

# Workshop Manual

## ZAXIS

### **200-3 class**

200-3•210H-3•210K-3•210LCN-3•240N-3

### **225US-3 class**

225US-3•225USLC-3

### **225USR-3 class**

225USR-3•225USRLC-3•225USRK-3•225USRLCK-3

### **240-3 class**

240-3•240LC-3•250H-3•250LC-3•250LCN-3•  
250LCH-3•250K-3•250LCK-3

### **270-3 class**

270-3•270LC-3•280LC-3•280LCN-3

## Hydraulic Excavator

Service Manual consists of the following separate Part No;

Technical Manual (Operational Principle) : Vol. No. TO1V1-E

Technical Manual (Troubleshooting) : Vol. No. TT1V1-E

Workshop Manual : Vol. No. W1V1-E



# INTRODUCTION

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## TO THE READER

- This manual is written for an experienced technician to provide technical information needed to maintain and repair this machine.
- Be sure to thoroughly read this manual for correct product information and service procedures.
- If you have any questions or comments, or if you found any errors regarding the contents of this manual, please contact using "Service Manual Revision Request Form" at the end of this manual. (Note: Do not tear off the form. Copy it for use.):  
Publications Marketing & Product Support  
Hitachi Construction Machinery Co. Ltd.  
TEL: 81-29-832-7084  
FAX: 81-29-831-1162

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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

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## MANUAL COMPOSITION

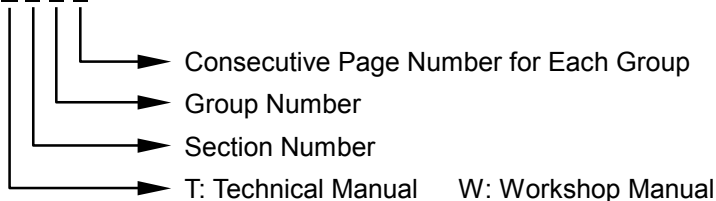
- This manual consists of three portions: the Technical Manual (Operational Principle), the Technical Manual (Troubleshooting) and the Workshop Manual.
- Information included in the Technical Manual (Operational Principle):  
technical information needed for redelivery and delivery, operation and activation 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.

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## 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

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## 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.

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## 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/cm<sup>2</sup>, 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 <sup>2</sup>	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 <sup>3</sup>	yd <sup>3</sup>	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 <sup>-1</sup>	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				

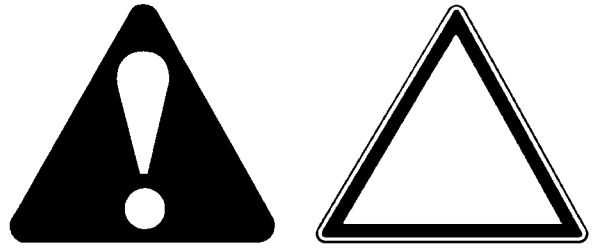


# SAFETY

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## 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.




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## 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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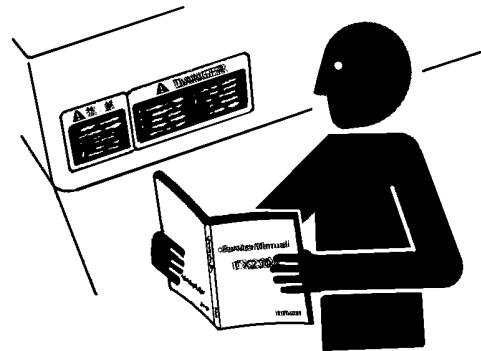
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# SAFETY

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## FOLLOW SAFETY INSTRUCTIONS

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



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# SAFETY

## PREPARE FOR EMERGENCIES

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



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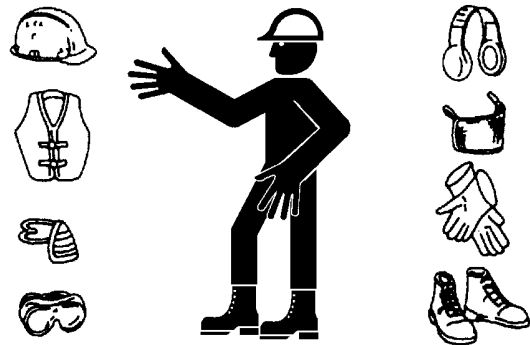
## WEAR PROTECTIVE CLOTHING

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

You may need:

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

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



SA-428

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

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# SAFETY

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## 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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## INSPECT MACHINE

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



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# SAFETY

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## 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.

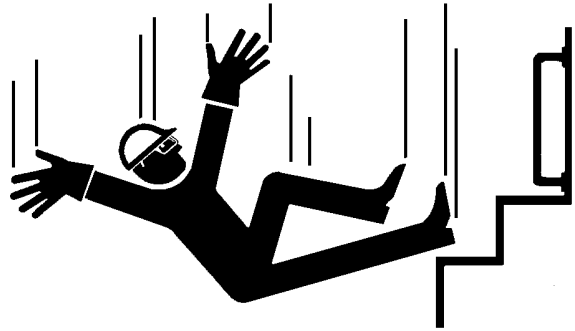
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## SAFETY

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### 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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### 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

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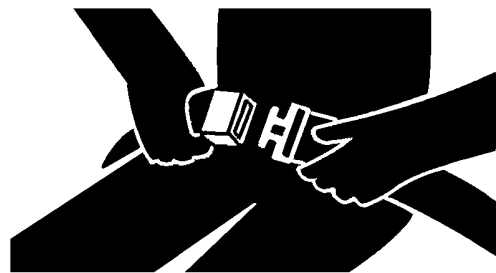
### ENSURE SAFETY BEFORE RISING FROM OR LEAVING OPERATOR'S SEAT

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

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### 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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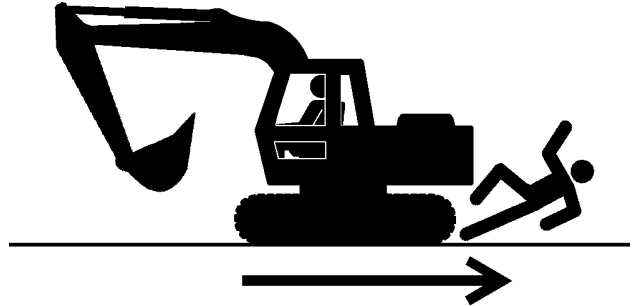
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## SAFETY

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### 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.



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### 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.



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## SAFETY

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### OPERATE ONLY FROM OPERATOR'S SEAT

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



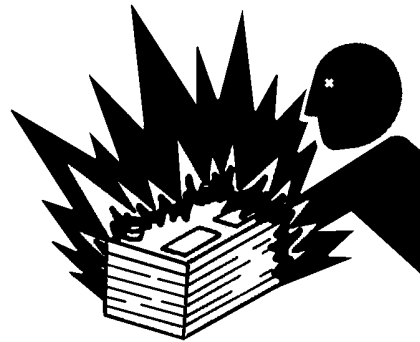
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### JUMP STARTING

- 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

S013-E01A-0032

## 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.

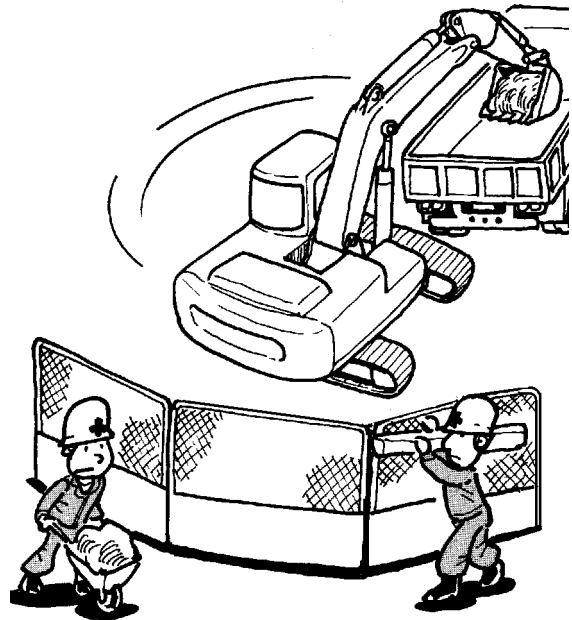
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SA-379

### 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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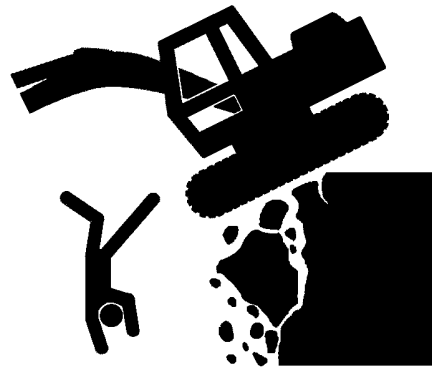
## SAFETY

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### INVESTIGATE JOB SITE BEFOREHAND

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

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



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## SAFETY

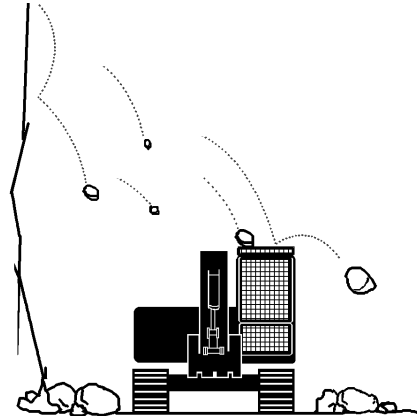
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### EQUIPMENT OF HEAD GUARD, ROPS, FOPS

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.

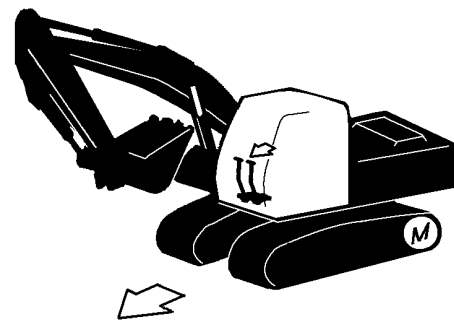


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### CONFIRM DIRECTION OF MACHINE TO BE DRIVEN

- 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.



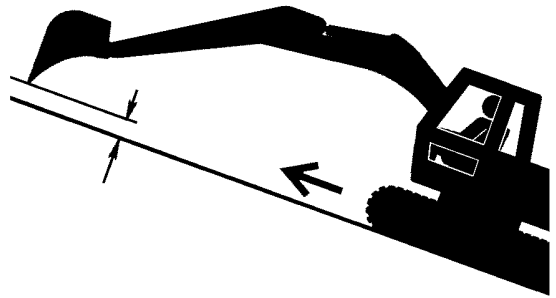
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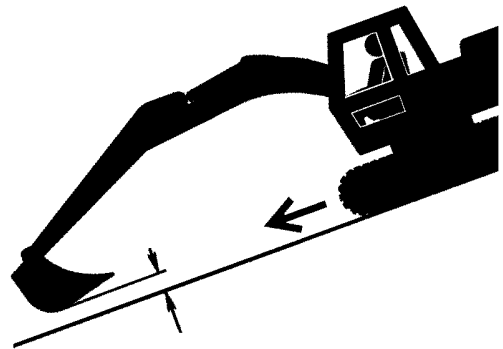
## SAFETY

### DRIVE MACHINE SAFELY

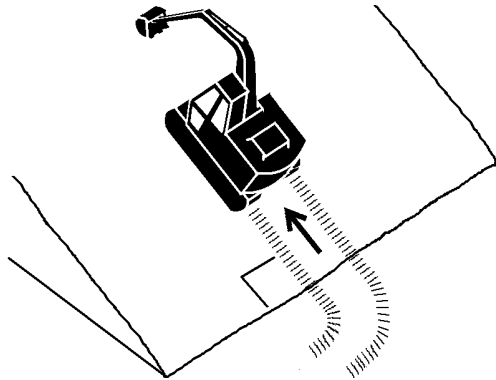
- Before driving the machine, always confirm that the travel levers/pedals direction corresponds to the direction you wish to drive.
- Be sure to detour around any obstructions.
- Avoid traveling over obstructions. Soil, fragments of rocks, and/or metal pieces may scatter around the machine. Don't allow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



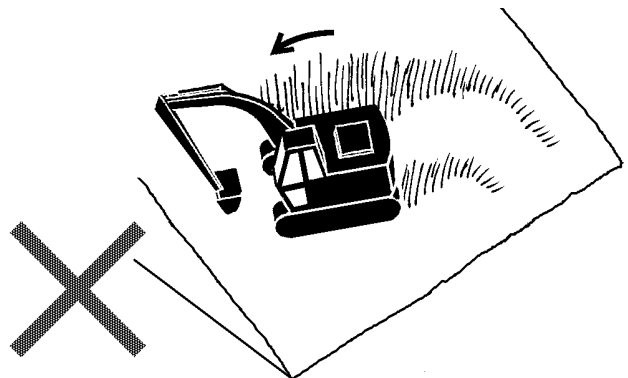
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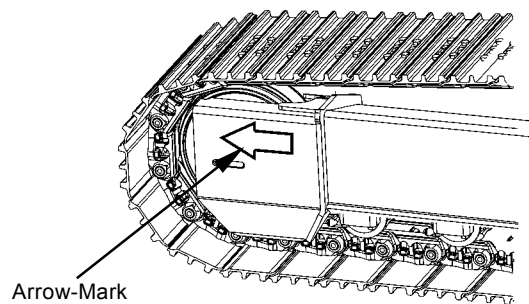
## SAFETY

### 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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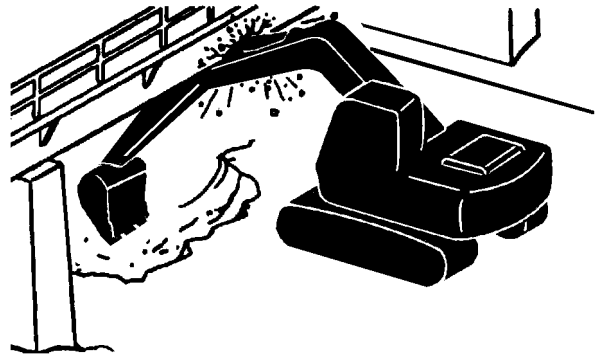


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## SAFETY

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



SA-011

## SAFETY

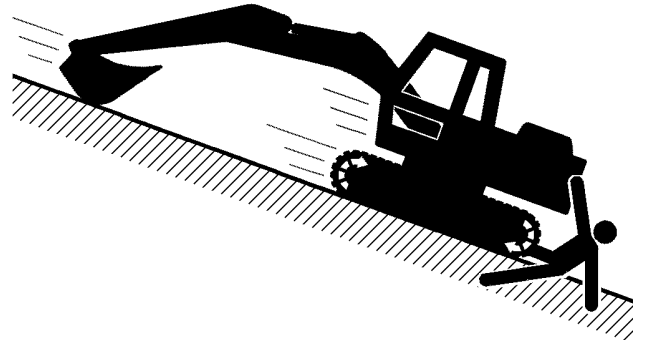
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### AVOID INJURY FROM ROLLAWAY ACCIDENTS

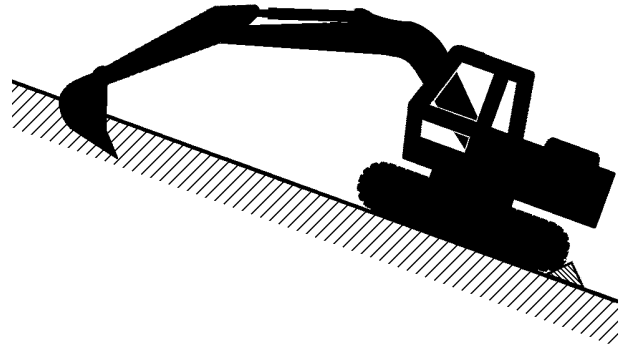
- Death or serious injury may result if you attempt to mount or stop a moving machine.

To avoid rollaways:

- Select level ground when possible to park machine.
- Do not park the machine on a grade.
- Lower the bucket and/or other work tools to the ground.
- Turn the auto-idle switch and the H/P mode switch off.
- Run the engine at slow idle speed without load for 5 minutes to cool down the engine.
- Stop the engine and remove the key from the key switch.
- Pull the pilot control shut-off lever to LOCK position.
- Block both tracks and lower the bucket to the ground. Thrust the bucket teeth into the ground if you must park on a grade.
- Position the machine to prevent rolling.
- Park a reasonable distance from other machines.



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SA-392

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## SAFETY

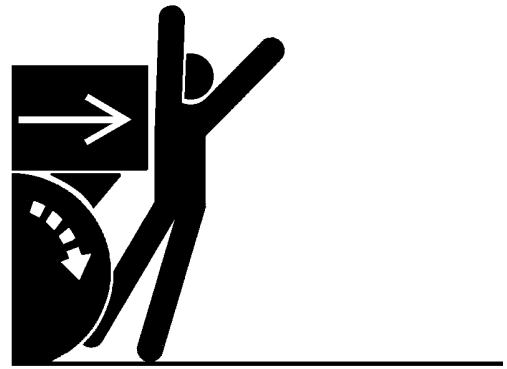
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### AVOID INJURY FROM BACK-OVER AND SWING ACCIDENTS

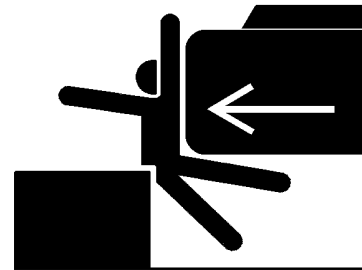
- If any person is present near the machine when backing or swinging the upperstructure, the machine may hit or run over that person, resulting in serious injury or death.

To avoid back-over and swing accidents:

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



SA-383



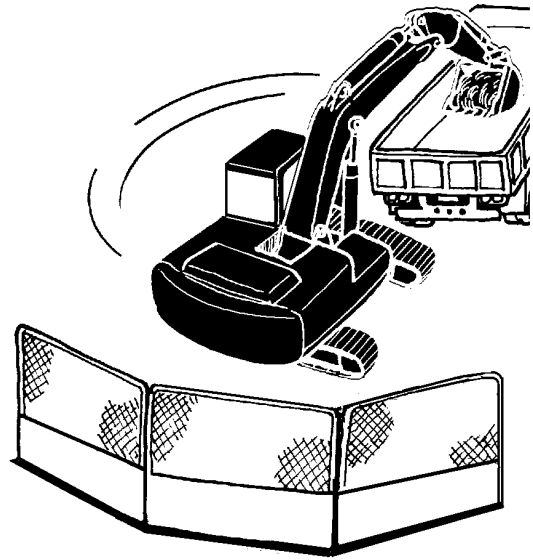
SA-384

021-E01A-0494

## 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.

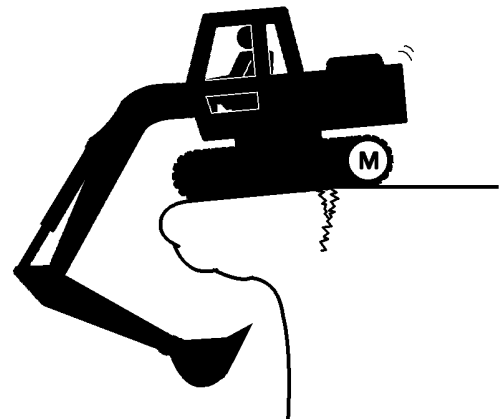


023-E01A-0487

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**

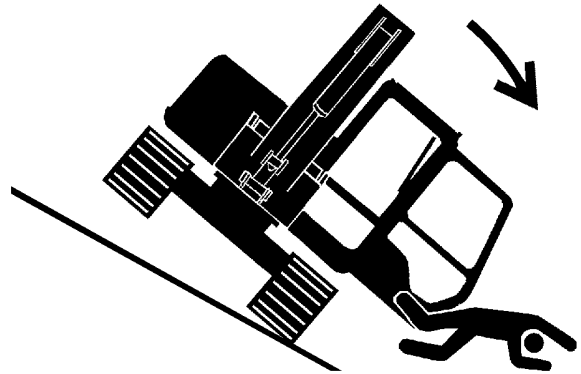
**MACHINE WILL TIP OVER FASTER THAN YOU CAN JUMP FREE**

**FASTEN YOUR SEAT BELT**

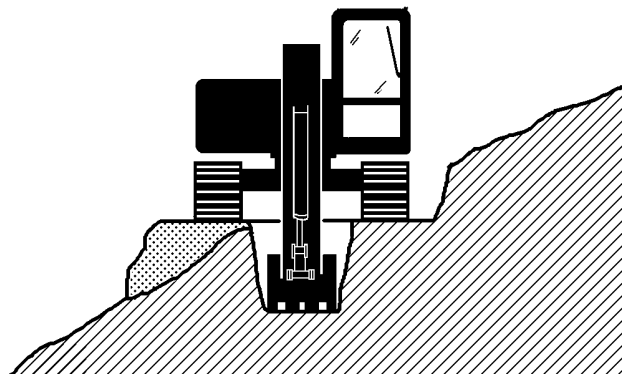
- The danger of tipping is always present when operating on a grade, possibly resulting in serious injury or death.

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



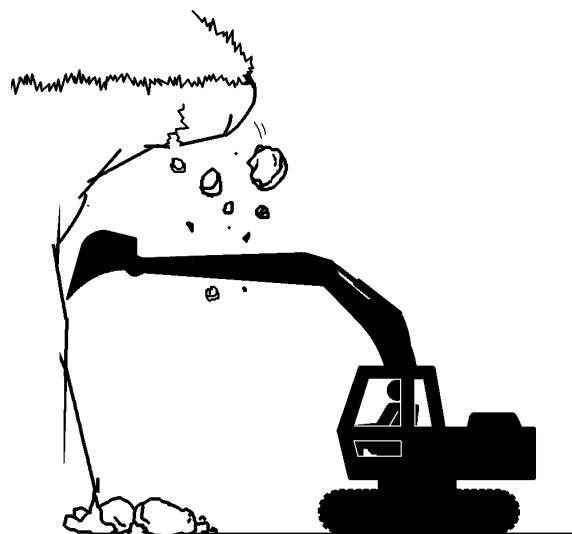
SA-440

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

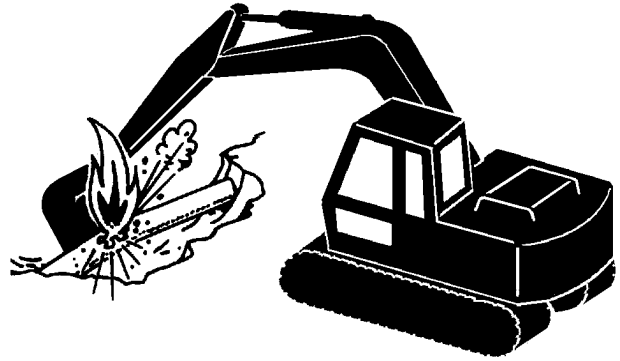
## SAFETY

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### 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.

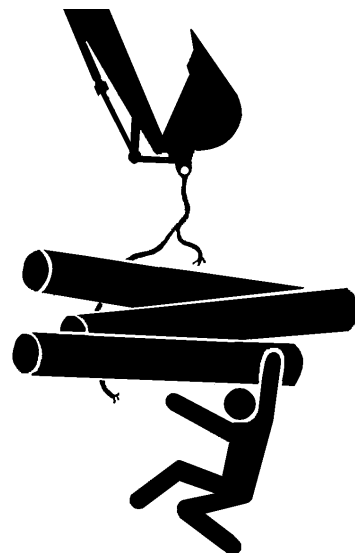


SA-1088

## 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

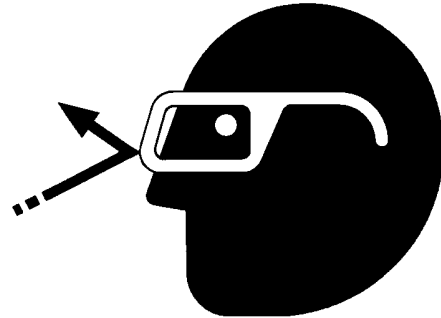


SA-014

## 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.



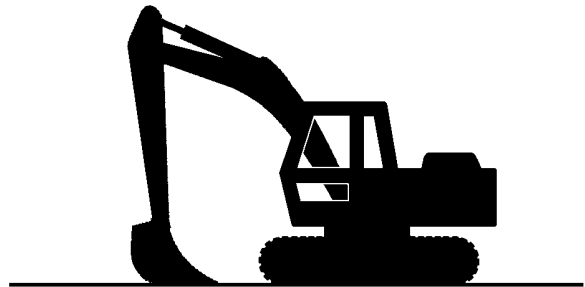
031-E01A-0432

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

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### TRANSPORT SAFELY

- Take care the machine may turn over when loading or unloading the machine onto or off of a truck or trailer.
  - Observe the related regulations and rules for safe transportation.
  - Select an appropriate truck or trailer for the machine to be transported.
  - Be sure to use a signal person.
  - Always follow the following precautions for loading or unloading:
    1. Select solid and level ground.
    2. Always use a ramp or deck strong enough to support the machine weight.
    3. Turn auto-idle switch OFF.
    4. Always select the slow speed mode with the travel mode switch.
    5. Never load or unload the machine onto or off a truck or trailer using the front attachment functions when driving up or down the ramp.
    6. Never steer the machine while on the ramp. If the traveling direction must be changed while the ramp, unload the machine from the ramp, reposition the machine on the ground, and then try loading again.
    7. The top end of the ramp where it meets the flatbed is a sudden bump. Take care when traveling over it.
    8. Place blocks in front of and behind the tracks. Securely hold the machine to the truck or trailer deck with wire ropes.



SA-395

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

035-E07A-0454

# SAFETY

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## 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



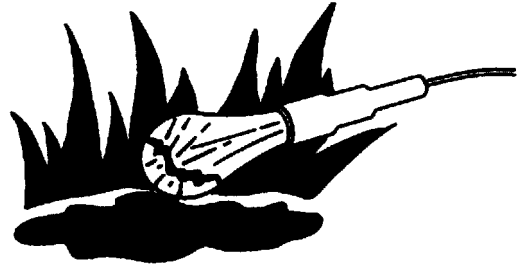
SA-527



## SAFETY

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- 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.



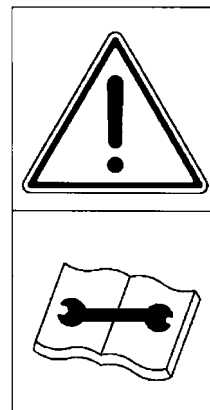
SA-037

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### 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

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### 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.

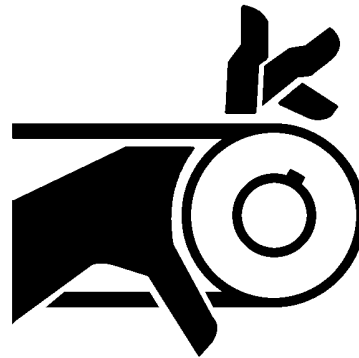


519-E01A-0527

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

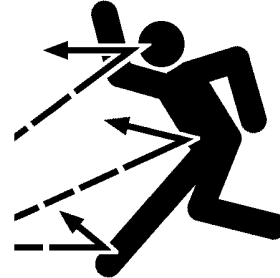
SA-026

## SAFETY

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### 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.



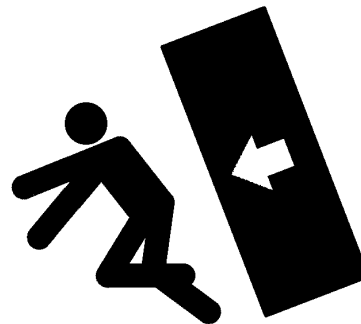
SA-344

503-E01B-0344

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### 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

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## 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

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## 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

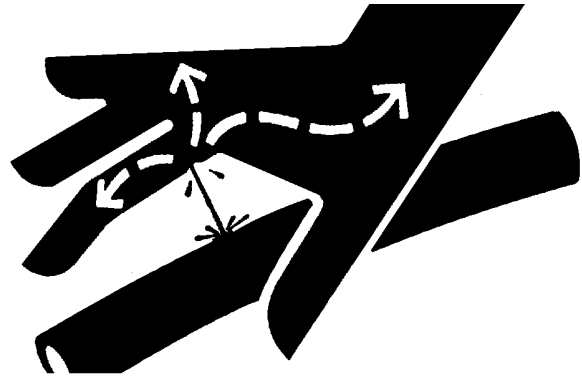
S506-E01A-0019

## SAFETY

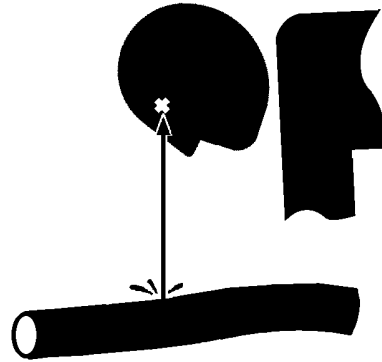
### AVOID HIGH-PRESSURE FLUIDS

- 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.

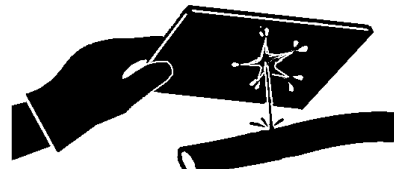
507-E03A-0499



SA-031



SA-292



SA-044

# SAFETY

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## PREVENT FIRES

Check for Oil Leaks:

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



SA-019

Check for Shorts:

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

Clean up Flammables:

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

Check Key Switch:

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

508-E02B-0019

Check Heat Shields:

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

508-E02A-0393

## SAFETY

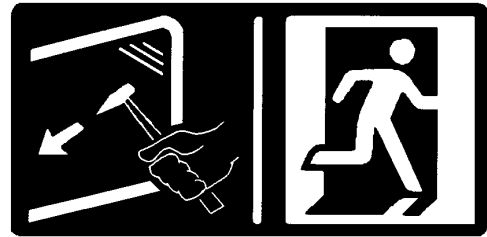
### EVACUATING IN CASE OF FIRE

- If a fire breaks out, evacuate the machine in the following way:
  - Stop the engine by turning the key switch to the OFF position if there is time.
  - Use a fire extinguisher if there is time.
  - Exit the machine.
- In an emergency, if the cab door or front window cannot be opened, break the front or rear window panes with the emergency evacuation hammer to escape from the cab. Refer the explanation pages on the Emergency Evacuation Method in the operator's manual.

18-E02B-0393



SA-393

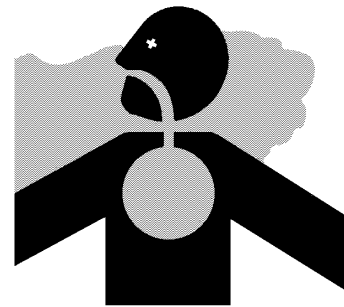


SS-1510

### BEWARE OF EXHAUST FUMES

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

509-E01A-0016

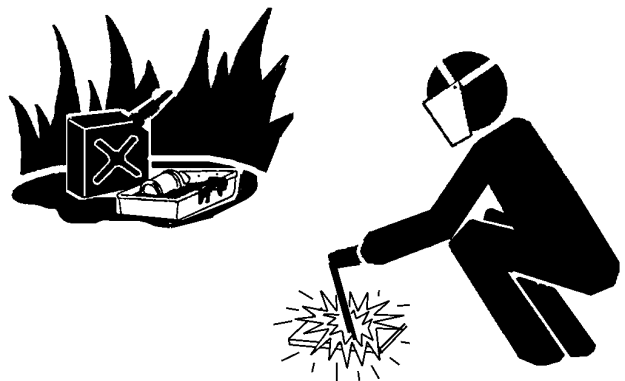


SA-016

### PRECAUTIONS FOR WELDING AND GRINDING

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

523-E01A-0818



SA-818

## SAFETY

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### 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

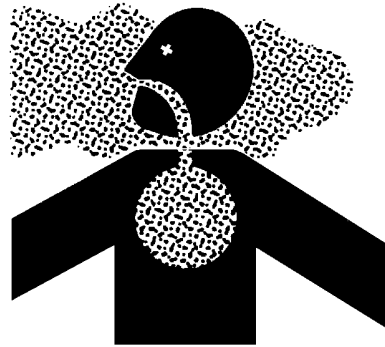


## SAFETY

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### BEWARE OF ASBESTOS DUST

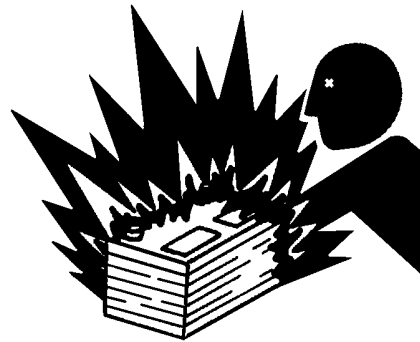
- Take care not to inhale dust produced in the work site. Inhalation of asbestos fibers may be the cause of lung cancer.
- Depending on the work site conditions, the risk of inhaling asbestos fiber may exist. Spray water to prevent asbestos from becoming airborne. Don't use compressed air.
- When operating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

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### 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

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### 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



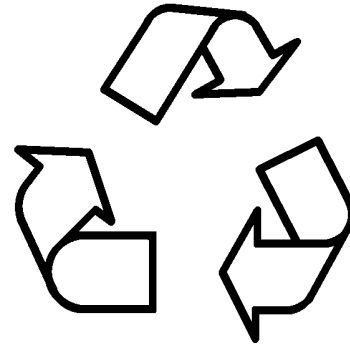
SA-309

## SAFETY

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### 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

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### BEFORE RETURNING THE MACHINE TO THE CUSTOMER

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



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# SAFETY

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## SECTION AND GROUP CONTENTS

## WORKSHOP MANUAL

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Group 3 Painting
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*All information, illustrations and specifications in this manual are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.*

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# SECTION 1 GENERAL



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## GENERAL / Precautions for Disassembling and Assembling

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### PRECAUTIONS FOR DISASSEMBLING AND ASSEMBLING

#### Precautions for Disassembling and Assembling

- Clean the Machine

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

- Inspect the Machine

Be sure to thoroughly understand all 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

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- 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

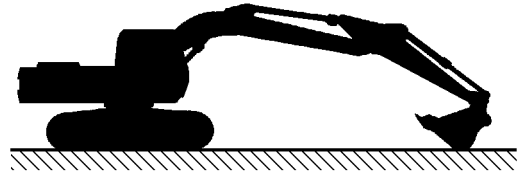
- With the drain plug / hose on travel motor / swing motor removed, fill the motor case with hydraulic oil.

## GENERAL / Precautions for Disassembling and Assembling

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- 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.



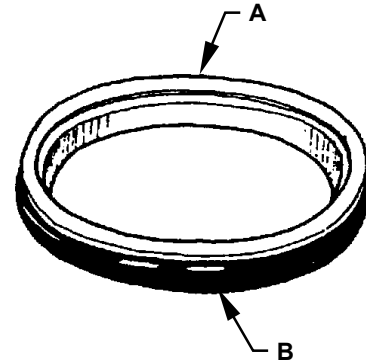
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# GENERAL / Precautions for Disassembling and Assembling

## 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:

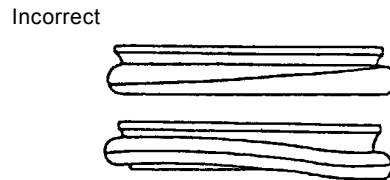
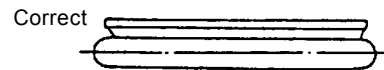
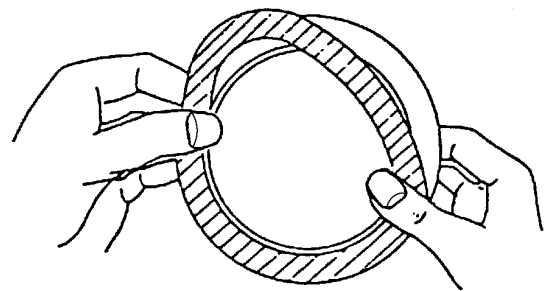
- (1) Keep seal rings together as a matched set with seal ring faces together. Insert a piece of cardboard to protect surfaces.
- (2) Check the slide surface on seal ring (A) for scuffing, scoring, corrosion, deformation or uneven wear.
- (3) Check O-ring (B) for tears, breaks, deformation or hardening.



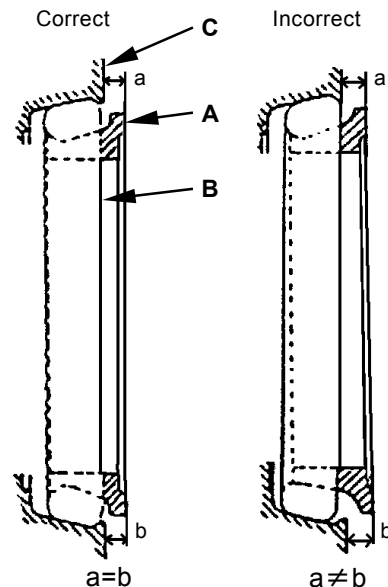
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2. If incorrectly assembled, oil leakage or damage will occur. Be sure to do the following, to prevent trouble.

- (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.



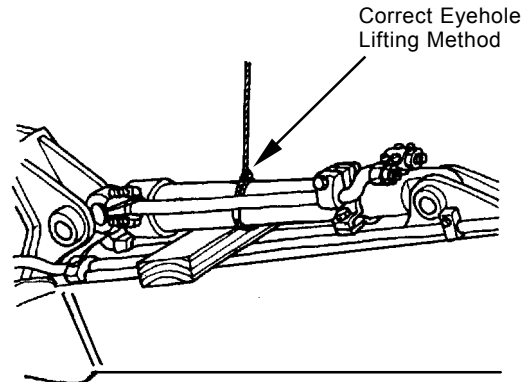
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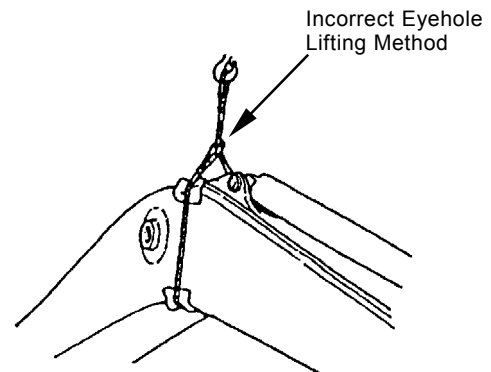
## GENERAL / Precautions for Disassembling and Assembling

### Precautions for Using Nylon Sling

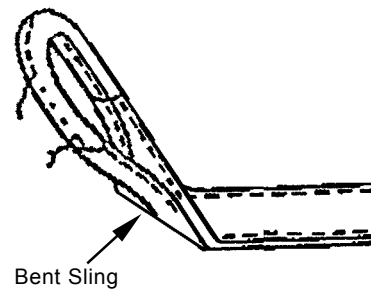
1. Follow the precautions below to use nylon slings safely.
  - Attach protectors (soft material) on the corners of the load so that the nylon sling does not directly contact the corners. This will prevent the nylon sling from being damaged and the lifted load from slipping.
  - Lower the temperature 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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W105-04-01-008



W162-01-01-009

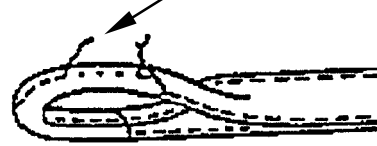
## GENERAL / Precautions for Disassembling and Assembling



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

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

Damaged Appearance Broken Sewing Thread

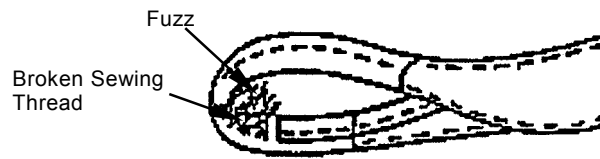


W162-01-01-002

Scuffing



W162-01-01-003



W162-01-01-004

Broken Sewing Thread



W162-01-01-005

Broken Sewing Thread



W162-01-01-006

Scoring

Separation of Belt



W162-01-01-007

Fuzz

Scuffing

Broken Warp



W162-01-01-008

## **GENERAL / Precautions for Disassembling and Assembling**

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### **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

### TIGHTENING TORQUE SPECIFICATIONS

(ZX200-3 Class)

No.	Descriptions	Bolt Dia	Q'ty	Wrench Size (mm)	Torque		
		mm			N·m	(kgf·m)	
1	Engine cushion rubber mounting nut (Pump side)	18	4	27	400	(40)	
	Engine cushion rubber mounting nut (Fan Side)	14	4	22	180	(18)	
2	Engine bracket mounting bolt (Pump side)	16	8	24	270	(27)	
	Engine bracket mounting bolt (Fan side)	10	8	17	65	(6.5)	
3	Hydraulic oil tank mounting bolt	20	4	30	550	(55)	
4	Fuel tank mounting bolt	16	4	24	270	(27)	
5	Radiator mounting bolt (Upper Side)	16	4	24	210	(21)	
	Radiator mounting bolt (Lower Side)	16	3	24	210	(21)	
6	Pump mounting bolt	10	8	17	65	(6.5)	
7	Control valve mounting bolt	16	4	24	210	(21)	
	Control valve bracket mounting bolt	16	4	24	270	(27)	
8	Swing device mounting bolt	20	14	30	500	(50)	
9	Swing motor mounting bolt	12	8	10	90	(9)	
10	ORS fittings for hydraulic hoses and piping			17	25	(2.5)	
				19	30	(3)	
				22	40	(4)	
				27	95	(9.5)	
				32	140	(14)	
				36	180	(18)	
11	Battery mounting nut	10	4	17	50	(5)	
	Cab mounting nut	16	4	24	210	(21)	
12	Cab mounting anchor bolt	22	2	32	550	(55)	
	Cab cushion rubber mounting bolt	12	8	19	110	(11)	
13	Cover mounting bolt	6	—	10	10	(1)	
		8	—	13			
		10	—	17	50	(5)	
		12	—	19	90	(9)	
14	Flexible master coupling of piping	8	4 pair	13	10.3 to 12.4	(1.05 to 1.26)	
		1/4-28UNF		11			6
	Jubilee clamp of low pressure piping		9	7	6	(0.6)	
			11	7	6	(0.6)	
			4	8	6	(0.6)	
T-bolt clamp of low pressure piping		9	10	6	(0.6)		
15	Swing bearing mounting bolt	(Upperstructure)	20	37	30	510	(51)
		(Undercarriage)	20	36	30	490	(49)
16	Travel device mounting bolt	20	32	30	630	(63)	
		20	40	30	630	(63)	
	Travel reduction device cover mounting bolt	14	12	22	180	(18)	
		Sprocket mounting bolt	20	40	30	550	(55)
		20	48	30	550	(55)	
17	Upper roller mounting bolt	16	16	24	270	(27)	
18	Lower roller mounting bolt	ZAXIS200-3, 210H-3, 210K-3	18	64	27	460	(46)
		ZAXIS200LC-3, 210LCH-3, 210LCK-3	18	72	27	460	(46)
19	Track shoe bolt	ZAXIS200-3, 210H-3, 210K-3	20	368	27	804	(82)
		ZAXIS200LC-3, 210LCH-3, 210LCK-3	20	392	27	804	(82)
20	Track guard mounting bolt	ZAXIS200-3, 210H-3, 210K-3	18	8	27	500	(50)
		ZAXIS200LC-3, 210LCH-3, 210LCK-3	18	16	27	500	(50)

## GENERAL / Tightening

### TIGHTENING TORQUE SPECIFICATIONS

(ZX225US-3 class, ZX225USR-3 Class)

No.	Descriptions	Bolt Dia	Q'ty	Wrench Size (mm)	Torque		
		mm			N·m	(kgf·m)	
1	Engine cushion rubber mounting nut (Pump side)	18	4	27	400	(40)	
	Engine cushion rubber mounting nut (Fan Side)	14	4	22	180	(18)	
2	Engine bracket mounting bolt (Pump side)	16	8	24	270	(27)	
	Engine bracket mounting bolt (Fan side)	10	8	17	65	(6.5)	
3	Hydraulic oil tank mounting bolt	20	4	30	550	(55)	
4	Fuel tank mounting bolt	16	4	24	270	(27)	
5	Radiator mounting bolt (Upper Side)	16	4	24	210	(21)	
	Radiator mounting bolt (Lower Side)	16	3	24	210	(21)	
6	Pump mounting bolt	10	8	17	65	(6.5)	
7	Control valve mounting bolt	16	4	24	210	(21)	
	Control valve bracket mounting bolt	16	4	24	270	(27)	
8	Swing device mounting bolt	20	14	30	500	(50)	
9	Swing motor mounting bolt	12	8	10	90	(9)	
10	ORS fittings for hydraulic hoses and piping			17	25	(2.5)	
				19	30	(3)	
				22	40	(4)	
				27	95	(9.5)	
				32	140	(14)	
				36	180	(18)	
		41	210	(21)			
11	Battery mounting nut	10	2	17	50	(5)	
12	Cab mounting nut	16	4	24	210	(21)	
	Cab mounting anchor bolt	22	2	32	550	(55)	
	Cab cushion rubber mounting bolt	12	8	19	110	(11)	
13	Cover mounting bolt	6	—	10	10	(1)	
		8	—	13			
		10	—	17	50	(5)	
		12	—	19	90	(9)	
14	Flexible master coupling of piping	8	4 pair	13	10.3 to 12.4	(1.05 to 1.26)	
	T-bolt clamp of low pressure piping	1/4-28UNF		11	6	(0.6)	
15	Swing bearing mounting bolt	(Upperstructure)	20	37	30	510	(51)
		(Undercarriage)	20	36	30	490	(49)
16	Travel device mounting bolt	20	32	30	630	(63)	
	Travel reduction device cover mounting bolt	14	12	22	180	(18)	
	Sprocket mounting bolt	20	40	30	550	(55)	
17	Upper roller mounting bolt	16	16	24	270	(27)	
18	Lower roller mounting bolt	ZAXIS225US-3, 225US-3, 225USR-3	18	64	27	460	(46)
		ZAXIS225USLC-3, 225USRLC-3, 225USRLCK-3	18	72	27	460	(46)
19	Track shoe bolt	ZAXIS225US-3, 225US-3, 225USR-3	20	368	27	804	(82)
		ZAXIS225USLC-3, 225USRLC-3, 225USRLCK-3	20	392	27	804	(82)
20	Track guard mounting bolt	ZAXIS225US-3, 225US-3, 225USR-3	18	8	27	500	(50)
		ZAXIS225USLC-3, 225USRLC-3, 225USRLCK-3	18	16	27	500	(50)

## GENERAL / Tightening

### TIGHTENING TORQUE SPECIFICATIONS

(ZX240-3 Class, ZX270-3 class)

No.	Descriptions	Bolt Dia	Q'ty	Wrench Size (mm)	Torque			
		mm			N·m	(kgf·m)		
1	Engine cushion rubber mounting bolt and nut (Pump side)	ZX240-3 class	18	4	27	400	(40)	
		ZX270-3 class	18	2	27	400	(40)	
	Engine cushion rubber mounting bolt and nut (Fan Side)	ZX240-3 class	14	4	22	180	(18)	
		ZX270-3 class	18	2	27	400	(40)	
2	Engine bracket mounting bolt (Pump side)	ZX240-3 class	16	8	24	270	(27)	
		ZX270-3 class	12	12	19	110	(11)	
	Engine bracket mounting bolt (Fan side)	ZX240-3 class	10	8	17	65	(6.5)	
		ZX270-3 class	12	6	19	110	(11)	
3	Hydraulic oil tank mounting bolt		18	4	27	400	(40)	
4	Fuel tank mounting bolt		20	4	30	550	(55)	
5	Radiator mounting bolt (Upper Side)		16	4	24	210	(21)	
	Radiator mounting bolt (Lower Side)		16	3	24	270	(27)	
6	Pump mounting bolt		10	8	17	65	(6.5)	
7	Control valve mounting bolt		16	4	24	210	(21)	
	Control valve bracket mounting bolt		16	4	24	270	(27)	
8	Swing device mounting bolt		22	14	32	650	(65)	
9	Swing motor mounting bolt		12	8	10	90	(9)	
10	ORS fittings for hydraulic hoses and piping		-	-	17	25	(2.5)	
					19	30	(3)	
					22	40	(4)	
					27	95	(9.5)	
					32	140	(14)	
					36	180	(18)	
			41	210	(21)			
11	Hycolin tube mounting nut		-	-	17	35	(3.5)	
12	Battery mounting nut		10	4	17	25	(2.5)	
13	Cab mounting nut		16	4	24	210	(21)	
	Cab mounting anchor bolt		22	2	32	550	(55)	
	Cab cushion rubber mounting bolt		12	8	19	110	(11)	
14	Cover mounting bolt		6	-	10	10	(1)	
			8	-	13	10	(1)	
			10	-	17	50	(5)	
15	Flexible master coupling of piping		-	4 pair	13	10.3 to 12.4	(1.05 to 1.26)	
					11	6	(0.6)	
	Jubilee clamp of low pressure piping		-	9	7	6	(0.6)	
			-	4	8	6	(0.6)	
	T-bolt clamp of low pressure piping		-	9	10	6	(0.6)	
16	Swing bearing mounting bolt	(Upperstructure)	22	35	32	650	(65)	
		(Undercarriage)	22	36	32	650	(65)	
17	Travel device mounting bolt	ZX240-3 class	20	32	30	630	(63)	
		ZX270-3 class	20	40	30	630	(63)	
	Travel reduction device cover mounting bolt			14	12	22	180	(18)
	Sprocket mounting bolt	ZX240-3 class	20	40	30	550	(55)	
ZX270-3 class		20	48	30	550	(55)		
18	Upper roller mounting bolt	ZX240-3 class	16	16	24	270	(27)	
		ZX270-3 class	18	16	27	460	(46)	
19	Lower roller mounting bolt	ZAXIS240-3, 250H-3, 250K-3	18	64	27	460	(46)	
		ZAXIS240LC-3, 250LCH-3, 250LCK-3	18	72	27	460	(46)	
		ZAXIS270-3	22	56	32	840	(84)	
		ZAXIS270LC-3	22	64	32	840	(84)	

## GENERAL / Tightening

No.	Descriptions	Bolt Dia	Q'ty	Wrench Size (mm)	Torque		
		mm			N·m	(kgf·m)	
20	Track shoe bolt	ZAXIS240-3, 250H-3, 250K-3	20	376	27	860	(86)
		ZAXIS240LC-3, 250LCH-3, 250LCK-3	20	408	27	860	(86)
		ZAXIS270-3	22	360	32	1160	(116)
		ZAXIS270LC-3	22	384	32	1160	(116)
21	Track guard mounting bolt	ZAXIS240-3, 240LC-3, 250K-3, 250LCK-3	18	8	27	500	(50)
		ZAXIS250H-3, 250LCH-3	18	16	27	500	(50)
		ZAXIS270-3, 270LC-3	22	8	32	750	(75)



- NOTE 1. Apply lubricant (e.g. white zinc B dissolved into spindle oil) to bolts and nuts to reduce friction coefficient of them.*
- 2. Make sure bolt and nut threads are clean before installing.*

## GENERAL / Tightening

### TORQUE 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

Bolt Dia.	Wrench Size	Hexagon Wrench Size	   <small>M552-07-091</small>			   <small>M552-07-090</small>			 <small>M552-07-092</small>		
			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

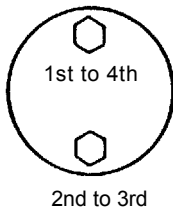
**IMPORTANT:** The following items are applied to both fine and coarse pitch threads.

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.

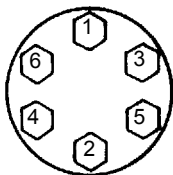
### Bolt Tightening Order

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

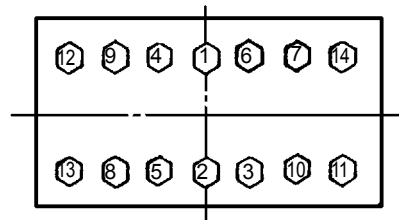
Equally tighten upper and lower alternately



Tighten diagonally



Tighten from center and diagonally

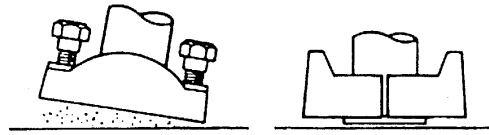


W105-01-01-003

# GENERAL / Tightening

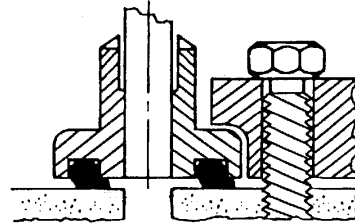
## Service Recommendations for Split Flange

- 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.

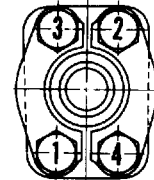


W105-01-01-015

**WRONG**

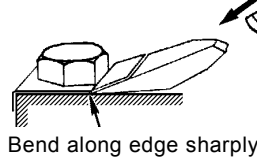


W105-01-01-016

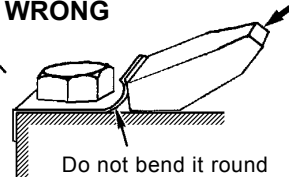


W105-01-01-008

**RIGHT**



**WRONG**



## Nut and Bolt Locking

- Lock Plate

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

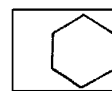
- Cotter Pin

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

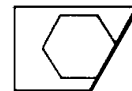
- Lock Wire

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

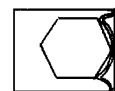
**RIGHT**



**RIGHT**

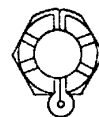


**WRONG**



Bend along edge sharply

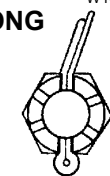
**RIGHT**



**RIGHT**

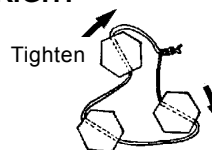


**WRONG**



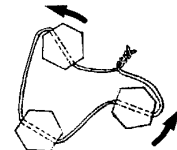
W105-01-01-009

**RIGHT**



Loosen

**WRONG**

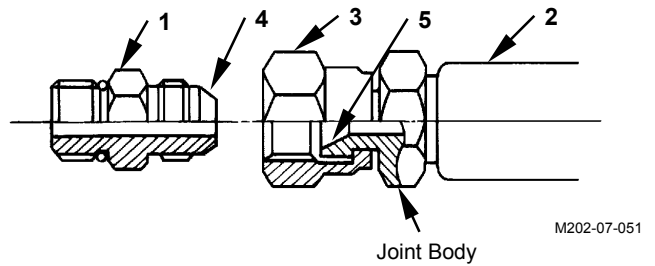


W105-01-01-010

## GENERAL / Tightening

### PIPING JOINT

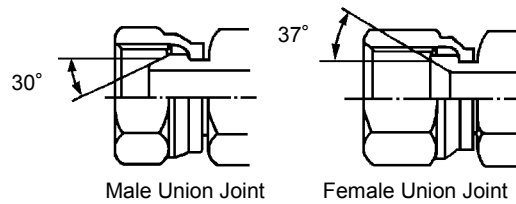
**IMPORTANT:** The torques given in the chart are for general use only. Do not use these torques if a different torque is given for a specific application.



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

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

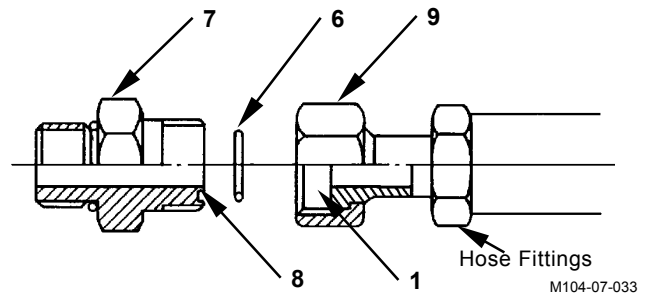


## GENERAL / Tightening

### O-ring Seal Joint

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



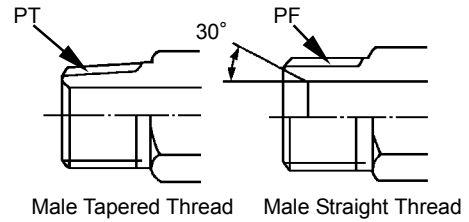
Wrench Size mm	Wrench Size mm	Tightening Torque
Union Nut	Hose Fittings	N·m (kgf·m, lbf·ft)
19	17	29.5 (3.0,21.5)
22	19	69 (7.0,51)
27	22	93 (9.5,69)
32	27	137 (14.0,101)
36	30,32	175 (18.0,129)
41	36	205 (21.0,151)
46	41	205 (21.0,151)

# GENERAL / Tightening

## Screw-In Connection

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

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



W105-01-01-018

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

## Seal Tape Application

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

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

### • Application Procedure

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

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

## Low-Pressure-Hose Clamp Tightening Torque

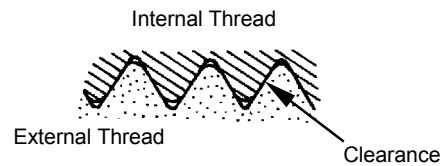
Low-pressure-hose clamp tightening torque differs depending on the type of clamp.

T-Bolt Type Band Clamp:

4.4 N·m (0.45 kgf·m, 3.25 lbf·ft)

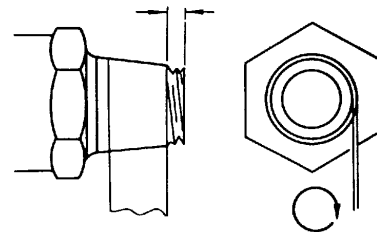
Worm Gear Type Band Clamp:

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

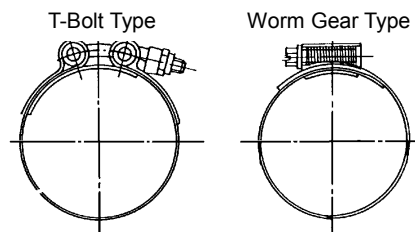


W105-01-01-019

Leave one to two pitch threads uncovered



M114-07-041



M114-07-043

M114-07-042

# GENERAL / Tightening

## Connecting Hose



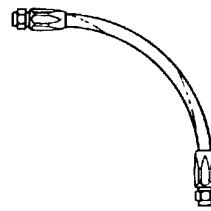
**CAUTION:** When replacing hoses, be sure to use only genuine Hitachi service parts. Using hoses other than genuine Hitachi hoses may cause oil leaks, hose rupture or Separation of fitting, possibly resulting in a fire on the machine.

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

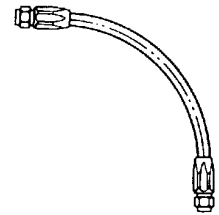
If hoses rub against each other, wear to the hoses will result, leading to hose rupture. Take necessary measures to protect hoses from rubbing against each other.

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

**WRONG**

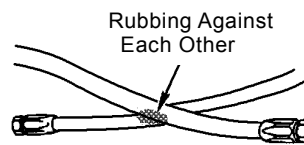


**RIGHT**

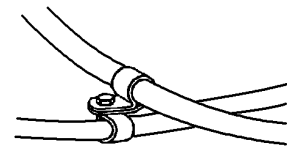


W105-01-01-011

**WRONG**

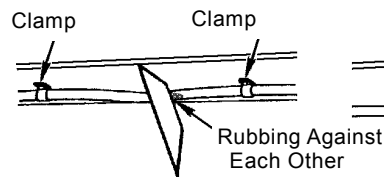


**RIGHT**

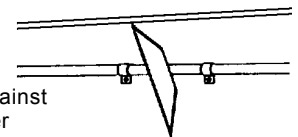


W105-01-01-012

**WRONG**

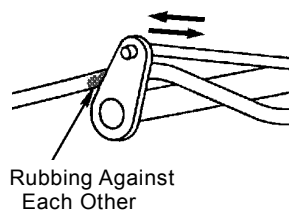


**RIGHT**

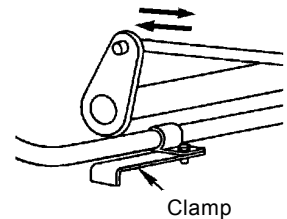


W105-01-01-013

**WRONG**



**RIGHT**



W105-01-01-014

## GENERAL / Tightening

### PERIODIC REPLACEMENT OF PARTS


To ensure safe operation, be sure to conduct periodic inspection of the machine. In addition, the parts listed below, if defective, may pose serious safety/fire hazards. It is very difficult to gauge the extent of deterioration, fatigue, or weakening of the parts listed below simply by visual inspection alone. For this reason, replace these parts at the intervals shown in the table below. However, if any of these parts are found to be defective, replace before starting operation, regardless of the interval.

Also, when replacing hoses, check the clamps for deformation, cracks, or other deterioration, and replace as necessary.

Be sure to perform periodic inspection of all hoses, as shown below, and replace or retighten any defective parts found, as necessary.

Consult your authorized dealer for correct replacement.

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

 **NOTE:** Replace seals, such as O-rings and gaskets, when replacing hoses.

## GENERAL / Painting

### PAINTING

#### Painting specification

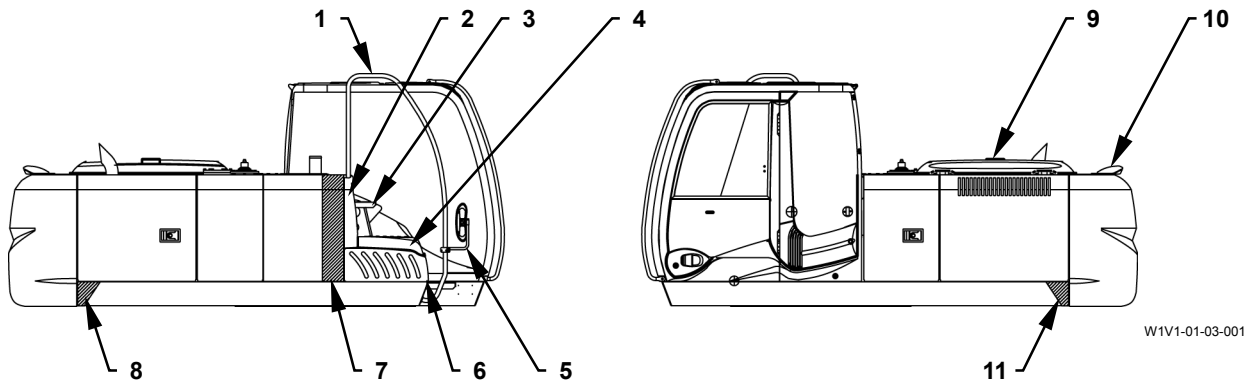
Surfaces to Be Painted	Painting Colour
• Main surface of upperstructure (except cab)	YR-01 [TAXI yellow]
Bed cover	HG Beige Deep
Inner	Grey
• Front attachment	YR-01 [TAXI yellow]
• Track (including swing ring)	N1.0 [Black]
• Floor plate	M/F Cation (allowed)

#### Final painted color

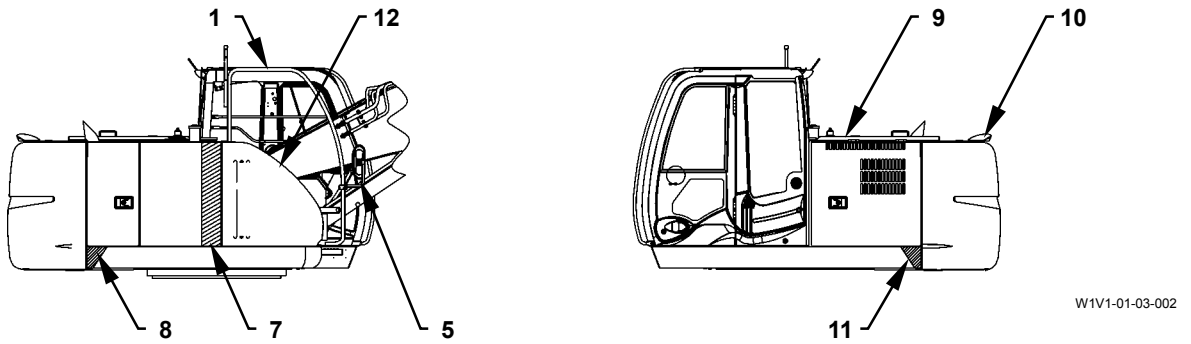
• Inside and outside surface of cab	HG Beige Deep
• Shaded area on cab outside	Shining Silver
• Right window beam, U-Bolt	[KASAI PAINT LF-113-230B (Charcoal series black, half glossy)]
• Suspension lifter (chair bottom)	[N2.0 (Black)]
• Lever (Travel, pilot shut-off, foot rest)	High Grade Brack
• Engine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

# GENERAL / Painting

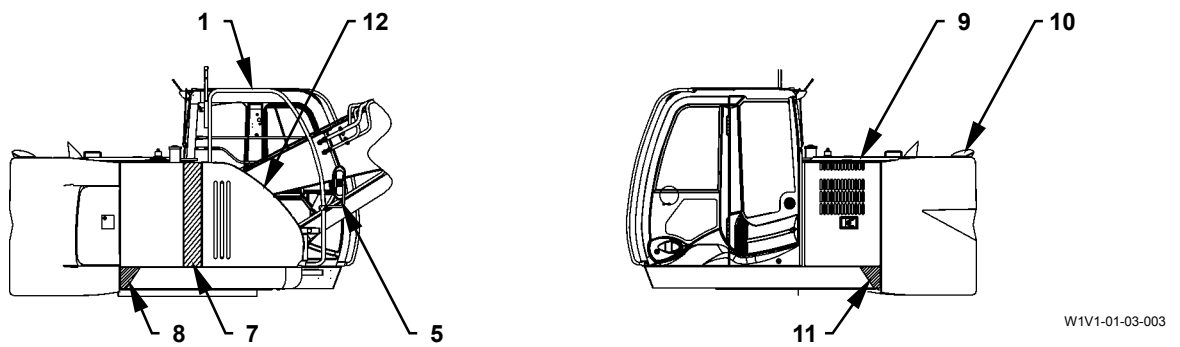
## ZX200-3 class, ZX240-3 class, ZX270-3 class



## ZX225USR-3 class



## ZX225US-3 class

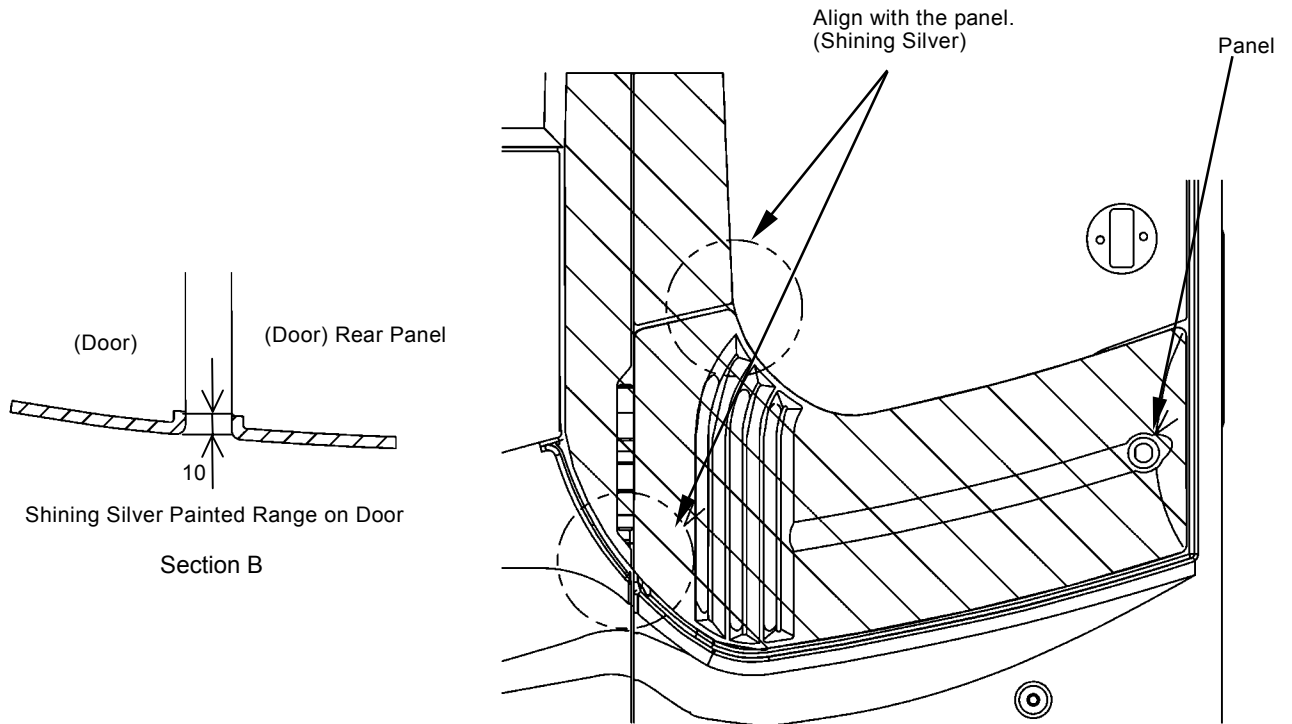
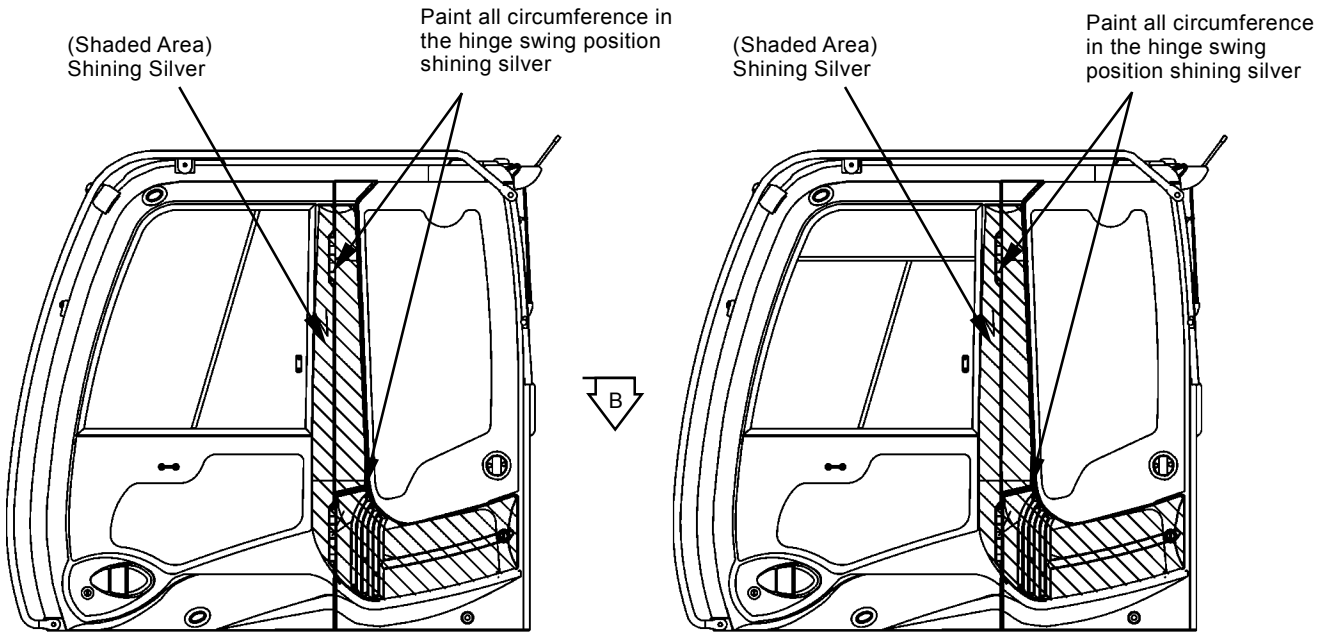


- |   |                    |                            |                          |
|---|--------------------|----------------------------|--------------------------|
| 1 - Handrail on Upperstructure Right Side | 4 - Tool Box Cover | 7 - Decal (Shining Silver) | 10 - Camera Cover        |
| 2 - Cover                                 | 5 - Mirror Stay    | 8 - Decal (TAXI Yellow)    | 11 - Decal (TAXI Yellow) |
| 3 - Step                                  | 6 - Tool Box       | 9 - Engine Cover           | 12 - Control Valve Cover |

# GENERAL / Painting

ZX200-3 class, ZX240-3 class, ZX270-3 class

ZX225US-3 class, ZX225USR-3 class



W1V1-01-03-004

**GENERAL / Painting**

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(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.

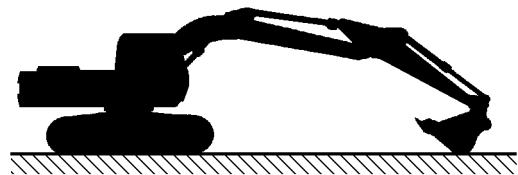
Hydraulic oil may be hot just after operation, and may spurt, possibly causing severe burns. Be sure to wait for oil to cool before starting work.

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

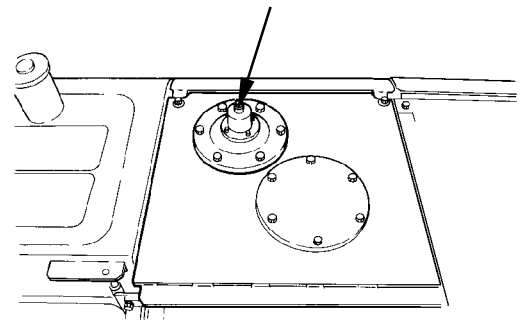
1. Place the machine on a firm, level surface.
2. Stop the engine. Push the pressure release button on top of the hydraulic oil tank to release any remaining pressure.
3. Remove hydraulic oil tank cap. Connect a vacuum pump to maintain negative pressure in the hydraulic oil tank.

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



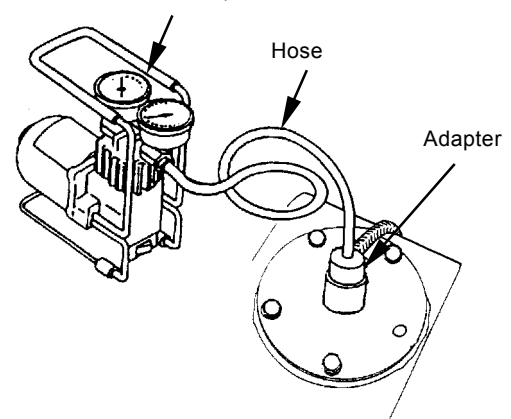
M104-07-021

Pressure Release Button



W1V1-04-01-008

Vacuum Pump



W562-02-03-008

## **GENERAL / Bleeding Air from Hydraulic Oil Tank**

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(Blank)

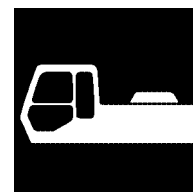




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# SECTION 2 UPPERSTRUCTURE



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Assemble Regulator .....	W2-4-58
Disassemble Solenoid Valve .....	W2-4-60
Assemble Solenoid Valve .....	W2-4-62
Structure of Pilot Pump .....	W2-4-64
Maintenance Standard .....	W2-4-66

### Group 5 Control Valve

Remove and Install Control Valve (ZX200-3 class, 240-3 class, 270-3 class) .....	W2-5-1
Remove and Install Control Valve (ZX225US-3 class, 225USR-3 class)..	W2-5-3
Disassemble Control Valve (4-Spool Side) .....	W2-5-10
Assemble Control Valve (4-Spool Side) .....	W2-5-22
Disassemble Control Valve (5-Spool Side) .....	W2-5-40
Assemble Control Valve (5-Spool Side) .....	W2-5-52
Disassemble Housing .....	W2-5-64
Assemble Housing.....	W2-5-66
Remove and Install Auxiliary Control Valve (Optional).....	W2-5-69
Disassemble Auxiliary Control Valve .....	W2-5-72
Assemble Auxiliary Control Valve .....	W2-5-76

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## Group 6 Swing Device

Remove and Install Swing Device (ZX200-3 class, 240-3 class, 270-3 class) .....	W2-6-1
Remove and Install Swing Device (ZX225US-3 class, 225USR-3 class) .....	W2-6-3
Disassemble Swing Device .....	W2-6-8
Assemble Swing Device .....	W2-6-16
Disassemble Swing Motor (ZX200-3 class, ZX225US-3 class, 225USR-3 class, 240-3 class) .....	W2-6-30
Disassemble Swing Motor (ZX270-3 class) .....	W2-6-34
Assemble Swing Motor (ZX200-3 class, ZX225US-3 class, 225USR-3 class, 240-3 class) .....	W2-6-38
Assemble Swing Motor (ZX270-3 class) .....	W2-6-42
Structure of Swing Parking Brake Switch Valve (ZX270-3 class) .....	W2-6-46
Maintenance Standard .....	W2-6-47

## 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 Solenoid Valve .....	W2-8-1
Disassemble Pilot Shut-Off Solenoid Valve .....	W2-8-2
Assemble Pilot Shut-Off Solenoid Valve .....	W2-8-4

## Group 9 Signal Control Valve

Remove and Install Signal Control Valve (ZX200-3 class, 240-3 class, 270-3 class) .....	W2-9-1
Remove and Install Signal Control Valve (ZX225US-3 class, 225USR-3 class) .....	W2-9-3
Structure of Signal Control Valve .....	W2-9-8

## Group 10 4-Spool Solenoid Valve Unit

Remove and Install 4- Spool Solenoid Valve Unit (ZX200-3 class, 240-3 class, 270-3 class) .....	W2-10-1
Remove and Install 4- Spool Solenoid Valve Unit (ZX225US-3 class, 225USR-3 class) .....	W2-10-2
Structure of 4-Spool Solenoid Valve Unit .....	W2-10-4

## Group 11 Engine

Remove and Install Engine (ZX200-3 class, 240-3 class, 270-3 class) .....	W2-11-1
Remove and Install Engine (ZX225US-3 class) .....	W2-11-24
Remove and Install Engine (ZX225USR-3 class) .....	W2-11-49


## UPPERSTRUCTURE / Cab

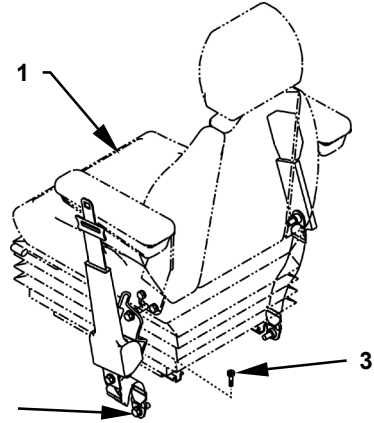
### REMOVE AND INSTALL CAB (ZX200-3 CLASS, 240-3 CLASS, 270-3 CLASS)

#### Removal

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


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

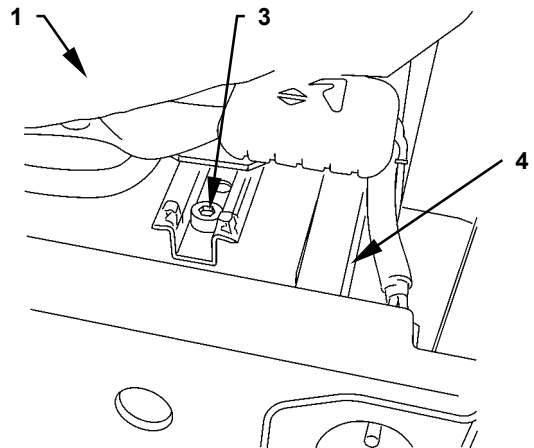
 : 16 mm



W1JB-02-01-008

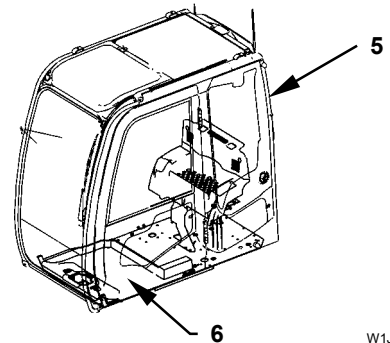
2. Remove socket bolts (3) (4 used) from seat (1). Remove seat (1) from bracket (4).

 : 6 mm



W1JB-02-07-007


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

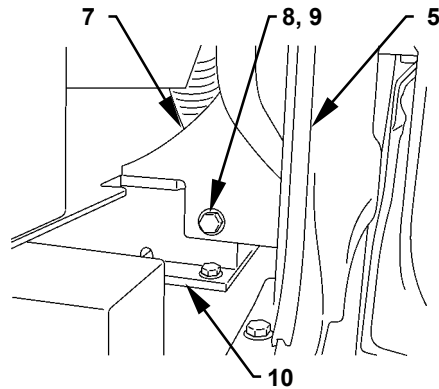


W1JB-02-07-015

## 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).

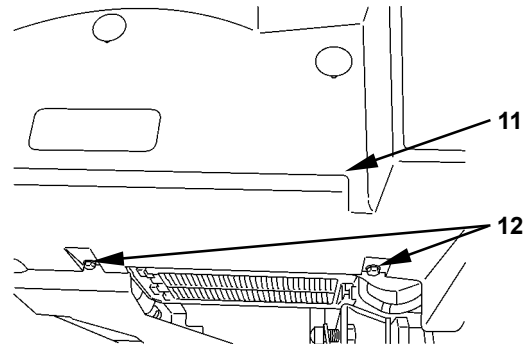
 : 19 mm



W1JB-02-01-003

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

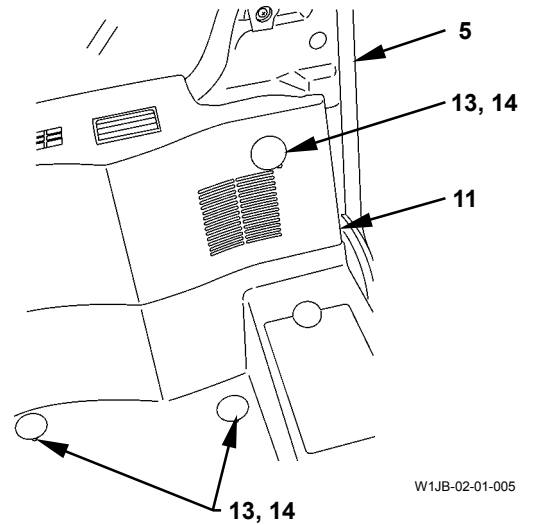
 : 13 mm



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).




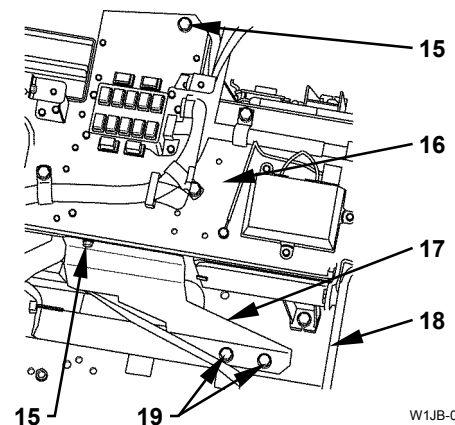
W1JB-02-01-005

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

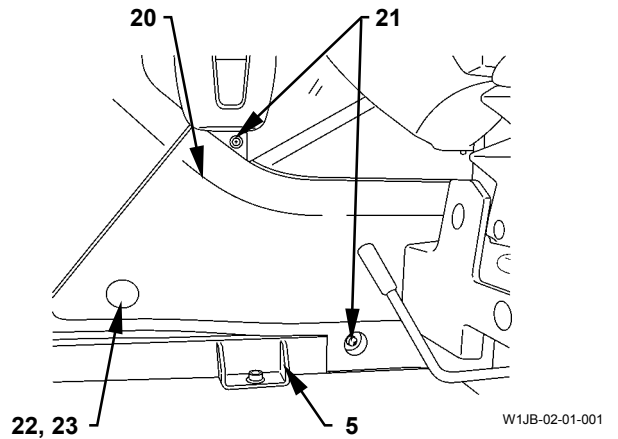


W1JB-02-01-040

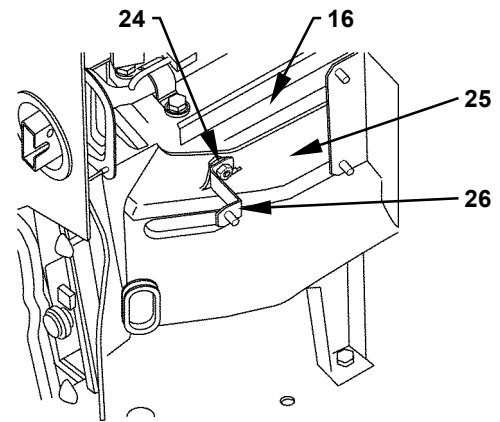


## UPPERSTRUCTURE / Cab

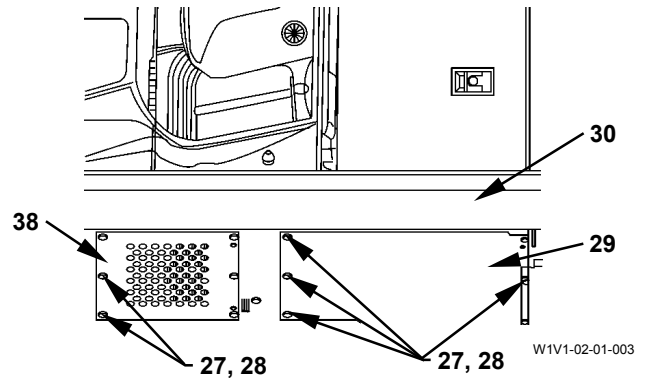
10. Remove screws (21) (2 used) from cover (20).  
Remove cap (22) and screw (23) from cover (20).  
Remove cover (20) from cab (5).



