

Workshop Manual

ZAXIS

850-3

850LC-3

870H-3

870LCH-3

Hydraulic Excavator

Service Manual consists of the following separate Part No;
Technical Manual (Operational Principle) : Vol. No.TO1JB-E
Technical Manual (Troubleshooting) : Vol. No.TT1JB-E
Workshop Manual : Vol. No.W1JB-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, or 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 use.):
Publications Marketing & Product Support
Hitachi Construction Machinery Co. Ltd.
TEL: 81-29-832-7084
FAX: 81-29-831-1162

ADDITIONAL REFERENCES

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

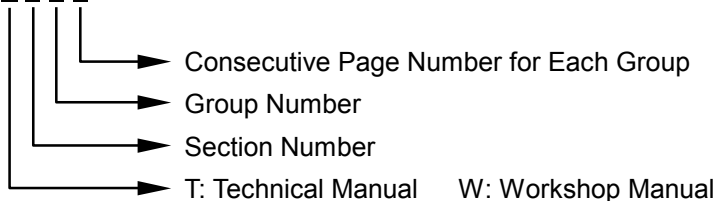
MANUAL COMPOSITION

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

PAGE NUMBER

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


Example : T 1-3-5



INTRODUCTION


SAFETY ALERT SYMBOL AND HEADLINE NOTATIONS

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


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

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

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

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

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

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

UNITS USED

- SI Units (International System of Units) are used in this manual.

MKSA system units and English units are also indicated in parentheses just behind SI units.

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

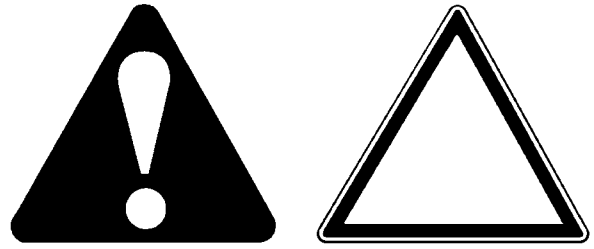
A table for conversion from SI units to other system units is shown below for reference purposes.

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

SAFETY

RECOGNIZE SAFETY INFORMATION


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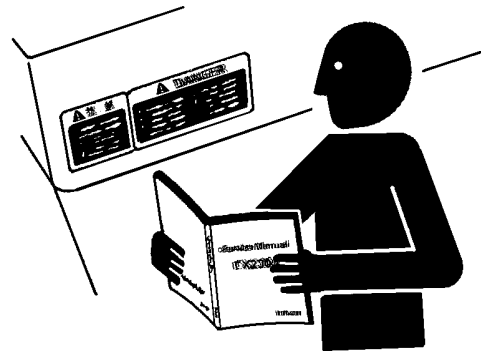


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SAFETY

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.



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003-E01B-0003

SAFETY

PREPARE FOR EMERGENCIES

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



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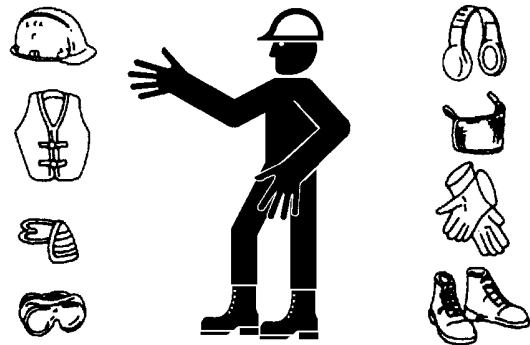
WEAR PROTECTIVE CLOTHING

- 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.



SA-428

- 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.

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SAFETY

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.



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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 INSPECTION" chapter in the operator's manual.



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SAFETY

GENERAL PRECAUTIONS FOR CAB

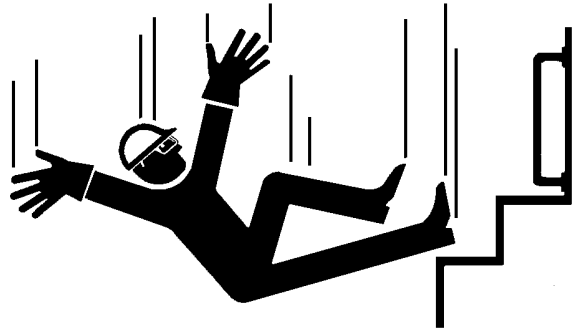
- Before entering the cab, thoroughly remove all dirt and/or oil from the soles of your work boots. If any controls such as a pedal is operated while with dirt and/or oil on the soles of the operator's work boots the operator's foot may slip off the pedal, possibly resulting in a personal accident.
-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

524-E01A-0000

SAFETY

USE HANDHOLDS AND STEPS

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



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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.



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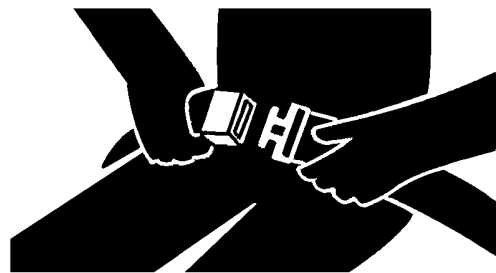
SAFETY

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.



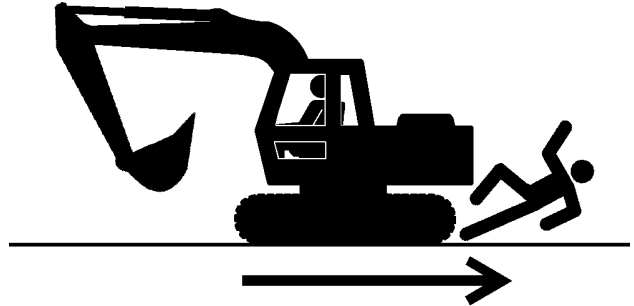
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SAFETY

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-426

011-E01A-0398

HANDLE STARTING AIDS SAFELY

Starting fluid:

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



SA-293

036-E01A-0293-3

SAFETY

OPERATE ONLY FROM OPERATOR'S SEAT

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

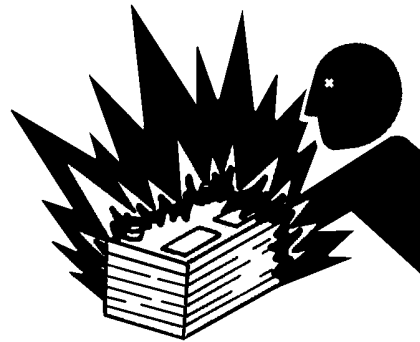


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JUMP STARTING

- 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.



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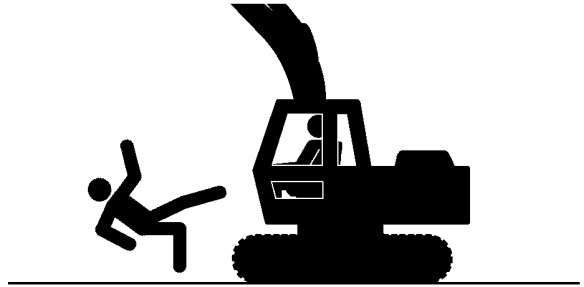
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SAFETY

KEEP RIDERS OFF MACHINE

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

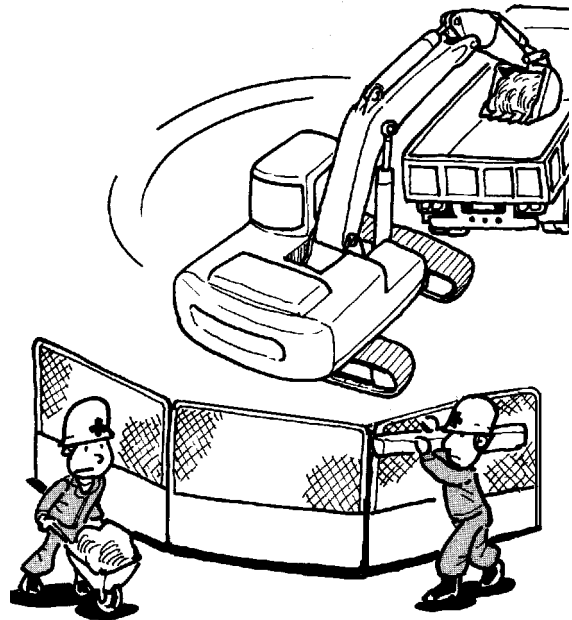
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SA-379

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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SAFETY

INVESTIGATE JOB SITE BEFOREHAND

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



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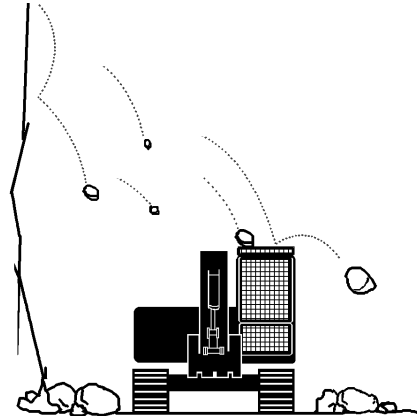
SAFETY

EQUIPMENT OF HEAD GUARD, ROPS, FOPS

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

ROPS: Roll-Over Protective Structure

FOPS: Falling Object Protective Structure



SA-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.

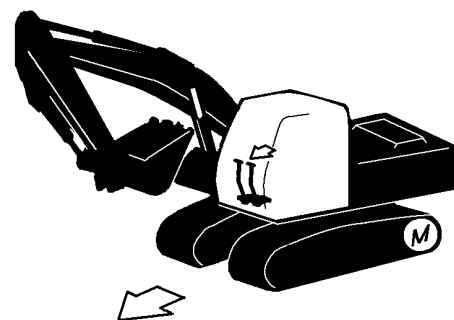


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SA-481

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.



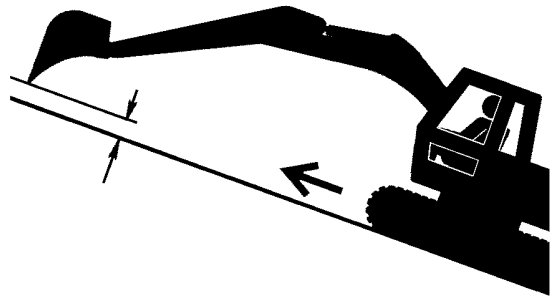
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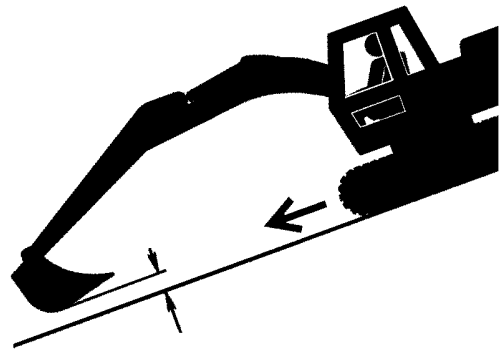
SAFETY

DRIVE MACHINE SAFELY

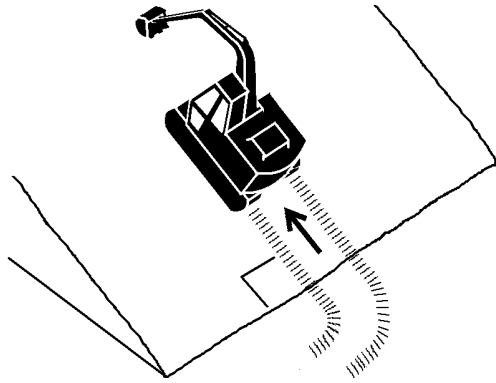
- Before driving the machine, always confirm that the travel levers/pedals direction corresponds to the direction you wish to drive.
- Be sure to detour around any obstructions.
- Avoid traveling over obstructions. Soil, fragments of rocks, and/or metal pieces may scatter around the machine. Don't allow 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.



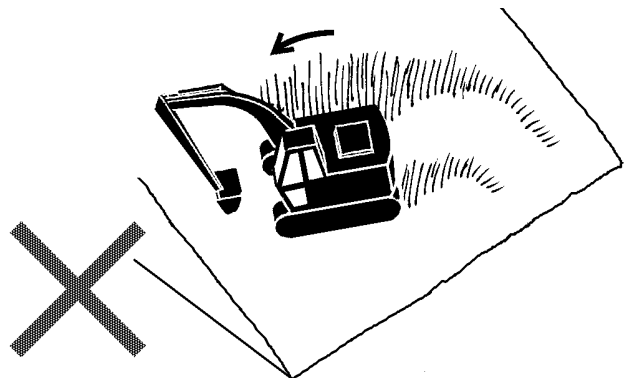
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SA-442

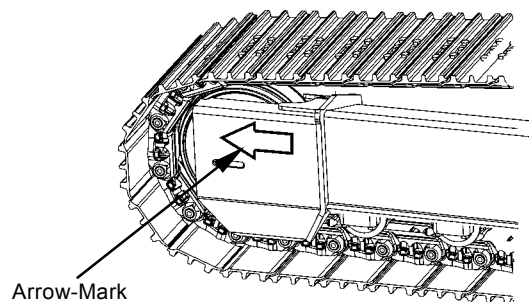
SAFETY

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.



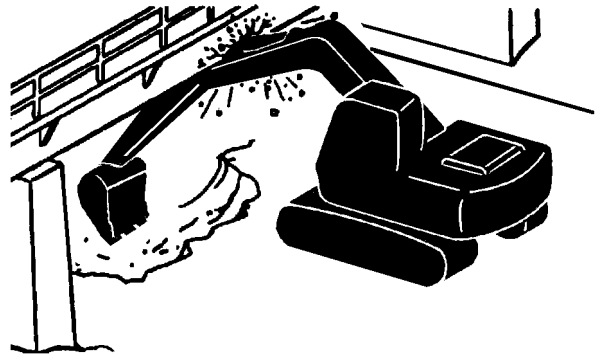
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SAFETY

- 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.



SA-011

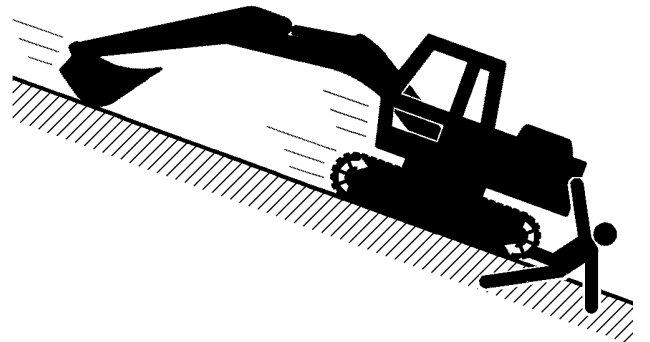
SAFETY

AVOID INJURY FROM ROLLAWAY ACCIDENTS

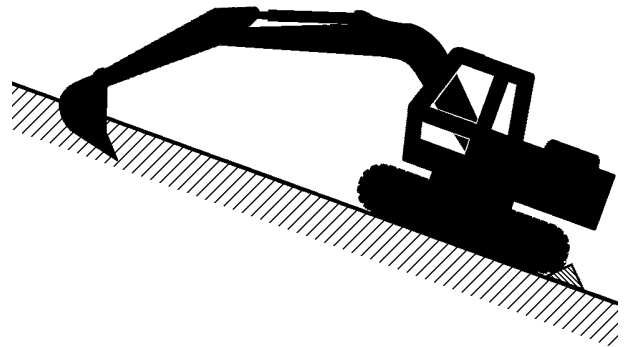
- Death or serious injury may result if you attempt to mount or stop a moving machine.

To avoid rollaways:

- Select level ground when possible to park machine.
- Do not park the machine on a grade.
- Lower the bucket 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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SA-392

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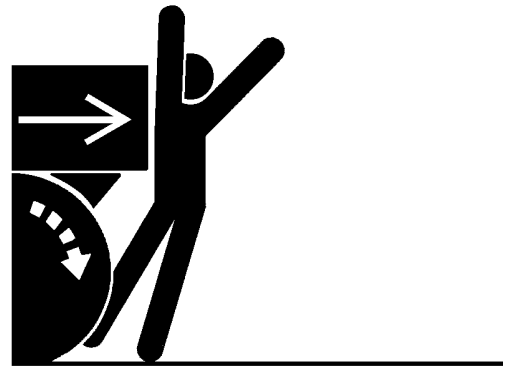
SAFETY

AVOID INJURY FROM BACK-OVER AND SWING ACCIDENTS

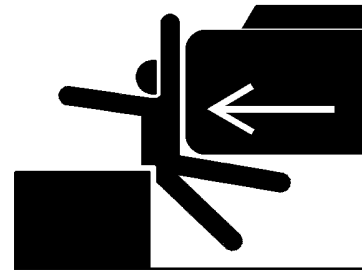
- If any person is present near the machine when backing or swinging the upperstructure, the machine may hit or run over that person, resulting in serious injury or death.

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.



SA-383



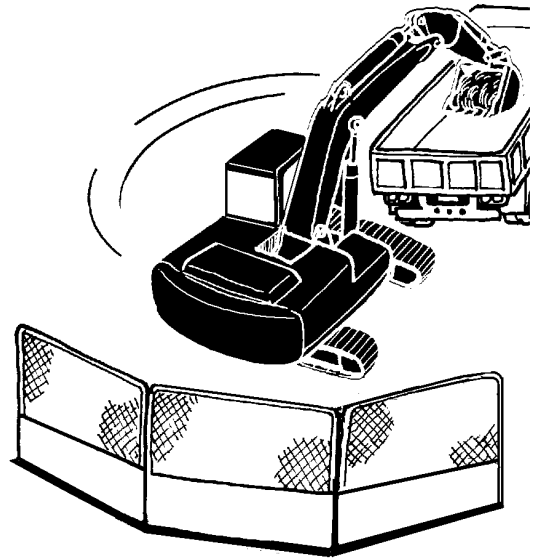
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SAFETY

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 ANYONE

- 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.

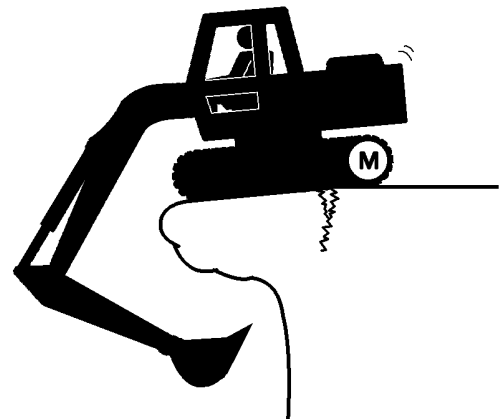


023-E01A-0487

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

SA-488

SAFETY

AVOID TIPPING

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

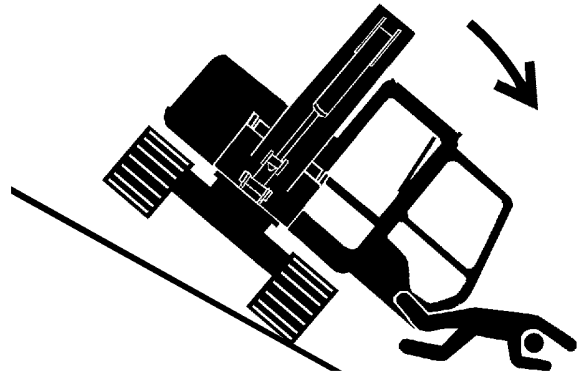
MACHINE WILL TIP OVER FASTER THAN YOU CAN JUMP FREE

FASTEN YOUR SEAT BELT

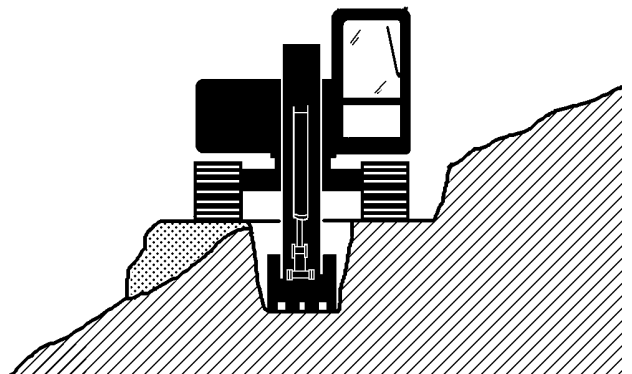
- The danger of tipping is always present when operating on a grade, possibly resulting in serious injury or death.

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.



SA-012



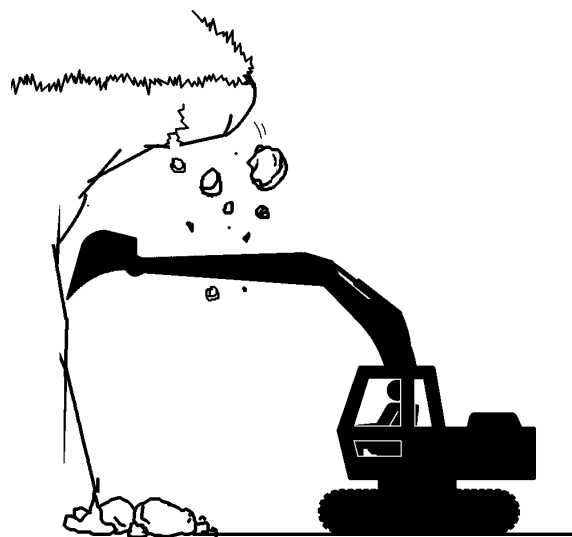
SA-440

025-E03B-0463

NEVER UNDERCUT A HIGH BANK

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

026-E01A-0519



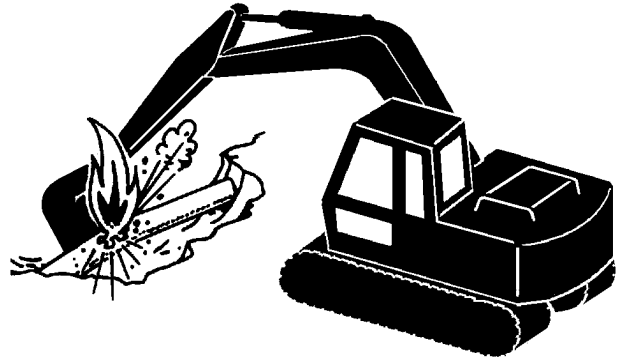
SA-489

SAFETY

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



SA-382

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.

028-E01A-0389



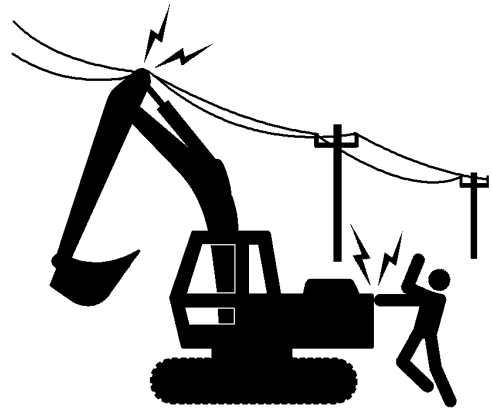
SA-389

SAFETY

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.

029-E01A-0381



SA-381

PRECAUTIONS FOR LIGHTENING

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

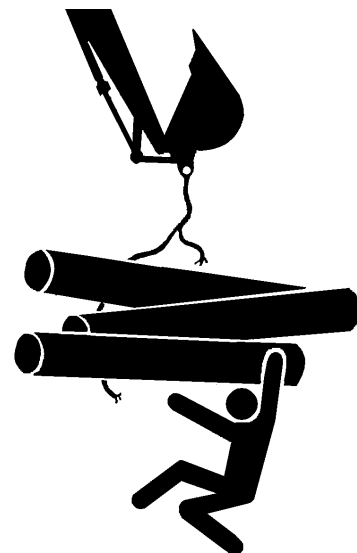


SA-1088

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, cables, 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.

032-E01A-0132

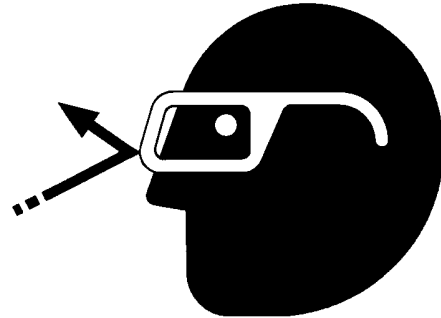


SA-014

SAFETY

PROTECT AGAINST FLYING DEBRIS

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



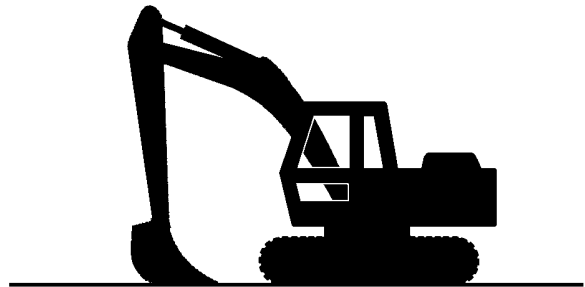
031-E01A-0432

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.



SA-018



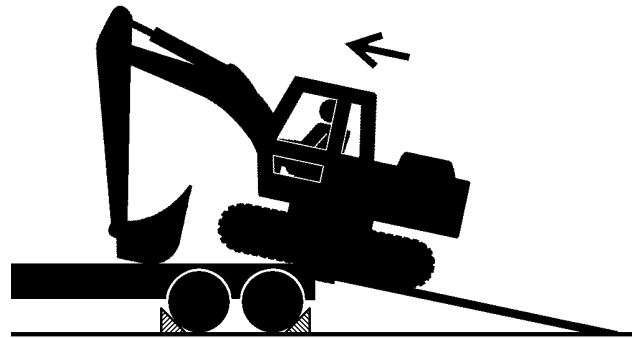
034-E01A-0496

SA-019

SAFETY

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.



SA-395

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

035-E07A-0454

SAFETY

PRACTICE SAFE MAINTENANCE

To avoid accidents:

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

Before servicing the machine:

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

500-E02C-0520



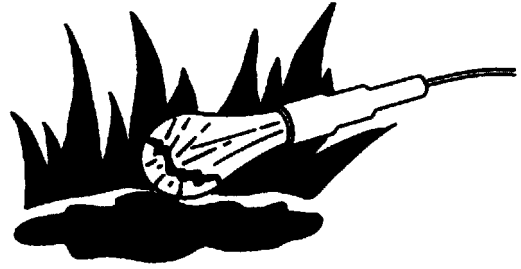
SA-028



SA-527

SAFETY

- 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, anti-freeze fluid, or window washer fluid may catch fire.

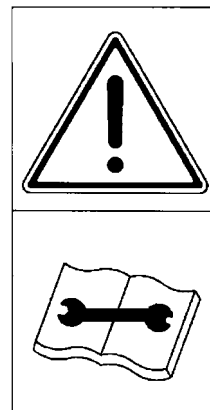


SA-037

WARN OTHERS OF SERVICE WORK

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

501-E01A-0287



T1J1-01-01-001

SAFETY

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.

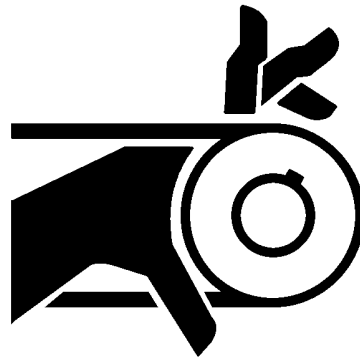


519-E01A-0527

SA-527

STAY CLEAR OF MOVING PARTS

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



502-E01A-0026

SA-026

SAFETY

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

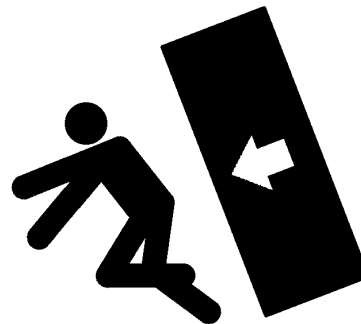


SA-344

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

SA-034

SAFETY

PREVENT BURNS

Hot spraying fluids:

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



SA-039

Hot fluids and surfaces:

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



SA-225

505-E01B-0498

REPLACE RUBBER HOSES PERIODICALLY

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



SA-019

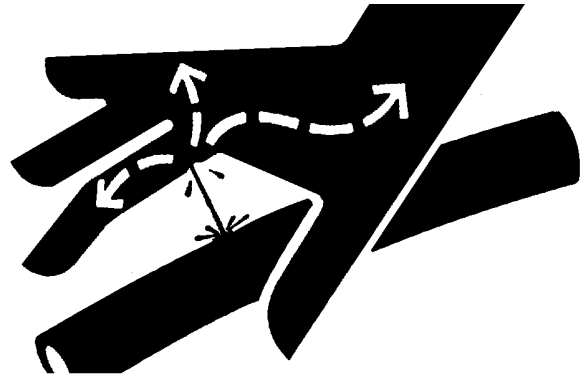
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SAFETY

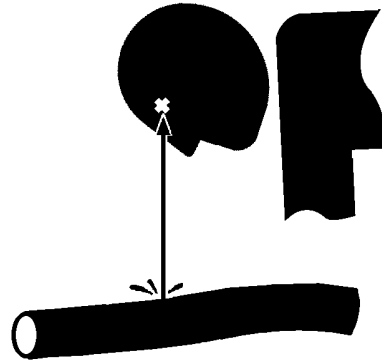
AVOID HIGH-PRESSURE FLUIDS

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

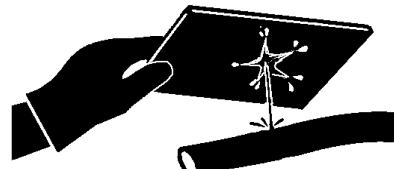
507-E03A-0499



SA-031



SA-292



SA-044

SAFETY

PREVENT FIRES

Check for Oil Leaks:

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



SA-019

Check for Shorts:

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

Clean up Flammables:

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

Check Key Switch:

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

508-E02B-0019

Check Heat Shields:

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

508-E02A-0393

SAFETY

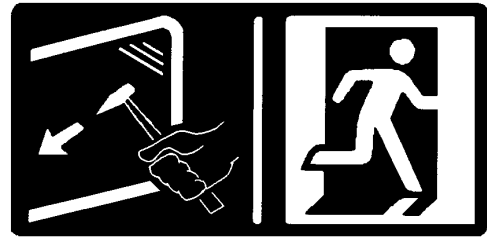
EVACUATING IN CASE OF FIRE

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

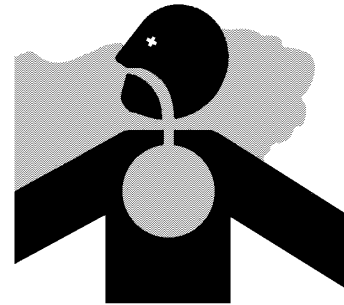


SS-1510

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.

523-E01A-0818



SA-818

SAFETY

AVOID HEATING NEAR PRESSURIZED FLUID LINES

- Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders.
- Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials.
- Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area. Install temporary 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.
 2. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.



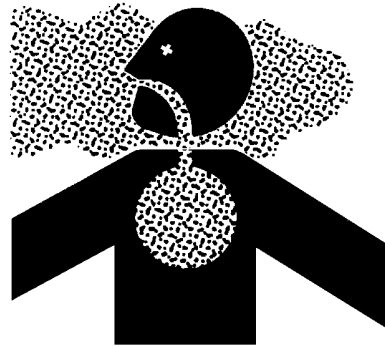
SA-029

511-E01A-0029

SAFETY

BEWARE OF ASBESTOS DUST

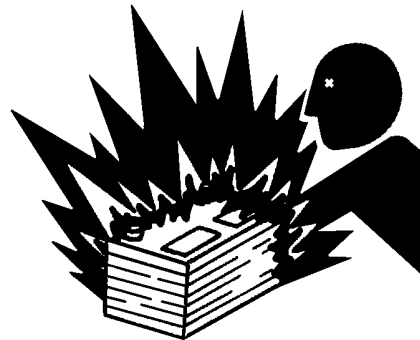
- Take care not to inhale dust produced in the work site. Inhalation of asbestos fibers may be the cause of lung cancer.
- Depending on the work site conditions, the risk of inhaling asbestos fiber may exist. Spray water to prevent asbestos from becoming airborne. Don't use compressed air.
- When operating 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

512-E01B-0032

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.

515-E01A-0309

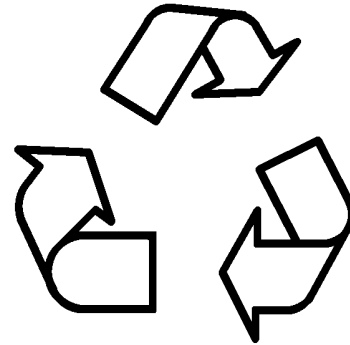


SA-309

SAFETY

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



S517-E01A-0435

SA-435

SAFETY

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SECTION AND GROUP CONTENTS

WORKSHOP MANUAL

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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SECTION 1 GENERAL



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GENERAL / Precautions for Disassembling and Assembling

PRECAUTIONS FOR DISASSEMBLING AND ASSEMBLING

Precautions for Disassembling and Assembling

- Clean the Machine

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

- Inspect the Machine

Be sure to thoroughly understand all disassembling / assembling procedures beforehand, to help avoid incorrect disassembling of components as well as personal injury.

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 any.
- Capacities and condition of lubricants.
- Loose or damaged parts.

- Prepare and Clean Tools and Disassembly Area

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

- Precautions for Disassembling

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

GENERAL / Precautions for Disassembling and Assembling

• Precautions for Assembling

- Be sure to clean all parts and inspect them for any damage. If any damage is found, repair or replace part.
- Dirt or debris on the contact or sliding surfaces may shorten the service life of the machine. Take care not to contaminate any contact or sliding surfaces.
- Before assembling, 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.

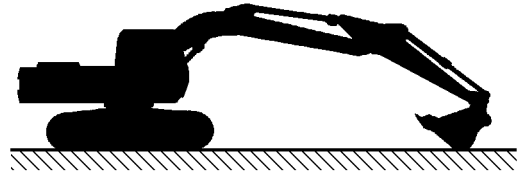
• Bleeding Air from Travel Motor / Swing Motor

- With the drain plug / hose on travel motor / swing motor removed, fill the motor case with hydraulic oil.

GENERAL / Precautions for Disassembling and Assembling

- 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.



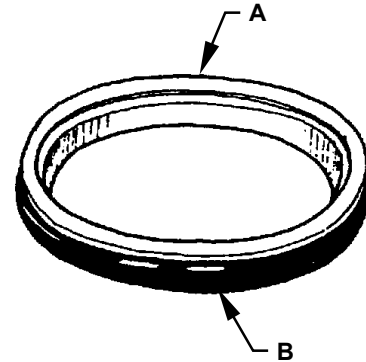
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GENERAL / Precautions for Disassembling and Assembling

Floating Seal Precautions

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

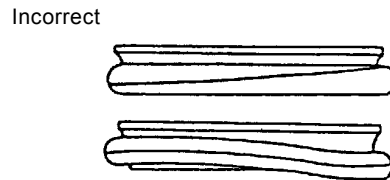
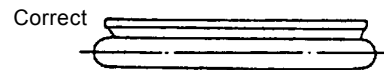
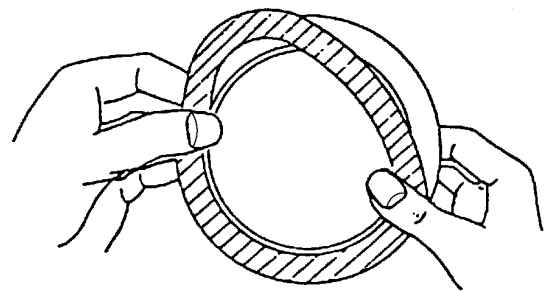
- (1) Keep seal rings together as a matched set with seal ring faces together. Insert a piece of cardboard to protect surfaces.
- (2) Check the slide surface on seal ring (A) for scuffing, scoring, corrosion, deformation or uneven wear.
- (3) Check O-ring (B) for tears, breaks, deformation or hardening.



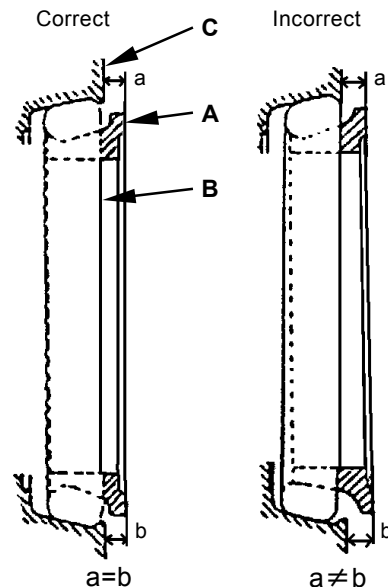
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2. If incorrectly assembled, oil leakage or damage will occur. Be sure to do the following, to prevent trouble.

- (1) Clean the floating seal and seal mounting bores with cleaning solvent. Use a wire brush to remove mud, rust or dirt. After cleaning, thoroughly dry parts with compressed air.
- (2) Clean the floating seal and seal mounting bores. Check the bore surface for scuffing or scoring by touching the surface with touch.
- (3) Check that 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.



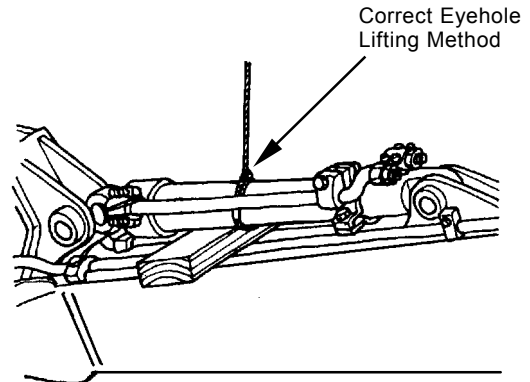
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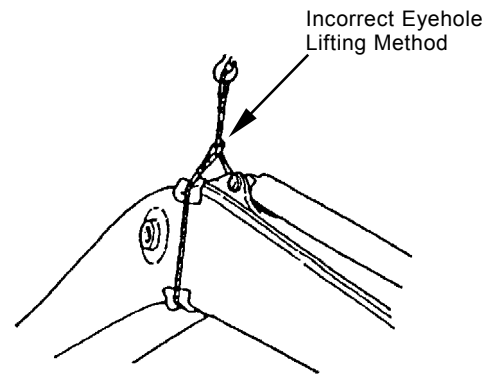
GENERAL / Precautions for Disassembling and Assembling

Precautions for Using Nylon Sling

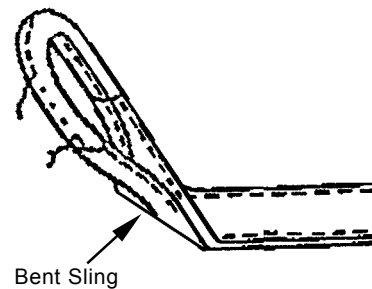
1. Follow the precautions below to use nylon slings safely.
 - Attach protectors (soft material) on the corners of the load so that the nylon sling does not directly contact the corners. This will prevent the nylon sling from being damaged and the lifted load from slipping.
 - Lower the temperature of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



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W162-01-01-009

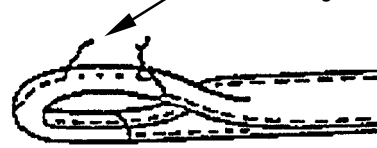
GENERAL / Precautions for Disassembling and Assembling



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

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

Damaged Appearance Broken Sewing Thread

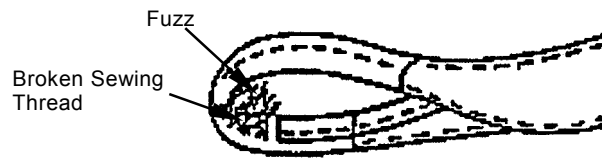


W162-01-01-002

Scuffing



W162-01-01-003



W162-01-01-004

Broken Sewing Thread



W162-01-01-005

Broken Sewing Thread



W162-01-01-006

Scoring

Separation of Belt



W162-01-01-007

Fuzz

Scuffing

Broken Warp



W162-01-01-008

GENERAL / Precautions for Disassembling and Assembling

MAINTENANCE STANDARD TERMINOLOGY

“Standard”

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

“Allowable Limit”

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


GENERAL / Precautions for Disassembling and Assembling

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GENERAL / Tightening Torque

TIGHTENING TORQUE SPECIFICATION

No.	Descriptions	Bolt Dia mm	Q'ty	Wrench Size (mm)	Torque		
					N·m	(kgf·m)	(lbf·ft)
1	Engine cushion rubber mounting bolt	Front	2	41	1050	(105)	(775)
		Rear	2	50	1950	(195)	(1440)
2	Engine bracket mounting bolt	Front	8	22	210	(21)	(155)
		Rear	12	30	400	(40)	(295)
3	Radiator mounting bolt	27	4	41	1050	(105)	(774)
4	Oil cooler mounting bolt	24	4	36	950	(95)	(700)
5	Hydraulic oil tank mounting bolt	20	8	30	400	(40)	(295)
6	Fuel tank mounting bolt	18	8	27	300	(30)	(220)
7	ORS fittings for hydraulic hoses and piping	1 - $\frac{3}{16}$ -12UNF		36	180	(18)	(135)
		1 - $\frac{7}{16}$ -12UNF		41	210	(21)	(155)
8	Pump transmission mounting bolt	12	14	19	110	(11)	(80)
9	Pump device mounting bolt	20	4×2	17 hole	400	(40)	(295)
10	Fan pump mounting bolt	16	4	14 hole	210	(21)	(155)
11	Fan motor mounting nut	12	2	19	110	(11)	(80)
12	Control valve mounting bolt	20	4	30	400	(40)	(295)
13	Control valve bracket mounting bolt	20	8	30	400	(40)	(295)
14	Swing device mounting bolt	24	14×2	36	950	(95)	(700)
15	Swing motor mounting bolt	20	12×2	30	400	(40)	(295)
16	Battery mounting bolt	12	2	19	35	(3.5)	(25)
17	Cab mounting nut	16	6	24	210	(21)	(155)
18	Swing bearing mounting bolt to upperstructure	33	41	50	2200	(220)	(1620)
	Swing bearing mounting bolt to undercarriage	30	48	46	1750	(175)	(1290)
19	Travel device mounting bolt	27	24×2	41	1400	(140)	(1030)
	Travel motor mounting bolt	18	4×2	27	300	(30)	(220)
	Sprocket mounting bolt	27	24×2	41	1400	(140)	(1030)
20	Upper roller mounting	22	24	32	750	(75)	(555)
21	Lower roller mounting bolt	STD, H	64	36	950	(95)	(700)
		LC, LCH	72	36	950	(95)	(700)
22	Track shoe bolt	STD, H	376	41	2000	(200)	(1475)
		LC, LCH	408	41	2000	(200)	(1475)
23	Track guard mounting bolt	STD	16	41	1400	(140)	(1030)
		LC	36	41	1400	(140)	(1030)
24	Track frame mounting bolt	36	44	55	2800	(280)	(2065)
25	Coupling and clamp of low pressure piping	Flex Master Coupling	8	13	10.5 to 12.5	(1.05 to 1.25)	(7.7 to 9.2)
		Clamp	1/4-28 UNF	11	10	(1)	(7.4)
26	Counterweight mounting bolt	45	2	65	2800	(280)	(2065)
	Counterweight retaining bolt	24	4	36	700	(70)	(515)
27	Signal control valve mounting bolt	10	4	8 hole	50	(5)	(37)
28	Front pin-retaining bolt	20	24	30	400	(40)	(295)
	Front pin retaining bolt	20	7	30	400	(40)	(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.

GENERAL / Tightening Torque

TORQUE CHART

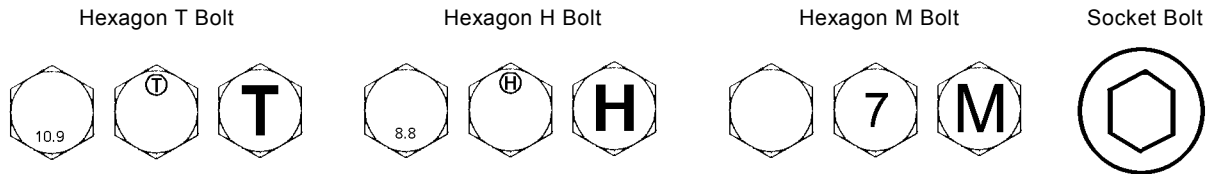
⚠ CAUTION: Use tools appropriate for the work to be done. Makeshift tools and procedures can create safety hazards. For loosening and tightening nuts and bolts, use correct size tools. Otherwise, tightening tools may slip, potentially causing personal injury.



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



W162-01-01-001

Specified Tightening Torque Chart

Bolt Dia.	Wrench Size	Hexagon Wrench Size	 M552-07-091			 M552-07-090			 M552-07-092		
			Socket 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)

GENERAL / Tightening Torque

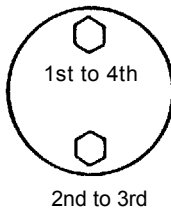
IMPORTANT: The following items are applied to both fine and coarse pitch threads.

1. 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 $\pm 10\%$.
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.
5. Make sure that nut and bolt threads are clean before installing.
Remove dirt or corrosion, if any.

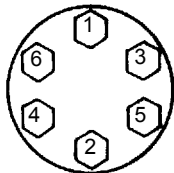
Bolt Tightening Order

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

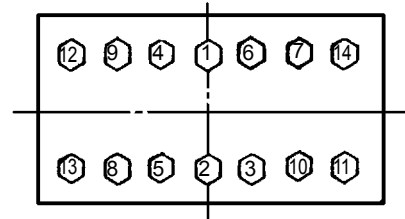
Equally tighten upper and lower alternately



Tighten diagonally



Tighten from center and diagonally

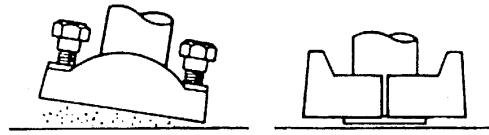


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GENERAL / Tightening Torque

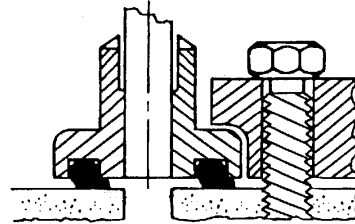
Service Recommendations for Split Flange

- 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.
 2. 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.
 5. 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.

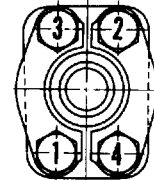


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WRONG

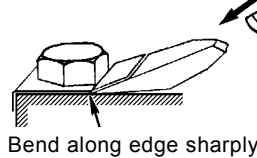


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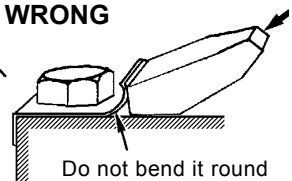


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RIGHT



WRONG



Nut and Bolt Locking

- Lock Plate

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

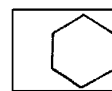
- Cotter Pin

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

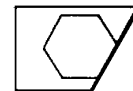
- Lock Wire

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

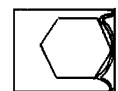
RIGHT



RIGHT

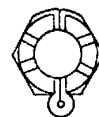


WRONG



Bend along edge sharply

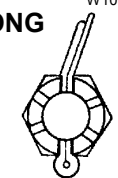
RIGHT



RIGHT

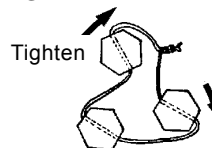


WRONG



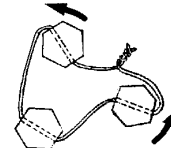
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RIGHT



Loosen

WRONG

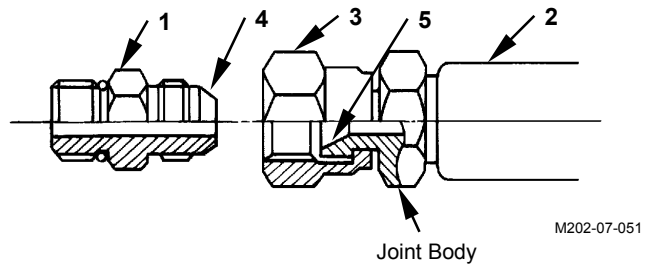


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GENERAL / Tightening Torque

PIPING JOINT

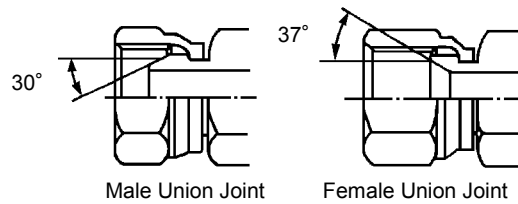
IMPORTANT: The torques given in the chart are for general use only. Do not use these torques if a different torque is given for a specific application.



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



W105-01-01-017

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

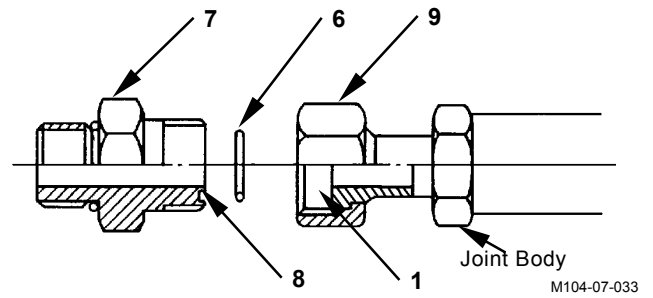
NOTE: Tightening torque of 37° male coupling without union is similar to tightening torque of 37° female.

GENERAL / Tightening

O-ring Seal Joint

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



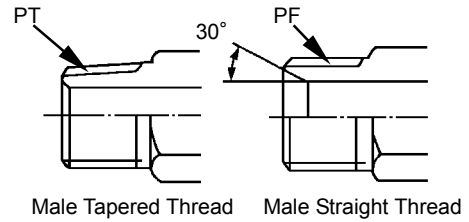
Wrench Size mm	Wrench Size mm	Tightening Torque
Union Nut	Joint Body	N-m (kgf-m, lbf-ft)
19	17	29.5 (3.0,21.5)
22	19	69 (7.0,51)
27	22	93 (9.5,69)
32	27	137 (14.0,101)
36	30,32	175 (18.0,129)
41	36	205 (21.0,151)
46	41	205 (21.0,151)

GENERAL / Tightening

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

Seal Tape Application

Seal tape is used 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.

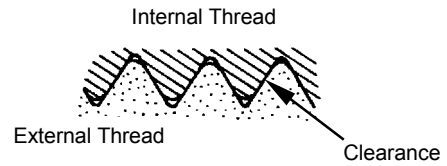
Apply seal tape around threads as shown. Wrap seal tape in the same direction as the threads.

Low-Pressure-Hose Clamp Tightening Torque

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

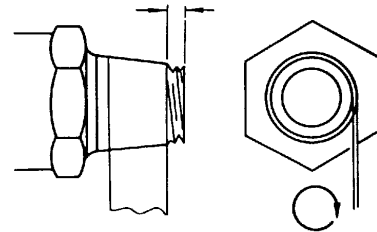
T-Bolt Type Band Clamp:
4.4 N·m (0.45 kgf·m, 3.25 lbf·ft)

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)

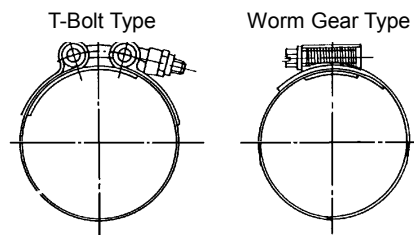


W105-01-01-019

Leave one to two pitch threads uncovered



M114-07-041



M114-07-043

M114-07-042

GENERAL / Tightening

Connecting Hose



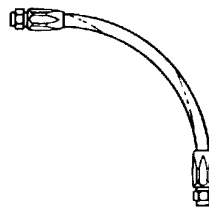
CAUTION: When replacing hoses, be sure to use only genuine Hitachi service parts. Using hoses other than genuine Hitachi hoses may cause oil leaks, hose rupture or Separation of fitting, possibly resulting in a fire on the machine.

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.

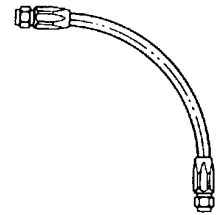
If hoses rub against each other, wear to the hoses will result, leading to hose rupture. Take necessary measures to protect hoses from rubbing against each other.

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

WRONG

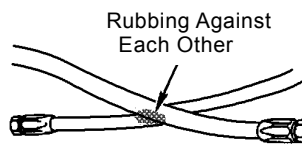


RIGHT

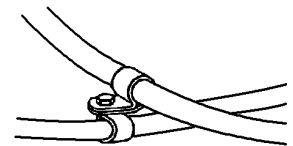


W105-01-01-011

WRONG

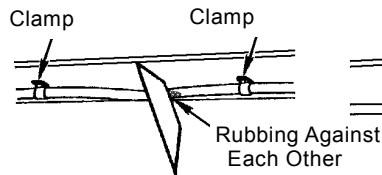


RIGHT

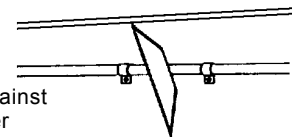


W105-01-01-012

WRONG

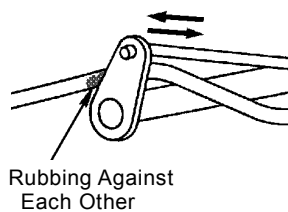


RIGHT

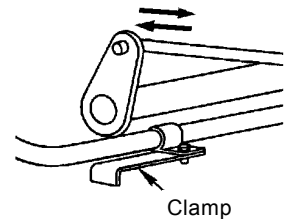


W105-01-01-013

WRONG



RIGHT



W105-01-01-014


GENERAL / Tightening

PERIODIC REPLACEMENT OF PARTS

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
Engine		Fuel hose (Fuel tank to filter)	Every 2 years or 6000 hours
		Fuel hose (Fuel tank to injection pump)	Every 2 years or 6000 hours
		Heater hose (Heater to engine)	Every 2 years or 6000 hours
Hydraulic System	Basic Machine	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
	Front-End Attachment	Boom cylinder line hose	Every 2 years or 6000 hours
		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
		Seat Belt	Every 3 years

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

GENERAL / Tightening Torque

(Blank)

GENERAL / Painting

PAINTING

Painting specification

Surfaces to Be Painted	Painting Colour
• Main surface of upperstructure (except cab)	YR-01 [TAXI yellow]
Bed cover	HG Beige Deep
Inner	Grey
Front left step, center, rear left step	HG Beige Deep
Counterweight	YR-01 [TAXI yellow]
Handrail	HG Beige Deep
• Front attachment	YR-01 [TAXI yellow]
• Track (including swing ring)	N1.0 [Black]
• Floor plate	M/F Cation (allowed)

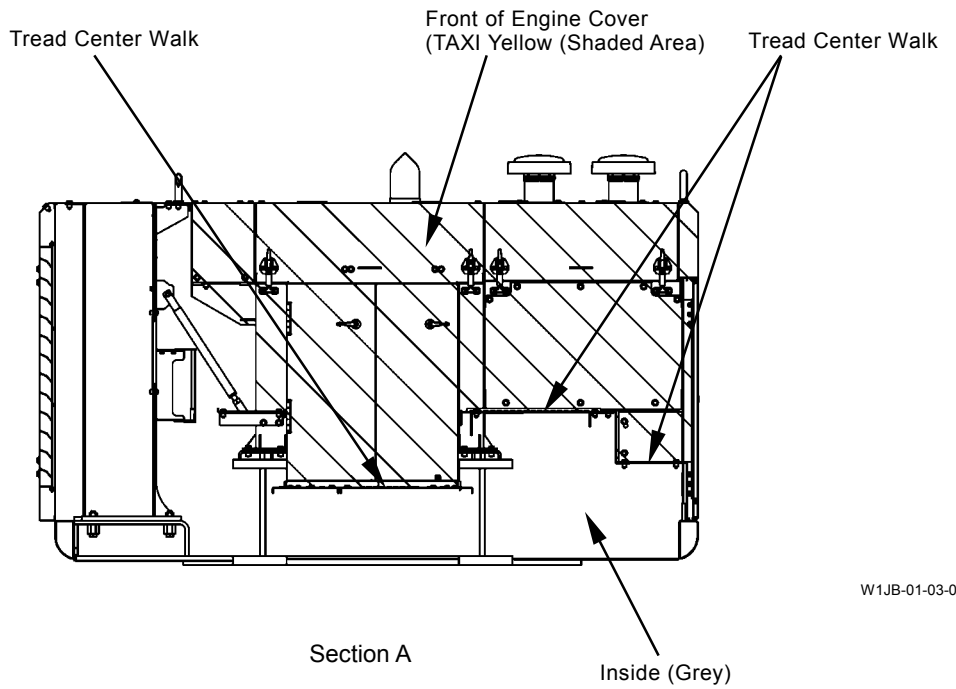
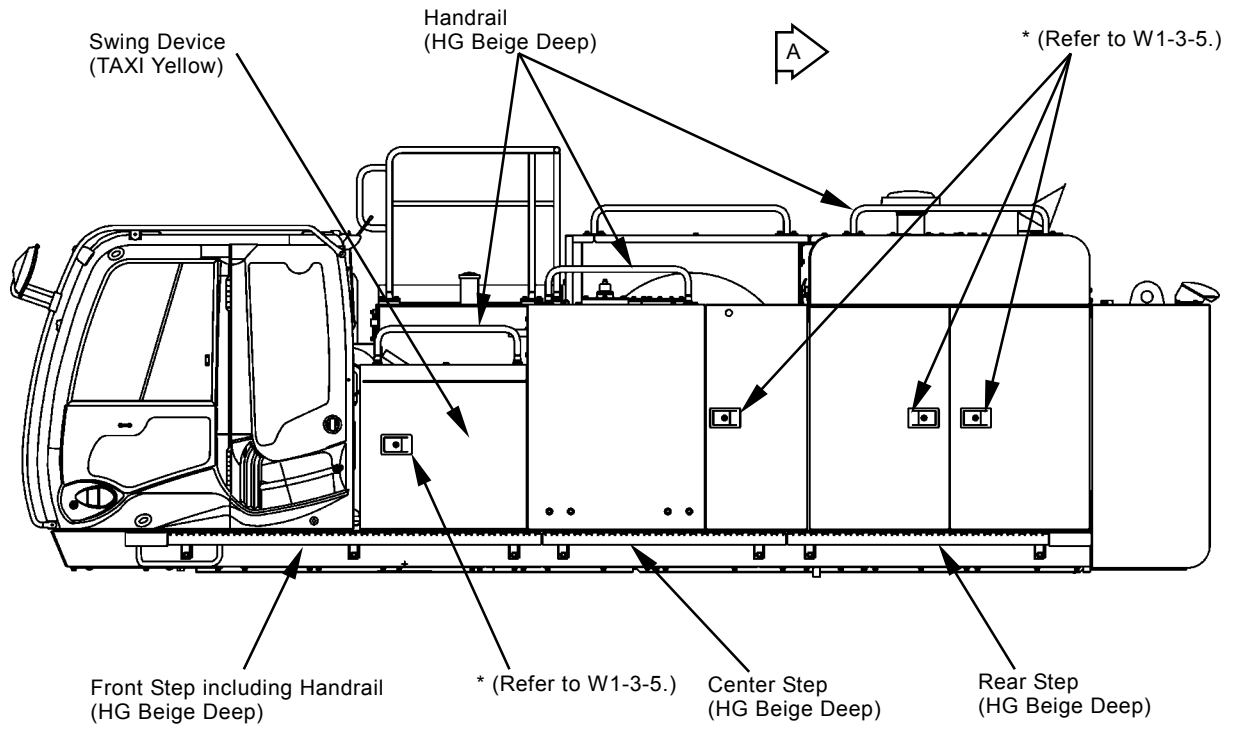
Final painted color

• Inside and outside surface of cab	HG Beige Deep
• Shaded area on cab outside	Shining Silver
• Right window beam, U-Bolt	[KANSAI PAINT LF-113-230B (Charcoal series black, half glossy)]
• Suspension lifter (chair bottom)	[N2.0 (Black)]
• Lever (travel, pilot shut-off, foot rest)	High Grade Brack
• Nonslip cover	KANSAI PAINT AMYLAC 1400 (Deep Black)
• Mirror stay	High Grade Brack
• Rear camera assembly	HG Beige Deep, HG Brack

Specified masked position

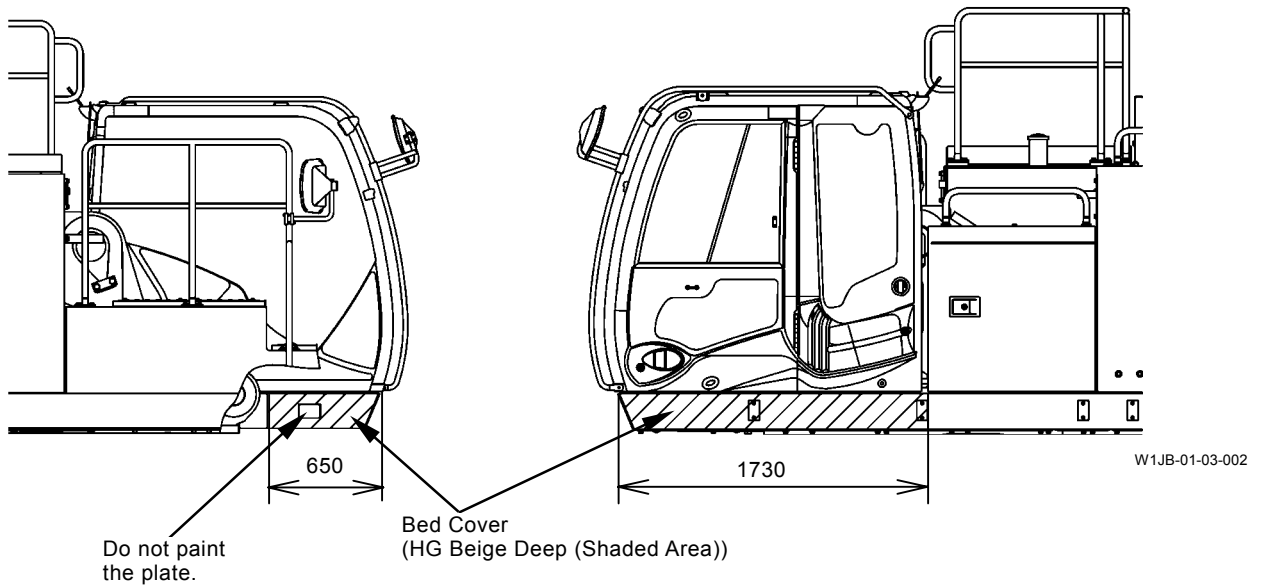
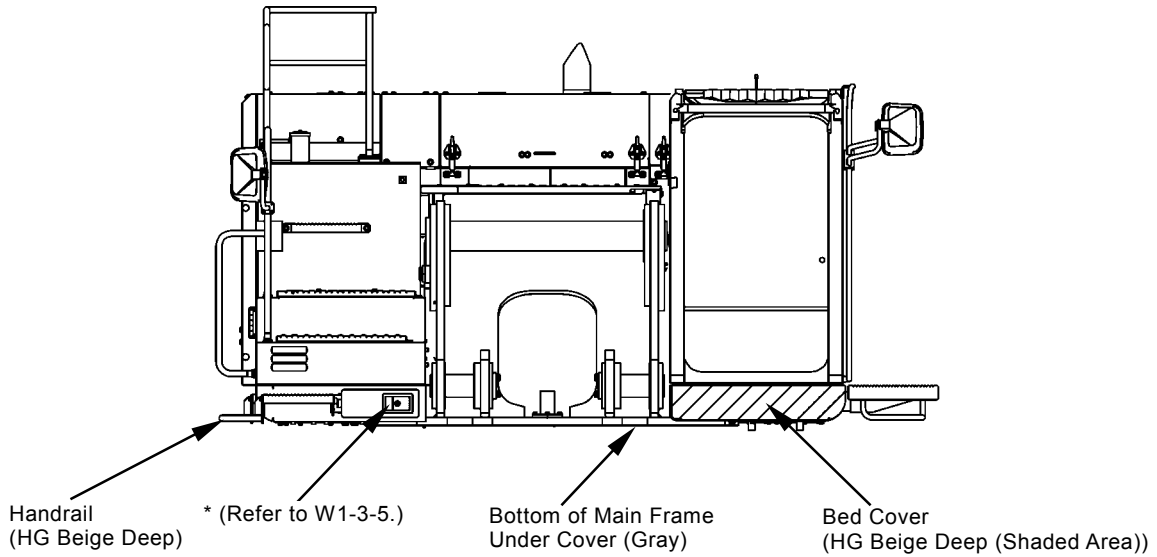
• Engine plate	
• Control valve plate	• Cover catch, door handle
• Swing motor plate	• Battery cable terminal cover
• Pump plate	• Air cleaner
• Fan pump plate	• Fan motor plate
• Muffler [including U-bolt]	• Atmospheric pressure [battery space]

GENERAL / Painting

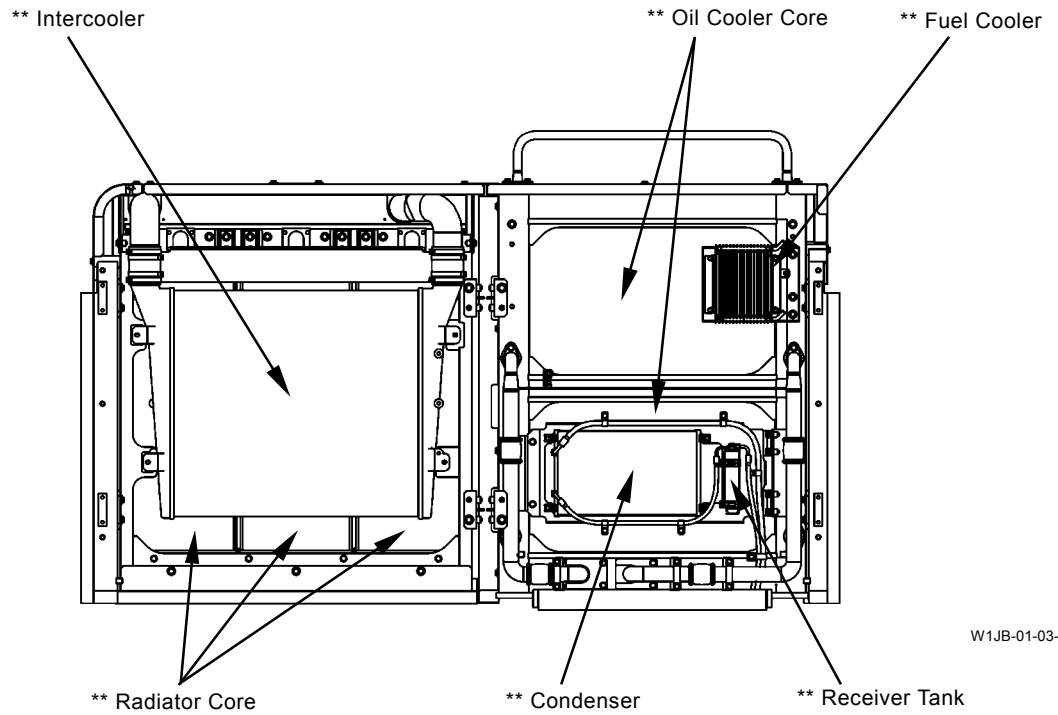
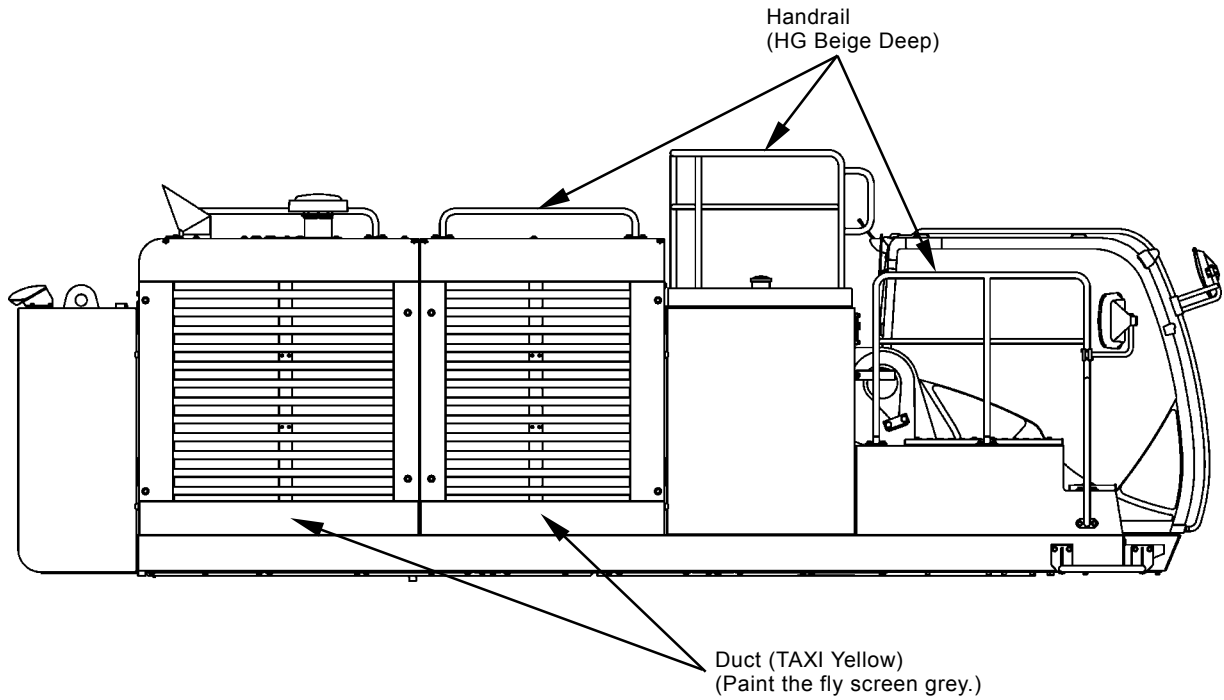


W1JB-01-03-001


GENERAL / Painting



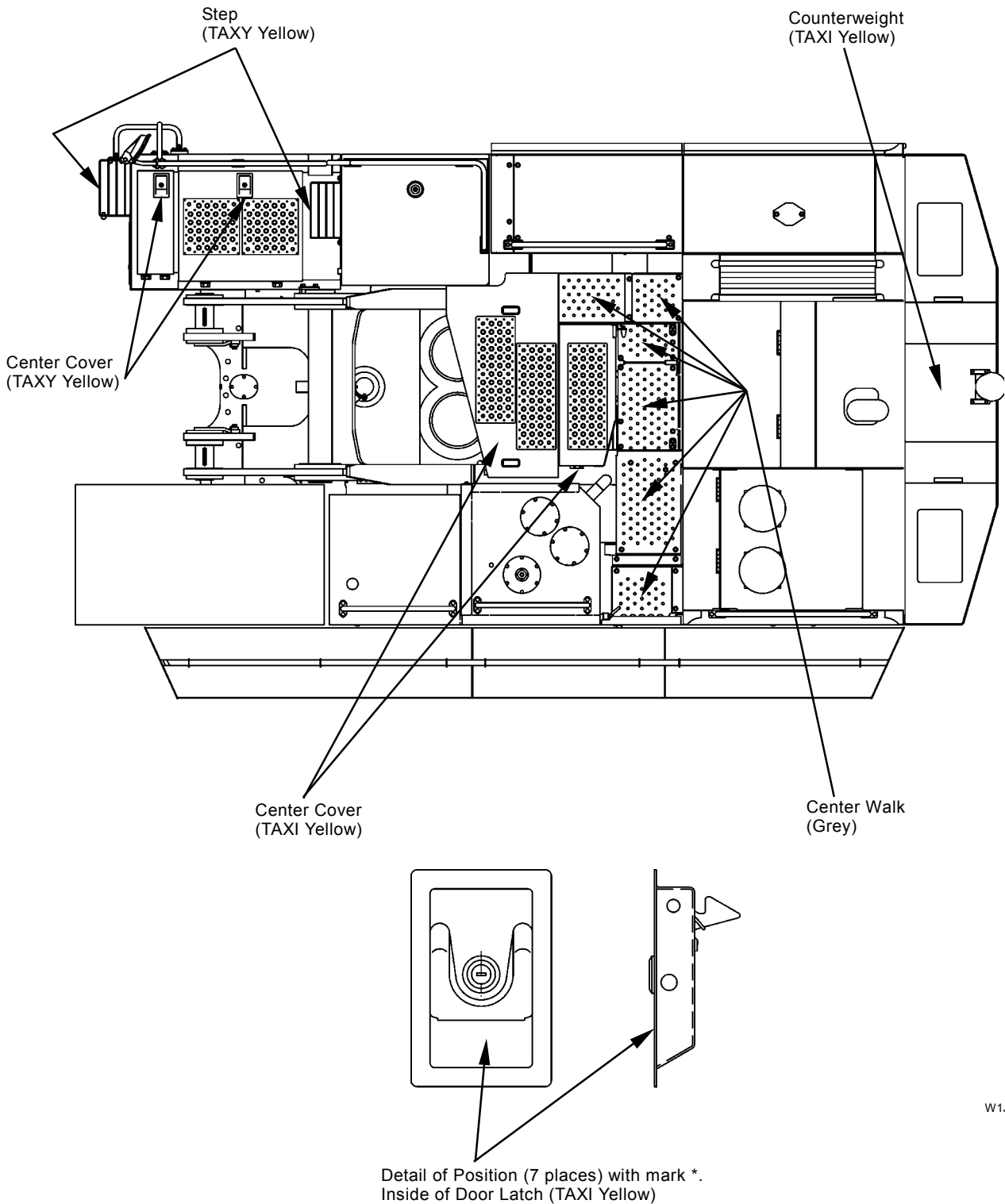
GENERAL / Painting



W1JB-01-03-003

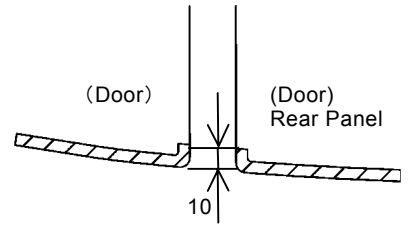
 **NOTE:** Do not paint the item with mark **.
(Put the mask here.)

GENERAL / Painting



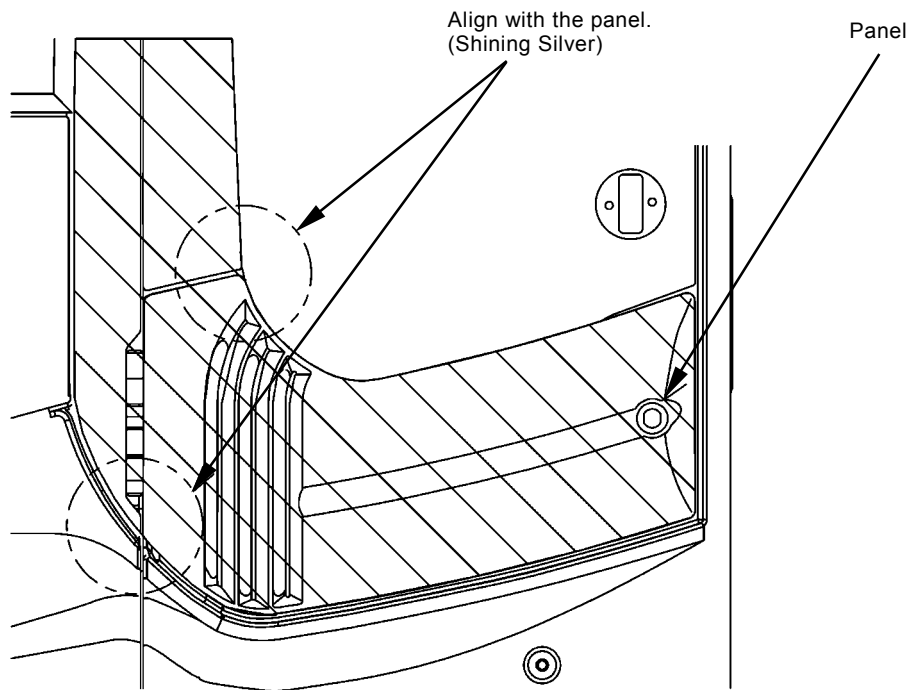
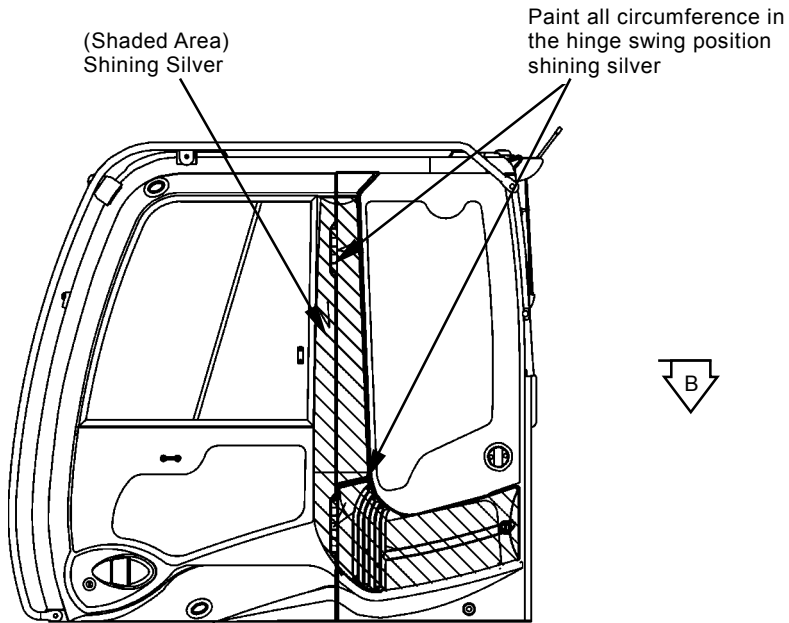
W1JB-01-03-004

GENERAL / Painting



Shining Silver Painted Range on Door

Section B



W1JB-01-03-005

GENERAL / Bleeding Air

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.

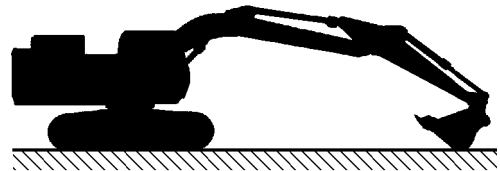
Hot hydraulic oil just after operation may spout and cause severe burns. Wait for oil in order to cool before starting any work.

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.

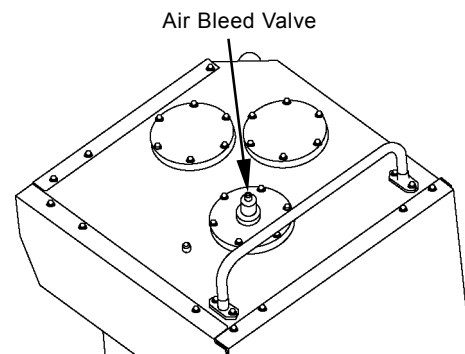
Preparation

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 in order to maintain negative pressure in the hydraulic oil tank.

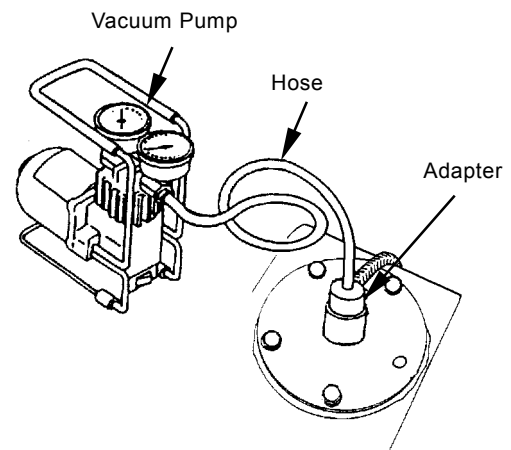
 **NOTE:** Run the vacuum pump continuously while working.



W800-01-04-002



W800-01-04-001

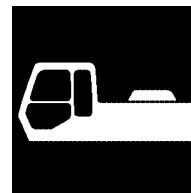


W562-02-03-008

GENERAL / Bleeding Air

(Blank)

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Structure of Fan Valve	W2-13-6

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Remove and Install Engine.....	W2-14-1
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UPPERSTRUCTURE / Cab

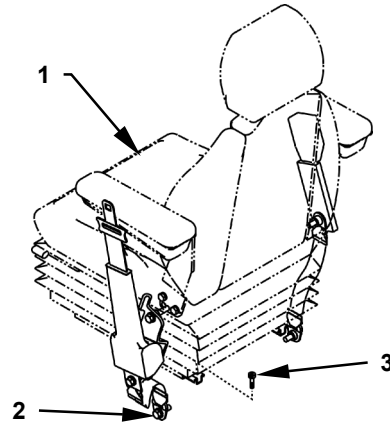
REMOVE AND INSTALL CAB

Removal

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


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

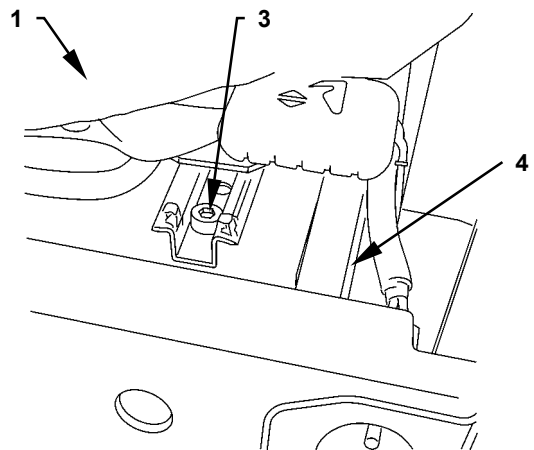
 : 16 mm



W1JB-02-01-008

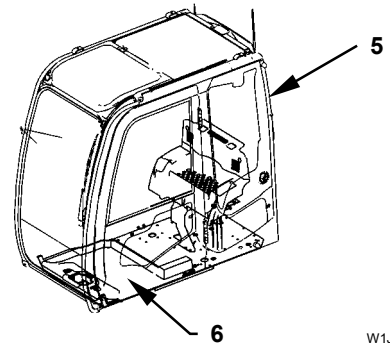
2. Remove socket bolts (3) (4 used) from seat (1). Remove seat (1) from bracket (4).

 : 6 mm



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3. Remove mat (6) from the cab (5) inside.

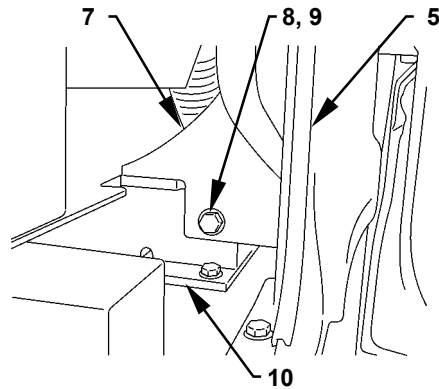


W1JB-02-07-015

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).

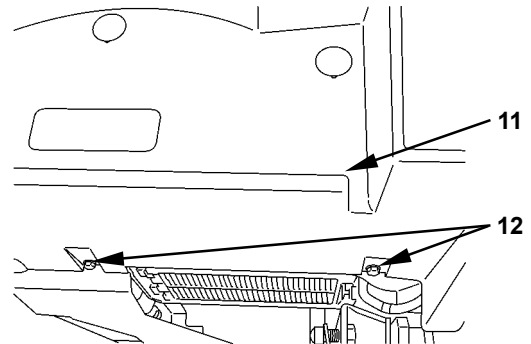
 : 19 mm



W1JB-02-01-003

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

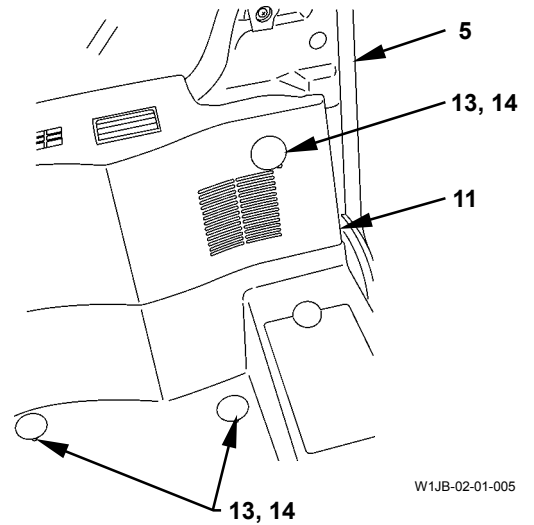
 : 13 mm



W1JB-02-01-004


6. Remove caps (13) (6 used) from cover (11).
Remove screws (14) (6 used) from cover (11).

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




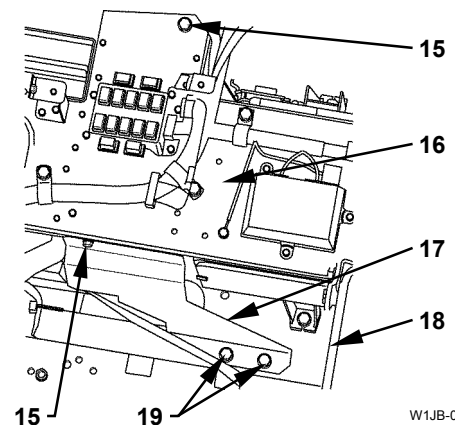
W1JB-02-01-005

8. Remove bolts (15) (2 used) from bracket (16) and cover (17).

 : 13 mm

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

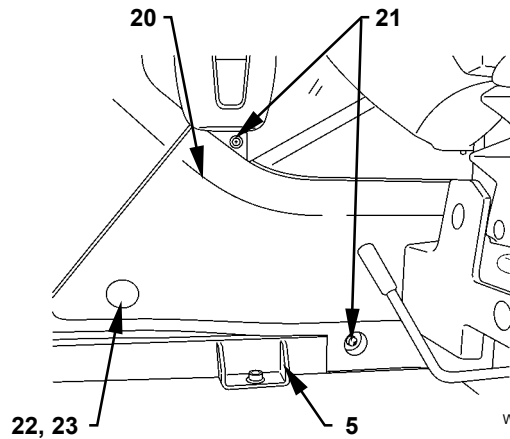
 : 17 mm



W1JB-02-01-040

UPPERSTRUCTURE / Cab

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

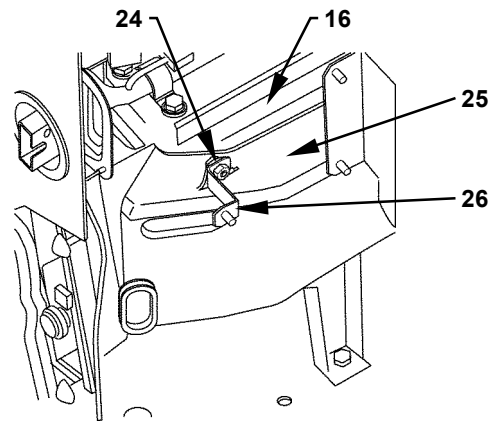


11. Remove bolt (24) from duct (25). Remove duct (25) from bracket (26).
🔧 : 13 mm

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

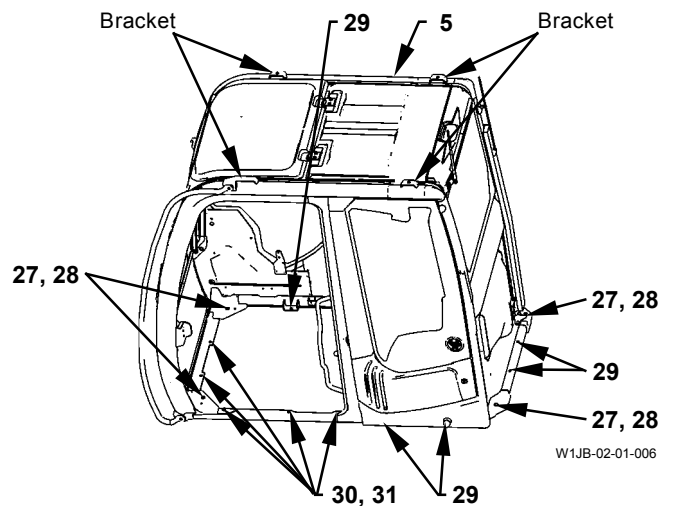
12. Attach a nylon sling onto the bracket and hold cab (5).

13. Remove nuts (27) (4 used) and washers (28) (4 used) from cab (5).
🔧 : 24 mm



14. Remove socket bolts (29) (6 used) from cab (5).
🔧 : 8 mm

15. Remove bolts (30) (5 used) and washers (31) (5 used) from cab (5).
🔧 : 17 mm

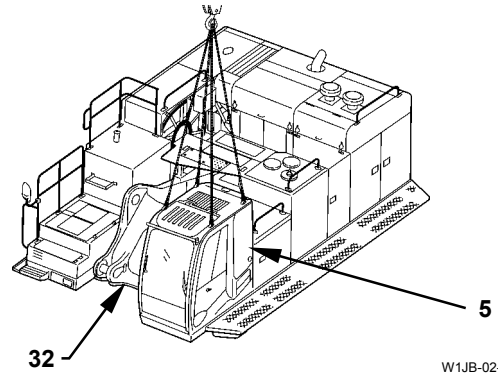


UPPERSTRUCTURE / Cab

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

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

17. Remove cab (5) from main frame (32).



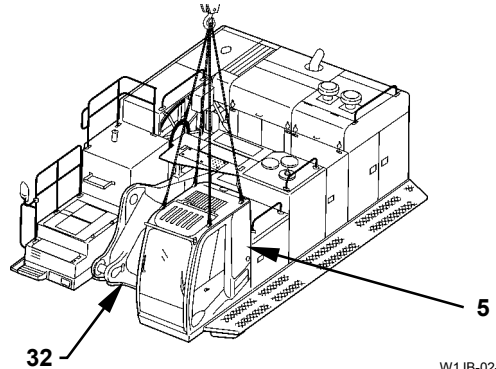
W1JB-02-03-007

UPPERSTRUCTURE / Cab

Installation


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 (32).




W1JB-02-03-007


2. Install cab (5) to main frame (32) with nuts (27) (4 used) and washers (28) (4 used).

 : 24 mm


 : 210 N·m (21.5 kgf·m, 155 lbf·ft)


3. Install cab (5) to main frame (32) with socket bolts (29) (6 used).

 : 8 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)


4. Install cab (5) to main frame (32) with bolts (30) (5 used) and washers (31) (5 used).

 : 17 mm

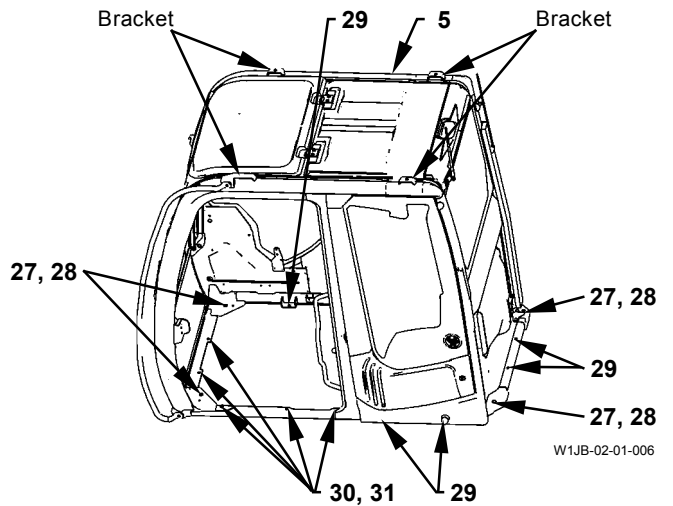
 : 50 N·m (5 kgf·m, 37 lbf·ft)

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

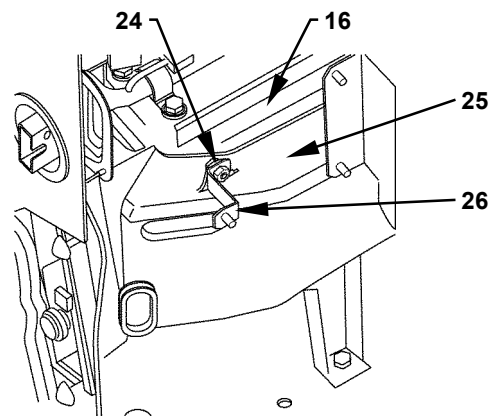
 : 13 mm

 : 20 N·m (2 kgf·m, 15 lbf·ft)

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



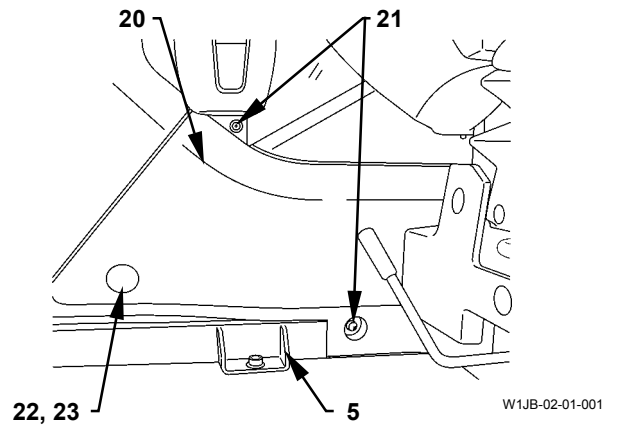
W1JB-02-01-006




W1JB-02-01-041


UPPERSTRUCTURE / Cab


7. 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).




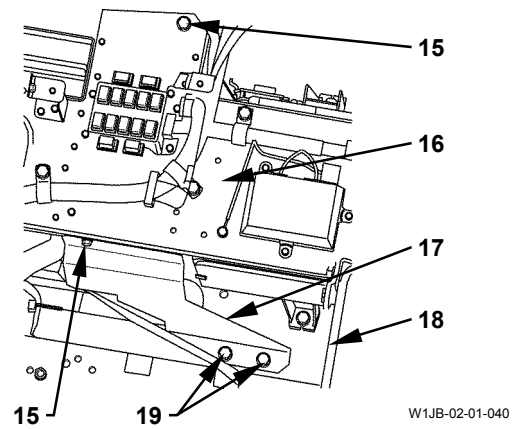
8. Install bracket (16) to bracket (18) with bolts (15) (2 used). Install cover (17) to bracket (18) with bolts (19) (2 used).

 : 13 mm

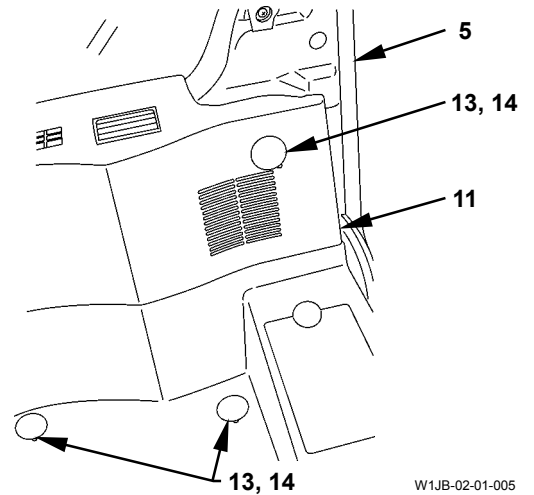
 : 20 N·m (2 kgf·m, 15 lbf·ft)

 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)




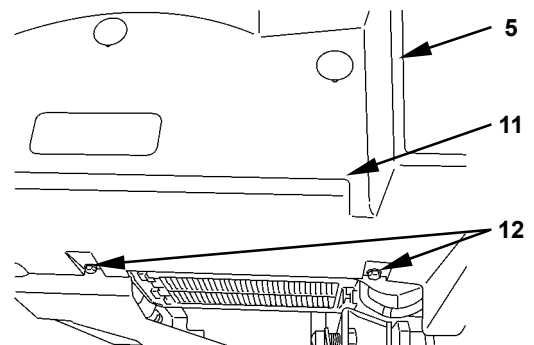
9. Install cover (11) to cab (5) with bolts (14) (5 used). Install caps (13) (6 used) to screws (14) (6 used).



10. Install cover (11) to cab (5) with bolts (12) (2 used).


 : 13 mm


 : 20 N·m (2 kgf·m, 15 lbf·ft)

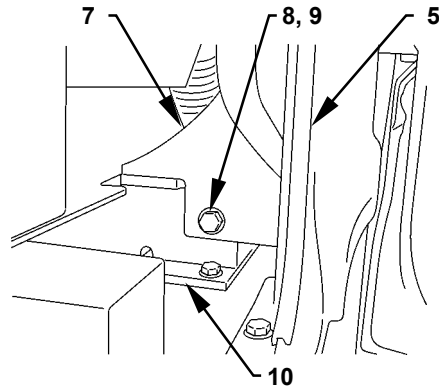


UPPERSTRUCTURE / Cab

11. 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)





W1JB-02-01-003

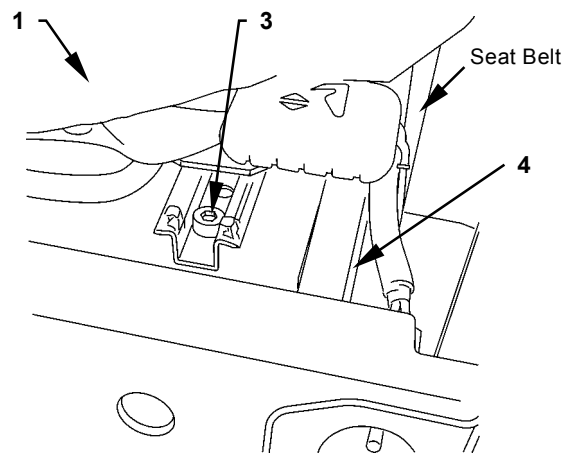


CAUTION: Seat (1) weight: 40 kg (88 lb)

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


 : 6 mm


 : 20 N·m (2 kgf·m, 15 lbf·ft)

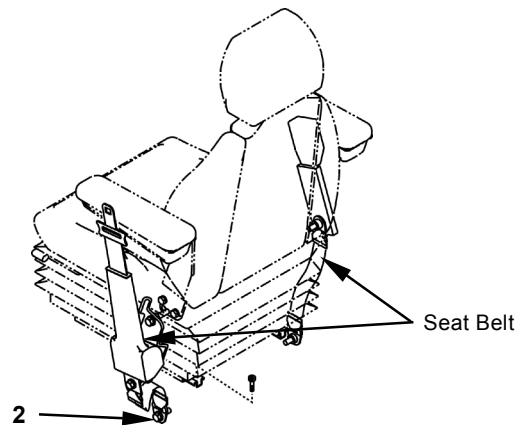


W1JB-02-07-007

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

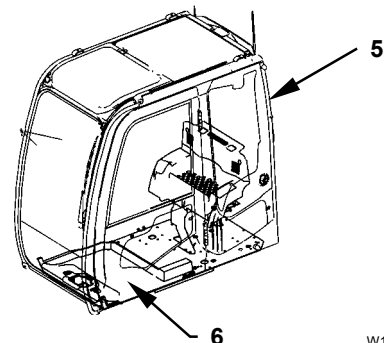
 : 16 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



W1JB-02-01-008


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

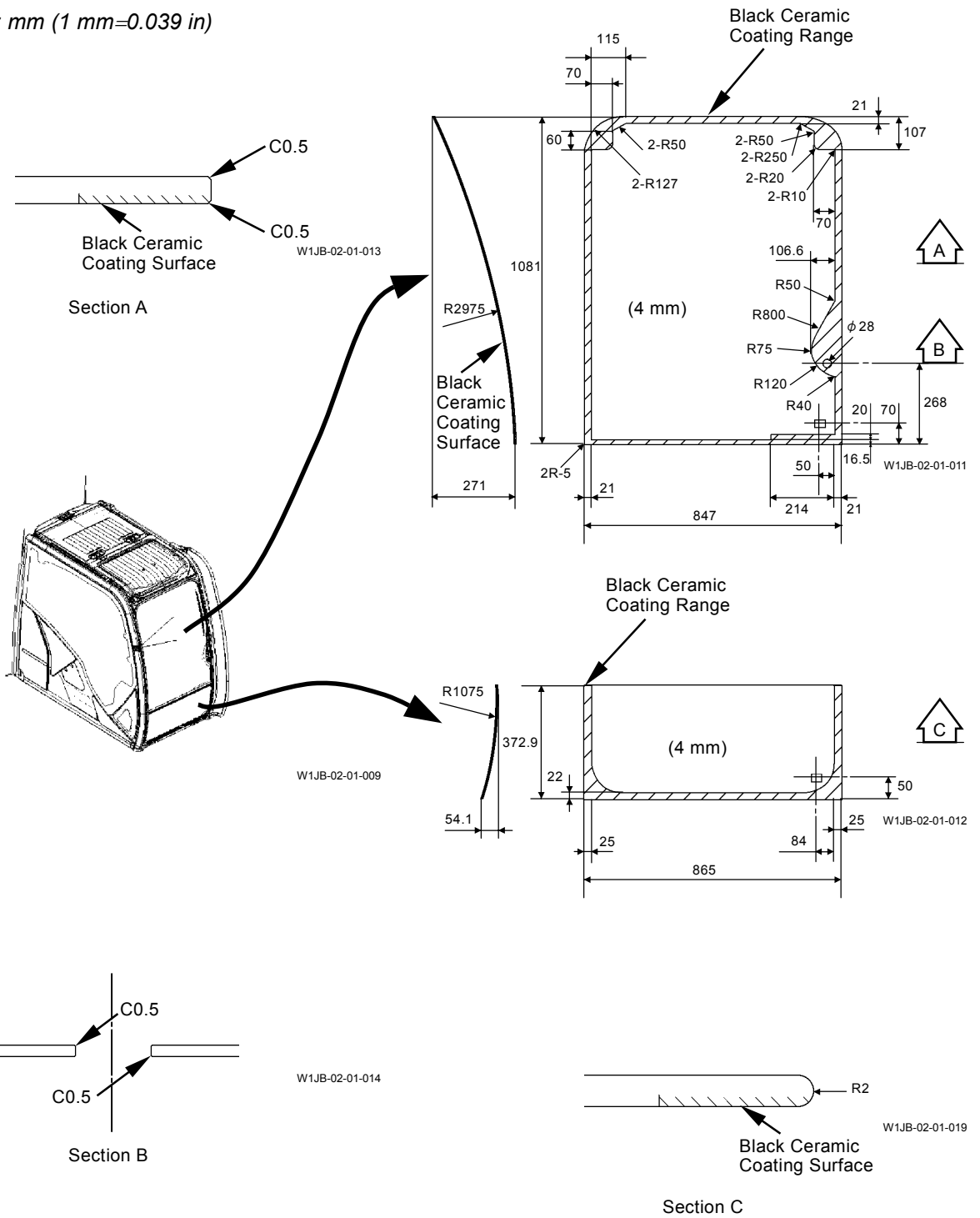


W1JB-02-07-015


UPPERSTRUCTURE / Cab

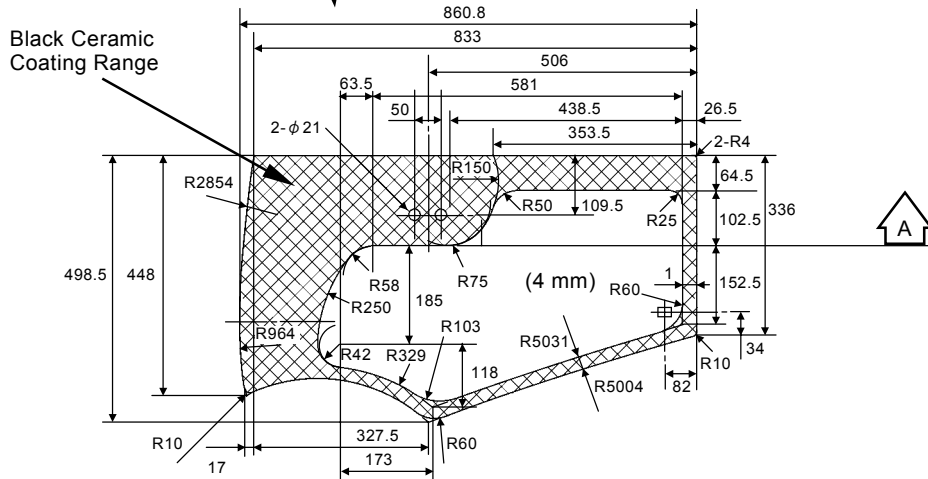
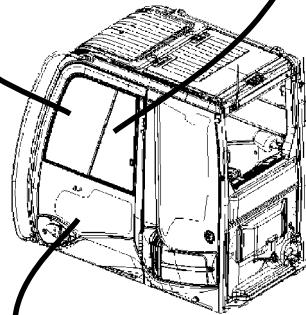
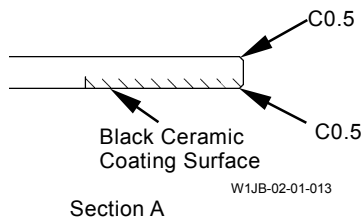
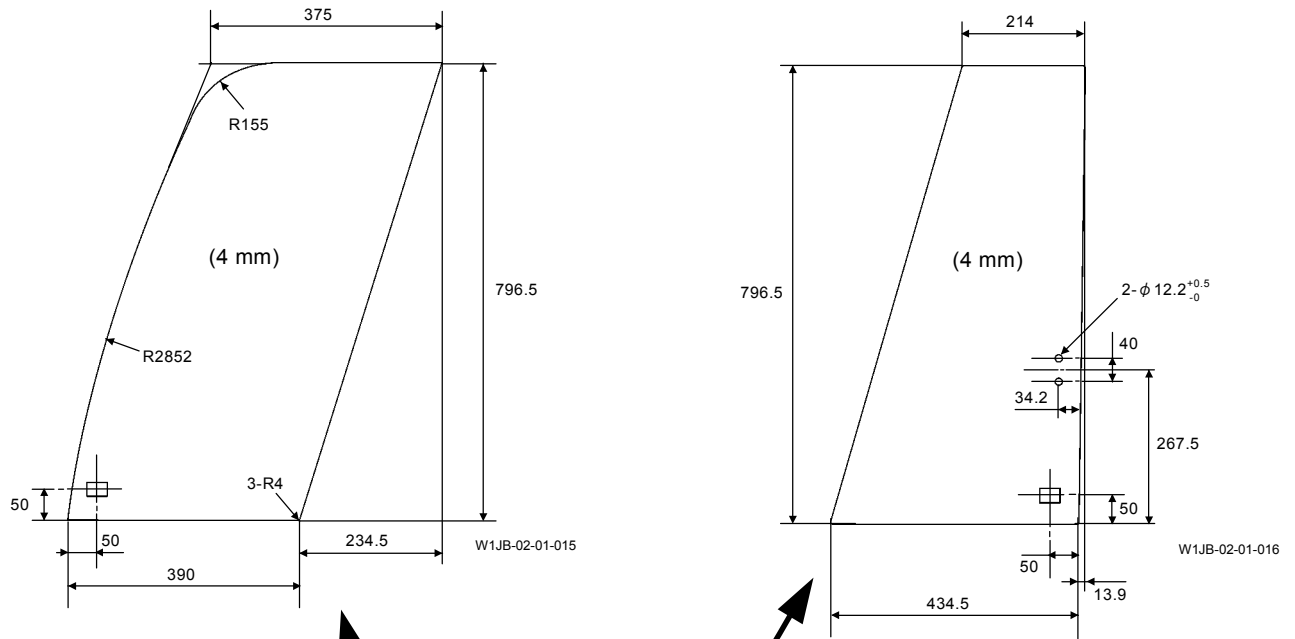
DIMENSIONS OF THE CAB GLASS

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



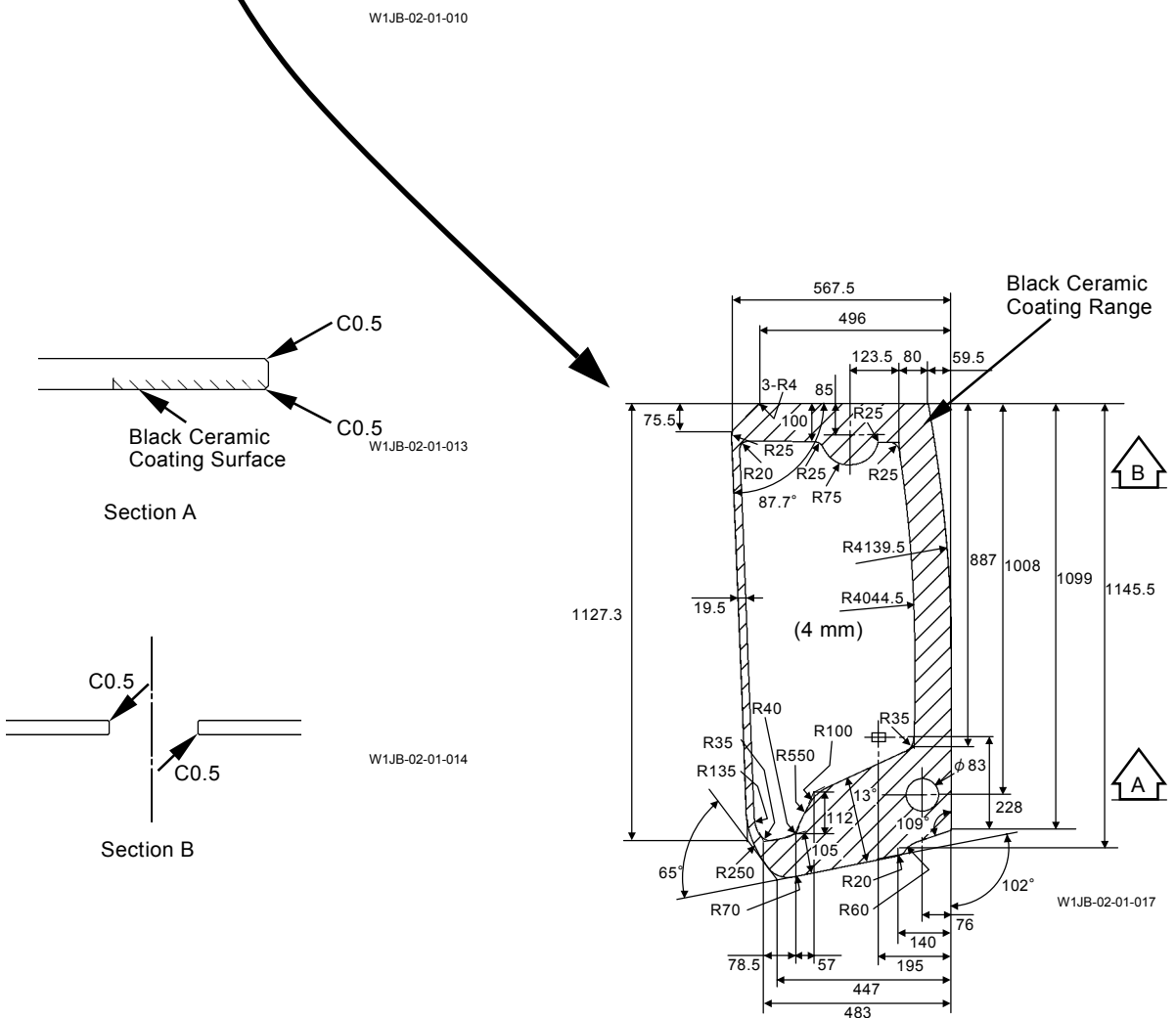
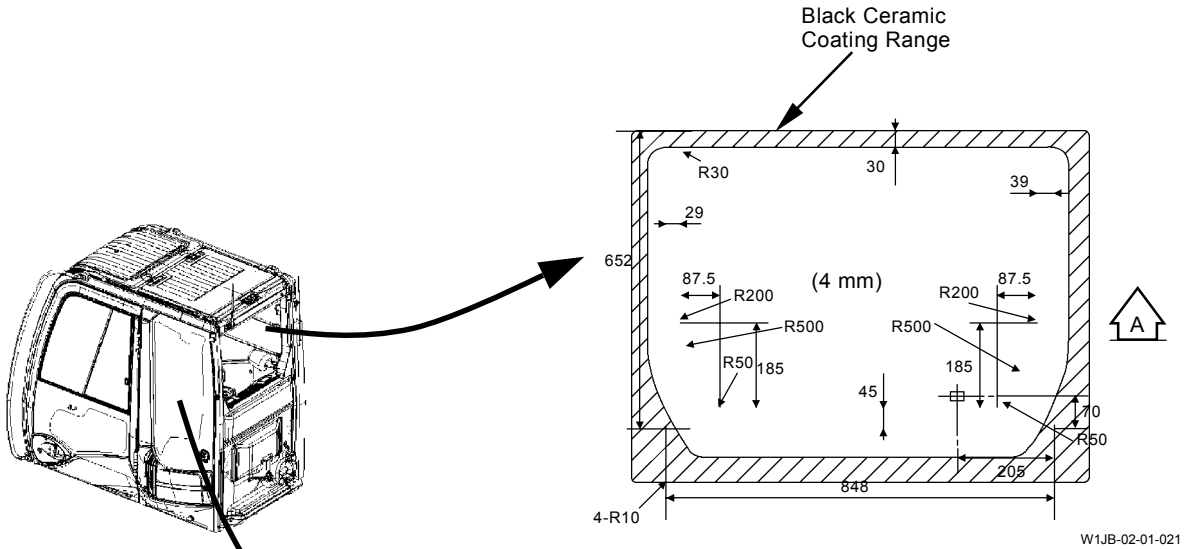
UPPERSTRUCTURE / Cab

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



UPPERSTRUCTURE / Cab

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



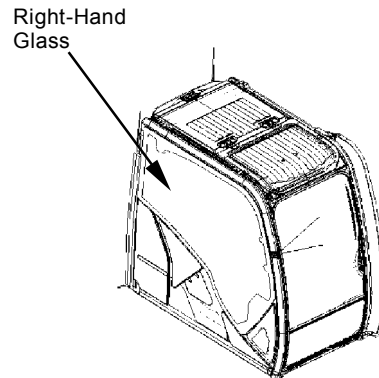
UPPERSTRUCTURE / Cab

Procedure to Remove Cab Glass

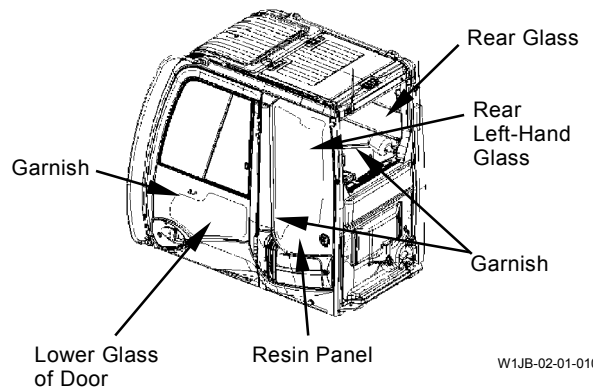
Procedures to Remove Right-Hand Glass, Rear Left Glass, Lower Door Glass and Rear Glass

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.

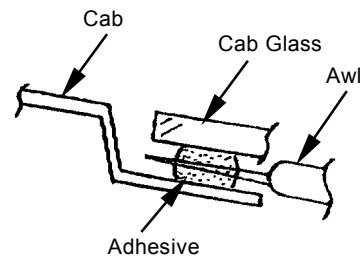


W1JB-02-01-009



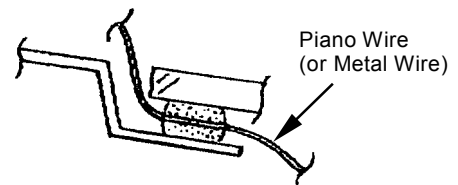
W1JB-02-01-010

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



W1SE-02-01-033


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

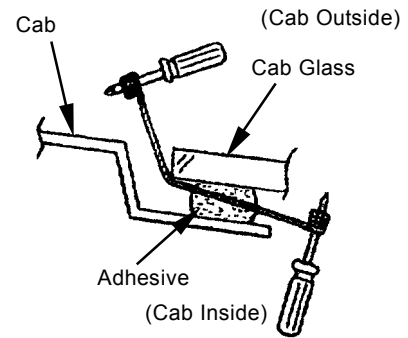


W1SE-02-01-034

UPPERSTRUCTURE / Cab

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

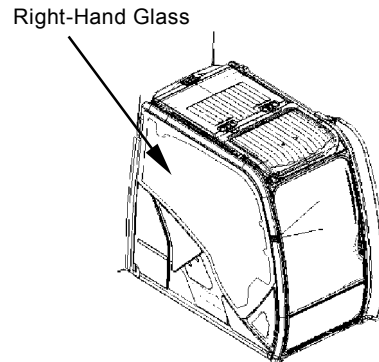
UPPERSTRUCTURE / Cab

Procedure to Install Cab Glass

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

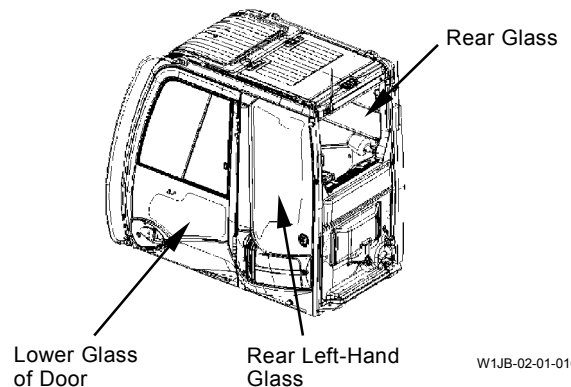
1. Cut off the residual adhesive from cab side by 1 to 2 mm deep all around by using a cutter knife or similar.

 **NOTE:** Do not damage the cab paint.



W1JB-02-01-009

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




W1JB-02-01-010

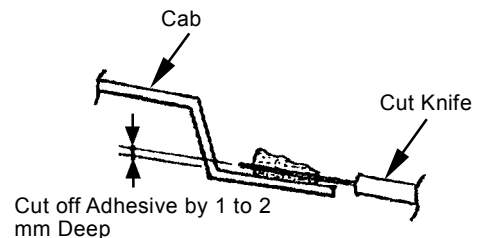
IMPORTANT: Primer should be shaken for about 1 minute and mix thoroughly before opening the cap.

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

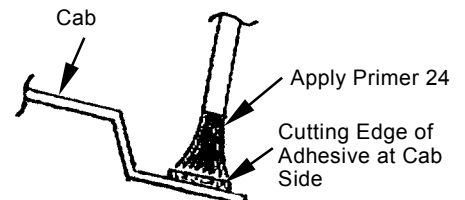
After opening Primer, all the contents should be used within 180 days (or 2 hours with the cap off).

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.



W1SE-02-01-036



W1SE-02-01-038

UPPERSTRUCTURE / Cab

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).

5. 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 W2-1-14.)

6. 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.)

7. 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.*

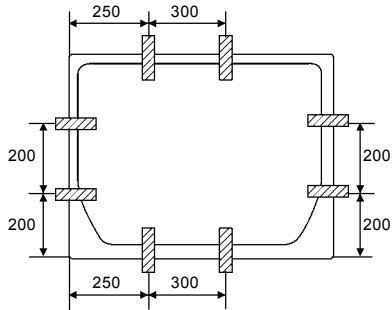
12. Secure the glass by using the gummed tape until the adhesive becomes solid in order to prevent them from being mispositioned or coming off.

 **NOTE:** *Time for adhesive (Sika Tack-Drive) to become solid: 8 hours (just for reference)*

UPPERSTRUCTURE / Cab

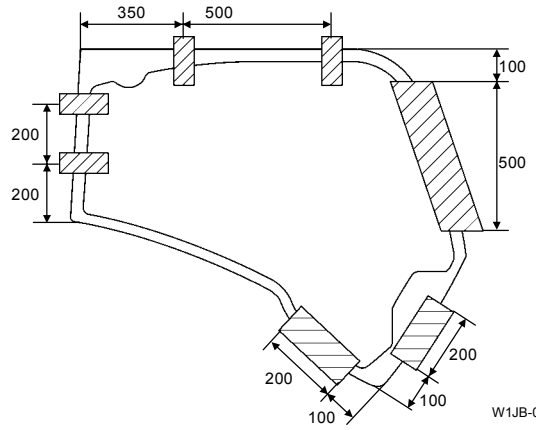
 NOTE: Unit: mm (1 mm=0.039 in)

Rear Glass



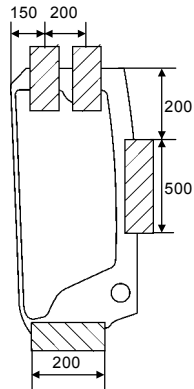
W1JB-02-01-029

Right-Hand Glass



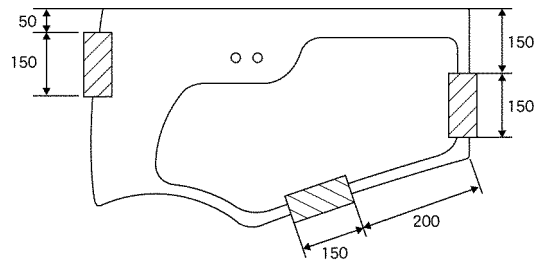
W1JB-02-01-030

Rear Left-Hand Glass




W1JB-02-01-035

Lower Glass of Door

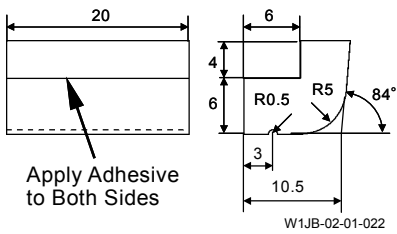


W1JB-02-01-038

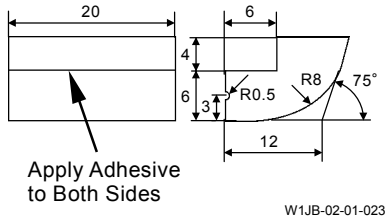
UPPERSTRUCTURE / Cab

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

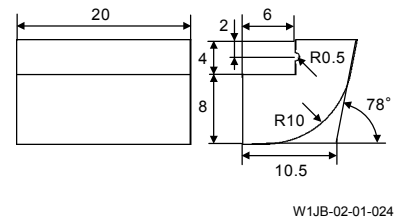
Spacer A



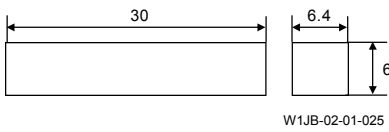
Spacer B



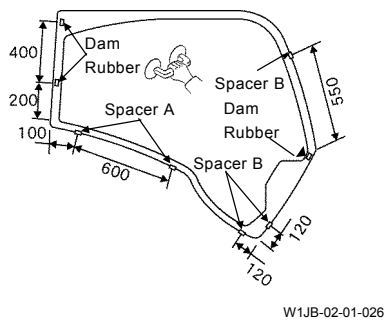
Spacer C



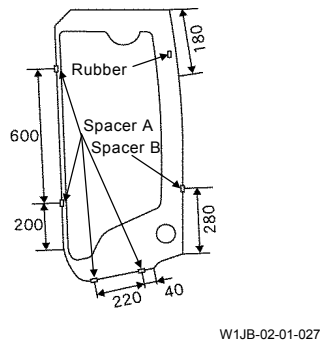
Dam Rubber



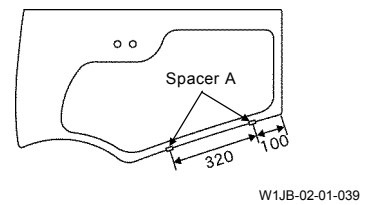
Right-Hand Glass



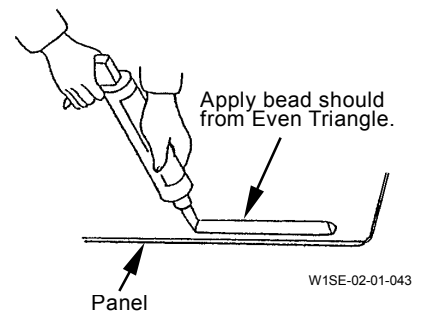
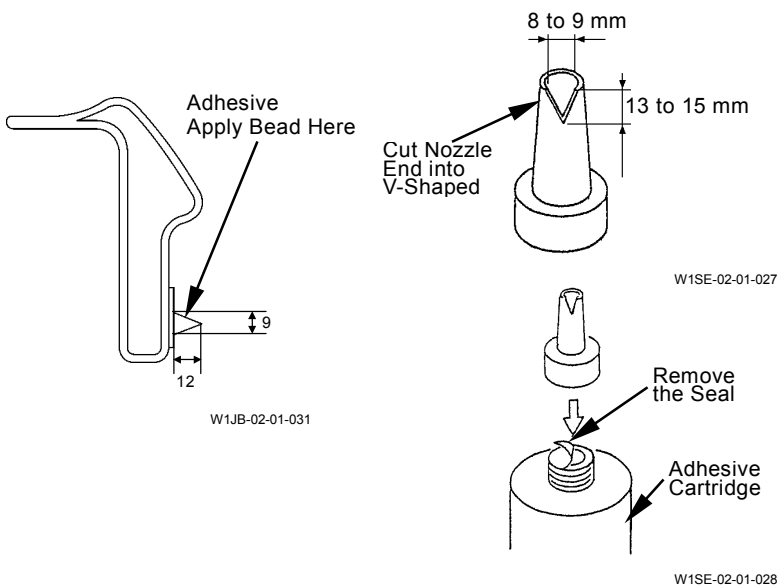
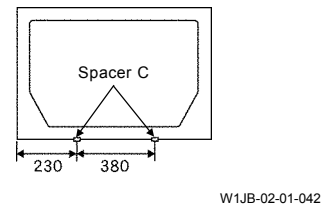
Rear Left-Hand Glass



Lower Glass of Door



Rear Glass



UPPERSTRUCTURE / Cab

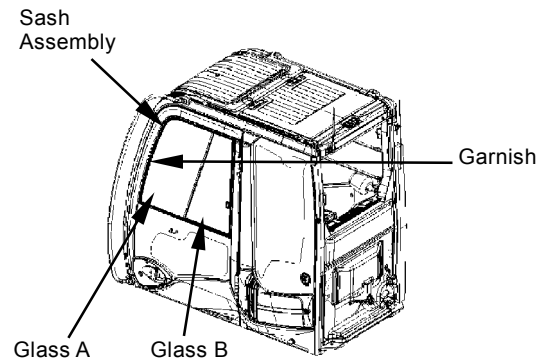
13. The required amount (just for reference) of adhesive and primer

		Painted Surface or Adhesive Surface	Glass Surface
	Adhesive Sika Tack-Drive 310 ml Cartridge	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

UPPERSTRUCTURE / Cab

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

UPPERSTRUCTURE / Cab

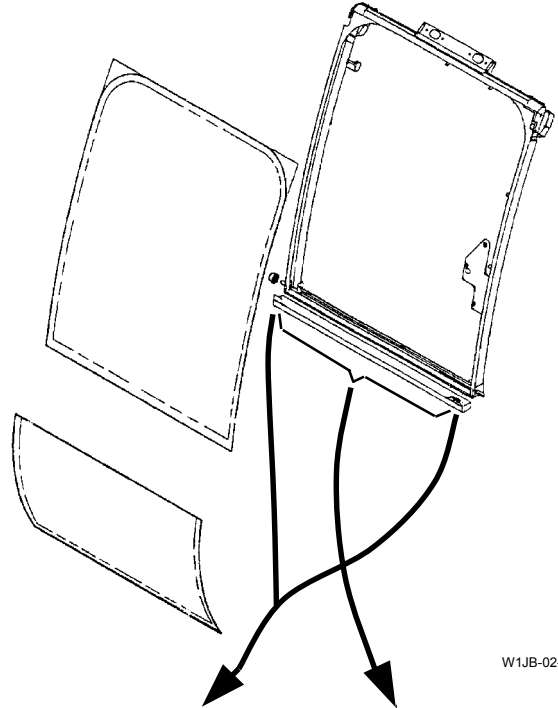
Procedures to Install Upper Front Glass

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.

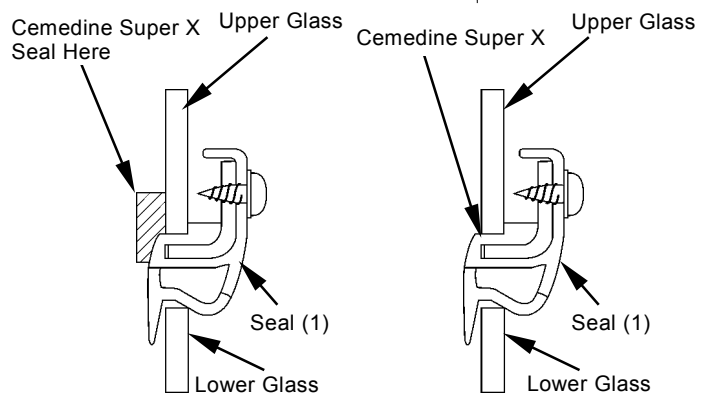
 **NOTE:** *Cemedine Super X Black No.8008*
Glue-state adhesive, tubed

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

Adhere the glass in the same method as right-hand glass.



W1JB-02-01-034



W1JB-02-01-032


W1JB-02-01-033

UPPERSTRUCTURE / Counterweight

REMOVE AND INSTALL COUNTERWEIGHT

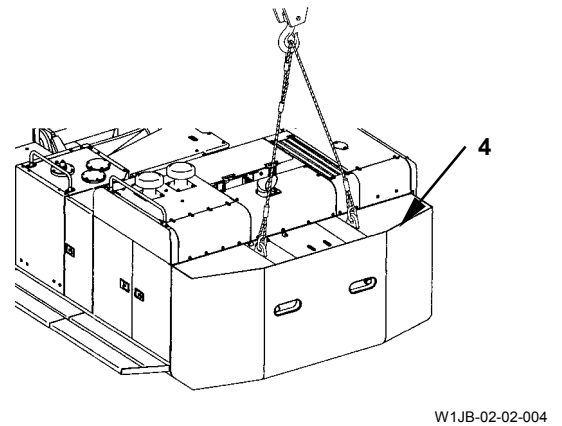
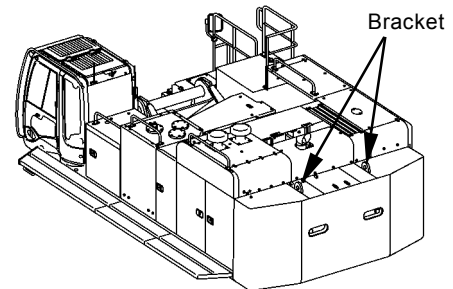
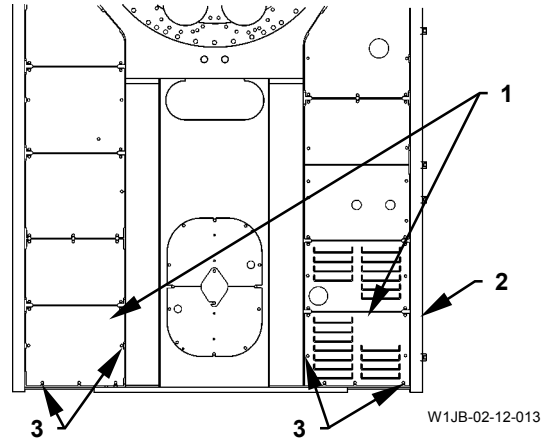
Removal

1. Remove bolts (3) (14 used). Remove covers (1) (2 used) from the lower side of main frame (2).

 : 19 mm

 **CAUTION: Counterweight (4) weight: Approx. 9150 kg (20200 lb)**

2. Hoist and install the shackle and wire rope to the lifting bracket on the top of counterweight (4). Hoist counterweight (4) and take up slack of the wire rope.




UPPERSTRUCTURE / Counterweight




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

3. Remove bolts (15) (2 used), nuts (7) (2 used), shims (5) (2 used) and washers (14, 6) (2 used for each) by using a power wrench.

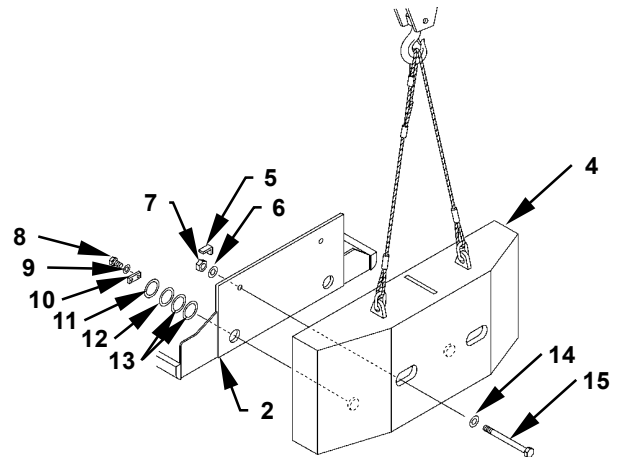
 : 65 mm

4. Remove bolts (8) (4 used). Remove spring washers (9) (4 used), stoppers (10) (2 used) and spacers (11) (2 used).

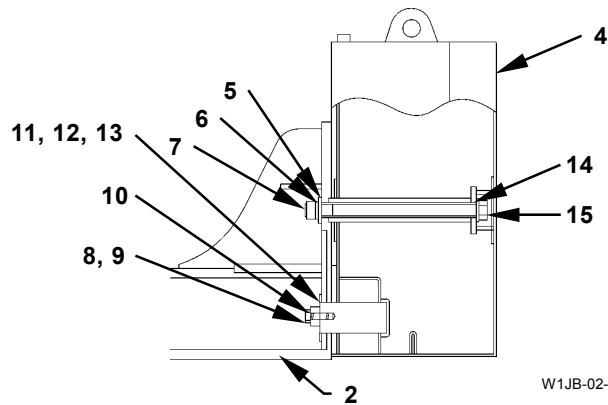
When shims (12, 13) are left, remove shims (12) (2 used) and (13) (2 used).

 : 36 mm

5. Hoist and remove counterweight (4) from main frame (2).



W1JB-02-02-001



W1JB-02-02-002

UPPERSTRUCTURE / Counterweight

Installation

CAUTION: Counterweight (4) weight: Approx. 9150 kg (20200 lb)


CAUTION: Do not stay under the lifted counterweight.


1. Install the shackle and wire rope to the lifting bracket on the top of counterweight (4). Hoist counterweight (4). Insert the protrusion part on counterweight (4) into the hole on main frame (2) and install counterweight (4).

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


IMPORTANT: Apply lubricant to bolt (15) and install bolt (15). Install shim (5) with the collar facing downward.


2. Install bolts (15) (2 used), nuts (7) (2 used), shims (5) (2 used) and washers (6, 14) (2 used for each). Tighten bolts (15) (2 used) by using a power wrench.

 : 65 mm

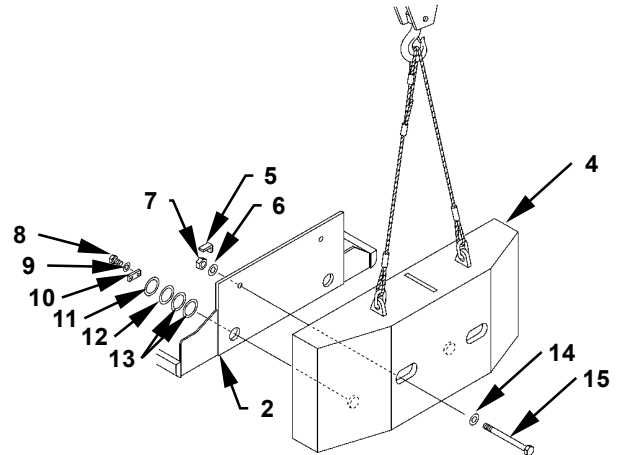
 : 3400 N·m (347 kgf·m, 2510 lbf·ft)

3. Install shims (12) (2 used), (13) (4 used), spacers (11) (2 used), stoppers (10) (2 used), spring washers (9) (4 used) and bolts (8) (4 used). Remove the wire rope and shackle.

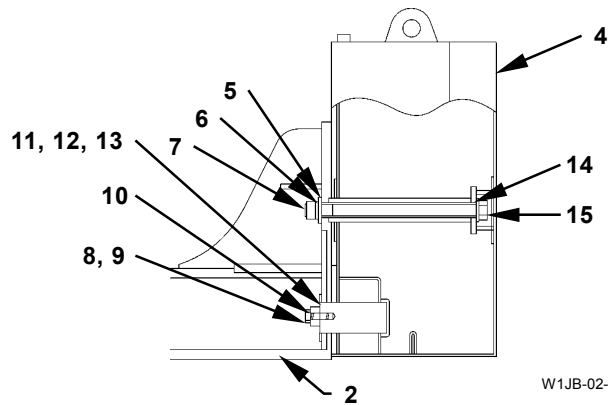
 : 36 mm

 : 700 N·m (71 kgf·m, 520 lbf·ft)

NOTE: In case there is clearance between spacer (11) and main frame (2), install shims (12, 13).




W1JB-02-02-001




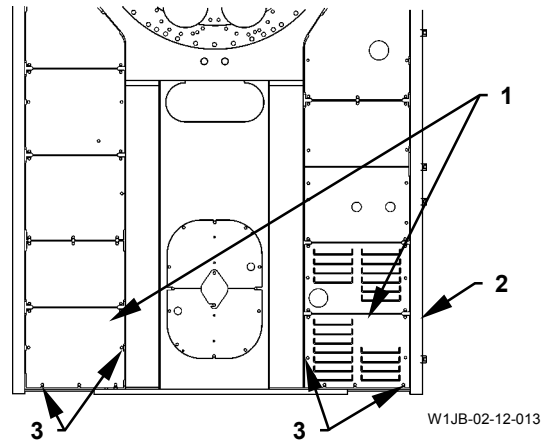
W1JB-02-02-002

UPPERSTRUCTURE / Counterweight

4. Install covers (1)(2 used) onto the lower side of main frame (2) with bolts (3) (14 used).

 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)



UPPERSTRUCTURE / Main Frame

REMOVE AND INSTALL MAIN FRAME

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.)

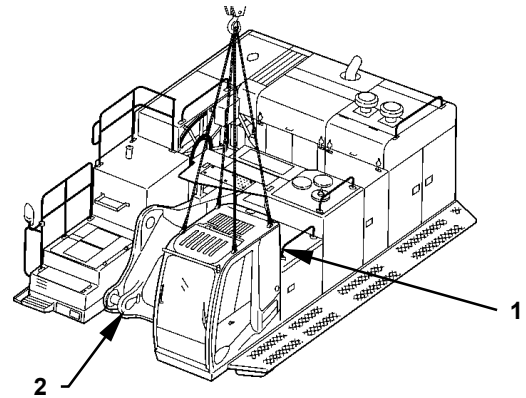
Removal

CAUTION: Cab (1) weight: 410 kg (905 lb)

1. Remove cab (1) from main frame (2).
(Refer to the Remove and Install Cab section on W2-1-1.)

🔧 : 13 mm, 17 mm, 19 mm, 24 mm

🔩 : 8 mm

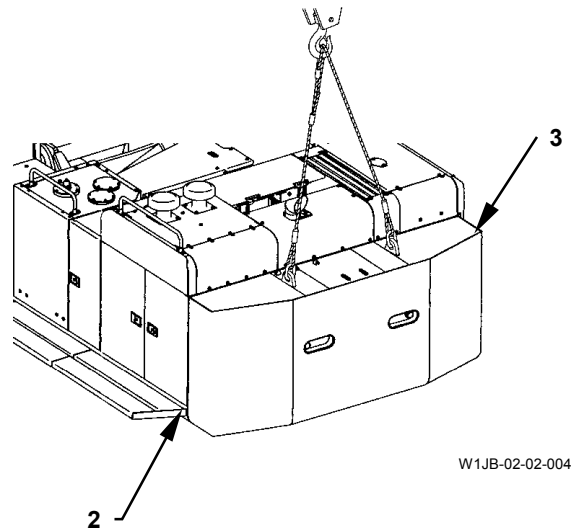


W1JB-02-03-007

CAUTION: Counterweight (3) weight: 9150 kg (20200 lb)

2. Remove counterweight (3) from main frame (2).
(Refer to the Remove and Install Counterweight section on W2-2-1.)

🔧 : 36 mm, 65 mm



W1JB-02-02-004

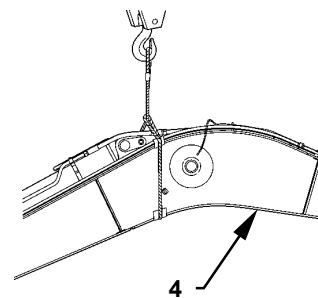
CAUTION: Front attachment (4) assembly weight: 15428 kg (34000 lb)

3. Remove the front attachment (4) assembly from main frame (2).

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

🔧 : 19 mm, 30 mm

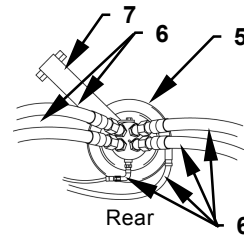
🔩 : 12 mm, 14 mm



W1JB-02-03-003

UPPERSTRUCTURE / Main Frame

4. Remove hoses (6) (6 used) from the upper of center joint (5). Remove lock plate (7) from center joint (5).
(Refer to the Remove and Install Center Joint section on W3-3-1.)



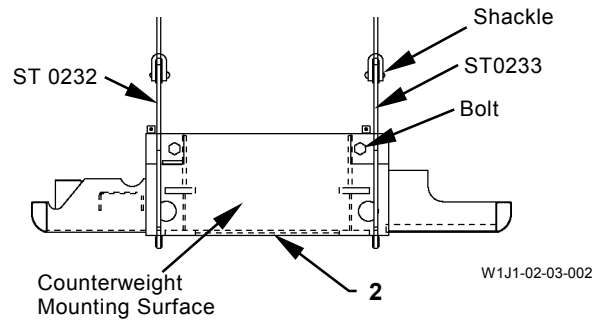
W16J-03-03-002

CAUTION: Upperstructure (8) weight: 17500 kg (38600 lb)

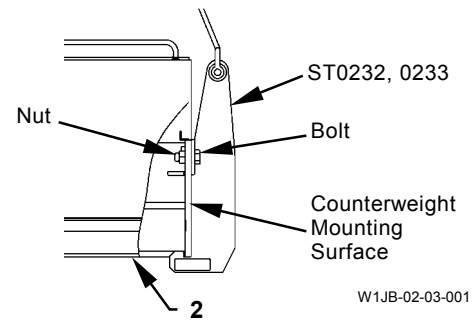
IMPORTANT: Do not damage the engine due to special tool and the wire rope attached in the rear of main frame.

5. Install special tools (ST0232, ST0233) to the bracket at the mounting position for counterweight in the rear of main frame (2) with the bolts (M30, Pitch 3.0 mm) and the nut. Install the shackle (for 6.2 ton) to special tools (ST0232, ST0233) and attach a wire rope to the shackles (2 used). Attach a wire rope onto the boom foot. Take up slack of the wire rope. If the chain block is used, the length of wire rope can be adjusted and it is easy to level the main frame.

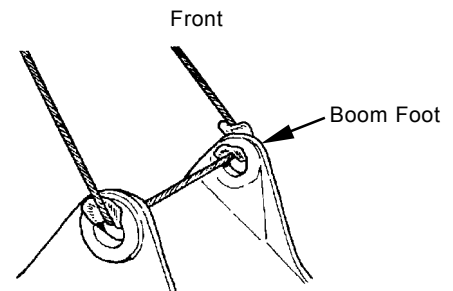
: 46 mm



W1J1-02-03-002




W1JB-02-03-001




W1JB-02-03-004

UPPERSTRUCTURE / Main Frame

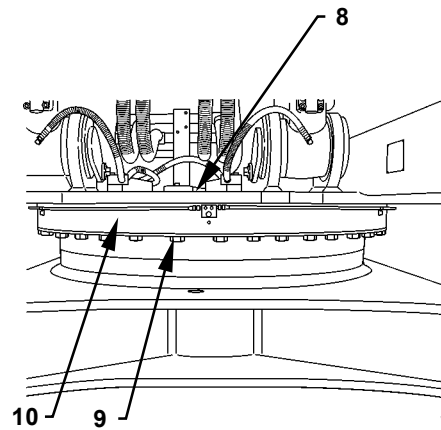
- Put the matching marks on upperstructure (8) and the outer race of swing bearing (10). Remove bolt (3). Install the knock pins (2 used) until the knock pin is in horizontal to the main frame mounting surface.

 : 50 mm

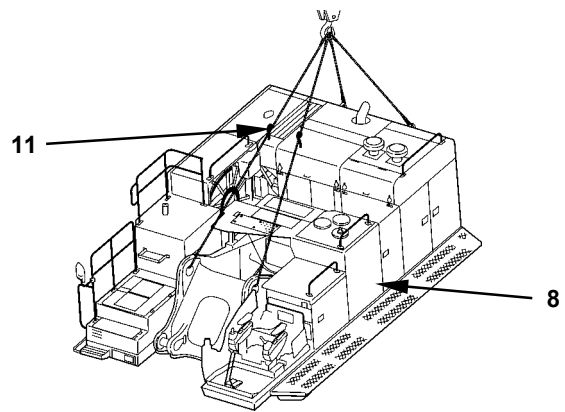
 **NOTE:** The angle for installing wing bearing (10) is determined. (Refer to the Remove and Install Swing Bearing section on W3-1-1.)

 **CAUTION:** Upperstructure (8) weight: 17500 kg (38600 lb)

- Adjust chain block (11). Level upperstructure (8). Hoist and remove upperstructure (8) from swing bearing (10).



W1JB-02-03-002



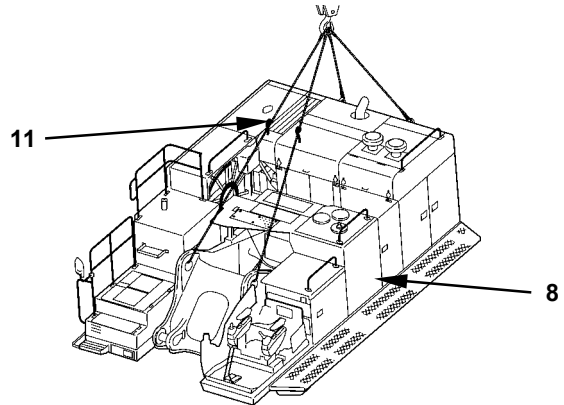
W1JB-02-03-008

UPPERSTRUCTURE / Main Frame

Installation


CAUTION: Upperstructure (8) weight: 17500 kg (38600 lb)


1. Attach a wire onto upperstructure (8). Adjust chain block (11). Level upperstructure (8). Hoist upperstructure (8) and align with the matching mark on swing bearing (10).

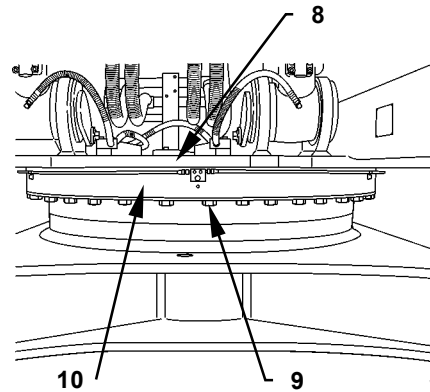


W1JB-02-03-008

2. Install the knock pins (2 used) into the outer race. Insert and tighten bolt (9) temporarily. Remove the wire rope. Tighten bolt (9).


 : 50 mm


 : 2160 N·m (220 kgf·m, 1590 lbf·ft)





W1JB-02-03-002


3. Install hoses (6) (6 used) to center joint (5).


 : 19 mm

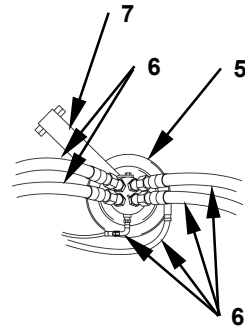
 : 29.5 N·m (3 kgf·m, 22 lbf·ft)

 : 27 mm

 : 98 N·m (9.5 kgf·m, 72 lbf·ft)


 : 41 mm


 : 205 N·m (21 kgf·m, 151 lbf·ft)



W16J-03-03-002

4. Install lock plate (7) to center joint (5).

 : 22 mm

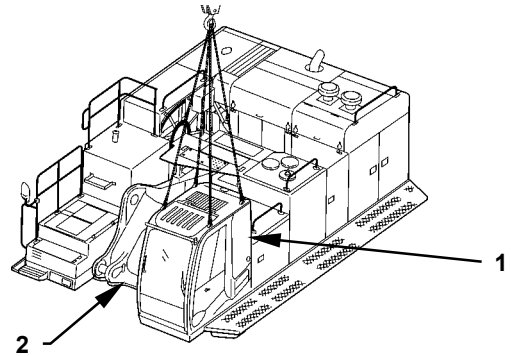
 : 140 N·m (14 kgf·m, 105 lbf·ft)

UPPERSTRUCTURE / Main Frame

CAUTION: Cab (1) weight: 410 kg (905 lb)

5. Install cab (1) to main frame (2).
(Refer to the Remove and Install Cab section.)





	: 13 mm
	: 20 N·m (2 kgf·m, 15 lbf·ft)
	: 17 mm
	: 50 N·m (5 kgf·m, 37 lbf·ft)
	: 19 mm
	: 90 N·m (9 kgf·m, 66 lbf·ft)
	: 24 mm
	: 210 N·m (21.5 kgf·m, 155 lbf·ft)
	: 8 mm
	: 50 N·m (5 kgf·m, 37 lbf·ft)

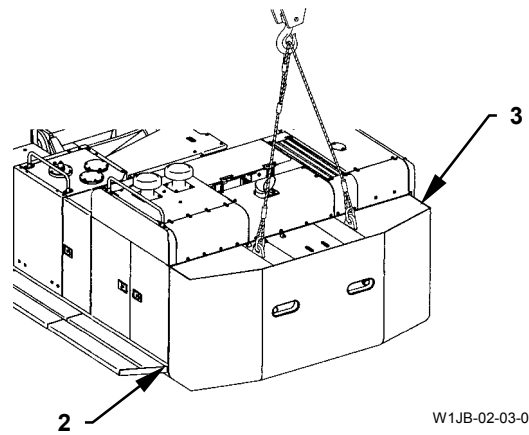


W1JB-02-03-007

CAUTION: Counterweight (3) weight: 9150 kg (20170 lb)

6. Install counterweight (3) to main frame (2).
(Refer to the Remove and Install Counterweight section.)









	: 36 mm
	: 700 N·m (71.5 kgf·m, 520 lbf·ft)
	: 65 mm
	: 3400 N·m (350 kgf·m, 2510 lbf·ft)

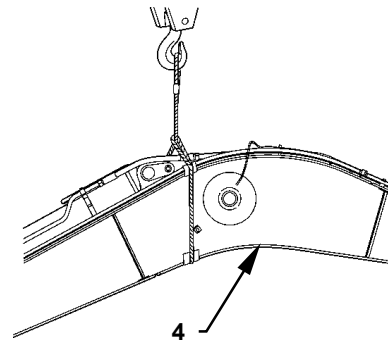


W1JB-02-03-004

CAUTION: The front attachment (4) assembly weight: 15428 kg (34000 lb)

7. Install the front attachment (4) assembly to main frame (2). Add hydraulic oil into the hydraulic oil tank.
(Refer to the Remove and Install Front Attachment section.)

	: 19 mm
	: 29.5 N·m (3 kgf·m, 22 lbf·ft)
	: 30 mm
	: 400 N·m (41 kgf·m, 295 lbf·ft)
	: 12 mm
	: 140 N·m (14 kgf·m, 105 lbf·ft)
	: 14 mm
	: 210 N·m (21.5 kgf·m, 155 lbf·ft)



W1JB-02-03-003

8. 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.



W1JB-02-03-005

UPPERSTRUCTURE / Main Frame

(Blank)



UPPERSTRUCTURE / Pump Device

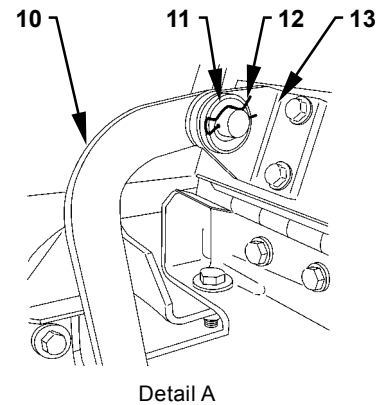
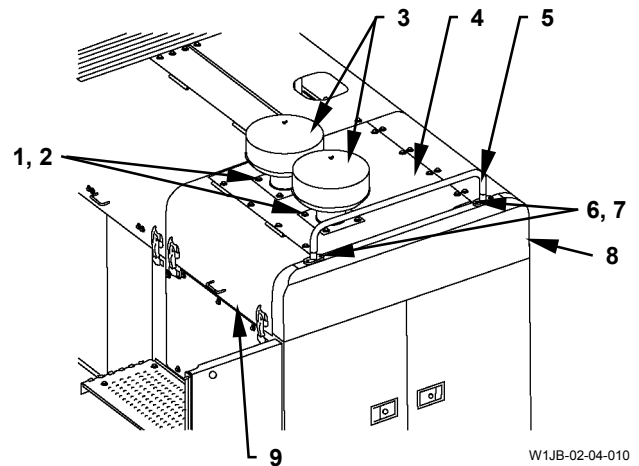
REMOVE AND INSTALL PUMP DEVICE




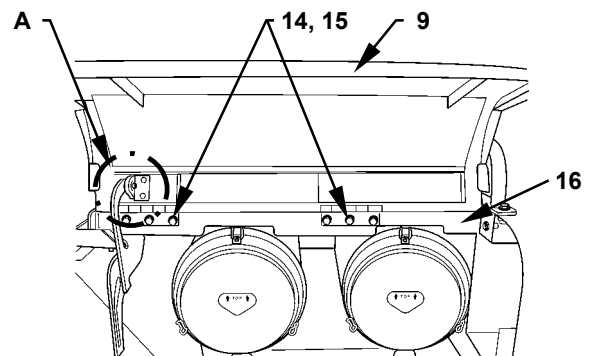
CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

Removal

1. Remove bolts (1) (8 used) and washers (2) (8 used) from pre-cleaner (3). Remove pre-cleaner (3) from cover (4).
 : 17 mm
2. Remove bolts (6) (4 used) and washers (7) (4 used) from stay (5). Remove stay (5) from cover (8).
 : 19 mm
3. Open cover (9).
4. Remove lock pin (12) and washer (11) from stay (10). Remove stay (10) from bracket (13).




5. Remove bolts (14) (6 used) and washers (15) (6 used) from cover (9). Remove cover (9) from support (16).
 : 17 mm




UPPERSTRUCTURE / Pump Device

CAUTION: Cover (19) weight: 20 kg (44 lb)

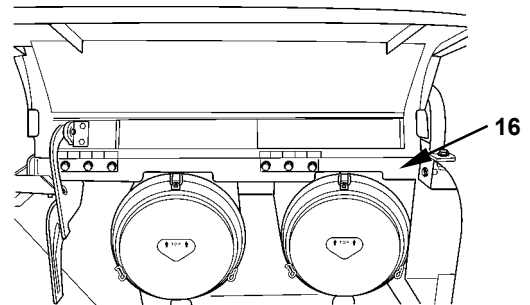
6. Remove bolts (17) (10 used) and washers (18) (10 used) from cover (19). Remove cover (19) from support (16).

 : 19 mm

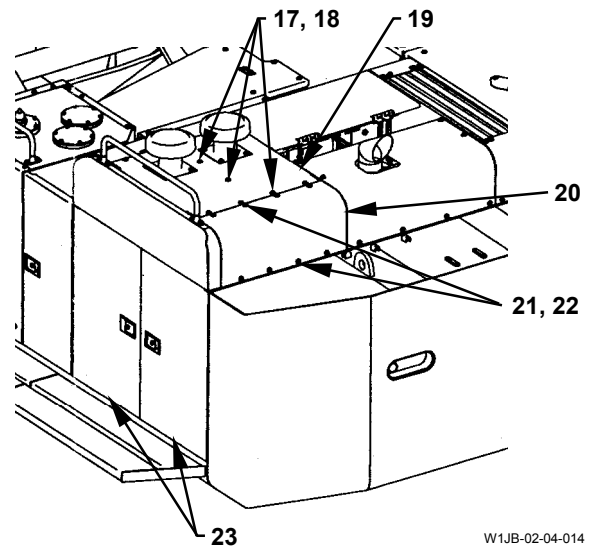
7. Remove bolts (21) (8 used) and washers (22) (8 used) from cover (20). Remove cover (20) from support (16).

 : 19 mm

8. Open door (23).




W1JB-02-04-020




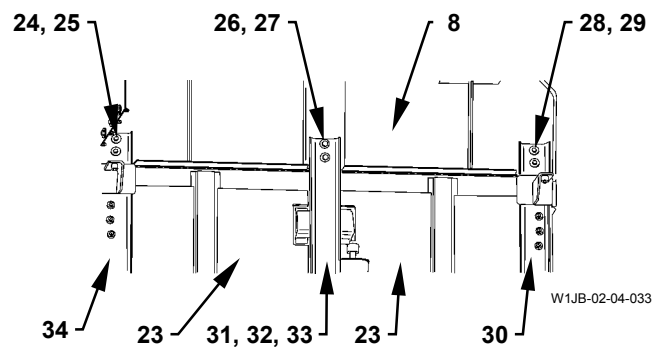
W1JB-02-04-014

9. Remove bolts (24, 26, 28) (2 used for each) and washers (25, 27, 29) (2 used for each) from supports (30, 31, 34). Remove cover (8) from supports (30, 31, 34).

 : 22 mm

10. Remove bolts (32) (2 used) and washers (32) (2 used) from support (31). Remove support (31) from the main frame.

 : 22 mm

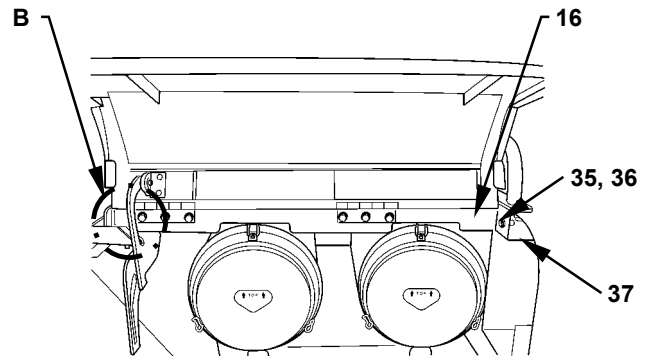


W1JB-02-04-033

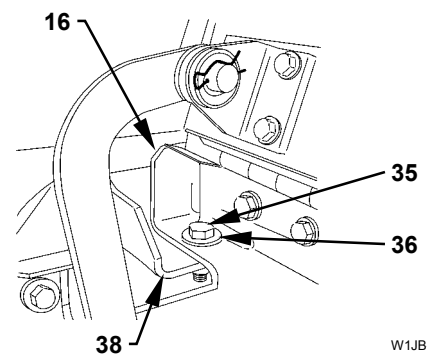
UPPERSTRUCTURE / Pump Device

CAUTION: Support (16) weight: 26 kg (57 lb)

11. Attach a nylon sling to support (16). Hoist and hold support (16).
12. Remove bolts (35) (4 used) and washers (36) (4 used) from support (16).
🔧 : 19 mm
13. Remove support (16) from supports (37, 38).



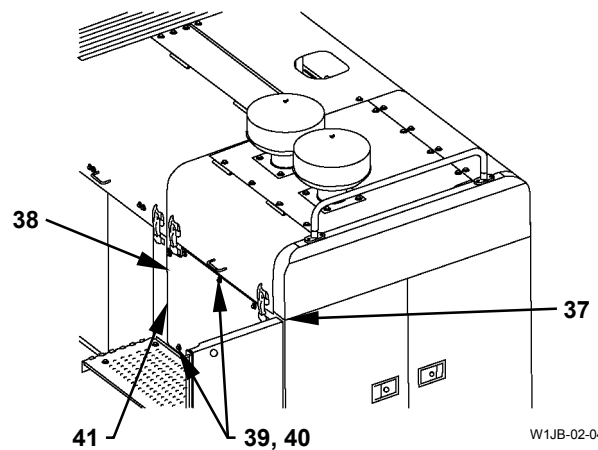
W1JB-02-04-020



W1JB-02-04-021

Detail B


14. Remove bolts (39) (8 used) and washers (40) (8 used) from cover (41). Remove cover (41) from supports (37, 38).
🔧 : 19 mm

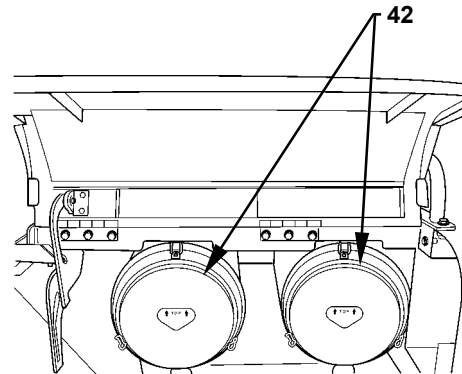


W1JB-02-04-010

UPPERSTRUCTURE / Pump Device

15. Remove bolts (46) (8 used) and washers (47) (8 used) from support (43). Remove air cleaner (42) (2 used) from support (43).

 : 17 mm




W1JB-02-04-020


16. Remove bands (48) (2 used) from hoses (49) (2 used).

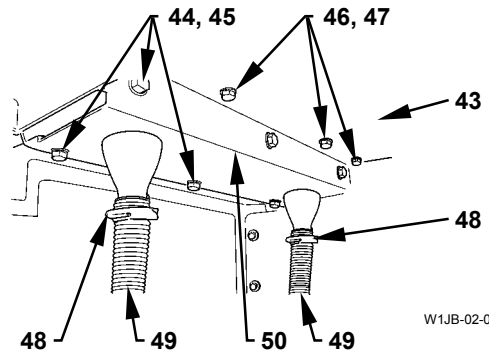
17. Remove hoses (49) (2 used) from cover (50).

18. Remove bolts (44) (6 used) and washers (45) (6 used) from cover (50). Remove cover (50) from support (43).

 : 19 mm


19. Remove bolts (51) (3 used) and washers (52) (3 used) from cover (56). Remove cover (56) from support (57).

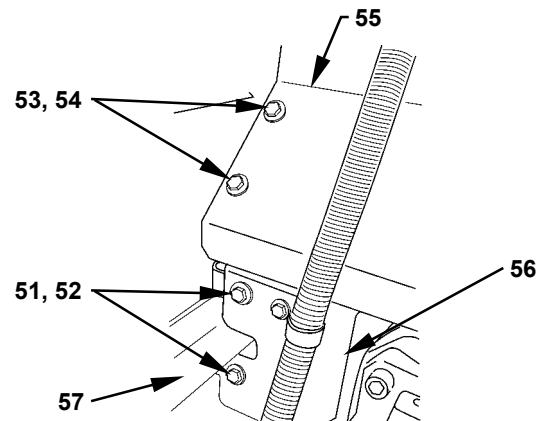
 : 17 mm, 19 mm



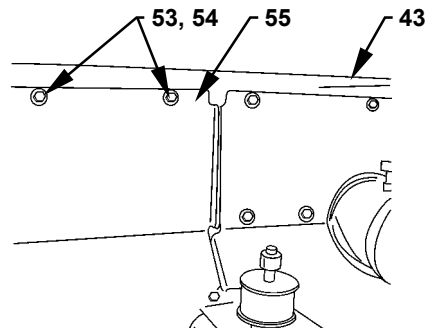
W1JB-02-04-022

20. Remove bolts (53) (6 used) and washers (54) (6 used) from cover (55). Remove cover (55) from supports (57, 43).

 : 19 mm



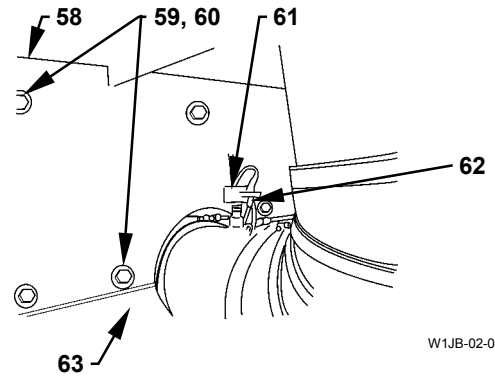
W1JB-02-04-023



W1JB-02-04-024


UPPERSTRUCTURE / Pump Device

21. Remove plug (62) from sensor (61).




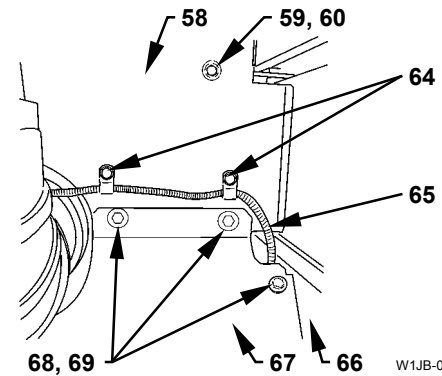
W1JB-02-04-025

22. Remove bolts (59) (4 used) and washers (60) (4 used) from cover (58).

 : 19 mm


23. Remove bolts (64) (2 used) from cover (58). Remove harness (65) from cover (58).

 : 17 mm




W1JB-02-04-026

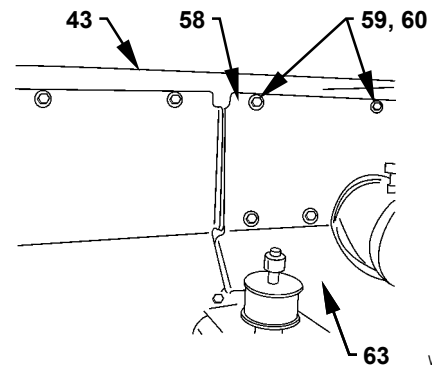
24. Remove bolts (68) (5 used) and washers (69) (5 used) from cover (67). Remove covers (63, 37, 56) from supports (66, 43).

