTIS -

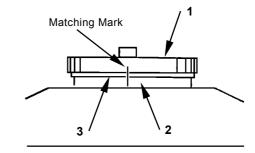
Group 1 Swing Bearing	Group 4 Track Adjuster
Remove and Install	Remove and Install Track AdjusterW3-4-7
Swing BearingW3-1-1	Disassemble Track AdjusterW3-4-2
Disassemble Swing BearingW3-1-4	Assemble Track AdjusterW3-4-10
Assemble Swing BearingW3-1-6	
	Group 5 Front Idler
Group 2 Travel Device	Remove and Install Front IdlerW3-5-7
Remove and Install Travel DeviceW3-2-1	Disassemble Front IdlerW3-5-4
Disassemble Travel DeviceW3-2-4	Assemble Front IdlerW3-5-10
Assemble Travel DeviceW3-2-18	Maintenance StandardW3-5-14
Disassemble Travel MotorW3-2-34	
Assemble Travel MotorW3-2-38	Group 6 Upper and Lower Roller
Disassemble Brake ValveW3-2-44	Remove and Install Upper RollerW3-6-7
Assemble Brake ValveW3-2-46	Remove and Install Lower RollerW3-6-4
Maintenance StandardW3-2-48	Disassemble Lower RollerW3-6-8
	Assemble Lower RollerW3-6-10
Group 3 Center Joint	Maintenance StandardW3-6-12
Remove and Install Center Joint W3-3-1	
Disassemble Center JointW3-3-4	Group 7 Track
Assemble Center JointW3-3-6	Remove and Install TrackW3-7-7
Maintenance Standard W3-3-11	Maintenance StandardW3-7-13

(Blank)			

REMOVE AND INSTALL SWING BEARING

Before removing and installing the swing bearing, the upperstructure must be removed first. For removal and installation of the upperstructure, refer to "Remove and Install Frame", "Remove and Install Front Attachment" and "Remove and Install Counterweight" sections.

In this section, the procedure starts on the premise that the upperstructure has already been removed.

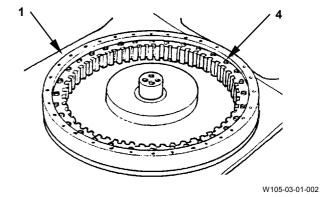


W142-03-01-001

Removal

- 1. Put the matching marks on inner race (3) of swing bearing (1) and track frame (2).
- 2. Remove all grease pipes from swing bearing (1). : 17 mm
- 3. Remove bolts (4) (40 used) from swing bearing (1).

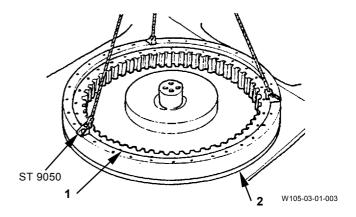
: 41 mm





CAUTION: Swing bearing (1) weight: 642 kg (1420 lb)

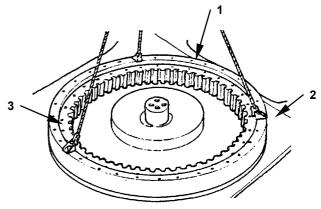
4. Install lifting tool (ST 9050) to swing bearing (1). Hoist and remove swing bearing (1) from track frame (2).



Installation

Clean the mounting surfaces of track frame (2) and swing bearing (1).

1. Apply THREEBOND #1102 to the mounting surface for swing bearing (1) on track frame (2).



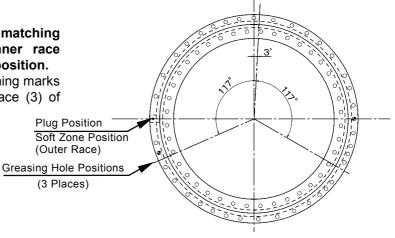
W105-03-01-003



CAUTION: Swing bearing (1) weight: 642 kg (1420 lb)

IMPORTANT: Check sure to align the matching marks. Otherwise, the inner race soft zone will be in wrong position.

2. Hoist swing bearing (1). Align the matching marks made when disassembling on inner race (3) of swing bearing (1) and track frame (2).



W1J1-03-01-002

3. Apply LOCTITE #262 to bolts (4) (40 used). Tighten swing bearing (1) to track frame (2) with bolts (4) (40 used).

: 41 mm

: 1375 N·m (140 kgf·m, 1015 lbf·ft)

4. Install all grease pipes to swing bearing (1).

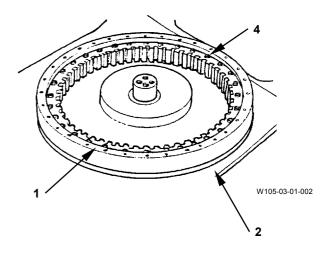
: 17 mm

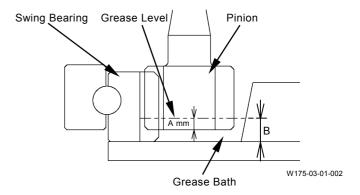
: 49 N·m (5 kgf·m, 36 lbf·ft)

5. After installing the swing bearing, fill the grease bath with grease until the pinion of swing bearing is covered clearance A or B in grease.

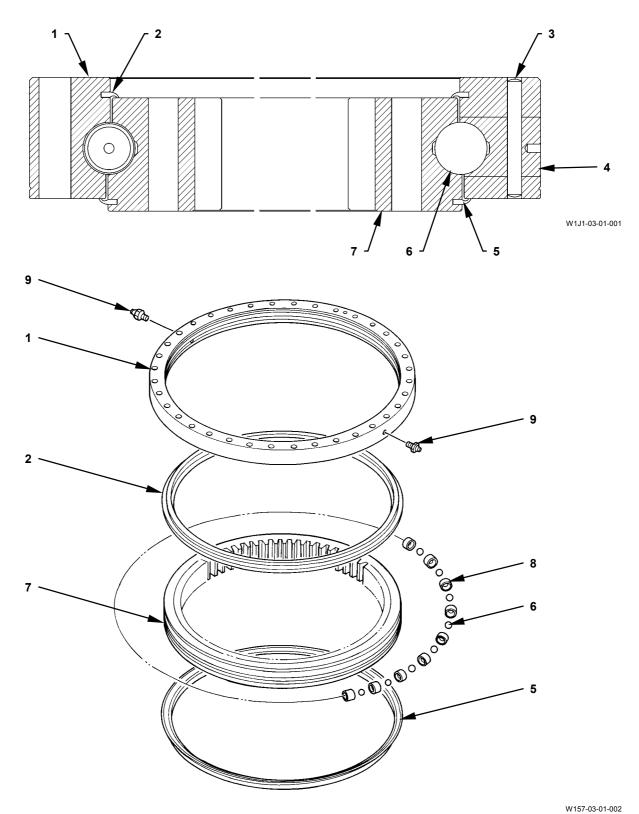
Grease amount: 18 L (4.76 US gal.)

Clearance A: 10 mm (0.4 in) Clearance B: 25 mm (1.0 in)





DISASSEMBLE SWING BEARING



1 - Outer Race

2 - Seal

3 - Pin

4 - Plug

5 - Seal

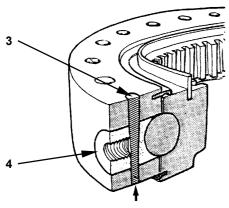
6 - Ball (86 Used) 7 - Inner Race

8 - Support (86 Used) 9 - Grease Fitting (3 Used)

Disassemble Swing Bearing

1. Remove pin (3) from the bottom side of plug (4).

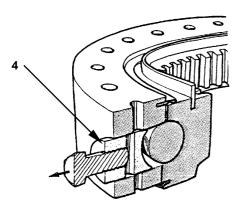
NOTE: As pin (3) head was crimped after installation, grind off the crimped part.



W105-03-01-007

2. Remove plug (4).

NOTE: Screw bolt (M10, Pitch 1.5 mm) in the threaded hole in plug (4). Tap the bolt head from the bottom side or pull the bolt in order to remove plug (4).



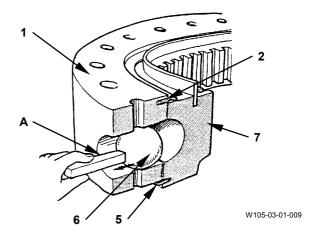
W105-03-01-008

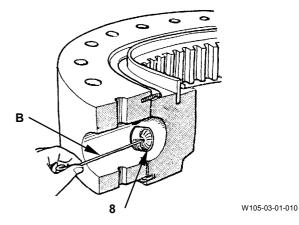
A

CAUTION: Swing bearing weight: 642 kg (1420 lb)

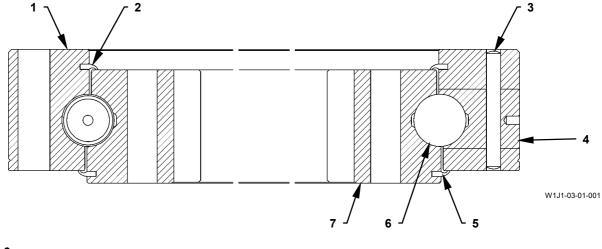
- 3. Hoist outer race (1) of the swing bearing horizontally and slightly. Remove seals (2 and 5) from outer race (1) and inner race (7).
- 4. Place inner race (7) of the swing bearing on the wooden blocks. Hoist outer race (1).
- 5. While rotating inner race (7), remove balls (6) (86 used) and supports (8) (86 used) from the plug hole

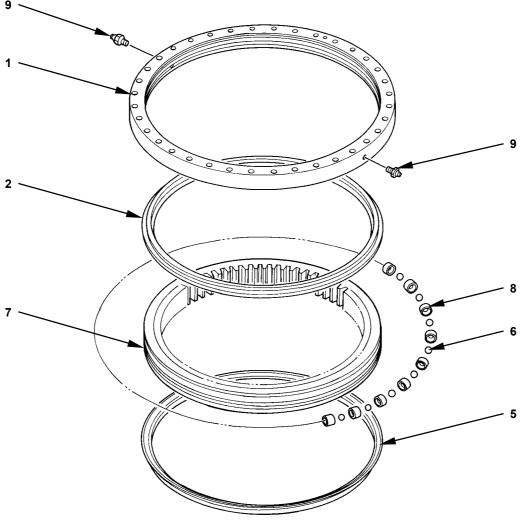
Use round-bar magnet (A) and remove the balls. Use tip-bent wire (B) and remove support (8).





ASSEMBLE SWING BEARING





W157-03-01-002

- 1 Outer Race
- 3 Pin
- 2 Seal
- 4 Plug
 - 5 Seal
- 6 Ball (86 Used)
- 7 Inner Race
- 8 Support (86 Used) 9 Grease Fitting (3 Used)

Assemble Swing Bearing

A

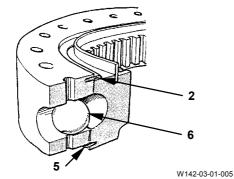
CAUTION: Swing bearing weight: 642 kg (1420 lb)

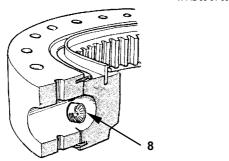
Outer race (1) weight: 289 kg (640 lb)

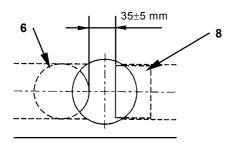
1. Align inner race (7) of the swing bearing with the ball groove on outer race (1).

IMPORTANT: Apply grease to balls (6) and support (8).

2. Install balls (6) (86 used) and support (8) (86 used) alternately from the plug hole. Install ball (6) first.



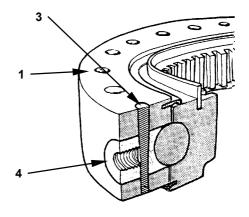




W142-03-01-004

W142-03-01-006

- 3. Clean the groove part for seals (2, 5) completely. Apply THREE BOND #1530D and install seal (2) to outer race (1). Install seal (5) to the groove part on inner race (7).
- 4. Install plug (4) into outer race (1). Secure plug (4) with pin (3). Crimp the head of pin (3) by using a punch.
- 5. Apply much grease to the swing bearing.



W142-03-01-007

NOTE: Dia. of support (8): 26 mm Dia. of support (9): 50.8 mm

W3-1-7

(Blank)

REMOVE AND INSTALL TRAVEL DEVICE

IMPORTANT: Release any pressure in the hydraulic oil tank before doing any

work.

(Refer to "BLEED AIR FROM HYDRAULIC OIL TANK" on W1-4-1.)

Removal

Before removing the travel device, the tracks must be removed first. For removal and installation of the tracks, refer to "Remove and Install Tracks" section on W3-7-1. In this section, the procedure starts on the premise that the track have already been removed.



CAUTION: Cover (4) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

32 kg (71 lb) ZAXIS500LC-3, 520LCH-3: 40 kg (88 lb)

1. Remove bolts (2) (6 used) and washer (3) (6 used) from cover (4). Remove cover (4) from track frame (1).

24 mm

2. Remove hoses (6, 7) from travel device (10). Attach an identification tag onto the removed hoses for reassembling. Cap the open ends.

• : 22 mm, 27 mm

 Remove split flanges (11) (4 used) and socket bolts (12) (8 used) from travel device (10). Remove hoses (5) (2 used) from travel device (10). Cap the open ends.

: 10 mm



CAUTION: Travel Device (10) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 671 kg (1479 lb)

ZAXIS500LC-3, 520LCH-3: 855 kg (1885 lb)

4. Attach a nylon sling to travel device (10). Hoist and hold travel device (10).

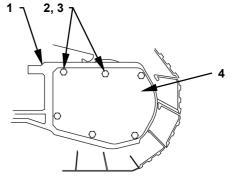
5. Put the matching marks on travel device (10) and track frame (1).

Remove bolts (8) and washers (9). Hoist and remove travel device (10) from track frame (1).

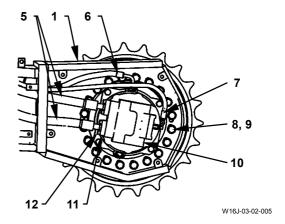
→ : 32 mm

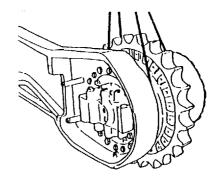
Bolts (8) and washers (9) ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 20 used

ZAXIS500LC-3, 520LCH-3: 24 used



W16J-03-02-006





W111-03-02-002

Installation



CAUTION: Travel device (10) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 671 kg (1480 lb)

ZAXIS500LC-3, 520LCH-3: 855 kg (1885 lb)

IMPORTANT: Align the matching marks made when disassembling. If the matching marks are not aligned, it is difficult to install hoses (6, 7).

1. Install travel device (10) to track frame (1) with bolts (8) and washers (9).

→ : 32 mm

: 750 N·m (76.5 kgf·m, 550 lbf·ft)

Bolts (8) and washers (9) ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 20 used ZAXIS500LC-3, 520LCH-3: 24 used

2. Install hoses (5) (2 used) to travel device (10) with split flanges (11) (4 used) and socket bolts (12) (8 used).

: 10 mm

: 90 N·m (9 kgf·m, 66 lbf·ft)

3. Install hoses (6, 7) to travel device (10).

22 mm

: 39 N·m (4 kgf·m, 29 lbf·ft)

27 mm

: 78 N·m (8 kgf·m, 58 lbf·ft)



CAUTION: Cover (4) weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

32 kg (71 lb)

ZAXIS500LC-3, 520LCH-3: 40 kg (88 lb)

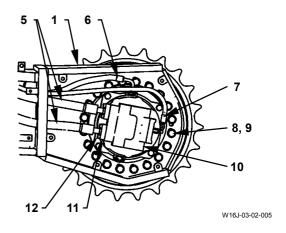
4. Install cover (4) to track frame (1) with bolts (2) (6 used) and washers (3) (6 used).

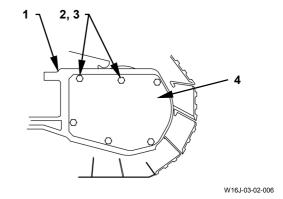
24 mm

: 210 N·m (21 kgf·m, 155 lbf·ft)

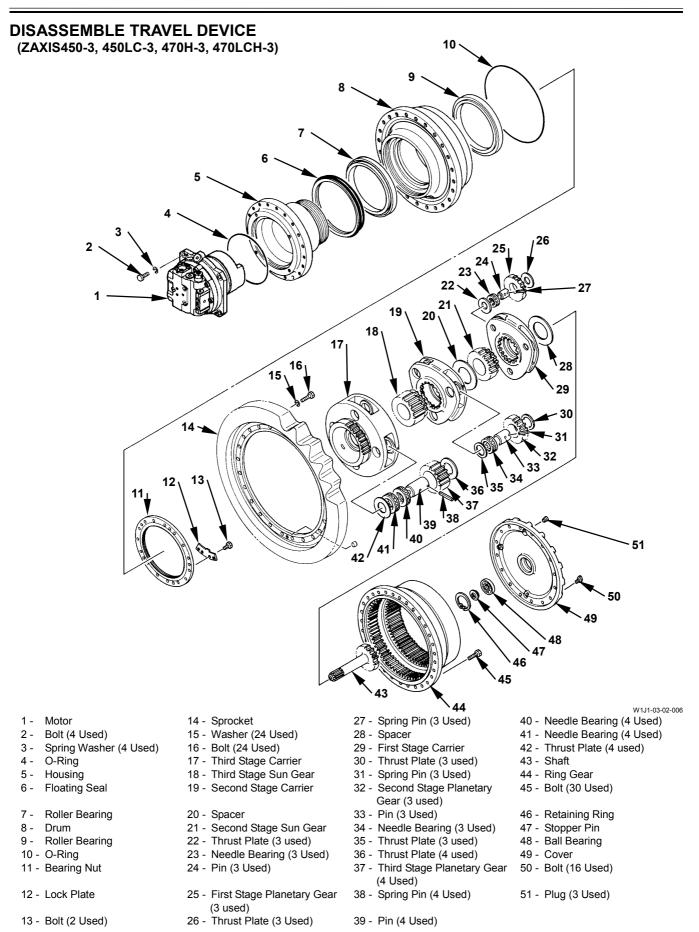
IMPORTANT: After completing the work, check the oil level. Start the engine and check for any oil leaks.

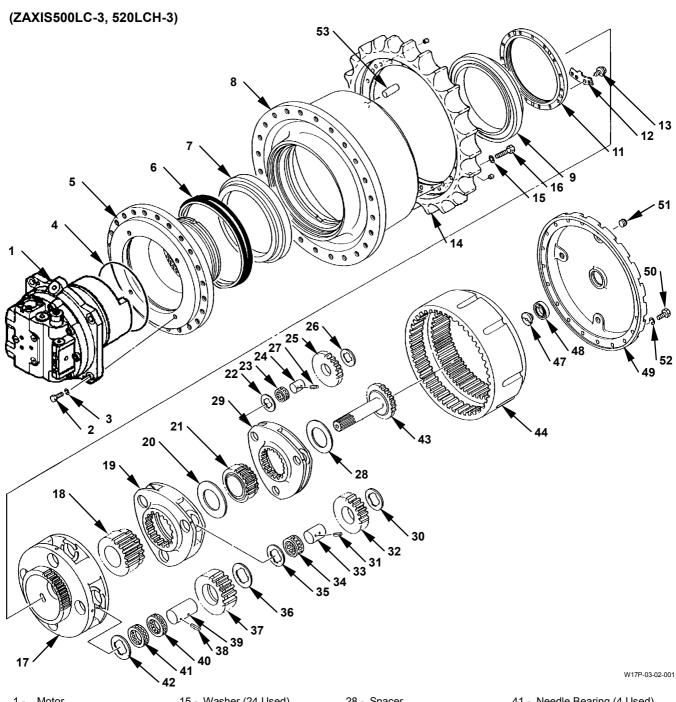
In order to prevent the travel motor from seizing, perform the break in operation after installation.





(Blank)





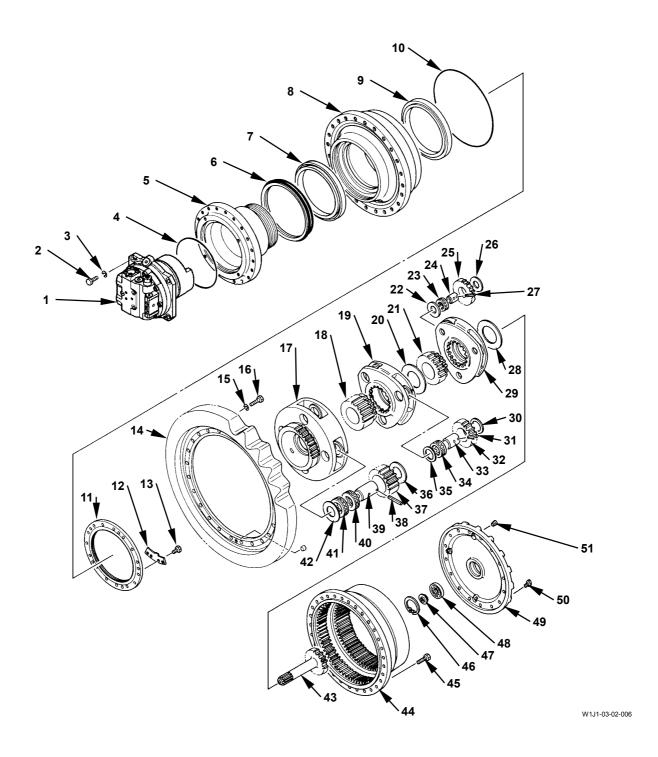
- 1 Motor
- Bolt (4 Used)
- Spring Washer (4 Used)
- O-Ring
- Housing
- Floating Seal
- Roller Bearing
- 8 Drum
- Roller Bearing
- 11 Bearing Nut
- 12 Lock Plate
- 13 Bolt (2 Used)
- 14 Sprocket

- 15 Washer (24 Used)
- 16 Bolt (24 Used)
- 17 Third Stage Carrier
- 18 Third Stage Sun Gear
- 19 Second Stage Carrier
- 20 Spacer
- 21 Second Stage Sun Gear
- 22 Thrust Plate (3 used)
- 23 Needle Bearing (3 Used)
- 24 Pin (3 Used)
- 25 First Stage Planetary Gear (3 used)
- 26 Thrust Plate (3 Used)
- 27 Spring Pin (3 Used)

- 28 Spacer
- 29 First Stage Carrier
- 30 Thrust Plate (3 used)
- 31 Spring Pin (3 Used)
- 32 Second Stage Planetary Gear (3 used)
- 33 Pin (3 Used)
- 34 Needle Bearing (3 Used)
- 35 Thrust Plate (3 used) 36 - Thrust Plate (4 used)
- 37 Third Stage Planetary Gear (4 Used)
- 38 Spring Pin (4 Used)
- 39 Pin (4 Used)
- 40 Needle Bearing (4 Used)

- 41 Needle Bearing (4 Used)
- 42 Thrust Plate (4 used)
- 43 Shaft
- 44 Ring Gear
- 47 Stopper Pin
- 48 Ball Bearing
- 49 Cover
- 50 Bolt (20 Used)
- 51 Plug (3 Used)
- 52 Spring Washer (20 Used)
- 53 Knock Pin (8 Used)

(ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3)



Disassemble Travel Device

The disassembling procedures of travel device for ZAXIS450-3, 450LC-3, 470H-3 and 470LCH-3 are same to ZAXIS500LC-3 and 520LCH-3 except ring gear (44).

This is explained according to the illustration of ZAXIS450-3, 450LC-3, 470H-3 and 470LCH-3.



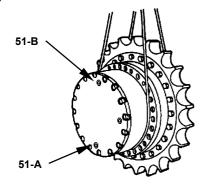
CAUTION: There may be pressure accumulated inside of the travel device. Slowly loosen the air bleed plug and completely release the residual pressure. Remove the drain plug and drain gear oil. If the air bleed plug is loosened quickly, the plug may fly off and/or gear oil may spurt. Keep away from the plug.



CAUTION: Travel device weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 671 kg (1479 lb) ZAXIS500LC-3, 520LCH-3: 855 kg (1885 lb)

 Hoist and hold the travel device. Loosen plug (51-B) 2 to 3 turns. Remove plug (51-A). Drain gear oil from the travel device. Place the travel device on a workbench with the motor (1) side facing upward.





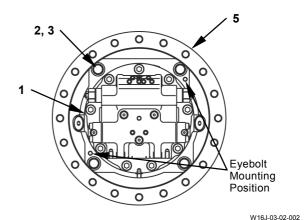
W111-03-02-006



CAUTION: Motor (1) weight: 130 kg (290 lb)

Put the matching marks on the mating positions of motor (1) and housing (5).
 Install eyebolts (M12, Pitch 1.75 mm) (2 used) to motor (1). Attach a nylon sling to eyebolt. Hoist and hold motor (1). Remove bolts (2) (4 used) and spring washers (3) (4 used) from motor (1). Remove motor (1) from housing (5).

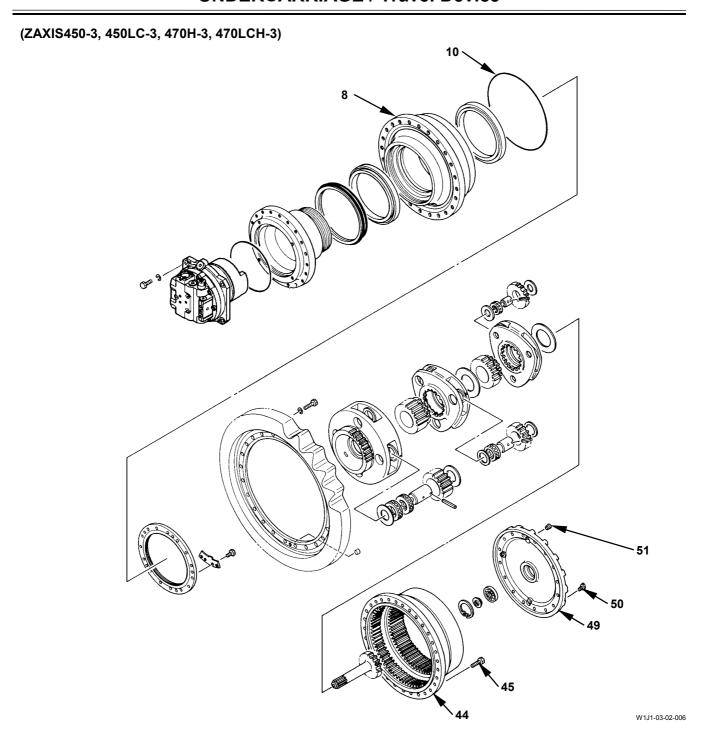
→ : 27 mm



A

CAUTION: Travel reduction gear weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 540 kg (1190 lb) ZAXIS500LC-3, 520LCH-3: 720 kg (1587 lb)

3. Wind a nylon sling to the body of drum (8) and ring gear (44). Hoist and place the travel device on the workbench with the cover (49) side facing upward.



Procedure to Remove Ring Gear (44) ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3



CAUTION: Cover (49) weight: 22 kg (50 lb)

4. Put the matching marks on the mating positions of cover (49) and ring gear (44).

Install eyebolt (PT 3/4) into the plug (51) hole (2 places).

Remove bolts (50) (16 used) from cover (49). Hoist and remove cover (49) from ring gear (44).



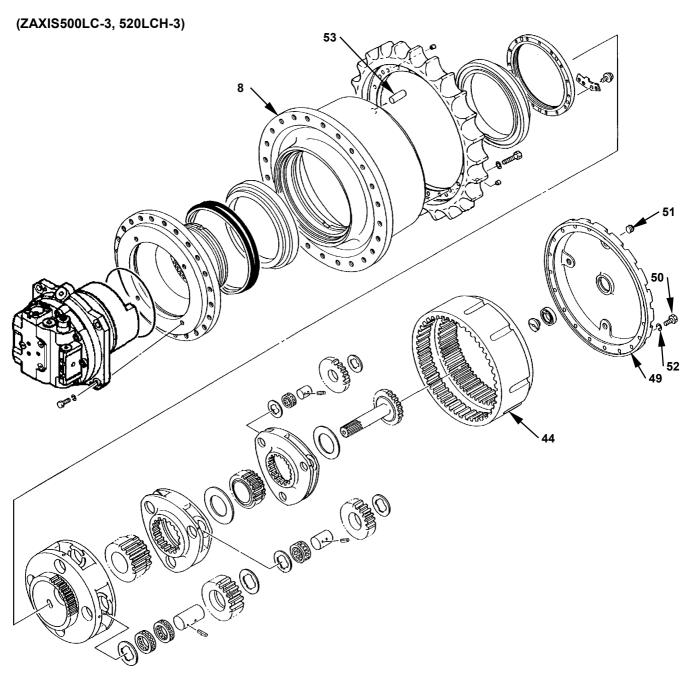
NOTE: THREEBOND has been applied to the mating surfaces of ring gear (44) and cover (49). Insert a screwdriver between ring gear (44) and cover (49). Raise cover (49) for easier removal.



CAUTION: Ring gear (44) weight: 70 kg (154 lb)

- 5. Put the matching marks on the mating positions of ring gear (44) and drum (8). Install eyebolt (M14, Pitch 2.0 mm) into the bolt (50) hole (2 places) on ring gear (44). Attach a nylon sling to eyebolt. Hoist and hold ring gear (44).
- 6. Remove bolts (45) (30 used) from ring gear (44). Remove ring gear (44) from drum (8). Remove O-ring (10) from drum (8).

27 mm



W17P-03-02-001

Procedure to Remove Ring Gear (44) ZAXIS500-3LC-3, 520LCH-3



CAUTION: Cover (49) weight: 40 kg (88 lb)

7. Put the matching marks on the mating positions of cover (49) and drum (8).

Install eyebolt (M10, Pitch 1.5 mm) into the plug (51) hole (2 places).

Remove bolts (50) and spring washers (52) (2 used for each from cover (49). Hoist and remove cover (49) from drum (8).

: 22 mm

NOTE: THREEBOND has been applied to the mating surfaces of drum (8) and cover (49). Insert a screwdriver between drum (8) and cover (49). Raise cover (49) for easier removal.



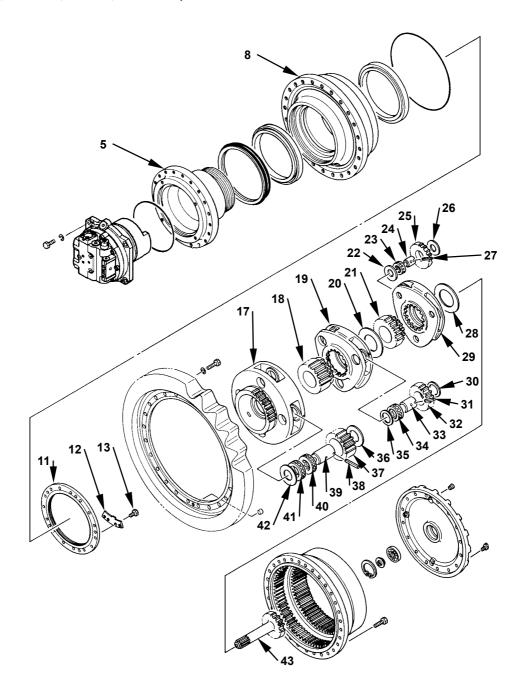
CAUTION: Ring gear (44) weight: 75 kg (165 lb)

8. Put the matching marks on the mating positions of ring gear (44) and drum (8).

Install eyebolt (M10, Pitch 1.5 mm) into the bolt (50) hole (2 places) on ring gear (44).

Attach a nylon sling to eyebolt. Hoist and hold ring gear (44). Remove ring gear (44) and knock pins (53) (8 used) from drum (8).

(ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3)



W1J1-03-02-006

Remove shaft (43) from first stage carrier (29).
 Remove first stage carrier assemblies (22 to 29) and second stage sun gear (21) from second stage carrier (19).



CAUTION: The second stage carrier (19) assembly weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

25 kg (55 lb)

ZAXIS500LC-3, 520LCH-3: 30 kg (66 lb)

10. Wind the nylon slings (2 used) onto second stage carrier (19). Hoist and remove second stage carrier assemblies (19, 20, 30 to 35) and third stage sun gear (18).



CAUTION: The third stage carrier (17) assembly weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

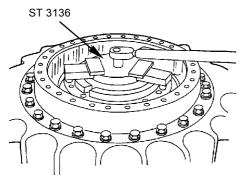
70 kg (154 lb)

ZAXIS500LC-3, 520LCH-3: 85 kg (187 lb)

- 11. Wind the nylon slings (2 used) onto third stage carrier (17). Hoist and remove third stage carrier (17) assemblies (17, 36 to 42) from drum (8).
- 12. Remove bolts (13) (2 used) from lock plate (12). Remove lock plate (12) from bearing nut (11).

