

Workshop Manual

ZAXIS

330-3 class

330-3•330LC-3

350H-3•350LCH-3

350LCK-3

350LC-3•350LCN-3

Hydraulic Excavator

Service Manual consists of the following separate Part No;
Technical Manual (Operational Principle) : Vol. No.TO1V7-E
Technical Manual (Troubleshooting) : Vol. No.TT1V7-E
Workshop Manual : Vol. No.W1V7-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.):

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ADDITIONAL REFERENCES

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

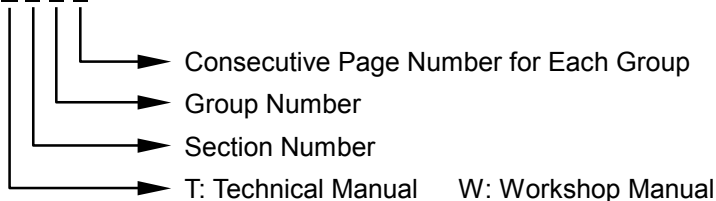
MANUAL COMPOSITION

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

PAGE NUMBER

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


Example : T 1-3-5



INTRODUCTION


SAFETY ALERT SYMBOL AND HEADLINE NOTATIONS

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


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

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

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

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

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

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

UNITS USED

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

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

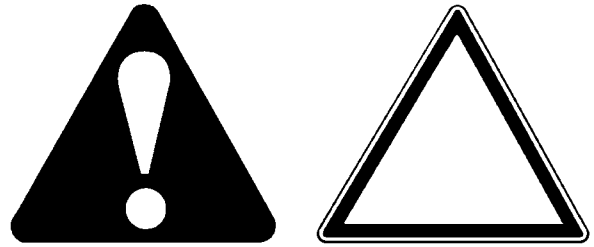
A table for conversion from SI units to other system units is shown below for reference purposes.

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

SAFETY

RECOGNIZE SAFETY INFORMATION

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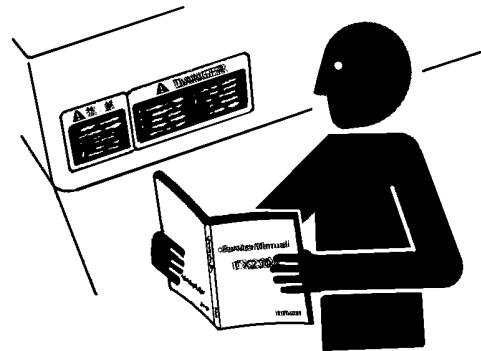


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SAFETY

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.



SA-003

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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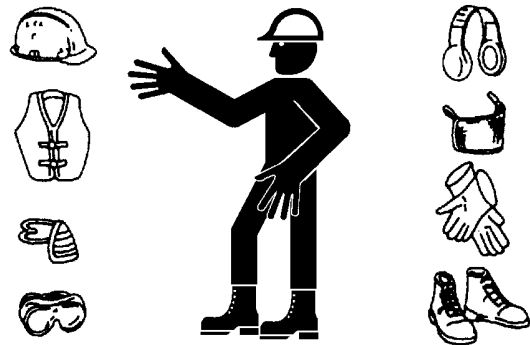
WEAR PROTECTIVE CLOTHING

- 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.

005-E01A-0438

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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SA-435

SAFETY

GENERAL PRECAUTIONS FOR CAB

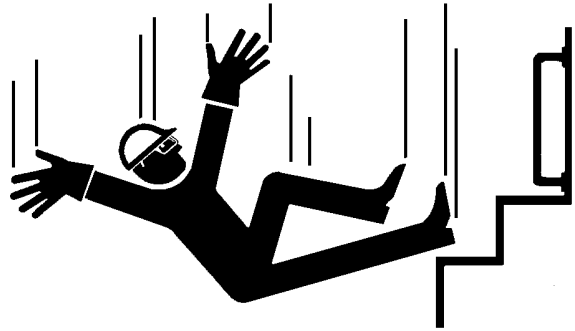
- Before entering the cab, thoroughly remove all dirt and/or oil from the soles of your work boots. If any controls such as a pedal is operated while with dirt and/or oil on the soles of the operator's work boots the operator's foot may slip off the pedal, possibly resulting in a personal accident.
-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

524-E01A-0000

SAFETY

USE HANDHOLDS AND STEPS

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



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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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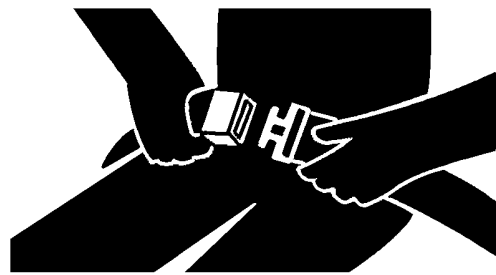
SAFETY

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.



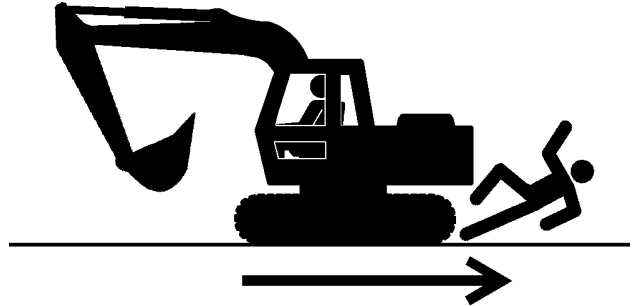
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SAFETY

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

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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.

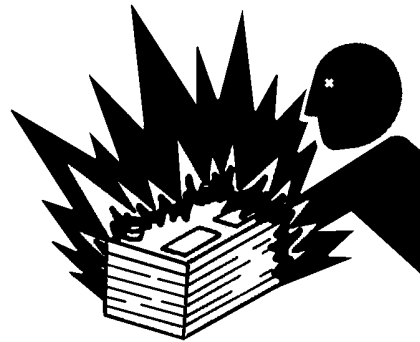


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JUMP STARTING

- 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.



SA-032

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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.

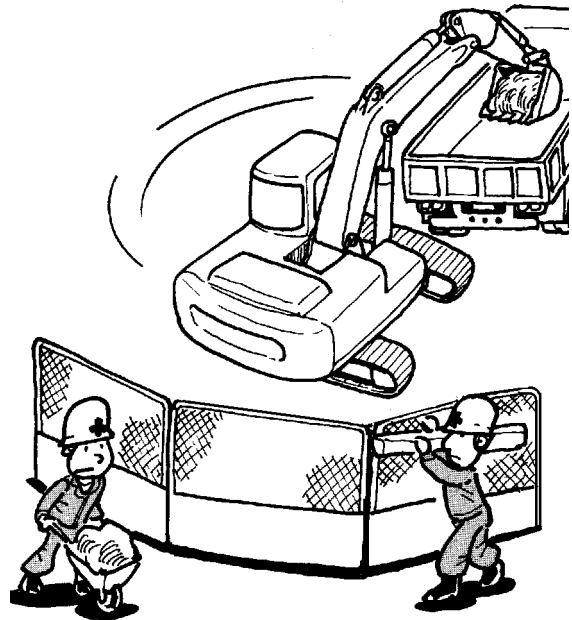
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SA-379

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.



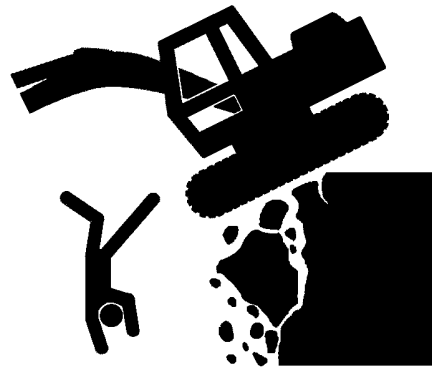
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SAFETY

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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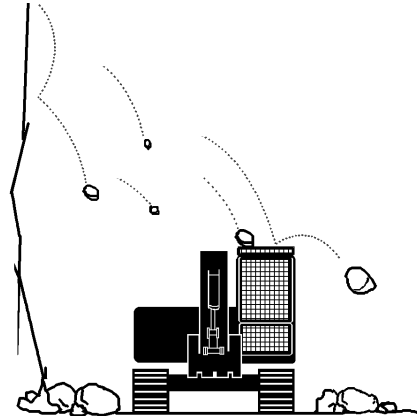
SAFETY

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.

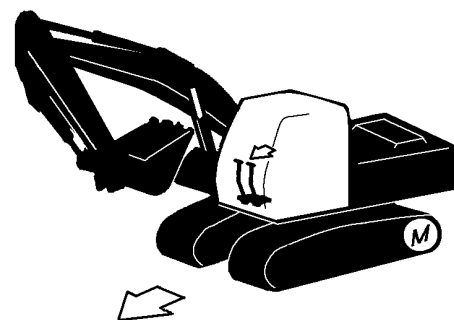


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SA-481

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.



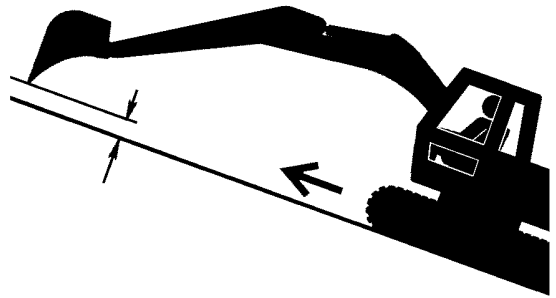
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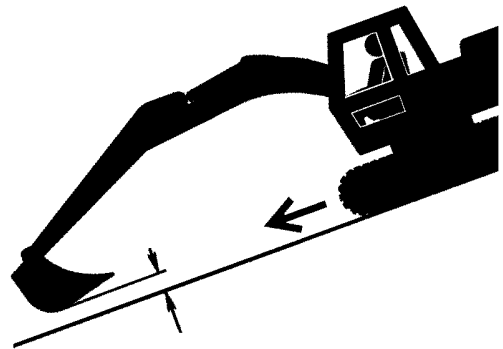
SAFETY

DRIVE MACHINE SAFELY

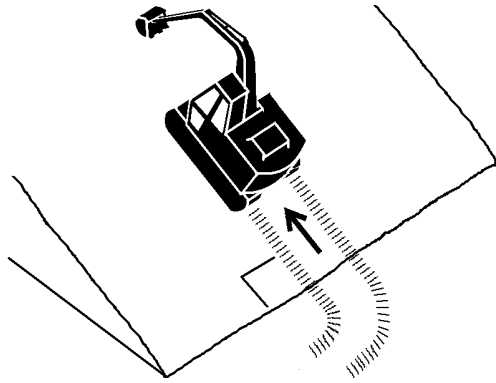
- Before driving the machine, always confirm that the travel levers/pedals direction corresponds to the direction you wish to drive.
- Be sure to detour around any obstructions.
- Avoid traveling over obstructions. Soil, fragments of rocks, and/or metal pieces may scatter around the machine. Don't allow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



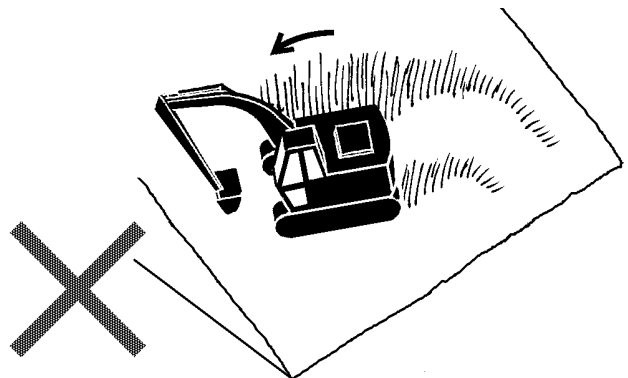
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SA-658



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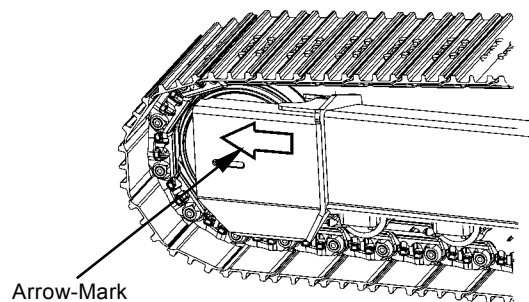
SAFETY

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.



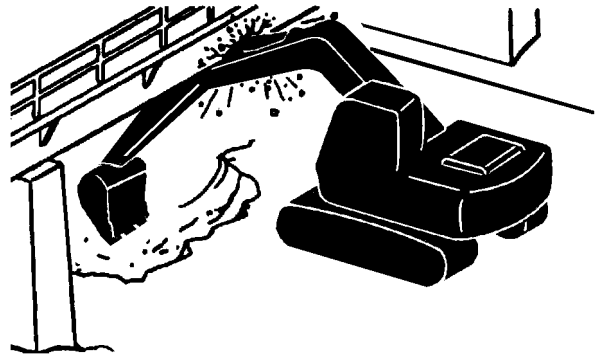
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SAFETY

- 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.



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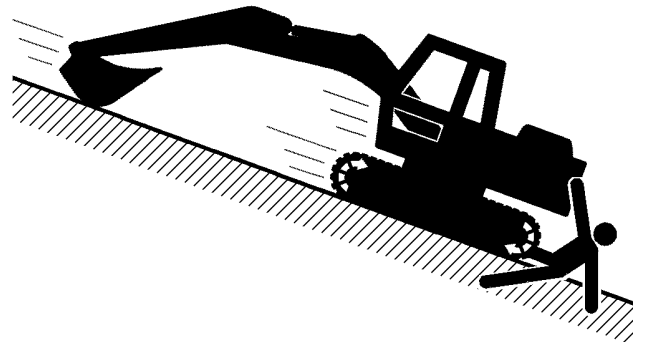
SAFETY

AVOID INJURY FROM ROLLAWAY ACCIDENTS

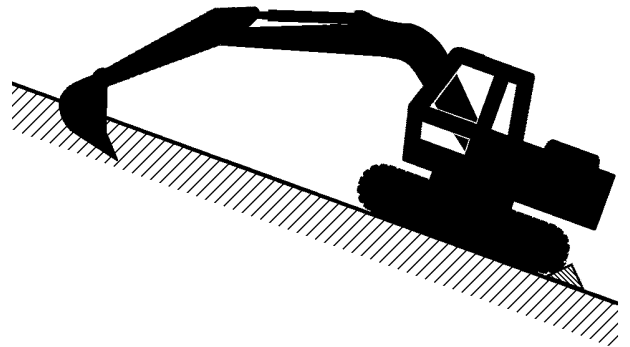
- Death or serious injury may result if you attempt to mount or stop a moving machine.

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.



SA-391



SA-392

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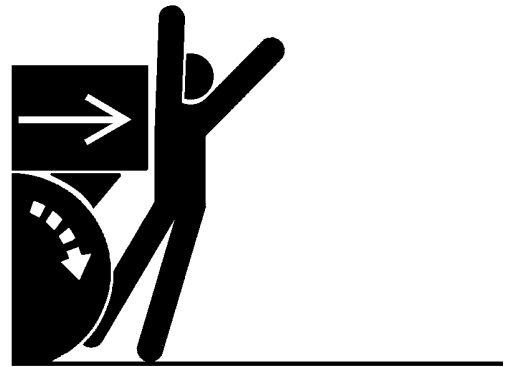
SAFETY

AVOID INJURY FROM BACK-OVER AND SWING ACCIDENTS

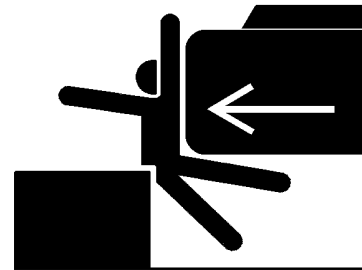
- If any person is present near the machine when backing or swinging the upperstructure, the machine may hit or run over that person, resulting in serious injury or death.

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



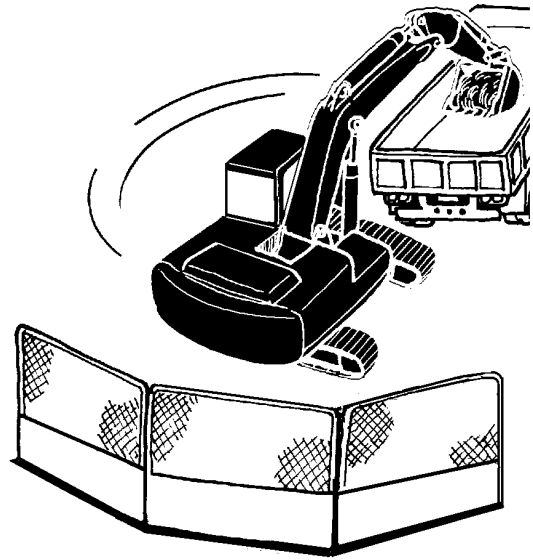
SA-384

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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.

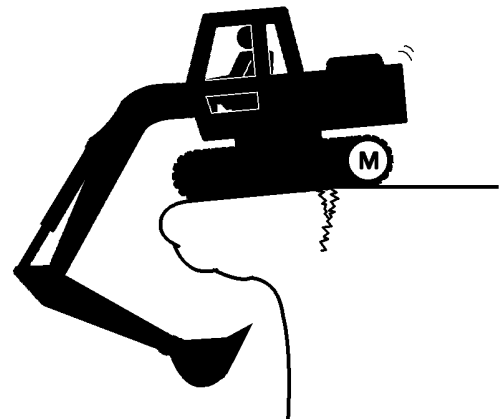


023-E01A-0487

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

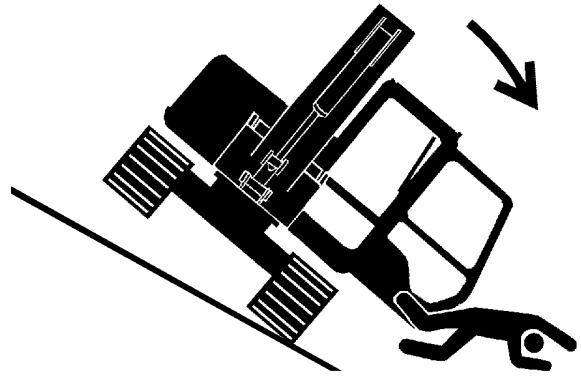
MACHINE WILL TIP OVER FASTER THAN YOU CAN JUMP FREE

FASTEN YOUR SEAT BELT

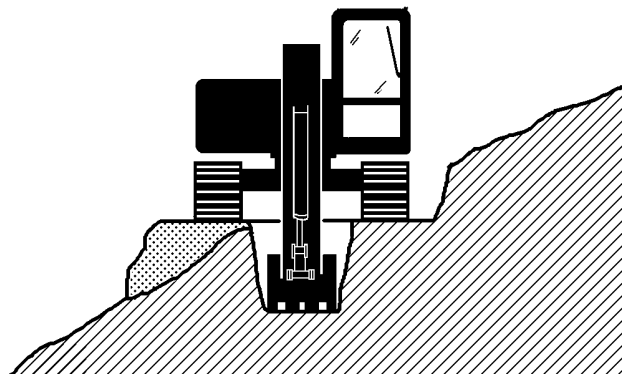
- The danger of tipping is always present when operating on a grade, possibly resulting in serious injury or death.

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



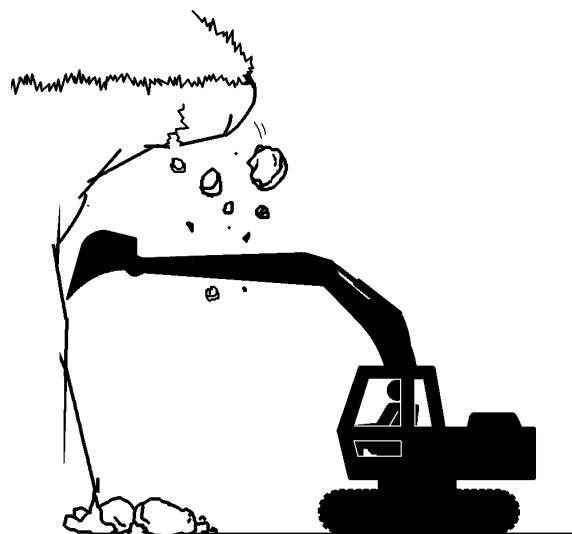
SA-440

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



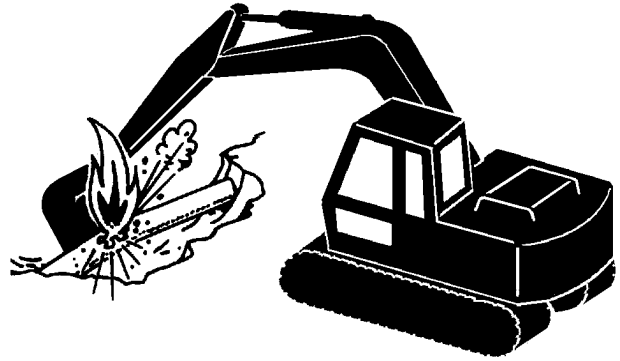
SA-489

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



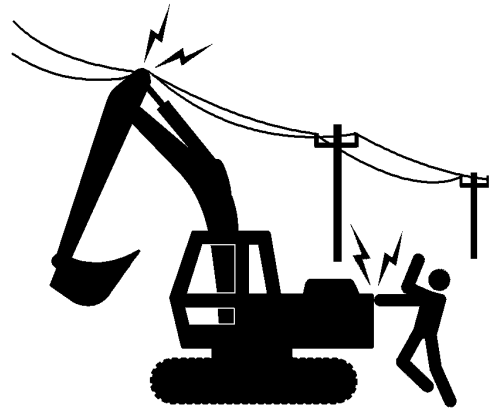
SA-389

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.

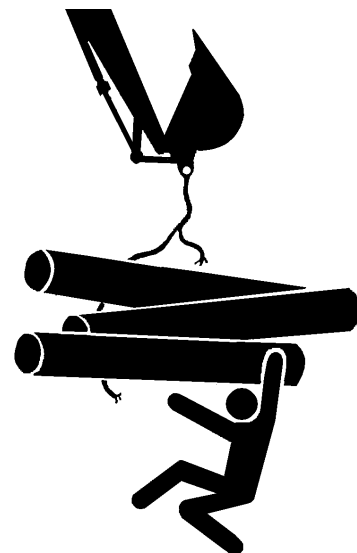


SA-1088

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

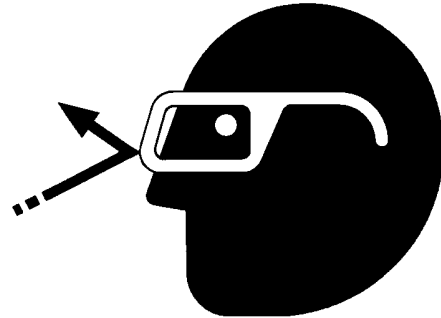


SA-014

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.



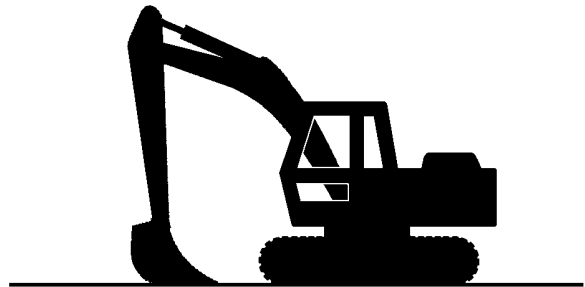
031-E01A-0432

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 flat-bed 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



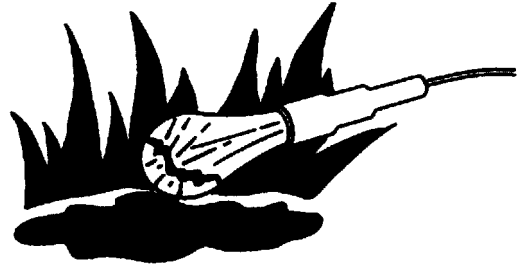
SA-028



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.

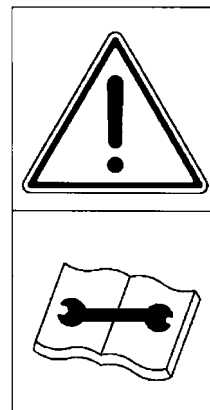


SA-037

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.

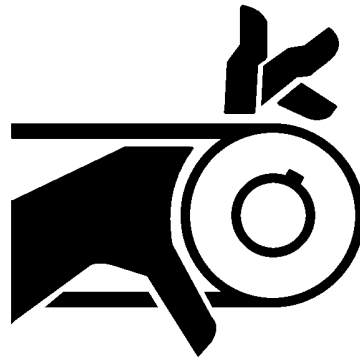


519-E01A-0527

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.



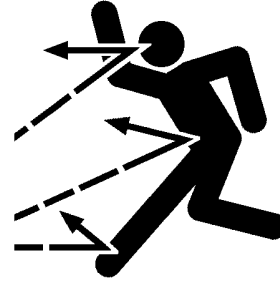
502-E01A-0026

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.

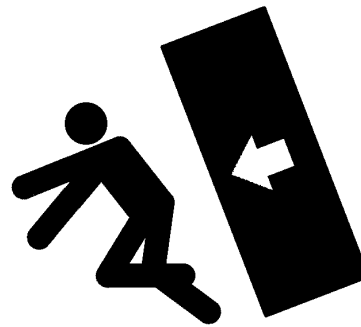


SA-344

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

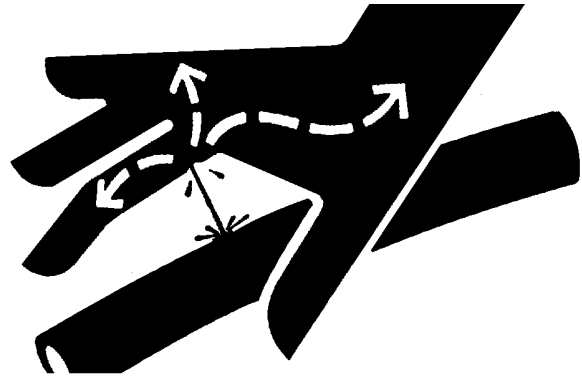
S506-E01A-0019

SAFETY

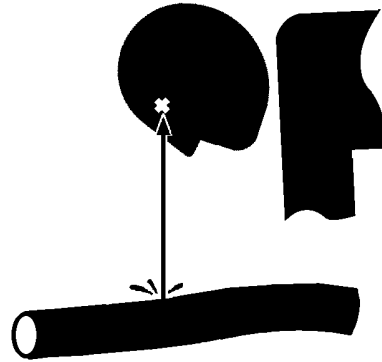
AVOID HIGH-PRESSURE FLUIDS

- 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.

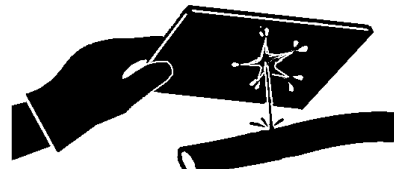
507-E03A-0499



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

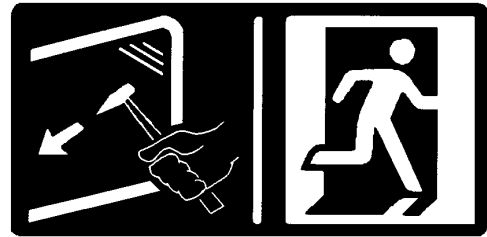
EVACUATING IN CASE OF FIRE

- 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

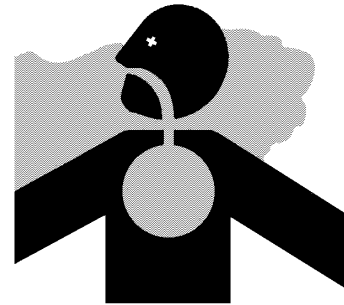


SS-1510

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.

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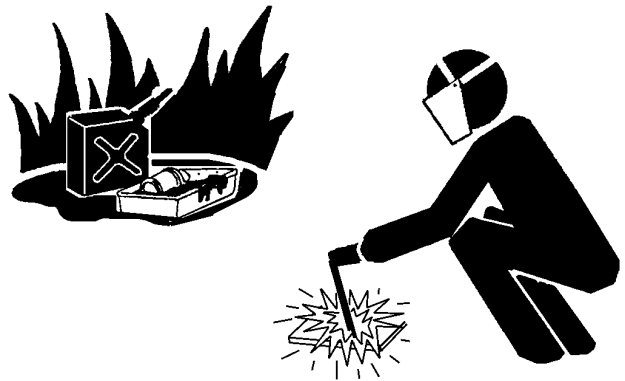


SA-016

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

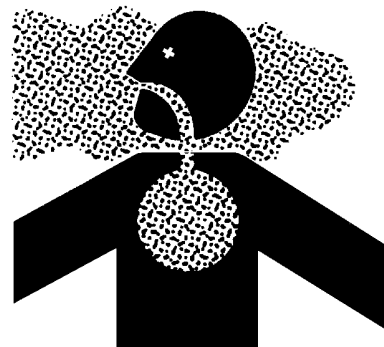
AVOID APPLYING HEAT TO LINES CONTAINING FLAMMABLE FLUIDS

- 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.



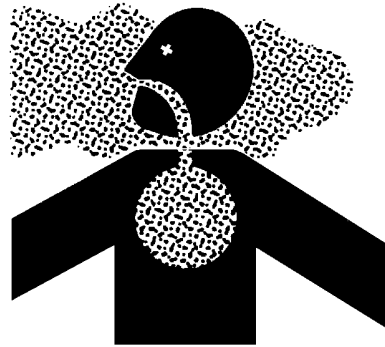
SA-029

511-E01A-0029

SAFETY

BEWARE OF ASBESTOS DUST

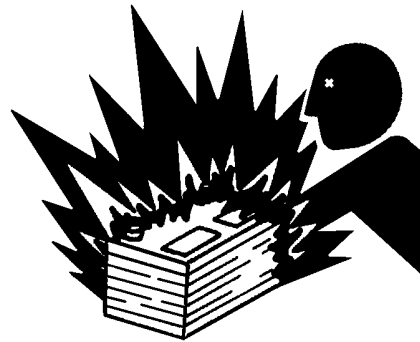
- Take care not to inhale dust produced in the work site. Inhalation of asbestos fibers may be the cause of lung cancer.
- Depending on the work site conditions, the risk of inhaling asbestos fiber may exist. Spray water to prevent asbestos from becoming airborne. Don't use compressed air.
- When operating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

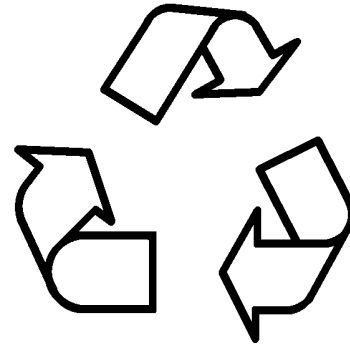


SA-309

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

SECTION 1 GENERAL INFORMATION

Group 1 Precautions for disassembling and Assembling
Group 2 Tightening Torque
Group 3 Painting
Group 4 Bleeding Air from Hydraulic Oil Tank

SECTION 2 UPPERSTRUCTURE

Group 1 Cab
Group 2 Counterweight
Group 3 Main Frame
Group 4 Pump Device
Group 5 Control Valve
Group 6 Swing Device
Group 7 Pilot Valve
Group 8 Pilot Shut-Off Solenoid Valve
Group 9 Signal Control Valve
Group 10 4-Spool Solenoid Valve Unit
Group 11 Engine

SECTION 3 UNDERCARRIAGE

Group 1 Swing Bearing
Group 2 Travel Device
Group 3 Center Joint
Group 4 Track Adjuster
Group 5 Front Idler
Group 6 Upper and Lower Roller
Group 7 Track

SECTION 4 FRONT ATTACHMENT

Group 1 Front Attachment
Group 2 Cylinder

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

TECHNICAL MANUAL (Operational Principle)

SECTION 1 GENERAL

- Group 1 Specification
- Group 2 Component Layout
- Group 3 Component Specifications

SECTION 2 SYSTEM

- Group 1 Controller
- Group 2 Control System
- Group 3 ECM System
- Group 4 Hydraulic System
- Group 5 Electrical System

SECTION 3 COMPONENT OPERATION

- Group 1 Pump Device
- Group 2 Swing Device
- Group 3 Control Valve
- Group 4 Pilot Valve
- Group 5 Travel Device
- Group 6 Signal Control Valve
- Group 7 Others (Upperstructure)
- Group 8 Others (Undercarriage)

TECHNICAL MANUAL (Troubleshooting)

SECTION 4 OPERATIONAL PERFORMANCE TEST

- Group 1 Introduction
- Group 2 Standard
- Group 3 Engine Test
- Group 4 Excavator Test
- Group 5 Component Test

SECTION 5 TROUBLESHOOTING

- Group 1 General
 - Group 2 Monitor Unit
 - Group 3 Dr. ZX
 - Group 4 e-Shovel
 - Group 5 Component Layout
 - Group 6 Troubleshooting A
 - Group 7 Troubleshooting B
 - Group 8 Electrical System Inspection
-

SECTION 1 GENERAL



— CONTENTS —

Group 1 Precautions for Disassembling and Assembling

- Precautions for Disassembling and Assembling..... W1-1-1
- Maintenance Standard Terminology W1-1-7

Group 2 Tightening Torque

- Tightening Torque Specification W1-2-1
- Torque Chart W1-2-2
- Piping Joint W1-2-5
- Periodic Replacement of Parts W1-2-9

Group 3 Painting

- Painting W1-3-1

Group 4 Bleeding Air from Hydraulic Oil Tank

- Bleeding Air from Hydraulic Oil Tank..... W1-4-1

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GENERAL / Precautions for Disassembling and Assembling

PRECAUTIONS FOR DISASSEMBLING AND ASSEMBLING

Precautions for Disassembling and Assembling

- Clean the Machine

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

- Inspect the Machine

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

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

- Prepare and Clean Tools and Disassembly Area

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

- Precautions for Disassembling

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

GENERAL / Precautions for Disassembling and Assembling

- Precautions for Assembling

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

Bleeding Air from Hydraulic System

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

IMPORTANT: If the engine is started with air trapped in the hydraulic pump housing, damage to the pump may result. If the 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.

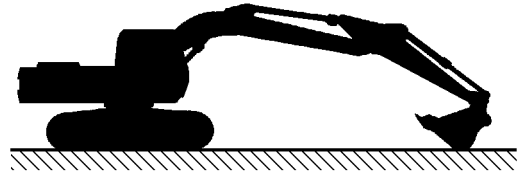
- Bleeding Air from Travel Motor / Swing Motor

- 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.



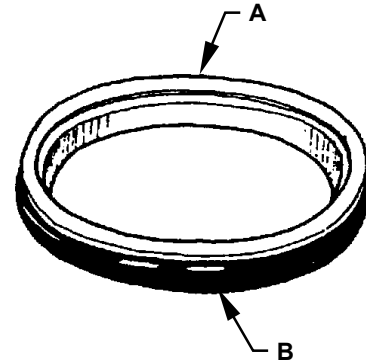
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GENERAL / Precautions for Disassembling and Assembling

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:

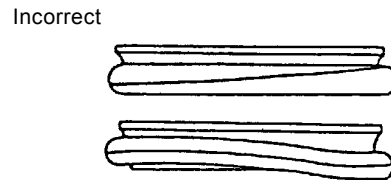
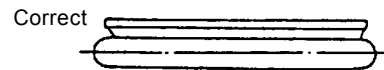
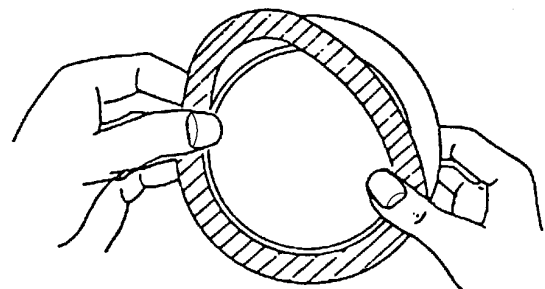
- (1) Keep seal rings together as a matched set with seal ring faces together. Insert a piece of cardboard to protect surfaces.
- (2) Check the slide surface on seal ring (A) for scuffing, scoring, corrosion, deformation or uneven wear.
- (3) Check O-ring (B) for tears, breaks, deformation or hardening.



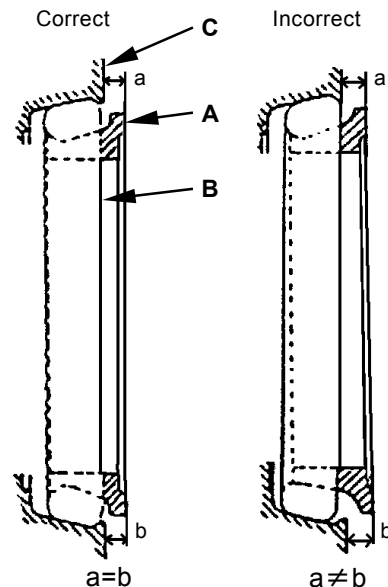
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2. If incorrectly assembled, oil leakage or damage will occur. Be sure to do the following, to prevent trouble.

- (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.



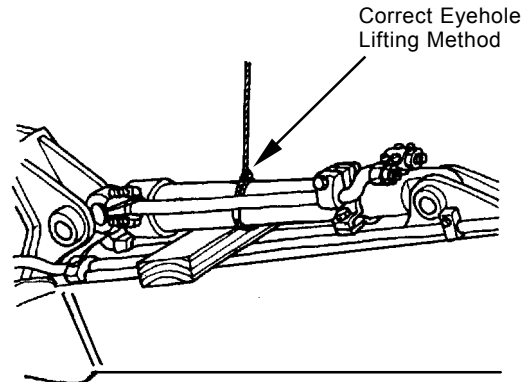
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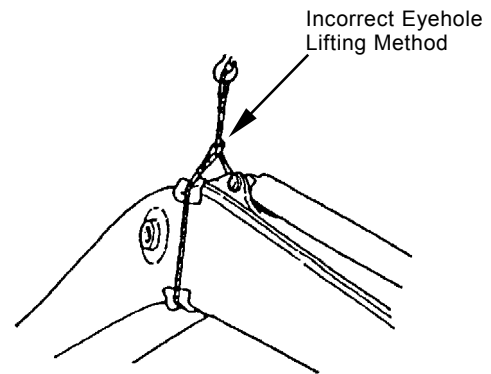
GENERAL / Precautions for Disassembling and Assembling

Precautions for Using Nylon Sling

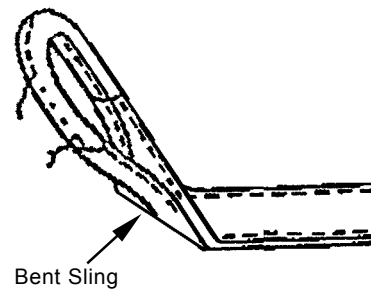
1. Follow the precautions below to use nylon slings safely.
 - Attach protectors (soft material) on the corners of the load so that the nylon sling does not directly contact the corners. This will prevent the nylon sling from being damaged and the lifted load from slipping.
 - Lower the temperature of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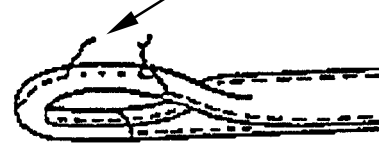
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GENERAL / Precautions for Disassembling and Assembling

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

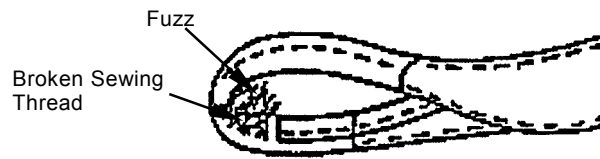


W162-01-01-002

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 and nut (Pump Side)	18	4	27	400	(40)	(300)	
2	Engine bracket mounting bolt	(Fan Side) 10	10	17	65	(6.5)	(48)	
		(Pump Side) 12	8	19	110	(11)	(81)	
3	Hydraulic oil tank mounting bolt	18	4	27	400	(40)	(300)	
4	Fuel tank mounting bolt	20	4	30	550	(55)	(405)	
5	Radiator mounting bolt	(Upper Side) 10	6	17	65	(6.5)	(48)	
		(Lower Side) 16	4	24	270	(27)	(200)	
6	Pump mounting bolt	10	8	17	65	(6.5)	(48)	
7	Control valve mounting bolt	16	4	24	210	(21)	(155)	
	Control valve bracket mounting bolt	16	4	24	270	(27)	(200)	
8	Swing device mounting bolt	22	14	32	650	(65)	(480)	
9	Swing motor mounting bolt	12	8	10	90	(9)	(65)	
10	ORS fittings for hydraulic hoses and piping			17	25	(2.5)	(18)	
				19	30	(3)	(22)	
				22	40	(4)	(30)	
				27	95	(95)	(70)	
				32	140	(14)	(103)	
				36	180	(18)	(133)	
		41	210	(21)	(155)			
		50	260	(26)	(190)			
11	Hycolin tube mounting nut	-	-	17	35	(3.5)	(26)	
12	Battery mounting nut	10	4	17	25	(2.5)	(18)	
13	Cab mounting nut	16	4	24	210	(21)	(155)	
	Cab mounting anchor bolt	22	2	32	550	(55)	(405)	
	Cab cushion rubber mounting bolt	12	8	19	110	(11)	(81)	
14	Cover mounting bolt	6	-	10	10	(1)	(7.4)	
		10	-	17	50	(5)	(37)	
		12	-	17	90	(9)	(66)	
15	Flexible master coupling of piping	-	5 pair	13	13.3 to 12.4	(1.05 to 1.26)	(7.59 to 9.11)	
		-		17	20.5 to 22.6	(2.07 to 2.30)	(15.1 to 16.3)	
		-	8	10	6	(0.6)	(4.4)	
	T-bolt clamp low pressure piping	27	36	41	1226	(125)	(905)	
16	Swing bearing mounting bolt	(Upperstructure) 27	36	41	1226	(125)	(905)	
		(Undercarriage) 20	48	30	630	(63)	(465)	
17	Travel device mounting bolt	14	12	22	180	(18)	(133)	
	Travel reduction device cover mounting bolt	22	44	32	680	(68)	(500)	
	Sprocket roller mounting bolt	18	16	27	460	(46)	(340)	
18	Upper roller mounting bolt	22	68	32	840	(84)	(620)	
19	Lower roller mounting bolt	ZAXIS330-3, 350H-3, 350K-3	22	76	32	840	(84)	(620)
		ZAXIS330LC-3, 350LCH-3, 350LCK	22	36	32	1130	(113)	(830)
20	Track shoe bolt	ZAXIS330-3, 350H-3, 350K-3	22	384	32	1130	(113)	(830)
		ZAXIS330LC-3, 350LCH-3, 350LCK	22	24	32	750	(75)	(555)
21	Track guard mounting bolt	ZAXIS3303, 330LC-3, 350K-3, 350LCK	22	24	32	750	(75)	(555)
			18	16	27	500	(50)	(370)
		ZAXIS350H-3	22	28	32	750	(75)	(555)
		ZAXIS330-3, 350LCH-3, 350K	18	16	27	500	(50)	(370)

 **NOTE** 1. Apply lubricant (e.g. white zinc B dissolved into spindle oil) to bolts and nuts to reduce friction coefficient of them.
(Except for Sprocket mounting bolt.)

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

GENERAL / Tightening Torque

TORQUE CHART

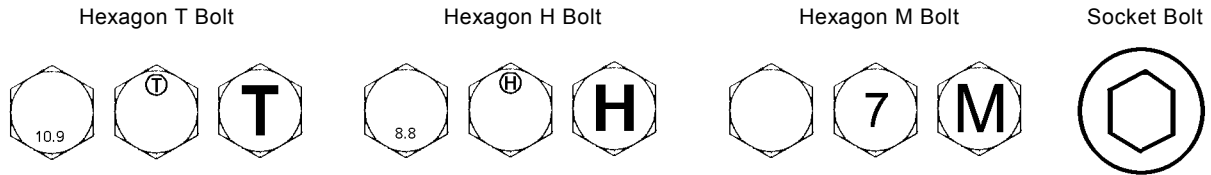
⚠ CAUTION: Use tools appropriate for the work to be done. Makeshift tools and procedures can create safety hazards. For loosening and tightening nuts and bolts, use correct size tools. Otherwise, tightening tools may slip, potentially causing personal injury.



Bolt Types

Tighten nuts or bolts correctly to torque specifications. Four different types and grades of bolt are employed. Make sure to employ correct bolts and tighten them correctly when assembling the machine or components.

SA-040



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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

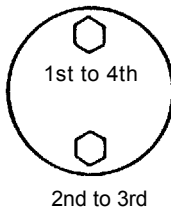
IMPORTANT: The following items are applied to both fine and coarse pitch threads.

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.

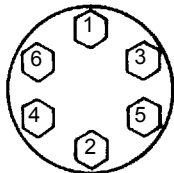
Bolt Tightening Order

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

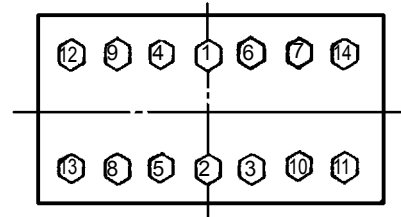
Equally tighten upper and lower alternately



Tighten diagonally



Tighten from center and diagonally

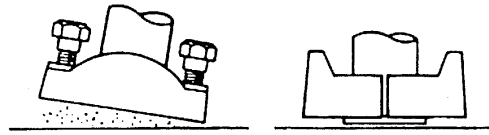


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GENERAL / Tightening Torque

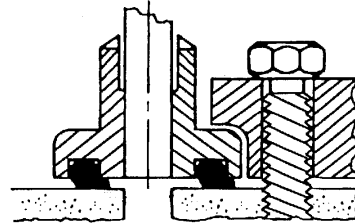
Service Recommendations for Split Flange

- 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.

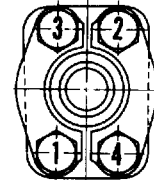


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WRONG

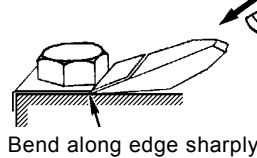


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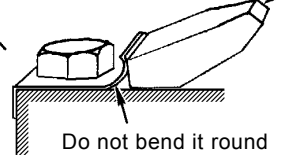


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RIGHT



WRONG



Nut and Bolt Locking

- Lock Plate

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

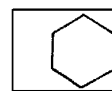
- Cotter Pin

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

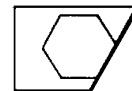
- Lock Wire

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

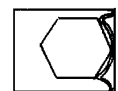
RIGHT



RIGHT

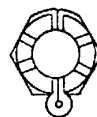


WRONG



Bend along edge sharply

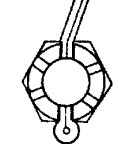
RIGHT



RIGHT

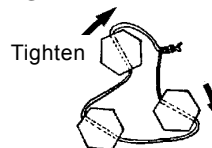


WRONG



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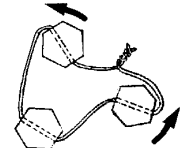
RIGHT



Tighten

Loosen

WRONG

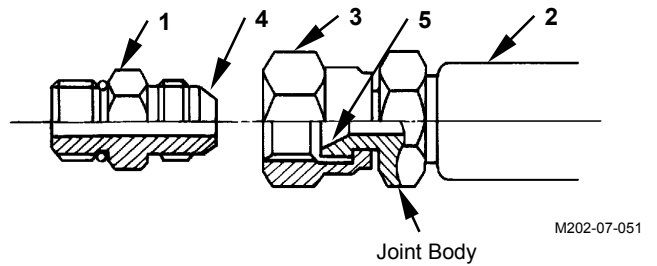


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GENERAL / Tightening Torque

PIPING JOINT

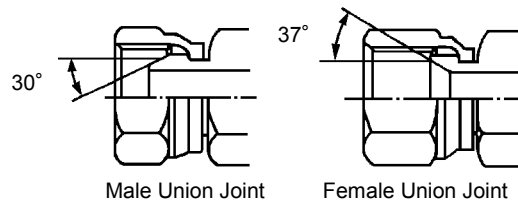
IMPORTANT: The torques given in the chart are for general use only. Do not use these torques if a different torque is given for a specific application.



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.



Description	Wrench Size mm	Wrench Size mm	Tightening Torque
	Union Nut	Joint Body	N-m (kgf-m, lbf-ft)
30° male	17	17	24.5 (2.5, 18)
	19	19	29.5 (3.0, 21.5)
	22	22	39 (4.0, 28.5)
	27	27	78 (8.0, 58)
	32	32	137 (14.0, 101)
	36	36	175 (18.0, 129)
	41	41	205 (21.0, 151)
37° female	17	14	24.5 (2.5, 18)
	19	17	29.5 (3.0, 21.5)
	22	19	39 (4.0, 28.5)
	27	22	78 (8.0, 58)
	32	27	137 (14.0, 101)
	36	32	175 (18.0, 129)
	41	36	205 (21.0, 151)

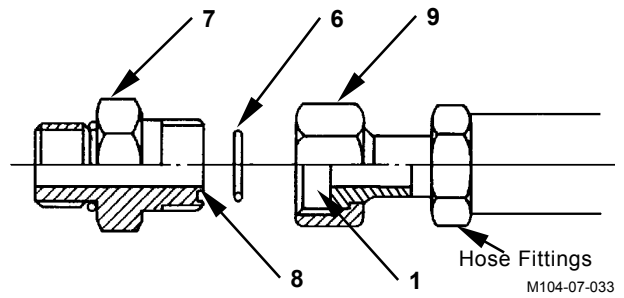
NOTE: Tightening torque of 37° male coupling without union is similar to tightening torque of 37° female.

GENERAL / Tightening Torque

O-ring Seal Joint

O-ring (6) seats against the end face 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 (e). 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 (e) 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).



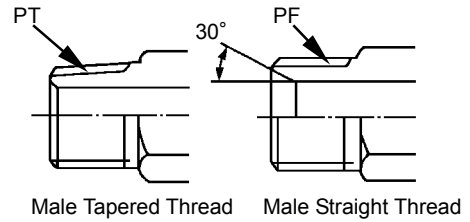
Wrench Size mm	Wrench Size mm	Tightening Torque
Union Nut	Joint Body	N-m (kgf-m, lbf-ft)
19	17	29.5 (3.0, 21.5)
22	19	69 (7.0, 51)
27	22	93 (9.5, 69)
32	27	137 (14.0, 101)
36	30, 32	175 (18.0, 129)
41	36	205 (21.0, 151)
46	41	205 (21.0, 151)

GENERAL / Tightening Torque

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)	
	FC material	SS material
Hose Fittings		
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

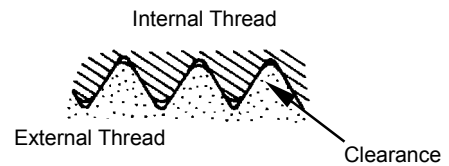
Seal tape is used to seal clearances between male and female threads, so as to prevent any leaks between threads.

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.



W105-01-01-019

Low-Pressure-Hose Clamp Tightening Torque

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

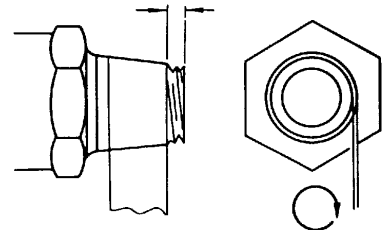
T-Bolt Type Band Clamp:

4.4 N·m (0.45 kgf·m, 3.25 lbf·ft)

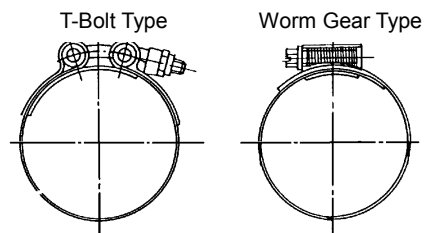
Worm Gear Type Band Clamp:

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

Leave one to two pitch threads uncovered



M114-07-041



M114-07-043

M114-07-042

GENERAL / Tightening Torque

Connecting Hose



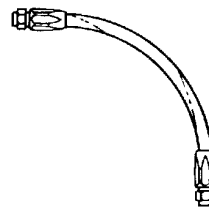
CAUTION: When replacing hoses, be sure to use only genuine Hitachi service parts. Using hoses other than genuine Hitachi hoses may cause oil leaks, hose rupture or Separation of fitting, possibly resulting in a fire on the machine.

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.

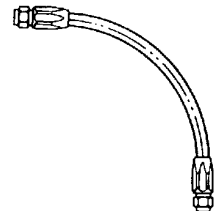
If hoses rub against each other, wear to the hoses will result, leading to hose rupture. Take necessary measures to protect hoses from rubbing against each other.

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

WRONG

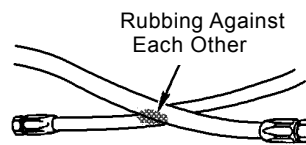


RIGHT

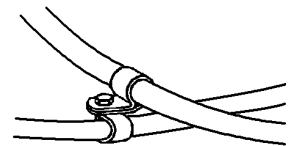


W105-01-01-011

WRONG

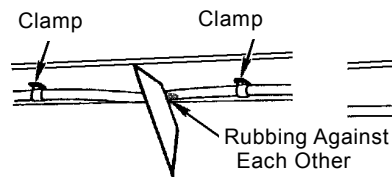


RIGHT

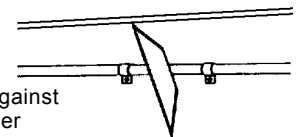


W105-01-01-012

WRONG

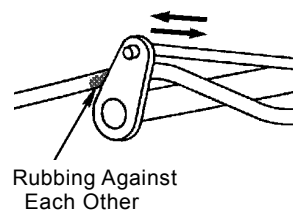


RIGHT

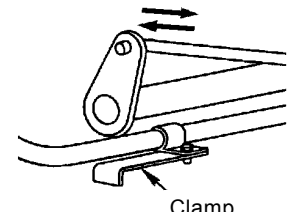


W105-01-01-013

WRONG



RIGHT



W105-01-01-014


GENERAL / Tightening Torque

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	
	Oil filter hose (Engine to oil filter)	Every 2 years	
	Heater hose (Heater to engine)	Every 2 years	
Hydraulic System	Base Machine	Pump suction hose	Every 2 years
		Pump delivery hose	Every 2 years
		Swing hose	Every 2 years
		Travel Hose	Every 2 years
	Front-End Attachment	Boom cylinder line hose	Every 2 years
		Arm cylinder line hose	Every 2 years
		Bucket cylinder line hose	Every 2 years
		Pilot hose	Every 2 years

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

GENERAL / Tightening Torque

(Blank)

GENERAL / Painting

PAINTING

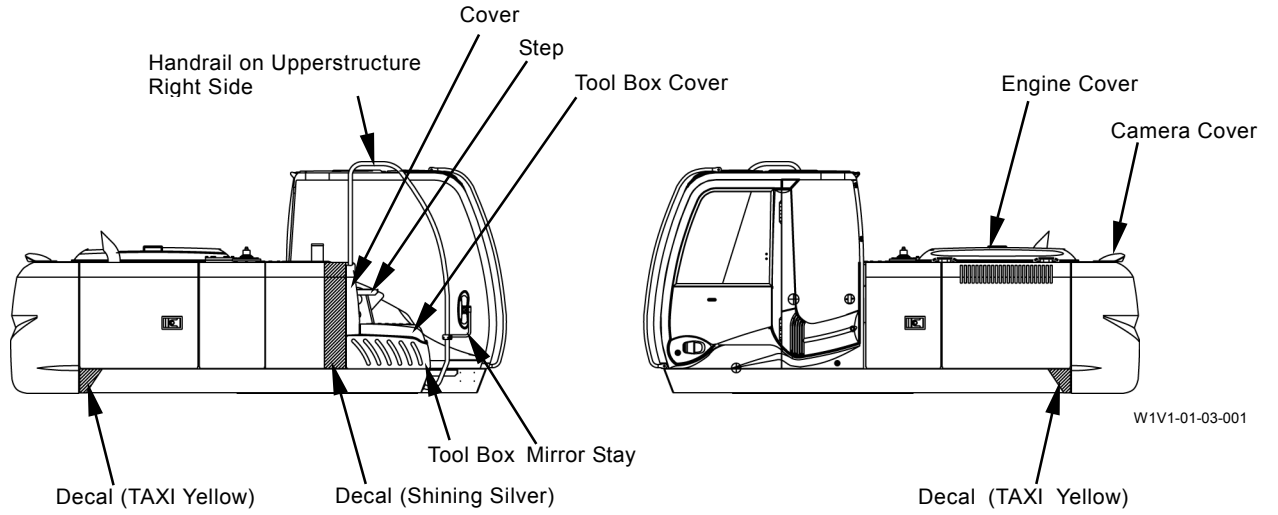
Painting specification

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

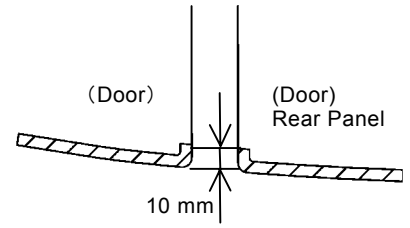
Final painted color

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

GENERAL / Painting

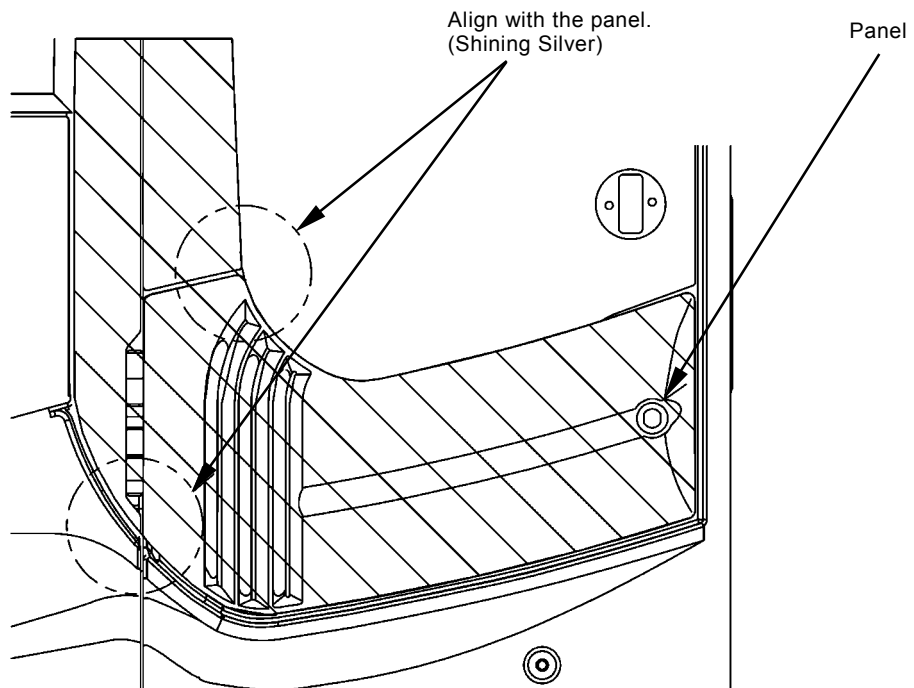
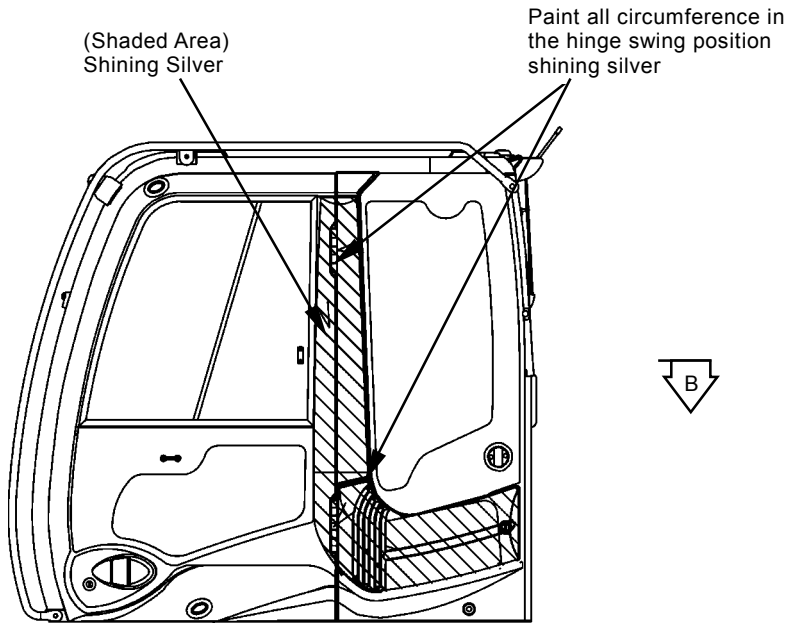


GENERAL / Painting



Shining Silver Painted Range on Door

Section B



W1JB-01-03-005

GENERAL / Painting

(Blank)

GENERAL / Bleeding Air from Hydraulic Oil Tank

BLEEDING AIR FROM HYDRAULIC OIL TANK




CAUTION: Escaping fluid under pressure can penetrate the skin, causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines.

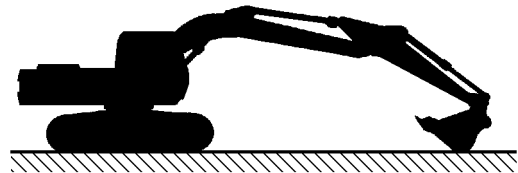
Hydraulic oil may be hot just after operation, and may spurt, possibly causing severe burns. Be sure to wait for oil to cool before starting work.

The hydraulic oil tank cap may fly off if removed without releasing internal pressure first. Push the air release valve on top of the hydraulic oil tank to release any remaining pressure.

Preparation

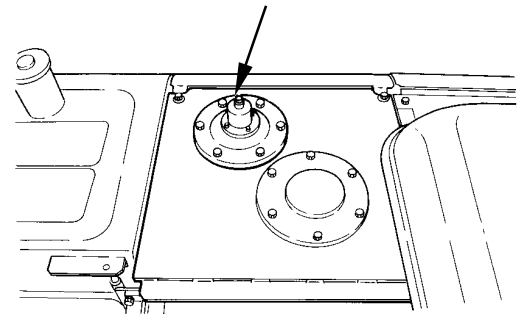
1. Place the machine on a firm, level surface.
2. Stop the engine. Push the pressure release button on top of the hydraulic oil tank to release any remaining pressure.
3. Remove hydraulic oil tank cap. Connect a vacuum pump to maintain negative pressure in the hydraulic oil tank.

 **NOTE:** Be sure to run the vacuum pump continuously while working.



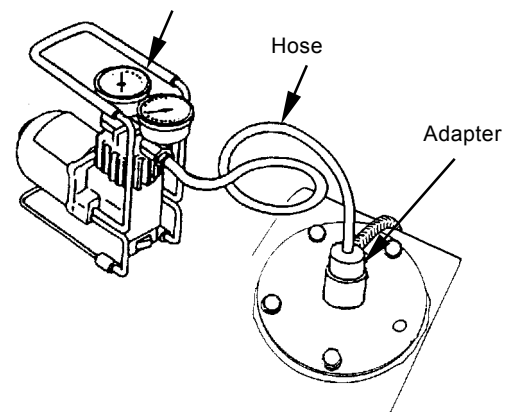
M104-07-021

Pressure Release Button



M157-07-173

Vacuum Pump

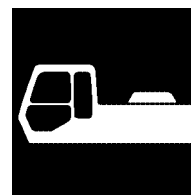


W562-02-03-008

GENERAL / Bleeding Air from Hydraulic Oil Tank

(Blank)

SECTION 2 UPPERSTRUCTURE



— CONTENTS —

Group 1 Cab

- Remove and Install Cab W2-1-1
- Dimensions of Cab Glass..... W2-1-9

Group 2 Counterweight

- Remove and Install Counterweight W2-2-1

Group 3 Main Frame

- Remove and Install Main Frame W2-3-1

Group 4 Pump Device

- Remove and Install Pump Device W2-4-1
- Disassemble Pump Device W2-4-8
- Assemble Pump Device W2-4-14
- Disassemble Main Pump W2-4-22
- Assemble Main Pump W2-4-30
- Disassemble Regulator W2-4-44
- Assemble Regulator W2-4-46
- Disassemble Pilot Pump W2-4-48
- Assemble Pilot Pump W2-4-50

Group 5 Control Valve

- Remove and Install Control Valve.....W2-5-1
- Disassemble Control Valve
(4-Spool Side)W2-5-4
- Assemble Control Valve
(4-Spool Side)W2-5-16
- Disassemble Control Valve
(5-Spool Side)W2-5-34
- Assemble Control Valve
(5-Spool Side)W2-5-46
- Disassemble HousingW2-5-58
- Assemble Housing.....W2-5-60

Group 6 Swing Device

Remove and Install Swing Device.....	W2-6-1
Disassemble Swing Device.....	W2-6-4
Assemble Swing Device.....	W2-6-12
Disassemble Swing Motor	W2-6-20
Assemble Swing Motor	W2-6-24
Structure of Swing Parking Brake	
Switch Valve	W2-6-28
Maintenance Standard	W2-6-29

Group 7 Pilot Valve

Remove and Install Pilot Valve.....	W2-7-1
Disassemble Right and Left	
Pilot Valves	W2-7-18
Assemble Right and Left	
Pilot Valves	W2-7-22
Disassemble Travel Pilot Valve	W2-7-26
Assemble Travel Pilot Valve.....	W2-7-30
Disassemble Positioning Pilot Valve	
(2-Piece Boom Only).....	W2-7-36
Assemble Positioning Pilot Valve	
(2-Piece Boom Only)	W2-7-38

Group 8 Pilot Shut-Off Solenoid Valve

Remove and Install	
Pilot Shut-Off Valve	W2-8-1
Disassemble Pilot Shut-Off	
Solenoid Valve.....	W2-8-2
Assemble Pilot Shut-Off Valve	W2-8-4

Group 9 Signal Control Valve

Remove and Install Signal	
Control Valve	W2-9-1
Structure of Signal Control Valve.....	W2-9-4

Group 10 4-Spool Solenoid Valve Unit

Remove and Install	
4-Spool Solenoid Valve Unit	W2-10-1
Structure of	
4-Spool Solenoid Valve Unit	W2-10-2

Group 11 Engine

Remove and Install Engine	W2-11-1
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UPPERSTRUCTURE / Cab

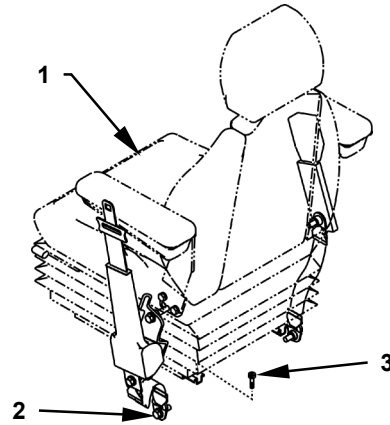
REMOVE AND INSTALL CAB

Removal

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


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

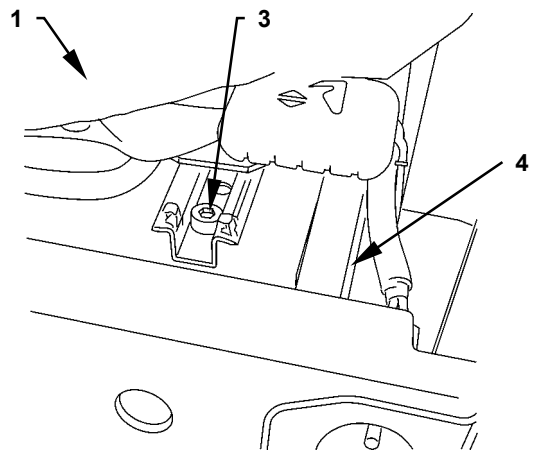
 : 16 mm



W1JB-02-01-008

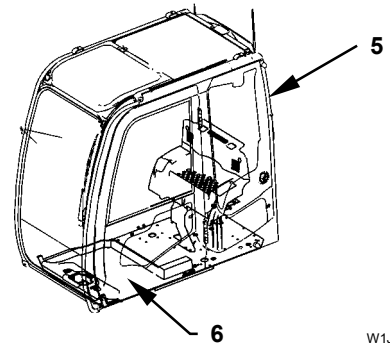
2. Remove socket bolts (3) (4 used) from seat (1). Remove seat (1) from bracket (4).

 : 6 mm



W1JB-02-07-007


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

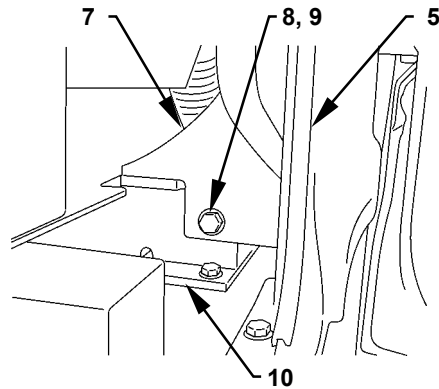


W1JB-02-07-015

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).

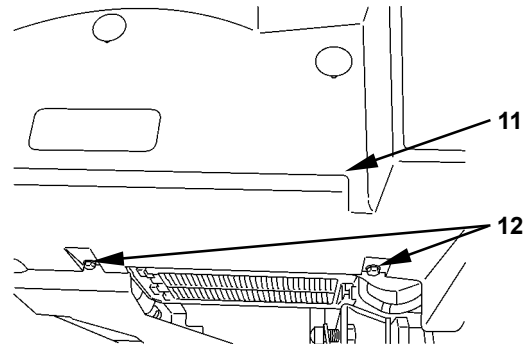
 : 19 mm



W1JB-02-01-003

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

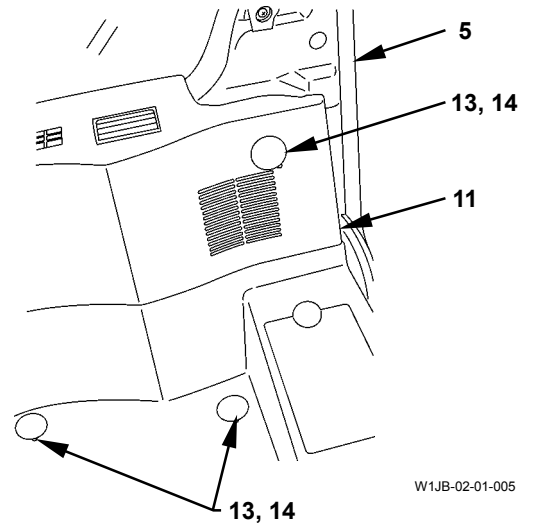
 : 13 mm



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).




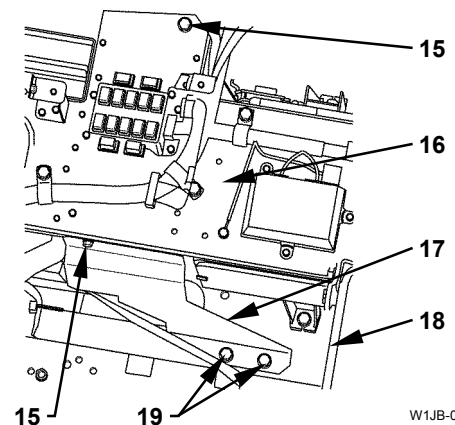
W1JB-02-01-005

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).

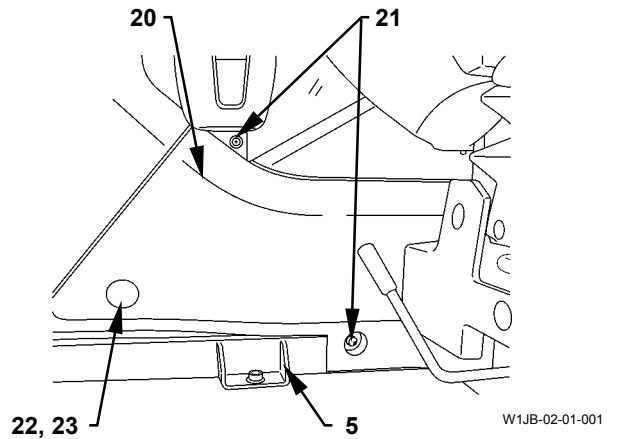
 : 17 mm



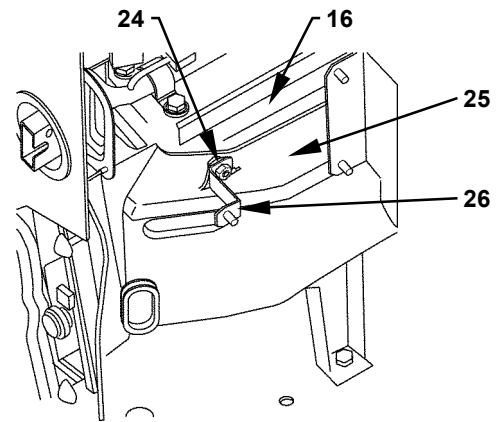
W1JB-02-01-040

UPPERSTRUCTURE / Cab

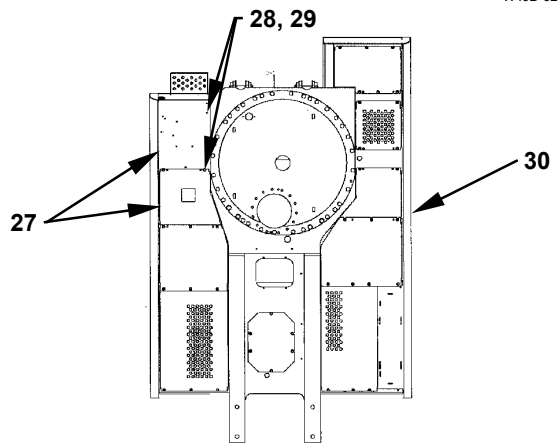
10. Remove screws (21) (2 used) from cover (20).
Remove cap (22) and screw (23) from cover (20).
Remove cover (20) from cab (5).



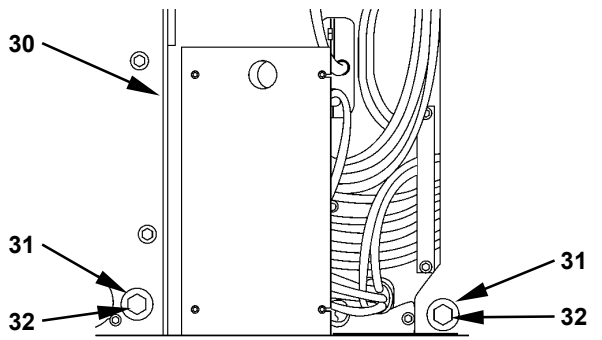
11. Remove bolt (24) from duct (25). Remove duct (25) from bracket (26).
🔧 : 13 mm



12. Remove bolts (28) (13 used) and washers (29) (13 used) from covers (27) (2 used). Remove covers (27) (2 used) from main frame (30).
🔧 : 17 mm






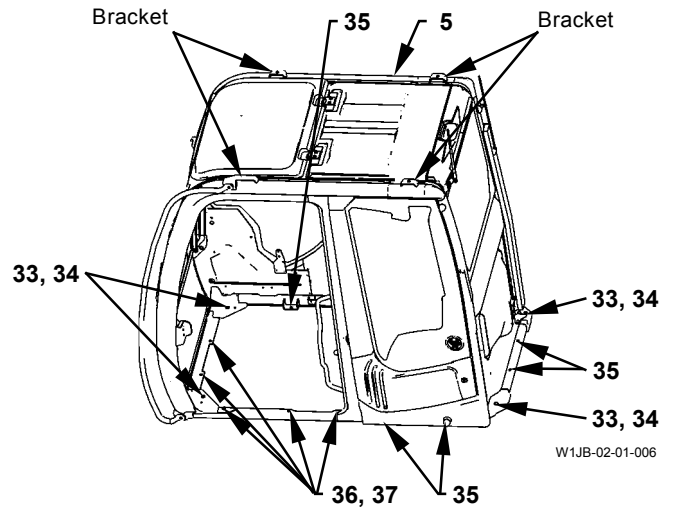
13. Remove anchor bolts (32) (2 used) and spacers (31) (2 used) from main frame (30).
🔧 : 32 mm




W1JV1-02-01-001

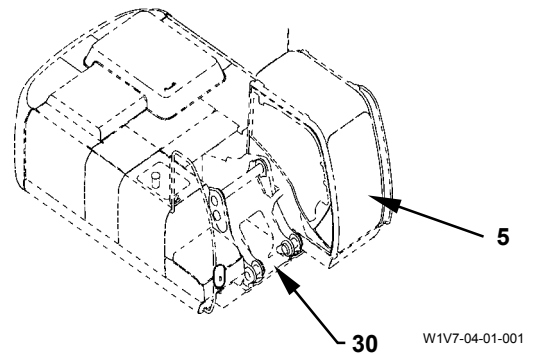
UPPERSTRUCTURE / Cab

14. Attach a nylon sling onto the bracket and hold cab (5).
15. Remove nuts (33) (4 used) and washers (34) (4 used) from cab (5).
 : 24 mm
16. Remove socket bolts (35) (6 used) from cab (5).
 : 8 mm
17. Remove bolts (36) (5 used) and washers (37) (5 used) from cab (5).
 : 17 mm
18. Remove all connectors, plugs and vinyl hoses from cab (5).



 **CAUTION: Cab (5) weight: 385 kg (850 lb)**

19. Remove cab (5) from main frame (30).

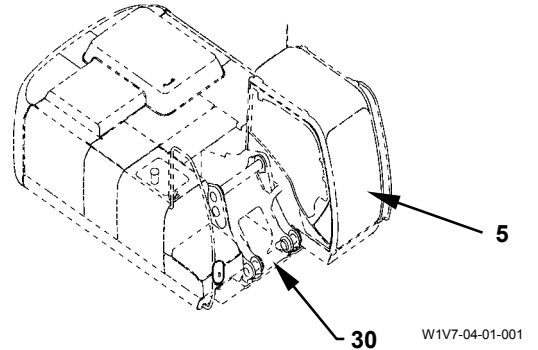


UPPERSTRUCTURE / Cab


Installation


CAUTION: Cab (5) weight: 385 kg (850 lb)

1. Attach a nylon sling onto cab (5) and hoist cab (5). Align cab (5) with the mounting hole on main frame (30).





2. Install cab (5) to main frame (30) with nuts (33) (4 used) and washers (34) (4 used).

 : 24 mm


 : 210 N·m (21.5 kgf·m, 155 lbf·ft)


3. Install cab (5) to main frame (30) with socket bolts (35) (6 used).

 : 8 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)


4. Install cab (5) to main frame (30) with bolts (36) (5 used) and washers (37) (5 used).

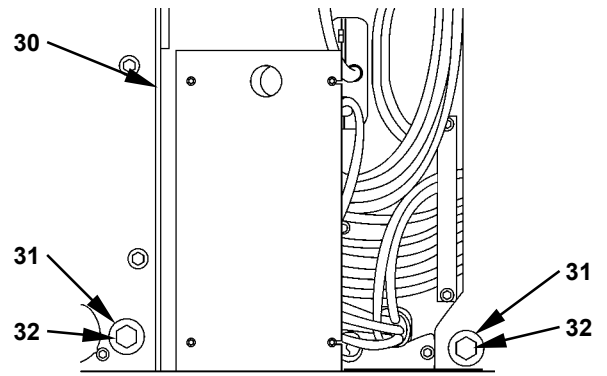
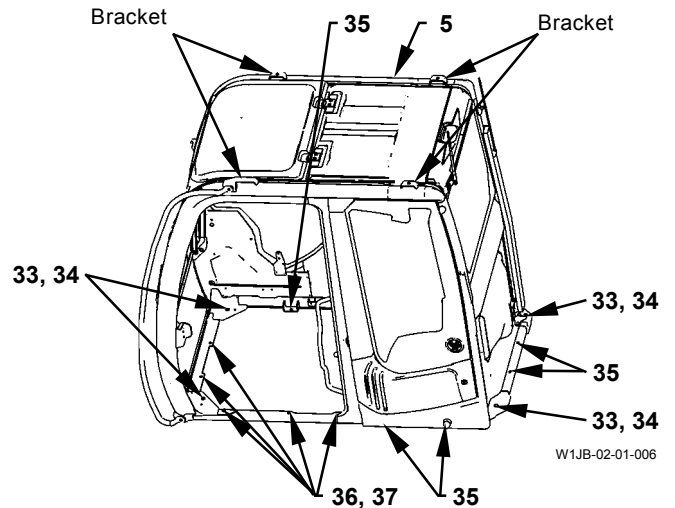
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

5. Install cab (5) to main frame (30) with bolts (33) (2 used) and spacers (31) (2 used).


 : 32 mm


 : 550 N·m (56 kgf·m, 410 lbf·ft)

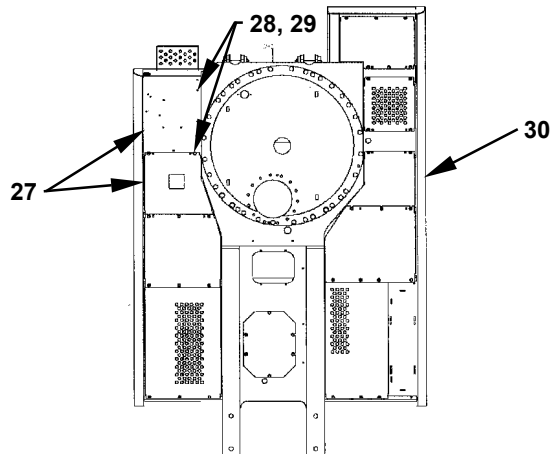


UPPERSTRUCTURE / Cab

6. Install covers (27) (2 used) to main frame (30) with bolts (28) (13 used) and washers (29) (13 used).


 : 19 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)



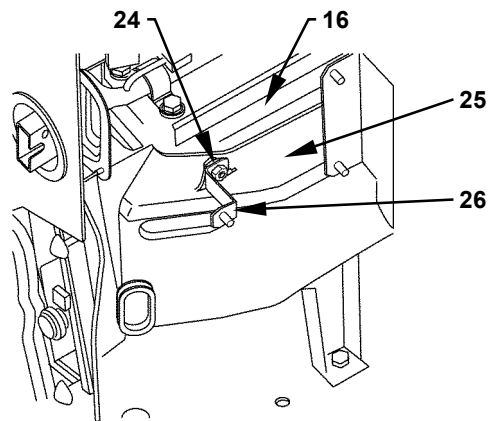
W1JV7-02-07-001

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

 : 13 mm

 : 20 N·m (2 kgf·m, 15 lbf·ft)

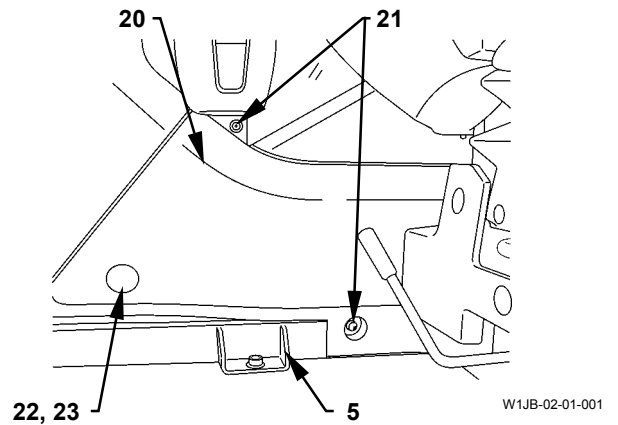
8. Install the connector, plug and vinyl hose to cab (5).




W1JB-02-01-041


UPPERSTRUCTURE / Cab


9. Install cover (20) to cab (5) with screws (21) (2 used). Install cover (20) to cab (5) with screw (23). Install cap (22) to screw (23).




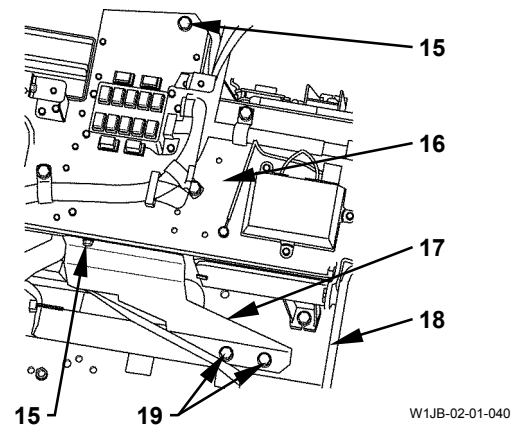
10. Install bracket (16) to bracket (18) with bolts (15) (2 used). Install cover (17) to bracket (18) with bolts (19) (2 used).

 : 13 mm

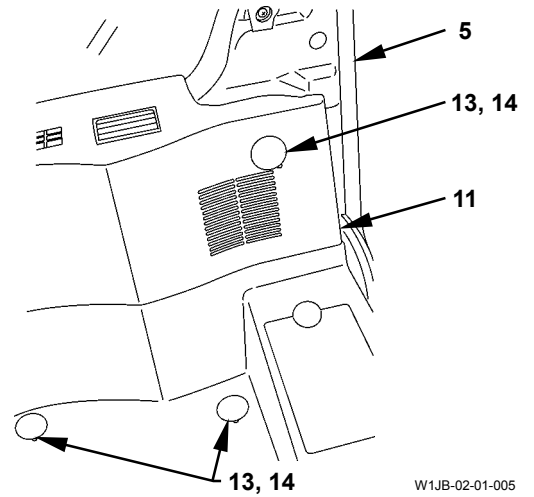
 : 20 N·m (2 kgf·m, 15 lbf·ft)

 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)




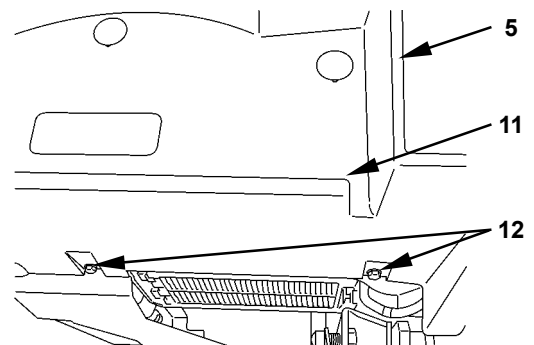
11. Install cover (11) to cab (5) with bolts (14) (5 used). Install caps (13) (6 used) to screws (14) (6 used).



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


 : 13 mm


 : 20 N·m (2 kgf·m, 15 lbf·ft)

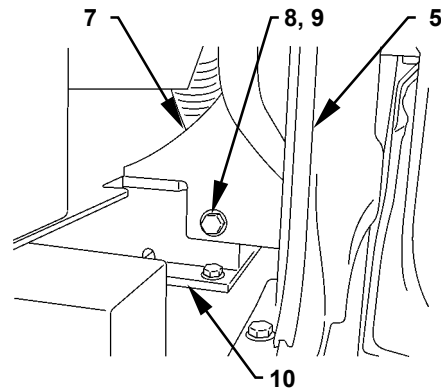


UPPERSTRUCTURE / Cab

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

 : 19 mm

 : 90 N·m (9 kgf·m, 66 lbf·ft)





W1JB-02-01-003

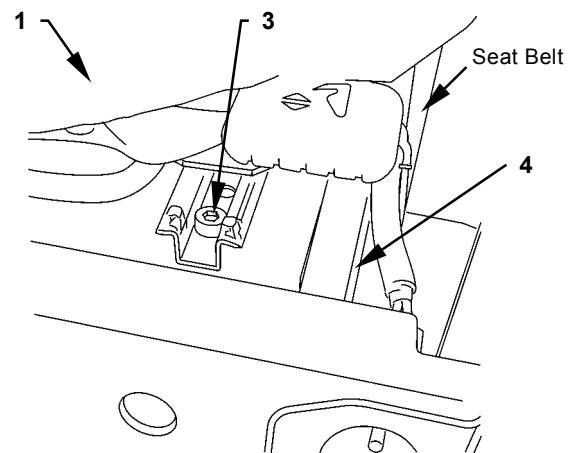


CAUTION: Seat (1) weight: 40 kg (88 lb)

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


 : 6 mm


 : 20 N·m (2 kgf·m, 15 lbf·ft)

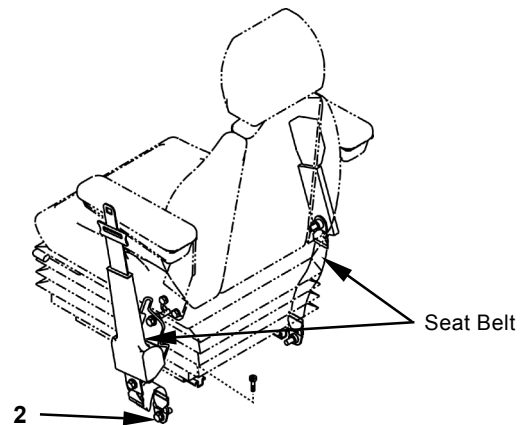


W1JB-02-07-007

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

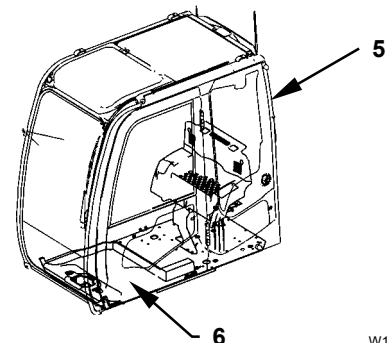
 : 16 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



W1JB-02-01-008


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

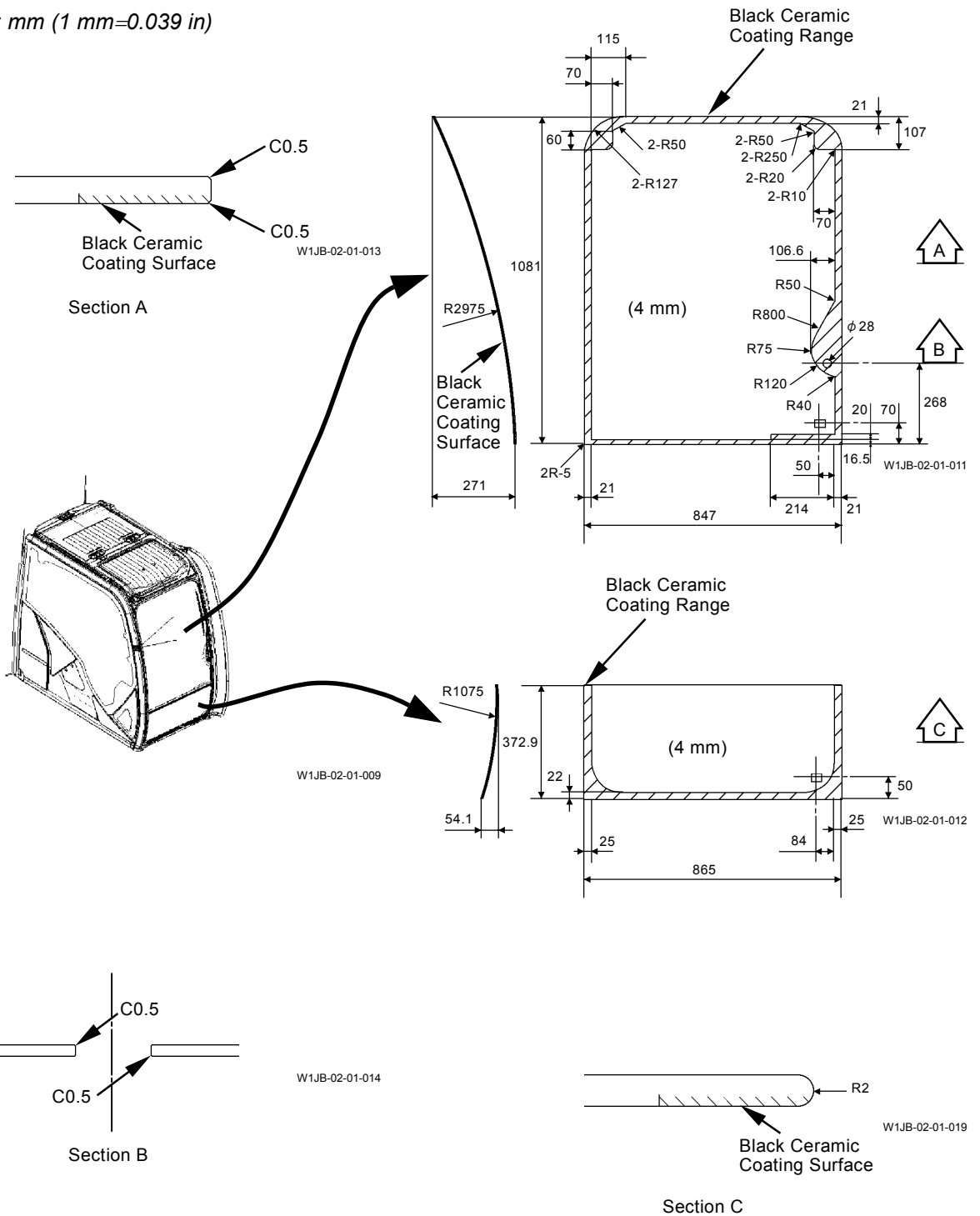


W1JB-02-07-015


UPPERSTRUCTURE / Cab

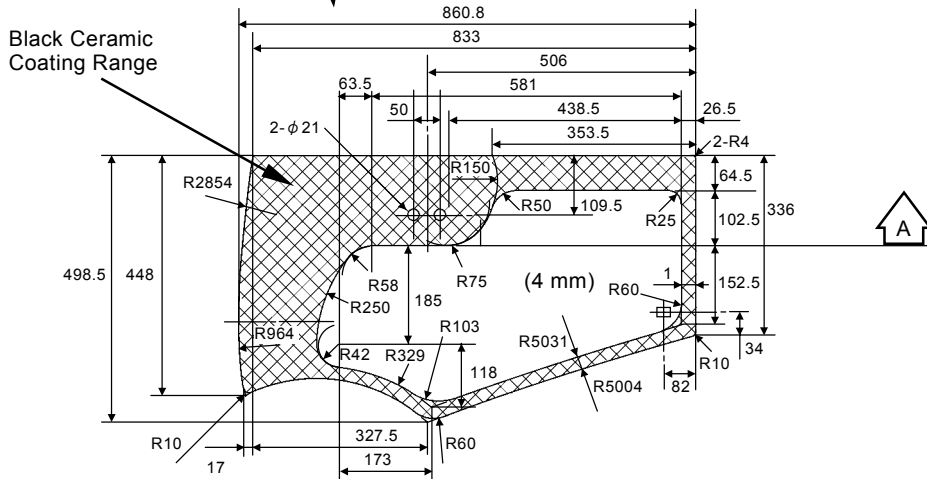
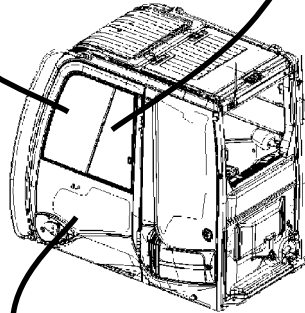
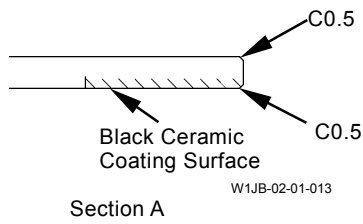
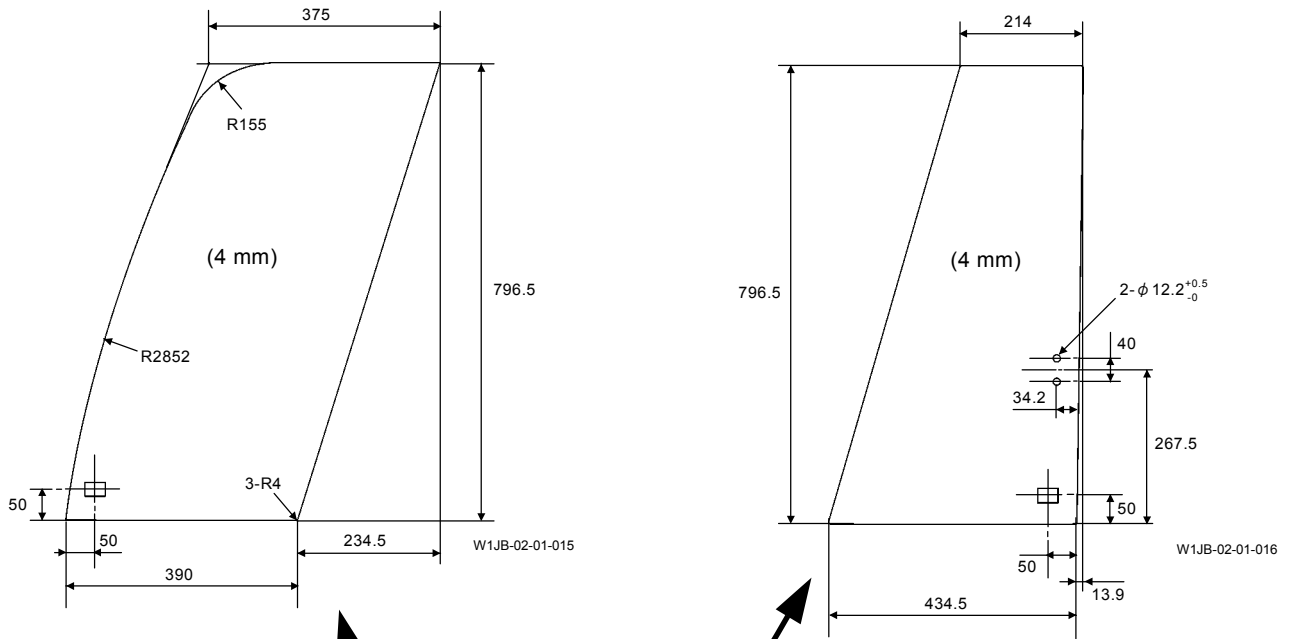
DIMENSIONS OF THE CAB GLASS

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



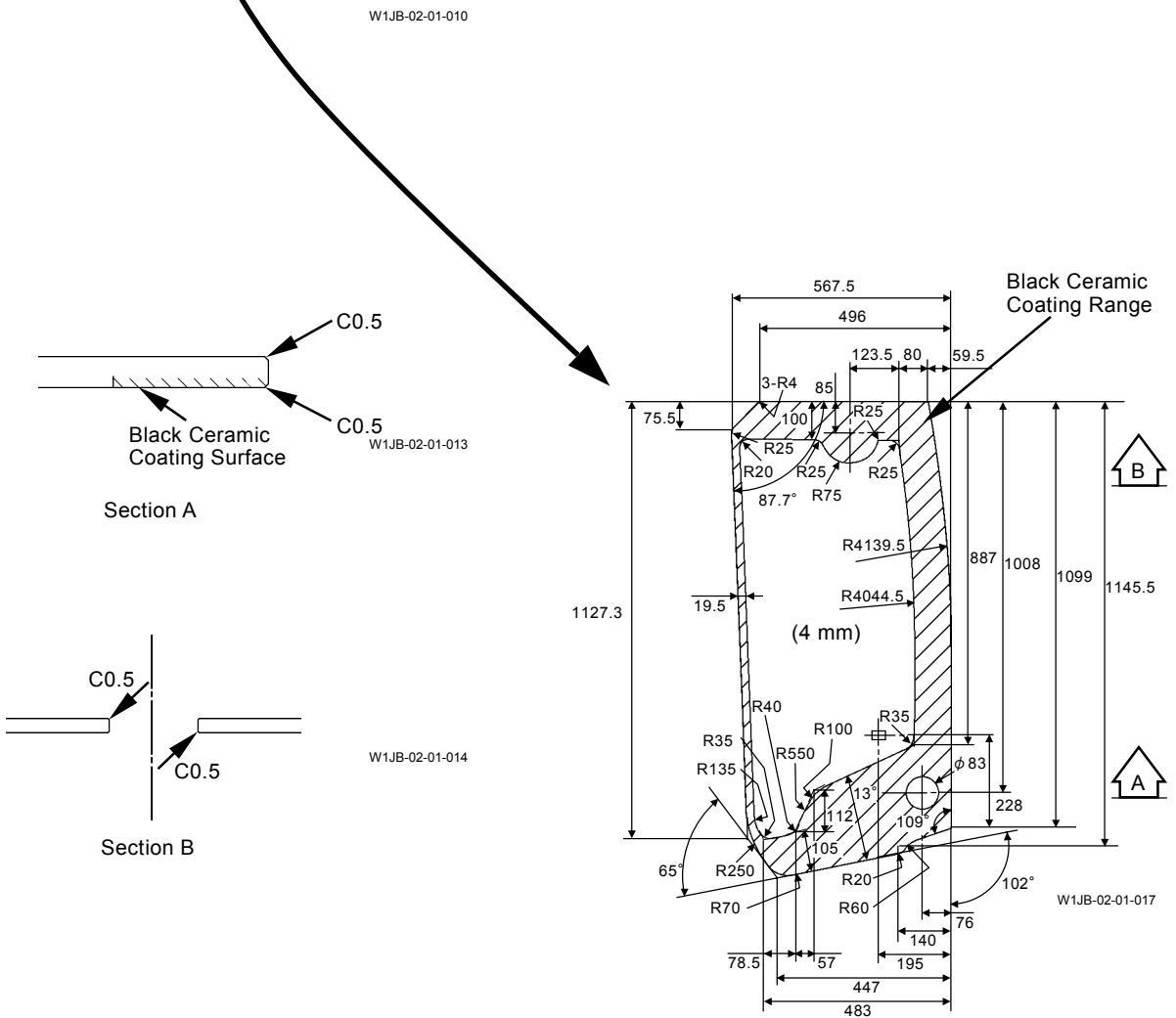
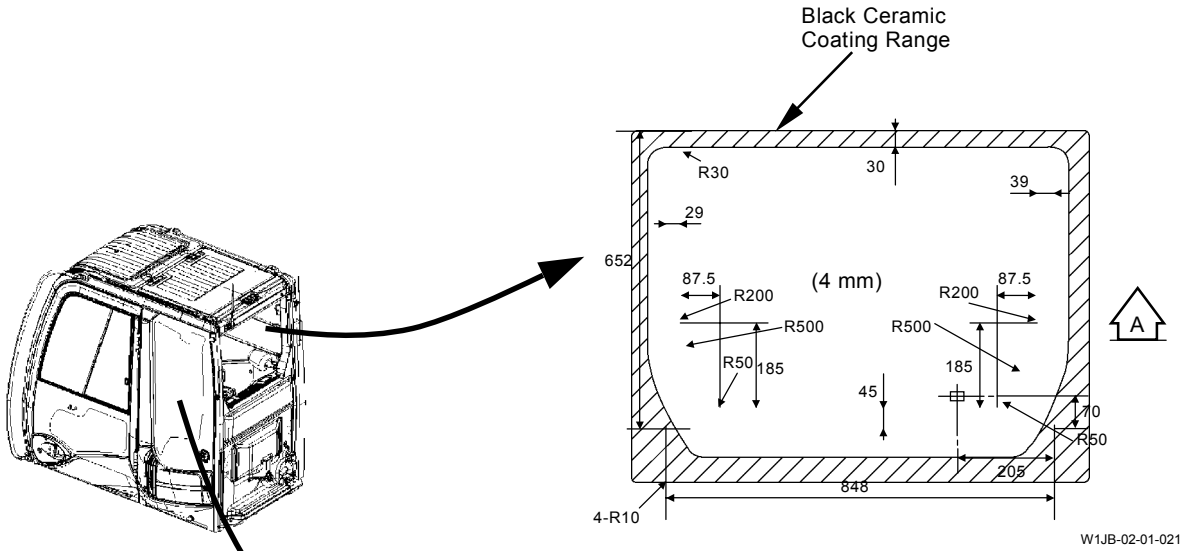
UPPERSTRUCTURE / Cab

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



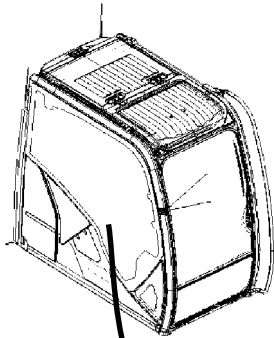
UPPERSTRUCTURE / Cab

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

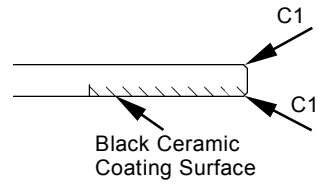


UPPERSTRUCTURE / Cab

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

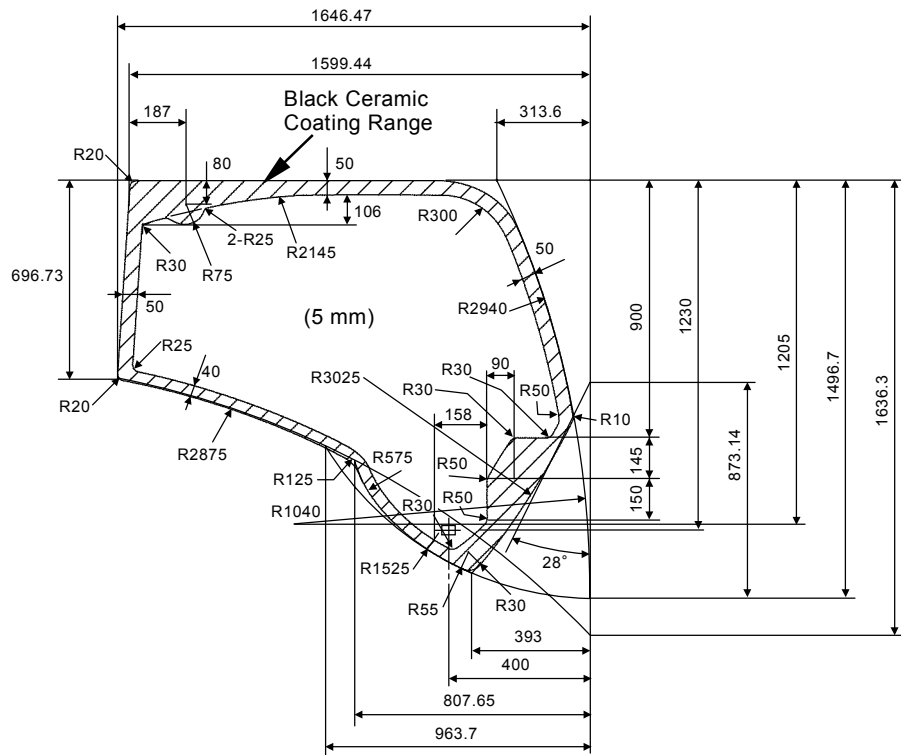


W1JB-02-01-009



W1JB-02-01-013

Section A



W1JB-02-01-020

UPPERSTRUCTURE / Cab

Procedure to Remove Cab Glass

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

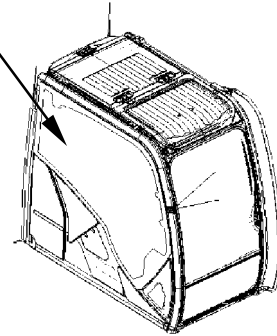


CAUTION: When removing the broken or cracked glass, the glass shards may cause serious injury.

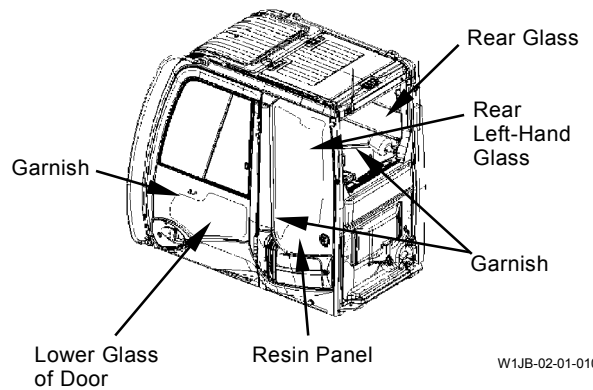
Before removing, use the gummed tape or something like in order to paste the broken or cracked glass and reinforce them. Remove the glass pieces away.

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

Right-Hand Glass

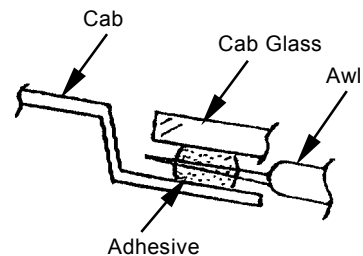


W1JB-02-01-009



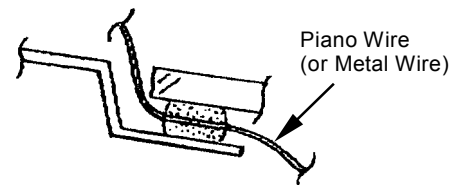
W1JB-02-01-010

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.

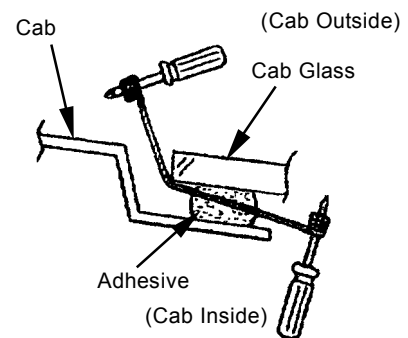


W1SE-02-01-034

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

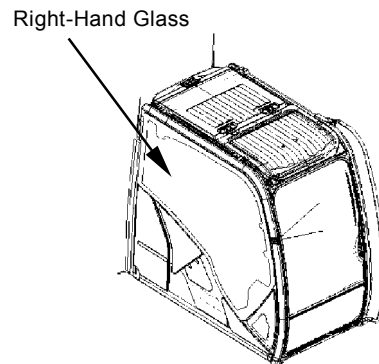
UPPERSTRUCTURE / Cab

Procedure to Install Cab Glass

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

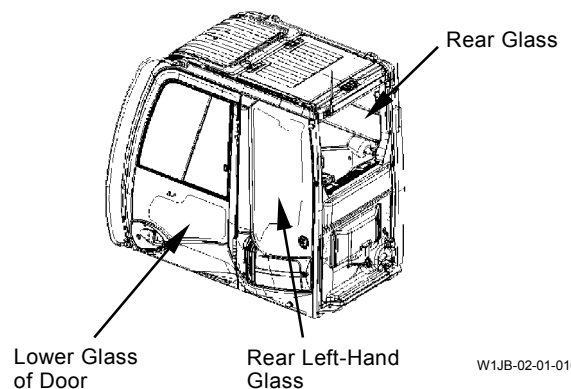
1. Cut off the residual adhesive from cab side by 1 to 2 mm deep all around by using a cutter knife or similar.

 **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

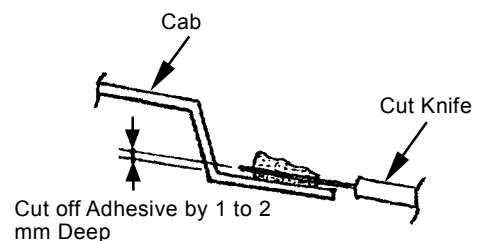
IMPORTANT: Primer should be shaken for about 1 minute and mix thoroughly before opening the cap.

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

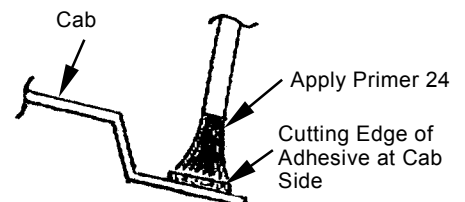
After opening Primer, all the contents should be used within 180 days (or 2 hours with the cap off).

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 W2-1-15.)
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 W2-1-18.)
7. Cut off the nozzle of adhesive cartridge (Sika Tack-Drive) into V-shaped by using a knife. (Refer to W2-1-18.)
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 W2-1-18.)
11. Suck, raise the glass by using sucker lifter 4355282 (refer to W2-1-18), 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.*

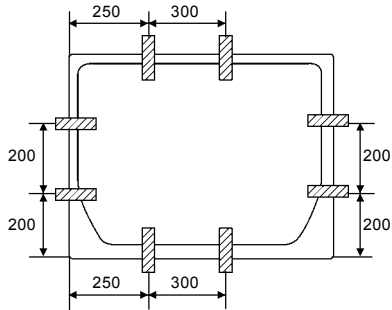
12. Secure the glass by using the gummed tape until the adhesive becomes solid in order to prevent them from being mispositioned or coming off.

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

UPPERSTRUCTURE / Cab

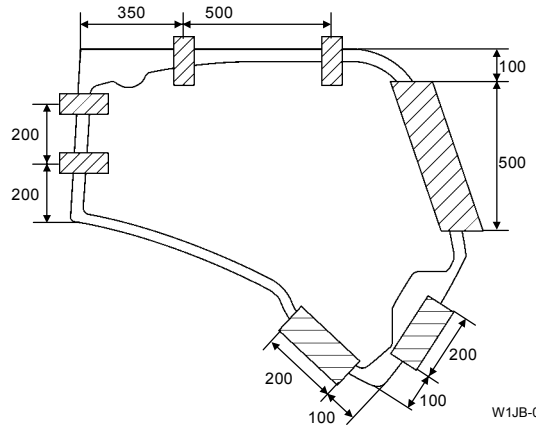
 NOTE: Unit: mm (1 mm=0.039 in)

Rear Glass



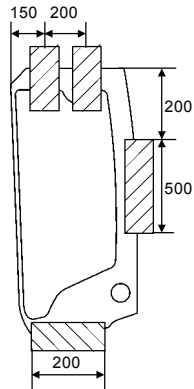
W1JB-02-01-029

Right-Hand Glass



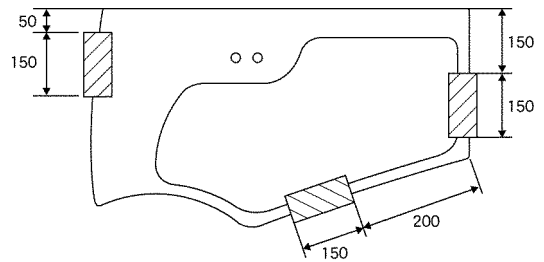
W1JB-02-01-030

Rear Left-Hand Glass




W1JB-02-01-035

Lower Glass of Door

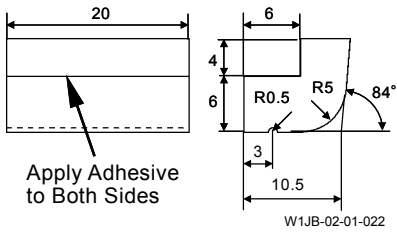


W1JB-02-01-038

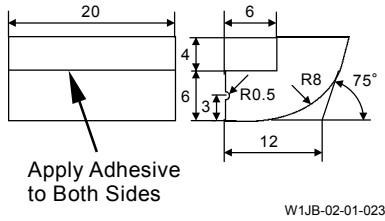
UPPERSTRUCTURE / Cab

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

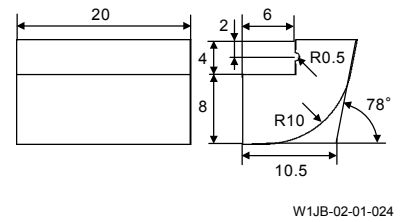
Spacer A



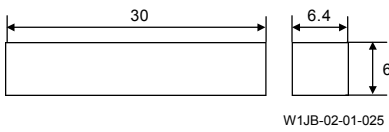
Spacer B



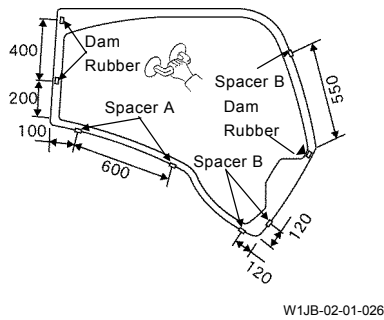
Spacer C



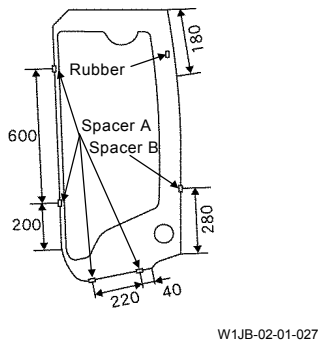
Dam Rubber



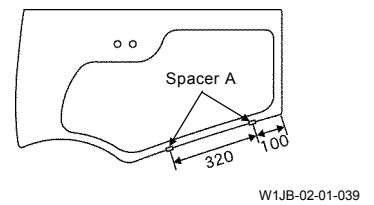
Right-Hand Glass



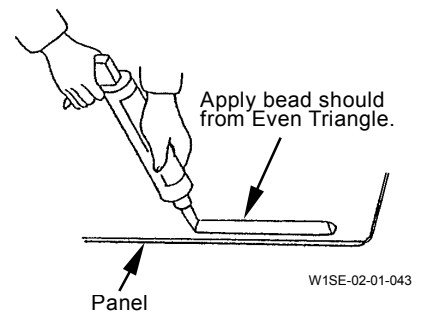
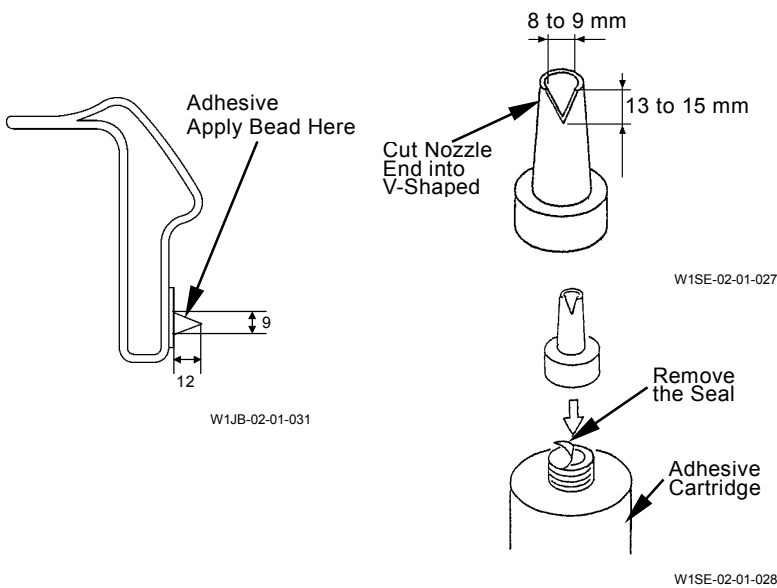
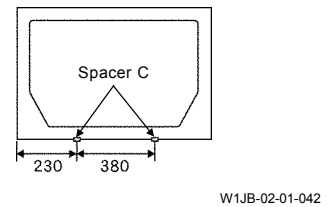
Rear Left-Hand Glass



Lower Glass of Door



Rear Glass



UPPERSTRUCTURE / Cab

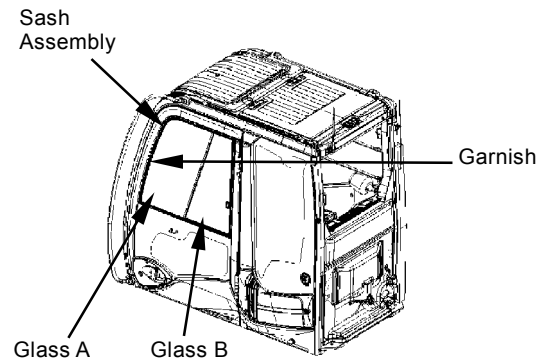
13. The required amount (just for reference) of adhesive and primer

		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

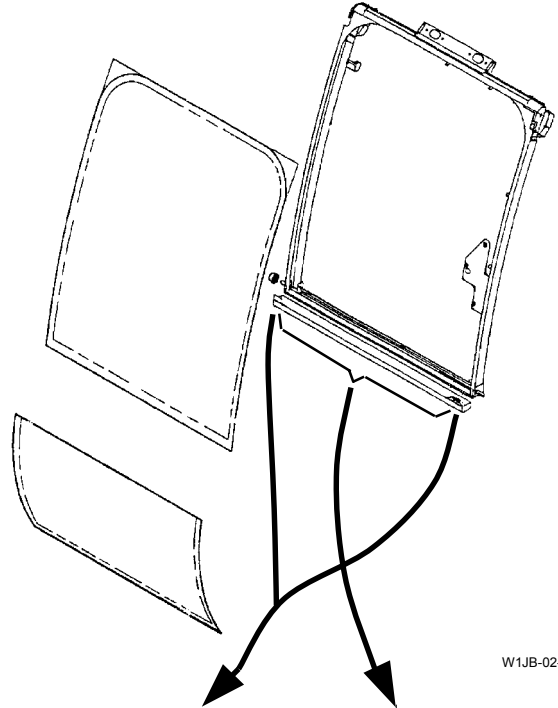
Procedures to Install Upper Front Glass

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.

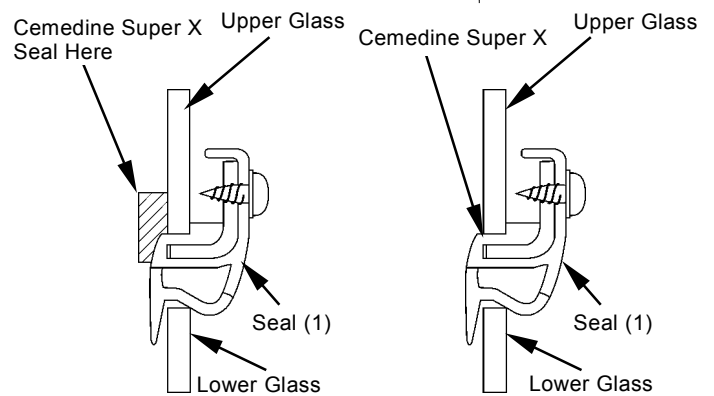
 **NOTE:** *Cemedine Super X Black No.8008*
Glue-state adhesive, tubed

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 / Cab

(Blank)

UPPERSTRUCTURE / Counterweight

REMOVE AND INSTALL COUNTERWEIGHT

Removal

1. Open the engine cover. Remove the connector from the rear view camera.




CAUTION: Counterweight (1) weight:
ZAXIS330-3, 330LC-3: 6800 kg (15000 lb)
ZAXIS350H-3, 350LCH-3, 350LC-3, 350LCN-3:
7400 kg (16320 lb)
ZAXIS350K-3, 350LCK-3: 8200 kg (18080 lb)


2. Attach a wire rope onto the bracket on upper side of counterweight (1). Hoist and counterweight (1) and take up slack of the wire rope.

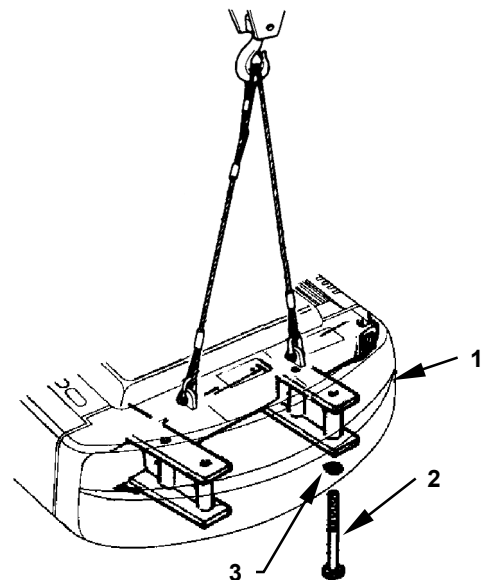
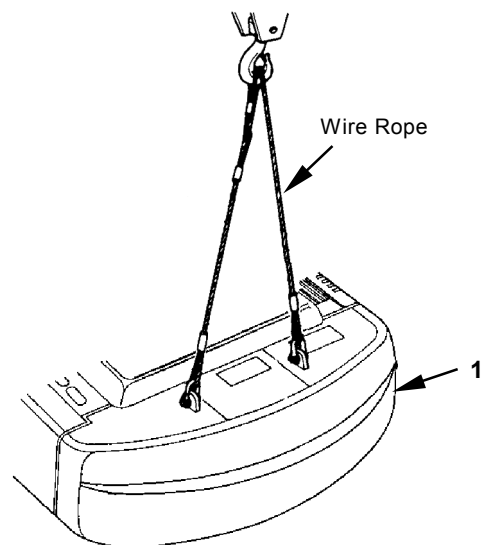
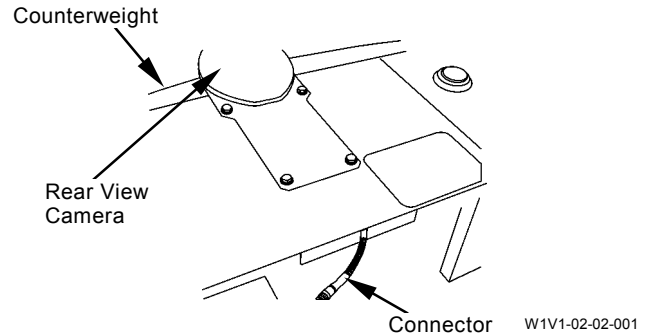
3. Remove bolts (2) (4 used) and washers (3) (4 used) from counterweight (1). Hoist and remove counterweight (1).

ZAXIS330-3, 330LC-3:

 : 50 mm

ZAXIS350H-3, 350LCH-3, 350LC-3, 350LCN-3,
350K-3, 350LCK-3:

 : 55 mm





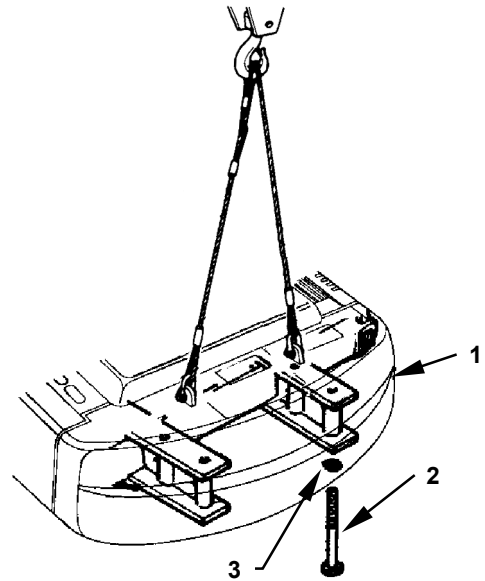
UPPERSTRUCTURE / Counterweight

Installation







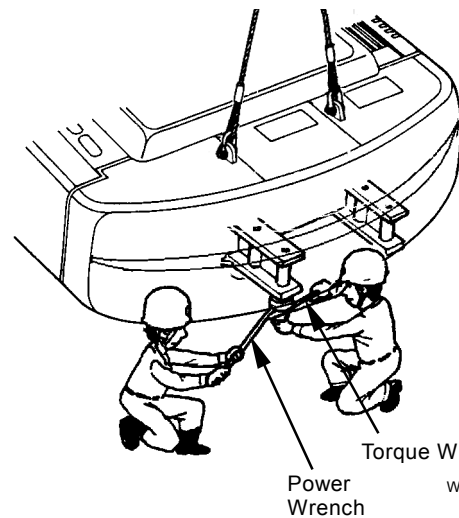
CAUTION: Counterweight (1) weight:
ZAXIS330-3, 330LC-3: 6800 kg (15000 lb)
ZAXIS350H-3, 350LCH-3, 350LC-3, 350LCN-3:
7400 kg (16320 lb)
ZAXIS350K-3, 350LCK-3: 8200 kg (18080 lb)

1. Attach a wire rope onto the bracket on upper side of counterweight (1)
2. Hoist counterweight (1). Install washers (3) (4 used) to the main frame. Temporarily tighten counterweight (1) with bolts (2) (4 used).
ZAXIS330-3, 330LC-3:
 : 50 mm
ZAXIS350H-3, 350LCH-3, 350LC-3, 350LCN-3, 350K-3, 350LCK-3:
 : 55 mm



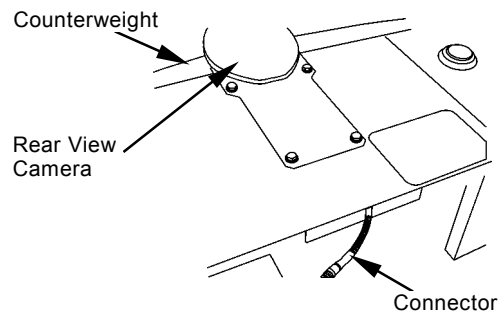
W1V7-02-02-002

3. Remove the wire rope. Tighten bolts (2) (4 used) by using a power wrench and torque wrench.
ZAXIS330-3, 330LC-3:
 : 50 mm
 : 2360 N·m (240 kgf·m, 1740 lbf·ft)
ZAXIS350H-3, 350LCH-3, 350LC-3, 350LCN-3, 350K-3, 350LCK-3:
 : 55 mm
 : 2840 N·m (290 kgf·m, 2090 lbf·ft)



W1V7-02-02-003

4. Install the connector to the rear view camera.



W1V1-02-02-001


UPPERSTRUCTURE / Main Frame

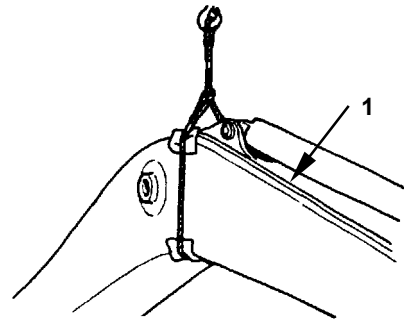
REMOVE AND INSTALL MAIN FRAME

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

Removal



CAUTION: Front attachment assembly (1) weight:
ZAXIS330-3, 330LC-3: 6040 kg (13320 lb)
ZAXIS350H-3, 350LCH-3: 6660 kg (14690 lb)
ZAXIS350K-3, 350LCK-3: 6550 kg (14440 lb)
ZAXIS350LC-3, 350LCN-3: 6270 kg (13830 lb)

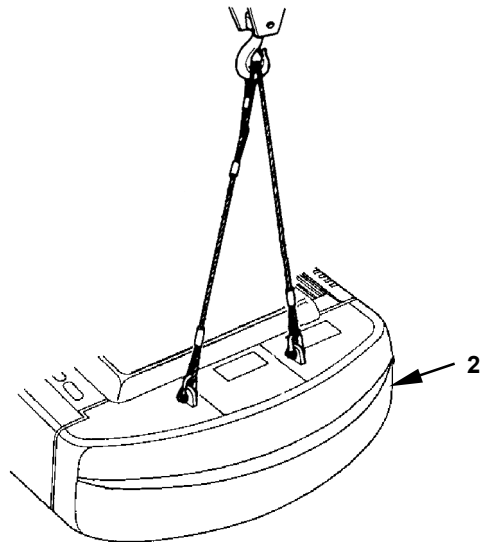
1. Remove front attachment assembly (1).
(Refer to the Remove and Install Front Attachment section.)
 : 17 mm, 19 mm, 30 mm, 32 mm, 41 mm, 50 mm



W105-02-03-002


CAUTION: Counterweight (2) weight:
ZAXIS330-3, 330LC-3: 6800 kg (15000 lb)
ZAXIS350H-3, 350LCH-3, 350LC-3, 350LCN-3:
7400 kg (16320 lb)
ZAXIS350K-3, 350LCK-3: 8200 kg (18080 lb)

2. Remove counterweight (2).
(Refer to the Remove and Install Counterweight section.)
ZAXIS330-3, 330LC-3:
 : 50 mm
ZAXIS350H-3, 350LCH-3, 350LC-3, 350LCN-3,
350K-3, 350LCK-3:
 : 55 mm





W1V7-02-02-001

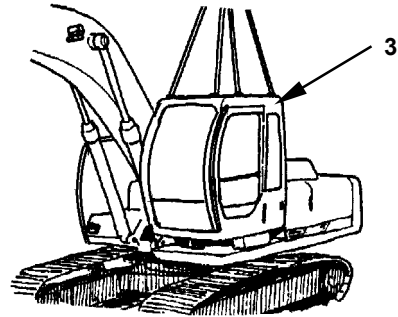
UPPERSTRUCTURE / Main Frame

 **CAUTION: Cab (3) weight: 385 kg (850 lb)**

3. Remove cab (3). (Refer to the Remove and Install Cab section.)


 : 13 mm, 16 mm, 17 mm, 19 mm, 24 mm, 32 mm

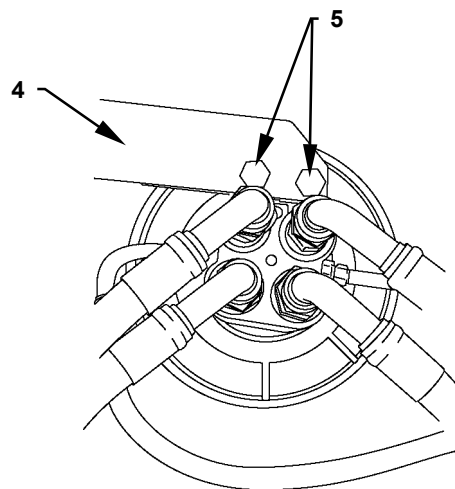
 : 6 mm, 8 mm



W157-02-01-001

4. Remove all hoses from the upper side of center joint. Cap the open ends. Remove stopper (4) and bolts (5) (2 used) from the center joint.

 : 17 mm, 27 mm, 41 mm



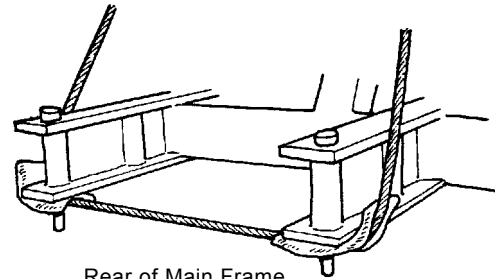
W1V1-03-03-001

UPPERSTRUCTURE / Main Frame



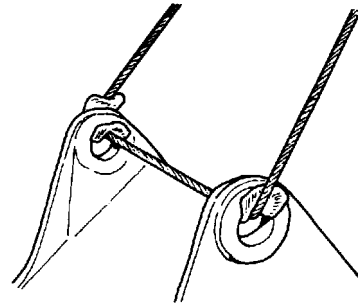
CAUTION: Upperstructure weight:
ZAXIS330-3, 330LC-3, 350LC-3, 350LCN-3:
6680 kg (14730 lb)
ZAXIS350H-3, 350LCH-3: 6870 kg (15150 lb)
ZAXIS350K-3, 350LCK-3: 7100 kg (15660 lb)

5. Attach wire ropes to the rear (counterweight bracket) of frame and boom bracket. Take up slack of wire ropes.
If chain block (6) is used, it is not only easy to adjust the length of wire rope, but also easy to level the main frame.