 : 19 mm

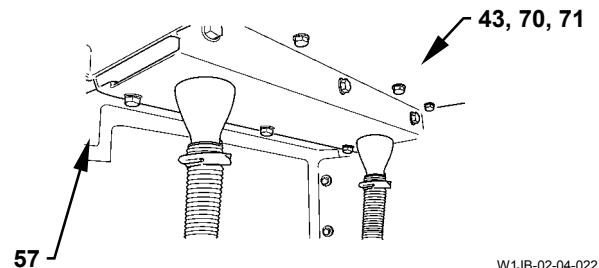
 **CAUTION: Support (43) weight: 59 kg (130 lb)**

25. Attach a nylon sling to support (43). Hoist and hold support (43). Remove bolts (70) (8 used) and washers (71) (8 used). Remove support (43) from supports (66, 57).

 : 19 mm



W1JB-02-04-024



W1JB-02-04-022


UPPERSTRUCTURE / Pump Device




CAUTION: Main pump (76) weight: 159 kg (350 lb)

Fan pump (77) weight: 55 kg (120 lb)


26. Remove bands (72) (4 used) from rubber hoses (73) (2 used).

 : 10 mm


27. Remove socket bolts (75) (8 used) from pipes (74) (2 used). Remove the pipe (74) assemblies (2 used) from main pumps (76) (2 used) and suction pipe (78).

 : 10 mm

28. Remove bands (81) (4 used) from rubber hose (80). Remove hose (80) from fan pump (77) and suction pipe (78).

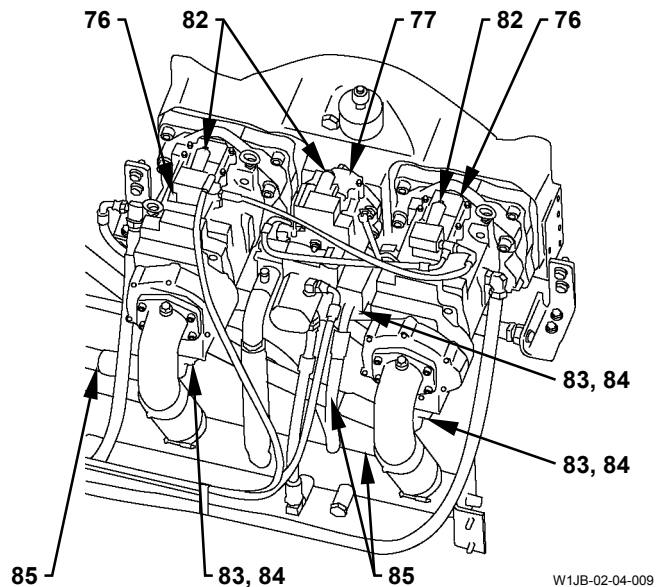
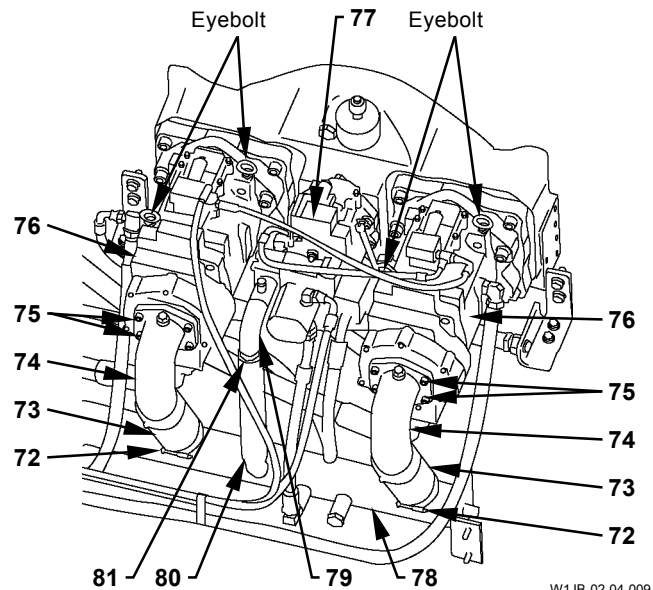
 : 10 mm

29. Disconnect connectors (85) (5 used) from main pumps (76) (2 used) and fan pump (77). Remove the bolts (3 used) from the harnesses (3 used) in connector (82).

 : 13 mm


30. Remove socket bolts (83) (12 used) and split flanges (84) (6 used) from hoses (85) (3 used). Remove hoses (85) (3 used) from main pumps (76) (2 used) and fan pump (77). Cap the open ends.

 : 8 mm, 10 mm




UPPERSTRUCTURE / Pump Device


31. Remove all hoses (86) from main pumps (76) (2 used) and fan pump (77). Attach an identification tag onto the removed hoses for assembling. Cap the open ends.

 : 17 mm, 19 mm, 27 mm, 36 mm, 41 mm


 **CAUTION: Main pump (76) weight: 159 kg (350 lb)**

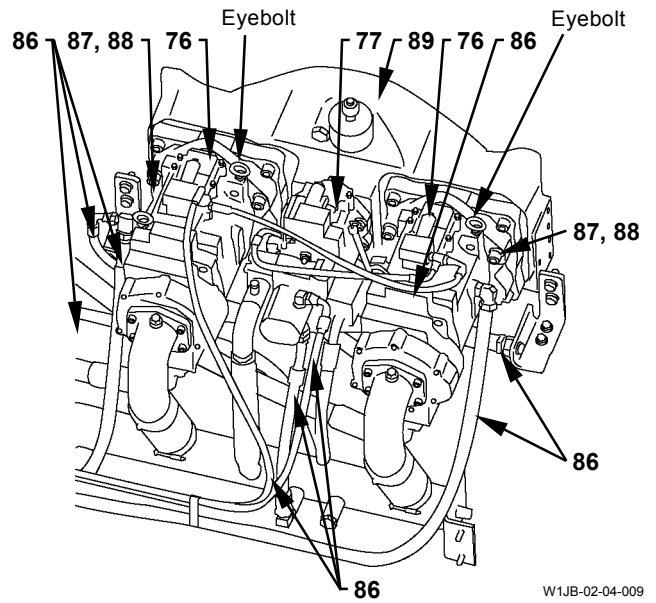
32. Attach a nylon sling onto eyebolt. Hoist and hold eyebolt. Remove socket bolts (87) (8 used) and washers (88) (8 used) from main pumps (76) (2 used). Remove main pumps (76) (2 used) from pump transmission (89).

 : 17 mm

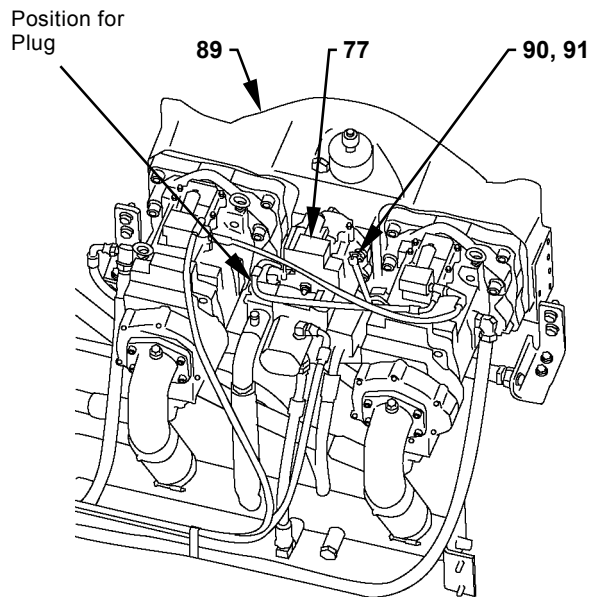
 **CAUTION: Fan pump (77) weight: 55 kg (120 lb)**

33. Install eyebolts (M8, Pitch 1.25 mm) (2 used) to the plugs at both left and right of fan pump (77). Attach a nylon sling onto eyebolt. Hoist and hold eyebolt. Remove socket bolts (90) (4 used) and washers (91) (4 used) from fan pump (77). Remove fan pump (77) from pump transmission (89).

 : 14 mm



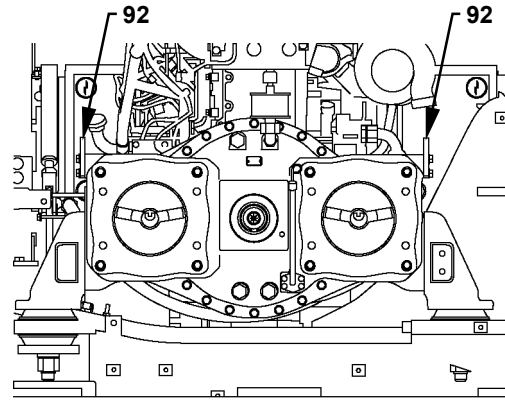
W1JB-02-04-009



W1JB-02-04-009

UPPERSTRUCTURE / Pump Device

34. Install the shackles (2 used) to brackets (92) (2 used). Attach a nylon sling onto the shackles (2 used). Hoist and hold the shackles (2 used).




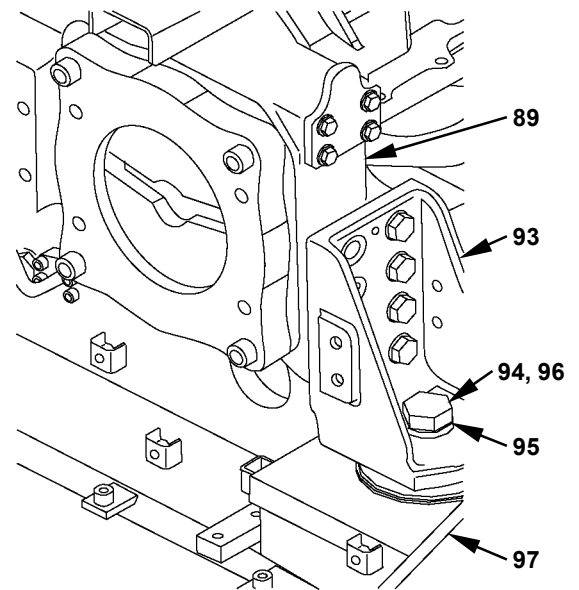
W1JB-02-04-006



CAUTION: Pump transmission (89) weight: 313 kg (690 lb)

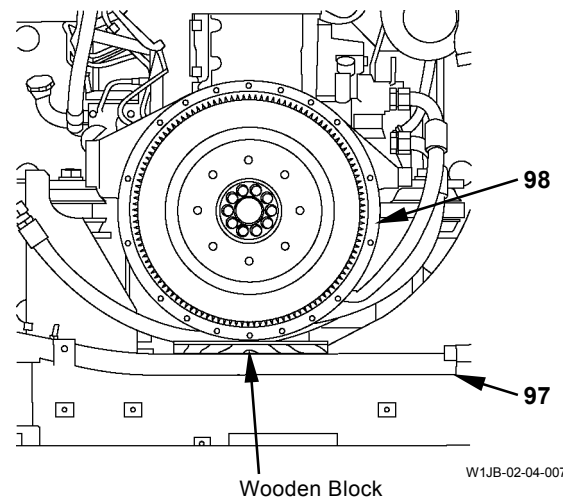
35. Remove nuts (96) (2 used), washers (95) (4 used) and bolts (94) (2 used) from brackets (93) (2 used).

 : 50 mm



W1JB-02-04-008

36. Hoist pump transmission (89) a little. Place the wooden block between engine (98) and main frame (97). Lower engine (98).




W1JB-02-04-007

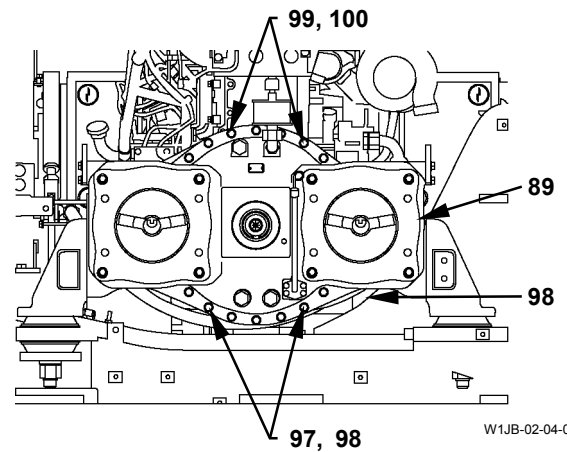
UPPERSTRUCTURE / Pump Device



CAUTION: Pump transmission (89) weight:
313 kg (690 lb)

37. Remove bolts (99) (18 used) and washers (100) (18 used) from pump transmission (89). Hoist and remove pump transmission (89) from engine (98).

 : 19 mm




UPPERSTRUCTURE / Pump Device

Installation

CAUTION: Pump transmission (89) weight: 313 kg (690 lb)


1. Hoist pump transmission (89) and align with the mounting hole on engine (98). Install pump transmission (89) to engine (98) with bolts (99) (18 used) and washers (100) (18 used).


 : mm

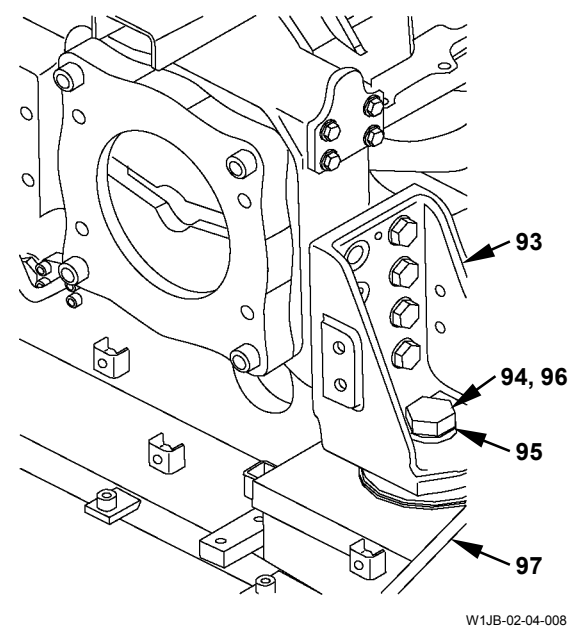
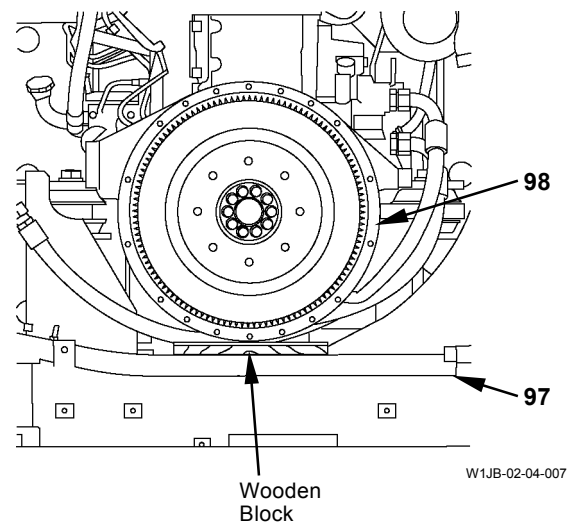
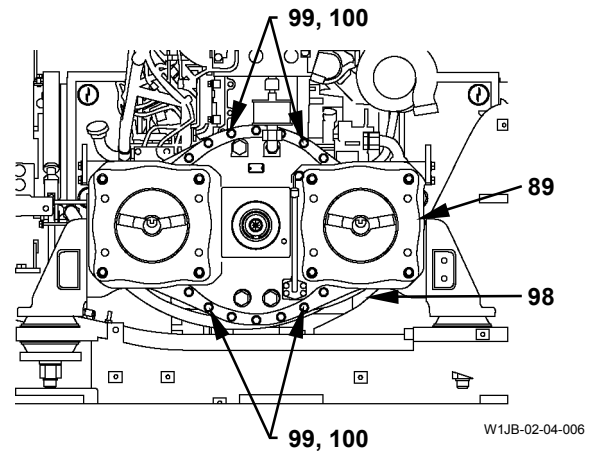
 : 90 N·m (9 kgf·m, 66 lbf·ft)

2. Hoist pump transmission (89). Remove the wooden block between engine (98) and main frame (97). Lower engine (98).

3. Install brackets (93) (2 used) to main frame (97) with bolts (94) (2 used), washers (95) (4 used) and nuts (96) (2 used).

 : 50 mm

 : 1950 N·m (195 kgf·m, 1440 lbf·ft)





UPPERSTRUCTURE / Pump Device



CAUTION: Fan pump (77) weight: 55 kg (120 lb)


4. Hoist fan pump (77) and align with the mounting hole on pump transmission (89). Install fan pump (77) to pump transmission (89) with socket bolts (90) (4 used) and washers (91) (4 used).

 : 14 mm


 : 300 N·m (30.5 kgf·m, 220 lbf·ft)


5. Install hose (85) to fan pump (77) with socket bolts (83) (4 used) and split flanges (84) (2 used).


 : 8 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

6. Install hoses (86) (2 used) to fan pump (77).


 : 27 mm


 : 78 N·m (8 kgf·m, 58 lbf·ft)

 : 36 mm

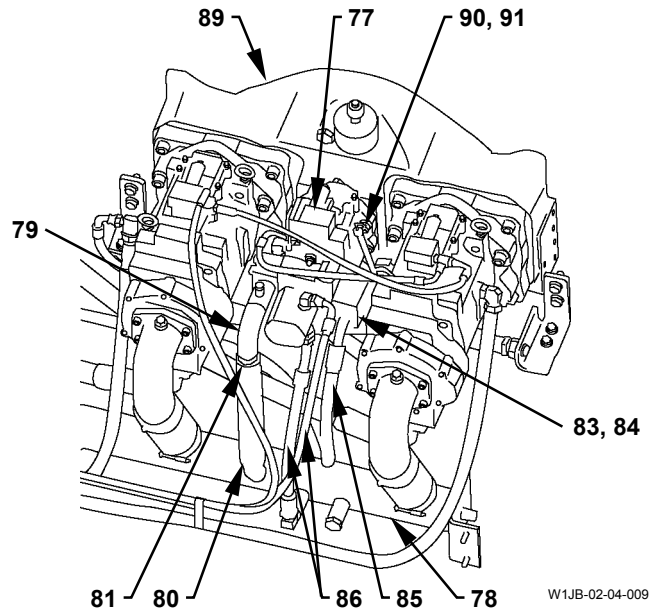
 : 175 N·m (18 kgf·m, 130 lbf·ft)

7. Install hose (80) to pipe (79) and suction pipe (78) with bands (81) (4 used).

 : 10 mm

 : 3.3 to 4.2 N·m

(0.3 to 0.4 kgf·m, 2.4 to 3.1 lbf·ft)




W1JB-02-04-009


UPPERSTRUCTURE / Pump Device




CAUTION: Main pump (76) weight: 159 kg (350 lb)


8. Hoist main pumps (76) (2 used) and align with the mounting hole on pump transmission (89). Install main pumps (76) (2 used) to pump transmission (89) with socket bolts (87) (8 used) and washers (88) (8 used).

 : 10 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)


9. Install hoses (85) (2 used) to main pumps (76) (2 used) with socket bolts (83) (8 used) and split flanges (84) (4 used).

 : 8 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)


10. Install pipes (74) (2 used) to main pumps (76) (2 used) with socket bolts (75) (8 used).

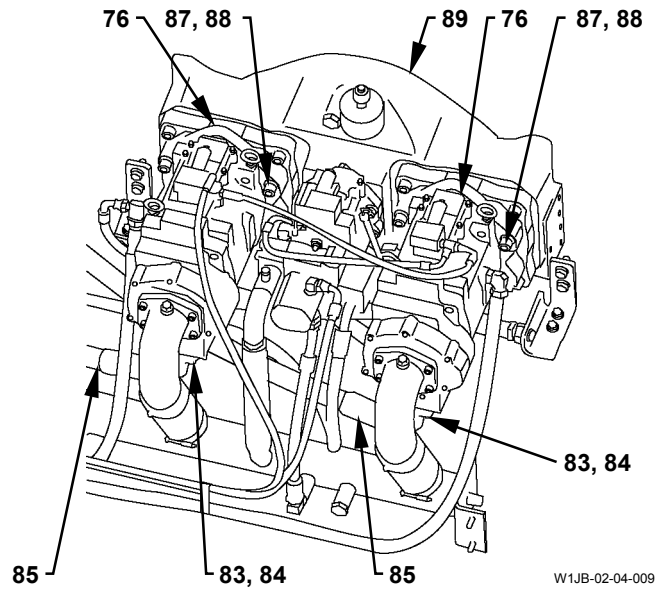
 : 10 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

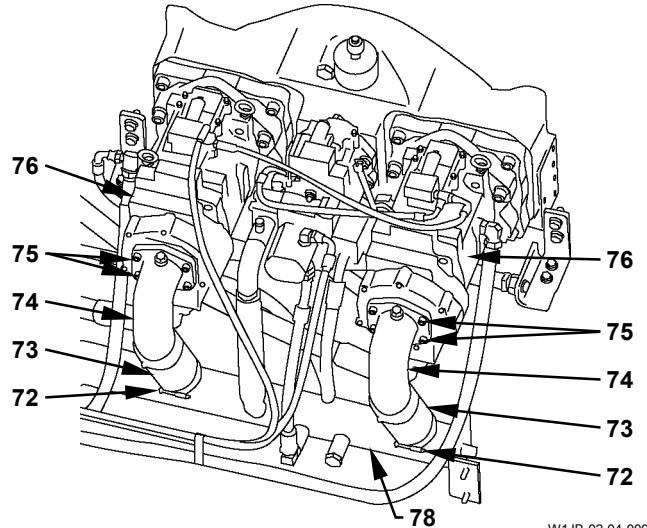
11. Install rubber hoses (73) (2 used) to suction pipe (78) with bands (72) (4 used).

 : 10 mm

 : 3.3 to 4.2 N·m
(0.3 to 0.4 kgf·m, 2.4 to 3.1 lbf·ft)











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UPPERSTRUCTURE / Pump Device

12. Install all hoses (86) to main pumps (76) (2 used) and fan pump (77).

	: 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)
	: 36 mm
	: 175 N·m (18 kgf·m, 130 lbf·ft)
	: 41 mm
	: 205 N·m (21 kgf·m, 150 lbf·ft)



13. Connect connectors (82) (5 used) to main pumps (76) (2 used) and fan pump (77). Install the harnesses (3 used) of connector (82) to main pumps (76) (2 used) and fan pump (77).


	: 13 mm
	: 35 N·m (3.5 kgf·m, 25 lbf·ft)





CAUTION: Support (43) weight: 59 kg (130 lb)

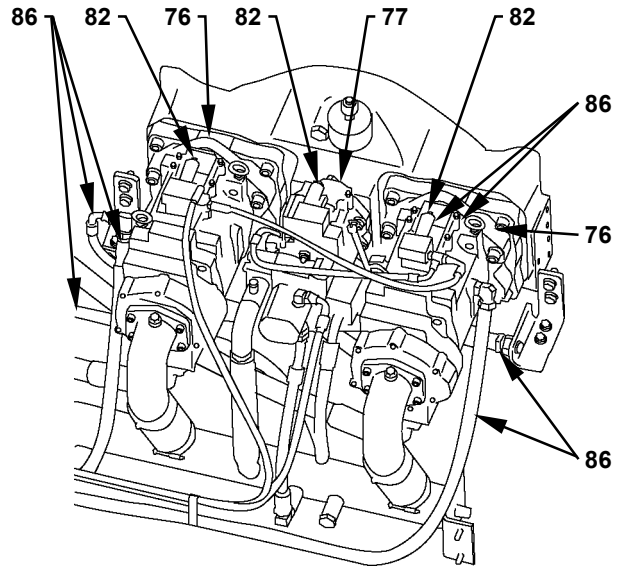
14. Hoist and align support (43) with the mounting hole of supports (57, 66). Install support (43) to supports (57, 64) with bolts (70) (8 used) and washers (71) (8 used).

	: 19 mm
	: 90 N·m (9 kgf·m, 66 lbf·ft)

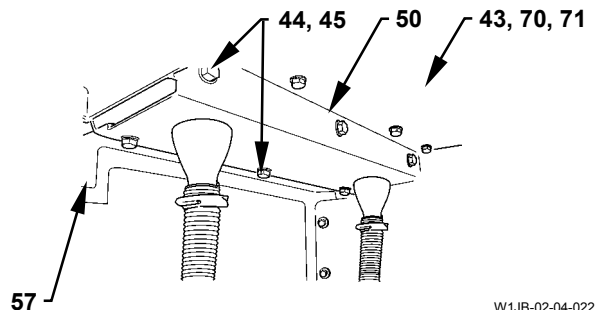
 **NOTE:** As for support (66), refer to step 22 in the procedures for assembling.

15. Install cover (50) to support (43) with bolts (44) (6 used) and washers (45) (6 used).

	: 19 mm
	: 90 N·m (9 kgf·m, 66 lbf·ft)




W1JB-02-04-009





W1JB-02-04-022


UPPERSTRUCTURE / Pump Device

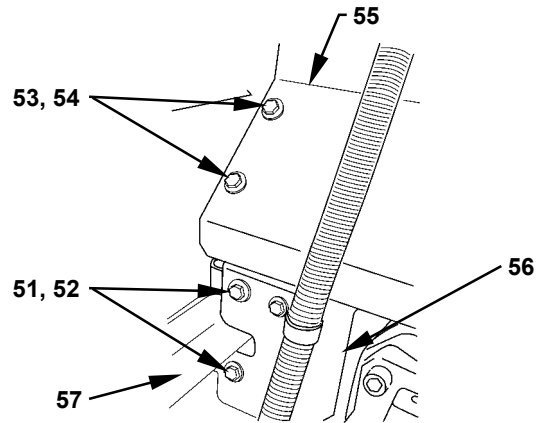
16. Install cover (56) to support (57) with bolts (51) (3 used) and washers (52) (3 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)


 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)

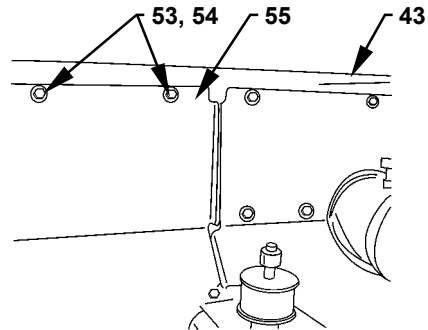


W1JB-02-04-023

17. Install cover (55) to supports (43, 57) with bolts (53) (6 used) and washers (54) (6 used).

 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)




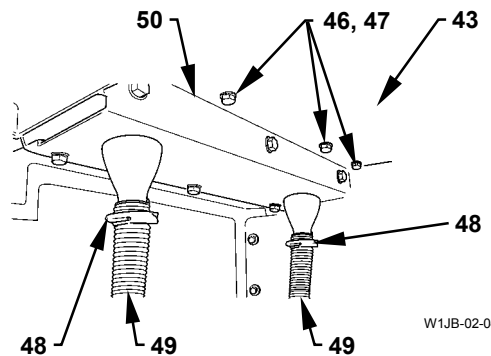
W1JB-02-04-024

18. Install hoses (49) (2 used) to cover (50) with bands (48) (2 used).

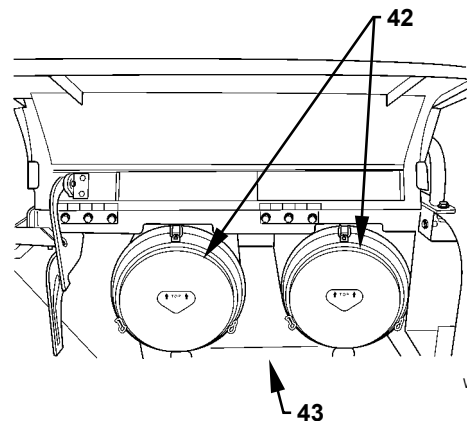
19. Install air cleaner (42) (2 used) to support (43) with bolts (46) (8 used) and washers (47) (8 used).

 : 17 mm

 : 50 N·m (5 kgf·m)




W1JB-02-04-022




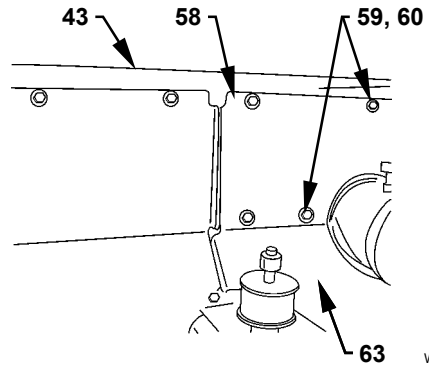
W1JB-02-04-020

UPPERSTRUCTURE / Pump Device

20. Install covers (63, 58) to support (43) with bolts (59) (5 used) and washers (60) (5 used).


 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)




W1JB-02-04-024


21. Install harness (65) to cover (58) with bolts (64) (2 used).

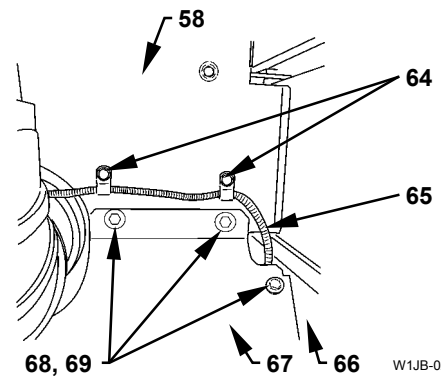
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

22. Install cover (67) to support (66) and cover (58) with bolts (68) (5 used) and washers (69) (5 used).

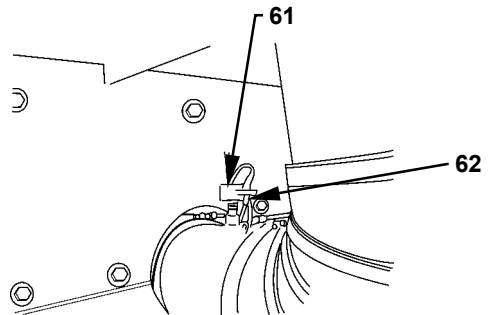
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)



W1JB-02-04-026

23. Install plug (62) to sensor (61).





W1JB-02-04-025

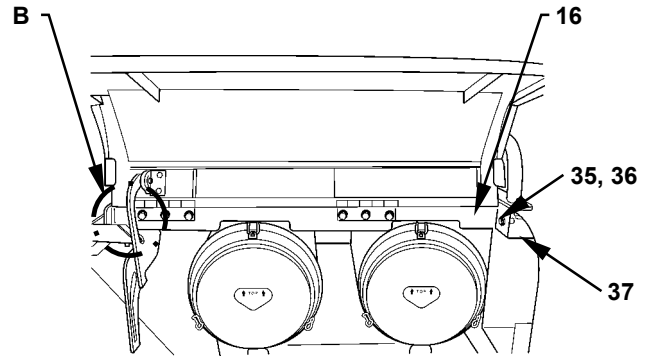
UPPERSTRUCTURE / Pump Device

CAUTION: Support (16) weight: 26 kg (57 lb)

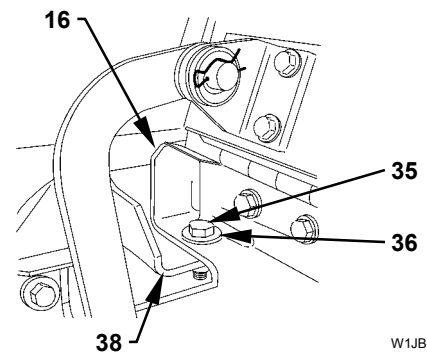
24. Attach a nylon sling to support (16). Hoist and align support (16) with the mounting hole of supports (37, 38). Install support (16) to supports (37, 38) with bolts (35) (4 used) and washers (36) (4 used).

 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)




W1JB-02-04-020




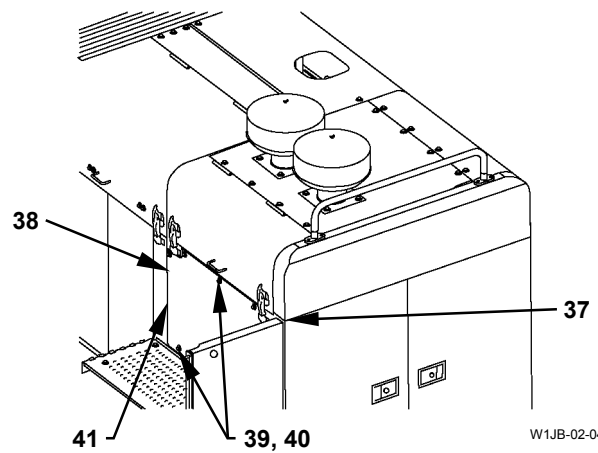
W1JB-02-04-021

Detail B

25. Install cover (41) to supports (37, 38) with bolts (39) (8 used) and washers (40) (8 used).

 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)




W1JB-02-04-010


UPPERSTRUCTURE / Pump Device


26. Install support (31) to the main frame with bolts (32) (2 used) and washers (33) (2 used).

 : 22 mm


 : 140 N·m (14 kgf·m, 105 lbf·ft)


27. Install cover (8) to supports (30, 31, 34) with bolts (24, 26, 28) (2 used for each) and washers (25, 27, 29) (2 used for each).

 : 22 mm


 : 140 N·m (14 kgf·m, 105 lbf·ft)


28. Install cover (19) to support (16) with bolts (17) (10 used) and washers (18) (10 used).

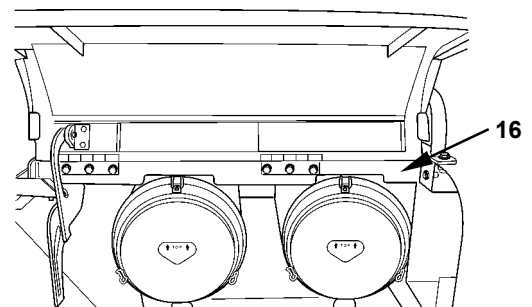
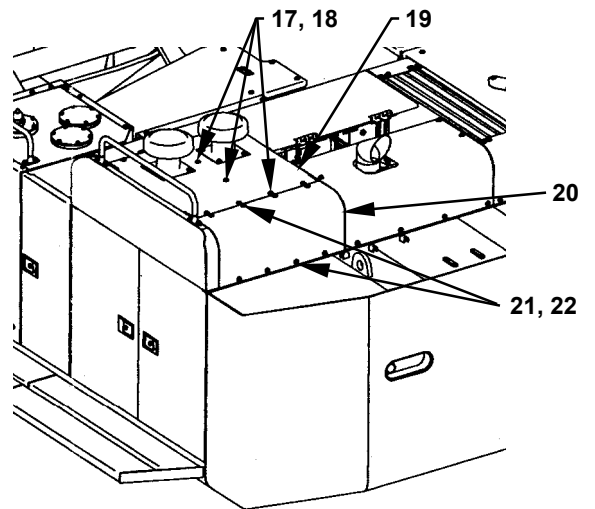
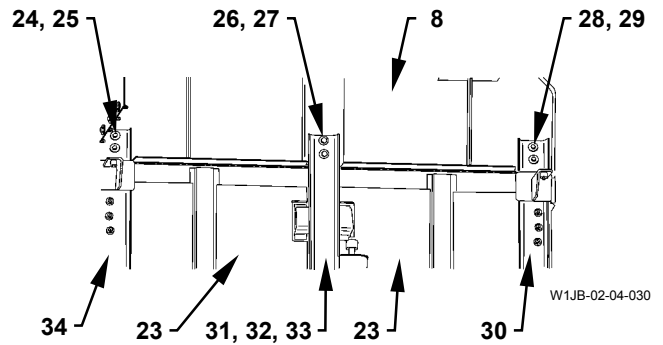
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

29. Install cover (20) to support (16) with bolts (21) (8 used) and washers (22) (8 used).


 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)




UPPERSTRUCTURE / Pump Device


30. Install pre-cleaners (3) (2 used) to cover (4) with bolts (1) (8 used) and washers (2) (8 used).

 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)


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

 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

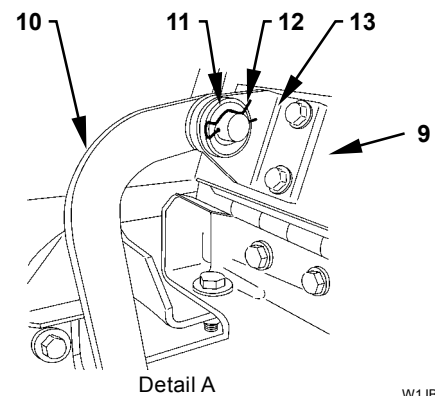
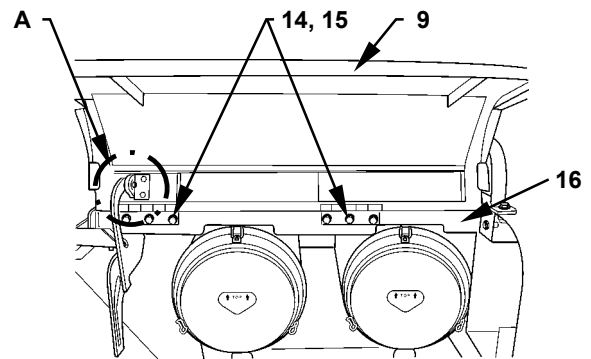
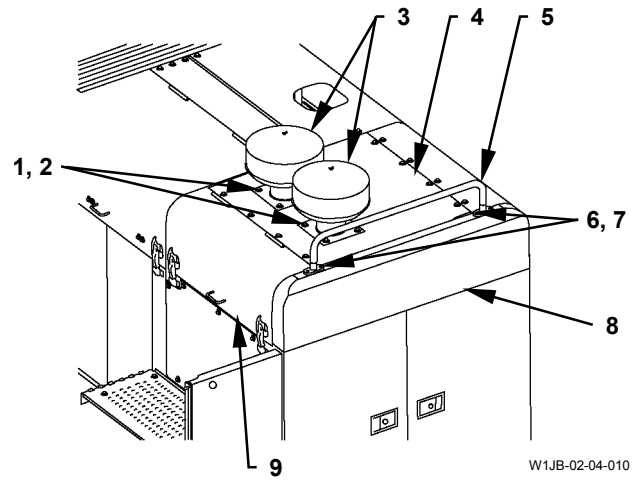
32. Install cover (9) to support (16) with bolts (14) (6 used) and washers (15) (6 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

33. Install stay (10) to the hole on bracket (13). Secure stay (10) to bracket (13) with washer (11) and lock pin (12).

34. Shut cover (9).

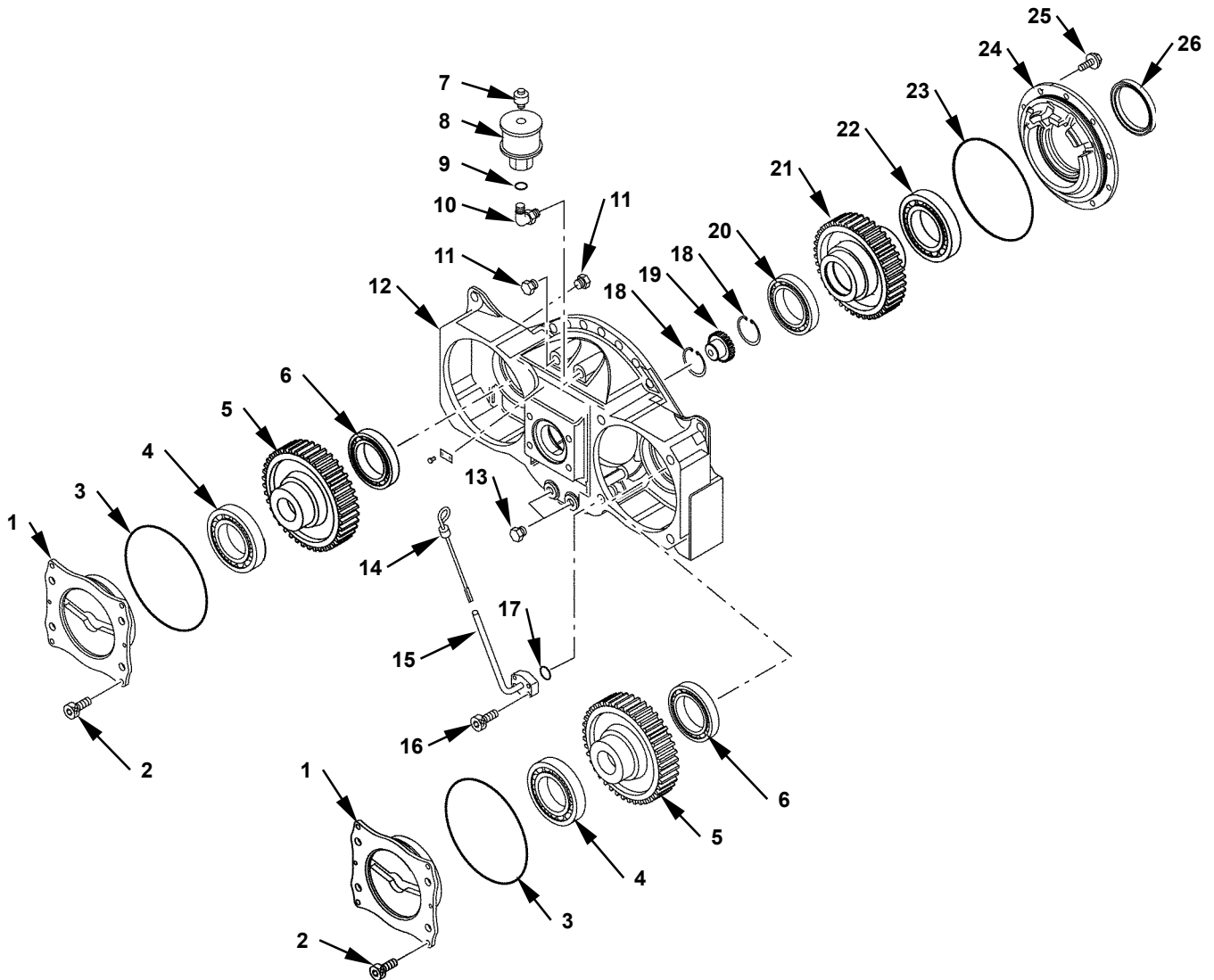


UPPERSTRUCTURE / Pump Device

(Blank)

UPPERSTRUCTURE / Pump Device

DISASSEMBLE PUMP TRANSMISSION




W1JB-02-04-015

- | | | | |
|---------------------------|--------------------|------------------------------|---------------------|
| 1 - Cartridge (2 Used) | 8 - Pipe | 15 - Pipe | 21 - Gear |
| 2 - Socket Bolt (8 Used) | 9 - O-Ring | 16 - Socket Bolt (4 Used) | 22 - Ball Bearing |
| 3 - O-Ring (2 Used) | 10 - Elbow | 17 - O-Ring | 23 - O-Ring |
| 4 - Ball Bearing (2 Used) | 11 - Plug (2 Used) | 18 - Retaining Ring (2 Used) | 24 - Cartridge |
| 5 - Gear (2 Used) | 12 - Casing | 19 - Coupling | 25 - Bolt (10 Used) |
| 6 - Ball Bearing (2 Used) | 13 - Plug | 20 - Ball Bearing | 26 - Oil Seal |
| 7 - Air Breather | 14 - Level Gauge | | |

UPPERSTRUCTURE / Pump Device

Disassemble Pump Transmission



1. Remove plugs (11, 13) (2 used for each) from casing (12). Drain off gear oil from the pump transmission.

 : 36 mm

7. Remove ball bearings (4, 6) (2 used for each) from gears (5) (2 used) by using a puller.




CAUTION: Pump transmission weight: 313 kg (690 lb)

2. Place the pump transmission with the main pump mounting side facing upward.
3. Remove socket bolts (16) (4 used) from pipe (15). Remove pipe (15), O-ring (17) and level gauge (14) from casing (12).
 : 8 mm
4. Remove the pipe (8) assembly from elbow (10). Remove elbow (10) from casing (12).
 : 32 mm, 46 mm



CAUTION: Cartridge (1) weight: 30 kg (66 lb)

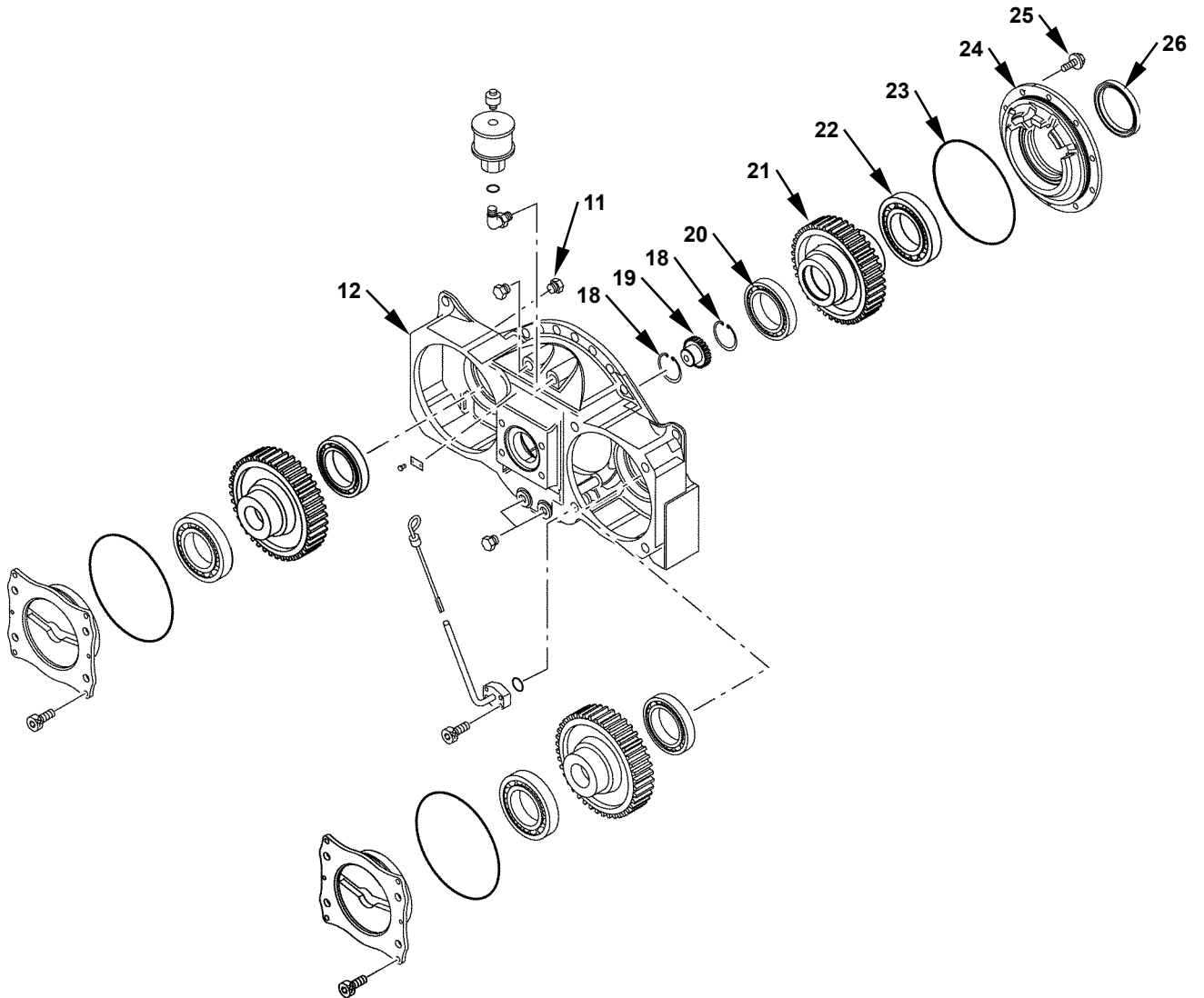
5. Remove socket bolts (2) (8 used) from cartridges (1) (2 used). Remove cartridges (1) (2 used) from casing (12).
 : 17 mm



CAUTION: The gear (5) assembly: 28 kg (62 lb)

6. Remove the gear (5) assemblies (2 used) from casing (12).

UPPERSTRUCTURE / Pump Device



W1JB-02-04-015


UPPERSTRUCTURE / Pump Device



CAUTION: Casing (12) + gear (21) + ball bearings (20, 22) + cartridge (24) + others weight: 195 kg (430 lb)

8. Place casing (12) on the wooden block with the engine mounting side facing upward.

9. Remove bolts (25) (10 used) from cartridge (24).

 : 19 mm

10. Turn over and place casing (12) with the engine mounting side facing downward.



NOTE: *At this time, do not touch the wooden block (height: 100 mm) with cartridge (24).*



**CAUTION: The gear (21) assembly weight: 31 kg (68 lb)
Cartridge (24) weight: 20 kg (44 lb)**

11. Attach a bar ($\phi 60$) onto coupling (19). Tap by using a plastic hammer and remove cartridge (24) and the gear (21) assembly from casing (12).

12. Remove cartridge (24) from the gear (21) assembly. Remove O-ring (23) and oil seal (26) from cartridge (24).

13. Remove retaining ring (18) from gear (21). Remove coupling (19) and retaining ring (18) from gear (21).

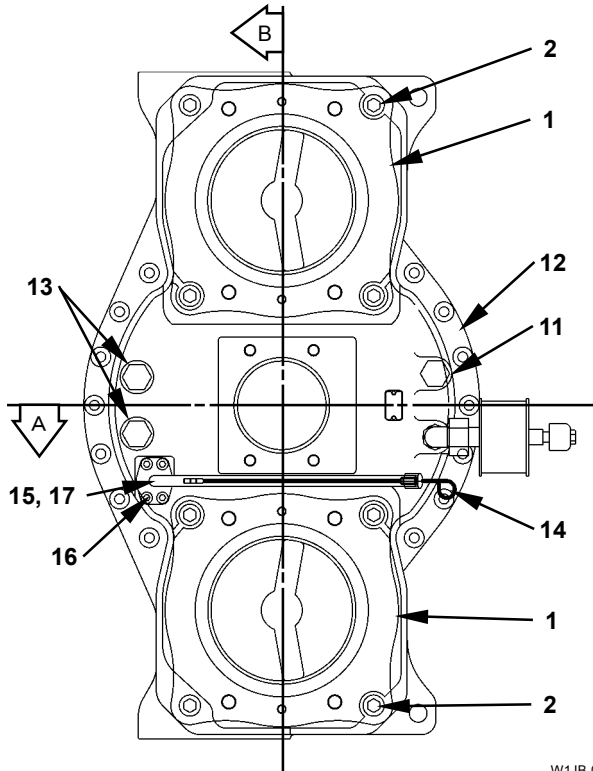


CAUTION: Gear (21) weight: 26 kg (57 lb)

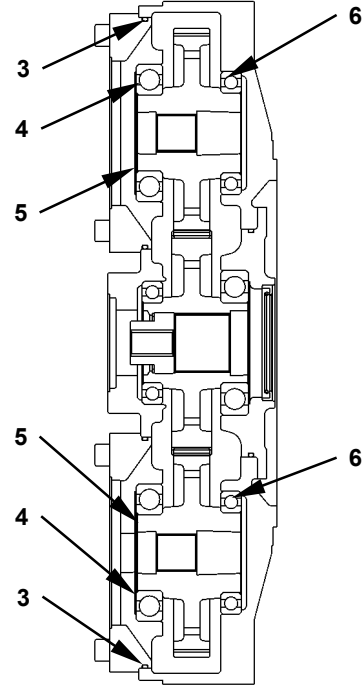
14. Remove ball bearings (20, 22) from gear (21).

UPPERSTRUCTURE / Pump Device

ASSEMBLE PUMP TRANSMISSION

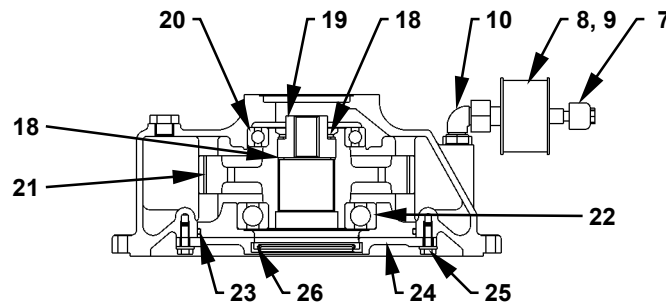


W1JB-02-04-011



Section B

W1JB-02-04-012



Section A

W1JB-02-04-013

- | | | | |
|---------------------------|--------------------|------------------------------|---------------------|
| 1 - Cartridge (2 Used) | 8 - Pipe | 15 - Pipe | 21 - Gear |
| 2 - Socket Bolt (8 Used) | 9 - O-Ring | 16 - Socket Bolt (4 Used) | 22 - Ball Bearing |
| 3 - O-Ring (2 Used) | 10 - Elbow | 17 - O-Ring | 23 - O-Ring |
| 4 - Ball Bearing (2 Used) | 11 - Plug (2 Used) | 18 - Retaining Ring (2 Used) | 24 - Cartridge |
| 5 - Gear (2 Used) | 12 - Casing | 19 - Coupling | 25 - Bolt (10 Used) |
| 6 - Ball Bearing (2 Used) | 13 - Plug (2 Used) | 20 - Ball Bearing | 26 - Oil Seal |
| 7 - Air Breather | 14 - Level Gauge | | |

UPPERSTRUCTURE / Pump Device

Assemble Pump Transmission

IMPORTANT: Clean rust prevention oil on the spline part of inner diameter in gears (5, 21). Apply grease to the spline part.

1. Install ball bearings (20, 22) to gear (21) by using a press.
2. Install retaining ring (18), coupling (19) and retaining ring (18) to gear (21).



CAUTION: Casing (12) weight: 135 kg (298 lb)

3. Place casing (12) onto the workbench with the main pump mounting side facing downward.



CAUTION: The gear (21) assembly weight: 31 kg (68 lb)

4. Install the gear (21) assembly to casing (12) by using a bar and hammer.

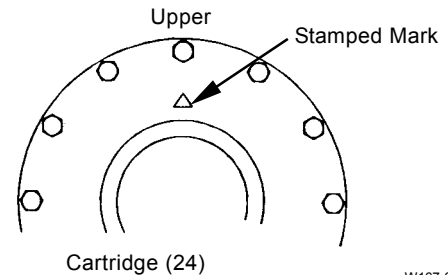


CAUTION: Cartridge (24) weight: 20 kg (44 lb)

5. Install oil seal (26) to cartridge (24) by using a plate.
6. Apply grease to the inner lip part in oil seal (26).
7. Install O-ring (23) to cartridge (24).


IMPORTANT: Install cartridge (24) to casing (12) with the stamped mark facing upward (the feeding pipe side).


8. Evenly tap and install cartridge (24) into casing (12) by using a plastic hammer.



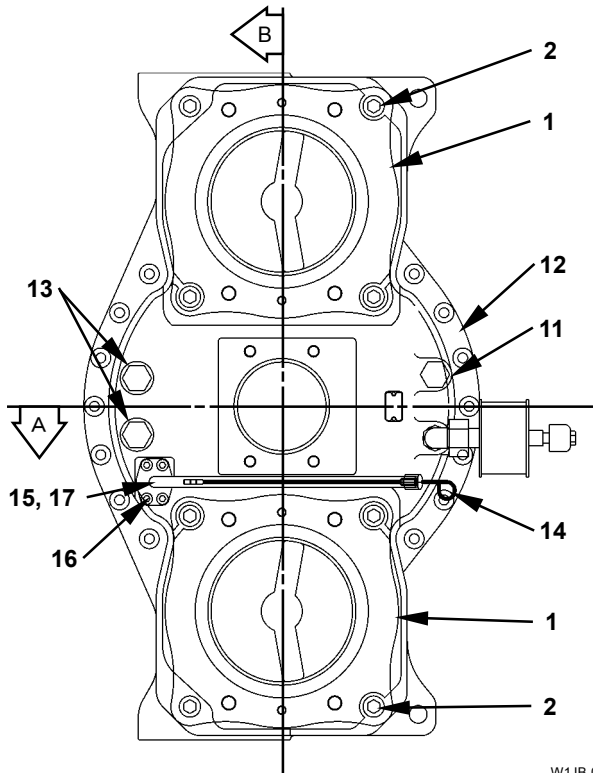
W167-02-03-006

9. Install cartridge (24) to casing (12) with socket bolts (25) (10 used).

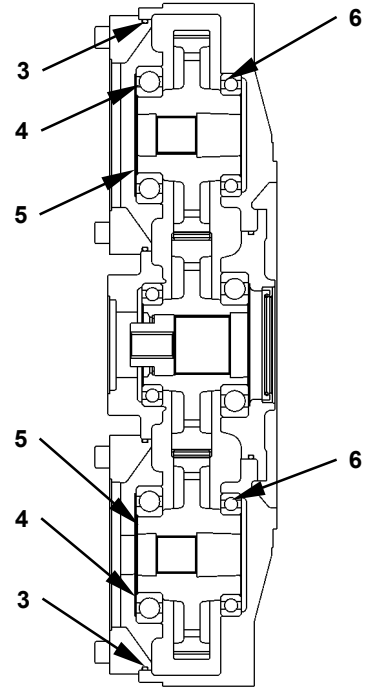
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

UPPERSTRUCTURE / Pump Device

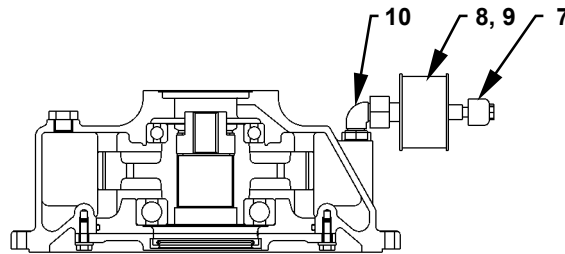


W1JB-02-04-011



Section B

W1JB-02-04-012



Section A

W1JB-02-04-013

UPPERSTRUCTURE / Pump Device



CAUTION: The casing (12) assembly weight: 195 kg (430 lb)

10. Place casing (12) onto the workbench with the engine mounting side facing downward.
11. Install ball bearings (4, 6) (2 used) to gears (5) (2 used).








CAUTION: The gear (5) assembly weight: 28 kg (62 lb)


12. Install the gear (5) assemblies (2 used) to casing (12).




CAUTION: Cartridge (1) weight: 30 kg (66 lb)

13. Install O-rings (3) (2 used) to cartridges (1) (2 used).
14. Install cartridges (1) (2 used) to casing (12) with socket bolts (2) (8 used).
 -  : 17 mm
 -  : 400 N·m (41 kgf·m, 295 lbf·ft)
15. Install elbow (10) to casing (12).
 -  : 32 mm
16. Install pipe (15) and O-ring (17) to casing (12) with socket bolts (16) (4 used).
 -  : 8 mm
 -  : 50 N·m (5.0 kgf·m, 37 lbf·ft)

17. Install plugs (13) (2 used) to casing (12).

 : 36 mm


 : 138 N·m (14 kgf·m, 102 lbf·ft)

18. Add gear oil into casing (12).

Gear oil amount: 6.2 L (1.64 gal.)

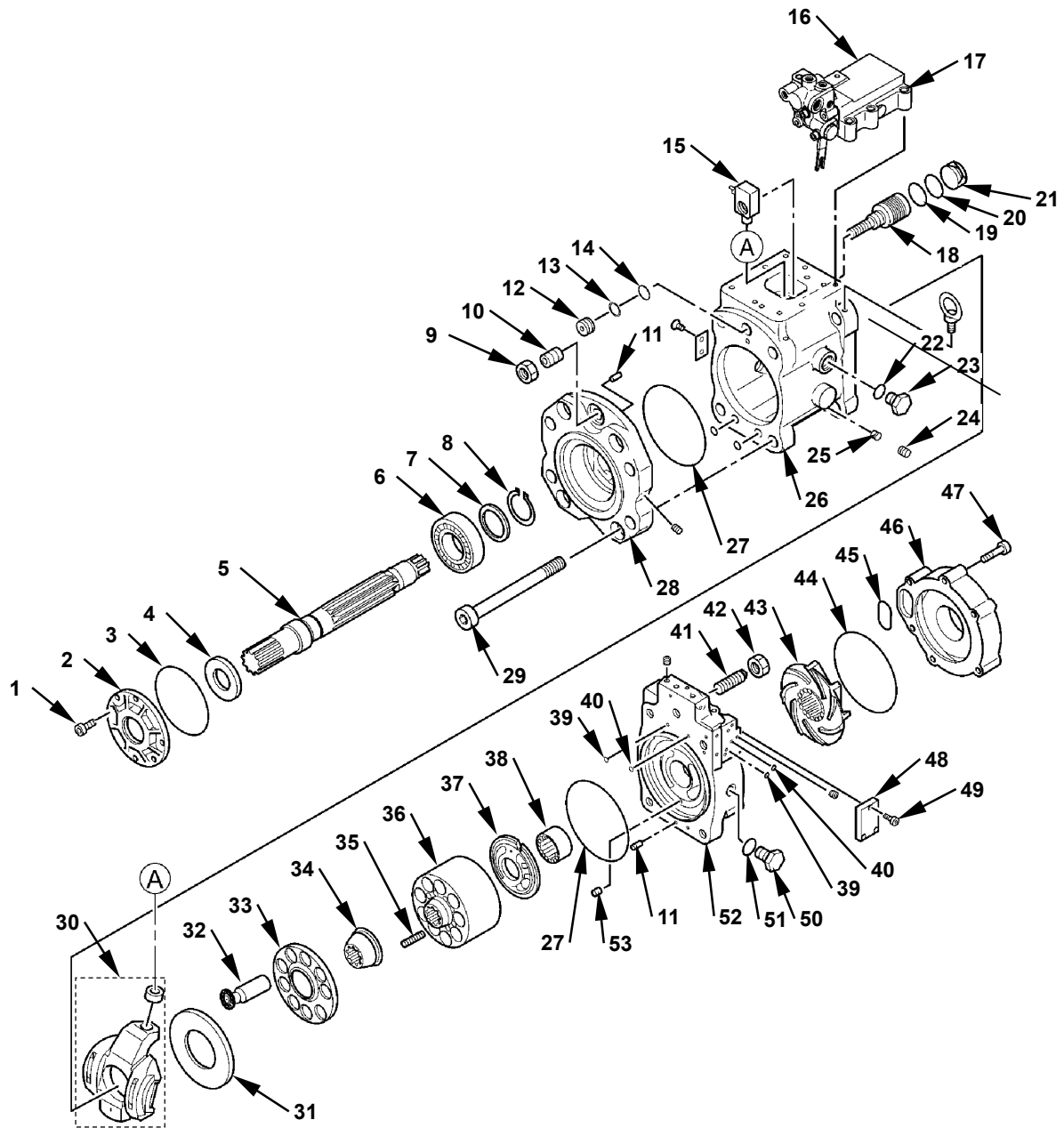
19. Install plugs (11) (2 used) to casing (12).

 : 36 mm

 : 138 N·m (14 kgf·m, 102 lbf·ft)

UPPERSTRUCTURE / Pump Device

DISASSEMBLE MAIN PUMP



W1JB-02-04-017


- | | | | |
|--------------------------|---------------------------|---------------------------|---------------------------|
| 1 - Socket Bolt (4 Used) | 15 - Tilt Pin | 28 - Support | 41 - Adjusting Screw |
| 2 - Cover | 16 - Regulator | 29 - Socket Bolt (4 Used) | 42 - Nut |
| 3 - O-Ring | 17 - Socket Bolt (6 Used) | 30 - Swash Plate | 43 - Booster |
| 4 - Oil Seal | 18 - Servo Piston | 31 - Shoe Plate | 44 - O-Ring |
| 5 - Drive Shaft | 19 - O-Ring | 32 - Plunger (9 Used) | 45 - O-Ring |
| 6 - Roller Bearing | 20 - Backup Ring | 33 - Retainer | 46 - Cover |
| 7 - Spacer | 21 - Stopper | 34 - Spherical Bushing | 47 - Socket Bolt (6 Used) |
| 8 - Retaining Ring | 22 - O-Ring (2 Used) | 35 - Spring (9 Used) | 48 - Cover |
| 9 - Nut | 23 - Plug (2 Used) | 36 - Cylinder Block | 49 - Socket Bolt (3 Used) |
| 10 - Adjusting Screw | 24 - Plug (2 Used) | 37 - Valve Plate | 50 - Plug (2 Used) |
| 11 - Spring Pin (2 Used) | 25 - Orifice (2 Used) | 38 - Needle Bearing | 51 - O-Ring (2 Used) |
| 12 - Stopper | 26 - Pump Casing | 39 - O-Ring (10 Used) | 52 - Cover |
| 13 - Backup Ring | 27 - O-Ring (2 Used) | 40 - O-Ring (3 Used) | 53 - Pin |
| 14 - O-Ring | | | |

UPPERSTRUCTURE / Pump Device


Disassemble Main Pump

IMPORTANT: As the setting of flow rate is changed, do not remove adjusting screws (10, 41) and nuts (9, 42) from support (28) and cover (52).


1. Remove plugs (23) (2 used) and O-rings (22) (2 used) from pump casing (26). Drain hydraulic oil from the pump.

 : 36 mm

2. Remove socket bolts (17) (6 used) from regulator (16). Remove regulator (16) from pump casing (26).

 : 6 mm


3. Remove socket bolts (47) (6 used) from cover (46). Remove cover (46), booster (43) and O-rings (44, 45) from pump casing (26).

 : 8 mm


4. Place pump casing (26) with the mounting surface for regulator (16) facing downward.

IMPORTANT: When removing cover (52), valve plate (37) may be removed together. Do not remove needle bearing (38) unless necessary. When removing needle bearing (38), replace with the new one.

5. Remove socket bolts (29) (4 used) from support (28). Remove cover (52), O-ring (27), (39) (8 used), (40), spring pin (11), valve plate (37) and pin (53) from pump casing (26).

 : 17 mm

6. Remove cylinder block (36) from pump casing (26). Plungers (32) (9 used) and spherical bushing (34) and retainer (33) are removed with cylinder block (36) together.

 **NOTE:** Rotate cylinder block (36) clockwise and counterclockwise by hands and remove cylinder block (36) slowly.


7. Remove retainer (33) from the cylinder block (36) assembly. Plungers (32) (9 used) are removed with retainer (33) together.


8. Remove plungers (32) (9 used) from retainer (33).

9. Remove spherical bushing (34) from cylinder block (36). Remove springs (35) (9 used) from cylinder block (36).

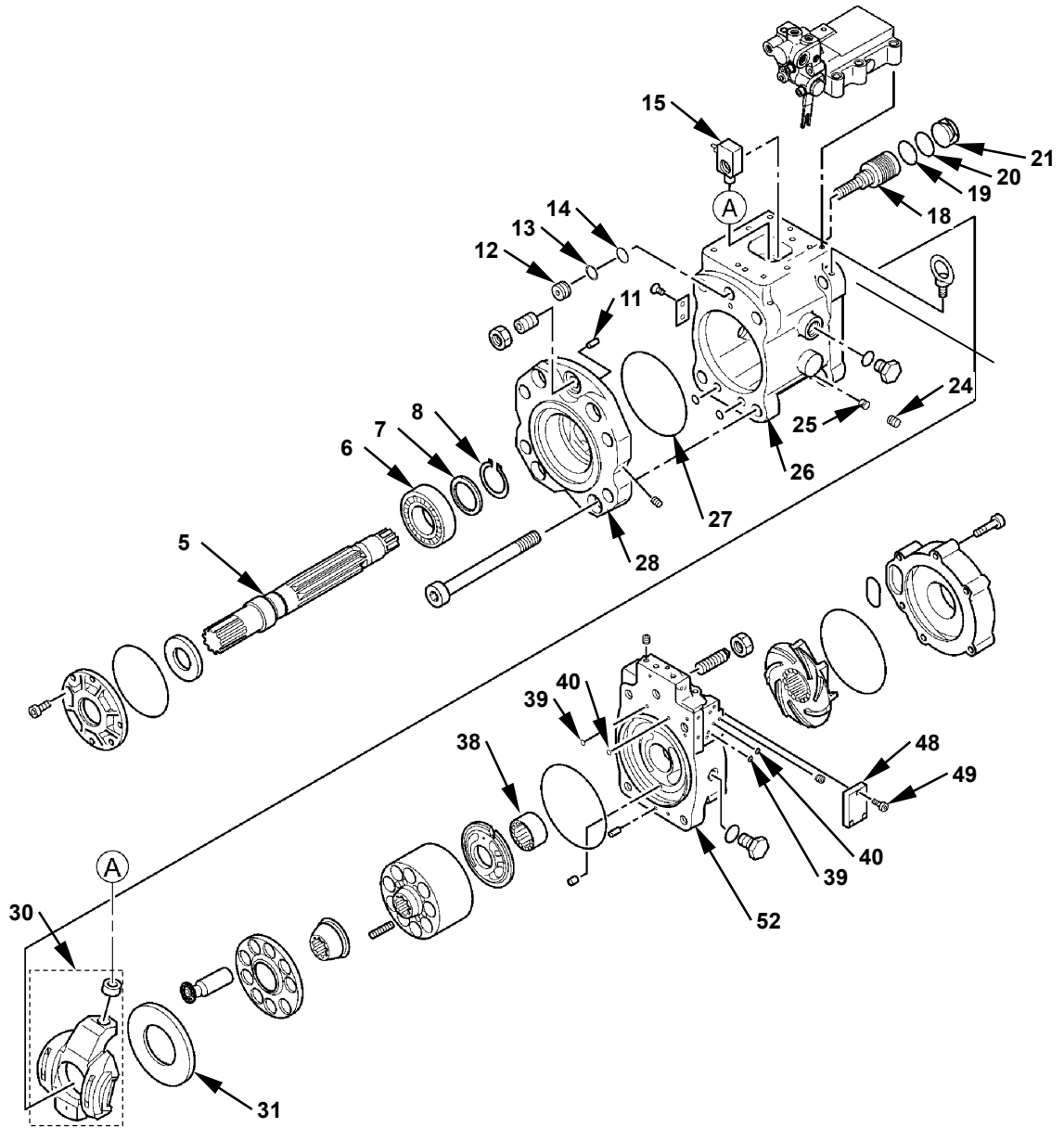
IMPORTANT: Do not remove oil seal (4) unless necessary. When removing oil seal (4), replace with the new one. Oil seal (4) is installed on cover (2). When removing cover (2), do not damage the lip part of oil seal (4).

10. Remove socket bolts (1) (4 used) from cover (2). Remove cover (2) and O-ring (3).

 : 6 mm


 **NOTE:** Insert the bolt into the hole (M8) on cover (2) for easy removal.

UPPERSTRUCTURE / Pump Device



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UPPERSTRUCTURE / Pump Device

11. Tap and remove support (28) from pump casing (26) by using a plastic hammer. At this time, remove O-rings (27, 39, 40) and spring pin (11).
12. Remove swash plate (30) and shoe plate (31) from pump casing (26).
13. Tap and remove drive shaft (5) from support (28) by using a plastic hammer.
14. Remove plugs (24) (2 used) and orifices (25) (2 used) from pump casing (26).
 : 2.5 mm, 5 mm
15. Install the bolt (M5, Pitch: 0.8 mm) to stoppers (12, 21). Remove stoppers (12, 21) from pump casing (26).
16. Remove backup rings (13, 20) and O-rings (14, 19) from stoppers (12, 21).

IMPORTANT: LOCTITE has been applied onto the contacting part between servo piston (18) and tilt pin (15). Do not disassemble them.

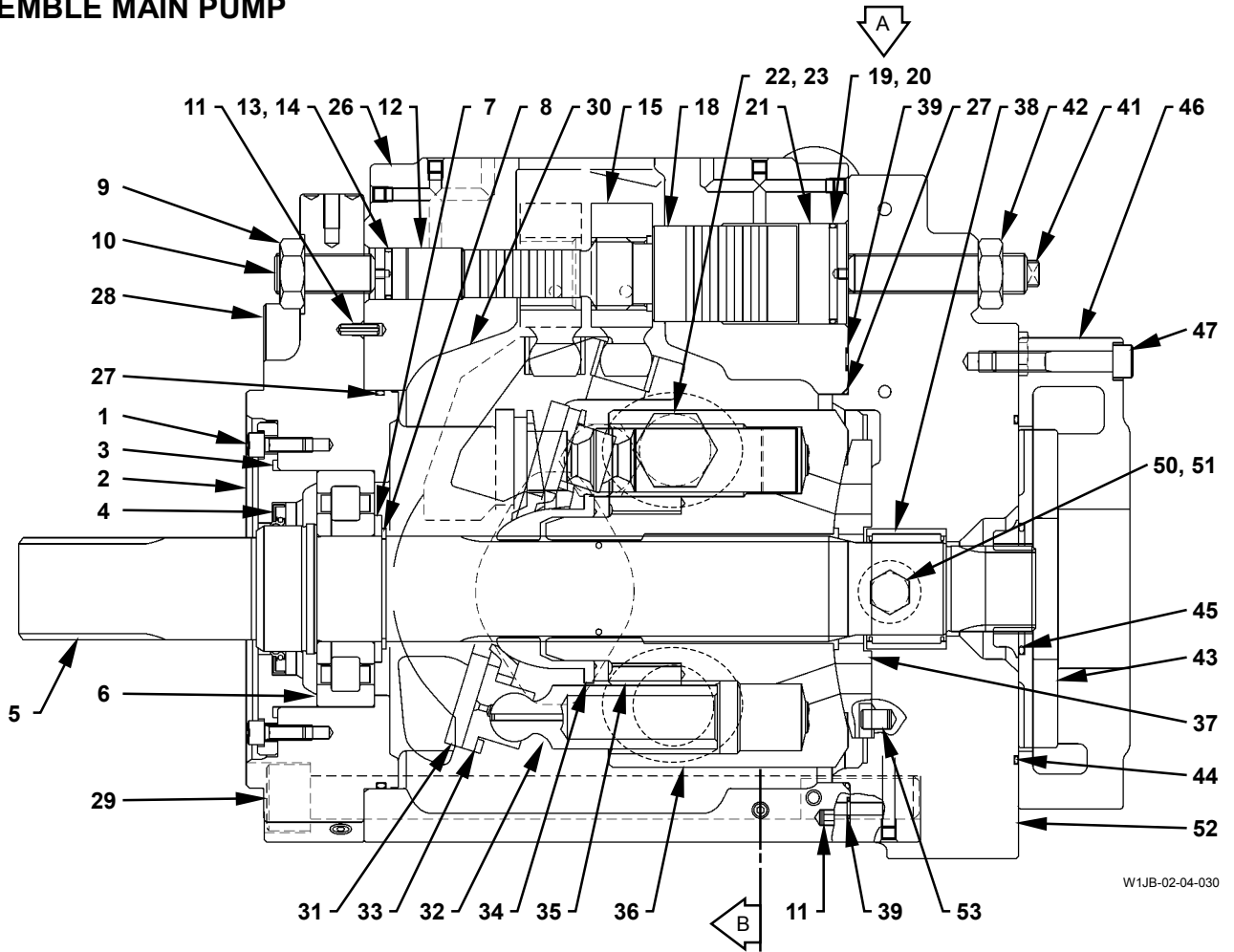
17. Heat tilt pin (15) by using a drier. Secure servo piston (18) by using a pair of pliers in order not to damage. Rotate and remove tilt pin (15). Remove servo piston (18) from pump casing (26).

IMPORTANT: Do not remove needle bearing (38) unless necessary.

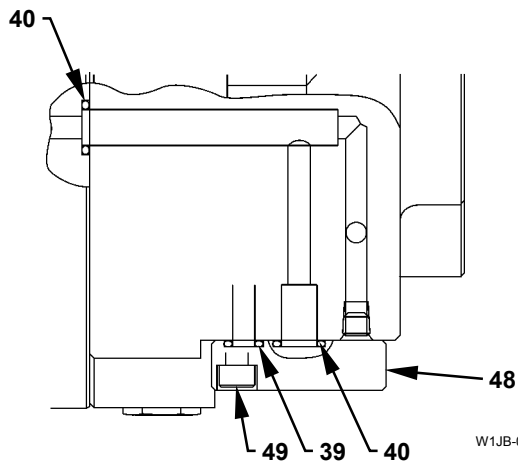
18. Remove needle bearing (38) from cover (52).
19. Remove socket bolts (49) (3 used) from cover (48). Remove cover (48) and O-rings (39, 40) from cover (52).
 : 5 mm
20. Remove retaining ring (8) from drive shaft (5). Remove spacer (7) and roller bearing (6) from drive shaft (5).

UPPERSTRUCTURE / Pump Device

ASSEMBLE MAIN PUMP

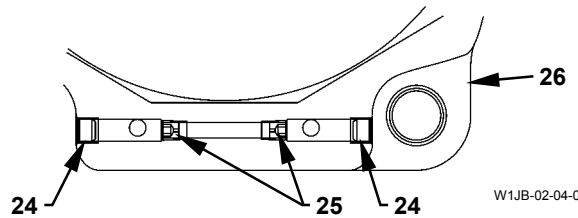


W1JB-02-04-030



View A

W1JB-02-04-031




Section B

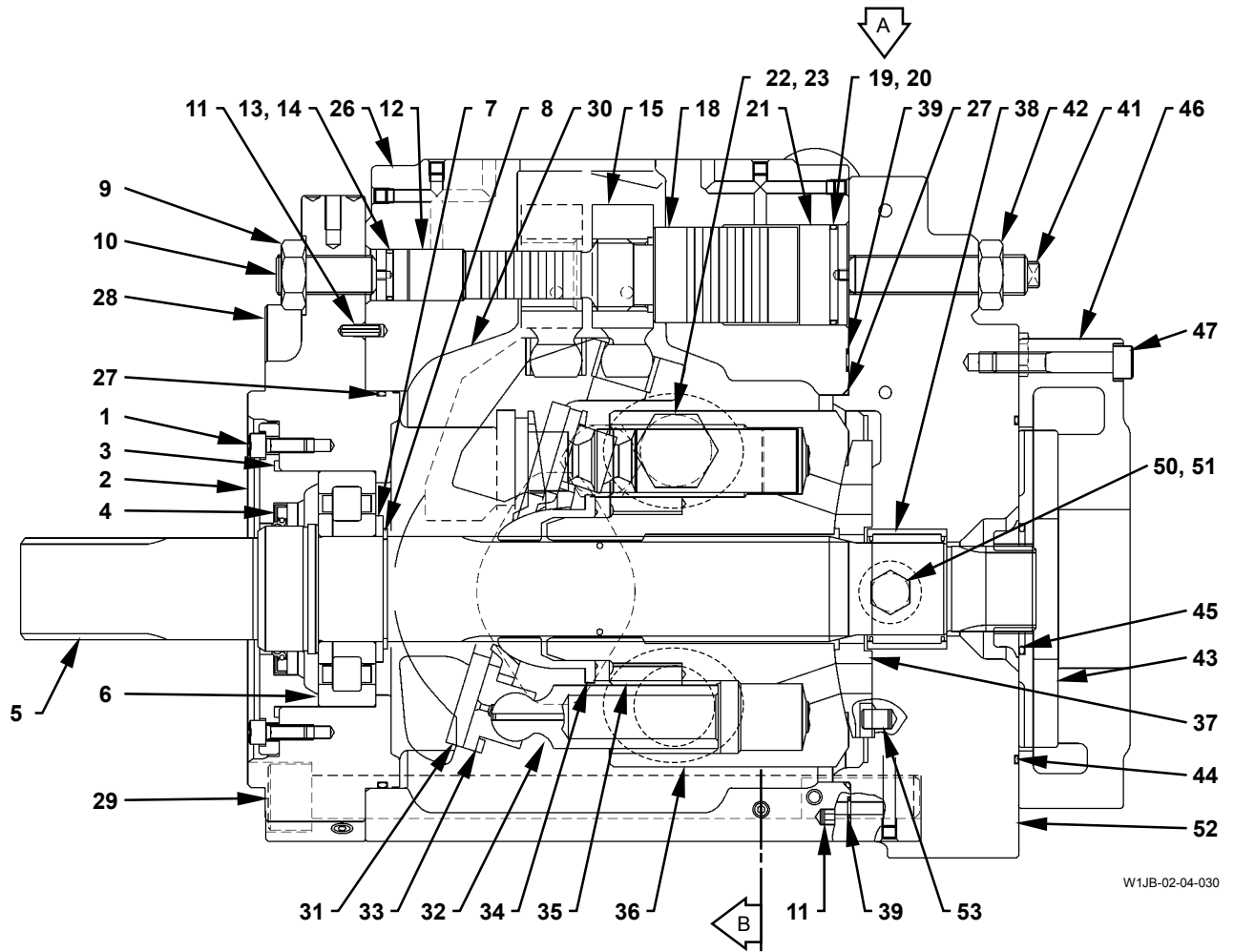
W1JB-02-04-032

UPPERSTRUCTURE / Pump Device

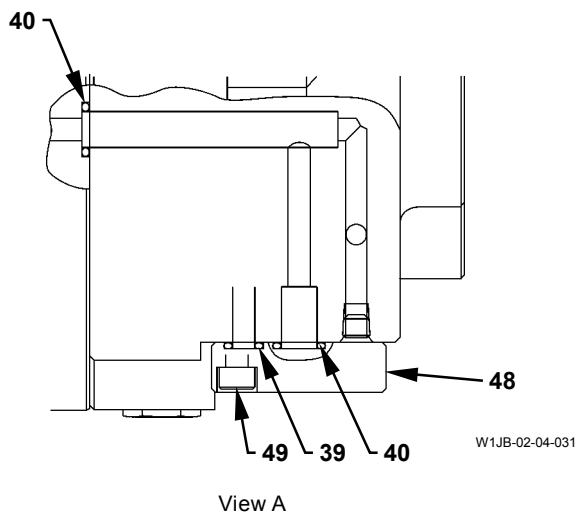
1 - Socket Bolt (4 Used)	15 - Tilt Pin	28 - Support	41 - Adjusting Screw
2 - Cover	16 - *Regulator	29 - Socket Bolt (4 Used)	42 - Nut
3 - O-Ring	17 - *Socket Bolt (6 Used)	30 - Swash Plate	43 - Booster
4 - Oil Seal	18 - Servo Piston	31 - Shoe Plate	44 - O-Ring
5 - Drive Shaft	19 - O-Ring	32 - Plunger (9 Used)	45 - O-Ring
6 - Roller Bearing	20 - Backup Ring	33 - Retainer	46 - Cover
7 - Spacer	21 - Stopper	34 - Spherical Bushing	47 - Socket Bolt (6 Used)
8 - Retaining Ring	22 - O-Ring (2 Used)	35 - Spring (9 Used)	48 - Cover
9 - Nut	23 - Plug (2 Used)	36 - Cylinder Block	49 - Socket Bolt (3 Used)
10 - Adjusting Screw	24 - Plug (2 Used)	37 - Valve Plate	50 - Plug (2 Used)
11 - Spring Pin (2 Used)	25 - Orifice (2 Used)	38 - Needle Bearing	51 - O-Ring (2 Used)
12 - Stopper	26 - Pump Casing	39 - O-Ring (10 Used)	52 - Cover
13 - Backup Ring	27 - O-Ring (2 Used)	40 - O-Ring (3 Used)	53 - Pin
14 - O-Ring			

 NOTE: As for the item with mark *, refer to W2-4-28.

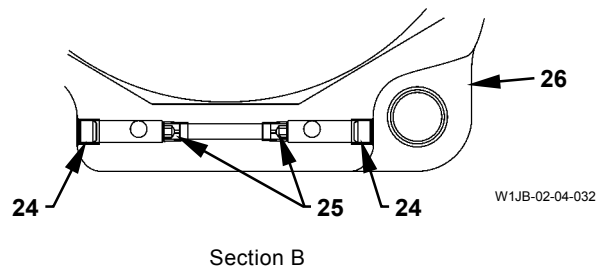
UPPERSTRUCTURE / Pump Device



W1JB-02-04-030



W1JB-02-04-031




W1JB-02-04-032


UPPERSTRUCTURE / Pump Device


Assemble Main Pump


IMPORTANT: Apply THREEBOND #1305N to the contacting part between servo piston (18) and tilt pin (15).

1. Install orifices (25) (2 used) and plugs (24) (2 used) to pump casing (26).

 : 2.5 mm

 : 8.8 N·m (0.9 kgf·m, 6.5 lbf·ft)


 : 5 mm

 : 9.8 N·m (1 kgf·m, 7.2 lbf·ft)

2. Install O-rings (14, 19) and backup rings (13, 20) to stoppers (12, 21).
3. Install tilt pin (15) and servo piston (18) and the stoppers (21, 30) assembly to pump casing (26).
4. Install roller bearing (6), spacer (7) and retaining ring (8) to shaft (5).
5. Install O-rings (39, 40) to pump casing (26). Install spring pin (20) and O-ring (27) to support (28). Lightly tap and install support (28) to pump casing (26) by using a plastic hammer.


6. Place pump casing (26) with the mounting surface for regulator facing downward.


7. Align swash plate (30) with tilt pin (15) and install shoe plate (31) to pump casing (26).

 **NOTE:** After installing swash plate (30), check if swash plate (30) can move smoothly.

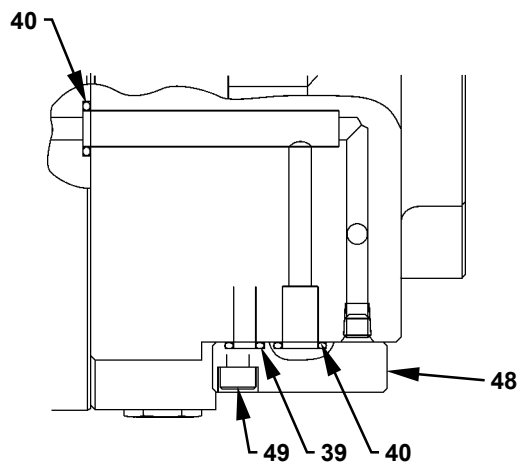
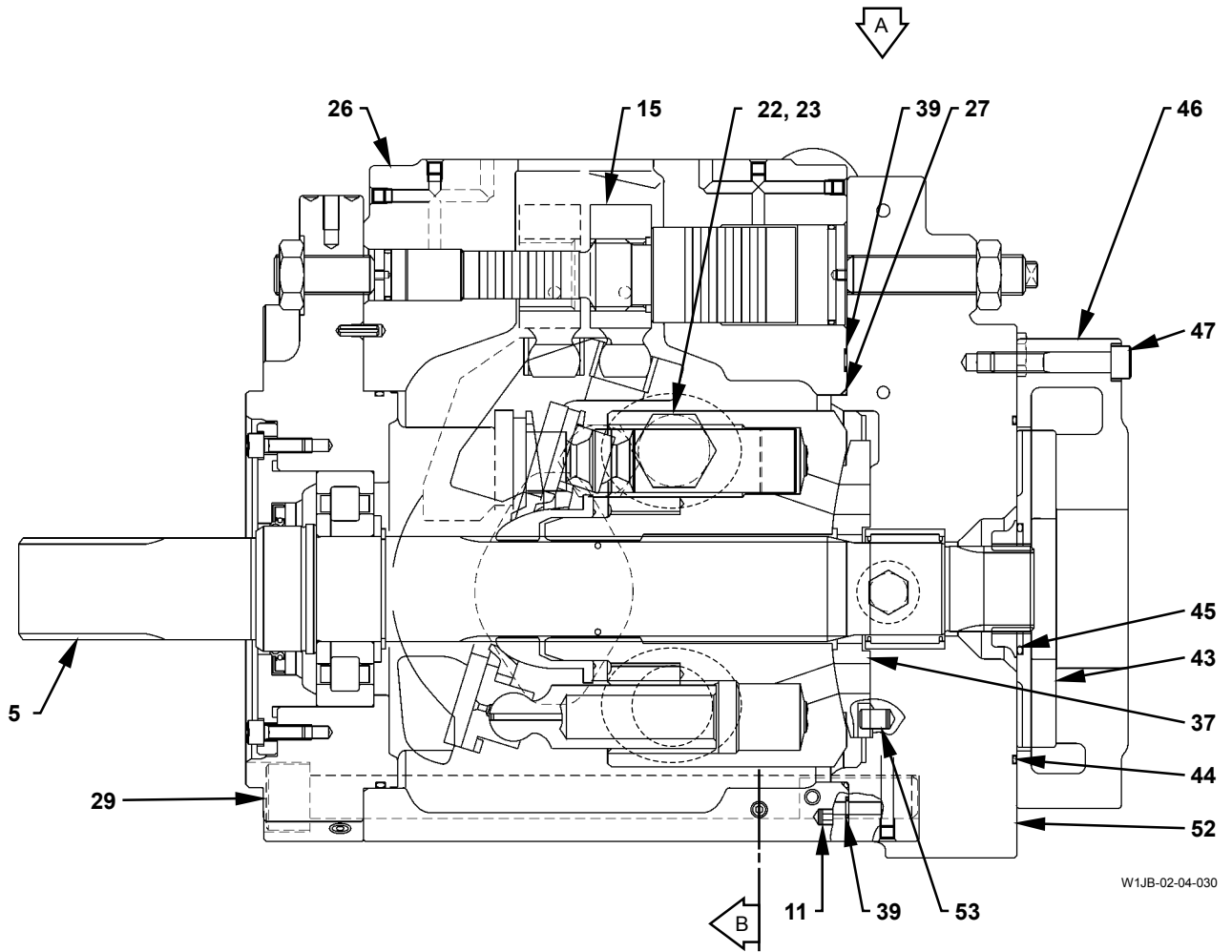
IMPORTANT: Apply lubricant to the outer surface of oil seal (4) and apply grease to the lip part.

8. Install oil seal (4) and O-ring (3) to cover (2).
9. Install drive shaft (5) to support (28). Install cover (2) to support (28) with socket bolts (1) (4 used).

 : 6 mm

 : 29 N·m (3 kgf·m, 21.4 lbf·ft)
10. Install springs (35) (9 used) and spherical bushing (34) to cylinder block (36).
11. Install plungers (32) (9 used) to retainer (33). Install the retainer (33) assembly to cylinder block (36).
12. Install the cylinder block (36) assembly to drive shaft (5).

UPPERSTRUCTURE / Pump Device



View A


UPPERSTRUCTURE / Pump Device

IMPORTANT: Apply grease to valve plate (37).


Check the direction of suction and delivery in valve plate (37).


13. Install O-rings (39) (8 used) and (40) (2 used) to pump casing (26).

14. Install spring pin (11), pin (53) and O-ring (27) to cover (52). Install valve plate (37) to cover (52).

 **NOTE:** Align the pin hole on valve plate (37) with pin (53) and install valve plate (37).


15. Install cover (52) to the pump casing (26) assembly with socket bolts (29) (4 used).


 : 17 mm

 : 490 N·m (50 kgf·m, 361 lbf·ft)


16. Align the splines and install booster (43) to drive shaft (5).


17. Install O-rings (44, 45) to cover (46). Install cover (46) to cover (52) with socket bolts (47) (6 used).


 : 8 mm

 : 57 N·m (5.8 kgf·m, 42 lbf·ft)


18. Align the feedback lever in regulator (16) with tilt pin (15). Install regulator (16) to pump casing (26) with socket bolts (17) (6 used).


 : 6 mm

 : 29 N·m (3 kgf·m, 21.4 lbf·ft)


 **NOTE:** As for the positions of regulator (16) and socket bolt (17), refer to W2-4-28.


19. Install O-rings (22) (2 used) to plugs (23) (2 used). Install the plug (23) assemblies (2 used) to pump casing (26).

 : 36 mm

 : 170 N·m (17 kgf·m, 125 lbf·ft)

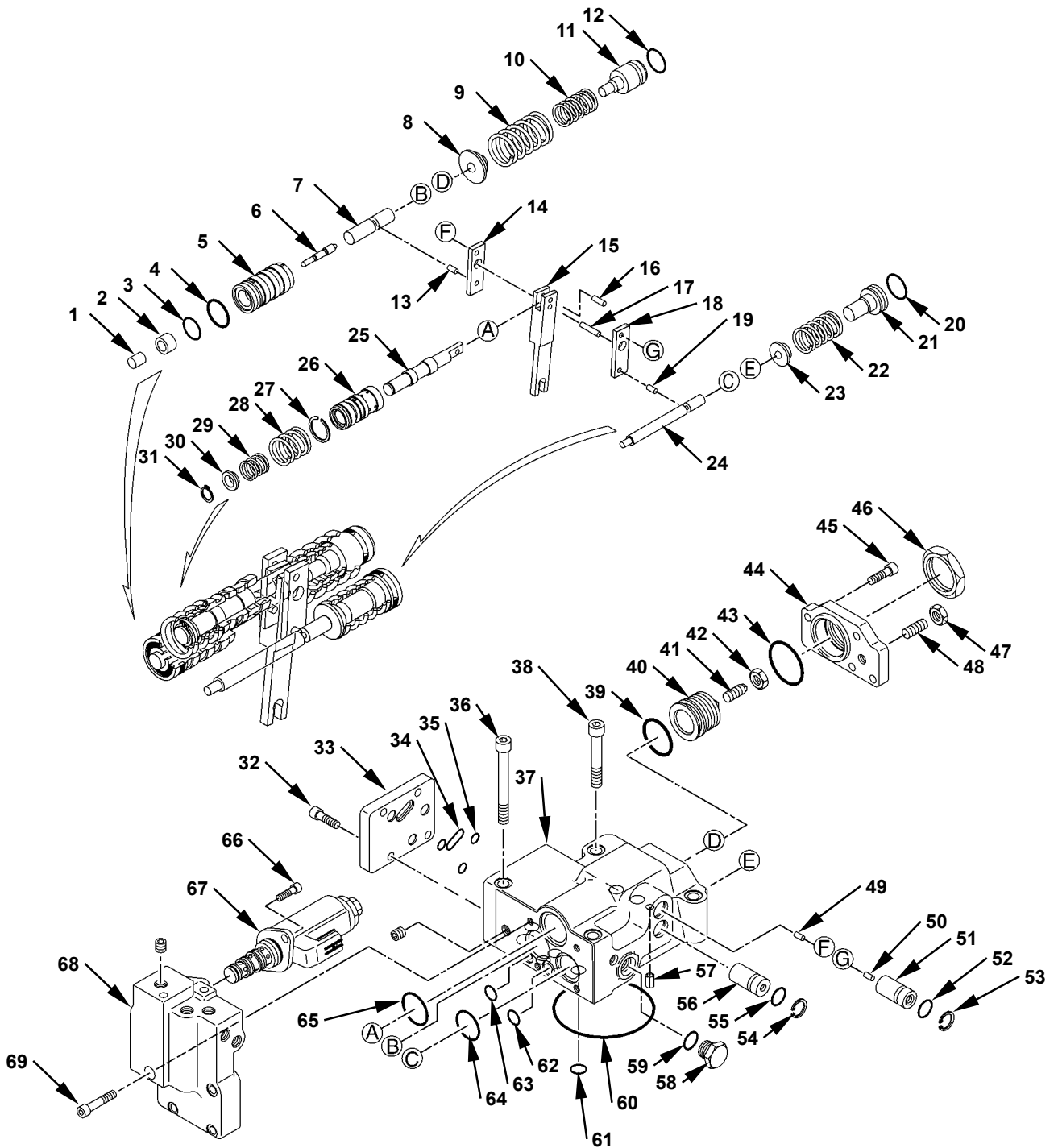
20. Install O-rings (39, 40) to cover (52). Install cover (48) to cover (52) with socket bolts (49) (3 used).

 : 5 mm

 : 12 N·m (1.2 kgf·m, 8.9 lbf·ft)

UPPERSTRUCTURE / Pump Device

DISASSEMBLE MAIN REGULATOR

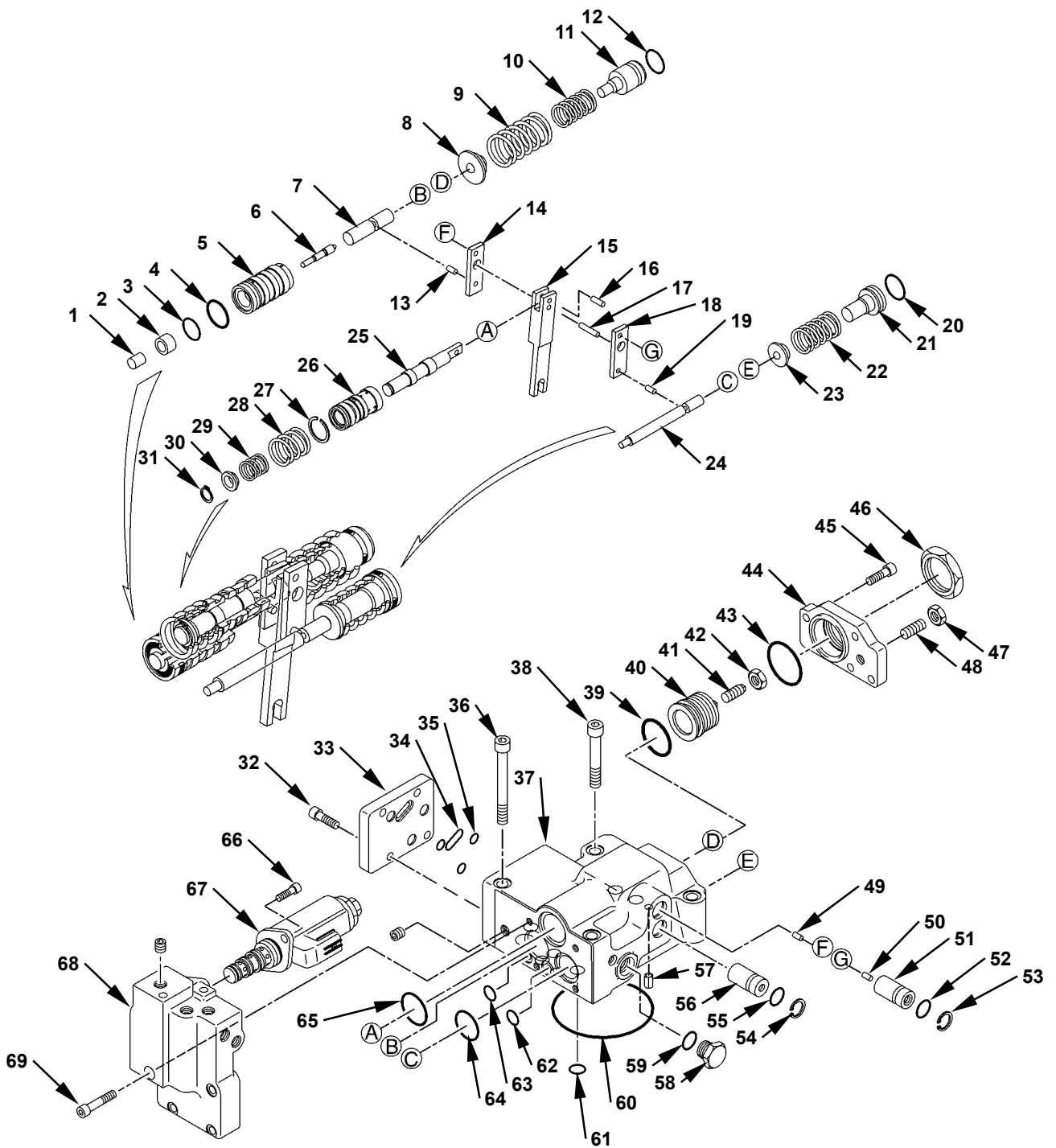


W1JB-02-04-027

UPPERSTRUCTURE / Pump Device

1 - Pin	19 - Pin	36 - Socket Bolt (2 Used)	53 - Lock Ring
2 - Sleeve	20 - O-Ring	37 - Casing	54 - Lock Ring
3 - O-Ring	21 - Stopper	38 - Socket Bolt (2 Used)	55 - O-Ring
4 - O-Ring	22 - Spring	39 - O-Ring	56 - Supporting Plug
5 - Sleeve	23 - Spring Seat	40 - Adjusting Screw	57 - Pin
6 - Compensating Piston	24 - Pilot Piston	41 - Adjusting Screw	58 - Plug
7 - Compensating Rod	25 - Spool	42 - Lock Nut	59 - O-Ring
8 - Spring Seat	26 - Sleeve	43 - O-Ring	60 - *O-Ring
9 - Spring	27 - Retaining Ring	44 - Cover	61 - *O-Ring
10 - Spring	28 - Spring	45 - *Socket Bolt (4 Used)	62 - O-Ring
11 - Stopper	29 - Spring	46 - Lock Nut	63 - *O-Ring
12 - O-Ring	30 - Spring Seat	47 - Lock Nut	64 - O-Ring
13 - Pin	31 - Retaining Ring	48 - Adjusting Screw	65 - O-Ring
14 - Lever	32 - Socket Bolt (4 Used)	49 - Pin	66 - Socket Bolt (2 Used)
15 - Feedback Lever	33 - Cover	50 - Pin	67 - Solenoid Valve
16 - Pin	34 - *O-Ring	51 - Supporting Plug	68 - Cover
17 - Pin	35 - *O-Ring (3 Used)	52 - O-Ring	69 - Socket Bolt (4 Used)
18 - Lever			

UPPERSTRUCTURE / Pump Device




W1JB-02-04-027

UPPERSTRUCTURE / Pump Device


Disassemble Main Regulator

1. Remove socket bolts (36, 38) (2 used for each) from casing (37). Remove the regulator from the pump.


Remove pin (57) and O-rings (60, 61) from casing (37).

 : 6 mm

2. Remove socket bolts (66) (2 used) from solenoid valve (67). Remove solenoid valve (67) from cover (68).


 : 4 mm

3. Remove socket bolts (32) (4 used) from cover (33). Remove cover (33), O-rings (34), and (35) (3 used) from casing (37).

 : 5 mm

IMPORTANT: Do not disassemble lock nuts (42, 46, 47) and adjusting screws (40, 41, 48) as the setting of flow rate changes. When removing cover (44), springs (9, 10) inside may fly out.


4. Remove socket bolts (45) (4 used) from cover (44). Remove the cover (44) assembly and O-ring (43) from casing (37).

 : 5 mm

5. Remove springs (9, 10) and spring seat (8) from casing (37).

6. Remove stopper (11) and O-ring (12) from the cover (44) assembly.

7. Remove socket bolts (69) (4 used) from cover (68). Remove cover (68) from casing (37).

 : 5 mm

8. Remove O-rings (62, 63, 64, 65) and spring (29) from casing (37).

9. Remove retaining ring (31) from spool (25). Remove spring seat (30), spring (29) and sleeve (26) from spool (25).

10. Remove retaining ring (27) from sleeve (26).

11. Remove pin (1), sleeve (2) and O-ring (3) from casing (37).

12. Remove lock rings (53, 54) from casing (37).

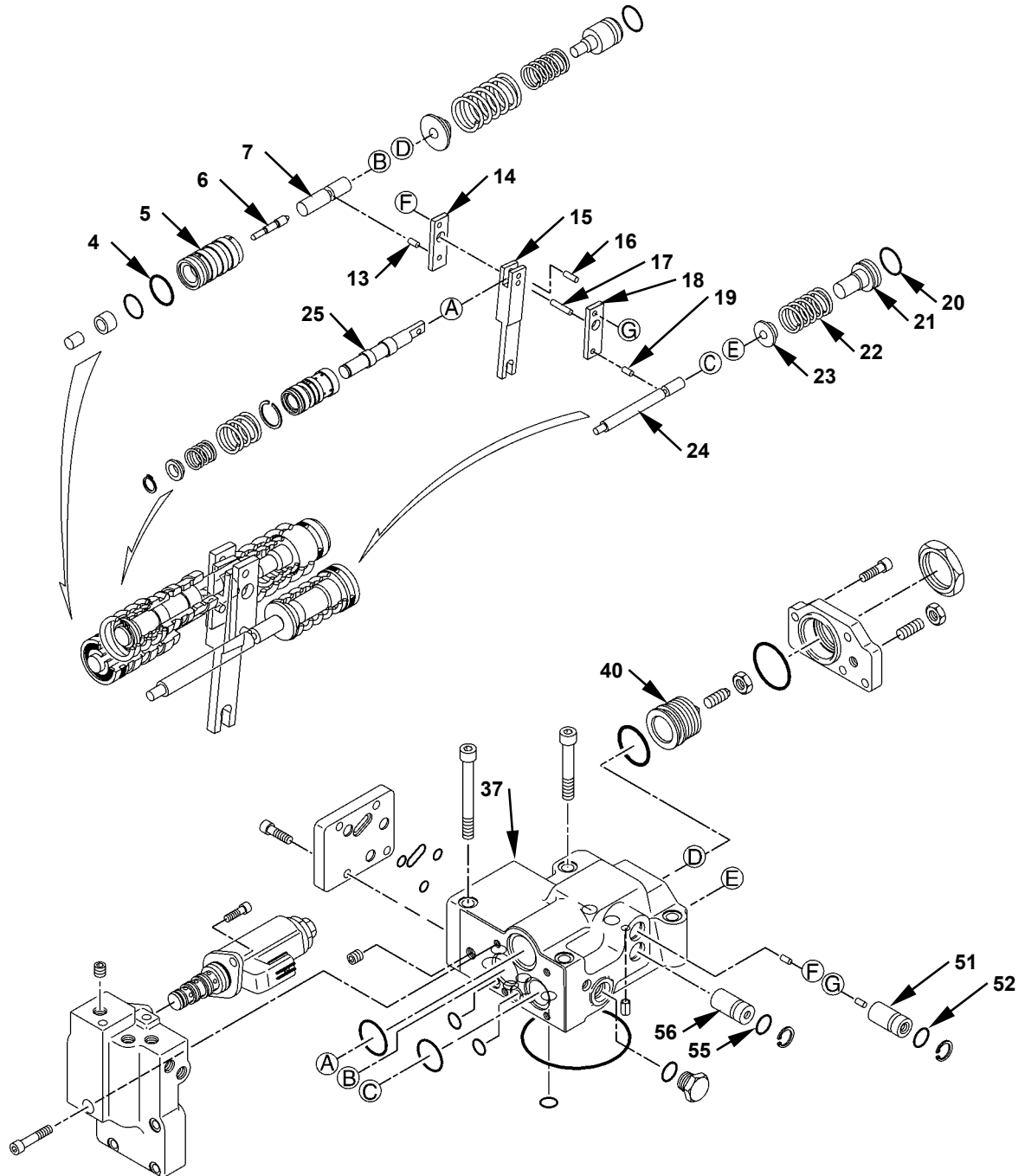
IMPORTANT: As supporting plugs (51, 56) are quite similar, align the matching marks in order not to confuse.

13. Insert bolt (M6, Pitch 1.0 mm) into the center hole of supporting plugs (51, 56). Remove supporting plugs (51, 56) from casing (37).

Pin (50) is removed with supporting plug (51) together.

14. Remove pin (50) from supporting plug (51).

UPPERSTRUCTURE / Pump Device



W1JB-02-04-027

UPPERSTRUCTURE / Pump Device

15. Remove O-rings (52, 55) from supporting plugs (51, 56).

IMPORTANT: Do not remove pin (19) from lever (18).

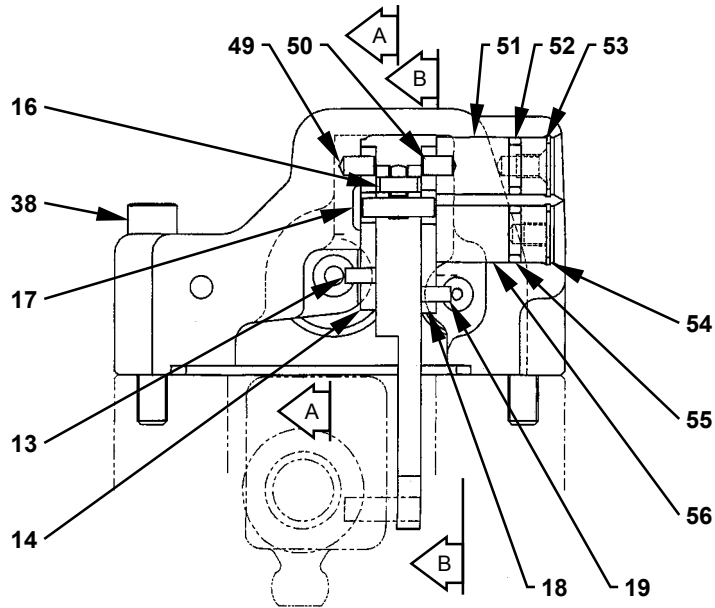
16. Remove lever (18) from casing (37) by using a pair of tweezers.
17. Remove pin (16) from feedback lever (15) by using a round bar (Dia. 3 mm (0.12 in)). Remove feedback lever (15) from casing (37).

IMPORTANT: Do not remove pin (13) from lever (14).

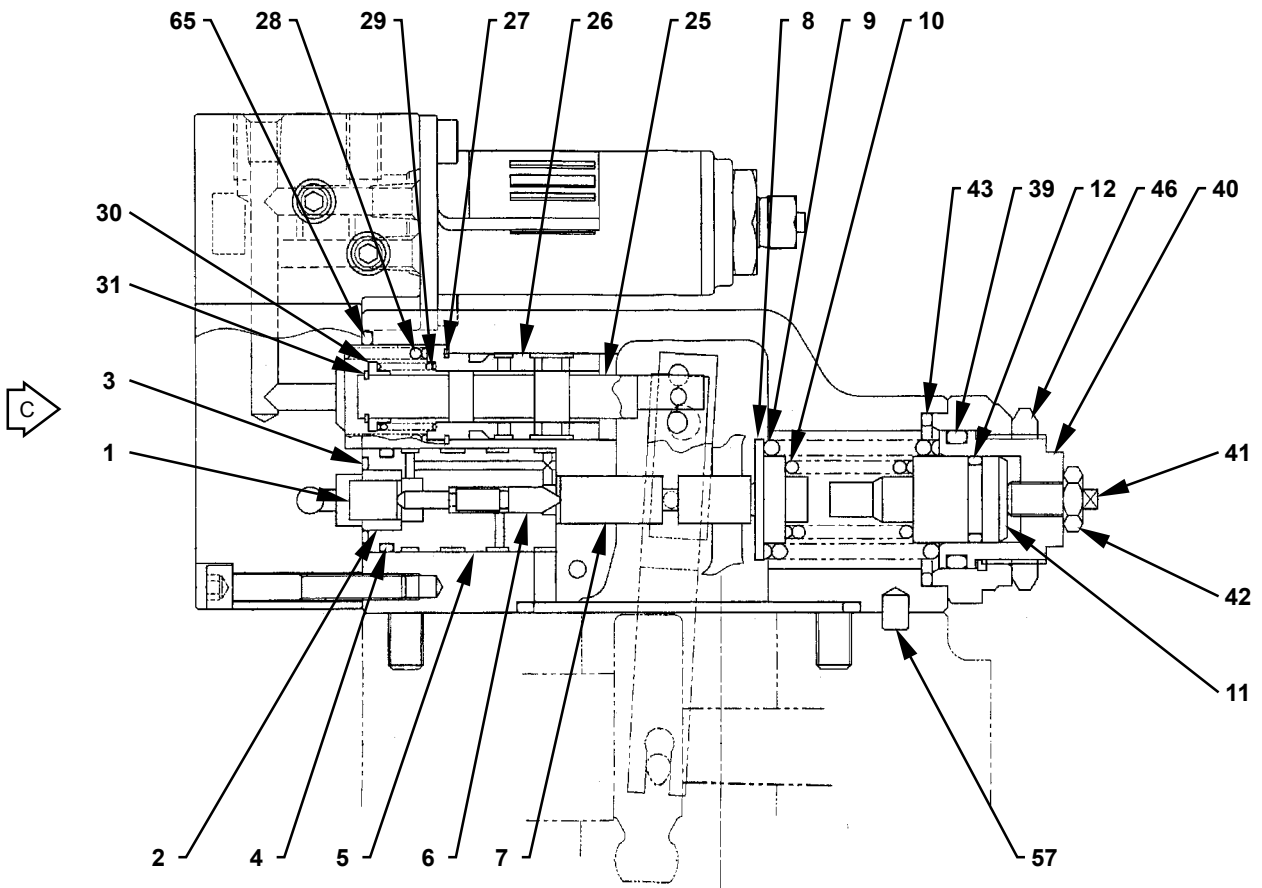
18. Remove lever (14) from casing (37).
19. Remove pilot piston (24) from casing (37).
20. Insert a round bar (Dia. 3 mm (0.12 in)) into the pilot piston (24) side. Remove spring seat (23), spring (22) and stopper (21) from casing (37).
21. Remove O-ring (20) from stopper (21).
22. Insert a round bar (Dia. 3 mm (0.12 in)) into the adjusting screw (40) side. Remove compensating rod (7) and the sleeve (5) assembly from casing (37).
23. Remove compensating rod (7), compensating piston (6) and O-ring (4) from sleeve (5).
24. Remove spool (25) from casing (37).

UPPERSTRUCTURE / Pump Device

ASSEMBLE MAIN REGULATOR



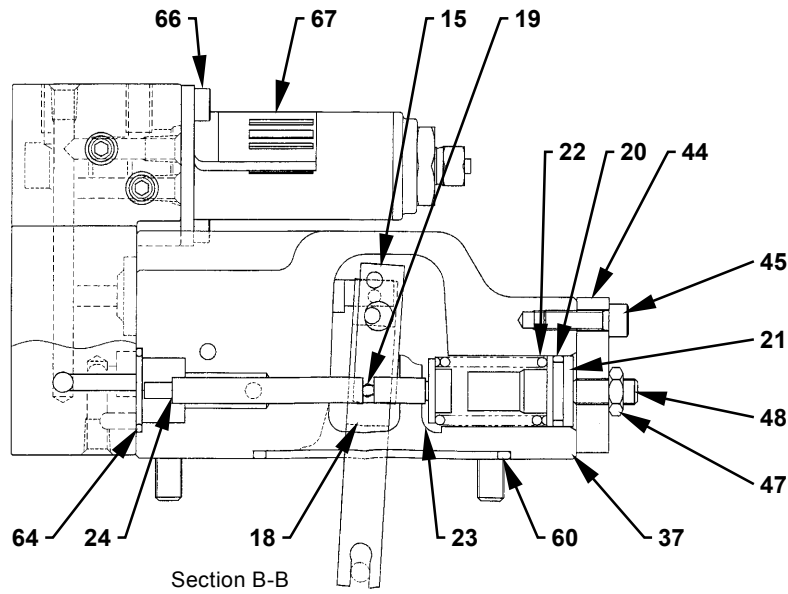
W1JB-02-04-003



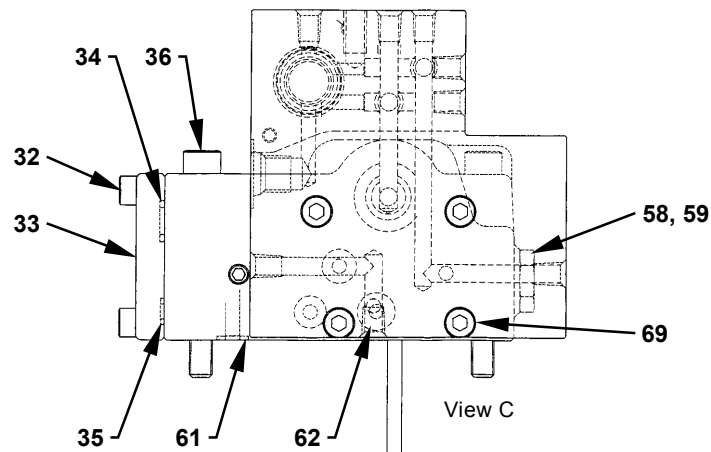
Section A-A

W1JB-02-04-002

UPPERSTRUCTURE / Pump Device



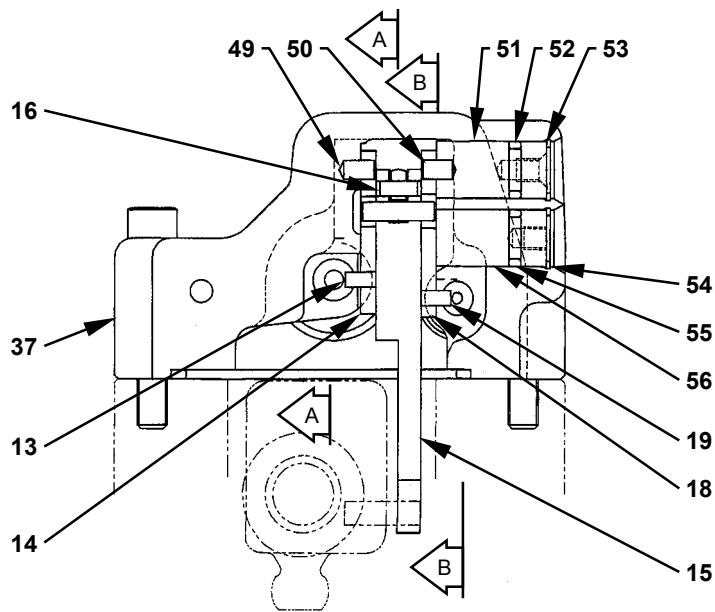
W1JB-02-04-004



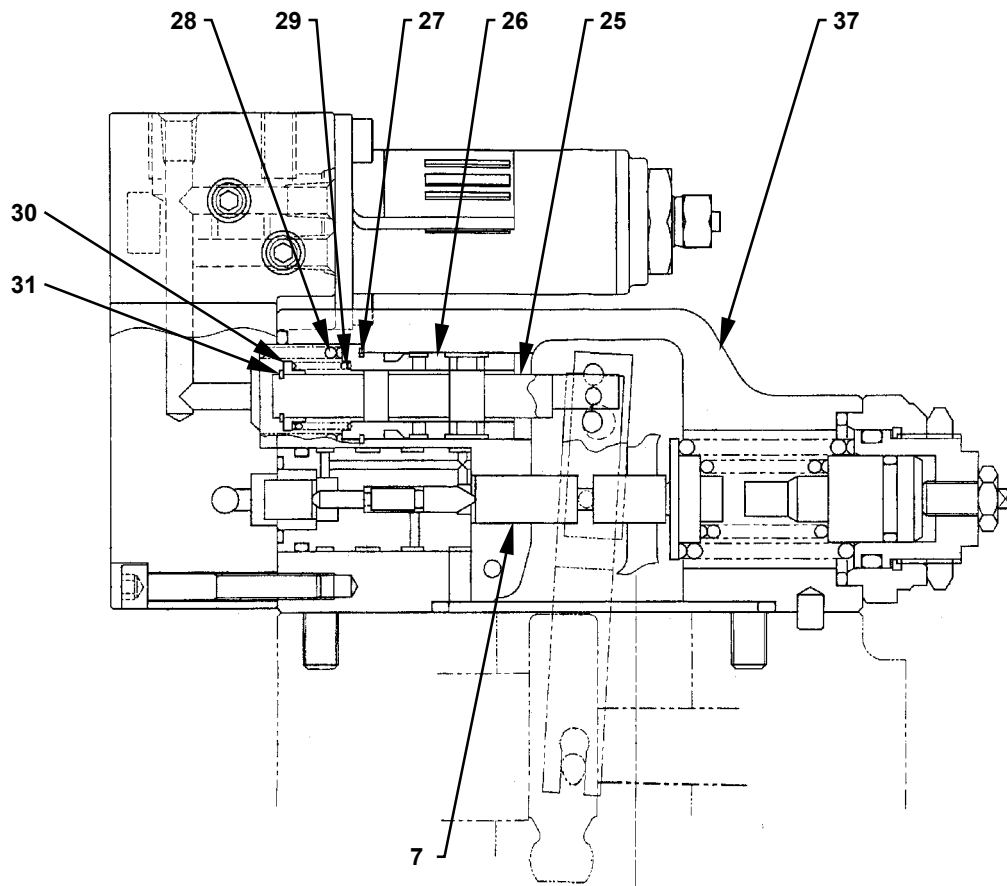
W1JB-02-04-005

- | | | | |
|-------------------------|---------------------------|----------------------------|---------------------------|
| 1 - Pin | 19 - Pin | 36 - Socket Bolt (2 Used) | 53 - Lock Ring |
| 2 - Sleeve | 20 - O-Ring | 37 - Casing | 54 - Lock Ring |
| 3 - O-Ring | 21 - Stopper | 38 - Socket Bolt (2 Used) | 55 - O-Ring |
| 4 - O-Ring | 22 - Spring | 39 - O-Ring | 56 - Supporting Plug |
| 5 - Sleeve | 23 - Spring Seat | 40 - Adjusting Screw | 57 - Pin |
| 6 - Compensating Piston | 24 - Pilot Piston | 41 - Adjusting Screw | 58 - Plug |
| 7 - Compensating Rod | 25 - Spool | 42 - Lock Nut | 59 - O-Ring |
| 8 - Spring Seat | 26 - Sleeve | 43 - O-Ring | 60 - *O-Ring |
| 9 - Spring | 27 - Retaining Ring | 44 - Cover | 61 - *O-Ring |
| 10 - Spring | 28 - Spring | 45 - *Socket Bolt (4 Used) | 62 - O-Ring |
| 11 - Stopper | 29 - Spring | 46 - Lock Nut | 63 - *O-Ring |
| 12 - O-Ring | 30 - Spring Seat | 47 - Lock Nut | 64 - O-Ring |
| 13 - Pin | 31 - Retaining Ring | 48 - Adjusting Screw | 65 - O-Ring |
| 14 - Lever | 32 - Socket Bolt (4 Used) | 49 - Pin | 66 - Socket Bolt (2 Used) |
| 15 - Feedback Lever | 33 - Cover | 50 - Pin | 67 - Solenoid Valve |
| 16 - Pin | 34 - *O-Ring | 51 - Supporting Plug | 68 - Cover |
| 17 - Pin | 35 - *O-Ring (3 Used) | 52 - O-Ring | 69 - Socket Bolt (4 Used) |
| 18 - Lever | | | |

UPPERSTRUCTURE / Pump Device



W1JB-02-04-003



Section A-A

W1JB-02-04-002

 NOTE: As for the item 24, refer to W2-4-38.

UPPERSTRUCTURE / Pump Device

Assemble Main Regulator

IMPORTANT: Check the direction to install compensating rod (7) as illustrated.

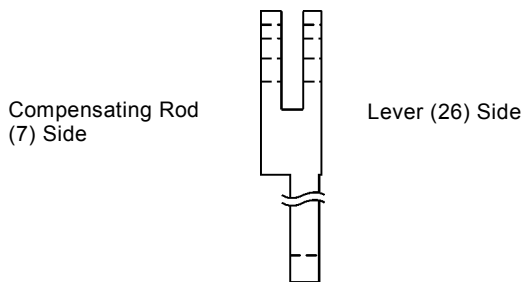
1. Insert compensating rod (7) into casing (37).
2. Install pin (13) to lever (14). Insert lever (14) into casing (37). Align pin (13) with the groove of compensating rod (7) and install pin (13).
3. Install retaining ring (27) to sleeve (26).

IMPORTANT: After inserting, check if spool (25) moves smoothly.

4. Insert sleeve (26) and spool (25) into casing (37).

IMPORTANT: Check the direction to install feed back lever (15).

5. Align the pin hole (the hole in upper side) in feed back lever (15) with that in spool (25). Install pin (16).



W18B-02-04-018

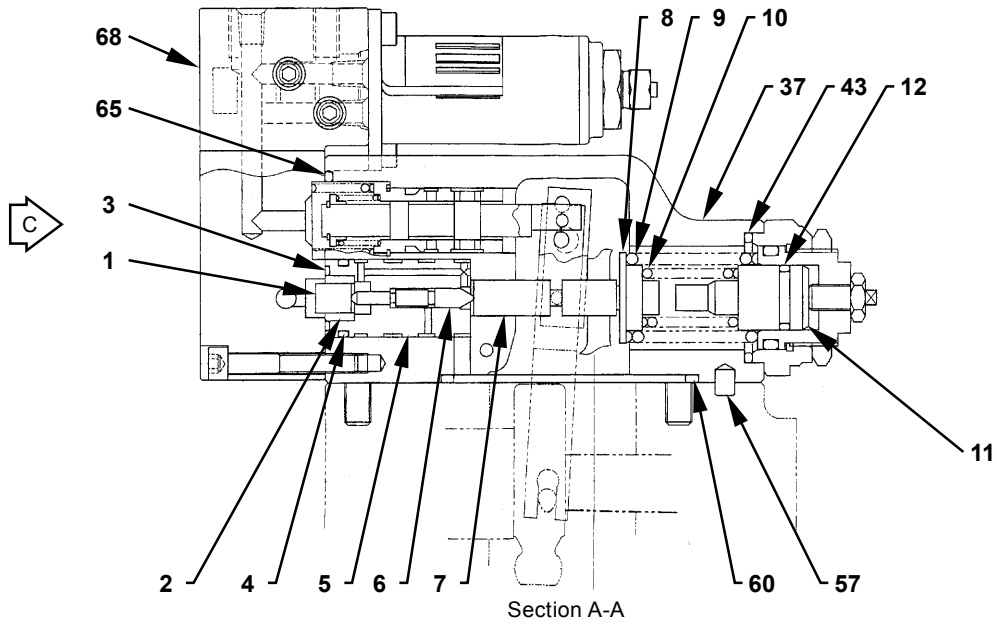
IMPORTANT: After inserting, check if pilot piston (24) moves smoothly.

6. Insert pilot piston (24) into casing (37).
7. Install O-rings (52, 55) to supporting plugs (51, 56).

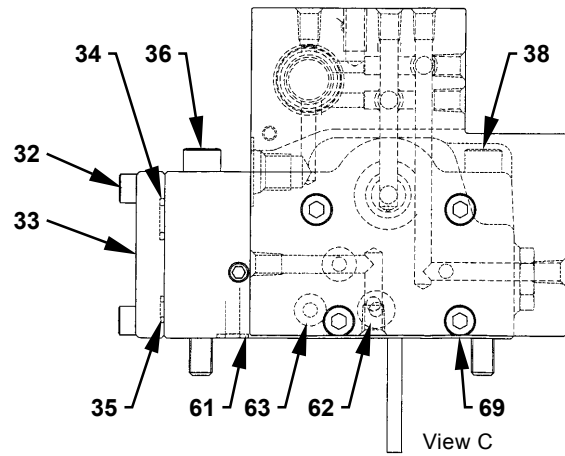
IMPORTANT: As supporting plugs (51, 56) are quite similar, align the matching marks and install plugs (51, 56).

8. Align pin (19) in lever (18) with the groove in pilot piston (24). Install pin (19).
9. Install pin (50) to supporting plug (51). Align with the pin holes of lever (18) and install supporting plug (51).
10. Install lock ring (53) to the groove on supporting plug (51) in casing (37).
11. Install supporting plug (56) to casing (37). Install lock ring (54) to the groove on supporting plug (56).
12. Install spring (29) and spring seat (30) to spool (25). Secure spring seat (30) to spool (25) with retaining ring (31).
13. Install spring (28) to casing (37).

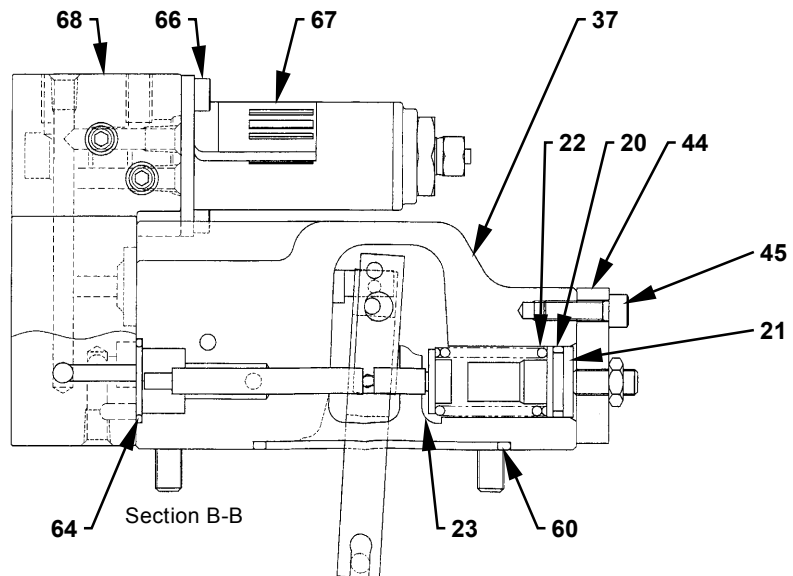
UPPERSTRUCTURE / Pump Device



W1JB-02-04-002













W1JB-02-04-005



W1JB-02-04-004

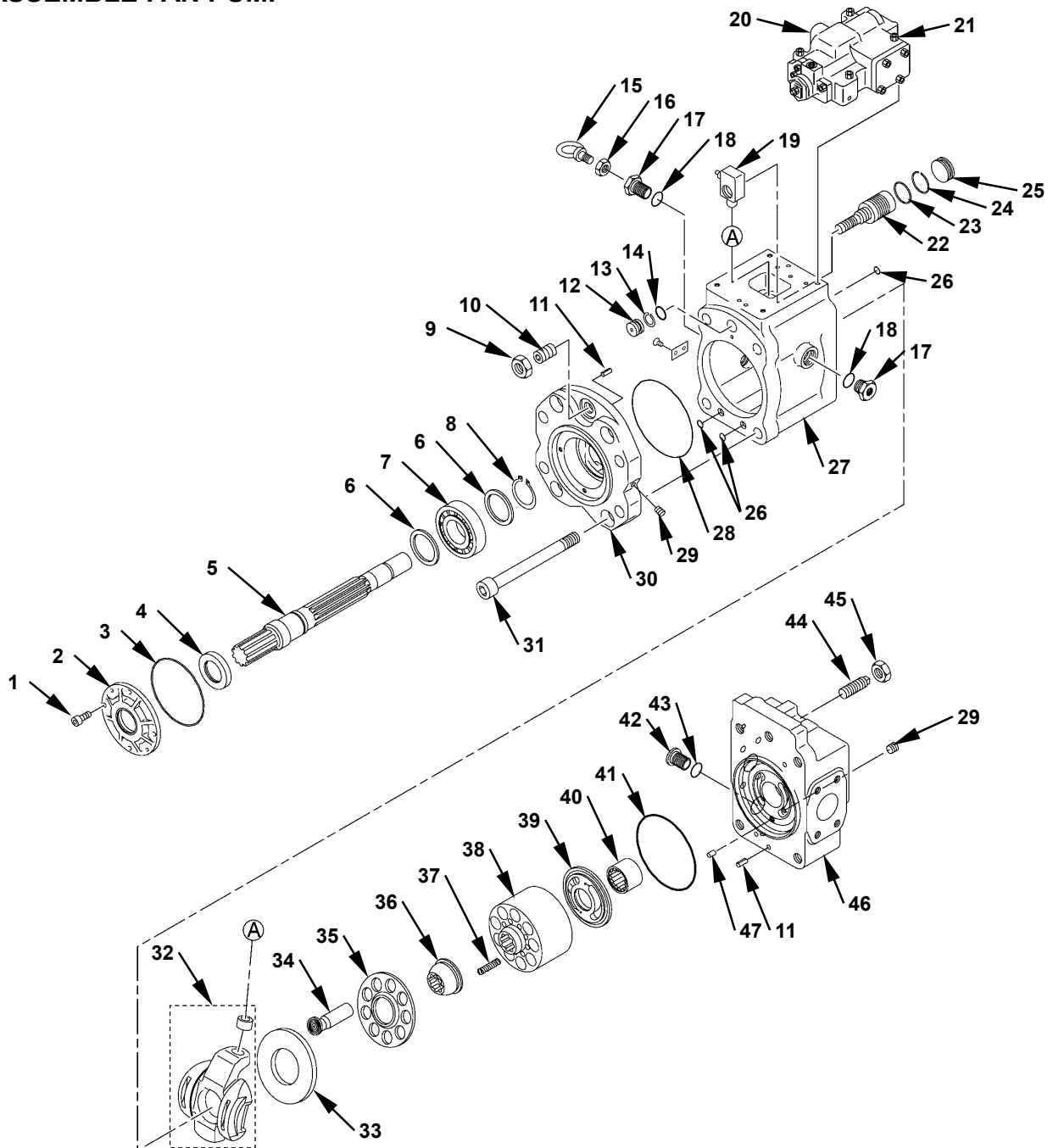
UPPERSTRUCTURE / Pump Device

IMPORTANT: Check the direction to install compensating piston (6) as illustrated.

14. Install O-ring (4) and compensating piston (6) to sleeve (5).
15. Install sleeve (5), O-ring (3), sleeve (2) and pin (1) to casing (37).
16. Install O-rings (62, 63, 64, 65) to casing (37).
17. Install cover (68) to casing (37) with socket bolts (69) (4 used).
 : 5 mm
 : 12 N·m (1.2 kgf·m, 8.9 lbf·ft)
18. Install O-rings (34) and (35) (3 used) to cover (33).
19. Install cover (33) to casing (37) with socket bolts (32) (4 used).
 : 5 mm
 : 12 N·m (1.2 kgf·m, 8.9 lbf·ft)
20. Install O-ring (20) to stopper (21).
21. Install spring seat (23), spring (22) and stopper (21) to casing (37).
22. Install O-ring (12) to stopper (11).
23. Install spring seat (8) and springs (9, 10) to casing (37).
24. Install stopper (11) and O-ring (43) to the cover (44) assembly. Install the cover (44) assembly to casing (37) with socket bolts (45) (4 used).
 : 5 mm
 : 12 N·m (1.2 kgf·m, 8.9 lbf·ft)
25. Install O-rings (60, 61) to casing (37).
26. Install the regulator to the pump with socket bolts (36, 38) (2 used for each).
 : 6 mm
 : 29 N·m (3 kgf·m, 21.4 lbf·ft)
27. Install solenoid valve (67) to cover (68) with socket bolts (66) (2 used).
 : 4 mm
 : 6.9 N·m (0.7 kgf·m, 5.1 lbf·ft)

UPPERSTRUCTURE / Pump Device

DISASSEMBLE FAN PUMP



W1JB-02-04-018


- | | | | |
|--------------------------|---------------------------|---------------------------|----------------------|
| 1 - Socket Bolt (4 Used) | 13 - Backup Ring | 25 - Stopper | 37 - Spring (9 Used) |
| 2 - Cover | 14 - O-Ring | 26 - O-Ring (9 Used) | 38 - Cylinder Block |
| 3 - O-Ring | 15 - Eyebolt | 27 - Pump Casing | 39 - Valve Plate |
| 4 - Oil Seal | 16 - Nut | 28 - O-Ring | 40 - Needle Bearing |
| 5 - Drive Shaft | 17 - Plug (2 Used) | 29 - Plug (7 Used) | 41 - O-Ring |
| 6 - Spacer (2 Used) | 18 - O-Ring (2 Used) | 30 - Support | 42 - Plug |
| 7 - Roller Bearing | 19 - Tilt Pin | 31 - Socket Bolt (4 Used) | 43 - O-Ring |
| 8 - Retaining Ring | 20 - Regulator | 32 - Swash Plate | 44 - Adjusting Screw |
| 9 - Nut | 21 - Socket Bolt (6 Used) | 33 - Shoe Plate | 45 - Nut |
| 10 - Adjusting Screw | 22 - Servo Piston | 34 - Plunger (9 Used) | 46 - Cover |
| 11 - Split Pin (2 Used) | 23 - O-Ring | 35 - Retainer | 47 - Pin |
| 12 - Stopper | 24 - Backup Ring | 36 - Spherical Bushing | |

UPPERSTRUCTURE / Pump Device


Disassemble Fan Pump

IMPORTANT: As the setting of flow rate changes, do not remove adjusting screws (10, 44) and nuts (9, 45) from support (30) and cover (46).

1. Remove plugs (17) (2 used) and O-rings (18) (2 used) from pump casing (27). Drain off hydraulic oil from the pump.

 : 27 mm


2. Remove socket bolts (21) (6 used) from regulator (20). Remove regulator (20) from pump casing (27).

 : 6 mm


3. Place pump casing (27) with the mounting surface for regulator (20) facing downward.

IMPORTANT: When removing cover (46), valve plate (39) may be removed together. Do not remove needle bearing (40) unless necessary. When removing needle bearing (40), replace with the new one.

4. Remove socket bolts (31) (4 used) from support (30). Remove cover (46), O-ring (41), (26) (4 used), spring pin (11), valve plate (39) and pin (47) from pump casing (27).

 : 14 mm

5. Remove cylinder block (38) from pump casing (27). Plungers (34) (9 used) and spherical bushing (36) and retainer (35) are removed with cylinder block (38) together.

 **NOTE:** Rotate cylinder block (38) clockwise and counterclockwise by hands and remove cylinder block (38) slowly.


6. Remove retainer (35) from the cylinder block (38) assembly. Plungers (34) (9 used) are removed with retainer (35) together.


7. Remove plungers (34) (9 used) from retainer (35).

8. Remove spherical bushing (36) from cylinder block (38). Remove springs (37) (9 used) from cylinder block (38).

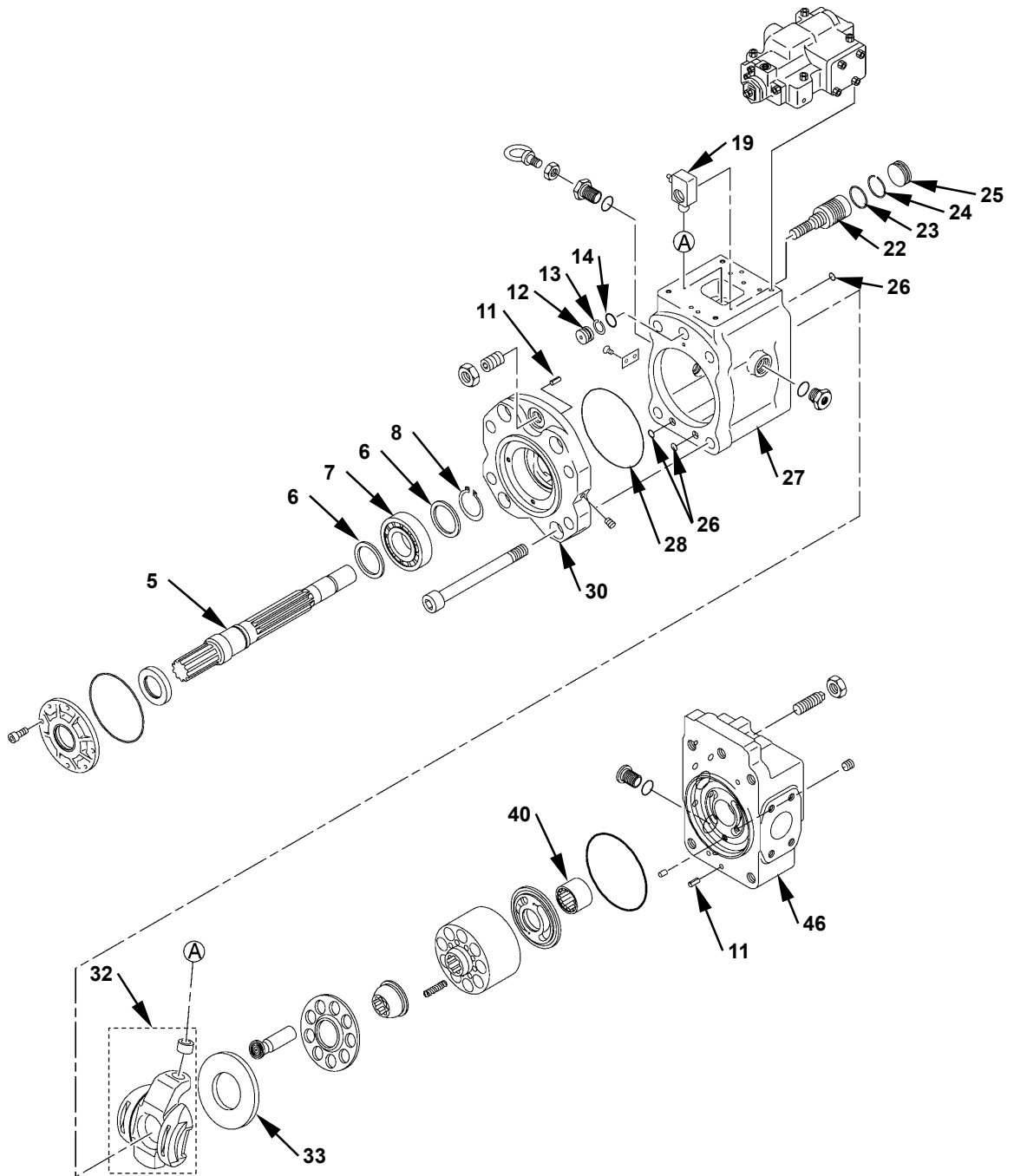
IMPORTANT: Do not remove oil seal (4) unless necessary. When removing oil seal (4), replace with the new one. Oil seal (4) is installed to cover (2). When removing cover (2), do not damage the lip part of oil seal (4).

9. Remove socket bolts (1) (4 used) from cover (2). Remove cover (2) and O-ring (3).

 : 5 mm

 **NOTE:** Insert the bolt into the hole (M8) on cover (2) for easy removal.

UPPERSTRUCTURE / Pump Device



W1JB-02-04-018

UPPERSTRUCTURE / Pump Device

10. Tap and remove support (30) from pump casing (27) by using a plastic hammer. At this time, remove O-rings (28), (26) (5 used) and spring pin (11).
11. Remove swash plate (32) and shoe plate (33) from pump casing (27).
12. Tap and remove drive shaft (5) from support (30) by using a plastic hammer.
13. Install the bolt (M5, Pitch: 0.8 mm) to stoppers (12, 25). Remove stoppers (12, 25) from pump casing (27).
14. Remove backup rings (13, 24) and O-rings (14, 23) from stoppers (12, 25).

IMPORTANT: LOCTITE has been applied onto the contacting part between servo piston (22) and tilt pin (19). Do not disassemble them.

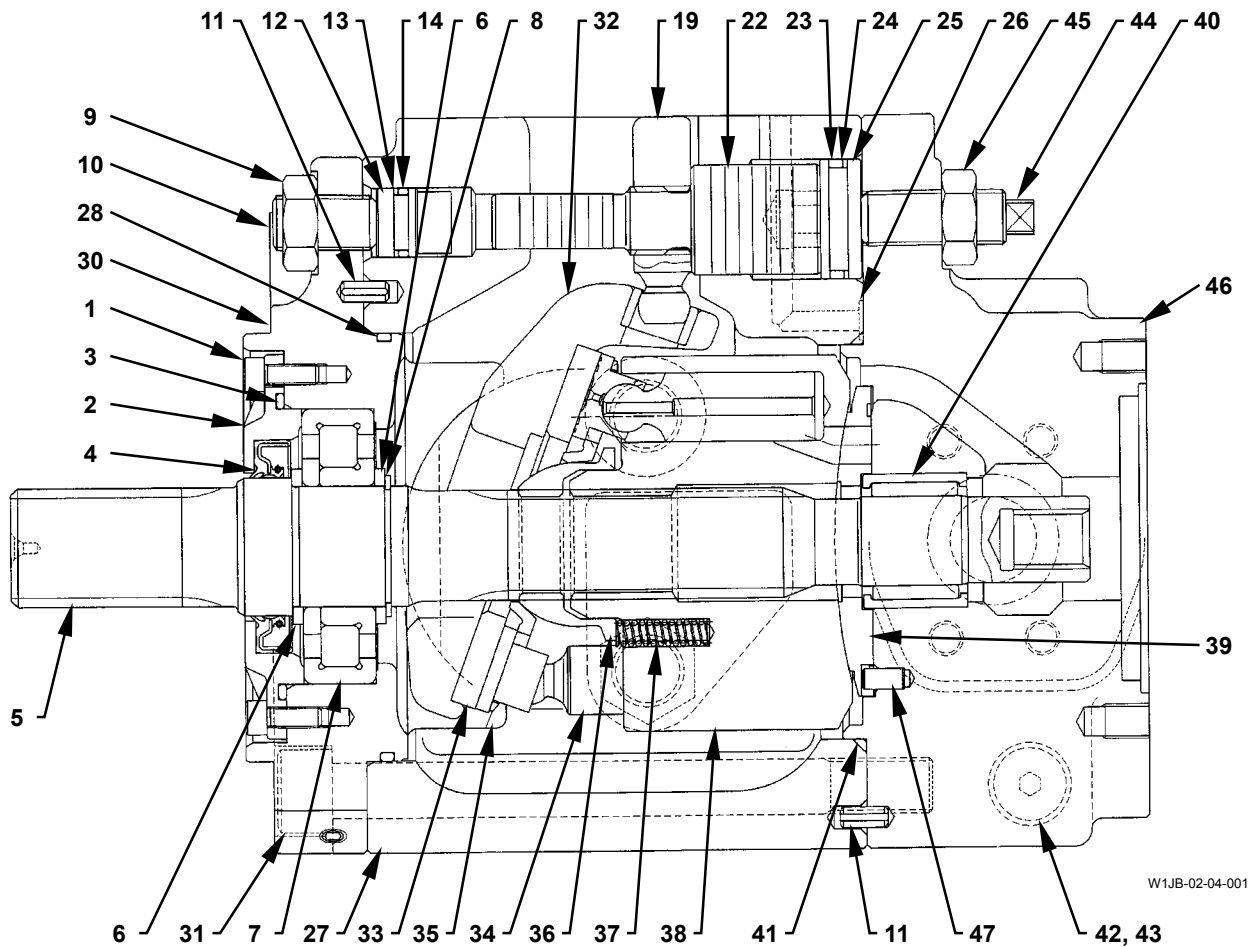
15. Heat tilt pin (19) by using a drier. Secure servo piston (22) by using a pair of pliers in order not to damage. Rotate and remove tilt pin (19). Remove servo piston (22) from pump casing (27).

IMPORTANT: Do not remove needle bearing (40) unless necessary.

16. Remove needle bearing (40) from cover (46).
17. Remove retaining ring (8) from drive shaft (5). Remove spacer (6), roller bearing (7) and spacer (6) from drive shaft (5).


UPPERSTRUCTURE / Pump Device

ASSEMBLE FAN PUMP



W1JB-02-04-001

- | | | | |
|--------------------------|----------------------------|---------------------------|----------------------|
| 1 - Socket Bolt (4 Used) | 13 - Backup Ring | 25 - Stopper | 37 - Spring (9 Used) |
| 2 - Cover | 14 - O-Ring | 26 - O-Ring (9 Used) | 38 - Cylinder Block |
| 3 - O-Ring | 15 - *Eyebolt | 27 - Pump Casing | 39 - Valve Plate |
| 4 - Oil Seal | 16 - *Nut | 28 - O-Ring | 40 - Needle Bearing |
| 5 - Drive Shaft | 17 - *Plug (2 Used) | 29 - *Plug (7 Used) | 41 - O-Ring |
| 6 - Spacer (2 Used) | 18 - *O-Ring (2 Used) | 30 - Support | 42 - Plug |
| 7 - Roller Bearing | 19 - Tilt Pin | 31 - Socket Bolt (4 Used) | 43 - O-Ring |
| 8 - Retaining Ring | 20 - *Regulator | 32 - Swash Plate | 44 - Adjusting Screw |
| 9 - Nut | 21 - *Socket Bolt (6 Used) | 33 - Shoe Plate | 45 - Nut |
| 10 - Adjusting Screw | 22 - Servo Piston | 34 - Plunger (9 Used) | 46 - Cover |
| 11 - Split Pin (2 Used) | 23 - O-Ring | 35 - Retainer | 47 - Pin |
| 12 - Stopper | 24 - Backup Ring | 36 - Spherical Bushing | |


 NOTE: As for the item with mark *, refer to W2-4-50.

UPPERSTRUCTURE / Pump Device



Assemble Fan Pump

IMPORTANT: Apply THREEBOND #1305N to the contacting part between servo piston (22) and tilt pin (19).

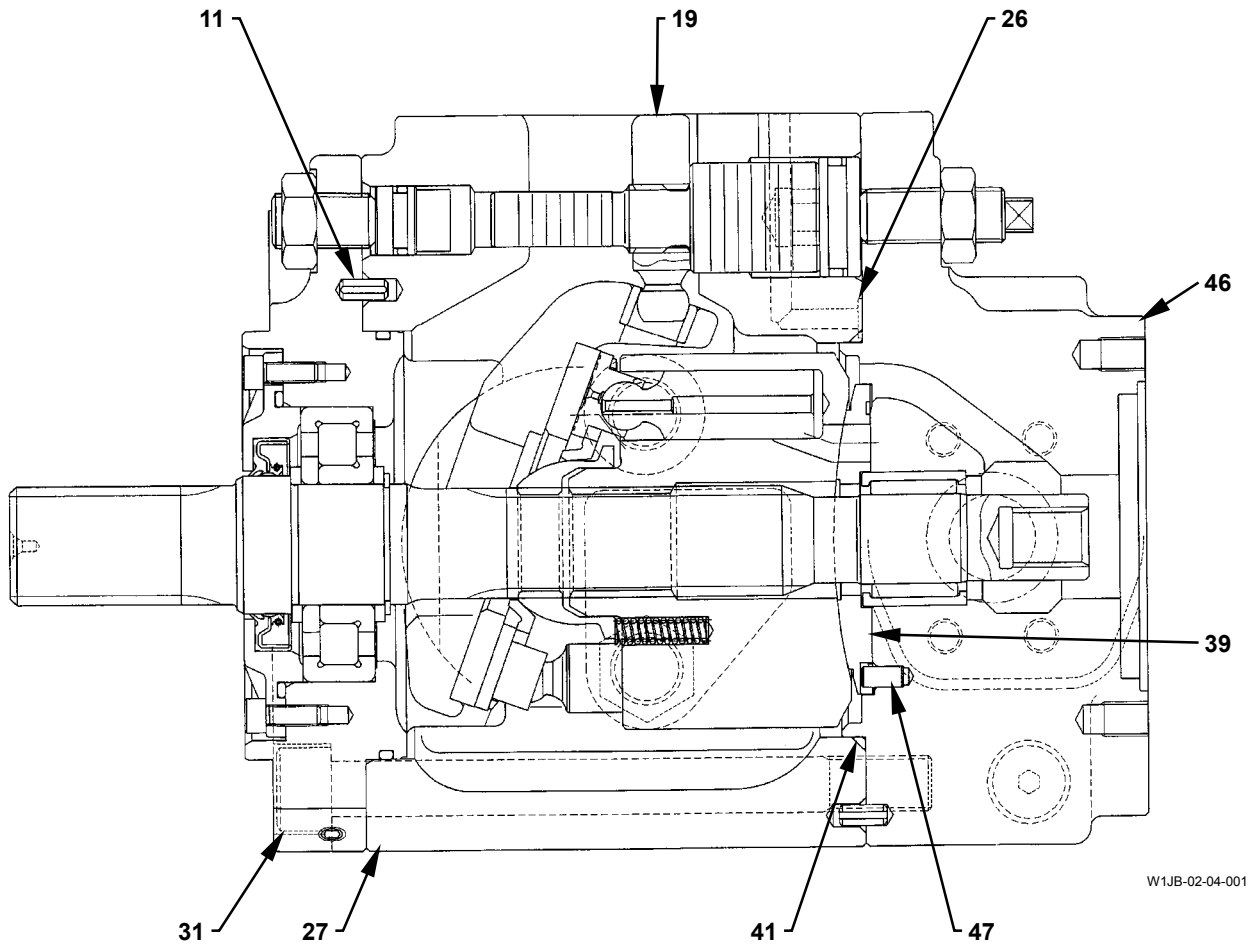
1. Install O-rings (14, 23) and backup rings (13, 24) to stoppers (12, 25).
2. Install tilt pin (19), servo piston (22) and the stoppers (12, 25) assembly to pump casing (27).
3. Install spacer (6), roller bearing (7), spacer (6) and retaining ring (8) to shaft (5).
4. Install O-rings (26) (2 used) to pump casing (27). Install spring pin (11) and O-ring (28) to support (30). Lightly tap and install support (30) to pump casing (27) by using a plastic hammer.
5. Place pump casing (27) with the mounting surface for regulator facing downward.
6. Align swash plate (32) to which shoe plate is installed with tilt pin (19). Install swash plate (32) to pump casing (27).

 **NOTE:** After installing swash plate (32), check if swash plate (32) moves by hand smoothly.

IMPORTANT: Apply lubricant to the outer surface of oil seal (4) and apply grease to the lip part.

7. Install oil seal (4) and O-ring (3) to cover (2).
8. Install drive shaft (5) to support (30). Install cover (2) to support (30) with socket bolts (1) (4 used).
 : 5 mm
 : 12 N·m (1.2 kgf·m, 8.9 lbf·ft)
9. Install springs (37) (9 used) and spherical bushing (36) to cylinder block (38).
10. Install plungers (34) (9 used) to retainer (35). Install the retainer (35) assembly to cylinder block (38).
11. Install the cylinder block (38) assembly to drive shaft (5).


UPPERSTRUCTURE / Pump Device




UPPERSTRUCTURE / Pump Device


**IMPORTANT: Apply grease to valve plate (39).
Check the direction of suction and
delivery in valve plate (39).**

12. Install O-rings (26) (8 used) to pump casing (27).
13. Install spring pin (11), pin (47) and O-ring (41) to cover (46). Install valve plate (39) to cover (46).


 **NOTE:** *Install valve plate (39) while aligning the pin hole on valve plate (39) with pin (47).*


14. Install cover (46) to the pump casing (27) assembly with socket bolts (31) (4 used).


 : 14 mm

 : 240 N·m (24.5 kgf·m, 177 lbf·ft)


15. Align the feedback lever in regulator (20) with tilt pin (19). Install regulator (20) to pump casing (27) with socket bolts (21) (6 used).


 : 6 mm

 : 29 N·m (3 kgf·m, 21.4 lbf·ft)

 **NOTE:** *As for the positions of regulator (20) and socket bolt (21), refer to W2-4-50.*

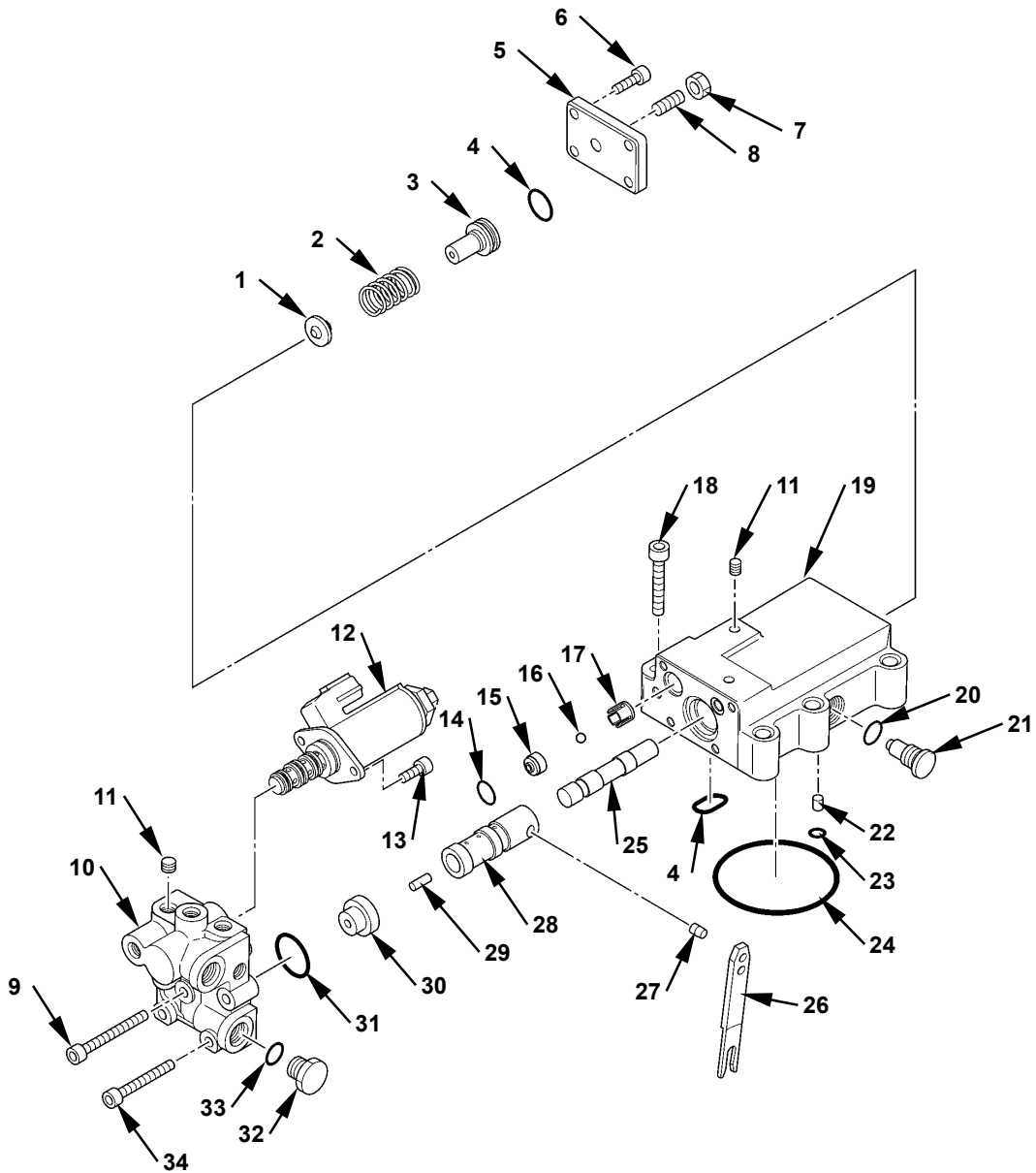
16. Install O-rings (18) (2 used) to plugs (17) (2 used). Install the plug (17) assemblies (2 used) to pump casing (27).

 : 27 mm

 : 110 N·m (11 kgf·m, 81 lbf·ft)

UPPERSTRUCTURE / Pump Device

DISASSEMBLE FAN REGULATOR







W1JB-02-04-016

- | | | | |
|--------------------------|---------------------------|---------------------|---------------------------|
| 1 - Spring Seat | 10 - Valve Casing | 19 - Casing | 27 - Pin |
| 2 - Spring | 11 - Plug (9 Used) | 20 - O-Ring | 28 - Sleeve |
| 3 - Stopper | 12 - Solenoid Valve | 21 - Plug | 29 - Pin |
| 4 - O-Ring (2 Used) | 13 - Socket Bolt (2 Used) | 22 - Pin | 30 - Sleeve |
| 5 - Cover | 14 - O-Ring (2 Used) | 23 - O-Ring | 31 - O-Ring |
| 6 - Socket Bolt (4 Used) | 15 - Seat (2 Used) | 24 - O-Ring | 32 - Plug |
| 7 - Lock Nut | 16 - Steel Ball (2 Used) | 25 - Spool | 33 - O-Ring |
| 8 - Screw | 17 - Stopper (2 Used) | 26 - Feedback Lever | 34 - Socket Bolt (4 Used) |
| 9 - Socket bolt | 18 - Socket Bolt (6 Used) | | |



UPPERSTRUCTURE / Pump Device


Disassemble Fan Regulator

1. Remove socket bolts (18) (6 used) from casing (19). Remove the casing (19) assembly from the pump casing.
 : 6 mm
2. Remove O-rings (4, 23, 24) and pin (22) from casing (19).
3. Remove socket bolts (13) (2 used) from solenoid valve (12). Remove solenoid valve (12) from valve casing (10).
 : 4 mm
4. Remove socket bolts (9), (34) (4 used) from valve casing (10). Remove valve casing (10) from casing (19).
 : 5 mm
5. Remove O-rings (14) (2 used), seats (15) (2 used), steel balls (16) (2 used) and stoppers (17) (2 used) from casing (19).
6. Remove O-ring (31), sleeve (30) and pin (29) from casing (19).

 **NOTE:** As for the positions of O-ring (14), steel ball (16) and stopper (17), refer to W2-4-60.

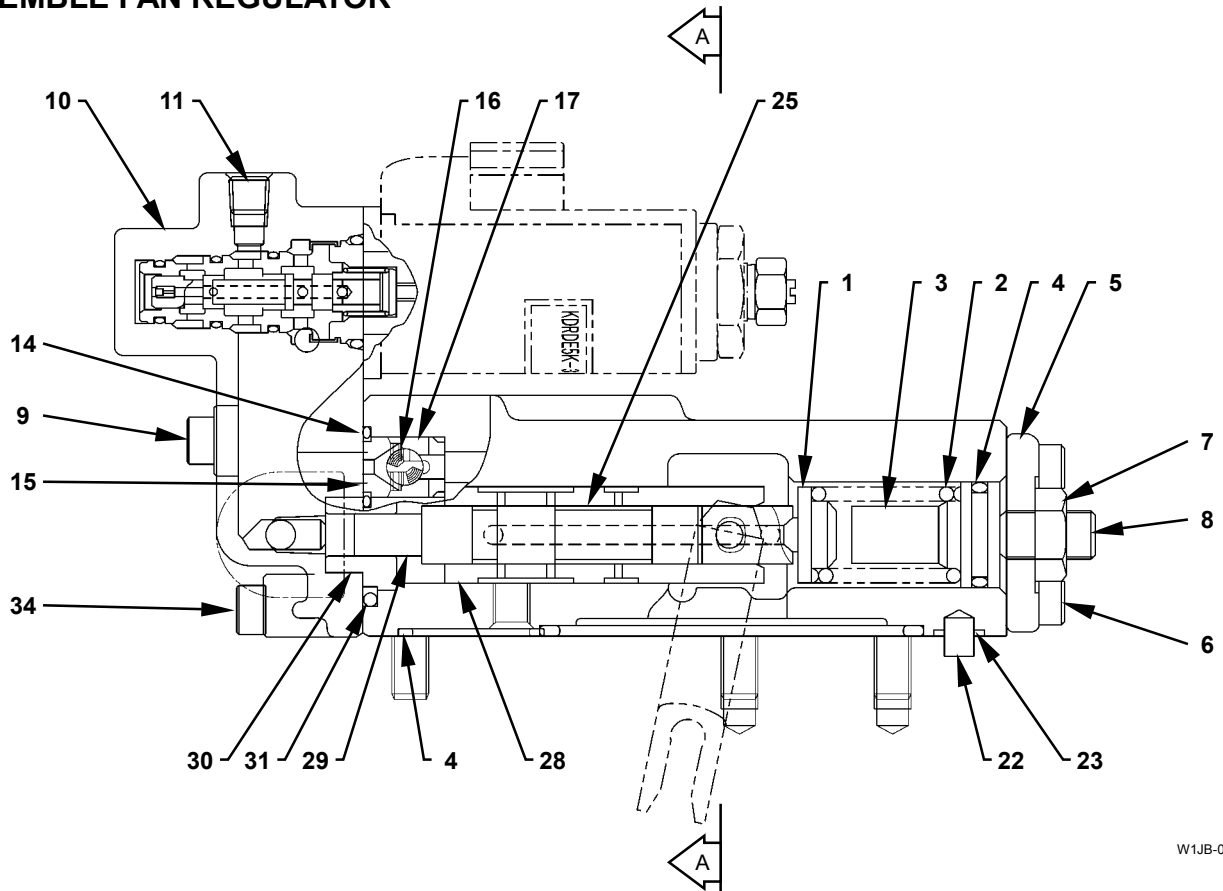
IMPORTANT: As the pump control changes, do not loosen screw (7) and nut (8).