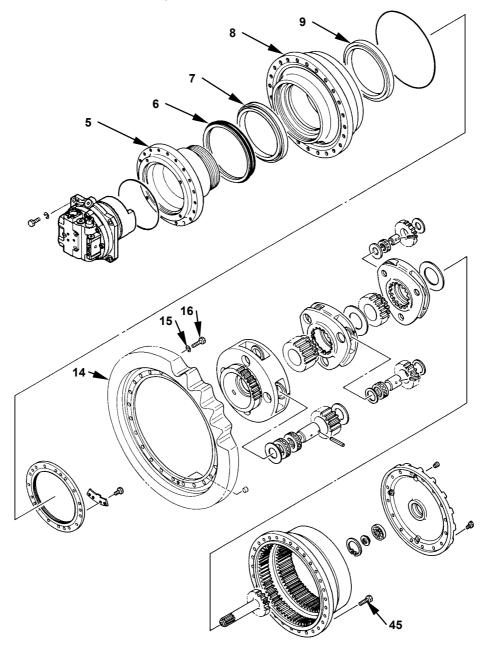
: 19 mm

13. Install special tool (ST 3136) to bearing nut (11). Remove bearing nut (11) from housing (5).



W1JB-03-02-003

(ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3)



W1J1-03-02-006

A

CAUTION: Drum (8), sprocket (14) and other parts weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

180 kg (400 lb)

ZAXIS500LC-3, 520LCH-3: 855 kg (1885 lb)

IMPORTANT: The mating parts of drum (8) and housing (5) are sliding surface. Place the drum (8) assembly on the wooden blocks in order not to damage the sliding surface.

14. Put the matching marks on the mating positions of drum (8) and housing (5).

Install eyebolt (A) into the bolt (45) hole (2 places) on drum (8). Attach a nylon sling to eyebolt. Hoist and hold drum (8).

Eyebolt (A)
ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:
M18, Pitch 2.5 mm
ZAXIS500LC-3, 520LCH-3: M14, Pitch 2.0 mm

- 15. Remove the drum (8) assembly from housing (5). At this time, the inner race of roller bearing (9) is also removed together.
- 16. Remove floating seals (6) from housing (5) and drum (8).

IMPORTANT: Do not remove the inner race of roller bearing (7) from housing (5) unless necessary. In case the inner race of roller bearing (7) has been removed, replace with a new one.

17. Remove the inner race of roller bearing (7) from housing (5) by using a bar and hammer.

NOTE: If the inner race of roller bearing (7) cannot be removed, cut the inner race by using a gas torch. At this time, do not damage housing (5). A

CAUTION: Sprocket (14) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 85 kg (187 lb) ZAXIS500LC-3, 520LCH-3: 115 kg (254 lb)

- Put the matching marks on the mating positions of sprocket (14) and drum (8).
 Attach a nylon sling to sprocket (14). Hoist and hold sprocket (14).
- 19. Remove bolts (16) (24 used) and washers (15) (24 used) from sprocket (14). Remove sprocket (14) from drum (8).

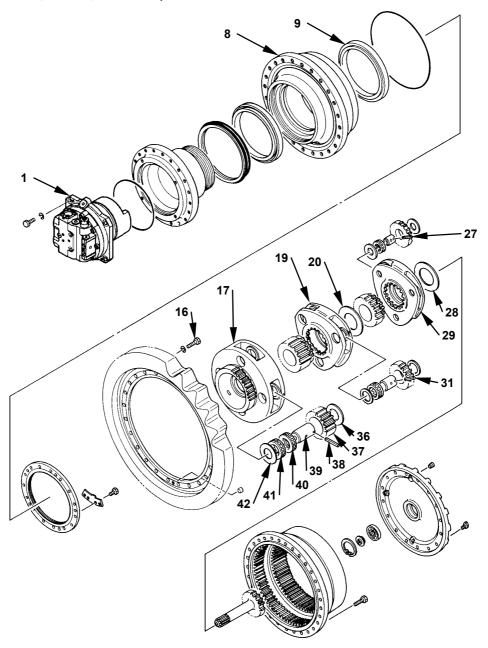
: 32 mm

IMPORTANT: Do not remove the outer race of roller bearings (7, 9) from drum (8) unless necessary.

If the bearing is pressed in insufficiently, the service life of bearing may be affected. In case the outer race has been removed, replace with a new one.

20. Remove the outer race of roller bearing (7) drum (8) by using a bar and hammer.

(ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3)



W1J1-03-02-006



CAUTION: Drum (8) and other parts weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 100 kg (221 lb) ZAXIS500LC-3, 520LCH-3: 185 kg (408 lb)

- 21. Install eyebolt (M22, Pitch 2.5 mm) into the bolt (16) hole (2 places) on drum (8) from the motor (1) side. Attach a nylon sling to eyebolt. Hoist and turn over drum (8). Remove the outer race of roller bearing (9) from drum (8) by using a bar and hammer.
- 22. Remove spring pin (38) from third stage carrier (17) by using a round bar. Remove pin (39). Remove third stage planetary gear (37) and thrust plates (36, 42) from third stage carrier (17). Remove needle bearings (40, 41) from the third stage planetary gear (37).

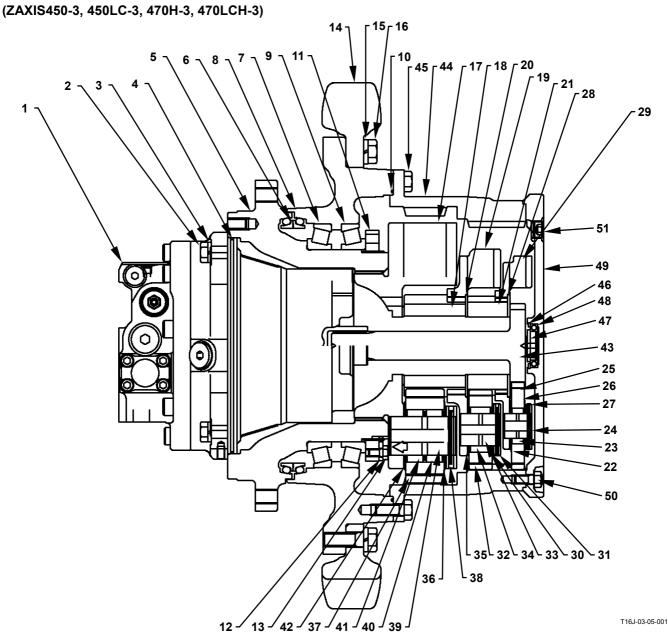
Round Bar Dia.: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 8 mm (0.32 in) ZAXIS500LC-3, 520LCH-3: 10 mm (0.39 in)

- 23. Remove spring pins (38) (4 used), pins (39) (4 used), third stage planetary gears (37) (4 used), thrust plates (36, 43) (4 used for each), needle bearings (40, 41) (3 used for each) from third stage carrier (17) according to step 20.
- 24. Disassemble the first stage carrier (29) assembly and the second stage carrier (19) assembly according to steps 20, 21.

Diameter of round bar for spring pin (27): A Diameter of round bar for spring pin (31): B ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: A=4 mm (0.16 in). B=5 mm (0.20 in) ZAXIS500LC-3, 520LCH-3: A=5 mm (0.20 in). B=6 mm (0.24 in)

25. Remove spacer (28) from first stage carrier (29). Remove spacer (20) from second stage carrier (19).

ASSEMBLE TRAVEL DEVICE



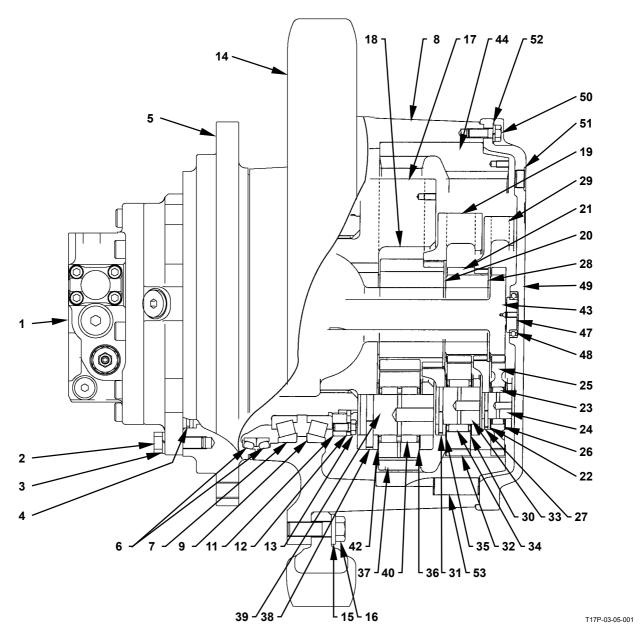
- 1 Motor
- 2 Bolt (4 Used)
- 3 Spring Washer (4 Used)
- 4 O-Ring
- 5 Housing
- 6 Floating Seal
- 7 Roller Bearing
- Drum
- 9 Roller Bearing
- 10 O-Ring
- 11 Bearing Nut
- 12 Lock Plate
- 13 Bolt (2 Used)

- 14 Sprocket
- 15 Washer (24 Used)
- 16 Bolt (24 Used)
- 17 Third Stage Carrier18 Third Stage Sun Gear
- 19 Second Stage Carrier
- 20 Spacer
- 21 Second Stage Sun Gear
- 22 Thrust Plate (3 used)
- 23 Needle Bearing (3 Used)
- 24 Pin (3 Used)
- 25 First Stage Planetary Gear (3 used)
- 26 Thrust Plate (3 used)

- 27 Spring Pin (3 Used)
- 28 Spacer
- 29 First Stage Carrier
- 30 Thrust Plate (3 used)
- 31 Spring Pin (3 Used)
- 32 Second Stage Planetary Gear (3 used)
- 33 Pin (3 Used)
- 34 Needle Bearing (3 Used)
- 35 Thrust Plate (3 used)
- 36 Thrust Plate (4 used)
- 37 Third Stage Planetary Gear (4 Used)
- 38 Spring Pin (4 Used)
- 39 Pin (4 Used)

- 40 Needle Bearing (4 Used)
- 41 Needle Bearing (4 Used)
- 42 Thrust Plate (4 used)
- 43 Shaft
- 44 Ring Gear
- 45 Bolt (30 Used)
- 46 Retaining Ring
- 47 Stopper Pin
- 48 Ball Bearing
- 49 Cover
- 50 Bolt (16 Used)
- 51 Plug (3 Used)

(ZAXIS500LC-3, 520LCH-3)



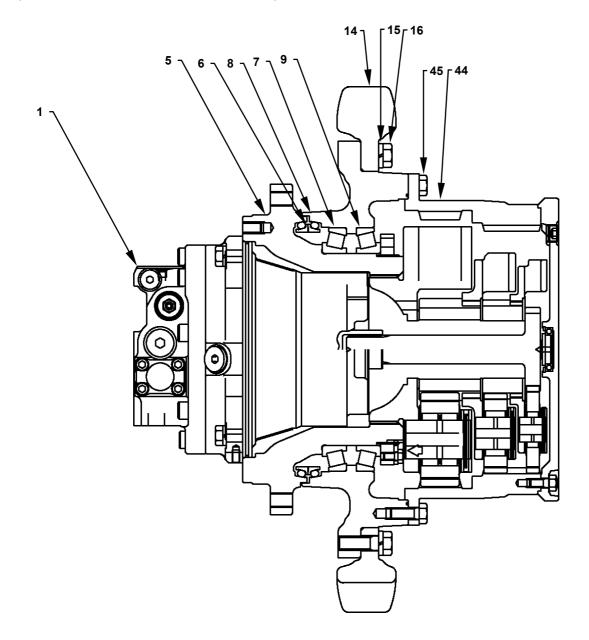
- 1 Motor
- 2 Bolt (4 Used)
- 3 Spring Washer (4 Used)
- 4 O-Ring
- 5 Housing
- 6 Floating Seal
- 7 Roller Bearing
- 8 Drum
- 9 Roller Bearing
- 11 Bearing Nut
- 12 Lock Plate
- 13 Bolt (2 Used)
- 14 Sprocket

- 15 Washer (24 Used)
- 16 Bolt (24 Used)
- 17 Third Stage Carrier
- 18 Third Stage Sun Gear
- 19 Second Stage Carrier
- 20 Spacer
- 21 Second Stage Sun Gear
- 22 Thrust Plate (3 used)
- 23 Needle Bearing (3 Used)
- 24 Pin (3 Used)
- 25 First Stage Planetary Gear (3 used)
- 26 Thrust Plate (3 used)
- 27 Spring Pin (3 Used)

- 28 Spacer
- 29 First Stage Carrier
- 30 Thrust Plate (3 used)
- 31 Spring Pin (3 Used)
- 32 Second Stage Planetary Gear (3 used)
- 33 Pin (3 Used)
- 34 Needle Bearing (3 Used)
- 35 Thrust Plate (3 used)
- 36 Thrust Plate (4 used)
- 37 Third Stage Planetary Gear (4 Used)
- 38 Spring Pin (4 Used)
- 39 Pin (4 Used)
- 40 Needle Bearing (4 Used)

- 41 Needle Bearing (4 Used)
- 42 Thrust Plate (4 used)
- 43 Shaft
- 44 Ring Gear
- 47 Stopper Pin
- 48 Ball Bearing
- 49 Cover
- 50 Bolt (20 Used)
- 51 Plug (3 Used)
- 52 Spring Washer (20 Used)
- 53 Knock Pin (8 Used)

(ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3)



T16J-03-05-001

Assemble Travel Device

The disassembling procedures of travel device for ZAXIS450-3, 450LC-3, 470H-3 and 470LCH-3 are same to ZAXIS500LC-3 and 520LCH-3 except ring gear (44).

This is explained according to the illustration of ZAXIS450-3, 450LC-3, 470H-3 and 470LCH-3.



CAUTION: Housing (5) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 90 kg (198 lb) ZAXIS500LC-3, 520LCH-3: 100 kg (221 lb)

- 1. Wind a nylon sling to the body of housing (5). Hoist and place housing (5) with the motor (1) side facing downward.
- Install one half of floating seal (6) to housing (5) by using a wooden spatula or similar tool.
 Tap and install the inner race of roller bearing (7) to housing (5) by using a bar and hammer evenly.
- NOTE: Tap and listen to ring in order to check if the inner race is installed to housing (5) completely.



CAUTION: Drum (8) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 100 kg (221 lb) ZAXIS500LC-3, 520LCH-3: 185 kg (408 lb)

3. Install eyebolt (M22, Pitch 2.5 mm) into the bolt (16) hole (2 places) on drum (8) from the motor (1) side.

Hoist and place drum (8) with the ring gear (44) side facing downward.

Tap and install the outer race of roller bearing (7) to drum (8) by using a bar and hammer evenly.

NOTE: Tap and listen to ring in order to check if the outer race is installed to drum (8) completely.

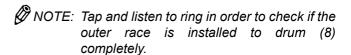
4. Apply grease to O-ring of floating seal (6) on the drum (8) side. Install one half of floating seal (6) to drum (8).

5. Install eyebolt (A) into the bolt (45) hole (2 places) on drum (8).

Hoist and place drum (8) with the ring gear (44) side facing upward.

Tap and install the outer race of roller bearing (9) to drum (8) by using a bar and hammer evenly.

Eyebolt (A)
ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:
M18, Pitch 2.5 mm
ZAXIS500LC-3, 520LCH-3: M14, Pitch 2.0 mm





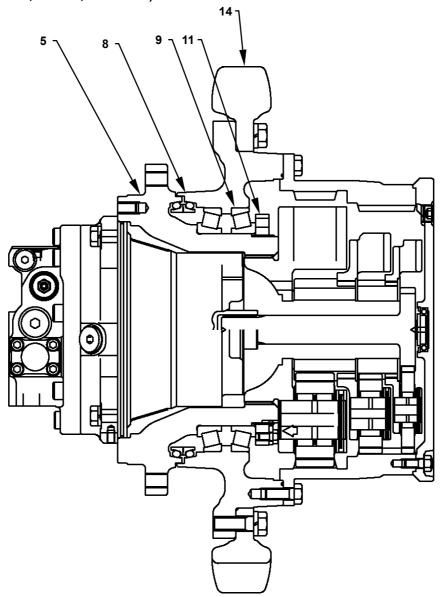
CAUTION: Sprocket (14) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 85 kg (187 lb) ZAXIS500LC-3, 520LCH-3: 115 kg (254 lb)

- 6. Attach nylon slings (2 used) to sprocket (14). Hoist and place sprocket (14) onto drum (8).
- 7. Apply LOCTITE #262 to bolt (16). Install sprocket (14) to drum (8) with bolts (16) (24 used) and spring washers (15) (24 used).

→ : 32 mm

: 750 N·m (76.5 kgf·m, 550 lbf·ft)

(ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3)



T16J-03-05-001



CAUTION: Drum (8), sprocket (14) and other

part weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

180 kg (397 lb)

ZAXIS500LC-3, 520LCH-3: 300 kg (661 lb)

IMPORTANT: Align the matching marks made when disassembling. Check the clearance all around drum (8) in housing (5) shall be equal.

- 8. Hoist and place the drum (8) assembly to housing (5).
- 9. Tap and install the inner race of roller bearing (9) to housing (5) by using a bar and hammer evenly.

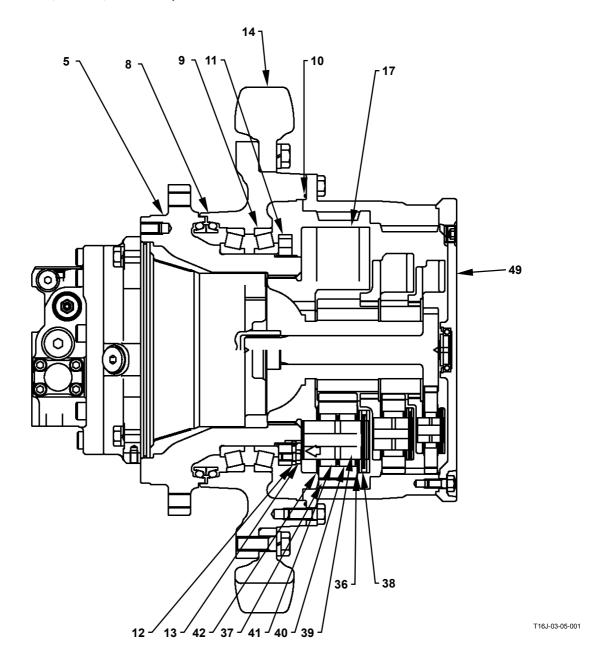
IMPORTANT: Install bearing nut (11) with the stepped part facing to roller bearing (9).

Apply a film of grease to the threaded part of bearing nut (11).

10. Install bearing nut (11) to housing (5). Tighten bearing nut (11) by hand.

NOTE: Apply a film of grease to the threaded part of bearing nut (11) in order to tighten to the specified torque.

(ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3)

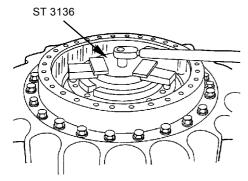


11. Install special tool (ST 3136) to bearing nut (11). Tighten bearing nut (11) by using a torque wrench. ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

: 500 N·m (51 kgf·m, 369 lbf·ft)

ZAXIS500LC-3, 520LCH-3

: 780 N·m (80 kgf·m, 575 lbf·ft)



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- 12. Hold and rotate sprocket (14) both clockwise and counterclockwise 4 to 5 turns. Tap drum (8) by using a plastic hammer in order to secure appropriate play.
- 13. Perform steps 11 and 12 twice and tighten bearing nut (11) to the specified torque. ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

: 500 N·m (51 kgf·m, 369 lbf·ft)

ZAXIS500LC-3, 520LCH-3

: 780 N·m (80 kgf·m, 575 lbf·ft)

IMPORTANT: If the spline of lock plate (12) is not align with that of housing (5), tighten bearing nut (11) further in the tightening direction in order to align with the spline.

14. Apply LOCTITE #262 to bolt (13). Install lock plate (12) to bearing nut (11) with bolts (13) (2 used). ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

: 19 mm

: 90 N·m (9 kgf·m, 66 lbf·ft) ZAXIS500LC-3, 520LCH-3

• : 19 mm

: 71 N·m (7.2 kgf·m, 52 lbf·ft)

IMPORTANT: There is an identification groove on one half of third stage planetary gear (37). Install third stage planetary gear (37) with the identification groove facing to cover (49).

- 15. Install needle bearings (40, 41) (4 used for each) to third stage planetary gears (37) (4 used). Clamp third stage planetary gear (37) with thrust plates (36, 42) (4 used for each). Install third stage planetary gear (37) to third stage carrier (17).
- 16. Align the spring pin (38) holes on third stage carrier (17) and pins (39) (4 used). Install pin (39).

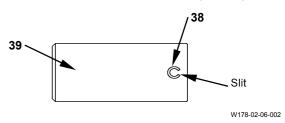
IMPORTANT: Install spring pin (38) with the slit of pin (38) facing to the end of pin (39).

17. Tap and install spring pins (38) (4 used) into third stage carrier (17) and pin (39) by using a round bar.

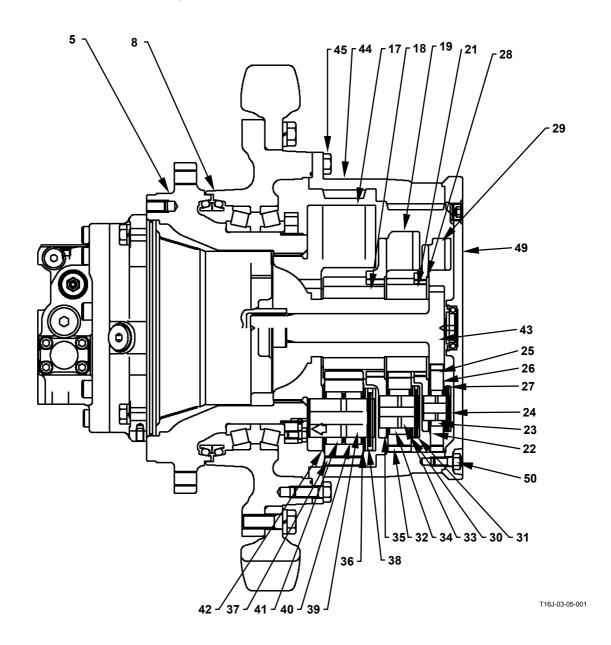
Round Bar Dia.:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 8 mm (0.32 in)

ZAXIS500LC-3, 520LCH-3: 10 mm (0.39 in)



(ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3)



- 18. Install spacer (28) to first stage carrier (29).
- 19. Install needle bearings (23) (3 used) to first stage planetary gears (25) (3 used). Clamp first stage planetary gear (25) with thrust plates (26, 22) (3 used for each). Install first stage planetary gear (25) to first stage carrier (29).

IMPORTANT: Install spring pin (27) with the slit of spring pin (27) facing to the end of pin (24).

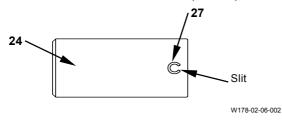
20. Install spring pins (27) (3 used) into first stage carrier (29) and pin (24) by using a round bar.

Round Bar Dia.:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

4 mm (0.16 in)

ZAXIS500LC-3, 520LCH-3: 6 mm (0.24 in)



21. Assemble second stage carrier (19) according to the steps 19 to 21.

Round Bar Dia.: 5 mm (0.20 in)



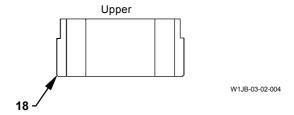
CAUTION: The third stage carrier (17) assembly weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

70 kg (154 lb)

ZAXIS500LC-3, 520LCH-3: 85 kg (187 lb)

- 22. Wind nylon slings (2 used) onto third stage carrier (17) assemblies (15 and 34 to 40). Hoist and lower the third stage carrier (17) assemblies onto housing (5).
- 23. Install third stage sun gear (18) to third stage carrier (17) with the thinner end facing to cover (49).



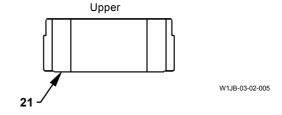


CAUTION: The second stage carrier (19) assembly weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 25 kg (55 lb)

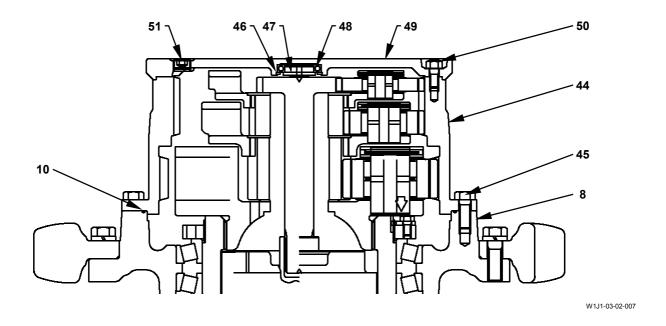
ZAXIS500LC-3, 520LCH-3: 30 kg (66 lb)

- 24. Wind nylon slings (2 used) onto second stage carrier (19) assemblies (19, 20 and 30 to 35). Hoist and lower the second stage carrier (19) assemblies onto third stage sun gear (18).
- 25. Install second stage sun gear (21) to second stage carrier (19) with the thinner end facing to cover (49).

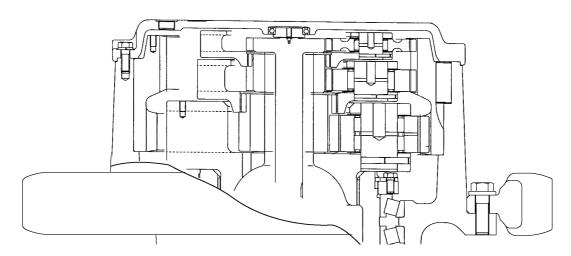


- 26. Install first stage carrier (29) assemblies (22 to 29) to second stage carrier (19).
- 27. Insert shaft (43) into the center of carrier. Let it engage with first stage planetary gears (25) (3 used).

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3



ZAXIS500LC-3, 520LCH-3



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Procedure to Install Ring Gear (44) ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3

28. Install O-ring (10) to drum (8).



CAUTION: Ring gear (44) weight: 70 kg

(150 lb)

IMPORTANT: Align the matching marks made when disassembling.

- 29. Install eyebolts (M14, Pitch 2.0 mm) into the bolt (50) hole on ring gear (44). Hoist and lower ring gear (44) onto drum (8).
- 30. Apply LOCTITE #262 to bolt (45). Install ring gear (44) to drum (8) with bolts (45) (30 used).

• : 27 mm

: 400 N·m (41 kgf·m, 295 lbf·ft)

31. Attach a tube bar onto ball bearing (48). Tap a tube bar by using a hammer and install ball bearing (48) to cover (49).

Ball Bearing (48) Inner Diameter: 45 mm (1.77 in) Outer Diameter: 68 mm (2.68 in)

32. Attach a tube bar onto stopper pin (47). Tap a tube bar by using a hammer and install stopper pin (47) to ball bearing (48).

Stopper Pin (47) Inner Diameter: 26 mm (1.02 in) Outer Diameter: 52 mm (2.05 in)

IMPORTANT: Install retaining ring (46) with the chamfered surface facing to cover (49).

33. Install retaining ring (46) to cover (49).



CAUTION: Cover (49) weight: 22 kg (50 lb)

IMPORTANT: Apply THREEBOND #1389B to the cover (49) mounting surface of ring gear (44).

34. Install eyebolt (PT 3/4) into the plug (51) hole (2 places) on cover (49).

Hoist and lower cover (49) onto ring gear (44).

IMPORTANT:

35. Apply LOCTITE #262 to bolt (50). Install cover (49) to ring gear (44) with bolts (50) (16 used).

5 : 22 mm

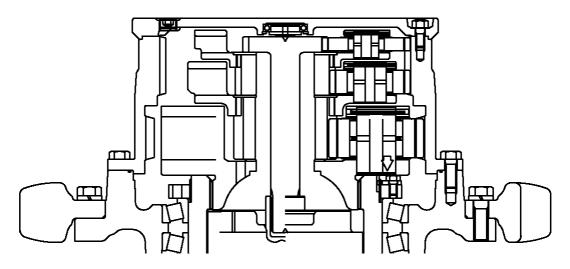
: 180 N·m (18 kgf·m, 130 lbf·ft)

36. Wind the seal tape onto plugs (51) (3 used). Install plugs (51) (3 used) to cover (49).

=== : 14 mm

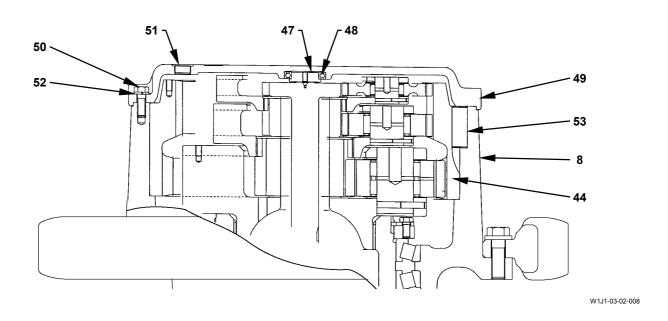
: 70 N·m (7 kgf·m, 51 lbf·ft)

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3



W1J1-03-02-007

ZAXIS500LC-3, 520LCH-3



Procedure to Install Ring Gear (44) ZAXIS500LC-3, 520LCH-3



CAUTION: Ring gear (44) weight: 75 kg (165

lb)

IMPORTANT: Align the matching marks made when disassembling.

- 37. Install eyebolt (M10, Pitch 1.5 mm) into the bolt (50) hole on ring gear (44). Hoist and lower ring gear (44) onto drum (8).
- 38. Install knock pin (53) between drum (8) and ring gear (44).
- 39. Attach a tube bar onto ball bearing (48). Tap the tube bar by using a hammer and install ball bearing (48) to cover (49).

Ball Bearing (48) Inner Diameter: 45 mm (1.77 in) Outer Diameter: 68 mm (2.68 in)

40. Attach a tube bar onto stopper pin (47). Tap the tube bar by using a hammer and install stopper pin (47) to ball bearing (46).

Stopper Pin (47) Inner Diameter: 26 mm (1.02 in) Outer Diameter: 52 mm (2.05 in)



CAUTION: Cover (49) weight: 40 kg (88 lb)

IMPORTANT: Apply THREEBOND #1389B onto the cover (49) mounting surface on ring gear (44).

41. Install eyebolts (PF1/4) into the plug (51) holes (2 places) on cover (49).

Hoist and lower cover (49) onto drum (8).

42. Apply LOCTITE #262 to bolt (50). Install cover (49) to drum (8) with bolts (50) (20 used) and washers (52) (20 used).

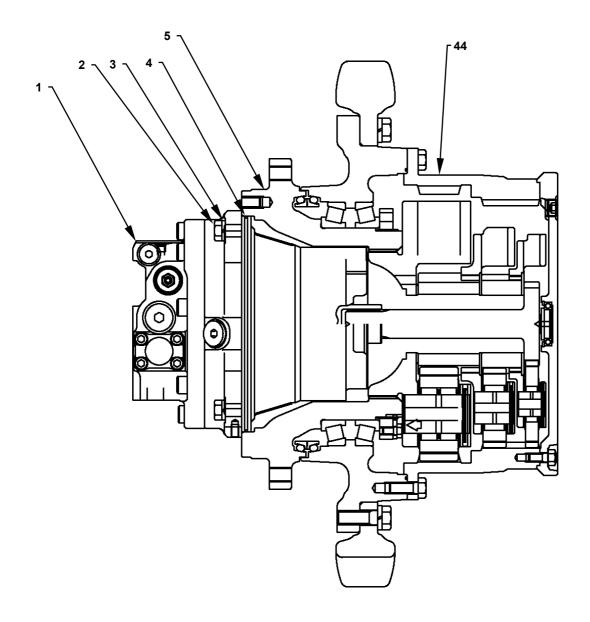
22 mm

: 180 N·m (18 kgf·m, 133 lbf·ft)

43. Wind the seal tape onto plugs (51) (3 used). Install plugs (51) (3 used) to cover (49).

: 14 mm

70 N·m (7 kgf·m, 52 lbf·ft)



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CAUTION: Travel device weight: ZAXIS450-3,

450LC-3, 470H-3, 470LCH-3:

540 kg (1191 lb)

ZAXIS500LC-3, 520LCH-3: 720 kg (1587 lb)

44. Install eyebolt (B) into the bolt hole (2 places) on the housing (5) flange part. Hoist and turn over the travel device.

Eyebolt (B) 7AXIS450-3 45

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

M18, Pitch 2.5 mm

ZAXIS500LC-3, 520LCH-3: M22, Pitch 2.5 mm

45. Fill gear oil (C) into the travel device.

Gear oil (C)

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

11.5 L (3.0 US gal.)

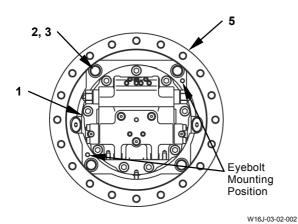
ZAXIS500LC-3, 520LCH-3: 14.0 L (3.7 US gal.)