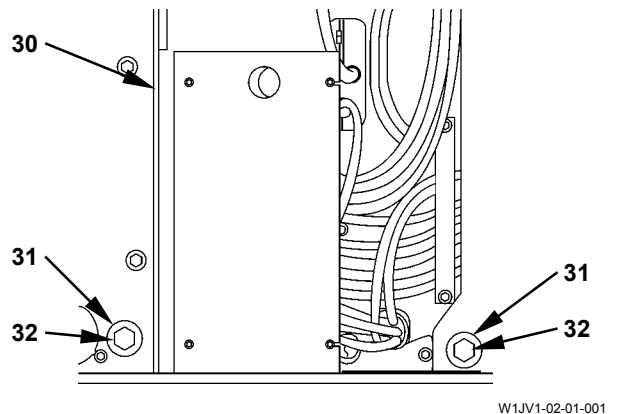
11. Remove bolt (24) from duct (25). Remove duct (25) from bracket (26).  
🔧 : 13 mm






12. Remove bolts (27) and washers (28) (13 used for each) from under covers (29, 38) under the cab.  
Remove the under covers from main frame (30).  
🔧 : 17 mm

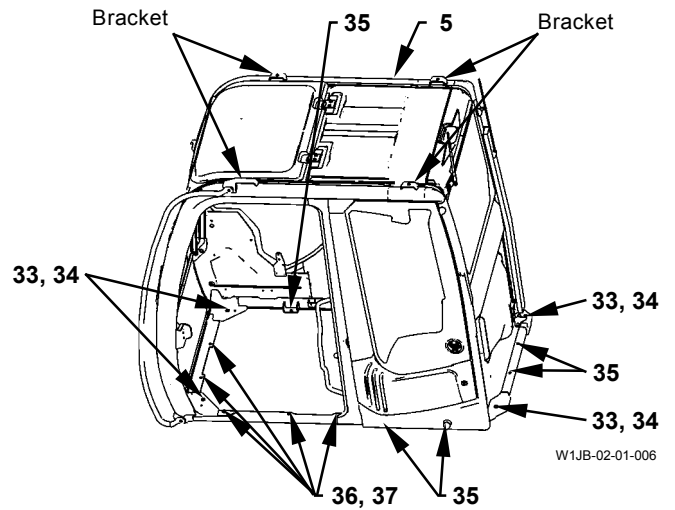


13. Remove anchor bolts (32) (2 used) and spacers (31) (2 used) from main frame (30).  
🔧 : 32 mm



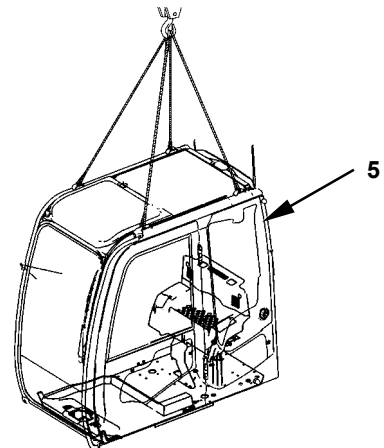
## UPPERSTRUCTURE / Cab

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:  
ZX200-3 class: 330 kg (730 lb)  
ZX240-3 class, 270-3 class: 385 kg (850 lb)

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



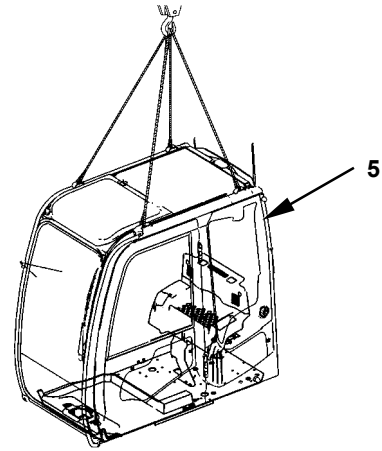
# UPPERSTRUCTURE / Cab

## Installation




**CAUTION: Cab (5) weight:**  
ZX200-3 class: 330 kg (730 lb)  
ZX240-3, 270-3 class: 385 kg (850 lb)


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




W1J7-02-01-001


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

 : 24 mm


 : 210 N·m (21 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).

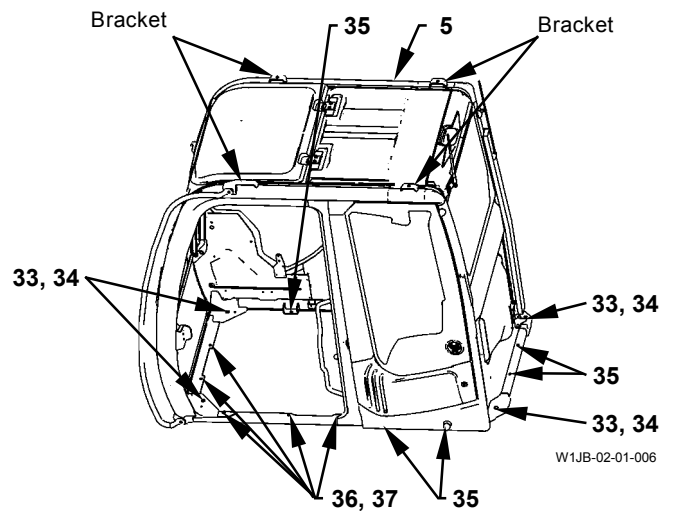
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

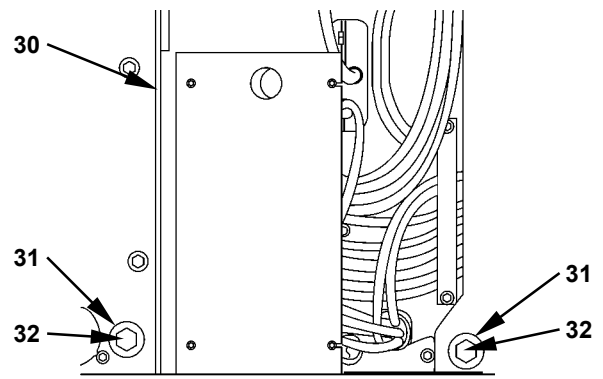
5. Install cab (5) to main frame (30) with anchor bolts (32) (2 used) and spacers (31) (2 used).

 : 32 mm

 : 550 N·m (56 kgf·m, 410 lbf·ft)




W1JB-02-01-006




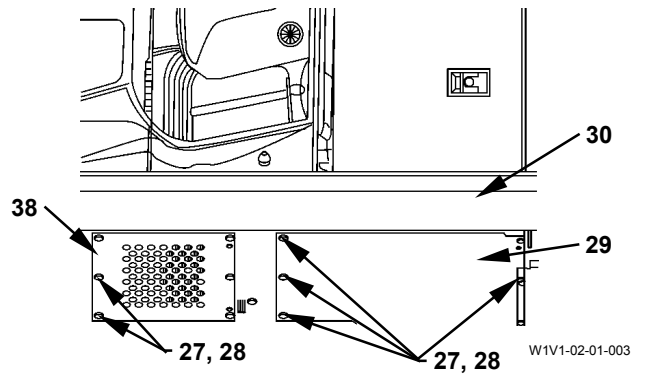
W1JV1-02-01-001

## UPPERSTRUCTURE / Cab


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


 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

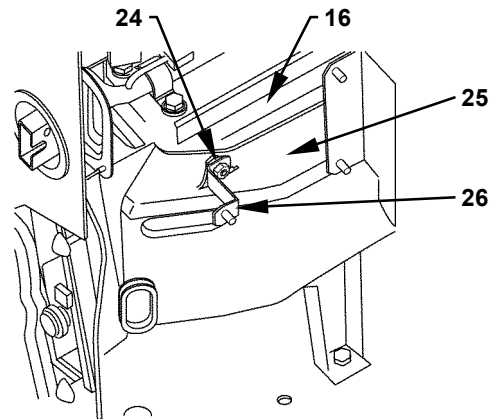


7. Install duct (25) to brackets (16, 26) with bolt (24).

 : 13 mm

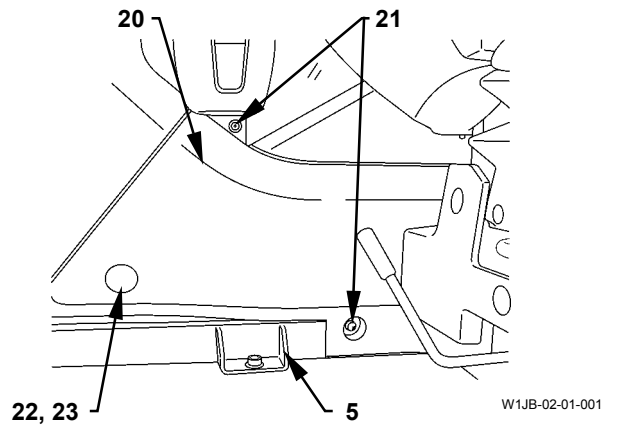
 : 20 N·m (2 kgf·m, 15 lbf·ft)

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





## 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).




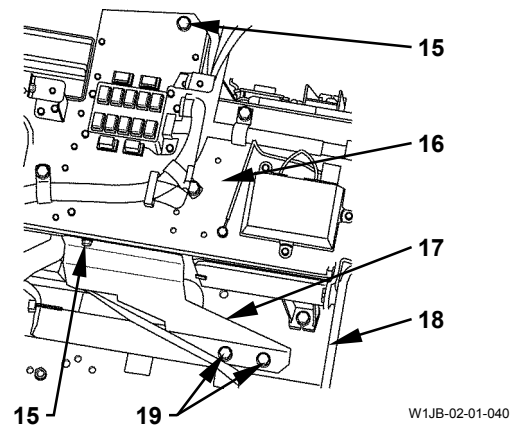
10. Install bracket (16) to bracket (18) with bolts (15) (2 used). Install cover (17) to bracket (18) with bolts (19) (2 used).

 : 13 mm

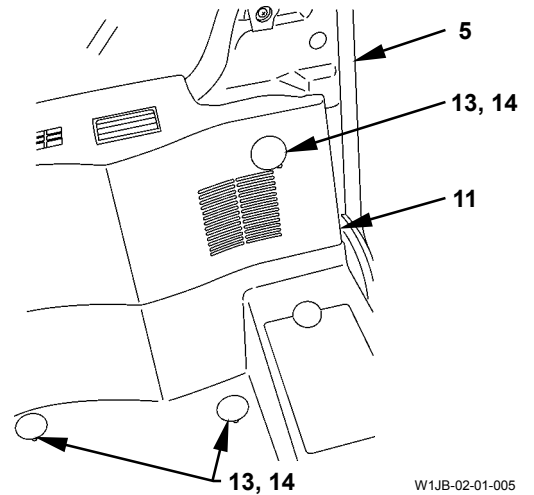
 : 20 N·m (2 kgf·m, 15 lbf·ft)

 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)




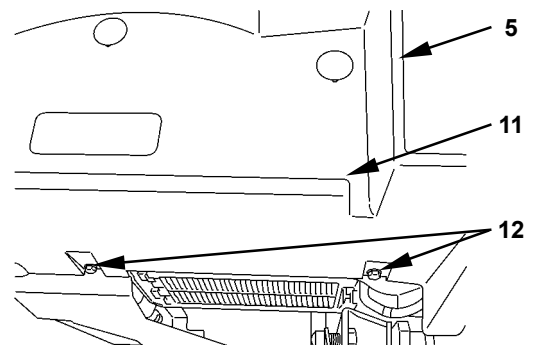
11. Install cover (11) to cab (5) with bolts (14) (5 used). Install caps (13) (6 used) to screws (14) (6 used).



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


 : 13 mm


 : 20 N·m (2 kgf·m, 15 lbf·ft)

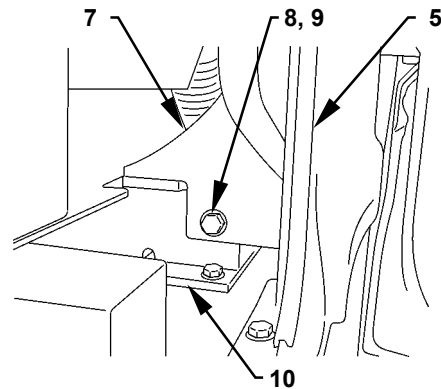


## UPPERSTRUCTURE / Cab

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

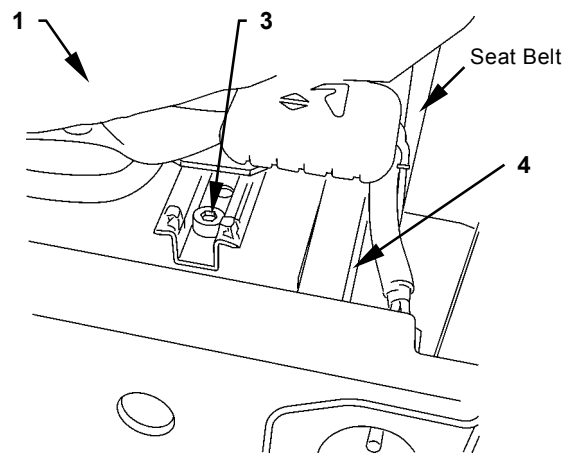


**CAUTION: Seat (1) weight: 40 kg (88 lb)**

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


 : 6 mm


 : 20 N·m (2 kgf·m, 15 lbf·ft)

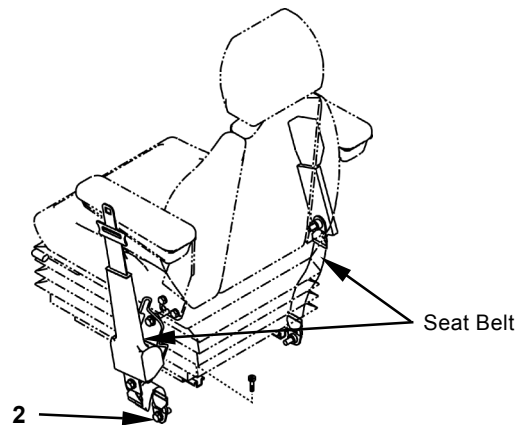


W1JB-02-07-007

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

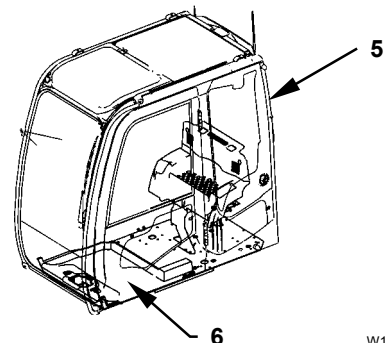
 : 16 mm

 : 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

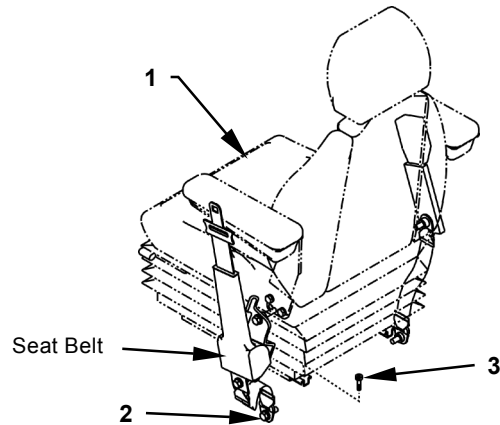
### REMOVE AND INSTALL CAB (ZX225US-3 CLASS, 225USR-3 CLASS)

#### Removal

**CAUTION:** Seat (1) weight: 40 kg (90 lb)


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

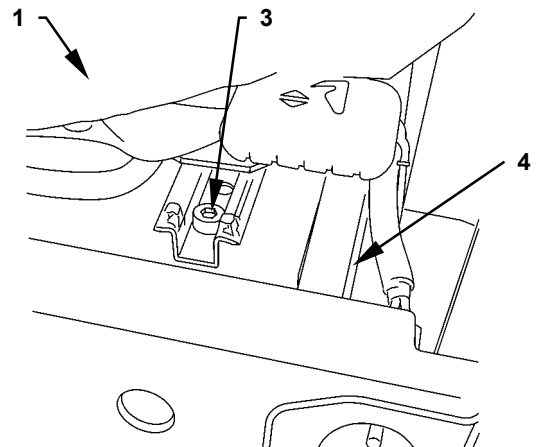
 : 16 mm



W1JB-02-01-008

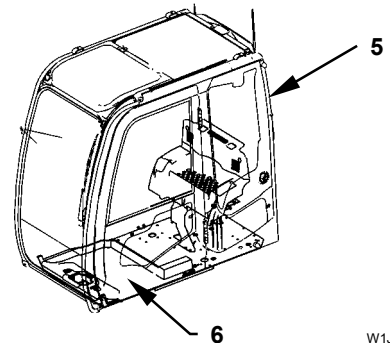
2. Remove socket bolts (3) (4 used) from seat (1). Remove seat (1) from bracket (4).

 : 6 mm



W1JB-02-07-007

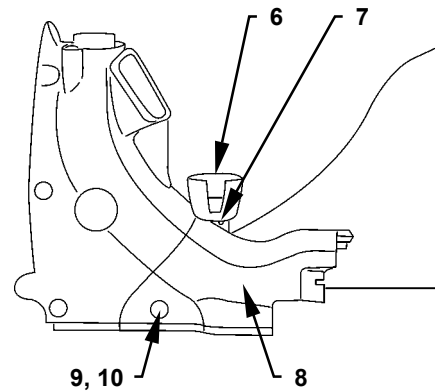
3. Remove mat (6) from cab (5).



W1JB-02-07-015

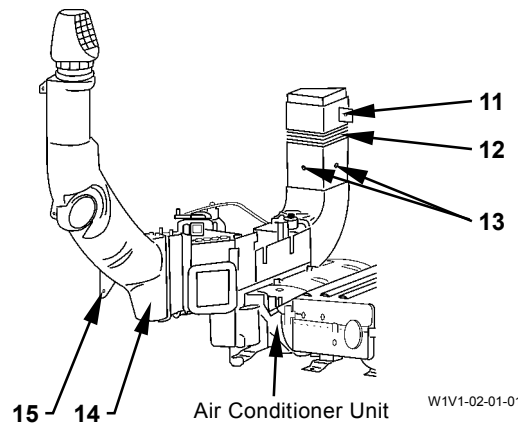
## UPPERSTRUCTURE / Cab

4. Remove screw (7). Remove cup holder (6) from cover (8). Remove cap (9) from cover (8). Remove bolt (10). Remove cover (8) from the cab.



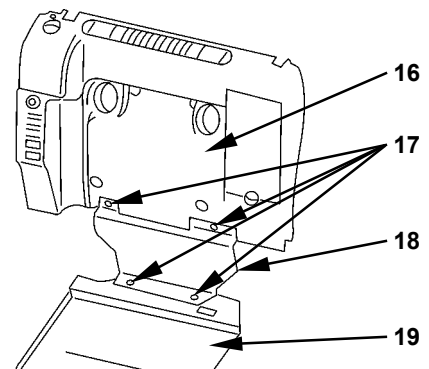
W1V1-02-01-011

5. Remove screw (15). Remove duct (14) from the cab.
6. Remove screws (13) (2 used) and screw (11). Remove duct (12) from the cab.



W1V1-02-01-012

7. Remove screws (17) (4 used). Remove cover (18) from covers (16, 19).

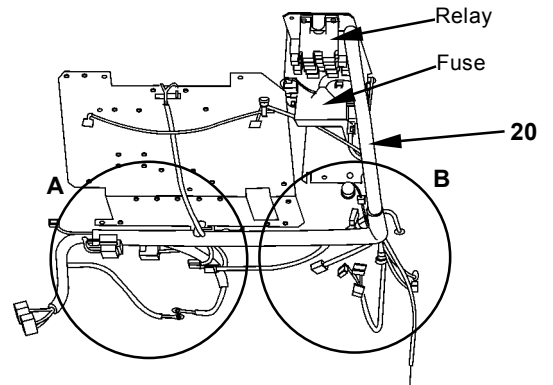


W1V1-02-01-013

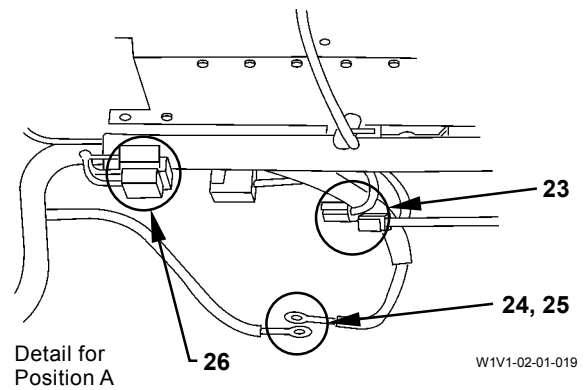


## UPPERSTRUCTURE / Cab

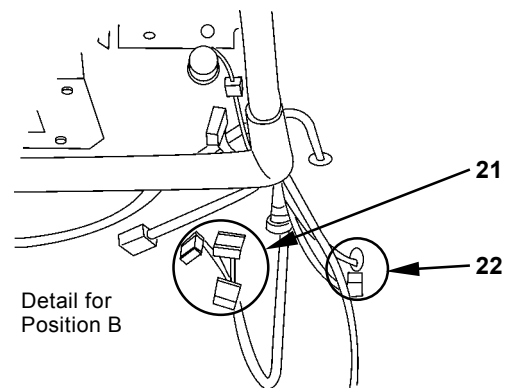
8. Remove connectors (21) (3 used) and (22) (2 used) of wirings tied with the left pilot valve hose.
9. Remove connectors (23) (2 used) and (26) (3 used) of wirings tied with the left pilot valve hose.
10. Remove screws (24) (2 used). Remove ground lines (25) (2 used) from the main frame.



W1V1-02-01-014



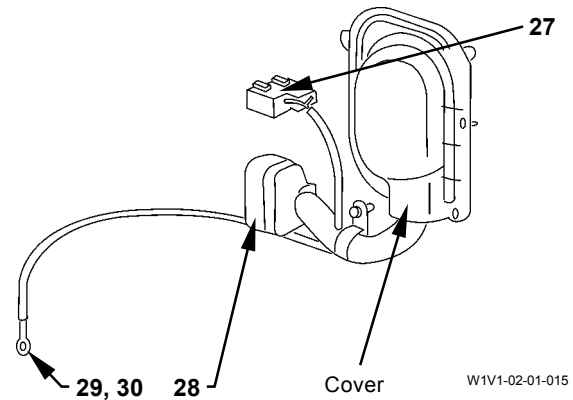
W1V1-02-01-019




W1V1-02-01-020

## UPPERSTRUCTURE / Cab


11. Remove connectors (27, 28) from the rear of cab.  
Remove screw (29). Remove ground line (30)  
from the main frame.

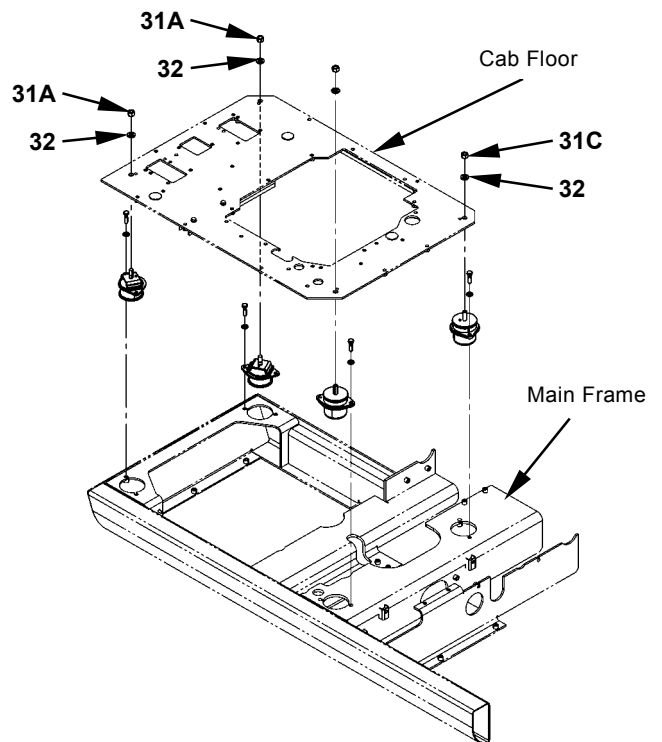


12. Remove nuts (31A) (2 used) and washers (32) (2 used) from the front floor inside cab.

 : 24 mm

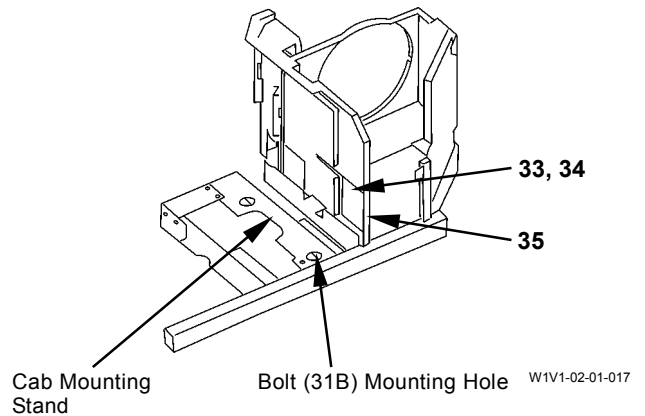
13. Remove nut (31C) and washer (32) from the bottom of rear right outside cab.

 : 24 mm

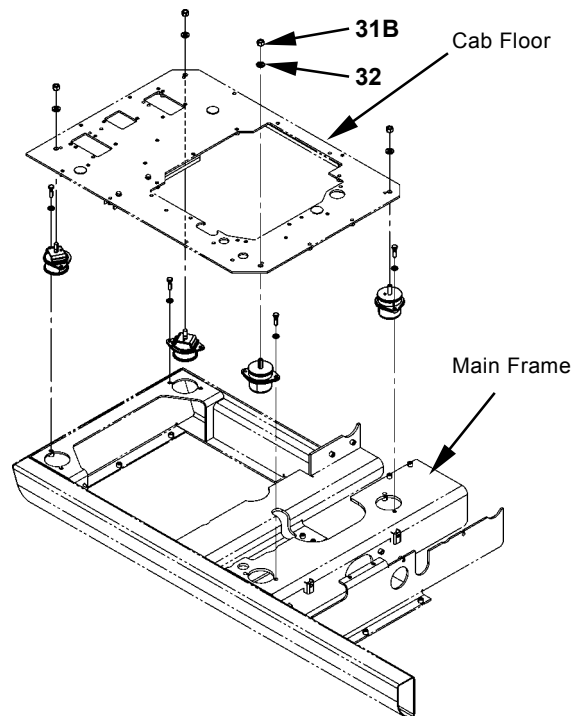


## UPPERSTRUCTURE / Cab



14. Open and lock the door in washer tank room. Remove wing nuts (34) (4 used) from cover (33). Remove cover (33) from bracket (35). Remove the hose of the window washer tank.

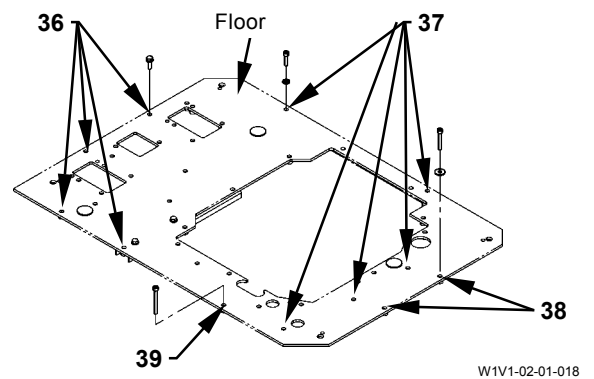


15. Remove nut (31B) and washer (32) from the cover (33) mounting side.




16. Remove nuts (36) (4 used), socket bolts (37) (5 used) and (39) from the floor in cab. Remove socket bolts (38) (2 used) from the bottom of rear in cab.

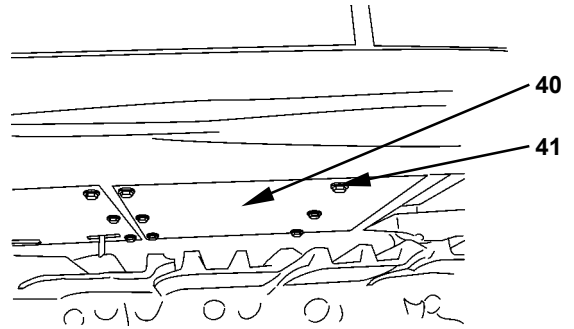
 : 17 mm  
 : 8 mm



## UPPERSTRUCTURE / Cab


17. Remove bolts (41) (6 used). Remove under cover (40) from the bottom of main frame.

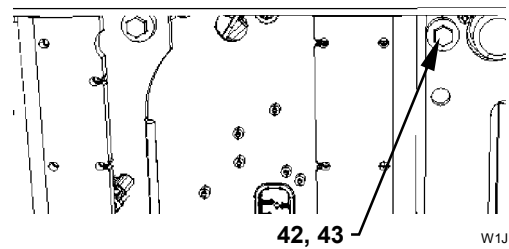
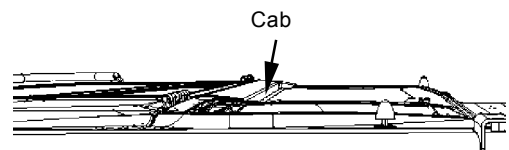
 : 17 mm



W1J1-02-01-004

18. Remove anchor bolts (42) and washer (43) from the bottom of main frame.

 : 32 mm

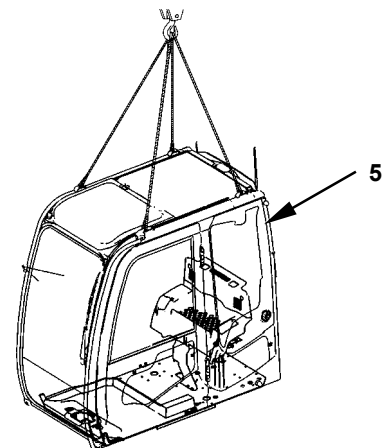


W1J1-02-01-003

 **CAUTION:** Cab weight: 310 kg (680 lb)

**IMPORTANT:** Before hoisting the cab, check if the wiring, connector and duct are removed.

19. Attach a nylon sling to the lifting hole (4 places) on cab top. Hoist and remove the cab from the main frame.



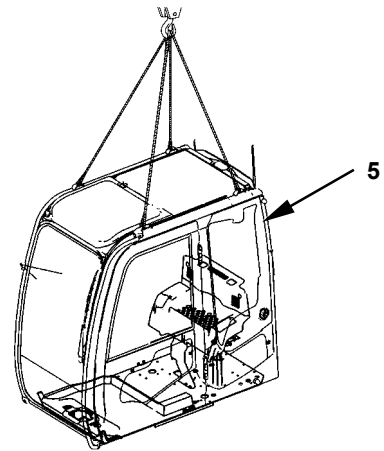
W1J7-02-01-001

## UPPERSTRUCTURE / Cab

### Installation


**CAUTION:** Cab weight: 310 kg (680 lb)


1. Attach a nylon sling to the lifting hole (4 places) on cab top. Hoist and install the cab to the main frame.




W1J7-02-01-001


2. Install the front floor inside cab with nuts (31A) (2 used) and washers (32) (2 used).

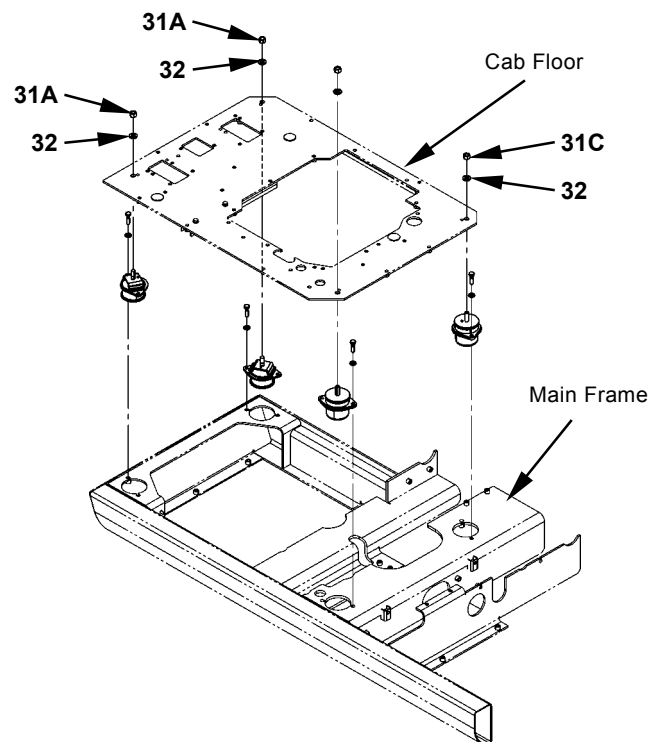
 : 32 mm

 : 550 N·m (56 kgf·m, 406 lbf·ft)

3. Install the bottom of rear right outside cab with nut (31C) and washer (32).

 : 32 mm


 : 550 N·m (56 kgf·m, 406 lbf·ft)




W1V1-02-01-016

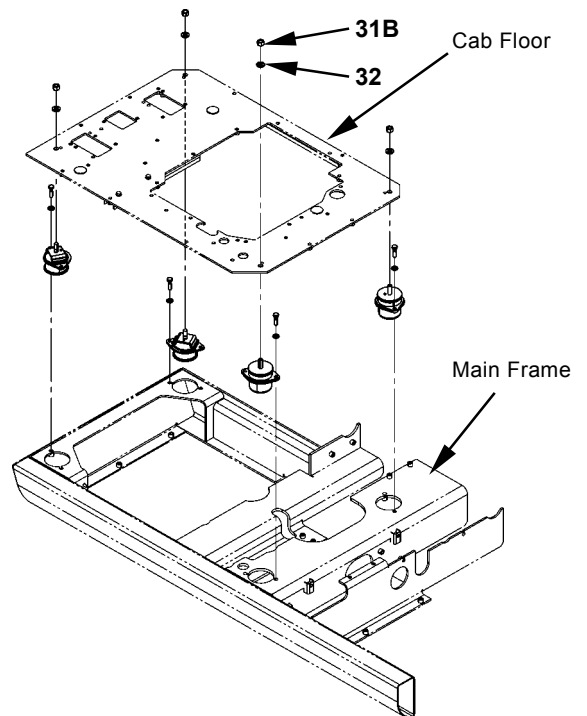
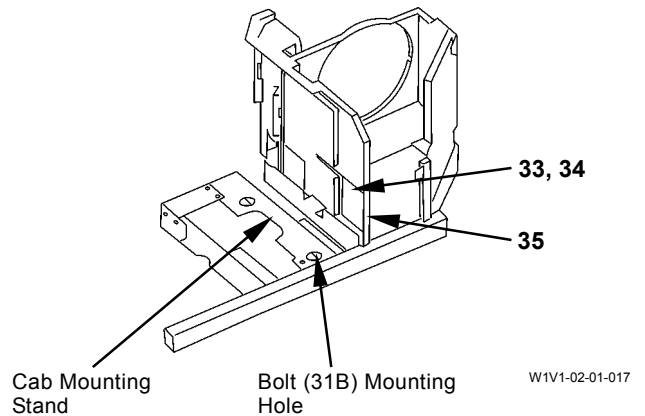
## UPPERSTRUCTURE / Cab

4. Install the bottom of rear left outside cab through the cover (33) mounting side with nut (31B) and washer (32).


 : 32 mm


 : 550 N·m (56 kgf·m, 406 lbf·ft)

5. Install cover (33) to bracket (35) with wing nuts (34) (4 used).




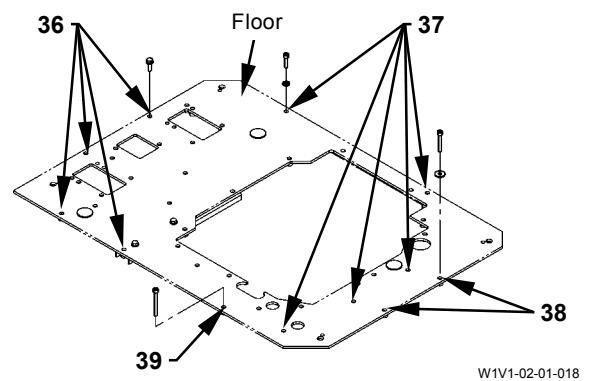
6. Install the cab to the floor with nuts (36) (4 used), socket bolts (37) (5 used) and (39). Install the rear of cab with socket bolts (38) (2 used).

 : 17 mm

 : 50 N·m (5.1 kgf·m, 37 lbf·ft)


 : 8 mm


 : 50 N·m (5.1 kgf·m, 37 lbf·ft)

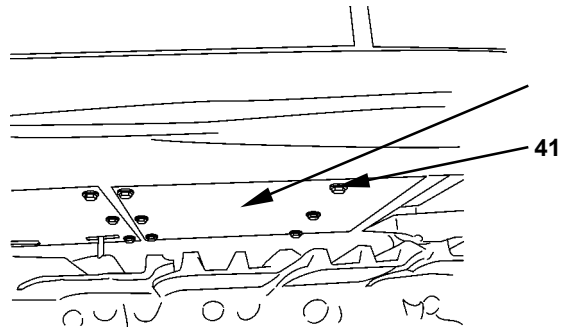


## UPPERSTRUCTURE / Cab

7. Remove anchor bolt (42) and washer (43) to the bottom of main frame.


 : 32 mm


 : 550 N·m (56 kgf·m, 406 lbf·ft)

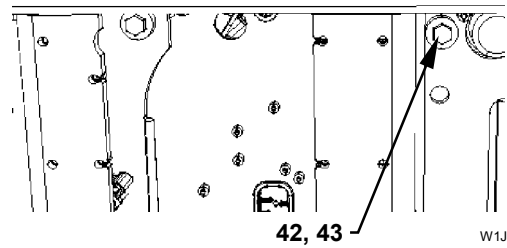
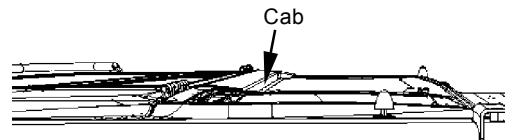


W1V1-02-01-004

8. Install under cover (40) to the bottom of main frame with bolts (41) (6 used).

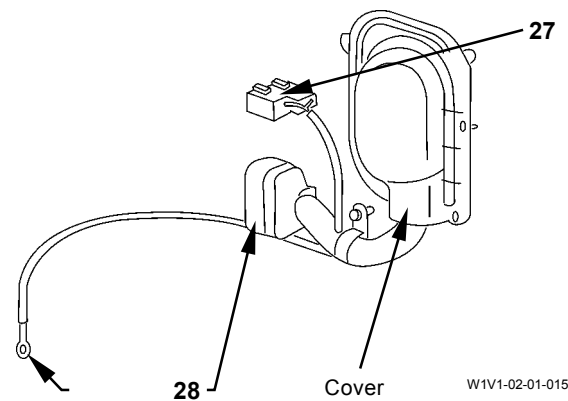
 : 17 mm

 : 50 N·m (5.1 kgf·m, 37 lbf·ft)



W1V1-02-01-003

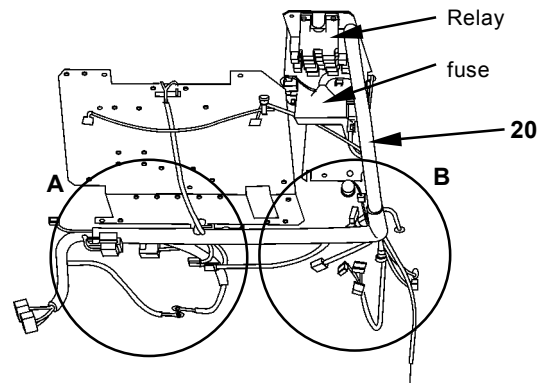
9. Connect connectors (27, 28) on the rear of cab. Install ground line (30) to the main frame with screw (29).



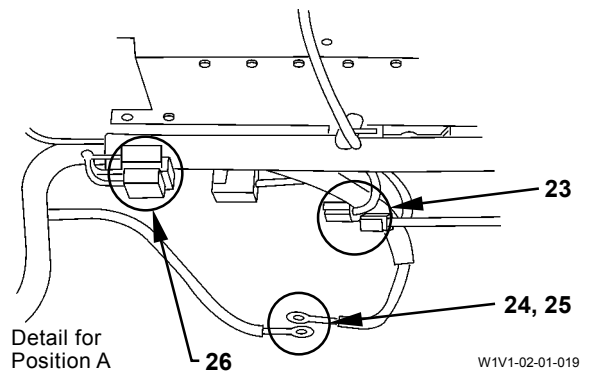
W1V1-02-01-015

## UPPERSTRUCTURE / Cab

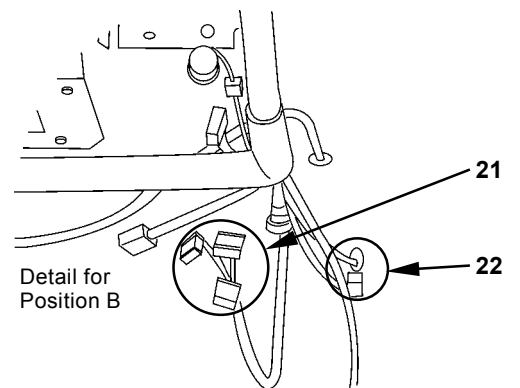
10. Install ground lines (25) (2 used) to the main frame with screws (24) (2 used).
11. Install connectors (21) (3 used) and (22) (2 used) of wirings tied with the left pilot valve hose.
12. Install connectors (23) (2 used) and (26) (3 used) of wirings tied with the right pilot valve hose.



W1V1-02-01-014



W1V1-02-01-019

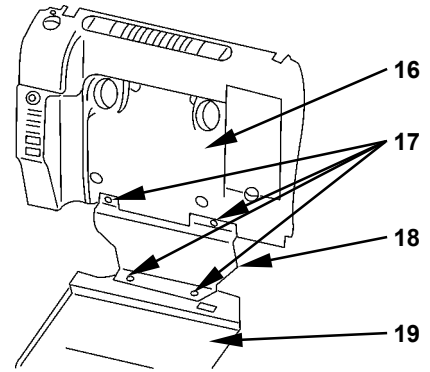


W1V1-02-01-020



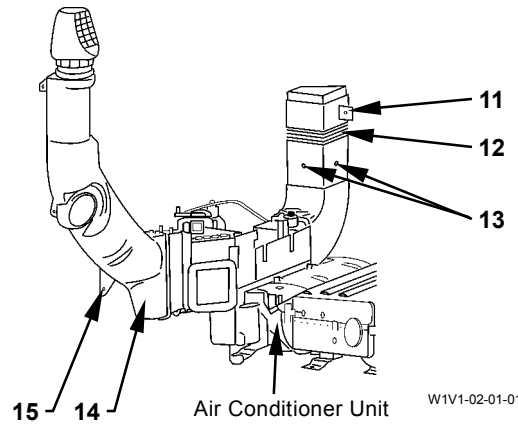
## UPPERSTRUCTURE / Cab

13. Install cover (18) to covers (16, 19) with screws (17) (4 used).



W1V1-02-01-013

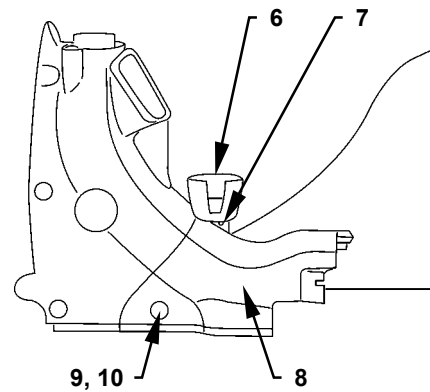
14. Install duct (12) to the cab with screws (13) (2 used) and screw (11).



Air Conditioner Unit

W1V1-02-01-012


15. Install cup holder (6) to cover (8) in the right side of cab with screw (7). Attach cap (9) to cover (8).

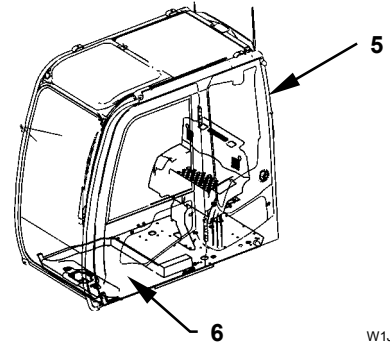


W1V1-02-01-011

## UPPERSTRUCTURE / Cab


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


 **CAUTION: Seat (1) weight: 40 kg (90 lb)**

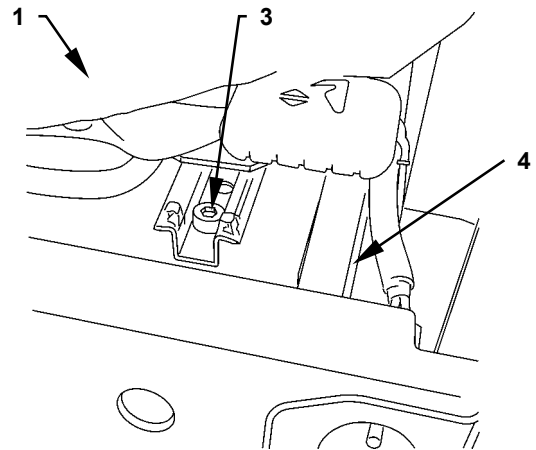


W1JB-02-07-015

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


 : 6 mm


 : 20 N·m (2 kgf·m, 15 lbf·ft)

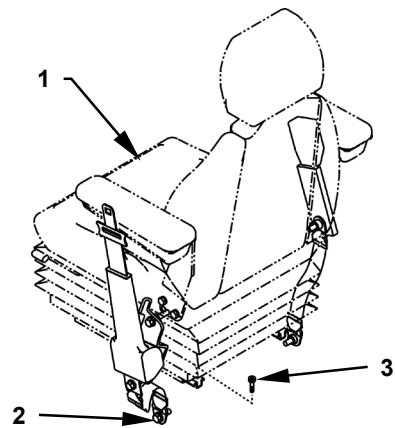


W1JB-02-07-007

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

 : 16 mm


 : 50 N·m (5.1 kgf·m, 37 lbf·ft)

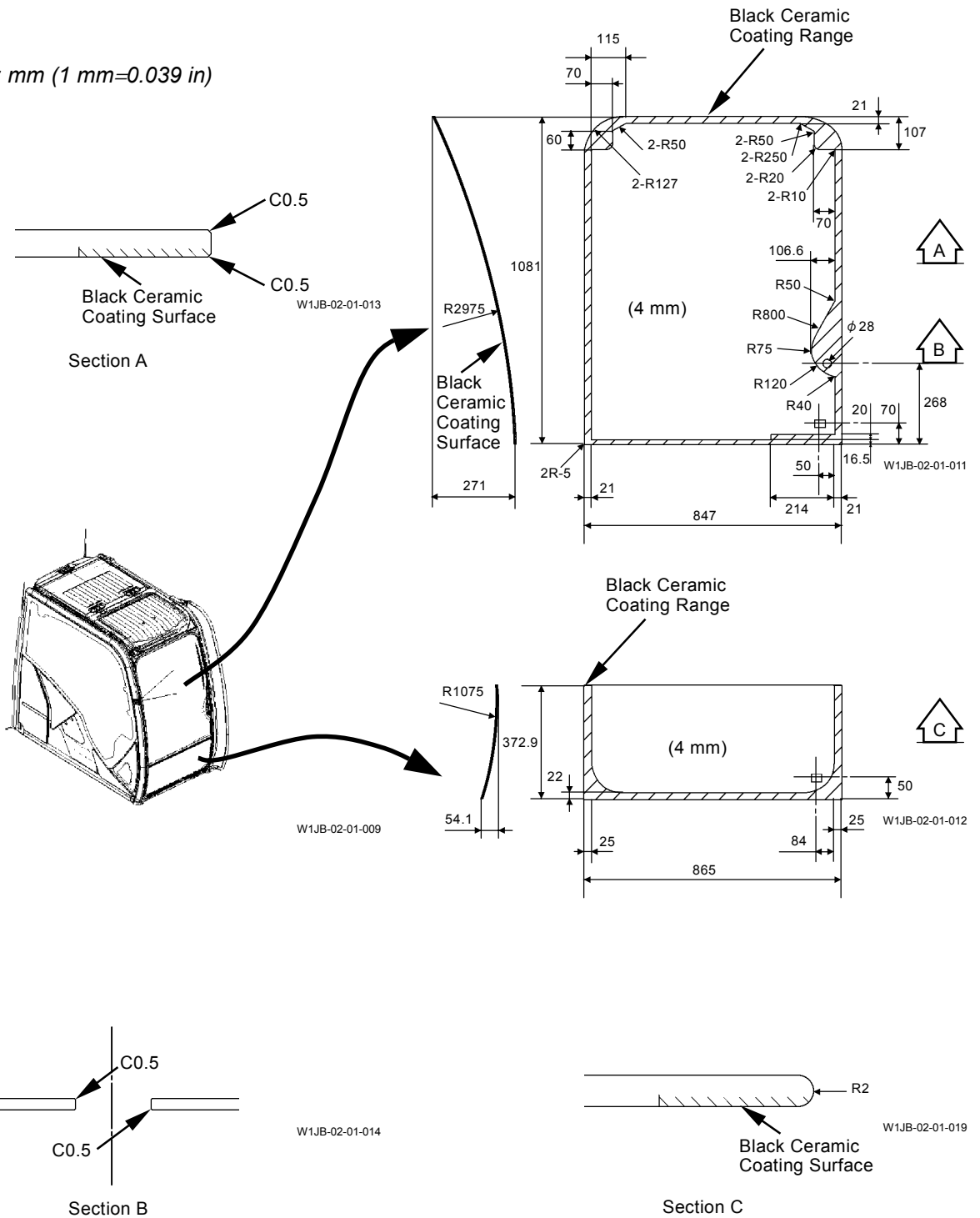


W1JB-02-01-008


# UPPERSTRUCTURE / Cab

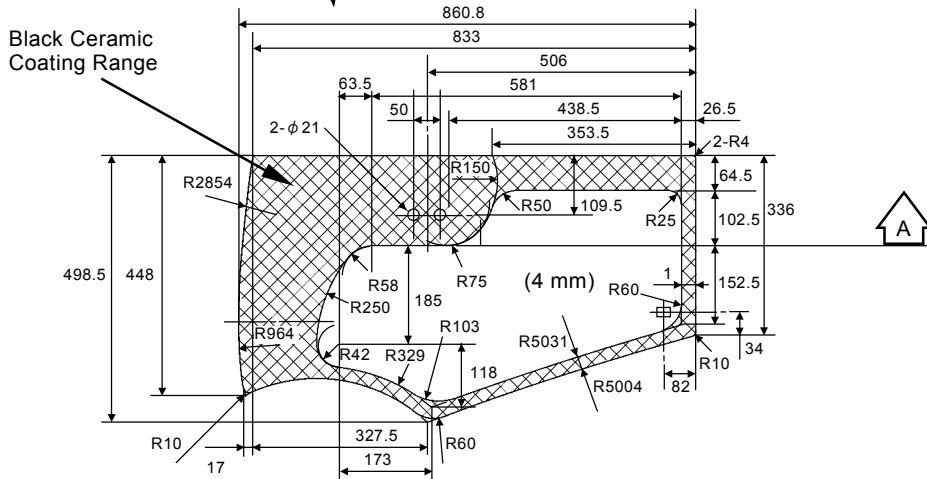
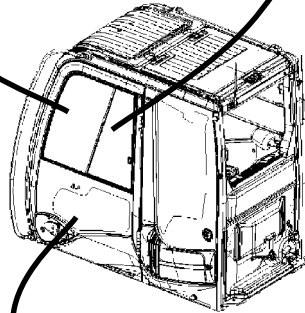
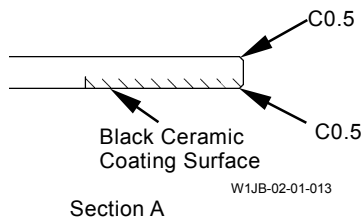
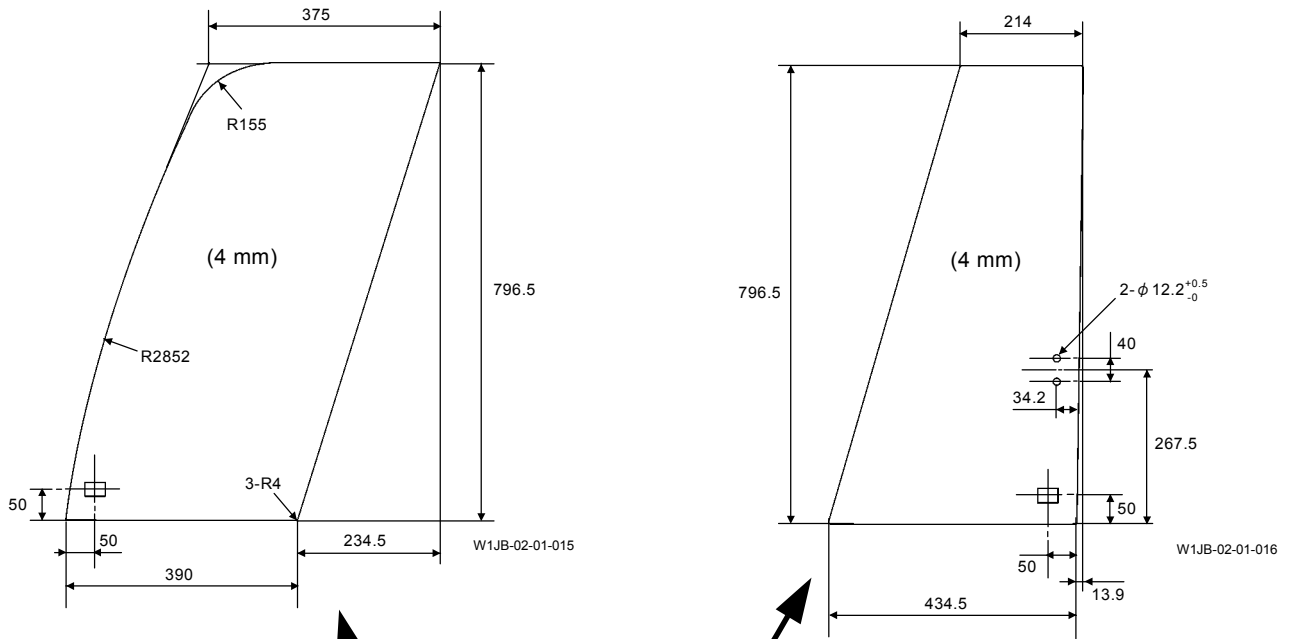
## DIMENSIONS OF CAB GLASS (ZX200-3 CLASS, 240-3 CLASS, 270-3 CLASS)

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



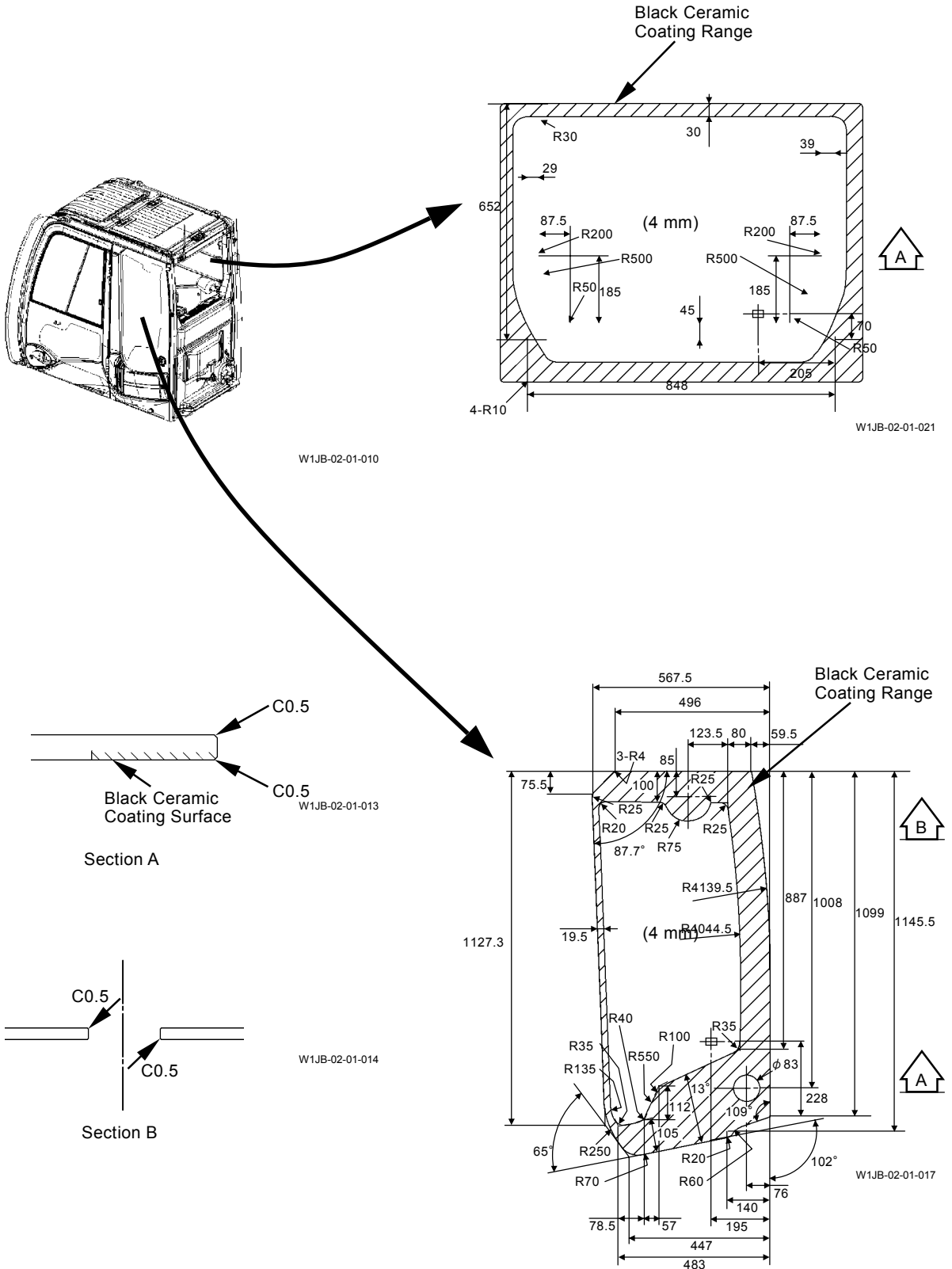
# UPPERSTRUCTURE / Cab

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




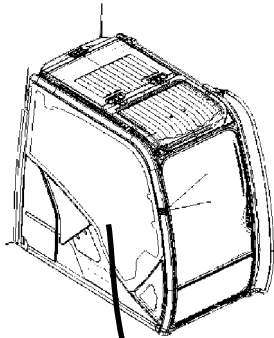
# UPPERSTRUCTURE / Cab

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

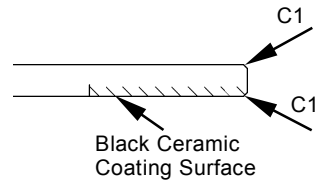


# UPPERSTRUCTURE / Cab

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

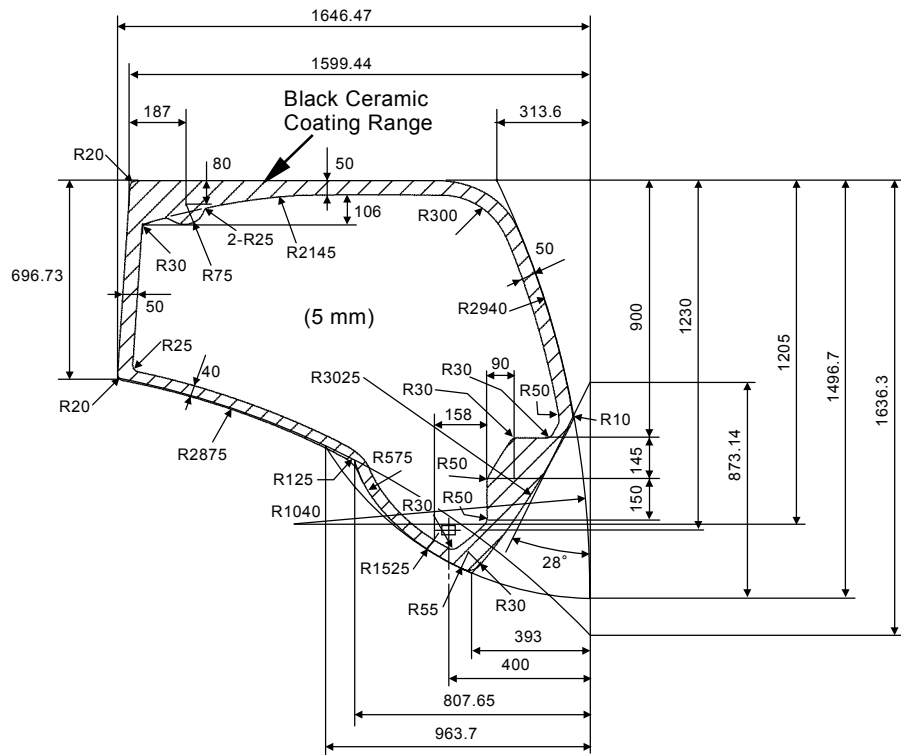


W1JB-02-01-009



W1JB-02-01-013


Section A

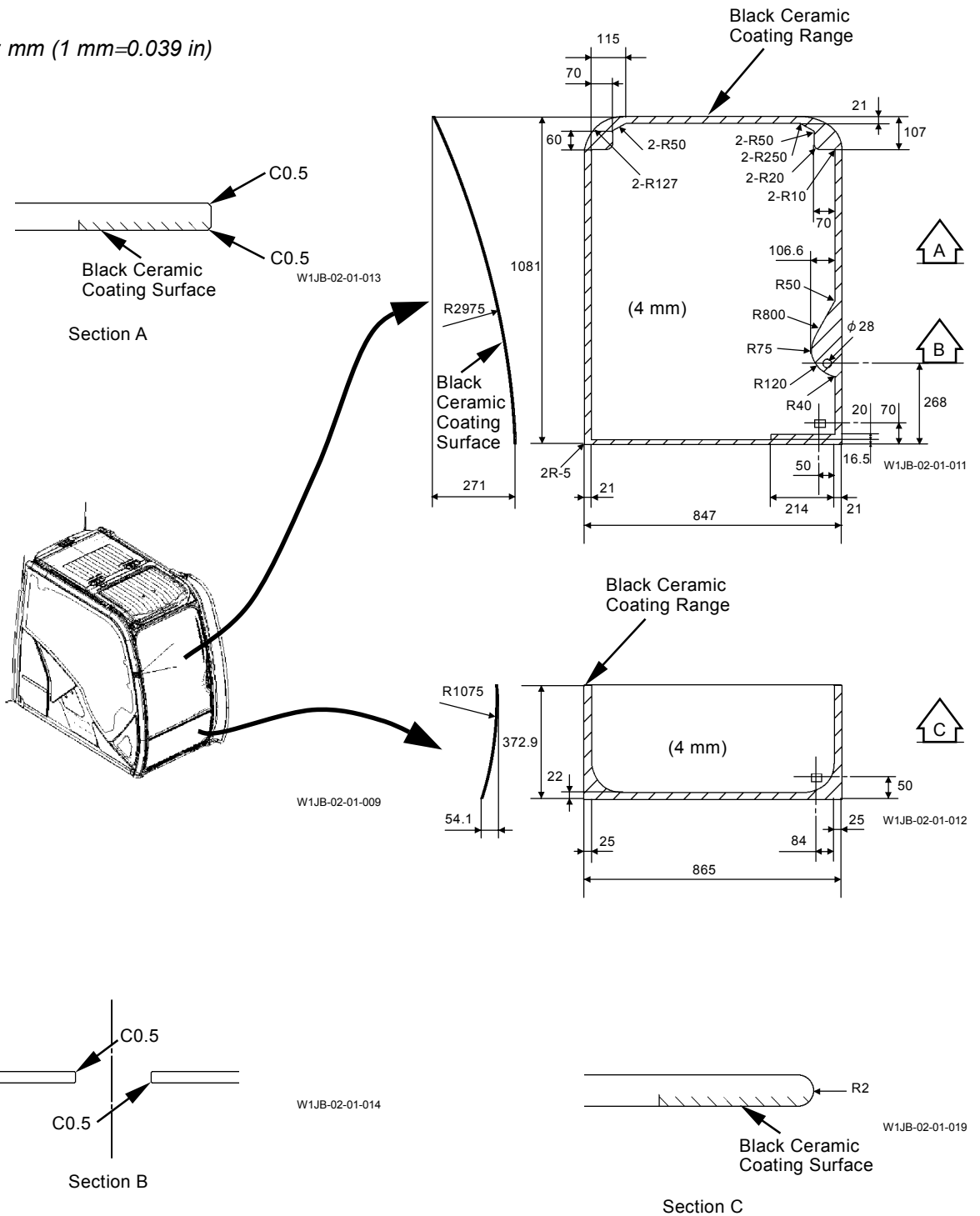


W1JB-02-01-020


# UPPERSTRUCTURE / Cab

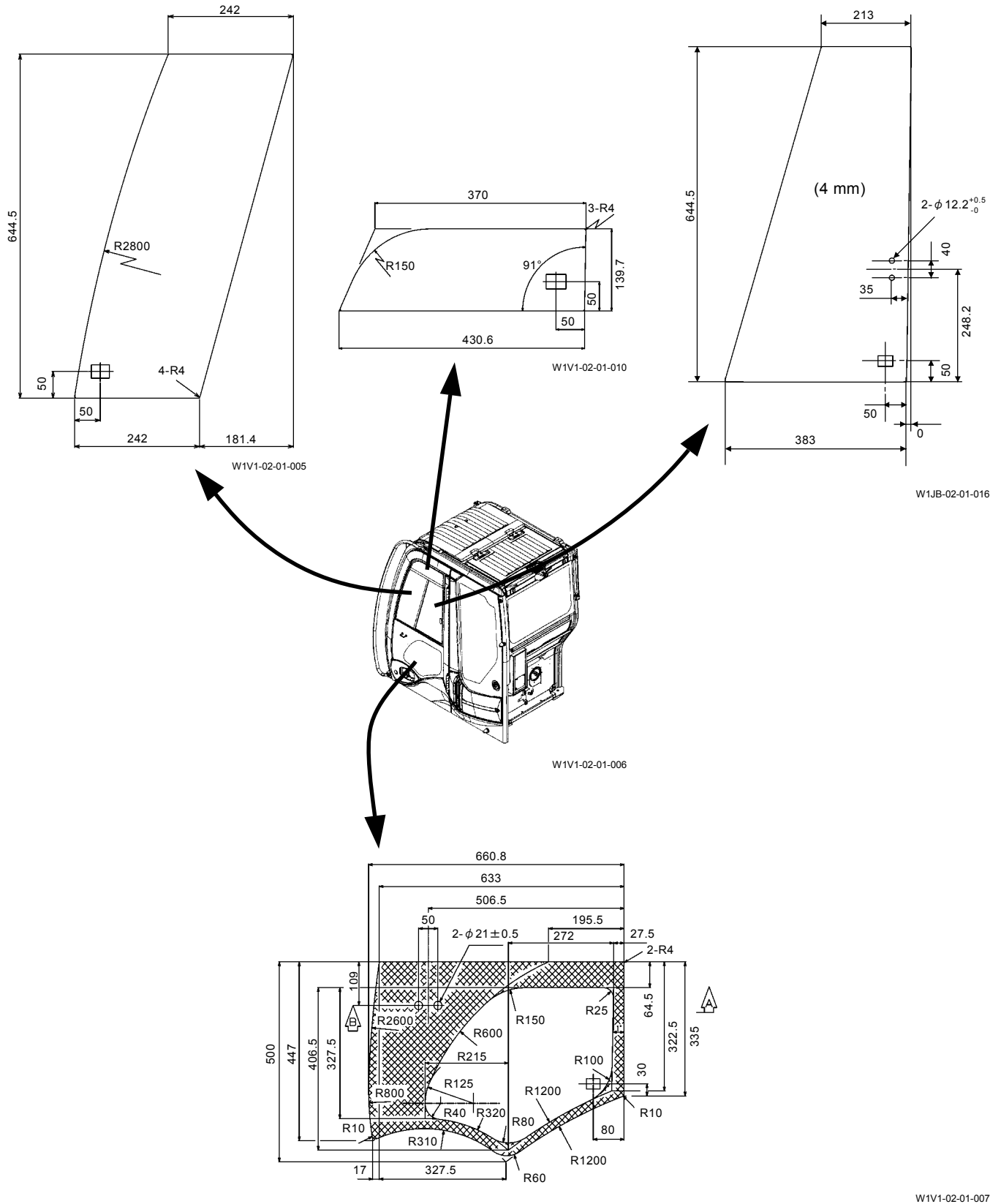
## DIMENSIONS OF CAB GLASS (ZX225US-3 CLASS, 225USR-3 CLASS)

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



# UPPERSTRUCTURE / Cab

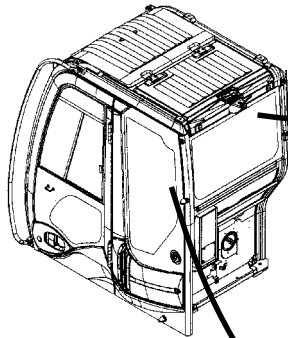
 NOTE: Unit: mm (1 mm=0.039 in)



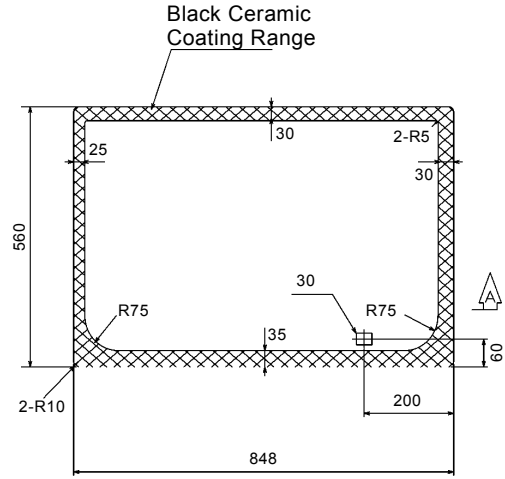


# UPPERSTRUCTURE / Cab

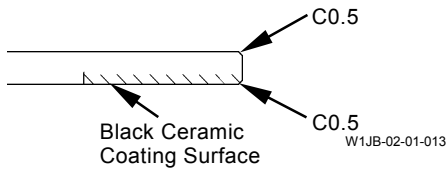
NOTE: Unit: mm (1 mm=0.039 in)



W1V1-02-01-006

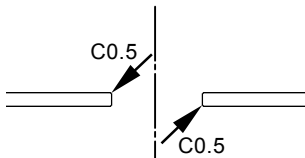


W1V1-02-01-008



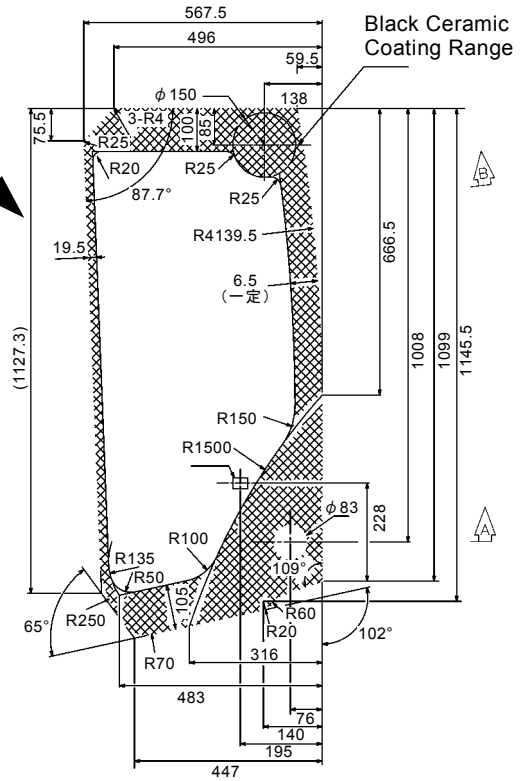
Section A

W1JB-02-01-013



Section B

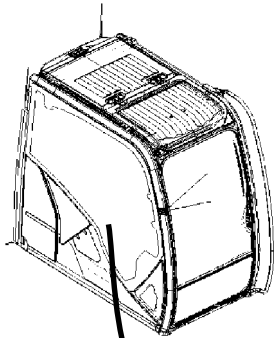
W1JB-02-01-014



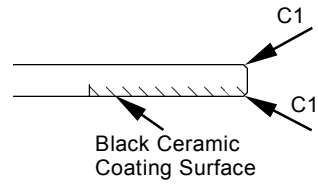
W1V1-02-01-009

# UPPERSTRUCTURE / Cab

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

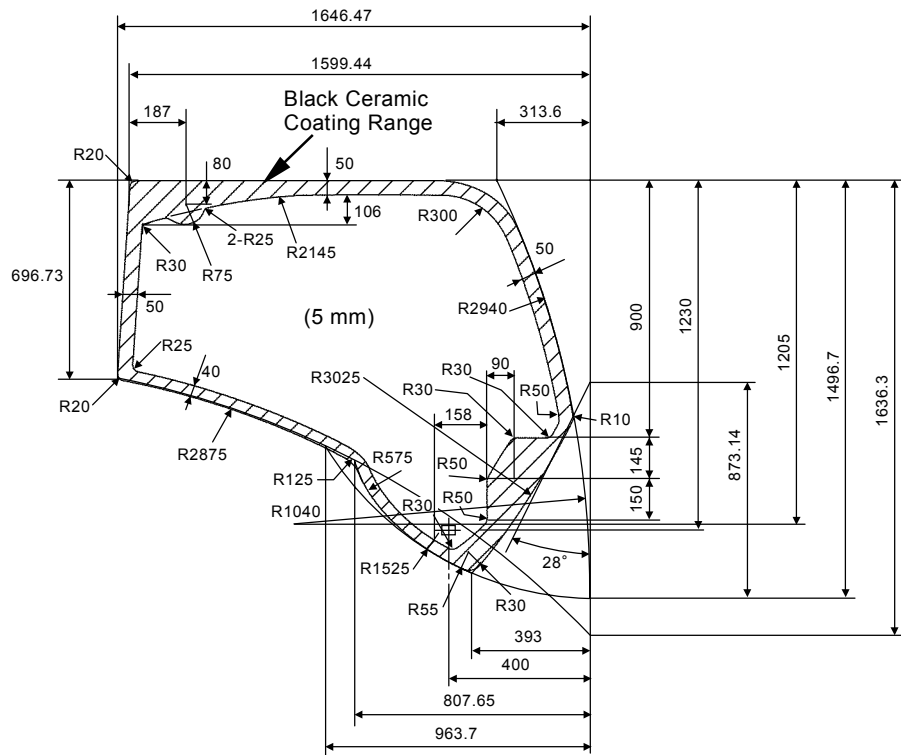


W1JB-02-01-009



W1JB-02-01-013

Section A



W1JB-02-01-020

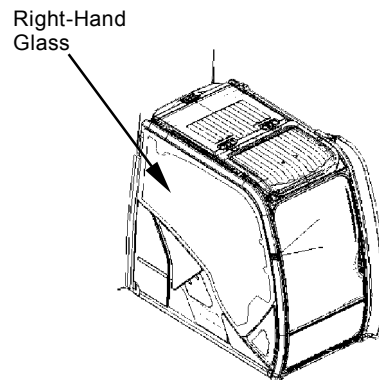
## UPPERSTRUCTURE / Cab

### Procedure to Remove Cab Glass

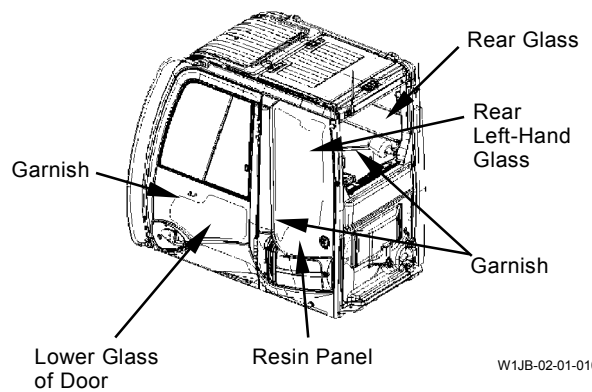
Procedures to Remove Right-Hand Glass, Rear Left Glass, Lower Door Glass and Rear Glass

**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.

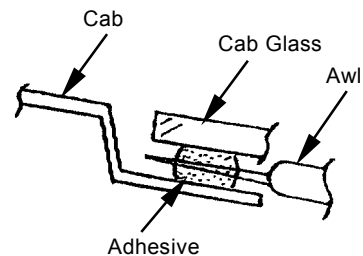


W1JB-02-01-009



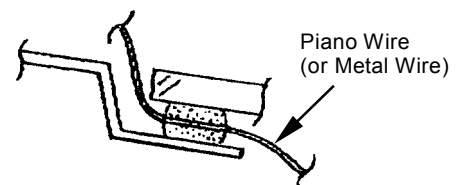
W1JB-02-01-010

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.




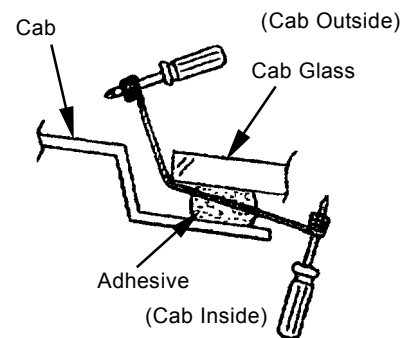
W1SE-02-01-034

## UPPERSTRUCTURE / Cab

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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

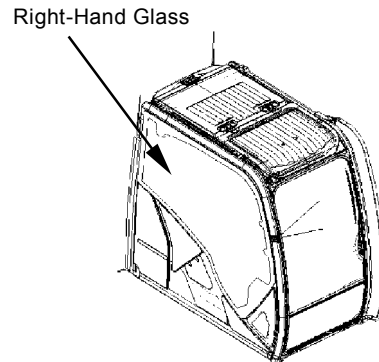
## UPPERSTRUCTURE / Cab

### Procedure to Install Cab Glass

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

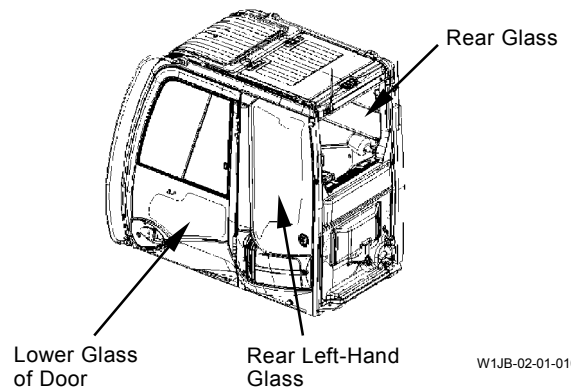
1. Cut off the residual adhesive from cab side by 1 to 2 mm deep all around by using a cutter knife or similar.

 **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

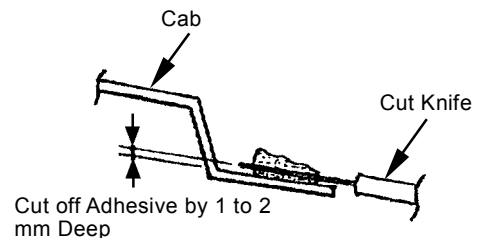
**IMPORTANT:** Primer should be shaken for about 1 minute and mix thoroughly before opening the cap.

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

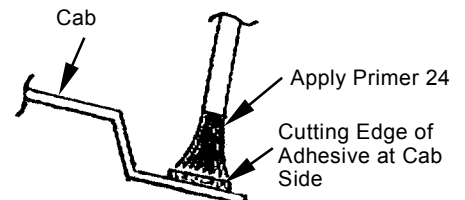
After opening Primer, all the contents should be used within 180 days (or 2 hours with the cap off).

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

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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 W2-1-31.)

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 W2-1-33.)


7. Cut off the nozzle of adhesive cartridge (Sika Tack-Drive) into V-shaped by using a knife. (Refer to W2-1-33.)

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 W2-1-33.)

11. Suck, raise the glass by using sucker lifter 4355282 (refer to W2-1-33), 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.*

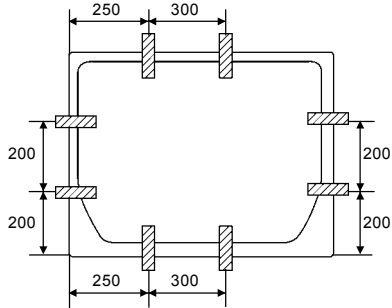
12. Secure the glass by using the gummed tape until the adhesive becomes solid in order to prevent them from being mispositioned or coming off.

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

# UPPERSTRUCTURE / Cab

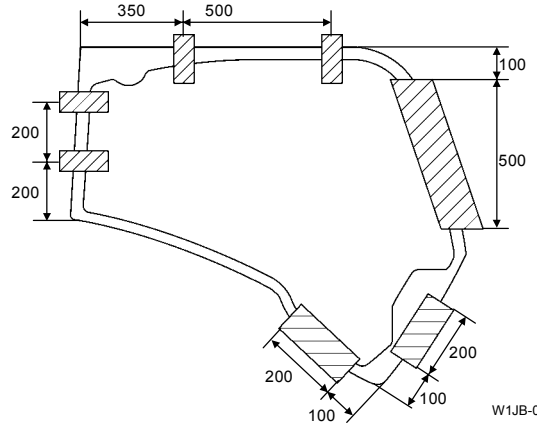
 NOTE: Unit: mm (1 mm=0.039 in)

Rear Glass



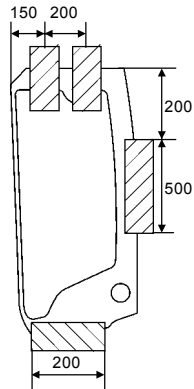
W1JB-02-01-029

Right-Hand Glass



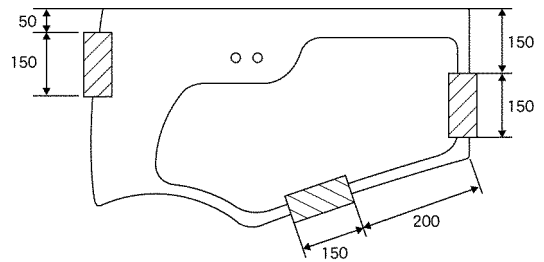
W1JB-02-01-030

Rear Left-Hand Glass




W1JB-02-01-035

Lower Glass of Door

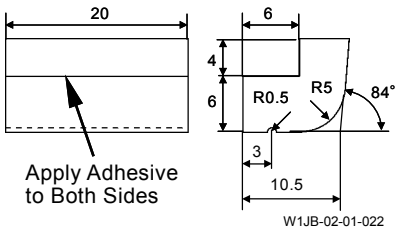


W1JB-02-01-038

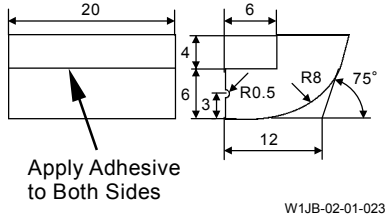
# UPPERSTRUCTURE / Cab

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

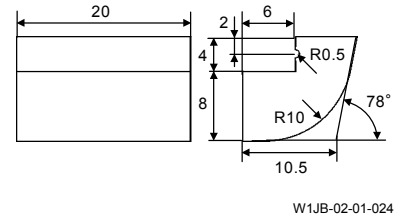
Spacer A



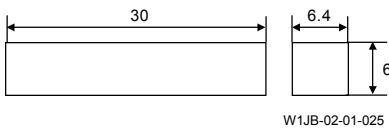
Spacer B



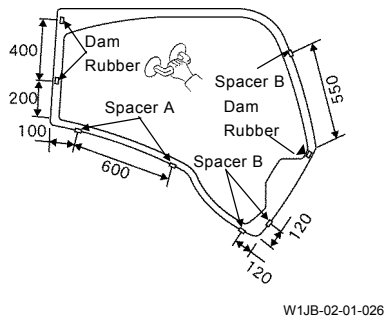
Spacer C



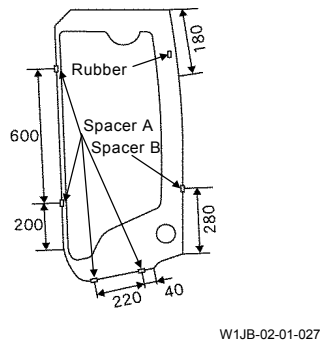
Dam Rubber



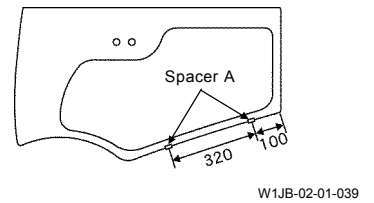
Right-Hand Glass



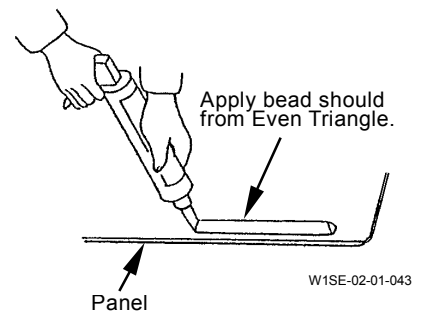
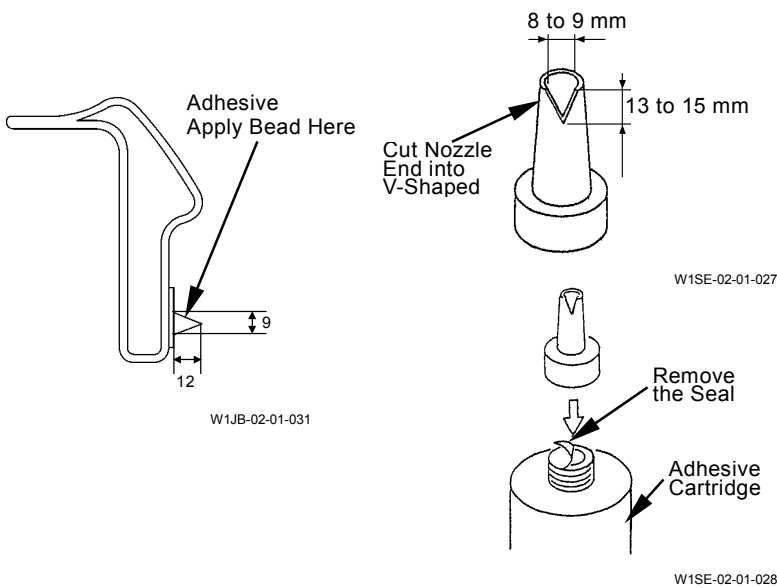
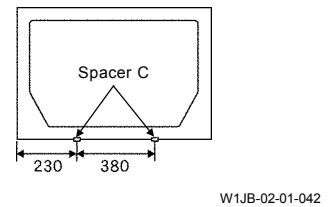
Rear Left-Hand Glass



Lower Glass of Door



Rear Glass





## UPPERSTRUCTURE / Cab

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

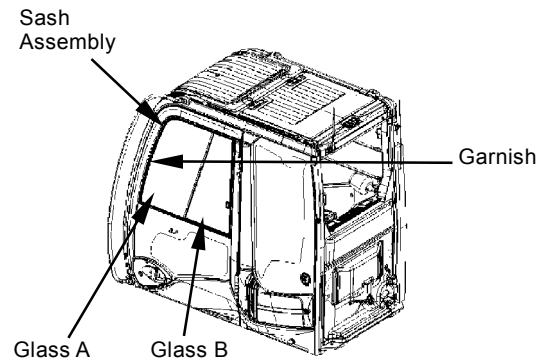
		Painted Surface or Adhesive Surface	Glass Surface
	Adhesive Sika Tack-Drive 310 ml Cartridge	Primer Sika Aktivator DM-1 250 ml Can	Primer Sika Primer 206G+P 30 ml Bottle
Upper Front Glass	310 ml	0.75 ml	0.67 ml
Lower Glass of Door	150 ml	0.5 ml	0.45 ml
Rear Left-Hand Glass	250 ml	0.65 ml	0.6 ml
Rear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

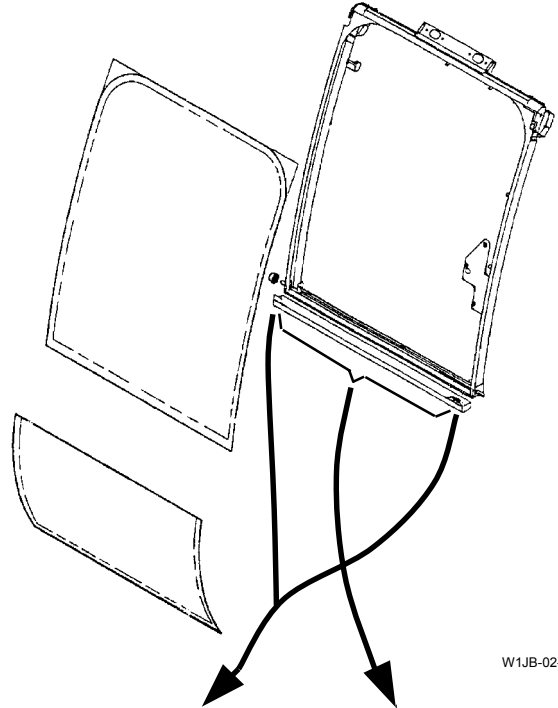
### Procedures to Install Upper Front Glass

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.