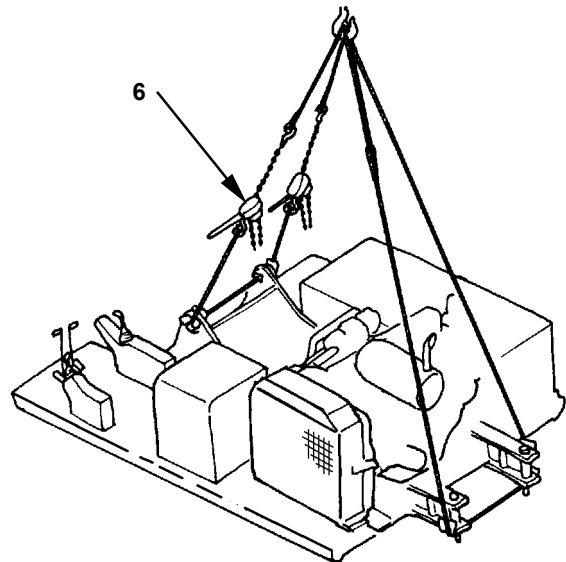
Rear of Main Frame

W105-02-03-004



Boom Bracket


W105-02-03-005

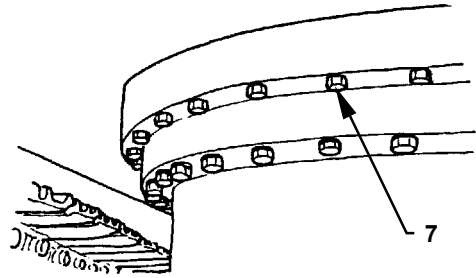


W157-02-03-001

UPPERSTRUCTURE / Main Frame

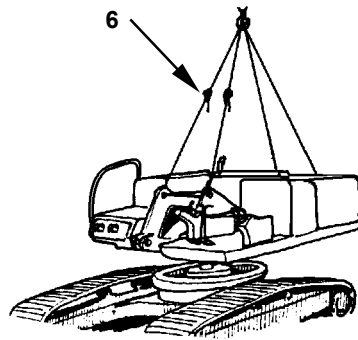
6. The mounting angle of swing bearing is specified.
(Refer to W3-1.) Put the matching marks on the
upperstructure and the outer race of swing bearing.
Remove bolt (7) from the swing bearing.

 : 41 mm



W105-02-03-007

7. Adjust chain block (6) in order to level the main
frame. Hoist and remove the main frame from the
undercarriage.



W157-02-03-002

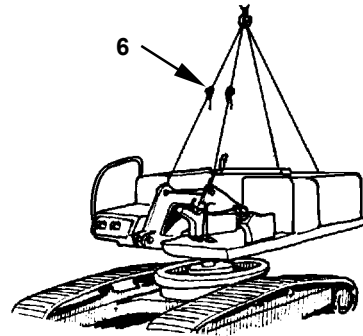
UPPERSTRUCTURE / Main Frame

Installation




CAUTION: Upperstructure weight:
ZAXIS330-3, 330LC-3, 350LC-3, 350LCN-3:
6680 kg (14730 lb)
ZAXIS350H-3, 350LCH-3: 6870 kg (15150 lb)
ZAXIS350K-3, 350LCK-3: 7100 kg (15660 lb)


1. Attach wire ropes to the main frame. Adjust chain block (6) in order to level the main frame. Hoist and install the main frame to the undercarriage. As for lifting method, refer to the Removal section.

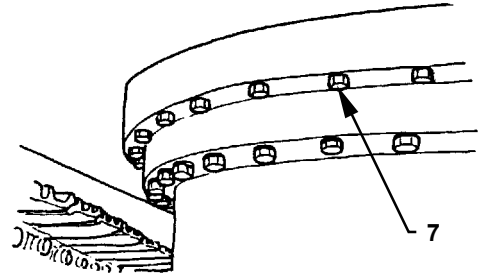


W157-02-03-002

2. Align the matching marks on the upperstructure and the outer race of swing bearing. Install and temporarily tighten bolt (7) to the swing bearing. Remove the wire ropes and tighten bolt (7) to the swing bearing.


 : 41 mm


 : 1230 N·m (125 kgf·m, 900 lbf·ft)





W105-02-03-007


3. Install all the hoses to the center joint.


 : 17 mm

 : 25 N·m (2.5 kgf·m, 18.5 lbf·ft)


 : 27 mm


 : 95 N·m (9.5 kgf·m, 70 lbf·ft)

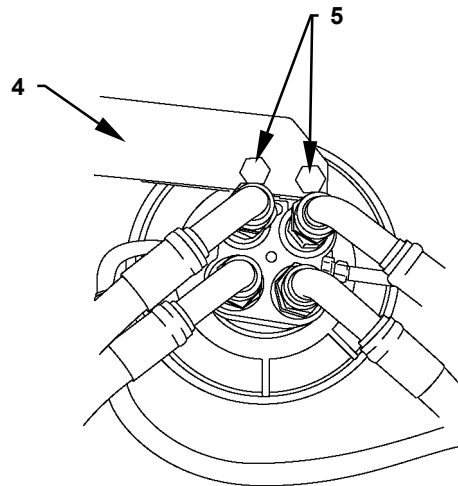
 : 41 mm

 : 210 N·m (21 kgf·m, 155 lbf·ft)

4. Install stopper (4) to the center joint with bolt (5).

 : 22 mm

 : 140 N·m (14 kgf·m, 103 lbf·ft)



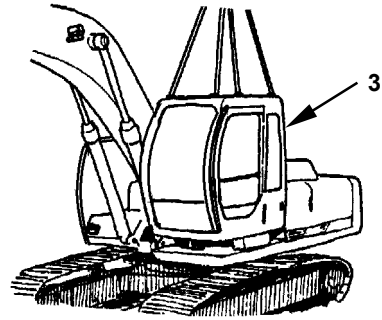
W1V1-03-03-001

UPPERSTRUCTURE / Main Frame

CAUTION: Cab (3) weight: 385 kg (850 lb)

5. Install cab (3).
(Refer to the Remove and Install Cab section.)





	: 13 mm
	: 20 N·m (2 kgf·m, 14.5 lbf·ft)
	: 16 mm, 17 mm
	: 50 N·m (5.1 kgf·m, 37 lbf·ft)
	: 19 mm
	: 90 N·m (9 kgf·m, 66 lbf·ft)
	: 24 mm
	: 210 N·m (21 kgf·m, 155 lbf·ft)
	: 32 mm
	: 550 N·m (56 kgf·m, 410 lbf·ft)
	: 6 mm
	: 20 N·m (2 kgf·m, 14.5 lbf·ft)
	: 8 mm
	: 50 N·m (5.1 kgf·m, 37 lbf·ft)

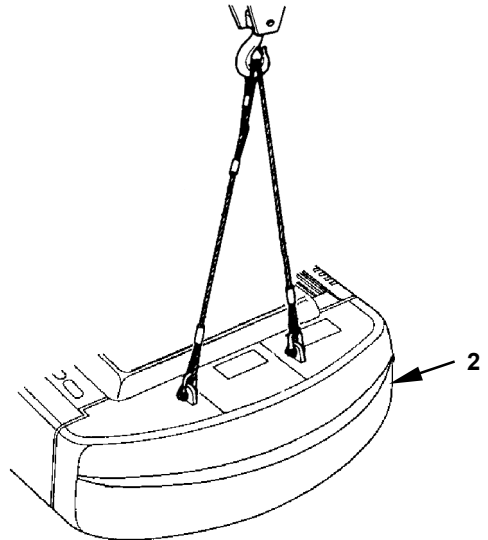


W157-02-01-001

CAUTION: Counterweight (2) weight:
ZAXIS330-3, 330LC-3: 6800 kg (15000 lb)
ZAXIS350H-3, 350LCH-3, 350LC-3, 350LCN-3:
7400 kg (16320 lb)
ZAXIS350K-3, 350LCK-3: 8200 kg (18080 lb)

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

ZAXIS330-3, 330LC-3:	
	: 50 mm
	: 2360 N·m (240 kgf·m, 1740 lbf·ft)
ZAXIS350H-3, 350LCH-3, 350LC-3, 350LCN-3, 350K-3, 350LCK-3:	
	: 55 mm
	: 2840 N·m (290 kgf·m, 2090 lbf·ft)



W1V7-02-02-001

UPPERSTRUCTURE / Main Frame



CAUTION: Front attachment assembly (1)
weight:

ZAXIS330-3, 330LC-3: 6040 kg (13320 lb)


ZAXIS350H-3, 350LCH-3: 6660 kg (14690 lb)


ZAXIS350K-3, 350LCK-3: 6550 kg (14440 lb)


ZAXIS350LC-3, 350LCN-3: 6270 kg (13830 lb)


7. Install front attachment assembly (1). Add hydraulic oil.


(Refer to the Remove and Install Front Attachment section.)


 : 17 mm


 : 50 N·m (5.1 kgf·m, 37 lbf·ft)


 : 19 mm


 : 30 N·m (3.0 kgf·m, 22 lbf·ft)


 : 30 mm


 : 550 N·m (55 kgf·m, 410 lbf·ft)

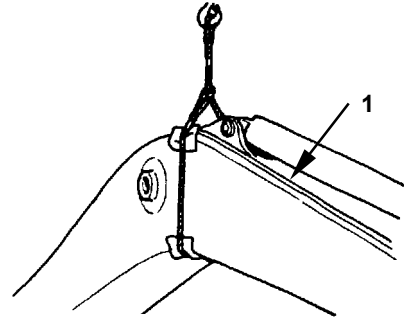
 : 32 mm

 : 750 N·m (77 kgf·m, 550 lbf·ft)

 : 41 mm

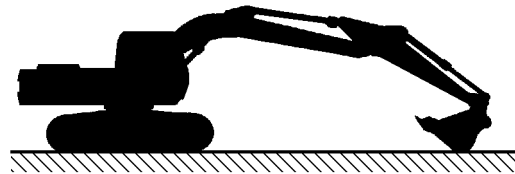
 : 210 N·m (21 kgf·m, 155 lbf·ft)

 : 50 mm



W105-02-03-002

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.



M104-07-021

UPPERSTRUCTURE / Main Frame

(Blank)


UPPERSTRUCTURE / Pump Device

REMOVE AND INSTALL PUMP DEVICE


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

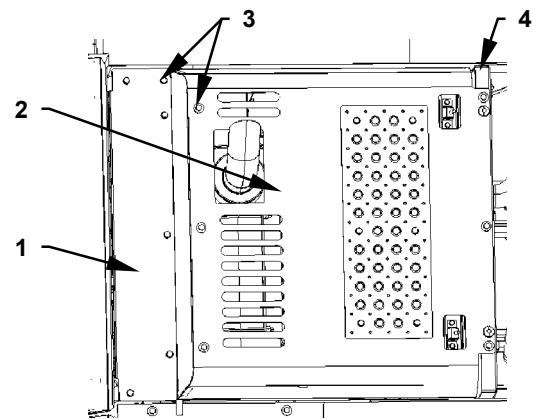
Removal

1. Open the engine cover. Remove bolts (3) (12 used). Remove covers (1, 2) from bracket (4).

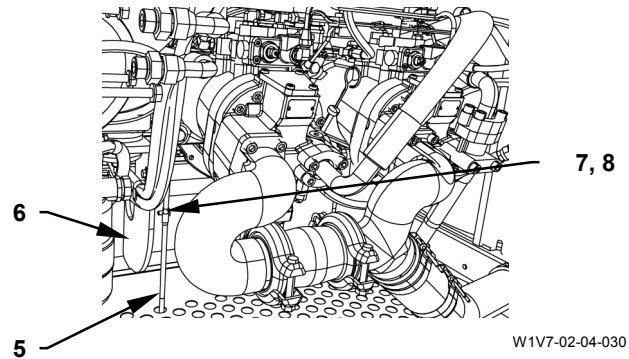
 : 17 mm

2. Remove bolt (7). Remove clip (8) and muffler tube (5) from frame (6).

 : 17 mm




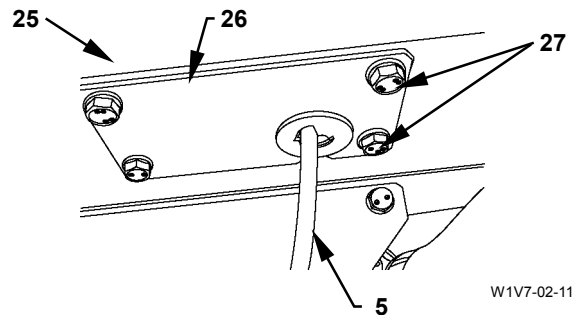
W1V7-02-04-025



W1V7-02-04-030

3. Remove bolts (27) (4 used) from muffler bracket (25). Remove cover (26)


 : 17 mm

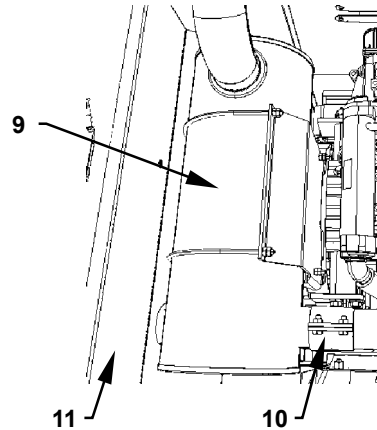


W1V7-02-11-007

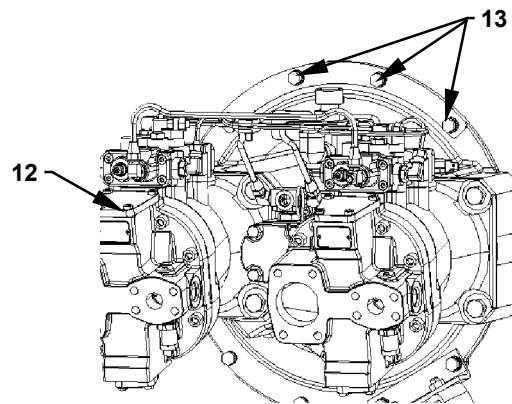
UPPERSTRUCTURE / Pump Device

4. Remove clamp (10) from muffler (9).
5. Remove bolts (13) (3 used) from the upper of pump device (12). Remove the muffler (9) assembly from muffler bracket (11).

 : 17 mm




W1V1-02-04-006




W1V7-02-04-028

6. Remove bolt (17). Remove clip (18) from muffler bracket (11).


 : 17 mm

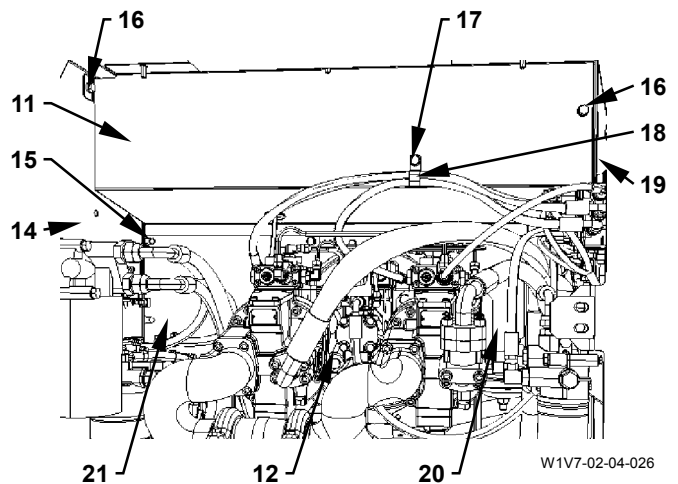
7. Remove bolts (15) (5 used) attached with side covers (14, 19) from covers (20, 21).

 : 17 mm

IMPORTANT: When removing the muffler bracket (11) assembly, do not damage the parts and hoses.


8. Remove bolts (16) (2 used). Remove the muffler bracket (11) assembly from side covers (14, 19).


 : 17 mm



W1V7-02-04-026

9. Remove all the connectors, hoses and pipes from pump device (12). Attach an identification tag onto the removed hoses for assembling. Cap the open ends.

 : 19 mm, 22 mm, 27 mm, 36 mm


 : 10 mm

UPPERSTRUCTURE / Pump Device


⚠ CAUTION: Pump device (12) weight: 210 kg
(463 lb)

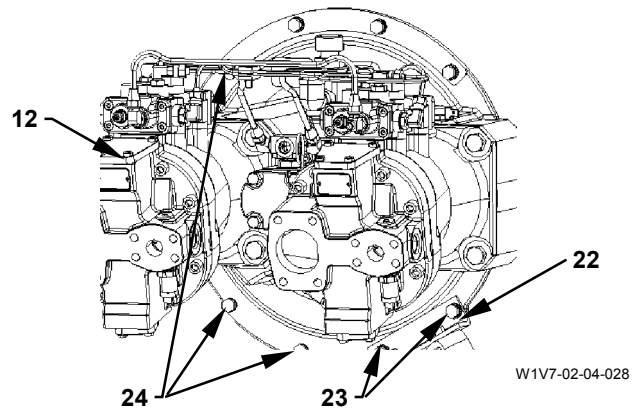
10. Attach a nylon sling to pump device (12) and hold pump device (12).

11. Remove bolts (23) (2 used) from the lower of pump device (12). Remove bracket (22) from pump device (12).

 : 17 mm

12. Remove other bolts (24) (3 used) from pump device (12). Hoist and remove pump device (12) from the engine.

 : 17 mm





UPPERSTRUCTURE / Pump Device

Installation


CAUTION: Pump device (12) weight: 210 kg (463 lb)


1. Hoist pump device (12). Install pump device (12) to the engine with bolts (24) (3 used).

 : 17 mm


 : 50 N·m (5.1 kgf·m, 37 lbf·ft)


2. Install bracket (22) to pump device (12) with bolts (23) (2 used).


 : 17 mm


 : 50 N·m (5.1 kgf·m, 37 lbf·ft)


3. Install all connectors, hoses and pipes to pump device (12).


 : 19 mm


 : 30 N·m (3.0 kgf·m, 22 lbf·ft)


 : 22 mm


 : 40 N·m (4.0 kgf·m, 30 lbf·ft)


 : 27 mm

 : 80 N·m (8.0 kgf·m, 59 lbf·ft)


 : 36 mm


 : 180 N·m (18 kgf·m, 133 lbf·ft)

 : 10 mm


 : 90 N·m (9.0 kgf·m, 66 lbf·ft)


4. Install the muffler bracket (11) assembly to side covers (14, 19) with bolts (16) (2 used).

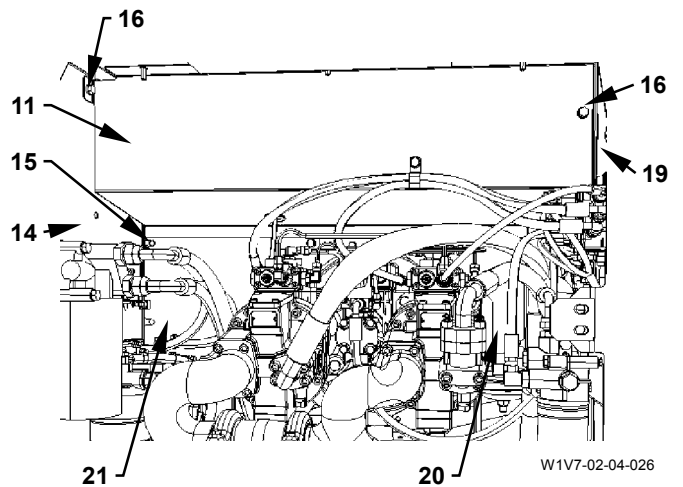
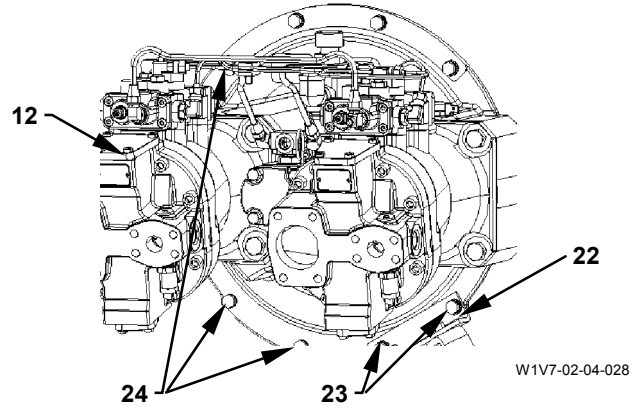
 : 17 mm

 : 50 N·m (5.1 kgf·m, 37 lbf·ft)

5. Install covers (20, 21) to side covers (14, 19) with bolts (15) (5 used).


 : 17 mm


 : 50 N·m (5.1 kgf·m, 37 lbf·ft)



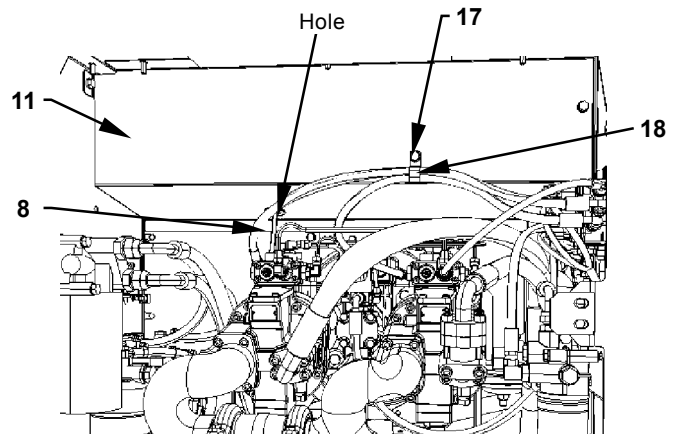
UPPERSTRUCTURE / Pump Device

6. Install clip (18) to muffler bracket (11) with bolt (17).

 : 17 mm


 : 50 N·m (5.1 kgf·m, 37 lbf·ft)


7. Pass muffler tube (8) through the hole on muffler bracket (11).

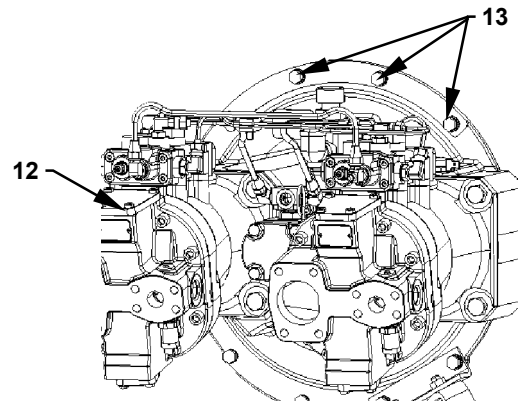


W1V7-02-04-026

8. Install the muffler (9) assembly to pump device (12) with bolts (13) (3 used).

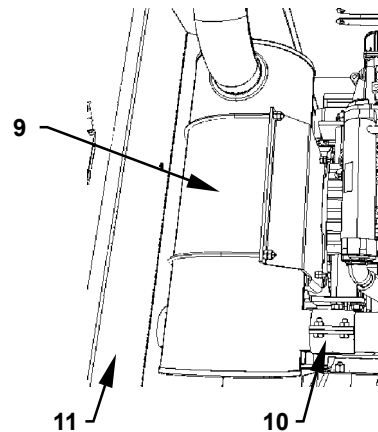
 : 17 mm

 : 50 N·m (5.1 kgf·m, 37 lbf·ft)




W1V7-02-04-028


9. Install clamp (10) to muffler (9).

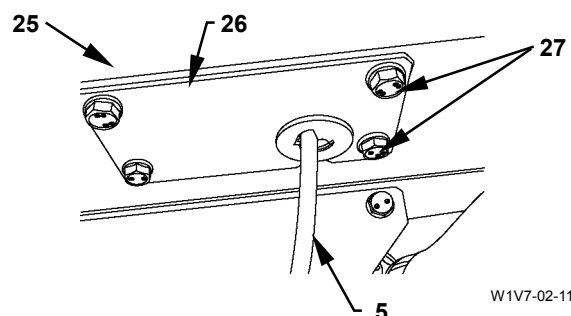


W1V1-02-04-006

10. Install cover (26) to muffler bracket (25) with bolts (27) (4 used).

 : 17 mm


 : 50 N·m (5.1 kgf·m, 37 lbf·ft)




W1V7-02-11-007


UPPERSTRUCTURE / Pump Device


11. Install clip (8) and muffler tube (5) to frame (6) with bolt (7).

 : 17 mm

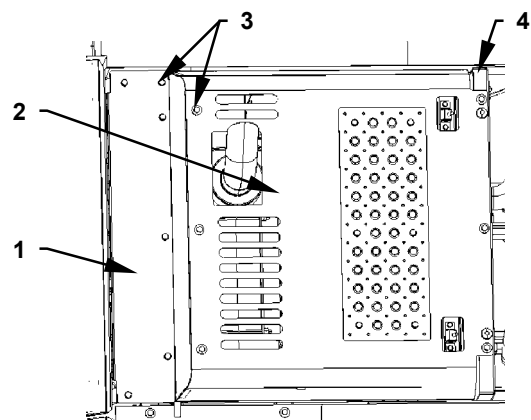
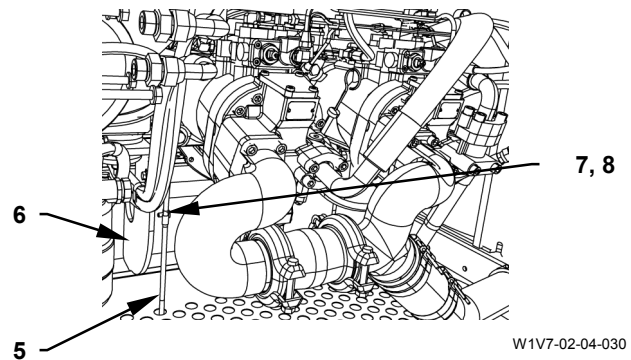
 : 50 N·m (5.1 kgf·m, 37 lbf·ft)

12. Install covers (1, 2) to bracket (4) with bolts (3) (12 used).

 : 17 mm

 : 50 N·m (5.1 kgf·m, 37 lbf·ft)

13. Release any pressure in the pump device. After completing the work, check hydraulic oil level and any oil leakage.

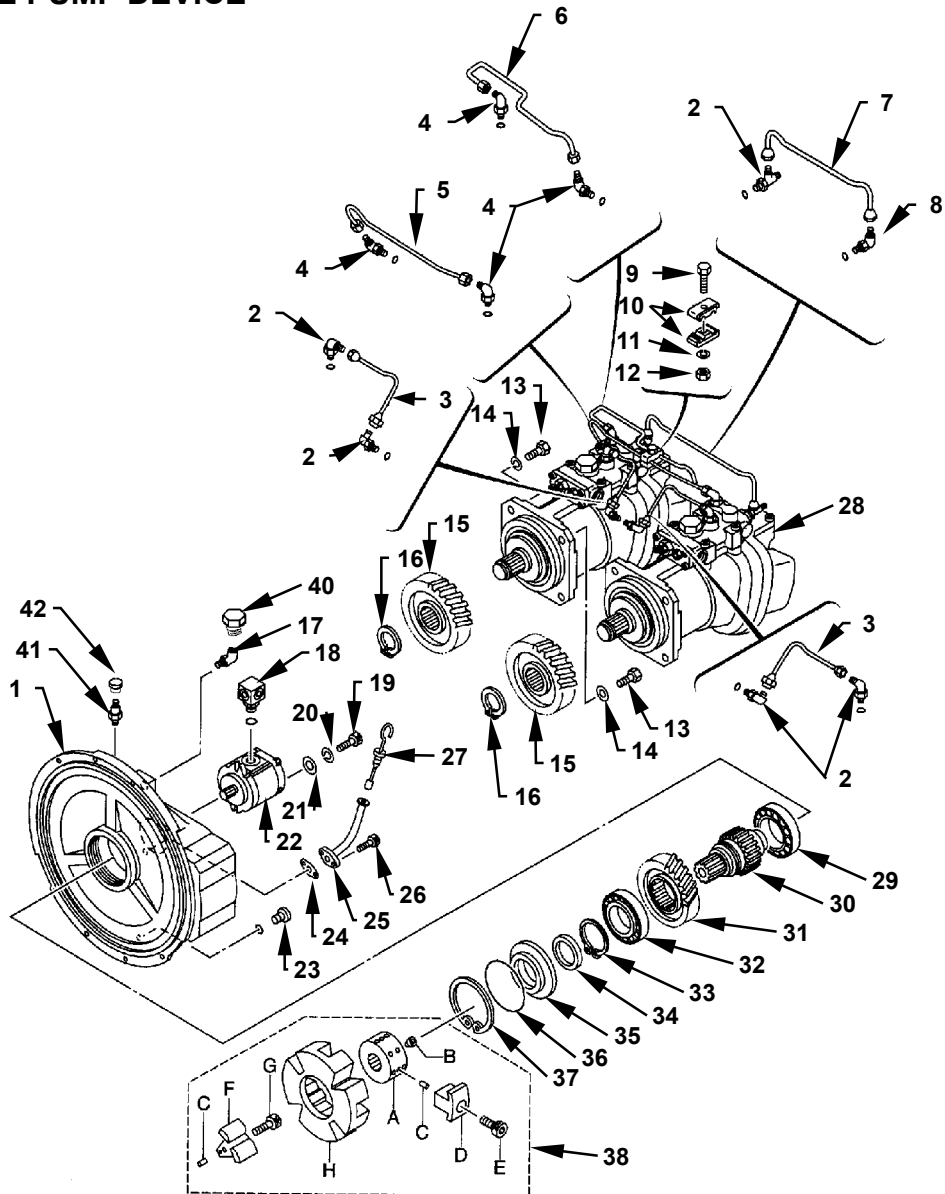


UPPERSTRUCTURE / Pump Device

(Blank)

UPPERSTRUCTURE / Pump Device

DISASSEMBLE PUMP DEVICE




W1V7-02-04-001

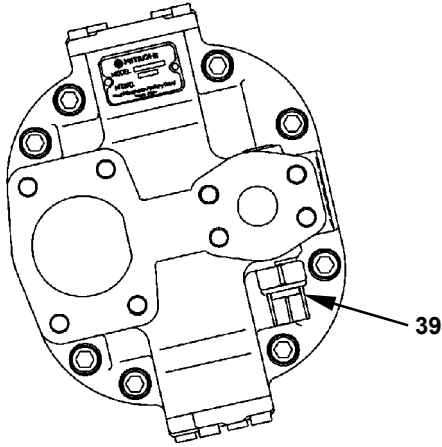
- | | | | |
|----------------------|------------------------------|---------------------------|-------------------------|
| 1 - Flange | 12 - Nut | 23 - Drain Plug | 33 - Retaining Ring |
| 2 - Fitting (5 Used) | 13 - Bolt (8 Used) | 24 - Packing | 34 - Oil Seal |
| 3 - Pipe (2 Used) | 14 - Spring Washer (8 Used) | 25 - Pipe | 35 - Seal Cover |
| 4 - Fitting (4 Used) | 15 - Drive Gear (2 Used) | 26 - Socket Bolt (2 Used) | 36 - O-Ring |
| 5 - Pipe | 16 - Retaining Ring (2 Used) | 27 - Level Gauge | 37 - Retaining Ring |
| 6 - Pipe | 17 - Elbow | 28 - Main Pump (2 Used) | 38 - Coupling Assembly |
| 7 - Pipe | 18 - Adapter | 29 - Bearing | 39 - *P Sensor (2 Used) |
| 8 - Fitting | 19 - Socket Bolt (2 Used) | 30 - Center Shaft | 40 - Plug |
| 9 - Bolt | 20 - Spring Washer (2 Used) | 31 - Center Gear | 41 - Adapter |
| 10 - Clamp (2 Used) | 21 - Washer (2 Used) | 32 - Bearing | 42 - Cap |
| 11 - Washer | 22 - Pilot Pump | | |

 NOTE: As for the item with mark *, refer to W2-4-14.


UPPERSTRUCTURE / Pump Device

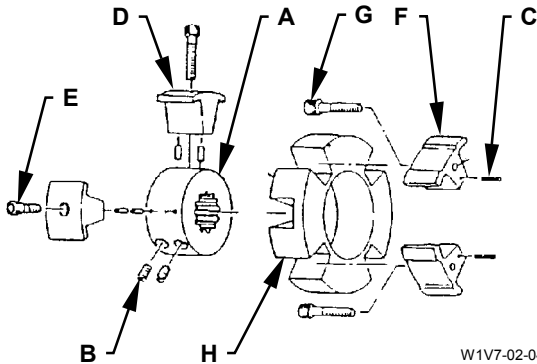
Disassemble Pump Device

1. Remove P sensors (39) (2 used) from flange (1).
 : 27 mm




W1V7-02-04-002


2. Remove bolts (E) (4 used) of coupling assembly (38). Remove insert (H) from hub (A).
 : 14 mm

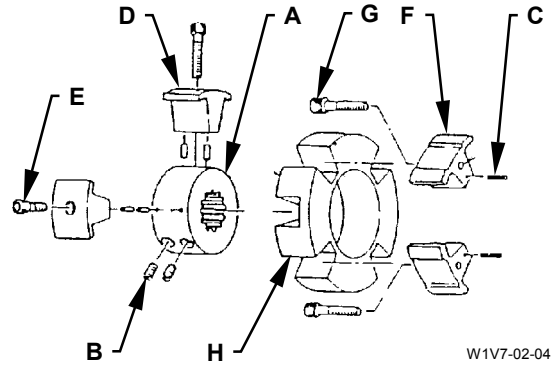


W1V7-02-04-003


3. Remove screws (B) (2 used) from hub (A). Remove hub (A) and insert (D) from center shaft (30).

 : 14 mm

 **NOTE:** Inserts (F) are installed to the flywheel with spring pins (C) and bolts (G).



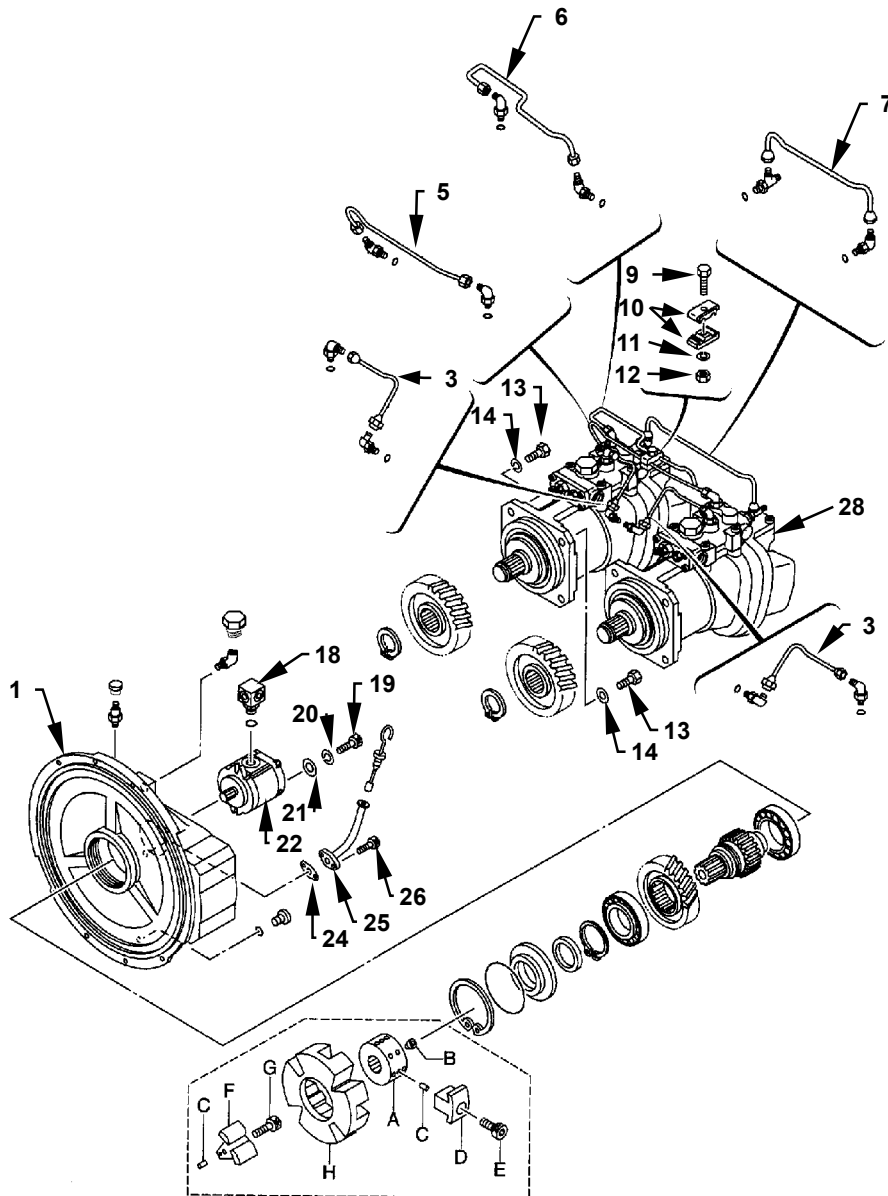
W1V7-02-04-003

4. Remove drain plug (23). Drain off gear oil through flange (1).
 : 22 mm

 **CAUTION:** Pump device weight: 205 kg (452 lb)

5. Secure the pump device assembly on a workbench.
Workbench: ST 5050


UPPERSTRUCTURE / Pump Device




W1V7-02-04-001

UPPERSTRUCTURE / Pump Device


6. Remove bolt (9). Remove nut (12), washer (11) and clamp (10) from pipes (5, 6).

 : 13 mm


7. Remove pipes (3) (3 used), (5, 6, 7) from main pumps (28) (2 used).

 : 19 mm, 22 mm


8. Remove adapter (18) from pilot pump (22).

 : 27 mm

9. Remove socket bolts (19) (2 used), spring washers (20) and washer (21). Remove pilot pump (22) from flange (1).

 : 8 mm

10. Remove bolts (13) (4 used) and spring washers (14) (4 used).

 : 24 mm




CAUTION: Main pump weight: 67 kg (148 lb)

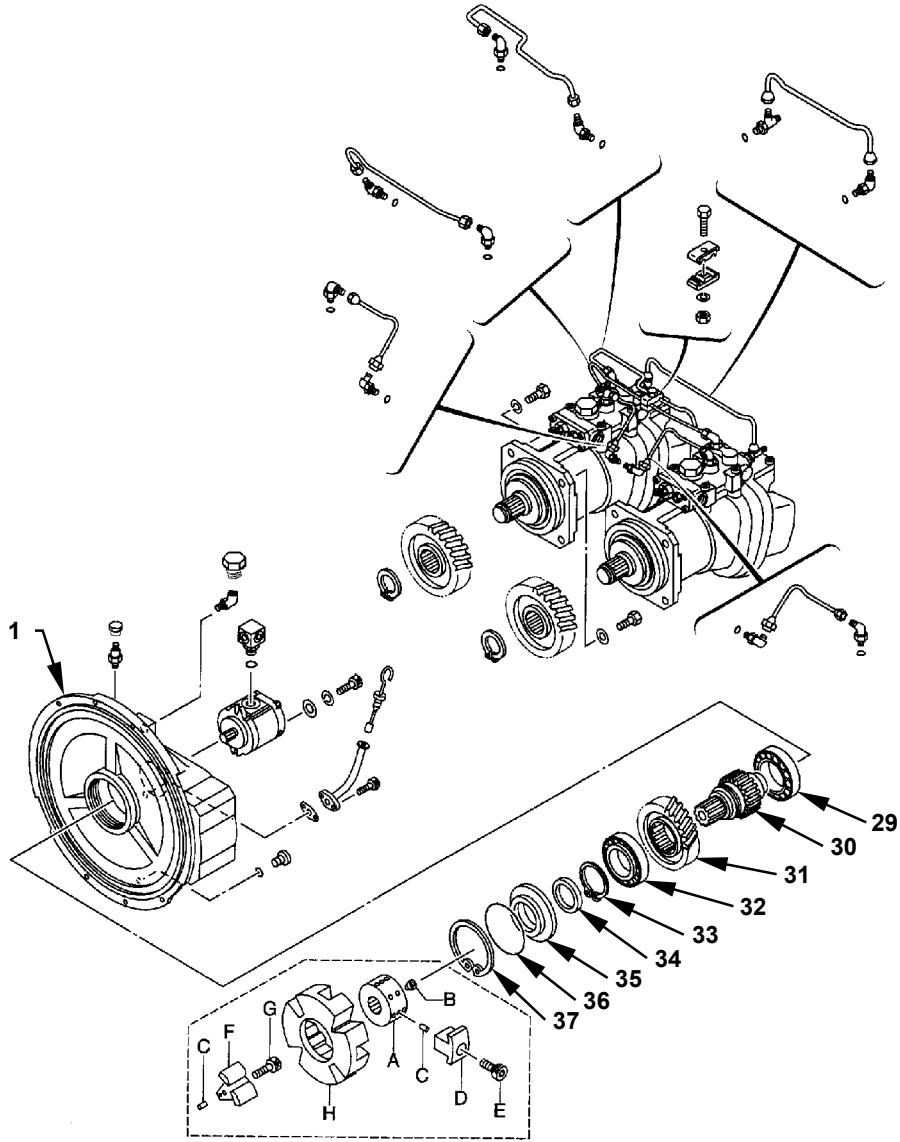
11. Install eyebolt (M12, Pitch 1.75 mm) to main pump (28). Hoist and remove main pump (28).

12. Remove the other main pump in the same procedures as steps 10 and 11.

13. Remove socket bolts (26) (2 used). Remove pipe (25) and packing (24) from flange (1).

 : 6 mm

UPPERSTRUCTURE / Pump Device



W1V7-02-04-001

UPPERSTRUCTURE / Pump Device



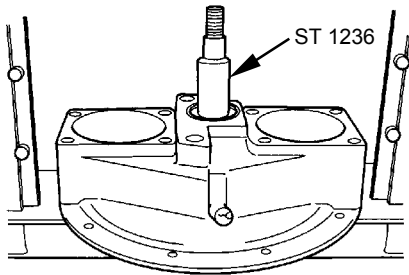
CAUTION: The flange (1) assembly weight: 48 kg (106 lb)

14. Remove flange (1) from the workbench. Turn over flange (1). Place flange (1) on the workbench. Remove retaining ring (37) from flange (1).
15. Remove seal cover (35) from flange (1).
16. Remove oil seal (34) from seal cover (35) by using special tool (ST 1234).
17. Remove O-ring (36) from flange (1). Remove retaining ring (33) from center shaft (30).



CAUTION: Flange (1) weight: 39 kg (86 lb)

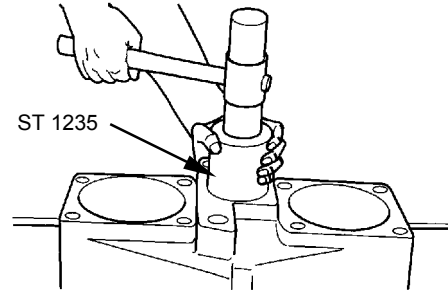
18. Turn over flange (1). Place flange (1) on a press. Remove center shaft (30) and bearing (32) from flange (1) by using special tool (ST 1236).



W1V7-02-04-004

19. Remove center gear (31) from flange (1).

20. Remove bearing (29) from flange (1) by using special tool (ST 1235).

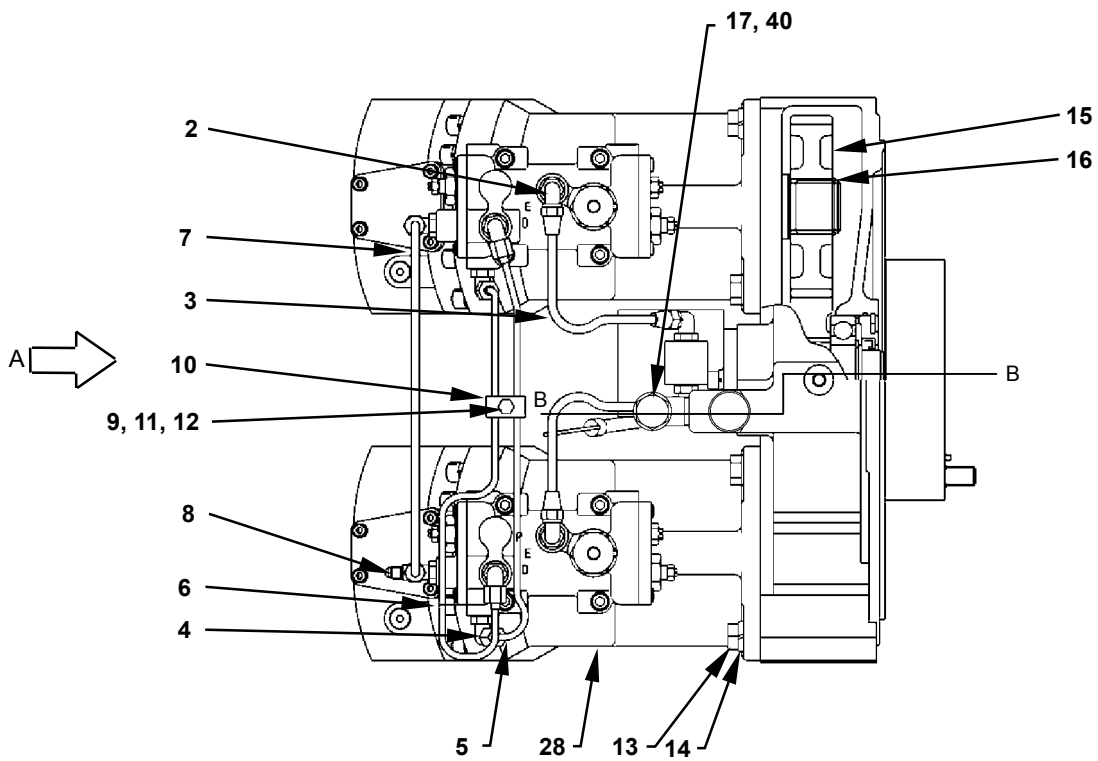


W1V7-02-04-005

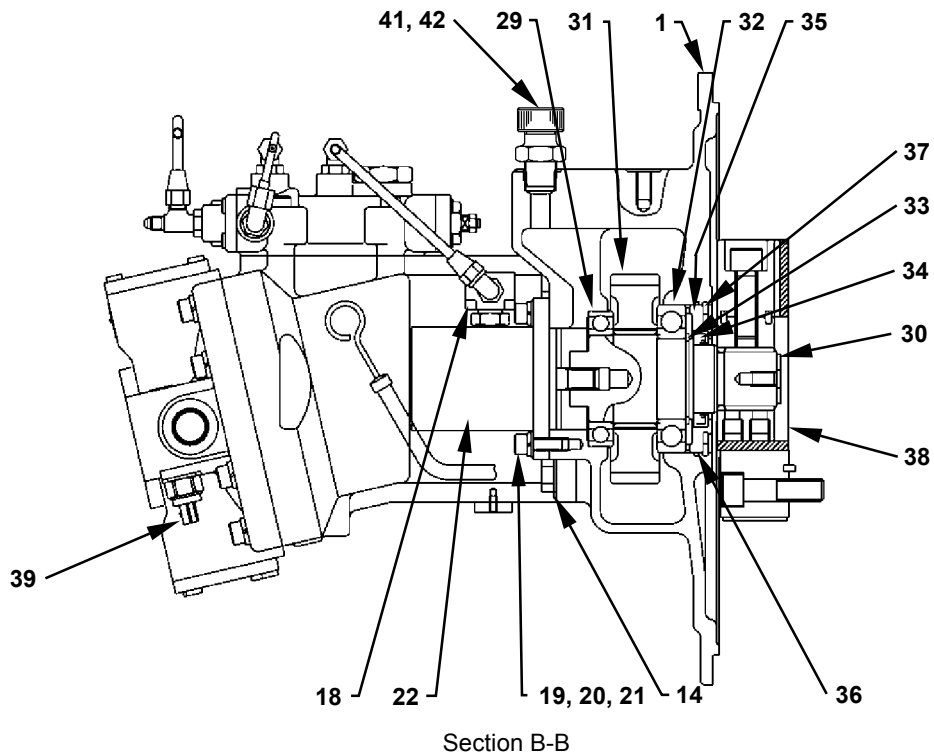
21. Remove bearing (32) from center shaft (30) by using a press or puller.

UPPERSTRUCTURE / Pump Device

ASSEMBLE PUMP DEVICE

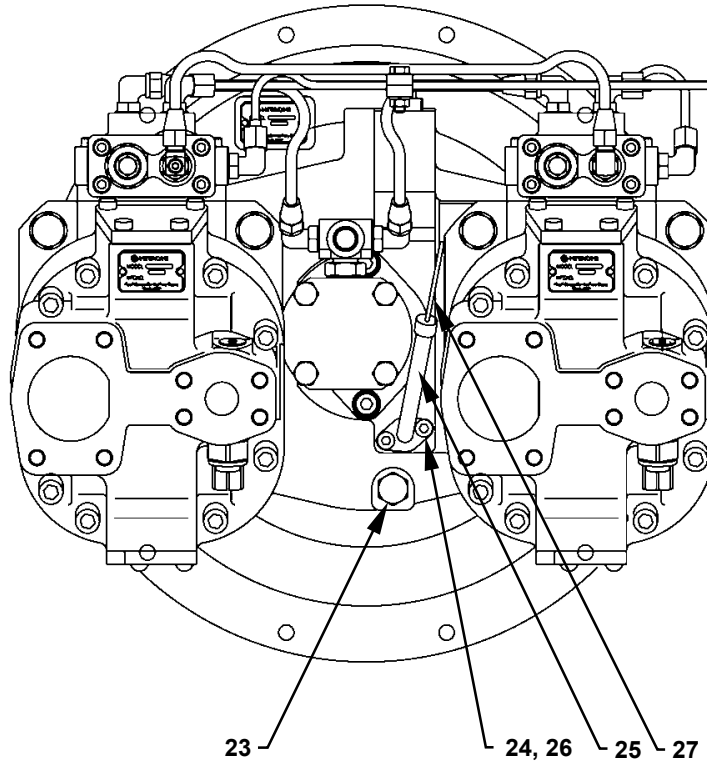


W1V7-02-04-006



W1V7-02-04-022

UPPERSTRUCTURE / Pump Device

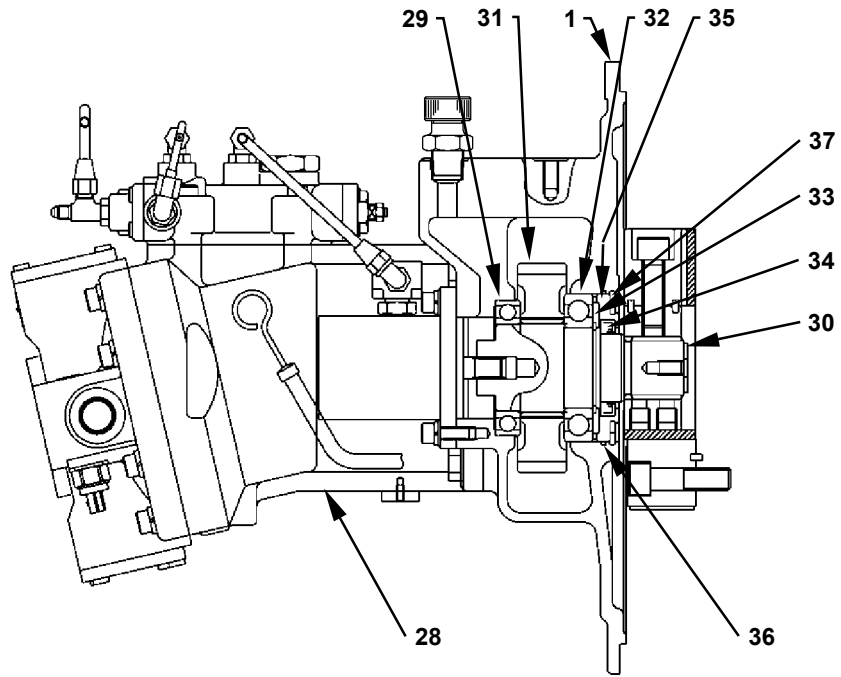


W1HH-02-04-003

View A

- | | | | |
|----------------------|------------------------------|---------------------------|------------------------|
| 1 - Flange | 12 - Nut | 23 - Drain Plug | 33 - Retaining Ring |
| 2 - Fitting (5 Used) | 13 - Bolt (8 Used) | 24 - Packing | 34 - Oil Seal |
| 3 - Pipe (2 Used) | 14 - Spring Washer (8 Used) | 25 - Pipe | 35 - Seal Cover |
| 4 - Fitting (4 Used) | 15 - Drive Gear (2 Used) | 26 - Socket Bolt (2 Used) | 36 - O-Ring |
| 5 - Pipe | 16 - Retaining Ring (2 Used) | 27 - Level Gauge | 37 - Retaining Ring |
| 6 - Pipe | 17 - Elbow | 28 - Main Pump (2 Used) | 38 - Coupling Assembly |
| 7 - Pipe | 18 - Adapter | 29 - Bearing | 39 - P Sensor (2 Used) |
| 8 - Fitting | 19 - Socket Bolt (2 Used) | 30 - Center Shaft | 40 - Plug |
| 9 - Bolt | 20 - Spring Washer (2 Used) | 31 - Center Gear | 41 - Adapter |
| 10 - Clamp (2 Used) | 21 - Washer (2 Used) | 32 - Bearing | 42 - Cap |
| 11 - Washer | 22 - Pilot Pump | | |

UPPERSTRUCTURE / Pump Device



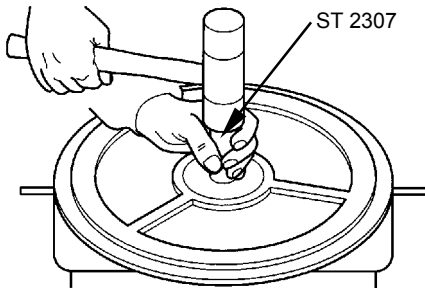
W1V7-02-04-022

UPPERSTRUCTURE / Pump Device

Assemble Pump Device

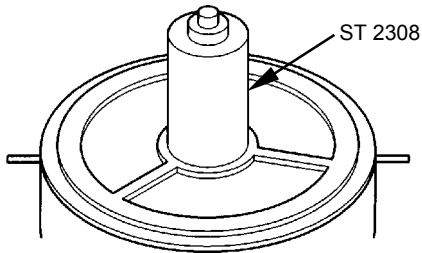
CAUTION: Flange (1) weight: 39 kg (86 lb)

1. Face input shaft side of flange (1) upward. Install bearing (29) by using special tool (ST 2307).



W1V7-02-04-007

2. Insert center gear (31) into flange (1) from the main pump (28) mounting hole. Place center gear (31) onto bearing (29).
3. Place flange (1) on a press. Align center shaft (30) with the center gear (31) spline. Install center shaft (30) into bearing (29).
4. Install bearing (32) to flange (1) and center shaft (30) by using special tool (ST 2308) and a press.

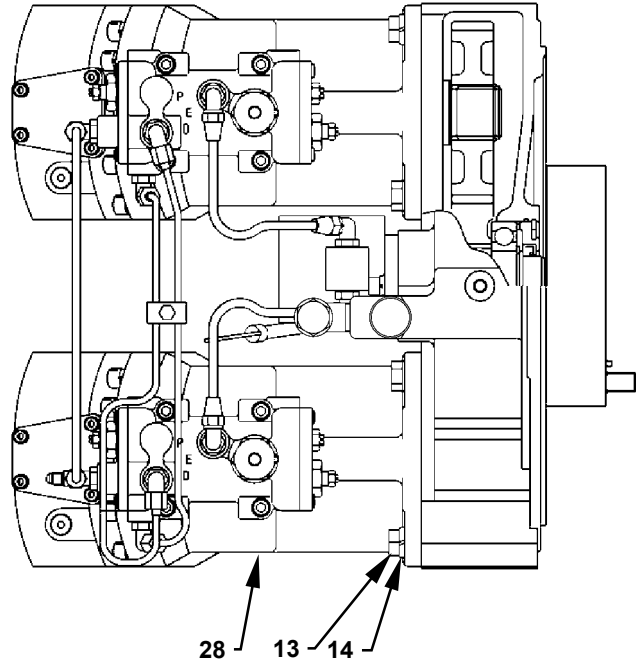


W1V7-02-04-008

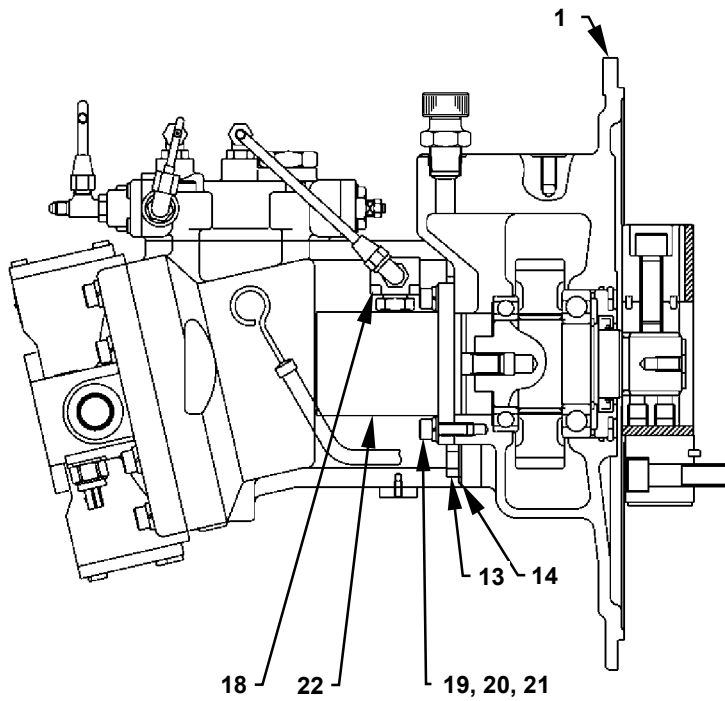
CAUTION: The flange (1) assembly weight: 48 kg (106 lb)

5. Remove flange (1) from the press. Place flange (1) on the workbench. Install retaining ring (33) to center shaft (30). Install O-ring (36) to flange (1).
6. Install oil seal (34) into seal cover (35) by using special tool (ST 2248).
7. Install special tool (ST 2280) to center shaft (30). Install seal cover (35) to flange (1).
8. Install retaining ring (37) to flange (1).

UPPERSTRUCTURE / Pump Device



W1V7-02-04-006







W1V7-02-04-022

UPPERSTRUCTURE / Pump Device



9. Turn over flange (1) and place flange (1) on the workbench. Apply THREEBOND #1215 to the main pump (28) mounting surface.
Workbench: ST 5050

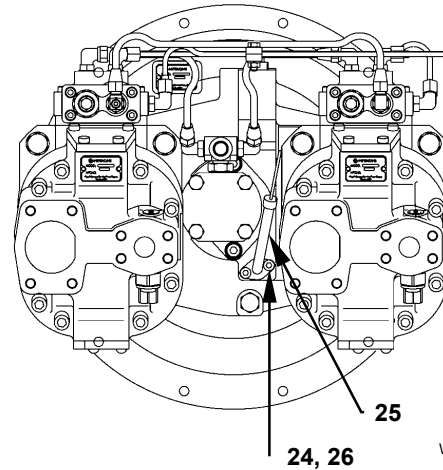


CAUTION: Main pump (28) weight: 67 kg (148 lb)



10. Install eyebolt (M12, Pitch 1.75 mm) to main pump (28). Hoist and install main pump (28) to flange (1).
11. Install main pump (28) to flange (1) with bolts (13) (4 used) and spring washers (14) (4 used).
 : 24 mm
 : 147 N·m (15 kgf·m, 108 lbf·ft)
12. Install other main pump (28) in the same procedures as steps 10 and 11.
13. Apply THREEBOND #1215 onto the mounting surface of pilot pump (22). Install pilot pump (22) to flange (1). Install pilot pump (22) to flange (1) with socket bolts (19) (2 used), spring washers (20) (2 used) and washers (21) (2 used).
 : 8 mm
 : 49 N·m (5 kgf·m, 36 lbf·ft)

14. Install pipe (25) and packing (24) to flange (1) with socket bolts (26) (2 used).

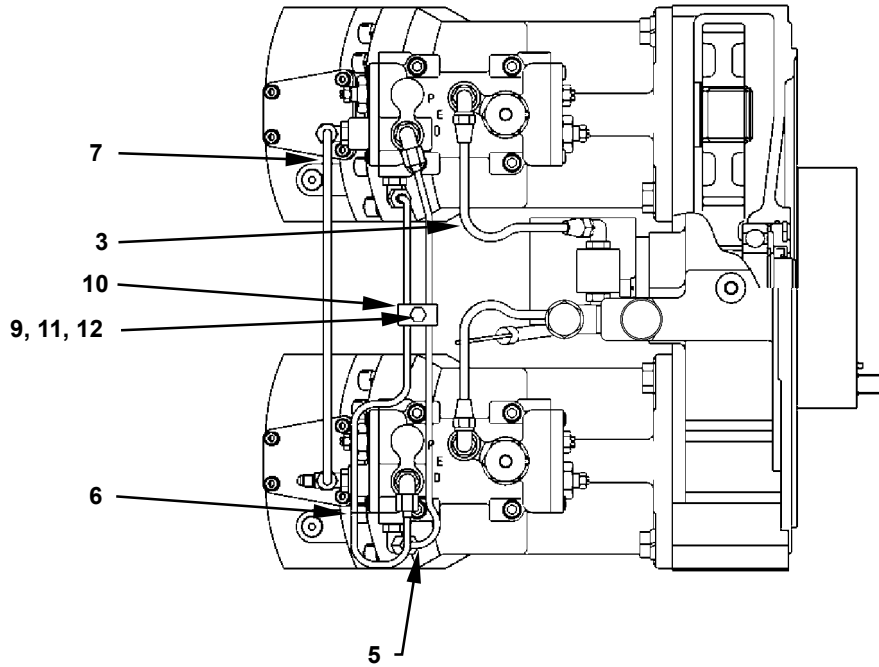
 : 6 mm
 : 19.5 N·m (2 kgf·m, 14 lbf·ft)



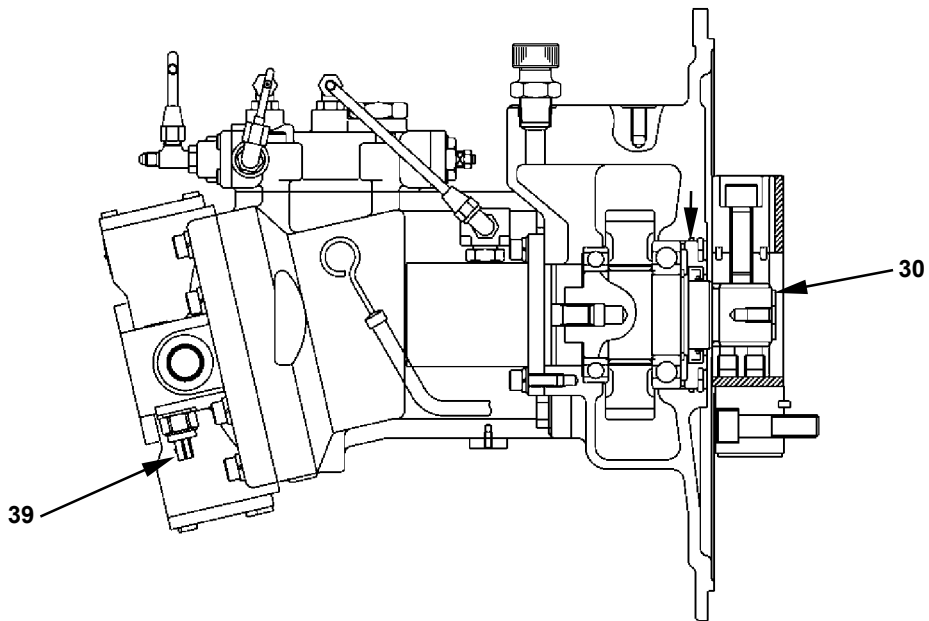
15. Install adapter (18) to pilot pump (22).

 : 27 mm
 : 93 N·m (9.5 kgf·m, 69 lbf·ft)

UPPERSTRUCTURE / Pump Device







W1V7-02-04-006





W1V7-02-04-022

UPPERSTRUCTURE / Pump Device

16. Install pipes (3) (2 used), (5, 6, 7).



-  : 19 mm
-  : 34 N·m (3.5 kgf·m, 25 lbf·ft)
-  : 22 mm
-  : 49 N·m (5 kgf·m, 36 lbf·ft)

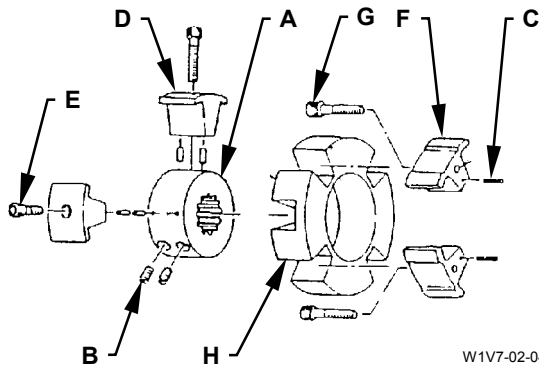
17. Install pipes (5, 6) with clamp (10), bolt (9), nut (12) and washer (11).

-  : 13 mm
-  : 3 N·m (0.3 kgf·m, 2.2 lbf·ft)

• Assemble Coupling



- Place the pump device horizontally. Install hub (A) to center shaft (30) with screws (B) (2 used).

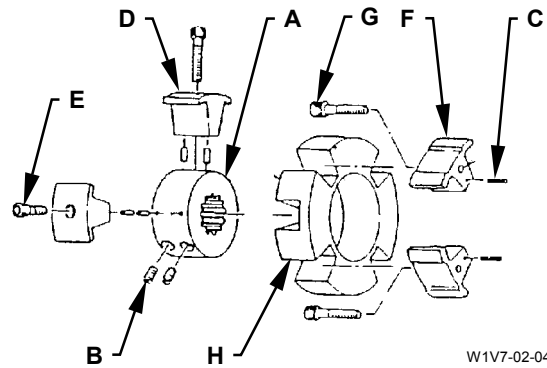
-  : 8 mm
-  : 108 N·m (11 kgf·m, 80 lbf·ft)



W1V7-02-04-003



19. Install inserts (H, D) to hub (A) with bolts (E) (4 used).

-  : 6 mm
-  : 310 N·m (32 kgf·m, 229 lbf·ft)



W1V7-02-04-003

20. Install P sensors (39) (2 used) to main pumps (28) (2 used).



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



CAUTION: Pump device weight: 205 kg (452 lb)

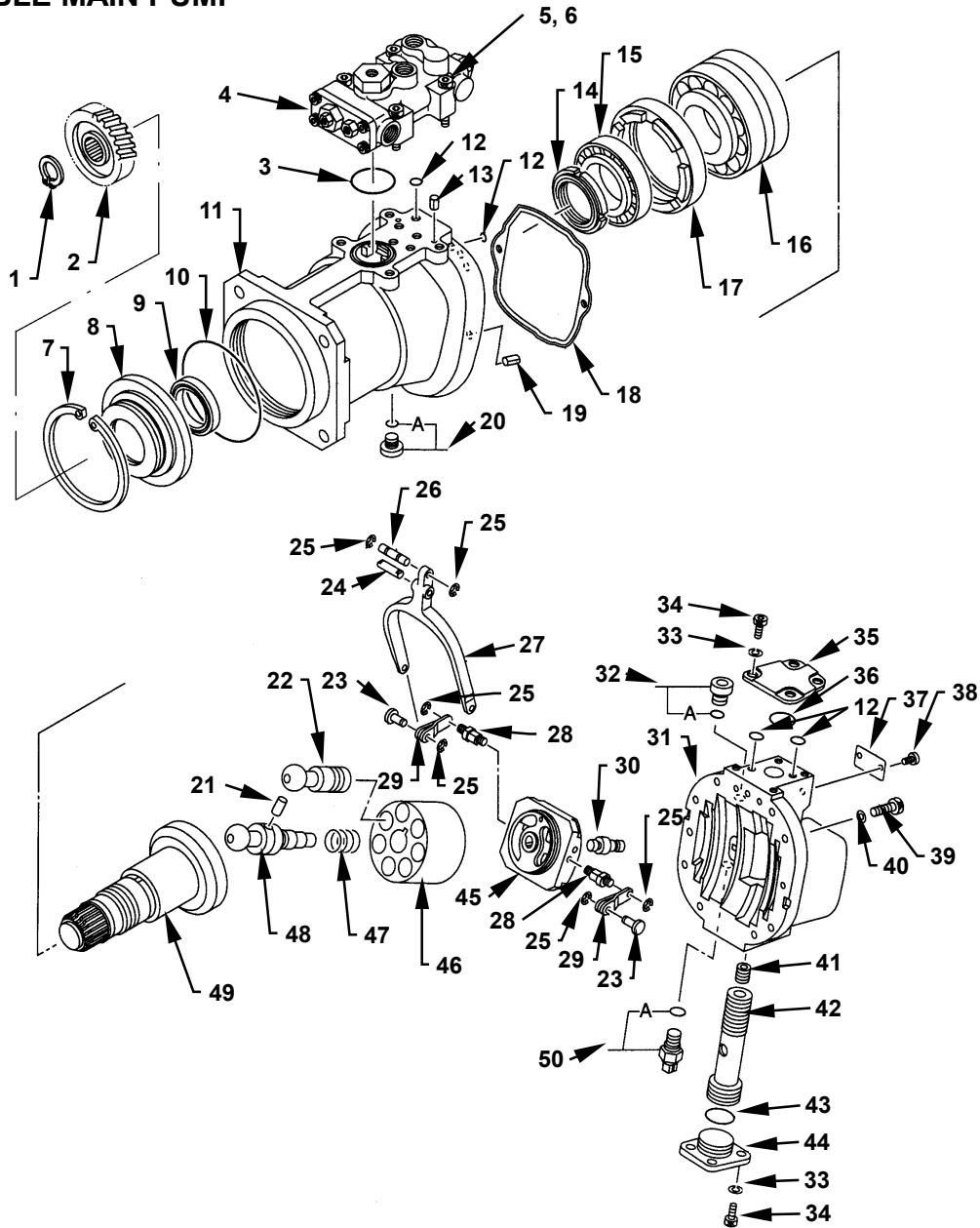
21. Place the pump device horizontally. Remove plug (40). Add engine oil into flange (1). Install plug (40) to flange (1).

Engine oil: Approx. 1.4 L (0.37 US gal.)

-  : 30 mm
-  : 39 N·m (4 kgf·m, 29 lbf·ft)

UPPERSTRUCTURE / Pump Device

DISASSEMBLE MAIN PUMP



W173-02-04-026

- | | | | |
|----------------------------|------------------------------|-----------------------------|-----------------------------|
| 1 - Retaining Ring | 14 - Bearing Nut | 27 - Link | 39 - Bolt (8 Used) |
| 2 - Drive Gear | 15 - Roller Bearing | 28 - Pin (2 Used) | 40 - Spring Washer (8 Used) |
| 3 - O-Ring | 16 - Roller Bearing | 29 - Lever (2 Used) | 41 - Set Screw |
| 4 - Regulator | 17 - Spacer | 30 - Servo Pin | 42 - Servo Piston |
| 5 - Socket Bolt (4 Used) | 18 - Packing | 31 - Head Cover | 43 - O-Ring |
| 6 - Spring Washer (4 Used) | 19 - Spring Pin (2 Used) | 32 - Plug | 44 - Stopper L |
| 7 - Retaining Ring | 20 - Plug | 33 - Spring Washer (8 Used) | 45 - Valve Plate |
| 8 - Seal Cover | 21 - Pin | 34 - Socket Bolt (8 Used) | 46 - Cylinder Block |
| 9 - Oil Seal | 22 - Plunger (7 Used) | 35 - Stopper S | 47 - Spring |
| 10 - O-Ring | 23 - Pin (2 Used) | 36 - O-Ring | 48 - Center Shaft |
| 11 - Casing | 24 - Pin | 37 - Name Plate | 49 - Drive Disc |
| 12 - O-Ring (10 Used) | 25 - Retaining Ring (6 Used) | 38 - Screw (2 Used) | 50 - P Sensor |
| 13 - Spring Pin (2 Used) | 26 - Feedback Pin | | |

UPPERSTRUCTURE / Pump Device



Disassemble Main Pump

- Remove Drive Gear

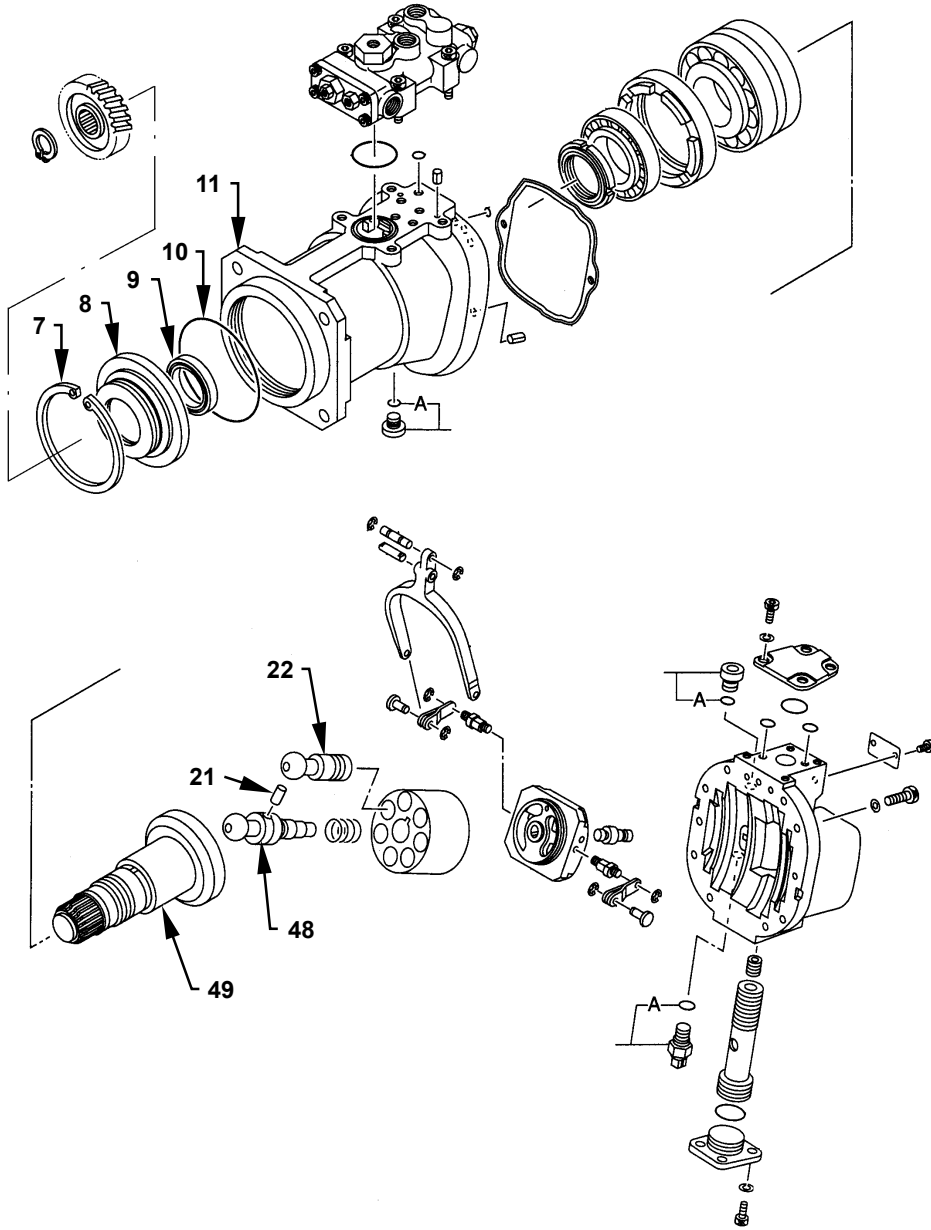
1. Remove retaining ring (1) from drive disc (49).
2. Remove drive gear (2) from drive disc (49).



CAUTION: Main pump weight: 67 kg (148 lb)

3. Secure the main pump on the workbench (ST 5050).
4. Remove bolts (5) (4 used) and spring washers (6) (4 used) from regulator (4). Remove regulator (4) from casing (11).
 : 8 mm
5. Remove O-rings (12) (5 used), (3) and spring pins (13) (2 used) from casing (11).
6. Remove bolts (39) (8 used) and spring washers (40) (8 used). Remove head cover (31) from casing (11).
 : 10 mm
7. Remove O-rings (12) (3 used) from casing (11).
8. Place valve plate (45) on casing (11).
9. Remove cylinder block (46) upward and remove valve plate (45) and the link (27) assembly.
10. Remove spring (47) from center shaft (48).

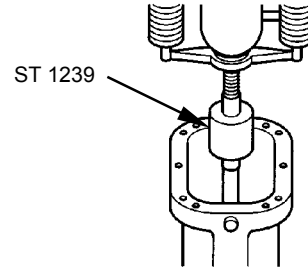
UPPERSTRUCTURE / Pump Device



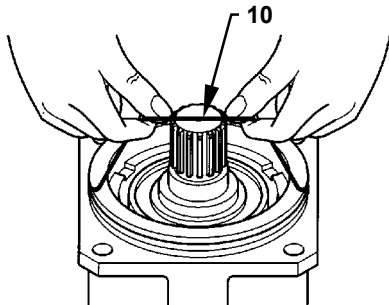
W173-02-04-026

UPPERSTRUCTURE / Pump Device

11. Remove center shaft (48) from drive disc (49). Do not lose pin (21).
12. Incline plungers (22) (7 used) to the center of drive disc (49). Remove plungers (22) (7 used) upward.
13. Place casing (11) on the workbench. Remove retaining ring (7) from casing (11).
14. Place casing (11) on the workbench with the drive disc (49) side upward. Remove seal cover (8) from casing (11) by using a screwdriver.
15. Remove oil seal (9) from seal cover (8) by using a screwdriver.
16. Remove O-ring (10) from casing (11).
17. Turn over casing (11) and place casing (11) on a press. Remove drive disc (49) and the bearing by using a press and special tool (ST 1239).

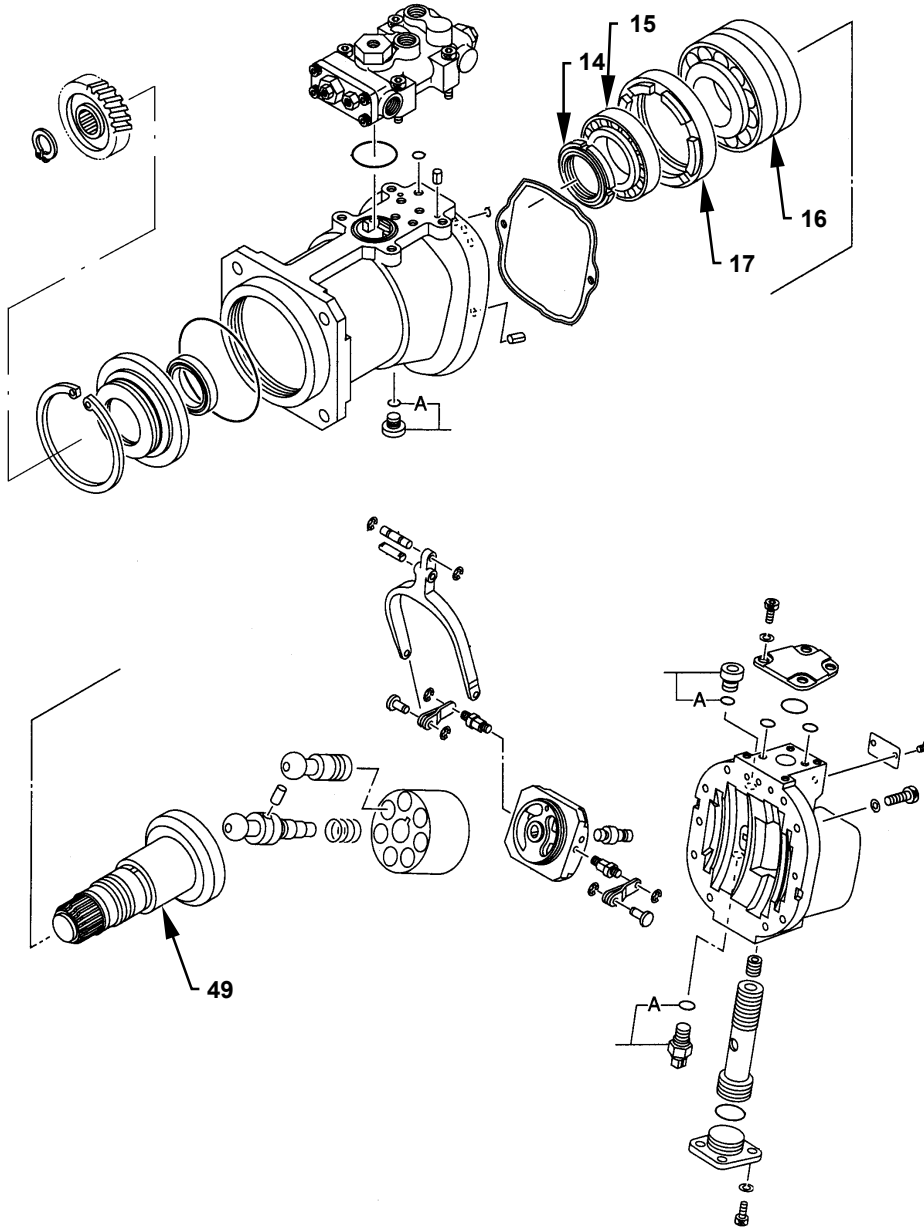


W1V7-02-04-010



W1V7-02-04-009

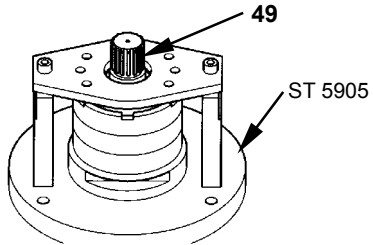
UPPERSTRUCTURE / Pump Device



W173-02-04-026

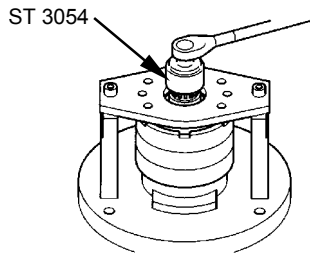
UPPERSTRUCTURE / Pump Device

18. Place the drive disc (49) assembly on special tool (ST 5905) as illustrated in order to remove bearing nut (14).



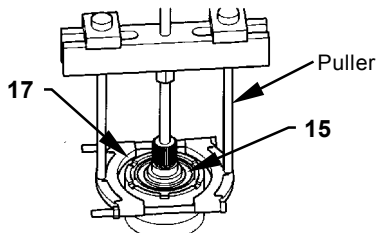
W1V7-02-04-011

19. Install special tool (ST 3054) on the spline of drive disc (49). Loosen bearing nut (14).



W1V7-02-04-012

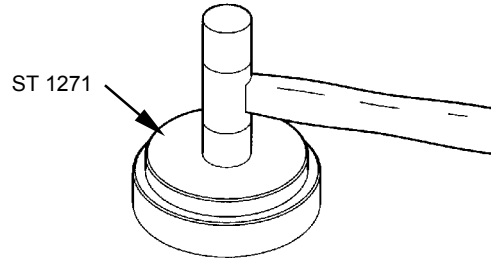
20. Remove bearing nut (14) from drive disc (49).
21. Remove roller bearing (15) and spacer (17) from drive disc (49) by using a puller.



W1V7-02-04-013

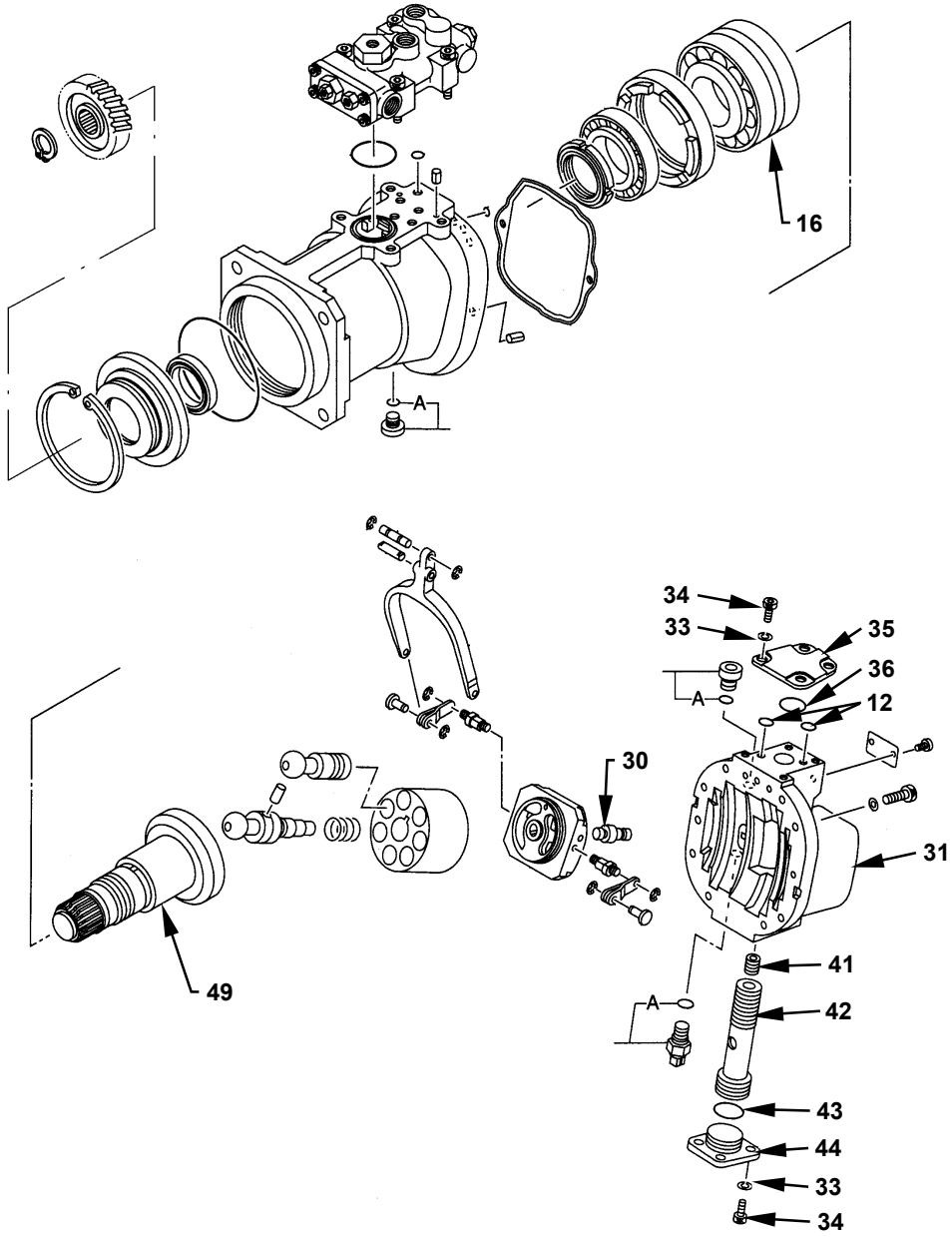
22. Remove the outer race of roller bearing (16).

23. Remove roller bearing (15) from spacer (17) by using special tool (ST 1271).



W1V7-02-04-014

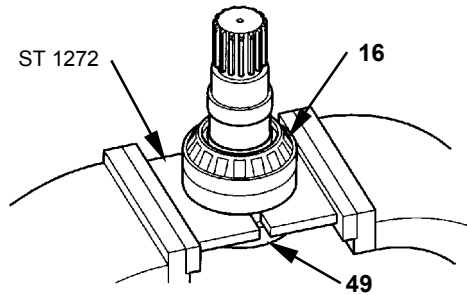
UPPERSTRUCTURE / Pump Device



W173-02-04-026

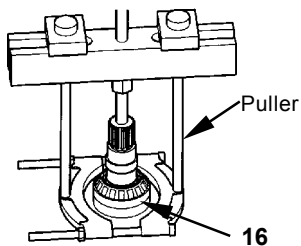
UPPERSTRUCTURE / Pump Device

24. Install special tool (ST 1272) between drive disc (49) and roller bearing (16). Clamp the assembly in a vise.
Adjust the clearance in order to use a puller.



W1V7-02-04-015

25. Set a puller. Remove roller bearing (16) from drive disc (49).



W1V7-02-04-016


26. Remove bolts (34) (4 used) and spring washers (33) (4 used) from stoppers S (35). Remove stopper S (35), O-rings (36), (12) (2 used) from head covers (31).
┌ : 6 mm

27. Remove bolts (34) (4 used) and spring washers (33) (4 used) from stoppers L (44). Remove stoppers L (44) and O-ring (43) from head cover (31).

┌ : 6 mm

28. Remove set screw (41) from servo piston (42). Remove servo pin (30) from head cover (31).

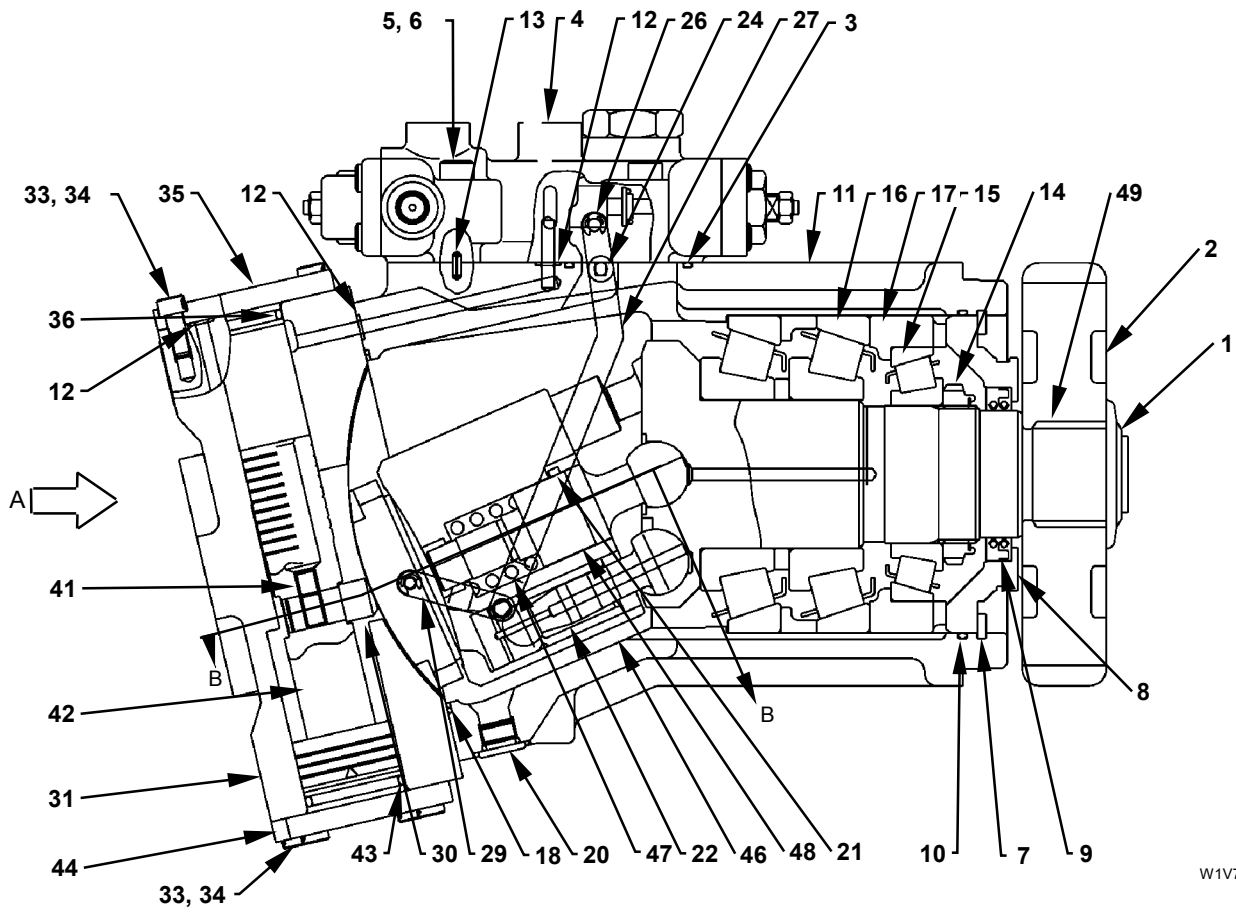
┌ : 8 mm

 **NOTE:** *LOCTITE #829 is applied to set screw (41). Heat set screw (41) before removing.*

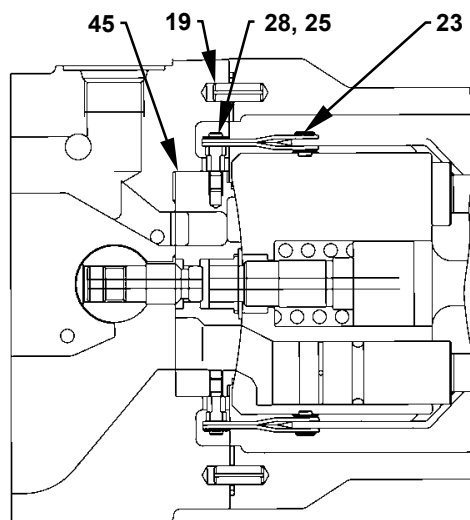
29. Remove servo piston (42) from head cover (31).

UPPERSTRUCTURE / Pump Device

ASSEMBLE MAIN PUMP



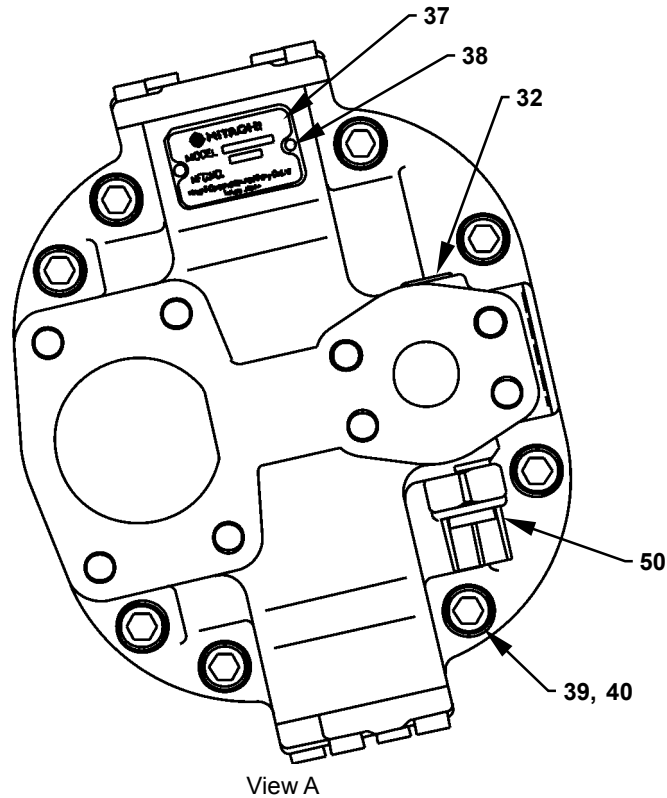
W1V7-02-04-023



Section B-B

W1HH-02-04-006

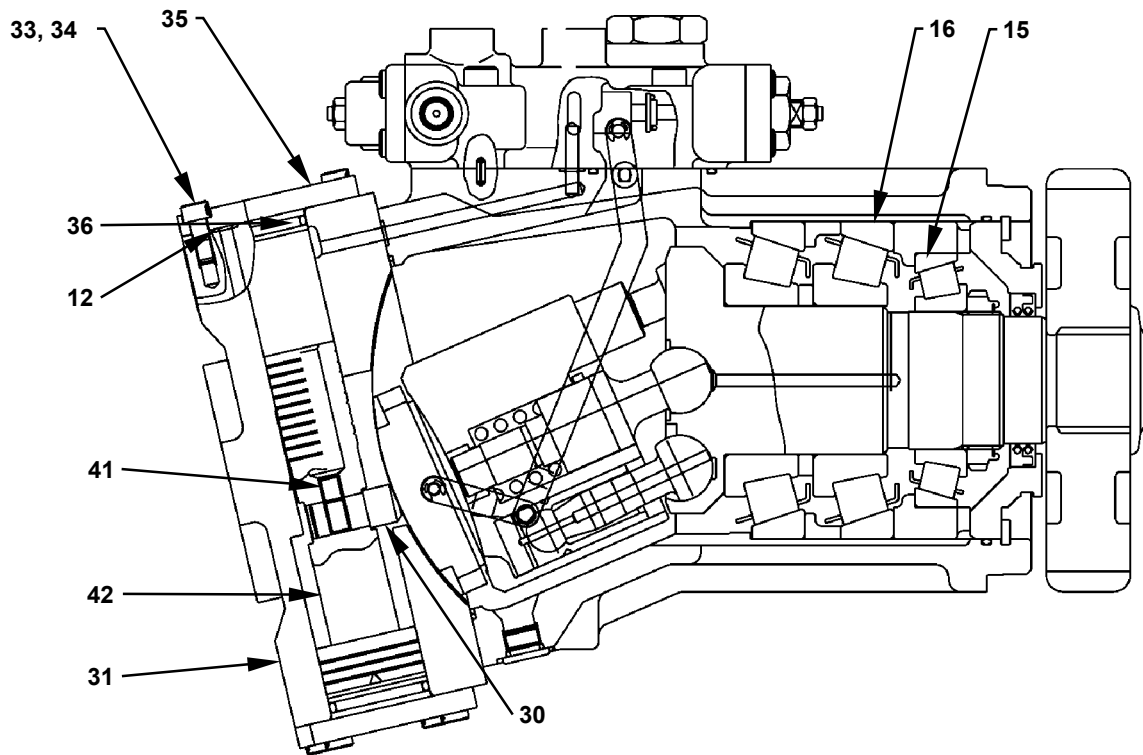
UPPERSTRUCTURE / Pump Device



W173-02-04-002

- | | | | |
|----------------------------|------------------------------|-----------------------------|-----------------------------|
| 1 - Retaining Ring | 14 - Bearing Nut | 27 - Link | 39 - Bolt (8 Used) |
| 2 - Drive Gear | 15 - Roller Bearing | 28 - Pin (2 Used) | 40 - Spring Washer (8 Used) |
| 3 - O-Ring | 16 - Roller Bearing | 29 - Lever (2 Used) | 41 - Set Screw |
| 4 - Regulator | 17 - Spacer | 30 - Servo Pin | 42 - Servo Piston |
| 5 - Socket Bolt (4 Used) | 18 - Packing | 31 - Head Cover | 43 - O-Ring |
| 6 - Spring Washer (4 Used) | 19 - Spring Pin (2 Used) | 32 - Plug | 44 - Stopper L |
| 7 - Retaining Ring | 20 - Plug | 33 - Spring Washer (8 Used) | 45 - Valve Plate |
| 8 - Seal Cover | 21 - Pin | 34 - Socket Bolt (8 Used) | 46 - Cylinder Block |
| 9 - Oil Seal | 22 - Plunger (7 Used) | 35 - Stopper S | 47 - Spring |
| 10 - O-Ring | 23 - Pin (2 Used) | 36 - O-Ring | 48 - Center Shaft |
| 11 - Casing | 24 - Pin | 37 - Name Plate | 49 - Drive Disc |
| 12 - O-Ring (10 Used) | 25 - Retaining Ring (6 Used) | 38 - Screw (2 Used) | 50 - P Sensor |
| 13 - Spring Pin (2 Used) | 26 - Feedback Pin | | |

UPPERSTRUCTURE / Pump Device





W1V7-02-04-023

UPPERSTRUCTURE / Pump Device


Assemble Main Pump


1. Insert servo piston (42) into head cover (31). Install servo pin (30) into the servo piston (42) hole from the suction port in head cover (31). Apply LOCTITE #829 to the thread part of set screw (41). Tighten set screw (41). Secure servo pin (30) to servo piston (42).

 : 8 mm

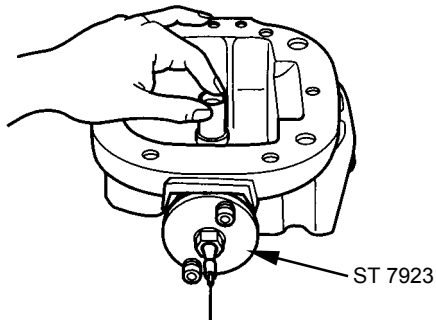
 : 24.5 N·m (2.5 kgf·m, 18 lbf·ft)

2. Install O-ring (36) to stopper S (35). Install O-rings (12) (2 used) to head cover (31). Install stopper S (35) to head cover (31) with socket bolts (34) (4 used) and spring washers (33) (4 used).

 : 6 mm

 : 30 N·m (3.1 kgf·m, 22 lbf·ft)

3. Install special tool (ST 7923) to the large chamber side of head cover (31). Set servo piston (42) so that servo pin (30) is at the center of the suction port.



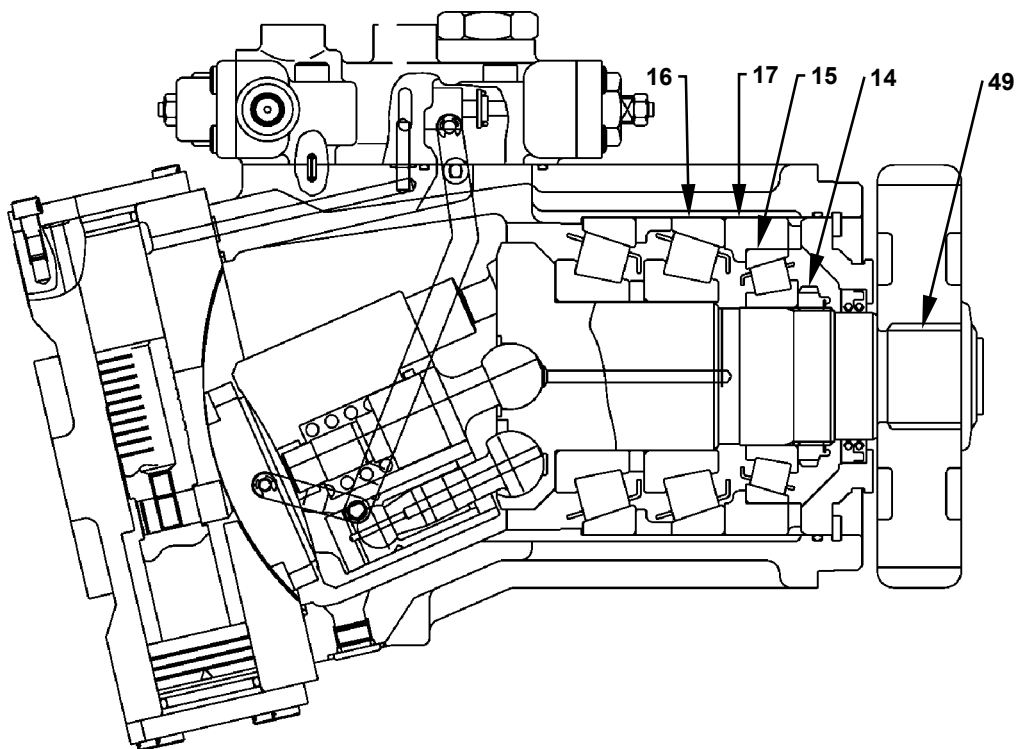
W173-02-04-015



CAUTION: The inner race becomes too hot. Avoid being burned.

4. Heat the inner race of roller bearings (15, 16) to 50 to 80 °C (122 to 176 °F). Apply hydraulic oil to roller bearings (15, 16) inside.

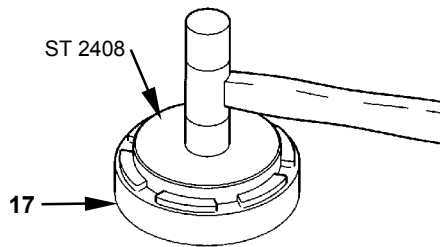
UPPERSTRUCTURE / Pump Device



W1V7-02-04-023

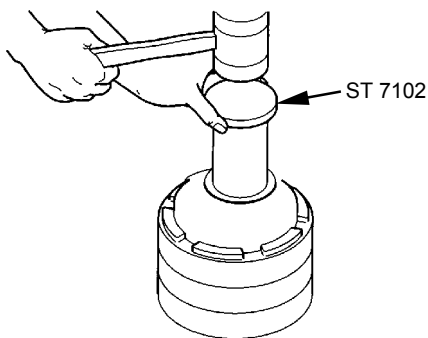
UPPERSTRUCTURE / Pump Device

5. Place drive disc (49) on a workbench with the spline side facing upward. Install roller bearing (16) to drive disc (49). Apply hydraulic oil to the bearing race surfaces.
6. Install the outer race to roller bearing (16).
7. Install the outer race of roller bearing (15) to spacer (17) by using special tool (ST 2408).



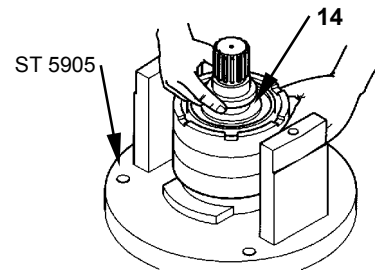
W1V7-02-04-017

8. Install roller bearing (15) and spacer (17) to drive disc (49). Check that roller bearings (15, 16) are securely installed to drive disc (49) after they have cooled down to atmosphere temperature. Apply hydraulic oil to the bearing race surfaces. Install the inner race of roller bearing (15) by using special tool (ST 7102).



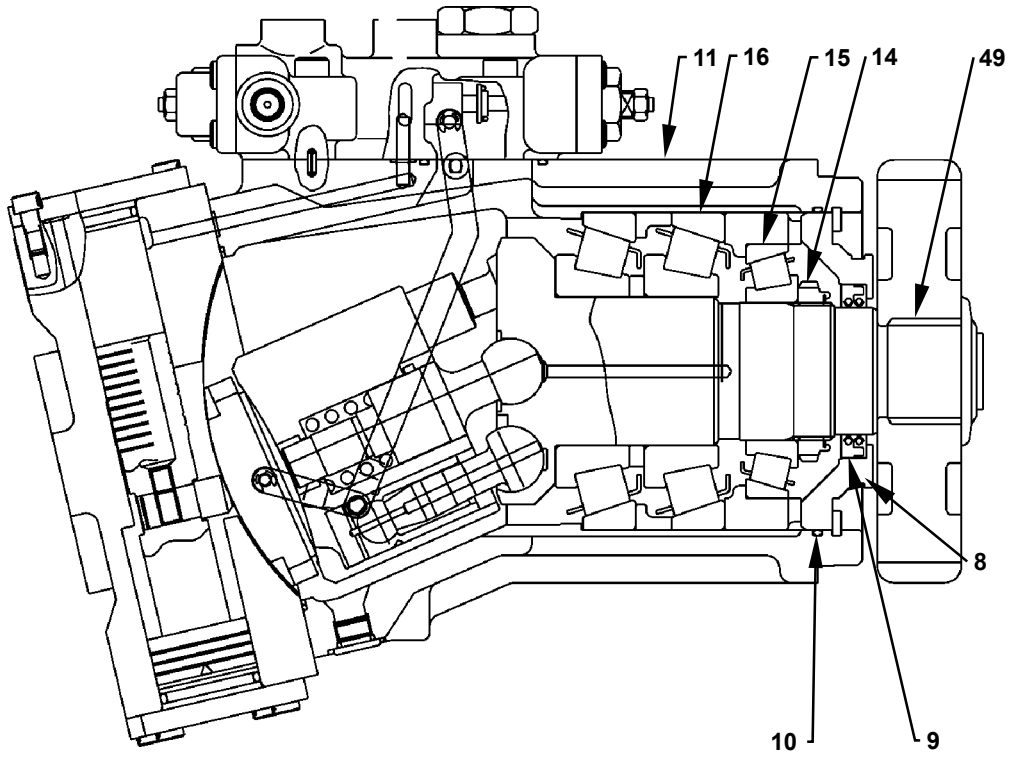
W1V7-02-04-018

9. Place drive disc (49) on special tool (ST 5905). Install bearing nut (14) to the thread part in drive disc (49). Tighten bearing nut (14) until it contacts bearing (15). Apply lubricating oil to the thread part in bearing nut (14).



W1V7-02-04-019

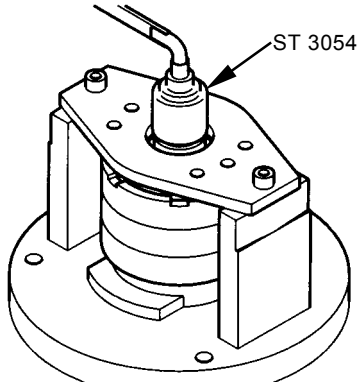
UPPERSTRUCTURE / Pump Device



W1V7-02-04-023

UPPERSTRUCTURE / Pump Device

10. Insert special tool (ST3054) into the spline in drive disc (49). Turn drive disc (49) and tighten bearing nut (14).

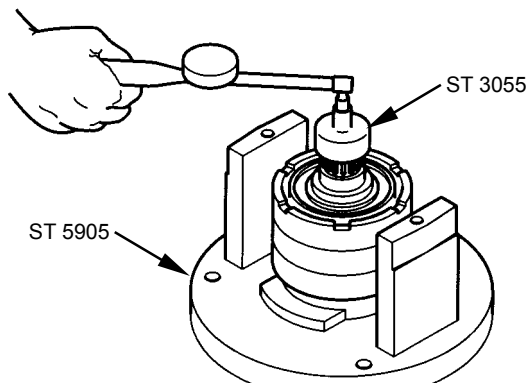


W173-02-04-023

11. Measure the preload of roller bearings (15, 16). Set special tool (ST5905). Install a torquemeter and adapter (ST 3055) on the spline. Rotate drive disc (49) two or three times before recording, for smoother movement of drive disc (49) and make a record of the torque.

Starting Torque Specification:

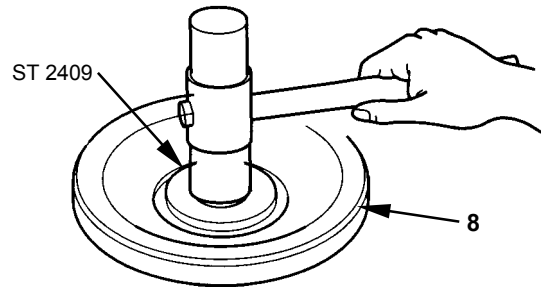
2.94 ± 0.49 N·m (0.30 ± 0.05 kgf·m, 2.17 ± 0.36 lbf·ft)



W173-02-04-024

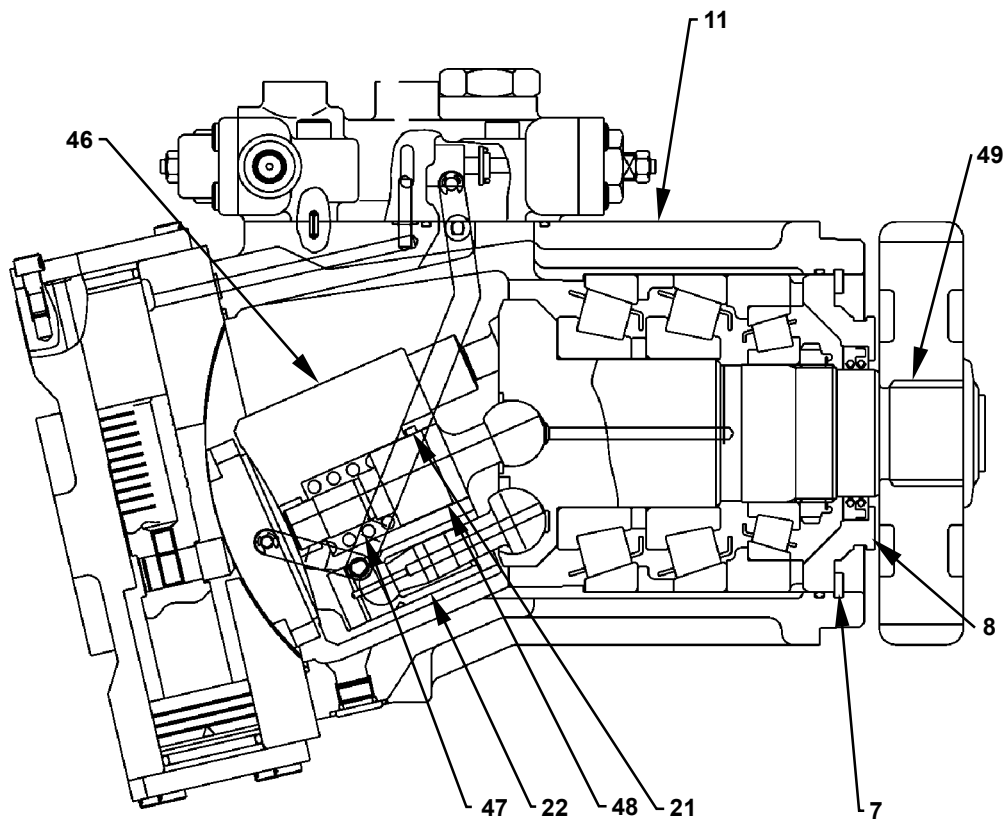
CAUTION: Casing (11) becomes too hot. When applying grease, avoid being burned.

12. Heat casing (11) to 50 to 80 °C (122 to 176 °F). Apply grease to the inside of casing (11).
13. Install the drive disc (49) assembly to casing (11). Check that drive disc (49) is securely installed after the casing has cooled down to atmosphere temperature.
14. Install O-ring (10) to the groove in casing (11). Apply grease to O-ring (10).
15. Install oil seal (9) to seal cover (8) by using special tool (ST 2409). Apply grease to the oil seal (9) lip.

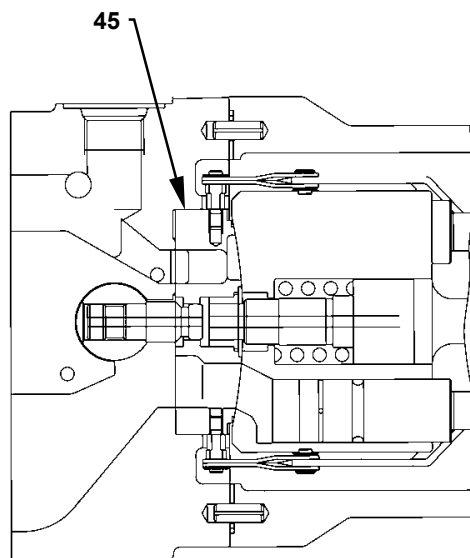


W173-02-04-019

UPPERSTRUCTURE / Pump Device



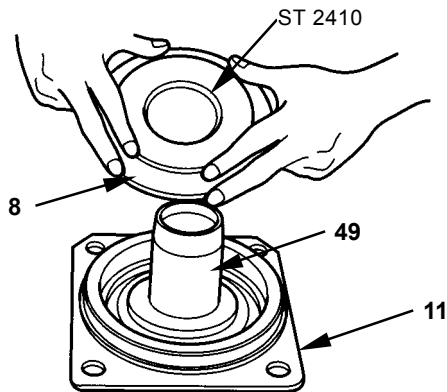
W1V7-02-04-023



W1HH-02-04-006

UPPERSTRUCTURE / Pump Device

16. Install special tool (ST 2410) on the spline of drive disc (49). Install seal cover (8) to casing (11). Tap seal cover (8) into casing (11) by using a plastic hammer until the retaining ring (7) groove on casing (11) is visible.

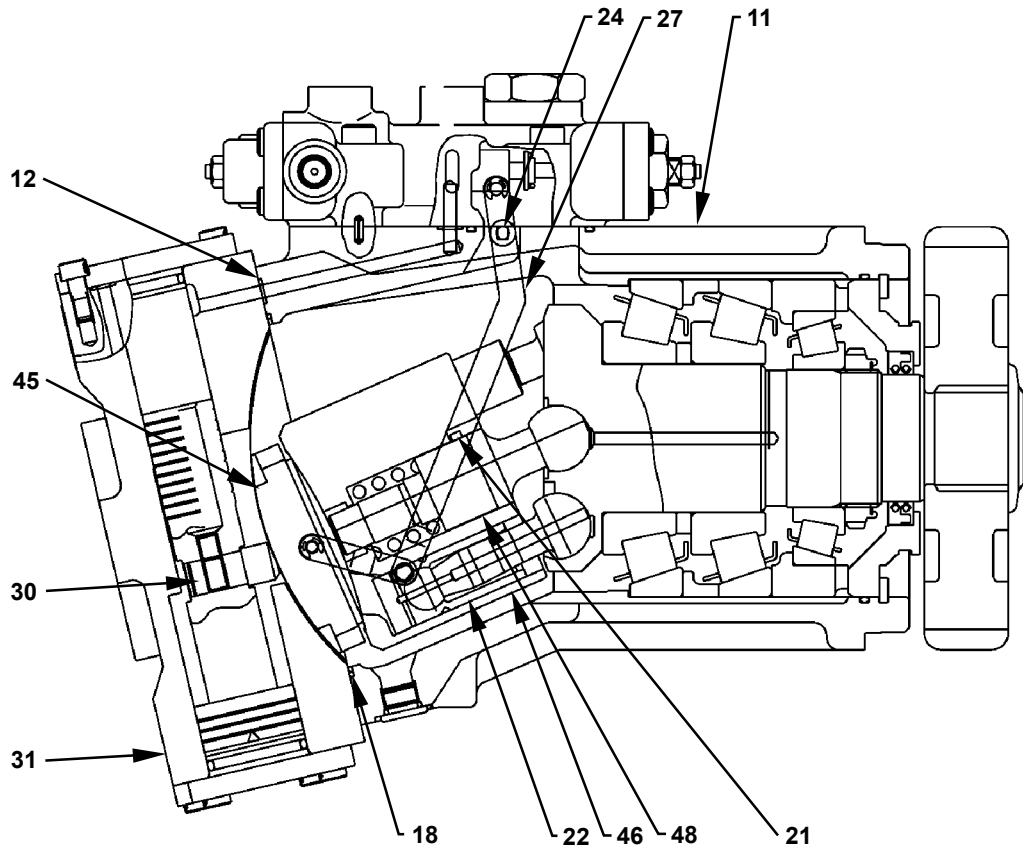


W173-02-04-020

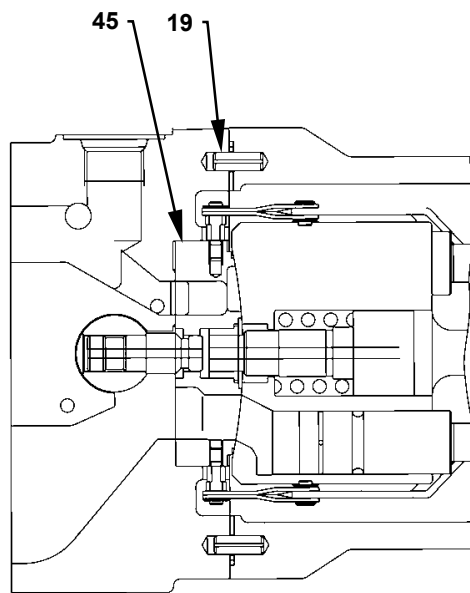
22. Install plungers (22) (7 used) and center shaft (48) to cylinder block (46). Install pin (21) into the groove of cylinder block (46) while rotating the end of center shaft (48) by using a radio plier.

17. Install retaining ring (7) to casing (11). Check that retaining ring (7) seats well in the groove after installing.
18. Turn over casing (11) and place casing (1) on a workbench with the drive disc (49) side facing downward.
Apply hydraulic oil to the spherical surface of drive disc (49).
Incline plunger (22) to the center of drive disc (49).
Install plungers (22) (7 used).
19. Apply grease to pin (21) in order not to fall off.
Install pin (21) to center shaft (48).
20. Install center shaft (48) to drive disc (49).
21. Install spring (47) to center shaft (48).

UPPERSTRUCTURE / Pump Device



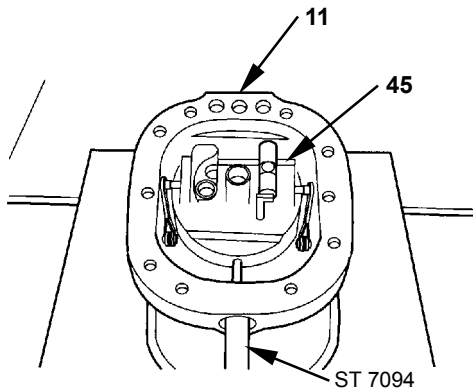
W1V7-02-04-023



W1HH-02-04-006



UPPERSTRUCTURE / Pump Device

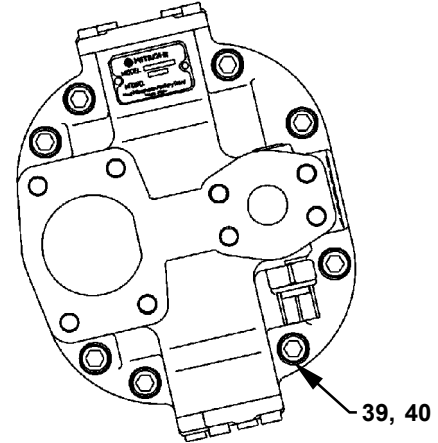
23. Connect link (27) to valve plate (45). Place valve plate (45) on casing (11) inside. Insert pin (24) in link (27) into the regulator mounting end for the casing (11).
24. Apply hydraulic oil to the spherical surfaces of valve plate (45) and cylinder block (46). Face the spherical surface of valve plate (45) to cylinder block (46) and insert into the end of center shaft (48) into the hole on valve plate (45).
25. Apply grease to O-rings (12) (3 used). Install O-rings (12) (3 used) and packing (18) to casing (11).
26. Install special tool (ST 7094) to the drain port of casing (11). Secure valve plate (45) at the center position.



W1V7-02-04-020

28. Align the holes of spring pin (19). Install head cover (31) to casing (11). Install head cover (31) to casing (11) with bolts (39) (8 used) and spring washers (40) (8 used).

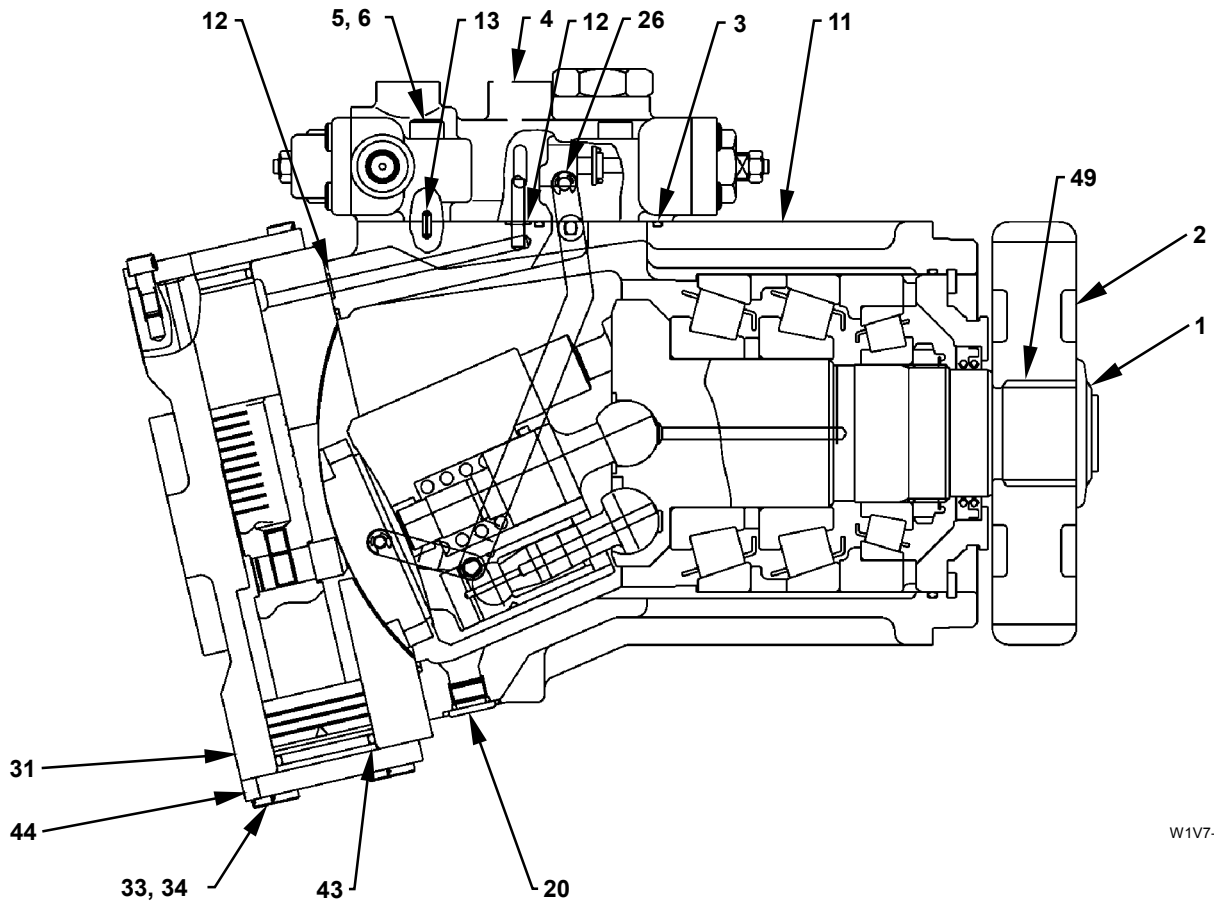
 : 12 mm
 : 110 N·m (11 kgf·m, 81 lbf·ft)



W1V7-02-04-002

27. Align servo pin (30) on head cover (31) with the valve plate (45) hole.

UPPERSTRUCTURE / Pump Device







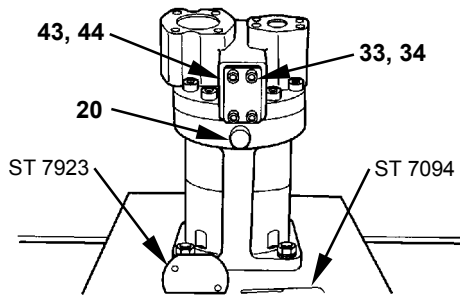
W1V7-02-04-023

UPPERSTRUCTURE / Pump Device

29. Remove special tool (ST7094) from casing (11).
Install plug (20) to casing (11).


Remove special tool (ST 7923) from head cover (31). Install O-ring (43) to stopper L (44). Install stopper L (44) to head cover (31) with socket bolts (34) (4 used) and spring washers (33) (4 used).

-  : 6 mm
-  : 20 N·m (2 kgf·m, 15 lbf·ft)
-  : 8 mm
-  : 49 N·m (5 kgf·m, 36 lbf·ft)



W1V7-02-04-021



30. Apply grease to O-rings (3, 12).
Install O-rings (12) (5 used) and (3) to the regulator mounting surface of casing (11).

 **NOTE:** Check that spring pins (13) (2 used) are installed.

 **CAUTION:** Main pump weight: 67 kg (148 lb)

31. Align feedback pin (26) in the pump with the notches on sleeves (2 used) in regulator (4).
Install regulator (4) to casing (11).

32. Install regulator (4) to casing (11) with socket bolts (5) (4 used) and spring washers (6) (4 used).

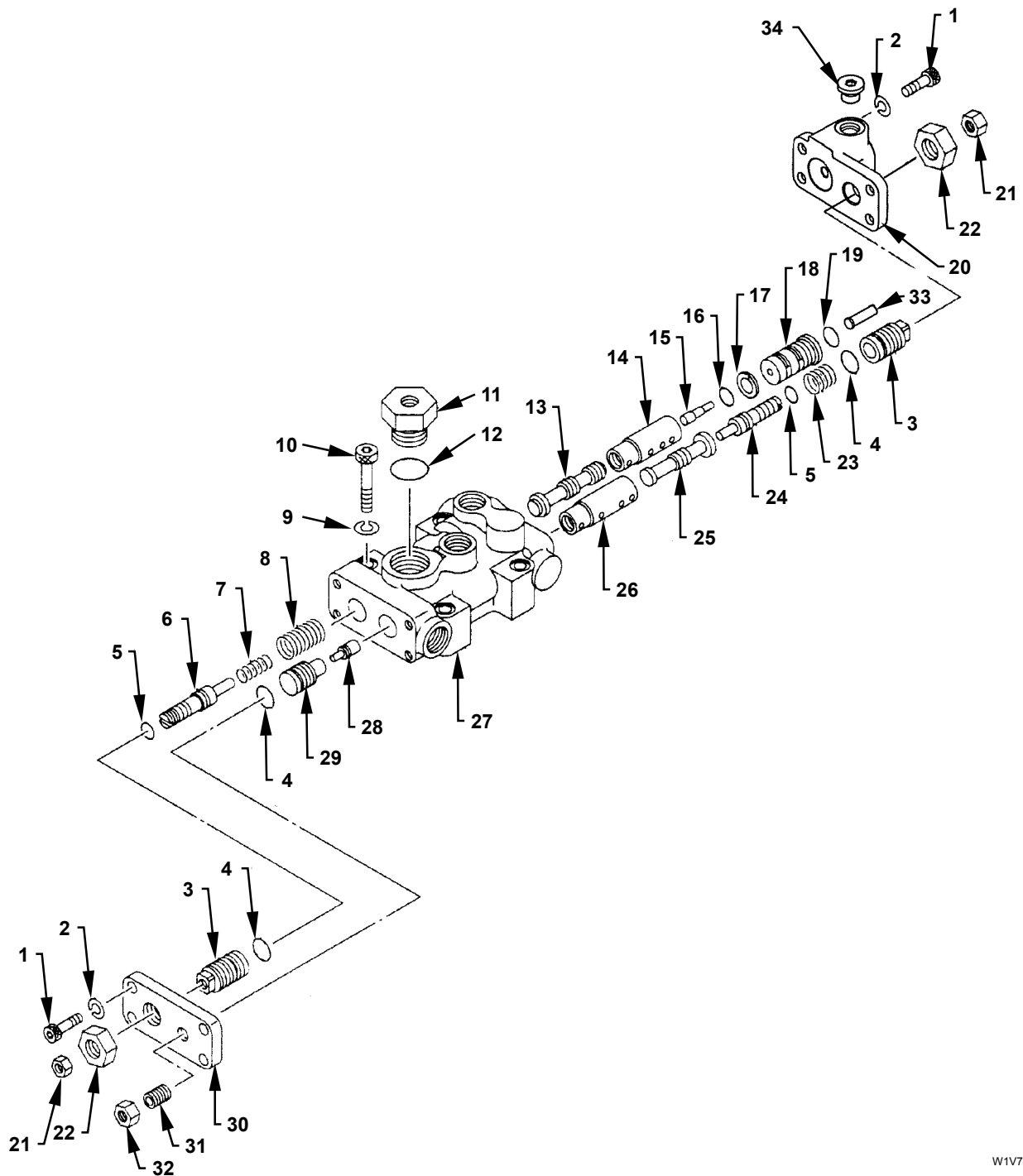
-  : 8 mm
-  : 49 N·m (5 kgf·m, 36 lbf·ft)

33. Install drive gear (2) to drive disc (49).

34. Install retaining ring (1) to drive disc (49).

UPPERSTRUCTURE / Pump Device

DISASSEMBLE REGULATOR





W1V7-02-04-024

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

UPPERSTRUCTURE / Pump Device

Disassemble Regulator

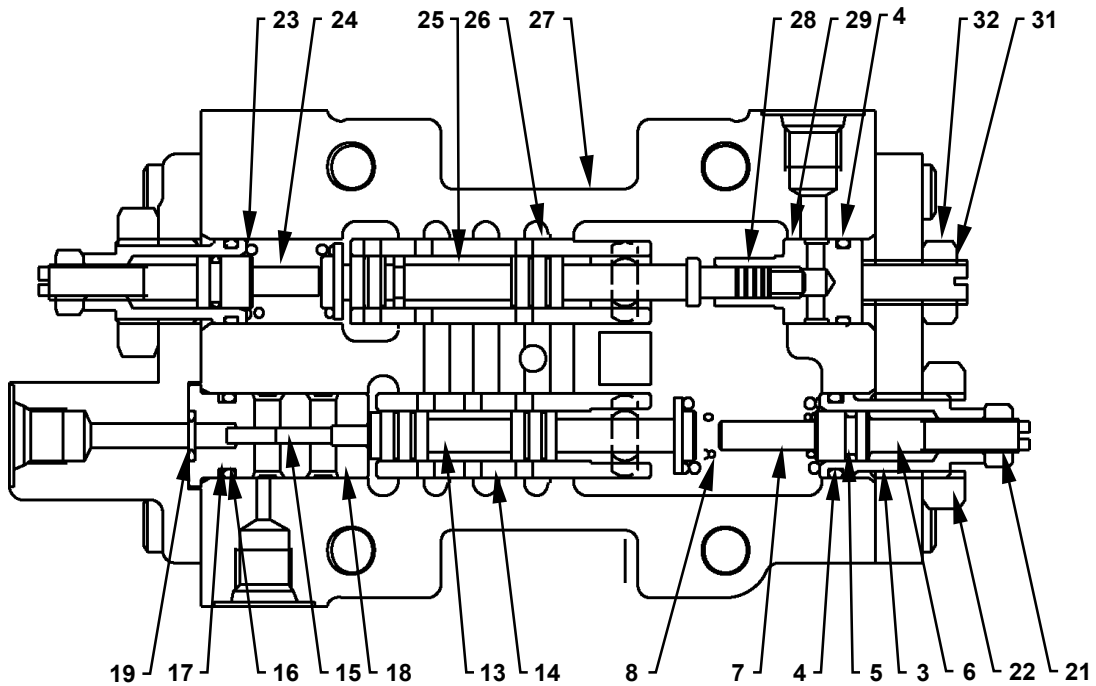
1. Secure casing (27) in a vise.
2. Remove air bleed plug (11) and O-ring (12) from casing (27).
Remove the elbows (4 used) from casing (27).
 : 19 mm, 41 mm
3. Remove socket bolts (1) (8 used) and spring washers (2) (8 used). Remove front cover (20) and rear cover (30) from casing (27). Remove piston (33) from front cover (20).
 : 6 mm
9. Remove spring (23) from the front cover (20) side in casing (27).
10. Push spool (25). Remove cylinder (29) and piston (28) from the rear cover (30) side in casing (27).
11. Remove piston (28) and O-ring (4) from cylinder (29).
12. Remove sleeve (26) and spool (25) from the front cover (20) side in casing (27). Remove spool (25) from sleeve (26) .

IMPORTANT: If loosening stoppers (3) (2 used), (6), nuts (21) (2 used), (32) and screw (31), the regulator setting will change. Do not loosen (3) (2 used), (6), nuts (21) (2 used), (32) and screw (31).

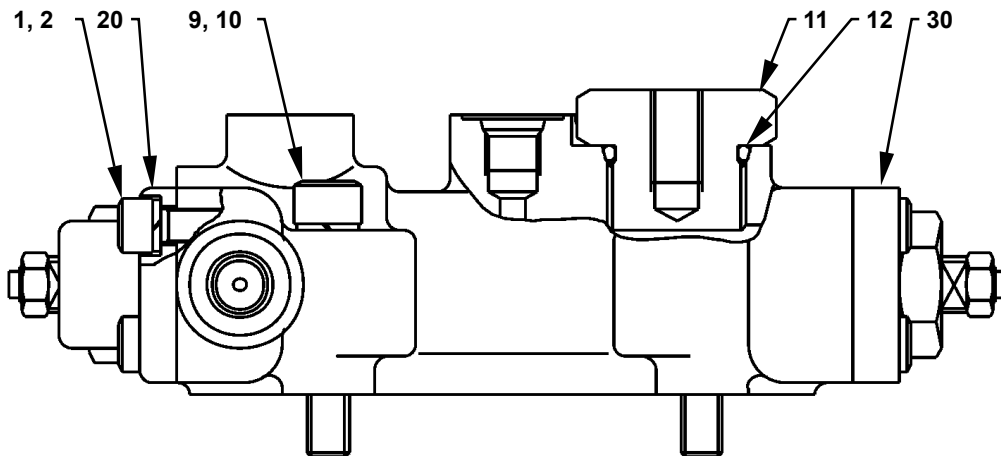
4. Remove springs (7, 8) from the rear cover (30) side in casing (27).
5. Push spool (13). Remove cylinder (18) from the front cover (20) side in casing (5).
6. Remove piston (15), O-ring (16) and backup ring (17) from cylinder (18).
7. Remove sleeve (14) and spool (13) from the front cover (20) side in casing (27).
8. Remove spool (13) from sleeve (14).