46. Install O-ring (4) to motor (1).



CAUTION: Motor (1) weight: 130 kg (290 lb)

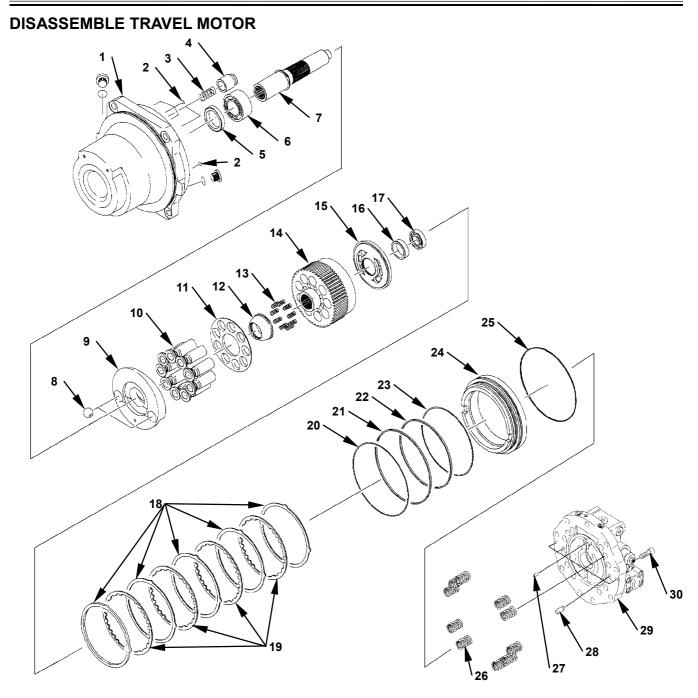
47. Install eyebolts (M12, Pitch 1.75 mm) (2 used) into the bolt hole on motor (1). Hoist motor (1) align the spline on shaft (43) with that on motor (1) and install motor (1) to housing (5).



48. Install motor (1) to housing (5) with bolts (2) (4 used) and spring washers (3) (4 used).

→ : 27 mm

: 300 N·m (31 kgf·m, 220 lbf·ft)



1 - Case

2 - O-Ring (4 Used)

3 - Spring (2 Used)

4 - Piston (2 Used)

5 - Oil Seal

6 - Roller Bearing

7 - Shaft

8 - Steel Ball (2 Used)

9 - Swash Plate

10 - Piston (9 Used)

11 - Retainer

12 - Holder

13 - Spring (9 Used)

14 - Cylinder Block

15 - Valve Plate

16 - Collar

17 - Roller Bearing

18 - *Disc Plate

19 - *Friction Plate

20 - Backup Ring

21 - O-Ring

22 - O-Ring 23 - Backup Ring

24 - Brake Piston

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25 - O-Ring

26 - Spring (10 Used)

27 - Pin

28 - Pin (4 Used)

29 - Valve Housing

30 - Socket Bolt (9 Used)

Ø NOTE: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

18-*Disc Plate (5 Used)

19-*Friction Plate (4 Used)

ZAXIS500LC-3, 520LCH-3:

18-*Disc Plate (6 Used)

19-*Friction Plate (5 Used)

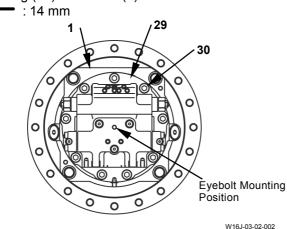
Disassemble Travel Motor



CAUTION: Valve housing (29) weight: 39 kg (90 lb)

IMPORTANT: Loosen socket bolts (30) (9 used) evenly. When socket bolts (30) are loosened, valve housing (29) will raise from case (1) under the reaction force from springs (13, 26). Take down the clearance between case (1) and valve housing (29). When removing valve housing (29) from case (1), valve plate (15) may be removed with valve housing (29) together. Do not drop valve plate (15).

1. Put the matching marks on the mating positions of valve housing (29) and case (1). Install eyebolt (M12, Pitch 1.75 mm) to valve housing (29). Attach a nylon sling onto eyebolt. Hoist and hold valve housing (29). Remove socket bolts (30) (9 used) from valve housing (29). Remove valve housing (29) from case (1).



2. Remove springs (26) (10 used), O-rings (2) (4 used), pins (28) (4 used) and O-ring (25) from case (1).

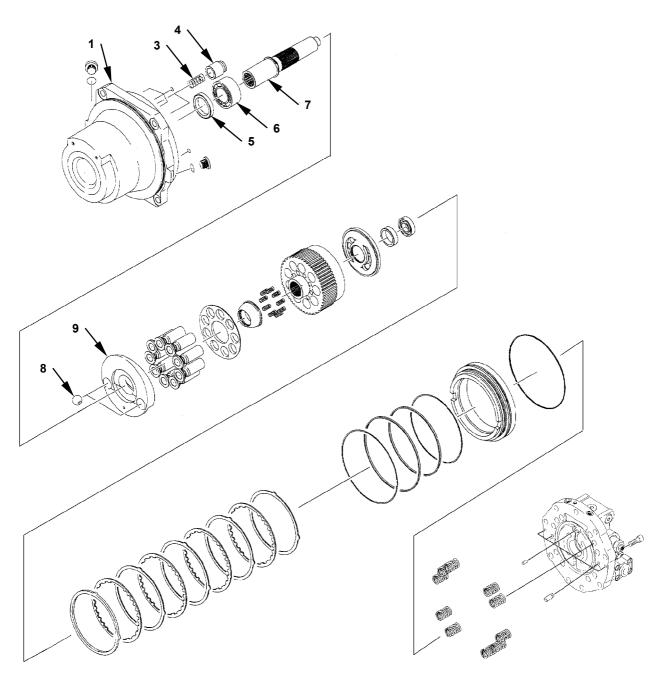
IMPORTANT: Do not damage valve plate (15).

3. Remove collar (16) and valve plate (15) from cylinder block (14).

IMPORTANT: Secure case (1) onto the workbench.

- 4. Install eyebolt (M12, Pitch 1.75 mm) to the pin (28) hole (2 places) on brake piston (24). Attach a nylon sling onto eyebolt. Hoist and remove brake piston (24) from case (1).
- 5. Remove O-rings (21, 22), backup rings (20, 23) from brake piston (24).
- 6. Remove disc plates (18) and friction plates (19) from case (1) one by one alternately.

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: Disc plates (18): 5 used
Friction plates (19): 4 used
ZAXIS500LC-3, 520LCH-3: 24 used
Disc plates (18): 6 used
Friction plates (19): 5 used



W1J1-03-02-002

A

CAUTION: The cylinder block (14) assembly weight: 20 kg (40 lb)

IMPORTANT: If cylinder block (14) needs to be replaced, cylinder block assemblies (10 to 15) with valve plate (15) should be replaced.

7. Remove cylinder block (14) assemblies (10 to 15) from case (1).

NOTE: Hold and rotate cylinder block (14) left and right lightly by both hands in order to remove slowly.

8. Remove retainer (11), pistons (10) (9 used), holder (12) and springs (13) (9 used) from cylinder block (14).

IMPORTANT: Do not damage the sliding surface of swash plate (9).

Piston (4) and steel ball (8) may be removed with swash plate (9) together. Do not drop piston (4) and steel ball (8).

9. Remove swash plate (9), pistons (4) (2 used), springs (3) (2 used) and steel balls (8) (2 used) from case (1).

NOTE: If it is difficult to remove steel ball (8), that means steel ball (8) has been set in case (1), so use some kerosene or thinner, etc. in order to clean grease first. Then remove steel ball (8) from case (1) by using a magnet.

IMPORTANT: Do not damage the spline part of shaft (7) and contact part of oil seal (5). Oil leakage will occur if they are damaged.

10. Remove shaft (7) from case (1). At this time, the inner race of roller bearing (6) is removed with shaft (7) together.

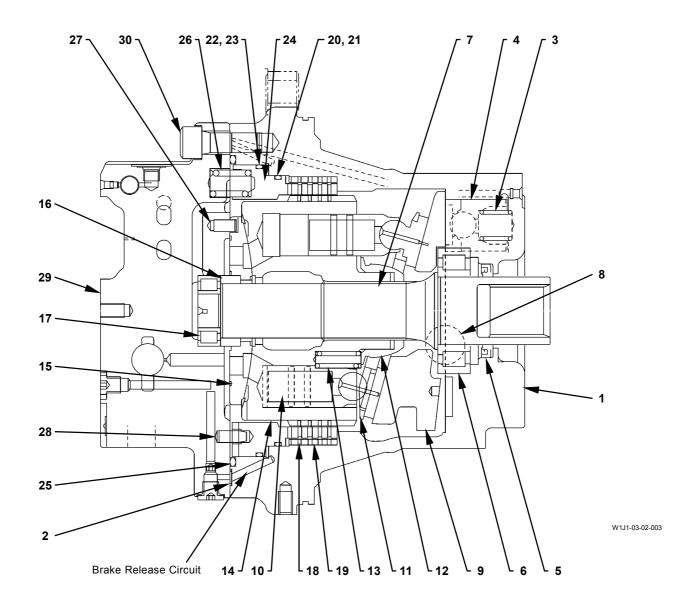
IMPORTANT: Do not remove the inner race of roller bearing (6) from shaft (7) and the outer race of roller bearing (6) from case (1) unless necessary.

11. Remove the inner race of roller bearing (6) from shaft (7) by using a press.

IMPORTANT: Keep the outer race of roller bearing
(6) properly so that it can be installed in the same direction before disassembling.

- 12. Remove the outer race of roller bearing (6) from case (1) by using a bar and hammer.
- 13. Remove oil seal (5) from case (1).

ASSEMBLE TRAVEL MOTOR



1 - Case

2 - O-Ring (4 Used)

3 - Spring (2 Used)

4 - Piston (2 Used)

5 - Oil Seal

6 - Roller Bearing

7 - Shaft

8 - Steel Ball (2 Used)

9 - Swash Plate

10 - Piston (9 Used)

11 - Retainer

12 - Holder

13 - Spring (9 Used)

14 - Cylinder Block

15 - Valve Plate

16 - Collar

17 - Roller Bearing

18 - *Disc Plate (5 Used)

19 - *Friction Plate (4 Used)

20 - Backup Ring

21 - O-Ring

22 - O-Ring

23 - Backup Ring

24 - Brake Piston

25 - O-Ring

26 - Spring (10 Used)

27 - Pin

28 - Pin (4 Used)

29 - Valve Housing

30 - Socket Bolt (9 Used)

Ø NOTE: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

18-*Disc Plate (5 Used)

19-*Friction Plate (4 Used)

ZAXIS500LC-3, 520LCH-3:

18-*Disc Plate (6 Used)

19-*Friction Plate (5 Used)

Assemble Travel Motor

IMPORTANT: Apply grease to the inner periphery of oil seal (5) for case (1) at the pressed-in part and the outer periphery of oil seal (5).

In addition, oil seal (5) should be pressed in straight in order not to deform.

1. Install oil seal (5) to case (1).

IMPORTANT: Install the outer race of roller bearing (6) with the stamped mark facing to the swash plate (9) side.

2. Tap the outer race of roller bearing (6) evenly by using a bar and hammer and install the outer race to case (1).

NOTE: Tap and listen to ring in order to check if the outer race is installed to case (1) completely.

IMPORTANT: Install the inner race of roller bearing (6) with its collar facing to the swash plate (9) side.

3. Tap the inner race of roller bearing (6) evenly by using a bar and hammer and install the inner race to shaft (7).

Tap and install the shaft (7) assembly to case (1) by using a hammer.

IMPORTANT: Apply hydraulic oil on outside periphery of steel ball (8) and piston (4).

Apply hydraulic oil to the piston and the steel ball mounting surface of case (1).

4. Install springs (3) (2 used), pistons (4) (2 used) and steel balls (8) (2 used) to case (1).



CAUTION: The case (1) assembly weight: 54 kg (120 lb)

 Install eyebolts (M18, Pitch 2.5 mm) into the socket bolts (30) hole (2 places) on case (1). Attach a nylon sling onto eyebolt. Hoist and place the case (1) assembly with the brake release circuit facing downward. IMPORTANT: Align the spherical hole in swash plate (9) with steel ball (8) and install swash plate (9).

Apply grease to the contact part of case (1) for swash plate (9).

6. Install swash plate (9) to case (1) with its thicker side facing downward.

IMPORTANT: Apply hydraulic oil to the piston (10) mounting hole of cylinder block (14).

Check the mounting direction of retainer (11).

7. Install springs (13) (9 used) and holder (12) to cylinder block (14).
Install pistons (10) (9 used) to retainer (11). Install retainer (11) to cylinder block (14).



CAUTION: The cylinder block (14) assembly weight: 20 kg (40 lb)

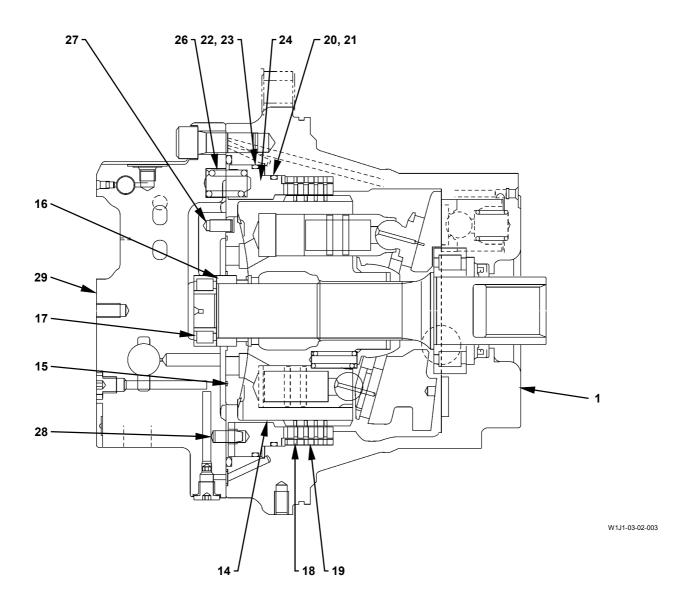
IMPORTANT: Apply hydraulic oil to the piston (10) sliding surface of swash plate (9) and the spherical surface of holder (12).

There is the inner race of roller bearing (17) on the tip of shaft (7). Do not damage them. Align the spline of shaft (7) with that of cylinder block (14).

8. Install the cylinder block (14) assembly to shaft (7).



CAUTION: The case (1) assembly weight: 54 kg (120 lb)



- 9. Install eyebolt (M18, Pitch 2.5 mm) into the socket bolt (30) hole (2 places) on case (1). Attach a nylon sling to eyebolt. Hoist and place case (1) vertically.
- 10. Install disc plates (18) and friction plates (19) alternately case (1).

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

Disc plates (18): 5 used Friction plates (19): 4 used ZAXIS500LC-3, 520LCH-3: Disc plates (18): 6 used

Friction plates (19): 5 used

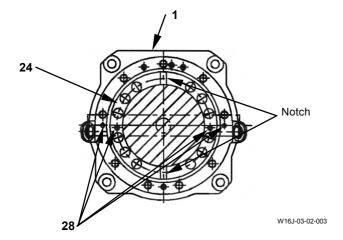
NOTE: When installing, align with the notch on case (1).

When installing disc plate (18), its inner splines shall be aligned with those of cylinder block (14).

IMPORTANT: Apply grease to O-rings (21, 22) and backup rings (20, 23).

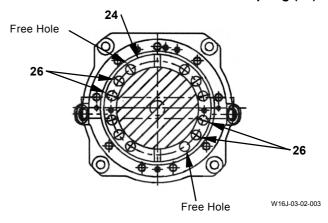
11. Install O-rings (21, 22) and backup rings (20, 23) to brake piston (24).

IMPORTANT: Check the mounting direction for brake piston (24). When installing, the notch shall be square to the pin (28) hole on case (1).

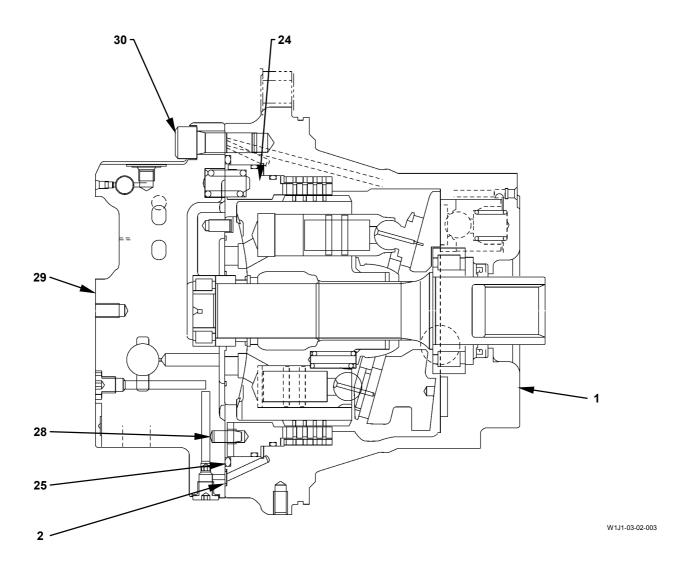


12. Lightly tap and install brake piston (24) to case (1) by using a plastic hammer.

IMPORTANT: As for springs (26) (10 used), there are twelve spring (25) mounting holes on brake piston (24). Check the correct hole to install spring (26).



13. Install springs (26) (10 used) to brake piston (24).



IMPORTANT: Install the outer race of roller bearing (17) with the stamped mark facing to the valve plate (15) side.

14. Tap the outer race of roller bearing (17) evenly by using a bar and hammer and install the outer race to valve housing (29).

NOTE: Tap and listen to ring in order to check if the outer race is installed to valve housing (29) completely.

IMPORTANT: Apply grease to the contact surfaces of valve plate (15) and valve housing (29).

15. Install collar (16) to valve housing (29). Align the pin holes on pin (27) and valve plate (15). Install valve plate (15) to valve housing (29).

IMPORTANT: Apply grease to O-rings (2, 25).

16. Install O-rings (25) and (2) (4 used) to case (1). Install pins (28) (4 used) to valve housing (29).

A

CAUTION: Valve housing (29) weight: 39 kg (90 lb)

IMPORTANT: When installing valve housing (29)

to case (1), check if the clearance between case (1) and valve housing (29) is equal to that noted when disassembling. If the value is different, disassemble them and reassemble again.

IMPORTANT: Align the matching marks made

when disassembling. If the matching marks cannot be aligned with each other, brake piston (24) may be in-

stalled in wrong direction.

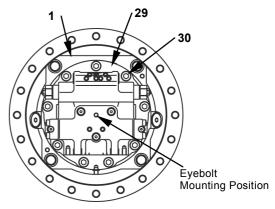
17. Install eyebolt (M12, Pitch 1.75 mm) into the bolt hole on valve housing (29). Attach a nylon sling onto eyebolt.

Hoist valve housing (32). Align with the pin (28) hole on brake piston (24) and place valve housing (29) onto the case (1).

Install valve housing (29) to case (1) with socket bolts (30) (9 used).

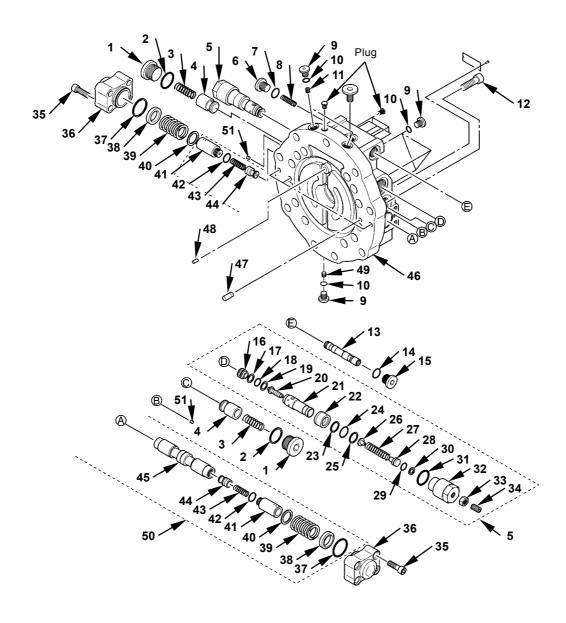
(45±2.2 kgf·m, 325±16 lbf·ft)

NOTE: Tighten socket bolts (30) (9 used) evenly.



W16J-03-02-002

DISASSEMBLE BRAKE VALVE



W1J1-03-02-004

- 1 Plug (2 Used)
- 2 O-Ring (2 Used)
- 3 Spring (2 Used)
- 4 Check Valve (2 Used)
- 5 Relief Valve (2 Used)
- 6 Plug
- 7 O-Ring
- 8 Spring
- 9 Plug (6 Used)
- 10 O-Ring (6 Used)
- 11 Orifice (2 Used)
- 12 Socket Bolt (9 Úsed)
- 13 Valve Assembly

- 14 O-Ring
- 15 Plug
- 16 Poppet Seat (2 Used)
- 17 Backup Ring (2 Used)
- 18 O-Ring (2 Used)
- 19 Backup Ring (2 Used)
- 20 Poppet (2 Used)
- 21 Relief Housing (2 Used)
- 22 Piston (2 Used)
- 23 Backup Ring (2 Used)
- 24 O-Ring (2 Used)
- 25 Backup Ring (2 Used)
- 26 Spring Seat (2 Used)

- 27 Spring (2 Used)
- 28 Spring Guide (2 Used)
 - 29 O-Ring (2 Used)
 - 30 Backup Ring (2 Used)
 - 31 O-Ring (2 Used)

 - 32 Plug (2 Used)
 - 33 Nut (2 Used) 34 - Set Screw (2 Used)
 - 35 Socket Bolt (8 Used)
 - 36 Cap (2 Used)
 - 37 O-Ring (2 Used)
 - 38 Spring Seat (2 Úsed)
 - 39 Spring (2 Used)

- 40 Spring Seat (2 Used)
- 41 Plug (2 Used)
- 42 O-Ring (2 Used)

- 43 Spring (2 Used) 44 Check Valve (2 Used)
- 45 Spool
- 46 Valve Housing
- 47 Pin (4 Used)
- 48 Pin
- 49 Orifice
- 50 Spool Assembly
- 51 Orifice (2 Used)

Disassemble Brake Valve



CAUTION: The valve housing (46) assembly weight: 39 kg (90 lb)

- 1. Secure the valve housing (46) assembly on a firm workbench.
- 2. Remove plugs (6, 15), O-rings (7, 14) and spring (8) from valve housing (46).

- : 10 mm

IMPORTANT: Remove valve assembly (13) while rotating. If a little resistance is felt while removing, do not try to remove it by force, return to original position and retry.

> In addition, do not disassemble valve assembly (13). In case replacement should be carried out to any parts of it, replace it with the valve housing (46) assembly including spool assembly (50), valve assembly (13), orifices (11, 49, 51) and the plug.

- 3. Push valve assembly (13) lightly. Rotate and remove valve assembly (13) by hand from valve housing (46).
- 4. Remove plugs (1) (2 used), O-rings (2) (2 used), springs (3) (2 used) and check valves (4) (2 used) from valve housing (46).

: 14 mm

IMPORTANT: Do not disassemble relief valves (5) (2 used). Relief valve (5) should be replaced as assembly. Attach an identification tag to each relief valve (5) in order to install to their original position.

> In addition, do not rotate set screw (34). The setting pressure can change.

5. Remove relief valves (5) (2 used) from valve housing (46).

: 36 mm

6. Push cap (36) and remove socket bolts (35) (8 used). Remove caps (36) (2 used) from valve housing (46).

: 10 mm

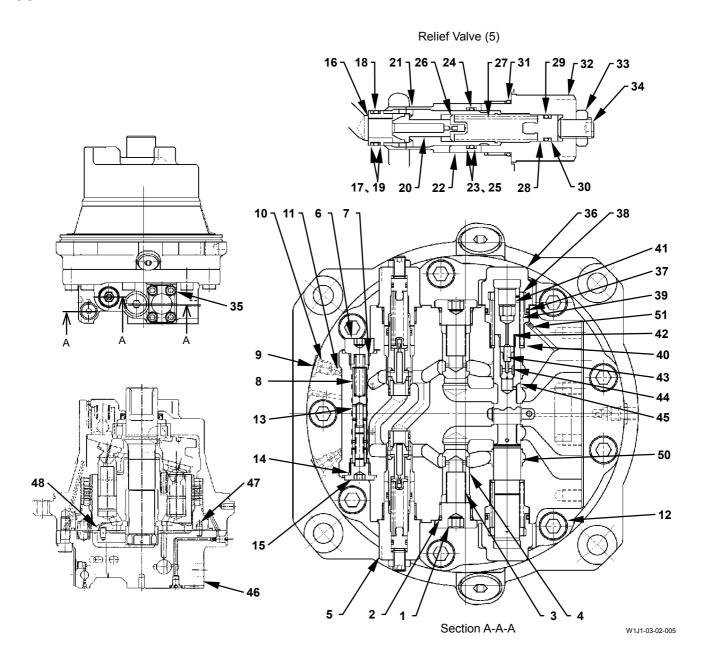
🕅 NOTE: In case cap (36) cannot be removed, tap cap (36) by using a plastic hammer. While tapping, loosened socket bolt (35) should be still on cap (36).

7. Remove spring seats (38) (2 used), springs (39) (2 used) and spring seats (40) (2 used) from valve housing (46).

IMPORTANT: Remove spool assembly (50) while rotating. In case a little resistance is felt while removing, do not try to remove it by force, return to original position and retry.

- 8. Push spool assembly (50) lightly. Rotate and remove spool assembly (50) by hand from valve housing (46).
- 9. Clamp spool assembly (50) in a vise by using chip of wood inserted at both side.
- 10. Remove plugs (41) (2 used) from spool (45). Remove springs (43) (2 used) and check valves (44) (2 used) from spool (45).

ASSEMBLE BRAKE VALVE

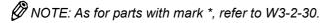


- 1 Plug (2 Used) 2 - O-Ring (2 Used)
- 3 Spring (2 Used) 4 - Check Valve (2 Used)
- 5 Relief Valve (2 Used)
- 6 Plug
- 7 O-Ring
- 8 Spring
- 9 *Plug (6 Used)
- 10 *O-Ring (6 Used)
- 11 *Orifice (2 Used)
- 12 Socket Bolt (9 Used)
- 13 Valve Assembly

- 14 O-Ring
- 15 Plug
- 16 Poppet Seat (2 Used)
- 17 Backup Ring (2 Used)
- 18 O-Ring (2 Used)
- 19 Backup Ring (2 Used)
- 20 Poppet (2 Used)
- 21 Relief Housing (2 Used)
- 22 Piston (2 Used)
- 23 Backup Ring (2 Used)
- 24 O-Ring (2 Used)
- 25 Backup Ring (2 Used)
- 26 Spring Seat (2 Used)

- 27 Spring (2 Used)
- 28 Spring Guide (2 Used)
- 29 O-Ring (2 Used)
- 30 Backup Ring (2 Used)
- 31 O-Ring (2 Used)
- 32 Plug (2 Used)
- 33 Nut (2 Used)
- 34 Set Screw (2 Used)
- 35 Socket Bolt (8 Used)
- 36 Cap (2 Used)
- 37 O-Ring (2 Used)
- 38 Spring Seat (2 Used)
- 39 Spring (2 Used)

- 40 Spring Seat (2 Used)
- 41 Plug (2 Used)
- 42 O-Ring (2 Used)
- 43 Spring (2 Used)
- 44 Check Valve (2 Used)
- 45 Spool
- 46 Valve Housing
- 47 Pin (4 Used)
- 48 Pin
- 49 *Orifice
- 50 Spool Assembly
- 51 Orifice



Assemble Brake Valve

1. Install O-rings (7, 14) to plugs (6, 15) respectively. Install valve assembly (13), spring (8) and plugs (6, 15) to valve housing (46).

: 10 mm : 67.3±4.9 N·m (6.9±0.5 kgf·m, 50±3.6 lbf·ft)

2. Install O-rings (2) (2 used) to plugs (1) (2 used) Install check valves (4) (2 used), springs (3) (2 used) and plugs (1) (2used) to valve housing (46).

: 14 mm : 412±20 N·m (42±2 kgf·m, 304±15 lbf·ft)

IMPORTANT: Install relief valve (5) to the former position before disassembling.

3. Install relief valves (5) (2 used) to valve housing (46).

: 36 mm : 412±22 N·m (42±2.2 kgf·m, 304±16 lbf·ft)

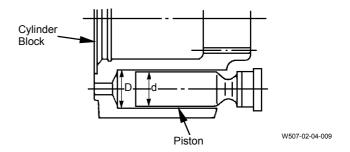
- 4. Slowly rotate and insert spool assembly (50) into valve housing (46).
- 5. Install O-rings (37) (2 used) to caps (36) (2 used).
- 6. Install spring seats (40) (2 used), springs (39) (2 used) and spring seats (38) (2 used) to valve housing (46). Install caps (36) (2 used) with socket bolts (35) (8 used).

: 10 mm : 108±4.9 N·m (11±0.5 kgf·m, 80±3.6 lbf·ft)

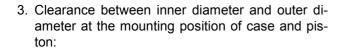
MAINTENANCE STANDARD

1. Clearance between inner diameter of cylinder block and outer diameter of piston:

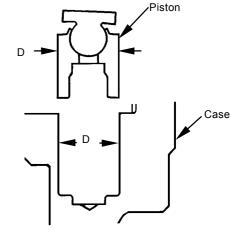
(D-d): 0.06 mm (0.002 in) or less



- 2. Clearance between piston and shoe engaging:
 - δ : 0.4 mm (0.016 in) or less

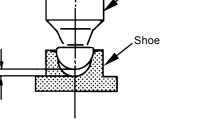


(D-d): 0.03 mm (0.001 in) or less



- 4. Wear amount on the sliding surfaces of cylinder block and valve plate:
 - Check there is no abnormal scratch, wear or score

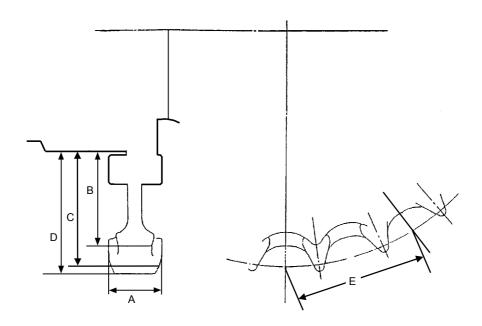
Damage and wear amount within 0.02 mm (0.001 in) or less.



Piston

W107-02-06-140

Sprocket



W105-03-07-042

ZAXIS450-3, 450L	Unit: mm (in)		
	Standard	Allowable Limit	Remedy

	Standard Allowable Limit		Remedy
Α	92 (3.6)	[82 (3.2)]	
В	131.6 (5.2)	126.6 (4.9)	Duild up and
С	167.6 (6.6)	-	Build up and finishing
D	177.5 (7.0)	172.5 (6.8)	Illistilig
E	215.9 (8.5)	-	

ZAXIS500LC-3, 520LCH-3	Unit: mm (in)

	Standard	Standard Allowable Limit	
Α	102 (4.0)	-	
В	91.4 (3.6)	86.4 (3.4)	Duild up and
С	132.3 (5.2)	-	Build up and finishing
D	143.9 (5.6)	138.9 (5.5)	illistilig
E	228.6 (9)	-	

NOTE: Value in [] is just for reference.

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REMOVE AND INSTALL CENTER JOINT

IMPORTANT: Release any pressure in the hydrau-

lic oil tank before doing any work. (Refer to "Bleed Air from Hydraulic

Oil Tank" on page W1-4-1.)

Removal

IMPORTANT: Attach an identification tag to all the

hoses of center joint for reassem-

bling.

IMPORTANT: Remove all the hoses and adapters

from center joint. Attach a cap to the

removed hoses.

1. Remove hoses (1, 2, 5, 6) and adapters (4 used) from the upper side of spindle on the center joint.

• : 41 mm

2. Remove hoses (3, 4) from the spindle.

: 19 mm, 27 mm

3. Remove bolts (8) (2 used) and spring washers (2 used) from the spindle. Remove stopper (7) from the spindle. At this time, remove the washers (2 used) between stopper (7) and spindle.

→ : 22 mm



CAUTION: Center joint weight: 52 kg (110 lb)

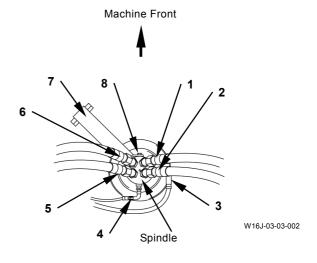
- Install eyebolts (G1) to the adapter holes (2 places) on the upper side of spindle. Attach a nylon sling onto eyebolt. Take up slack of the nylon sling.
- 5. Remove hoses (9 to 16) from the lower side of center joint.

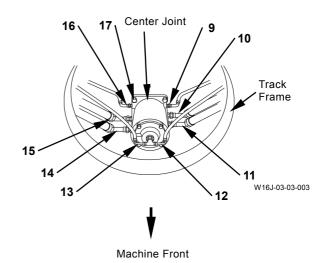
: 22 mm, 27 mm, 41 mm

6. Put the matching marks on the track frame and the center joint.

Remove bolts (17) (4 used) and spring washers (4 used). Hoist and remove the center joint slowly.

: 24 mm





Installation



CAUTION: Center joint weight: 52 kg (110 lb)

IMPORTANT: Align the matching marks made when disassembling.

1. Install the center joint to the track frame with bolts (17) (4 used) and spring washers (4 used).

24 mm

: 210 N·m (21.5 kgf·m, 154 lbf·ft)

2. Install hoses (9 to 16) to the lower side of center joint.

: 22 mm

: 39 N·m (4 kgf·m, 29 lbf·ft)

: 27 mm

: 78 N·m (8 kgf·m, 58 lbf·ft)

: 41 mm

: 205 N·m (21 kgf·m, 152 lbf·ft)

3. Insert the washer between stopper (7) and the spindle. Install stopper (7) to the spindle with bolts (8) (2 used) and spring washers (2 used).