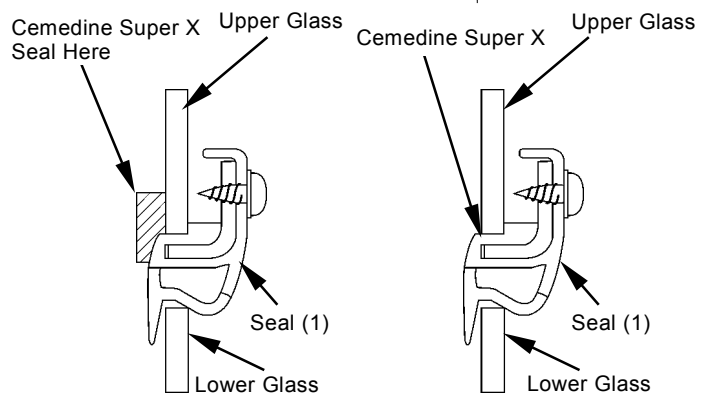
 **NOTE:** *Cemedine Super X Black No.8008*  
*Glue-state adhesive, tubed*

**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


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(Blank)

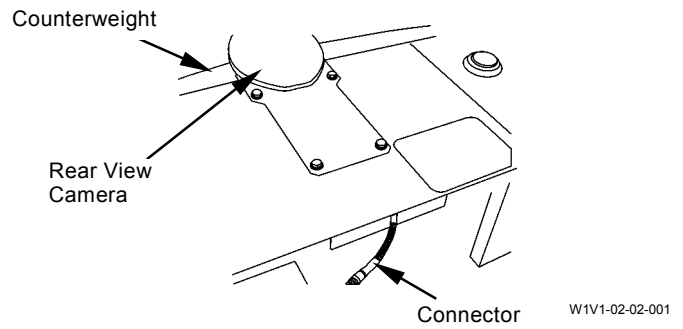
## UPPERSTRUCTURE / Counterweight


### REMOVE AND INSTALL COUNTERWEIGHT

#### Removal

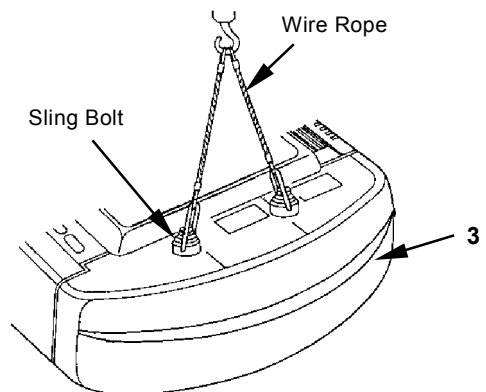
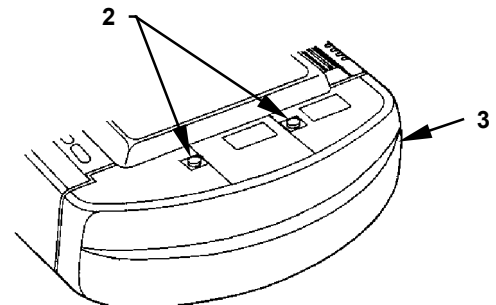
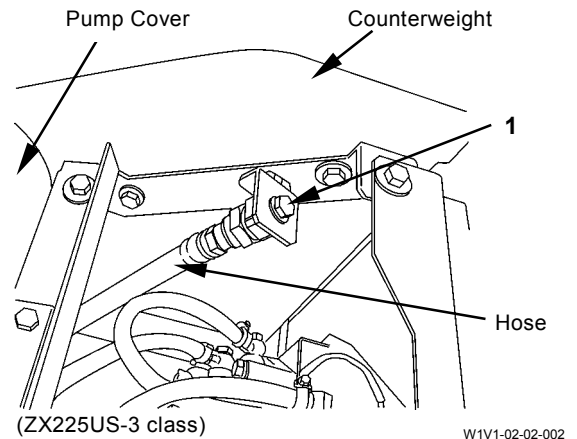
 **NOTE:** The illustration in right is for ZX200-3 class, ZX240-3 class and ZX270-3 class. Counterweight (3) for Zx225US-3 class and ZX225USR-3 is different.

1. Open the engine cover. Remove the connector from the rear view camera.
2. Open the pump cover. Remove bolt (1). Remove the hose from the counterweight. (ZX225US-3 class only)




 **CAUTION:** Counterweight (3) weight: Refer to the List of Weight on W2-2-4.

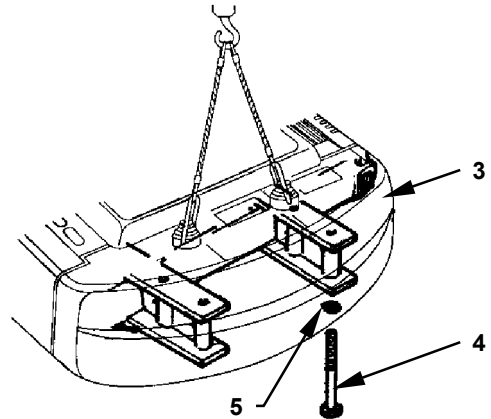
3. Remove caps (2) (2 used). Install the sling bolts (FLENO RINK BOLT B-42: M42, Pitch 4.5 mm) (2 used) to the cap (2) hole (2 places).
4. Attach a wire rope to the sling bolts (2 used). Hold counterweight (3).



## UPPERSTRUCTURE / Counterweight


5. Remove bolts (4) (4 used) and washers (5) (4 used) from counterweight (3). Hoist and remove counterweight (3).

 : 46 mm



W178-02-11-068

### Installation


 **NOTE:** The illustration in right is for ZX200-3 class, ZX240-3 class and ZX270-3 class. Counterweight (3) for Zx225US-3 class and ZX225USR-3 is different.


 **CAUTION:** Counterweight (3) weight:  
Refer to the List of Weight on W2-2-4.

1. Install the sling bolts (B-42: M42, Pitch: 4.5 mm) (2 used) to counterweight (3).


2. Hoist and place counterweight (3) onto the main frame. Install counterweight (3) to the main frame with washers (5) (4 used) and bolts (4) (4 used).


ZX200-3 class, ZX225US-3 class, ZX225USR-3 class

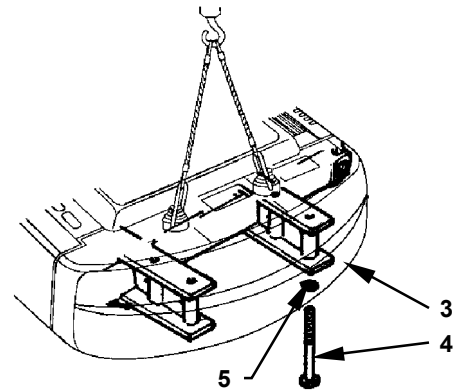
 : 46 mm

 : 1570 N·m (160 kgf·m, 1158 lbf·ft)

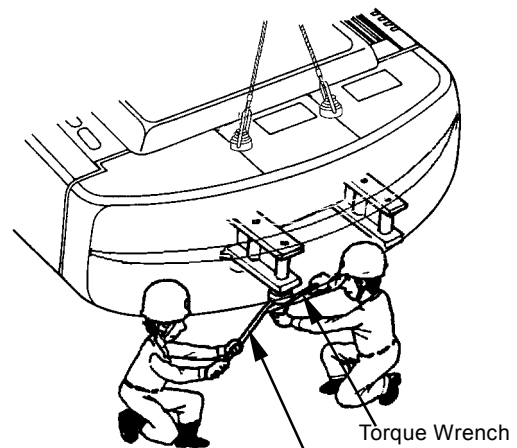
ZX240-3 class, ZX270-3 class

 : 46 mm

 : 1950 N·m (200 kgf·m, 1438 lbf·ft)



W178-02-11-069

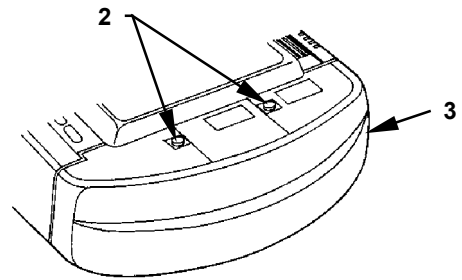


Power Wrench

W178-02-02-004

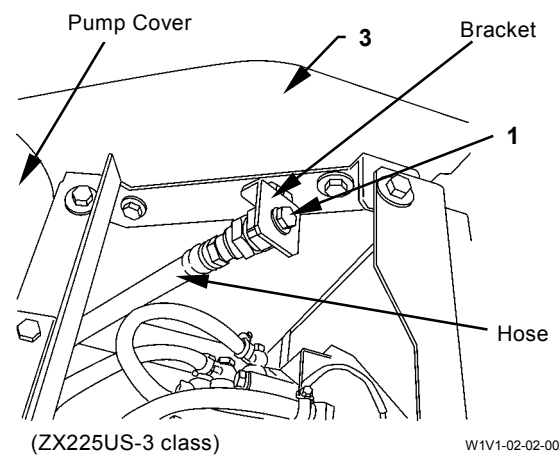
## UPPERSTRUCTURE / Counterweight

3. Remove the sling bolts (2 used) from counterweight (3). Install caps (2) (2 used).

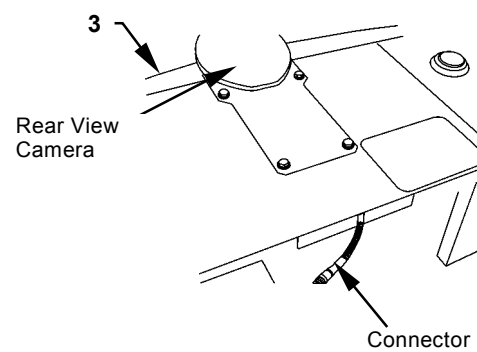


W178-02-11-070

4. Open the pump cover. Install the hose to the bracket with bolt (1). (ZX225US-3 class only)



5. Open the engine cover. Install the connector to the rear view camera.



## UPPERSTRUCTURE / Counterweight

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### LIST OF WEIGHT

Unit: kg (lb)

Model	Weight
ZAXIS200-3, 200LC-3	4250 (9370)
ZAXIS210H-3, 210LCH-3, 210K-3, 210LCK-3	4750 (10470)
ZAXIS210K(HG)-3, 210LCK(HG)-3	5350 (11800)
ZX225US-3 class	7570 (16690)
ZX225USR-3 class	6650 (14660)
ZAXIS210LCN-3, 240N-3	5500 (12130)
ZAXIS240-3, 240LC-3	5400 (11900)
ZAXIS250H-3, 250LCH-3, 250LC-3, 250LCN-3, ZAXIS270-3, 270LC-3	6100 (13450)
ZAXIS250K-3, 250LCK-3, ZAXIS280LC-3, 280LCN-3	6500 (14330)



## 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.)

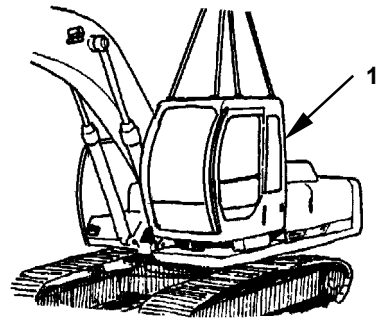
#### Removal



**CAUTION: Cab (1) weight:**  
Refer to the List of Weight on W2-3-9.

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

 : 17 mm, 24 mm, 30 mm  
 : 8 mm




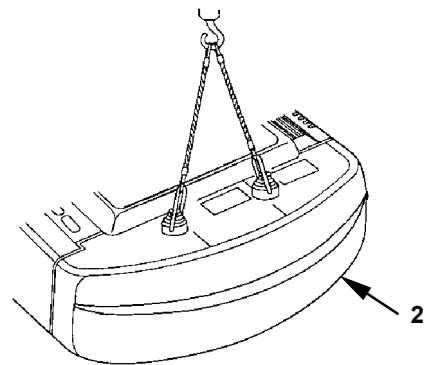
W157-02-01-001



**CAUTION: Counterweight (2) weight:**  
Refer to the List of Weight on W2-3-9.

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

 : 46 mm




W178-02-11-071




**CAUTION: The front attachment (3) assembly weight:**  
Refer to the List of Weight on W2-3-9.

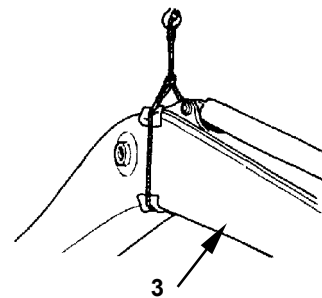
3. Remove the front attachment (3) assembly.  
(Refer to the Remove and Install Front Attachment section on W4-1-2.)

ZX200-3 class, 225US-3 class, 225USR-3 class

 : 17 mm, 27 mm, 30 mm, 36 mm, 41 mm

ZX240-3 class, 270-3 class

 : 17 mm, 30 mm, 32 mm, 36 mm, 41 mm




W178-02-11-072


## UPPERSTRUCTURE / Main Frame


- Remove all hoses from the upper of center joint (6). Remove bolts (5) (2 used) from center joint (6). Remove stopper (4).

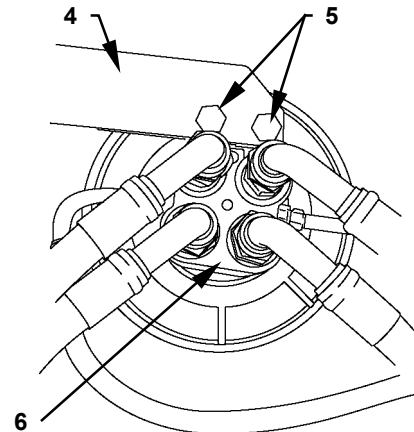
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class

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

ZX270-3 class

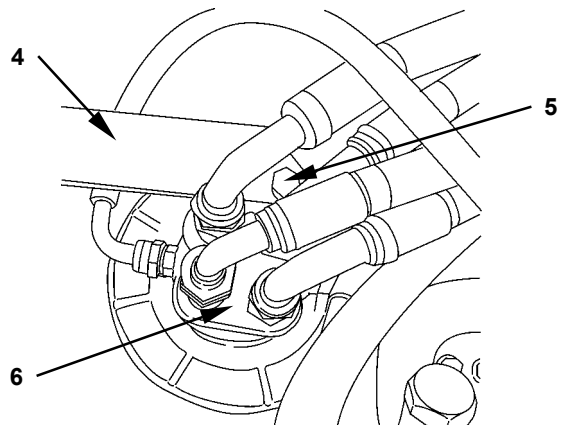
 : 17 mm, 22mm, 27 mm, 41 mm

 **NOTE:** The direction to install the hose for ZX225US-3 class, 225USR-3 class is different from that for ZX200-3 class, 240-3 class, 240-3 class. (Refer to the illustration in the right.)



ZX200-3 class, 240-3 class, 270-3 class

W1V1-03-03-001

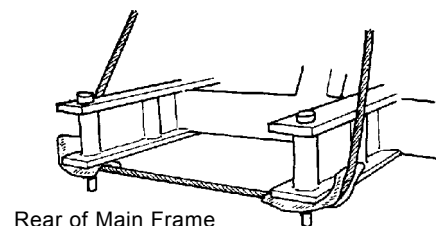


ZX225US-3 class, 225USR-3 class

W1V1-03-03-002

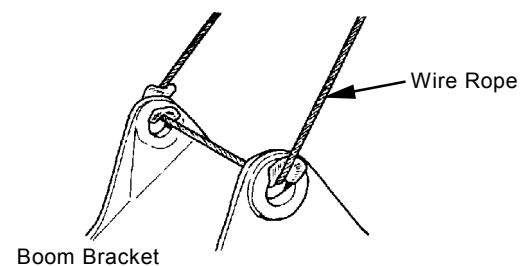
 **CAUTION:** Upperstructure weight:  
Refer to the List of Weight on W2-3-9.

- Attach wire ropes to the rear (counterweight bracket) of main frame and boom bracket.



Rear of Main Frame

W178-02-11-074



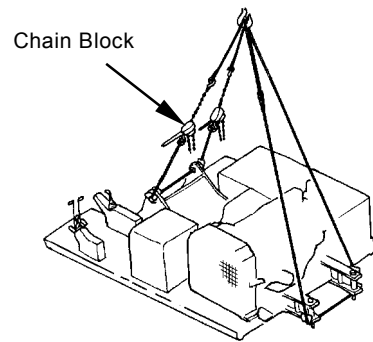
Boom Bracket

W178-02-11-075

## UPPERSTRUCTURE / Main Frame

6. Take up slack of wire ropes.


If the chain block is used, it is not only easy to adjust the length of wire rope, but also easy to level the main frame. Do not damage the engine.




W1V1-02-03-001

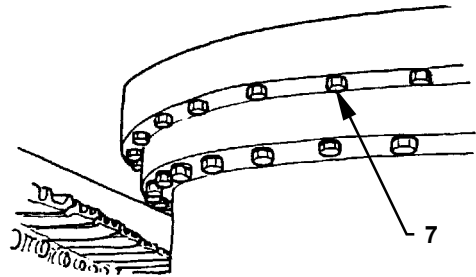
7. The mounting angle of swing bearing is specified. (Refer to W3-1-2.) Put the matching marks on the upperstructure and the outer race of swing bearing. Remove bolt (7).

ZX200-3 class, 225US-3 class, 225USR-3 class

 : 30 mm

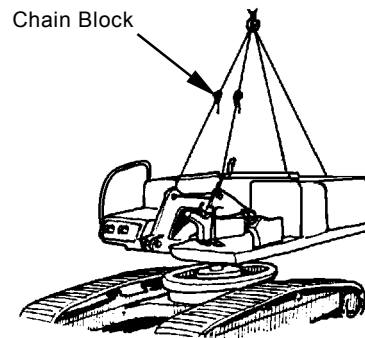
ZX240-3 class, 270-3 class

 : 32 mm



W105-02-03-007

8. Adjust the chain block in order to level the main frame. Hoist and remove the main frame from the undercarriage.



W157-02-03-002

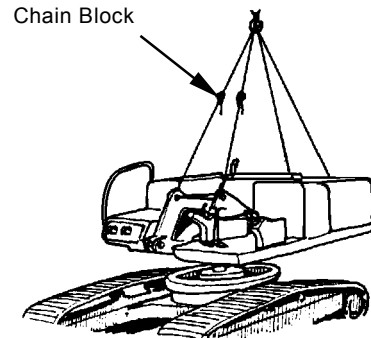
## UPPERSTRUCTURE / Main Frame

### Installation



**CAUTION: Upperstructure weight:  
Refer to the List of Weight on W2-3-9.**


1. Attach a wire rope to the main frame. Adjust the chain block in order to level the main frame. Hoist and install the main frame to the undercarriage. As for the hoisting procedures, refer to the removal section on W2-3-2.




W157-02-03-002

2. Align the matching marks on the upperstructure and the outer race of swing bearing. Temporarily tighten bolts (7) to the swing bearing. Remove the wire rope. Tighten bolt (7).


ZX200-3 class, 225US-3 class, 225USR-3 class

 : 30 mm


Upperstructure side:

 : 510 N·m (52 kgf·m, 375 lbf·ft)


Track side:

 : 490 N·m (50 kgf·m, 360 lbf·ft)


ZX240-3 class, 270-3 class

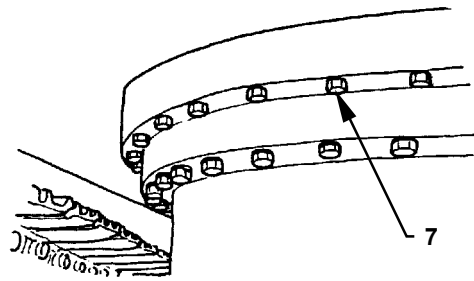
 : 32 mm

Upperstructure side:

 : 650 N·m (65 kgf·m, 480 lbf·ft)

Track side:

 : 650 N·m (65 kgf·m, 480 lbf·ft)



W105-02-03-007



## UPPERSTRUCTURE / Main Frame

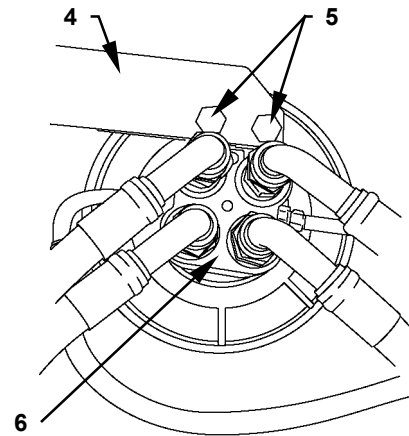
3. Install all hoses to center joint (6).  
ZX200-3 class, 225US-3 class, 225USR-3 class,  
240-3 class

 : 17 mm  
 : 25 N·m (2.5 kgf·m, 18 lbf·ft)  
 : 19 mm  
 : 30 N·m (3.0 kgf·m, 22 lbf·ft)  
 : 27 mm  
 : 95 N·m (9.5 kgf·m, 70 lbf·ft)  
 : 36 mm  
 : 180 N·m (18 kgf·m, 133 lbf·ft)

ZX270-3 class  
 : 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)

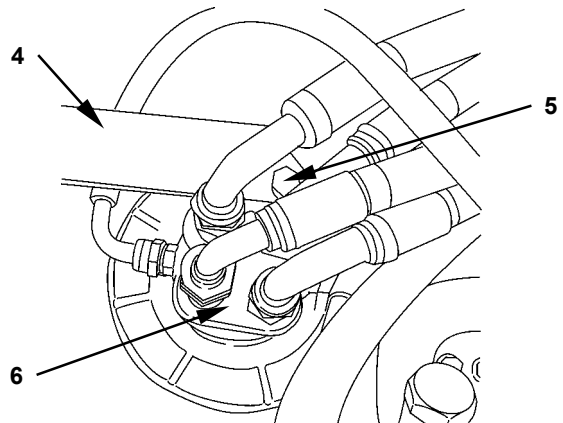
4. Install stopper (4) to center joint (6) with bolts (5)  
(2 used).

 : 22 mm  
 : 140 N·m (14 kgf·m, 103 lbf·ft)



ZX200-3 class, 240-3 class, 270-3 class

W1V1-03-03-001



ZX225US-3 class, 225USR-3 class

W1V1-03-03-002

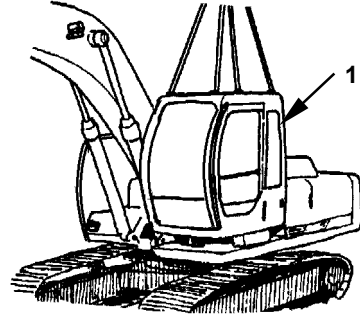
## UPPERSTRUCTURE / Main Frame



**CAUTION: Cab (1) weight:**  
Refer to the List of Weight on W2-3-9.

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

	: 17 mm
	: 50 N·m (5.0 kgf·m, 37 lbf·ft)
	: 24 mm
	: 210 N·m (21 kgf·m, 155 lbf·ft)
	: 30 mm
	: 550 N·m (55 kgf·m, 405 lbf·ft)
	: 8 mm
	: 50 N·m (5.0 kgf·m, 37 lbf·ft)





W157-02-01-001





**CAUTION: Counterweight (2) weight:**  
Refer to the List of Weight on W2-3-9.

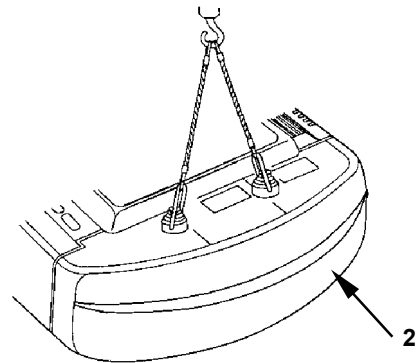
6. Install counterweight (2).  
(Refer to the Remove and Install Counterweight section on W2-2-1.)

ZX200-3 class, 225US-3 class, 225USR-3 class

	: 46 mm
	: 1570 N·m (160 kgf·m, 1160 lbf·ft)

ZX240-3 class, 270-3 class

	: 46 mm
	: 1950 N·m (200 kgf·m, 1440 lbf·ft)



W178-02-11-071

## UPPERSTRUCTURE / Main Frame




**CAUTION:** The front attachment (3) assembly weight:  
Refer to the List of Weight on W2-3-9.


7. Install front attachment assembly (3). Add hydraulic oil.


(Refer to the Remove and Install Front Attachment section on W4-1-2.)


ZX200-3 class, 225US-3 class, 225USR-3 class


(Bolt)


 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)


 : 27 mm


 : 400 N·m (40 kgf·m, 295 lbf·ft)


 : 30 mm


 : 550 N·m (55 kgf·m, 405 lbf·ft)


(Hose)


 : 17 mm

 : 25 N·m (2.5 kgf·m, 18 lbf·ft)

 : 36 mm


 : 180 N·m (18 kgf·m, 133 lbf·ft)


 : 41 mm


 : 210 N·m (21 kgf·m, 155 lbf·ft)


ZX240-3 class, 270-3 class


(Bolt)


 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)


 : 30 mm


 : 550 N·m (55 kgf·m, 405 lbf·ft)


 : 32 mm


 : 750 N·m (7.5 kgf·m, 550 lbf·ft)


(Hose)


 : 17 mm

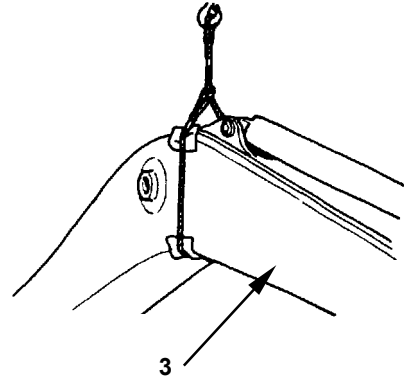
 : 25 N·m (2.5 kgf·m, 18 lbf·ft)

 : 36 mm

 : 180 N·m (18 kgf·m, 133 lbf·ft)

 : 41 mm

 : 210 N·m (21 kgf·m, 155 lbf·ft)

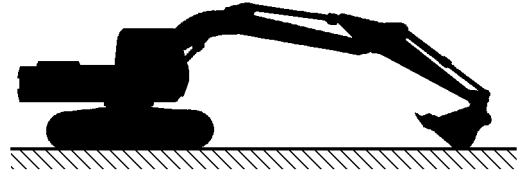


W105-02-03-002

## UPPERSTRUCTURE / Main Frame

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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

### LIST OF WEIGHT

		Unit: kg (lb)
Item	Model	Weight
Cab	ZX200-3 class	330 (730)
	ZX225US-3 class, 225USR-3 class	310 (690)
	ZX240-3 class, 270-3 class	385 (850)
Counterweight	ZAXIS 200-3, 200LC-3	4350 (9590)
	ZAXIS 210H-3, 210LCH-3, 210K(B)-3, 210LCK(B)-3	4750 (10470)
	ZAXIS 210K(HG)-3, 210LCK(HG)-3	5360 (11820)
	ZX 225US-3 class	7570 (16690)
	ZX 225USR-3 class	6650 (14660)
	ZAXIS 210LCN-3, 240N-3	5510 (12150)
	ZAXIS 240-3, 240LC-3	5400 (11900)
	ZAXIS 250H-3, 250LCH-3, 250LC-3, 250LCN-3	6100 (13450)
	ZAXIS 250K-3, 250LCK-3	6500 (14330)
	ZAXIS 270-3, 270LC-3	6100 (13450)
	ZAXIS 280LC-3, 280LCN-3	6500 (14330)
Upperstructure except Counterweight	ZAXIS 200-3, 200LC-3	4900 (10800)
	ZAXIS 210H-3, 210LCH-3	5000 (11020)
	ZAXIS 210K-3, 210LCK-3	5200 (11460)
	ZX225US-3 class	4930 (10870)
	ZX225USR-3 class	4820 (10630)
	ZAXIS210LCN-3, 240N-3	4550 (10030)
	ZAXIS 240-3, 240LC-3, 250LC-3, 250LCN-3	5630 (12410)
	ZAXIS 250H-3, 250LCH-3	5790 (12760)
	ZAXIS 250K-3, 250LCK-3	6020 (13270)
	ZX270-3 class	5730 (12630)
Front attachment total of mono boom except boom cylinder	ZAXIS 200-3, 200LC-3, 210LCN-3, 240N-3, ZX225US-3 class, 225USR-3 class	3450 (7610)
	ZAXIS 210H-3, 210LCH-3	3650 (8050)
	ZAXIS 210K-3, 210LCK-3	3800 (8380)
	ZAXIS 240-3, 240LC-3	4360 (9610)
	ZAXIS 250H-3, 250LCH-3	4600 (10140)
	ZAXIS 250K-3, 250LCK-3	4710 (10380)
	ZAXIS 250LC-3, 250LCN-3	4300 (9480)
	ZAXIS 270-3, 270LC-3	4730 (10430)
	ZAXIS 280LC-3, 280LCN-3	4920 (10850)
Front attachment total of 2-piece boom except boom cylinder	ZAXIS 210LCN-3, 240N-3	3280 (7230)
	ZAXIS 250LC-3, 250LCN-3	4530 (9990)
	ZAXIS 280LC-3, 280LCN-3	4820 (10630)

## UPPERSTRUCTURE / Main Frame

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(Blank)


## UPPERSTRUCTURE / Pump Device

### REMOVE AND INSTALL PUMP DEVICE (ZX200-3 CLASS, 240-3 CLASS, 270-3 CLASS)


**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.)

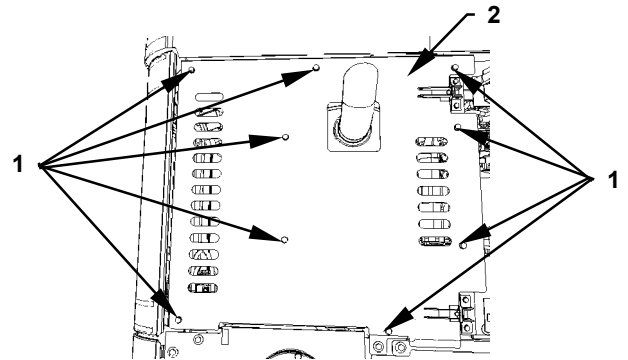
#### Removal

1. Open the engine cover. Remove bolts (1) (9 used) from cover(2). Remove cover (2).

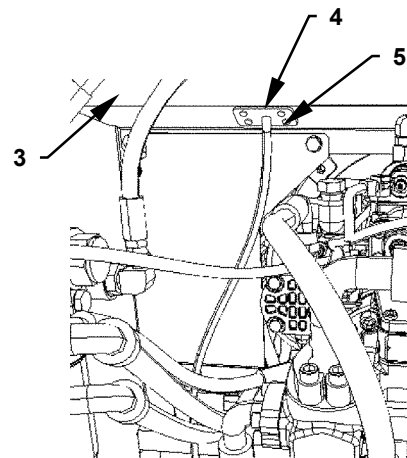
 : 17 mm

2. Remove bolts (5) (4 used) from muffler bracket (3) assembly in the pump space. Remove cover (4). Remove clamp (6). Make the muffler (8) tube free.

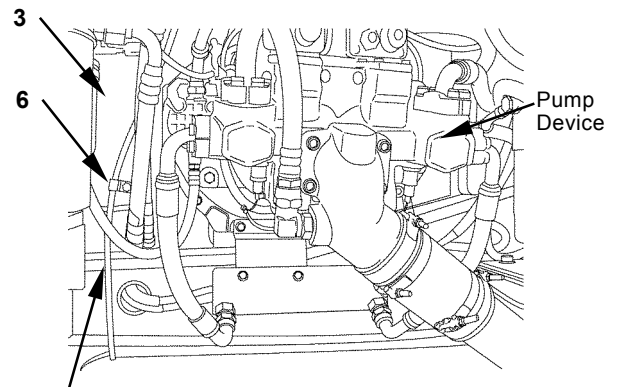
 : 17 mm



W1V1-02-04-005




W1V1-02-04-008

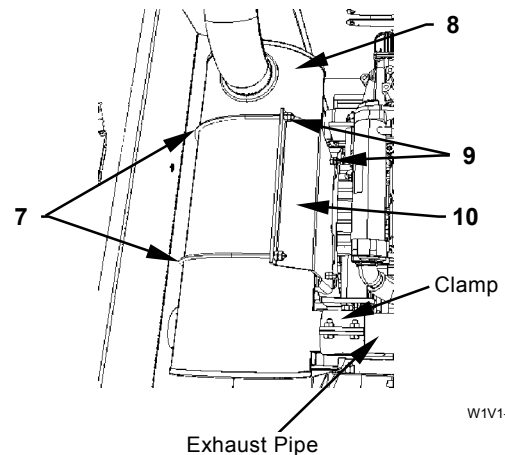


Muffler (8) Tube

W1V1-02-11-012

3. Remove nuts (9) (8 used) and U-bolts (7) (2 used) from bracket (10). Remove the clamp. Remove muffler (8).

 : 14 mm, 17 mm




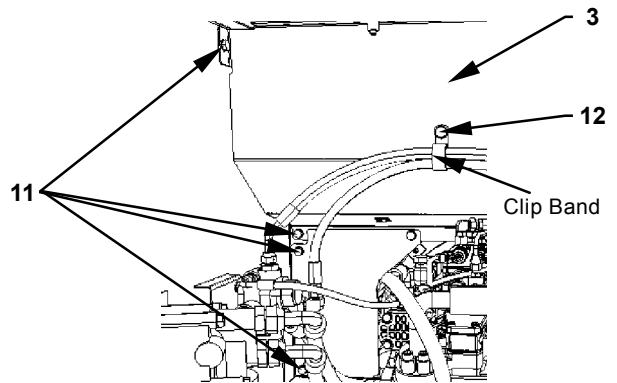
Exhaust Pipe

W1V1-02-04-006

## UPPERSTRUCTURE / Pump Device

4. Remove bolt (12) and bolt (13), which are installed to the hydraulic oil tank, from muffler bracket (3). Remove the clip bands. (2 used)


 : 17 mm

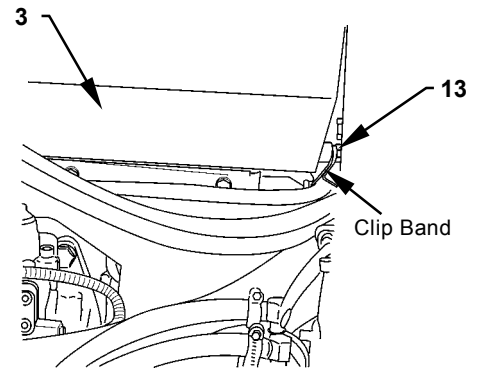


W1V1-02-04-007

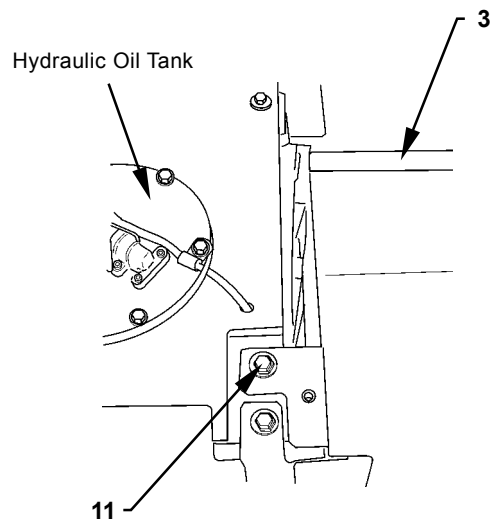
**IMPORTANT: When removing the muffler bracket (3) assembly, do not damage the parts and hoses.**

5. Remove bolts (11) (5 used) from the pump device and the upper side of machine. Remove the muffler bracket (3) assembly.

 : 17 mm



W1V1-02-04-016





W1V1-02-04-017

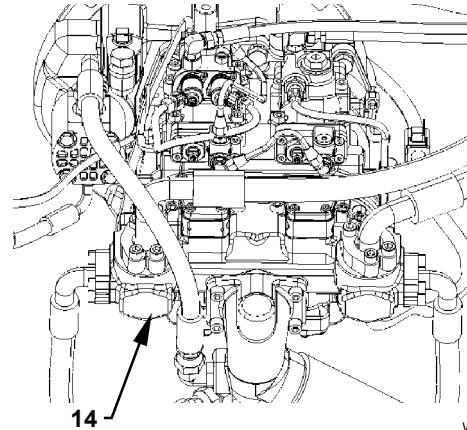
## UPPERSTRUCTURE / Pump Device

6. Remove all connectors, hoses and pipes connecting to pump device (14).

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

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

 : 8 mm, 10 mm





W1V1-02-04-003



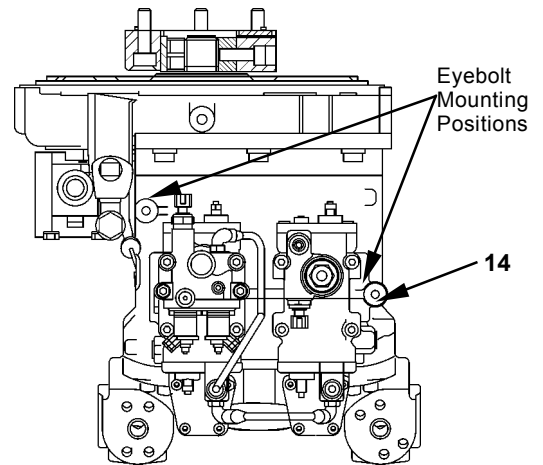
**CAUTION: Pump device (14) weight: 164 kg (362 lb)**

7. Install eyebolt (M12, Pitch: 1.75 mm) to pump device (14). Hoist and hold pump device (14). Remove bolts (16) (8 used). Remove brackets (15, 17).

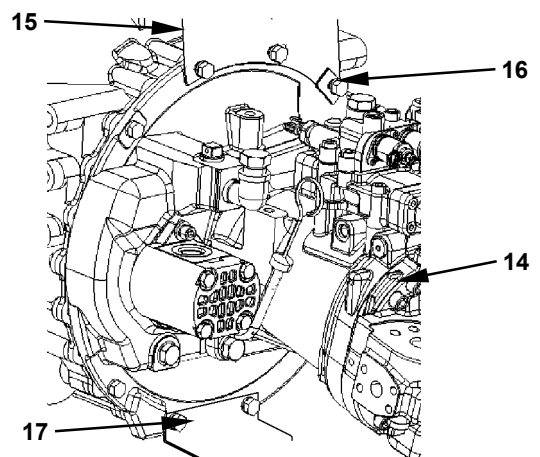
 : 17 mm

 **NOTE:** Bracket (17) is equipped for ZX200-3 class only.

8. Hoist and remove pump device (14).



W1J1-02-04-018




W1V1-02-04-009


## UPPERSTRUCTURE / Pump Device


### Installation

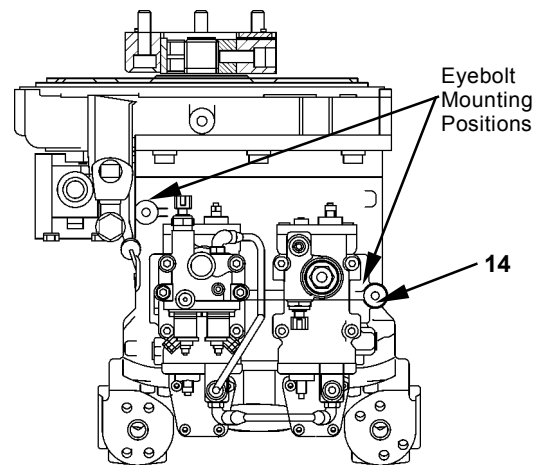
**CAUTION:** Pump device (14) weight: 164 kg (362 lb)

1. Install eyebolt (M12, Pitch 1.75 mm) to pump device (14) and hoist pump (14). Install pump device (14) and brackets (15, 17) with bolts (16) (8 used).

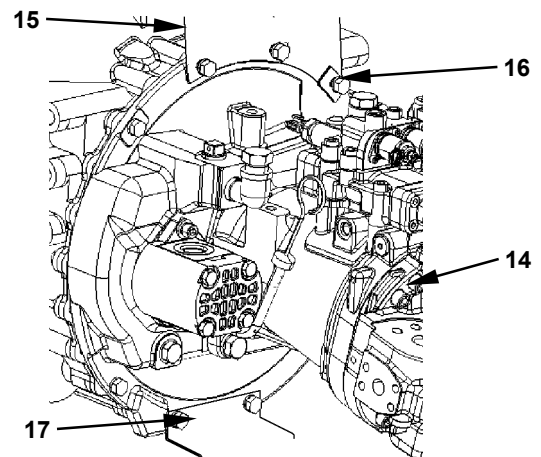
 : 17 mm

 : 65 N·m (6.5 kgf·m, 48 lbf·ft)

 **NOTE:** Bracket (14) is equipped for ZX200-3 class only.





W1J1-02-04-018





W1V1-02-04-009


2. Install all connectors, hoses and pipes to pump device (14).


 : 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

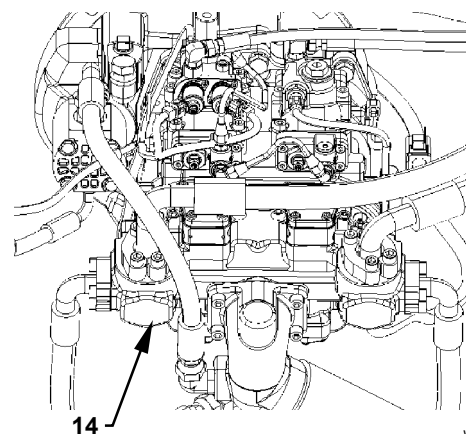
 : 180 N·m (18 kgf·m, 113 lbf·ft)

 : 8 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

 : 10 mm

 : 90 N·m (9.0 kgf·m, 66 lbf·ft)





W1V1-02-04-003

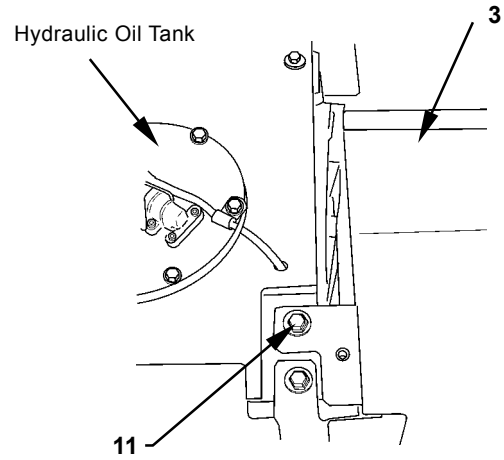
## UPPERSTRUCTURE / Pump Device

**IMPORTANT:** When installing the muffler bracket (3) assembly, do not damage the parts and hoses.

3. Install the muffler bracket (3) assembly with bolts (11) (5 used).


 : 17 mm


 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

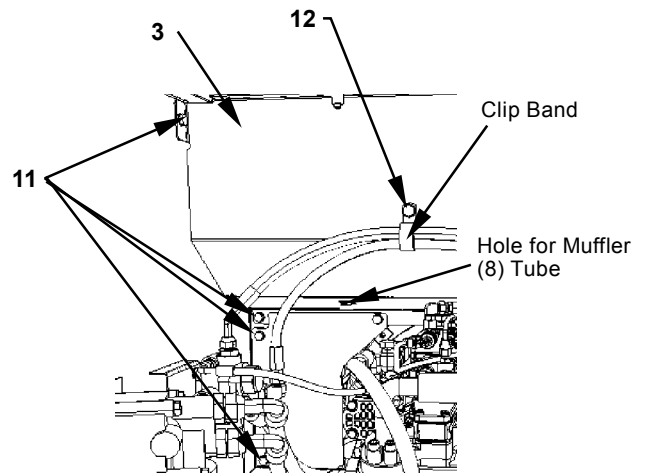


W1V1-02-04-017

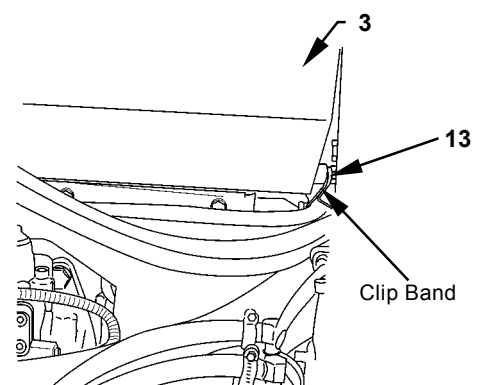
4. Secure the clip bands (2 used) to muffler bracket (3) with bolts (12, 13).

 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)




W1V1-02-04-007




W1V1-02-04-016


## UPPERSTRUCTURE / Pump Device

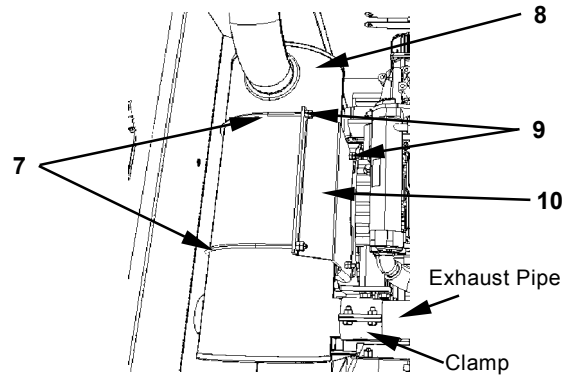
5. Install muffler (8) to the exhaust pipe.  
Install the clamp to the connection part.

 : 14 mm

6. Secure muffler (8) to bracket (10) with U-bolts (7) (2 used) and nuts (9) (8 used).


 : 17 mm


 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

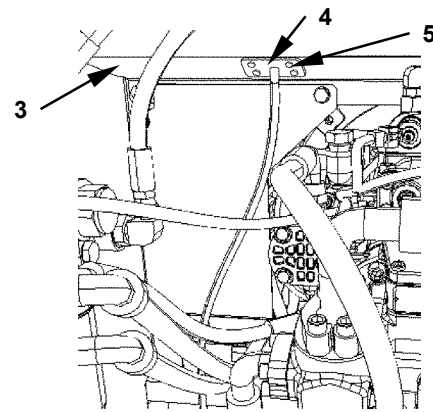


W1V1-02-04-006

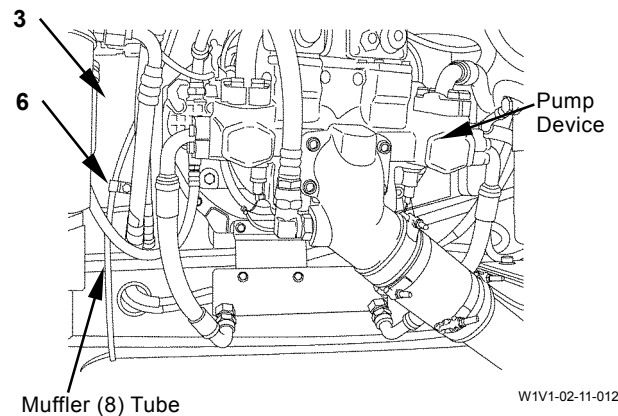
7. Pass the tube of muffler (8) through muffler bracket (3) assembly in the pump space. Install cover (4) with bolts (5) (4 used). Secure the muffler (8) tube to the muffler bracket (3) assembly with clamp (6).

 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)





W1V1-02-04-008

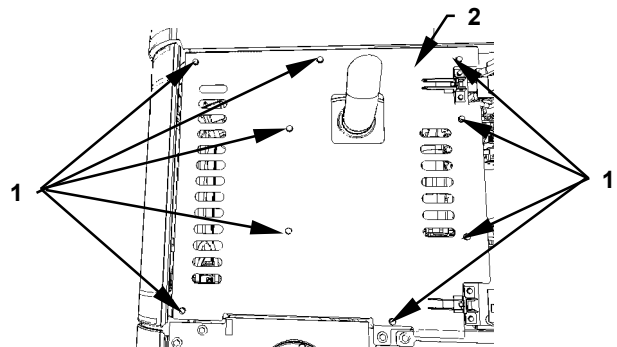


W1V1-02-11-012

8. Install cover (2) with bolts (1) (9 used).

 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)



W1V1-02-04-005




## UPPERSTRUCTURE / Pump Device

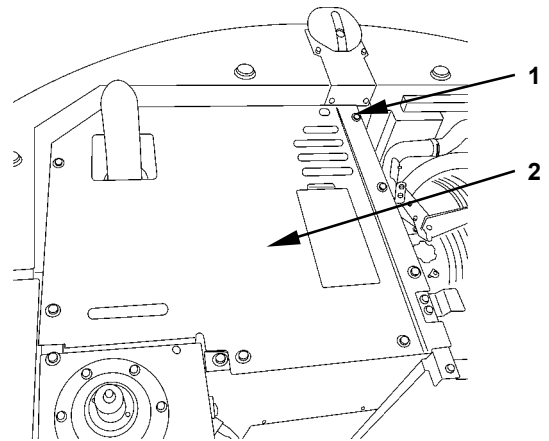
### REMOVE AND INSTALL PUMP DEVICE (ZX225US-3 CLASS)

#### Removal

1. Open and lock the engine cover. Remove bolts (2) (7 used) from cover(2). Remove cover (2).


 : 17 mm

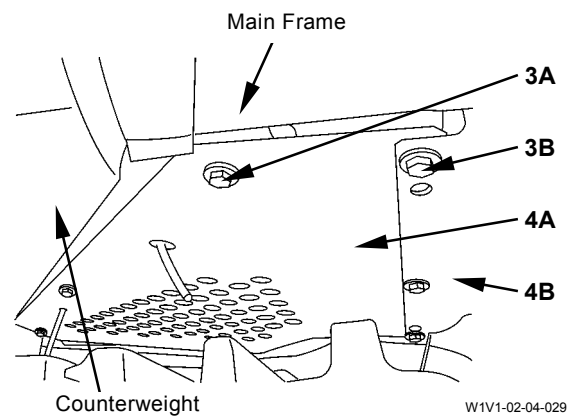
2. Remove the counterweight from the main frame.  
(Refer to REMOVE AND INSTALL COUNTERWEIGHT on W2-2-1.)



W1V1-02-04-028

3. Remove bolts (3A) (3 used) and (3B) (6 used).  
Remove covers (4A, 4B) from the main frame.


 : 17 mm

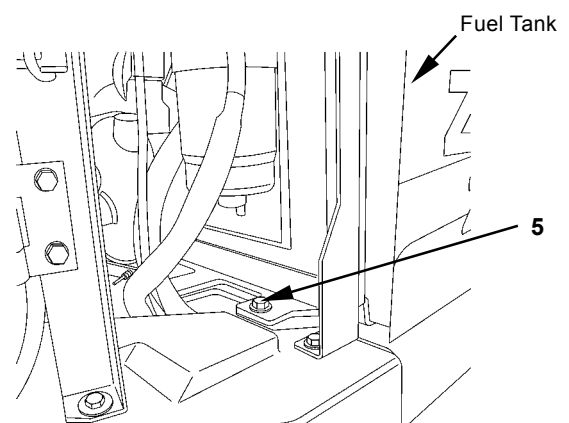


W1V1-02-04-029

 **CAUTION: Fuel tank weight: 97 kg (214 lb)**

4. Attach a nylon sling to the fuel tank and hold the fuel tank. Remove bolts (5) (2 used) from the fuel tank.

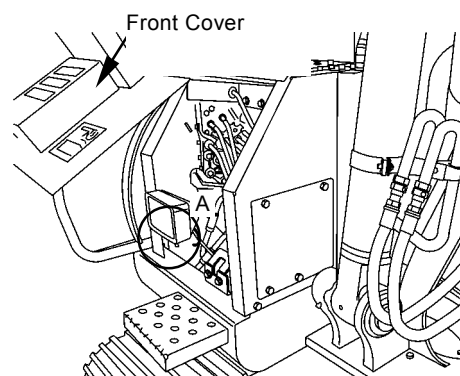
 : 24 mm



W1V1-02-04-030


## UPPERSTRUCTURE / Pump Device

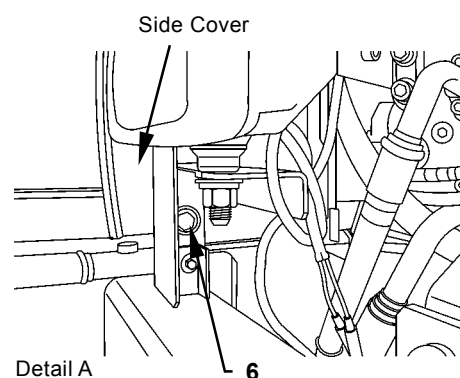
5. Open the front cover.



W1V1-02-05-078


6. Remove bolt (6). Open the side cover.

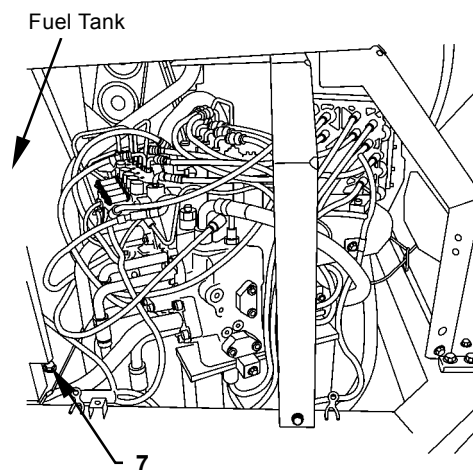
 : 17 mm



W1V1-02-05-076

7. Remove bolts (7) (2 used) from the fuel tank.


 : 24 mm

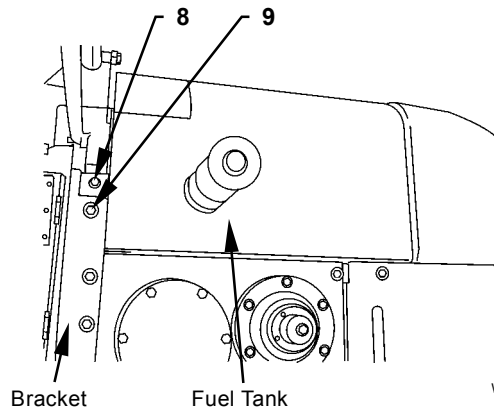


W1V1-02-05-079

## UPPERSTRUCTURE / Pump Device

8. Remove bolt (8) from the fuel tank and remove bolts (9) (3 used) from the bracket.


 : 17 mm

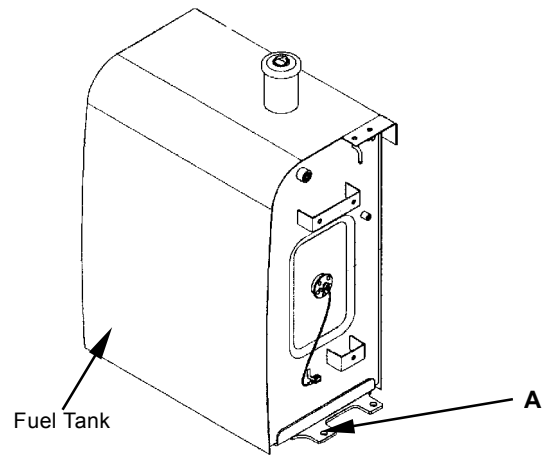


 **CAUTION:** Fuel tank weight: 97 kg (214 lb)

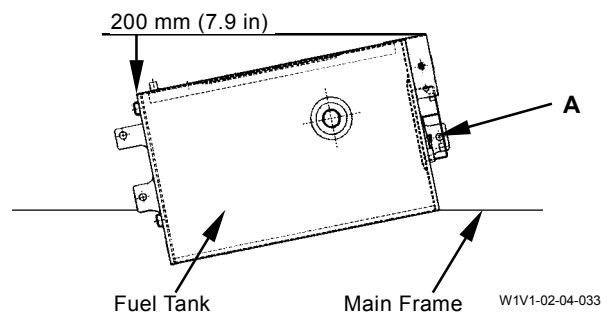
**IMPORTANT:** Do not touch the hose and cock under the fuel tank to the main frame.

9. Move the fuel tank 20 mm (0.8 in) away to the counterweight. Turn the fuel tank 200 mm (7.9 in) outside around bolt hole (A) on the fuel tank in order to have space between pump device and fuel tank.

 **NOTE:** Check the positions of fuel cock and main frame through the cover mounting side under the fuel tank.




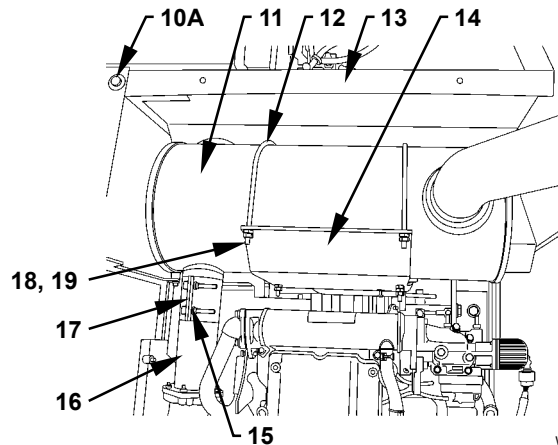
10. Secure the fuel tank by using a nylon sling in order not to turn over.



## UPPERSTRUCTURE / Pump Device


11. Attach a nylon sling to muffler (11) and hold muffler (11). Remove washers (18) (4 used) and nuts (19) (8 used) from U-bolts (12) (2 used). Loosen bolts (15) (2 used) on clamp (17). Move clamp (17) to the exhaust pipe (16) side. Remove muffler (11) from muffler bracket (14).


 : 14 mm, 17 mm

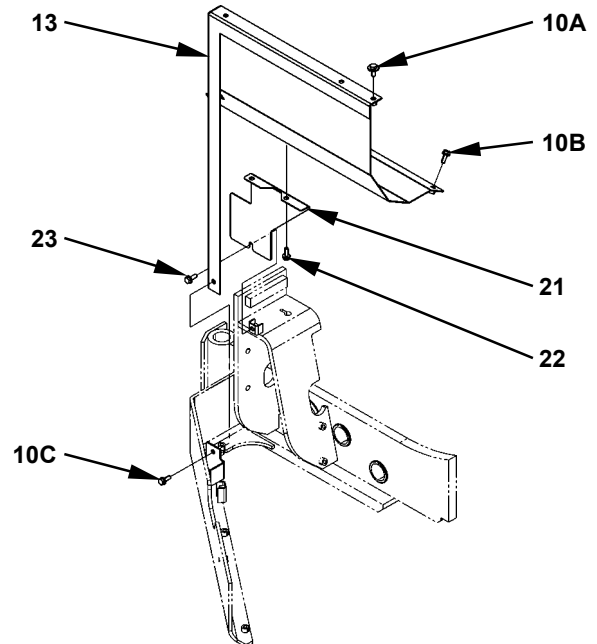


W1V1-02-04-022

12. Remove bolts (10A, 10B). Remove bolts (10C, 23) from the counterweight side. Remove covers (13, 21).

 : 17 mm


 **NOTE:** As cover (21) attached with cover (13) is removed, do not remove bolts (22) (2 used).




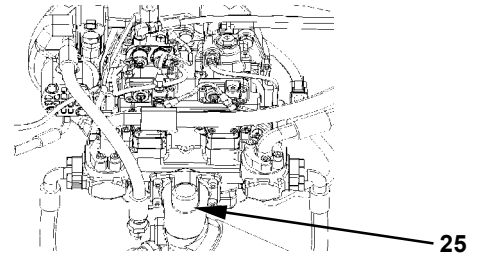
W1V1-02-04-045

## UPPERSTRUCTURE / Pump Device

13. Remove all hoses, pipes, and harnesses from pump device (25). Attach an identification tag onto the removed hoses for assembling. Cap the hose, pipe and open end.

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

 : 8 mm, 10 mm

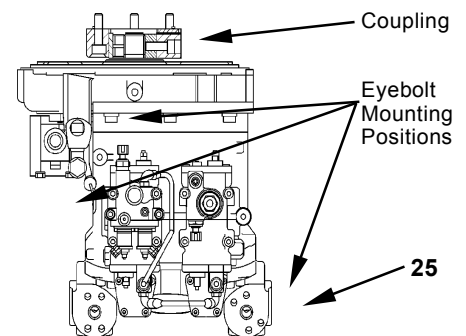


W1V1-02-04-034




**CAUTION: Pump device (25) weight: 165 kg (264 lb)**

14. Install eyebolts (M12, Pitch: 1.75 mm) (3 used) to pump device (25). Attach a wire rope to eyebolts (3 used). Adjust the wire rope and hold pump device (25) horizontally.



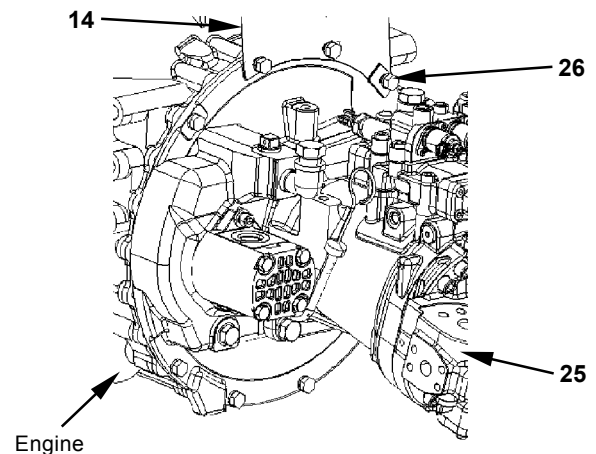
W1J1-02-04-040

15. Remove bolts (26) (8 used) and muffler bracket (14) from the muffler bracket (14) side and the lower cover (4A) side of pump device (25).

 : 17 mm

**IMPORTANT: Before removing pump device (25) from the engine, check the connection of engine and coupling in pump device (25). If pump device (25) is hoisted vertically with the coupling connected, the coupling may be damaged or deformed. Before hoisting pump device (25), check if the hose, pipe and connector installed to pump device (25) are normal.**

16. Hoist pump device (25) horizontally and move pump device (25) 50 mm away from the engine. When the coupling in pump device (25) is removed from the engine, vertically hoist and remove pump device (25) from the engine.



W1V1-02-04-041

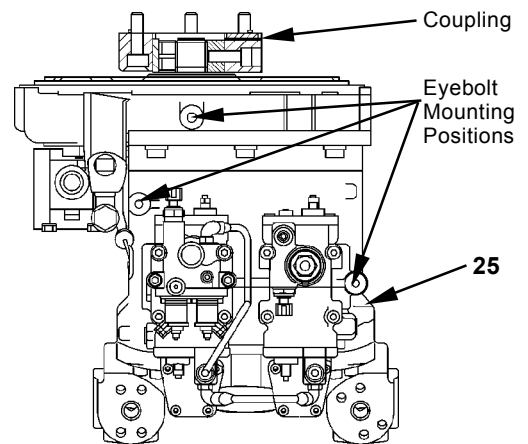
## UPPERSTRUCTURE / Pump Device

### Installation

**CAUTION:** Pump device (25) weight: 165 kg (264 lb)

**IMPORTANT:** Install pump device (25) to the engine horizontally. Although pump device (25) is not horizontal, if the coupling is inserted into the engine, the coupling may be damaged or deformed.

1. Install eyebolts (M12, Pitch: 1.75 mm) (3 used) to pump device (25). Attach a wire rope to eyebolts (3 used). Adjust the wire rope and hold pump device (25) horizontally.




W1J1-02-04-040

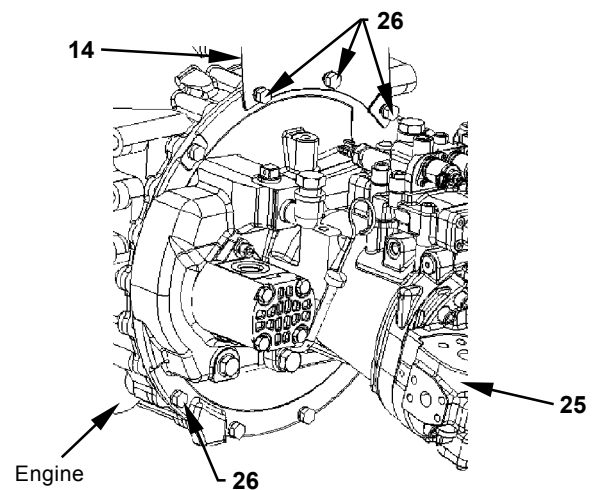
2. Hoist and move pump device (25) to the mounting position in engine. Hold pump device (25) horizontal and insert pump device (25) into the coupling part in engine.

3. Install pump device (25) to the engine with bolts (26) (5 used). Install pump device (25) and muffler bracket (14) to the engine with bolts (26) (3 used).

 : 17 mm

 : 65 N·m (6.5 kgf·m, 48 lbf·ft)


4. Remove the wire rope and eyebolts (3 used) from pump device (25).

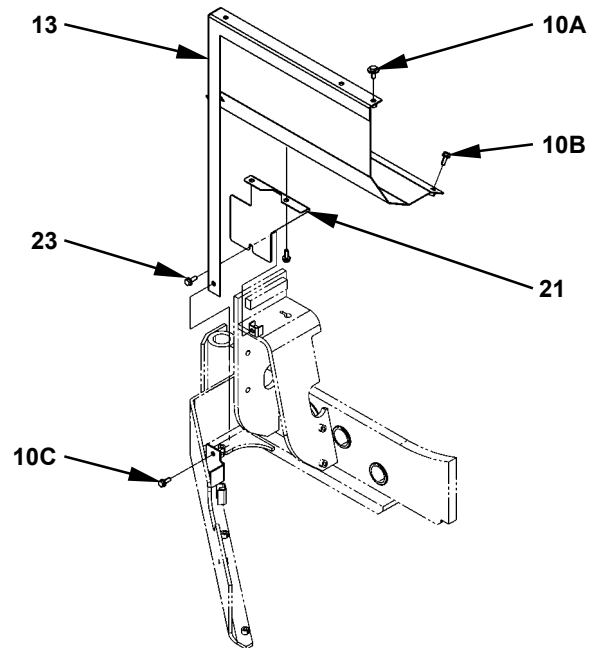


W1V1-02-04-041

## UPPERSTRUCTURE / Pump Device


5. Install covers (13, 21) to the main frame with bolts (10A, 10B, 10C, 23).


 **NOTE:** Install cover (21) attached with cover (13) to the main frame.




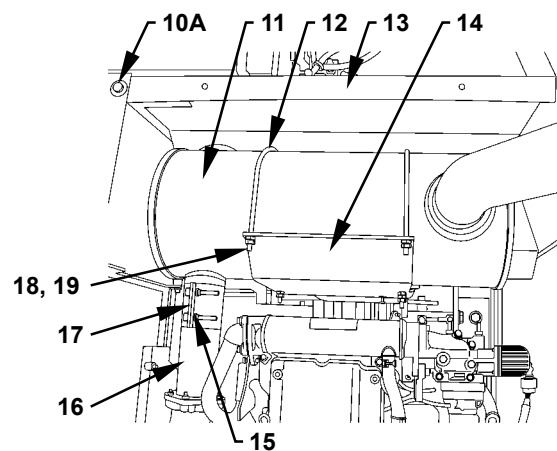
W1V1-02-04-045

6. Attach a nylon sling to muffler (11). Move muffler (11) to muffler bracket (14) and hold muffler (11). Temporarily tighten muffler (11) to muffler bracket (14) with U-bolts (12) (2 used), washers (18) (4 used) and nuts (19) (8 used). Align the pipe in muffler (11) with exhaust pipe (16). Move clamp (17) to the pipe connection part. Tighten bolts (15) (2 used) of clamp (17). Tighten nuts (19) (8 used).

 : 14 mm

 : 17 mm












 : 50 N·m (5 kgf·m, 37 lbf·ft)

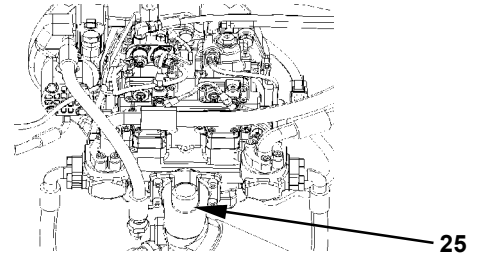


W1V1-02-04-022

## UPPERSTRUCTURE / Pump Device

7. Install all connectors, hoses and pipes to pump device (25).

-  : 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)
-  : 8 mm
-  : 50 N-m (5.0 kgf-m, 37 lbf-ft)
-  : 10 mm
-  : 90 N-m (9.0 kgf-m, 67 lbf-ft)





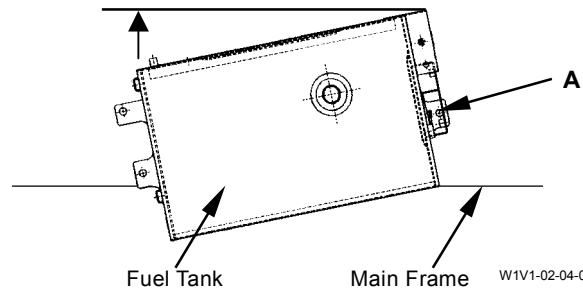
W1V1-02-04-034



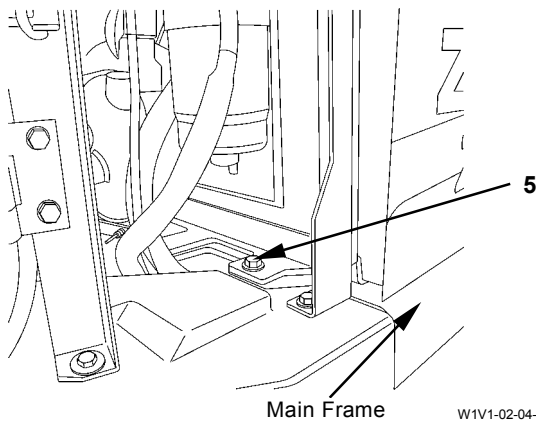
**CAUTION: Fuel tank weight: 97 kg (214 lb)**

8. Hoist and move the fuel tank to the mounting position in the main frame. Install the fuel tank to the main frame with bolts (5, 7) (2 used for each).

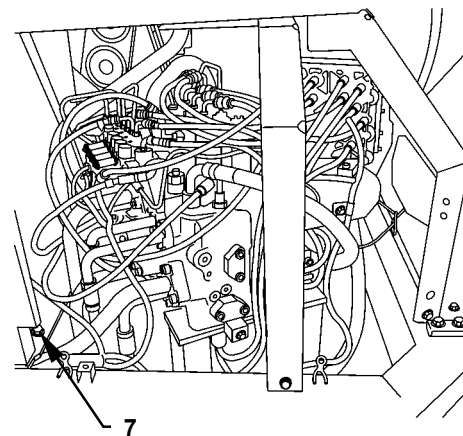
-  : 24 mm
-  : 270 N-m (27 kgf-m, 199 lbf-ft)



W1V1-02-04-033



W1V1-02-04-030





W1V1-02-05-079

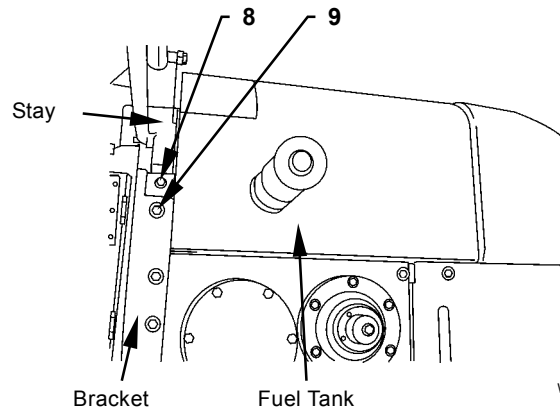


## UPPERSTRUCTURE / Pump Device

9. Install the fuel tank with bolt (8). Install the bracket to the fuel tank and hydraulic oil tank with bolts (9) (3 used).


 : 19 mm


 : 30 N·m (3.0 kgf·m, 22 lbf·ft)

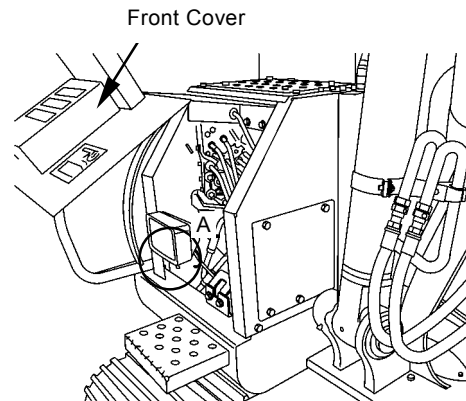


W1V1-02-04-031

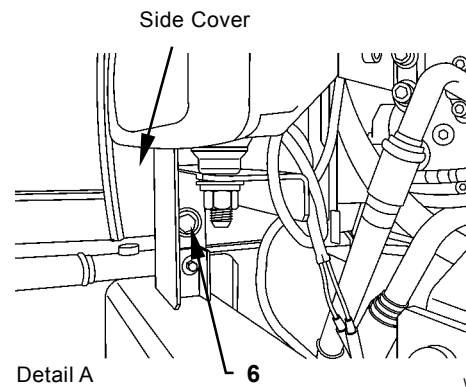
10. Close the side cover. Install bolt (6). Close the front cover.

 : 17 mm

 : 65 N·m (6.5 kgf·m, 48 lbf·ft)




W1V1-02-05-078




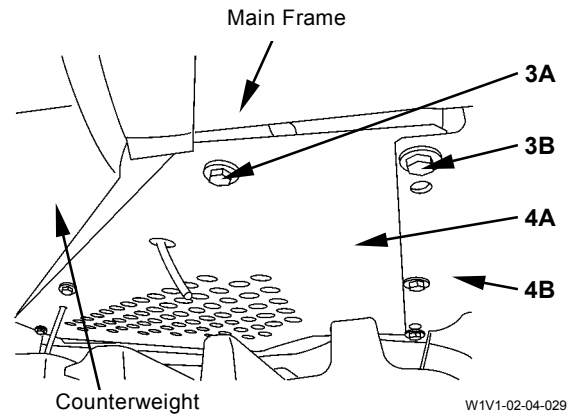
W1V1-02-05-076

## UPPERSTRUCTURE / Pump Device

11. Install cover (4A) with bolts (3A) (3 used). Install cover (4B) with bolts (3B) (6 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)



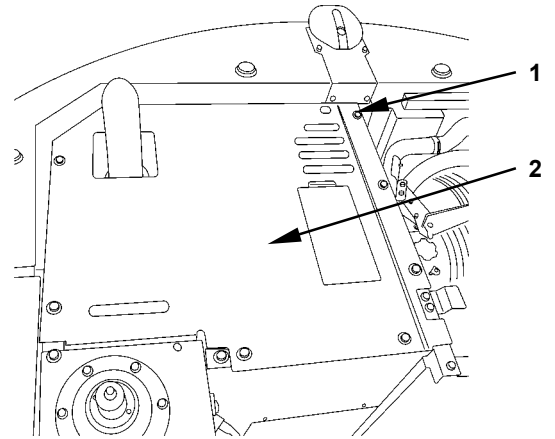
12. Install the counterweight to the main frame. (Refer to REMOVE AND INSTALL COUNTERWEIGHT on W2-2-1.)

13. Install cover (2) with bolts (1) (7 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

14. Unlock and close the engine cover.



## UPPERSTRUCTURE / Pump Device


### REMOVE AND INSTALL PUMP DEVICE (ZX225USR-3 CLASS)

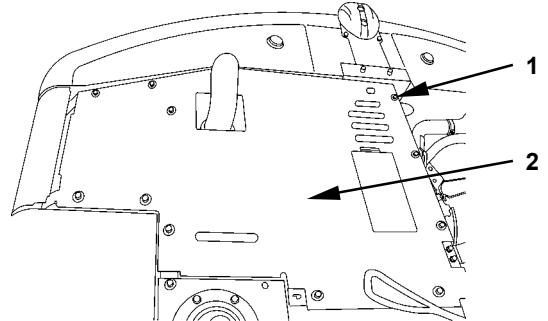
#### Removal



**CAUTION: Cover (2) weight: 23 kg (51 lb)**


1. Open and lock the engine cover. Remove bolts (1) (11 used) from cover(2). Attach a nylon sling onto cover (2). Hoist and remove cover (2).

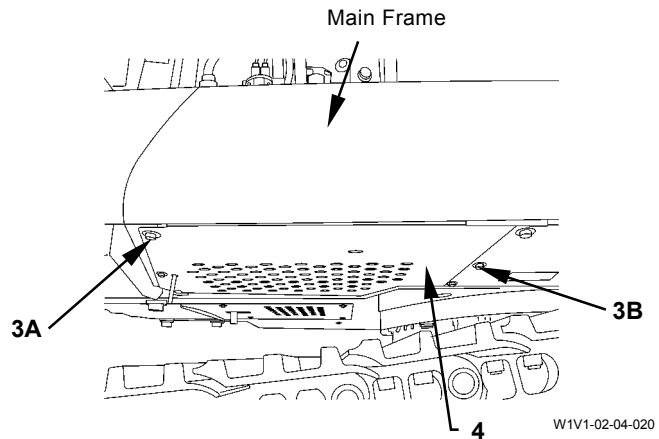
 : 17 mm



W1V1-02-04-019


2. Remove bolts (3A, 3B) (3 used for each) from cover (4). Remove cover (4) from the main frame.

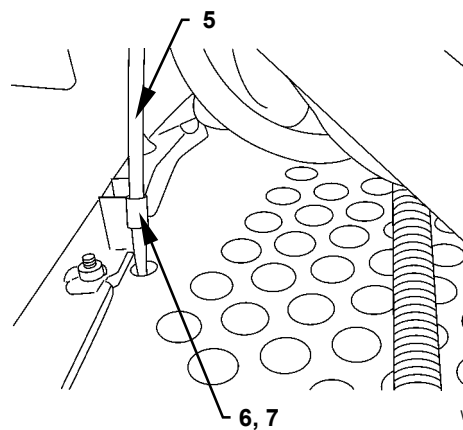
 : 17 mm



W1V1-02-04-020

3. Loosen bolt (6) on the cover (4) mounting side. Remove hose (5) from clip (7).


 : 17 mm

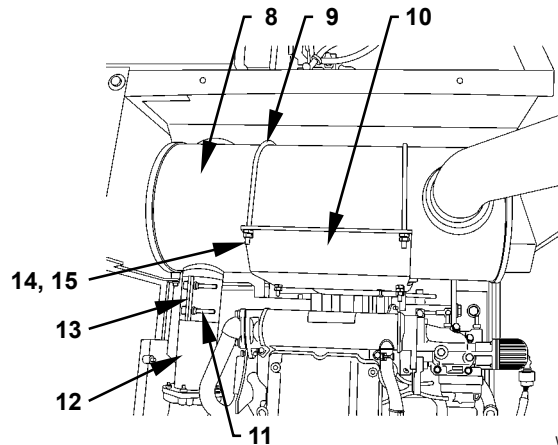


W1V1-02-04-021

## UPPERSTRUCTURE / Pump Device


- Attach a nylon sling to muffler (8) and hold muffler (8). Remove washers (14) (4 used) and nuts (15) (8 used) from U-bolts (9) (2 used). Loosen bolts (11) (2 used) on clamp (13). Move clamp (13) to the exhaust pipe (12) side. Hoist and remove muffler (8) from muffler bracket (10).

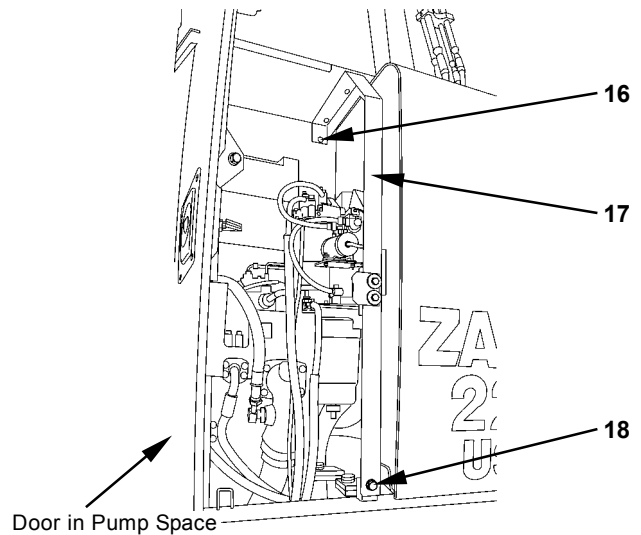
 : 14 mm, 17 mm



W1V1-02-04-022


- Open and lock the door in pump space. Remove bolts (16, 18) from bracket (17). Remove bracket (17).

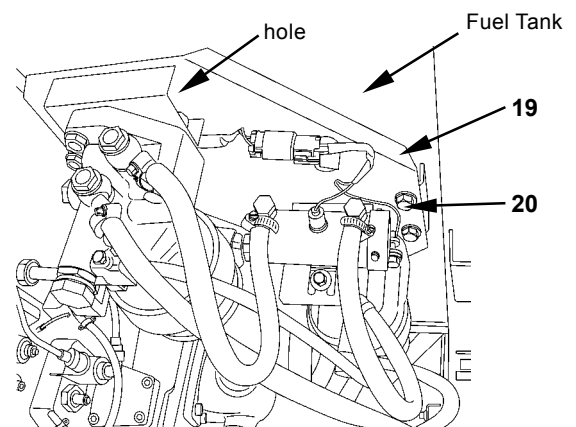
 : 17 mm



W1V1-02-04-024

- Pass a nylon sling through the hole on bracket (19) and hold bracket (19). Remove bolts (20) (4 used) from bracket (19). Remove the bracket (19) assembly from the fuel tank. Move bracket (19) to the position where the pump device can be removed and installed safely.


 : 17 mm




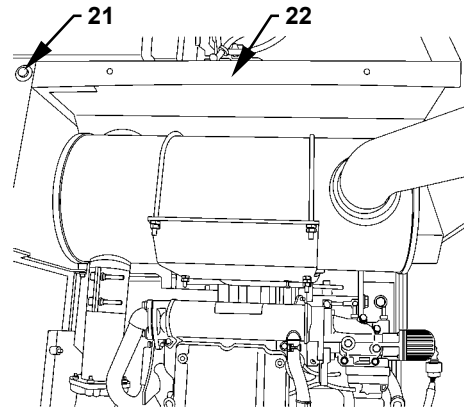
W1V1-02-04-023

## UPPERSTRUCTURE / Pump Device

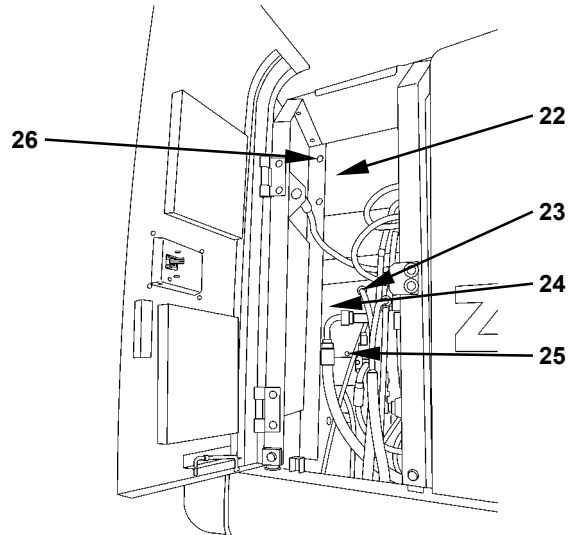
7. Remove bolts (21) and (26) (3 used) from covers (22, 24). Loosen bolt (25) in cover (24). Remove covers (22, 24).

 : 17 mm

 **NOTE:** As cover (24) attached with cover (22) is removed, do not remove bolts (23) (2 used).




W1V1-02-04-022




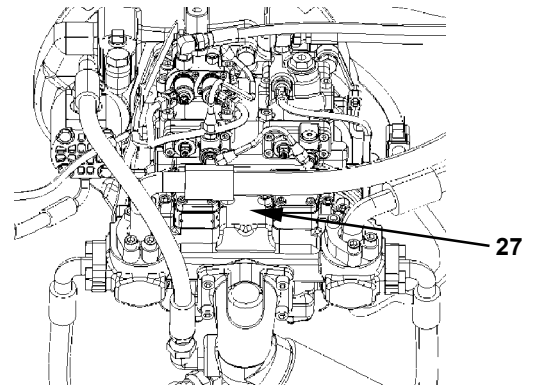
W1V1-02-04-025

## UPPERSTRUCTURE / Pump Device

8. Remove all hoses, pipes, and connectors from pump device (27). Attach an identification tag onto the removed hoses for assembling. Cap the open ends of hose and pipe.

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

 : 8 mm, 10 mm

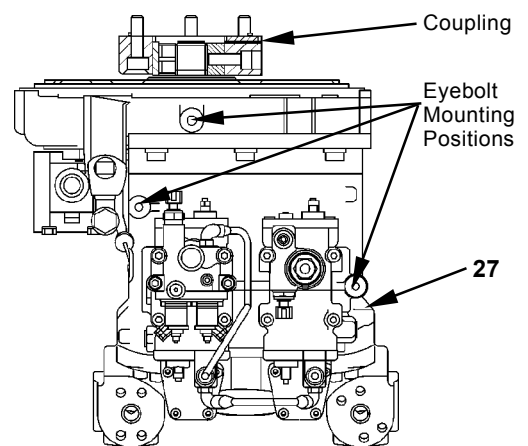


W1V1-02-04-034




**CAUTION: Pump device (27) weight: 165 kg (364 lb)**

9. Install eyebolts (M12, Pitch: 1.75 mm) (3 used) to pump device (27). Attach a wire rope to eyebolts (3 used). Adjust the wire rope and hold pump device (27) horizontally.