7. Remove socket bolts (6) (4 used) from cover (5). Remove the cover (5) assembly from casing (19).
 : 5 mm
8. Install the bolt (M4, Pitch 0.7 mm) to stopper (3). Remove stopper (3), spring (2) and spring seat (1) from casing (19).
9. Remove plug (21) from casing (19). Remove feedback lever (26), pin (27), sleeve (28) and spool (25) from housing (19).
 : 6 mm

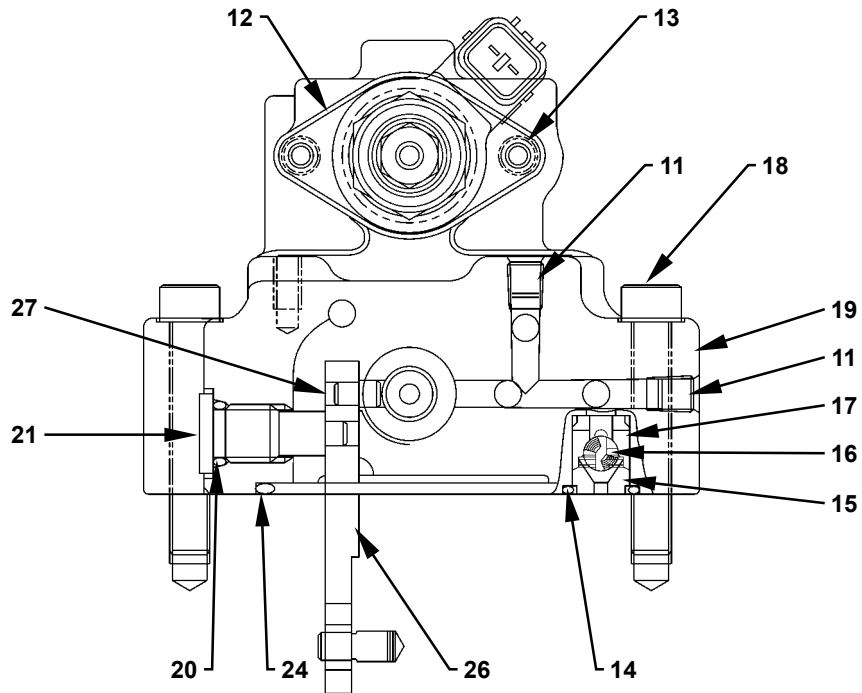
 **NOTE:** Feedback lever (26) and pin (27) are removed together.

UPPERSTRUCTURE / Pump Device

ASSEMBLE FAN REGULATOR



W1JB-02-04-028



W1JB-02-04-029

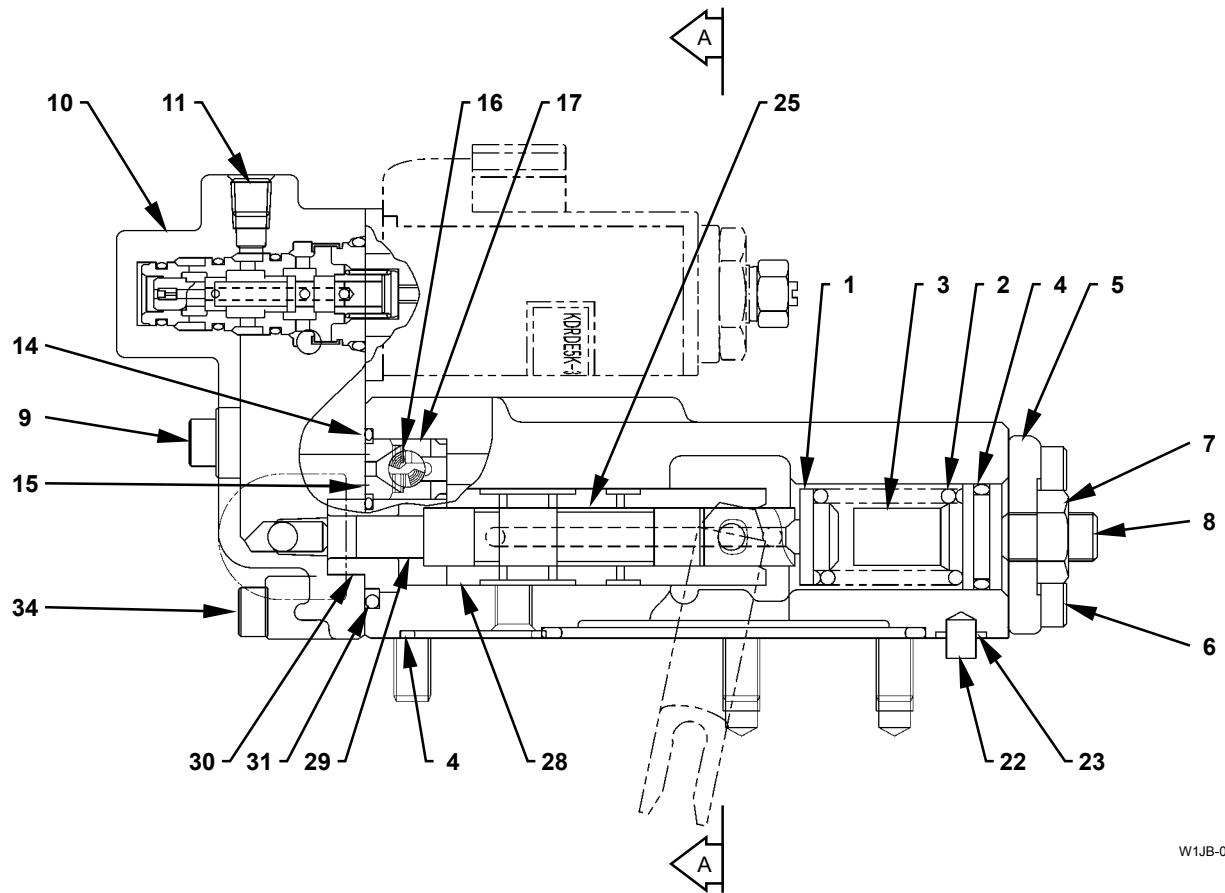
Section A-A

UPPERSTRUCTURE / Pump Device

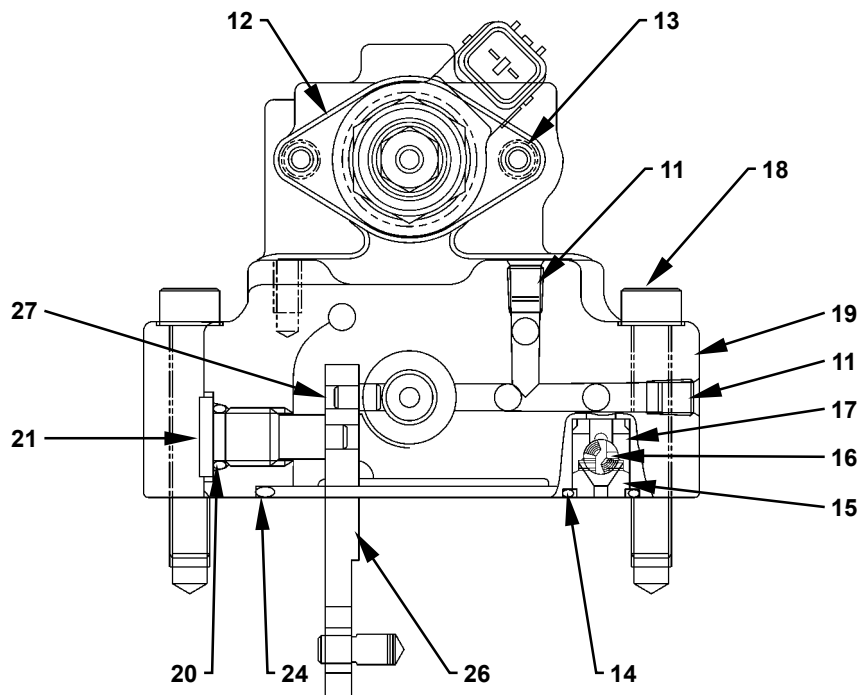
1 - Spring Seat	10 - Valve Casing	19 - Casing	27 - Pin
2 - Spring	11 - Plug (9 Used)	20 - O-Ring	28 - Sleeve
3 - Stopper	12 - Solenoid Valve	21 - Plug	29 - Pin
4 - O-Ring (2 Used)	13 - Socket Bolt (2 Used)	22 - Pin	30 - Sleeve
5 - Cover	14 - O-Ring (2 Used)	23 - O-Ring (5 Used)	31 - *O-Ring
6 - Socket Bolt (4 Used)	15 - Seat (2 Used)	24 - O-Ring	32 - *Plug
7 - Lock Nut	16 - Steel Ball (2 Used)	25 - Spool	33 - O-Ring
8 - Screw	17 - Stopper (2 Used)	26 - Feedback Lever	34 - Socket Bolt (4 Used)
9 - Socket bolt	18 - Socket Bolt (6 Used)		

 NOTE: As for the item with mark *, refer to W2-4-58.

UPPERSTRUCTURE / Pump Device



W1JB-02-04-028



Section A-A

W1JB-02-04-029

UPPERSTRUCTURE / Pump Device


Assemble Fan Regulator


1. Install stopper (17), steel ball (16), seat (15) and O-ring (19) to the mounting surface for pump casing in casing (19).


IMPORTANT: Check the direction to insert sleeve (28) and spool (25).

2. Install sleeve (28) and spool (25) to casing (19). Install feedback lever (26) to sleeve (28) with pin (27).

3. Install O-ring (10) to plug (21). Align with the pin hole on feedback lever (26) and install plug (21) to casing (19).


 : 6 mm

 : 36 N·m (3.7 kgf·m, 26.6 lbf·ft)

 **NOTE:** After installing plug (21), check if feedback lever (26) moves smoothly.

4. Install spring seat (1), spring (2), stopper (3) and O-ring (4) to the mounting surface for valve casing (10) in casing (19). Install cover (5) to casing (19) with socket bolts (6) (4 used).


 : 5 mm


 : 12 N·m (1.2 kgf·m, 8.9 lbf·ft)

5. Install piston (29), sleeve (30) and O-ring (31) to casing (19).


6. Install stopper (17), steel ball (16), seat (15) and O-ring (14) to casing (19).


7. Install solenoid valve (12) to valve casing (10) with socket bolts (13) (2 used).

 : 4 mm

 : 6.9 N·m (0.7 kgf·m, 5.1 lbf·ft)

8. Install valve casing (10) to casing (19) with socket bolts (9) and (34) (4 used).

 : 5 mm

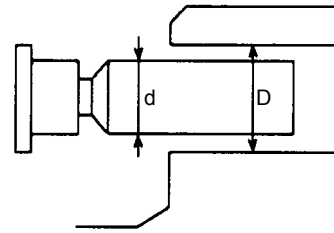
 : 12 N·m (1.2 kgf·m, 8.9 lbf·ft)

UPPERSTRUCTURE / Pump Device

MAINTENANCE STANDARD

1. Clearance between plungers (32, 34) outer diameter (d) and cylinder blocks (36, 38) bore diameter (D).

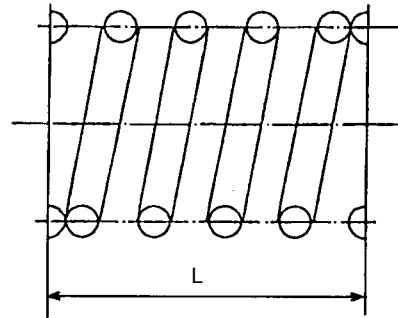
D-d		Unit: mm (in)
Standard	Allowable Limit	
0.047 (0.002)	0.094 (0.004)	



W117-02-02-009

2. Free length (L) of springs (35, 37)

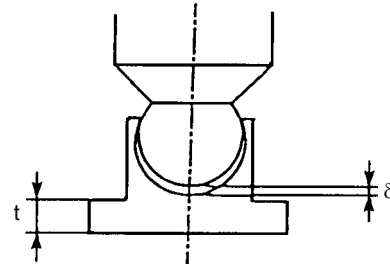
L		Unit: mm (in)
Standard	Allowable Limit	
49.5 (1.949)	48.0 (1.890)	



W117-02-02-010

3. Clearance (δ) between plungers (32, 34) and shoe bottom and shoe thickness (t)

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

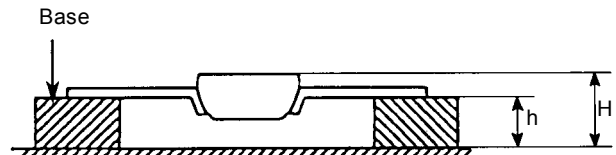


W117-02-02-011

t		Unit: mm (in)
Standard	Allowable Limit	
6.5 (0.256)	6.3 (0.248)	

4. The difference between the surface of retainers (33, 35) to the top of spherical bushings (34, 36)

H-h		Unit: mm (in)
Standard	Allowable Limit	
33.0 (1.299)	32.0 (1.26)	



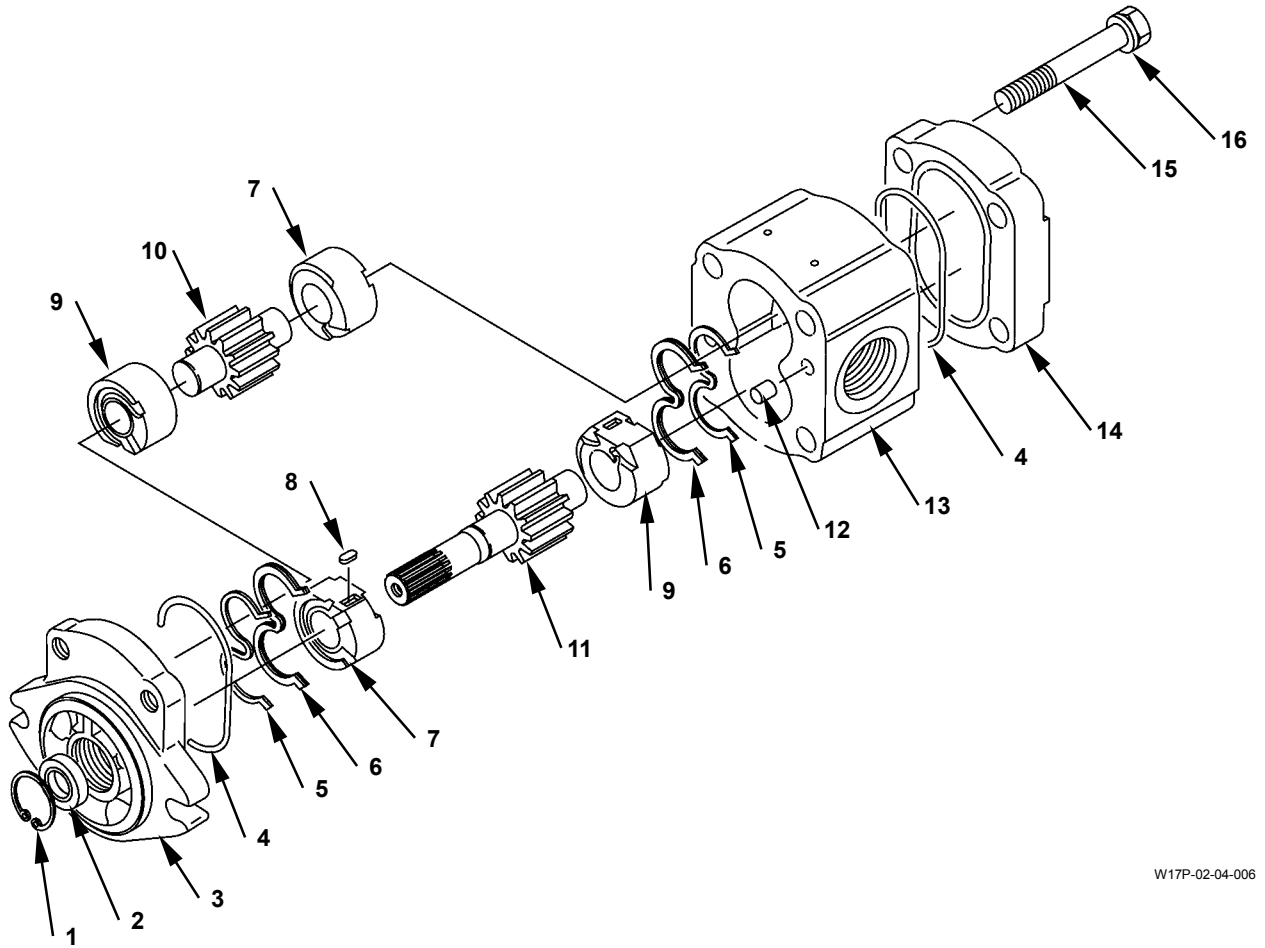
W117-02-02-012

UPPERSTRUCTURE / Pump Device

(Blank)


UPPERSTRUCTURE / Pump Device

STRUCTURE OF PILOT PUMP



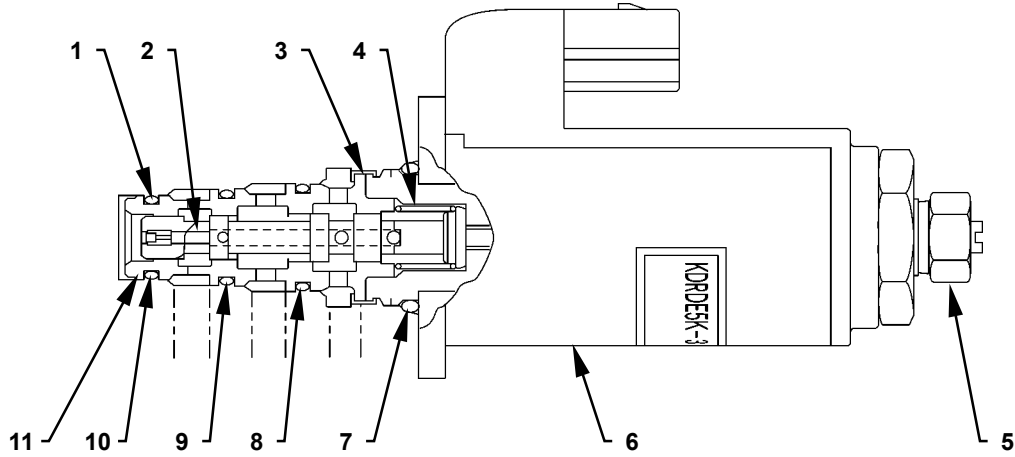
W17P-02-04-006

UPPERSTRUCTURE / Pump Device

Item	Part Name	Q'ty	Wrench Size (mm)	Tightening Torque			Remark
				N·m	(kgf·m)	(lbf·ft)	
1	Retaining Ring	1					
2	Oil Seal	1					Apply grease onto the lip when installing
3	Flange	1					
4	O-Ring	2					Apply grease onto the lip when installing
5	Backup Ring	2					Apply grease onto the lip when installing
6	Seal	2					Apply grease onto the lip when installing
7	Bushing	2					
8	Key	2					
9	Bushing	2					Apply grease onto the lip when installing
10	Gear	1					
11	Gear	1					
12	Knock Pin	2					Apply grease onto the lip when installing
13	Housing	1					
14	Cover	1					
15	Bolt	4	 : 17	39 to 44	(4.0 to 4.5)	(29 to 32.5)	
16	Washer	4					

UPPERSTRUCTURE / Pump Device

STRUCTURE OF SOLENOID VALVE



W1JB-02-04-019

Item	Part Name	Q'ty	Wrench Size (mm)	Tightening Torque			Remark
				N·m	(kgf·m)	(lbf·ft)	
1	Orifice	1	: 1.5	0.6±0.1	(0.06±0.01)	(0.44±0.07)	
2	Spool	1					
3	Retaining Ring	1					
4	Spring	1					
5	Nut	1	: 10	7.4±0.5	(0.76±0.05)	(5.46±0.37)	
6	Solenoid	1					
7	O-Ring	1					1B P20
8	O-Ring	1					1B
9	O-Ring	1					1B
10	O-Ring	1					1B
11	Sleeve	1					


UPPERSTRUCTURE / Control Valve

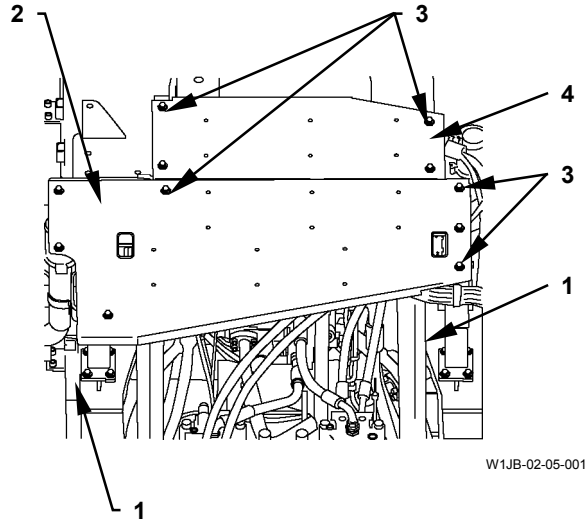
REMOVE AND INSTALL CONTROL VALVE

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) (11 used). Remove covers (2, 4) from main frame (1).


 : 19 mm

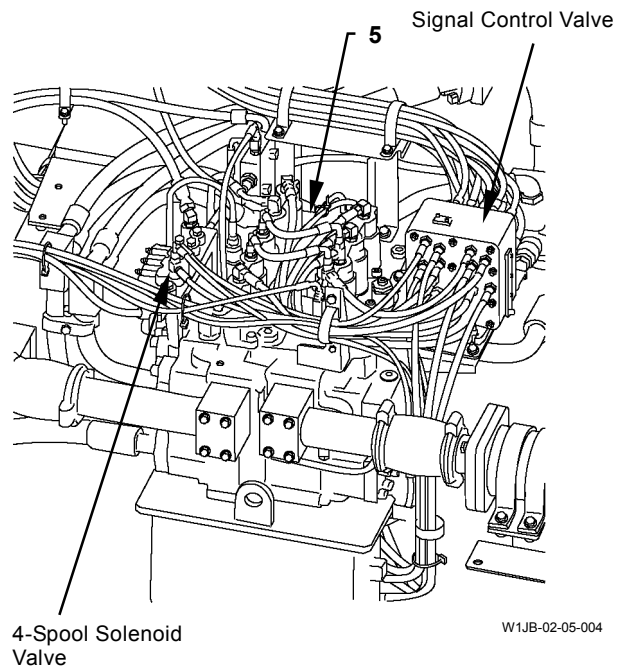


W1JB-02-05-001

2. Remove the signal control valve. (Refer to "Remove and Install Signal Control Valve" on page W2-10-1.)
3. Remove the 4-spool solenoid valve. (Refer to "Remove and Install 4-Spool Solenoid Valve" on page W2-9-1.)
4. Remove all the hoses and pipes from control valve (5). Attach an identification tag onto the removed hoses for assembling. Cap the open ends.

 : 17 mm, 19 mm, 41 mm

 : 12 mm



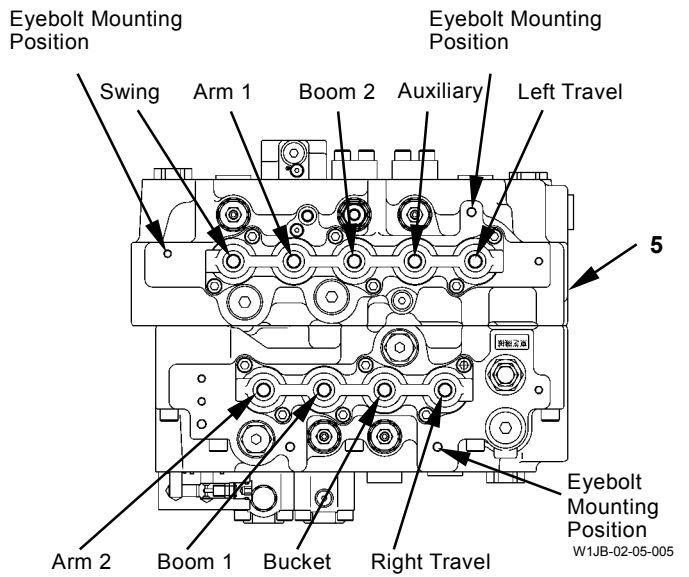
W1JB-02-05-004

UPPERSTRUCTURE / Control Valve



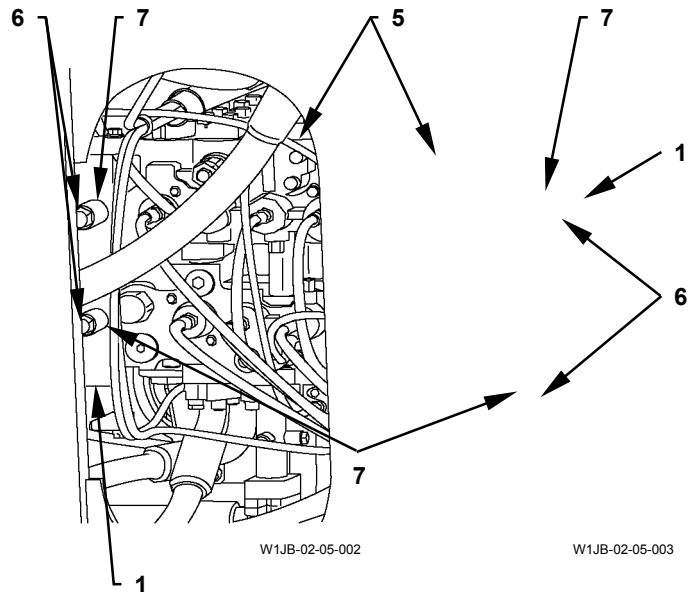
CAUTION: Control valve (5) weight: 400 kg (890 lb)

5. Install eyebolts (M12, Pitch 1.75 mm) (3 used) to control valve (5). Attach a nylon sling to eyebolt and hold control valve (5).



6. Remove bolts (6) (4 used) and spacers (7) (4 used). Remove control valve (5) from main frame (1).

: 30 mm

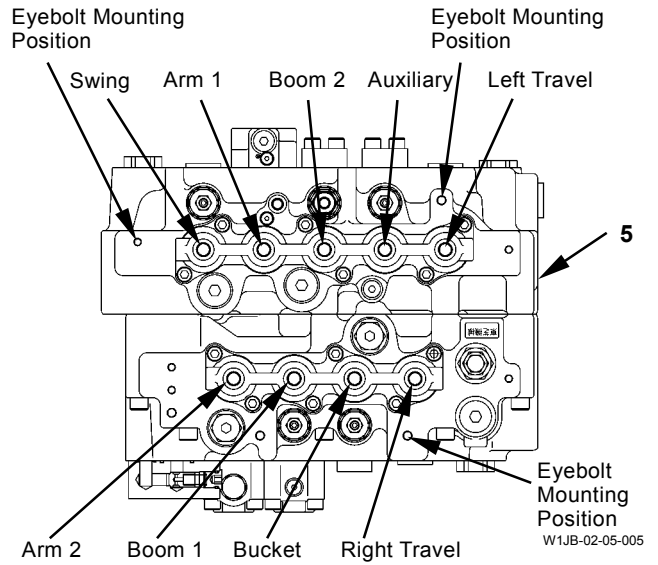


UPPERSTRUCTURE / Control Valve


Installation


CAUTION: Control valve (5) weight: 400 kg (890 lb)

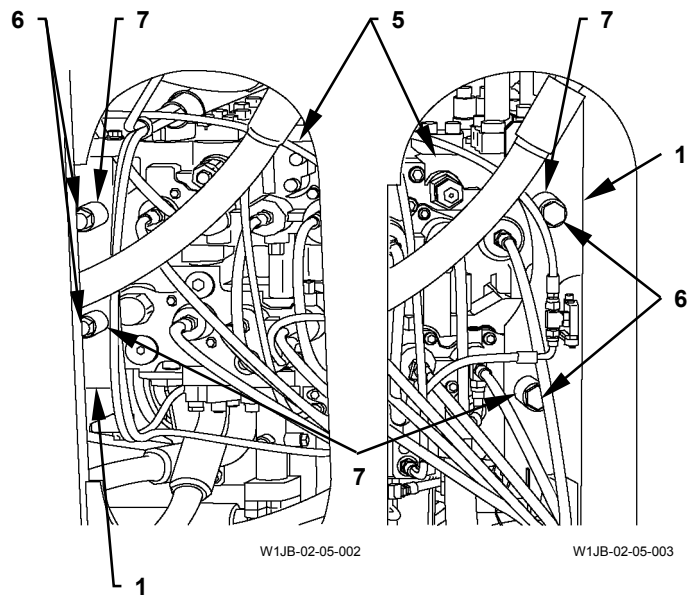
1. Install eyebolts (M12, Pitch 1.75 mm) (3 used) to control valve (5). Attach a nylon sling to eyebolt and hold control valve (5).



2. Hoist control valve (5) and align control valve (5) with the mounting hole on main frame (1). Install control valve (5) to main frame (1) with spacers (7) (4 used) and bolts (6) (4 used).

 : 30 mm

 : 400 N·m (41 kgf·m, 295 lbf·ft)





UPPERSTRUCTURE / Control Valve

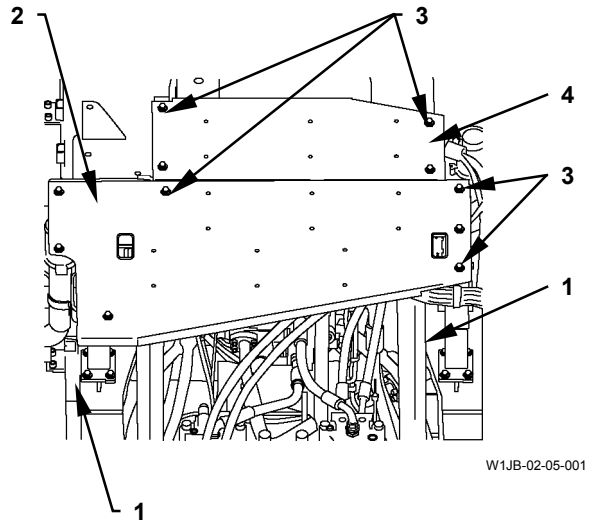
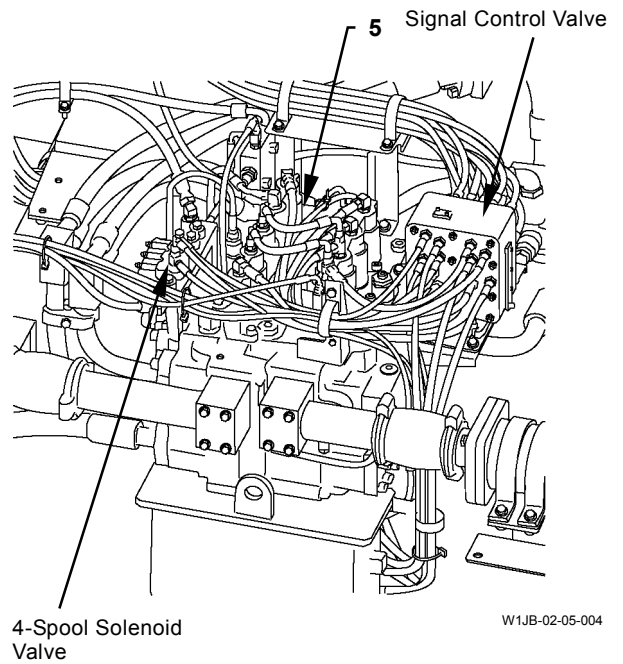
3. Install all the hoses and pipes to control valve (5).

-  : 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)
-  : 19 mm
-  : 90 N·m (9 kgf·m, 66 lbf·ft)
-  : 41 mm
-  : 205 N·m (21 kgf·m, 155 lbf·ft)
-  : 12 mm
-  : 180 N·m (18.5 kgf·m, 133 lbf·ft)

4. Install covers (2, 4) to main frame (1) with bolts (3) (11 used).

-  : 19 mm
-  : 90 N·m (9 kgf·m, 66 lbf·ft)

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

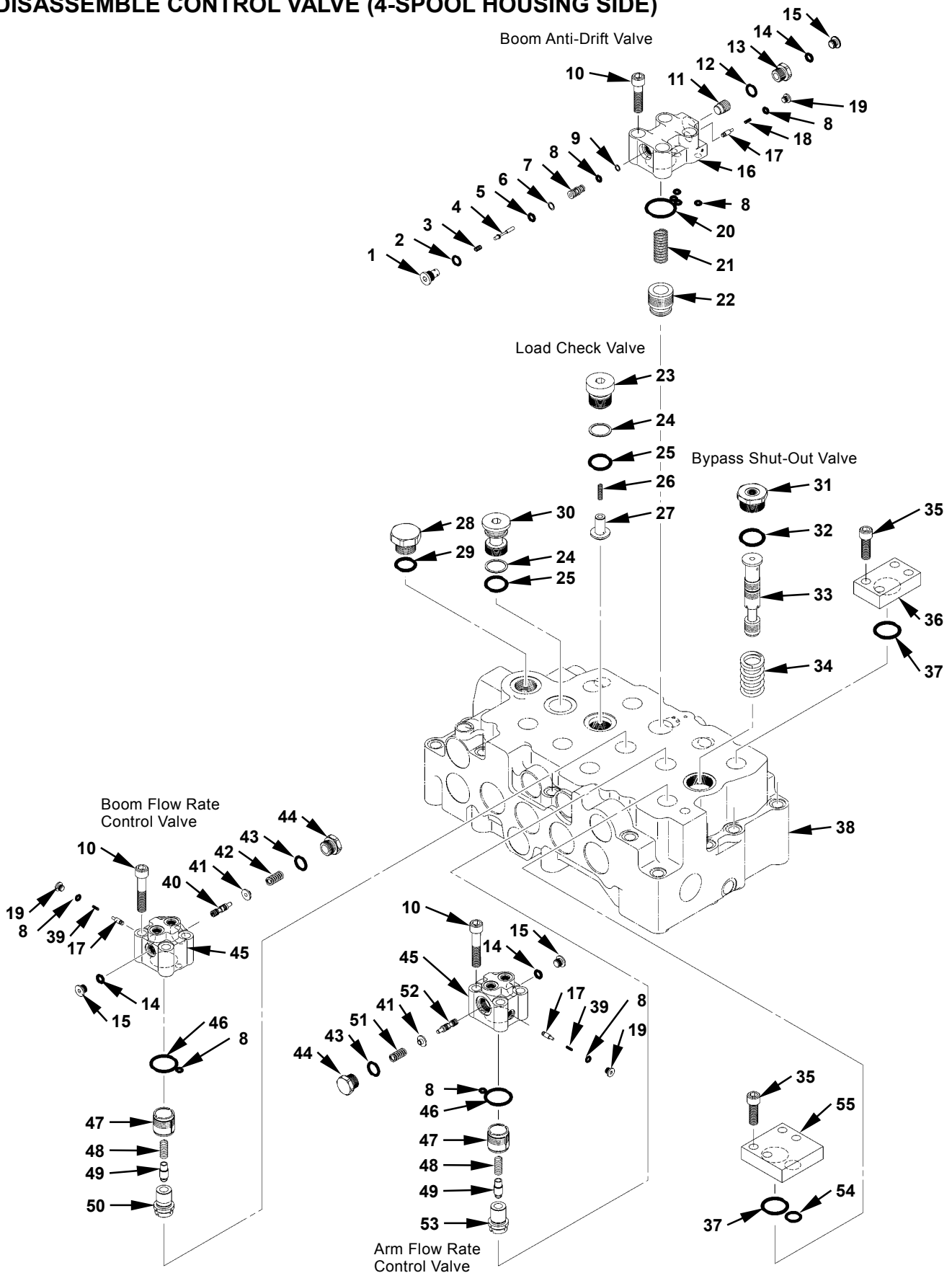


UPPERSTRUCTURE / Control Valve

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UPPERSTRUCTURE / Control Valve

DISASSEMBLE CONTROL VALVE (4-SPOOL HOUSING SIDE)

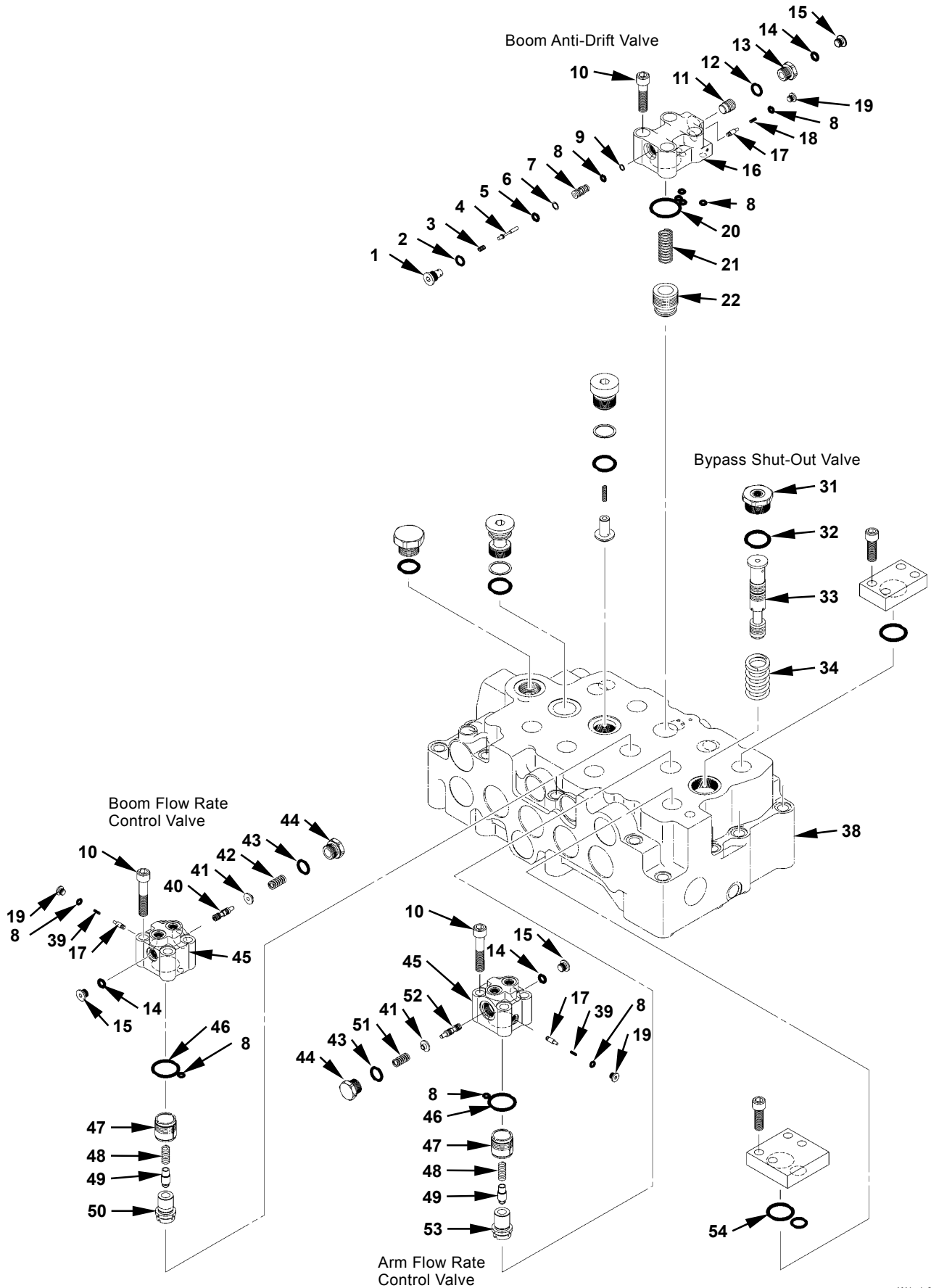


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UPPERSTRUCTURE / Control Valve

1 - Cap	15 - Cap (3 Used)	29 - O-Ring	43 - O-Ring (2 Used)
2 - O-Ring	16 - Cover	30 - Cap	44 - Cap (2 Used)
3 - Spring	17 - Check Valve (3 Used)	31 - Cap	45 - Cover (2 Used)
4 - Poppet	18 - Spring	32 - O-Ring	46 - O-Ring (2 Used)
5 - O-Ring	19 - Cap (3 Used)	33 - Spool	47 - Piston (2 Used)
6 - Backup Ring	20 - O-Ring	34 - Spring	48 - Spring (2 Used)
7 - Sleeve	21 - Spring	35 - Socket Bolt (8 Used)	49 - Check Valve (2 Used)
8 - O-Ring (10 Used)	22 - Poppet	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	52 - Spool
11 - Piston	25 - O-Ring (2 Used)	39 - Spring (2 Used)	53 - Poppet
12 - O-Ring	26 - Spring	40 - Spool	54 - O-Ring
13 - Cap	27 - Check Valve	41 - Guide (2 Used)	55 - Flange
14 - O-Ring (3 Used)	28 - Cap	42 - Spring	













UPPERSTRUCTURE / Control Valve



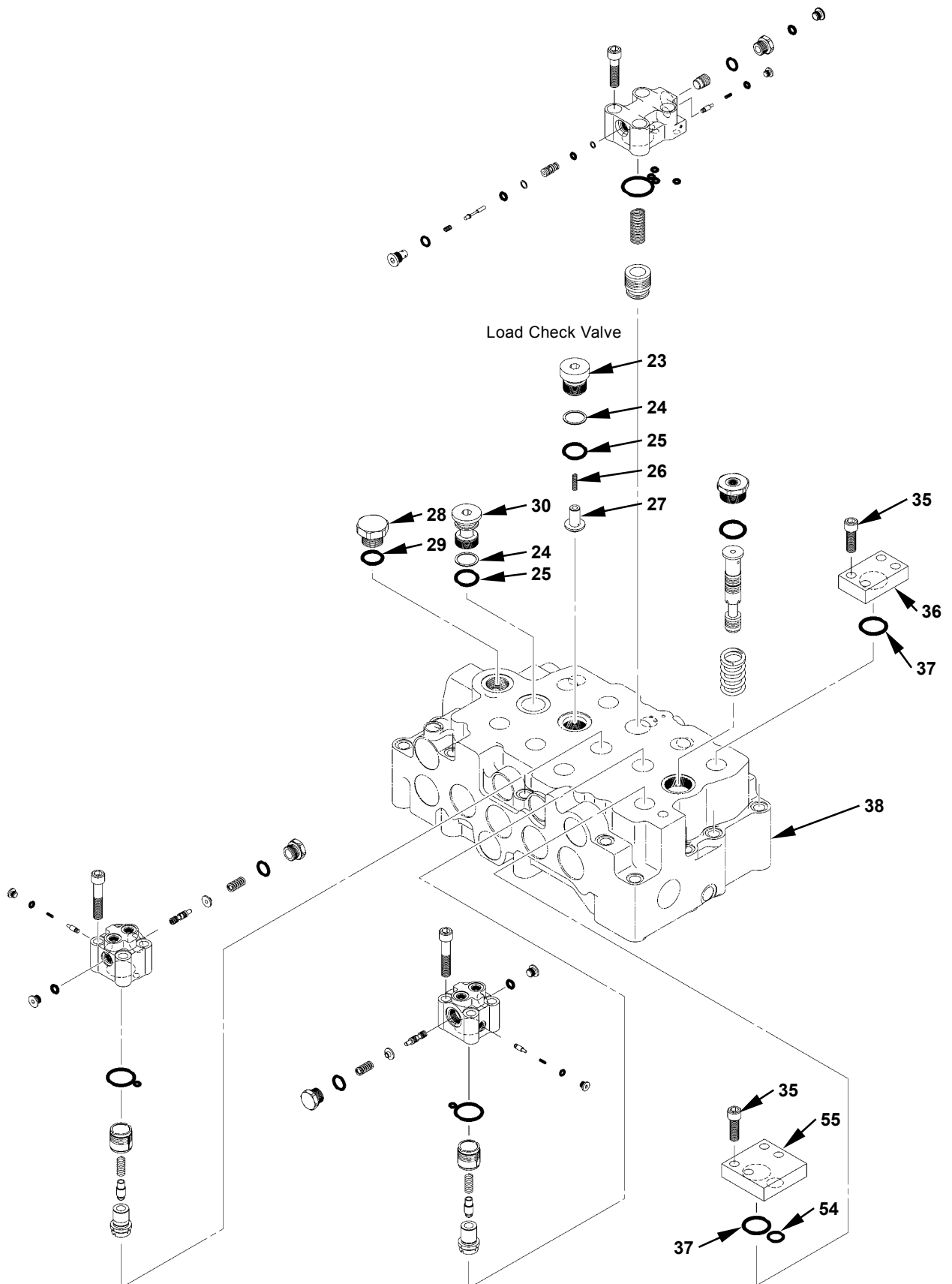
W1J1-02-05-051

UPPERSTRUCTURE / Control Valve

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
3. 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


UPPERSTRUCTURE / Control Valve



UPPERSTRUCTURE / Control Valve

- Disassemble Load Check Valve

17. Remove cap (23), spring (26) and check valve (27) from housing (38).

 : 14 mm

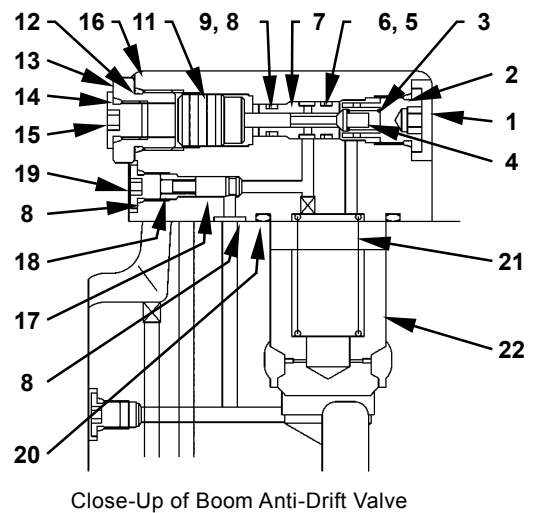
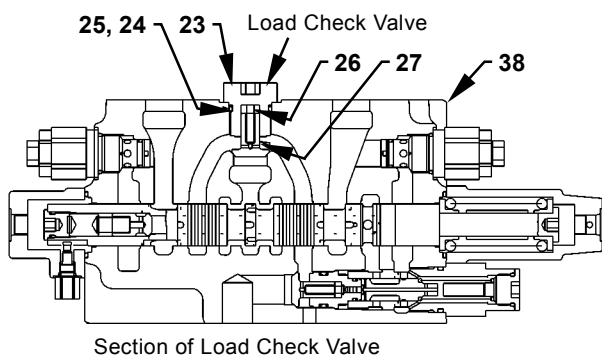
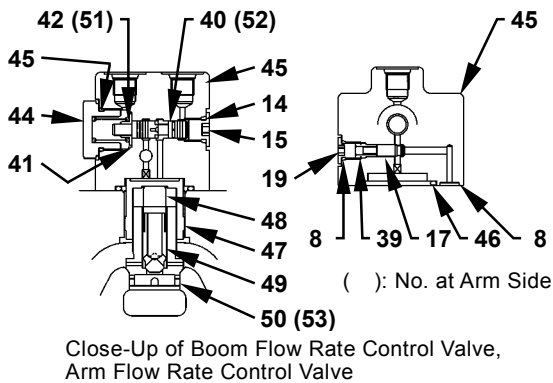
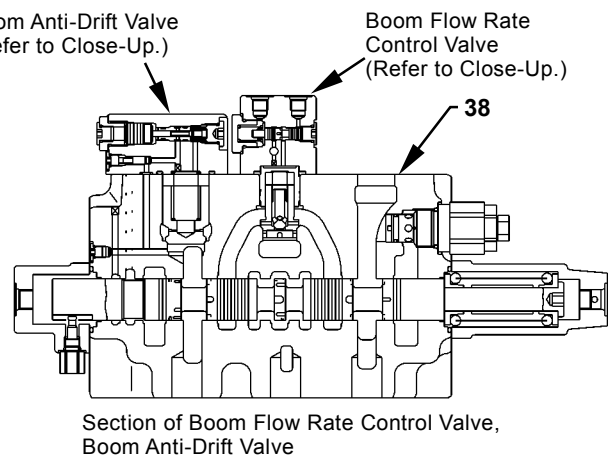
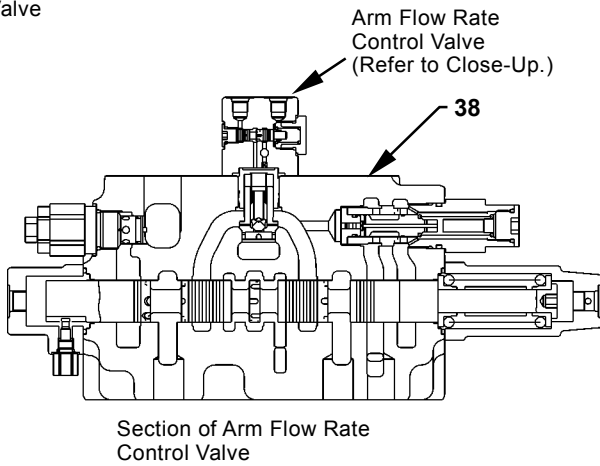
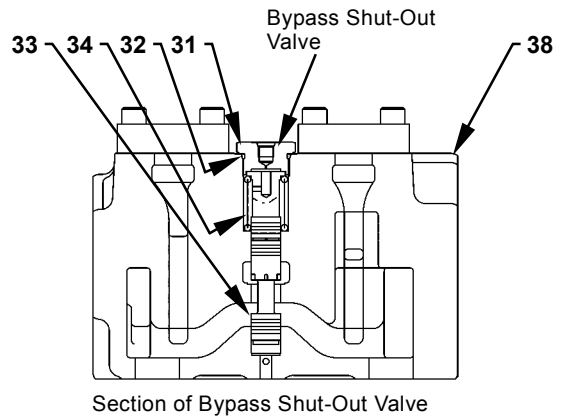
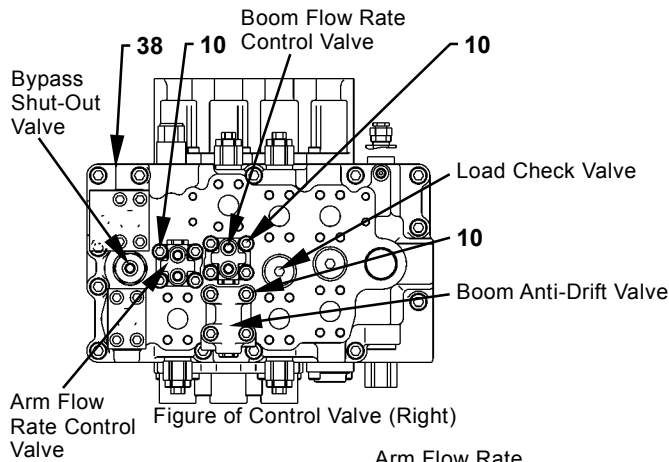
18. When replacing O-ring (25), remove cap (30) from housing (38).

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).

UPPERSTRUCTURE / Control Valve

ASSEMBLE CONTROL VALVE (4-SPOOL HOUSING SIDE)

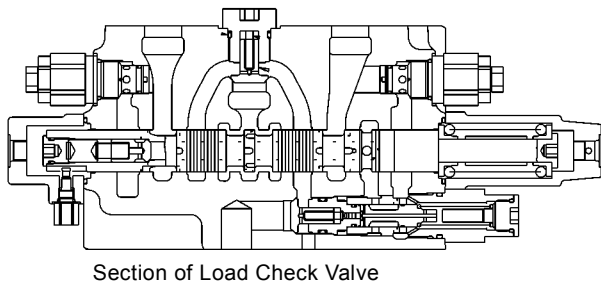
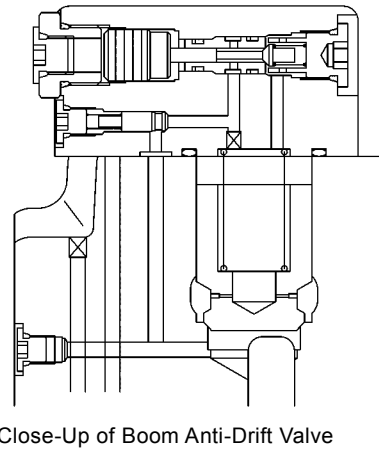
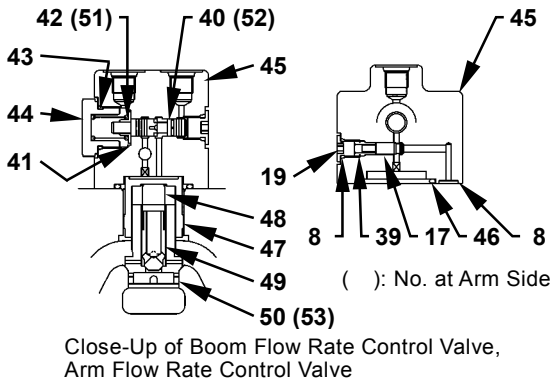
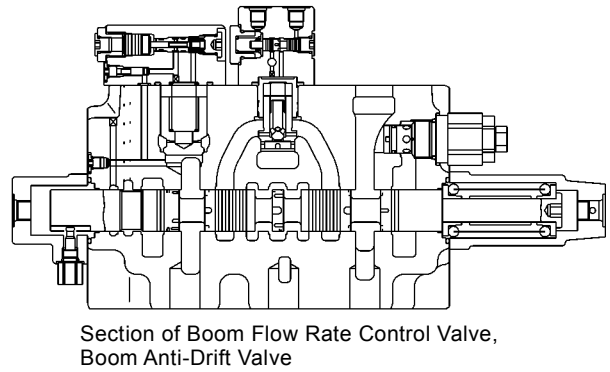
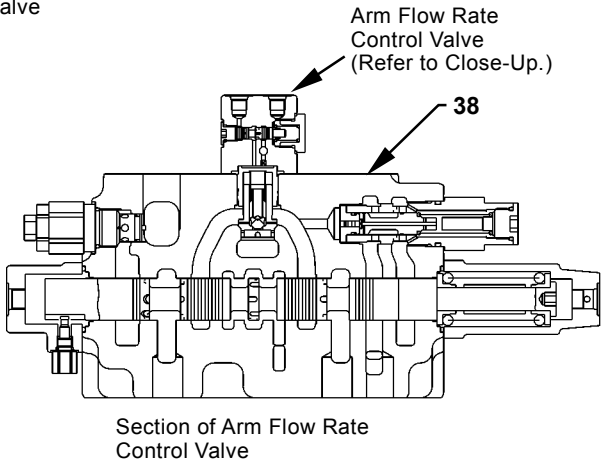
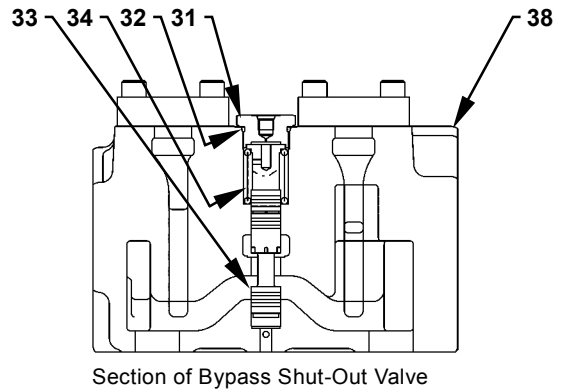
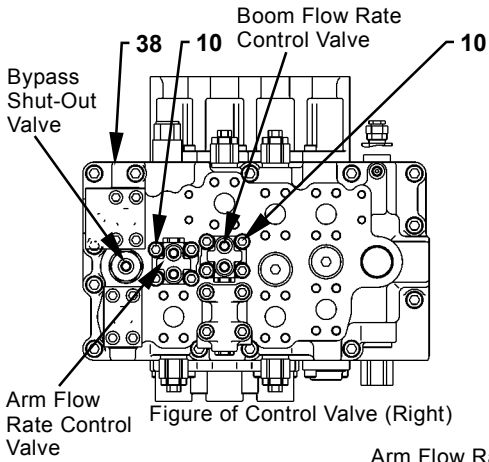


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UPPERSTRUCTURE / Control Valve

1 - Cap	15 - Cap (3 Used)	29 - O-Ring	43 - O-Ring (2 Used)
2 - O-Ring	16 - Cover	30 - Cap	44 - Cap (2 Used)
3 - Spring	17 - Check Valve (3 Used)	31 - Cap	45 - Cover (2 Used)
4 - Poppet	18 - Spring	32 - O-Ring	46 - O-Ring (2 Used)
5 - O-Ring	19 - Cap (3 Used)	33 - Spool	47 - Piston (2 Used)
6 - Backup Ring	20 - O-Ring	34 - Spring	48 - Spring (2 Used)
7 - Sleeve	21 - Spring	35 - Socket Bolt (8 Used)	49 - Check Valve (2 Used)
8 - O-Ring (10 Used)	22 - Poppet	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	52 - Spool
11 - Piston	25 - O-Ring (2 Used)	39 - Spring (2 Used)	53 - Poppet
12 - O-Ring	26 - Spring	40 - Spool	54 - O-Ring
13 - Cap	27 - Check Valve	41 - Guide (2 Used)	55 - Flange
14 - O-Ring (3 Used)	28 - Cap	42 - Spring	

UPPERSTRUCTURE / Control Valve





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UPPERSTRUCTURE / Control Valve

Assemble Control Valve (4-Spool 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)

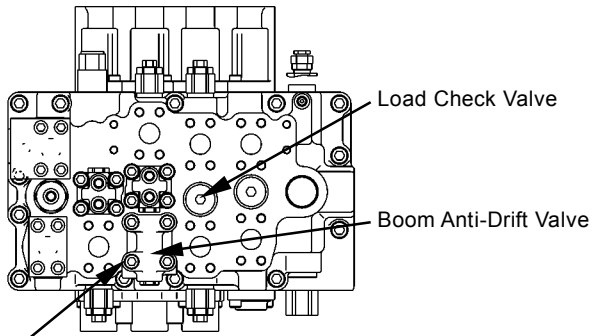
- Assemble Arm Flow Rate Control Valve

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)

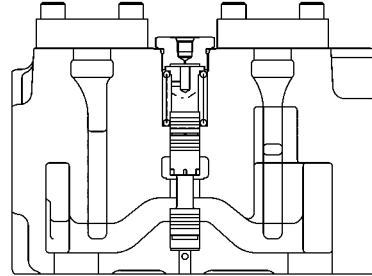
- Assemble Boom Flow Rate Control Valve

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)

UPPERSTRUCTURE / Control Valve

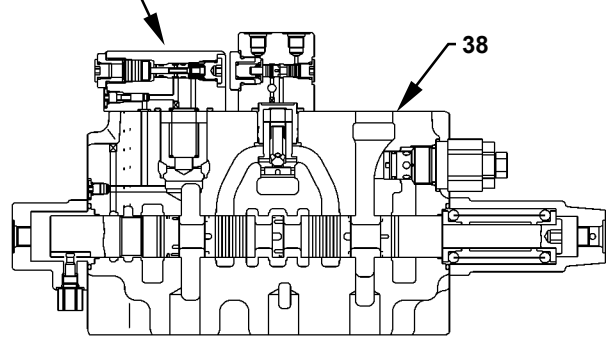


10 Figure of Control Valve (Right)

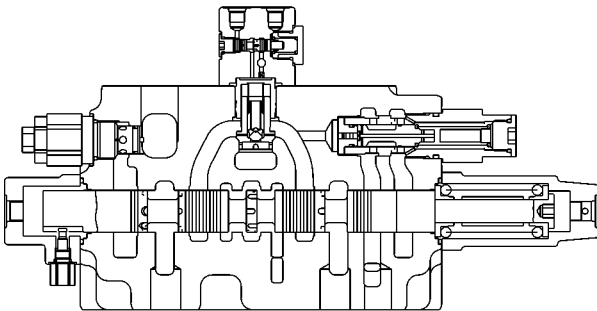


Section of Bypass Shut-Out Valve

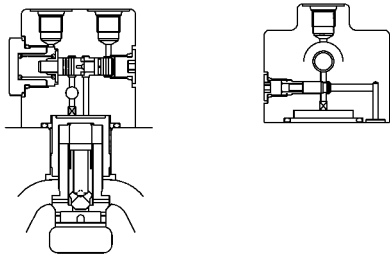
Boom Anti-Drift Valve
(Refer to Close-Up.)



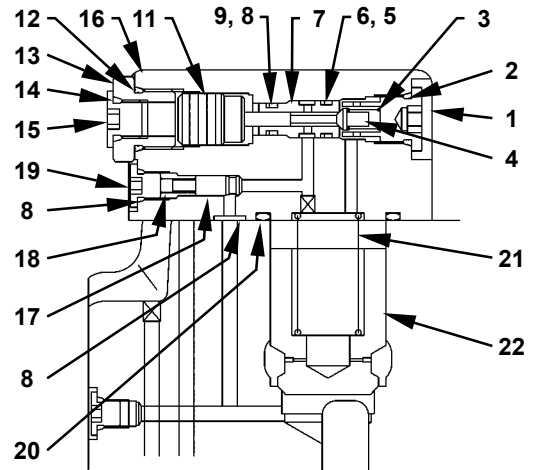
Section of Boom Flow Rate Control Valve



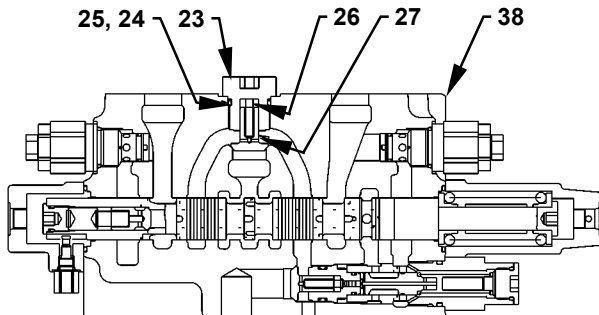
Section of Arm Flow Rate Control Valve



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



Close-Up of Boom Anti-Drift Valve



Section of Load Check Valve

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UPPERSTRUCTURE / Control Valve


- 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

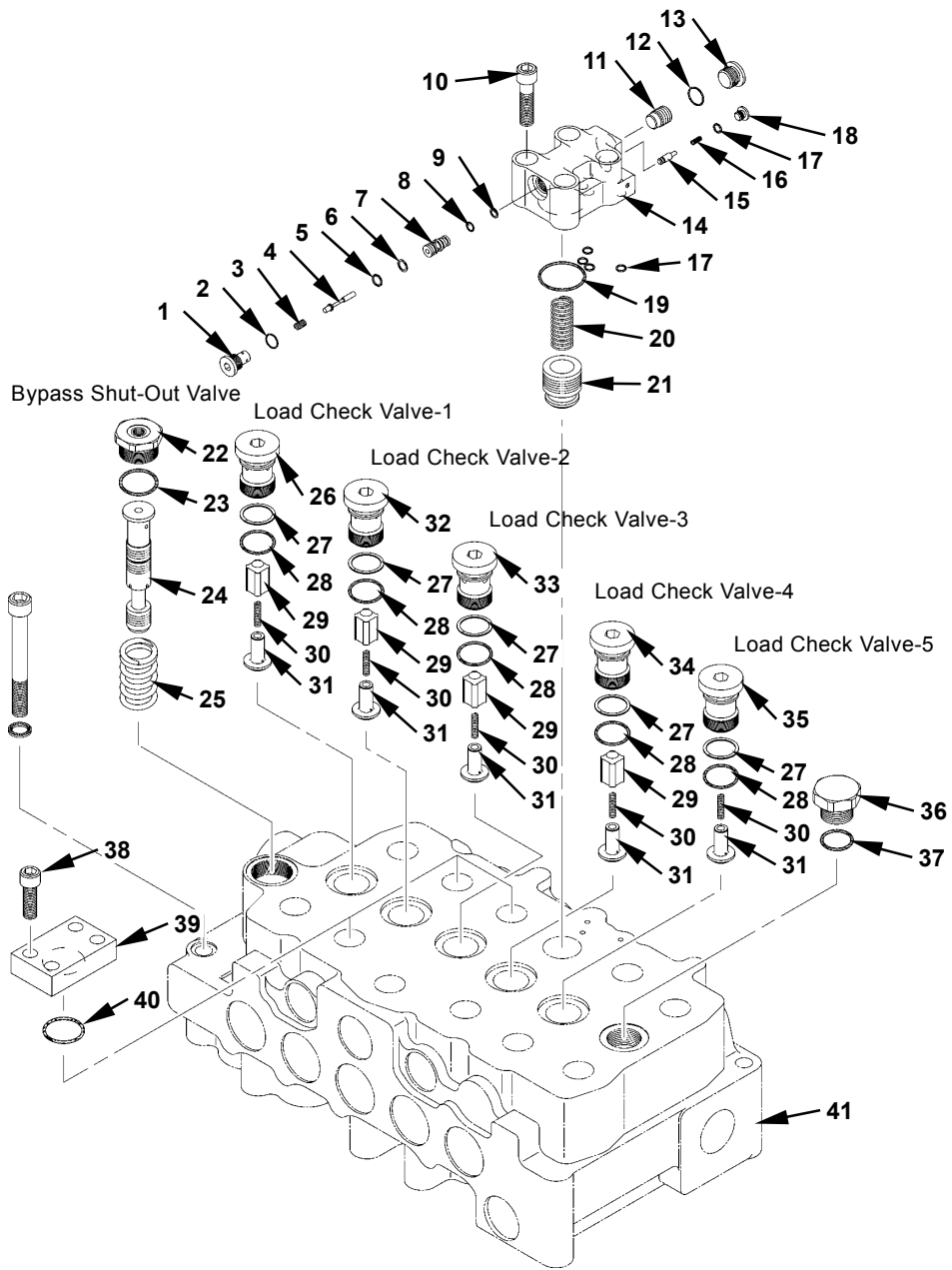
17. Install O-ring (25) and backup ring (24) to cap (23). Install check valve (27), spring (26) and cap (23) to housing (38).

 : 14 mm

 : 350 N·m (36 kgf·m, 260 lbf·ft)

UPPERSTRUCTURE / Control Valve

DISASSEMBLE CONTROL VALVE (5-SPOOL HOUSING SIDE)

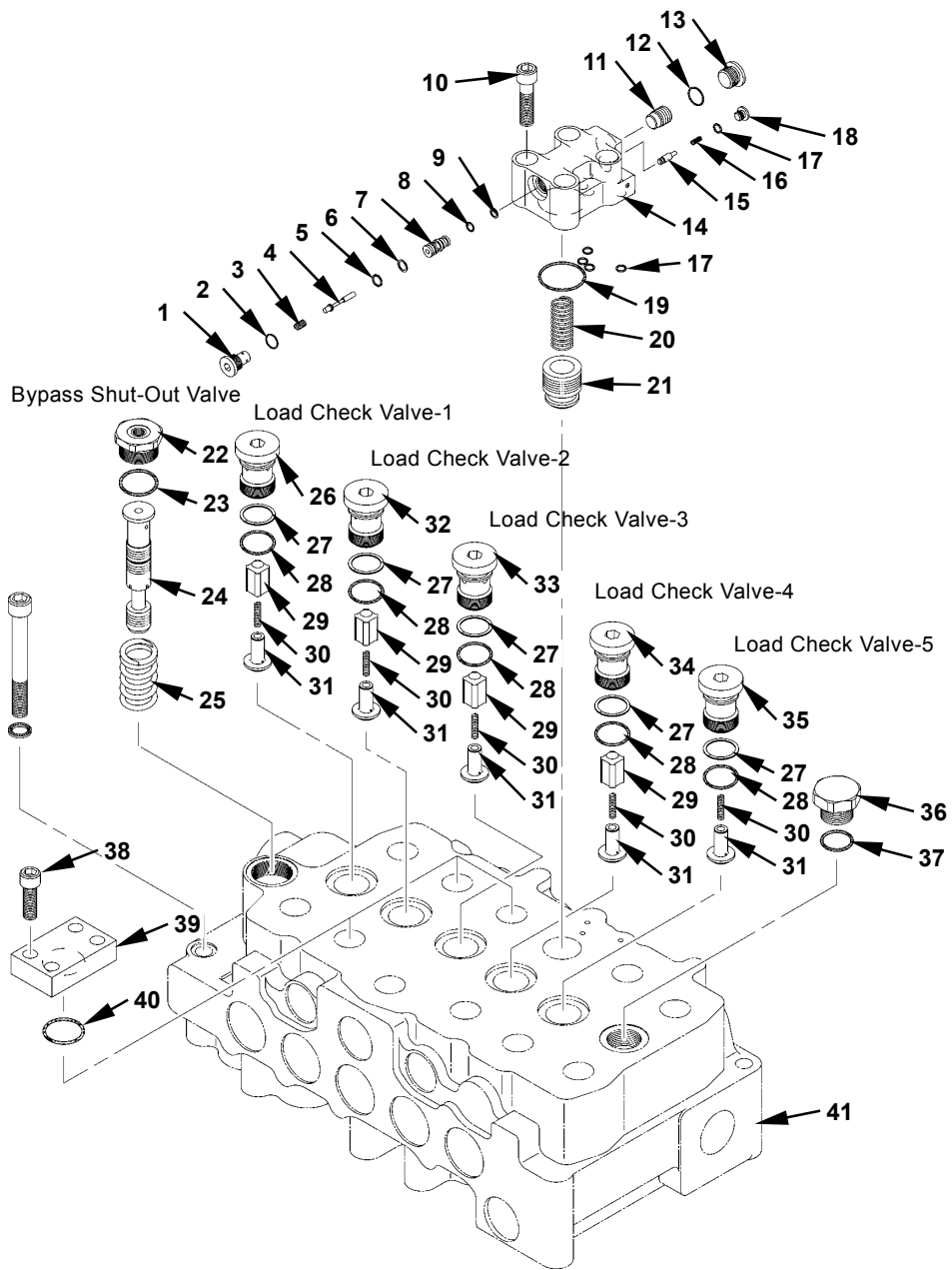


W1J7-02-05-010

UPPERSTRUCTURE / Control Valve

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











UPPERSTRUCTURE / Control Valve



W1J7-02-05-010

UPPERSTRUCTURE / Control Valve

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) (12 used) from flanges (39) (3 used).
 15. When replacing O-ring (37), remove cap (36) from housing (41).

UPPERSTRUCTURE / Control Valve

ASSEMBLE CONTROL VALVE (5-SPOOL HOUSING SIDE)

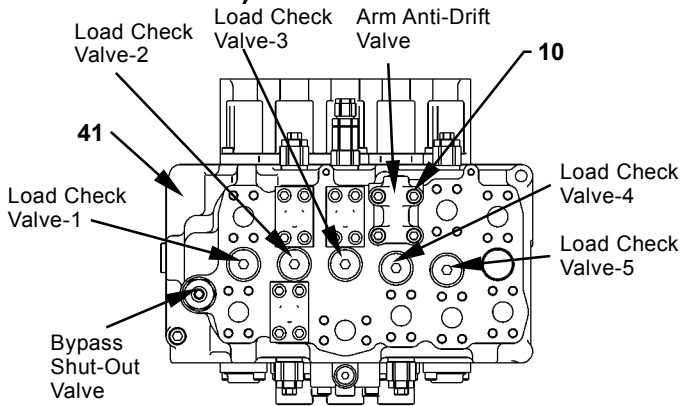
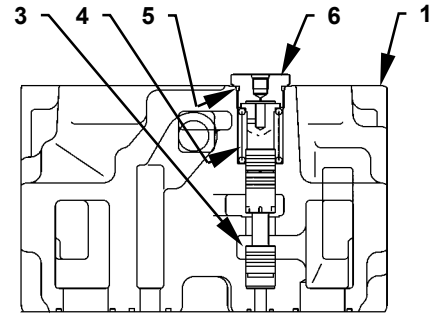
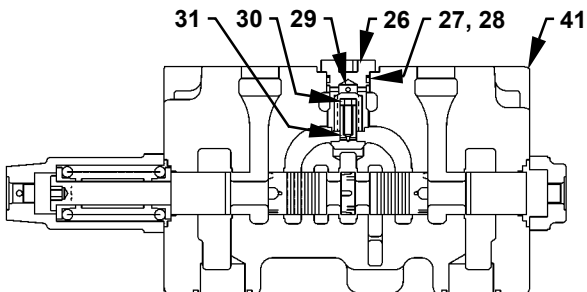


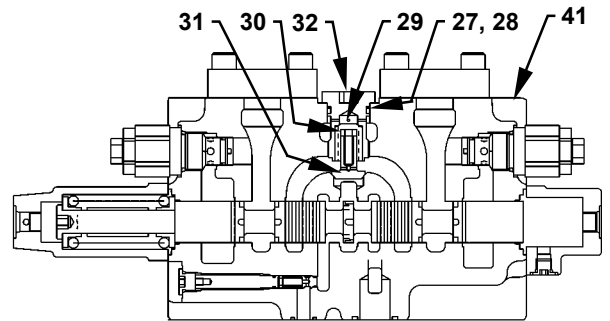
Figure of Control Valve (Right)



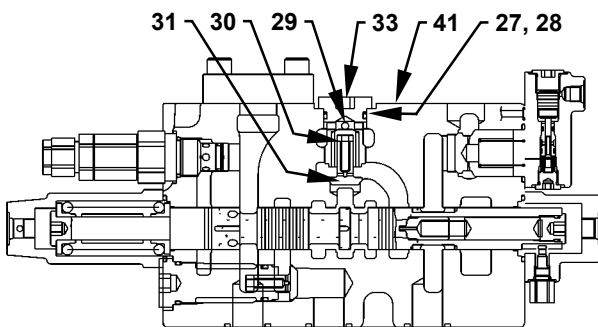
Section of Bypass Shut-Out Valve



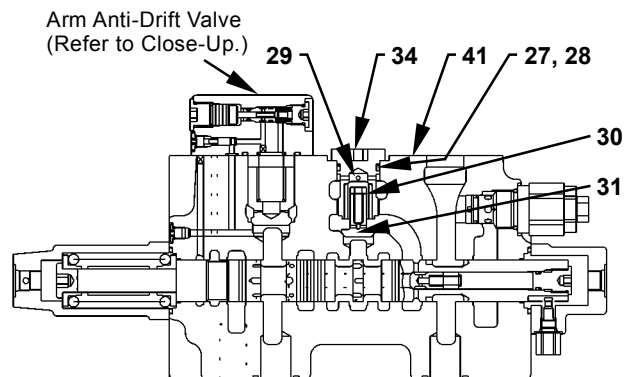
Section of Load Check Valve-1



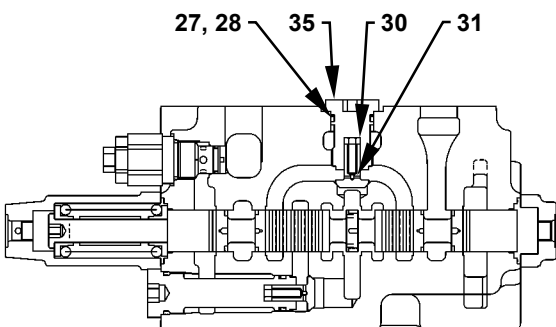
Section of Load Check Valve-2



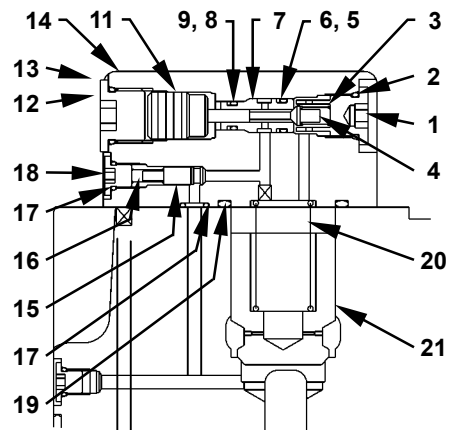
Section of Load Check Valve-3



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



Section of Load Check Valve-5



Close-Up of Arm Anti-Drift Valve

W1J7-02-05-002

UPPERSTRUCTURE / Control Valve

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

UPPERSTRUCTURE / Control Valve

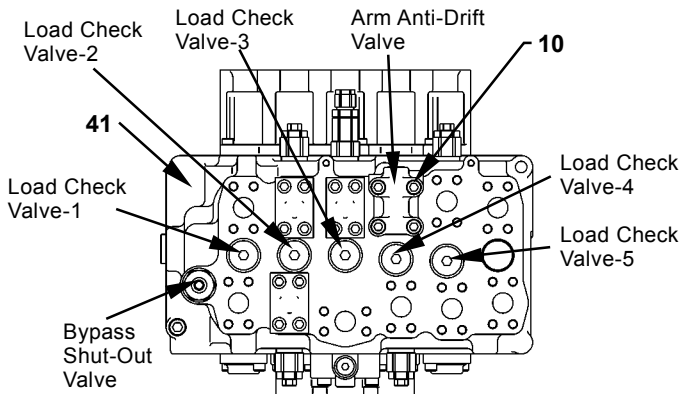
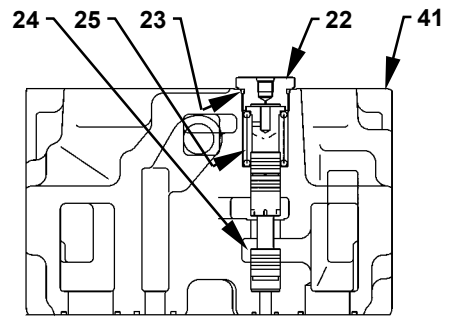
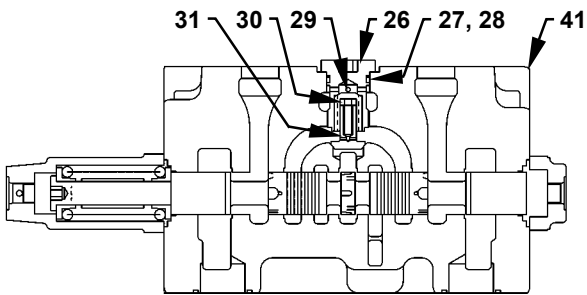


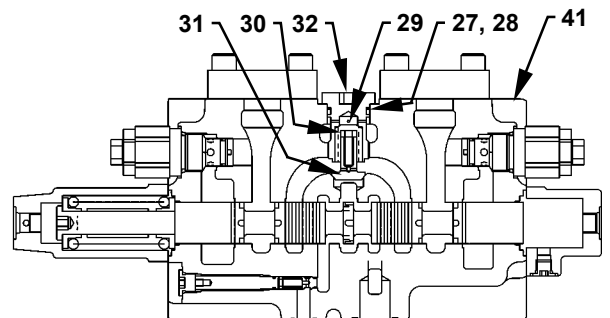
Figure of Control Valve (Right)



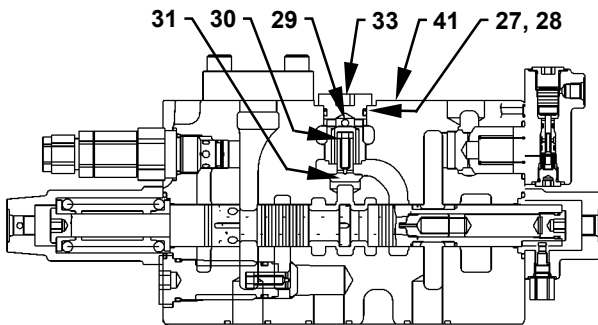
Section of Bypass Shut-Out Valve



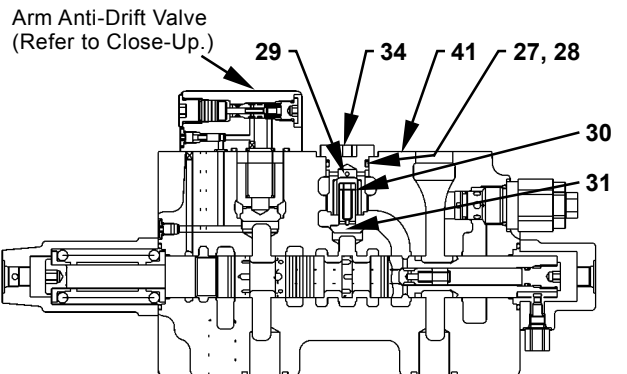
Section of Load Check Valve-1



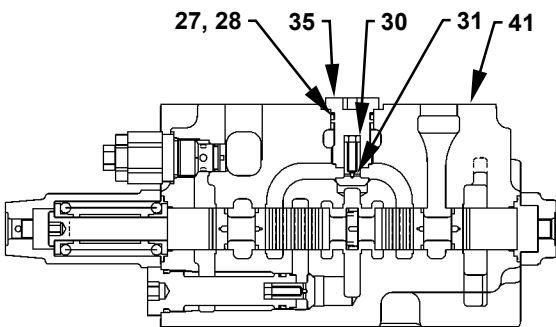
Section of Load Check Valve-2



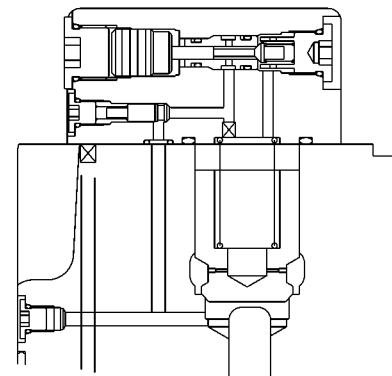
Section of Load Check Valve-3



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



Section of Load Check Valve-5





Close-Up of Arm Anti-Drift Valve

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UPPERSTRUCTURE / Control Valve

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-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
 : 350 N·m (35.7 kgf·m, 260 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)

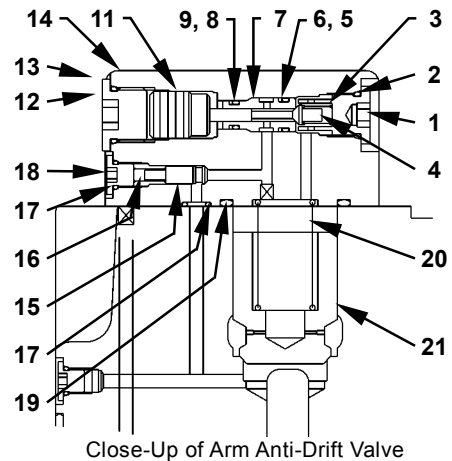
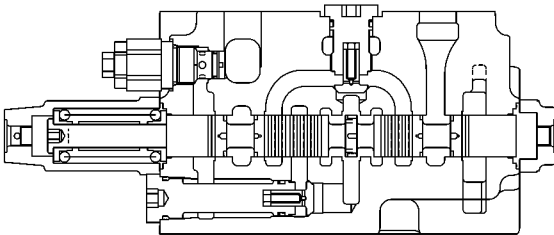
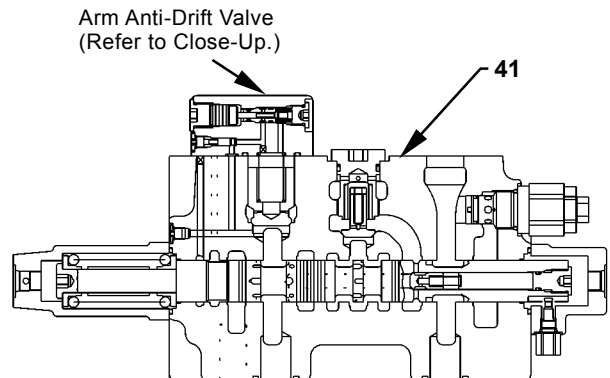
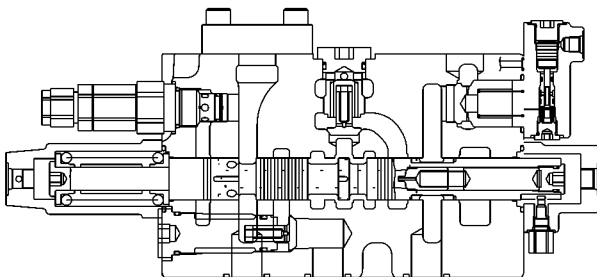
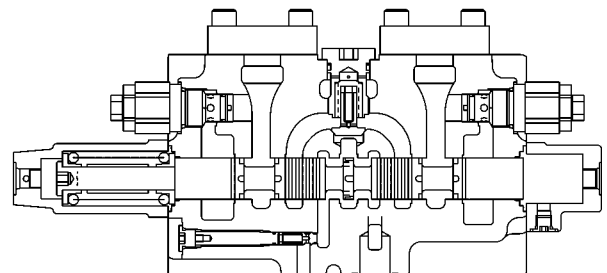
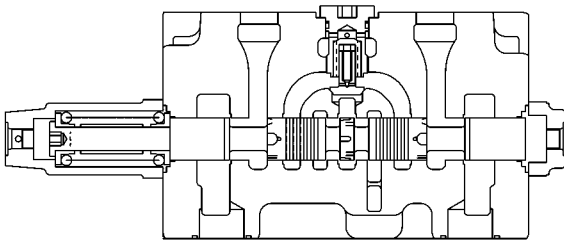
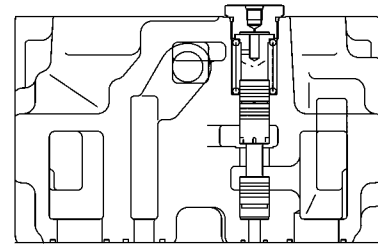
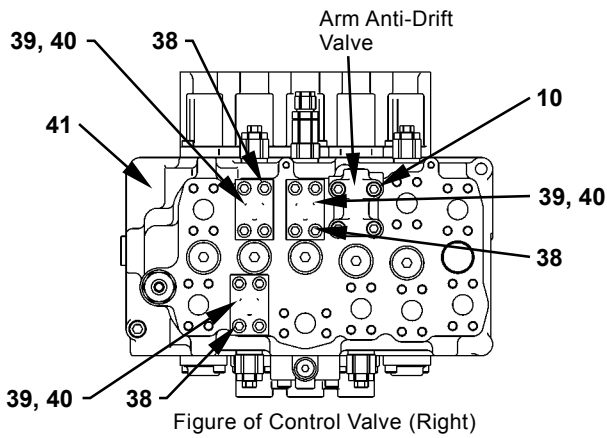
- Assemble Load Check Valve-3

- 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)

UPPERSTRUCTURE / Control Valve



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UPPERSTRUCTURE / Control Valve


- 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)

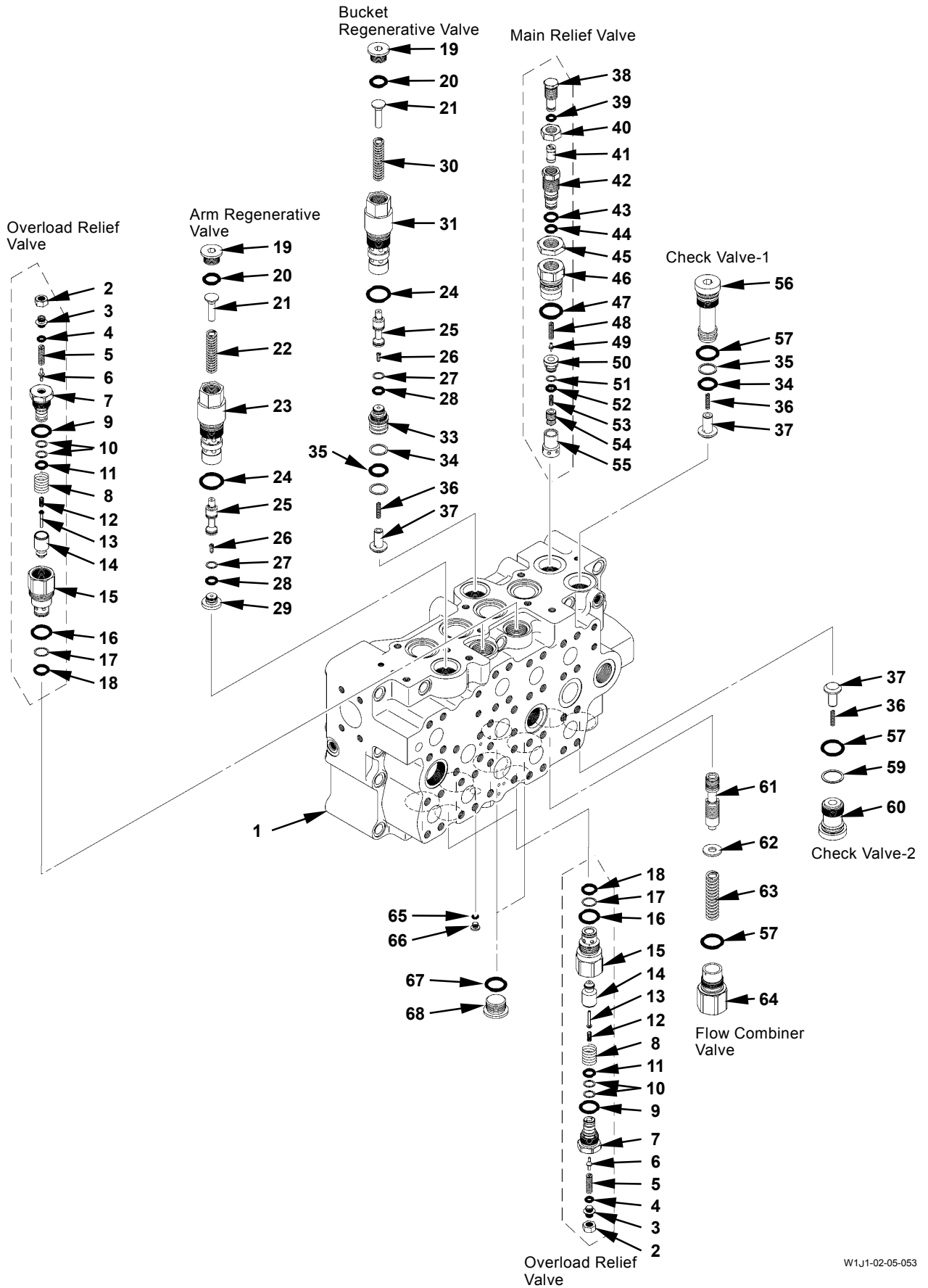
13. Install O-rings (19) and (17) (4 used) to cover (14). Install cover (14) to housing (41) with socket bolts (10) (4 used).

 : 12 mm

 : 180 N·m (18.3 kgf·m, 130 lbf·ft)

UPPERSTRUCTURE / Control Valve

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

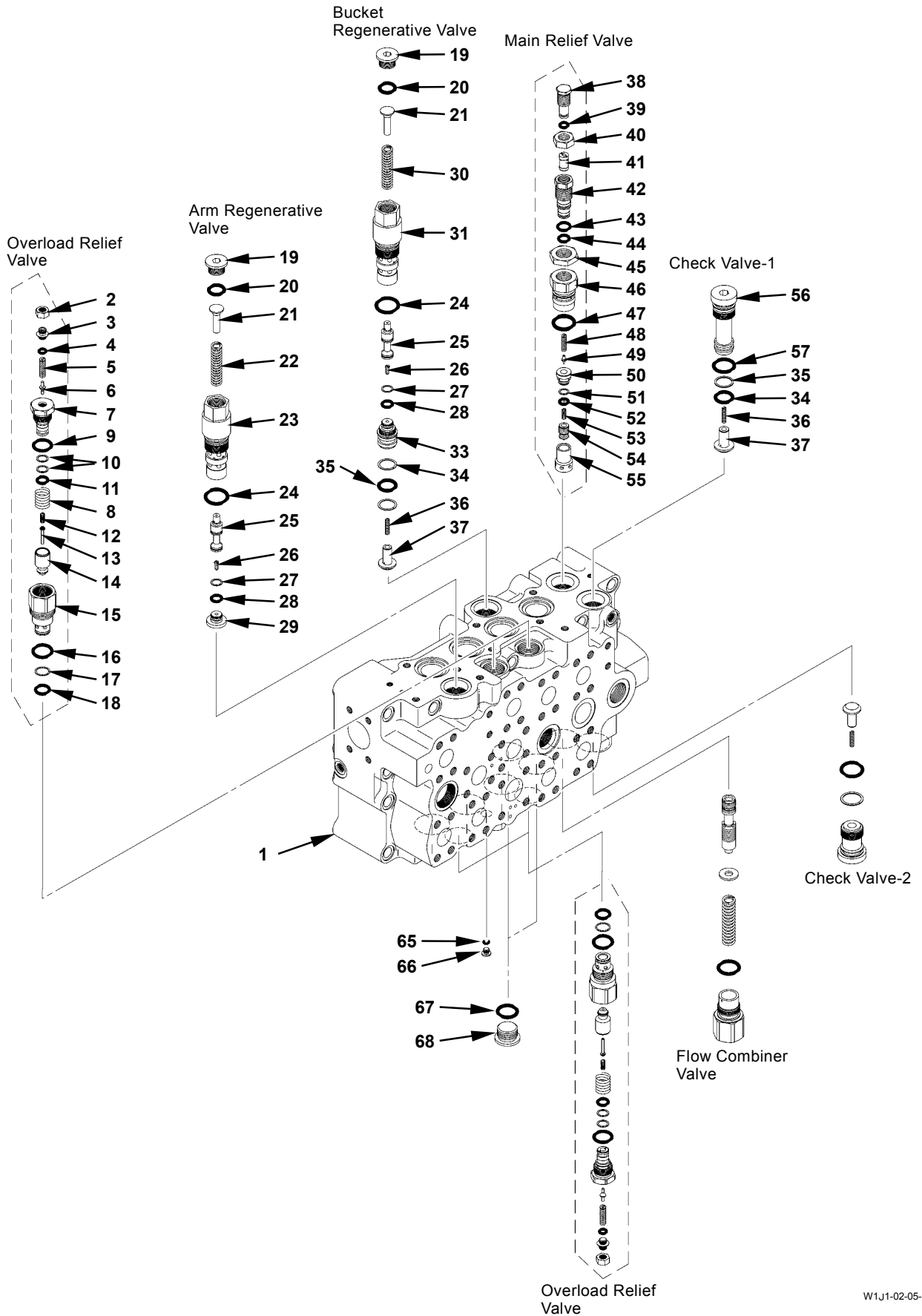


W1J1-02-05-053

UPPERSTRUCTURE / Control Valve

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

UPPERSTRUCTURE / Control Valve



W1J1-02-05-053


UPPERSTRUCTURE / Control Valve

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).

 : 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).

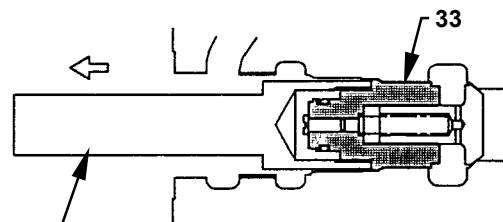
 : 14 mm

 **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).

11. Remove sleeve (33) from housing (1) by using special tool (ST 1469).

Remove piston (26) from sleeve (33).




ST 1469

W183-02-05-015

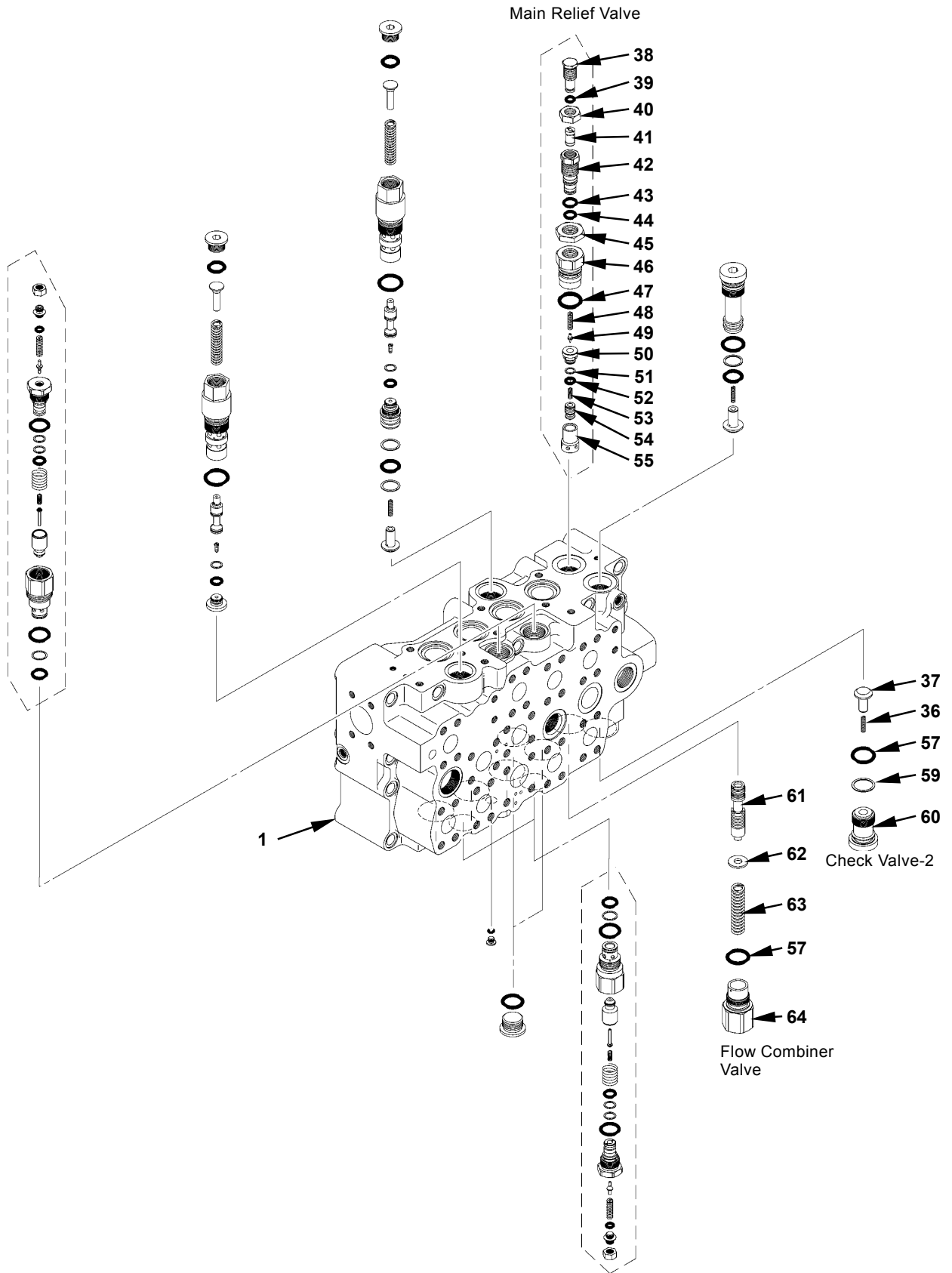
12. Remove spring (36) and check valve (37) from housing (1).

- Disassemble Check Valve-1

13. Remove cap (56), check valve (37) and spring (36) from housing (1).

 : 14 mm

UPPERSTRUCTURE / Control Valve




W1J1-02-05-053

UPPERSTRUCTURE / Control Valve

- 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

UPPERSTRUCTURE / Control Valve

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

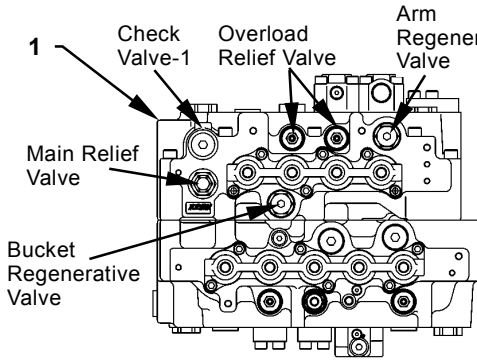


Figure of Control Valve (Upper)

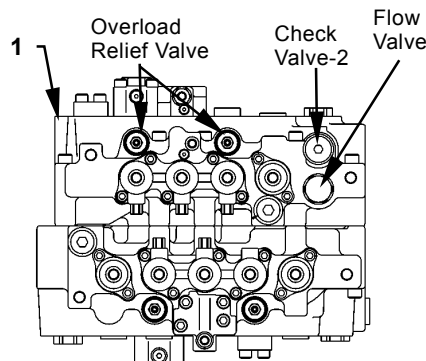
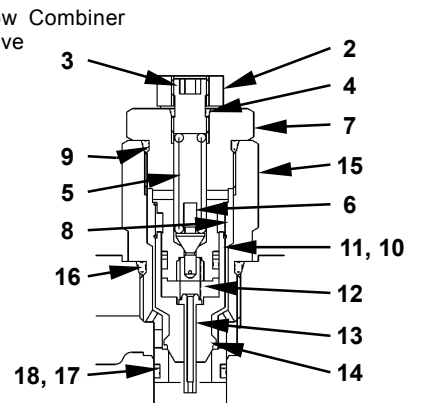
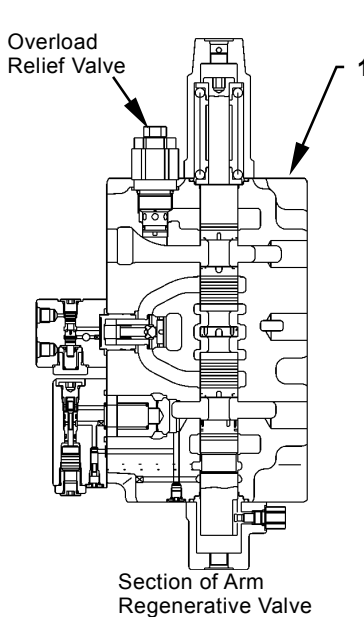


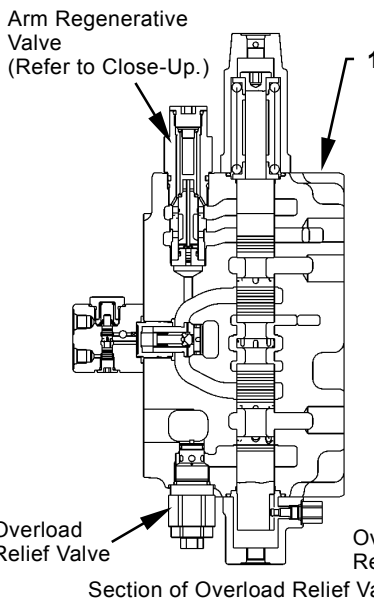
Figure of Control Valve (Lower)



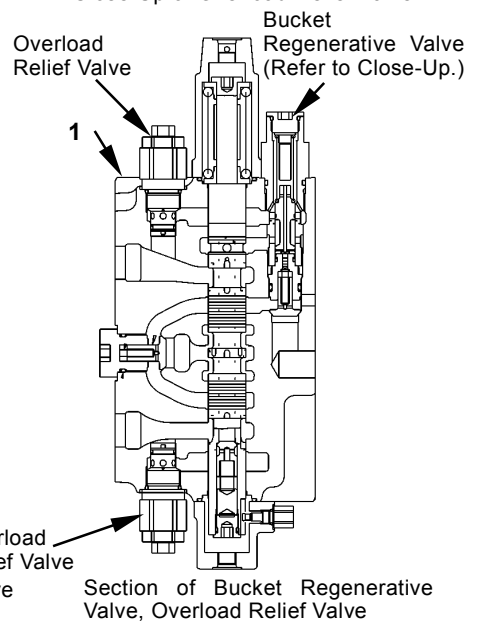
Close-Up of Overload Relief Valve



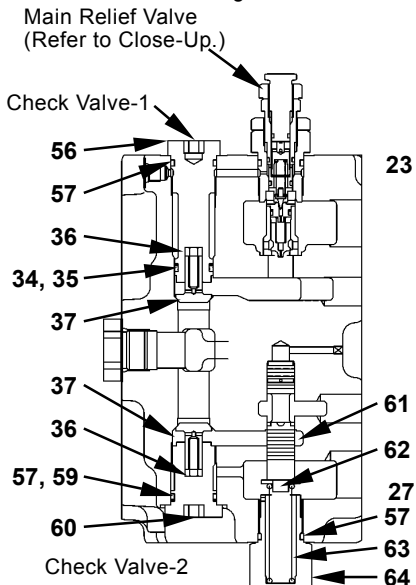
Section of Arm Regenerative Valve



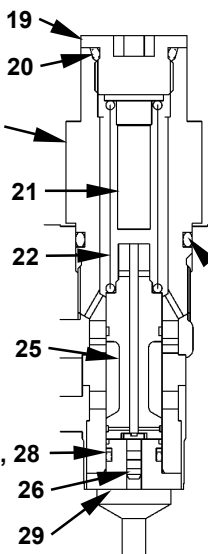
Section of Overload Relief Valve



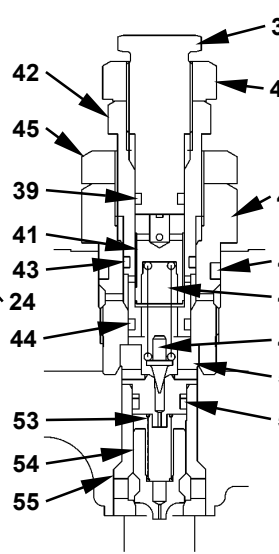
Section of Bucket Regenerative Valve, Overload Relief Valve



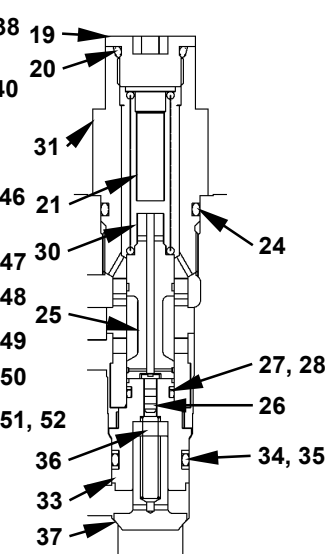
Section of Check Valve-1, Main Relief Valve, Check Valve-2, Flow Combiner Valve



Close-Up of Arm Regenerative Valve



Close-Up of Main Relief Valve



Close-Up of Bucket Regenerative Valve

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UPPERSTRUCTURE / Control Valve

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

UPPERSTRUCTURE / Control Valve

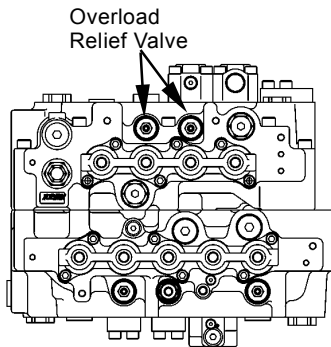


Figure of Control Valve (Upper)

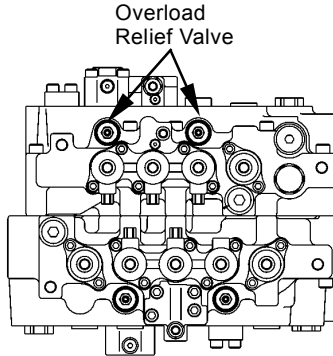
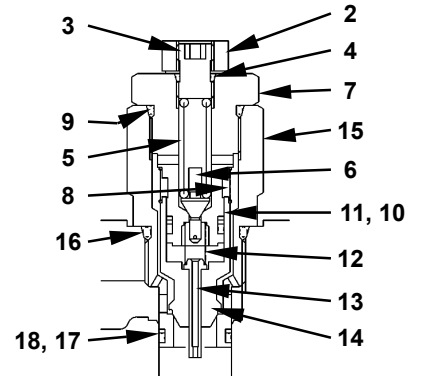
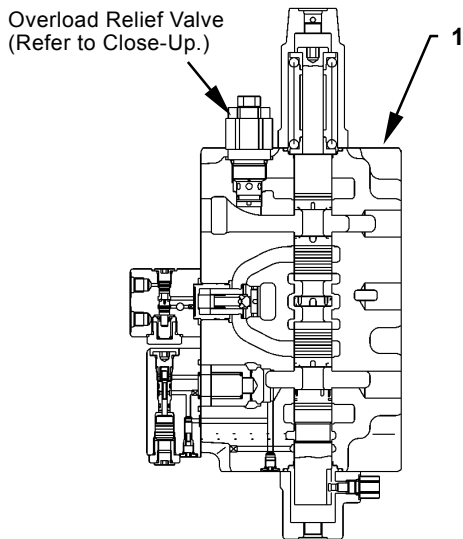


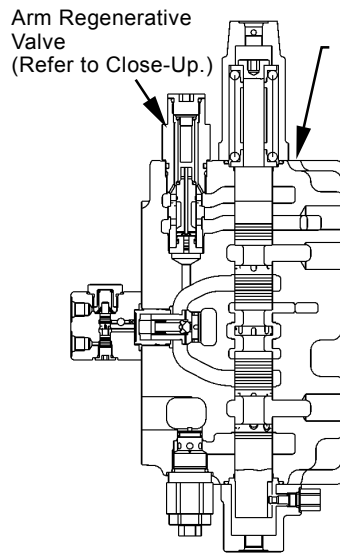
Figure of Control Valve (Lower)



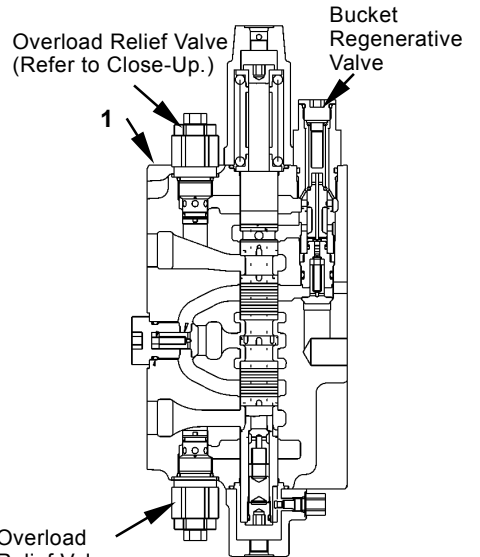
Close-Up of Overload Relief Valve



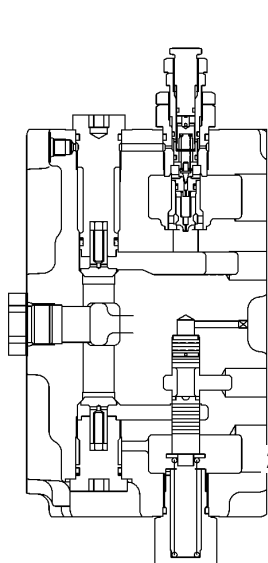
Section of Arm Regenerative Valve



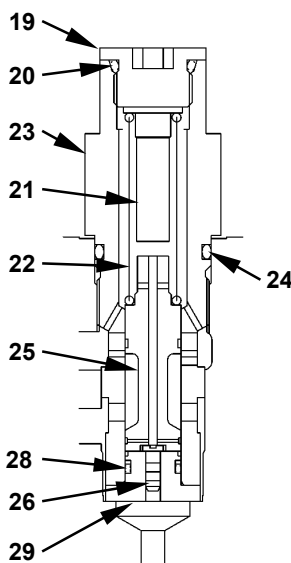
Section of Overload Relief Valve



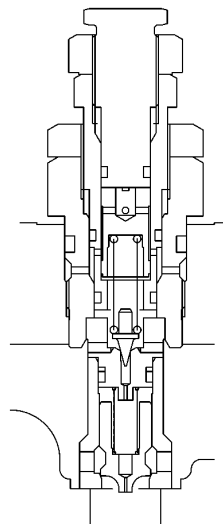
Section of Overload Relief Valve, Bucket Regenerative Valve



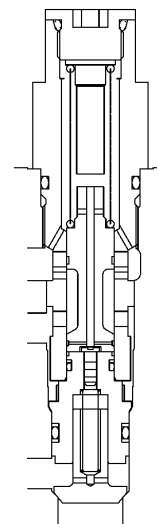
Section of Check Valve-1, Main Relief Valve, Check Valve-2, Flow Combiner Valve



Close-Up of Arm Regenerative Valve



Close-Up of Main Relief Valve



Close-Up of Bucket Regenerative Valve



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UPPERSTRUCTURE / Control Valve

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.

1. Install pilot poppet (6), spring (5), adjusting screw (3) 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).
 : 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 seat (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)

UPPERSTRUCTURE / Control Valve

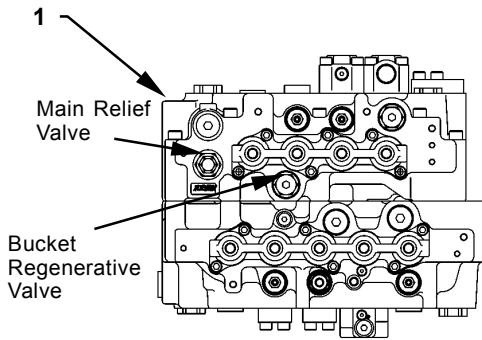


Figure of Control Valve (Upper)

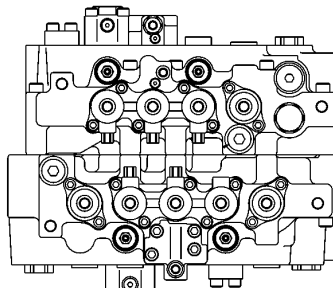
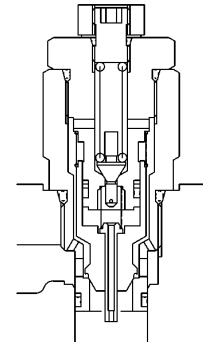
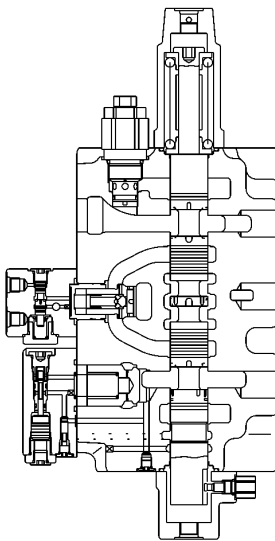


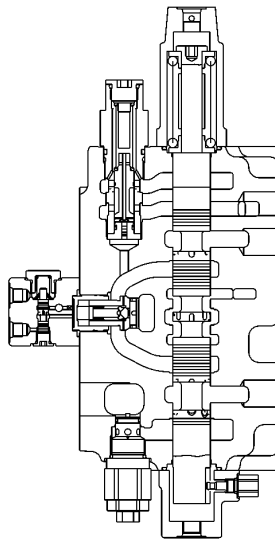
Figure of Control Valve (Lower)



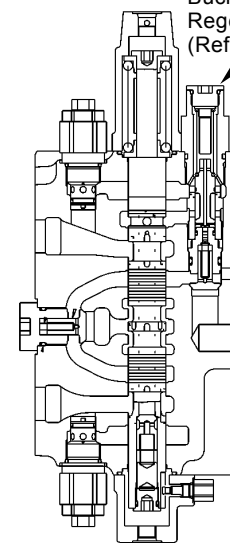
Close-Up of Overload Relief Valve
Bucket Regenerative Valve (Refer to Close-Up.)



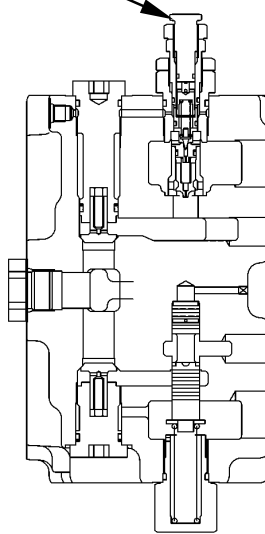
Section of Arm Regenerative Valve
Main Relief Valve (Refer to Close-Up.)



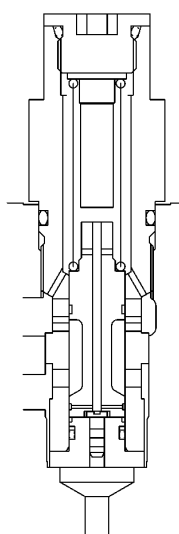
Section of Overload Relief Valve



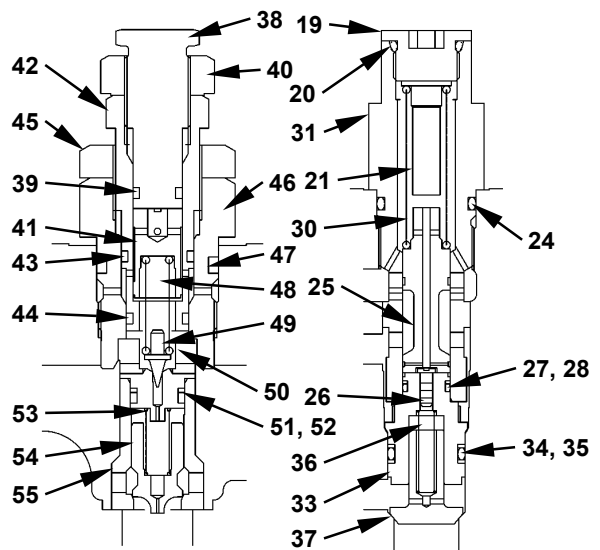
Section of Overload Relief Valve, Bucket Regenerative Valve



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



Close-Up of Arm Regenerative Valve



Close-Up of Main Relief Valve

Close-Up of Bucket Regenerative Valve





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UPPERSTRUCTURE / Control Valve

- Assemble Bucket Regenerative Valve



10. Install O-rings (28, 35) and backup rings (27, 34) to sleeve (33).
11. Install piston (26), spring (36) and check valve (37) to sleeve (33). Install the sleeve (33) assembly 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).

UPPERSTRUCTURE / Control Valve

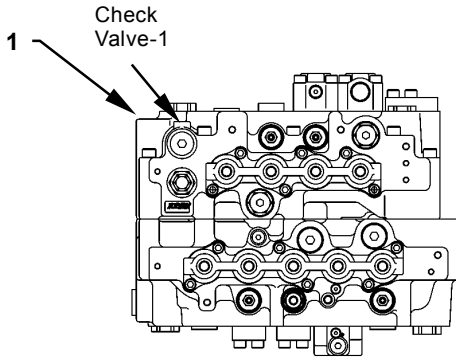


Figure of Control Valve (Upper)

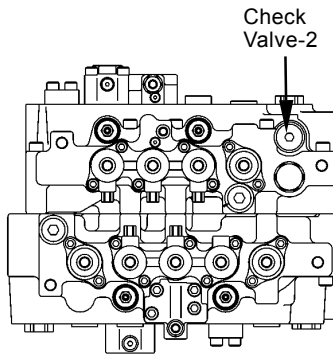
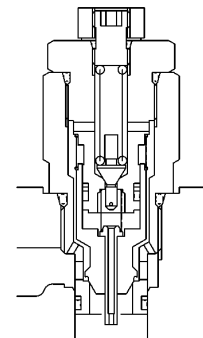
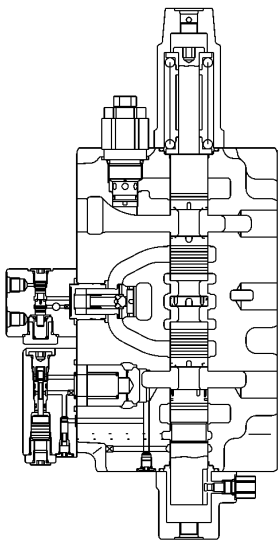


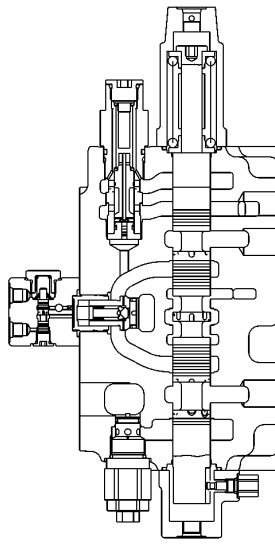
Figure of Control Valve (Lower)



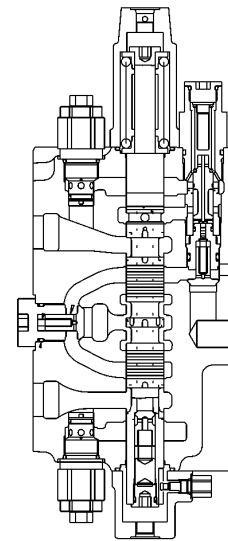
Close-Up of Overload Relief Valve



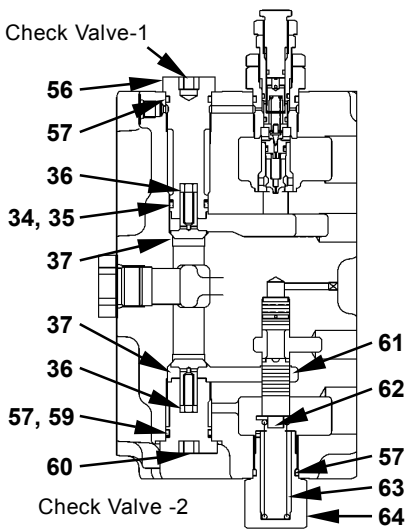
Section of Arm Regenerative Valve



Section of Overload Relief Valve

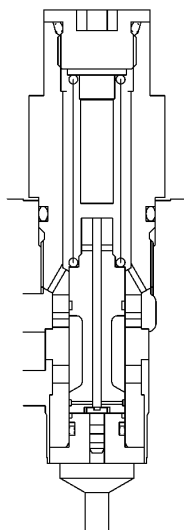


Section of Bucket Regenerative Valve, Overload Relief Valve

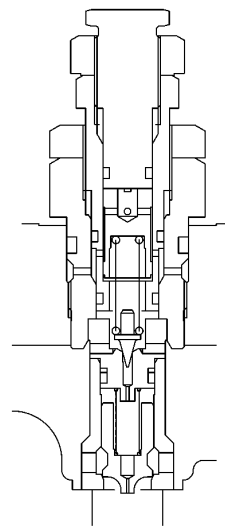


Flow Combiner Valve

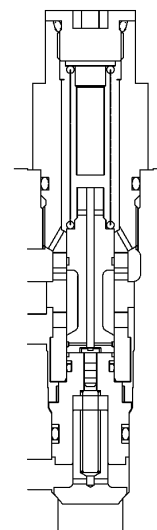
Section of Check Valve-1, Check Valve-2, Flow Combiner Valve



Close-Up of Arm Regenerative Valve



Close-Up of Main Relief Valve




Close-Up of Bucket Regenerative Valve


W1J7-02-05-003

UPPERSTRUCTURE / Control Valve

- 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

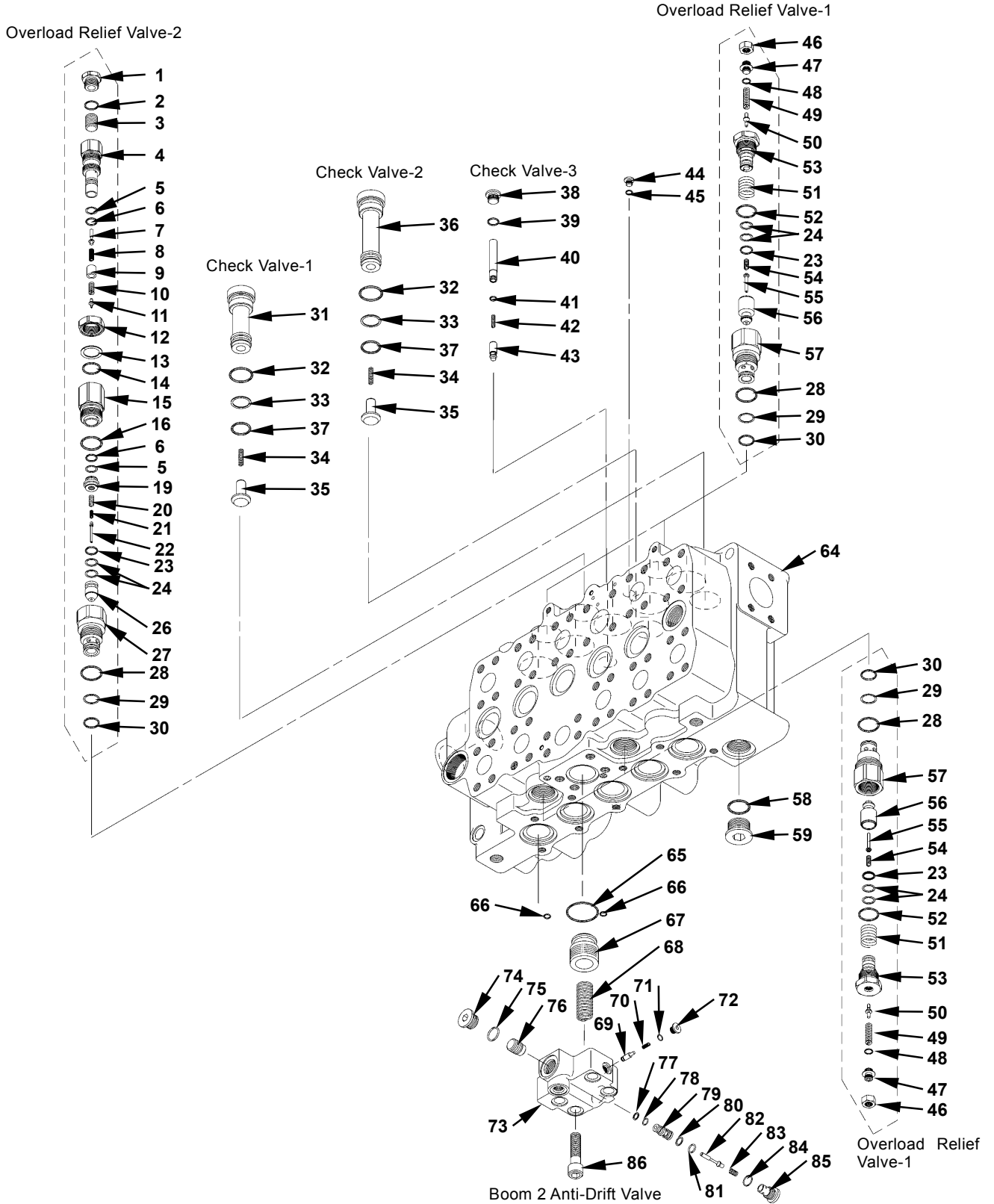
25. Install O-ring (57) and backup ring (59) to cap (60). Install spring (36), check valve (37) and cap (60) to housing (1).

 : 14 mm

 : 350 N·m (35.7 kgf·m, 258 lbf·ft)

UPPERSTRUCTURE / Control Valve

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

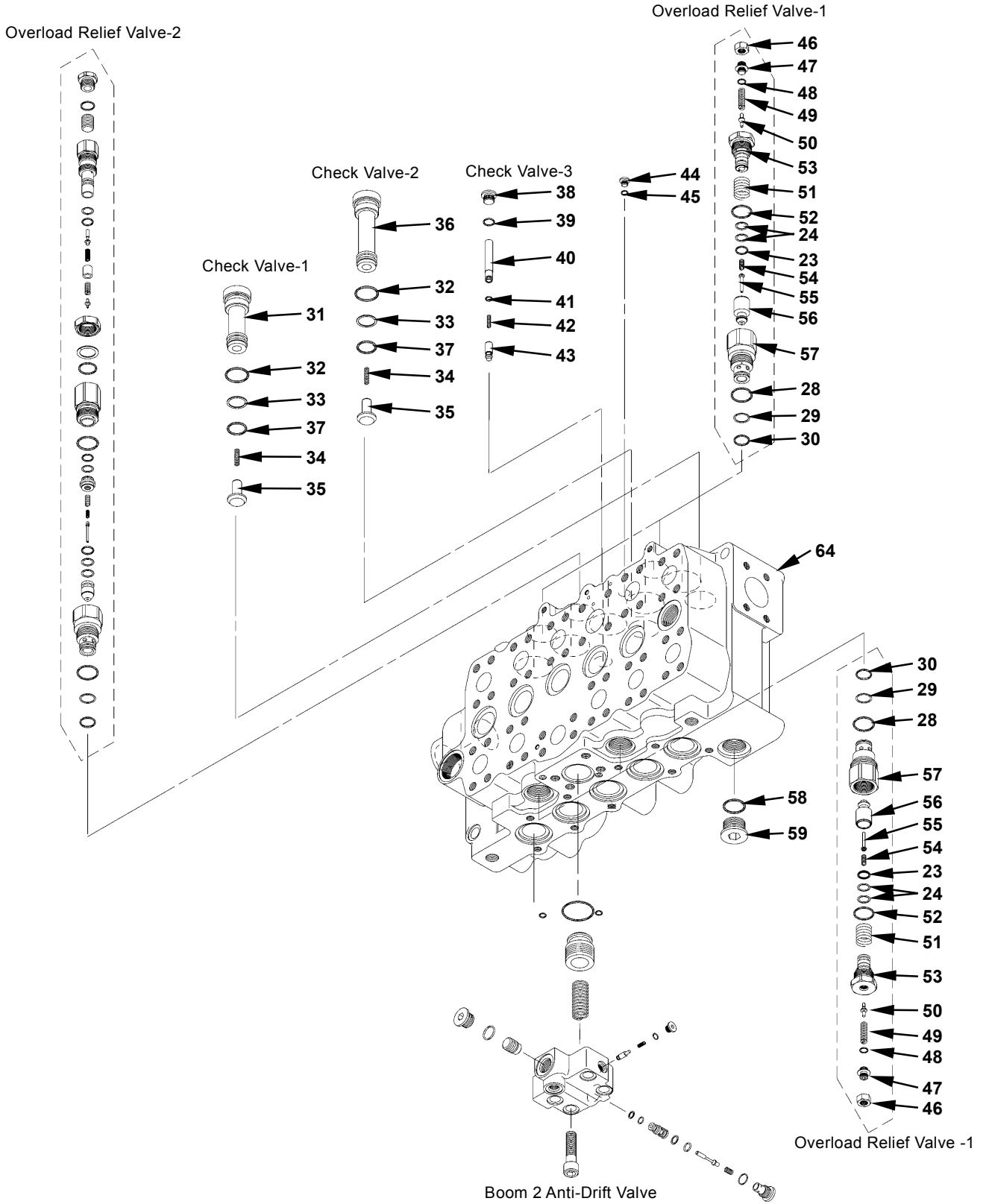


W1J7-02-05-012

UPPERSTRUCTURE / Control Valve

1 - Cap	24 - Backup Ring (10 Used)	46 - Lock Nut (4 Used)	67 - Poppet
2 - O-Ring	26 - Main Poppet	47 - Adjusting Screw (4 Used)	68 - Spring
3 - Piston	27 - Sleeve	48 - O-Ring (4 Used)	69 - Check Valve
4 - Sleeve	28 - O-Ring (5 Used)	49 - Spring (4 Used)	70 - Spring
5 - Backup Ring (2 Used)	29 - Backup Ring (5 Used)	50 - Pilot Poppet (4 Used)	71 - O-Ring
6 - O-Ring (2 Used)	30 - O-Ring (5 Used)	51 - Spring (4 Used)	72 - Cap
7 - Poppet	31 - Cap	52 - O-Ring (4 Used)	73 - Cover
8 - Spring	32 - O-Ring (2 Used)	53 - Seat (4 Used)	74 - Cap
9 - Spring Seat	33 - Backup Ring (2 Used)	54 - Spring (4 Used)	75 - O-Ring
10 - Spring	34 - Spring (2 Used)	55 - Piston (4 Used)	76 - Piston
11 - Pilot Poppet	35 - Check Valve (2 Used)	56 - Main Poppet (4 Used)	77 - Backup Ring
12 - Lock Nut	36 - Cap	57 - Sleeve (4 Used)	78 - O-Ring
13 - Backup Ring	37 - O-Ring	58 - O-Ring	79 - Sleeve
14 - O-Ring	38 - Cap	59 - Cap	80 - Backup Ring
15 - Sleeve	39 - O-Ring	60 - O-Ring	81 - O-Ring
16 - O-Ring	40 - Spacer	61 - O-Ring (2 Used)	82 - Poppet
19 - Pilot Seat	41 - O-Ring	62 - Flange	83 - Spring
20 - Spring	42 - Spring	63 - Socket Bolt (4 Used)	84 - O-Ring
21 - Spring	43 - Check Valve	64 - Housing	85 - Cap
22 - Piston	44 - Cap	65 - O-Ring	86 - Socket Bolt (4 Used)
23 - O-Ring (4 Used)	45 - O-Ring	66 - O-Ring	

UPPERSTRUCTURE / Control Valve



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UPPERSTRUCTURE / Control Valve


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) in 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

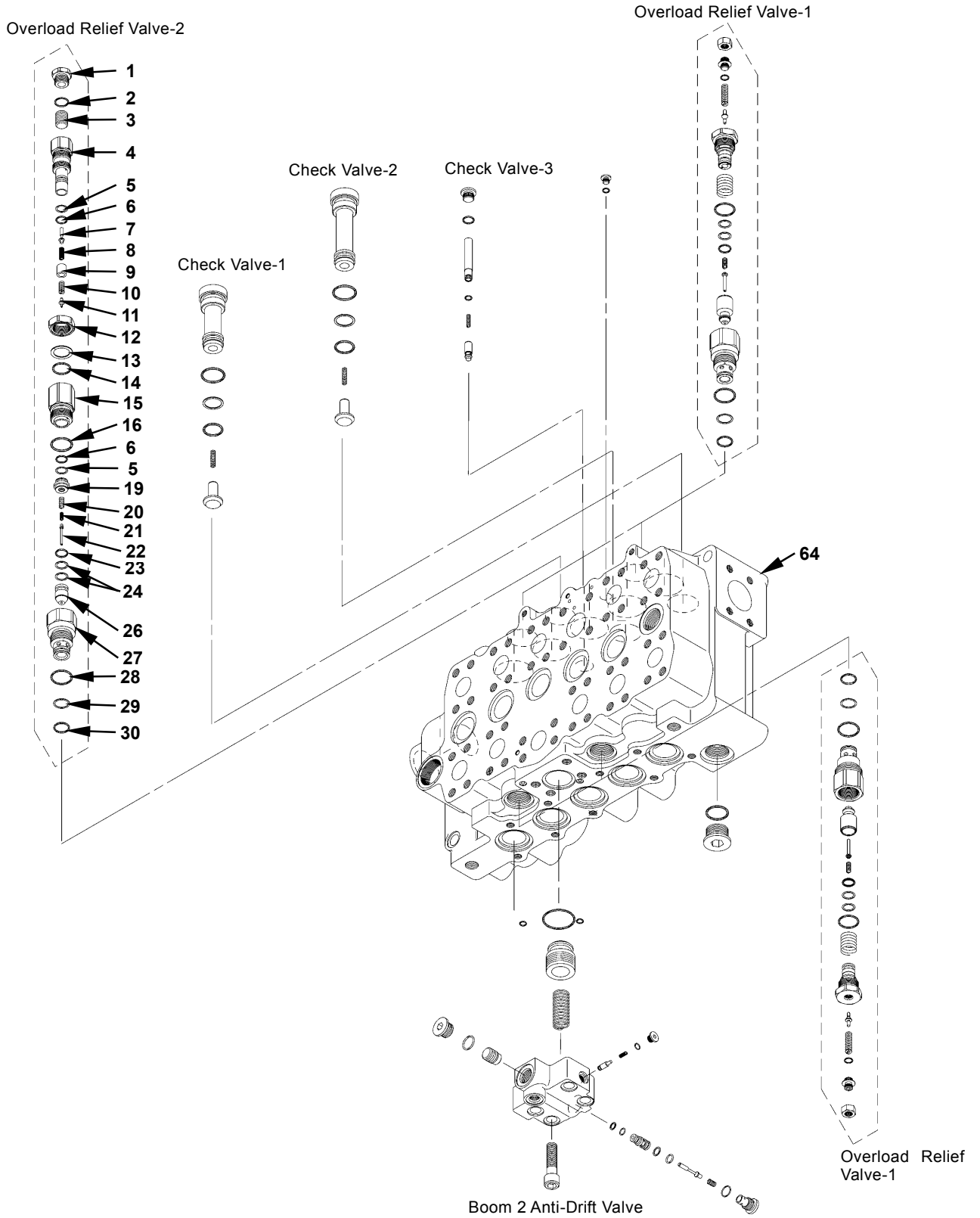
5. Remove cap (38), spacer (40), spring (42) and check valve (43) from housing (64).

 : 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).

UPPERSTRUCTURE / Control Valve




W1J7-02-05-012

UPPERSTRUCTURE / Control Valve

- 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 sleeve (15).

9. Clamp sleeve (27) in 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) in a vise. Loosen lock nut (12). Remove sleeve (4) and lock nut (12) from sleeve (15).

 : 36 mm

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

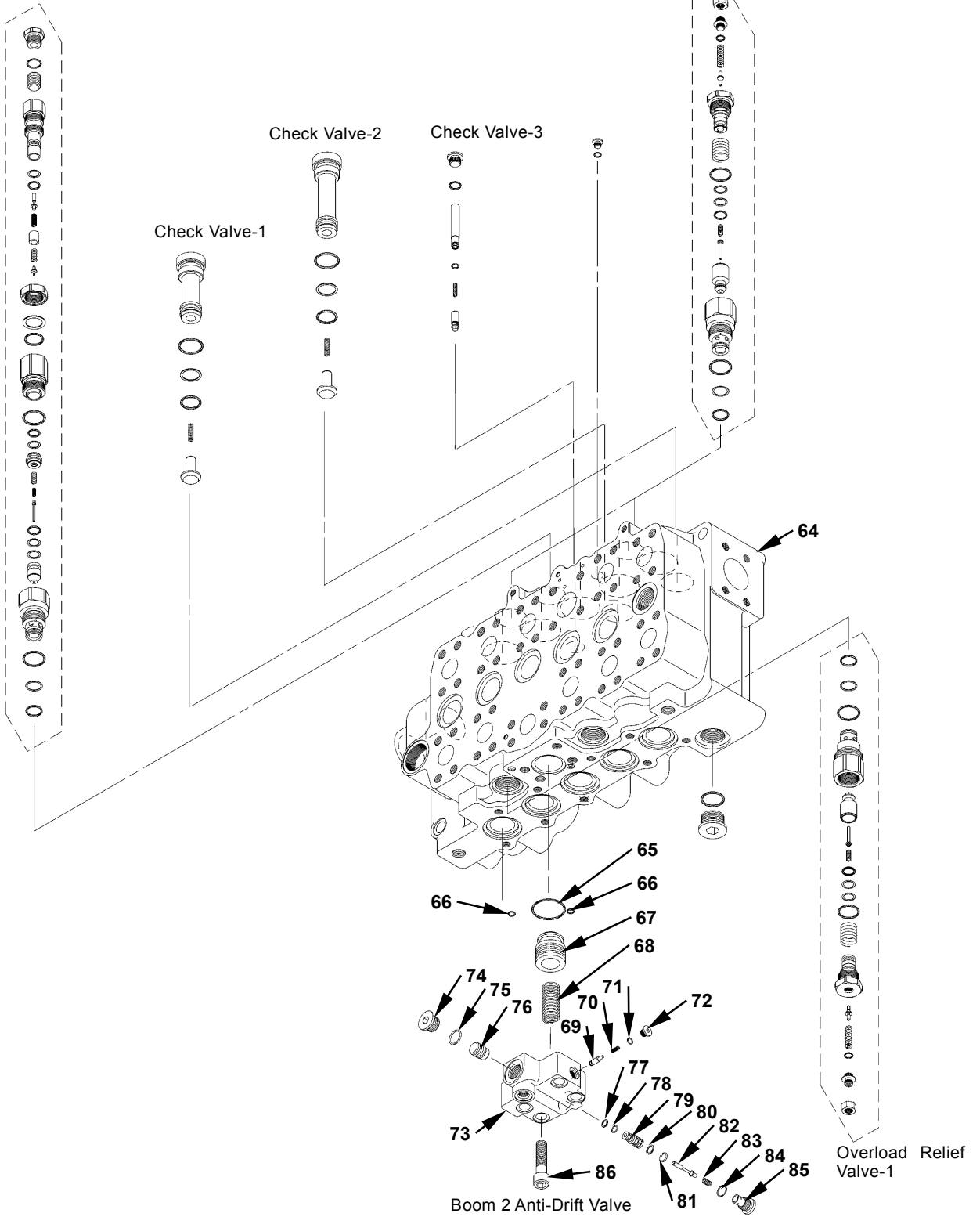
 : 27 mm

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

UPPERSTRUCTURE / Control Valve

Overload Relief Valve-2





Overload Relief Valve-1



W1J7-02-05-012

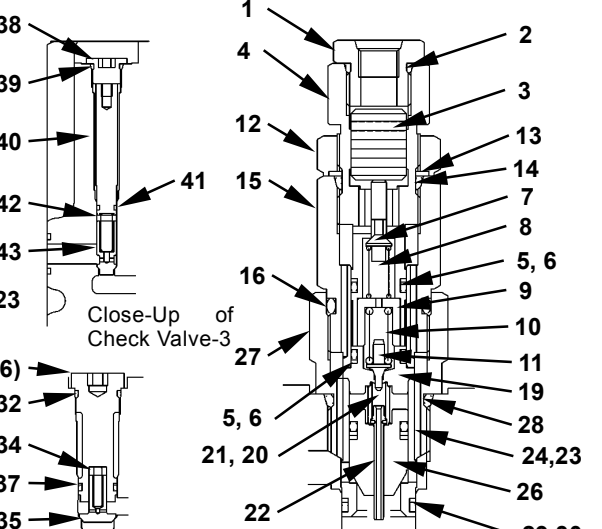
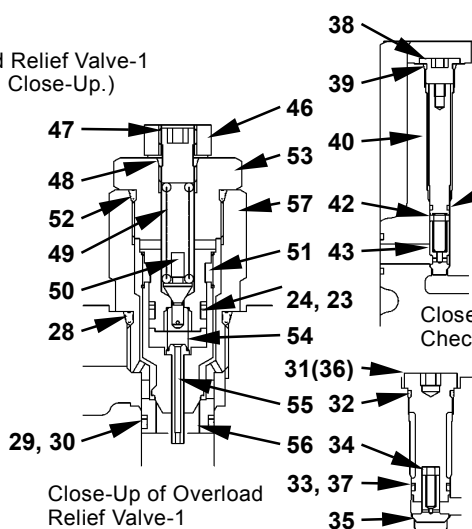
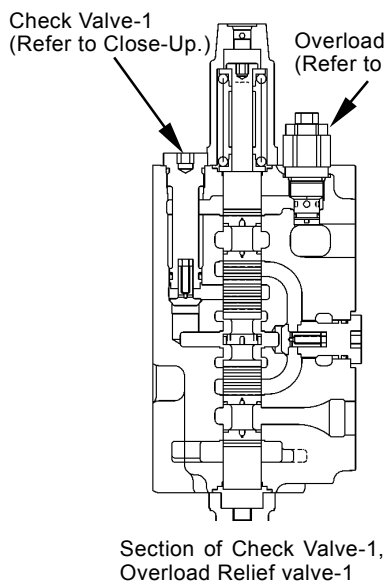
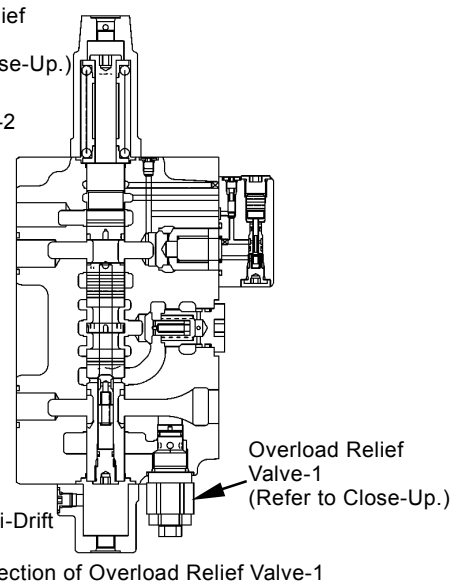
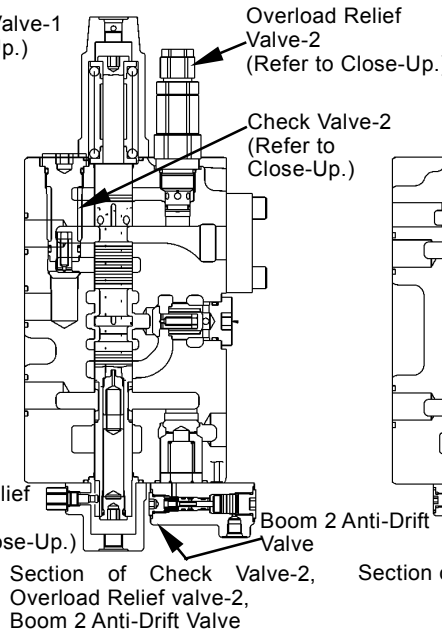
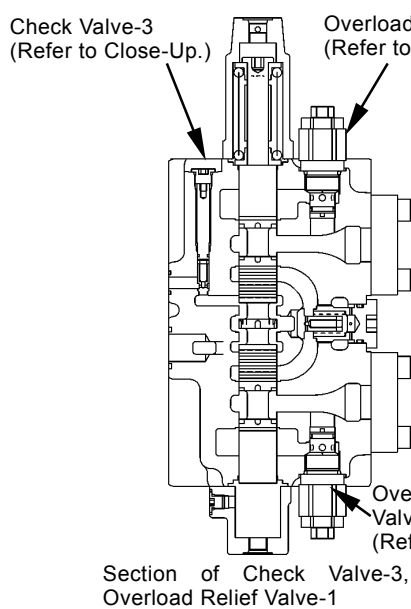
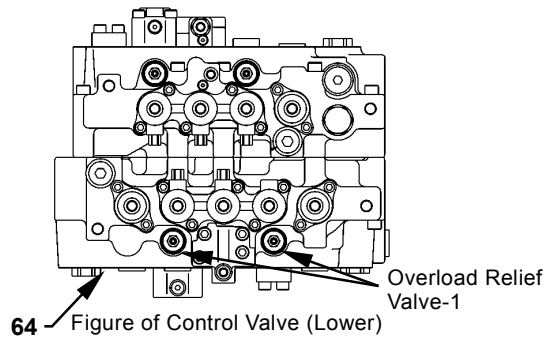
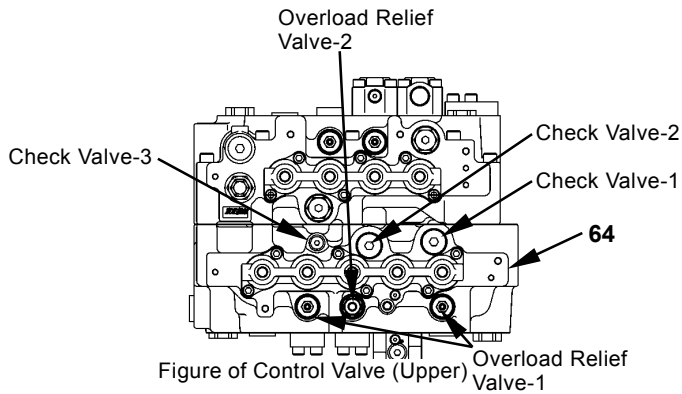
UPPERSTRUCTURE / Control Valve

Disassemble Boom 2 Anti-Drift Valve

1. Remove socket bolts (85) (4 used). Remove cover (73), O-rings (65) and (66) (2 used) from housing (64).
 : 12 mm
2. Remove spring (68) and poppet (67) from housing (64).
3. Remove cap (85), spring (83) and poppet (82) from cover (73).
 : 8 mm
4. Remove cap (74) and piston (76) from cover (73).
 : 27 mm
5. Insert the pipe (inner dia.: 7 mm, outer dia.: 10 mm, length: 15 mm) into the hole on cap (74). Tap and remove sleeve (79) through the hole on cap (85).
6. Remove cap (72), spring (70) and check valve (69) from cover (73).
 : 5 mm

UPPERSTRUCTURE / Control Valve

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



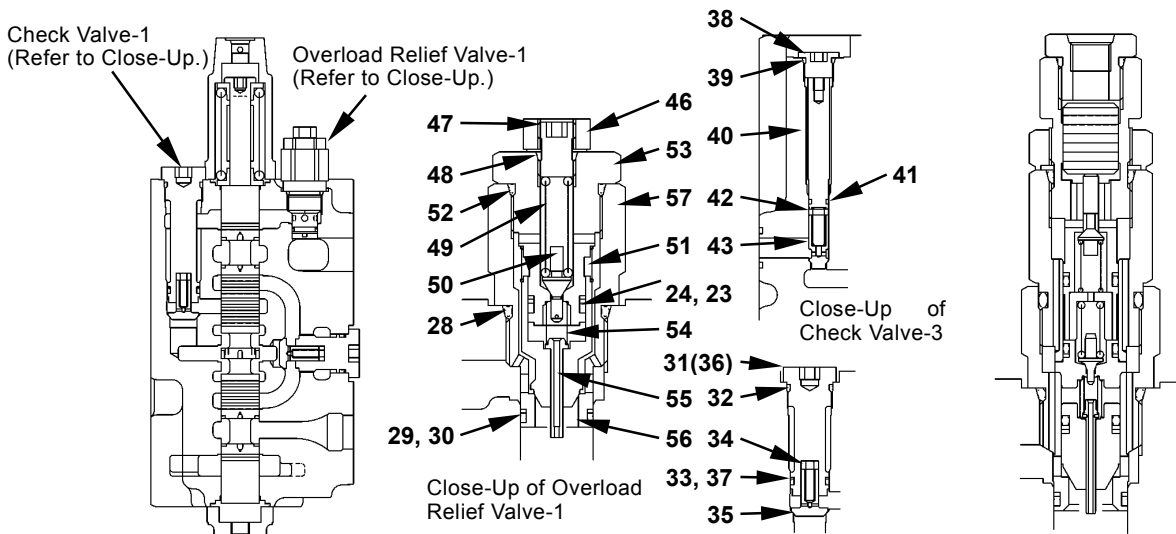
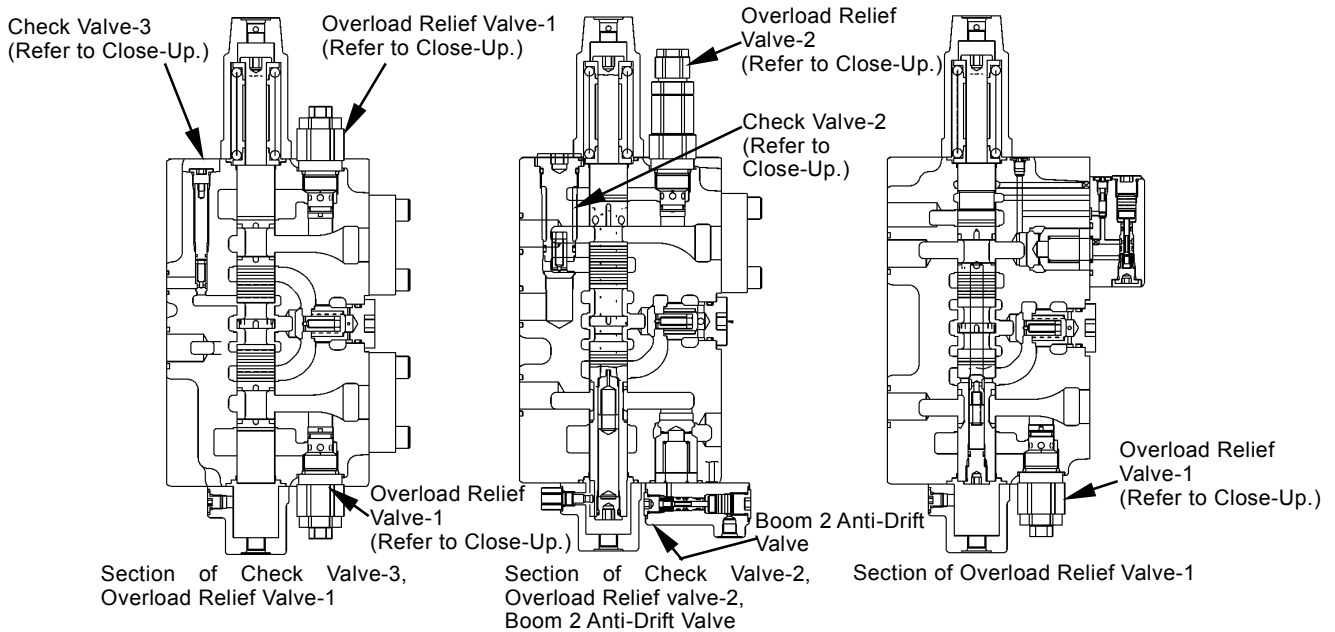
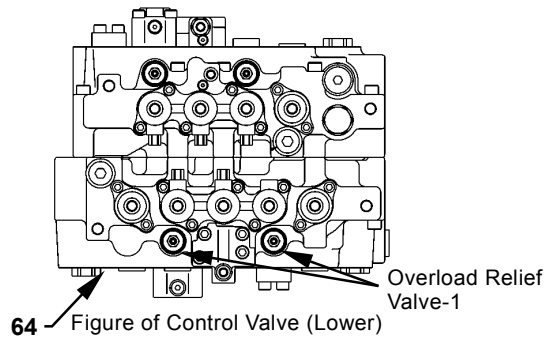
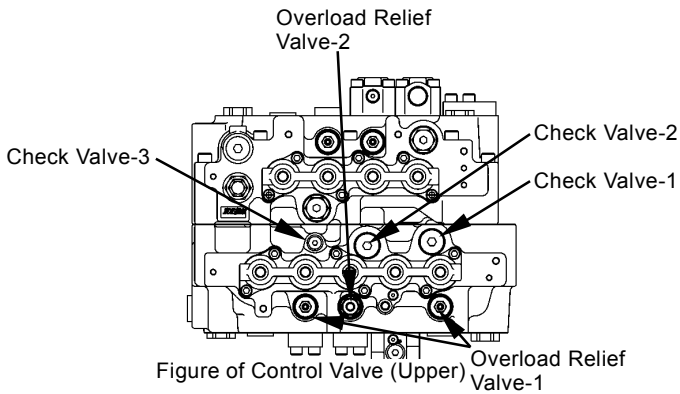
(): For Check Valve-2
 Close-Up of Check Valve-1, Check Valve-2

W1J7-02-05-004

UPPERSTRUCTURE / Control Valve

1 - Cap	19 - Pilot Seat	36 - Cap	52 - O-Ring (4 Used)
2 - O-Ring	20 - Spring	37 - O-Ring	53 - Seat (4 Used)
3 - Piston	21 - Spring	38 - Cap	54 - Spring (4 Used)
4 - Sleeve	22 - Piston	39 - O-Ring	55 - Piston (4 Used)
5 - Backup Ring (2 Used)	23 - O-Ring (4 Used)	40 - Spacer	56 - Main Poppet (4 Used)
6 - O-Ring (2 Used)	24 - Backup Ring (10 Used)	41 - O-Ring	57 - Sleeve (4 Used)
7 - Poppet	26 - Main Poppet	42 - Spring	58 - O-Ring
8 - Spring	27 - Sleeve	43 - Check Valve	59 - Cap
9 - Spring Seat	28 - O-Ring (5 Used)	44 - Cap	60 - O-Ring
10 - Spring	29 - Backup Ring (5 Used)	45 - O-Ring	61 - O-Ring (2 Used)
11 - Pilot Poppet	30 - O-Ring (5 Used)	46 - Lock Nut (4 Used)	62 - Flange
12 - Lock Nut	31 - Cap	47 - Adjusting Screw (4 Used)	63 - Socket Bolt (4 Used)
13 - Backup Ring	32 - O-Ring (2 Used)	48 - O-Ring (4 Used)	64 - Housing
14 - O-Ring	33 - Backup Ring (2 Used)	49 - Spring (4 Used)	
15 - Sleeve	34 - Spring (2 Used)	50 - Pilot Poppet (4 Used)	
16 - O-Ring	35 - Check Valve (2 Used)	51 - Spring (4 Used)	

UPPERSTRUCTURE / Control Valve



(): For Check Valve-2

Close-Up of Overload Relief Valve-2

Close-Up of Check Valve-1, Check Valve-2

W1J7-02-05-004

UPPERSTRUCTURE / Control Valve


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-1 by using a test bench.

(Refer to the Operational 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)

UPPERSTRUCTURE / Control Valve

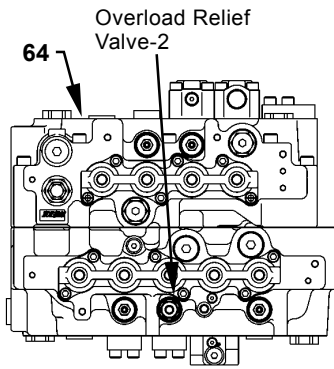


Figure of Control Valve (Upper)

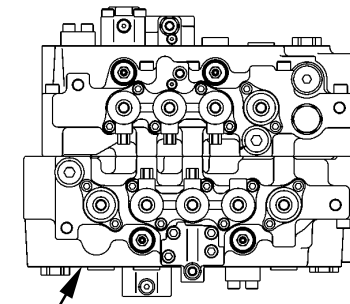
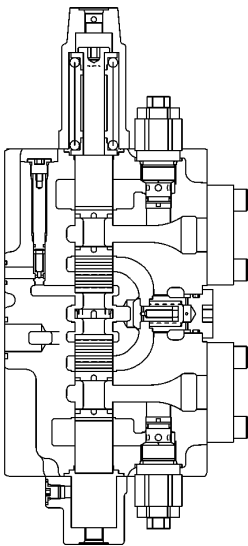
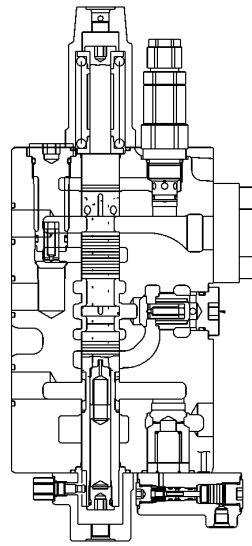


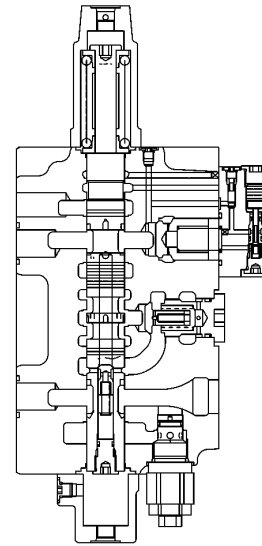
Figure of Control Valve (Lower)



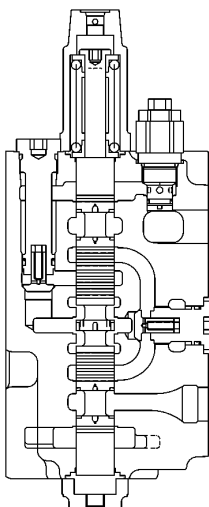
Section of Check Valve-3,
Overload Relief Valve-1



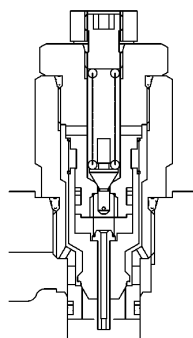
Section of Check Valve-2,
Overload Relief Valve-2



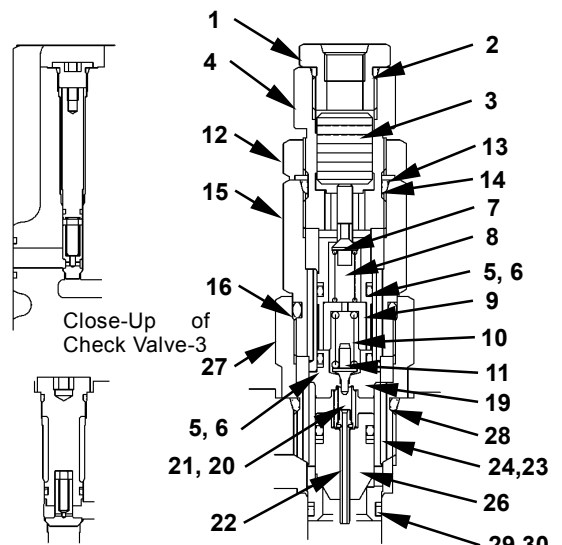
Section of Overload Relief Valve-1



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, Close-Up of Overload
Relief Valve-2


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UPPERSTRUCTURE / Control Valve

- 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) in 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.

(Refer to the Operational Performance Test section / 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).

UPPERSTRUCTURE / Control Valve

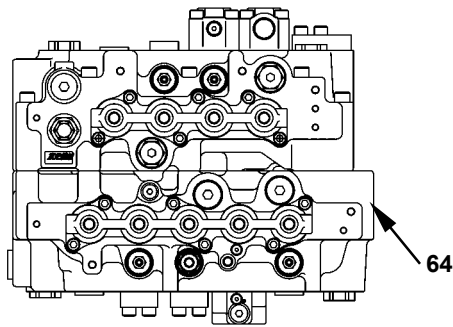


Figure of Control Valve (Upper)

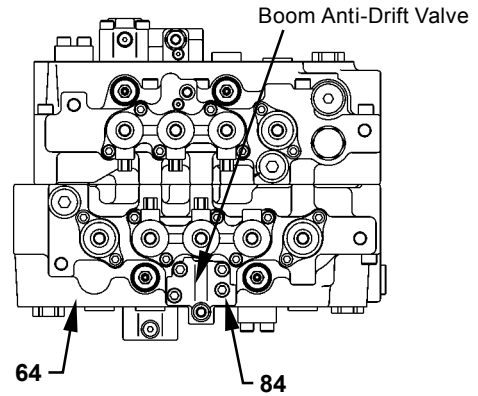
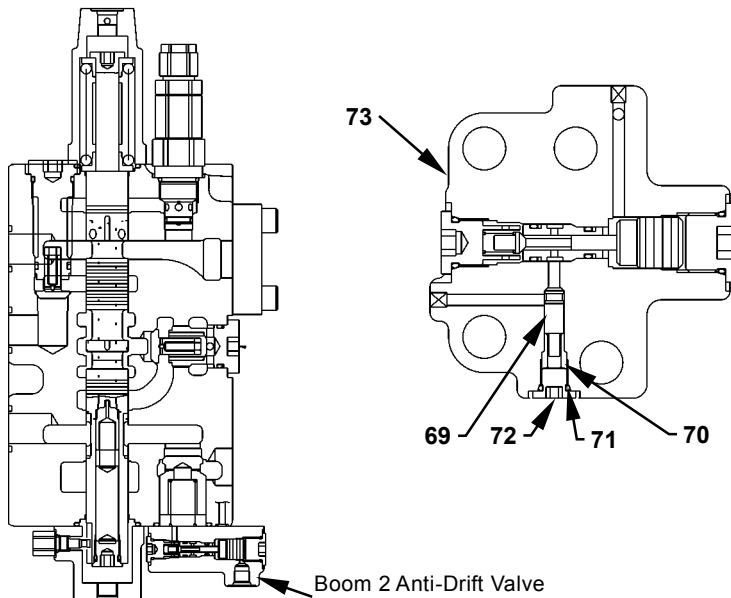
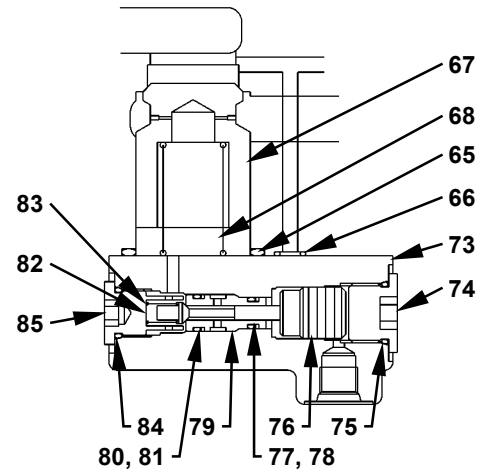


Figure of Control Valve (Lower)



Section of Boom 2 Anti-Drift Valve

(Refer to Close-Up.)