: 22 mm

=== : 140 N·m (14 kgf·m, 101 lbf·ft)

4. Install hoses (3, 4) to the spindle.

: 27 mm

: 93 N·m (9.5 kgf·m, 69 lbf·ft)

: 19 mm

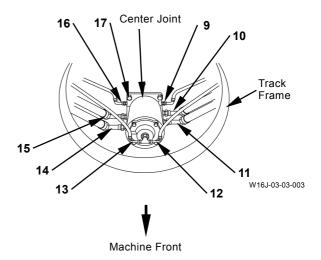
: 29.5 N·m (3 kgf·m, 21.5 lbf·ft)

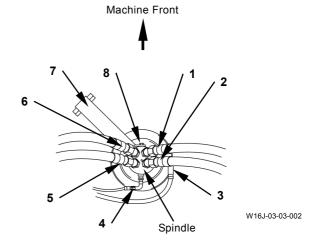
5. Install the adapters (4 used) to the upper side of spindle. Install hoses (1, 2, 5, 6) to the adapters (4 used).

• : 41 mm

: 205 N·m (21 kgf·m, 152 lbf·ft)

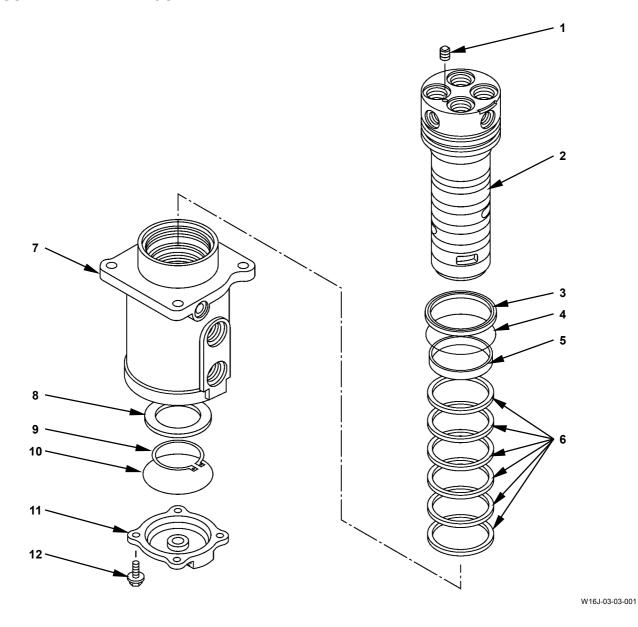
IMPORTANT: After completing the work, check the oil level. Start the engine and check for any oil leaks.





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DISASSEMBLE CENTER JOINT



1 - Plug2 - Spindle3 - Dust Seal

4 - O-Ring

5 - Bushing 6 - Oil Seal (6 Used)

7 - Body

8 - Ring 9 - Retaining Ring

10 - O-Ring

11 - Cover 12 - Bolt (4 Used)

Disassemble Center Joint



CAUTION: Center joint weight: 52 kg (110 lb)

1. Remove bolts (12) (2 used) in diagonal position from cover (11). Install eyebolts (M12, Pitch 1.75 mm) into the bolt holes.

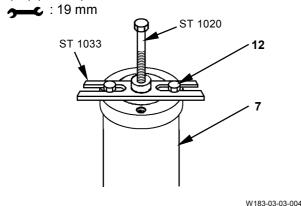
Attach a nylon sling onto eyebolt. Place the center joint on the workbench.

→ : 19 mm

2. Remove bolts (12) (2 used) and eyebolts (2 used) from body (7). Remove cover (11) from body (7).

: 19 mm

- 3. Remove O-ring (10), retaining ring (9) and ring (8) from body (7).
- 4. Put the matching marks on body (7) and spindle (2).
- 5. Install special tool (ST 1033) to body (7) with bolts (12) (2 used).



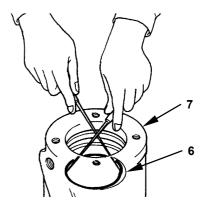
A

CAUTION: Spindle (2) weight: 22 Kg (50 lb) Body (7) weight: 29 kg (60 lb)

6. Tighten bolt (ST 1020) of special tool (ST 1033) and remove body (7) from spindle (2) upward. Just before spindle (2) is separated from body (7), remove special tool. Install eyebolt (M12, Pitch 1.75 mm) into the bolt (12) holes (2 places) on body (7). Attach a nylon sling onto eyebolt. Push spindle (2). Hoist and remove body (7).

IMPORTANT: It is easier to remove oil seal (6) if two pins are used. Do not damage the seal groove with the pins.

7. Remove oil seals (6) (6 used) from body (7).



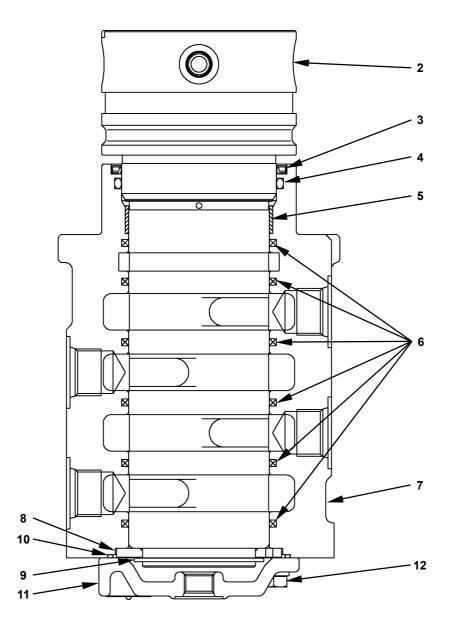
W105-03-03-015

8. Remove dust seal (3) and O-ring (4) from body (7).

IMPORTANT: While welding, cover the seal surface in order to prevent it from being spattered.

9. When replacing bushing (5), build-up weld at 90° (4 places) in its inner diameter by using a welding rod. Shrink and remove bushing (5).

ASSEMBLE CENTER JOINT



W183-03-08-001

- 1 *Plug 2 - Spindle 3 - Dust Seal
- 4 O-Ring
- 5 Bushing 6 Oil Seal (6 Used)
- 7 Body
- 8 Ring 9 Retaining Ring
- 10 O-Ring
- 11 Cover 12 Bolt (4 Used)

NOTE: As for the item with mark*, refer to W3-3-4.

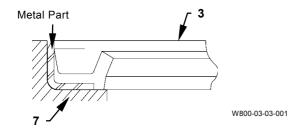
Assemble Center Joint

IMPORTANT: Apply grease to the bushing (5) mounting part on body (7).

1. When bushing (5) is removed, first install bushing (5) to body (7). (Refer to page W3-3-10.)

IMPORTANT: Apply grease to the dust seal (3) mounting part on body (7). Face the metal part of dust seal (3) to the body (7) side.

2. Install O-ring (4) and dust seal (3) to body (7).

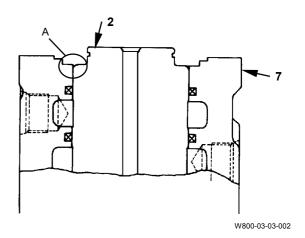


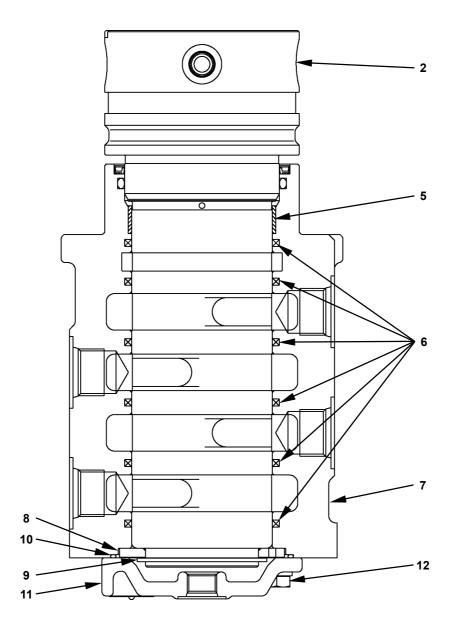
3. Install oil seals (6) (6 used) to body (7).

IMPORTANT: The clearance between body (7) and spindle (2) is not much. Align the center of body (7) and spindle (2) and install body (7) straightly.

As the seal may be damaged, slowly install body (7).

Install body (7) in order not to form the step at position A (the mounting position for ring (8)) shown below.





W183-03-08-001

A

CAUTION: Spindle (2) weight: 22 kg (50 lb)

Body (7) weight: 29 kg (60 lb)

IMPORTANT: Apply grease to the sliding surface of dust seal (3) on spindle (2) and inner surfaces of oil seal (6) and bushing (5).

- 4. Place spindle (2) on a workbench with its upside down. Install eyebolt (M12, Pitch 1.75 mm) into the bolt (12) holes (2 places) on body (7). Hoist and place body (7) while aligning the matching mark with that of spindle (2).
- 5. Tap the circumference of body (7) evenly by using a plastic hammer and insert body (7) into spindle (2).

IMPORTANT: Install ring (8) with the chamfered edge facing to the inner surface of body (7).

6. Install ring (8) to body (7).

IMPORTANT: Install retaining ring (9) with its chamfered edge facing to the ring (8) side.

- 7. Install retaining ring (9) to spindle (2).
- 8. Install O-ring (10) to body (7). Install cover (11) to body (7) with bolts (12) (4 used).

: 19 mm

: 88 N·m (9 kgf·m, 65 lbf·ft)

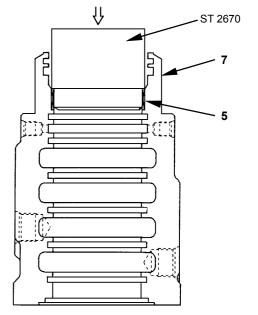
When replacing body (7) with a new one, the following procedures are required.

IMPORTANT: When installing bushing (5) to body (7), grease and molybdenum disulphide should be applied to the fitting surface.

Push and install bushing (5) to body (7).

- 1. Clean body (7) and bushing (5).
- 2. Push bushing (5) to body (7) by using a press.

Pushing force: 0.5 to 1.5 ton Pushing tool: ST 2670



W105-03-03-029

MAINTENANCE STANDARD

Item		Allowable Limit (basis of judgment)	Remedy
Bushing		1. Wear more than 0.2 mm (0.008 in)	Replace
		Seizure and abnormal wear	Replace
		3. Uneven wear within 180°	Replace
		Wear Area Within Half Range	
	Sliding surface with	T157-01-01-040 Heavily damaged one by seizure or foreign matter	Replace
	seals		. topiaco
		1) Excessively worn one by seizure or foreign	Replace
Body, Spindle	Sliding surface be- tween body and spin-	matter, or one having the score of 0.1 mm (0.004 in) or more	
	dle other than sliding surfaces with seals	2) One having the score of less than 0.1 mm (0.004 in)	Repair the surface smooth by using an oil stone
	Sliding surface with ring	One that has worn 0.5 mm (0.02 in) or more, or excessively worn	Replace
		2) One that has worn 0.5 mm (0.02 in) or less	Repair the surface smooth
		3) One that has scores due to seizure or foreign matter but the damage is less than the allowable wear limit 0.5 mm (0.02 in) and is repairable	Repair the surface smooth
Cover	Sliding surface with ring	1) One that has worn 0.5 mm (0.02 in) or more	Replace
		2) One that has worn less than 0.5 mm (0.02 in)	Repair the surface smooth
		One that has scores due to seizure or foreign matter but the damage is less than the allowable wear limit 0.5 mm (0.02 in) and is repairable	Repair the surface smooth

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REMOVE AND INSTALL TRACK ADJUSTER

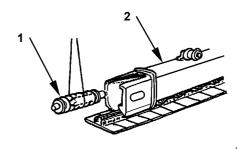
Before removing and installing the track adjuster, the tracks and the front idler must be removed first. For removal and installation of the tracks and the front idler, refer to "Remove and Install Track" and "Remove and Install Front Idler" sections. In this section, the procedure starts on the premise that the tracks and the front idler have already been removed.



CAUTION: When removing track adjuster (1), track adjuster (1) may fly off due to spring force.

Do not stand in the same direction to remove track adjuster (1) or where track adjuster (1) may fly out. The rod screw is always loaded by spring force.

Be alert that if the rod or screw section is broken, the broken pieces may fly out by spring force.



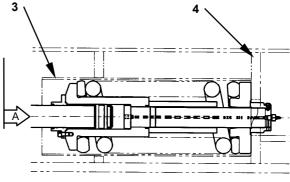
W142-03-04-002

Removal



CAUTION: Track adjuster (1) weight: ZAXIS450-3, 470H-3: 235 kg (518 lb) ZAXIS450LC-3, 470LCH-3: 239 kg (527 lb) ZAXIS500LC-3, 520LCH-3: 365 kg (805 lb)

1. Pry and remove track adjuster (1) from track frame (2) by using a pry bar.



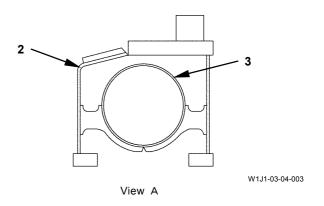
W16J-03-04-002

Installation

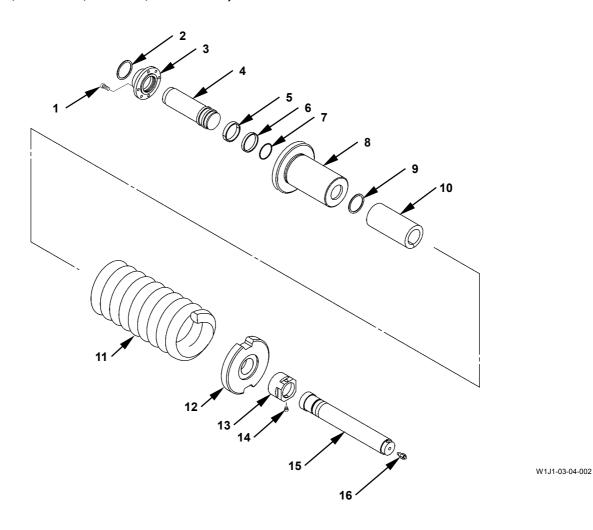


CAUTION: Track adjuster (1) weight: ZAXIS450-3, 470H-3: 235 kg (518 lb) ZAXIS450LC-3, 470LCH-3: 239 kg (527 lb) ZAXIS500LC-3, 520LCH-3: 365 kg (805 lb)

 As illustrated, install track adjuster (1) into spring guide (3) on track frame (2).
 Check that the end face of track adjuster (1) comes into contact with that of plate (4) at this time.



DISASSEMBLE TRACK ADJUSTER (ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3)



1 - Socket Bolt (4 Used)

2 - O-Ring 3 - Guide

4 - Piston Rod

5 - Wear Ring

6 - U-Ring

7 - Retaining Ring

8 - Cylinder

9 - O-Ring

10 - Spacer

11 - Spring

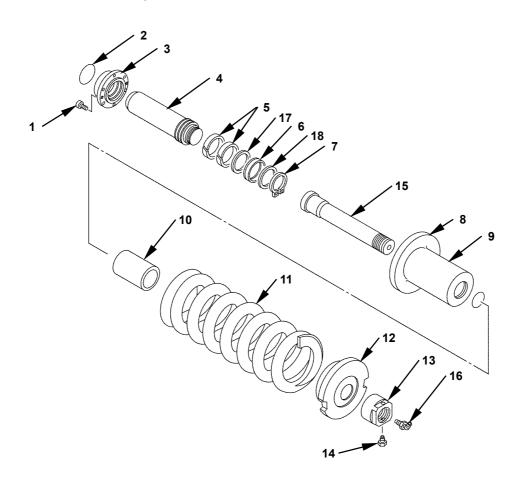
12 - Bracket

13 - Nut

14 - Bolt

15 - Rod 16 - Valve

(ZAXIS500LC-3, 520LCH-3)



W1J1-03-04-004

1 - Socket Bolt (4 Used)

2 - O-Ring

3 - Guide

4 - Piston Rod

5 - Wear Ring (2 Used)

6 - U-Ring

7 - Retaining Ring

8 - Cylinder

9 - O-Ring

10 - Spacer

11 - Spring

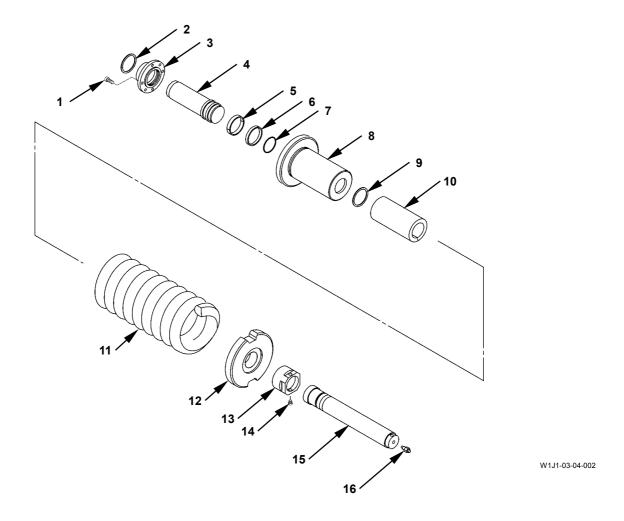
12 - Bracket

13 - Nut 14 - Bolt 15 - Rod

16 - Valve

17 - Backup Ring

18 - Plate



Disassemble Track Adjuster

• Use a pump unit which has the maximum pressure of 69 MPa (700 kgf/cm², 9950 psi) and the flow rate of 8 to 10 liters (2.1 to 2.6 US gal). Set the main relief pressure to 49 MPa (500 kgf/cm², 7110 psi) (80 tons) or lower.

IMPORTANT: Use special tool (ST4932) when assembling and disassembling the track adjuster.

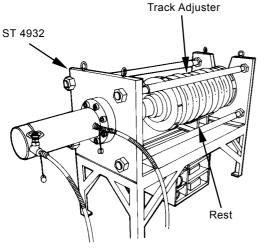


CAUTION: As the spring force of track adjuster is extremely large, carry out the disassembly and assembly work carefully. Thoroughly inspect the special tool for any damage in order to perform the work safely.



CAUTION: Track adjuster weight: ZAXIS450-3, 470H-3: 235 kg (518 lb) ZAXIS450LC-3, 470LCH-3: 239 kg (527 lb) ZAXIS500LC-3, 520LCH-3: 365 kg (805 lb)

1. Hoist and place the track adjuster on the rest of special tool (ST 4932).

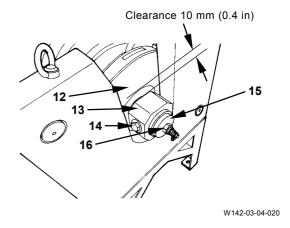


W142-03-04-019

IMPORTANT: Compress the spring until the clearance between bracket (12) and nut (13) is approximately 10 mm (0.4 in).

2. Loosen valve (16). Compress spring (11) of the track adjuster by using special tool (ST 4932).

24 mm



IMPORTANT: Put the matching marks on rod (15) and nut (13).

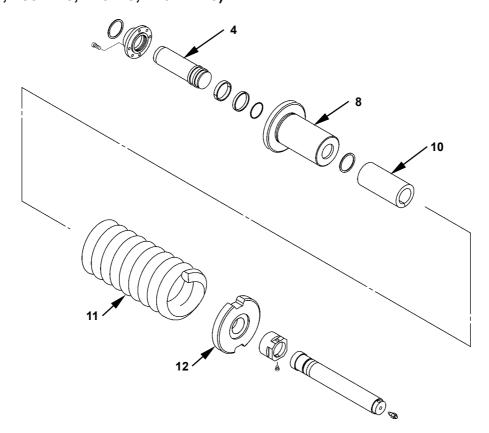
3. Remove valve (16) from rod (15).

24 mm

4. Remove bolt (14) from nut (13). Remove nut (13) from rod (15).

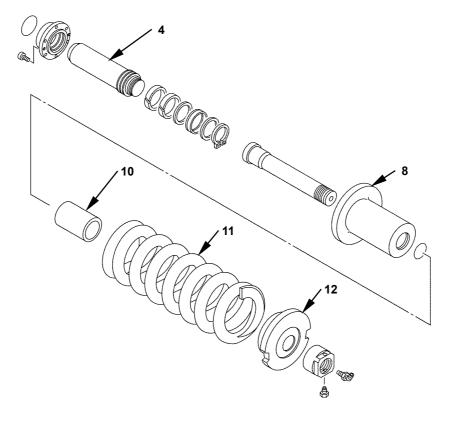
: 17 mm, 100 mm

(ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3)



(ZAXIS500LC-3, 520LCH-3)





W1J1-03-04-004

5. Slowly return the piston of special tool (ST 4932) until spring (11) extends to its free length.

NOTE: Spring (11) free length:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

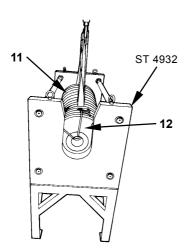
782 mm (31 in)

ZAXIS500LC-3, 520LCH-3: 733 mm (29 in)



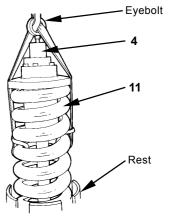
CAUTION: Track adjuster weight: ZAXIS450-3, 470H-3: 235 kg (518 lb) ZAXIS450LC-3, 470LCH-3: 239 kg (527 lb) ZAXISS500LC-3, 520LCH-3: 365 kg (805 lb)

 Secure bracket (12) and spring (11) together by using a wire. Attach a nylon sling to spring (11) of the track adjuster. Hoist and remove the track adjuster from special tool (ST 4932).



W142-03-04-005

 Install eyebolt (M16, Pitch 2.0 mm) to piston rod (4). Attach a nylon sling to spring (11). Pass a nylon sling through eyebolt. Hoist and place the assembly on the rest.

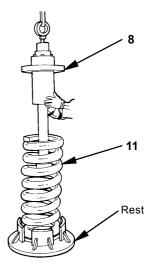


W142-03-04-006

A

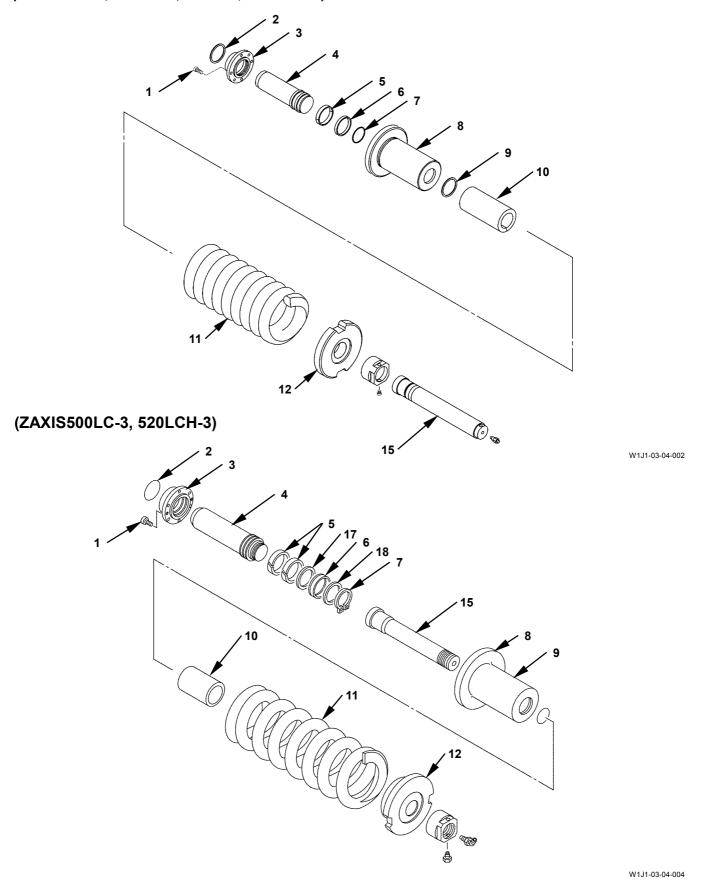
CAUTION: The cylinder (8) assembly weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 75 kg (165 lb) ZAXIS500LC-3, 520LCH-3: 102 kg (225 lb)

8. Hoist and remove cylinder (8) assemblies (1 to 9, 15) from spring (11).



W142-03-04-007

(ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3)





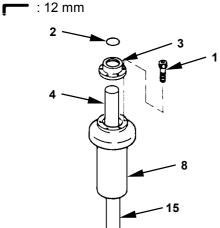
CAUTION: Spring (11) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 122 kg (269 lb) ZAXIS500LC-3, 520LCH-3: 150 kg (331 lb)

9. Remove wire fastening spring (11) and bracket (12). Hoist and remove spring (11) from the rest.



CAUTION: Bracket (12) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 22 kg (48.5 lb) ZAXIS500LC-3, 520LCH-3: 21.5 kg (47.4 lb)

- 10. Remove spacer (10) and bracket (12) from the rest.
- 11. Remove socket bolts (1) (4 used) from guide (3). Remove guide (3) from piston rod (4).



W142-03-04-010

- 12. Remove piston rod (4) from cylinder (8).
- 13. Remove O-ring (2) from guide (3).

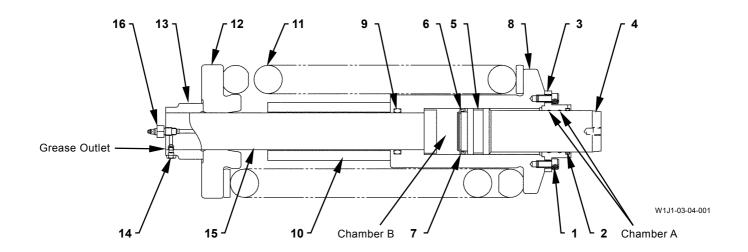


CAUTION: Cylinder (8) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 39 kg (86 lb) ZAXIS500LC-3, 520LCH-3: 52.4 kg 115.5 lb) Rod (15) weight: 21 kg (50 lb)

- Install eyebolt (M16, Pitch 2.0 mm) to rod (15).
 Attach a nylon sling. Hoist and remove rod (15) from cylinder (8).
 Remove O-ring (9) from inside of cylinder (8).
- 15. Remove the following parts below from piston rod (4).

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: Wear ring (5), retaining ring (7) and U-ring (6) ZAXIS500LC-3, 520LCH-3: Wear ring (5) (2 used), backup ring (17), U-ring (6), plate (18) and retaining ring (7)

ASSEMBLE TRACK ADJUSTER



6 - U-Ring 1 - Socket Bolt (4 Used) 15 - Rod 11 - Spring 2 - O-Ring 7 - Retaining Ring 12 - Bracket 16 - Valve 3 - Guide 13 - Nut 17 - **Backup Ring 8 - Cylinder 18 - **Plate 4 - Piston Rod 9 - O-Ring 14 - Bolt 5 - *Wear Ring 10 - Spacer

© NOTE: *: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 1 used ZAXIS500LC-3, 520LCH-3: 2 used

**: The parts are used for ZAXIS500LC-3, 520LCH-3.

Assemble Track Adjuster

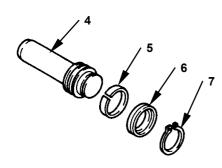
IMPORTANT: Apply grease to wear ring (5) and U-ring (6).

Install U-ring (6) with the lip facing to rod (15).

1. After cleaning all parts, install the following parts below to piston rod (4).

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: Wear ring (5), retaining ring (7) and U-ring (6) ZAXIS500LC-3, 520LCH-3:

Wear ring (5) (2 used), backup ring (17), U-ring (6), plate (18) and retaining ring (7)

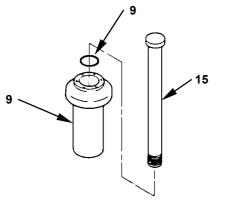


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CAUTION: Rod (15) weight: 21 kg (50 lb)

2. Apply grease to O-ring (9). Install O-ring (9) to cylinder (8). Install eyebolt (M16, Pitch 2.0 mm) to rod (15). Attach a nylon sling. Hoist and install rod (15) to cylinder (8).



W142-03-04-012

IMPORTANT: Fill chamber (B) in cylinder (8) with grease. Push piston rod (4) and completely release pressure in chamber (B) and rod (15).

Apply hydraulic oil to the inner sur-

Apply hydraulic oil to the inner surface of cylinder (8) and piston rod (4).

3. Install eyebolt (M16, Pitch 2.0 mm) to piston rod (4). Attach a nylon sling. Hoist and install piston rod (4) to cylinder (8).

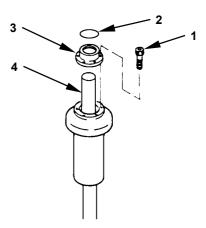
IMPORTANT: Fill chamber (A) in guide (3) with grease.

Apply grease to O-ring (2) and apply LOCTITE #262 to socket bolts (1) (4 used).

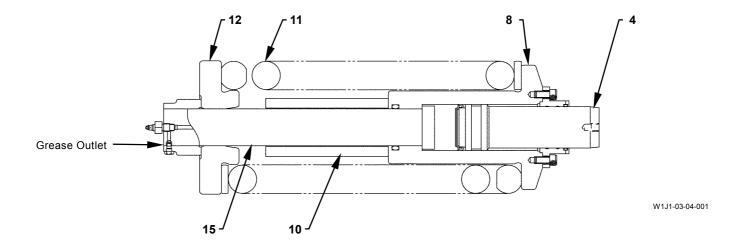
4. Install O-ring (2) to guide (3). Install guide (3) to cylinder (8) with socket bolts (1) (4 used).

: 12 mm

--- : 140 N·m (14 kgf·m, 103 lbf·ft)



W142-03-04-018



A

CAUTION: Bracket (12) weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 22

kg (48.5 lb)

ZAXIS500LC-3, 520LCH-3: 21.5 kg (47.4 lb) Spring (11) weight: ZAXIS450-3, 450LC-3,

470H-3, 470LCH-3: 122 kg (270 lb)

ZAXIS500LC-3, 520LCH-3: 150 kg (331 lb)

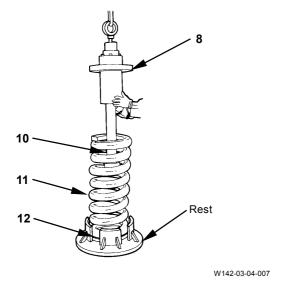
5. Attach a nylon sling to bracket (12). Hoist and place bracket (12) and spacer (10) on the rest. Attach the nylon sling to spring (11). Hoist and place spring (11) onto bracket (12). Secure bracket (12) and spring (11) together by using pieces of wire.



CAUTION: The Cylinder (8) assembly weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 75 kg (165 lb)

ZAXIS500LC-3, 520LCH-3: 102 kg (225 lb)

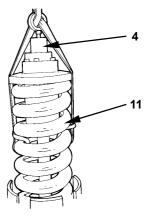
6. Install eyebolt (M16, Pitch 2.0 mm) to piston rod (4). Hoist the cylinder (8) assembly. Align spacer (10) and bracket (12) and install the cylinder (8) assembly.





CAUTION: Track adjuster weight: ZAXIS450-3, 470H-3: 235 kg (518 lb) ZAXIS450LC-3, 470LCH-3: 239 kg (527 lb) ZAXIS500LC-3, 520LCH-3: 365 kg (805 lb)

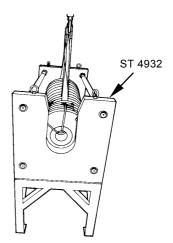
7. Attach a nylon sling to spring (11) and pass it through eyebolt on piston rod (4). Hoist and place spring (11) horizontally and slowly.



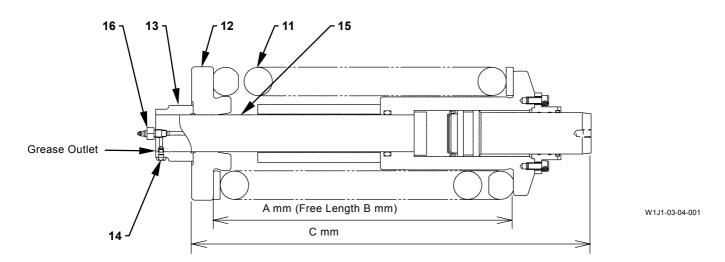
W142-03-04-006

IMPORTANT: Set rod (15) with its grease outlet facing downward.

8. Hoist and set the track adjuster on special tool (ST 4932). Remove eyebolt from piston rod (4).



W142-03-04-005



NOTE: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: A=620 mm (24.4 in), B=782 mm (30.8 in), C=830 mm (32.7 in) ZAXIS500LC-3, 520LCH-3: A=590 mm (23.2 in), B=733 mm (28.9 in), C=885 mm (34.9 in)

IMPORTANT: Slowly compress spring (11) while aligning the center of rod (15) with that of bracket (12) by using a pry

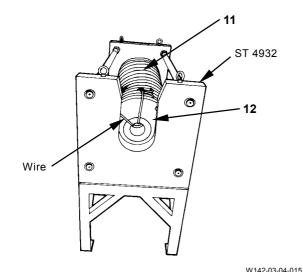
Do not damage the threads on rod (15).

9. Operate the cylinder of special tool (ST 4932) and remove a wire. Compress spring (11) until specified spring (11) length (A) is obtained.

NOTE: Specified Spring Length (A)

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:
782 mm (30.8 in)

ZAXIS500LC-3, 520LCH-3:
733 mm (28.9 in)

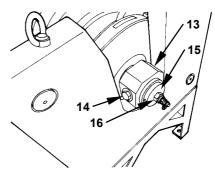


IMPORTANT: Align the matching marks made when disassembling. Check that the grease outlet in rod (15) is aligned with that in nut (13).