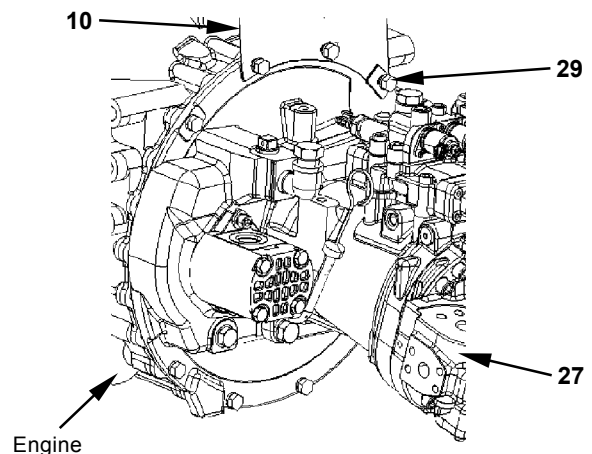
W1V1-02-04-040

10. Remove bolts (29) (8 used) and muffler bracket (10) from the muffler bracket (10) side and the lower cover (4) side of pump device (27).

 : 17 mm

**IMPORTANT: Before removing pump device (27) from the engine, check the connection of engine and coupling in pump device (27). If pump device (27) is hoisted vertically with the coupling connected, the coupling may be damaged or deformed. Before hoisting pump device (27), check if the hose, pipe and connector installed to pump device (27) are normal.**

11. Hoist pump device (27) horizontally and move pump device (27) 50 mm (2 in) away from the engine. When the coupling in pump device (27) is removed from the engine, vertically hoist and remove pump device (27) from the engine.



W1V1-02-04-041

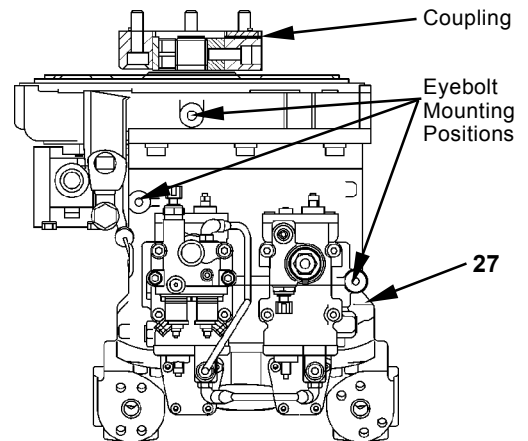
## UPPERSTRUCTURE / Pump Device

### Installation

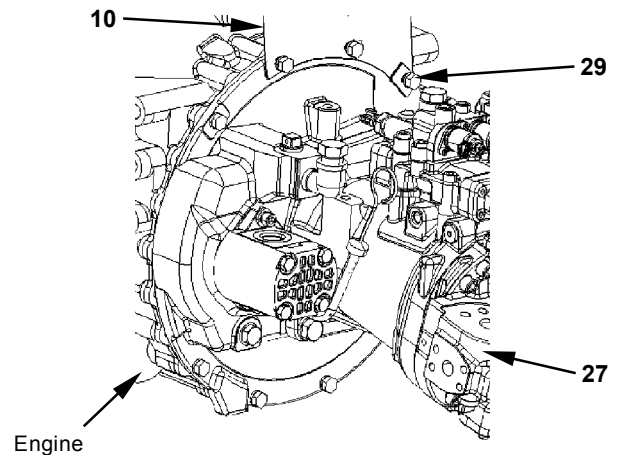
**CAUTION:** Pump device (27) weight: 165kg (364 lb)

**IMPORTANT:** Install pump device (27) to the engine horizontally. Although pump device (27) is not horizontal, if the coupling is inserted into the engine, the coupling may be damaged or deformed.

1. Install eyebolts (M12, Pitch: 1.75 mm) (3 used) to pump device (27). Attach a wire rope to eyebolts (3 used). Adjust the wire rope and hold pump device (27) horizontally
2. Hoist pump device (27) and horizontally move pump device (27) 50 mm (2 in) to the engine. Insert the coupling is inserted into that in the engine.
3. Install pump device (27) to the engine with bolts (29) (5 used). Install pump device (27) and bracket (10) to the engine with bolts (29) (3 used).  
🔧 : 17 mm  
🔩 : 65 N·m (6.5 kgf·m, 48 lbf·ft)
4. Remove the wire rope and eyebolts (3 used) from pump device (27).




W1J1-02-04-040





W1V1-02-04-041

## UPPERSTRUCTURE / Pump Device

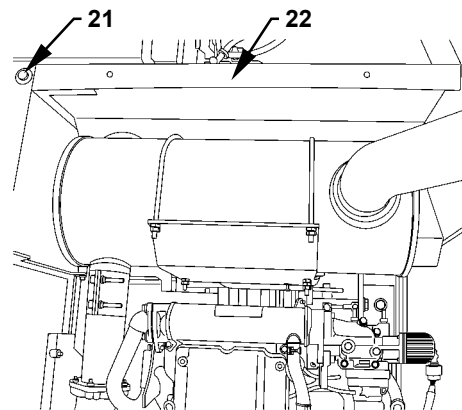
5. Install covers (22, 24) onto the main frame with bolts (21, 25) and (26) (3 used).

 : 17 mm

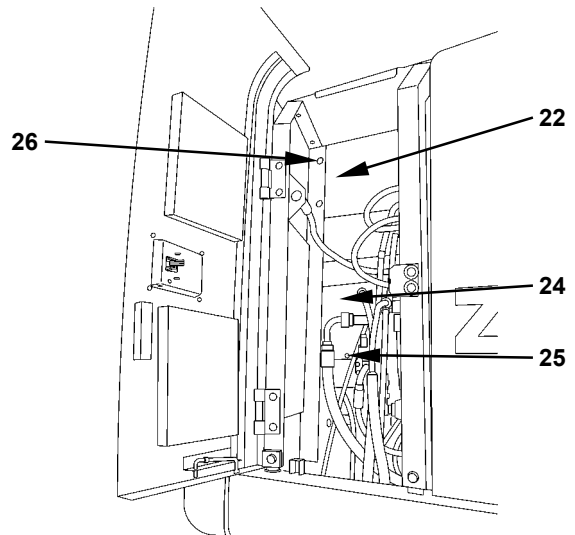
 : 50 N·m (5 kgf·m, 37 lbf·ft)

 **NOTE:** Install cover (24) attached with cover (22) to the main frame.

*Bolt (25) is not removed from the main frame. Insert the bolt (25) hole on cover (24) to bolt (25) and tighten bolt (25).*



W1V1-02-04-022















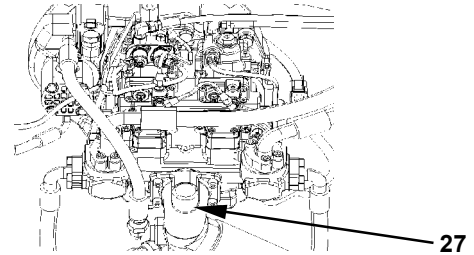
W1V1-02-04-025



## UPPERSTRUCTURE / Pump Device



6. Install all hoses, pipes and connectors to pump device (27).

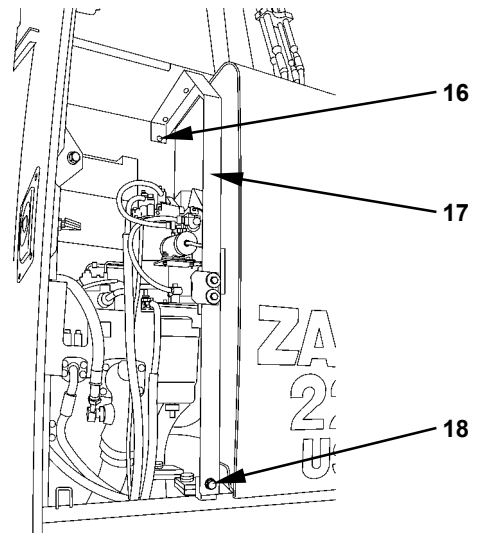
-  : 19 mm
-  : 30 N·m (3.0 kgf·m, 22 lbf·ft)
-  : 22 mm
-  : 40 N·m (4.0 kgf·m, 30 lbf·ft)
-  : 27 mm
-  : 80 N·m (8.0 kgf·m, 59 lbf·ft)
-  : 36 mm
-  : 180 N·m (18 kgf·m, 133 lbf·ft)
-  : 8 mm
-  : 50 N·m (5.0 kgf·m, 37 lbf·ft)
-  : 10 mm
-  : 90 N·m (9.0 kgf·m, 67 lbf·ft)



W1V1-02-04-029

7. Install bracket (17) with bolts (16,18).


-  : 17 mm
-  : 50 N·m (5 kgf·m, 37 lbf·ft)




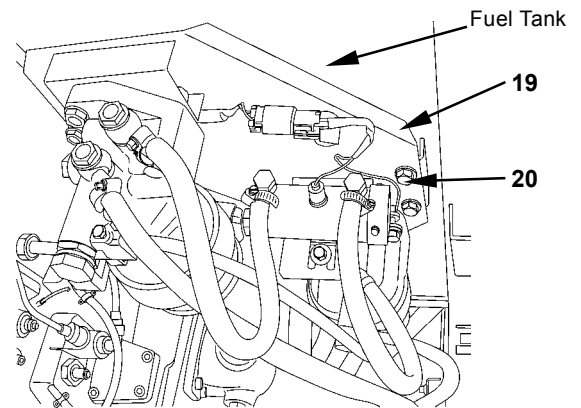
W1V1-02-04-024

## UPPERSTRUCTURE / Pump Device

8. Install bracket (19) to the fuel tank with bolts (20) (4 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

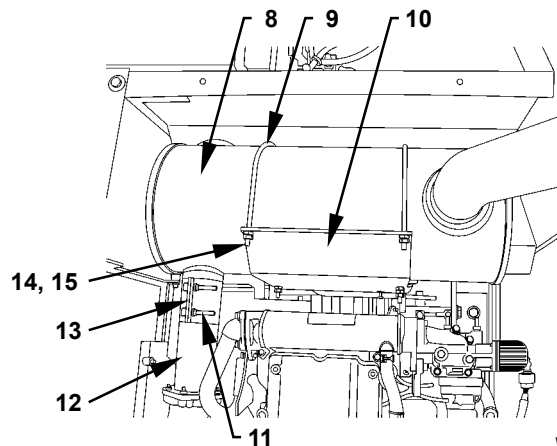


W1V1-02-04-023

9. Attach a nylon sling to muffler (8). Move muffler (8) to muffler bracket (10) and hold muffler (8). Temporarily tighten muffler (8) to muffler bracket (10) with U-bolts (9) (2 used), washers (14) (4 used) and nuts (15) (8 used). Move clamp (13) to the connection part of muffler (8) pipe and exhaust pipe (12). Tighten clamp (13) with bolts (11) (2 used). Tighten nuts (15) (8 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

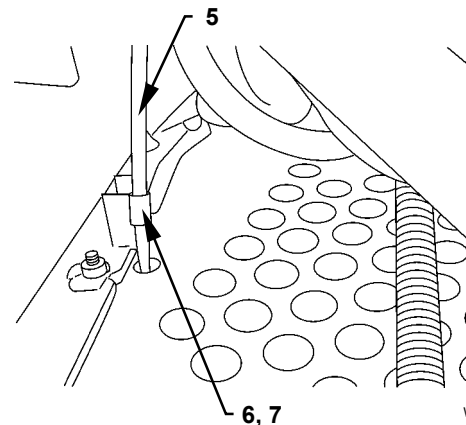


W1V1-02-04-022

10. Insert hose (5) to clip (7). Tighten bolt (6).

 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)




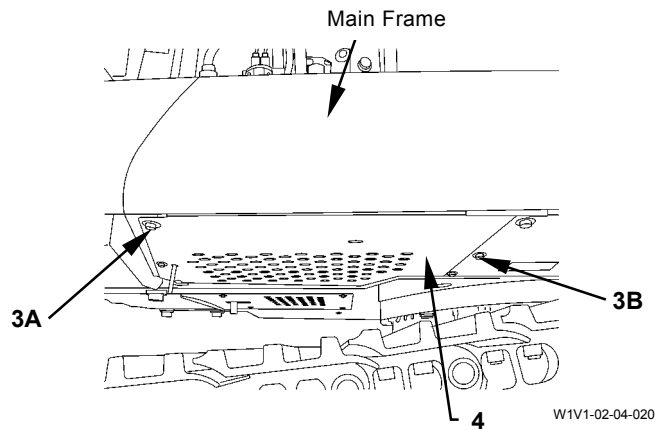
W1V1-02-04-021

## UPPERSTRUCTURE / Pump Device

11. Install cover (4) with bolts (3A, 3B) (3 used for each).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

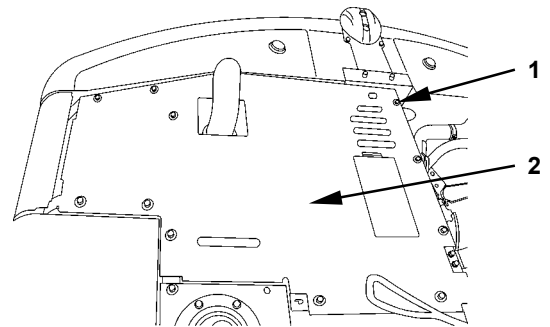


**CAUTION: Engine cover weight: 23 kg (51 lb)**

12. Attach a nylon sling onto cover (2). Hoist and move cover (2) to the mounting position. Install cover (2) with bolts (1) (11 used).

 : 17 mm

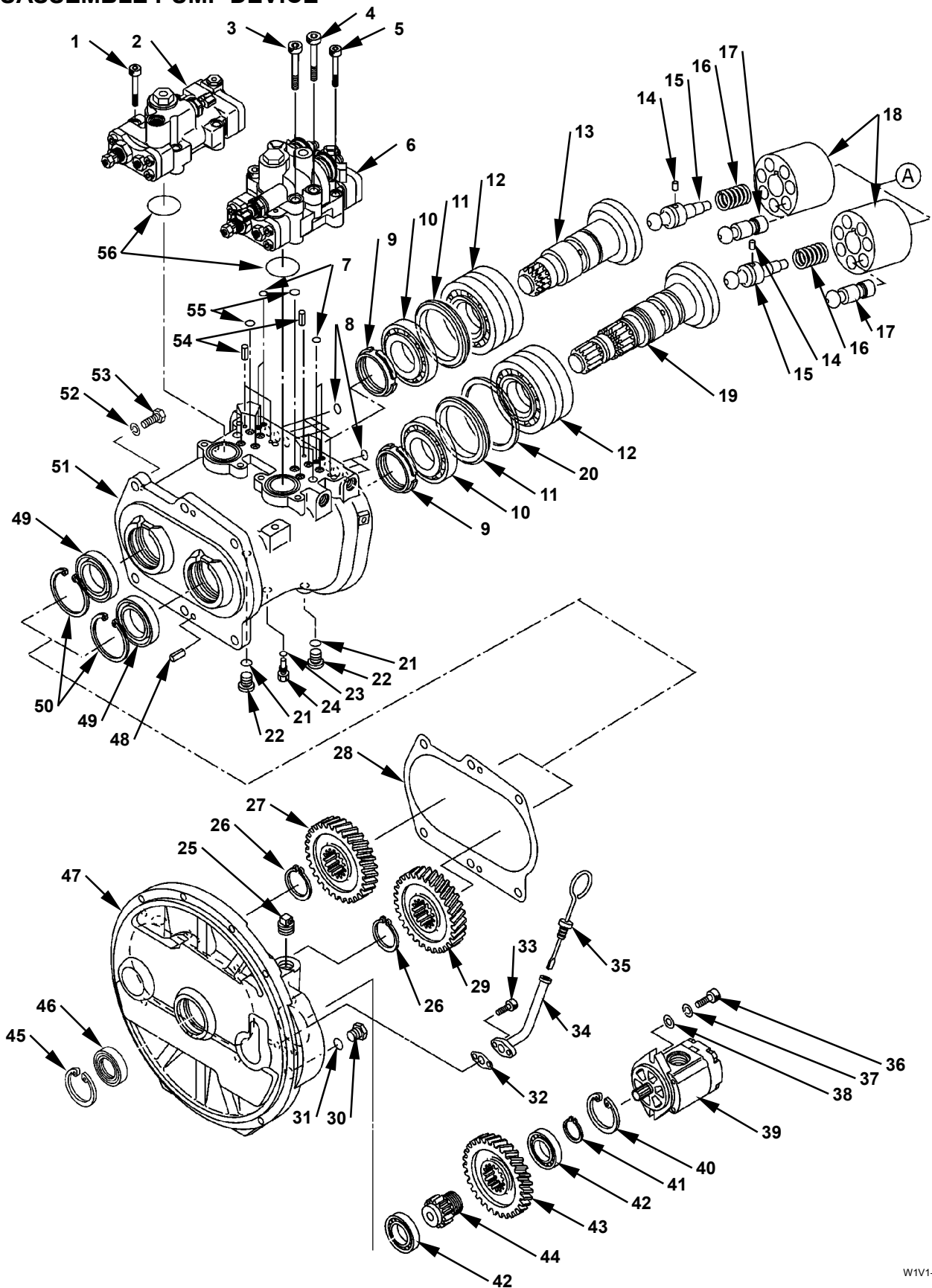
 : 50 N·m (5 kgf·m, 37 lbf·ft)



13. Unlock and close the engine cover.

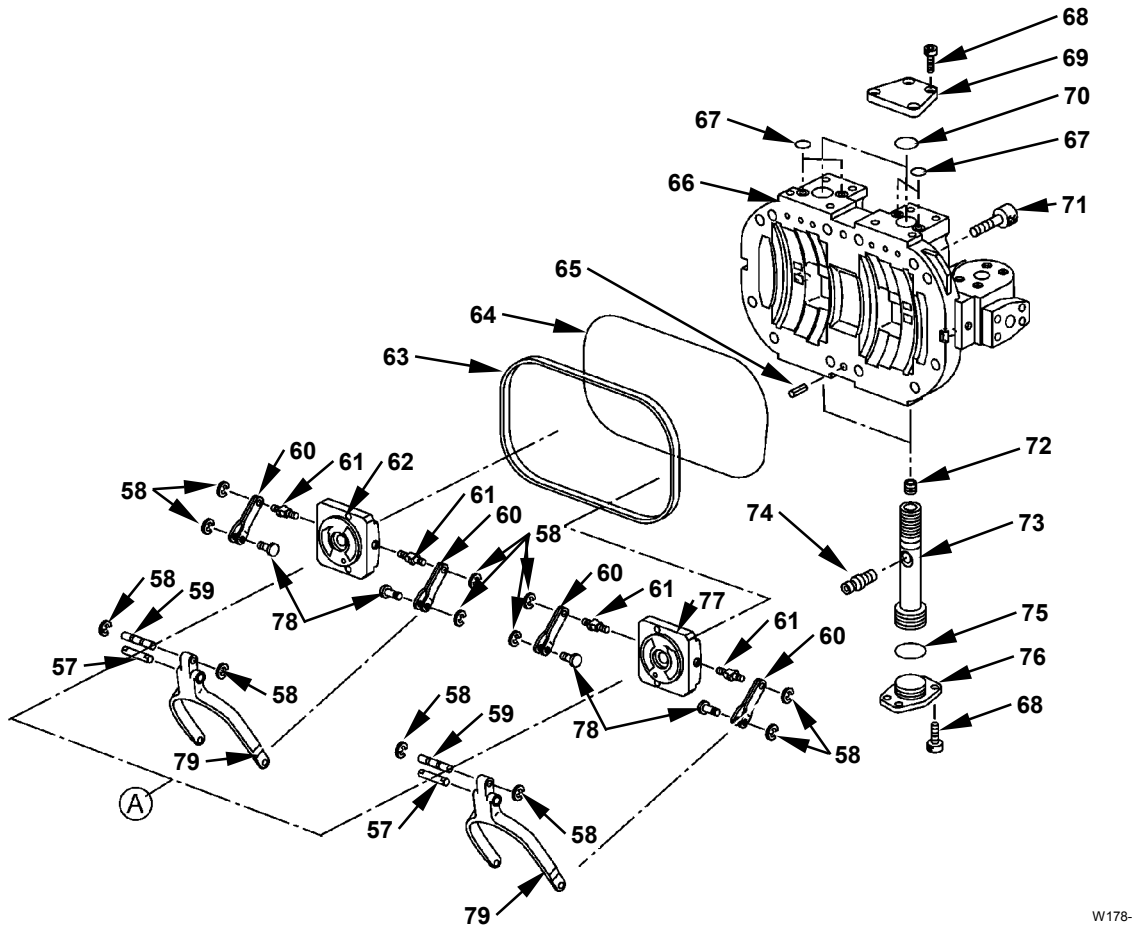
# UPPERSTRUCTURE / Pump Device

## DISASSEMBLE PUMP DEVICE



W1V1-02-04-011

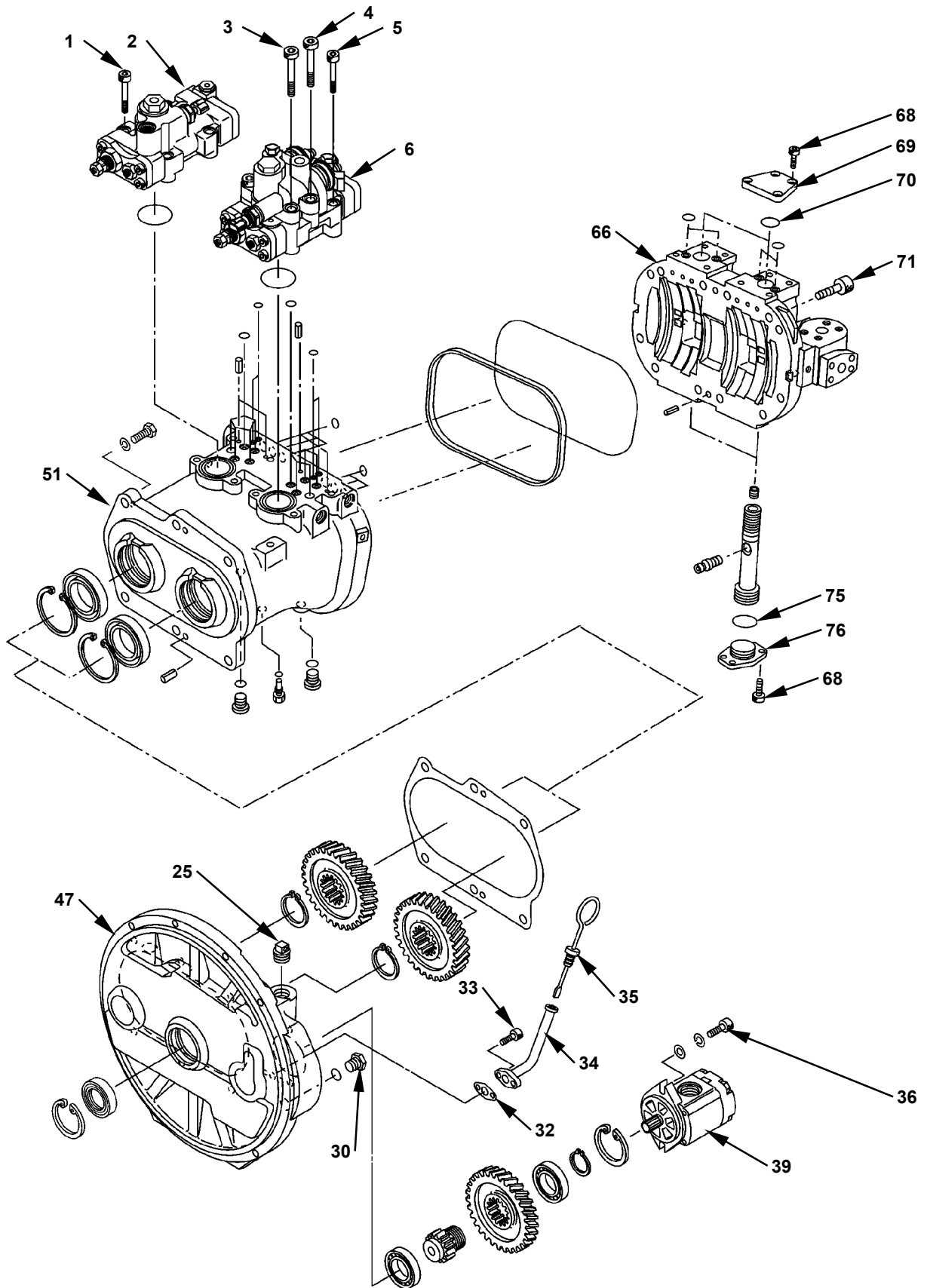
# UPPERSTRUCTURE / Pump Device



W178-02-11-080

- |                            |                              |                               |                            |
|----------------------------|------------------------------|-------------------------------|----------------------------|
| 1 - Socket Bolt (4 Used)   | 21 - O-Ring (2 Used)         | 41 - Retaining Ring           | 61 - Pin (4 Used)          |
| 2 - Right Regulator        | 22 - Plug (2 Used)           | 42 - Ball Bearing (2 Used)    | 62 - Right Valve Plate     |
| 3 - Socket Bolt (2 Used)   | 23 - O-Ring                  | 43 - Gear                     | 63 - Backup Ring           |
| 4 - Socket Bolt (2 Used)   | 24 - Stopper                 | 44 - Gear Shaft               | 64 - O-Ring                |
| 5 - Socket Bolt (2 Used)   | 25 - Plug                    | 45 - Retaining Ring           | 65 - Spring Pin (2 Used)   |
| 6 - Left Regulator         | 26 - Retaining Ring (2 Used) | 46 - Oil Seal                 | 66 - Select Head           |
| 7 - O-Ring (4 Used)        | 27 - Gear                    | 47 - Gear Casing              | 67 - O-Ring (4 Used)       |
| 8 - O-Ring (6 Used)        | 28 - Gasket                  | 48 - Spring Pin (2 Used)      | 68 - Socket Bolt (16 Used) |
| 9 - Bearing Nut (2 Used)   | 29 - Gear                    | 49 - Oil Seal (2 Used)        | 69 - Stopper S (2 Used)    |
| 10 - Bearing (2 Used)      | 30 - Plug                    | 50 - Retaining Ring (2 Used)  | 70 - O-Ring (2 Used)       |
| 11 - Ring (2 Used)         | 31 - O-Ring                  | 51 - Pump Casing              | 71 - Socket Bolt (12 Used) |
| 12 - Bearing (2 Used)      | 32 - Gasket                  | 52 - Spring Washer (6 Used)   | 72 - Set Screw (2 Used)    |
| 13 - Shaft                 | 33 - Socket Bolt (2 Used)    | 53 - Bolt (6 Used)            | 73 - Servo Piston (2 Used) |
| 14 - Pin (2 Used)          | 34 - Pipe                    | 54 - Spring Pin (2 Used)      | 74 - Pin (2 Used)          |
| 15 - Center Shaft (2 Used) | 35 - Level Gauge             | 55 - O-Ring (2 Used)          | 75 - O-Ring (2 Used)       |
| 16 - Spring (2 Used)       | 36 - Socket Bolt (2 Used)    | 56 - O-Ring (2 Used)          | 76 - Stopper L (2 Used)    |
| 17 - Plunger (14 Used)     | 37 - Spring Washer (2 Used)  | 57 - Pin (2 Used)             | 77 - Left Valve Plate      |
| 18 - Rotor (2 Used)        | 38 - Washer (2 Used)         | 58 - Retaining Ring (12 Used) | 78 - Pin (4 Used)          |
| 19 - Shaft                 | 39 - Pilot Pump              | 59 - Pin (2 Used)             | 79 - Link (2 Used)         |
| 20 - Slide Ring            | 40 - Retaining Ring          | 60 - Lever (4 Used)           |                            |

# UPPERSTRUCTURE / Pump Device




W1V1-02-04-012


## UPPERSTRUCTURE / Pump Device

### Disassemble Pump Device


1. Remove plug (25) from gear casing (47).

 : 17 mm


2. Remove plug (30) from gear casing (47). Drain gear oil. (Approx 1.0 L, 0.26 US gal)

 : 22 mm

3. Remove socket bolts (1) (4 used). Raise right regulator (2) to the direction of selector head (66) and remove right regulator (2) from pump casing (51).

 : 8 mm

4. Remove socket bolts (3) (2 used) and (5) (2 used). Raise left regulator (6) to the direction of selector head (66) and remove left regulator (6) from pump casing (51). Do not remove socket bolt (4).

 : 8 mm




**CAUTION: Pump device weight: 160 kg (353 lb)**




**CAUTION: When hoisting the pump device, do not take pump casing (51) off the ground and turn to the gear casing (47) side.**


5. Install eyebolt (M10, Pitch 1.5 mm) to the thread hole for socket bolts (1, 3) of pump casing (51). Hoist the pump device. Place the pump device with the gear casing (47) facing downward. Place the wooden block (80 mm or more square) under gear casing (47).


6. Remove socket bolts (33) (2 used) from gear casing (47). Remove level gauge (35), pipe (34) and gasket (32).

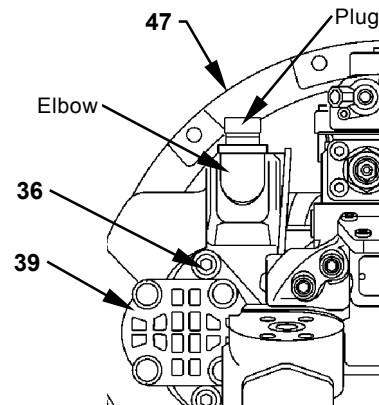
 : 6 mm

7. Remove socket bolts (36) (2 used) from gear casing (47). Tap the flange of pilot pump (39) by using a plastic hammer and remove pilot pump (39) from gear casing (47). Remove the plug and elbow from gear casing (47).

 : 30 mm

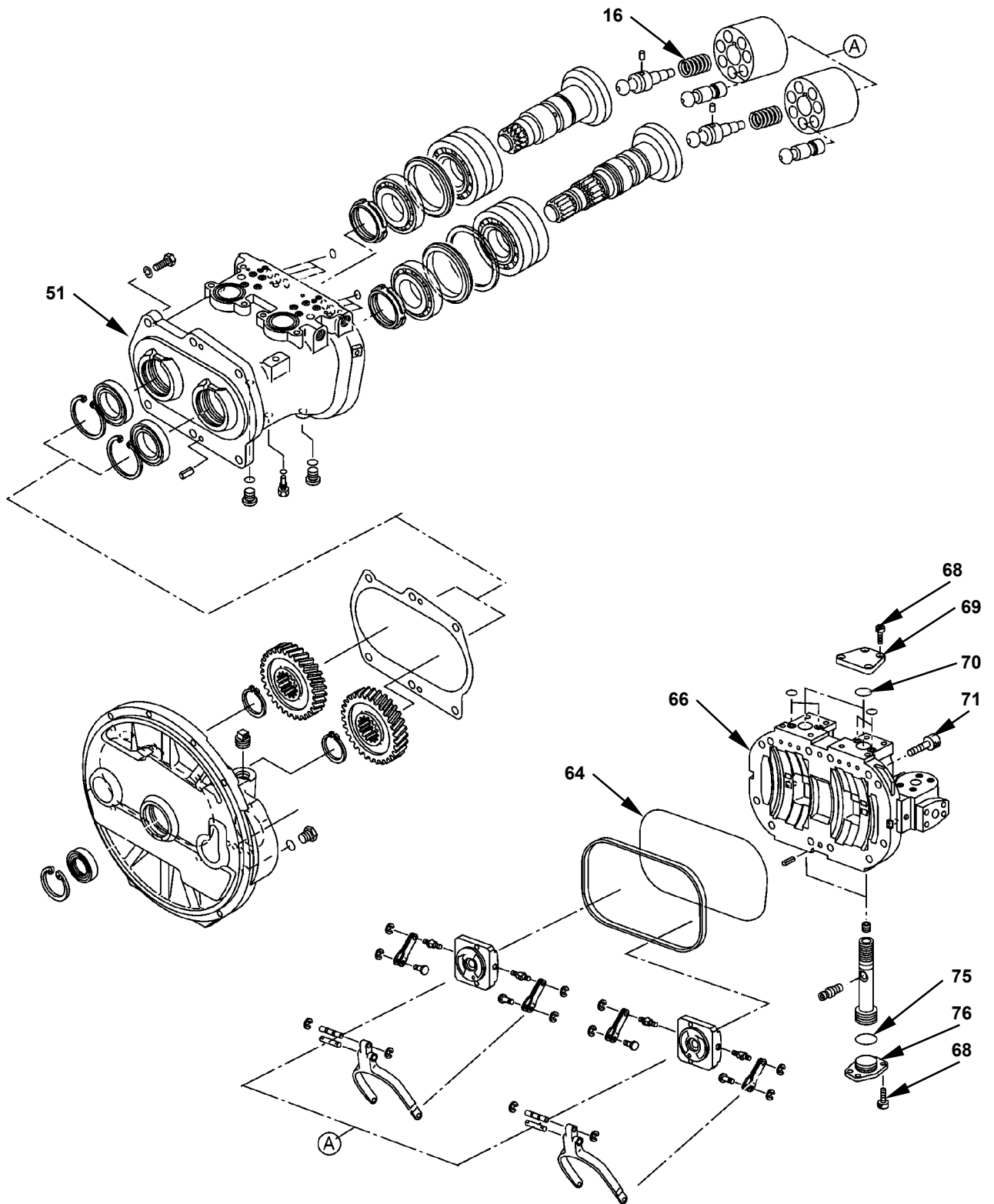
 : 8 mm

 **NOTE:** *THREEBOND* has been applied onto the mounting surface of pilot pump (39).



W1V1-02-04-010

# UPPERSTRUCTURE / Pump Device




W178-02-11-083





## UPPERSTRUCTURE / Pump Device

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8. Record the clearance between pump casing (51) and selector head (66). Remove socket bolts (71) (12 used) from selector head (66).


 : 10 mm


 **NOTE:** When loosening socket bolt (71), selector head (66) will be pushed out due to the force of spring (16).

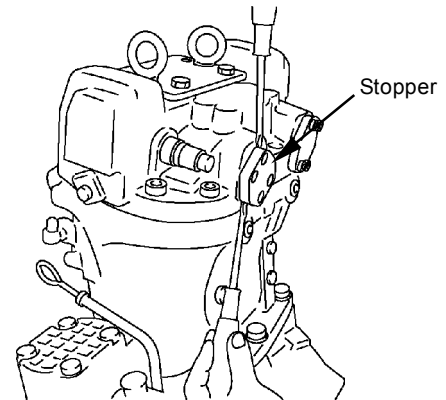
 **CAUTION:** Selector head (66) weight: 28 kg (62 lb)

9. Install eyebolt (M12, Pitch 1.75 mm) to the bolt hole on the top of selector head (66). Hoist and remove selector head (66) from pump casing (51). O-ring (64) may be removed with the lower surface of selector head (66). Remove O-ring (64) from selector head (66).

10. Remove socket bolts (68) (16 used) from selector head (66). Remove stoppers S (69) (2 used) and stoppers L (76) (2 used).

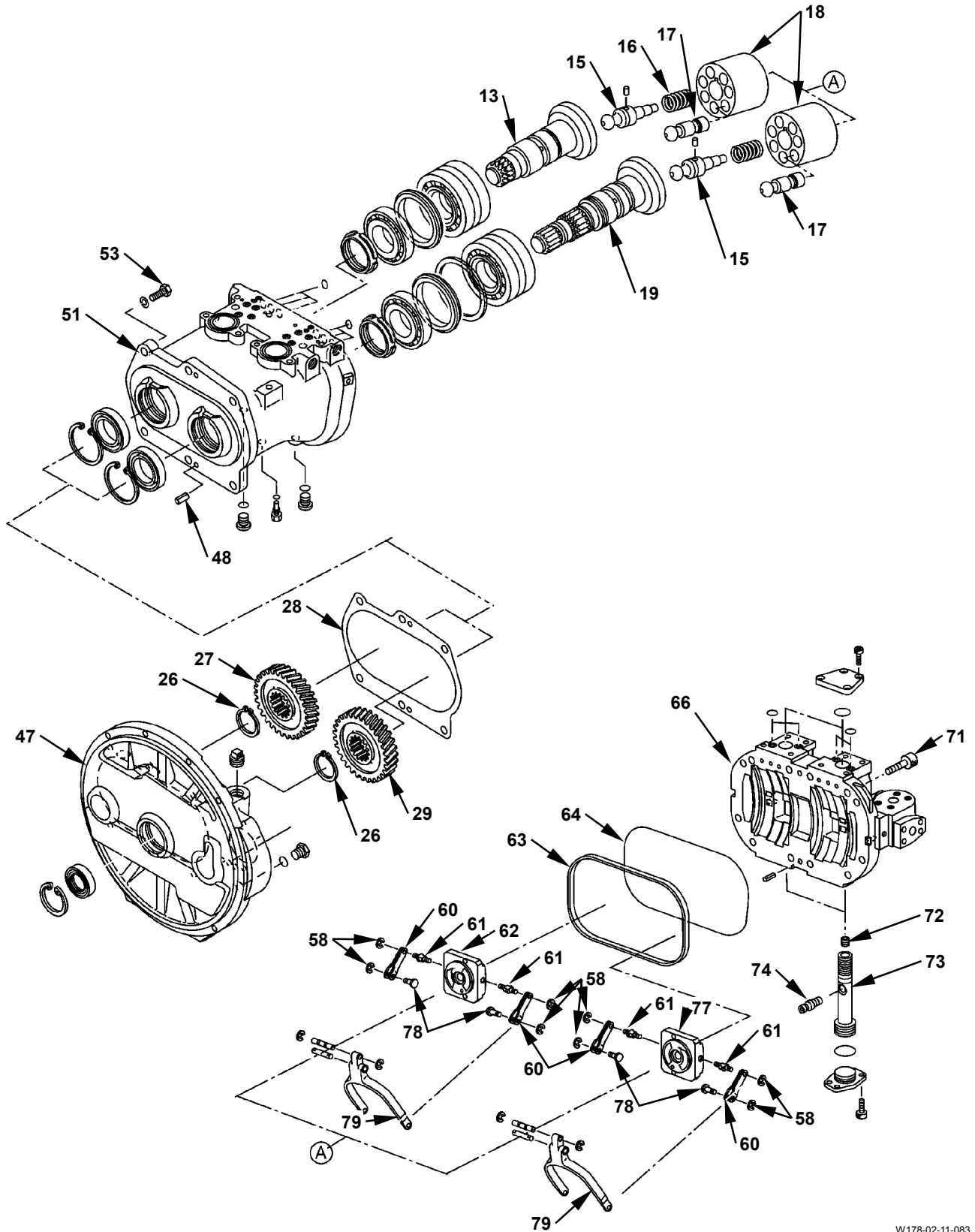
 : 6 mm

 **NOTE:** O-rings (70, 75) are installed on stopper S (69) and stopper L (76). If it is difficult to remove the stopper, tap the outer periphery of stopper. Turn the stopper until about half of the hole for the mounting bolt can be seen. Insert a screwdriver into the mounting bolt hole. Remove the stopper by using a screwdriver.



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# UPPERSTRUCTURE / Pump Device




W178-02-11-083

## UPPERSTRUCTURE / Pump Device

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11. Heat set screw (72) by using a drier etc. Remove set screw (72) from servo piston (73). Remove pin (74). (2 places)


 : 6 mm

12. Remove servo piston (73) from selector head (66). (2 places)

13. Remove backup ring (63) and O-ring (64) from pump casing (51).


14. Both valve plates (62, right) and (77, left) are very similar and their installing direction are determined. Record the position and direction of valve plates (62, right) and (77, left) before removing. Remove retaining rings (58) (4 used) from pins (61) (4 used). Remove valve plates (62, right) and (77, left) from links (79) (2 used). Do not remove pins (61) (4 used) unless necessary.

15. Remove rotor (18), spring (16), center shaft (15) and plungers (17) (7 used) from pump casing (51) in this order. (Both right and left pumps)


 **NOTE:** When removing plunger (17), turn plunger (17) inside and remove plunger (7).

**IMPORTANT:** As the pump performance may be changed, do not deform link (79).

16. Remove the link (79) assemblies (2 used) from pump casing (51). Do not disassemble the link (79) assembly unless necessary.

 **NOTE:** If it is difficult to remove the link (79) assembly, use a screwdriver.

17. Remove bolts (53) (6 used) from pump casing (51).

 : 24 mm

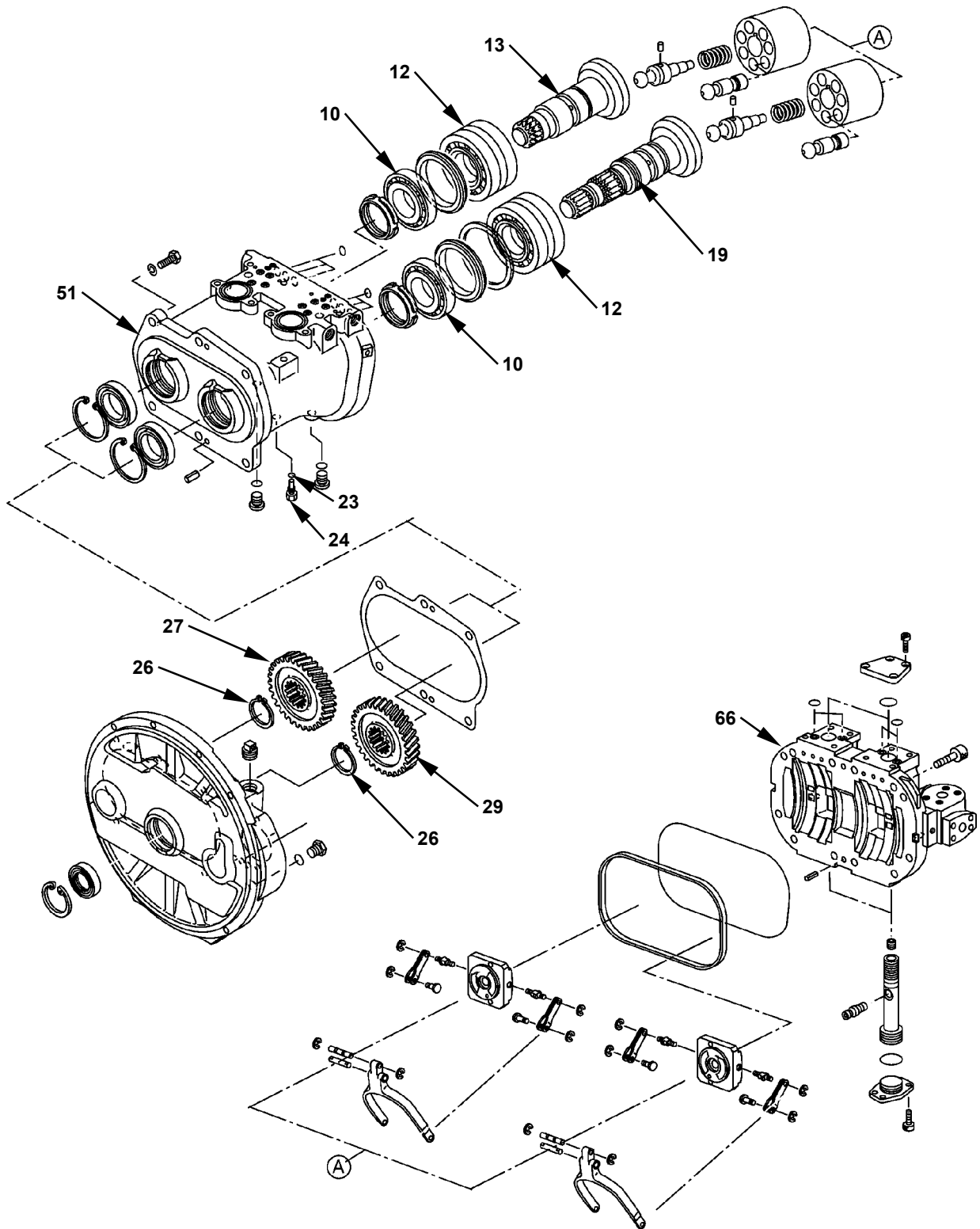


**CAUTION:** Pump casing (51) weight: 105 kg (230 lb)

18. Install eyebolt (M12, Pitch 1.75 mm) to the socket bolt (71) hole on pump casing (51). Hoist and remove pump casing (51) from gear casing (47). Shafts (13, 19), gears (27, 29) and etc. are removed with pump casing (51) together. Place pump casing (51) with the mounting surface for regulator facing upward.

19. Remove spring pins (48) (2 used) and gasket (28) from gear casing (47).

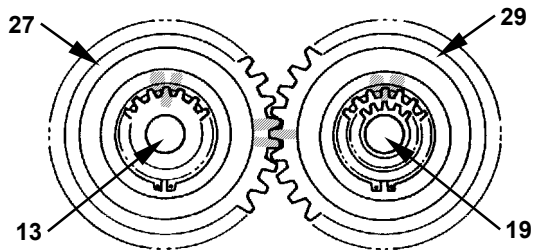
# UPPERSTRUCTURE / Pump Device



W178-02-11-083

## UPPERSTRUCTURE / Pump Device

20. Put the matching marks on the meshed position of splines on shafts (13, 19) and gears (27, 29). Put the matching marks on the meshed position of gears (27, 29).




W137-02-04-007

21. Remove retaining rings (26) (2 used) from shafts (13, 19). Remove gears (27, 29) from shafts (13, 19).

**CAUTION:** Pump casing (51) weight: 70 kg (154 lb)

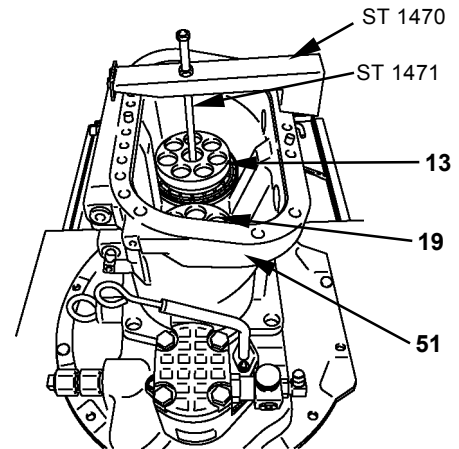
22. Attach a nylon sling onto pump casing (51). Hoist and place pump casing (51) with the mounting side for selector head (66) facing downward.
23. Remove stopper (24) from pump casing (51). Remove O-ring (23) from stopper (24).

 : 19 mm

**CAUTION:** Pump casing (51) weight: 70 kg (154 lb)

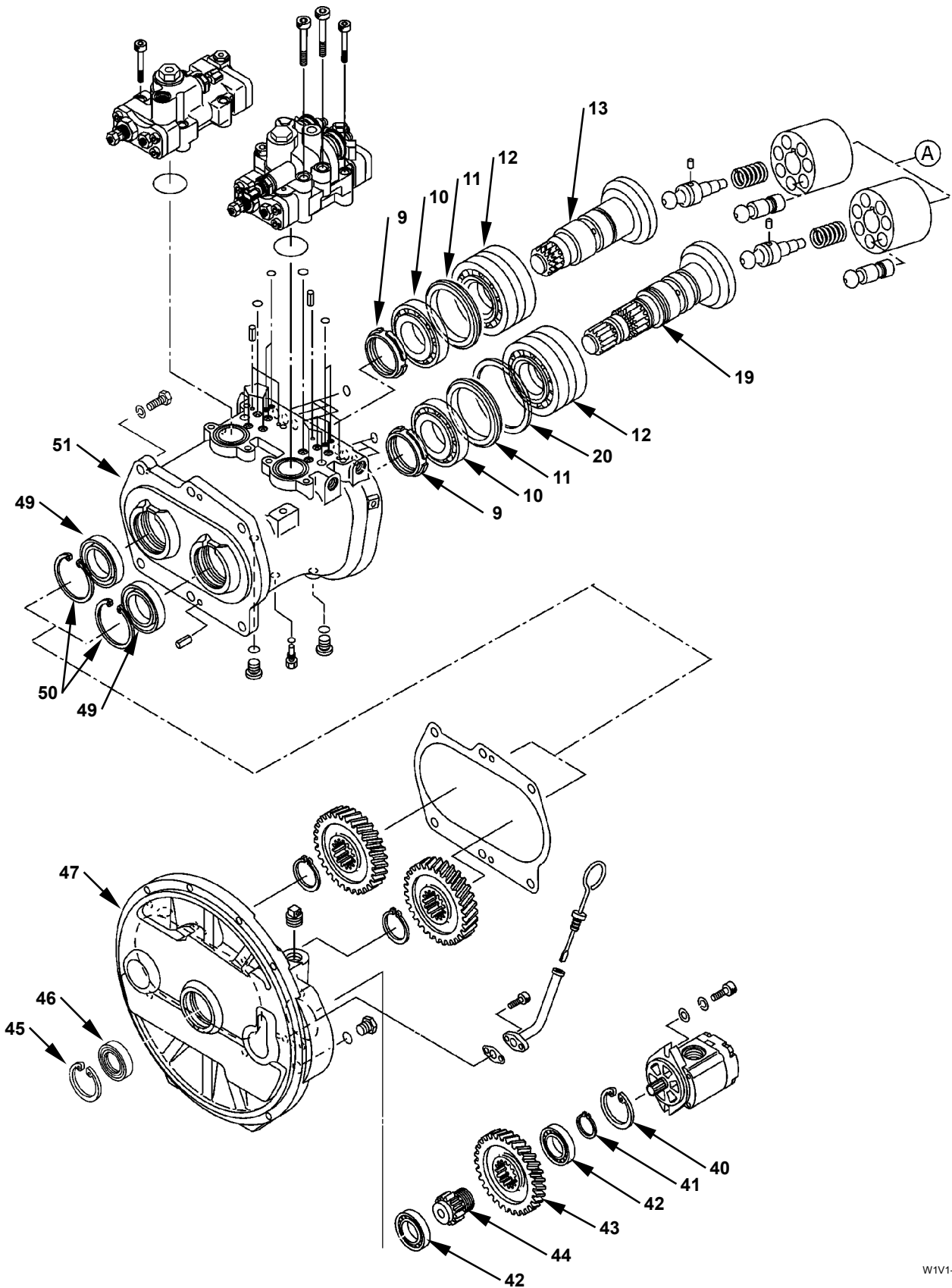
24. Attach a nylon sling onto pump casing (51). Hoist and place pump casing (51) on the wooden blocks with the pump transmission side facing downward. Use the wooden block: 100 mm (3.9 in) or more square.

25. Remove shafts (13, 19) from pump casing (51) by using special tools (ST 1470, ST 1471). Bearings (10, 12) are removed with shafts (13, 19) together.



W178-02-04-054

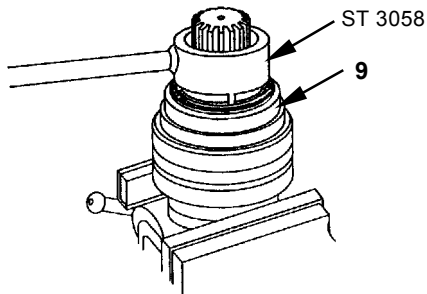
# UPPERSTRUCTURE / Pump Device



W1V1-02-04-011

## UPPERSTRUCTURE / Pump Device

26. Remove slide ring (20) from pump casing (51).
27. Remove bearing nut (9) from shafts (13, 19) by using special tool (ST 3058).



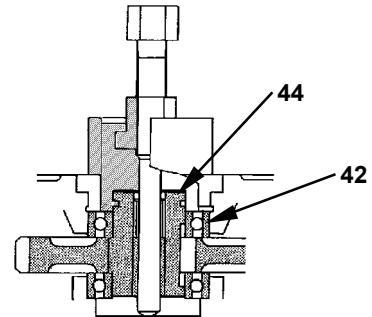
W137-02-04-023

28. Remove bearings (10, 12) and ring (11) from shafts (13, 19) by using a press.

**CAUTION:** Pump casing (51) weight: 42 kg (93 lb)

29. Attach a nylon sling onto pump casing (51). Hoist and place pump casing (51) with the mounting surface for regulator facing upward.
30. Remove retaining rings (50) (2 used) and oil seals (49) (2 used) from pump casing (51).
31. Remove retaining ring (40) from gear casing (47). Remove retaining ring (41) from gear shaft (44).

32. Remove upper ball bearing (42) and gear shaft (44) from gear casing (47) by using special tool (ST 1393).

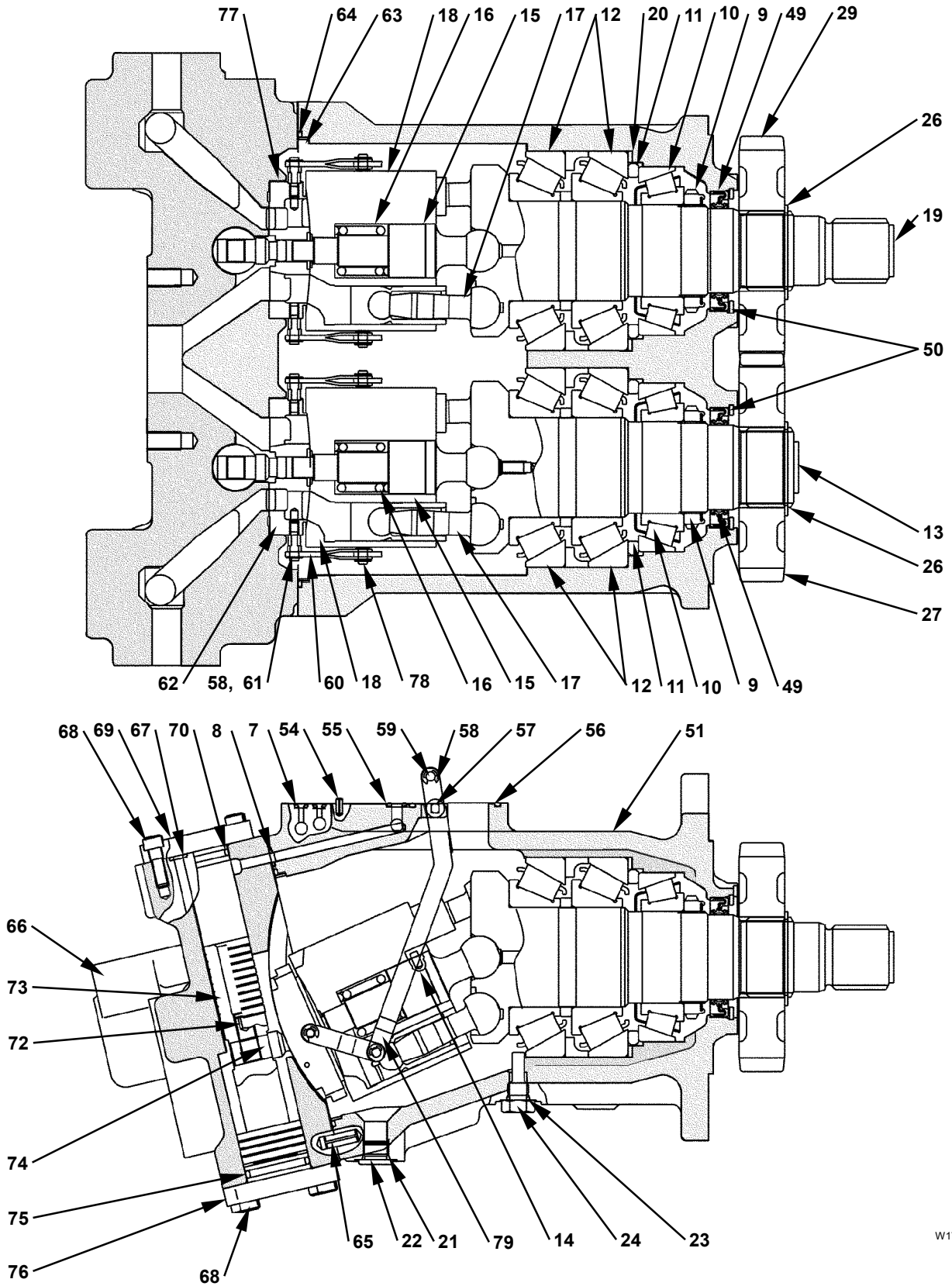


W178-02-11-085

33. Remove gear (43) and ball bearing (42) from gear casing (47).
34. Install a shackle to the bolt hole on the outer periphery of gear casing (47). Hoist and turn over gear casing (47) by using a nylon sling.
35. Remove retaining ring (45) and oil seal (46) from gear casing (47).

# UPPERSTRUCTURE / Pump Device

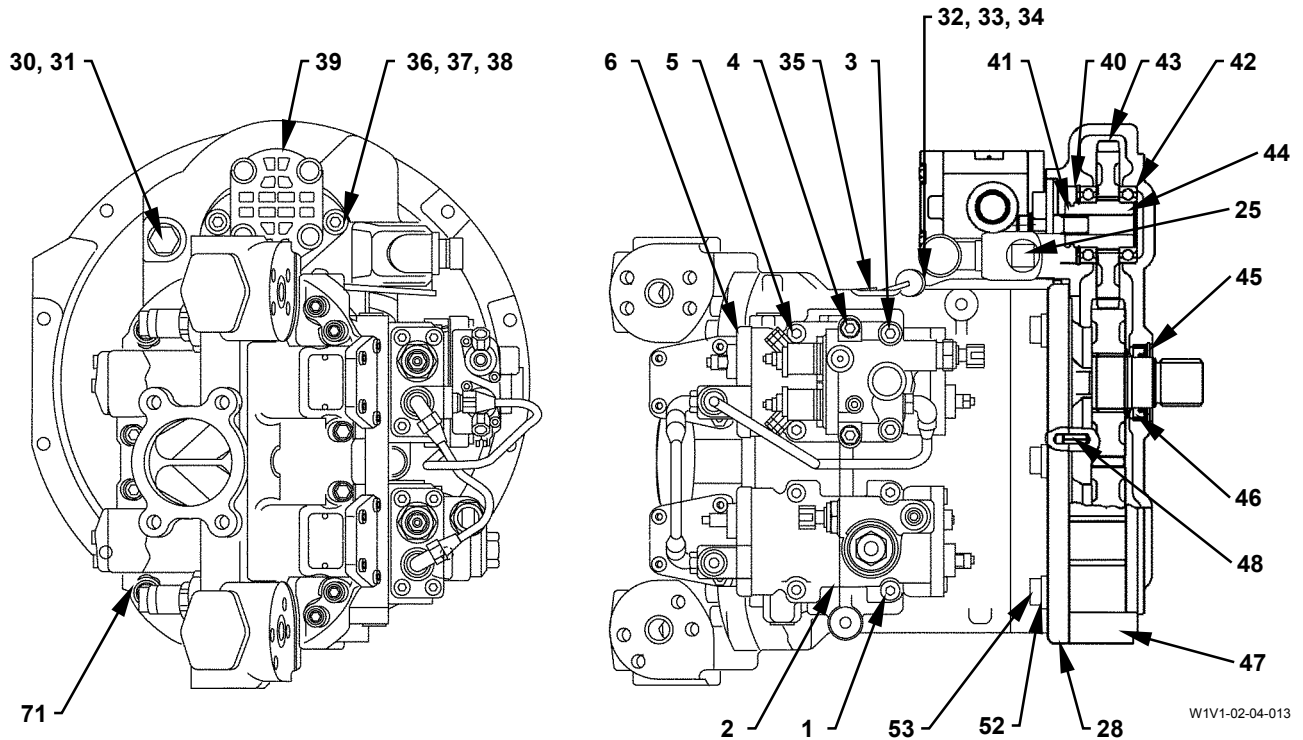
## ASSEMBLE PUMP DEVICE



W178-02-11-086

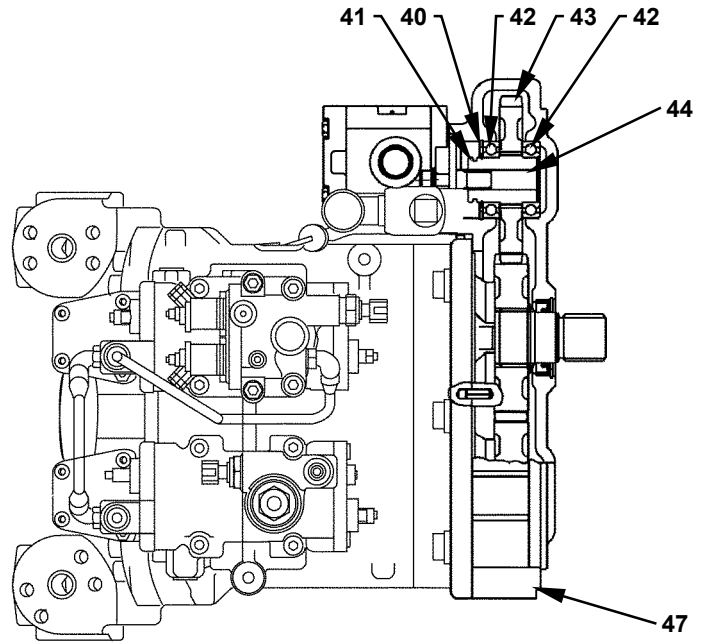
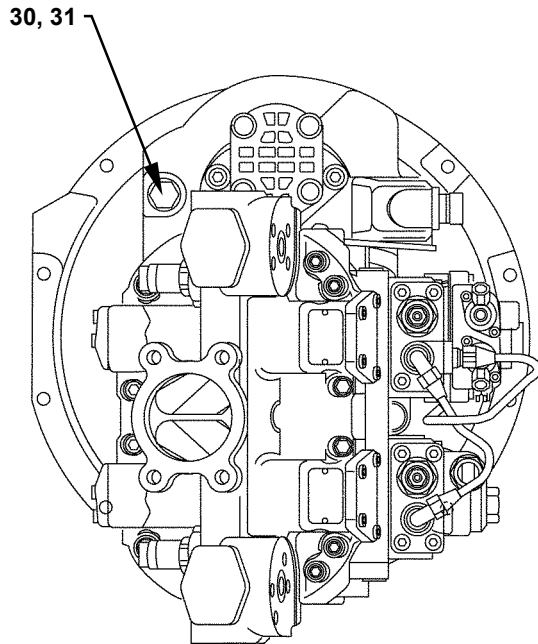


## UPPERSTRUCTURE / Pump Device

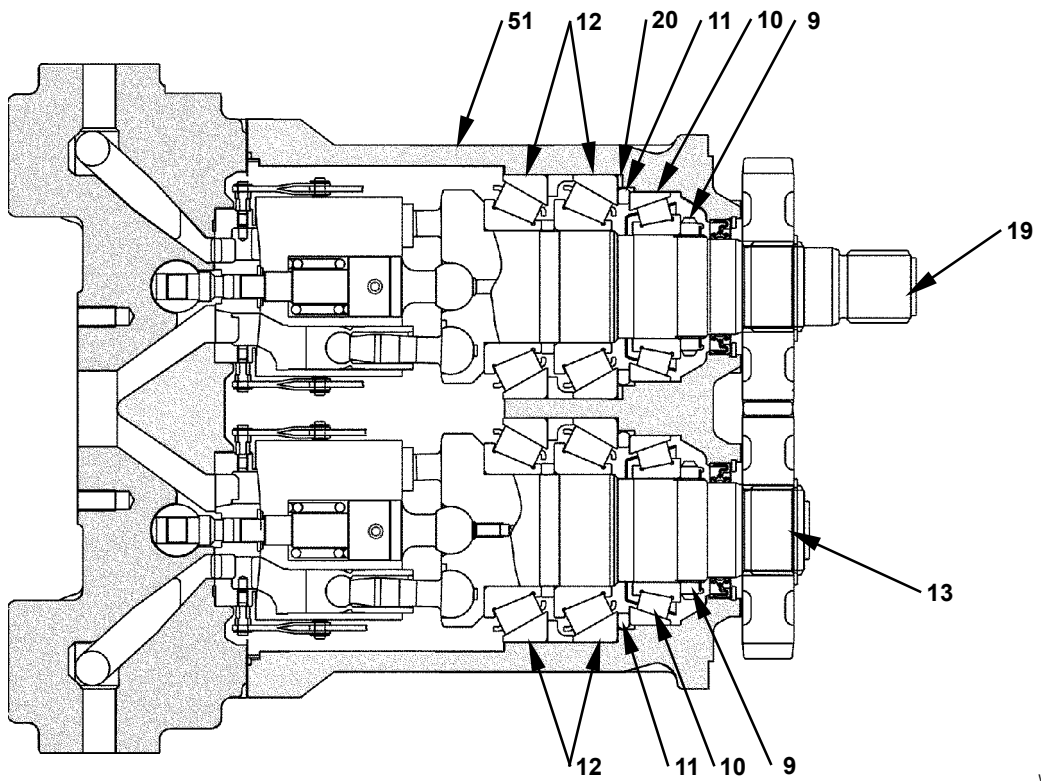


- |                            |                              |                               |                            |
|----------------------------|------------------------------|-------------------------------|----------------------------|
| 1 - Socket Bolt (4 Used)   | 21 - O-Ring (2 Used)         | 41 - Retaining Ring           | 61 - Pin (4 Used)          |
| 2 - Right Regulator        | 22 - Plug (2 Used)           | 42 - Ball Bearing (2 Used)    | 62 - Right Valve Plate     |
| 3 - Socket Bolt (2 Used)   | 23 - O-Ring                  | 43 - Gear                     | 63 - Backup Ring           |
| 4 - Socket Bolt (2 Used)   | 24 - Stopper                 | 44 - Gear Shaft               | 64 - O-Ring                |
| 5 - Socket Bolt (2 Used)   | 25 - Plug                    | 45 - Retaining Ring           | 65 - Spring Pin (2 Used)   |
| 6 - Left Regulator         | 26 - Retaining Ring (2 Used) | 46 - Oil Seal                 | 66 - Select Head           |
| 7 - O-Ring (4 Used)        | 27 - Gear                    | 47 - Gear Casing              | 67 - O-Ring (4 Used)       |
| 8 - O-Ring (6 Used)        | 28 - Gasket                  | 48 - Spring Pin (2 Used)      | 68 - Socket Bolt (16 Used) |
| 9 - Bearing Nut (2 Used)   | 29 - Gear                    | 49 - Oil Seal (2 Used)        | 69 - Stopper S (2 Used)    |
| 10 - Bearing (2 Used)      | 30 - Plug                    | 50 - Retaining Ring (2 Used)  | 70 - O-Ring (2 Used)       |
| 11 - Ring (2 Used)         | 31 - O-Ring                  | 51 - Pump Casing              | 71 - Socket Bolt (12 Used) |
| 12 - Bearing (2 Used)      | 32 - Gasket                  | 52 - Spring Washer (6 Used)   | 72 - Set Screw (2 Used)    |
| 13 - Shaft                 | 33 - Socket Bolt (2 Used)    | 53 - Bolt (6 Used)            | 73 - Servo Piston (2 Used) |
| 14 - Pin (2 Used)          | 34 - Pipe                    | 54 - Spring Pin (2 Used)      | 74 - Pin (2 Used)          |
| 15 - Center Shaft (2 Used) | 35 - Level Gauge             | 55 - O-Ring (10 Used)         | 75 - O-Ring (2 Used)       |
| 16 - Spring (2 Used)       | 36 - Socket Bolt (2 Used)    | 56 - O-Ring (2 Used)          | 76 - Stopper L (2 Used)    |
| 17 - Plunger (14 Used)     | 37 - Spring Washer (2 Used)  | 57 - Pin (2 Used)             | 77 - Left Valve Plate      |
| 18 - Rotor (2 Used)        | 38 - Washer (2 Used)         | 58 - Retaining Ring (12 Used) | 78 - Pin (4 Used)          |
| 19 - Shaft                 | 39 - Pilot Pump              | 59 - Pin (2 Used)             | 79 - Link (2 Used)         |
| 20 - Slide Ring            | 40 - Retaining Ring          | 60 - Lever (4 Used)           |                            |

# UPPERSTRUCTURE / Pump Device



W1V1-02-04-013





W178-02-11-089

## UPPERSTRUCTURE / Pump Device

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### Assemble Pump Device

1. Install inside ball bearing (42) into gear casing (47) with the stamped mark facing inside by using a bar and hammer. Tap and listen to ring in order to check that ball bearing (42) is installed completely.
2. Place gear (43) on ball bearing (42). Insert gear shaft (44) while aligning with the spline.
3. Install outside ball bearing (42) into gear casing (44) with the stamped mark facing outside using a bar and hammer. Tap and listen to ring in order to check that ball bearing (42) is installed completely.
4. Install retaining ring (40) to gear casing (47).  
Install retaining ring (41) to gear shaft (44).
5. Install O-ring (31) to plug (30). Install plug (30) to gear casing (47).  
 : 22 mm  
 : 49 N·m (5.0 kgf·m, 36 lbf·ft)
6. Heat bearings (10, 12) (2 used for each) to 50 to 80 °C (122 to 176 °F).



**CAUTION: Be careful as bearing (12) is too hot.**

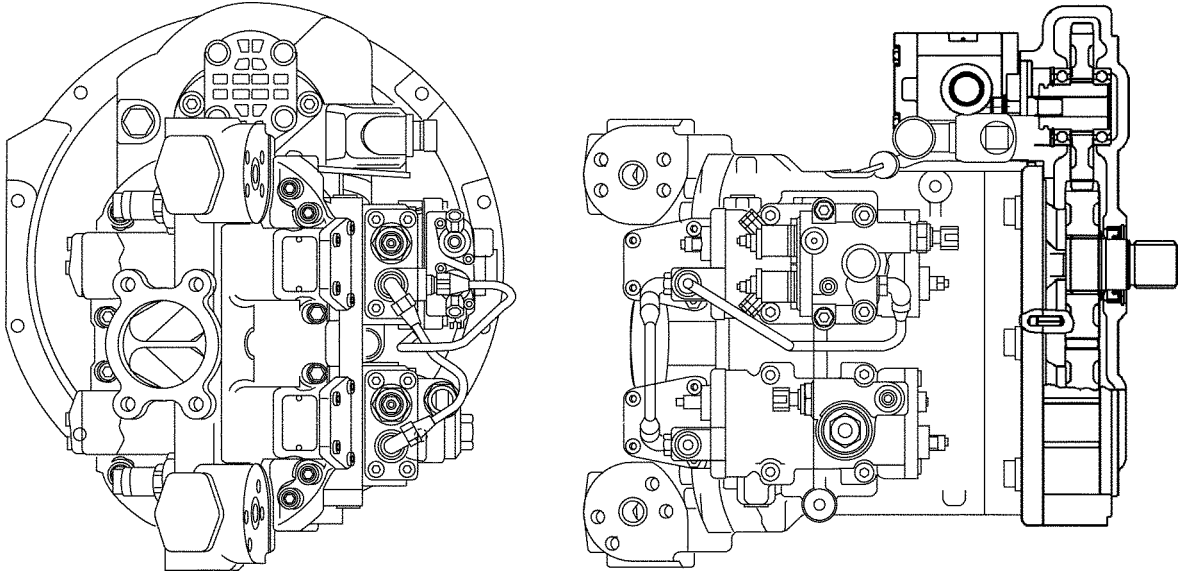
7. Apply hydraulic oil onto the inside of bearings (12) (2 used). Install bearings (12) (2 used) to shafts (13, 19) by using a press.
8. Install rings (11) (2 used) to shafts (13, 19).



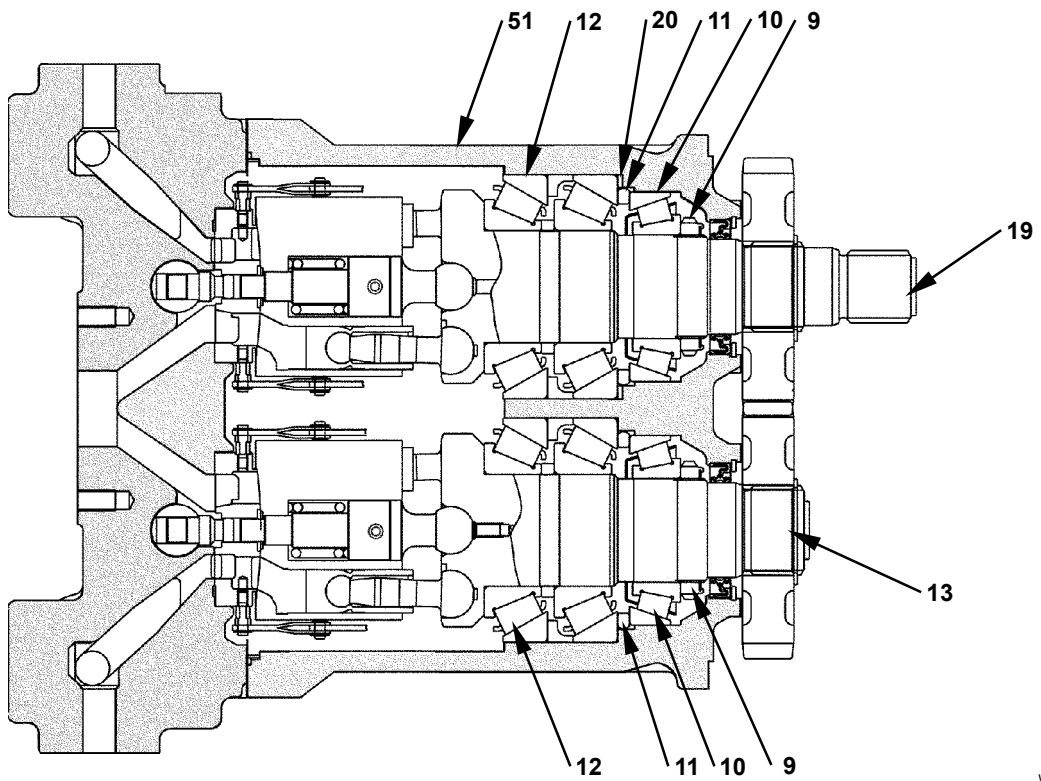
**CAUTION: Be careful as bearing (10) is too hot.**

9. Apply hydraulic oil onto the inside of bearings (10) (2 used). Install bearings (10) (2 used) to shafts (13, 19) by using a press.

# UPPERSTRUCTURE / Pump Device



W1V1-02-04-013

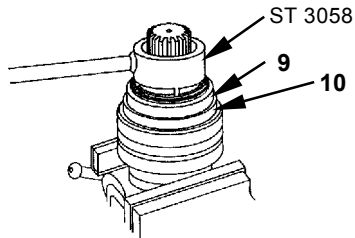


W178-02-11-089

## UPPERSTRUCTURE / Pump Device

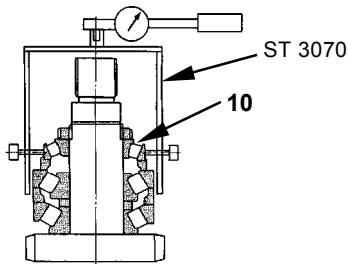
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10. Set the pre-loads of bearings (10, 12) installed on shaft (13) according to the following procedures.
- Apply hydraulic oil onto the thread part of bearing nut (9). Tighten bearing nut (9) until bearing nut (9) comes in contact with bearing (10) by using special tool (ST 3058).




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- Install special tool (ST 3070) to bearing (10). Rotate 2 to 3 turns and measure the starting torque.



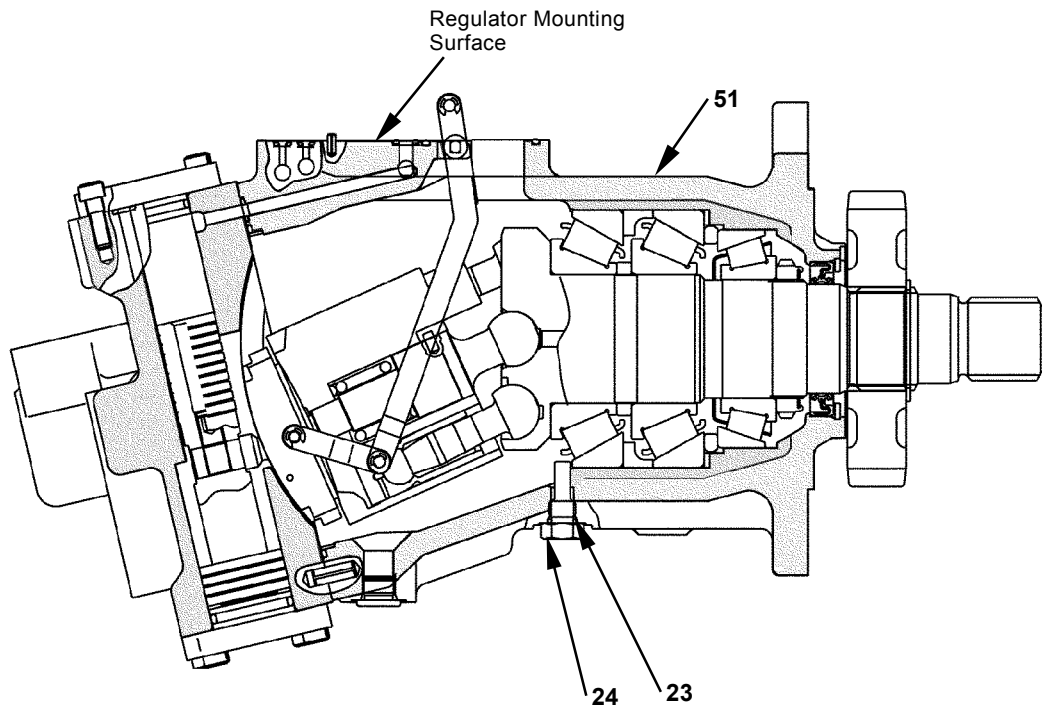
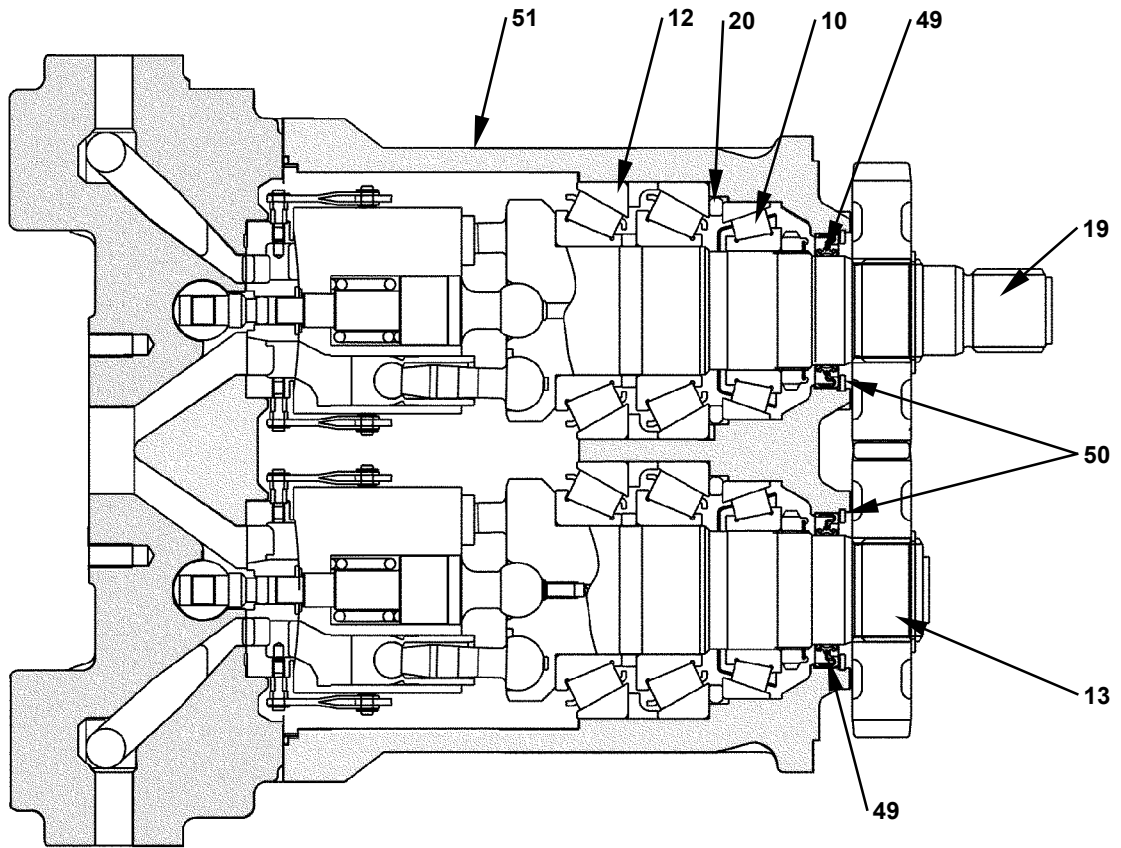
W178-02-11-091

- Adjust bearing nut (9) until the starting torque reaches specification.  
🔑 :  $1.96 \pm 0.49$  N·m  
( $0.20 \pm 0.05$  kgf·m,  $1.4 \pm 0.4$  lbf·ft)

 **NOTE:** *If the starting torque is higher than the limit of specified torque, loosen bearing nut (9). Tap the shaft end and release the load of bearing (10).*

11. Set the pre-loads for bearing (10, 12) installed on shaft (19) in the same procedure as step 10.
12. Install slide ring (20) to the side to insert shaft (19) in pump casing (51).

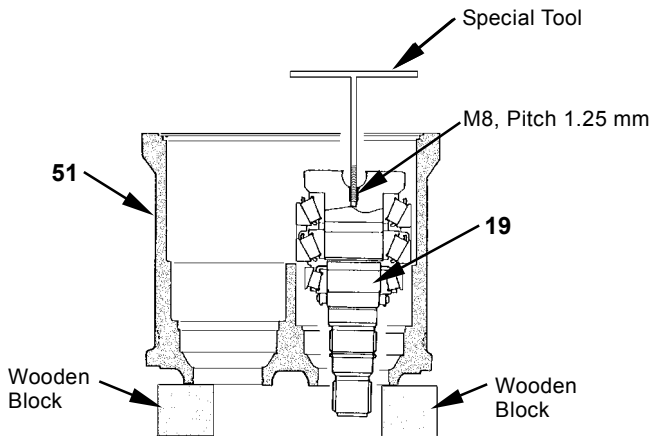
# UPPERSTRUCTURE / Pump Device





W178-02-11-092

## UPPERSTRUCTURE / Pump Device

- Heat pump casing (51) to 50 to 80 °C (122 to 176 °F).
- Apply hydraulic oil onto the outside of bearings (10, 12) installed on shaft (19). Install shaft (19) to pump casing (51) by using special tool. If it is difficult to insert shaft (19), tap shaft (19) by using a bar etc.




W178-02-11-093

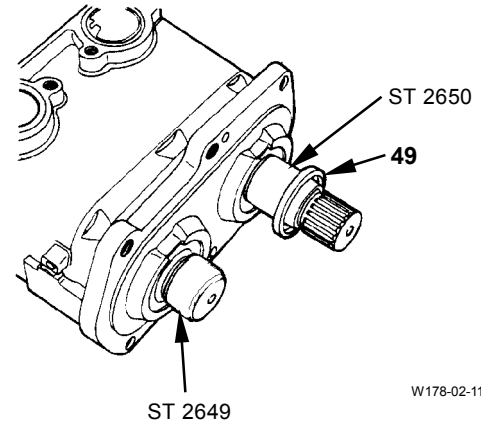
- Install shaft (13) to pump casing (51) in the same procedure as step 14.
- Wait for pump casing (51) in order to cool down to the temperature lower than 40 °C (104 °F).
- Install O-ring (23) to stopper (24). Install stopper (24) to pump casing (51).
  -  : 19 mm
  -  : 34.5 N·m (3.5 kgf·m, 25 lbf·ft)

**CAUTION:** Pump casing (51) weight: 65 kg (143 lb)

- Attach a nylon sling onto pump casing (51). Hoist and place pump casing (51) with the mounting surface for regulator facing upward.

- Install special tools (ST 2649, ST 2650) over the spline parts of shafts (13, 19).

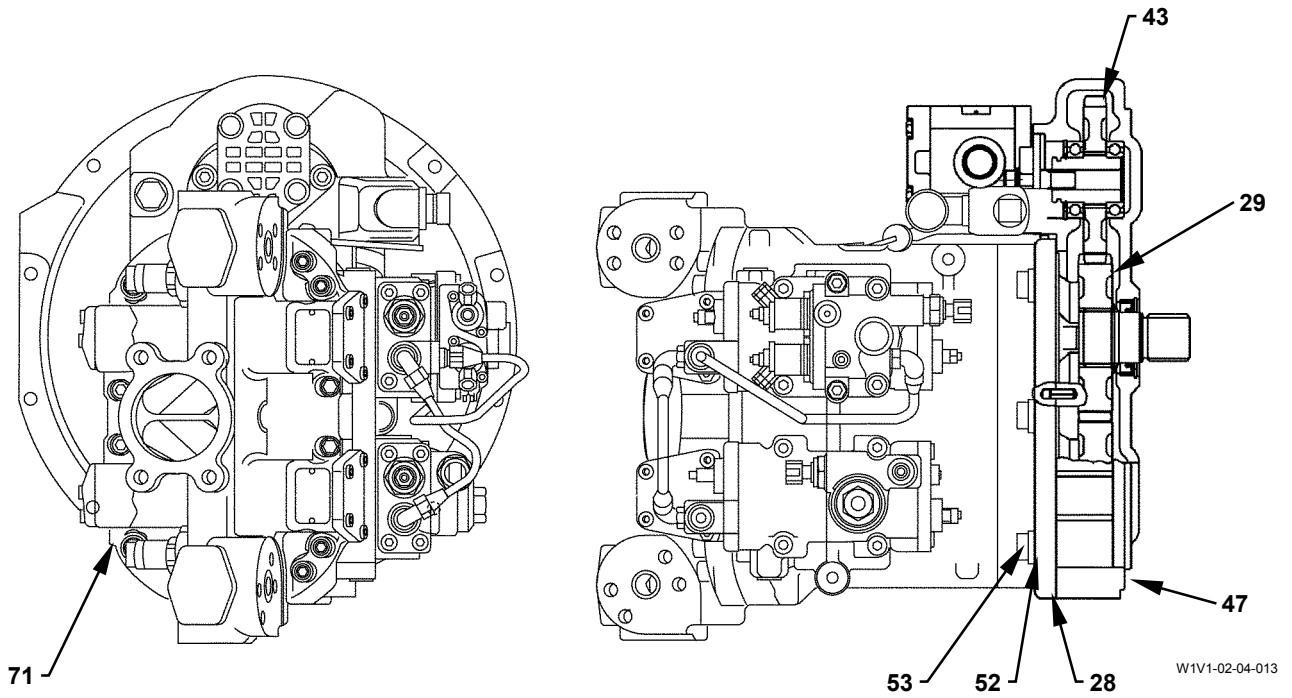
 **NOTE:** If special tools are not available, wind the vinyl tape over the spline part of shaft in order not to damage oil seal (49).