Close-Up Boom 2 Anti-Drift Valve

W1J7-02-05-020

- | | | | |
|--------------------------|----------------------------|-------------------------------|---------------------------|
| 1 - Cap | 24 - Backup Ring (10 Used) | 46 - Lock Nut (4 Used) | 67 - Poppet |
| 2 - O-Ring | 26 - Main Poppet | 47 - Adjusting Screw (4 Used) | 68 - Spring |
| 3 - Piston | 27 - Sleeve | 48 - O-Ring (4 Used) | 69 - Check Valve |
| 4 - Sleeve | 28 - O-Ring (5 Used) | 49 - Spring (4 Used) | 70 - Spring |
| 5 - Backup Ring (2 Used) | 29 - Backup Ring (5 Used) | 50 - Pilot Poppet (4 Used) | 71 - O-Ring |
| 6 - O-Ring (2 Used) | 30 - O-Ring (5 Used) | 51 - Spring (4 Used) | 72 - Cap |
| 7 - Poppet | 31 - Cap | 52 - O-Ring (4 Used) | 73 - Cover |
| 8 - Spring | 32 - O-Ring (2 Used) | 53 - Seat (4 Used) | 74 - Cap |
| 9 - Spring Seat | 33 - Backup Ring (2 Used) | 54 - Spring (4 Used) | 75 - O-Ring |
| 10 - Spring | 34 - Spring (2 Used) | 55 - Piston (4 Used) | 76 - Piston |
| 11 - Pilot Poppet | 35 - Check Valve (2 Used) | 56 - Main Poppet (4 Used) | 77 - Backup Ring |
| 12 - Lock Nut | 36 - Cap | 57 - Sleeve (4 Used) | 78 - O-Ring |
| 13 - Backup Ring | 37 - O-Ring | 58 - O-Ring | 79 - Sleeve |
| 14 - O-Ring | 38 - Cap | 59 - Cap | 80 - Backup Ring |
| 15 - Sleeve | 39 - O-Ring | 60 - O-Ring | 81 - O-Ring |
| 16 - O-Ring | 40 - Spacer | 61 - O-Ring (2 Used) | 82 - Poppet |
| 19 - Pilot Seat | 41 - O-Ring | 62 - Flange | 83 - Spring |
| 20 - Spring | 42 - Spring | 63 - Socket Bolt (4 Used) | 84 - O-Ring |
| 21 - Spring | 43 - Check Valve | 64 - Housing | 85 - Cap |
| 22 - Piston | 44 - Cap | 65 - O-Ring | 86 - Socket Bolt (4 Used) |
| 23 - O-Ring (4 Used) | 45 - O-Ring | 66 - O-Ring | |


UPPERSTRUCTURE / Control Valve


- Assemble Boom 2 Anti-Drift Valve

20. Install poppet (67) and spring (68) to housing (64).


21. Install O-rings (78, 81) and backup rings (77, 80) to sleeve (79). Install sleeve (79) to cover (73).


22. Install O-ring (84) to cap (85). Install poppet (82), spring (83) and cap (85) to cover (73).

 : 8 mm


 : 50 N·m (5.1 kgf·m, 37 lbf·ft)


23. Install O-ring (75) to cap (74). Install piston (76) and cap (74) to cover (73).

 : 27 mm


 : 60 N·m (6.1 kgf·m, 44 lbf·ft)


24. Install O-ring (71) to cap (72). Install check valve (69), spring (70) and cap (72) to cover (73).

 : 5 mm

 : 20 N·m (2 kgf·m, 15 lbf·ft)

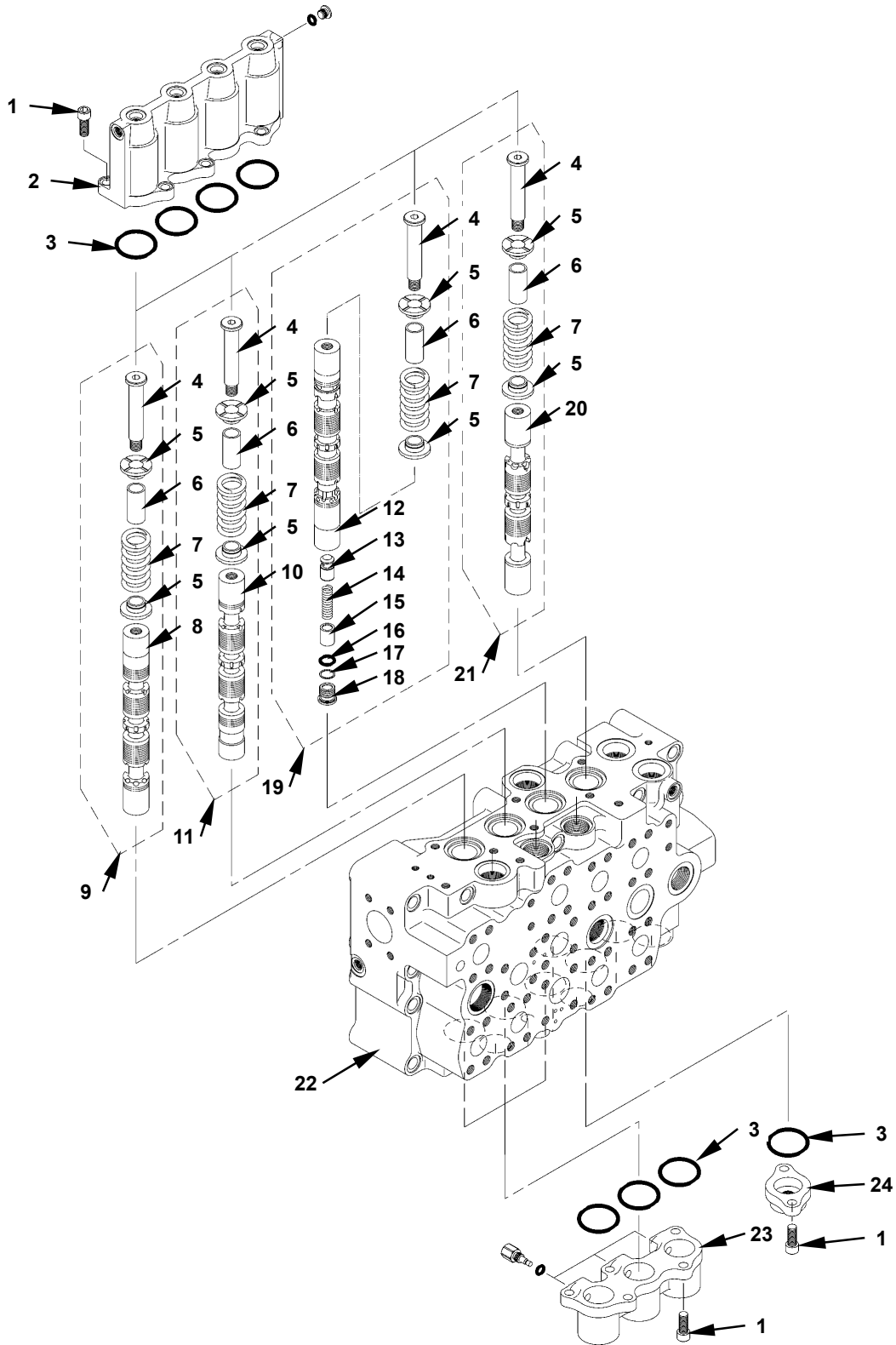
25. Install O-rings (65), (66) (2 used) and cover (73) to housing (64) with socket bolts (86) (4 used).

 : 12 mm

 : 180 N·m (18.3 kgf·m, 133 lbf·ft)

UPPERSTRUCTURE / Control Valve

DISASSEMBLE CONTROL VALVE (4-SPOOL CONTROL VALVE)

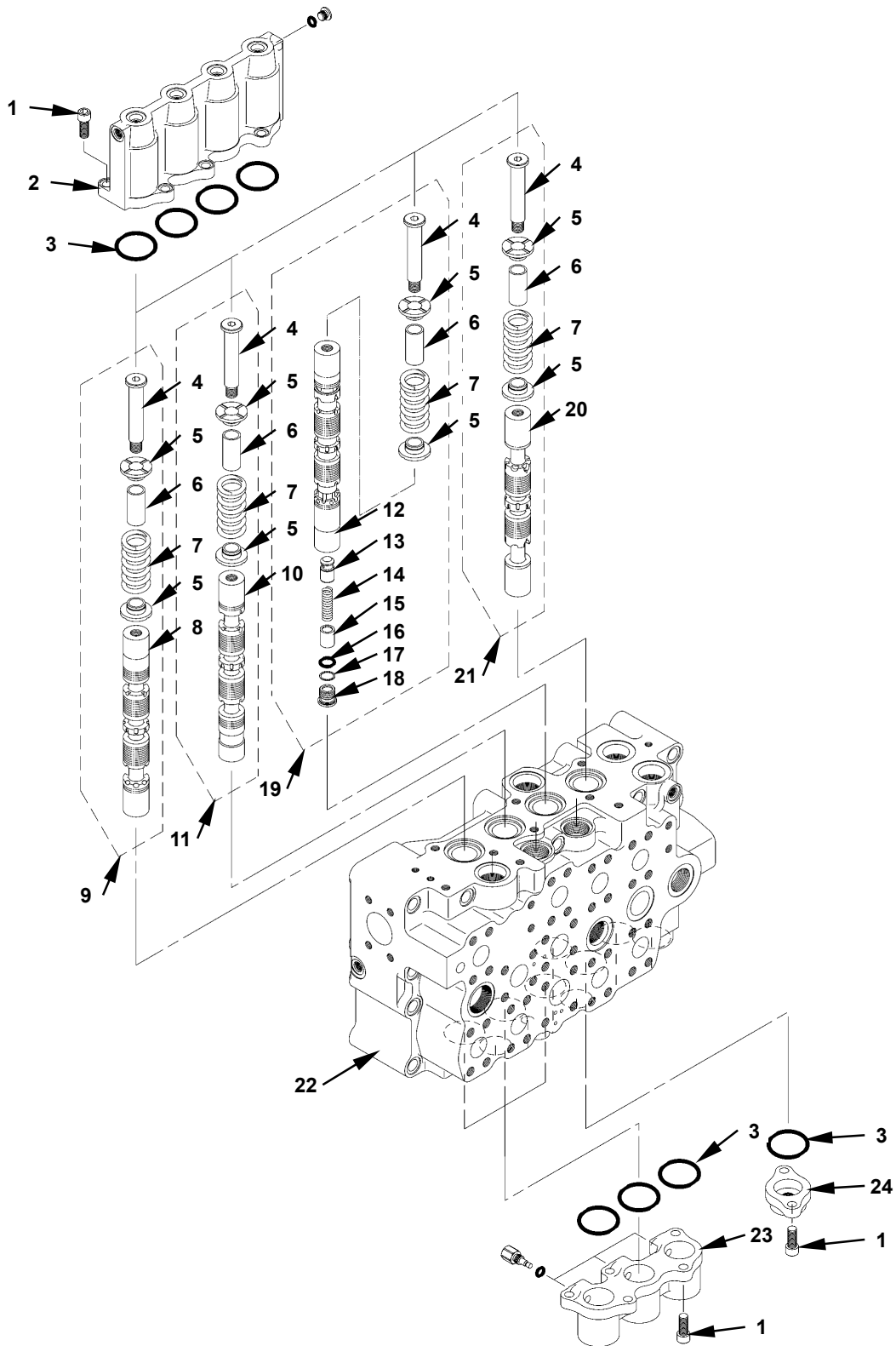


W1J7-02-05-013

UPPERSTRUCTURE / Control 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)
4 - Bolt (4 Used)	10 - Spool	16 - O-Ring	22 - Housing (4-Spool Side)
5 - Spring Guide (8 Used)	11 - Spool (Boom 2)	17 - Backup Ring	23 - Cover
6 - Sleeve (4 Used)	12 - Spool	18 - Cap	24 - Cover

UPPERSTRUCTURE / Control Valve




W1J7-02-05-013

UPPERSTRUCTURE / Control Valve


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

UPPERSTRUCTURE / Control Valve

ASSEMBLE CONTROL VALVE (4-SPOOL CONTROL VALVE)

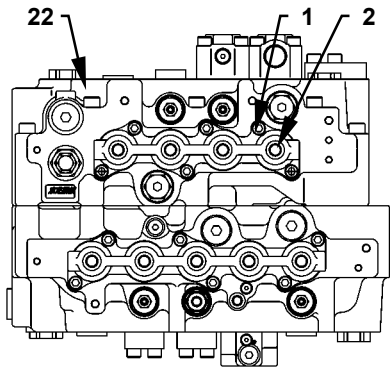


Figure of Control Valve (Upper)

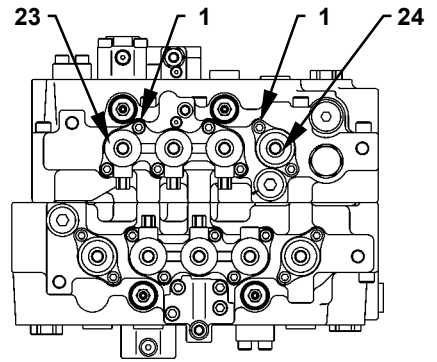
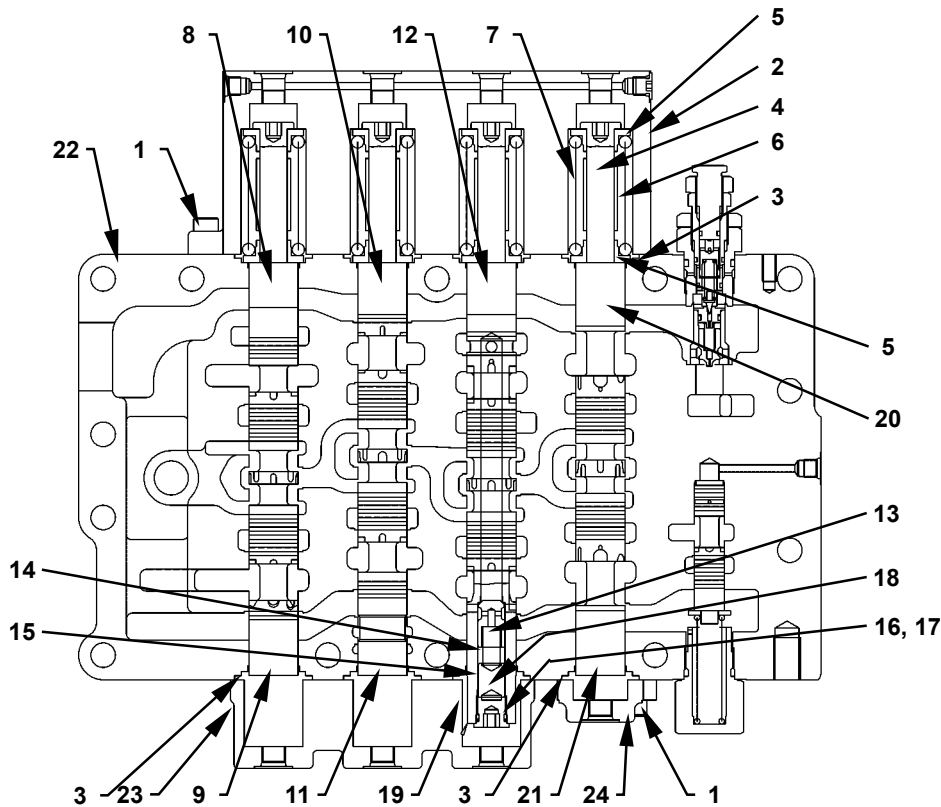


Figure of Control Valve (Lower)



Section of 4-Spool


W1J7-02-05-005


- | | | | |
|---------------------------|---------------------|------------------|---------------------|
| 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) |
| 4 - Bolt (4 Used) | 10 - Spool | 16 - O-Ring | 22 - Housing |
| 5 - Spring Guide (8 Used) | 11 - Spool (Boom 2) | 17 - Backup Ring | 23 - Cover |
| 6 - Sleeve (4 Used) | 12 - Spool | 18 - Cap | 24 - Cover |

UPPERSTRUCTURE / Control Valve


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)

4. Apply hydraulic oil onto the surface of spools (9, 11, 19, 21). Rotate and install spools (8, 10, 12, 20) to housing (22) slowly.

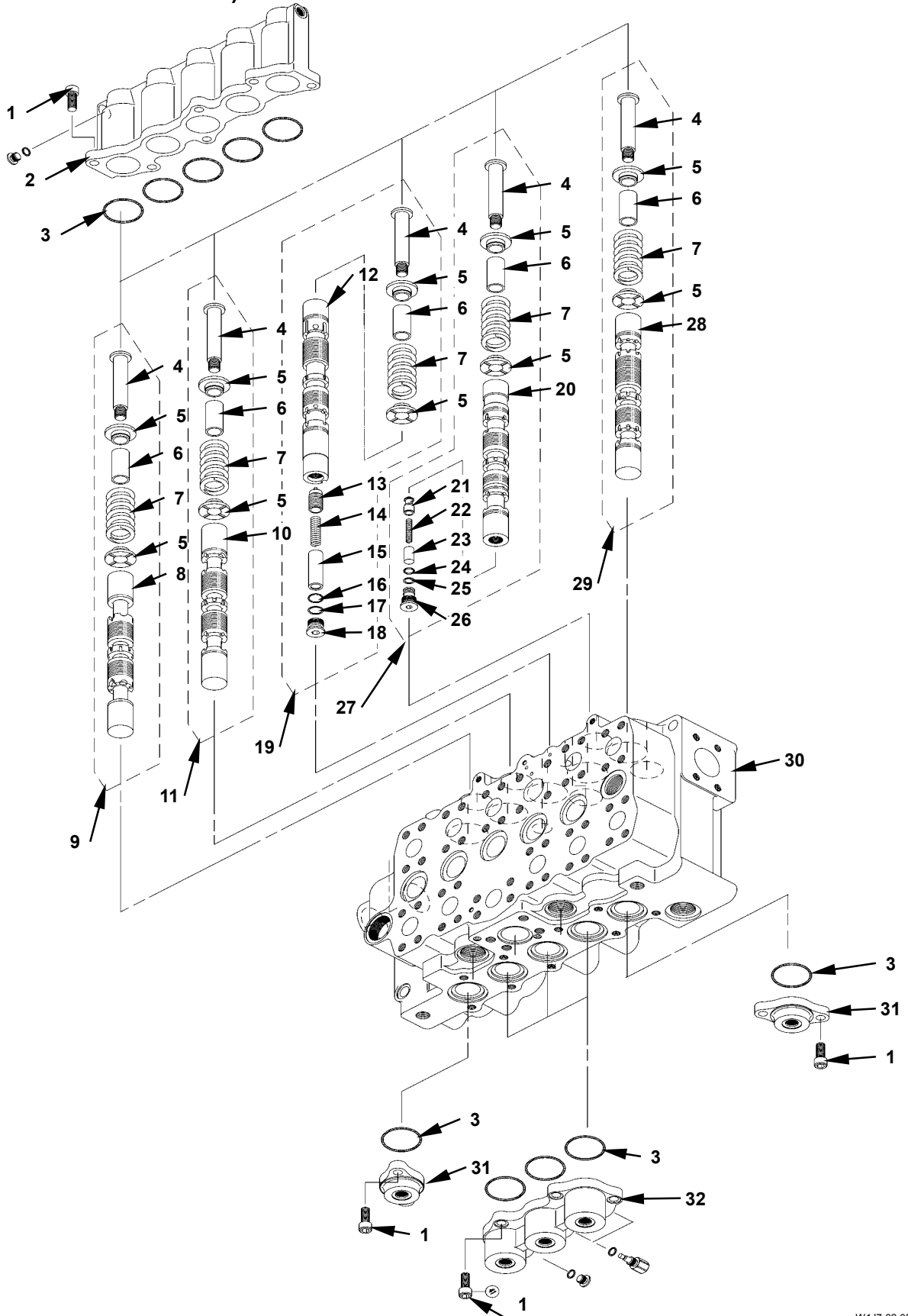
5. Install O-rings (3) (8 used) to housing (22). Install cover (2) to housing (22) with bolts (1) (6 used).

 : 10 mm

 : 100 N·m (10 kgf·m, 74 lbf·ft)

UPPERSTRUCTURE / Control Valve

DISASSEMBLE CONTROL VALVE (5-SPOOL CONTROL VALVE)

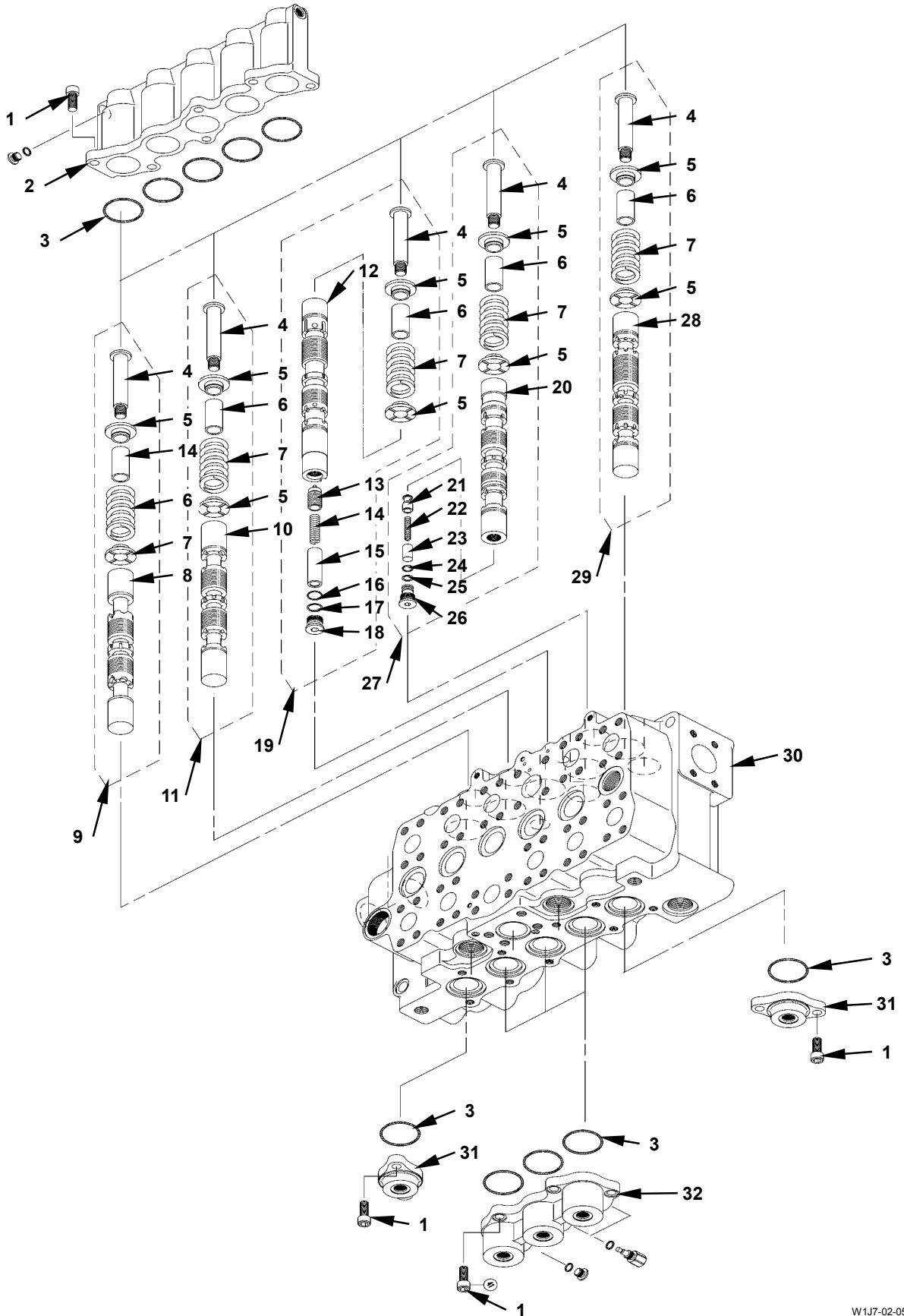


W1J7-02-05-014

UPPERSTRUCTURE / Control Valve

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
7 - Spring (5 Used)	15 - Spacer	23 - Spacer	31 - Cover (2 Used)
8 - Spool	16 - O-Ring	24 - O-Ring	32 - Cover

UPPERSTRUCTURE / Control Valve




W1J7-02-05-014

UPPERSTRUCTURE / Control Valve


Disassemble Control Valve (5-Spool Control Valve)

Disassemble Spools

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

UPPERSTRUCTURE / Control Valve

ASSEMBLE CONTROL VALVE (5-SPOOL CONTROL VALVE)

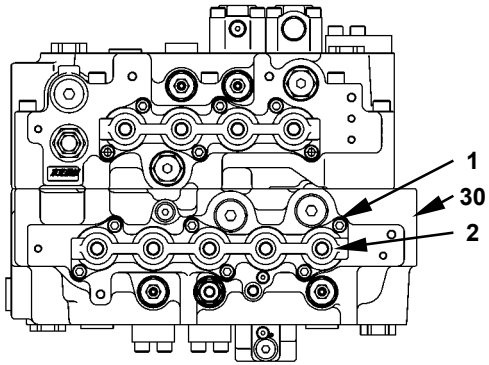


Figure of Control valve (Upper)

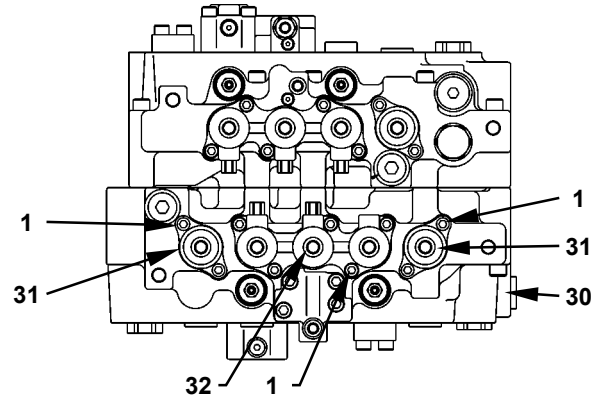
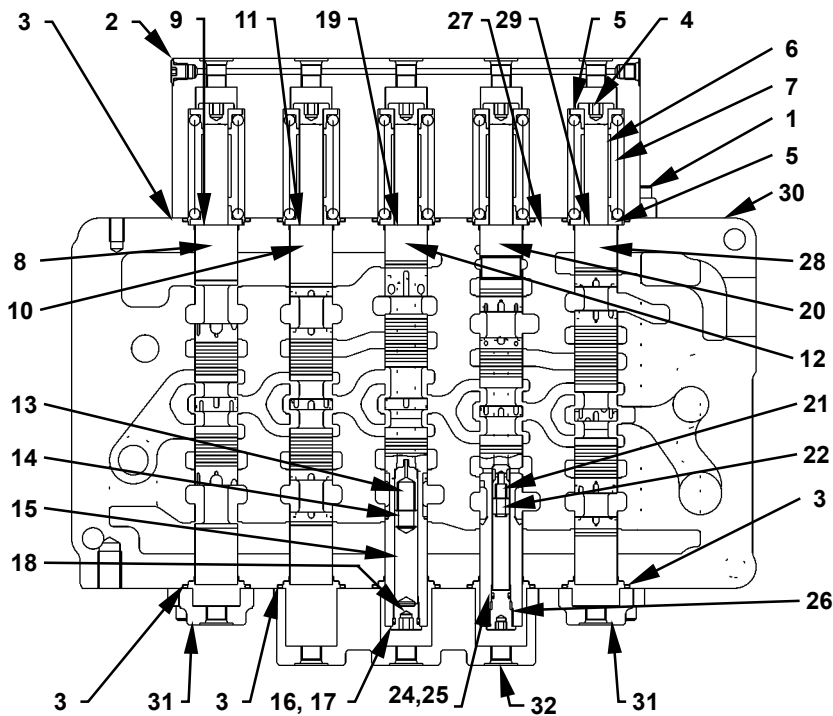


Figure of Control Valve (Lower)













Section of 5-Spool

W1J7-02-05-006

- | | | | |
|----------------------------|------------------------|---------------------|---------------------|
| 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 - Cap (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 |
| 7 - Spring (5 Used) | 15 - Spacer | 23 - Spacer | 31 - Cover (2 Used) |
| 8 - Spool | 16 - O-Ring | 24 - O-Ring | 32 - Cover |

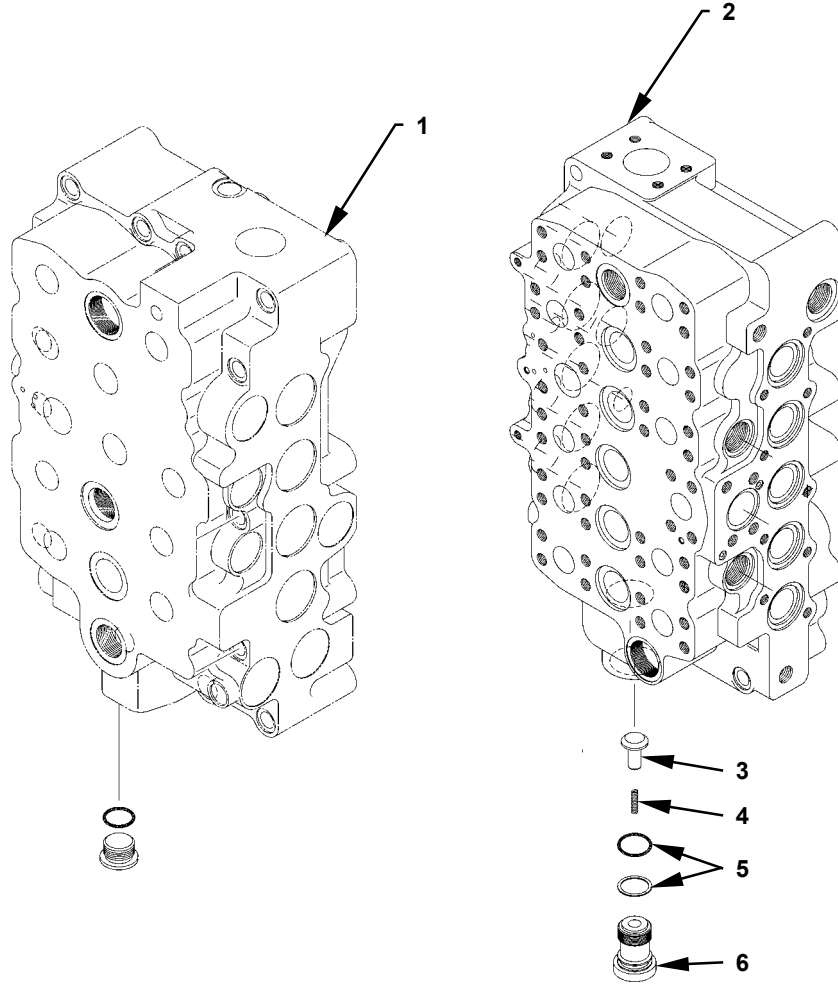
UPPERSTRUCTURE / Control Valve

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)
2. Apply LOCTITE #262 to the thread part of bolts (4) (5 used). 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)
5. Apply hydraulic oil onto the surfaces of spools (8, 10, 12, 20, 28). 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)

UPPERSTRUCTURE / Control Valve

DISASSEMBLE CONTROL VALVE
(HOUSING FRONT AND REAR SURFACES)



W1J7-02-05-021

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

3 - Check Valve
4 - Spring


5 - O-Ring, Backup Ring

6 - Cap

UPPERSTRUCTURE / Control Valve

Disassemble Control Valve (Housing Front and Rear Surfaces)

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

 : 14 mm

UPPERSTRUCTURE / Control Valve

ASSEMBLE CONTROL VALVE (HOUSING FRONT AND REAR SURFACES)

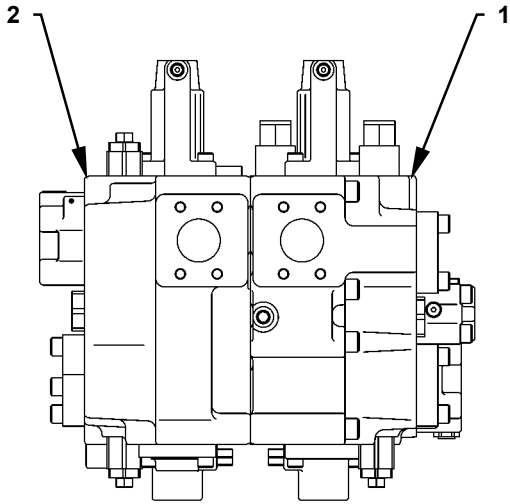


Figure of Control Valve (Rear)

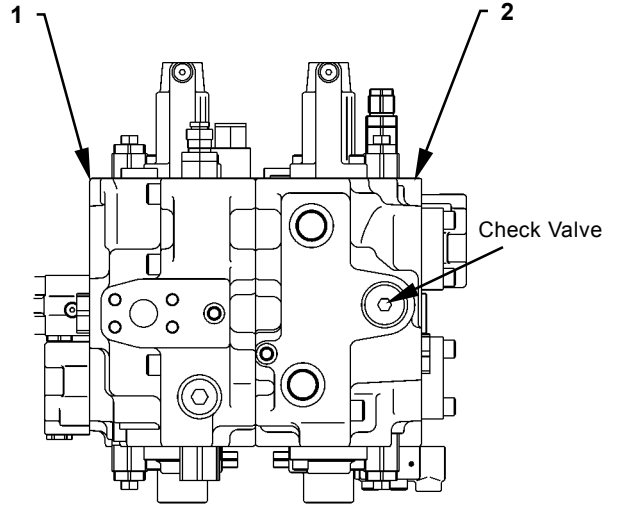
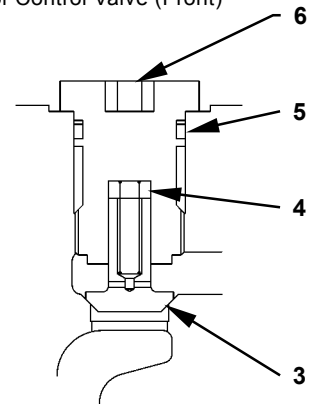


Figure of Control Valve (Front)



Section of Check Valve

W1J7-02-05-007

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

3 - Check Valve
4 - Spring


5 - O-Ring, Backup Ring


6 - Cap

UPPERSTRUCTURE / Control Valve

Assemble Control Valve (Housing Front and Rear Surfaces)

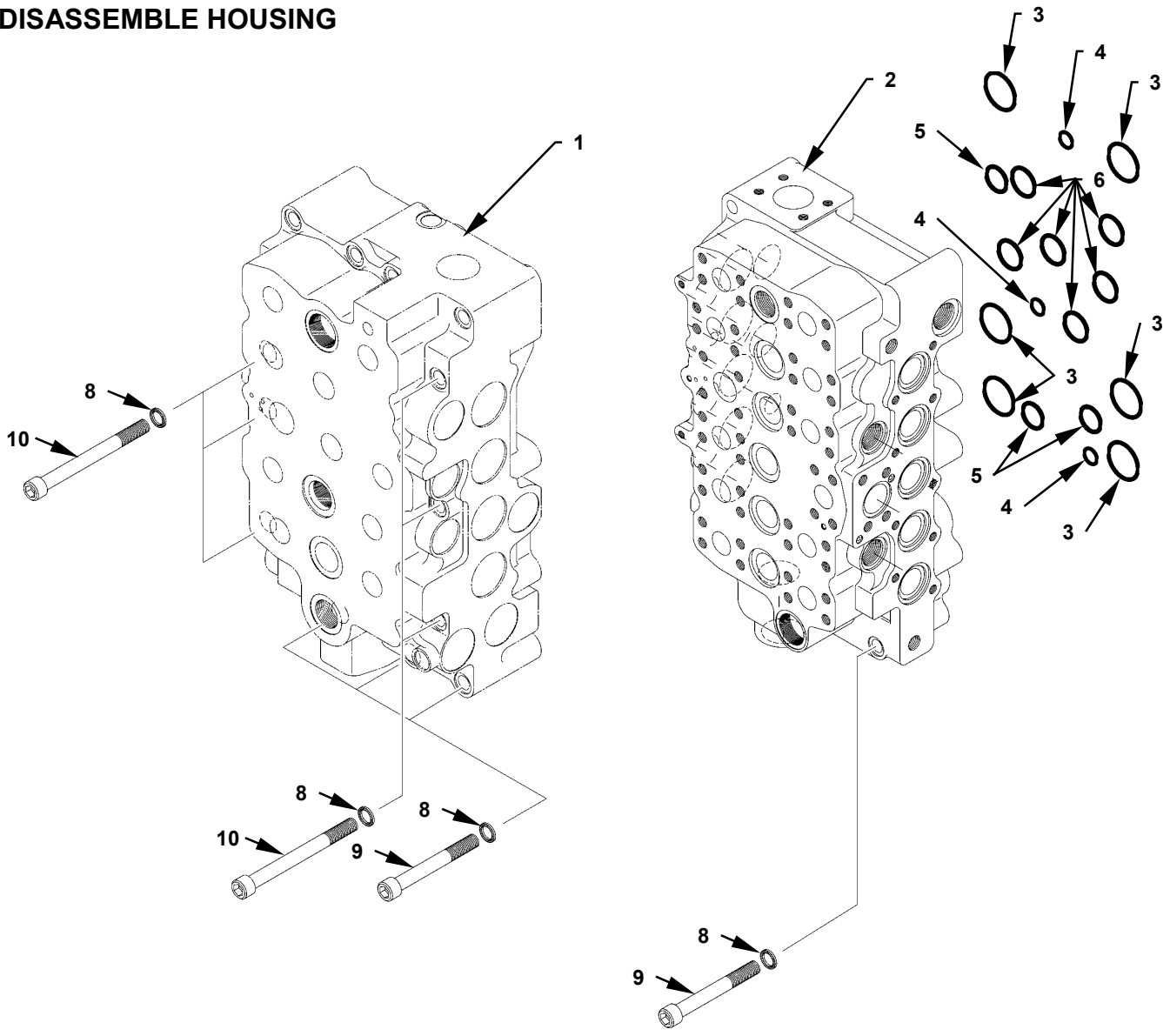
1. Install O-ring and backup ring (5) to cap (6). Install check valve (3), spring (4) and cap (6) to housing (2).

 : 14 mm

 : 350 N·m (36 kgf·m, 258 lbf·ft)

UPPERSTRUCTURE / Control Valve

DISASSEMBLE HOUSING



W1J1-02-05-057

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

UPPERSTRUCTURE / Control Valve


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.

2. 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

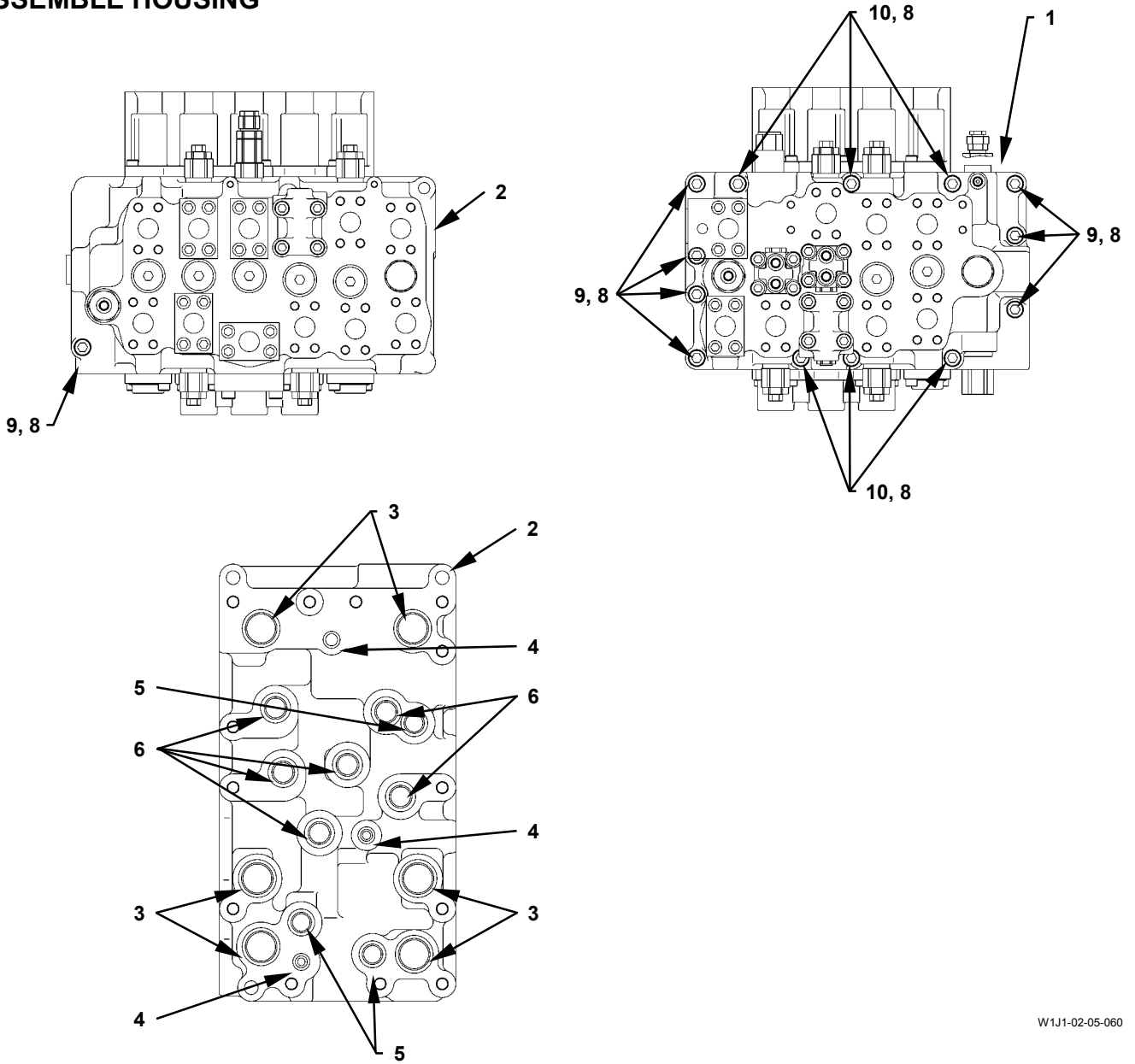


CAUTION: Housing (1) weight: 200 kg (440 lb)

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).

UPPERSTRUCTURE / Control Valve

ASSEMBLE HOUSING



W1J1-02-05-060

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

UPPERSTRUCTURE / Control Valve

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)


1. 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.
2. 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)

UPPERSTRUCTURE / Control Valve

(Blank)


UPPERSTRUCTURE / Swing Device

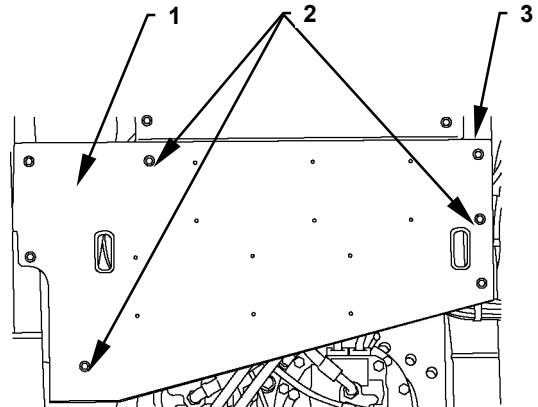
REMOVE AND INSTALL SWING DEVICE

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


1. Remove bolts (2) (7 used). Remove cover (1) from main frame (3).

 : 19 mm




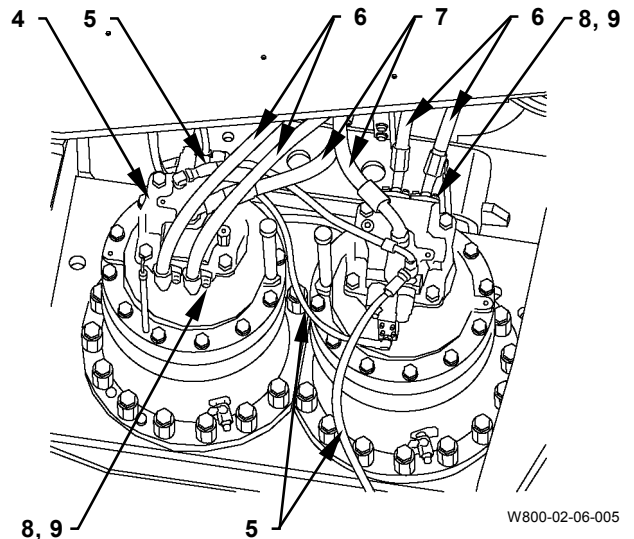
W800-02-06-004

2. Remove socket bolts (8) (16 used) and split flange (9) (8 used). Remove hoses (6) (4 used) from swing motor (4). Cap the open ends.

 : 8 mm

3. Remove hoses (5) (3 used), (7) (2 used). Cap the open ends.


 : 19 mm, 27 mm, 41 mm



W800-02-06-005

UPPERSTRUCTURE / Swing Device

- Put the matching marks onto reduction gear (10) and main frame (3). Remove bolts (12) (14 used) and spacers (11) (14 used).


 : 36 mm

- Remove corks (14) (2 used) from reduction gear (10).



CAUTION: Swing device weight 470 kg (1040 lb)

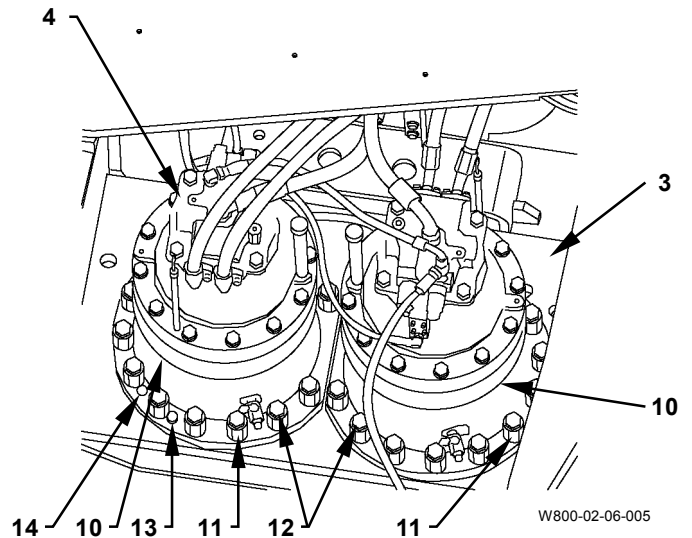
- Install the bolts (M24, Pitch 3.0 mm) to the hole where cork (14) is removed.

 : 36 mm

- Turn the pulling-out bolt and float the swing device from main frame (3).

Wind the body of swing motor (4) by using a nylon sling. Hoist and remove the swing device from main frame (3).

- Remove another swing device in the same procedures as steps 4 to 7.



UPPERSTRUCTURE / Swing Device


Installation


1. Apply liquid packing onto the both mounting surfaces on reduction gear (10) and main frame (3).

CAUTION: Swing device weight: 470 kg (1040 lb)

2. Align the matching marks made when disassembling. Align the knock pin (13) position on the swing device and lower the swing device onto the mounting surface for main frame (3). Tap and install knock pins (13) (2 used).


3. Install the swing device to main frame (3) with spacers (11) (14 used) and bolts (12) (14 used). Install new corks (14) (2 used) into the pulling-out hole.


 : 36 mm


 : 950 N·m (97 kgf·m, 700 lbf·ft)


4. Install another swing device in the same procedures as steps 1 to 3.


5. Install hoses (5) (3 used), (7) (2 used).


 : 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, 150 lbf·ft)


6. Install hoses (6) (4 used) to swing motor (4) with socket bolts (8) (16 used) and split flanges (9) (8 used).

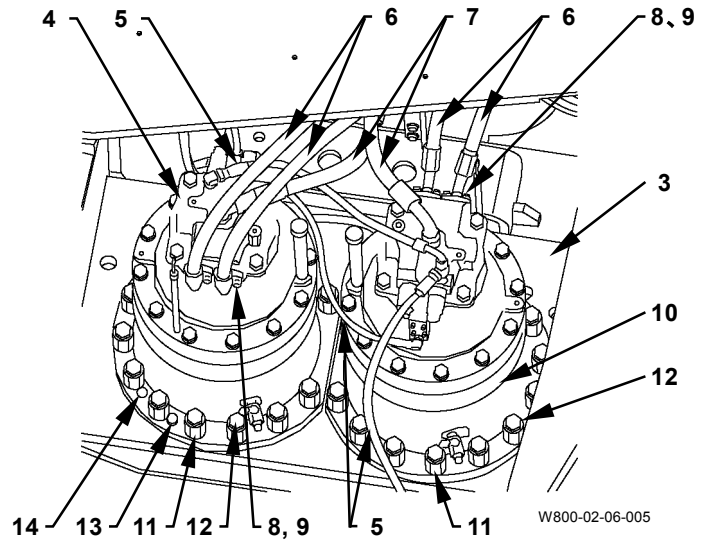
 : 8 mm

 : 50 N·m (5 kgf·m, 36 lbf·ft)

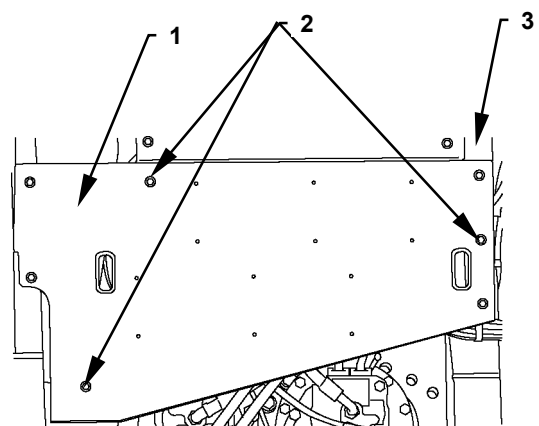
7. Install cover (1) to main frame (3) with bolts (2) (7 used).

 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)



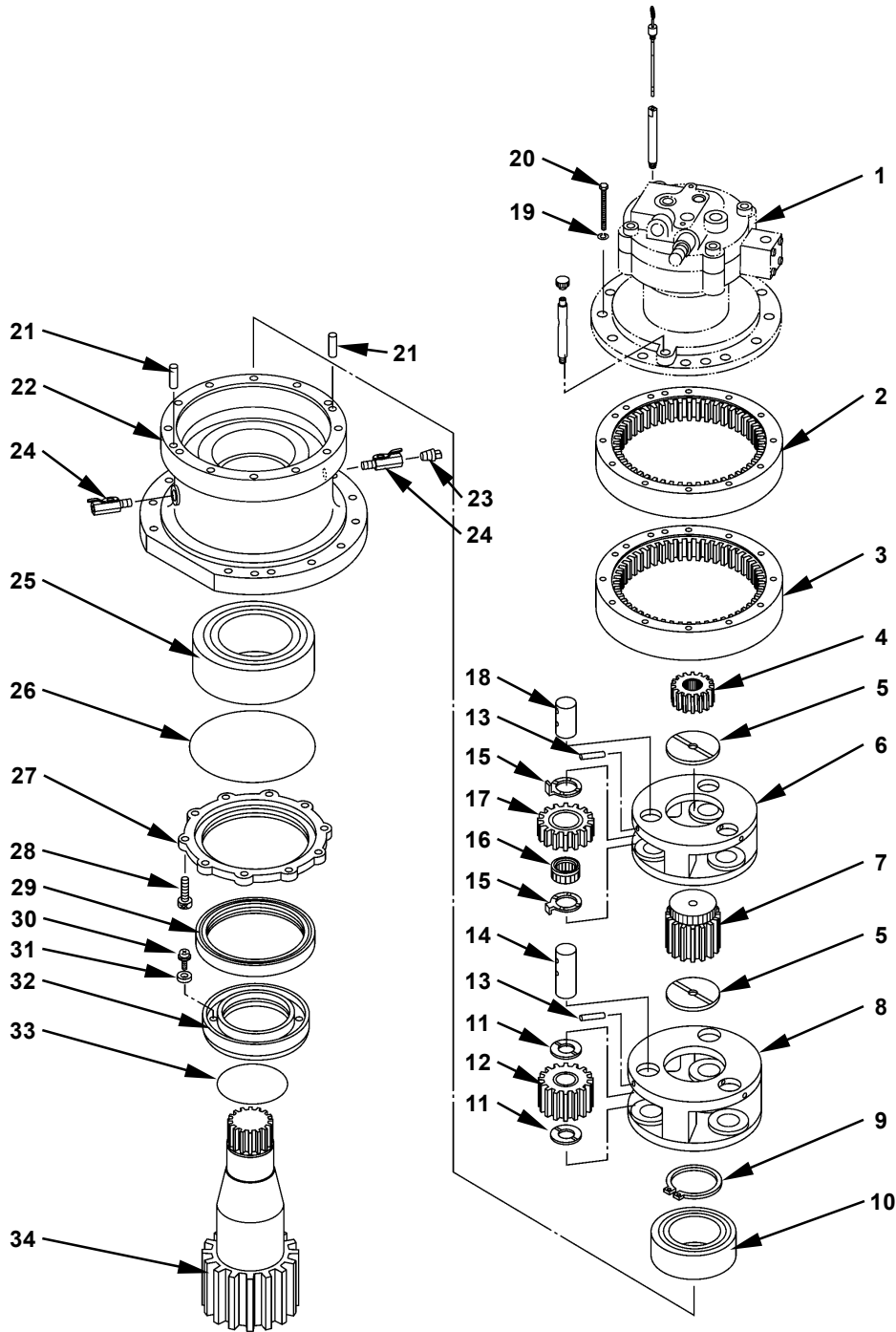
W800-02-06-005



W800-02-06-004

UPPERSTRUCTURE / Swing Device

DISASSEMBLE SWING DEVICE



- | | | | |
|---------------------------|---|------------------------------|----------------------------|
| 1 - Motor | 10 - Bearing | 19 - Spring Washer (12 Used) | 27 - Cover |
| 2 - Ring Gear | 11 - Thrust Plate (6 used) | 20 - Bolt (12 Used) | 28 - Socket Bolt (10 Used) |
| 3 - Ring Gear | 12 - Second Stage Planetary Gear (3 used) | 21 - Pin (3 Used) | 29 - Oil Seal |
| 4 - First Stage Sun Gear | 13 - Spring Pin (6 Used) | 22 - Housing | 30 - Screw (4 Used) |
| 5 - Thrust Plate (2 used) | 14 - Pin (3 Used) | 23 - Plug | 31 - Magnet (4 Used) |
| 6 - First Stage Carrier | 15 - Thrust Plate (6 used) | 24 - Cock (2 Used)) | 32 - Sleeve |
| 7 - Second Stage Sun Gear | 16 - Needle Bearing (3 Used) | 25 - Bearing | 33 - O-Ring |
| 8 - Second Stage Carrier | 17 - First Stage Planetary Gear (3 used) | 26 - O-Ring | 34 - Shaft |
| 9 - Retaining Ring | 18 - Pin (3 Used) | | |


W17V-02-06-002

UPPERSTRUCTURE / Swing Device

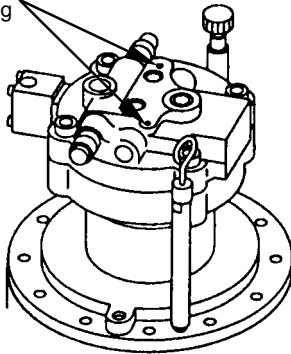
Disassemble Swing Device

CAUTION: Motor weight: 70 kg (155 lb)

1. Install eyebolt (M10, Pitch: 1.5 mm) to motor (1). Put the matching marks on the mating surface of motor (1), ring gears (2, 3) and housing (22). Remove bolts (20) (12 used). Remove motor (1) from ring gear (2).


 : 30 mm

Eyebolt
Mounting
Position




W162-02-05-010

2. Remove plug (23). Remove cock (24) and drain off oil.

 : 14 mm

CAUTION: Ring gear (2) weight: 23 kg (51 lb)

3. Remove first stage sun gear (4). Remove ring gear (2) from ring gear (3).

 *NOTE: Insert a screwdriver into clearance between ring gears (2, 3) and float ring gear (2).*

CAUTION: The first stage carrier (6) assembly weight: 24 kg (53 lb)


4. Remove the first stage carrier (6) assembly.
5. Remove second stage sun gear (7) from second stage carrier (8).

CAUTION: The second stage carrier (8) assembly weight: 44 kg (97 lb)

6. Attach a nylon sling onto second stage carrier (8). Hoist and remove second stage carrier (8).

CAUTION: Ring gear (3) weight: 32 kg (71 lb)

7. Remove ring gear (3) from housing (22).


 *NOTE: Insert a screwdriver into clearance between ring gears (3) and housing (22), and float ring gear (3).*

8. Remove retaining ring (9) from shaft (34).

CAUTION: Housing (22)+shaft (34)+others weight: 265 kg (585 lb)

9. Fasten the housing (22) body by using a nylon sling. Place housing (22) with the motor mounting side facing downward.

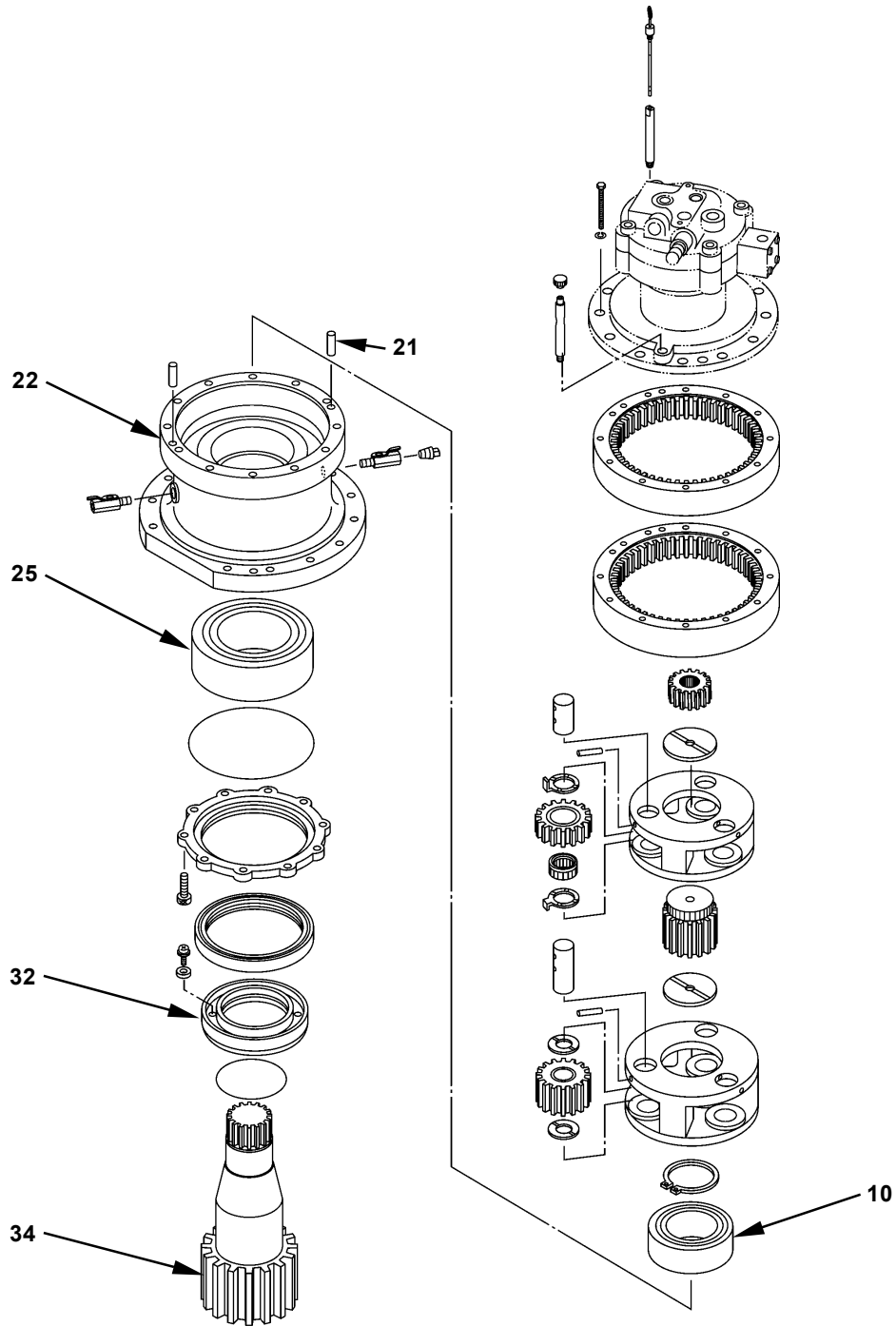
10. Remove socket bolts (28) (10 used). Remove cover (27) from housing (22). Remove O-Ring (26) from housing (22).

 : 10 mm

CAUTION: Housing (22) + shaft (34) +others weight: 260 kg(575 lb)

11. Fasten the housing (22) body by using a nylon sling. Place housing (22) with the motor mounting side facing upward.

UPPERSTRUCTURE / Swing Device

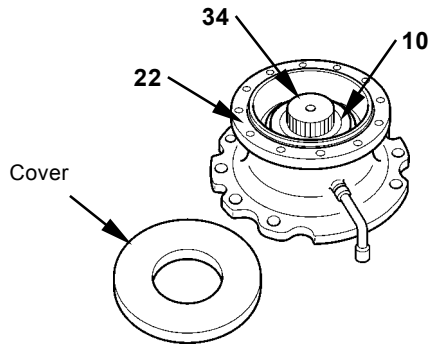


W17V-02-06-002

UPPERSTRUCTURE / Swing Device

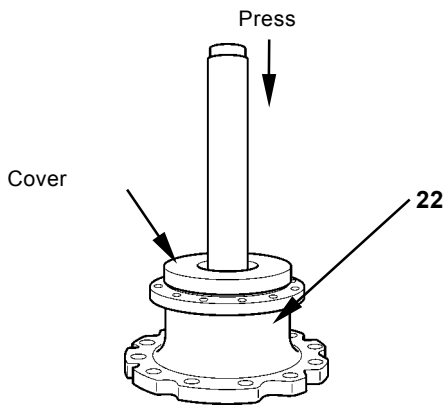


CAUTION: Push shaft (34) by using a press with a cover (outer dia.: 420 mm, inner dia.: 130 mm, thickness: 25 to 30 mm) attached. When housing (22) or bearing (10) are broken and flown off, the metal fragments may result in personal injury. Use a press with the capacity less than 30 tons (66150 lb). Degrease the housing inside before heating the roller bearing. Failure to degrease may cause a fire.



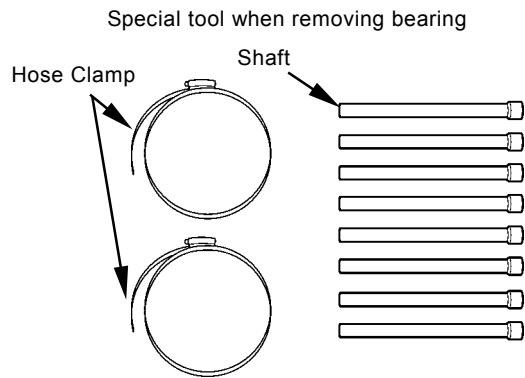
W157-02-06-010

12. Remove the shaft (34) assembly from housing (22) by using a press.

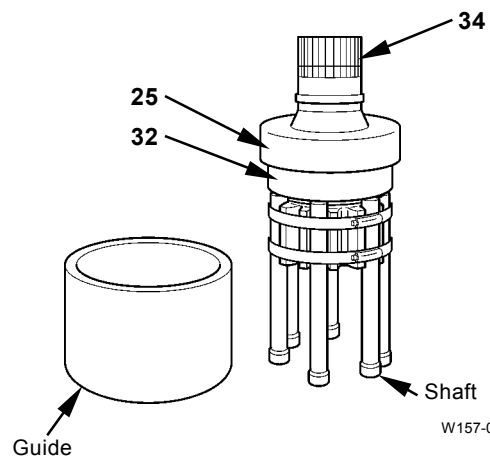


W157-02-06-011

13. Set special tool to the shaft (34) assembly.



W157-02-06-012

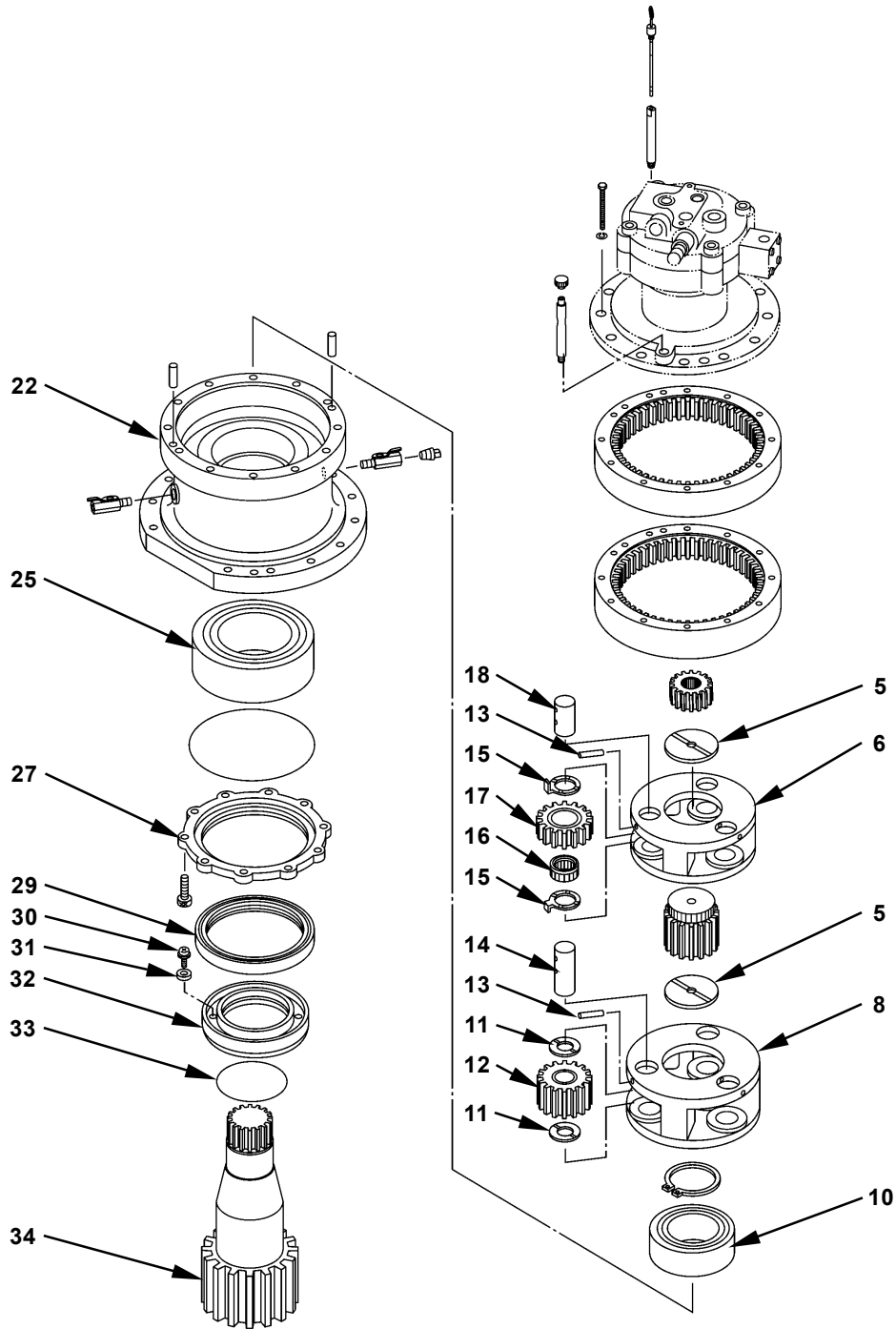


W157-02-06-013

NOTE: Use the following parts as special tool for roller bearing (25).

Name	Specification
Shaft (Bolt)	Length: 305 mm (12 in) Diameter: 19 mm (0.7 in) Number: 8 used (Same in length and with no wear and deformation at both ends) Material: S35C
Hose Clamp	Standard dia.: 8-1/2 Tighten dimension: 235 to 350 mm (9.3 to 13.8 in) Number: 2 used
Guide	Height: 230 mm (9.1 in) Outer dia.: 275 mm (10.8 in) Inner dia.: 255 mm (10 in)

UPPERSTRUCTURE / Swing Device

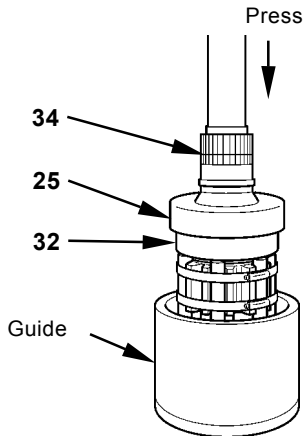


W17V-02-06-002

UPPERSTRUCTURE / Swing Device

CAUTION: When pushing shaft (34) by using a press inside the guide.

14. Set shaft (34) with special tool to a press stand.



W157-02-06-014

CAUTION: Shaft (34) + bearing (25) + others weight: 100 kg (220 lb)

15. Remove bearing (25) from shaft (34) by using a press.

16. Remove sleeve (32) from shaft (34). Remove O-ring (33), screws (30) (4 used) and magnets (31) (4 used) from sleeve (32).

17. Remove oil seal (29) from cover (27).

18. Fasten the housing (22) body by using a nylon sling. Turn over housing (22).

19. Remove bearing (10) from housing (22).

20. Remove spring pin (13) from first stage carrier (6) by using a round bar and hammer.
Round bar (ϕ 5.0 mm, Length: 50 mm or longer)

21. Remove pins (18) (3 used), first stage planetary gears (17) (3 used), thrust plates (15) (6 used) and needle bearings (16) (3 used) from first stage carrier (6).

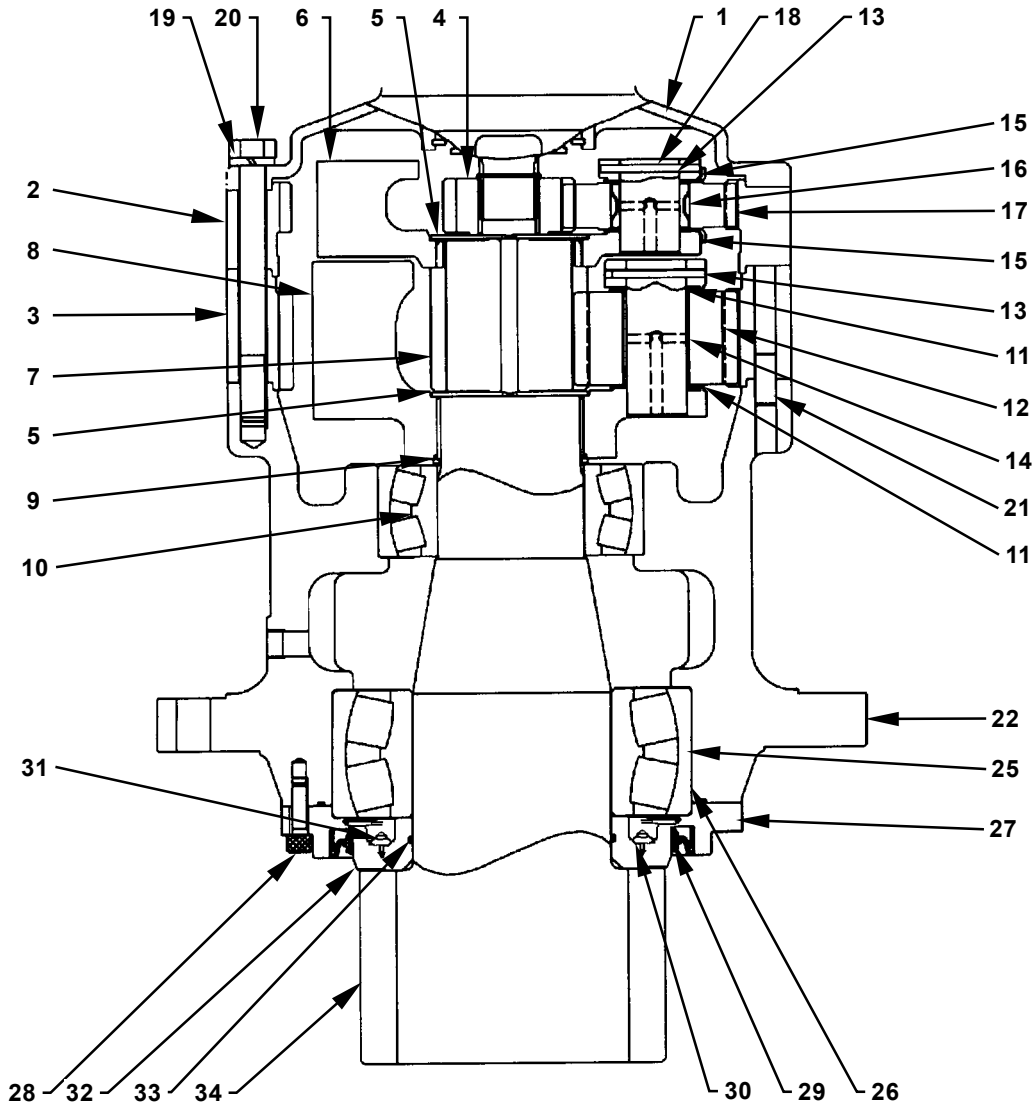
22. Remove thrust plate (5) from first stage carrier (6).

23. Disassemble the second stage carrier (8) assembly in the procedures as steps 20 to 22.

NOTE: The needle bearing is not used for second stage planetary gear (12).


UPPERSTRUCTURE / Swing Device

ASSEMBLE SWING DEVICE



W17V-02-06-003

- | | | | |
|---------------------------|---|------------------------------|----------------------------|
| 1 - Motor | 10 - Bearing | 19 - Spring Washer (12 Used) | 27 - Cover |
| 2 - Ring Gear | 11 - Thrust Plate (6 used) | 20 - Bolt (12 Used) | 28 - Socket Bolt (10 Used) |
| 3 - Ring Gear | 12 - Second Stage Planetary Gear (3 used) | 21 - Pin (3 Used) | 29 - Oil Seal |
| 4 - First Stage Sun Gear | 13 - Spring Pin (6 Used) | 22 - Housing | 30 - Screw (4 Used) |
| 5 - Thrust Plate (2 used) | 14 - Pin (3 Used) | 23 - Plug | 31 - Magnet (4 Used) |
| 6 - First Stage Carrier | 15 - Thrust Plate (6 used) | 24 - Cock (2 Used) | 32 - Sleeve |
| 7 - Second Stage Sun Gear | 16 - Needle Bearing (3 Used) | 25 - Bearing | 33 - O-Ring |
| 8 - Second Stage Carrier | 17 - First Stage Planetary Gear (3 used) | 26 - O-Ring | 34 - Shaft |
| 9 - Retaining Ring | 18 - Pin (3 Used) | | |

 **NOTE:** As for the positions of cock (24) and plug (23), refer to W2-6-4.

UPPERSTRUCTURE / Swing Device


Assemble Swing Device

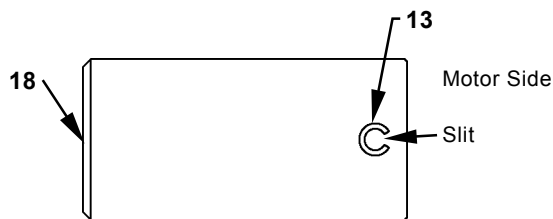
IMPORTANT: Face the oil groove of thrust plate (5) upward.

1. Install thrust plate (5) to first stage carrier (6).
2. Install needle bearing (16) to first stage planetary gear (17).


IMPORTANT: Install thrust plate (15) with the oil groove facing to the planetary gear side. Install the thrust plate while matching the bending part with the carrier.

3. Install first stage planetary gear (17) and thrust plates (15) (2 used) to first stage carrier (6).
4. Align with the spring pin (13) on first stage carrier (6) and install pin (18).
5. Tap and install spring pin (13) to first stage carrier (6) and pin (18) by using a round bar and hammer. Round bar (ϕ 5.0 mm, Length: 50 mm or longer)

 **NOTE:** At this time, face the split part of spring pin (13) to the end of pin (18) (motor side).



6. Install other planetary gears (17) to first stage carrier (6).
7. Assemble second stage carrier (8) in the procedures as steps 1 to 6.


 **NOTE:** Thrust plate (11) is not bent. The needle bearing is not used for second stage planetary gear (12).

IMPORTANT: Apply grease to O-ring (33) and LOCTITE #262 to screw (30).

8. Install screws (30) (4 used), magnets (31) (4 used) and O-ring (33) to sleeve (32).

IMPORTANT: Apply THREEBOND #1215 to the oil seal mounting surface on cover (27) and grease to the lip part of oil seal (29) respectively.


9. Install oil seal (29) to cover (27).
10. Install the cover (27) assembly to sleeve (32).
11. Install the sleeve (32) assembly to shaft (34).
12. Install bearing (25) to shaft (34) by using a press.


 **CAUTION: Housing (22) weight: 145 kg (320 lb)**


13. Place housing (22) to the press stand with the motor mounting surface facing downward.

14. Install O-ring (26) to housing (22).

15. Install the shaft (34) assembly to housing (22) by using a press. Install cover (27) to housing (22) with socket bolts (28) (10 used).

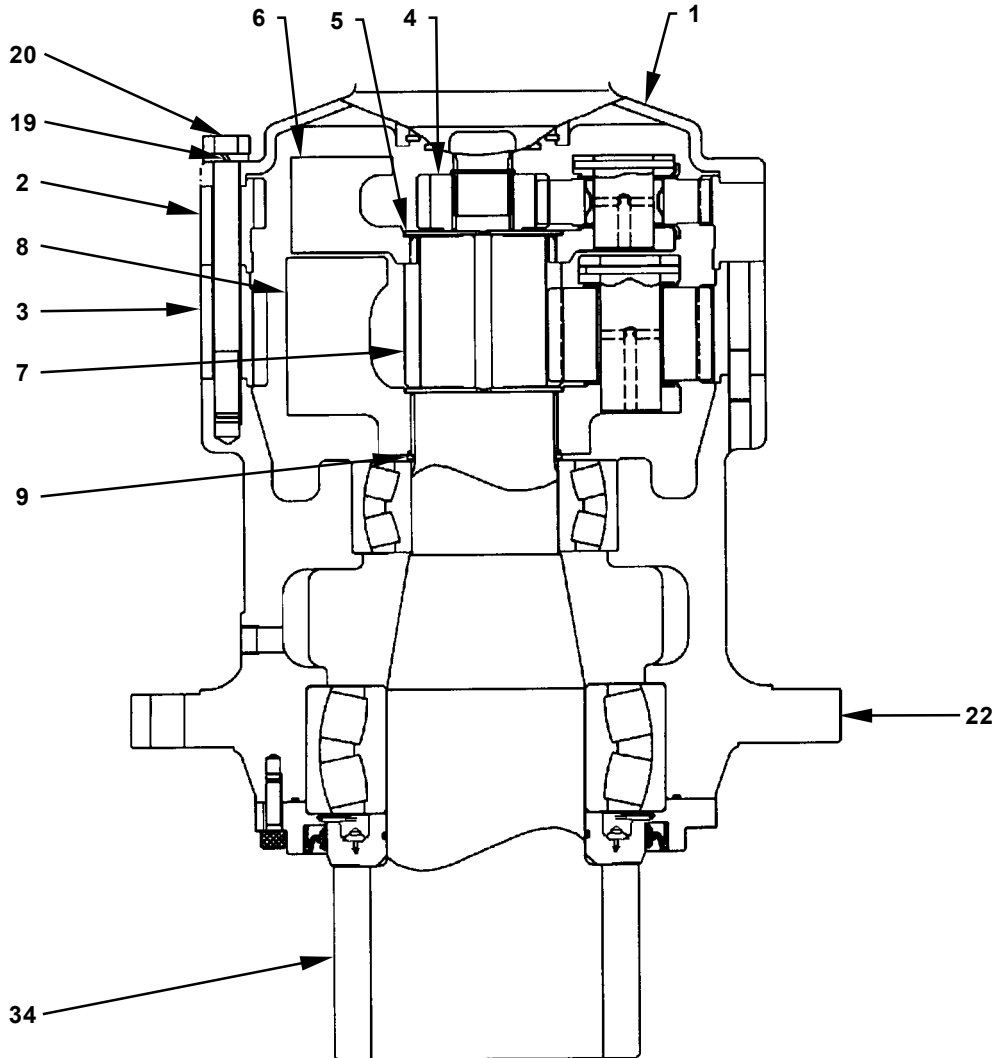
 : 10 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

 **CAUTION: Housing (22)+shaft (34)+others: 265 kg (585 lb)**

16. Turn over housing (22). Install bearing (10) to housing (22) and shaft (34) by using a press.

UPPERSTRUCTURE / Swing Device



W17V-02-06-003

UPPERSTRUCTURE / Swing Device

17. Install retaining ring (9) to shaft (34).

CAUTION: The second stage carrier (8) assembly weight: 44 kg (97 lb)

18. Attach a nylon sling onto the second stage carrier (8) assembly. Hoist and install the second stage carrier (8) assembly to housing (22).

CAUTION: Ring gear (3) weight: 32 kg (71 lb)

IMPORTANT: Apply THREEBOND #1215 onto the ring gear (3) mounting surface on housing (22).

19. Hoist and install ring gear (3) to housing (22) while aligning the matching marks made when disassembling.

20. Install second stage sun gear (7) to second stage carrier (8).

CAUTION: The first stage carrier (6) assembly weight: 24 kg (53 lb)

21. Attach a nylon sling onto the first stage carrier (6) assembly. Hoist and install the first stage carrier (6) assembly to second stage carrier (8).

IMPORTANT: Install first stage sun gear (4) with the step end facing downward (thrust plate side).

22. Install first stage sun gear (4) to first stage carrier (6).

CAUTION: Ring gear (2) weight: 23 kg (51 lb)


IMPORTANT: Apply THREEBOND #1215 to the ring gear (2) mounting surface on ring gear (3).


23. Hoist and install ring gear (2) to ring gear (3) while aligning the matching marks made when disassembling.

24. Install cocks (24) (2 used) to housing (22). Face the handle of cock (24) and close the port hole.

NOTE: As for the positions of cock (24) and plug (23), refer to W2-6-4.

25. Install plug (23) to cock (24).

 : 14 mm


 : 30 N·m (3 kgf·m, 22 lbf·ft)


26. Add gear oil.

Gear oil: 15 L (4 US gal.)

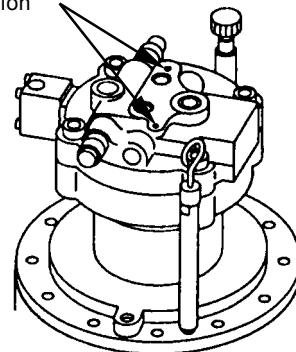
CAUTION: Motor (1) weight: 70 kg (155 lb)

27. Install eyebolt (M10, Pitch: 1.5 mm) to motor (1). Hoist and install motor (1) to the swing reduction gear assembly with bolts (20) (12 used) and spring washers (19) (12 used).

 : 30 mm

 : 400 N·m (41 kgf·m, 295 lbf·ft)

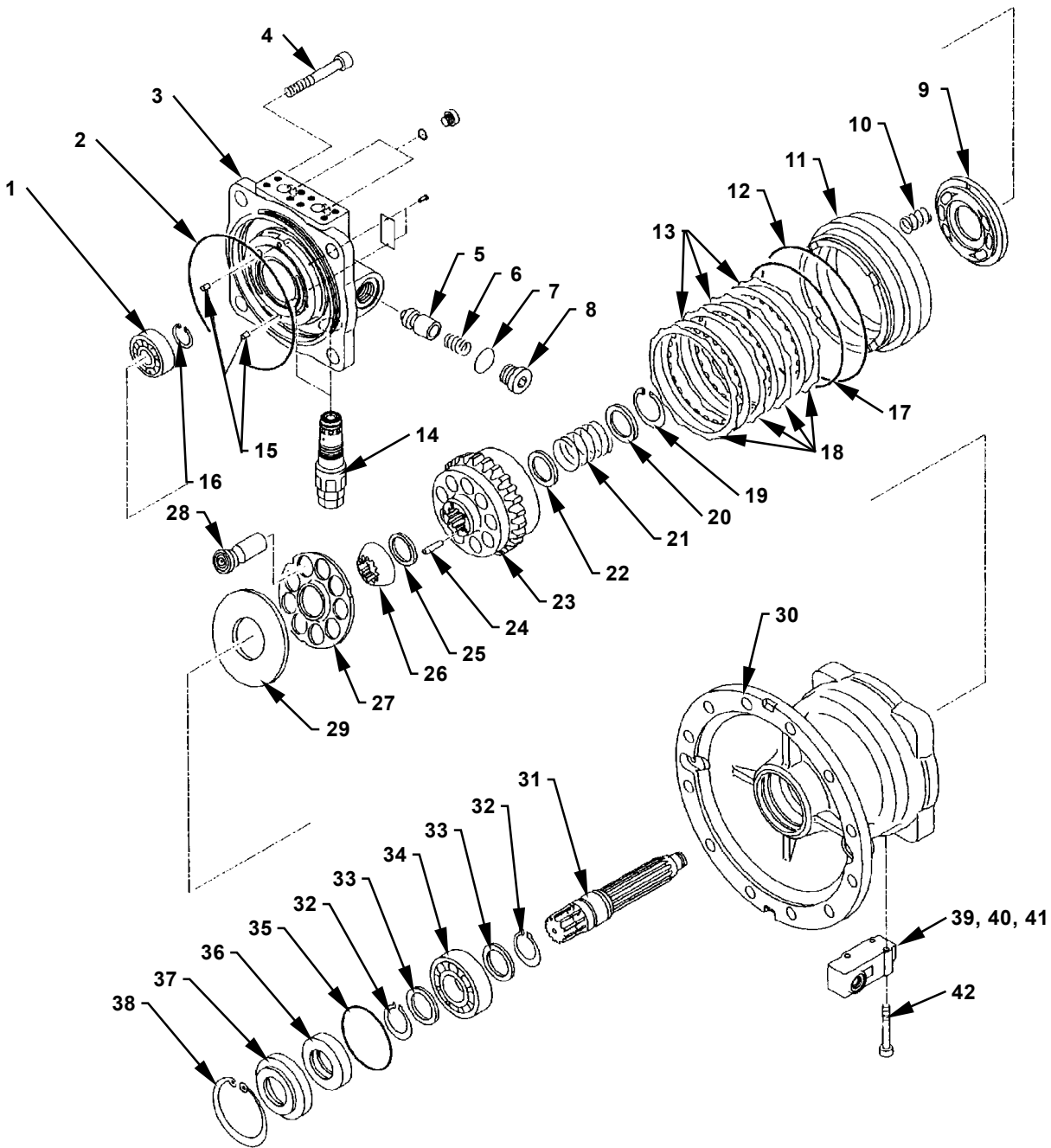
Eyebolt Mounting Position



W162-02-05-010

UPPERSTRUCTURE / Swing Device

DISASSEMBLE SWING MOTOR



W800-02-06-001

- | | | | |
|--------------------------|------------------------------|------------------------------|--------------------------------|
| 1 - Roller Bearing | 12 - O-Ring | 23 - Rotor | 34 - Roller Bearing |
| 2 - O-Ring | 13 - Friction Plate (3 Used) | 24 - Push Rod (12 Used) | 35 - O-Ring |
| 3 - Valve Casing | 14 - Relief Valve (2 Used) | 25 - Spacer | 36 - Oil Seal |
| 4 - Socket Bolt (4 Used) | 15 - Pin (2 Used) | 26 - Holder | 37 - Seal Cover |
| 5 - Poppet (2 Used) | 16 - Retaining Ring | 27 - Retainer Plate | 38 - Retaining Ring |
| 6 - Spring (2 Used) | 17 - O-Ring | 28 - Plunger (9 Used) | 39 - Swing Parking Brake Valve |
| 7 - O-Ring (2 Used) | 18 - Plate (4 Used) | 29 - Shoe Plate | |
| 8 - Plug (2 Used) | 19 - Retaining Ring | 30 - Casing | 40 - O-Ring |
| 9 - Valve Plate | 20 - Spacer (3 Used) | 31 - Shaft | 41 - O-Ring |
| 10 - Spring (16 Used) | 21 - Spring | 32 - Retaining Ring (2 Used) | 42 - Socket Bolt (3 Used) |
| 11 - Brake Piston | 22 - Spacer | 33 - Spacer (2 Used) | |

UPPERSTRUCTURE / Swing Device


Disassemble Swing Motor

CAUTION: The swing motor assembly weight: 70 kg (155 lb)


1. Drain hydraulic oil from the drain port on casing (30) in the swing motor.

IMPORTANT: Do not disassemble relief valve (14).

2. Remove relief valves (14) (2 used) from valve casing (3).


 : 41 mm


3. Remove plugs (8) (2 used) from valve casing (3).

 : 14 mm


4. Remove springs (6) (2 used) and poppets (5) (2 used) from valve casing (3).

5. Put the matching marks on the contacting surfaces on valve casing (3) and casing (30). Remove socket bolts (4) (4 used).

 : 17 mm


 **NOTE:** Valve casing (3) is floated by springs (10) (16 used).

6. Remove valve casing (3) from casing (30).


 **NOTE:** Remove valve casing (3) carefully as valve plate (9) falls off. Do not drop valve plate (9).

7. Remove valve plate (9) from valve casing (3).

8. Remove springs (10) (16 used) from casing (30).

 **NOTE:** When removing springs (10) (16 used), check the mounting position of springs (10) (16 used).

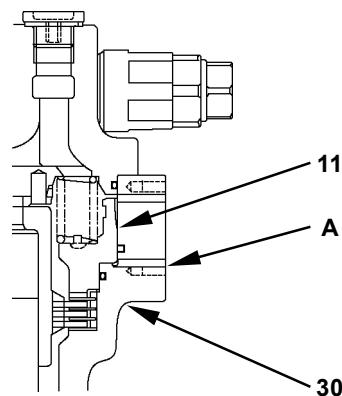
9. Remove socket bolts (42) (3 used). Remove swing parking brake valve (39) and O-rings (40, 41) from casing (30).

 : 5 mm

IMPORTANT: Do not damage the contacting surfaces due to the screwdriver.

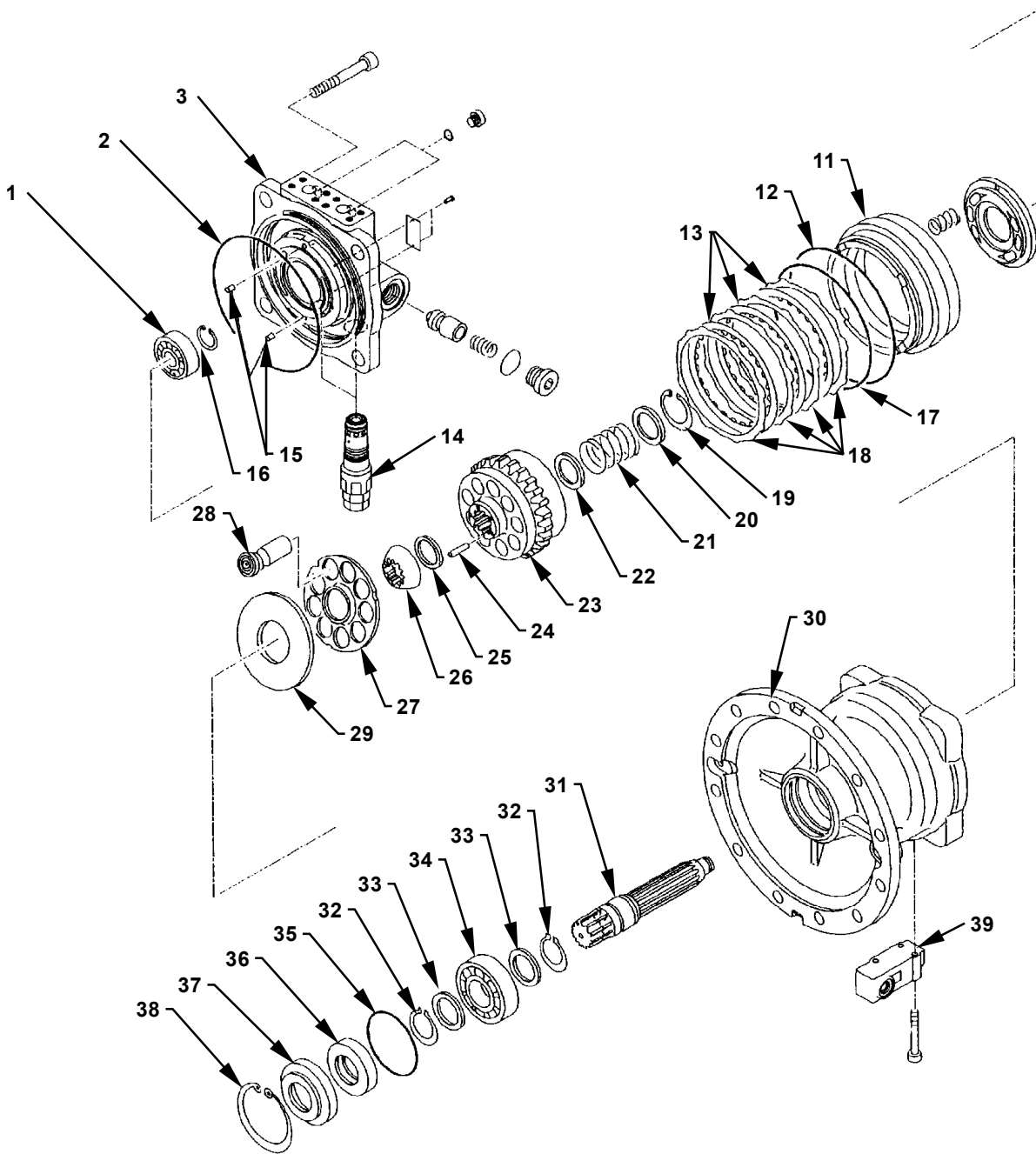
Put the matching marks on brake piston (11) and casing (30). Measure and record dimension between the upper surfaces on casing (30) and upper surfaces on brake piston (11). (necessary when assembling)

10. Apply air through part A by using an air compressor. Float and remove brake piston (11) from casing (30).




W800-02-06-006

UPPERSTRUCTURE / Swing Device




W800-02-06-001

UPPERSTRUCTURE / Swing Device

11. Remove O-rings (12, 17) from casing (30).
 12. Place casing (30) horizontally with the swing parking brake valve (39) side facing upward. At this time, place a wooden block under casing (30) with casing (30) horizontal.
 13. Remove rotor (23) from shaft (31). At this time, plunger (28) and retainer plate (27) are removed with rotor (23) together.
-  **NOTE:** *When it is difficult to remove rotor (23), plate (18) and friction plate (13) are inclined. Push in plate (18) and friction plate (13) by using a round bar.*
14. Remove plates (18) (4 used) and friction plates (13) (3 used) from casing (30).
 15. Remove retaining ring (38) from casing (30). Remove seal cover (37) from casing (30).
 16. Tap the roller bearing (1) side by using a plastic hammer lightly and remove shaft (31) from casing (30). At this time, roller bearing (34) is removed with shaft (31) together.
 17. Remove shoe plate (29) from casing (30).
 18. Remove oil seal (36) from seal cover (37) by using a screwdriver and hammer.

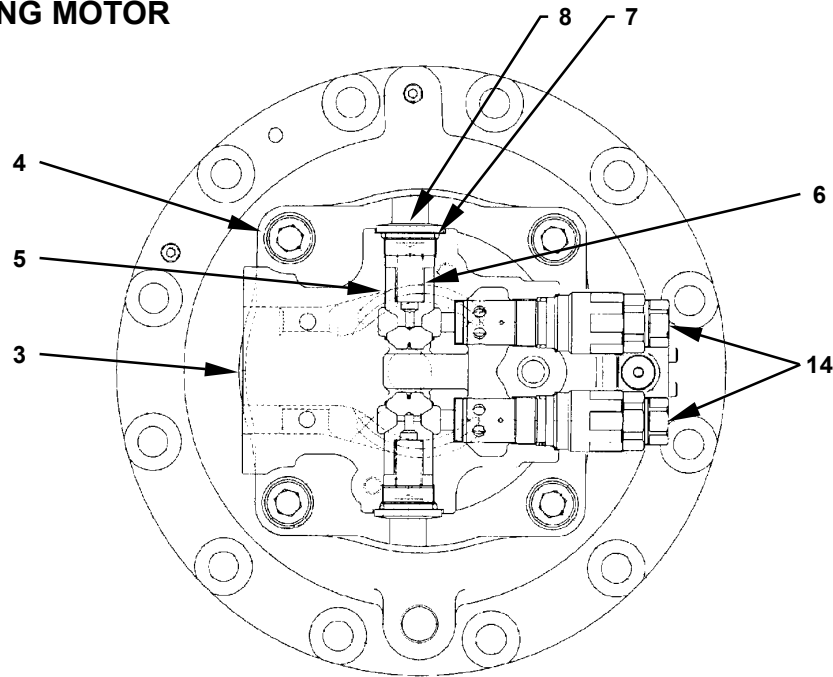
19. Remove the outer race of roller bearing (1) from valve casing (3) by using a puller. Remove O-ring (2) and pins (15) (2 used) from valve casing (3).

IMPORTANT: Do not remove the inner race of roller bearing (1) unless necessary.

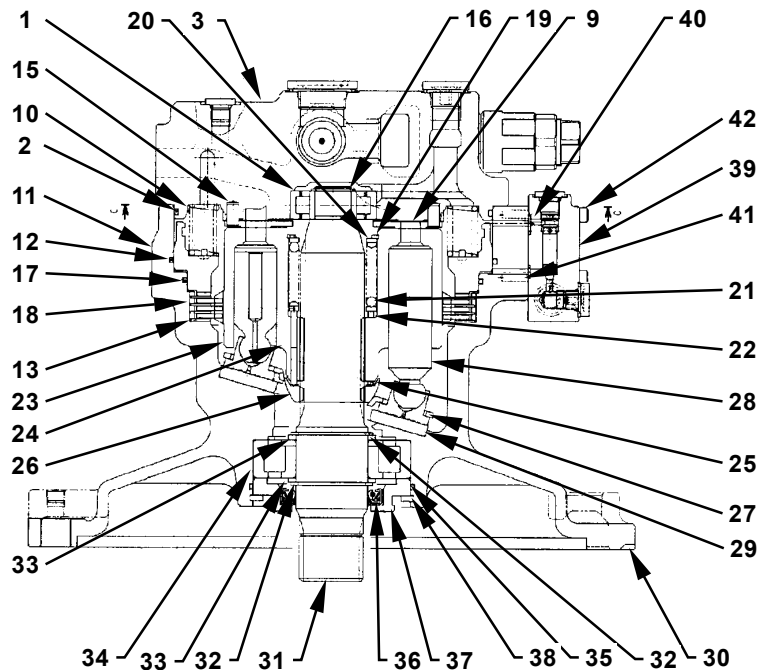
20. Remove retaining ring (16) from shaft (31).
 21. Remove retaining rings (32) (2 used), spacers (33) (2 used), the inner ring plate and outer race of roller bearing (34) from shaft (31).
 22. Remove the inner race of roller bearing (34) from shaft (31) by using a press.
At this time, remove the inner race from the roller bearing (1) side.
 23. Remove plungers (28) (9 used), retainer plate (27), holder (26), spacer (25) and push rods (24) (12 used) from rotor (23).
-  **CAUTION: Push spacer (20) by using a press when removing retaining ring (19). If removing only retaining ring (19), spacer (20) and spring (21) may fly out.**
24. Push spacer (20) by using a press and remove retaining ring (19).
 25. Remove spacers (20, 22) and spring (21).

UPPERSTRUCTURE / Swing Device

ASSEMBLE SWING MOTOR



W800-02-06-002



W800-02-06-003

- | | | | |
|--------------------------|------------------------------|------------------------------|--------------------------------|
| 1 - Roller Bearing | 12 - O-Ring | 23 - Rotor | 34 - Roller Bearing |
| 2 - O-Ring | 13 - Friction Plate (3 Used) | 24 - Push Rod (12 Used) | 35 - O-Ring |
| 3 - Valve Casing | 14 - Relief Valve (2 Used) | 25 - Spacer | 36 - Oil Seal |
| 4 - Socket Bolt (4 Used) | 15 - Pin (2 Used) | 26 - Holder | 37 - Seal Cover |
| 5 - Poppet (2 Used) | 16 - Retaining Ring | 27 - Retainer Plate | 38 - Retaining Ring |
| 6 - Spring (2 Used) | 17 - O-Ring | 28 - Plunger (9 Used) | 39 - Swing Parking Brake Valve |
| 7 - O-Ring (2 Used) | 18 - Plate (4 Used) | 29 - Shoe Plate | |
| 8 - Plug (2 Used) | 19 - Retaining Ring | 30 - Casing | 40 - O-Ring |
| 9 - Valve Plate | 20 - Spacer (3 Used) | 31 - Shaft | 41 - O-Ring |
| 10 - Spring (16 Used) | 21 - Spring | 32 - Retaining Ring (2 Used) | 42 - Socket Bolt (3 Used) |
| 11 - Brake Piston | 22 - Spacer | 33 - Spacer (2 Used) | |

UPPERSTRUCTURE / Swing Device

Assemble Swing Motor

1. Install retaining ring (32) and spacer (33) at the rotor (23) side to shaft (31). Install the inner race of roller bearing (34) to shaft (31).
2. Install the outer race and inner ring plate to the inner race of roller bearing (34). Face the stamped mark on inner ring plate to the rotor (23) side.
3. Install other spacer (33) and retaining ring (32) to shaft (31).
4. Install the inner race of roller bearing (1) to shaft (31). Install retaining ring (16) to shaft (31).
5. Install the shaft (31) assembly to casing (30) by using a bar and hammer.
6. Install oil seal (36) to seal cover (37) by using a plate.
7. Install O-ring (35) to casing (30).

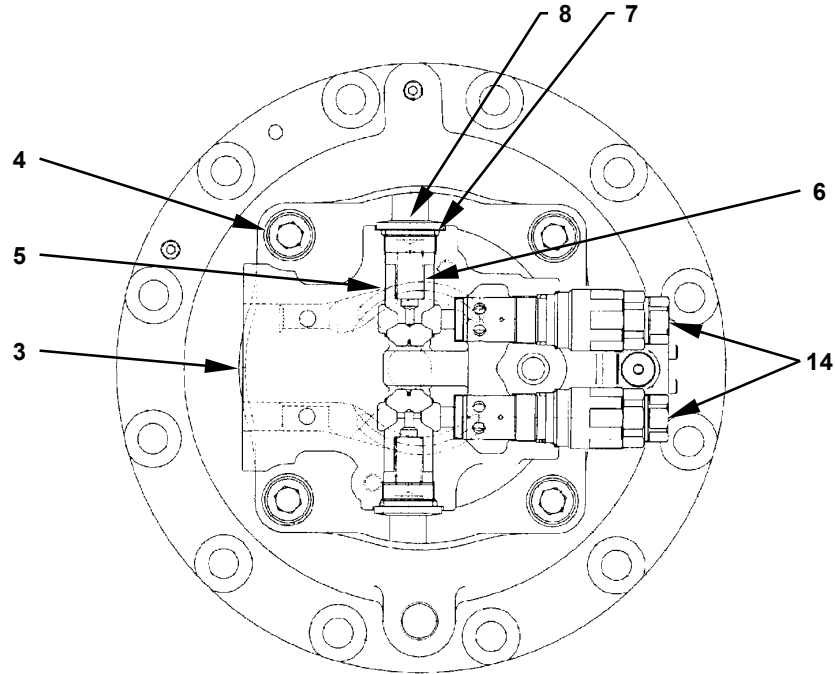
IMPORTANT: Apply grease to the inner surface on oil seal (36). Wind the tape onto the spline at the end of shaft (31) in order not to damaging the oil seal.

8. Install seal cover (37) and retaining ring (38) to casing (30).
9. Place casing (30) horizontally with the swing parking brake valve (39) side facing upward.

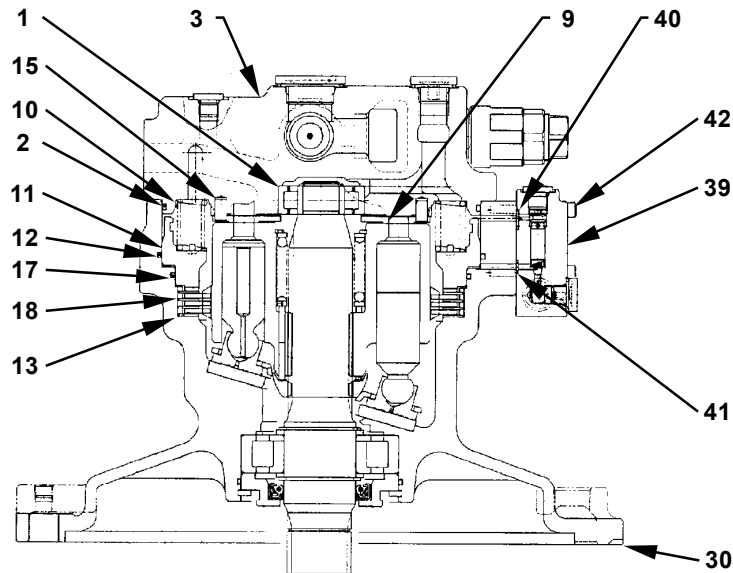
IMPORTANT: Apply grease onto the mating surfaces between casing (30) and shoe plate (29) in order not to fall off. Face the larger chamfered side on shoe plate (29) to casing (30) when installing.

10. Install shoe plate (29) to casing (30).
11. Install spacer (22), spring (21) and spacer (20) to rotor (23) in this order.
12. Push spacer (20) to the position where retaining ring (19) can be inserted by using a press. Install retaining ring (19).
13. Insert push rods (24) (12 used) to rotor (23). Install spacer (25) and holder (36) in this order.
14. Apply hydraulic oil into the plunger hole on rotor (23). Install plungers (28) (9 used) to retainer plate (27). Insert the plunger (28) assembly into rotor (23).
15. Insert the rotor (23) assembly into casing (31). Hold the rotor (23) assembly by one hand and align the splines while rotating shaft (31) by another hand.
16. Place the casing (30) assembly vertically.

UPPERSTRUCTURE / Swing Device



W800-02-06-002



W800-02-06-003

UPPERSTRUCTURE / Swing Device

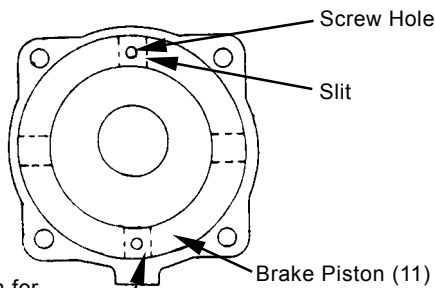
IMPORTANT: There are four slots on the outer circumstance of plate (18) and four slots on the spline teeth of friction plate (13). When installing, align the slots respectively.

17. Place casing (30) on the wooden block with the reduction side facing downward. Alternately install plates (18) (4 used) and friction plates (13) (3 used).

18. Install O-rings (17, 12) to casing (30). At this time, apply much grease to O-ring.

IMPORTANT: Align the slits of brake piston (11) as illustration below.

19. Install brake piston (11) to casing (30).



Mounting Position for Swing Parking Brake (39)

W142-02-06-011

NOTE: When it is difficult to install brake piston (11) due to resistance of O-rings (12, 17), install the bolt (M8, Pitch 1.25 mm) to brake piston (11). Tap the end of bolt by using a plastic hammer evenly.

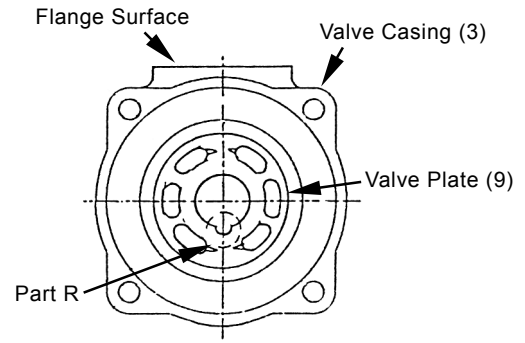
20. Install springs (10) (16 used) to brake piston (11).

IMPORTANT: Tap the roller bearing (1) type indicated surface by using a plastic hammer and install roller bearing (1).

21. Install the outer race of roller bearing (1) to valve casing (3) by using a plastic hammer.

IMPORTANT: When installing, face part R of valve plate (9) opposite to the flange surface of valve casing (3).

22. Install O-rings (2) and pins (15) (2 used) to valve casing (3). Install valve plate (9) to valve casing (3).





W17V-02-06-004

NOTE: Apply grease to valve plate (9). Valve plate (9) is prevented from dropping from valve casing (3).


IMPORTANT: Align the matching marks made when disassembling and take care in order not to drop valve plate (9).


23. Install valve casing (3) to casing (30). Install valve casing (3) with socket bolts (4) (4 used).

 : 17 mm


 : 627 N·m (64 kgf·m, 462 lbf·ft)


24. Install O-rings (40, 41) to swing parking brake valve (39). Install swing parking brake valve (39) to casing (30) with socket bolts (42) (3 used).

 : 10 mm


 : 12 N·m (1.2 kgf·m, 9 lbf·ft)


25. Install poppets (5) (2 used) and springs (6) (2 used) to valve casing (3). Tighten plugs (8) (2 used) with O-ring (7) attached.

 : 17 mm

 : 539 N·m (55 kgf·m, 398 lbf·ft)

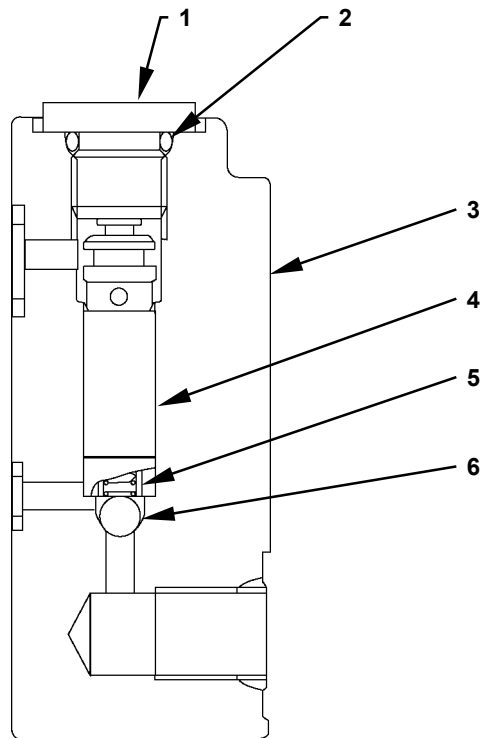
26. Install relief valves (14) (2 used) to valve casing (3).

 : 41 mm

 : 177 N·m (18 kgf·m, 130 lbf·ft)

UPPERSTRUCTURE / Swing Device

STRUCTURE OF SWING PARKING BRAKE VALVE



W800-02-06-007

1 - Plug
2 - O-Ring


3 - Casing
4 - Spool

5 - Spring
6 - Steel Ball

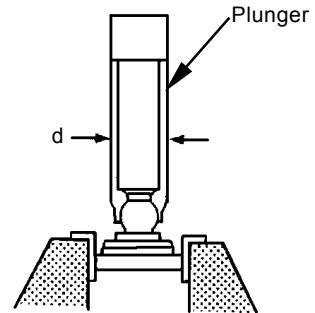
UPPERSTRUCTURE / Swing Device

MAINTENANCE STANDARD

Swing Motor

 **NOTE:** If items 1 to 4 are out of allowable limit, replace them.

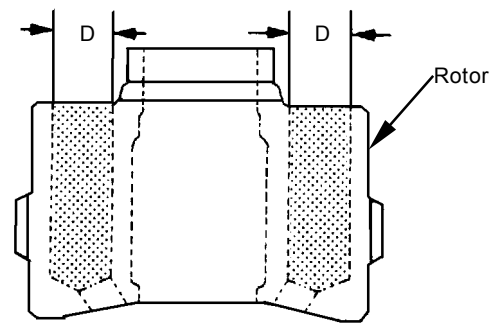
1. Clearance between plunger outer diameter and rotor bore



W107-02-06-138

D-d

Standard Clearance	Allowable Limit
0.032 mm (0.001 in)	0.062 mm (0.002 in)

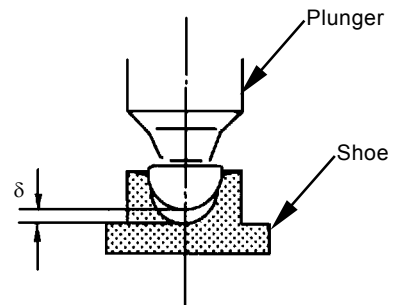


W107-02-06-139

2. Clearance between plunger and shoe bottom

δ

Standard Clearance	Allowable Limit
0 mm	0.3 mm (0.012 in)

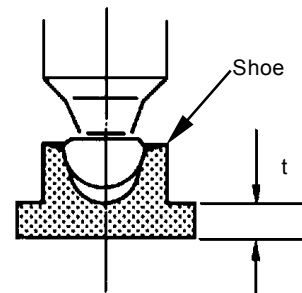


W107-02-06-140

3. Shoe thickness

t

Standard Thickness	Allowable Limit
6.0 mm (0.24 in)	5.8 mm (0.23 in)

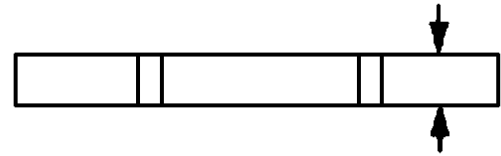


W107-02-06-142

UPPERSTRUCTURE / Swing Device

4. Friction plate thickness

Standard Thickness	Allowable Limit
4.0 mm (0.16 in)	3.6 mm (0.14 in)



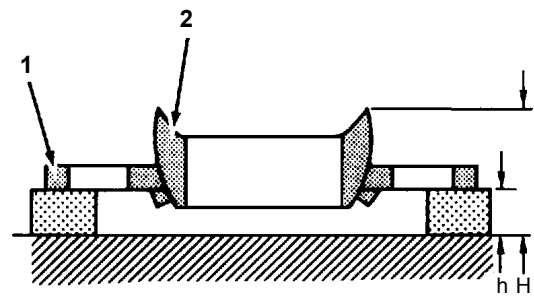
W107-02-06-143

5. Total clearance of retainer plate (1) and holder (2)

Dimension: $H-h$

Standard Clearance	Allowable Limit
7 mm (0.28 in)	6.5 mm (0.26 in)

If the dimension is to below 6.5 mm (0.26 in), replace retainer plate (1) and holder (2).



W107-02-06-146

UPPERSTRUCTURE / Pilot Valve


REMOVE AND INSTALL PILOT VALVE

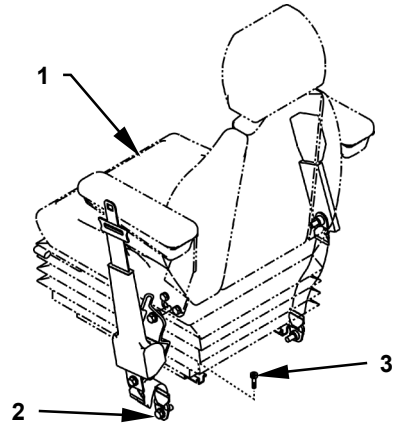
CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

Remove Left Pilot Valve

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


1. Remove bolts (2) (2 used).

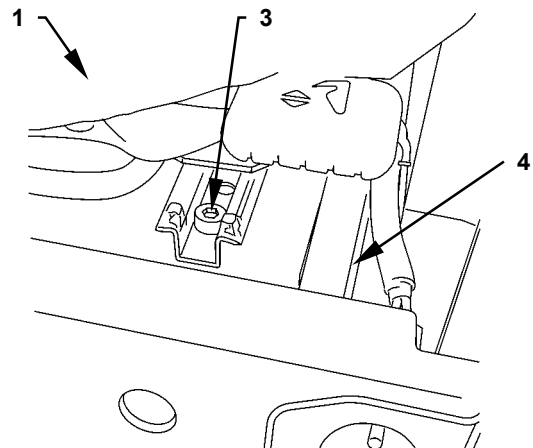
 : 16 mm



W1JB-02-01-008

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

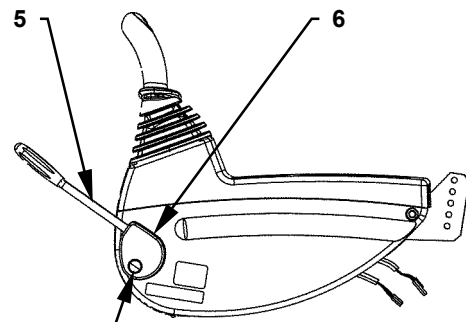
 : 6 mm



W1JB-02-07-007

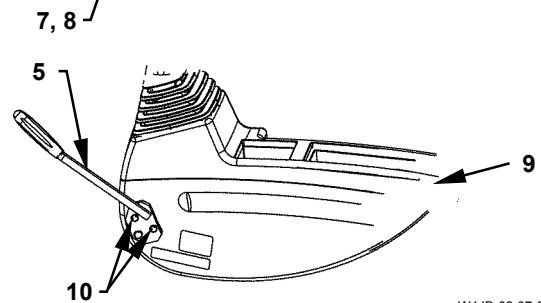
UPPERSTRUCTURE / Pilot Valve

3. Remove cap (7) from lever (5). Remove screw (8).
Remove cover (6) from lever (5).



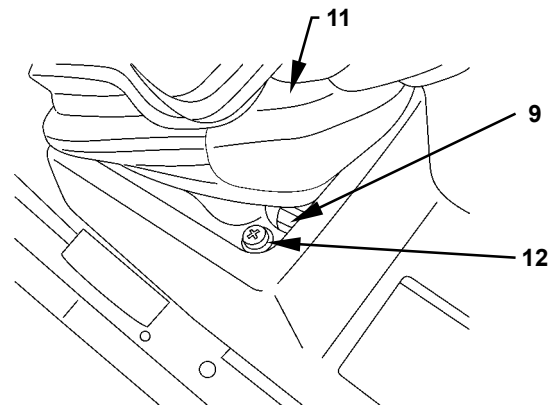
W1JB-02-07-013

4. Remove bolts (10) (2 used). Remove lever (5) from bracket (9).
🔧 : 13 mm



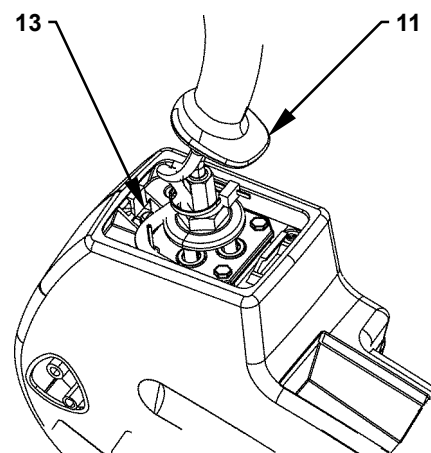
W1JB-02-07-012

5. Remove screws (12) (4 used). Move boot (11) up from bracket (9).



W1JB-02-07-002


6. Remove screw (13).

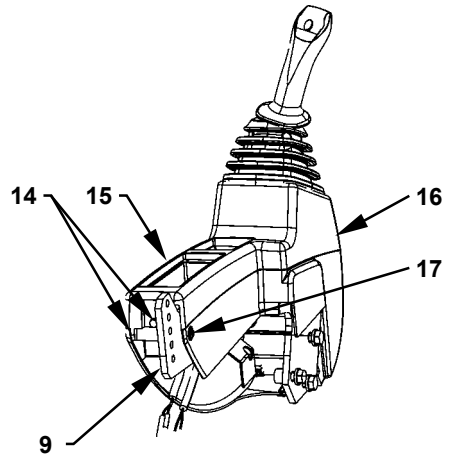


W1JB-02-07-014

UPPERSTRUCTURE / Pilot Valve

7. Remove bolts (14) (2 used) and screw (17).
Remove covers (15, 16) from bracket (9).


 : 10 mm

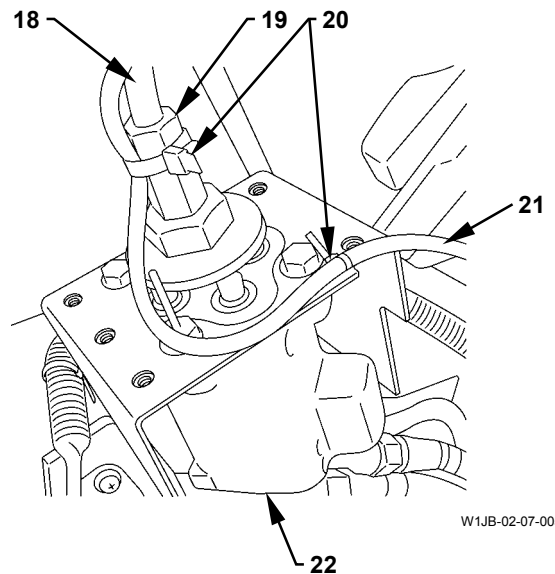


W1JB-02-07-011

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).

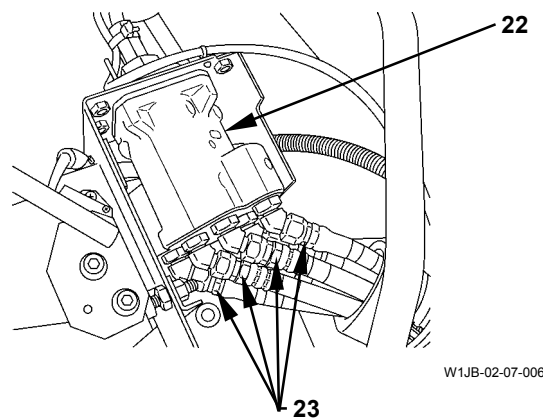
 : 19 mm, 22 mm



W1JB-02-07-005

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

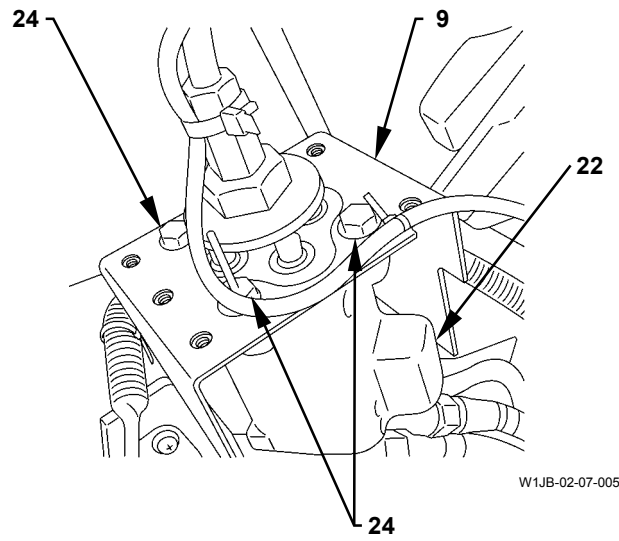


W1JB-02-07-006

UPPERSTRUCTURE / Pilot Valve

11. Remove bolt (24). Remove pilot valve (22) from bracket (9).

 : 13 mm





W1JB-02-07-005

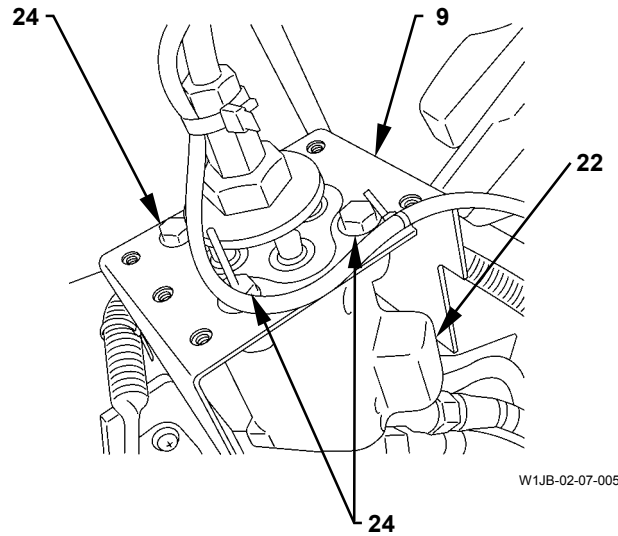
UPPERSTRUCTURE / Pilot Valve

Install Left Pilot Valve


1. Install pilot valve (22) to bracket (9) with bolts (24) (4 used).


 : 13 mm

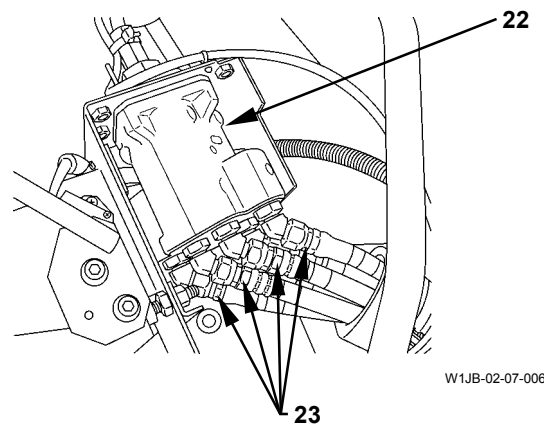
 : 20 N·m (2 kgf·m, 15 lbf·ft)




2. Install hoses (23) (6 used) onto pilot valve (22).


 : 19 mm

 : 29.5 N·m (3 kgf·m, 22 lbf·ft)



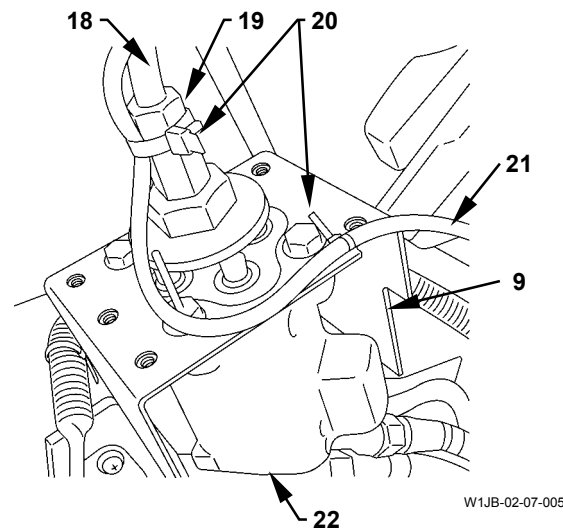
3. Install the lever (18) assembly to pilot valve (22). Secure the lever (18) assembly to pilot valve (22) with lock nut (19).

 : 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).



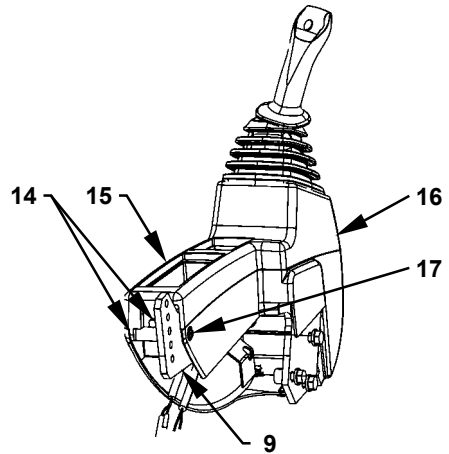
UPPERSTRUCTURE / Pilot Valve

6. Install covers (15, 16) to bracket (9) with bolts (14) (2 used) and screw (17).

 : 10 mm

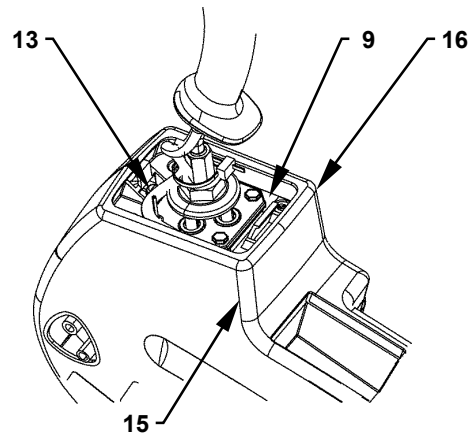
 : 3.3 to 4.2 N·m

(0.3 to 0.4kgf·m, 2.4 to 3.1 lbf·ft)



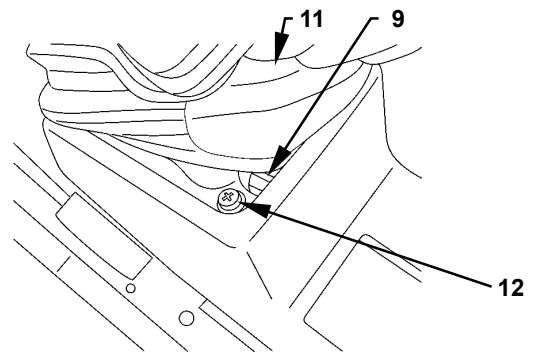
W1JB-02-07-011

7. Install covers (15, 16) to bracket (9) with screw (13).




W1JB-02-07-014


8. Install boot (11) to bracket (9) with screws (12) (4 used).

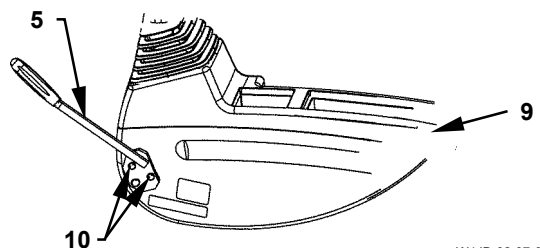


W1JB-02-07-002

9. Install lever (5) to bracket (9) with bolts (10) (2 used).

 : 13 mm

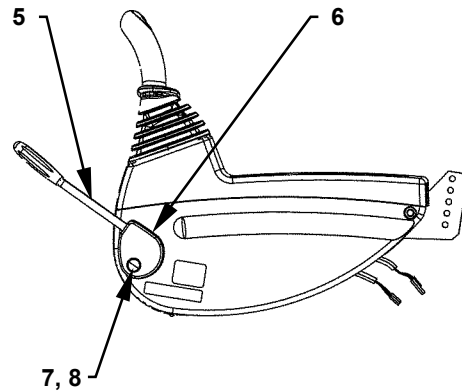
 : 20 N·m (2 kgf·m, 15 lbf·ft)



W1JB-02-07-012

UPPERSTRUCTURE / Pilot Valve

10. Install cover (6) to lever (5) with screw (8). Attach cap (7) to cover (6).





W1JB-02-07-013

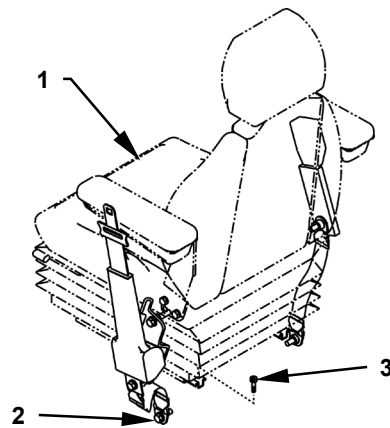


CAUTION: Seat (1) weight: 40 kg (88 lb)

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


 : 6 mm


 : 20 N·m (2 kgf·m, 15 lbf·ft)

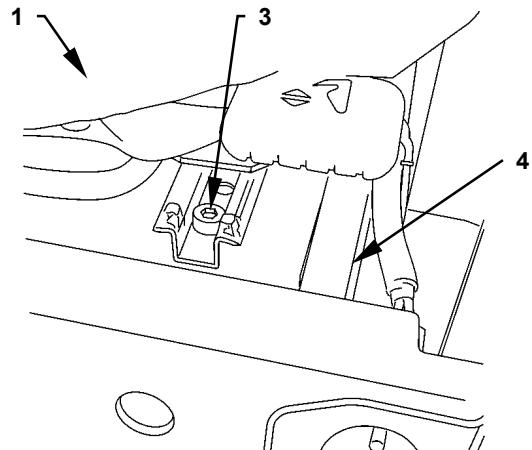


W1JB-02-01-008

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

 : 16 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

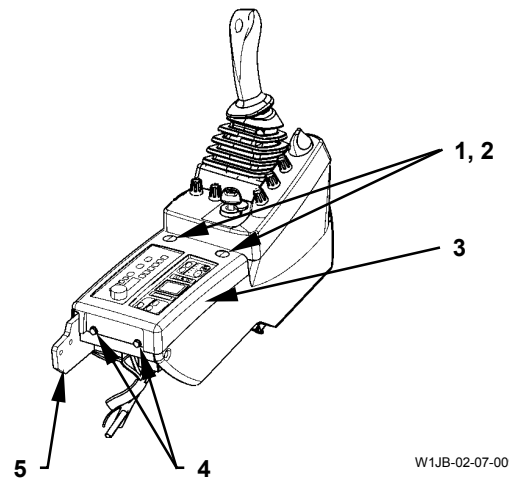


W1JB-02-07-007

UPPERSTRUCTURE / Pilot Valve

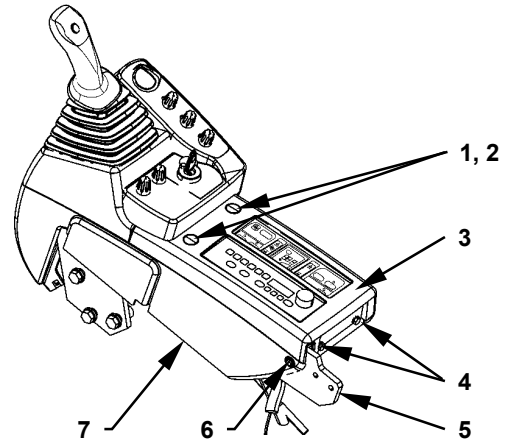
Remove Right Pilot Valve

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).



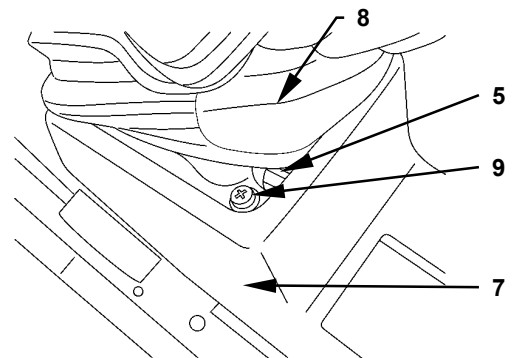
W1JB-02-07-009

3. Remove screw (6).

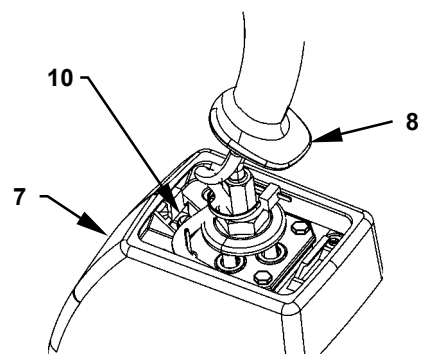


W1JB-02-07-008

4. Remove screws (9) (4 used). Move boot (8) up from bracket (5). Remove screw (10).
5. Remove cover (7) from bracket (5).



W1JB-02-07-002




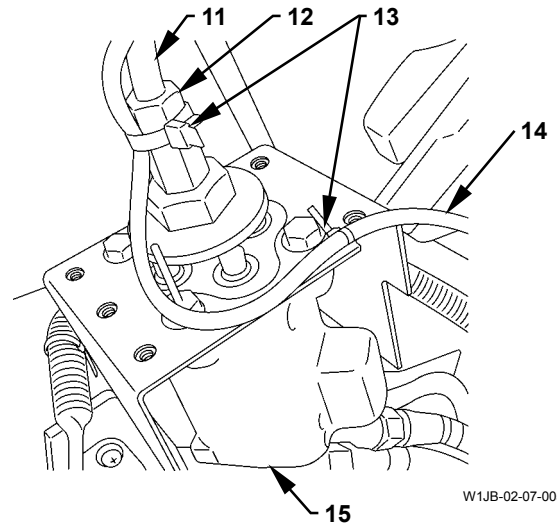
W1JB-02-07-016

UPPERSTRUCTURE / Pilot Valve


6. Remove clip bands (13) (2 used). Disconnect the connector of wire (14).

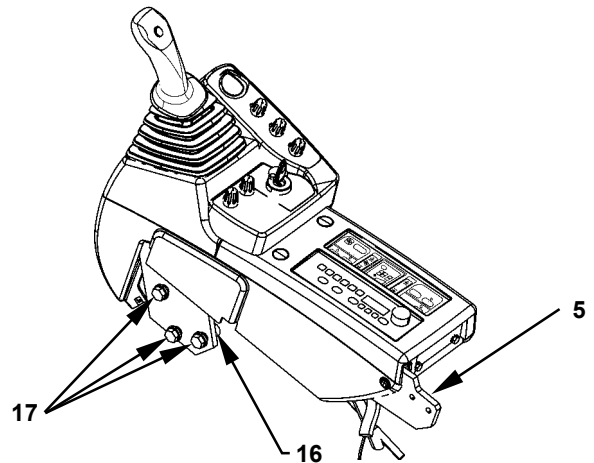
7. Loosen lock nut (12). Remove the lever (11) assembly from pilot valve (15).

 : 19 mm, 22 mm




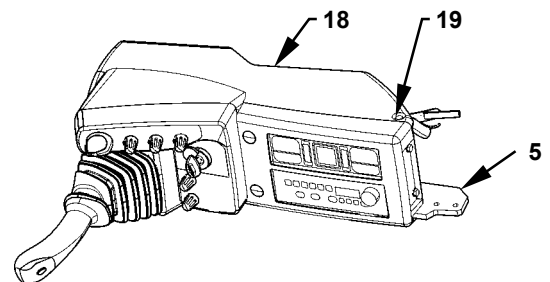
8. Remove bolts (17) (3 used). Remove the bracket (5) assembly from stand (16). Lay down the bracket (5) assembly.

 : 17 mm




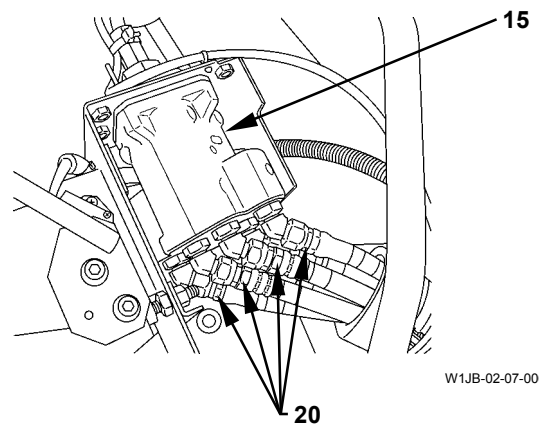
9. Remove bolt (19). Remove cover (18) from bracket (5).

 : 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.

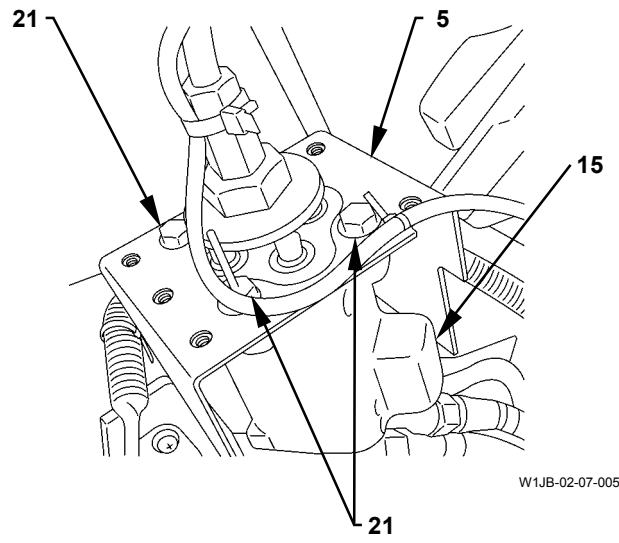
 : 19 mm



UPPERSTRUCTURE / Pilot Valve

11. Remove bolts (21) (4 used). Remove pilot valve (15) from bracket (5).


 : 13 mm




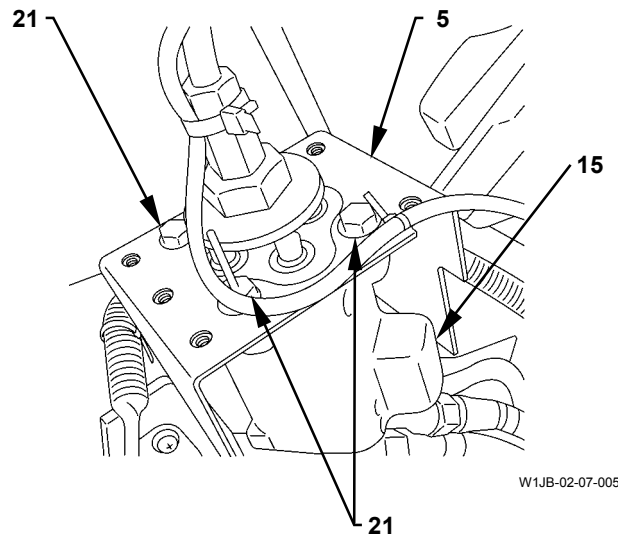
UPPERSTRUCTURE / Pilot Valve

Install Right Pilot Valve


1. Install pilot valve (15) to bracket (5) with bolts (21) (4 used).


 : 13 mm

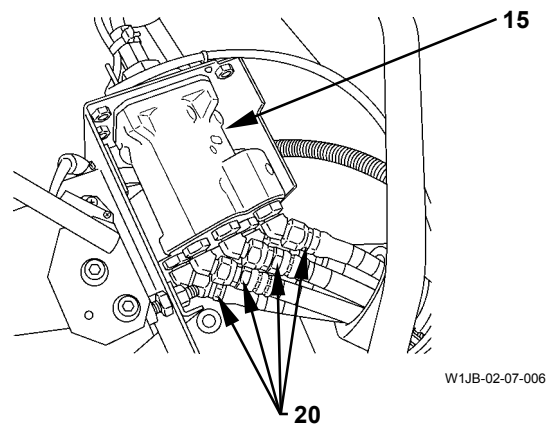
 : 20 N·m (2 kgf·m, 15 lbf·ft)



2. Install hoses (20) (6 used) to pilot valve (15).


 : 19 mm


 : 29.5 N·m (3 kgf·m, 22 lbf·ft)



UPPERSTRUCTURE / Pilot Valve

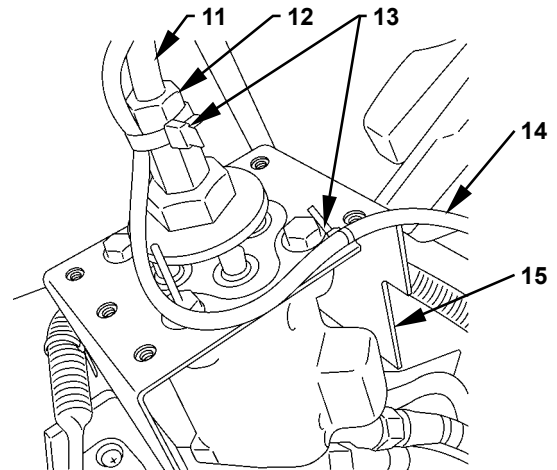
3. Install the lever (11) assembly to pilot valve (15).
Secure the lever (11) assembly to pilot valve (15)
with lock nut (12).

 : 22 mm

 : 56 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).

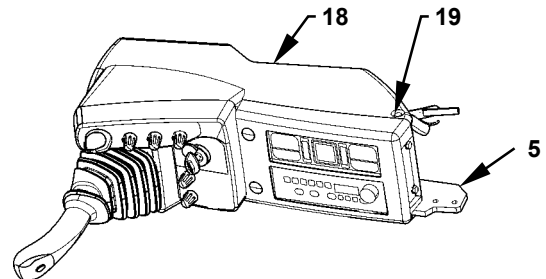


W1JB-02-07-005

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)




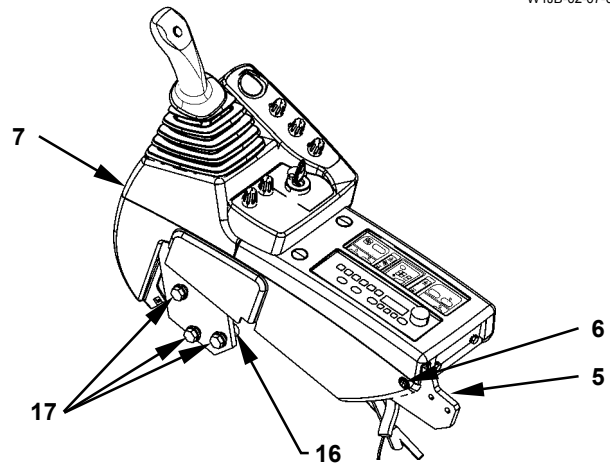
W1JB-02-07-010

7. Install cover (7) to bracket (5) with screw (6).

8. Install the bracket (5) assembly to stand (16) with
bolts (17)(3 used).

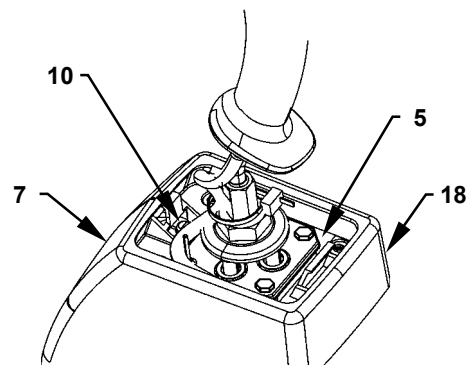
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



W1JB-02-07-008

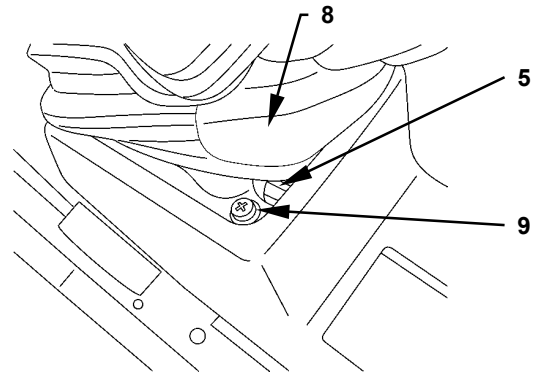
9. Install covers (18, 7) to bracket (5) with screw
(10).



W1JB-02-07-016

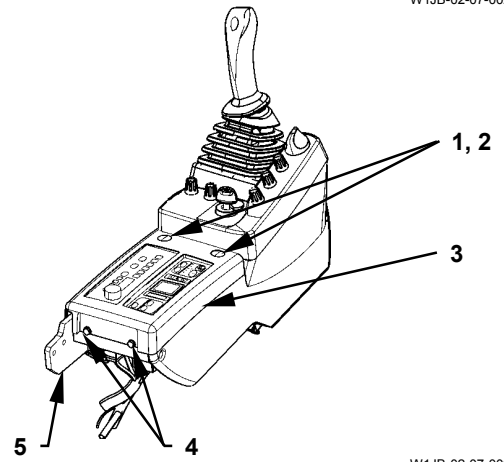
UPPERSTRUCTURE / Pilot Valve

10. Install boot (8) to bracket (5) with screws (9) (4 used).



W1JB-02-07-002


11. Install cover (3) to bracket (5) with screws (2, 4) (2 used for each). Attach caps (1) (2 used) to cover (3).




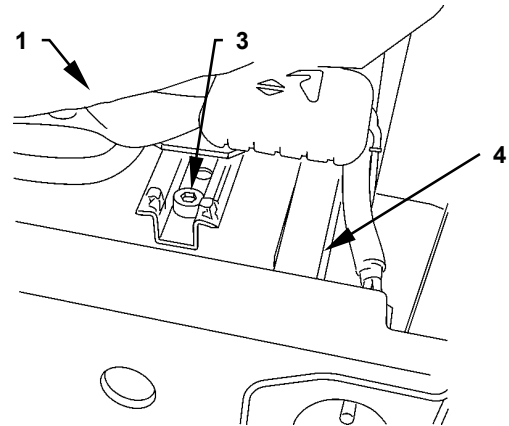
W1JB-02-07-009

⚠ 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)

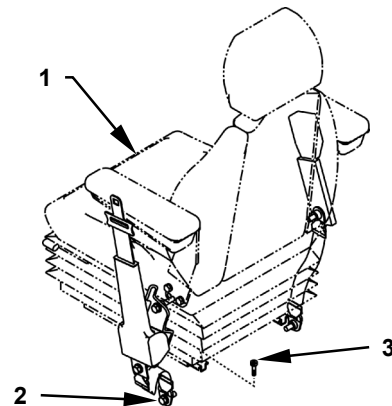


W1JB-02-07-007

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

 : 16 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)




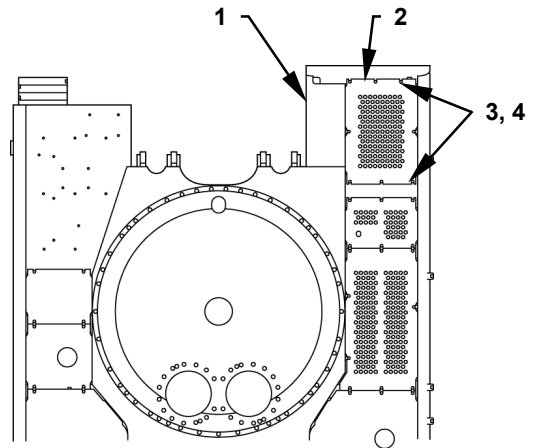
W1JB-02-01-008

UPPERSTRUCTURE / Pilot Valve

Remove Travel Pilot Valve


1. Remove bolts (3) (8 used) and washers (4) (8 used). Remove cover (2) from the lower of main frame (1).

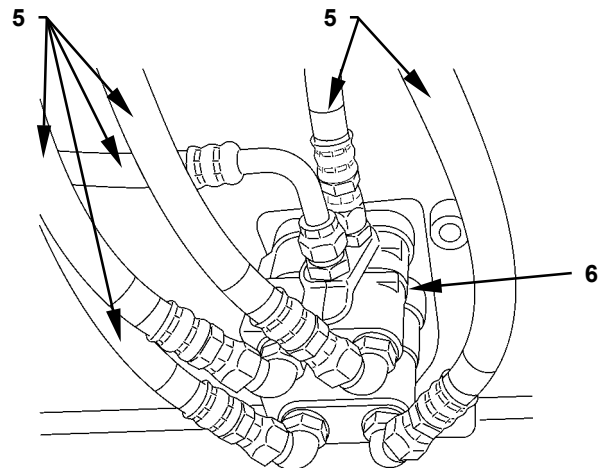
 : 19 mm



W1JB-02-11-002

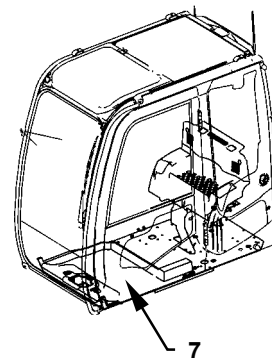
2. Remove hoses (5) (6 used) from pilot valve (6). Attach identification tags to the removed hoses for reassembling. Cap the open end.

 : 17 mm, 19 mm



W1JB-02-07-001


3. Remove floor mat (7).

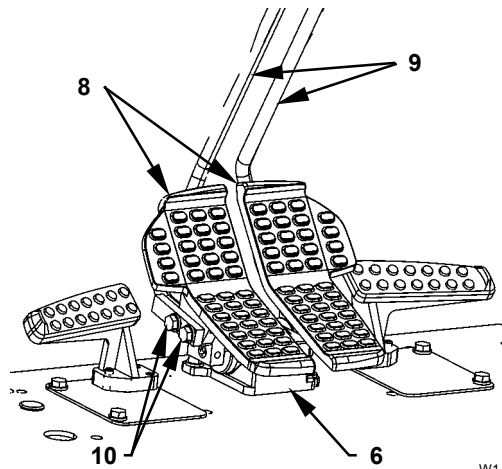


W1JB-02-07-015

UPPERSTRUCTURE / Pilot Valve


4. Remove bolts (10) (4 used). Remove levers (9) (2 used) and pedals (8) (2 used) from pilot valve (6).

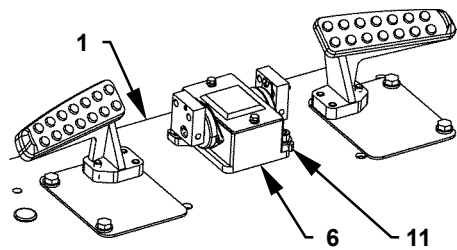
 : 17 mm



W1JB-02-07-003

5. Remove socket bolts (11) (2 used). Remove pilot valve (6) from main frame (1).

 : 8 mm





W1JB-02-07-004

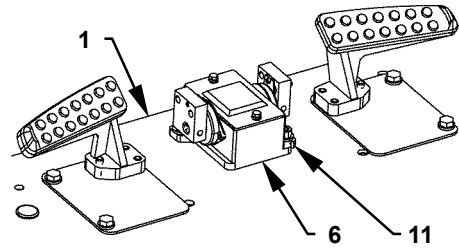
UPPERSTRUCTURE / Pilot Valve

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)

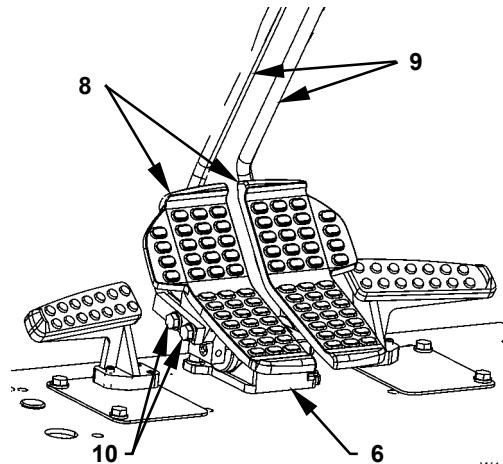


W1JB-02-07-004

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)





W1JB-02-07-003

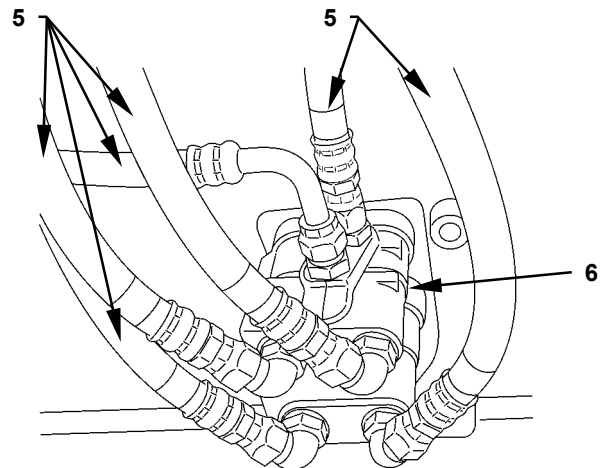
3. Install hoses (5) (6 used) to pilot valve (6).

 : 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)




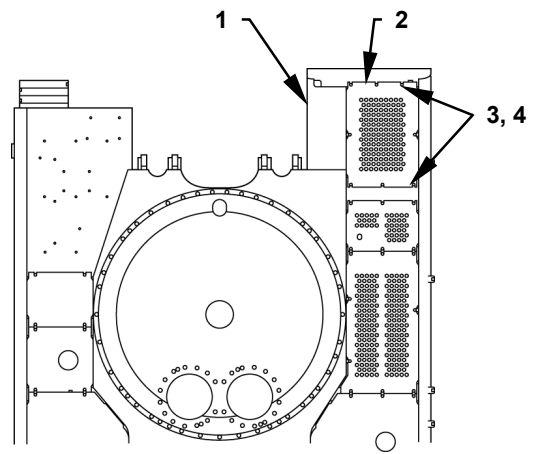
W1JB-02-07-001

UPPERSTRUCTURE / Pilot Valve

4. Install cover (2) onto the lower of main frame (1) with bolts (3) (8 used) and washers (4) (8 used).

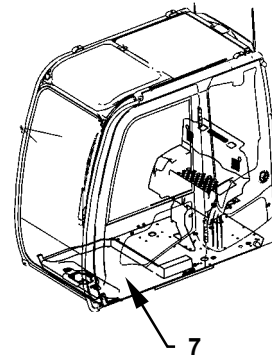
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)



W1JB-02-11-002

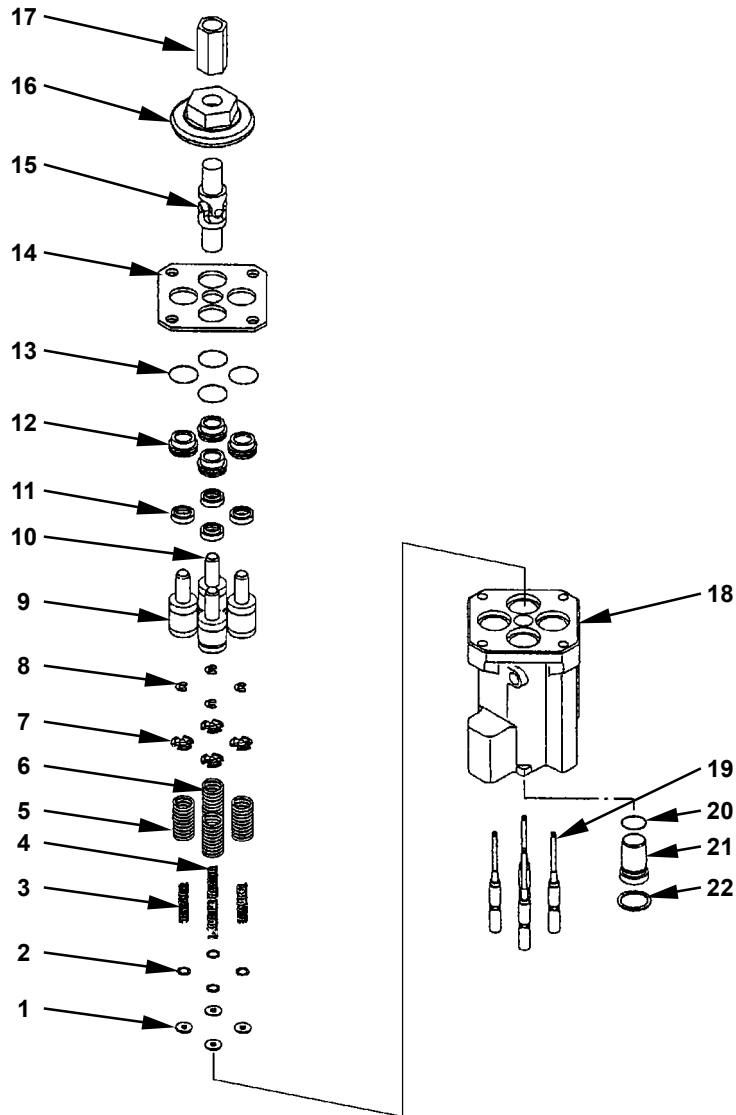
5. Install floor mat (7).



W1JB-02-07-015

UPPERSTRUCTURE / Pilot Valve

DISASSEMBLE RIGHT AND LEFT PILOT VALVES



W178-02-07-064

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

UPPERSTRUCTURE / Pilot Valve


Disassemble Right and Left Pilot Valves

IMPORTANT: Casing (18) is made of aluminum. 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).

 : 32 mm

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).

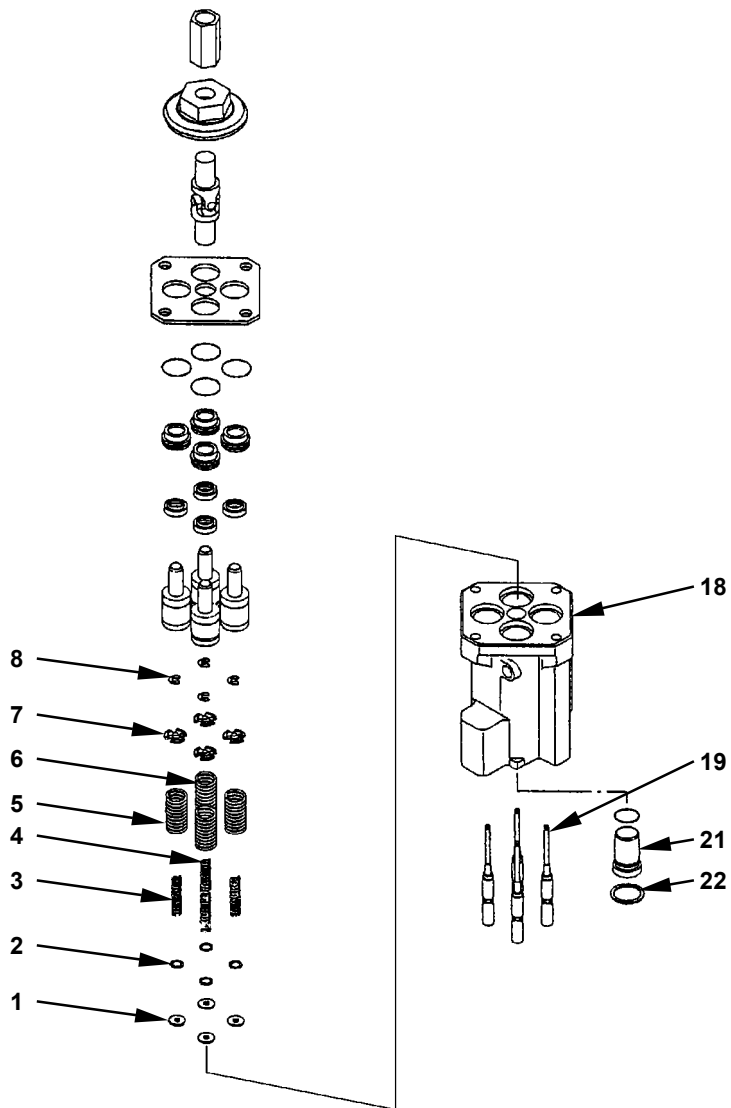
IMPORTANT: Do not damage the surface of sleeve (12). Insert a soft rubber between sleeve (12) and the tool. Oil seal (11) cannot be removed from sleeve (12). Sleeve (12) and oil seal (11) must be replaced as an assembly.

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).


UPPERSTRUCTURE / Pilot Valve




W178-02-07-064

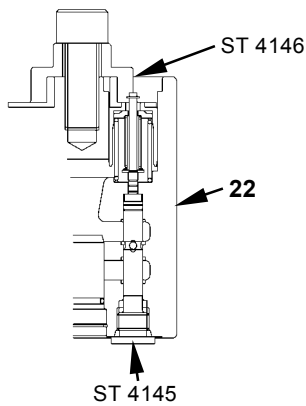
UPPERSTRUCTURE / Pilot Valve

- 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

- 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



W178-02-07-048

IMPORTANT: The quantity of shims (2) has been determined for each port during the performance testing at the factory. Do not lose 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).


- 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.

- Remove special tool (ST4145) from casing (18). Slowly turn and remove spool (19) from casing (18).