10. Install nut (13) to rod (15). Secure nut (13) to rod (15) with bolt (14).

: 100 mm : 17 mm

: 39 N·m (4 kgf·m, 29 lbf·ft)



W142-03-04-020

11. Install valve (16) to rod (15).

24 mm

: 147 N·m (15 kgf·m, 108 lbf·ft)

12. Retract the cylinder of special tool (ST 4932).

A

CAUTION: Track adjuster weight: ZAXIS450-3, 470H-3: 235 kg (518 lb) ZAXIS450LC-3, 470LCH-3: 239 kg (527 lb) ZAXIS500lc-3, 520lch-3: 365 kg (805 lb)

13. Attach a nylon sling to the track adjuster. Hoist and remove the track adjuster from special tool.



CAUTION: If only the spring assembly is transported, use a firm steel box and take any other precautions in order to carry the track adjuster safely.

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REMOVE AND INSTALL FRONT IDLER

Before removing and installing the front idler, the tracks must be removed first. For removal and installation of the tracks, refer to "Remove and Install Track" section (W3-7-1).

In this section, the procedure starts on the premise that the tracks have already been removed.

Removal

A

CAUTION: Front idler weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

281 kg (619 lb)

ZAXIS500LC-3, 520LCH-3: 353 kg (778 lb)

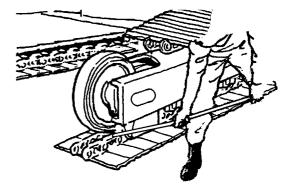
The front idler may fly off due to the strong spring force when removing the track adjuster. Do not stand in the same direction to remove the front idler or where the front idler flies off.

- 1. Pry and remove the front idler and yoke (4) from track frame (1) by using a pry bar.
- 2. Attach a nylon sling to bearing (5) and yoke (4) sections. Hoist and remove the front idler assembly from track frame (1).
- 3. Remove socket bolts (2) and remove guard (3) from yoke (4).

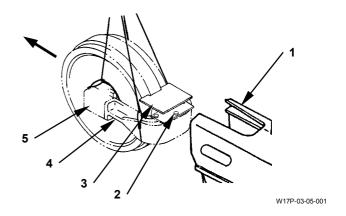
: 19 mm

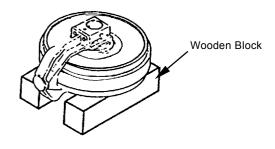
: 90 N·m (9.2 kgf·m, 66 lbf·ft)

4. When storing the front idler, place the front idler on wooden block as illustrated.



W142-03-05-002





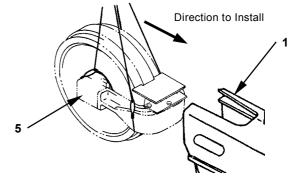
W105-03-05-003

Installation



CAUTION: Front idler weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 281 kg (619 lb) ZAXIS500LC-3, 520LCH-3: 353 kg (778 lb)

- 1. Install the front idler in reverse procedures when removing.
- Clean and apply grease to the bearing (5) sliding surface on track frame (1).

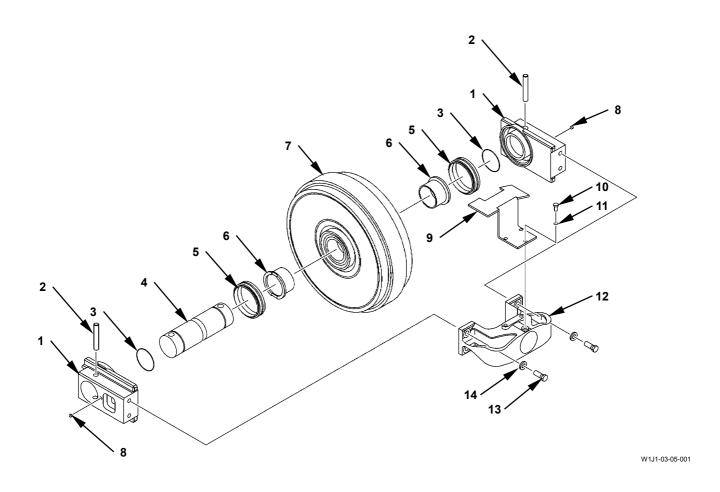


W17P-03-05-001

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DISASSEMBLE FRONT IDLER

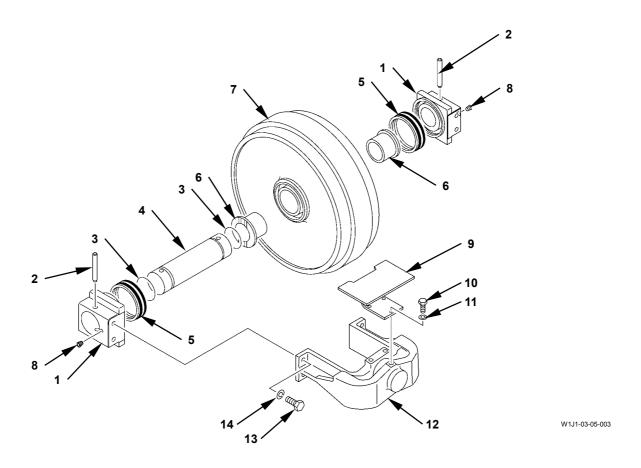
ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3



- 1 Bearing (2 Used) 2 Pin (2 Used)
- 3 O-Ring (2 Used) 4 Axle

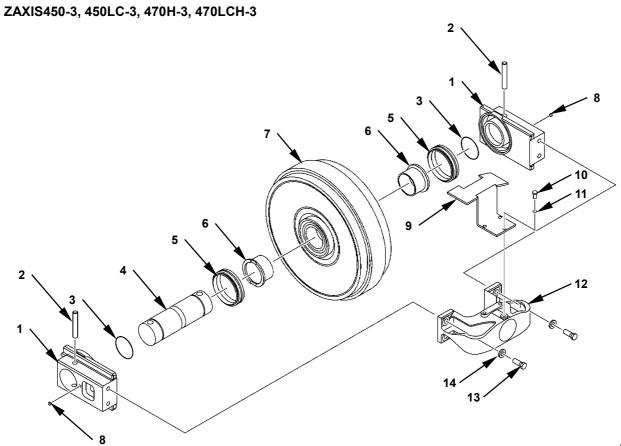
- 5 Floating Seal (2 Used)
- 6 Bushing (2 Used) 7 Idler
- 8 Plug (2 Used)
- 9 Guard
- 10 Bolt (3 Used) 11 Spring Washer (3 Used)
- 12 Yoke
- 13 Bolt (4 Used) 14 Spring Washer (4 Used)

ZAXIS500LC-3, 520LCH-3



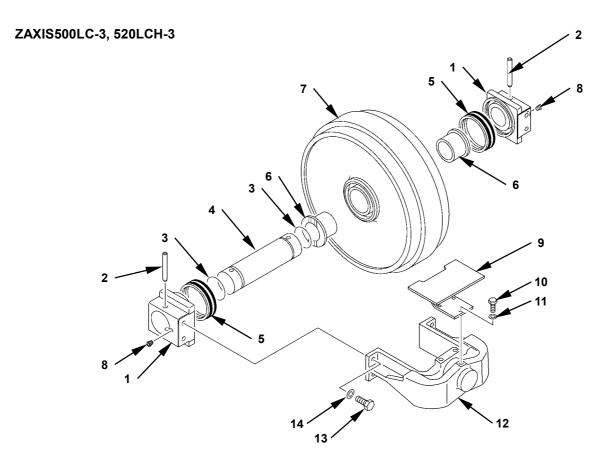
- 1 Bearing (2 Used)
- 2 Pin (2 Used)
- 3 O-Ring (2 Used)
- 4 Axle

- 5 Floating Seal (2 Used)
- 6 Bushing (2 Used)
- 7 Idler
- 8 Plug (2 Used)
- 9 Guard
- 10 Bolt (3 Used)
- 11 Spring Washer (3 Used)
- 12 Yoke
- 13 Bolt (4 Used) 14 Spring Washer (4 Used)



W1J1-03-05-001

W1J1-03-05-003



Disassemble Front Idler

1. Loosen bolts (10) (3 used), and spring washers (11) (3 used) from guard (9). Remove guard (9) from yoke (12).

: 19 mm



CAUTION: Yoke (12) weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

44 kg (97 lb)

ZAXIS500LC-3, 520LCH-3: 70 kg (154 lb)

2. Attach a nylon sling to yoke (12) and hold yoke (12). Remove bolts (13) (4 used) and spring washers (14) (4 used). Hoist and remove yoke (12) from bearings (1) (2 used).

→ : 30 mm

3. Remove plug (8) from bearing (1). Drain off oil.

: 6 mm

4. Remove pin (2) from bearing (1) by using a bar and hammer.

A

CAUTION: The idler (7) assembly weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

232 kg (511 lb)

ZAXIS500LC-3, 520LCH-3: 183 kg (403 lb)

Axle (4) weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

28 kg (62 lb)

ZAXIS500LC-3, 520LCH-3: 31.4 kg (69 lb)

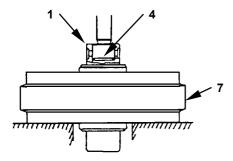
Bearing (1) weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

27 kg (60 lb)

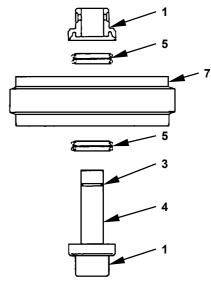
ZAXIS500LC-3, 520LCH-3: 18 kg (40 lb)

5. Put the matching marks on bearing (1) and axle (4). Remove the axle (4) assembly from idler (7) by using press.

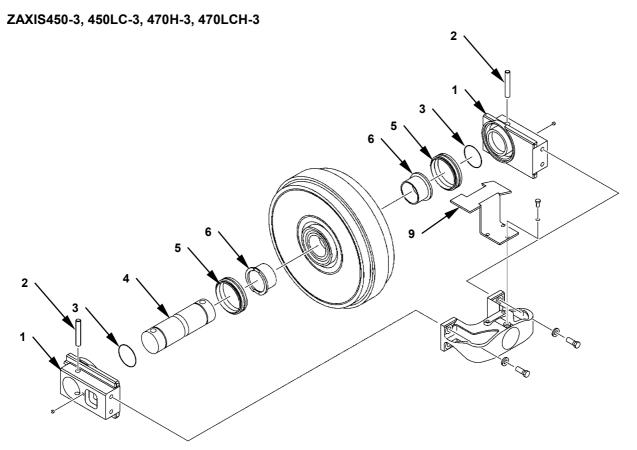


W105-03-05-008

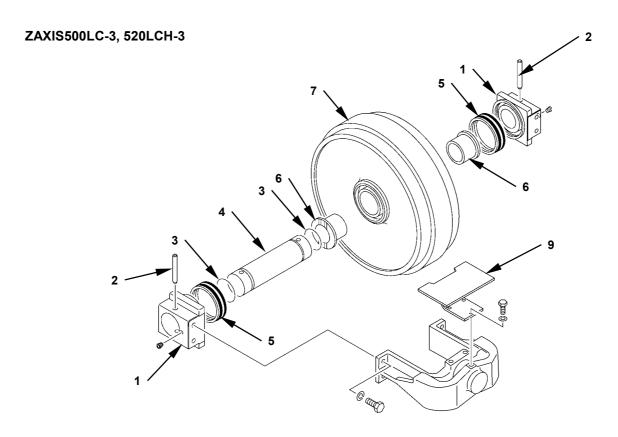
6. Remove bearing (1) from the upper side of idler (7). Remove floating seals (5) (2 used) from both sides of idler (7) and bearing (1).



W105-03-05-009



W1J1-03-05-001



W1J1-03-05-003



CAUTION: The axle (4) assembly weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 54 kg (119 lb)

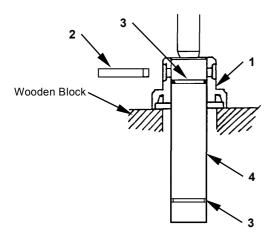
ZAXIS500LC-3, 520LCH-3: 50 kg (110 lb)

IMPORTANT: Place wooden blocks or etc. under the lower part of bearing (1) in order not to damage bearing (1).

- 7. Wind a nylon sling to the axle (4) assembly. Hoist and place bearing (1) onto wooden blocks.
- 8. Remove pin (2) from bearing (1) by using a bar and hammer.

Put the matching marks on bearing (1) and axle (4). Remove axle (4) from bearing (1) by using a press.

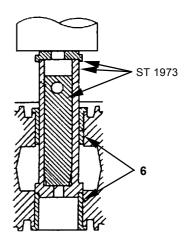
Remove O-rings (3) (2 used) from axle (4).



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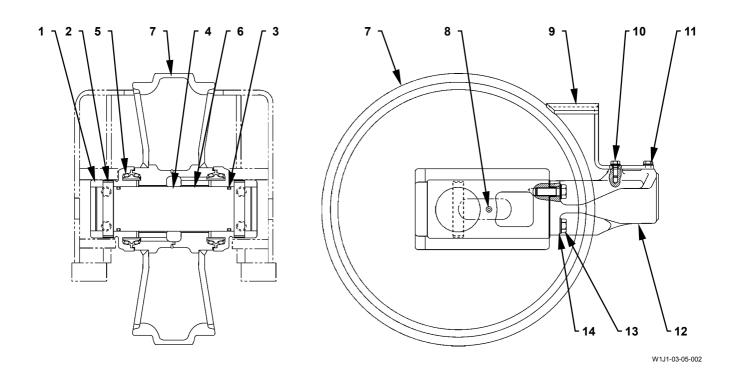
IMPORTANT: Do not remove bushing (6) unless necessary.

9. When replacing bushing (6), remove bushing (6) by using special tool (ST 1973) and a press.



W105-03-05-011

ASSEMBLE FRONT IDLER



- 1 Bearing (2 Used)
- 2 Pin (2 Used)
- 3 O-Ring (2 Used) 4 Axle

- 5 Floating Seal (2 Used)
- 6 Bushing (2 Used)
- 7 Idler
- 8 Plug (2 Used)
- 9 Guard
- 10 Bolt (3 Used)
- 11 Spring Washer (3 Used)
- 12 Yoke
- 13 Bolt (4 Used)
- 14 Spring Washer (4 Used)

Assemble Front Idler



CAUTION: Idler (7) weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

150 kg (331 lb)

ZAXIS500LC-3, 520LCH-3: 208 kg (459 lb)

1. Install bushing (6) to idler (7).



CAUTION: Axle (4) weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

28 kg (62 lb)

ZAXIS500LC-3, 520LCH-3: 31.4 kg (69 lb)

Bearing (1) weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

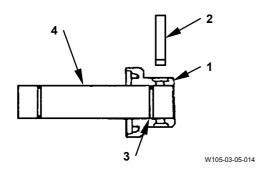
27 kg (60 lb)

ZAXIS500LC-3, 520LCH-3: 18 kg (40 lb)

2. Wind a nylon sling to axle (4). Hoist and place axle (4) vertically. Install O-ring (3) (1 used) onto the upper side of axle (4).

IMPORTANT: Align the matching marks made when disassembling.

3. Evenly tap and install bearing (1) into axle (4) by using a plastic hammer. Insert pin (2) into bearing (1) by using a bar and hammer.



4. Apply grease to O-ring (3) on the floating seal (5). Install a pair of floating seals (5) to idler (7) and bearing (1).



CAUTION: The axle (4) assembly weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 54 kg (119 lb) ZAXIS500LC-3, 520LCH-3: 50 kg (110 lb)

- 5. Wind a nylon sling to bearing (1) of the axle (4) assembly. Hoist and insert the axle (4) assembly into idler (7) from the side where floating seal (5) has already been installed.
- 6. Apply LOCTITE #503 to plug (8). Install plug (8) to bearing (1).

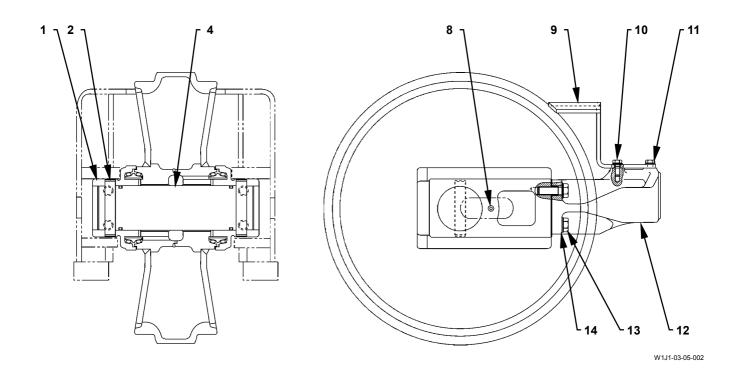
: 6 mm

: 20 N·m (2 kgf·m, 15 lbf·ft)

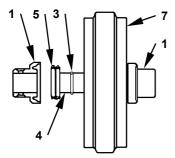


CAUTION: The idler (7) assembly weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 183 kg (403 lb) ZAXIS500LC-3, 520LCH-3: 286 kg (631 lb)

7. Wind a nylon sling to the idler (7) assembly. Hoist and turn over the idler (7) assembly. Install O-ring (3) to axle (4).



8. Apply grease to O-ring (3) of floating seal (5). Install the other floating seal (5) to idler (7) and bearing (1).



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IMPORTANT: Align the matching marks made when disassembling.

- 9. Evenly tap and install bearing (1) into axle (4) by using a plastic hammer. Insert pin (2) into bearing (1) by using a bar and hammer.
- 10. Add engine oil (API CD grade SAE30) 450 mL (0.12 US gal.) via the plug (8) hole on bearing (1).
- 11. Apply LOCTITE #503 to plug (8). Install plug (8) to bearing (1).

: 6 mm

: 20 N·m (2 kgf·m, 15 lbf·ft)

A

CAUTION: Yoke (12) weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

44 kg (97 lb)

ZAXIS500LC-3, 520LCH-3: 70 kg (154 lb)

- 12. Wind a nylon sling to yoke (12). Hoist and align the bolt (13) hole on the yoke (12) and bearing (1).
- 13. Install yoke (12) to bearings (1) (2 used) with bolts (13) (4 used) and spring washers (14) (4 used).

: 30 mm

: 392 N·m (40 kgf·m, 290 lbf·ft)

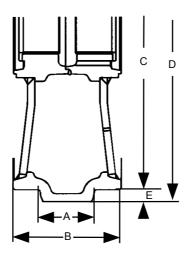
14. Install guard (9) to yoke (12) with bolts (10) (3 used) and spring washers (11) (3 used).

: 19 mm

: 88·m (9 kgf·m, 65lbf·ft)

MAINTENANCE STANDARD

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3



W166-03-05-001

Unit: mm (in)

	Standard	Allowable Limit	Remedy		
Α	116 (4.6)	[88.4 (3.5)]			
В	234 (9.2)	-			
С	716 (28.2)		Cladding by welding and finish or replace		
D	761 (30)	-	and linish of replace		
E	(22.5 (0.9)	32.5 (1.3)			

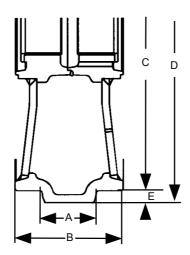
Axle and Bushing

Unit: mm (in)

		Standard	Allowable Limit	Remedy
Axle	Outside Dia.	110 (4.33)	[109.2 (4.30)]	
Bushing	Inside Dia.	111 (4.37)	[112 (4.41)]	Replace
	Flange Thickness	6 (0.24)	[5.2 (0.21)]	

NOTE: Values in [] are just for reference.

ZAXIS500LC-3, 500LCH-3



W166-03-05-001

Unit: mm (in)

	Standard	Allowable Limit	Remedy		
Α	116 (4.6)	[88.4 (3.5)]			
В	234 (9.2)	-			
С	716 (28.2)		Cladding by welding and finish or replace		
D	761 (30)	-	and linish of replace		
E	(22.5 (0.9)	32.5 (1.3)			

Axle and Bushing

Unit: mm (in)

		Standard	Allowable Limit	Remedy
Axle	Outside Dia.	110 (4.33)	[109.2 (4.30)]	
Bushing	Inside Dia.	111 (4.37)	[112 (4.41)]	Replace
	Flange Thickness	6 (0.24)	[5.2 (0.21)]	

NOTE: Values in [] are just for reference.

(Blank)

REMOVE AND INSTALL UPPER ROLLER

Removal



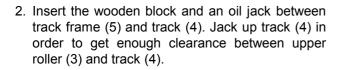
CAUTION: Grease pressure in the adjuster cylinder is high. Do not loosen valve (1) quickly or too much as valve (1) may fly off or high-pressure grease in the adjuster cylinder may gush out.

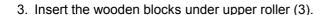
Keep body parts and face away from valve (1) and loosen valve (1) carefully. Do not loosen grease fitting (2).

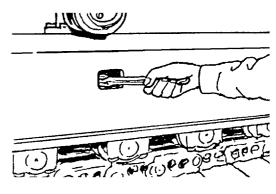
IMPORTANT: Remove any mud or gravel between sprockets and tracks before loosening valve (1). It is enough to loosen valve (1) by 1 to 1.5 turns.

1. Loosen valve (1) on the track adjuster. Drain grease and release the tension of track link.

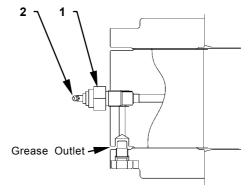
: 24 mm



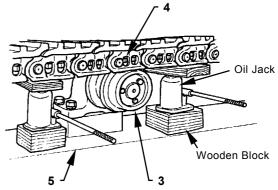




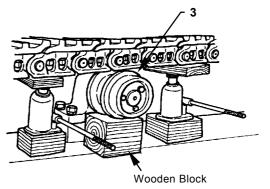
W105-03-06-001



W800-03-07-002



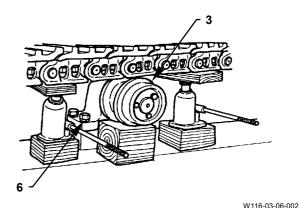
W116-03-06-001



W116-03-06-002

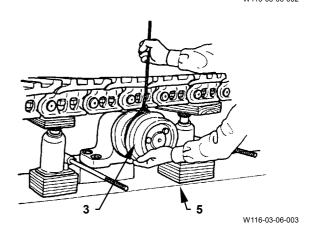
4. Remove bolts (6) (4 used) from upper roller (3).

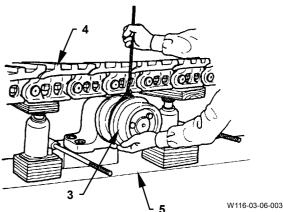
: 27 mm

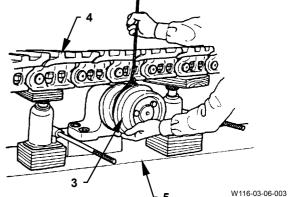


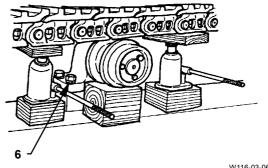
CAUTION: Upper roller (3) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 39 kg (86 lb) ZAXIS500LC-3, 520LCH-3: 46.5 kg (102.5 lb)

5. Attach a nylon sling to the roller part of upper roller (3). Hoist and remove upper roller (3) from track frame (5).









W116-03-06-002

Installation



CAUTION: Upper roller (3) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 39 kg (86 lb) ZAXIS500LC-3, 520LCH-3: 46.5 kg (102.5 lb)

1. Hoist and insert upper roller (3) between track frame (5) and track (4).

Insert the wooden blocks between upper roller (3) and track frame (5) and hold upper roller (3). Align the holes for bolt (6) and install upper roller (3) with bolts (6) (4 used).

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

27 mm

: 400 N·m (41 kgf·m, 295 lbf·ft)

ZAXIS500LC-3, 520LCH-3:

30 mm

: 550 N·m (41 kgf·m, 406 lbf·ft)

2. Remove the wooden blocks and oil jack.

3. Tighten valve (1) on the track adjuster.

: 24 mm

: 147 N·m (15 kgf·m, 108 lbf·ft)



CAUTION: If track sag should be measured with the machine raised, support the jacked up machine firmly by using the wooden blocks.

4. Jack up the track to be measured. Apply grease via grease fitting (2) and adjust track tension.

Track sag specifications (A):

ZAXIS450-3, 470H-3: 380 to 430 mm

(15 to 17 in)

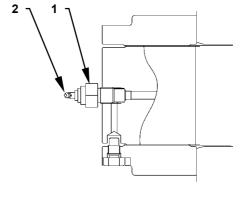
ZAXIS450LC-3, 470LCH-3: 390 to 440 mm

(15.4 to 17.3 in)

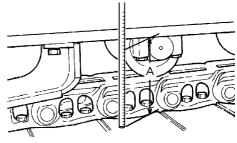
ZAXIS500LC-3, 520LCH-3: 430 to 480 mm

(17 to 19 in)

NOTE: Before measuring track sag, clean the track frame and tracks and rotate the track by a half turn in reverse direction.



W800-03-07-002



W800-03-06-001

IMPORTANT: Replace the upper roller as an assembly.

5. Add engine oil (API CD class SAE 30) through the plug (8) hole on cover (7).

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

120 mL (0.03 US gal.))

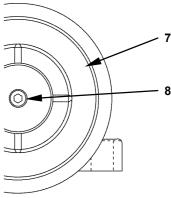
ZAXIS500LC-3, 520LCH-3:

150 mL (0.04 US gal.)

6. Apply LOCTITE #503 to plug (8). Install plug (8) to cover (7).

: 6 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)



W1J1-03-06-001

REMOVE AND INSTALL LOWER ROLLER

Removal

A

CAUTION: Track guard weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

40 kg (88 lb)

ZAXIS500LC-3, 520LCH-3: 56 kg (123 lb)

1. Remove the track guard.

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

→ : 32 mm

ZAXIS500LC-3, 520LCH-3:

→ : 36 mm

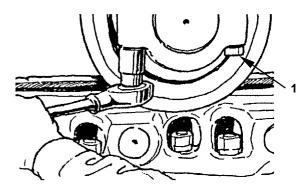
2. Remove bolts (1) (4 used) from the lower roller. ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

: 32 mm

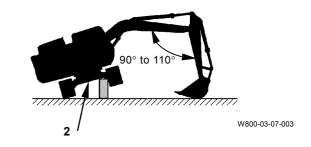
ZAXIS500LC-3, 520LCH-3:

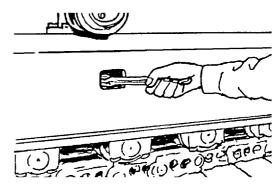
: 36 mm

3. Raise the machine by using the front attachment and insert the wooden blocks under track frame (2).

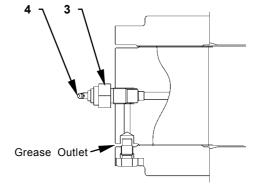


W105-03-06-008





W105-03-06-001



W800-03-07-002



CAUTION: Grease pressure in the adjuster cylinder is high. Do not loosen valve (3) quickly or too much as valve (3) may fly off or high-pressure grease in the adjuster cylinder may gush out.

Keep body parts and face away from valve (3) and loosen valve carefully.

Do not loosen grease fitting (4).

IMPORTANT: It is enough to loosen valve (3) by 1 to 1.5 turns. Do not loosen valve (3) over that degree.

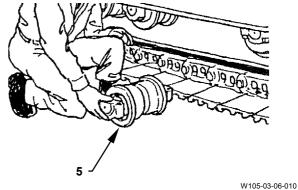
4. Loosen valve (3) on the track adjuster. Drain enough grease and permit the lower roller to be removed.

: 24 mm

A

CAUTION: Lower roller (5) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 80 kg (176 lb) ZAXIS500LC-3, 520LCH-3: 108 kg (238 lb)

5. Remove lower roller (5) by using a fork lift.



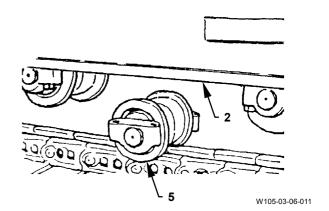
** 100 00 00 010

Installation



CAUTION: Lower roller (5) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 80 kg (176 lb) ZAXIS500LC-3, 520LCH-3: 108 kg (238 lb)

1. Set lower roller (5) under track frame (2) by using a fork lift.



 Lower the machine so that track frame (2) may keep a little clearance away from the collar of lower roller (5). Align lower roller (5) with the mounting hole for track frame (2). Install lower roller (5) to track frame (2) with bolts (1) (4 used). ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

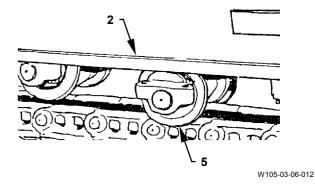
: 32 mm

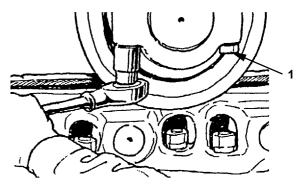
: 750 N·m (77 kgf·m, 553 lbf·ft)

ZAXIS500LC-3, 520LCH-3:

→ : 36 mm

- : 950 N⋅m (97 kgf⋅m, 700 lbf⋅ft)





W105-03-06-008

A

CAUTION: Track guard weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

80 kg (176 lb)

ZAXIS500LC-3, 520LCH-3: 108 kg (238 lb)

3. Install the track guard to track frame (2). ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

: 32 mm

: 750 N·m (77 kgf·m, 553 lbf·ft)

ZAXIS500LC-3, 520LCH-3:

: 36 mm

: 950 N·m (97 kgf·m, 700 lbf·ft)

4. Tighten valve (3) on the track adjuster.

24 mm

: 147 N·m (15 kgf·m, 108 lbf·ft)



CAUTION: If track sag should be measured with the machine raised, support the jacked up machine firmly by using the wooden blocks.

5. Apply grease via grease fitting (4) and adjust track tension.

Track sag specifications (A):

ZAXIS450-3, 470H-3: 380 to 430 mm

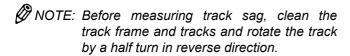
(15 to 17 in)

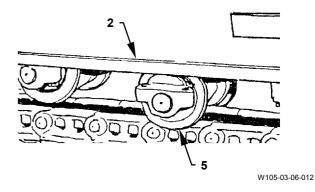
ZAXIS450LC-3, 470LCH-3: 390 to 440 mm

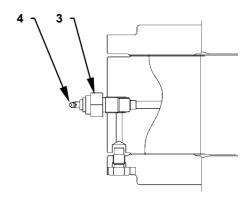
(15.4 to 17.3 in)

ZAXIS500LC-3, 520LCH-3: 430 to 480 mm

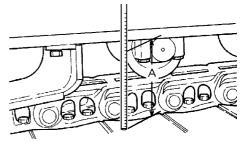
(17 to 19 in)





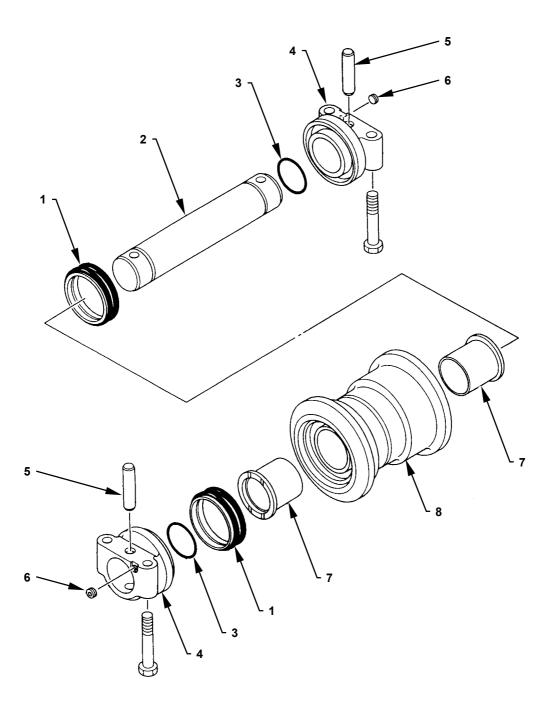


W800-03-07-002



W800-03-06-001

DISASSEMBLE LOWER ROLLER



W166-03-06-006

- 1 Floating Seal (2 Used)
- 2 Axle

- 3 O-Ring (2 Used) 4 Collar (2 Used)
- 5 Pin (2 Used)
- 6 Plug (2 Used)
- 7 Bushing (2 Used)
- 8 Roller

Disassemble Lower Roller

IMPORTANT: Put the matching marks on collar (4) and axle (2).

 Remove plug (6) from the end of collar (4). Drain oil. (2 places). Remove pin (5) from collar (4) (2 places) by using a bar (Dia. 25 mm (1.0 in)) and hammer.

: 6 mm

A

CAUTION: Lower roller (8) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 80 kg (176 lb) ZAXIS500LC-3, 520LCH-3: 108 kg (238 lb)

2. Set the roller (8) assembly to the press. Push axle (2) until O-ring (3) is removed from collar (4) by using a press. Remove collar (4) from axle (2).

NOTE: Collar (4) can be removed if axle (2) is pushed in by approx. 55 mm (2.2 in) by using a press.

3. Remove floating seal (1) from collar (4) and roller (8).

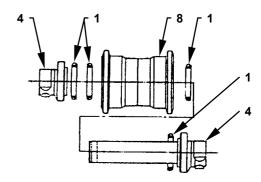
Remove O-ring (3) from axle (2).