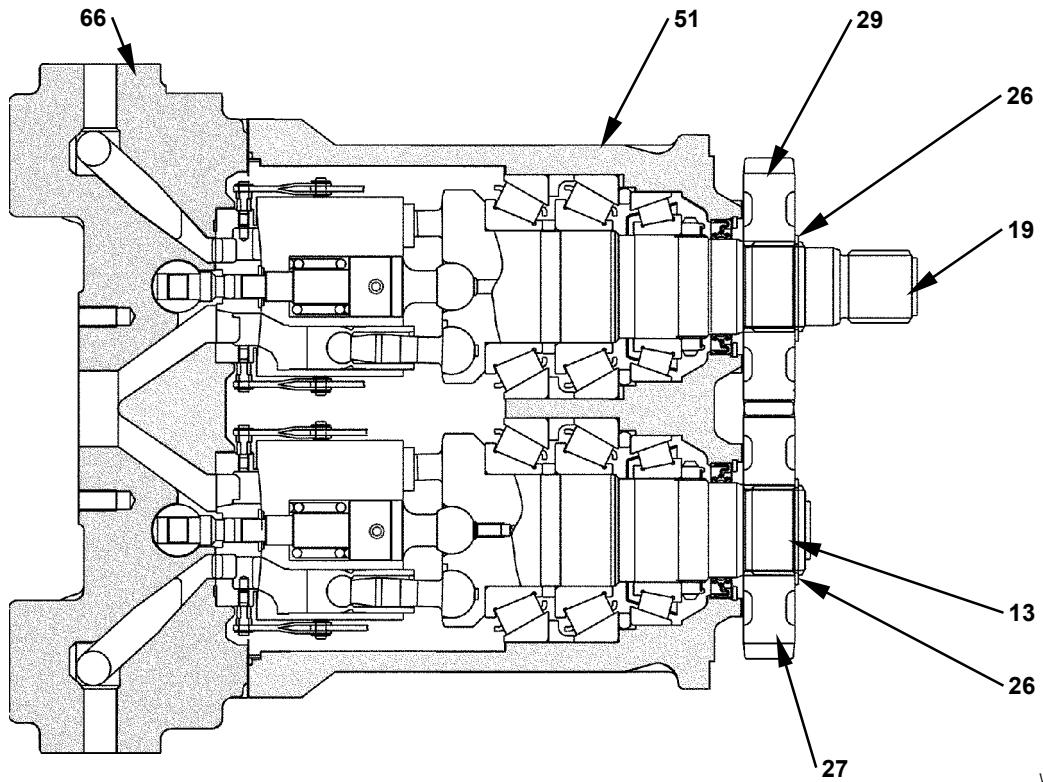
W178-02-11-094

- Apply grease onto the inner diameter of oil seals (49) (2 used). Evenly tap and install oil seals (49) (2 used) to shafts (13, 19).
- Remove special tools (ST 2649, ST 2650) from shafts (13, 19).
- Install retaining rings (50) (2 used) to pump casing (51).

# UPPERSTRUCTURE / Pump Device



W1V1-02-04-013



W178-02-11-096

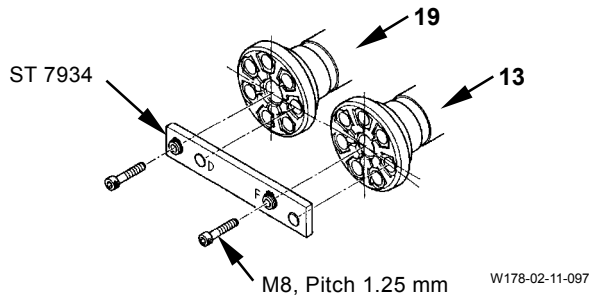


## UPPERSTRUCTURE / Pump Device

23. Align the matching marks and install gears (27, 29) to shafts (13, 19). Install retaining rings (26) (2 used) to shafts (13, 19).

When replacing the shaft and gear, install the gear according to the following procedure.

- Secure special tool (ST 7934) to the mounting surface of shafts (13, 19) for plunger (17).



- Turn shafts (13, 19) clockwise, viewed from the mounting side of gears (27, 29), until shafts (13, 19) come into contact with special tool. (Remove a play in periphery direction.)
- Install gear (27) and retaining ring (26) to the spline of shaft (13).
- Install gear (29) to the spline of shaft (19) and engage with gear (27). If gear (29) does not engage, turn and adjust shaft (19) in a play range of special tool.
- Install retaining ring (26) to the spline of shaft (19).
- Remove special tool (ST 7934).


24. Install spring pins (48) (2 used) to gear casing (47). Install gasket (28).




**CAUTION: Pump casing (51) weight: 70 kg (154 lb)**

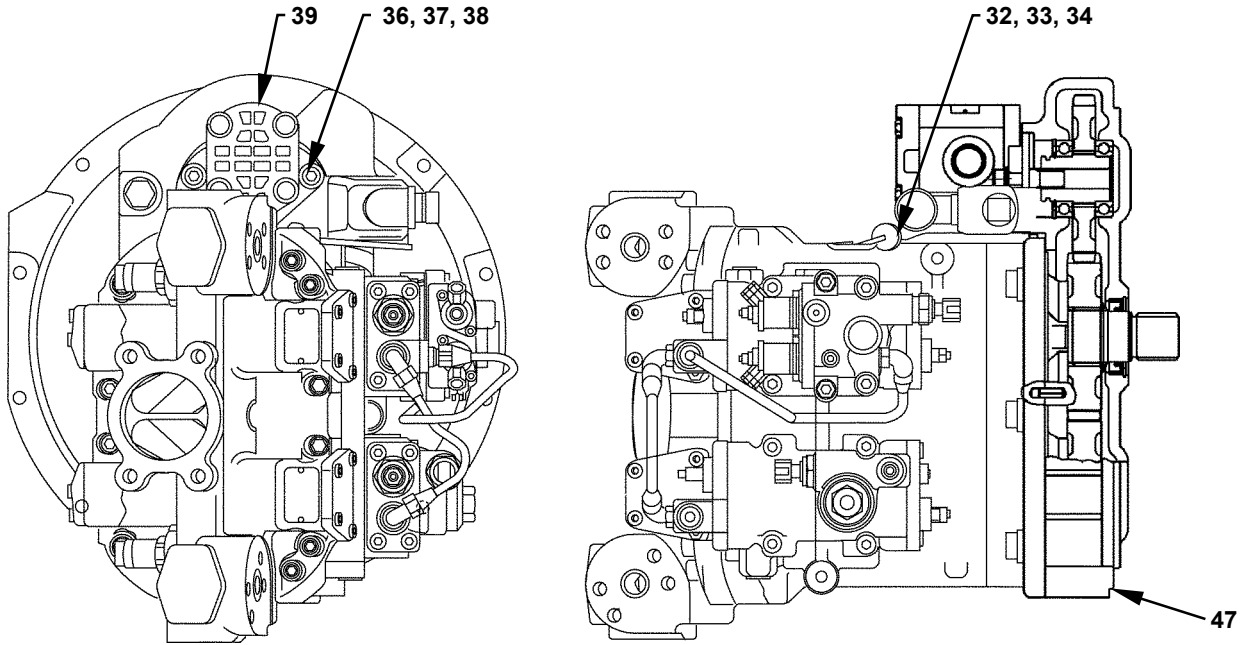
25. Install eyebolts (M12, Pitch 1.75 mm) (2 used) to the socket bolt (71) hole on pump casing (51). Hoist pump casing (51).

Engage gear (43) with gear (29) and install pump casing (51) to gear casing (47) with bolts (53) and spring washers (52) (6 used for each).

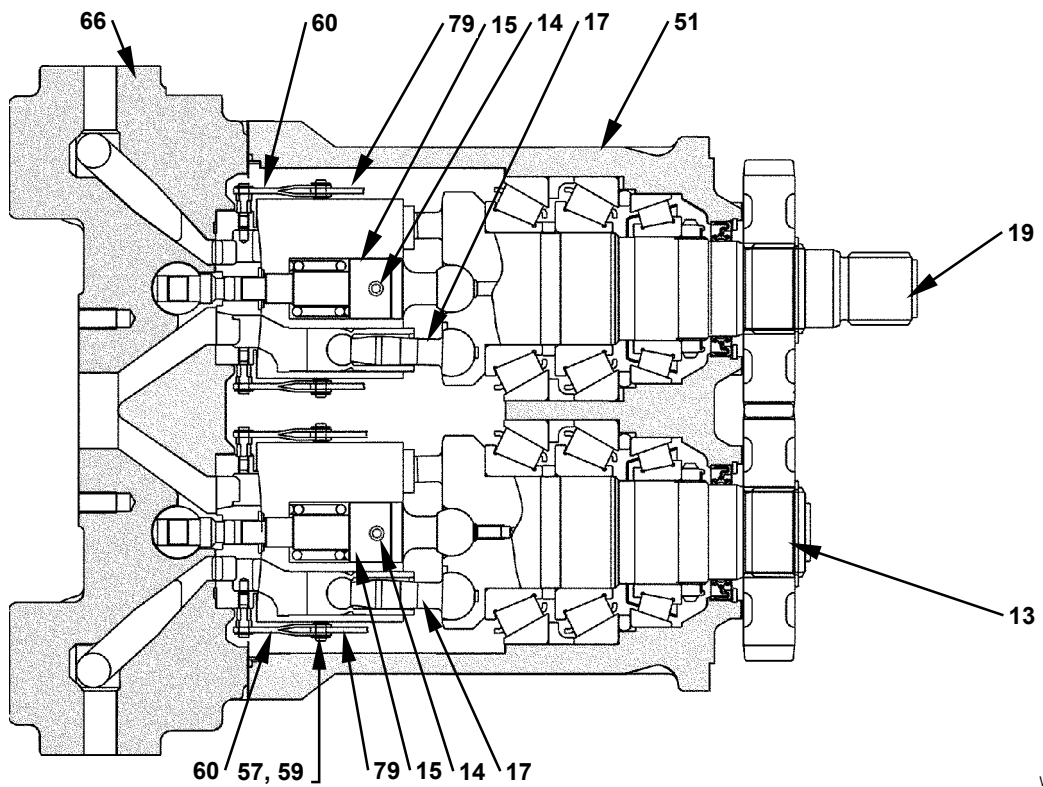
 : 24 mm

 : 147 N·m (15 kgf·m, 108 lbf·ft)

# UPPERSTRUCTURE / Pump Device




W1V1-02-04-013




W178-02-11-096


## UPPERSTRUCTURE / Pump Device


26. Apply THREEBOND #1215 onto the mounting surface of pilot pump (39). Install pilot pump (39) to gear casing (47) with socket bolts (36), spring washers (37) and washers (38) (2 used for each).

 : 8 mm

 : 49 N·m (5.0 kgf·m, 36 lbf·ft)


27. Install gasket (32) and pipe (34) to gear casing (47) with socket bolts (33) (2 used).

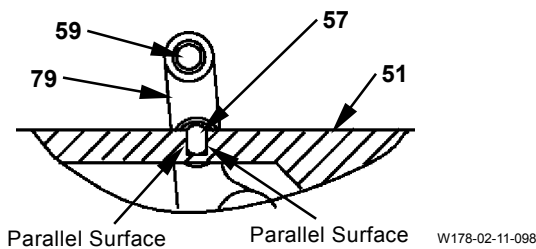
 : 6 mm

 : 19.5 N·m (2.0 kgf·m, 14 lbf·ft)

**IMPORTANT: As the pump performance may be changed, do not deform link (79).**

28. Align with the groove for pin (57) in pump casing (51) and install the link (79) assemblies (2 used), with lever (60) facing to selector head (66).

 **NOTE:** Both surfaces of pin (57) are parallel to each other. Align the parallel surface with the groove.



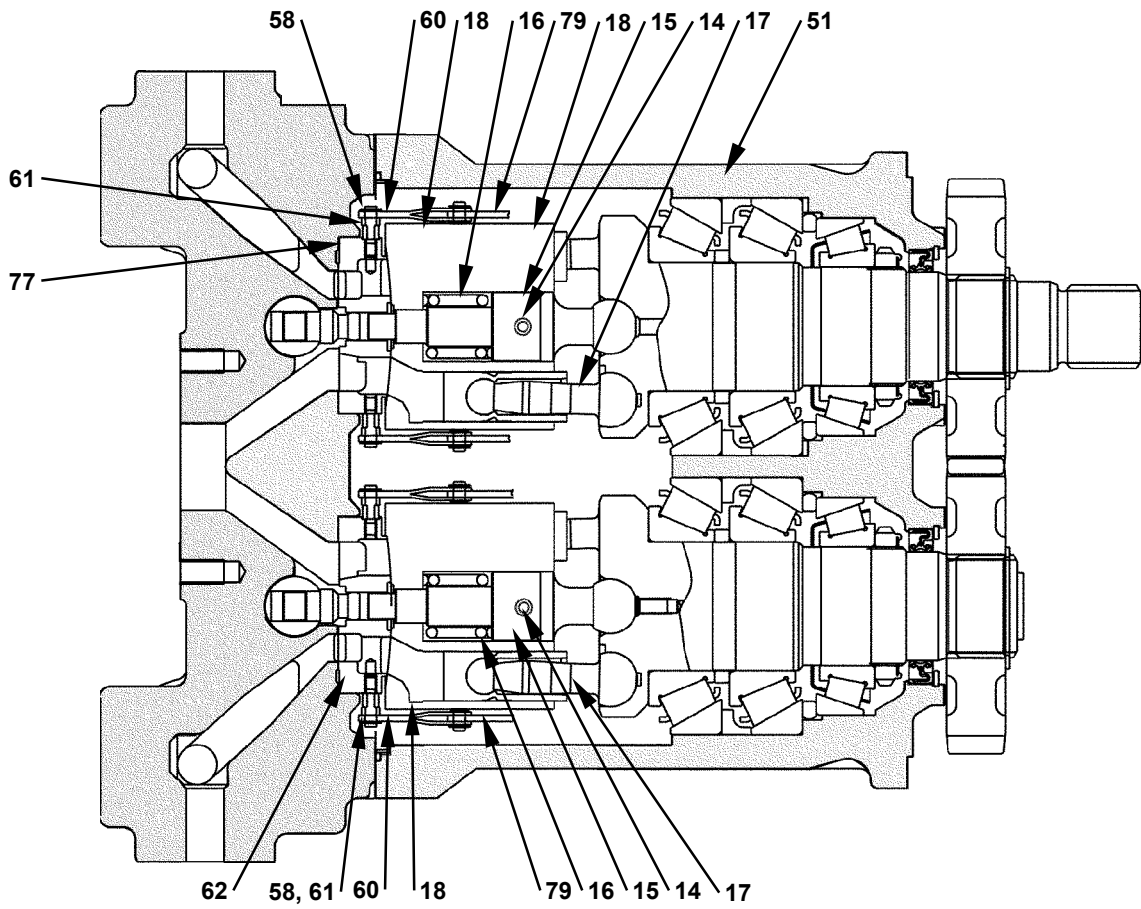
29. Apply hydraulic oil onto the plunger (17) mounting surface of shafts (13, 19).

30. Insert plungers (17) (7 used for each) into shafts (13, 19).

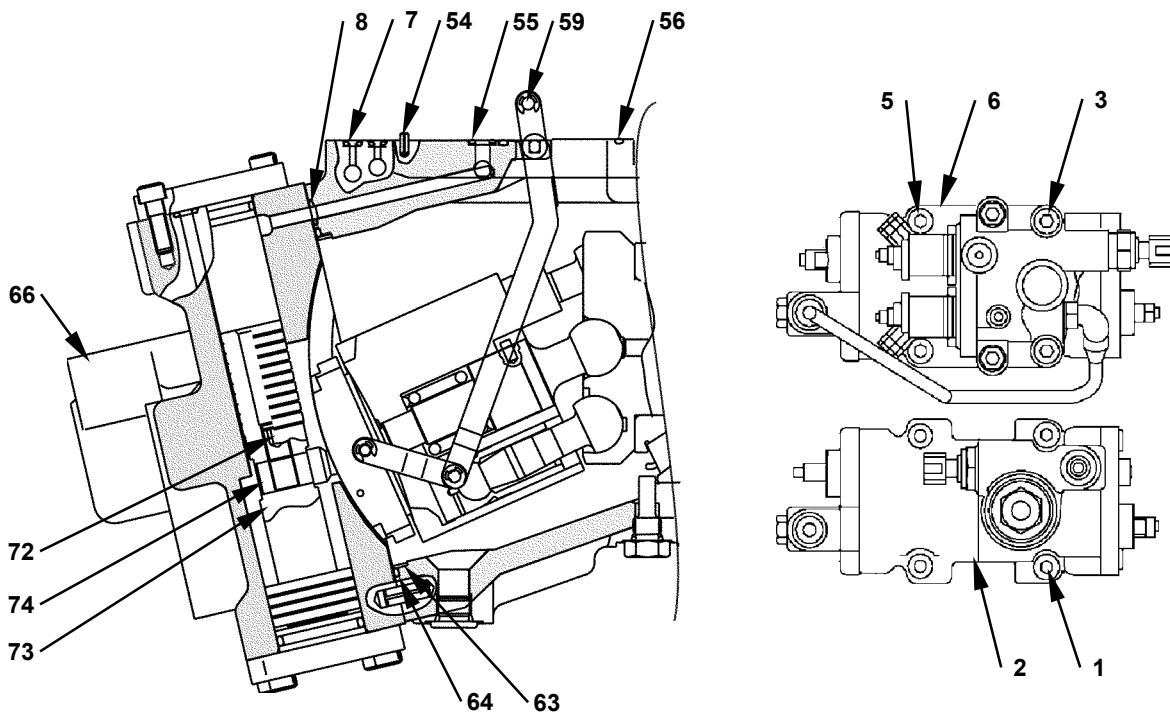
31. Apply grease onto pins (14) (2 used). Install pin (14) to center shafts (15) (2 used).

32. Apply grease onto the spherical surface of center shafts (15) (2 used). Install center shafts (15) (2 used) to shafts (13, 19).

# UPPERSTRUCTURE / Pump Device



W178-02-11-099




W1V1-02-04-014

## UPPERSTRUCTURE / Pump Device

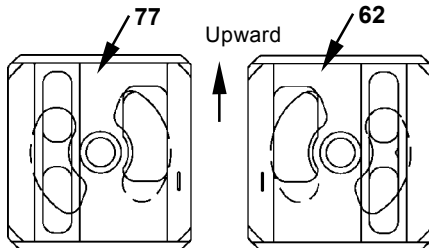
33. Install springs (16) (2 used) to center shafts (15) (2 used).

34. Insert center shafts (15) (2 used) and plungers (17) (14 used) into rotors (18) (2 used).

35. Insert a shank of file etc. into the center hole of center shaft (15). Rotate center shaft (15) and install pin (14) into the groove of rotor (18). (Both right and left pumps)

 **NOTE:** If pin (14) does not enter into the groove of rotor (18), selector head (66) cannot be assembled to pump casing (51).

36. Insert pins (61) (2 used) for right valve plate (62) into the hole of levers (60) (2 used) for right regulator (2). Install retaining rings (58) (2 used). Check the direction to install right valve plate (62).




W178-02-11-100


37. Insert pins (61) (2 used) for left valve plate (77) into the hole of levers (60) (2 used) for left regulator (6). Install retaining rings (58) (2 used). Check the direction to install left valve plate (77).

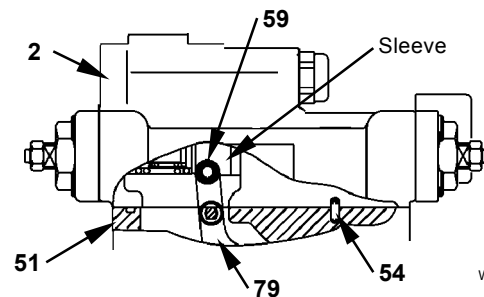
38. Install O-rings (56) (2 used), (55) (10 used), (7) (4 used) and spring pins (54) (2 used) to pump casing (51).

39. Install right regulator (2) to pump casing (51) according to the following procedure.

- Adjust the sleeve position so that two grooves in both sleeves on right regulator (2) are in a line.
- Place right regulator (2) on pump casing (51). Install pin (59) for link (79) into two grooves in the sleeve.
- Move right regulator (2) so that spring pin (54) extended from pump casing (51) can enter into right regulator (2).
- Install right regulator (2) to pump casing (51) with socket bolts (1) (4 used).


 : 8 mm


 : 49 N·m (5.0 kgf·m, 36 lbf·ft)



W178-02-11-101

40. Install left regulator (6) to pump casing (51) with socket bolts (3) (2 used) and (5) (2 used) in the same procedure as step 41.

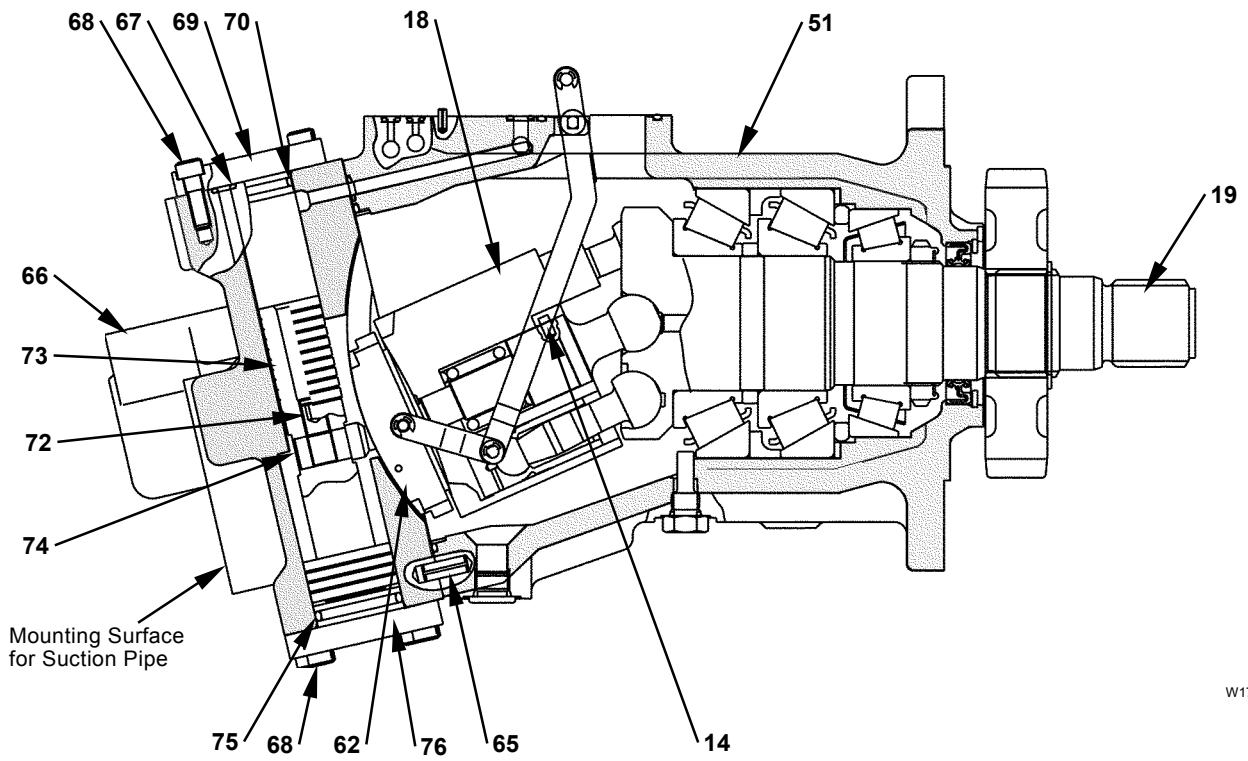
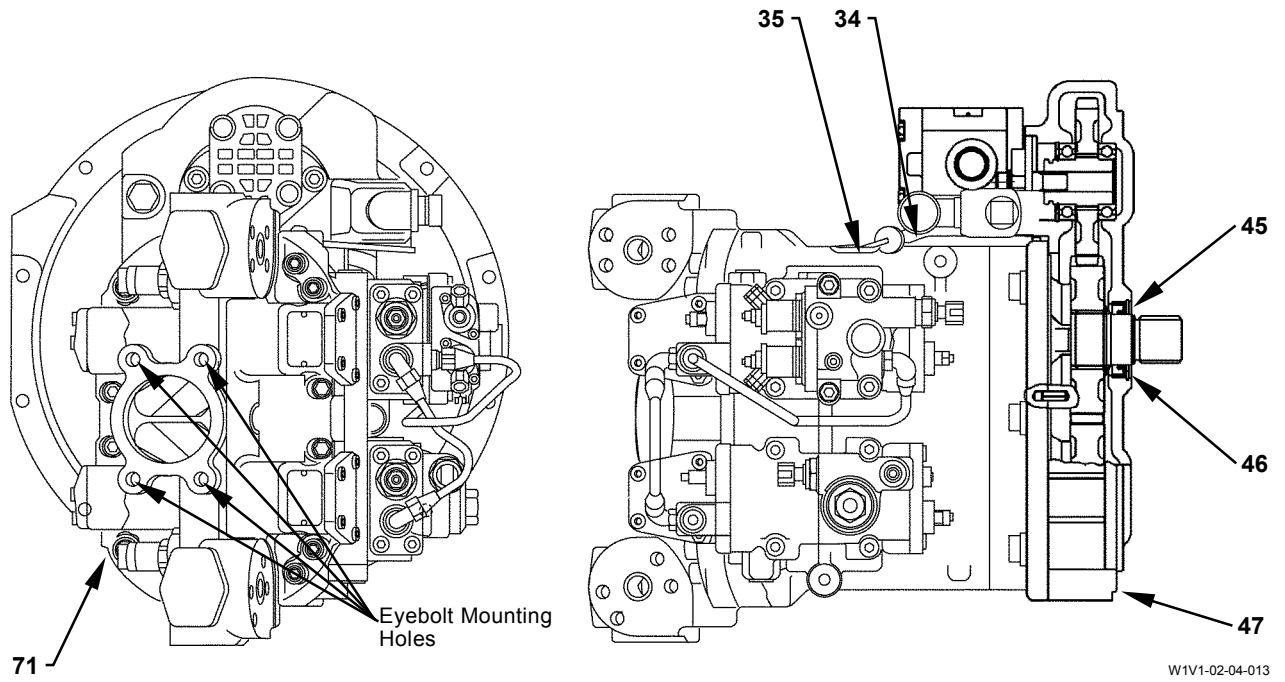
 : 8 mm

 : 49 N·m (5.0 kgf·m, 36 lbf·ft)

41. Install backup ring (63), O-ring (64) and O-rings (8) (6 used) to pump casing (51).


42. Insert servo pistons (73) (2 used) into selector head (66).


# UPPERSTRUCTURE / Pump Device



## UPPERSTRUCTURE / Pump Device

43. Apply LOCTITE LI829 onto the thread of set screw (72). Install pins (74) (2 used) to servo pistons (73) (2 used) with set screws (72) (2 used).

 : 6 mm

 : 34.3 N·m (3.5 kgf·m, 25 lbf·ft)


44. Install spring pins (65) (2 used) to selector head (66).




**CAUTION: Selector head (66) weight: 29 kg (64 lb)**


45. Install eyebolts (M12, Pitch 1.75 mm) (2 used) into the thread hole for suction pipe in selector head (66). Hoist selector head (66).

Place selector head (66) on pump casing (51) while aligning selector head (66) with spring pin (65).

 **NOTE:** Check the clearance between selector head (66) and pump casing (51) in order to compare with the clearance before disassembling. If the clearance is larger, pin (14) may not be inserted into the groove in rotor (18), or pin (74) may not be inserted into the holes in valve plates (62, 77).


46. Install selector head (66) to pump casing (51) with socket bolts (71) (12 used).


 : 10 mm

 : 108 N·m (11 kgf·m, 80 lbf·ft)


47. Install O-rings (67) (4 used) to selector head (66).


48. Install O-rings (70) (2 used) to stoppers S (69) (2 used). Install stoppers S (69) (2 used) to selector head (66) with socket bolts (68) (8 used).

 : 6 mm

 : 19.5 N·m (2.0 kgf·m, 14 lbf·ft)

49. Install O-rings (75) (2 used) to stoppers L (76) (2 used). Install stoppers L (76) (2 used) to selector head (66) with socket bolts (68) (8 used).

 : 6 mm

 : 19.5 N·m (2.0 kgf·m, 14 lbf·ft)




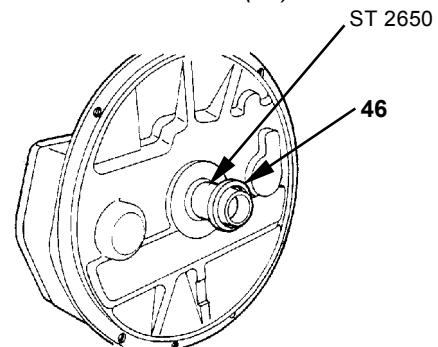
**CAUTION: Pump device weight: 160 kg (353 lb)**

50. Hoist and place selector head (66) with the regulator mounting side facing upward.

51. Insert special tool (ST 2650) to shaft (19). Apply grease onto oil seal (46). Install oil seal (46) to shaft (19).

Remove special tool (ST 2650). Tap and install oil seal (46).

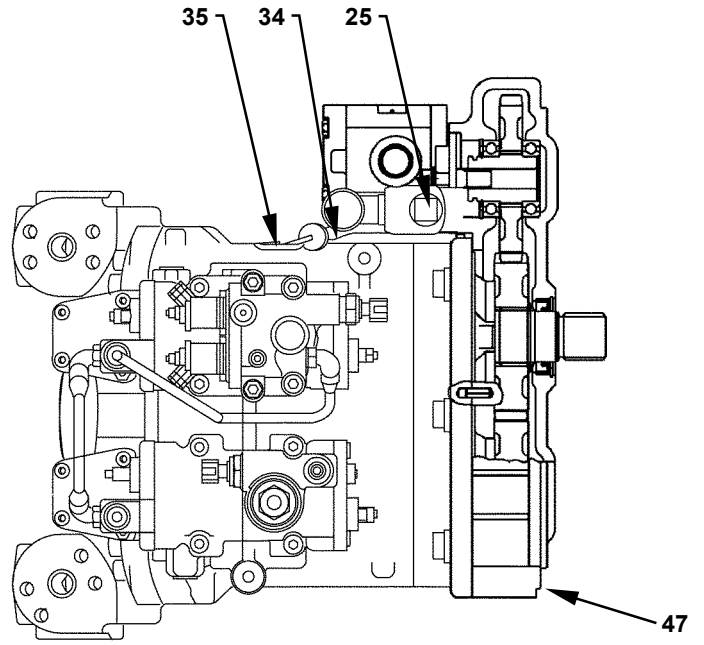
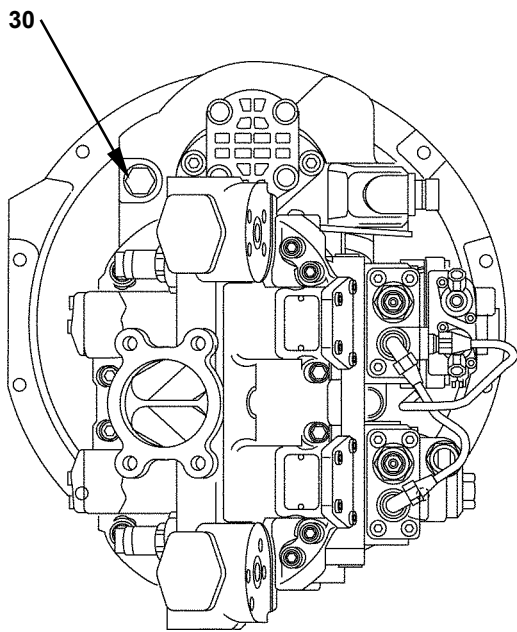
 **NOTE:** If special tool (ST 2650) is not available, wind the vinyl tape etc. over the spline parts of shaft (19) in order to protect oil seal (46), and install oil seal (46).



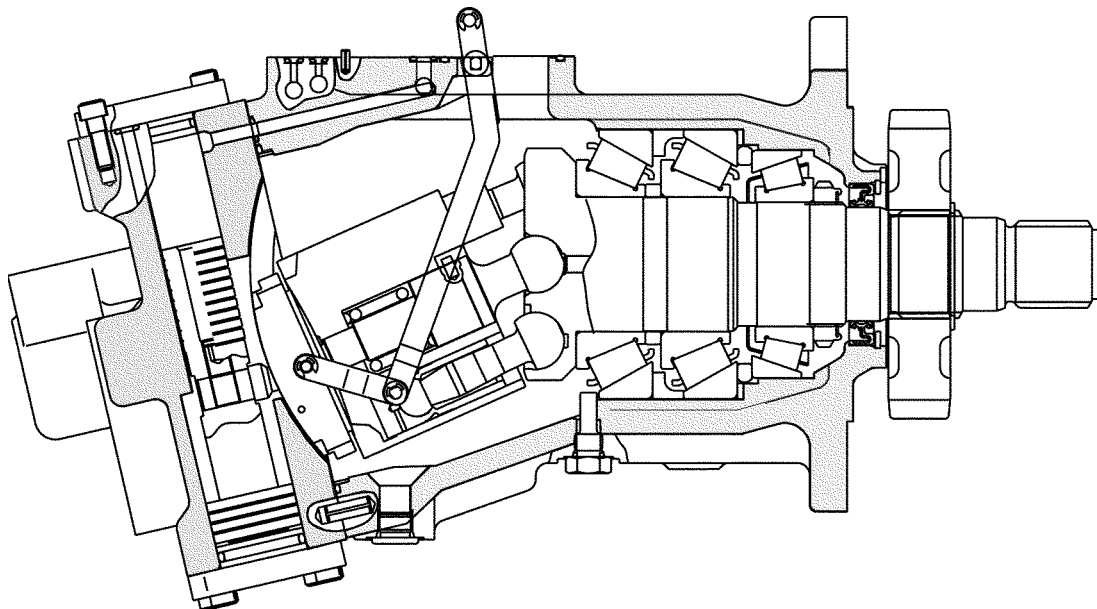
W178-02-11-103

52. Install retaining ring (45) to gear casing (47).

# UPPERSTRUCTURE / Pump Device



W1V1-02-04-013




W178-02-04-016



## UPPERSTRUCTURE / Pump Device


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53. Install plug (30) to gear casing (47).

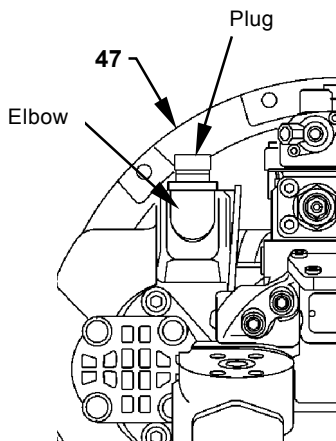
 : 22mm

54. Wind the seal tape onto the elbow. Install the elbow to gear casing (47). Add engine oil (1.0 L, 0.26 US gal.) through the elbow hole.

55. Wind the seal tape onto the plug. Install the plug to the elbow.

 : 30 mm


 : 39.5 N·m (4.0 kgf·m, 29 lbf·ft)




W1V1-02-04-010

**IMPORTANT: The breather hole for plug (25) is located at the left side, seen from the front of gear casing (47).**

56. Wind the seal tape onto plug (25). Install plug (25) to gear casing (47).

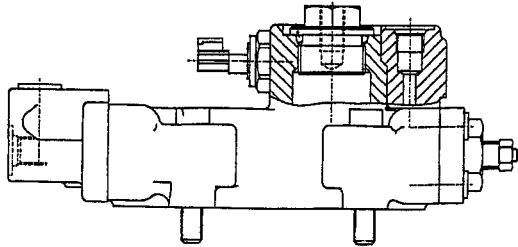
 : 17 mm

 : 39.5 N·m (4.0 kgf·m, 29 lbf·ft)

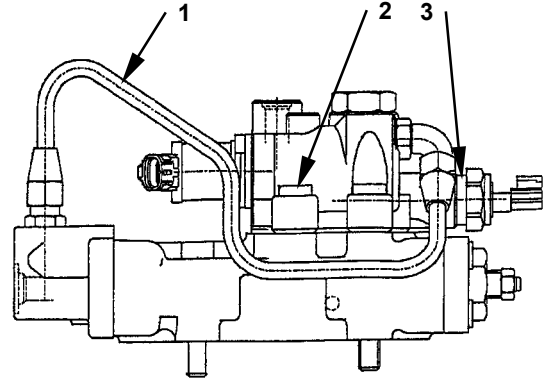
57. Insert level gauge (35) into pipe (34).

# UPPERSTRUCTURE / Pump Device

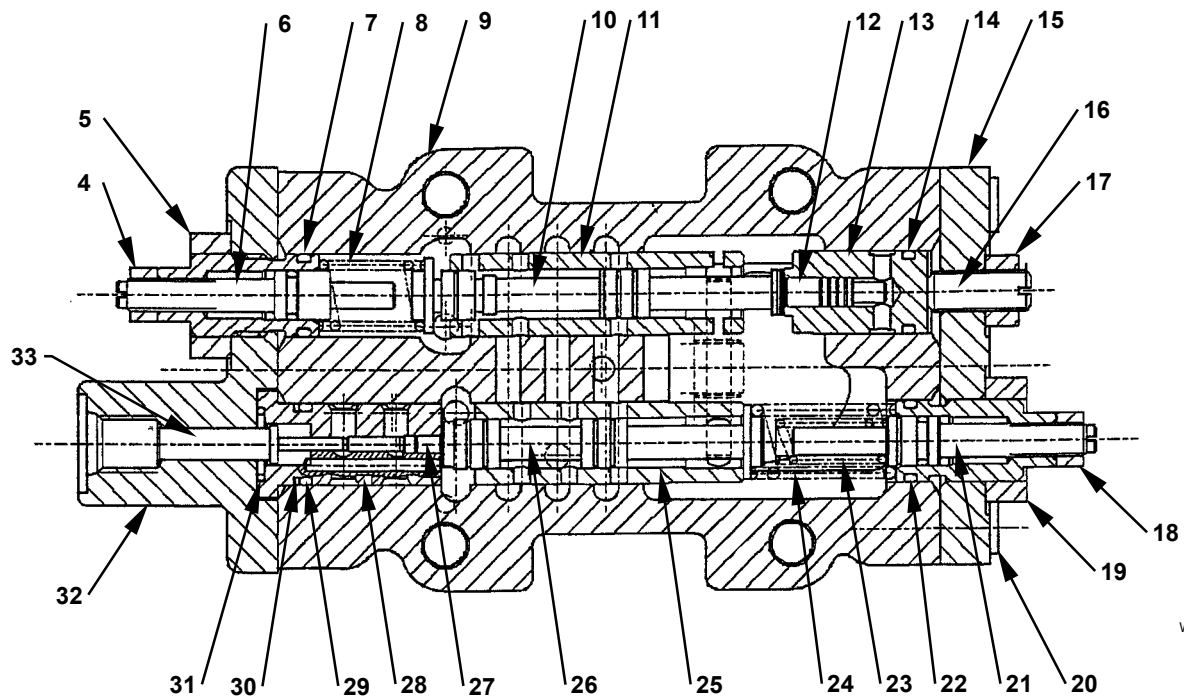
## DISASSEMBLE REGULATOR



Regulator for Right Pump



Regulator for Left Pump



W1V1-02-04-001

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

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## UPPERSTRUCTURE / Pump Device

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### Disassemble Regulator


The regulators are used for right pump and left pump. The inner structure in regulator is fully identical, and the difference is only in its accessories.

Here the left regulator is explained.


**IMPORTANT: As the setting changes, do not disassemble adjusting screws (4, 5, 16, 17, 18 and 19).**

**When adjusting screws (4, 5, 16, 17, 18 and 19) must be disassembled, carry out adjustment according to the procedure of performance test after assembling.**

1. Clamp casing (9) in a vise. Remove pipe (1) from casing (9).


 : 22 mm

2. Remove socket bolts (2) (2 used). Remove solenoid valve (3) from casing (9).

 : 8 mm


**IMPORTANT: As the setting changes, do not turn set bolt (16), lock nuts (17, 18 and 19).**

3. Remove socket bolts (20) (4 used) from cover (15). Remove cover (15) from casing (9). Set bolt (16) and stopper assembly (21) are removed with cover (15) together.

 : 6 mm

**IMPORTANT: As the setting changes, do not turn lock nuts (4, 5).**

4. Remove socket bolts (20) (4 used) from cover (32). Remove cover (32) and piston (33) from casing (9). Stopper assembly (6) is removed with cover (32) together.

 : 6 mm

5. Remove springs (23, 24) from casing (9).

6. Insert a round bar into the hole of casing (9). Push the spool (26) end. Remove cylinder (28), sleeve (25) and spool (26) from casing (9). Piston (27) is removed with cylinder (28) together.

7. Remove piston (27) from cylinder (28).

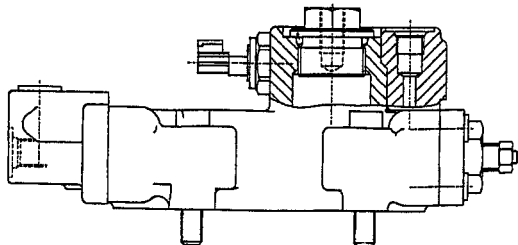
8. Remove spring (8) from casing (9).

9. Insert a round bar into the hole of casing (9). Push the spool (10) end. Remove cylinder (13), sleeve (11) and spool (10) from casing (9). Piston (12) is removed with cylinder (13) together.

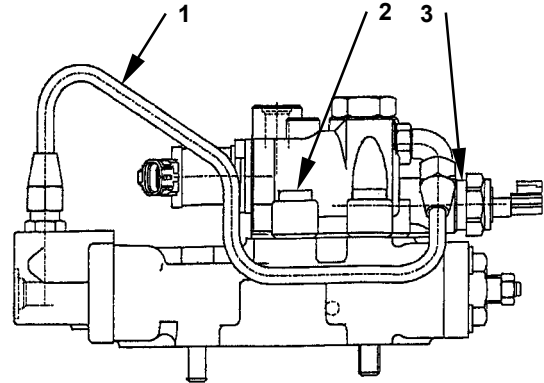
10. Remove piston (12) from cylinder (13).

# UPPERSTRUCTURE / Pump Device

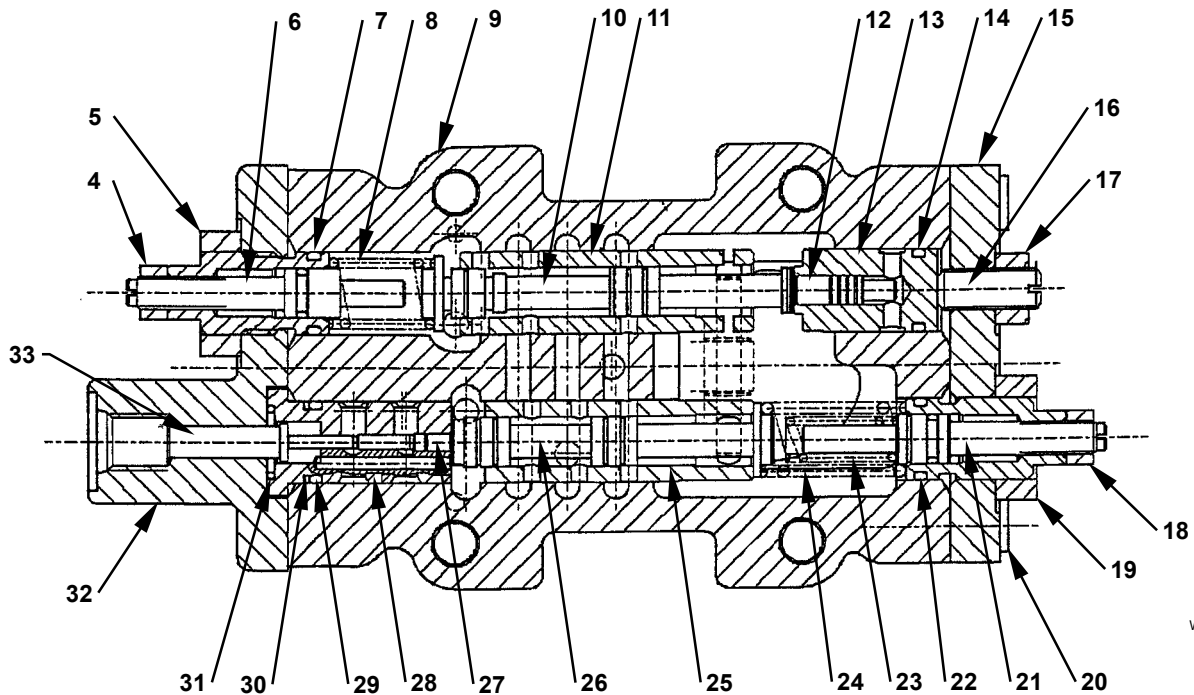
## ASSEMBLE REGULATOR



Regulator for Right Pump



Regulator for Left Pump



W1V1-02-04-001









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

## UPPERSTRUCTURE / Pump Device

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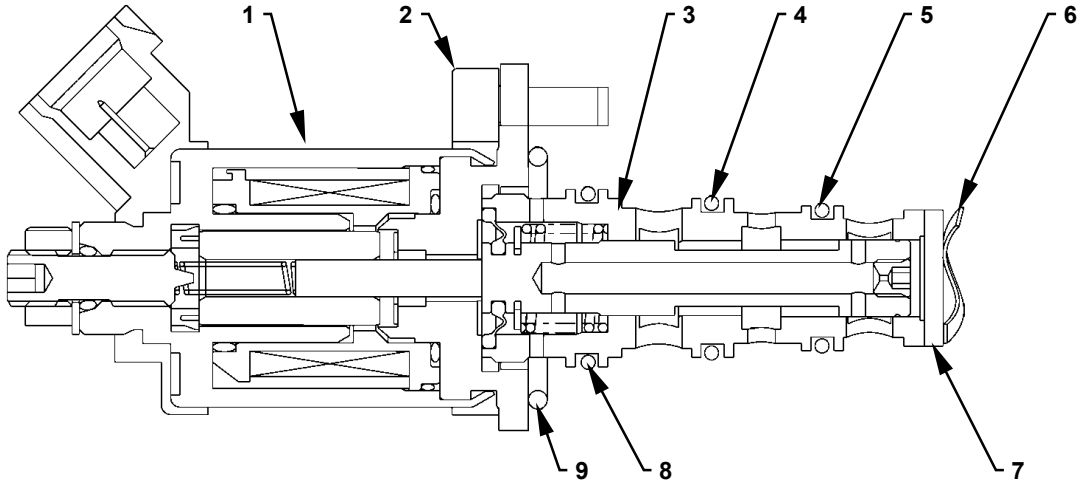
### Assemble Regulator

**IMPORTANT: Two holes for sleeves (11, 25) in casing (9) are the same bores. The shapes of various parts in casing (9) are very similar. Check the illustration and assemble the regulator.**

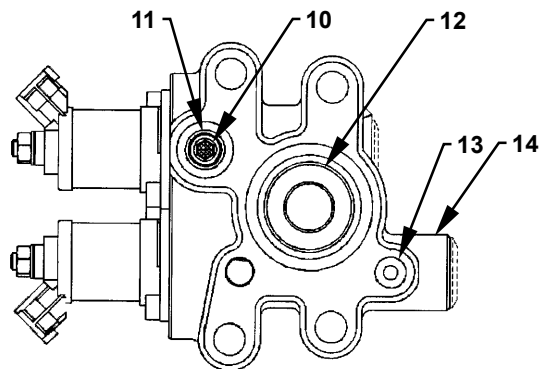
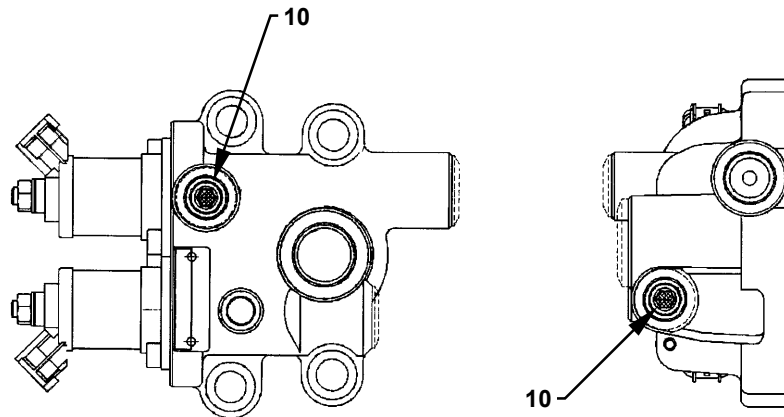
- Clean all parts and apply hydraulic oil.
- Install spool (10) into sleeve (11). Install sleeve (11) to the center of casing (9) by using a round bar. Check the direction to install sleeve (11), spool (10) and piston (12).
- Install O-ring (14) to cylinder (13).
- Insert piston (12) into cylinder (13). Install cylinder (13) to casing (9).
- Install spool (26) into sleeve (25). Install sleeve (25) to the center of casing (9) by using a round bar. Check the direction to install sleeve (25) and spool (26).
- Install O-rings (29, 31) and backup ring (30) to cylinder (28).
- Insert piston (27) into cylinder (28). Install cylinder (28) to casing (9).
- Install piston (33) to cover (32) from the mounting side for casing (9).
- Install O-ring (7) and spring (8) to stopper assembly (6) attached with cover (32). Install cover (32) to casing (9) with socket bolts (20) (4 used).  
 : 6 mm  
 : 19.6 N·m (2.0 kgf·m, 14 lbf·ft)
- Install O-ring (22) and springs (23, 24) to stopper assembly (21) attached with cover (15). Install cover (15) to casing (9) with socket bolts (20) (4 used).  
 : 6 mm  
 : 19.6 N·m (2.0 kgf·m, 14 lbf·ft)
- Install solenoid valve (3) to casing (9) with socket bolts (2) (2 used).  
 : 8 mm  
 : 49 N·m (5.0 kgf·m, 36 lbf·ft)
- Apply grease onto the thread part of pipe (1). Install pipe (1) to casing (9).  
 : 22 mm  
 : 34 N·m (3.5 kgf·m, 25 lbf·ft)

# UPPERSTRUCTURE / Pump Device

## DISASSEMBLE SOLENOID VALVE



W1V1-02-04-015



W1V1-02-04-002

- |                    |                 |                      |             |
|--------------------|-----------------|----------------------|-------------|
| 1 - Solenoid Valve | 5 - O-Ring      | 9 - O-Ring           | 12 - O-Ring |
| 2 - Socket bolt    | 6 - Wave Washer | 10 - Filter (3 Used) | 13 - O-Ring |
| 3 - Sleeve         | 7 - Plate       | 11 - O-Ring          | 14 - Body   |
| 4 - O-Ring         | 8 - O-Ring      |                      |             |


## UPPERSTRUCTURE / Pump Device

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### Disassemble Solenoid Valve

- Do not damage the mating surface for regulator.
- When replacing the inner parts, replace them as an assembly.
- Do not hit the solenoid part.
- When removing the connector, do not pry, but pull out straightly.


1. Remove socket bolts (2) (2 used). Remove solenoid (1) and O-ring (9).


 : 4 mm

**IMPORTANT: Do not drop plate (7) and wave washer (6).**

2. Remove plate (7) and wave washer (6) from body (14).
3. Remove O-rings (4, 5, 8) from sleeve (3).

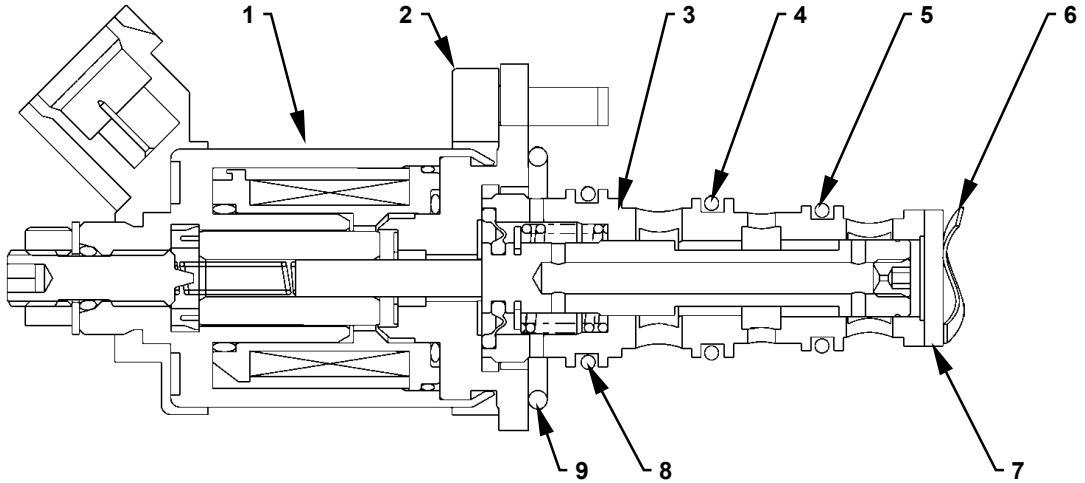
4. Remove filters (10) (3 used) from body (14). Remove O-rings (11, 12, 13).

 : 6 mm

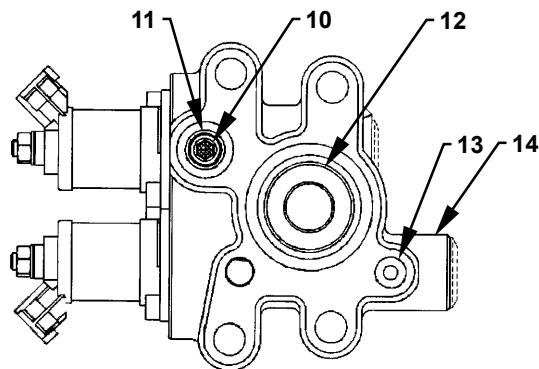
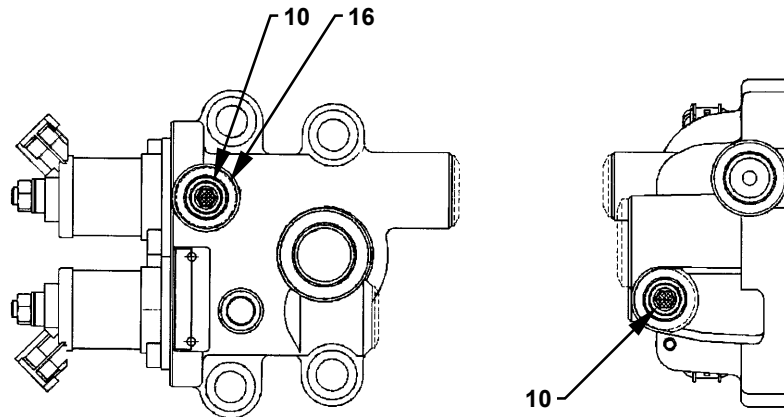
 **NOTE:** When cleaning filter (10), blow filter (10) by using air from the both surfaces. Finally blow filter (10) by using the air from the outer side (thread side).

# UPPERSTRUCTURE / Pump Device

## ASSEMBLE SOLENOID VALVE



W1V1-02-04-015



W1V1-02-04-002

- |                    |                 |                      |             |
|--------------------|-----------------|----------------------|-------------|
| 1 - Solenoid Valve | 5 - O-Ring      | 9 - O-Ring           | 12 - O-Ring |
| 2 - Socket bolt    | 6 - Wave Washer | 10 - Filter (3 Used) | 13 - O-Ring |
| 3 - Sleeve         | 7 - Plate       | 11 - O-Ring          | 14 - Body   |
| 4 - O-Ring         | 8 - O-Ring      |                      |             |





## UPPERSTRUCTURE / Pump Device

---


### Assemble Solenoid Valve

1. Install O-rings (11, 12, 13) and filters (10) (3 used) to body (14).

 : 6 mm

 :  $10^{+3}$  N·m ( $1.0^{+0.3}$  kgf·m,  $7.4^{+2}$  lbf·ft)

2. Install wave washer (6) and plate (7) to body (14).


 **NOTE:** *When body (14) is horizontally inserted, apply grease to wave washer (6) and plate (7) in order not to fall off.*


*After assembling, check that plate (7) is installed straightly.*

3. Install O-rings (4, 5, 8) to sleeve (3).

4. Install O-ring (9) to body (14).

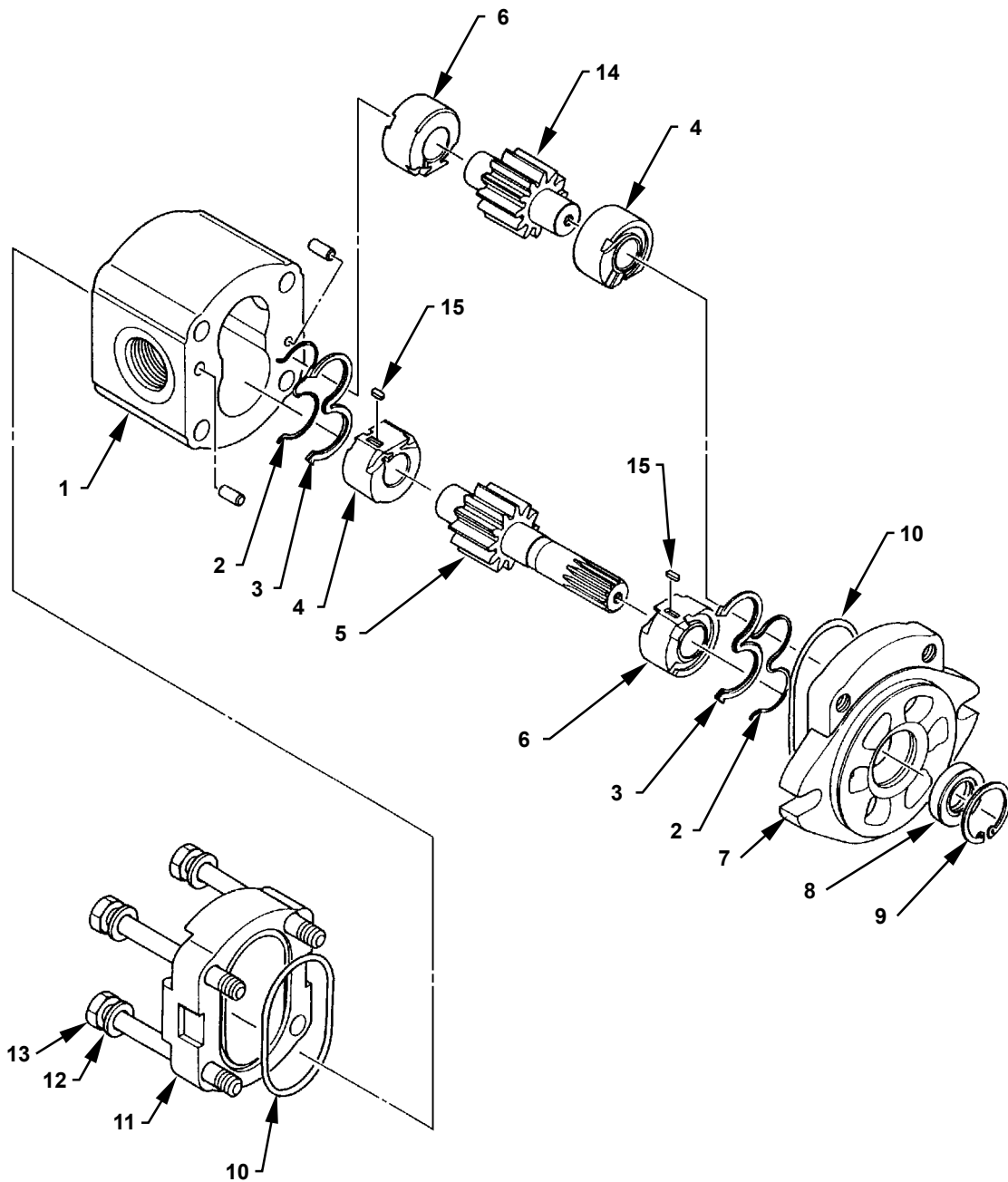
5. Install solenoid (1) to body (14) with socket bolts (2) (2 used).

 : 4 mm

 :  $5^{+2}$  N·m ( $0.5^{+0.2}$  kgf·m,  $3.7^{+1.5}$  lbf·ft)

# UPPERSTRUCTURE / Pump Device


## STRUCTURE OF PILOT PUMP



W137-02-04-034

## UPPERSTRUCTURE / Pump Device

**IMPORTANT: The housing is made of aluminum.  
Do not damage the housing. Take  
extreme care in order to control the  
tightening torque.**

Item	Part Name	Q'ty	Wrench Size (mm)	Tightening Torque			Remark
				N·m	(kgf·m)	(lbf·ft)	
1	Housing	1					
2	Backup Ring	2					Apply grease when installing
3	Seal	2					Apply grease when installing
4	Bushing	2					Apply hydraulic oil when installing
5	Gear	1					
6	Bushing	2					Apply hydraulic oil when installing
7	Flange	1					
8	Oil Seal	1					Apply grease onto the lip when installing
9	Retaining Ring	1					
10	O-Ring	2					Apply grease when installing
11	Cover	1					
12	Washer	4					
13	Bolt	4	 : 17	39 to 44	(4 to 4.5)	(3 to 3.3)	
14	Gear	1					
15	Key	2					

# UPPERSTRUCTURE / Pump Device

## MAINTENANCE STANDARD

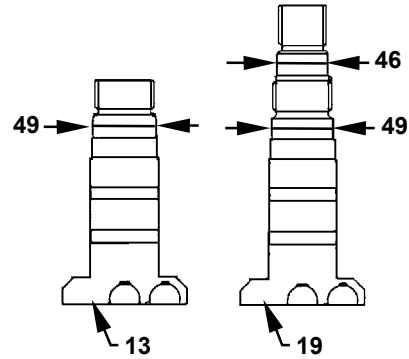
### Pump Device

	Standard	Allowable Limit	Unit: mm (in)
Gear (27, 29, 43) Backlash	0.68 (0.027)	1.5 (0.059)	Remedy
			Replace

### Main Pump

1. Shafts (13, 19): Spline tooth thickness.

Unit: mm (in)	
Standard	Allowable Limit
5.4 (0.213)	3.8 (0.150)



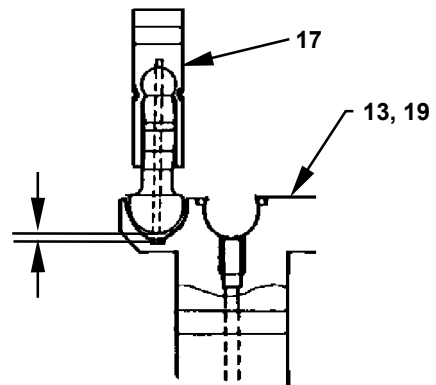
W157-02-04-015

2. Shafts (13, 19): Oil seal outer diameter.

Unit: mm (in)		
	Standard	Allowable Limit
46	45 (1.77)	44.8 (1.76)
49	55 (2.17)	54.8 (2.16)

3. Spherical joint: Clearance between plunger (17) and shafts (13, 19):.

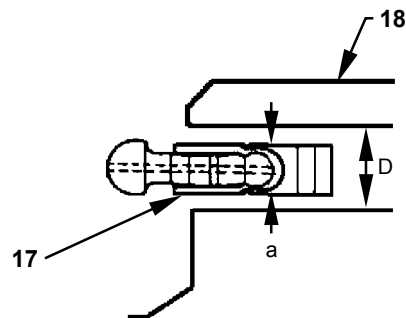
Unit: mm (in)	
Standard	Allowable Limit
0.058 (0.0023)	0.4 (0.0157)



W178-02-11-105

4. Cylinder block: Clearance between plunger (17) outer diameter and rotor (18) bore.

Unit: mm (in)		
	Standard	Allowable Limit
D-a	0.043 (0.0017)	0.08 (0.0031)

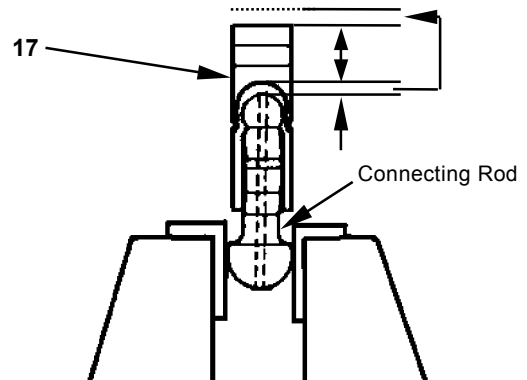


W178-02-11-106

## UPPERSTRUCTURE / Pump Device

5. Plunger: Clearance between plunger (17) and connecting rod

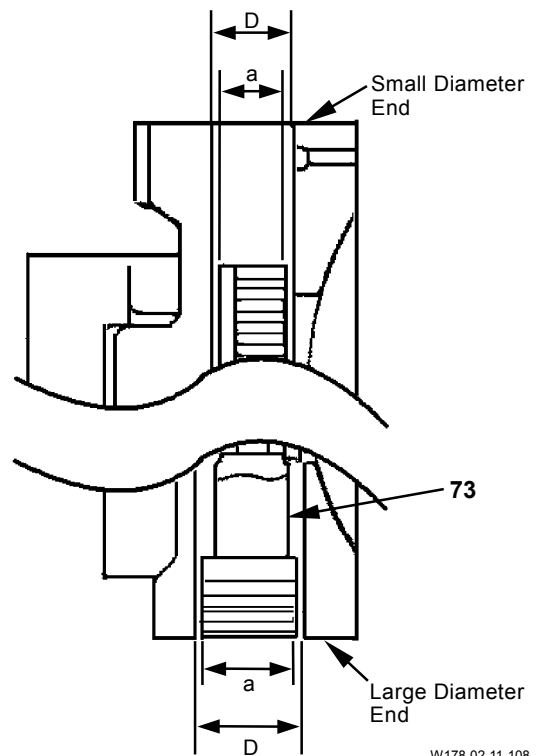
Unit: mm (in)	
Standard	Allowable Limit
0.15 (0.0059)	0.4 (0.0157)



6. Clearance between servo small chamber inner diameter (D) and servo outer diameter (a)

Unit: mm (in)		
	Standard	Allowable Limit
D-a	0.083 (0.0033)	0.2 (0.0079)

W178-02-11-107



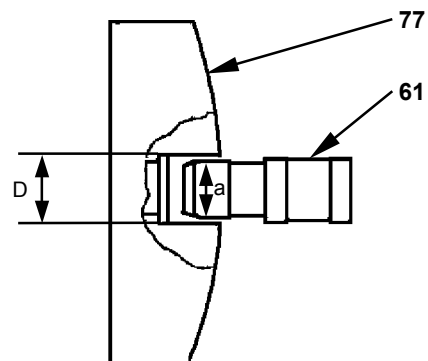
W178-02-11-108

7. Clearance between servo large chamber inner diameter (D) and servo piston (73) outer diameter (a)

Unit: mm (in)		
	Standard	Allowable Limit
D-a	0.079 (0.0031)	0.2 (0.0079)

8. Clearance between pin (61) and valve plate (77)

Unit: mm (in)		
	Standard	Allowable Limit
D-a	0.051 (0.0020)	0.3 (0.0118)



W178-02-11-109

## UPPERSTRUCTURE / Pump Device

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(Blank)


## UPPERSTRUCTURE / Control Valve

### REMOVE AND INSTALL CONTROL VALVE (ZX200-3 CLASS, 240-3 CLASS, 270-3 CLASS)

**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) (4 used). Remove cover (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 group (W2-10-1) and the Remove and Install Signal Control Valve group (W2-9-1) respectively.

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

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


 : 8 mm

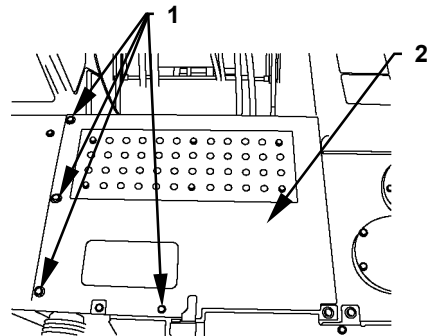


**CAUTION: Control valve (3) weight: 216 kg (475 lb)**

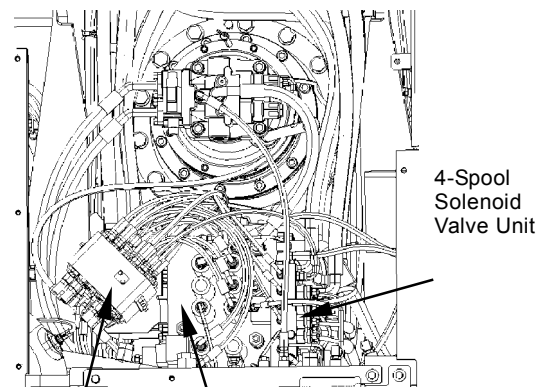
4. Install eyebolts (M10, Pitch 1.75 mm) (2 used) to control valve (3) and hold control valve (3).

5. Remove bolts (5) (4 used) from the bottom of main frame. Hoist and remove control valve (3) from brackets (4, 6).

 : 24 mm

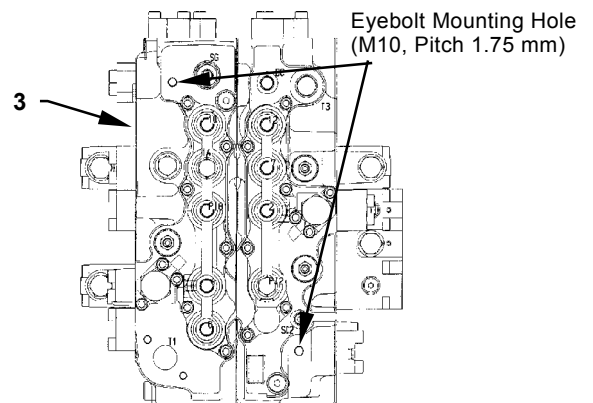


W1V1-02-10-003

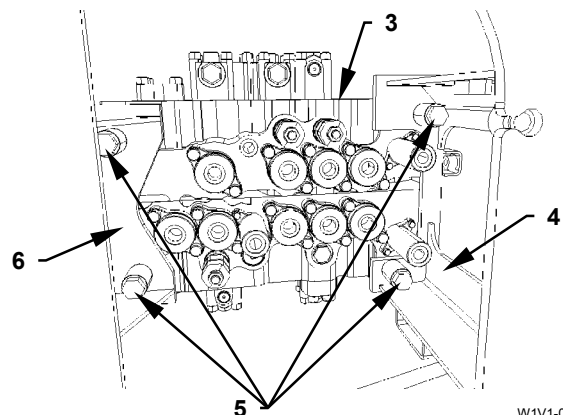


Signal Control Valve

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 (3). Hold control valve (3).


2. Install control valve (3) to brackets (4, 6) from the bottom of main frame with bolts (5) (4 used).


 : 24 mm


 : 270 N·m (27 kgf·m, 200 lbf·ft)


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


 : 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 (3).

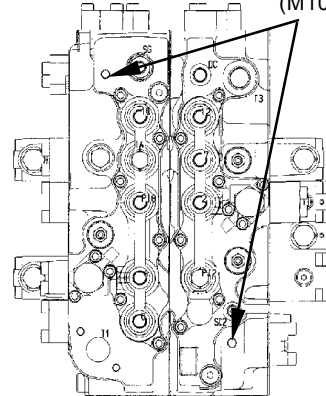
Refer to the Remove and install 4-Spool Solenoid Valve Unit group (W2-10-1) and the Remove and Install Signal Control Valve group (W2-9-1) respectively.

5. Install cover (2) with bolts (1) (4 used).

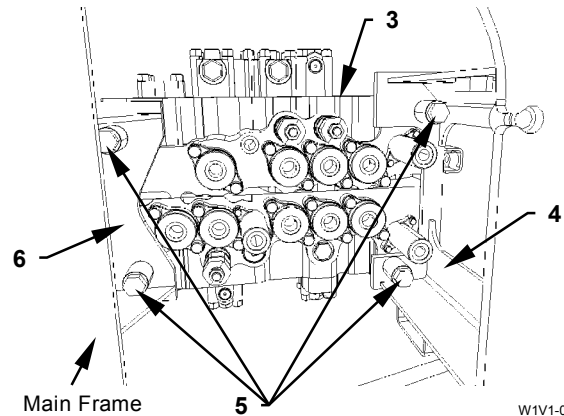
 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

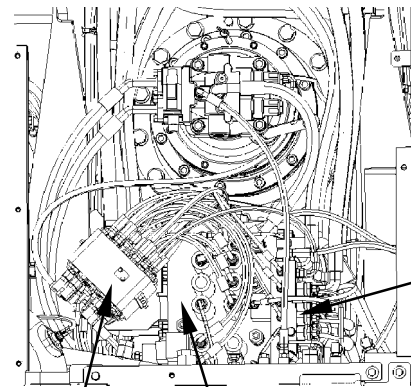
Eyebolt Mounting Hole  
(M10, Pitch 1.75 mm)



W1V1-02-05-063

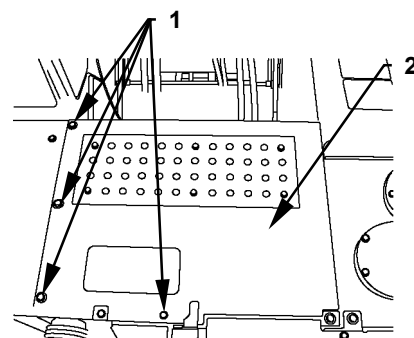


W1V1-02-05-022



W1V1-02-05-021

Signal Control Valve



W1V1-02-10-003




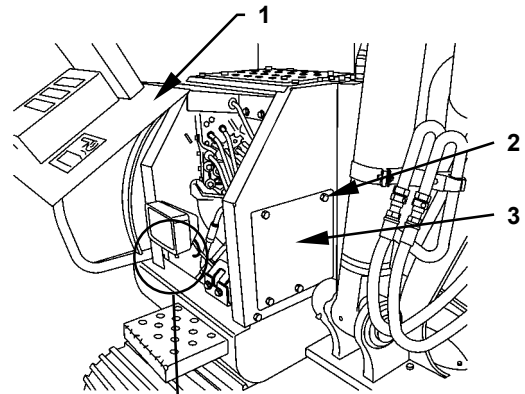
## UPPERSTRUCTURE / Control Valve

### REMOVE AND INSTALL CONTROL VALVE (ZX225USR-3 CLASS, 225US-3 CLASS)

#### Removal


1. Remove bolts (2) (4 used). Remove cover (3).  
Open and lock front cover (1).

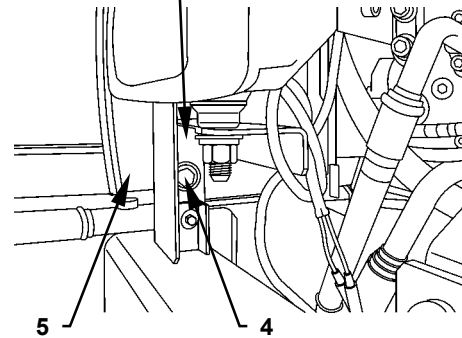
 : 17 mm



W1V1-02-05-075


2. Remove bolt (4). Open side cover (5).

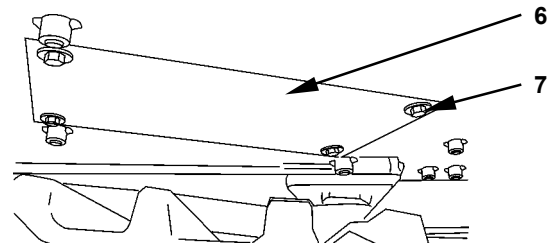
 : 17 mm



W1V1-02-05-076

3. Remove bolts (7) (4 used) from the bottom of main frame. Remove cover (6).


 : 17 mm




W1V1-02-05-077

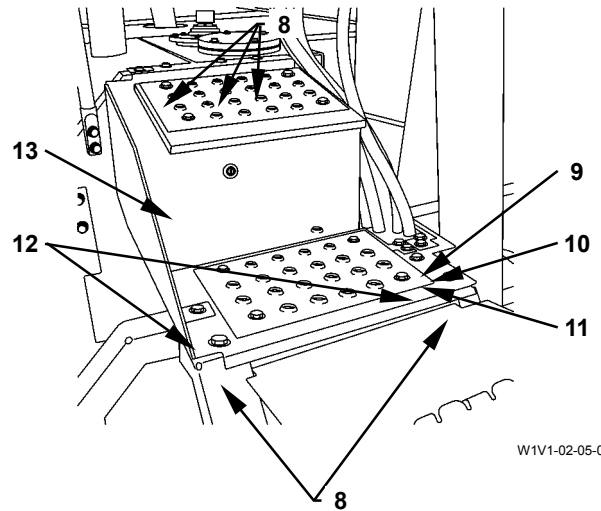
## UPPERSTRUCTURE / Control Valve

4. Remove bolts (9, 11) (2 used for each). Remove brackets (10) (2 used).


 : 17 mm

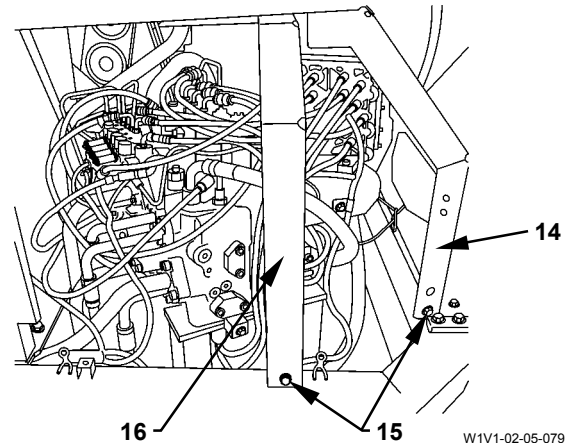
5. Remove bolts (8) (5 used). Remove under cover (13).

 : 17 mm



6. Remove bolts (12, 15) (2 used for each). Remove brackets (14, 16).


 : 17 mm




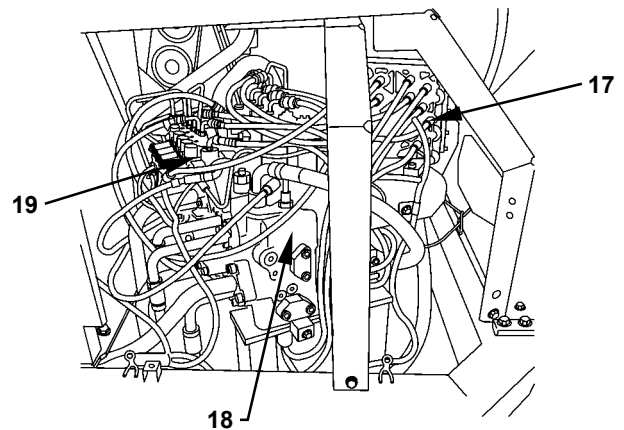
7. Remove signal control valve (17) from control valve (18). As for removal of signal control valve (17), refer to W2-9-1.

8. Remove 4-spool solenoid valve unit (19) from control valve (18). As for removal of 4-spool solenoid valve unit (19), refer to W2-10-1.

9. Remove all hoses and connectors from control valve (18). Attach an identification tag onto the removed hoses for assembling. Cap the hoses and open ends.

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

 : 8 mm

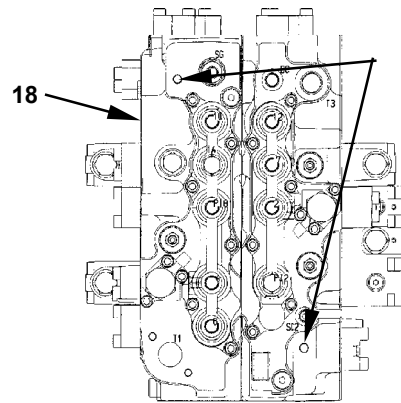


## UPPERSTRUCTURE / Control Valve




**CAUTION:** The control valve (18) assembly weight: 230 kg (510 lb)

10. Install eyebolts (M10, Pitch: 1.75 mm) (2 used) to control valve (18). Hold control valve (18).




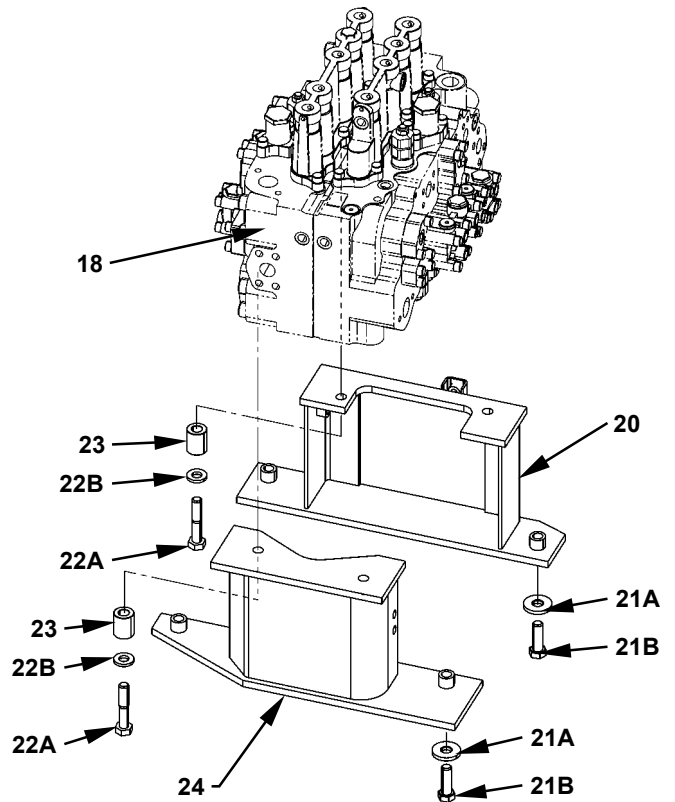
W1V1-02-05-063

11. Remove washers (21A) (4 used) and bolts (21B) (4 used) from the lower of main frame. Hoist and remove brackets (20, 24) and control valve (18) from the main frame

 : 24 mm

12. Remove bolts (22A) (2 used for each), washers (22B) (2 used) for each) and spacers (23) (2 used for each) from brackets (20, 24). Remove brackets (20, 24) from control valve (18).

 : 24 mm

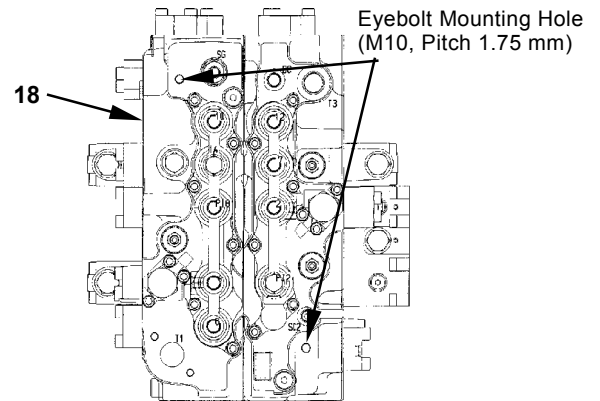


W1V1-02-05-086

## UPPERSTRUCTURE / Control Valve

### Installation

1. Install eyebolts (M10, Pitch 1.75 mm) (2 used) to control valve (18) and hold control valve (18).





W1V1-02-05-063



**CAUTION: Control valve (18) weight: 216 kg (476 lb)**

2. Install brackets (20, 24) to control valve (18) with bolts (22A) (2 used for each), washers (22B) (2 used for each) and spacers (23) (2 used for each).


 : 24 mm


 : 270 N·m (27 kgf·m, lbf·ft)

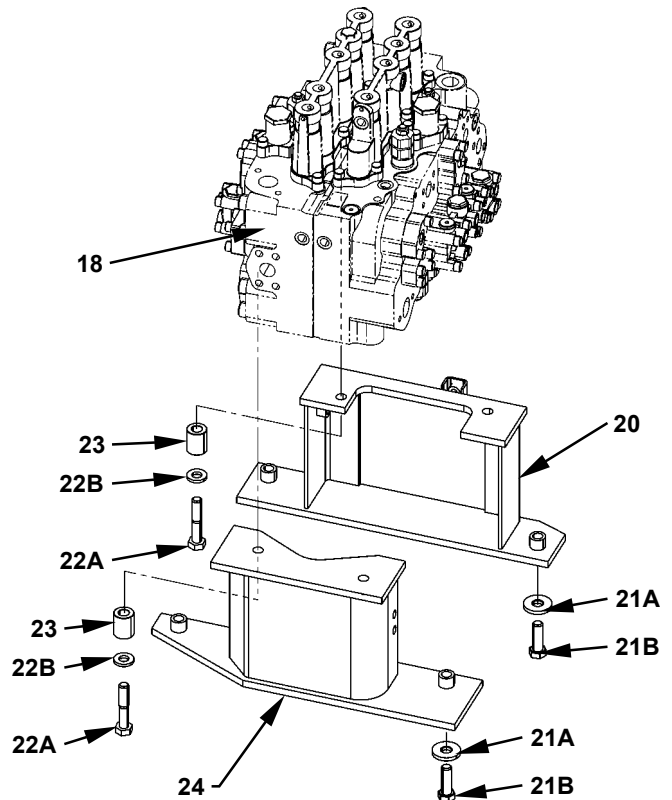


**CAUTION: The control valve (18) assembly weight: 230 kg (510 lb)**

3. Hoist and move control valve (18) to the mounting position in main frame. Install brackets (20, 24) with bolts (21B) (2 used for each) and washers (21A) (2 used for each).

 : 24 mm

 : 270 N·m (27.5 kgf·m, lbf·ft)

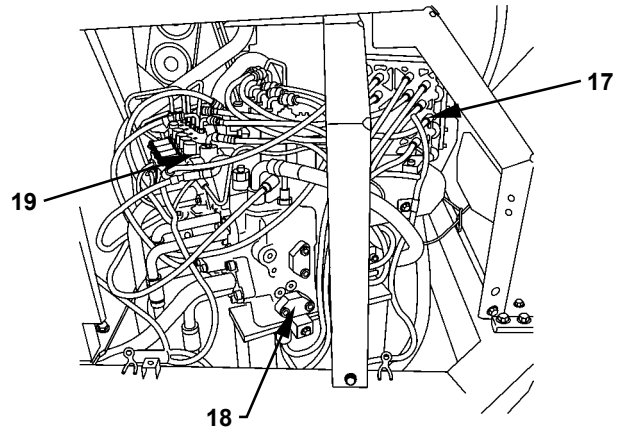


W1V1-02-05-086

## UPPERSTRUCTURE / Control Valve

4. Install all connectors, hoses and pipes to control valve (18).

	: 17 mm
	: 25 N·m (2.5 kgf·m, 55 lbf·ft)
	: 19 mm
	: 30 N·m (3.0 kgf·m, 66 lbf·ft)
	: 22 mm
	: 40 N·m (4.0 kgf·m, 88 lbf·ft)
	: 36 mm
	: 180 N·m (18 kgf·m, 397 lbf·ft)
	: 8 mm
	: 50 N·m (5.0 kgf·m, 37 lbf·ft)





W1V1-02-05-079



5. Install 4-spool solenoid valve unit (19) to control valve (18). As for installation of 4-spool solenoid valve unit (19), refer to W2-10-1.