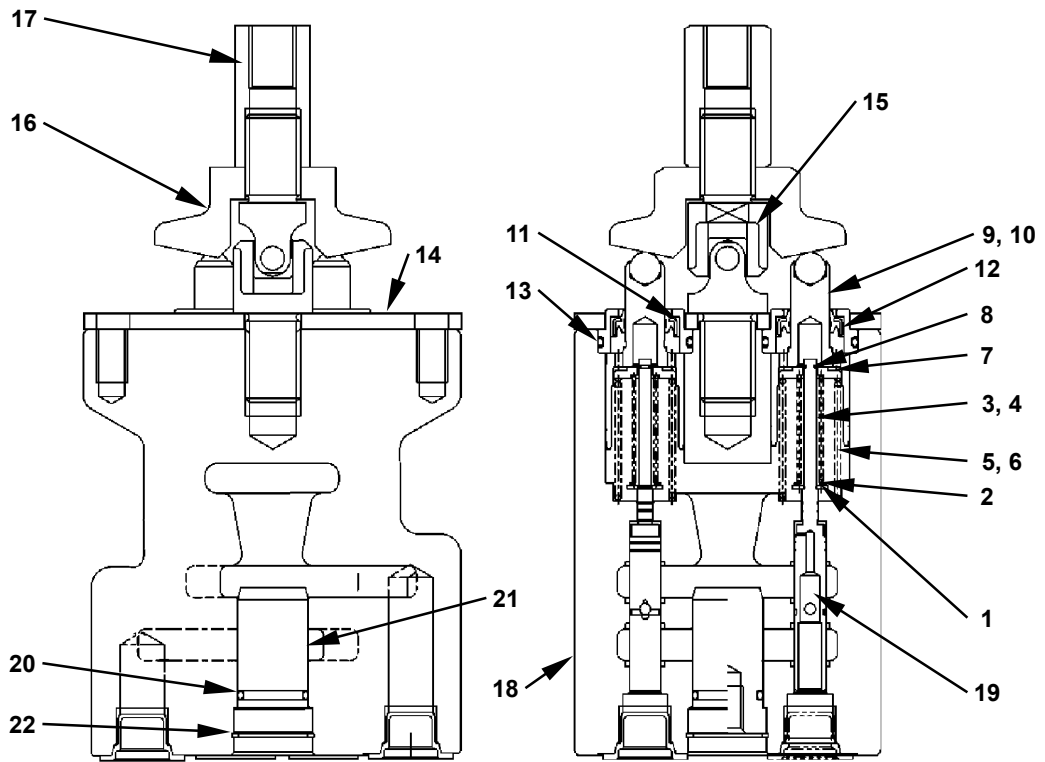
IMPORTANT: Retaining ring (22) may come off while disassembling. Do not drop retaining ring (22) inside the casing. If retaining ring (22) falls inside the casing, remove retaining ring (22) completely. Retaining ring (22) cannot be reused.

- 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

UPPERSTRUCTURE / Pilot Valve

ASSEMBLE RIGHT AND LEFT PILOT VALVES




W1V1-02-07-001

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

UPPERSTRUCTURE / Pilot Valve

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 former one	Same to the former one	Outer grooves (3 used)
2			Without outer groove
3			Outer grooves (3 used)
4			Without outer groove

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


1. Check the port hole number. Insert same spools (19) (4 used) before disassembling. Slowly rotate and insert spool (19) from the thinner side into the port hole on casing (18).

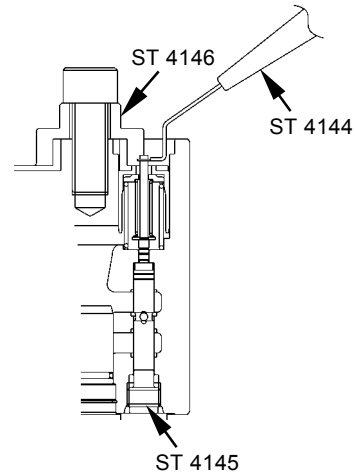
 **NOTE:** Spool (19) has been selected to match the port hole. Spool (19) and casing (18) must be replaced as an assembly.

2. Install special tool (ST 4145) to the port hole on casing (18) in order not to lower the spool when the spring is compressed.

 : 6 mm

IMPORTANT: Refer to the table in left in order to assemble them correctly.

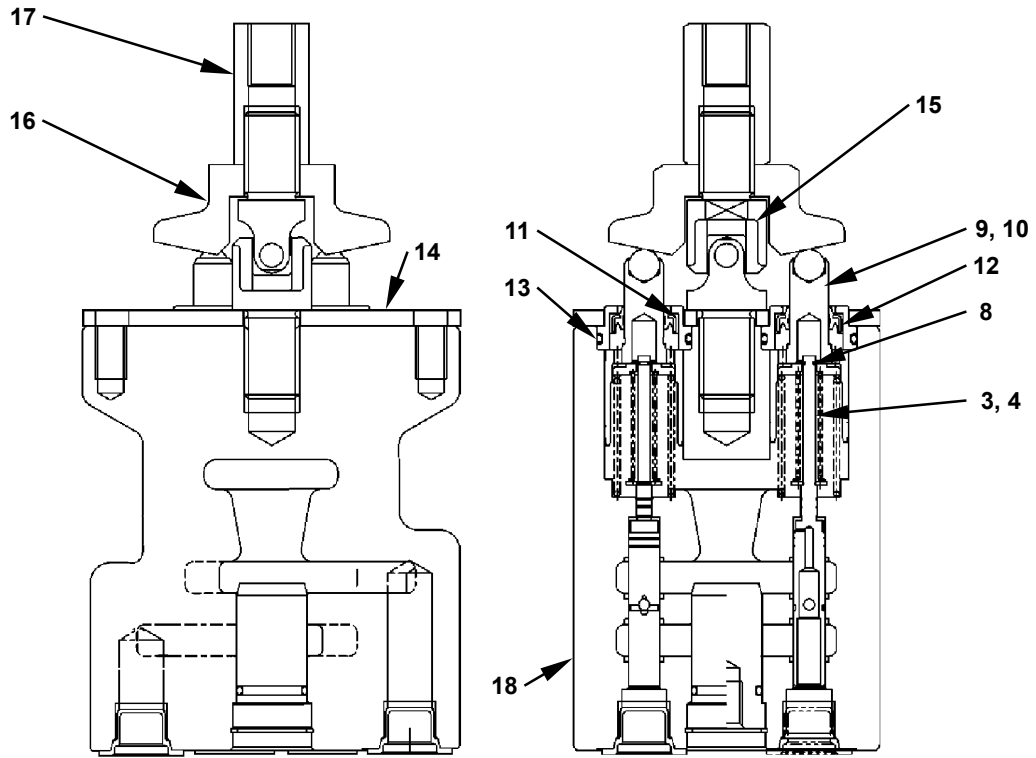
3. Install spacers (1) (4 used), shim (2) and balance springs (3, 4) (2 used for each) to spools (19) (4 used). Install return springs (5, 6) (2 used for each) to casing (18).
4. Install spring guides (7) (4 used) onto return springs (5, 6) (2 used for each) with the protrusion facing upward.
5. Install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



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

UPPERSTRUCTURE / Pilot Valve



W1V1-02-07-001

UPPERSTRUCTURE / Pilot Valve

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


12. Install oil seals (11) (4 used) to sleeves (12) (4 used). Push the 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).

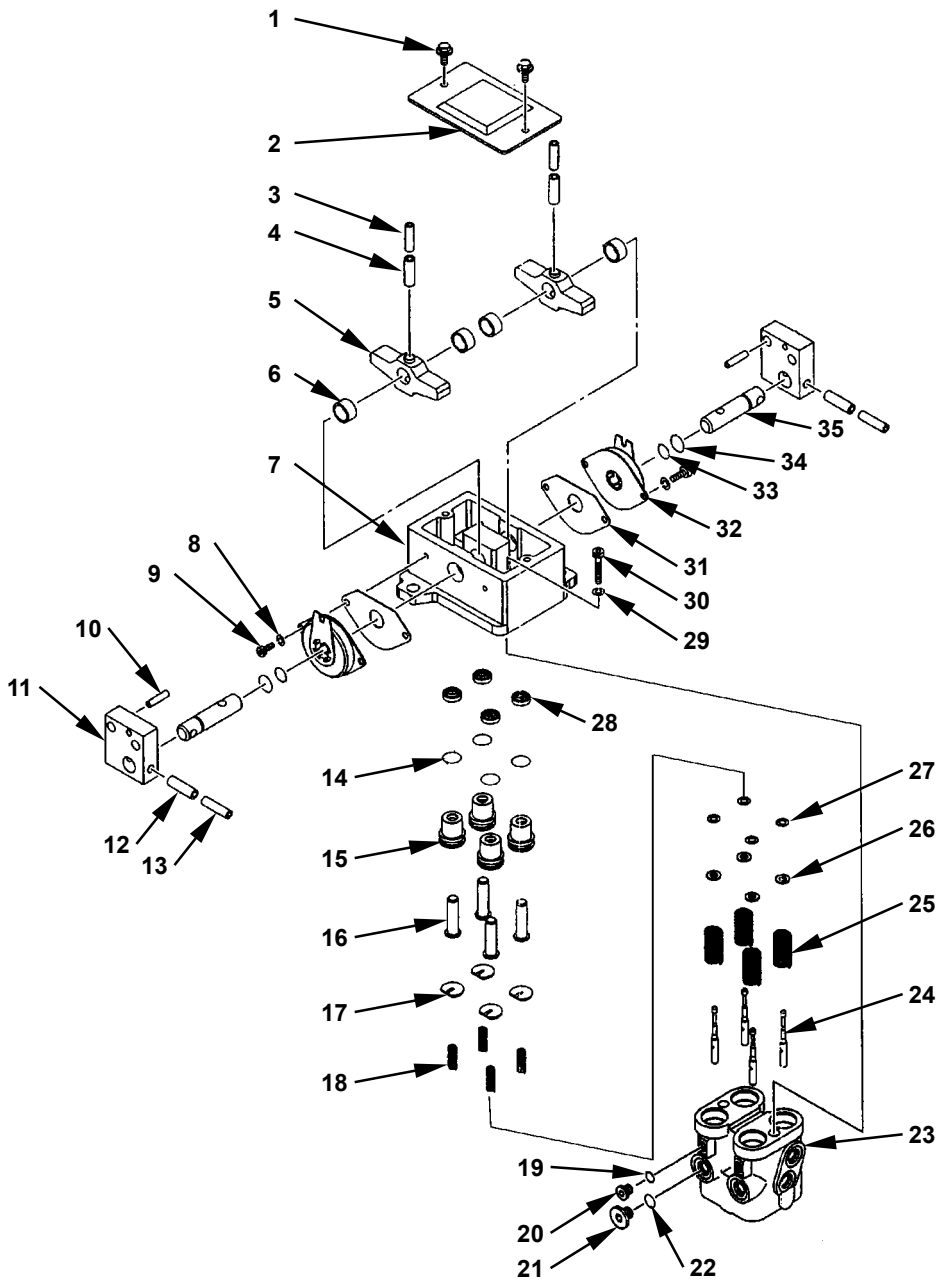
16. Secure cam (16) by using a spanner. Tighten screw joint (17) by using a spanner.

 : 19 mm, 32 mm

 : 68.4 N·m (6.98 kgf·m, 50 lbf·ft)

UPPERSTRUCTURE / Pilot Valve

DISASSEMBLE TRAVEL PILOT VALVE



W178-02-07-063

- | | | | |
|----------------------------|------------------------------|-----------------------------|-----------------------------|
| 1 - Bolt (2 Used) | 10 - Spring Pin | 19 - O-Ring (2 Used) | 28 - Oil Seal (4 Used) |
| 2 - Cover | 11 - Bracket (2 Used) | 20 - Plug (2 Used) | 29 - Spring Washer (2 Used) |
| 3 - Spring Pin (2 Used) | 12 - Spring Pin (2 Used) | 21 - Plug (2 Used) | 30 - Socket Bolt (2 Used) |
| 4 - Spring Pin (2 Used) | 13 - Spring Pin (2 Used) | 22 - O-Ring (2 Used) | 31 - Rubber Seat (2 Used) |
| 5 - Cam (2 Used) | 14 - O-Ring (4 Used) | 23 - Casing | 32 - Damper (2 Used) |
| 6 - Bushing (4 Used) | 15 - Bushing (4 Used) | 24 - Spool | 33 - O-Ring (2 Used) |
| 7 - Holder | 16 - Pusher (4 Used) | 25 - Return Spring (4 Used) | 34 - O-Ring (2 Used) |
| 8 - Spring Washer (4 Used) | 17 - Spring Guide (16 Used) | 26 - Spacer (4 Used) | 35 - Pin |
| 9 - Socket Bolt (4 Used) | 18 - Balance Spring (4 Used) | 27 - Shim (12 Used) | |

UPPERSTRUCTURE / Pilot Valve


Disassemble Travel Pilot Valve

IMPORTANT: Casing (23) is made of aluminum. 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).

4. 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.

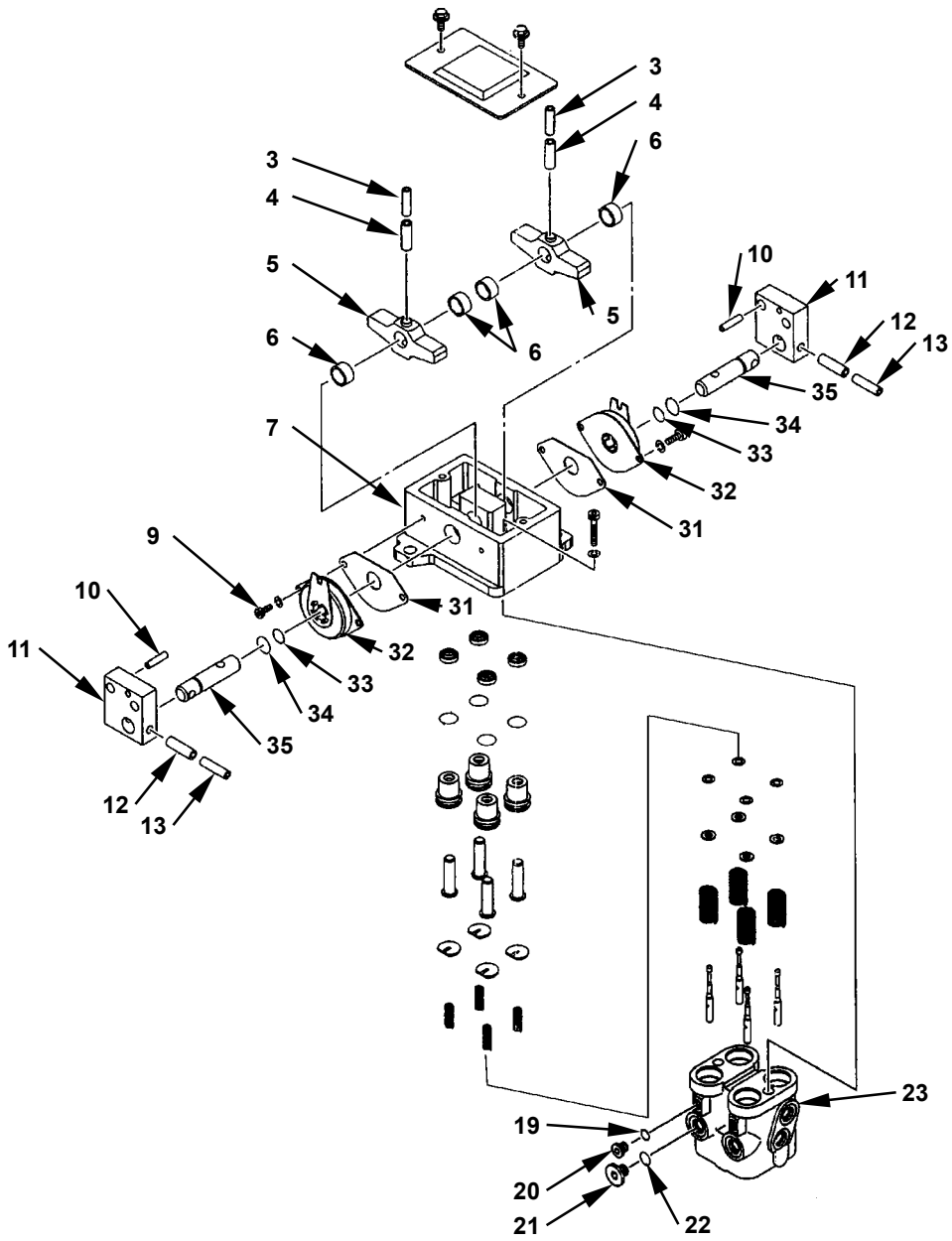
 **NOTE:** Spool (24) has been selected to match the hole of casing (23). Replace spool (24) and casing (23) as an assembly.

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).

UPPERSTRUCTURE / Pilot Valve

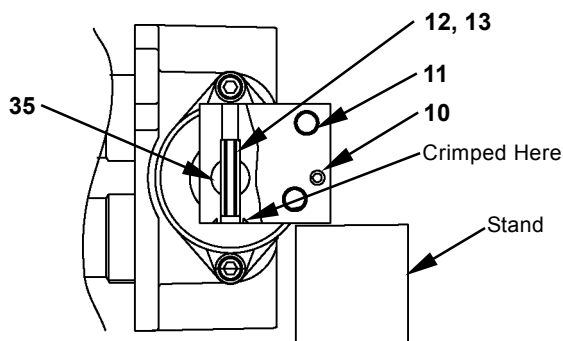


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UPPERSTRUCTURE / Pilot Valve

IMPORTANT: Place a 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.



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9. 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.

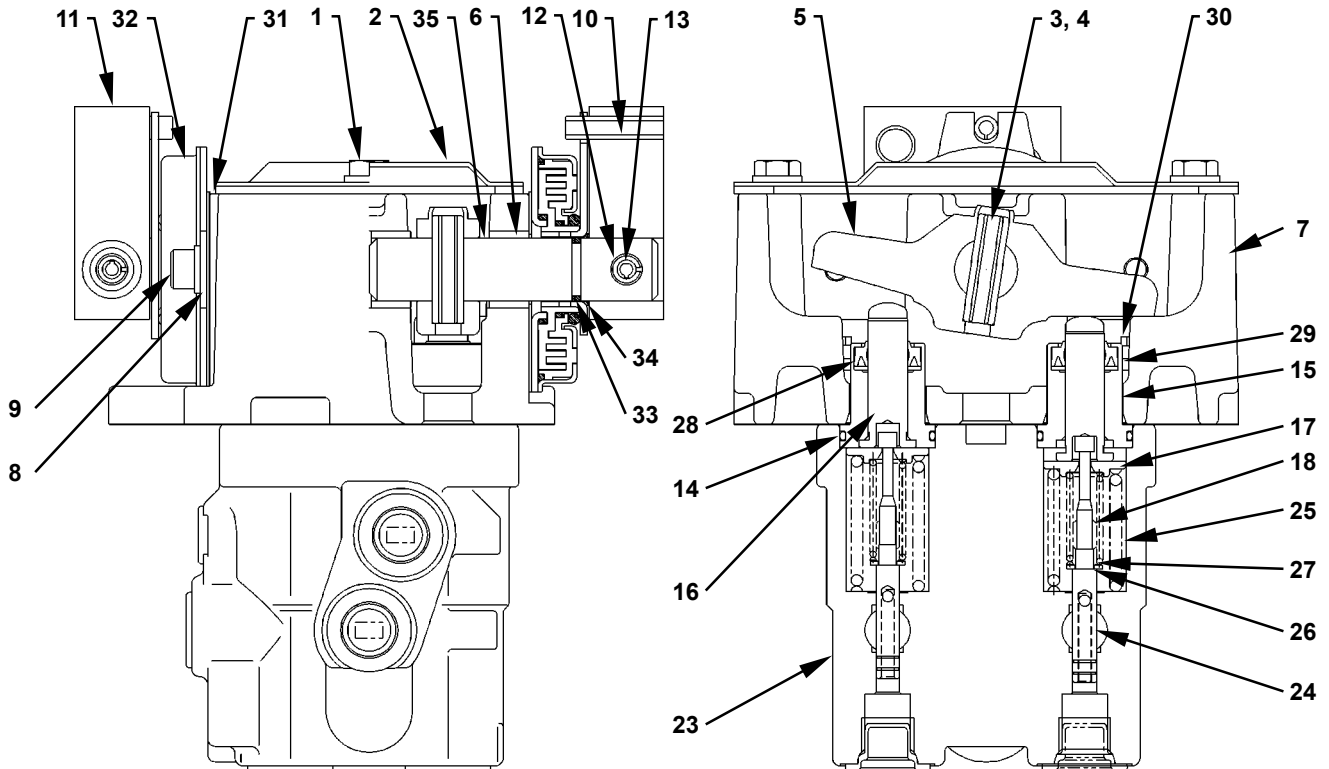
┌ : 5 mm

15. Remove plugs (21) (2 used) from casing (23). O-rings (22) (2 used) are removed with plugs (21) (2 used) together.

┌ : 6 mm

UPPERSTRUCTURE / Pilot Valve

ASSEMBLE TRAVEL PILOT VALVE



W178-02-11-316

- | | | | |
|----------------------------|------------------------------|-----------------------------|-----------------------------|
| 1 - Bolt (2 Used) | 10 - Spring Pin | 19 - *O-Ring (2 Used) | 28 - Oil Seal (4 Used) |
| 2 - Cover | 11 - Bracket (2 Used) | 20 - *Plug (2 Used) | 29 - Spring Washer (2 Used) |
| 3 - Spring Pin (2 Used) | 12 - Spring Pin (2 Used) | 21 - *Plug (2 Used) | 30 - Socket Bolt (2 Used) |
| 4 - Spring Pin (2 Used) | 13 - Spring Pin (2 Used) | 22 - *O-Ring (2 Used) | 31 - Rubber Seat (2 Used) |
| 5 - Cam (2 Used) | 14 - O-Ring | 23 - Casing | 32 - Damper (2 Used) |
| 6 - Bushing (4 Used) | 15 - Bushing (4 Used) | 24 - Spool (4 Used) | 33 - O-Ring (2 Used) |
| 7 - Holder | 16 - Pusher (4 Used) | 25 - Return Spring (4 Used) | 34 - O-Ring (2 Used) |
| 8 - Spring Washer (4 Used) | 17 - Spring Guide (16 Used) | 26 - Spacer (4 Used) | 35 - Pin |
| 9 - Socket Bolt (4 Used) | 18 - Balance Spring (4 Used) | 27 - Shim (12 Used) | |

 **NOTE:** As for the parts with mark *, refer to W2-7-24.

UPPERSTRUCTURE / Pilot Valve


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.

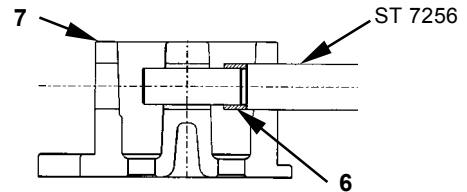
IMPORTANT: Before inserting the parts into holder (7) and casing (23), apply hydraulic oil onto the parts.

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.

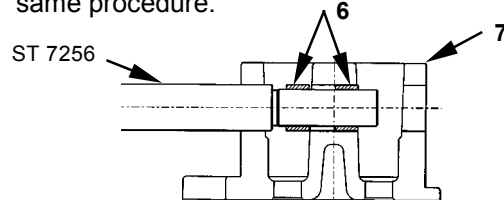
- Insert bushings (6) (4 used) into special tool (ST 7256). Tap special tool (ST 7256) and install bushing (6) into the hole of holder (7) by using a hammer.

Stop tapping when the bushing (6) end is flush with the inside wall.



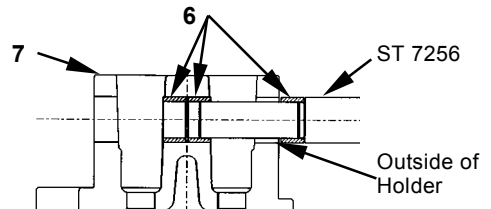
W176-02-11-310

- Install bushing (6) on the opposite side in the same procedure.



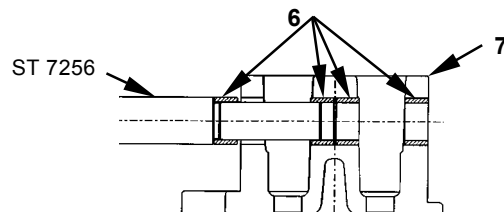
W176-02-11-311

- Install bushing (6) in near side as illustrated. Stop tapping when the bushing (6) end is flush with the outside of holder (7).



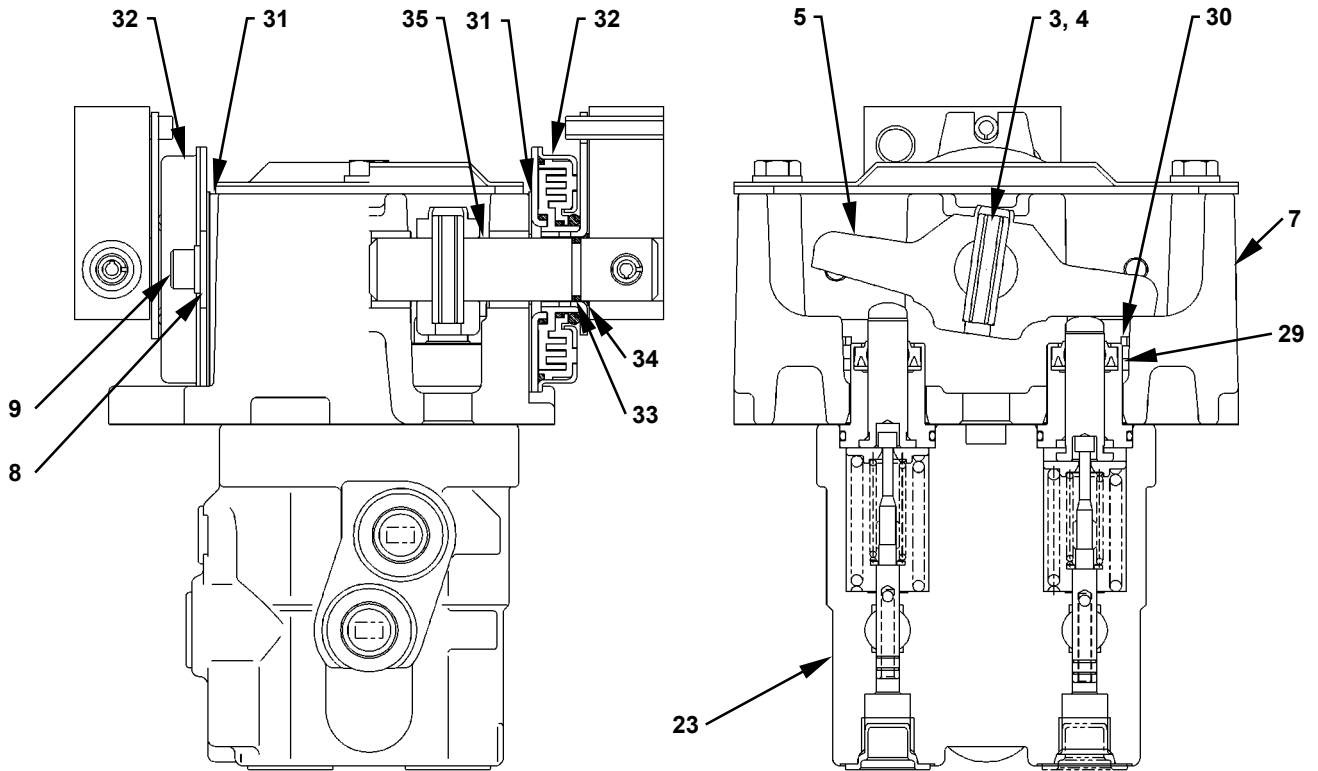
W176-02-11-312

- Install bushing (6) in the near and opposite side as illustrated.



W176-02-11-313

UPPERSTRUCTURE / Pilot Valve



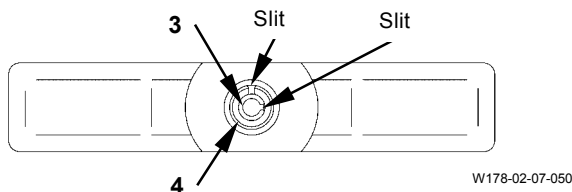
W178-02-11-316

UPPERSTRUCTURE / Pilot Valve

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).


8. 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.

10. 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.

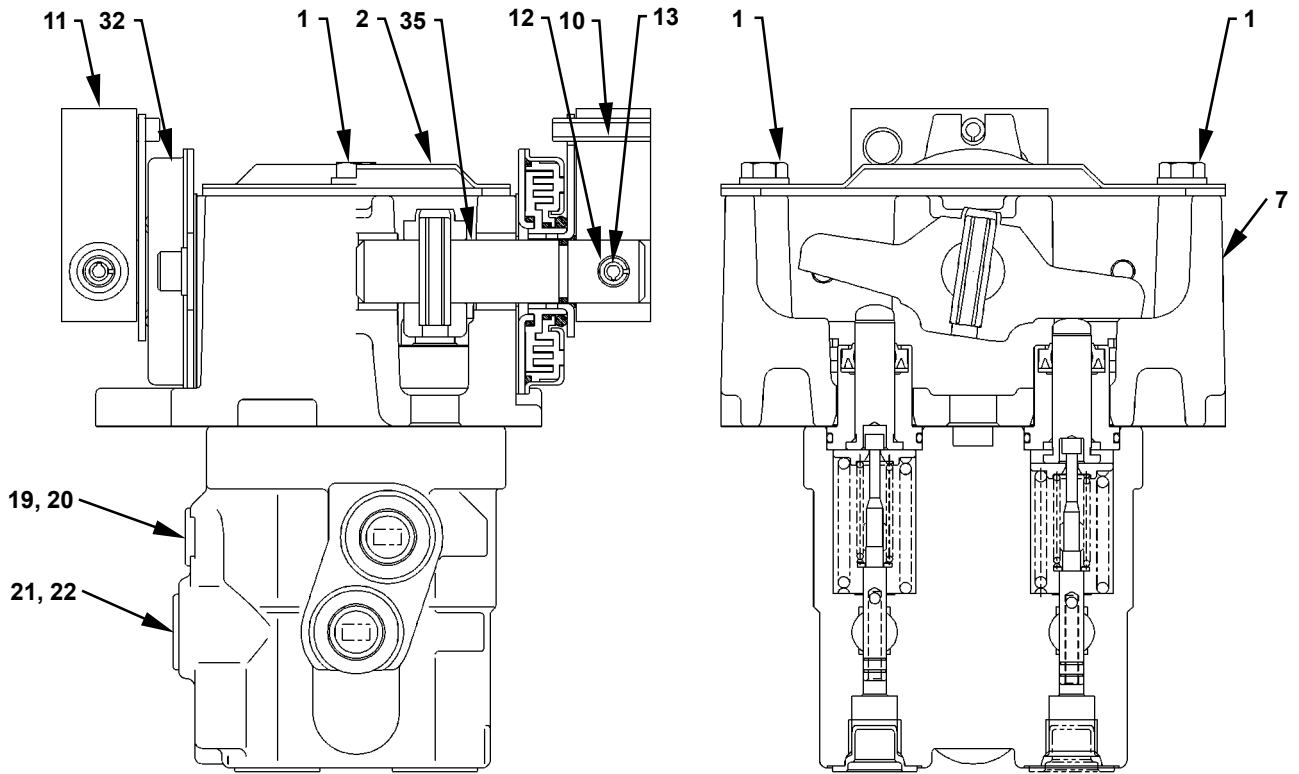
13. Secure damper (32) and rubber seat (31) to holder (7) with socket bolts (9) (4 used) and spring washers (8) (4 used).

 : 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).

UPPERSTRUCTURE / Pilot Valve



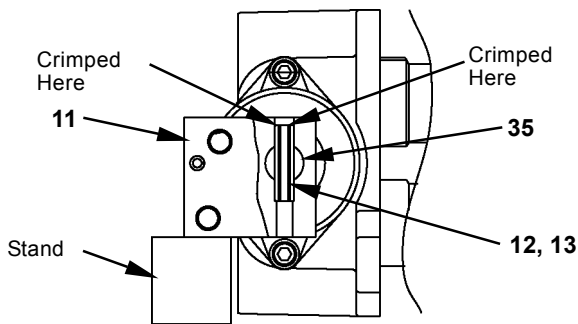
W178-02-11-316

UPPERSTRUCTURE / Pilot Valve

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°.



W176-02-07-011

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)

UPPERSTRUCTURE / Pilot Valve

(Blank)


UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve

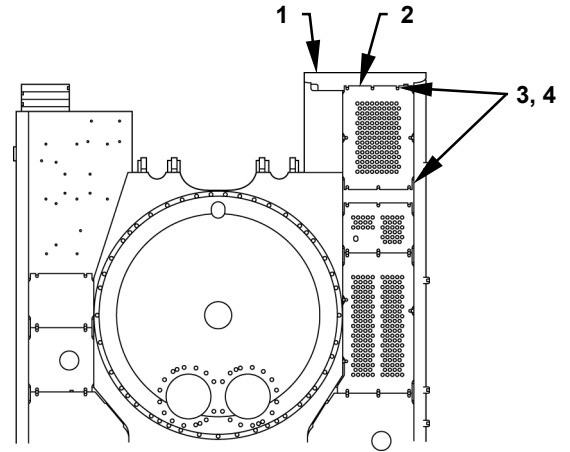
REMOVE AND INSTALL PILOT SHUT-OFF SOLENOID VALVE

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) (9 used) and washers (4) (9 used). Remove cover (2) from main frame (1).

 : 19 mm



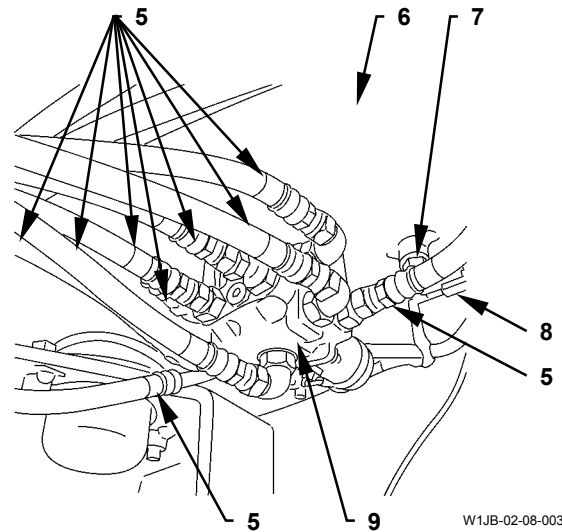
W1JB-02-11-002

2. Remove bolt (7). Remove connector (8).

 : 17 mm


3. Remove hoses (5) (9 used). Attach identification tags to the removed hoses for reassembling. Cap the open ends.

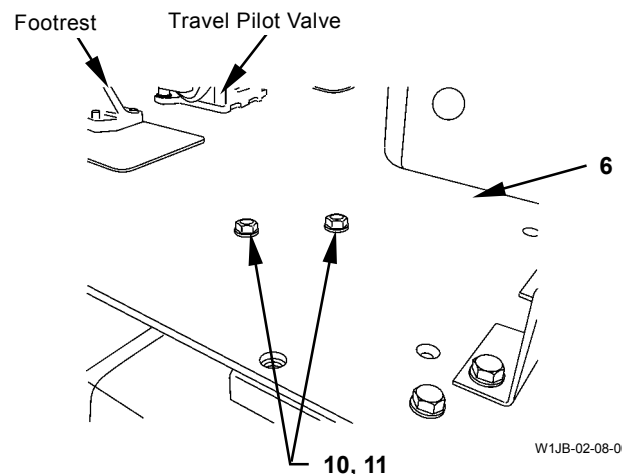
 : 17mm, 19 mm



W1JB-02-08-003

4. Remove bolts (10) (2 used) and washers (11) (2 used). Remove pilot shut-off solenoid valve (9) from plate (6).

 : 17 mm





W1JB-02-08-004

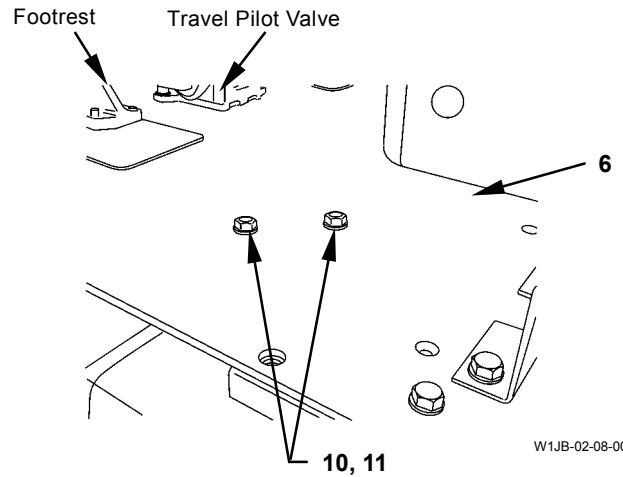
UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve

Installation


1. Install pilot shut-off solenoid valve (9) to plate (6) 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 (9).

 : 17 mm


 : 24.5 N·m (2.5 kgf·m, 18 lbf·ft)


 : 19 mm

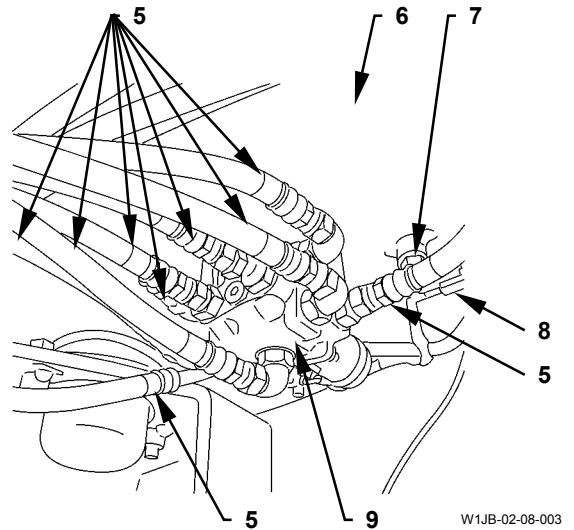
 : 29.5 N·m (3 kgf·m, 22 lbf·ft)

3. Install connector (8).


4. Install bolt (7).


 : 17 mm

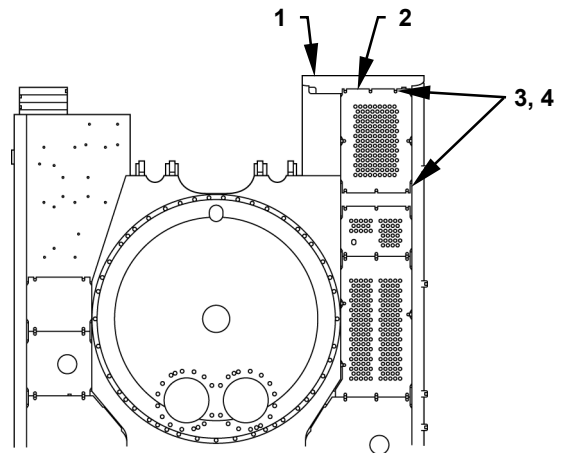
 : 50 N·m (5 kgf·m, 66 lbf·ft)



5. Install cover (2) onto main frame (1) with bolts (3) (9 used) and washers (4) (9 used).

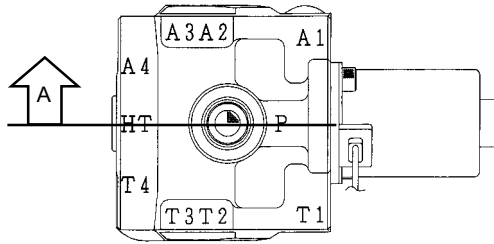
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

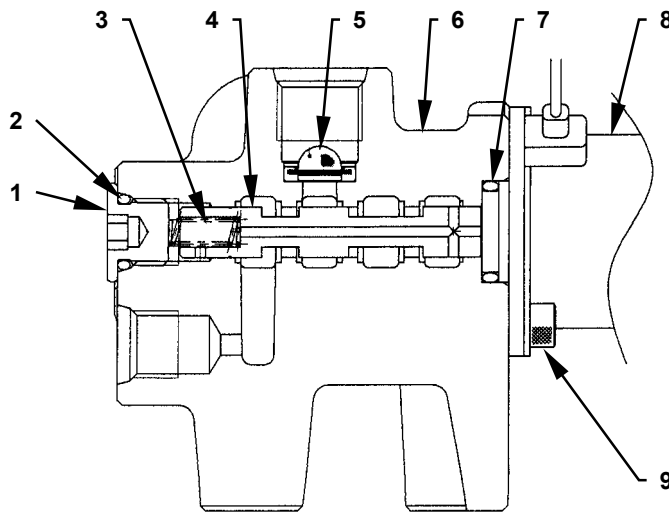


UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve

STRUCTURE OF PILOT SHUT-OFF SOLENOID VALVE



W1JB-02-08-001



Section A

W1JB-02-08-002

Item	Part Name	Q'ty	Wrench Size (mm)	Tightening Torque			Remark
				N·m	(kgf·m)	(lbf·ft)	
1	Plug	1	┌ : 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)

UPPERSTRUCTURE / Solenoid Valve


REMOVE AND INSTALL 4-SPOOL SOLENOID VALVE

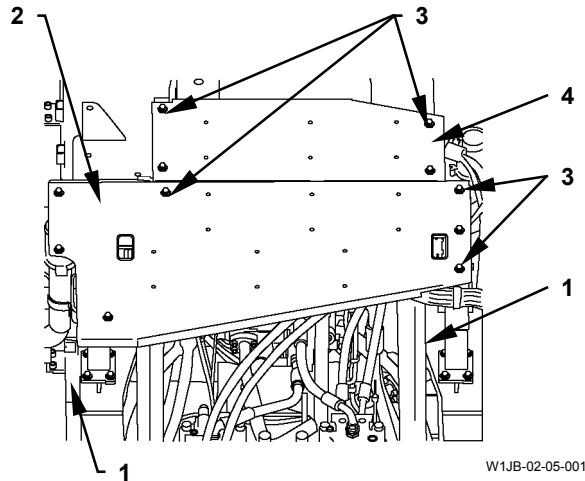


CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)


Removal

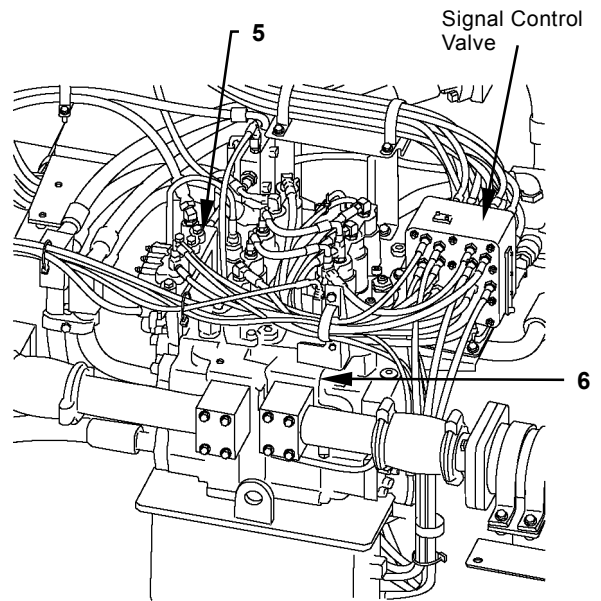
1. Remove bolts (3) (11 used). Remove covers (2, 4) from main frame (1).

 : 19 mm




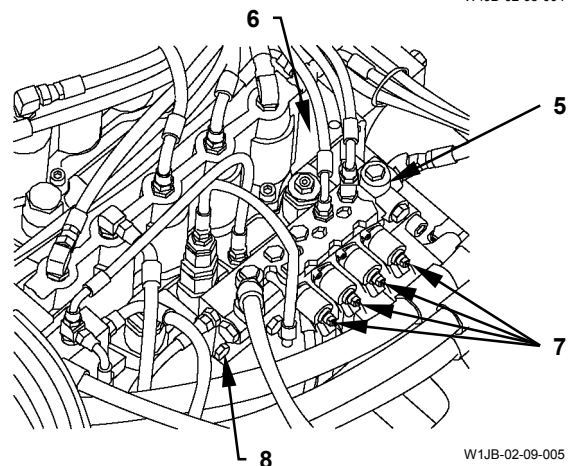
2. Remove all hoses, pipes and connectors (7) (4 used) from 4-spool solenoid valve (5). Attach an identification tag onto the removed hoses for assembling. Cap the open ends.

 : 17, 19 mm



3. Remove bolts (8) (2 used). Remove 4-spool solenoid valve (5) from control valve (6).


 : 17 mm




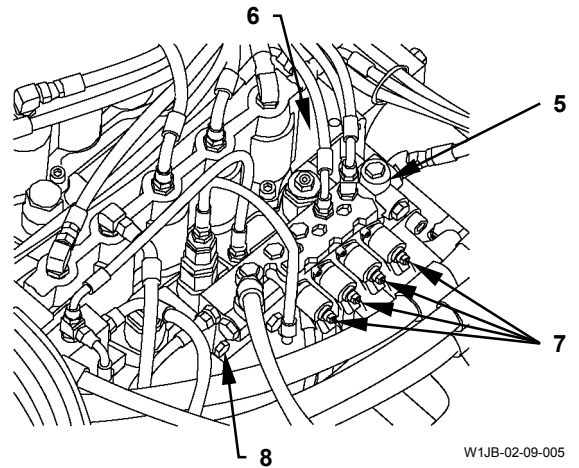
UPPERSTRUCTURE / Solenoid Valve

Installation


1. Install 4-spool solenoid valve (5) to control valve (6) with bolts (8) (2 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 36 lbf·ft)




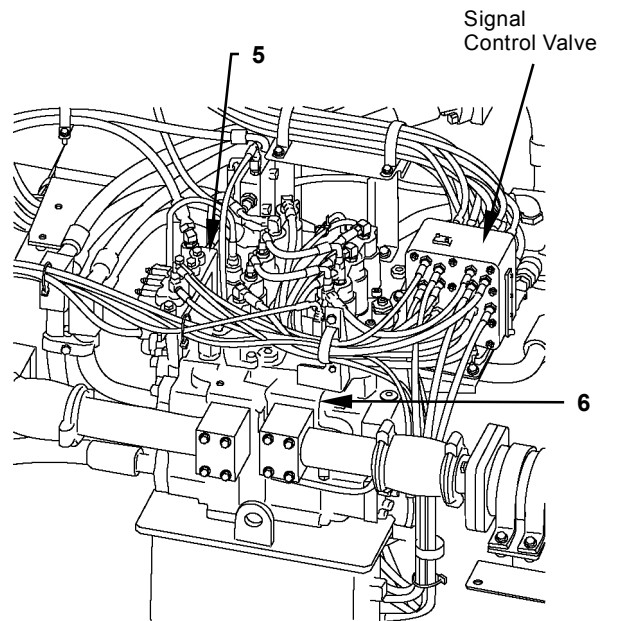
2. Install all hoses, pipes and connectors (7) (4 used) to 4-spool solenoid valve (5).

 : 17 mm


 : 24.5 N·m (2.5 kgf·m, 18 lbf·ft)


 : 19 mm

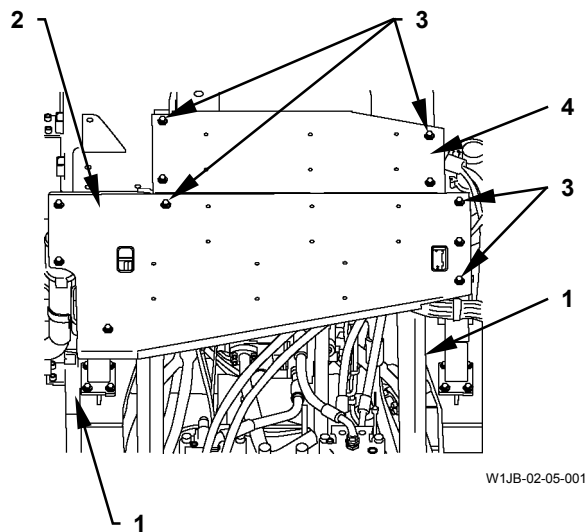
 : 29.5 N·m (3 kgf·m, 22 lbf·ft)



3. Install covers (2, 4) onto main frame (1) with bolts (3) (11 used).

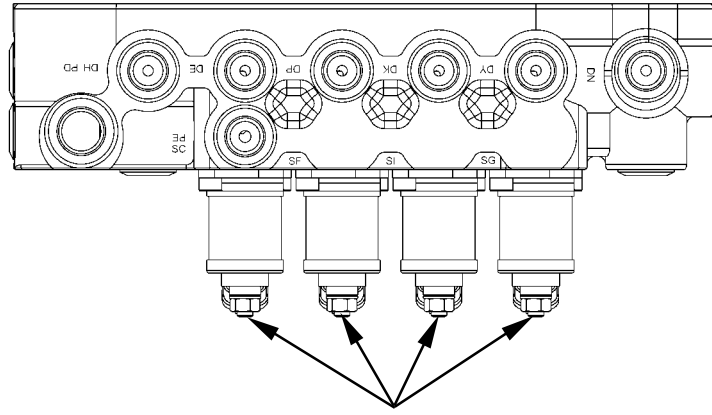
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)



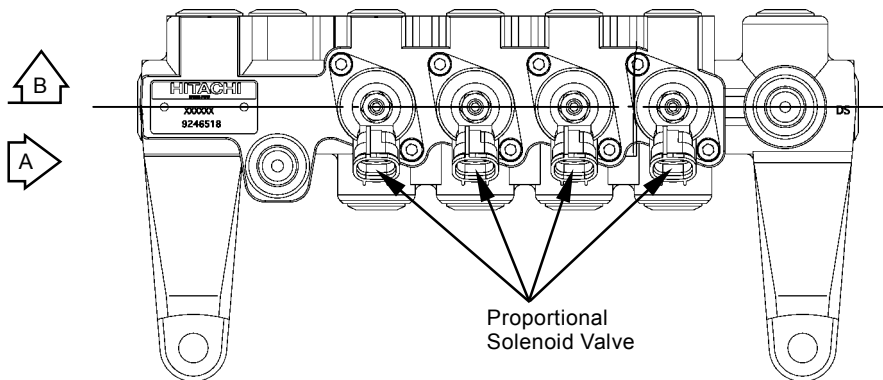
UPPERSTRUCTURE / Solenoid Valve

STRUCTURE OF 4-SPOOL SOLENOID VALVE



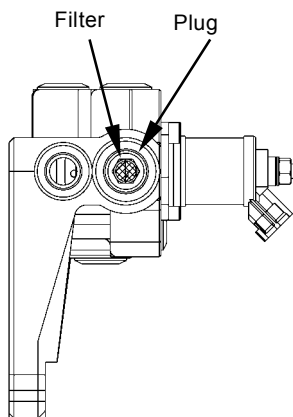
W800-02-09-001

Proportional Solenoid Valve



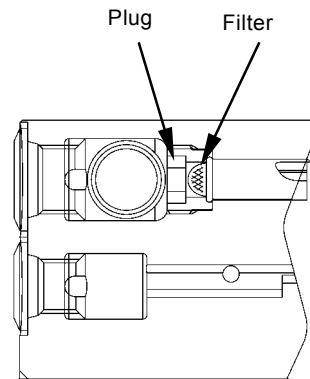
W800-02-09-002

Proportional Solenoid Valve



View A

W800-02-09-003

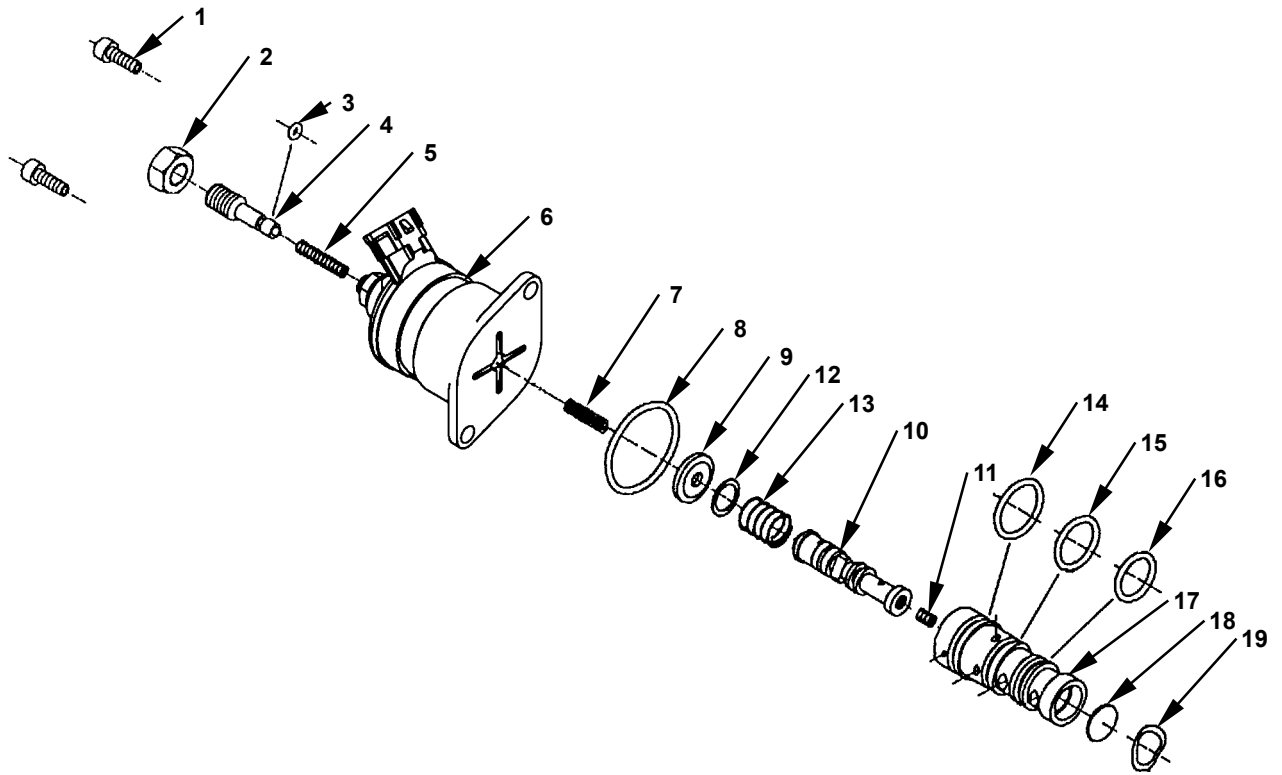


Section B

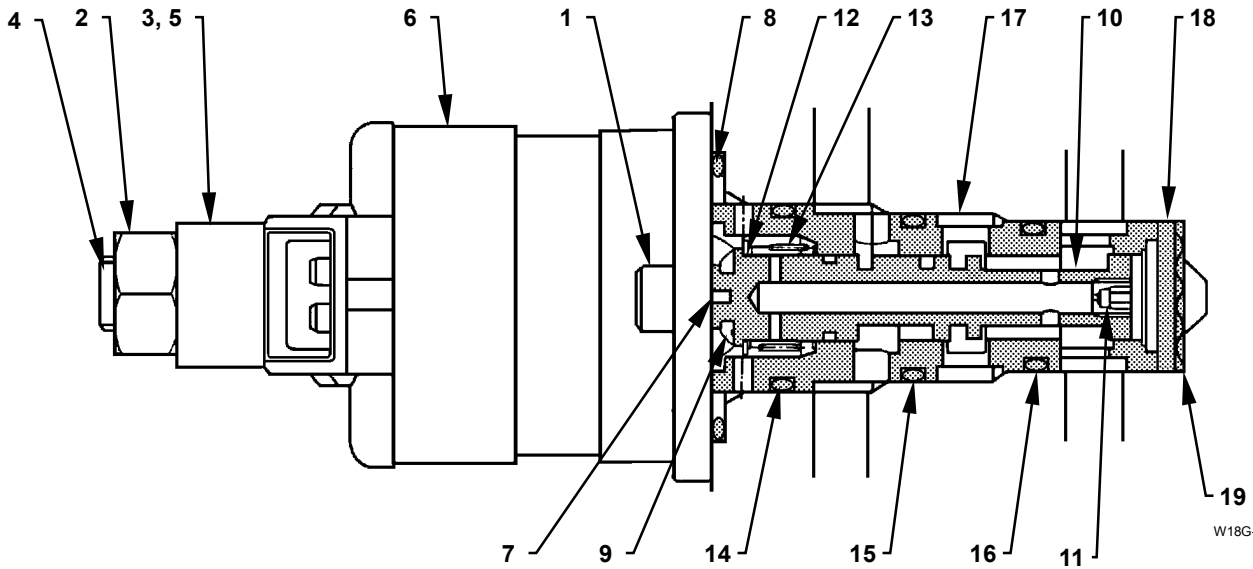
W800-02-09-004

UPPERSTRUCTURE / Solenoid Valve

DISASSEMBLE AND ASSEMBLE 4-SPOOL SOLENOID VALVE



W18G-02-08-012




W18G-02-08-013

- | | | | |
|--------------------------|---------------|--------------|------------------|
| 1 - Socket Bolt (4 Used) | 6 - Solenoid | 11 - Orifice | 16 - O-Ring |
| 2 - Lock Nut | 7 - Spring | 12 - Washer | 17 - Sleeve |
| 3 - O-Ring | 8 - O-Ring | 13 - Spring | 18 - Plate |
| 4 - Adjusting Bolt | 9 - Diaphragm | 14 - O-Ring | 19 - Wave Spring |
| 5 - Spring | 10 - Spool | 15 - O-Ring | |

UPPERSTRUCTURE / Solenoid Valve

Disassemble 4-Spool Solenoid Valve

1. Remove socket bolts (1) (2 used). Remove solenoid (6) and O-ring (8) from the housing.

 : 4 mm

IMPORTANT: When removing solenoid (6), do not lose spring (7) inside the hole on solenoid (6).

Do not disassemble lock nut (2) and adjusting screw (4) for pressure adjustment.

2. Remove spool (10) from sleeve (17). Remove diaphragm (9), washer (12) and spring (13).
3. Remove sleeve (17) from the housing. Remove plate (18) and wave spring (19).
4. Remove O-rings (14,15, 16) from sleeve (17).

IMPORTANT: Do not remove orifice (11) from sleeve (17).

Assemble 4-Spool Solenoid Valve

1. Install wave spring (19) and plate (18) to the housing.

IMPORTANT: When inserting sleeve (17) into the housing, align the hole on sleeve (17) with that on 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). Insert spool (10) into sleeve (17).

IMPORTANT: When installing solenoid (6), do not drop spring (7).

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)

UPPERSTRUCTURE / Solenoid Valve

(Blank)

UPPERSTRUCTURE / Signal Control Valve


REMOVE AND INSTALL SIGNAL CONTROL VALVE

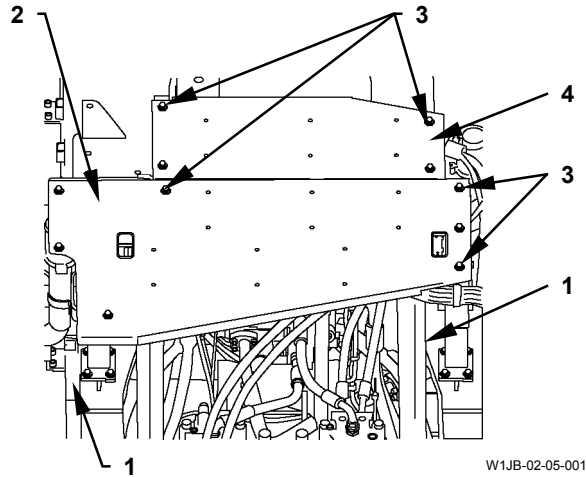


CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

Removal

1. Remove bolts (3) (11 used). Remove covers (2, 4) from main frame (1).


 : 19 mm

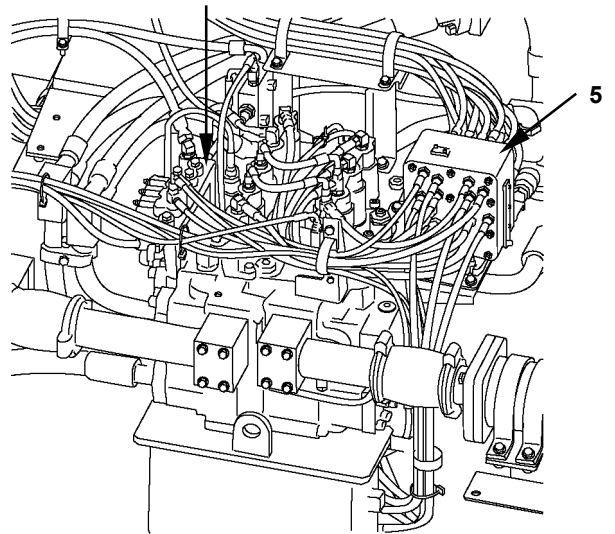


W1JB-02-05-001

4-Spool Solenoid Valve


1. Remove all hoses and the connectors (2 used) from signal control valve (5). Attach an identification tag onto the removed hoses for assembling. Cap the open ends.

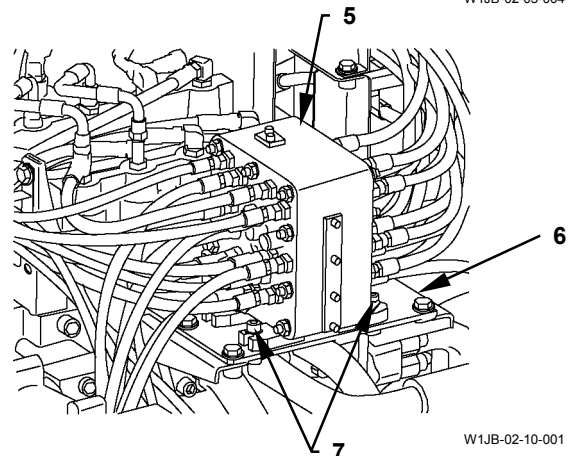
 : 17 mm, 19 mm



W1JB-02-05-004

2. Remove socket bolts (7) (4 used). Remove signal control valve (5) from bracket (6).

 : 8 mm





W1JB-02-10-001

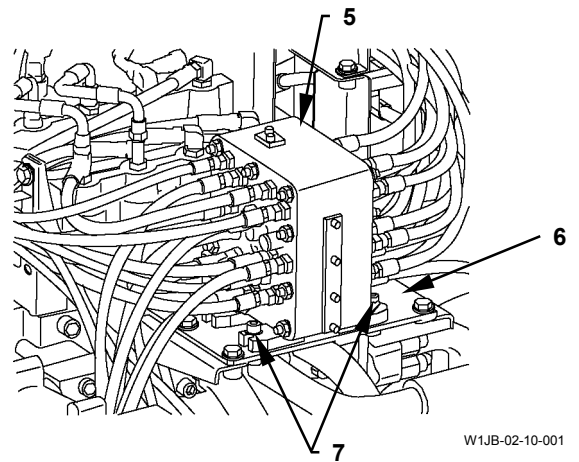
UPPERSTRUCTURE / Signal Control Valve

Installation


1. Install signal control valve (5) to bracket (6) with socket bolts (7) (4 used).


 : 8 mm


 : 50 N·m (5 kgf·m, 36 lbf·ft)




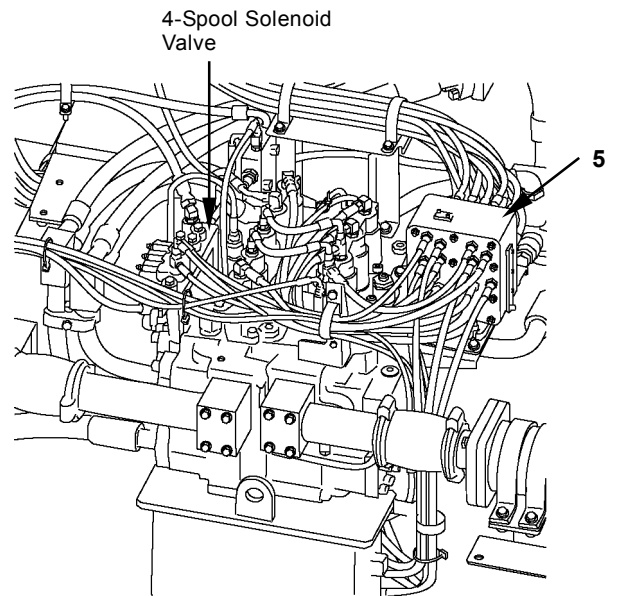
2. Install all hoses and the connectors (2 used) to signal control valve (5).

 : 17 mm


 : 24.5 N·m (2.5 kgf·m, 18 lbf·ft)


 : 19 mm

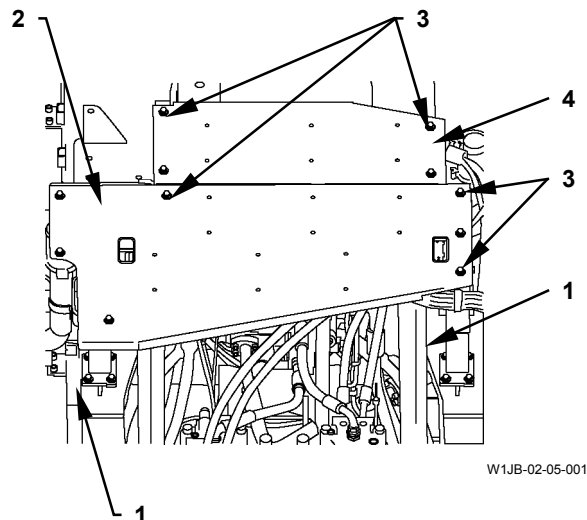
 : 29.5 N·m (3 kgf·m, 22 lbf·ft)



3. Install covers (2, 4) onto main frame (1) with bolts (3) (11 used).

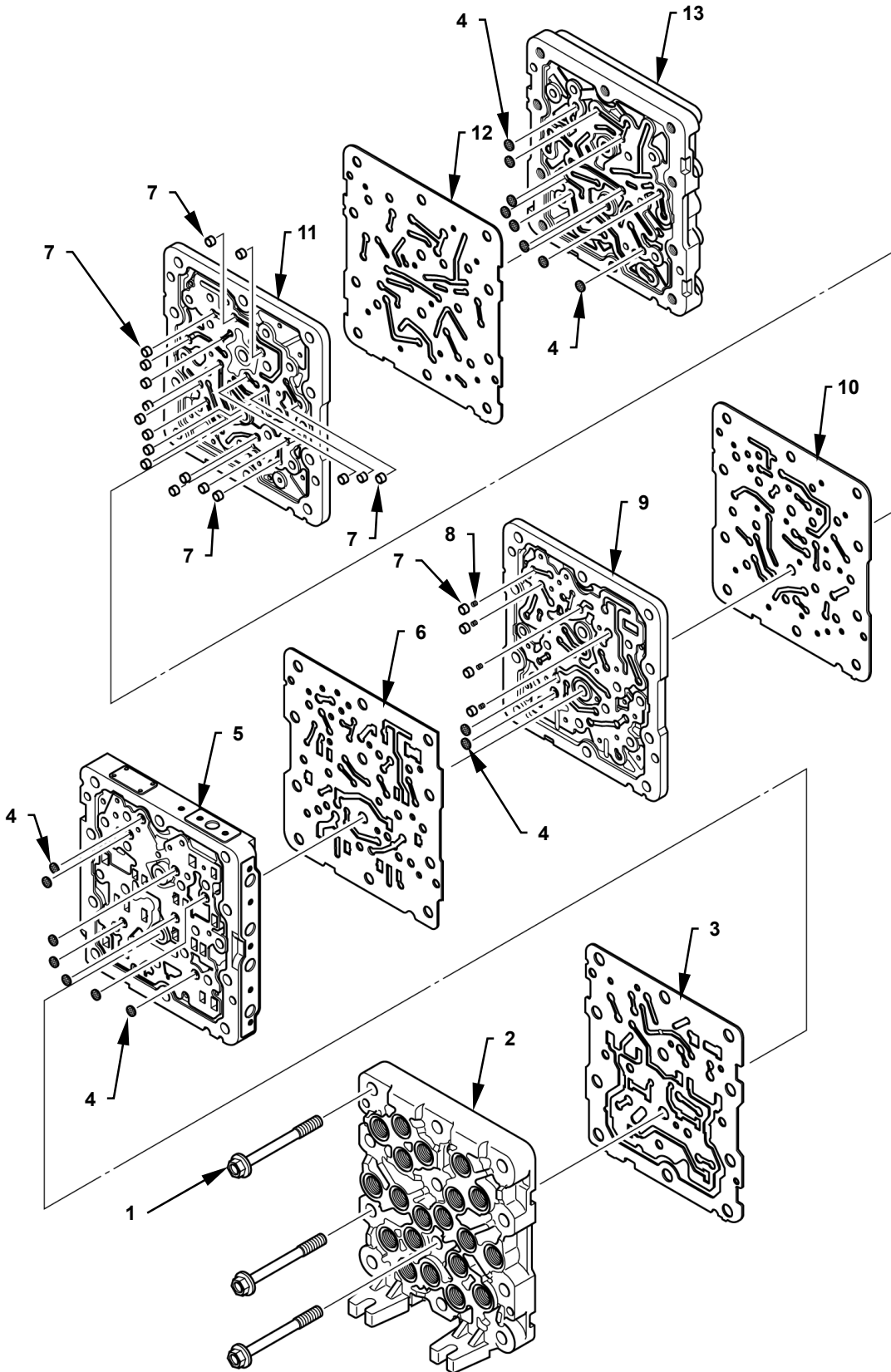
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

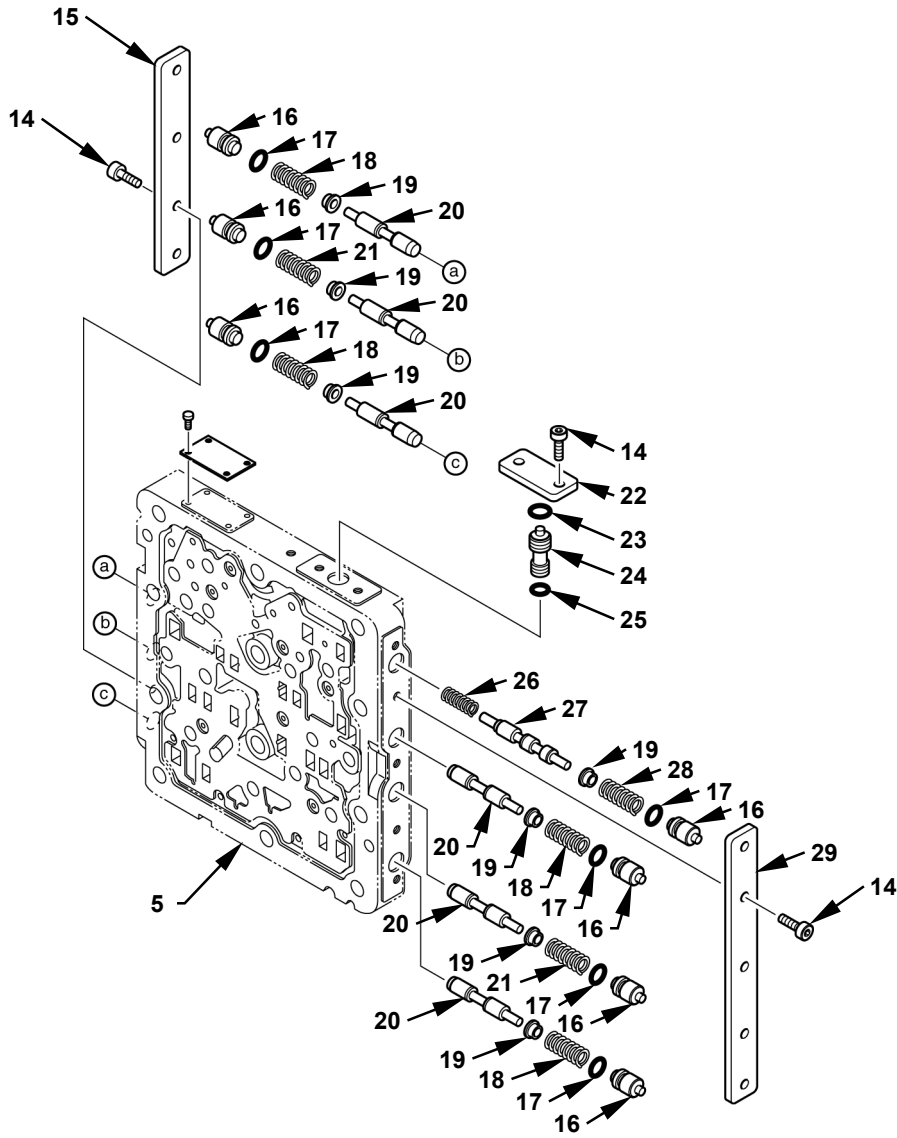


UPPERSTRUCTURE / Signal Control Valve

STRUCTURE OF SIGNAL CONTROL VALVE



UPPERSTRUCTURE / Signal Control Valve



Detail of Body 2 (5)

W1JB-02-10-003

- | | | | |
|----------------------------|----------------------------|----------------------------|-------------|
| 1 - Bolt (3 Used) | 9 - Body 3 | 17 - O-Ring (7 Used) | 25 - O-Ring |
| 2 - Body 1 | 10 - Gasket | 18 - Spring (4 Used) | 26 - Spring |
| 3 - Gasket | 11 - Body 4 | 19 - Spring Guide (7 Used) | 27 - Spool |
| 4 - Filter (17 Used) | 12 - Gasket | 20 - Spool (6 Used) | 28 - Spring |
| 5 - Body 2 | 13 - Body 5 | 21 - Spring (2 Used) | 29 - Plate |
| 6 - Gasket | 14 - Socket Bolt (11 Used) | 22 - Plate | |
| 7 - Shuttle Valve (2 Used) | 15 - Plate | 23 - O-Ring | |
| 8 - Spring (4 Used) | 16 - Plug (7 Used) | 24 - Shuttle Valve | |

UPPERSTRUCTURE / Shockless Valve


REMOVE AND INSTALL SHOCKLESS VALVE

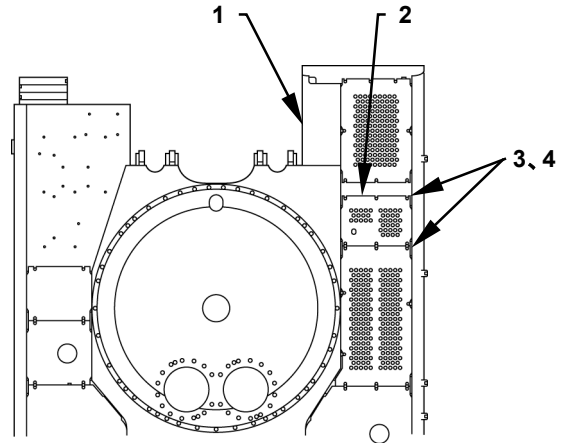


CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

Removal


1. Remove bolts (3) (8 used) and washers (4) (8 used). Remove cover (2) from main frame (1).

 : 19 mm




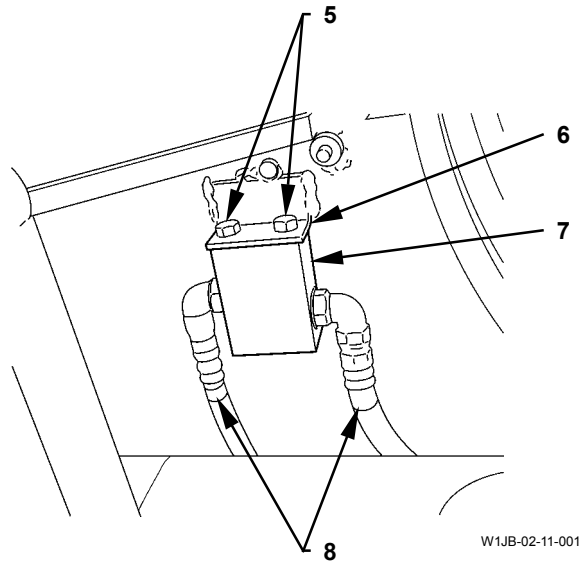
W1JB-02-11-002

2. Remove hoses (8) (2 used). Cap the open ends.

 : 19 mm

3. Remove bolts (5) (2 used). Remove shockless valve (7) from bracket (6).

 : 13 mm





W1JB-02-11-001

UPPERSTRUCTURE / Shockless Valve


Installation


1. Install shockless valve (7) to bracket (6) with bolts (5) (2 used).

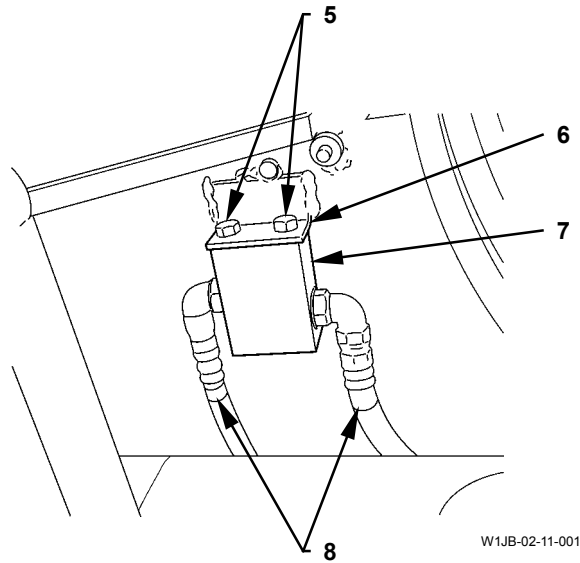
 : 13 mm

 : 20 N·m (2 kgf·m, 15 lbf·ft)


2. Install the hoses (2 used) to shockless valve (7).


 : 19 mm

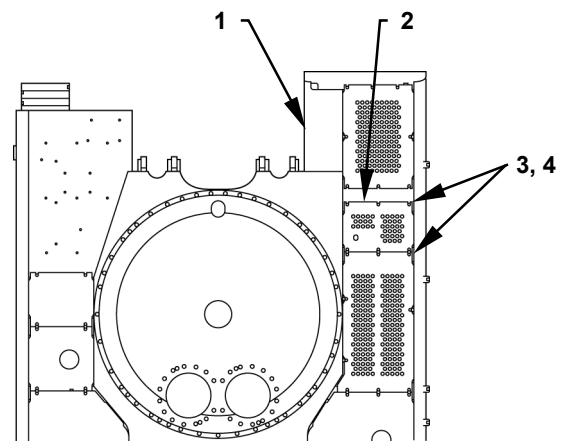
 : 29.5 N·m (3 kgf·m, 22 lbf·ft)



3. Install cover (2) onto main frame (1) with bolts (3) (8 used) and washers (4) (8 used).

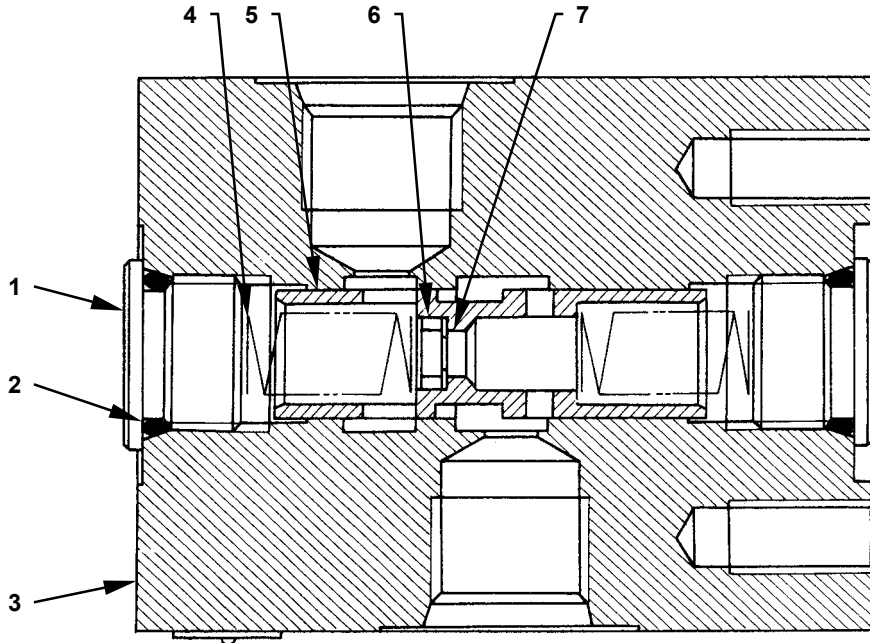
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)




UPPERSTRUCTURE / Shockless Valve

STRUCTURE OF SHOCKLESS VALVE



T183-03-07-008

Item	Part Name	Q'ty	Wrench Size (mm)	Tightening Torque			Remark
				N-m	(kgf-m)	(lbf-ft)	
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					

UPPERSTRUCTURE / Shockless Valve

(Blank)






UPPERSTRUCTURE / Fan Motor

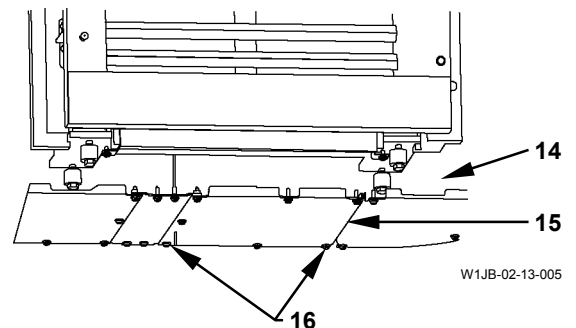
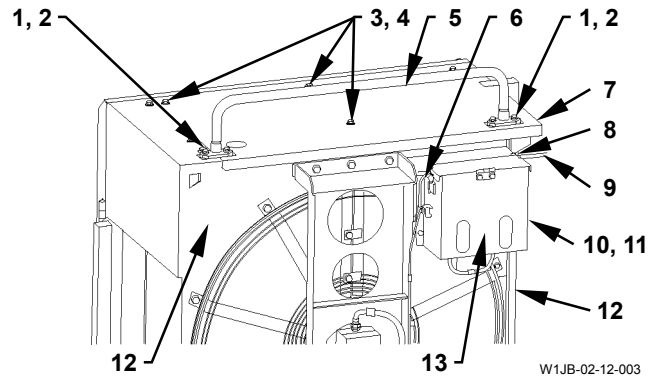
REMOVE AND INSTALL FAN MOTOR



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 of Fan Motor for Oil Cooler

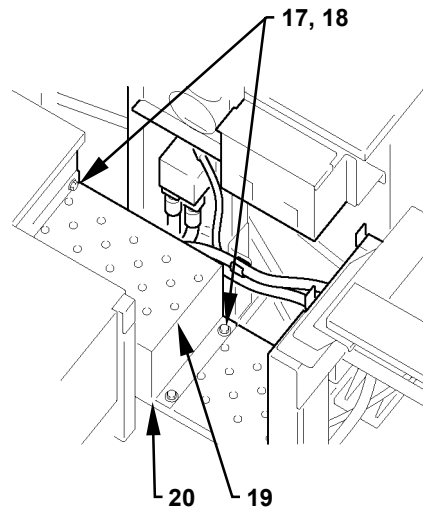
1. Remove bolts (1) (4 used) and washers (2) (4 used). Remove handrail (5) from shroud (12).
 : 19 mm
2. Remove bolts (3) (6 used) and washers (4) (6 used). Remove cover (7) from shroud (12).
 : 19 mm
3. Remove bolt (8). Open the upper cover on box (10). Remove vinyl hose (9) from water tank (13).
 : 17 mm
4. Raise vinyl hose (6). Disconnect the connector from the lower of box (10).
5. Remove bolts (11) (5 used). Remove the box (10) assembly from shroud (12).
 : 17 mm
6. Remove bolts (16) (6 used). Remove cover (15) from main frame (14).
 : 19 mm



UPPERSTRUCTURE / Fan Motor


7. Remove bolts (17) (4 used) and washers (18) (4 used). Remove cover (19) from bracket (20).

 : 19 mm




W1JB-02-13-004


8. Remove bolt (22) and clamp (21). Remove hoses (23) (2 used) from fan valve (26). Cap the open ends.


 : 19 mm, 36 mm

9. Remove hose (24). Cap the open ends.

 : 27 mm

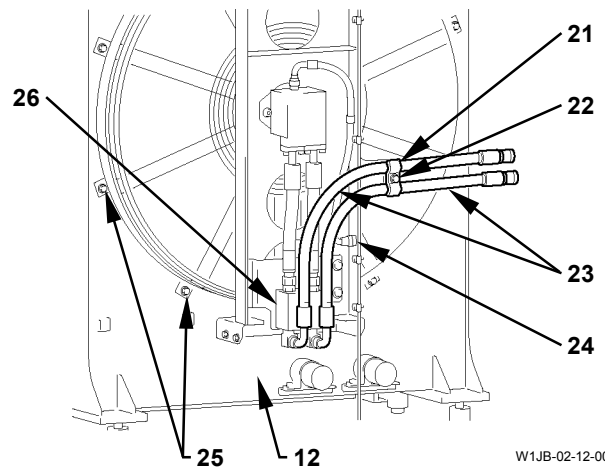
10. Remove bolts (25) (8 used).

 : 19 mm

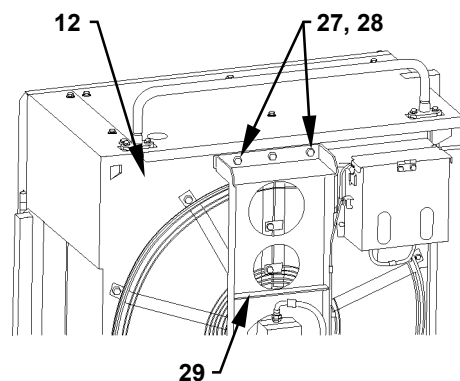
 **CAUTION:** The bracket (29) assembly weight: 116 kg (255 lb)

11. Attach a nylon sling to bracket (29) and hold bracket (29). Remove bolts (27) (6 used) and washers (28) (6 used). Remove the bracket (29) assembly from shroud (12).

 : 19 mm





W1JB-02-12-004

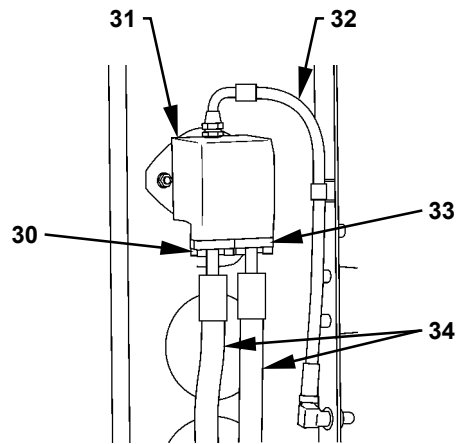


W1JB-02-12-003


UPPERSTRUCTURE / Fan Motor

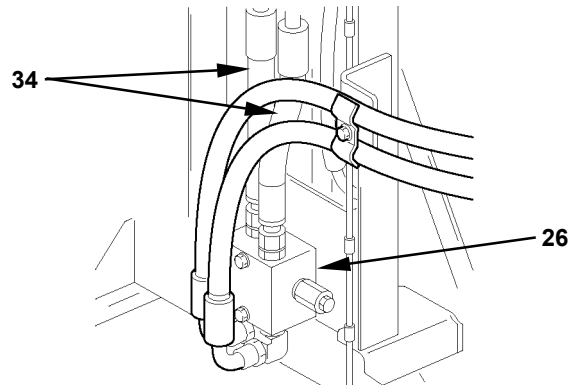
CAUTION: The bracket (29) assembly weight: 116 kg (255 lb)

12. Remove hose (32) from fan motor (31). Cap the open ends.
 : 27 mm
13. Remove socket bolts (30) (8 used) and split flanges (33) (4 used).
 : 8 mm




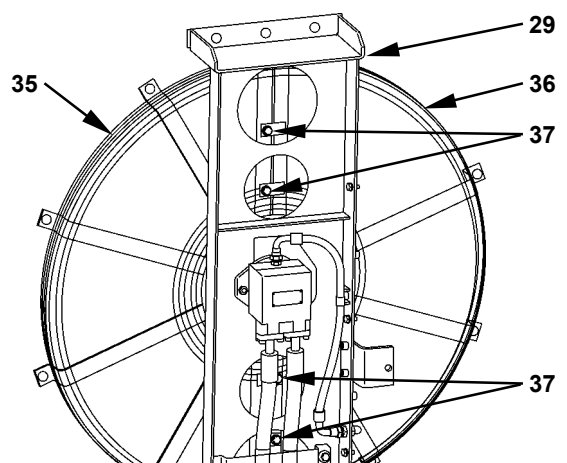
W1JB-02-12-016

14. Remove hoses (34) (2 used) from fan valve (26). Cap the open ends.
 : 36 mm



W1JB-02-13-006


15. Remove bolts (37) (4 used). Remove nets (35, 36) from bracket (29).
 : 19 mm

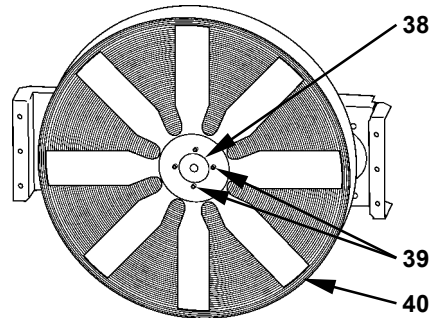


W1JB-02-12-014

UPPERSTRUCTURE / Fan Motor

16. Remove socket bolts (39) (4 used). Remove fan (40) from coupling (38).


 : 8 mm



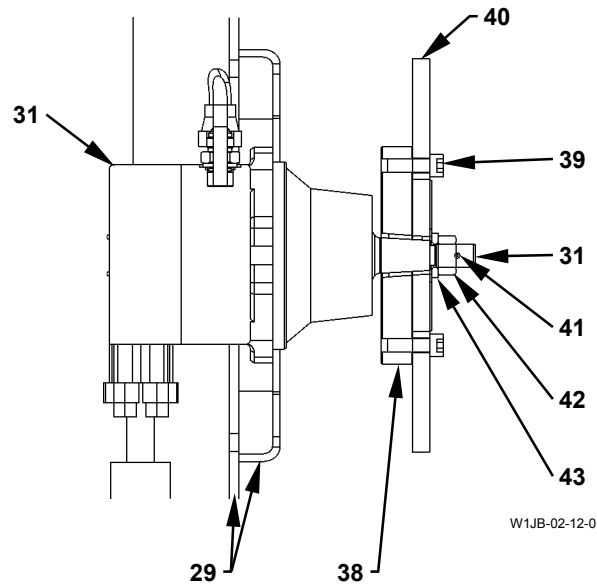
W1JB-02-12-010

17. Remove lock pin (41) from fan motor (31).

18. Remove nut (42) and washer (43) from fan motor (31).

 : 24 mm

19. Remove coupling (38) from fan motor (31).




W1JB-02-12-017

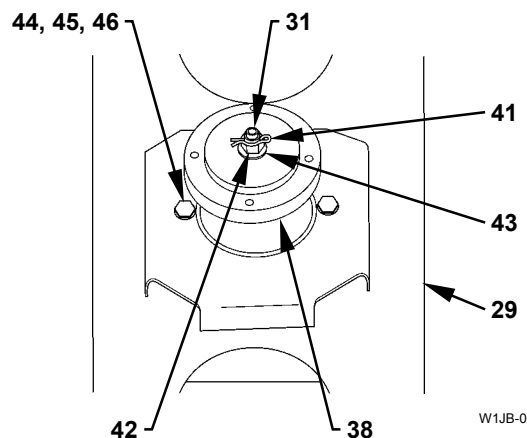


CAUTION: Fan motor (31) weight: 20 kg (44 lb)
Bracket (29) weight: 34 kg (64 lb)

20. Remove nuts (46) (2 used) and washers (45) (2 used). Remove bolts (44) (2 used) and washers (45) (2 used) from bracket (29).

 : 19 mm

21. Remove fan motor (31) from bracket (29).



W1JB-02-12-015

UPPERSTRUCTURE / Fan Motor


Installation




CAUTION: Fan motor (31) weight: 20 kg (44 lb)


Bracket (29) weight: 34 kg (64 lb)


1. Install fan motor (31) to bracket (29) with bolts (44) (2 used), washers (45) (4 used) and nuts (46) (2 used).

 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)


2. Install coupling (38) to fan motor (31). Secure coupling (38) to fan motor (31) with washer (34), nuts (42) and lock pin (41).

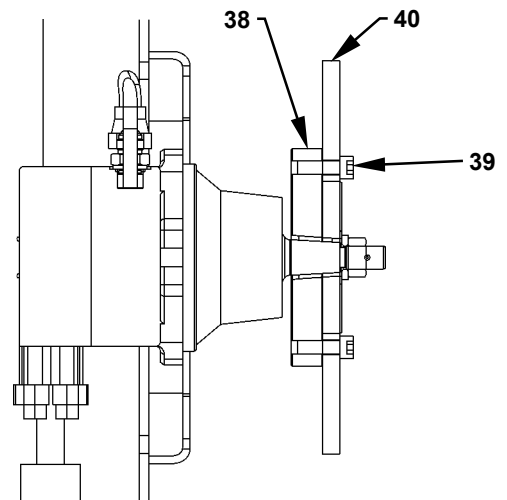
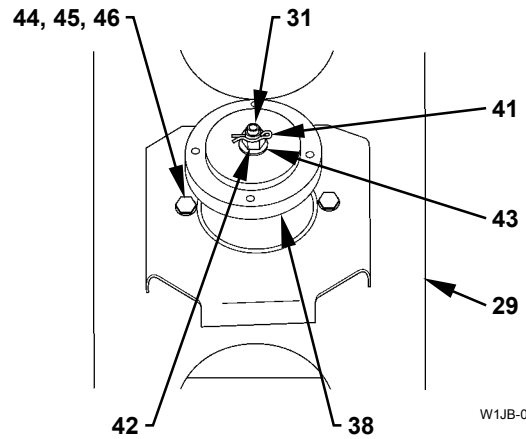
 : 24 mm

 : 100 N·m (10 kgf·m, 74 lbf·ft)

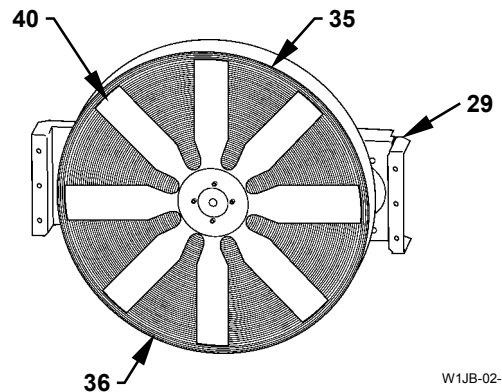
3. Install fan (40) to coupling (38) with socket bolts (39) (4 used).

 : 8 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)





4. Insert nets (35, 36) from the right and left sides between fan (40) and bracket (29).

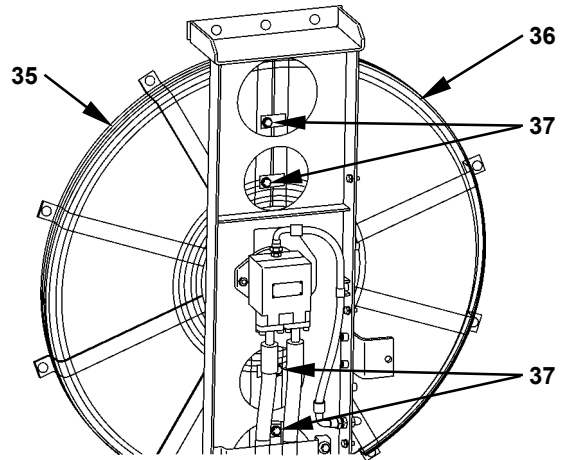


UPPERSTRUCTURE / Fan Motor

5. Secure nets (35, 36) with bolts (37) (4 used).


 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)




W1JB-02-12-014


6. Install hose (32) to fan motor (31).

 : 27 mm


 : 78 N·m (8 kgf·m, 58 lbf·ft)


7. Install hoses (34) (2 used) to fan valve (26).

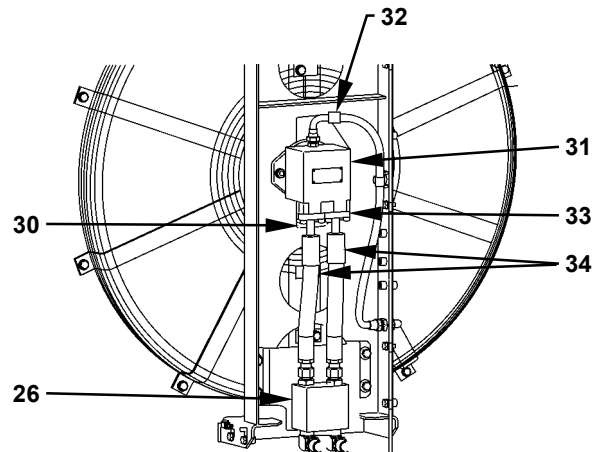
 : 36 mm

 : 175 N·m (18 kgf·m, 130 lbf·ft)

8. Install hoses (34) (2 used) to fan motor (31) with split flanges (33) (4 used) and socket bolts (30) (8 used).


 : 8 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)




W1JB-02-12-018


9. Install hoses (23) (2 used) to fan valve (26).

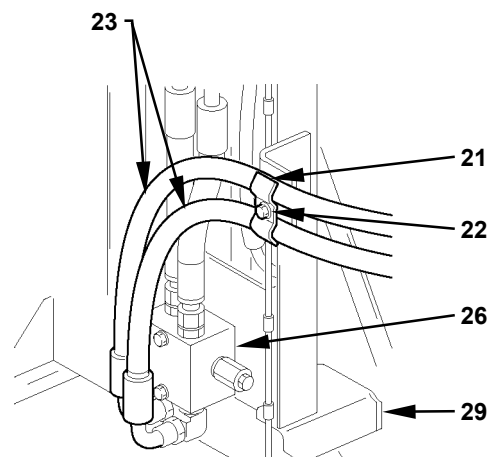
 : 36 mm

 : 175 N·m (18 kgf·m, 130 lbf·ft)

10. Secure hoses (23) (2 used) to bracket (29) with bolt (22) and clamp (21).

 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)




W1JB-02-13-006


UPPERSTRUCTURE / Fan Motor

CAUTION: The bracket (29) assembly weight: 116 kg (255 lb)


11. Attach a nylon sling onto the bracket (29) assembly and hold the bracket (29) assembly. Hoist the bracket (29) assembly and align with the mounting hole for shroud (12).


12. Install the bracket (29) assembly to shroud (12) with bolts (27) (6 used) and washers (28) (6 used).

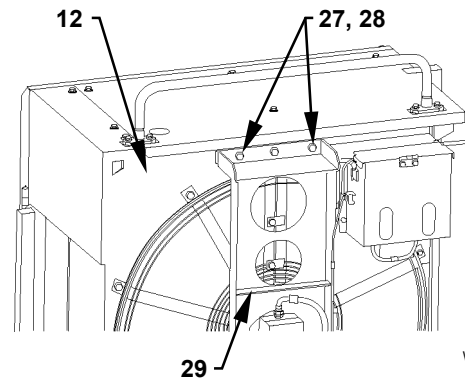
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

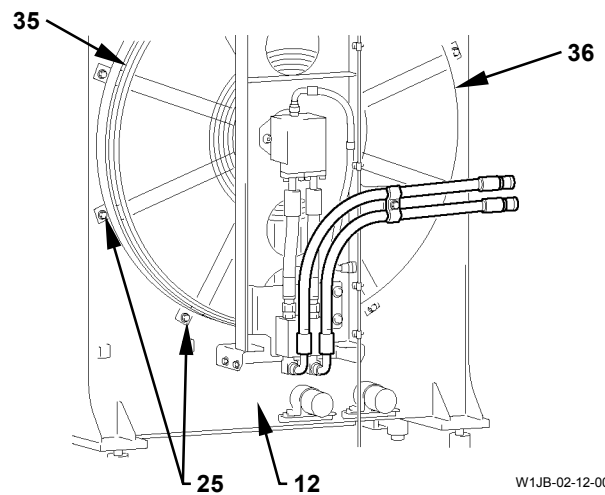
13. Install nets (35, 36) to shroud (12) with bolts (25) (8 used).

 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)





W1JB-02-12-003



W1JB-02-12-004


14. Install the box (10) assembly to shroud (12) with bolts (11) (5 used).


 : 17 mm

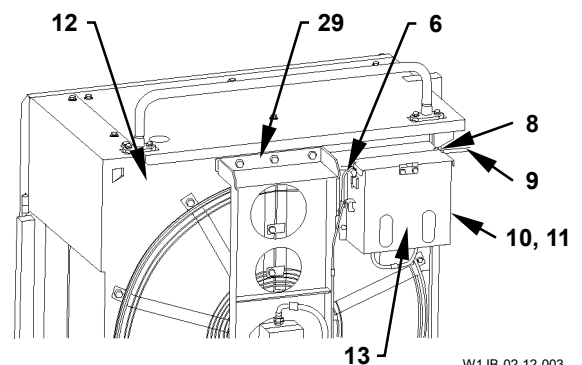
 : 50 N·m (5 kgf·m, 37 lbf·ft)

15. Install vinyl hose (6) to the clamp attached with bracket (29). Install the connector to the lower of box (10).

16. Open the upper cover of box (10). Install vinyl hose (9) to water tank (13). Install the clamp to shroud (12) with bolt (8).

 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)




W1JB-02-12-003


UPPERSTRUCTURE / Fan Motor


17. Install cover (7) to shroud (12) with bolts (3) (6 used) and washers (4) (6 used).

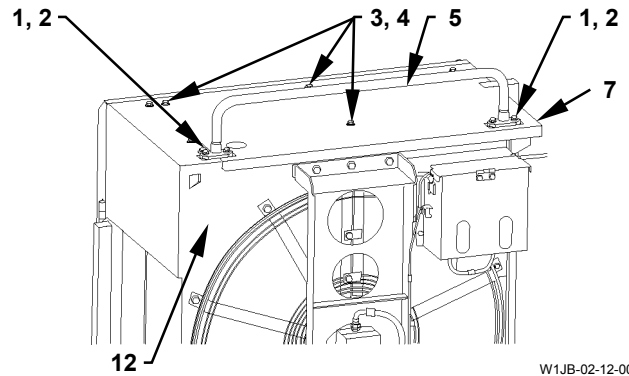
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

18. Install handrail (5) to shroud (12) with bolts (1) (4 used) and washers (2) (4 used).


 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)

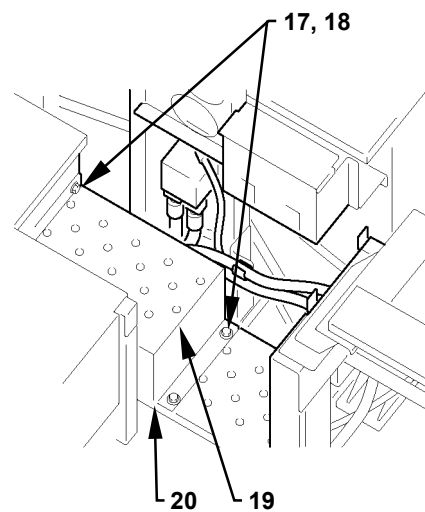


W1JB-02-12-003

19. Install cover (19) to bracket (20) with bolts (17) (4 used) and washers (18) (4 used).


 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)

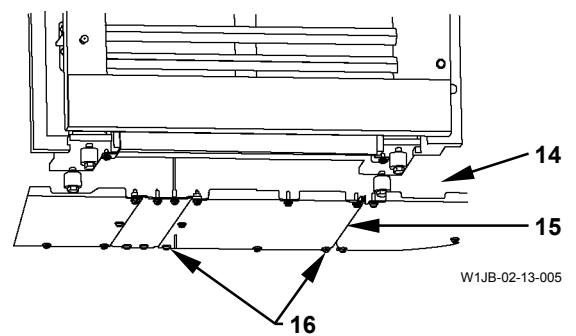


W1JB-02-13-004

20. Install cover (15) to main frame (14) with bolts (16) (6 used).

 : 19 mm





 : 90 N·m (9 kgf·m, 66 lbf·ft)

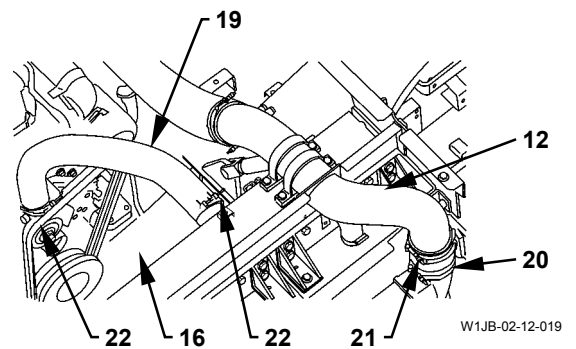
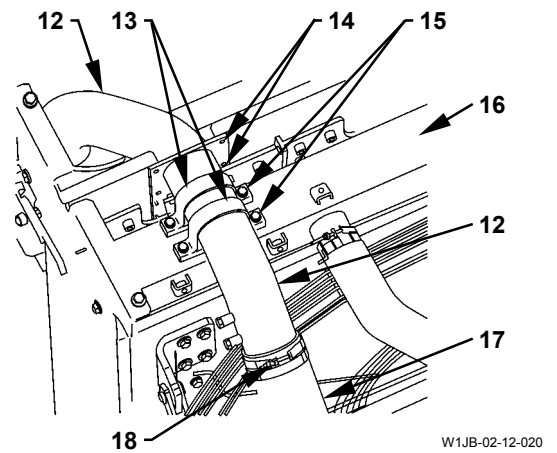
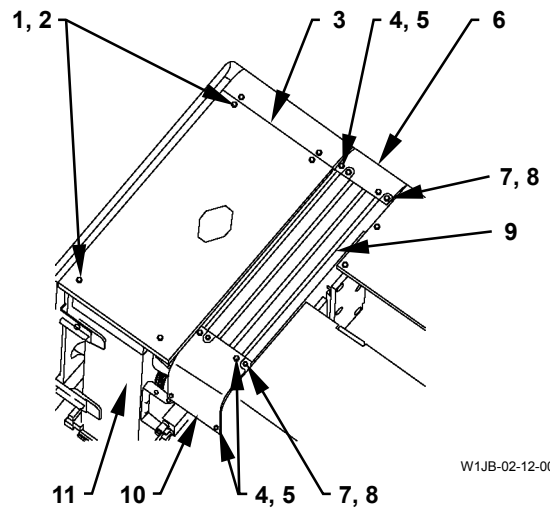


W1JB-02-13-005

UPPERSTRUCTURE / Fan Motor

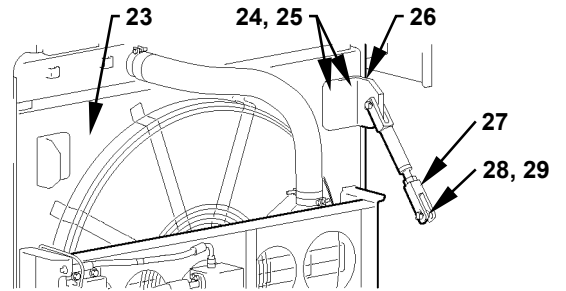
Removal of Fan Motor for Radiator

1. Remove bolts (1) (4 used) and washers (2) (4 used). Remove cover (3) from bracket (11).
 : 19 mm
2. Remove bolts (4) (8 used) and washers (5) (8 used). Remove covers (6, 10) from bracket (11).
 : 19 mm
3. Remove bolts (7) (4 used) and washers (8) (4 used). Remove cover (9) from bracket (11).
 : 19 mm
4. Remove bolts (15) (4 used). Remove bands (13) (2 used) from radiator (16).
 : 17 mm
5. Loosen the bolts (2 used) for band (18). Remove rubber hose (17) from pipe (12).
6. Remove caps (14) (4 used).
7. Loosen the bolts (2 used) for band (21). Remove the pipe (12) assembly from rubber (20).
8. Loosen the bolts (4 used) for band (22). Remove rubber hose (19) from radiator (16).




UPPERSTRUCTURE / Fan Motor

9. Remove split pin (28). Remove pin (29) from fork end (27).

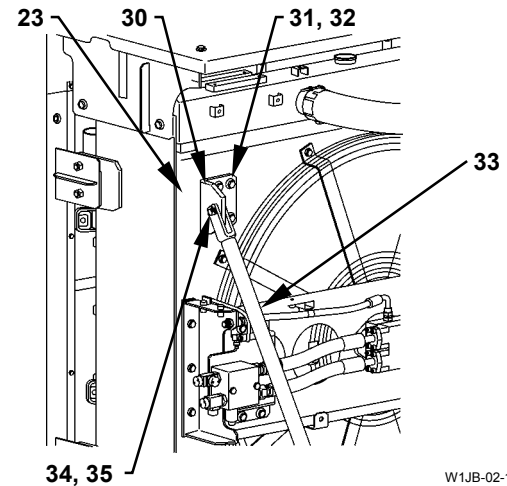


W1JB-02-12-006

10. Remove bolts (24) (4 used) and washers (25) (4 used). Remove the bracket (26) assembly from shroud (23).


 : 19 mm

11. Remove split pin (34) and pin (35). Lay down stay (33) to the engine side.




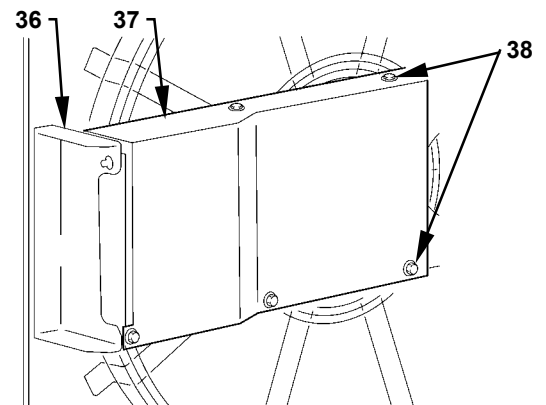
W1JB-02-13-007

12. Remove bolts (31) (4 used) and washers (32) (4 used). Remove bracket (30) from shroud (23).

 : 19 mm


13. Remove bolts (38) (5 used). Remove cover (37) from bracket (36).

 : 17 mm




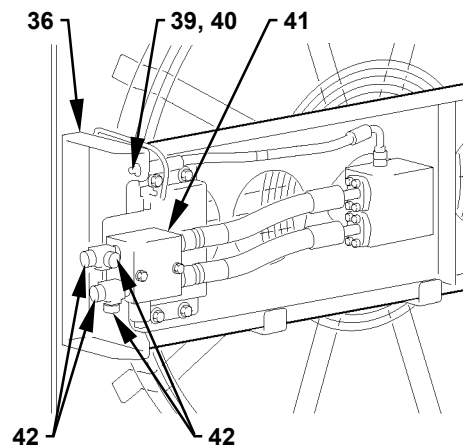
W1JB-02-12-009

14. Remove hose (40) from adapter (39). Cap the open ends.

 : 27 mm

15. Remove hoses (42) (4 used) from fan valve (41). Cap the open ends.


 : 36 mm



W1JB-02-12-008

UPPERSTRUCTURE / Fan Motor


16. Remove bolts (45) (8 used).

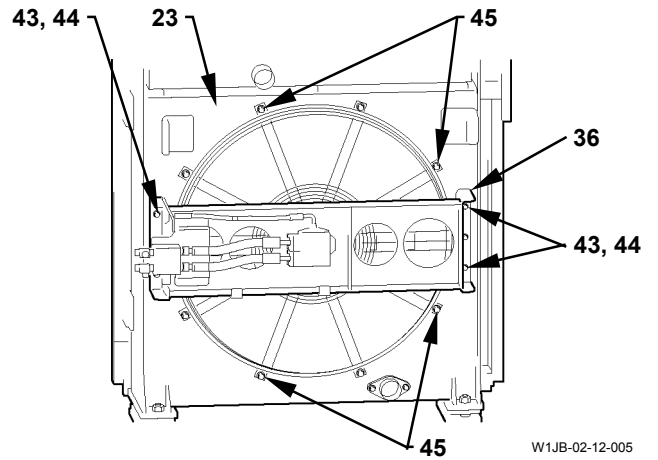
 : 19 mm




CAUTION: The bracket (36) assembly weight: 120 kg (265 lb)

17. Attach a nylon sling to bracket (36) and hold bracket (36). Remove bolts (43) (6 used) and washers (44) (6 used). Remove the bracket (36) assembly from shroud (23).


 : 19 mm

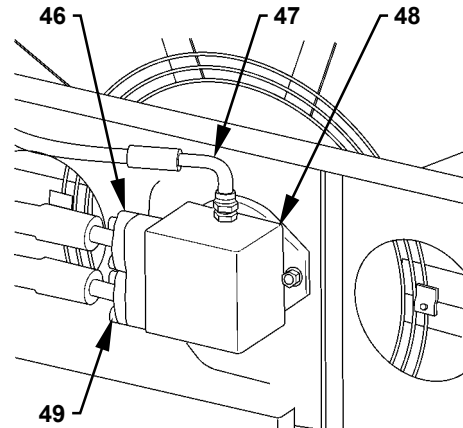


18. Remove hose (47) from fan motor (48). Cap the open ends.


 : 27 mm

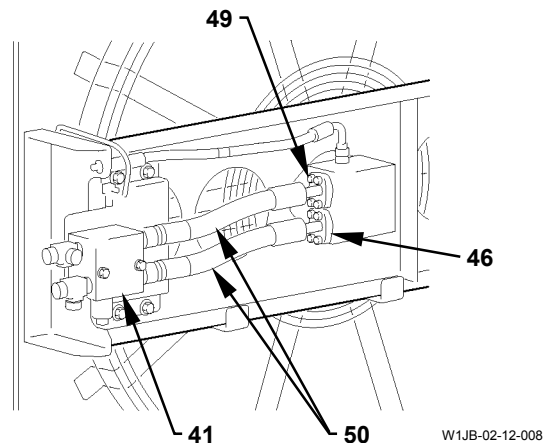
19. Remove socket bolts (49) (8 used) and split flanges (46) (4 used).

 : 8 mm




20. Remove hoses (50) (2 used) from fan valve (41). Cap the open ends.

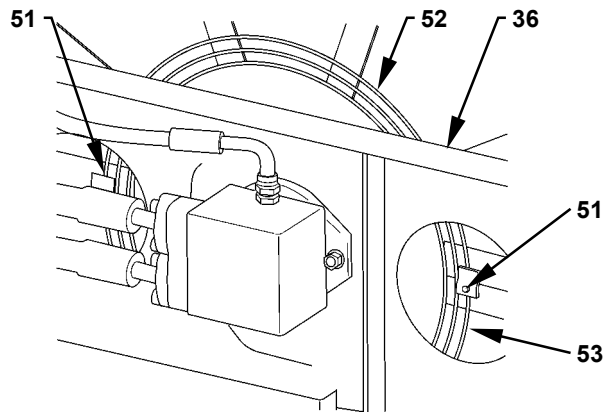
 : 36 mm



UPPERSTRUCTURE / Fan Motor


21. Remove bolts (51) (4 used). Remove nets (52, 53) from bracket (36).

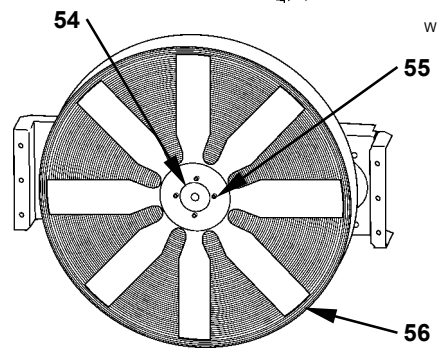
 : 19 mm




W1JB-02-12-012

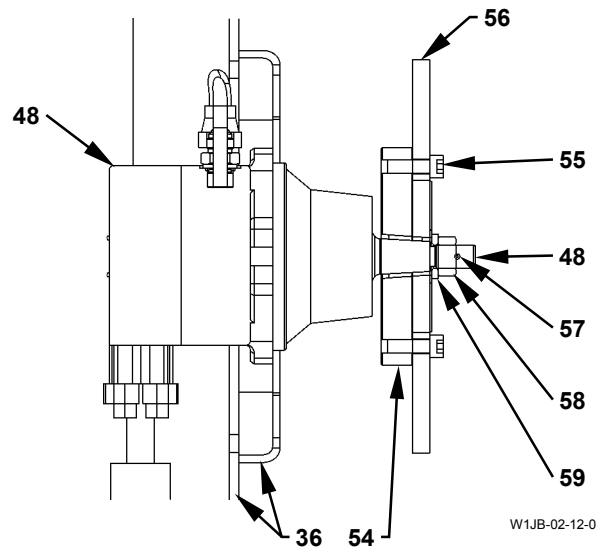
22. Remove socket bolts (55) (4 used). Remove fan (56) from coupling (54).

 : 8 mm




W1JB-02-12-010


23. Remove lock pin (57) from fan motor (48).
24. Remove nut (58) and washer (59) from fan motor (48).
-  : 24 mm
25. Remove coupling (54) from fan motor (48).



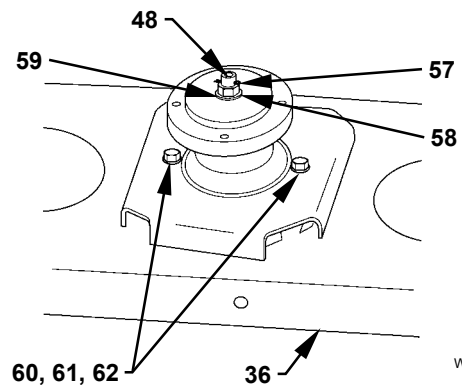
W1JB-02-12-017

-  **CAUTION: Fan motor (48) weight: 20 kg (44 lb)**
Bracket (36) weight: 36 kg (80 lb)

26. Remove nuts (62) (2 used) and washers (61) (2 used). Remove bolts (60) (2 used) and washers (61) (2 used) from bracket (36).

 : 19 mm

27. Remove fan motor (48) from bracket (36).



W1JB-02-12-011

UPPERSTRUCTURE / Fan Motor


Installation




CAUTION: Fan motor (48) weight: 20 kg (44 lb)


Bracket (36) weight: 36 kg (80 lb)


1. Install fan motor (48) to bracket (36) with bolts (60) (2 used), washers (61) (4 used) and nuts (62) (2 used).

 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)


2. Install coupling (54) to fan motor (48). Secure coupling (54) to fan motor (48) with washer (59), nut (58) and lock pin (57).

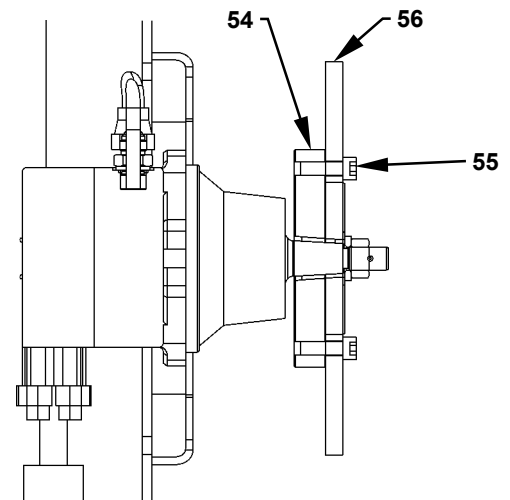
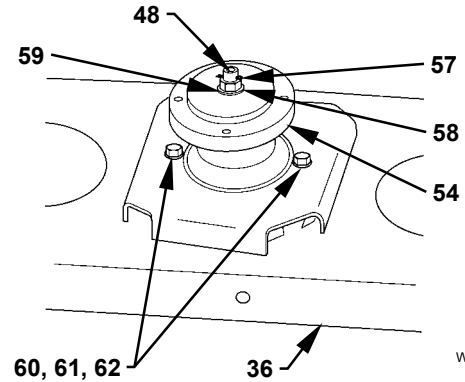
 : 24 mm

 : 100 N·m (10 kgf·m, 74 lbf·ft)

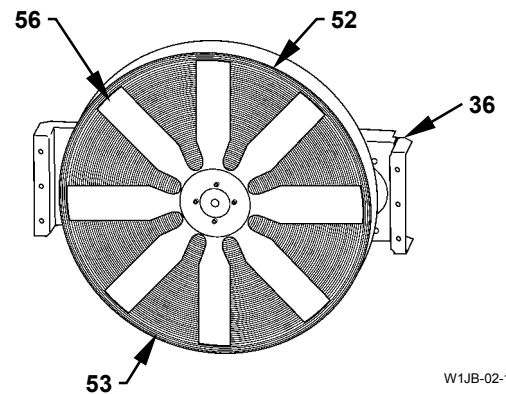
3. Install fan (56) to coupling (54) with socket bolts (55) (4 used).

 : 8 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)





4. Insert nets (52, 53) from right and left sides between fan (56) and bracket (36).

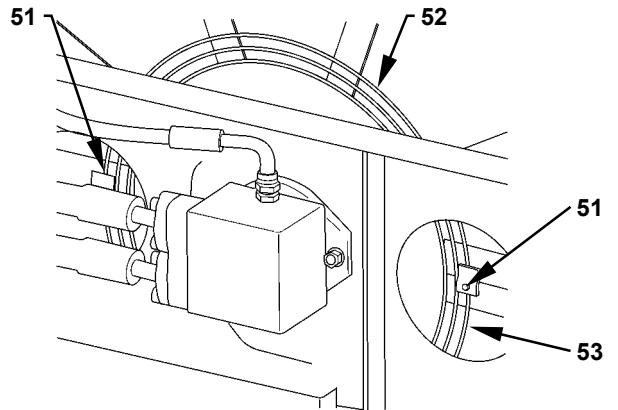


UPPERSTRUCTURE / Fan Motor

5. Secure nets (52, 53) with bolts (51) (4 used).


 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)




W1JB-02-12-012


6. Install hoses (50) (2 used) to fan valve (41).

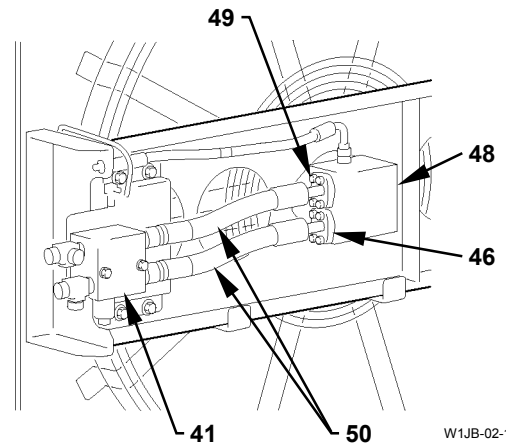
 : 36 mm

 : 175 N·m (18 kgf·m, 130 lbf·ft)

7. Install hoses (50) (2 used) to fan motor (48) with split flanges (46) (4 used) and socket bolts (49) (8 used).


 : 8 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

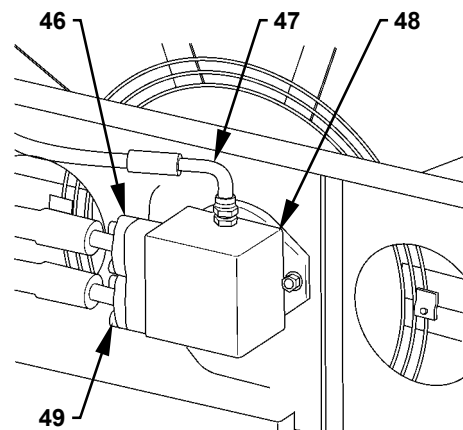


W1JB-02-12-008

8. Install hose (47) to fan motor (48).

 : 27 mm

 : 78 N·m (8 kgf·m, 58 lbf·ft)




W1JB-02-12-012


UPPERSTRUCTURE / Fan Motor

CAUTION: The bracket (36) assembly weight: 120 kg (265 lb)


9. Attach a nylon sling onto the bracket (36) assembly and hold the bracket (36) assembly. Hoist the bracket (36) assembly and align with the mounting hole for shroud (23).


10. Install the bracket (36) assembly to shroud (23) with bolts (43) (6 used) and washers (44) (6 used).

 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)


11. Install nets (52, 53) to shroud (23) with bolts (45) (8 used).

 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)


12. Install hose (40) to adapter (39).

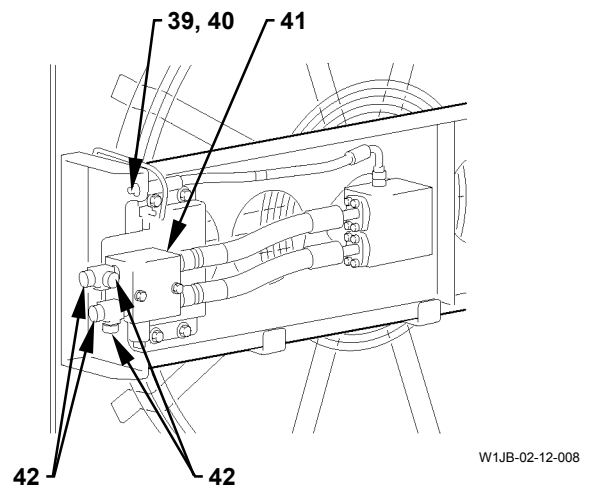
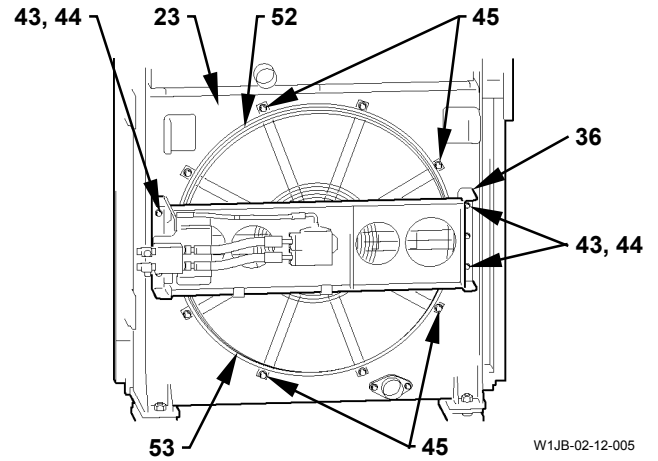
 : 27 mm

 : 78 N·m (8 kgf·m, 58 lbf·ft)


13. Install hoses (42) (4 used) to fan valve (41).


 : 36 mm

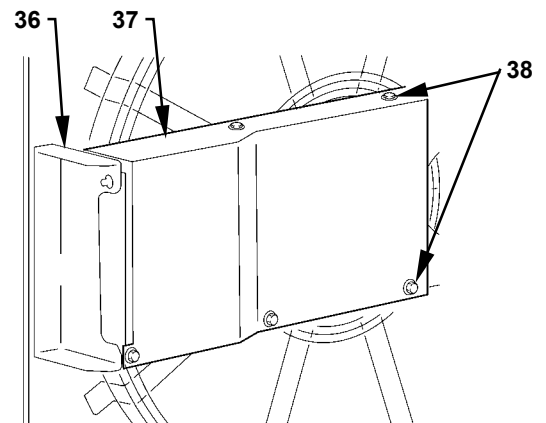
 : 175 N·m (18 kgf·m, 130 lbf·ft)



14. Install cover (37) to bracket (36) with bolts (38) (5 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)



UPPERSTRUCTURE / Fan Motor


15. Install the bracket (26) assembly to shroud (23) with bolts (24) (4 used) and washers (25) (4 used).


 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)


16. Install fork end (27) to bracket (26) with pin (29) and split pin (28).


17. Install rubber hose (19) to radiator (16) and the water pump. Secure rubber hose (19) to radiator (16) and the water pump with bands (22) (4 used).

 : 10 mm

 : 3.3 to 4.2 N·m
(0.3 to 0.4 kgf·m, 2.4 to 3.1 lbf·ft)


18. Install the pipe (12) assembly to rubber hoses (17, 20). Secure rubber hoses (17, 20) to the pipe assembly with bands (18, 21) (2 used for each).


 : 10 mm

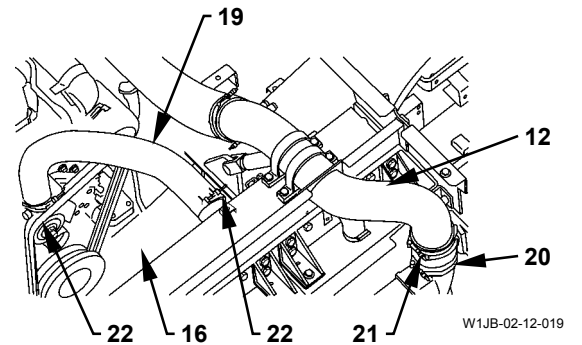
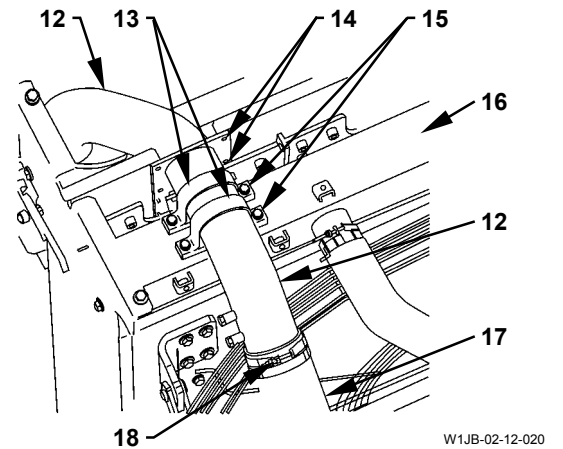
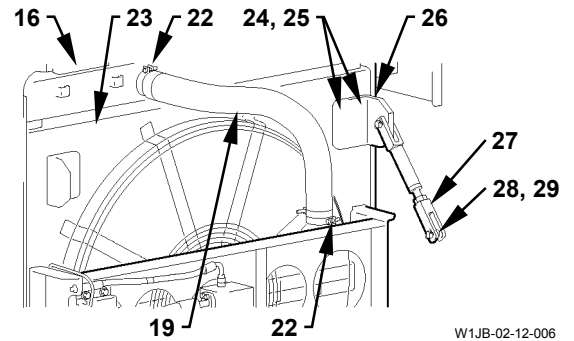
 : 3.3 to 4.2 N·m
(0.3 to 0.4 kgf·m, 2.4 to 3.1 lbf·ft)

19. Install pipe (12) to bracket (11) with caps (14) (4 used).

20. Install pipe (12) to radiator (16) with bolts (15) (4 used) and bands (13) (2 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)



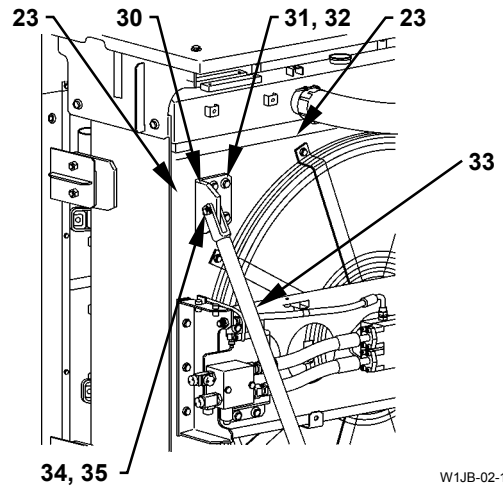
UPPERSTRUCTURE / Fan Motor

21. Install bracket (30) to shroud (23) with bolts (31) (4 used) and washers (32) (4 used).


 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)

22. Install stay (33) to bracket (30) with pin (35) and split pin (34).





23. Install cover (9) to bracket (11) with bolts (7) (4 used) and washers (8) (4 used).

 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)


24. Install covers (6, 10) to bracket (11) with bolts (4) (8 used) and washers (5) (8 used).

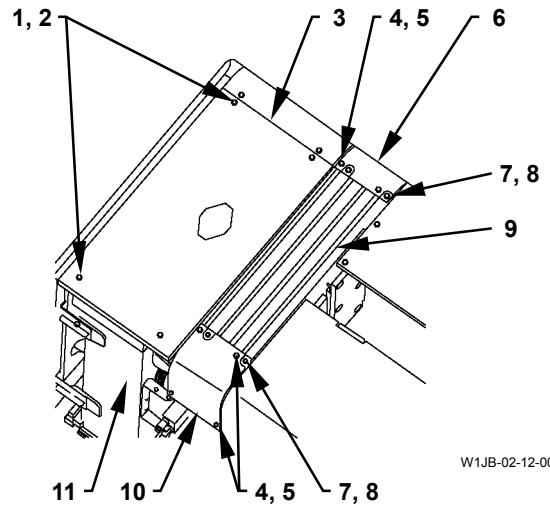
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

25. Install cover (3) to bracket (11) with bolts (1) (4 used) and washers (2) (4 used).

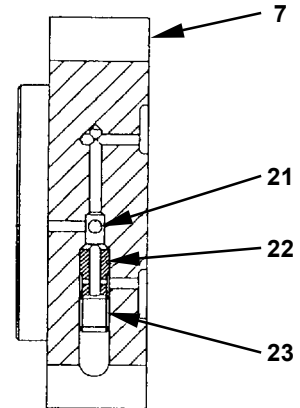
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

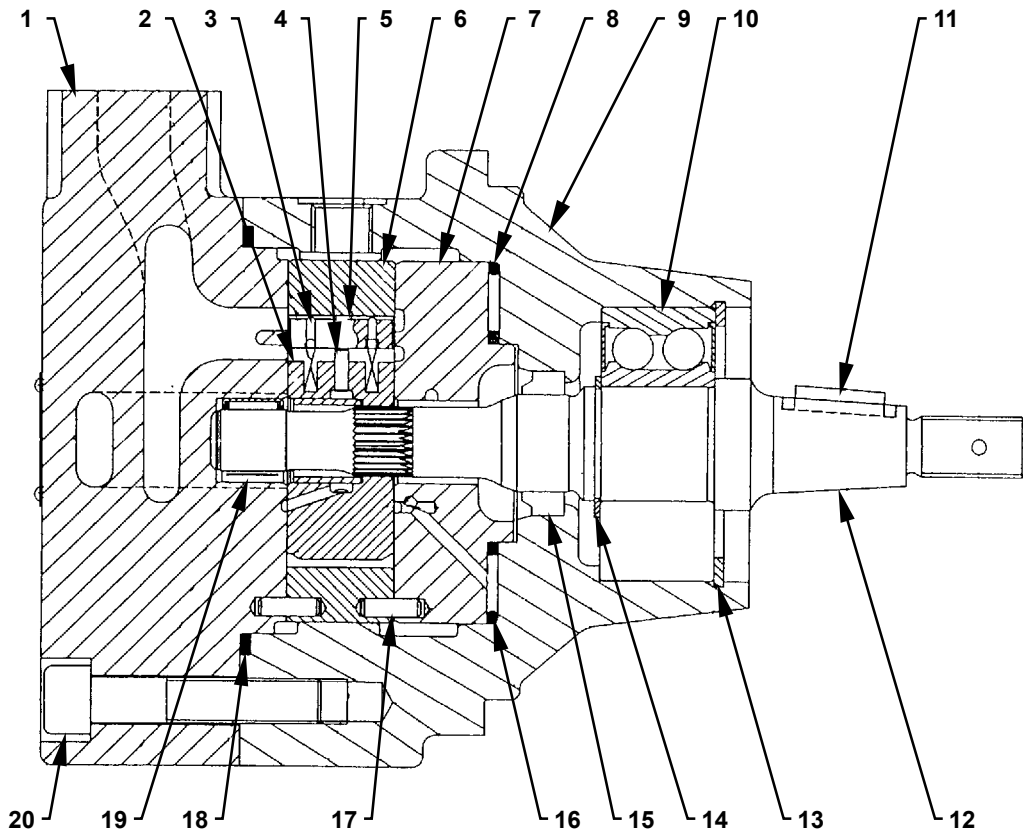


UPPERSTRUCTURE / Fan Motor

STRUCTURE OF FAN MOTOR



W1JB-02-12-002



W1JB-02-12-001

- | | | | |
|--------------------------------------|-------------------------|---------------------|---------------------------|
| 1 - End Cap | 7 - Pressure Port Plate | 13 - Retaining Ring | 19 - Needle Bearing |
| 2 - Rotor Insert Assembly | 8 - O-Ring | 14 - Retaining Ring | 20 - Socket Bolt (4 Used) |
| 3 - Vane Spring (24 Used) | 9 - Housing | 15 - Seal | 21 - Ball |
| 4 - Pin Vane Hold Mount
(12 Used) | 10 - Ball Bearing | 16 - Seal | 22 - Valve |
| 5 - Vane (12 Used) | 11 - Key | 17 - Pin (2 Used) | 23 - Screw |
| 6 - Cam Ring | 12 - Shaft | 18 - Seal | |

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 Valve


REMOVE AND INSTALL FAN VALVE

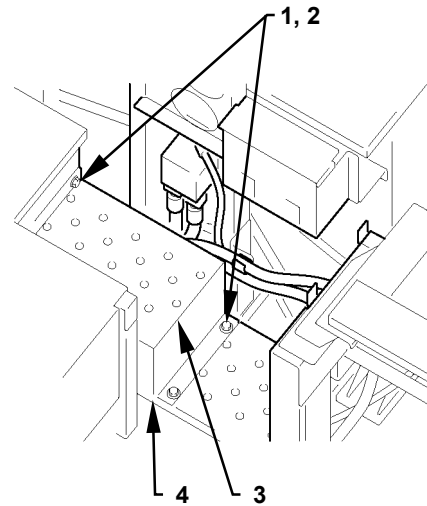


CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

Removal of Fan Valve for Oil Cooler


1. Remove bolts (1) (4 used) and washers (2) (4 used). Remove cover (3) from bracket (4).

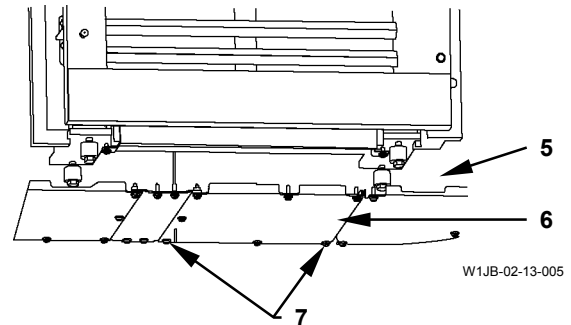
 : 19 mm



W1JB-02-13-004


2. Remove bolts (7) (6 used). Remove cover (6) from main frame (5).

 : 19 mm




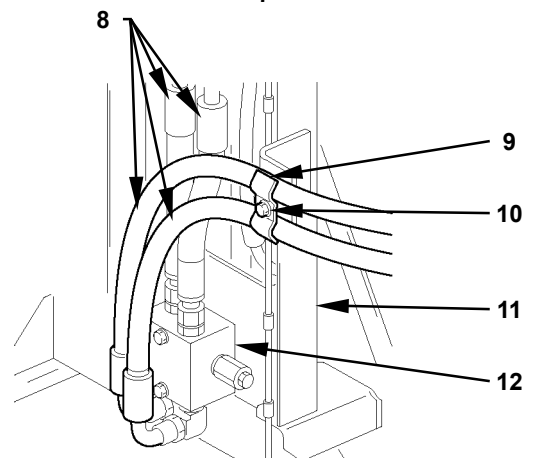
W1JB-02-13-005

3. Remove bolt (10) and clamp (9) from bracket (11).

 : 19 mm

4. Remove hoses (8) (4 used) from fan valve (12). Cap the open ends.


 : 36 mm

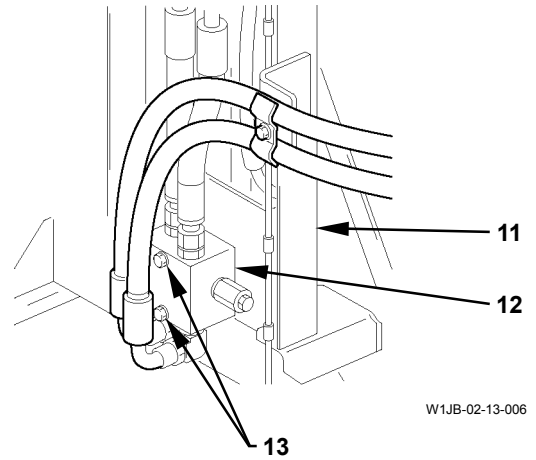


W1JB-02-13-006

UPPERSTRUCTURE / Fan Valve


5. Remove bolts (13) (2 used). Remove fan valve (12) from bracket (11).


 : 17 mm




Installation of Fan Valve for Oil Cooler


1. Install fan valve (12) to bracket (11) with bolts (13) (2 used).

 : 17 mm


 : 50 N·m (5 kgf·m, 36 lbf·ft)


2. Install hoses (8) (4 used) to fan valve (12).

 : 36 mm


 : 175 N·m (18 kgf·m, 129 lbf·ft)


3. Secure hoses (8) (2 used) to bracket (11) with bolt (10) and clamp (9).

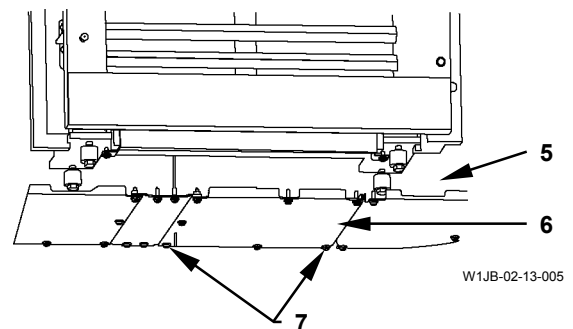
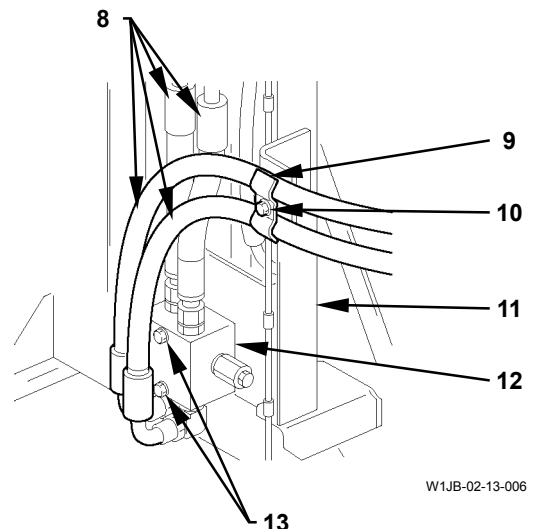
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

4. Install cover (6) onto main frame (5) with bolts (7) (6 used).


 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)

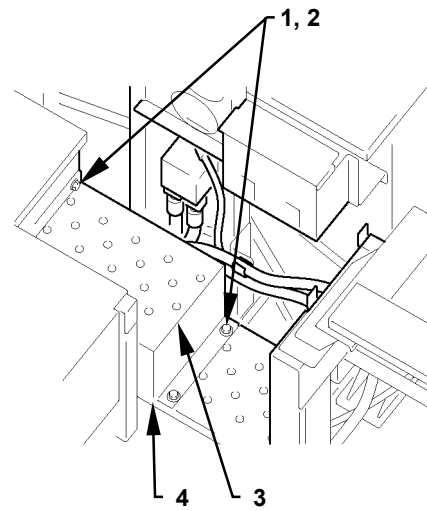


UPPERSTRUCTURE / Fan Valve

5. Install cover (3) to bracket (4) with bolts (1) (4 used) and washers (2) (4 used).

 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

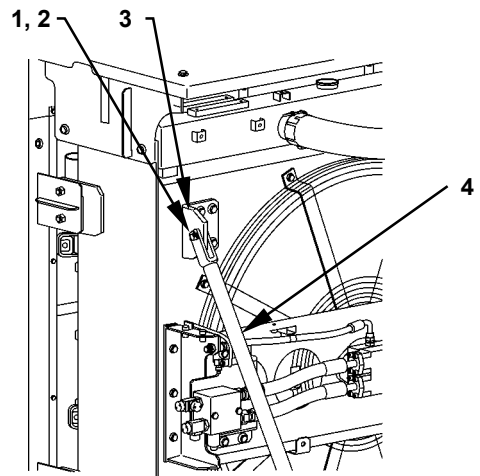


W1JB-02-13-004

UPPERSTRUCTURE / Fan Valve


Removal of Fan Valve for Radiator

1. Remove split pins (1) (2 used). Remove pins (2) (2 used) and stay (4) from bracket (3).




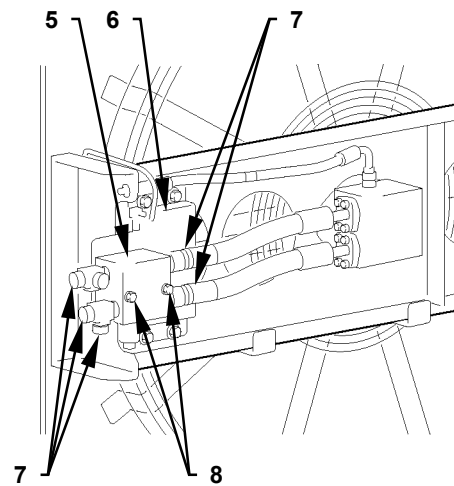
W1JB-02-13-007

2. Remove hoses (7) (6 used) from fan valve (5).
Cap the open ends.

 : 36 mm

3. Remove bolts (8) (2 used). Remove fan valve (5) from bracket (6).

 : 17 mm





W1JB-02-12-008

UPPERSTRUCTURE / Fan Valve


Installation of Fan Valve for Radiator


1. Install fan valve (5) to bracket (6) with bolts (8) (2 used).

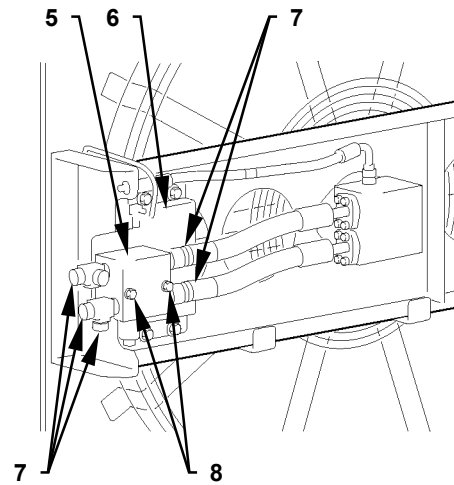
 : 17 mm

 : 50 N·m (5 kgf·m, 36 lbf·ft)

3. Install hoses (7) (6 used) to fan valve (5).

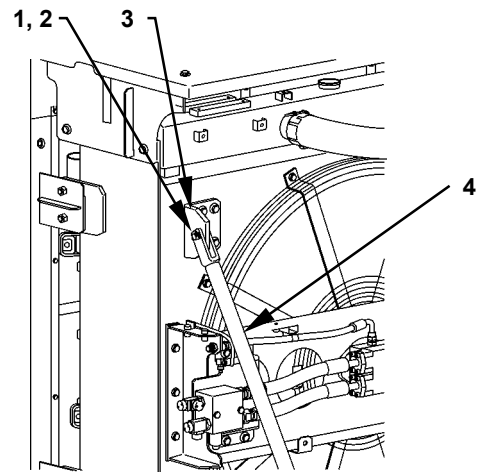
 : 36 mm

 : 175 N·m (18 kgf·m, 129 lbf·ft)



W1JB-02-12-008

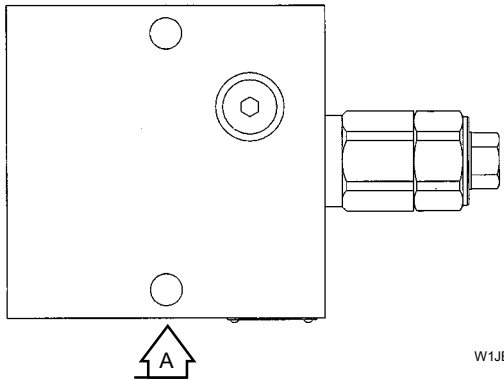
3. Install stay (4) to bracket (3) with pins (2) (2 used). Secure pins (2) (2 used) to bracket (3) with split pins (1) (2 used).



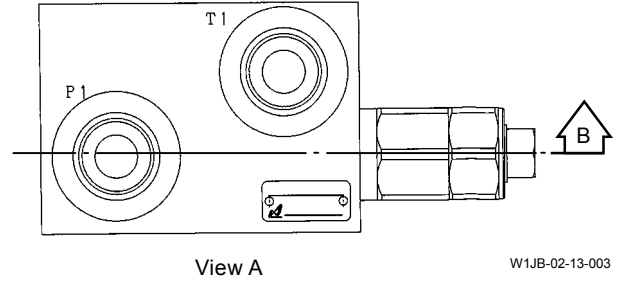
W1JB-02-13-007

UPPERSTRUCTURE / Fan Valve

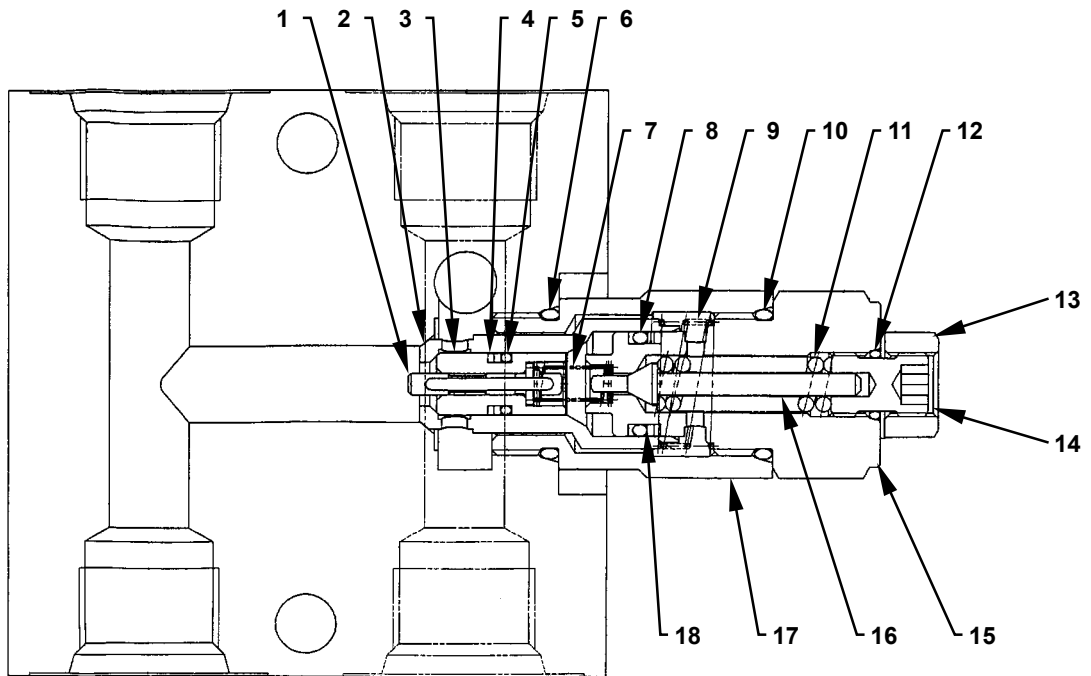
STRUCTURE OF FAN VALVE



W1JB-02-13-002



W1JB-02-13-003



Section B

W1JB-02-13-001


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	

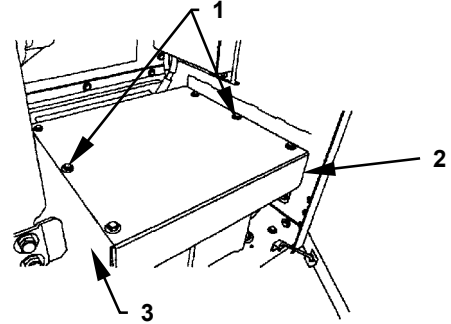
UPPERSTRUCTURE / Engine

REMOVE AND INSTALL ENGINE

Removal


1. Remove sems bolts (1) (6 used) from cover (2).
Remove cover (2) from bracket (3).

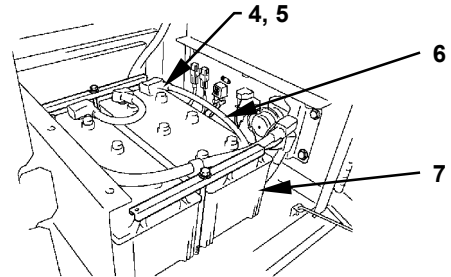
 : 17 mm



W1JB-02-14-028


2. Remove bolt (4) and washer (5) from ground code (6). Remove ground code (6) from battery (7).

 : 17 mm




W1JB-02-14-029


3. Remove sems bolts (10) (13 used) from covers (11) (2 used). Remove covers (11) (2 used) from main frame (12).

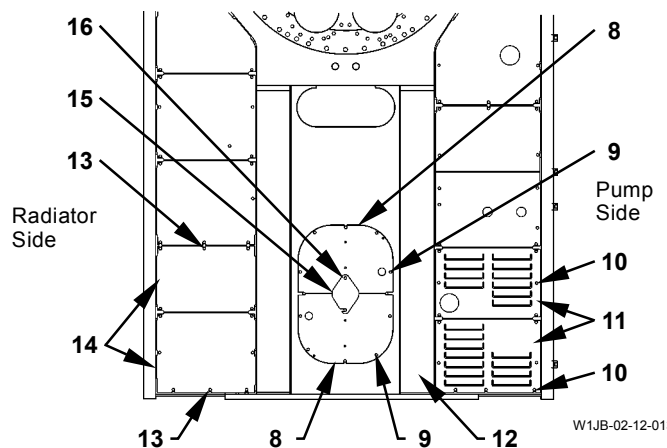
 : 19 mm

4. Remove sems bolts (13) (12 used) from covers (14) (2 used). Remove covers (14) (2 used) from main frame (12).

 : 19 mm

5. Loosen sems bolts (16) (2 used). Open cover (15) on cover (8). Remove sems bolts (9) (10 used) from covers (8) (2 used). Remove covers (8) (2 used) from main frame (12).


 : 19 mm

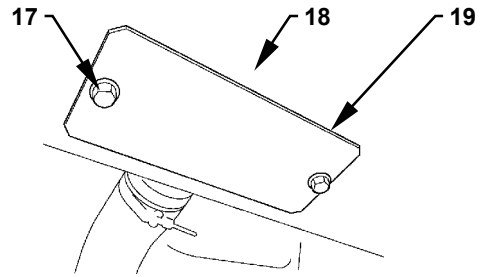


W1JB-02-12-013

UPPERSTRUCTURE / Engine

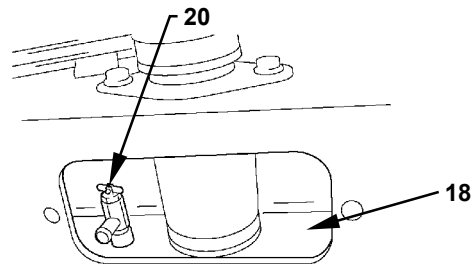
6. Remove sems bolts (17) (2 used) from cover (19).
Remove cover (19) from radiator (18).

 : 17 mm



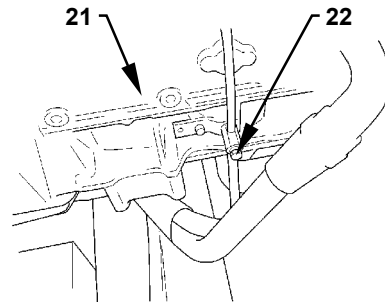
W1JB-02-14-031

7. Install the vinyl hose to the lower side of cock (20).
Loosen cock (20) and drain off water from radiator (18). Close cock (20). Remove the vinyl hose.




W1JB-02-14-032

8. Loosen cock (22). Drain off water from engine (21).
Close cock (22).

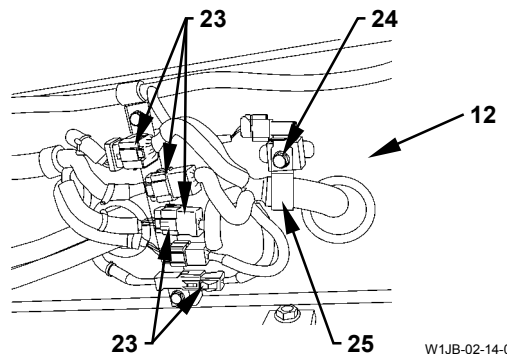


W1JB-02-14-030

9. Remove sems bolts (24) (4 used) from clamps (25) (4 used). Remove clamps (25) (4 used) from main frame (12).

 : 17 mm

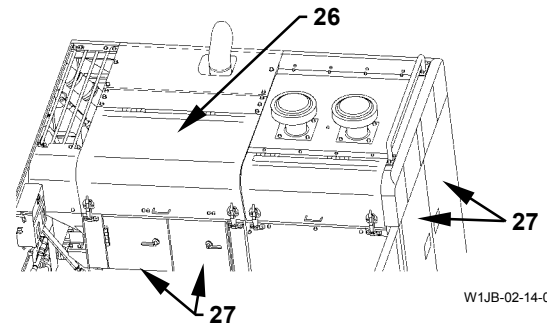
10. Remove connectors (23) (5 used).



W1JB-02-14-011

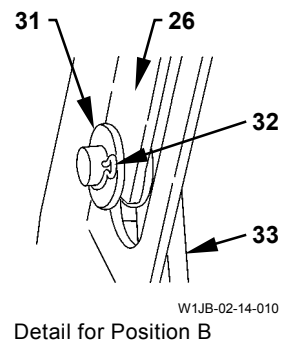
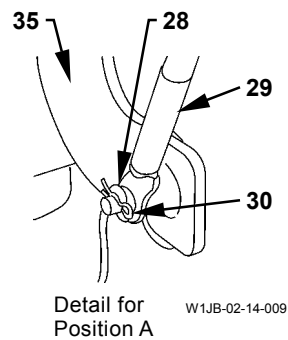
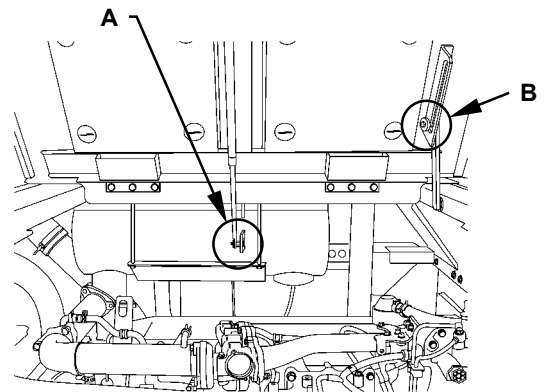
UPPERSTRUCTURE / Engine

11. Open covers (26, 27).




12. Remove lock pin (30) and washer (28) from the pin part in beam (35). Remove shock absorber (29) from the pin part in beam (35).

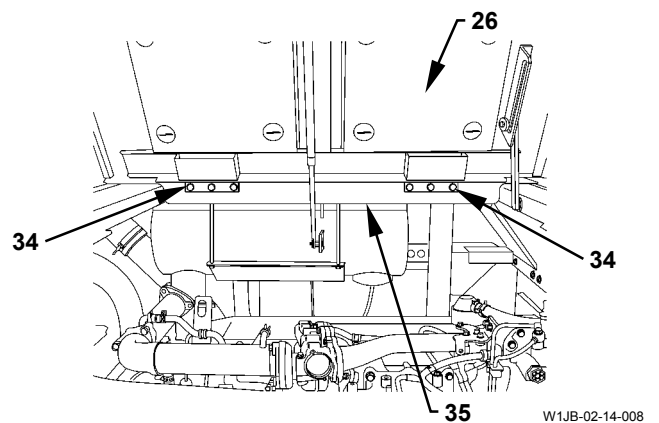
13. Remove lock pin (32) and washer (31) from stay (33). Remove stay (33) from cover (26).



CAUTION: Cover (26) weight: 39 kg (85 lb)

14. Attach a nylon sling onto cover (26). Hoist and hold cover (26). Remove sems bolts (34) (6 used) from cover (26). Remove cover (26) from beam (35).

 : 17 mm




UPPERSTRUCTURE / Engine

15. Remove pre-cleaners (43) (2 used) and covers (44, 45, 46). (Refer to the Remove and Install Pump Device group on W2-4-1.)




CAUTION: Cover (42) weight: 25 kg (55 lb)


16. Attach a nylon sling onto cover (42). Hoist and hold cover (42). Remove sems bolts (41) (8 used) from cover (42). Remove cover (42) from supports (47, 49).

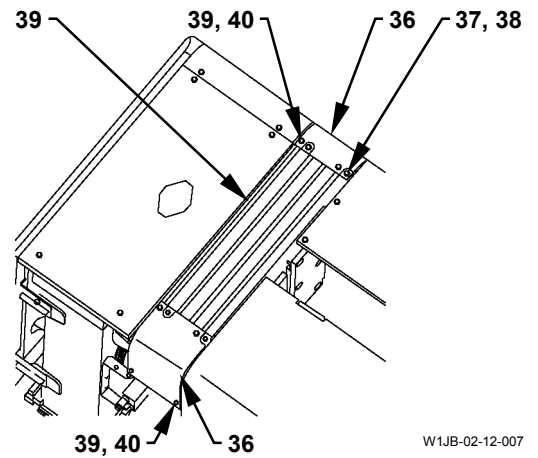
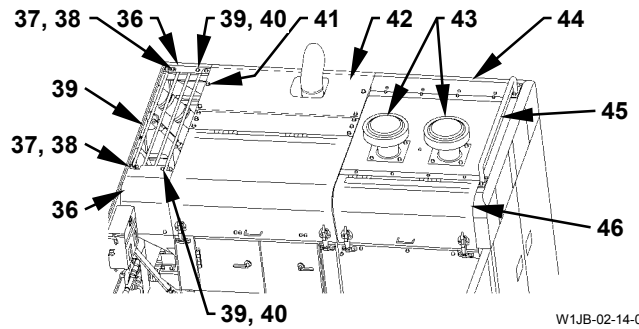
 : 19 mm

17. Remove sems bolts (39) (8 used) and washers (40) (8 used) from covers (36) (2 used). Remove covers (36) (2 used) from support (47).

 : 19 mm

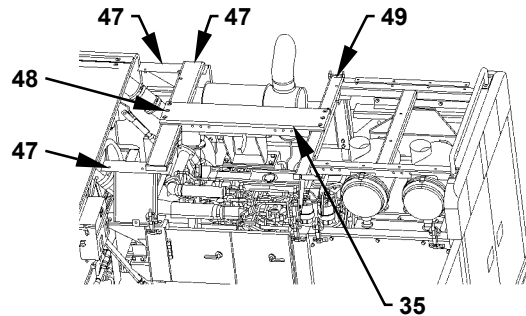
18. Remove bolts (37) (4 used) and washers (38) (4 used) from duct (39). Remove duct (39) from support (47).

 : 19 mm




CAUTION: Beam (35) weight: 22 kg (49 lb)

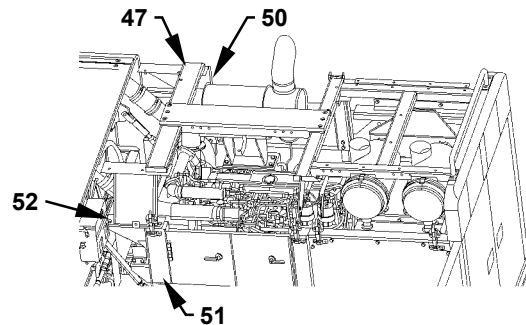
19. Attach a nylon sling to beam (35). Hoist and hold beam (35). Remove sems bolts (48) (6 used) from beam (35). Remove beam (35) from supports (47, 49).



CAUTION: Support (47) weight: 34 kg (75 lb)

20. Attach a nylon sling to support (47). Hoist and hold support (47). Remove sems bolts (52) (4 used) from support (47). Remove support (47) from supports (50, 51).


 : 19 mm



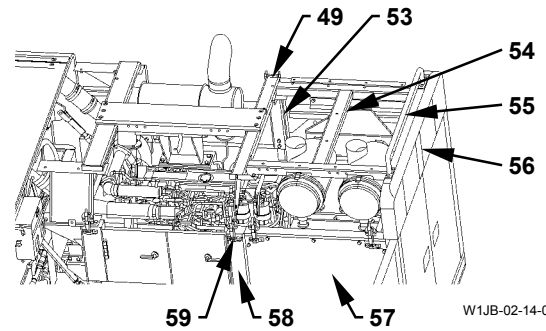
UPPERSTRUCTURE / Engine

CAUTION: Support (49) weight: 21 kg (46 lb)

21. Attach a nylon sling to support (49). Hoist and hold support (49). Remove sems bolts (59) (4 used) from support (49). Remove support (49) from supports (53, 58).