A

CAUTION: Axle (2) weight + collar (4) weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 25 kg (55 lb) ZAXIS500LC-3, 520LCH-3: 38 kg (84 lb)

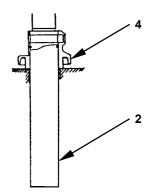
4. Remove the axle (2) assembly from roller (8).

5. Remove floating seal (1) from roller (8) and collar (4).



W105-03-06-026

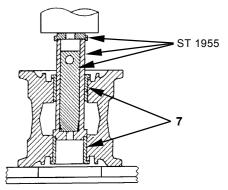
6. Set the axle (2) assembly to a press. Remove axle (2) from collar (4).



W105-03-06-027

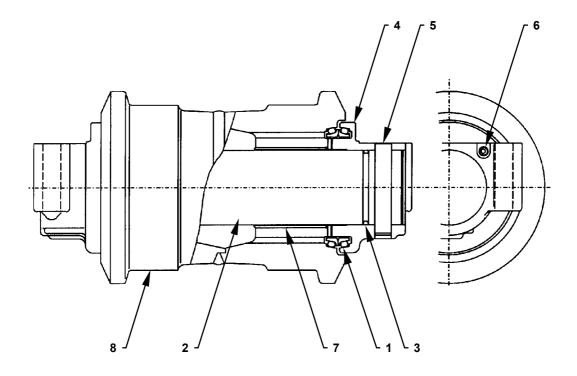
7. Remove O-ring (3) from axle (2).

8. When replacing bushing (7), remove bushing (7) by using special tool (ST 1955) and a press.



W105-03-06-028

ASSEMBLE LOWER ROLLER



W162-03-06-002

- 1 Floating Seal (2 Used) 2 Axle

- 3 O-Ring (2 Used) 4 Collar (2 Used)

- 5 Pin (2 Used) 6 Plug (2 Used)
- 7 Bushing (2 Used) 8 Roller

UNDERCARRIAGE / Upper and Lower Roller

Assemble Lower Roller



CAUTION: Lower roller (8) weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

47 kg (104 lb)

ZAXIS500LC-3, 520LCH-3: 61 kg (134 lb)

Axle (2) weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

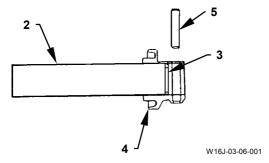
20 kg (44 lb)

ZAXIS500LC-3, 520LCH-3: 29 kg (62 lb)

 Install bushings (7) (2 used) to roller (8). Do not dent the flange surface of bushing (7).
 Apply much grease to O-ring (3) and install O-ring (3) to axle (2).

IMPORTANT: Align the matching marks made when disassembling.

2. Install one of collar (4) to axle (2). Do not damage O-ring (3). Tap pin (5) into the pin hole and secure collar (4) on axle (2).

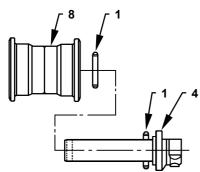




CAUTION: Lower roller (8) assembly weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 80 kg (176 lb)

ZAXIS500LC-3, 520LCH-3: 108 kg (238 lb)

3. Apply grease to the O-ring part on floating seal (1). Install floating seal (1) to roller (8) and collar (4).



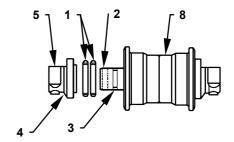
W157-03-06-008



CAUTION: The axle (2) assembly weight: ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3: 25 kg (55 lb)

ZAXIS500LC-3, 520LCH-3: 38 kg (84 lb)

4. Insert axle (2) into roller (8). Install O-ring (3) with grease applied to axle (2). Install other collar (4) and floating seal (1) in the same procedures and secure with pin (5).

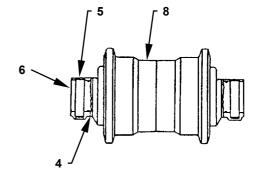


W157-03-06-009

- 5. Fill engine oil (API CD class SAE30) 1.0 L (0.26 US gal.) via the plug (6) hole on collar (4) on both sides.
- 6. Apply LOCTITE #503 or equivalent to plug (6). Install plugs (6) (2 used) to collars (4) on both sides.

• : 6 mm

: 20 N·m (2 kgf·m, 14.5 lbf·ft)



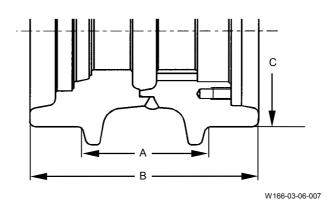
W105-03-06-024

UNDERCARRIAGE / Upper and Lower Roller

MAINTENANCE STANDARD

Upper Roller

• Roller



ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3

Unit: mm (in)

	Standard	Allowable Limit	Remedy
Α	103 (4.1)	-	
В	210 (8.3)	-	Replace
С	170 (6.7)	160 (6.3)	

ZAXIS500LC-3, 520LCH-3

	Standard	Allowable Limit	Remedy
Α	114 (4.5)	-	
В	220 (8.7)	-	Replace
С	180 (7.1)	[170 (6.7)]	

· Axle and Bushing

ZAXIS45<u>0-3</u>, 450LC-3, 470H-3, 470LCH-3

Unit: mm (in)

		Standard	Allowabel Limit	Remedy
Axle	Outside Dia.	60 (2.4)	[59.2 (2.3)]	
Bushing	Inside Dia.	61 (2.4)	[62 (2.4)]	Replace
Bushing	Flange Thickness	4.5 (0.2)	[3.7 (0.1)]	

ZAXIS500LC-3, 520LCH-3

Unit: mm (in)

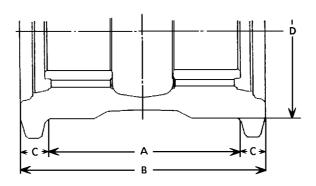
		Standard	Allowabel Limit	Remedy
Axle	Outside Dia.	68 (2.7)	[67.2 (2.6)]	
Duching	Inside Dia.	69 (2.7)	[70 (2.8)]	Replace
Bushing	Flange Thickness	4.5 (0.2)	[3.7 (0.1)]	

NOTE: The values in [] are just for reference.

UNDERCARRIAGE / Upper and Lower Roller

Lower Roller

Roller



W157-03-06-003

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3

Unit: mm (in)

	Standard	Allowable Limit	Remedy
Α	214 (8.4)	[249 (9.8)]	
В	284 (11.2)	-	Clad by welding and
С	35 (1.4)	[17.5 (0.7)]	finish or replace
D	200 (7.9)	180 (7.1)	

ZAXIS500LC-3, 520LCH-3

Unit: mm (in)

	Standard	Allowable Limit	Remedy
Α	246 (9.7)	[283 (11.1)]	
В	320 (12.6)	-	Clad by welding and
С	37 (1.5)	[18.5 (0.7)]	finish or replace
D	220 (8.7)	[202 (8.0)]	

· Axle and Bushing

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3

Unit: mm (in)

		Standard	Allowable Limit	Remedy
Axle	Outside Dia.	85 (3.3)	[84.2 (3.3)]	
Puching	Inside Dia.	86 (3.4)	[87.0 (3.4)]	Replace
Bushing	Flange Thickness	6 (0.2)	[5.2 (0.2)]	

ZAXIS500LC-3, 520LCH-3

Unit: mm (in)

		Standard	Allowable Limit	Remedy
Axle	Outside Dia.	100 (3.9)	[99.2 (3.9)]	
Pushing	Inside Dia.	101 (4.0)	[102 (4.0)]	Replace
Bushing	Flange Thickness	6 (0.2)	[5.2 (0.2)]	

NOTE: The values in [] are just for reference.

UNDERCARRIAGE / Upper and Lower Roller (Blank)

REMOVE AND INSTALL TRACK

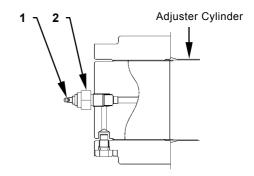
Removal



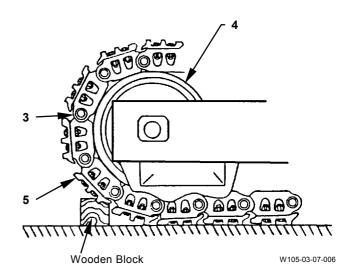
CAUTION: Grease pressure in the adjuster cylinder is high. Do not loosen valve (2) quickly or too much as valve (2) may fly off or high-pressure grease in the cylinder may gush out.

Keep body parts and face away from valve (2) and loosen valve (2) carefully. Do not loosen grease fitting (1).

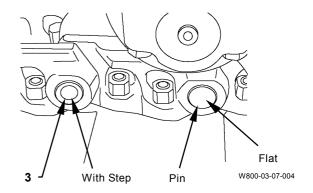
- 1. Loosen valve (2) in the track adjuster and drain grease.
- 2. Rotate the track so that master pin (3) is positioned at the upper of front idler (4). Place a wooden block under shoe (5) and support shoe (5).



W800-03-07-027



NOTE: The heads in both ends of master pin (3) are the stepped-shape. The heads of other pins are the flat-shape. As master pin (3) is symmetrical, master pin (3) can be removed from and installed to both directions.





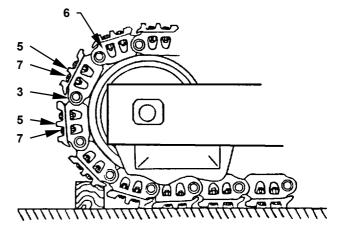
CAUTION: Shoe (5) weight:

ZAXIS450-3, 450LC-3, 470H-3, 470LCH-3:

600 mm: 28 kg (62 lb) 750 mm: 36 kg (79 lb) 900 mm: 42 kg (93 lb) ZAXIS500LC-3, 520LCH-3: 600 mm: 32 kg (71 lb) 600 mm (WG): 31 kg (68 lb) 750 mm: 40 kg (88 lb) 900 mm: 48 kg (106 lb)

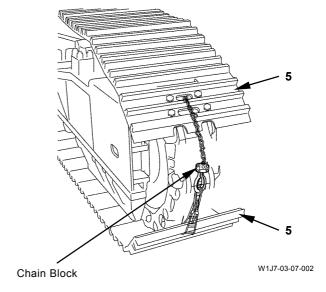
3. Remove bolts (7) (8 used) from shoes (5) (2 used) at front and rear of master pin (3). Remove shoes (5) (2 used) from track link (6).

→ : 41 mm



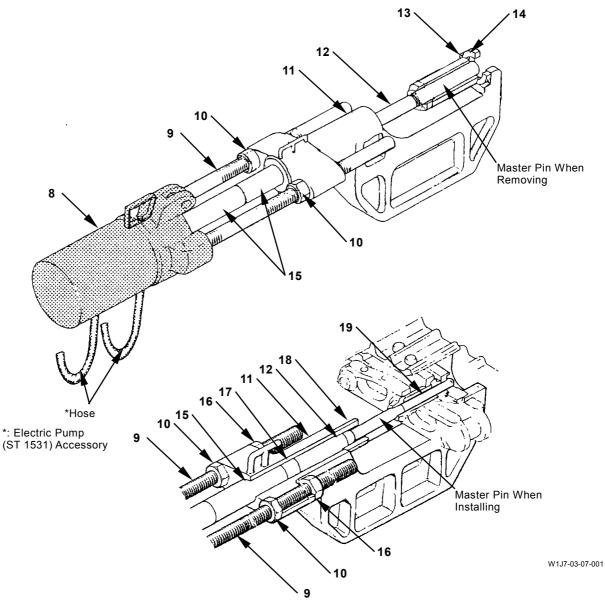
W105-03-07-006

4. Secure shoes (5) (2 used) at front and rear of master pin (3) by using a chain block.



	UNDERCARRI	AGE / Irack	
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ASSEMBLE SPECIAL TOOL WHEN REMOVING AND INSTALLING MASTER PIN



8 - Hydraulic Cylinder (ST 1512)

11 - Frame (ST 1513)

14 - Adapter (ST 1518)

17 - Pilot (ST 1517)

9 - Screw (2 Used) (ST 1516)

12 - Pusher (ST 1521)

15 - Extension (3 Types) (ST 1514) 18 - Guide (ST 1525)

10 - Nut (2 Used) (ST 1515)

13 - Handling Screw (ST 1530)

16 - Nut (2 Used) (ST 1515)

19 - Guide Pin (ST 1529)

Assemble Special Tool (ST 1532) When Removing and Installing Master Pin

The procedures (steps 5 to 11) are for assembly of special tool (ST 1532) when removing and installing master pin. If special tool (ST 1532) when removing and installing master pin has already been assembled, these procedures are unnecessary.

IMPORTANT: Insert screws (9) (2 used) into the screw hole on hydraulic cylinder (8) completely. If screws (9) (2 used) are not inserted completely, screw (9) may be removed from hydraulic cylinder (8) when removing and installing master pin (3).

5. Install screws (9) (2 used) to hydraulic cylinder (8).

IMPORTANT: If lengths (A) of nut (10) at both sides are different, screw (9) may be deformed when removing and installing master pin (3). Install nuts (10) (2 used) to the position, same length (A) away from hydraulic cylinder (8).

6. Install nuts (10) (2 used) to screws (9) (2 used), where same length (A) away from hydraulic cylinder (8).



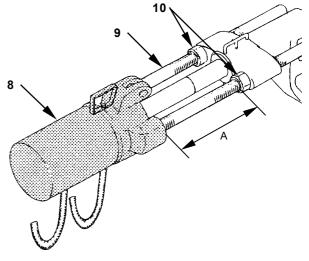
CAUTION: Frame (11) weight: 74 kg (163 lb)

- 7. Insert frame (11) into the position for nut (10) in screws (9) (2 used) and tighten with nut (16).
- 8. Install extension (15) to hydraulic cylinder (8).

NOTE: Extension (15) consists of three types. The length for each is different. When the stroke of hydraulic cylinder (8) is insufficient during removal / installation work, add extension (15) in order to extend the stroke.

- 9. Install pilot (17) and pusher (12) to extension (15).
- 10. Install adapter (14) to frame (11) with handling screw (13).

11. Install the hoses (2 used) of electric pump (ST 1531) to hydraulic cylinder (8).



W1J7-03-07-005

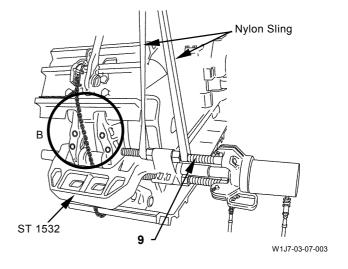


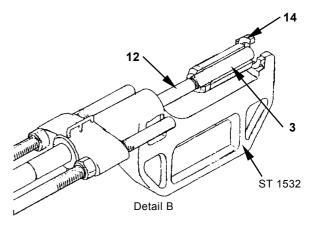
CAUTION: Special tool (ST 1532) when removing and installing master pin weight: 150kg (330 lb)

12. Attach a nylon sling to screws (9) (2 used) in special tool (ST 1532) when removing and installing master pin and hoist special tool. Move special tool (ST 1532) when removing and installing master pin to the mounting position for master pin (3). Adjust length of the nylon sling and align adapter (14) and pusher (12) in special tool (ST 1532) when removing and installing master pin with master pin (3).

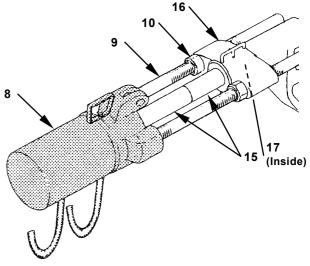
IMPORTANT: Align the centers of adapter (14) and pusher (12) with that of master pin (3). If the centers are not aligned and master pin (3) is removed, special tool (ST 1532) when removing and installing master pin may be deformed or damaged.

- 13. Align the end of master pin (3) with the hole of adapter (14) in special tool (ST 1532) when removing and installing master pin. Adjust hydraulic cylinder (8) and push pusher (12) to the end of master pin (3). Check for the installation conditions of master pin (3) and special tool (ST 1532) when removing and installing master pin.
- 14. Extend hydraulic cylinder (8) and push out master pin (3).
- NOTE: When the stroke of hydraulic cylinder (8) is insufficient, retract hydraulic cylinder (8) once. Add extension (15) between extension (15) and pilot (17) in order to extend the stroke. When extensions (15) (3 used) are added and the stroke of hydraulic cylinder (8) is insufficient, move the positions to install nuts (10, 16) (2 used for each) to the hydraulic cylinder (8) side.



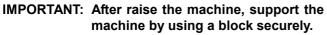


W1J7-03-07-004



W1J7-03-07-005

15. Remove special tool (ST 1532) when removing and installing master pin and a chain block from track link (6).



16. Turn the upperstructure 90° to the direction to remove the track. Set the angle between boom and arm in 90° to 110° and lower the bucket onto the ground. Raise the machine and support the machine by using a block.



CAUTION: The track assembly weight:

ZAXIS450-3, 470H-3:

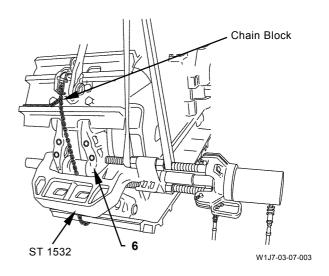
600 mm: 2450 kg (5401 lb) 750 mm: 2810 kg (6195 lb) ZAXIS450LC-3, 470LCH-3: 600 mm: 2470 kg (5445 lb)

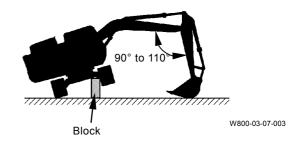
750 mm: 3040 kg (6702 lb) 900 mm: 3380 kg (7452 lb) ZAXIS500LC-3, 520LCH-3:

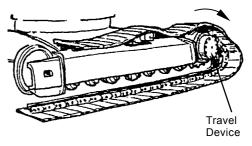
600 mm: 2975 kg (6559 lb) 600 mm (WG): 2915 kg (6426 lb)

750 mm: 3380 kg (7452 lb) 900 mm: 3745 kg (8256 lb)

17. Turn the travel device to the reverse direction and extend the track.







W105-03-07-011

Installation



CAUTION: The track assembly weight:

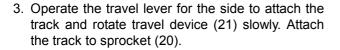
ZAXIS450-3, 470H-3:

600 mm: 2450 kg (5401 lb) 750 mm: 2810 kg (6195 lb) ZAXIS450LC-3, 470LCH-3: 600 mm: 2470 kg (5445 lb) 750 mm: 3040 kg (6702 lb) 900 mm: 3380 kg (7452 lb) ZAXIS500LC-3, 520LCH-3: 600 mm: 2975 kg (6559 lb)

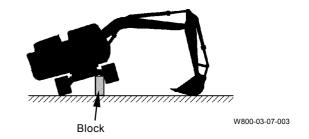
600 mm (WG): 2915 kg (6426 lb) 750 mm: 3380 kg (7452 lb) 900 mm: 3745 kg (8256 lb)

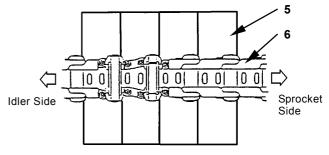
IMPORTANT: Check the direction of track.

- 1. Raise the machine and support the machine by using a block. Place the track under the machine so that the track end can mesh with sprocket (20).
- 2. Hoist the track at sprocket (20) side and mesh the tack with sprocket (20).

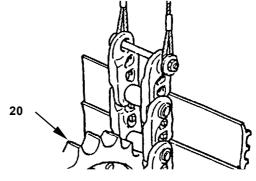


4. While rotating travel device (21) slowly, pass the track over the upper rollers (2 used) and attach the track to front idler (4).

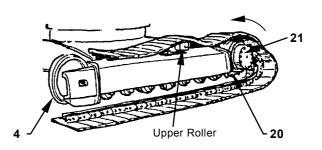




W105-03-07-013

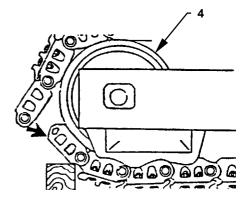


W105-03-07-014



W105-03-07-011

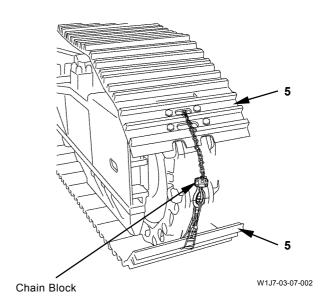
5. After the track is attached to front idler (4), raise the machine. Remove the block. Lower the machine.



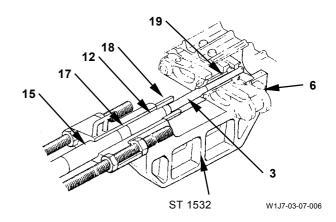
W1J7-03-07-007

IMPORTANT: Insert the tapered side of guide pin (19) first.

6. Secure shoe (5) of both ends of the track by using a chain block. Adjust the chain length by using the chain block and align with the master pin (3) mounting hole on track link (6). Insert guide pin (19) into the master pin (3) mounting hole.



- 7. Install extension (15), pilot (17), pusher (12) and master pin (3) to special tool (ST 1532) when removing and installing master pin.
- NOTE: Master pin (3) is symmetrical. Master pin (3) can be installed to both directions.
 - 8. Install guide (18) to master pin (3).



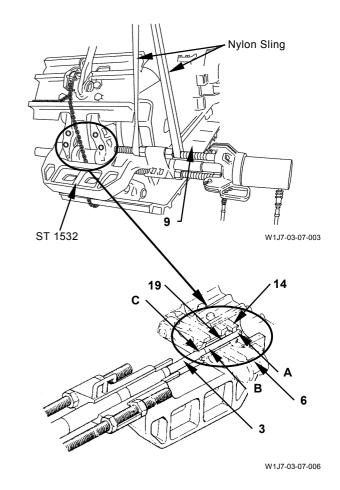


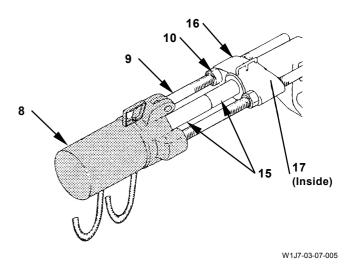
CAUTION: Special tool (ST 1532) when removing and installing master pin weight: 150 kg (330 lb)

9. Attach a nylon sling to screws (9) (2 used) in special tool (ST 1532) when removing and installing master pin and hoist special tool. Move special tool (ST 1532) when removing and installing master pin to the mounting position for master pin (3). Adjust length of the nylon sling and align the master pin (3) mounting hole with adapter (14) hole and of position C in master pin (3) in special tool (ST 1532) when removing and installing master pin.

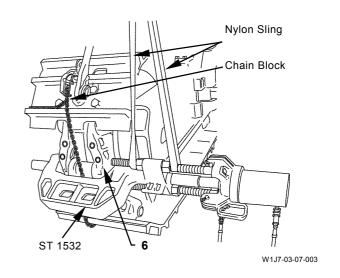
IMPORTANT: Align the centers of adapter (14) and master pin (3) with that of master pin (3) mounting hole. If the centers are not aligned and master pin (3) is installed, special tool (ST 1532) when removing and installing master pin may be deformed or damaged.

- 10. Align position A of guide pin (19) with the hole center of adapter (14) in special tool (ST 1532) when removing and installing master pin. Adjust hydraulic cylinder (8) and push master pin (3) to position B of guide pin (19). Check for the installation conditions of guide pin (19) and special tool (ST 1532) when removing and installing master pin.
- 11. Extend hydraulic cylinder (8) and insert master pin (3) until guide pin (19) is pushed out from the master pin mounting hole on track link (6).
- NOTE: When the stroke of hydraulic cylinder (8) is insufficient, retract hydraulic cylinder (8) once. Add extension (15) between extension (15) and pilot (17) in order to extend the stroke. When extensions (15) (3 used) are added and the stroke of hydraulic cylinder (8) is insufficient, move the positions to install nuts (10, 16) (2 used for each) to the hydraulic cylinder (8) side.





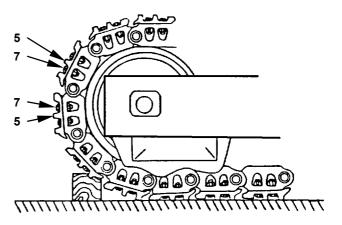
12. Remove special tool (ST 1532) when removing and installing master pin and a chain block from track link (6).



13. Install shoes (5) (2 used) with bolts (7) (8 used).

: 32 mm

: 750 N·m (77 kgf·m, 553 lbf·ft)



W105-03-07-006

14. Tighten valve (2). Apply grease through grease fitting (1) and adjust the track tension.

: 24 mm

: 147 N·m (15 kgf·m, 108 lbf·ft)

Track sag specifications (A):

ZAXIS450-3, 470H-3: 380 to 430 mm

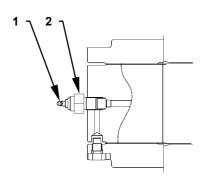
(15 to 17 in)

ZAXIS450LC-3, 470LCH-3: 390 to 440 mm

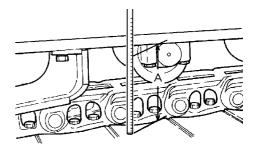
(15.4 to 17.3 in)

ZAXIS500LC-3, 520LCH-3: 430 to 480 mm

(17 to 19 in)

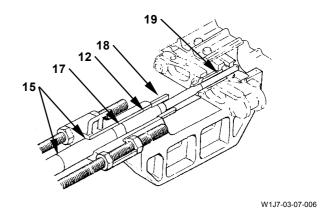


W800-03-07-027



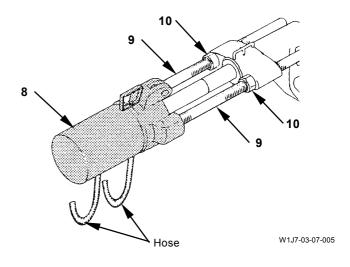
W800-03-06-001

15. Remove extension (15), pilot (17), pusher (12) and guide (18) from special tool (ST 1532) when removing and installing master pin.



16. Remove the hoses (2 used) of electric pump (ST 1531) from hydraulic cylinder (8). If special tool (ST 1532) when removing and installing master pin is disassembled and stored, disassemble according to the assembling procedures on W3-7-5 in reverse.

NOTE: Put the matching marks on screw (9) and nut (10) before removing screws (9) (2 used) and nuts (10) (2 used).

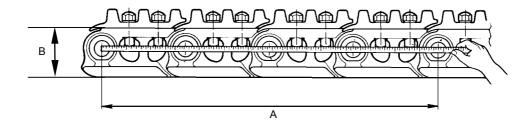


MAINTENANCE STANDARD

Link

Measure the length of four links.

- 1. Do not measure the part included the master pin.
- 2. Measure the length with tension on the track.

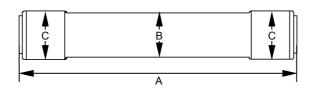


W155-03-07-001

ZAXIS450-3, 450L0	C-3, 470H-3, 470LCH-3		Unit: mm (in)
	Standard	Allowable Limit	Remedy
A	863.6 (34)	[905.3 (35.6)]	Cladding by welding and
В	129 (5.1)	[122 (4.8)]	finish or replace
ZAXIS500LC-3, 520	OLCH-3		
	Standard	Allowable Limit	Remedy
Α	915.5 (36)	[944.3 (37.2)]	Cladding by welding and
В	134.6 (5.3)	[127.6 (5.0)]	finish or replace

[]: Reference

Master Pin

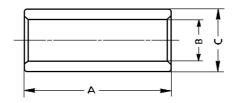


W800-03-07-028

ZAXIS450-3, 450L0	C-3, 470H-3, 470LCH-3		Unit: mm (in)
	Standard	Allowable Limit	Remedy
Α	254 (10)	-	
В	47.3 (1.86)	[44.3 (1.74)]	Replace
С	47.57 (1.87)	-	
ZAXIS500LC-3, 52	0LCH-3		
	Standard	Allowable Limit	Remedy
Α	290 (11.4)	-	
В	48.5 (1.91)	[45.5 (1.79)]	Replace
С	48.83 (1.92)	-	
	•		[] Deference

[]: Reference

Master Bushing

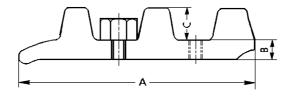


W105-03-07-023

ZAXIS450-3, 450LC	C-3, 470H-3, 470LCH-3		Unit: mm (in)
	Standard	Allowable Limit	Remedy
Α	160.8 (6.3)	-	
В	47.9 (1.89)	[59.9 (2.36)]	Replace
С	71.35 (2.81)	[66.4 (2.61)]	
ZAXIS500LC-3, 520	DLCH-3		
•	Standard	Allowable Limit	Remedy
Α	181.4 (7.1)	-	
В	49.2 (1.94)	[52.2 (2.06)]	Replace
С	79.0 (3.11)	[74.0 (2.91)]	

[]:Reference

Grouser Shoe

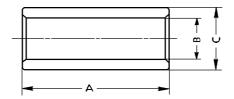


W105-03-07-024

ZAXIS450-3, 450LC	C-3, 470H-3, 470LCH-3		Unit: mm (in)
	Standard	Allowable Limit	Remedy
Α	247 (9.7)	-	
В	15 (0.6)	-	Replace
С	36 (1.4)	24 (0.9)	
ZAXIS500LC-3, 520	LCH-3		
	Standard	Allowable Limit	Remedy
Α	254.5 (10)	-	
В	18 (0.7)	-	Replace
С	37 (1.5)	24 (0.9)	

[]: Reference

Bushing

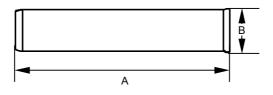


W105-03-07-023

ZAXIS450-3, 450L0	C-3, 470H-3, 470LCH-3		Unit: mm (in)
•	Standard	Allowable Limit	Remedy
Α	169 (6.7)	-	
В	48.4 (1.91)	[49.4 (1.95)]	Replace
С	71.35 (2.81)	[66.4 (2.61)]	
ZAXIS500LC-3, 52	0LCH-3		
	Standard	Allowable Limit	Remedy
Α	192.4 (7.6)	-	
В	49.6 (1.95)	[50.6 (1.99)]	Replace
С	79.0 (3.11)	[74.0 (2.91)]	

[]: Reference

Pin



W142-03-07-004

ZAXIS450-3, 450L0	C-3, 470H-3, 470LCH-3		Unit: mm (in)
	Standard	Allowable Limit	Remedy
Α	254 (10)	-	Cladding by welding and
В	47.6 (1.87)	[44.6 (1.76)]	finish or replace
ZAXIS500LC-3, 52	0LCH-3		
	Standard	Allowable Limit	Remedy
Α	290 (11.4)	-	Cladding by welding and
В	48.8 (1.92)	[45.8 (1.80)]	finish or replace
-			[] D.(

[]: Reference

UNDLINGAIN	MAGE / Hack		
		UNDERGARRIAGE / Hack	CNDERCARRIAGE / Hack

MEMO

MEMO

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Group 1 Front Attachment	
Hydraulic Circuit Pressure Release	
Procedure	W4-1-1
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Maintenance Standard	W4-2-28

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HYDRAULIC CIRCUIT PRESSURE RELEASE PROCEDURE

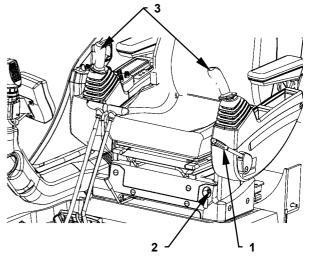
NOTE: Operate the pilot pump by using the power from battery without starting the engine and deliver the pilot pressure to the spool of control valve.

- 1. Turn pilot shut-off lever (1) to the UNLOCK position.
- 2. Turn engine stop switch (2) ON.

NOTE: Perform steps 1, 2 and turn the key switch to the START position. Although the starter rotates, the engine does not start.

IMPORTANT: Battery will deplete. Operate the key switch for short period.

- 3. With the key switch in the START position, operate the lever in order to release any pressure in hydraulic circuit 4 to 5 times.
- 4. Turn pilot shut-off lever (1) to the LOCK position.
- 5. Turn engine stop switch (2) OFF.



M1U1-01-029

REMOVE AND INSTALL FRONT ATTACHMENT

Removal

- 1. Park the machine on a solid, level surface. Fully retract the bucket and arm cylinders and lower the front attachment onto the ground.
- 2. Remove the connector in boom light between cab and main frame.
- 3. Remove lubrication hose (2) from the rod side of boom cylinder (1). (2 places on both right and left): 19 mm
- 4. Remove bolts (5) (4 used). Remove washer (3) and stopper (4). (2 places on both right and left)

 30 mm

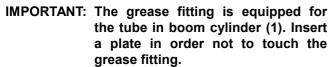


CAUTION: Boom cylinder weight: 430 kg (950 lb)



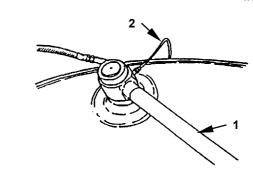
CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

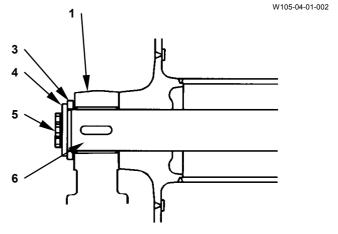
- 5. Hoist the tube end of boom cylinder (1). By using a bar and hammer, pull out pin (6) to the position where the cylinder rod can be removed.
- NOTE: When pin (6) cannot be removed, start the engine and operate the boom lever in order to adjust the hole position of boom cylinder (1) piston rod end.