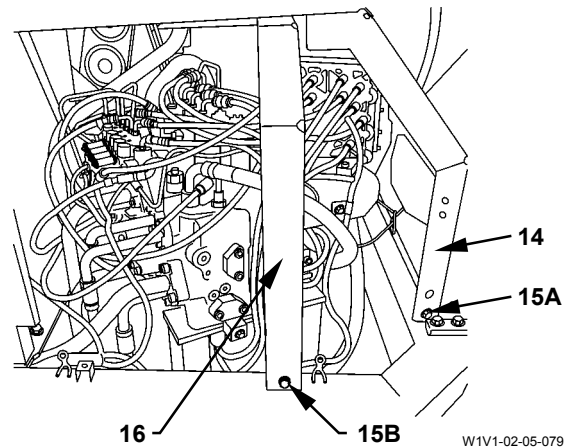
6. Install signal control valve (17) to control valve (18). As for installation of signal control valve (17), refer to W2-9-1.

7. Install bracket (16) to the main frame with bolts (12B, 15B).

	: 17 mm
	: 50 N·m (5.2 kgf·m, 37 lbf·ft)



8. Install bracket (14) to the main frame with bolts (12A, 15A).

	: 17 mm
	: 50 N·m (5.2 kgf·m, 37 lbf·ft)





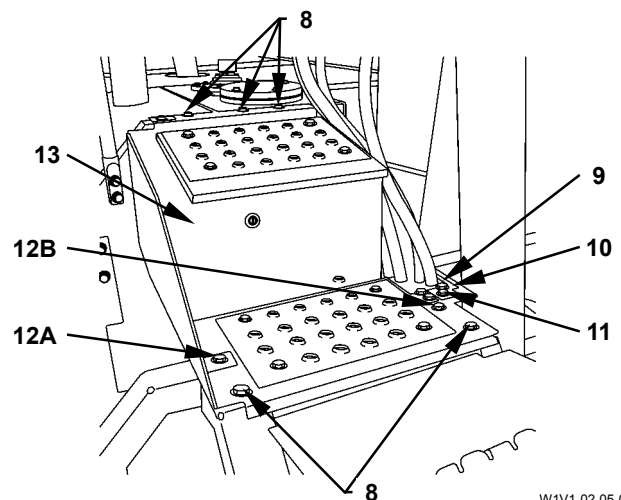
W1V1-02-05-079

9. Install upper cover (13) with bolts (8) (5 used).

	: 17 mm
	: 50 N·m (5.2 kgf·m, 37 lbf·ft)

10. Install brackets (10) (2 used) with bolts (9, 11) (2 used for each).


	: 17 mm
	: 50 N·m (5.2 kgf·m, 37 lbf·ft)




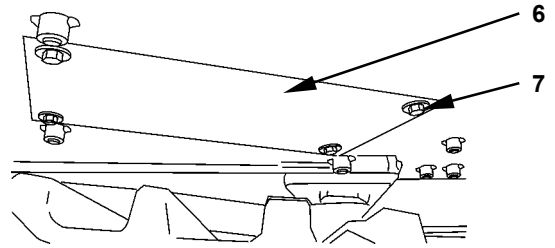
W1V1-02-05-078

## UPPERSTRUCTURE / Control Valve

11. Install cover (6) with bolts (7) (4 used).


 : 17 mm


 : 50 N·m (5.2 kgf·m, 37 lbf·ft)



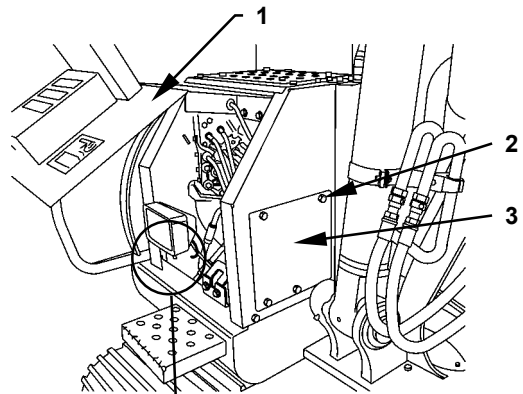
W1V1-02-05-077

12. Close side cover (5). Install bolt (4). Install cover (3) with bolts (2) (4 used).

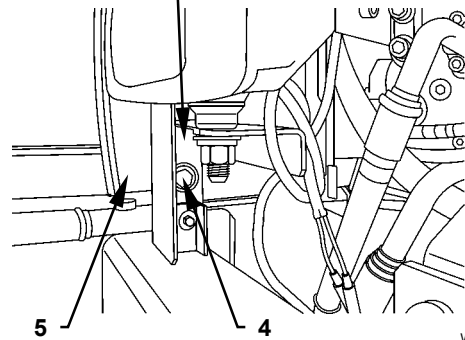
 : 17 mm

 : 50 N·m (5.2 kgf·m, 37 lbf·ft)

13. Close front cover (1).



W1V1-02-05-075



W1V1-02-05-076

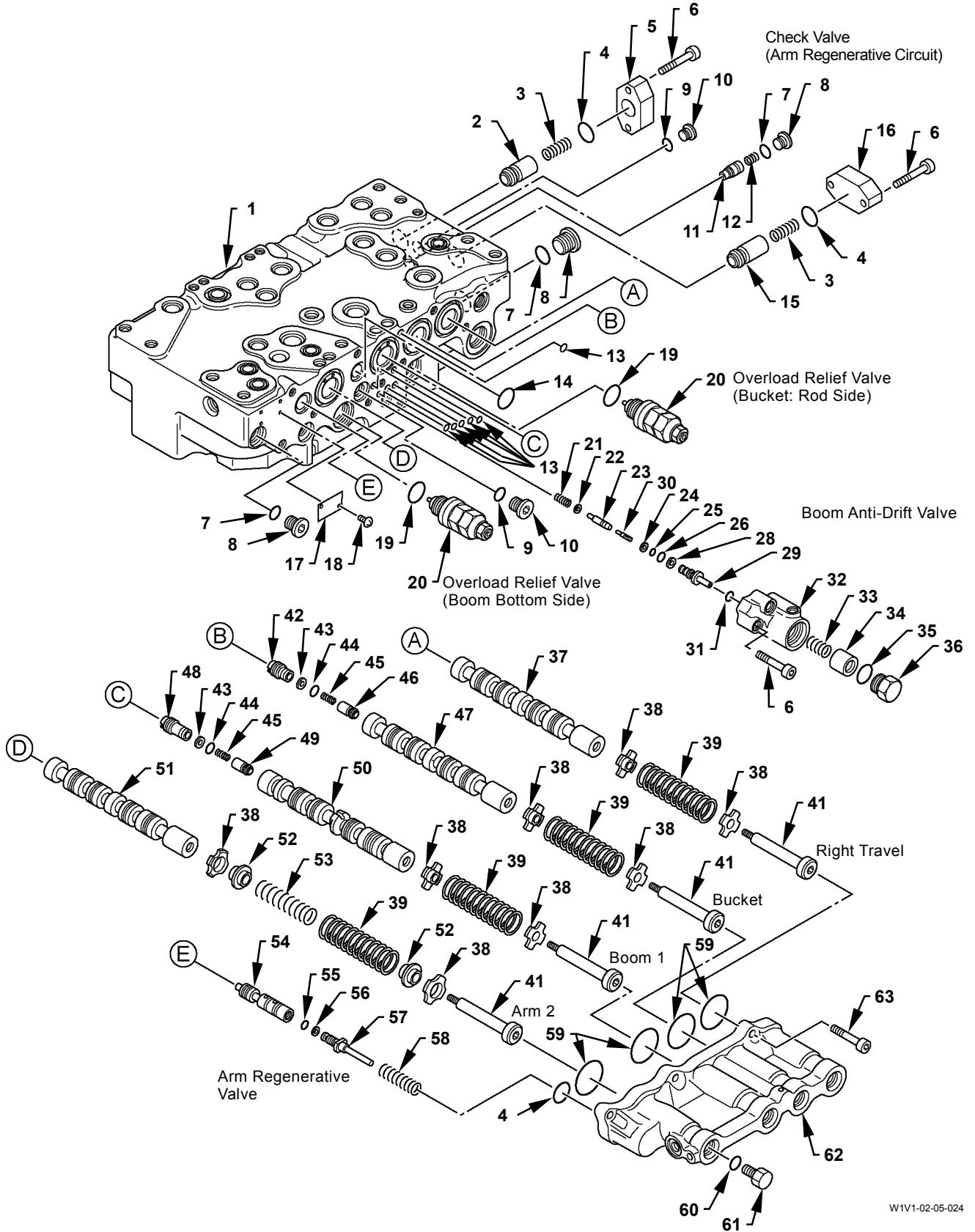
## UPPERSTRUCTURE / Control Valve

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# UPPERSTRUCTURE / Control Valve

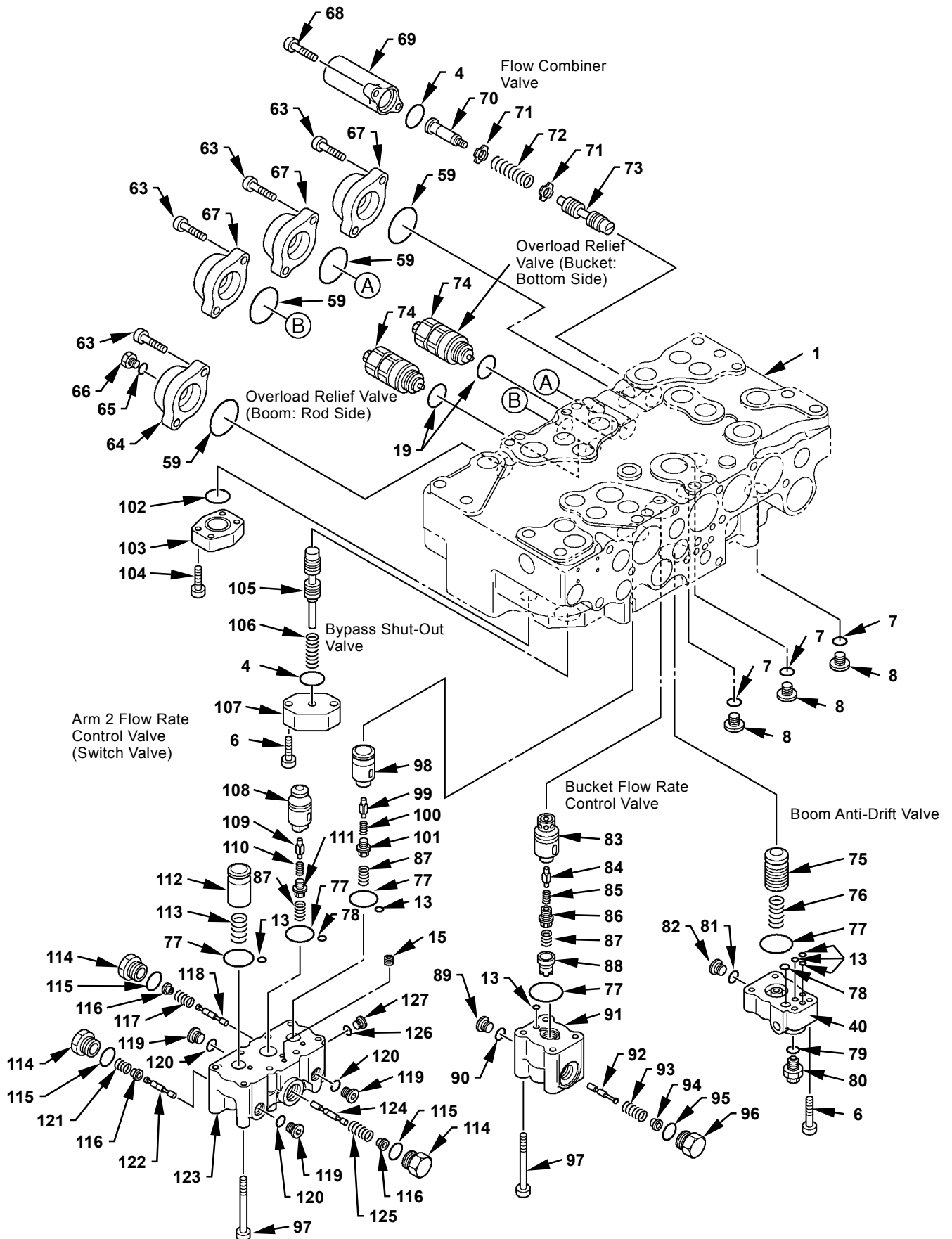
## DISASSEMBLE CONTROL VALVE 4-SPOOL SIDE



W1V1-02-05-024



# UPPERSTRUCTURE / Control Valve



## UPPERSTRUCTURE / Control Valve

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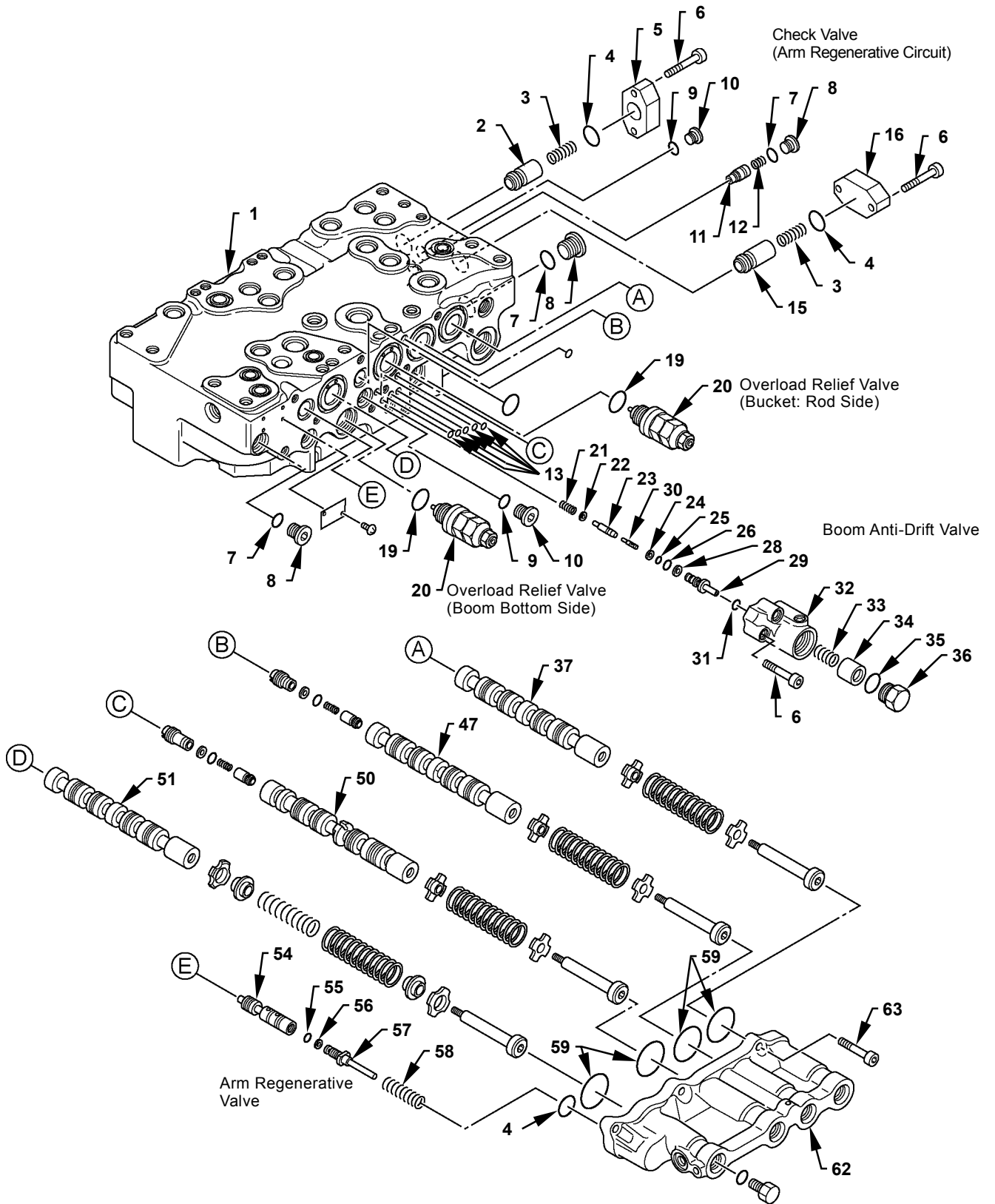
1 - Housing	34 - Piston	66 - Plug	97 - Socket Bolt (12 Used)
2 - Poppet	35 - O-Ring	67 - Cap (3 Used)	98 - Poppet
3 - Spring (2 Used)	36 - Plug	68 - Socket Bolt (2 Used)	99 - Poppet
4 - O-Ring (3 Used)	37 - Spool	69 - Cap	100 - Spring
5 - Flange	38 - Spring Seat (8 Used)	70 - Bolt	101 - Plug
6 - Socket 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 (12 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



W1V1-02-05-024


## UPPERSTRUCTURE / Control Valve

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### 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) (5 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

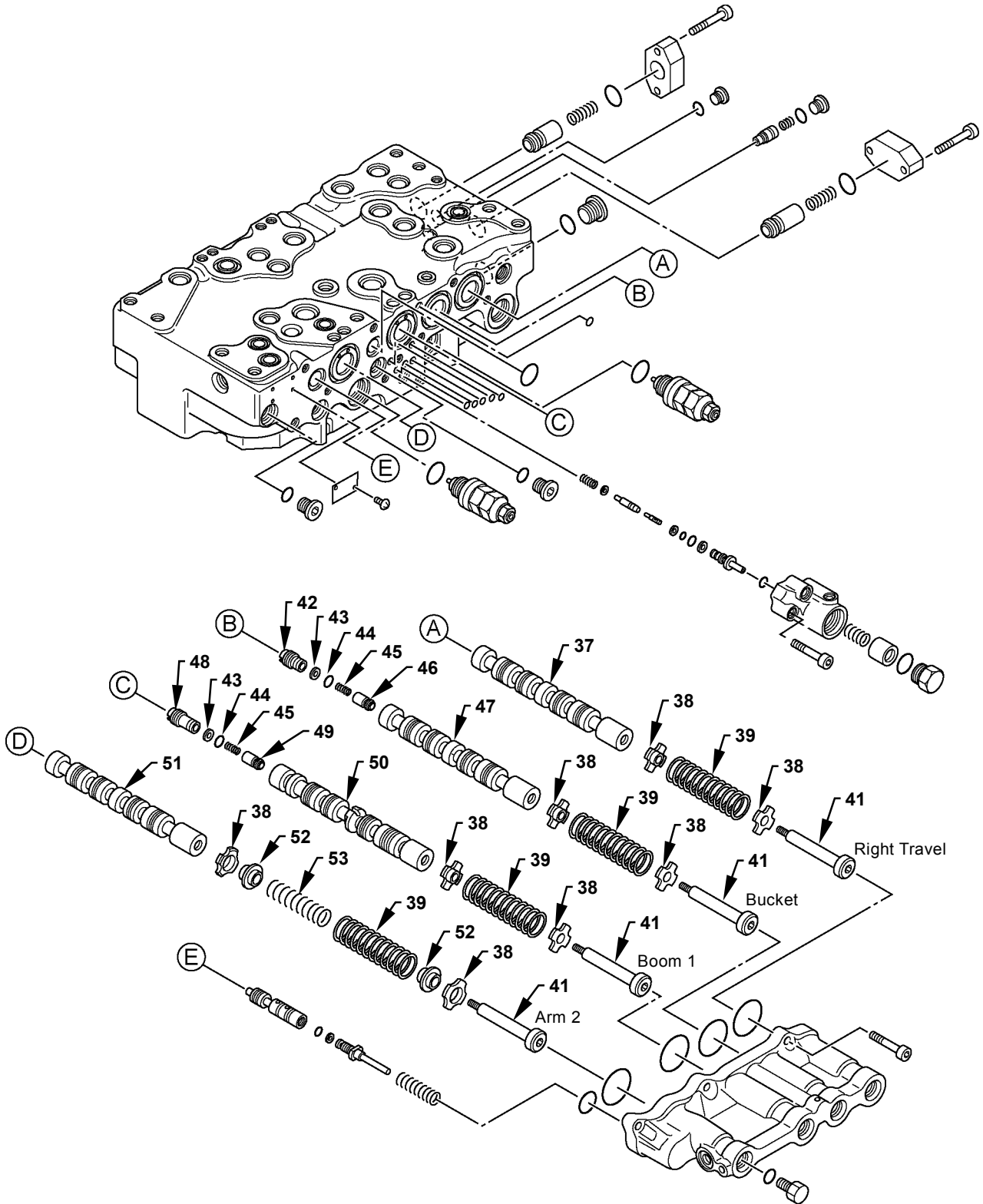
10. Remove socket bolts (6) (2 used). Remove flange (16), O-ring (4), spring (3) and poppet (15) from housing (1).

 : 8 mm

11. Remove plugs (8, 10) (2 used for each) from housing (1).

 : 6 mm, 10 mm

# UPPERSTRUCTURE / Control Valve




W1V1-02-05-024

## UPPERSTRUCTURE / Control Valve

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- 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).

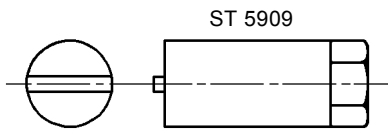
 : 8 mm

- 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).

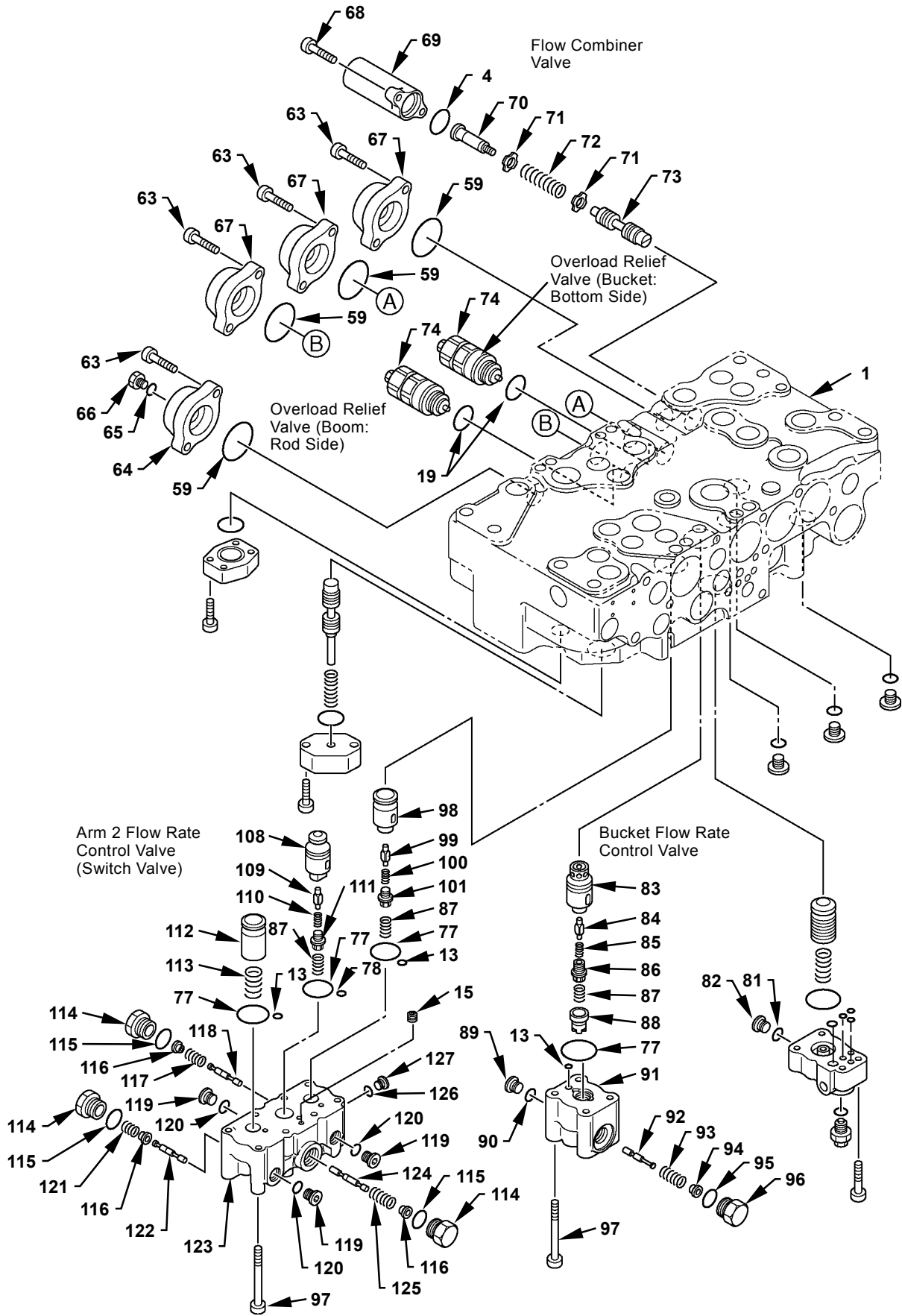
18. Remove spring (45) and poppet (49) from spool (50).

- 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 seats (52, 38) from spool (51).

 : 8 mm

# UPPERSTRUCTURE / Control Valve






## UPPERSTRUCTURE / Control Valve


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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).

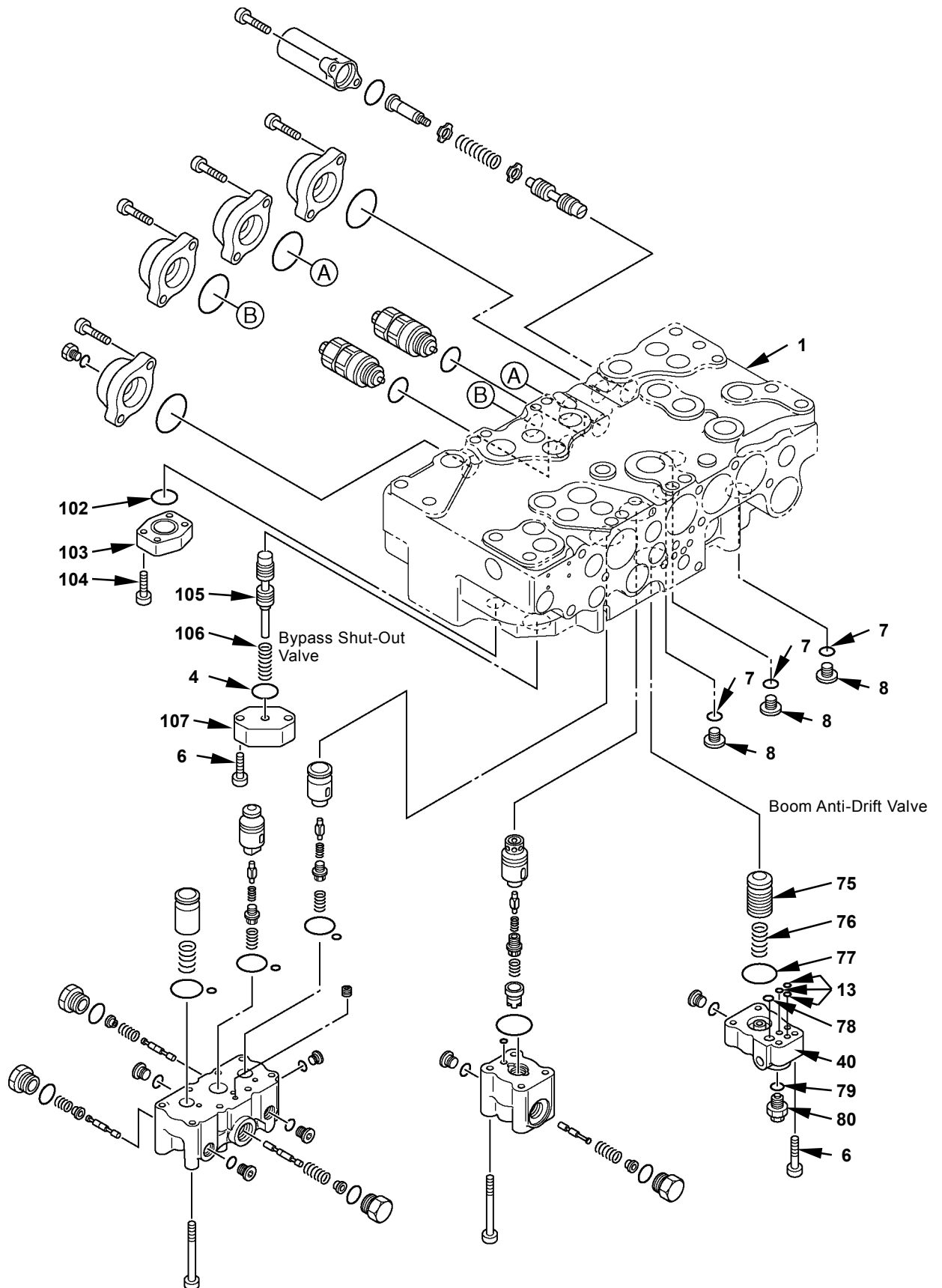
 : 24 mm

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




W1V1-02-05-025

## UPPERSTRUCTURE / Control Valve

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- Disassemble Boom Anti-Drift Valve


31. Remove socket bolts (6) (4 used). Remove body (40), O-rings (13) (3 used), (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).

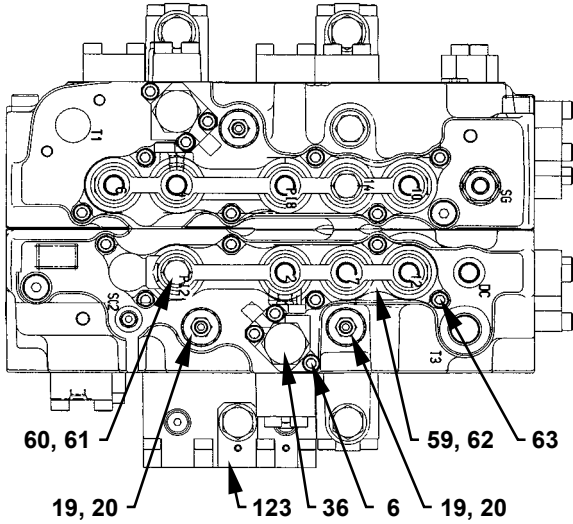
 : 8 mm

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

 : 8 mm

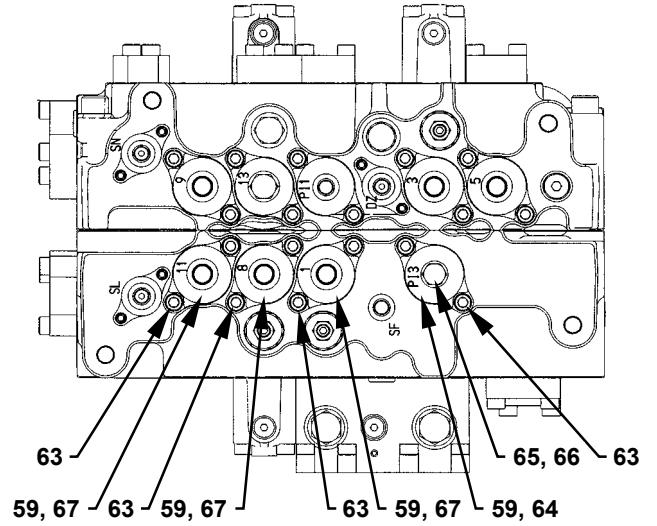
# UPPERSTRUCTURE / Control Valve

## ASSEMBLE CONTROL VALVE 4-SPOOL SIDE



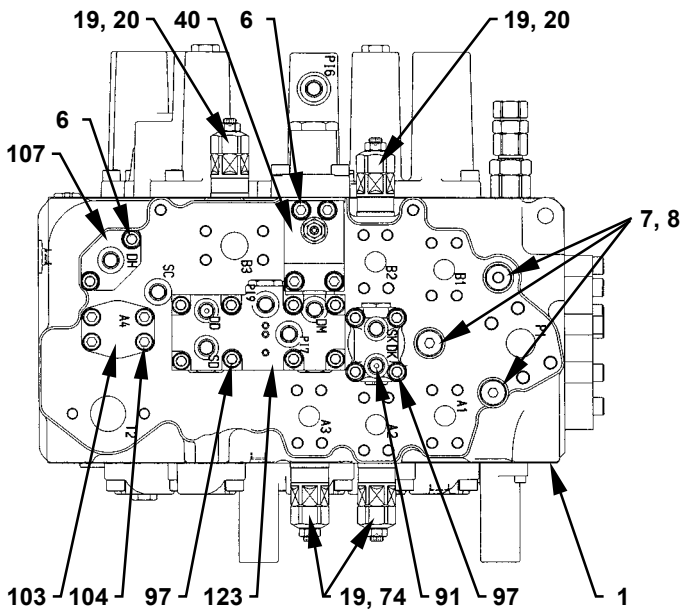
Control Valve (Upper)

W1V1-02-05-065



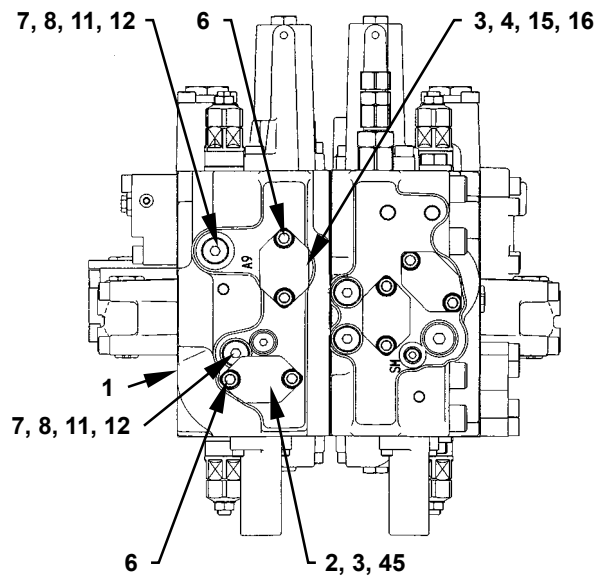
Control Valve (Lower)

W1V1-02-05-066



Control Valve (Side)

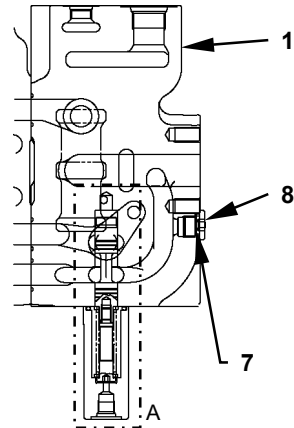
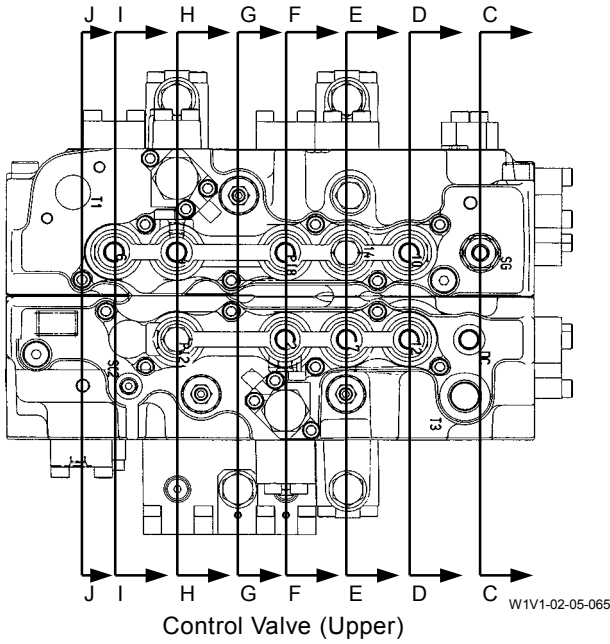
W1V1-02-05-067



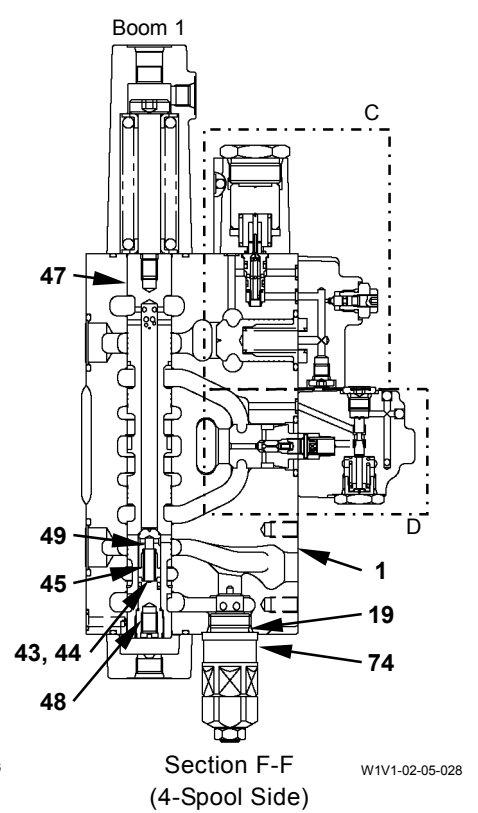
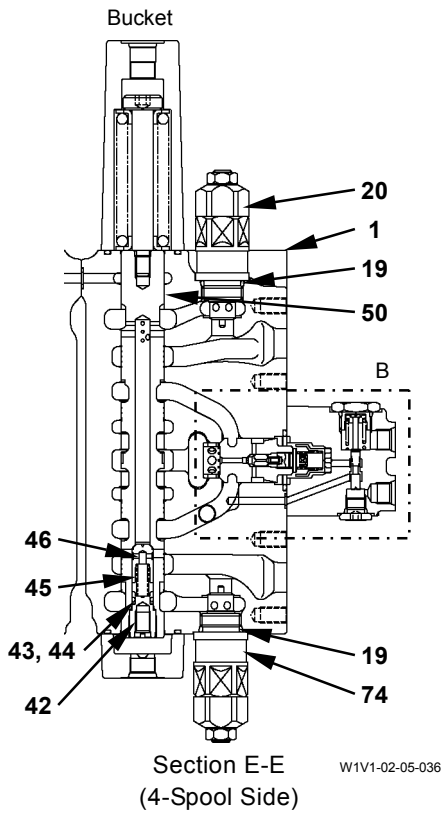
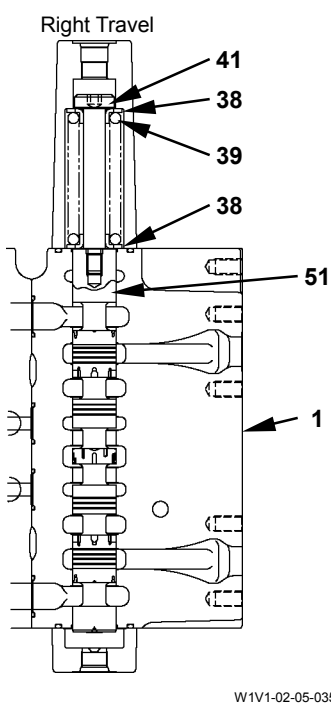
Control Valve (Front)

W1V1-02-05-068

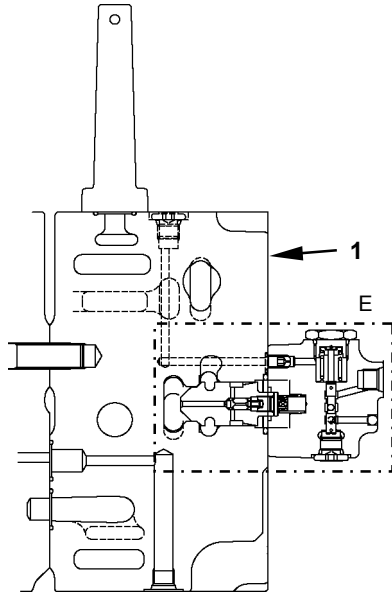
# UPPERSTRUCTURE / Control Valve



W1V1-02-05-038

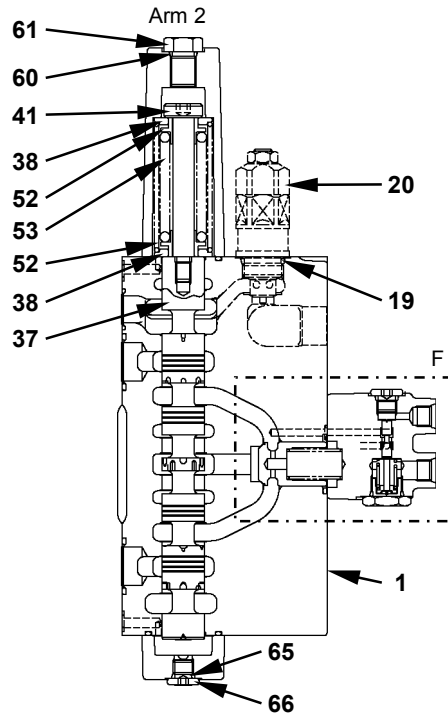


# UPPERSTRUCTURE / Control Valve



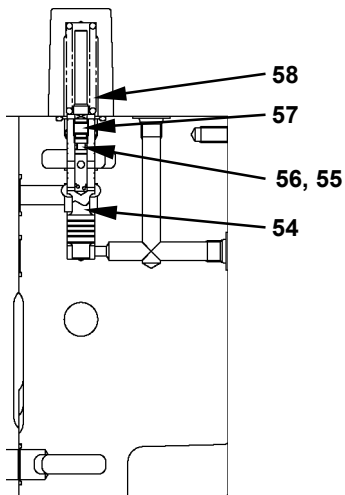
W1V1-02-05-029

Section G-G  
(4-Spool Side)



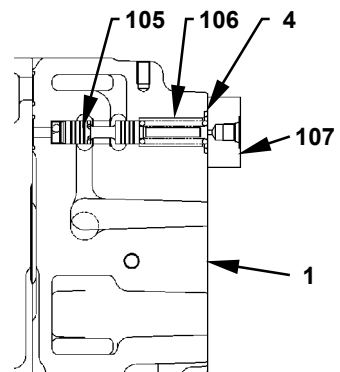
W1V1-02-05-030

Section H-H  
(4-Spool Side)



W1V1-02-05-071

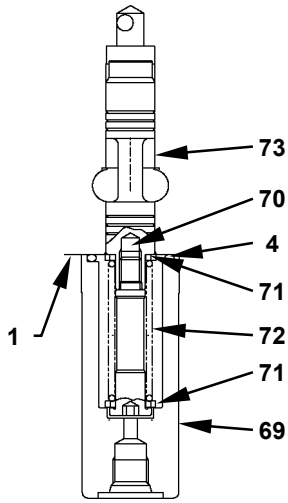
Section I-I (4-Spool Side)



W1V1-02-05-037

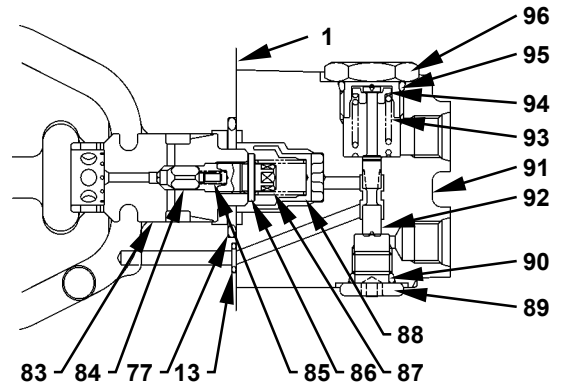
Section J-J (4-Spool Side)

# UPPERSTRUCTURE / Control Valve



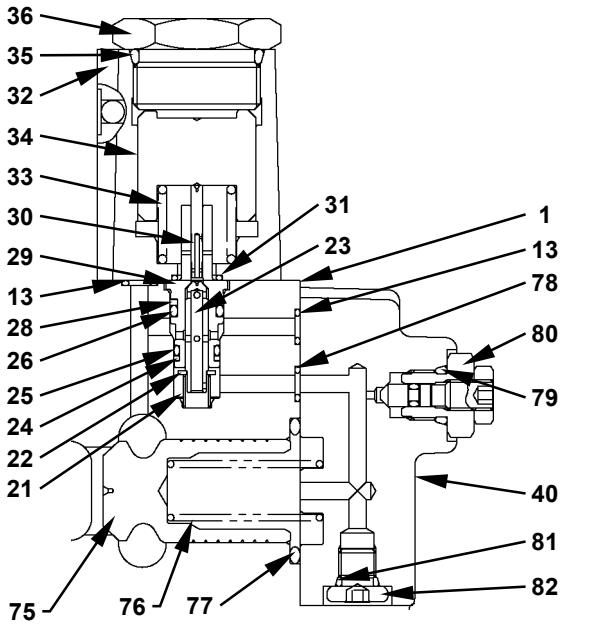
Detail A

W1V1-02-05-040



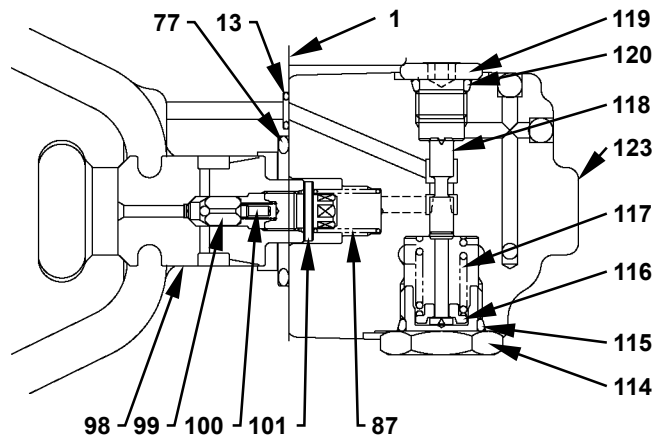
Detail B

W1V1-02-05-033



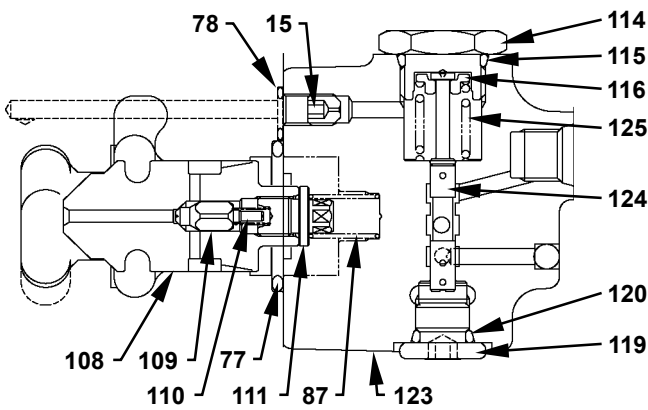
Detail C

W1V1-02-05-031



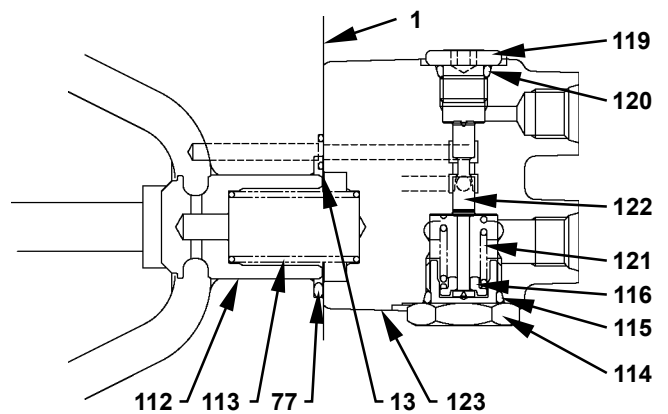
Detail D

W1V1-02-05-032



Detail E

W1V1-02-05-042



Detail F

W1V1-02-05-034

## UPPERSTRUCTURE / Control Valve

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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 (12 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		

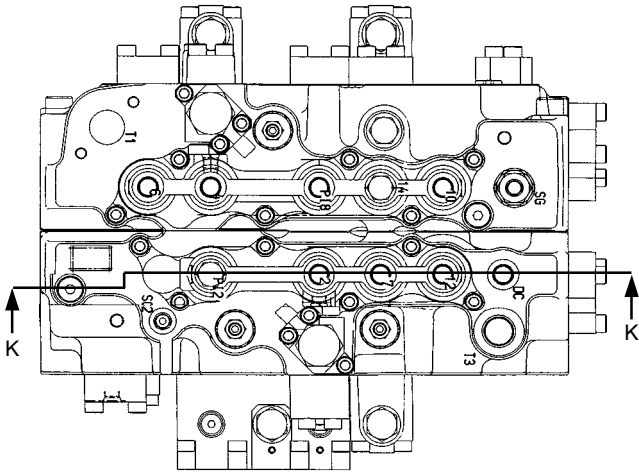


## UPPERSTRUCTURE / Control Valve

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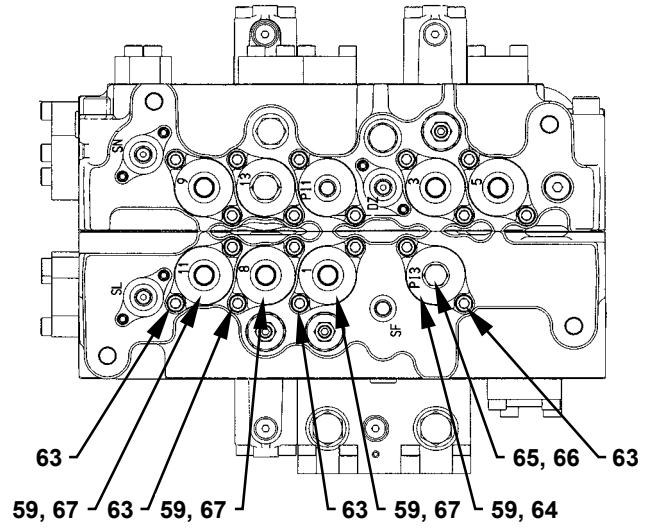
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# UPPERSTRUCTURE / Control Valve

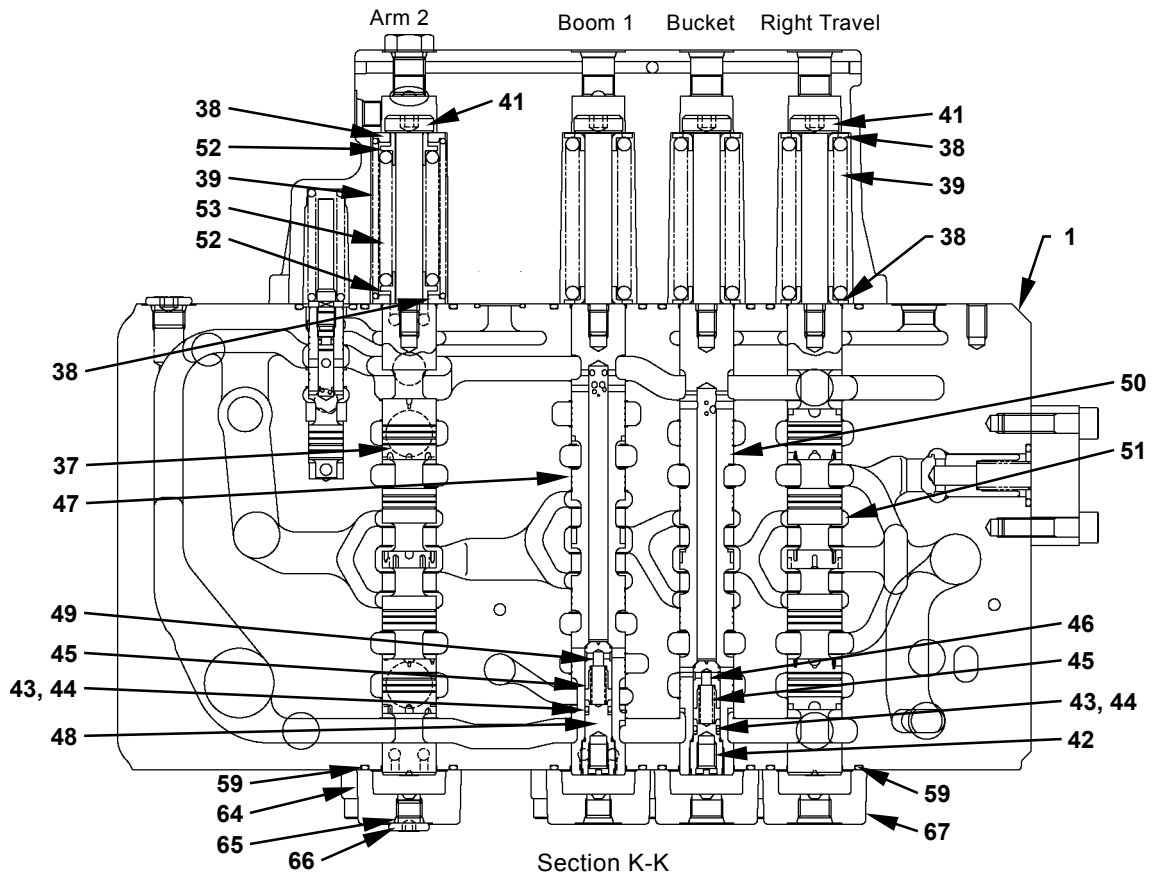


Control Valve (Upper)

W1V1-02-05-065



Control Valve (Lower)



Section K-K


W1V1-02-05-072


## 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

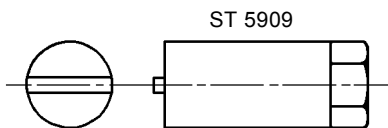
2. Clamp spool (50) in a vise by using wooden pieces.

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 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 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

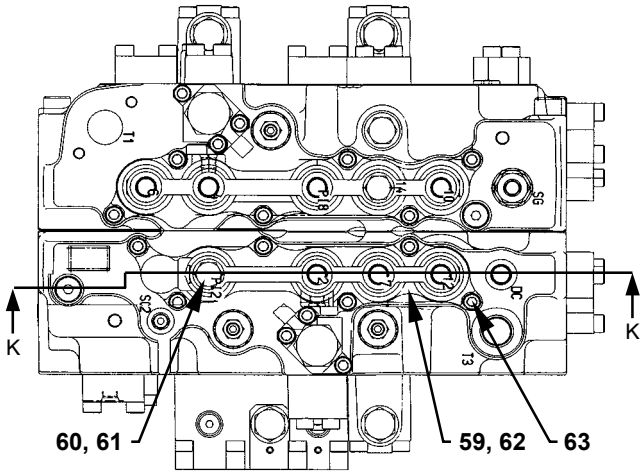
10. Clamp spool (37) in a vise by using wooden pieces. Install spring seats (38, 52), springs (39, 53), spring seats (52, 38) and bolt (41) to spool (37).

 : 8 mm

 : 15 N·m (1.5 kgf·m, 11 lbf·ft)

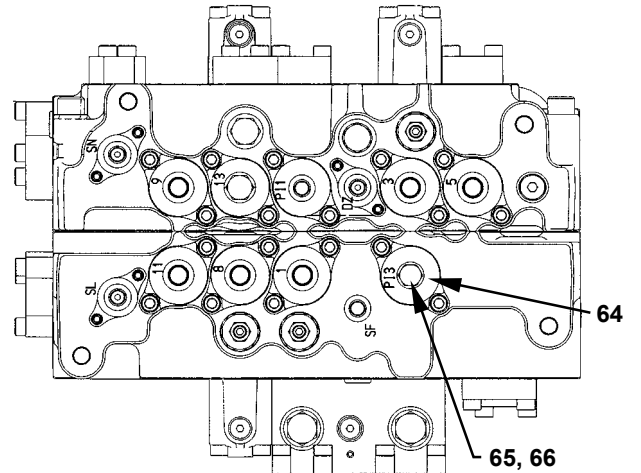
11. Install O-rings (59) (4 used) to housing (1). Install caps (67) (3 used) and (64) to housing (1) with socket bolts (63) (8 used).

# UPPERSTRUCTURE / Control Valve



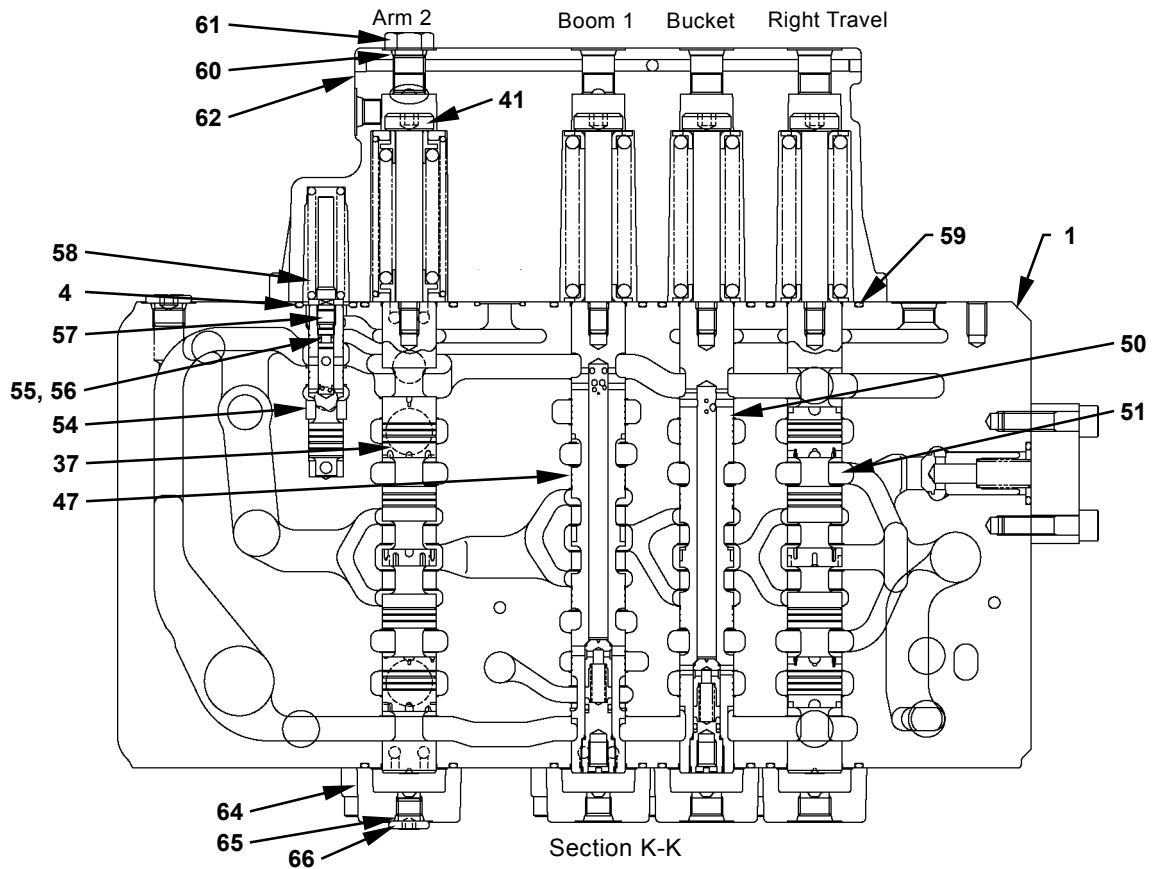
Control Valve (Upper)

W1V1-02-05-065



Control Valve (Lower)

W1V1-02-05-066








Section K-K

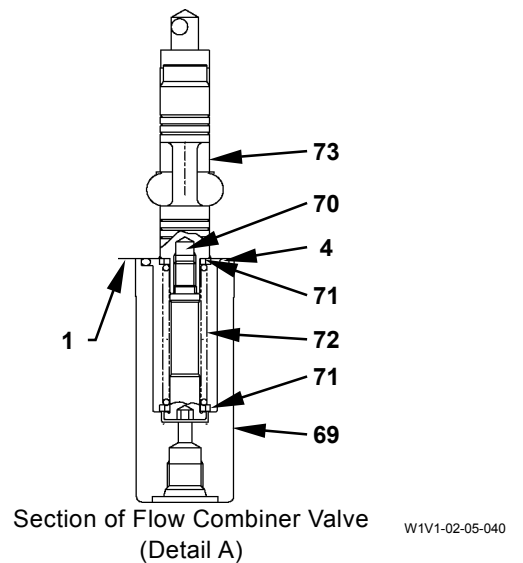
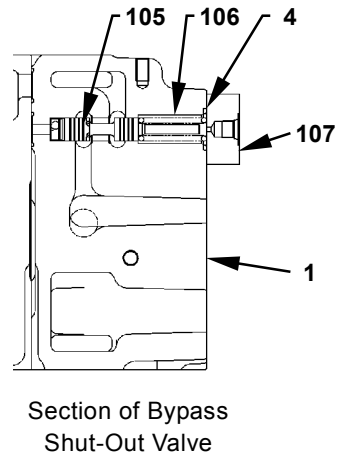
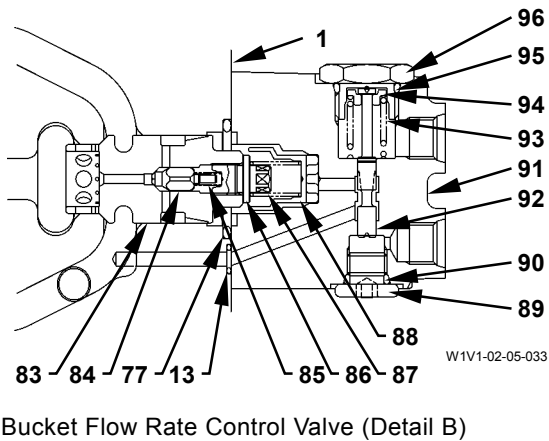
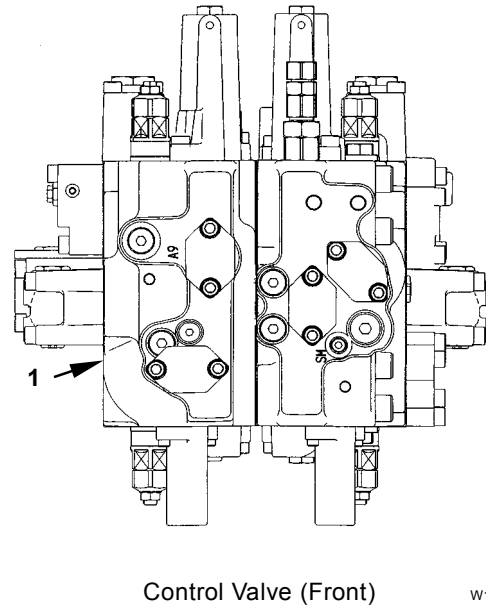
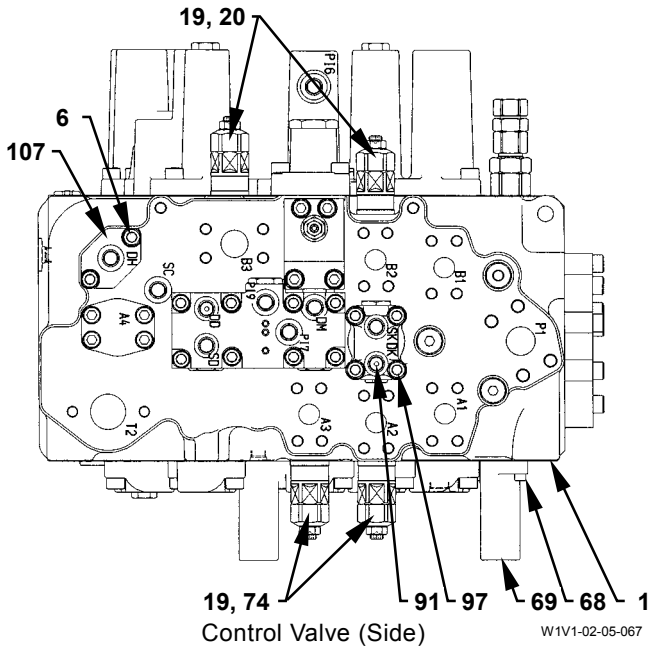
W1V1-02-05-072

## UPPERSTRUCTURE / Control Valve

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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 spool (51, 50, 47, 37) assemblies, 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 seat (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)

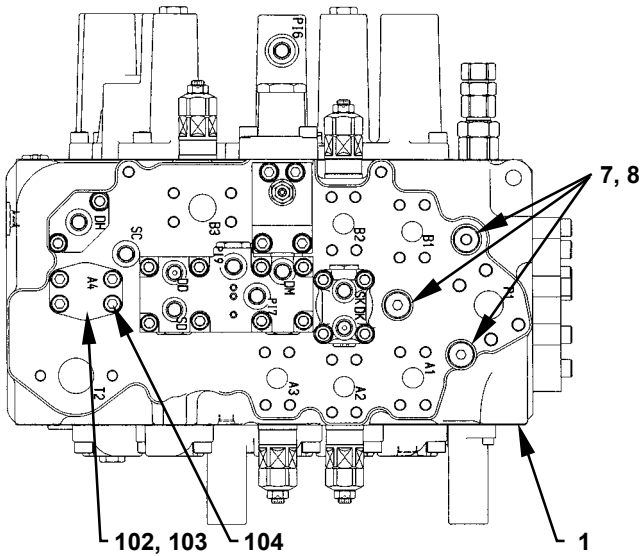
- Assemble Overload Relief Valve

**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.)**

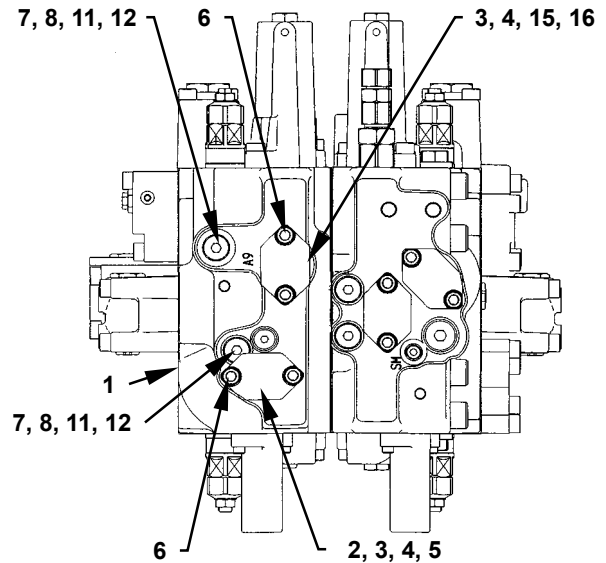
24. Install O-rings (19) (4 used) to overload relief valves (20, 74) (2 used for each). Install overload relief valves (20, 74) (2 used for each) to housing (1).
  -  : 32 mm
  -  : 83 N·m (8.5 kgf·m, 61 lbf·ft)

# UPPERSTRUCTURE / Control Valve



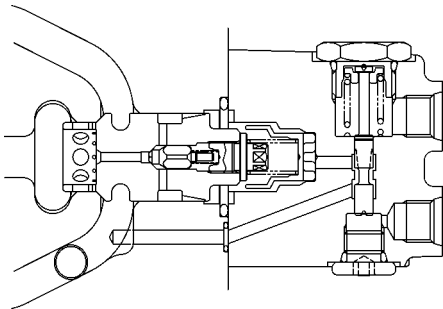
Control Valve (Side)

W1V1-02-05-067



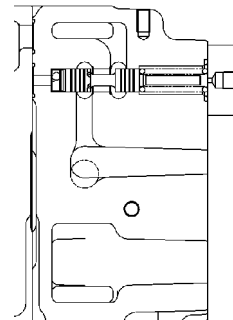
Control Valve (Front)

W1V1-02-05-068



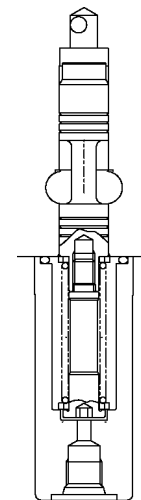
Bucket Flow Rate Control Valve (Detail B)

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


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
- 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

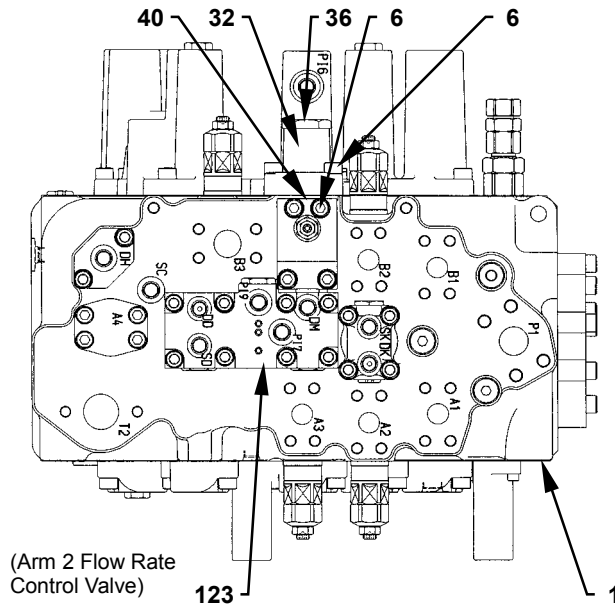
 : 61 N·m (6.2 kgf·m, 45 lbf·ft)

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)

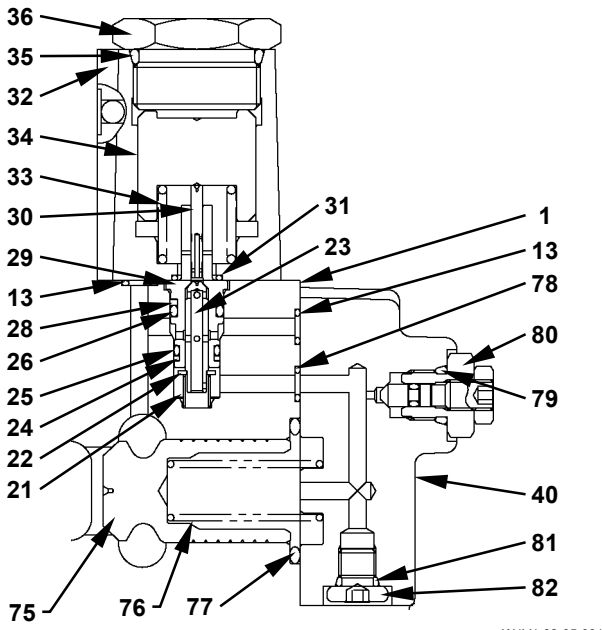
# UPPERSTRUCTURE / Control Valve



(Arm 2 Flow Rate Control Valve)

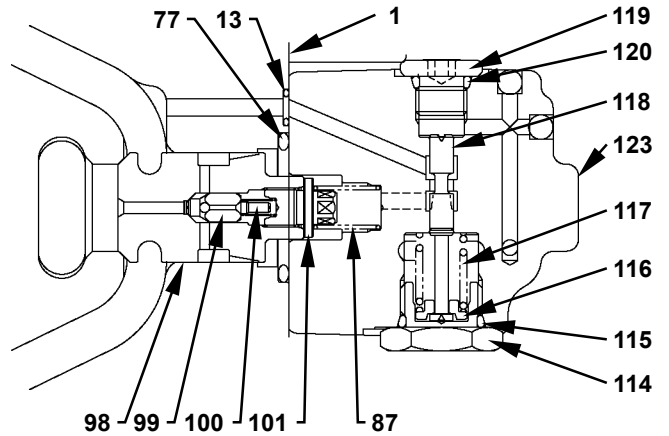
Control Valve (Side)

W1V1-02-05-067



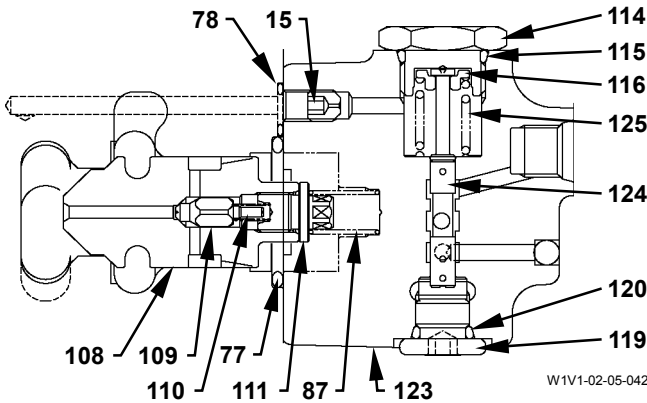
Boom Anti-Drift Valve (Detail C)

W1V1-02-05-031



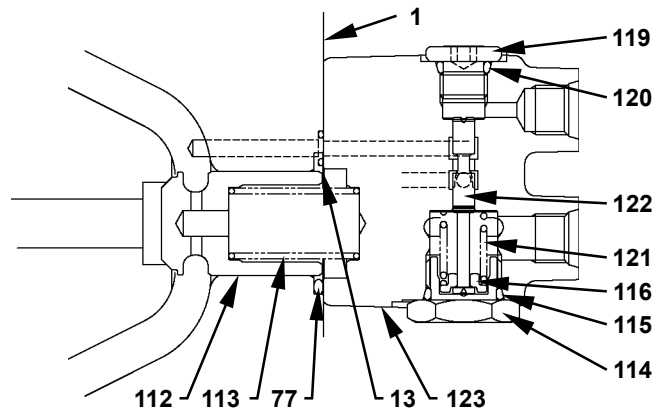
Arm 2 Flow Rate Control Valve (Detail D)

W1V1-02-05-032



Arm 2 Flow Rate Control Valve (Detail E)

W1V1-02-05-042



Arm 2 Flow Rate Control Valve (Detail F)

W1V1-02-05-034


## UPPERSTRUCTURE / Control Valve

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- 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).

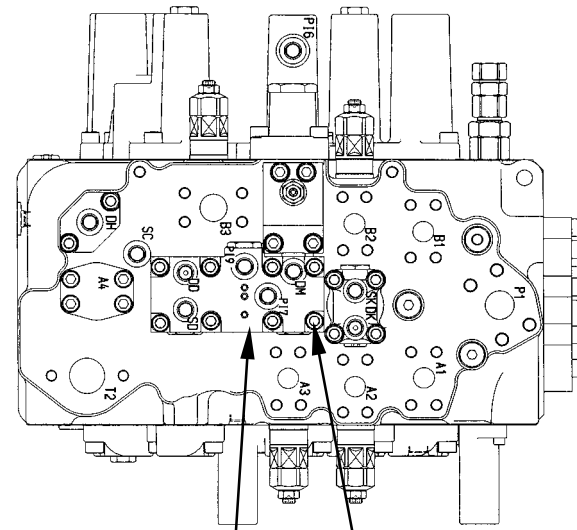
41. Install spool (124), spring (125) and spring seat (116) to body (123) in detail E. Temporarily tighten plugs (114, 119) to body (123).

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.

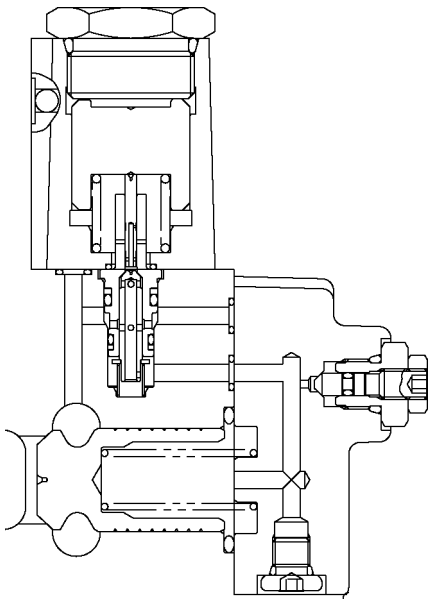
44. Install poppet (112), spring (113) and O-rings (77, 13) to housing (1) in detail F.

# UPPERSTRUCTURE / Control Valve

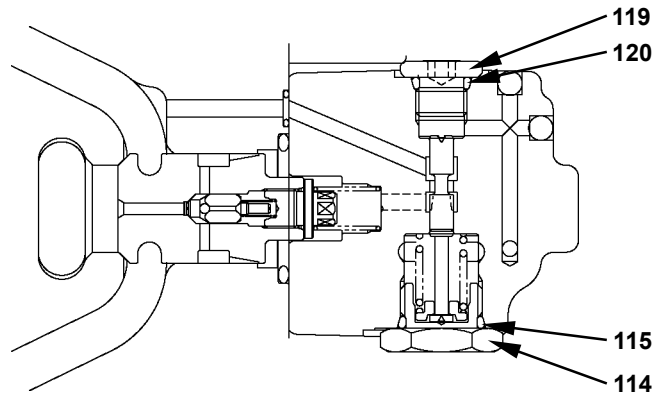


(Arm 2 Flow Rate Control Valve) **123**  
Control Valve (Side) **97**

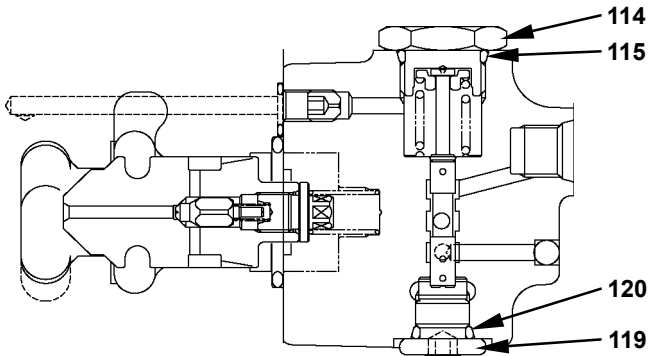
W1V1-02-05-067



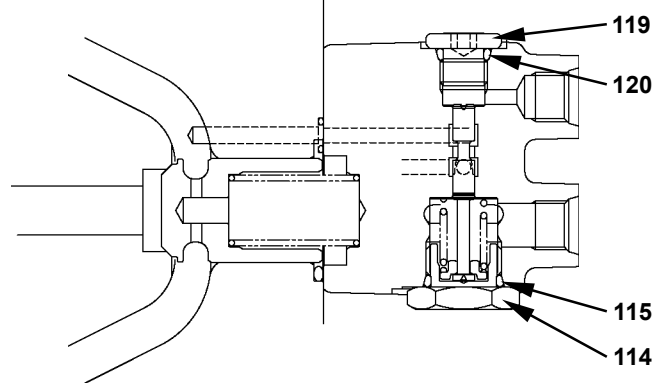
Boom Anti-Drift Valve (Detail C) W1V1-02-05-031



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



Arm 2 Flow Rate Control Valve (Detail E) W1V1-02-05-042





Arm 2 Flow Rate Control Valve (Detail F) W1V1-02-05-034

## UPPERSTRUCTURE / Control Valve


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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)

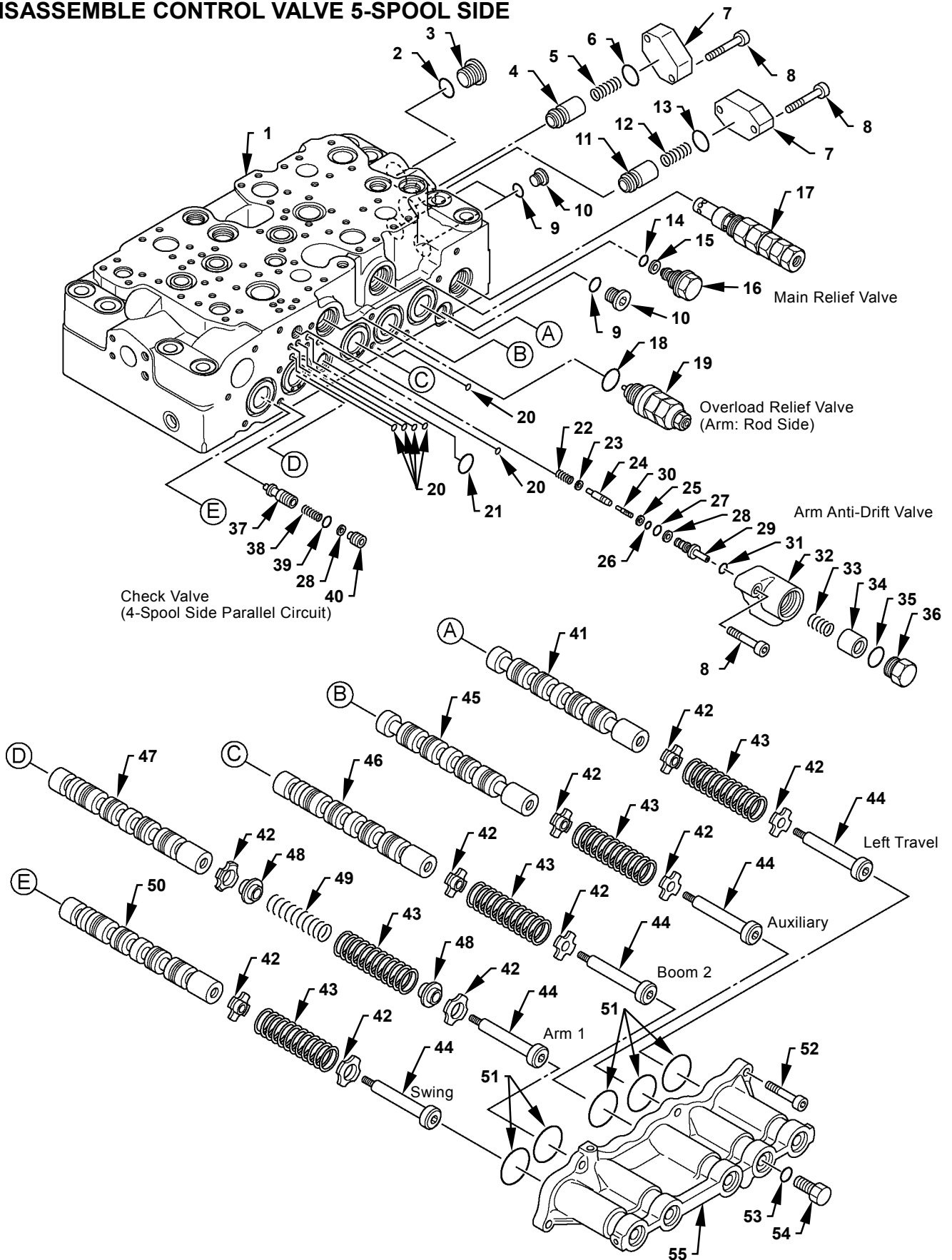
46. Tighten plugs (114, 119) (3 used for each) in body (123).