UPPERSTRUCTURE / Pump Device

ASSEMBLE REGULATOR



W1V7-02-04-029









W1V7-02-04-001

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

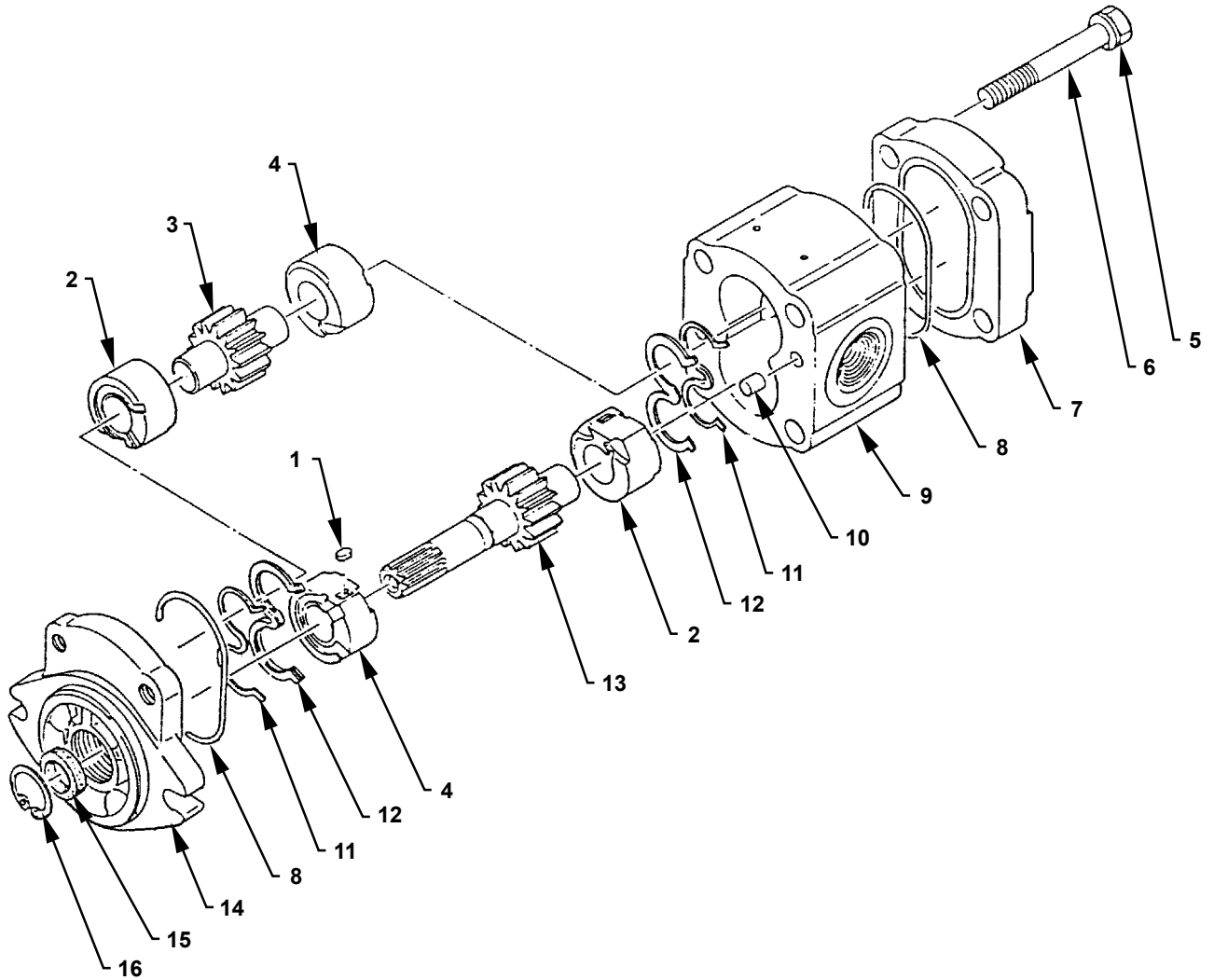
UPPERSTRUCTURE / Pump Device

Assemble Regulator

1. Secure casing (27) in a vise.
2. Install spool (13) to sleeve (14).
3. Install the sleeve (14) assembly from the front cover (20) side in casing (27).
4. Install spool (25) to sleeve (26). Insert the sleeve (26) assembly from the rear cover (30) side in casing (27).
5. Install piston (28) to cylinder (29).
6. Install O-ring (4) to cylinder (29). Apply grease to O-ring (4). Insert the cylinder (29) assembly from the rear cover (30) side in casing (27).
7. Install the rear cover (30) assembly and springs (7, 8) to casing (27). Install the rear cover (30) assembly to casing (27) with socket bolts (1) (4 used) and spring washers (2) (4 used).
 : 6 mm
 : 19.6 N·m (2 kgf·m, 14 lbf·ft)
8. Install O-ring (16), backup ring (17) and piston (15) to cylinder (18).
9. Apply grease to O-ring (16). Install the cylinder (18) assembly from the front cover (20) side in casing (5).
10. Insert piston (33) into front cover (20). Install the front cover (20) assembly and spring (23) to casing (27). Install the front cover (20) assembly to casing (27) with socket bolts (1) (4 used) and spring washers (2) (4 used).
 : 6 mm
 : 19.6 N·m (2 kgf·m, 14 lbf·ft)
11. Apply grease to O-ring (12). Install O-ring (2) to plug (11).
12. Install plug (11) to casing (27).
 : 41 mm
 : 78.5 N·m (8 kgf·m, 58 lbf·ft)
13. Install the elbows (4 used) to casing (27).

UPPERSTRUCTURE / Pump Device

DISASSEMBLE PILOT PUMP




W110-02-04-022

- | | | | |
|----------------------|---------------------|---------------------------|---------------------|
| 1 - Key (2 Used) | 5 - Washer (4 Used) | 9 - Housing | 13 - Drive Gear |
| 2 - Bushing (2 Used) | 6 - Bolt (4 Used) | 10 - Knock Pin (2 Used) | 14 - Flange |
| 3 - Gear | 7 - Cover | 11 - Backup Ring (2 Used) | 15 - Oil Seal |
| 4 - Bushing (2 Used) | 8 - O-Ring (2 Used) | 12 - Seal (2 Used) | 16 - Retaining Ring |

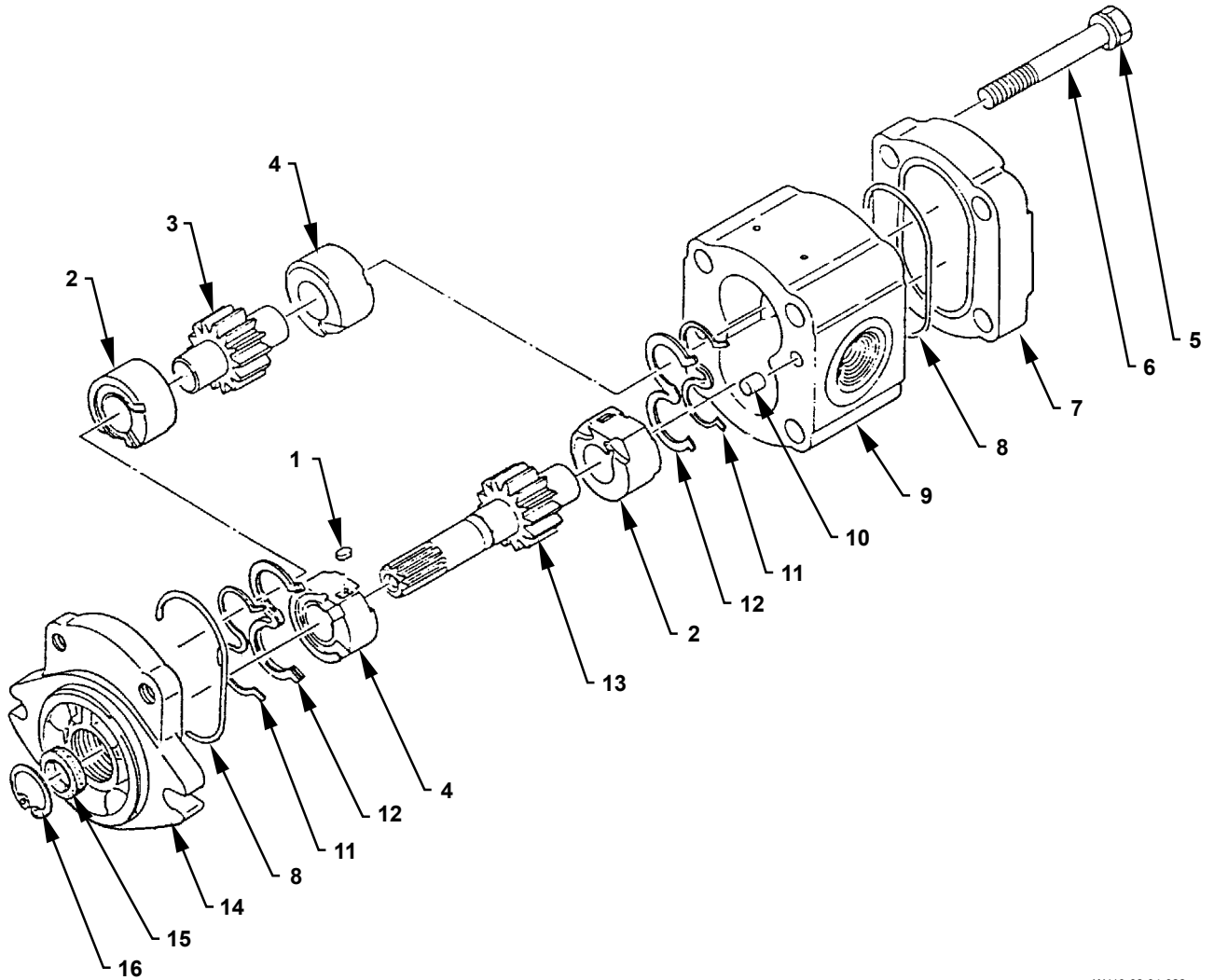
UPPERSTRUCTURE / Pump Device

Disassemble Pilot Pump

1. Clamp flange (14) in the pilot pump in a vise with cover (7) up.
2. Remove bolts (6) (4 used).
 : 17 mm
3. Remove cover (7) from housing (9).
4. Remove O-ring (8) from cover (7).
5. Remove flange (14) from housing (9).
6. Remove O-ring (8) from flange (14).
7. Remove retaining ring (16) from flange (14).
8. Remove oil seal (15) from flange (14) by using a screwdriver.
9. Remove seal (12) and backup ring (11) in cover (7) side from bushings (2, 4).
10. Lightly push drive gear (13). Remove bushings (2, 4) in cover (7) side from housing (9). Do not fall off key (1) between the bushings.
11. Remove seal (12) and backup ring (11) in flange (14) side from bushings (2, 4).
12. Remove bushings (2, 4) in flange (14) side from housing (9). Remove drive gear (13) and gear (3) from housing (9).

UPPERSTRUCTURE / Pump Device

ASSEMBLE PILOT PUMP






W110-02-04-022

- | | | | |
|----------------------|---------------------|---------------------------|---------------------|
| 1 - Key (2 Used) | 5 - Washer (4 Used) | 9 - Housing | 13 - Drive Gear |
| 2 - Bushing (2 Used) | 6 - Bolt (4 Used) | 10 - Knock Pin (2 Used) | 14 - Flange |
| 3 - Gear | 7 - Cover | 11 - Backup Ring (2 Used) | 15 - Oil Seal |
| 4 - Bushing (2 Used) | 8 - O-Ring (2 Used) | 12 - Seal (2 Used) | 16 - Retaining Ring |

UPPERSTRUCTURE / Pump Device

Assemble Pilot Pump

1. Install oil seal (15) into flange (14) by using special tool.
 2. Install retaining ring (16) to flange (14).
 3. Install bushings (2, 4) in cover (7) side to housing (9) with the seal groove side facing downward.
-  **NOTE:** Key (1) is installed between bushings (2, 4).
4. Install drive gear (13) and gear (3) to housing (9).
 5. Install bushings (2, 4) in flange (14) side to housing (9) with the seal groove side facing upward.
 6. Install seal (12) and backup ring (11) to the seal groove on bushings.
 7. Install O-ring (8) to flange (14).
 8. Install flange (14) while aligning the position of knock pin (10) in housing (9).
 9. Turn over housing (9) and the flange (14) assembly. Clamp the flange part in a vise. Do not fall off the bushings and gears when turning over. Install seal (12) and backup ring (11) to the seal groove on bushings.
 10. Install O-ring (8) to cover (7).
 11. Install cover (7) to housing (9).
 12. Secure flange (14), housing (9) and cover (7) with bolts (6) (4 used) and washers (5) (4 used).
 : 17 mm
 : 39 to 44 N·m
(4 to 4.5 kgf·m, 29 to 32 lbf·ft)

UPPERSTRUCTURE / Pump Device


(Blank)

UPPERSTRUCTURE / Control Valve

REMOVE AND INSTALL CONTROL VALVE



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

Removal

1. Remove bolts (3) (4 used). Remove covers (1, 2).
 : 17 mm

2. Remove the 4-spool solenoid valve unit and signal control valve. Refer to the Remove and install 4-Spool Solenoid Valve Unit section (W2-9-1) and the Remove and Install Signal Control Valve section (W2-10-1) respectively.


3. Remove all the connectors, hoses and pipes from control valve (4). Attach an identification tag onto the removed hoses for assembling. Cap the open ends.

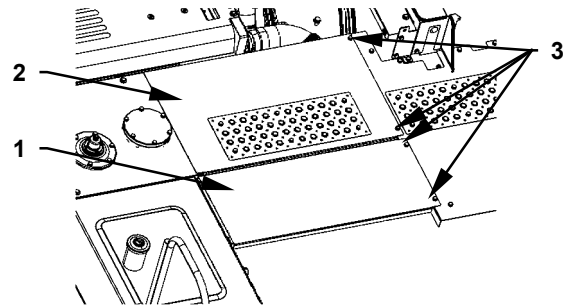
 : 17 mm, 19 mm, 22 mm, 36 mm
 : 8 mm

 **CAUTION:** Control valve (4) weight: 216 kg (475 lb)

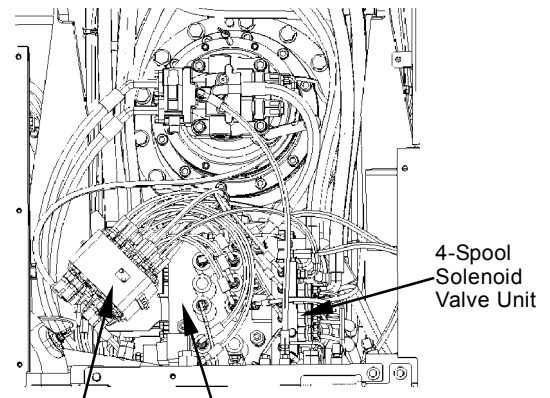
4. Install eyebolts (M10, Pitch 1.75 mm) (2 used) to control valve (4) and hold control valve (4).

5. Remove bolts (7) (4 used) from the bottom of main frame. Hoist and remove control valve (4) from brackets (5, 6).

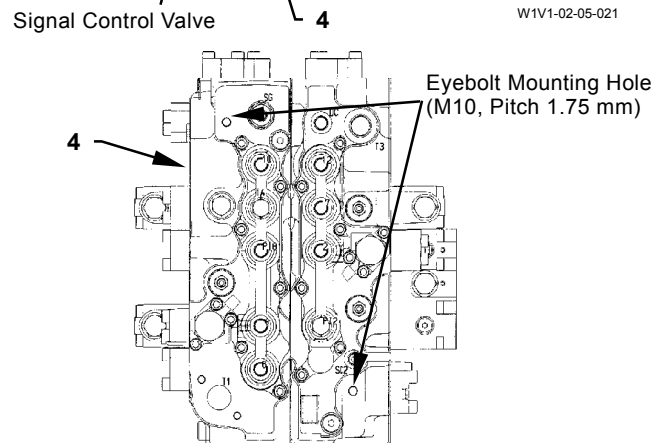
 : 24 mm



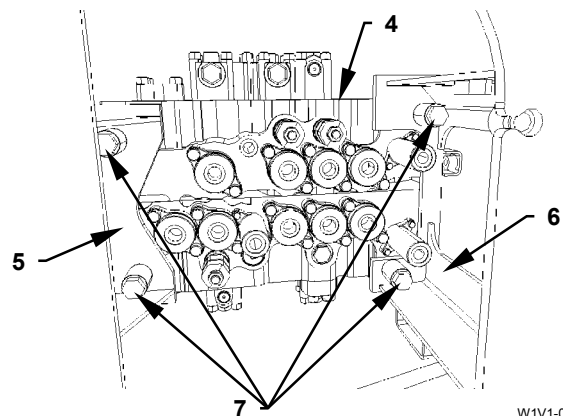
W1V7-02-08-001



W1V1-02-05-021



W1V1-02-05-063



W1V1-02-05-022


UPPERSTRUCTURE / Control Valve


Installation

CAUTION: Control valve (3) weight: 216 kg (475 lb)


1. Install eyebolt (M10, Pitch 1.75 mm) to control valve (4). Hold control valve (4).


2. Install control valve (4) to brackets (5, 6) from the bottom of main frame with bolts (7) (4 used).


 : 24 mm


 : 270 N·m (27 kgf·m, 200 lbf·ft)


3. Install all connectors, hoses and pipes to control valve (4).


 : 17 mm


 : 25 N·m (2.5 kgf·m, 18 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)

 : 36 mm

 : 180 N·m (18 kgf·m, 133 lbf·ft)


 : 8 mm


 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

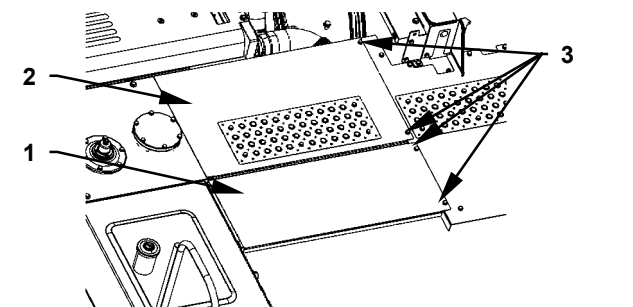
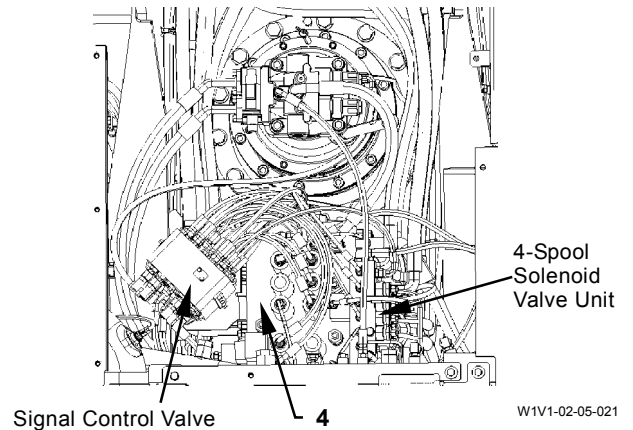
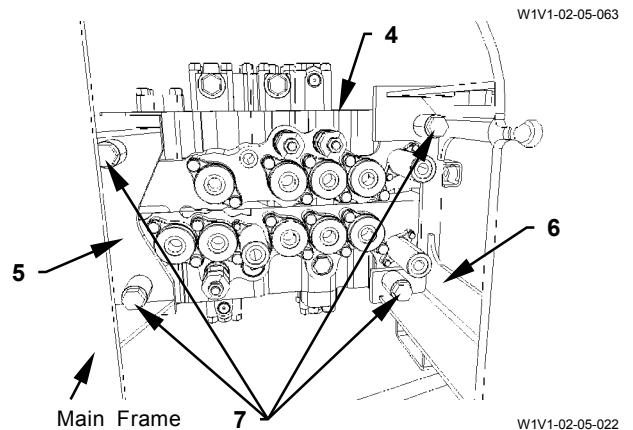
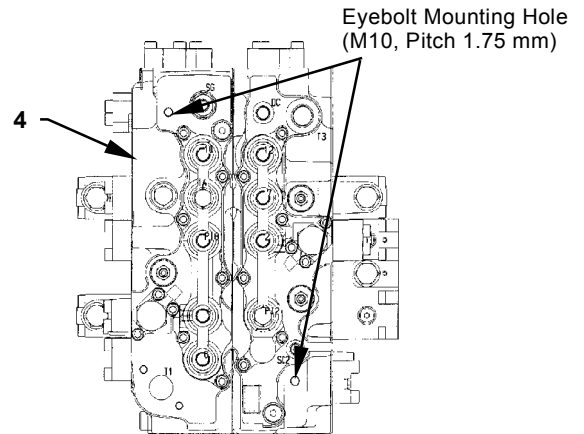
4. Install the 4-spool solenoid valve unit and signal control valve to control valve (4).

Refer to the Remove and install 4-Spool Solenoid Valve Unit section (W2-9-1) and the Remove and Install Signal Control Valve section (W2-10-1) respectively.

5. Install covers (1, 2) with bolts (3) (4 used).

 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)



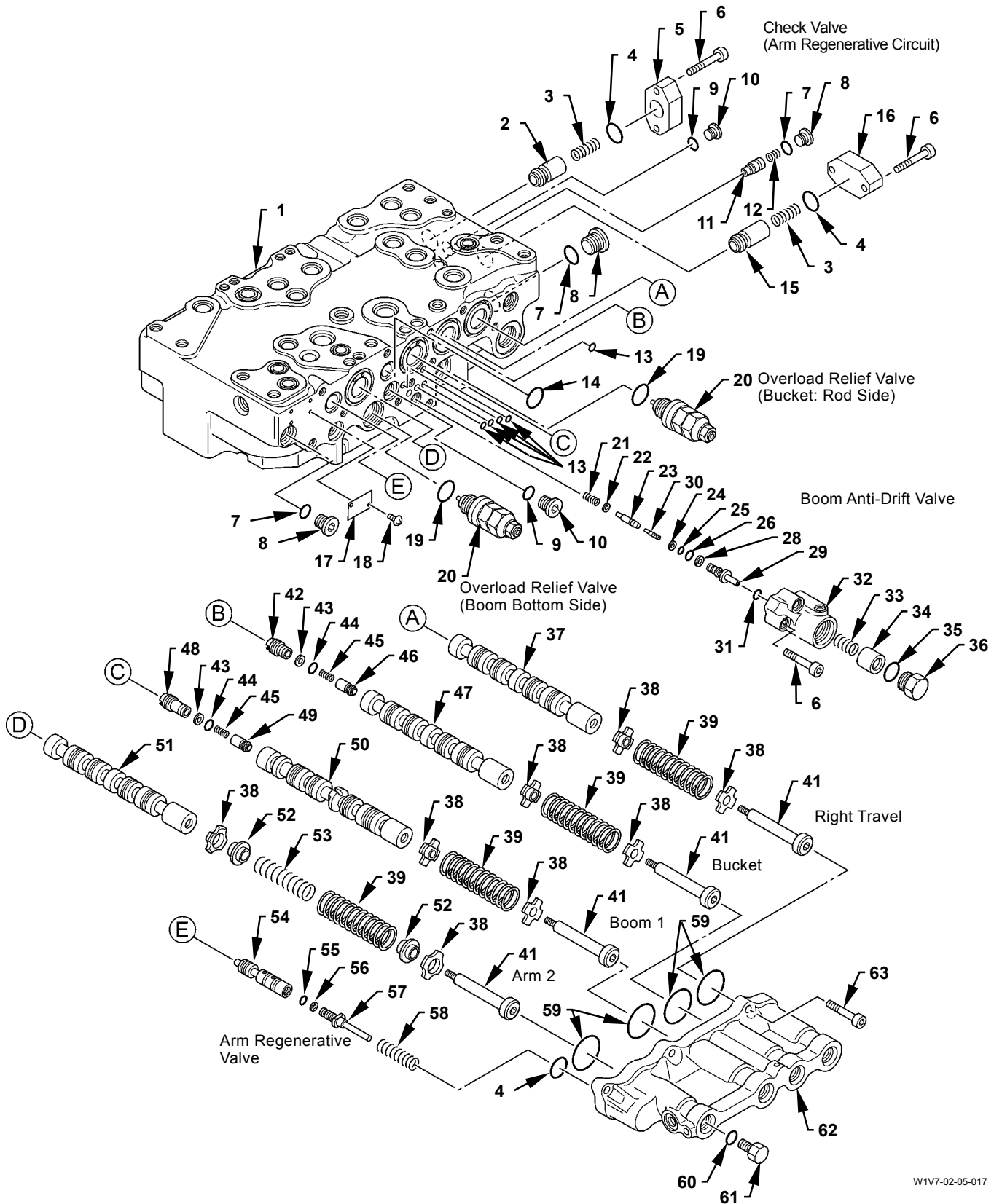
W1V7-02-08-001

UPPERSTRUCTURE / Control Valve

(Blank)

UPPERSTRUCTURE / Control Valve

DISASSEMBLE CONTROL VALVE 4-SPOOL SIDE



W1V7-02-05-017

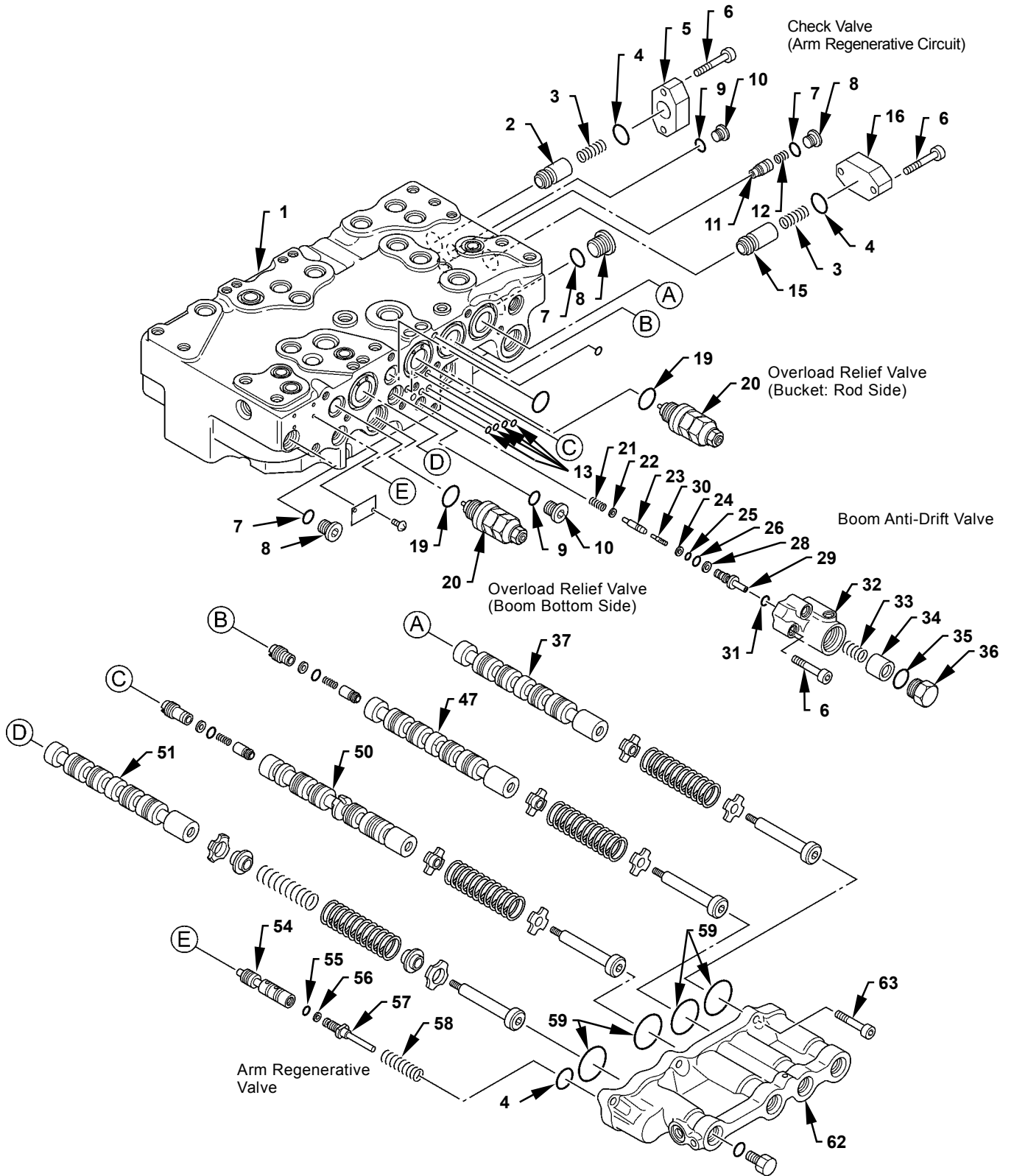
UPPERSTRUCTURE / Control Valve

1 - Housing	34 - Piston	66 - Plug	97 - Socket Bolt (12 Used)
2 - Poppet	35 - O-Ring	67 - Cap (3 Used)	98 - Poppet
3 - Spring (2 Used)	36 - Plug	68 - Socket Bolt (2 Used)	99 - Poppet
4 - O-Ring (3 Used)	37 - Spool	69 - Cap	100 - Spring
5 - Flange	38 - Spring Seat (8 Used)	70 - Bolt	101 - Plug
6 - Socket Bolt (13 Used)	39 - Spring (4 Used)	71 - Spring Seat (2 Used)	102 - O-Ring
7 - O-Ring (3 Used)	40 - Body	72 - Spring	103 - Cap
8 - Plug (3 Used)	41 - Bolt (4 Used)	73 - Spool	104 - Socket Bolt (4 Used)
9 - O-Ring (5 Used)	42 - Plug	74 - Overload Relief Valve (2 Used)	105 - Spool
10 - Plug (5 Used)	43 - Backup Ring (2 Used)	75 - Poppet	106 - Spring
11 - Poppet	44 - O-Ring	76 - Spring	107 - Flange
12 - Spring	45 - Spring	77 - O-Ring (5 Used)	108 - Poppet
13 - O-Ring (9 Used)	46 - Poppet	78 - O-Ring (2 Used)	109 - Poppet
14 - O-Ring	47 - Spool	79 - O-Ring	110 - Spring
15 - Poppet	48 - Plug	80 - Plug	111 - Plug
16 - Flange	49 - Poppet	81 - O-Ring	112 - Poppet
17 - Name Plate	50 - Spool	82 - Plug	113 - Spring
18 - Screw (2 Used)	51 - Spool	83 - Poppet	114 - Plug (3 Used)
19 - O-Ring (2 Used)	52 - Spring Seat (2 Used)	84 - Poppet	115 - O-Ring (3 Used)
20 - Overload Relief Valve (2 Used)	53 - Spring	85 - Spring	116 - Spring Seat (3 Used)
21 - Spring	54 - Spool	86 - Plug	117 - Spring
22 - Seat	55 - O-Ring	87 - Spring (3 Used)	118 - Spool
23 - Poppet	56 - Backup Ring	88 - Sleeve	119 - Plug (3 Used)
24 - Backup Ring	57 - Spool	89 - Plug	120 - O-Ring (3 Used)
25 - O-Ring	58 - Spring	90 - O-Ring	121 - Spring
26 - O-Ring	59 - O-Ring (8 Used)	91 - Body	122 - Spool
28 - Backup Ring	60 - O-Ring	92 - Spool	123 - Body
29 - Sleeve	61 - Plug	93 - Spring	124 - Spool
30 - Spool	62 - Cap	94 - Spring Seat	125 - Spring
31 - O-Ring	63 - Socket Bolt (14 Used)	95 - O-Ring	126 - O-Ring
32 - Body	64 - Cap	96 - Plug	127 - Plug
33 - Spring	65 - O-Ring		

UPPERSTRUCTURE / Control Valve

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UPPERSTRUCTURE / Control Valve




W1V7-02-05-017

UPPERSTRUCTURE / Control Valve


Disassemble Control Valve 4-Spool Side

- Disassemble Spool

1. Remove socket bolts (63) (6 used). Remove cap (62), O-rings (59) (4 used) and (4) from housing (1).


 : 8 mm

2. Put the matching marks on the spool (37, 47, 50, 51, 54) assemblies and housing (1). Remove the spool (37, 47, 50, 51) assemblies, spring (58) and the spool (54) assembly from housing (1).


 **NOTE:** Do not disassemble the spool (54) assembly unless necessary.

- Disassemble Boom Anti-Drift Valve

3. Remove plug (36) from body (32).

 : 38 mm

4. Remove socket bolts (6) (3 used). Remove the body (32) assembly, O-rings (13) (4 used) and (31) from housing (1).

 : 8 mm

5. Remove piston (34) and spring (33) from body (32).

6. Remove the spool (29) assembly, seat (22) and spring (21) from housing (1). Remove backup rings (24, 28), O-rings (25, 26), poppet (23) and spool (30) from sleeve (29).

- Disassemble Overload Relief Valve (20)


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

7. Remove overload relief valves (20) (2 used) from housing (1).


 : 32 mm

- Disassemble Check valve


8. Remove plug (8), spring (12) and poppet (11) from housing (1).

 : 6 mm


9. Remove socket bolts (6) (2 used). Remove flange (5), O-ring (4), spring (3) and poppet (2) from housing (1).

 : 8 mm

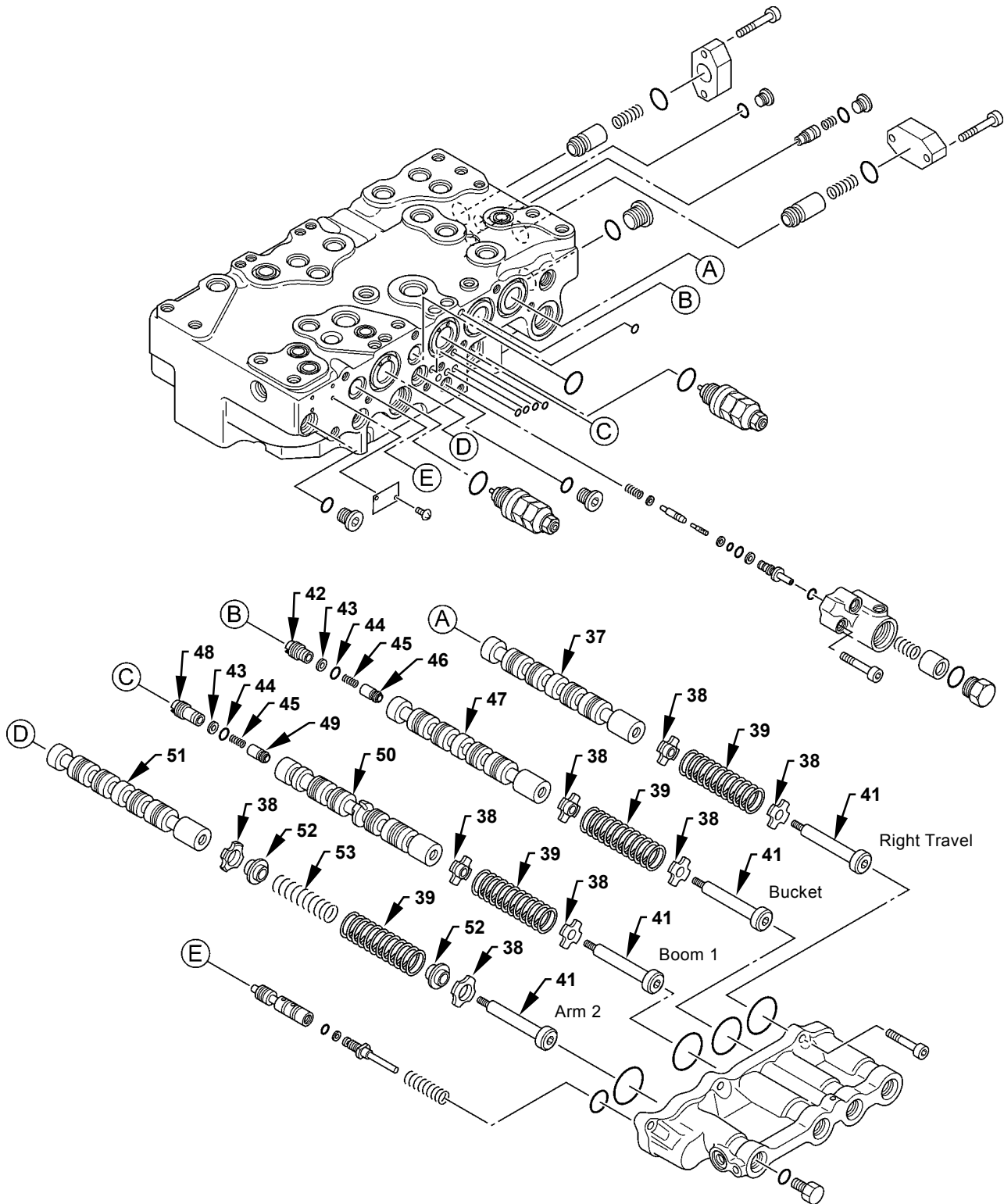
10. Remove socket bolts (6) (2 used). Remove flange (16), O-ring (4), spring (3) and poppet (15) from housing (1).

 : 8 mm

11. Remove plugs (8) (2 used) and (10) (2 used) from housing (1).

 : 6 mm, 10 mm

UPPERSTRUCTURE / Control Valve




W1V7-02-05-017

UPPERSTRUCTURE / Control Valve


- Disassemble Right Travel Spool (37)

12. Clamp spool (37) in a vise by using wooden pieces. Remove bolt (41), spring seat (38), spring (39) and spring seat (38) from spool (37).

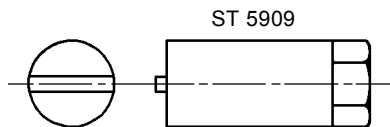
 : 8 mm

- Disassemble Bucket Spool (47)

13. Clamp spool (47) in a vise by using wooden pieces. Remove bolt (41), spring seat (38), spring (39) and spring seat (38) from spool (47).

 : 8 mm

14. Heat the plug (42) part of spool (47) by using a drier. Remove plug (42) by using special tool (ST 5909). Remove O-Ring (44) and backup ring (43) from plug (42).




W157-02-05-049

15. Remove spring (45) and poppet (46) from spool (47).

- Disassemble Boom 1 Spool (50)

16. Clamp spool (50) in a vise by using wooden pieces. Remove bolt (41), spring seat (38), spring (39) and spring seat (38) from spool (50).


 : 8 mm

17. Heat the plug (48) part of spool (50) by using a drier. Remove plug (48) by using special tool (ST 5909). Remove O-Ring (44) and backup ring (43) from plug (48).

18. Remove spring (45) and poppet (49) from spool (50).


- Disassemble Arm 2 Spool (51)

19. Clamp spool (51) in a vise by using wooden pieces. Remove bolt (41), spring seats (38, 52), springs (53, 39) and spring seat (52, 38) from spool (51).

 : 8 mm


UPPERSTRUCTURE / Control Valve

20. Remove socket bolts (63) (8 used). Remove caps (67) (3 used), (64) and O-rings (59) (4 used) from housing (1).

 : 8 mm

- Disassemble Flow Combiner Valve


21. Remove socket bolts (68) (2 used). Remove cap (69), O-ring (4) and the spool (73) assembly from housing (1). Remove bolt (70), spring seats (71) (2 used) and spring (72) from spool (73).

 : 5 mm

- Disassemble Overload Relief Valve


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

22. Remove overload relief valves (74) (2 used) from housing (1).


 : 32 mm


- Disassemble Bucket Flow Rate Control Valve

23. Remove socket bolts (97) (4 used). Remove body (91) and O-rings (13, 77) from housing (1).

 : 8 mm

24. Remove plug (96), spring seat (94), spring (93) and spool (92) from body (91). Remove plug (89) from body (91).


 : 27 mm

 : 5 mm


25. Remove sleeve (88), spring (87), plug (86), spring (85) and poppets (84, 83) from housing (1).

- Disassemble Arm 2 Flow Rate Control Valve

26. Remove socket bolts (97) (8 used). Remove body (123), O-rings (77) (3 used), (13) (2 used) (78) and poppet (15) from housing (1).

 : 8 mm

27. Remove plugs (114) (3 used), spring seats (116) (3 used), springs (117, 121, 125) and spools (118, 122, 124) from body (123).

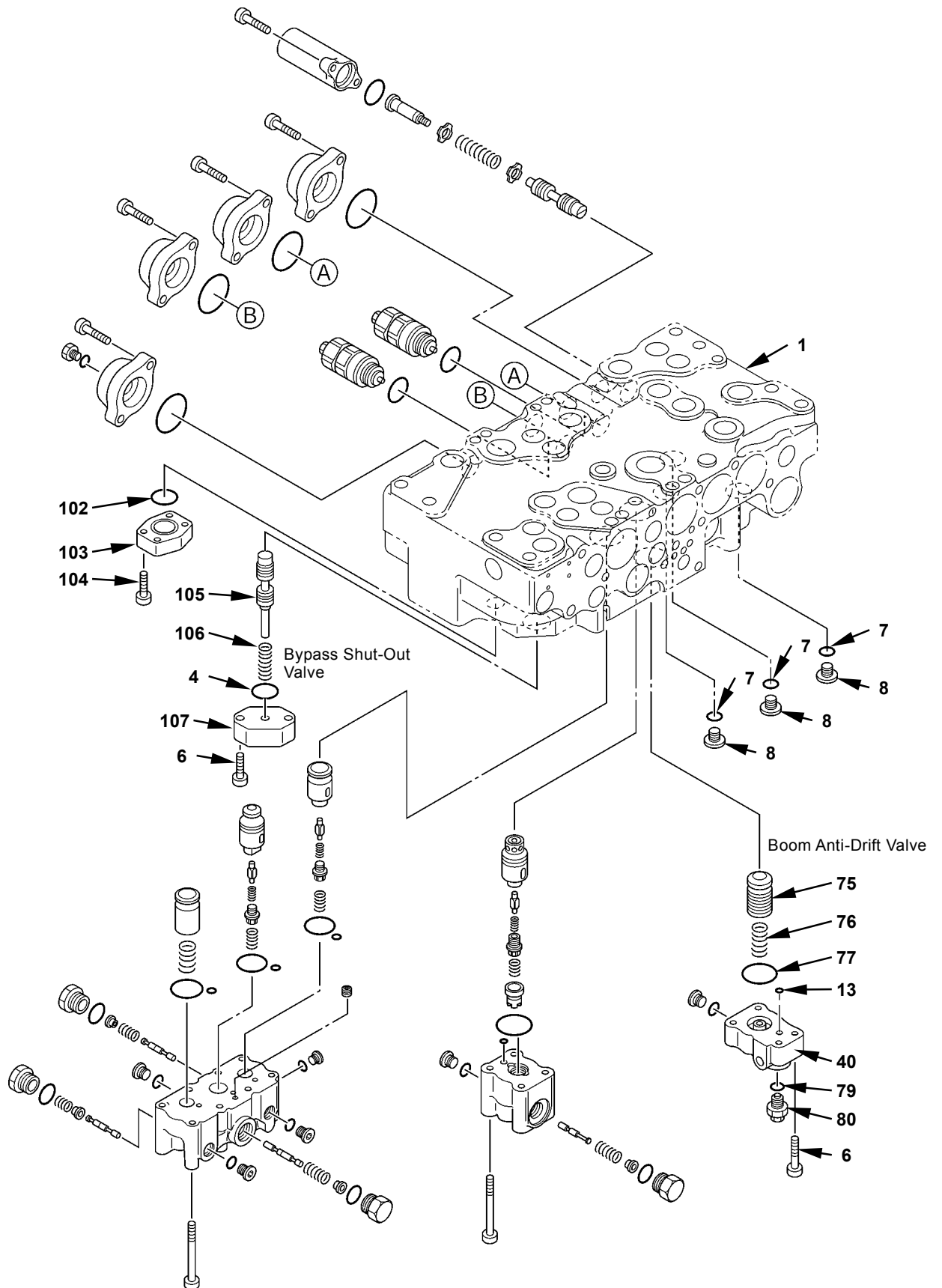
 : 24 mm

28. Remove plugs (119) (3 used) and (127) from body (123).

29. Remove spring (113) and poppet (112) from housing (1).

30. Remove springs (87) (2 used) and the poppet (98, 108) assemblies from housing (1). Remove plugs (101, 111), springs (100, 110) and poppets (99, 109) from poppets (98, 108).

UPPERSTRUCTURE / Control Valve




W1V7-02-05-018

UPPERSTRUCTURE / Control Valve

- Disassemble Boom Anti-Drift Valve


31. Remove socket bolts (6) (4 used). Remove body (40), O-rings (13), (78) and (77) from housing (1).

 : 8 mm

32. Remove spring (76) and poppet (75) from housing (1).


- Disassemble Bypass Shut-Out Valve

33. Remove socket bolts (6) (2 used). Remove flange (107) and O-ring (4) from housing (1).


 : 8 mm

34. Remove spring (106) and spool (105) from housing (1).

35. Remove socket bolts (104) (4 used). Remove cap (103) and O-ring (102) from housing (1).

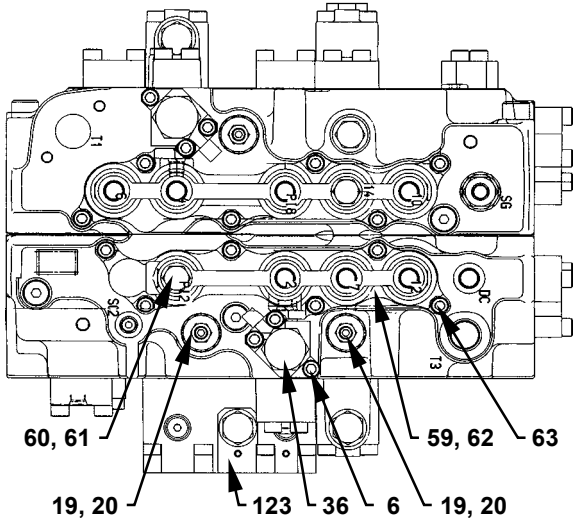
 : 8 mm

36. Remove plugs (8) (3 used) from housing (1).

 : 8 mm

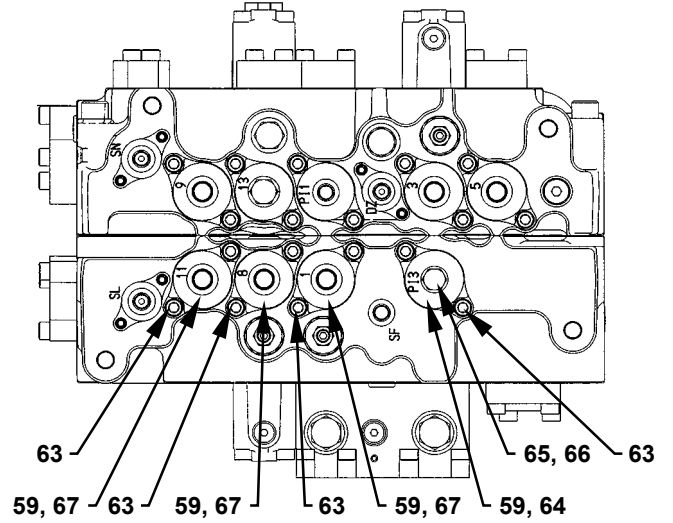
UPPERSTRUCTURE / Control Valve

ASSEMBLE CONTROL VALVE 4-SPOOL SIDE



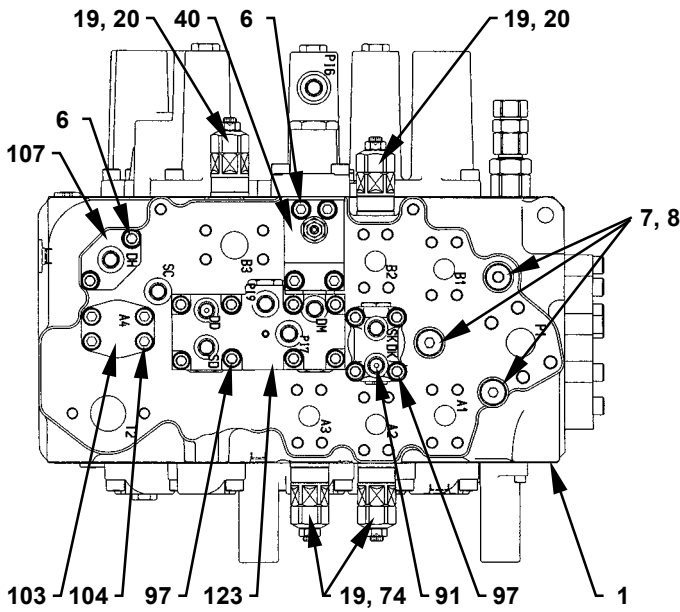
Control Valve (Upper)

W1V7-02-05-027



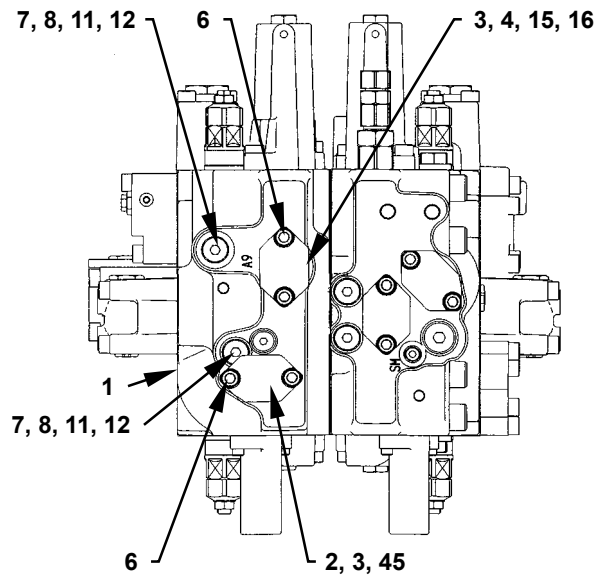
Control Valve (Lower)

W1V7-02-05-028



Control Valve (Side)

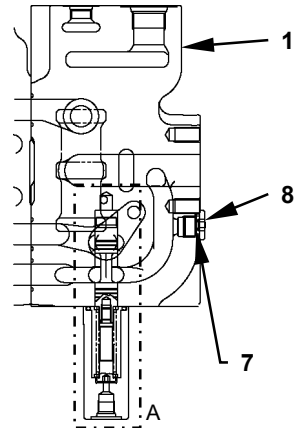
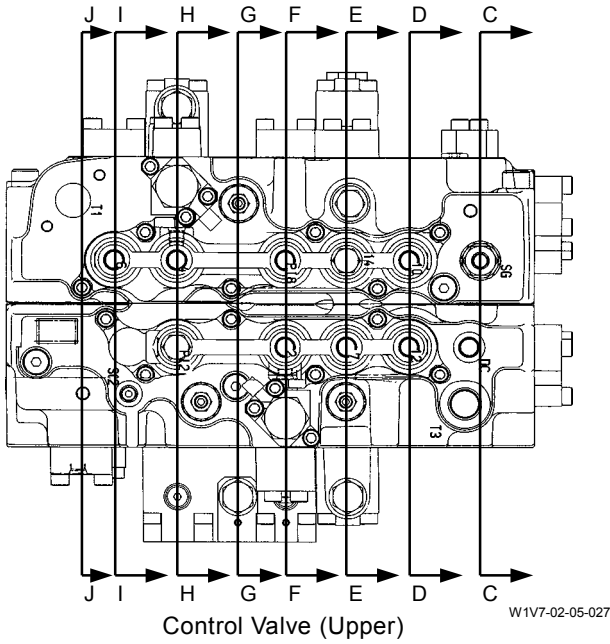
W1V7-02-05-029



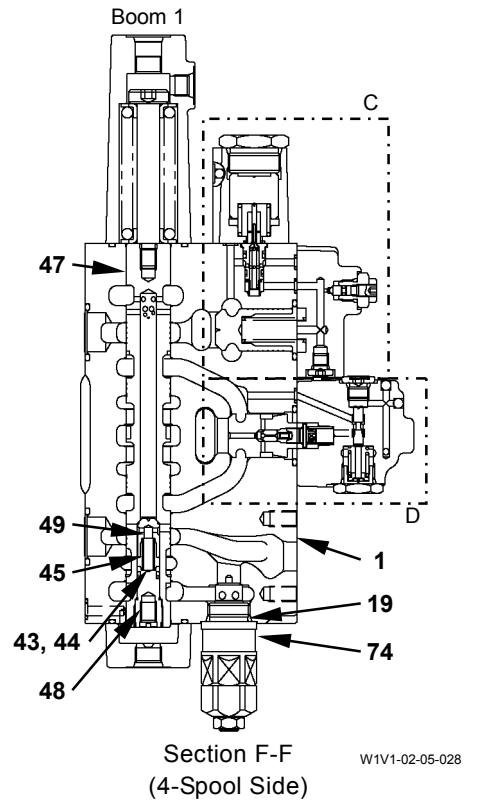
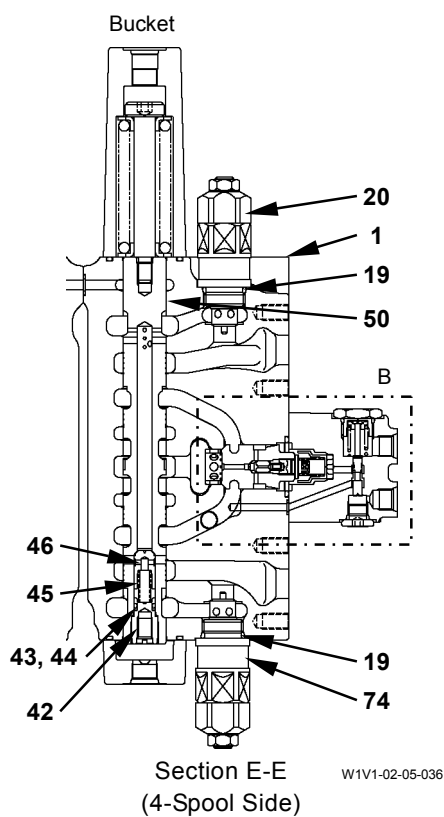
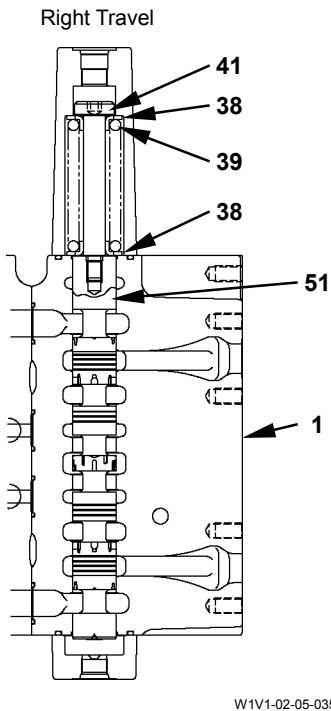
Control Valve (Front)

W1V1-02-05-068

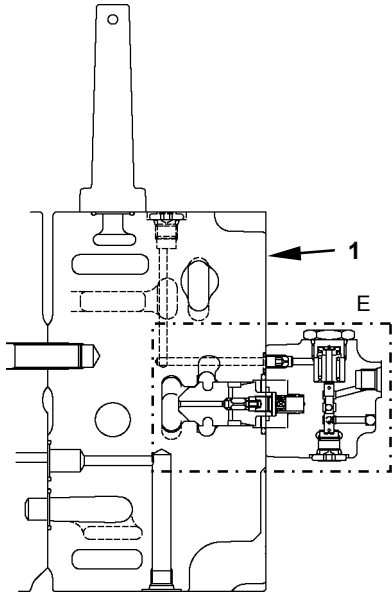
UPPERSTRUCTURE / Control Valve



W1V1-02-05-038

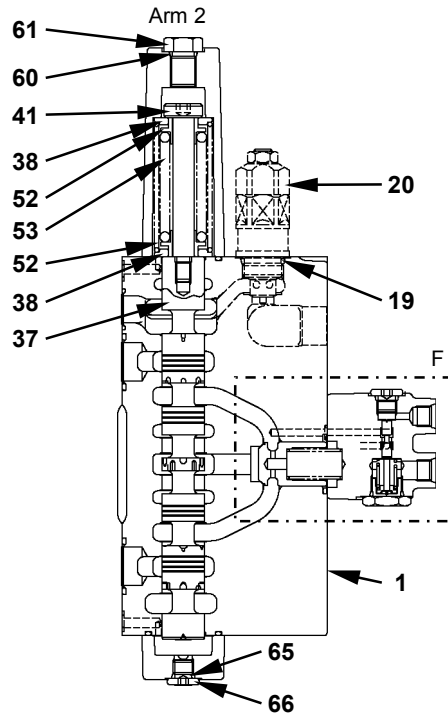


UPPERSTRUCTURE / Control Valve



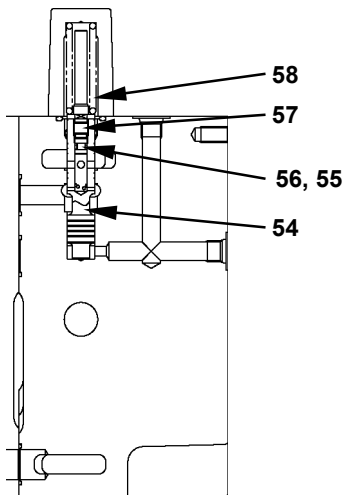
W1V1-02-05-029

Section G-G
(4-Spool Side)



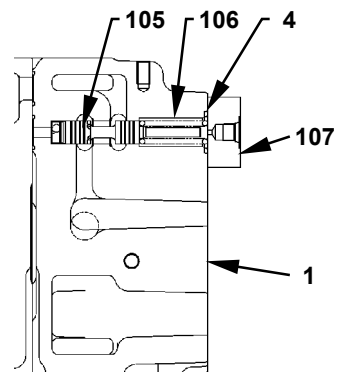
W1V1-02-05-030

Section H-H
(4-Spool Side)



W1V1-02-05-071

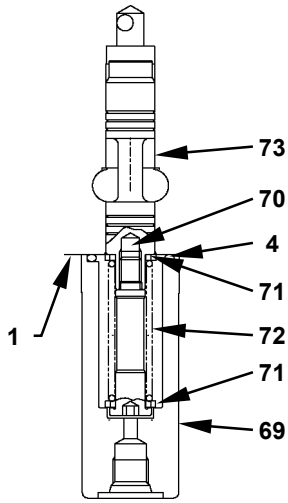
Section I-I (4-Spool Side)



W1V1-02-05-037

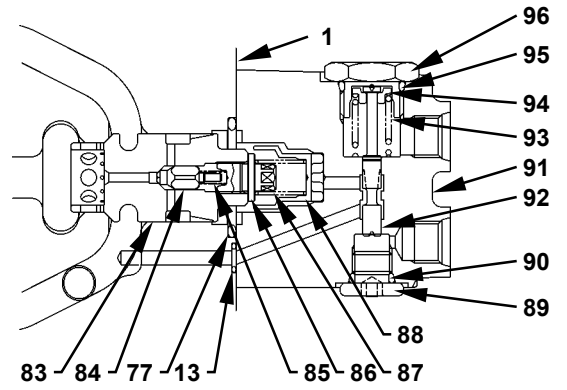
Section J-J (4-Spool Side)

UPPERSTRUCTURE / Control Valve



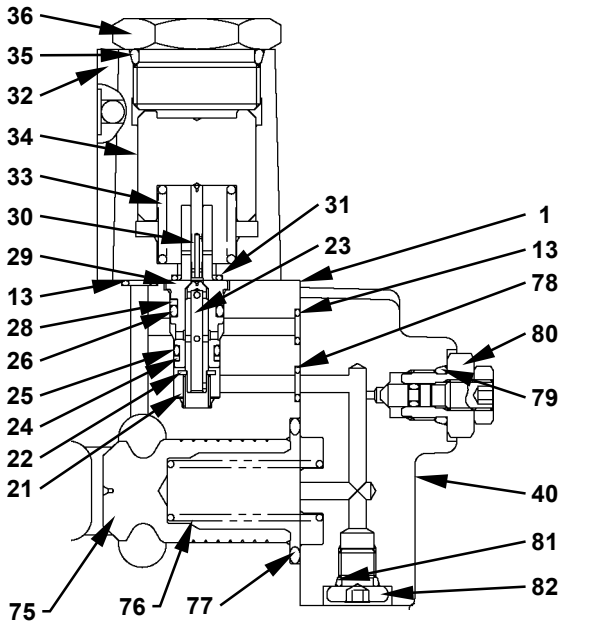
Detail A

W1V1-02-05-040



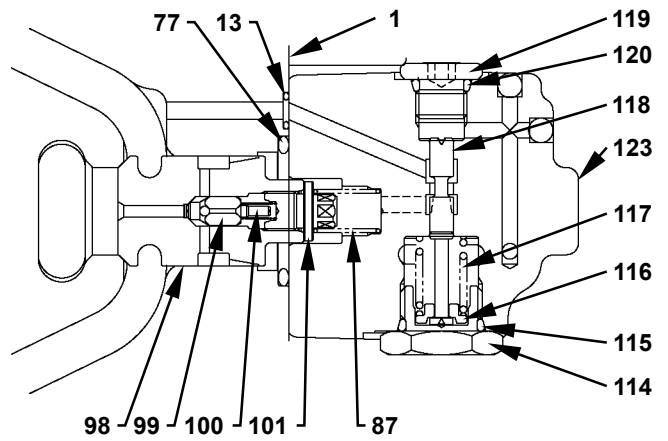
Detail B

W1V1-02-05-033



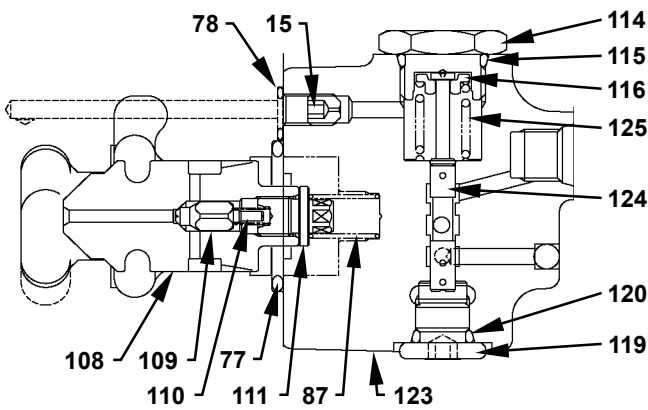
Detail C

W1V1-02-05-031



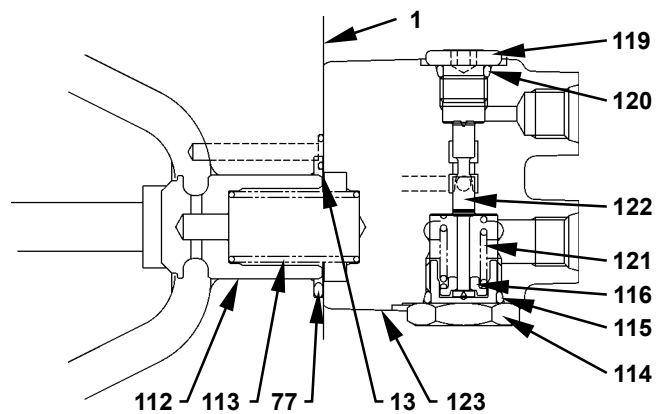
Detail D

W1V1-02-05-032



Detail E

W1V1-02-05-042



Detail F

W1V7-02-05-031

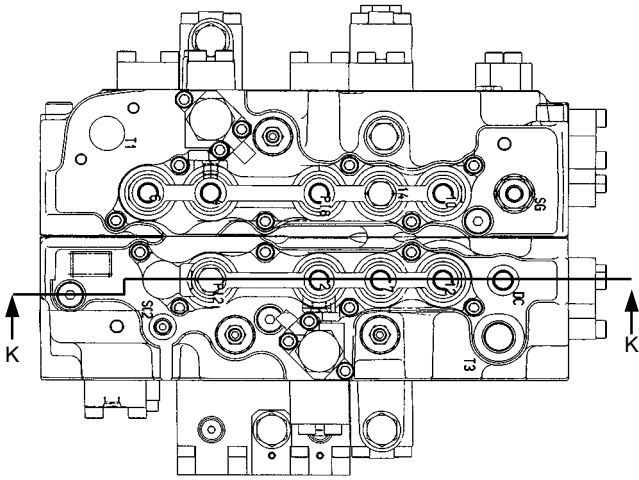
UPPERSTRUCTURE / Control Valve

1 - Housing	34 - Piston	66 - Plug	97 - Socket Bolt (12 Used)
2 - Poppet	35 - O-Ring	67 - Cap (3 Used)	98 - Poppet
3 - Spring (2 Used)	36 - Plug	68 - Socket Bolt (2 Used)	99 - Poppet
4 - O-Ring (3 Used)	37 - Spool	69 - Cap	100 - Spring
5 - Flange	38 - Spring Seat (8 Used)	70 - Bolt	101 - Plug
6 - Socket Bolt (13 Used)	39 - Spring (4 Used)	71 - Spring Seat (2 Used)	102 - O-Ring
7 - O-Ring (3 Used)	40 - Body	72 - Spring	103 - Cap
8 - Plug (3 Used)	41 - Bolt (4 Used)	73 - Spool	104 - Socket Bolt (4 Used)
9 - O-Ring (5 Used)	42 - Plug	74 - Overload Relief Valve (2 Used)	105 - Spool
10 - Plug (5 Used)	43 - Backup Ring (2 Used)	75 - Poppet	106 - Spring
11 - Poppet	44 - O-Ring	76 - Spring	107 - Flange
12 - Spring	45 - Spring	77 - O-Ring (5 Used)	108 - Poppet
13 - O-Ring (9 Used)	46 - Poppet	78 - O-Ring (2 Used)	109 - Poppet
14 - O-Ring	47 - Spool	79 - O-Ring	110 - Spring
15 - Poppet	48 - Plug	80 - Plug	111 - Plug
16 - Flange	49 - Poppet	81 - O-Ring	112 - Poppet
17 - Name Plate	50 - Spool	82 - Plug	113 - Spring
18 - Screw (2 Used)	51 - Spool	83 - Poppet	114 - Plug (3 Used)
19 - O-Ring (2 Used)	52 - Spring Seat (2 Used)	84 - Poppet	115 - O-Ring (3 Used)
20 - Overload Relief Valve (2 Used)	53 - Spring	85 - Spring	116 - Spring Seat (3 Used)
21 - Spring	54 - Spool	86 - Plug	117 - Spring
22 - Seat	55 - O-Ring	87 - Spring (3 Used)	118 - Spool
23 - Poppet	56 - Backup Ring	88 - Sleeve	119 - Plug (3 Used)
24 - Backup Ring	57 - Spool	89 - Plug	120 - O-Ring (3 Used)
25 - O-Ring	58 - Spring	90 - O-Ring	121 - Spring
26 - O-Ring	59 - O-Ring (8 Used)	91 - Body	122 - Spool
28 - Backup Ring	60 - O-Ring	92 - Spool	123 - Body
29 - Sleeve	61 - Plug	93 - Spring	124 - Spool
30 - Spool	62 - Cap	94 - Spring Seat	125 - Spring
31 - O-Ring	63 - Socket Bolt (14 Used)	95 - O-Ring	126 - O-Ring
32 - Body	64 - Cap	96 - Plug	127 - Plug
33 - Spring	65 - O-Ring		

UPPERSTRUCTURE / Control Valve

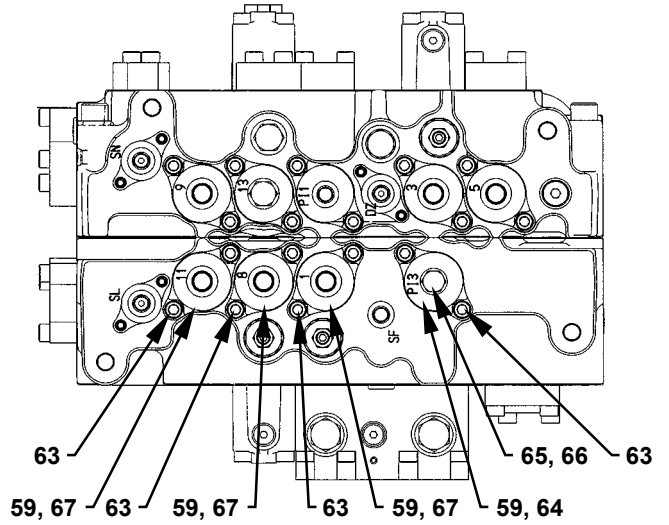
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UPPERSTRUCTURE / Control Valve



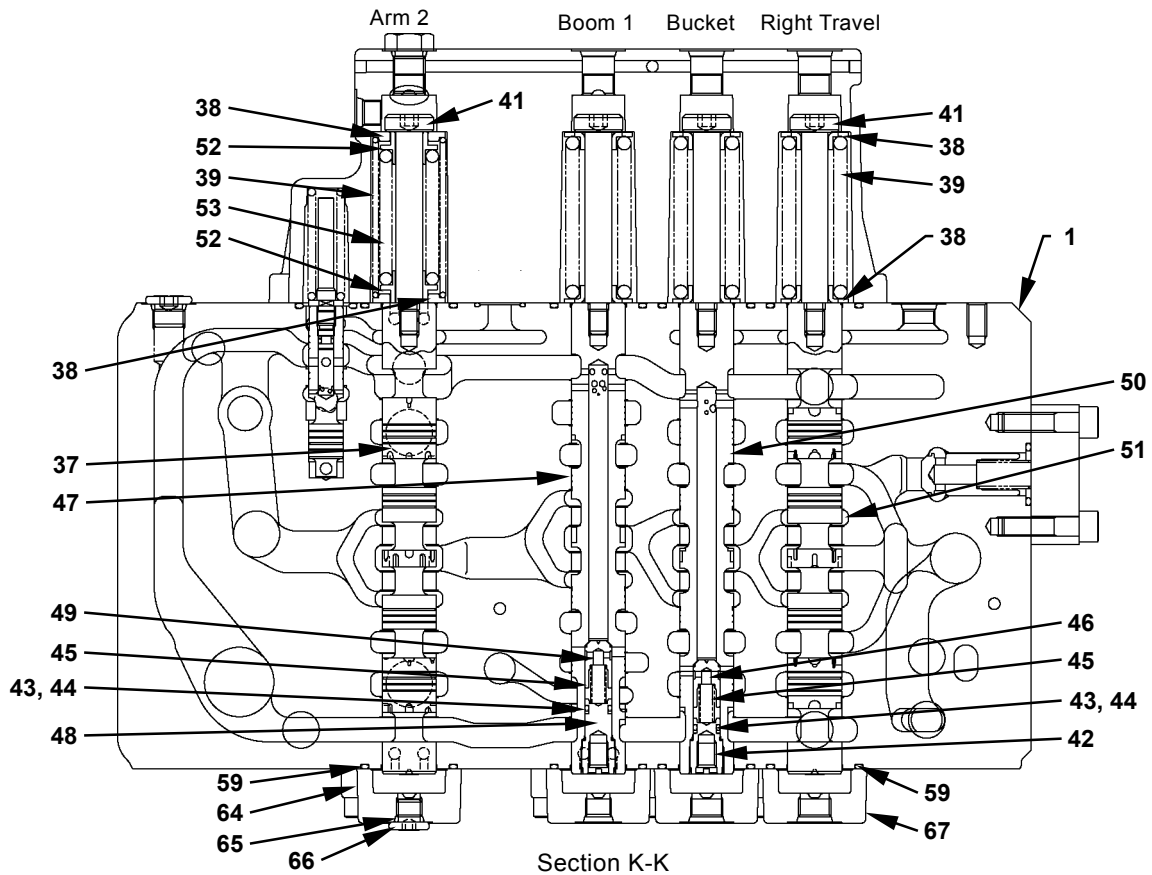
W1V7-02-05-027

Control Valve (Upper)



W1V7-02-05-028

Control Valve (Lower)



W1V1-02-05-072


Section K-K


UPPERSTRUCTURE / Control Valve

Assemble Control Valve 4-Spool Side

- Assemble Right Travel Spool

1. Clamp spool (51) in a vise by using wooden pieces. Install spring seat (38), spring (39), spring seat (38) and bolt (41) to spool (51).

 : 8 mm

 : 15 N·m (1.5 kgf·m, 11 lbf·ft)


- Assemble Bucket Spool

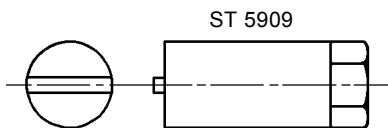
2. Clamp spool (50) in a vise by using wooden pieces.

Install poppet (46) and spring (45) to the bottom of spool (50).

3. Install O-ring (44) and backup ring (43) to plug (42). Apply LOCTITE #271 to the thread of part of plug (42).


4. Install plug (42) to spool (50) by using special tool (ST 5909).


 : 15 N·m (1.5 kgf·m, 11 lbf·ft)



W157-02-05-049

5. Install spring seat (38), spring (39), spring seat (38) and bolt (41) to the upper of spool (50).

 : 8 mm

 : 15 N·m (1.5 kgf·m, 11 lbf·ft)


- Assemble Boom 1 Spool

6. Clamp spool (47) in a vise by using wooden pieces.


Install poppet (49) and spring (45) to the bottom of spool (47).


7. Install O-ring (44) and backup ring (44) to plug (48). Apply LOCTITE #271 to the thread of part of plug (48).

8. Install plug (48) to spool (47) by using special tool (ST 5909).

 : 15 N·m (1.5 kgf·m, 11 lbf·ft)


9. Install spring seat (38), spring (39), spring seat (38) and bolt (41) to the upper of spool (47).


 : 8 mm

 : 15 N·m (1.5 kgf·m, 11 lbf·ft)

- Assemble Arm 2 Spool

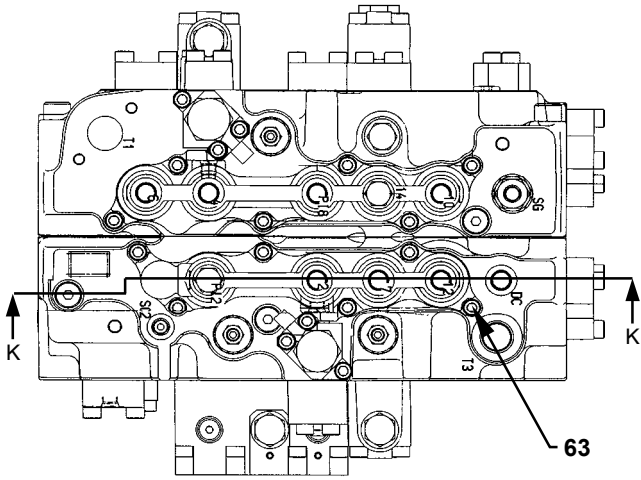
10. Clamp spool (37) in a vise by using wooden pieces. Install spring seats (38, 52), springs (39, 53), spring seats (52, 38) and bolt (41) to spool (37).

 : 8 mm

 : 15 N·m (1.5 kgf·m, 11 lbf·ft)

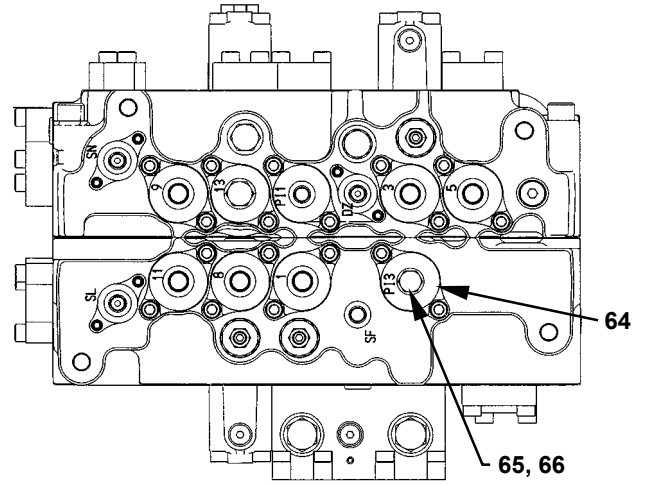
11. Install O-rings (59) (4 used) to housing (1). Install caps (67) (3 used) and (64) to housing (1) with socket bolts (63) (8 used).

UPPERSTRUCTURE / Control Valve



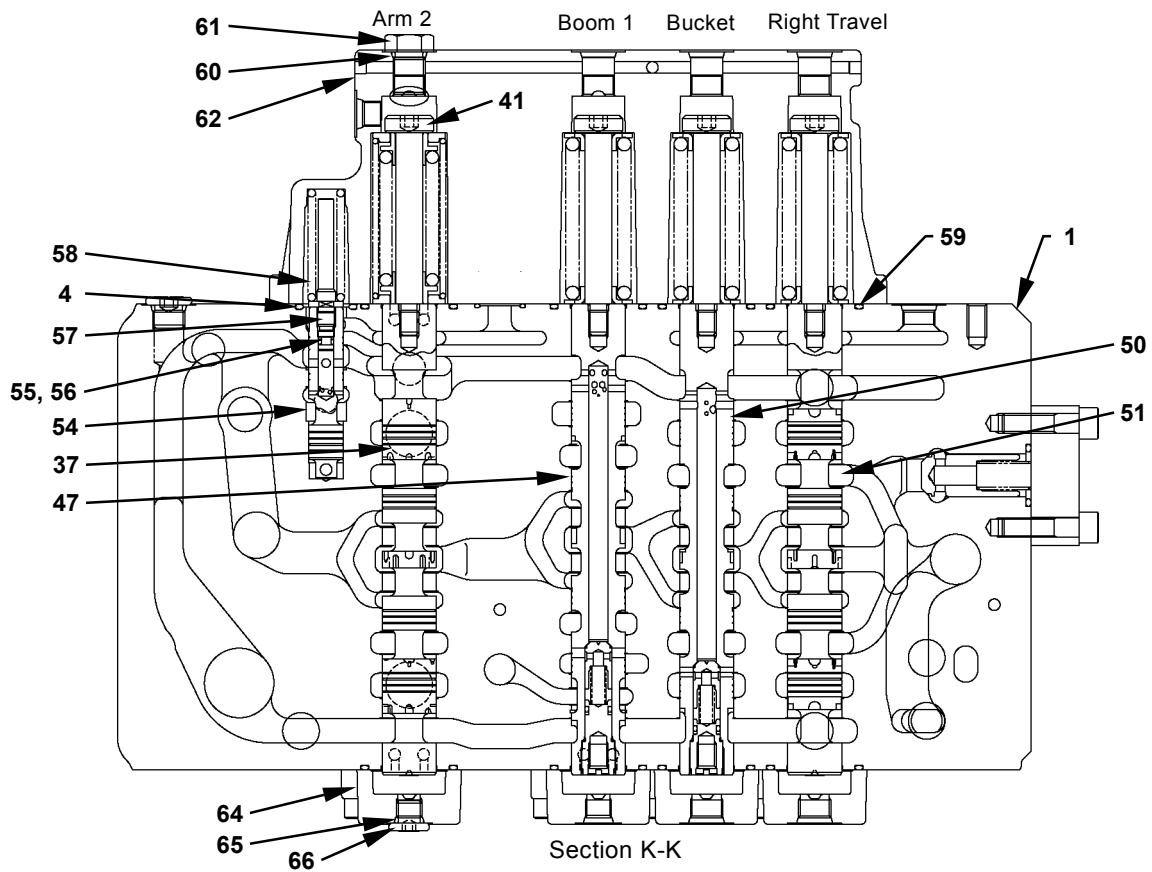
Control Valve (Upper)

W1V7-02-05-027



Control Valve (Lower)

W1V7-02-05-028




Section K-K


W1V1-02-05-072

UPPERSTRUCTURE / Control Valve


12. Clamp spool (54) in a vise by using wooden pieces. Install O-ring (56) and backup ring (55) to spool (57). Install spool (57) to spool (54). Install spool (54) and spring (58) to housing (1).


13. Install the spools (51, 50, 47, 37) assembly, O-rings (59) (4 used) and (4) to housing (1). Install cap (62) to housing (1) with socket bolts (63) (6 used).

 : 8 mm


 : 42 N·m (4.3 kgf·m, 31 lbf·ft)

14. Install O-ring (60) to plug (61). Install plug (61) to cap (62).

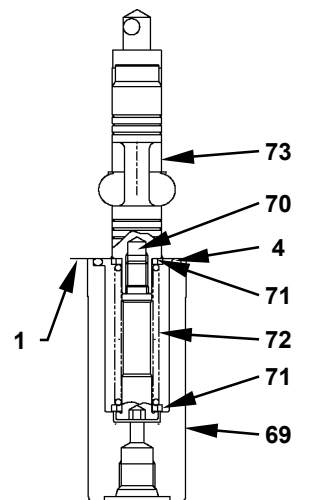
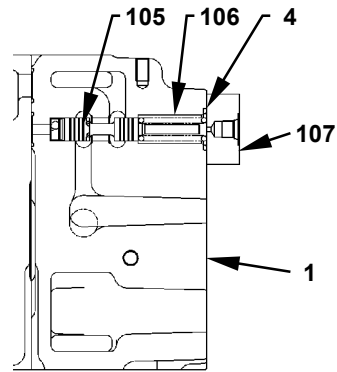
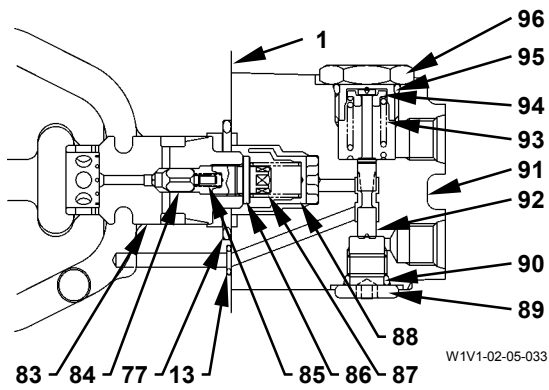
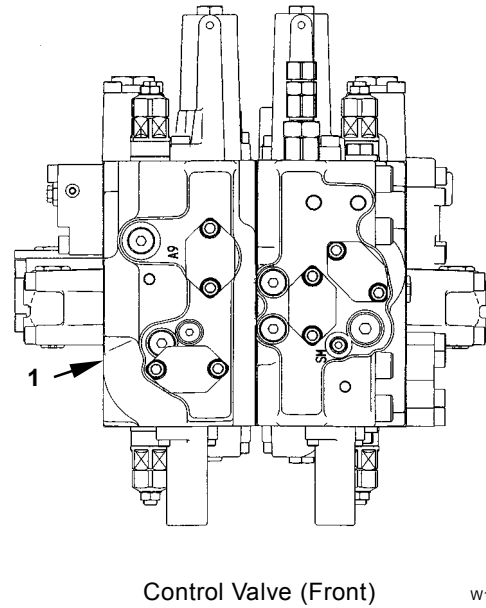
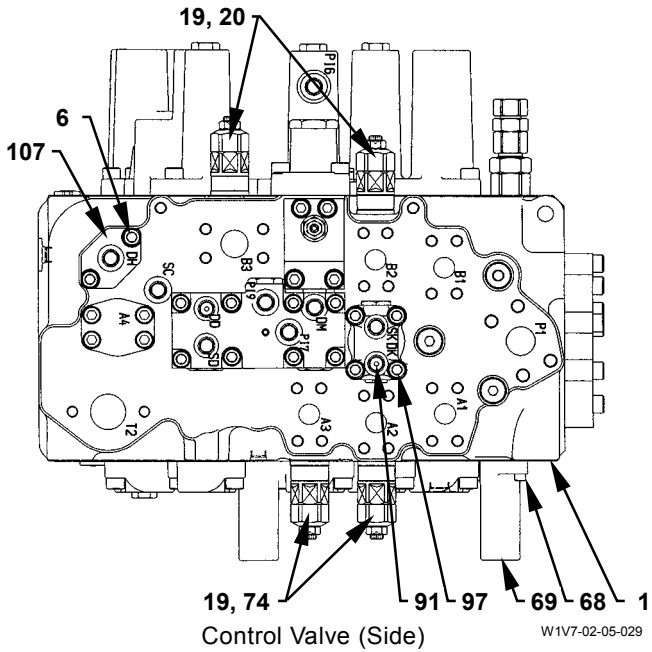
 : 21 mm

 : 54 N·m (5.5 kgf·m, 40 lbf·ft)

15. Install O-ring (65) to plug (66). Install plug (66) to cap (64).



 : 19 N·m (2.0 kgf·m, 14 lbf·ft)

UPPERSTRUCTURE / Control Valve





UPPERSTRUCTURE / Control Valve



- Assemble Bucket Flow Rate Control Valve

16. Install O-rings (95, 90) to plugs (96, 89).
17. Install spring (93), spool (92), spring seat (94) and plug (96) to body (91).
18. Install plug (89) to body (91).
19. Install poppets (83, 84), spring (85), plug (86), spring (87) and sleeve (88) to housing (1).
20. Install O-rings (13, 77) to housing (1). Install body (91) to housing (1) with socket bolts (97) (4 used).
 -  : 8 mm
 -  : 61 N·m (6.2 kgf·m, 45 lbf·ft)

- Assemble Flow Combiner Valve

21. Install spring seat (71), spring (72) and spring (71) to bolt (70). Install bolt (70) to spool (73).
22. Install spool (73) and O-ring (4) to housing (1). Install cap (69) to housing (1) with socket bolts (68) (2 used).
 -  : 5 mm
 -  : 10 N·m (1.0 kgf·m, 7.4 lbf·ft)



- Assemble Bypass Shut-Out Valve

23. Install spool (105), spring (106) and O-ring (4) to housing (1). Install flange (107) to housing (1) with socket bolts (6) (4 used).
 -  : 8 mm
 -  : 61 N·m (6.2 kgf·m, 45 lbf·ft)

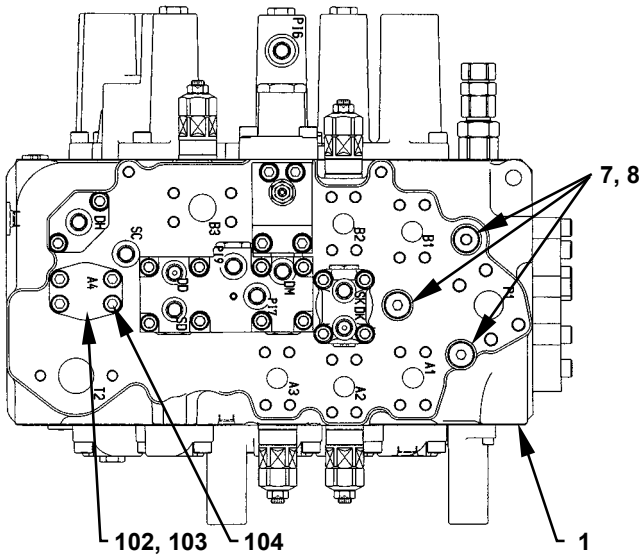
- Assemble Overload Relief Valve

IMPORTANT: If the overload relief valve is disassembled, pressure must be adjusted.

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

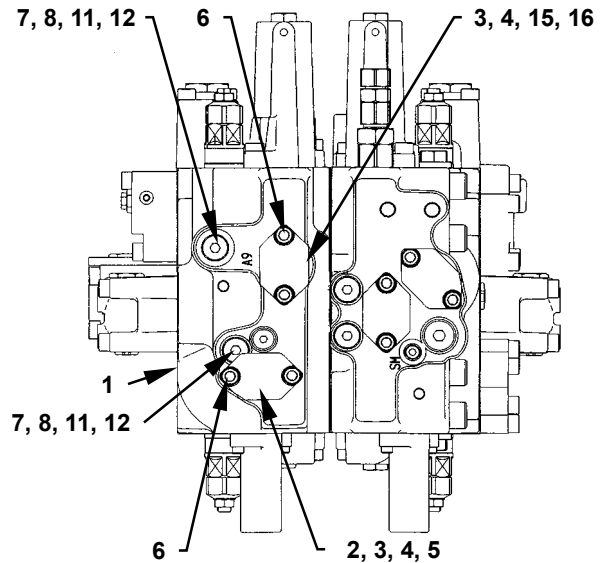
24. Install O-rings (19) (4 used) to overload relief valves (20, 74) (2 used for each). Install overload relief valves (20, 74) (2 used for each) to housing (1).
 -  : 32 mm
 -  : 83 N·m (8.5 kgf·m, 61 lbf·ft)

UPPERSTRUCTURE / Control Valve



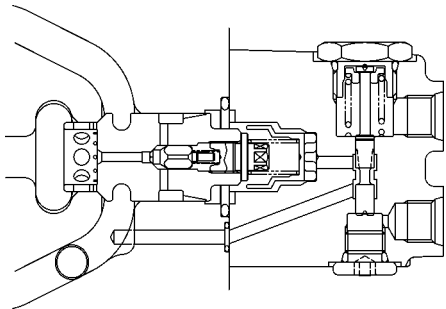
Control Valve (Side)

W1V7-02-05-029



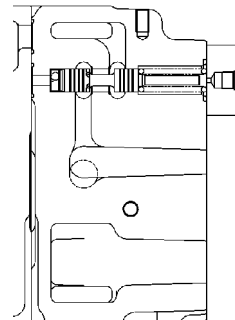
Control Valve (Front)

W1V1-02-05-068



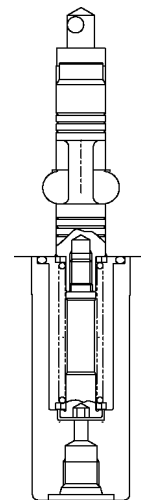
Bucket Flow Rate Control Valve (Detail B)

W1V1-02-05-033



Section of Bypass Shut-Out Valve

W1V1-02-05-037



Section of Flow Combiner Valve (Detail A)

W1V1-02-05-040


UPPERSTRUCTURE / Control Valve


- Assemble Check Valve

25. Install O-rings (7) (2 used) to plugs (8) (2 used).
Install poppets (11) (2 used), springs (12) (2 used)
and plugs (8) (2 used) to housing (1).


26. Install poppets (2, 15), springs (3) (2 used) and
O-rings (4) (2 used) to housing (1).


27. Install flanges (5, 16) to housing (1) with socket
bolts (6) (4 used).

 : 8 mm

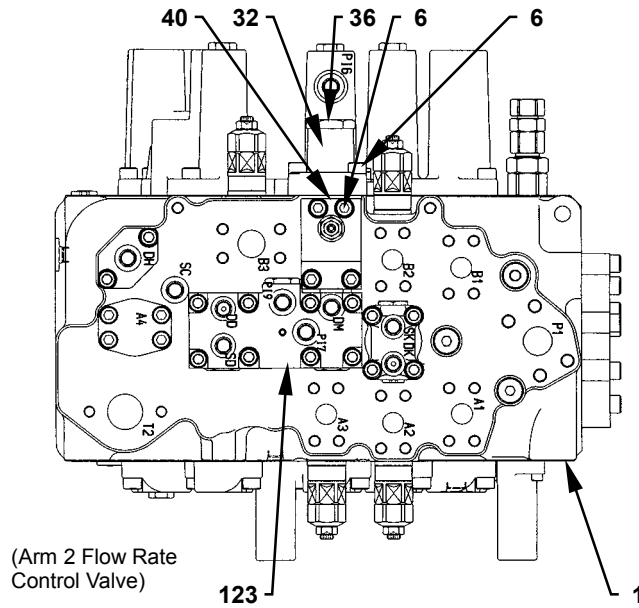
 : 61 N·m (6.2 kgf·m, 45 lbf·ft)

28. Install O-ring (102) to housing (1). Install cap
(103) to housing (1) with socket bolts (104) (4
used).

 : 8 mm

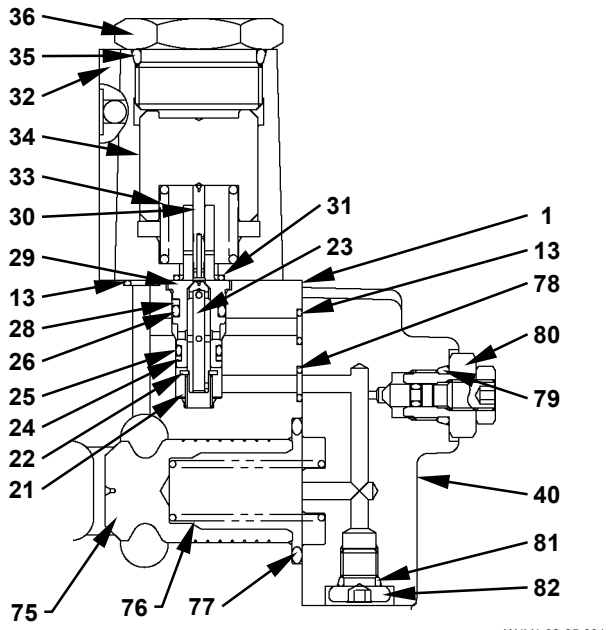
 : 61 N·m (6.2 kgf·m, 45 lbf·ft)

UPPERSTRUCTURE / Control Valve

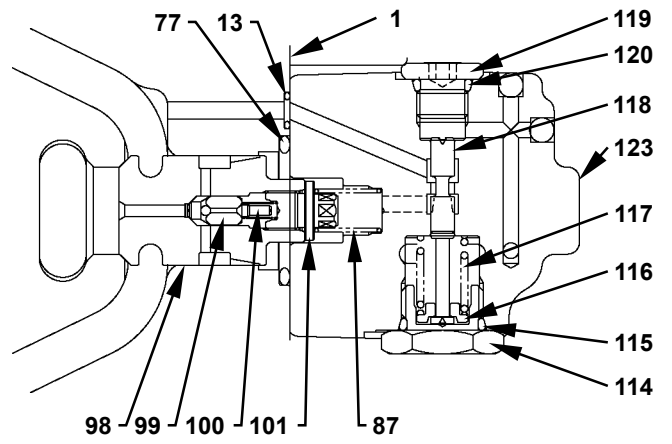


W1V7-02-05-029

Control Valve (Side)

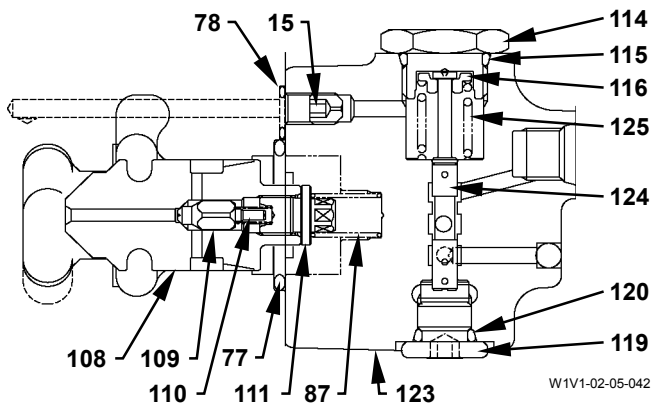


Boom Anti-Drift Valve (Detail C) W1V1-02-05-031



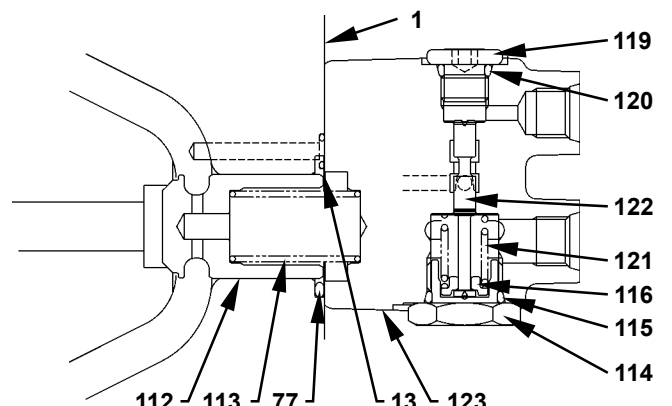
W1V1-02-05-032

Arm 2 Flow Rate Control Valve (Detail D)



W1V1-02-05-042

Arm 2 Flow Rate Control Valve (Detail E)



W1V7-02-05-031


Arm 2 Flow Rate Control Valve (Detail F)

UPPERSTRUCTURE / Control Valve

- Assemble Boom Anti-Drift Valve


29. Install backup rings (24, 28) and O-rings (25, 26) to sleeve (29).


30. Face the hole on spool (30) to the poppet (23) side. Install spool (30), poppet (23), seat (22) and spring (21) to sleeve (29). Install the sleeve (29) assembly to housing (1).

 **NOTE:** Apply grease to seat (22) and spring (21) in order not to drop.

31. Install O-ring (35) to plug (36). Install spring (33), piston (34), O-ring (31) and plug (36) to body (32).

32. Install O-ring (13) to housing (1). Install the body (32) assembly with socket bolts (6) (3 used).

 : 8 mm


 : 61 N·m (6.2 kgf·m, 45 lbf·ft)


33. Tighten plug (36).

34. Install O-rings (79, 81) to plugs (80, 82).

35. Install poppet (75), spring (76), O-rings (77, 78) and (13) (3 used) to housing (1).

36. Install body (40) to housing (1) with socket bolts (6) (4 used).

 : 8 mm

 : 61 N·m (6.2 kgf·m, 45 lbf·ft)

37. Tighten plugs (80, 82).

- Assemble Arm 2 Flow Rate Control Valve

38. Install O-rings (115, 120) (3 used for each) to plugs (114, 119) (3 used for each) in details D, E and F.

39. Install spool (118), spring (117) and spring seat (116) to body (123) in detail D. Temporarily tighten plugs (114, 119) to body (123).

40. Install spool (122), spring (121) and spring seat (116) to body (123) in detail F. Temporarily tighten plugs (114, 119) to body (123).

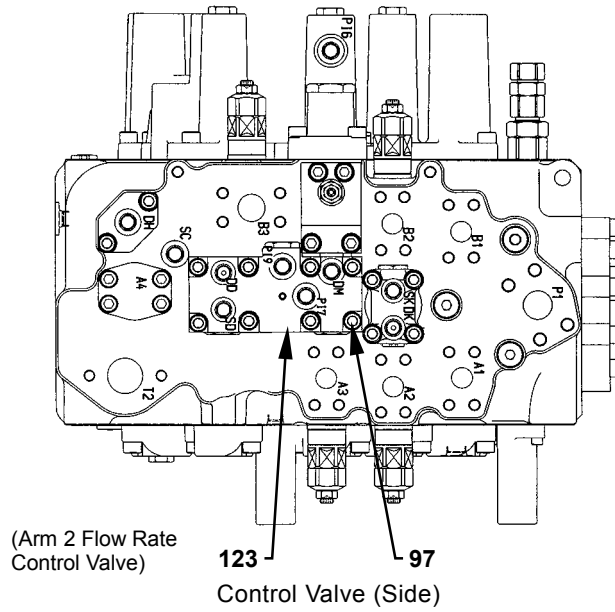
41. Install spool (124), spring (125) and spring seat (116) to body (123) in detail E. Temporarily tighten plugs (114, 119) to body (123).

42. Install poppets (98, 99), spring (100), plug (101), spring (87), poppet (15) and O-rings (13, 77) to housing (1) in detail D.

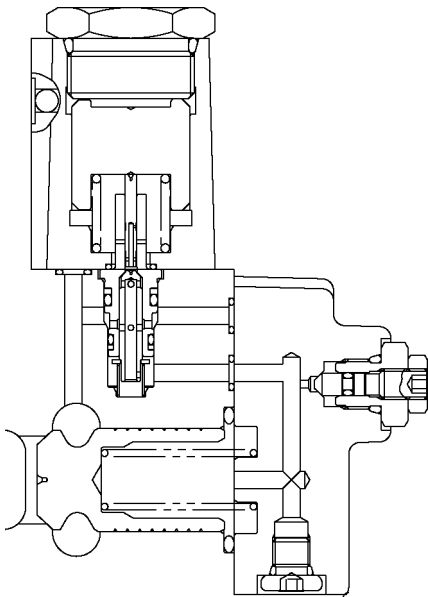
43. Install poppets (108, 109), spring (110), plug (111), spring (87) and O-rings (77, 78) to housing (1) in detail E.

44. Install poppet (112), spring (113) and O-rings (77, 13) to housing (1) in detail F.

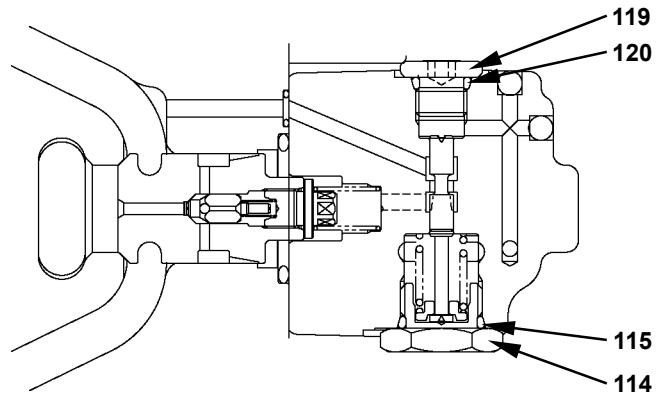
UPPERSTRUCTURE / Control Valve



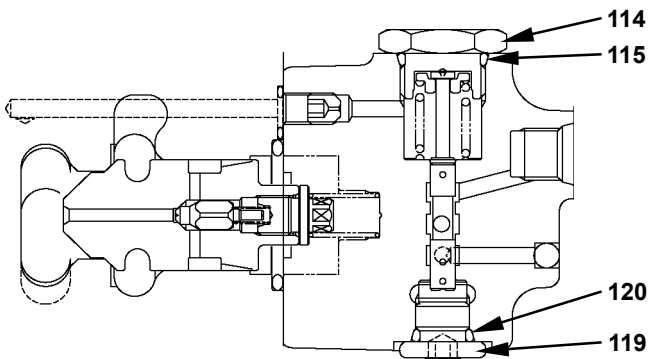
W1V7-02-05-029



Boom Anti-Drift Valve (Detail C) W1V1-02-05-031

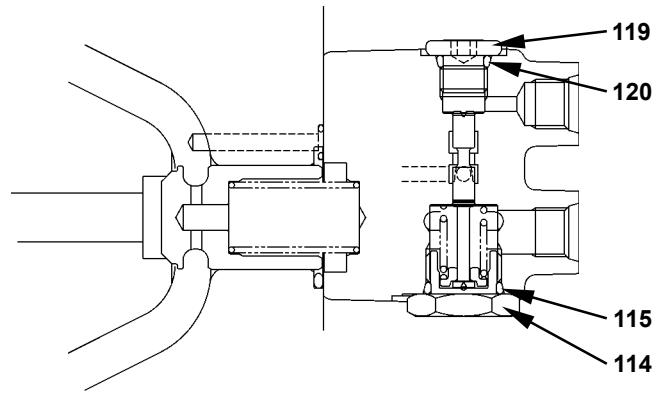


Arm 2 Flow Rate Control Valve (Detail D) W1V1-02-05-032



W1V1-02-05-042


Arm 2 Flow Rate Control Valve (Detail E)




Arm 2 Flow Rate Control Valve (Detail F) W1V7-02-05-031

UPPERSTRUCTURE / Control Valve

45. Install body (123) to housing (1) with socket bolts (97) (8 used).

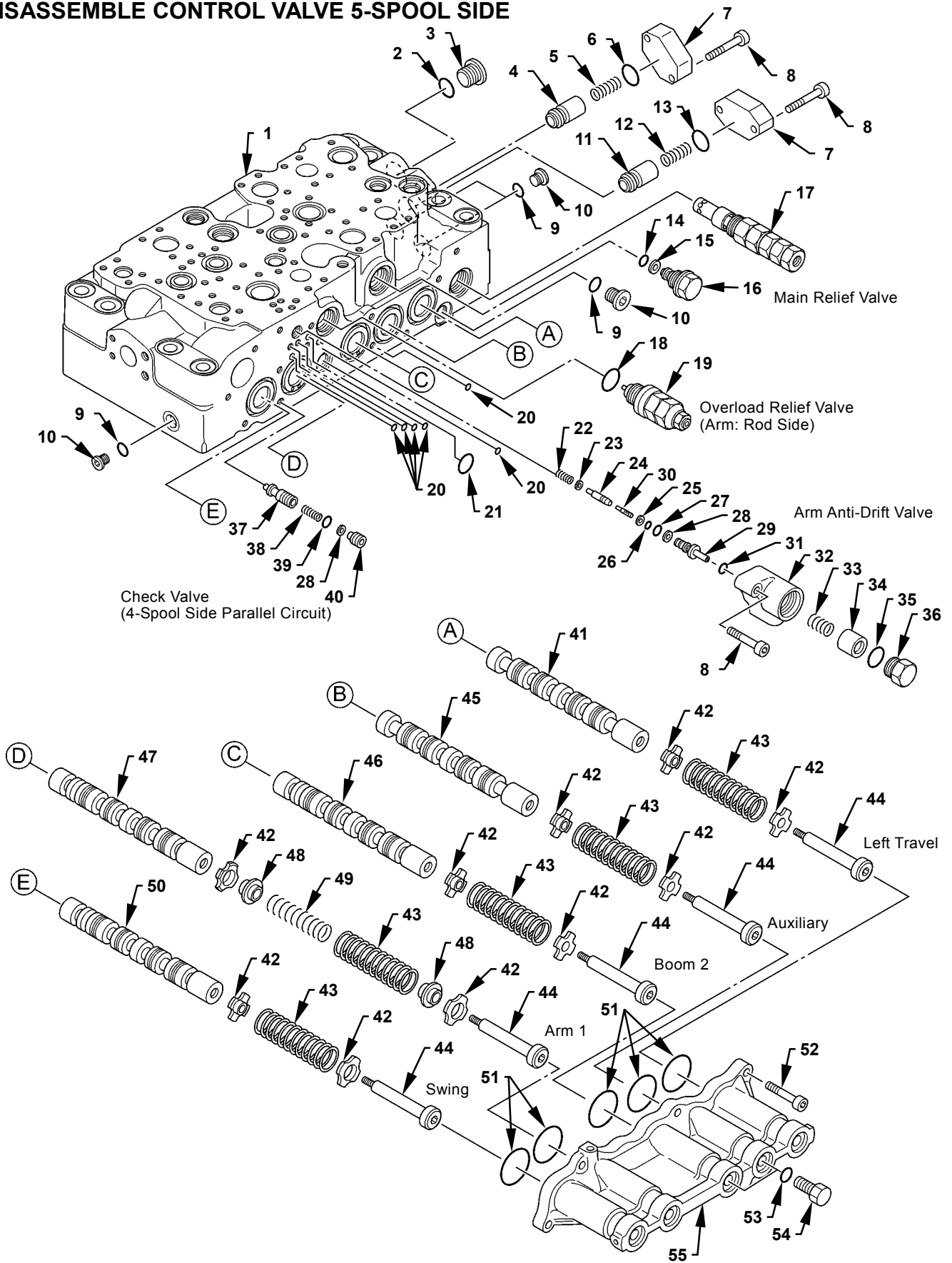
 : 8 mm

 : 61 N·m (6.2 kgf·m, 45 lbf·ft)

46. Tighten plugs (114, 119) (3 used for each) in body (123).

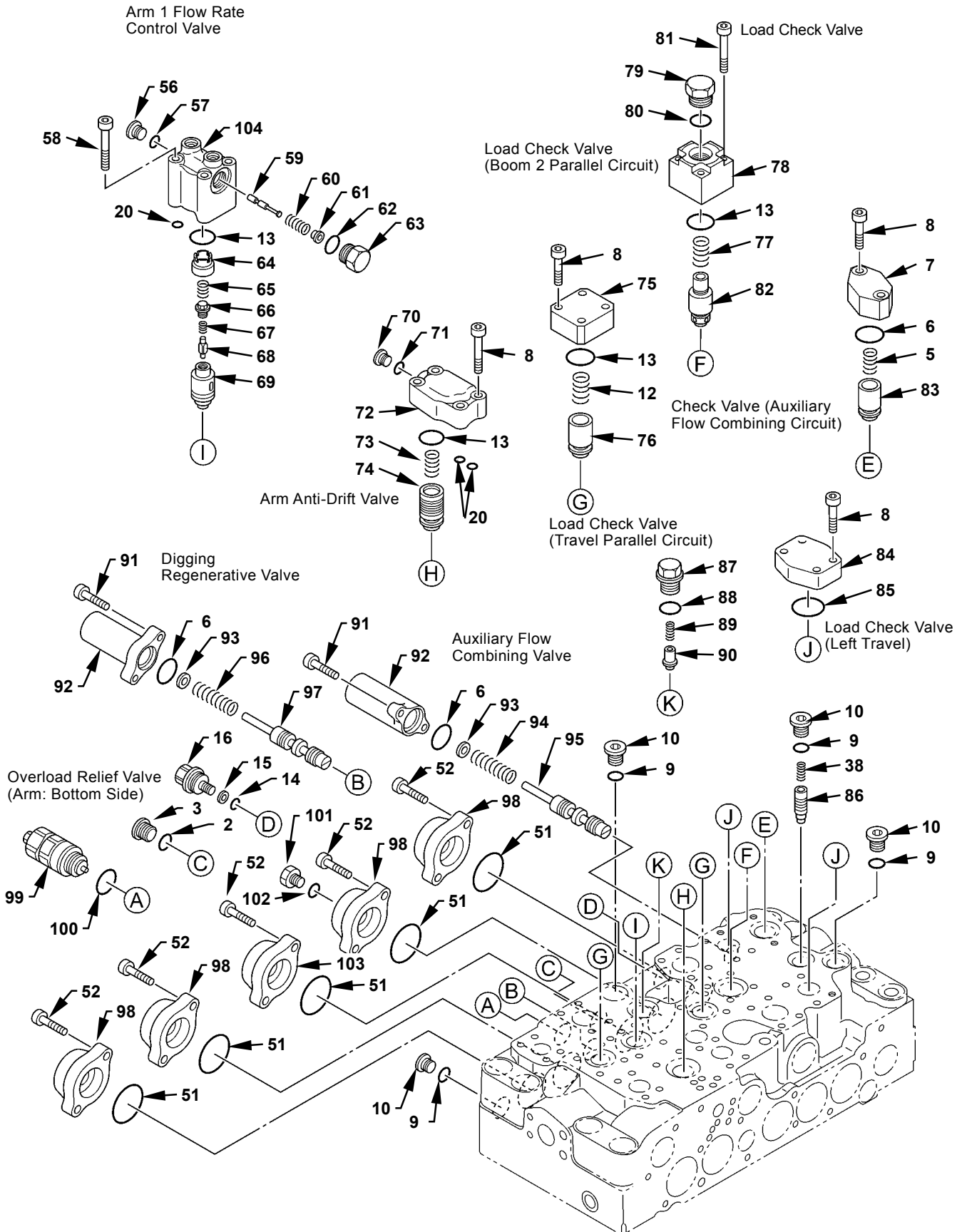
UPPERSTRUCTURE / Control Valve

DISASSEMBLE CONTROL VALVE 5-SPOOL SIDE



W1V7-02-05-019

UPPERSTRUCTURE / Control Valve



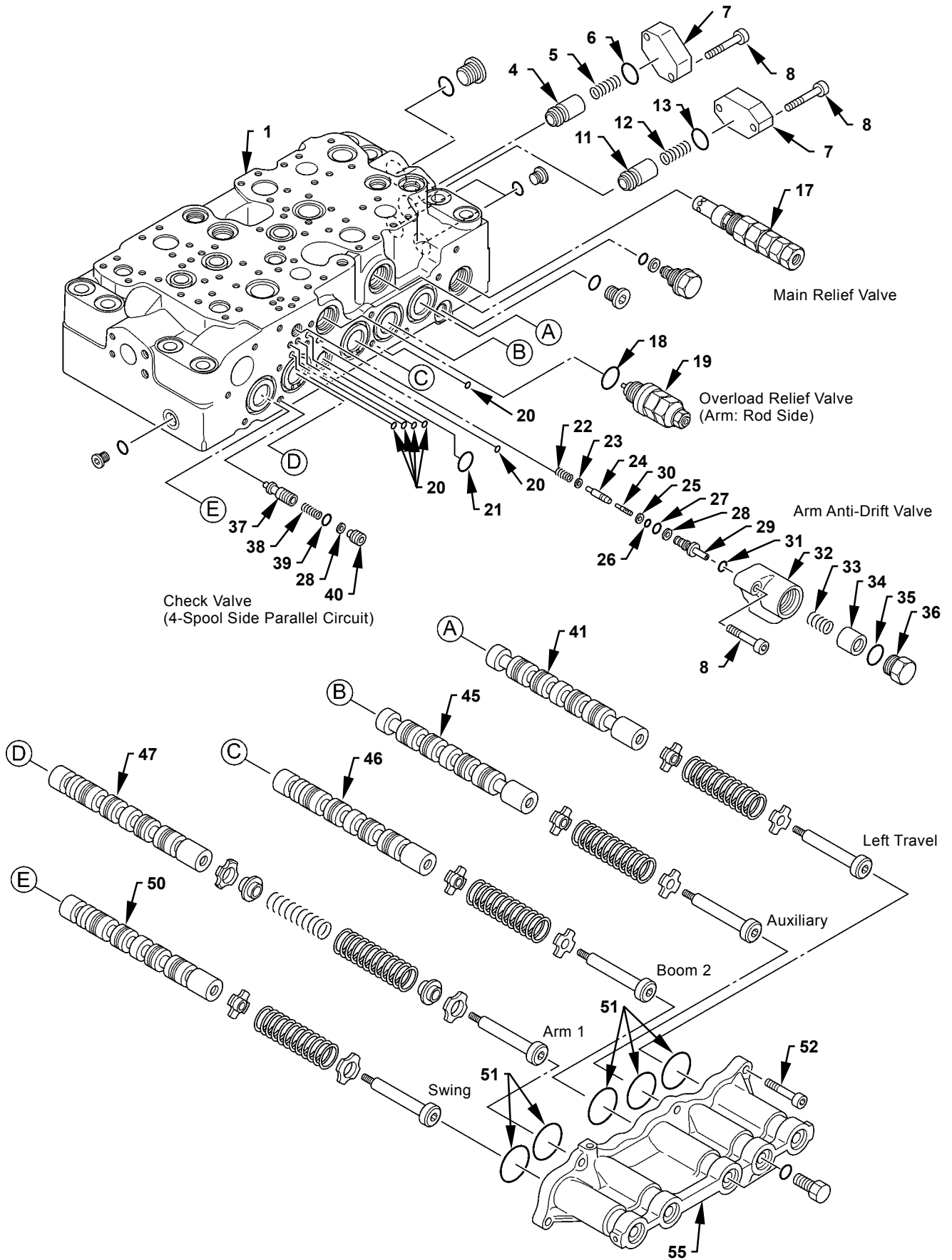
UPPERSTRUCTURE / Control Valve

1 - Housing	27 - O-Ring	53 - O-Ring (2 Used)	82 - Poppet
2 - O-Ring	28 - Backup Ring	54 - Plug (2 Used)	83 - Poppet
3 - Plug	29 - Sleeve	55 - Cap	84 - Cover (2 Used)
4 - Poppet	30 - Spool	58 - Socket Bolt (8 Used)	85 - O-Ring (2 Used)
5 - Spring	31 - O-Ring	59 - Spool	86 - Poppet
6 - O-Ring (3 Used)	32 - Body	60 - Spring	87 - Plug
7 - Flange	33 - Spring	62 - O-Ring (2 Used)	88 - O-Ring
8 - Socket Bolt (22 Used)	34 - Piston	63 - Plug (2 Used)	89 - Spring
9 - O-Ring (5 Used)	35 - O-Ring	64 - Sleeve	90 - Poppet
10 - Plug (5 Used)	36 - Plug	65 - Spring	91 - Socket Bolt (4 Used)
11 - Poppet	37 - Poppet	66 - Plug	92 - Cap (2 Used)
12 - Spring (2 Used)	38 - Spring	67 - Spring	93 - Spring Seat (2 Used)
13 - O-Ring (5 Used)	39 - O-Ring	68 - Poppet	94 - Spring
14 - O-Ring	40 - Spacer	69 - Poppet	95 - Spool
15 - Backup Ring	41 - Spool	70 - Plug	96 - Spring
16 - Plug	42 - Spring Seat (10 Used)	71 - O-Ring	97 - Spool
17 - Main Relief Valve	43 - Spring (5 Used)	72 - Flange	98 - Cap (4 Used)
18 - O-Ring	44 - Bolt (5 Used)	73 - Spring	99 - Overload Relief Valve
19 - Overload Relief Valve (2 Used)	45 - Spool	74 - Poppet	100 - O-Ring
20 - O-Ring (4 Used)	46 - Spool	75 - Flange (2 Used)	101 - Plug
21 - O-Ring	47 - Spool	76 - Poppet (2 Used)	102 - O-Ring
22 - Spring	48 - Spring Seat (2 Used)	77 - Spring	103 - Cap
23 - Seat	49 - Spring	78 - Body	104 - Body
24 - Poppet	50 - Spool	79 - Plug	
25 - Backup Ring	51 - O-Ring (10 Used)	80 - O-Ring	
26 - O-Ring	52 - Socket Bolt (16 Used)	81 - Socket Bolt (4 Used)	

UPPERSTRUCTURE / Control Valve

(Blank)

UPPERSTRUCTURE / Control Valve




W1V7-02-05-019

UPPERSTRUCTURE / Control Valve

Disassemble Control Valve 5-Spool Side

- Disassemble Spool


1. Remove socket bolts (52) (6 used). Remove cap (55) and O-rings (51) (5 used) from housing (1).

 : 8 mm


2. Put the matching marks on spools (41, 45, 46, 47, 50) and housing (1). Remove the spool (41, 45, 46, 47, 50) assemblies from housing (1).

- Disassemble Arm Anti-Drift Valve


3. Remove plug (36) from body (32).

 : 38 mm

4. Remove socket bolts (8) (3 used). Remove the body (32) assembly, O-rings (21, 31) and (20) (4 used) from housing (1).

 : 8 mm

5. Remove piston (34) and spring (33) from body (32).


 : 38 mm

6. Remove spool (30), sleeve (29), poppet (24), seat (23) and spring (22) from housing (1). Remove backup rings (25, 28) and O-rings (26, 27) from sleeve (29).

- Disassemble Overload Relief Valve

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


7. Remove overload relief valve (19) from housing (1).

 : 32 mm

- Disassemble Main Relief Valve

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


8. Remove main relief valve (17) from body (1).

 : 32 mm


- Disassemble Check valve

9. Remove spacer (40), spring (38) and poppet (37) from housing (1). Remove backup ring (28) and O-ring (39) from spacer (40).

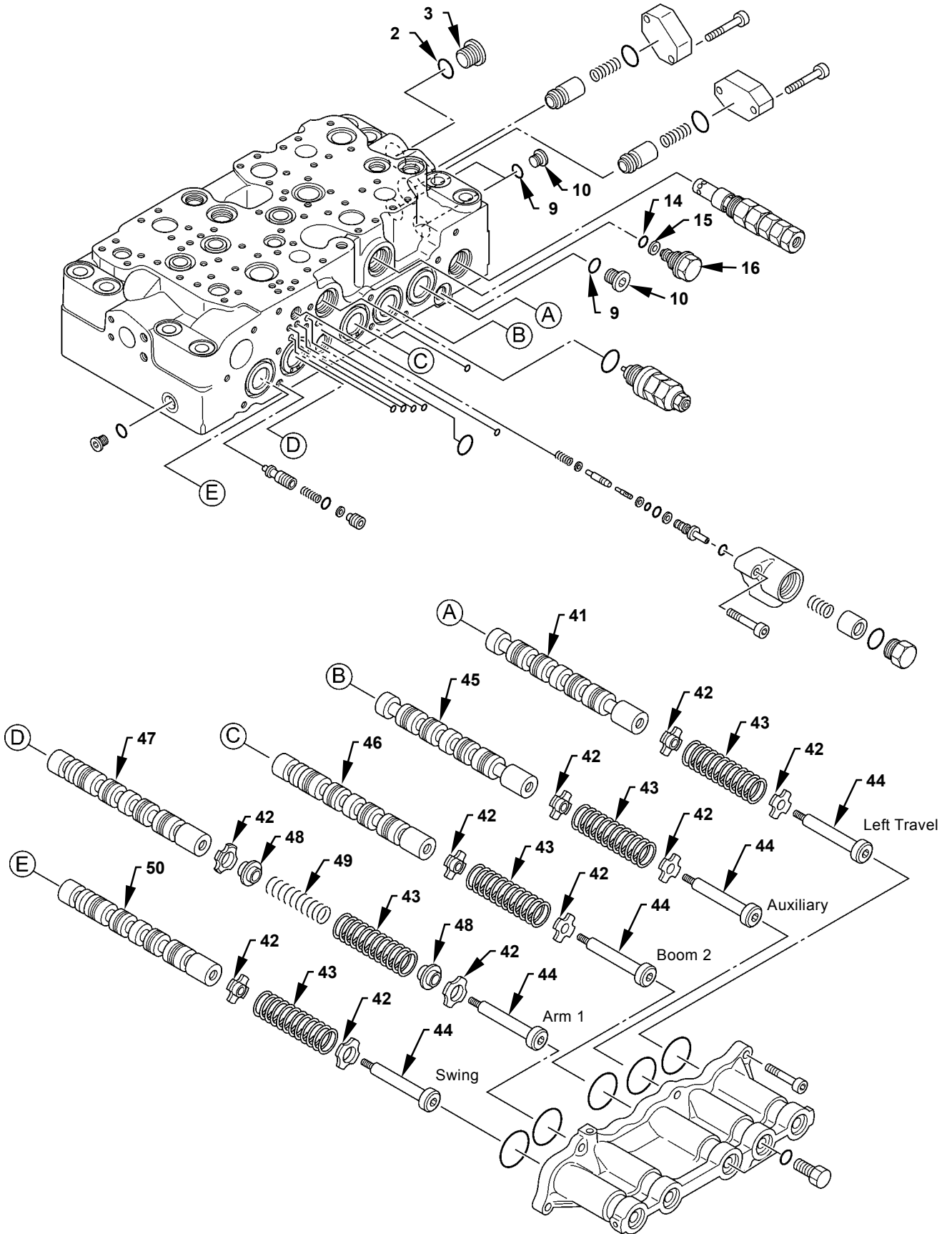
10. Remove socket bolts (8) (2 used). Remove flange (7), O-ring (6), spring (5) and poppet (4) from housing (1).

 : 8 mm

11. Remove socket bolts (8) (2 used). Remove flange (7), O-ring (13), spring (12) and poppet (11) from housing (1).

 : 8 mm


UPPERSTRUCTURE / Control Valve




W1V7-02-05-019

UPPERSTRUCTURE / Control Valve

12. Remove plugs (10) (2 used) and (3) from housing (1).


 : 24 mm

13. Remove plug (16) from housing (1).

 : 24 mm


- Disassemble Left Travel Spool (41)

14. Clamp spool (41) in a vise by using wooden pieces. Remove bolt (44), spring seat (42), spring (43) and spring seat (42) from spool (41).

 : 8 mm


- Disassemble Auxiliary Spool (45)

15. Clamp spool (45) in a vise by using wooden pieces. Remove bolt (44), spring seat (42), spring (43) and spring seat (42) from spool (45).

 : 8 mm


- Disassemble Boom 2 Spool (46)

16. Clamp spool (46) in a vise by using wooden pieces. Remove bolt (44), spring seat (42), spring (43) and spring seat (42) from spool (46).

 : 8 mm


- Disassemble Arm 1 Spool (47)

17. Clamp spool (47) in a vise by using wooden pieces. Remove bolt (44), spring seats (42, 48), springs (49, 43) and spring seats (48, 42) from spool (47).

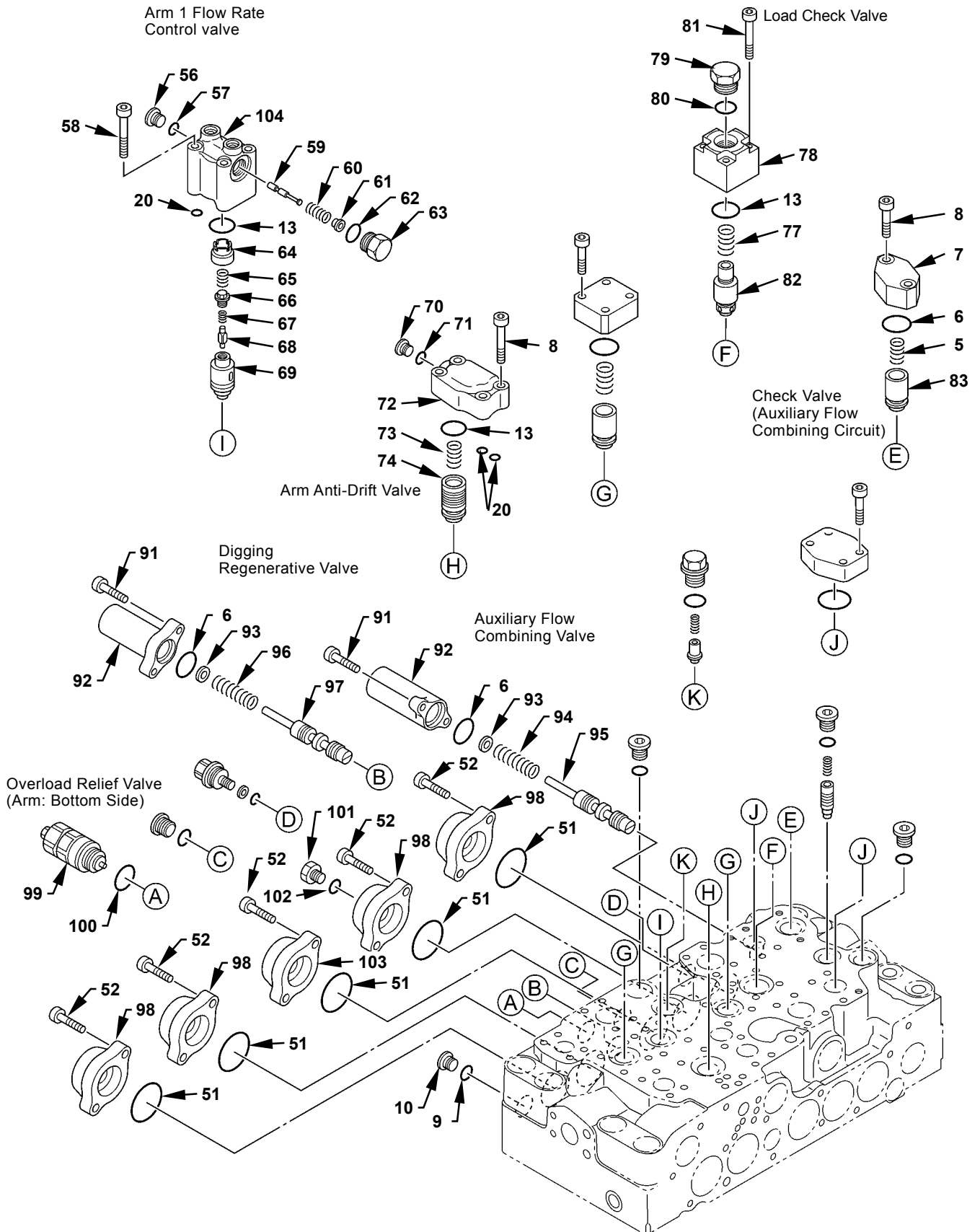
 : 8 mm

- Disassemble Swing Spool (50)

18. Clamp spool (50) in a vise by using wooden pieces. Remove bolt (44), spring seat (42), spring (43) and spring seat (42) from spool (50).


 : 8 mm

UPPERSTRUCTURE / Control Valve




UPPERSTRUCTURE / Control Valve

19. Remove socket bolts (52) (10 used). Remove caps (98) (4 used), (103) and O-rings (51) (5 used) from housing (1).

 : 8 mm

- Disassemble Digging Regenerative Valve, Auxiliary Flow Combining Valve


20. Remove socket bolts (91) (4 used). Remove caps (92) (2 used), O-rings (6) (2 used), spring seats (93) (2 used), springs (96, 94) and spools (97, 95) from housing (1).

 : 5 mm

- Disassemble Overload Relief Valve


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

21. Remove overload relief valve (99) from housing (1).

 : 32 mm


- Disassemble Check Valve

22. Remove socket bolts (8) (2 used). Remove flange (7), O-ring (6), spring (5) and poppet (83) from housing (1).

 : 8 mm

- Disassemble Arm Anti-Drift Valve


23. Remove socket bolts (8) (4 used). Remove flange (72), O-rings (20) (3 used), (13), spring (73) and poppet (74) from housing (1).

 : 8 mm

- Disassemble Arm 1 Flow Rate Control Valve

24. Loosen plugs (56, 63) from body (104).

25. Remove socket bolts (58) (4 used). Remove O-rings (20, 13) from housing (1).

 : 8 mm


26. Remove plug (63), spring seat (61), spring (60) and spool (59) from body (104). Remove plug (56).

27. Remove sleeve (64), spring (65), plug (66), spring (67) and poppets (68, 69) from housing (1).


UPPERSTRUCTURE / Control Valve

- Disassemble Load Check Valve


28. Remove socket bolts (8) (4 used) from housing (1).
Remove flange (75), O-ring (13), spring (12) and poppet (76).

 : 8 mm


29. Remove socket bolts (8) (4 used). Remove cover (84) and O-ring (85) from housing (1).

 : 8 mm


30. Remove plug (87), spring (89) and poppet (90) from housing (1).

 : 24 mm


31. Remove plug (10), spring (38) and poppet (86) from housing (1).

 : 8 mm

32. Remove plug (16) from housing (1).


 : 24 mm

33. Remove plug (3) from housing (1).

 : 10 mm

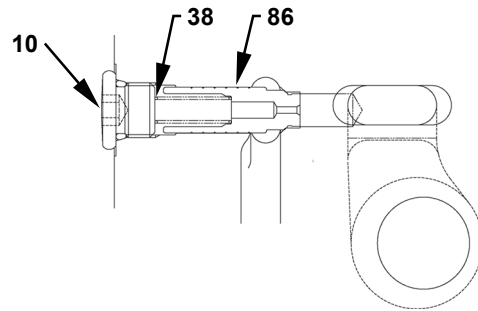
34. Loosen plug (79) from baby (78).

35. Remove socket bolts (81) (4 used). Remove body (78) and O-ring (13) from housing (1).

 : 8 mm

36. Remove plug (79) from body (104).

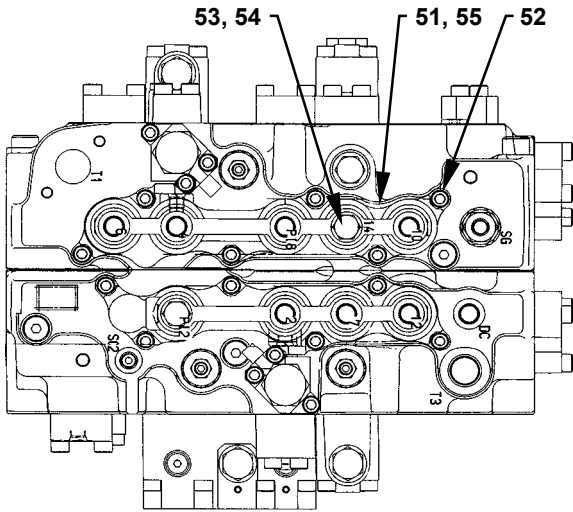
37. Remove spring (77) and poppet (82) from housing (1).