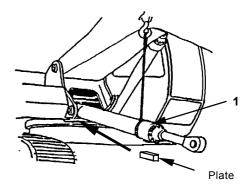
- 6. Insert a plate between the boom cylinder and main frame. Hold and lower the boom cylinder.
- 7. Remove the other boom cylinder in the same procedures as steps 5, 6.







W166-04-01-005



W157-04-01-005

- 8. Start the engine. Operate the boom lever and retract the rod of boom cylinder (1). In order not to extend the rod, pass a wire through the rod hole and secure the rod to the cylinder tube. Stop the engine.
- 9. Operate the control lever several times with the pilot shut-off lever in the UNLOCK position and release any pressure in the circuit.

NOTE: The accumulator is equipped for the pilot circuit.

After the engine stops and when the control lever is operated with the pilot shut-off lever in the UNLOCK position, any pressure can be released in the front attachment circuit.

 Release any pressure in the front attachment pipe and bleed air in the hydraulic oil tank. (Refer to W4-1-1, W1-4-1.)

NOTE: Steps 10 to 12 are for the machine attached with the auto lubrication device (optional).

11. Remove lubrication hose (7). Cap the removed hoses.

: 19 mm

12. Remove bolt (8) and remove clip (9).

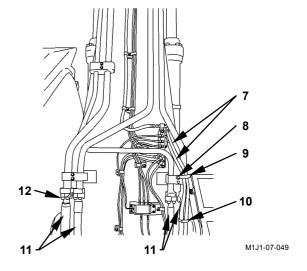
→ : 17 mm

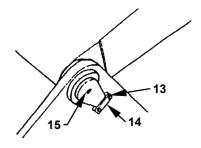
- 13. Remove the clip bands (10) (2 used).
- 14. Remove socket bolts (12) (16 used). Remove hoses (11) (4 used). Cap the removed hoses.

: 12 mm

15. Remove bolts (13) (2 used) from plate (14) in boom foot pin (15).

→ : 30 mm

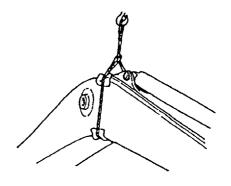




W105-04-01-007

A CAUTION: Standard front attachment weight: 8000 kg (17650 lb)

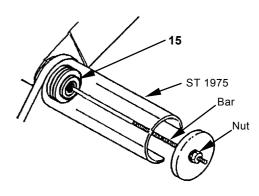
16. Attach a wire rope to the boom. Hoist the boom and take up slack of wire ropes.



W105-04-01-008

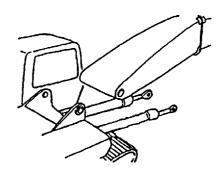
17. Install a bar of special tool (ST 1975) into the hole on boom foot pin (15). Install the nut. Remove boom foot pin (15).

→ : 36 mm



W105-04-01-022

18. Hoist the front attachment and operate the machine in reverse.



W157-04-01-004

Installation



CAUTION: Standard front attachment weight: 8000 kg (17650 lb)

 Hoist the front attachment. Align the boom foot with the mounting hole of main frame.
 Insert the shim into the left and right sides of boom foot and adjust the clearance between the

boom foot and main frame within 1.5 mm. Shim thickness: 3.2 mm, 2.3 mm or 1.0 mm



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.

2. Install boom foot pin (15). Install plate (14) with bolts (13) (2 used).

→ : 30 mm

: 400 N·m (41 kgf·m, 295 lbf·ft)

3. Install hoses (11) (4 used) with socket bolts (12) (16 used).

: 12 mm

■ : 140 N·m (14 kgf·m, 103 lbf·ft)

NOTE: Steps 4 to 6 are for the machine attached with the auto lubrication device (optional).

4. Install lubrication hose (7).

: 19 mm

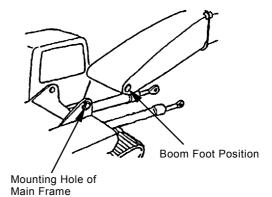
: 30 N·m (3.0 kgf·m, 22 lbf·ft)

5. Install clip (9) with bolt (8).

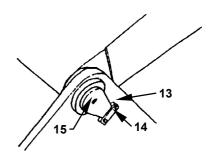
→ : 17 mm

: 50 N·m (5.1 kgf·m, 37 lbf·ft)

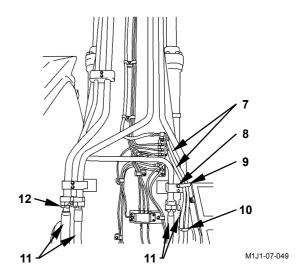
6. Secure lubrication hose (7) to hose (11) in the outside with clip bands (10) (2 used).



W157-04-01-004



W105-04-01-007



A

CAUTION: Boom cylinder weight: 430 kg (950 lb)

IMPORTANT: Fill hydraulic oil to specified level.
Start the engine. Check for any oil leaks of each hose.

7. Hoist boom cylinder (1). Start the engine. Extend the boom cylinder and align with the pin hole.



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.

- 8. Install pin (6) and install boom cylinder (1) to both sides.
- 9. Install washer (3) and stopper (4) and tighten with bolts (5) (4 used). (2 places on both right and left)

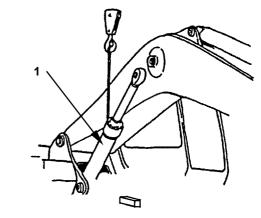
→ : 30 mm

: 400 N·m (41 kgf·m, 295 lbf·ft)

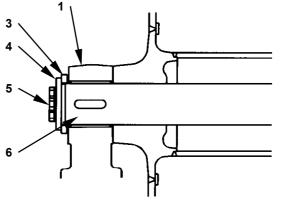
10. Install lubrication hose (2) to the rod side of boom cylinder (1).

→ : 19 mm

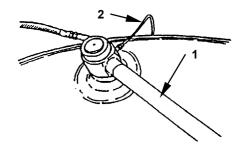
11. Install the connector to the boom light.



W157-04-01-006

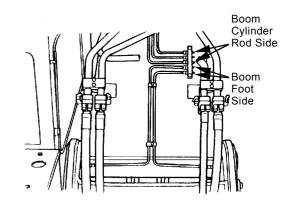


W166-04-01-005

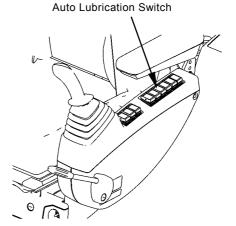


W105-04-01-002

- 12. Apply grease into the boom foot position and the rod side of boom cylinder by using a grease gun. As for the machine attached with the auto lubrication device (Optional), turn the auto lubrication switch ON.
- 13. After completing the work, add hydraulic oil to the specified level.
- 14. Operate every cylinder fully to the stroke end several times and release the pressure in the circuit. Check for any oil leaks of each hose.



W166-04-01-102



M1J1-03-001

IMPORTANT: When the arm has been removed from the boom, perform the followings when installing the arm.

- 15. Install shim (14) to the left and right sides of arm. Shim (14) thickness: 8.0 mm
- 16. Insert the shim between the arm and shim (14) so that the clearance between shim and arm is within 1.5 mm.

Shim thickness: 1.0 mm or 2.0 mm

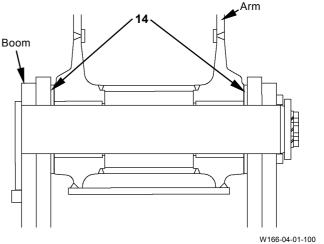
17. After installing the arm, apply grease into the boom/arm joint pin and the rod side of arm cylinder by using a grease gun.

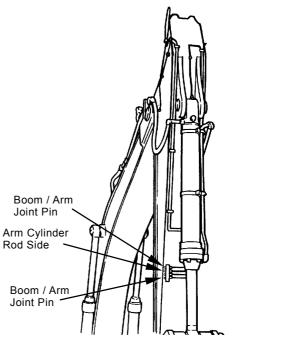
As for the machine attached with the auto lubrication device (Optional), turn the auto lubrication switch ON

IMPORTANT: For handling of HN bushing for the front attachment, check the followings.

- Precautions when installing the bushing When installing the bushing and if a hammer is used, the bushing may be damaged. Install the bushing by using a press.
- Precautions when reinforcing the arm
 The heat when welding in order to reinforce the
 arm may cause oil leakage and decrease
 lubrication performance.

When lubrication oil leaks, replace the bushing.

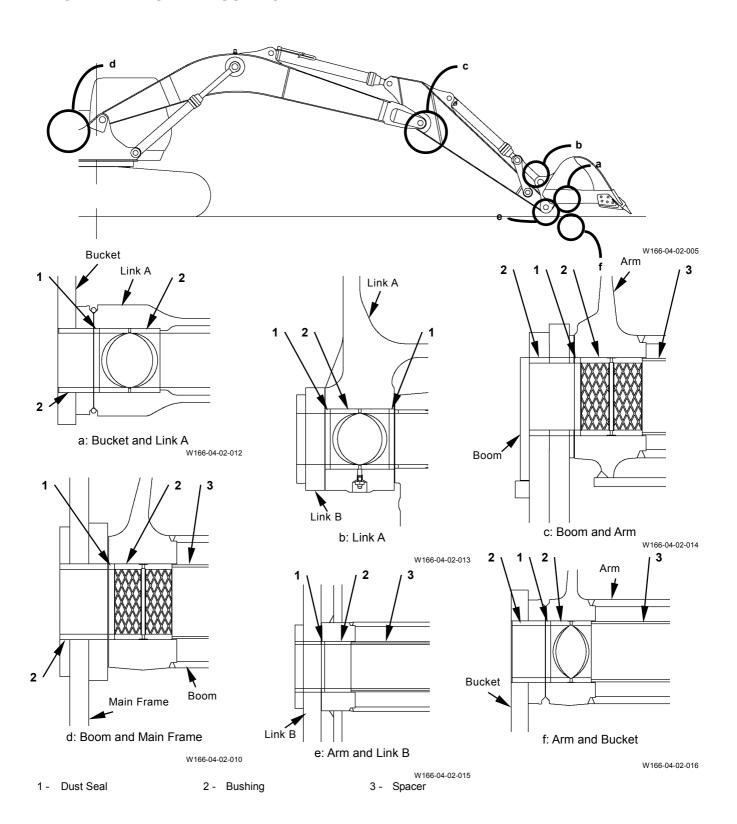




W166-04-01-10

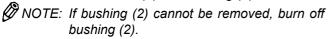
(Blank)

REMOVE AND INSTALL BUSHING



Removal

1. Remove dust seal (1) and bushing (2).



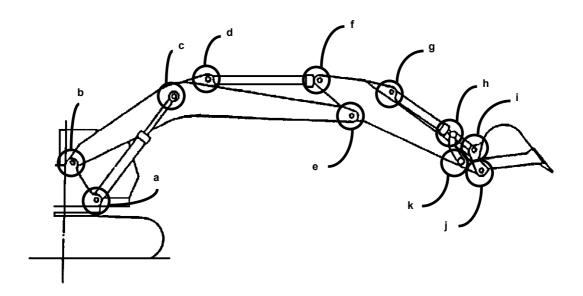
Installation

- 1. Cool bushing (2) by using dry ice.
- 2. Install bushing (2) and dust seal (1). When installing bushing (2), use the following plate.

Plate when installing bushing

a:	Bucket side	ST 2881
	Link A side	ST 2873
b:	Link A	ST 2873
C:	Arm	ST 2877
d:	Boom side	ST 2877
	Main frame side	ST 2886
e:	Arm	ST 2882
f:	Bucket side	ST 2881
	Armside	ST 2873

MAINTENANCE STANDARD Pin and Bushing



W105-04-01-018

Unit: mm (in)

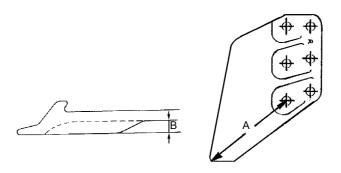
Position	Item		Standard	Allowable Limit	
	Pin	Outer Dia.	110 (4.33)	109 (4.29)	
a: Boom Cylinder and Main Frame	Bushing	Inner Dia. (Frame Side)	110 (4.33)	111.5 (4.39)	
	Bushing	Outer Dia.	130 (5.12)	-	
	Bearing	Inner Dia. (Cylinder Side)	110 (4.33)	111.5 (4.39)	
	Pin	Outer Dia.	120 (4.72)	119 (4.69)	
	Bushing	Inner Dia. (Frame Side)	120 (4.72)	121.5 (4.78)	
b: Boom and Main Frame	Bushing	Outer Dia.	140 (5.51)	-	
	Bushing	Inner Dia. (Boom Side)	120 (4.72)	121.5 (4.78)	
	Bushing	Outer Dia.	140 (5.51)	-	
	Pin	Outer Dia.	120 (4.72)	119 (4.69)	
c: Boom Cylinder and Boom	Pin Hole	Inner Dia. (Boom Side)	120 (4.72)	-	
	Bearing	Inner Dia. (Cylinder Side)	120 (4.72)	121.5 (4.78)	

Unit: mm (in)

			Unit: mm (in)
Position	Item	Standard	Allowable Limit
	Pin Outer Dia.	110 (4.33)	109 (4.29)
d: Boom and Arm Cylinder	Pin Hole Inner Dia. (Boom Side)	110 (4.33)	-
	Bearing Inner Dia. (Cylinder Side)	110 (4.33)	111.5 (4.39)
	Pin Outer Dia.	120 (4.72)	119 (4.29)
	Bushing Inner Dia. (Boom Side)	120 (4.72)	121.5 (4.78
e: Boom and Arm	Bushing Outer Dia.	140 (5.51)	-
	Bushing Inner Dia. (Arm Side)	120 (4.72)	121.5 (4.78)
	Bushing Outer Dia.	140 (5.51)	-
	Pin Outer Dia.	110 (4.33)	109 (4.29)
f: Arm Cylinder and Arm	Pin Hole Inner Dia. (Arm Side)	110 (4.33)	-
	Bearing Inner Dia. (Cylinder Side)	110 (4.33)	111.5 (4.39)
	Pin Outer Dia.	100 (3.94)	99 (3.90)
g: Arm and Bucket Cylinder	Pin Hole Inner Dia. (Arm Side)	100 (3.94)	-
	Bearing Inner Dia. (Cylinder Side)	100 (3.94)	101.5 (4.00)
h: Bucket Cylinder and Link	Pin Outer Dia.	110 (4.33)	109 (4.29)
	Bushing Inner Dia. (Link A Side)	110 (4.33)	111.5 (4.39)
	Bushing Outer Dia.	130 (5.12)	-
	Bearing Inner Dia. (Cylinder Side)	110 (4.33)	111.5 (4.39)
	Pin Outer Dia.	110 (4.33)	109 (4.29)
	Bushing Inner Dia. (Link A Side)	110 (4.33)	111.5 (4.39)
i: Link and Bucket	Bushing Outer Dia.	130 (5.12)	-
	Bushing Inner Dia. (Bucket Side)	110 (4.33)	109 (4.29)
	Bushing Outer Dia.	130 (5.12)	-
	Pin Outer Dia.	110 (4.33)	109 (4.29)
	Bushing Inner Dia. (Arm Side)	110 (4.33)	111.5 (4.39)
j: Arm and Bucket	Bushing Outer Dia.	130 (5.12)	-
	Bushing Inner Dia. (Bucket Side)	110 (4.33)	111.5 (4.39)
	Bushing Outer Dia.	130 (5.12)	-
	Pin Outer Dia.	100 (3.94)	99 (3.90)
k: Arm and Link	Bushing Inner Dia. (Arm Side)	100 (3.94)	101.5 (4.00)
	Bushing Outer Dia.	115 (4.53)	-

IMPORTANT: When replacing HN bushing for the front attachment, install it by using a press.

Side Cutter

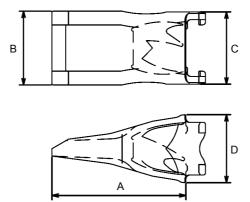


W166-04-01-011

Unit: mm (in)

_				/ /
		Standard	Allowable Limit	Remedy
	A	305 (12.0)	200 (7.9)	Replace
_	В	40 (1.6)	-	Neplace

Point



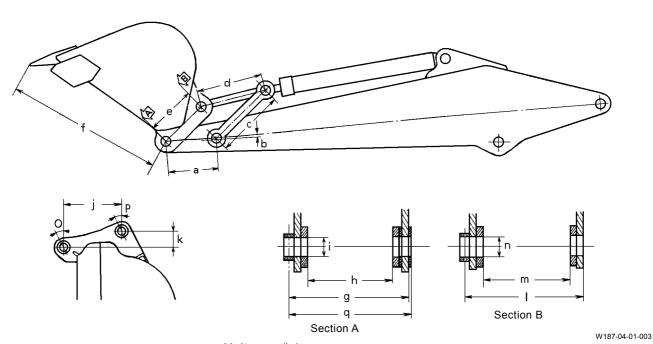
W1J1-04-01-002

Unit: mm (in)

			\ /_
	Standard	Allowable Limit	Remedy
Α	254 (10.0)	127 (5.0)	
В	140 (5.5)	-	Donlago
С	137 (5.4)	-	Replace
D	129 (5.1)	-	

STANDARD DIMENSIONS FOR ARM AND **BUCKET CONNECTION**

IMPORTANT: If the front attachment of a previous model machine is used, use the grease intervals for previous model machine.



			Unit: mm (in)	
Model	ZX450-3/500LC-3	ZX450	EX400-5	
а	520 (20.47)	←	←	
b	10 (0.39)	←	←	
С	750 (29.53)	←	←	
d	710 (27.95)	←	←	
е	1	-	-	
f	1911 (75.24)	1896 (74.65)	←	
g	-	643 (25.32)	←	
h	470.5 to 471.0	,	,	
	(18.52 to 18.54)	←		
i	110 (4.33)	←	←	
j	558 (21.97)	←	←	
k	106 (4.17)	←	←	
	648 (25.51)	643 (25.32)	←	
m	471 (18.54)	←	←	
n	110 (4.33)	←	←	
0	45°	←	←	
р	45°	←	←	
q	680 (26.77)	←		

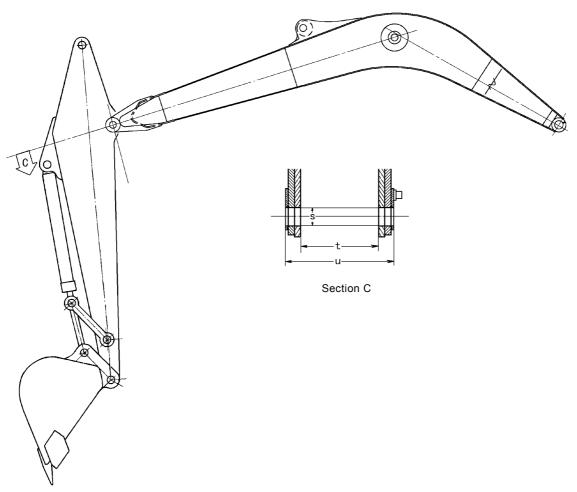
NOTE: Dimension h: 470 mm (5.51 in) includes the clearance for shims to adjust bucket clearance.

> Dimensions o and p: 45° means the angle for the bolt hole.

> Dimension i and n: 110 mm (4.33 in) means the inner diameter of bushing.

STANDARD DIMENSIONS FOR ARM AND BOOM CONNECTION

IMPORTANT: If the front attachment of a previous model machine is used, use the grease intervals for previous model machine.



W187-04-01-002

				Unit: mm (in
_	Model	ZX450-3/500LC-3	ZX450	EX400-5
	s	140 (5.51)	←	←
	t	471 (18.54)	←	←
	u	632 (24.88)	←	←

REMOVE AND INSTALL CYLINDER

Preparation

- 1. Park the machine on a solid, level surface. Fully retract the bucket and arm cylinders and lower the front attachment onto the ground.
- 2. Stop the engine. Operate the control lever several time with the pilot shut-off lever in the UNLOCK position and release any pressure in the circuit.
- NOTE: The accumulator is equipped for the pilot circuit.

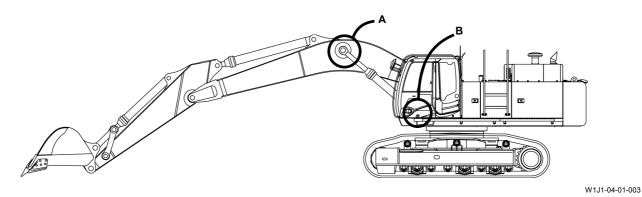
After the engine stops, when the control lever is operated several time with the pilot shut-off lever in the UNLOCK position, any pressure can be released in the circuit.

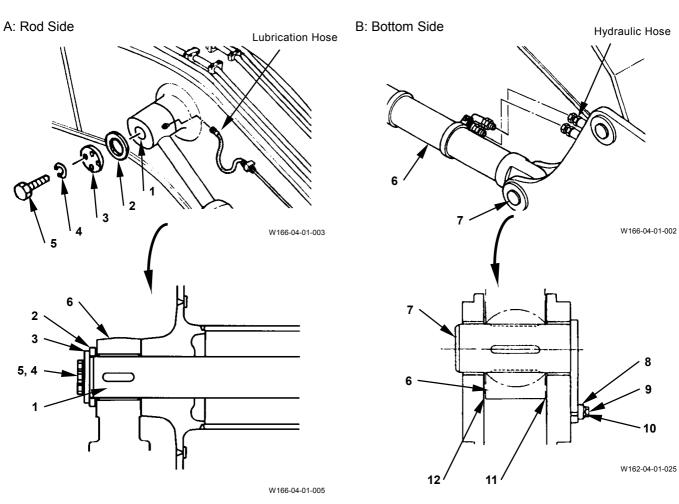
- 3. Release any pressure in the front attachment pipe. (Refer to the HYDRAULIC CIRCUIT PRESSURE RELEASE PROCEDURE on W4-1-1.)
- Release the pressure in the hydraulic oil tank. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)



W1.I1-04-01-001

Remove and Install Boom Cylinder





1 - Pin

2 - Washer (2 Used) 3 - Stopper (2 Used) 7 - Pin (2 Used)

8 - Washer (2 Used) 9 - Bolt (2 Used) 10 - Spring Washer (2 Used)

11 - Spacer 12 - Shim

4 - Spring Washer (8 Used)

5 - Bolt (8 Used) 6 - Boom Cylinder (2 Used)

Removal

1. Remove the lubrication hoses (4 used) from the rod side and bottom side in boom cylinder (6) on both sides.

: 19 mm



CAUTION: Boom cylinder weight: 430 kg (950 lb)

Pin (1) weight: 90 kg (200 lb)



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.

2. Attach a wire rope onto boom cylinder (6) and hold boom cylinder (6).

Remove bolts (5) (4 used) from the cylinder rod side. Remove spring washers (4) (4 used), stopper (3) and washer (2).

Remove pin (1) from the cylinder rod hole.

Place boom cylinder (6) on a stand.

: 30 mm

- Remove other boom cylinder (6) in the same procedures.
- 4. Start the engine. Retract the cylinder rod to the stroke end. Pass a wire through the cylinder rod hole and secure the rod in order not to extend boom cylinder (6).
- 5. Stop the engine. Release any remaining pressure in the hydraulic lines and air in oil tank. Remove the hydraulic hoses (4 used). (Refer to W4-1-1, W1-4-1.)

• 41 mm



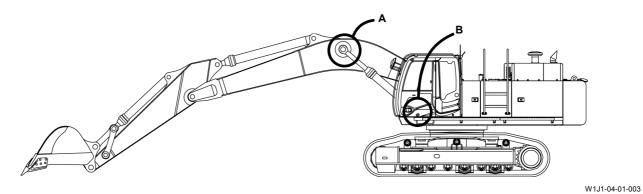
CAUTION: Pin (7) weight: 24 kg (53 lb)

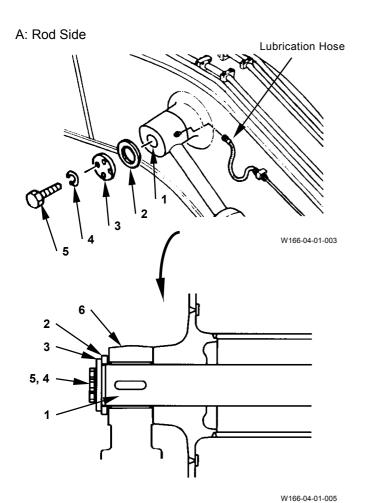
6. Remove bolt (9) from the bottom side of boom cylinder (6). Remove spring washer (10) and washer (8).

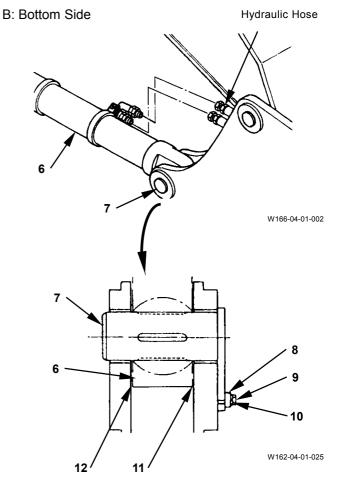
Pry and remove pin (7) by using a pry bar. Remove boom cylinder (6). Remove spacer (11) and shim (12). (Shim (12) may not be installed.)

: 30 mm

7. Remove other boom cylinder (6) in the same procedures.







- 1 Pin
- 2 Washer (2 Used) 3 Stopper (2 Used)

- 4 Spring Washer (8 Used)5 Bolt (8 Used)6 Boom Cylinder (2 Used)
- 7 Pin (2 Used)
- 8 Washer (2 Used) 9 Bolt (2 Used)
- 10 Spring Washer (2 Used)
- 11 Spacer 12 Shim

Installation



CAUTION: Boom cylinder weight: 430 kg

Pin (7) weight: 24 kg (53 lb)



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.

 Hoist boom cylinder (6) and align with the pin hole on cylinder bottom side. Install spacer (11) to inside and install shim (12) to outside. Install pin (7). Install washer (8), spring washer (10) and bolt (9).

: 30 mm

: 400 N·m (41 kgf·m, 295 lbf·ft)

- 2. Install other boom cylinder (6) in the same procedures.
- 3. Install the hydraulic hoses (4 used). Remove the wire to secure the cylinder rod.

• : 41 mm

: 210 N·m (21 kgf·m, 155 lbf·ft)

4. Install the lubrication hoses (2 used) to the bottom side of boom cylinder (6) on both sides.

: 19 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)

5. Hoist the cylinder rod side. While adjusting the height, extend the cylinder rod. Align the pin hole on cylinder rod side with that on boom side.



CAUTION: Pin (1) weight: 90 kg (200 lb)

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.

6. Install pin (1) from the cylinder rod side.



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.

- 7. Hoist the boom cylinder rod side on other side. While adjusting the height, extend the cylinder rod. Align the pin hole on cylinder rod side with that on boom side. Install pin (1) into the hole on the boom cylinder rod side.
- 8. Install bolts (5) (4 used for each), spring washers (4) (4 used for each), stopper (3) and washer (2) to both sides of pin (1).

30 mm

: 400 N·m (41 kgf·m, 295 lbf·ft)

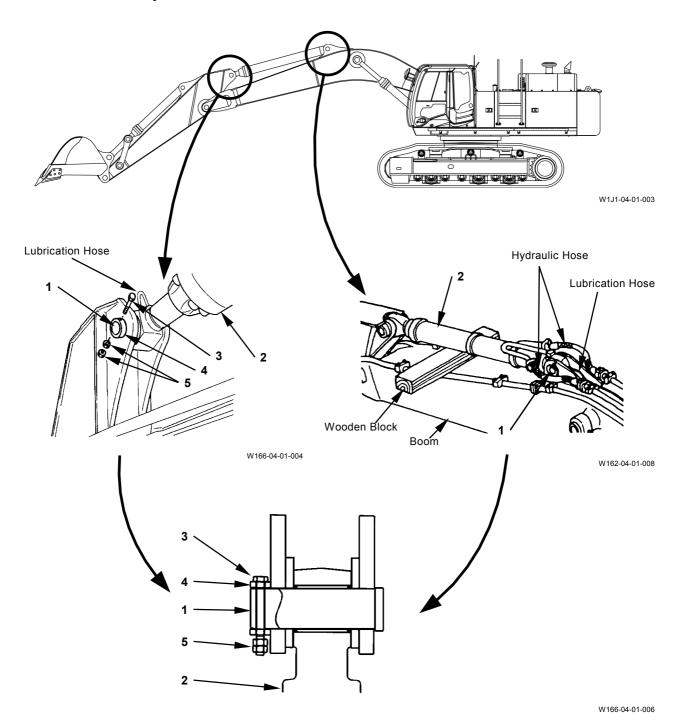
9. Install the lubrication hoses (2 used).

→ : 19 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)

 When all work is completed, operate the boom cylinder for several times to stroke end and bleed air from the circuit.

Remove and Install Arm Cylinder



- 1 Pin (2 Used)
- 2 Arm Cylinder
- 3 Bolt (2 Used)
- 4 Stopper (2 Used)
- 5 Lock Nut (4 Used)

Removal

1. Remove the lubrication hose from the rod side of arm cylinder (2).

: 19 mm



CAUTION: Arm cylinder weight: 660 kg (1455

lb)

Pin weight: 25 kg (55 lb)



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.

2. Insert the wooden blocks between the boom and arm cylinder (2). Attach a wire rope onto arm cylinder (2) and hold arm cylinder (2). Remove lock nuts (5) (2 used) from the cylinder rod side. Remove bolt (3). Remove pin (1).

30 mm

- Start the engine. Retract the cylinder rod to the stroke end. Pass a wire through the cylinder rod hole and secure the rod in order not to extend arm cylinder (2).
- 4. Stop the engine. Release any remaining pressure in the hydraulic lines and oil tank. Remove the hydraulic hoses (2 used) and the lubrication hose from the bottom side.

(Refer to W4-1-1, W1-4-1.)

: 12 mm

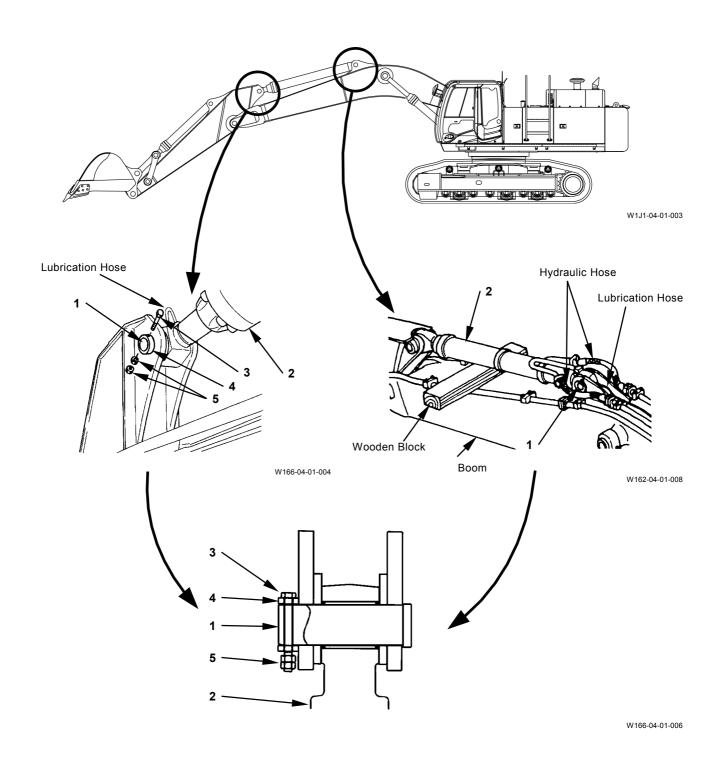


CAUTION: Pin weight: 25 kg (55 lb)

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.

5. Remove lock nuts (5) (2 used) from the bottom side of arm cylinder (2). Remove bolt (3). Remove pin (1). Hoist and remove arm cylinder (2)

30 mm



- 1 Pin (2 Used) 2 Arm Cylinder
- 3 Bolt (2 Used)
- 4 Stopper (2 Used)
- 5 Lock Nut (4 Used)

Installation



CAUTION: Arm cylinder weight: 660 kg (1455 lb)

1. Hoist arm cylinder (2). Align the pin hole on the mounting part for cylinder bottom side.



CAUTION: Pin weight: 25 kg (55 lb)

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.

2. Hoist pin (1). Insert pin (1) into the pin hole on cylinder bottom side. Align the bolt holes on pin and stopper (4) in boom. Install bolt (3) and lock nuts (5) (2 used) to stopper (4). Insert the wooden blocks between the boom and arm cylinder (2).

: 30 mm

: 400 N·m (41 kgf·m, 295 lbf·ft)

3. Install the hydraulic hoses (2 used) and the lubrication hose to the bottom side.

: 12 mm

=== : 140 N·m (14 kgf·m, 103 lbf·ft)

: 19 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)

4. Hoist the cylinder rod. Remove the wire to secure the rod.

Start the engine. Extend the cylinder rod. Align the pin hole on cylinder rod side with that on arm.



CAUTION: Pin weight: 25 kg (55 lb)

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.