 : 5 mm

 : 27 mm

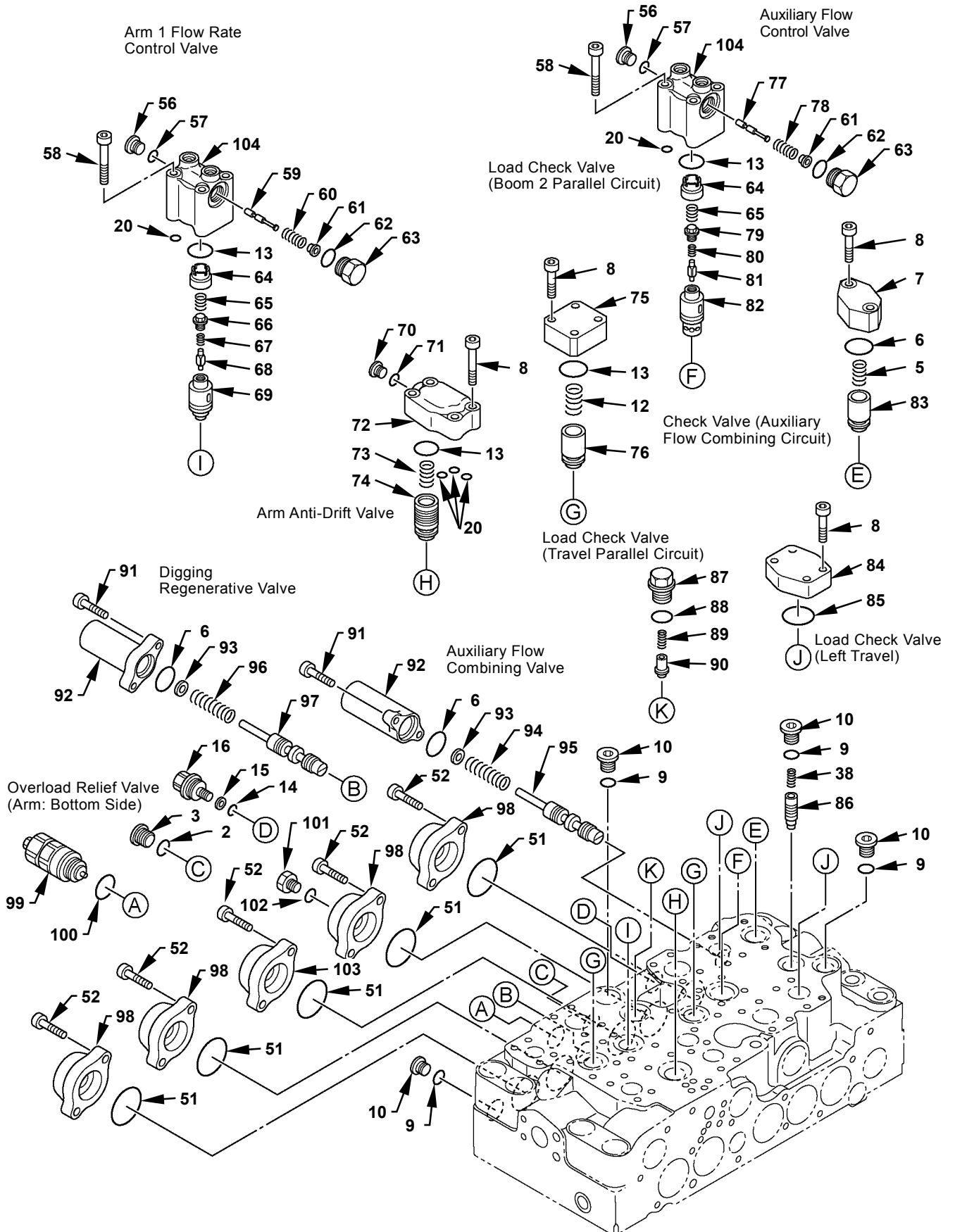
# UPPERSTRUCTURE / Control Valve

## DISASSEMBLE CONTROL VALVE 5-SPOOL SIDE



W1V1-02-05-026

# UPPERSTRUCTURE / Control Valve



## UPPERSTRUCTURE / Control Valve

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1 - Housing	27 - O-Ring	53 - O-Ring	79 - Plug
2 - O-Ring	28 - Backup Ring	54 - Plug	80 - Spring
3 - Plug	29 - Sleeve	55 - Cap	81 - Poppet
4 - Poppet	30 - Spool	56 - Plug (2 Used)	82 - Poppet
5 - Spring	31 - O-Ring	57 - O-Ring (2 Used)	83 - Poppet
6 - O-Ring (3 Used)	32 - Body	58 - Socket Bolt (8 Used)	84 - Cover (2 Used)
7 - Flange	33 - Spring	59 - Spool	85 - O-Ring (2 Used)
8 - Socket Bolt (22 Used)	34 - Piston	60 - Spring	86 - Poppet
9 - O-Ring (4 Used)	35 - O-Ring	61 - Spring Seat (2 Used)	87 - Plug
10 - Plug (4 Used)	36 - Plug	62 - O-Ring (2 Used)	88 - O-Ring
11 - Poppet	37 - Poppet	63 - Plug (2 Used)	89 - Spring
12 - Spring (2 Used)	38 - Spring	64 - Sleeve (2 Used)	90 - Poppet
13 - O-Ring (5 Used)	39 - O-Ring	65 - Spring (2 Used)	91 - Socket Bolt (4 Used)
14 - O-Ring	40 - Spacer	66 - Plug	92 - Cap (2 Used)
15 - Backup Ring	41 - Spool	67 - Spring	93 - Spring Seat (2 Used)
16 - Plug	42 - Spring Seat (10 Used)	68 - Poppet	94 - Spring
17 - Main Relief Valve	43 - Spring (5 Used)	69 - Poppet	95 - Spool
18 - O-Ring	44 - Bolt (5 Used)	70 - Plug	96 - Spring
19 - Overload Relief Valve (2 Used)	45 - Spool	71 - O-Ring	97 - Spool
20 - O-Ring (5 Used)	46 - Spool	72 - Flange	98 - Cap (4 Used)
21 - O-Ring	47 - Spool	73 - Spring	99 - Overload Relief Valve
22 - Spring	48 - Spring Seat (2 Used)	74 - Poppet	100 - O-Ring
23 - Seat	49 - Spring	75 - Flange (2 Used)	101 - Plug
24 - Poppet	50 - Spool	76 - Poppet (2 Used)	102 - O-Ring
25 - Backup Ring	51 - O-Ring (10 Used)	77 - Spool	103 - Cap
26 - O-Ring	52 - Socket Bolt (16 Used)	78 - Spring	104 - Body

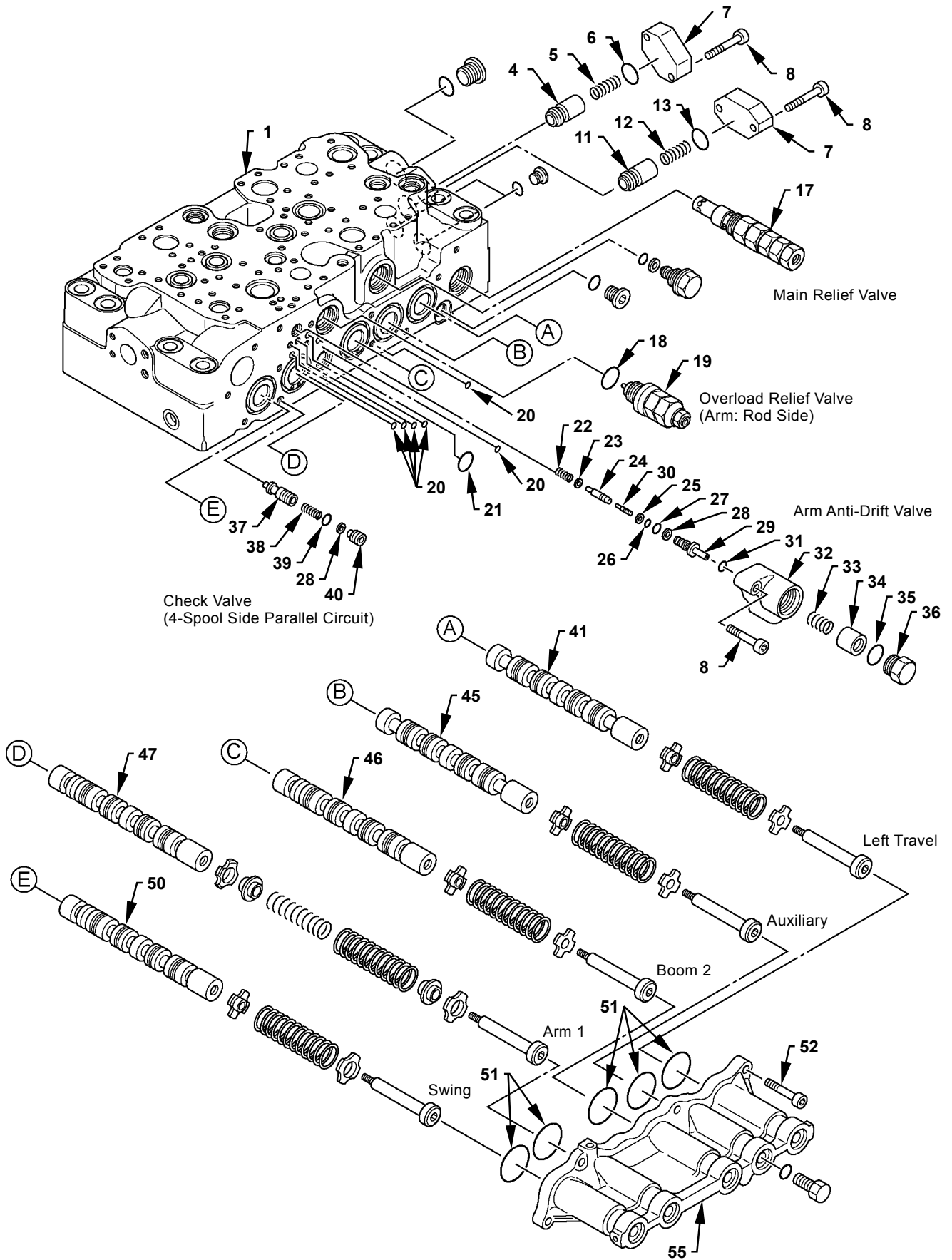


## UPPERSTRUCTURE / Control Valve

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# UPPERSTRUCTURE / Control Valve



W1V1-02-05-026


## UPPERSTRUCTURE / Control Valve

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### 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 housing (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).

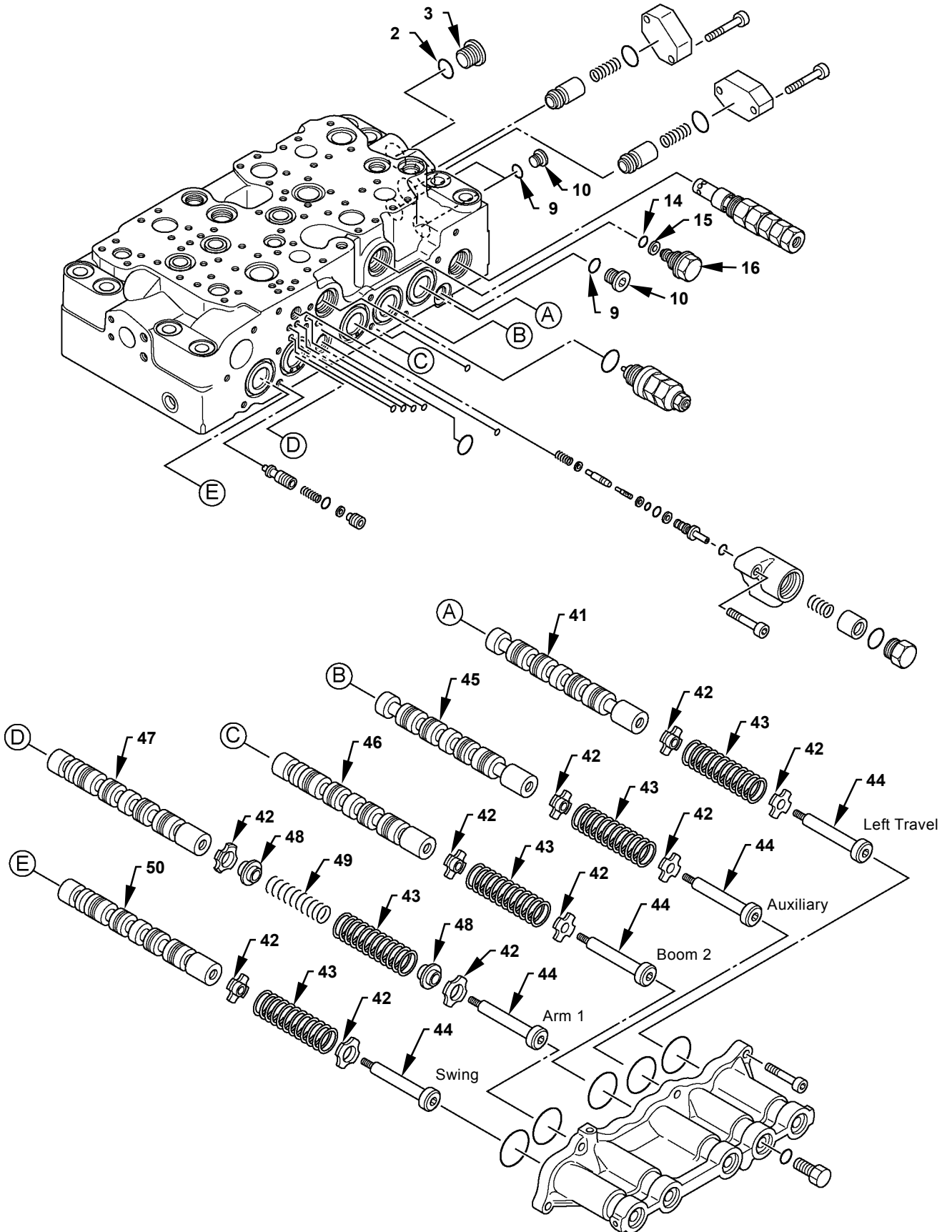
10. Remove socket bolts (8) (2 used). Remove flange (7), O-ring (6), spring (5) and poppet (4) from housing (1).

 : 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




## UPPERSTRUCTURE / Control Valve

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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


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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, Auxiliary Flow Rate Control Valve

24. Loosen plugs (56, 63) (2 used for each) from bodies (104) (2 used).

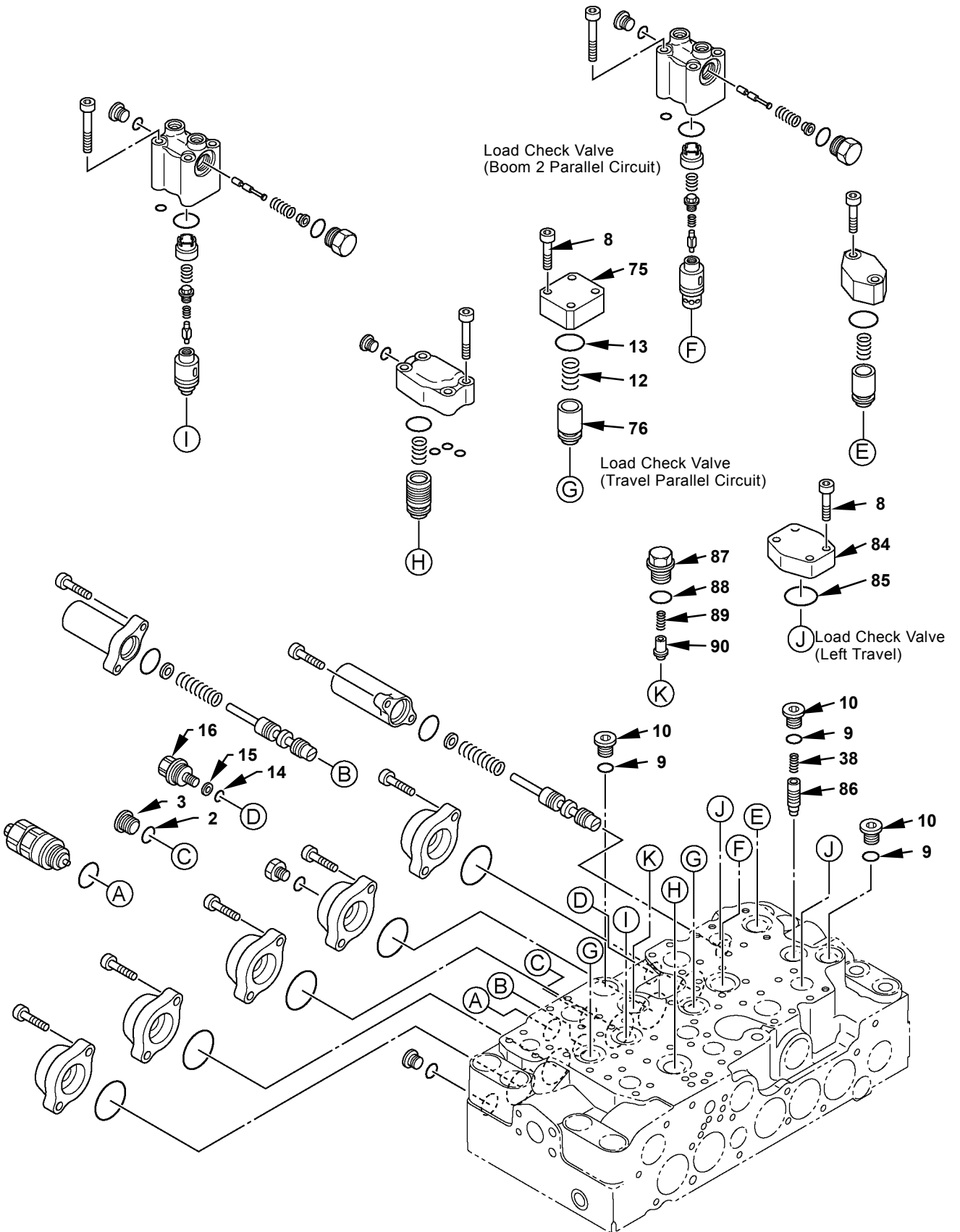
25. Remove socket bolts (58) (8 used). Remove O-rings (20, 13) (2 used for each) from housing (1).

 : 8 mm

26. Remove plugs (63) (2 used), spring seats (61) (2 used), springs (60, 78) and spools (59, 77) from bodies (104) (2 used). Remove plugs (56) (2 used).

27. Remove sleeves (64) (2 used), springs (65) (2 used), plugs (66, 79), springs (67, 68) and poppets (68, 69, 81, 82) from housing (1).

# UPPERSTRUCTURE / Control Valve






## UPPERSTRUCTURE / Control Valve


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- 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).

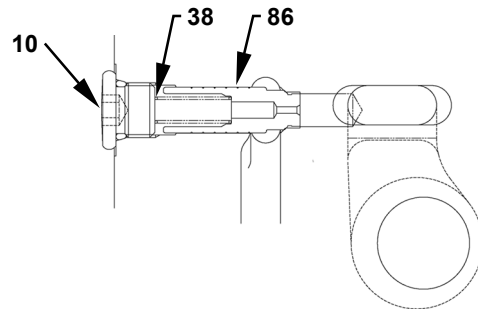
 : 8 mm

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

 : 24 mm

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

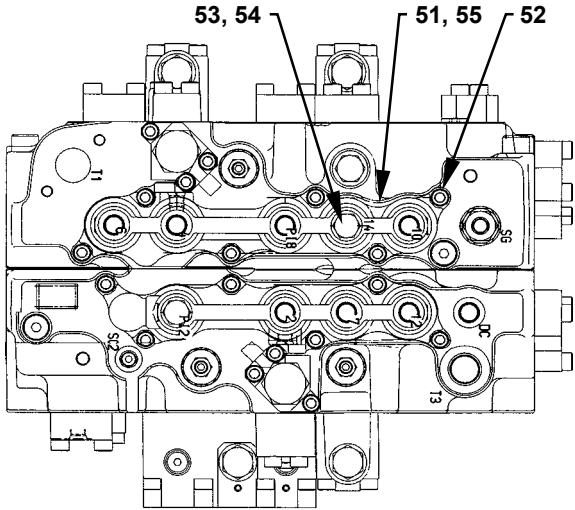
 : 10 mm



W1V1-02-05-016

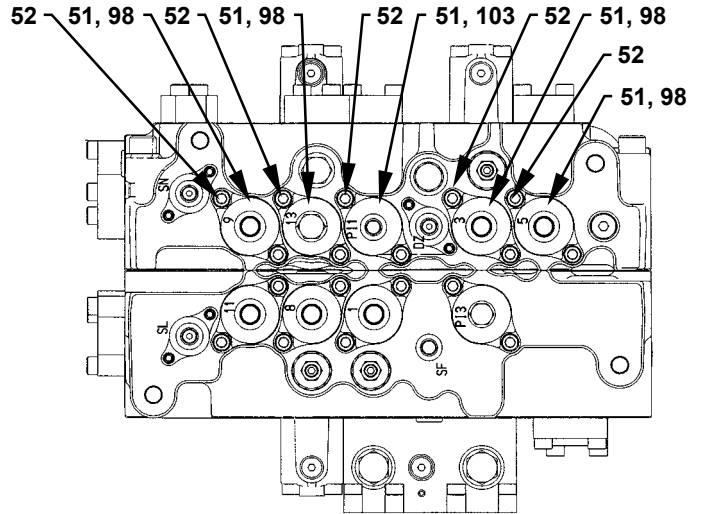
# UPPERSTRUCTURE / Control Valve

## ASSEMBLE CONTROL VALVE 5-SPOOL SIDE



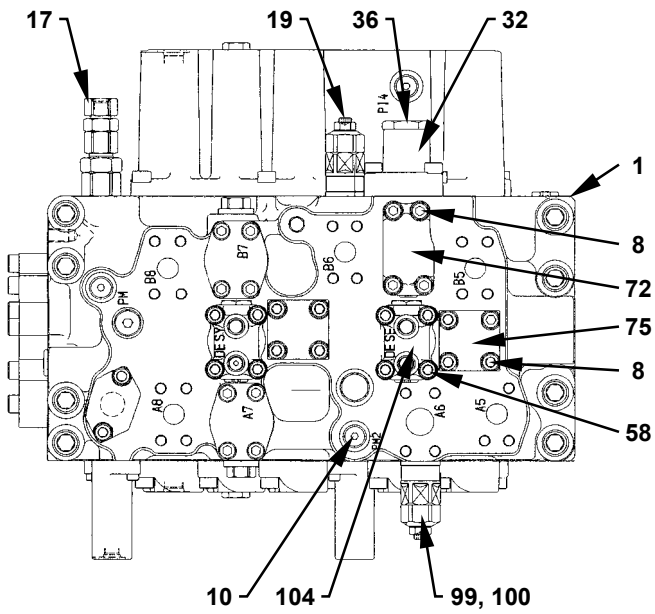
Control Valve (Upper)

W1V1-02-05-065



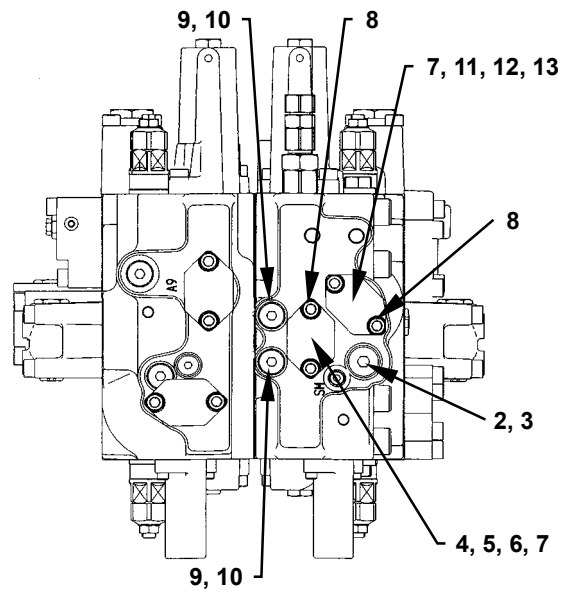
Control Valve (Lower)

W1V1-02-05-066



Control Valve (Side)

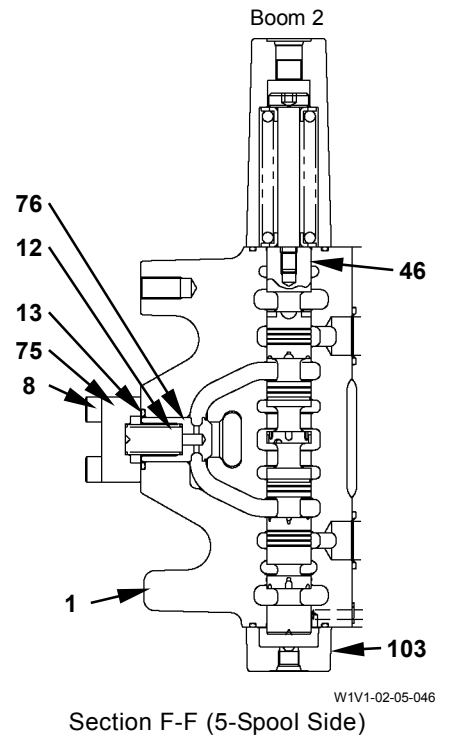
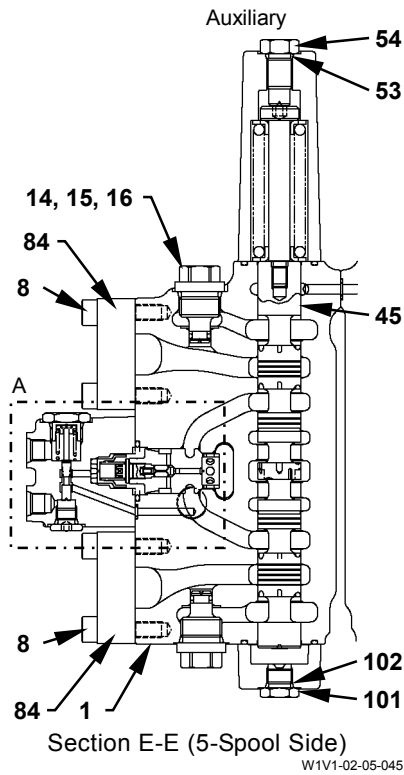
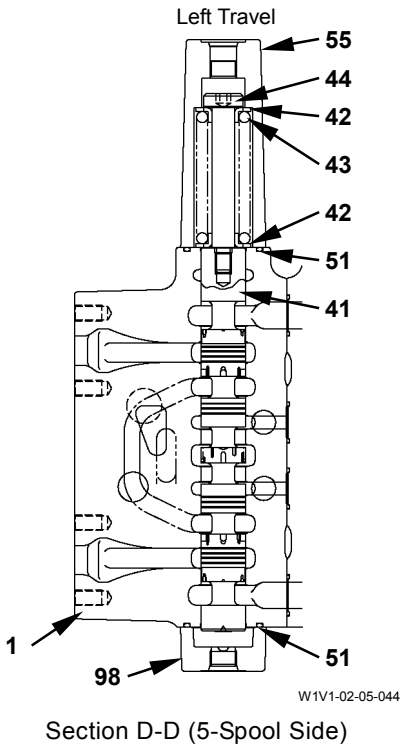
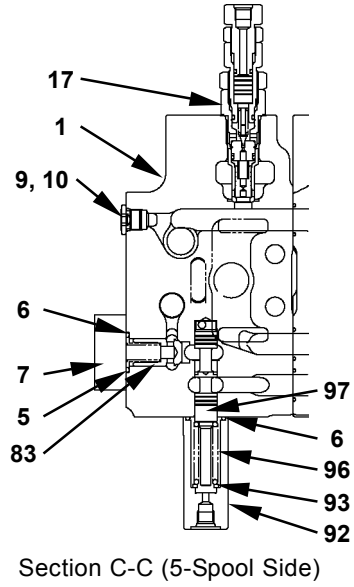
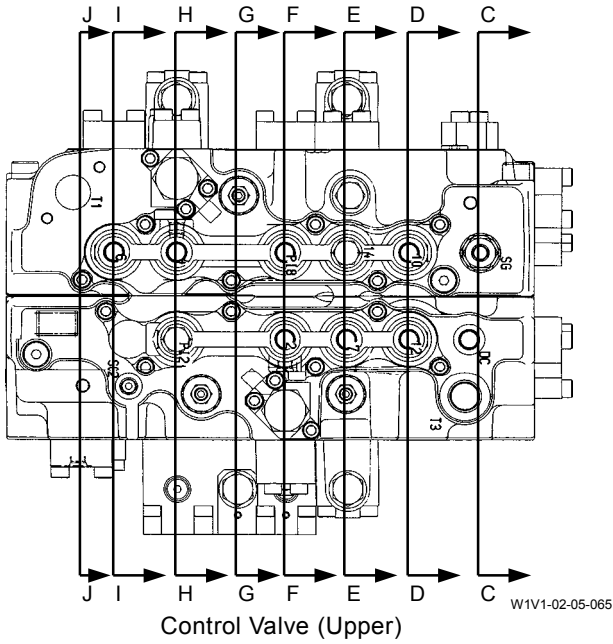
W1V1-02-05-070



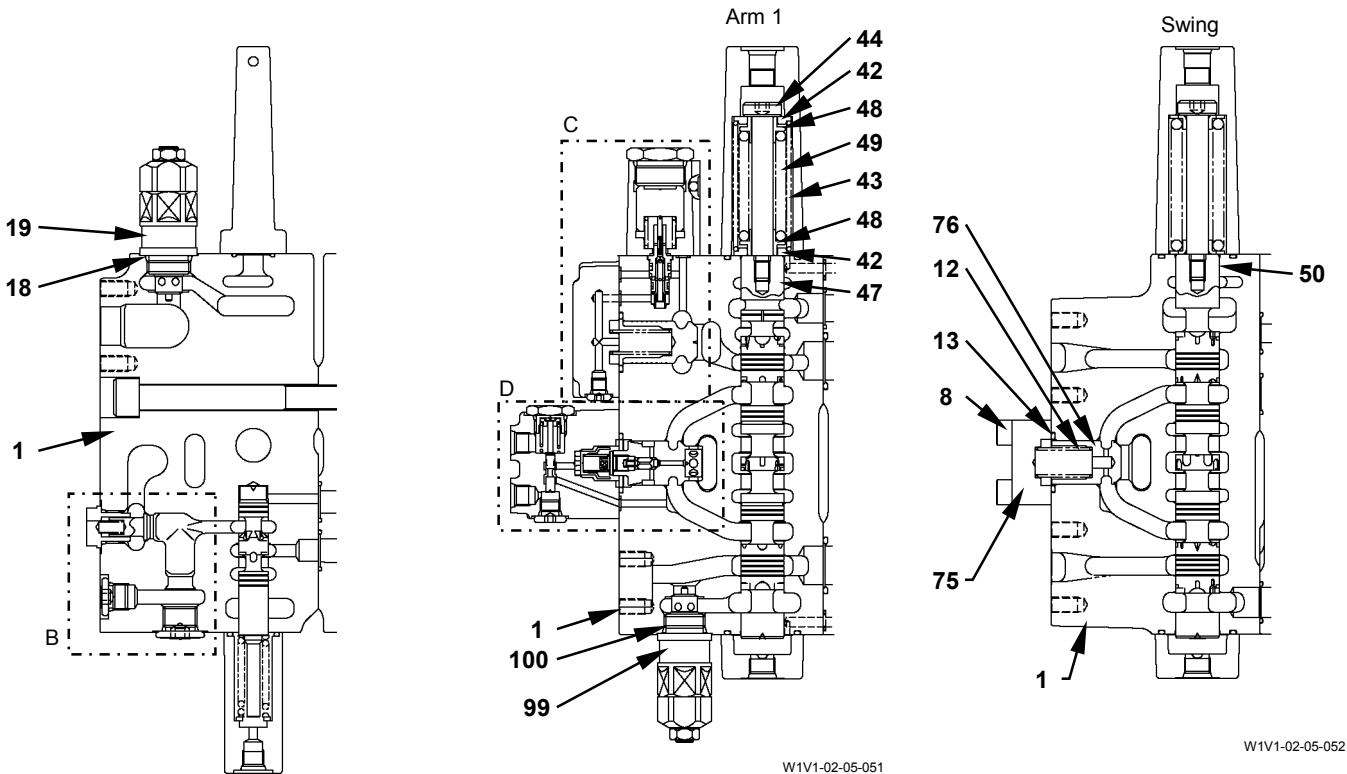
Control Valve (Front)

W1V1-02-05-068

# UPPERSTRUCTURE / Control Valve



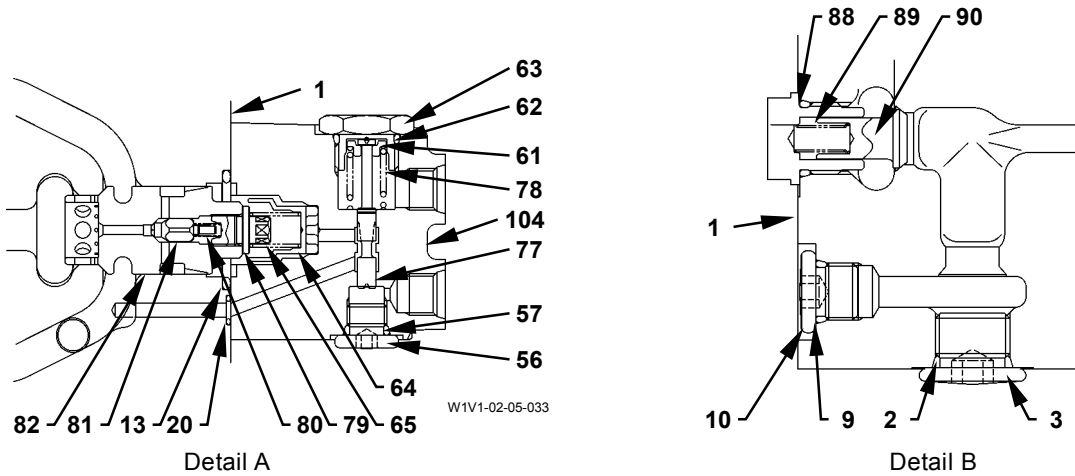
# UPPERSTRUCTURE / Control Valve



Section G-G (5-Spool Side)

Section H-H (5-Spool Side)

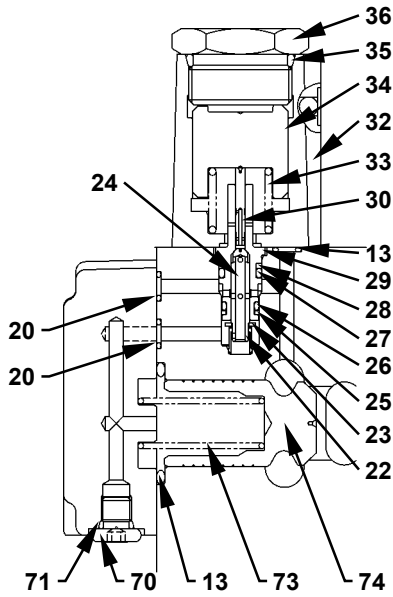
Section I-I (5-Spool Side)



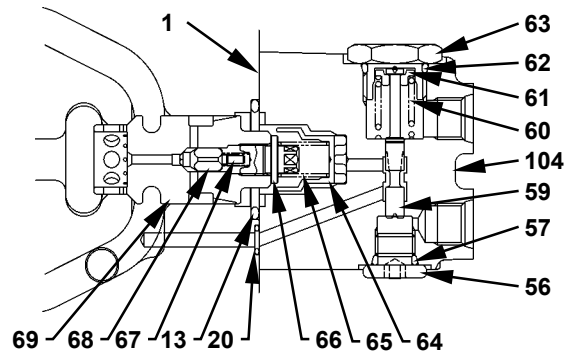
Detail A

Detail B

# UPPERSTRUCTURE / Control Valve



Detail C



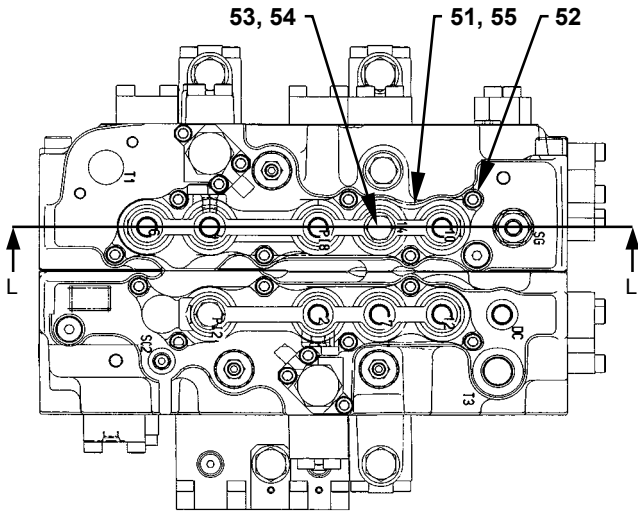
Detail D

W1V1-02-05-033

W1V1-02-05-054

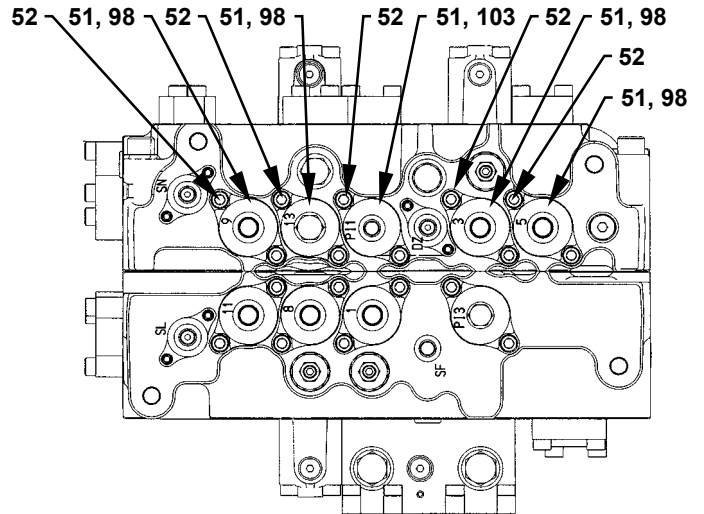
- |                                     |                            |                           |                            |
|-------------------------------------|----------------------------|---------------------------|----------------------------|
| 1 - Housing                         | 27 - O-Ring                | 53 - O-Ring               | 79 - Plug                  |
| 2 - O-Ring                          | 28 - Backup Ring           | 54 - Plug                 | 80 - Spring                |
| 3 - Plug                            | 29 - Sleeve                | 55 - Cap                  | 81 - Poppet                |
| 4 - Poppet                          | 30 - Spool                 | 56 - Plug (2 Used)        | 82 - Poppet                |
| 5 - Spring                          | 31 - O-Ring                | 57 - O-Ring (2 Used)      | 83 - Poppet                |
| 6 - O-Ring (3 Used)                 | 32 - Body                  | 58 - Socket Bolt (8 Used) | 84 - Cover (2 Used)        |
| 7 - Flange                          | 33 - Spring                | 59 - Spool                | 85 - O-Ring (2 Used)       |
| 8 - Socket Bolt (22 Used)           | 34 - Piston                | 60 - Spring               | 86 - Poppet                |
| 9 - O-Ring (4 Used)                 | 35 - O-Ring                | 61 - Spring Seat (2 Used) | 87 - Plug                  |
| 10 - Plug (4 Used)                  | 36 - Plug                  | 62 - O-Ring (2 Used)      | 88 - O-Ring                |
| 11 - Poppet                         | 37 - Poppet                | 63 - Plug (2 Used)        | 89 - Spring                |
| 12 - Spring (2 Used)                | 38 - Spring                | 64 - Sleeve (2 Used)      | 90 - Poppet                |
| 13 - O-Ring (5 Used)                | 39 - O-Ring                | 65 - Spring (2 Used)      | 91 - Socket Bolt (4 Used)  |
| 14 - O-Ring                         | 40 - Spacer                | 66 - Plug                 | 92 - Cap (2 Used)          |
| 15 - Backup Ring                    | 41 - Spool                 | 67 - Spring               | 93 - Spring Seat (2 Used)  |
| 16 - Plug                           | 42 - Spring Seat (10 Used) | 68 - Poppet               | 94 - Spring                |
| 17 - Main Relief Valve              | 43 - Spring (5 Used)       | 69 - Poppet               | 95 - Spool                 |
| 18 - O-Ring                         | 44 - Bolt (5 Used)         | 70 - Plug                 | 96 - Spring                |
| 19 - Overload Relief Valve (2 Used) | 45 - Spool                 | 71 - O-Ring               | 97 - Spool                 |
| 20 - O-Ring (5 Used)                | 46 - Spool                 | 72 - Flange               | 98 - Cap (4 Used)          |
| 21 - O-Ring                         | 47 - Spool                 | 73 - Spring               | 99 - Overload Relief Valve |
| 22 - Spring                         | 48 - Spring Seat (2 Used)  | 74 - Poppet               | 100 - O-Ring               |
| 23 - Seat                           | 49 - Spring                | 75 - Flange (2 Used)      | 101 - Plug                 |
| 24 - Poppet                         | 50 - Spool                 | 76 - Poppet (2 Used)      | 102 - O-Ring               |
| 25 - Backup Ring                    | 51 - O-Ring (10 Used)      | 77 - Spool                | 103 - Cap                  |
| 26 - O-Ring                         | 52 - Socket Bolt (16 Used) | 78 - Spring               | 104 - Body                 |

# UPPERSTRUCTURE / Control Valve



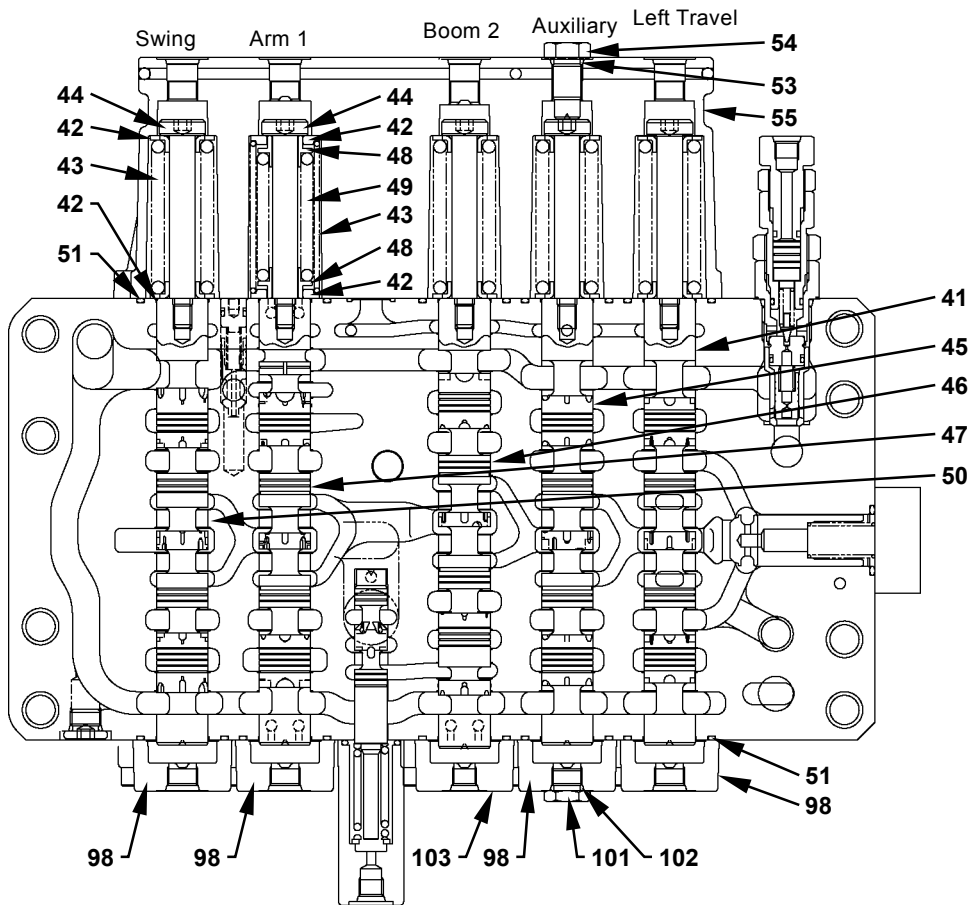
Control Valve (Upper)

W1V1-02-05-065



Control Valve (Lower)

W1V1-02-05-066



Section L-L

W1V1-02-05-057


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
## UPPERSTRUCTURE / Control Valve

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- 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

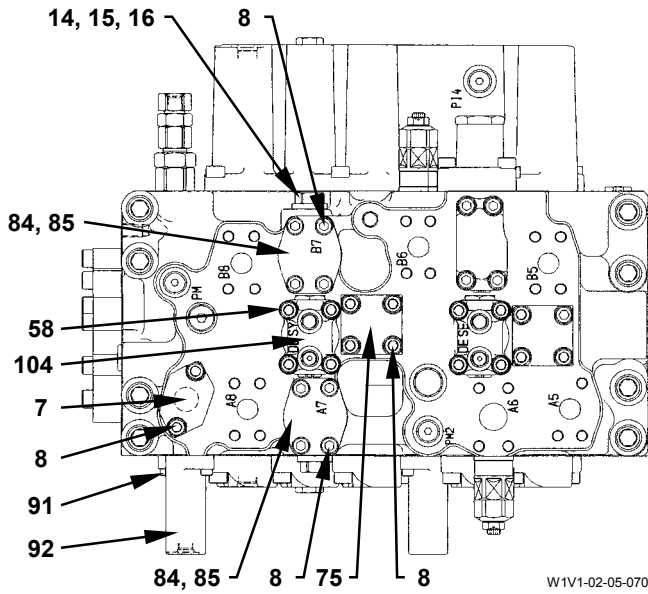
 : 20 N·m (2.0 kgf·m, 15 lbf·ft)

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

 : 21 mm

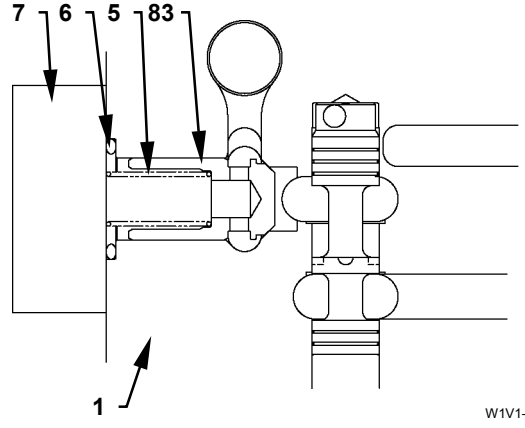
 : 54 N·m (5.5 kgf·m, 40 lbf·ft)

# UPPERSTRUCTURE / Control Valve



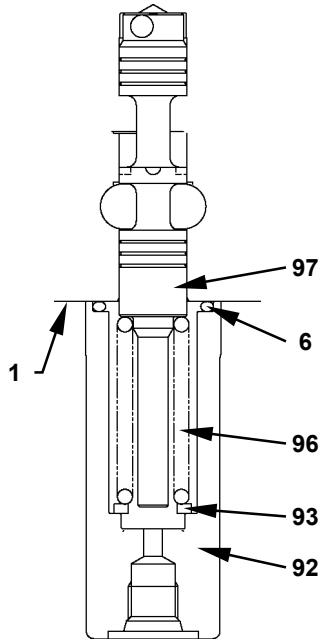
Control Valve (Side)

W1V1-02-05-070



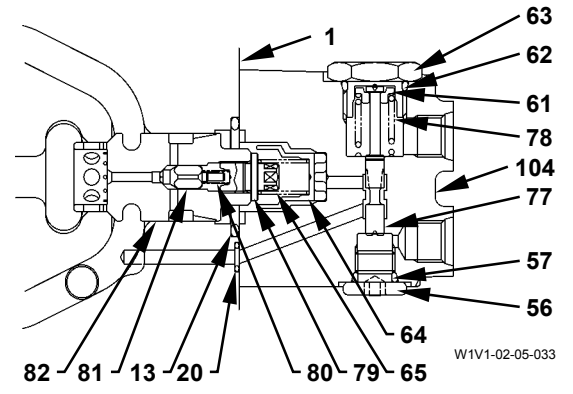
Check Valve

W1V1-02-05-047



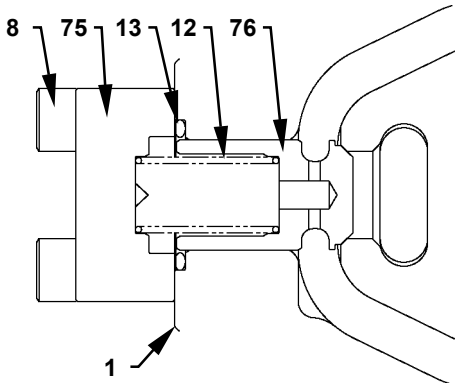
Auxiliary Flow Combining Valve

W1V1-02-05-048



Auxiliary Flow Rate Control Valve (Detail A)

W1V1-02-05-033



Load Check Valve



W1V1-02-05-049





## UPPERSTRUCTURE / Control Valve

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- Assemble Auxiliary Flow Rate Control Valve

11. Install O-rings (57, 62) to plugs (56, 63).
12. Install spring (78), spool (77), spring seat (61) and plug (63) to body (104).
13. Install plug (56) to body (104).
14. Install poppets (81, 82), spring (80), plug (79), spring (65) and sleeve (64) to housing (1).
15. Install O-rings (13, 20) to housing (1). Install body (104) to housing (1) with socket bolts (58) (4 used).
  -  : 8 mm
  -  : 61 N·m (6.2 kgf·m, 45 lbf·ft)





- Assemble Check Valve

16. 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)

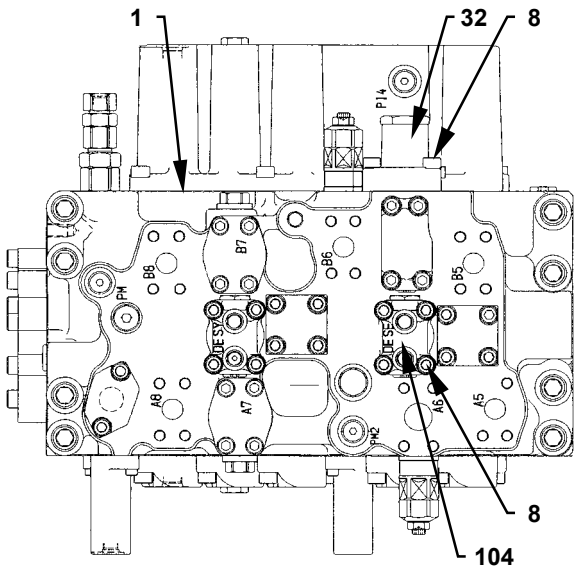
- Assemble Auxiliary Flow Combining Valve

17. 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

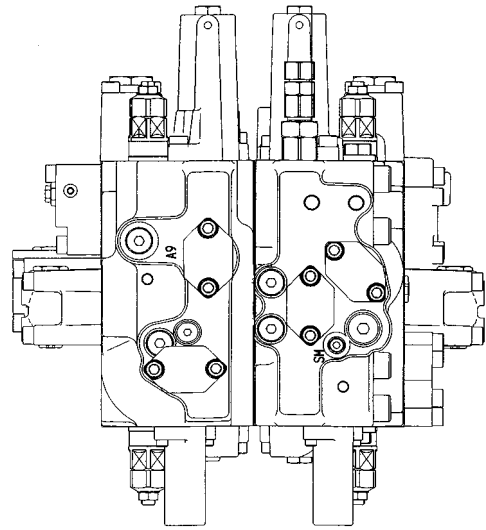
18. Install poppet (76), spring (12) and O-ring (13) to housing (1).
19. Install flange (75) to housing (1) with socket bolts (8) (4 used).
  -  : 8 mm
  -  : 61 N·m (6.2 kgf·m, 45 lbf·ft)
20. Install O-ring (14) and backup ring (15) to plug (16). Install plug (16) to housing (1).
21. Install O-rings (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)

# UPPERSTRUCTURE / Control Valve



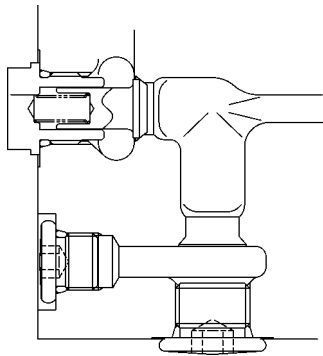
Control Valve (Side)

W1V1-02-05-070



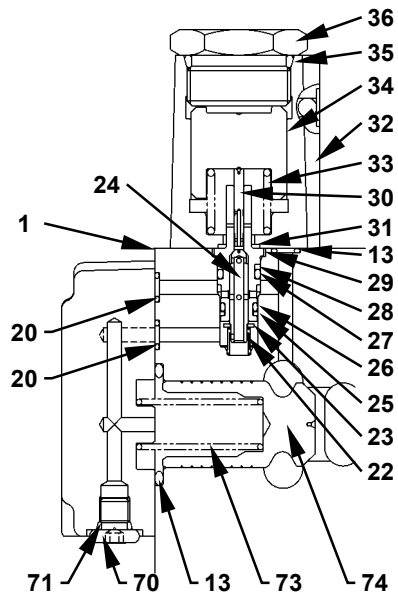
Control Valve (Front)

W1V1-02-05-068



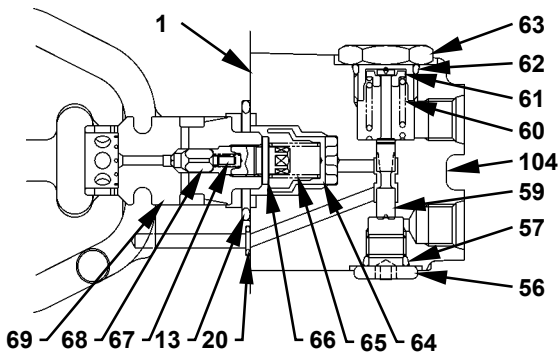
Section of Load Check Valve (Detail B)

W1V1-02-05-053



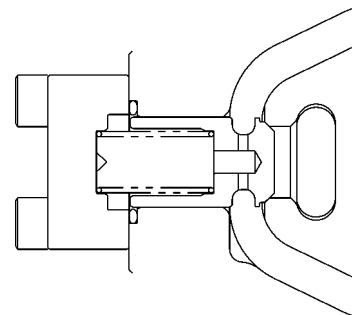
Section of Arm Anti-Drift Valve (Detail C)

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

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- Assemble Arm Anti-Drift Valve


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


23. 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.

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

25. 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)

26. Tighten plug (36).

- Assemble Arm Flow Rate Control Valve


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


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

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

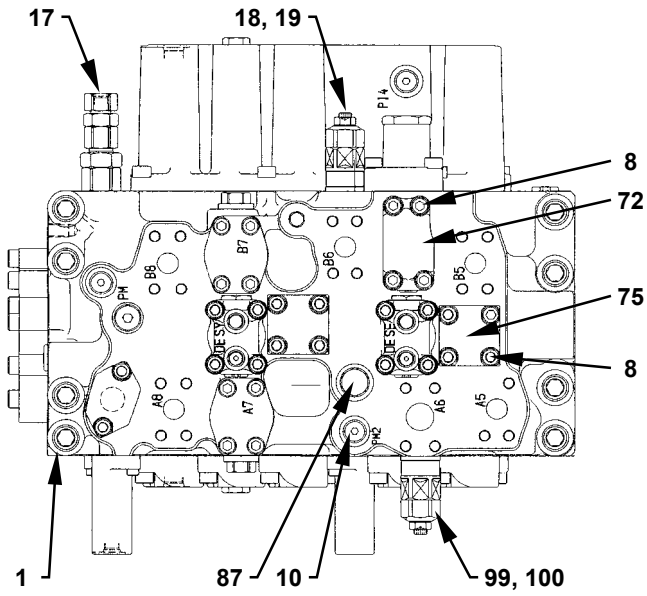
30. Install poppets (69, 68), spring (67), plug (66), spring (65) and sleeve (64) to housing (1).

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

 : 8 mm

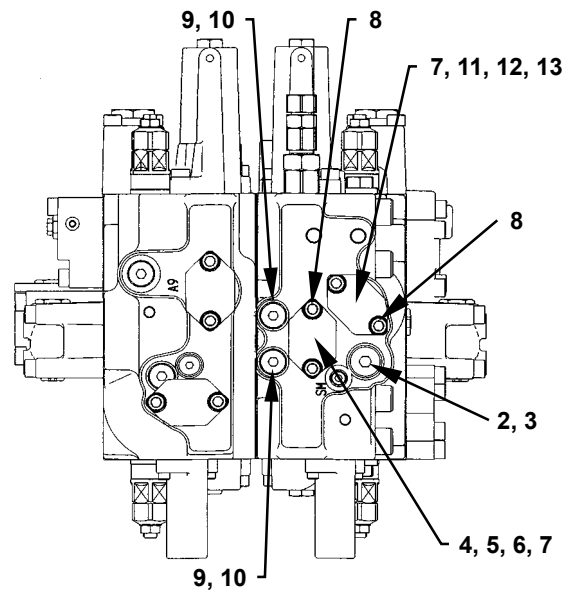
 : 61 N·m (6.2 kgf·m, 45 lbf·ft)

# UPPERSTRUCTURE / Control Valve



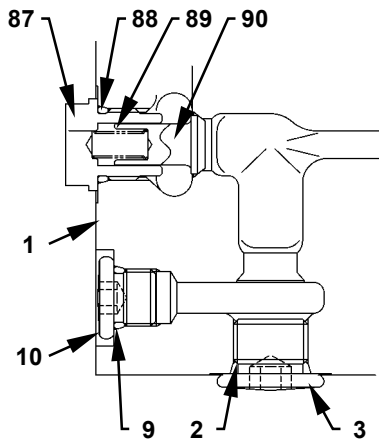
Control Valve (Side)

W1V1-02-05-070



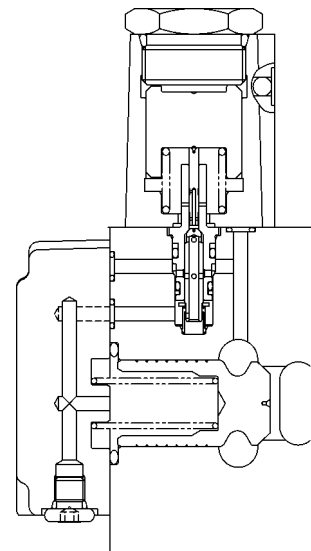
Control Valve (Front)

W1V1-02-05-068



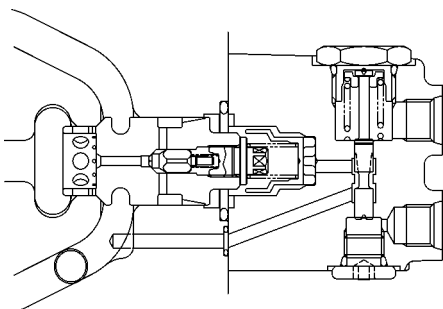
Section of Load Check Valve (Detail B)

W1V1-02-05-053



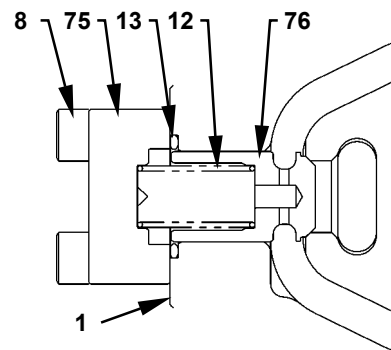
Section of Arm Anti-Drift Valve (Detail C)

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

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## UPPERSTRUCTURE / Control Valve


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- Assemble Load Check Valve

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

33. 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)


34. 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.)**

35. 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.)**


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


 : 32 mm

 : 83 N·m (8.5 kgf·m, 61 lbf·ft)


- Assemble Check Valve


37. 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)

38. 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

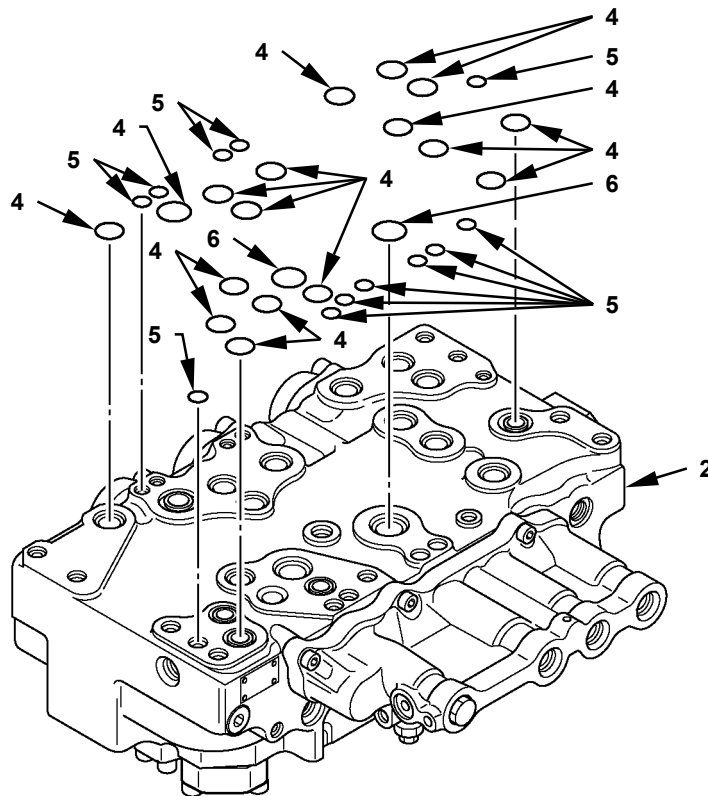
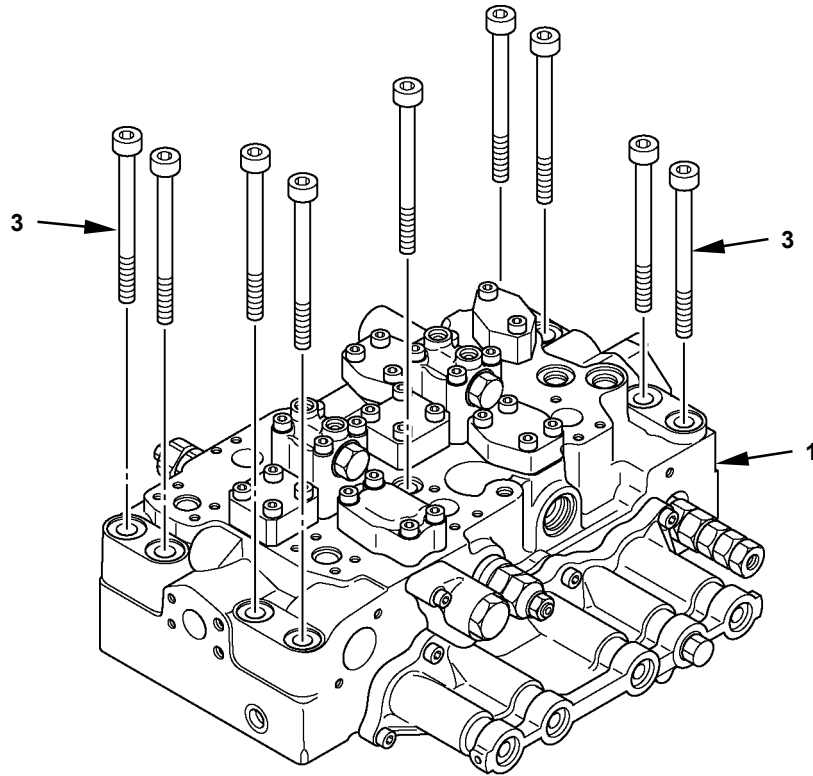
 : 61 N·m (6.2 kgf·m, 61 lbf·ft)

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

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

# UPPERSTRUCTURE / Control Valve

## DISASSEMBLE HOUSING



W1V1-02-05-023

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


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### Disassemble Housing



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

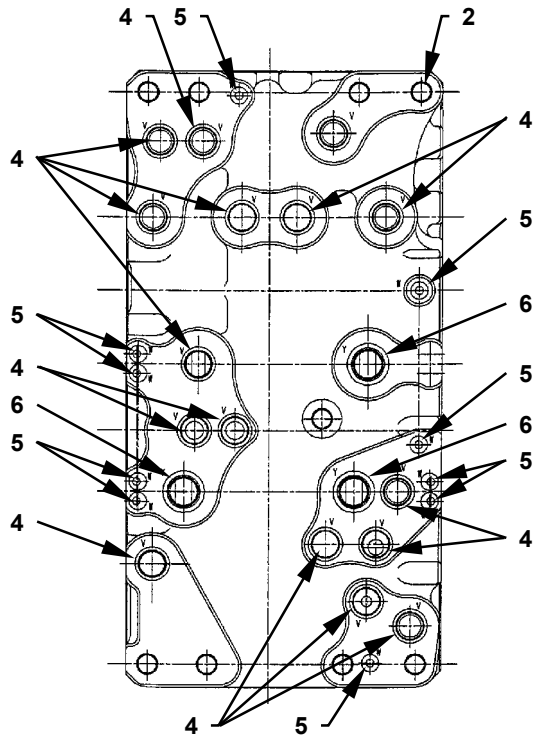
1. Remove socket bolts (3) (9 used). Remove O-rings (4) (16 used), (5) (12 used) and (6) (3 used) from housing (1 or 2).

 : 14 mm

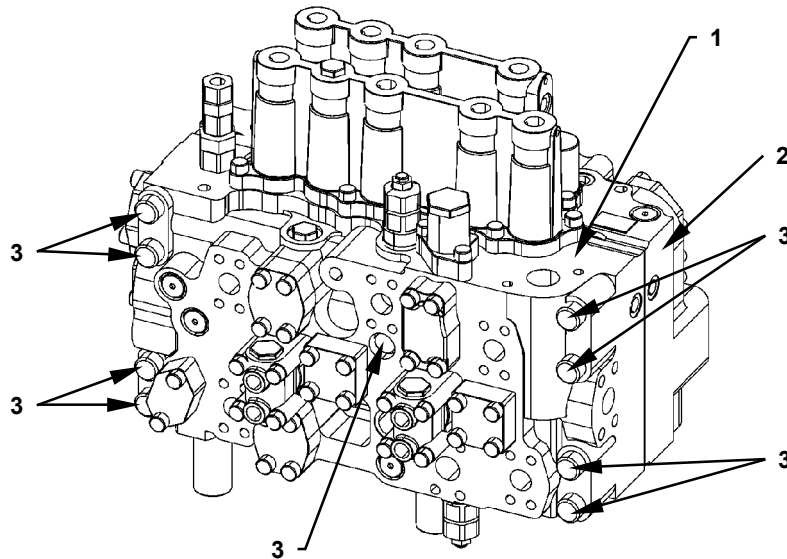
2. Separate housing (1) and housing (2).

# 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

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
### 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

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## UPPERSTRUCTURE / Control Valve

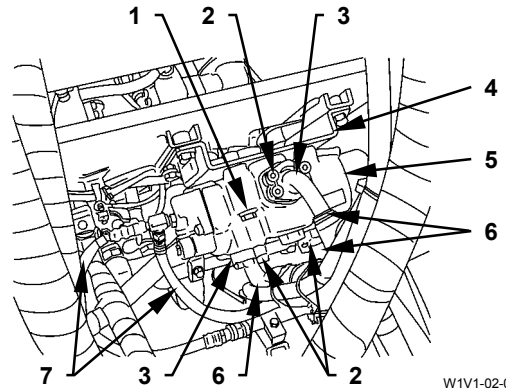
### REMOVE AND INSTALL AUXILIARY CONTROL VALVE (OPTIONAL)



**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 socket bolts (2) (16 used) and split flanges (3) (8 used) from control valve (5).  
 : 8 mm
2. Remove hoses (6) (4 used) from control valve (5). Cap the open ends. Attach an identification tag onto the removed hoses for assembling.  
 : 8 mm
3. Remove hoses (7) (4 used) from control valve (5). Cap the open ends. Attach an identification tag onto the removed hoses for assembling.  
 : 19 mm, 22 mm, 27 mm
4. Remove sems bolts (1) (3 used) from control valve (5). Remove control valve (5) from bracket (4).  
 : 22 mm





W1V1-02-05-084

## UPPERSTRUCTURE / Control Valve


### Installation


1. Install control valve (5) to bracket (4) with sems bolts (1) (3 used).

 : 22 mm


 : 140 N·m (14 kgf·m, 103 lbf·ft)


2. Install hoses (6) (4 used) to control valve (5) with socket bolts (2) (16 used) and split flanges (3) (8 used).


 : 8 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)


3. Install hoses (7) (4 used) to control valve (5).


 : 19 mm

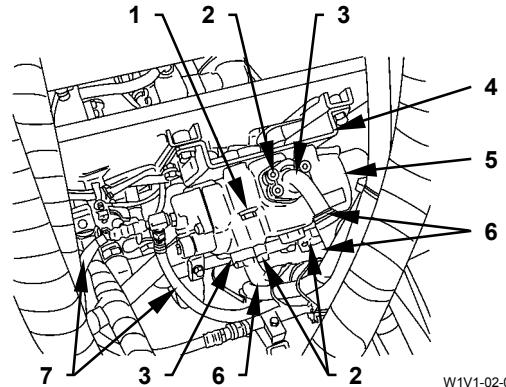
 : 29.5 N·m (3 kgf·m, 22 lbf·ft)

 : 22 mm

 : 39 N·m (4 kgf·m, 29 lbf·ft)

 : 27 mm

 : 78 N·m (8 kgf·m, 58 lbf·ft)



W1V1-02-05-084

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

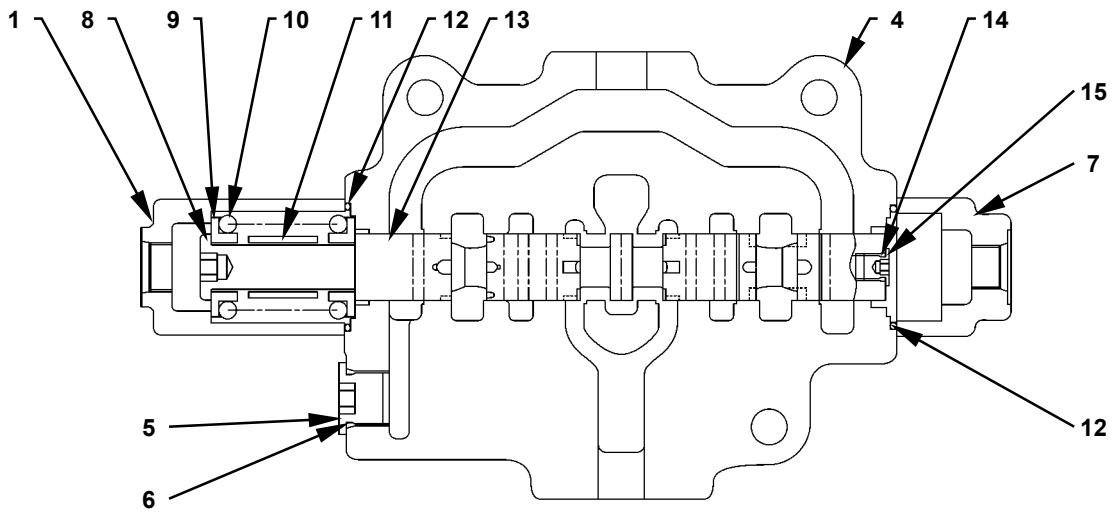
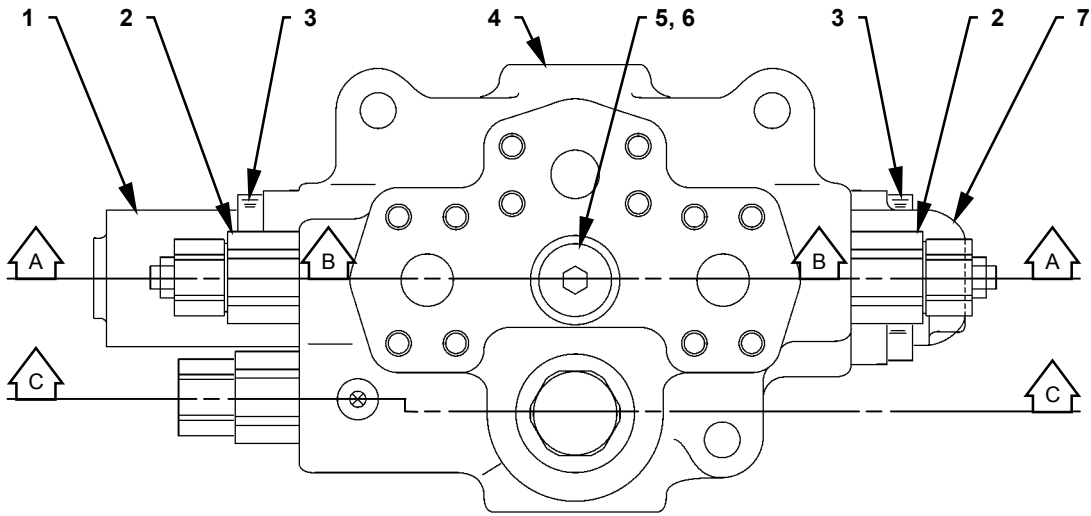
## UPPERSTRUCTURE / Control Valve

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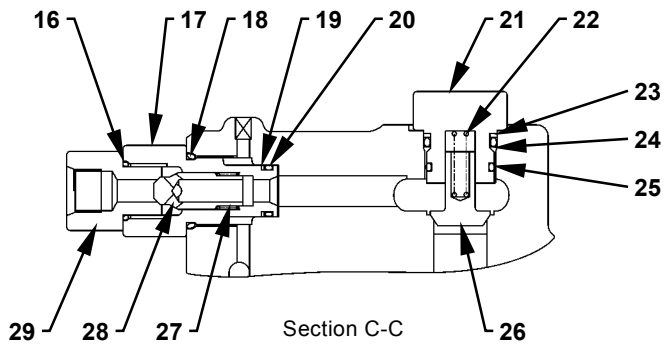
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# UPPERSTRUCTURE / Control Valve

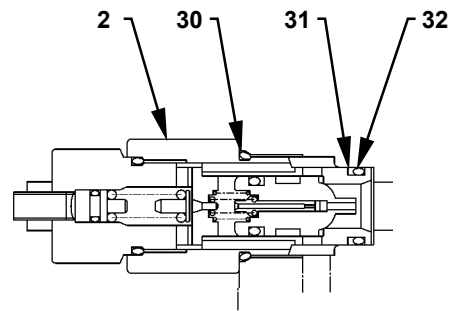
## DISASSEMBLE AUXILIARY CONTROL VALVE



Section A-A



Section C-C



Section B-B

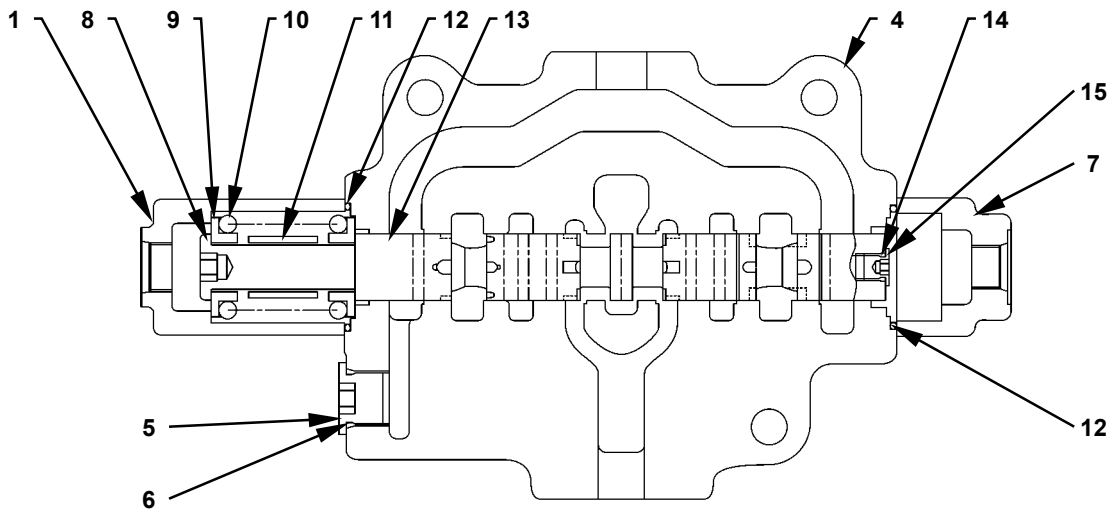
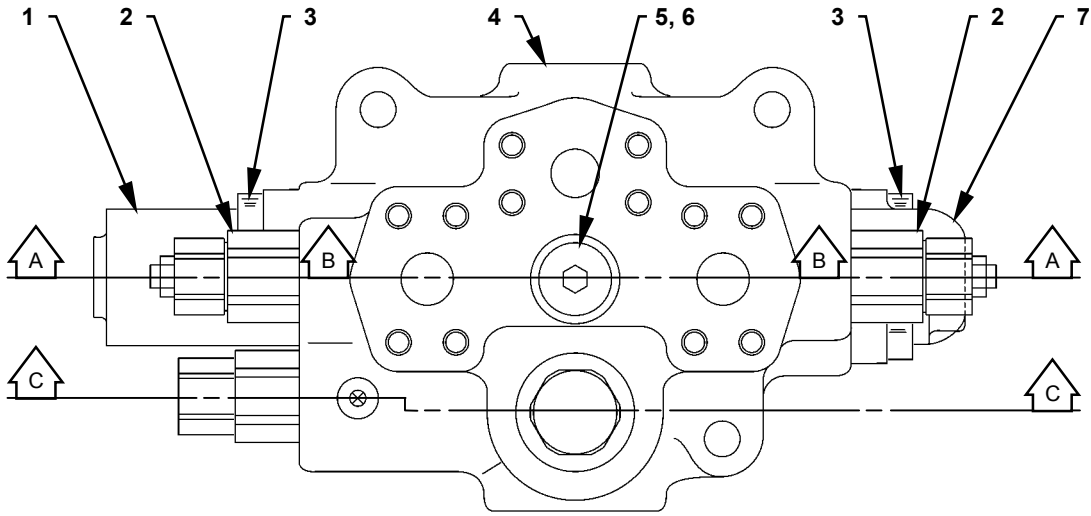
W1V1-02-05-085

## UPPERSTRUCTURE / Control Valve

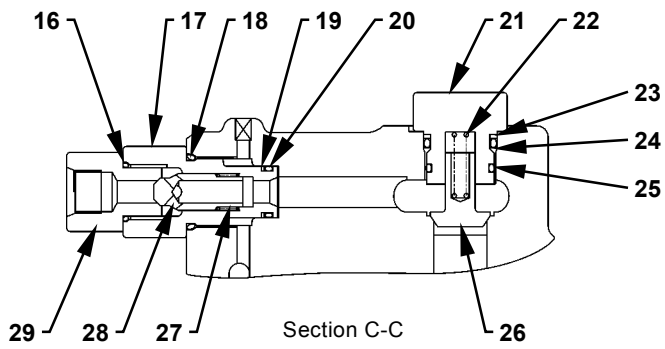
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1 - Cover	9 - Guide (2 Used)	17 - Sleeve	25 - O-Ring
2 - Relief Valve Assembly (2 Used)	10 - Spring	18 - O-Ring	26 - Check Valve
3 - Socket Bolt (4 Used)	11 - Spacer	19 - Backup Ring	27 - Spring
4 - Housing	12 - O-Ring (2 Used)	20 - O-Ring	28 - Check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

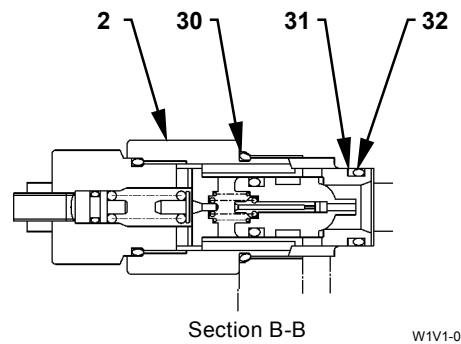
# UPPERSTRUCTURE / Control Valve



Section A-A



Section C-C



Section B-B

W1V1-02-05-085




## UPPERSTRUCTURE / Control Valve

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### Disassemble Auxiliary Control Valve

1. Remove socket bolts (3) (4 used) from covers (1, 7). Remove covers (1, 7) and O-rings (12) (2 used) from housing (4).

 : 8 mm


**IMPORTANT: Turn and remove the spools. If the spools stick even a little, try again instead of pulling roughly.**


2. Remove the spool (13) assembly from housing (4).
3. Clamp spool (13) in a vise by using wooden pieces. Remove cap (8), guides (9) (2 used), spacer (11) and spring (10) from spool (13).

 : 8 mm


**IMPORTANT: As the set pressure changes, do not disassemble relief valve assemblies (2) (2 used).**

4. Remove relief valve assemblies (2) (2 used) from housing (4).

 : 32 mm


 **NOTE:** *The set pressures of relief valve assemblies (2) (2 used) are different respectively. Do not confuse when assembling.*

5. Remove plug (21) from housing (4). Remove spring (22) and check valve (26) from housing (4) by using a magnet.


 : 32 mm

6. Remove backup ring (23) and O-rings (24, 25) from plug (21).

7. Remove the sleeve (17) assembly from housing (4). Remove backup ring (19) and O-rings (18, 20) from sleeve (17).


 : 32 mm

8. Clamp sleeve (17) in a vise. Remove seat (29), check valve (28) and spring (27) from sleeve (17).

 : 27 mm

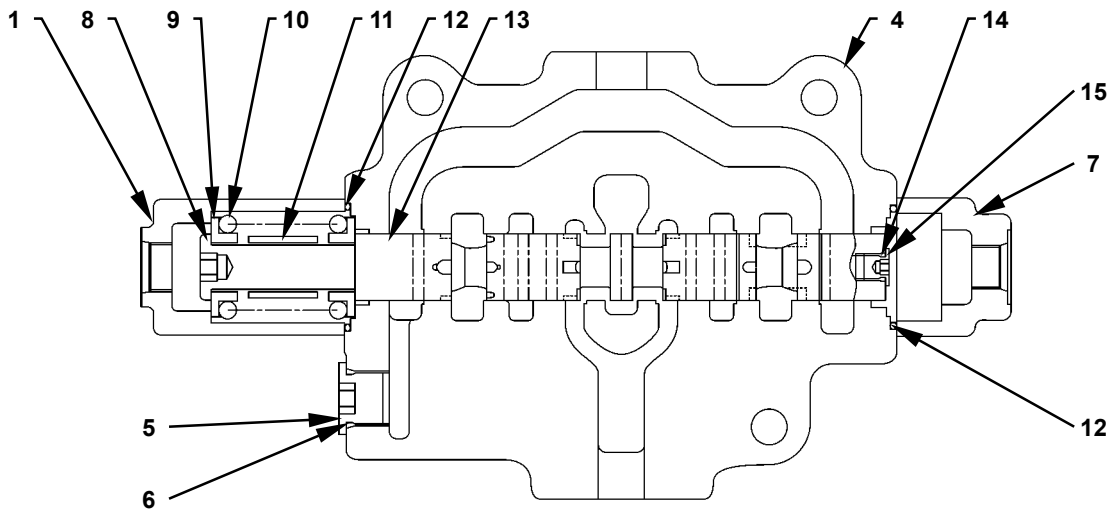
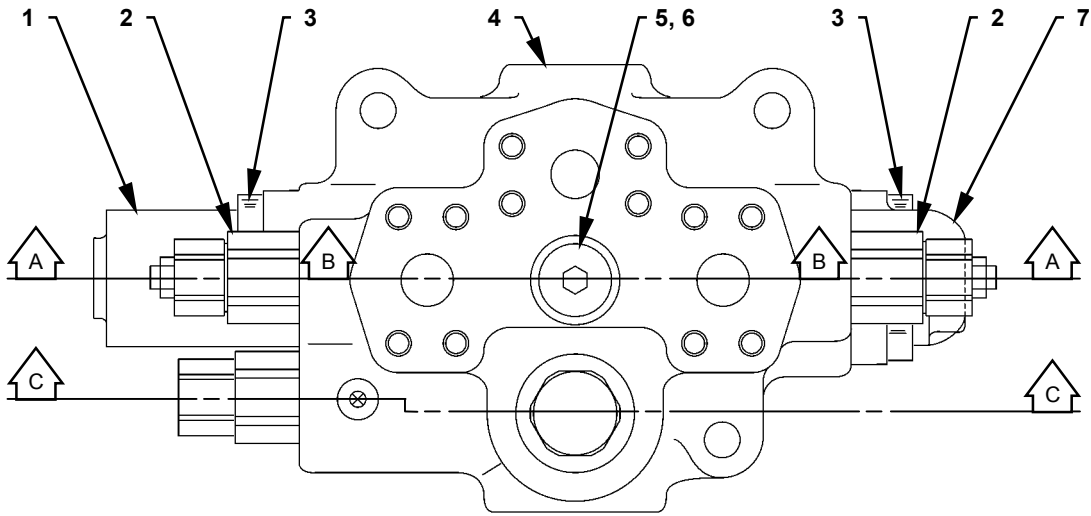
9. Remove O-ring (16) from seat (29).

10. Remove plugs (5) (2 used) and O-rings (6) (2 used) from housing (4).

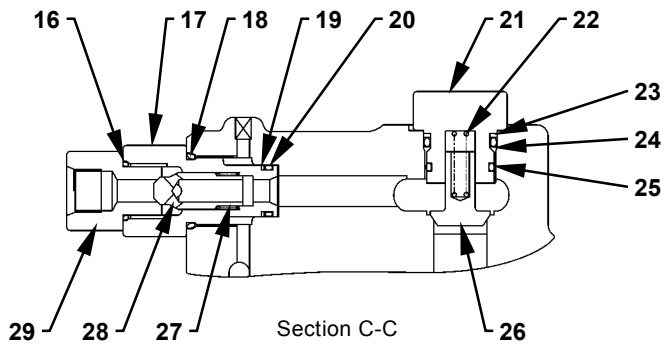
 : 8 mm

# UPPERSTRUCTURE / Control Valve

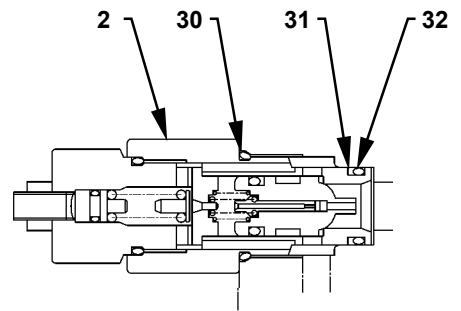
## ASSEMBLE AUXILIARY CONTROL VALVE



Section A-A



Section C-C



Section B-B

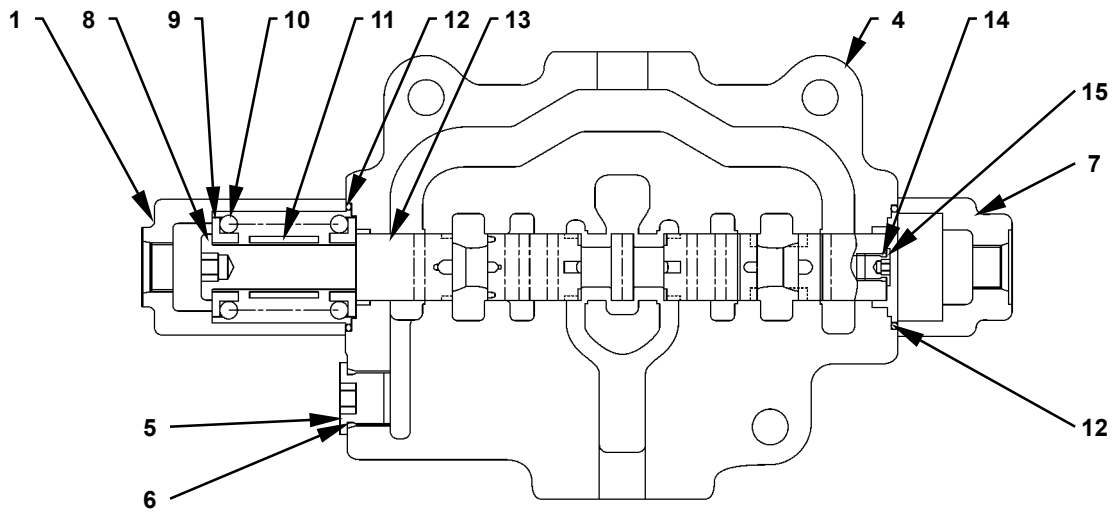
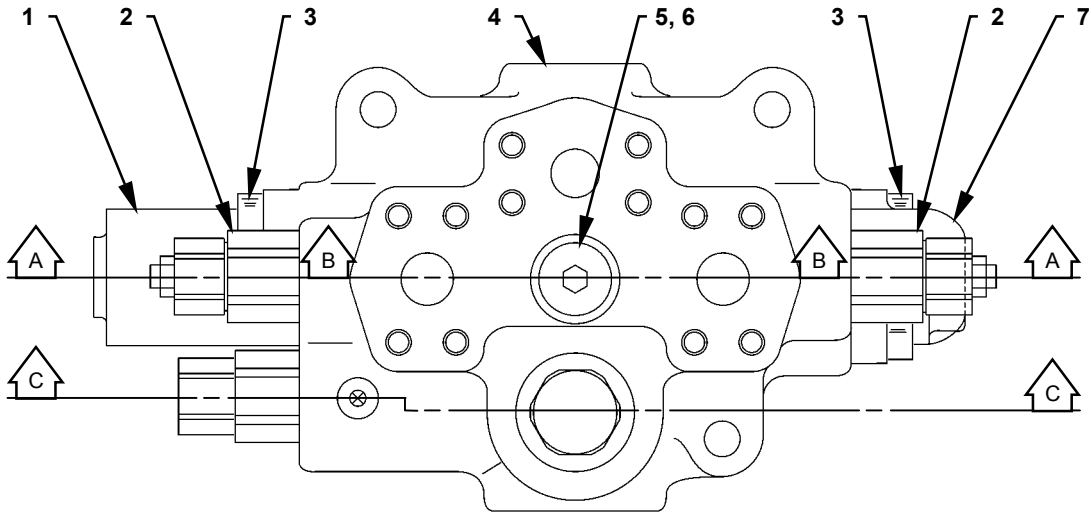
W1V1-02-05-085

## UPPERSTRUCTURE / Control Valve

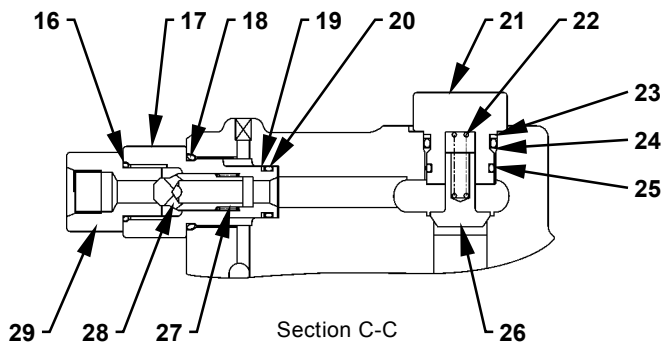
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1 - Cover	9 - Guide (2 Used)	17 - Sleeve	25 - O-Ring
2 - Relief Valve Assembly (2 Used)	10 - Spring	18 - O-Ring	26 - Check Valve
3 - Socket Bolt (4 Used)	11 - Spacer	19 - Backup Ring	27 - Spring
4 - Housing	12 - O-Ring (2 Used)	20 - O-Ring	28 - Check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

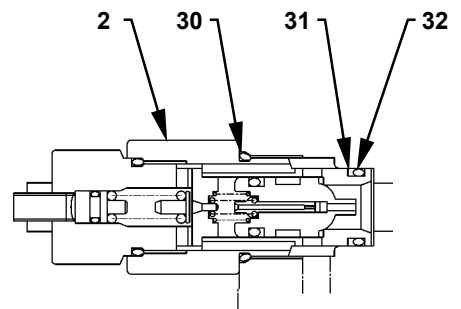
# UPPERSTRUCTURE / Control Valve



Section A-A



Section C-C



Section B-B


W1V1-02-05-085


## UPPERSTRUCTURE / Control Valve

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### Assemble Auxiliary Control Valve


1. Install the plug (5) assemblies (2 used) to housing (4).


 : 8 mm

 : 42 N·m (4.3 kgf·m, 31 lbf·ft)

2. Install O-ring (16) to seat (29).


3. Clamp sleeve (17) in a vise. Install spring (27) and check valve (28) to sleeve (17).


 : 27 mm

 : 78 N·m (8 kgf·m, 58 lbf·ft)

4. Install O-rings (18, 20) and backup ring (19) to sleeve (17).


5. Install the sleeve (17) assembly to housing (4).


 : 32 mm

 : 83 N·m (8.5 kgf·m, 61 lbf·ft)


**IMPORTANT: The set pressures of relief valve assemblies (2) are different respectively. Do not confuse when installing.**


6. Install the relief valve (2) assembly to housing (4).

 : 32 mm

 : 59 N·m (6 kgf·m, 44 lbf·ft)


7. Clamp spool (13) in a vise by using wooden pieces. Install guide (9), spacer (11), spring (10) and guide (9) to cap (8) in this order. Install the guide (9) assembly to spool (13).