 : 19 mm

22. Remove support (54), stay (55) and covers (56, 57). (Refer to the Remove and Install Pump Device group on W2-4-1.)




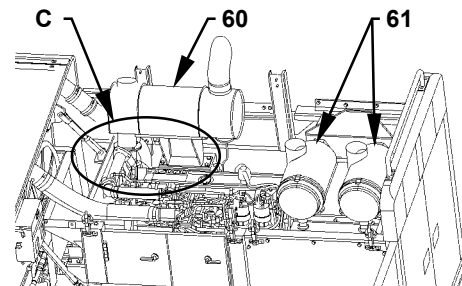
CAUTION: The muffler (60) assembly weight: 73 kg (160 lb)

23. Remove nuts (67) (8 used) from bolts (62) (4 used).

 : 17 mm

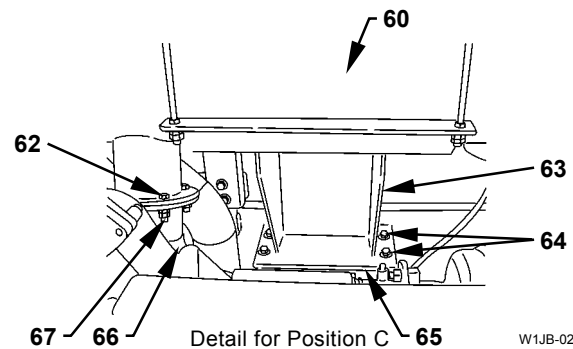
24. Attach a nylon sling to the muffler (60) assembly. Hoist and hold the muffler (60) assembly. Remove sems bolts (64) (4 used) from bracket (63). Remove the muffler (60) assembly from bracket (65) and pipe (66).

 : 19 mm



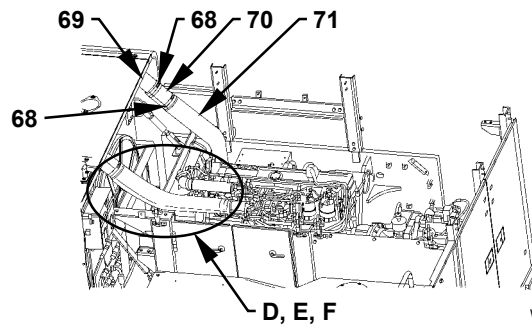
CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

25. Remove air cleaners (61) (2 used), hose and connector in the pump device. (Refer to the Remove and Install Pump Device group on W2-4-1.)



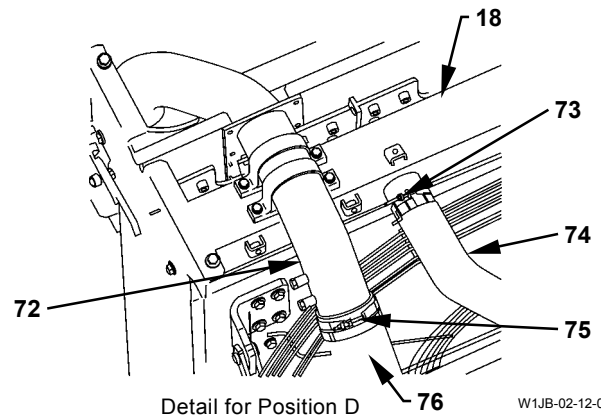
UPPERSTRUCTURE / Engine

26. Loosen bands (68) (4 used) from rubber hose (70).
Remove rubber hose (70) from pipes (69, 71).



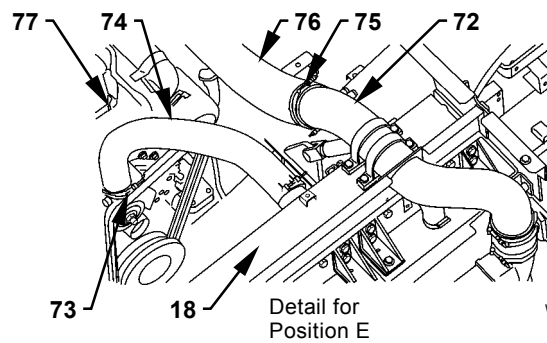
W1JB-02-14-005

27. Loosen bands (75) (4 used). Remove rubber hose (76) from pipe (72) and engine (77).

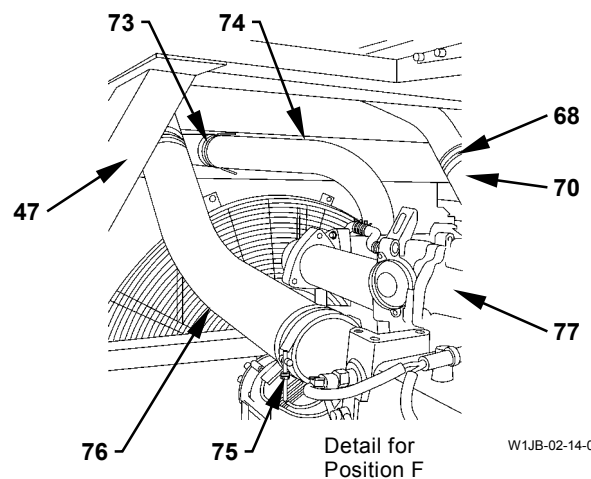


W1JB-02-12-020

28. Loosen bands (73) (4 used). Remove rubber hose (74) from radiator (18) and engine (77).



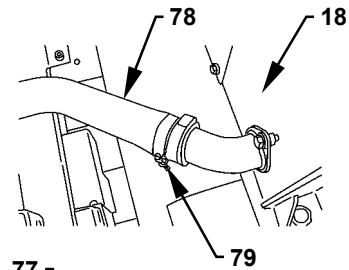
W1JB-02-12-019



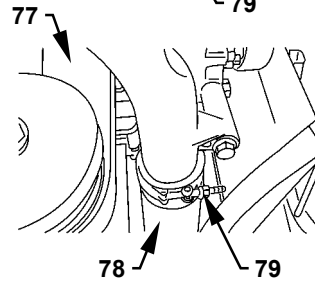
W1JB-02-14-024

UPPERSTRUCTURE / Engine

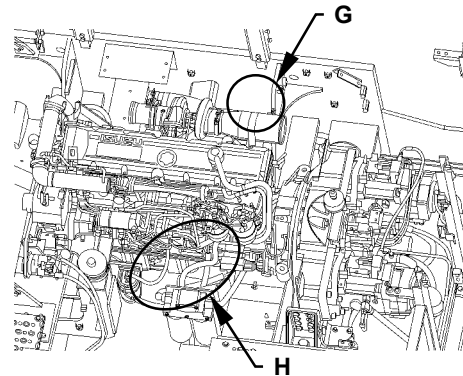
29. Loosen bands (79) (4 used). Remove rubber hose (78) from radiator (18) and engine (77).



W1JB-02-14-012

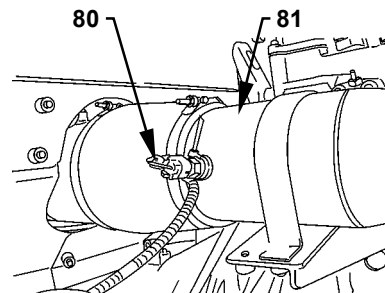


W1JB-02-14-013



W1JB-02-14-007

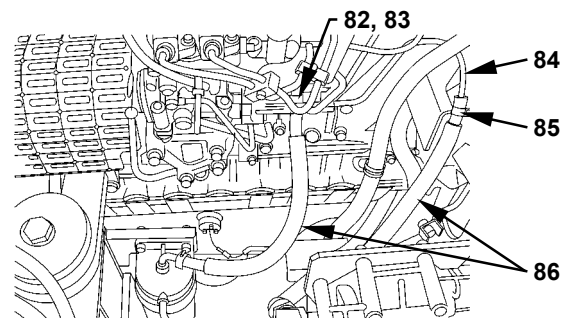
30. Remove connector (80) from pipe (81) for the air cleaner.



Detail for
Position G

W1JB-02-14-020

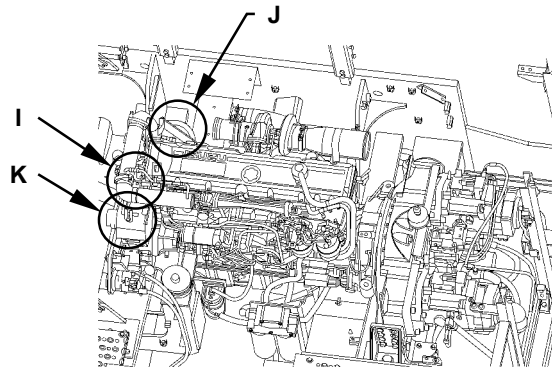
31. Loosen bands (83, 85). Remove fuel hoses (86) (2 used) from pipes (82, 84). Install a plug to the open ends. Keep fuel hoses (86) (2 used) in order not to leak fuel.



Detail for
Position H

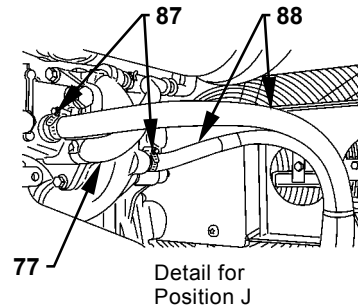
W1JB-02-14-019

UPPERSTRUCTURE / Engine




W1JB-02-14-007

32. Loosen bands (87) (2 used). Remove hoses (88) (2 used) from engine (77). Cap the open ends.




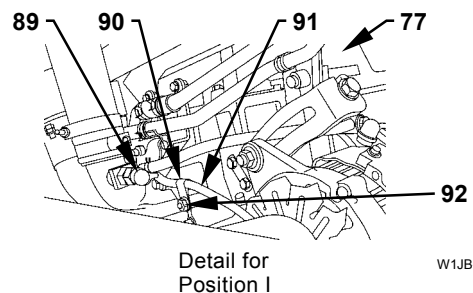
W1JB-02-14-014

33. Remove semi bolts (92) (4 used) from clamps (90) (4 used). Remove clamps (90) (4 used) from engine (77).

 : 13 mm, 17 mm

34. Remove nut (89) from wiring (91). Remove wiring (91) from engine (77).


 : 6 mm

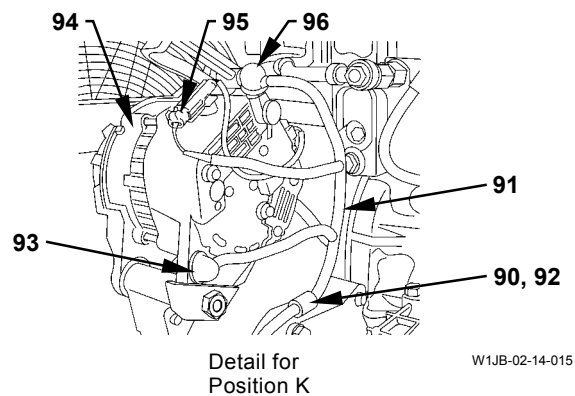


W1JB-02-14-016

35. Remove connector (95) from alternator (94).

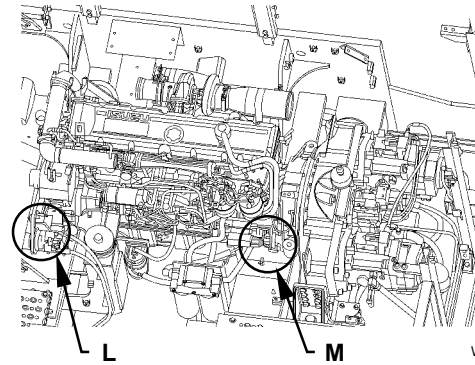
36. Remove nut (96) and screw (93) from wiring (91). Remove wiring (91) from alternator (94).

 : 12 mm



W1JB-02-14-015


UPPERSTRUCTURE / Engine



W1JB-02-14-007


IMPORTANT: Before removing hoses (97) (2 used), release the gas in air conditioner pump (99). Refer to Air Conditioner/ Troubleshooting in Technical Manual (T1G6-JAC-00).

37. Release the gas in air conditioner pump (99). Remove sems bolts (100) (2 used) from hoses (97) (2 used). Remove hoses (97) (2 used) from air conditioner pump (99). Cap the open ends.


 : 10 mm

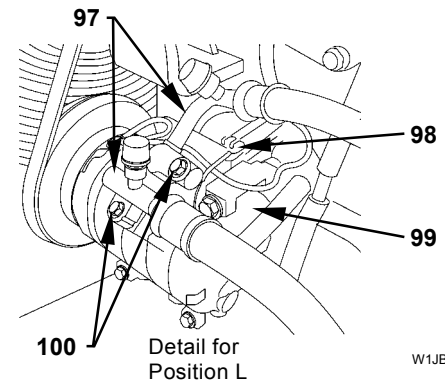
38. Remove connector (98) from air conditioner pump (99).

39. Remove nuts (101) (2 used) from wirings (106) (2 used). Remove wirings (106) (2 used) from starter motor (102).

 : 8 mm, 17 mm

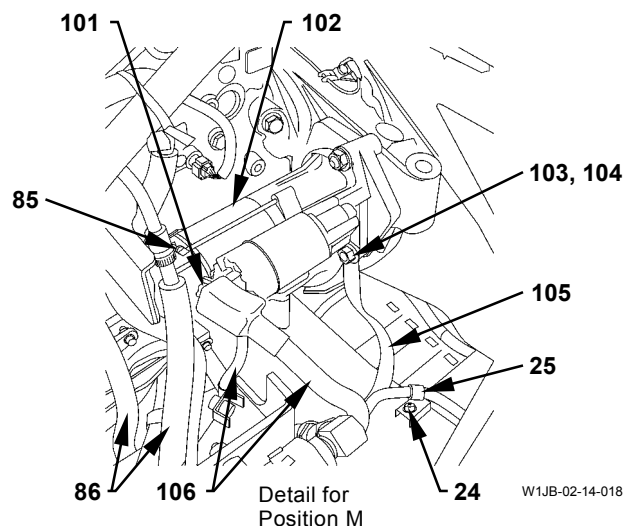
40. Remove nut (103) and washer (104) from ground liner (105). Remove ground liner (105) from starter motor (102).

 : 22 mm



Detail for Position L

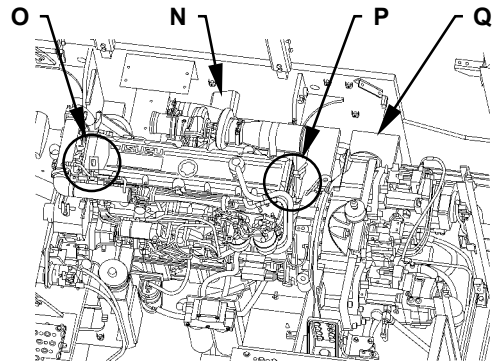
W1JB-02-14-017



Detail for Position M


W1JB-02-14-018

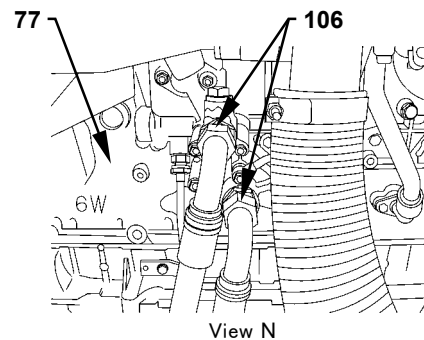
UPPERSTRUCTURE / Engine



W1JB-02-14-007

41. Remove hoses (106) (2 used) from engine (77). Install a plug to the open ends. Keep hoses (106) (2 used) in order not to leak oil.

 : 41 mm

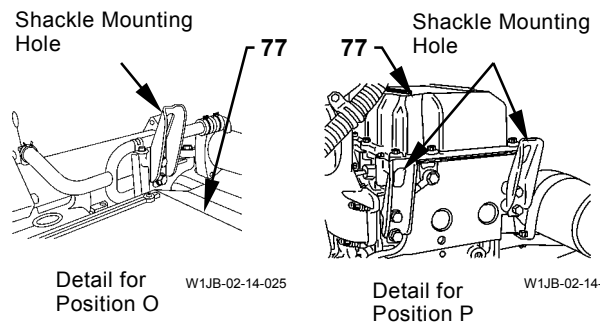


W1JB-02-14-021



CAUTION: The engine (77) assembly weight: 2000 kg (4410 lb)


42. Install the shackles (3 used) to the lifting hole for engine (77). Attach a nylon sling onto the shackles (3 used). Hoist and hold the shackles (3 used).



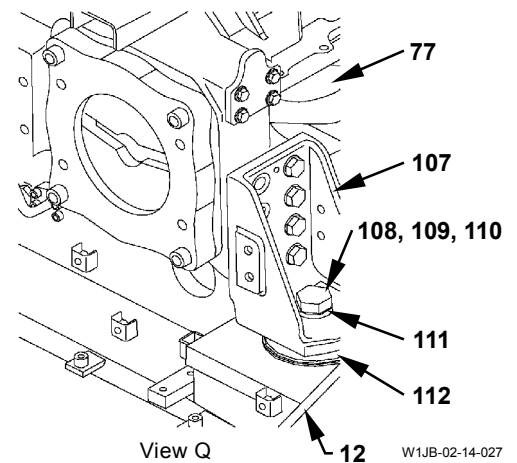
W1JB-02-14-025

W1JB-02-14-026

43. Remove U-nut (109), washers (111) (2 used) and plates (110) (2 used) from bolts (108) (2 used).

 : 50 mm

44. Remove bolts (108) (2 used) and washers (111) (2 used) from brackets (107) (2 used).

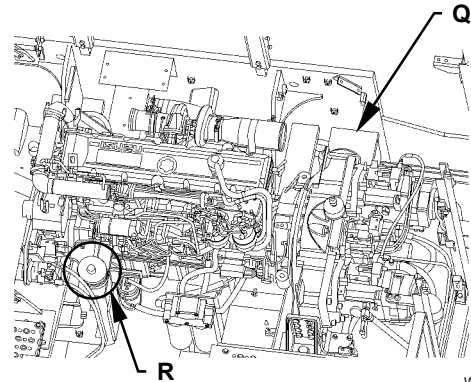


W1JB-02-14-027

UPPERSTRUCTURE / Engine




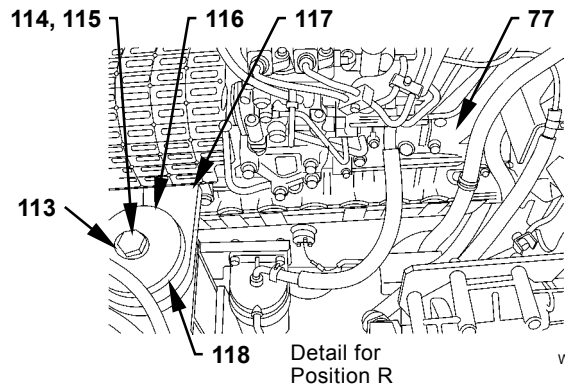
CAUTION: The engine (77) assembly weight:
2000 kg (4410 lb)



W1JB-02-14-007

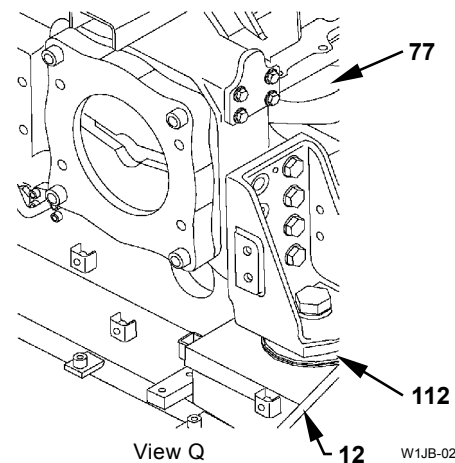
45. Remove bolts (114) (2 used), special nuts (115) (2 used), washers (113) (4 used) and plates (116) (2 used) from brackets (117) (2 used).

 : 41 mm



W1JB-02-14-019

46. Remove the engine (77) assembly and cushions (112, 118) (4 used for each) from main frame (12).







W1JB-02-14-027

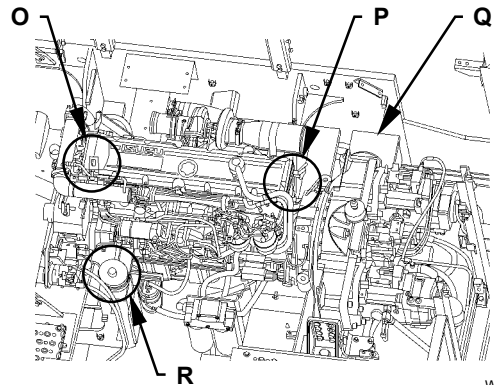
UPPERSTRUCTURE / Engine

Installation



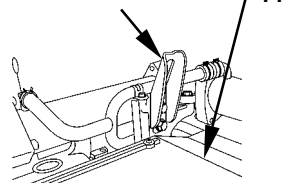
CAUTION: The engine (77) assembly weight: 2000 kg (4410 lb)

1. Install the shackles (3 used) to the lifting hole for engine (77). Attach a nylon sling onto the shackles (3 used). Hoist and hold the shackles (3 used).
2. Place cushions (112) (4 used) and (118) (4 used) to the mounting hole on main frame (12).
3. Hoist and hold the engine (77) assembly 15 mm above the mounting hole.
4. Install washers (111) (2 used) to bolts (108) (2 used). Install the bolts (108) (2 used) assembly to the mounting hole on brackets (107) (2 used).
5. Install washers (113) (2 used), plates (116) (2 used) and cushions (118) (2 used) to bolts (114) (2 used). Install the bolts (114) (2 used) assembly to the hole on brackets (117) (2 used).
6. Lower the engine (77) assembly.
7. Install bolts (108) (2 used), plates (110) (2 used), washers (111) (2 used) and U-nuts (109) (2 used).
 : 50 mm
 : 2600 N·m (265 kgf·m, 1920 lbf·ft)
8. Install washers (113) (2 used) and special nuts (115) (2 used) to bolts (114) (2 used).
 : 41 mm
 : 1400 N·m (143 kgf·m, 1030 lbf·ft)



W1JB-02-14-007

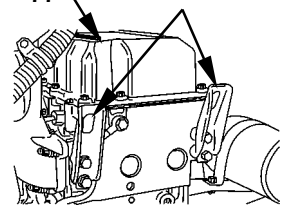
Shackle Mounting Hole



Detail for Position O

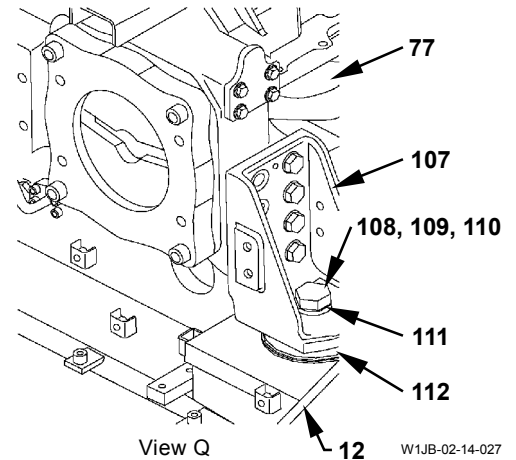
W1JB-02-14-025

Shackle Mounting Hole



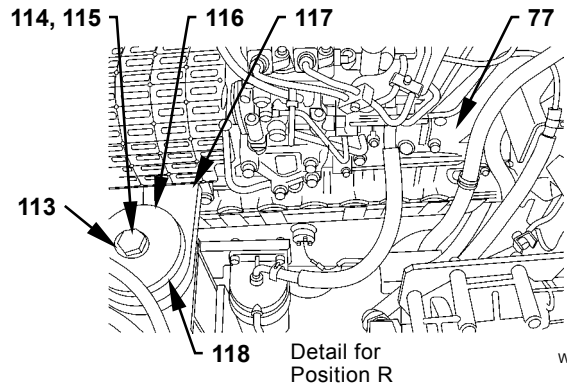
Detail for Position P

W1JB-02-14-026



View Q

W1JB-02-14-027

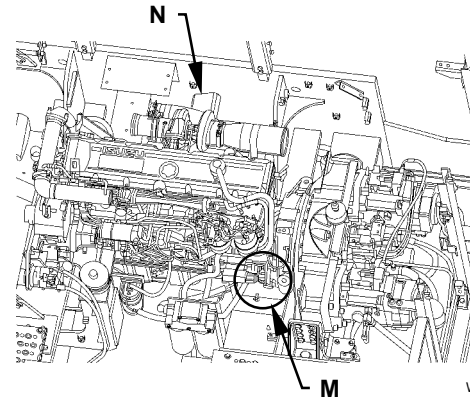


Detail for Position R

W1JB-02-14-019


UPPERSTRUCTURE / Engine


9. Install the hose, pipe and connector to the pump device. (Refer to the Remove and Install Pump Device group on W2-4-1.)

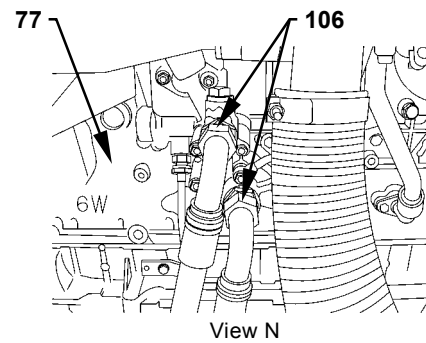


W1JB-02-14-007

10. Install hoses (106) (2 used) to engine (77).


 : 41 mm


 : 205 N·m (21 kgf·m, 150 lbf·ft)





W1JB-02-14-021

11. Install wirings (106) (2 used) to starter motor (102) with nuts (101) (2 used).


 : 8 mm


 : 5 N·m (0.5 kgf·m, 3.7 lbf·ft)

 : 17 mm

 : 20 N·m (2 kgf·m, 15 lbf·ft)


12. Install the ground line to starter motor (102) with nut (103) and washer (104).


 : 22 mm

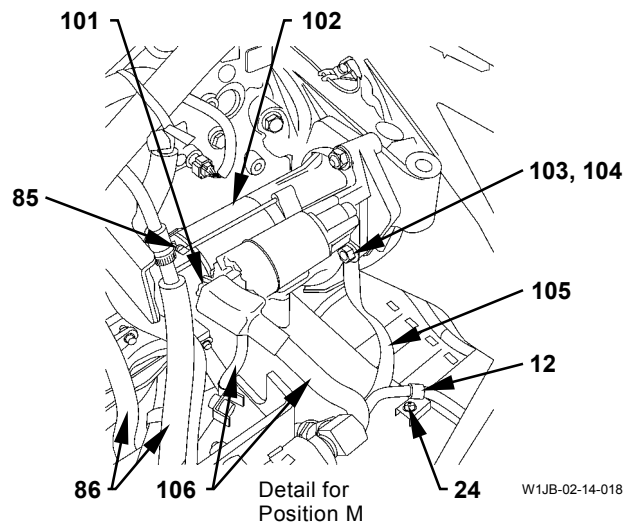
 : 55 N·m (5.5 kgf·m, 40 lbf·ft)

13. Install connectors (23) (5 used).

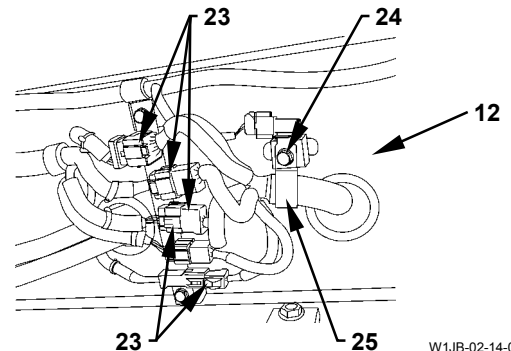
14. Install clamps (25) (4 used) to main frame (12) with sems bolts (24)(4 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

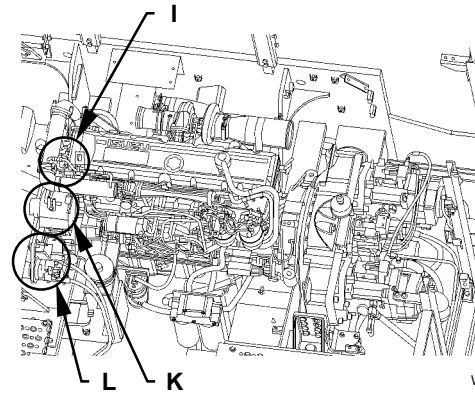


W1JB-02-14-018



W1JB-02-14-011


UPPERSTRUCTURE / Engine




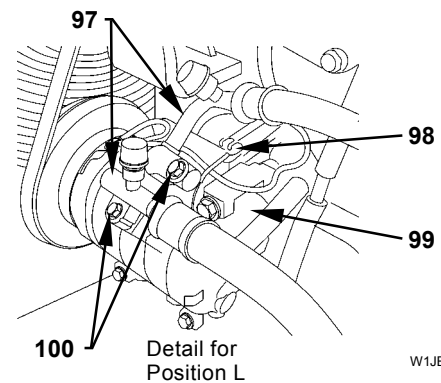
W1JB-02-14-007

IMPORTANT: After installing hoses (97) (2 used), charge refrigerant. Refer to Air Conditioner/ Troubleshooting in Technical Manual (T1G6-JAC-00).

15. Install hoses (97) (2 used) to air conditioner pump (99) with sems bolts (100) (2 used). Charge refrigerant to air conditioner pump (99).

 : 10 mm


 : 3.3 to 4.2 N·m
(0.3 to 0.4 kgf·m, 2.4 to 3.1 lbf·ft)




W1JB-02-14-017

16. Install connector (98) to air conditioner pump (99).

17. Install wiring (91) to alternator (94) with nut (96) and screw (93).

 : 12 mm


 : 10 N·m (1 kgf·m, 7.3 lbf·ft)


18. Install connector (95) to alternator (94).


19. Install wiring (91) to engine (77) with nut (89).


 : 6 mm

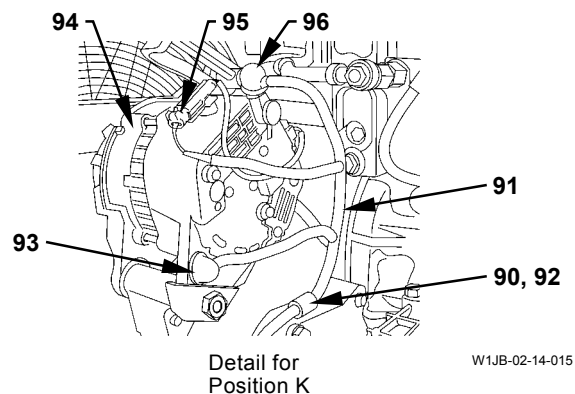
20. Secure wiring (91) to engine (77) with clamps (90) (4 used) and sems bolts (92) (4 used).

 : 13 mm

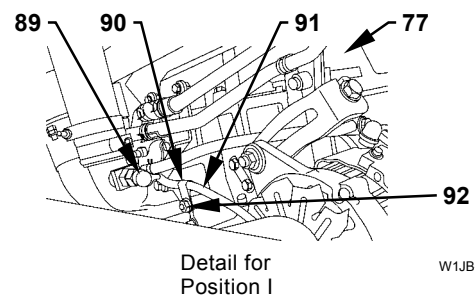
 : 20 N·m (2 kgf·m, 15 lbf·ft)

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

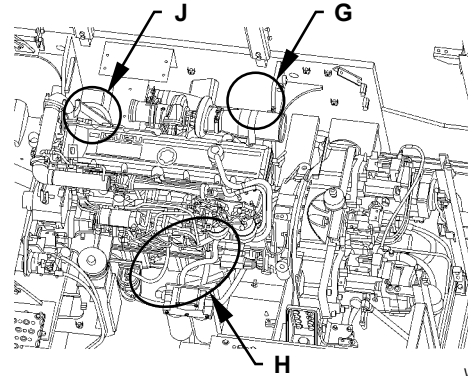


W1JB-02-14-015



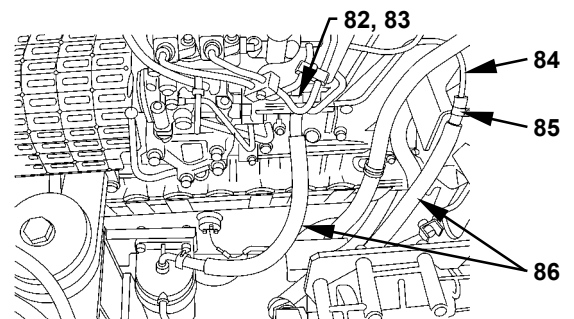
W1JB-02-14-016

UPPERSTRUCTURE / Engine



W1JB-02-14-007

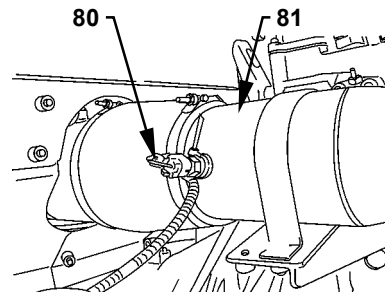
21. Install fuel hoses (86) (2 used) to pipes (82, 84).
Secure fuel hoses (86) (2 used) to pipes (82, 84)
with bands (83, 85).



Detail for
Position H

W1JB-02-14-019

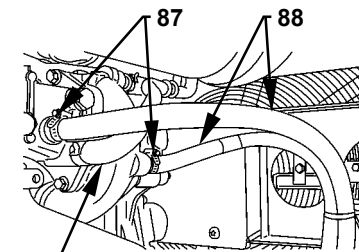
22. Install connector (80) to pipe (81) for the air
cleaner.



Detail for
Position G

W1JB-02-14-020

23. Install hoses (88) (2 used) to engine (77). Secure
hoses (88) (2 used) to engine (77) with bands (87)
(2 used).

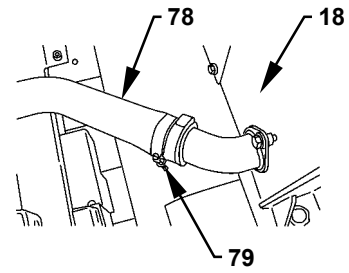


Detail for
Position J

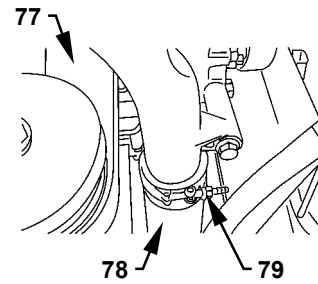
W1JB-02-14-014

UPPERSTRUCTURE / Engine

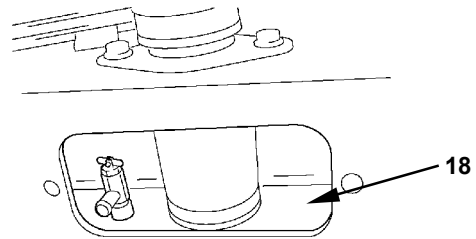
24. Install rubber hose (78) to engine (77) and radiator (18). Secure rubber hose (78) to engine (77) and radiator (18) with bands (79) (2 used).



W1JB-02-14-012





W1JB-02-14-013

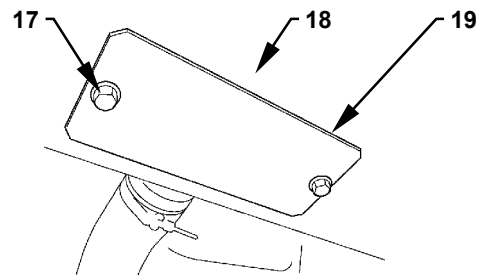


W1JB-02-14-032

25. Install cover (19) to radiator (18) with sems bolts (17) (2 used).

 : 17 mm

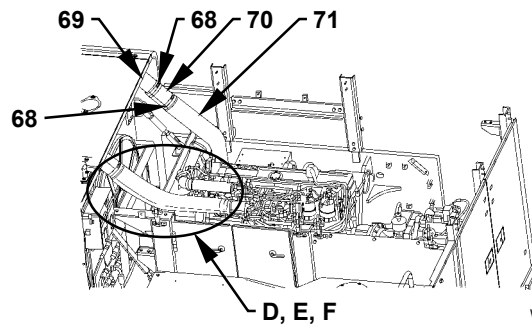
 : 50 N·m (5 kgf·m, 37 lbf·ft)



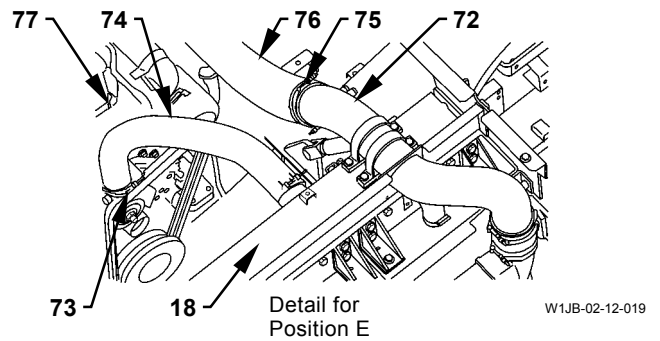
W1JB-02-14-031

UPPERSTRUCTURE / Engine

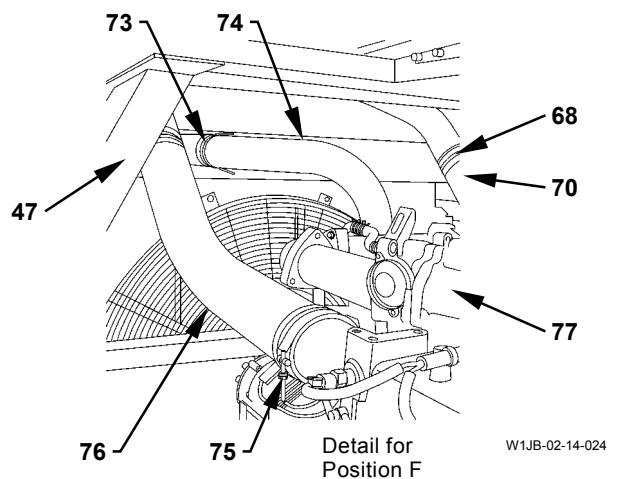
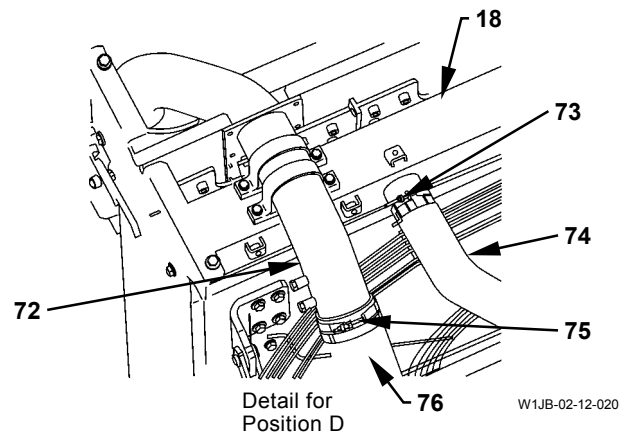
26. Install rubber hose (70) to pipes (69, 71). Secure rubber hose (70) to pipes (69, 71) with bands (68) (4 used).



27. Install rubber hose (74) to engine (77) and radiator (18). Secure rubber hose (74) to engine (77) and radiator (18) with bands (73) (4 used).



28. Install rubber hose (76) to pipe (72) and engine (77). Secure rubber hose (76) to pipe (72) and engine (77) with bands (75) (4 used).

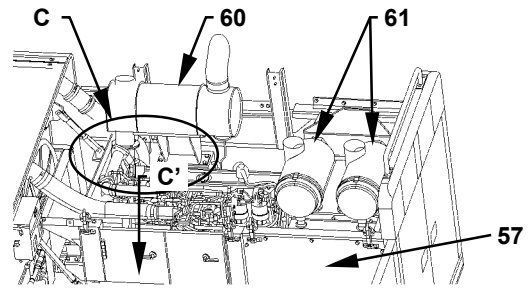


UPPERSTRUCTURE / Engine




CAUTION: The muffler (60) assembly weight: 73 kg (160 lb)


29. Attach a nylon sling to the muffler (60) assembly. Hoist and align the muffler (60) assembly with the mounting hole.




W1JB-02-14-003


30. Install muffler (60) to pipe (66) with bolts (62) (4 used) and nuts (67) (8 used).

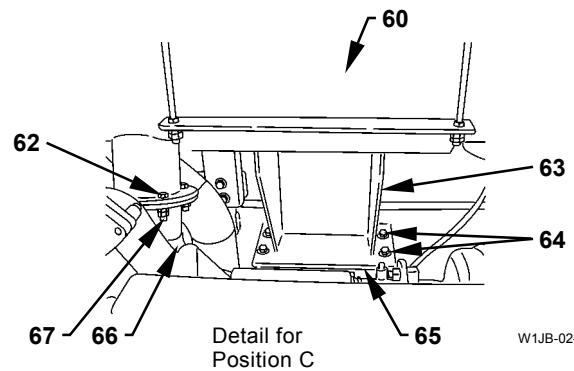
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

31. Install bracket (63) to bracket (65) with sems bolts (64) (4 used).

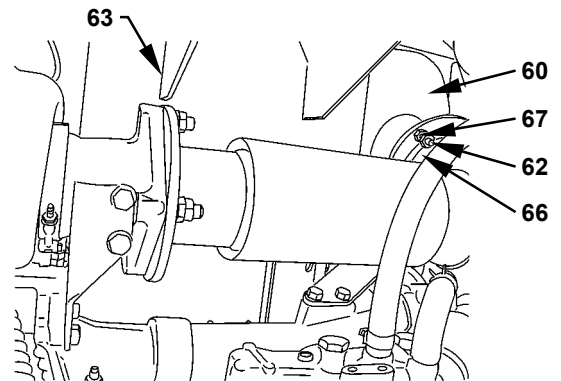
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)



W1JB-02-14-022

32. Install air cleaners (61) (2 used) and cover (57). (Refer to the Remove and Install Pump Device group on W2-4-1.)




Detail for
Position C'


W1JB-02-14-023

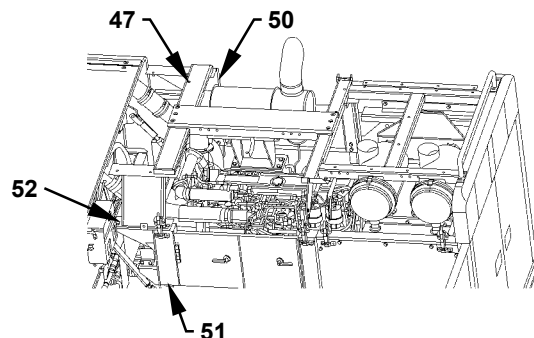


CAUTION: Support (47) weight: 34 kg (75 lb)

33. Attach a nylon sling to support (47). Hoist and align support (47) with the mounting holes on supports (50, 51). Install support (47) to supports (50, 51) with sems bolts (52) (4 used).

 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)





W1JB-02-14-002

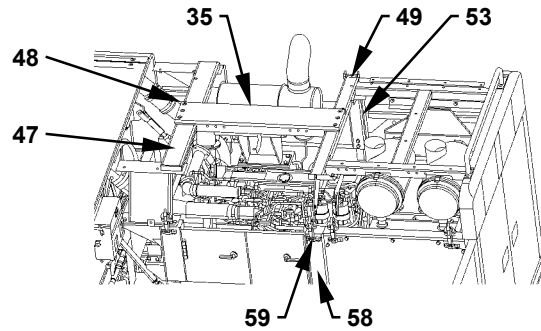
UPPERSTRUCTURE / Engine

CAUTION: Support (49) weight: 21 kg (46 lb)

34. Attach a nylon sling to support (49). Hoist and align support (49) with the mounting holes on supports (53, 58). Install support (49) to supports (53, 58) with sems bolts (59) (4 used).

 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)




W1JB-02-14-002

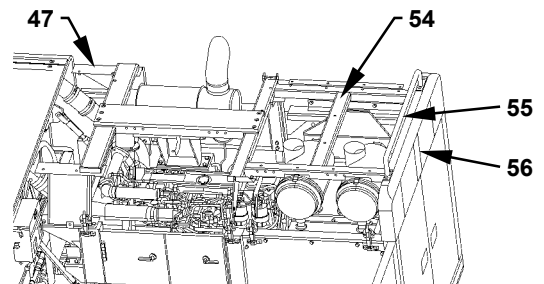
CAUTION: Beam (35) weight: 22 kg (49 lb)

35. Attach a nylon sling to beam (35) and hoist beam (35). Align beam (35) with the mounting hole on supports (47, 49). Install beam (35) to supports (47, 49) with sems bolts (48) (6 used).

 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)


36. Install support (54), stay (55) and cover (56). (Refer to the Remove and Install Pump Device group on W2-4-1.)




W1JB-02-14-002


37. Install duct (39) to support (47) with bolts (37) (4 used) and washers (38) (4 used).

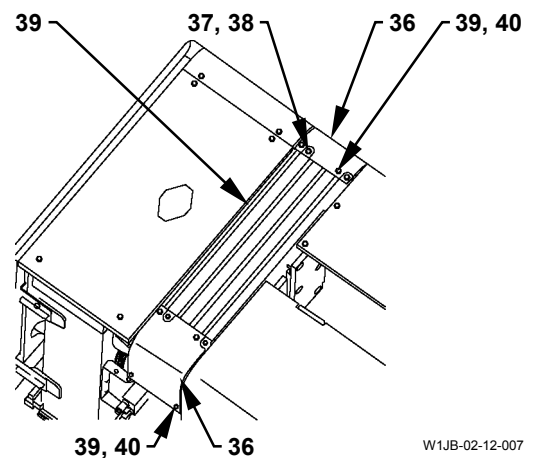
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

38. Install covers (36) (2 used) to support (47) with sems bolts (39) (8 used) and washers (40) (8 used).

 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)





W1JB-02-12-007

UPPERSTRUCTURE / Engine

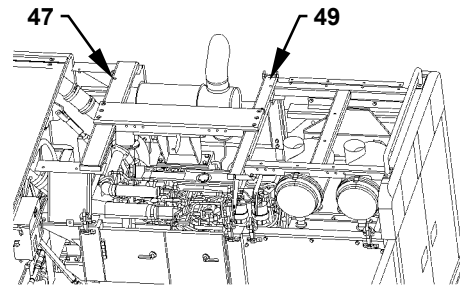
CAUTION: Cover (42) weight: 25 kg (55 lb)

39. Attach a nylon sling to cover (42) and hoist cover (42). Align cover (42) with the mounting hole on supports (47, 49). Install cover (42) to supports (47, 49) with sems bolts (41) (8 used).

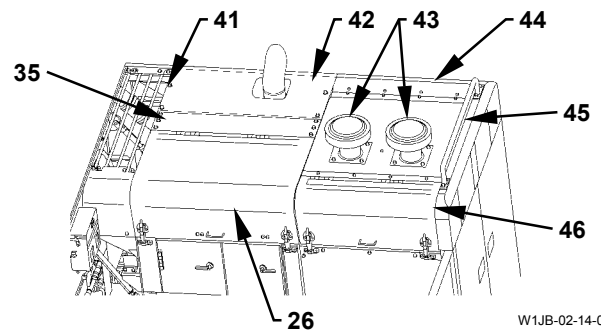
 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

40. Install pre-cleaners (43) (2 used) and covers (44, 45, 46). (Refer to the Remove and Install Pump Device group on W2-4-1.)




W1JB-02-14-002




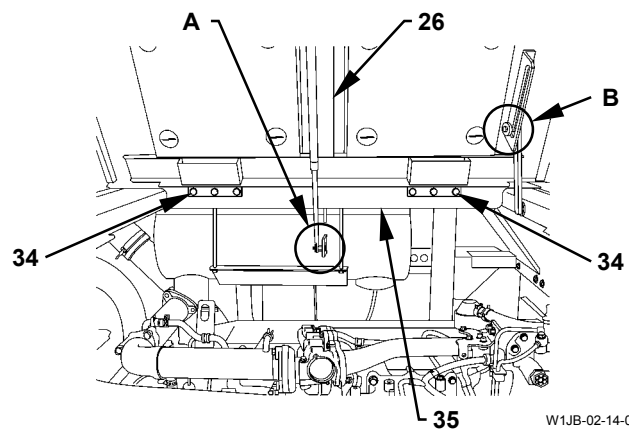
W1JB-02-14-001

CAUTION: Cover (26) weight: 39 kg (85 lb)

41. Attach a nylon sling to cover (26) and hoist cover (26). Align cover (26) with the mounting hole on beam (35). Install cover (26) to beam (35) with sems bolts (34)(6 used).

 : 17 mm

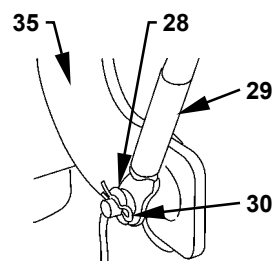
 : 50 N·m (5 kgf·m, 37 lbf·ft)



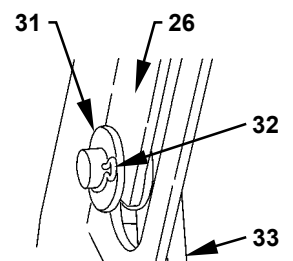
W1JB-02-14-008

42. Install shack absorber (29) to the pin part in beam (35). Secure shock absorber (29) to beam (35) with washer (28) and lock pin (30).

43. Install stay (33) to cover (26). Secure cover (26) to stay (33) with washer (31) and lock pin (32).




Detail for Position A W1JB-02-14-009




Detail for Position B W1JB-02-14-010


UPPERSTRUCTURE / Engine


44. Install covers (8) (2 used) to main frame (12) with sems bolts (9)(10 used).

 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)


45. Install cover (15) to covers (8) (2 used) with sems bolts (16) (2 used).

 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)


46. Install covers (14) (2 used) to main frame (12) with sems bolts (13)(12 used).

 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)


47. Install covers (11) (2 used) to main frame (12) with sems bolts (10) (13 used).

 : 19 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)


48. Install ground code (6) to battery (7) with bolt (4) and washer (5).

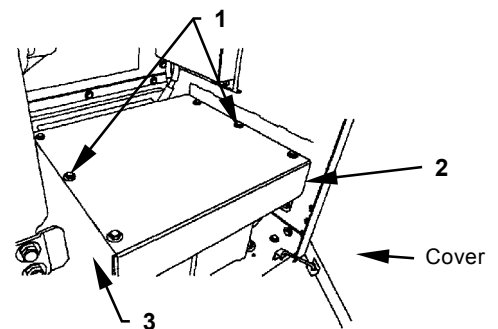
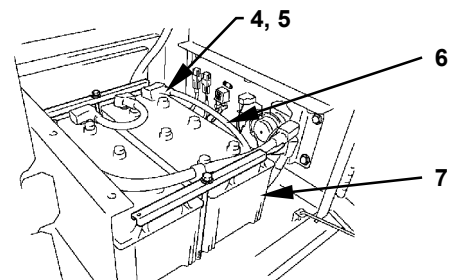
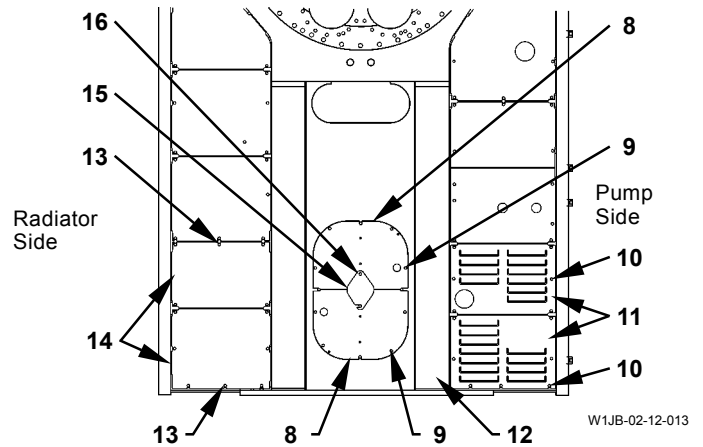
 : 17 mm

 : 20 N·m (2 kgf·m, 37 lbf·ft)

49. Install cover (2) to bracket (3) with sems bolts (1) (6 used). Shut the cover.

 : 17 mm

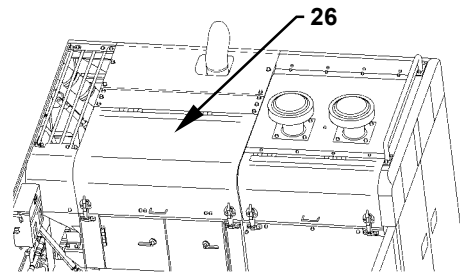
 : 50 N·m (5 kgf·m, 37 lbf·ft)



UPPERSTRUCTURE / Engine

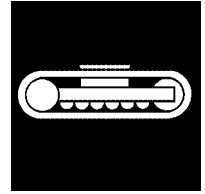
50. Shut cover (26).

51. Add coolant into the radiator.



W1JB-02-14-001

SECTION 3 UNDERCARRIAGE



— CONTENTS —

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- Remove and Install Swing Bearing W3-1-1
- Disassemble Swing Bearing W3-1-4
- Assemble Swing Bearing W3-1-6

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- Disassemble Travel Motor..... W3-2-18
- Assemble Travel Motor W3-2-22
- Disassemble Brake Valve W3-2-28
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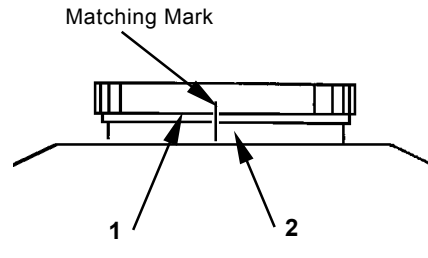
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UNDERCARRIAGE / Swing Bearing

REMOVE AND INSTALL SWING BEARING


Removal

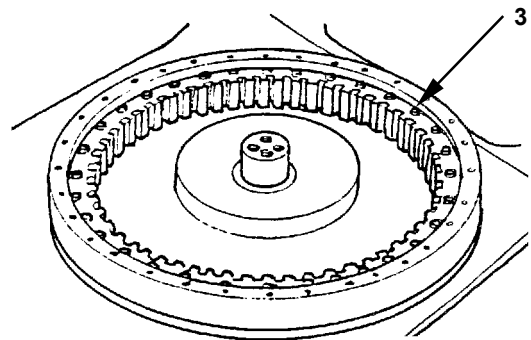
1. Remove the front attachment, counterweight and cab. (Refer to "Remove and Install Main Frame" section.)
2. Put the matching marks on inner race (1) of swing bearing and track frame (2).




W800-03-01-001

3. Remove bolts (3) (48 used).


 : 46 mm



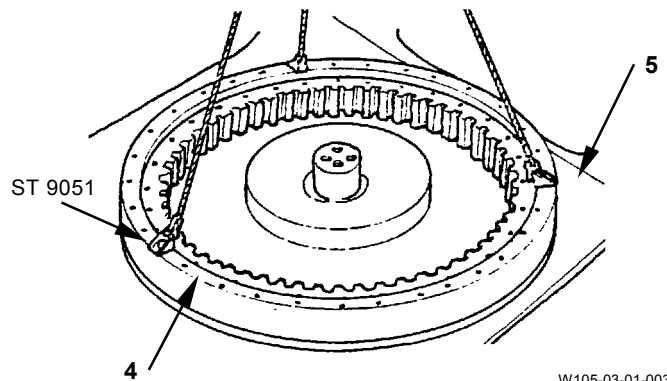
W105-03-01-002

 **CAUTION: Swing bearing weight: 1250 kg (7560 lb)**

4. Install special tools (ST 9051) (3 used) to outer race (4) with bolts (3) (3 used), nuts (M33, Pitch 3.0 mm) (3 used).

 : 46 mm

5. Attach a nylon sling to special tool (ST 9051). Hoist and remove the swing bearing from track frame (5).



W105-03-01-003

UNDERCARRIAGE / Swing Bearing

Installation

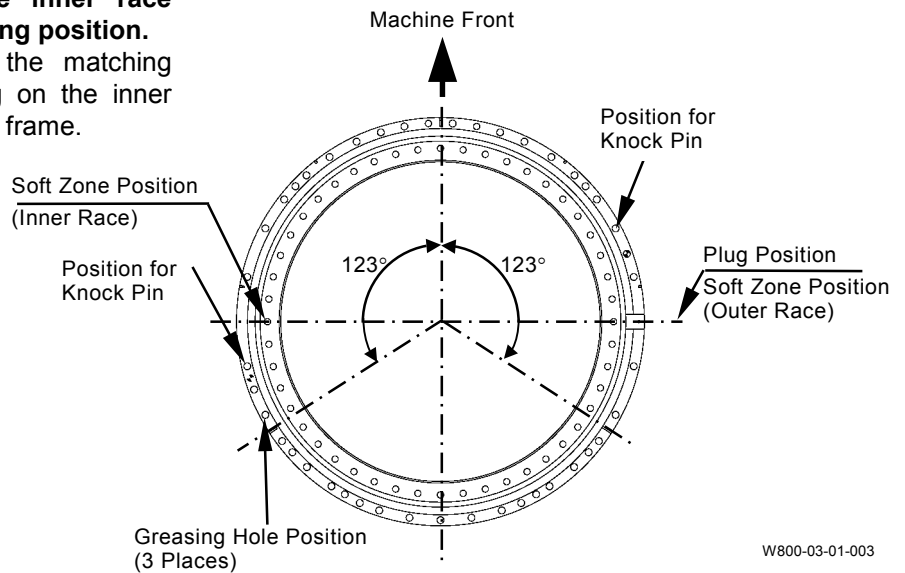
Clean the mounting surfaces of track frame and swing bearing.

1. Apply THREEBOND #1102 to the mounting surface for swing bearing on track frame.


CAUTION: Swing bearing weight: 1250 kg (7560 lb)


IMPORTANT: Check sure to align the matching marks. Otherwise, the inner race soft zone will be in wrong position.

2. Hoist the swing bearing. Align the matching marks made when disassembling on the inner race of swing bearing and the track frame.

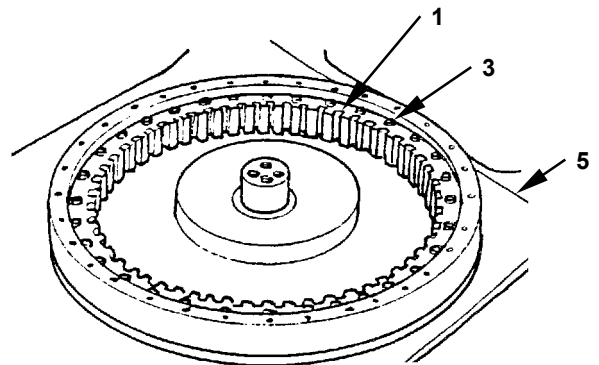


3. Apply LOCTITE #262 to bolts (3) (48 used) for inner race (1) in the swing bearing. Tighten inner race (1) to track frame (5) with bolts (3) (48 used).

 : 46 mm

 : 1750 N·m (178 kgf·m, 1290 lbf·ft)

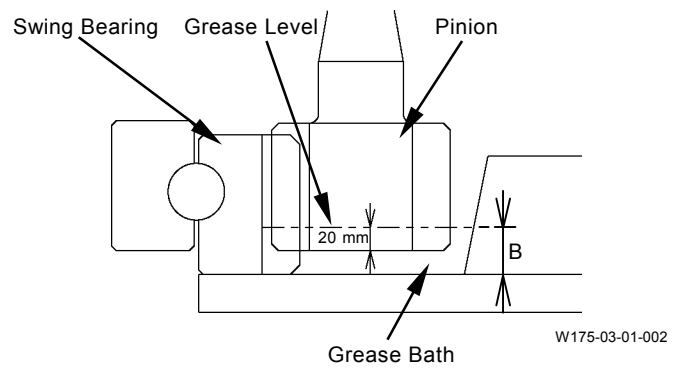
4. Install the front attachment, counterweight and cab. (Refer to "Remove and Install Main Frame" section)



UNDERCARRIAGE / Swing Bearing

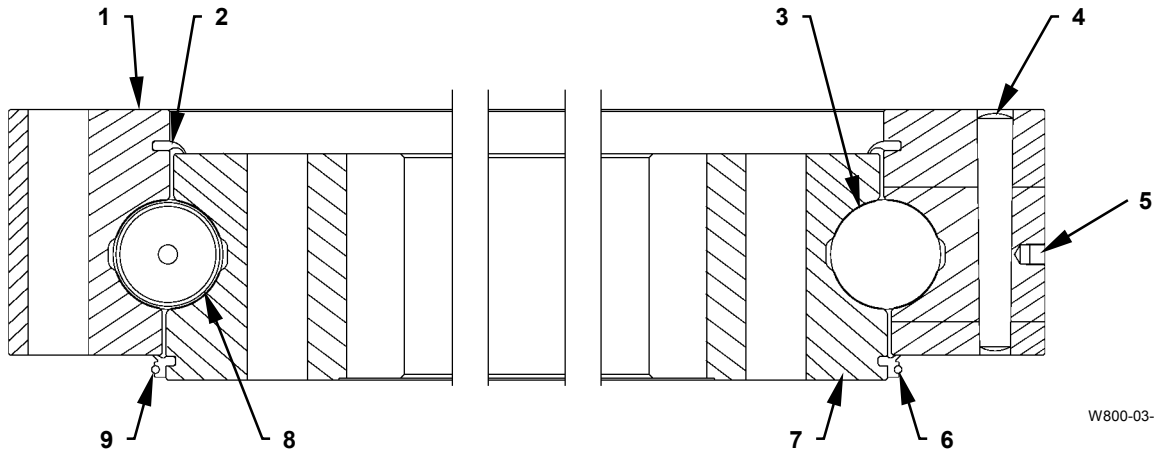
5. After installing the swing bearing, fill the grease bath with grease until the pinion of swing bearing is covered 20 mm (0.8 in) in grease.

Grease amount: 22 L (5.81 US gal.)

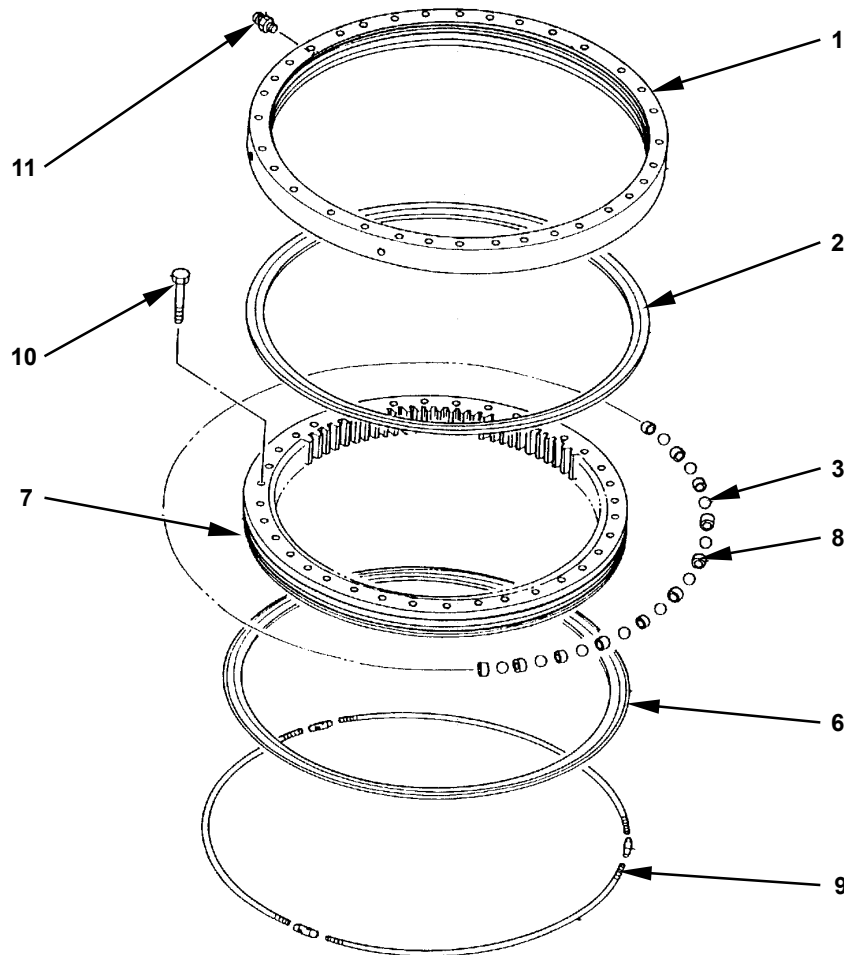


UNDERCARRIAGE / Swing Bearing

DISASSEMBLE SWING BEARING



W800-03-01-002



1 - Outer Race
2 - Seal
3 - Ball (85 Used)

4 - Pin
5 - Plug
6 - Seal

7 - Inner Race
8 - Support (85 Used)
9 - Rod and Turnbuckle
(3 Used)


10 - Bolt (48 Used)
11 - Grease Fitting (3 Used)

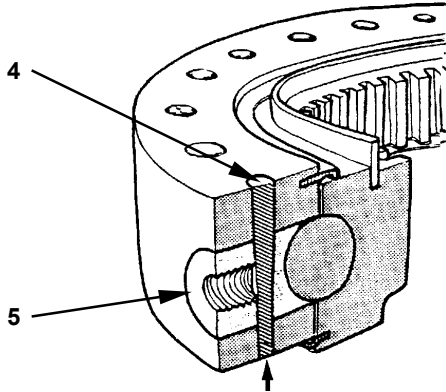
W111-03-01-008

UNDERCARRIAGE / Swing Bearing

Disassemble Swing Bearing


1. Remove pin (4) from the bottom side of plug (5).

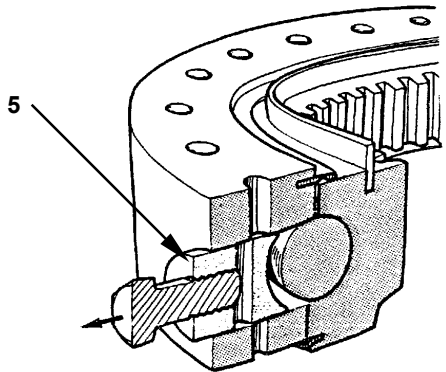
 **NOTE:** As pin (4) head was crimped after installation, grind off the crimped part.



W105-03-01-007

2. Remove plug (5).

 **NOTE:** Screw bolt (M10, Pitch 1.5 mm) in the threaded hole in plug (5). Tap the bolt head from the bottom side or pull the bolt in order to remove plug (5).

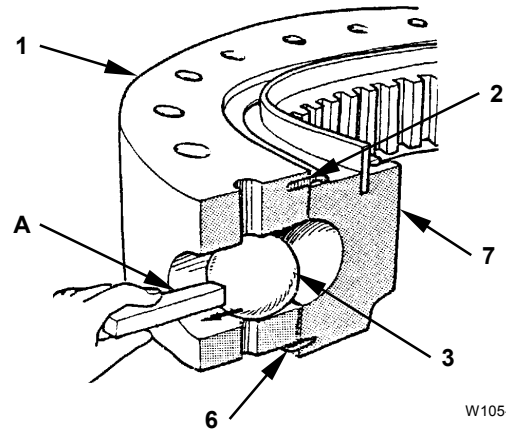


W105-03-01-008

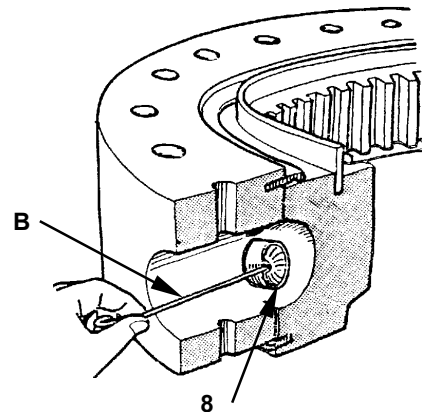


CAUTION: Swing bearing weight: 1250 kg (7560 lb)

3. Hoist outer race (1) of the swing bearing horizontally and slightly by using special tool (ST 9051). Remove rod and turnbuckles (9) (3 used) tightening seal (6).
4. Remove seal (6) from inner race (7). Remove seal (2) from outer race (1).
5. Place inner race (7) of the swing bearing on the wooden blocks. Hoist outer race (1).
6. While rotating outer race (1), remove balls (3) (85 used) and supports (8) (85 used) from the plug hole. Use round-bar magnet (A) and remove the balls. Use tip-bent wire (B) and remove support (8).



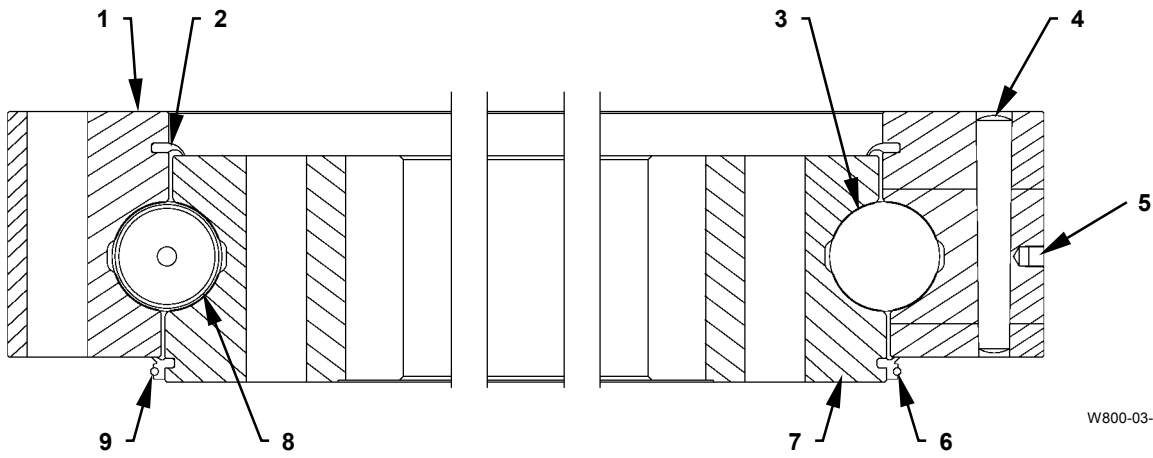
W105-03-01-009



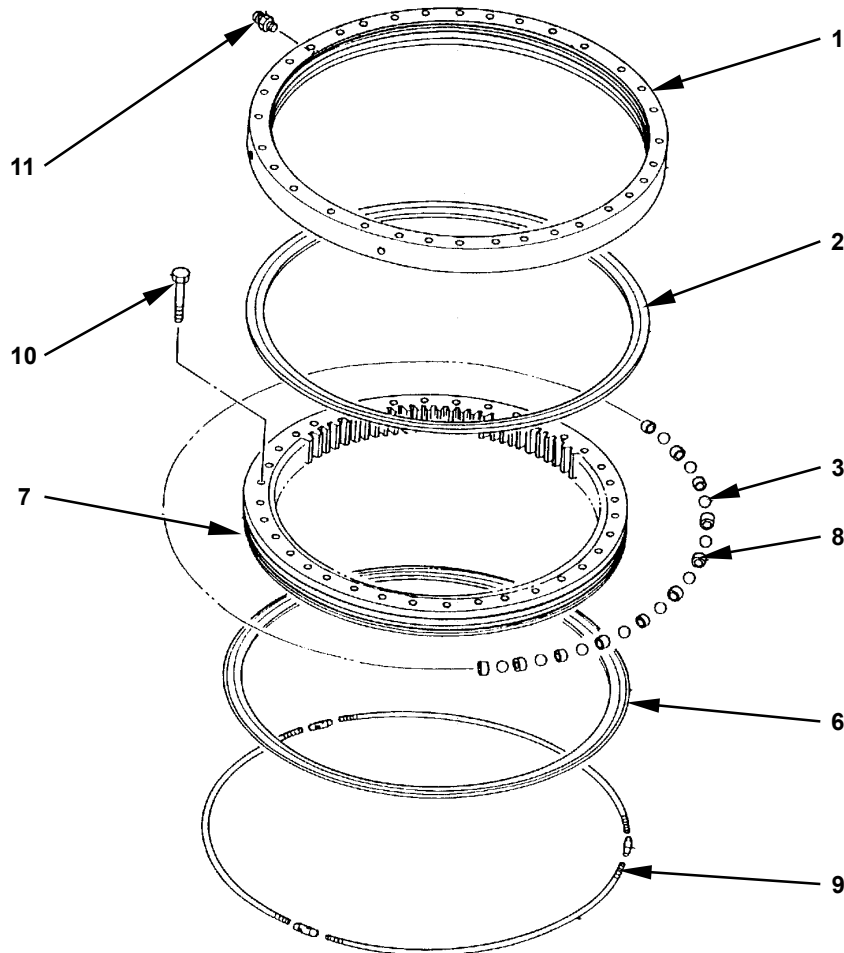
W105-03-01-010

UNDERCARRIAGE / Swing Bearing

ASSEMBLE SWING BEARING



W800-03-01-002



W111-03-01-008

- | | | | |
|--------------------|----------|---------------------------------|------------------------------|
| 1 - Outer Race | 4 - Pin | 7 - Inner Race | 10 - Bolt (48 Used) |
| 2 - Seal | 5 - Plug | 8 - Support (85 Used) | 11 - Grease Fitting (3 Used) |
| 3 - Ball (85 Used) | 6 - Seal | 9 - Rod and Turnbuckle (3 Used) | |

UNDERCARRIAGE / Swing Bearing

Assemble Swing Bearing

CAUTION: Swing bearing weight: 1250 kg (7560 lb)

1. Align inner race (7) of the swing bearing with the ball groove on outer race (1).

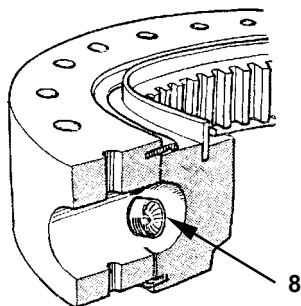
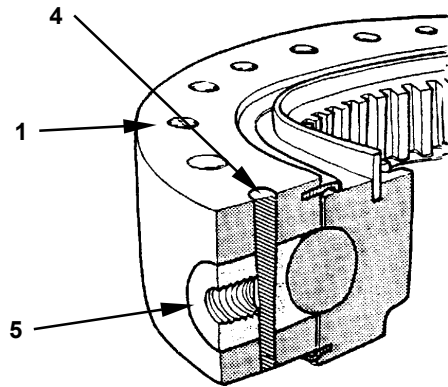
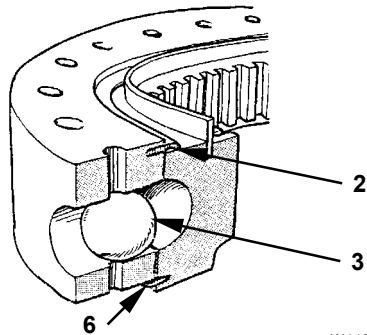
IMPORTANT: Apply grease to ball (3) and support (8).

2. Install balls (3) (85 used) and support (8) (85 used) alternately from the plug hole. Install ball (3) first.

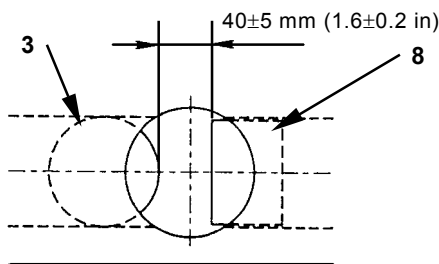
3. Clean the groove part for seals (2, 6) completely. Apply THREEBOND #1735 and install seal (2) to outer race (1). Install seal (6) to the groove part on inner race (7). Tighten seal (6) with rod and turnbuckle (9) evenly by 10 to 15 turns.

NOTE: When tightening the turnbuckle, use a round bar (Dia.: 2 to 2.3 mm (0.08 to 0.09 in)).

4. Install plug (5) into outer race (1). Secure plug (5) with pin (4). Crimp the head of pin (4) by using a punch.



5. Apply much grease to the swing bearing.



NOTE: Dia. of support (8): 31.5 mm (1.24 in)
Dia. of ball (3): 63.5 mm (2.50 in)

UNDERCARRIAGE / Swing Bearing

(Blank)

UNDERCARRIAGE / Travel Device


REMOVE AND INSTALL TRAVEL 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


Before removing the travel device, the tracks must be removed first. For removal and installation of the tracks, refer to REMOVE AND INSTALL TRACK on W3-7-1. In this section, the procedure starts on the premise that the tracks have already been removed.

1. Remove bolt (4). Install eyebolt (M16, Pitch 2.0 mm) into the hole. Attach a nylon sling onto eyebolt and hold cover (5).

 : 24 mm


CAUTION: Cover (5) weight: 46 kg (100 lb)

2. Remove bolts (2) (7 used) and washers (3) (7 used). Remove cover (5) from track frame (1).


 : 24 mm

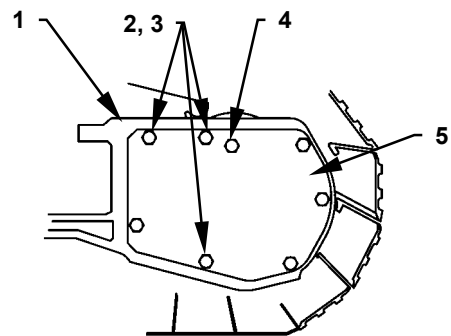
IMPORTANT: Attach an identification tag onto the removed hoses for assembling.

3. Remove hoses (8, 9) from travel device (12). Cap the open ends.

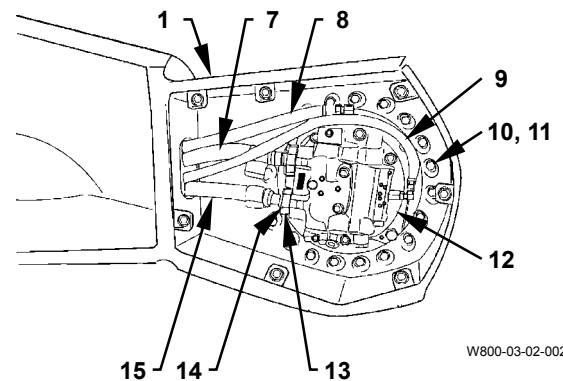
 : 22 mm, 27 mm

4. Remove socket bolts (14) (8 used) and split flanges (13) (4 used). Remove hoses (7, 15) from travel device (12). Cap the open ends.

 : 10 mm



W800-03-02-001




W800-03-02-002

UNDERCARRIAGE / Travel Device

⚠ CAUTION: Travel device (12) weight: 1087 kg (2400 lb)

5. Attach a nylon sling to travel device (12) and hold travel device (12).
6. Put the matching marks on travel device (12) and track frame (1).
Remove bolts (10) (24 used) and washers (11) (24 used). Remove travel device (12) from track frame (1).


 : 41 mm


Installation

⚠ CAUTION: Travel device (12) weight: 1087 kg (2400 lb)


IMPORTANT: Align the matching marks made when disassembling.


1. Attach a nylon sling onto travel device (12). Hoist and align travel device (12) with the mounting hole of track frame (1). Install travel device (12) to track frame (1) with bolts (10) (24 used) and washers (11) (24 used).

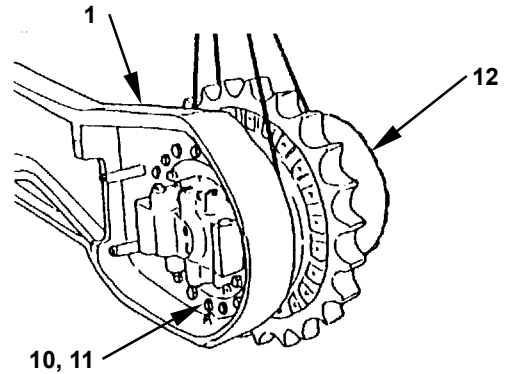
 : 41 mm

 : 1400 N·m (143 kgf·m, 1030 lbf·ft)

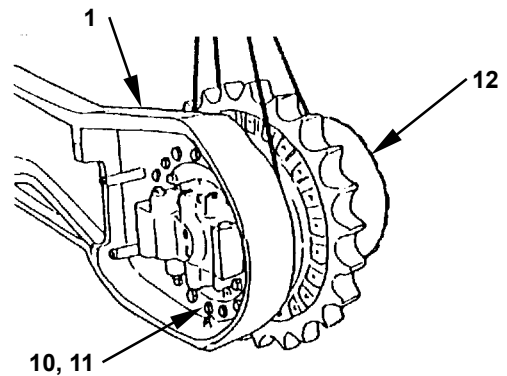
2. Install hoses (7, 15) to travel device (12) with split flanges (13) (4 used) and socket bolts (14) (8 used).

 : 10 mm

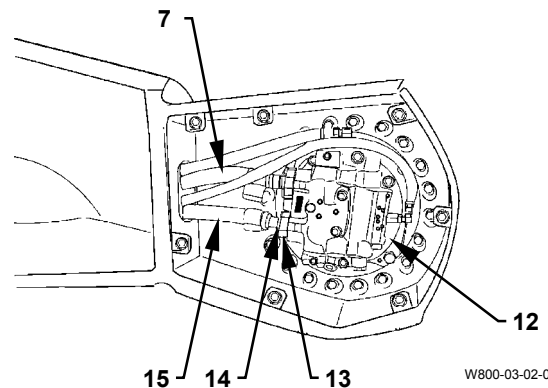
 : 90 N·m (9 kgf·m, 66 lbf·ft)



W111-03-02-002







W111-03-02-002

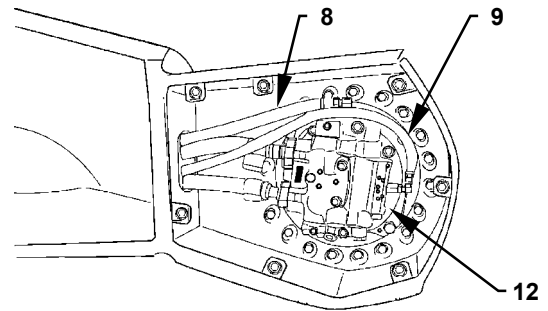


W800-03-02-002

UNDERCARRIAGE / Travel Device

3. Install hoses (8, 9) to travel device (12).

-  : 22 mm
-  : 39 N·m (4 kgf·m, 29 lbf·ft)
-  : 27 mm
-  : 78 N·m (8 kgf·m, 58 lbf·ft)





W800-03-02-002





CAUTION: Cover (5) weight: 46 kg (101 lb)

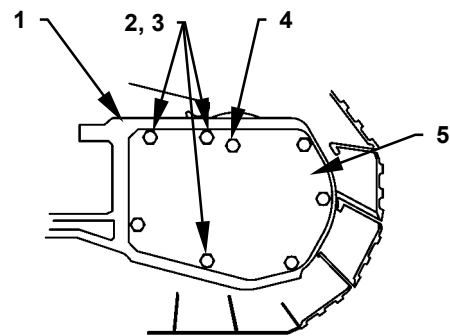
4. Install eyebolt (M16, Pitch 2.0 mm) to cover (5). Attach a nylon sling onto eyebolt. Align with the mounting hole on track frame (1).

5. Install cover (5) to track frame (1) with bolts (2) (7 used) and washers (3) (7 used).

-  : 24 mm
-  : 210 N·m (21.5 kgf·m, 155 lbf·ft)

6. Remove eyebolt. Install bolt (4) to cover (5).

-  : 24 mm
-  : 210 N·m (21.5 kgf·m, 155 lbf·ft)



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

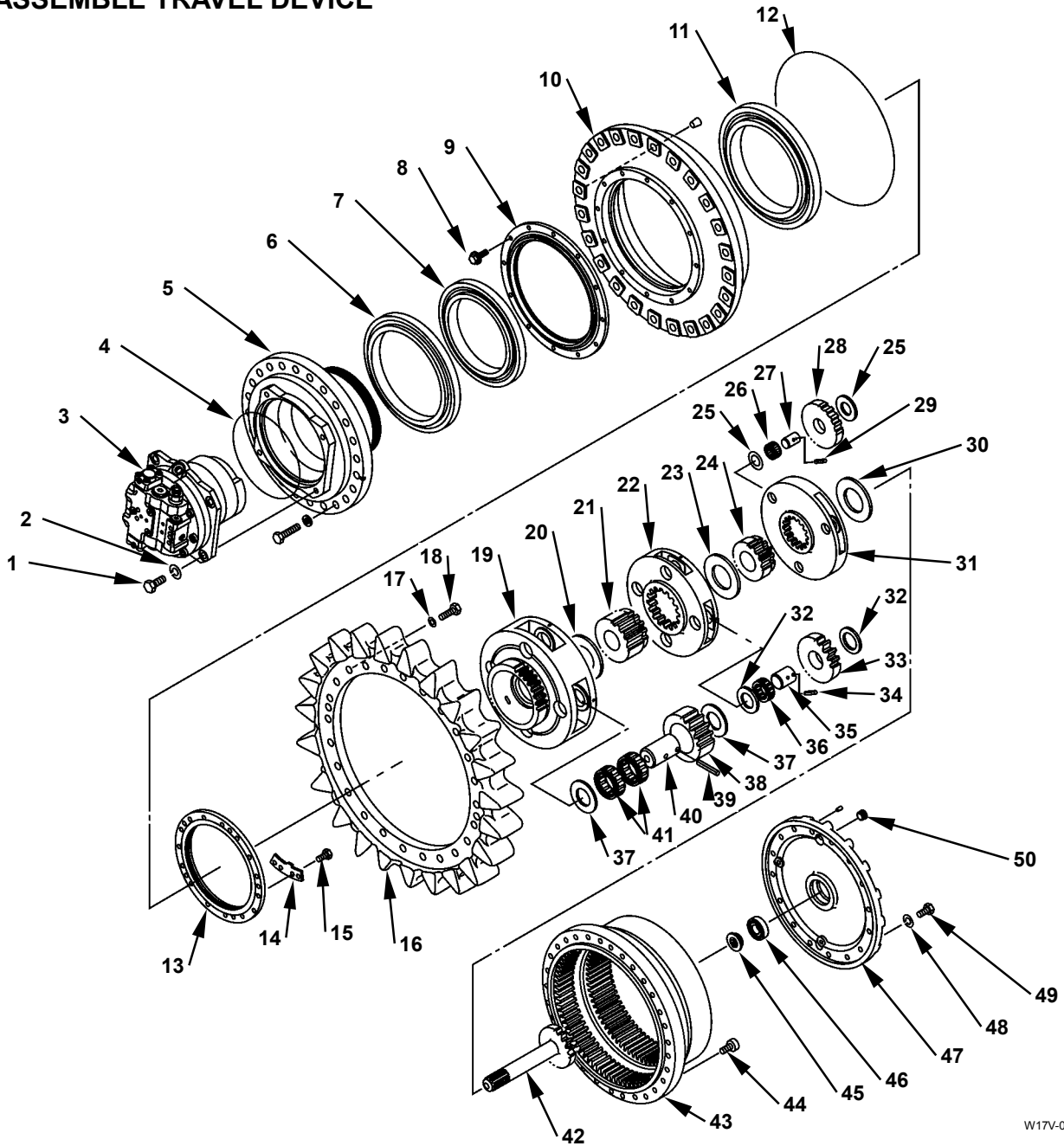
In order to prevent the travel motor from seizing, perform the break-in operation after installation.

Condition

1. Engine control dial: Slow idle speed
2. Travel mode switch: Slow
3. Operation duration: Over 2 minutes

UNDERCARRIAGE / Travel Device

DISASSEMBLE TRAVEL DEVICE



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- | | | | |
|----------------------------|------------------------------|---|------------------------------|
| 1 - Bolt (4 Used) | 14 - Lock Plate | 27 - Pin (3 Used) | 39 - Spring Pin (4 Used) |
| 2 - Spring Washer (4 Used) | 15 - Bolt (2 Used) | 28 - First Stage Planetary Gear (3 used) | 40 - Pin (4 Used) |
| 3 - Motor | 16 - Sprocket | 29 - Spring Pin (3 Used) | 41 - Needle Bearing (8 Used) |
| 4 - O-Ring | 17 - Spring Washer (24 Used) | 30 - Spacer | 42 - Shaft |
| 5 - Housing | 18 - Bolt (24 Used) | 31 - First Stage Carrier | 43 - Ring Gear |
| 6 - Floating Seal | 19 - Third Stage Carrier | 32 - Thrust Plate (8 Used) | 44 - Socket Bolt (30 Used) |
| 7 - Roller Bearing | 20 - Spacer | 33 - Second Stage Planetary Gear (4 used) | 45 - Stopper Pin |
| 8 - Bolt (12 Used) | 21 - Third Stage Sun Gear | 34 - Spring Pin (4 Used) | 46 - Bearing |
| 9 - Support | 22 - Second Stage Carrier | 35 - Pin (4 Used) | 47 - Cover |
| 10 - Drum | 23 - Spacer | 36 - Needle Bearing (4 Used) | 48 - Spring Washer (18 Used) |
| 11 - Roller Bearing | 24 - Second Stage Sun Gear | 37 - Thrust Plate (8 Used) | 49 - Bolt (18 Used) |
| 12 - O-Ring | 25 - Thrust Plate (6 Used) | 38 - Third Stage Planetary Gear (4 Used) | 50 - Plug (3 Used) |
| 13 - Bearing Nut | 26 - Needle Bearing (3 Used) | | |


UNDERCARRIAGE / Travel Device

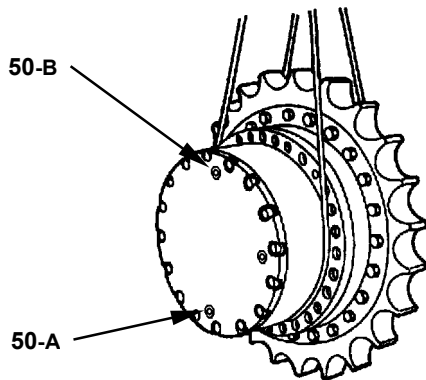
Disassemble Travel Device

CAUTION: There may be pressure accumulated inside of the travel device. Loosen the air bleed plug and release any remaining pressure completely. Remove the drain plug. Drain off gear oil. As the plug or gear oil gush out, do not loosen the air bleed plug suddenly. Keep away from the plug.

CAUTION: Travel device weight: 1085 kg (2400 lb)


1. Hoist and hold the travel device. Loosen plug (50-B) by two to three turns. Remove drain plug (50-A). Drain off gear oil from the travel device. Place the travel device on the workbench with the motor (3) side facing upward.

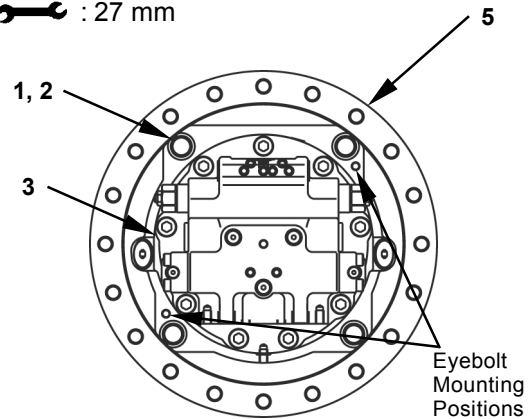
 : 17 mm



CAUTION: Motor (3) weight: 135 kg (300 lb)

2. Put the matching marks on the mating positions of motor (3) and housing (5). Install eyebolts (M12, Pitch 1.75 mm) (2 used) to the diagonal positions in motor (3). Remove bolts (1) (4 used) and spring washers (2) (4 used). Hoist and remove motor (3). Remove O-ring (4) from motor (3).

 : 27 mm



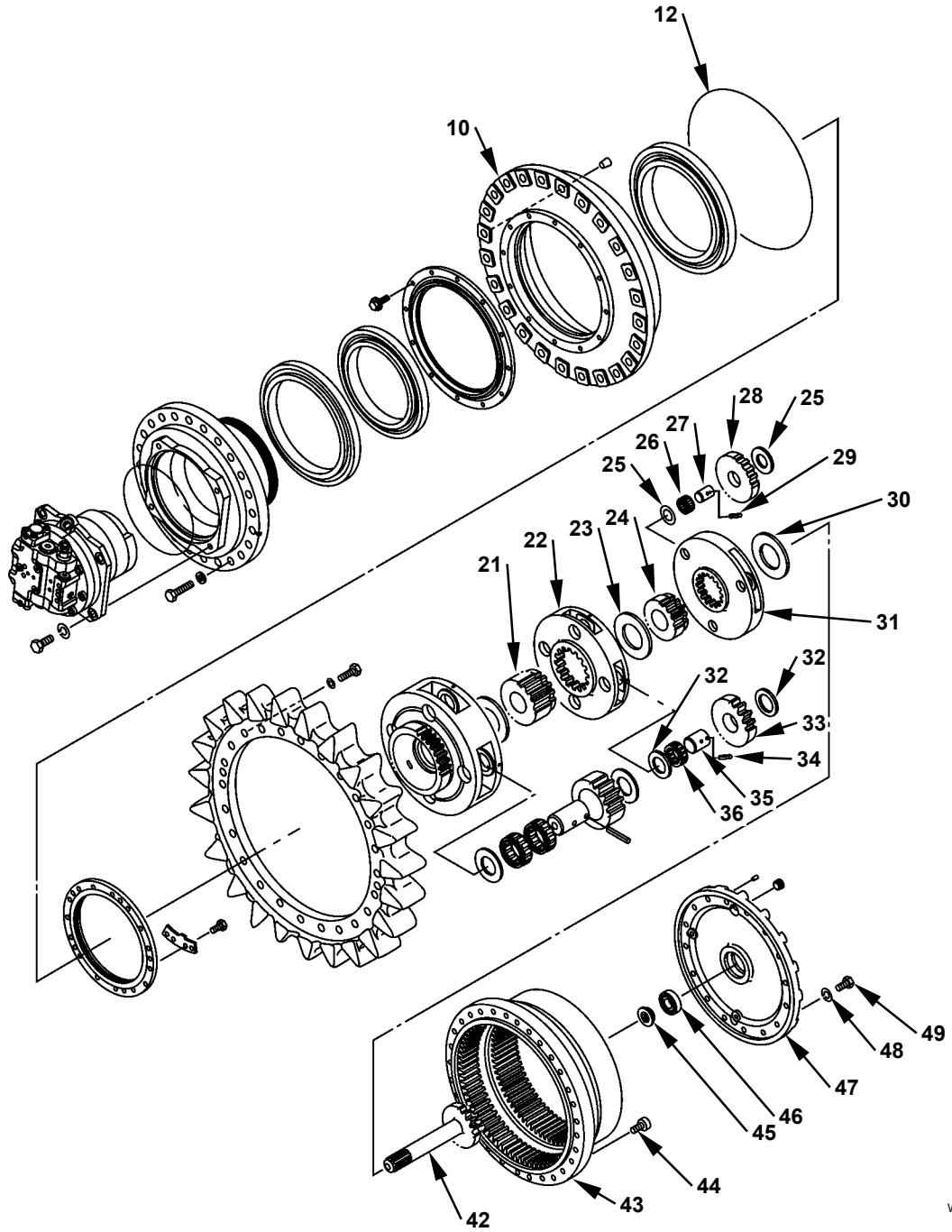
W16J-03-02-002

CAUTION: Travel reduction gear weight: 960 kg (2120 lb)

3. Attach a nylon sling onto the body of drum (10). Place the travel device on the workbench with the cover (47) side facing upward.


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UNDERCARRIAGE / Travel Device





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UNDERCARRIAGE / Travel Device

 **CAUTION: Cover (47) weight: 40 kg (90 lb)**

- Put the matching marks on the mating positions of cover (47) and ring gear (43).
Install eyebolt (M12, Pitch 1.75 mm) into the cork hole (2 places) on cover (47).
Remove bolts (49) (18 used) and spring washers (48) (18 used). Hoist and remove cover (47) from ring gear (43).


 : 22 mm

 **NOTE:** *THREEBOND #1215 has been applied on the mating surfaces between ring gear (43) and cover (47). Install the bolt into the cork hole on cover (47) (34 mm or deeper). Float and remove cover (47).*

 **NOTE:** *Do not remove stopper pin (45) and bearing (46) attached with cover (47) unless damage and wear are found.*

 **CAUTION: The first stage carrier (31) assembly weight: 30 kg (70 lb)**

- Remove shaft (42) from first stage carrier (31). Attach a nylon sling onto first stage carrier assembly (25 to 31). Hoist and remove first stage carrier assembly (25 to 31) from second stage carrier (22). Remove second stage sun gear (24) from second stage carrier (22).


 **CAUTION: The second stage carrier (22) assembly weight: 50 kg (110 lb)**


- Attach a nylon sling onto second stage carrier (22). Hoist and remove second stage carrier assembly (22, 23, 32 to 36) from ring gear (43). Remove third stage sun gear (21).

 **CAUTION: Ring gear (43) weight: 130 kg (290 lb)**

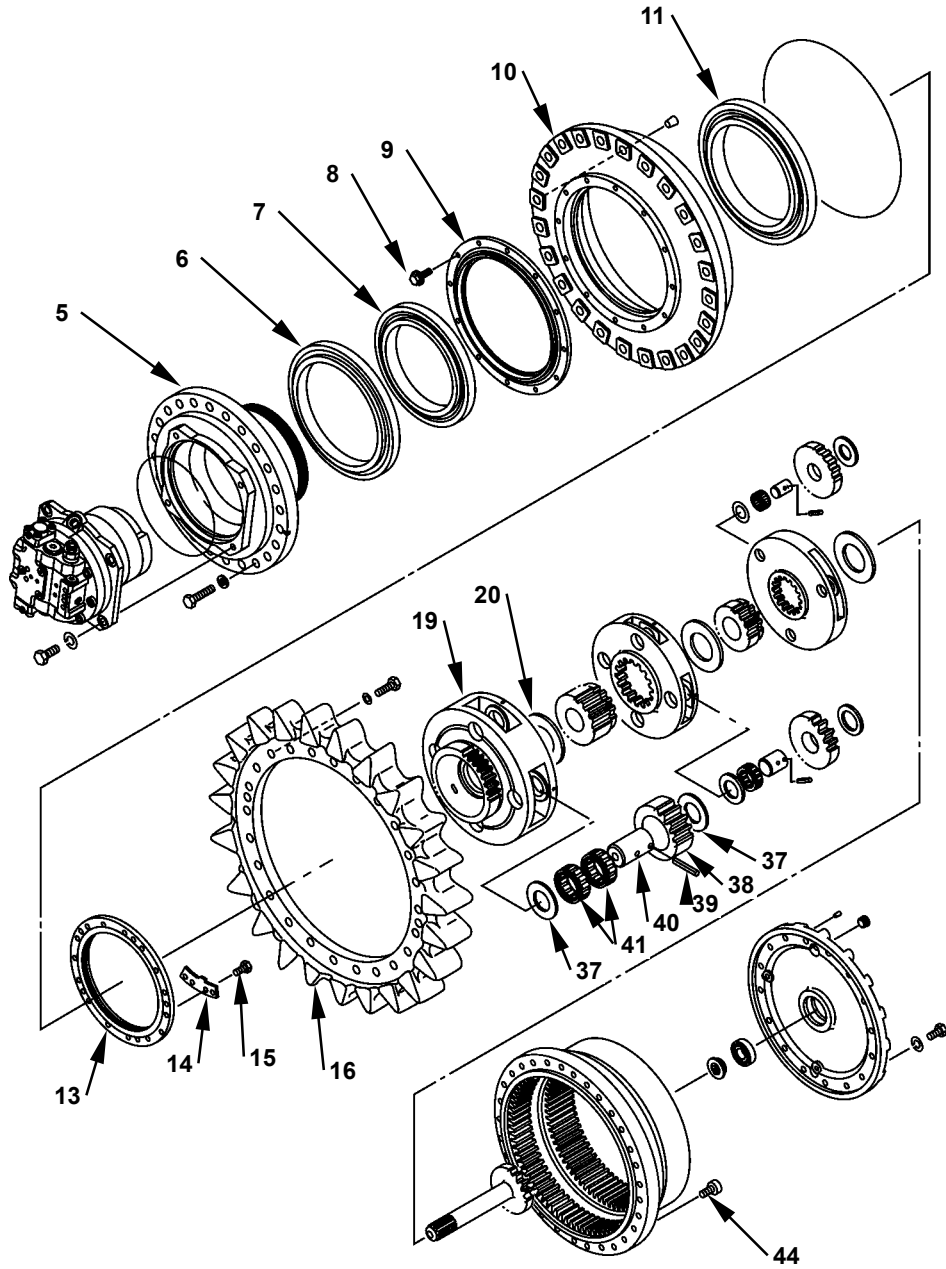
- Put the matching marks on the mating positions of ring gear (43) and drum (10). Remove socket bolts (44) (30 used). Install eyebolt (M14, Pitch 2.0 mm) into the bolt (49) hole (2 places) on ring gear (43).

Hoist and remove ring gear (43). Remove O-ring (12) from drum (10).

 : 17 mm

 **NOTE:** *LOCTITE #262 has been applied to socket bolt (44).*

UNDERCARRIAGE / Travel Device




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UNDERCARRIAGE / Travel Device

CAUTION: The third stage carrier (19) assembly weight: 130 kg (290 lb)

8. Attach a nylon sling to third stage carrier (19). Hoist and remove third stage carrier (19) assembly (19, 20, 37 to 41).

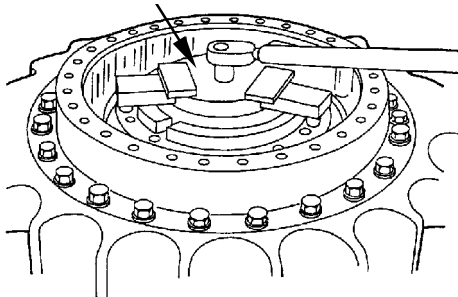
9. Remove bolts (15) (2 used). Remove lock plate (14) from bearing nut (13).

 : 19 mm

 **NOTE:** LOCTITE #262 has been applied to bolt (15).

10. Install special tool (ST 3140) to bearing nut (13). Remove bearing nut (13) from housing (5).

ST 3140



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IMPORTANT: The housing (5) contacting surface on support (9) is the sliding surface. Place the drum (10) assembly onto the wooden block in order not to damage the sliding surface.

CAUTION: Drum (10), sprocket (16) and others weight: 350 kg (770 lb)

11. Secure housing (5) onto the workbench tightly. Install eyebolt (M22, Pitch 2.5 mm) into the bolt (44) hole (2 places) on drum (10).

Hoist and remove the drum (10) assembly from housing (5).

At this time, the inner race of roller bearing (7) is removed together.

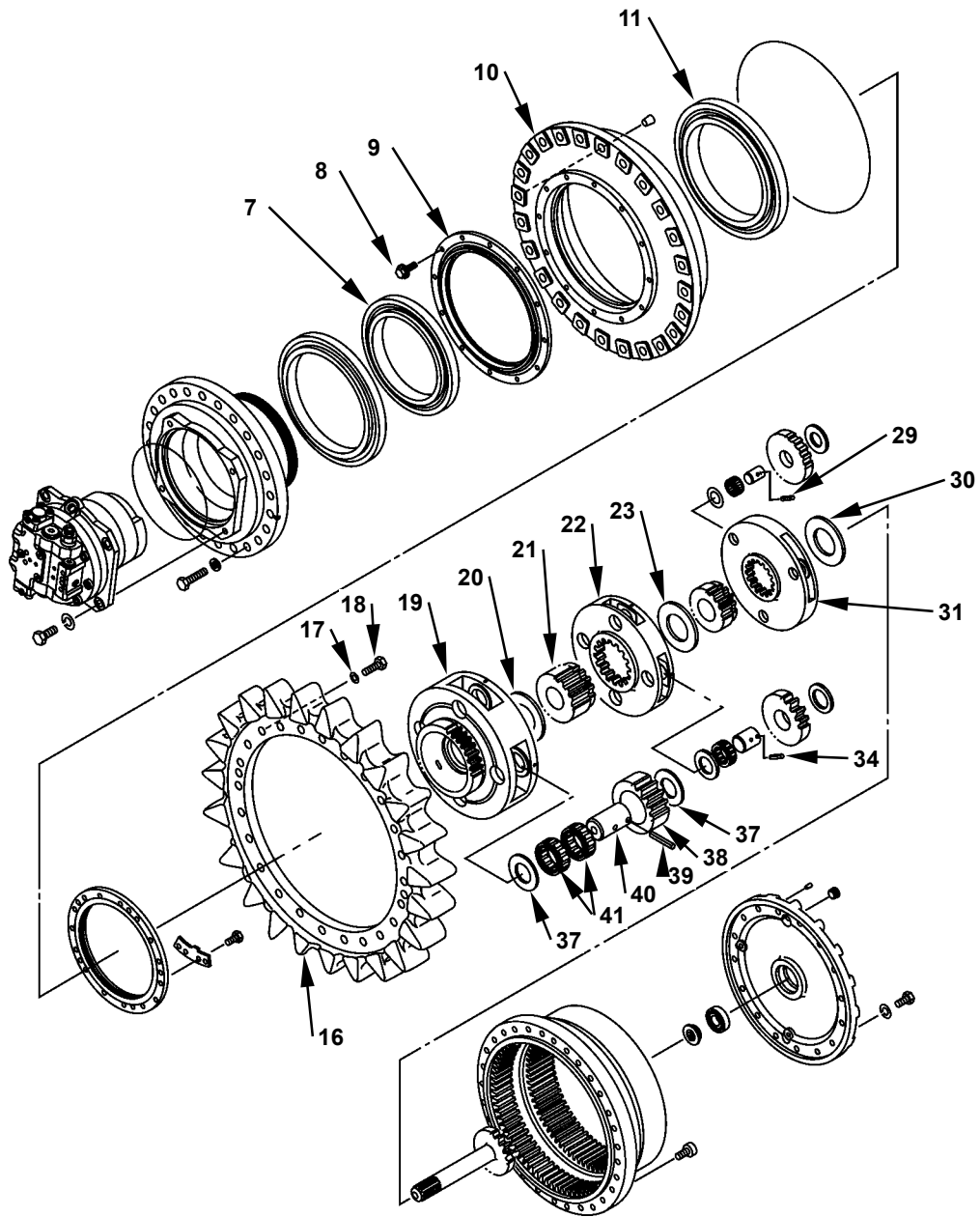
12. Remove the inner race of roller bearing (11) from drum (10).

Attach a nylon sling to sprocket (16). Turn over the drum (10) assembly.

13. Remove floating seal (6) at one side from housing (5).

14. Remove floating seal (6) at other side from support (9).


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UNDERCARRIAGE / Travel Device

15. Put the matching marks on the mating positions of support (9) and drum (10). Remove bolts (8) (12 used). Remove support (9) from drum (10). Remove the inner race of roller bearing (7) from drum (10).


 : 19 mm


 **NOTE:** *THREEBOND #1215 has been applied to the mating surfaces between support (9) and drum (10).*

 **CAUTION: Sprocket (16) weight: 150 kg (330 lb)**
Drum (10) + sprocket (16) weight: 320 kg (705 lb)

16. Attach a nylon sling to sprocket (16). Turn over sprocket (16). Put the matching marks on the mounting surfaces between sprocket (16) and drum (10).

Remove the corks (2) from sprocket (16). Install eyebolt (M27, Pitch 3.0 mm) into the cork hole (2 places). Remove bolts (18) (24 used) and spring washers (17) (24 used). Hoist and remove sprocket (16).

 : 41 mm

 **NOTE:** *LOCTITE #262 has been applied to bolt (18).*

IMPORTANT: Do not remove the outer race of roller bearings (7, 11) from drum (10) unless necessary.

Failure to follow these instructions will shorten service life of the bearings as press-fit force is reduced. If removing, replace with a new one when assembling.

17. Remove the outer race of roller bearing (7) from drum (10) by using a bar and hammer.



CAUTION: Drum (10), others weight: 185 kg (410 lb)

18. Attach a nylon sling onto the body of drum (10). Hoist and lay down drum (10). Install eyebolt (M12, Pitch 1.75 mm) into the bolt (8) hole (2 places) on drum (10).

Hoist and turn over drum (10). Remove the outer race of roller bearing (11) from drum (10) by using a bar and hammer.

19. Tap and remove spring pin (39) from the third stage carrier (19) assembly by using a round bar (Dia.: 8 mm (0.05 in)). Remove the pin. Remove third stage planetary gear (38) and thrust plates (37) (2 used) from third stage carrier (19).

Remove needle bearings (41) (2 used) from third stage planetary gear (38).

20. Remove spring pins (39) (3 used), pins (40) (3 used), third stage planetary gears (38) (3 used), thrust plates (37) (6 used) and needle bearings (41) (6 used) from third stage carrier (19) according to step 19. Remove spacer (20) from third stage carrier (19).

21. Disassemble the first stage carrier (31) assembly and the second stage carrier (22) assembly according to step 19.

Spring Pin (29)

Round Bar Dia.: 4 mm (0.2 in)

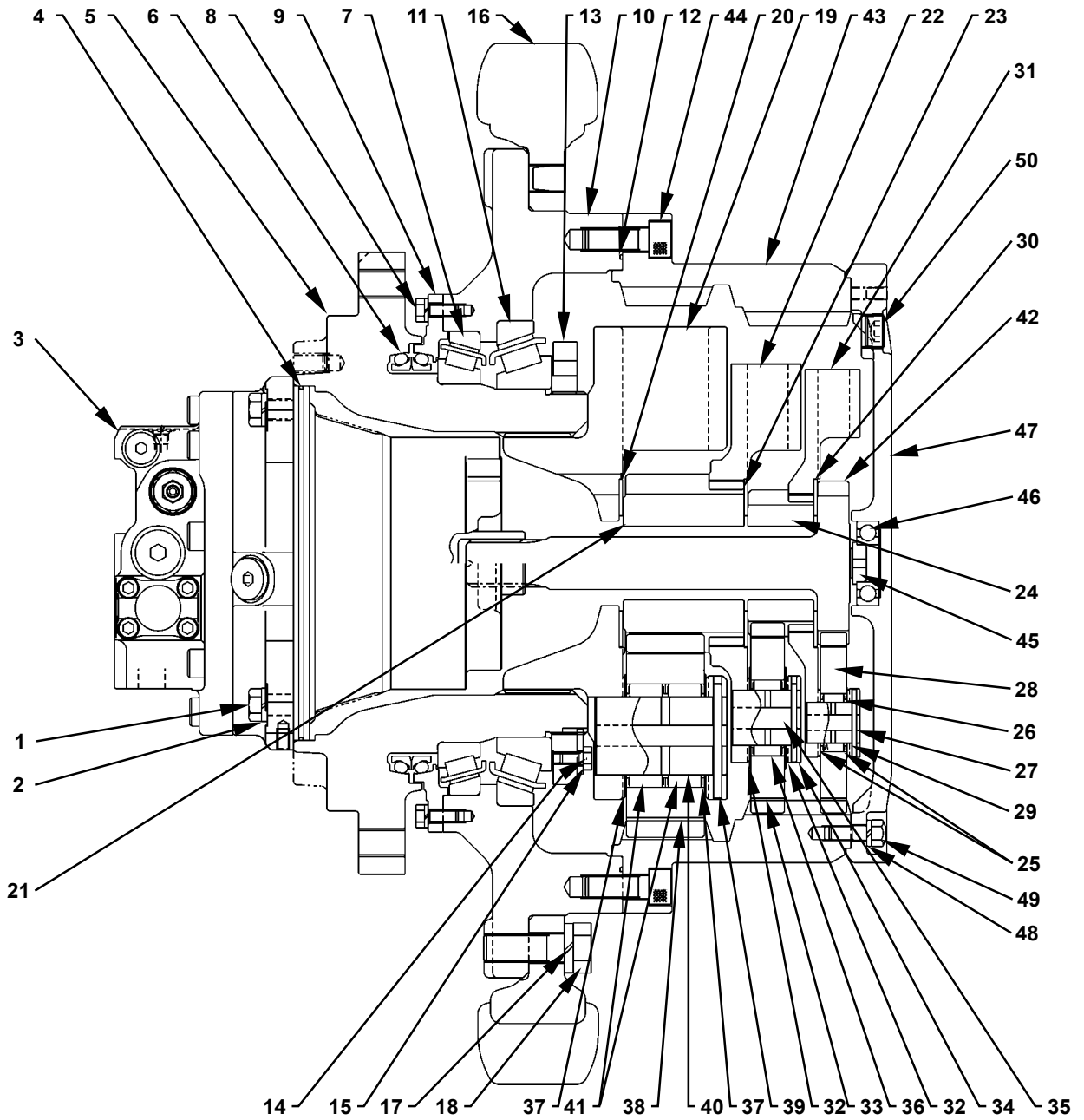
Spring Pin (34)

Round Bar Dia.: 5 mm (0.2 in)

22. Remove spacer (30) from first stage carrier (31). Remove spacer (23) from second stage carrier (22).

UNDERCARRIAGE / Travel Device

ASSEMBLE TRAVEL DEVICE



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- | | | | |
|----------------------------|------------------------------|---|------------------------------|
| 1 - Bolt (4 Used) | 14 - Lock Plate | 27 - Pin (3 Used) | 39 - Spring Pin (4 Used) |
| 2 - Spring Washer (4 Used) | 15 - Bolt (2 Used) | 28 - First Stage Planetary Gear (3 used) | 40 - Pin (4 Used) |
| 3 - Motor | 16 - Sprocket | 29 - Spring Pin (3 Used) | 41 - Needle Bearing (8 Used) |
| 4 - O-Ring | 17 - Spring Washer (24 Used) | 30 - Spacer | 42 - Shaft |
| 5 - Housing | 18 - Bolt (24 Used) | 31 - First Stage Carrier | 43 - Ring Gear |
| 6 - Floating Seal | 19 - Third Stage Carrier | 32 - Thrust Plate (8 Used) | 44 - Socket Bolt (30 Used) |
| 7 - Roller Bearing | 20 - Spacer | 33 - Second Stage Planetary Gear (4 used) | 45 - Stopper Pin |
| 8 - Bolt (12 Used) | 21 - Third Stage Sun Gear | 34 - Spring Pin (4 Used) | 46 - Bearing |
| 9 - Support | 22 - Second Stage Carrier | 35 - Pin (4 Used) | 47 - Cover |
| 10 - Drum | 23 - Spacer | 36 - Needle Bearing (4 Used) | 48 - Spring Washer (18 Used) |
| 11 - Roller Bearing | 24 - Second Stage Sun Gear | 37 - Thrust Plate (8 Used) | 49 - Bolt (18 Used) |
| 12 - O-Ring | 25 - Thrust Plate (6 Used) | 38 - Third Stage Planetary Gear (4 Used) | 50 - Plug (3 Used) |
| 13 - Bearing Nut | 26 - Needle Bearing (3 Used) | | |


UNDERCARRIAGE / Travel Device


Assemble Travel Device



CAUTION: Housing (5) weight: 140 kg (310 lb)

1. Attach a nylon sling onto housing (5). Hoist and place housing (5) with the motor (3) side facing downward.
2. Apply grease onto O-ring in floating seal (6). Install floating seal at one side to housing (5) by using a bamboo spatula.
3. Install floating seal (6) at other side to support (9). Install bolts (8) (12 used) to support (9). Install support (9) to housing (5).

 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

4. Tap and install the inner race of roller bearing (7) into 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 in housing (5) completely.



CAUTION: Drum (10) weight: 170 kg (370 lb)

5. Install eyebolt (M12, Pitch 1.75 mm) into the bolt (8) hole (2 places) on drum (10). Attach a nylon sling onto drum (10). Hoist and place drum (10) with the cover (47) side facing downward.
Tap and install the outer race of roller bearing (7) into drum (10) by using a bar and hammer evenly.



NOTE: Tap and listen to ring in order to check if the outer race is installed in drum (10) completely.



CAUTION: Drum (10) and others weight: 175 kg (390 lb)

6. Install eyebolt (M22, Pitch 2.5 mm) into the socket bolt (44) hole (2 places) on drum (10).
Attach a nylon sling onto drum (10). Hoist and place drum (10) with the cover (47) side facing upward.
Tap and install the outer race of roller bearing (11) into drum (10) by using a bar and hammer evenly.



NOTE: Tap and listen to ring in order to check if the outer race is installed in drum (10) completely.





CAUTION: Sprocket (16) weight: 150 kg (330 lb)

7. Install eyebolt (M27, Pitch 3.0 mm) to sprocket (16). Attach a nylon sling onto sprocket (16). Hoist and place sprocket (16) onto the drum (10) assembly.

IMPORTANT: Align the matching marks on sprocket (16) and drum (10). Apply LOCTITE #262 to bolt (18).

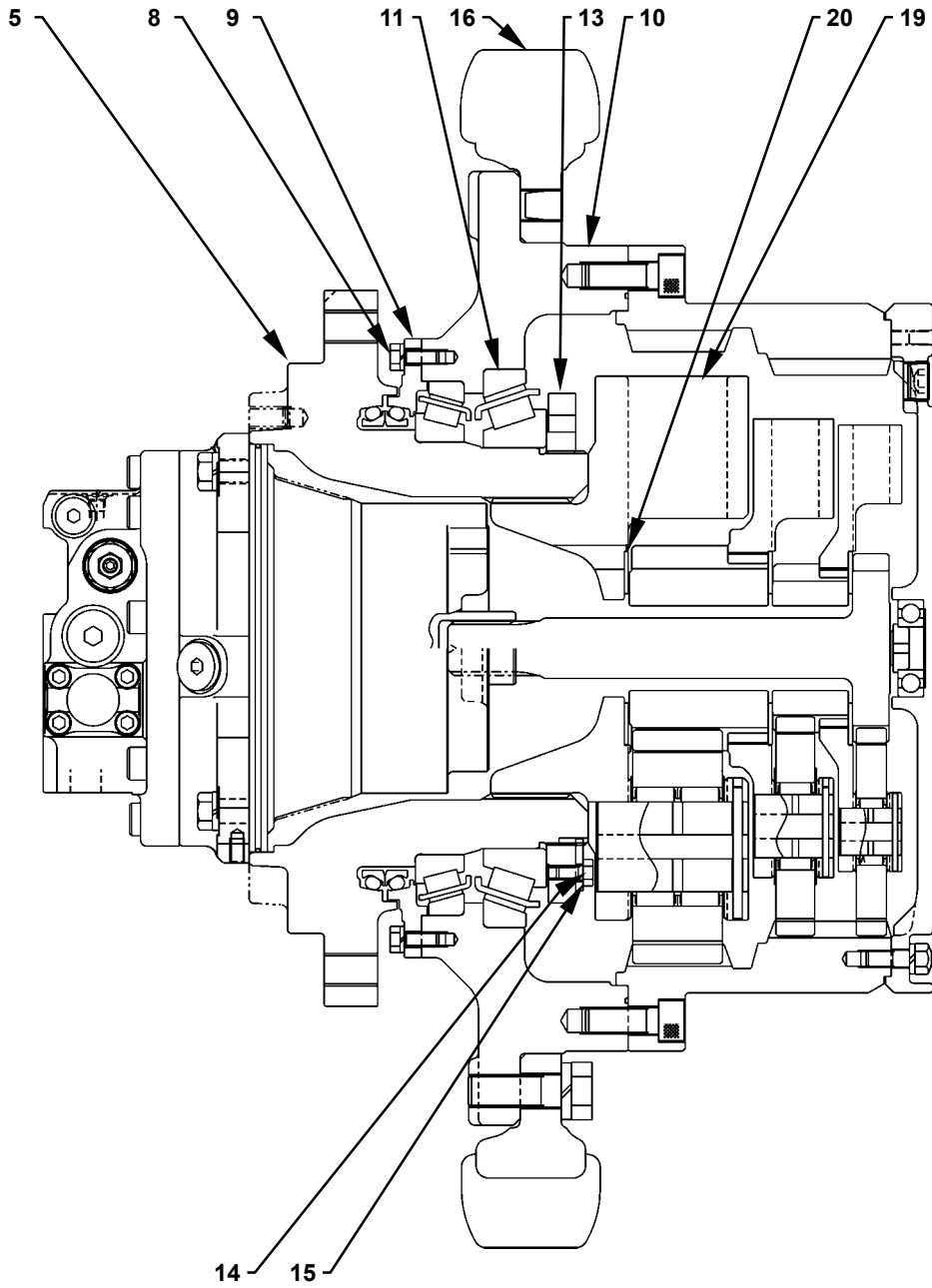
8. Insert spring washers (17) (24 used) to bolts (18) (24 used) respectively. Tighten bolt (18) and install sprocket (16) to drum (10).

 : 41 mm

 : 1400 N·m (143 kgf·m, 1033 lbf·ft)

9. Apply THREEBOND #1215 onto the drum (10) mounting surface on support (9). Apply hydraulic oil to the inner race of roller bearing (7).

UNDERCARRIAGE / Travel Device



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UNDERCARRIAGE / Travel Device


CAUTION: Drum (10), sprocket (16) and others weight: 330 kg (730 lb)


IMPORTANT: Check if the clearance between housing (5) and support (9) is equal all around.

10. Hoist and place the drum (10) assembly onto support (9) gently.

IMPORTANT: Align the matching marks on support (9) and drum (10).

11. Install support (9) to drum (10) with bolts (8) (12 used).


 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)


12. Tap and install the inner race of roller bearing (11) into housing (5) by using a bar and hammer evenly.

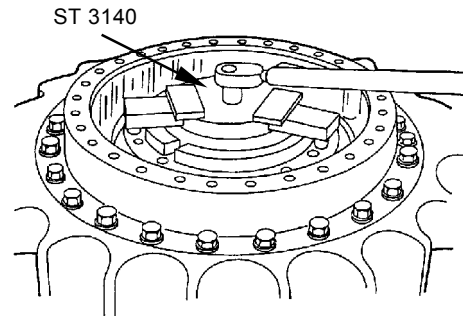
IMPORTANT: Install bearing nut (13) with the step part facing to the roller bearing (11) side. Apply grease to the thread part of bearing nut (13).

13. Install bearing nut (13) to housing (5). Tighten bearing nut (13) by hand.

 **NOTE:** Apply grease to thread part of bearing nut (13) for keeping correct tightening torque.

14. Install special tool (ST 3140) to bearing nut (13). Tighten bearing nut (13) by using a torque wrench.

 : 790 N·m (81 kgf·m, 583 lbf·ft)




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15. Rotate sprocket (16) both clockwise and counterclockwise 4 to 5 turns. Tap the end of drum (10) by using a plastic hammer and take up slack.


IMPORTANT: After tightening bearing nut (13), check if bolts (8) (12 used) are loosened. If bolt (8) is loosened, tighten bolt (8) to the specification.


16. Repeat steps 14, 15 and tighten bearing nut (13) to the specification.

 : 790 N·m (81 kgf·m, 583 lbf·ft)

IMPORTANT: If the splines of lock plate (14) and housing (5) are not aligned, turn bearing nut (13) in tightening direction in order to align the splines. Apply LOCTITE #262 to bolt (15).

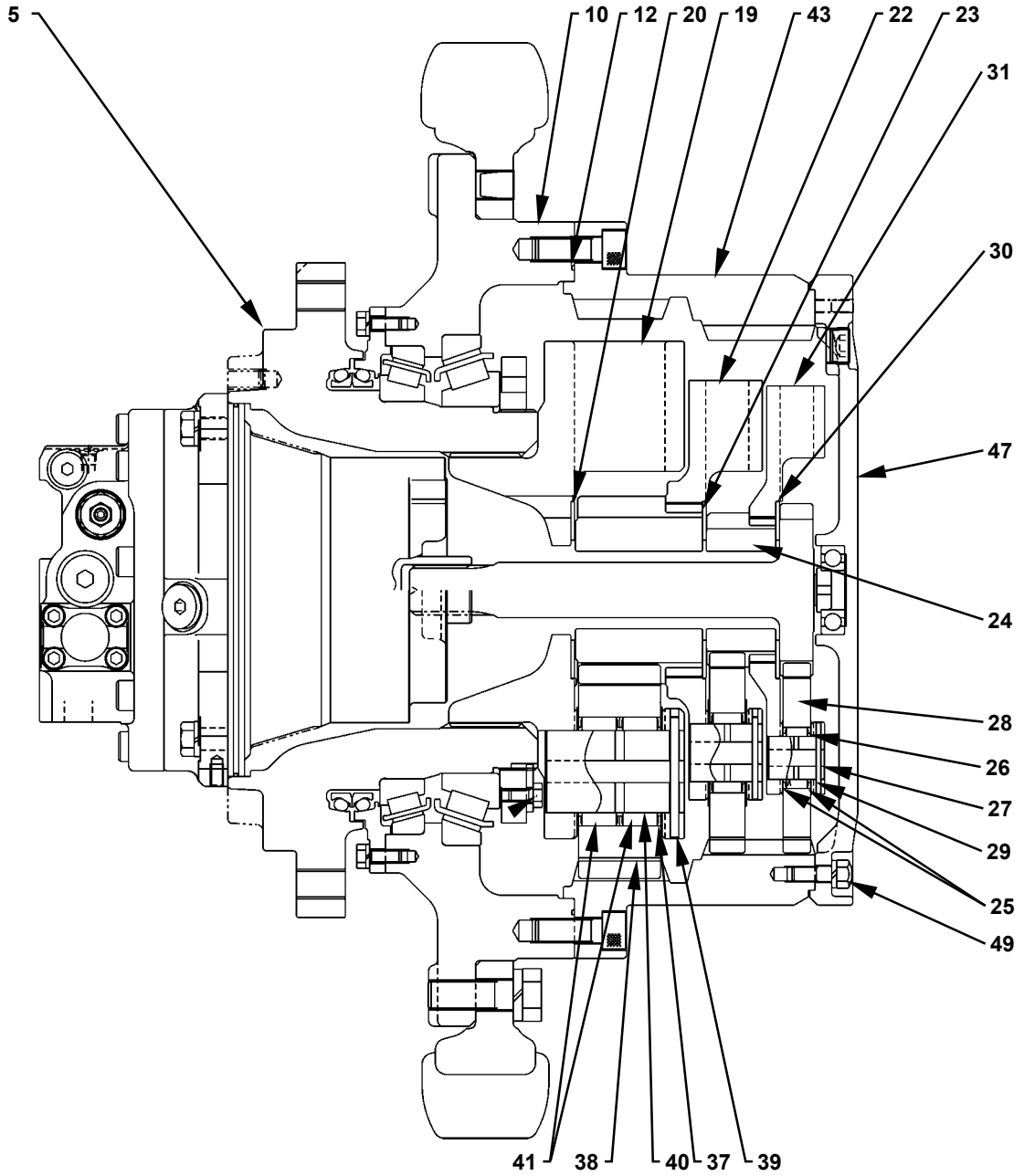
17. Install lock plate (14) to bearing nut (13) with bolts (15) (2 used).

 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

18. Install spacer (20) to third stage carrier (19).

UNDERCARRIAGE / Travel Device



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UNDERCARRIAGE / Travel Device

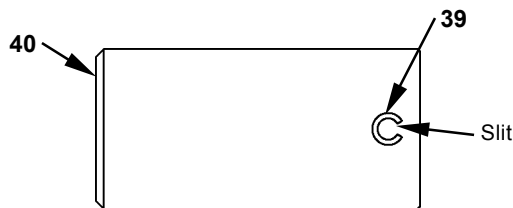
IMPORTANT: There is an identification groove on the end of third stage planetary gear (38). Install third stage planetary gear (38) with the identification groove facing to the cover (47) side.

19. Install needle bearings (41) (4 used) to third stage planetary gears (38) (4 used). Clamp third stage planetary gear (38) with thrust plates (37) (8 used). Install third stage planetary gear (38) to third stage carrier (19).

20. Apply grease onto pins (40) (4 used). Align with the pin (39) hole on third stage carrier (19) and install pins (40) (4 used).

IMPORTANT: Install spring pin (39) with the slit facing to the pin (40) end.

21. Tap and install spring pins (39) (4 used) into third stage carrier (19) and pin (40) by using a round bar (Dia.: 8 mm (0.3 in)).



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22. Install spacer (30) to first stage carrier (31).

23. Install needle bearing (26) to first stage planetary gear (28). Clamp first stage planetary gear (28) with thrust plates (25) (2 used). Install first stage planetary gear (28) to first stage carrier (31). Install other first stage planetary gears (28) (2 used) in the same procedures.

IMPORTANT: Install spring pin (29) with the slit facing to the pin (27) end.

24. Apply hydraulic oil to pin (27). Align with the spring pin (29) hole on first stage carrier (31) and install pins (27) (3 used). Tap and install spring pins (29) (3 used) into first stage carrier (31) and pin (27) by using a round bar (Dia.: 4 mm (0.2 in)).



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25. Assemble second stage carrier (22) according to steps 22 to 24.

Round Bar Dia.: 5 mm (0.2 in)



CAUTION: The third stage carrier (19) assembly weight: 130 kg (290 lb)

26. Attach a nylon sling onto third stage carrier (19) assembly (19, 20, 37 to 41). Hoist and place the third stage carrier (19) assembly onto housing (5).

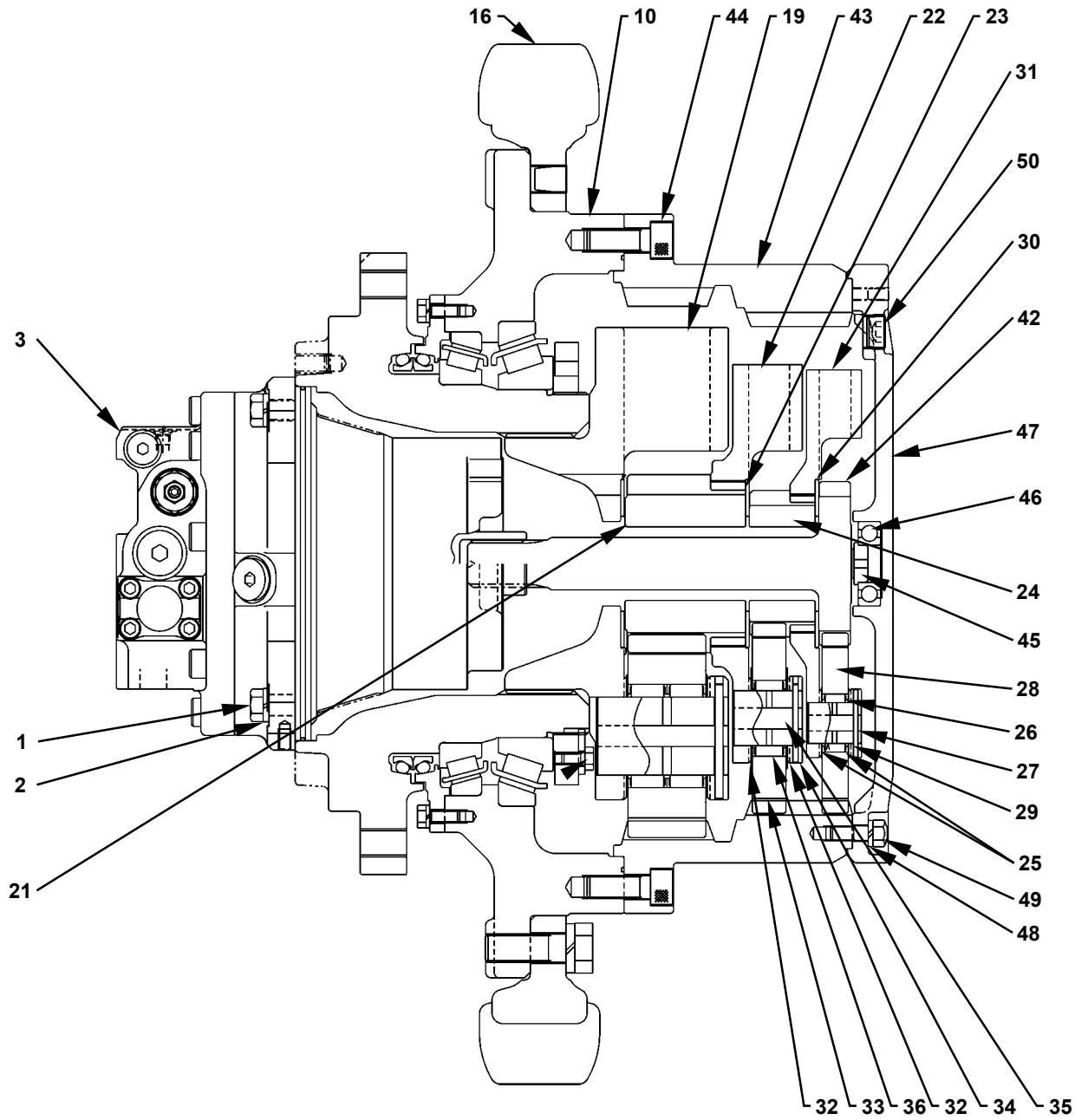


CAUTION: Ring gear (43) weight: 130 kg (290 lb)

IMPORTANT: Engage the spline of ring gear (43) with third stage planetary gears (38) (4 used). Align the matching marks on drum (10) and ring gear (43).

27. Apply grease to O-ring (12). Install O-ring (12) to drum (10). Install eyebolt (M14, Pitch 2.0 mm) into the bolt (49) hole (2 places) on ring gear (43). Attach a nylon sling onto ring gear (43). Hoist and place ring gear (43) onto drum (10).


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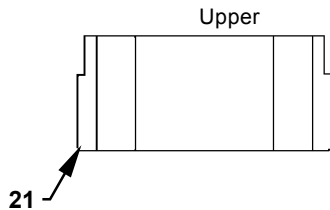
UNDERCARRIAGE / Travel Device

28. Apply LOCTITE #262 to socket bolts (44) (30 used). Install ring gear (43) to drum (10) with socket bolts (44) (30 used).


 : 17 mm

 : 750 N·m (76 kgf·m, 553 lbf·ft)

29. Install third stage sun gear (21) to third stage carrier (19) with the thinner outer diameter facing to the cover (47) side.

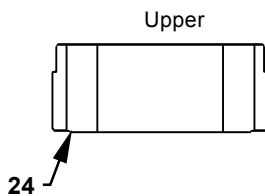


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-  **CAUTION: The second stage carrier (22) assembly weight: 50 kg (110 lb)**

30. Attach a nylon sling onto second stage carrier (22) assembly (22, 23, 32 to 36). Hoist and place the second stage carrier (22) assembly onto third stage sun gear (21)

31. Install second stage sun gear (24) to second stage carrier (22) with the thinner outer diameter facing to the cover (47) side.



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-  **CAUTION: The first stage carrier (31) assembly weight: 30 kg (70 lb)**

32. Hoist and install the first stage carrier (31) assembly (25 to 31) to second stage carrier (22).


33. Insert shaft (42) into the center of carrier. Engage with first stage planetary gears (28) (3 used).

34. Attach a round bar onto bearing (46). Tap the round bar by using a hammer and install bearing (46) to cover (47).

Inner diameter of bearing (46): 35 mm (1.4 in),
Outer diameter: 80 mm (3.1 in)

35. Attach a round bar onto stopper pin (45). Tap the round bar by using a hammer and install stopper pin (45) to bearing (46).

Diameter of stopper pin (45): 26 mm (1.0 in)


-  **CAUTION: Cover (47) weight: 40 kg (90 lb)**


- IMPORTANT: Apply THREEBOND #1215 onto the cover (47) mounting surface on ring gear (43).**

36. Install eyebolt (M12, Pitch 1.75 mm) into the cork hole (2 places) on cover (47).


Hoist and place cover (47) onto ring gear (43).


37. Install cover (47) to ring gear (43) with bolts (49) (18 used) and spring washers (48) (18 used).

 : 22 mm

 : 210 N·m (210 kgf·m, 155 lbf·ft)

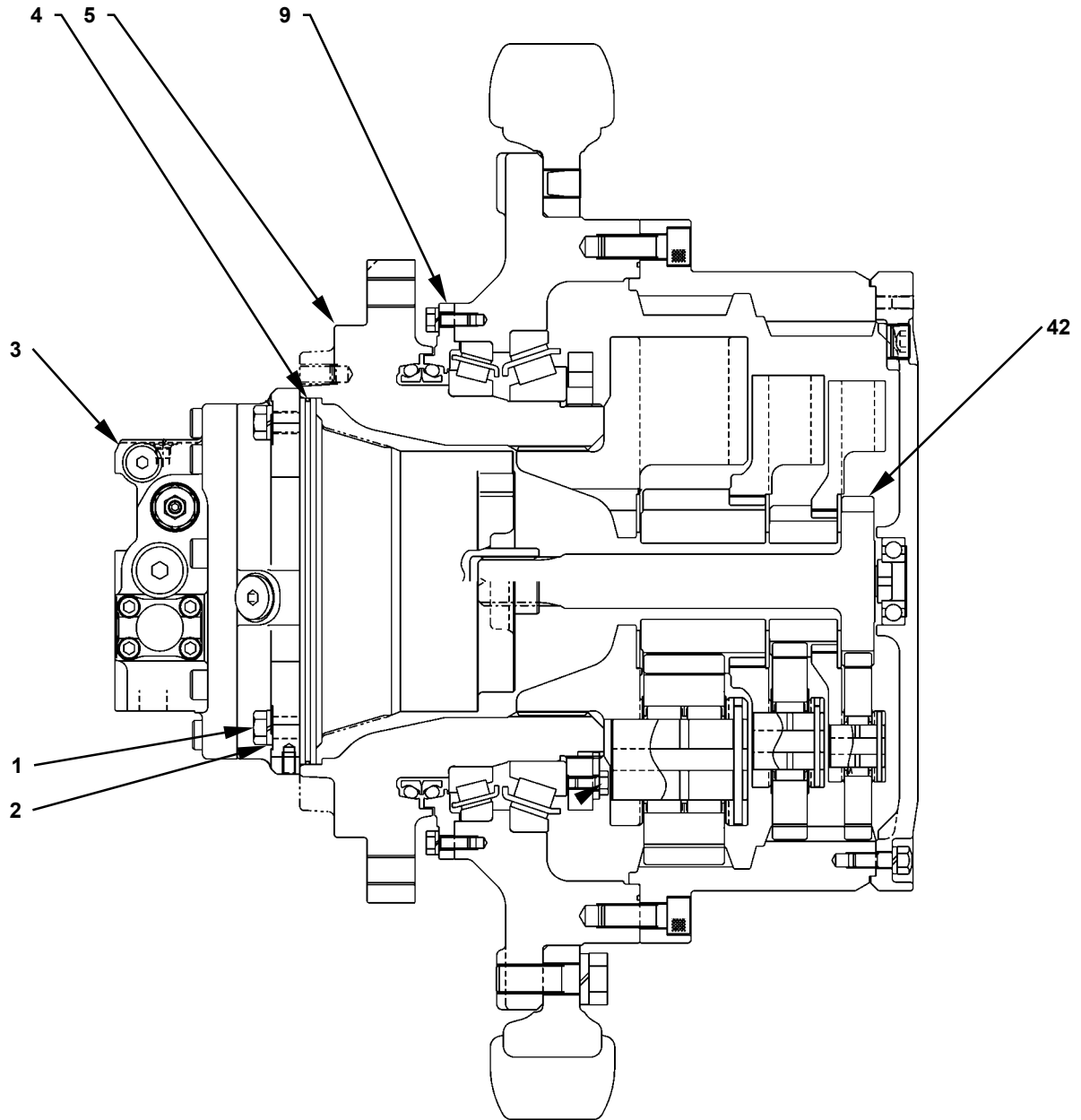
38. Wind the seal tape onto plugs (50) (3 used). Install plugs (50) (3 used) to cover (47).

 : 17 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)

39. Install the new corks (2 used) to sprocket (16) and cover (47) respectively.

UNDERCARRIAGE / Travel Device



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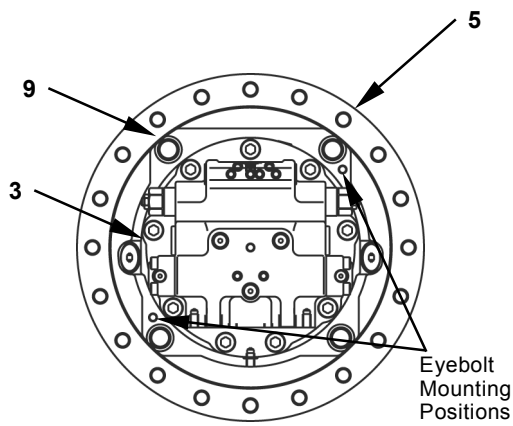
UNDERCARRIAGE / Travel Device

⚠ CAUTION: Travel reduction gear including sprocket weight: 955 kg (2110 lb)

40. Wind a nylon sling between the flange part in housing (5) and gap in support, and tighten them. Hoist and turn over the travel reduction gear.
41. Add gear oil (19 L, 5 US gal.) into the travel reduction gear.
42. Apply grease to O-ring (4). Install O-ring (4) to motor (3).

⚠ CAUTION: Motor (3) weight: 135 kg (300 lb)

43. Install eyebolts (M12, Pitch 1.75 mm) (2 used) into the lifting hole on motor (3). Hoist motor (3). Align the spline of shaft (42) with that of motor (3) and install motor (3) to housing (5).

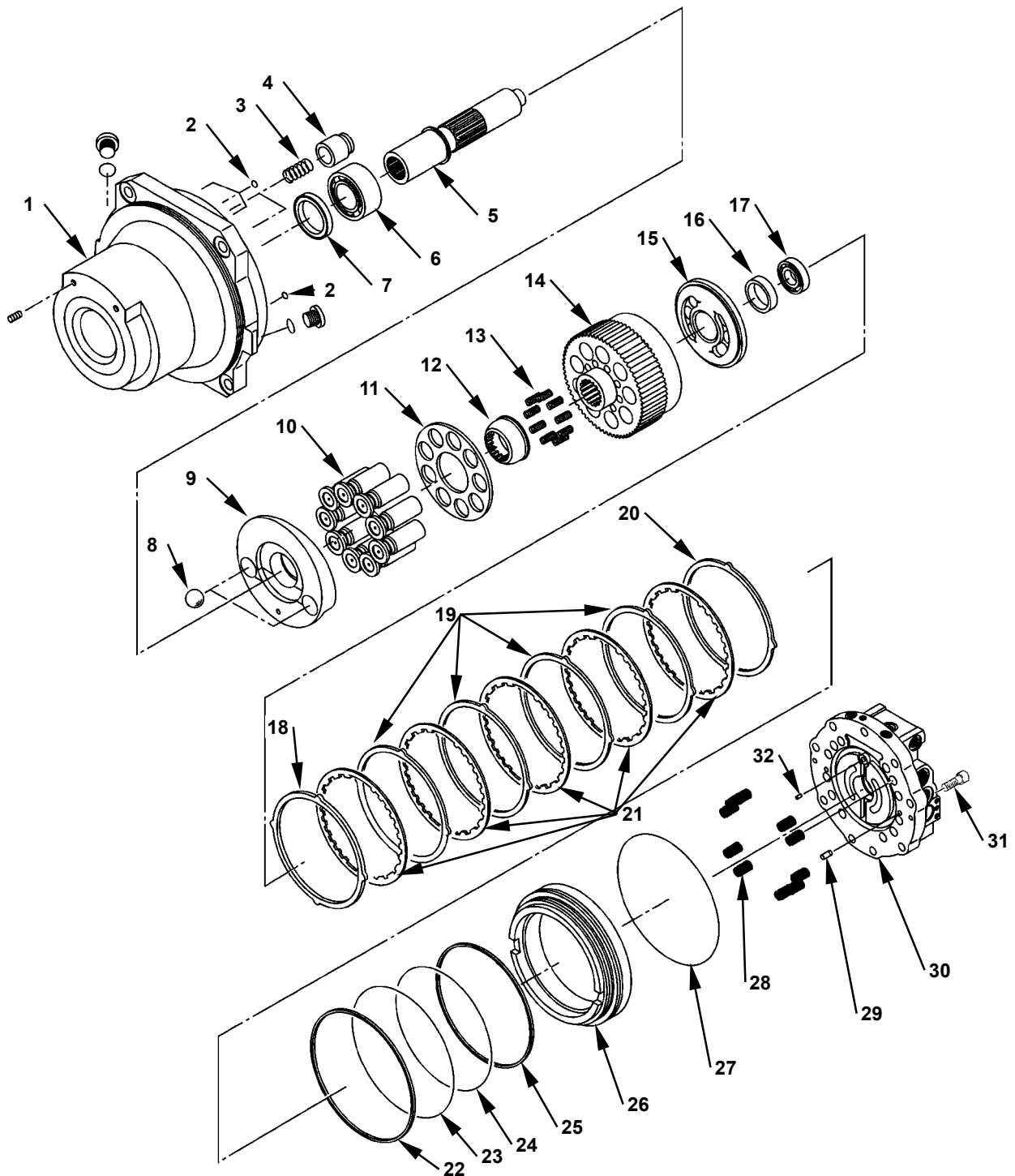


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44. Install motor (3) to housing (5) with bolts (1) (4 used) and spring washers (2) (4 used).
🔧 : 27 mm
🔩 : 300 N·m (30 kgf·m, 221 lbf·ft)

UNDERCARRIAGE / Travel Device

DISASSEMBLE TRAVEL MOTOR



- | | | | |
|-------------------------|----------------------|------------------------------|---------------------------|
| 1 - Case | 9 - Swash Plate | 17 - Roller Bearing | 25 - Backup Ring |
| 2 - O-Ring (4 Used) | 10 - Piston (9 Used) | 18 - Disc Plate | 26 - Brake Piston |
| 3 - Spring (2 Used) | 11 - Retainer | 19 - Disc Plate (4 Used) | 27 - O-Ring |
| 4 - Piston (2 Used) | 12 - Holder | 20 - Disc Plate | 28 - Spring (10 Used) |
| 5 - Shaft | 13 - Spring (9 Used) | 21 - Friction Plate (5 Used) | 29 - Pin (4 Used) |
| 6 - Roller Bearing | 14 - Cylinder Block | 22 - Backup Ring | 30 - Valve Housing |
| 7 - Oil Seal | 15 - Valve Plate | 23 - O-Ring | 31 - Socket Bolt (9 Used) |
| 8 - Steel Ball (2 Used) | 16 - Collar | 24 - O-Ring | 32 - Pin |

W17P-03-02-002

UNDERCARRIAGE / Travel Device


Disassemble Travel Motor

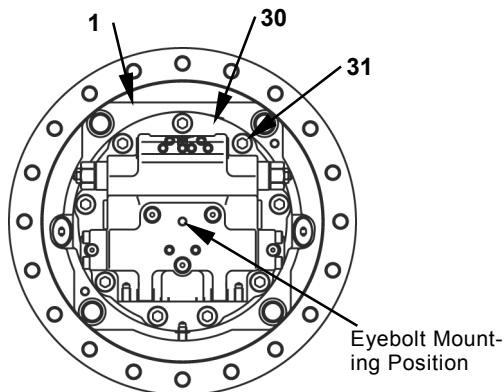
CAUTION: Valve housing (30) weight: 40 kg (90 lb)

IMPORTANT: Loosen socket bolts (31) (9 used) evenly. When loosening socket bolt (31), valve housing (30) may come up from case (1) due to reaction force from springs (13, 28). Record the clearance between case (1) and valve housing (30).

When removing valve housing (30) from case (1), valve plate (15) is removed with valve housing (30). Do not drop valve plate (15).

1. Put the matching marks on the mounting part of valve housing (30) and case (1). Install eyebolts (M12, Pitch 1.75 mm) to valve housing (30). Remove socket bolts (31) (9 used). Hoist and remove valve housing (30) from case (1). At this time, the outer race of roller bearing (17) is removed with valve housing (30).

 : 14 mm



W16J-03-02-002

IMPORTANT: Do not damage valve plate (15).

2. Remove valve plate (15) and collar (16) from valve housing (30).

3. Remove springs (28) (10 used), O-rings (2) (4 used), pins (29) (4 used) and O-ring (27) from case (1).

IMPORTANT: Case (1) may move away. Fix case (1) securely.

4. Install eyebolts (M12, Pitch 1.75 mm) into the pin (29) hole (2 places) on brake piston (26). Hoist and remove brake piston (26) from case (1).

NOTE: If case (1) moves away, tap the periphery of case (1) by using a plastic hammer.

5. Remove O-rings (23, 24) and backup rings (22, 25) from brake piston (26).

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) including valve plate (15) should be replaced.

6. Place case (1) horizontally with the brake releasing oil pressure facing downward. Remove cylinder block (14) assemblies (10 to 15) from case (1).

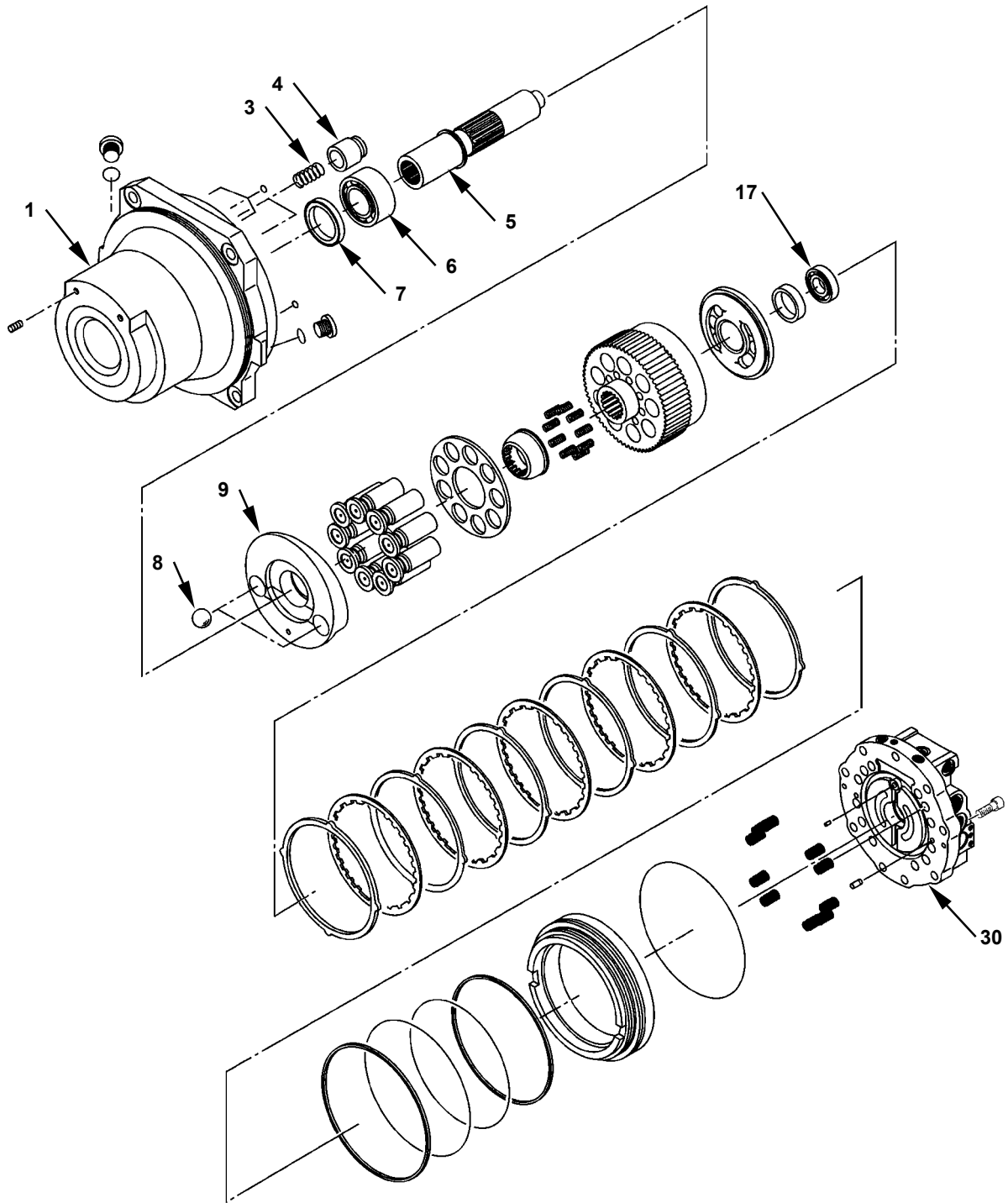
NOTE: Hold cylinder block (14) and turn it left and right lightly by two hands. Slowly remove the cylinder block (14) assembly.

7. Remove pistons (10) (9 used), retainer (11), holder (12) and springs (13) (9 used) from cylinder block (14).

IMPORTANT: Disc plates (18, 19, 20) are different in thickness and the order to install them has been determined. Keep in order while removing.

8. Remove disc plate (20) from case (1). Remove friction plates (21) (5 used) and disc plates (19) (4 used) one by one alternately. Remove disc plate (18).

UNDERCARRIAGE / Travel Device



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UNDERCARRIAGE / Travel Device

IMPORTANT: Do not damage the sliding surface of swash plate (9).

Piston (4) and steel ball (8) may be removed with swash plate (9). Do not drop piston (4) and steel ball (8).

9. Remove swash plate (9) from case (1).

10. Remove 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), clean grease first by using some kerosene or thinner with steel ball (8) set in case (1). Remove steel ball (8) from case (1) by using a magnet.

IMPORTANT: Do not damage the spline part of shaft (5) and the contact part of oil seal (7). Oil leakage will occur if they are damaged.

11. Tap the spline hole in shaft (5) at the most end by using a bar and hammer. Remove shaft (5) from case (1). At this moment, the inner race of roller bearing (6) is removed with shaft (5) together.

IMPORTANT: Do not remove the inner race of roller bearing (6) from shaft (5) and the outer race of roller bearing (6) from case (1) unless necessary.

12. Remove the inner race of roller bearing (6) from shaft (5) 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.

13. Remove the outer race of roller bearing (6) from case (1) by using a bar and hammer.

14. Remove oil seal (7) from case (1).

IMPORTANT: Do not remove the inner race of roller bearing (17) from shaft (5) and the outer race of roller bearing (17) from valve housing (30) unless necessary.

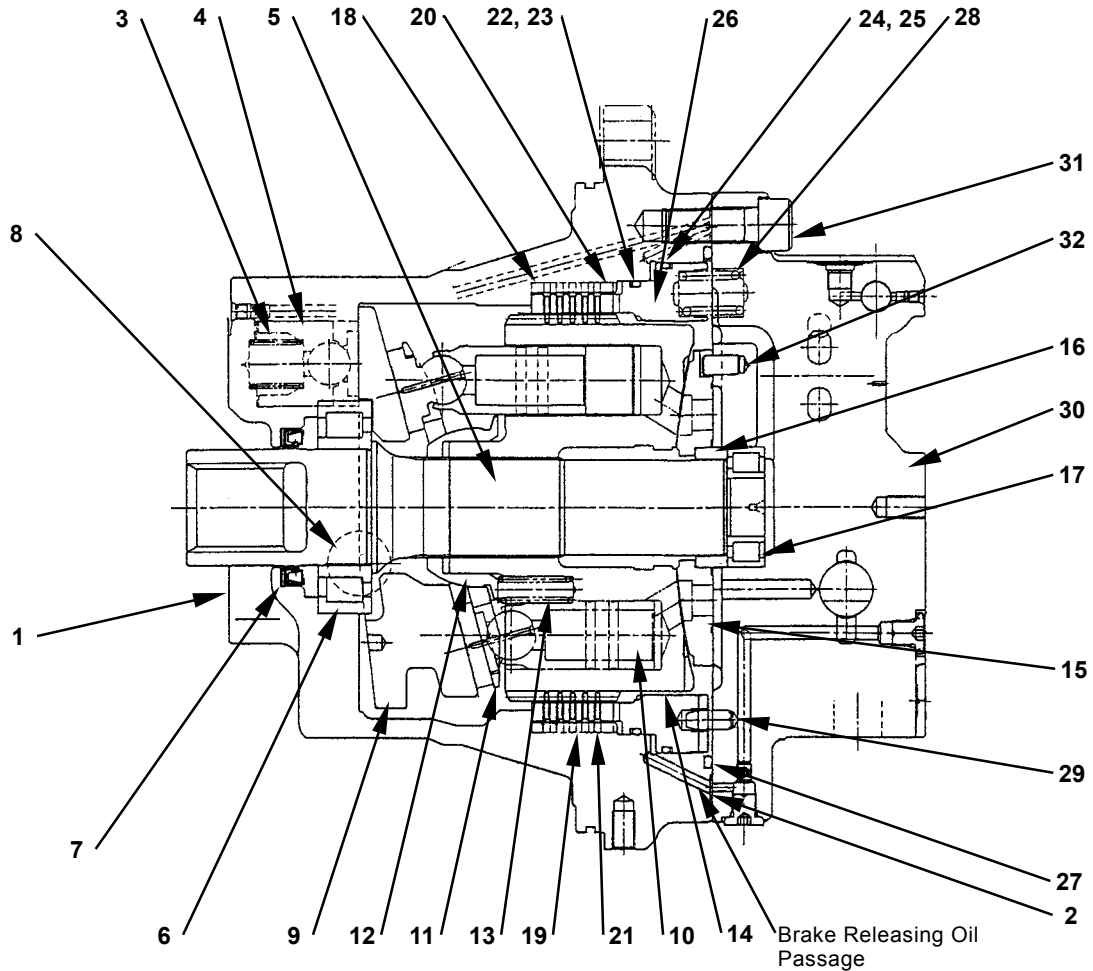
IMPORTANT: When replacing roller bearing (17), do not damage the surfaces of shaft (5) and valve housing.

15. Make a clearance between shaft (5) and the inner race of roller bearing (17) by using a flat chisel and hammer. Pull out the inner race by using a gear puller.

Insert a bar into the clearance between roller bearing (17) and valve housing (30). Pry and remove the outer race of roller bearing (17) from valve housing (30).

UNDERCARRIAGE / Travel Device

ASSEMBLE TRAVEL MOTOR



W17V-03-02-002

- | | | | |
|-------------------------|----------------------|------------------------------|---------------------------|
| 1 - Case | 9 - Swash Plate | 17 - Roller Bearing | 25 - Backup Ring |
| 2 - O-Ring (4 Used) | 10 - Piston (9 Used) | 18 - Disc Plate | 26 - Brake Piston |
| 3 - Spring (2 Used) | 11 - Retainer | 19 - Disc Plate (4 Used) | 27 - O-Ring |
| 4 - Piston (2 Used) | 12 - Holder | 20 - Disc Plate | 28 - Spring (10 Used) |
| 5 - Shaft | 13 - Spring (9 Used) | 21 - Friction Plate (5 Used) | 29 - Pin (4 Used) |
| 6 - Roller Bearing | 14 - Cylinder Block | 22 - Backup Ring | 30 - Valve Housing |
| 7 - Oil Seal | 15 - Valve Plate | 23 - O-Ring | 31 - Socket Bolt (9 Used) |
| 8 - Steel Ball (2 Used) | 16 - Collar | 24 - O-Ring | 32 - Pin |

UNDERCARRIAGE / Travel Device

Assemble Travel Motor


IMPORTANT: Apply grease on to the inner periphery of oil seal (7) for case (1) at the pressed-in part and the outer periphery of oil seal (7).

Install oil seal (7) straightly in order not to deform.

1. Press oil seal (7) into casing (1).

IMPORTANT: Install the outer race of roller bearing (6) with the stamped mark on the outer race 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 into case (1).


 **NOTE:** Tap and listen to ring in order to check if the race is installed in case (1) completely.

IMPORTANT: Install the inner race of roller bearing (6) with the flange part facing to swash plate (9).

3. Tap the inner race of roller bearing (6) evenly by using a bar and hammer and install into shaft (5). Tap and install the shaft (5) assembly to case (1) by using a hammer.

IMPORTANT: Apply hydraulic oil onto the outer periphery of steel ball (8) and piston (4). Apply hydraulic oil onto piston (4) and steel ball (8) 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: 55 kg (120 lb)

5. Install eyebolt (M18, Pitch 2.5 mm) into the bolt (31) hole (2 places) in case (1). Hoist and place the case (1) assembly onto with the brake releasing oil passage facing downward.


IMPORTANT: Align the spherical hole in swash plate (9) with steel ball (8) and install swash plate (9).

Apply grease to the contacting surface of case (1) for swash plate (9).

6. Install swash plate (9) to case (1) with the thicker side facing downward.

IMPORTANT: Install friction plates (21) (5 used) to case (1) with their notch position facing into the same direction.

7. Install disc plate (18) to case (1). Install friction plates (21) (5 used) and disc plates (19) (4 used) alternately. Install disc plate (20) at last.

 **NOTE:** Disc plates (18, 20) and (19) are in different thickness.

(18, 20): 4.8 mm (0.20 in)

(19): 3 mm (0.1 in)

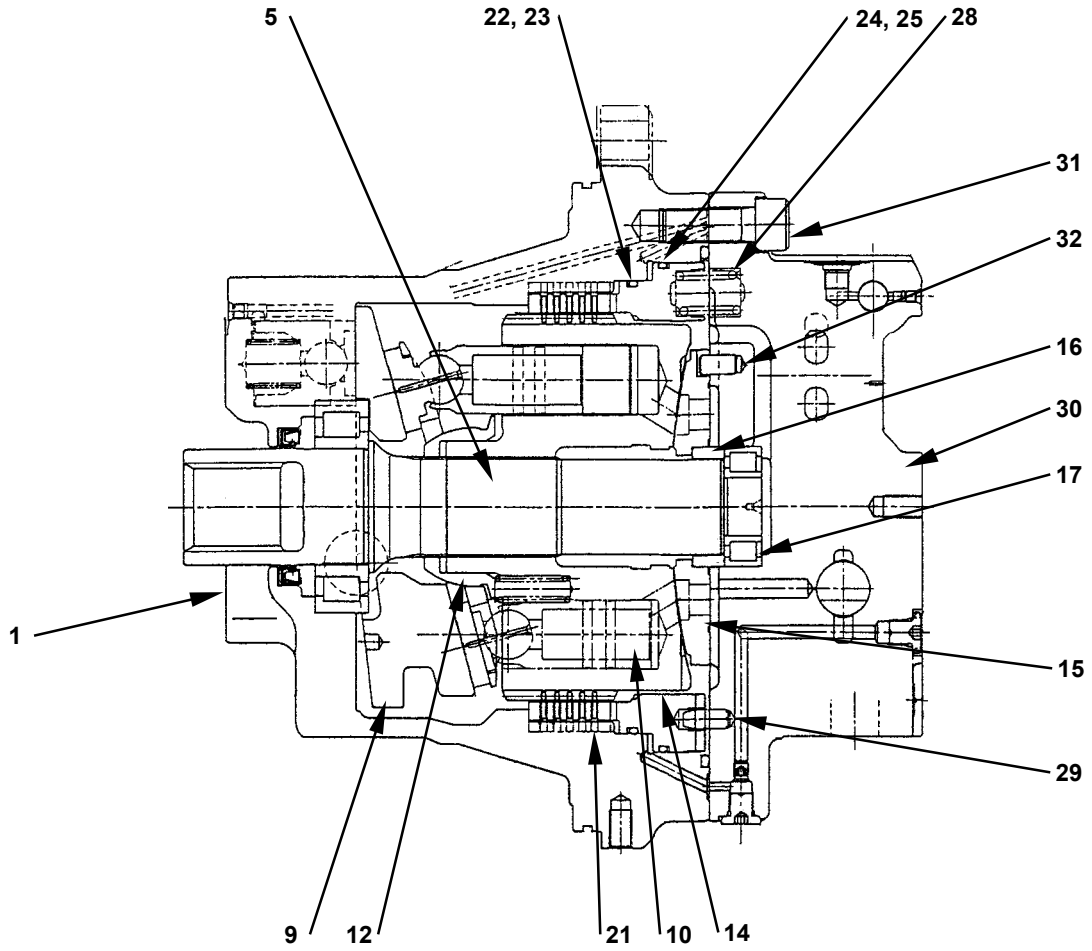
Align the disc plate with the notch position of case (1) first and install the disc plate.

IMPORTANT: Apply hydraulic oil on to the piston (10) mounting hole of cylinder block (14).

Check the direction to install retainer (11).

8. 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).