W1V1-02-05-016

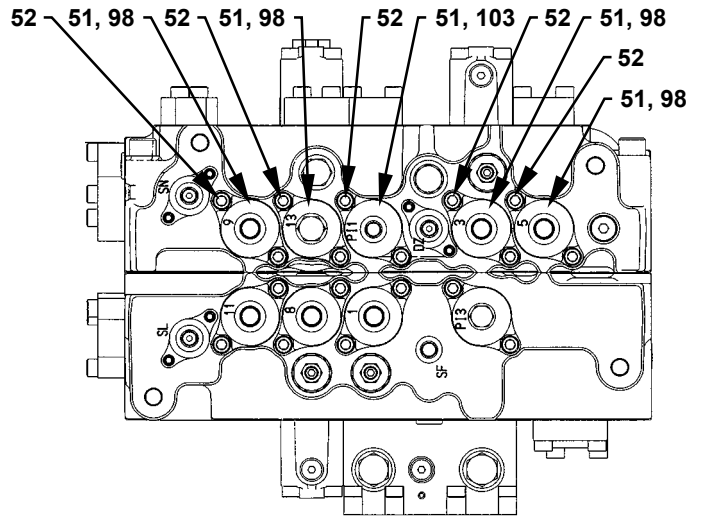
UPPERSTRUCTURE / Control Valve

ASSEMBLE CONTROL VALVE 5-SPOOL SIDE



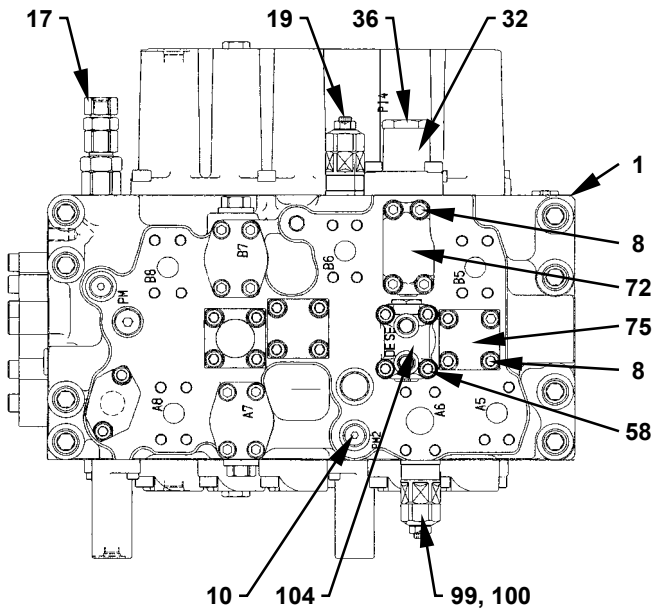
Control Valve (Upper)

W1V7-02-05-027



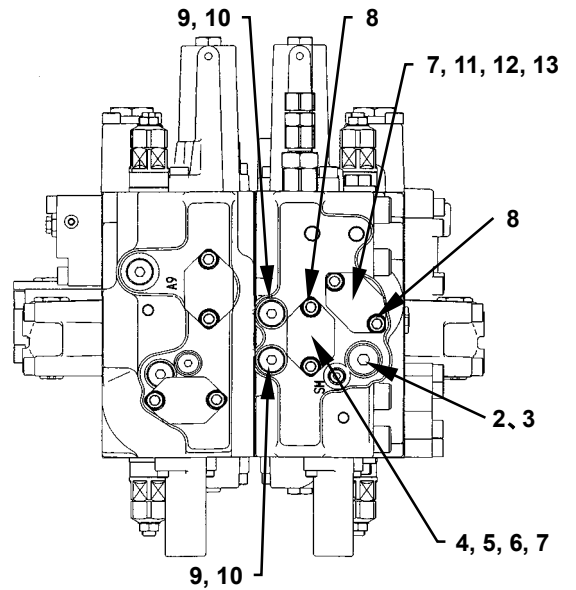
Control Valve (Lower)

W1V7-02-05-028



Control Valve (Side)

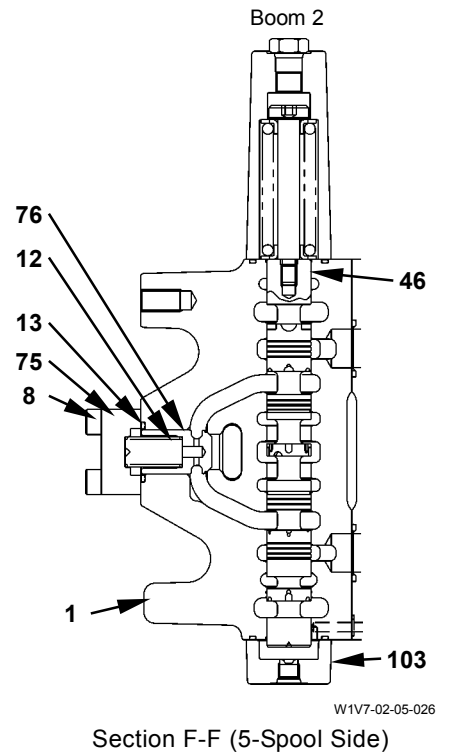
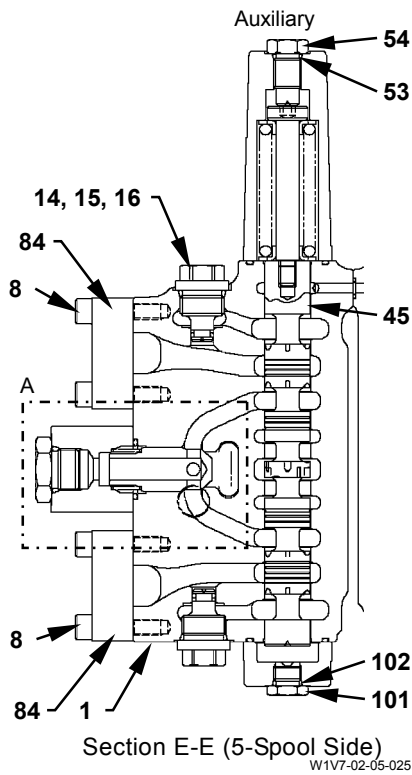
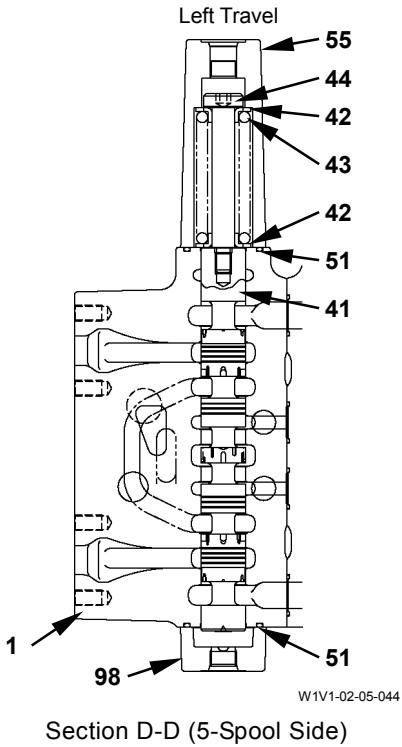
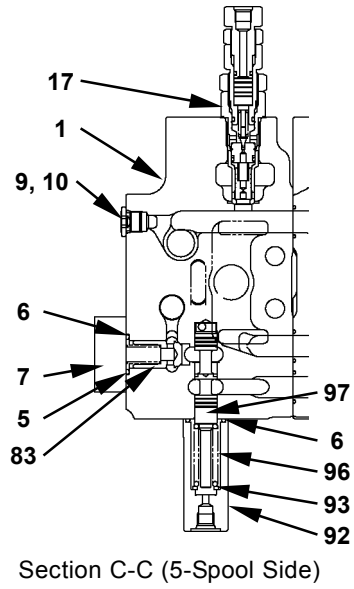
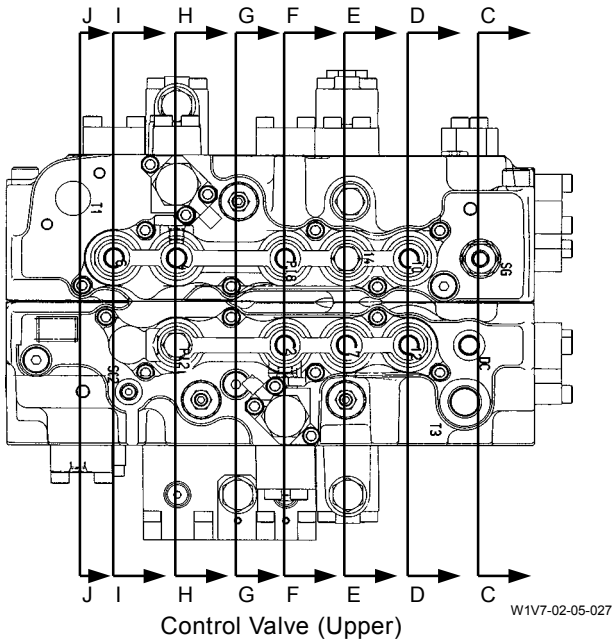
W1V7-02-05-032



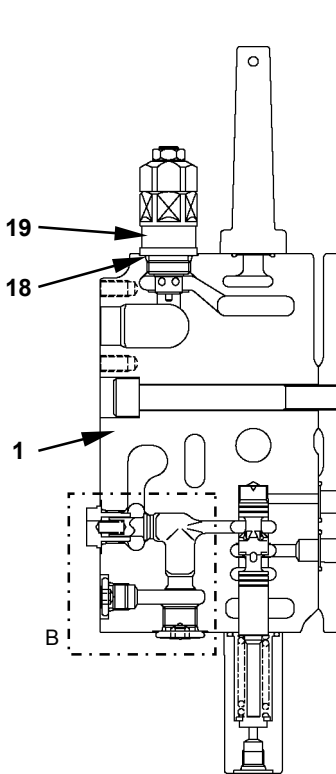
Control Valve (Front)

W1V1-02-05-068

UPPERSTRUCTURE / Control Valve

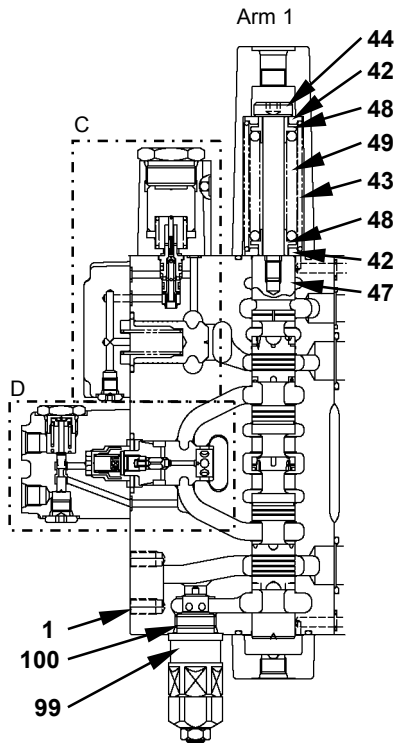


UPPERSTRUCTURE / Control Valve



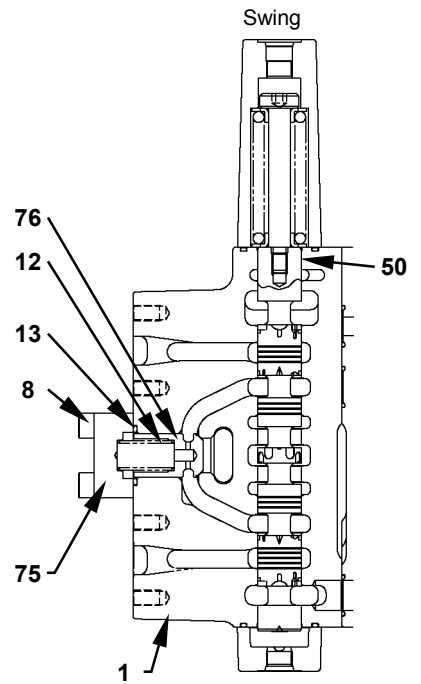
Section G-G (5-Spool Side)

W1V1-02-05-050



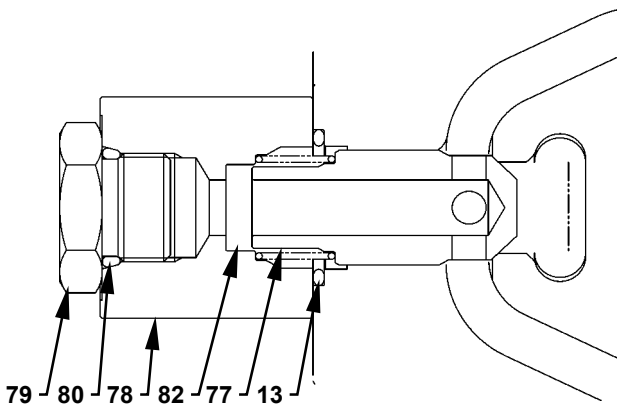
Section H-H (5-Spool Side)

W1V1-02-05-051



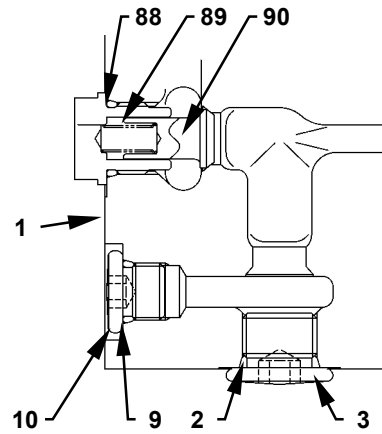
Section I-I (5-Spool Side)

W1V1-02-05-052



Detail A

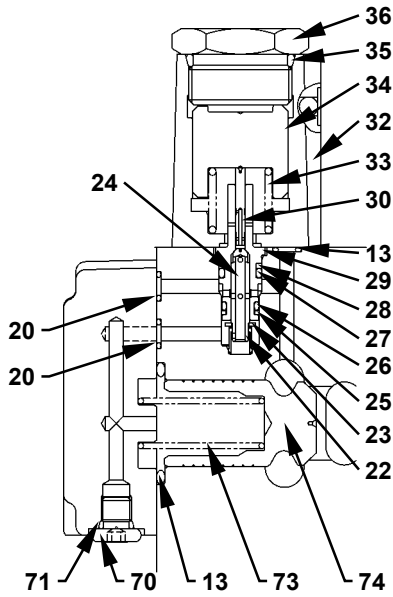
W1V7-02-05-033



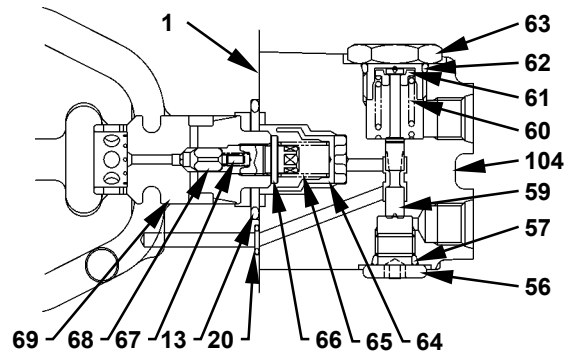
Detail B

W1V1-02-05-053

UPPERSTRUCTURE / Control Valve



Detail C



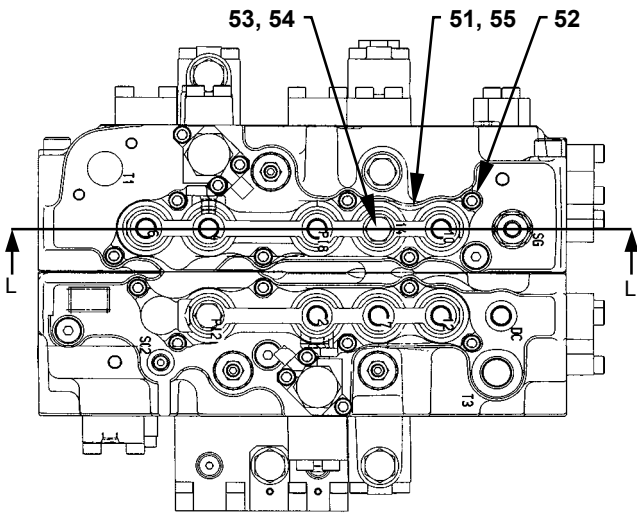
Detail D

W1V1-02-05-033

W1V1-02-05-054

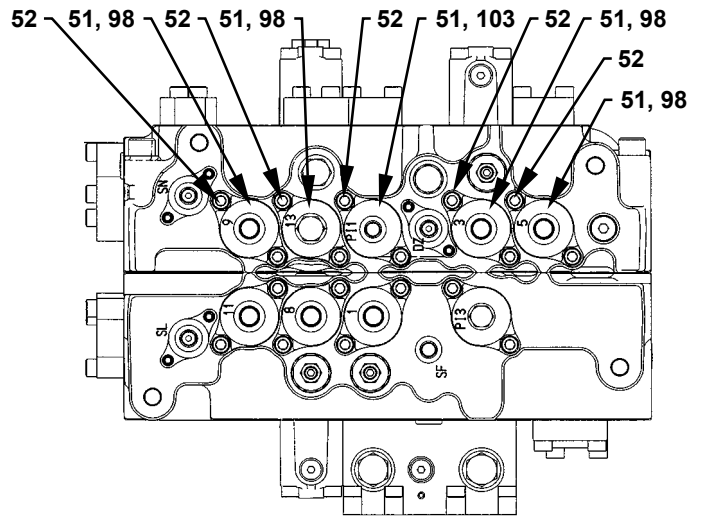
- | | | | |
|-------------------------------------|----------------------------|---------------------------|----------------------------|
| 1 - Housing | 27 - O-Ring | 53 - O-Ring (2 Used) | 82 - Poppet |
| 2 - O-Ring | 28 - Backup Ring | 54 - Plug (2 Used) | 83 - Poppet |
| 3 - Plug | 29 - Sleeve | 55 - Cap | 84 - Cover (2 Used) |
| 4 - Poppet | 30 - Spool | 58 - Socket Bolt (8 Used) | 85 - O-Ring (2 Used) |
| 5 - Spring | 31 - O-Ring | 59 - Spool | 86 - Poppet |
| 6 - O-Ring (3 Used) | 32 - Body | 60 - Spring | 87 - Plug |
| 7 - Flange | 33 - Spring | 62 - O-Ring (2 Used) | 88 - O-Ring |
| 8 - Socket Bolt (22 Used) | 34 - Piston | 63 - Plug (2 Used) | 89 - Spring |
| 9 - O-Ring (5 Used) | 35 - O-Ring | 64 - Sleeve | 90 - Poppet |
| 10 - Plug (5 Used) | 36 - Plug | 65 - Spring | 91 - Socket Bolt (4 Used) |
| 11 - Poppet | 37 - Poppet | 66 - Plug | 92 - Cap (2 Used) |
| 12 - Spring (2 Used) | 38 - Spring | 67 - Spring | 93 - Spring Seat (2 Used) |
| 13 - O-Ring (5 Used) | 39 - O-Ring | 68 - Poppet | 94 - Spring |
| 14 - O-Ring | 40 - Spacer | 69 - Poppet | 95 - Spool |
| 15 - Backup Ring | 41 - Spool | 70 - Plug | 96 - Spring |
| 16 - Plug | 42 - Spring Seat (10 Used) | 71 - O-Ring | 97 - Spool |
| 17 - Main Relief Valve | 43 - Spring (5 Used) | 72 - Flange | 98 - Cap (4 Used) |
| 18 - O-Ring | 44 - Bolt (5 Used) | 73 - Spring | 99 - Overload Relief Valve |
| 19 - Overload Relief Valve (2 Used) | 45 - Spool | 74 - Poppet | 100 - O-Ring |
| 20 - O-Ring (4 Used) | 46 - Spool | 75 - Flange (2 Used) | 101 - Plug |
| 21 - O-Ring | 47 - Spool | 76 - Poppet (2 Used) | 102 - O-Ring |
| 22 - Spring | 48 - Spring Seat (2 Used) | 77 - Spring | 103 - Cap |
| 23 - Seat | 49 - Spring | 78 - Body | 104 - Body |
| 24 - Poppet | 50 - Spool | 79 - Plug | |
| 25 - Backup Ring | 51 - O-Ring (10 Used) | 80 - O-Ring | |
| 26 - O-Ring | 52 - Socket Bolt (16 Used) | 81 - Socket Bolt (4 Used) | |

UPPERSTRUCTURE / Control Valve



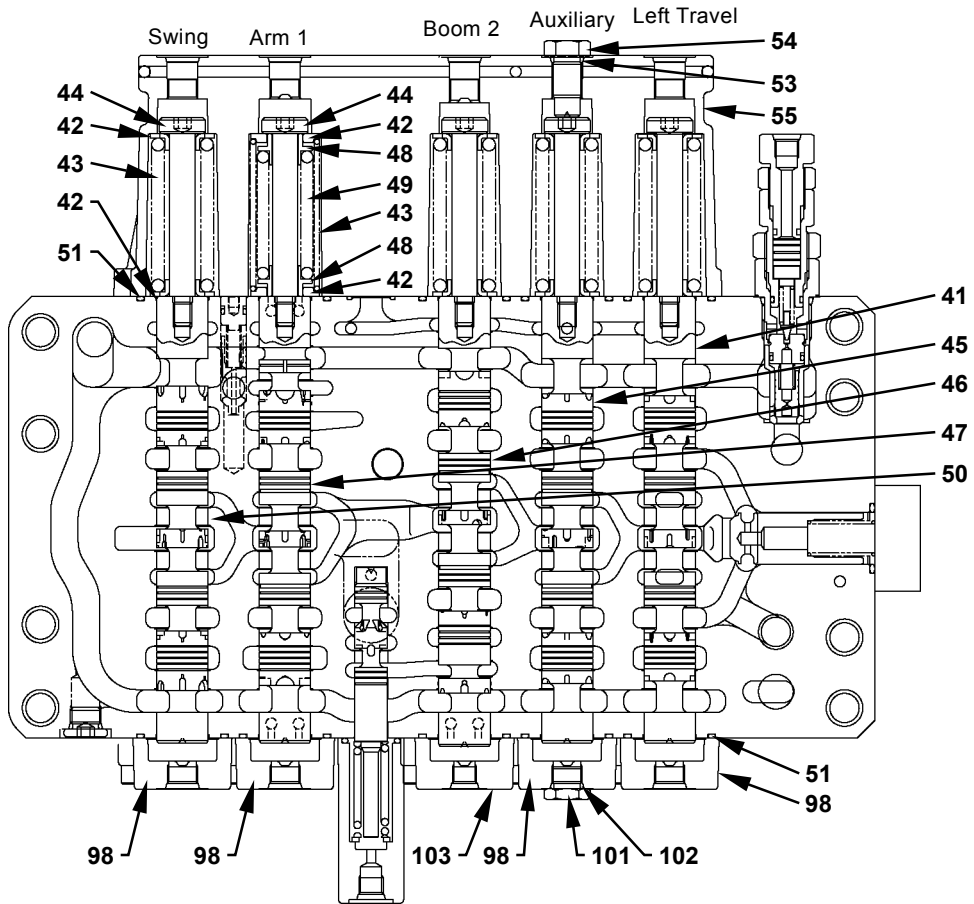
Control Valve (Upper)

W1V7-02-05-027



Control Valve (Lower)

W1V7-02-05-028




Section L-L


W1V1-02-05-057

UPPERSTRUCTURE / Control Valve

- Assemble Left Travel Spool

1. Clamp spool (41) in a vise by using wooden pieces. Install spring seat (42), spring (43), spring seat (42) and bolt (44) to spool (41).


 : 8 mm

 : 15 N·m (1.5 kgf·m, 11 lbf·ft)

- Assemble Auxiliary Spool


2. Clamp spool (45) in a vise by using wooden pieces. Install spring seat (42), spring (43), spring seat (42) and bolt (44) to spool (45).


 : 8 mm

 : 15 N·m (1.5 kgf·m, 11 lbf·ft)

- Assemble Boom 2 Spool

3. Clamp spool (46) in a vise by using wooden pieces. Install spring seat (42), spring (43), spring seat (42) and bolt (44) to spool (46).


 : 8 mm

 : 15 N·m (1.5 kgf·m, 11 lbf·ft)

- Assemble Arm 1 Spool


4. Clamp spool (47) in a vise by using wooden pieces. Install spring seats (42, 48), springs (43, 49), spring seats (42, 48) and bolt (44) to spool (47).


 : 8 mm

 : 15 N·m (1.5 kgf·m, 11 lbf·ft)


- Assemble Swing Spool


5. Clamp spool (50) in a vise by using wooden pieces. Install spring seat (42), spring (43), spring seat (42) and bolt (44) to spool (50).

 : 8 mm

 : 15 N·m (1.5 kgf·m, 11 lbf·ft)


6. Install O-rings (51) (5 used) to housing (1). Install caps (103) and (98) (4 used) to housing (1) with socket bolts (52) (10 used).


 : 8 mm

 : 42 N·m (4.3 kgf·m, 31 lbf·ft)


7. Install the spools (41, 45, 46, 47, 50) assemblies to housing (1).


8. Install O-rings (51) (5 used) onto housing (1). Install cap (55) to housing (1) with socket bolts (52) (6 used).

 : 8 mm


 : 42 N·m (4.3 kgf·m, 31 lbf·ft)


9. Install O-rings (53, 102) to plugs (54, 101). Install plug (101) to cap (98).

 : 19 mm

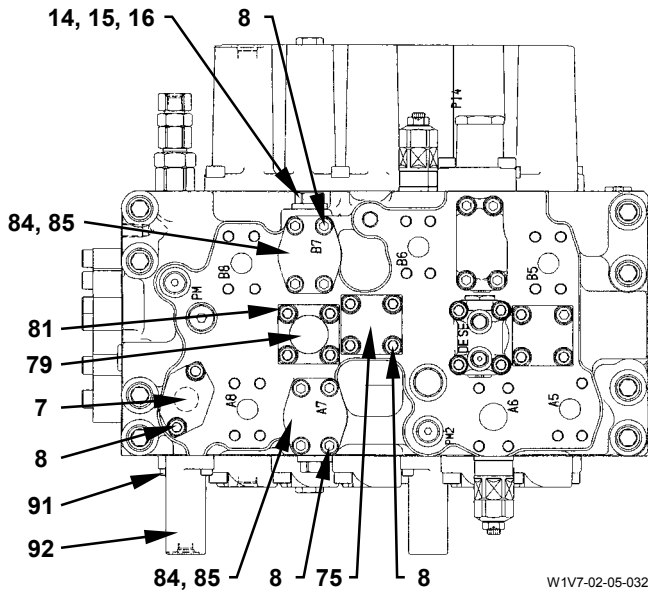
 : 20 N·m (2.0 kgf·m, 15 lbf·ft)

10. Install plug (54) to cap (55).

 : 21 mm

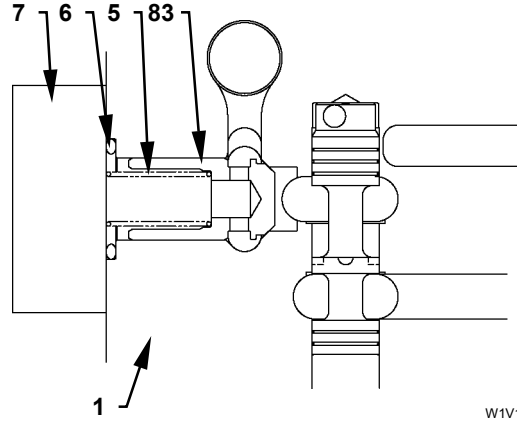
 : 54 N·m (5.5 kgf·m, 40 lbf·ft)

UPPERSTRUCTURE / Control Valve



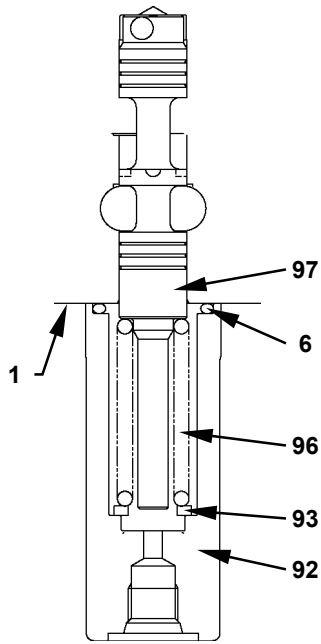
Control Valve (Side)

W1V7-02-05-032



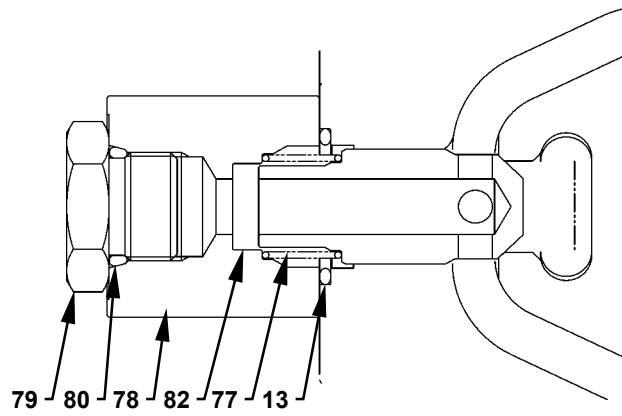
Check Valve

W1V1-02-05-047



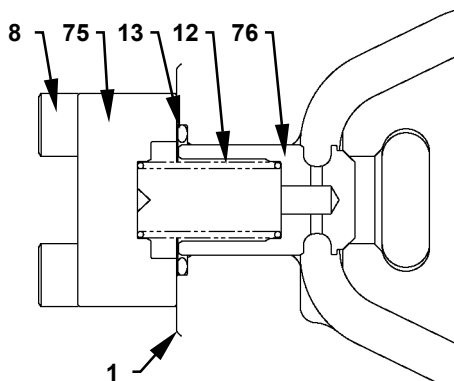
Auxiliary Flow Combining Valve

W1V1-02-05-048



Load Check Valve (Detail A)

W1V7-02-05-033




Load Check Valve


W1V1-02-05-049

UPPERSTRUCTURE / Control Valve

- Assemble Check Valve


11. Install poppet (83), spring (5) and O-ring (6) to housing (1). Install flange (7) to housing (1) with socket bolts (8) (2 used).


 : 5 mm

 : 10 N·m (1.0 kgf·m, 7.4 lbf·ft)

- Assemble Auxiliary Flow Combining Valve

12. Install spool (97), spring (96) and spring seat (93) to housing (1). Install cap (92) to housing (1) with socket bolts (91) (2 used).


 : 5 mm


 : 10 N·m (1.0 kgf·m, 7.4 lbf·ft)

- Assemble Load Check Valve

13. Install poppet (76), spring (12) and O-ring (13) to housing (1).


14. Install flange (75) to housing (1) with socket bolts (8) (4 used).


 : 8 mm

 : 61 N·m (6.2 kgf·m, 45 lbf·ft)

15. Install O-ring (14) and backup ring (15) to plug (16). Install plug (16) to housing (1).

16. Install O-rings (85) (2 used) to housing (1). Install covers (84) (2 used) to housing (1) with socket bolts (8) (8 used).


 : 8 mm


 : 61 N·m (6.2 kgf·m, 45 lbf·ft)

17. Install O-ring (80) to plug (79).

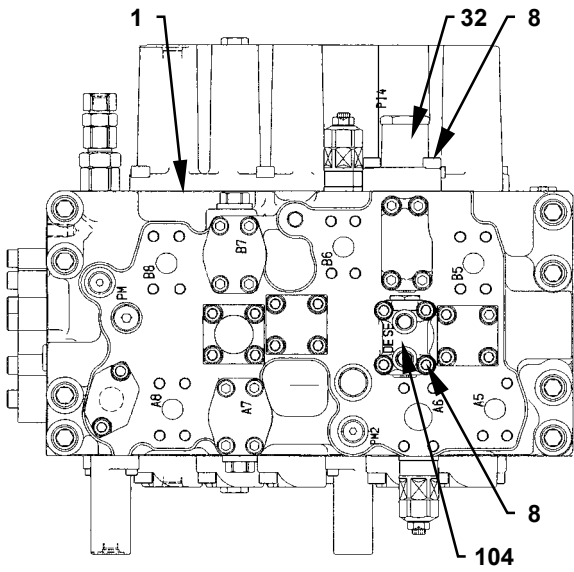
18. Install spring (77), spool (82) and plug (79) to housing (1).

19. Install O-ring (13) to housing (1). Install body (78) to housing (1) with socket bolts (81) (4 used).

 : 8 mm

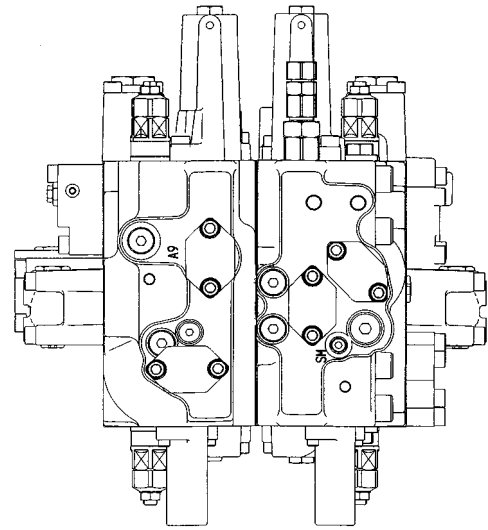
 : 61 N·m (6.2 kgf·m, 45 lbf·ft)

UPPERSTRUCTURE / Control Valve



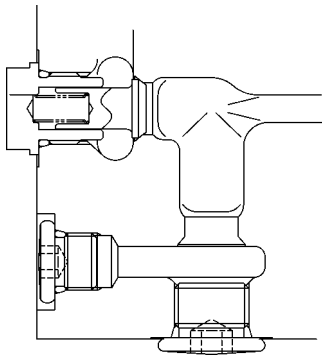
Control Valve (Side)

W1V7-02-05-032



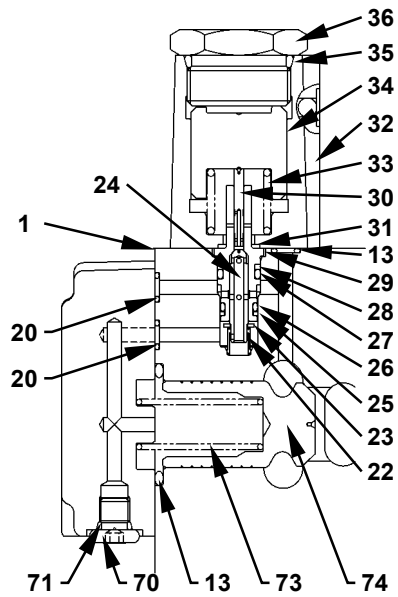
Control Valve (Front)

W1V1-02-05-068



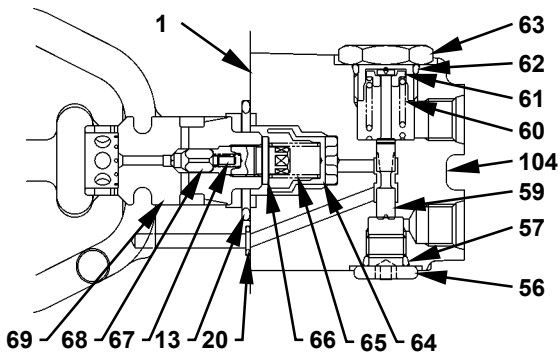
Section of Load Check Valve (Detail B)

W1V1-02-05-053



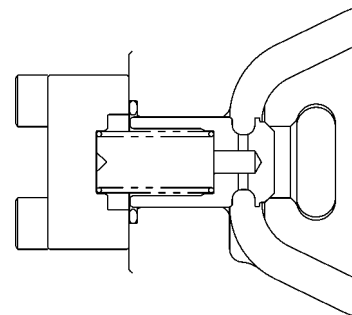
Section of Arm Anti-Drift Valve (Detail C)

W1V1-02-05-054



Section of Arm Flow Rate Control Valve (Detail D)

W1V1-02-05-033



Section of Load Check Valve


W1V1-02-05-055

UPPERSTRUCTURE / Control Valve

- Assemble Arm Anti-Drift Valve


20. Install backup rings (25, 28) and O-rings (26, 27) to sleeve (29).


21. Face the hole on spool (30) to the poppet (24) side. Install spool (30), poppet (24), seat (23) and spring (22) to sleeve (29). Install the sleeve (29) assembly to housing (1).

 **NOTE:** Apply grease to seat (23) and spring (22) in order not to drop.

22. Install O-ring (35) to plug (36). Install spring (33), piston (34), O-ring (31) and plug (36) to body (32).

23. Install O-rings (13, 31) to housing (1). Install the body (32) assembly to housing (1) with socket bolts (8) (3 used).

 : 8 mm

 : 61 N·m (6.2 kgf·m, 45 lbf·ft)

24. Tighten plug (36).

- Assemble Arm Flow Rate Control Valve


25. Install O-rings (57, 62) to plugs (56, 63).


26. Install spring (60), spool (59), spring seat (61) and plug (63) to body (104).

27. Install plug (56) to body (104).

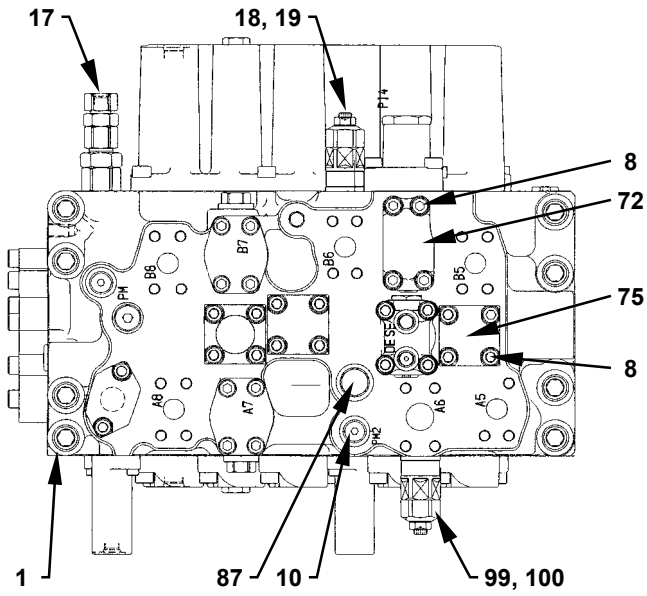
28. Install poppets (69, 68), spring (67), plug (66), spring (65) and sleeve (64) to housing (1).

29. Install O-rings (13, 20) to housing (1). Install body (104) to housing (1) with socket bolts (8) (4 used).

 : 8 mm

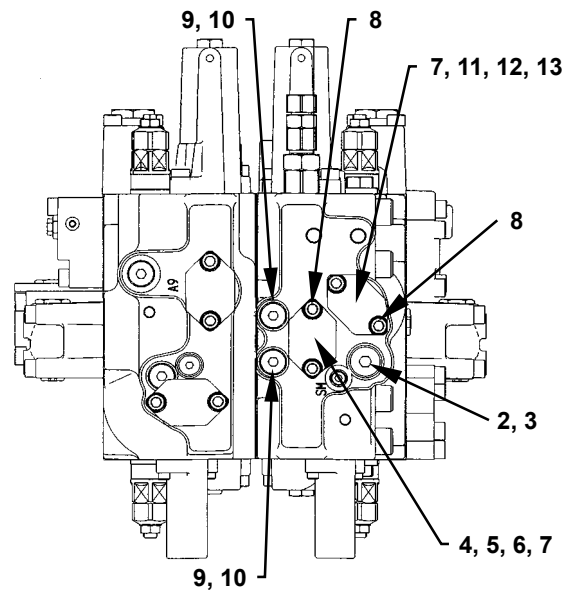
 : 61 N·m (6.2 kgf·m, 45 lbf·ft)

UPPERSTRUCTURE / Control Valve



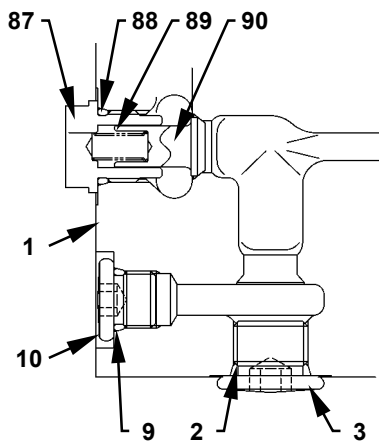
Control Valve (Side)

W1V7-02-05-032



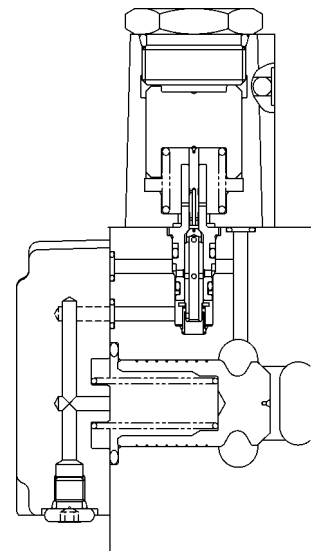
Control Valve (Front)

W1V1-02-05-068



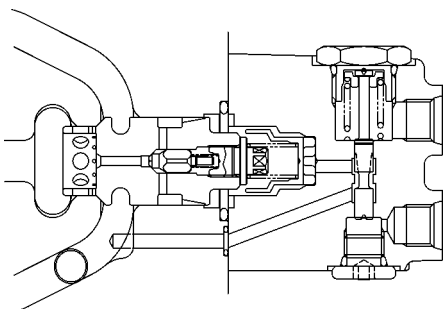
Section of Load Check Valve (Detail B)

W1V1-02-05-053



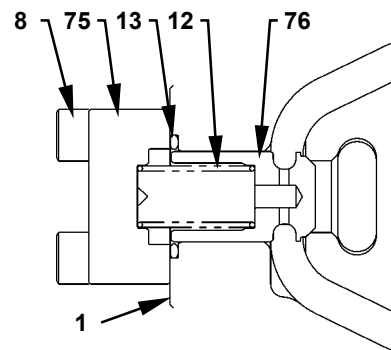
Section of Arm Anti-Drift Valve (Detail C)

W1V1-02-05-054



Section of Arm Flow Rate Control Valve (Detail D)

W1V1-02-05-033



Section of Load Check Valve


W1V1-02-05-055


UPPERSTRUCTURE / Control Valve

- Assemble Load Check Valve

30. Install O-ring (88) to plug (87). Install poppet (90), spring (89) and plug (87) to housing (1).

31. Install poppet (76), spring (12) and O-ring (13) to housing (1). Install flange (75) to housing (1) with socket bolts (8) (4 used).

 : 8 mm


 : 61 N·m (6.2 kgf·m, 45 lbf·ft)


32. Install O-rings (2, 9) to plugs (3, 10). Install plugs (3, 10) to housing (1).

- Assemble Overload Relief Valve

IMPORTANT: If the overload relief valve is disassembled, pressure must be adjusted. (Refer to the Operational Performance Test section / TROUBLESHOOTING in the separated volume, T/M.)

33. Install O-rings (18, 100) to overload relief valves (19, 99). Install overload relief valves (19, 99) to housing (1).


 : 32 mm


 : 83 N·m (8.5 kgf·m, 61 lbf·ft)

- Assemble Main Relief Valve

IMPORTANT: If the main relief valve is disassembled, pressure must be adjusted. (Refer to the Operational Performance Test section / TROUBLESHOOTING in the separated volume, T/M.)


34. Install main relief valve (17) to housing (1).


 : 32 mm

 : 83 N·m (8.5 kgf·m, 61 lbf·ft)


- Assemble Check Valve


35. Install poppet (4), spring (5) and O-ring (6) to housing (1). Install flange (7) to housing (1) with socket bolts (8) (2 used).

 : 8 mm

 : 61 N·m (6.2 kgf·m, 61 lbf·ft)

36. Install poppet (11), spring (12) and O-ring (13) to housing (1). Install flange (7) to housing (1) with socket bolts (8) (2 used).

 : 8 mm

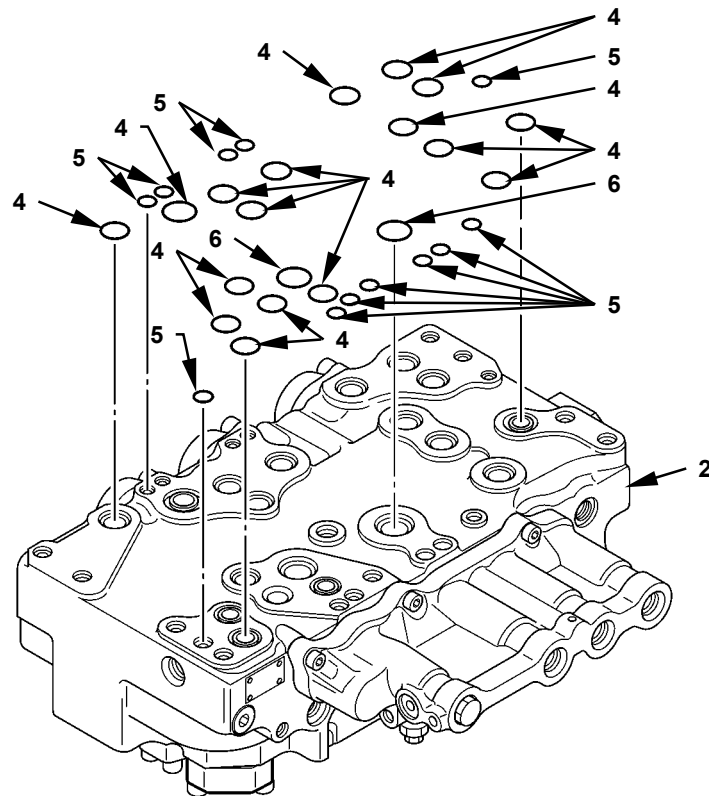
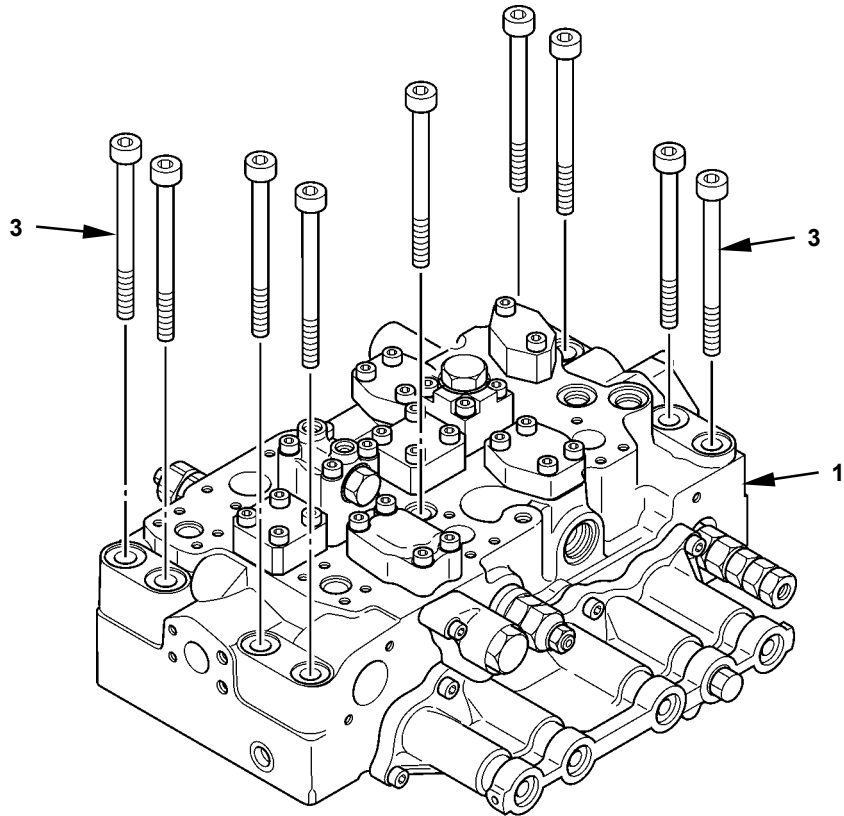
 : 61 N·m (6.2 kgf·m, 61 lbf·ft)

37. Install O-rings (9) (2 used) to plugs (10) (2 used). Install plugs (10) (2 used) to housing (1).

38. Install O-ring (2) to plug (3). Install plug (3) to housing (1).

UPPERSTRUCTURE / Control Valve

DISASSEMBLE HOUSING



W1V7-02-05-016

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

3 - Socket Bolt (9 Used)
4 - O-Ring (16 Used)

5 - O-Ring (12 Used)

6 - O-Ring (3 Used)


UPPERSTRUCTURE / Control Valve

Disassemble Housing



CAUTION: Housings (1, 2) weight: 150 kg (330 lb)

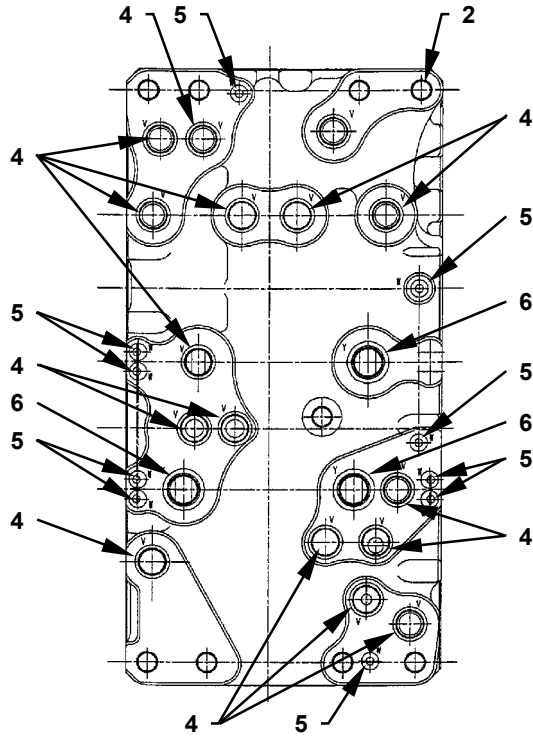
1. Remove socket bolts (3) (9 used). Remove O-rings (4) (16 used), (5) (12 used) and (6) (3 used) from housing (1 or 2).

 : 14 mm

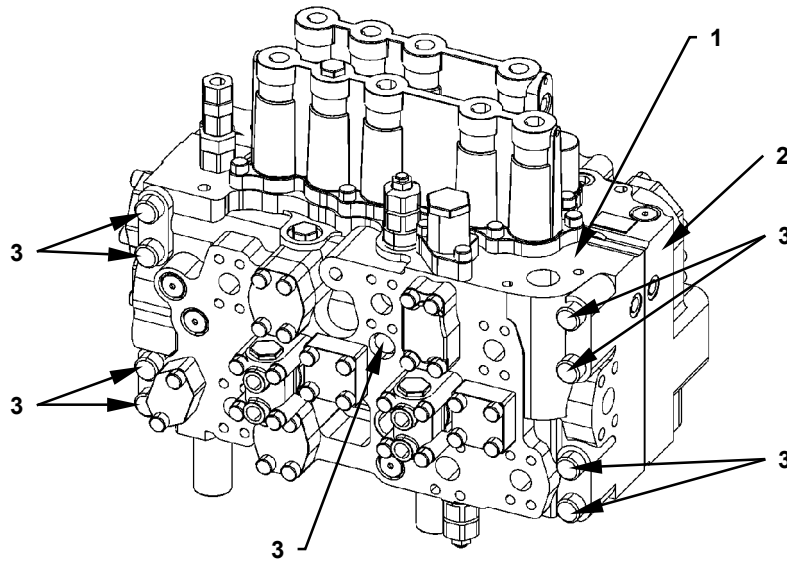
2. Separate housing (1) and housing (2).

UPPERSTRUCTURE / Control Valve

ASSEMBLE HOUSING



W1V1-02-05-011



W1V1-02-05-001

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

3 - Socket Bolt (9 Used)
4 - O-Ring (16 Used)

5 - O-Ring (12 Used)

6 - O-Ring (3 Used)

UPPERSTRUCTURE / Control Valve


Assemble Housing


1. Install O-rings (4) (16 used), (5) (12 used) and (6) (3 used) to the mounting surface for housing (2).



CAUTION: Housings (1, 2) weight: 150 kg (330 lb)

2. Install housing (1) to housing (2) with socket bolts (3) (9 used).

 : 14 mm

 : 206 to 216 N·m
(21 to 22 kgf·m, 152 to 159 lbf·ft)

UPPERSTRUCTURE / Control Valve

(Blank)


UPPERSTRUCTURE / Swing Device


REMOVE AND INSTALL SWING DEVICE

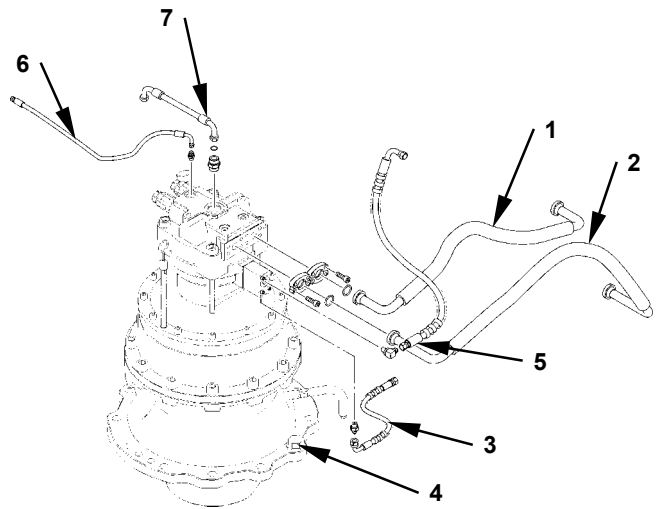
CAUTION: Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

Removal

1. Remove hoses (1 to 3, 5 to 7). Attach an identification tag onto the removed hoses for assembling. Cap the open ends.

 : 17 mm, 19 mm, 41 mm


 : 8 mm

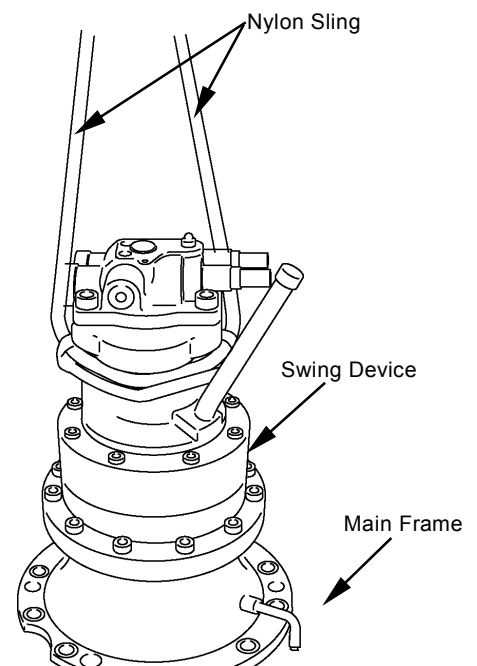


W1HH-02-06-001

CAUTION: Swing device weight: 384 kg (850 lb)

2. Attach a nylon sling to the swing motor and hold the swing device. Remove bolts (4) (12 used). Hoist and remove the swing device from the main frame.

 : 32 mm



W176-02-06-002


UPPERSTRUCTURE / Swing Device


Installation

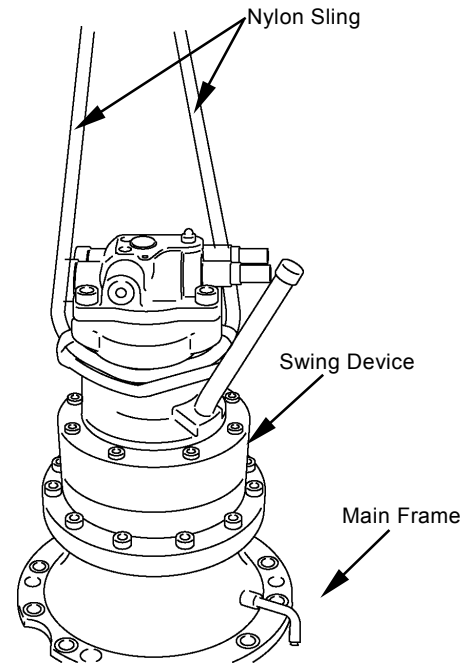
1. Apply THREEBOND #1102 to both mounting surfaces on the swing device and main frame.

CAUTION: Swing device weight: 384 kg (850 lb)

2. Hoist and align the swing device with the mounting hole. Install the swing device to the main frame with bolts (4) (12 used).


 : 32 mm


 : 640 N·m (65 kgf·m, 470 lbf·ft)





W176-02-06-002


2. Install hoses (1 to 3, 5 to 7) to the swing motor.


 : 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)

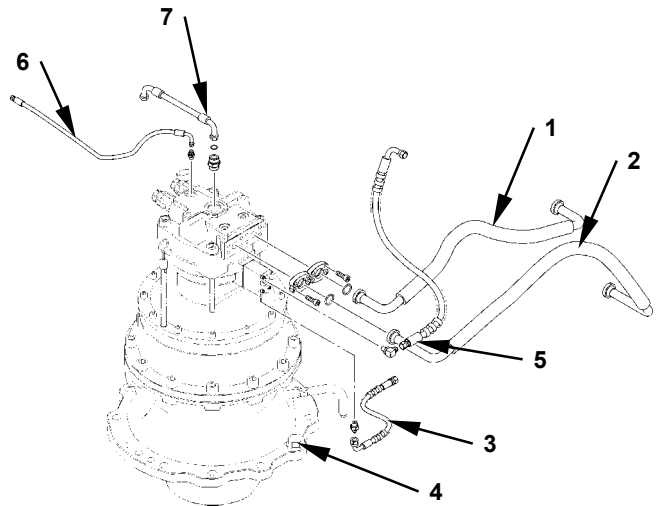
 : 41 mm

 : 205 N·m (21 kgf·m, 150 lbf·ft)

 : 8 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

IMPORTANT: After completing the work, fill the swing motor with hydraulic oil. Check the hydraulic oil level. Start the engine and check for any oil leaks.



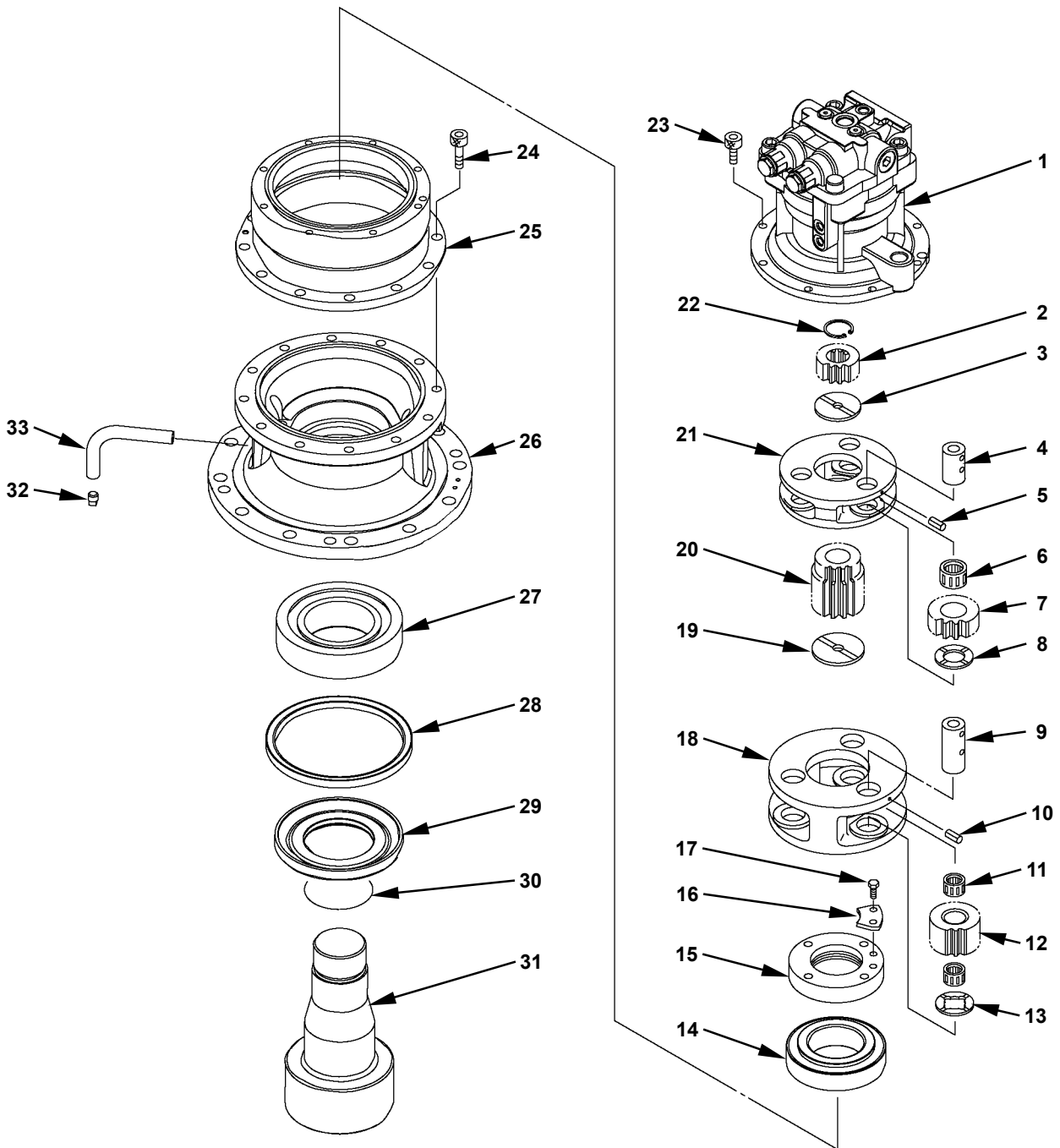
W1HH-02-06-001

UPPERSTRUCTURE / Swing Device

(Blank)

UPPERSTRUCTURE / Swing Device

DISASSEMBLE SWING DEVICE



W1V1-02-06-003

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

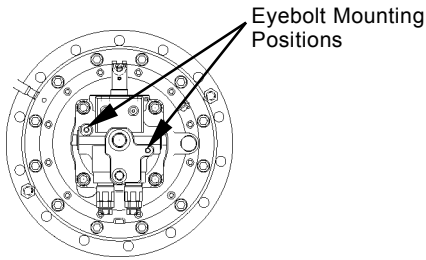
UPPERSTRUCTURE / Swing Device

Disassemble Swing Device




CAUTION: Swing device weight: 384 kg (850 lb)

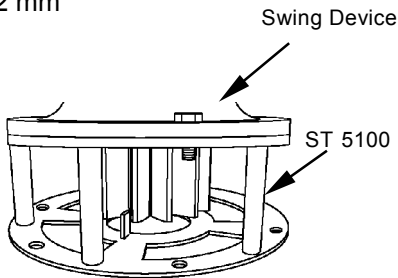
1. Install eyebolts (M12, Pitch 1.75 mm) (2 used) to the swing motor. Hoist the swing device.



W1V7-02-06-006


1. Place the swing device on bracket (ST 5100). Secure the swing device onto the bracket by using the bolts (M22, Pitch 2.5 mm) (2 used). Secure the bracket on a workbench in order to reduce the reaction force.

 : 32 mm




W1V7-02-06-001

3. Remove drain plug (32). Drain off oil from the swing device.

 : 8 mm


4. Remove pipe (33) from housing (26).


 : 18 mm



CAUTION: Motor (1) weight: 71 kg (157 lb)

5. Put the matching marks at the jointed part between motor (1) and ring gear (25), between ring gear (25) and housing (26). Remove socket bolts (23) (8 used). Hoist and remove motor (1).

 : 10 mm


 **NOTE:** Insert the screwdriver between motor (1) and ring gear (25). Float motor (1) for easy removal.


6. Remove first stage sun gear (2). Remove the first stage carrier (21) assembly from ring gear (25).



CAUTION: Ring gear (25) weight: 38 kg (85 lb)

7. Remove socket bolts (24) (12 used). Install eyebolt (M12, Pitch 1.75 mm) to the motor mounting thread part on ring gear (25). Hoist and remove ring gear (25) from housing (26).

 : 17 mm

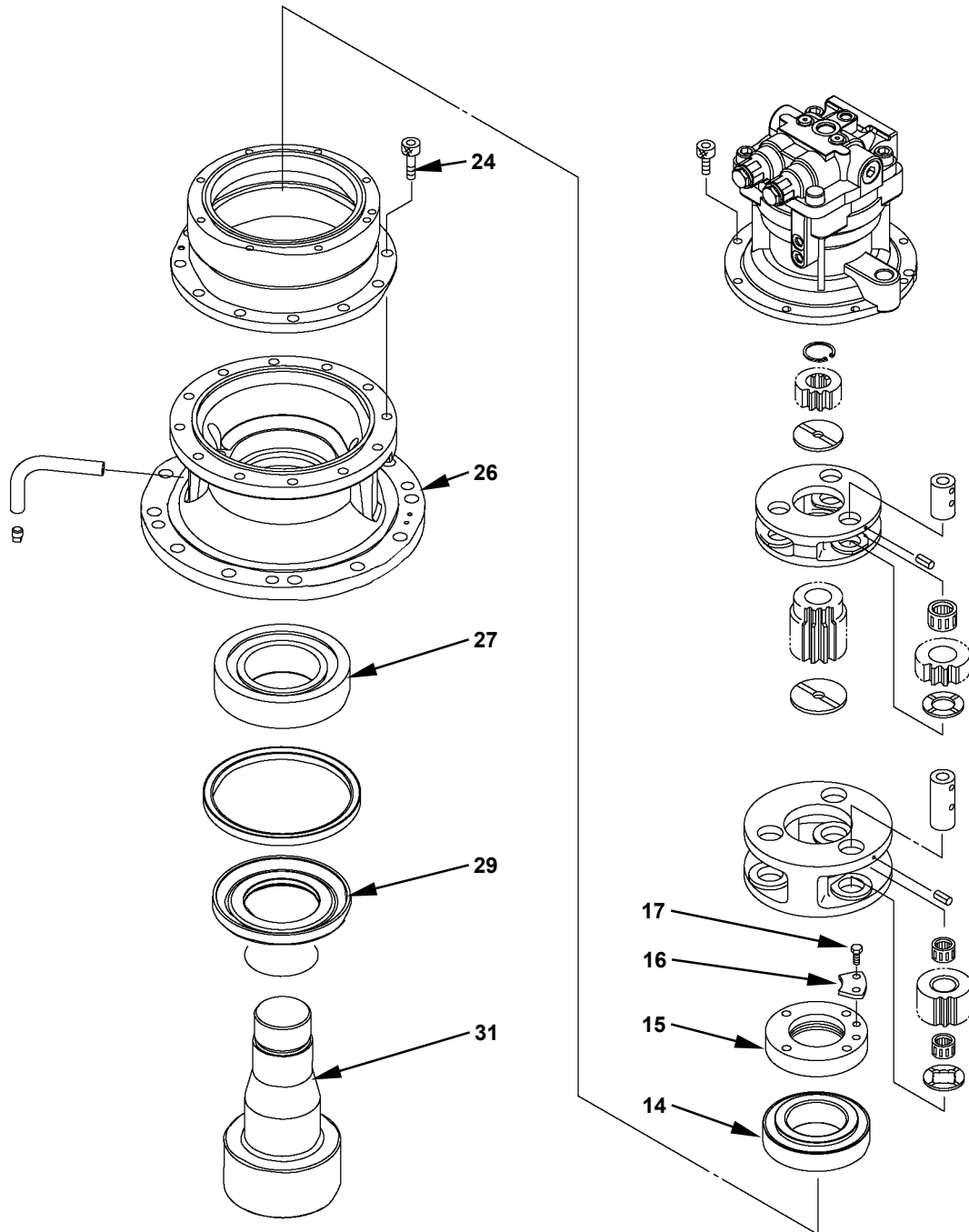
 **NOTE:** *THREEBOND* has been applied on the jointed surfaces between housing (26) and ring gear (25). Attach a screwdriver onto the notch between jointed portion. Float it for easy removal.



CAUTION: The second stage carrier (18) assembly weight: 32 kg (70 lb)

8. Remove second stage sun gear (20) and the second stage carrier (18) assembly from housing (26).

UPPERSTRUCTURE / Swing Device

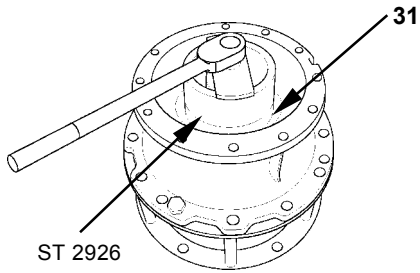


W1V1-02-06-003

UPPERSTRUCTURE / Swing Device

CAUTION: The housing (26) assembly weight: 178 kg (395 lb)

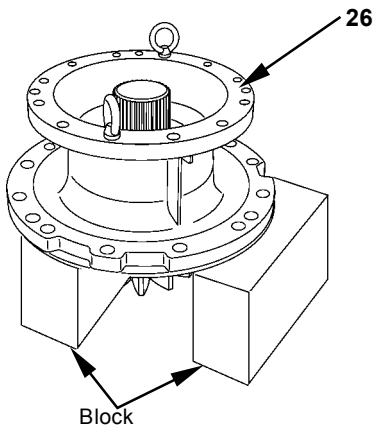
- Remove bolts (17) (2 used). Remove lock plate (16) from bearing nut (15).
🔧 : 17 mm
- Remove bearing nut (15) from shaft (31) by using special tool (ST 2926).



W178-02-06-008

- Install eyebolts (M18, Pitch 2.5 mm) (2 used) into the bolt (24) hole on housing (26). Remove the bolts (M22, Pitch 2.5 mm) (2 used) securing housing (26) and bracket (ST 5100). Hoist the housing (26) assembly and remove the bracket.
🔧 : 32 mm

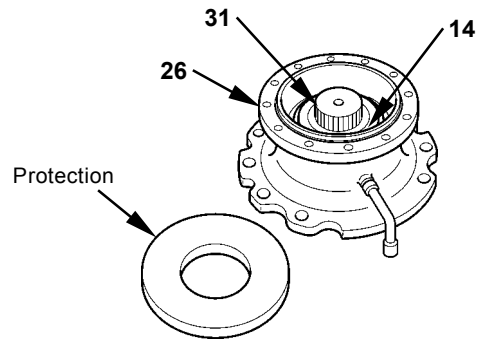
- Set the blocks on the press. Set the housing (26) assembly on the blocks.



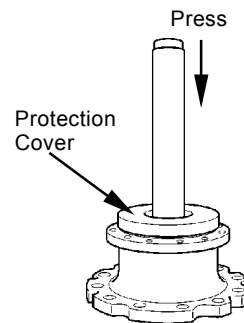
W1HH-02-06-012

CAUTION: If pushing shaft (31) by using a press, provide a protection cover (outer diameter: 369 mm (14.5 in), inner diameter: 90 mm (3.5 in), thickness: 25 to 30 mm (1.0 to 1.2 in)). Push shaft (31) with the protection cover on by using a press. When housing (26) and/or roller bearing (14) are broken and flown off, the metal fragments may result in personal injury. Use a press with the capacity less than 30 tons (66000 lb). Degrease the housing inside before heating roller bearing (14). Failure to degrease may cause a fire.

- Put the protection cover onto housing (26) and remove shaft (31) by using a press. At this time, the inner race of roller bearing (27) and sleeve (29) are removed with shaft (31) together.

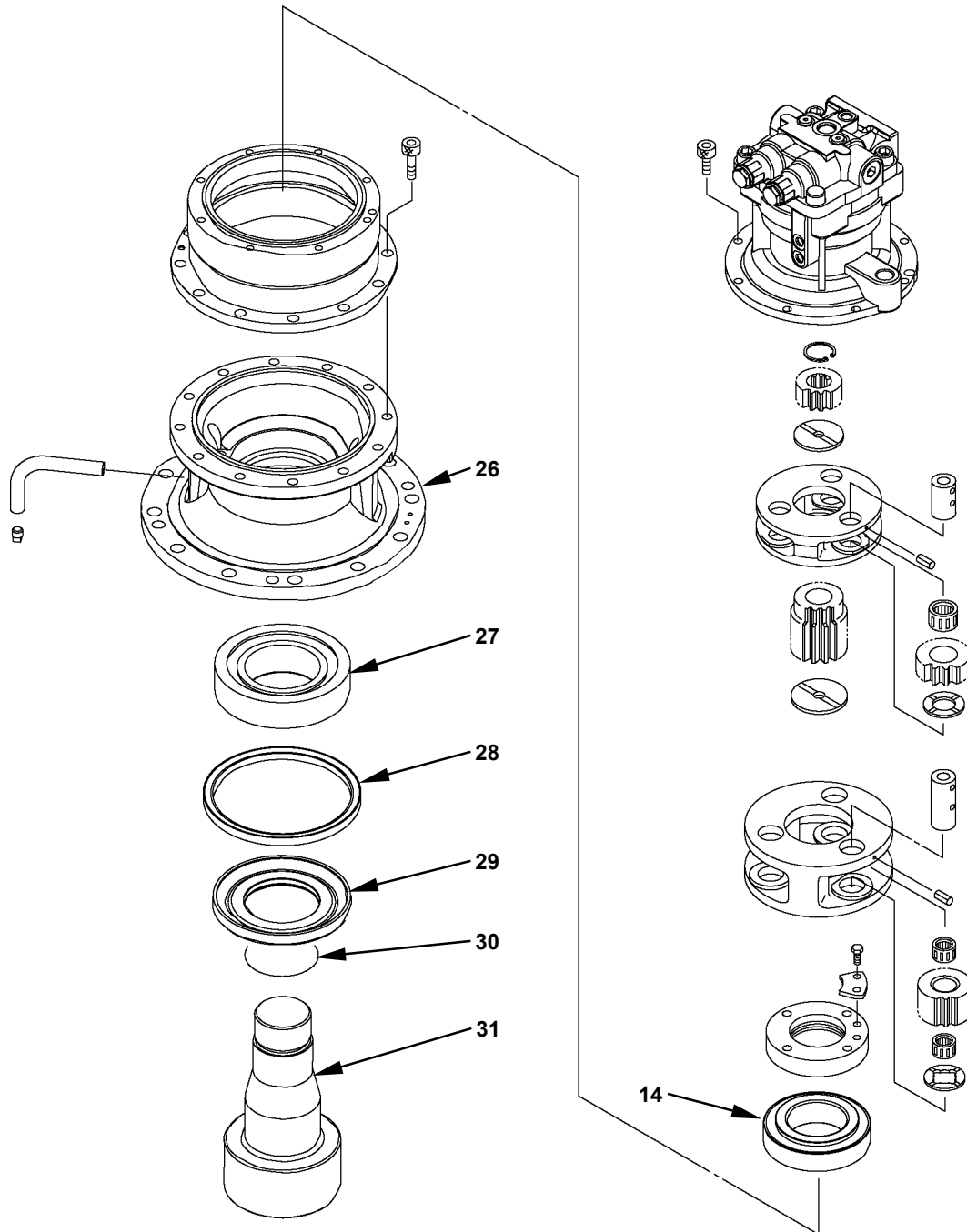


W157-02-06-010



W1V7-02-06-002

UPPERSTRUCTURE / Swing Device




W1V1-02-06-003


UPPERSTRUCTURE / Swing Device

14. Remove the inner race of roller bearing (14) from housing (26).

15. Set special tool to the shaft (31) assembly.

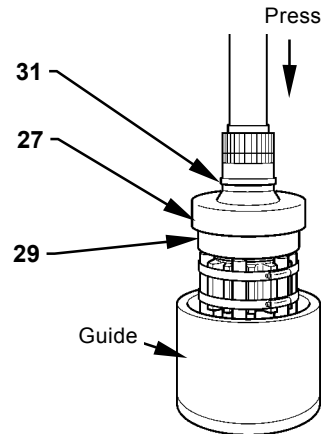
 **NOTE:** Use the following parts as special tool for roller bearing (27).

Part	Size	Remarks
Shaft or Bolt	Length: 220 mm (8.7 in) Diameter: 19 mm (3/4 in)	8 used. All should be identical in length with no wear and deformation on both ends. Material: S35C
Hose Clamp	Standard Diameter: 8-1/2" (Applicable Diameter: 185 to 215 mm)	2 used.
Guide	Height: 160 mm (6.3 in) Outer Diameter: 292 mm (11.5 in) Inner Diameter: 272 mm (10.7 in)	

 **CAUTION:** When pushing shaft (31) by using a press, set shaft (31) into the guide.

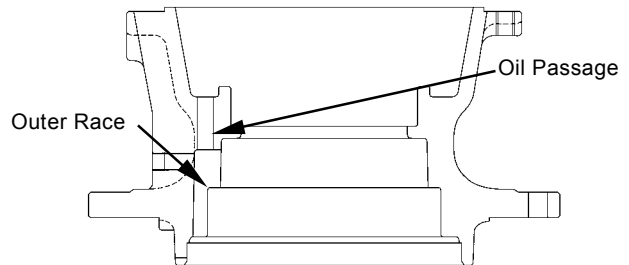
16. Set shaft (31) attached with special tool to a press. Remove roller bearing (27).

17. Remove sleeve (29) from shaft (31). Remove O-ring (30) from sleeve (29).

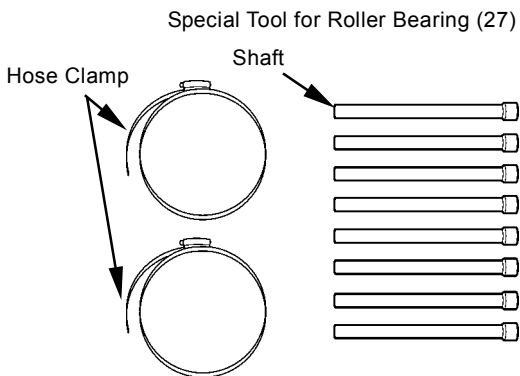


W157-02-06-014

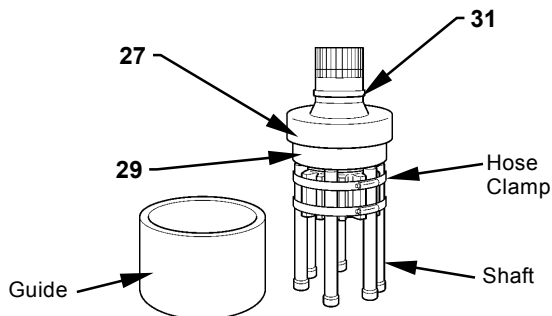
18. Insert a round bar into the oil passage in housing (26). Tap and remove the outer race of roller bearing (27).



W1HH-02-06-007




W157-02-06-012



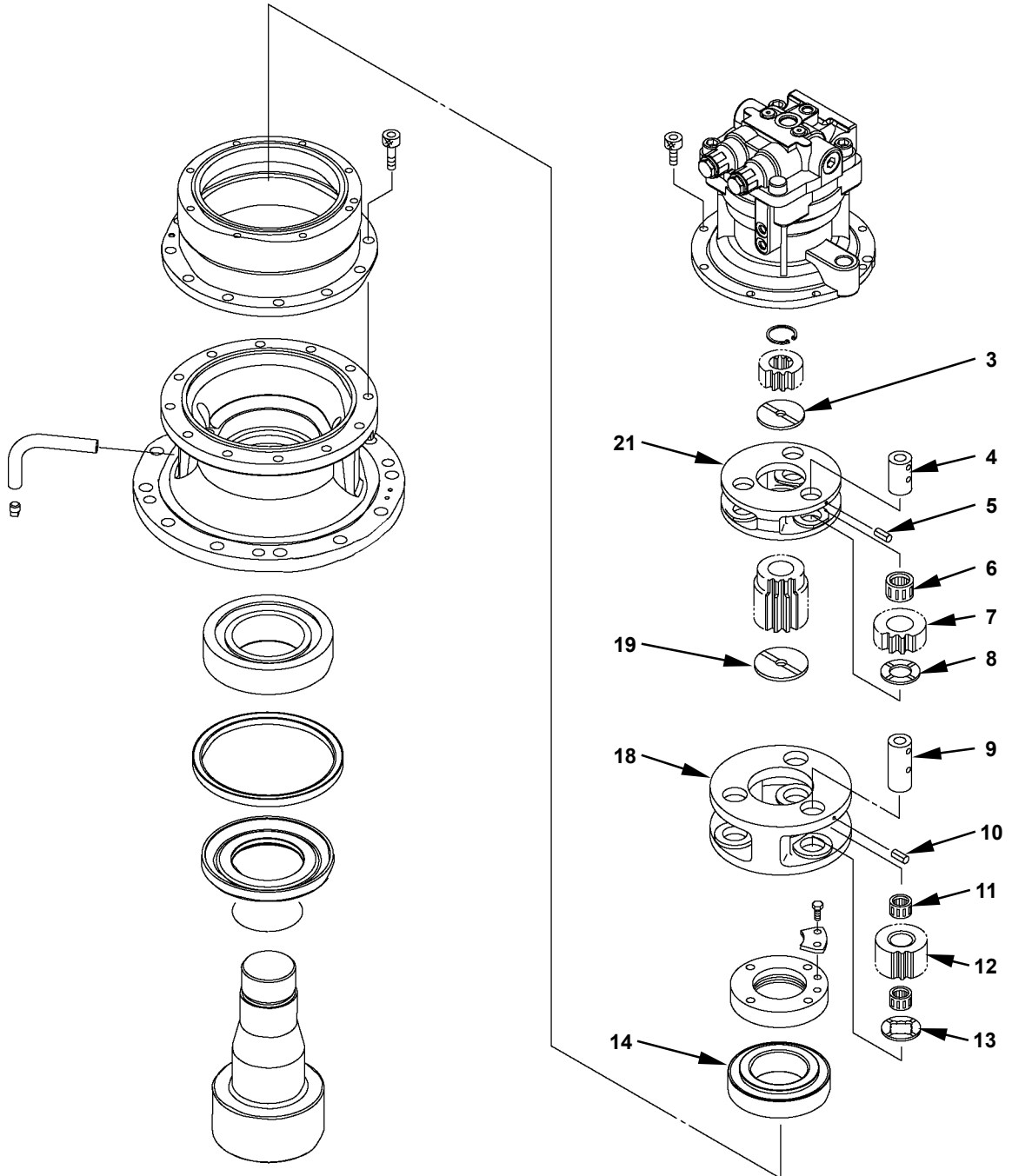
W157-02-06-01

 **CAUTION:** Housing (26) weight: 105 kg (230 lb)

19. Fasten the housing (26) body by using a nylon sling. Hoist and turn over housing (26). Insert a screwdriver into the notch on housing (26) where oil seal (28) is mounted. Remove oil seal (28).

 **NOTE:** THREEBOND has been applied on the periphery of oil seal (28). The oil seal cannot be reused.

UPPERSTRUCTURE / Swing Device



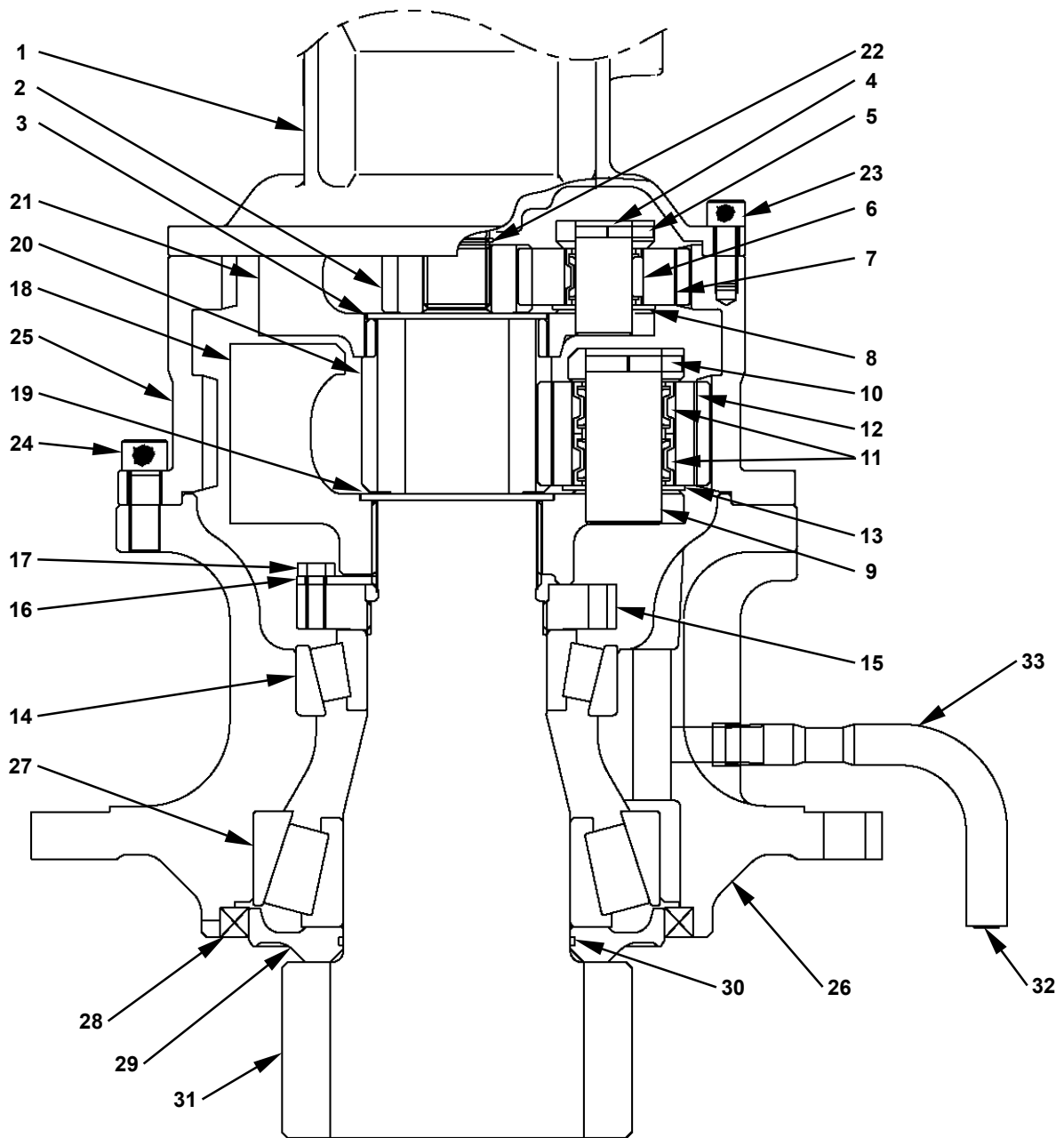
W1V1-02-06-003

UPPERSTRUCTURE / Swing Device

20. Tap and remove the outer race of roller bearing (14) from housing (26) by using a bar and hammer.
21. Remove spring pins (5) (3 used) from first stage carrier (21) by using a round bar and hammer.
22. Remove pins (4) (3 used), first stage planetary gears (7) (3 used), thrust plates (8) (3 used) and needle bearings (6) (3 used) from first stage carrier (21).
23. Remove thrust plates (3) from first stage carrier (21).
24. Remove spring pins (10) (3 used) from second stage carrier (18) by using a round bar and hammer.
25. Remove pins (9) (3 used), second stage planetary gears (12) (3 used), thrust plates (13) (6 used), and needle bearings (11) (6 used) from second stage carrier (18).
26. Remove thrust plate (19) from second stage carrier (18).

UPPERSTRUCTURE / Swing Device

ASSEMBLE SWING DEVICE



W1V1-02-06-004

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

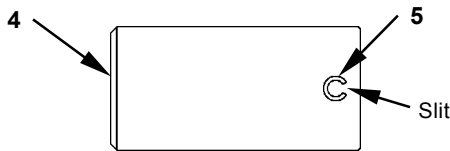
UPPERSTRUCTURE / Swing Device

Assemble Swing Device

1. Install needle bearings (6) (3 used) to first stage planetary gears (7) (3 used).
2. Install thrust plate (3) to first stage carrier (21) with the oil groove facing upward.
3. Install first stage planetary gears (7) (3 used) and thrust plates (8) (3 used) to first stage carrier (21).
4. Align the hole on pin (4) with the spring pin hole on first stage carrier (21). Install pins (4) (3 used) by using a plastic hammer.

IMPORTANT: Check the direction of spring pin (5).


5. Face the slit of spring pin (6) to the end of pin (5). Install spring pin (6) into first stage carrier (21) and pin (5) by using a hammer.

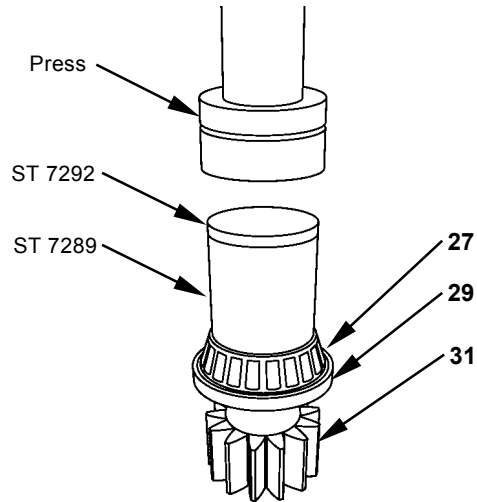


W1V7-02-06-003

6. Assemble second stage carrier (18) in the same procedures as steps 1 to 5. Assemble thrust plate (19), second stage planetary gears (12) (3 used), needle bearings (11) (6 used), thrust plates (13) (6 used), pins (9) (3 used) and spring pins (10) (3 used).
7. Install O-ring (30) to sleeve (29).

8. Install sleeve (29) and the inner race of roller bearing (27) to shaft (31). Install sleeve (29) and the inner race of roller bearing (27) by using special tools (ST 7289, ST 7292) and a press.

 **NOTE:** Use special tool in order to install the inner race of roller bearing (27) correctly.



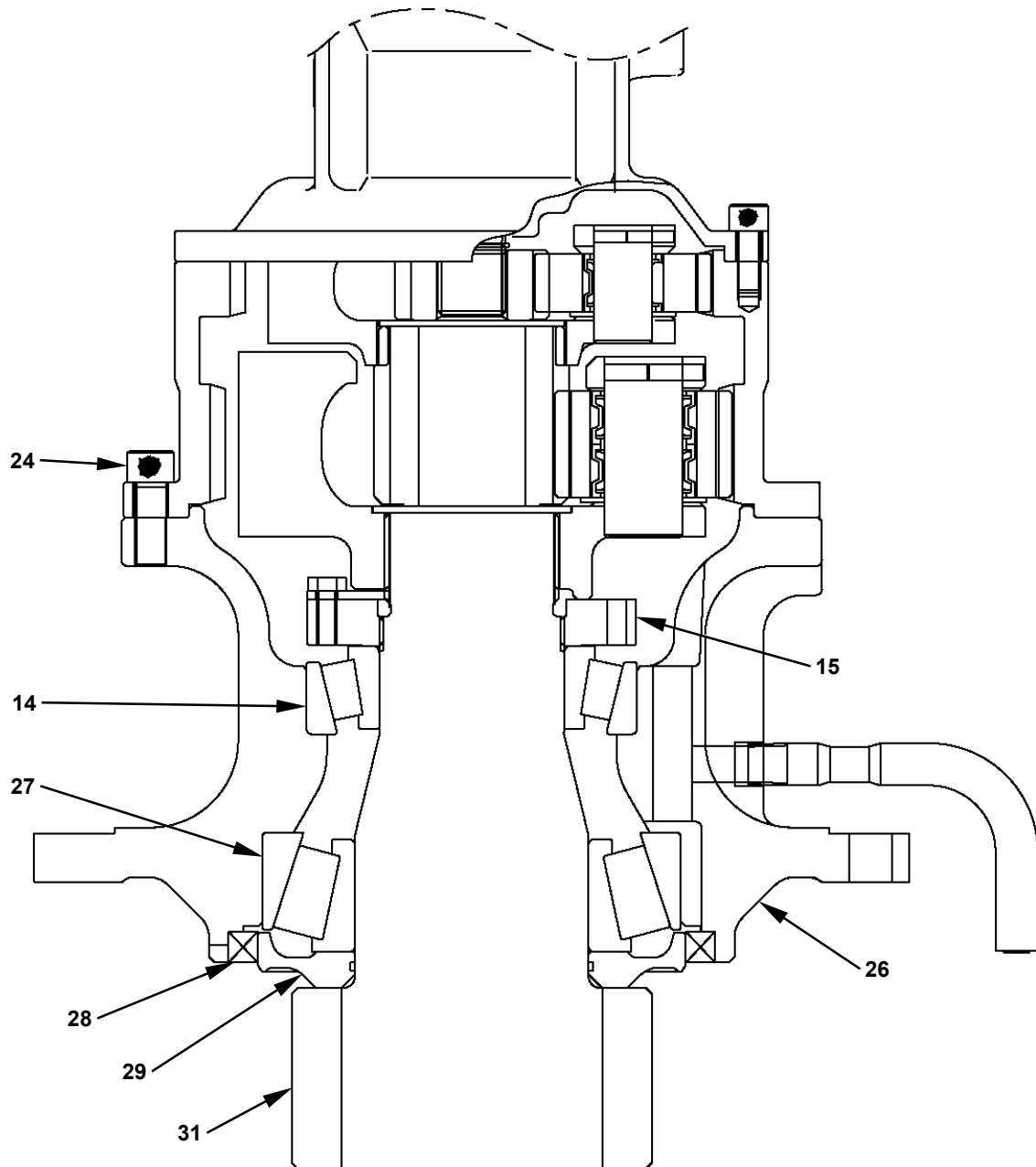
WIHH-02-06-008



CAUTION: Housing (26) weight: 105kg (230 lb)

9. Fasten the housing (26) body by using a nylon sling. Hoist and place housing (26) with the sleeve (29) mounting side facing upward.
10. Tap and install the outer race of roller bearing (27) to housing (26) by using a bar and hammer evenly. Tap and listen to ring in order to check if the installation is completed.

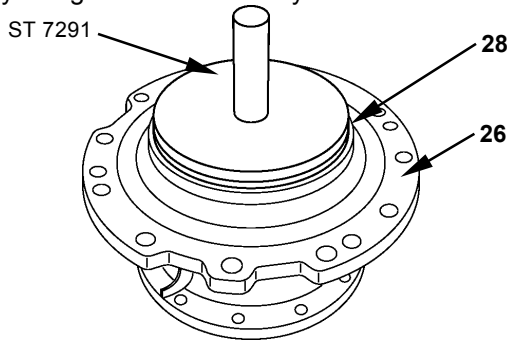
UPPERSTRUCTURE / Swing Device



W1V1-02-06-004


UPPERSTRUCTURE / Swing Device

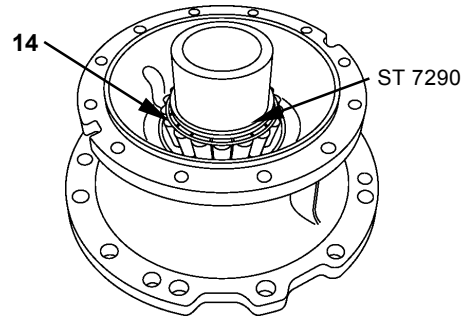
11. Apply THREEBOND #1215 on the outer surface of oil seal (28). Place oil seal (28) flat on housing (26) and push by hand in gently. Place special tool (ST 7291) on oil seal (28). Tap in special tool by using a hammer directly.



WIHH-02-06-010

19. Place special tool (ST 7290) onto the inner race of roller bearing (14). Install the inner race by using a press.

 **NOTE:** Use special tool in order to install the inner race correctly.



WIHH-02-06-009


12. Apply grease to the inner surface of oil seal (28). Apply grease to the outer surface of sleeve (29) attached on shaft (31).

13. Turn over housing (26). Install eyebolts (M18, Pitch 2.5 mm) (2 used) to the bolt (24) hole on housing (26). Hoist and place housing (26) on shaft (31). Check and align carefully in order to prevent the oil seal (28) lip from curling.

14. Tap and install the outer race of roller bearing (14) to housing (26) by using a bar and hammer evenly. Tap and listen to ring in order to check if the installation is completed.

15. Tap and install the inner race of roller bearing (14) into shaft (31) by using a bar and hammer. Tap the inner race until two threads of shaft for bearing nut (15) appear.

16. Tighten bearing nut (15) to shaft (31) by hand.

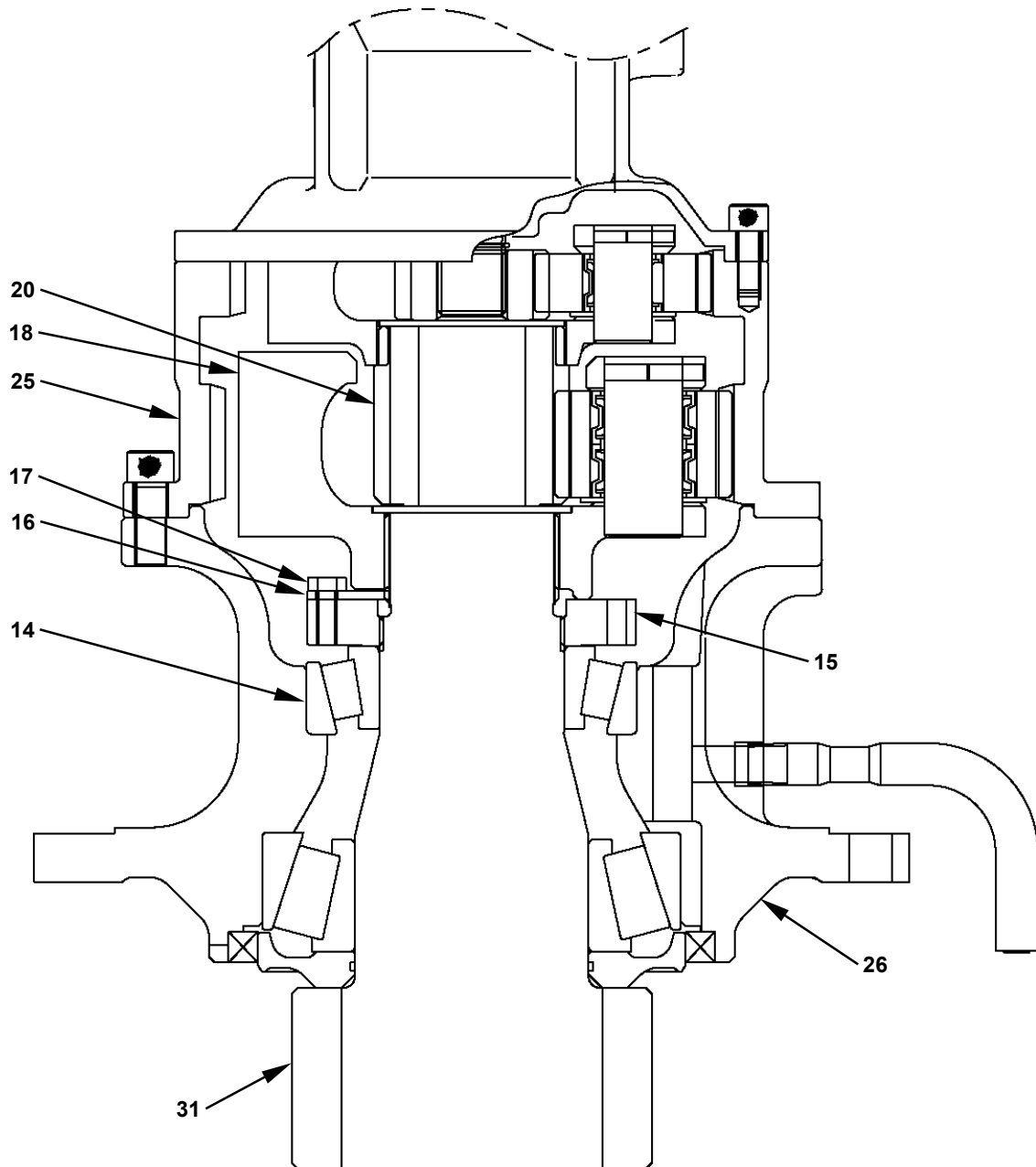
 **NOTE:** Prevent shaft (31) from falling off when hoisting housing (26).

 **CAUTION:** Housing (26) + shaft (31) + bearing (14) weight: 178 kg (390 lb)

17. Install eyebolts (M18, Pitch 2.5 mm) (2 used) to the bolt (24) hole on housing (26). Hoist and place housing (26) on a press.

18. Remove bearing nut (15) from shaft (31).


UPPERSTRUCTURE / Swing Device

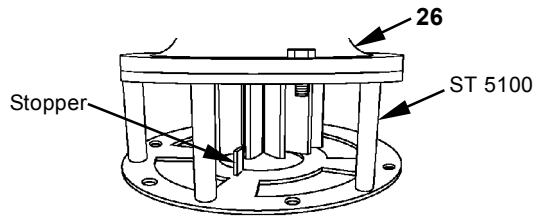


W1V1-02-06-004

UPPERSTRUCTURE / Swing Device


20. Hoist and place the housing (26) assembly on bracket (ST 5100). Install the housing (26) assembly with bolts (M22, Pitch 2.5 mm) (2 used). Insert the stopper at the bottom of bracket between teeth of the pinion gear. Secure the bracket on a workbench in order to reduce the reaction force.


 : 32 mm

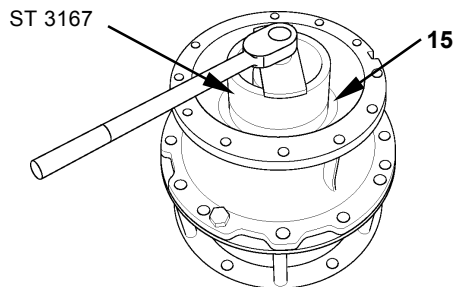


W1V7-02-06-001

21. Apply a firm of grease to the thread part of bearing nut (15). Install bearing nut (15) to shaft (31) with the stepped side facing to roller bearing (14). Tighten bearing nut (15) to the specified torque by using special tool (ST 2926).


 : 735 N·m (75 kgf·m, 540 lbf·ft)


 **NOTE:** Apply grease for keeping correct tightening torque.



W178-02-06-008

22. Install lock plate (16) to bearing nut (15) with bolt (17). In case the spline of lock plate (16) and that of shaft (31) are not aligned, tighten bearing nut (15) in tightening direction until both splines are aligned.

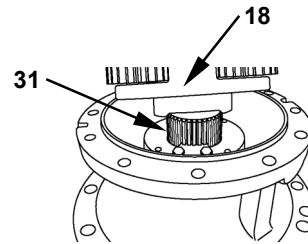
 : 17 mm

 : 50 N·m (5 kgf·m, 36 lbf·ft)

 **CAUTION:** Second stage carrier (18) weight: 32 kg (70 lb)

IMPORTANT: Check the direction of second stage carrier (18).

23. Install the second stage carrier (18) assembly to the spline of shaft (31).

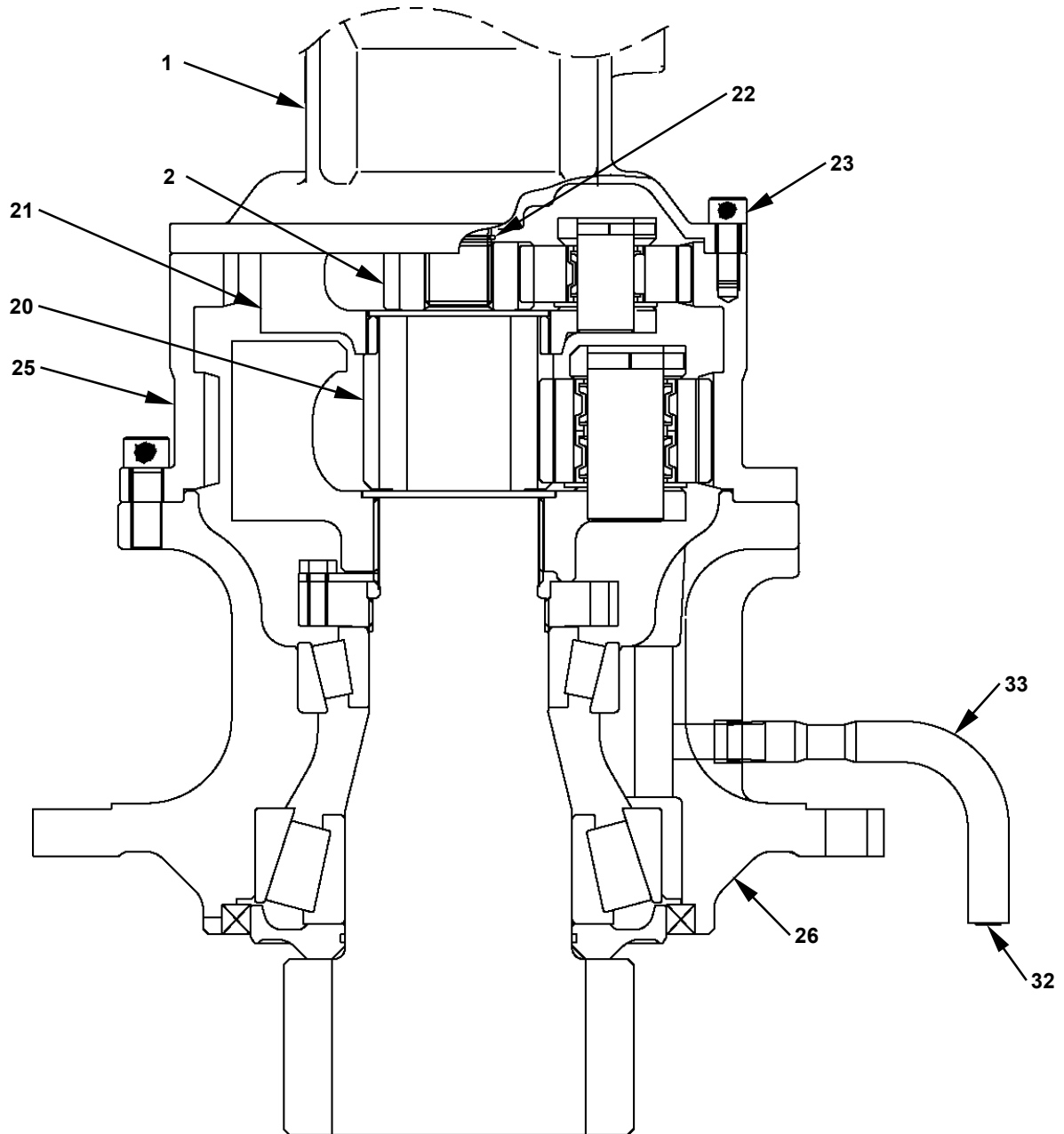


W1V7-02-06-005

24. Install second stage sun gear (20) to the second stage carrier (18) assembly.

25. Clean off old adhesive. Apply THREEBOND #1215 onto the ring gear (25) mounting surface of housing (26).

UPPERSTRUCTURE / Swing Device



W1V1-02-06-004


UPPERSTRUCTURE / Swing Device




CAUTION: Ring gear (25) weight: 38 kg (85 lb)

26. Install eyebolts (M12, Pitch 1.75 mm) (2 used) to the motor mounting thread part on ring gear (25). Hoist and install ring gear (25) on housing (26) while aligning the matching marks made when disassembling.

Tighten socket bolts (24) (12 used).

 : 17 mm


 : 430 N·m (44 kgf·m, 320 lbf·ft)

27. Install the first stage carrier (21) assembly to the spline of second stage sun gear (20).


IMPORTANT: Check the direction to install first stage sun gear (2).


28. Install first stage sun gear (2) to the first stage carrier (21) assembly with the stepped side facing downward.

29. Wind the seal tape onto the thread part of pipe (33). Install pipe (33) to housing (26). Face pipe (33) downward.

 : 18 mm

30. Wind the seal tape onto drain plug (32). Install drain plug (32) to pipe (33).

 : 8 mm

 : 50 N·m (5.1 kgf·m, 37 lbf·ft)


31. Add gear oil (15.7 L (4.15 US gal.)) into housing (26).


32. Apply liquid packing (THREEBOND #1215) onto the motor (1) mounting surface of ring gear (25).



CAUTION: Motor (1) weight: 71 kg (157 lb)

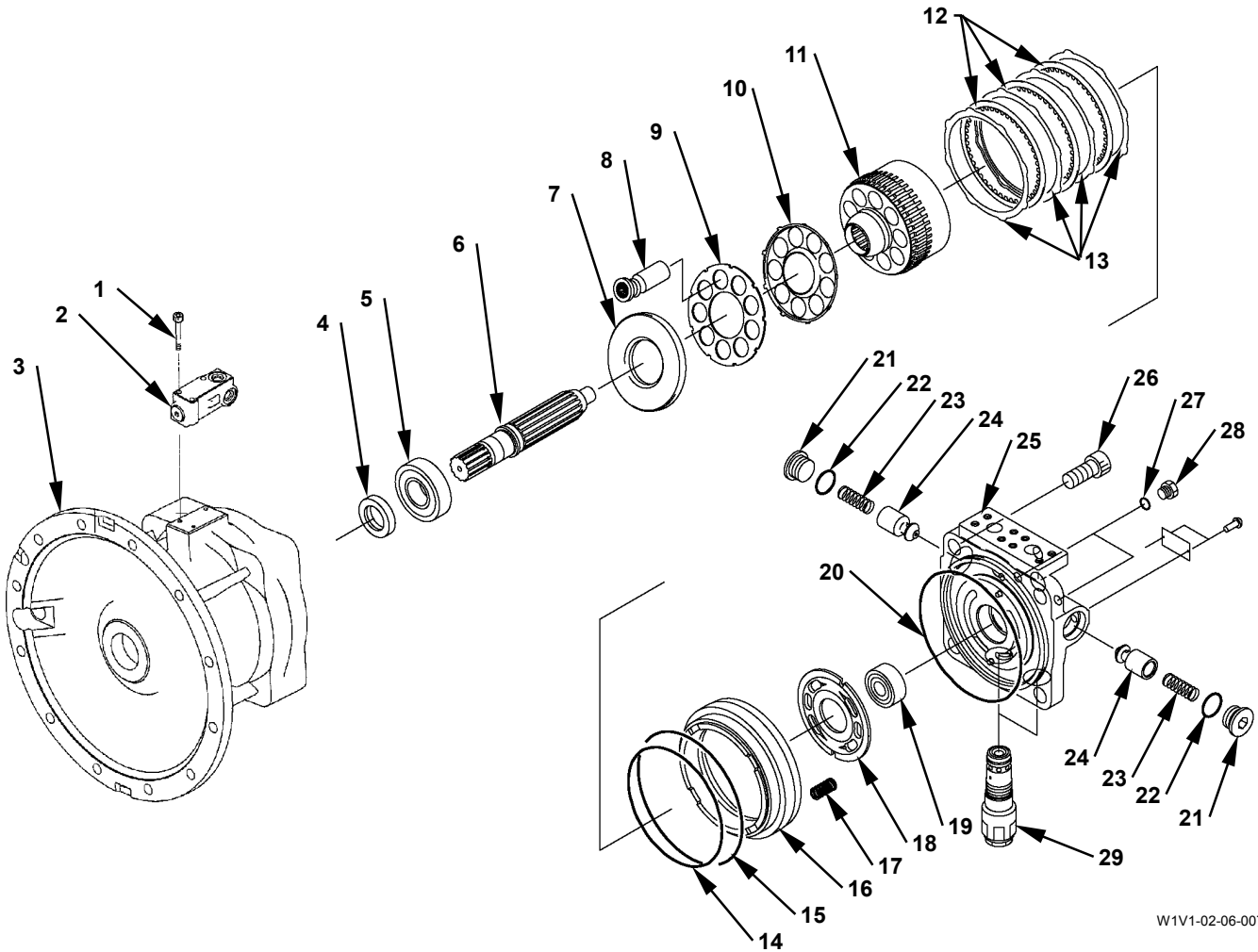
33. Hoist motor (1) and align the matching marks made when disassembling. Install motor (1) to ring gear (23) with socket bolts (23) (8 used).

 : 10 mm

 : 88 N·m (9 kgf·m, 65 lbf·ft)

UPPERSTRUCTURE / Swing Device

DISASSEMBLE SWING MOTOR



W1V1-02-06-007

- 1 - Socket Bolt (3 Used)
- 2 - Swing Parking Brake Switch Valve
- 3 - Casing
- 4 - Oil Seal
- 5 - Bearing
- 6 - Shaft
- 7 - Shoe Plate
- 8 - Plunger (9 Used)

- 9 - Plate
- 10 - Retainer
- 11 - Rotor
- 12 - Friction Plate (3 Used)
- 13 - Plate (4 Used)
- 14 - O-Ring
- 15 - O-Ring

- 16 - Brake Piston
- 17 - Spring (20 Used)
- 18 - Valve Plate
- 19 - Bearing
- 20 - O-Ring
- 21 - Plug (2 Used)
- 22 - O-Ring (2 Used)

- 23 - Spring (2 Used)
- 24 - Poppet (2 Used)
- 25 - Valve Casing
- 26 - Socket Bolt (4 Used)
- 27 - O-Ring (2 Used)
- 28 - Plug (2 Used)
- 29 - Relief Valve (2 Used)

UPPERSTRUCTURE / Swing Device


Disassemble Swing Motor




CAUTION: The swing motor assembly weight: 71 kg (157 lb)

IMPORTANT: Do not disassemble relief valve (29).

1. Remove relief valves (29) (2 used) from valve casing (25).


 : 41 mm

2. Remove plugs (21) (2 used).


 : 17 mm


3. Remove springs (23) (2 used) and poppets (24) (2 used) from valve casing (25).

4. Remove socket bolts (1) (3 used). Remove swing parking brake switch valve (2) from casing (3).

 : 5 mm

5. Put the matching marks on the jointed part between valve casing (25) and casing (3). Remove socket bolts (26) (4 used). Remove valve casing (25) from casing (3).

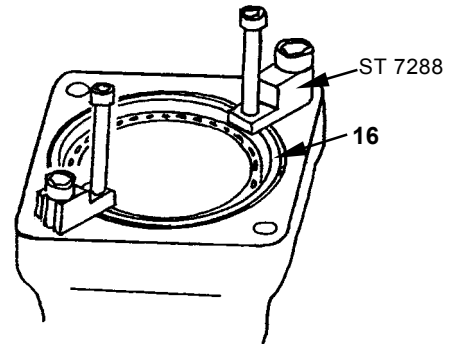
 : 17 mm

 **NOTE:** Check that valve casing (25) is floated by spring (17). When removing valve casing (25), valve plate (18) may be removed together. Do not drop valve plate (18).

IMPORTANT: Do not damage the mating surfaces when separating valve plate (18) from valve casing (25) by using a screwdriver.

6. If valve plate (18) is still attached in step 5, remove valve plate (18) from the rotor. Remove springs (17) (20 used) from brake piston (16).

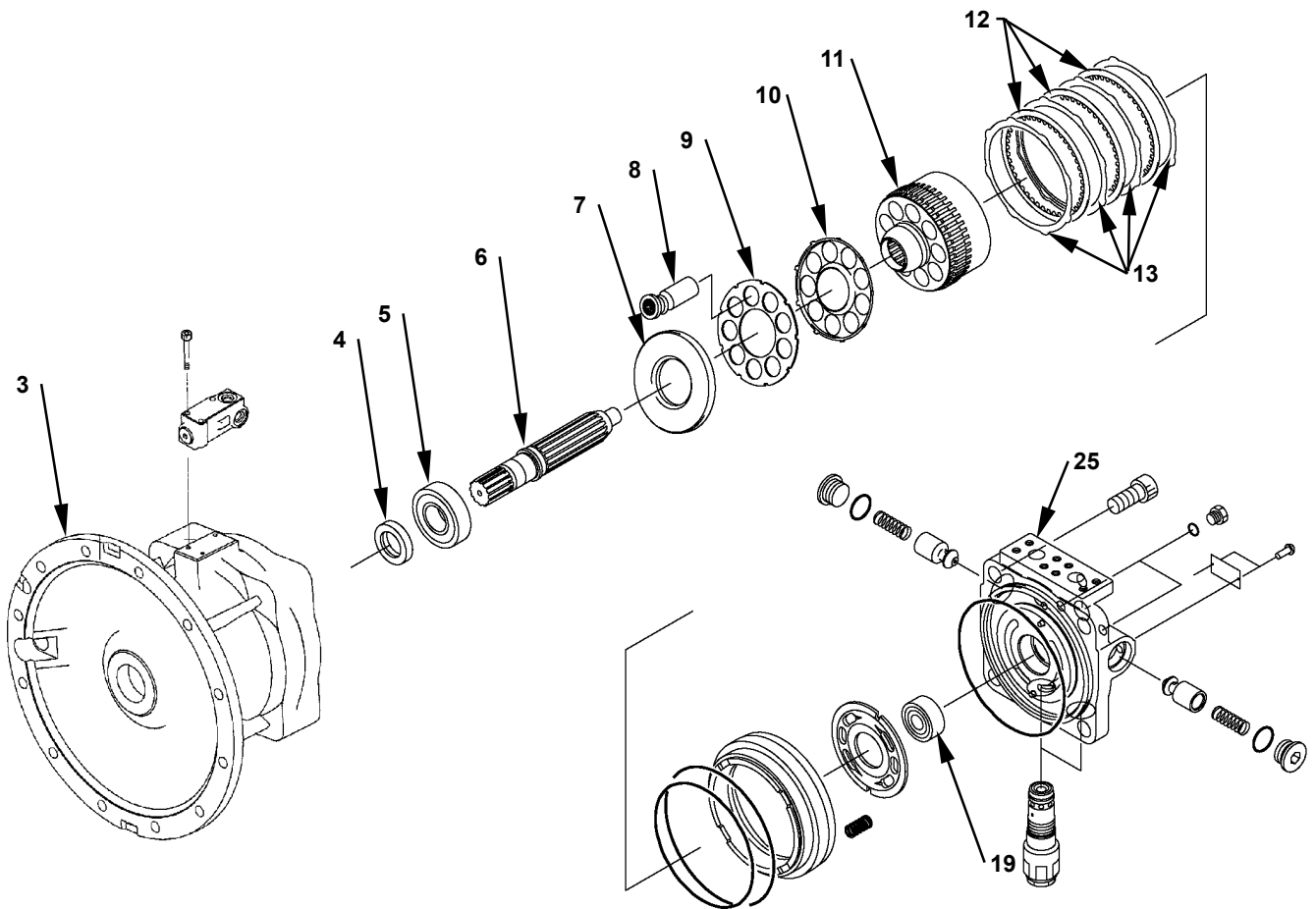
7. Attach special tool (ST 7288) onto the brake piston (16) groove and hoist brake piston (16) straightly.



W1HH-02-06-006

8. Remove O-rings (14, 15) from casing (3).

UPPERSTRUCTURE / Swing Device



W1V1-02-06-007

UPPERSTRUCTURE / Swing Device

IMPORTANT: Do not damage the sliding surfaces of rotor (11) and plunger (8).

9. Set casing (3) in horizontal and remove rotor (11) from shaft (6). Remove plungers (8) (9 used), plate (9) and retainer (10) from casing (3).

10. Remove plates (13) (4 used) and friction plates (12) (3 used) from casing (3).

IMPORTANT: Do not damage the sliding surface of shoe plate (7).

11. Remove shoe plate (7) from casing (3).

IMPORTANT: When removing shaft (6), the spline damages oil seal (4). Wind the tape onto the spline of shaft (6) before removing shaft (6).

12. Tap and remove shaft (6) from casing (3) by using a plastic hammer lightly.

13. Remove oil seal (4) from casing (3).

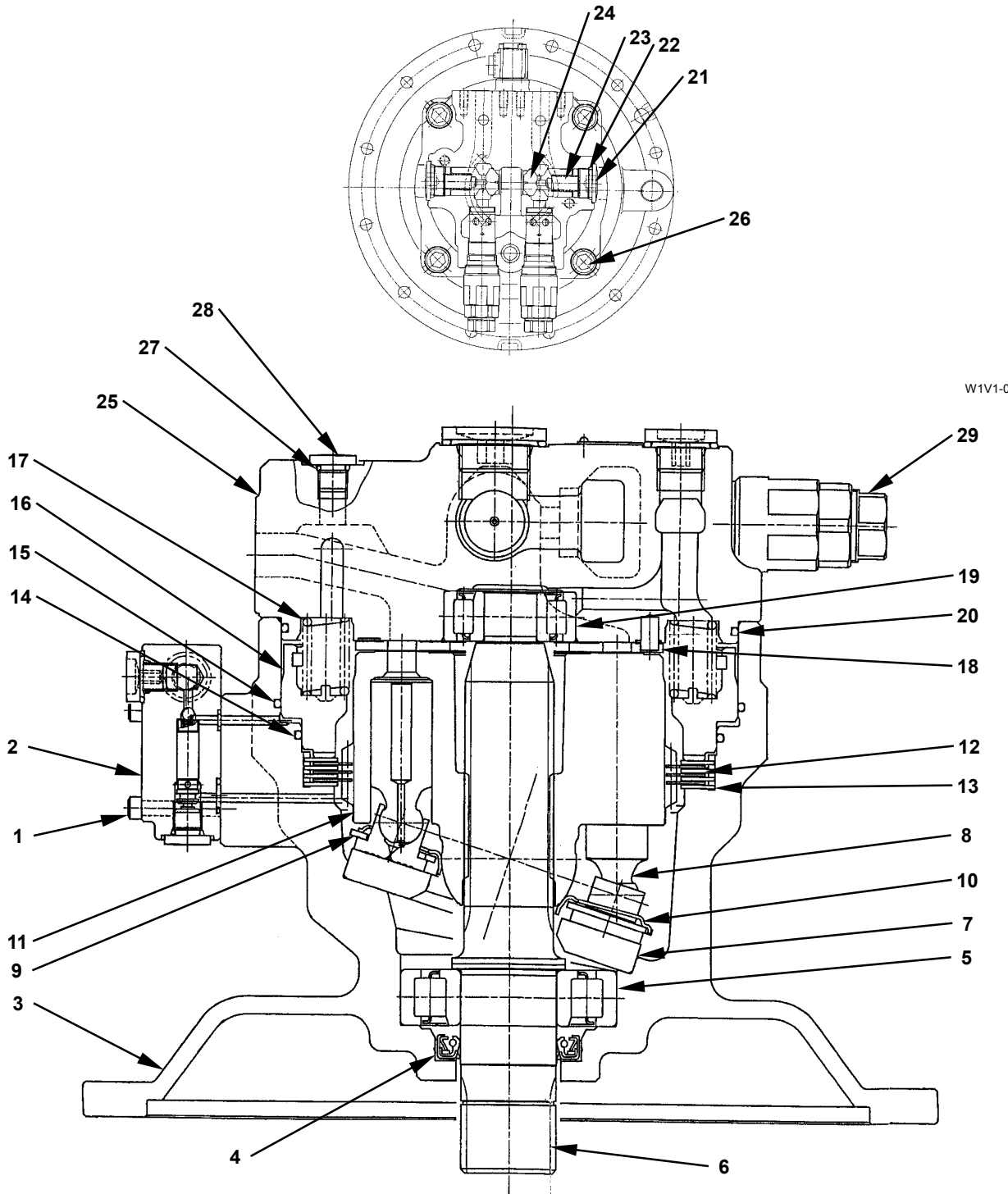
14. Remove the outer race of roller bearing (5) from casing (3) by using a bar and plastic hammer.

15. Remove the inner race of roller bearing (5) from shaft (6) by using a press.

16. Remove bearing (19) from valve casing (25) by using a bearing puller.

UPPERSTRUCTURE / Swing Device

ASSEMBLE SWING MOTOR



W1V1-02-06-008

W1V1-02-06-009

- | | | | |
|--------------------------------------|------------------------------|-----------------------|----------------------------|
| 1 - Socket Bolt (3 Used) | 9 - Plate | 16 - Brake Piston | 23 - Spring (2 Used) |
| 2 - Swing Parking Brake Switch Valve | 10 - Retainer | 17 - Spring (20 Used) | 24 - Poppet (2 Used) |
| 3 - Casing | 11 - Rotor | 18 - Valve Plate | 25 - Valve Casing |
| 4 - Oil Seal | 12 - Friction Plate (3 Used) | 19 - Bearing | 26 - Socket Bolt (4 Used) |
| 5 - Bearing | 13 - Plate (4 Used) | 20 - O-Ring | 27 - O-Ring (2 Used) |
| 6 - Shaft | 14 - O-Ring | 21 - Plug (2 Used) | 28 - Plug (2 Used) |
| 7 - Shoe Plate | 15 - O-Ring | 22 - O-Ring (2 Used) | 29 - Relief Valve (2 Used) |
| 8 - Plunger (9 Used) | | | |

UPPERSTRUCTURE / Swing Device

Assemble Swing Motor

IMPORTANT: Install the inner race of bearing (5) with the flange facing to the stepped side of shaft (6).

1. Install the inner races of bearings (5, 19) into shaft (6) by using a press.

IMPORTANT: Install oil seal (4) with the lip facing to the bearing (5) mounting side.

2. Push oil seal (4) into casing (3) by using a plate.
3. Install the outer race of bearing (5) to casing (3) by using a bar.


IMPORTANT: Wind the tape onto the spline at the end of shaft (6) in order not to damage the lip of oil seal (4).

4. Set casing (3) in horizontal and install shaft (6) to casing (3).
5. Place casing (3) with the valve casing (25) mounting side facing upward. Install shoe plate (7).
6. Align the notches on retainer (10) and plate (9). Install plungers (8) (9 used) to retainer (10) and plate (9). Apply hydraulic oil into the plunger hole on rotor (11). Insert the plunger (8) assemblies (9 used) into rotor (11).
7. Set casing (3) in horizontal and install the rotor (11) assembly to shaft (6).


IMPORTANT: 4 notches are on the outer side of plate (13). 4 notches are at the spline teeth side of friction plate (12). Align each notch at the same place when installing.

8. Place casing (3) vertically. Alternately install plates (13) (4 used) and friction plates (12) (3 used).

9. Install O-rings (14, 15) to casing (3).

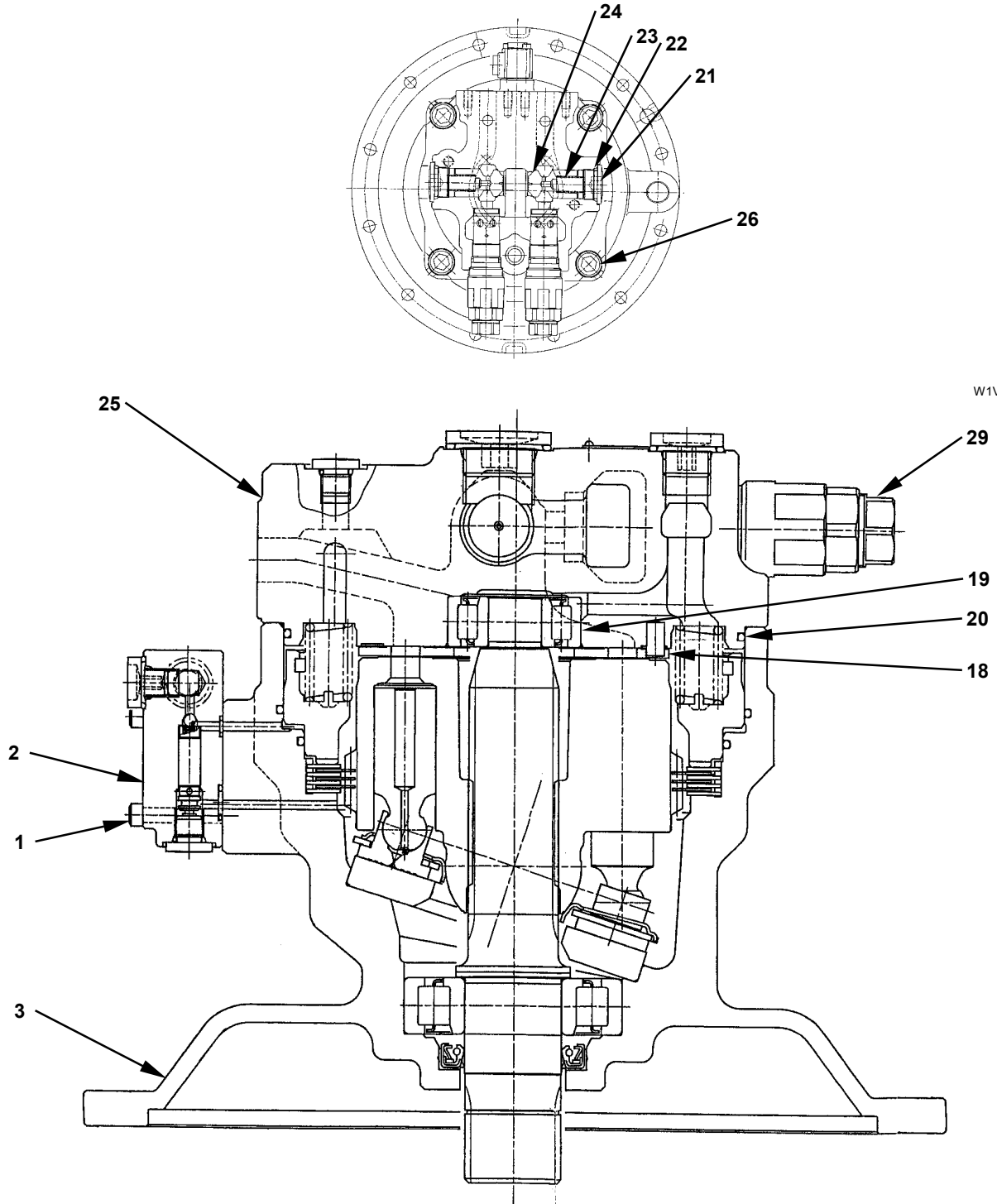
 **NOTE:** Grease to O-rings (14, 15) prevents from damaging when inserting brake piston (16).

10. Install brake piston (16) to casing (3).

 **NOTE:** If it is not easy to install brake piston (16) due to the resistant force from O-rings (14, 15), tap O-rings evenly by using a plastic hammer.

11. Install springs (17) (20 used) to brake piston (16).

UPPERSTRUCTURE / Swing Device











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W1V1-02-06-009

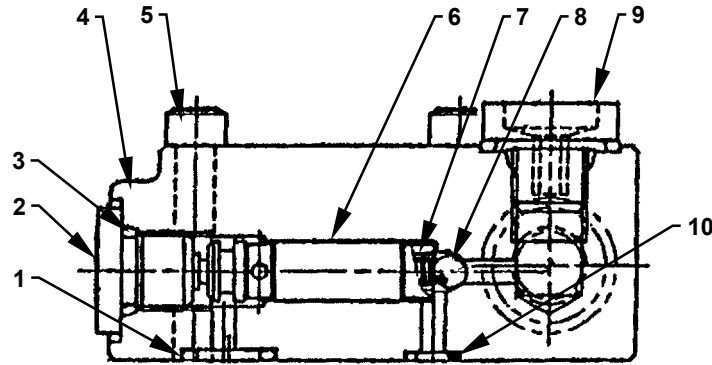
UPPERSTRUCTURE / Swing Device

IMPORTANT: Tap the bearing type indicated surface by using a plastic hammer and install bearing (19).

12. Install the outer race of bearing (19) into valve casing (25) by using a bar and plastic hammer.
13. Install O-ring (20) to valve casing (25). Apply grease to valve plate (18) in order not to fall off. Install valve plate (18) to value casing (25).
14. Align the matching mark on casing (3) and install valve casing (25) with socket bolts (26) (4 used).
 : 17 mm
 : 430 N·m (44 kgf·m, 320 lbf·ft)
15. Install poppets (24) (2 used) and springs (23) (2 used) to valve casing (25). Install plugs (21) (2 used) attached with O-rings (22) (2 used) to valve casing (25).
 : 17 mm
 : 539 N·m (55 kgf·m, 400 lbf·ft)
16. Install relief valves (29) (2 used) to valve casing (25).
 : 41 mm
 : 177 N·m (18 kgf·m, 130 lbf·ft)
17. Install swing parking brake switch valve (2) to casing (3) with socket bolts (1) (3 used).
 : 5 mm
 : 12 N·m (1.2 kgf·m, 8.7 lbf·ft)

UPPERSTRUCTURE / Swing Device

STRUCTURE OF SWING PARKING BRAKE SWITCH VALVE



W1V1-02-06-010

Item	Part Name	Q'ty	Wrench Size mm	Tightening Torque			Remark
				N·m	kgf·m	lbf·ft	
1	O-Ring	1					
2	Plug	1	┌ : 6	36	3.7	27	
3	O-Ring	1					
4	Casing	1					
5	Socket bolt	3	┌ : 5	12	1.2	8.9	
6	Plunger Assembly	1					
7	Spring	1					
8	Steel Ball	1					
9	Cap	1	┌ : 6	0.9	0.1	0.7	
10	O-Ring	1					

UPPERSTRUCTURE / Swing Device

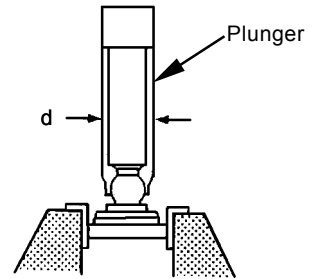
MAINTENANCE STANDARD

Swing Motor

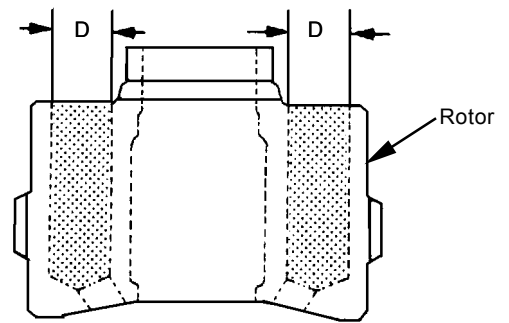
1. Clearance between plunger outer diameter and rotor inner bore.