5. Hoist pin (1). Insert pin (1) into the pin hole on cylinder rod side and install pin (1) to the arm. Install bolt (3) and lock nuts (5) (2 used) to stopper (4) in the arm.

→ : 30 mm

: 400 N·m (41 kgf·m, 295 lbf·ft)

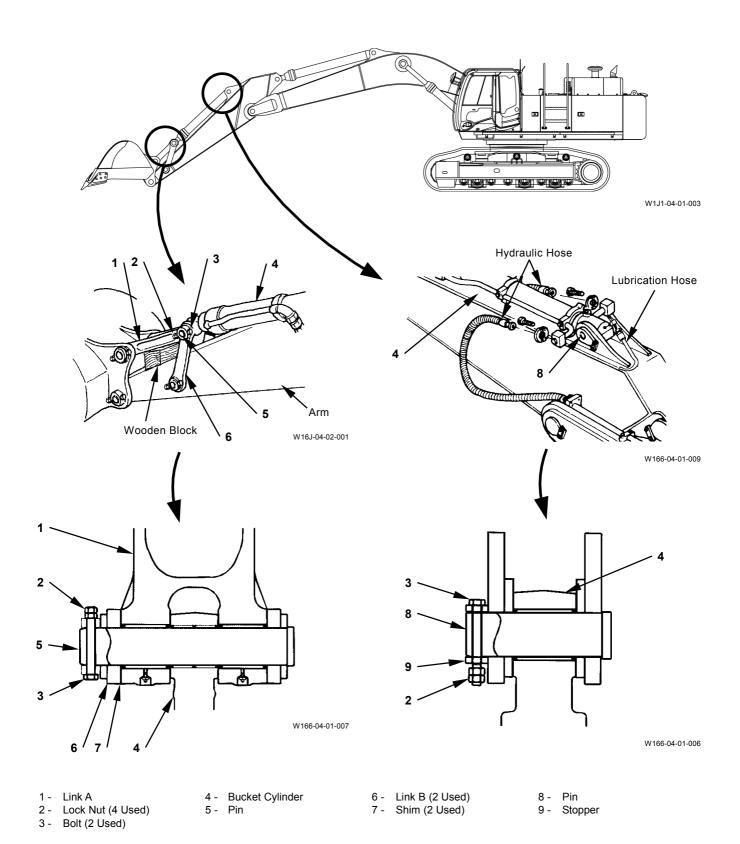
6. Install the lubrication hose to pin (1) at the rod side of arm cylinder (2).

: 19 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)

7. When completing the work, operate the arm cylinder several times to the stroke end and release the pressure in the circuit.

Remove and Install Bucket Cylinder



Removal

1. Insert a wooden block between the arm and bucket cylinder (4). Remove the lubrication hose from the bottom side of bucket cylinder (4).

: 19 mm

2. Place the wooden block under link A (1). Secure link A and link B by using a wire in order not to drop links B (6) (2 used) when removing pin (5).



CAUTION: Bucket cylinder weight: 410 kg (905 lb)

Pin (5) weight: 46 kg (101 lb)



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.

3. Attach a wire rope onto bucket cylinder (4) and hold bucket cylinder (4). Remove lock nuts (2) (2 used) from the cylinder rod side. Remove bolt (3). Remove pin (5) and remove shims (7) (2 used).

30 mm

- 4. Start the engine. Retract the cylinder rod to the stroke end. Pass a wire through the cylinder rod hole and secure the rod in order not to extend bucket cylinder (4).
- Stop the engine. Release any remaining pressure in the hydraulic lines and oil tank. (Refer to W4-1-1, W1-4-1.)

1. Remove the hydraulic hoses (2 used) from the cylinder bottom side.

: 10 mm



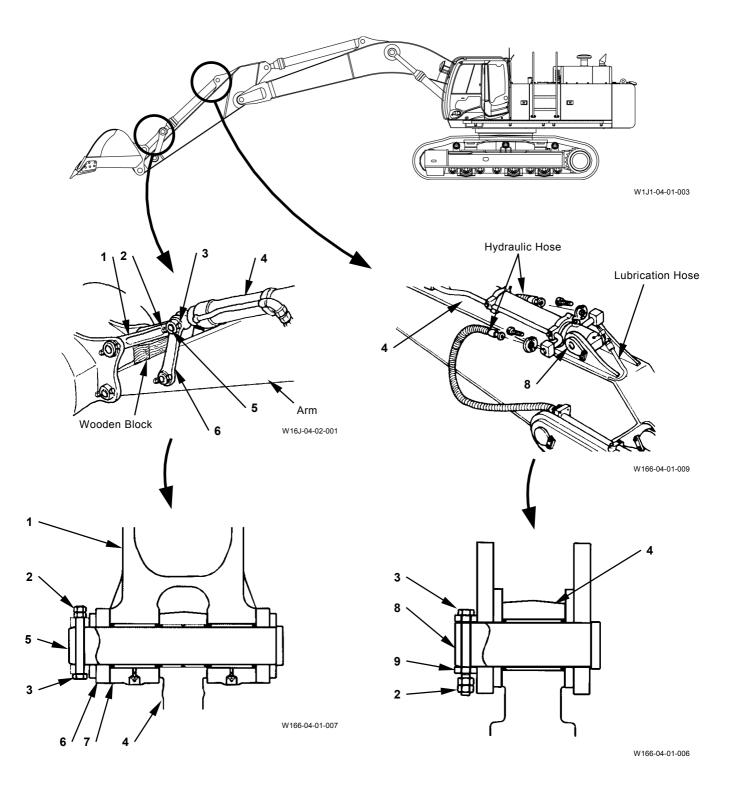
CAUTION: Pin (8) weight: 20 kg (44 lb)

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.

7. Remove lock nuts (2) (2 used) from the cylinder bottom side. Remove bolt (3). Remove pin (8).

→ : 30 mm

8. Hoist and remove bucket cylinder (4).



- 1 Link A 2 Lock Nut (4 Used) 3 Bolt (2 Used)
- 4 Bucket Cylinder5 Pin

- 6 Link B (2 Used) 7 Shim (2 Used)

- 8 Pin 9 Stopper

Installation



CAUTION: Bucket cylinder weight: 410 kg (905 lb)

1. Hoist bucket cylinder (4). Align the pin hole on mounting part for cylinder bottom side with that on arm side.



CAUTION: Pin (8) weight: 20 kg (44 lb)

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.

2. Hoist and insert pin (8) into the cylinder bottom side. Install bolt (3) and lock nuts (2) (2 used) to stopper (9) in the arm. Insert a wooden block between the arm and bucket cylinder (4).

: 30 mm

: 400 N·m (41 kgf·m, 295 lbf·ft)

3. Install the hydraulic hoses (2 used) and the lubrication hose to the bottom side in bucket cylinder (4).

: 10 mm

: 90 N·m (9.2 kgf·m, 66 lbf·ft)

→ : 19 mm

: 29.5 N·m (3 kgf·m, 22 lbf·ft)

4. Hoist the cylinder rod side. Remove the wire to secure the cylinder rod. Start the engine. Extend the cylinder rod. Align with the pin (5) holes on link A (1) and link B (6).



CAUTION: Pin (5) weight: 46 kg (101 lb)

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.

 Hoist pin (5). While aligning, insert pin (5) into the pin hole on cylinder rod side. Install bolt (3) and lock nuts (2) (2 used). Insert shim (7) so that the maximum clearance between link A (1) and link B (6) is 1.5 mm or smaller.

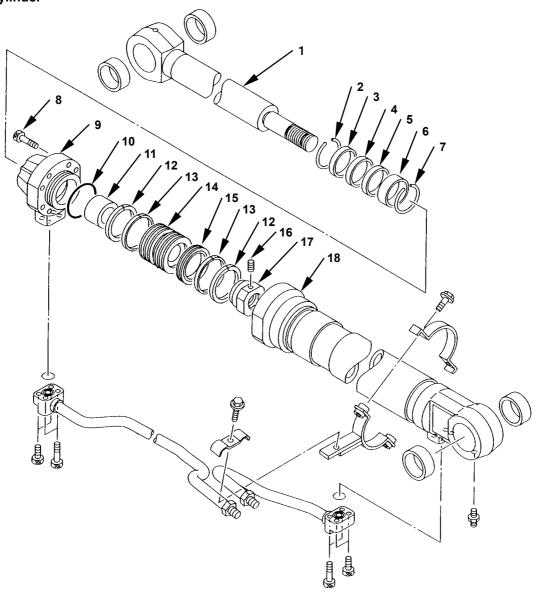
30 mm

: 400 N·m (41 kgf·m, 295 lbf·ft)

- 6. Remove the wire to secure links B (6) (2 used) in order not to drop. Start the engine. Remove the wooden block set under link A (1).
- 7. After completing the work, operate the bucket cylinder several times to the stroke end and release the pressure in the circuit.

DISASSEMBLE CYLINDERS

Boom Cylinder



W158-04-02-001

- 1 Cylinder Rod
- 2 Retaining Ring
- 3 Dust Seal
- 4 Seal 5 Ring

- 6 Bushing7 Retaining Ring
- 8 Socket Bolt (8 Used) 9 Cylinder Head
- 10 O-Ring
- 11 Cushion Ring
- 12 Teflon Ring (2 Used)
- 13 Wear Ring (2 Used)
- 14 Piston
- 15 Seal Ring
- 16 Set Screw
- 17 Nut
- 18 Cylinder Tube

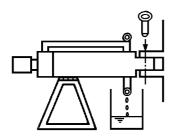
Disassemble Boom Cylinder

 The disassembling procedure starts on the premise that the hydraulic lines and the bands securing lines have been removed.



CAUTION: Boom cylinder weight: 430 kg (950 lb)

 Hoist the cylinder. Secure the cylinder on a workbench horizontally. Drain hydraulic oil from the cylinder.



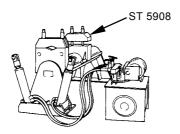
W102-04-02-027

2. Fully extend and support cylinder rod (1). Remove socket bolt (8) from cylinder head (9).

: 19 mm

IMPORTANT: Pull out cylinder rod (1) straightly in order not to damage the sliding surface.

- Tap and remove cylinder head (9) with cylinder rod (1) together from cylinder tube (18) by using a plastic hammer.
- 4. Secure cylinder rod (1) on special tool (ST 5908). Put the matching marks on cylinder rod (1) and nut (17).



W158-04-02-022

5. Remove set screw (16).

-- : 6 mm

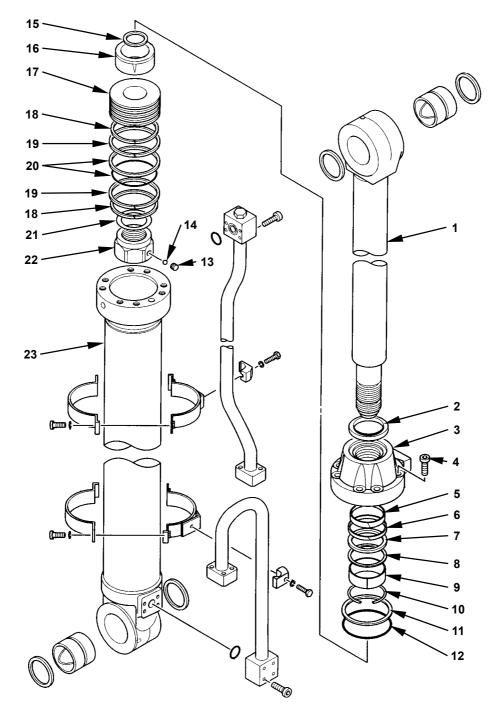
NOTE: As set screw (16) was mushroomed by using a punch and hammer at two places after set screw (16) had been screwed in, cut away its mushroomed part by using a drill first.

 Loosen nut (17) and remove piston (14) by using special tool (ST 5908).
 Special Tools when turning nut: 125 mm (ST 3268)

IMPORTANT: Do not re-use Teflon ring (12) and wear ring (13). When the cylinder disassembled, replace teflon ring (12) and wear ring (13) with the new ones.

- 7. Remove seal ring (15), wear rings (13) (2 used) and teflon rings (12) (2 used) from piston (14).
- 8. Remove cushion ring (11) and cylinder head (9) from cylinder rod (1).
- Remove O-ring (10) and retaining rings (2, 7) from cylinder head (9). Remove dust seal (3), ring (5), seal (4) and bushing (6).
 Special tool when removing bushing: 115 mm (ST 2671)

Arm Cylinder

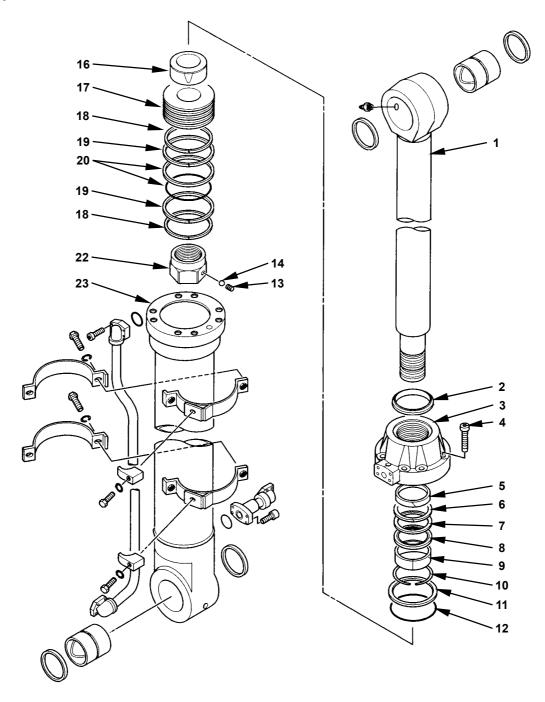


W166-04-02-002

- Cylinder Rod
- Wiper Ring 2 -
- Cylinder Head
- 4 Socket Bolt (8 Used)
- 5 Slide Ring
- 6 Backup Ring
- 7 U-Ring 8 Buffer Ring
- 9 Bushing 10 Retaining Ring
- 11 Backup Ring 12 O-Ring

- 13 Set Screw
- 14 Steel Ball
- 15 Cushion Seal
- 16 Cushion Bearing
- 17 Piston
- 18 Slide Ring (2 Used)
- 19 Slide Ring (2 Used) 20 Seal Ring
- 21 Shim
- 22 Nut
- 23 Cylinder Tube

Bucket Cylinder



W166-04-02-003

1 - Cylinder Rod

2 - Wiper Ring

3 - Cylinder Head

4 - Socket Bolt (8 Used)

5 - Slide Ring

6 - Backup Ring

7 - U-Ring

8 - Buffer Ring

9 - Bushing

10 - Retaining Ring

11 - Backup Ring

12 - O-Ring

13 - Set Screw

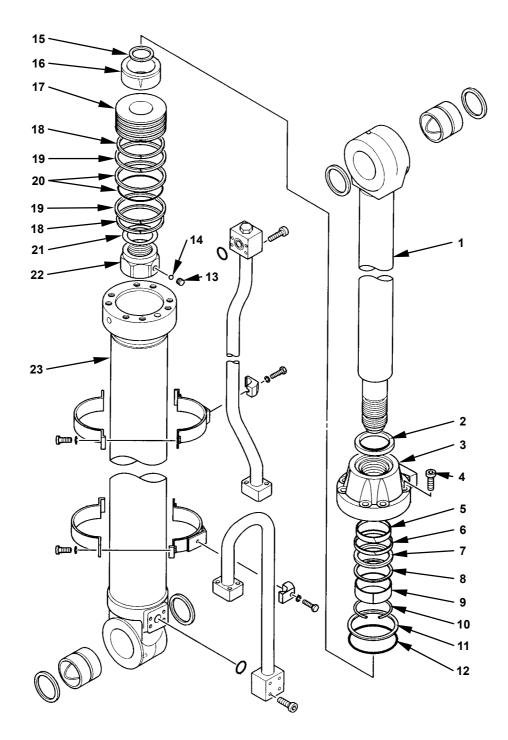
14 - Steel Ball

16 - Cushion Bearing 17 - Piston

18 - Slide Ring (2 Used) 19 - Slide Ring (2 Used) 20 - Seal Ring

22 - Nut 23 - Cylinder Tube

NOTE: The illustration shows arm cylinder.



W166-04-02-002

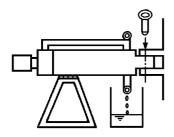
Disassemble Arm Cylinder, Bucket Cylinder

- As the other hydraulic oil cylinders are very similar in construction, the procedures of arm cylinder are shown as an example.
- The disassembling procedure starts on the premise that the hydraulic lines and the bands securing lines have been removed.



CAUTION: Cylinder weight: Arm cylinder: 660 kg (1455 lb) Bucket cylinder: 410 kg (905 lb)

1. Hoist the cylinder. Secure the cylinder on a workbench horizontally. Drain hydraulic oil from the cylinder.



W102-04-02-027



CAUTION: Cylinder rod (1) weight: Arm cylinder: 275 kg (606 lb) Bucket cylinder: 170 kg (375 lb)

2. Fully extend cylinder rod (1) and hold cylinder rod (1). Remove socket bolts (4) (8 used) from cylinder head (3).

Bucket

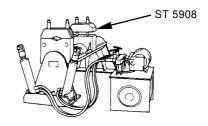
: 19 mm

Arm

: 22 mm

IMPORTANT: Pull out cylinder rod (1) straightly in order not to damage the sliding surface.

- 3. Tap and remove cylinder head (3) with cylinder rod (1) together from cylinder tube (23) by using a plastic hammer.
- 4. Secure cylinder rod (1) on special tool (ST 5908). Put the matching marks on cylinder rod (1) and nut (22).

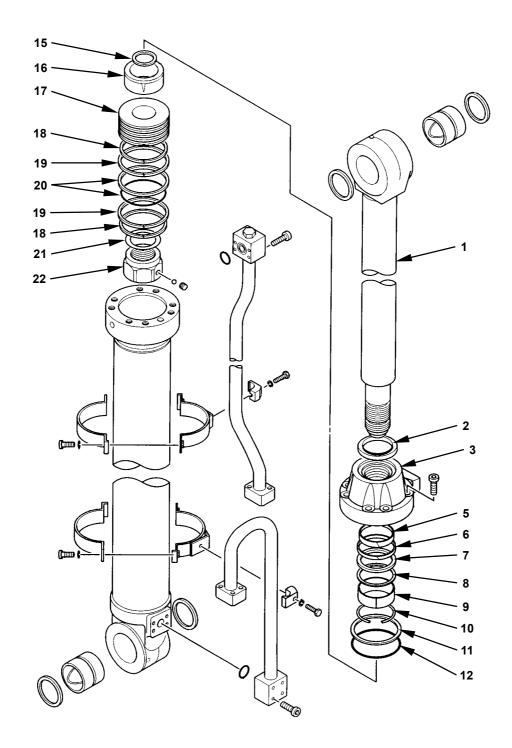


W158-04-02-022

5. Remove set screw (13).

: 8 mm

NOTE: As set screw (13) was mushroomed by using a punch and hammer at two places after set screw (13) had been screwed in, cut away its mushroomed part by using a drill first



W166-04-02-002

- Loosen nut (21) and remove piston (17) by using special tool (ST 5908).
 - Remove the nut. Remove shim (21) from cylinder rod (1).

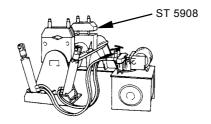
Special Tool when turning nut:

Arm cylinder

ST 3283: 135 mm (5.3 in)

Bucket cylinder

ST 7213: 130 mm (5.1 in)



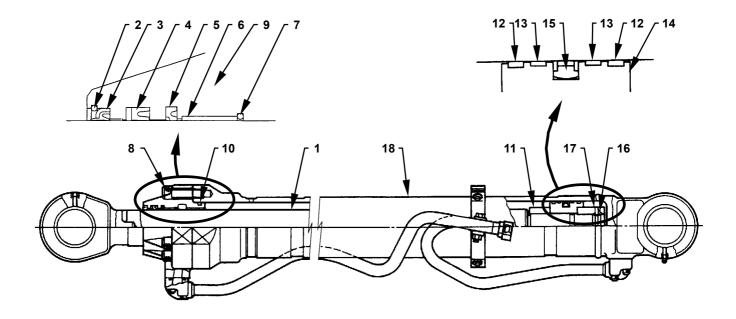
W158-04-02-022

- NOTE: Shim (21) is not equipped for the bucket cylinder.
- IMPORTANT: Do not re-use slide rings (18, 19). When the cylinder disassembled, replace slide rings (18, 19) with the new ones.
 - 7. Remove slide rings (18) (2 used), (19) (2 used) and seal ring (20) from piston (17).
 - 8. Remove cushion bearing (16), cushion seal (15) and cylinder head (4) from cylinder rod (1).
- NOTE: Cushion seal (15) is not equipped for the bucket cylinder.
- IMPORTANT: Do not re-use slide ring (5). When the cylinder disassembled, replace slide ring (5) with the new one.
 - 9. Remove wiper ring (2), slide ring (5), backup ring (6), U-ring (7) and buffer ring (8) from cylinder head (3).

- 10. Remove retaining ring (10) and bushing (9) from cylinder head (3).
- 11. Remove O-ring (12) and backup ring (11) from cylinder head (3).

ASSEMBLE CYLINDERS

Boom Cylinder



W158-04-02-002

- 1 Cylinder Rod
- 2 Retaining Ring 3 Dust Seal

- 4 Seal 5 Ring

- 6 Bushing7 Retaining Ring8 Socket Bolt (8 Used)9 Cylinder Head10 O-Ring

- 11 Cushion Ring
- 12 Teflon Ring (2 Used) 13 Wear Ring (2 Used)
- 14 Piston
- 15 Seal Ring
- 16 Set Screw
- 17 Nut
- 18 Cylinder Tube

Assemble Boom Cylinder

- Install bushing (6) to cylinder head (9).
 Special tool when installing bushing:
 ST 2671: 115 mm (4.5 in)
- 2. Install ring (5), seal (4) and retaining ring (7) to cylinder head (9).
- Install dust seal (3) to cylinder head (9) by using a plastic hammer.
 Special tool when installing dust seal: ST 2672
- 4. Install O-ring (10) and retaining ring (2) to cylinder head (9).
- 5. Install wear rings (13) (2 used), seal ring (15) and teflon rings (12) (2 used) to piston (14).
- 6. Install the cylinder head (9) assembly to cylinder rod (1).

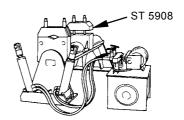
IMPORTANT: Install cushion ring (11) with part R in cushion seal (11) facing to the nut (17) side in cylinder rod (1).

7. Install cushion ring (11) to cylinder rod (1). Install the piston (14) assembly to cylinder rod (1).

8. Align the matching marks before disassembling and tighten nut (17) by using special tool (ST 5908).

Special Tool when turning nut: ST 3268: 125 mm (4.9 in)

↑ 5266: 126 mm (1.6 m) ↑ 14220±1420 N·m (1450±145 kgf·m, 10490±1049 lbf·ft)



W158-04-02-022

9. Tighten nut (17) with set screw (16). Crimp by using a punch at two places.

: 6 mm : 64±5.9 N·m (6.5±0.6 kgf·m, 47±4.4 lbf·ft)

IMPORTANT: Align with the center of cylinder tube (18) and insert the cylinder rod (1) assembly straightly in order not to damage the rings.

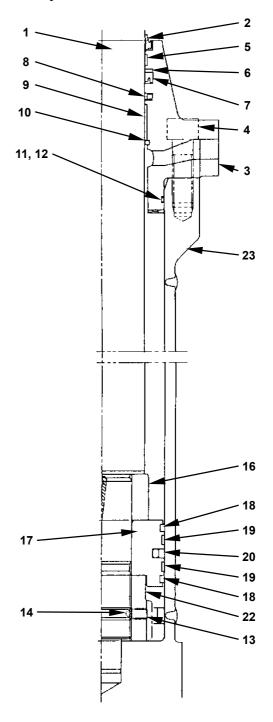
- 10. Secure cylinder tube (18) horizontally on a workbench. Insert the cylinder rod (1) assembly into cylinder tube (18).
- 11. Tighten cylinder head (9) to cylinder tube (18) with socket bolts (8) (8 used).

: 19 mm : 1230±123 N·m (125±12.5 kgf·m, 907±91 lbf·ft)

Arm Cylinder

11, 12 -- 23 Slit - 15 - 18 - 19 20 **~ 18** ~ 22 **~ 13**

Bucket Cylinder



W162-04-02-005

- 1 Cylinder Rod
- 2 Wiper Ring
- 3 Cylinder Head
- 4 Socket Bolt (8 Used)
- 5 Slide Ring
- 6 Backup Ring
- 7 U-Ring
- 8 Buffer Ring
- 9 Bushing
- 10 Retaining Ring
- 11 Backup Ring
- 12 O-Ring

- 13 Set Screw
- 14 Steel Ball
- 15 Cushion Seal
- 16 Cushion Bearing
- 17 Piston
- 18 Slide Ring (2 Used)
- 19 Slide Ring (2 Used)
- 20 Seal Ring
- 21 Shim
- 22 Nut
- 23 Cylinder Tube

Assemble Arm Cylinder, Bucket Cylinder

1. Install bushing (9) to cylinder head (3). Install retaining ring (10).

Special tool when installing bushing:

Arm cylinder

ST 8023: 135 mm (5.3 in)

Bucket cylinder

ST 8036: 120 mm (4.7 in)

IMPORTANT: Install buffer ring (8) with the lip facing to the cylinder bottom side.

2. Install buffer ring (8) to cylinder head (3).

IMPORTANT: Install U-ring (7) with the lip facing to the cylinder bottom side.

- 3. Install backup ring (6) to cylinder head (3). Install U-ring (7).
- 4. Install slide ring (5) to cylinder head (3).

IMPORTANT: Install wiper ring (2) with the lip facing to the outside.

5. Install wiper ring (2) to cylinder head (3).

Arm cylinder

ST 8023: 135 mm (5.3 in)

Bucket cylinder

ST 8036: 120 mm (4.7 in)

- 6. Install O-ring (12) and backup ring (11) to cylinder head (3).
- 7. Install seal ring (20) to piston (17). Special tool when installing seal ring:

Arm cylinder: ST 2971 Bucket cylinder: ST 2970

IMPORTANT: Install slide rings (18, 19) with their slits positioned 180 degrees each facing the opposite of each other.

- 8. Install slide rings (18, 19) (2 used for each) to piston (17).
- 9. Install special tool to piston (17). Retract seal ring (20) and slide rings (18, 19).

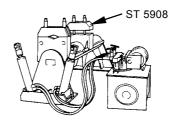
Special tool:

Arm cylinder: ST 2971 Bucket cylinder: ST 2970



CAUTION: Cylinder rod (1) weight: Arm cylinder: 275 kg (606 lb) Bucket cylinder: 170 kg (375 lb)

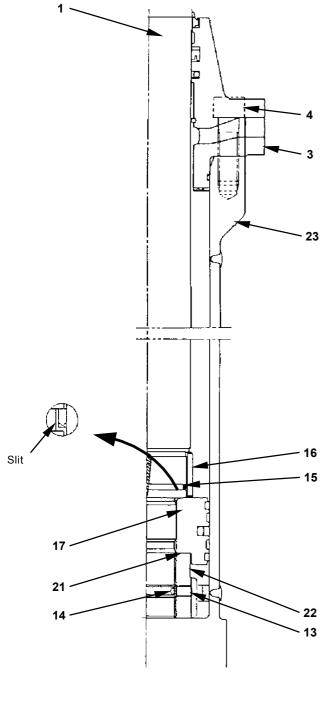
10. Secure cylinder rod (1) to special tool (ST 5908).

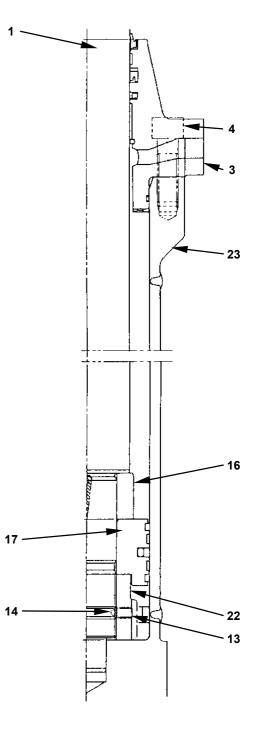


W158-04-02-022

Arm Cylinder

Bucket Cylinder





W162-04-02-004

W162-04-02-005

11. Install cylinder head (3) to cylinder rod (1). Special tool when installing cylinder head:

Arm cylinder: ST 8023 Bucket cylinder: ST 8022

IMPORTANT: Install cushion seal (15) with the slit facing to the piston side.

12. Install cushion seal (15) to cylinder rod (1).

NOTE: Cushion seal (15) is not equipped for the bucket cylinder.

IMPORTANT: Install cushion bearing (16) with the chamfered side facing to the cylinder head (3) side.

- 13. Install cushion bearing (16) to cylinder rod (1).
- 14. Install piston (17) to cylinder rod (1).
- 15. Install shim (21) and nut (22) to cylinder rod (1).

NOTE: Shim (21) is not equipped for the bucket cylinder.

16. Tighten nut (22).

Special tool when turning nut:

Arm cylinder

ST 3283: 135 mm (5.3 in)

: 27300 N·m (2780 kgf·m, 20135 lbf·ft)

Bucket cylinder

ST 7213: 130 mm (5.1 in)

- 20900 N⋅m (2130 kgf⋅m, 15415 lbf⋅ft)

17. Install steel ball (14) to nut (22). Install set screw (13).

: 8 mm

: 100 N·m (10 kgf·m, 74 lbf·ft)

18. Crimp set screw (13) at two places on the outer surface by using a punch in order not to loosen.



CAUTION: Cylinder tube (23) weight:

Arm cylinder: 265 kg (585 lb) Bucket cylinder: 170 kg (375 lb)

19. Secure cylinder tube (23) horizontally on a workbench.



CAUTION: Cylinder rod (1) weight:

Arm cylinder: 275 kg (606 lb) Bucket cylinder: 170 kg (375 lb)

IMPORTANT: Align with the center of cylinder tube (23) and insert the cylinder rod (1) assembly straightly in order not to damage the rings.

- 20. Insert cylinder rod (1) into cylinder tube (23).
- 21. Install cylinder head (3) to cylinder tube (23) and tighten with socket bolts (4) (8 used).

Arm cylinder

: 22 mm

: 1560 N·m (160 kgf·m, 1150 lbf·ft)

Bucket cylinder : 19 mm

: 1140 N·m (116 kgf·m, 840 lbf·ft)

MAINTENANCE STANDARD

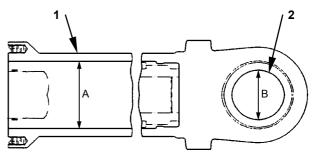
Cylinder Tube

- 1. Tube Section (1)
- · Check the inside and outside for any damage.
- 2. Pin, Bushing Section (2)
- Check whether the wear on surface of inner diameter is 0.5 mm (0.02 in) more than specified dimension (B).
- · Check the inside for any damage.

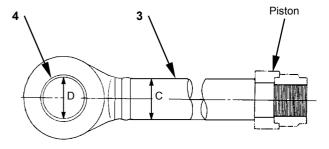
IMPORTANT: Check the inner bore in tube completely.

Cylinder Rod

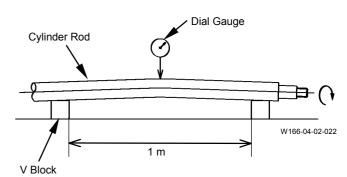
- 1. Rod Section (3)
- Place two V-blocks 1 m apart on level ground. Lay the cylinder rod across the V-blocks. Rotate the rod one turn and measure the rod deflection by using a dial gauge. Measure the deflection in three positions. If one measured deflection is 1 mm or more, replace the rod.
- · Check the surface for any damage.
- · Check the plated part for any rust.
- · Check the cushion part for any damage.
- 2. Pin, Bushing Section (4)
- Check if the bushing bore (D) wear is 0.2 mm or more than specification.
- · Check the inside for any damage.



W145-04-01-015



W166-04-02-023



Standard Dimension Lis	Standard	Dimension	า List
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	Boom	Arm	Bucket
Cylinder Tube Inner Dia. (A)	170 +0.063	190 +0.072	110 +0.063
Cylinder Tube Pin, Bushing Bore Dia. (B)	110 +0.25 +0.05	110 +0.25 +0.05	100+0.25
Rod Dia. (C) Recommended O.D size after Re-plating	115 ^{-0.012} _{-0.027}	130 +0.031 -0.061	120 +0.027 -0.057
Piston Rod Pin, Bushing Bore Dia. (D)	120+0.25+0.05	110 +0.25 +0.05	110 +0.25 +0.05
Adjusted Piston Rod Deflection	0.125/1000		

Pipe

- 1. Pipe (5)
- Check for any damage in depth more than 0.1 mm (0.004 in).
- · Check for any deformation and damage
- 2. Socket bolt (6)
- · Check for any heavy rust.
- Check the thread for any damage.
- 3. Ring (7)
- · Replace O-ring when disassembling.

T182-05-02-004

Piston, Cylinder Head

- Check the inside and outside for any damage.
- Check the groove for any damage.
- When the internal leakage is found, check the seals for damage.
- Replace when the base metal of bushing slide surface shows.

(Blank)

MEMO

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