UNDERCARRIAGE / Travel Device



W17V-03-02-002

UNDERCARRIAGE / Travel Device

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). The inner race of roller bearing (17) is on the tip of shaft (5). Do not damage them.

Align the splines of shaft (5), cylinder block (14) and friction plate (21).

9. Install the cylinder block (14) assembly onto shaft (5).

CAUTION: The case (1) assembly weight: 55 kg (120 lb)

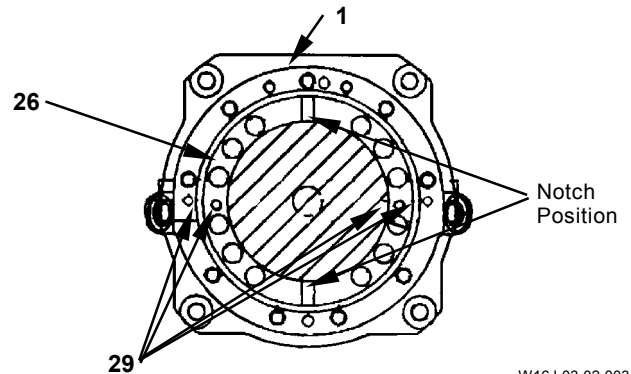
10. Install eyebolt (M18, Pitch 2.5 mm) into the socket bolt (31) hole (2 places) in case (1). Hoist and place case (1) vertically.

IMPORTANT: Apply grease to O-rings (23, 24) and backup rings (22, 25). Check the direction to install O-rings (23, 24) and backup rings (22, 25).

11. Install backup rings (25, 22) and O-rings (24, 23) to brake piston (26).

NOTE: Install backup ring (22) while facing the travel device side.
Install backup ring (25) while facing the valve housing (30) side.

IMPORTANT: Check the direction to install brake piston (26). The notch shall be square to the pin (29) mounting holes on case (1).

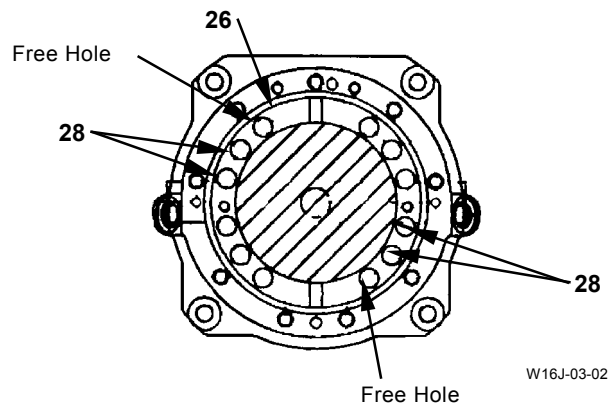


IMPORTANT: Apply grease to the outer surface of brake piston (26) and the inner surface of case (1).

12. Tap brake piston (26) by using a plastic hammer and install brake piston into case (1).

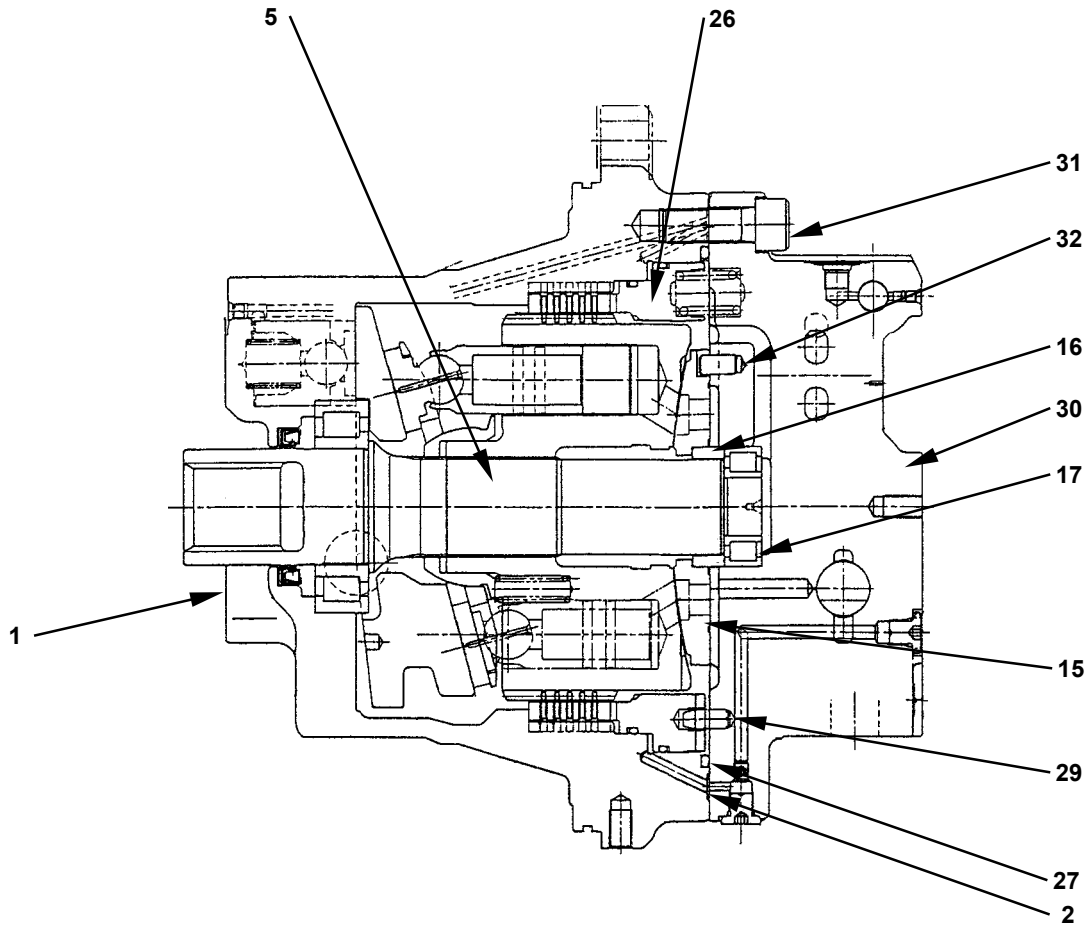
IMPORTANT: As for springs (28) (10 used), there are twelve spring (28) mounting holes in brake piston (26). (Check the piston where spring (28) should be inserted.)

Install spring (28) so that the free holes should be in diagonal position.



13. Install springs (28) (10 used) onto brake piston (26).

UNDERCARRIAGE / Travel Device




W17V-03-02-002

UNDERCARRIAGE / Travel Device

IMPORTANT: Install the outer race of roller bearing (17) with the stamped mark on the outer race 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 into valve housing (30).

Install the inner race to shaft (5).

 **NOTE:** Tap and listen to ring in order to check if the outer race is installed to valve housing (30) completely.

IMPORTANT: Apply grease to the contacting surfaces of valve plate (15) and valve housing (30).

15. Install collar (16) to valve housing (30). Align pin (32) with the pin hole on valve plate (15) and install valve plate (15) to valve housing (30).

IMPORTANT: Apply grease to O-rings (2, 27).

16. Install O-rings (27) and (2) (4 used) to case (1). Install pins (29) (4 used) to valve housing (30).



CAUTION: Valve housing (30) weight: 40 kg (90 lb)

IMPORTANT: When installing valve housing (30) to case (1), check if the clearance between case (1) and valve housing (30) 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 (26) may be installed in wrong direction.

17. Install eyebolt (M12, Pitch 1.75 mm) into the bolt hole in valve housing (30).


Hoist valve housing. Align with the pin (29) hole in brake piston (26) and place valve housing (30) onto case (1).

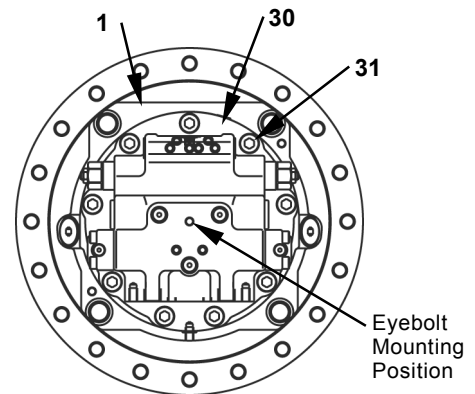
Install valve housing (30) to case (1) with socket bolts (31) (9 used).

 : 14 mm

 : 440±22 N·m

(45±2.2 kgf·m, 330±16.0 lbf·ft)

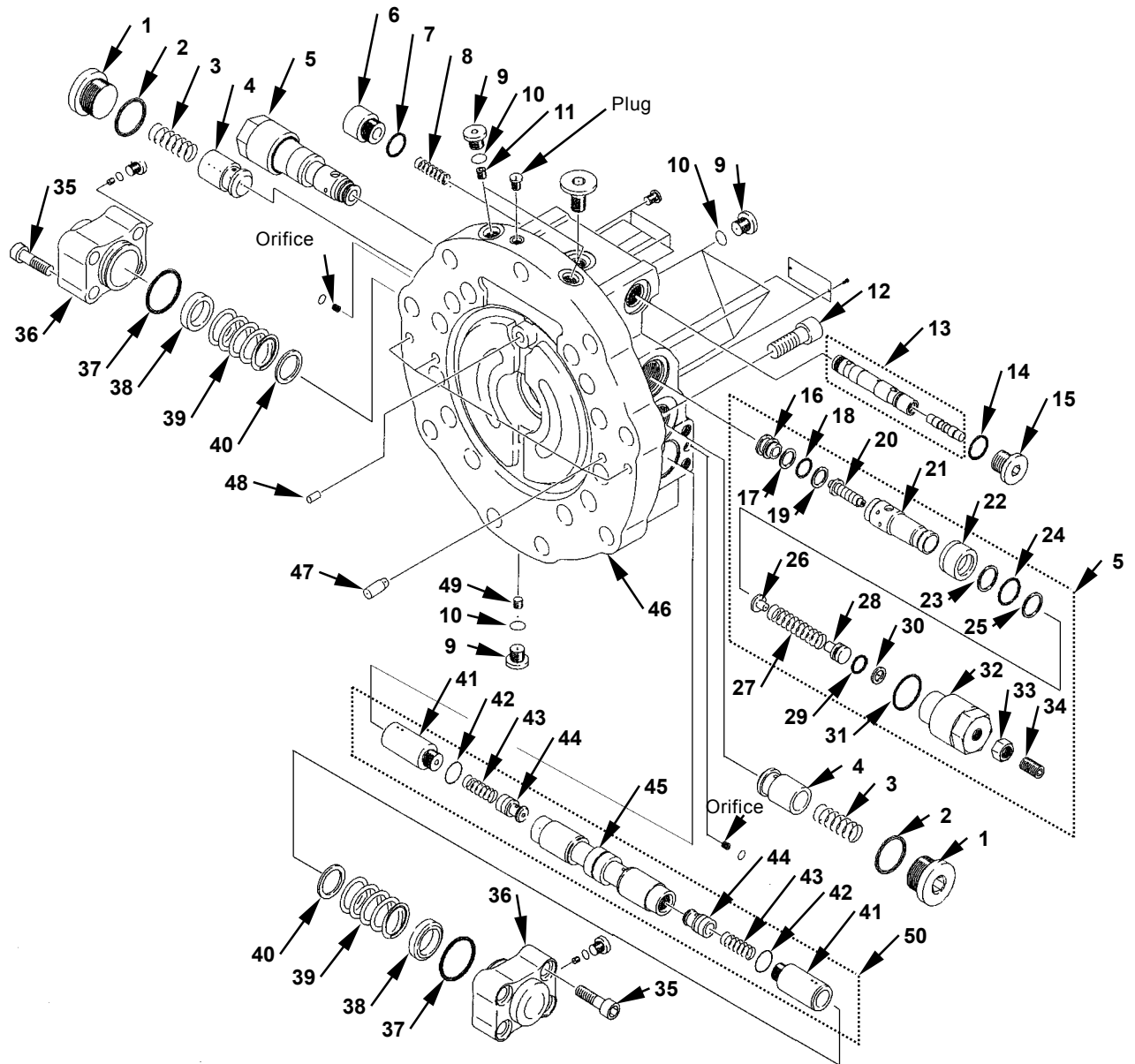
 **NOTE:** Tighten socket bolts (31) (9 used) evenly.



W16J-03-02-002

UNDERCARRIAGE / Travel Device

DISASSEMBLE BRAKE VALVE



W183-03-02-010

- | | | | |
|------------------------------------|------------------------------|----------------------------|---------------------------|
| 1 - Plug (2 Used) | 14 - O-Ring | 27 - Spring (2 Used) | 39 - Spring (2 Used) |
| 2 - O-Ring (2 Used) | 15 - Plug | 28 - Spring Guide (2 Used) | 40 - Spring Seat (2 Used) |
| 3 - Spring (2 Used) | 16 - Poppet Seat (2 Used) | 29 - O-Ring (2 Used) | 41 - Plug (2 Used) |
| 4 - Check Valve (2 Used) | 17 - Backup Ring (2 Used) | 30 - Backup Ring (2 Used) | 42 - O-Ring (2 Used) |
| 5 - Overload Relief Valve (2 Used) | 18 - O-Ring (2 Used) | 31 - O-Ring (2 Used) | 43 - Spring (2 Used) |
| 6 - Plug | 19 - Backup Ring (2 Used) | 32 - Plug (2 Used) | 44 - Check Valve (2 Used) |
| 7 - O-Ring | 20 - Poppet (2 Used) | 33 - Nut (2 Used) | 45 - Spool |
| 8 - Spring | 21 - Relief Housing (2 Used) | 34 - Set Screw (2 Used) | 46 - Valve Housing |
| 9 - Plug (6 Used) | 22 - Piston (2 Used) | 35 - Socket Bolt (8 Used) | 47 - Pin (4 Used) |
| 10 - O-Ring (6 Used) | 23 - Backup Ring (2 Used) | 36 - Backup Ring (2 Used) | 48 - Pin |
| 11 - Orifice | 24 - O-Ring (2 Used) | 37 - O-Ring (2 Used) | 49 - Orifice |
| 12 - Socket Bolt (9 Used) | 25 - Backup Ring (2 Used) | 38 - Spring Seat (2 Used) | 50 - Spool Assembly |
| 13 - Valve Assembly | 26 - Spring Seat (2 Used) | | |


UNDERCARRIAGE / Travel Device

Disassemble Brake Valve



CAUTION: The valve housing (46) assembly weight: 40 kg (90 lb)


1. Secure the valve housing (46) assembly on a firm workbench.
2. Remove plugs (6, 15) and O-rings (7, 14). Remove spring (8) from valve housing (46).

 : 10 mm

IMPORTANT: Rotate and remove valve assembly (13). If a little resistance is felt while removing, do not try to remove it by force, return to original position and retry.

Do not disassemble valve assembly (13). Replace the valve housing (46) assembly including spool assembly (50), valve assembly (13), orifices (11, 49) and the orifice plug.


3. Lightly press valve assembly (13). Rotate and remove valve assembly (13) from valve housing (46) by hand.
4. Remove plug (1). Remove O-ring (2), spring (3) and check valve (4). (2 places on both right and left)

 : 14 mm


IMPORTANT: Do not disassemble overload relief valves (5) (2 used). Replace overload relief valve (5) as assembly. Attach a tag on each overload relief valve (5) so that they can be installed to their original positions.


Do not rotate set screw (34). The setting pressure can change.

5. Loosen plug (32). Remove overload relief valve (5) from valve housing (46). (2 places on both right and left)

 : 36 mm

6. Push cap (36). Evenly loosen and remove socket bolts (35) (4 used). Remove cap (36) from valve housing (46). (2 places on both right and left)

 : 10 mm

 **NOTE:** In case cap (36) cannot be removed, a plastic hammer can be used to tap cap (36). Tap cap (36) with the loosened socket bolt (35) attached on cap (36).

7. Remove spring seat (38), spring (39) and spring seat (40) from valve housing (46). (2 places at right and left)

IMPORTANT: Rotate and remove spool assembly (50). In case a little resistance is felt while removing, do not try to remove it by force, return to original position and retry.

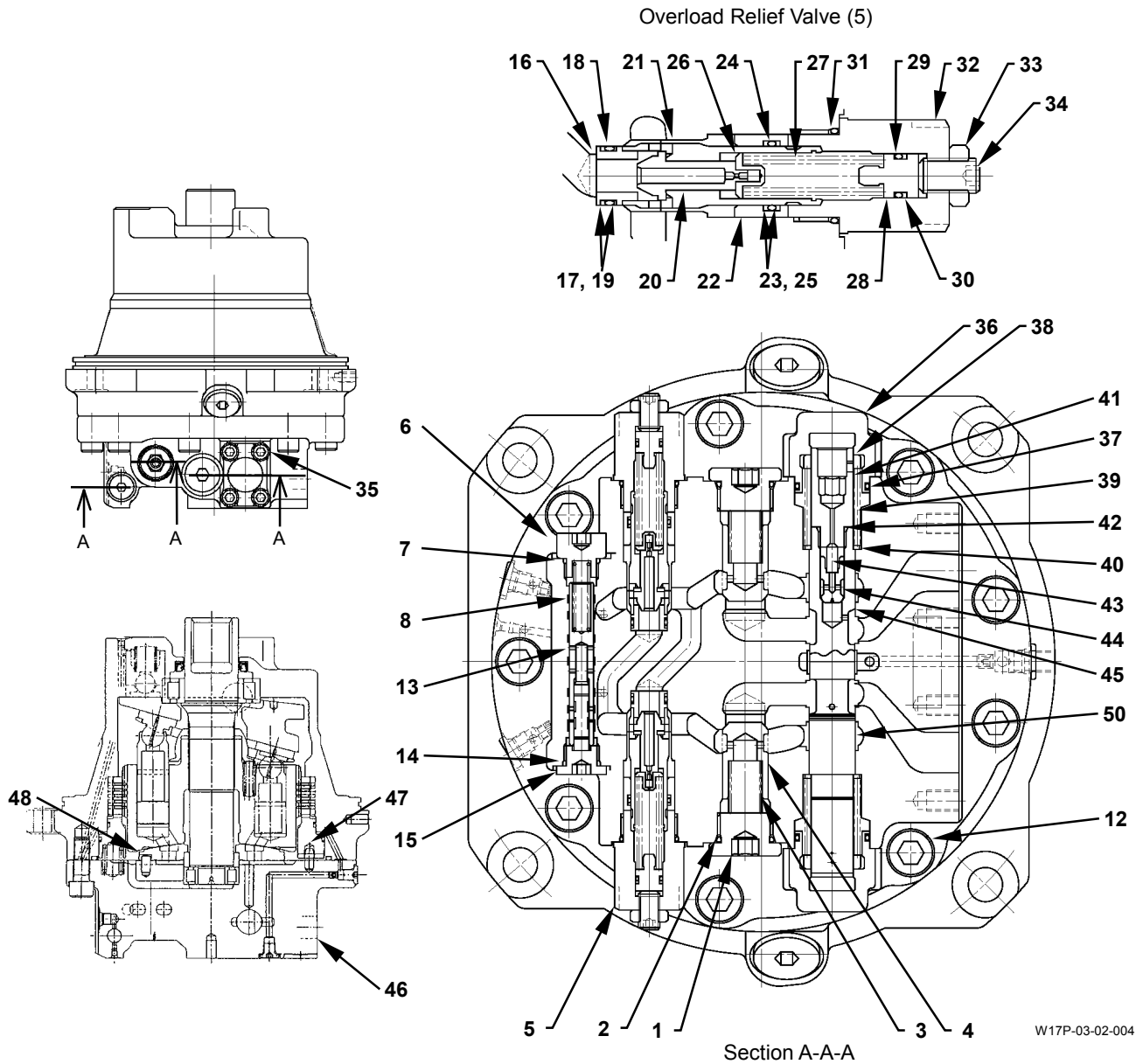
8. Lightly push spool assembly (50). Rotate and remove spool assembly (50) from valve housing (46) by hand.

9. Clamp spool assembly (50) in a vise by using wooden pieces.

10. Remove plugs (41) (2 used). Remove springs (43) (2 used) and check valves (44) (2 used) from spool (45).

UNDERCARRIAGE / Travel Device

ASSEMBLE BRAKE VALVE




- | | | | |
|------------------------------------|------------------------------|----------------------------|---------------------------|
| 1 - Plug (2 Used) | 14 - O-Ring | 27 - Spring (2 Used) | 39 - Spring (2 Used) |
| 2 - O-Ring (2 Used) | 15 - Plug | 28 - Spring Guide (2 Used) | 40 - Spring Seat (2 Used) |
| 3 - Spring (2 Used) | 16 - Poppet Seat (2 Used) | 29 - O-Ring (2 Used) | 41 - Plug (2 Used) |
| 4 - *Check Valve (2 Used) | 17 - Backup Ring (2 Used) | 30 - Backup Ring (2 Used) | 42 - O-Ring (2 Used) |
| 5 - Overload Relief Valve (2 Used) | 18 - O-Ring (2 Used) | 31 - O-Ring (2 Used) | 43 - Spring (2 Used) |
| 6 - Plug | 19 - Backup Ring (2 Used) | 32 - Plug (2 Used) | 44 - Check Valve (2 Used) |
| 7 - O-Ring | 20 - Poppet (2 Used) | 33 - Nut (2 Used) | 45 - Spool |
| 8 - Spring | 21 - Relief Housing (2 Used) | 34 - Set Screw (2 Used) | 46 - Valve Housing |
| 9 - *Plug (6 Used) | 22 - Piston (2 Used) | 35 - Socket Bolt (8 Used) | 47 - Pin (4 Used) |
| 10 - *O-Ring (6 Used) | 23 - Backup Ring (2 Used) | 36 - Cap (2 Used) | 48 - Pin |
| 11 - *Orifice | 24 - O-Ring (2 Used) | 37 - O-Ring (2 Used) | 49 - *Orifice |
| 12 - Socket Bolt (9 Used) | 25 - Backup Ring (2 Used) | 38 - Spring Seat (2 Used) | 50 - Spool Assembly |
| 13 - Valve Assembly | 26 - Spring Seat (2 Used) | | |


NOTE: As for parts with mark *, refer to W3-2-32.

UNDERCARRIAGE / Travel Device


Assemble Brake Valve


1. Install O-rings (7, 14) to plugs (6, 15) respectively. Install valve assembly (13) and plugs (6, 15) to valve housing (46).

 : 10 mm

 : 64±4.9 N·m
(6.5±0.5 kgf·m, 47±3.6 lbf·ft)


2. Install O-ring (2) to plug (1). Install check valve (4), spring (3) and plug (1) to valve housing (46). (2 places on both right and left)


 : 14 mm

 : 410±20 N·m
(42±2 kgf·m, 300±14.5 lbf·ft)

IMPORTANT: Install overload relief valve (5) to the former position before disassembled.

3. Install overload relief valves (5) (2 used) to valve housing (46).


 : 36 mm


 : 410±20 N·m
(42±2 kgf·m, 300±14.5 lbf·ft)

4. Rotate and insert spool assembly (50) slowly into valve housing (46).

5. Install O-ring (37) to cap (36). (2 places on both right and left)

6. Install spring seat (40), spring (39) and spring seat (38) to valve housing (46). Install cap (36) with socket bolts (35) (4 used). (2 places on both right and left)

 : 10 mm

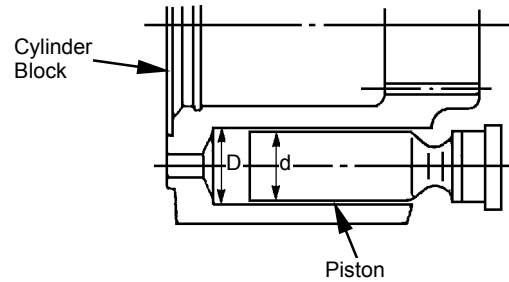
 : 108±4.9 N·m
(11±0.5 kgf·m, 80±3.6 lbf·ft)

UNDERCARRIAGE / Travel Device

MAINTENANCE STANDARD

1. Clearance between inner diameter (D) of cylinder block and outer diameter (d) of piston

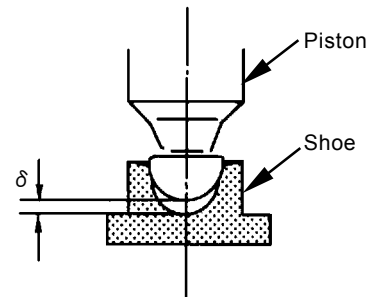
(D-d): 0.06 mm (0.002 in) or less



W507-02-04-009

2. Clearance between piston and shoe

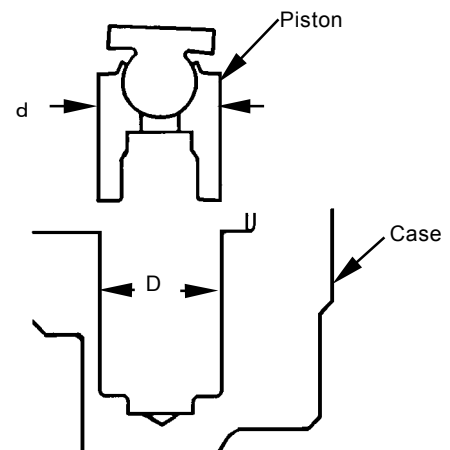
δ : 0.4 mm (0.02 in) or less



W107-02-06-140

3. Clearance between inner diameter (D) and outer diameter (d) at mounting position of case and piston

(D-d): 0.03 mm (0.001 in) or less



W162-03-02-005

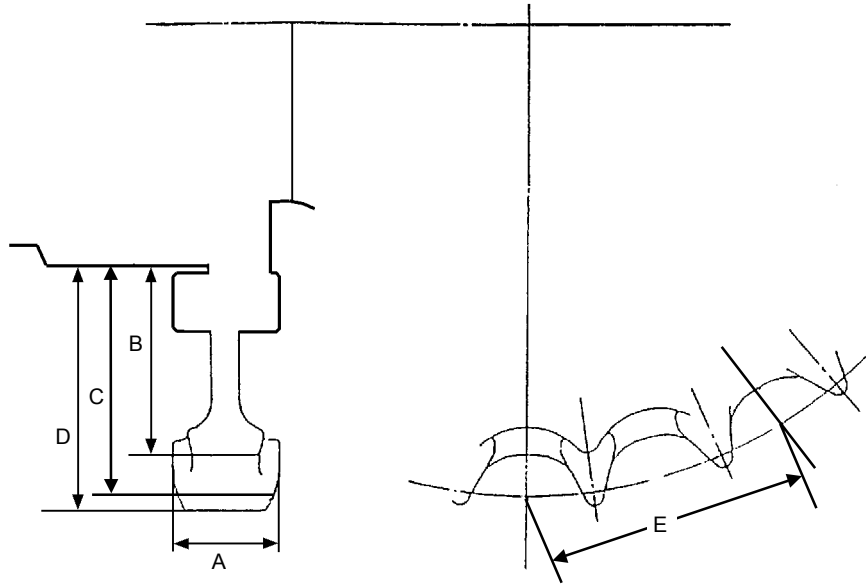
4. Wear allowance on the sliding surfaces of cylinder block and valve plate

Check if there is no abnormal scratch, wear, score or seizure.

Wear allowance: within 0.02 mm (0.0008 in) or less.

UNDERCARRIAGE / Travel Device

Sprocket



W105-03-07-042

Unit: mm (in)

	Standard Dimension	Allowable Limit	Remedy
A	114 (4.5)	-	Build-up and finishing
B	104.5 (4.1)	99.5 (3.9)	
C	139 (5.5)	-	
D	162 (6.4)	157 (6.2)	
E	260.35 (10.2)	-	

UNDERCARRIAGE / Travel Device

(Blank)

UNDERCARRIAGE / Center Joint

REMOVE AND INSTALL CENTER JOINT


IMPORTANT: Release any pressure in the hydraulic 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 reassembling.

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.

 : 27 mm, 19 mm


3. Remove bolts (8) (2 used) and spring washers (2 used). 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)


4. Install eyebolts (G1) to the adapter holes (2 places) in diagonal position on the upper side of spindle. Attach a nylon sling onto eyebolt. Take up slack of the nylon sling.

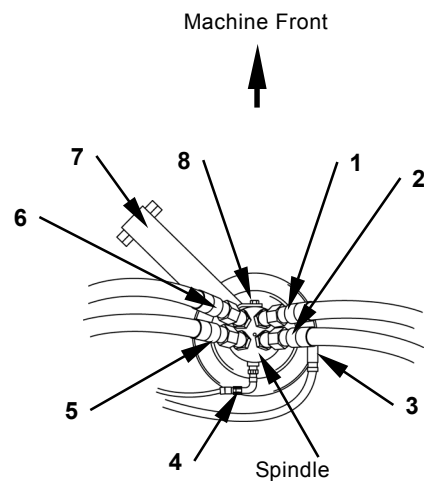
5. Remove hoses (9 to 16) from lower side of center joint.

 : 22 mm, 27 mm, 41 mm

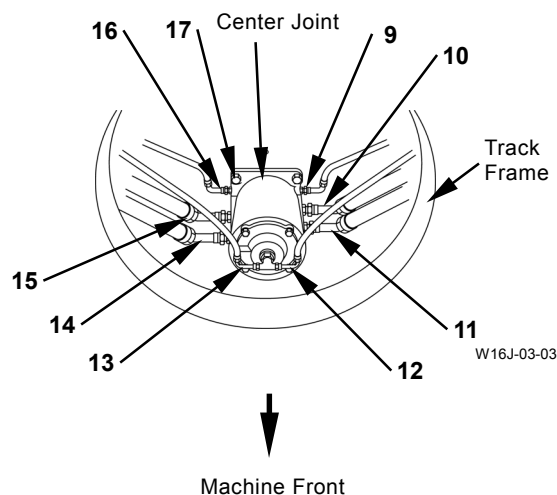
6. Put the matching marks on track frame and center joint.

Remove bolts (17) (4 used) and spring washers (4 used). Remove the center joint slowly.

 : 24 mm



W16J-03-03-002



W16J-03-03-003


UNDERCARRIAGE / Center Joint


Installation

CAUTION: Center joint weight: 52 kg (110 lb)


IMPORTANT: Align the matching marks made when disassembling.


1. Install the spring washer to bolt (17) respectively. Install the center joint to the track frame with bolts (17) (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. Install the spring washer to bolt (8). Insert the washer between stopper (7) and the spindle. Install stopper (7) to the spindle with bolts (8) (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

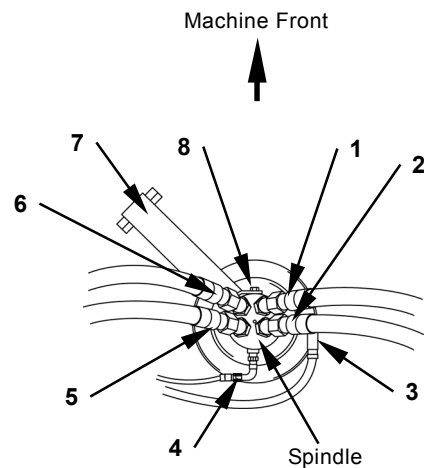
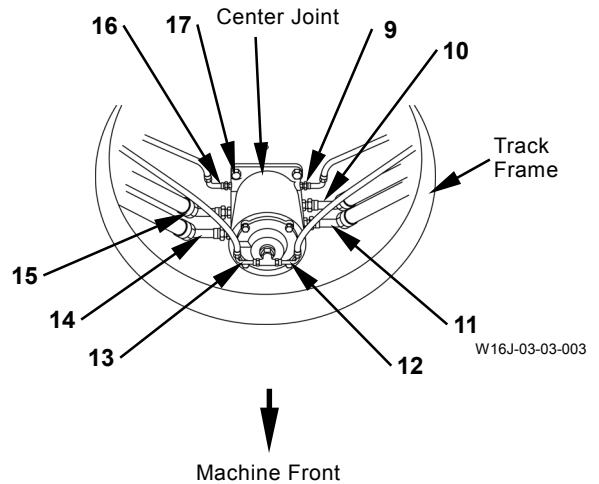
 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)

5. Install the adapters (4 used) to the upper side of spindle. Install hoses (1, 2, 5, 6).

 : 41 mm

 : 205 N·m (21 kgf·m, 152 lbf·ft)

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

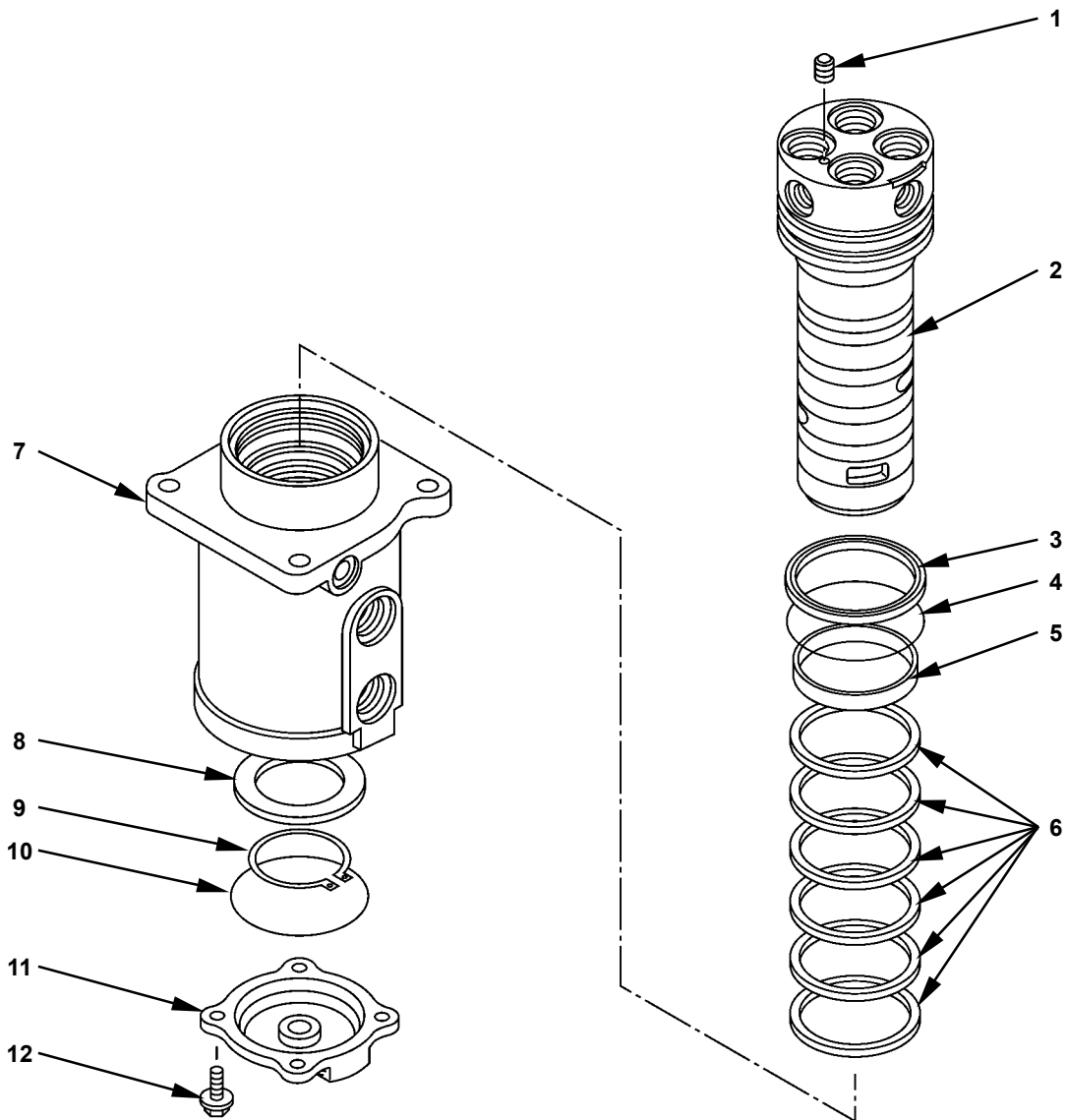


UNDERCARRIAGE / Center Joint

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UNDERCARRIAGE / Center Joint

DISASSEMBLE CENTER JOINT






W16J-03-03-001

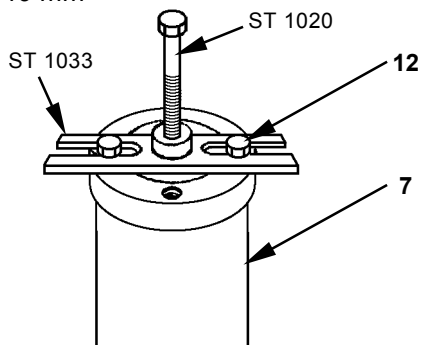
- | | | | |
|---------------|-----------------------|--------------------|--------------------|
| 1 - Plug | 4 - O-Ring | 7 - Body | 10 - O-Ring |
| 2 - Spindle | 5 - Bushing | 8 - Ring | 11 - Cover |
| 3 - Dust Seal | 6 - Oil Seal (6 Used) | 9 - Retaining Ring | 12 - Bolt (4 Used) |

UNDERCARRIAGE / Center Joint

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). 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).
 : 19 mm



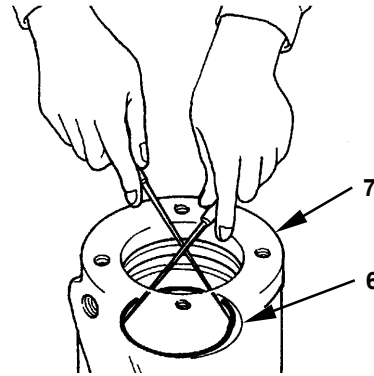
W183-03-03-004

! 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) hole (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

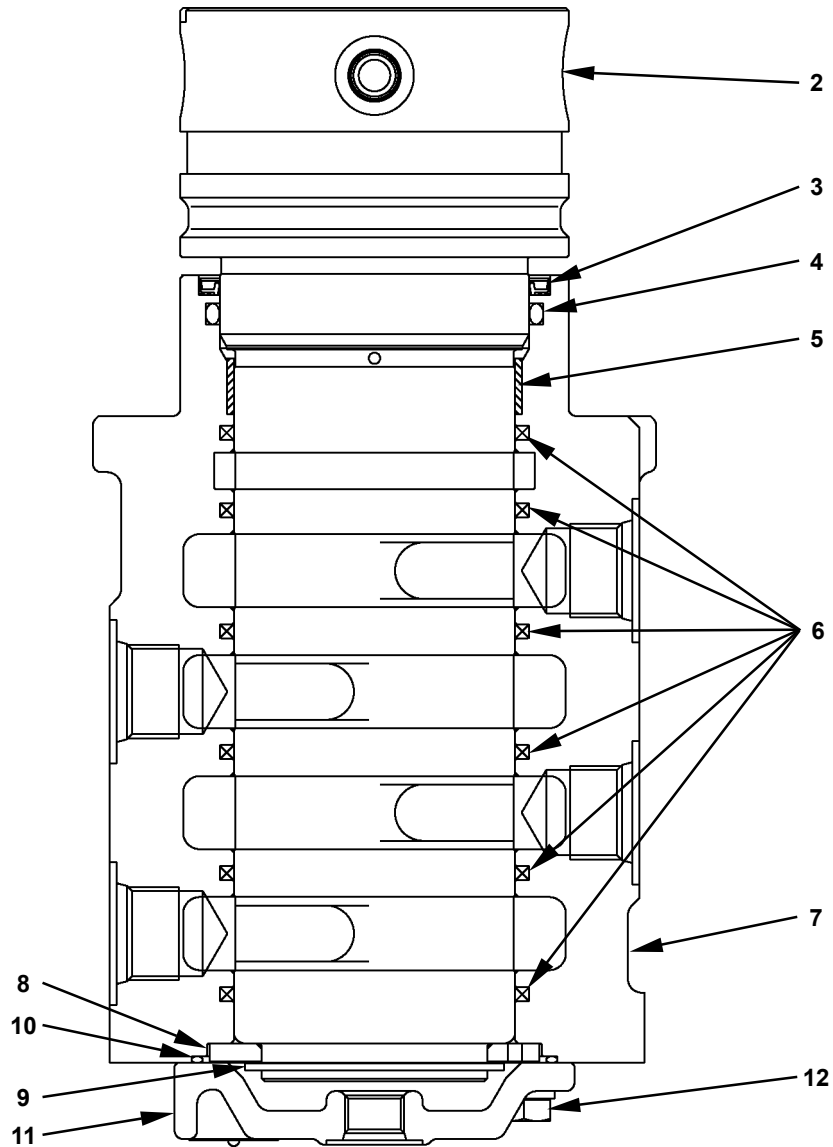
8. Remove dust seal (3) and O-ring (4) from body (7).

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).


UNDERCARRIAGE / Center Joint

ASSEMBLE CENTER JOINT



W183-03-08-001

- | | | | |
|---------------|-----------------------|--------------------|--------------------|
| 1 - *Plug | 4 - O-Ring | 7 - Body | 10 - O-Ring |
| 2 - Spindle | 5 - Bushing | 8 - Ring | 11 - Cover |
| 3 - Dust Seal | 6 - Oil Seal (6 Used) | 9 - Retaining Ring | 12 - Bolt (4 Used) |

 NOTE: As for the item with mark*, refer to W3-3-4.

UNDERCARRIAGE / Center Joint

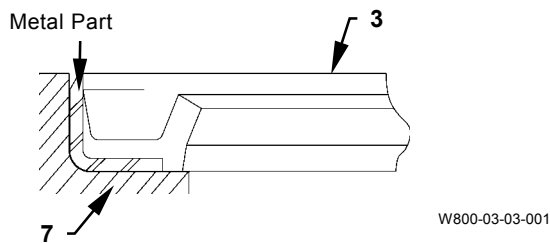
Assemble Center Joint

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).

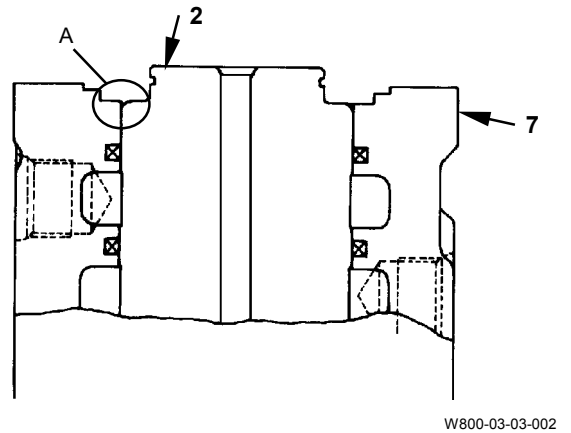


3. Install oil seals (6) (6 used) to body (7).

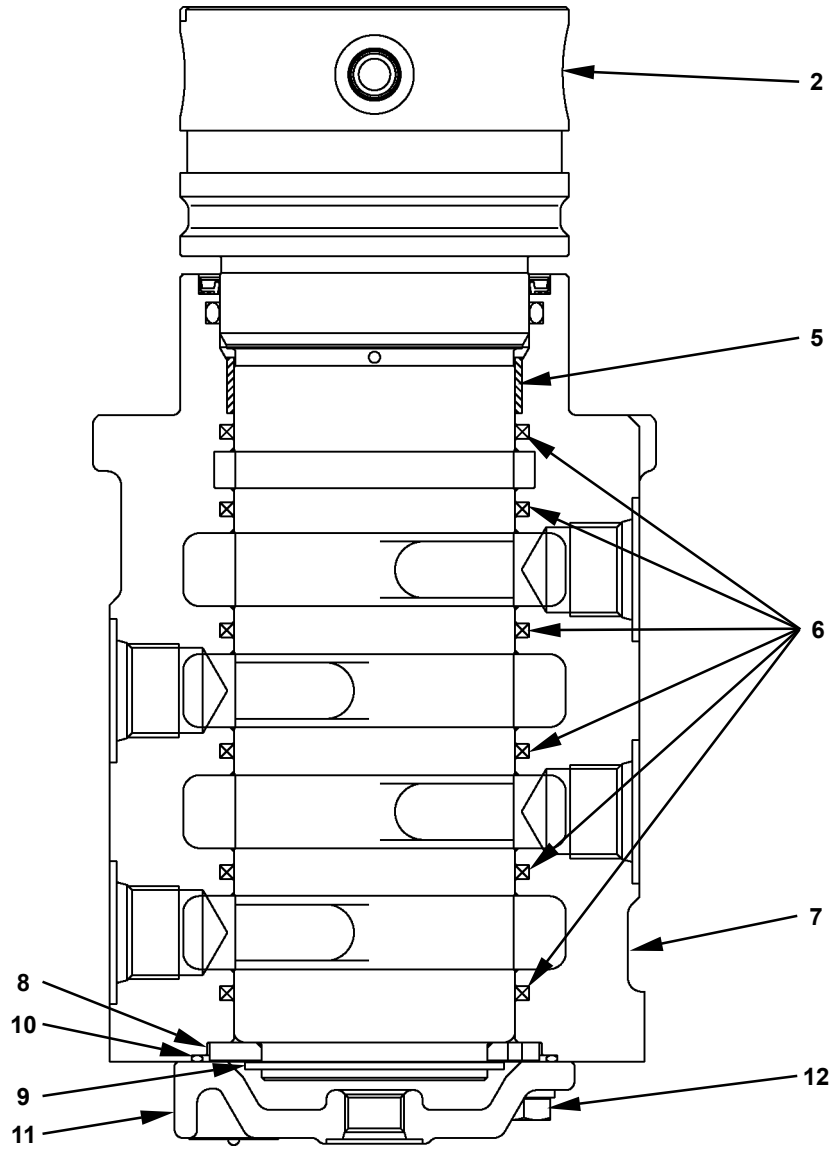
IMPORTANT: The clearance between body (7) and spindle (2) is not much. Align the center of body (7) and spindle (2) and install body (7) straightly.

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.



UNDERCARRIAGE / Center Joint



W183-03-08-001

UNDERCARRIAGE / Center Joint



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)

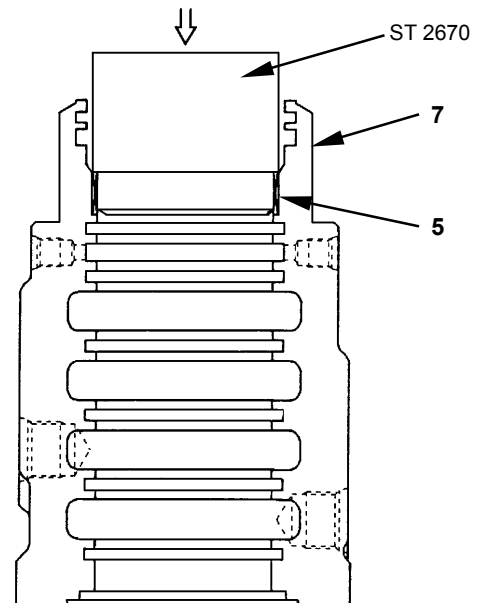
UNDERCARRIAGE / Center Joint

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).

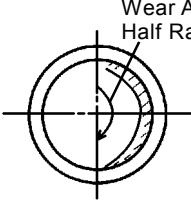
1. Clean body (7) and bushing (5).
2. Push bushing (5) to body (7) by using a press.
Pushing force: 0.5 to 1.5 ton
Pushing tool: ST 2670



W105-03-03-029

UNDERCARRIAGE / Center Joint

MAINTENANCE STANDARD

Item	Allowable Limit (basis of judgment)	Remedy	
Bushing	1. Wear more than 0.2 mm (0.008 in)	Replace	
	2. Seizure and abnormal wear	Replace	
	3. Uneven wear within 180° <div style="text-align: center;">  <p style="text-align: center; font-size: small;">T157-01-01-040</p> </div>	Replace	
Body, Spindle	Sliding surface with seals	Heavily damaged one by seizure or foreign matter	Replace
	Sliding surface between body and spindle other than sliding surfaces with seals	1) Excessively worn one by seizure or foreign matter, or one having the score of 0.1 mm (0.004 in) or more	Replace
		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	1) 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
		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

UNDERCARRIAGE / Center Joint

(Blank)

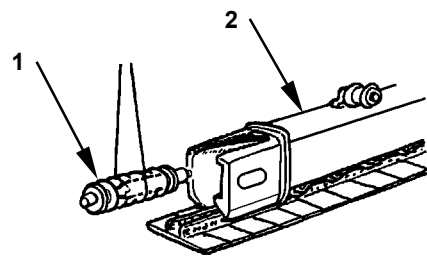
UNDERCARRIAGE / Track Adjuster

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 applicable removal and installation 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 the spring force. Do not stand in the same direction to remove track adjuster (1) or where track adjuster (1) flies off. The rod screw is loaded by spring force. Be alert if the rod or screw section is broken, the broken pieces may fly out by spring force, so that personal injury and/or death may cause.



W142-03-04-002

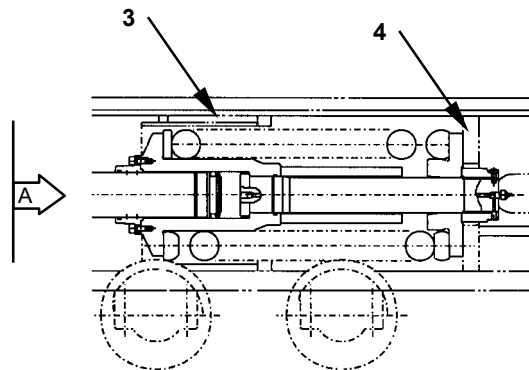
Removal

- CAUTION:** Track adjuster (1) weight: 491 kg (1080 lb)

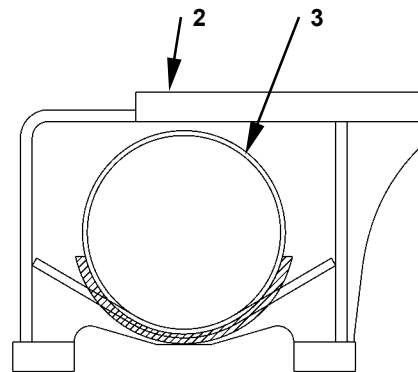
1. Pry and remove track adjuster (1) from track frame (2) by using a pry bar.

Installation

1. As illustrated, install track adjuster (1) into spring guide (3) on side frame (2). Check that the end of track adjuster (1) comes in contact with that of plate (4).



W17V-03-04-002

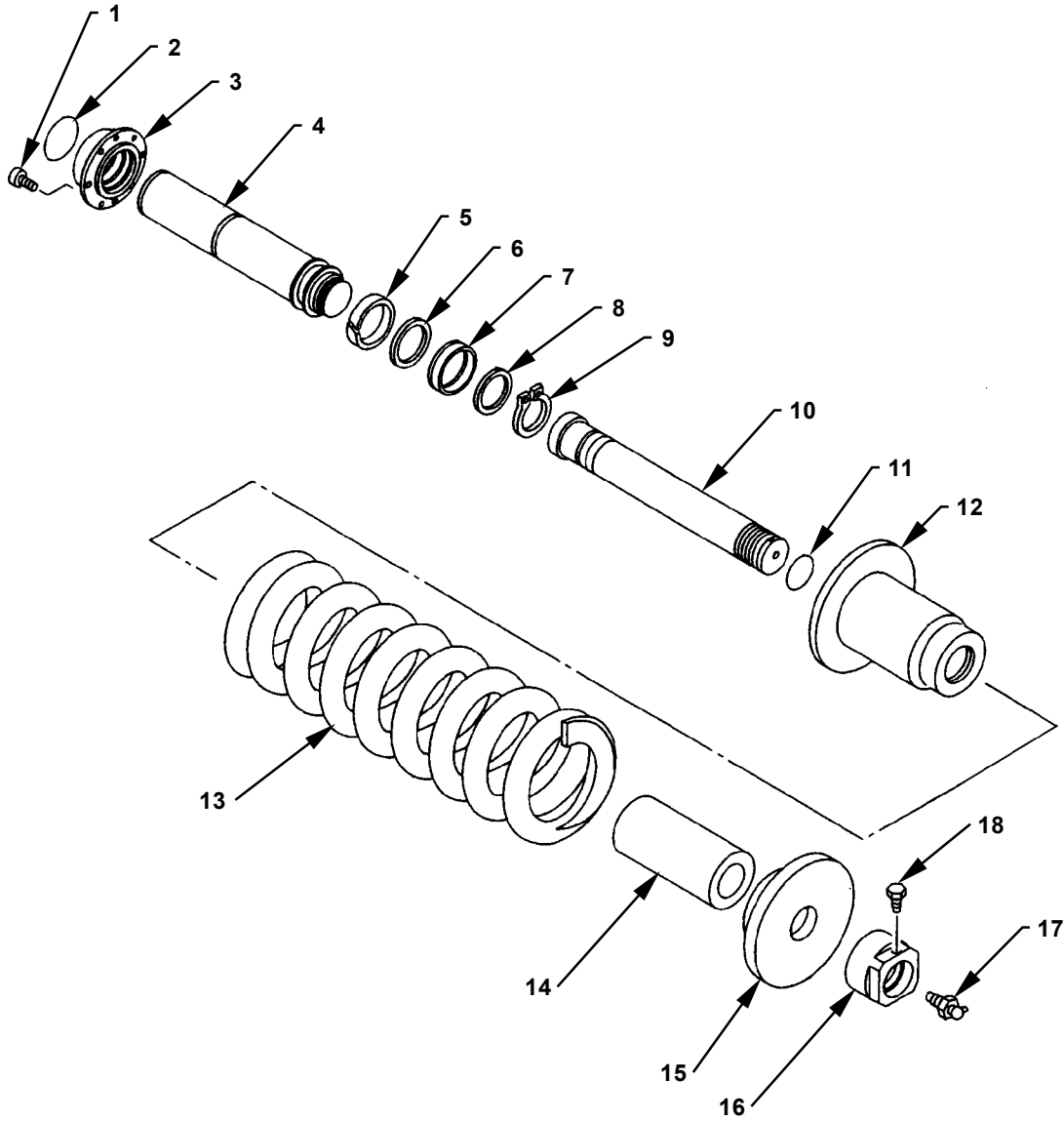


W800-03-04-004

View A

UNDERCARRIAGE / Track Adjuster

DISASSEMBLE TRACK ADJUSTER



W800-03-04-002

- | | | | |
|--------------------------|--------------------|---------------|--------------|
| 1 - Socket Bolt (6 Used) | 6 - Backup Ring | 11 - O-Ring | 15 - Bracket |
| 2 - O-Ring | 7 - U-Ring | 12 - Cylinder | 16 - Nut |
| 3 - Guide | 8 - Plate | 13 - Spring | 17 - Valve |
| 4 - Piston Rod | 9 - Retaining Ring | 14 - Spacer | 18 - Bolt |
| 5 - Wear Ring | 10 - Rod | | |

UNDERCARRIAGE / Track Adjuster

Disassemble Track Adjuster

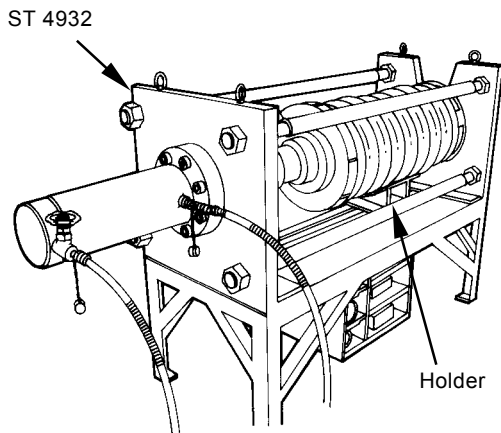
- Use a pump unit which has the maximum pressure of 69 MPa (700 kgf/cm², 9950 psi) and the flow rate of 8 to 10 liters (2.1 to 2.6 gal). Set the main relief pressure to 49 MPa (500 kgf/cm², 7110 psi) (80 tons) or lower.

IMPORTANT: Use special tool (ST 4932) when assembling / disassembling the track adjuster.

CAUTION: Carefully perform disassembly and assembly work as spring force of the track adjuster is extremely large. Thoroughly inspect special tool for any damage in order to perform the work safely.

CAUTION: Track adjuster weight: 491 kg (1080 lb)


1. Hoist and place the track adjuster on the holder of special tool (ST 4932).

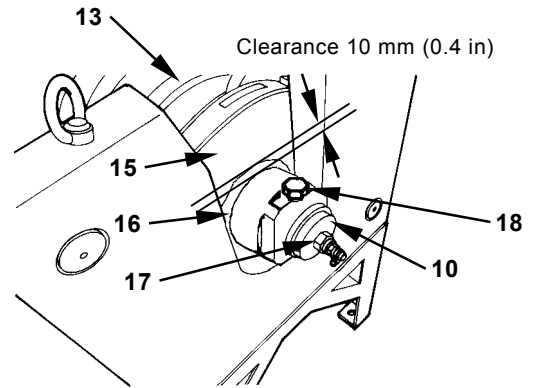


W142-03-04-019

IMPORTANT: Compress spring (13) until clearance between bracket (15) and nut (16) is approximately 10 mm (0.4 in).

2. Loosen valve (17). Compress spring (13) in the track adjuster by using special tool (ST 4932).


 : 24 mm



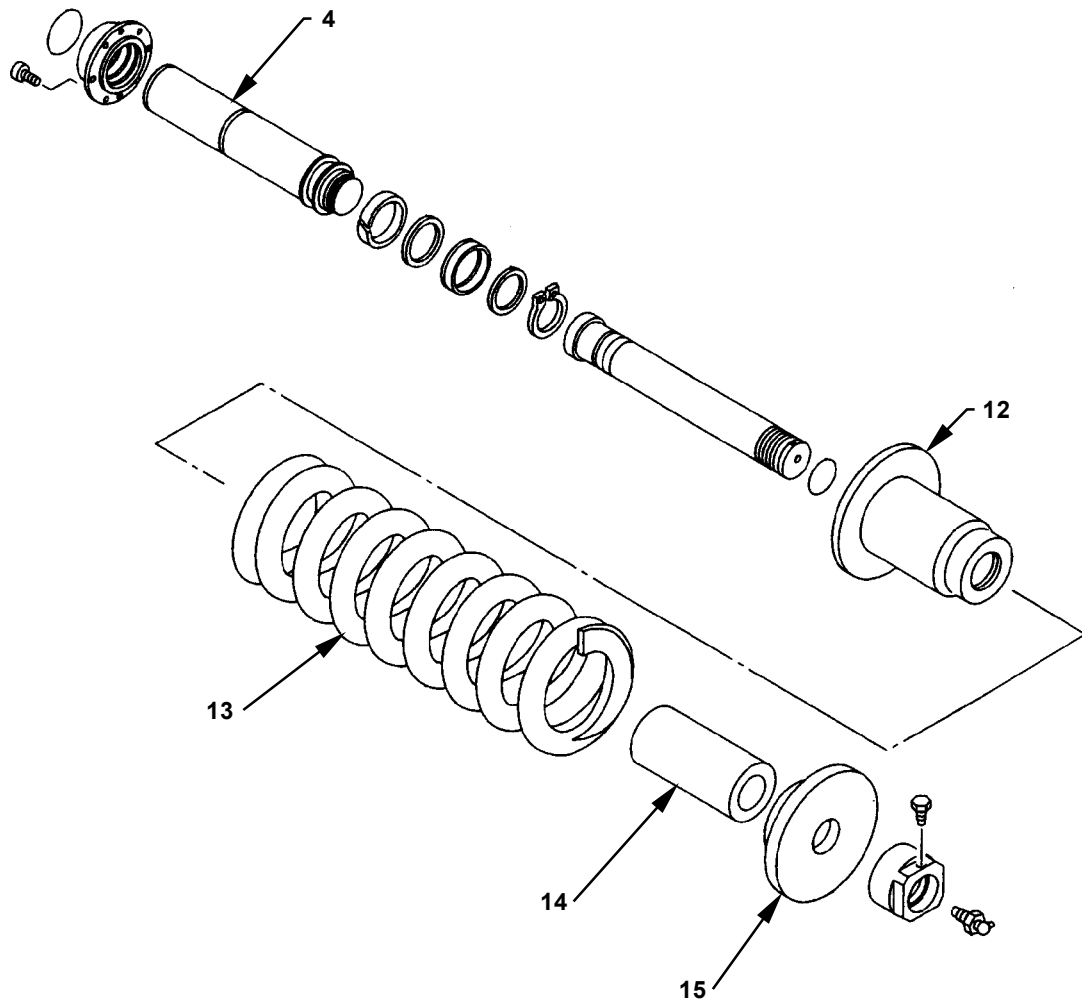
W17V-03-04-006

IMPORTANT: Put the matching marks on rod (10) and nut (16).

3. Remove valve (17) and bolt (18). Remove nut (16) from rod (10).

 : 24 mm, 19 mm, 140 mm


UNDERCARRIAGE / Track Adjuster




W800-03-04-002

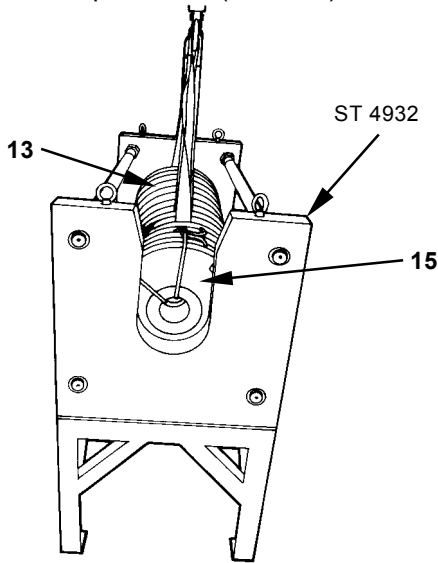
UNDERCARRIAGE / Track Adjuster

- Slowly return the piston of special tool (ST 4932) until spring (13) extends to its free length.

 **NOTE:** Spring (13) free length: 1004.5 mm (39.5 in)

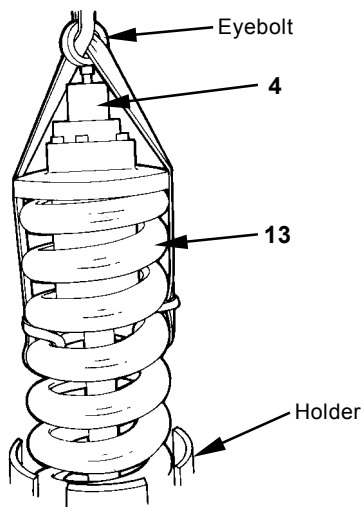
 **CAUTION:** Track adjuster weight: 491 kg (1080 lb)

- Bind bracket (15) and spring (13) together by using a wire. Attach a nylon sling to spring (13) on the track adjuster. Hoist and remove the track adjuster from special tool (ST 4932).




W142-03-04-005

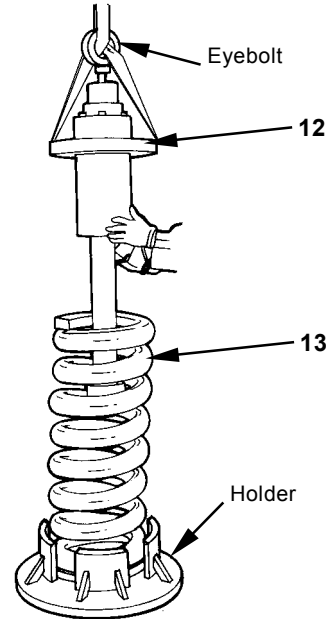
- Install eyebolt (M16, Pitch 2.0 mm) to piston rod (4). Attach a nylon sling onto spring (13). Pass a nylon sling through eyebolt. Hoist and place the assembly on the holder.




W142-03-04-006

 **CAUTION:** The cylinder (12) assembly weight: 153 kg (340 lb)


- Remove a nylon sling from spring (13). Attach a nylon sling on cylinder (12) and pass a nylon sling through eyebolt. Hoist and remove the cylinder (12) assembly from spring (13).



W17V-03-04-004

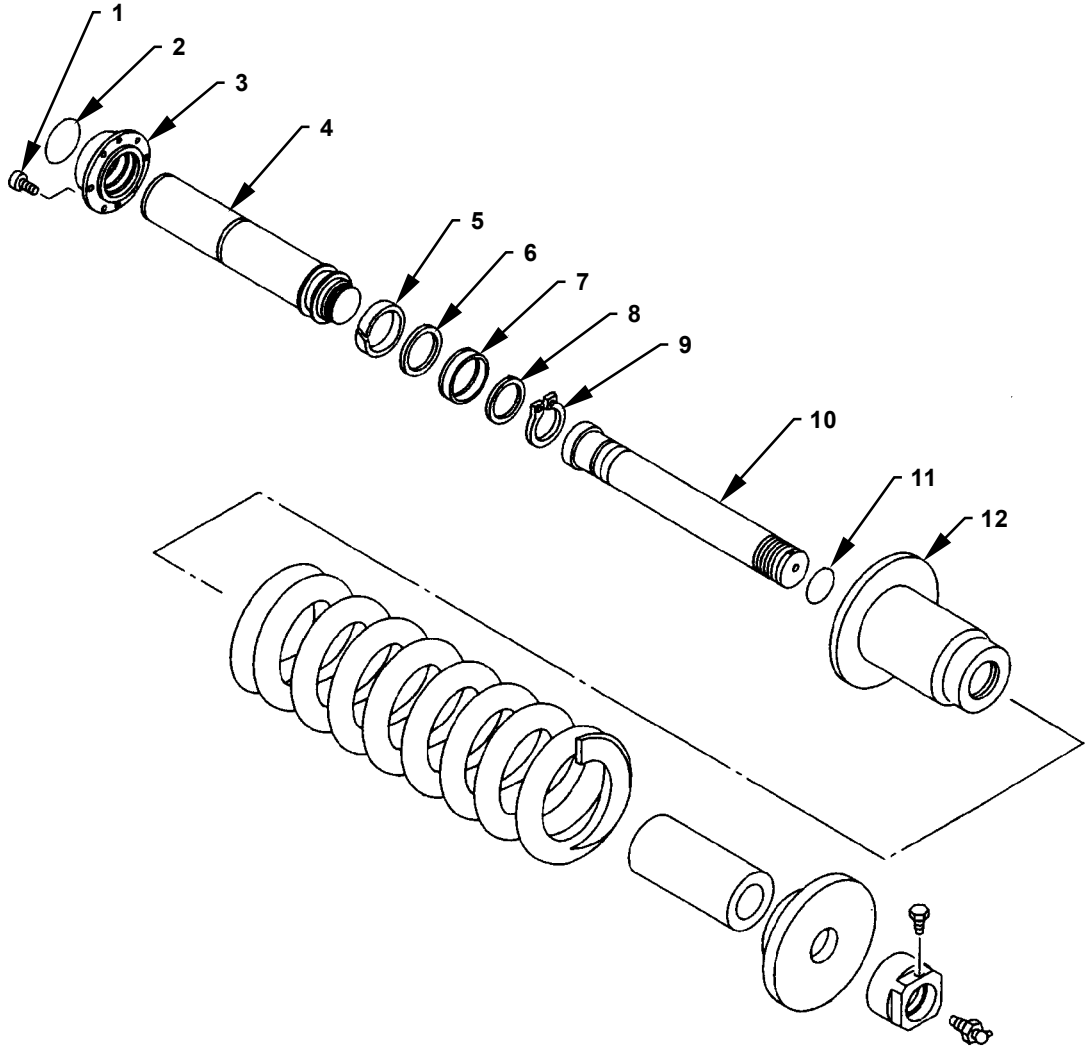
 **CAUTION:** Spring (13) weight: 266 kg (590 lb)

- Remove the wire fastening spring (13) and bracket (15). Hoist and remove spring (13).

 **CAUTION:** Bracket (15) weight: 34 kg (75 lb)

- Remove spacer (14) and bracket (15) from the holder.

UNDERCARRIAGE / Track Adjuster




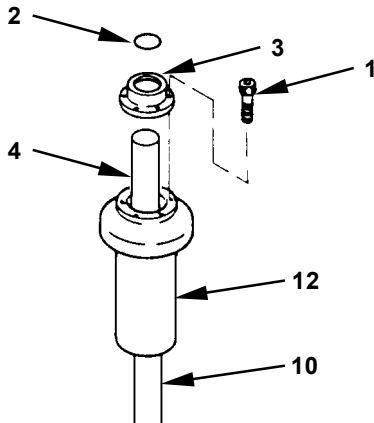
W800-03-04-002

UNDERCARRIAGE / Track Adjuster

CAUTION: The cylinder (12) assembly weight: 153 kg (340 lb)

10. Place the wooden blocks on the flange portion of cylinder (12). Secure the cylinder (12) assembly to the workbench. Remove socket bolts (1) (6 used). Remove guide (3) from cylinder (12).

 : 12 mm



W142-03-04-010

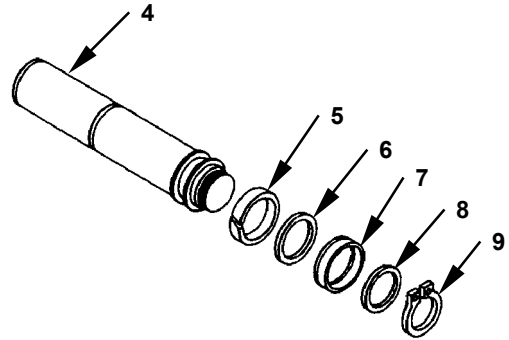
CAUTION: Piston rod (4) weight: 36 kg (80 lb)

11. Remove piston rod (4) from cylinder (12).
12. Remove O-ring (2) from guide (3).

CAUTION: Cylinder (12) weight: 65 kg (140 lb)
Rod (10) weight: 47 kg (105 lb)

13. Install eyebolt (M16, Pitch 2.0 mm) to the cylinder (12) side in rod (10). Attach a nylon sling. Hoist and remove rod (10) from cylinder (12). Remove O-ring (11) from inside of cylinder (12).

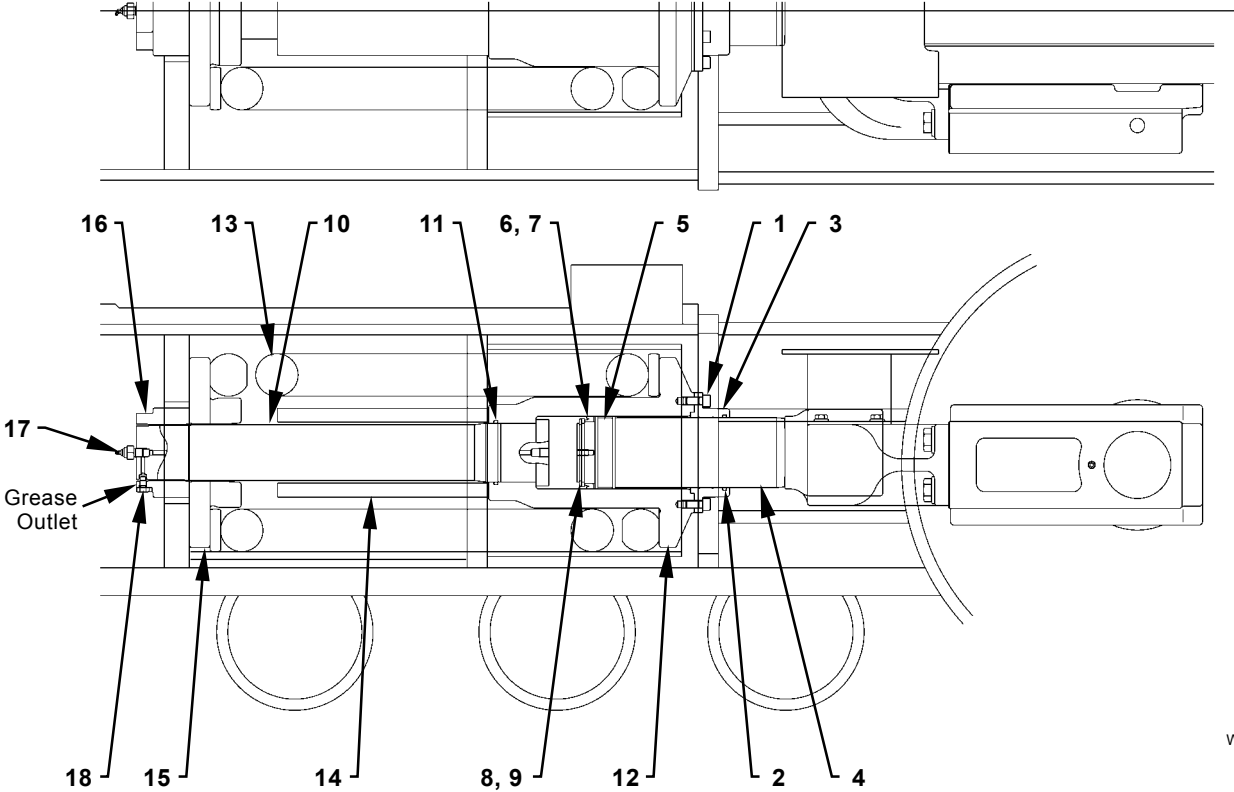
14. Remove wear ring (5), retaining ring (9), plate (8), U-ring (7) and backup ring (6) from piston rod (4).



W800-03-04-003

UNDERCARRIAGE / Track Adjuster

ASSEMBLE TRACK ADJUSTER



W800-03-04-001

- | | | | |
|--------------------------|--------------------|---------------|--------------|
| 1 - Socket Bolt (6 Used) | 6 - Backup Ring | 11 - O-Ring | 15 - Bracket |
| 2 - O-Ring | 7 - U-Ring | 12 - Cylinder | 16 - Nut |
| 3 - Guide | 8 - Plate | 13 - Spring | 17 - Valve |
| 4 - Piston Rod | 9 - Retaining Ring | 14 - Spacer | 18 - Bolt |
| 5 - Wear Ring | 10 - Rod | | |

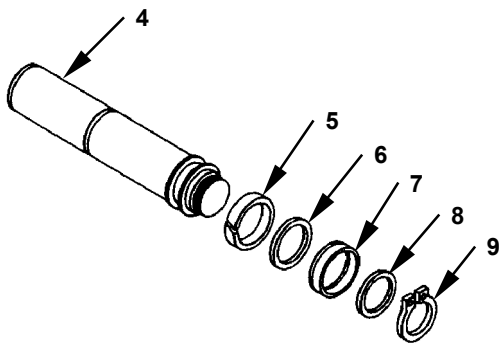
UNDERCARRIAGE / Track Adjuster

Assemble Track Adjuster

IMPORTANT: Apply grease to wear ring (5), backup ring (6), U-ring (7) and plate (8). Install U-ring (7) with the lip side facing to rod (10).

After applying hydraulic oil to the inner surface of cylinder (12) and to rod (10) and piston rod (4), assemble them.

1. After cleaning all parts, install wear ring (5), backup ring (6), U-ring (7), plate (8) and retaining ring (9) to piston rod (4).



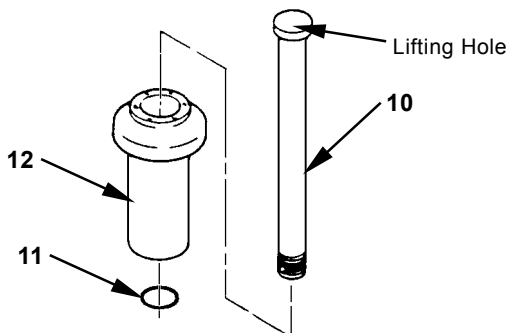
W800-03-04-003

CAUTION: Cylinder (12) weight: 65 kg (140 lb)
Rod (10) weight: 47 kg (105 lb)

CAUTION: Do not tilt cylinder (12) over.

2. Install eyebolts (M14, Pitch 2.0 mm) to the socket bolt (1) hole (two places) in the diagonal in cylinder (12). Attach a nylon sling. Hoist and set cylinder (12) on the workbench. Apply grease to O-ring (11). Install O-ring (11) to cylinder (12). Install eyebolt (M16, Pitch 2.0 mm) to the lifting hole on rod (10). Attach a nylon sling. Hoist and install rod (10) to cylinder (12).

NOTE: Clearance of approx. 120 mm (4.7 in) shall be left under cylinder (12) for lowering rod (10).



W17V-03-04-001


CAUTION: The piston rod (4) assembly weight: 36 kg (80 lb)


IMPORTANT: Fill chamber (B) in cylinder (12) with grease. Insert piston rod (4) and bleed air completely from chamber (B) and from the inside of rod (10).

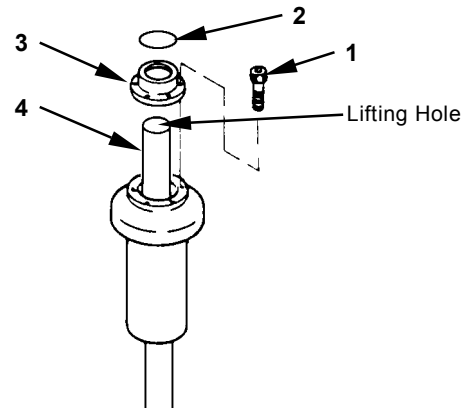
3. Fill cylinder (12) fully with grease. Install eyebolt (M16, Pitch 2.0 mm) to the lifting hole on piston rod (4). Attach a nylon sling. Hoist piston rod (4). Install piston rod (4) to cylinder (12) after being applied with grease.

IMPORTANT: Fill V-groove in guide (3) with grease.

4. Install O-ring (2) after being applied with grease onto guide (3). Install guide (3) to piston rod (4). Apply LOCTITE #262 to socket bolts (1) (6 used) and tighten.

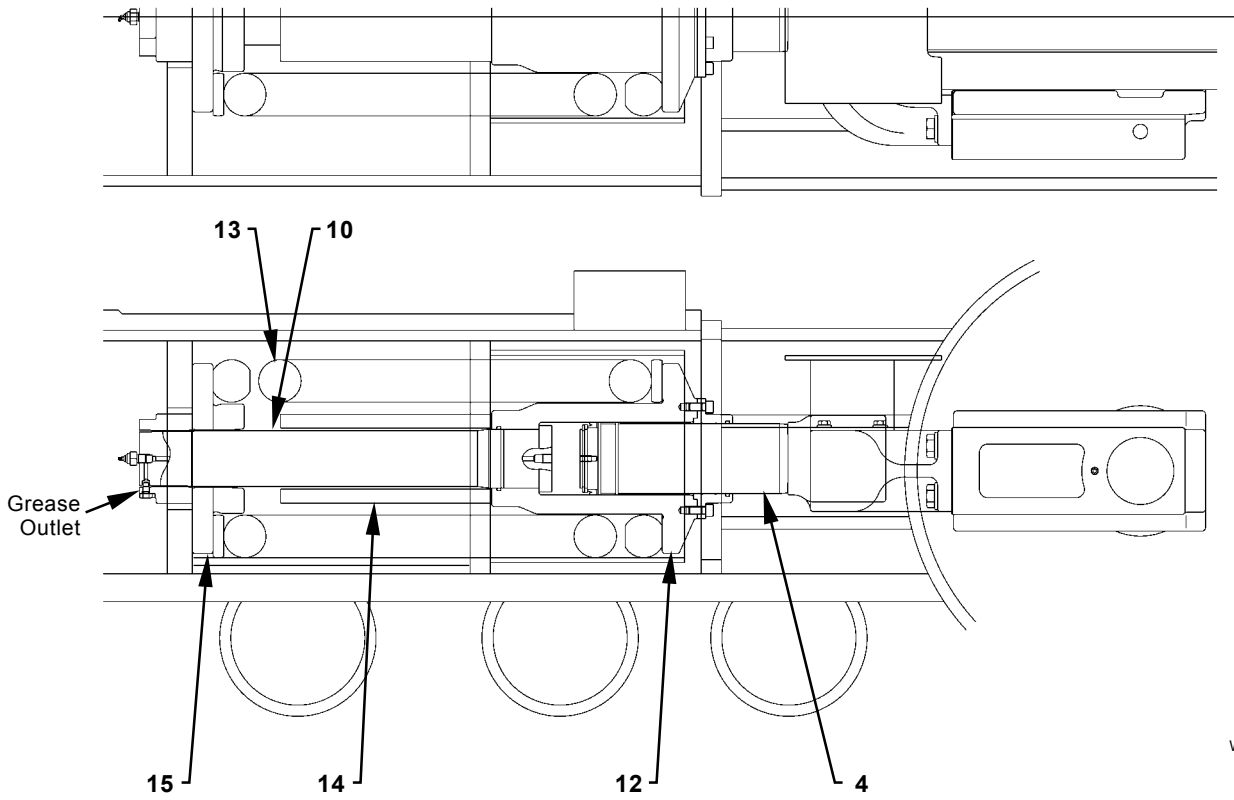
 : 12 mm

 : 140 N·m (14 kgf·m, 101 lbf·ft)



W142-03-04-018

UNDERCARRIAGE / Track Adjuster



W800-03-04-001

UNDERCARRIAGE / Track Adjuster

CAUTION: Bracket (15) weight: 34 kg (75 lb)
Spring (13) weight: 266 kg (590 lb)

CAUTION: Do not tilt spring (13) over.

5. Set the wire on the holder. Place bracket (15), spacer (14) and spring (13) on the holder by using a nylon sling. Bind bracket (15) and spring (13) together by using pieces of wire.

CAUTION: The cylinder (12) assembly weight: 153 kg (340 lb)

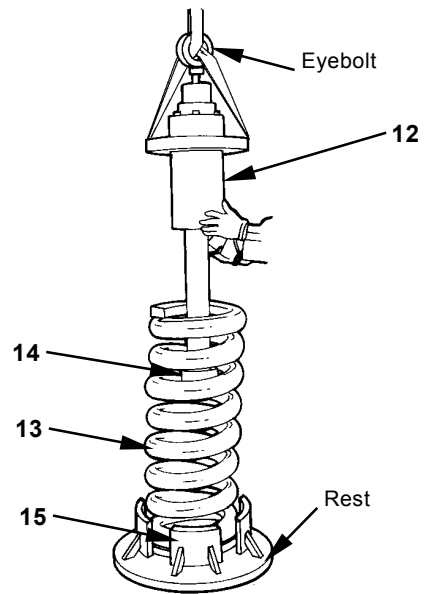
6. Install eyebolt (M16, Pitch 2.0 mm) to piston rod (4). Attach a nylon sling. Hoist and install the cylinder (12) assembly while aligning with spacer (14) and bracket (15).

CAUTION: Track adjuster weight: 491 kg (1080 lb)

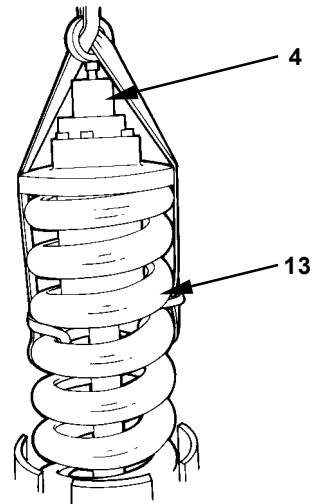
7. Attach a nylon sling to spring (13). Pass a nylon sling through eyebolt in piston rod (4). Hoist and lay down piston rod (4) horizontally and slowly.

IMPORTANT: Set rod (10) with its grease outlet facing downward.

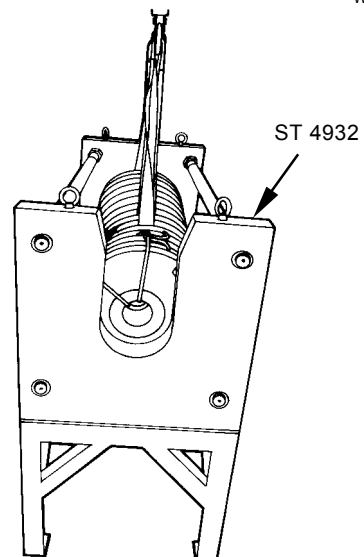
8. Hoist and set the track adjuster on special tool (ST 4932). Remove eyebolt and the nylon sling.



W17V-03-04-004

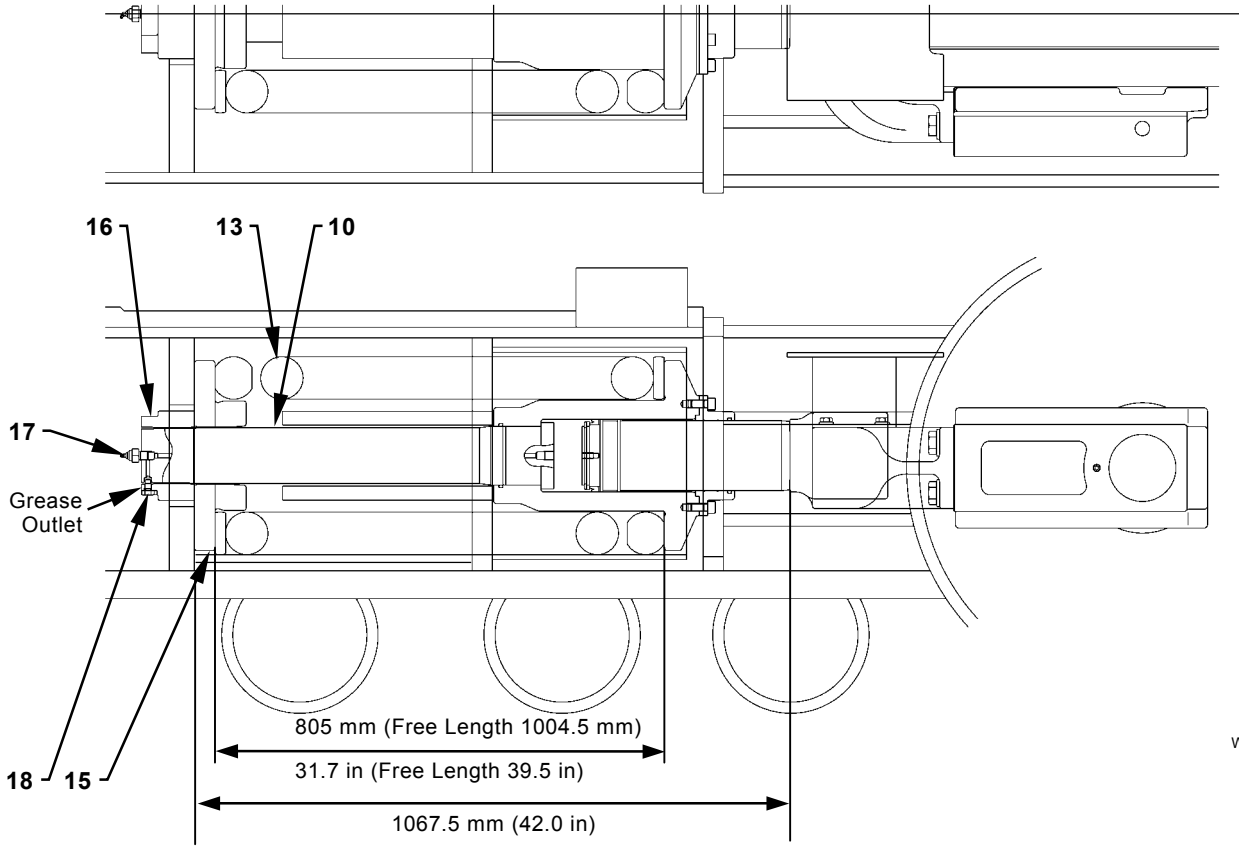


W142-03-04-006



W142-03-04-005

UNDERCARRIAGE / Track Adjuster



W800-03-04-001




UNDERCARRIAGE / Track Adjuster

IMPORTANT: Slowly compress spring (13) while aligning rod (10) with the center of bracket (15) by using a pry bar.
Do not damage the threads in rod (10).



9. Operate the cylinder of special tool (ST 4932). Remove the wire. Compress spring (13) until the specified spring length is obtained. (Specified Spring Length: 805 mm (31.7 in))

IMPORTANT: Align the matching marks made when disassembling. Align the grease outlets both in rod (10) and nut (16).

10. Install nut (16) to rod (10). Install bolt (18).

-  : 140 mm
-  : 19 mm
-  : 59 N·m (6 kgf·m, 44 lbf·ft)

11. Tighten valve (17).

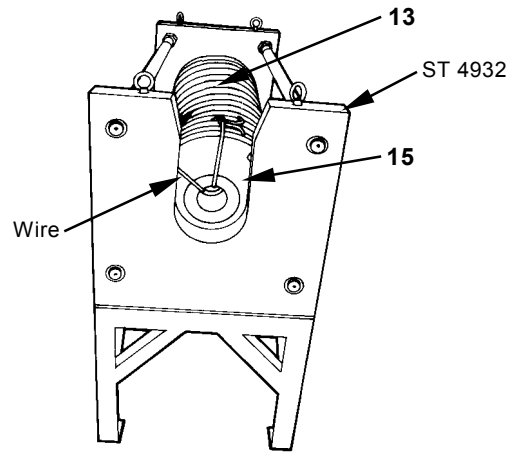
-  : 24 mm
-  : 147 N·m (15 kgf·m, 108 lbf·ft)

12. Retract the cylinder of special tool (ST 4932).

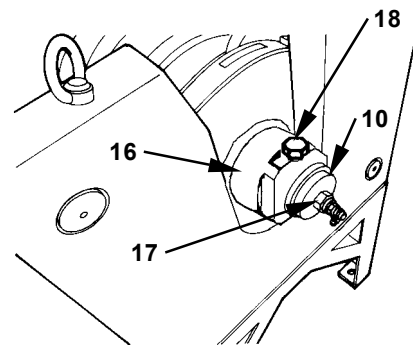
CAUTION: Track adjuster weight: 491 kg (1080 lb)

13. Attach a nylon sling to the track adjuster. Hoist and remove the track adjuster from special tool (ST 4932).

CAUTION: If the spring assembly must be transported, do not damage it. Use a firm steel box for transportation of the spring assembly and take any other precautions in order to insure safe transportation.



W142-03-04-015



W17V-03-04-006

UNDERCARRIAGE / Track Adjuster

(Blank)

UNDERCARRIAGE / Front Idler

REMOVE AND INSTALL FRONT IDLER

Removal

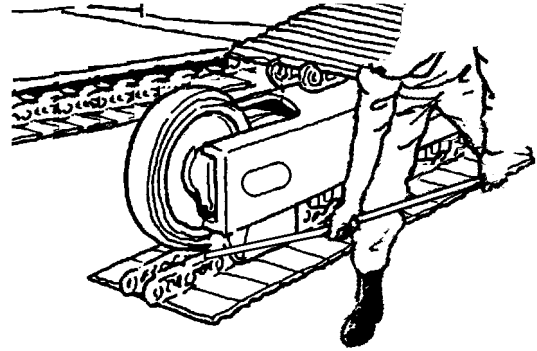
Before removing the front idler, the tracks must be removed first. For removal and installation of the tracks, refer to "Remove and Install Tracks" on W3-7-1.

In this section, the procedure starts on the premise that the tracks have already been removed.

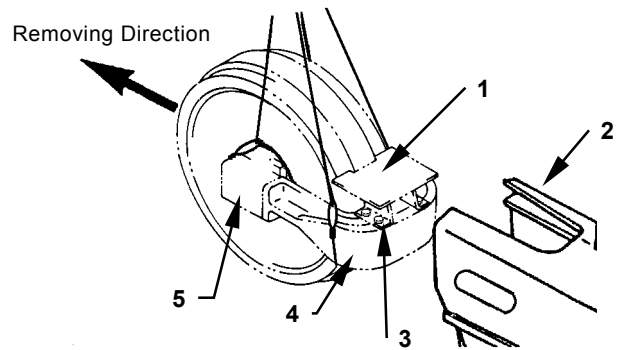
CAUTION: When removing the front idler, the front idler may fly off due to the strong spring force. Do not stand in the same direction to remove the front idler or where the front idler flies off.

CAUTION: Front idler weight: 574 kg (1270 lb)

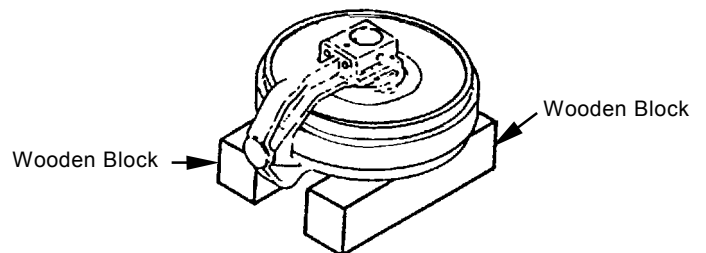
1. Pry and remove the front idler still with the yoke attached from track frame (2) by using a pry bar.
2. Attach a nylon sling to bearing (5) and yoke (4) sections as illustrated. Hoist and remove the front idler assembly from track frame (2).
3. When storing the front idler, place the front idler on the wooden blocks as illustrated.



W142-03-05-002



W142-03-05-003

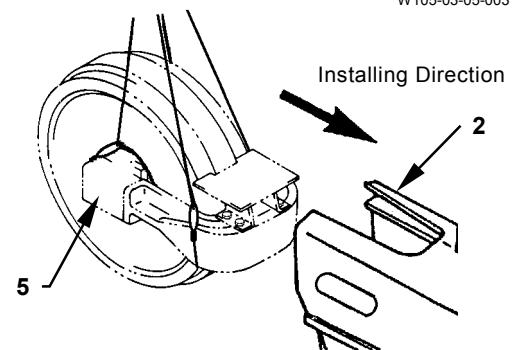


W105-03-05-003

Installation

CAUTION: Front idler weight: 574 kg (1270 lb)

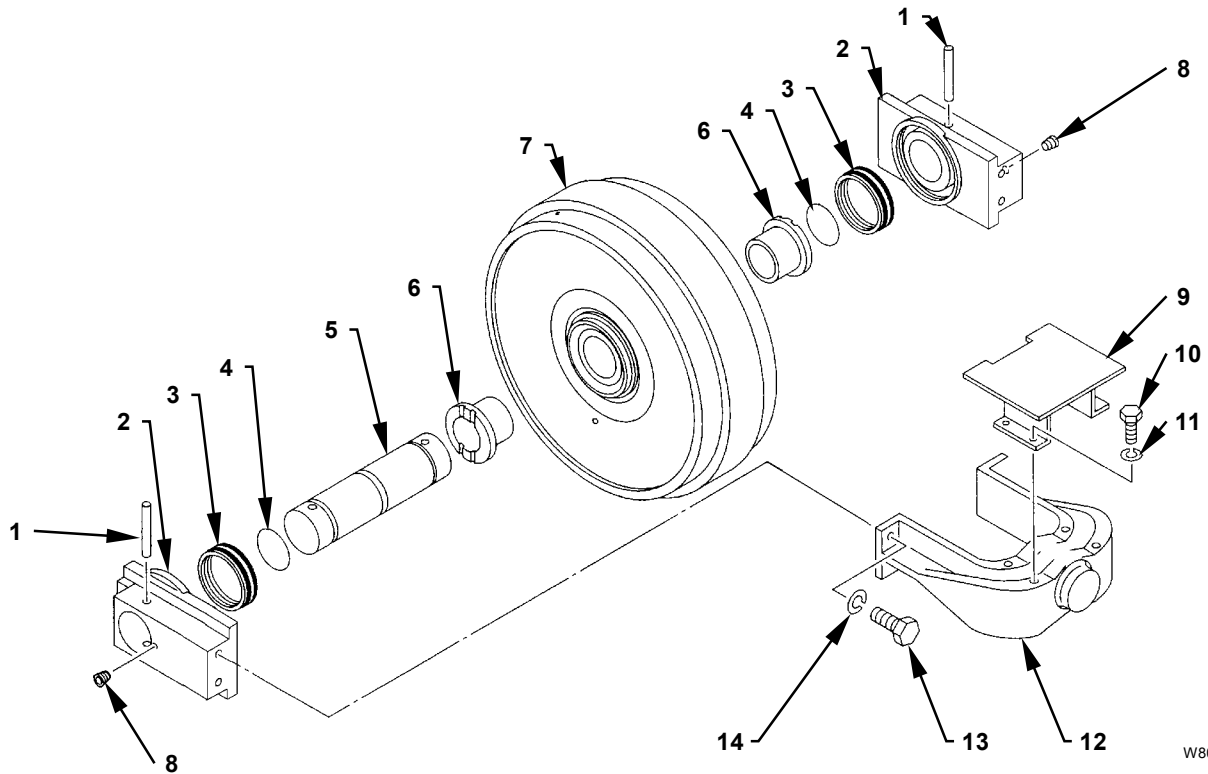
1. The procedures to install the front idler are just the reverse of those for removal. Pay attention to following:
 - Apply grease to the bearing (5) sliding surface on track frame (2) after cleaning.



W142-03-05-005

UNDERCARRIAGE / Front Idler

DISASSEMBLE FRONT IDLER




W800-03-05-001

- | | | | |
|----------------------------|----------------------|-----------------------------|-----------------------------|
| 1 - Pin (2 Used) | 5 - Axle | 9 - Guard | 12 - Yoke |
| 2 - Bearing (2 Used) | 6 - Bushing (2 Used) | 10 - Bolt (4 Used) | 13 - Bolt (4 Used) |
| 3 - Floating Seal (2 Used) | 7 - Idler | 11 - Spring Washer (4 Used) | 14 - Spring Washer (4 Used) |
| 4 - O-Ring (2 Used) | 8 - Plug (2 Used) | | |



UNDERCARRIAGE / Front Idler

Disassemble Front Idler

1. Remove bolts (10) (4 used) and spring washers (11) (4 used). Remove guard (9) from yoke (12).
 : 19 mm

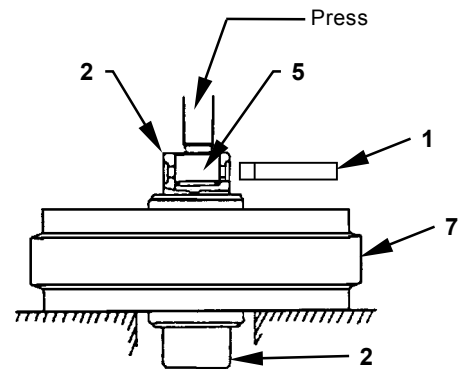
CAUTION: The Idler (7) assembly weight: 503 kg (1110 lb)
Yoke (12) weight: 71 kg (160 lb)

IMPORTANT: Keep idler (7) steady by using the wooden blocks in order to prevent from tilting over.

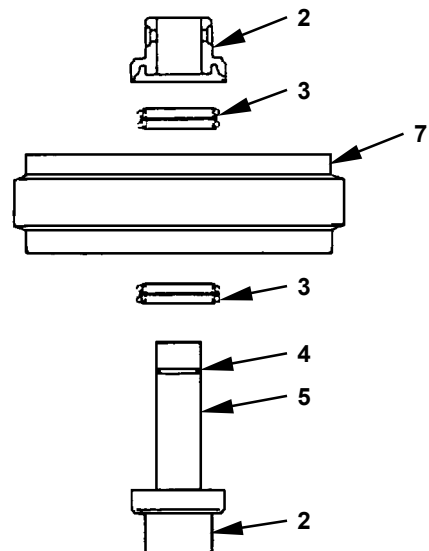
2. Attach a nylon sling to yoke (12). Hold idler (7) vertically. Remove bolts (13) (4 used) and spring washers (14) (4 used). Remove yoke (12) from idler (7).
Remove plugs (8) (2 used) from the end of bearing (2). Tilt idler (7) and drain off oil.
 : 36 mm
 : 6 mm
3. Put the matching marks on bearing (2) and axle (5). Tap and remove pin (1) from bearing (2) by using a round bar (Dia. 25 mm (1.0 in)) and hammer.

CAUTION: Bearing (2) weight: 52 kg (115 lb)
Idler (7) and other weight: 425 kg (940 lb)
Axle (5) weight + bearing (2) weight: 97 kg (215 lb)

4. Set the idler (7) assembly to the press. Remove axle (5) from the idler (7) assembly by using a press. At this time, bearing (2) on other side is removed together with axle (5).



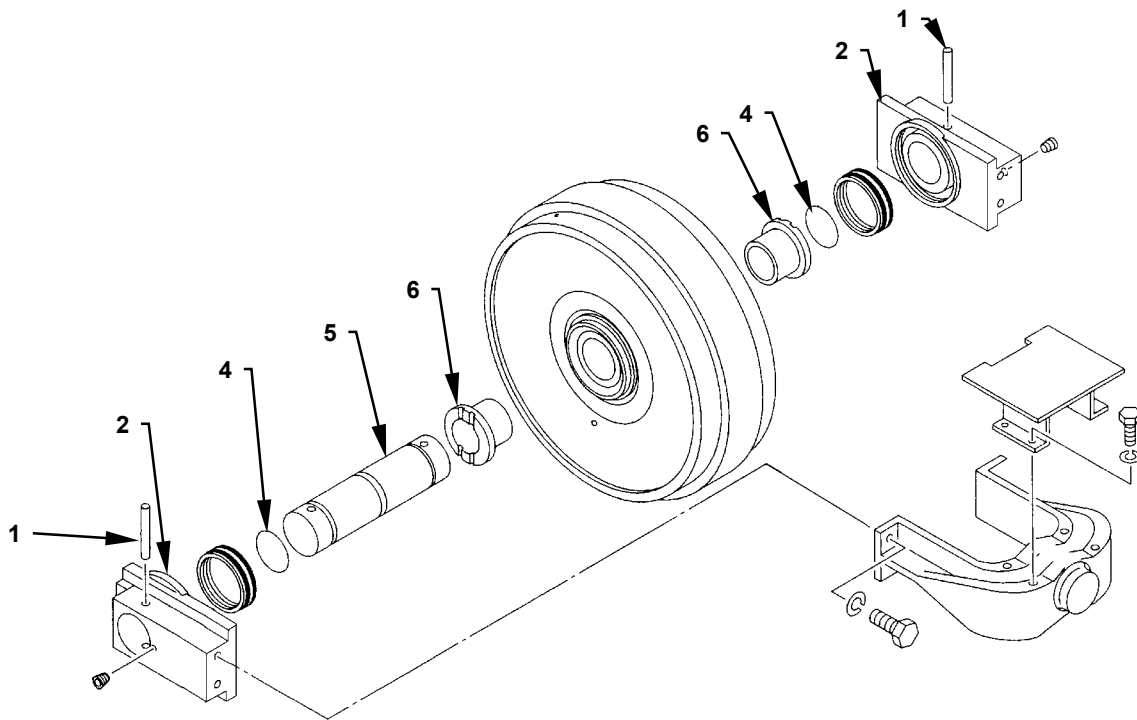
W17P-03-05-002



W105-03-05-009

5. Remove O-ring (4) from axle (5).

UNDERCARRIAGE / Front Idler



W800-03-05-001

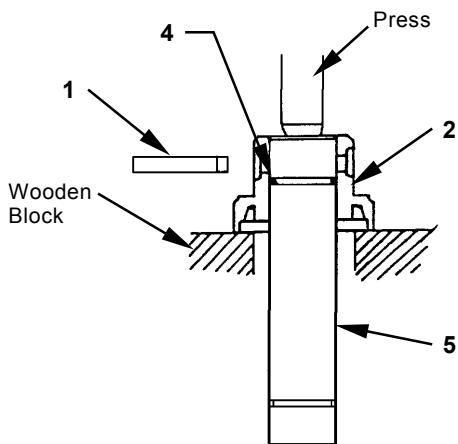
UNDERCARRIAGE / Front Idler

- Remove floating seal (3) from idler (7) and bearing (2).
- Put the matching marks on bearing (2) and axle (5). Remove pin (1) from bearing (2) by using a round bar (Dia. 25 mm (1.0 in)) and hammer.

CAUTION: Axle (5) weight + bearing (2) weight: 97 kg (215 lb)

IMPORTANT: Place the wooden blocks or the like etc. under bearing (2) in order to prevent bearing (2) from being damaged.

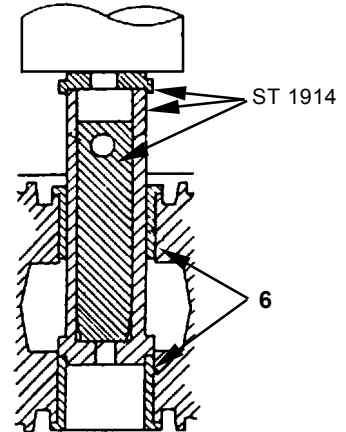
- Wind a nylon sling to the axle (5) assembly. Hoist and place the axle (5) assembly on a press. Remove axle (5) from bearing (2) by using a press. Remove O-ring (4) from axle (5).



W105-03-05-010

IMPORTANT: Do not remove bushing (6) unless necessary.

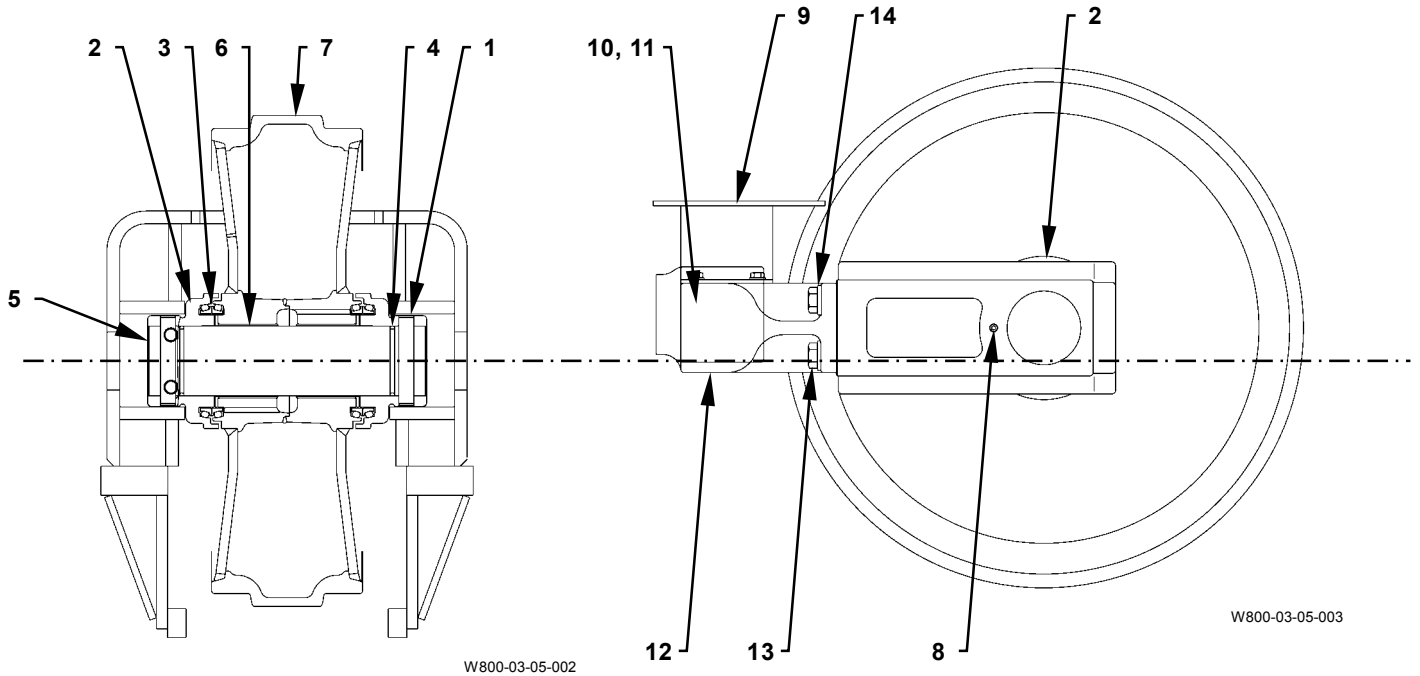
- When replacing bushing (6), remove bushing (6) by using special tool (ST 1914) and a press.



W105-03-05-011

UNDERCARRIAGE / Front Idler

ASSEMBLE FRONT IDLER



W800-03-05-002

W800-03-05-003

- | | | | |
|----------------------------|----------------------|-----------------------------|-----------------------------|
| 1 - Pin (2 Used) | 5 - Axle | 9 - Guard | 12 - Yoke |
| 2 - Bearing (2 Used) | 6 - Bushing (2 Used) | 10 - Bolt (4 Used) | 13 - Bolt (4 Used) |
| 3 - Floating Seal (2 Used) | 7 - Idler | 11 - Spring Washer (4 Used) | 14 - Spring Washer (4 Used) |
| 4 - O-Ring (2 Used) | 8 - Plug (2 Used) | | |

UNDERCARRIAGE / Front Idler

Assemble Front Idler

CAUTION: Idler (7) weight: 344 kg (760 lb)

1. Install bushings (6) (2 used) to both sides of idler (7).

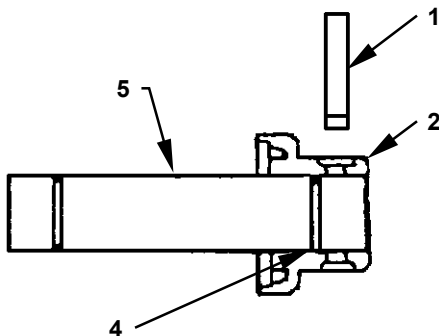
CAUTION: Axle (5) weight: 45 kg (100 lb)

IMPORTANT: Support axle (5) in order to prevent axle (5) from tilting over.

2. Wind a nylon sling to axle (5). Hoist and place axle (5) vertically. Apply enough grease to O-ring (4). Install O-ring (4) (1 used) to the upper side of axle (5).

IMPORTANT: Align the matching marks made when disassembling.

3. Apply grease to the inner surface of bearing (2). Insert bearing (2) to axle (5) at the side where O-ring (4) is installed. Tap the end of bearing (2) evenly by using a plastic hammer while aligning the holes for pin (1). Insert pin (1) into bearing (2) by using a bar and hammer.



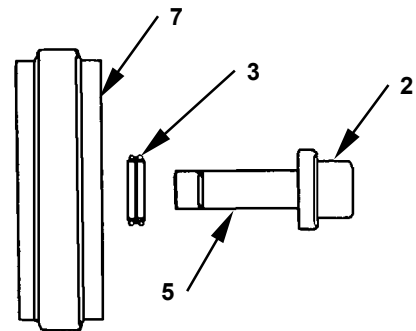
W105-03-05-014

4. Apply grease to floating seal (3). Install one floating seal (3) to idler (7) and bearing (2).

CAUTION: The axle (5) assembly weight: 97 kg (215 lb)

IMPORTANT: Support idler (7) in order to prevent idler (7) from tilting over.

5. Wind a nylon sling to bearing (2) in the axle (5) assembly. Hoist and insert the axle (5) assembly into idler (7) from the side where floating seal (3) is installed.

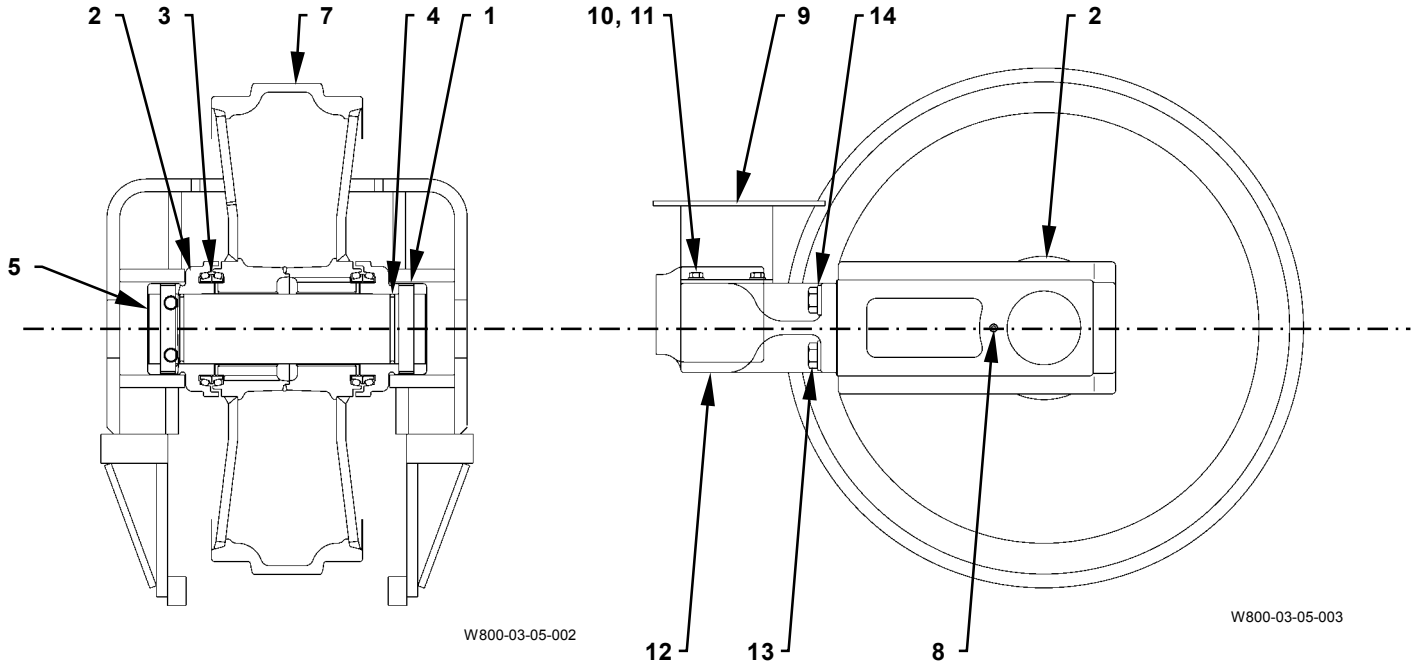


W157-03-05-006

CAUTION: The idler (7) assembly weight: 441 kg (970 lb)

6. Wind a nylon sling to the idler (7) assembly. Hoist and place the idler (7) assembly with bearing (2) facing downward. Apply grease to O-ring (4). Install O-ring (4) to axle (5).

UNDERCARRIAGE / Front Idler



UNDERCARRIAGE / Front Idler

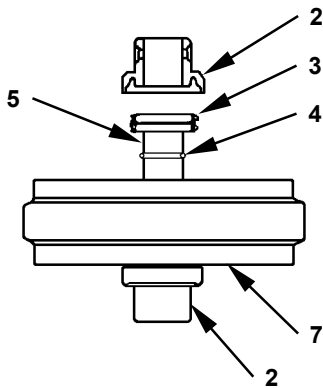
IMPORTANT: Apply grease to floating seal (3).

7. Install the other floating seal (3) to idler (7) and bearing (2).

CAUTION: Bearing (2) weight: 52 kg (115 lb)

IMPORTANT: Align the matching marks made when disassembling.

8. Apply grease to the inner surface of bearing (2). Tap the end of bearing (2) evenly by using a plastic hammer while aligning the holes for pin (1). Insert pin (1) into bearing (2) by using a bar and hammer.





W17P-03-05-003

9. Fill engine oil (API CD Class SAE30) 0.5L (0.132 US gal.) via the plug (8) hole on bearing (2).

IMPORTANT: Apply LOCTITE #503 to plug (8).

10. Install plug (8) to bearing (2).



 : 6 mm
 : 20 N·m (2 kgf·m, 14.5 lbf·ft)

CAUTION: The idler (7) assembly weight: 503 kg (1110 lb)

11. Attach a nylon sling to the idler (7) assembly. Hoist and turn over the idler (7) assembly.

IMPORTANT: Apply LOCTITE #503 to plug (8).



12. Install plug (8) to bearing (2).

 : 6 mm
 : 20 N·m (2 kgf·m, 14.5 lbf·ft)



CAUTION: Yoke (12) weight: 71 kg (160 lb)

13. Wind a nylon sling to yoke (12). Hoist and align the bolt (13) hole on yoke (12) with that on bearing (2).

14. Install spring washers (14) (4 used) to bolts (13) (4 used) respectively. Install yoke (12) to bearing (2) on both sides with bolts (13) (4 used).

 : 36 mm
 : 700 N·m (70 kgf·m, 510 lbf·ft)

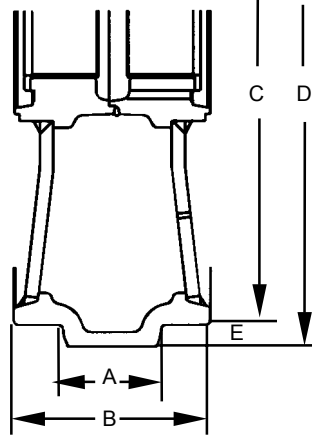
15. Install spring washer (11) to bolts (10) (4 used) respectively. Install guard (9) to yoke (12) with bolts (10) (4 used).

 : 19 mm
 : 90 N·m (9 kgf·m, 65 lbf·ft)

UNDERCARRIAGE / Front Idler

MAINTENANCE STANDARD

Idler



W166-03-05-001

Unit: mm (in)			
	Standard	Allowable Limit	Remedy
A	126 (5.0)	-	Clad by welding and finish or replace
B	260 (10.2)	-	
C	800 (31.5)	780 (30.7)	
D	845 (33.3)	-	
E	22.5 (0.9)	32.5 (1.3)	

Axle and Bushing

Unit: mm (in)				
		Standard	Allowable Limit	Remedy
Axle	Outside Dia.	120 (4.7)	[119.2 (4.7)]	Replace
Bushing	Inside Dia.	120 (4.7)	[121 (4.8)]	
	Flange Thickness	6 (0.2)	[5.2 (0.2)]	

NOTE: Values in [] are just for reference.

UNDERCARRIAGE / Upper and Lower Roller


REMOVE AND INSTALL UPPER ROLLER

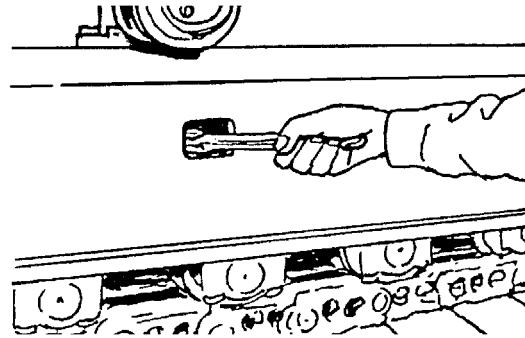
Removal

⚠ 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).

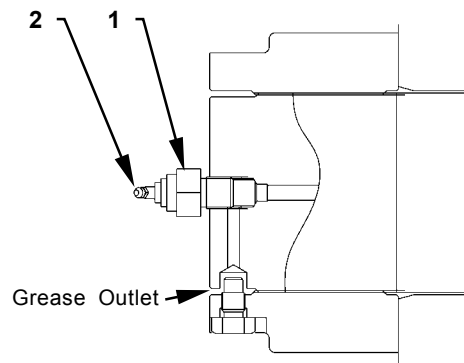
IMPORTANT: Remove any mud or gravel between sprockets and tracks before loosening valve (1). It is enough to loosen valve (1) by 1 to 1.5 turns.

1. Loosen valve (1) on the track adjuster. Drain grease and release the tension of track link.

 : 24 mm

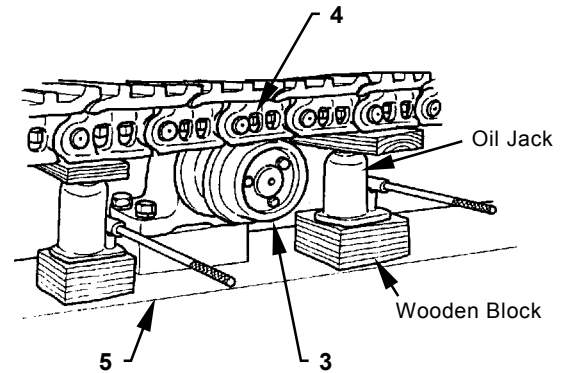


W105-03-06-001



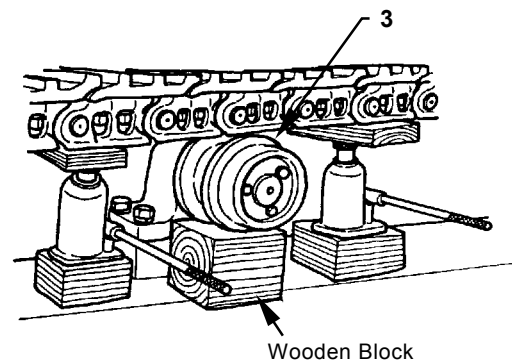
W800-03-07-002

2. Insert the wooden block and an oil jack between track frame (5) and track (4). Jack-up track (4) in order to get enough clearance between upper roller (3) and track (4).



W116-03-06-001


3. Insert the wooden blocks under upper roller (3).

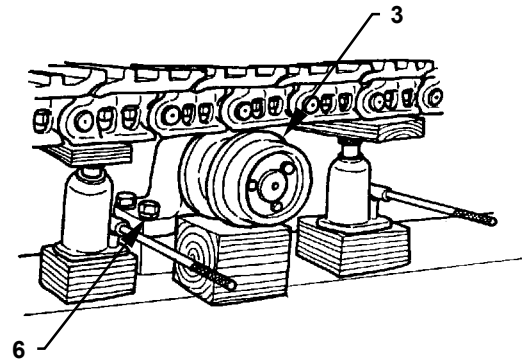


W116-03-06-002

UNDERCARRIAGE / Upper and Lower Roller

- Remove bolts (6) (4 used) from upper roller (3).

 : 30 mm

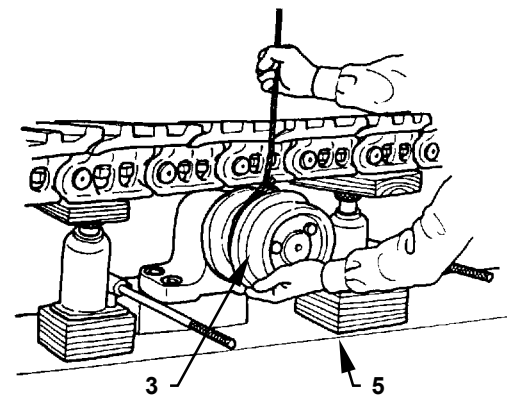


W116-03-06-002



CAUTION: Upper roller (3) weight: 79 kg (175 lb)

- Attach a nylon sling to the roller part of upper roller (3). Hoist and remove upper roller (3) from track frame (5).




W116-03-06-003


Installation



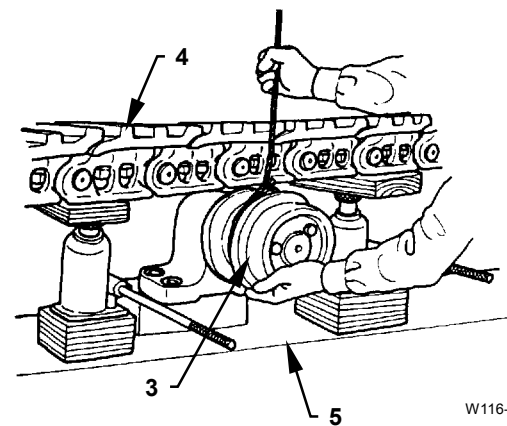
CAUTION: Upper roller (3) weight: 79 kg (175 lb)

- 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).

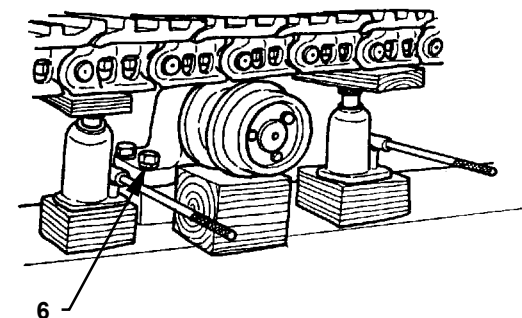
 : 30 mm

 : 550 N·m (56 kgf·m, 405 lbf·ft)

- Remove the wooden blocks and oil jack.




W116-03-06-003




W116-03-06-002

UNDERCARRIAGE / Upper and Lower Roller

3. Tighten valve (1) on the track adjuster.

 : 24 mm

 : 147 N·m (15 kgf·m, 108 lbf·ft)



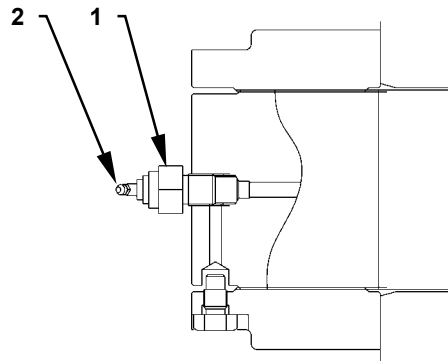
CAUTION: If track sag should be measured with the machine raised, support the jacked up machine firmly by using the wooden blocks.

4. Jack up the track to be measured. Apply grease via grease fitting (2) and adjust track tension.

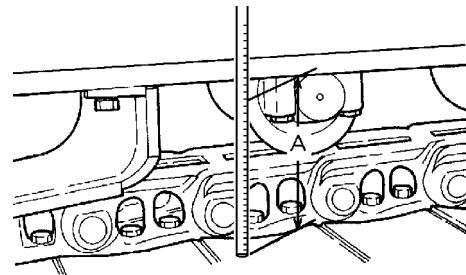
Track sag specification (A): 460 to 510 mm
(18.1 to 20.1 in)



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


UNDERCARRIAGE / Upper and Lower Roller

REMOVE AND INSTALL LOWER ROLLER


Removal

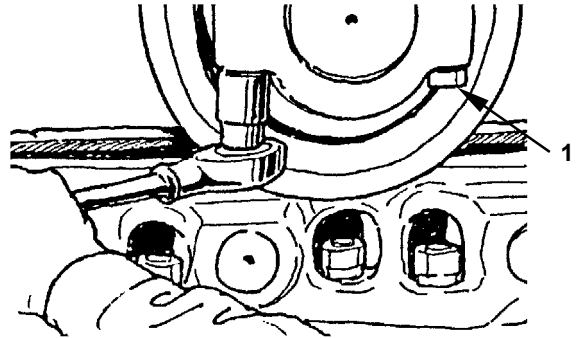
! CAUTION: Track guard weight: 86 kg (190 lb)

1. Remove the track guard.

 : 41 mm

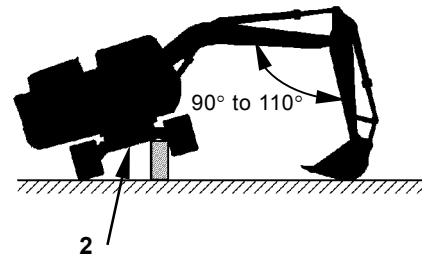
2. Remove bolts (1) (4 used) from the lower roller.

 : 36 mm



W105-03-06-008

3. Jack up the machine by using the front attachment and insert the wooden blocks under track frame (2).

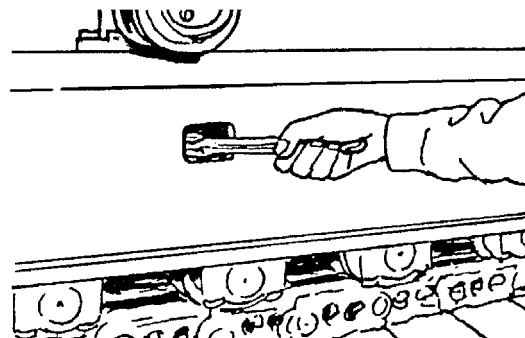


W800-03-07-003

! 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).

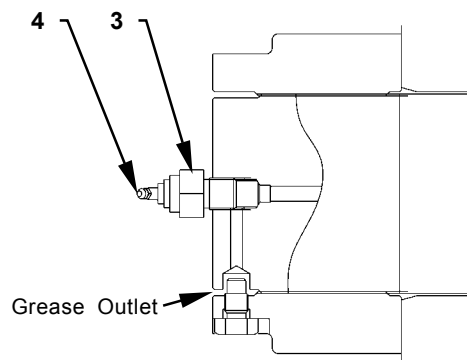


W105-03-06-001

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

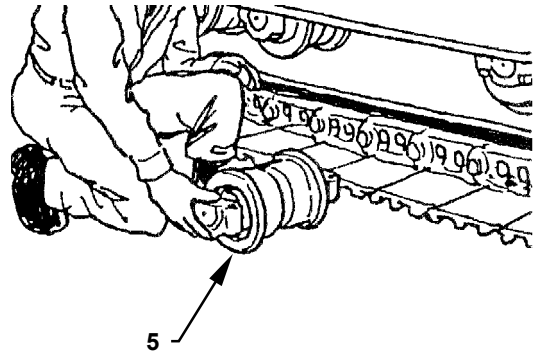


W800-03-07-002

UNDERCARRIAGE / Upper and Lower Roller

CAUTION: Lower roller (5) weight: 143 kg (320 lb)

5. Remove lower roller (5) by using a fork lift.

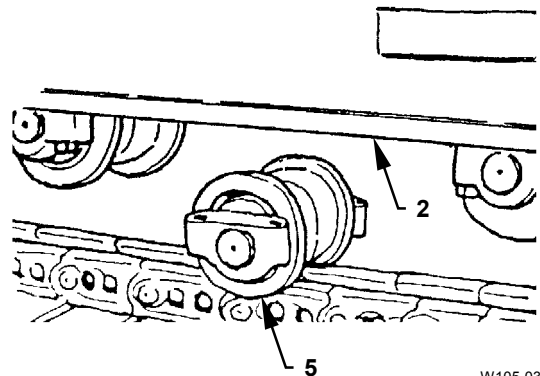


W105-03-06-010

Installation


CAUTION: Lower roller (5) weight: 143 kg (320 lb)


1. Set lower roller (5) under track frame (2) by using a fork lift.

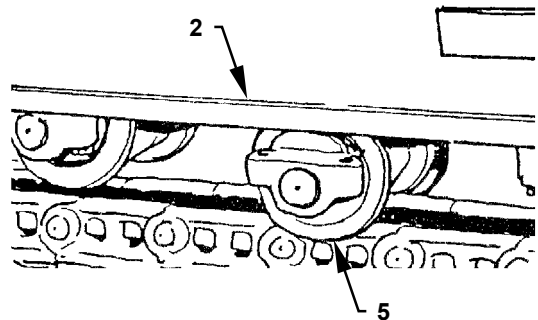


W105-03-06-011

2. 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).

 : 36 mm


 : 950 N·m (97 kgf·m, 700 lbf·ft)




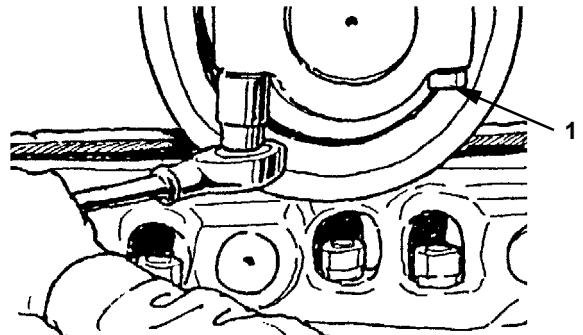
W105-03-06-012

CAUTION: Track guard weight: 86 kg (190 lb)

3. Install the track guard to track frame (2).

 : 41 mm


 : 1400 N·m (143 kgf·m, 1030 lbf·ft)




W105-03-06-008

UNDERCARRIAGE / Upper and Lower Roller

4. Tighten valve (3) on the track adjuster.

 : 24 mm


 : 147 N·m (15 kgf·m, 108 lbf·ft)

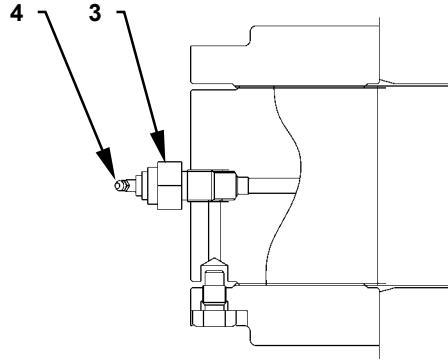


CAUTION: If track sag should be measured with the machine raised, support the jacked up machine firmly by using the wooden blocks.

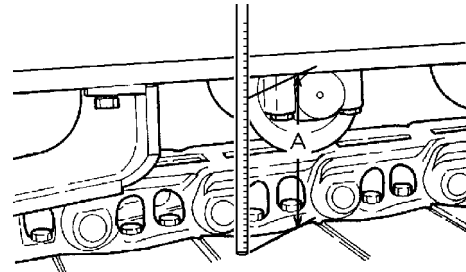
5. Apply grease via grease fitting (4) and adjust track tension.

Track sag specification (A): 460 to 510 mm
(18.1 to 20.1 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



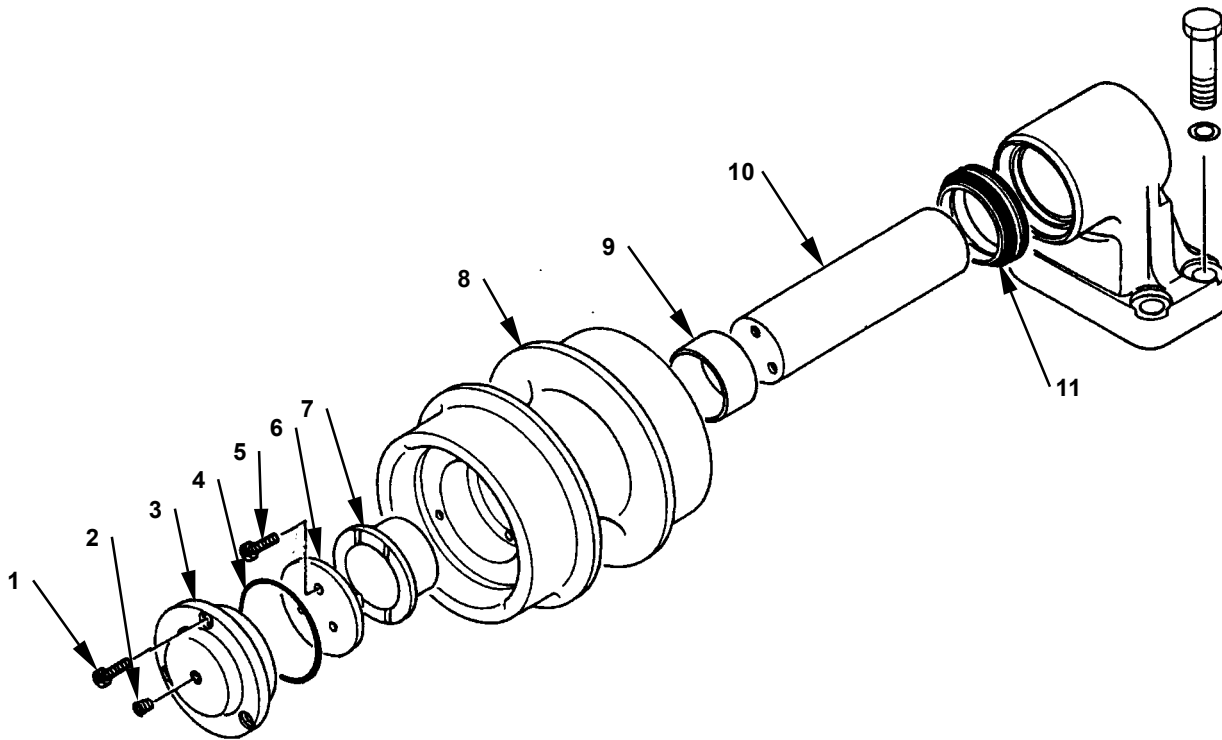
W800-03-06-001

UNDERCARRIAGE / Upper and Lower Roller

(Blank)

UNDERCARRIAGE / Upper and Lower Roller

DISASSEMBLE UPPER ROLLER



W800-03-06-003

1 - Socket Bolt (3 Used)
2 - Plug
3 - Cover

4 - O-Ring
5 - Socket Bolt (3 Used)
6 - Thrust Plate


7 - Bushing
8 - Roller
9 - Bushing

10 - Axle
11 - Floating Seal


UNDERCARRIAGE / Upper and Lower Roller


Disassemble Upper Roller

1. Remove plug (2). Drain off oil.


 : 6 mm


2. Put the matching marks on roller (8) and cover (3). Remove socket bolts (1) (3 used). Remove cover (3) from roller (8).

 : 8 mm

 **NOTE:** Insert a driver between cover (3) and roller (8). Pry and remove cover (3) by using a screwdriver.


3. Remove socket bolts (5) (3 used). Remove thrust plate (6) from roller (8).

 : 8 mm

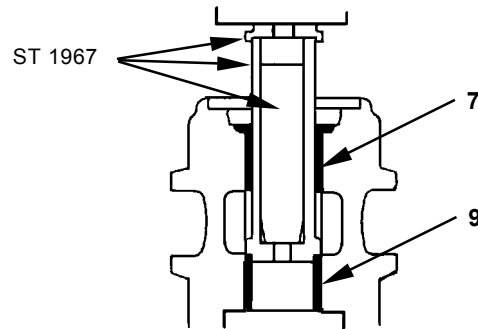
 **CAUTION:** The axle (10) assembly weight: 26 kg (60 lb)

4. Remove roller (8) from the axle (10) assembly.


5. Remove floating seal (11) from the axle (10) assembly and roller (8).

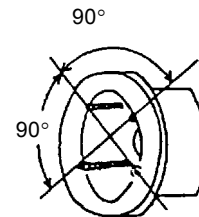
 **NOTE:** If floating seal (11) should be reused, floating seal (11) should be kept with its seal surface covered by cardboard.

6. When replacing bushings (7, 9), remove bushings (7, 9) by using special tool (ST 1967) and a press.



W17V-03-06-002

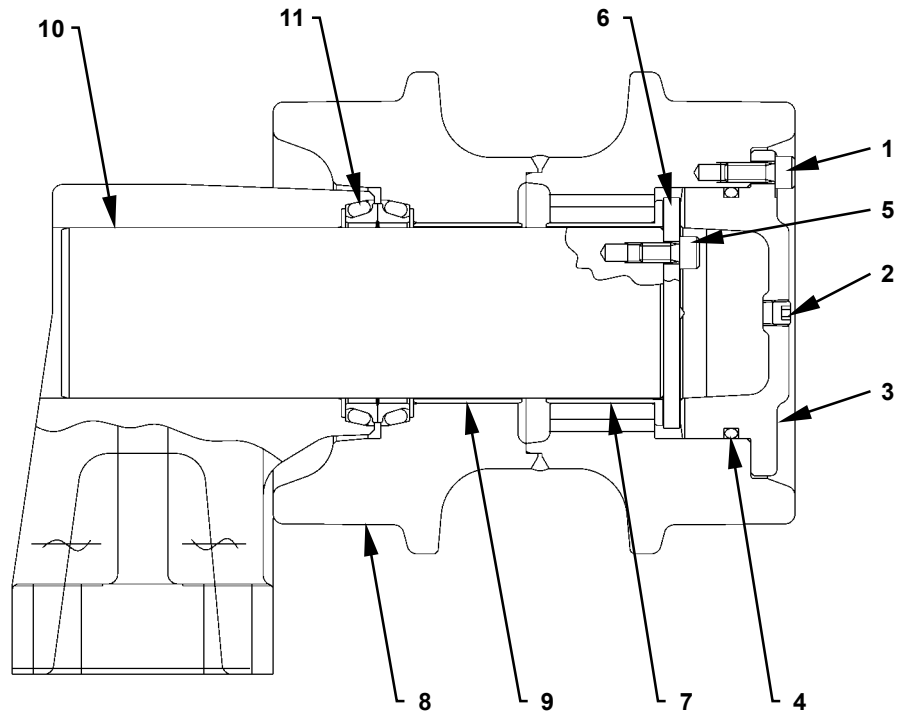
 **NOTE:** If no special tool is available, build up weld at the inner diameter of bushing at 4 places in equal distance of 90° apart. Shrink and remove the bushing.



W105-03-05-012

UNDERCARRIAGE / Upper and Lower Roller

ASSEMBLE UPPER ROLLER



W800-03-06-002

1 - Socket Bolt (3 Used)
2 - Plug
3 - Cover

4 - O-Ring
5 - Socket Bolt (3 Used)
6 - Thrust Plate

7 - Bushing
8 - Roller
9 - Bushing

10 - Axle
11 - Floating Seal

UNDERCARRIAGE / Upper and Lower Roller

Assemble Upper Roller

IMPORTANT: The force can be applied to press in the bushing of roller (8) when replacing bushings (7, 9).


Force for bushing (7): 20 ton


Force for bushing (9): 2.1 to 3.7 ton

1. Install bushings (7, 9) to roller (8).


IMPORTANT: Apply grease to the O-ring part on floating seal (11). Apply oil to the steel ring.


2. Install floating seal (11) to the axle (10) assembly and roller (8).

 **NOTE:** Install O-ring with grease applied to the seal ring. Push O-ring by using a screwdriver and install to the axle and roller. Do not damage O-ring when the screwdriver is used.

 **CAUTION:** Roller (8) weight: 30 kg (70 lb)


3. Install roller (8) to the axle (10) assembly.
4. Install thrust plate (6) to the axle (10) assembly and tighten with socket bolts (5) (3 used).


 : 8 mm


 : 65 N·m (6.5 kgf·m, 47 lbf·ft)

5. Apply grease to O-ring (4). Install O-ring (4) to cover (3).

6. Align the matching marks made when disassembling. Install cover (3) to roller (8) and tighten with socket bolts (1) (3 used).


 : 8 mm


 : 65 N·m (6.5 kgf·m, 47 lbf·ft)

 **NOTE:** If the socket bolt (1) holes are not aligned, a bar can be used in order to move cover (3) and align socket bolt (1) holes both in roller (8) and cover (3).

7. Fill engine oil via the plug (2) hole on cover (3).
Engine oil: API CD class SAE#30
Oil amount: 200 mL (0.053 US gal.)

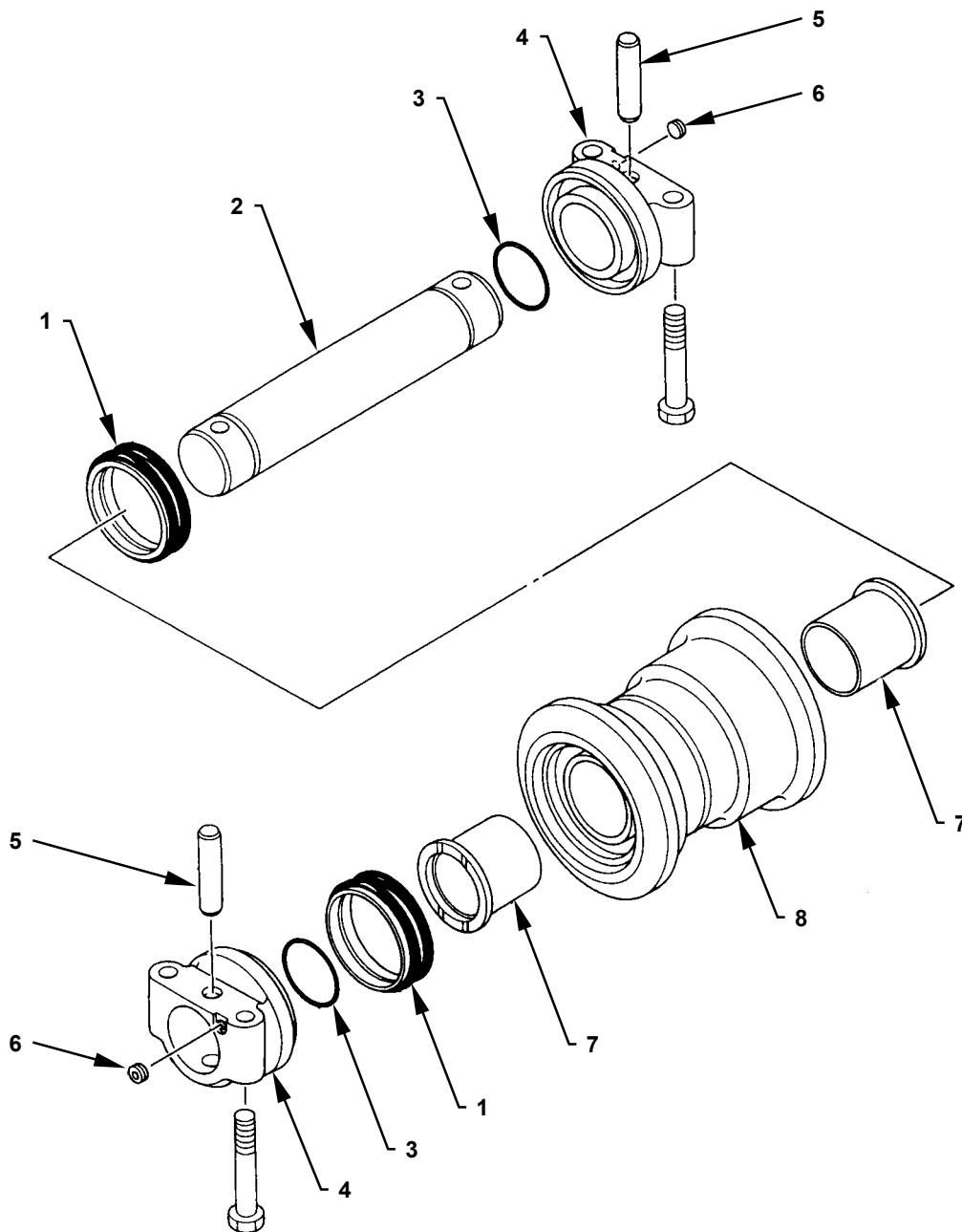
8. Apply LOCTITE #503 or equivalent to plug (2). Install plug (2) to cover (3).

 : 6 mm

 : 20 N·m (2 kgf·m, 14.5 lbf·ft)

UNDERCARRIAGE / Upper and Lower Roller

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

UNDERCARRIAGE / Upper and Lower Roller

Disassemble Lower Roller


IMPORTANT: Put the matching marks on collar (4) and axle (2) at both sides.

1. Remove plug (6) from the end of collar (4). Drain off 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

CAUTION: Lower roller weight: 142 kg (315 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).

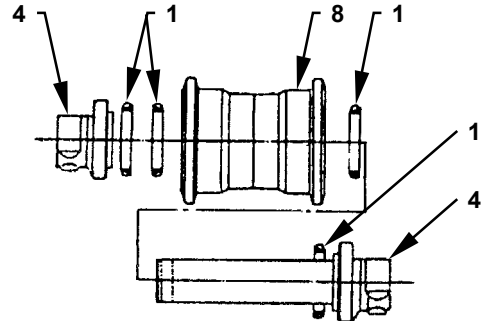
 **NOTE:** Collar (4) can be removed if axle (2) is pushed in by approx. 55 mm (2.2 in) by using a press.

3. Remove floating seal (1) from collar (4) and roller (8).
Remove O-ring (3) from axle (2).

CAUTION: Axle (2) weight + collar (4) weight: 48 kg (110 lb)

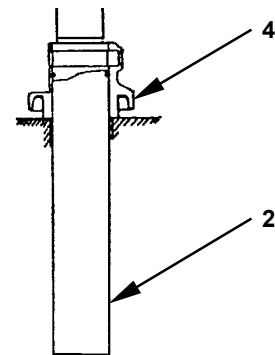
4. Remove the axle (2) assembly from roller (8).

5. Remove floating seal (1) from roller (8) and collar (4).



W105-03-06-026

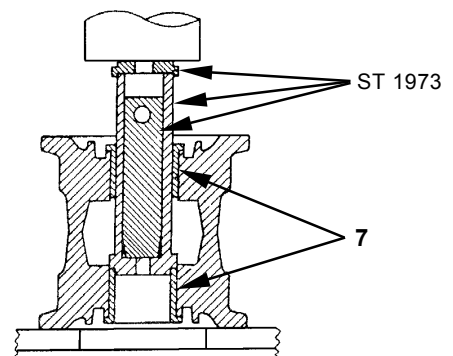
6. Set the axle (2) assembly to a press. Remove axle (2) from collar (4).



W105-03-06-027

7. Remove O-ring (3) from axle (2).

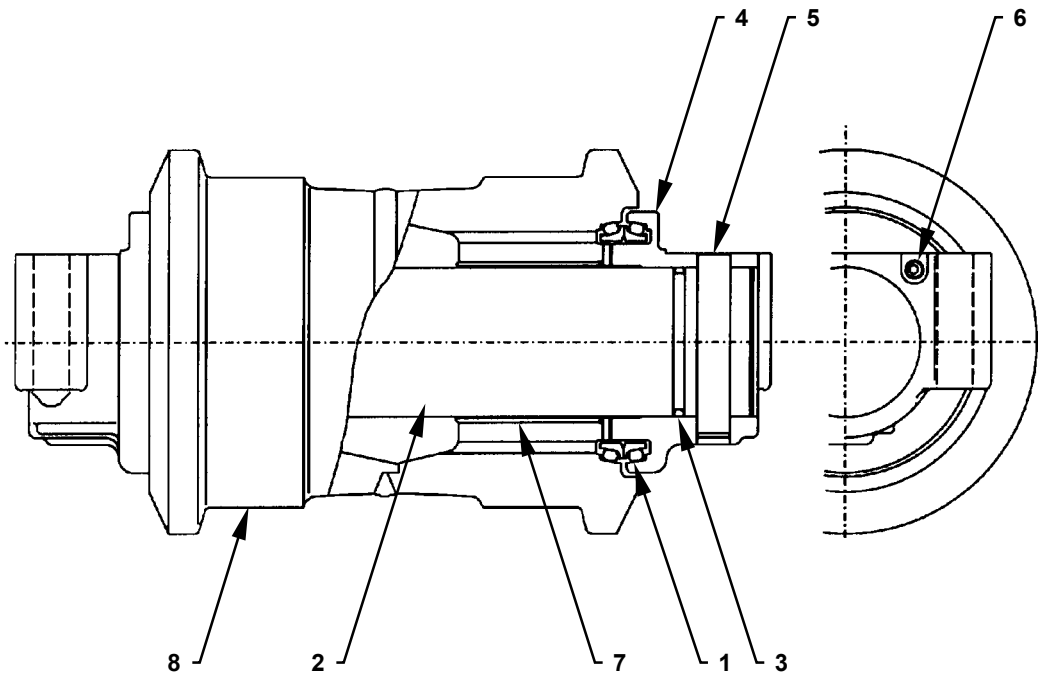
8. When replacing bushing (7), remove bushing (7) by using special tool (ST 1973) and a press.



W105-03-06-028

UNDERCARRIAGE / Upper and Lower Roller

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

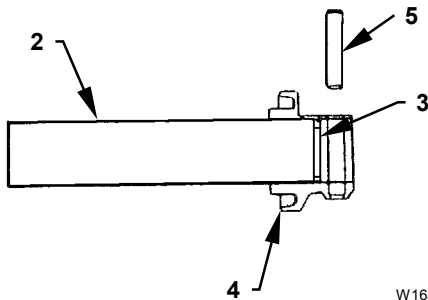
Assemble Lower Roller

CAUTION: Roller (8) weight: 81 kg (180 lb)
Axle (2) weight: 38 kg (80 lb)

1. 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).

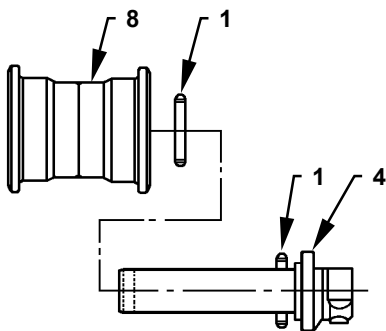
IMPORTANT: Align the matching marks made when disassembling.

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).



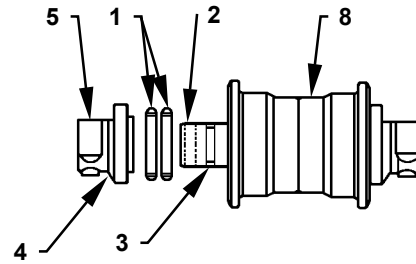
CAUTION: The roller (8) assembly weight: 84 kg (190 lb)

3. Apply grease to the O-ring part on floating seal (1). Install floating seal (1) to roller (8) and collar (4).





CAUTION: The axle (2) assembly weight: 48 kg (110 lb)

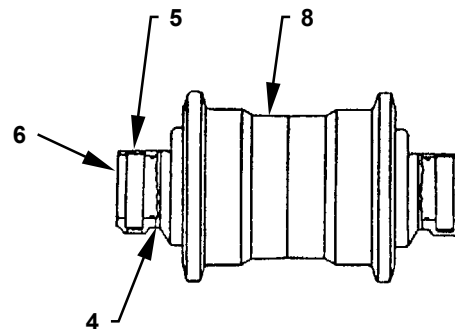
4. Insert axle (2) into roller (8). Install O-ring (3) with grease applied to axle (2). Install other collar (4) and floating seal (1) in the same procedures and secure with pin (5).



5. Fill engine oil (API CD class SAE30) 1.0 L (0.26 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)

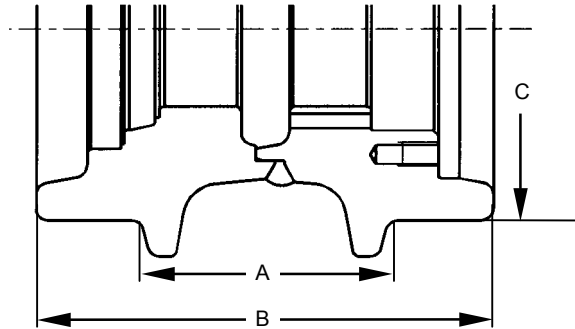


UNDERCARRIAGE / Upper and Lower Roller

MAINTENANCE STANDARD

Upper Roller

- Roller



W166-03-06-007

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	132 (5.26)	–	Clad by welding and finish or replace
B	260 (10.2)	–	
C	210 (8.3)	190 (7.5)	

- Axle and Bushing

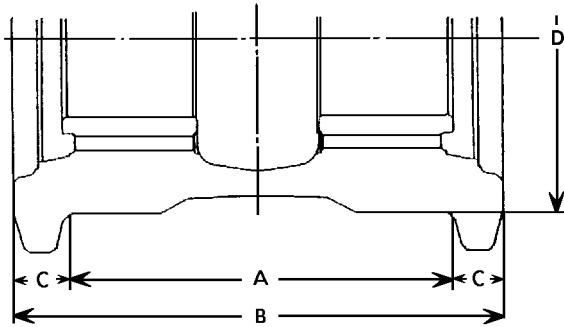
Unit: mm (in)

		Standard	Remedy
Axle	Outside Dia.	85 (3.3)	Replace
Bushing	Inside Dia.	85 (3.3)	
	Flange Thickness	4.5 (0.2)	

UNDERCARRIAGE / Upper and Lower Roller

Lower Roller

- Roller



W157-03-06-003

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	274 (10.8)	–	Clad by welding and finish or replace
B	356 (14.0)	–	
C	41 (1.6)	–	
D	240 (9.4)	220 (8.7)	

- Axle and Bushing

Unit: mm (in)

		Allowable Limit	Remedy
Axle	Outside Dia.	110 (4.3)	Replace
Bushing	Inside Dia.	110 (4.3)	
	Flange Thickness	6 (0.2)	

UNDERCARRIAGE / Upper and Lower Roller

(Blank)

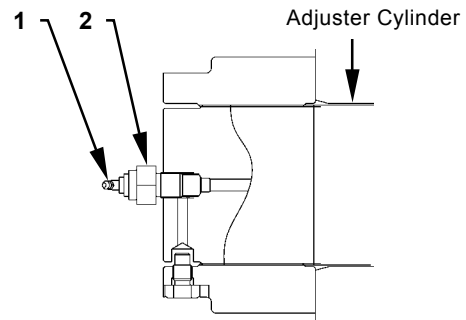
UNDERCARRIAGE / Track

REMOVE AND INSTALL TRACK

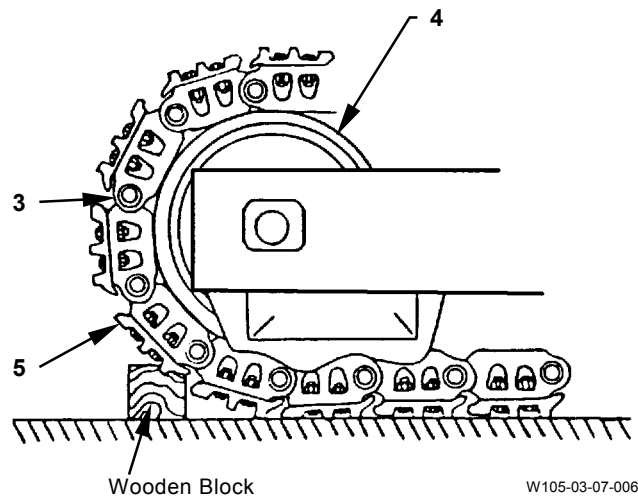
Removal

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).

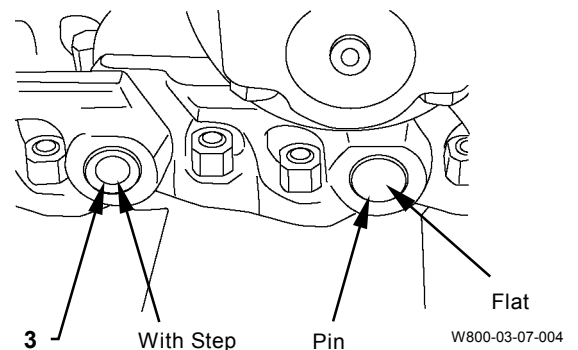


W800-03-07-027



W105-03-07-006

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.




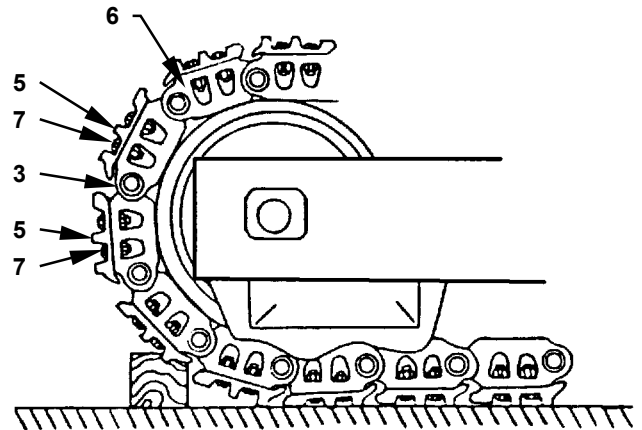
W800-03-07-004

UNDERCARRIAGE / Track



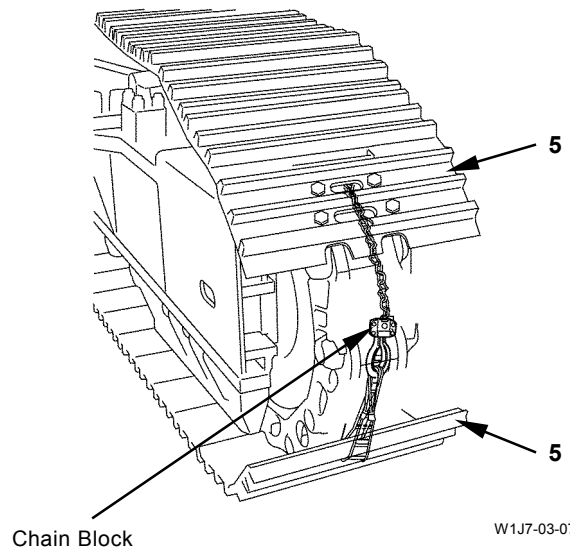
CAUTION: Shoe (5) weight: 43 kg (95 lb)

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.



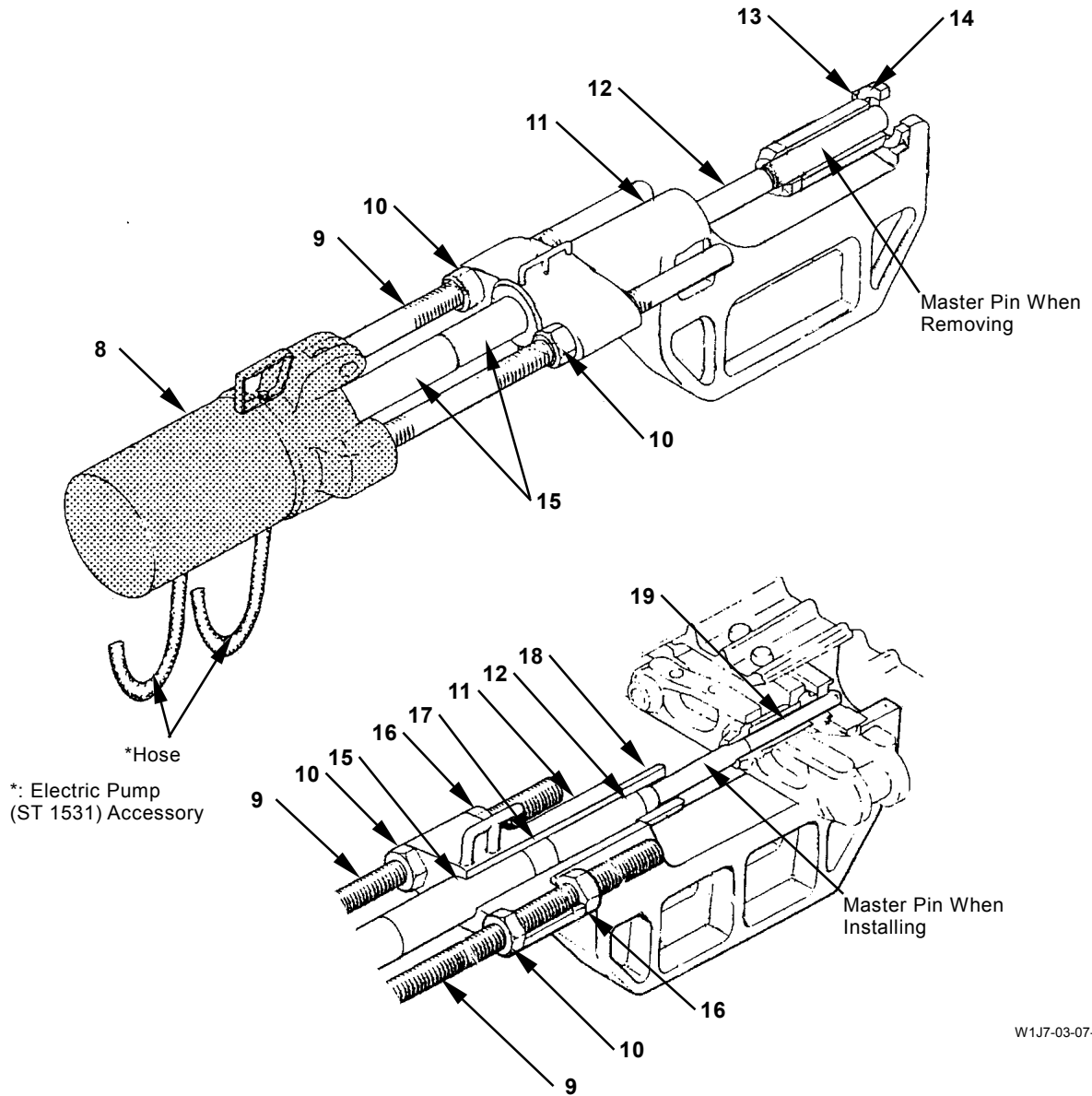
W1J7-03-07-002

UNDERCARRIAGE / Track

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UNDERCARRIAGE / Track

ASSEMBLE SPECIAL TOOL WHEN REMOVING AND INSTALLING MASTER PIN



W1J7-03-07-001

- | | | | |
|----------------------------------|-------------------------------|------------------------------------|--------------------------|
| 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) |

NOTE: Guide (18) is not used for ZAXIS850-3.

UNDERCARRIAGE / Track

Assemble Special Tool 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).

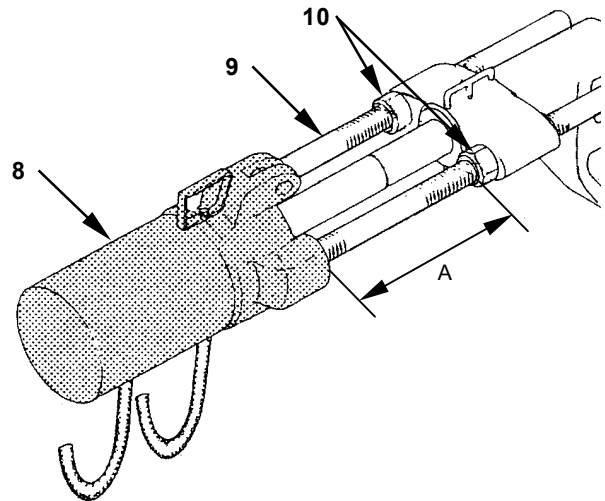
8. Install extension (15) to hydraulic cylinder (8).