Unit:m (in)

	Standard	Allowable Limit
D-d	0.028 (0.001)	0.058 (0.002)



W107-02-06-138

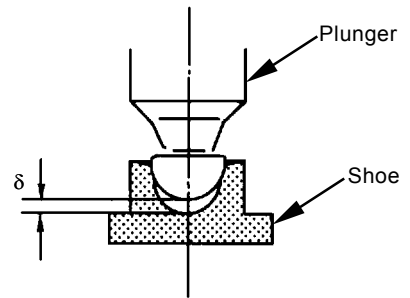


W107-02-06-139

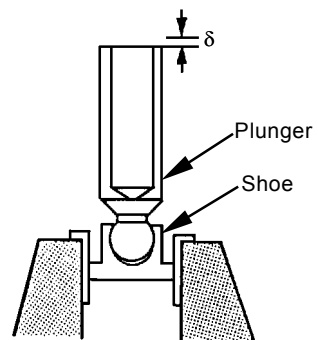
2. Clearance between plunger and shoe bottom

Unit: mm (in)

	Standard	Allowable Limit
δ	0 (0)	0.3 mm (0.0118)



W107-02-06-140



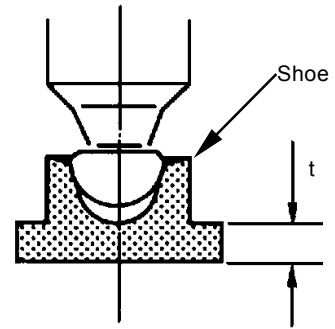
W107-02-06-141

UPPERSTRUCTURE / Swing Device

3. Shoe thickness

Unit: mm (in)

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

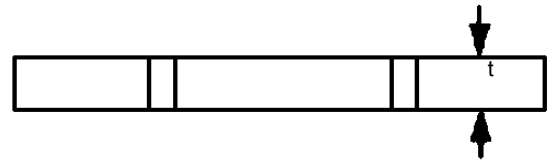


W107-02-06-142

4. Friction plate thickness

Unit: mm (in)

	Standard	Allowable Limit
t	2.0 (0.08)	1.6 (0.06)



W107-02-06-143


UPPERSTRUCTURE / Pilot Valve

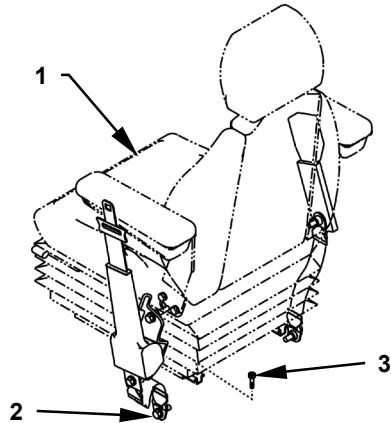
REMOVE AND INSTALL PILOT VALVE

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

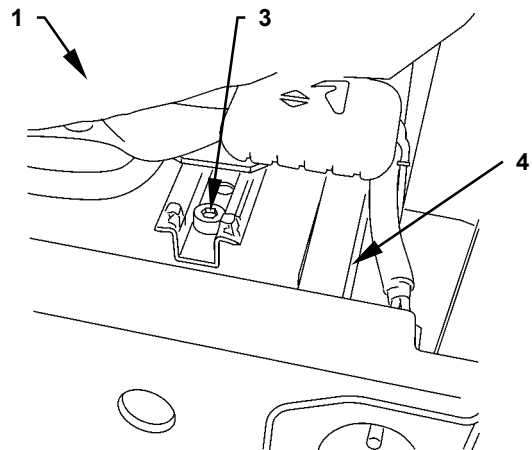
CAUTION: Seat (1) weight: 40 kg (88 lb)

1. Remove bolts (2) (2 used).
 : 16 mm



W1JB-02-01-008

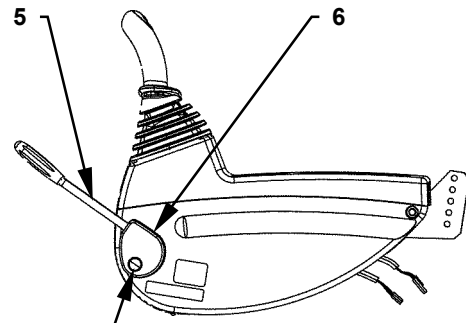
2. Remove socket bolts (3) (4 used). Remove seat (1) from bracket (4).
 : 6 mm



W1JB-02-07-007

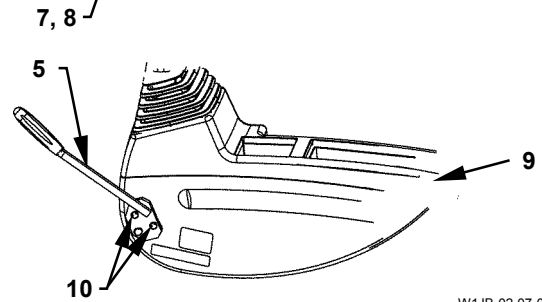
UPPERSTRUCTURE / Pilot Valve

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



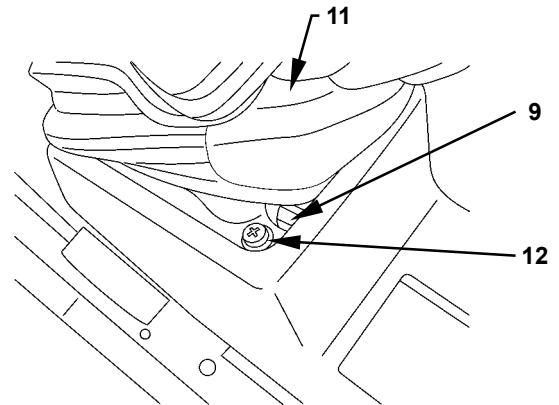
W1JB-02-07-013

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



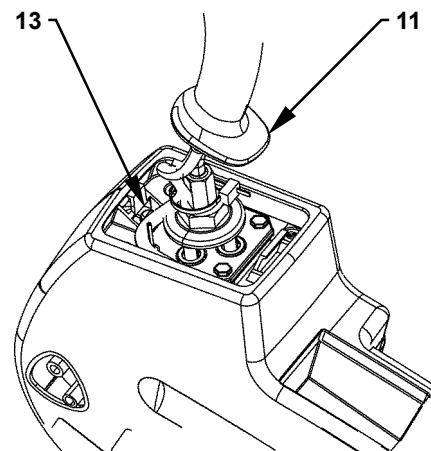
W1JB-02-07-012

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



W1JB-02-07-002


6. Remove screw (13).

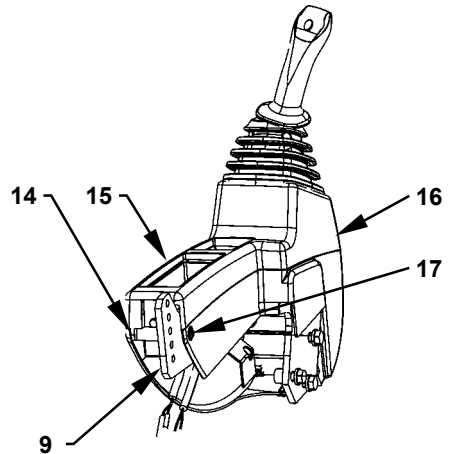


W1JB-02-07-014

UPPERSTRUCTURE / Pilot Valve

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


 : 10 mm

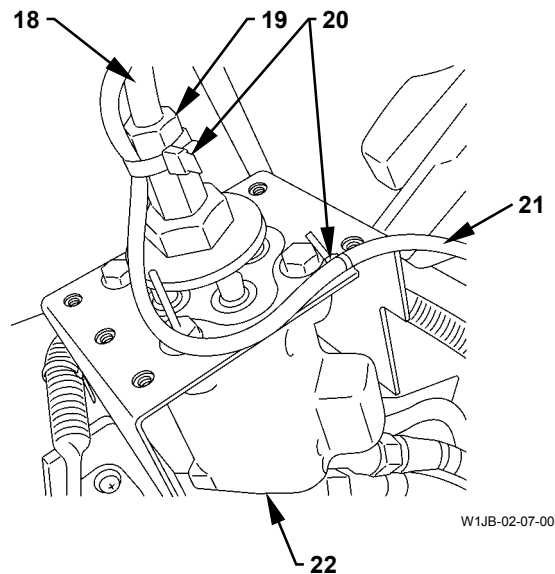


W1JB-02-07-011

8. Remove clip bands (20) (2 used). Disconnect the connector of harness (21).


9. Loosen lock nut (19). Remove the lever (18) assembly from pilot valve (22).

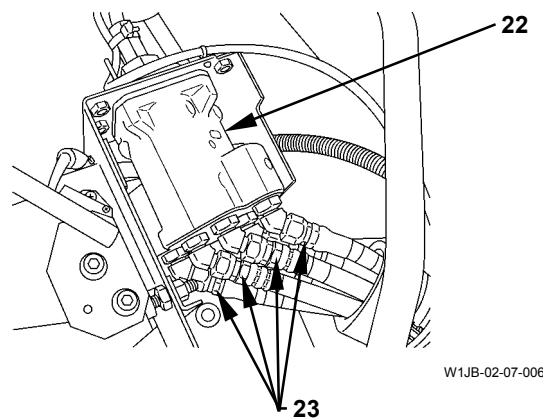
 : 19 mm, 32 mm



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

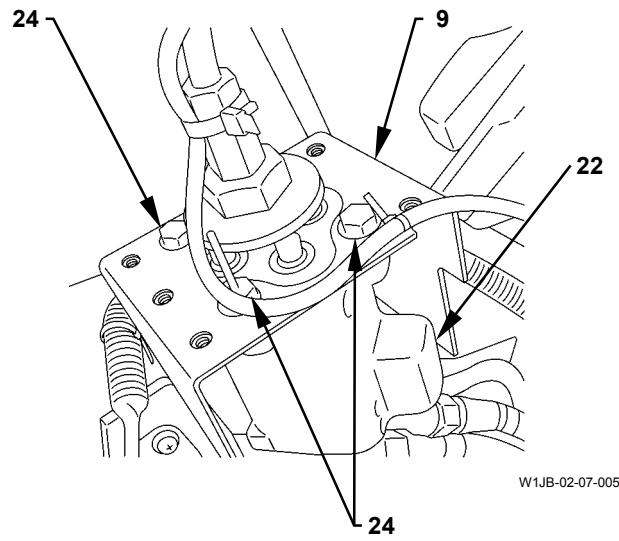


W1JB-02-07-006

UPPERSTRUCTURE / Pilot Valve

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

 : 13 mm





W1JB-02-07-005

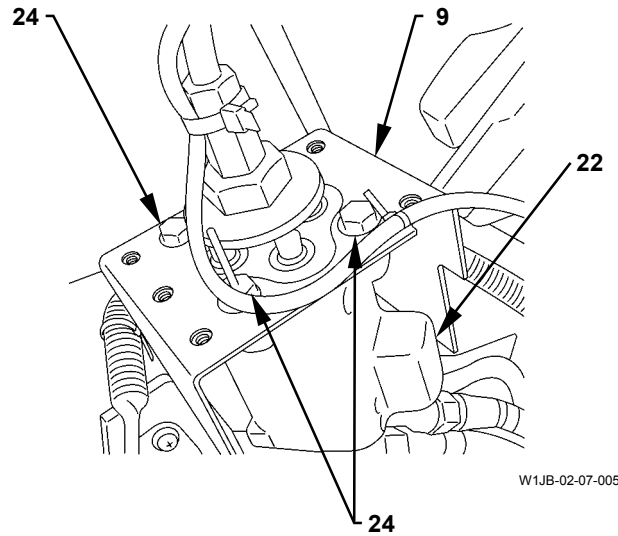
UPPERSTRUCTURE / Pilot Valve

Install Left Pilot Valve


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


 : 13 mm

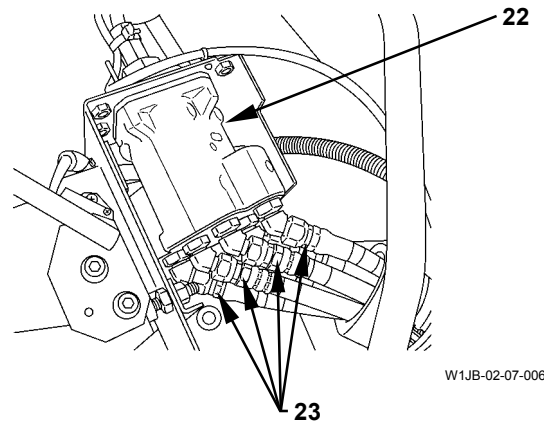
 : 10 N·m (1.0 kgf·m, 7.4 lbf·ft)




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


 : 19 mm

 : 29.5 N·m (3 kgf·m, 22 lbf·ft)



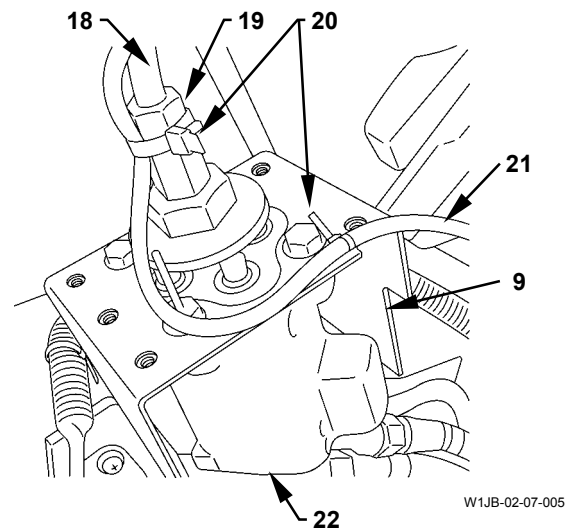
3. Install the lever (18) assembly to pilot valve (22). Secure the lever (18) assembly to pilot valve (22) with lock nut (19).

 : 19 mm, 32 mm

 : 69 N·m (7.0 kgf·m, 51 lbf·ft)


4. Connect the connector of harness (21).


5. Install harness (21) to pilot valve (22) and bracket (9) with clip bands (20) (2 used).

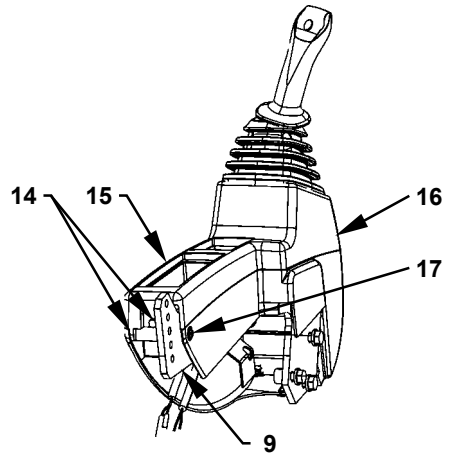


UPPERSTRUCTURE / Pilot Valve

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

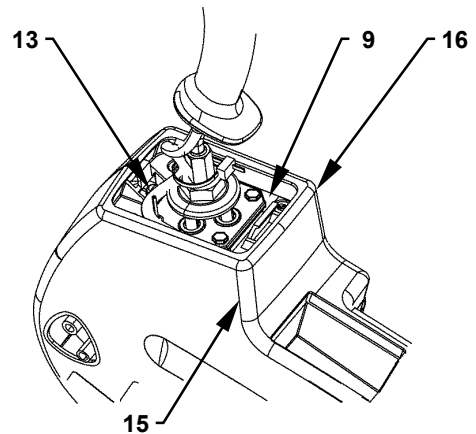
 : 10 mm

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



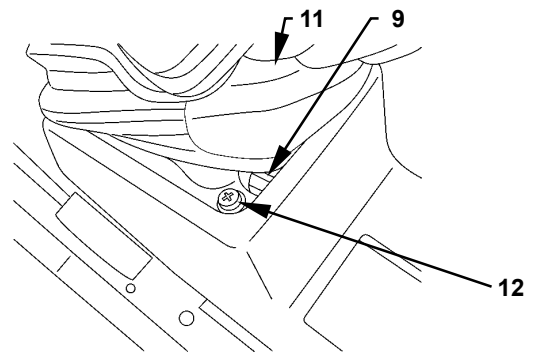
W1JB-02-07-011

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).

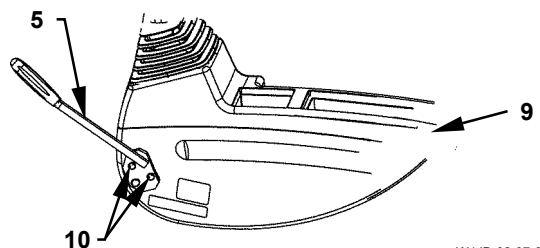


W1JB-02-07-002

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

 : 6 mm

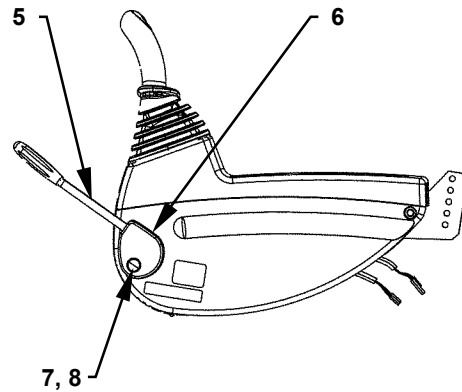
 : 20 N·m (2 kgf·m, 15 lbf·ft)



W1JB-02-07-012

UPPERSTRUCTURE / Pilot Valve


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




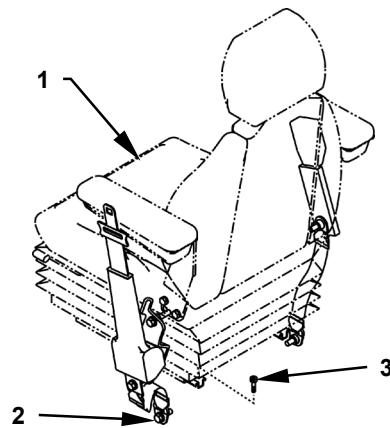
W1JB-02-07-013

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)

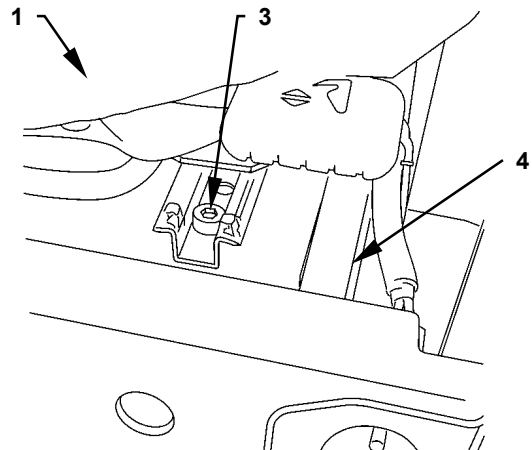


W1JB-02-01-008

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

 : 16 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

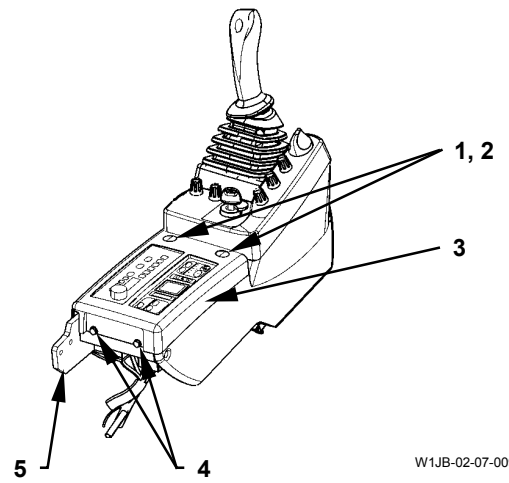


W1JB-02-07-007

UPPERSTRUCTURE / Pilot Valve

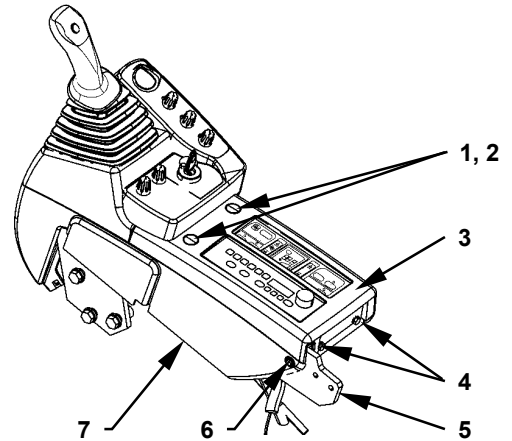
Remove Right Pilot Valve

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).



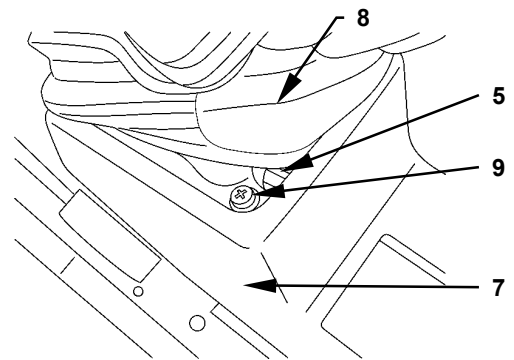
W1JB-02-07-009

3. Remove screw (6).

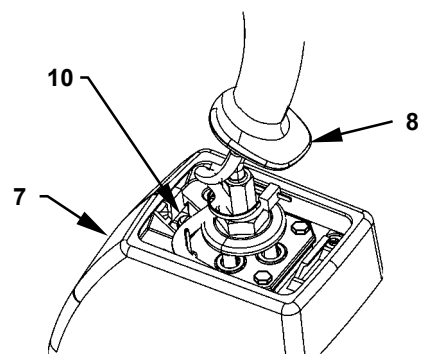


W1JB-02-07-008

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




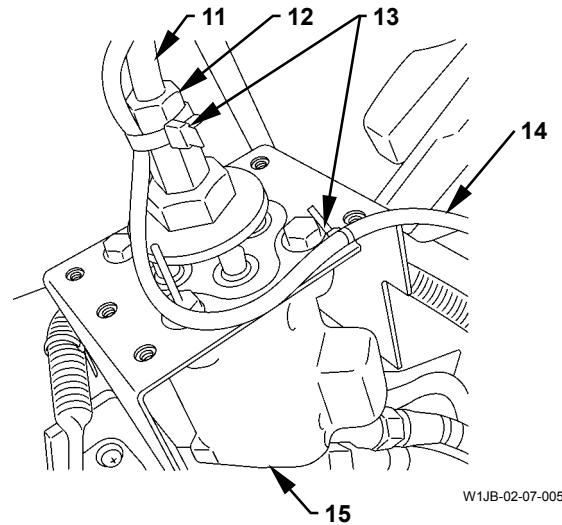
W1JB-02-07-016

UPPERSTRUCTURE / Pilot Valve


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

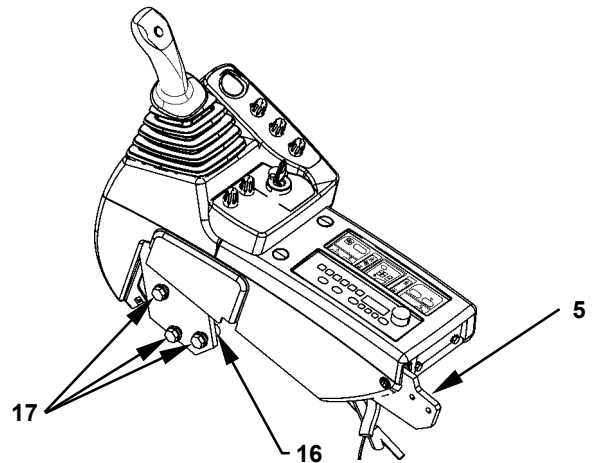
7. Loosen lock nut (12). Remove the lever (11) assembly from pilot valve (15).

 : 19 mm, 32 mm




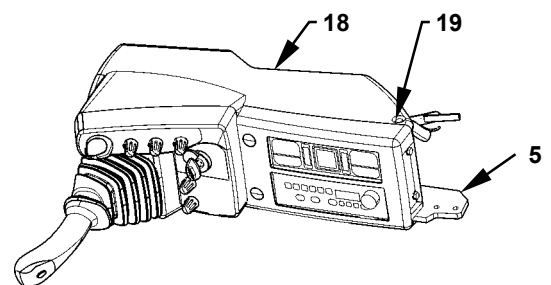
8. Remove bolts (17) (3 used). Remove the bracket (5) assembly from stand (16). Lay down the bracket (5) assembly.

 : 17 mm




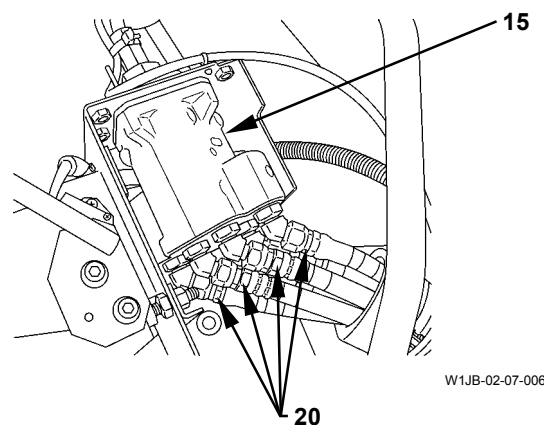
9. Remove bolt (19). Remove cover (18) from bracket (5).

 : 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.

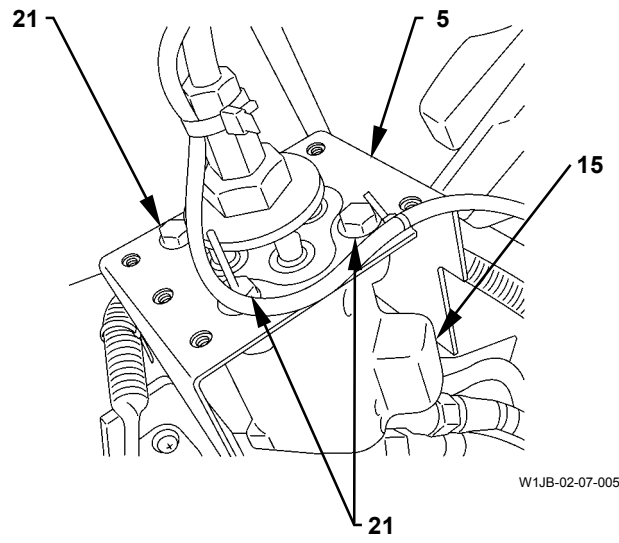
 : 19 mm



UPPERSTRUCTURE / Pilot Valve

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


 : 13 mm




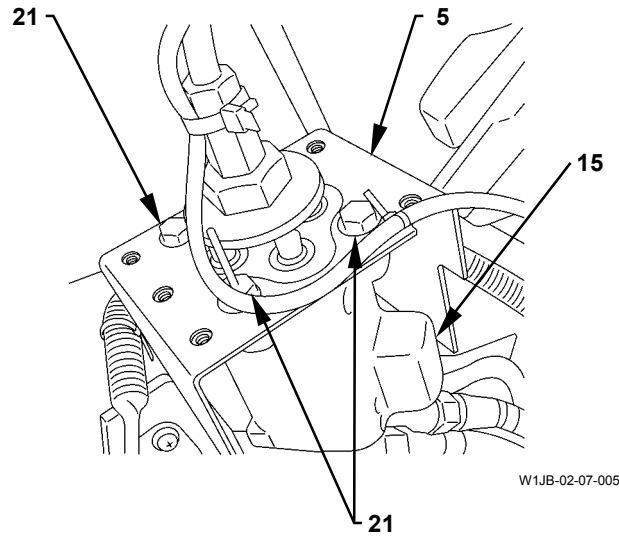
UPPERSTRUCTURE / Pilot Valve

Install Right Pilot Valve


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


 : 13 mm

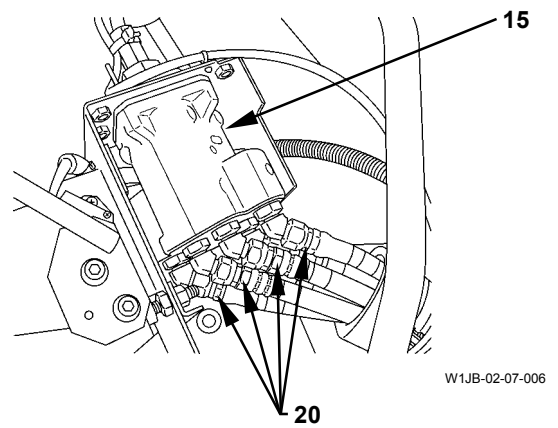
 : 10 N·m (1.0 kgf·m, 7.4 lbf·ft)



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


 : 19 mm


 : 29.5 N·m (3 kgf·m, 220 lbf·ft)



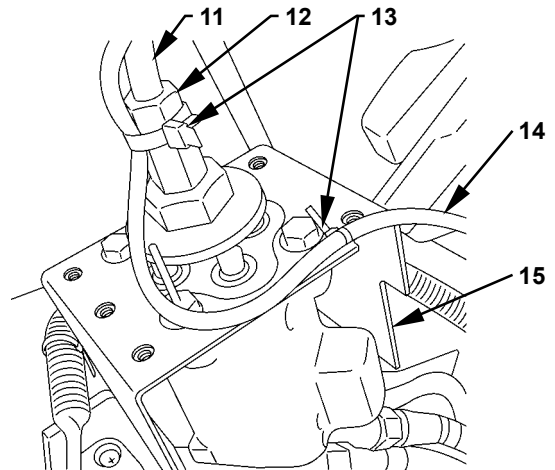
UPPERSTRUCTURE / Pilot Valve

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

 : 19 mm, 32 mm


 : 69 N·m (7.0 kgf·m, 51 lbf·ft)


4. Connect the connector of harness (14).
5. Install harness (14) to pilot valve (15) and bracket
(5) with clip bands (13) (2 used).

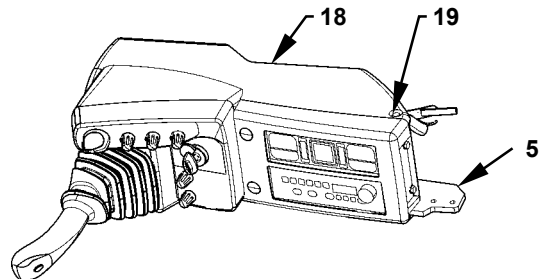


W1JB-02-07-005

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)

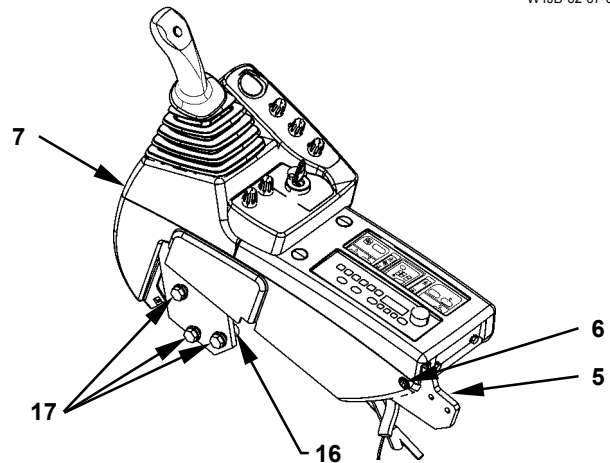


W1JB-02-07-010

7. Install cover (7) to bracket (5) with screw (6).
8. Install the bracket (5) assembly to stand (16) with
bolts (17)(3 used).

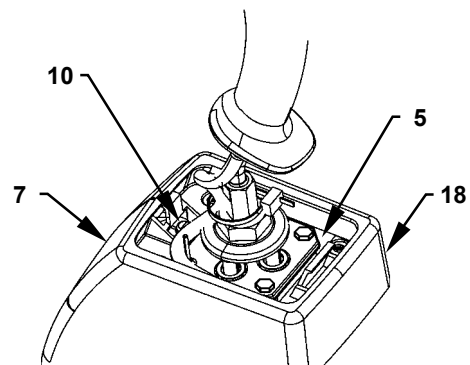
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



W1JB-02-07-008

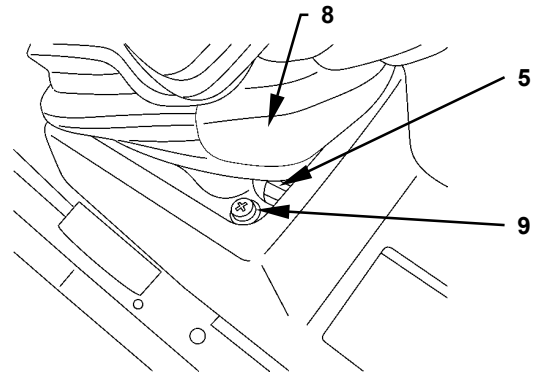
9. Install covers (18, 7) to bracket (5) with screw
(10).



W1JB-02-07-016

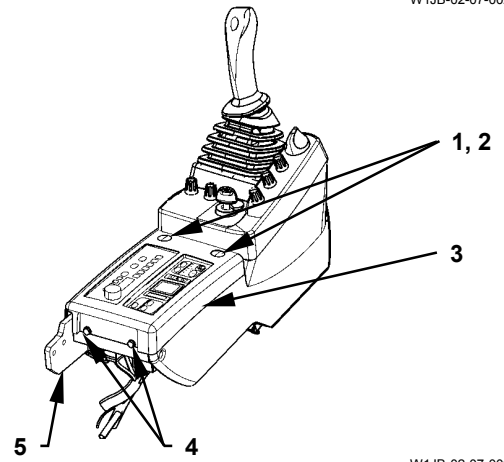
UPPERSTRUCTURE / Pilot Valve

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).




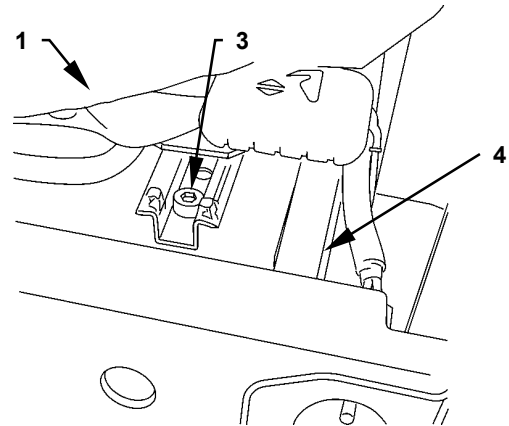
W1JB-02-07-009

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)

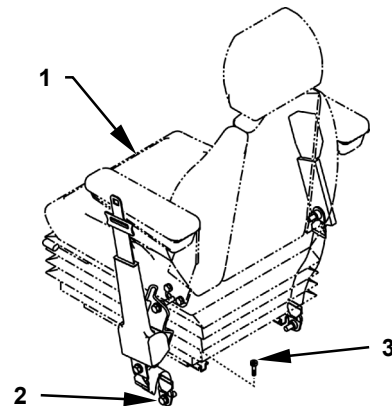


W1JB-02-07-007

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

 : 16 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)




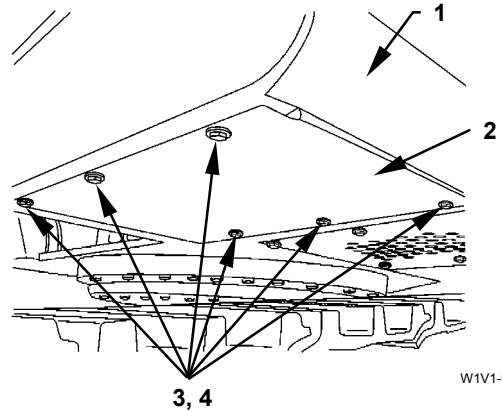
W1JB-02-01-008

UPPERSTRUCTURE / Pilot Valve

Remove Travel Pilot Valve


1. Remove bolts (3) (6 used) and washers (4) (6 used). Remove cover (2) from the lower of main frame (1).

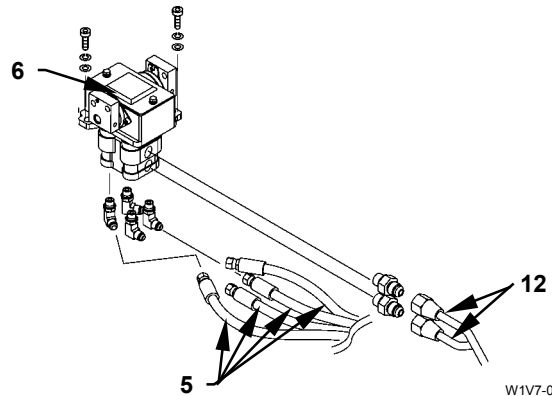
 : 17 mm



W1V1-02-08-002

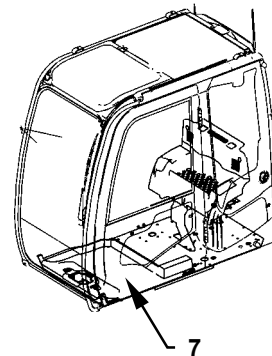
2. Remove hoses (5) (4 used) and pipes (2) (2 used) from pilot valve (6). Attach identification tags to the removed hoses for reassembling. Cap the open end.

 : 17 mm, 19 mm



W1V7-02-07-002


3. Remove floor mat (7).

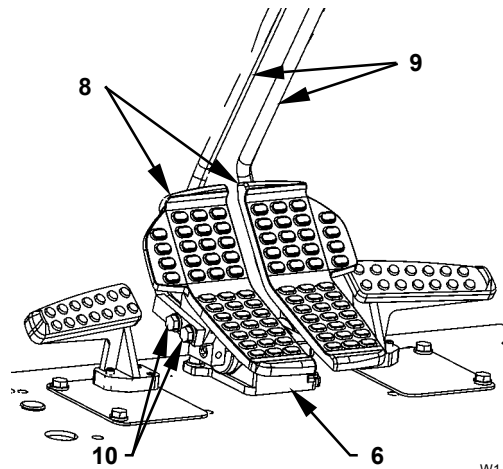


W1JB-02-07-015

UPPERSTRUCTURE / Pilot Valve


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

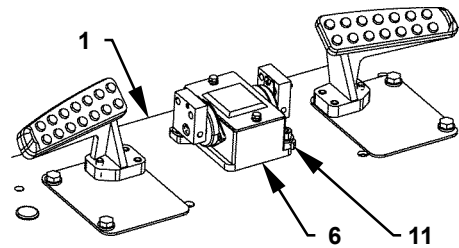
 : 17 mm



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

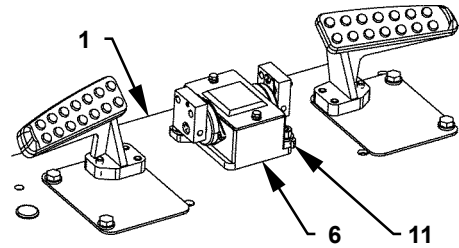
UPPERSTRUCTURE / Pilot Valve

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)

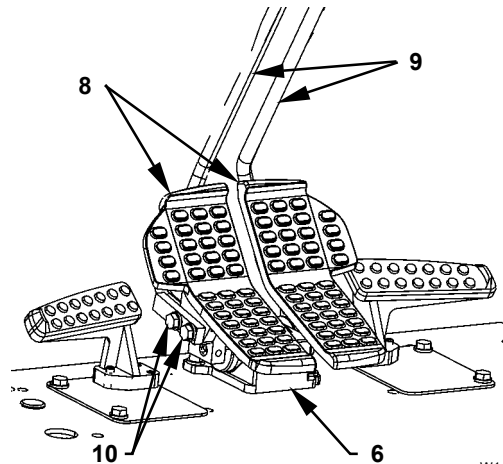


W1JB-02-07-004

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

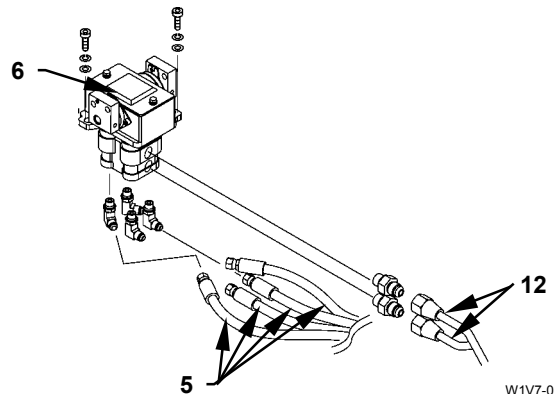
3. Install hoses (5) (4 used) and pipes (12) (2 used) to pilot valve (6).

 : 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)




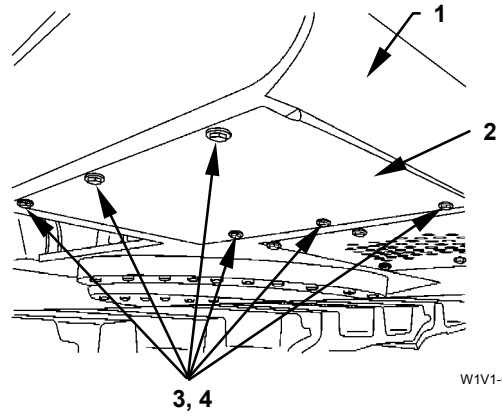
W1V7-02-07-002

UPPERSTRUCTURE / Pilot Valve

4. Install cover (2) to the lower of main frame (1) with bolts (3) (6 used) and washers (4) (6 used).

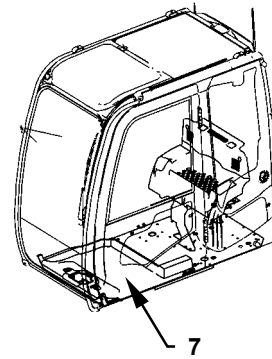
 : 17 mm

 : 50 N·m (5.1 kgf·m, 37 lbf·ft)



W1V1-02-08-002

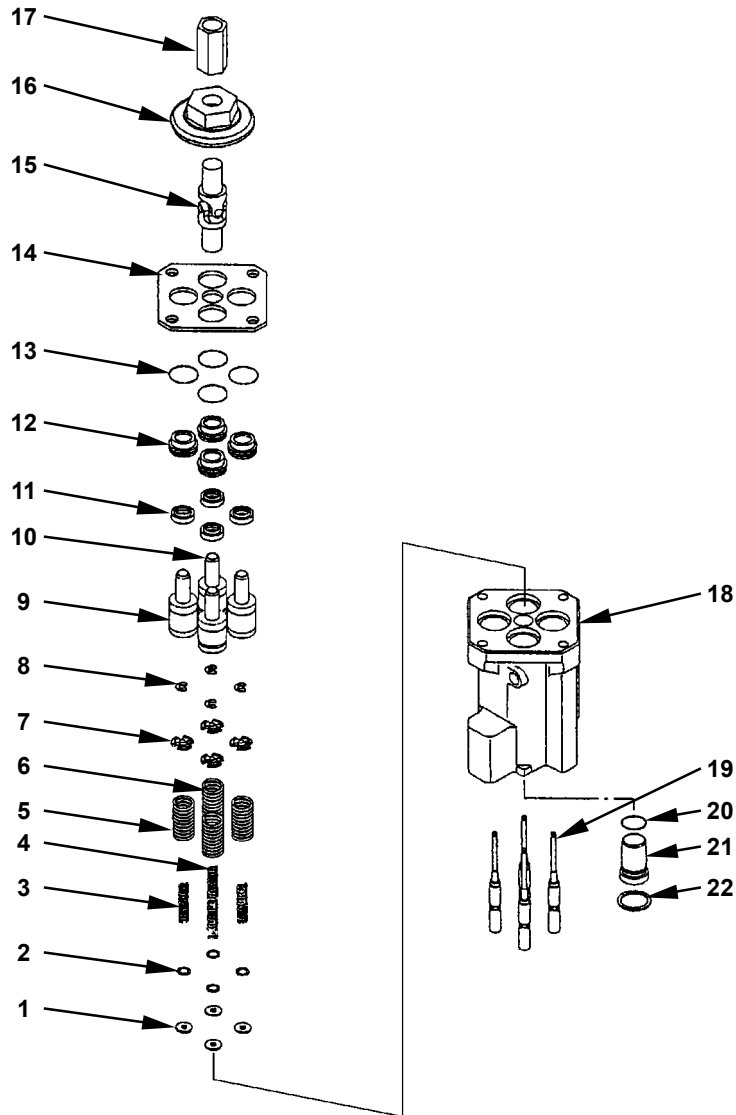
5. Install floor mat (7).



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 aluminium. Too strong a force can deform or damage them. Be careful while handling them.


IMPORTANT: Spool (19) has been selected to match the hole of casing (18). The dimensions of balance springs A (3), B (4) and return springs A (5), B (6) as well as those of pushers A (9), B (10) are different. Indicate the port number from which it is removed. Port numbers are stamped on the outer surface of casing (18).

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


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


 : 19 mm, 32 mm

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

 : 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).

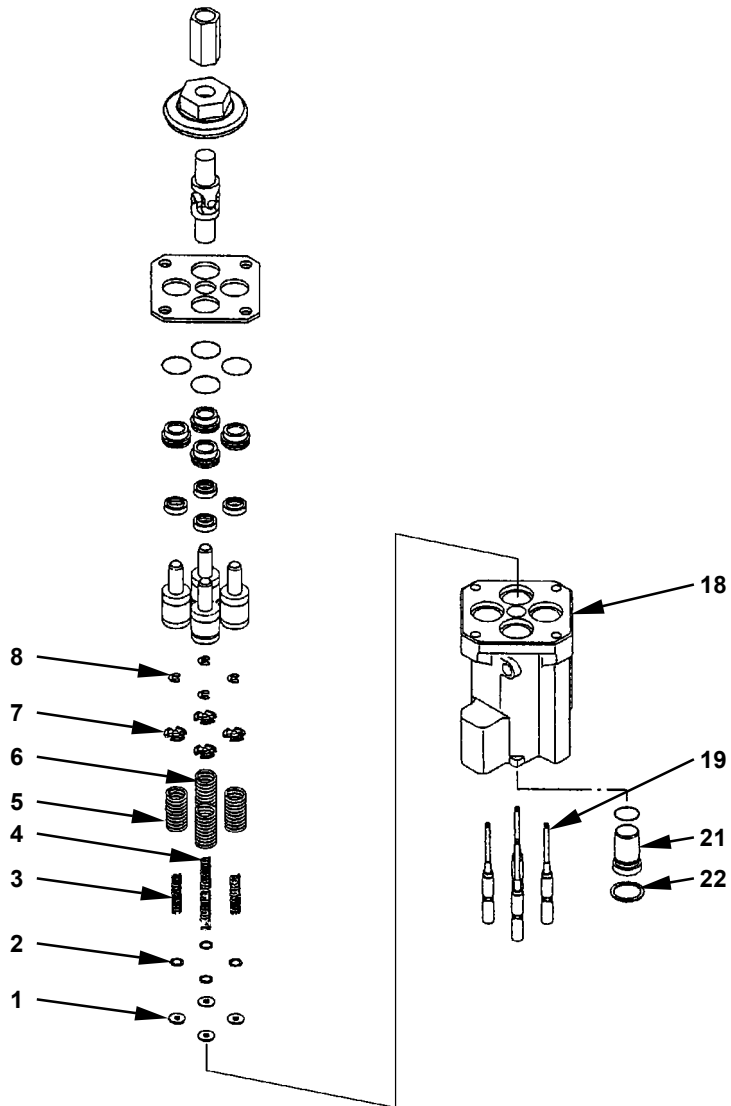
IMPORTANT: Do not damage the surface of sleeve (12). Insert a soft rubber between sleeve (12) and the tool. Oil seal (11) cannot be removed from sleeve (12). Sleeve (12) and oil seal (11) must be replaced as an assembly.

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

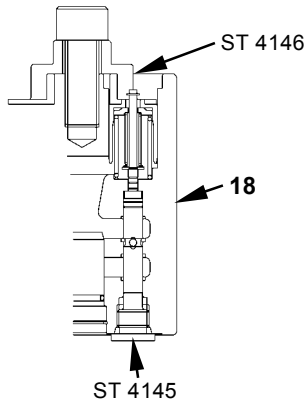


W178-02-07-064


UPPERSTRUCTURE / Pilot Valve

7. When compressing the spring, do not lower the spool. Install special tool (ST 4145) to the port hole on casing (18) as illustrated.

 : 6 mm



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

 : 12 mm

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

9. 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) and B (4) (2 used) from spools (19) (4 used).


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

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

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

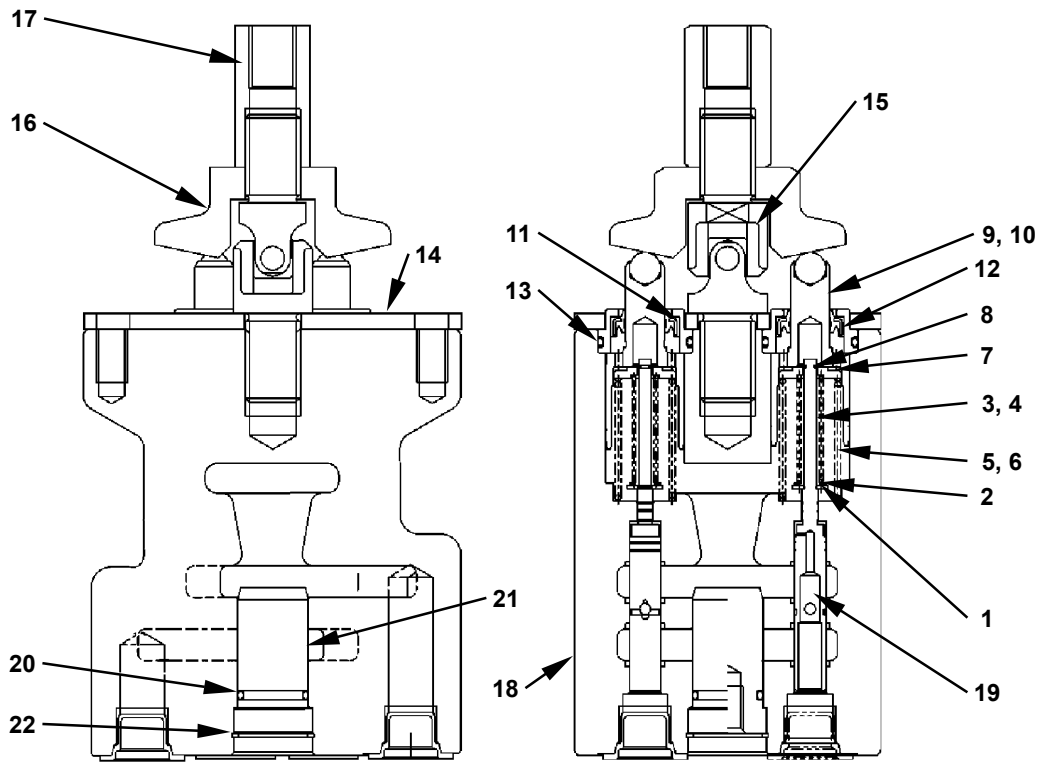
IMPORTANT: Retaining ring (22) may come off while disassembling. Do not drop retaining ring (22) inside casing (18). If retaining ring (22) falls inside casing (18), remove retaining ring (22) completely. Retaining ring (22) cannot be reused.

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

 : 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.


1. Install O-ring (20) to plug (21). Install plug (21) and retaining ring (22) to casing (18).

 **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 (1 used)
2			Outer grooves (2 used)
3			Outer grooves (1 used)
4			Outer grooves (2 used)

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


2. Check the port number. Insert same spools (19) (4 used) before disassembling. Slowly rotate and install the thinner end of spool (19) to the port hole on casing (18).

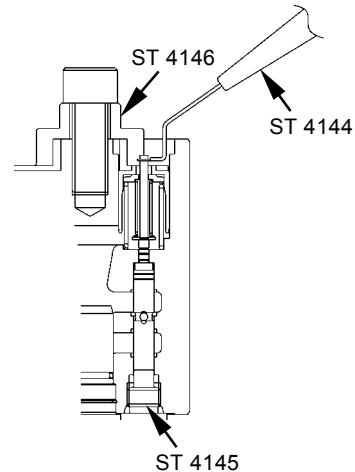
 **NOTE:** Spool (19) has been selected to match the port hole. Spool (19) and casing (18) must be replaced as an assembly.

3. Install special tool (ST 4145) to the port hole on casing (18) in order not to lower spool (19) when the spring is compressed.

 : 6 mm

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

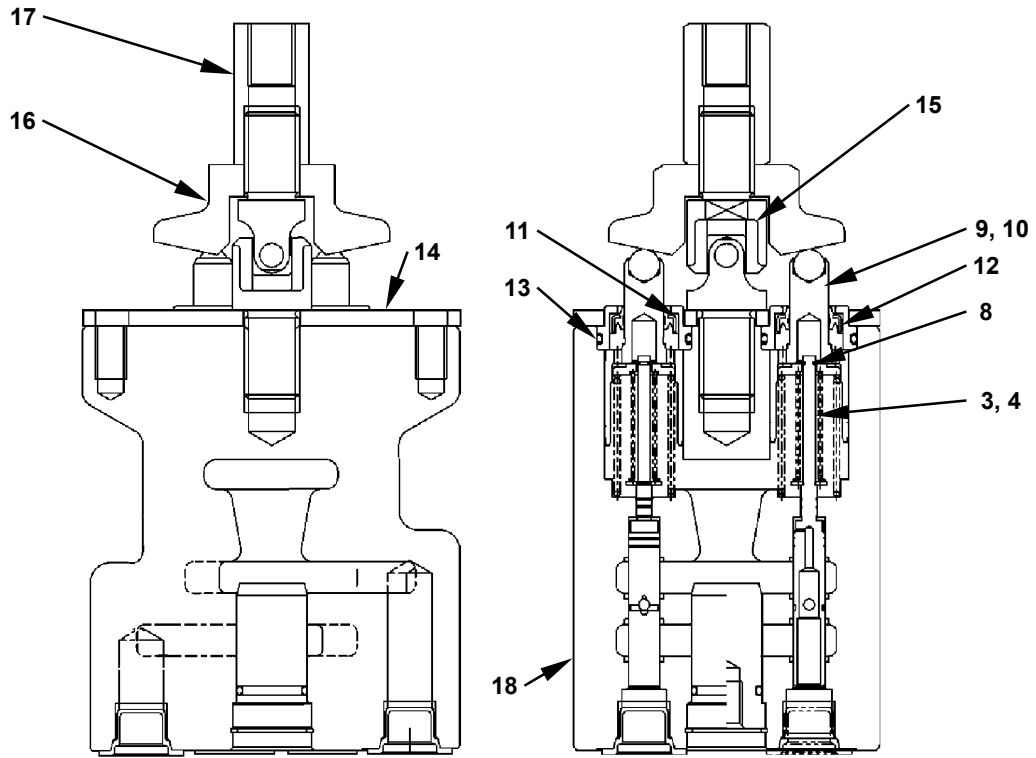
4. Install spacers (1) (4 used), shim (2) and balance springs (3, 4) (2 used for each) to spools (19) (4 used). Install return springs (5, 6) (2 used for each) to casing (18).
5. Install spring guides (7) (4 used) onto return springs (5, 6) (2 used for each) with the protrusion facing upward.
6. Install 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



W178-02-07-049

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

UPPERSTRUCTURE / Pilot Valve



W1V1-02-07-001

UPPERSTRUCTURE / Pilot Valve

8. 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).

9. 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).

10. Apply grease to the ball at the ends of pushers (9, 10) (2 used for each).

11. Apply grease to the joint part of universal joint (15).

12. Apply grease to the inner surface of oil seals (11) (4 used).


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


13. 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).

14. Clamp casing (18) in a vise lightly.

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

15. 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).

16. 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).

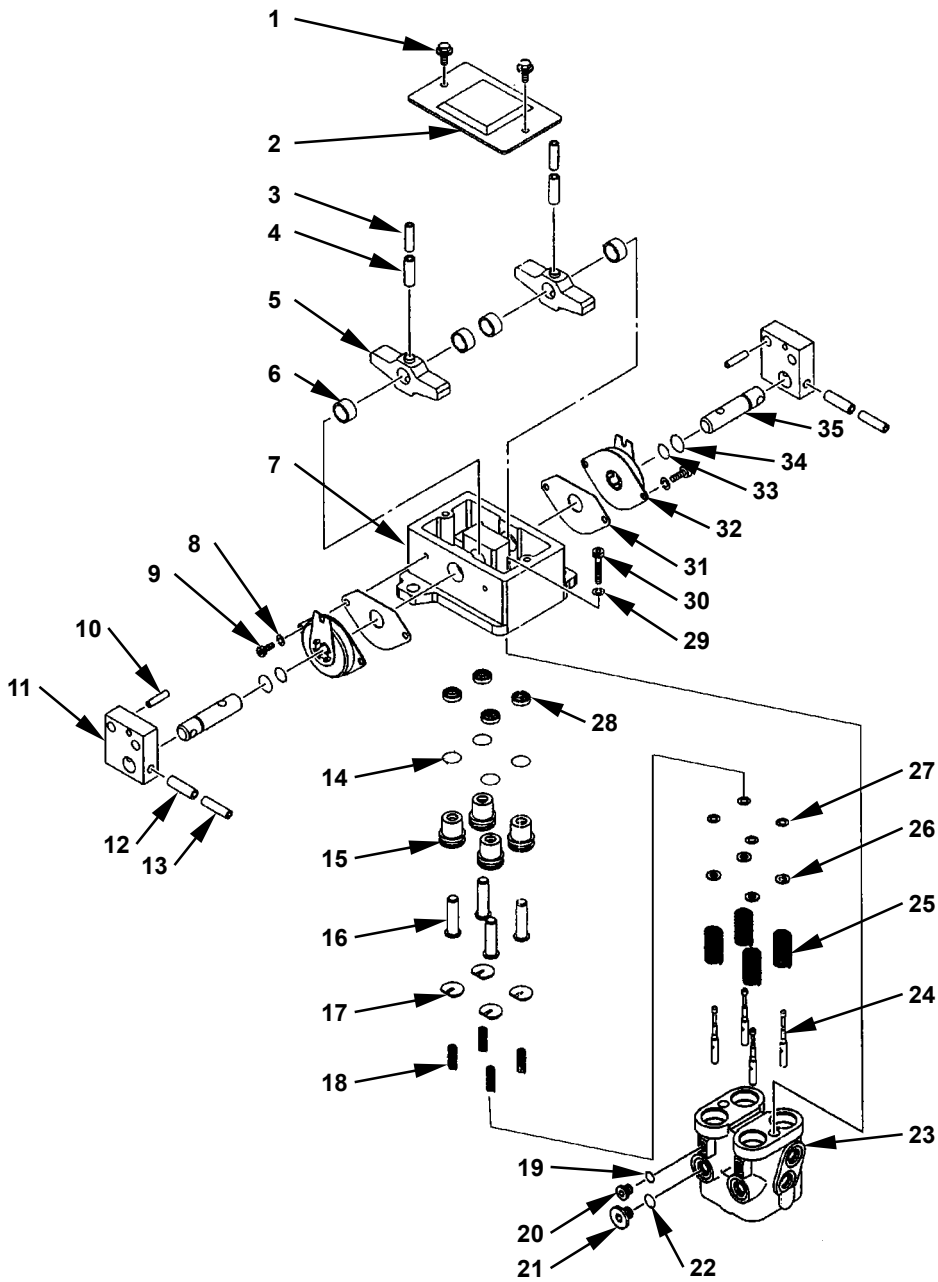
17. Secure cam (16) by using a spanner. Tighten screw joint (17) by using a spanner.

 : 19 mm, 32 mm

 : 69 N·m (7.0 kgf·m, 51 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 aluminium. Too strong a force can deform or damage them. Be careful while handling them.


IMPORTANT: Spool (24) has been selected to match the hole of casing (23). Indicate the port number from which it is removed.

Port numbers are stamped on the outer surface of casing (23).

1. Clamp casing (23) in a vise. Remove bolts (1) (2 used). Remove cover (2) from holder (7).

 : 10 mm

2. Remove bolts (30) (2 used) and spring washers (29) (2 used). Remove the holder (7) assembly from casing (23).

 : 8 mm


3. Pull out the pusher (16) assemblies (4 used) from casing (23).

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) assemblies (4 used) 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.

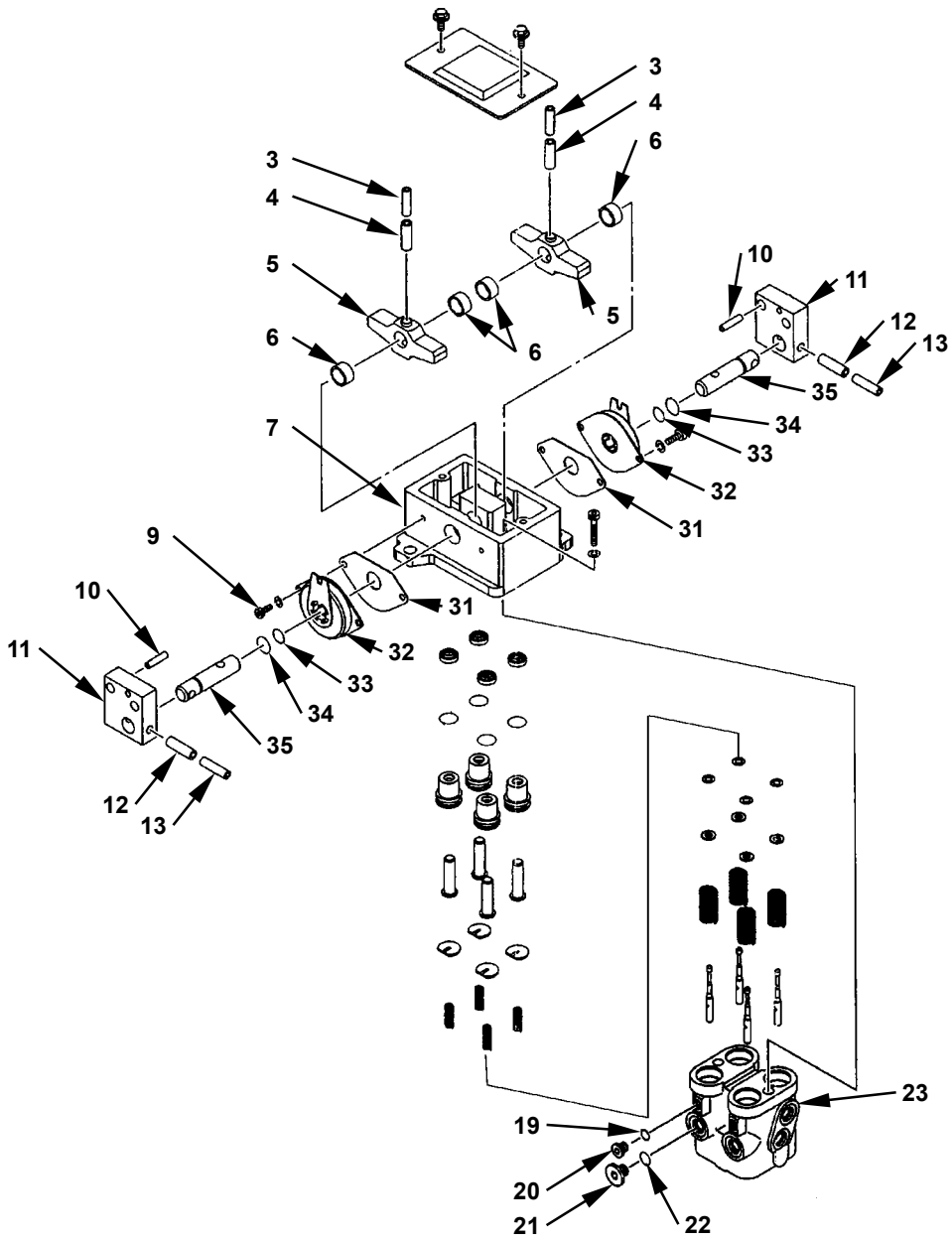
 **NOTE:** Spool (24) has been selected to match the hole of casing (23). Replace spool (24) and casing (23) as an assembly.

IMPORTANT: The quantity of shim (27) 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

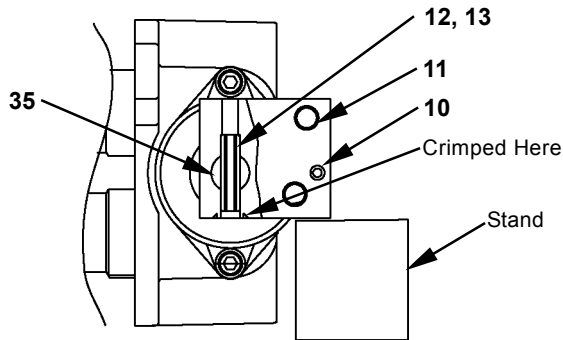


W178-02-07-063

UPPERSTRUCTURE / Pilot Valve

IMPORTANT: Place a stand under bracket (11) and form an 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 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.



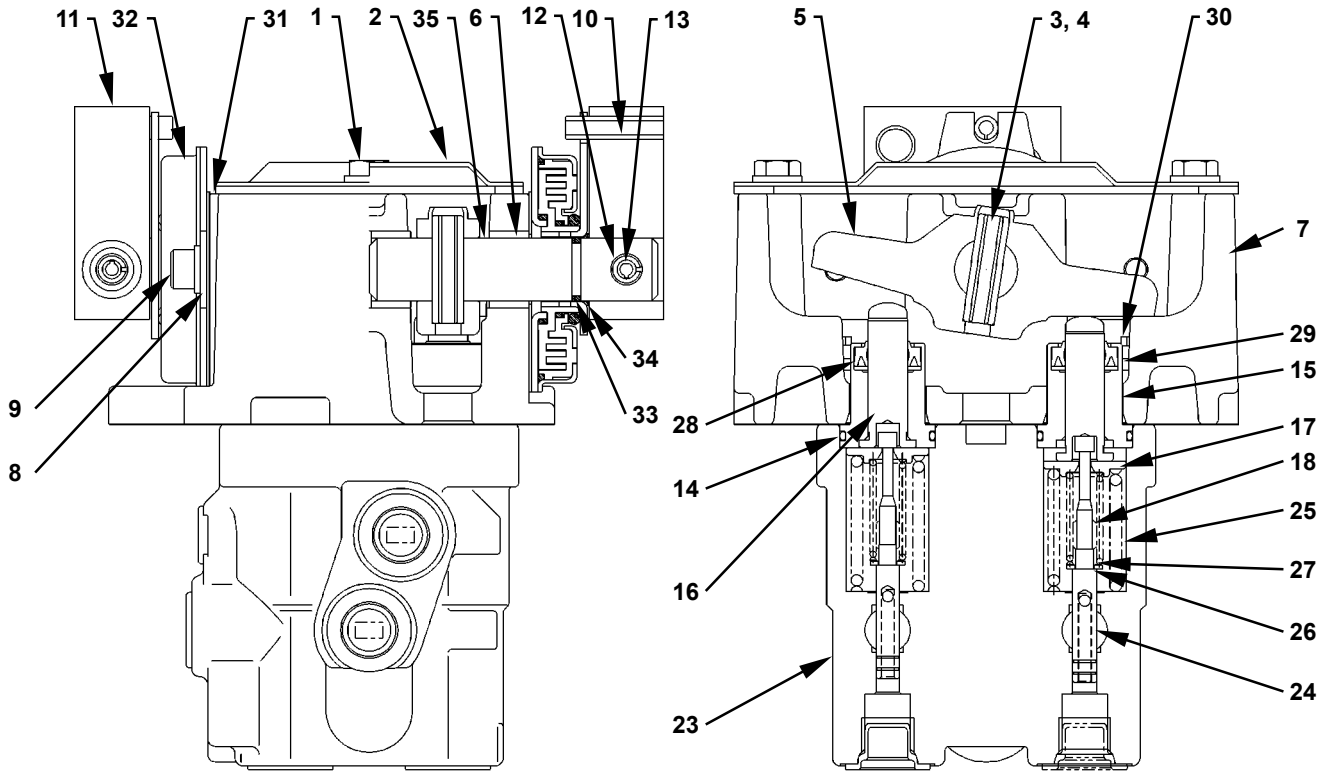
W176-02-07-019

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. 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) and remove spring pins (3, 4) (2 used for each) from cams (5) (2 used) at the same time by using special tool (ST 1237).
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 W2-7-26.

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 shim (27) 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.

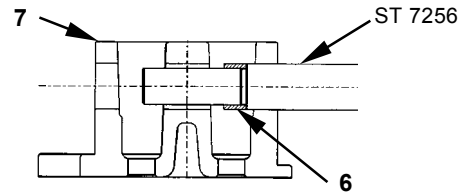
IMPORTANT: Before inserting the parts into holder (7) and casing (23), apply hydraulic oil onto the parts.

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 spool (24) assemblies (4 used) 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.

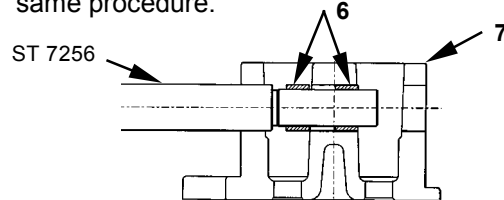
- Insert bushings (6) (4 used) into special tool (ST 7256). Tap special tool (ST 7256) and install bushing (6) into the hole of holder (7) by using a hammer.

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



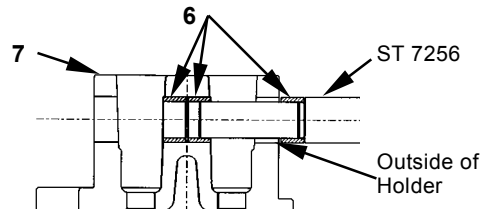
W176-02-11-310

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



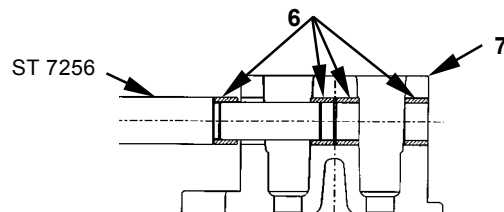
W176-02-11-311

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



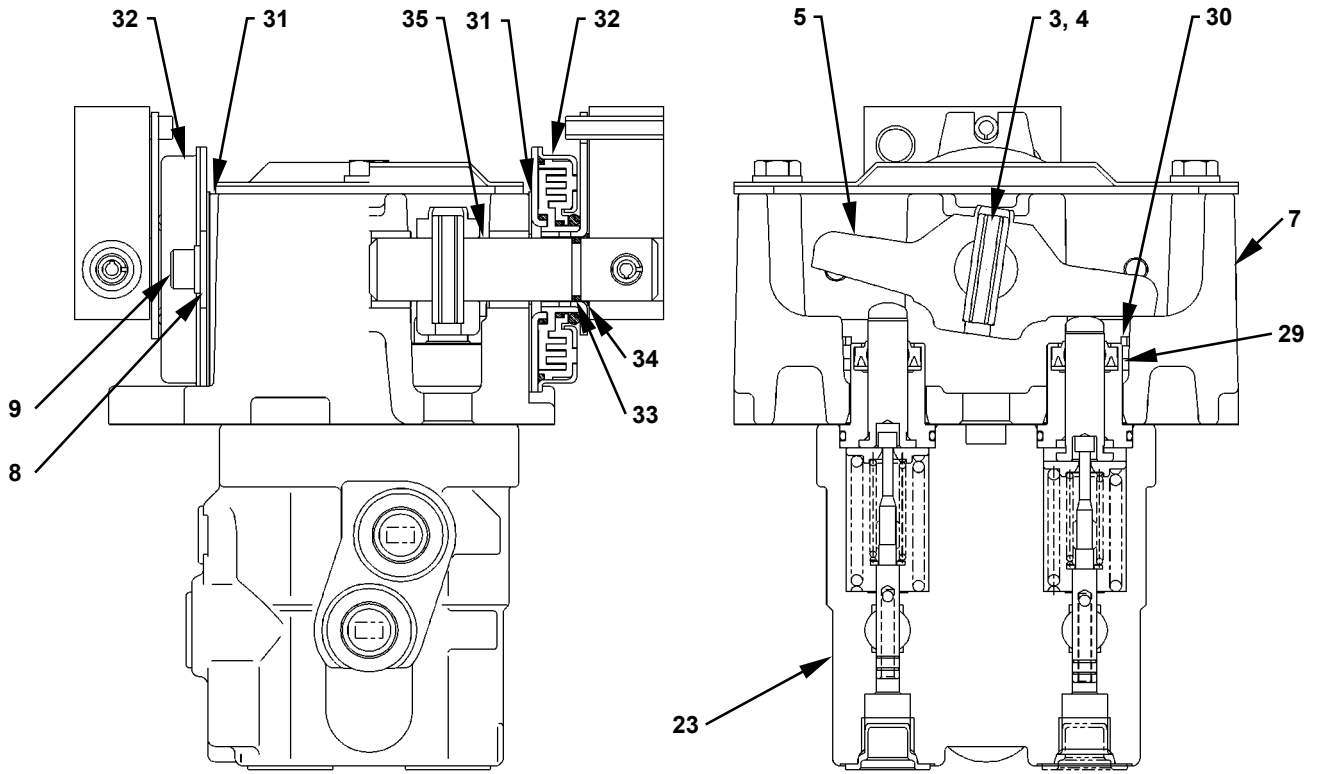
W176-02-11-312

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



W176-02-11-313

UPPERSTRUCTURE / Pilot Valve



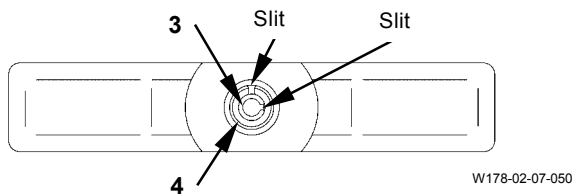
W178-02-11-316

UPPERSTRUCTURE / Pilot Valve

- Install O-rings (33) (2 used) to pin (35).
Apply grease to O-rings (33) (2 used). Assemble pin (35) and cams (5) (2 used) to holder (7).



IMPORTANT: Check the direction to install spring pins (3, 4) (2 used for each).

- Install spring pins (3, 4) (2 used for each) to cams (5) (2 used) by using special tool (ST 1237). Secure cams (5) (2 used) and pin (35). At this time, spring pins (3, 4) (2 used for each) should be displaced with their slits at 90°. Tap and install spring pins (3, 4) (2 used for each) until spring pins (3, 4) make contact with the stepped part in the hole.



- Crimp the hole edge (2 places) of cams (5) (2 used), where spring pins (3, 4) are inserted, by using a punch.

- Place holder (7) on the casing (23) assembly. Install holder (7) to casing (23) with socket bolts (30) (2 used) and spring washers (29) (2 used). Check the mark direction and install holder (7).



 : 8 mm
 : 50 N·m (5 kgf·m, 36 lbf·ft)

- 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.

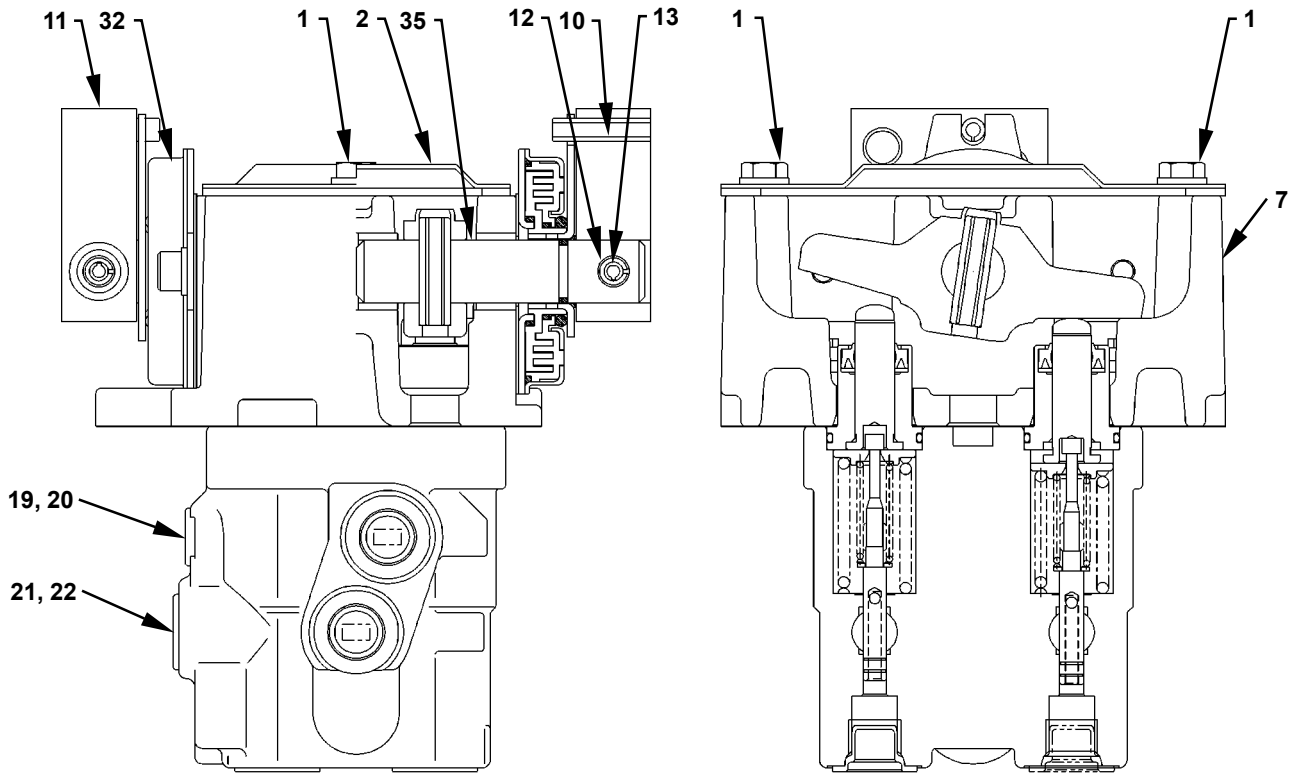
- Install dampers (32) (2 used) to pin (35) with the lever facing upward.

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

 : 5 mm
 : 79 N·m (0.7 kgf·m, 5.1 lbf·ft)

- Apply grease to O-ring (34). Push O-rings (34) (2 used) to the endmost of pin (35).

UPPERSTRUCTURE / Pilot Valve



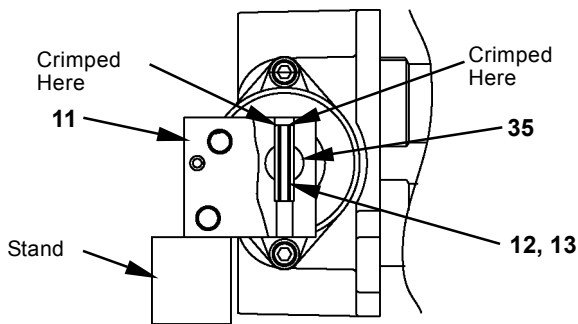
W178-02-11-316

UPPERSTRUCTURE / Pilot Valve

15. As for the direction to install bracket (11), refer to the figure in the disassemble section (W2-7-26). 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)

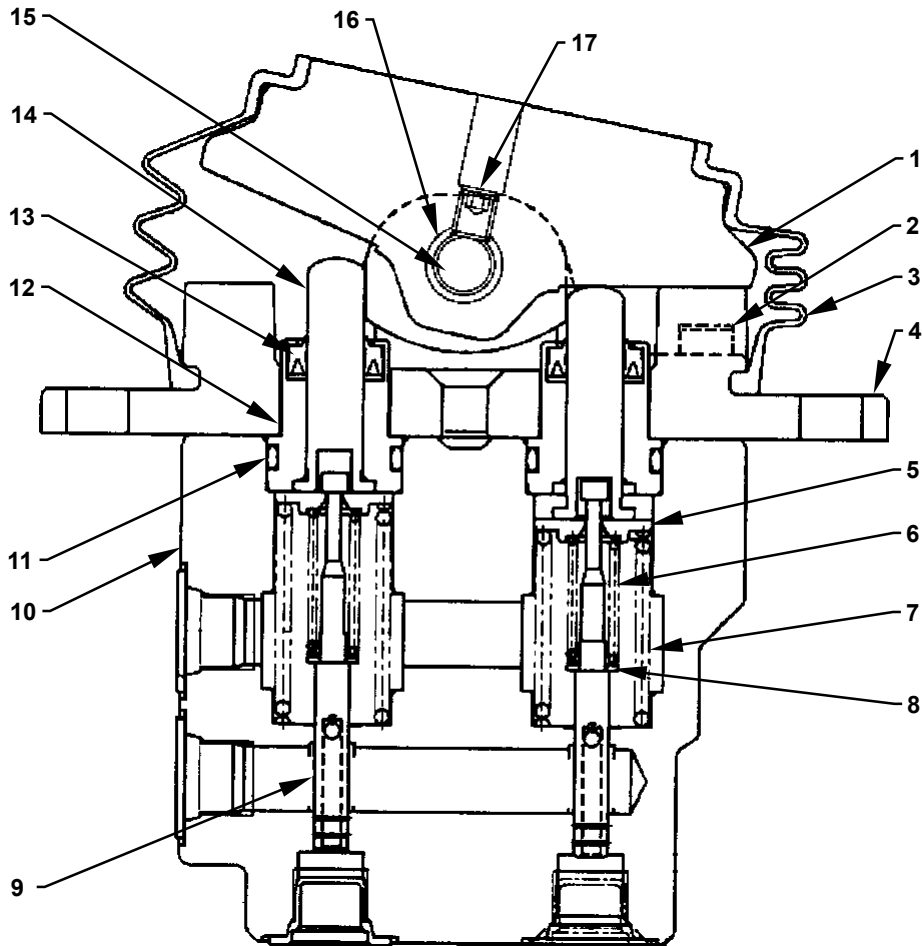
22. Install O-rings (22) (2 used) to plugs (21) (2 used). Install plugs (21) (2 used) to casing (23).

 : 6 mm

 : 19.6 N·m (2 kgf·m, 14.5 lbf·ft)

UPPERSTRUCTURE / Pilot Valve

DISASSEMBLE POSITIONING PILOT VALVE (2-PIECE BOOM ONLY)




W1V1-02-07-002

- | | | | |
|---------------------------|-----------------------------|------------------------|-----------------------|
| 1 - Cam | 6 - Balance Spring (2 Used) | 10 - Casing | 14 - Pusher (2 Used) |
| 2 - Socket Bolt (2 Used) | 7 - Return Spring (2 Used) | 11 - O-Ring (2 Used) | 15 - Pin |
| 3 - Boot | 8 - Spacer (2 Used) | 12 - Bushing (2 Used) | 16 - Bushing (2 Used) |
| 4 - Holder | 9 - Spool (2 Used) | 13 - Oil Seal (2 Used) | 17 - Set Screw |
| 5 - Spring Guide (2 Used) | | | |

UPPERSTRUCTURE / Pilot Valve

Disassemble Positioning Pilot Valve


1. Remove boot (3) from holder (4).
2. Secure the pilot valve in a vise. Loosen set screw (17). Remove pin (15) from cam (1) by using a round bar. Remove the cam (1) assembly from holder (4).

 : 3 mm

IMPORTANT: Record the positions of casing (10) and holder (4).

The pusher (14) assembly may fly out due to return springs (7) (2 used).

3. Loosen and remove socket bolts (2) (2 used) alternately. Remove holder (4) and the pusher (14) (2 used) assembly from casing (10).

 : 6 mm

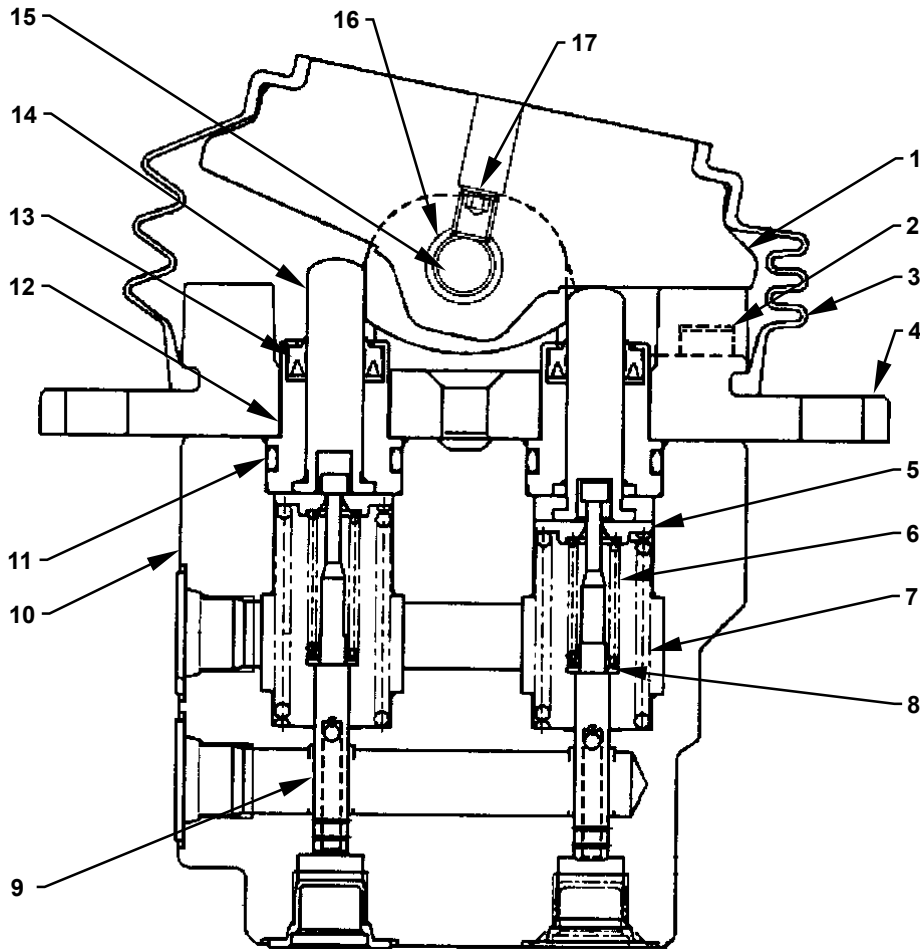
4. Remove bushings (12) (2 used), O-rings (11) (2 used) and oil seals (13) (2 used) from pushers (14) (2 used).

IMPORTANT: Indicate the port number in order not to confuse.

5. Remove the spool (9) assemblies (2 used) and return springs (7) (2 used) from each port of casing (10).
6. Compress balance springs (6) (2 used). Remove spring guides (5) (2 used) and balance springs (6) (2 used) from spools (9) (2 used). Remove spacers (8) (2 used) from spools (9) (2 used).

UPPERSTRUCTURE / Pilot Valve

ASSEMBLE POSITIONING PILOT VALVE (2-PIECE BOOM ONLY)



W1V1-02-07-002

- | | | | |
|---------------------------|-----------------------------|------------------------|-----------------------|
| 1 - Cam | 6 - Balance Spring (2 Used) | 10 - Casing | 14 - Pusher (2 Used) |
| 2 - Socket Bolt (2 Used) | 7 - Return Spring (2 Used) | 11 - O-Ring (2 Used) | 15 - Pin |
| 3 - Boot | 8 - Spacer (2 Used) | 12 - Bushing (2 Used) | 16 - Bushing (2 Used) |
| 4 - Holder | 9 - Spool (2 Used) | 13 - Oil Seal (2 Used) | 17 - Set Screw |
| 5 - Spring Guide (2 Used) | | | |

UPPERSTRUCTURE / Pilot Valve

Assemble Positioning Pilot Valves

IMPORTANT: Install spring guide (5) with the groove side facing to the spring. When installing spring guide (5), do not lower spring guide (5) beyond 6 mm.

1. Install spacers (8) (2 used) and balance springs (7) (2 used) to spools (9) (2 used). While compressing springs (7) (2 used), install spring guides (5) (2 used) to spools (9) (2 used).

IMPORTANT: Insert the spool (9) assemblies (2 used) to the original port when removing.


2. Insert return springs (7) (2 used) and the spool (9) assemblies (2 used) into casing (10).


IMPORTANT: Check the direction of oil seals (13) (2 used). Apply grease to the lip of oil seals (13) (2 used) and to the inside of bushings (12) (2 used).

3. Install oil seals (13) (2 used) and O-rings (11) (2 used) to sleeves (12) (2 used). Insert pushers (14) (2 used) into bushings (12) (2 used).

 **NOTE:** Grease: IDEMITSU AUTOLEX-C

4. Place the pusher (14) assemblies (2 used) onto the spool (9) assemblies (2 used). Place holder (4). Alternately tighten socket bolts (2) (2 used) and install holder (4) to casing (10).


 : 6 mm


 : 15 N·m (1.5 kgf·m, 11 lbf·ft)

5. Install cam (1) to holder (4) with pin (15).

IMPORTANT: Apply LOCTITE #262 to set screw (17).

6. Install set screw (17) to cam (1).

 : 3 mm

 : 7 N·m (0.7 kgf·m, 5.2 lbf·ft)

7. Tilt cam (1) and apply grease to the ends of pushers (14) (2 used).

8. Install boot (3) to holder (4).

UPPERSTRUCTURE / Pilot Valve

(Blank)


UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve

REMOVE AND INSTALL PILOT SHUT-OFF SOLENOID VALVE

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


Removal

1. Remove bolts (1) (6 used) and remove cover (2) from bottom of the cab.


 : 17 mm

2. Remove the hose and pipe from pilot shut-off solenoid valve (3).

Attach an identification tag onto the removed hoses for assembling. Cap the open ends.


 : 22 mm


3. Remove the floor mat. Remove bolts (4) (2 used). Remove pilot shut-off solenoid valve (3) from the main frame.

 : 17 mm


Installation


1. Install pilot shut-off solenoid valve (3) to the main frame with bolts (4) (2 used).

 : 17 mm


 : 50 N·m (5.0 kgf·m, 37 lbf·ft)


2. Install all hoses and pipes to pilot shut-off solenoid valve (3).

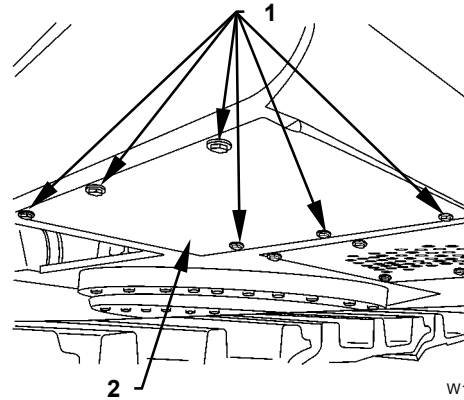
 : 22 mm

 : 48.5 N·m (4.9 kgf·m, 36 lbf·ft)

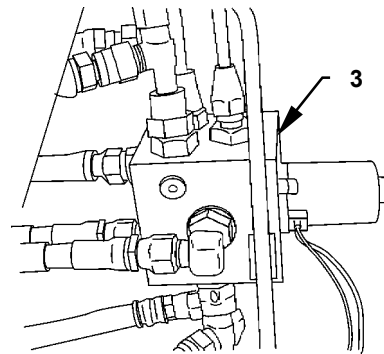
3. Install cover (2) to bottom of the cab with bolts (1) (6 used).

 : 17 mm

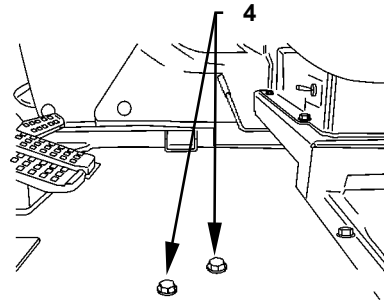
 : 50 N·m (5.0 kgf·m, 37 lbf·ft)



W1V1-02-08-002



W1V1-02-08-004



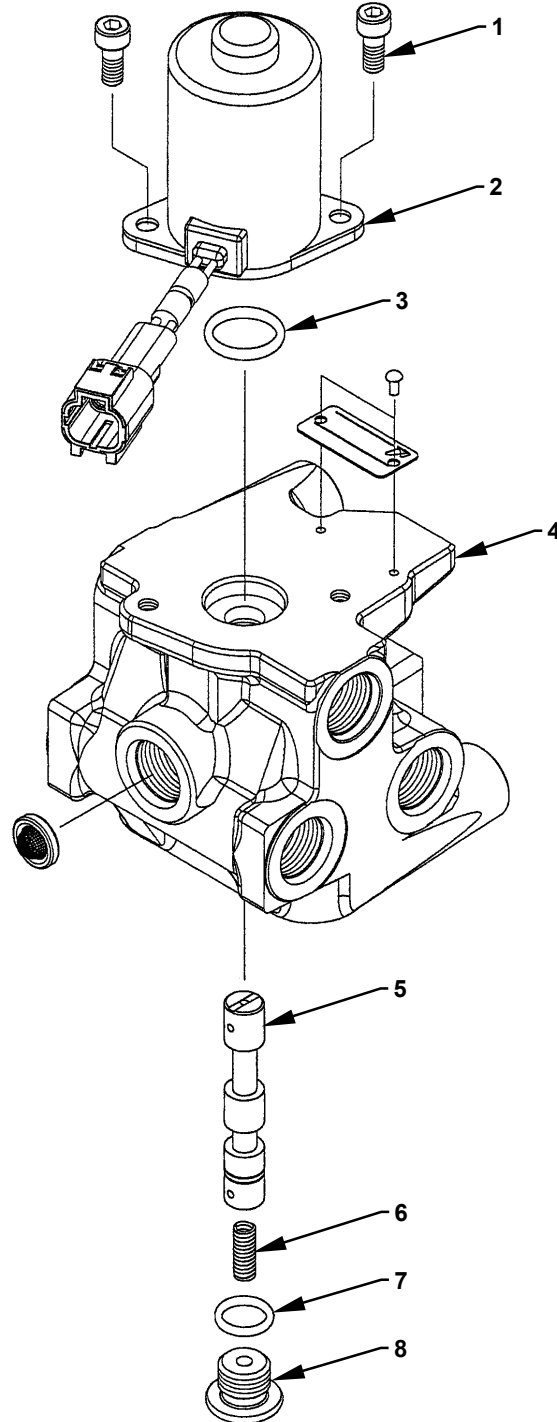
W1V1-02-08-003

UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve

DISASSEMBLE
SOLENOID VALVE

PILOT

SHUT-OFF



1 - Socket Bolt (2 Used)
2 - Solenoid

3 - O-Ring
4 - Body

5 - Spool
6 - Spring


7 - O-Ring
8 - Plug

W1V1-02-08-001


UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve

Remove and Install Pilot Shut-off Solenoid Valve

1. Put the matching marks on body (4) and solenoid (2). Clamp body (4) in a vise. Remove socket bolts (1) (2 used) from body (4). Remove solenoid (2) and O-ring (3) from body (4).

 : 4 mm

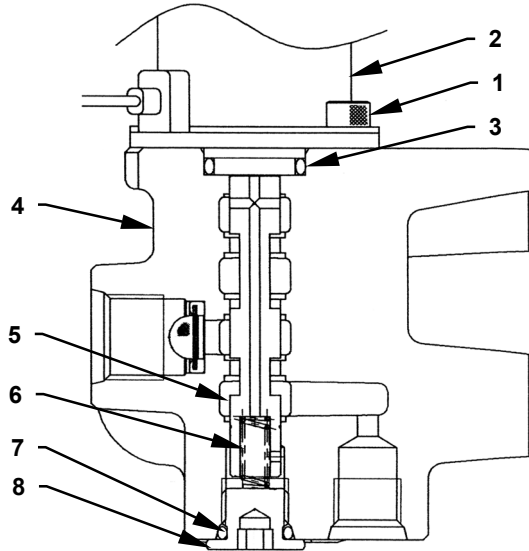
2. Remove plug (8) from body (4). Remove O-ring (7) from plug (8).

 : 6 mm

3. Remove spring (6) and spool (5) from body (4).

UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve

ASSEMBLE PILOT SHUT-OFF SOLENOID VALVE



T1V1-03-07-012

1 - Socket Bolt (2 Used)
2 - Solenoid

3 - O-Ring
4 - Body

5 - Spool
6 - Spring


7 - O-Ring
8 - Plug


UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve

Assemble Pilot Shut-off Solenoid Valve

1. Clamp body (4) in a vise. Insert spool (5) and spring (6) into body (4).


2. Install O-ring (7) to plug (8). Install plug (8) to body (4).

 : 6 mm


 : 26.5 ± 2.7 N·m


(2.7 ± 0.3 kgf·m, 19.5 ± 2.0 lbf·ft)

3. Install O-ring (3) to solenoid (2). Install solenoid (2) to body (4) while aligning the matching marks.

 **NOTE:** *If solenoid (2) is installed to body (4) after installation of O-ring (3), O-ring (3) may be damaged.*

3. Install solenoid (2) to body (4) with socket bolts (1) (2 used).

 : 4 mm

 : 3.92 ± 0.4 N·m

(0.4 ± 0.04 kgf·m, 2.9 ± 0.30 lbf·ft)

UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve

(Blank)


UPPERSTRUCTURE / Signal Control Valve

REMOVE AND INSTALL SIGNAL CONTROL VALVE


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

Removal


1. Open the engine cover. Remove bolts (3) (4 used). Remove covers (1, 2).

 : 17 mm


2. Remove bolt (4). Remove the clip band.

 : 17 mm


3. Remove all connectors, hoses and pipes from signal control valve (5).

 : 19 mm, 22 mm


4. Attach a nylon sling onto the body of signal control valve (5). Hold signal control valve (5).

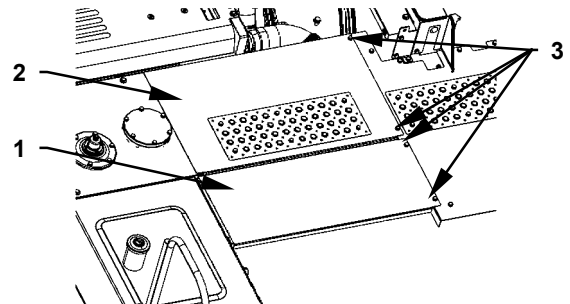
 **CAUTION:** Signal control valve (5) + bracket (7) weight: 21 kg (46 lb)

5. Remove bolts (8) (3 used). Hoist and remove signal control valve (5) and bracket (7) from the control valve.

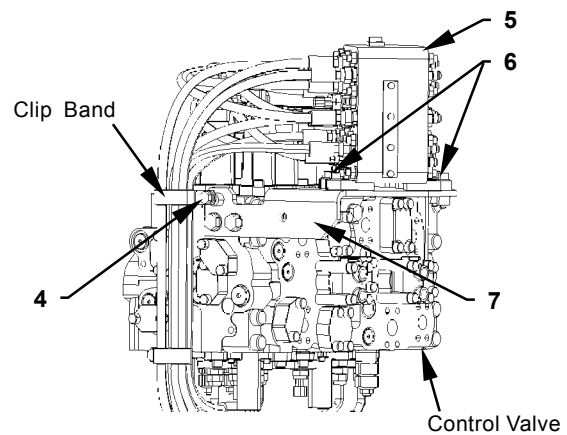
 : 22 mm

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

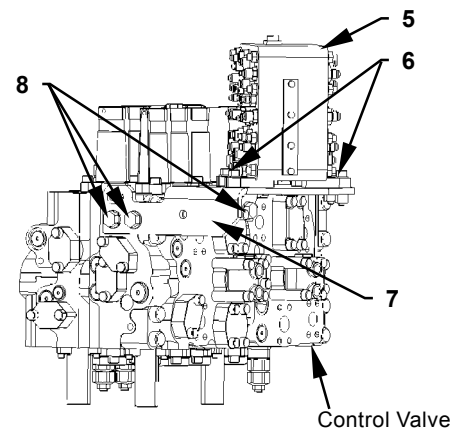
 : 8 mm



W1V7-02-08-001



W1V1-02-09-001





W1V1-02-09-002

UPPERSTRUCTURE / Signal Control Valve

Installation

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


 : 8 mm


 : 65 N·m (6.5 kgf·m, 48 lbf·ft)




CAUTION: Signal control valve (5) + bracket (7) weight: 21 kg (46 lb)


2. Attach a nylon sling onto the body of signal control valve (5). Hold signal control valve (5). Install the signal control valve (5) assembly to the control valve with bolts (8) (3 used).


 : 22 mm


 : 140 N·m (14 kgf·m, 103 lbf·ft)

3. Install all connectors, hoses and pipes to signal control valve (5).


 : 19 mm


 : 30 N·m (3.0 kgf·m, 22 lbf·ft)

 : 22 mm


 : 40 N·m (4.0 kgf·m, 30 lbf·ft)


4. Wind the clip band to the hanging hose. Secure the clip band to bracket (7) with bolt (4).

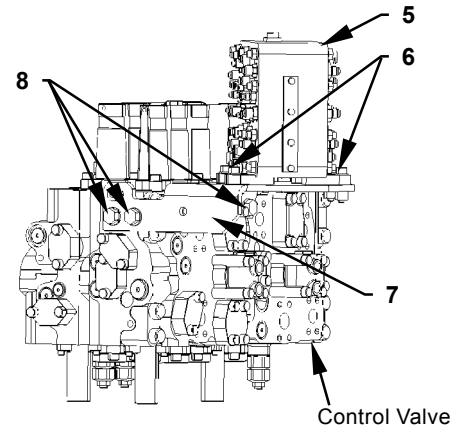
 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

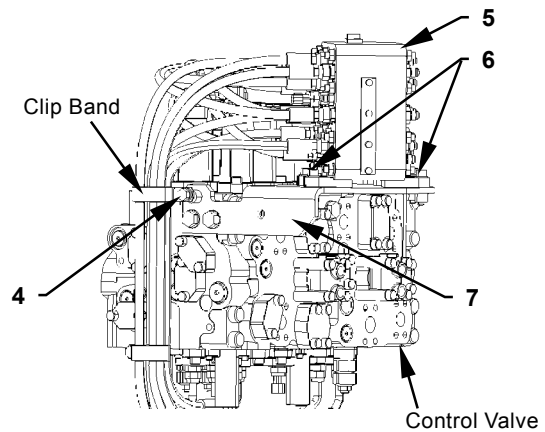
5. Install covers (1, 2) with bolts (3) (4 used).

 : 17 mm

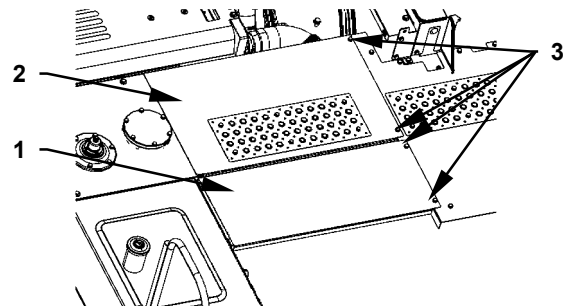
 : 50 N·m (5.0 kgf·m, 37 lbf·ft)



W1V1-02-09-002



W1V1-02-09-001



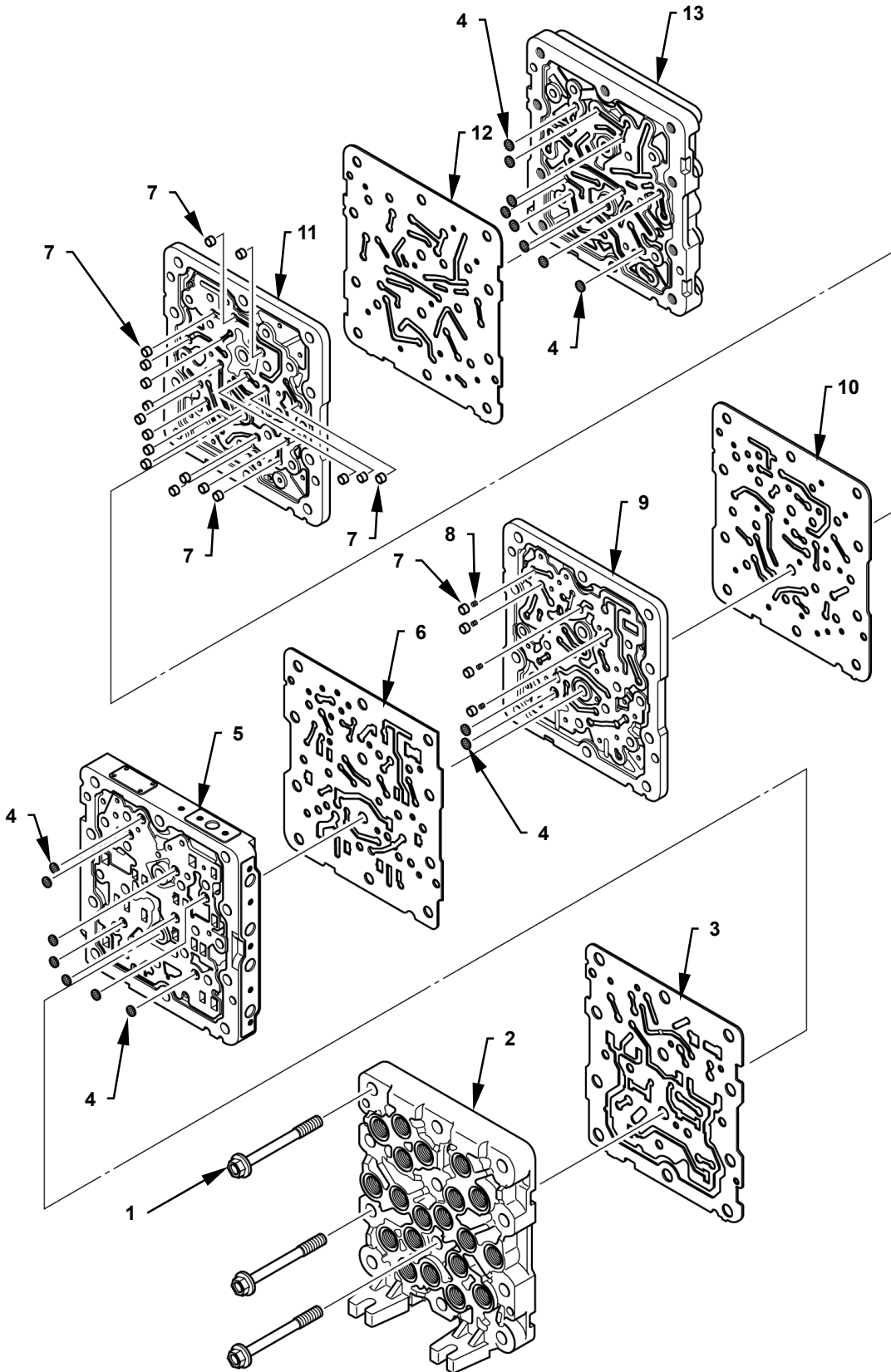
W1V7-02-08-001

UPPERSTRUCTURE / Signal Control Valve

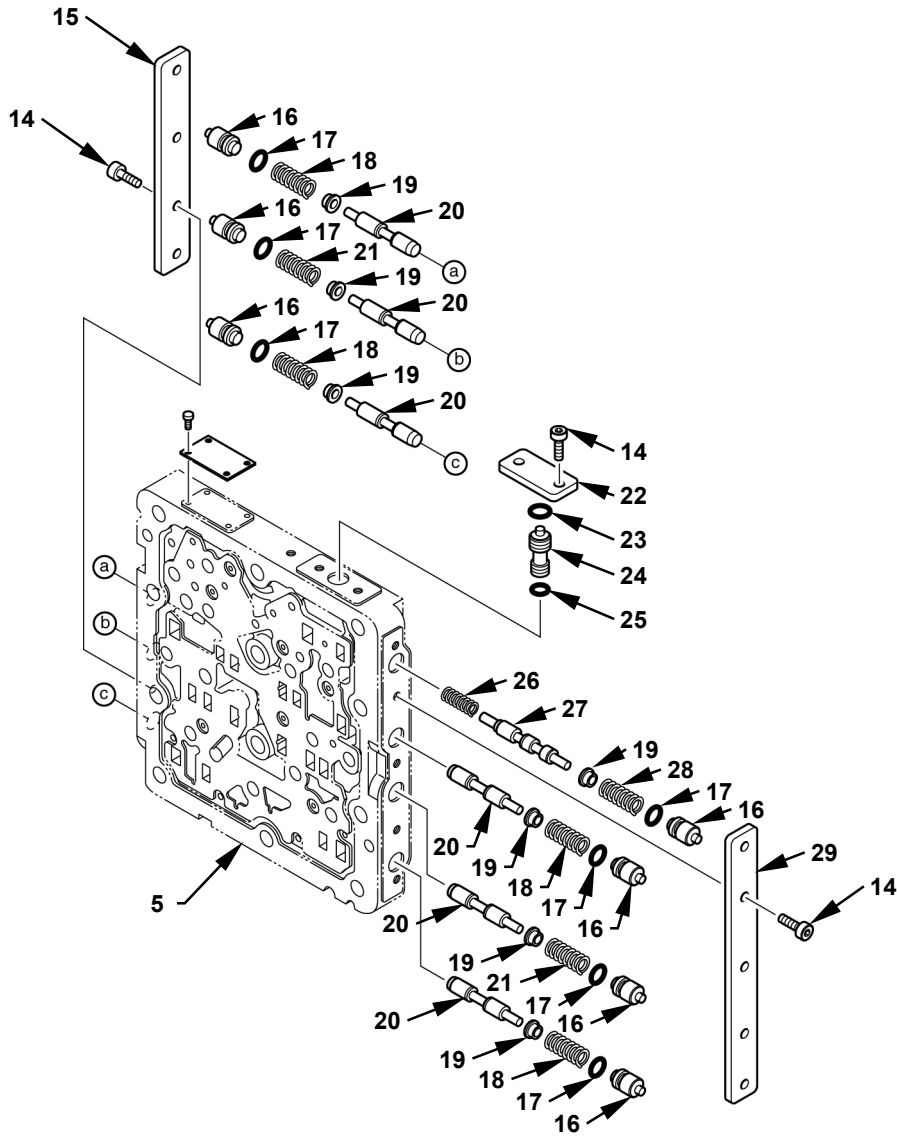
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UPPERSTRUCTURE / Signal Control Valve

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

UPPERSTRUCTURE / Signal Control Valve

(Blank)


UPPERSTRUCTURE / 4-Spool Solenoid Valve Unit

REMOVE AND INSTALL 4-SPOOL SOLENOID VALVE

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

Removal

1. Open the engine cover. Remove bolts (3) (4 used). Remove covers (1, 2).


 : 17 mm

2. Attach identification tags to all the removed hoses for reassembling.

Remove all wirings and hoses from 4-spool solenoid valve unit (4). Cap all the hoses.


 : 17 mm, 19 mm


3. Remove socket bolts (5) (2 used). Remove 4-spool solenoid valve unit (4) from the control valve.

 : 8 mm


Installation


1. Install 4-spool solenoid valve unit (4) to the control valve with socket bolts (5) (2 used).


 : 8 mm


 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

2. Install all wirings and hoses to 4-spool solenoid valve unit (4).


 : 17 mm


 : 25 N·m (2.5 kgf·m, 18 lbf·ft)

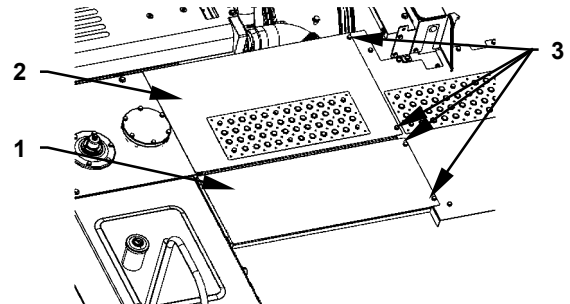
 : 19 mm

 : 30 N·m (3.0 kgf·m, 22 lbf·ft)

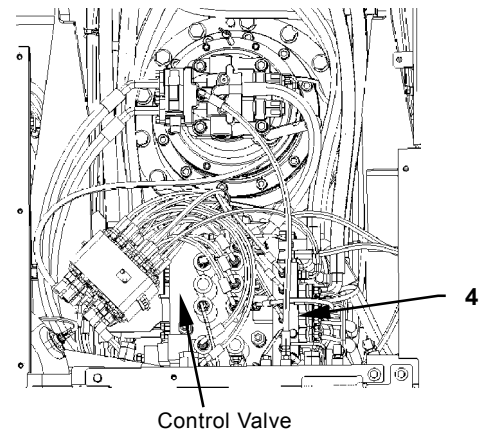
3. Install covers (1, 2) with bolts (3) (4 used).

 : 17 mm

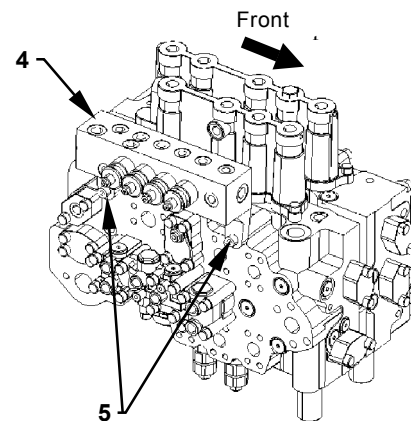
 : 50 N·m (5.0 kgf·m, 37 lbf·ft)



W1V7-02-08-001



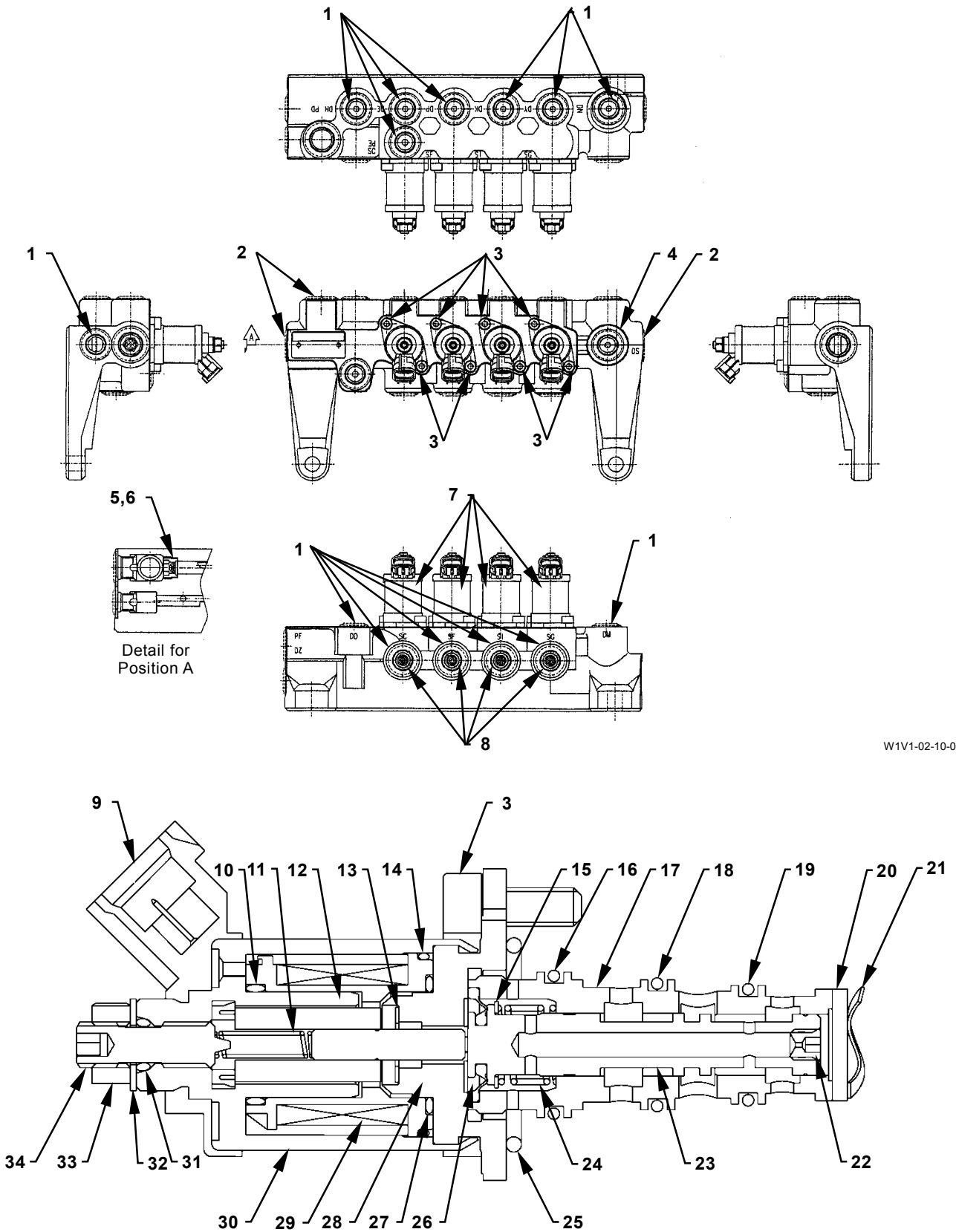
W1V1-02-05-021



W1V1-02-10-004

UPPERSTRUCTURE / 4-Spool Solenoid Valve Unit






STRUCTURE OF 4-SPOOL SOLENOID VALVE UNIT



W1V1-02-10-001

T1V1-03-07-008

UPPERSTRUCTURE / 4-Spool Solenoid Valve Unit

Item	Part Name	Q'ty	Wrench Size mm	Tightening Torque			Remark
				N.m	kgf.m	lbf.ft	
1	Plug	14	 : 6				
2	Plug	3	 : 8				
3	Socket bolt	8	 : 2.5	5 to 7	0.5 to 0.7	3.7 to 5.2	
4	Body (4-spool solenoid valve)	1					
5	Filter	1					
6	Plug	1	 : 10	20 to 23	2.0 to 2.3	14.8 to 17.0	
7	Solenoid	4					
8	Orifice	4	 : 6	10 to 13	1.0 to 1.3	7.4 to 9.6	
9	Socket	1					
10	O-Ring	1					
11	Spring	1					
12	Plunger	1					
13	Spacer	1					
14	O-Ring	1					
15	Washer	1					
16	O-Ring	1					
17	Sleeve	1					
18	O-Ring	1					
19	O-Ring	1					
20	Plate	1					
21	Wave Spring	1					
22	Orifice	1					
23	Spool	1					
24	Spring	1					
25	O-Ring	1					
26	Diaphragm	1					
27	O-Ring	1					
28	Flange	1					
29	Coil	1					
30	Solenoid	1					
31	O-Ring	1					
32	Spacer	1					
33	Nut	1					
34	Adjusting Screw	1					

UPPERSTRUCTURE / 4-Spool Solenoid Valve Unit


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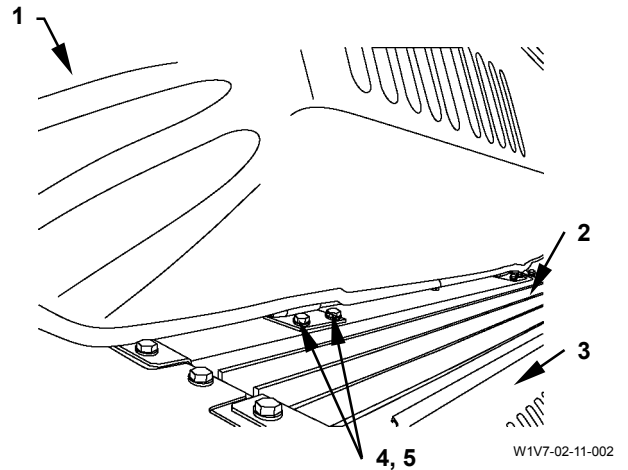
UPPERSTRUCTURE / Engine

REMOVE AND INSTALL ENGINE

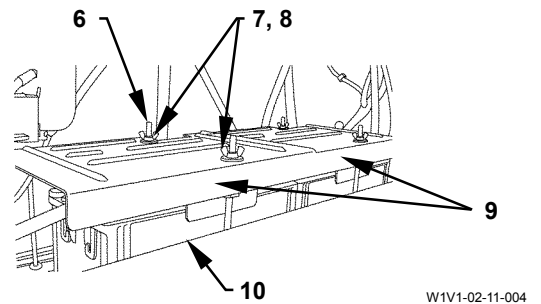
Removal

1. Open engine cover (1). Remove the pin and washer from the stopper. Remove the stopper from engine cover (1).
2. Attach a nylon sling to engine cover (1). Remove bolts (4) (4 used) and spring washers (5) (4 used) from cover (2). Hoist and remove engine cover (1) from cover (2).


 : 17 mm

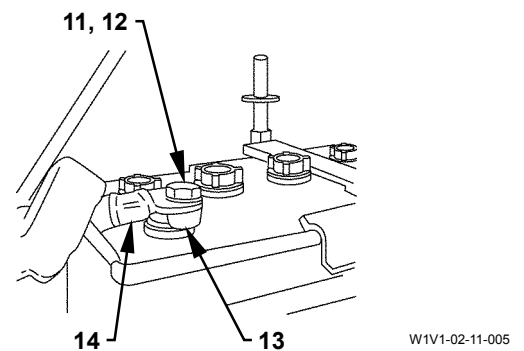


3. Open cover (3) in the radiator space. Remove wing nuts (7) (4 used) and washers (8) (4 used) from bolts (6) (4 used). Remove covers (9) (2 used) from batteries (10) (2 used).




4. Remove bolt (11) and washer (12) from ground code (14). Remove ground code (14) from terminal (13).

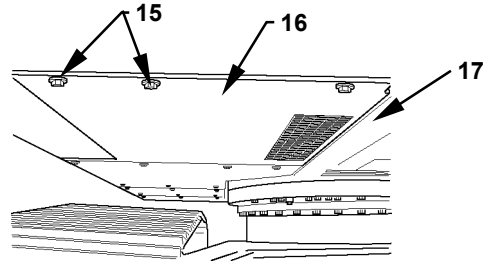
 : 17 mm



UPPERSTRUCTURE / Engine


5. Remove sems bolts (15) (6 used) from cover(16).
Remove cover (16) from main frame (17).

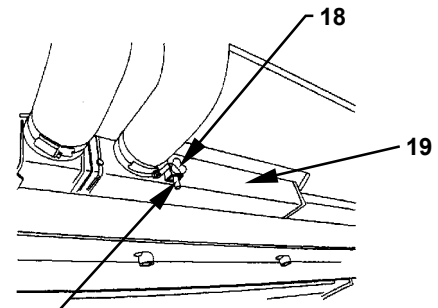
 : 17 mm



W1V7-02-11-003

6. Install the vinyl hose to the lower side of cock (18).
Loosen cock (18) and drain off water from radiator (19). Close cock (18). Remove the vinyl hose.


 **NOTE:** This procedure can be done from the battery space side.

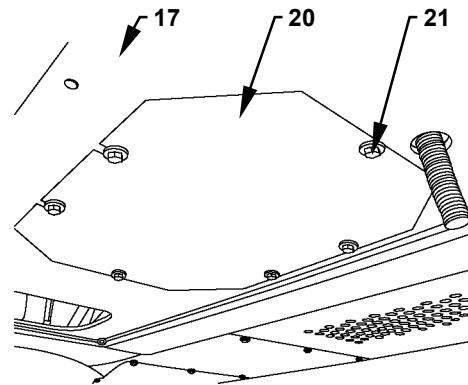


Vinyl Hose Mounting Position

W1V1-02-11-034

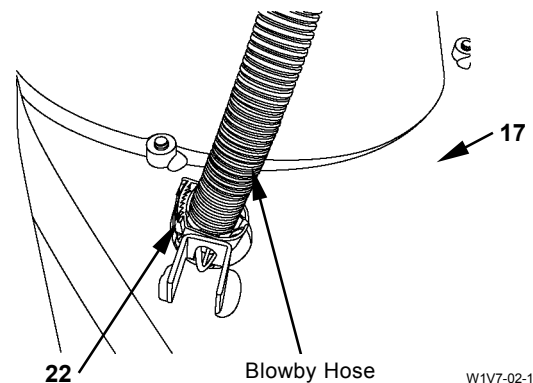
7. Remove sems bolts (21) (6 used) from cover (20).
Remove cover (20) from main frame (17).

 : 17 mm



W1V7-02-11-004


8. Remove band (22). Make the blowby hose (26) free.

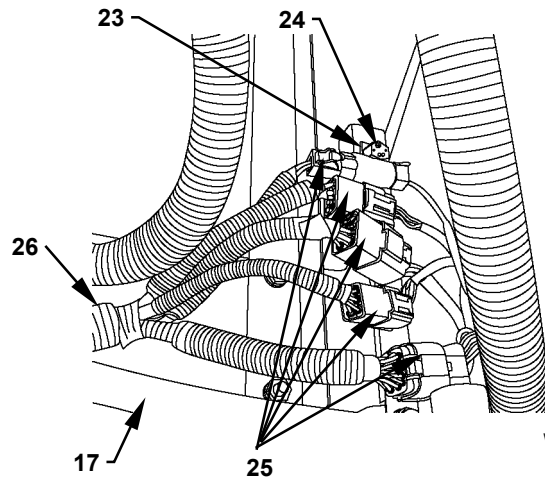


W1V7-02-11-005

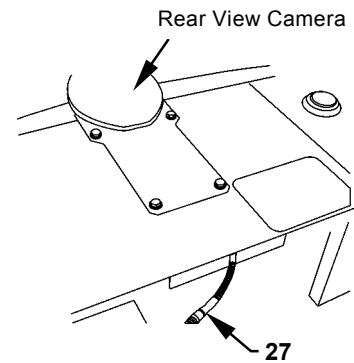
UPPERSTRUCTURE / Engine

9. Remove the clamp to secure wire harness (26). (2 places) Remove semi bolts (24) (2 used) from plate (23). Remove connectors (25) (5 used) from plate (23).

 : 17 mm

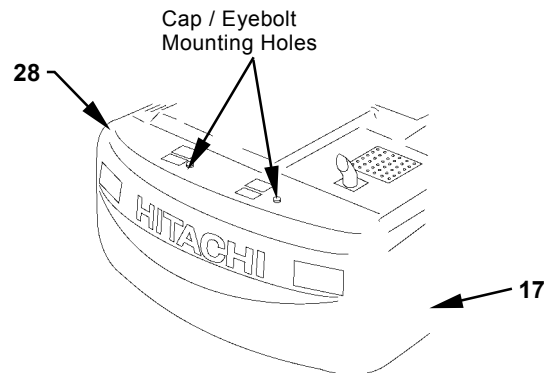


10. Remove connector (27) in the rear view camera.



CAUTION: Counterweight (28) weight:
ZAXIS 330-3, 330LC-3: 6800 kg (14991 lb)
ZAXIS 350H-3, 350LCH-3, 350LC-3, 350LCN-3:
7400 kg (16314 lb)
ZAXIS 350K-3, 350LCK-3: 8200 kg (18078 lb)


11. Remove counterweight (28) from main frame (17). As for removal and installation of the counterweight, refer to the Remove and Install Counterweight group (W2-2-1).

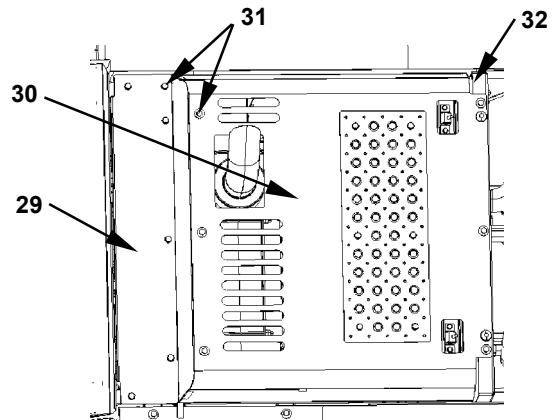


UPPERSTRUCTURE / Engine

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

12. Remove bolts (31) (12 used) from covers (29, 30) in the upper of muffler. Remove covers (29, 30) from bracket (32).


 : 17 mm

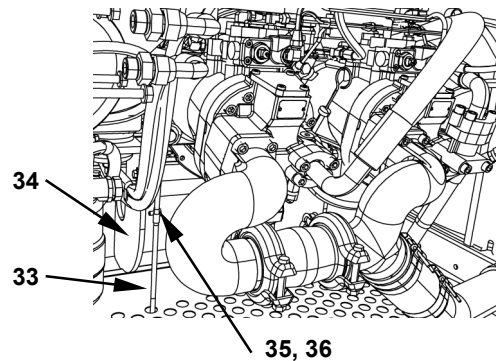


W1V7-02-04-025

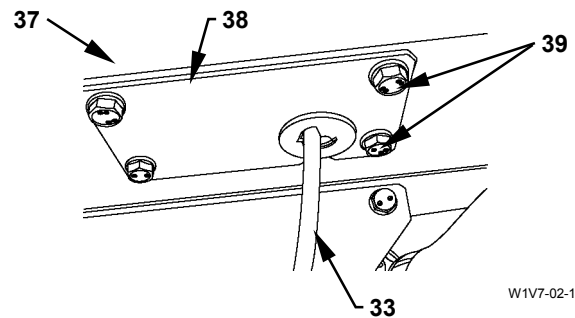
13. Remove bolt (35). Remove clip (36) and muffler tube (33) from frame (34)

14. Remove bolts (39) (4 used) from muffler bracket (37). Remove cover (38).

 : 17 mm




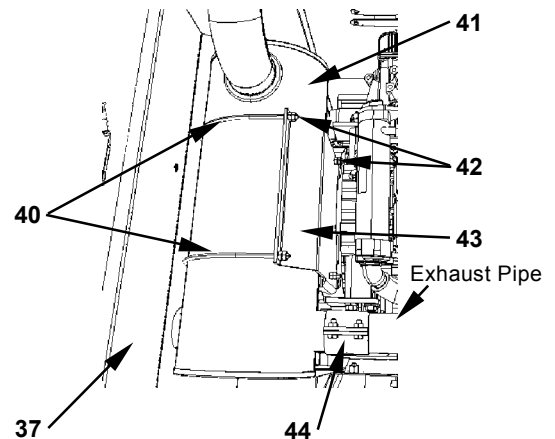
W1V7-02-04-030



W1V7-02-11-007

15. Remove nuts (42) (8 used) and U-bolts (40) (2 used) from bracket (43). Remove clamp (44) from the exhaust pipe. Remove muffler (41).


 : 14 mm, 17 mm




W1V1-02-04-006

UPPERSTRUCTURE / Engine

16. Remove bolt (48). Remove clip (49) from muffler bracket (37).


 : 17 mm

17. Remove bolts (46) (5 used), which are installed to side covers (45, 50), from covers (51, 53).


 : 17 mm


IMPORTANT: When removing the muffler bracket (37) assembly, do not damage the parts and hoses.

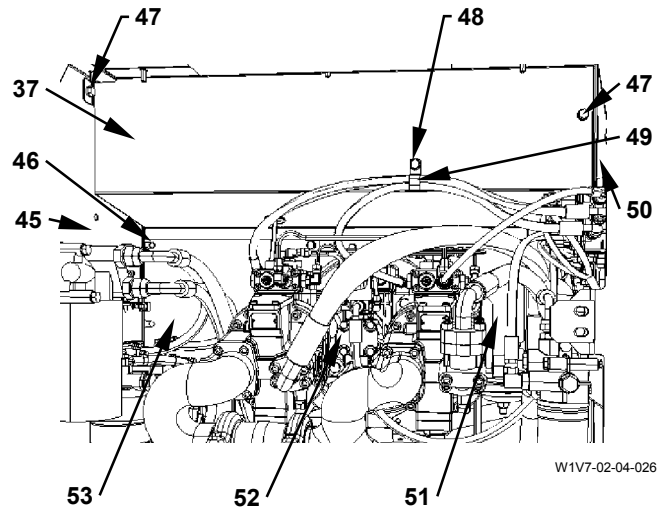
18. Remove bolts (47) (2 used). Remove the muffler bracket (37) assembly from side covers (45, 50).

 : 17 mm

19. Remove all connectors, hoses and pipe from pump device (52). Attach an identification tag onto the removed hose for assembling. Cap the open end.


 : 19 mm, 22 mm, 27 mm, 36 mm

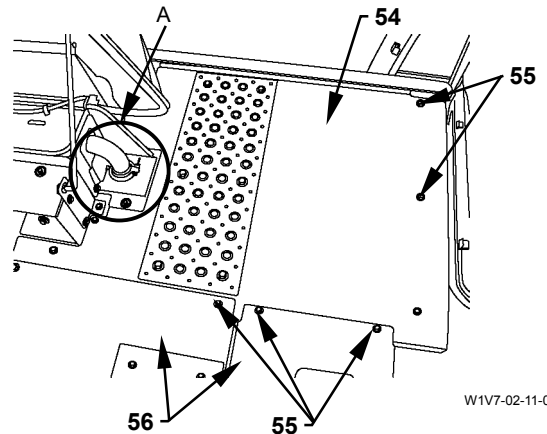
 : 10 mm



UPPERSTRUCTURE / Engine


20. Remove sems bolts (55) (9 used) from covers (54), (56) (2 used).

 : 17 mm

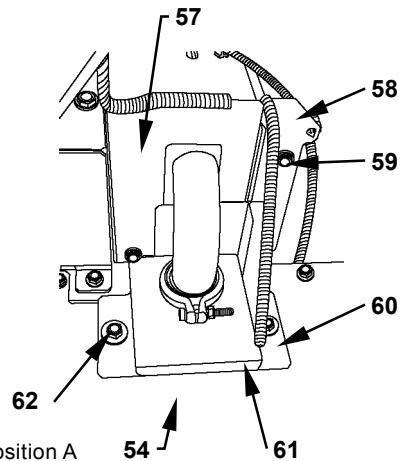


W1V7-02-11-008

21. Remove sems bolts (62) (2 used) and rubber (61) from bracket (60). Remove sems bolts (59) (2 used) from bracket (58). Remove brackets (58, 60) from covers (54, 57).

 : 17 mm


22. Remove covers (54) and (56) (2 used).

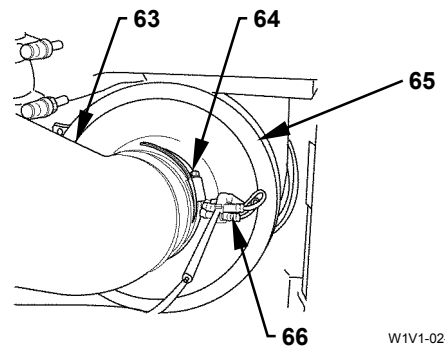


W1V7-02-11-009

23. Remove connector (66) from air cleaner (65).

24. Remove band (64) from rubber hose (63).


 : 7 mm

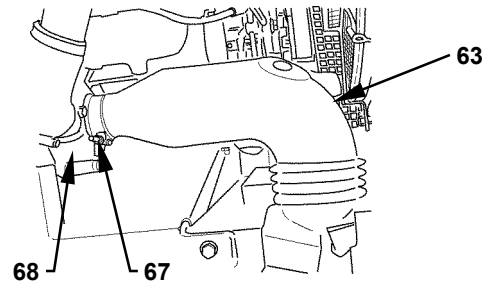


W1V1-02-11-014

UPPERSTRUCTURE / Engine


25. Remove clamp (67) from rubber hose (63).
Remove rubber hose (63) from turbocharger (68)
and air cleaner (65).

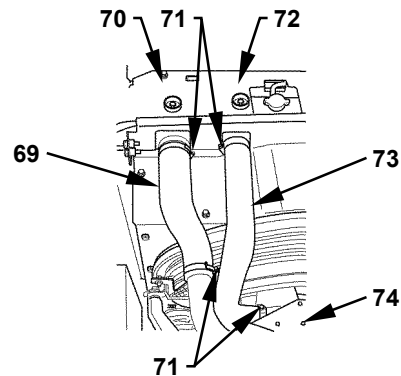
 : 7 mm



W1V1-02-11-013


26. Loosen clamps (71) (4 used) from rubber hoses (69, 73). Remove rubber hoses (69, 73) from intercooler (70), radiator (72) and engine (74).

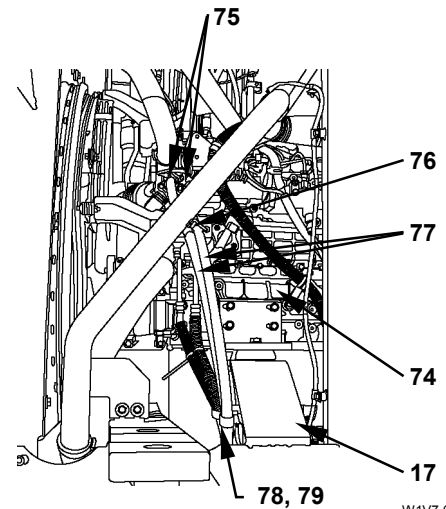
 : 7 mm



W1V1-02-11-009

27. Remove band (76). Remove bolt (78) from main frame (17). Remove clamp (79).

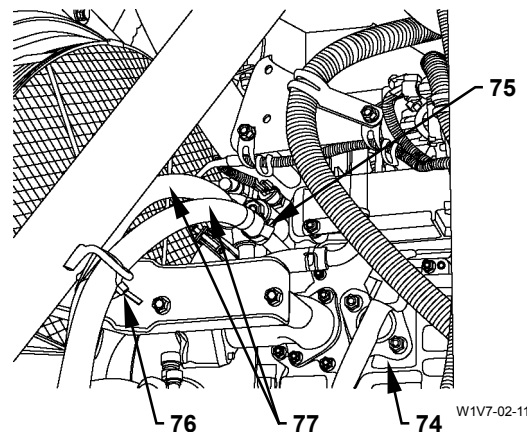
 : 17 mm



W1V7-02-11-011

28. Loosen clamps (75) (2 used) of hoses (77) (2 used). Remove hoses (77) (2 used) from engine (74).

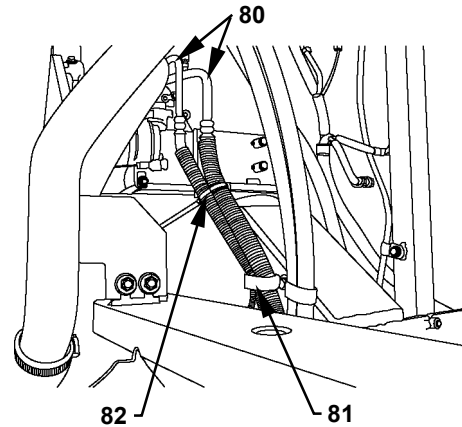
 : 7 mm



W1V7-02-11-010

UPPERSTRUCTURE / Engine


29. Remove band (82) and clamp (81) from pipes (80) (2 used).



W1V7-02-11-013

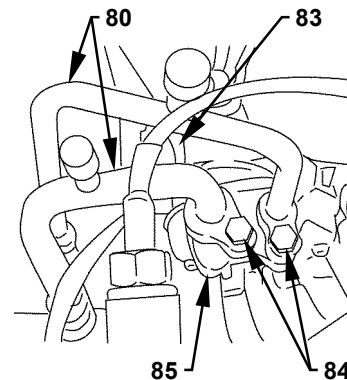
IMPORTANT: Before removing pipe (80), release the gas. Refer to Air Conditioner/ Troubleshooting in Technical Manual (T1G6-JAC-00).

30. Remove semi bolts (84) (2 used) from pipes (80) (2 used). Remove pipes (80) (2 used) from air conditioner pump (85).

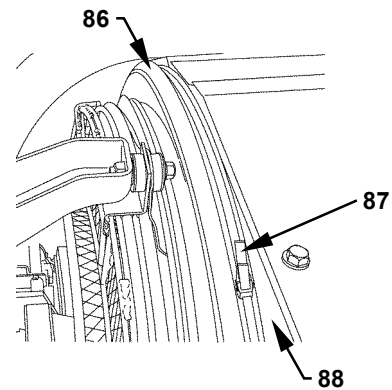
 : 13 mm

31. Remove connector (83).

32. Remove band (87) from rubber (86). Remove rubber (86) from shroud (88).




W1V1-02-11-018




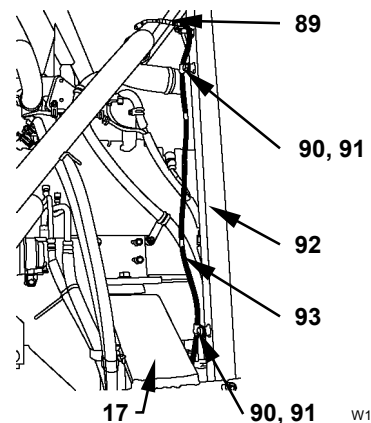
W1V1-02-11-010

33. Remove band (89). Remove semi bolts (91) (2 used) from clamps (90) (2 used). Remove wiring (93) from support (92).

 : 17 mm

34. Remove the bolts (4 used) from the inside of support (92). Remove support (92) from main frame (17) and cover (97).


 : 17 mm

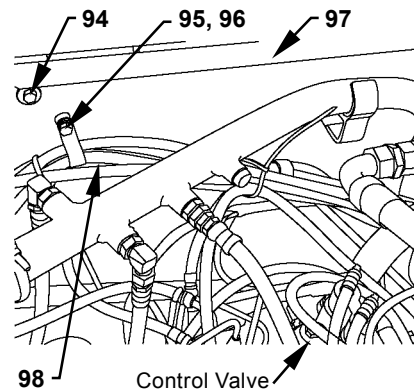


W1V7-02-11-012

UPPERSTRUCTURE / Engine


35. Remove sems bolts (96) (4 used) from clamps (95) (4 used). Remove pilot hose (98) and the wiring from cover (97).

 : 17 mm

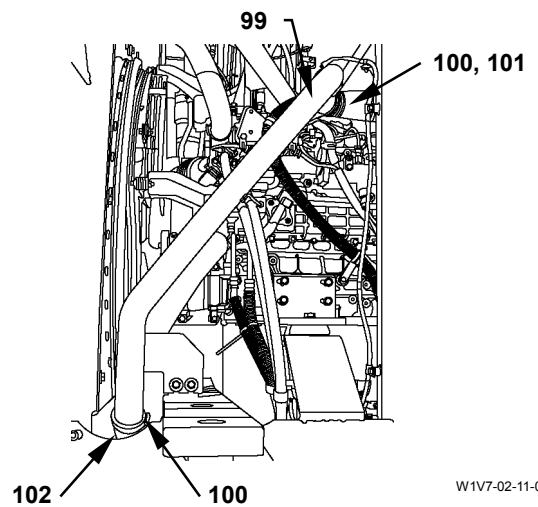


W1V7-02-11-014

36. Remove sems bolts (94) (6 used) from cover (97). Remove cover (97).


 : 17 mm

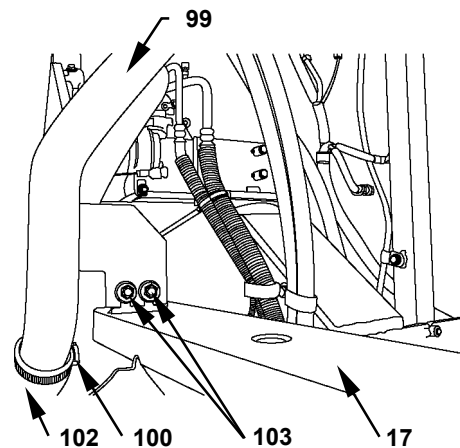
37. Loosen clamps (100) (2 used) in pipe (99). Remove pipe (99) from rubber hoses (101, 102).



W1V7-02-11-011

38. Remove sems bolts (103) (2 used) from pipe (99). Remove pipe (99) from main frame (17).


 : 17 mm

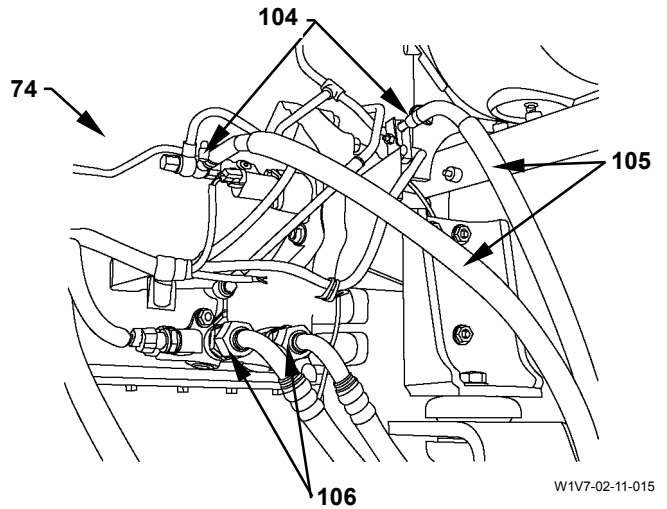


W1V7-02-11-013


UPPERSTRUCTURE / Engine

39. Loosen clamps (104) (2 used). Remove fuel hoses (105) (2 used) from engine (74). Install a plug to the open ends. Keep fuel hoses (105) (2 used) in order not to leak fuel.


 : 7 mm

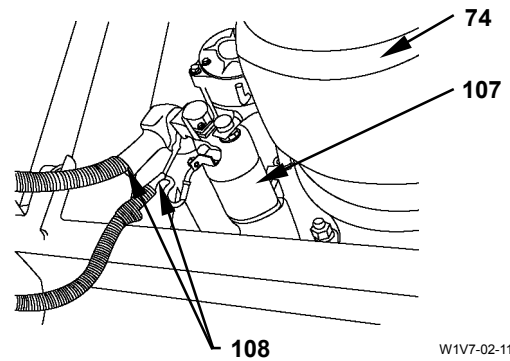


40. Remove hoses (106) (2 used) from engine (74). Cap the open ends.


 : 36 mm

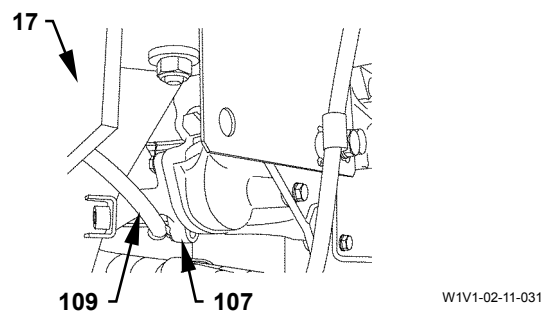
41. Remove wirings (108) (2 used) from starter motor (107).

 : 8 mm, 14 mm




42. Remove ground line (109) from main frame (17).

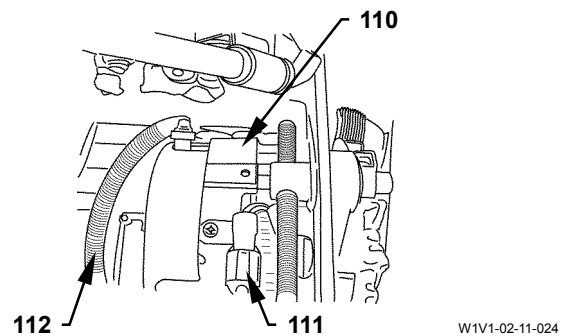
 : 17 mm



43. Remove connector (111) from alternator (110).

44. Remove wirings (112) (2 used) from alternator (110).

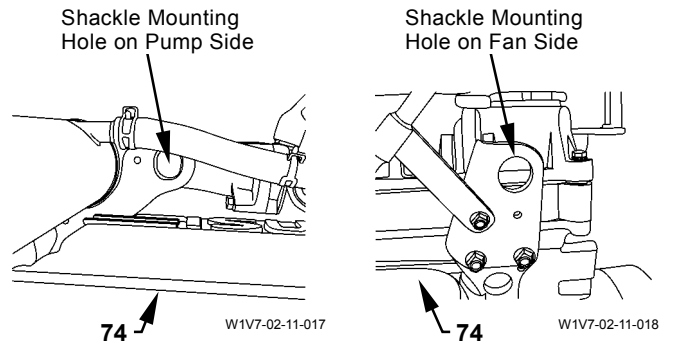
 : 12 mm




UPPERSTRUCTURE / Engine

CAUTION: The engine (74) assembly weight: 850 kg (1874 lb)


45. Install the shackles (2 used) to the lifting hole for engine (74). Attach a nylon sling onto the shackles (2 used). Hoist and hold engine (74).



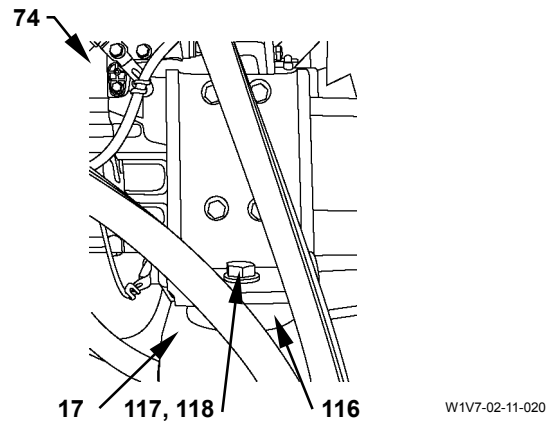
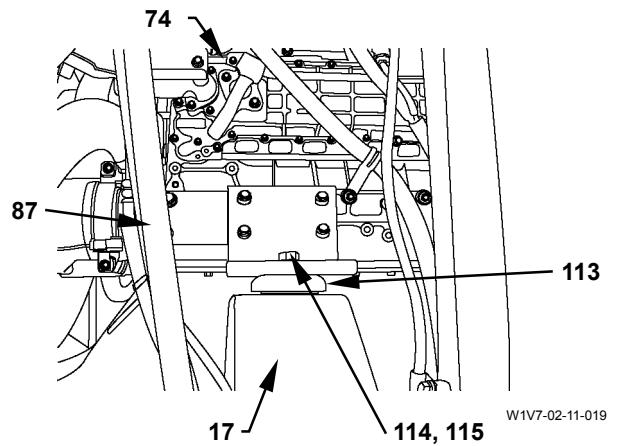
46. Remove bolts (114) (2 used) and spacers (115) (2 used) from rubber vibration isolators (113) (2 used).

 : 27 mm

47. Remove bolts (117) (2 used) and spacers (118) (2 used) from rubber vibration isolators (116) (2 used).


 : 27 mm


48. Hoist and remove the engine (74) assembly from main frame (17).




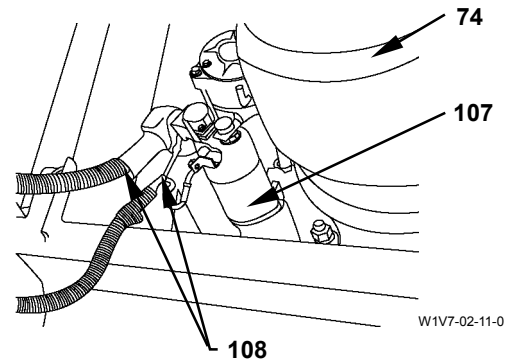
UPPERSTRUCTURE / Engine

5. Install wirings (108) (2 used) to starter motor (107).


 : 8 mm


 : 14 mm

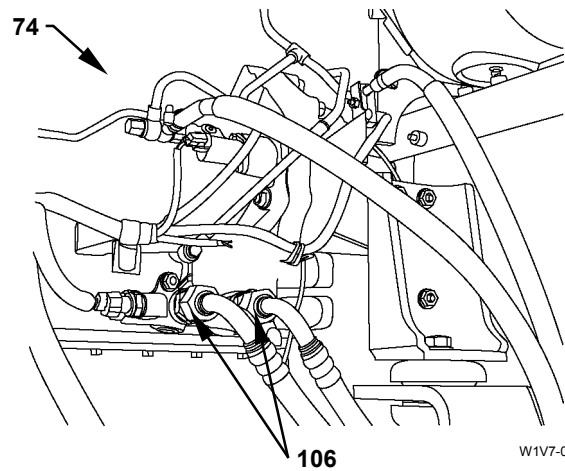
 : 10 N·m (1 kgf·m, 7 lbf·ft)




6. Install hoses (106) (2 used) to engine (74).


 : 36 mm

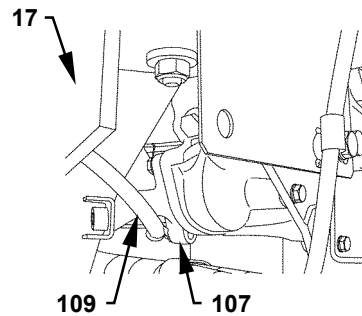
 : 205 N·m (21 kgf·m, 151 lbf·ft)




7. Install ground line (109) to main frame (17).


 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

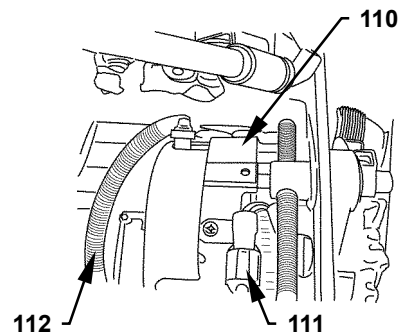


8. Install wiring (112) to alternator (110).

 : 12 mm


 : 10 N·m (1 kgf·m, 7 lbf·ft)


9. Install connector (111).

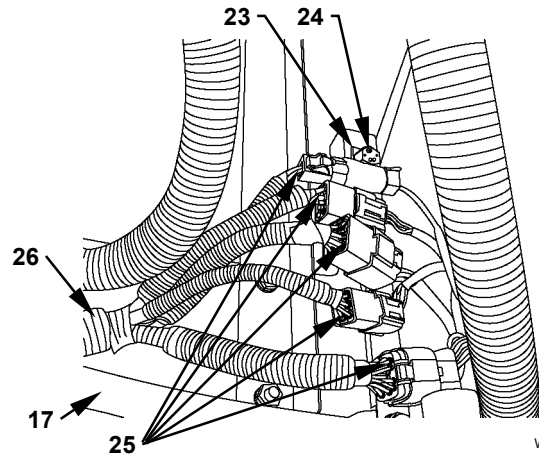


UPPERSTRUCTURE / Engine

10. Install connectors (25) (5 used). Install plate (23) to main frame (17) with sems bolts (24) (2 used).

 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)




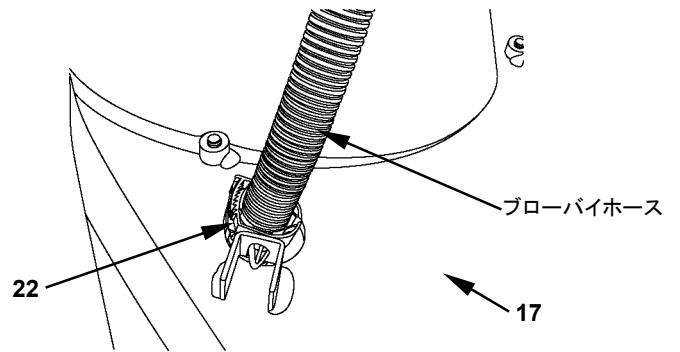
W1V7-02-11-006

11. Secure the blowby hose to band (22).

12. Secure wire harness (26) to main frame (17) with the clamp (2 places).

 : 17 mm

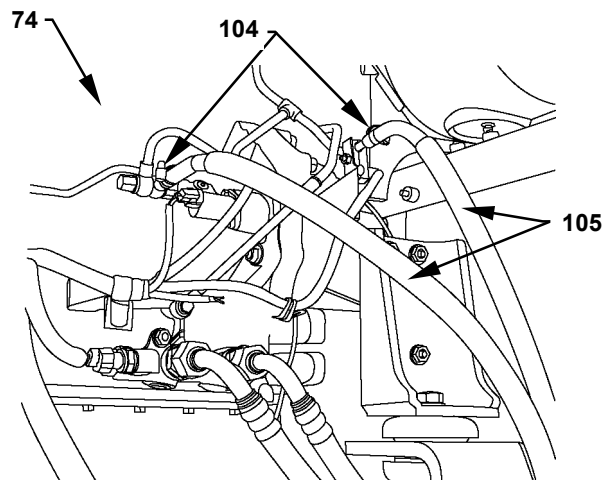
 : 50 N·m (5 kgf·m, 37 lbf·ft)



W1V7-02-11-005

13. Secure fuel hoses (105) (2 used) to engine (74) with clamps (104) (2 used).

 : 7 mm




W1V7-02-11-015


UPPERSTRUCTURE / Engine

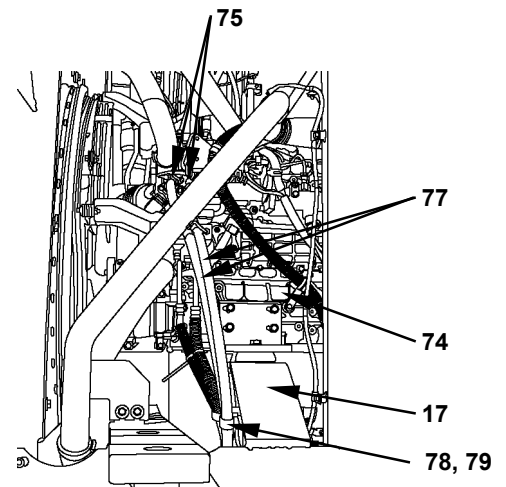
14. Install heater hoses (77) (2 used) to engine (74) with clamps (75) (2 used).

 : 7 mm

15. Install clamp (78) to hoses (77) (2 used). Secure clamp (78) to main frame (17) with bolt (79).

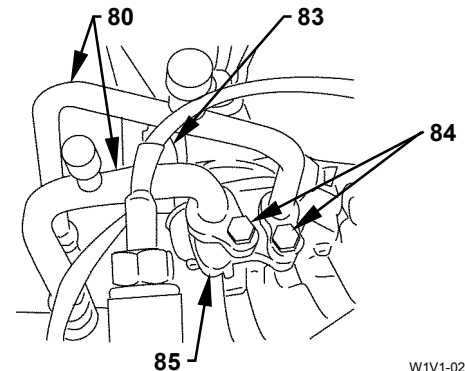
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



W1V7-02-11-011


16. Install connector (83) to air conditioner pump (85).





W1V1-02-11-018


IMPORTANT: Before installing pipe (80), charge refrigerant. Refer to Air Conditioner/ Troubleshooting in Technical Manual (T1G6-JAC-00).

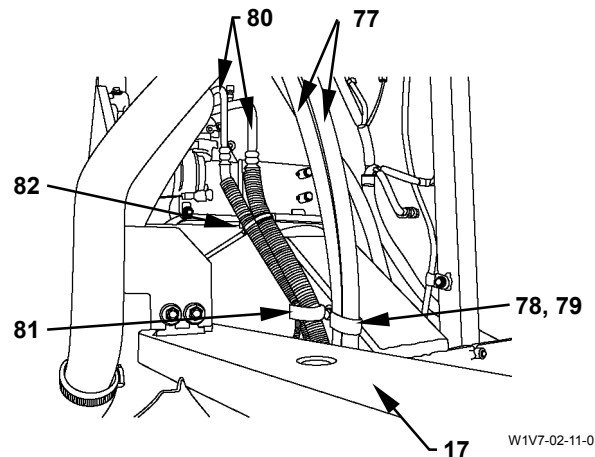
17. Install pipes (80) (2 used) to air conditioner pump (85) with sems bolts (84) (2 used). Install band (82) to pipes (80) (2 used). Secure pipes (80) (2 used) to main frame (17) with clamp (81).

 : 13 mm

 : 20 N·m (2 kgf·m, 15 lbf·ft)

 : 17 mm

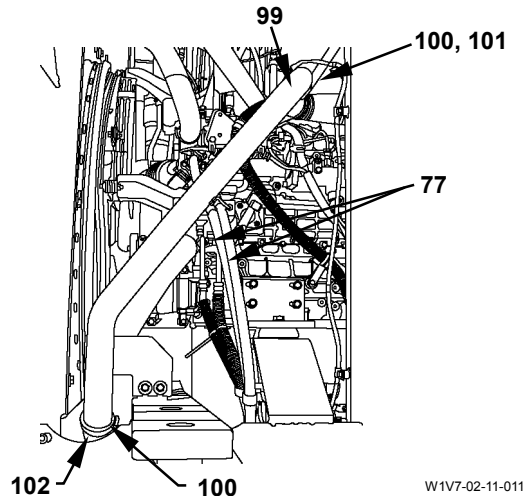
 : 50 N·m (5 kgf·m, 37 lbf·ft)




W1V7-02-11-013


UPPERSTRUCTURE / Engine

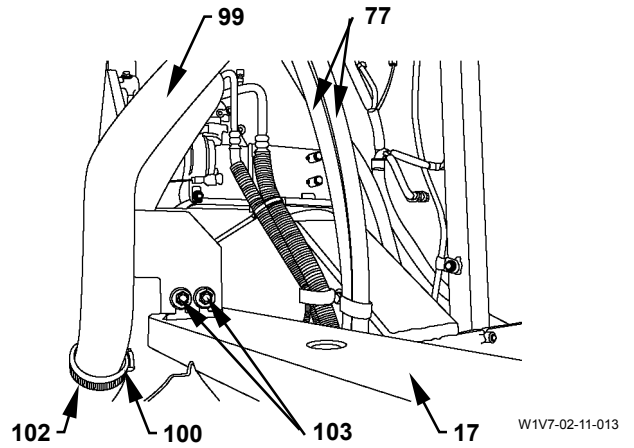
18. Install pipe (99) to rubber hoses (101, 102) with clamps (92) (2 used).




19. Install pipe (99) to main frame (17) with sems bolts (103) (2 used).


 : 17 mm

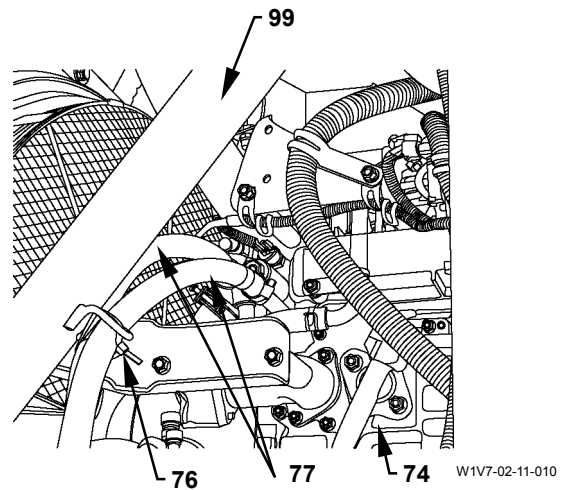
 : 50 N·m (5 kgf·m, 37 lbf·ft)



20. Install hose (77) to pipe (99) with band (76).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

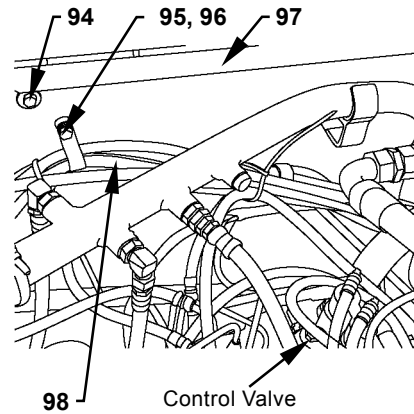


UPPERSTRUCTURE / Engine

21. Install cover (97) with sems bolts (94) (6 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)




W1V7-02-11-014


22. Install pilot hose (98) and the wiring to cover (97) with sems bolts (96) (4 used) and clamps (95) (4 used).

 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)


23. Install support (92) to main frame (17) and cover (97) with the bolts (4 used).

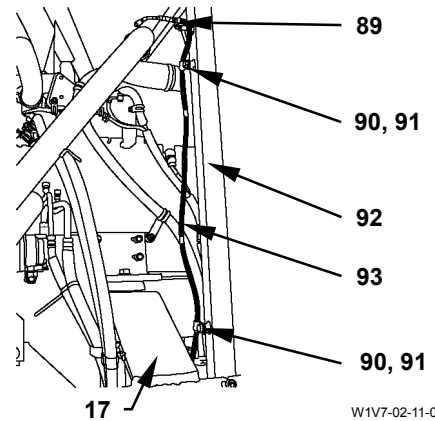
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

24. Install wiring (93) to support (92) with sems bolts (90) (2 used) and clamps (91) (2 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

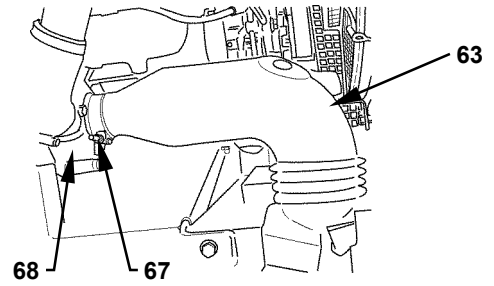


W1V7-02-11-012

UPPERSTRUCTURE / Engine

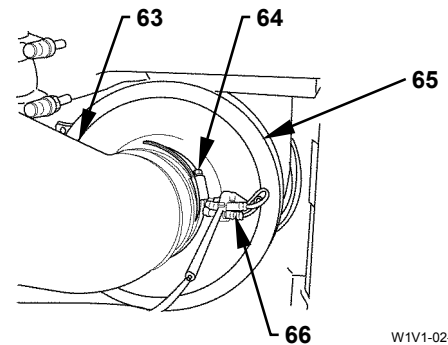
25. Install rubber hose (63) to turbocharger (68) and air cleaner (65) with clamps (67, 64).

 : 7 mm



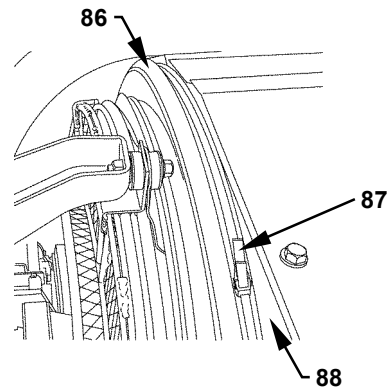
W1V1-02-11-013

26. Install connector (66) to air cleaner (65).




W1V1-02-11-014

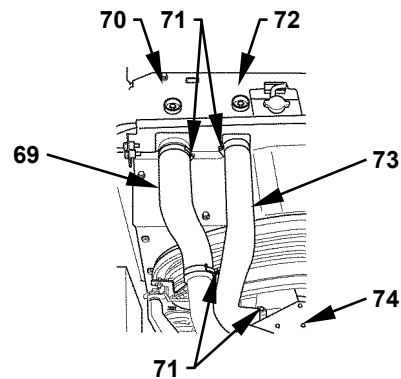
27. Install rubber (86) to shroud (88). Secure rubber (86) to shroud (88) with band (87).



W1V1-02-11-010

28. Install rubber hoses (69, 73) to engine (74), intercooler (70) and radiator (72) with clamps (71) (4 used).

 : 7 mm





W1V1-02-11-009

UPPERSTRUCTURE / Engine



29. Install all connectors, hoses and pipes to pump device (52).

-  : 19 mm
-  : 30 N·m (3 kgf·m, 22 lbf·ft)
-  : 22 mm
-  : 40 N·m (4 kgf·m, 30 lbf·ft)
-  : 27 mm
-  : 80 N·m (8 kgf·m, 59 lbf·ft)
-  : 36 mm
-  : 180 N·m (18 kgf·m, 133 lbf·ft)
-  : 10 mm
-  : 90 N·m (9 kgf·m, 66 lbf·ft)



30. Install the muffler bracket (37) assembly to side covers (45, 50) with bolts (47) (2 used).

-  : 17 mm
-  : 50 N·m (5 kgf·m, 37 lbf·ft)




31. Install covers (51, 53) to side covers (45, 50) with bolts (46) (5 used).

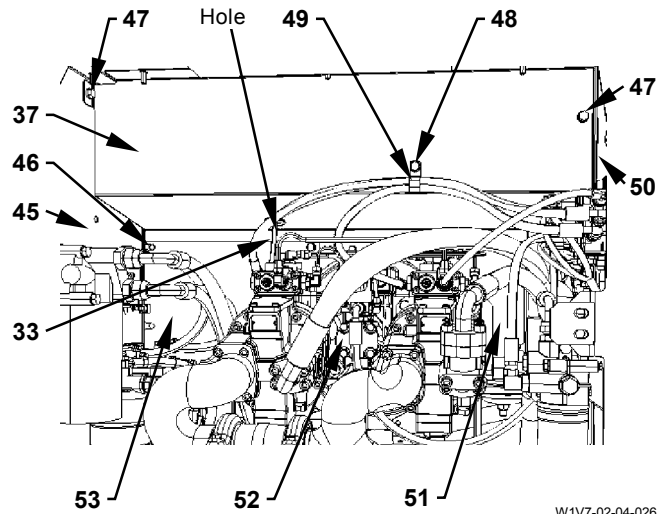
-  : 17 mm
-  : 50 N·m (5 kgf·m, 37 lbf·ft)

32. Secure clip (49) to muffler bracket (37) with bolt (48).

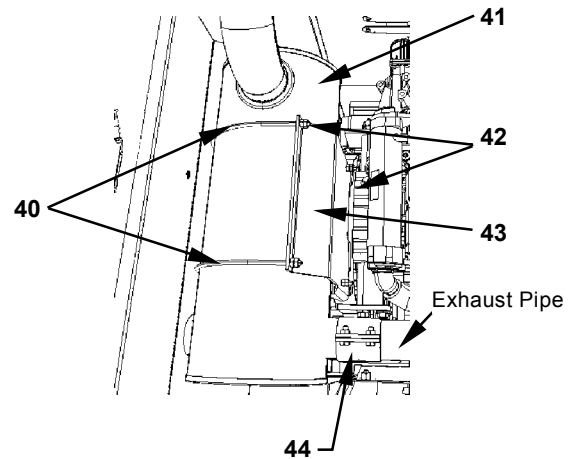
-  : 17 mm
-  : 50 N·m (5 kgf·m, 37 lbf·ft)

33. Install muffler (41) to the exhaust pipe with clamp (44). Secure muffler (41) to bracket (43) with U-bolts (40) (2 used) and nuts (42) (8 used).

-  : 14 mm
-  : 17 mm
-  : 50 N·m (5 kgf·m, 37 lbf·ft)



W1V7-02-04-026





W1V1-02-04-006

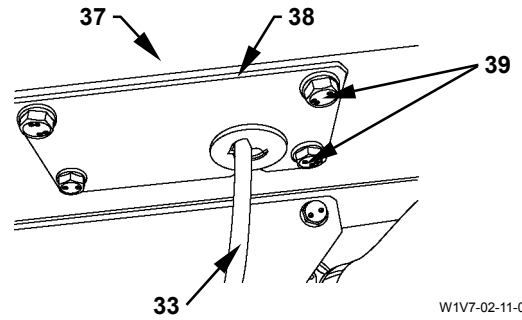
UPPERSTRUCTURE / Engine

34. Pass muffler tube (33) through the hole on muffler bracket (37).

35. Install cover (38) to muffler bracket (37) with bolts (39) (4 used).

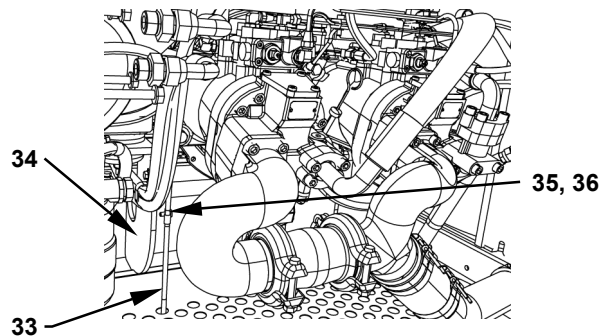
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)




W1V7-02-11-007


36. Install clip (36) and muffler tube (33) to frame (34) with bolt (35).



W1V7-02-04-030

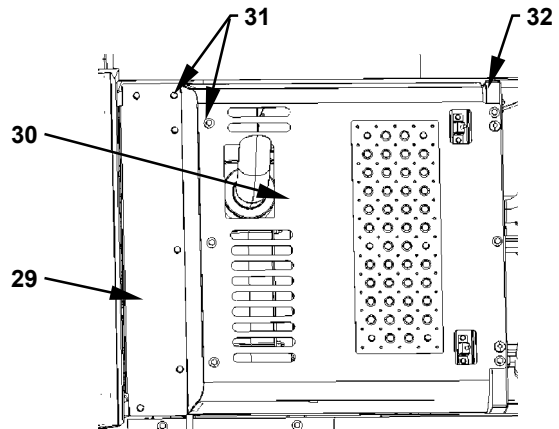
37. Install covers (29, 30) to bracket (32) with bolts (31) (12 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

38. Release any pressure in the pump. (Refer to W1-1-2.)


After completing the work, check the hydraulic level and any oil leakage.




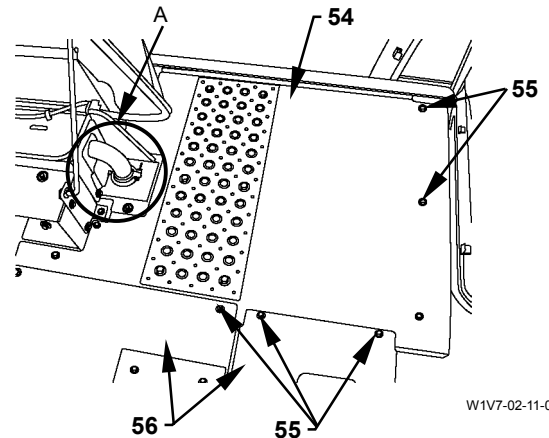
W1V7-02-04-025

UPPERSTRUCTURE / Engine

39. Install covers (56) (2 used) with sems bolts (55) (9 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

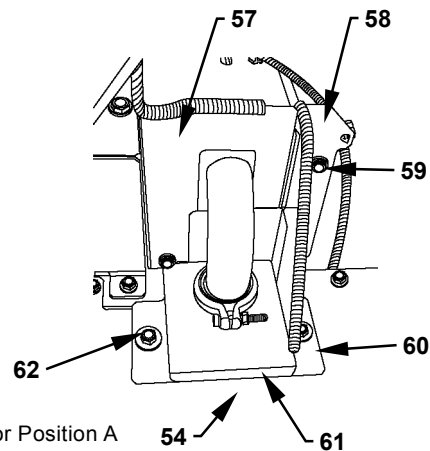


W1V7-02-11-008

40. Install brackets (58, 60) to covers (54, 57) with sems bolts (59, 62). Install rubber (61).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



Detail for Position A

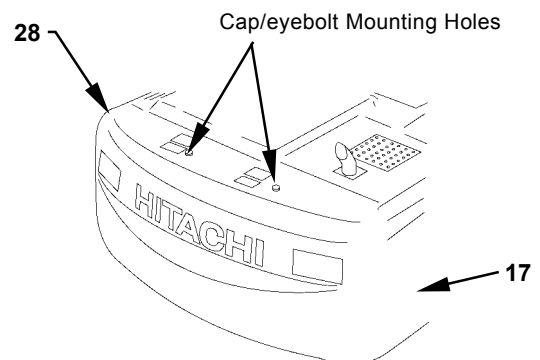
W1V7-02-11-009



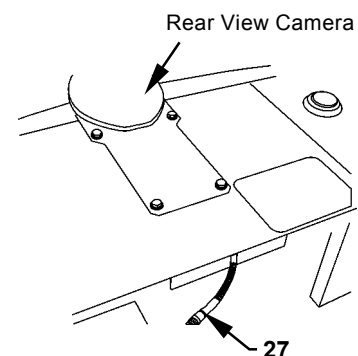
CAUTION: Counterweight (28) weight:
ZAXIS 330-3, 330LC-3: 6800 kg (14991 lb)
ZAXIS 350H-3, 350LCH-3, 350LC-3, 350LCN-3:
7400 kg (16314 lb)
ZAXIS 350K-3, 350LCK-3: 8200 kg (18078 lb)

41. Install counterweight (28) to main frame (17). As for removal and installation of the counterweight, refer to the Remove and Install Counterweight group (W2-2-1).

42. Install connector (27) of the rear view camera.




W1V1-02-11-001




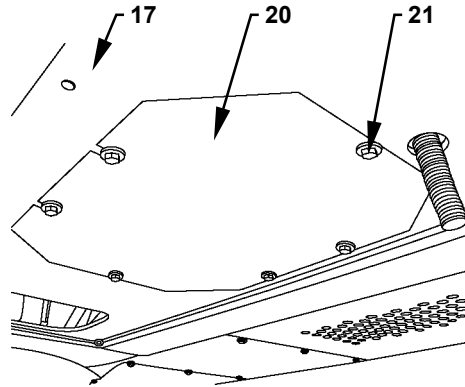
W1V1-02-02-001

UPPERSTRUCTURE / Engine

43. Install cover (20) to main frame (17) with sems bolts (21) (6 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

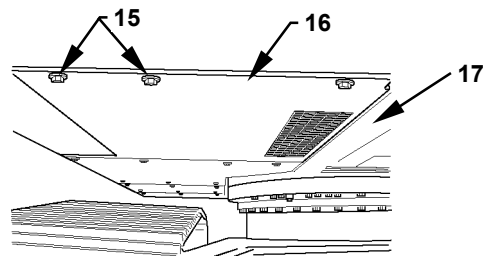


W1V7-02-11-004

44. Install cover (16) to main frame (17) with sems bolts (15) (6 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

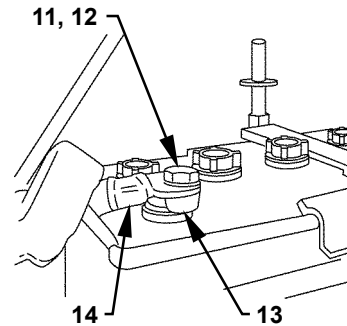


W1V7-02-11-003

45. Install ground code (14) to terminal (13) with bolt (11) and washer (12).

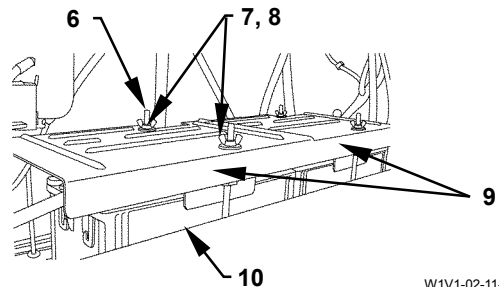
 : 17 mm

 : 20 N·m (2 kgf·m, 15 lbf·ft)



W1V1-02-11-005


46. Install covers (9) (2 used) to batteries (10) (2 used). Secure covers (9) (2 used) to bolts (6) (4 used) with washers (8) (4 used) and wing nuts (7) (4 used).




W1V1-02-11-004

UPPERSTRUCTURE / Engine

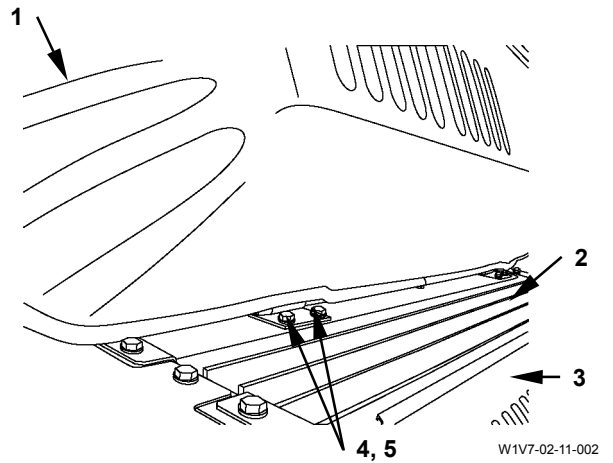
47. Attach a nylon sling onto engine cover (1). Hoist cover (5) and align the mounting hole on cover (2). Install engine cover (1) to cover (2) with washers (5) (4 used) and bolts (4) (4 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

48. Install the stopper to engine cover (1). Secure the stopper to engine cover (1) with the washer and pin.

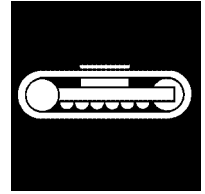
49. Add coolant into the radiator.



UPPERSTRUCTURE / Engine

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SECTION 3 UNDERCARRIAGE



— CONTENTNS —

Group 1 Swing Bearing

Remove and Install	
Swing Bearing	W3-1-1
Disassemble Swing Bearing	W3-1-4
Assemble Swing Bearing	W3-1-6

Group 2 Travel Device

Remove and Install Travel Device.....	W3-2-1
Disassemble Travel Device.....	W3-2-4
Assemble Travel Device.....	W3-2-10
Disassemble Travel Motor.....	W3-2-18
Assemble Travel Motor	W3-2-22
Disassemble Brake Valve	W3-2-28
Assemble Brake Valve	W3-2-30
Maintenance Standard	W3-2-32

Group 3 Center Joint

Remove and Install Center Joint	W3-3-1
Disassemble Center Joint	W3-3-4
Assemble Center Joint	W3-3-6

Group 4 Track Adjuster

Remove and Install Track Adjuster	W3-4-1
Disassemble Track Adjuster	W3-4-2
Assemble Track Adjuster.....	W3-4-6

Group 5 Front Idler

Remove and Install Front Idler.....	W3-5-1
Disassemble Front Idler.....	W3-5-2
Assemble Front Idler	W3-5-6
Maintenance Standard	W3-5-10

Group 6 Upper and Lower Roller

Remove and Install Upper Roller.....	W3-6-1
Remove and Install Lower Roller.....	W3-6-4
Disassemble Lower Roller.....	W3-6-8
Assemble Lower Roller.....	W3-6-10
Maintenance Standard.....	W3-6-12

Group 7 Track

Remove and Install Track	W3-7-1
Maintenance Standard.....	W3-7-7

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UNDERCARRIAGE / Swing Bearing

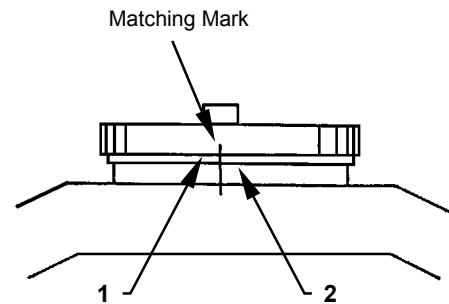
REMOVE AND INSTALL SWING BEARING

Before removing and installing the swing bearing, the upperstructure must be removed first. For removal and installation of the upperstructure, refer to "Remove and Install Main Frame" section.

In this section, the procedure starts on the premise that the upperstructure has already been removed.


Removal

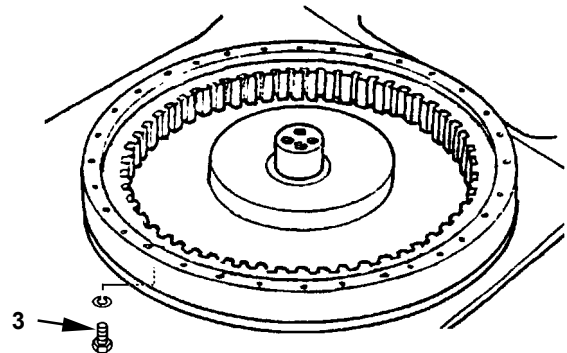
1. Put the matching marks on inner race (1) of swing bearing and track frame (2).



W105-03-01-001

2. Remove bolts (3) (36 used) from the inner race of swing bearing.

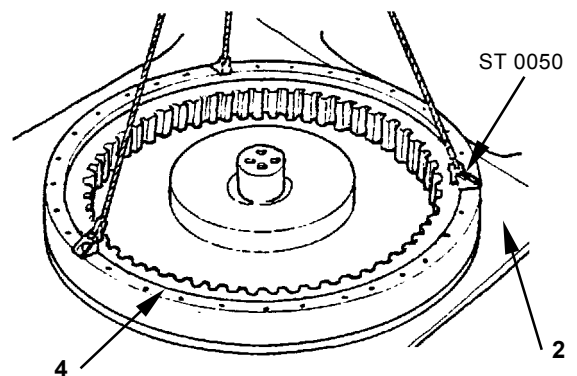
 : 41 mm



W158-03-01-001

 **CAUTION: Swing bearing (4) weight: 510 kg (1125 lb)**

3. Attach lifting tools (ST 0050) onto swing bearing (4). Hoist and remove swing bearing (4) from track frame (2).



W110-03-01-004

UNDERCARRIAGE / Swing Bearing

Installation

Clean the mounting surfaces of track frame (2) and swing bearing (4).

1. Apply THREEBOND # 1102 to the mounting surfaces of track frame (2) and swing bearing (4).





CAUTION: Swing bearing (4) weight: 510 kg (1125 lb)

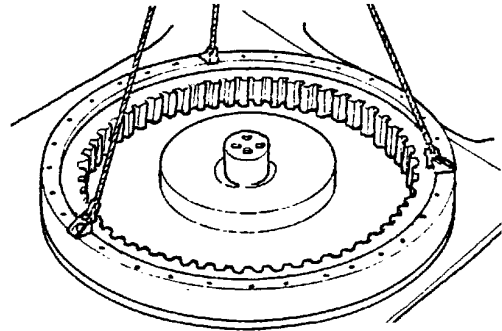
IMPORTANT: If the matching marks are not aligned, the soft zone position will be dislocated.

2. Hoist swing bearing (4). Align the matching marks on track frame (2) and inner race of swing bearing (4).

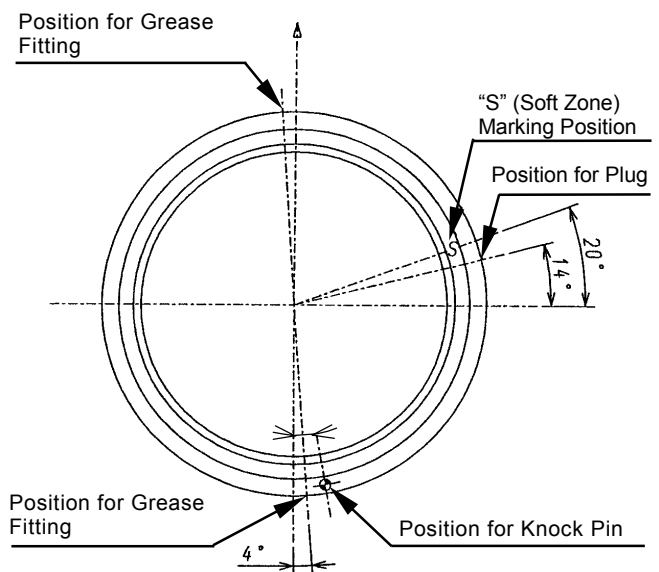
3. Install swing bearing (4) to track frame (2) with bolts (3) (36 used).

 : 41 mm

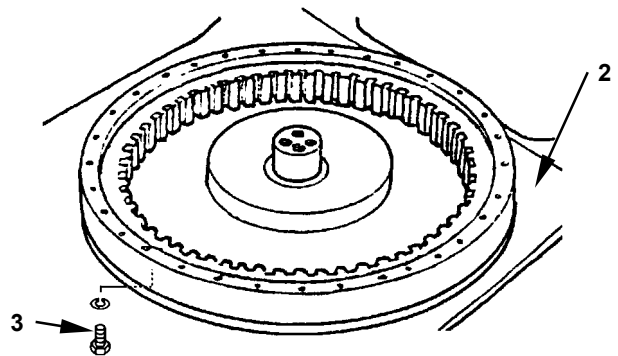
 : 1230 N·m (125 kgf·m, 900 lbf·ft)



W110-03-01-004



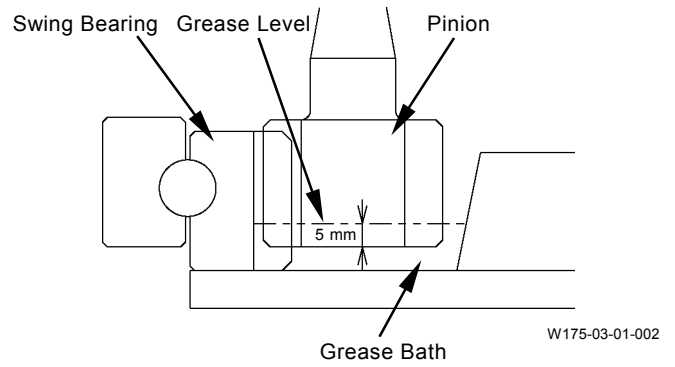
W1V7-03-01-001



W158-03-01-001

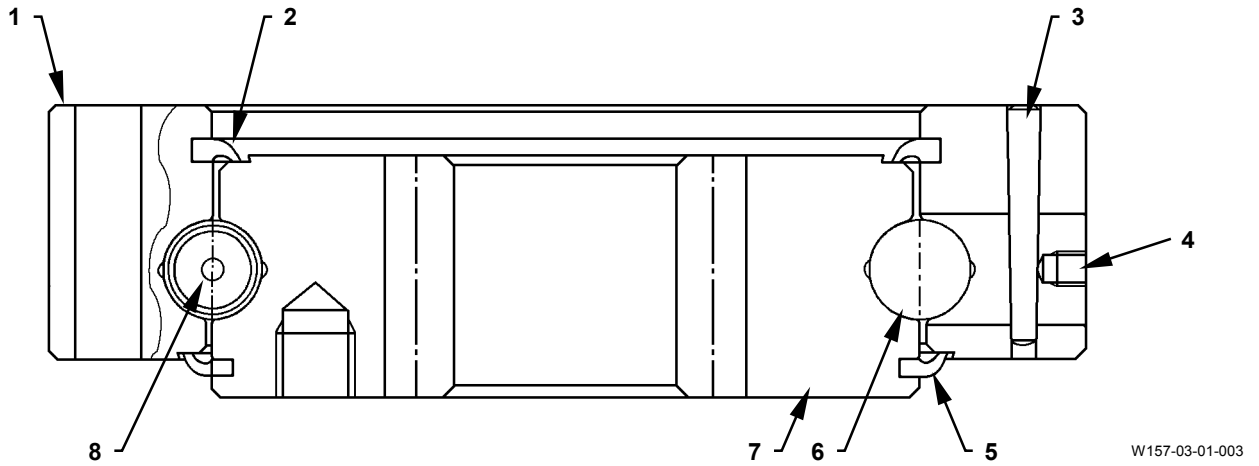
UNDERCARRIAGE / Swing Bearing

4. Add the grease bath with grease (Alvania EP2 or equivalent) until the pinion of swing device is covered 5 mm (0.18 in) in grease.
Amount of Grease: 19 L (5.0 US gal.)

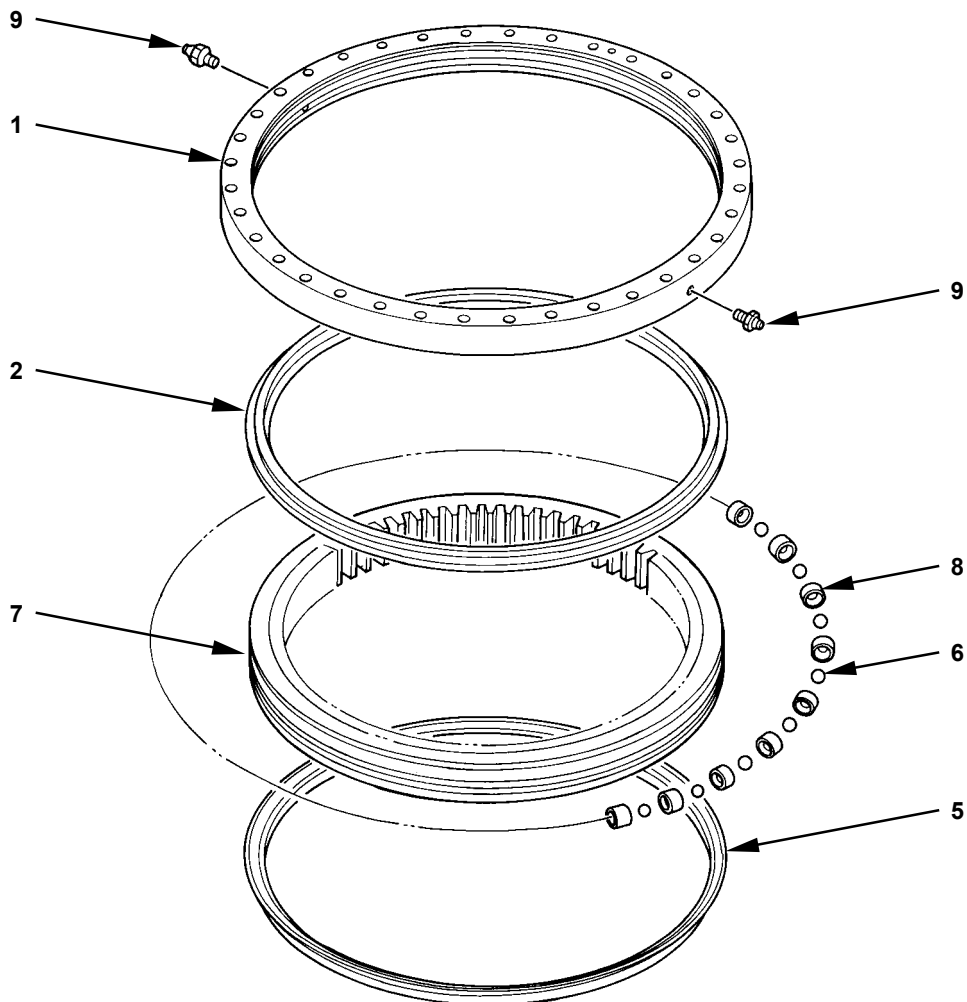


UNDERCARRIAGE / Swing Bearing

DISASSEMBLE SWING BEARING



W157-03-01-003



W157-03-01-002

1 - Outer Race
2 - Seal
3 - Pin

4 - Plug
5 - Seal

6 - Ball (95 Used)
7 - Inner Race

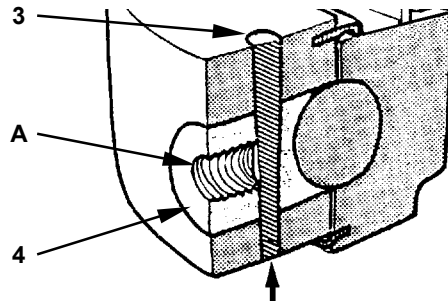
8 - Support (95 Used)
9 - Grease Fitting (2 Used)

UNDERCARRIAGE / Swing Bearing

Disassemble Swing Bearing

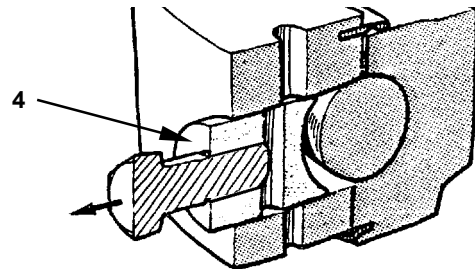
CAUTION: Swing bearing weight: 510 kg (1125 lb)

1. Place the swing bearing onto the flat workbench.
2. Grind off the caulked part of pin (3). Tap and remove pin (3) from the bottom side of plug (4).



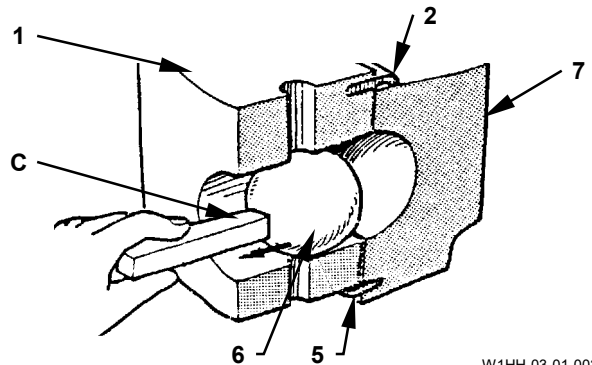
W1HH-03-01-006

3. Install the bolt (M10, pitch 1.5 mm) into hole A on plug (4). Tap the bolt from its back or pull out plug (4).



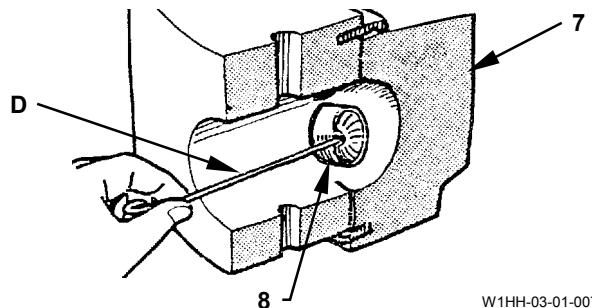
W1HH-03-01-001

4. Hoist and hold outer race (1) of swing bearing horizontally. Remove seals (2, 5).



W1HH-03-01-002

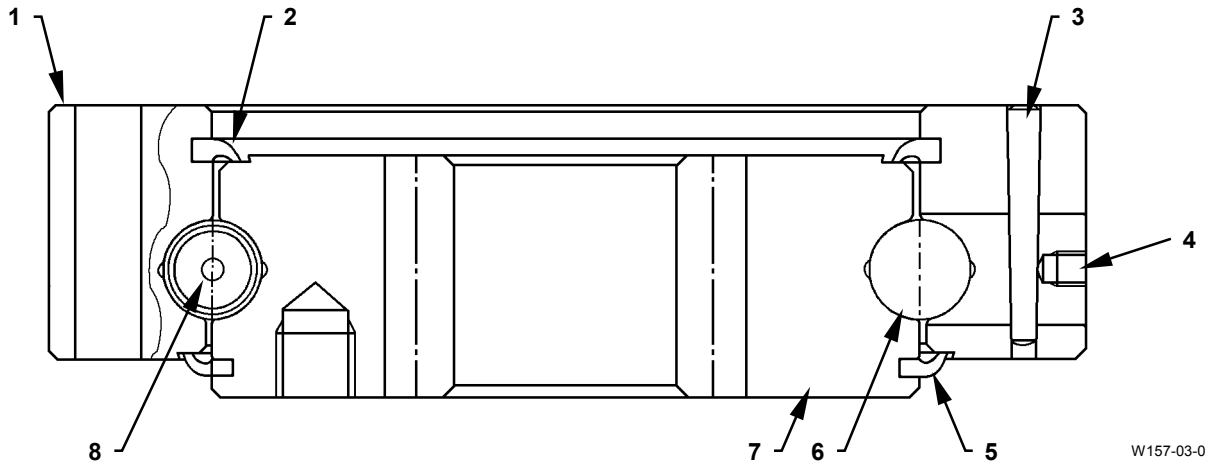
5. Rotate outer race (1). Remove balls (6) (95 used) and supports (9) (95 used) from the plug (4) hole. When removing ball (6), use rod magnet (C). Use wire (D) and remove support (8).



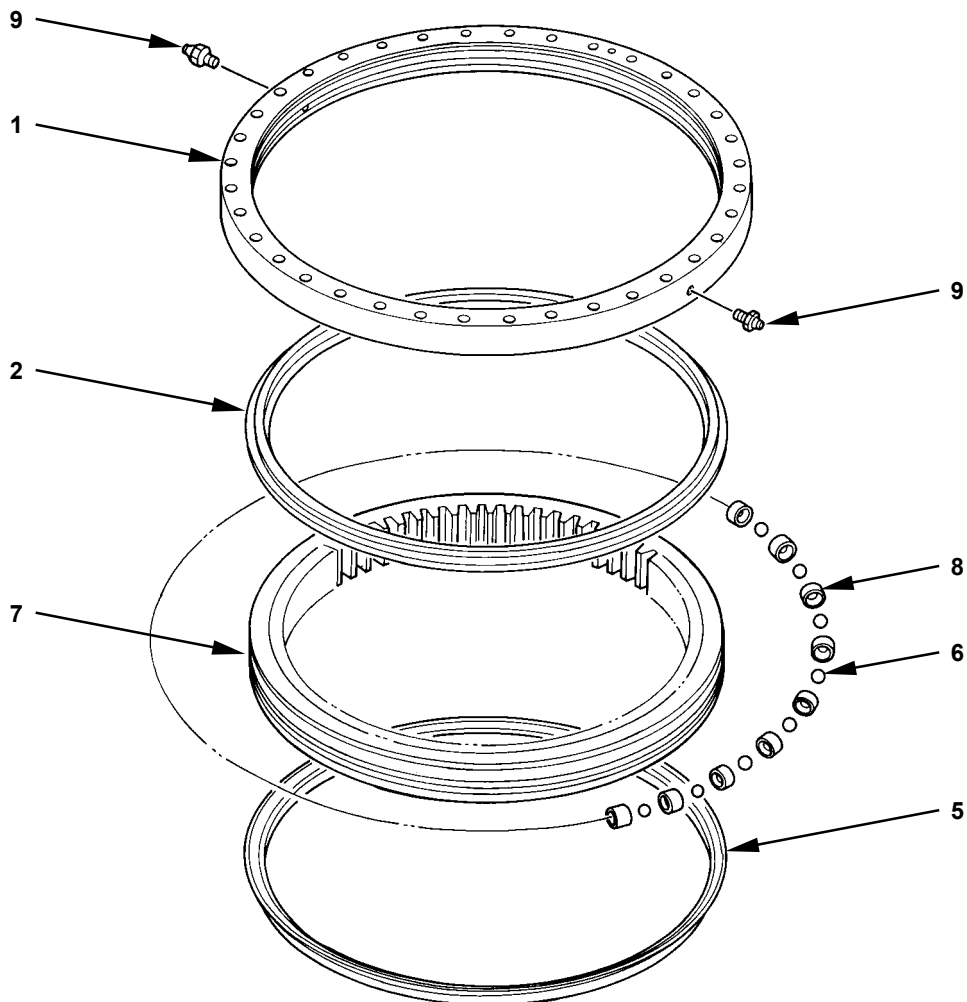
W1HH-03-01-007

UNDERCARRIAGE / Swing Bearing

ASSEMBLE SWING BEARING



W157-03-01-003



W157-03-01-002

1 - Outer Race
2 - Seal
3 - Pin

4 - Plug
5 - Seal

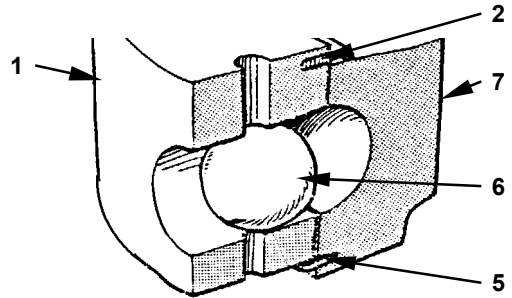
6 - Ball (95 Used)
7 - Inner Race

8 - Support (95 Used)
9 - Grease Fitting (2 Used)

UNDERCARRIAGE / Swing Bearing

Assemble Swing Bearing

1. Clean (degrease) the grooves on outer race (1) and inner race (7) for seals (2, 5).
Apply THREEBOND #1530D. Install seals (2, 5) to outer race (1) and inner race (7).

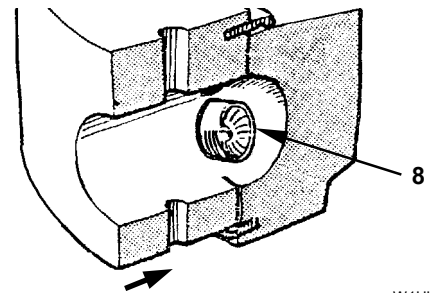


W1HH-03-01-003

⚠ CAUTION: Swing bearing weight: 510 kg (1125 lb)

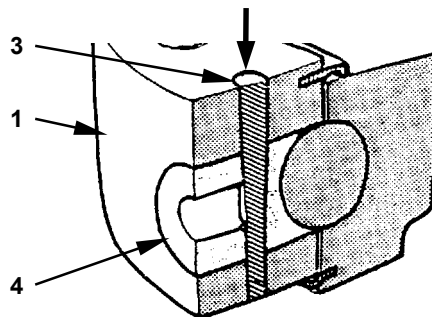
IMPORTANT: Apply grease to balls (6) and supports (9).

2. Hoist outer race (1) horizontally. Align outer race (1) with inner race (7) coaxially.
While rotating outer race (1), insert balls (6) (95 used) and support (9) (95 used) into the plug (4) hole one by one by using a round bar.



W1HH-03-01-004

3. Install plug (4) into outer race (1) and install pin (3).
Crimp the head of pin (3) by using a punch.
Add grease 0.9 L (Alvania EP2 grease or equivalent) into the swing bearing through grease fitting (9).



W1HH-03-01-005

UNDERCARRIAGE / Swing Bearing

(Blank)

UNDERCARRIAGE / Travel Device


REMOVE AND INSTALL TRAVEL DEVICE

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

Removal


The procedure starts on the premise that the track has been removed. Refer to the Remove and Install Track on W3-7-1.

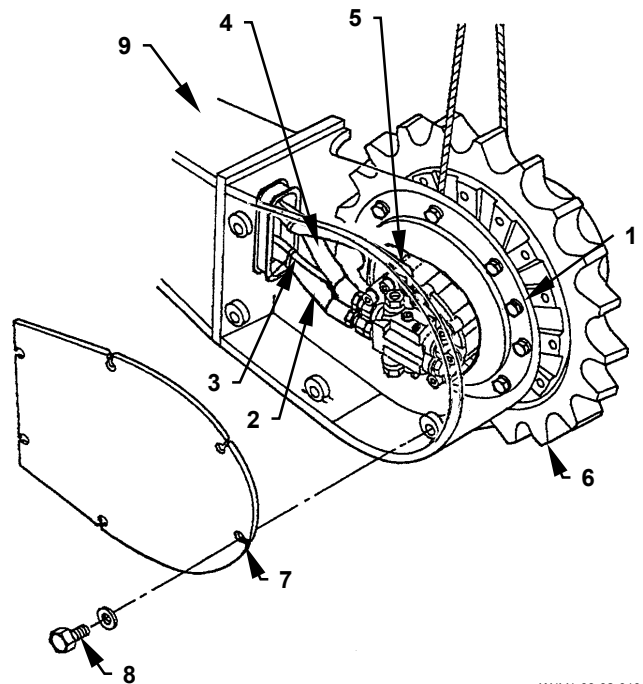
1. Remove bolts (8) (6 used). Remove cover (7) from track frame (9). Remove hoses (2 to 5). Attach an identification tag onto the removed hoses for assembling. Cap the open ends.

 : 17 mm, 22 mm, 27 mm, 41 mm

 **CAUTION:** Travel device (6) weight: 483 kg (1065 lb)

2. Attach a nylon sling on to travel device (6). Remove bolts (1) (20 used). Hoist and remove travel device (6) from track frame (9).

 : 30 mm




W1V1-03-02-010


UNDERCARRIAGE / Travel Device

Installation


CAUTION: Travel device (5) weight: 483 kg (1065 lb)


1. Attach a nylon sling onto travel device (6) and hoist travel device (6). Align with the mounting hole on track frame (9). Install travel device (6) to track frame (9) with bolts (1) (20 used).


 : 30 mm


 : 630 N·m (63 kgf·m, 465 lbf·ft)


2. Install hoses (2 to 5) to travel device (6).


 : 17 mm

 : 24.5 N·m (2.5 kgf·m, 18 lbf·ft)


 : 27 mm


 : 78 N·m (8.0 kgf·m, 58 lbf·ft)

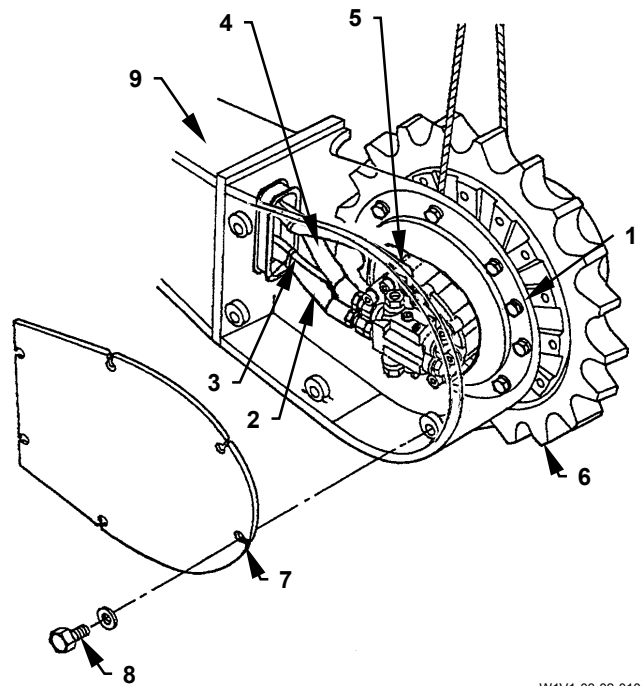
 : 41 mm

 : 205 N·m (21 kgf·m, 151 lbf·ft)

3. Install cover (7) to track frame (9) with bolts (8) (6 used).

 : 22 mm

 : 140 N·m (14 kgf·m, 103 lbf·ft)



W1V1-03-02-010

IMPORTANT: After installing the travel motor, fill hydraulic oil into the travel motor. Perform break-in operation after installing the travel motor or travel device (6) in order to prevent the travel motor and/or travel reduction gear from seizing.

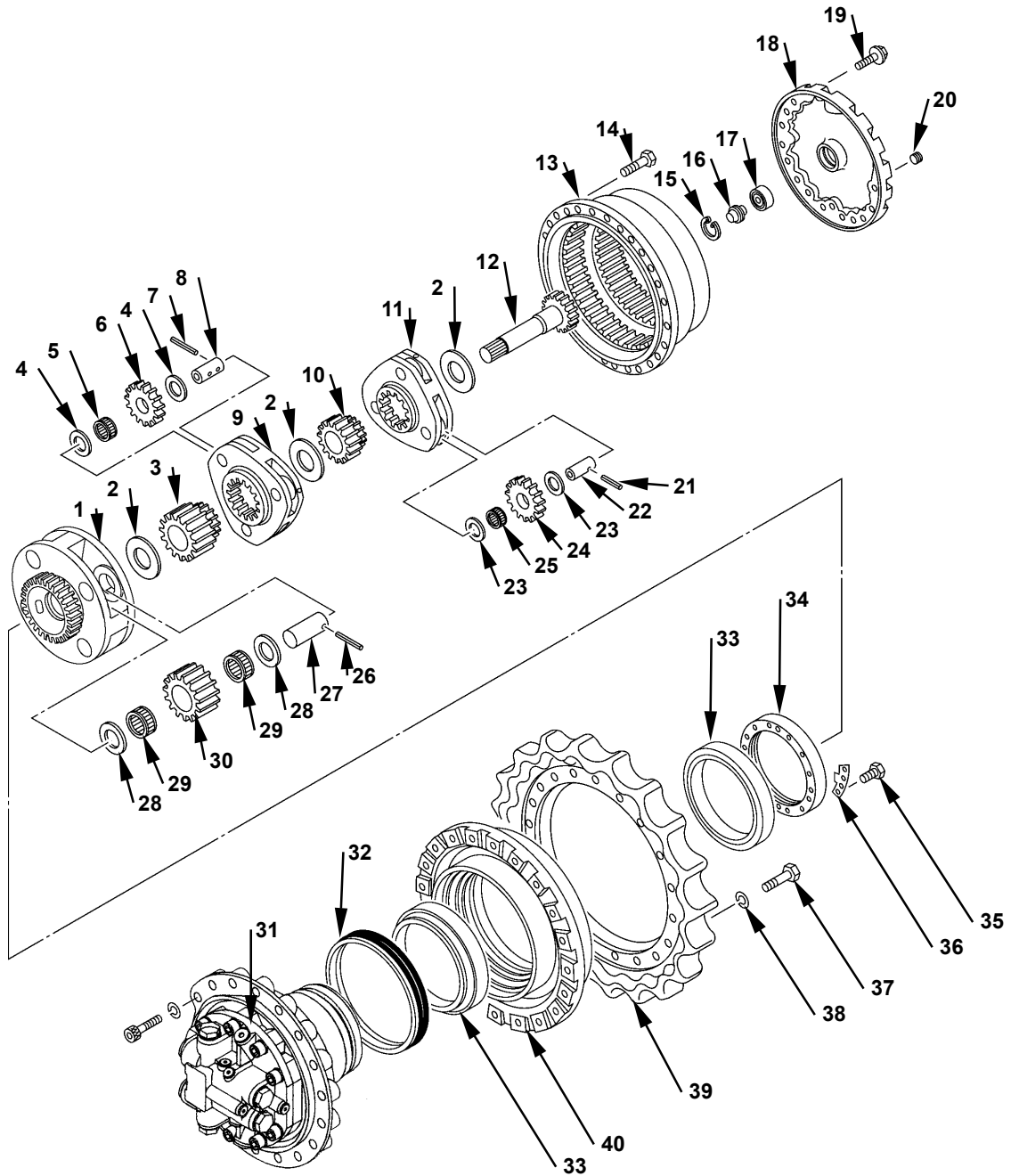
- Condition**
- 1.Engine control dial: Slow idle
 - 2.Travel mode switch: Slow speed
 - 3.Operation duration: Over 2 minutes

UNDERCARRIAGE / Travel Device

(Blank)

UNDERCARRIAGE / Travel Device

DISASSEMBLE TRAVEL DEIVCE



W1V7-03-02-001

- | | | | |
|--|--------------------------|--|------------------------------|
| 1 - Third Stage Carrier | 11 - First Stage Carrier | 21 - Spring Pin (3 Used) | 31 - Motor |
| 2 - Spacer (3 Used) | 12 - Propeller Shaft | 22 - Pin (3 Used) | 32 - Floating Seal |
| 3 - Third Stage Sun Gear | 13 - Ring Gear | 23 - Thrust Plate (6 Used) | 33 - Roller Bearing (2 used) |
| 4 - Thrust Plate (6 Used) | 14 - Bolt (34 Used) | 24 - First Stage Planetary Gear (3 used) | 34 - Bearing Nut |
| 5 - Needle Bearing (3 Used) | 15 - Retaining Ring | 25 - Needle Bearing (3 Used) | 35 - Bolt (2 Used) |
| 6 - Second Stage Planetary Gear (3 used) | 16 - Stopper Pin | 26 - Spring Pin (4 Used) | 36 - Lock Plate |
| 7 - Spring Pin (3 Used) | 17 - Bearing | 27 - Pin (4 Used) | 37 - Bolt (22 Used) |
| 8 - Pin (3 Used) | 18 - Cover | 28 - Thrust Plate (8 Used) | 38 - Washer (22 Used) |
| 9 - Second Stage Carrier | 19 - Bolt (20 Used) | 29 - Needle Bearing (8 Used) | 39 - Sprocket |
| 10 - Second Stage Sun Gear | 20 - Plug (3 Used) | 30 - Third Stage Planetary Gear (4 Used) | 40 - Drum |

UNDERCARRIAGE / Travel Device

Disassemble Travel Device




CAUTION: There may be pressure accumulated inside of the travel device. Loosen the air bleed plug slowly. Release any remaining pressure completely. Remove the drain plug and drain off gear oil.

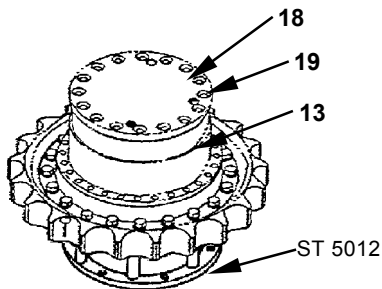
As the plug or gear oil gush out, do not loosen the air bleed plug suddenly. Keep away from the plug.



CAUTION: Travel device weight: 483 kg (1065 lb)

1. Turn over the travel device. Place the travel device in stable condition on the workbench with the motor side facing downward in order not to touch the brake valve.
2. Remove bolt (19). Remove cover (18) from ring gear (13).

 : 19 mm

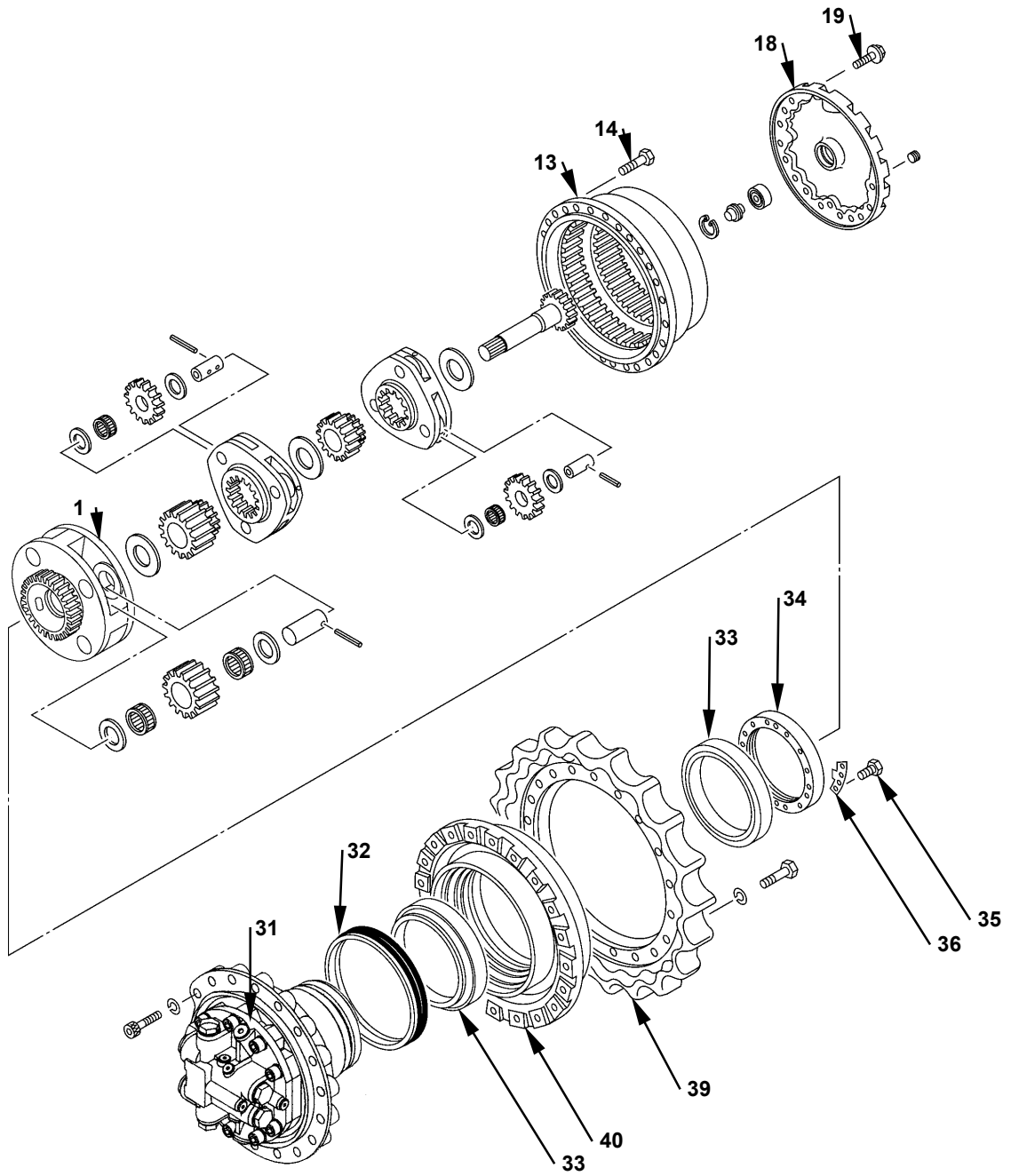


W1V7-03-02-003



NOTE: *THREEBOND #1215 or LOCTITE #5020 has been applied between cover (18) and ring gear (13). Insert a chisel between cover (18) and ring gear (13), tap a chisel for easy removal. Do not remove stopper pin (16) attached with cover (16) unless damage and wear are found.*

UNDERCARRIAGE / Travel Device



W1V7-03-02-001

UNDERCARRIAGE / Travel Device


CAUTION: Ring gear (13) weight: 53 kg (117 lb)

- Remove bolts (14) (34 used). Install eyebolts (M12, Pitch 1.75 mm) (2 used) into the bolt (19) hole on ring gear (13). Hoist ring gear (13). Remove ring gear (13) from drum (40).

NOTE: *THREEBOND #1389B has been applied between ring gear (13) and drum (40). When it is difficult to remove, use a screwdriver.*

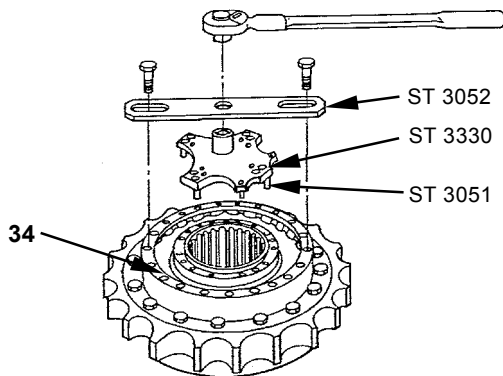
CAUTION: The third stage carrier (1) assembly weight: 61 kg (135 lb)

- Remove the third stage carrier (1) assembly.
- Remove bolt (35) and lock plate (36) from bearing nut (34).

 : 19 mm

NOTE: *LOCTITE #262 or THREEBOND #1386B has been applied to the bolt.*

- Secure the travel device in order not to rotate. Remove bearing nut (34) by using special tools
Special tool: ST 3052, ST 3051, ST 3330
Bolt: M16 (Length 60 to 90 mm) (2 used)



W1V7-03-02-004

CAUTION: Drum (40) + sprocket (39) weight: 146 kg (320 lb)

IMPORTANT: The motor (31) side of drum (40) is a seal sliding surface for motor (31). After removing drum (40), place drum (40) onto the wooden block.

- Install eyebolts (M16, Pitch 2.0 mm) (2 used) to drum (40). Hoist drum (40). Remove drum (40) from the housing of motor (31).

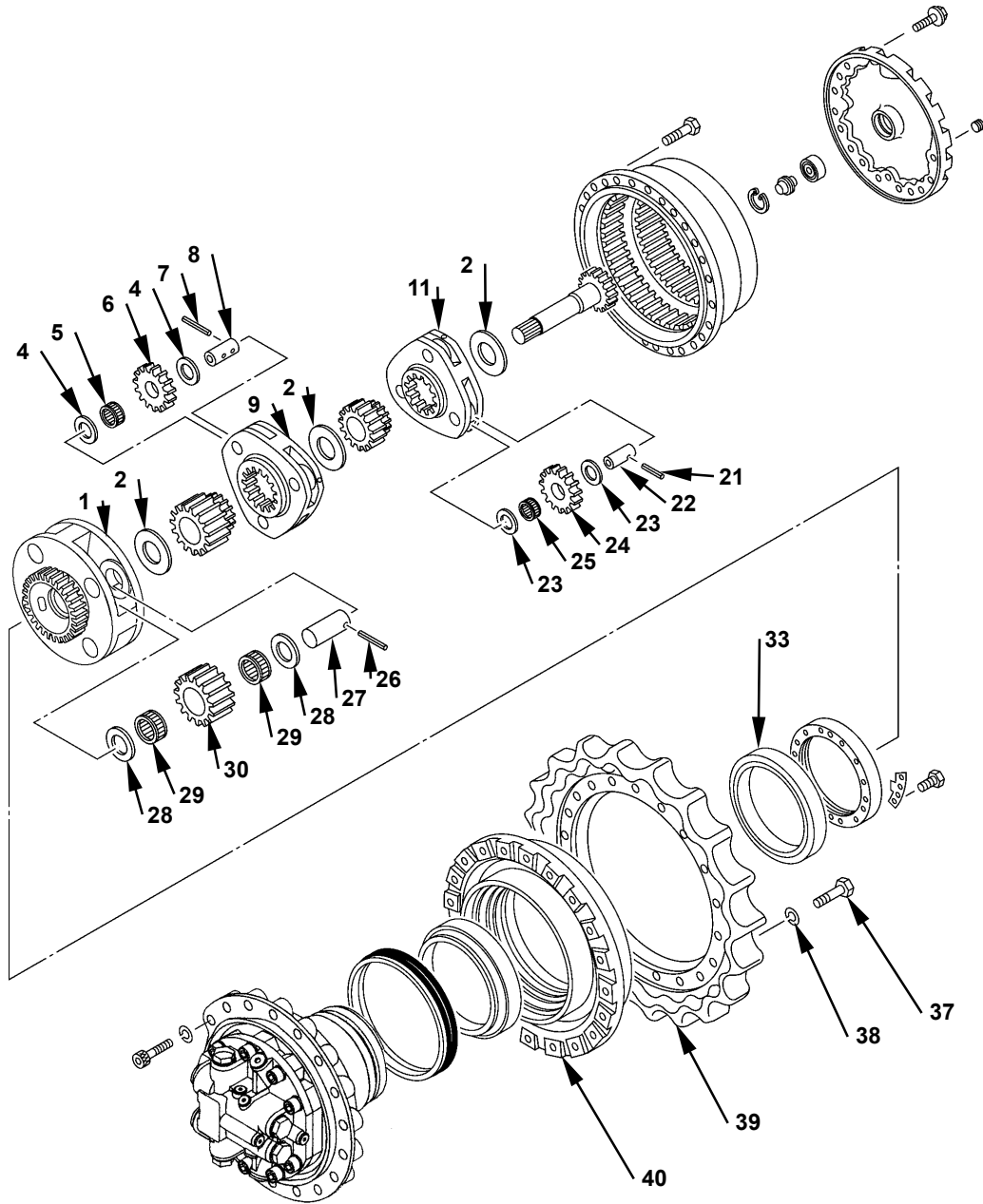
- Remove the inner race of roller bearing (33) from drum (40).

NOTE: *Do not remove the inner race of roller bearing (30) in the motor (28) side unless necessary. Do not remove the outer race of roller bearing (33) attached with drum (40) unless replacement.*

- Remove floating seal (32) from drum (40) and motor (31).

- Tap the back of outer race evenly by using a hammer and remove the outer race of roller bearing (33) from drum (40).

UNDERCARRIAGE / Travel Device



W1V7-03-02-001


UNDERCARRIAGE / Travel Device


13. Tap and remove spring pins (21) from the first stage carrier (11) assembly by using around bar and hammer.
14. Remove pins (22) (3 used). Remove first stage planetary gears (22) (3 used), needle bearings (25) (3 used) and thrust plates (23) (6 used) from first stage carrier (11).
15. Remove spacer (2) from first stage carrier (11).
16. Disassemble the second stage carrier (9) assembly in the same procedures as steps 13 to 15. Remove spring pins (7) (3 used), pins (8) (3 used), second stage planetary gears (6) (3 used), thrust plate (4) (6 used), needle bearings (5) (3 used) and spacer (2) from second stage carrier (9).
17. Disassemble the third stage carrier (1) assembly in the same procedures as steps 13 to 15. Remove spring pins (26) (4 used), pins (27) (4 used), thrust plates (28) (8 used), third stage planetary gears (30) (4 used) and needle bearings (29) (8 used) from third stage carrier (1).



CAUTION: Sprocket (39) weight: 69 kg (152 lb)

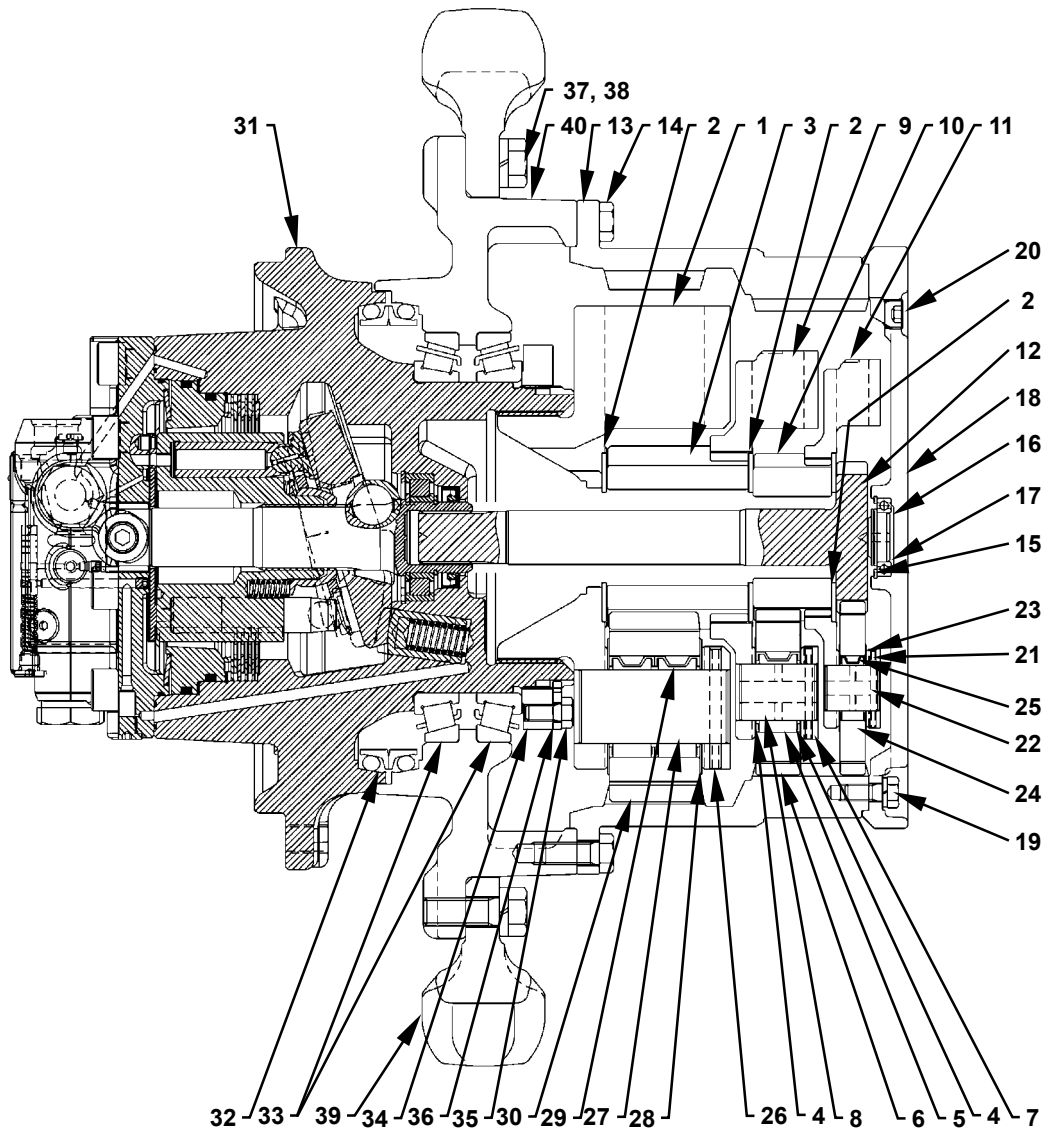
18. Remove bolts (37) (22 used) and washers (38) (22 used). Attach a nylon sling onto sprocket (39). Slowly hoist and remove sprocket (39) from drum (40).

 : 32 mm

 **NOTE:** *LOCTITE #262 or THREEBOND #1386B has been applied to bolt (37).*

UNDERCARRIAGE / Travel Device

ASSEMBLE TRAVEL DEVICE




W1V7-03-02-005

1 - Third Stage Carrier	11 - First Stage Carrier	21 - Spring Pin (3 Used)	31 - Motor
2 - Spacer (3 Used)	12 - Propeller Shaft	22 - Pin (3 Used)	32 - Floating Seal
3 - Third Stage Sun Gear	13 - Ring Gear	23 - Thrust Plate (6 Used)	33 - Roller Bearing (2 used)
4 - Thrust Plate (6 Used)	14 - Bolt (34 Used)	24 - First Stage Planetary Gear (3 used)	34 - Bearing Nut
5 - Needle Bearing (3 Used)	15 - Retaining Ring	25 - Needle Bearing (3 Used)	35 - Bolt (2 Used)
6 - Second Stage Planetary Gear (3 used)	16 - Stopper Pin	26 - Spring Pin (4 Used)	36 - Lock Plate
7 - Spring Pin (3 Used)	17 - Bearing	27 - Pin (4 Used)	37 - Bolt (22 Used)
8 - Pin (3 Used)	18 - Cover	28 - Thrust Plate (8 Used)	38 - Washer (22 Used)
9 - Second Stage Carrier	19 - Bolt (20 Used)	29 - Needle Bearing (8 Used)	39 - Sprocket
10 - Second Stage Sun Gear	20 - Plug (3 Used)	30 - Third Stage Planetary Gear (4 Used)	40 - Drum


UNDERCARRIAGE / Travel Device

Assemble Travel Device

1. When replacing roller bearing (33), heat the inner races (2 used) of roller bearing (33) to temperature 50 to 70 °C by using a heater and install the inner race to motor (31). Cool roller bearing (33) and install the inner race by using a bar completely.


 **NOTE:** Tap and listen to ring to in order to check if the installation is completed.

2. Apply grease to O-ring on floating seal (32). Install one side of floating seal (32) to motor (31). Apply gear oil onto the sliding surface of floating seal (32).

 **NOTE:** When it is difficult to install O-ring of floating seal (32), push O-ring in the circumference by using a bamboo spatula.

IMPORTANT: Tap the outer race only.

3. Tap the outer races (2 used) by using a bar and hammer evenly and install the outer races (2 used) of roller bearing (33). Install other side of floating seal (32) to drum (40).

 **NOTE:** Tap and listen to ring in order to check that the outer race of roller bearing (33) is installed completely.




CAUTION: Sprocket (39) weight: 69 kg (152 lb).

IMPORTANT: Align the chamfered side of sprocket (39) with the drum (40) side.

4. Wind a nylon sling onto sprocket (39) and hoist sprocket (39). Place sprocket (39) onto drum (40). Clean and apply LOCTITE #262 or THREEBOND #1386B to bolts (37) (22 used). Clean the bolt (37) hole on drum (40). Install bolts (37) (22 used) and washers (38) (22 used).

 : 30 mm

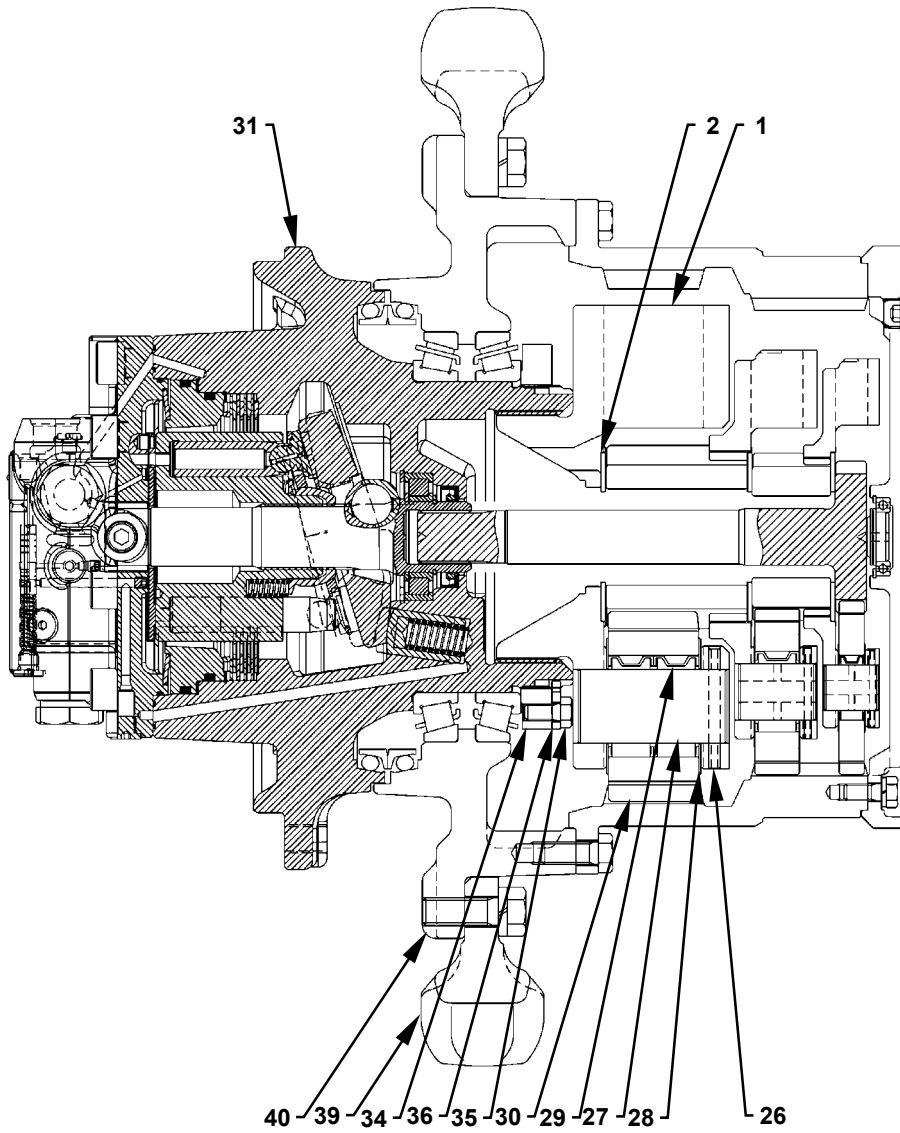
 : 750 N·m (75 kgf·m, 555 lbf·ft)



CAUTION: Drum (40) + sprocket (39) weight: 146 kg (320 lb)

5. Install eyebolts (M16, Pitch 2.0 mm) (2 used) into the bolt (14) hole on drum (40). Hoist and place drum (40) onto motor (31) vertically. At this time, check if the clearance between motor (31) and drum (40) is equal.
6. Install the inner race of roller bearing (30) between drum (40) and motor (31).

UNDERCARRIAGE / Travel Device





W1V7-03-02-005

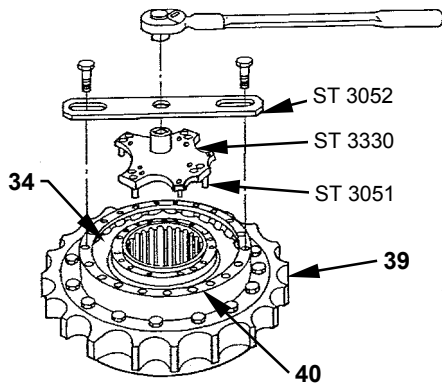
UNDERCARRIAGE / Travel Device

IMPORTANT: Install bearing nut (34) with the stepped part facing to the bearing side.

7. Install bearing nut (34) to motor (31) and tighten by hand.

 **NOTE:** Apply grease to the thread part of bearing nut (34).
If no grease is applied, it cannot be tightened to the specified torque.


8. Secure the travel device in order not to rotate. Install special tool to bearing nut (34). Tighten bearing nut (34) by using a torque wrench. Special tool: ST 3052, ST 3051, ST 3330 Bolt: M16 (Length 60 to 90 mm) (2 used)
 : 800 N·m (80 kgf·m, 590 lbf·ft)




W1V7-03-02-004


9. After tighten bearing nuts (34) to the specified torque and tap the drum (40) end by using a plastic hammer in order to reduce play. Rotate sprocket (39) both clockwise and counterclockwise 4 to 5 turns.

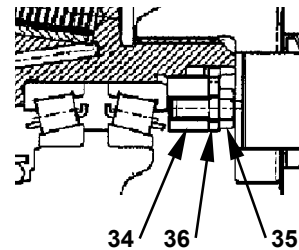
10. Repeat steps 8, 9.

11. Repeat step 9 again. Tighten bearing nut (34) to the specified torque. Special tool: ST 3052, ST 3051, ST 3330 Bolt: M16 (Length 60 to 90 mm) (2 used)
 : 800 N·m (80 kgf·m, 590 lbf·ft)

12. Clean bolts (35) (2 used). Apply LOCTITE #262 or THREEBOND #1386B to bolt (35). Clean the bolt (35) hole on bearing nut (34). Install lock plate (36) to bearing nut (34) so that the convex part of lock plate (36) can be aligned with the concave part (one of 2 places) of motor (31). If the bolt hole on lock plate (36) is not aligned, tighten bearing nut (34) in order to align.

 : 19 mm

 : 90 N·m (9.0 kgf·m, 66 lbf·ft)



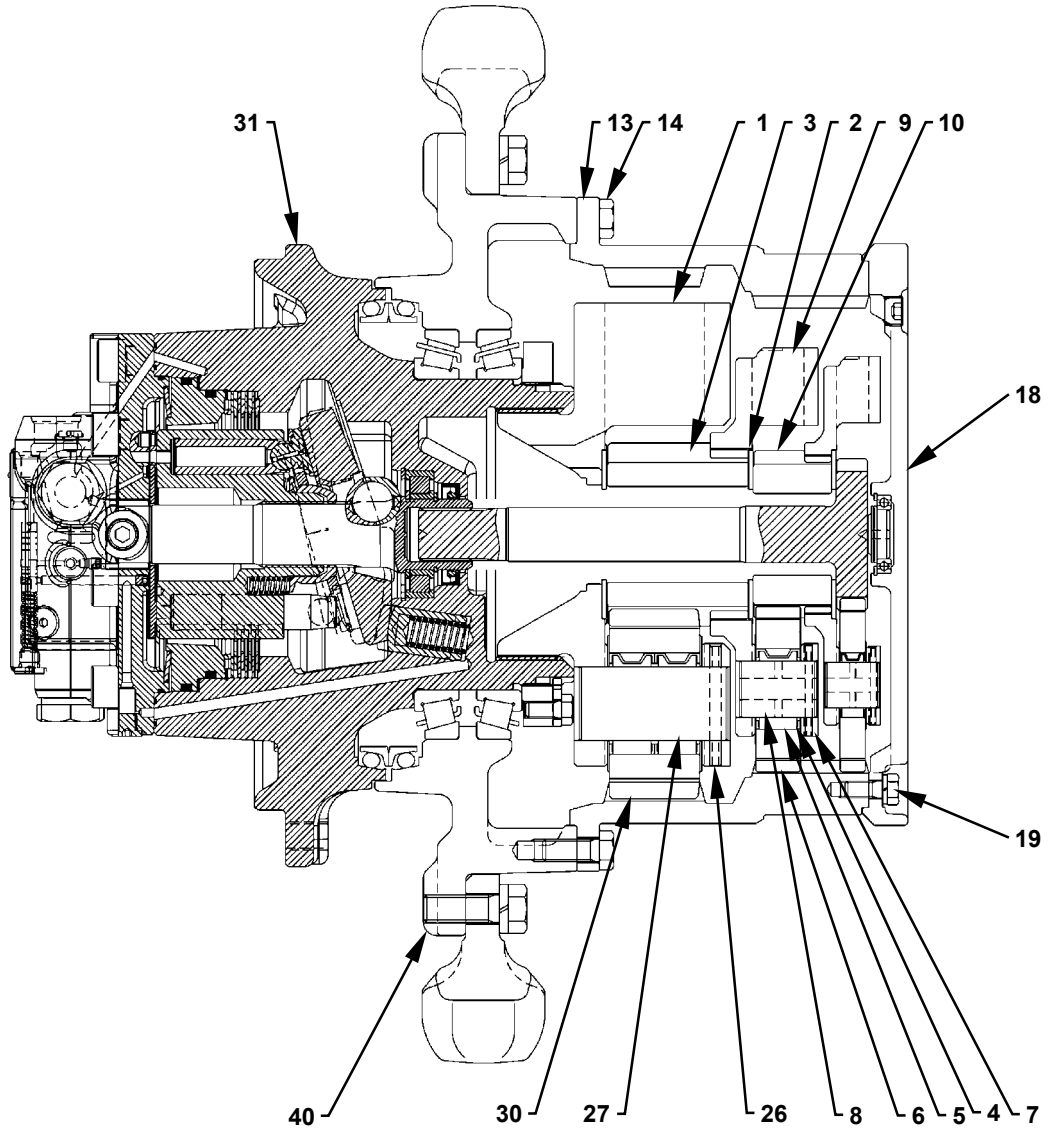
W1V7-03-02-006

13. Install needle bearings (29) (2 used for each) to third stage planetary gears (30) (4 used).

IMPORTANT: There is an identification groove on one side of planetary gear (30). Install with the identification groove facing to the spring pin (26) hole.

14. Install spacer (2) to third stage carrier (1). Align thrust plate (28) with both ends of third stage planetary gears (30) (4 used) and install thrust plates (28) (8 used) to third stage carrier (1).

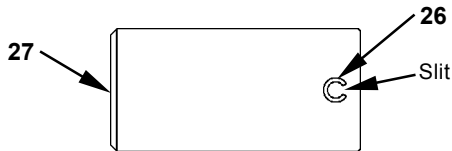
UNDERCARRIAGE / Travel Device



W1V7-03-02-005

UNDERCARRIAGE / Travel Device

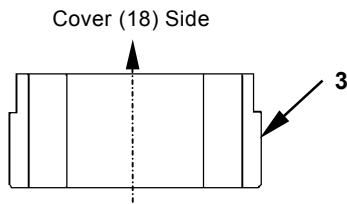
15. Insert pins (27) (4 used) into third stage carrier (1). Secure third stage planetary gears (30) (4 used). At this time, align the spring pin (26) holes on third stage carrier (1) and pin (27).
16. Install spring pins (26) (4 used) into third stage carrier (1). At this time, face the slit of spring pin (26) to the end of pin (27) (the cover (18) side).



W1V7-02-06-003

CAUTION: The third stage carrier (1) assembly weight: 61 kg (135 lb)

17. Align the third stage carrier (1) assembly with the spline in motor (31) and install the third stage carrier (1) assembly.
18. Install third stage sun gear (3) to third stage carrier (1). At this time, face the thinner side of outer diameter to the cover (18) side.



W1V7-03-02-007

19. Clean the ring gear (13) mounting surface on drum (40). Apply THREEBOND #1389B.

NOTE: At the same time, clean the ring gear (13) side. Clean the bolt (14) hole on drum (40).

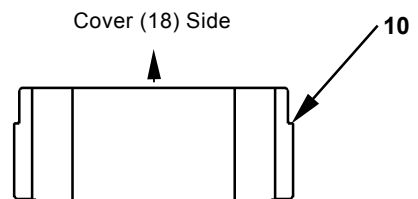
CAUTION: Ring gear (13) weight: 53 kg (117 lb)

20. Install eyebolts (M12, Pitch 1.75 mm) (2 used) into the bolt (19) hole on ring gear (13) and hoist ring gear (13) to drum (40). Install ring gear (13) to drum (40). Apply LOCTITE #262 or THREEBOND #1386B to bolts (14) (34 used). Install ring gear (13) to drum (40) with bolts (14) (34 used).

: 24 mm

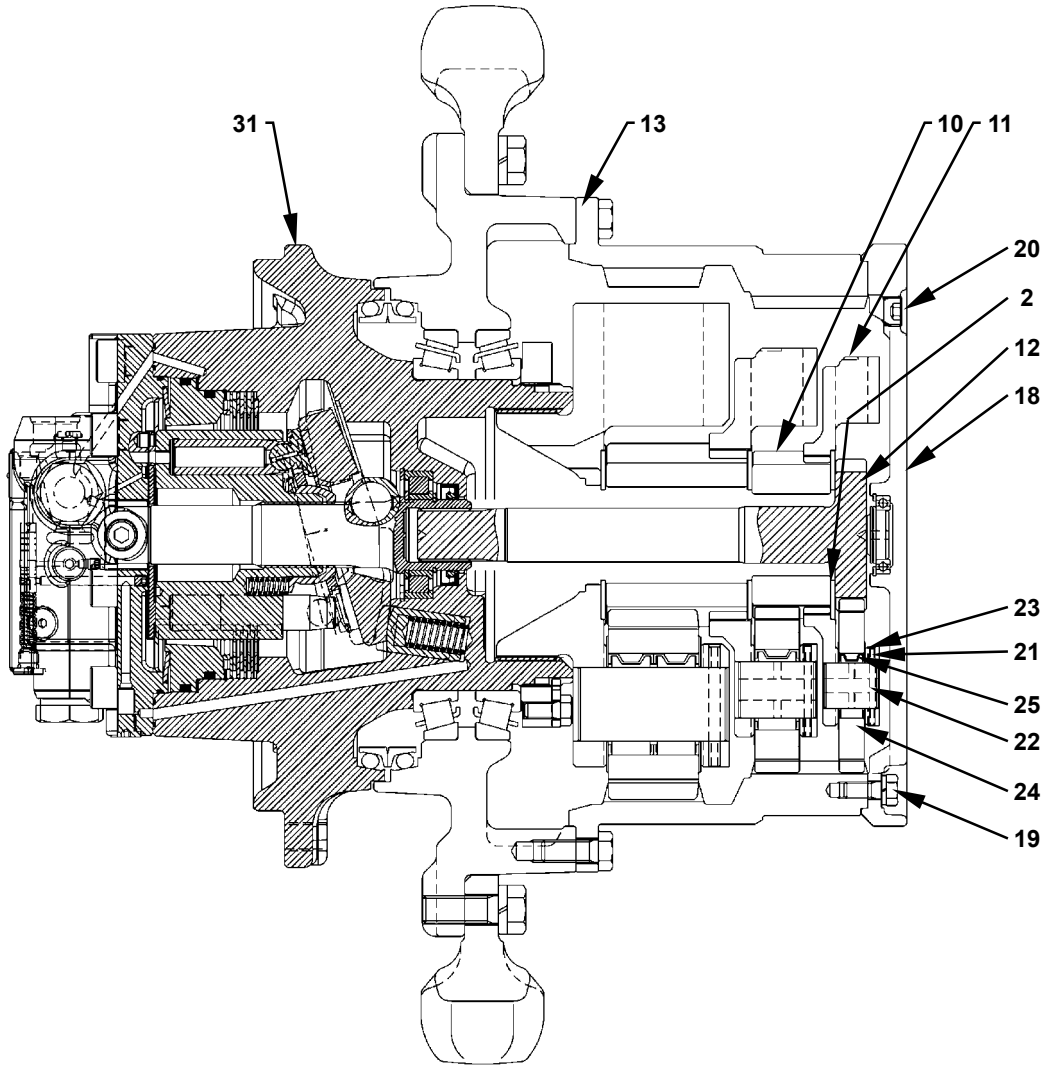
: 270 N·m (27 kgf·m, 200 lbf·ft)

21. Install spacer (2), second stage planetary gears (6) (3 used), needle bearings (5) (3 used), thrust plates (4) (6 used), pins (8) (3 used) and spring pins (7) (3 used) to second stage carrier (9) in the same procedures as steps 13 to 16.
22. Install the second stage carrier (9) assembly to ring gear (13).
23. Install second stage sun gear (10) to second stage carrier (9). At this time, face the thinner side of outer diameter to the cover (18) side.







W166-03-02-002

UNDERCARRIAGE / Travel Device



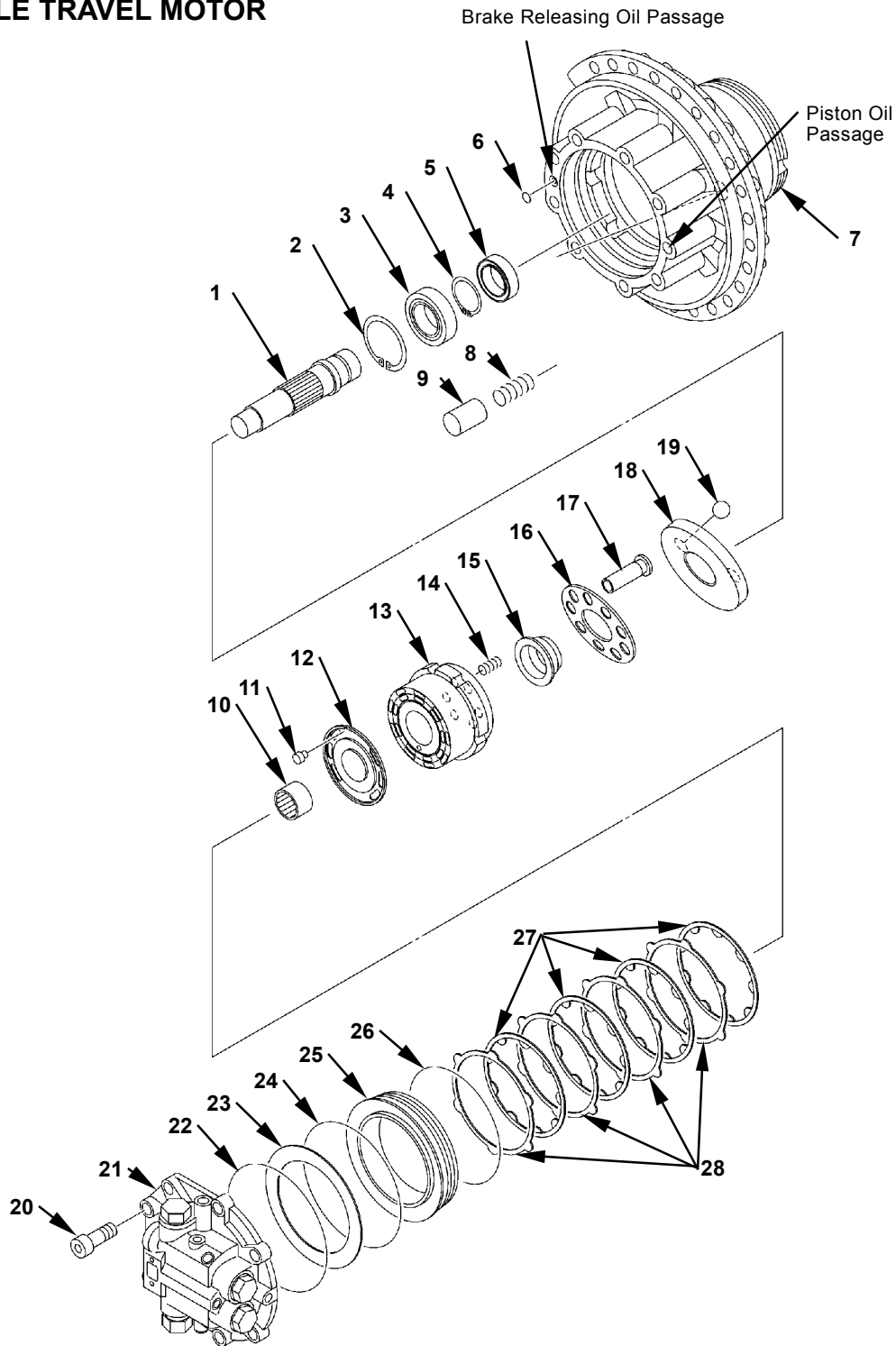
W1V7-03-02-005

UNDERCARRIAGE / Travel Device

24. Install spacer (2), first stage planetary gears (24) (3 used), needle bearings (25) (3 used), thrust plates (23) (6 used), pins (22) (3 used) and spring pins (21) (3 used) to first stage carrier (11) in the same procedures as steps 13 to 16.
25. Align the first stage carrier (11) assembly with the spline in second stage sun gear (10). Install the first stage carrier (11) assembly to ring gear (13).
26. Add gear oil 10.2 L (2.7 US gal.) into ring gear (13).
27. Insert propeller shaft (12) into the center of carrier. Mesh the splines of motor (31) and propeller shaft (12) and install.
28. Clean the mounting surface for ring gear (13) and cover (18). Apply THREEBOND #1215 or LOCTITE #5020 to the ring gear (13) side. Install cover (18) to ring gear (13). Install cover (18) to ring gear (13) with bolts (19) (20 used).
 -  : 19 mm
 -  : 90 N·m (9 kgf·m, 66 lbf·ft)
29. Wind the seal tape onto plugs (20) (3 used). Install plugs (20) (3 used) to cover (18).
 -  : 10 mm
 -  : 49 N·m (5 kgf·m, 36 lbf·ft)

UNDERCARRIAGE / Travel Device

DISASSEMBLE TRAVEL MOTOR



W178-02-11-219

- | | | | |
|---------------------|----------------------|---------------------------|------------------------------|
| 1 - Shaft | 8 - Spring | 15 - Bushing | 22 - O-Ring |
| 2 - Retaining Ring | 9 - Piston | 16 - Retainer | 23 - Disc Spring |
| 3 - Roller Bearing | 10 - Needle Bearing | 17 - Plunger (9 Used) | 24 - O-Ring |
| 4 - Retaining Ring | 11 - Knock Pin | 18 - Swash Plate | 25 - Brake Piston |
| 5 - Oil Seal | 12 - Valve Plate | 19 - Ball (2 Used) | 26 - O-Ring |
| 6 - O-Ring (2 Used) | 13 - Rotor | 20 - Socket Bolt (8 Used) | 27 - Friction Plate (4 Used) |
| 7 - Housing | 14 - Spring (6 Used) | 21 - Brake Valve | 28 - Plate (4 Used) |

UNDERCARRIAGE / Travel Device


Disassemble Travel Motor



CAUTION: Travel motor weight: 137 kg (300 lb)


IMPORTANT: When removing the brake valve (21) assembly from the motor, valve plate (12) is removed with brake valve (21) together. Do not drop valve plate (12).

1. Place the travel motor vertically. Remove socket bolts (20) (8 used). Remove brake valve (21) from housing (7).

 : 17 mm

IMPORTANT: As valve plate (12) is easily cracked and scratched, handle with care.

2. Remove valve plate (12) and knock pin (11) from brake valve (21). Do not remove needle bearing (10) unless necessary.
Remove O-ring (22) from brake valve (21).


 **NOTE:** When removing needle bearing (10), use a small puller. As the outer race is deformed, needle bearing (10) cannot be reused.

3. Wind vinyl tape onto the rotating surface of needle bearing (10) on shaft (1) in order to protect the surface.
4. Remove O-rings (6) (2 used) and disc spring (23) from housing (7).



CAUTION: When removing brake piston (25) by applying the compressed air into housing (7), cover brake piston (25) by using a cloth in order to prevent brake piston (25) from flying out.

5. Apply 100 to 300 kPa (1 to 3 kgf/cm², 14 to 43 psi) pressure air to brake releasing oil passage in housing (7). Float and remove brake piston (25).

 **NOTE:** A bicycle pump can be used. As the part is damaged, do not use a screwdriver.


6. Remove rotor (13), springs (14) (6 used), bushing (15), retainer (16) and plungers (17) (9 used) from housing (7) in this order.

7. Remove plates (28) (4 used) and friction plates (27) (4 used) from housing (7).



CAUTION: Housing (7) weight: 87 kg (190 lb)

8. Place housing (7) horizontally with the brake releasing oil passage facing downward.

 **NOTE:** When facing the brake piston releasing oil passage upward, the thicker part of swash plate (18) faces upward. When placing housing (7) horizontally, swash plate (18) suddenly may come out.

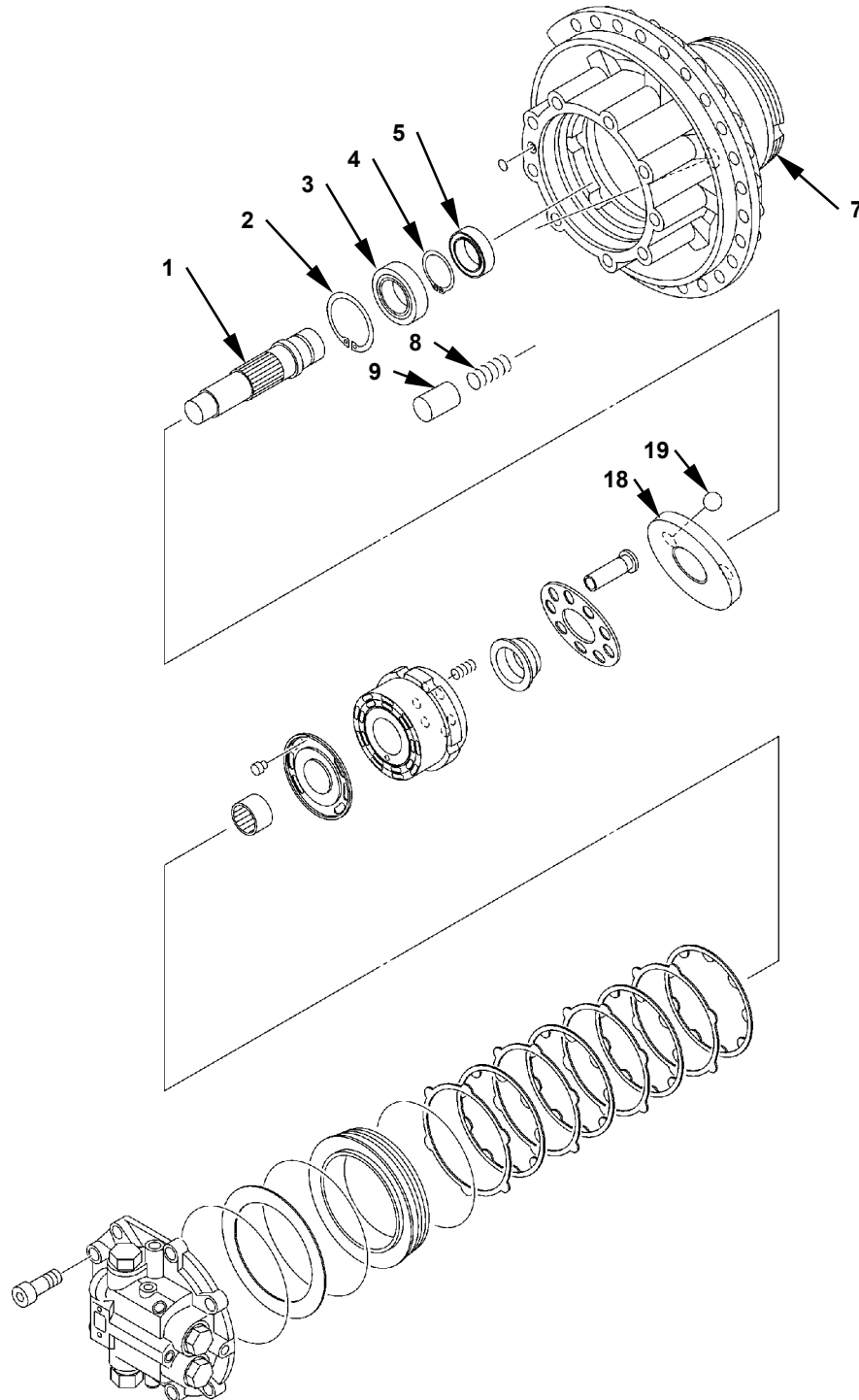
9. Remove swash plate (18) from housing (7).

10. Remove balls (19) (2 used), piston (9) and spring (8) from housing (7) by using a magnet.

11. Remove retaining ring (2) from housing (7).

12. Attach a bar onto the bottom side on inner spline hole of shaft (1). Lightly tap by using a plastic hammer and remove shaft (1) attached with roller bearing (3) from housing (7).


UNDERCARRIAGE / Travel Device




W178-02-11-219

UNDERCARRIAGE / Travel Device

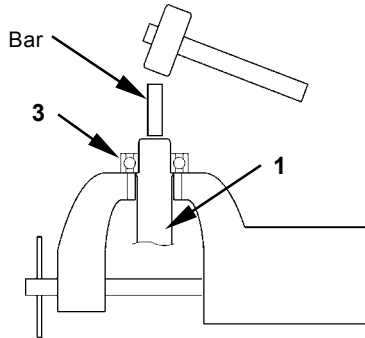
13. Insert a screwdriver into the shaft (1) hole on housing (7). Remove oil seal (4).

 **NOTE:** As oil seal (4) has been covered with *THREEBOND 31104* or #1215, oil seal (4) cannot be used again.

14. Remove retaining ring (4) from shaft (1).

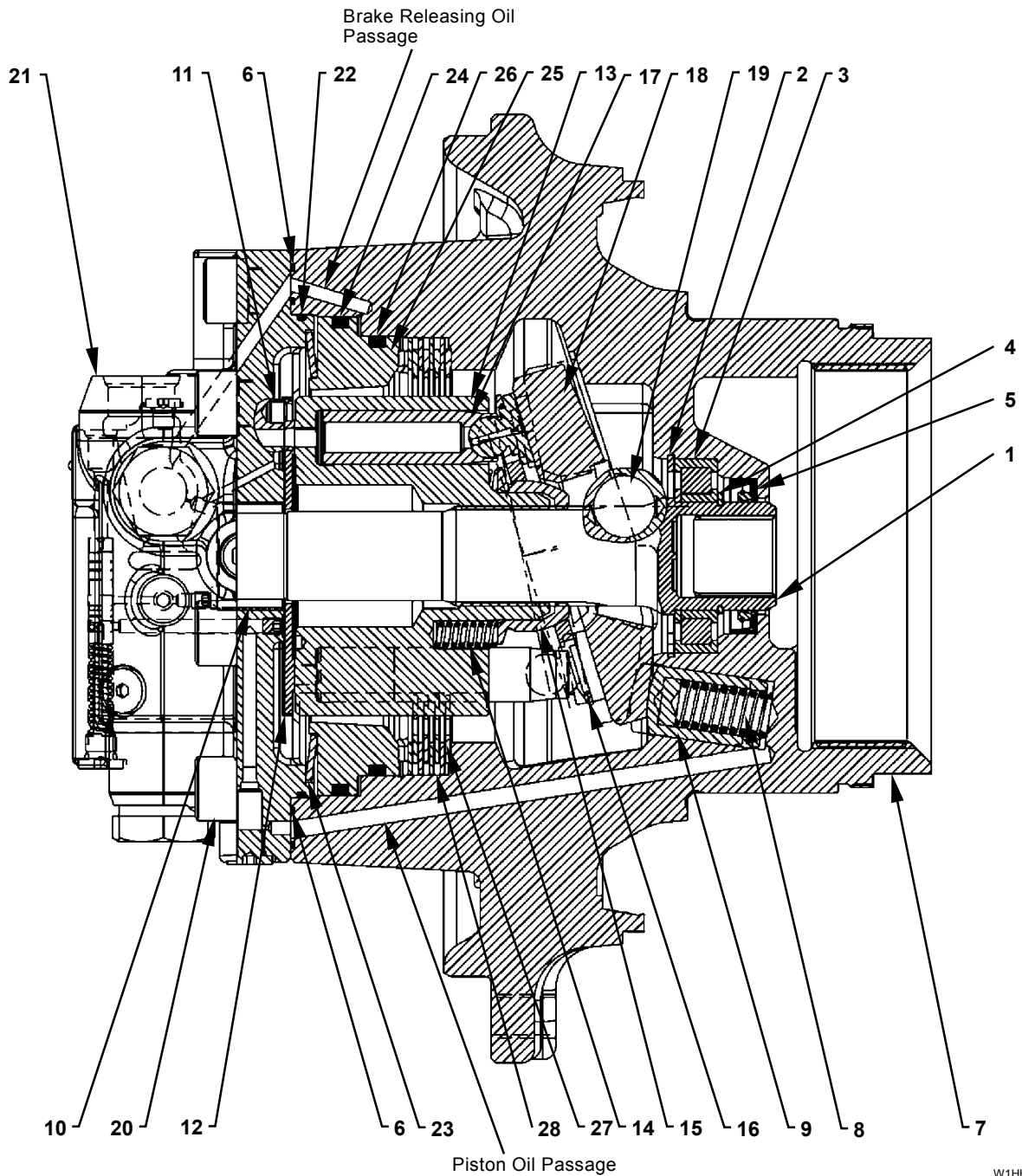
 **CAUTION:** When shaft (1) is removed from roller bearing (3), do not drop shaft (1).

15. Clamp the inner race of roller bearing (3) remained on shaft (1) in a vise. Lightly tap shaft (1) and remove roller bearing (3) by using a bar and plastic hammer.



UNDERCARRIAGE / Travel Device

ASSEMBLE TRAVEL MOTOR



W1HH-03-02-006

- | | | | |
|---------------------|----------------------|---------------------------|------------------------------|
| 1 - Shaft | 8 - Spring | 15 - Bushing | 22 - O-Ring |
| 2 - Retaining Ring | 9 - Piston | 16 - Retainer | 23 - Disc Spring |
| 3 - Roller Bearing | 10 - Needle Bearing | 17 - Plunger (9 Used) | 24 - O-Ring |
| 4 - Retaining Ring | 11 - Knock Pin | 18 - Swash Plate | 25 - Brake Piston |
| 5 - Oil Seal | 12 - Valve Plate | 19 - Ball (2 Used) | 26 - O-Ring |
| 6 - O-Ring (2 Used) | 13 - Rotor | 20 - Socket Bolt (8 Used) | 27 - Friction Plate (4 Used) |
| 7 - Housing | 14 - Spring (6 Used) | 21 - Brake Valve | 28 - Plate (4 Used) |

UNDERCARRIAGE / Travel Device

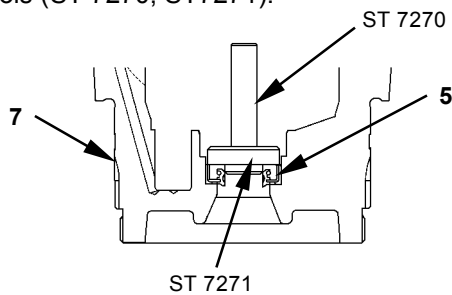
Assemble Travel Motor

CAUTION: Housing (7) weight: 87 kg (190 lb)

1. Place housing (7) with the brake valve (21) mounting surface facing upward.

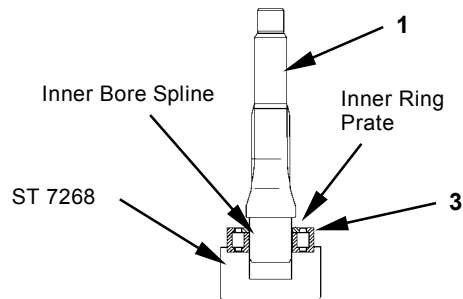
IMPORTANT: Apply OCEAN grease #7 to the inner surface of oil seal (5) and apply THREEBOND #1104 or #1215 to the outer surface of oil seal (4).

2. Clean the oil seal (5) mating part of housing (7). Install oil seal (5) to housing (7) by using special tools (ST 7270, ST7271).



W176-03-02-007

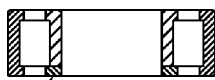
4. Insert the inner ring plate side of roller bearing (3) into the inner bore spline end of shaft (1) until roller bearing (3) comes into the tight fitting part. Do not damage the seal lip surface of shaft (1).
5. Insert the inner bore spline end of shaft (1) into special tool (ST 7268). Tap the opposite end of shaft (1) by using a plastic hammer and install roller bearing (3) to shaft (1).



W178-02-11-230

IMPORTANT: Check the direction to install roller bearing (3).

3. Install roller bearing (3) with the stamped mark on inner ring plate facing to the smaller bore side of shaft (1).

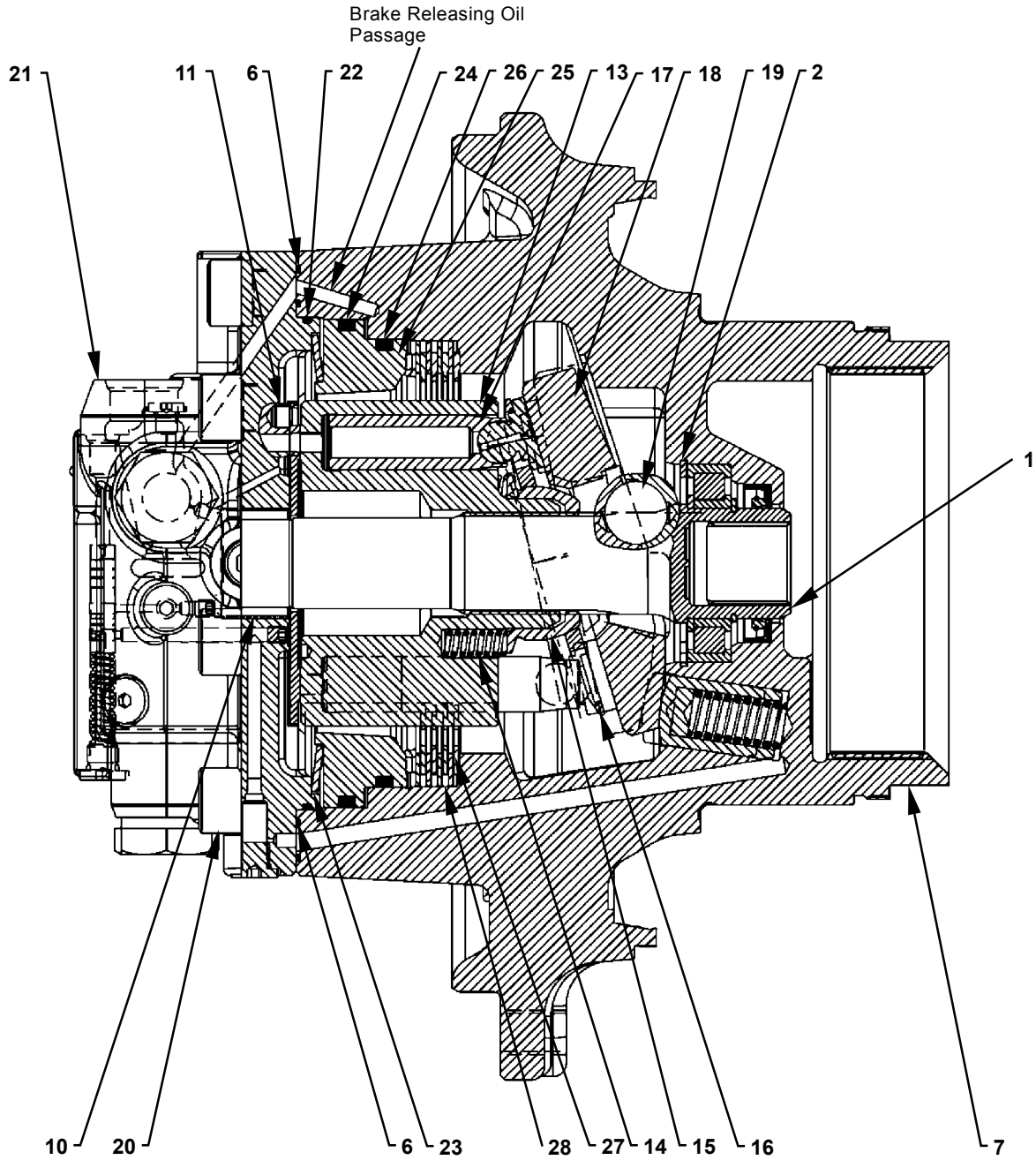


Marked Surface on Inner Ring Plate

W178-02-11-324

6. Install retaining ring (4) to shaft (1). Do not damage the sliding surface of oil seal (5).
7. Apply grease to the balls (19) (2 used) surface sufficiently. Install balls (19) (2 used) to housing (7).
8. Install spring (8) and piston (9) to housing (7). Install piston (9) with the hole end facing to endmost.

UNDERCARRIAGE / Travel Device




W1HH-03-02-006

UNDERCARRIAGE / Travel Device


IMPORTANT: The small diameter side of shaft (1) is matched with the inner race on needle bearing (10). Do not damage the inner race.

9. Lightly tap and install shaft (1) into housing (7) by using a plastic hammer.


10. Install retaining ring (2) to housing (7). Secure shaft (1) to housing (7).

 **NOTE:** If the open part of retaining ring (2) is located at the lowest bottom of housing (7), retaining ring (2) can be removed and installed easily.

11. Apply grease to the ball (19) hole on swash plate (18). Align the positions of balls (19) (2 used) and install swash plate (18) to housing (7).

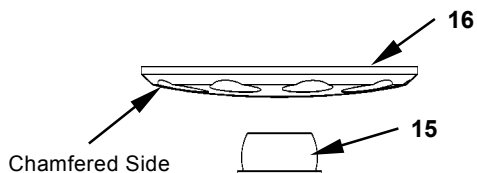
 **CAUTION:** Housing (7) weight: 87 kg (190 lb)

12. Place housing (7) horizontally with the brake releasing oil passage facing downward.

 **NOTE:** If the brake releasing oil passage faces upward, swash plate (18) may come off.


IMPORTANT: Face the chamfered side of retainer (16) to the bushing (15) side.