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

UNDERCARRIAGE / Track

CAUTION: Special tool (ST 1532) when removing and installing master pin weight: 150kg (330 lb)

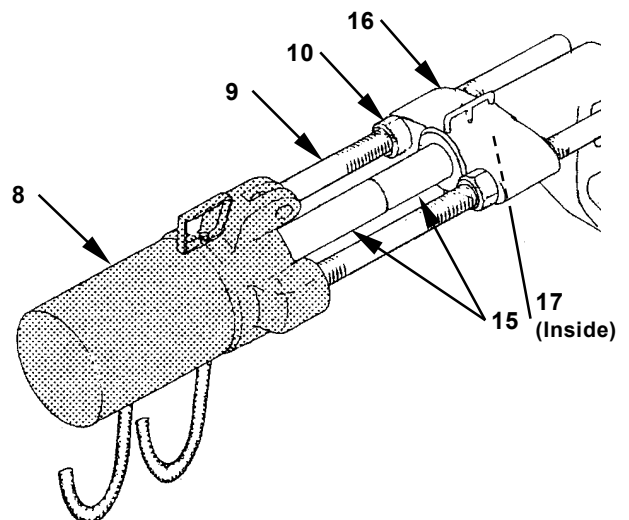
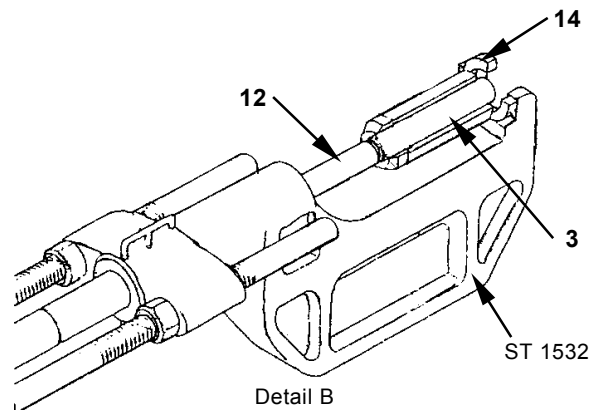
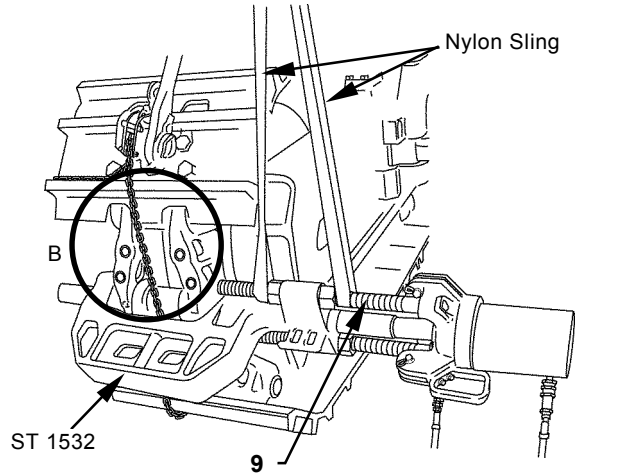
- Attach a nylon sling to screws (9) (2 used) in special tool (ST 1532) when removing and installing master pin and hoist special tool. Move special tool (ST 1532) when removing and installing master pin to the mounting position for master pin (3). Adjust length of the nylon sling and align adapter (14) 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.

- 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.

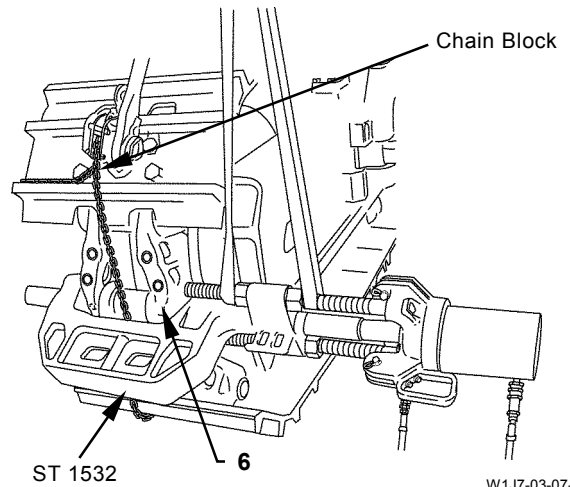
- Extend hydraulic cylinder (8) and push out master pin (3).

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.



UNDERCARRIAGE / Track

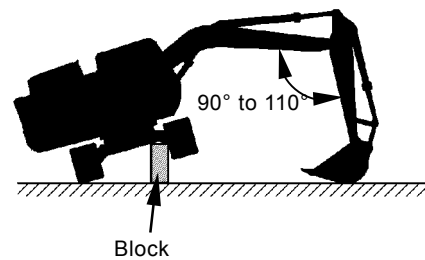
15. Remove special tool (ST 1532) when removing and installing master pin and a chain block from track link (6).



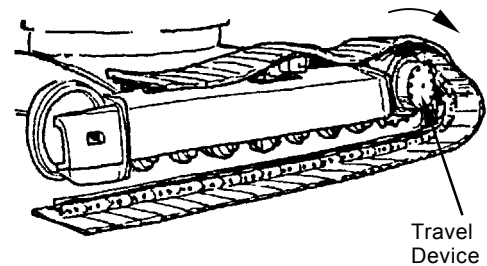
IMPORTANT: After raise the machine, support the machine by using a block securely.

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: 4080 kg (9000 lb)



17. Turn the travel device to the reverse direction and extend the track.



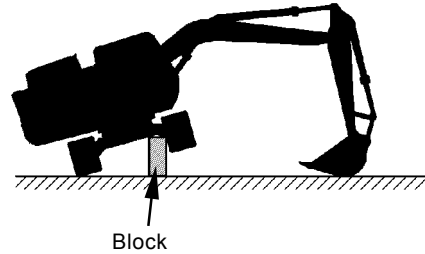
UNDERCARRIAGE / Track

Installation

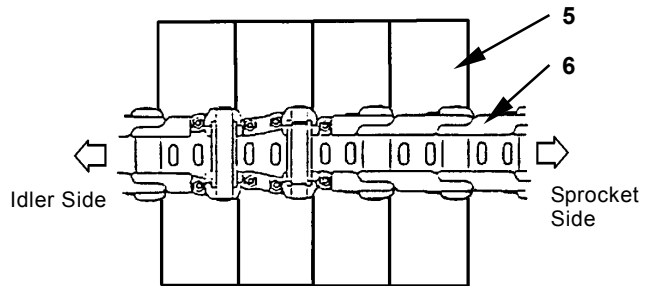
CAUTION: The track assembly weight: 4080 kg (9000 lb)

IMPORTANT: Check the direction of track.

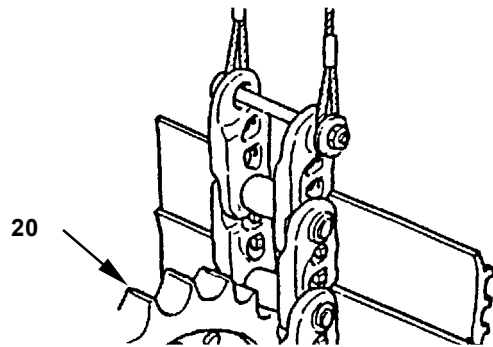
1. Raise the machine and support the machine by using a block. Place the track under the machine so that the track end can mesh with sprocket (20).
2. Hoist the track at sprocket (20) side and mesh the track with sprocket (20).
3. Operate the travel lever for the side to attach the track and rotate travel device (21) slowly. Attach the track to 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).



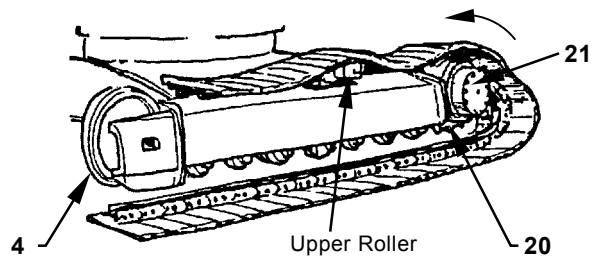
W800-03-07-003



W105-03-07-013



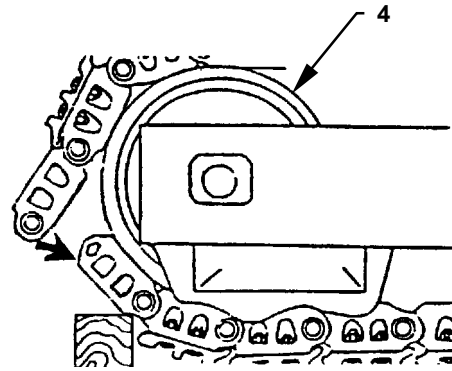
W105-03-07-014



W105-03-07-011

UNDERCARRIAGE / Track

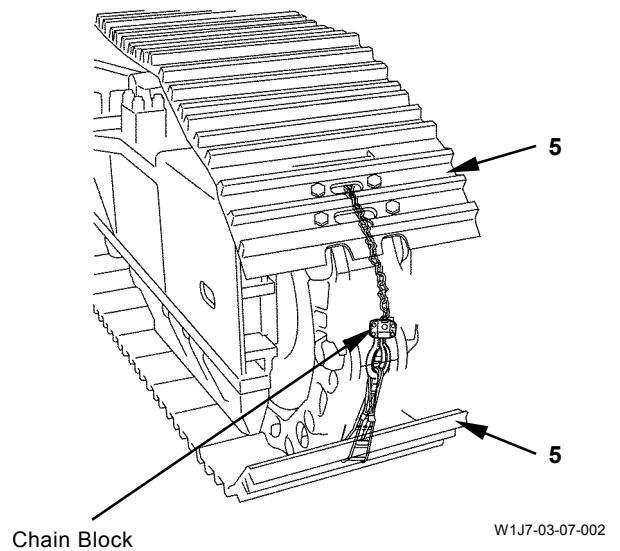
5. After the track is attached to front idler (4), raise the machine. Remove the block. Lower the machine.



W1J7-03-07-007


IMPORTANT: Insert the tapered side of guide pin (19) first.

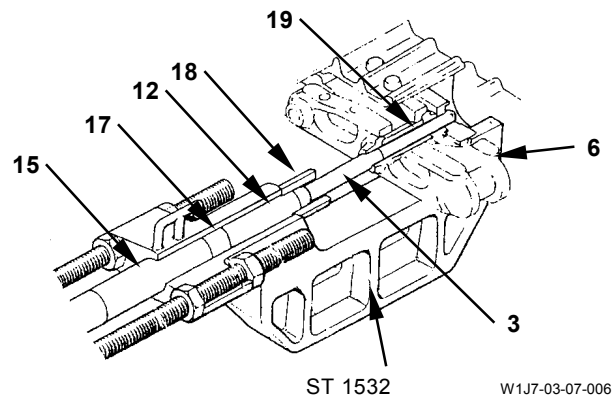
6. Secure shoe (5) of both ends of the track by using a chain block. Adjust the chain length by using the chain block and align with the master pin (3) mounting hole on track link (6). Insert guide pin (19) into the master pin (3) mounting hole.



W1J7-03-07-002

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. Guide (18) is not used for ZAXIS850-3.



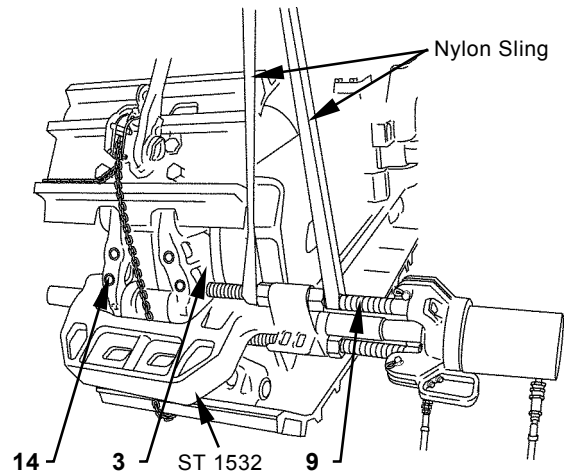
W1J7-03-07-006

UNDERCARRIAGE / Track



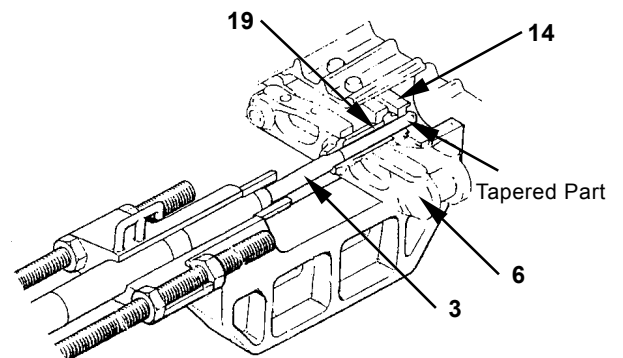
CAUTION: Special tool (ST 1532) when removing and installing master pin weight: 150 kg (330 lb)

- 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 adjust height of adapter (14) and master pin (3) in special tool (ST 1532) when removing and installing master pin (3).



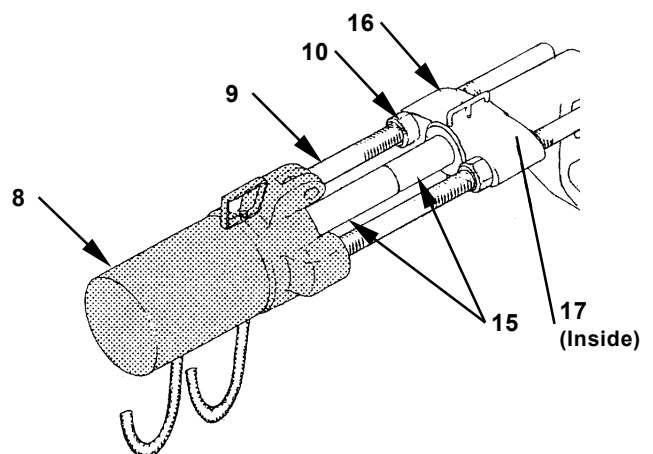
IMPORTANT: Align the centers of adapter (14) and master pin (3) with that of master pin (3) mounting hole. If the centers are not aligned and master pin (3) is installed, special tool (ST 1532) when removing and installing master pin (3) may be deformed or damaged.

- Align the tapered part end of guide pin (19) with the hole of adapter (14) in special tool (ST 1532) when removing and installing master pin. Adjust hydraulic cylinder (8) and push master pin (3) to the end of guide pin (19). Check for the installation conditions of guide pin (19) and special tool (ST 1532) when removing and installing master pin.



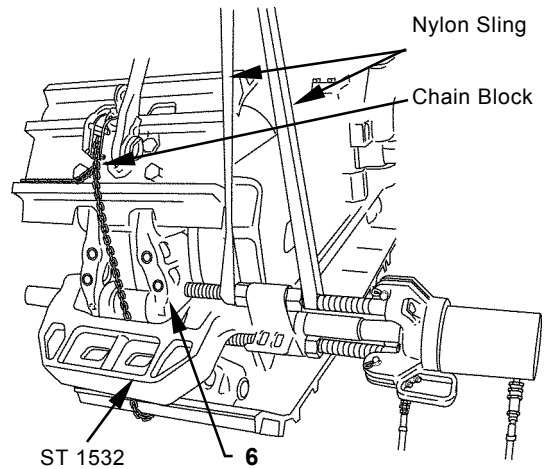
- Extend hydraulic cylinder (8) and insert master pin (3) until guide pin (19) is pushed out from the master pin (3) mounting hole on track link (6).

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.



UNDERCARRIAGE / Track


11. Remove special tool (ST 1532) when removing and installing master pin and a chain block from track link (6).




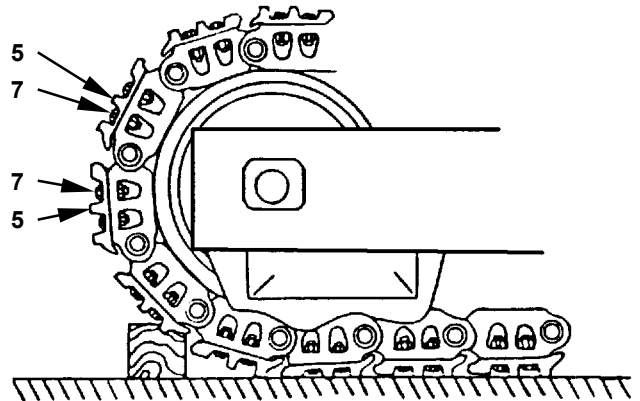
W1J7-03-07-003

CAUTION: Shoe (5) weight: 43 kg (65 lb)

12. Install shoes (5) (2 used) with bolts (7) (8 used).


 : 41 mm


 : 1400 N·m (143 kgf·m, 1033 lbf·ft)



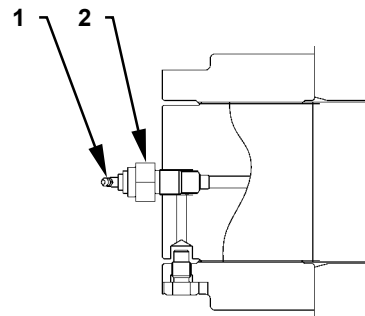
W105-03-07-006

13. Tighten valve (2). Apply grease through grease fitting (1) and adjust the track tension.

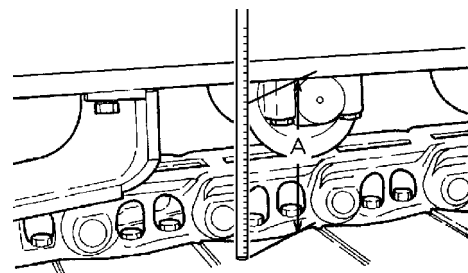
 : 24 mm

 : 147 N·m (15 kgf·m, 108 lbf·ft)

Track sag specifications (A): 450 to 500 mm
(17.7 to 19.7 in)




W800-03-07-027

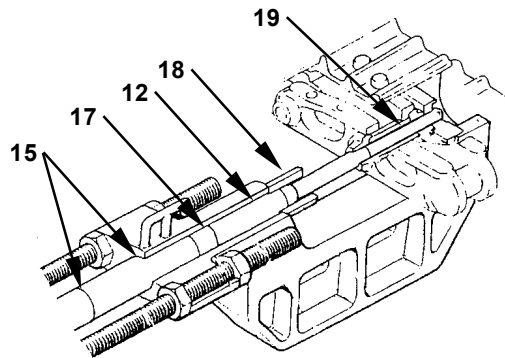


W800-03-06-001

UNDERCARRIAGE / Track


14. Remove extension (15), pilot (17), pusher (12) and guide (18) from special tool (ST 1532) when removing and installing master pin.

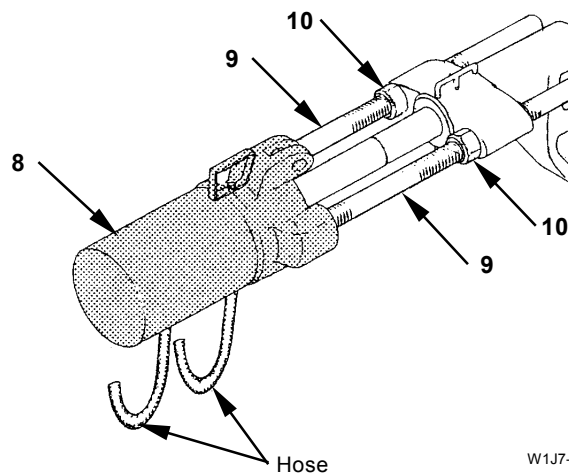
 **NOTE:** Guide (18) is not used for ZAXIS850-3.



W1J7-03-07-006

15. Remove the hoses (2 used) from 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).



W1J7-03-07-005

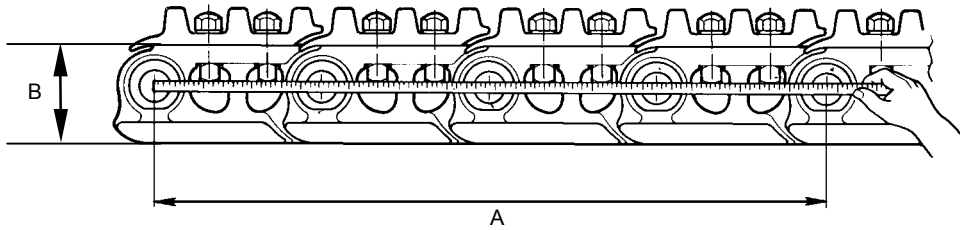
UNDERCARRIAGE / Track

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.



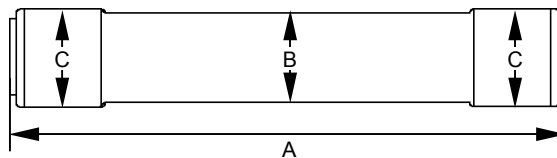
W155-03-07-001

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	1041.4 (41.0)	1062.2 (41.8)	Cladding by welding and finish or replace
B	155 (6.1)	[147.2 (5.8)]	

[] : Reference

Master Pin



W800-03-07-028

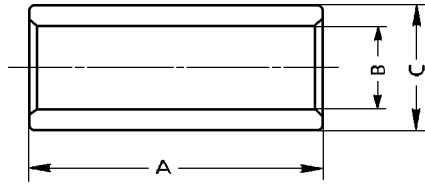
Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	319.5 (12.6)	-	Replace
B	56.8 (2.2)	[53.8 (2.1)]	
C	57.0 (2.2)	-	

[] : Reference

UNDERCARRIAGE / Track

Master Bushing



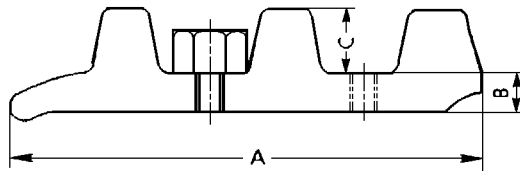
W105-03-07-023

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	204.15 (8.0)	-	Replace
B	57.65 (2.27)	[60.7 (2.4)]	
C	85.35 (3.36)	[80.4 (3.2)]	

[] : Reference

Grouser Shoe



W105-03-07-024

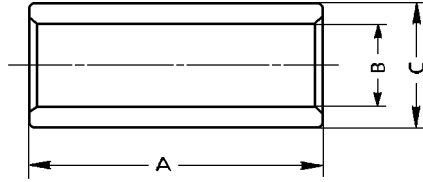
Unit: mm (in)

Shoe Size	Grouser Shoe		Remedy
	Standard	Allowable Limit	
A	302 (11.89)	-	Replace
B	19 (0.75)	-	
C	50 (1.97)	24 (0.95)	

[] : Reference

UNDERCARRIAGE / Track

Bushing



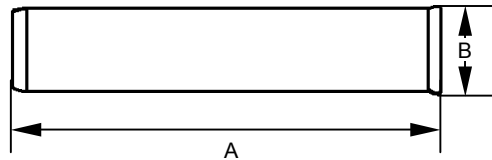
W105-03-07-023

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	223.6 (8.80)	-	Replace
B	58.15 (2.29)	[60.7 (2.4)]	
C	85.35 (3.36)	78.55 (3.09)	

[] : Reference

Pin



W142-03-07-004

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	319.5 (12.6)	-	Replace
B	57.1 (2.25)	[54.1 (2.1)]	

[] : Reference

UNDERCARRIAGE / Track

(Blank)

SECTION 4 FRONT ATTACHMENT



— CONTENTS —

Group 1 Front Attachment

Hydraulic Circuit Pressure Release	
Procedure.....	W4-1-1
Remove and Install Bucket.....	W4-1-2
Remove and Install Arm	W4-1-6
Remove and Install Boom.....	W4-1-12
Remove and Install Bushing	W4-1-20
Maintenance Standard.....	W4-1-22
Standard Dimensions for	
Arm and Bucket Connection	W4-1-25
Standard Dimensions for	
Arm and Boom Connection	W4-1-26


Group 2 Cylinder

Remove and Install Cylinder.....	W4-2-1
Hydraulic Circuit Pressure Release	
Procedure	W4-2-14
Main Pilot to Release Pressure	W4-2-15
Disassemble Cylinder	W4-2-16
Assemble Cylinder.....	W4-2-22
Maintenance Standard.....	W4-2-26

(Blank)


FRONT ATTACHMENT / Front Attachment

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.

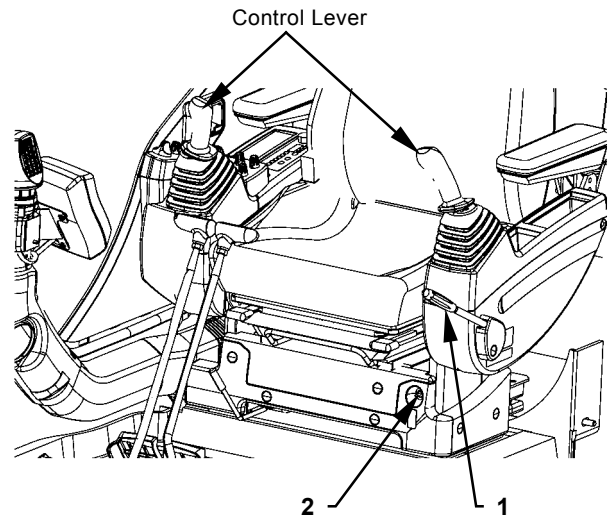
 **NOTE:** Perform steps 1, 2 and turn the key switch to the START position. Although the starter rotates, the engine does not start.

IMPORTANT: Battery will deplete. Operate the key switch for short period.

3. 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


FRONT ATTACHMENT / Front Attachment

REMOVE AND INSTALL BUCKET

Removal

1. Lower the bucket bottom onto the ground and set the arm in vertical against the ground contacting surface.
2. Remove nut (2). Remove split type O-rings (1) (4 used) from the bucket.
 : 8 mm
3. Remove bolts (5) (3 used) from stopper (4). Remove stopper (4) from pin (3).
 : 30 mm

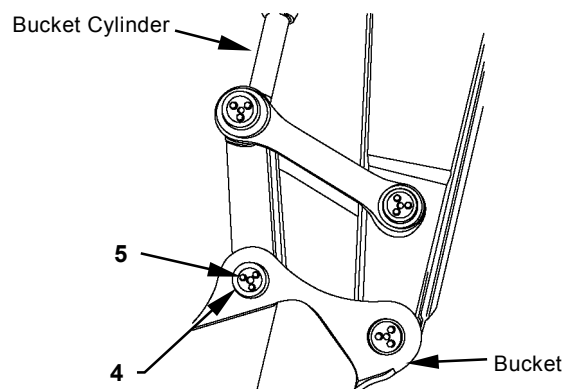
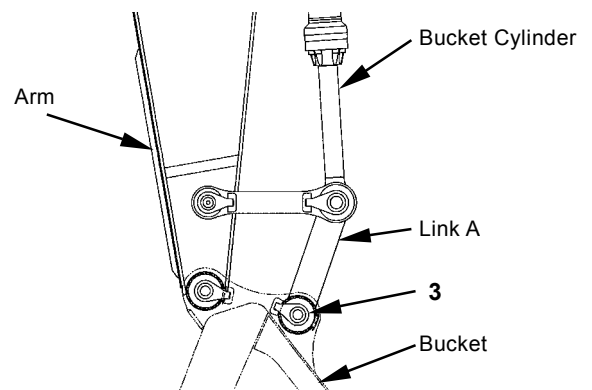
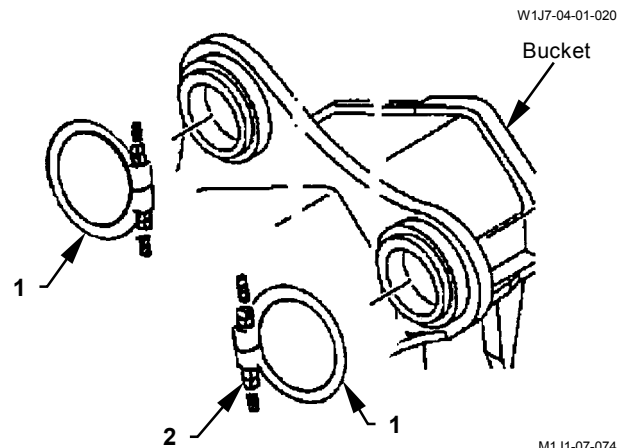
 **CAUTION:** Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

 **CAUTION:** Pin (3) weight: 82 kg (180 lb)

4. Slowly pull out pin (3) to the position where the bucket can be removed from link A. Attach a nylon sling onto the body of pin (3) and hoist pin (3). Remove pin (3) from the bucket.

IMPORTANT: Put a soft waste under link A and the bucket cylinder in order not to damage the arm.


5. Start the engine. Slowly retract the bucket cylinder. Secure link A and the bucket cylinder rod side to the arm.
Stop the engine.





W1J7-04-01-022

FRONT ATTACHMENT / Front Attachment


- Remove bolts (8) (3 used) from stopper (7). Remove stopper (7) from pin (6).

 : 30 mm

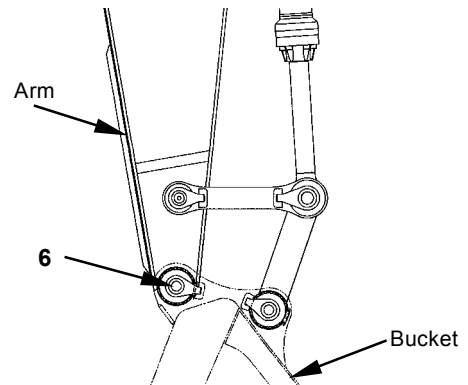
 **CAUTION:** Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

 **CAUTION:** Pin (6) weight:
2.9 m³ bucket: 94 kg (207 lb)
3.5 m³ bucket (BE): 98 kg (216 lb)

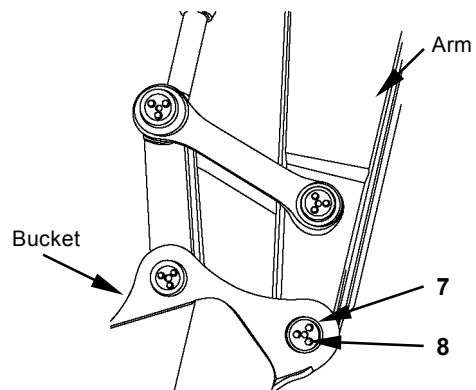
- Slowly pull out pin (6) to the position where the bucket can be removed from the arm. Attach a nylon sling onto the body of pin (6) and hoist pin (6). Remove pin (6) from the bucket.

 **CAUTION:** Bucket weight:
2.9 m³ bucket: 2980 kg (6570 lb)
3.5 m³ Bucket (BE): 3790 kg (8355 lb)

- Remove the bucket from the arm.



W1J7-04-01-021



W1J7-04-01-022

FRONT ATTACHMENT / Front Attachment

Installation



CAUTION: Bucket weight:
2.9 m³ bucket: 2980 kg (6570 lb)
3.5 m³ Bucket (BE): 3790 kg (8355 lb)

1. Hoist the bucket and lower the bucket bottom onto the ground.
2. Start the engine. Extend the bucket cylinder. Travel the machine forward and align the pin (6) hole on bucket with that on arm. Stop the engine.
3. Insert the shim between arm end and bucket. Adjust the clearance between arm end and bucket to 0.5 to 1.0 mm (0.02 to 0.04 in).

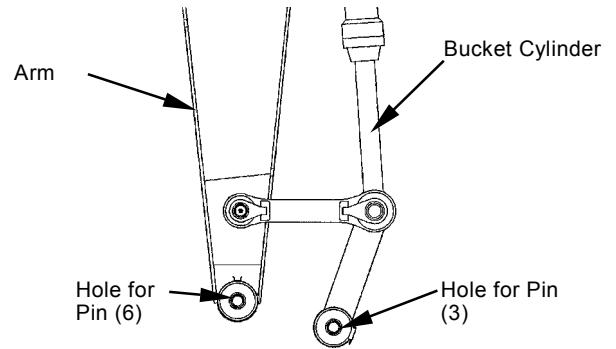


CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

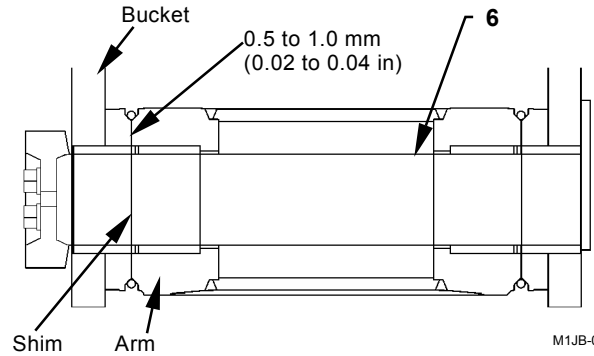


CAUTION: Pin (6) weight
2.9 m³ bucket: 94 kg (207 lb)
3.5 m³ Bucket (BE): 98 kg (216 lb)

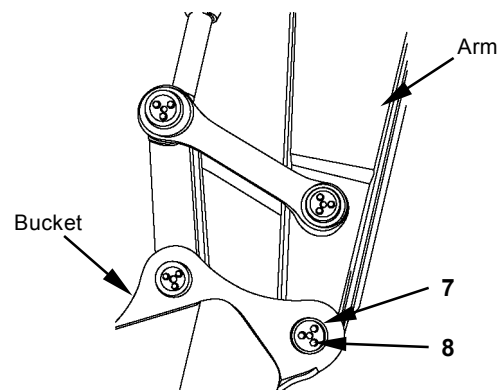
4. Attach a nylon sling onto the body of pin (6) and hoist pin (6). Install pin (6). Install stopper (7) to pin (6) with bolts (8) (3 used).
🔧 : 30 mm
🔩 : 400 N·m (40 kgf·m, 295 lbf·ft)
5. Extend the bucket cylinder. Align the pin (3) hole on bucket with that on link A.



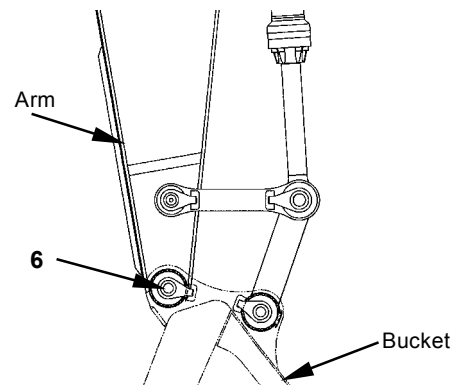
W1J7-04-01-009



M1JB-07-057



W1J7-04-01-022




W1J7-04-01-021

FRONT ATTACHMENT / Front Attachment

CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

CAUTION: Pin (3) weight: 82 kg (180 lb)


6. Attach a nylon sling onto the body of pin (3) and hoist pin (3). Install pin (3). Install stopper (4) to pin (3) with bolts (5) (3 used).


 : 30 mm

 : 400 N·m (40 kgf·m, 295 lbf·ft)

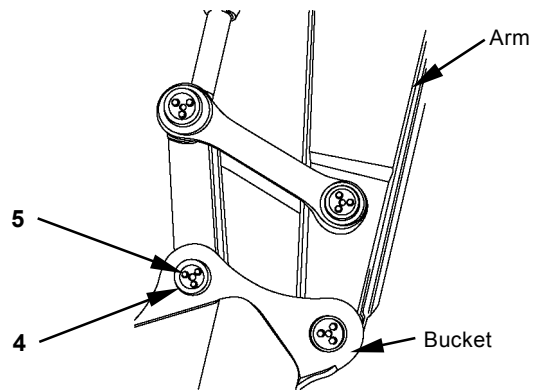
IMPORTANT: Install split type O-ring (1) so that the split part does not contact sand in order to reduce the damage of split type O-ring (1).

7. Install split type O-rings (1) (4 used) to the bucket.

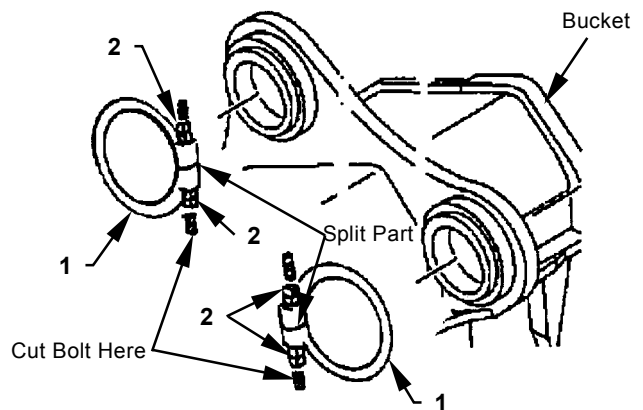
 : 8 mm

 **NOTE:** After installing O-ring (1), cut the bolt out of nut (2) to 10 to 20 mm (0.4 to 0.8 in) in order not to damage O-ring (1).

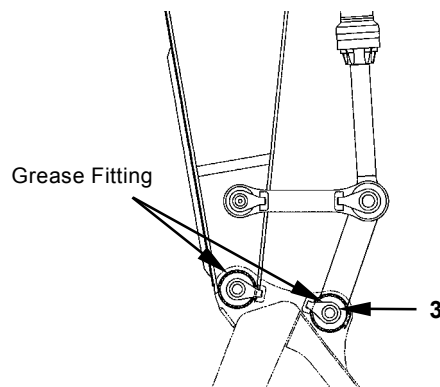
8. Apply grease to the grease fitting at bucket connecting side in the arm and link A.



W1J7-04-01-022



M1J1-07-074





W1J7-04-01-021

FRONT ATTACHMENT / Front Attachment

REMOVE AND INSTALL ARM

Removal

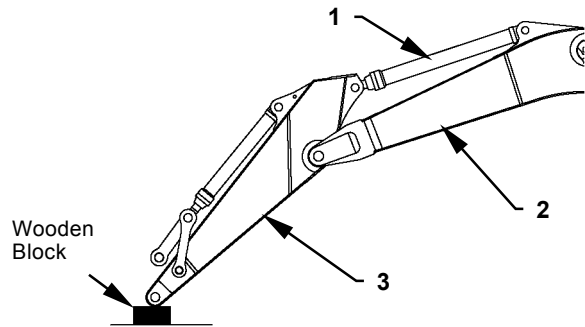
1. Remove the bucket.
(Refer to Removal of Bucket on W4-1-2.)
2. Fully retract arm cylinder (1) and lower boom (2).
Place the end of arm (3) onto the wooden block.
3. Release any pressure in the front attachment pipe and bleed air in the hydraulic oil tank. (Refer to W4-1-1, W1-4-1.)
4. Remove socket bolts (6) (8 used) from split flanges (7) (4 used). Remove hoses (5) (2 used) from bucket cylinder (4). Attach a plug onto the removed hose end and pipe end.
 : 14 mm
5. Remove lubrication hoses (8) (2 used) and (9) from arm (3) and arm cylinder (1). Attach a plug onto the removed hose end and pipe end.
 : 19 mm, 22 mm

CAUTION: The arm (3) assembly weight:
Standard 3.7 m arm: 4300 kg (9480 lb)
H 3.7 m arm: 4510 kg (9940 lb)
BE 2.9 m arm: 4650 kg (10250 lb)

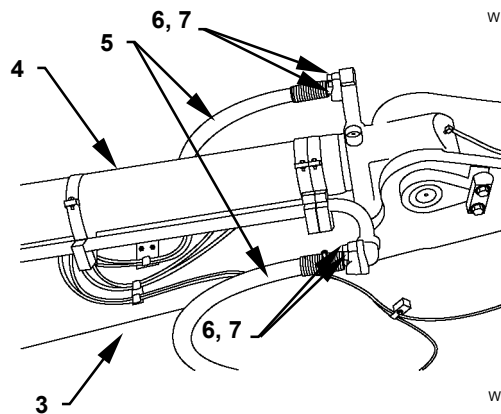
6. Install the shackles (2 used) to the arm (3) assembly. Attach a wire rope onto the arm (3) assembly and hold the arm (3) assembly.

CAUTION: Arm cylinder (1) weight: 1200 kg (2645 lb)

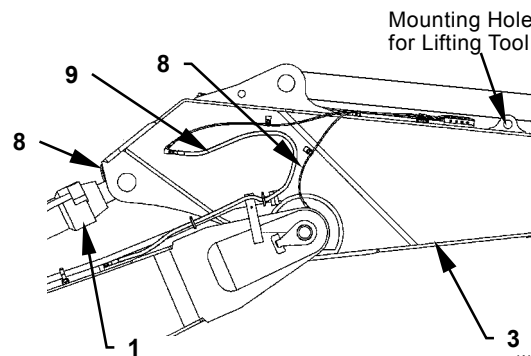
7. Place the wooden block between boom (2) and arm cylinder (1), and hold arm cylinder (1).



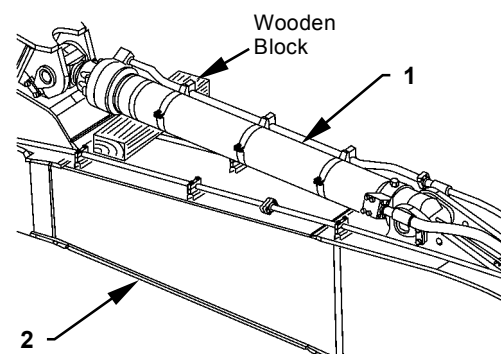
W1J7-04-01-010



W1J7-04-01-011




W1J7-04-01-012





W1JB-04-02-012

FRONT ATTACHMENT / Front Attachment

8. Remove bolts (12) (2 used) and washers (13) (2 used) from plate (11). Remove plate (11) from pin (10).

 : 30 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.


 **CAUTION:** Pin (10) weight: 44 kg (97 lb)

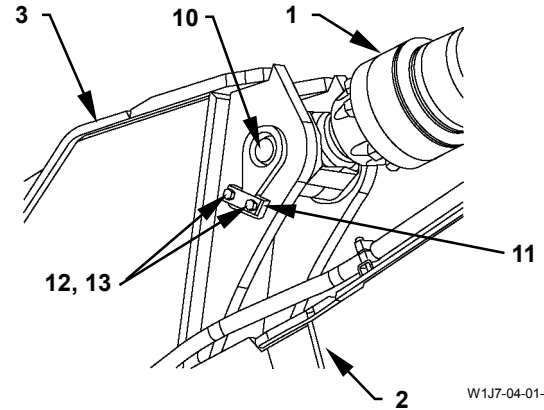
9. Pull out pin (10) to the position where the arm cylinder (1) rod can be removed from arm (3). Wind a nylon sling onto pin (10). Hoist and remove pin (10).

10. Start the engine and retract arm cylinder (1). In order not to extend the rod, pass a wire through the rod hole and secure the rod to the cylinder tube.

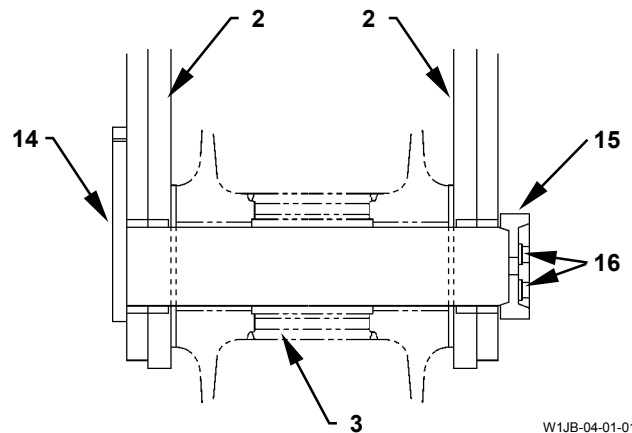
11. Secure arm cylinder (1) to boom (2).

12. Remove bolts (16) (3 used) from stopper (15). Remove stopper (15) from pin (14).

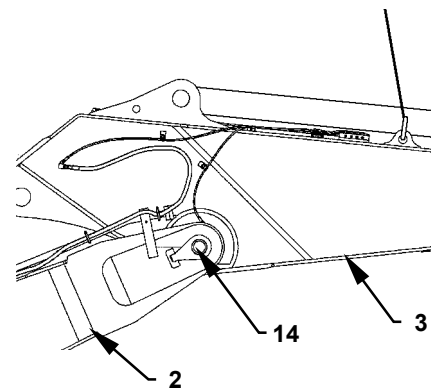
 : 30 mm



W1J7-04-01-015



W1JB-04-01-012



W1J7-04-01-014

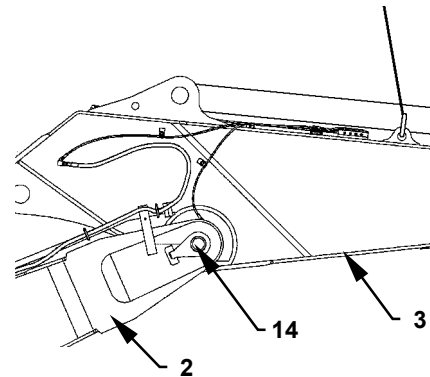
FRONT ATTACHMENT / Front Attachment

CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

CAUTION: Pin (14) weight: 110 kg (240 lb)

13. Pull out pin (14) to the position where the arm (3) assembly can be removed from boom (2). Remove thrust plate (17) from arm (3).

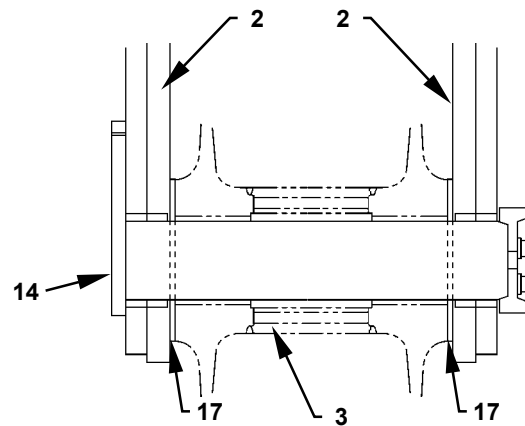
14. Attach a nylon sling onto pin (14). Hoist and remove pin (14).



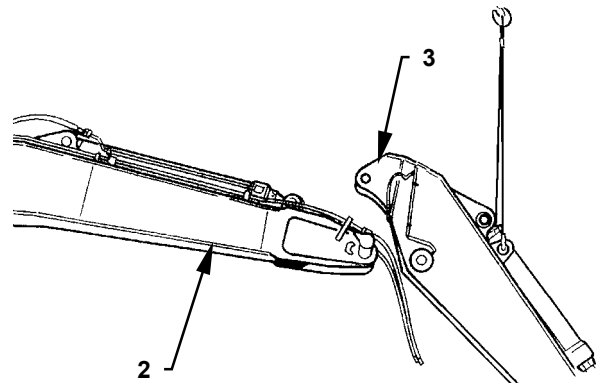
W1J7-04-01-014

CAUTION: The arm (3) assembly weight:
Standard 3.7 m arm: 4300 kg (9480 lb)
H 3.7 m arm: 4510 kg (9940 lb)
BE 2.9 m arm: 4650 kg (10250 lb)

15. Hold the arm (3) assembly and travel the machine backward. Remove the arm (3) assembly.



W1JB-04-01-012



W1J7-04-01-013

FRONT ATTACHMENT / Front Attachment

Installation


CAUTION: The arm (3) assembly weight:
Standard 3.7 m arm: 4300 kg (9480 lb)
H 3.7 m arm: 4510 kg (9940 lb)
BE 2.9 m arm: 4650 kg (10250 lb)


1. Install the shackles (2 used) to the arm (3) assembly. Hoist the arm (3) assembly. Travel the machine forward and align the pin (14) hole on boom (2) with that on arm (3).
2. Install thrust plates (17) into left and right sides of arm (3) respectively.
Thrust plate (17) thickness: 8.0 mm (0.3 in)
3. Insert the shims between arm (3) and thrust plate (17). Adjust clearance a to arm (3) within 1.5 mm (0.06 in).
Shim thickness: 1.0 or 2.0 mm (0.04 or 0.08 in)

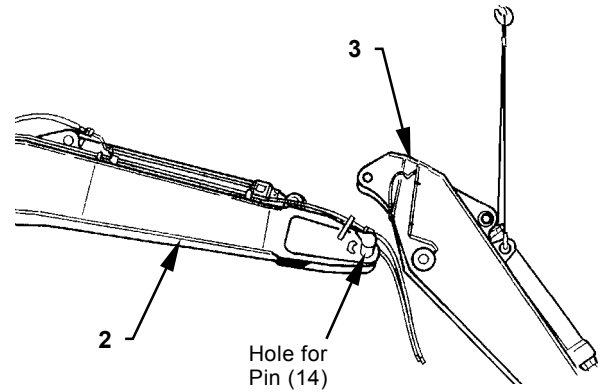
CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

CAUTION: Pin (14) weight: 110 kg (240 lb)

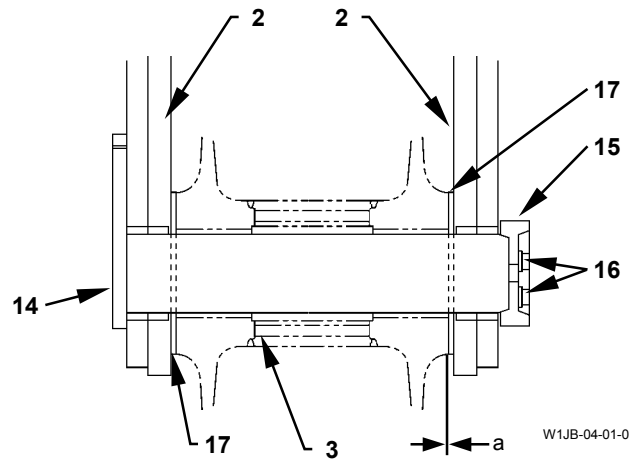
4. Attach a nylon sling onto pin (14) and hoist pin (14). Install pin (14) into boom (2). Install stopper (15) to pin (14) with bolts (16) (3 used).

 : 30 mm

 : 400 N·m (40 kgf·m, 295 lbf·ft)



W1J7-04-01-013



W1JB-04-01-012


FRONT ATTACHMENT / Front Attachment


⚠ CAUTION: Arm cylinder (1) weight: 1200 kg (2645 lb)

- Attach a wire rope onto arm cylinder (1) and hoist the rod side. Start the engine and extend the arm cylinder (1) rod. Align the pin (10) hole on arm cylinder (1) with that on arm (3).


⚠ CAUTION: Pin (10) weight: 44 kg (97 lb)


- Stop the engine. Attach a nylon sling onto pin (10) and hoist pin (10). Install pin (10). Install plate (11) to arm (3) with bolts (12) (2 used) and washers (13) (2 used).


 : 30 mm


 : 400 N·m (40 kgf·m, 295 lbf·ft)


- Install hoses (5) (2 used) to bucket cylinder (4) with split flanges (7) (4 used) and socket bolts (6) (8 used). Install lubrication hoses (8, 9).


 : 14 mm

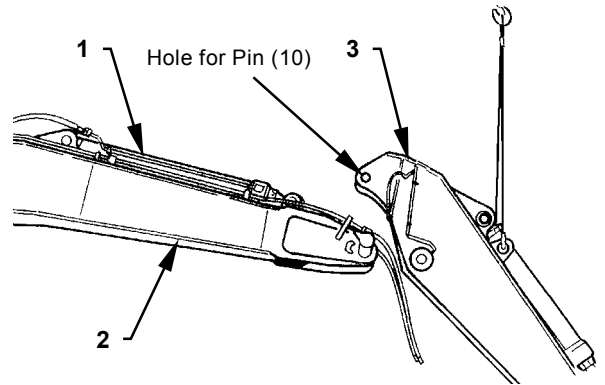
 : 210 N·m (21 kgf·m, 155 lbf·ft)

 : 19 mm

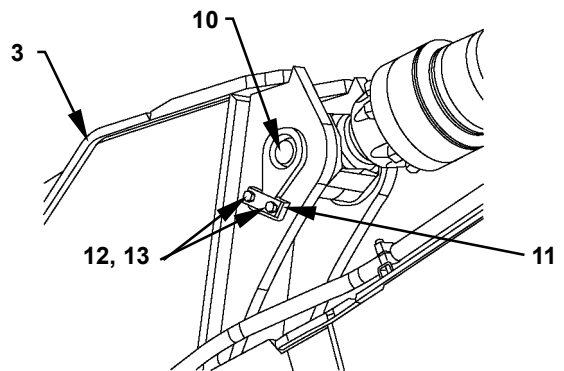
 : 30 N·m (3.0 kgf·m, 22 lbf·ft)

 : 22 mm

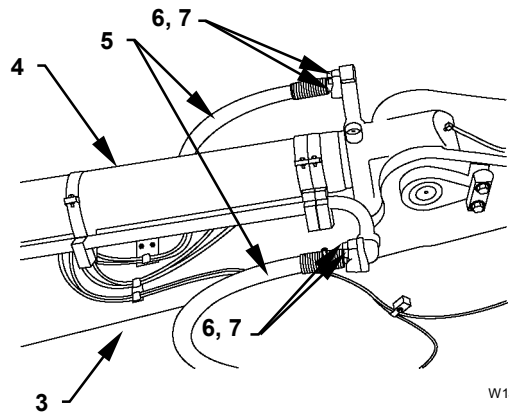
 : 40 N·m (4.0 kgf·m, 30 lbf·ft)



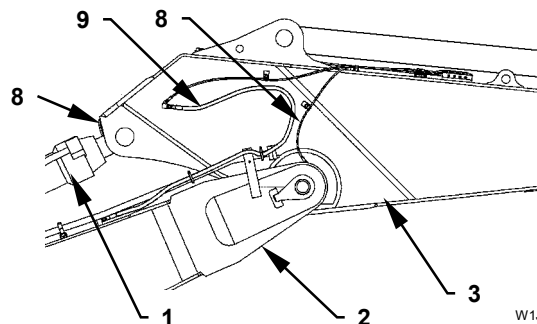
W1J7-04-01-013



W1J7-04-01-015



W1J7-04-01-011



W1J7-04-01-012

FRONT ATTACHMENT / Front Attachment

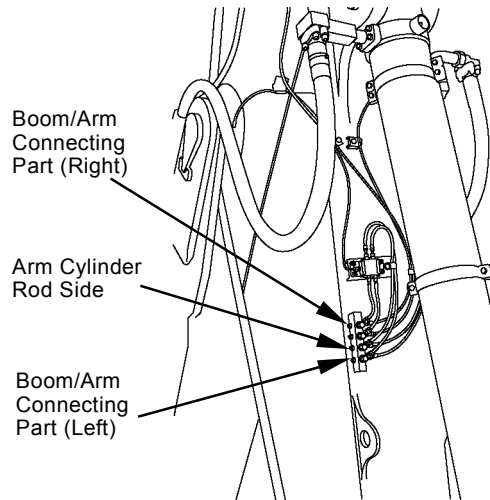
8. After installing the arm, apply grease to the boom/arm joint pin and the arm cylinder rod side by using a grease gun.

As for the machine equipped with the auto lubrication device (optional), turn the auto lubrication switch ON.

9. After completing the work, add hydraulic oil to the specified level.

10. Operate every cylinder fully to the stroke end several times and release the pressure in the circuit. Check for any oil leaks at the hose connection.

11. Install the bucket.
(Refer to Installation of Bucket on W4-1-4.)




W1J7-04-01-018


FRONT ATTACHMENT / Front Attachment


REMOVE AND INSTALL BOOM

Removal


1. Remove the bucket.
(Refer to Removal of Bucket on W4-1-2.)
2. Remove the arm.
(Refer to Removal of Arm on W4-1-6.)
3. Start the engine. Retract the boom cylinder and place the boom end onto the wooden block. Stop the engine.
4. Remove lubrication hose (1) from the boom cylinder rod side (both right and left sides). Disconnect the plug of boom light between cab and main frame.


 : 19 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.**

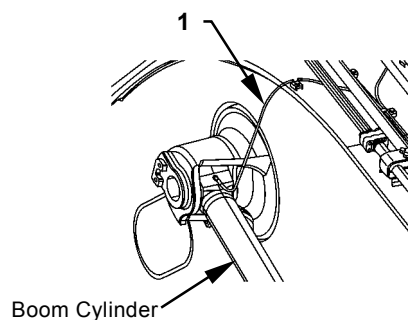
 **CAUTION: Boom cylinder weight: 850 kg (1875 lb)**

5. Attach a wire rope onto the boom cylinder and hold the boom cylinder. Remove bolts (4) (2 used). Remove plate (5) and spring washer (3) from pin (2).

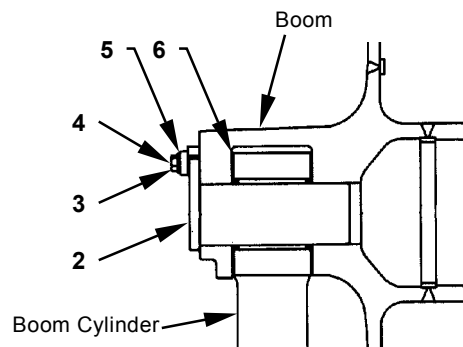
 : 30 mm

 **CAUTION: Pin (2) weight: 37 kg (82 lb)**

6. Pull out pin (2) from the boom. Hoist and remove pin (2). Remove the boom cylinder rod side from the boom. Remove plate (6).



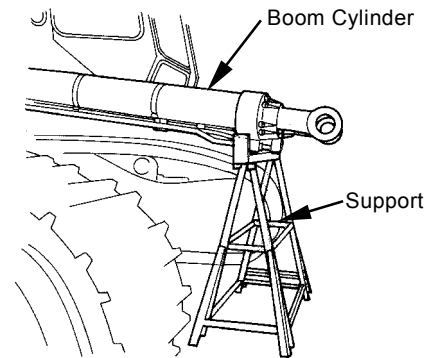
W1JB-04-02-007



W1JB-04-02-008

FRONT ATTACHMENT / Front Attachment


7. Lower the tube end on boom cylinder onto the support. Start the engine and retract the boom cylinder. 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.
8. Remove the rod side of other boom cylinder in the same procedures as steps 5, 6.
9. Release any pressure in the front attachment pipe and bleed air in the hydraulic oil tank. (Refer tot W4-1-1, W1-4-1.)




W1J7-04-01-019

NOTE: Procedures 10, 11 are for the machine equipped with the auto lubrication device (optional).


10. Remove lubrication hose (7). Cap the removed hoses.

 : 22 mm


11. Remove bolt (8) and remove clip (9).

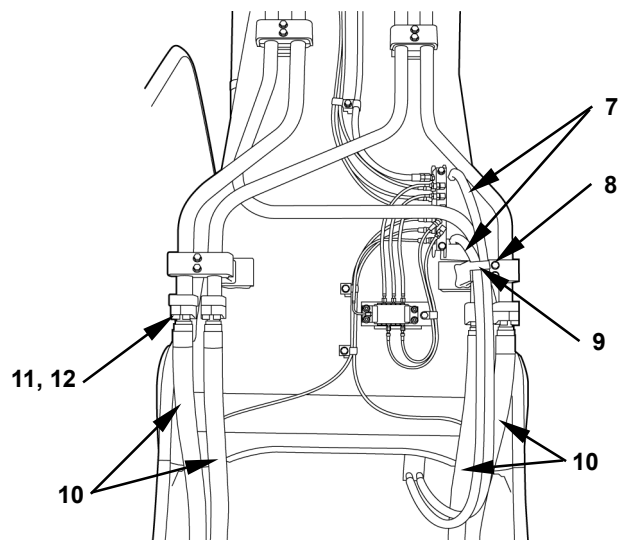
 : 17 mm

12. Remove socket bolts (11) (16 used) from split flanges (12) (8 used). Remove hoses (10) (4 used). Cap the removed hoses.

 : 12 mm, 14 mm

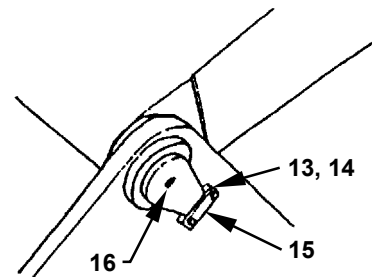
13. Remove bolts (13) (2 used) and spring washers (14) (2 used) from plate (15) for boom foot pin (16).

 : 30 mm

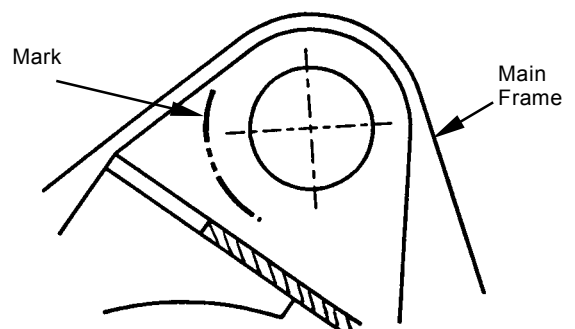


W1J7-04-01-001

NOTE: Put the mark for boom foot position on inside of the main frame in order to align the boom foot pin (16) holes easily when installing.



W105-04-01-007



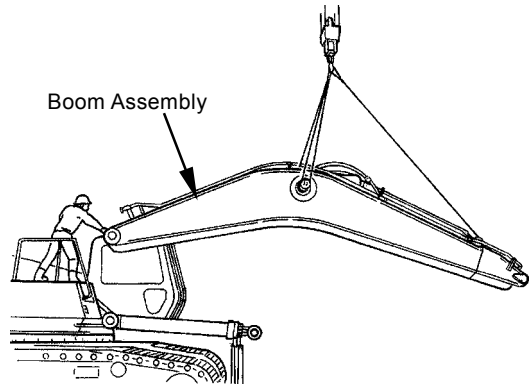
M116-07-121

FRONT ATTACHMENT / Front Attachment



CAUTION: The boom assembly weight:
Standard, H 8.4 m boom: 6710 kg (14790 lb)
BE 7.1 m boom: 6220 kg (13710 lb)

14. Attach a wire rope to the boom assembly. Hoist and hold the boom assembly.



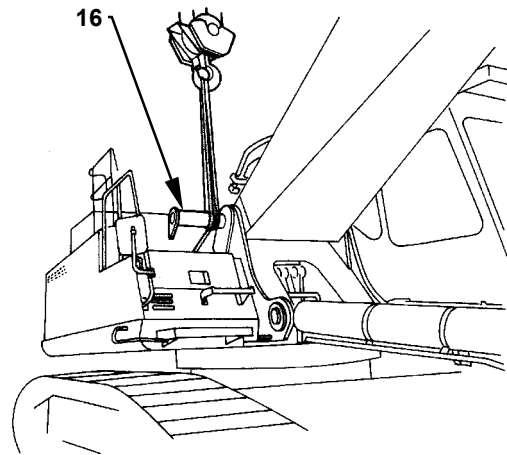
W1J7-04-01-017



CAUTION: Boom foot pin (16) weight: 250 kg (550 lb)

15. Insert a pry bar between the flange of boom foot pin (16) and the boss of main frame. Pull out boom foot pin (16) a little. Rotate boom foot pin (16) with the flange facing upward by hand. Slightly rotate boom foot pin (16) left and right and pull out boom foot pin (16). Wind a nylon sling onto boom foot pin (16). Hoist and remove boom foot pin (16).

16. Hoist and remove the boom assembly.



M162-06-028

FRONT ATTACHMENT / Front Attachment

Installation

CAUTION: The boom assembly weight:
Standard, 8.4 m boom: 6710 kg (14790 lb)
BE 7.1 m boom: 6220 kg (13710 lb)

1. Hoist the boom assembly and align the mounting hole for main frame with the boom foot part. Insert the shims into the left and right sides of boom foot. Adjust the clearance to main frame within 1.5 mm (0.06 in).


Shim Thickness: 2.3 or 1.0 mm (0.1 or 0.04 in)


NOTE: Align the matching marks made when removing.

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.


CAUTION: Boom foot pin (16) weight: 250 kg (550 lb)


2. Apply grease to boom foot pin (16). Insert boom foot pin (16). Install plate (15) to the main frame with bolts (13) (2 used) and spring washers (14) (2 used).


 : 30 mm


 : 400 N·m (40 kgf·m, 295 lbf·ft)

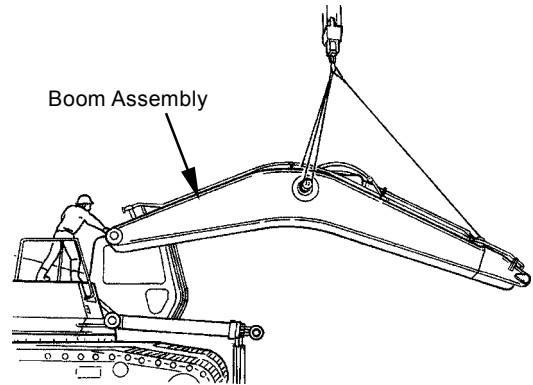
3. Install hoses (10) (4 used) with split flanges (12) (8 used) and socket bolts (11) (16 used).

 : 12 mm

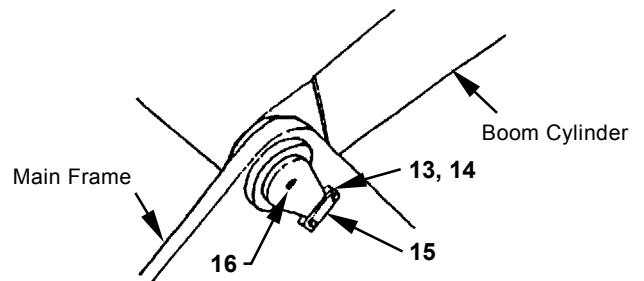
 : 140 N·m (14 kgf·m, 103 lbf·ft)

 : 14 mm

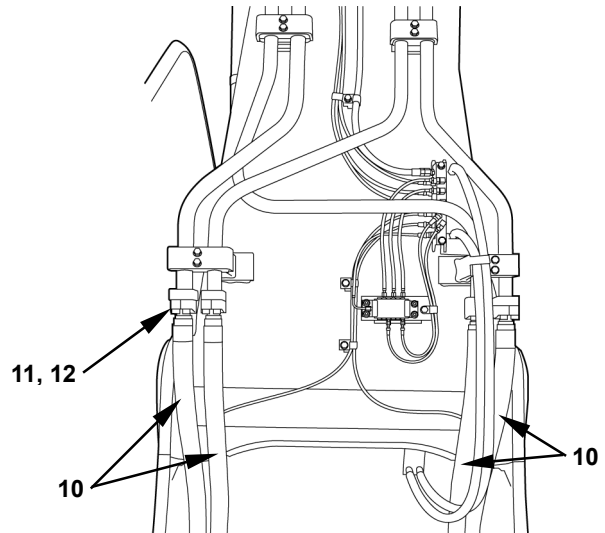
 : 210 N·m (21 kgf·m, 155 lbf·ft)



W1J7-04-01-017




W105-04-01-007





W1J7-04-01-001

FRONT ATTACHMENT / Front Attachment


 **NOTE:** Procedures 4, 5 are for the machine equipped with the auto lubrication device (optional).


4. Install lubrication hose (7).

 : 22 mm

 : 40 N·m (4.0 kgf·m, 30 lbf·ft)

5. Install clip (9) to lubrication hose (7) and secure with bolt (8).


 : 17 mm


 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

6. When adding hydraulic oil to the specified level, start the engine and check for any oil leaks at hose connection.

 **CAUTION:** Boom cylinder weight: 850 kg (1875 lb)


7. Hoist the boom cylinder rod side. Start the engine. Extend the boom cylinder and align with the pin (2) 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.

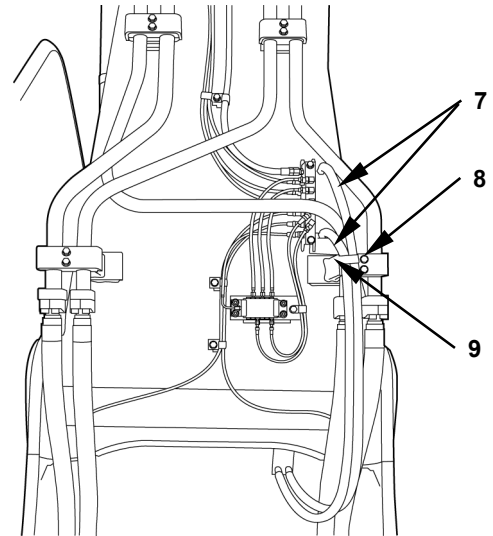
 **CAUTION:** Pin (2) weight: 37 kg (82 lb)

8. Attach a nylon sling onto pin (2) and hoist pin (2). Insert plate (6) between boom and boom cylinder. Install pin (2). Install the boom cylinder to the boom.

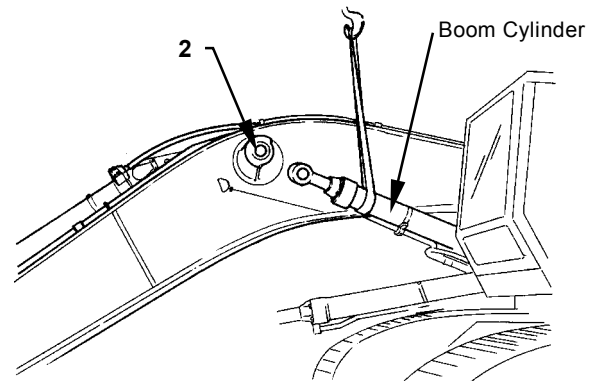
9. Secure pin (2) to the boom with plate (5), spring washers (3) (2 used) and bolts (4) (2 used).

 : 30 mm

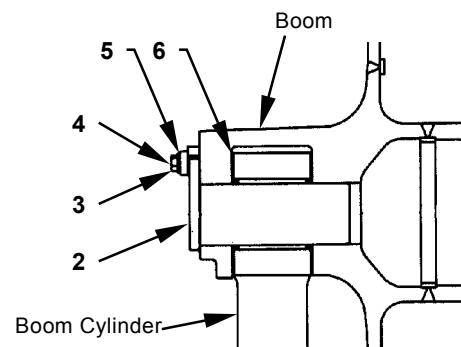
 : 400 N·m (40 kgf·m, 295 lbf·ft)



W1J7-04-01-001




W1J7-04-01-016




W1JB-04-02-008

FRONT ATTACHMENT / Front Attachment

10. Install lubrication hose (1) to the boom cylinder rod side.

 : 19 mm

 : 30 N·m (3.0 kgf·m, 22 lbf·ft)

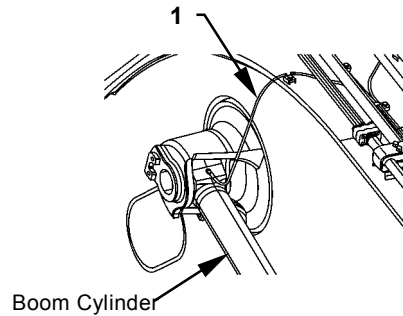
11. Connect the plug of boom light.

12. Apply grease to the boom foot part and the boom cylinder rod side by using a grease gun.
As for the machine equipped with the auto lubrication device (optional), turn the auto lubrication switch ON

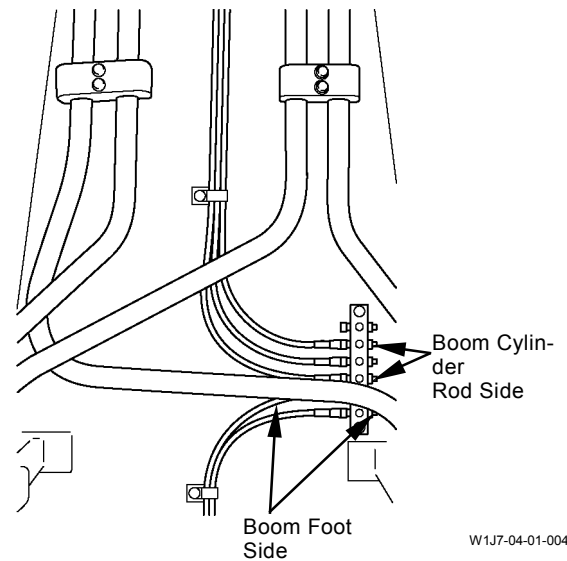
13. Install the arm.
(Refer to Installation of Arm on W4-1-9.)

14. Install the bucket.
(Refer to Installation of Bucket on W4-1-4.)

15. After completing the work, add hydraulic oil to the specified level. 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.



W1JB-04-02-007



W1J7-04-01-004

FRONT ATTACHMENT / Front Attachment

IMPORTANT: For handling of HN bushing for the front attachment, check the followings.

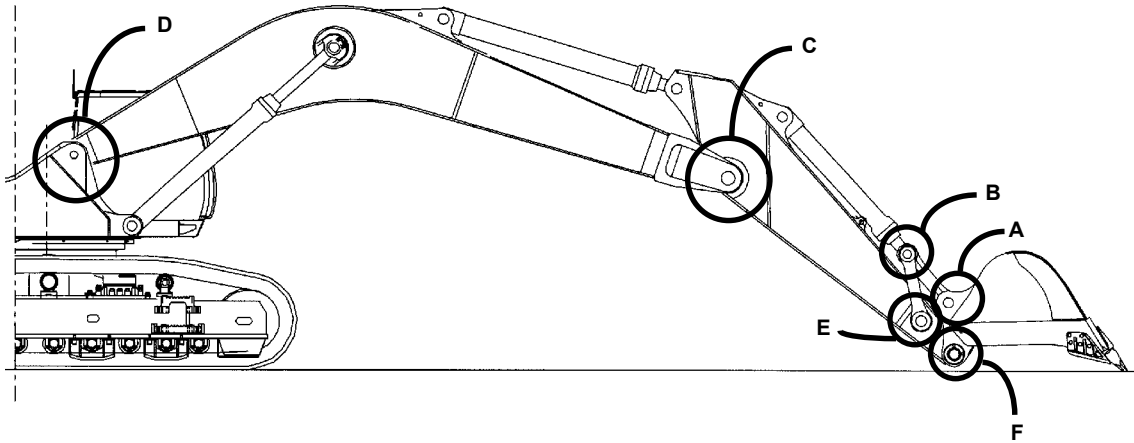
- Precautions when installing the bushing
When installing the bushing and if a hammer is used, the bushing may be damaged. Install the bushing by using a press.
- Precautions when reinforcing the arm
The heat when welding in order to reinforce the arm may cause oil leakage and decrease lubrication performance.
When lubrication oil leaks, replace the bushing.

FRONT ATTACHMENT / Front Attachment

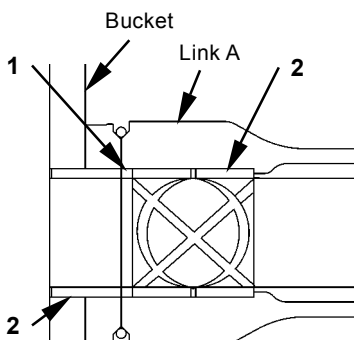
(Blank)

FRONT ATTACHMENT / Front Attachment

REMOVE AND INSTALL BUSHING

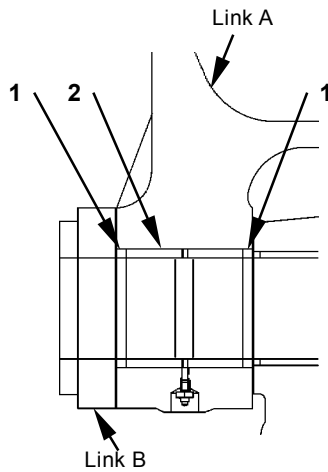


W1JB-04-02-015



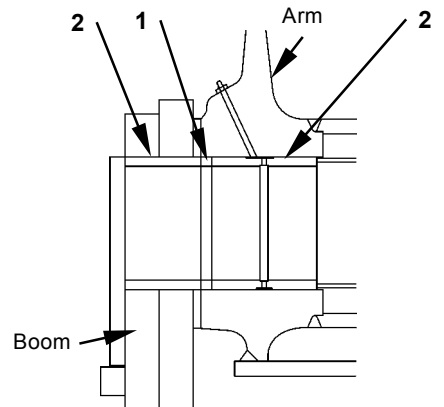
A: Bucket and Link A

W17V-04-01-001



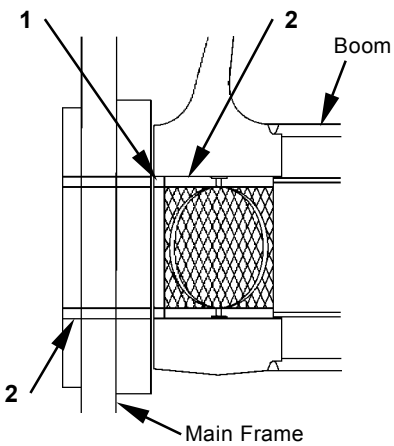
B: Link A

W1JB-04-01-015



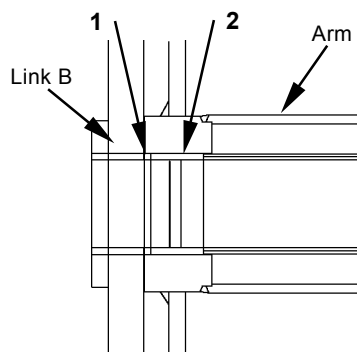
C: Arm

W1JB-04-01-013



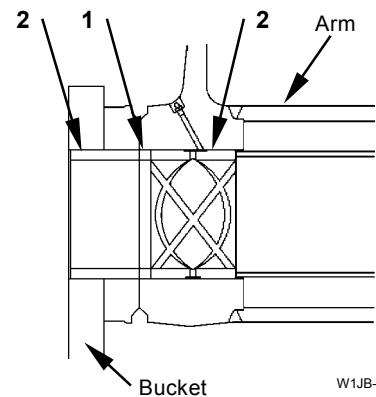
D: Boom and Main Frame

W1JB-04-01-016



E: Arm

W17V-04-01-005



F: Arm and Bucket

W1JB-04-01-014


1 - Dust Seal

2 - Bushing

FRONT ATTACHMENT / Front Attachment

Removal

1. Remove dust seal (1) and bushing (2).

 *NOTE: If bushing (2) cannot be removed, burn off bushing (2).*

Installation

1. Cool bushing (2) by using dry ice.
2. Install bushing (2) and dust seal (1).
Install bushing (2) by using the following plate.

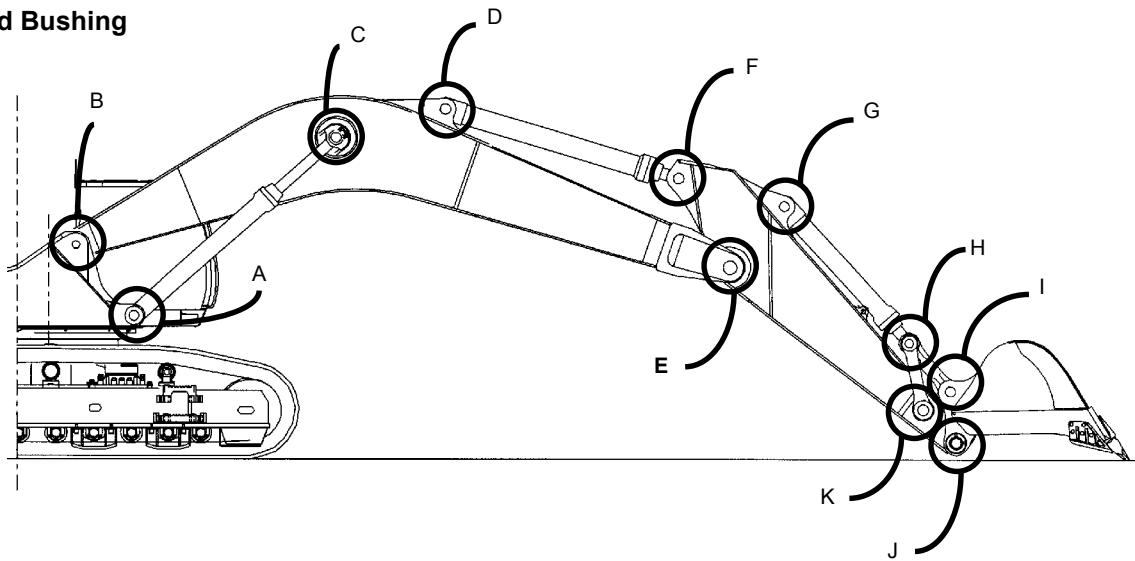
Plate when installing bushing

A: Bucket side	ST 2081
Link A side.....	ST 2081
B: Link A.....	ST 2179
C: Arm	ST 2179
Boom side.....	ST 2080
D: Boom side.....	ST 2038
Main frame side	ST 2038
E: Arm	ST 2007
F: Bucket side	ST 2081
Arm side.....	ST 2134

FRONT ATTACHMENT / Front Attachment

MAINTENANCE STANDARD

Pin and Bushing



W1JB-04-02-015

Unit: mm (in)

Position	Item	Standard	Allowable Limit
A: Boom Cylinder and Main Frame	Pin Outer Dia.	130 (5.12)	129 (5.08)
	Pin Hole Inner Dia. (Main Frame Side)	130 (5.12)	-
	Bearing Inner Dia. (Cylinder Side)	130 (5.12)	131.5 (5.18)
B: Boom and Main Frame	Pin Outer Dia.	170 (6.69)	169 (6.65)
	Bushing Inner Dia. (Frame Side)	170 (6.69)	171.5 (6.75)
	Bushing Outer Dia.	190 (7.48)	-
	Bushing Inner Dia. (Boom Side)	170 (6.69)	171.5 (6.75)
C: Boom Cylinder and Boom	Bushing Outer Dia.	200 (7.87)	-
	Pin Outer Dia.	130 (5.12)	129 (5.08)
	Pin Hole Inner Dia. (Boom Side)	130 (5.12)	-
	Bearing Inner Dia. (Cylinder Side)	130 (5.12)	131.5 (5.18)

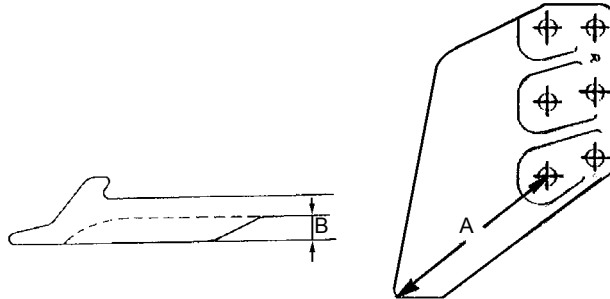
FRONT ATTACHMENT / Front Attachment

			Unit: mm(in)
Position	Item	Standard	Allowable Limit
D: Boom and Arm Cylinder	Pin Outer Dia.	140 (5.51)	139 (5.47)
	Pin Hole Inner Dia. (Boom Side)	140 (5.51)	-
	Bearing Inner Dia. (Cylinder Side)	140 (5.51)	141.5 (5.57)
E: Boom and Arm	Pin Outer Dia.	150 (5.91)	149 (5.87)
	Bushing Inner Dia. (Boom Side)	150 (5.91)	151.5 (5.97)
	Bushing Outer Dia.	180 (7.09)	-
	Bushing Inner Dia. (Arm Side)	150 (5.91)	151.5 (5.97)
	Bushing Outer Dia.	180 (7.09)	-
F: Arm Cylinder and Arm	Pin Outer Dia.	140 (5.51)	139 (5.47)
	Pin Hole Inner Dia. (Arm Side)	140 (5.51)	-
	Bearing Inner Dia. (Cylinder Side)	140 (5.51)	141.5 (5.57)
G: Arm and Bucket Cylinder	Pin Outer Dia.	130 (5.12)	129 (5.08)
	Pin Hole Inner Dia. (Arm Side)	130 (5.12)	-
	Bearing Inner Dia. (Cylinder Side)	130 (5.12)	131.5 (5.18)
H: Bucket Cylinder and Link	Pin Outer Dia.	150 (5.91)	149 (5.87)
	Bushing Inner Dia. (Link A Side)	150 (5.91)	151.5 (5.97)
	Bushing Outer Dia.	180 (7.09)	-
	Bearing Inner Dia. (Cylinder Side)	150 (5.91)	151.5 (5.97)
I: Link and Bucket	Pin Outer Dia.	130 (5.12)	129 (5.08)
	Bushing Inner Dia. (Link A Side)	130 (5.12)	131.5 (5.18)
	Bushing Outer Dia.	160 (6.30)	-
	Bushing Inner Dia. (Bucket Side)	130 (5.12)	129 (5.08)
	Bushing Outer Dia.	160 (6.30)	-
J: Arm and Bucket	Pin Outer Dia.	140 (5.51)	139 (5.47)
	Bushing Inner Dia. (Arm Side)	140 (5.51)	141.5 (5.57)
	Bushing Outer Dia.	170 (6.69)	-
	Bushing Inner Dia. (Bucket Side)	140 (5.51)	141.5 (5.57)
	Bushing Outer Dia.	170 (6.69)	-
K: Arm and Link	Pin Outer Dia.	110 (4.33)	109 (4.29)
	Bushing Inner Dia. (Arm Side)	110 (4.33)	111.5 (4.39)
	Bushing Outer Dia.	140 (5.51)	-

IMPORTANT: When replacing HN bushing for the front attachment, install it by using a press.

FRONT ATTACHMENT / Front Attachment

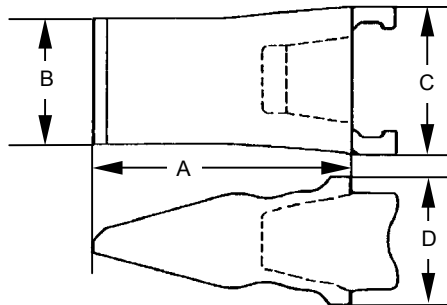
Side Cutter



W166-04-01-011

			Unit: mm (in)
	Standard	Allowable Limit	Remedy
A	351 (13.8)	228 (8.97)	Replace
B	25 (0.98)	-	

Point

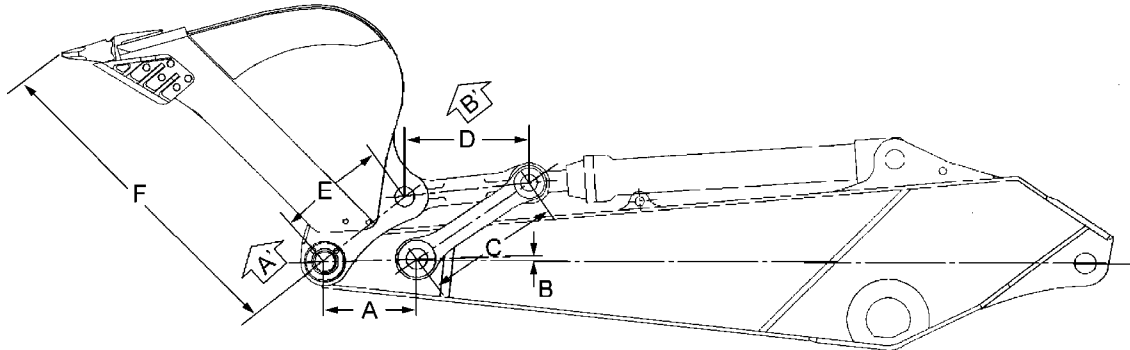


W142-04-01-021

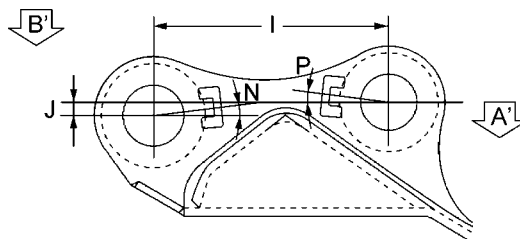
			Unit: mm (in)
	Standard	Allowable Limit	Remedy
A	3.6 (12.05)	153 (6.02)	Replace
B	153 (6.02)	-	
C	164 (6.46)	-	
D	158 (6.22)	-	

FRONT ATTACHMENT / Front Attachment

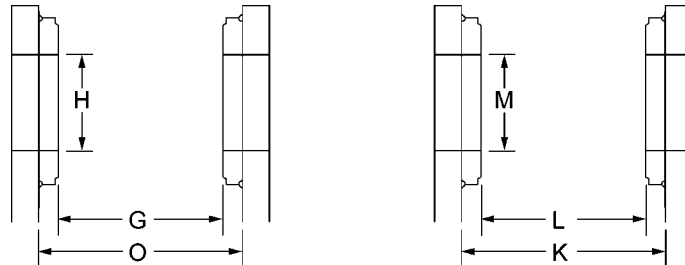
STANDARD DIMENSIONS FOR ARM AND BUCKET CONNECTION



W1JB-04-01-001



W1JB-04-01-007



Section A'

Section B'

W1JB-04-01-008

A	600 (23.6)
B	20 (0.79)
C	890 (35.0)
D	820 (32.3)
E	-

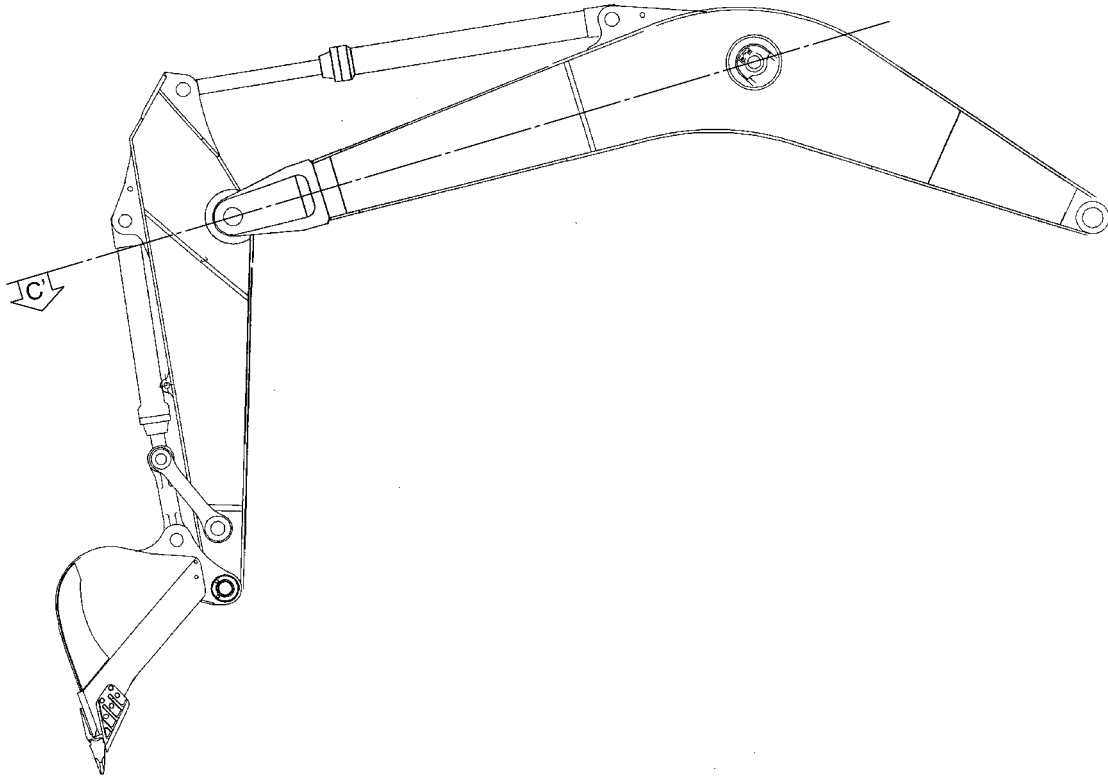
F	2190 (86.2)
G	555 (21.85)
H	140 (5.51)
I	674 (26.54)
J	56 (2.20)

Unit: mm (in)	
K	627 (24.69)
L	555 (21.85)
M	130 (5.12)
N	10°
O	627 (24.69)
P	5°

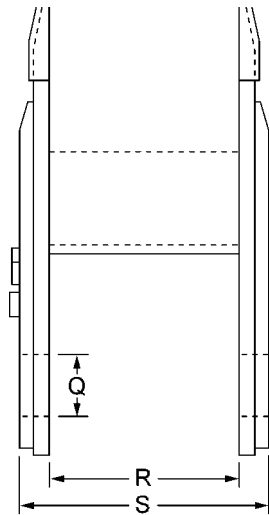
NOTE: Dimension G: 555 mm (21.85 in) includes the clearance for shims in order to adjust the bucket clearance.
 Dimensions N: 10°, P: 5° indicate the angle of stopper.
 Dimensions E, I and J are different according to the bucket type.

FRONT ATTACHMENT / Front Attachment

STANDARD DIMENSIONS FOR ARM AND BOOM CONNECTION



W1JB-04-01-002



W1JB-04-01-009

Section C'

Unit: mm (in)


Q	150 (5.91)
R	538 (21.18)
S	708 (27.87)

FRONT ATTACHMENT / Cylinder

REMOVE AND INSTALL CYLINDER

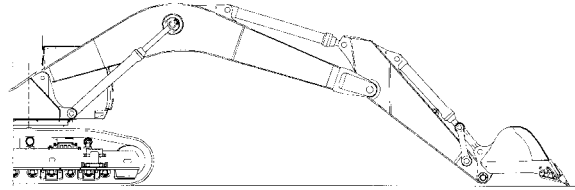
Preparation

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.

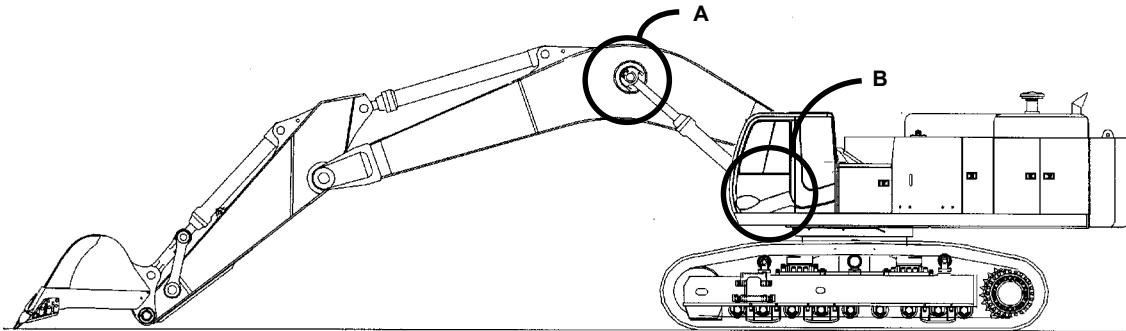
3. Release any pressure in the front attachment pipe.
(Refer to the HYDRAULIC CIRCUIT PRESSURE RELEASE PROCEDURE on W4-1-1.)
4. Release the pressure in the hydraulic oil tank.
(Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)



W1JB-04-02-015

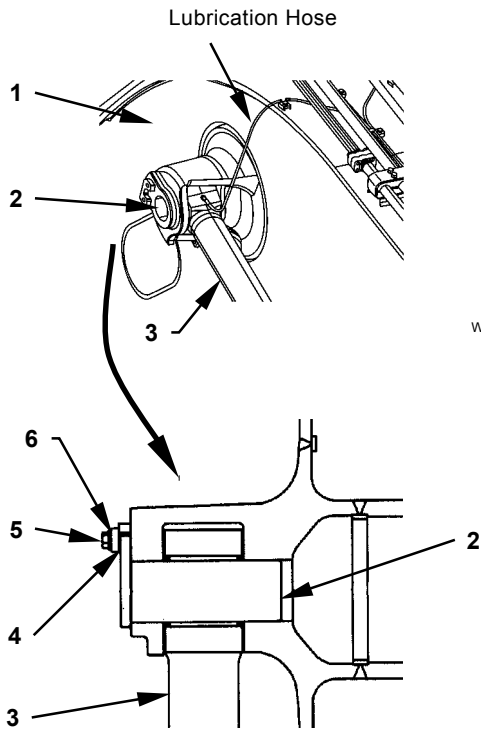
FRONT ATTACHMENT / Cylinder

Remove and Install Boom Cylinder



W1JB-04-02-006

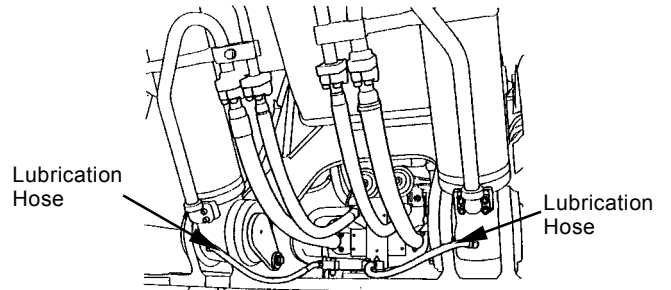
A: Rod Side



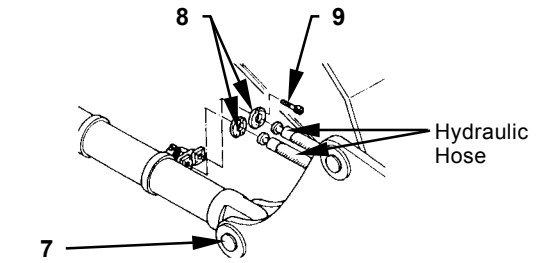
W1JB-04-02-007

W1JB-04-02-008

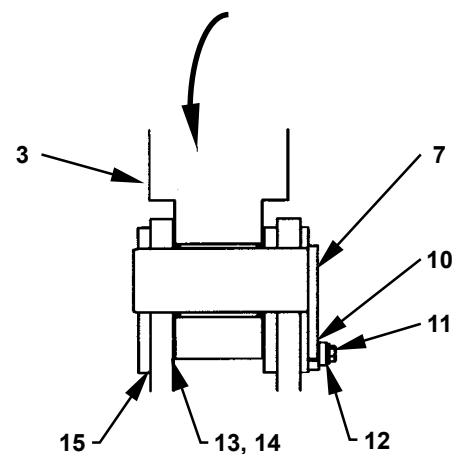
B: Bottom Side



W1JB-04-01-017



W162-04-01-019



W162-04-01-025

- | | | | |
|----------------------------|----------------------------|---------------------------|-----------------|
| 1 - Boom | 5 - Bolt (4 Used) | 9 - Socket Bolt (16 Used) | 13 - Shim |
| 2 - Pin (2 Used) | 6 - Spring Washer (4 Used) | 10 - Plate (2 Used) | 14 - Shim |
| 3 - Boom Cylinder (2 Used) | 7 - Pin (2 Used) | 11 - Bolt (4 Used) | 15 - Main Frame |
| 4 - Plate (2 Used) | 8 - Split Flange (8 Used) | 12 - Washer (4 Used) | |


FRONT ATTACHMENT / Cylinder

Removal




CAUTION: When tapping the pin by using a hammer, metal fragments may fly off. Prevent personal injury. Be sure to wear necessary protection, such as goggles, a hard hat, etc..

1. Remove the lubrication hoses (2 used) from the rod side of both boom cylinders (3).

 : 19 mm

2. Remove the lubrication hoses (2 used) from the bottom side of boom cylinder (3) (2 used).

 : 19 mm




**CAUTION: Boom cylinder (3) weight: 850 kg (1870 lb)
Pin (2) weight: 37 kg (82 lb)**

3. Attach a nylon sling to boom cylinder (3) and hold boom cylinder (3).

Remove bolts (5) (2 used), spring washers (6) (2 used) and plate (4) from the cylinder rod side.

Pry and remove pin (2) from boom (1) by using a pry bar.


 : 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 boom cylinder (3).



CAUTION: 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.


5. Stop the engine. Release any remaining pressure in the hydraulic lines and oil tank (Refer to W4-2-14). Remove socket bolts (9) (8 used) and split flanges (8) (4 used). Remove the hydraulic hoses (2 used) from boom cylinder (3). Cap the open ends.

 : 12 mm



CAUTION: Pin (7) weight: 41 kg (90 lb)

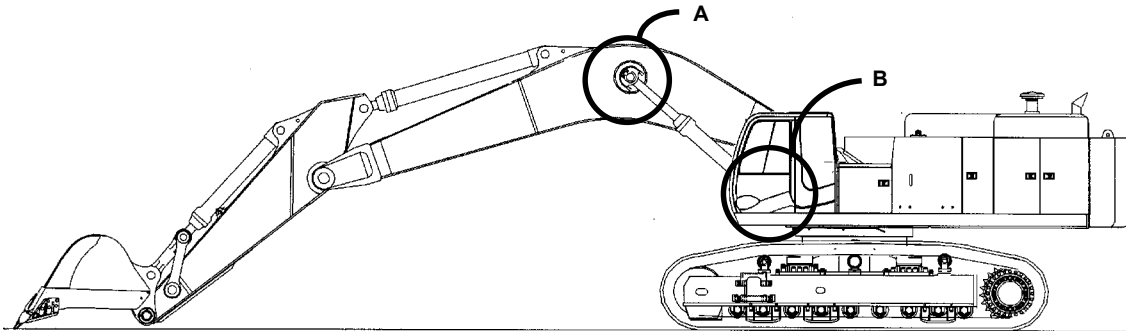
6. Remove bolts (11) (2 used) from the bottom side of boom cylinder (3). Remove spring washers (12) (2 used) and plate (10). Pry and remove pin (7) from main frame (15) by using a pry bar. Remove boom cylinder (3) and shims (13, 14) from main frame (15).

 : 30 mm

7. Remove boom cylinder (3) on the other side in the same procedures as steps 2 to 6.

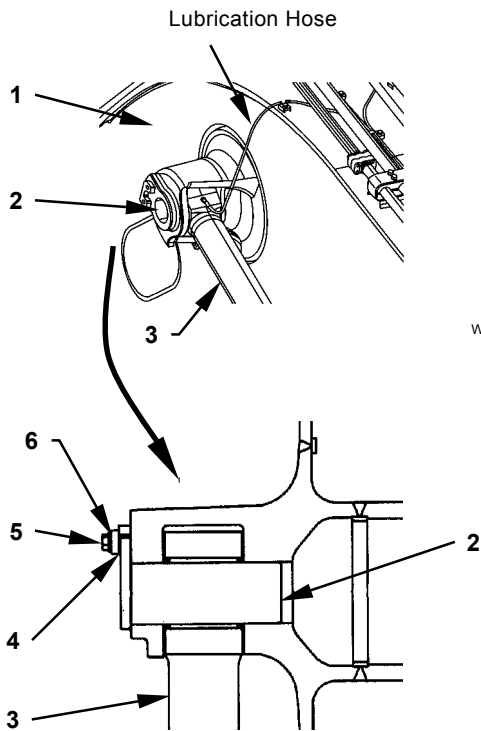
FRONT ATTACHMENT / Cylinder

Remove and Install Boom Cylinder



W1JB-04-02-006

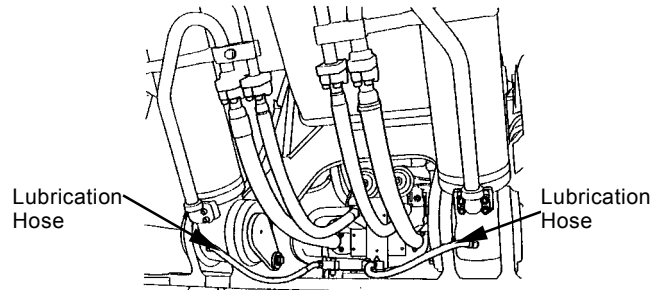
A: Rod Side



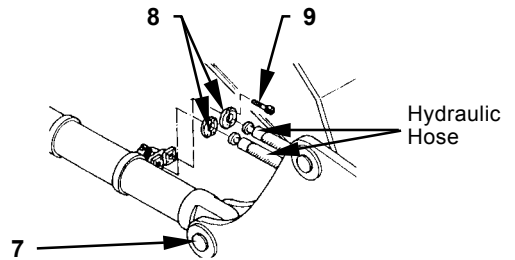
W1JB-04-02-007

W1JB-04-02-008

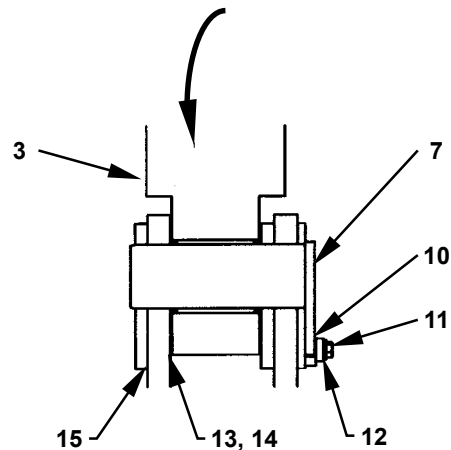
B: Bottom Side



W1JB-04-01-017



W162-04-01-019



W162-04-01-025

- | | | | |
|----------------------------|----------------------------|---------------------------|-----------------|
| 1 - Boom | 5 - Bolt (4 Used) | 9 - Socket Bolt (16 Used) | 13 - Shim |
| 2 - Pin (2 Used) | 6 - Spring Washer (4 Used) | 10 - Plate (2 Used) | 14 - Shim |
| 3 - Boom Cylinder (2 Used) | 7 - Pin (2 Used) | 11 - Bolt (4 Used) | 15 - Main Frame |
| 4 - Plate (2 Used) | 8 - Split Flange (8 Used) | 12 - Washer (4 Used) | |

FRONT ATTACHMENT / Cylinder


Installation



CAUTION: Boom cylinder (3) weight: 850 kg (1870 lb)


Pin (7) weight: 41 kg (90 lb)


1. Hoist boom cylinder (3). Align the boom cylinder (3) bottom side pin hole with main frame (15) pin hole. Install shims (13, 14) between main frame (15) and boom cylinder (3). Install pin (7). Secure pin (7) to main frame (15) with plate (10), spring washers (12) (2 used) and bolts (11) (2 used). Support the boom cylinder (3) rod side by using a support.

 : 30 mm

 : 390 N·m (40 kgf·m, 290 lbf·ft)

2. Install the hydraulic hoses (2 used). Remove the wire to secure the cylinder rod.

 : 12 mm

 : 175 N·m (18 kgf·m, 130 lbf·ft)


3. Hoist the cylinder rod. Adjust and extend the cylinder rod. Align the cylinder rod pin hole with the boom (1) pin hole.



CAUTION: Pin (2) weight: 37 kg (82 lb)


4. Install pin (2) into the cylinder rod side of boom (1).


5. Install bolts (5) (2 used), spring washers (6) (2 used) and plate (4) to pin (2).

 : 30 mm

 : 390 N·m (40 kgf·m, 290 lbf·ft)

6. Install the lubrication hose.

 : 19 mm

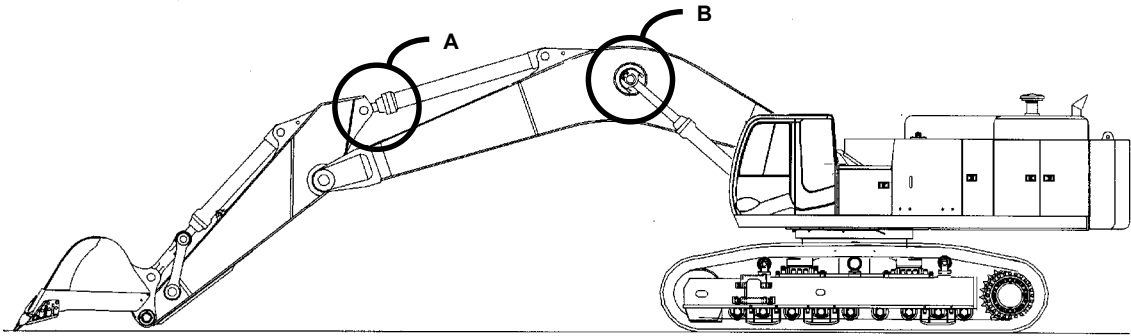
 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)

7. Install boom cylinder (3) at other side in the same procedures as steps 1 to 6.

IMPORTANT: After all work is completed, operate the boom cylinder to the stroke end for several times and release the pressure in the circuit. (Refer to W4-2-14.)

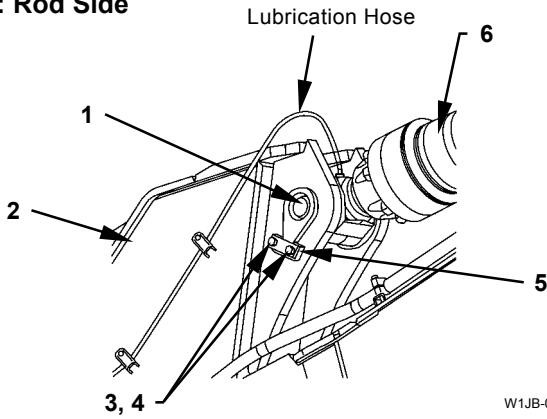
FRONT ATTACHMENT / Cylinder

Remove and Install Arm Cylinder



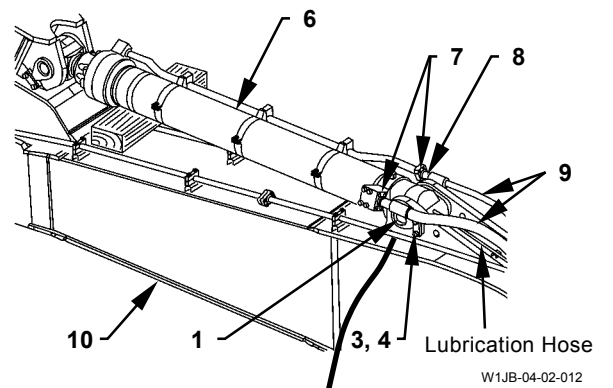
W1JB-04-02-006

A: Rod Side

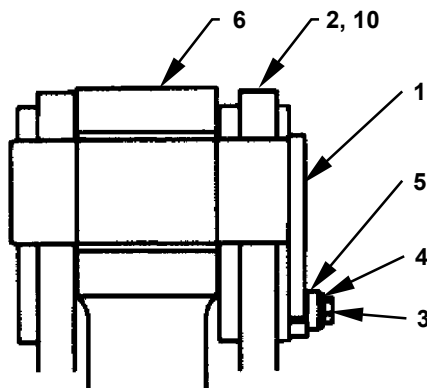


W1JB-04-02-010

B: Bottom Side



W1JB-04-02-012



W1JB-04-02-011

- 1 - Pin (2 Used)
- 2 - Arm
- 3 - Bolt (4 Used)

- 4 - Spring Washer (4 Used)
- 5 - Plate (2 Used)
- 6 - Arm Cylinder

- 7 - Split Flange (4 Used)
- 8 - Socket Bolt (8 Used)
- 9 - Hose (2 Used)

- 10 - Boom


FRONT ATTACHMENT / Cylinder

Removal



CAUTION: When tapping the pin by using a hammer, metal fragments may fly off. Prevent personal injury. Be sure to wear necessary protection, such as goggles, a hard hat, etc..


1. Remove the lubrication hose from the rod side of arm cylinder (6).

 : 19 mm



CAUTION: Arm cylinder (6) weight: 1200 kg (2650 lb)
Pin (1) weight: 44 kg (97 lb)

2. Attach a nylon sling to arm cylinder (6) and hold arm cylinder (6). Remove bolts (3) (2 used), spring washers (4) (2 used) and plate (5) from the cylinder rod side. Remove pin (1) from arm (2).


 : 30 mm

3. 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 (6).




CAUTION: 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.

4. Stop the engine. Release any remaining pressure in the hydraulic lines and oil tank. (Refer to W4-2-14.)

 : 19 mm


5. Remove socket bolts (8) (8 used) and split flanges (7) (4 used) from arm cylinder (6). Remove hoses (9) (2 used) from arm cylinder (6). Cap the open ends.

 : 14 mm

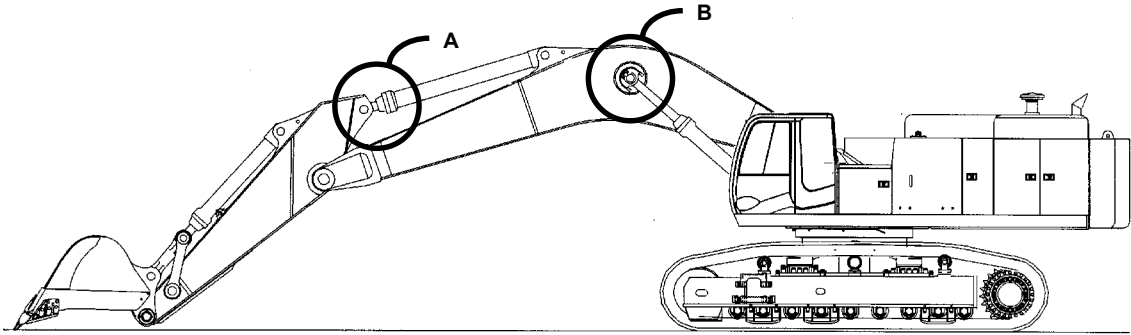


CAUTION: Arm cylinder (6) weight: 1200 kg (2650 lb)
Pin (1) weight: 44 kg (97 lb)

6. Remove bolts (3) (2 used), spring washers (4) (2 used) and plate (5) from the bottom side of arm cylinder (6). Remove pin (1) from boom (10). Hoist and remove arm cylinder (6) from boom (10).

 : 30 mm

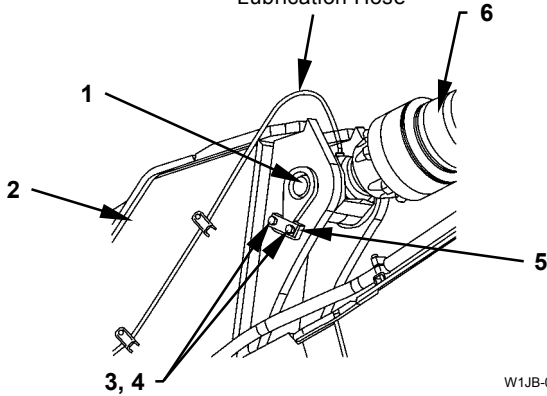
FRONT ATTACHMENT / Cylinder



W1JB-04-02-006

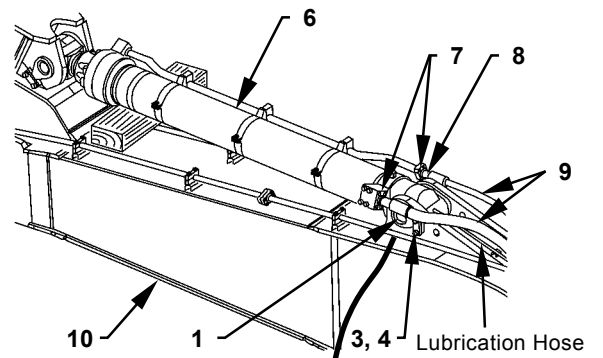
A: Rod Side

Lubrication Hose

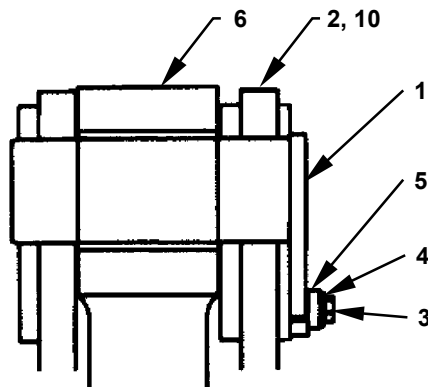


W1JB-04-02-010

B: Bottom Side



W1JB-04-02-012



W1JB-04-02-011

- 1 - Pin (2 Used)
- 2 - Arm
- 3 - Bolt (4 Used)

- 4 - Spring Washer (4 Used)
- 5 - Plate (2 Used)
- 6 - Arm Cylinder

- 7 - Split Flange (4 Used)
- 8 - Socket Bolt (8 Used)
- 9 - Hose (2 Used)

- 10 - Boom

FRONT ATTACHMENT / Cylinder

Installation




CAUTION: Arm cylinder (6) weight: 1200 kg (2650 lb)


1. Hoist arm cylinder (6). Align the pin hole on arm cylinder (6) bottom side with that on boom (10).




CAUTION: Pin (1) weight: 44 kg (97 lb)


2. Hoist pin (1). Insert pin (1) into the pin hole on arm cylinder (6) bottom side. Install bolts (3) (2 used), spring washers (4) (2 used) and plate (5).

 : 30 mm


 : 390 N·m (40 kgf·m, 290 lbf·ft)


3. Install hoses (9) (2 used) to the bottom side of arm cylinder (6) with socket bolts (8) (8 used) and split flanges (7) (4 used).

 : 14 mm

 : 265 N·m (27 kgf·m, 195 lbf·ft)

4. Install the lubrication hose to arm cylinder (6).

 : 19 mm

 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)


5. Hoist arm cylinder (6). Remove the wire to secure the rod.


Start the engine. Extend the cylinder rod. Align the pin hole on arm cylinder (6) rod side with that on arm (2).




CAUTION: Pin (1) weight: 44 kg (97 lb)


6. Hoist pin (1). Insert pin (1) into the pin hole on cylinder rod side. Install pin (1) to arm (2) with bolts (3) (2 used), spring washers (4) (2 used) and plate (5).

 : 30 mm

 : 390 N·m (40 kgf·m, 290 lbf·ft)

7. Install the lubrication hose to the rod side of arm cylinder (6).

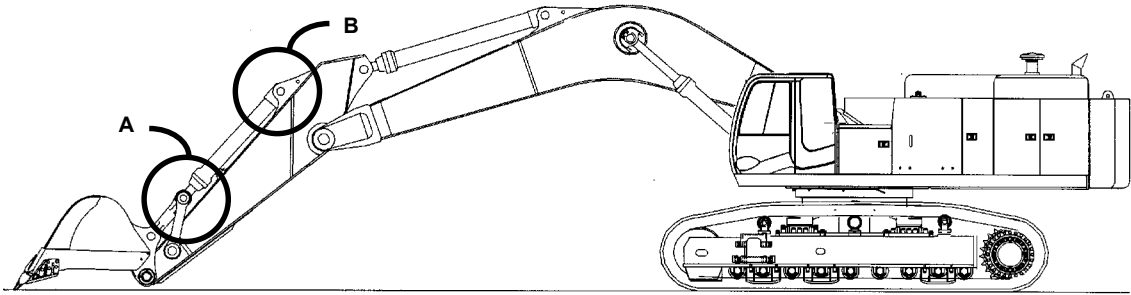
 : 19 mm

 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)

IMPORTANT: After all work is completed, operate the arm cylinder to the stroke end several times and release the pressure in the circuit. (Refer to W4-2-14.)

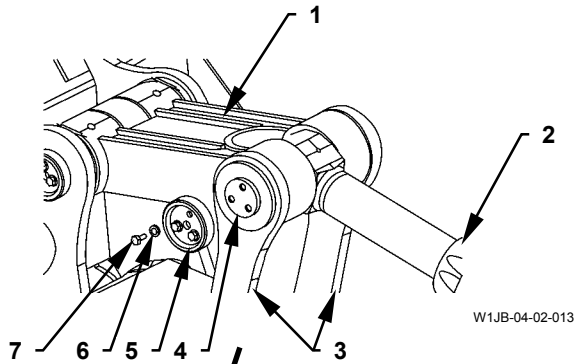
FRONT ATTACHMENT / Cylinder

Remove and Install Bucket Cylinder

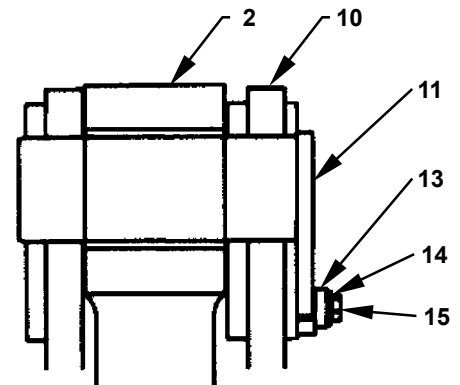
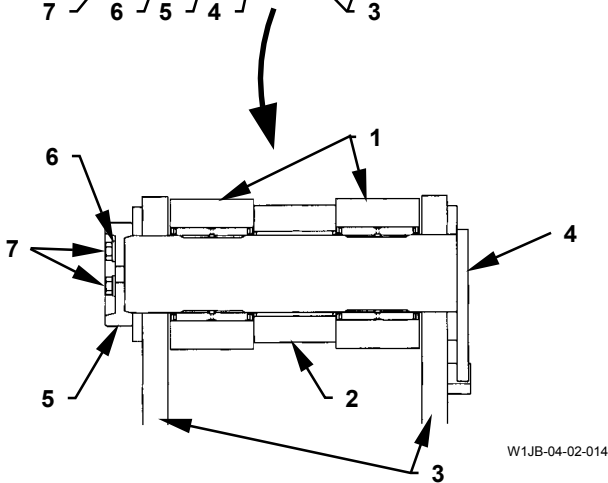
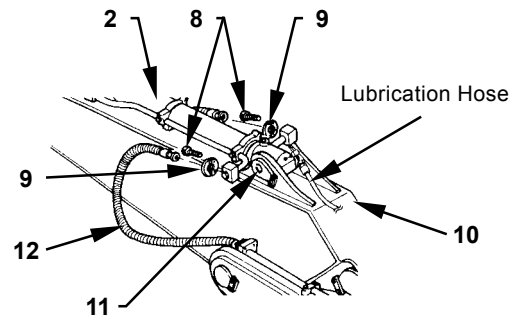


W1JB-04-02-006

A: Rod Side



B: Bottom Side



W1JB-04-02-011

- | | | | |
|---------------------|----------------------------|---------------------------|----------------------|
| 1 - Link A | 5 - Stopper | 9 - Split Flange (4 Used) | 13 - Plate |
| 2 - Bucket Cylinder | 6 - Spring Washer (4 Used) | 10 - Arm | 14 - Washer (2 Used) |
| 3 - Link B (2 Used) | 7 - Bolt (3 Used) | 11 - Pin | 15 - Bolt (2 Used) |
| 4 - Pin | 8 - Socket Bolt (8 Used) | 12 - Hose (2 Used) | |


FRONT ATTACHMENT / Cylinder

Removal



CAUTION: When tapping the pin by using a hammer, metal fragments may fly off. Prevent personal injury. Be sure to wear necessary protection, such as goggles, a hard hat, etc..

1. Remove the lubrication hose from the bottom side of bucket cylinder (2).


 : 19 mm

2. Place the wooden block under link A (1). Secure link A (1) and link B (3) by using a wire in order not to drop links B (3) (2 used) when removing pin (4).



**CAUTION: Bucket cylinder (2) weight: 680 kg (1500 lb)
Pin (4) weight: 94 kg (210 lb)**

3. Attach a nylon sling to bucket cylinder (2) and hold bucket cylinder (2). Remove bolts (7) (3 used), spring washers (6) (3 used) and stopper (5) from the cylinder rod side. Remove pin (4) from link B (3) and link A (1).

 : 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 (2).



CAUTION: 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.

5. Stop the engine. Release any remaining pressure in the hydraulic lines and oil tank. (Refer to W4-2-14.)


6. Remove socket bolts (8) (8 used) and split flanges (9) (4 used) from the bottom side of bucket cylinder (2). Remove hoses (2) (2 used) from bucket cylinder (2). Cap the open ends.

 : 12 mm



CAUTION: Pin (11) weight: 34 kg (75 lb)

7. Remove bolts (15) (2 used), spring washers (14) (2 used) and plate (13) from the bottom side of bucket cylinder (2). Remove pin (11) from arm (10).

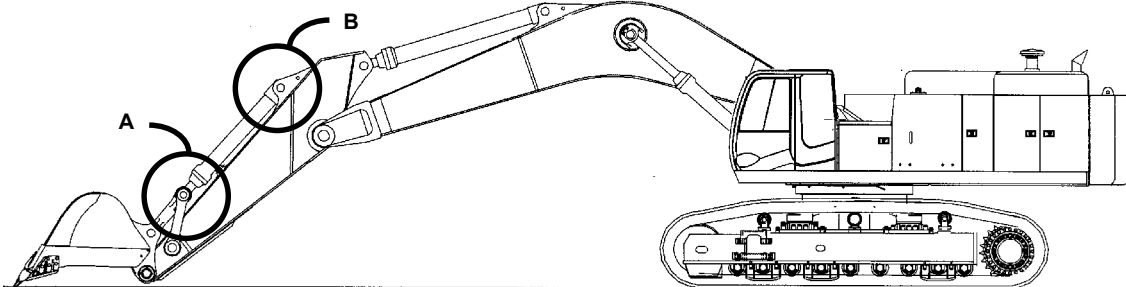
 : 30 mm



CAUTION: Bucket cylinder (2) weight: 680 kg (1500 lb)

8. Hoist and remove bucket cylinder (2) from arm (10).

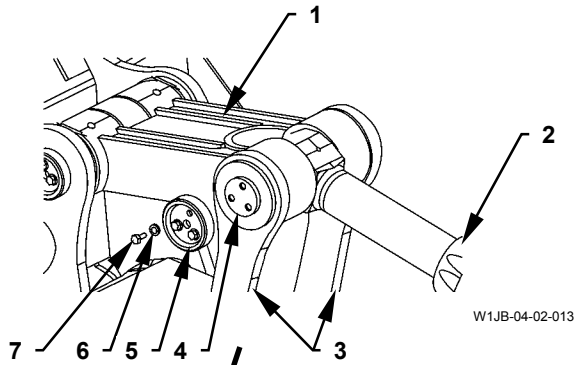
FRONT ATTACHMENT / Cylinder



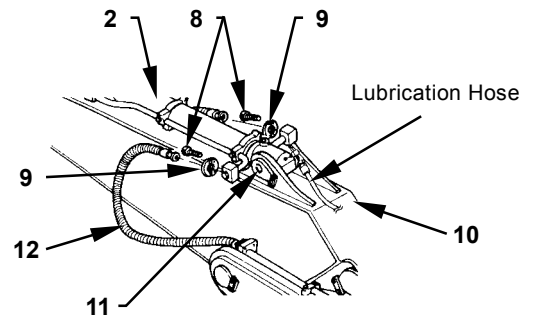
W1JB-04-02-006

A: Rod Side

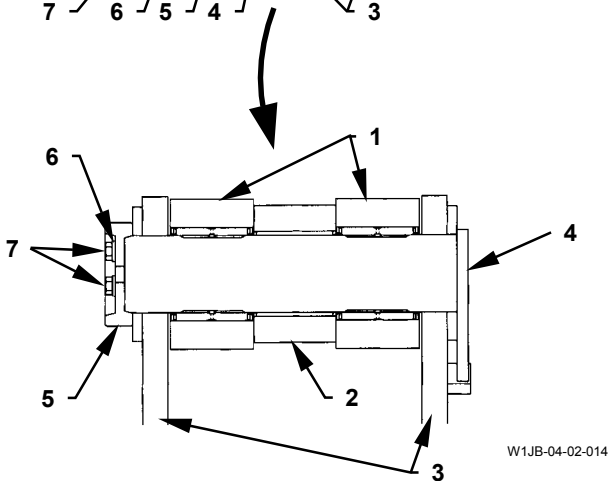
B: Bottom Side



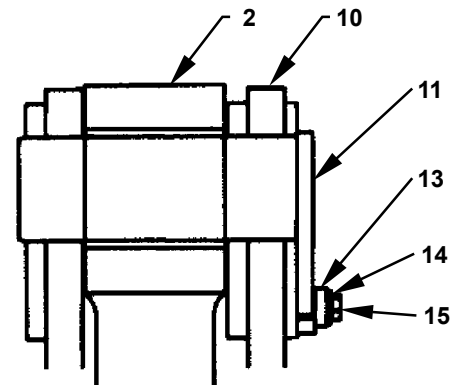
W1JB-04-02-013



W162-04-01-026



W1JB-04-02-014



W1JB-04-02-011

- | | | | |
|---------------------|----------------------------|---------------------------|----------------------|
| 1 - Link A | 5 - Stopper | 9 - Split Flange (4 Used) | 13 - Plate |
| 2 - Bucket Cylinder | 6 - Spring Washer (4 Used) | 10 - Arm | 14 - Washer (2 Used) |
| 3 - Link B (2 Used) | 7 - Bolt (3 Used) | 11 - Pin | 15 - Bolt (2 Used) |
| 4 - Pin | 8 - Socket Bolt (8 Used) | 12 - Hose (2 Used) | |

FRONT ATTACHMENT / Cylinder

Installation




CAUTION: Bucket cylinder (2) weight: 680 kg (1500 lb)


1. Hoist bucket cylinder (2). Align the pin hole on bucket cylinder (2) bottom side with that on arm (10).




CAUTION: Pin (11) weight: 34 kg (75 lb)


2. Hoist pin (11). Insert pin (11) into the hole on bucket cylinder (2) bottom side. Install pin (11) to arm (10) with plate (13), spring washers (14) (2 used) and bolts (15) (2 used).


 : 30 mm


 : 390 N·m (40 kgf·m, 290 lbf·ft)

3. Install hoses (12) (2 used) to the bottom side of bucket cylinder (2) with socket bolts (8) (8 used) and split flanges (9) (4 used). Install the lubrication hose.

 : 12 mm

 : 175 N·m (18 kgf·m, 130 lbf·ft)

 : 19 mm

 : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)




CAUTION: Bucket cylinder (2) weight: 680 kg (1500 lb)

4. Hoist bucket cylinder (2). Remove the wire to secure the cylinder rod. Start the engine. Extend the cylinder rod. Align the pin hole on bucket cylinder (2) rod side with that on link A (1) and link B (3).



CAUTION: Pin (4) weight: 94 kg (210 lb)

5. Hoist pin (4). Insert pin (4) into the pin hole on cylinder rod side. Install stopper (5), spring washers (6) (3 used) and bolts (7) (3 used) to pin (4).

 : 30 mm


 : 390 N·m (40 kgf·m, 290 lbf·ft)


6. Remove the wire to secure links B (3) (2 used) in order not to drop. Start the engine. Remove the wooden block set under link A (1).




IMPORTANT: After all work is completed, operate the bucket cylinder to the stroke end several times and release the pressure in the circuit. (Refer to W4-2-14.)

FRONT ATTACHMENT / Cylinder

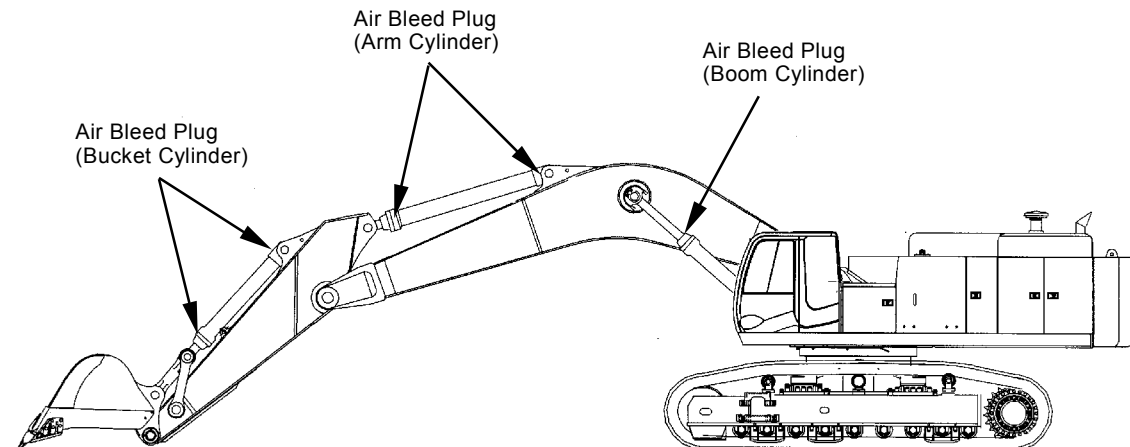
MAIN POINTS TO RELEASE PRESSURE

 **NOTE:** As for the loader front, almost same main points should be followed.

 **CAUTION:** Escaping fluid under high pressure may penetrate the skin and eyes, and cause serious injury. Release the pressure before removing the hydraulic or other lines. Hot hydraulic oil just after operation may spout and cause severe burns. Wait for oil in order cool before starting any work.

1. Position the front attachment as illustrated.
2. Start engine. (at slow idle speed)
3. Remove the gum cap. Loosen the air bleed plug.
 : 19 mm
4. Operate cylinder to extend and retract. Bleed air out until only oil flow out from the plug hole.
5. Tighten the plug and install the gum cap.
 : 19 mm
 : 44 ± 2.9 N·m
(4.5 ± 0.3 kgf·m, 33.0 ± 2.2 lbf·ft)

Positions for Air Bleed Plug



W1JB-04-02-006

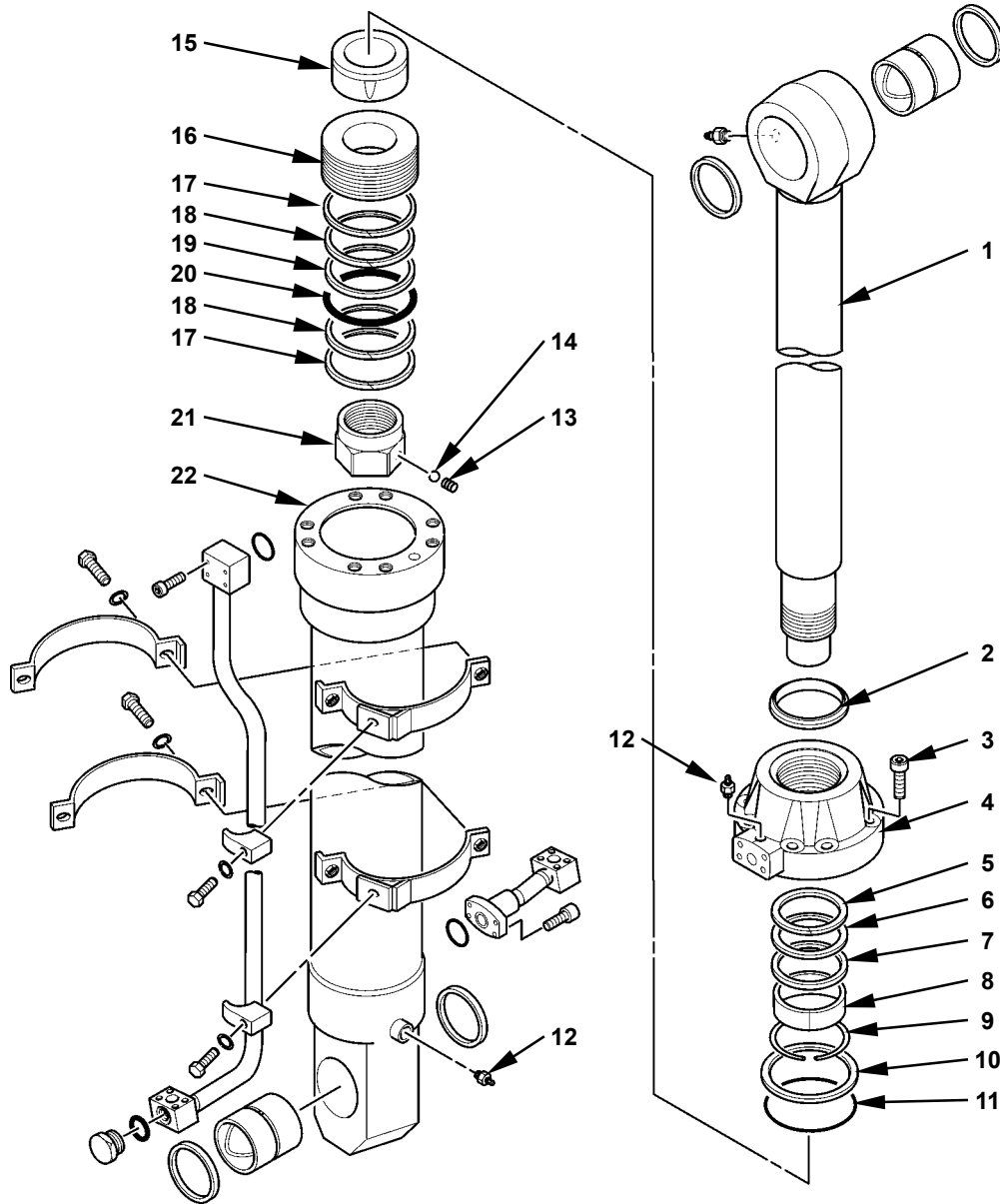
FRONT ATTACHMENT / Cylinder

(Blank)

FRONT ATTACHMENT / Cylinder

DISASSEMBLE CYLINDER

Bucket Cylinder

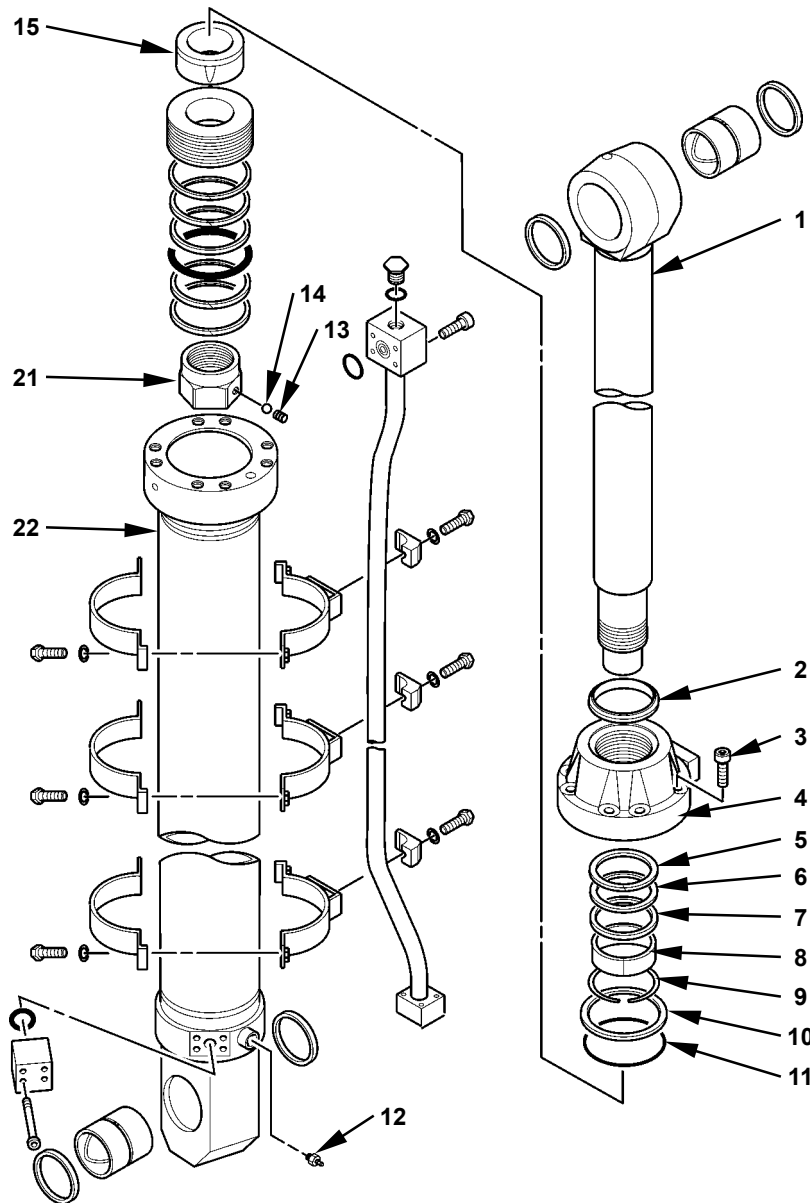


W1JB-04-02-003

- | | | | |
|--------------------------|------------------------------|--------------------------|--------------------|
| 1 - Cylinder Rod | 7 - Buffer Ring | 13 - Set Screw | 19 - Seal Ring |
| 2 - Wiper Ring | 8 - Bushing | 14 - Steel Ball | 20 - O-Ring |
| 3 - Socket Bolt (8 Used) | 9 - Retaining Ring | 15 - Cushion Bearing | 21 - Nut |
| 4 - Cylinder Head | 10 - Backup Ring | 16 - Piston | 22 - Cylinder Tube |
| 5 - Backup Ring | 11 - O-Ring | 17 - Slide Ring (2 Used) | |
| 6 - U-Ring | 12 - Air Bleed Plug (2 Used) | 18 - Slide Ring (2 Used) | |

FRONT ATTACHMENT / Cylinder

Arm Cylinder

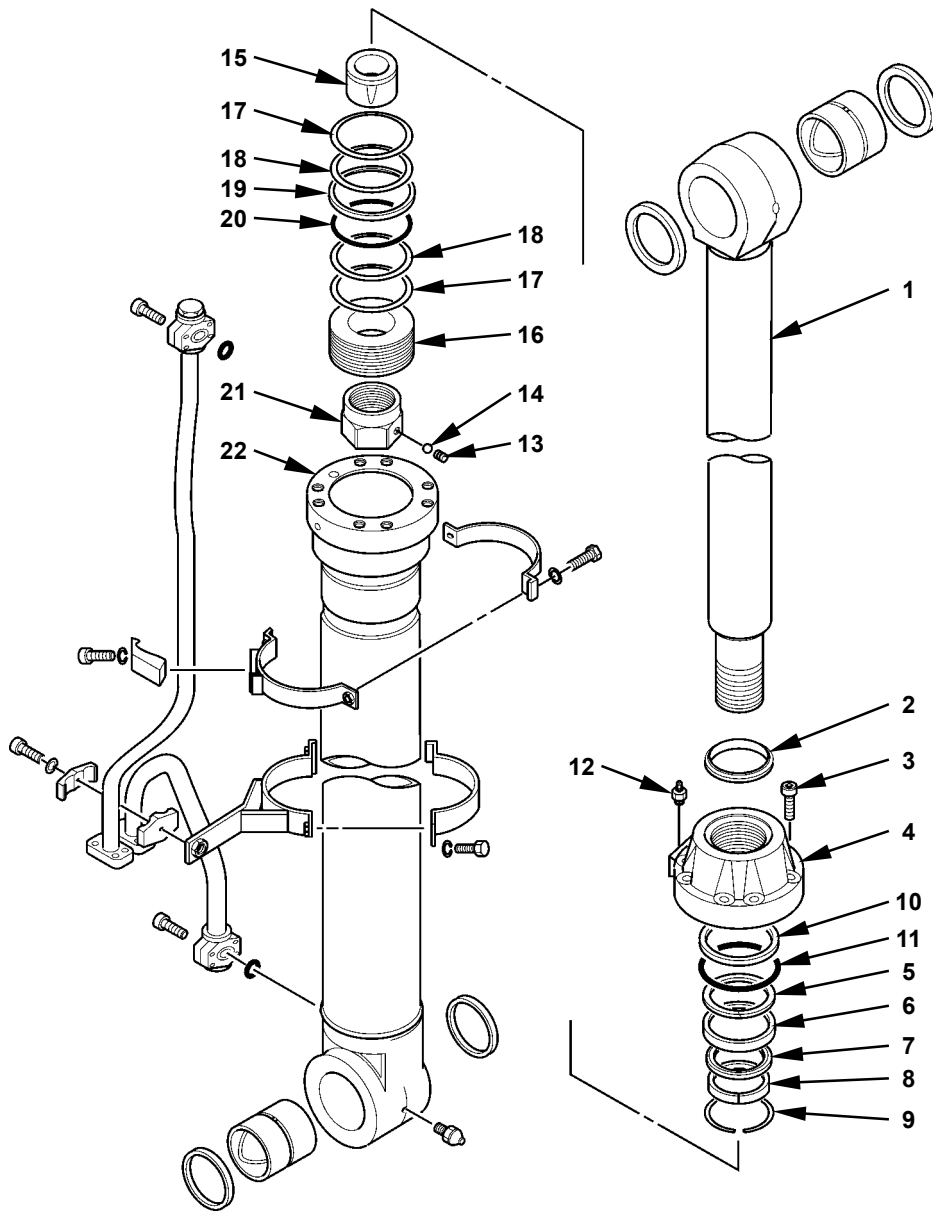


W1JB-04-02-004

- | | | | |
|--------------------------|------------------------------|--------------------------|--------------------|
| 1 - Cylinder Rod | 7 - Buffer Ring | 13 - Set Screw | 19 - Seal Ring |
| 2 - Wiper Ring | 8 - Bushing | 14 - Steel Ball | 20 - O-Ring |
| 3 - Socket Bolt (8 Used) | 9 - Retaining Ring | 15 - Cushion Bearing | 21 - Nut |
| 4 - Cylinder Head | 10 - Backup Ring | 16 - Piston | 22 - Cylinder Tube |
| 5 - Backup Ring | 11 - O-Ring | 17 - Slide Ring (2 Used) | |
| 6 - U-Ring | 12 - Air Bleed Plug (2 Used) | 18 - Slide Ring (2 Used) | |

FRONT ATTACHMENT / Cylinder

Boom Cylinder



W1JB-04-02-005

- | | | | |
|--------------------------|---------------------|--------------------------|--------------------|
| 1 - Cylinder Rod | 7 - Buffer Ring | 13 - Set Screw | 19 - Seal Ring |
| 2 - Wiper Ring | 8 - Bushing | 14 - Steel Ball | 20 - O-Ring |
| 3 - Socket Bolt (8 Used) | 9 - Retaining Ring | 15 - Cushion Bearing | 21 - Nut |
| 4 - Cylinder Head | 10 - Backup Ring | 16 - Piston | 22 - Cylinder Tube |
| 5 - Backup Ring | 11 - O-Ring | 17 - Slide Ring (2 Used) | |
| 6 - U-Ring | 12 - Air Bleed Plug | 18 - Slide Ring (2 Used) | |

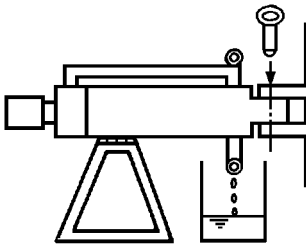
FRONT ATTACHMENT / Cylinder

Disassemble Cylinder

- The disassembling procedure starts on the premise that the hydraulic lines and the bands securing lines have been removed.

CAUTION: Boom cylinder weight: 850 kg (1870 lb)
Arm cylinder: 1200 kg (2650 lb)
Bucket cylinder: 680 kg (1500 lb)

1. Hoist and place the cylinder on a workbench horizontally. Drain off hydraulic oil from the cylinder.




W102-04-02-027


CAUTION: The cylinder rod (1) assembly weight:
Boom cylinder: 437 kg (965 lb)
Arm cylinder: 571 kg (1260 lb)
Bucket cylinder: 331 kg (730 lb)

2. Fully extend cylinder rod (1). Hold cylinder rod (1). Remove socket bolts (3) (8 used) from cylinder head (4).

Bucket cylinder

 : 22 mm

Arm cylinder, Boom cylinder

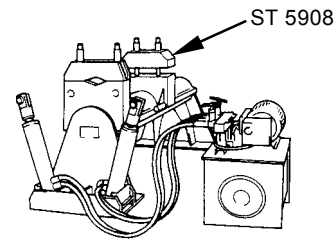
 : 24 mm

IMPORTANT: Pull out cylinder rod (1) straightly in order not to damage the sliding surface.

CAUTION: The cylinder rod (1) assembly weight:
Boom cylinder: 437 kg (965 lb)
Arm cylinder: 571 kg (1260 lb)
Bucket cylinder: 331 kg (730 lb)

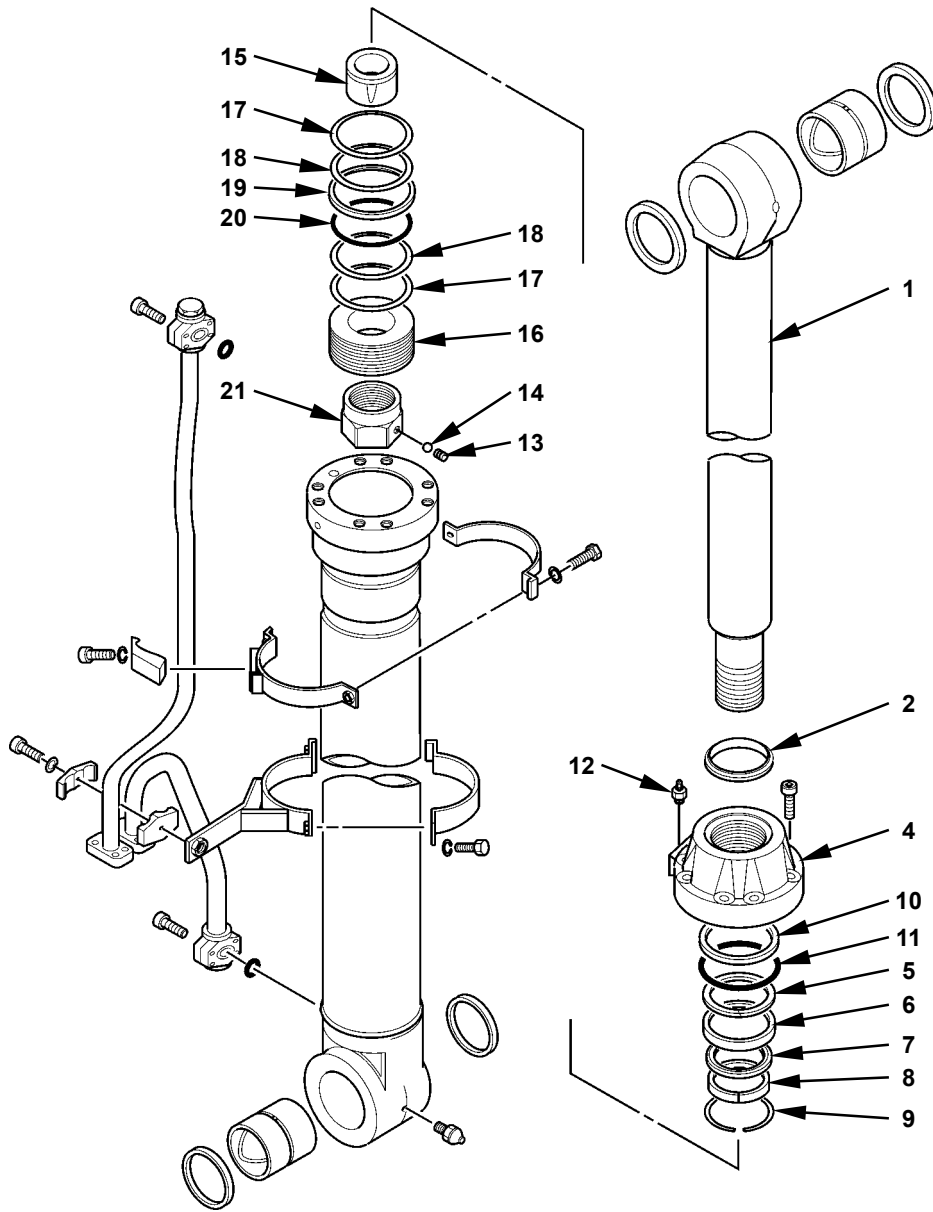
CAUTION: Cylinder tube (22) weight:
Boom cylinder: 359 kg (790 lb)
Arm cylinder: 561 kg (1240 lb)
Bucket cylinder: 280 kg (620 lb)

3. Tap and remove cylinder head (4) with cylinder rod (1) together from cylinder tube (22) by using a plastic hammer.
4. Secure cylinder rod (1) to special tool (ST 5908). Put the matching marks on cylinder rod (1) and nut (21).



W158-04-02-022

FRONT ATTACHMENT / Cylinder




W1JB-04-02-005


FRONT ATTACHMENT / Cylinder


5. Remove set screw (13). Remove steel ball (14) from nut (21).

Boom cylinder, Bucket cylinder

 : 14 mm

Arm cylinder

 : 17 mm

 **NOTE:** Set screw (13) has been crimped by using a punch at two places after installing. Cut away the crimped position by using a hand drill and remove set screw (13).

6. Remove nut (21) and piston (16) from cylinder rod (1) by using special tool (ST 5908).

Special tools when turning nut:

Boom cylinder : 155 mm (ST 3285)

Arm cylinder : 180 mm (ST 3278)

Bucket cylinder : 150 mm (ST 3284)

7. Remove slide rings (17, 18) (2 used for each), seal ring (19) and O-ring (20) from piston (16).



CAUTION: Cylinder rod (1) weight:
Boom cylinder: 380 kg (840 lb)
Arm cylinder: 508 kg (1120 lb)
Bucket cylinder: 286 kg (630 lb)



CAUTION: Cylinder head (4) weight:
Boom cylinder: 57 kg (125 lb)
Arm cylinder: 63 kg (140 lb)
Bucket cylinder: 45 kg (99 lb)

8. Remove cushion bearing (15) and cylinder head (4) from cylinder rod (1).

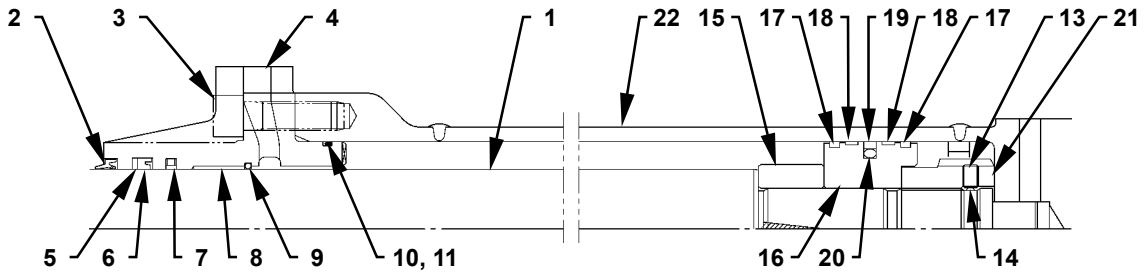
9. Remove backup ring (10) and O-ring (11) from the outer side of cylinder head (4).

10. Remove wiper ring (2), backup ring (5), U-ring (6), buffer ring (7), retaining ring (9) and bushing (8) from the inner side of cylinder head (4).

FRONT ATTACHMENT / Cylinder

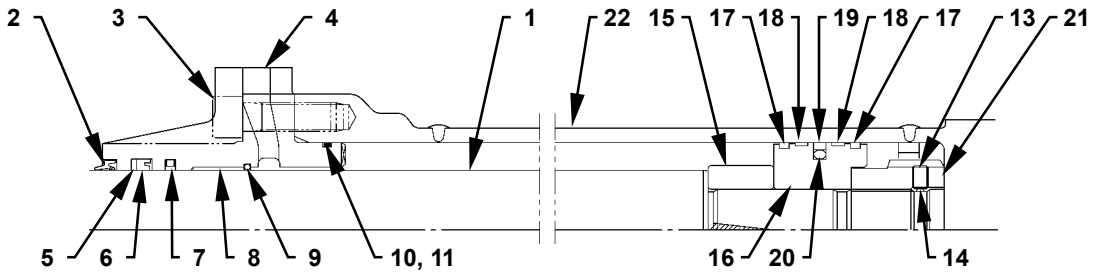
ASSEMBLE CYLINDER

Bucket Cylinder and Arm Cylinder



W1JB-04-02-002

Boom Cylinder



W1JB-04-02-001

- | | | | |
|--------------------------|--------------------|--------------------------|--------------------|
| 1 - Cylinder Rod | 7 - Buffer Ring | 14 - Steel Ball | 20 - O-Ring |
| 2 - Wiper Ring | 8 - Bushing | 15 - Cushion Bearing | 21 - Nut |
| 3 - Socket Bolt (8 Used) | 9 - Retaining Ring | 16 - Piston | 22 - Cylinder Tube |
| 4 - Cylinder Head | 10 - Backup Ring | 17 - Slide Ring (2 Used) | |
| 5 - Backup Ring | 11 - O-Ring | 18 - Slide Ring (2 Used) | |
| 6 - U-Ring | 13 - Set Screw | 19 - Seal Ring | |

FRONT ATTACHMENT / Cylinder

Assemble Cylinder

1. Install bushing (8) to cylinder head (4). Secure bushing (8) with retaining ring (9).

IMPORTANT: Install buffer ring (7) with the lip facing to the bushing (9) side.

2. Install buffer ring (7) to cylinder head (4).

IMPORTANT: Install U-ring (6) with the lip facing to the buffer ring (7) side.

3. Install backup ring (5) to cylinder head (4). Install U-ring (6).

IMPORTANT: Install wiper ring (2) with the lip facing to the outside of cylinder head (4).

4. Install wiper ring (2) to cylinder head (4).

5. Install O-ring (11) and backup ring (10) to cylinder head (4).

6. Install O-ring (20) and seal ring (19) to piston (16).

Special tools when installing seal ring:

Boom cylinder : ST 2052, ST 2053

Arm cylinder : ST 2054, ST 2055

Bucket cylinder : ST 2059, ST 2060

IMPORTANT: Install slide rings (17, 18) with their slits positioned 180 degrees each facing the opposite of each other.

7. Install slide rings (17, 18) (2 used for each) to piston (16).

8. Install special tool to piston (16). Retract seal ring (19) and slide rings (17, 18).

Special tool:

Boom cylinder : ST 7360, ST 7361

Arm cylinder : ST 7362, ST 7363

Bucket cylinder : ST 7364, ST 7365



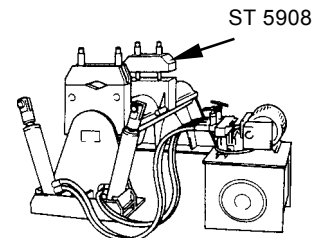
CAUTION: Cylinder rod (1) weight:

Boom cylinder: 380 kg (840 lb)

Arm cylinder: 508 kg (1120 lb)

Bucket cylinder: 286 kg (630 lb)

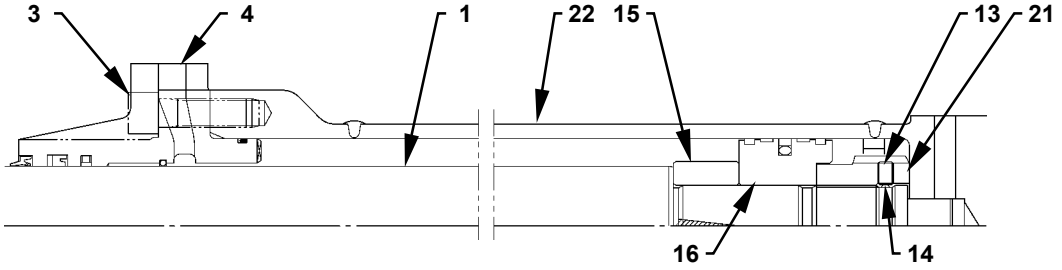
9. Secure cylinder rod (1) to special tool (ST 5908).



W158-04-02-022

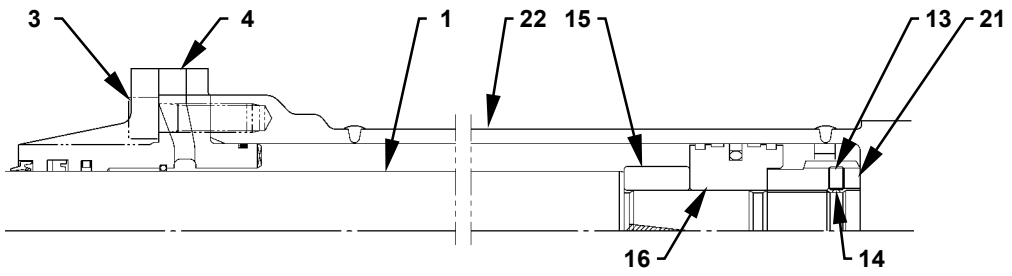
FRONT ATTACHMENT / Cylinder

Bucket Cylinder and Arm Cylinder



W1JB-04-02-002

Boom Cylinder



W1JB-04-02-001

FRONT ATTACHMENT / Cylinder



CAUTION: Cylinder rod (1) weight:
Boom cylinder: 380 kg (840 lb)
Arm cylinder: 508 kg (1120 lb)
Bucket cylinder: 286 kg (630 lb)



CAUTION: Cylinder head (4) weight:
Boom cylinder: 57 kg (125 lb)
Arm cylinder: 63 kg (140 lb)
Bucket cylinder: 45 kg (99 lb)

10. Install the cylinder head (4) assembly to cylinder rod (1).

IMPORTANT: Install cushion bearing (15) with the thinner oil groove facing to the piston (16) side.

11. Install cushion bearing (15) to cylinder rod (1).
12. Install the piston (16) assembly to cylinder rod (1).
13. Install nut (21) to cylinder rod (1).



14. Tighten nut (21).

Special tool when turning nut:



Boom cylinder: 155 mm (ST 3285)
 : 30200 N·m (3080 kgf·m, 22270 lbf·ft)
Arm cylinder: 180 mm (ST 3278)
 : 51800 N·m (5284 kgf·m, 38210 lbf·ft)
Bucket cylinder: 150 mm (ST 3284)
 : 34600 N·m (3529 kgf·m, 25520 lbf·ft)

15. Install steel ball (14) and set screw (13) to nut (21).

Boom cylinder, Bucket cylinder

 : 14 mm
 : 97±18 N·m
(9.9±1.8 kgf·m, 72±13 lbf·ft)

Arm cylinder

 : 17 mm
 : 180±36.3 N·m
(18.4±3.7 kgf·m, 133±27 lbf·ft)

16. Crimp the outer surface of set screw (13) at two places by using a punch in order not to loosen.



CAUTION: Cylinder tube (22) weight:
Boom cylinder: 359 kg (790 lb)
Arm cylinder: 561 kg (1240 lb)
Bucket cylinder: 280 kg (620 lb)

17. Secure cylinder tube (22) horizontally on a workbench.





CAUTION: The cylinder rod (1) assembly weight:
Boom cylinder: 437 kg (965 lb)
Arm cylinder: 571 kg (1260 lb)
Bucket cylinder: 331 kg (730 lb)

IMPORTANT: Align with the center of cylinder tube (22) and insert the cylinder rod (1) assembly straightly in order not to damage the rings.



18. Insert cylinder rod (1) into cylinder tube (22).

19. Push cylinder head (4) into cylinder tube (22). Tighten cylinder head (4) to cylinder tube (22) with socket bolts (3) (8 used).

Arm cylinder, Boom cylinder

 : 24 mm
 : 1910±353 N·m
(195±37 kgf·m, 1410±260 lbf·ft)

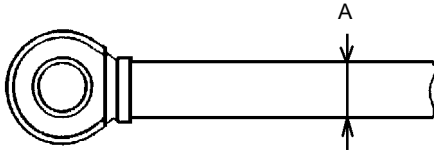
Bucket cylinder

 : 22 mm
 : 1590±294 N·m
(162±30 kgf·m, 1170±217 lbf·ft)

FRONT ATTACHMENT / Cylinder

MAINTENANCE STANDARD

Cylinder Rod

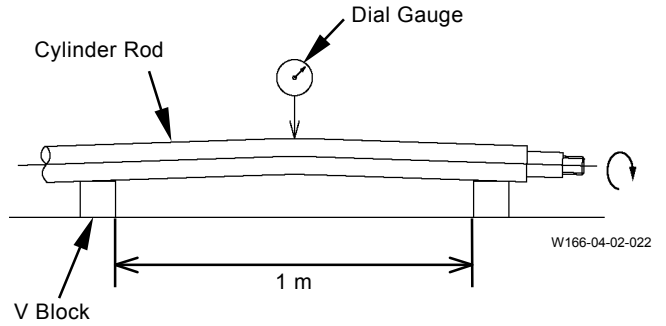


W105-04-02-094

Unit: mm (in)

Cylinder Name	Recommended Size after Re-manufacturing (A)	
Boom	150 $\begin{matrix} +0.031 \\ -0.061 \end{matrix}$	(5.9 $\begin{matrix} +0.001 \\ -0.002 \end{matrix}$)
Arm	160 $\begin{matrix} +0.031 \\ -0.061 \end{matrix}$	(6.3 $\begin{matrix} +0.001 \\ -0.002 \end{matrix}$)
Bucket	140 $\begin{matrix} +0.031 \\ -0.061 \end{matrix}$	(5.5 $\begin{matrix} +0.001 \\ -0.002 \end{matrix}$)

Rod Bend and Run Out



W166-04-02-022

Unit: mm (in)

Bend	Run Out	Remedy
0.5 (0.02)	1.0 (0.04)	Repair
1.0 (0.04)	2.0 (0.08)	Replace

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