13. Install springs (14) (6 used), bushing (15), retainer (16) and plungers (17) (9 used) to rotor (13) in this order.



W178-02-11-225

14. Install the rotor (13) assembly to housing (7).


 **CAUTION:** Housing weight: 87 kg (190 lb)

15. Place housing (7) with the brake valve (21) mounting surface facing upward.

16. Install plates (28) (4 used) and friction plates (27) (4 used) to housing (7) one by one. Install friction plate (27) first.

17. Apply grease to O-rings (24, 26). Install O-rings (24, 26) to brake piston (25).

15. Tap and install brake piston (25) into housing (7) by using a plastic hammer evenly.

 **NOTE:** As O-ring is positioned around brake piston (25), brake piston (25) cannot be fully inserted. When installing brake piston (21), tighten brake piston (21) with socket bolt (20).

IMPORTANT: Check the direction to install disc spring (23).

19. Place disc spring (23) on brake piston (25) with the inner diameter facing to brake piston (25).

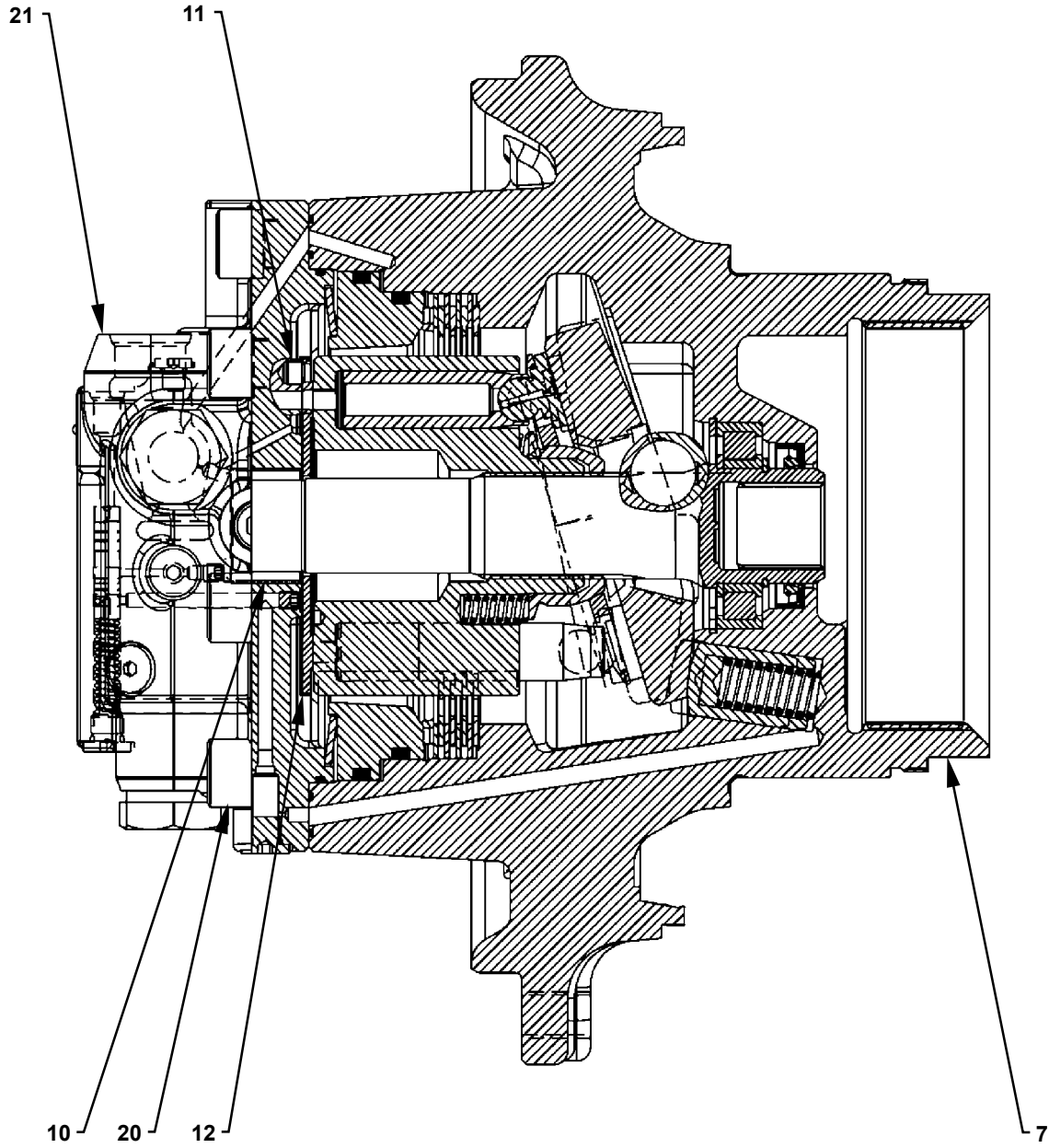
20. Install O-rings (6) (2 used) to the brake valve (21) mating surface of housing (7). Install O-ring (22) to brake valve (21).

21. Add hydraulic oil into housing (7) until plate (28) is submerged.

IMPORTANT: Check the direction to install knock pin (11).

22. Install knock pin (11) to brake valve (21). Insert the large diameter side of knock pin (11) into the pin hole on brake valve (21).

UNDERCARRIAGE / Travel Device

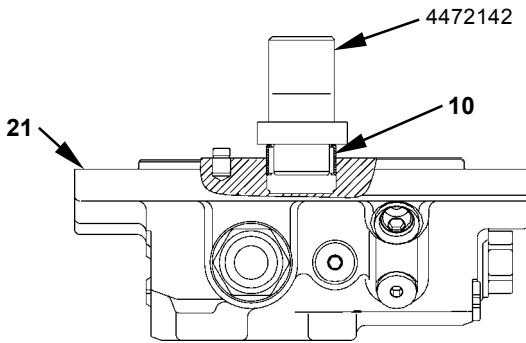


W1HH-03-02-006

UNDERCARRIAGE / Travel Device


IMPORTANT: Check the direction to install the outer race of needle bearing (10).

23. Lightly tap and install the outer race of needle bearing (10) to brake valve (21) by using special tool (4472142) and a hammer. Install the outer race of needle bearing (10) with the stamped mark facing outside.




W178-02-11-231


24. Apply grease onto the silver surface of valve plate (12). Install valve plate (12) while aligning the position of knock pin (11) in brake valve (21).

 **NOTE:** Valve plate (12) is secured to brake valve (21) tightly in order not to drop brake valve (21) when turning over.

IMPORTANT: Do not drop valve plate (12). If valve plate (12) is damaged, oil leakage will occur.

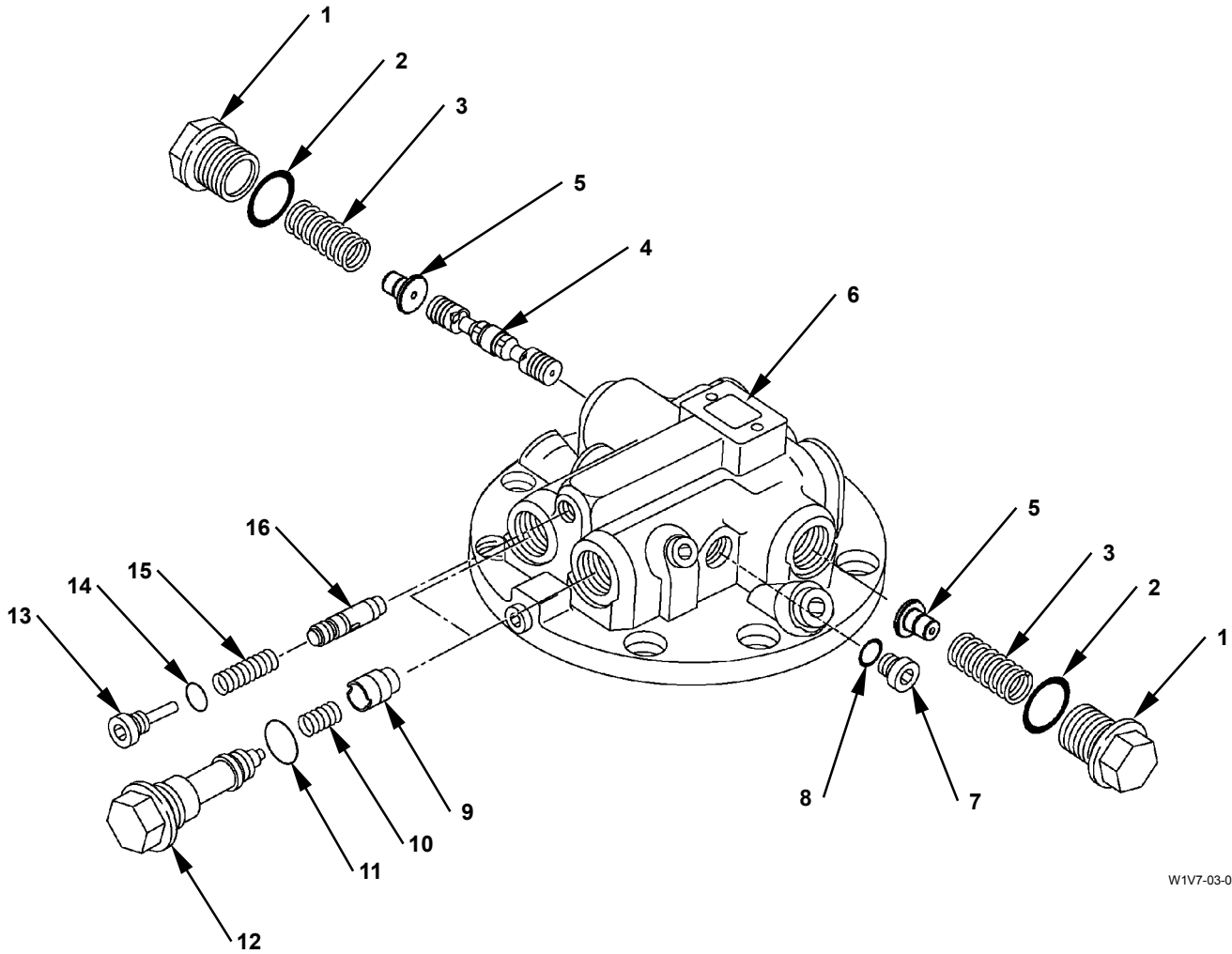
25. Install brake valve (21) to housing (7) with socket bolts (20) (8 used).

 : 17 mm

 : 400 N·m (40 kgf·m, 295 lbf·ft)

UNDERCARRIAGE / Travel Device

DISASSEMBLE BRAKE VALVE



W1V7-03-02-008

- | | | | |
|---------------------|----------------------|----------------------------|-------------|
| 1 - Plug (2 Used) | 5 - Stopper (2 Used) | 9 - Poppet (2 Used) | 13 - Plug |
| 2 - O-Ring (2 Used) | 6 - Valve Housing | 10 - Spring (2 Used) | 14 - O-Ring |
| 3 - Spring (2 Used) | 7 - Plug | 11 - O-Ring (2 Used) | 15 - Spring |
| 4 - Spool | 8 - O-Ring | 12 - Relief Valve (2 Used) | 16 - Spool |

UNDERCARRIAGE / Travel Device

Disassemble Brake Valve

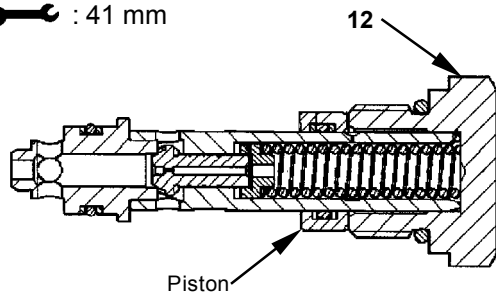
1. Remove plugs (1) (2 used) from valve housing (6).
🔑 : 41 mm
2. Remove springs (3) (2 used) and stoppers (5) (2 used) from valve housing (6) by using a magnet.
3. Remove spool (4) from valve housing (6) by using a magnet.
4. Remove plug (7) from valve housing (6).
The orifice inserted into the hole has been applied by using LOCTITE. Do not remove the orifice unless necessary.
🔑 : 6 mm
5. Remove relief valves (12) (2 used) from valve housing (6).
🔑 : 41 mm
6. Remove springs (10) (2 used) and poppets (9) (2 used) from valve housing (6) by using a magnet.
7. Remove plug (13) from valve housing (6).
🔑 : 6 mm
8. Remove spring (15) and spool (16) from valve housing (6) by using a magnet.

IMPORTANT: Do not disassemble relief valve (12) as the set pressure changes.

IMPORTANT: Do not move the piston installed to the outer surface of relief valve (12). O-ring may be damaged by the hole on cartridge.

5. Remove relief valves (12) (2 used) from valve housing (6).

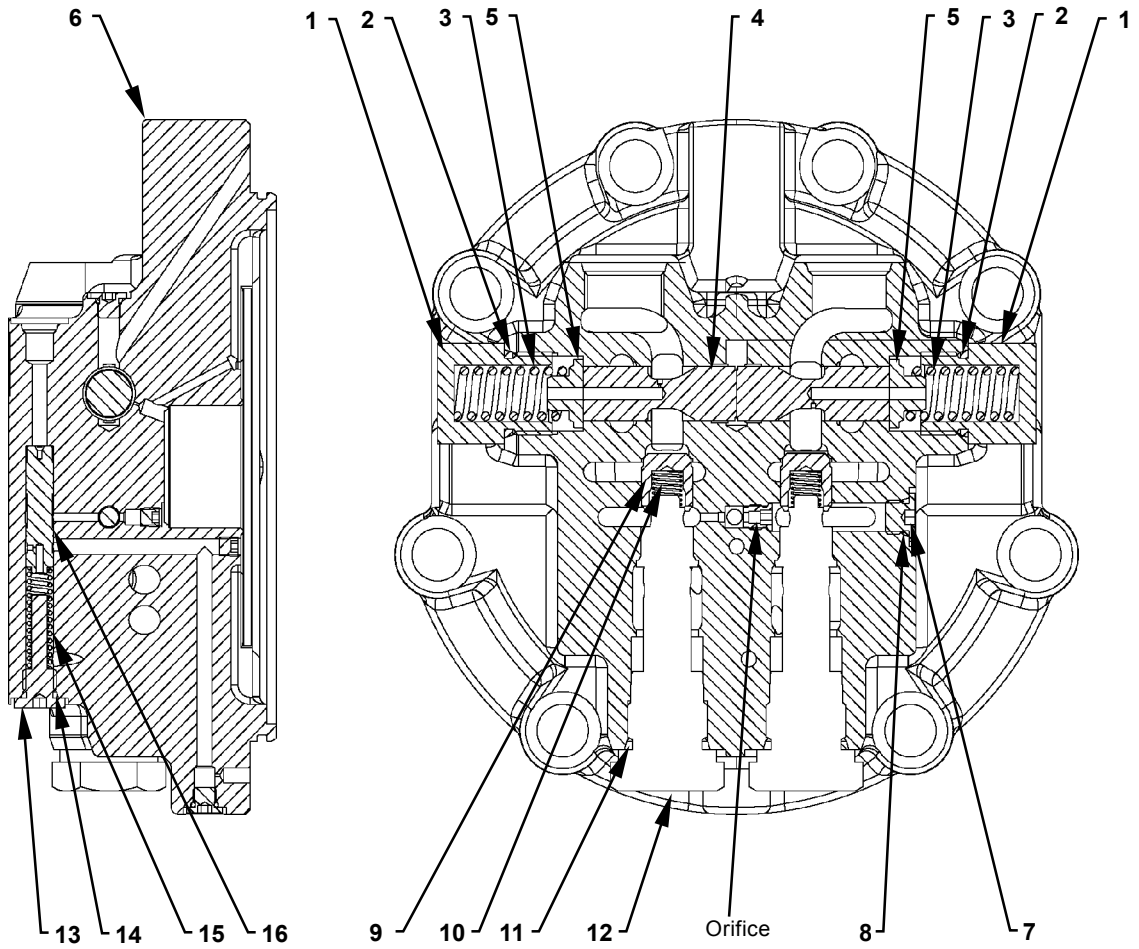
🔑 : 41 mm



W1V7-03-02-009

UNDERCARRIAGE / Travel Device

ASSEMBLE BRAKE VALVE











W178-02-11-226


- | | | | |
|----------------------|-------------------|----------------------------|-------------|
| 1 - Plug (2 Used) | 5 - Spool | 9 - Poppet (2 Used) | 13 - Plug |
| 2 - O-Ring (2 Used) | 6 - Valve Housing | 10 - Spring (2 Used) | 14 - O-Ring |
| 3 - Spring (2 Used) | 7 - Plug | 11 - O-Ring (2 Used) | 15 - Spring |
| 4 - Stopper (2 Used) | 8 - O-Ring | 12 - Relief Valve (2 Used) | 16 - Spool |

UNDERCARRIAGE / Travel Device

Assemble Brake Valve

1. Install spool (4) approximately half way into valve housing (6).
2. Install O-ring (2), spring (3) and stopper (5) to plug (1) at one side. Install plug (1) at one side to valve housing (6). Tighten plug (1) by hand.
3. Install O-ring (2), spring (3) and stopper (5) to plug (1) at other side. Install the plug (1) assembly to valve housing (6). Tighten plug (1) by hand.
4. Tighten plug (1) on both sides by using a spanner.
 : 41 mm
 : 343 N·m (35 kgf·m, 253 lbf·ft)
5. Install O-ring (8) to plug (7). Install plug (7) to valve housing (6).
 : 6 mm
 : 34 N·m (3.5 kgf·m, 25 lbf·ft)
6. Install springs (10) (2 used) to poppets (9) (2 used). Install poppets (9) (2 used) in the hole of valve housing (6) completely.
7. Install O-rings (11) (2 used) to relief valves (12) (2 used).
8. While pushing poppets (9) (2 used) which were installed at step 6, install relief valves (12) (2 used) to valve housing (6) while pushing poppet (9).
 : 41 mm
 : 441 N·m (45 kgf·m, 325 lbf·ft)
9. Install spool (16) to valve housing (6) with the hole end facing to the front.
10. Insert spring (15) into valve housing (6).
11. Install O-ring (14) to plug (13). Install plug (13) to valve housing (6).
 : 6 mm
 : 34 N·m (3.5 kgf·m, 25 lbf·ft)

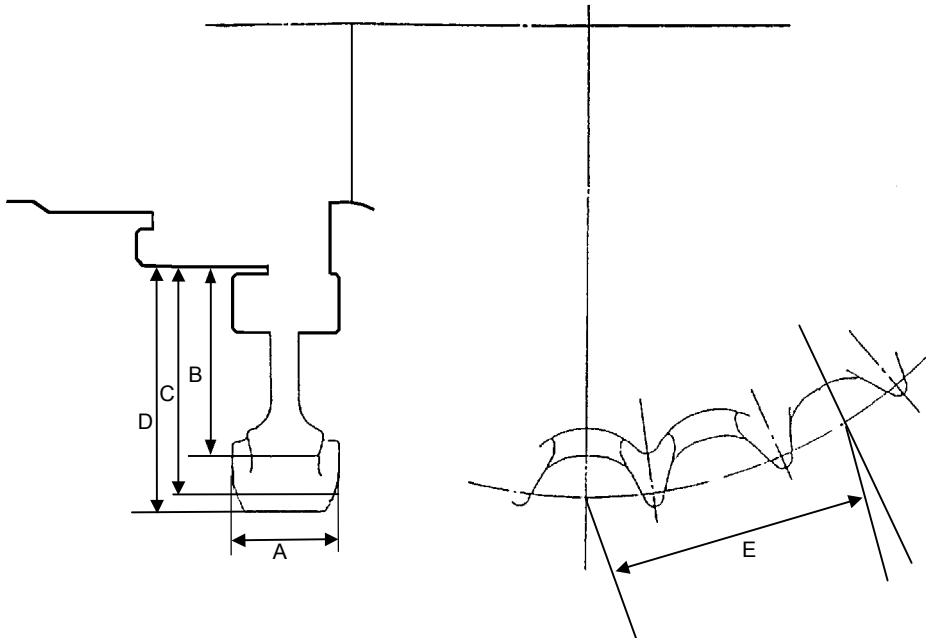
IMPORTANT: Check the direction to install spool (16).

 **NOTE:** *If poppet (9) is installed into the farthest end, spring (10) may come off on the way.*

UNDERCARRIAGE / Travel Device

MAINTENANCE STANDARD

Sprocket



W1HH-03-02-002

Unit: mm (in)			
	Standard Dimension	Allowable Limit	Remedy
A	87 (3.43)	[77 (3.03)]	Cladding by welding and finishing
B	87.65 (3.45)	82.65 (3.25)	
C	124.25 (4.89)	-	
D	132.05 (5.20)	127 (5.0)	
E	216 (8.50)	-	

NOTE: Value in [] is for reference only.

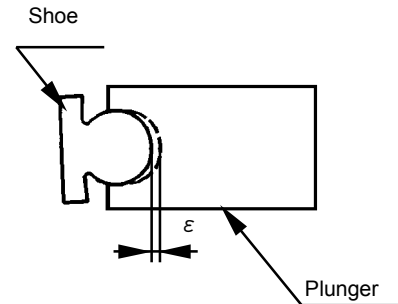
UNDERCARRIAGE / Travel Device

Travel Motor

1. Clearance between plunger and shoe bottom

Standard	Allowable Limit
0	0.5 mm (0.020 in)

$$\varepsilon \leq 0.2 \text{ mm}$$

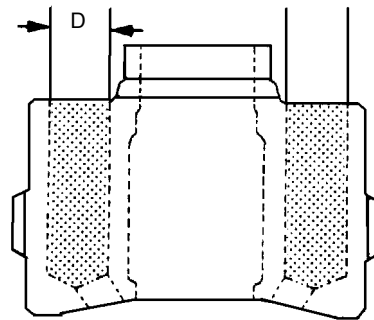


W1V1-03-02-005

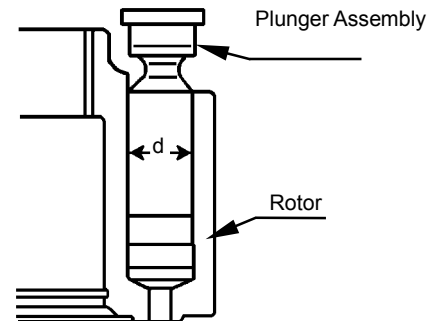
2. Clearance between plunger outer diameter and rotor inner bore

Standard	Allowable Limit
0	0.08 mm (0.003 in)

$$D - d \leq 0.08 \text{ mm}$$



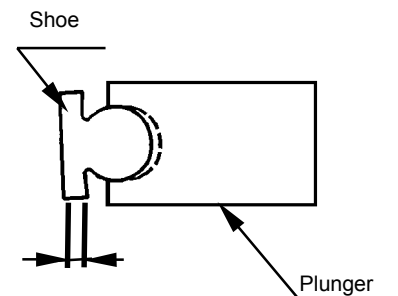
W105-02-06-134



W105-02-06-135

3. Shoe thickness

Standard	Allowable Limit
6.0 mm (0.236 in)	5.6 mm (0.220 in)



W1V1-03-02-005

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 W1-4-1.)

Removal

1. Attach an identification tag to all the hoses of center joint (3) for reassembling. Remove all hoses and adapters from center joint (3). Cap all the hoses.

 : 17mm, 27mm, 41 mm


2. Remove bolts (2) (2 used) from center joint (3). Remove lock plate (1).

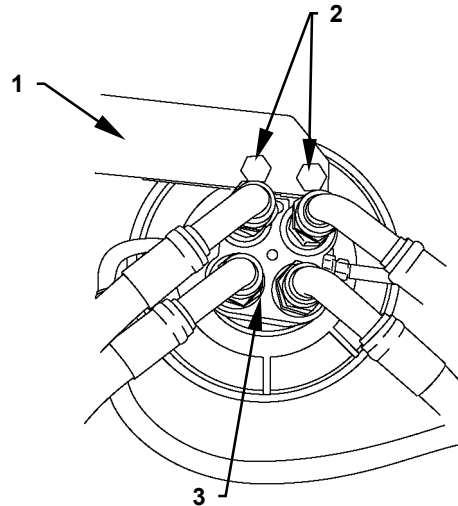
 : 22 mm

 **CAUTION:** Center joint (3) weight: 26.5 kg (58 lb)

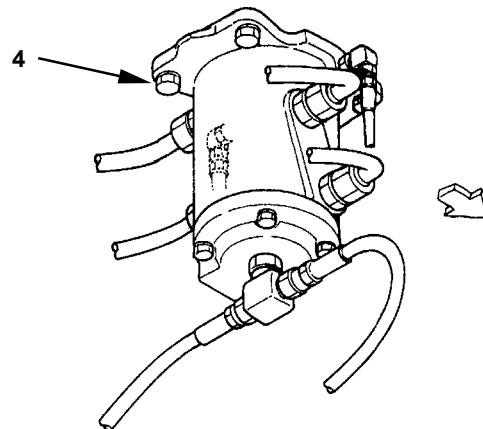
3. Install eyebolt to center joint (3). Attach a wire rope. Hoist center joint (3) and take up the slack of wire rope.

Remove bolts (4) (4 used). Slowly lower and remove center joint (3).

 : 19 mm



W1V1-03-03-001



W178-02-11-238

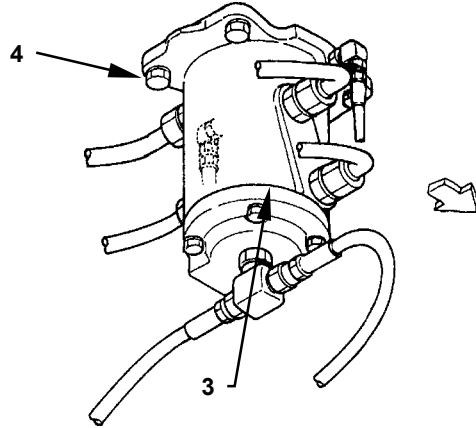
UNDERCARRIAGE / Center Joint

Installation

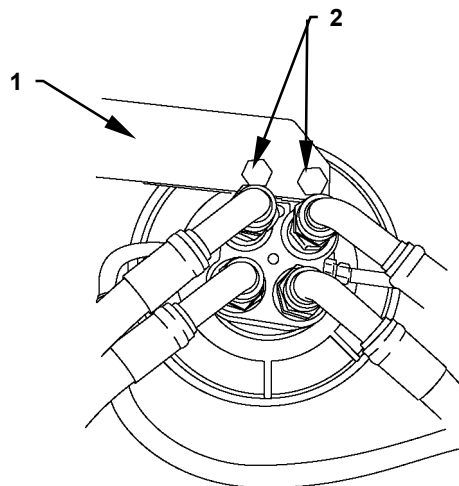
CAUTION: Center joint (3) weight: 26.5 kg (58 lb)

1. Install center joint (3) with bolts (4) (4 used).
🔧 : 19 mm
🔩 : 90 N·m (9.0 kgf·m, 66 lbf·ft)
2. Install lock plate (1) to center joint (3) with bolts (2) (2 used).
🔧 : 22 mm
🔩 : 140 N·m (14 kgf·m, 103 lbf·ft)
3. Install all hoses to center joint (3).
🔧 : 17 mm
🔩 : 25 N·m (2.5 kgf·m, 18 lbf·ft)
🔧 : 27 mm
🔩 : 95 N·m (9.5 kgf·m, 70 lbf·ft)
🔧 : 41 mm
🔩 : 210 N·m (21 kgf·m, 155 lbf·ft)

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



W178-02-11-238



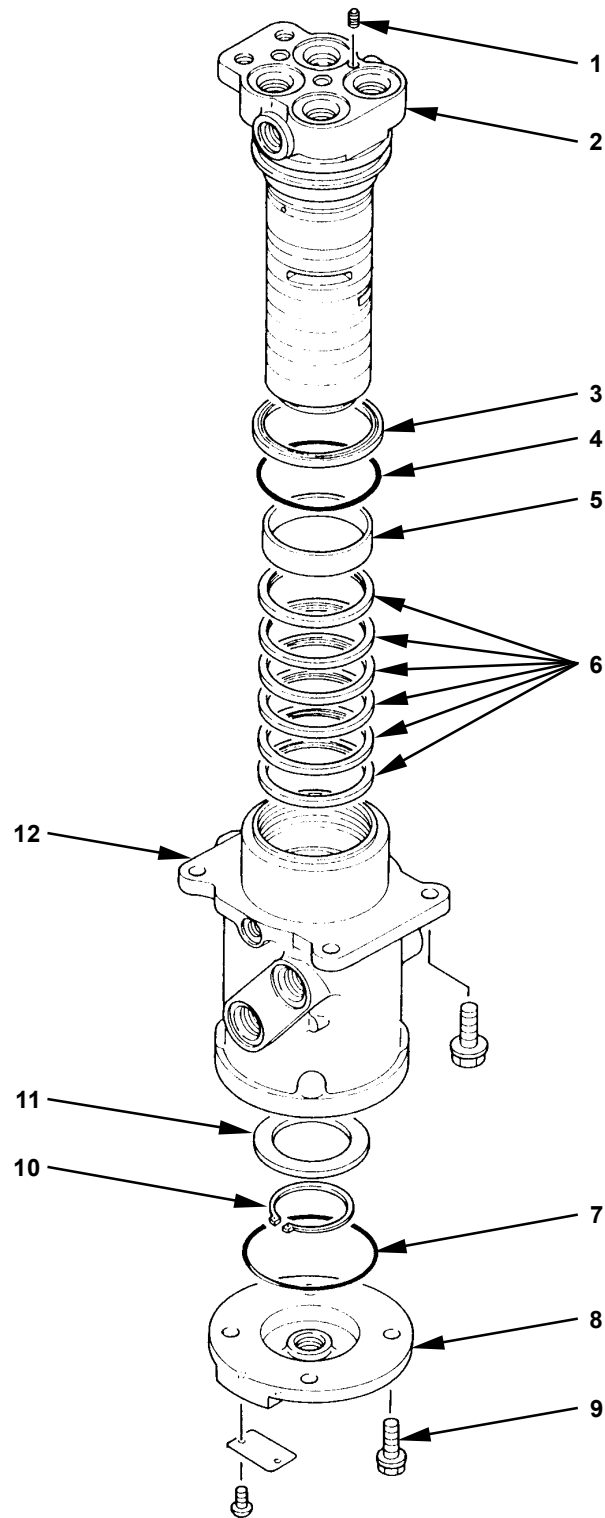
W1V1-03-03-001

UNDERCARRIAGE / Center Joint

(Blank)

UNDERCARRIAGE / Center Joint

DISASSEMBLE CENTER JOINT



W157-03-03-002

1 - Plug (With Ball)
2 - Spindle
3 - Dust Seal

4 - O-Ring
5 - Bushing
6 - Oil Seal (6 Used)

7 - O-Ring
8 - Cover
9 - Bolt (4 Used)

10 - Retaining Ring
11 - Ring
12 - Body


UNDERCARRIAGE / Center Joint

Disassemble Center Joint

CAUTION: Center joint weight: 26.5 kg (60 lb)


Install eyebolts (M10, Pitch 1.5 mm, Length 18 mm: ST 0001). Hoist and place the center joint on a workbench by using eyebolts (2 used).

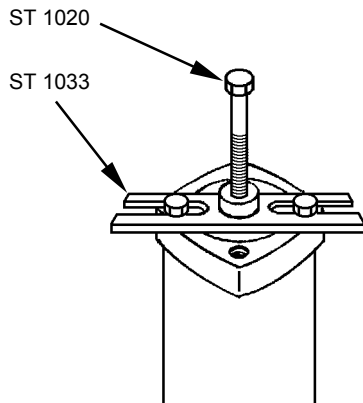
- Put the matching marks on body (12) and spindle (2). Remove bolts (9) (4 used). Remove cover (8) from body (12).

 : 17 mm

- Remove O-ring (7), retaining ring (10) and ring (11) from body (12).

- Install special tools (ST 1033, ST 1020) to body (12) with bolts (9) (2 used).

 : 17 mm



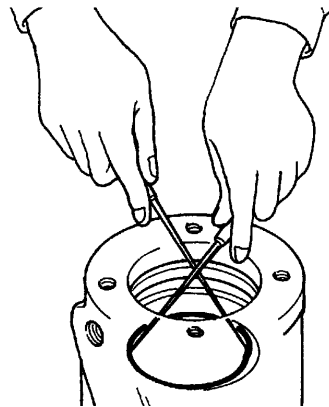
W506-03-03-002

IMPORTANT: Do not damage the seal sliding surface of spindle (2).

- Remove spindle (2) from body (12).

IMPORTANT: For easy removal, use the pins (2 used) when removing oil seals (6). Do not damage the seal groove by the pins.

- Remove oil seals (6) (6 used) and O-ring (4) from body (12).



W105-03-03-015

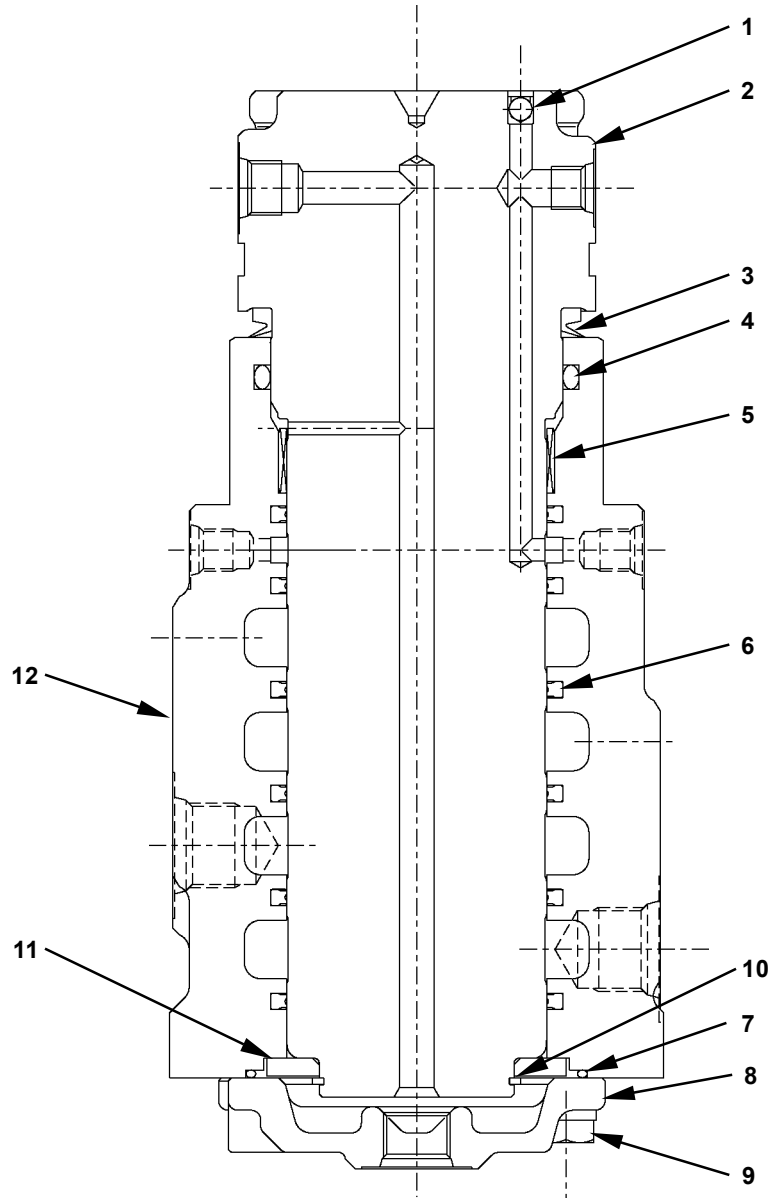
- Remove dust seal (3) from spindle (2).

IMPORTANT: While welding, cover the seal surface in order to prevent it from being spattered.

- When replacing bushing (5), build-up weld at 4 places in its inner diameter by using a welding rod. Shrink and remove bushing (5).

UNDERCARRIAGE / Center Joint

ASSEMBLE CENTER JOINT



W178-03-03-001

1 - Plug (With Ball)
2 - Spindle
3 - Dust Seal

4 - O-Ring
5 - Bushing
6 - Oil Seal (6 Used)

7 - O-Ring
8 - Cover
9 - Bolt (4 Used)

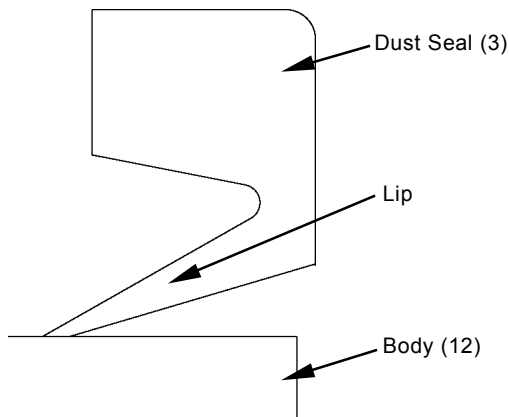
10 - Retaining Ring
11 - Ring
12 - Body

UNDERCARRIAGE / Center Joint

Assemble Center Joint

IMPORTANT: If bushing (5) is removed, install bushing (5) first. (Refer to page W3-3-6.)

1. Install dust seal (3) to spindle (2) with the lip part facing to the body (12) side.

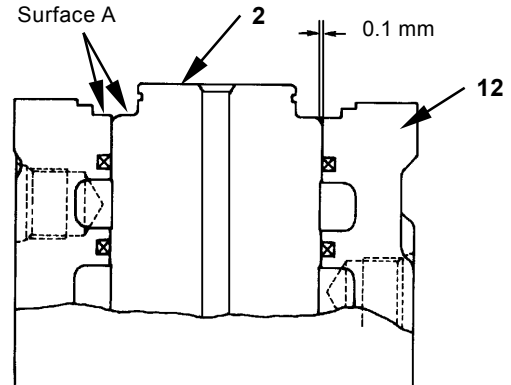


W178-03-03-002

2. Install oil seals (6) (6 used) and O-ring (4) to body (12).
3. Place spindle (2) on a workbench. Align the matching marks made when disassembling and install body (12) to spindle (2).

4. Lightly tap and insert body (12) by using a plastic hammer until surface A of body (12) is flush with that of spindle (2).

As the clearance between body (12) and spindle (2) is approximately 0.1 mm (0.004 in), insert body (12) along the axis straightly and slowly.



W105-03-03-024

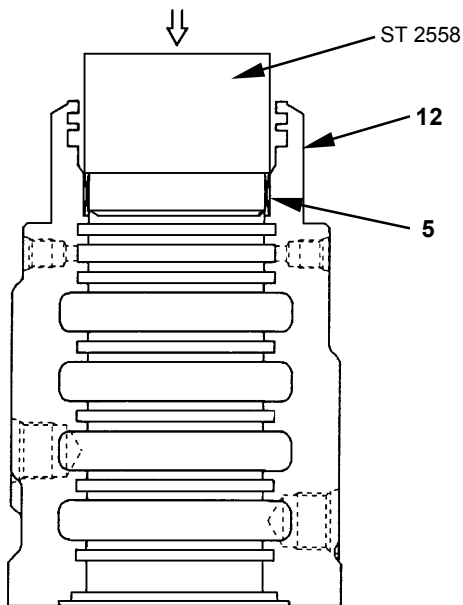
5. Install ring (8) to body (12) with the chamfered side facing to the spindle. Install O-ring (7) to body (12).
6. Install retaining ring (10) to spindle (2).
7. Install cover (8) with bolts (9) (4 used).
 - ⚒ : 17 mm
 - 🔧 : 49 N·m (5 kgf·m, 36 lbf·ft)

UNDERCARRIAGE / Center Joint

When replacing the body or spindle with new one, the following procedures are required.

In case of Body (12)

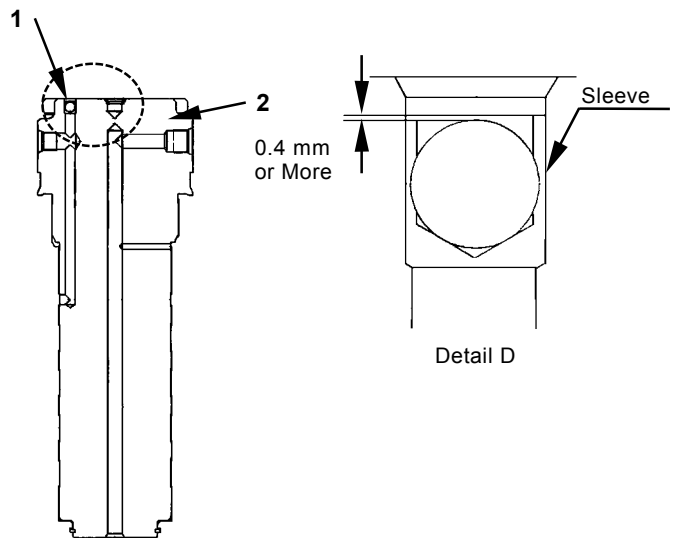
1. Clean body (12) and bushing (5).
2. Install bushing (5) into body (12) by using a press. Grease or molybdenum disulfide shall be applied to the fitting surface.
Pressing force: 0.5 to 1.5 t (1100 to 3300 lb)
Pressing tool: ST 2558



W105-03-03-029

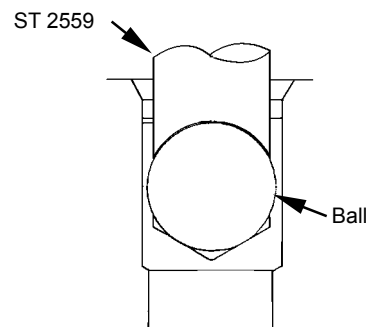
In case of Spindle (2)

1. Clean spindle (2).
2. Tap plug (1) into spindle (2) by using special tool (ST 2559).
3. Tap the balls of plug (1) so that the top of each ball is 0.4 mm (0.016 in) or more than the respective sleeve edge as illustrated in detail D.



W136-03-03-031

W135-03-03-001



W157-03-03-004

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 front idler, refer to "Remove and Install Front Idler" (W3-5-1) and "Remove and Install track" (W3-7-1).

In this section, the procedure starts on the premise that the tracks and front idler have already been removed.

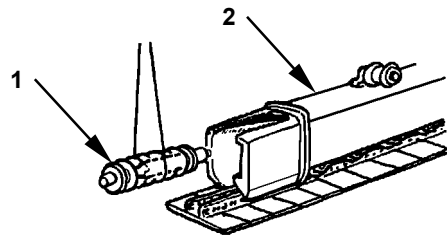
Removal

CAUTION: Track adjuster (1) weight: 200 kg (440 lb)

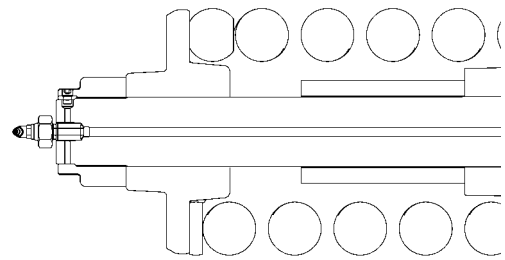
CAUTION: Track adjuster (1) may fly off due to the strong force when removing track adjuster (1). Do not stand in the same direction to track adjuster (1) or where the track adjuster(1) flies off.

Particularly, a strong force is always applied to the thread part of rod. If the rod and/or the threads are damaged, metal fragments under spring force may fly off.

1. Pry and remove track adjuster (1) from track frame (2) by using a pry bar.



W157-03-04-003

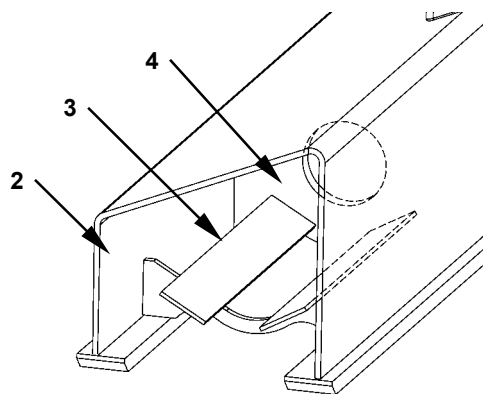


W1V7-03-04-005

Installation

CAUTION: Track adjuster (1) weight: 200 kg (440 lb)

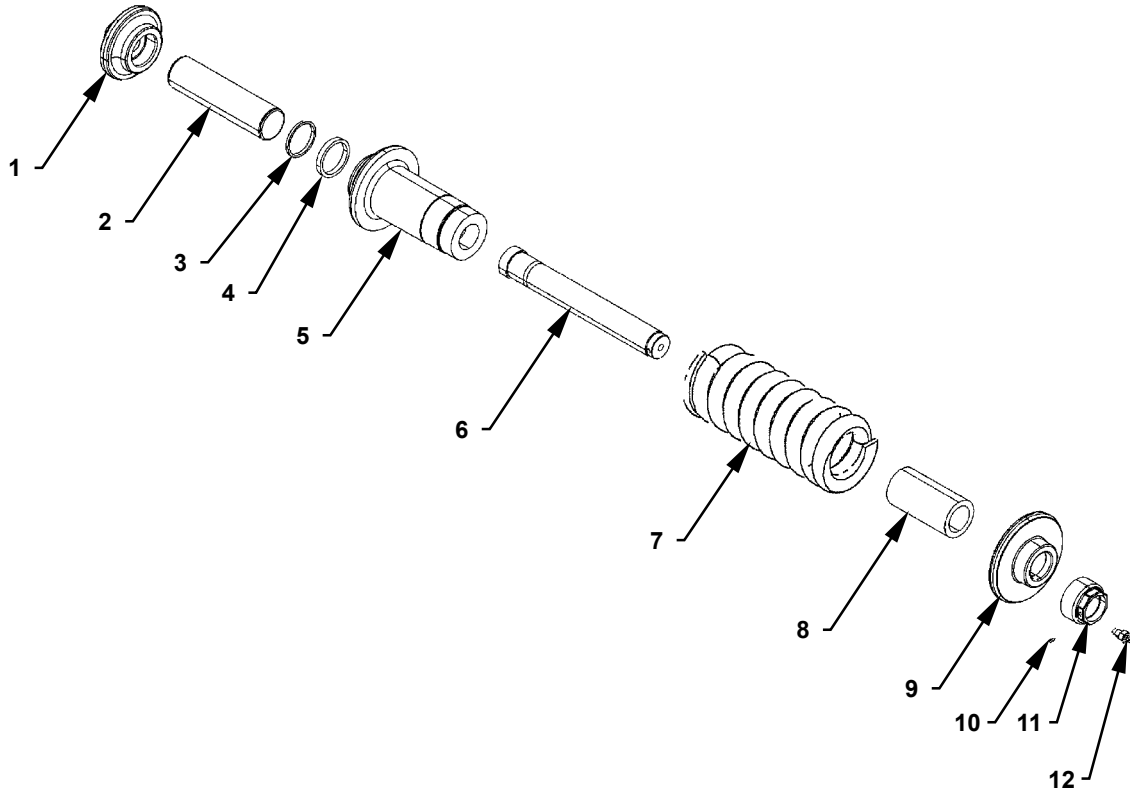
1. Insert track adjuster (1) into spring guide (3) in track frame (2) as illustrated. At this time, check that the end of track adjuster (1) comes into contact with that of plate (4).



W1V7-03-04-008

UNDERCARRIAGE / Track Adjuster

DISASSEMBLE TRACK ADJUSTER



W1V7-03-04-001

1 - Holder
2 - Piston Rod
3 - Dust Seal

4 - U-Ring
5 - Cylinder
6 - Rod

7 - Spring
8 - Spacer
9 - Washer

10 - Plug
11 - Nut
12 - Valve

UNDERCARRIAGE / Track Adjuster

Disassemble Track Adjuster

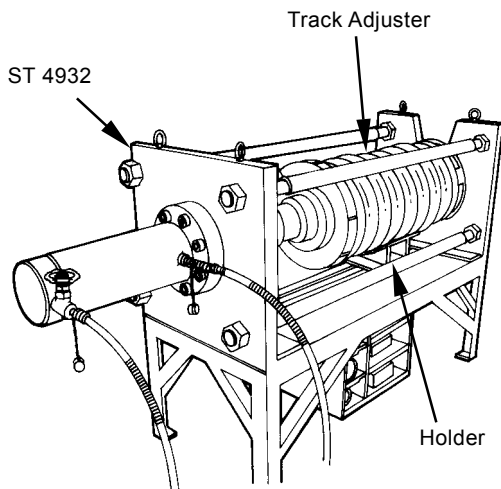
- Use a pump unit which has the maximum pressure of 69 MPa (700 kgf/cm², 9950 psi) and the flow rate of 8 to 10 liters (2.1 to 2.6 gal). Set the main relief pressure to 49 MPa (500 kgf/cm², 7110 psi) (80 tons) or lower.

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 the special tool for any damage in order to perform the work safely.

CAUTION: Track adjuster weight: 200 kg (440 lb)

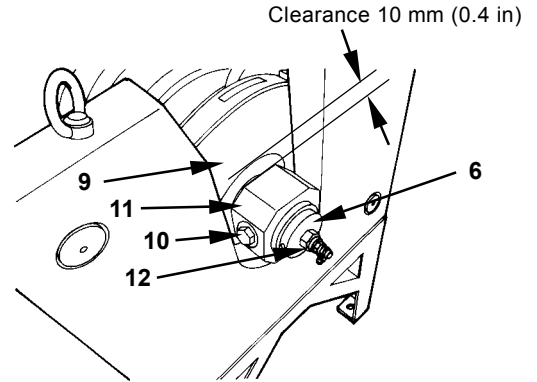
1. Hoist and place the track adjuster on the holder of special tool (ST 4932).



W142-03-04-019

IMPORTANT: Compress spring (7) until clearance between washer (9) and nut (11) is approximately 10 mm (0.4 in).

2. Loosen valve (12). Compress spring (7) in the track adjuster by using special tool (ST 4932).



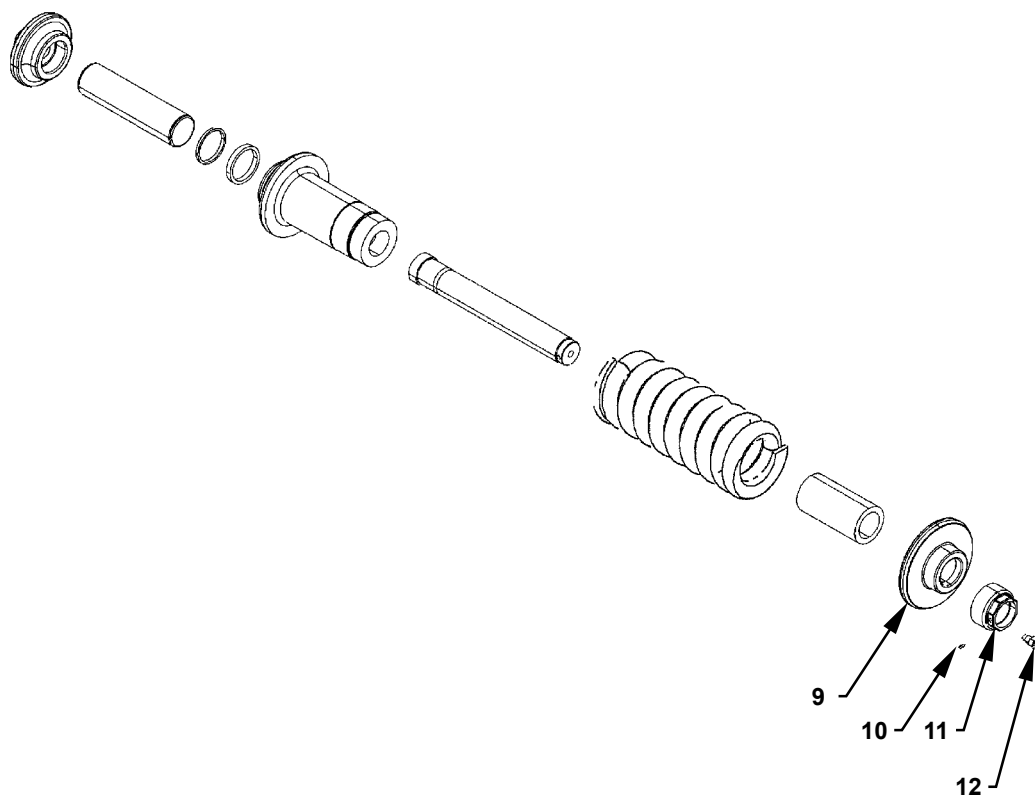
W142-03-04-020

3. Remove valve (12) from rod (6).
🔧 : 24 mm

IMPORTANT: Put the matching marks on rod (6) and nut (11).

4. Remove plug (10) from nut (11). Remove nut (11) from rod (6).
🔧 : 85 mm
🔧 : 5 mm


UNDERCARRIAGE / Track Adjuster




W1V7-03-04-001

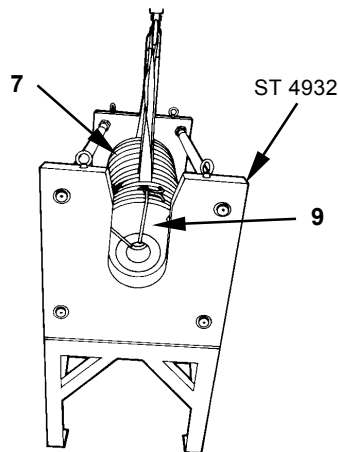
UNDERCARRIAGE / Track Adjuster

5. Slowly return the piston of special tool (ST 4932) until spring (7) extends to the free length.

 **NOTE:** Spring (7) free length: 691 mm (27.2 in)

 **CAUTION:** Track adjuster weight: 200 kg (440 lb)

6. Attach a nylon sling to spring (7) in the track adjuster. Hoist and remove the track adjuster from special tool (ST 4932).




W142-03-04-005

7. Remove washer (9) from rod (6).


 **CAUTION:** The spring (7) assembly weight: 183 kg (405 lb)

8. Install eyebolt (M16, Pitch 1.5 mm) to rod (6). Hoist and remove the spring (7) assembly from special tool (ST 4932).

 **CAUTION:** Spring (7) weight: 104 kg (230 lb)

9. After removing eyebolt, remove spring (7) from the rod (6) assembly.

10. Remove spacer (8) from rod (6).

 **CAUTION:** Holder (1) is pushed into piston rod (2).

11. Remove piston rod (2) from cylinder (5).

12. Remove holder (1) from piston rod (2) by using a press.

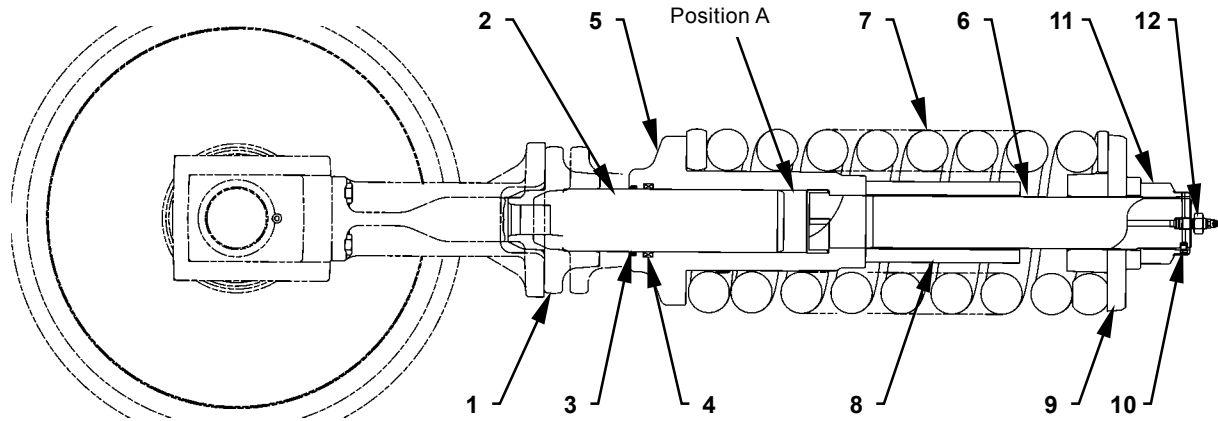
13. Remove rod (6) from cylinder (5).

IMPORTANT: Do not damage dust seal (3) and U-ring (4).

14. Remove dust seal (3) and U-ring (4) from cylinder (5).

UNDERCARRIAGE / Track Adjuster

ASSEMBLE TRACK ADJUSTER



W1V7-03-04-002

- 1 - Holder
- 2 - Piston Rod
- 3 - Dust Seal

- 4 - U-Ring
- 5 - Cylinder
- 6 - Rod

- 7 - Spring
- 8 - Spacer
- 9 - Washer

- 10 - Plug
- 11 - Nut
- 12 - Valve

UNDERCARRIAGE / Track Adjuster

Assemble Track Adjuster

CAUTION: Cylinder (5) weight: The cylinder (5) assembly weight: 47 kg (105 lb)

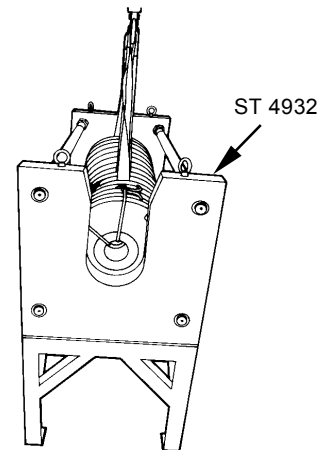
1. Install rod (6) to cylinder (5). Install U-ring (4) and dust seal (3) to cylinder (5). Apply grease to the inner surface of U-ring (4) and dust seal (3). Fill position (A) in cylinder (5) with grease.
2. Push holder (1) into piston rod (2).
3. Install the piston rod (2) assembly to cylinder (5). Release any pressure in position A and rod (6) completely.
4. Install spacer (8) to the rod (6) assembly.

CAUTION: Spring (7) weight: 104 kg (230 lb)

5. Install spring (7) on rod (6).
6. Install eyebolt (M16, Pitch 1.5 mm) to rod (6).

CAUTION: The spring (7) assembly weight: 183 kg (405 lb)

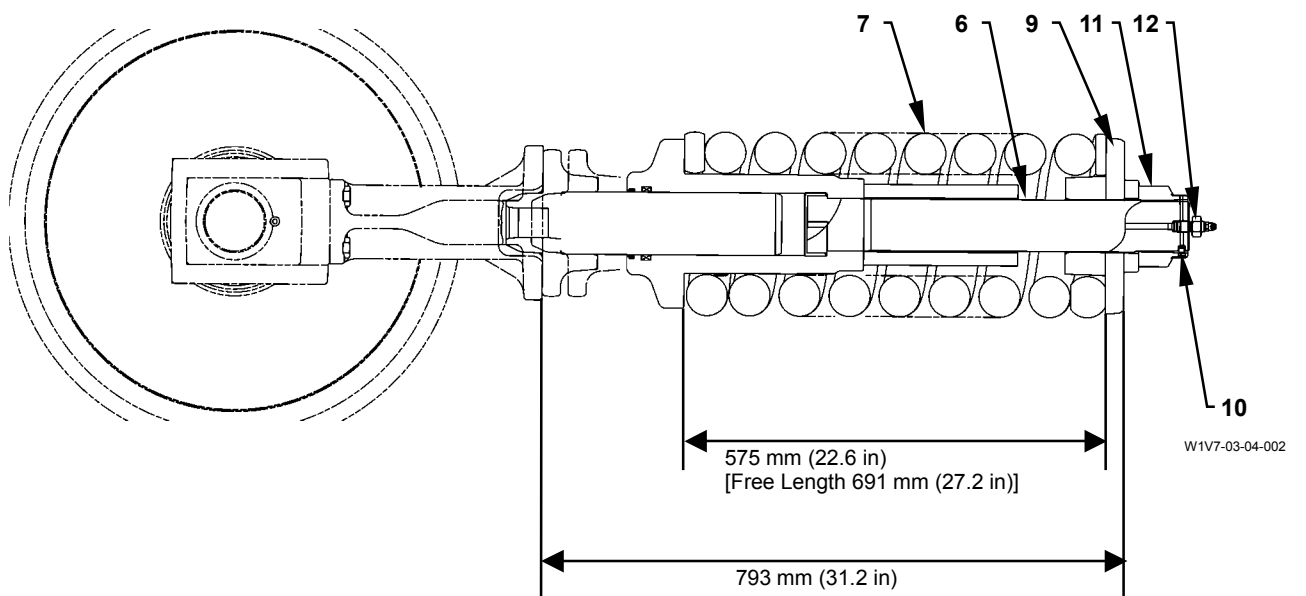
7. Hoist and place the spring (7) assembly on special tool (ST 4932). Remove eyebolt from piston rod (4).



W142-03-04-005

8. Install washer (9) to rod (6).

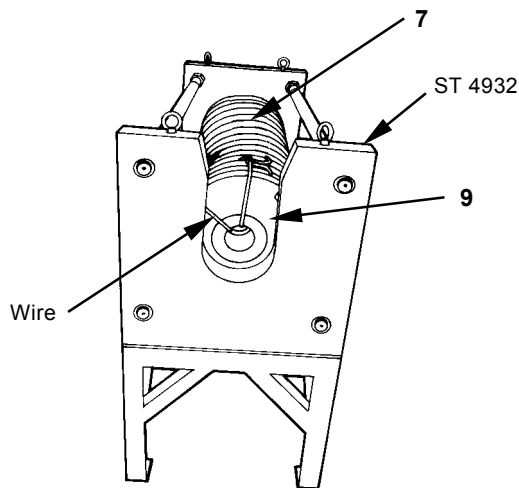
UNDERCARRIAGE / Track Adjuster



UNDERCARRIAGE / Track Adjuster


IMPORTANT: Slowly compress spring (7) while aligning the center of rod (6) with that of washer (9) by using a pry bar. Do not damage the threads in rod (6).


9. Operate the cylinder of special tool (ST 4932). Compress spring (7) until the specified spring length is obtained. (Specified Spring Length: 575 mm (22.6 in))




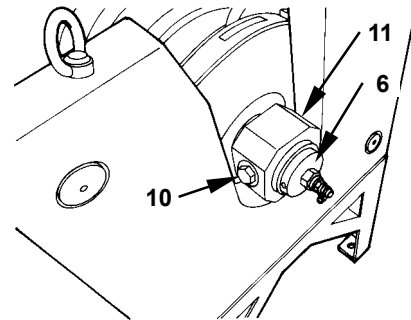
W142-03-04-015

10. Align the matching marks made when disassembling. Install nut (11) to rod (6). Install plug (10) to nut (11).

 : 85 mm


 : 5 mm


 : 14.8 N·m (1.5 kgf·m, 11 lbf·ft)



W142-03-04-020

11. Install valve (12) to rod (6).


 : 24 mm

 : 88 N·m (9 kgf·m, 65 lbf·ft)

12. Retract the cylinder of special tool (ST 4932).

 **CAUTION:** Track adjuster weight: 200 kg (440 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.

UNDERCARRIAGE / Track Adjuster

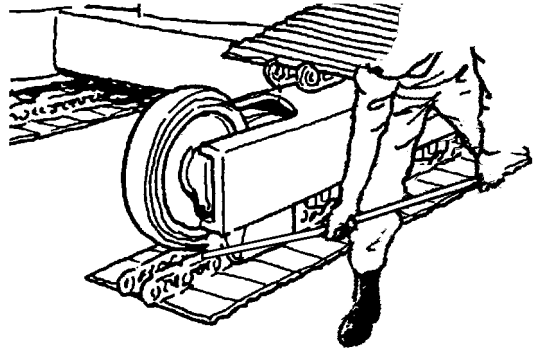
(Blank)

UNDERCARRIAGE / Front Idler

REMOVE AND INSTALL FRONT IDLER

Before removing and installing the front idler, the tracks must be removed first. For removal and installation of the tracks, refer to "Remove and Install Tracks" section (W3-7-1).

In this section, the procedure starts on the premise that the tracks have already been removed.



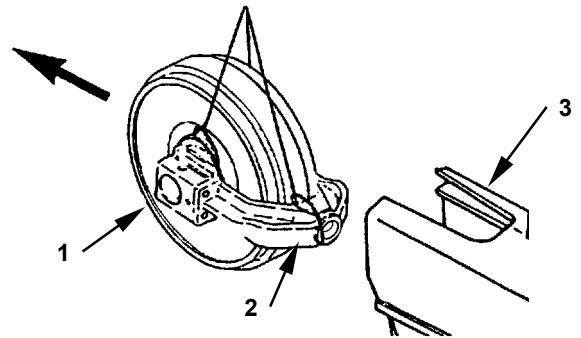
W110-03-05-001

Removal

CAUTION: Front idler (1) weight: 187 kg (412 lb)

CAUTION: Front idler (1) may fly off due to the strong spring force when removing front idler (1). Do not stand in the same direction to remove front idler (1) or where front idler (1) flies off.

1. Pry and remove front idler (1) and yoke (2) from track frame (3) by using a pry bar.
2. Attach a sling belt to the bearing and yoke (2) sections in front idler (1) as illustrated. Remove the front idler (1) assembly from track frame (3).
3. When storing front idler (1), place front idler (1) on the wooden block as illustrated.

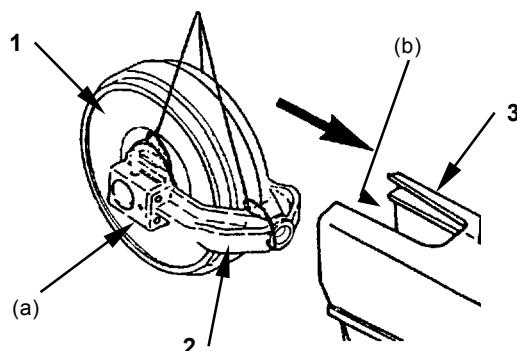


W178-03-05-001

Installation

CAUTION: Front idler (1) weight: 187 kg (412 lb)

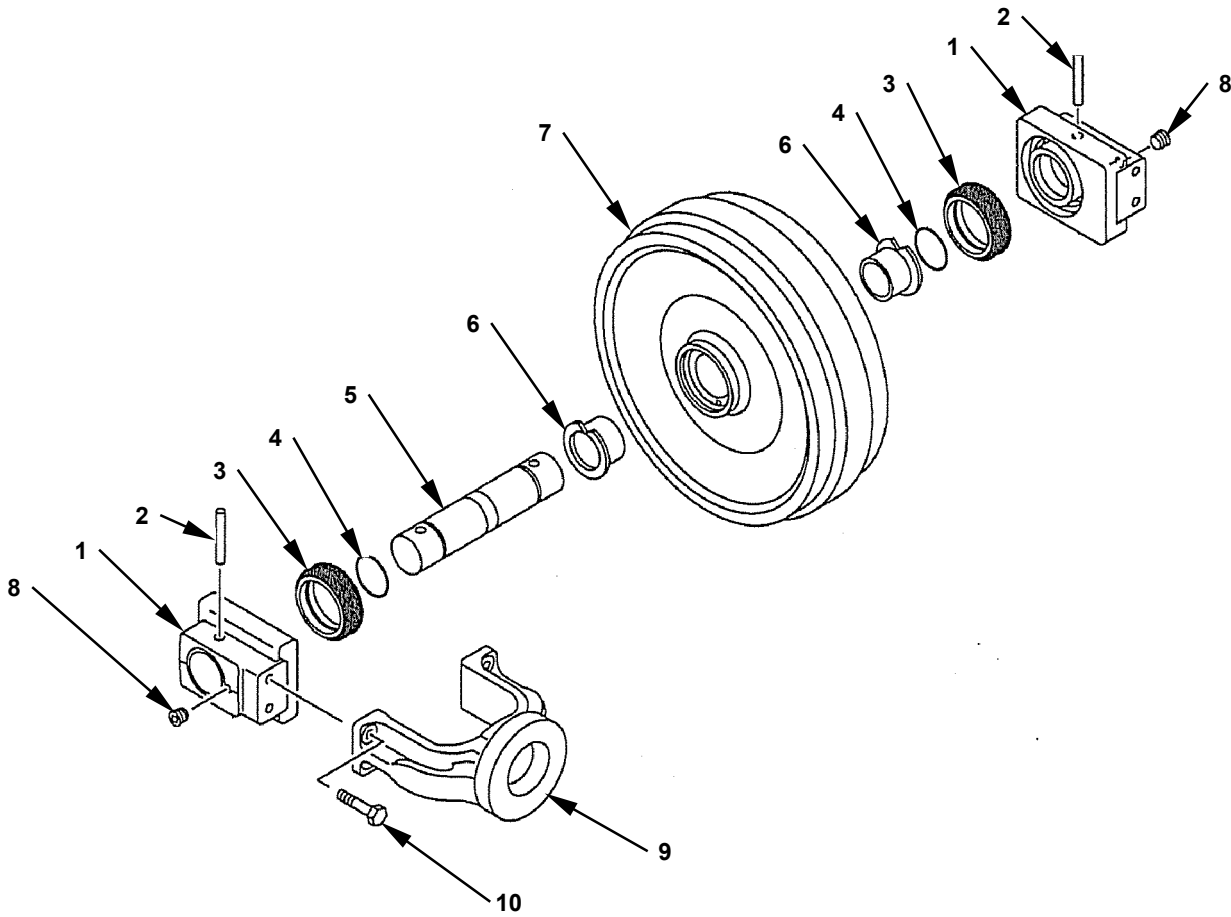
1. Install front idler in reverse procedures when removing.
 - Clean sliding surface (a) of idler (1) and sliding surface (b) of track frame (3), and apply grease.



W178-03-05-004

UNDERCARRIAGE / Front Idler

DISASSEMBLE FRONT IDLER



W1V7-03-05-001

1 - Bearing (2 Used)
2 - Pin (2 Used)
3 - Floating Seal (2 Used)

4 - O-Ring (2 Used)
5 - Axle
6 - Bushing (2 Used)

7 - Idler
8 - Plug (2 Used)


9 - Yoke
10 - Bolt (4 Used)

UNDERCARRIAGE / Front Idler

Disassemble Front Idler


CAUTION: Yoke (9) weight: 25 kg (55 lb)

1. Attach a nylon sling to yoke (9) and hold yoke (9). Remove bolts (10) (4 used). Hoist and remove yoke (9).

 : 24 mm

CAUTION: The idler (7) assembly weight: 162 kg (357 lb)

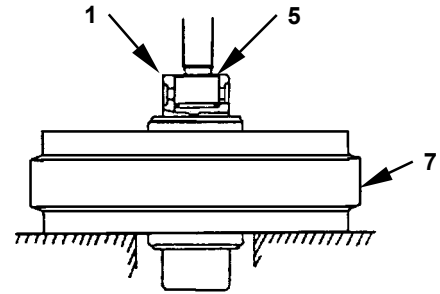
2. Place the idler (7) assembly horizontally. Remove plug (8) from the lower side. Drain oil from the idler (7) assembly.

 : 6 mm

3. Remove pin (2) from bearing (1) by using a bar and hammer.

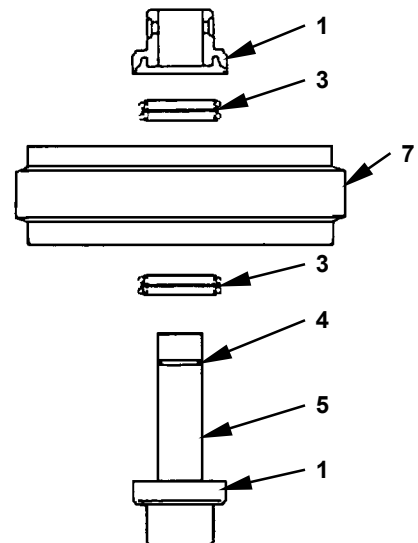
CAUTION: The axle (5) assembly weight: 32 kg (71 lb)

4. Put the matching marks on bearing (1) and axle (5). Remove the axle (5) assembly from the idler (7) assembly by using a press.



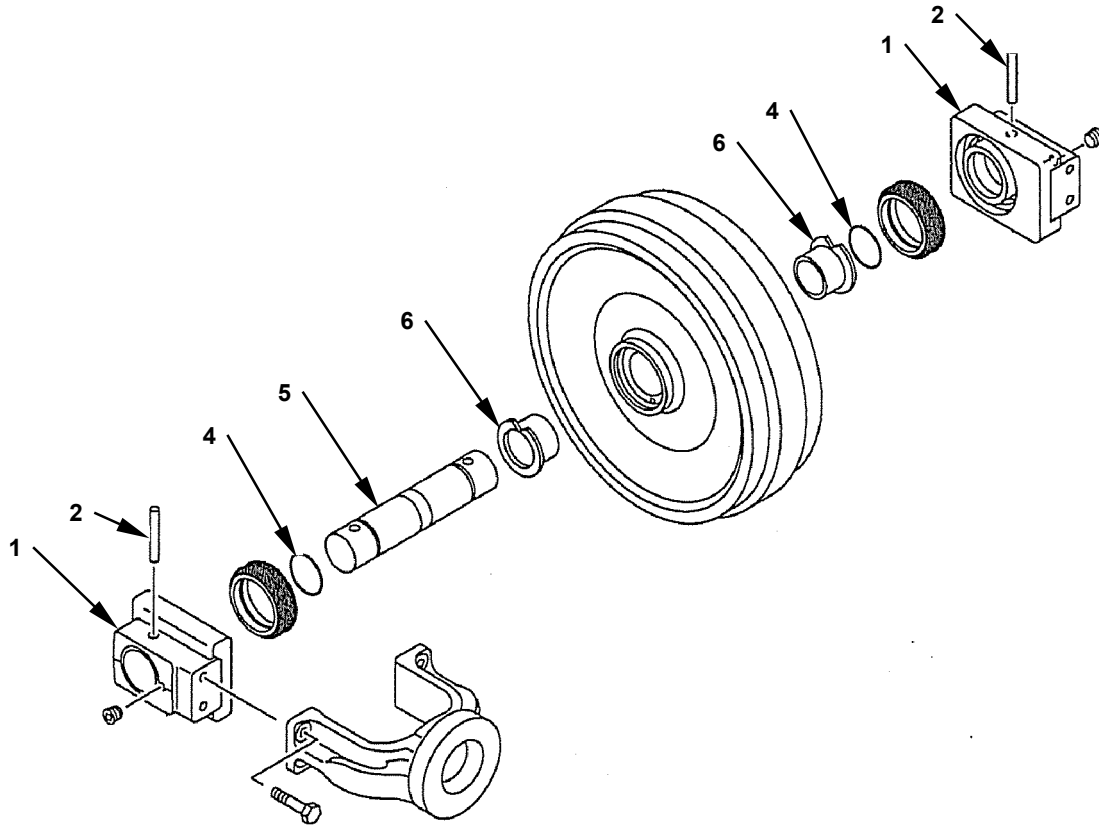
W105-03-05-008

5. Remove bearing (1) from the upper side of idler (7). Remove floating seals (3) (2 used) from both sides of idler (7) and bearing (1).



W105-03-05-009

UNDERCARRIAGE / Front Idler



W1V7-03-05-001

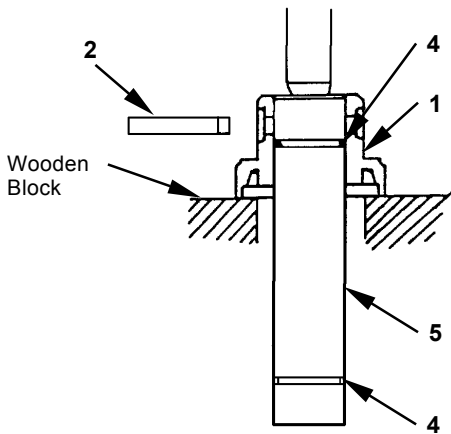
UNDERCARRIAGE / Front Idler



CAUTION: The axle (5) assembly weight: 32 kg (71 lb)

IMPORTANT: Place the wooden block under bearing (1) in order not to damage bearing (1).

6. Wind a nylon sling onto the axle (5) assembly. Hoist and place bearing (1) onto the wooden block.
7. Remove pin (2) by using a bar and hammer. Put the matching marks on bearing (1) and axle (5). Remove axle (5) from bearing (1) by using a press. Remove O-rings (4) (2 used) from axle (5).



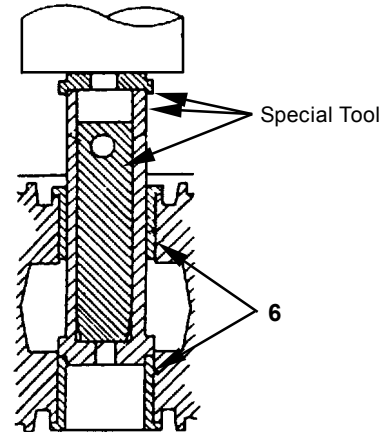
W105-03-05-010



CAUTION: Idler (7) weight: 116 kg (260 lb)

IMPORTANT: Do not remove bushing (6) unless necessary.

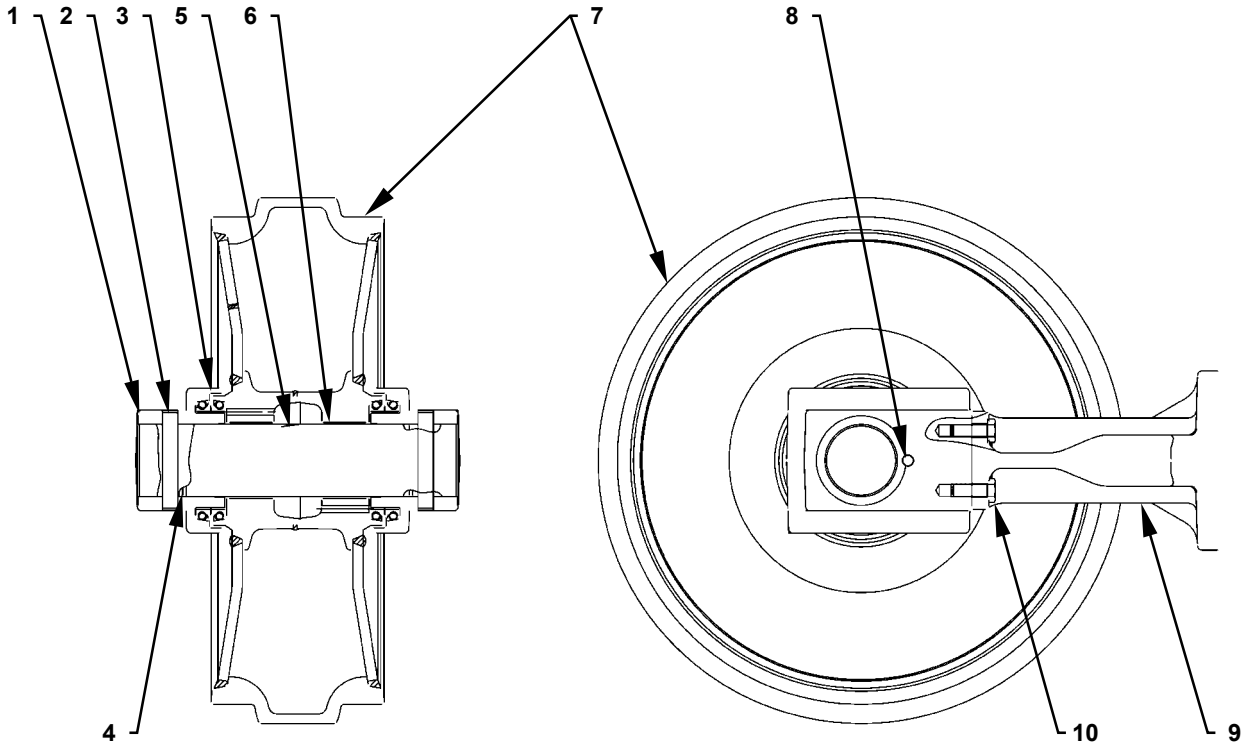
8. When replacing bushing (6), remove bushing (6) by using special tool and a press. Special Tool: ST 1973



W105-03-05-011

UNDERCARRIAGE / Front Idler

ASSEMBLE FRONT IDLER



W1V7-03-05-001

1 - Bearing (2 Used)
2 - Pin (2 Used)
3 - Floating Seal (2 Used)

4 - O-Ring (2 Used)
5 - Axle
6 - Bushing (2 Used)

7 - Idler
8 - Plug (2 Used)

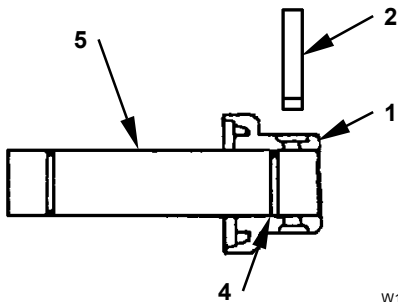
9 - Yoke
10 - Bolt (4 Used)

UNDERCARRIAGE / Front Idler

Assemble Front Idler

CAUTION: Idler (7) weight: 116 kg (260 lb)

1. Install bushings (6) (2 used) to idler (7).
2. Place axle (5) vertically. Install O-ring (4) (1 used) to the upper side of axle (5).
3. Align the matching marks made when disassembling. Evenly tap and install bearing (1) into axle (5) by using a plastic hammer. Insert pin (2) by using a bar and hammer.





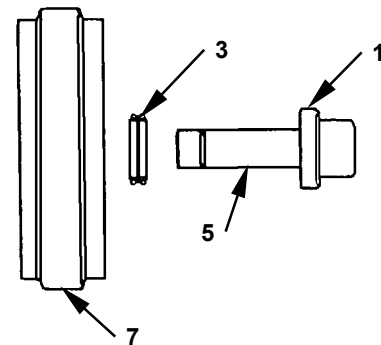
IMPORTANT: For handling of the floating seal, refer to the Precaution for Floating Seal Handling section on W1-1-4.

4. Apply grease to O-ring of floating seal (3). Install a pair of floating seals (3) to idler (7) and bearing (1).

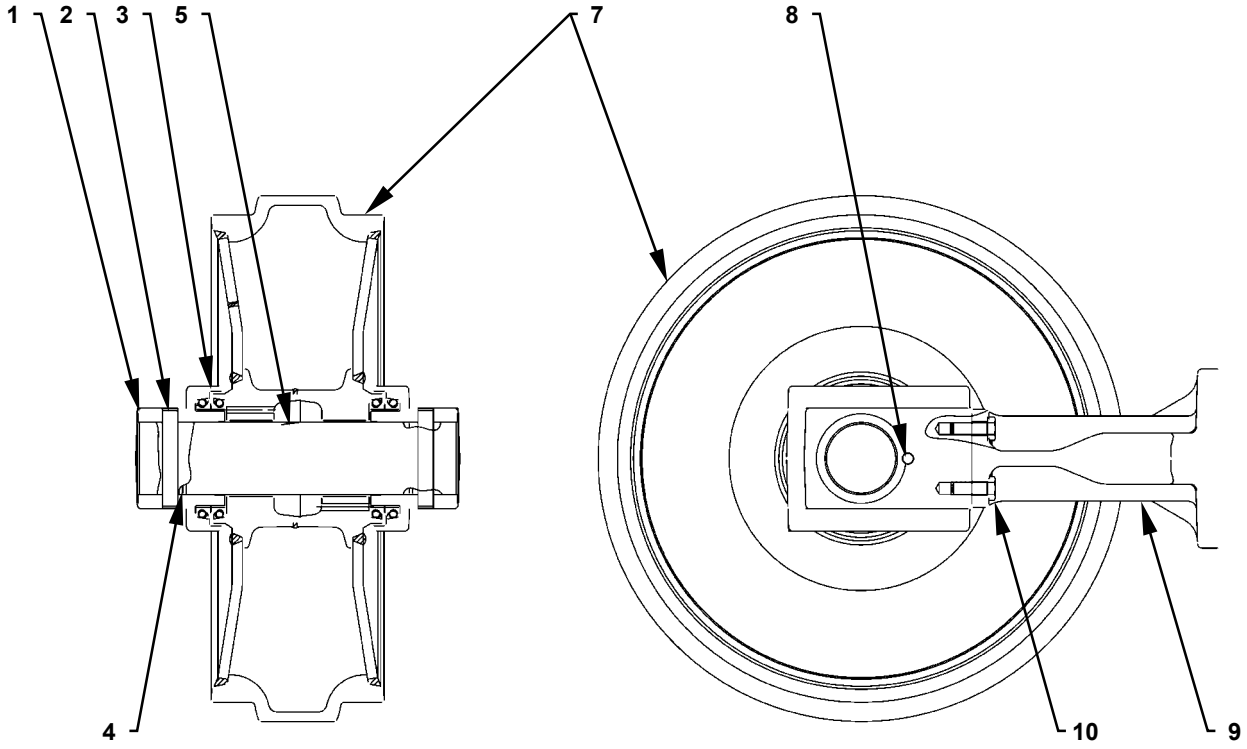
CAUTION: The axle (5) assembly weight: 32 kg (71 lb)

5. Wind a nylon sling onto bearing (1) of the axle (5) assembly. Hoist and insert the axle (5) assembly into idler (7) where floating seal (3) was installed. Apply LOCTITE #503 to plug (8). (Sealant is applied to new plug (8).) Install plug (8) to bearing (1).

 : 6 mm
 : 29.5 N·m (3.0 kgf·m, 22 lbf·ft)



UNDERCARRIAGE / Front Idler



W1V7-03-05-001

UNDERCARRIAGE / Front Idler

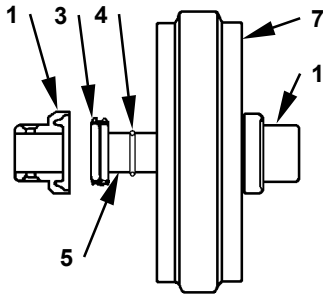


CAUTION: The idler (7) assembly weight: 150 kg (330 lb)

6. Wind a nylon sling onto the idler (7) assembly. Hoist and turn over the idler (7) assembly. Install O-ring (4) to axle (5).

IMPORTANT: For handling of the floating seal, refer to the Precaution for Floating Seal Handling section on W1-1-4.

7. Apply grease to O-ring of floating seal (3). Install the other floating seal (3) into idler (7) and bearing (1).





W157-03-05-005

IMPORTANT: Align the matching marks made when disassembling.

8. Evenly tap and install bearing (1) on the other into axle (5) by using a plastic hammer. Insert pin (2) by using a bar and hammer.
9. Add engine oil (API CD grade SAE30) through the plug (8) hole on bearing (1).
Oil amount: 0.3 L (0.08 US gal.)

10. Apply LOCTITE #503 to plug (8). Install plug (8) to bearing (1).

 : 6 mm


 : 29.5 N·m (3.0 kgf·m, 22 lbf·ft)




CAUTION: Yoke (9) weight: 25 kg (55 lb)

11. Wind a nylon sling onto yoke (9). Hoist yoke (9). Align the bolt (10) holes on both bearings (1) and yoke (9).

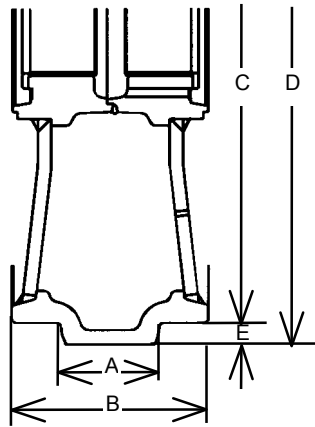
12. Install yoke (9) to bearing (1) on both sides with bolts (10) (4 used).

 : 24 mm

 : 210 N·m (21 kgf·m, 155 lbf·ft)

UNDERCARRIAGE / Front Idler

MAINTENANCE STANDARD



W166-03-05-001

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	102 (4.0)	[82 (3.22)]	Build-up weld and finishing
B	204 (1.64)	-	
C	572 (22.5)	[558 (21.96)]	
D	617 (24.3)	-	
E	22.5 (0.89)	29.5 (1.16)	

Axle and Bushing

Unit: mm (in)

		Standard	Allowable Limit	Remedy
Axle	Outer Dia.	85.0 (3.35)	[84.2 (3.31)]	Replace
Bushing	Inner Dia.	85.0 (3.35)	[86.0 (3.39)]	
	Flange Thickness	2.0 (0.02)	[1.2 (0.05)]	

NOTE: Values in [] are just for reference.

UNDERCARRIAGE / Upper And Lower Roller

REMOVE AND INSTALL UPPER ROLLER

Removal

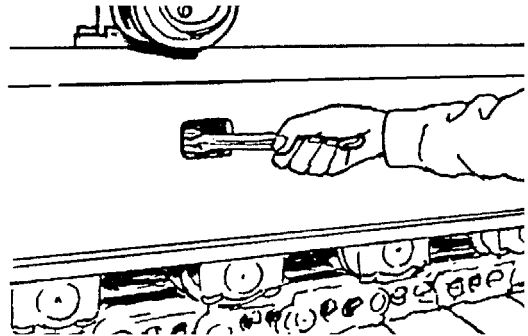
- CAUTION:** Grease pressure in the adjuster cylinder is high. Do not loosen valve (1) quickly or too much as valve (1) may fly off or high-pressure grease in the cylinder may gush out. Keep body parts and face away from valve (1) and loosen valve (1) carefully. Do not loosen grease fitting (2).

IMPORTANT: Remove gravel or mud between the sprocket and track (3) before loosening valve (1). It is enough to loosen valve (1) by 1 to 1.5 turns. Do not loosen valve (1) over that degree.

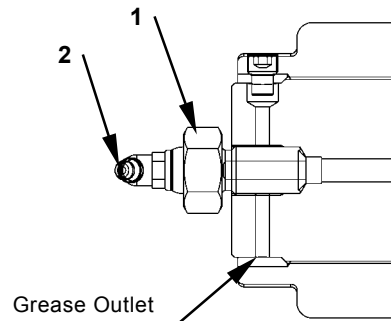
1. Loosen valve (1) on the track adjuster. Drain grease from the cylinder.
🔧 : 24 mm

- CAUTION:** Use a nonskid cloth between track frame (5) and oil jack in order not to slip.

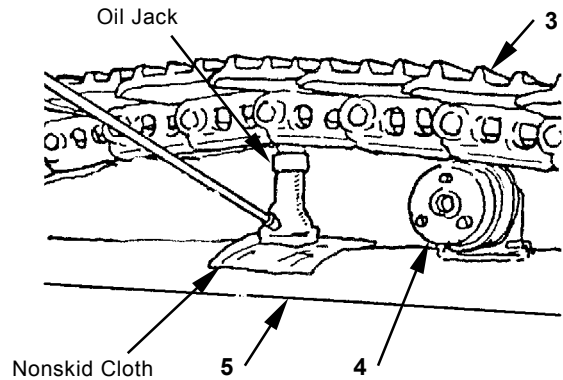
2. Jack up track (3) in order to get enough clearance between upper roller (4) and track (3).
3. Insert the wooden blocks between track (3) and track frame (5).



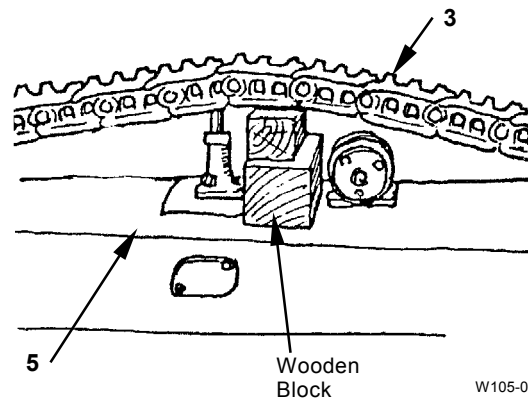
W105-03-06-001



W1V7-03-04-006




W105-03-06-002



W105-03-06-003

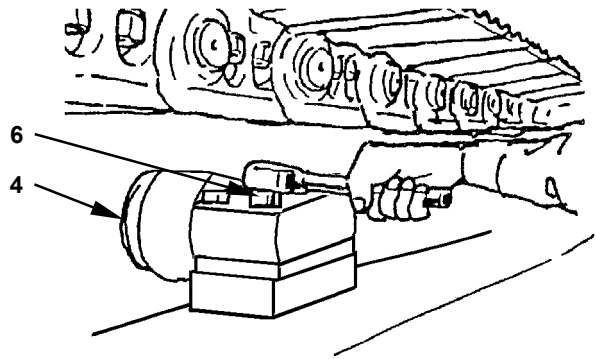
UNDERCARRIAGE / Upper And Lower Roller

- Loosen bolts (6) (4 used) on upper roller (4).

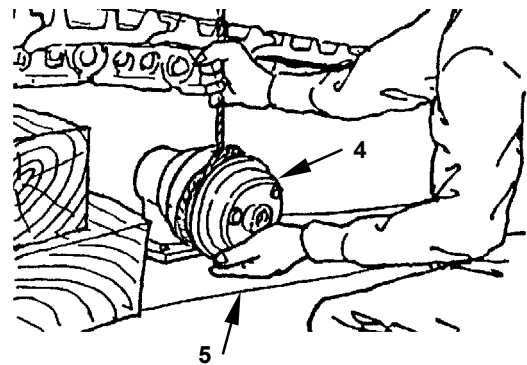
 : 27 mm

 **CAUTION:** Upper roller (4) weight: 35 kg (77 lb)

- Remove upper roller (4) from track frame (5).




W1V7-03-06-001





W105-03-06-005

Installation

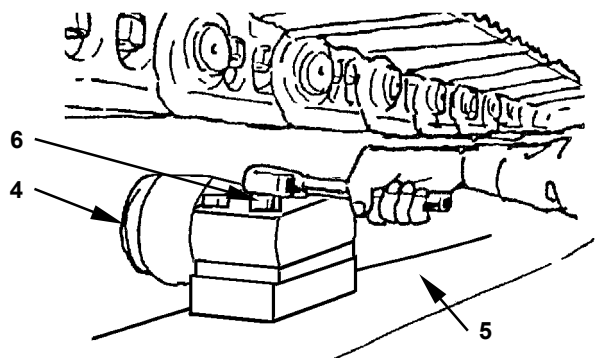
 **CAUTION:** Upper roller (4) weight: 35 kg (77 lb)

- Install upper roller (4) to track frame (5) with bolts (6) (4 used).

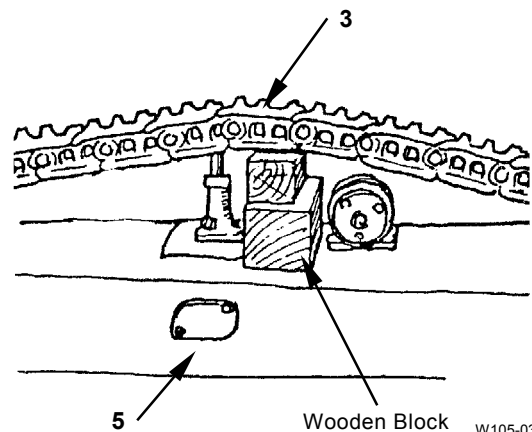
 : 27 mm

 : 460 N·m (46 kgf·m, 340 lbf·ft)

- Remove the wooden blocks and oil jack between track (3) and track frame (5).



W1V7-03-06-001





Wooden Block

W105-03-06-003

UNDERCARRIAGE / Upper And Lower Roller

3. Tighten valve (1) on the track adjuster.

 : 24 mm

 : 88 N·m (9.0 kgf·m, 65 lbf·ft)

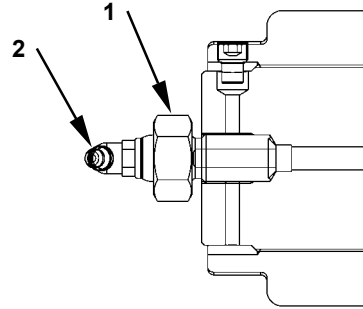


CAUTION: Support the jacked up machine firmly by using wooden blocks.

4. Jack up the track to be adjusted and rotate the track in the reverse direction a little.

5. Apply grease through grease fitting (2) and adjust the track tension.

Track sag specifications (A): 340 to 380 mm
(13.4 to 15.0 in)

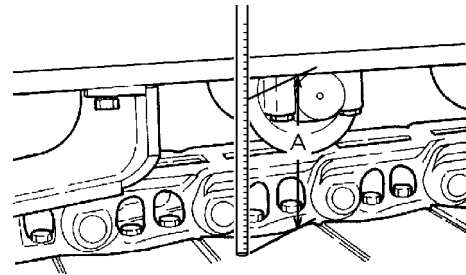


W1V7-03-04-006

IMPORTANT: Replace upper roller (4) as an assembly.

6. Add engine oil (API CD class SAE#30) to the plug (8) hole on cover (7).

Oil Amount: 95 mL (0.025 US gal.)




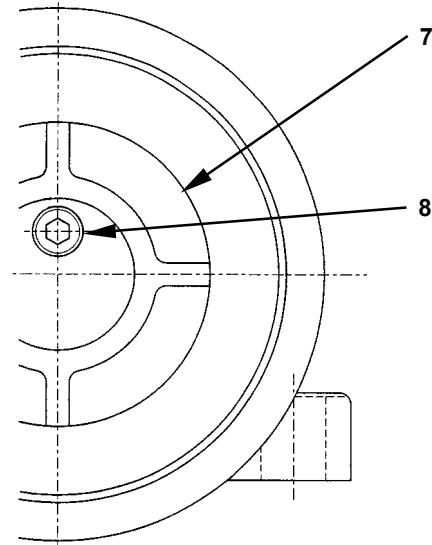
W800-03-06-001

IMPORTANT: Apply LOCTITE #503 to plug (8).

7. Tighten plug (8).

 : 6 mm

 : 29.5 N·m (3.0 kgf·m, 22 lbf·ft)




W158-03-06-001

UNDERCARRIAGE / Upper And Lower Roller

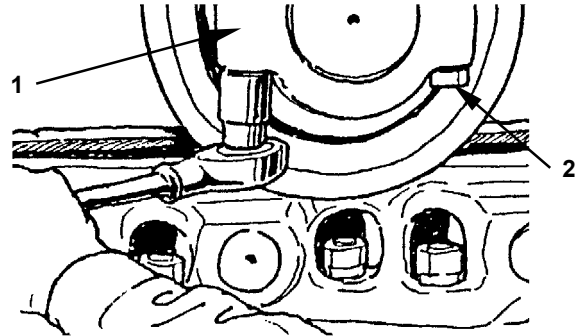
REMOVE AND INSTALL LOWER ROLLER

Removal

1. Remove the track guard. Remove bolts (2) (4 used) from lower roller (1).

 : 32 mm

2. Jack up the track frame high enough (90° to 110° between boom and arm is obtained when the bucket is lowered with the round bottom contacting with ground). At this time, insert the wooden blocks under track frame (3) and support the machine.



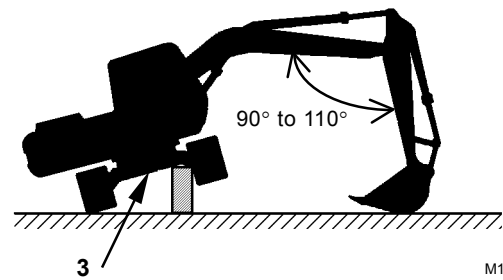
W105-03-06-008



CAUTION: Grease pressure in the adjuster cylinder is high. Do not loosen valve (4) quickly or too much as valve (4) may fly off or high-pressure grease in the cylinder may gush out.

Keep body parts and face away from valve (4) and loosen valve (4) carefully.


Do not loosen grease fitting (5).

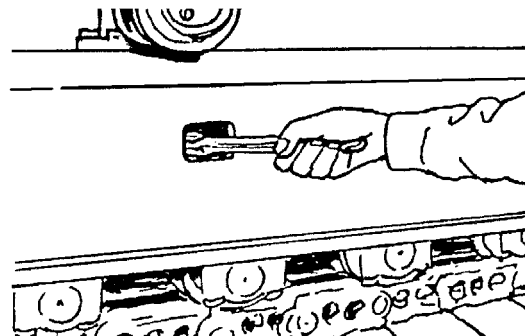


M104-07-067

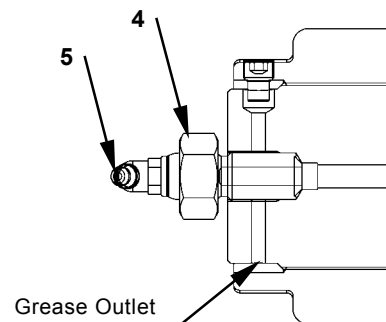
IMPORTANT: It is enough to loosen valve (4) by 1 to 1.5 turns. Do not loosen the valve (4) over that degree.

3. Loosen valve (4) on the track adjuster. Drain grease. Get enough clearance in the track in order to remove lower roller (1).

 : 24 mm



W105-03-06-001

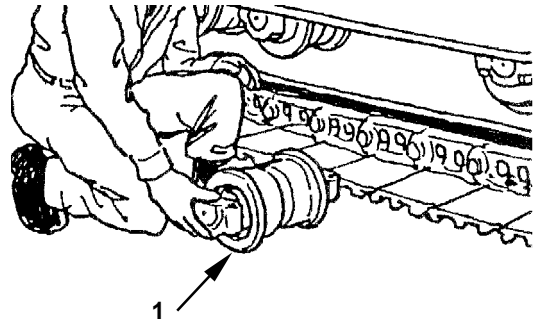


W1V7-03-04-006

UNDERCARRIAGE / Upper And Lower Roller

CAUTION: Lower roller (1) weight: 57 kg (127 lb)

4. Remove lower roller (1) by using a fork lift.

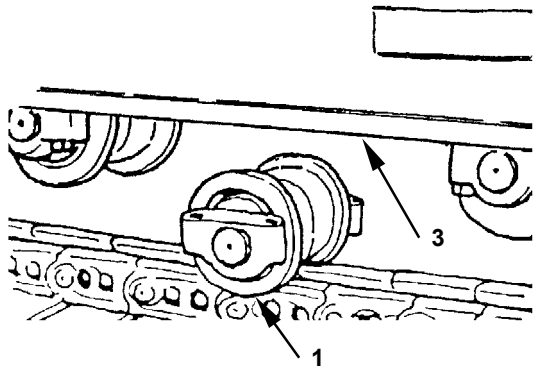


W105-03-06-010

Installation

CAUTION: Lower roller (1) weight: 57 kg (126 lb)


1. Set lower roller (1) below track frame (3) by using a fork lift.




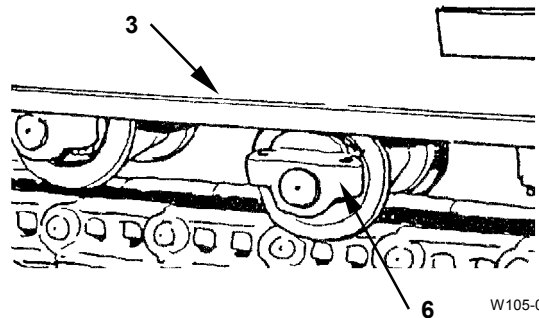
W105-03-06-011

2. Lower the machine so that track frame (3) may keep a little away from collar (6).

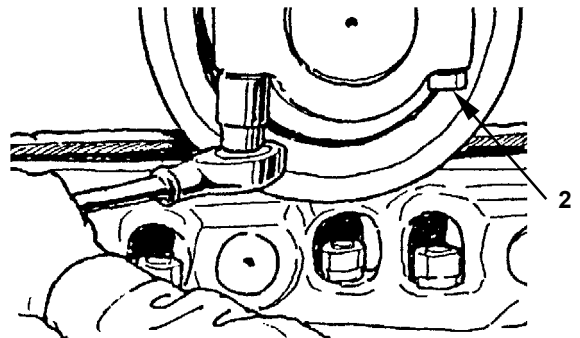
3. Align lower roller (1) with the bolt hole. Install lower roller (1) to track frame (3) with bolts (2) (4 used).

 : 32 mm

 : 840 N·m (86 kgf·m, 620 lbf·ft)




W105-03-06-012




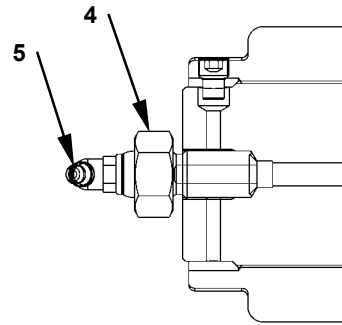
W105-03-06-008

UNDERCARRIAGE / Upper And Lower Roller

4. Tighten valve (4) on the track adjuster.

 : 24 mm

 : 88 N·m (9.0 kgf·m, 55 lbf·ft)



W1V7-03-04-006

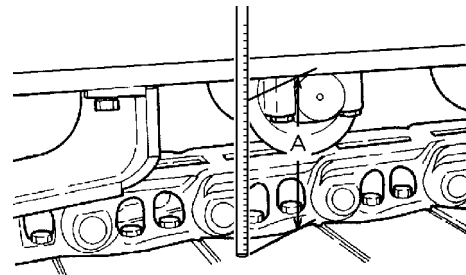


CAUTION: Support the jacked up machine firmly by using wooden blocks.

5. Jack up the track to be adjusted and rotate the track in the reverse direction a little.

6. Apply grease through grease fitting (5) and adjust the track tension.

Track sag specifications (A): 340 to 380 mm
(13.4 to 15.0 in)



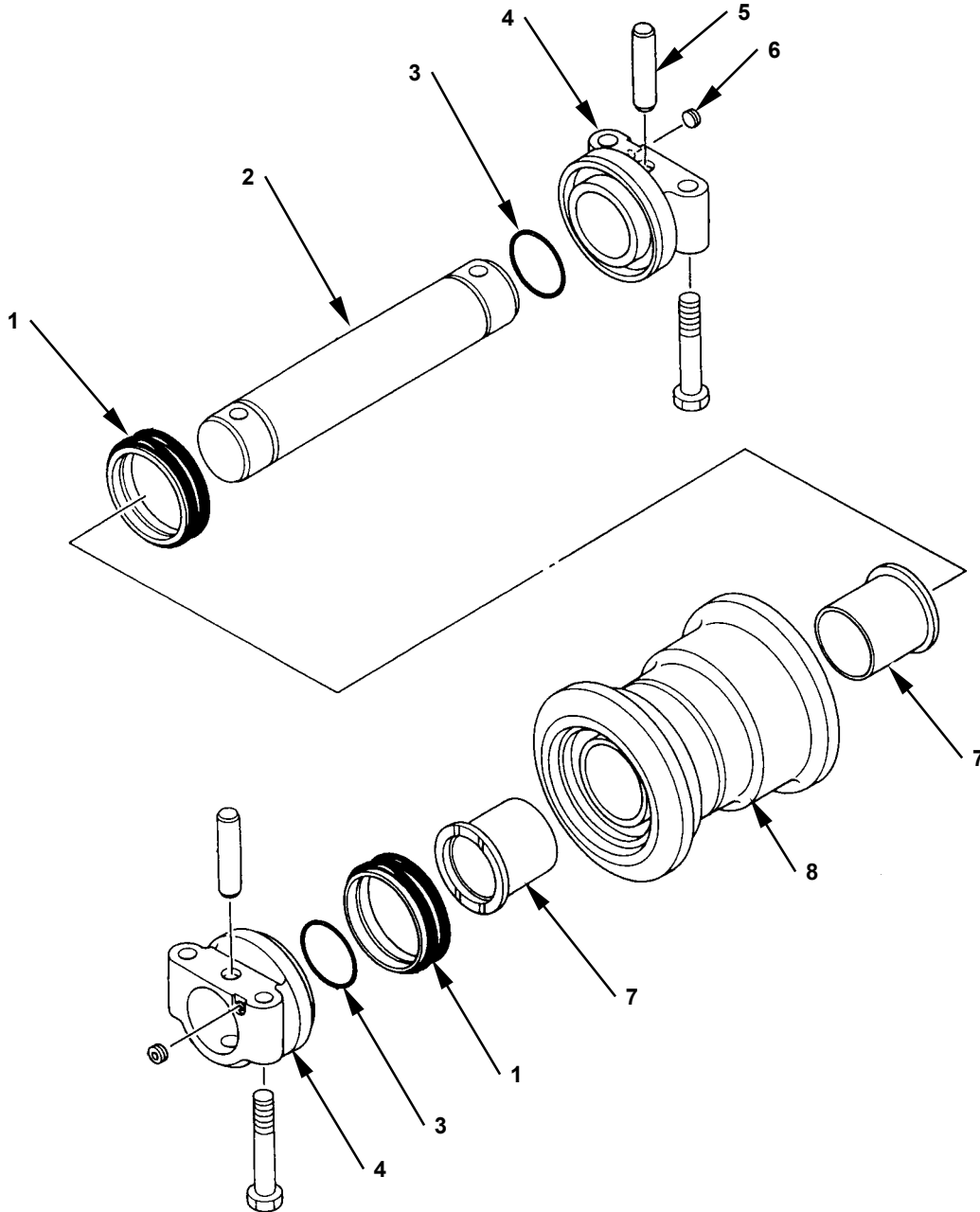
W800-03-06-001

UNDERCARRIAGE / Upper And Lower Roller

(Blank)

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

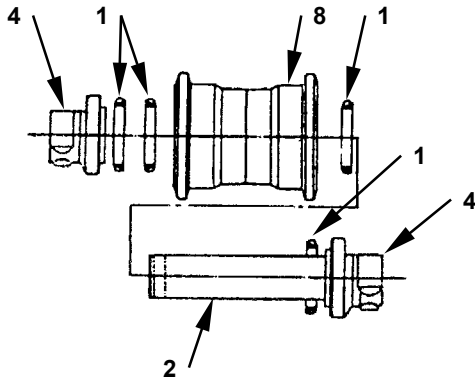
Disassemble Lower Roller

CAUTION: Lower roller weight: 57 kg (127 lb)

1. Remove plug (6) from the end of collar (4). Drain oil in roller (8).

 : 6 mm

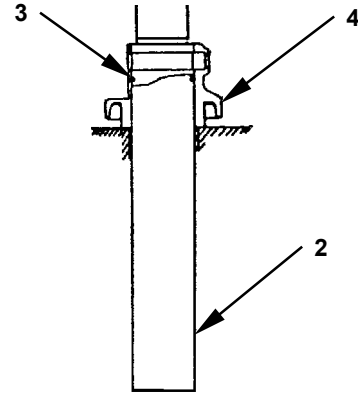
2. Put the matching marks on collar (4) and axle (2). Remove pin (5) from collar (4) at one side by using a round bar (Dia.: 14 mm) and hammer. Remove axle (2) from roller (8), from the side where pin (5) was removed by using a press. At this time, pin (5) and collar (4) at opposite side are removed together.



W105-03-06-026

3. Remove floating seal (1) from both sides of roller (8) and collars (4) (2 used) respectively.

4. Remove pin (5) from the axle (2) assembly. Remove axle (2) from collar (4) by using a press.



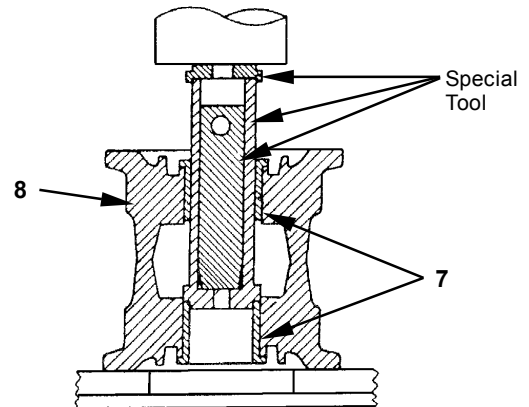
W105-03-06-027

5. Remove O-rings (3) (2 used) from axle (2).

CAUTION: Roller (8) weight: 34 kg (75 lb)

6. When replacing bushing (7), remove bushing (7) by using special tool and a press.

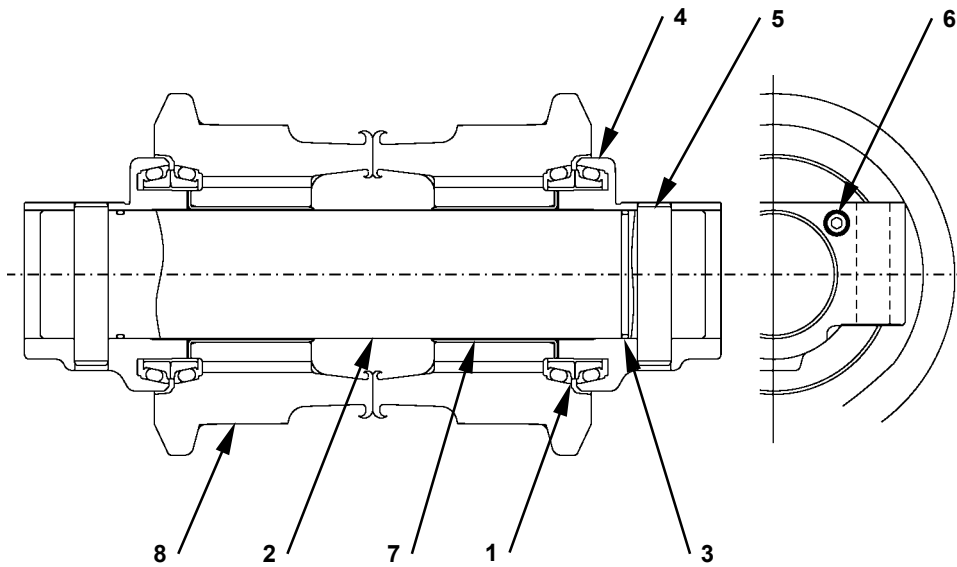
Special tool: ST 1475



W105-03-06-028

UNDERCARRIAGE / Upper And Lower Roller

ASSEMBLE LOWER ROLLER



W1HH-03-06-001

1 - Floating Seal (2 Used)
2 - Axle

3 - O-Ring (2 Used)
4 - Collar (2 Used)

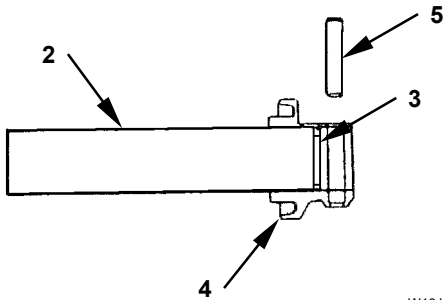
5 - Pin (2 Used)
6 - Plug (2 Used)

7 - Bushing (2 Used)
8 - Roller

UNDERCARRIAGE / Upper And Lower Roller


Assemble Lower Roller


1. Install bushings (7) (2 used) to roller (8).
Do not dent the flange surface of bushing (7).
Apply grease to O-ring (3). Install O-ring (3) to axle (2).
2. Align the matching marks made when disassembling. Install collar (4) at one side to axle (2). Secure with pin (3).
Do not damage O-ring (3) at this time.



W16J-03-06-001

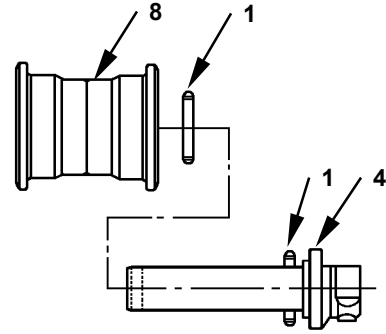
3. Apply LOCTITE #503 to plug (6). Install plug (6) to collar (4) at one side.

 : 6 mm

 : 29.5 N·m (3.0 kgf·m, 22 lbf·ft)

IMPORTANT: For handling floating seal (5), refer to the section "Precautions for Handling Floating Seal" on page W1-1-4.

4. Install floating seal (1) to roller (8) and collar (4).



W157-03-06-008

5. Insert axle (2) into roller (8). Install O-ring (3) to axle (2). Install other collar (4) in the same procedures. Secure collar with pin (5).


6. Add engine oil through the plug (6) hole on collar (4).


Engine oil: API CF class, SAE15W-40

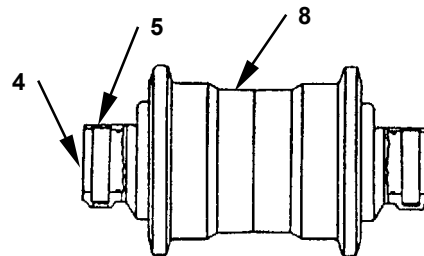
Oil Amount: 0.42 L (0.11 US gal.)

IMPORTANT: Apply LOCTITE # 503 or equivalent to plug (1). (Sealant is applied to new plug (6).)

7. Install plug (6) to collar (4).

 : 6 mm

 : 29.5 N·m (3.0 kgf·m, 22 lbf·ft)

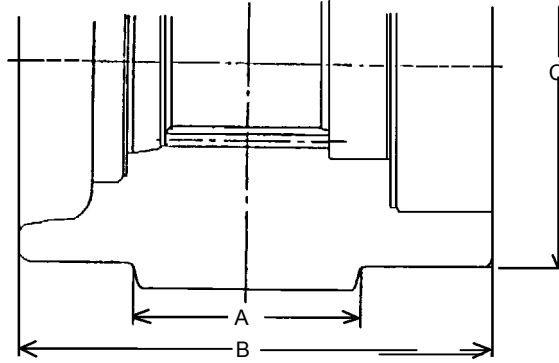


W105-03-06-024

UNDERCARRIAGE / Upper And Lower Roller

MAINTENANCE STANDARD

Upper Roller



W1V7-03-06-002

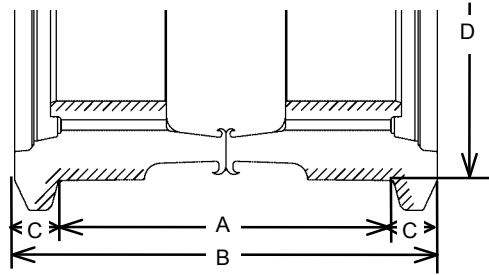
Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	100 (3.9)	–	Replace
B	190 (7.5)	–	
C	150 (5.9)	[140 (5.5)]	

NOTE: Values in [] are just for reference.

UNDERCARRIAGE / Upper And Lower Roller

Lower Roller



W1HH-03-06-002

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	199	[217 (8.5)]	Cladding by welding and finish or replace
B	256	-	
C	28.5	[19.5 (0.8)]	
D	180	162.0 (69.4)	

Axle and Bushing

Unit: mm (in)

		Standard	Allowable Limit	Remedy
Axle	Outer Dia.	75 (3.0)	[74.2 (2.9)]	Replace
	Inner Dia.	75 (3.0)	[76 (3.0)]	
Bushing	Flange Thickness	2 (0.08)	[1.2 (0.05)]	

NOTE: Values in [] are just for reference.

UNDERCARRIAGE / Upper And Lower Roller

(Blank)

UNDERCARRIAGE / Track


REMOVE AND INSTALL TRACK


Removal

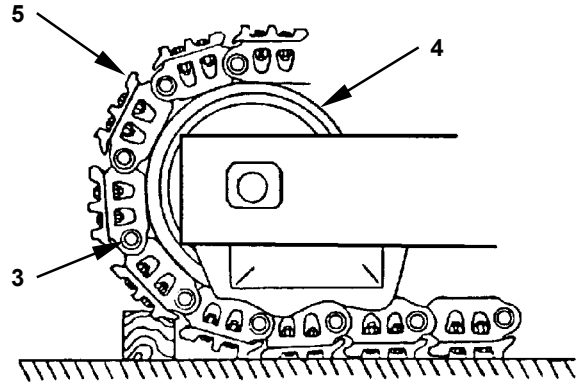
1. Rotate the tracks so that master pin (3) is positioned over front idler (4). Place a wooden block under shoe (5) and support shoe (5).

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 cylinder may gush out. Keep body parts and face away from valve (1) and loosen valve (1) carefully. Do not loosen grease fitting (2).

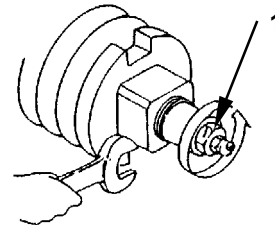
1. Loosen the track tension.

 : 24 mm

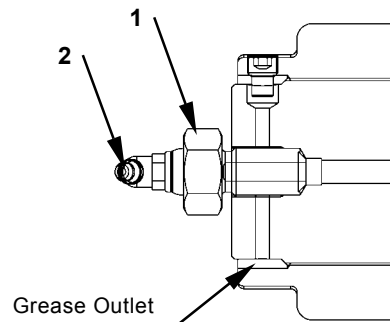
 **NOTE:** When rotating valve (1) in the track adjuster only one turn, grease can be drained from the grease outlet.



W178-02-11-270




W105-03-07-002





W1V7-03-04-006

UNDERCARRIAGE / Track

3. Remove snap ring (6) to prevent master pin (3) from coming off.

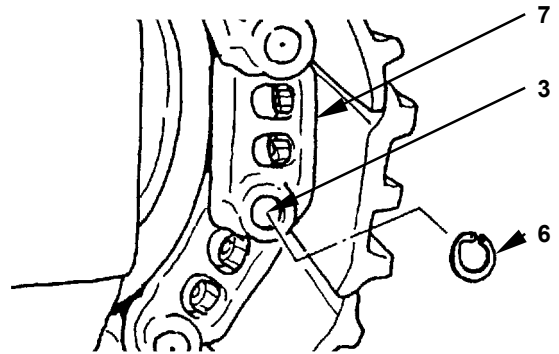
 **NOTE:** If snap ring (6) interferes with master link (7), push in master pin (3) to the removal direction in order to make clearance between snap ring (6) and master pin (3).

 **CAUTION:** The front idler may fly off due to the spring force when removing the track. Particularly, a strong force is always applied to the thread part of rod. If the rod and/or the threads are damaged, metal fragments under spring force may fly off.

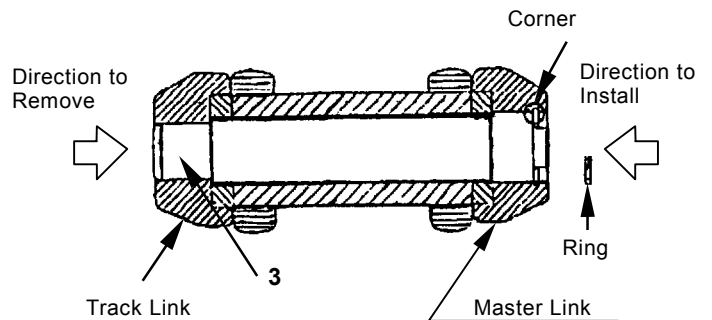
 **CAUTION:** Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

IMPORTANT: Master pin (3) can be removed to only one direction. Check the removal direction.

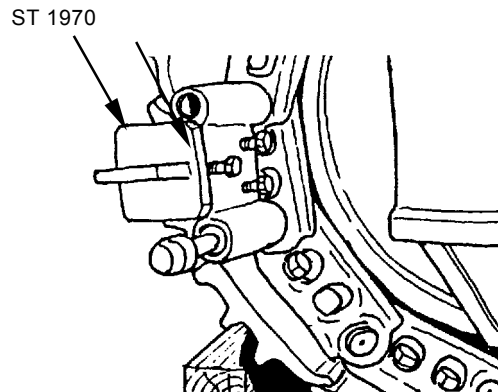
4. Remove master pin (3) by using special tool (ST 1970).



W105-03-07-009



W105-03-07-010



W1V1-03-07-001

UNDERCARRIAGE / Track

5. Operate the boom and arm so that the angle between them is 90 to 110 degrees. Lower the boom with the round bottom contacting with the ground. Jack up the machine and remove the track. Place a stand under the track frame and support the machine.



CAUTION: The track assembly (standard spec.) weight:

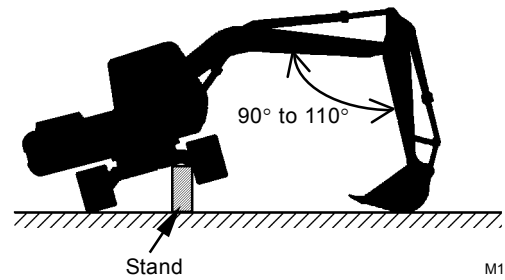
ZAXIS 330-3: 1750 kg (3860 lb)

ZAXIS 330LC-3: 1870 kg (4120 lb)

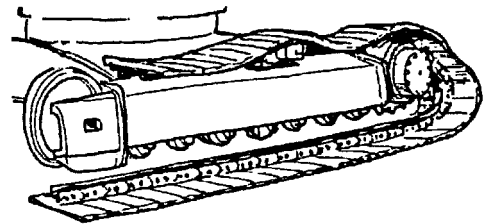
ZAXIS 350H-3, 350K-3: 1860 kg (4100 lb)

ZAXIS 350LCH-3, 350LCK-3, 350LC-3, 350LCN-3: 1980 kg (4365 lb)

6. Slowly operate travel lever on the side with track being removed to the reverse position and extend the track.



M104-07-067



W105-03-07-011

UNDERCARRIAGE / Track

Installation

1. Jack up the machine. Set the track under the machine so that the sprocket meshes with the track end. Check the direction of track at this time.



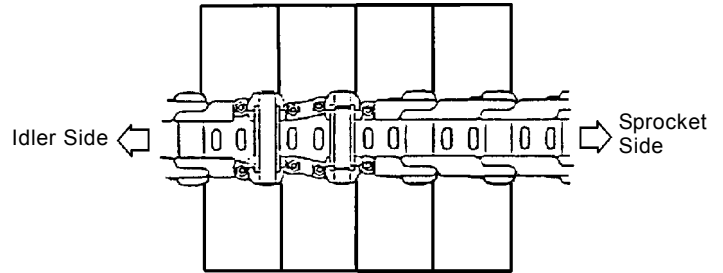
CAUTION: The track assembly (standard spec.) weight:

ZAXIS 330-3: 1750 kg (3860 lb)

ZAXIS 330LC-3: 1870 kg (4120 lb)

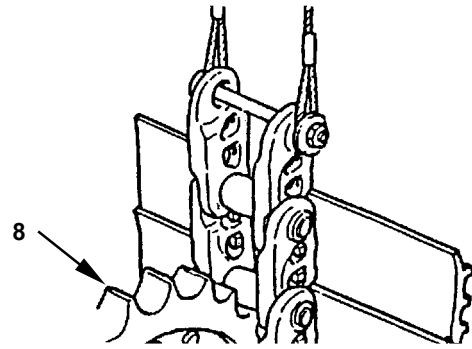
ZAXIS 350H-3, 350K-3: 1860 kg (4100 lb)

ZAXIS 350LCH-3, 350LCK-3, 350LC-3, 350LCN-3: 1980 kg (4365 lb)



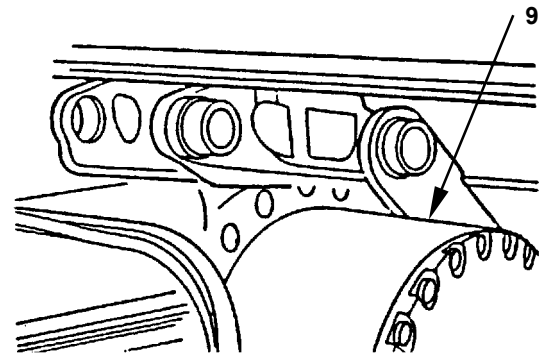
W178-02-11-271

2. Hoist and place the track on sprocket (8).



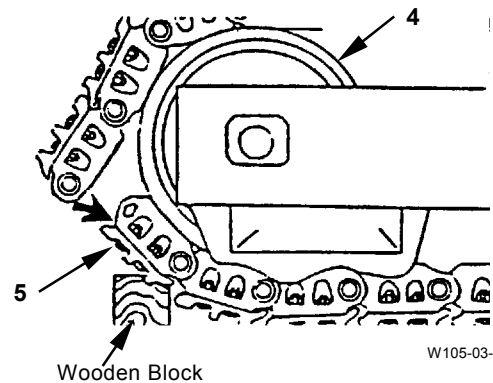
W105-03-07-014

3. With the machine jacked up, slowly operate the lever for the track to be installed in the forward direction. Turn travel device (9) and wind the track.



W105-03-07-015

4. Wind the connection of track link to the front idler (4) side. Lower the machine. Place a wooden block under shoe (5) and support shoe (5).

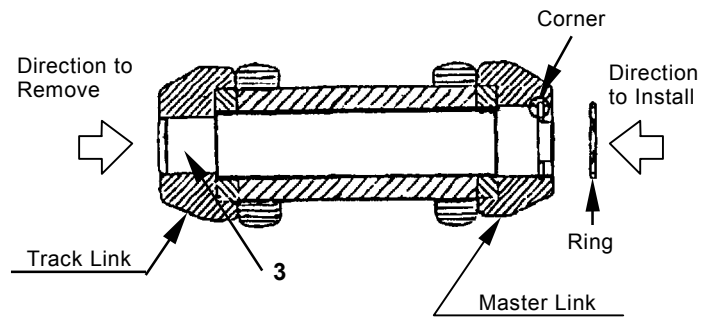


W105-03-07-016

UNDERCARRIAGE / Track

IMPORTANT: Master pin (3) can be installed to only one direction. Check the installation direction.

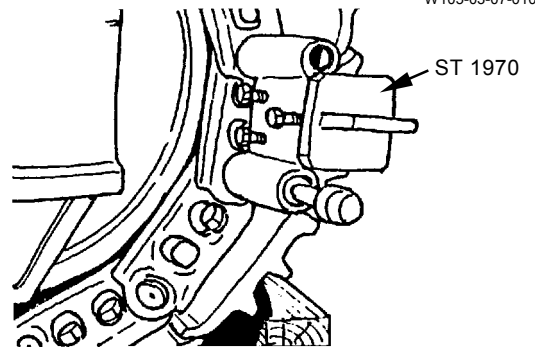
5. Install special tool (ST 1970). Install master pin (3).



W105-03-07-010

IMPORTANT: As snap ring (6) may be deformed, replace snap ring (6) with a new one.

6. Install snap ring (6).
Snap ring (6) can be installed to only one direction. Install a pair of pliers to the groove in master link (7) with the flat surface on hole facing forward.

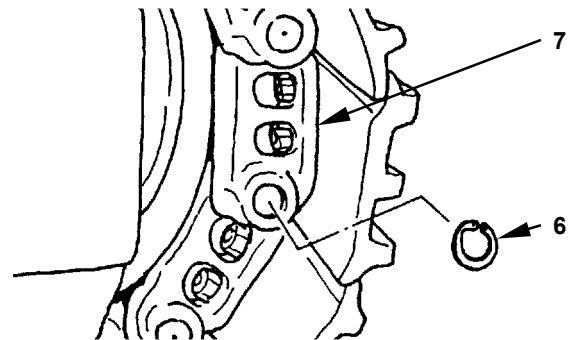


W1V1-03-07-002

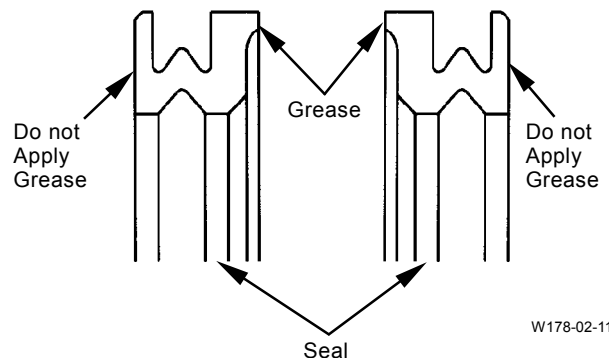
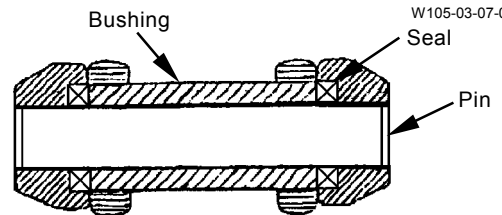
IMPORTANT: If disassembling the links, fill grease (Daphne Epones SR) into the clearance between the pin and bushing. Apply grease onto the bushing end.

Stand the bushing on a flat plate. Fill the bushing bore with grease. Insert the pin into the bushing while pushing the bushing onto the plate in order not to move because of grease. After inserting the pin, wipe off excess grease.

Check the direction to install the seal.




W105-03-07-009




W178-02-11-272

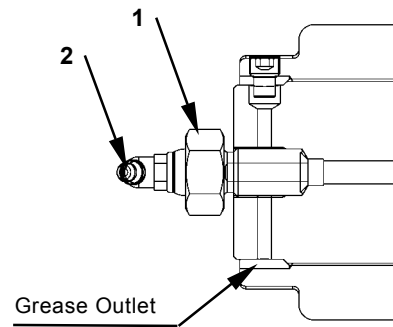
UNDERCARRIAGE / Track

7. Tighten valve (1) in the adjuster. Apply grease through grease fitting (2) and adjust the track tension.

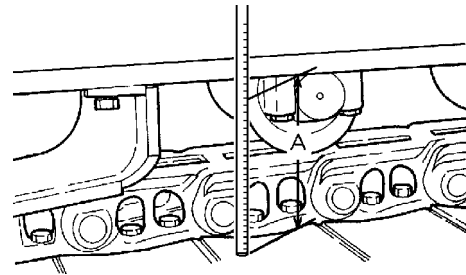
 : 24 mm

 : 88 N·m (9 kgf·m, 65 lbf·ft)

Track sag specifications (A): 340 to 380 mm
(13.4 to 15.0 in)



W1V7-03-04-006



W800-03-06-001

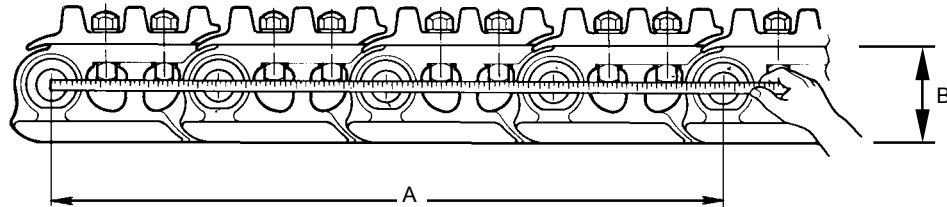
UNDERCARRIAGE / Track

MAINTENANCE STANDARD

Link

Measure the length of four links.

- Do not measure the part included the master pin.
- Measure the length with tension on the track.

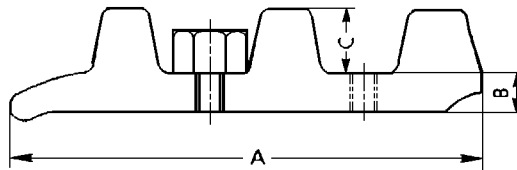


W155-03-07-001

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	865.92 (34.1)	[893.4 (35.2)]	Cladding by welding and hand finishing, or replace
B	116 (4.6)	[108 (4.3)]	

Grouser Shoe



W105-03-07-024

ZAXIS 330-3, 330 LC-3 Unit: mm (in)

Shoe Size	600 mm Grouser Shoe		
	Standard	Allowable Limit	Remedy
A	250 (9.8)	-	Cladding by welding or replace
B	11 (0.43)	-	
C	30 (1.18)	[21 (0.83)]	

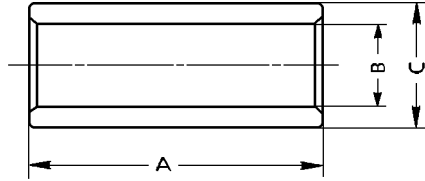
ZAXIS 350H-3, 350LCH-3, 350K-3, 350LCK-3, 350LC-3, 350LCN-3 Unit: mm (in)

Shoe Size	600 mm Grouser Shoe		
	Standard	Allowable Limit	Remedy
A	247 (9.7)	-	Cladding by welding or replace
B	11 (0.43)	-	
C	36 (1.42)	[27 (1.06)]	

NOTE: Values in [] are just for reference.

UNDERCARRIAGE / Track

Master Bushing

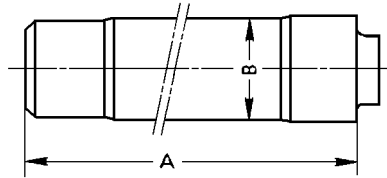


W105-03-07-023

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	148.3 (5.84)	-	Replace
B	45.45 (1.79)	[49.4 (1.95)]	
C	66.91 (2.63)	[61.1 (2.41)]	

Master Pin



W105-03-07-021

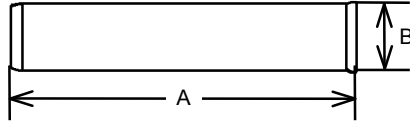
Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	237 (9.33)	-	Replace
B	45.0 (1.77)	[41.0 (1.61)]	

NOTE: Values in [] are just for reference.

UNDERCARRIAGE / Track

Pin

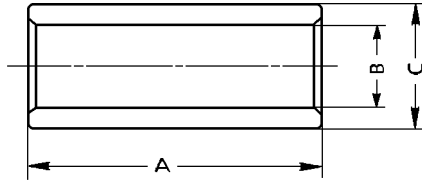


W142-03-07-004

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	242 (9.53)	-	Replace
B	44.69 (1.76)	[40.7 (1.60)]	


Bushing



W105-03-07-023

Unit: mm (in)

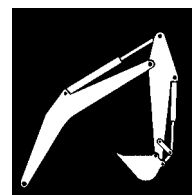
	Standard	Allowable Limit	Remedy
A	158.9 (6.26)	-	Replace
B	45.45 (1.79)	[49.4 (1.95)]	
C	66.91 (2.63)	[61.1 (2.41)]	

 NOTE: Values in [] are just for reference.

UNDERCARRIAGE / Track

(Blank)

SECTION 4 FRONT ATTACHMENT



— CONTENTS —

Group 1 Front Attachment

Hydraulic Circuit Pressure Release Procedure.....	W4-1-1
Remove and Install Front Attachment (Mono Boom)	W4-1-2
Remove and Install Front Attachment (2-Piece Boom).....	W4-1-10
Maintenance Standard.....	W4-1-18
Standard Dimensions for Arm and Bucket Connection	W4-1-22
Standard Dimensions for Arm and Boom Connection	W4-1-23


Group 2 Cylinder

Hydraulic Circuit Pressure Release Procedure.....	W4-2-1
Remove and Install Cylinder	W4-2-2
Disassemble Boom, Arm, Bucket Cylinders	W4-2-18
Disassemble Positioning Cylinder.....	W4-2-24
Assemble Boom, Arm, Bucket Cylinders	W4-2-26
Assemble Positioning Cylinder	W4-2-30
Maintenance Standard.....	W4-2-32

(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.

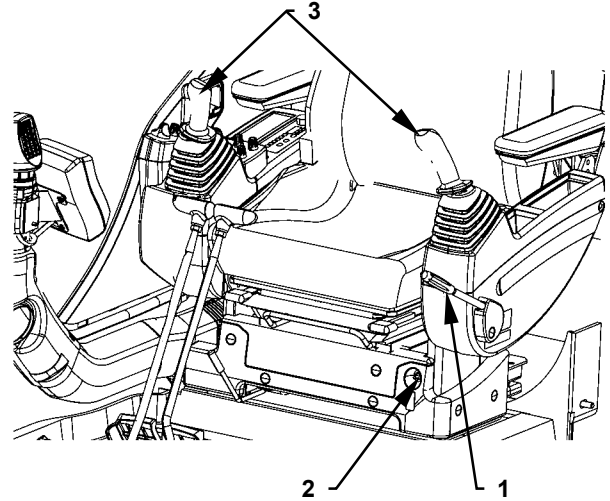
 **NOTE:** Perform steps 1, 2 and turn the key switch to the START position. Although the starter rotates, the engine does not start.

IMPORTANT: Battery will deplete. Operate the key switch for short period.

3. With the key switch in the START position, operate the lever in order to release any pressure in hydraulic circuit 4 to 5 times.

4. Turn pilot shut-off lever (1) to the LOCK position.

5. Turn engine stop switch (2) OFF.



M1U1-01-029

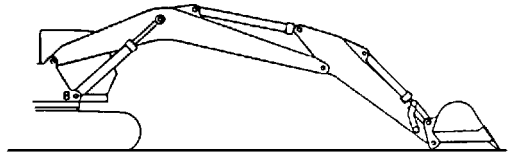
FRONT ATTACHMENT / Front Attachment

REMOVE AND INSTALL FRONT ATTACHMENT (MONO BOOM)

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

Preparation


1. Park the machine on a solid, level surface. Fully retract the bucket and arm cylinders and lower the bucket onto the ground.

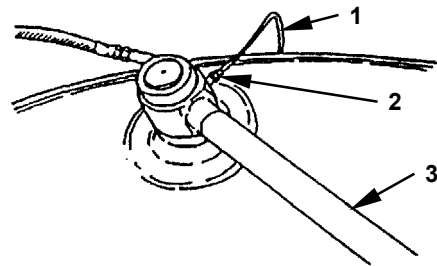


W105-04-02-001

Removal

1. Remove of lubrication pipe (1) on the boss at the boom cylinder (3) rod side from adapter (2). (2 places on both left and right)


 : 19 mm

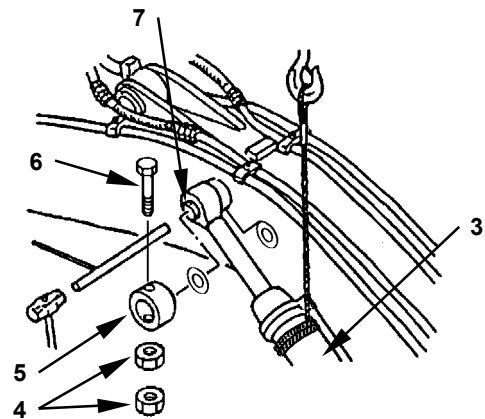


W105-04-01-002

 **CAUTION:** Boom cylinder (3) weight: 290 kg (639 lb)

2. Hoist and hold boom cylinder (3). Remove nuts (4) (2 used), bolt (6) and stopper (5) from boom cylinder rod front pin (7). (2 places on both left and right)

 : 30 mm



W178-04-01-004

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.

3. By using a bar and hammer tap pin (7) into the position where thrust plate (8) can be removed. Remove thrust plate (8).

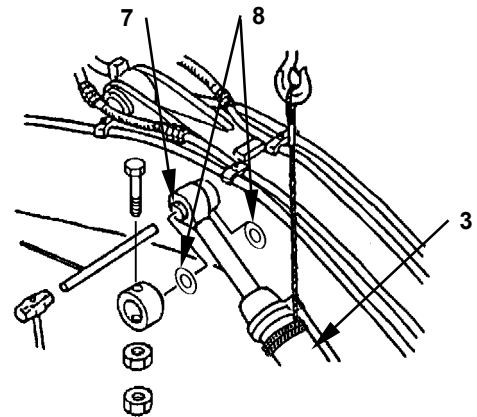
NOTE: When pin (7) is impossible to remove, start the engine and slightly operate the boom lever. Adjust the piston rod pin (7) hole on boom cylinder (3) while hoisting/lowering the front attachment.

4. Place the tube top of boom cylinder (3) on a stand of 1 m (39.4 in) height. Start the engine. Operate the boom lever and retract boom cylinder (3). In order not to extend the rod, pass a wire through the rod hole and secure the rod to the cylinder tube.

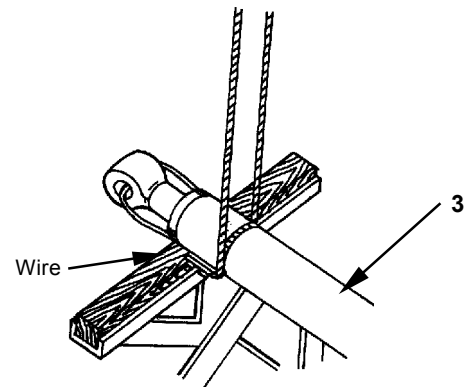
5. Stop the engine. Remove boom cylinder (3). Refer to the Remove Boom Cylinder section on W4-2-10.

6. Remove other boom cylinder (3) in the same procedures.

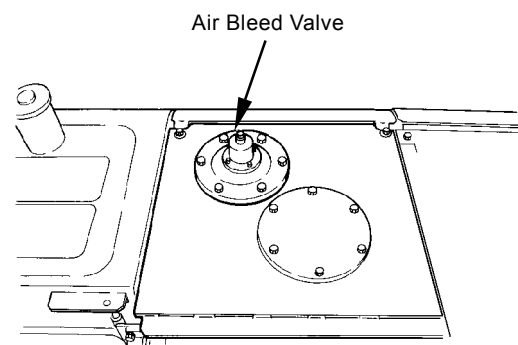
7. After stopping the engine, push the air bleed valve. Release any pressure in the hydraulic oil tank and remove the cap. Completely release the pressure in the hydraulic circuit. Refer to the Hydraulic Circuit Pressure Release Procedure section on W4-1-1.



W178-04-01-004




W178-02-11-274

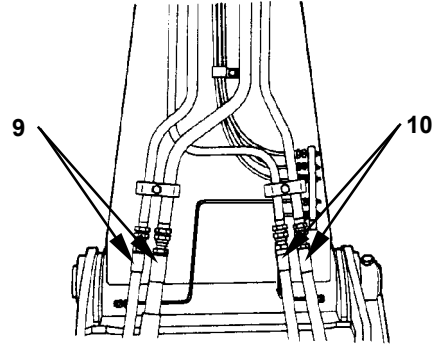


W178-02-11-275

FRONT ATTACHMENT / Front Attachment


8. Remove hoses (9, 10) of the bucket cylinder and arm cylinder. Cap the open ends.

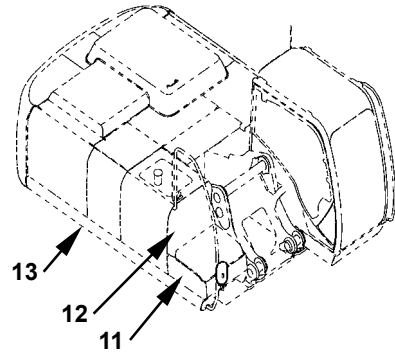
 : 41 mm, 50 mm



W1V1-04-01-001

9. Remove the mounting bolts (9 used) for tool box (11) and cover (12). Remove tool box (11) and cover (12) from main frame (13).

 : 17 mm



W1V7-04-01-001


FRONT ATTACHMENT / Front Attachment

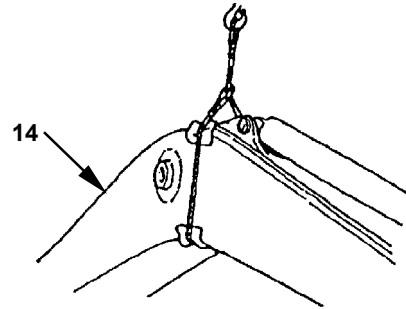


CAUTION: The front assembly weight:
ZAXIS330-3, 330LC-3: 6040 kg (13320 lb)
ZAXIS350H-3, 350LCH-3: 6660 kg (14680 lb)
ZAXIS350K-3, 350LCK-3: 6550 kg (14440 lb)
ZAXIS350LC-3, 350LCN-3: 6270 kg (13820 lb)

10. Attach a wire rope to the boom (14). Take up slack of wire ropes.

11. Remove bolt (15), washer (19), plate (16) and block (17) from boom foot pin (18).

 : 32 mm



W178-02-11-281



CAUTION: Boom foot pin (18) weight: 80 kg (176 lb)

12. Insert a pry bar between boom foot pin (18) and main frame (13). Slightly pull out boom foot pin (18).

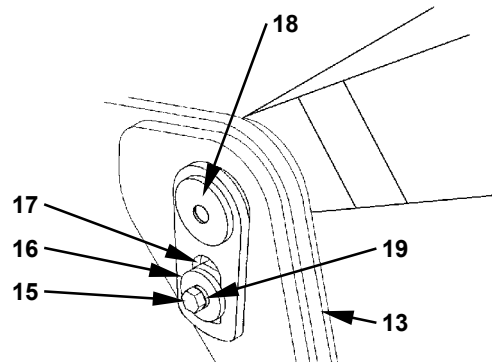
13. Attach a nylon sling to boom foot pin (18). Turn boom foot pin (18) left and right and pull out boom foot pin (18) from main frame (13).

(Adjust the position by using the lifting rope for the front attachment.)

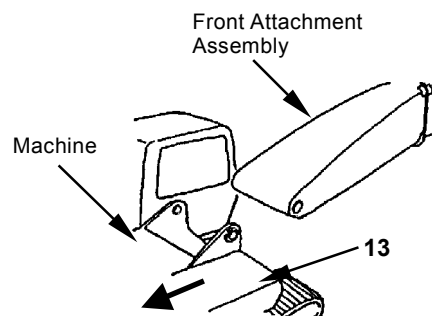
14. Hoist and hold the front attachment assembly. Move the machine backward.

15. Remove the thrust plate from the pin hole on both sides of main frame (13).

16. Place the wooden block. Place the front attachment assembly onto the wooden block.



W178-02-11-280



W178-02-11-282

FRONT ATTACHMENT / Front Attachment

Installation




CAUTION: The front assembly weight:
ZAXIS330-3, 330LC-3: 6040 kg (13320 lb)
ZAXIS350H-3, 350LCH-3: 6660 kg (14680 lb)
ZAXIS350K-3, 350LCK-3: 6550 kg (14440 lb)
ZAXIS350LC-3, 350LCN-3: 6270 kg (13820 lb)


1. Hoist and hold the front attachment assembly. Move the machine forward and align boom (14) with the mounting hole for main frame (13). Insert the thrust plate into the left and right sides of boom (14). Adjust the clearance between boom (14) and main frame (13) within 1 mm. (Adjust the position by using the lifting rope for the 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.


2. Install boom foot pin (18). Install bolt (15), washer (19), plate (16) and block (17).

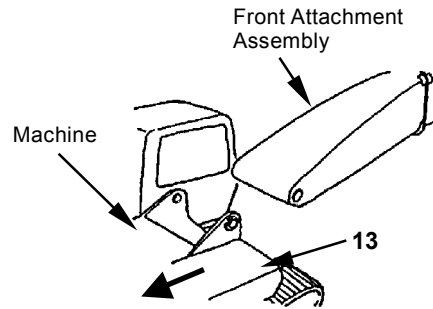
 : 32 mm

 : 750 N·m (77 kgf·m, 553 lbf·ft)

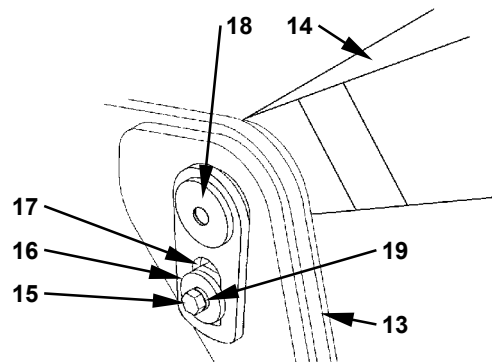
3. Install tool box (11) and cover (12) with the bolts (9 used).

 : 17 mm

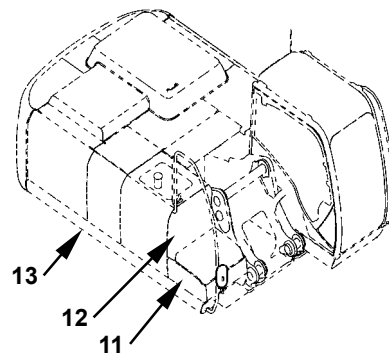
 : 50 N·m (5.0 kgf·m, 37 lbf·ft)



W178-02-11-282




W178-02-11-280





W1V7-04-01-001

FRONT ATTACHMENT / Front Attachment

4. Install hoses (9, 10) of the bucket cylinder and arm cylinder.

 : 41 mm

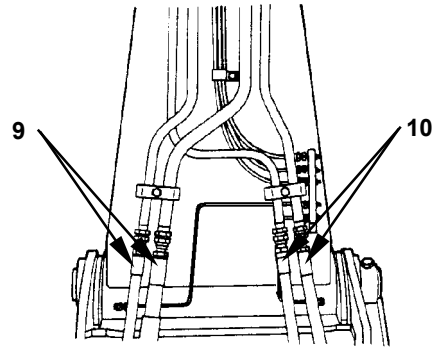
 : 210 N·m (21 kgf·m, 155 lbf·ft)

 : 50 mm

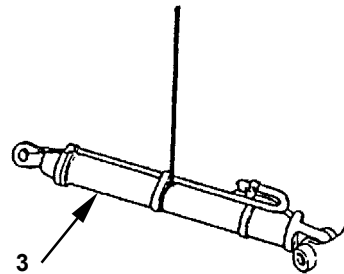


CAUTION: Boom cylinder (3) weight: 290 kg (640 lb)

5. Hoist and install boom cylinder (3).
Refer to the Install Boom Cylinder section on W4-2-12.



W1V1-04-01-001



W105-04-02-040


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.


6. Hoist and hold boom cylinder (3). Insert thrust plate (8). Install pin (7). Install the boom cylinder (3) on both sides.


7. Install stopper (5) to pin (7). Tighten with bolt (6) and nuts (4) (2 used). (2 places on both left and right)

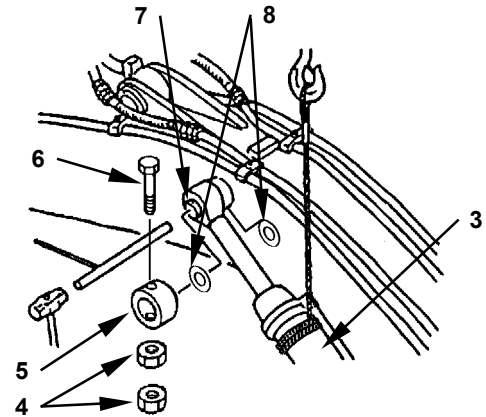
 : 30 mm

 : 550 N·m (55 kgf·m, 405 lbf·ft)

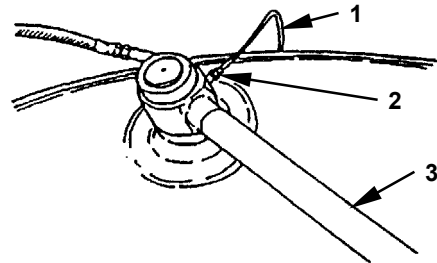
8. Install lubrication pipe (1) to the rod side of boom cylinder (3). (2 places on both left and right)

 : 19 mm

 : 30 N·m (3.0 kgf·m, 22 lbf·ft)

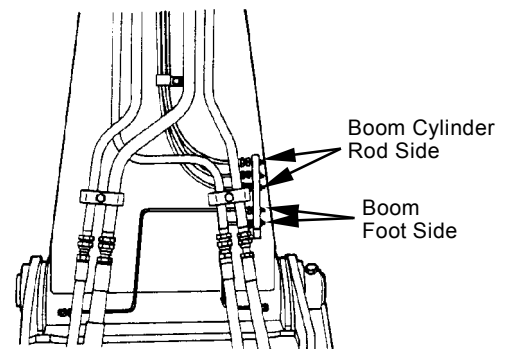


W178-04-01-004



W105-04-01-002

9. Apply grease to the rod side, bottom side and boom foot side of boom cylinders (3) (2 used).



W1V1-04-01-001

FRONT ATTACHMENT / Front Attachment

IMPORTANT: When removing arm (24) from the boom, perform the following steps when installing arm (24).

10. Install thrust plate (21) into left and right sides of arm (24). Adjust total clearance of left and right within 1.5 mm.
11. Install the rod side of arm cylinder (23) to arm (24).
12. Apply grease to grease fittings (20, 22) on the boom connecting boss of arm (24) and the arm cylinder (23) rod side.

IMPORTANT: For handling of HN bushing for the front attachment, check the followings.

Precautions when installing the bushing

If a hammer is used, the bushing may be damaged.

Use a special tool and press.

Special tool when installing the bushing (Bushing inner diameter)

90 mm (ST 2883)

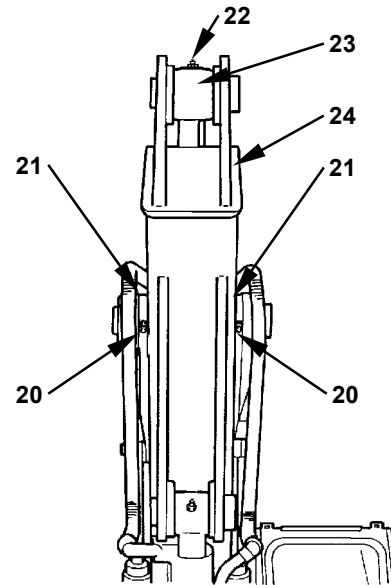
100 mm (ST 2882)

110 mm (ST 2875)

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.



W178-02-11-285

FRONT ATTACHMENT / Front Attachment

REMOVE AND INSTALL FRONT ATTACHMENT (2-PIECE BOOM)


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

Preparation

1. Park the machine on a solid, level surface. Fully retract the bucket and arm cylinders and lower the bucket onto the ground.


Removal


1. Remove lubrication pipe (2) from the adapter (3) at the boom cylinder (1) rod side.
(2 places on both left and right)

 : 19 mm


 **CAUTION:** Boom cylinder (1) weight: 290 kg (640 lb)

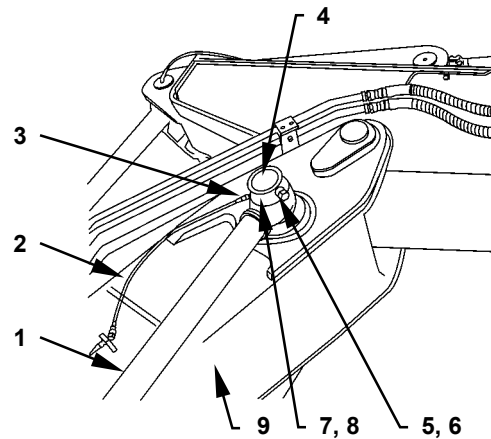
2. Hoist and hold the boom cylinder (1). Remove nut (5), bolt (6) and stopper (7) from boom cylinder (1) rod front pin (4). (2 places on both left and right)

 : 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.

3. By using a bar and hammer tap pin (4) into the position where thrust plate (8) on the first boom (9) side can be removed. Remove thrust plate (8).

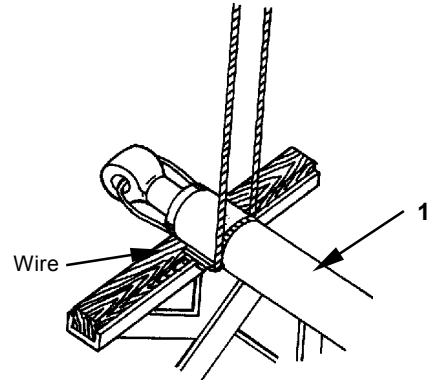
 **NOTE:** When pin (4) is impossible to remove, start the engine and slightly operate the boom lever. Adjust the piston rod pin hole on boom cylinder (1) while hoisting / lowering the front attachment.



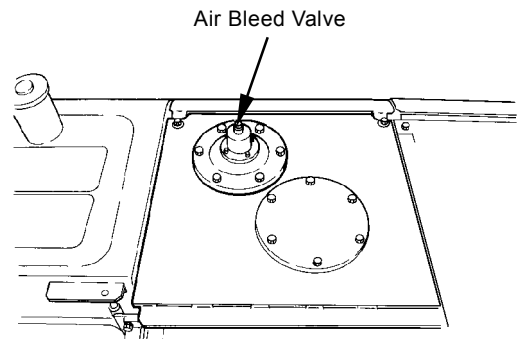
W1V1-04-01-003

FRONT ATTACHMENT / Front Attachment

- Place the tube end of boom cylinder (1) on a stand of 1 m (39.4 in) height.
Start the engine. Operate the boom lever and retract boom cylinder (4). 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. Remove boom cylinder (1).
Refer to the Remove Boom Cylinder section on W4-2-10.
- Remove other boom cylinder (1) in the same procedures.
- After stopping the engine, push the air bleed valve.
Release any pressure in the hydraulic oil tank and remove the cap.
Completely release the pressure in the hydraulic circuit.
Refer to the Hydraulic Circuit Pressure Release Procedure section on W4-1-1.




W178-02-11-274

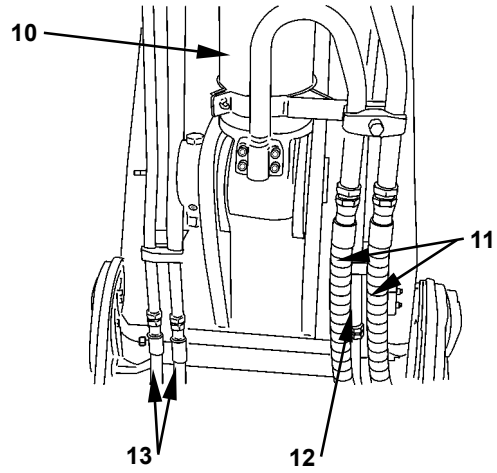


W1V1-04-01-008

FRONT ATTACHMENT / Front Attachment


8. Remove hoses (12), (13) (2 used) from the bucket cylinder and arm cylinder, and remove hoses (11) (2 used) from positioning cylinder (10). Cap the open end.

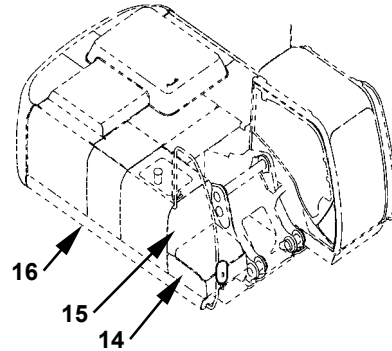
 : 41 mm, 50 mm



W1V1-04-01-004

9. Remove the mounting bolts (9 used) for tool box (14) and cover (15). Remove tool box (14) and cover (15) from main frame (16).

 : 17 mm

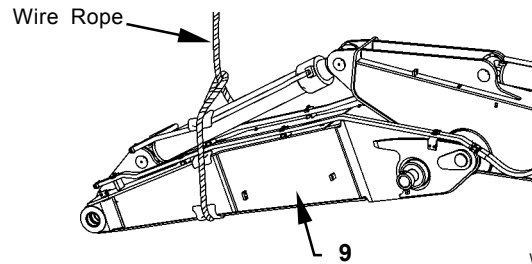


W1V7-04-01-001

FRONT ATTACHMENT / Front Attachment


CAUTION: The front attachment assembly weight: 7230 kg (15940 lb)

10. Attach a wire rope to first boom (9) and hold first boom (9).



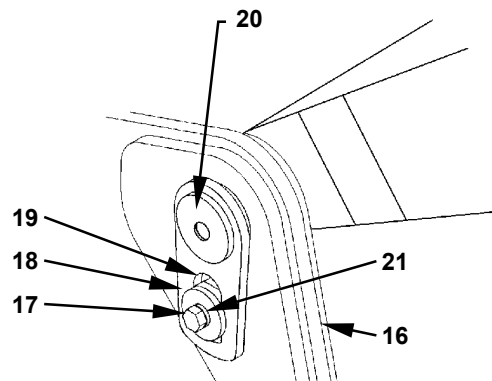
W1V1-04-01-007

11. Remove bolt (17), washer (21), plate (18) and block (19) from boom foot pin (20).

 : 32 mm

CAUTION: Boom foot pin (20) weight: 80 kg (176 lb)

12. Insert a pry bar between boom foot pin (20) and main frame (16). Slightly pull out boom foot pin (20).
13. Attach a nylon sling to boom foot pin (20). Turn boom foot pin (20) left and right and pull out boom foot pin (20) from main frame (16). (Adjust the position by using the lifting rope for the front attachment.)
14. Hoist and hold the front attachment assembly. Move the machine backward.
15. Remove the thrust plate from the pin hole on both sides in main frame (16).
16. Place the wooden block. Place the front attachment assembly onto the wooden block.



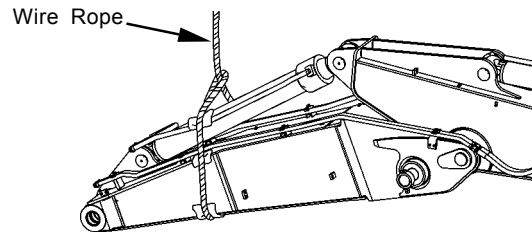
W178-02-11-280

FRONT ATTACHMENT / Front Attachment

Installation

CAUTION: The front attachment assembly weight: 7230 kg (15940 lb)


1. Hoist and hold the front attachment assembly. Move the machine forward and align first boom (9) with the mounting hole for main frame (16). Insert the thrust plate into the left and right sides of first boom (9). Adjust the clearance between first boom (9) and main frame (16) within 1 mm. (Adjust the position by using the lifting rope for the front attachment.)




W1V1-04-01-007


CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.


2. Install boom foot pin (20). Install bolt (17), washer (21), plate (18) and block (19).

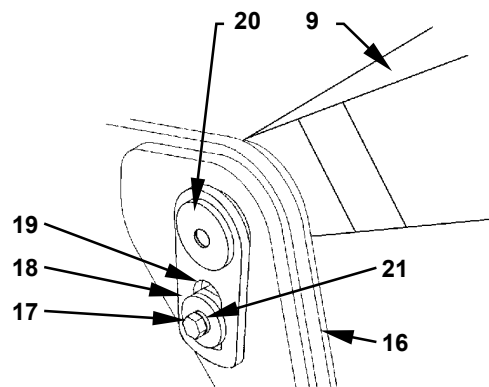
 : 32 mm

 : 750 N·m (77 kgf·m, 553 lbf·ft)

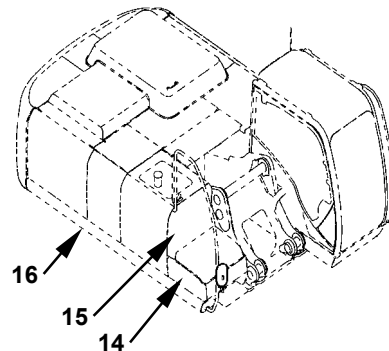
3. Install tool box (14) and cover (15) to main frame (16) with the bolts (9) used.

 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)




W1V7-02-11-280





W1V7-04-01-001

FRONT ATTACHMENT / Front Attachment

4. Install hoses (11) (2 used), (12) and (13) (2 used) to the bucket cylinder, arm cylinder and positioning cylinder (10).

 : 41 mm

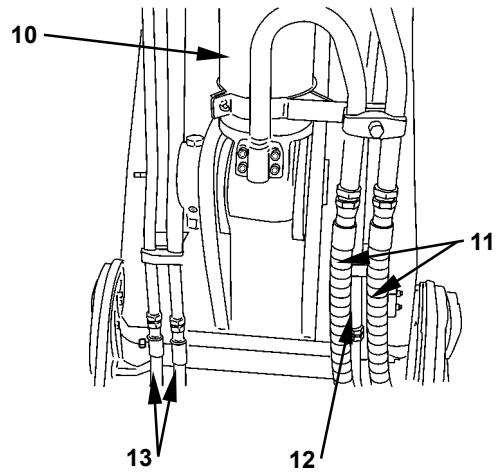
 : 210 N·m (21 kgf·m, 155 lbf·ft)

 : 50 mm

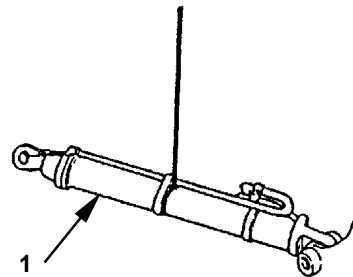


CAUTION: Boom cylinder (1) weight: 290 kg (640 lb)

5. Hoist and install boom cylinder (1).
Refer to the Install Boom Cylinder section on W4-2-12.



W1V1-04-01-004



W105-04-02-040


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.


6. Hoist and hold boom cylinder (1). Insert thrust plate (8). Install pin (4). Install boom cylinder (1) on both sides.


7. Install stopper (7) to pin (4) with bolt (6) and nuts (5) (2 used). (2 places on both left and right)

 : 30 mm

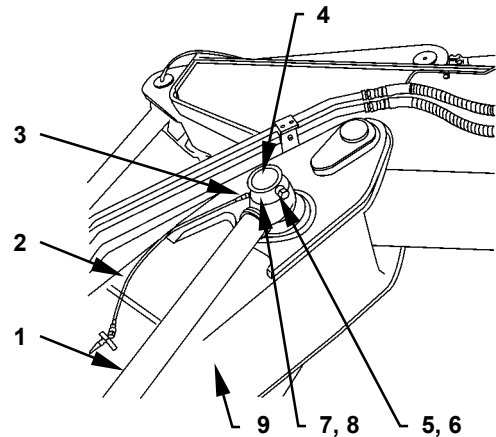
 : 550 N·m (55 kgf·m, 405 lbf·ft)

8. Install lubrication pipe (2) to the rod side of boom cylinder (1). (2 places on both left and right)

 : 19 mm

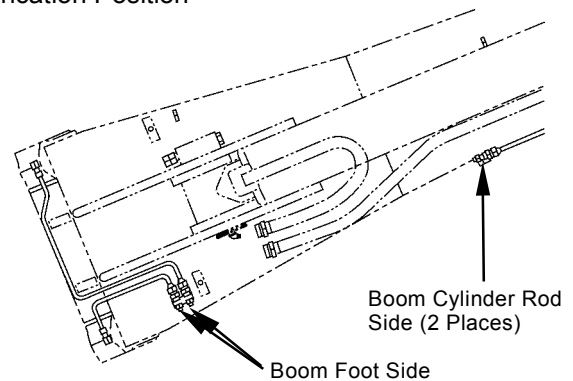
 : 30 N·m (3.0 kgf·m, 22 lbf·ft)

9. Apply grease to the rod side, bottom side and boom foot side of boom cylinder (1) (2 used).

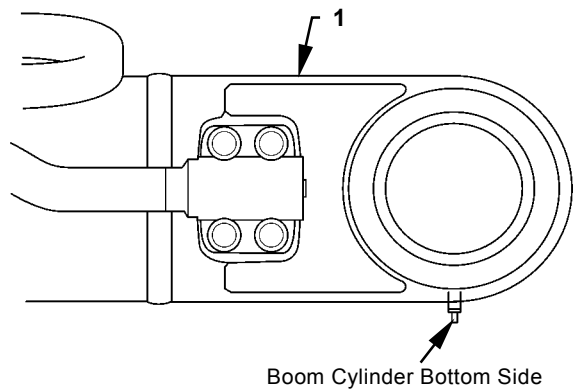


W1V1-04-01-003

Lubrication Position



W1V1-04-01-005



W1V1-04-01-011

FRONT ATTACHMENT / Front Attachment

IMPORTANT: When removing arm (22) from second boom (25), perform the following steps when installing arm (22).

10. Install thrust plates (24) into left and right sides of arm (22). Adjust total clearance of left and right within 1.5 mm.
11. Install the rod side of arm cylinder (26) to arm (22).
12. Apply grease to grease fittings (23, 27) in the second boom (25) connecting boss of arm (22) and the rod side of arm cylinder (26).

IMPORTANT: For handling of HN bushing for the front attachment, check the followings.

Precautions when installing the bushing
If a hammer is used, the bushing may be damaged.
Use a special tool and press.

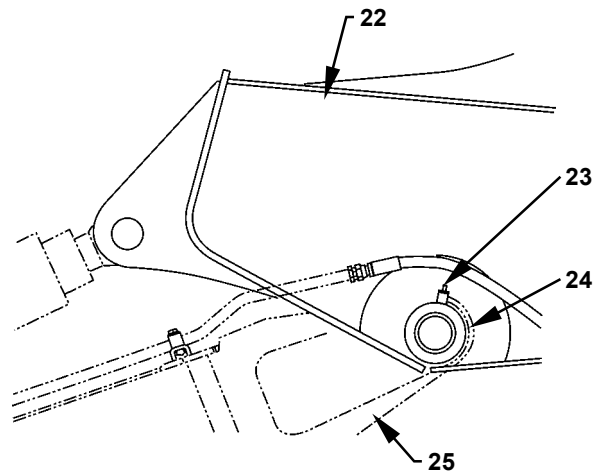
Special tool when installing the bushing (Bushing inner diameter):

- 90 mm (ST 2883)
- 100 mm (ST 2882)
- 110 mm (ST 2875)

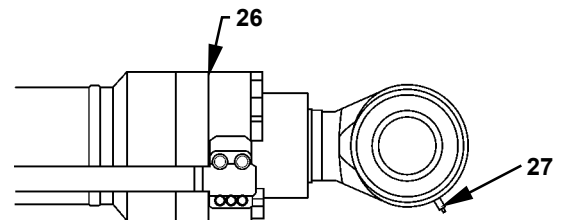
Precautions when reinforcing the arm

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.



W1V1-04-01-010



W1V1-04-01-009

W1V1-04-01-009

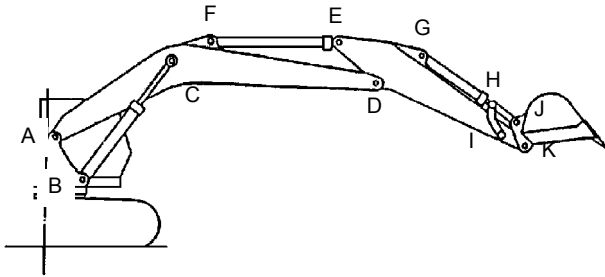
FRONT ATTACHMENT / Front Attachment

MAINTENANCE STANDARD

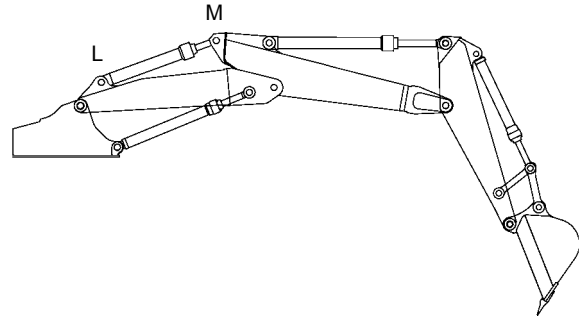
Pin and Bushing

Mono Boom

2-Piece Boom



W1V7-04-01-005



W1V7-04-01-004


Unit: mm

	Item	Standard	Allowable Limit	Remedy
A	Pin	110	109	Replace
	Bushing	110	111.5	
B	Pin	110	109.0	
	Boss (Main Frame)	110	111.5	
C	Bushing (Boom Cylinder)	110	111.5	
	Pin	110	109.0	
	Boss (Boom)	110	111.5	
D	Bushing (Boom Cylinder)	110	111.5	
	Pin	110	109.0	
	Boss (Boom)	110	111.5	
E	Bushing (Arm)	110	111.5	
	Pin	110	109.0	
F	Boss (Arm)	110	111.5	
	Bushing (Arm Cylinder)	110	111.5	
	Pin	110	109.0	
G	Boss (Boom)	110	111.5	
	Bushing (Arm Cylinder)	110	111.5	

NOTE: 1 mm=0.039 in

FRONT ATTACHMENT / Front Attachment

				Unit: mm
	Item	Standard	Allowable Limit	Remedy
G	Pin	90	89.0	Replace
	Boss (Arm)	90	91.5	
	Bushing (Bucket Cylinder)	90	91.5	
H	Pin	100	99.0	
	Boss (Link B)	100	101.5	
	Bushing (Bucket Cylinder, Link A)	100	101.5	
I	Pin	90	89.0	
	Boss (Link B)	90	91.5	
	Bushing (Arm)	90	91.5	
J	Pin	100	99.0	
	Boss (Bucket)	100	101.5	
	Bushing (Link A)	100	101.5	
K	Pin	100	99.0	
	Boss (Bucket)	100	101.5	
	Bushing (Arm)	100	101.5	
L	Pin	90	89.0	
	Boss (First Boom)	90	91.5	
	Bushing (Positioning Cylinder)	90	91.5	
M	Pin	90	89.0	
	Boss (Second Boom)	90	91.5	
	Bushing (Positioning Cylinder)	90	91.5	

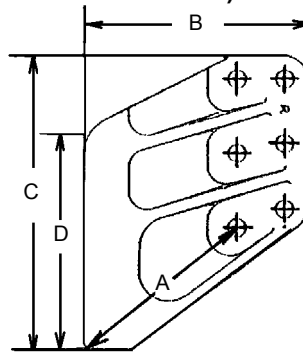
 NOTE: 1 mm=0.039 in

IMPORTANT: When replacing HN bushing for the front attachment, install it by using a press.

FRONT ATTACHMENT / Front Attachment

Side Cutter

(ZAXIS330-3/330LC-3/350K-3/350LCK-3/350LC-3/350LCN-3)

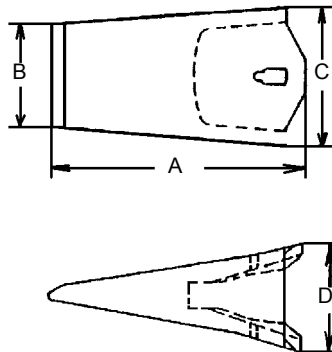


W105-04-01-019

			Unit: mm (in)
	Standard	Allowable Limit	Remedy
A	258 (10.2)	168 (6.6)	Replace
B	300 (11.8)	-	
C	400 (15.7)	-	
D	300 (11.8)	-	

Point

(ZAXIS330-3/330LC-3/350K-3/350LCK-3/350LC-3/350LCN-3)

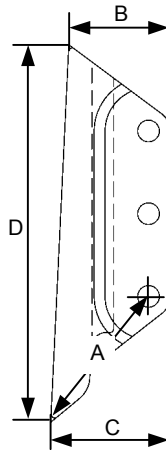


W105-04-01-020

			Unit: mm (in)
	Standard	Allowable Limit	Remedy
A	240 (9.4)	120 (4.7)	Replace
B	96 (3.8)	-	
C	130 (5.1)	-	
D	105 (4.1)	-	

FRONT ATTACHMENT / Front Attachment

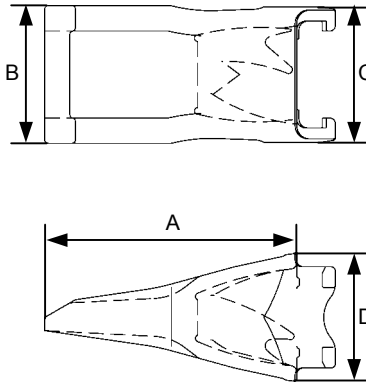
Side Cutter (ZAXIS350H-3/350LCH-3)



W1V7-04-01-002.TIF

			Unit: mm (in)
	Standard	Allowable Limit	Remedy
A	214 (8.4)	[139 (5.5)]	Replace
B	140 (5.5)	-	
C	165(6.5)	-	
D	525 (20.7)	-	

Point (ZAXIS350H-3/350LCH-3)



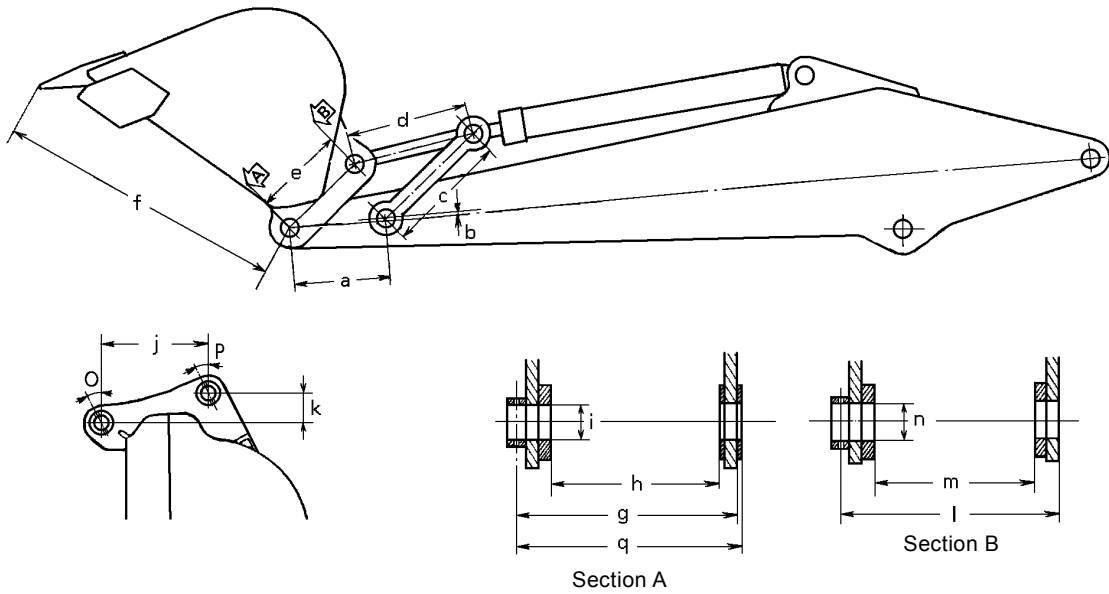
W1V7-04-01-003

			Unit: mm (in)
	Standard	Allowable Limit	Remedy
A	229 (9.0)	[114.5 (4.5)]	Replace
B	125 (4.9)	-	
C	123 (4.8)	-	
D	116 (4.6)	-	

NOTE: Values in [] are just for reference.

FRONT ATTACHMENT / Front Attachment

STANDARD DIMENSIONS FOR ARM AND BUCKET CONNECTION



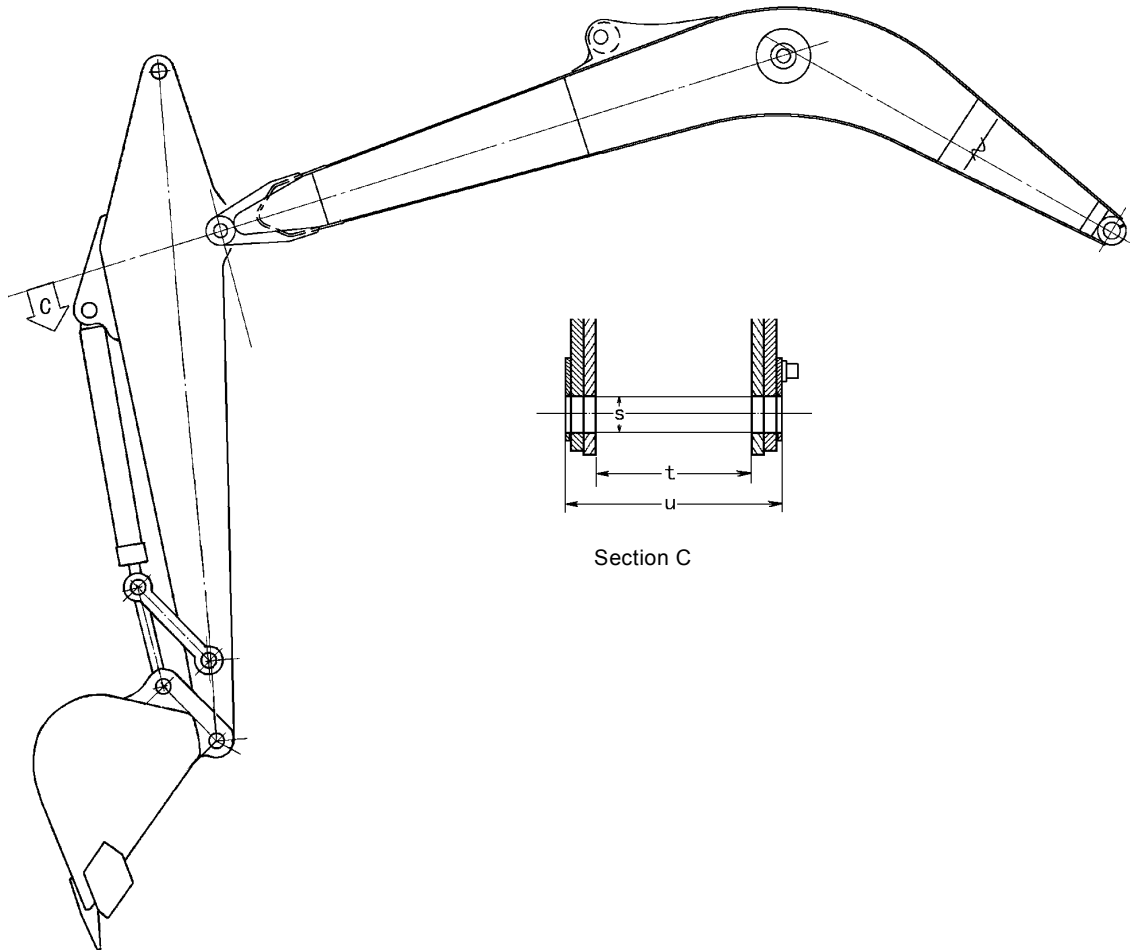
T137-01-03-001

Unit: mm (in)

	ZAXIS330-3, 330LC-3	ZAXIS350H-3, 350LCH-3	ZAXIS350K-3, 350LCK-3	ZAXIS350LC-3, 350LCN-3	ZAXIS330
a	575 (22.6)	←	←	←	←
b	10 (0.4)	←	←	←	←
c	700 (27.6)	←	750 (29.5)	700 (27.6)	←
d	695 (27.4)	←	←	←	←
e	585 (23.0)	-	-	-	-
f	1661 (65.4)	1666 (65.6)	1661 (65.4)	←	←
g	581 (22.9)	←	←	←	←
h	442 (17.4)	←	←	←	←
i	100 (3.9)	←	←	←	←
j	578 (22.8)	←	←	←	←
k	90 (3.5)	←	←	←	←
l	581 (22.9)	←	←	←	←
m	420 (16.5)	←	←	←	←
n	100 (3.9)	←	←	←	←
o	45°	←	←	←	8.85°
p	0°	←	←	←	8.85°
q	600 (23.6)	←	←	←	592 (23.3)

FRONT ATTACHMENT / Front Attachment

STANDARD DIMENSIONS FOR ARM AND BOOM CONNECTION



Section C

W187-04-01-002

Unit: mm (in)

	ZAXIS330-3, 330LC-3	ZAXIS350H-3, 350LCH-3	ZAXIS350K-3, 350LCK-3	ZAXIS350LC-3, 350LCN-3	ZAXIS330
s	110 (4.3)	←	←	←	←
t	418.5 (16.5)	←	←	←	←
u	571 (22.5)	←	←	←	←


IMPORTANT: If the front attachment of a previous model machine is used, use the grease intervals for previous model machine.

FRONT ATTACHMENT / Front Attachment


(Blank)

FRONT ATTACHMENT / Cylinder

HYDRAULIC CIRCUIT PRESSURE RELEASE PROCEDURE

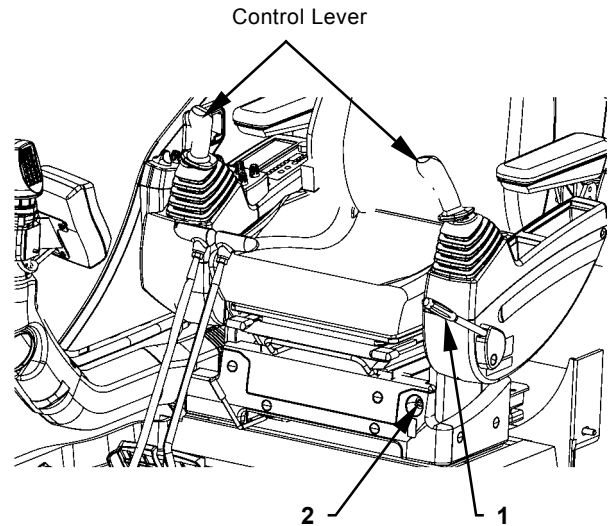
 **NOTE:** Operate the pilot pump by using the power from battery without starting the engine and deliver the pilot pressure to the spool of control valve.

1. Turn pilot shut-off lever (1) to the UNLOCK position.
2. Turn engine stop switch (2) ON.

 **NOTE:** Perform steps 1, 2 and turn the key switch to the START position. Although the starter rotates, the engine does not start.

IMPORTANT: Battery will deplete. Operate the key switch for short period.

3. With the key switch in the START position, operate the lever in order to release any pressure in hydraulic circuit 4 to 5 times.
4. Turn pilot shut-off lever (1) to the LOCK position.
5. Turn engine stop switch (2) OFF.



M1U1-01-029

FRONT ATTACHMENT / Cylinder

REMOVE AND INSTALL CYLINDER

Remove Bucket Cylinder


1. Insert wooden block (3) under the arm (2) top and between arm (2) and bucket cylinder (1).

CAUTION: Before removing pin (7), fasten the link by using a wire in order not to fall off.

CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

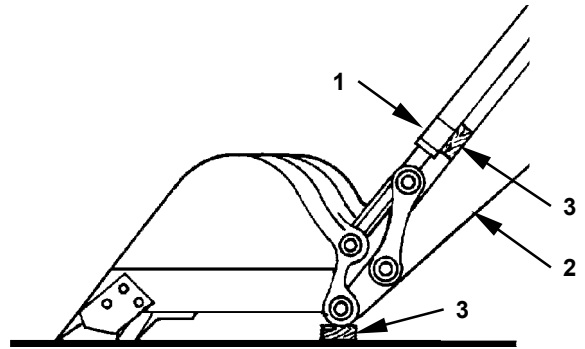
2. Remove nuts (6) (2 used) and bolt (4). Remove pin (7).

Remove thrust plate (5).

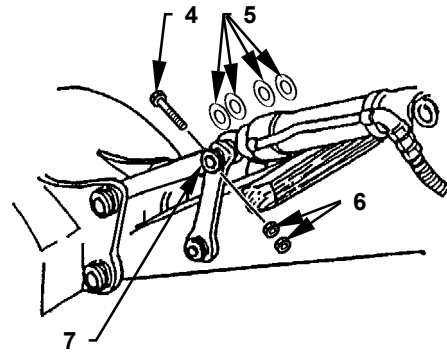
 : 32 mm

3. Operate the bucket lever and retract bucket cylinder (1). In order not to extend rod (8), pass wire (9) through the cylinder (1) tube and secure rod (8) to the bucket cylinder (1) tube.

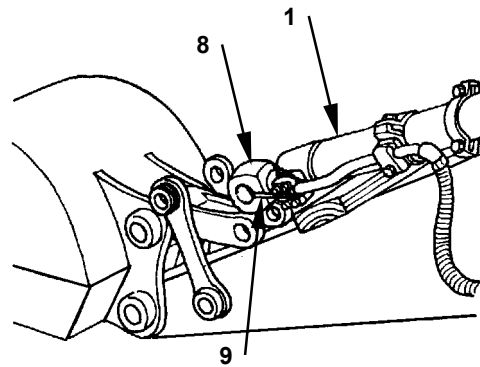
4. Stop the engine. Push the air bleed valve and release any remaining pressure in the hydraulic oil tank. Remove the cap. Release the bucket circuit pressure. Refer to the Hydraulic Circuit Pressure Release Procedure section on W4-2-1.



W178-02-11-287




W158-04-02-006




W102-04-02-005

FRONT ATTACHMENT / Cylinder


5. Remove bucket cylinder hoses (12) (2 used) at the bottom of bucket cylinder (1). Cap the open ends.

 : 41 mm

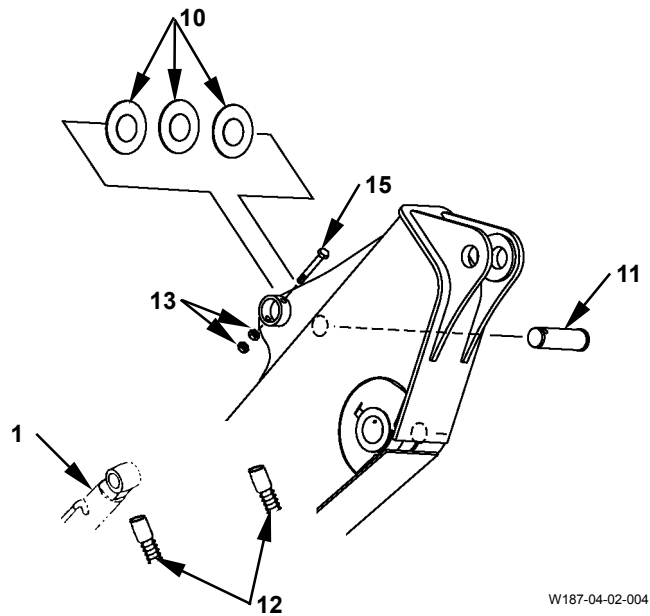
 **CAUTION:** Bucket cylinder (1) weight: 250 kg (550 lb)

 **CAUTION:** Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

6. Attach a nylon sling onto bucket cylinder (1) and hold bucket cylinder (1). Remove nuts (13) (2 used) and bolt (15). Remove pin (11). Remove thrust plate (10).

 : 30 mm

7. Hoist and remove bucket cylinder (1).



W187-04-02-004

FRONT ATTACHMENT / Cylinder

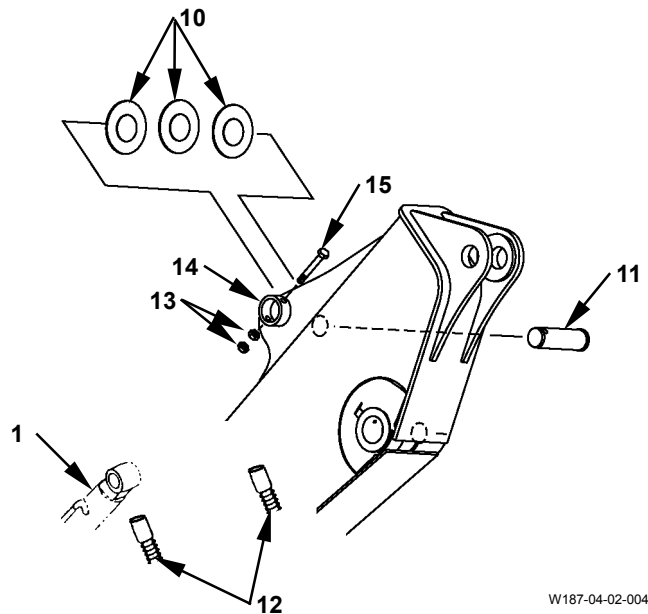
Install Bucket Cylinder

IMPORTANT: When installing the bushing and if a hammer is used, the bushing may be damaged. Install the bushing by using a press.

CAUTION: Bucket cylinder (1) weight: 250 kg (550 lb)

CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

1. Hoist bucket cylinder (1). Align the hole on cylinder bottom side with the pin (11) mounting hole on arm. Install thrust plate (10) and pin (11).
2. Install bolt (15) to stopper (14) and pin (11) in the arm with nuts (13) (2 used).
 - 🔧 : 30 mm
 - 🔩 : 550 N·m (56 kgf·m, 405 lbf·ft)
3. Install hoses (12) (2 used) to bucket cylinder (1).
 - 🔧 : 41 mm
 - 🔩 : 205 N·m (21 kgf·m, 150 lbf·ft)



W187-04-02-004

FRONT ATTACHMENT / Cylinder


4. Remove wire (9) from rod (8) of bucket cylinder (1).


CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

IMPORTANT: Fill hydraulic oil to specified level. Start the engine and check for any oil leaks.

5. Start the engine and operate the bucket lever. Align the hole on cylinder rod side with those of links (16, 18). Insert thrust plate (5) and pin (7).

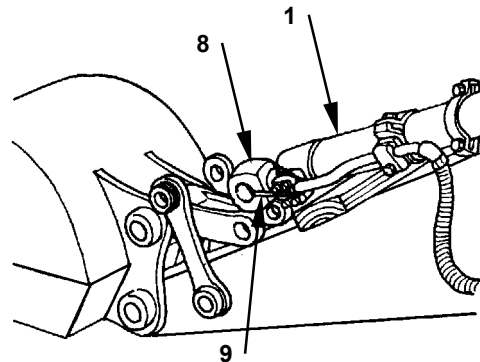
6. Install bolt (4) to stopper (17) and pin (7) with nuts (6) (2 used).

 : 32 mm

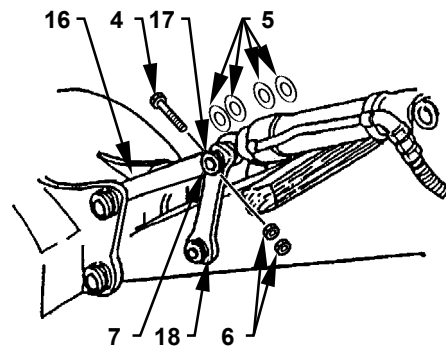
 : 750 N·m (76.5 kgf·m, 553 lbf·ft)

IMPORTANT: In case link (18) has been removed from the arm, insert thrust plate (19) when installing.

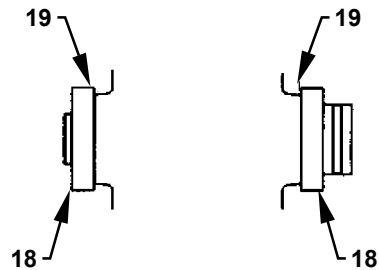
IMPORTANT: After completing the work, operate the bucket cylinder several times to the stroke end and release the pressure in the circuit.



W102-04-02-005




W158-04-02-006




W178-02-11-289

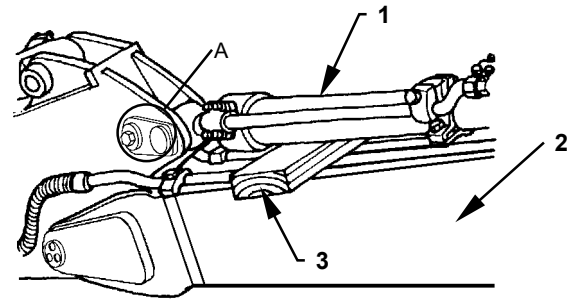
FRONT ATTACHMENT / Cylinder

Remove Arm Cylinder

1. Insert wooden block (3) between arm cylinder (1) and boom (2).
2. Remove bolt (4) and plate (5) from the rod side in arm cylinder (1)
 : 27 mm

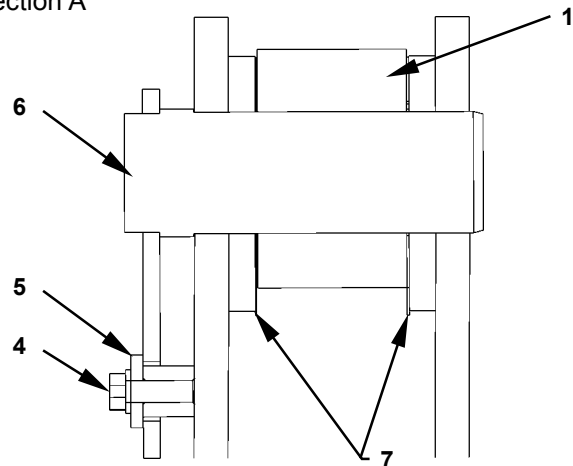
 **CAUTION:** Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

3. Remove pin (6). Remove thrust plate (7).
4. Operate the arm lever and retract arm cylinder (1). In order not to extend rod (8), pass wire (9) through the cylinder rod hole and secure rod (8) to the arm cylinder (1) tube.
5. Stop the engine. Push the air bleed valve and release any remaining pressure in the hydraulic oil tank. Remove the cap. Release arm circuit pressure. Refer to the Hydraulic Circuit Pressure Release Procedure section on W4-2-1.

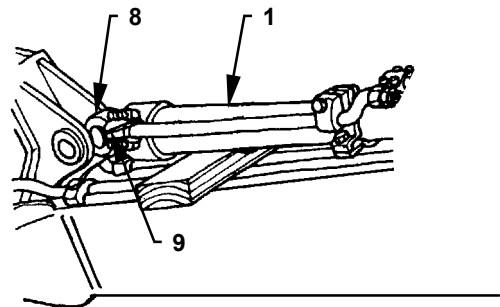


W1V7-04-02-009

Section A




W1V1-04-02-018



W1V7-04-02-010

FRONT ATTACHMENT / Cylinder

6. Remove hoses (10) (2 used) and lubrication pipe (11) at the bottom of arm cylinder (1). Cap the open ends.

 : 19 mm, 50 mm




CAUTION: Arm cylinder (1) weight:
Mono boom: 470 kg (1040 lb)
2-piece boom: 480 kg (1060 lb)

7. Attach a nylon sling to arm cylinder (1) and hold arm cylinder (1).



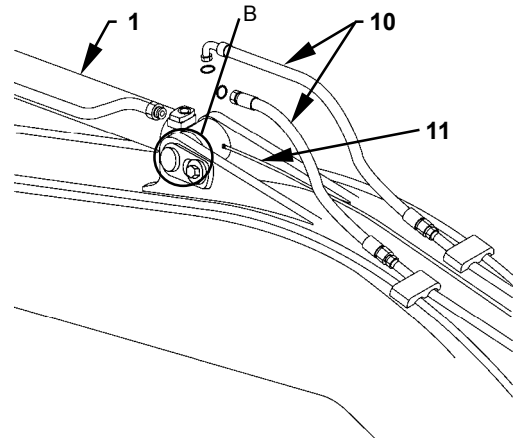
CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

8. Remove bolt (12) and plate (13) from the bottom side in arm cylinder (1).

 : 27 mm

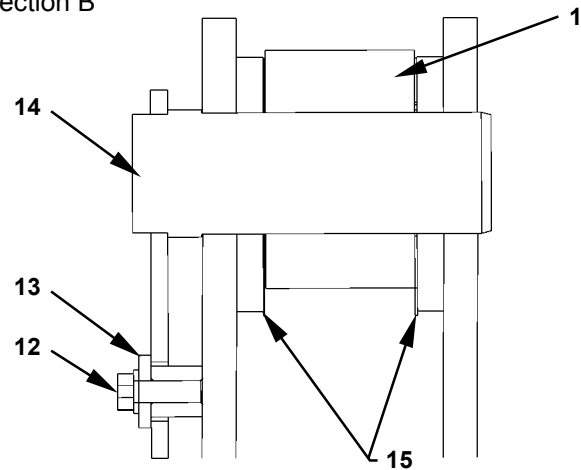
9. Remove pin (14). Remove thrust plate (15).

10. Hoist and remove arm cylinder (1).



W1V7-04-02-011

Section B



W1V1-04-02-018

FRONT ATTACHMENT / Cylinder






Install Arm Cylinder

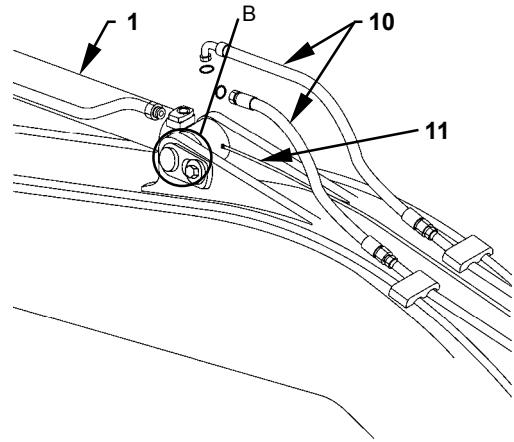
IMPORTANT: When installing the bushing and if a hammer is used, the bushing may be damaged. Install the bushing by using a press.

CAUTION: Arm cylinder (1) weight:
Mono boom: 470 kg (1040 lb)
2-piece boom: 480 kg (1060 lb)

1. Hoist arm cylinder (1). Align the cylinder bottom side hole with the pin (14) mounting hole on the boom.

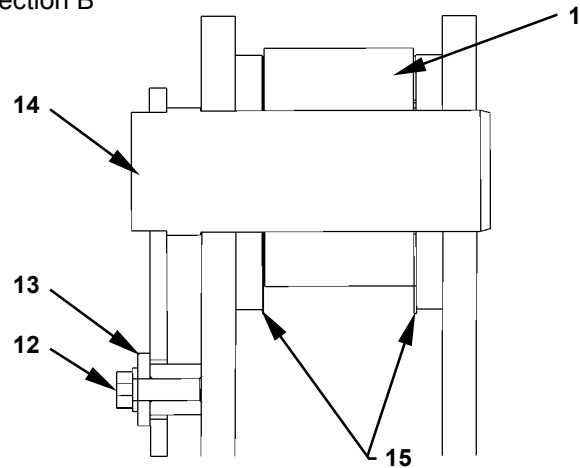
CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

2. Install thrust plate (15) and pin (14).
3. Install plate (13) to pin (14) with bolt (12).
 -  : 27 mm
 -  : 400 N·m (41 kgf·m, 295 lbf·ft)
4. Install lubrication pipe (11) and hoses (10) (2 used) to arm cylinder (1).
 -  : 19 mm
 -  : 30 N·m (3.0 kgf·m, 22 lbf·ft)
 -  : 50 mm



W1V7-04-02-011

Section B



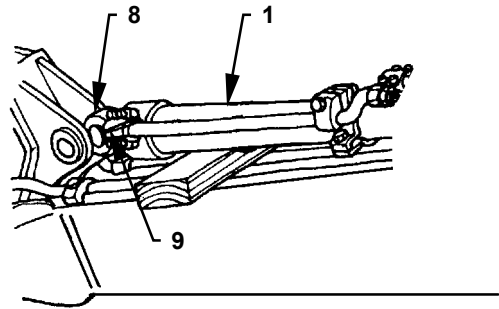
W1V1-04-02-018

FRONT ATTACHMENT / Cylinder

CAUTION: Arm cylinder (1) weight:
Mono boom: 470 kg (1040 lb)
2-piece boom: 480 kg (1060 lb)

IMPORTANT: Fill hydraulic oil to specified level.
Start the engine and check for any oil leaks.

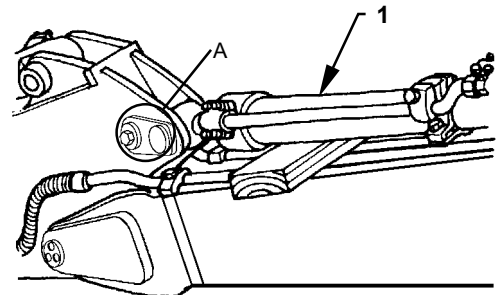
5. Remove wire (9) from rod (8) of arm cylinder (1). Hoist arm cylinder (1) and start the engine. Operate the arm lever and align the hole at cylinder rod side with the pin (6) mounting hole on arm.



W1V7-04-02-010

CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

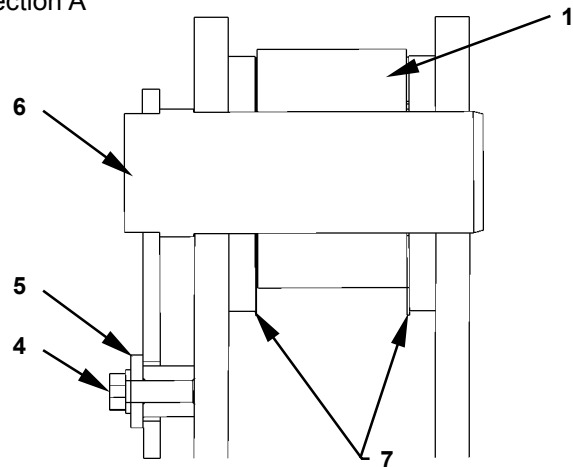
6. Install thrust plate (7) and pin (6).
7. Install plate (5) to pin (6) with bolt (4).
🔧 : 27 mm
🔩 : 400 N·m (41 kgf·m, 295 lbf·ft)



W1V7-04-02-009

IMPORTANT: When completing the work, operate the arm cylinder several times to the stroke end and release the pressure in the circuit.

Section A




W1V1-04-02-018

FRONT ATTACHMENT / Cylinder


Remove Boom Cylinder

1. Remove lubrication pipe (1) from boom cylinder (2).


 : 19 mm

 **CAUTION: Boom cylinder (2) weight: 290 kg (640 lb)**

2. Attach a nylon sling to boom cylinder (2) and hold boom cylinder (2).

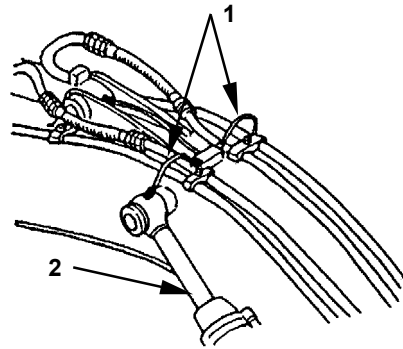
 **CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.**

3. Remove nuts (5) (2 used), bolt (7) and stopper (6) from the boom cylinder (2) rod side. Push pin (4) into the boom.
Remove thrust plate (3).

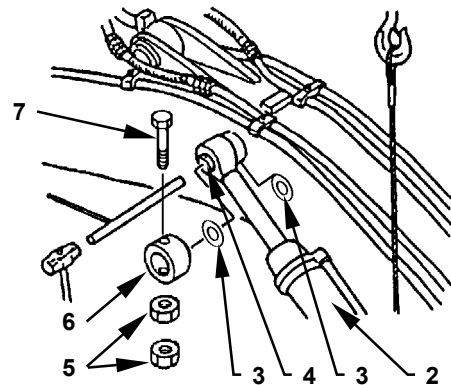
 : 30 mm

4. Place boom cylinder (2) on a stand. Remove the other boom cylinder in the same procedures.

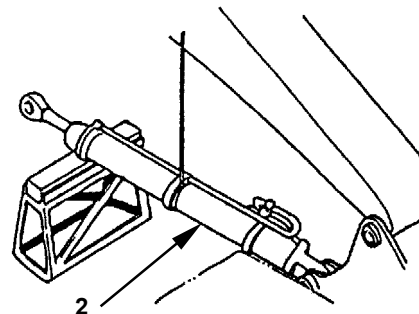
5. Operate the boom lever and retract boom cylinder (2). In order not to extend the rod, pass a wire through the cylinder rod hole and secure the rod to the boom cylinder (2) tube.



W105-04-02-032



W158-04-02-013



W105-04-02-035


FRONT ATTACHMENT / Cylinder

6. Stop the engine. Push the air bleed valve and release any remaining pressure in the hydraulic oil tank.

Release the circuit pressure.

Refer to the Hydraulic Circuit Pressure Release Procedure section on W4-2-1.

7. Remove hoses (8) (4 used) and lubrication pipes (9) (2 used) from the bottom of boom cylinder (2). Cap the open ends.

 : 19 mm, 41 mm




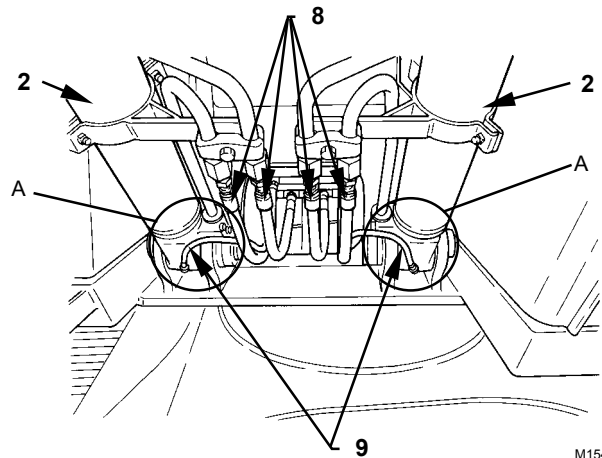
CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

8. Remove bolt (10) and plate (11) from the cylinder bottom side.

Remove pin (12).

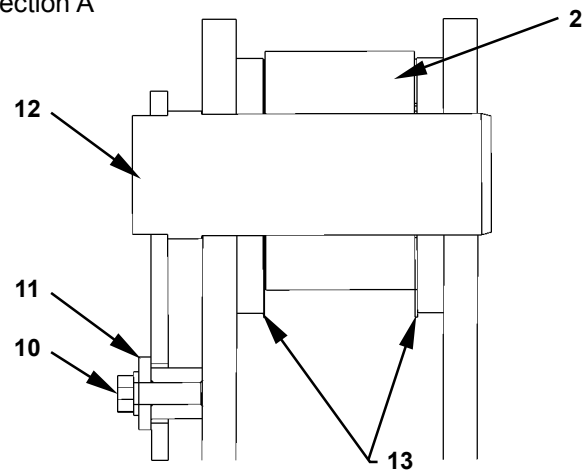
Remove thrust plate (13).

 : 27 mm



M154-07-006

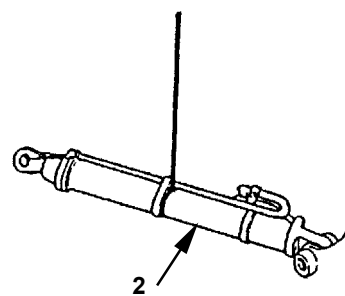
Section A



W1V1-04-02-018

9. Hoist and remove boom cylinder (2).

10. Remove the other boom cylinder in the same procedures.



W105-04-02-040

FRONT ATTACHMENT / Cylinder

Install Boom Cylinder


IMPORTANT: When installing the bushing and if a hammer is used, the bushing may be damaged. Install the bushing by using a press.


CAUTION: Boom cylinder (2) weight: 290 kg (640 lb)

1. Hoist boom cylinder (2). Align the hole at cylinder tube side with the pin (12) mounting hole on the main frame.

CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.


2. Install thrust plate (13) and pin (12). Install plate (11) to pin (12) with bolt (10).


 : 27 mm


 : 400 N·m (41 kgf·m, 295 lbf·ft)


3. Install the other boom cylinder in the same procedures.

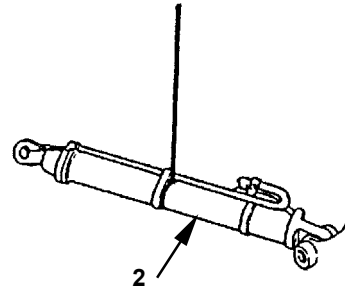
4. Install hoses (8) (4 used) and lubrication pipes (9) (2 used) to boom cylinders (2) (2 used).

 : 19 mm

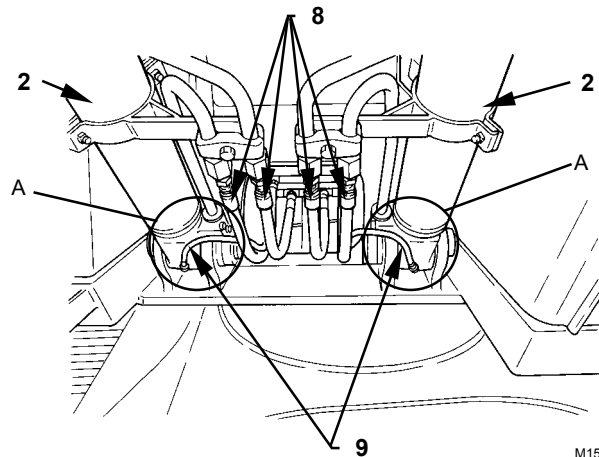
 : 30 N·m (3.0 kgf·m, 22 lbf·ft)

 : 41 mm

 : 205 N·m (21 kgf·m, 150 lbf·ft)

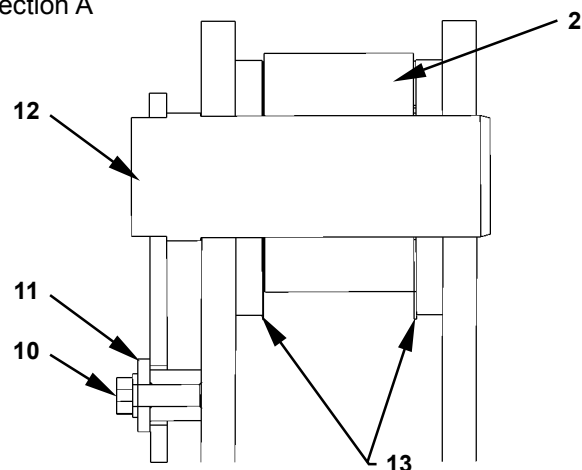


W105-04-02-040



M154-07-006

Section A



W1V1-04-02-018

FRONT ATTACHMENT / Cylinder

IMPORTANT: Fill hydraulic oil to specified level.
Start the engine and check for any oil leaks.

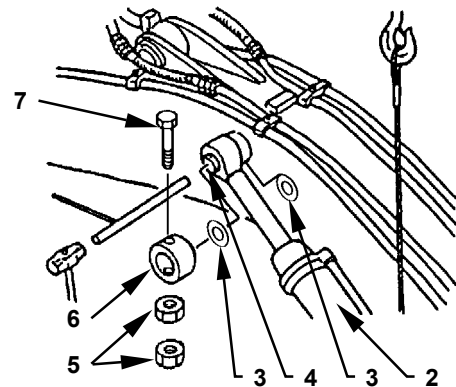
- Remove the wire from the rod side of boom cylinder (2). Start the engine. Operate the boom lever and align the hole at cylinder rod side with the pin (4) mounting hole on boom.

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.

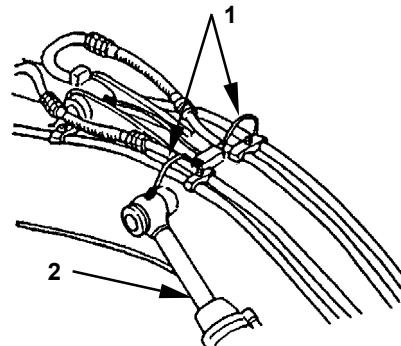
- Install thrust plate (3) and pin (4).
- Install bolt (7) to pin (4) and stopper (6) with nuts (5) (2 used).
 - Wrench : 30 mm
 - Torque wrench : 550 N·m (56 kgf·m, 405 lbf·ft)
- Install lubrication pipe (1) to boom cylinder (2).
 - Wrench : 19 mm
 - Torque wrench : 30 N·m (3.0 kgf·m, 22 lbf·ft)

- Install the other boom cylinder in the same procedures.

IMPORTANT: When all work is completed, operate the boom cylinder for several times to stroke end and bleed air from the circuit.



W158-04-02-013




W105-04-02-032

FRONT ATTACHMENT / Cylinder

Remove Positioning Cylinder

CAUTION: Positioning cylinder (3) weight: 360 kg (795 lb)

1. Attach a nylon sling to positioning cylinder (3) and hold positioning cylinder (3).

2. Remove bolt (4) and plate (5) from pin (6).
 : 27 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.

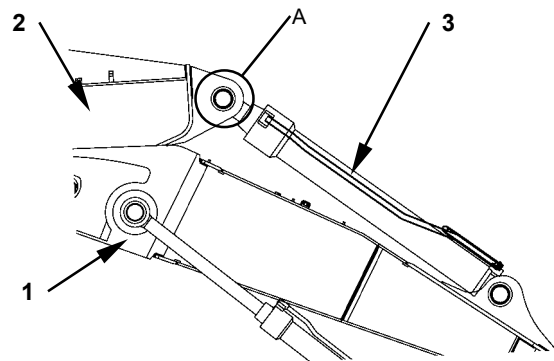
3. Remove pin (6) from second boom (2). Remove thrust plate (7).

4. In order not to extend the rod in positioning cylinder (3), pass the wire through the cylinder rod hole and secure the rod to the positioning cylinder (3) tube.

5. Stop the engine. Push the air bleed valve and release any remaining pressure in the hydraulic oil tank.

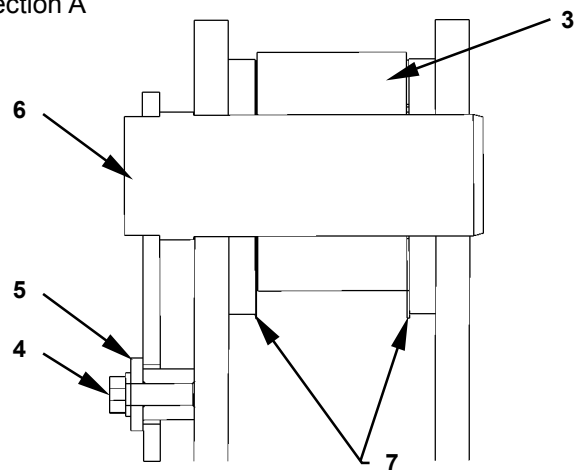
Release the circuit pressure.

Refer to the Hydraulic Circuit Pressure Release Procedure section on W4-2-1.



W1V1-04-02-017


Section A




W1V1-04-02-018

FRONT ATTACHMENT / Cylinder

6. Remove all hoses and lubrication pipes from positioning cylinder (3). Cap the open ends.

 : 19 mm, 41 mm

7. Remove bolt (8) and plate (9) from pin (10).

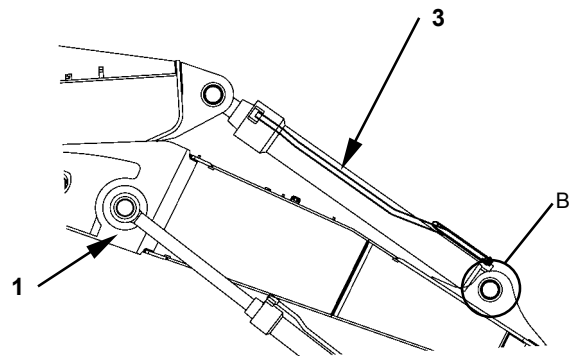
 : 27 mm



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.

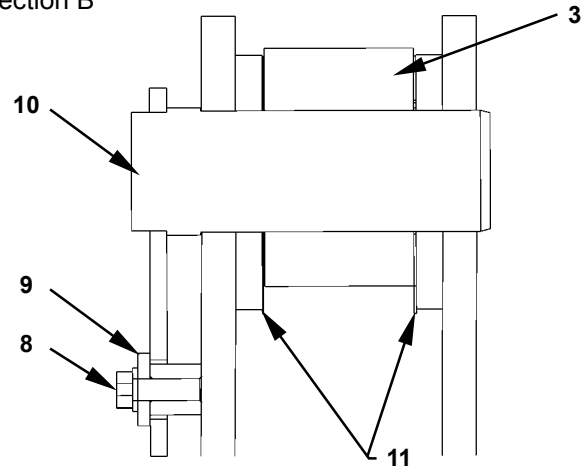
8. Remove pin (10) from first boom (1). Remove thrust plate (11).

9. Hoist and remove positioning cylinder (3) from first boom (1).



W1V1-04-02-017

Section B



W1V1-04-02-018

FRONT ATTACHMENT / Cylinder


Install Positioning Cylinder


CAUTION: Positioning cylinder (3) weight: 360 kg (795 lb)

CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.


1. Hoist positioning cylinder (3). Align the pin (10) holes on the cylinder bottom side and first boom (1).
Insert thrust plate (11) and pin (10).


2. Install plate (9) to pin (10) with bolt (8).


 : 27 mm


 : 400 N·m (41 kgf·m, 295 lbf·ft)

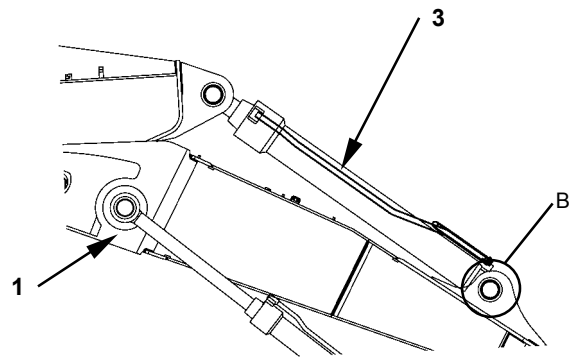
3. Install all hoses and lubrication pipes to positioning cylinder (3).

 : 19 mm

 : 30 N·m (3.0 kgf·m, 22 lbf·ft)

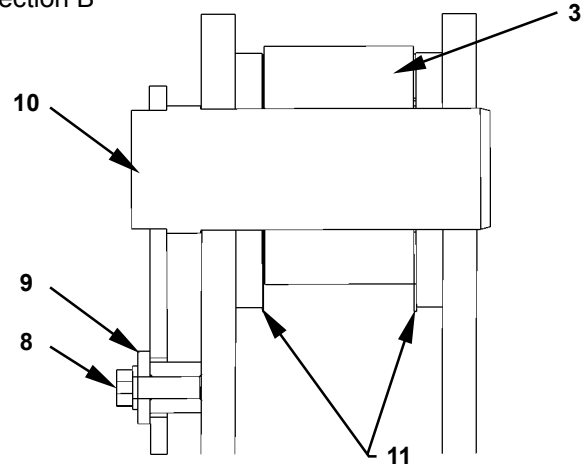
 : 41 mm

 : 205 N·m (21 kgf·m, 150 lbf·ft)



W1V1-04-02-017

Section B



W1V1-04-02-018

FRONT ATTACHMENT / Cylinder





CAUTION: Positioning cylinder (3) weight: 360 kg (795 lb)

IMPORTANT: Fill hydraulic oil to specified level. Start the engine and check for any oil leaks.

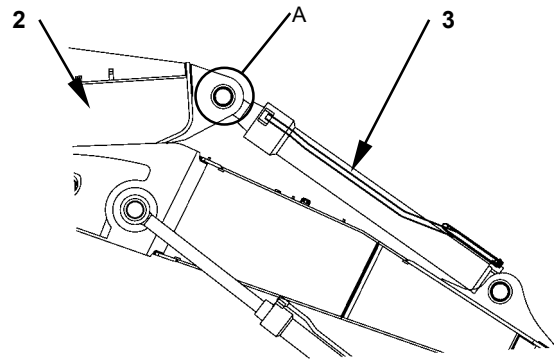
4. Remove the wire from the rod side of positioning cylinder (3). Hoist positioning cylinder (3). Start the engine. Operate the positioning lever and align the hole at cylinder rod side in positioning cylinder (3) with the pin (6) hole on second boom (2). Insert thrust plate (7) and pin (6).

5. Install plate (5) to pin (6) with bolt (4).

 : 27 mm

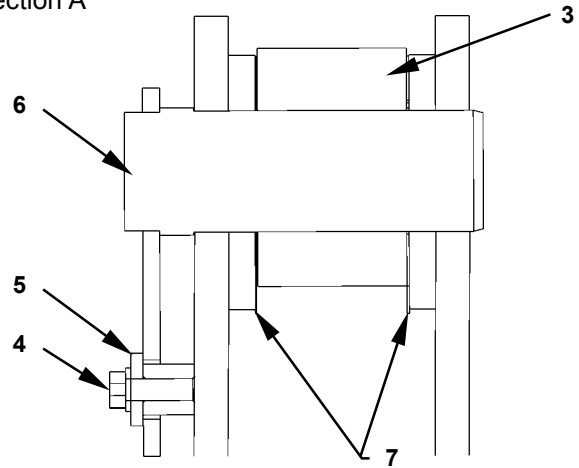
 : 400 N·m (41 kgf·m, 295 lbf·ft)

IMPORTANT: After completing the work, operate the positioning cylinder fully to the stroke end several times and release the pressure in the circuit.



W1V1-04-02-017

Section A

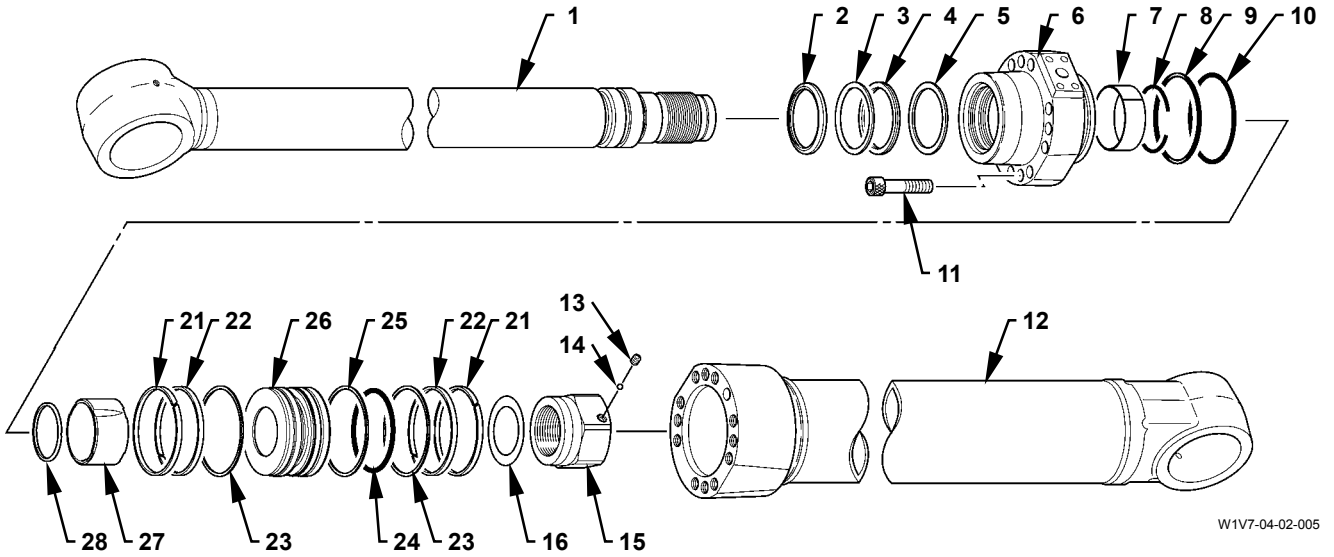


W1V1-04-02-018

FRONT ATTACHMENT / Cylinder

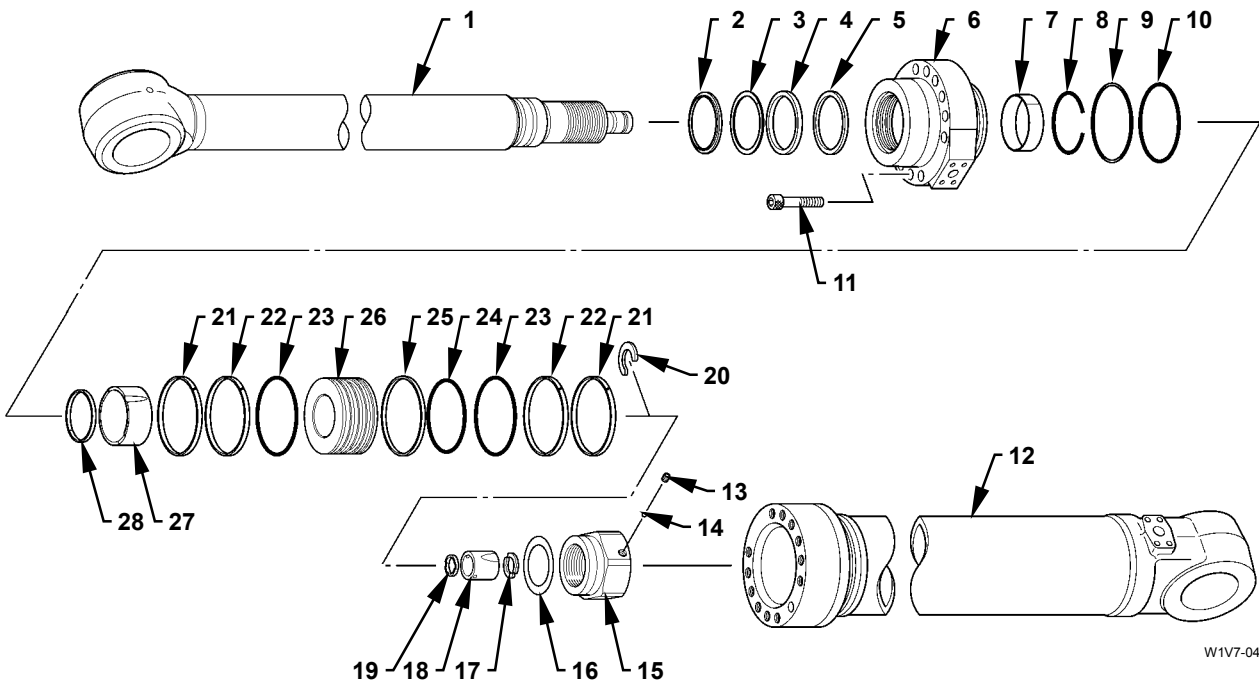
DISASSEMBLE BOOM, ARM, BUCKET CYLINDERS

Boom Cylinder



W1V7-04-02-005

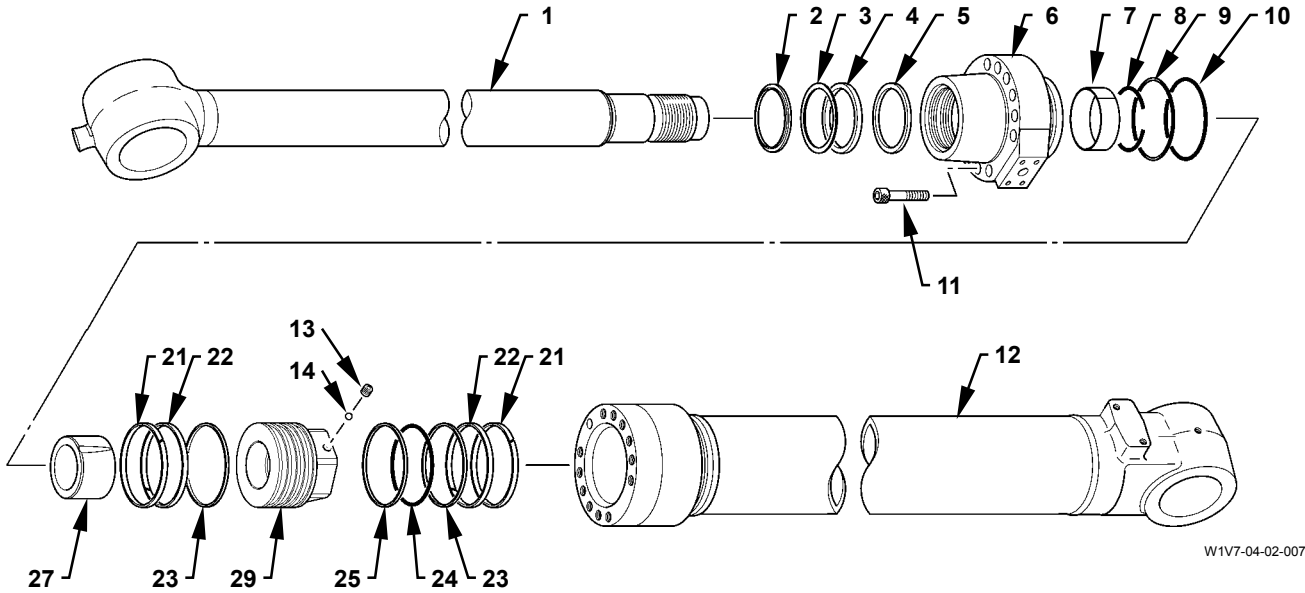
Arm Cylinder



W1V7-04-02-006

FRONT ATTACHMENT / Cylinder

Bucket Cylinder

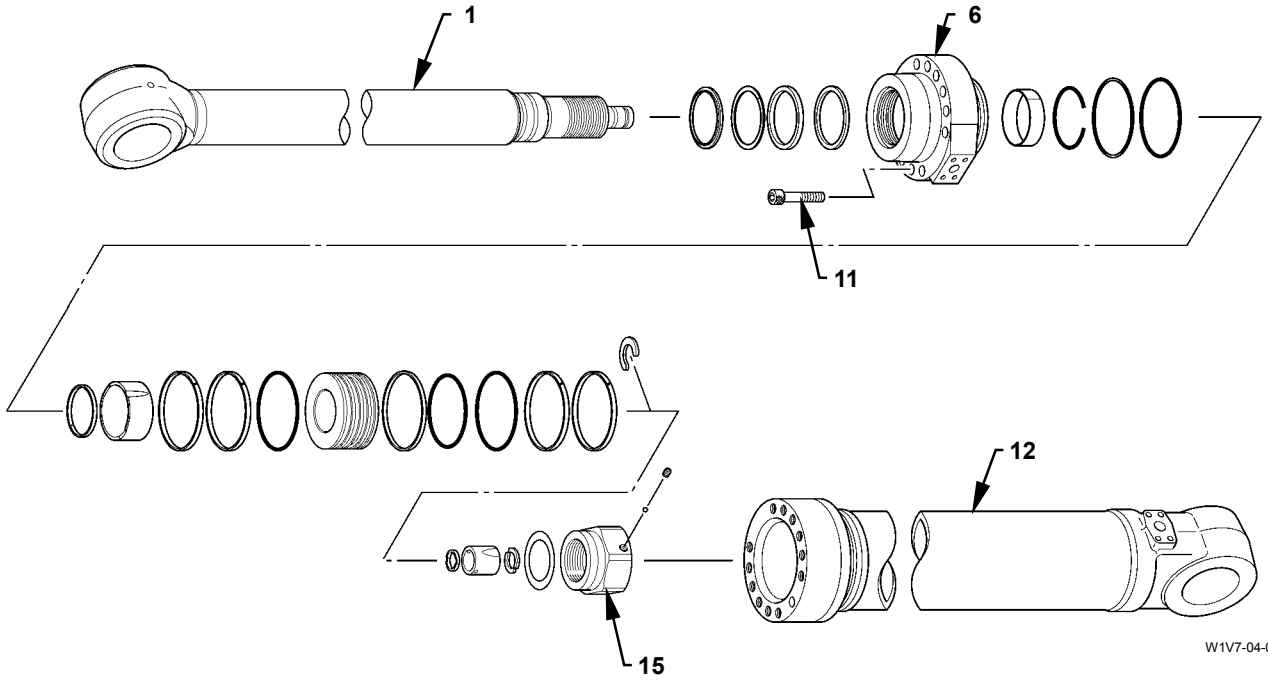


W1V7-04-02-007

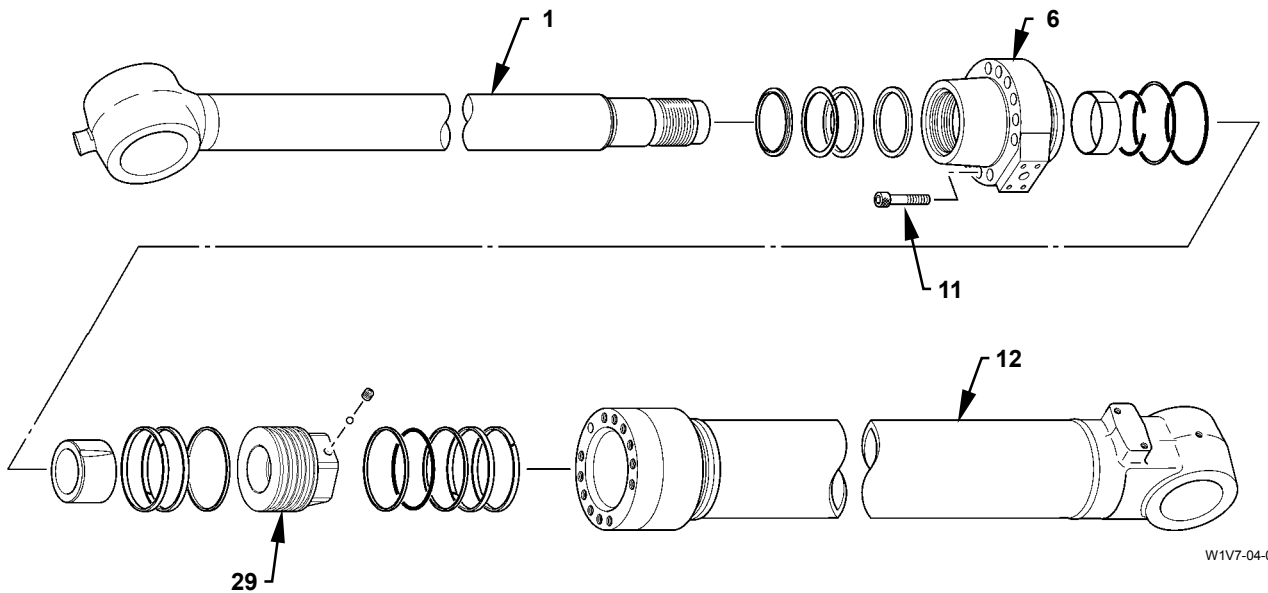
- | | | | |
|-------------------|----------------------------|--------------------------|---------------------------|
| 1 - Piston Rod | 9 - Backup Ring | 16 - Shim | 23 - Backup Ring (2 Used) |
| 2 - Wiper Ring | 10 - O-Ring | 17 - Stopper (2 Used) | 24 - O-Ring |
| 3 - Backup Ring | 11 - Socket Bolt (12 Used) | 18 - Cushion Bearing | 25 - Seal Ring |
| 4 - U-Ring | 12 - Cylinder Tube | 19 - Cushion Seal | 26 - Piston |
| 5 - Buffer Ring | 13 - Set Screw | 20 - Snap Ring | 27 - Cushion Bearing |
| 6 - Cylinder Head | 14 - Steel Ball | 21 - Slide Ring (2 Used) | 28 - Cushion Seal |
| 7 - Bushing | 15 - Nut | 22 - Slide Ring (2 Used) | 29 - Piston Nut |

FRONT ATTACHMENT / Cylinder

Arm Cylinder




Bucket Cylinder



FRONT ATTACHMENT / Cylinder

Disassemble Boom, Arm, Bucket Cylinders

- The disassembling procedure starts on the premise that the hydraulic lines and the bands securing lines have been removed.

 **NOTE:** The procedure for arm cylinder is an example.

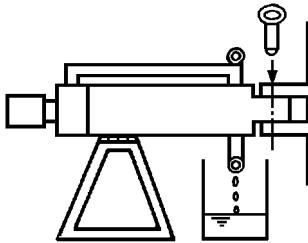


CAUTION: Boom cylinder weight: 290 kg (215 lb)

Arm cylinder weight: 470 kg (350 lb)

Bucket cylinder weight: 250 kg (185 lb)


1. Hoist and place the cylinder on a workbench horizontally. Drain hydraulic oil from the cylinder.




W102-04-02-027

2. Fully extend and support piston rod (1). Remove socket bolts (11) (12 used) from cylinder head (6).

Boom cylinder, Arm cylinder

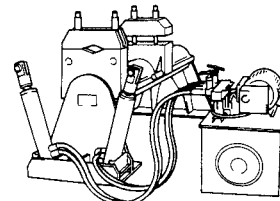
 : 17 mm

Bucket Cylinder

 : 14 mm

IMPORTANT: Pull out piston rod (1) straightly in order not to damage the sliding surface.

3. Tap and remove cylinder head (6) with piston rod (1) together from cylinder tube (12) by using a plastic hammer.
4. Secure piston rod (1) on special tool (ST 5908). Put the matching marks on piston rod (1) and the end of nut (15) (bucket cylinder: piston nut (29)).

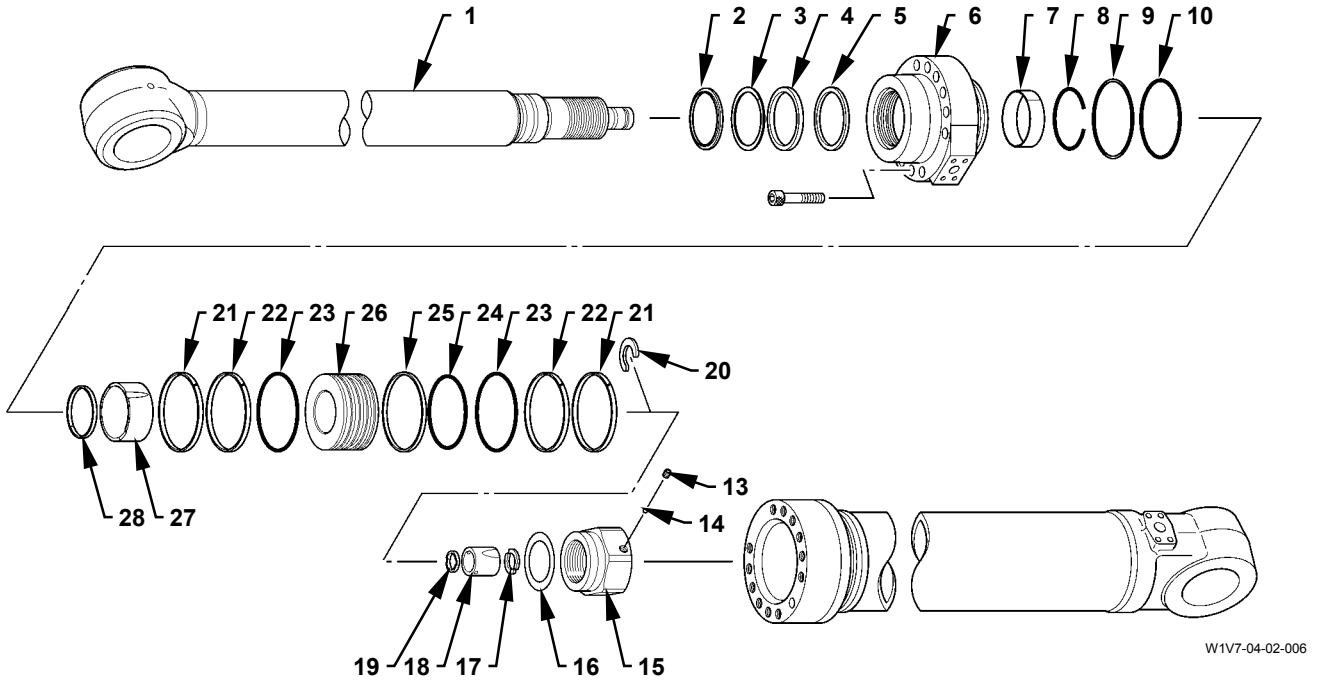


Special Tool: ST 5908

W158-04-02-022

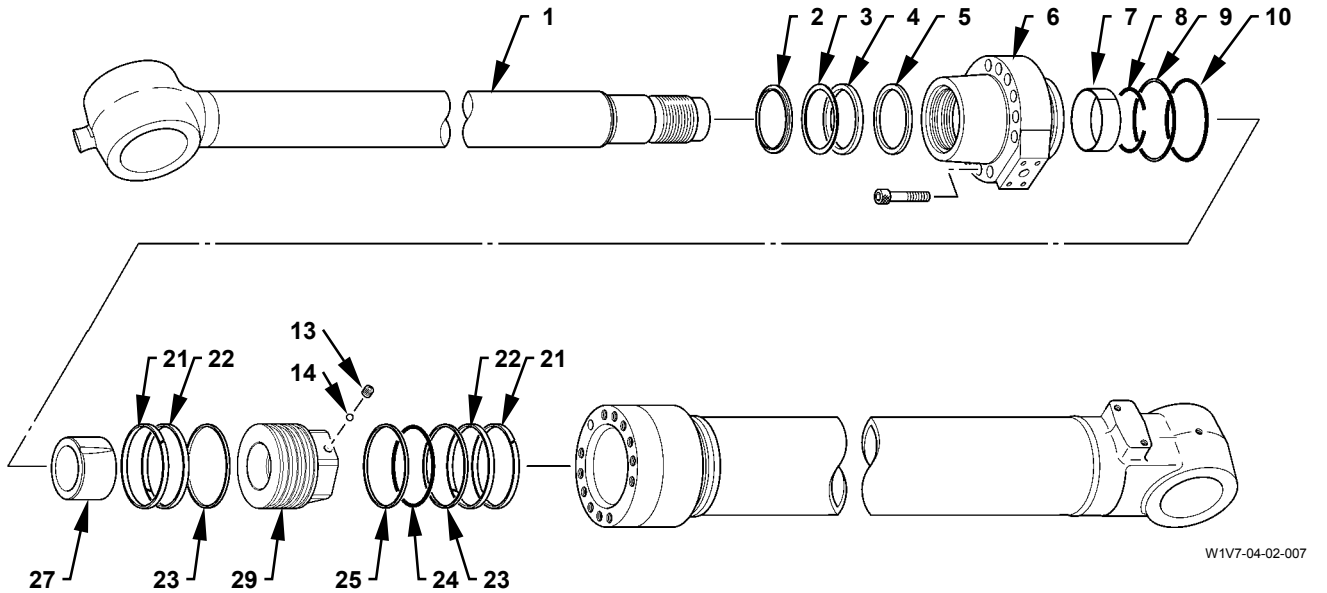
FRONT ATTACHMENT / Cylinder

Arm Cylinder



W1V7-04-02-006


Bucket Cylinder




W1V7-04-02-007

FRONT ATTACHMENT / Cylinder


5. Cut away the crimped position by using a hand drill and remove set screw (13). Remove steel ball (14).

 **NOTE:** Set screw (13) has been caulked by using a punch at two places after installing.

Boom cylinder, Bucket cylinder

 : 6 mm

Arm cylinder

 : 8 mm

6. Remove nut (15) (bucket cylinder: piston nut (29)) by using special tool (ST 5908) and special tool for nut.

Remove shim (16), piston (26), cushion bearing (27) and cushion seal (28) from piston rod (1).

(Shim (16), piston (26) and cushion seal (26) are not equipped for the bucket cylinder.

Special tool when turning nut:

Boom cylinder, Bucket cylinder: ST 3247

Arm cylinder: ST 3276

9. Remove O-ring (10) and backup rings (9, 3) from cylinder head (6). Remove wiper ring (2), U-ring (4), buffer ring (5), snap ring (8) and bushing (7).

Special tool when removing bushing

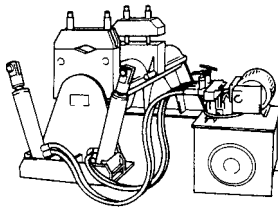
Boom cylinder: ST 8027

Arm cylinder: ST 8022

Bucket cylinder: ST 8021

10. (Arm cylinder only)

Remove stoppers (17) (2 used) from piston rod (1) by using a screwdriver. Remove cushion bearing (18), cushion seal (19) and snap ring (20).



Special Tool: ST 5908

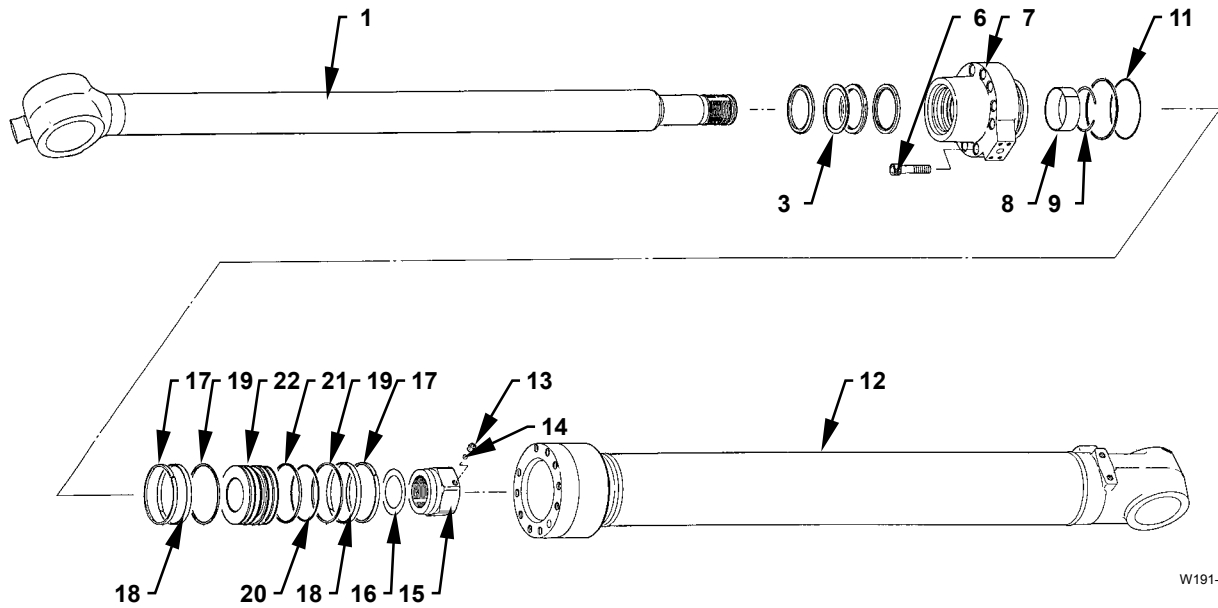
W158-04-02-022

7. Remove seal ring (25), slide rings (22) (2 used), (21) (2 used), O-ring (24) and backup rings (23) (2 used) from piston (26) (bucket cylinder: piston nut (29)).

8. Remove cylinder head (6) from piston rod (1).

FRONT ATTACHMENT / Cylinder

DISASSEMBLE POSITIONING CYLINDER



W191-04-02-002

- | | | | |
|---------------------------|--------------------|--------------------------|---------------------------|
| 1 - Piston Rod | 7 - Cylinder Head | 13 - Set Screw | 18 - Slide Ring (2 Used) |
| 2 - Wiper Ring | 8 - Bushing | 14 - Steel Ball | 19 - Backup Ring (2 Used) |
| 3 - Backup Ring | 9 - Snap Ring | 15 - Nut | 20 - O-Ring |
| 4 - U-Ring | 10 - Backup Ring | 16 - Shim | 21 - Seal Ring |
| 5 - Buffer Ring | 11 - O-Ring | 17 - Slide Ring (2 Used) | 22 - Piston |
| 6 - Socket Bolt (12 Used) | 12 - Cylinder Tube | | |

FRONT ATTACHMENT / Cylinder

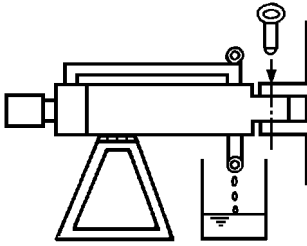
Disassemble Positioning Cylinder

- The disassembling procedure starts on the premise that the hydraulic lines and the bands securing lines have been removed.




CAUTION: Positioning cylinder weight: 360 kg (795 lb)

1. Hoist and place the cylinder on a workbench horizontally. Drain hydraulic oil from the cylinder.



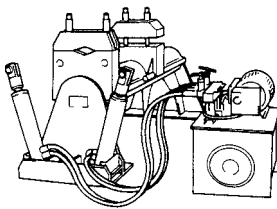
W102-04-02-027

2. Fully extend and support piston rod (1). Remove socket bolt (6) from cylinder head (7).

 : 17 mm

IMPORTANT: Pull out piston rod (1) straightly in order not to damage the sliding surface.


3. Tap and remove cylinder head (7) with piston rod (1) together from cylinder tube (12) by using a plastic hammer.
4. Secure piston rod (1) on special tool (ST 5908). Put the matching marks on piston rod (1) and nut (15).




Special Tool: ST 5908

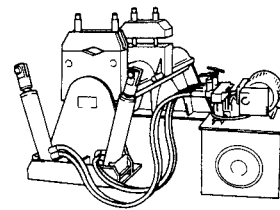
W158-04-02-022

5. Cut away the crimped position by using a hand drill and remove set screw (13). Remove steel ball (14).

 **NOTE:** Set screw (13) has been caulked by using a punch at two places after installing.

 : 8 mm

6. Remove nut (15) by using special tools (ST 5908, ST 3276). Remove piston (22) and shim (16) from piston rod (1).



Special Tool: ST 5908

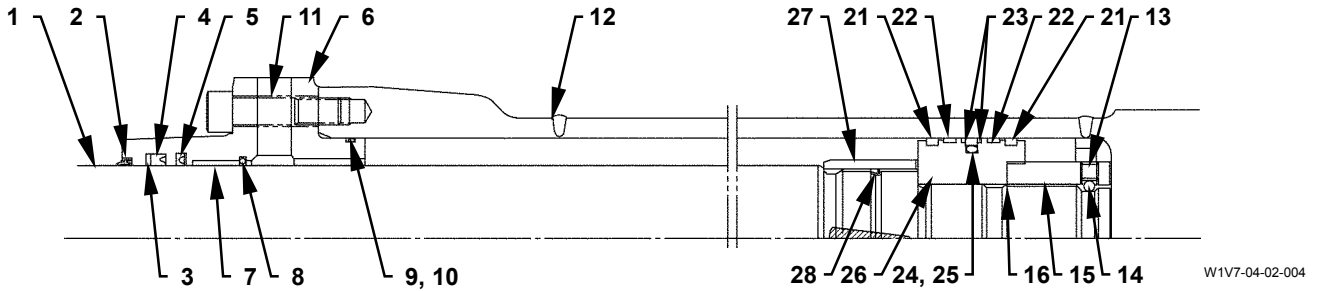
W158-04-02-022

7. Remove slide rings (17) (2 used), (18) (2 used), backup rings (19) (2 used), O-ring (20) and seal ring (21) from piston (22).
8. Remove cylinder head (7) from piston rod (1).
9. Remove O-rings (11) and backup rings (10, 3) from cylinder head (7). Remove wiper ring (2), U-ring (4), buffer ring (5), snap ring (9) and bushing (8).
Special tool when removing bushing: ST 8026

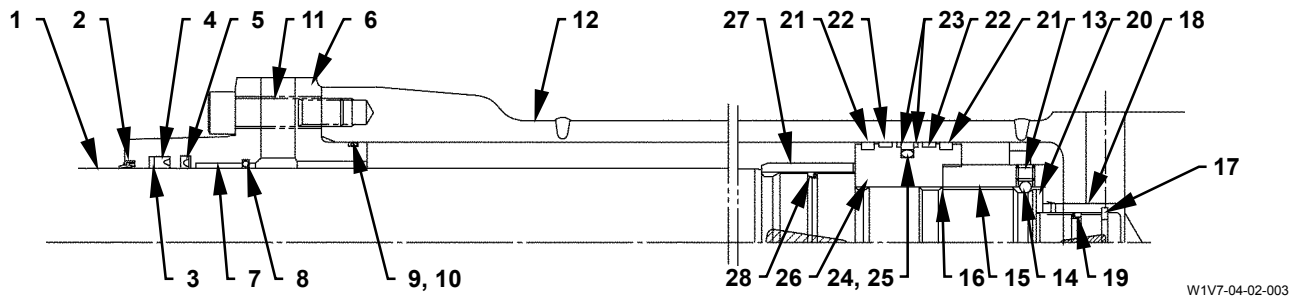
FRONT ATTACHMENT / Cylinder

ASSEMBLE BOOM, ARM, BUCKET CYLINDERS

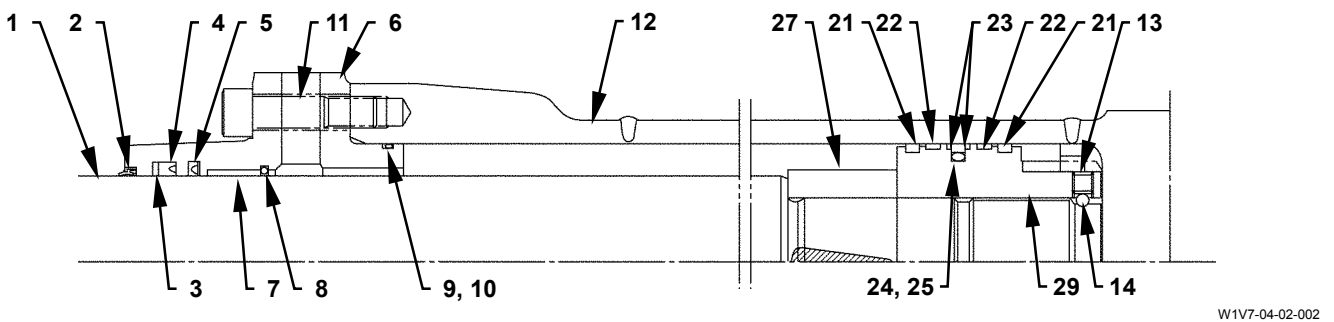
Boom Cylinder



Arm Cylinder




Bucket Cylinder



- | | | | |
|-------------------|----------------------------|--------------------------|---------------------------|
| 1 - Piston Rod | 9 - Backup Ring | 16 - Shim | 23 - Backup Ring (2 Used) |
| 2 - Wiper Ring | 10 - O-Ring | 17 - Stopper (2 Used) | 24 - O-Ring |
| 3 - Backup Ring | 11 - Socket Bolt (12 Used) | 18 - Cushion Bearing | 25 - Seal Ring |
| 4 - U-Ring | 12 - Cylinder Tube | 19 - Cushion Seal | 26 - Piston |
| 5 - Buffer Ring | 13 - Set Screw | 20 - Snap Ring | 27 - Cushion Bearing |
| 6 - Cylinder Head | 14 - Steel Ball | 21 - Slide Ring (2 Used) | 28 - Cushion Seal |
| 7 - Bushing | 15 - Nut | 22 - Slide Ring (2 Used) | 29 - Piston Nut |
| 8 - Snap Ring | | | |

FRONT ATTACHMENT / Cylinder

Disassemble Boom, Arm, Bucket Cylinders

 **NOTE:** The procedure for arm cylinder is an example.




1. Install bushing (7) into cylinder head (6).
Special tool when installing bushing:
Boom cylinder (ST 8027)
Arm cylinder (ST 8022)
Bucket cylinder (ST 8021)

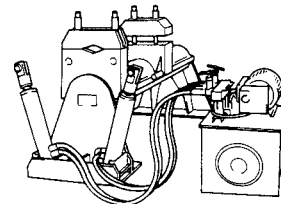
IMPORTANT: Check the direction to install.

2. Install U-ring (4), backup ring (3), buffer ring (5) and snap ring (8) to cylinder head (6).
3. Install wiper ring (2) to cylinder head (6) by using a plastic hammer.
Special tool when installing wiper ring:
Boom cylinder (ST 8027)
Arm cylinder (ST 8022)
Bucket cylinder (ST 8021)
4. Install O-ring (10) and backup ring (9) to cylinder head (6).
5. Install O-ring (24) and seal ring (25) to piston (26) (bucket cylinder: piston nut (29)).
After installing seal ring (25), adjust seal ring (25) by using special tool B.
Special Tool A, Special Tool B:
Boom cylinder (ST 2979, ST 2310)
Arm cylinder (ST 2970, ST 2211)
Bucket cylinder (ST 2967, ST 2090)
6. Install backup rings (23) (2 used), slide rings (22) (2 used) and (21) (2 used) to piston (26) (bucket cylinder: piston nut (29)).

7. Install the cylinder head (6) assembly to piston rod (1).
Special tool when installing cylinder head:
Boom cylinder (ST 8027)
Arm cylinder (ST 8022)
Bucket cylinder (ST 8021)

IMPORTANT: Face the slit in cushion seal (28) to the piston. Check the direction of oil groove in cushion bearing (27).

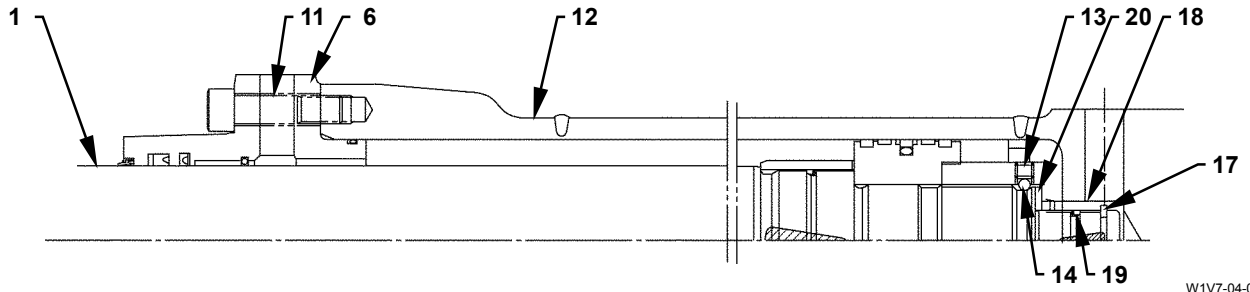
8. Install cushion seal (28) to piston rod (1). Install cushion bearing (27) and piston (26) to piston rod (1). (Cushion seal (28) and piston (26) are not equipped for the bucket cylinder.)
9. Install shim (16) to piston rod (1). Align the matching marks before disassembling and tighten nut (15) (bucket cylinder: piston nut (29)) by using special tool (ST 5908) and special tool for nut.
Special tool when turning nut:
Boom cylinder 115 mm (ST 3247)
 : 9060 N·m (924 kgf·m, 6680 lbf·ft)
Arm cylinder 130 mm (ST 3276)
 : 21150 N·m (2157 kgf·m, 15600 lbf·ft)
Bucket cylinder 115 mm (ST 3247)
 : 12200 N·m (1244 kgf·m, 9000 lbf·ft)



Special Tool: ST 5908

W158-04-02-022

FRONT ATTACHMENT / Cylinder





W1V7-04-02-003

FRONT ATTACHMENT / Cylinder


10. Install steel ball (14) with set screw (13). Crimp set screw (13) by using a punch (2 places).


Boom cylinder, Bucket cylinder

 : 6 mm

 : 56.9 N·m (5.8 kgf·m, 42 lbf·ft)

Arm cylinder

 : 8 mm

 : 96.6 N·m (9.9 kgf·m, 71 lbf·ft)

IMPORTANT: Face the slit in cushion seal (19) to the piston. Check the direction of oil groove in cushion bearing (18).

11. (Arm cylinder only)


Install snap ring (20), cushion seal (19), cushion bearing (18) and stoppers (17) (2 used) to piston rod (1).




CAUTION: Align with the center of cylinder tube (12) and insert the piston rod (1) assembly in order not to damage the rings.

12. Secure cylinder tube (12) horizontally on a workbench. Insert the piston rod (1) assembly into cylinder tube (12).

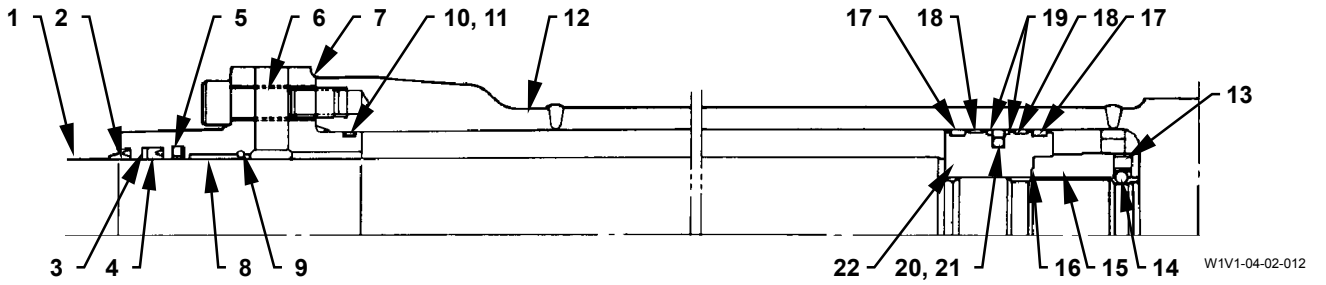
13. Tighten cylinder head (6) to cylinder tube (12) with socket bolts (11) (12 used).

 : 14 mm

 : 367 N·m (37.4 kgf·m, 270 lbf·ft)

FRONT ATTACHMENT / Cylinder

ASSEMBLE POSITIONING CYLINDER



- | | | | |
|---------------------------|--------------------|--------------------------|---------------------------|
| 1 - Piston Rod | 7 - Cylinder Head | 13 - Set Screw | 18 - Slide Ring (2 Used) |
| 2 - Wiper Ring | 8 - Bushing | 14 - Steel Ball | 19 - Backup Ring (2 Used) |
| 3 - Backup Ring | 9 - Snap Ring | 15 - Nut | 20 - O-Ring |
| 4 - U-Ring | 10 - Backup Ring | 16 - Shim | 21 - Seal Ring |
| 5 - Buffer Ring | 11 - O-Ring | 17 - Slide Ring (2 Used) | 22 - Piston |
| 6 - Socket Bolt (12 Used) | 12 - Cylinder Tube | | |

FRONT ATTACHMENT / Cylinder


ASSEMBLE POSITIONING CYLINDER

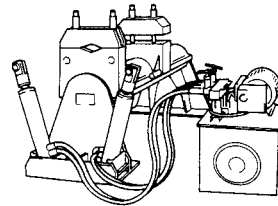
1. Install bushing (8) into cylinder head (7).
Special tool when installing bushing: ST 8029

IMPORTANT: Check the direction to install.

2. Install U-ring (4), backup ring (3), buffer ring (5) and snap ring (9) to cylinder head (7).
3. Install wiper ring (2) to cylinder head (7) by using a plastic hammer.
Special tool when installing wiper ring: ST 8029
4. Install O-ring (11) and backup ring (10) to cylinder head (7).
5. Install plug (22) into spool (20) by using special tool (ST 2970). After installing seal ring (21), adjust seal ring (21) by using special tool (ST 2211).
6. Install backup rings (19) (2 used), slide rings (18) (2 used) and (17) (2 used) to piston (22).



7. Install the cylinder head (7) assembly to piston rod (1).
Special tool when installing cylinder head: ST 8029


8. Install shim (16) to piston rod (1). Align the matching marks before disassembling and tighten nut (15) by using special tool (ST 5908) and special tool for nut.
 : 14300 N·m (1459 kgf·m, 10550 lbf·ft)





Special Tool: ST 5908

W158-04-02-022

9. Install steel ball (14) to nut (15) and tighten with set screw (13). Crimp set screw (13) by using a punch (2 places).
 : 8 mm
 : 96.6 N·m (9.9 kgf·m, 71 lbf·ft)

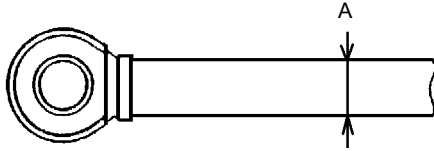
 **CAUTION: Align with the center of cylinder tube (12) and insert the piston rod (1) assembly in order not to damage the rings.**

10. Secure cylinder tube (12) horizontally on a workbench. Insert the piston rod (1) assembly into cylinder tube (12).
11. Tighten cylinder head (7) to cylinder tube (12) with socket bolts (6) (12 used).
 : 17 mm
 : 711 N·m (73 kgf·m, 524 lbf·ft)

FRONT ATTACHMENT / Cylinder

MAINTENANCE STANDARD

Rod



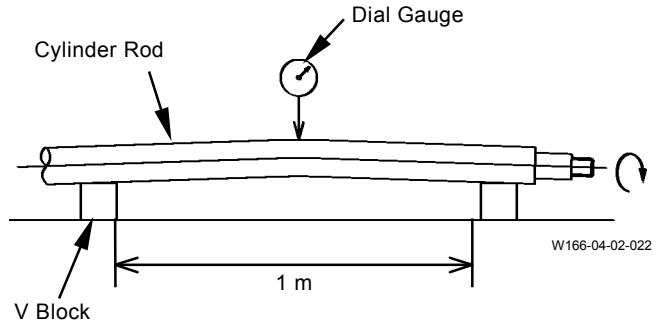
W105-04-02-094

Unit: mm

Cylinder Name	Recommended Size After Re-manufacturing (A)
Boom	100 ^{-0.012} -0.027
Arm	115 ^{-0.012} -0.027
Bucket	95 ^{-0.012} -0.027
Positioning	110 ^{-0.012} -0.027

NOTE: 1 mm = 0.039 in

Rod Bend and Run Out



W166-04-02-022

Unit: mm

Bend	Run Out	Remedy
0.5	1.0	Repair
1.0	2.0	Replace

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