 : 8 mm


 : 42 N·m (4.3 kgf·m, 31 lbf·ft)


**IMPORTANT: After installing the spool (13) assembly to housing (4), check if the spool (13) assembly can move smoothly.**

8. Insert the spool (13) assembly into housing (4).

 **NOTE:** *If the spool (13) assembly is not inserted straight and when spool (13) assembly is inserted forcibly, the inside of spool (13) and spool (13) is damaged and may not be used. Insert the spool (13) assembly straight.*

9. Install O-rings (12) (2 used) to covers (1, 7). Install covers (1, 7) to housing (4) with socket bolts (3) (4 used).

 : 8 mm

 : 42 N·m (4.3 kgf·m, 31 lbf·ft)

## UPPERSTRUCTURE / Control Valve

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(Blank)


## UPPERSTRUCTURE / Swing Device


### REMOVE AND INSTALL SWING DEVICE (ZX200-3 class, ZX240-3 class, ZX270-3 class)

**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 hoses (1 to 4, 8) and wire harness (7). Cap the open ends.

 : 17 mm, 19 mm, 32 mm, 36 mm


 : 8 mm

2. Attach a nylon sling onto the body of swing motor (5).


 **CAUTION: Swing device weight:**  
ZX200-3 class: 218 kg (480 lb)  
ZX240-3 class: 286 kg (630 lb)  
ZX270-3 class: 357 kg (790 lb)


3. Remove bolts (6) (14 used). Hoist and remove the swing device from the main frame.


ZX200-3 class

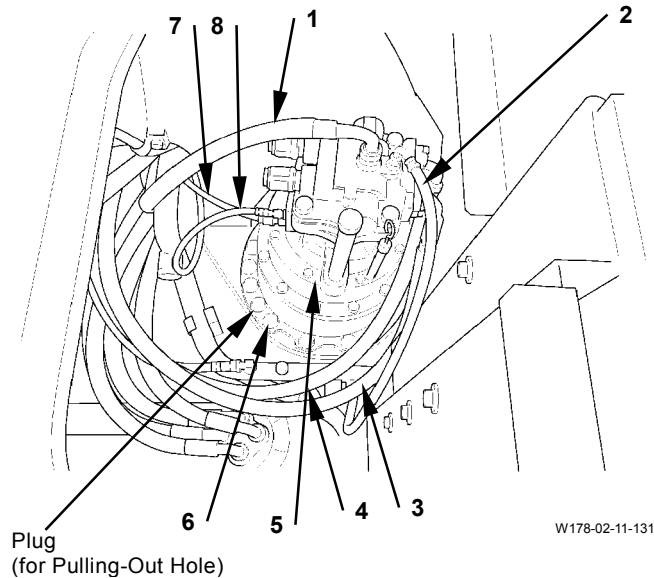
 : 30 mm

ZX240-3 class, 270-3 class

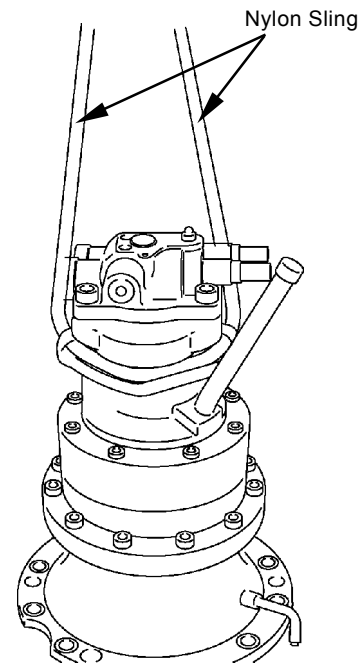
 : 32 mm

 **NOTE:** When hoisting the swing device and if the machine may float together, remove the plug (2 used). Hoist the swing device from the main frame by using a pulling-out bolt (ZX200-3 class: M20, Pitch 2.5 mm, ZX240-3 class, 270-3 class: M22, Pitch 2.5 mm).

 **NOTE:** When hoisting the swing device, one part of swing device will contact with the main frame. Hoist the swing device a little and push to the cab side while hoisting slowly.



W178-02-11-131



W178-02-11-132

# UPPERSTRUCTURE / Swing Device

## Installation



**CAUTION: Swing device weight:**

**ZX200-3 class: 218 kg (480 lb)**


**ZX240-3 class: 286 kg (630 lb)**


**ZX270-3 class: 357 kg (790 lb)**

1. Apply liquid packing onto the both mounting surfaces on swing device and main frame. Attach a nylon sling onto the body of swing motor (5).


2. Hoist the swing device. Install the swing device to the main frame with bolts (6) (14 used).


ZX200-3 class

 : 30 mm


 : 500 N·m (51 kgf·m, 370 lbf·ft)


ZX240-3 class, 270-3 class


 : 32 mm


 : 650 N·m (66 kgf·m, 480 lbf·ft)


3. Install hoses (1 to 4, 8) and wire harness (7) to the swing device.


 : 17 mm


 : 25 N·m (2.5 kgf·m, 18 lbf·ft)


 : 19 mm


 : 30 N·m (3.0 kgf·m, 22 lbf·ft)


 : 32 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

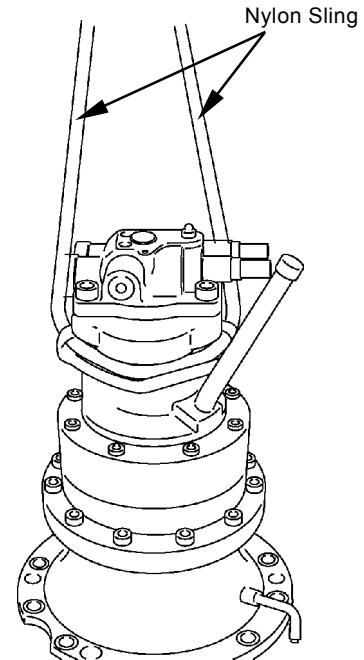
 : 36 mm

 : 180 N·m (18 kgf·m, 133 lbf·ft)

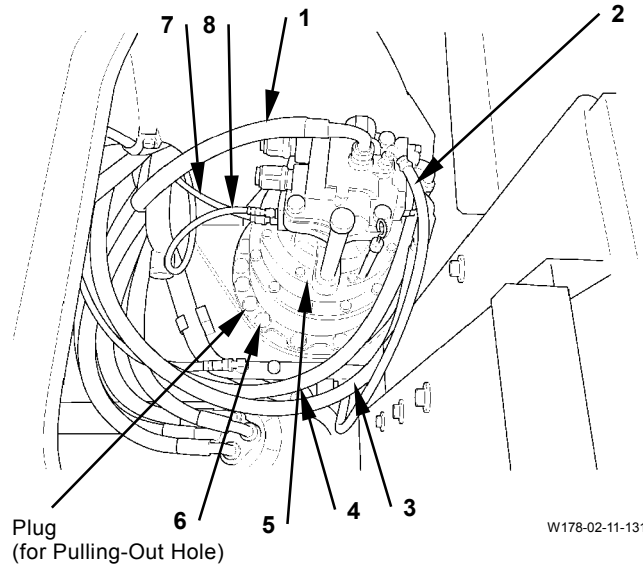
 : 8 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

4. 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.



W178-02-11-132




W178-02-11-131



## UPPERSTRUCTURE / Swing Device

### REMOVE AND INSTALL SWING DEVICE (ZX225US-3 class, ZX225USR-3 class)

#### Removal


 **CAUTION: Cover (1) weight: 23 kg (51 lb)**

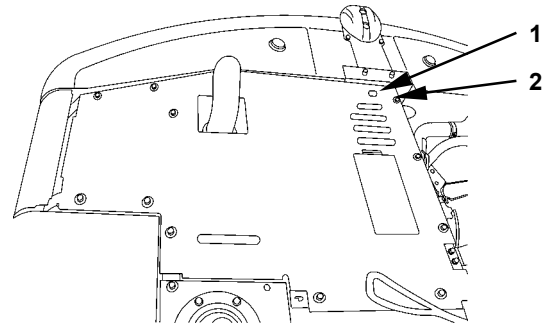
1. Open and lock the engine cover. Remove bolt (2) from cover (1).

Bolt (2):

ZX225USR-3 class: 11 used

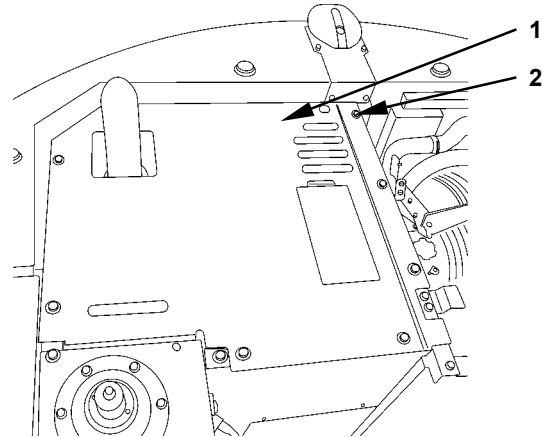
ZX225US-3 class: 7 used

 : 17 mm



ZX225USR-3 class


W1V1-02-04-019

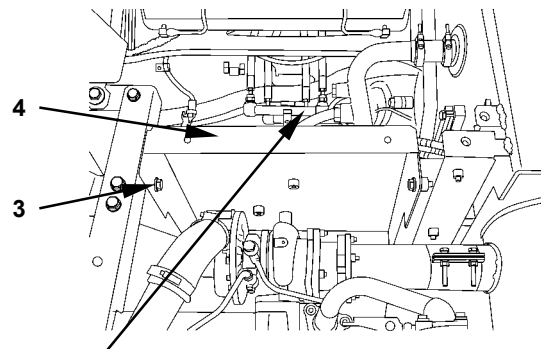


ZX225US-3 class

W1V1-02-04-028

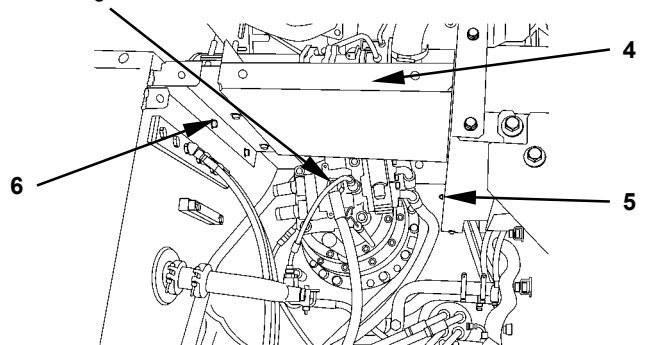
2. Remove bolts (3), (6) (3 used) and (5) (2 used) from cover (4). Remove cover (4) from the main frame.

 : 17 mm



Swing Device

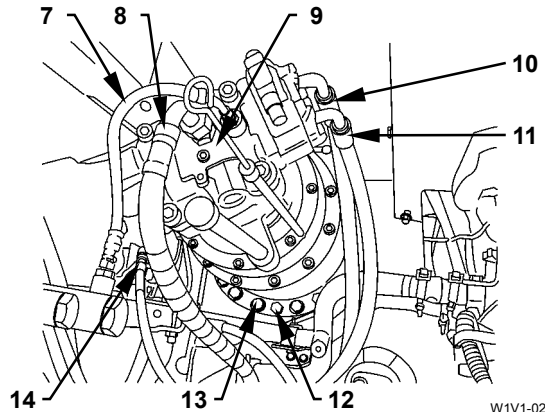
W1V1-02-11-054



W1V1-02-11-055

## UPPERSTRUCTURE / Swing Device

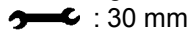
3. Remove hoses (7, 8, 10, 11, 14) from the swing device. Cap the hose and the open ends.



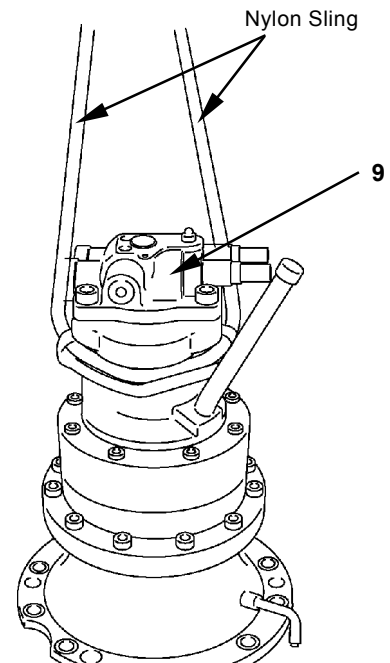
4. Attach a nylon sling onto the body of swing motor (9).

**CAUTION:** Swing device weight: 218 kg (481 lb)

5. Remove bolts (13) (14 used). Hoist and remove the swing device from the main frame.



**NOTE:** When hoisting the swing device and if the machine may float together, remove plugs (12) (2 used). Install a pulling-out bolt (M20, Pitch 2.5 mm). Tighten the pulling-out bolt. Remove the swing device from the main frame. Push the swing device to the cab side while hoisting slowly.





# UPPERSTRUCTURE / Swing Device

## Installation


**CAUTION:** Swing device weight: 218 kg (481 lb)


1. Attach a nylon sling onto the body of swing motor (9) and hoist the swing motor. Clean the mounting surfaces of swing device and main frame. Apply THREEBOND #1102 (yellow).
2. Install swing device (9) to the main frame with bolts (13) (14 used). When plugs (12) (2 used) are removed, install new plugs (12) (2 used).


 : 30 mm


 : 500 N·m (50 kgf·m, 370 lbf·ft)


3. Install hoses (7, 8, 10, 11, 14) to swing device (9).


 : 17 mm


 : 25 N·m (2.5 kgf·m, 18 lbf·ft)


 : 19 mm


 : 30 N·m (3.0 kgf·m, 22 lbf·ft)


 : 32 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

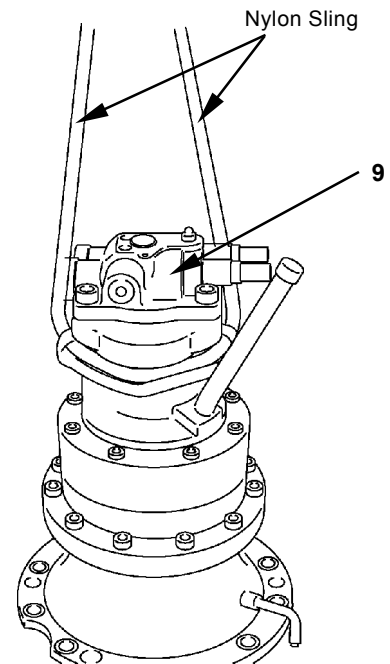
 : 36 mm

 : 180 N·m (18 kgf·m, 133 lbf·ft)

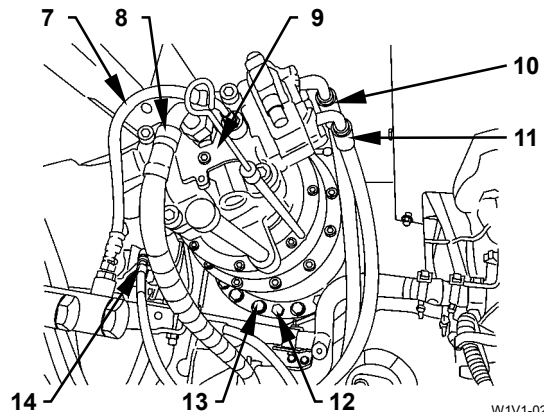
 : 8 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

4. Add hydraulic oil into the swing motor. Start the engine and check for any oil leaks.




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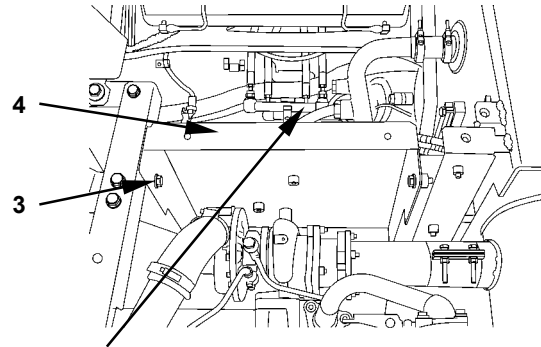
W1V1-02-06-014

## UPPERSTRUCTURE / Swing Device

5. Install cover (4) to the main frame with bolts (3), (5) (2 used) and (6) (3 used).

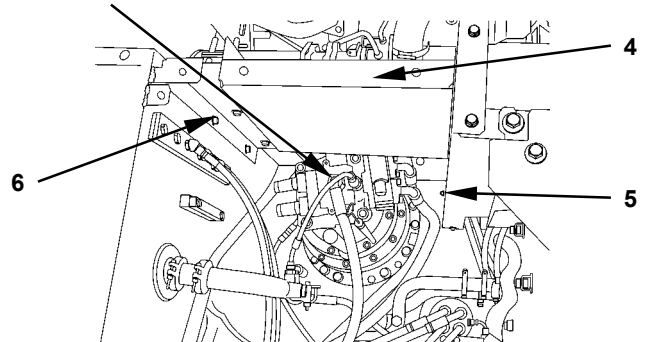
 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)



W1V1-02-11-054

Swing Device



W1V1-02-11-055




**CAUTION: Cover (1) weight: 23 kg (51 lb)**


6. Install cover (1) with bolt (2).

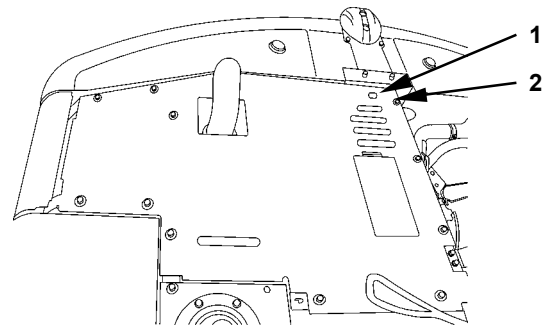
Bolt (2):

ZX225USR-3 class: 11 used

ZX225US-3 class: 7 used

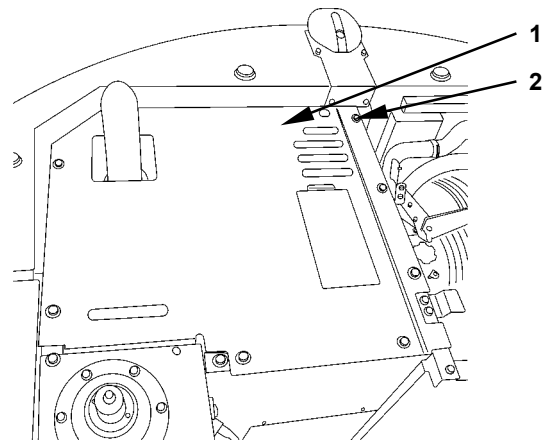
 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)



ZX225USR-3 class

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ZX225US-3 class

W1V1-02-04-028

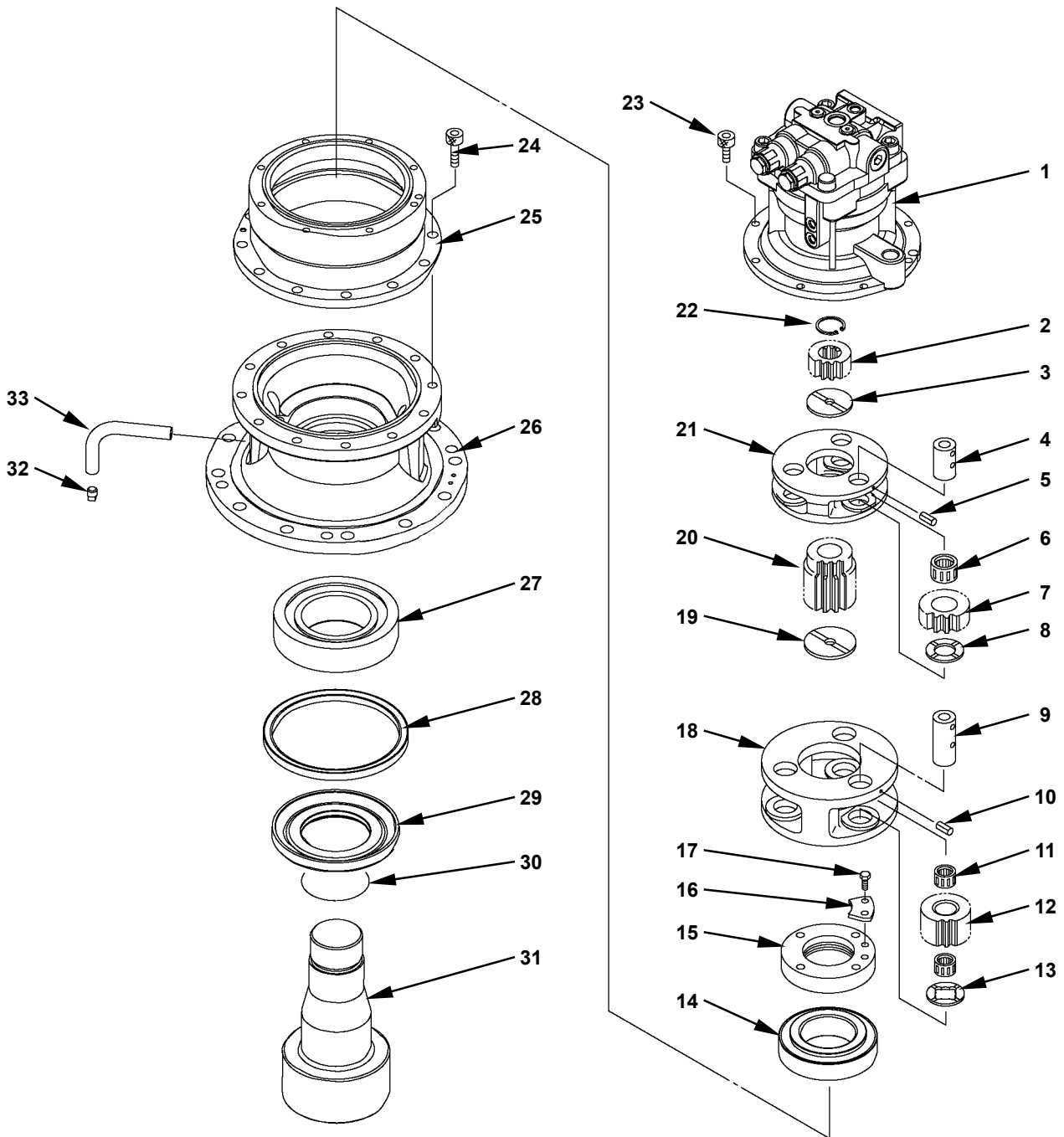
## UPPERSTRUCTURE / Swing Device

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(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 - Planetary Gear (3 Used) | 20 - Second Stage Sun Gear | 28 - Oil Seal       |
| 4 - Pin (3 Used)            | 13 - Thrust Plate (3 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

## Disassemble Swing Device

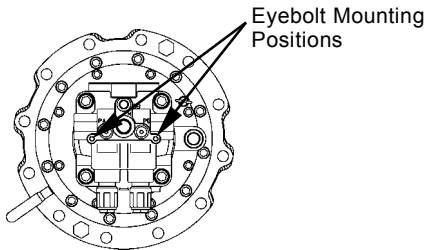


**CAUTION: Swing device weight:**  
**ZX200-3 class, 225USR-3 class, 225US-3 class: 218 kg (480 lb)**  
**ZX240-3 class: 286 kg (630 lb)**  
**ZX270-3 class: 357 kg (790 lb)**



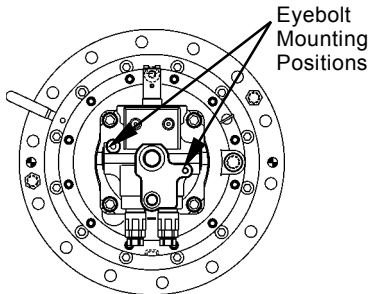
**CAUTION: When hoisting the swing device, do not string the rope suddenly.**

1. (ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)  
 Install eyebolts (M10, Pitch 1.5 mm) (2 used) to the swing device. Hoist the swing device.



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- (ZX270-3 class)  
 Install eyebolts (M12, Pitch: 1.75 mm) (2 used) to the swing device. Hoist the swing device.




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2. Place the swing device on the bracket. Secure the swing device with the bolts (ZX200-3 class, 225USR-3 class, 225US-3 class: M20, Pitch 2.5 mm, ZX240-3 class, 270-3 class: M22, Pitch 2.5mm) (2 used) so that the stopper located at the bottom of bracket is inserted into the middle of two teeth of pinion gear in shaft (31). Secure the bracket on a workbench in order to reduce the reaction force.

ZX200-3 class, 225USR-3 class, 225US-3 class

 : 30 mm

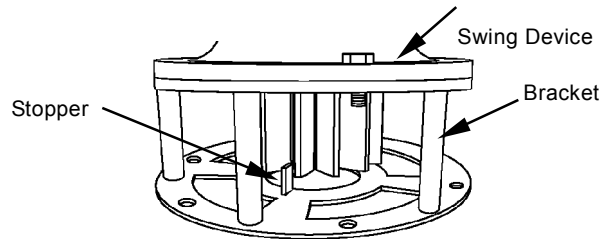
ZX240-3 class, 270-3 class

 : 32 mm

Bracket:


ZX200-3 class, 225USR-3 class, 225US-3 class: ST5097

ZX240-3 class, 270-3 class: ST5100




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

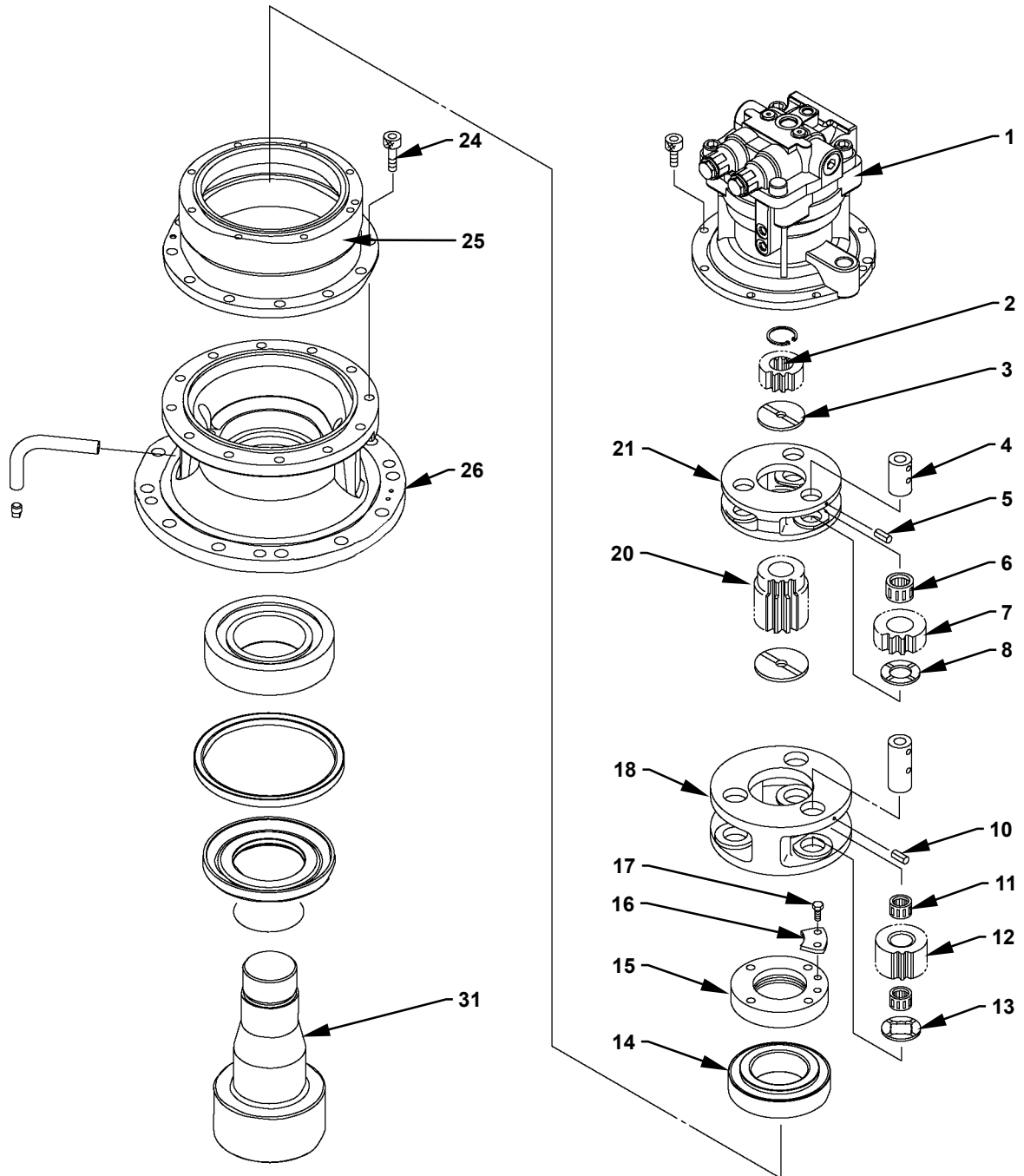
 : 8 mm

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

 : 18 mm

5. Put the matching marks at the jointed part between motor (1) and ring gear (25), between ring gear (25) and housing (26).

# UPPERSTRUCTURE / Swing Device



W1V1-02-06-003




## UPPERSTRUCTURE / Swing Device


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**CAUTION: Motor (1) weight:**  
ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class 48 kg (105 lb)  
ZX270-3 class: 70 kg (155 lb)

6. Remove socket bolts (23) (8 used). Insert a screwdriver into the gap around jointed part. Hoist and remove motor (1) from ring gear (25).

 : 10 mm

 **NOTE:** *THREEBOND #1215 (or LOCTITE # 5020) is applied to the mating surface.*


7. Remove first stage sun gear (2) from first stage carrier (21).
8. Remove the first stage carrier (21) assembly from ring gear (25).
9. Remove socket bolts (24) (12 used).

 : 14 mm



**CAUTION: Ring gear (25) weight:**  
ZX200-3 class, 225USR-3 class, 225US-3 class: 23 kg (50 lb)  
ZX240-3 class: 27 kg (60 lb)  
ZX270-3 class: 38.5 kg (85 lb)

10. Install eyebolts (M12, Pitch 1.75 mm) (2 used) to the motor (1) mounting thread part on ring gear (25). Insert a screwdriver into the gap around jointed part. Hoist and remove ring gear (25) from housing (26).

 **NOTE:** *THREEBOND #1215 (or LOCTITE # 5020) is applied to the mating surface.*

11. Remove second stage sun gear (20) from second stage carrier (18).

12. Remove the second stage carrier (18) assembly from shaft (31).

**IMPORTANT: The hole for spring pin (5) located on the first stage carrier (21) is not a through one. Check the tapping-in distance of spring pin (5).**

13. Tap spring pin (5) on the first stage carrier (21) assembly into pin (4) by using special tool (ST 1462). Stop tapping when spring pin (5) reaches the middle of pin (4) hole and do not tap spring pin (5) to the end.

14. Remove pins (4) (3 used), planetary gears (7) (3 used), needle bearings (6) (3 used) and thrust plates (8) (3 used) from first stage carrier (21).


15. Remove thrust plates (3) from first stage carrier (21).

**IMPORTANT: Do not damage the rotating surface for the needle bearing of pin (4) except for the both ends.**

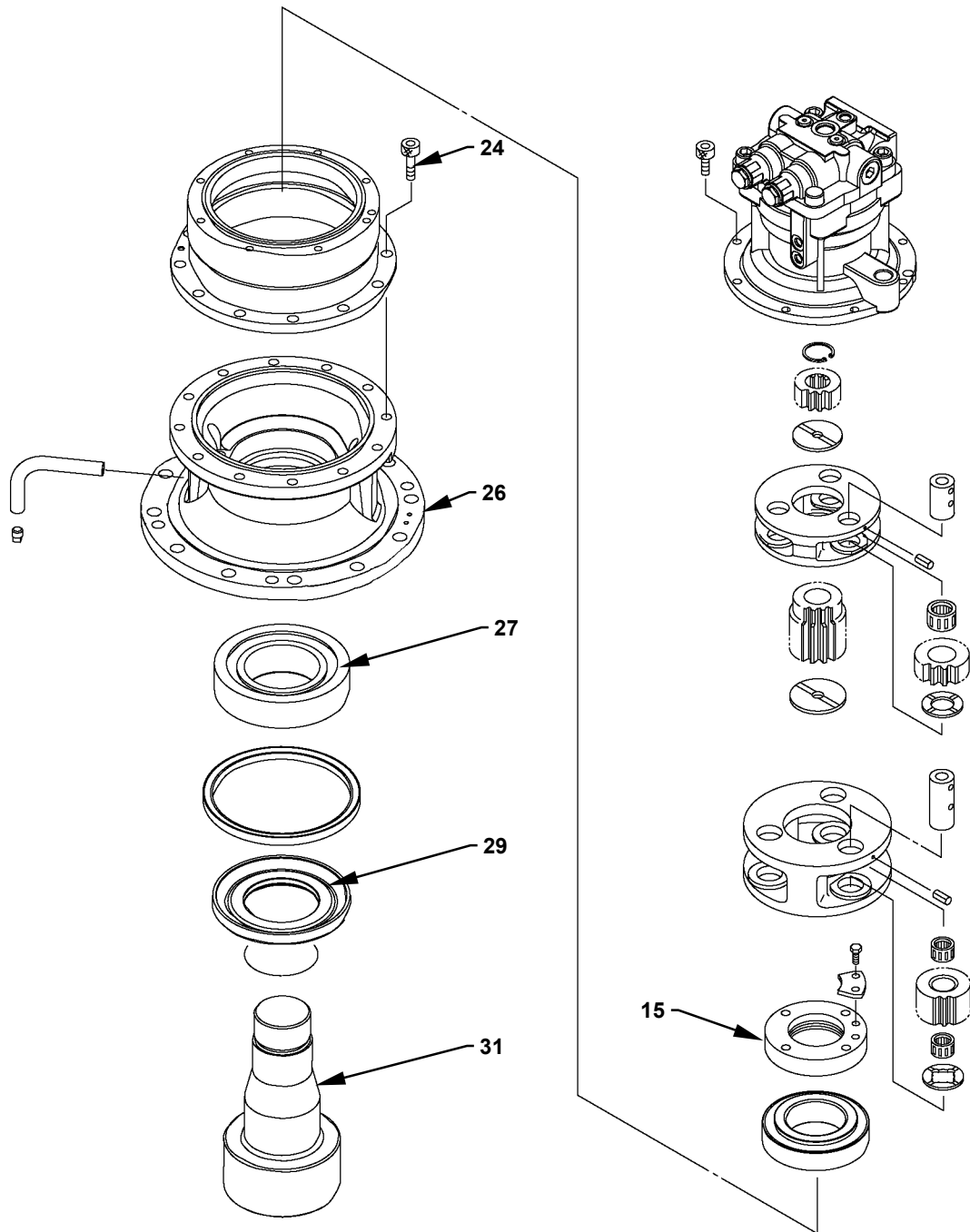
16. Clamp the end of pin (4) opposite the spring pin (5) hole in a vise. Remove spring pins (5) (3 used) by using special tool (ST 1462).

17. Disassemble the second stage carrier (18) assembly in the same procedure as the first stage carrier (21) assembly. Remove planetary gears (12) (3 used), needle bearings (11) (6 used) and thrust plates (13) (3 used). Remove spring pin (10) by using special tool (ST 1463).

18. Remove bolts (17) (2 used). Remove lock plate (16) from bearing nut (15).

 : 17 mm

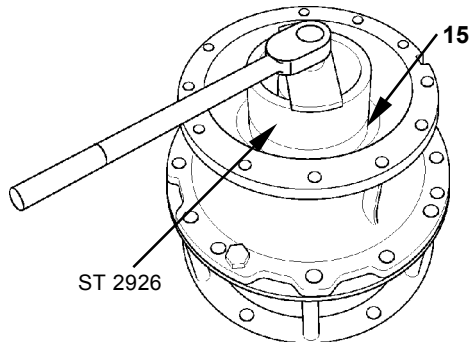
# UPPERSTRUCTURE / Swing Device



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## UPPERSTRUCTURE / Swing Device

19. Remove bearing nut (15) from shaft (31) by using special tool (ST 2926).




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**CAUTION: The housing (26) assembly weight:**  
**ZX200-3 class, 225USR-3 class, 225US-3 class: 106 kg (234 lb)**  
**ZX240-3 class: 153 kg (337 lb)**  
**ZX270-3 class: 178 kg (392 lb)**

20. Install eyebolts (ZX200-3 class, 225USR-3 class, 225US-3 class: M16, Pitch 2.0 mm, ZX240-3 class, 270-3 class: M18, Pitch 2.5 mm) (2 used) into the bolt (24) hole on housing (26). Remove the bolts (ZX200-3 class, 225USR-3 class, 225US-3 class: M20, Pitch 2.5 mm, ZX240-3 class, 270-3 class: M22, Pitch 2.5mm) to secure housing (26) and the bracket. Hoist the housing (26) assembly and remove the bracket.

 : 30 mm

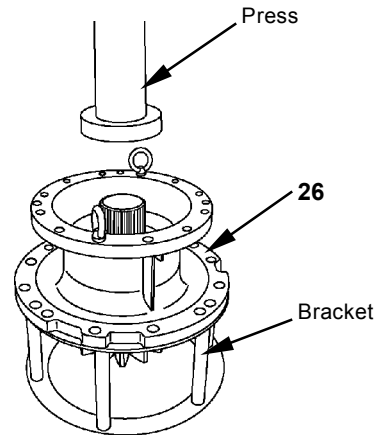
Bracket:  
 ZX200-3 class, 225USR-3 class, 225US-3 class:  
 ST5097  
 ZX240-3 class, 270-3 class: ST5100

21. Install the bracket to housing (26). Install housing (26) on a press.

 : 30 mm

Bracket:

ZX200-3 class, 225USR-3 class, 225US-3 class,  
 240-3 class: ST1464  
 ZX270-3 class: ST5106



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22. Push the spline side on shaft (31) by using a press. Remove shaft (31) from housing (26). The inner race of roller bearing (27) and sleeve (29) are removed with shaft (31) together.

23. Place special tool (B) on the step part on special tool (A).

Special Tool (A):

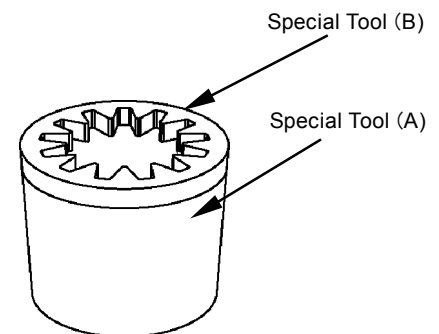
ZX200-3 class, 225USR-3 class, 225US-3 class:  
 ST1461

ZX240-3 class, 270-3 class: ST5108

Special Tool (B):

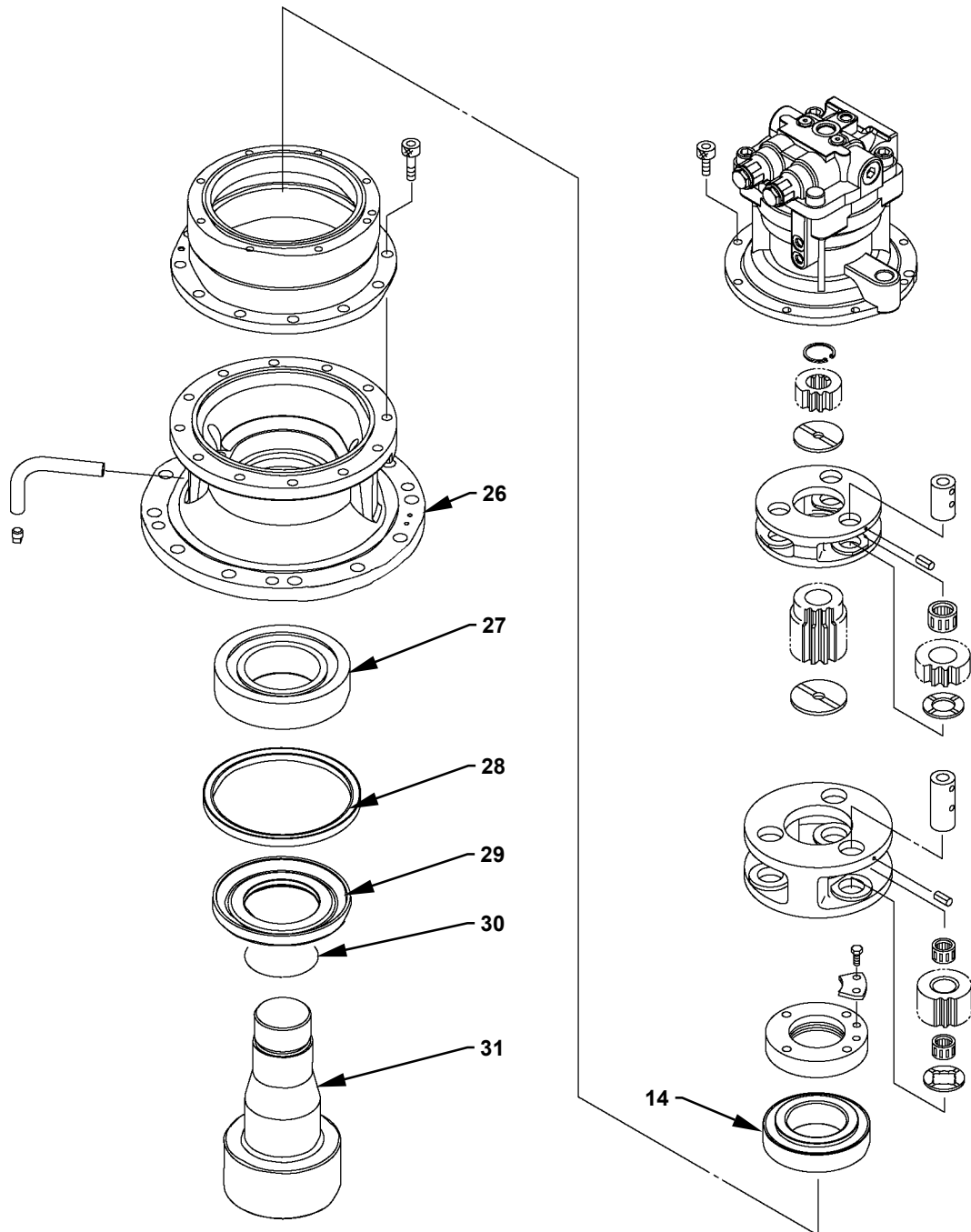
ZX200-3 class, 225USR-3 class, 225US-3 class:  
 ST1460

ZX240-3 class, 270-3 class: ST5107



W178-02-11-137

# UPPERSTRUCTURE / Swing Device



W1V1-02-06-003

## UPPERSTRUCTURE / Swing Device



**CAUTION: The shaft (31) assembly weight:**  
**ZX200-3 class, 225USR-3 class, 225US-3 class: 38 kg (84 lb)**  
**ZX240-3 class: 54 kg (119 lb)**  
**ZX270-3 class: 60 kg (132 lb)**

24. Insert the pinion gear of shaft (31) assembly into the tooth-hole of special tool (B). Install the pinion gear of shaft (31) to a press.

Special Tool (A):

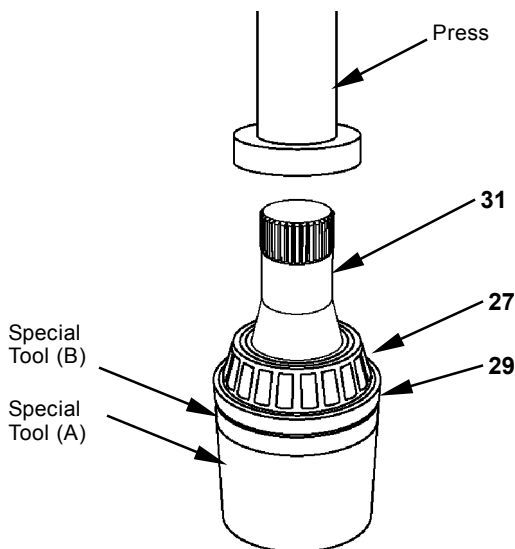
ZX200-3 class, 225USR-3 class, 225US-3 class:  
ST 1461

ZX240-3 class, 270-3 class: ST 5108

Special Tool (B):

ZX200-3 class, 225USR-3 class, 225US-3 class:  
ST 1460

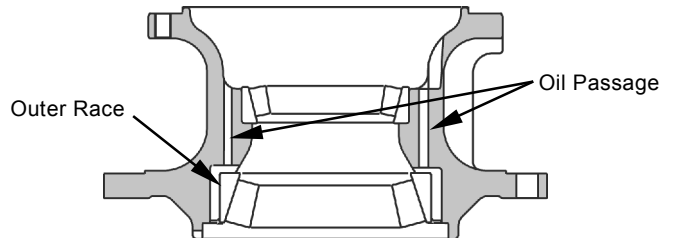
ZX240-3 class, 270-3 class: ST 5107



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25. Push the spline side on shaft (31) by using a press. Remove the inner race of roller bearing (27) and sleeve (29).
26. Remove O-ring (30) from sleeve (29).

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



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**CAUTION: The housing (26) assembly weight:**

**ZX200-3 class, 225USR-3 class, 225US-3 class: 60 kg (132 lb)**

**ZX240-3 class: 90 kg (198 lb)**

**ZX270-3 class: 110 kg (243 lb)**

28. Attach a nylon sling onto the body of the housing (26) assembly. Hoist and turn over the housing (26) assembly.

29. Insert a screwdriver into the notch on housing (26) where oil seal (28) is mounted. Remove oil seal (28) from housing (26).



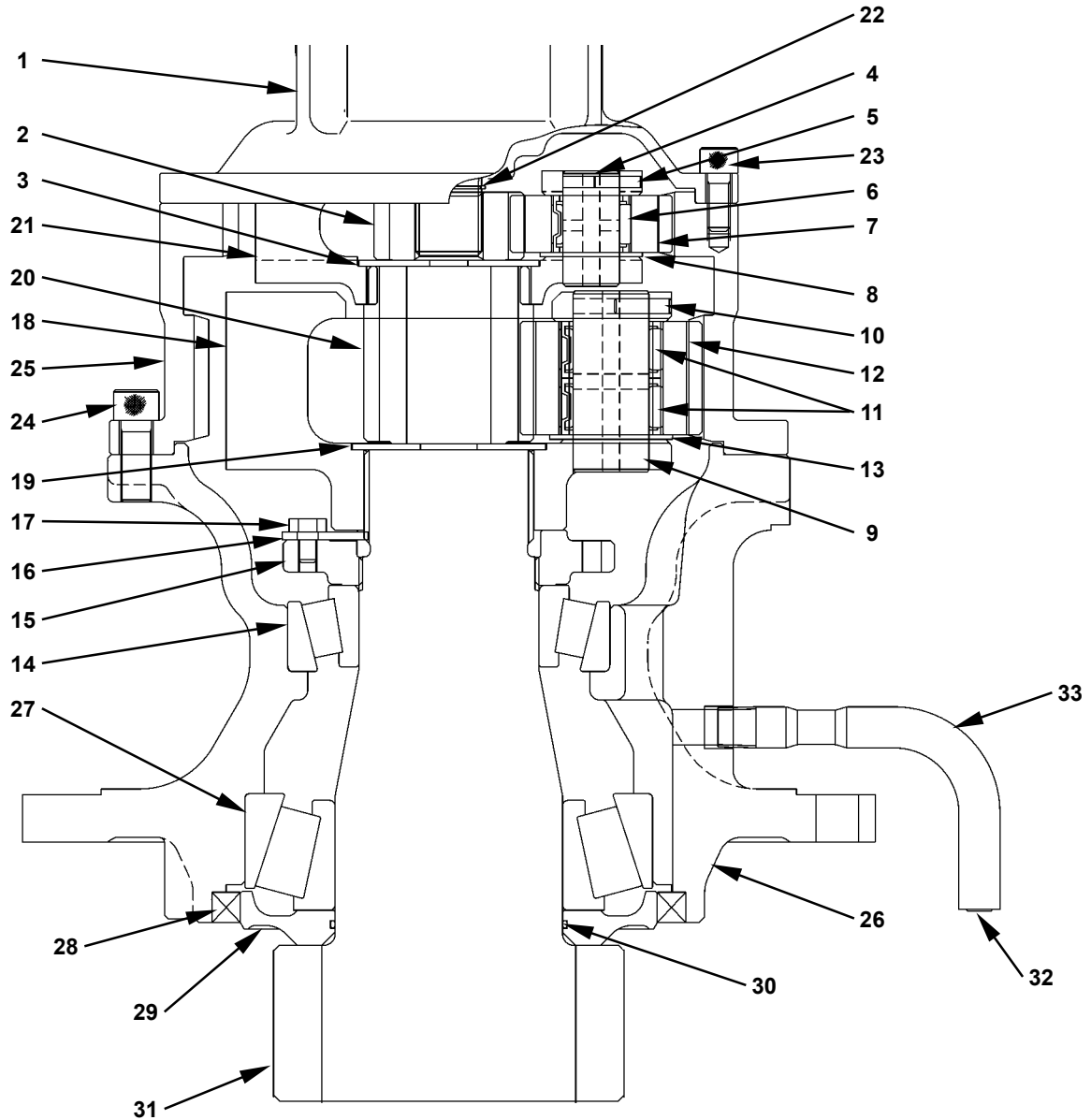
**NOTE: THREEBOND #1215 (or LOCTITE # 5020) is applied to the outer surface on oil seal (28). Oil seal (28) cannot be reused.**

30. Remove the outer race of roller bearing (14) from housing (26) by using a bar and hammer.

# UPPERSTRUCTURE / Swing Device

## ASSEMBLE SWING DEVICE

ZX200-3 class, 225USR-3 class, 225US-3 class

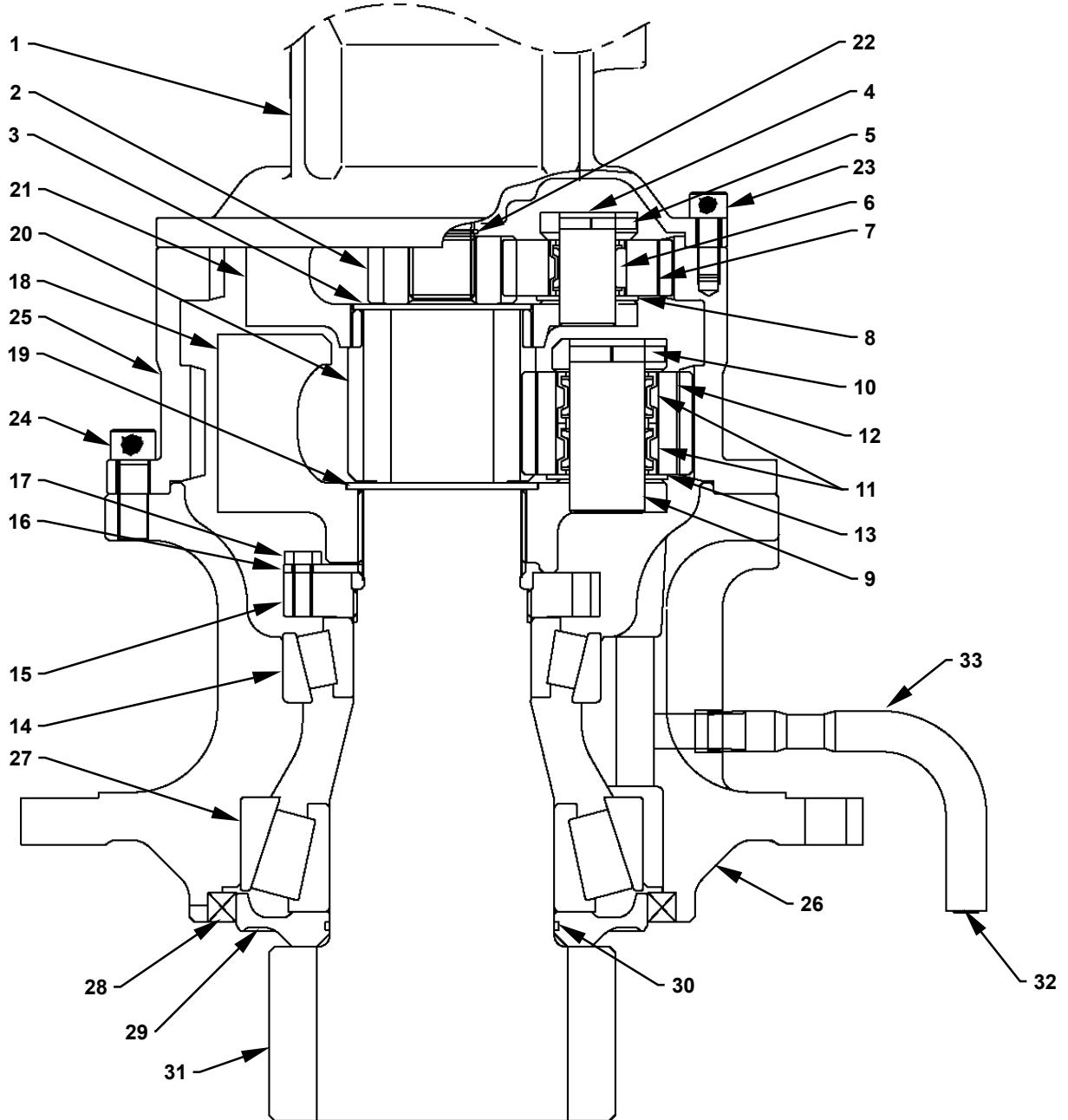


W1V1-02-06-012

- |                             |                              |                            |                     |
|-----------------------------|------------------------------|----------------------------|---------------------|
| 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 (3 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

ZX240-3 class

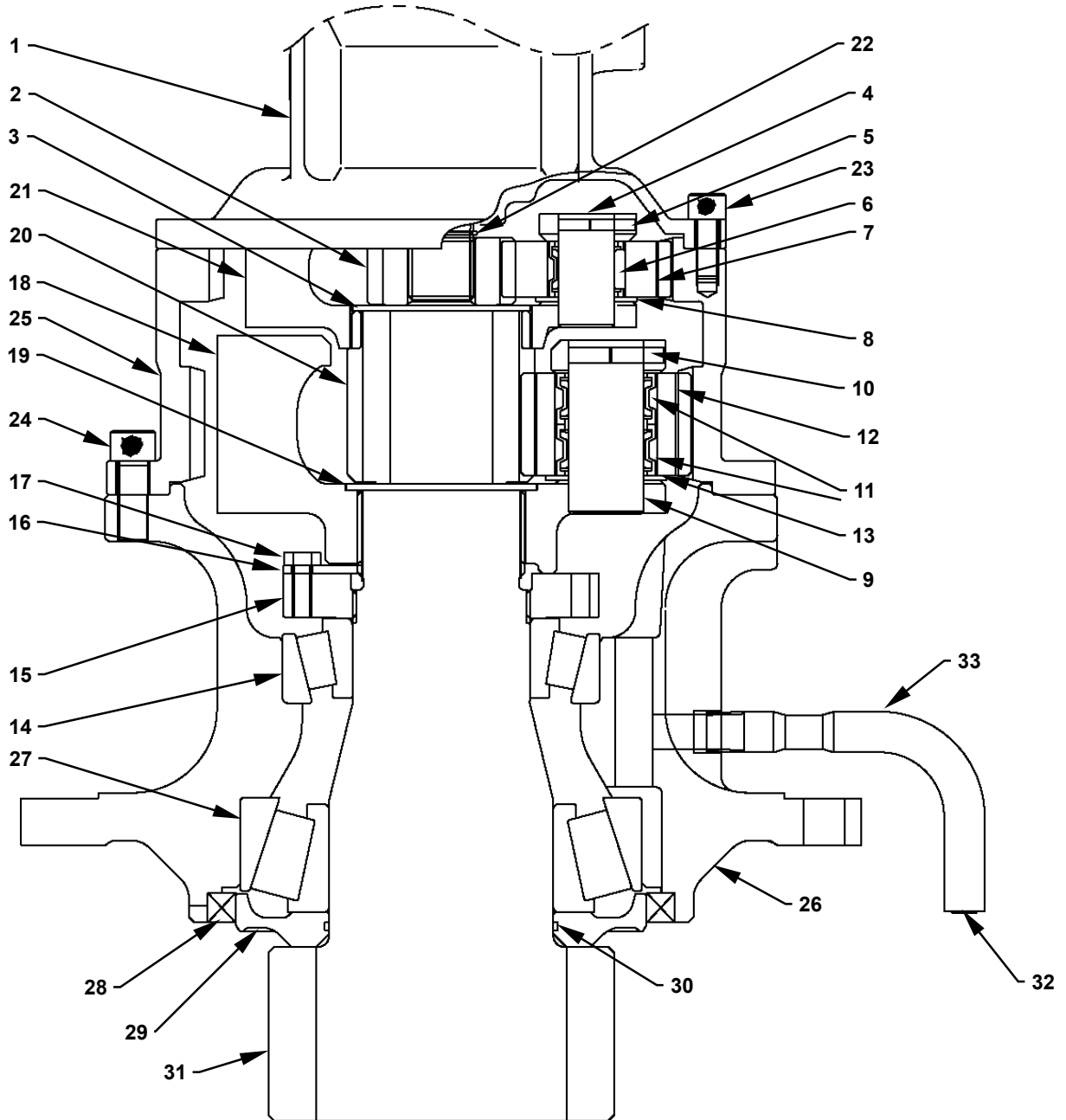


W1V1-02-06-004

- |                             |                              |                            |                     |
|-----------------------------|------------------------------|----------------------------|---------------------|
| 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 (3 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

ZX270-3 class



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 (3 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 O-ring (30) to sleeve (29).

**CAUTION:** The shaft (31) assembly weight:  
ZX200-3 class, 225USR-3 class, 225US-3 class: 38 kg (84 lb)  
ZX240-3 class: 54 kg (119 lb)  
ZX270-3 class: 60 kg (132 lb)

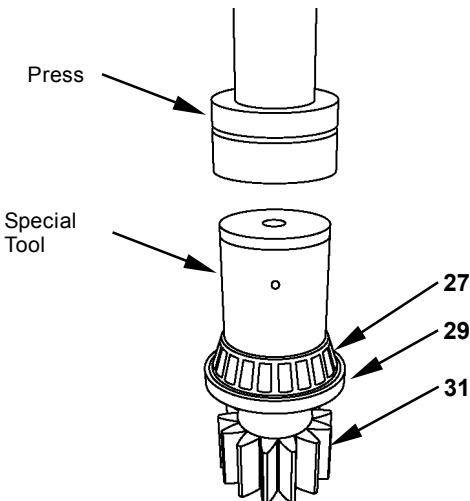
2. Install sleeve (29) and the inner race of roller bearing (27) to shaft (31). Install sleeve (29) and the inner race of roller bearing (27) by using special tool and a press.

**NOTE:** The press-in distance of inner race can be assured by using special tool.

Special Tool:

ZX200-3 class, 225USR-3 class, 225US-3 class: ST4149

ZX240-3 class, 270-3 class: ST2554



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**CAUTION:** Housing (26) weight:  
ZX200-3 class, 225USR-3 class, 225US-3 class: 57 kg (126 lb)  
ZX240-3 class: 86 kg (190 lb)  
ZX270-3 class: 105 kg (231 lb)

3. Attach a nylon sling to the body of housing (26). Hoist and place housing (26) with the sleeve (29) mounting side facing upward.

4. Tap and install the outer race of roller bearing (27) into housing (26) by using a bar and hammer evenly. Tap and listen to ring in order to check if the installation is completed.

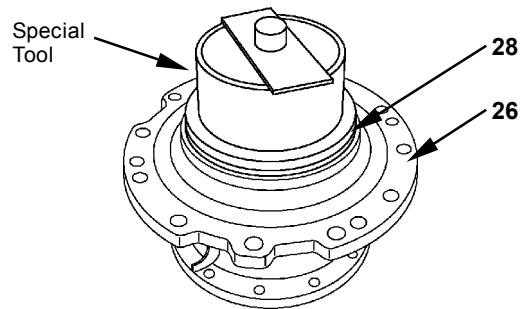
5. Apply THREEBOND #1215 on the outer surface of oil seal (28). Place oil seal (28) flat on housing (26) and push by hands in gently. Place special tool on oil seal (28). Tap in special tool by using a hammer straightly.

**NOTE:** Oil seal (28) can be replaced by using special tool without removing sleeve (29).

Special Tool:

ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class: ST2550

ZX270-3 class: ST2552

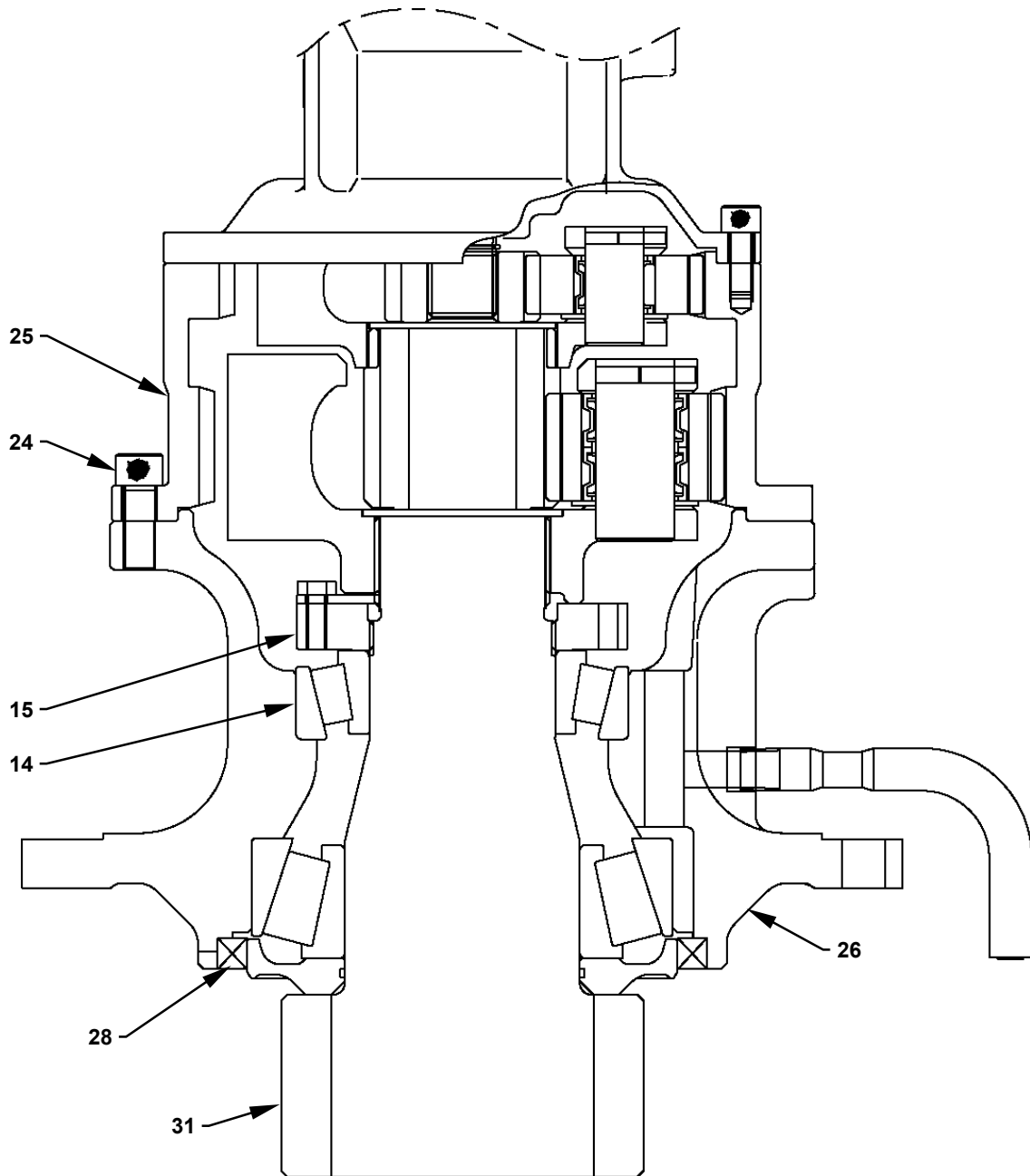


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6. Apply grease to the inner surface of oil seal (28). Apply grease to the outer surface of sleeve (29) on shaft (31). Apply grease carefully when installing shaft (31) in order not to curl the lip.

# UPPERSTRUCTURE / Swing Device

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W1V1-02-06-004

## UPPERSTRUCTURE / Swing Device



**CAUTION:** The housing (26) assembly weight:

**ZX200-3 class, 225USR-3 class, 225US-3 class: 62 kg (137 lb)**

**ZX240-3 class: 92 kg (203 lb)**

**ZX270-3 class: 110 kg (243 lb)**

7. Attach a nylon sling onto the body of the housing (26) assembly. Hoist and place the housing (26) assembly with the ring gear (25) side facing upward.

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



**CAUTION:** The housing (26) assembly weight:

**ZX200-3 class, 225USR-3 class, 225US-3 class: 65 kg (143 lb)**

**ZX240-3 class: 95 kg (209 lb)**

**ZX270-3 class: 115 kg (254 lb)**

9. Install eyebolts (ZX200-3 class, 225USR-3 class, 225US-3 class: M16, Pitch 2.0 mm, ZX240-3 class, 270-3 class: M18, Pitch 2.5 mm) (2 used) into the bolt (24) hole on housing (26). Slowly hoist and place housing (26) on shaft (31). Check and align carefully in order not to curl the oil seal (28) lip.

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



**NOTE:** The fitting between inner race and shaft (31) is tight.

11. Tighten bearing nut (15) to shaft (31) by hand in order not to drop shaft (31).



**CAUTION:** The housing (26) assembly weight:

**ZX200-3 class, 225USR-3 class, 225US-3 class: 106 kg (234 lb)**

**ZX240-3 class: 153 kg (337 lb)**

**ZX270-3 class: 178 kg (392 lb)**

12. Install eyebolt (ZX200-3 class: M16, Pitch 2.0 mm, ZX240-3 class, 270-3 class: M18, Pitch 2.5 mm) into the ring gear (25) mounting thread part on housing (26). Hoist and place housing (26) on a press.

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

14. Place special tool on the inner race of roller bearing (14). Install the inner race by using a press.



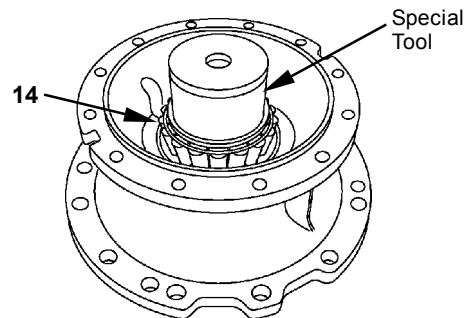
**NOTE:** The press-in distance of inner race can be assured by using special tool.

Special Tool:

ZX200-3 class, 225USR-3 class, 225US-3 class: ST2924

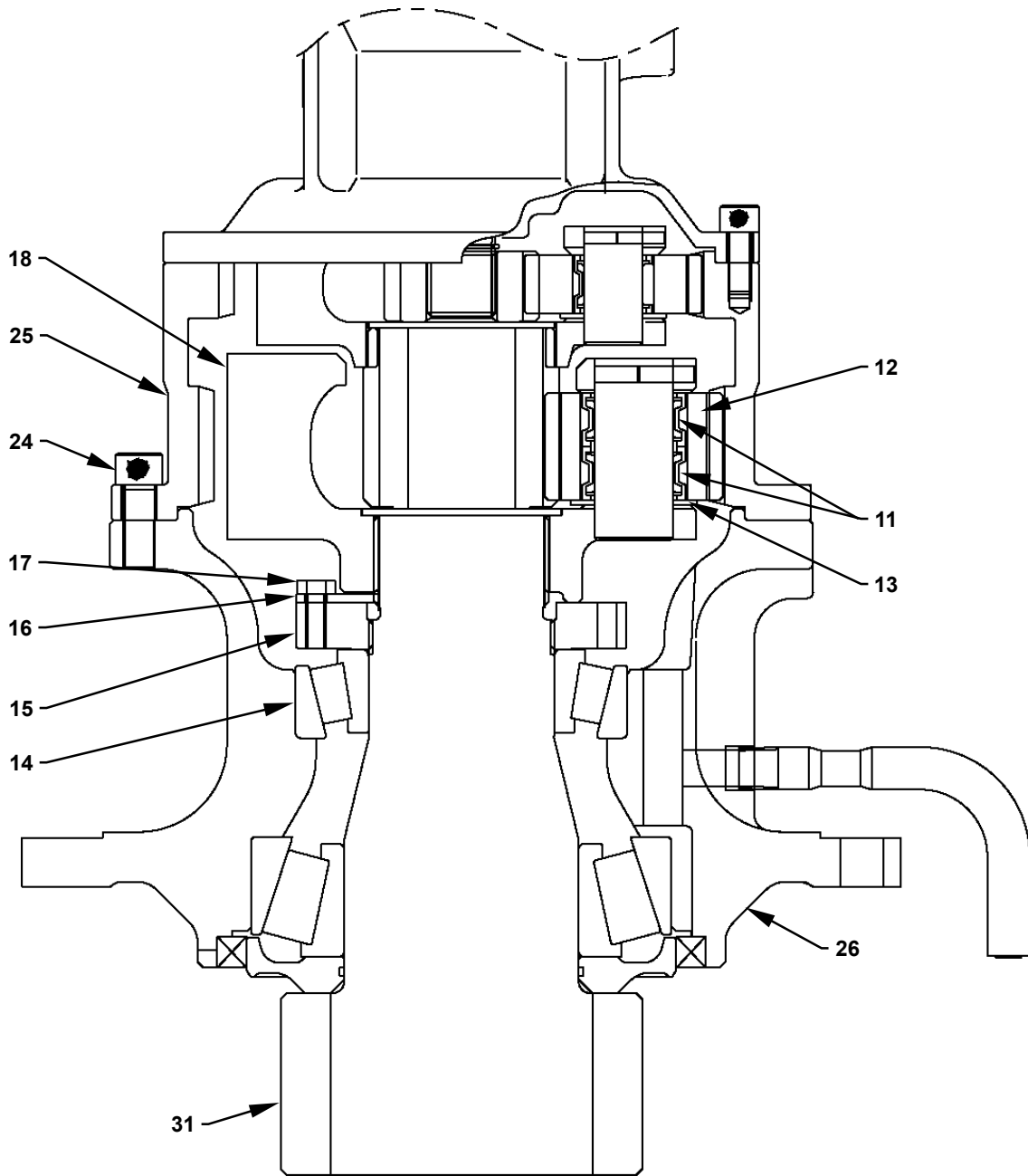
ZX240-3 class: ST2551

ZX270-3 class: ST2553



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# UPPERSTRUCTURE / Swing Device



W1V1-02-06-004

## UPPERSTRUCTURE / Swing Device

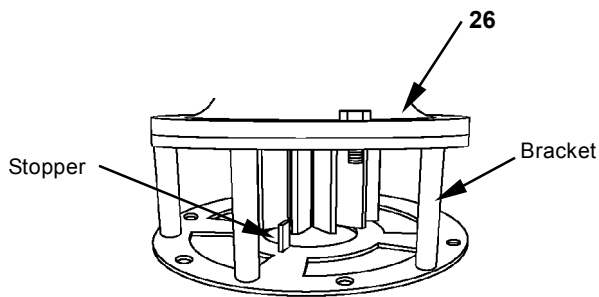
15. Hoist and place the housing (26) assembly on the bracket. Install the housing (26) assembly with the bolts (ZX200-3 class, 225USR-3 class, 225US-3 class: M20, Pitch 2.5 mm, 240-3 class, ZX270-3 class: M22, Pitch 2.5 mm) (2 used) so that the stopper located at the bottom of bracket is inserted into the middle of two teeth of pinion gear in shaft (31). Secure the bracket on a work bench in order to reduce the reaction force.

 : 30 mm

Bracket:

ZX200-3 class, 225USR-3 class, 225US-3 class:  
ST5097

ZX240-3 class, 270-3 class: ST 5100




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**IMPORTANT: Check the direction to install bearing nut (15).**


16. Apply a film of grease on the thread part of bearing nut (15). Install bearing nut (15) to shaft (31) with the step part of bearing nut (15) facing to roller bearing (14). Tighten by using special tool (ST 2926) to the specified torque.

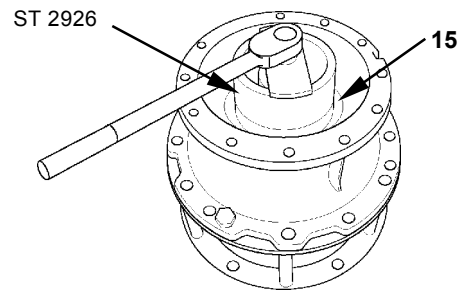
ZX200-3 class, 225USR-3 class, 225US-3 class

 : 490 N·m (50 kgf·m, 360 lbf·ft)

ZX240-3 class, 270-3 class


 : 590 N·m (60 kgf·m, 435 lbf·ft)


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



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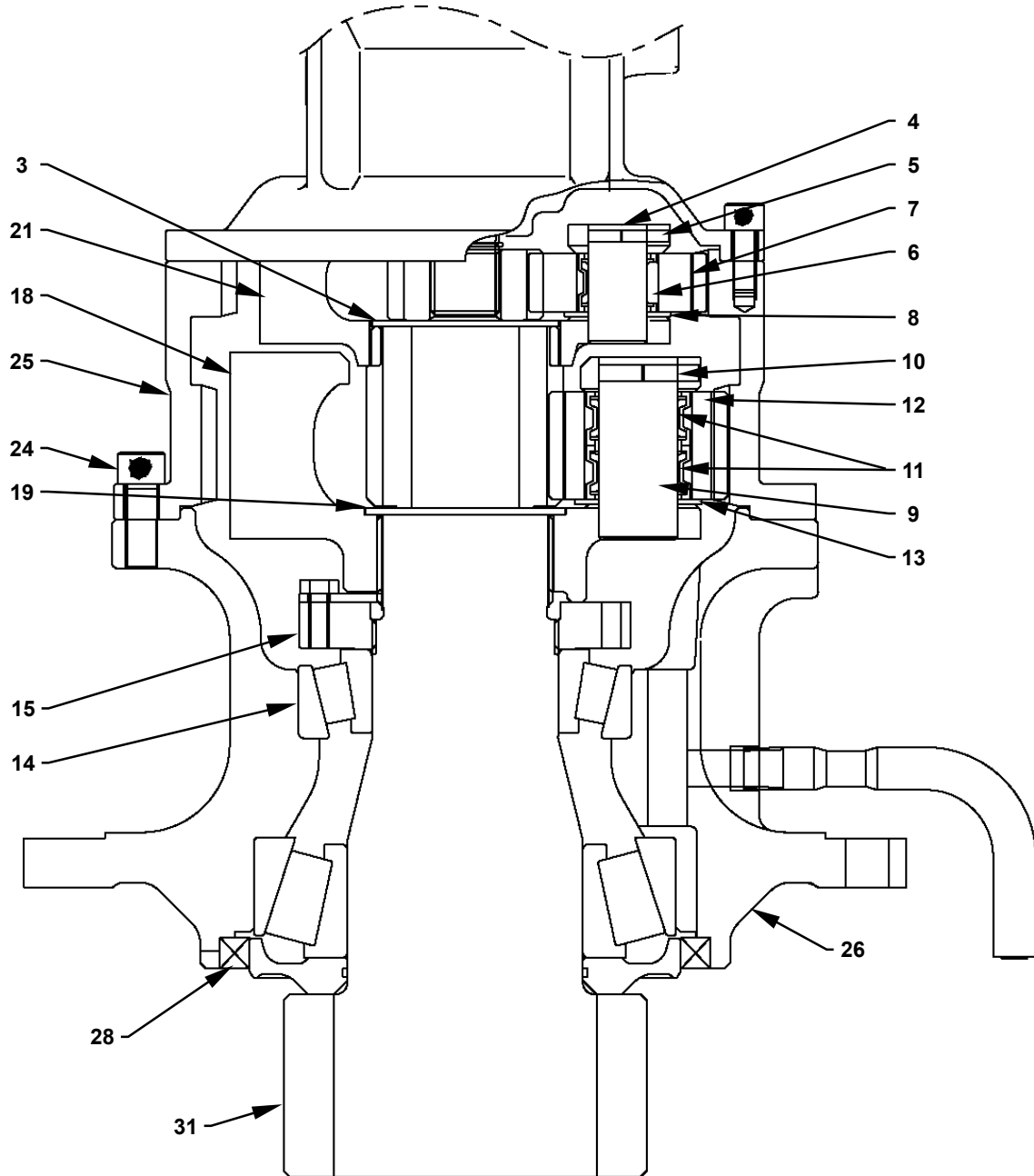
17. Install lock plate (16) to bearing nut (15) with bolts (17) (2 used). In case the splines of lock plate (16) and shaft (31) are not aligned, tighten bearing nut (15) in tightening direction until both splines are aligned.

 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

18. Secure planetary gear (12) and needle bearings (11) (2 used) with thrust plate (13). Install the planetary gear (12) assembly to second stage carrier (18).

# UPPERSTRUCTURE / Swing Device



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## UPPERSTRUCTURE / Swing Device

19. Install pin (9) to the position where planetary gear (12) has been installed onto second stage carrier (18) with the spring pin hole facing front. The spring pin holes both in second stage carrier (18) and pin (9) should be in line.

**IMPORTANT: Check the direction of spring pin (10).**

20. Tap and install spring pin (10) into second stage carrier (18) by using special tool (ST 1463) with the slit of spring pin (10) facing to the end of pin (9).



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**IMPORTANT: Check the direction to install thrust plate (19).**

21. Install thrust plate (19) to second stage carrier (18) with the oil groove facing outside.

**IMPORTANT: Check the mounting position of thrust plate (13).**

22. Install planetary gears (12) (2 used), needle bearings (11) (4 used), thrust plates (13) (2 used), pins (9) (2 used) and spring pins (10) (2 used) to second stage carrier (18) in the same procedures as steps 18 to 20. Install thrust plate (13) to the housing (26) side.

23. Secure planetary gear (7) and needle bearing (6) with thrust plate (8).  
Install the planetary gear (7) assembly to first stage carrier (21).

24. Install pin (4) to the position where planetary gear (7) has been installed onto first stage carrier (21) with the spring pin hole facing front. The spring pin holes both in first stage carrier (21) and pin (4) should be in line.

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

25. Tap and install spring pin (5) into first stage carrier (21) with the slit of spring pin (5) facing to the end of pin (4).



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**IMPORTANT: Check the direction to install thrust plate (3).**

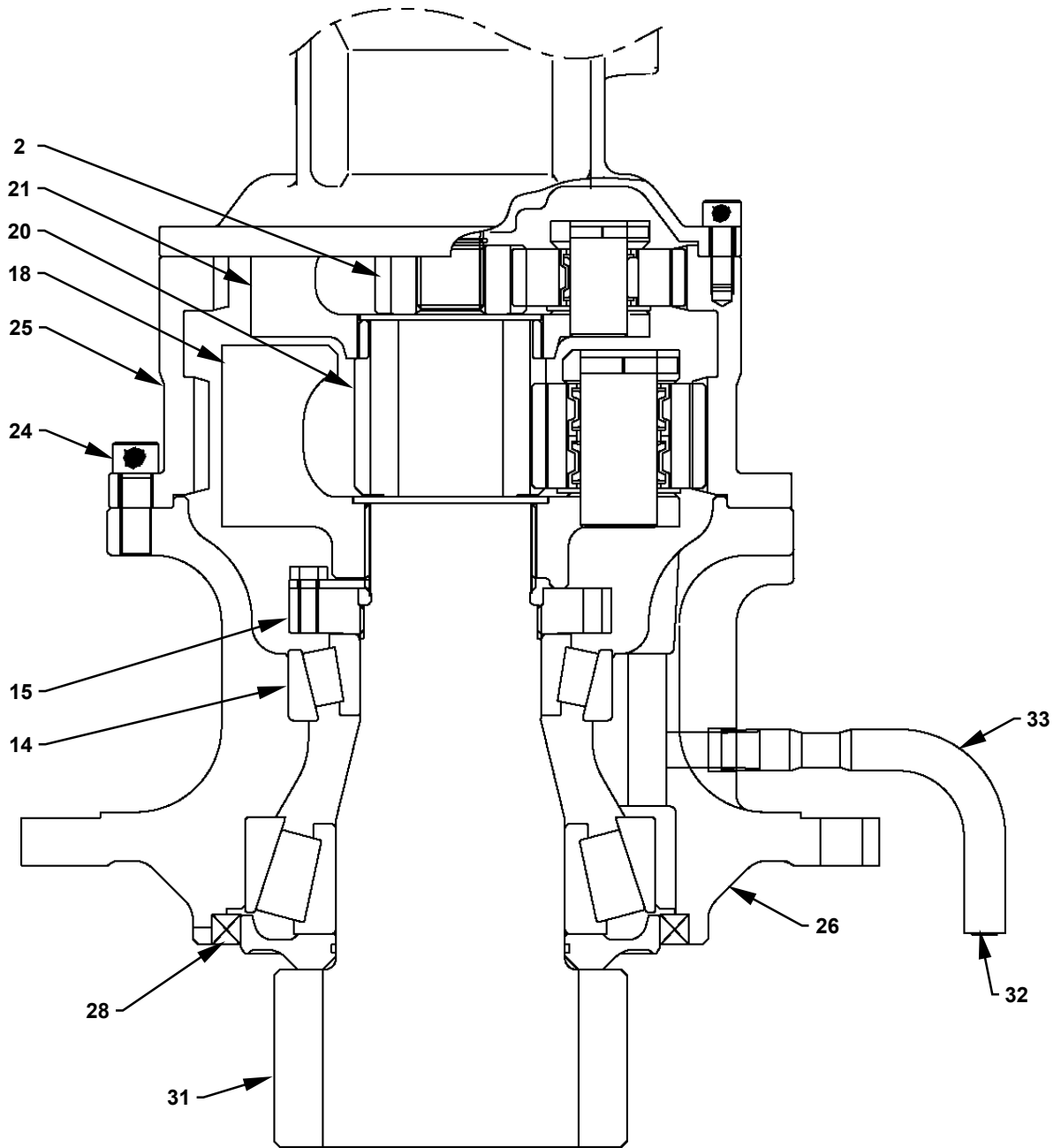
26. Install thrust plate (3) into the first stage carrier (21) with the oil groove facing outside.

**IMPORTANT: Check the mounting position of thrust plate (8).**

27. Install planetary gears (7) (2 used), needle bearings (6) (2 used), thrust plates (8) (2 used), pins (4) (2 used), spring pins (5) (2 used) and thrust plate (3) to first stage carrier (21) in the same procedures as steps 23 to 25. Install thrust plate (8) to the housing (6) side of needle bearing (6) by using special tool (ST1462).

28. Align the spline of shaft (31) and install the second stage carrier (18) assembly.

# UPPERSTRUCTURE / Swing Device



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## UPPERSTRUCTURE / Swing Device

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29. Install second stage sun gear (20) to the second stage carrier (18) assembly with the small diameter part facing upward.

30. Clean old adhesive. Apply THREEBOND #1215 (or LOCTITE # 5020) onto the ring gear (25) mounting surface of housing (26).



**CAUTION: Ring gear (25) weight:**


**ZX200-3 class, 225USR-3 class, 225US-3 class: 23 kg (50 lb)**


**ZX240-3 class: 27 kg (60 lb)**

**ZX270-3 class: 38.5 kg (85 lb)**


31. Install eyebolts (M12, Pitch 1.75 mm) (2 used) to the motor mounting thread part on ring gear (25). Hoist ring gear (25). Align the matching marks and install ring gear (25) to housing (26) with socket bolts (24) (12 used).


ZX200-3 class, 225USR-3 class, 225US-3 class

 : 10 mm

 : 210 N·m (21 kgf·m, 155 lbf·ft)

ZX240-3 class, 270-3 class

 : 14 mm


 : 300 N·m (30 kgf·m, 220 lbf·ft)

32. Align with the spline of second stage sun gear (20) and install the first stage carrier (22) assembly.


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


33. Install first stage sun gear (2) to the first stage carrier (21) assembly with the step part facing downward.

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

 : 18 mm

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

 : 8 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

36. Add gear oil into ring gear (25) until gear oil reaches the middle part of first stage sun gear (2). Gear oil amount:

ZX200-3 class, 225USR-3 class, 225US-3 class:  
6.9 L (1.82 US gal.)

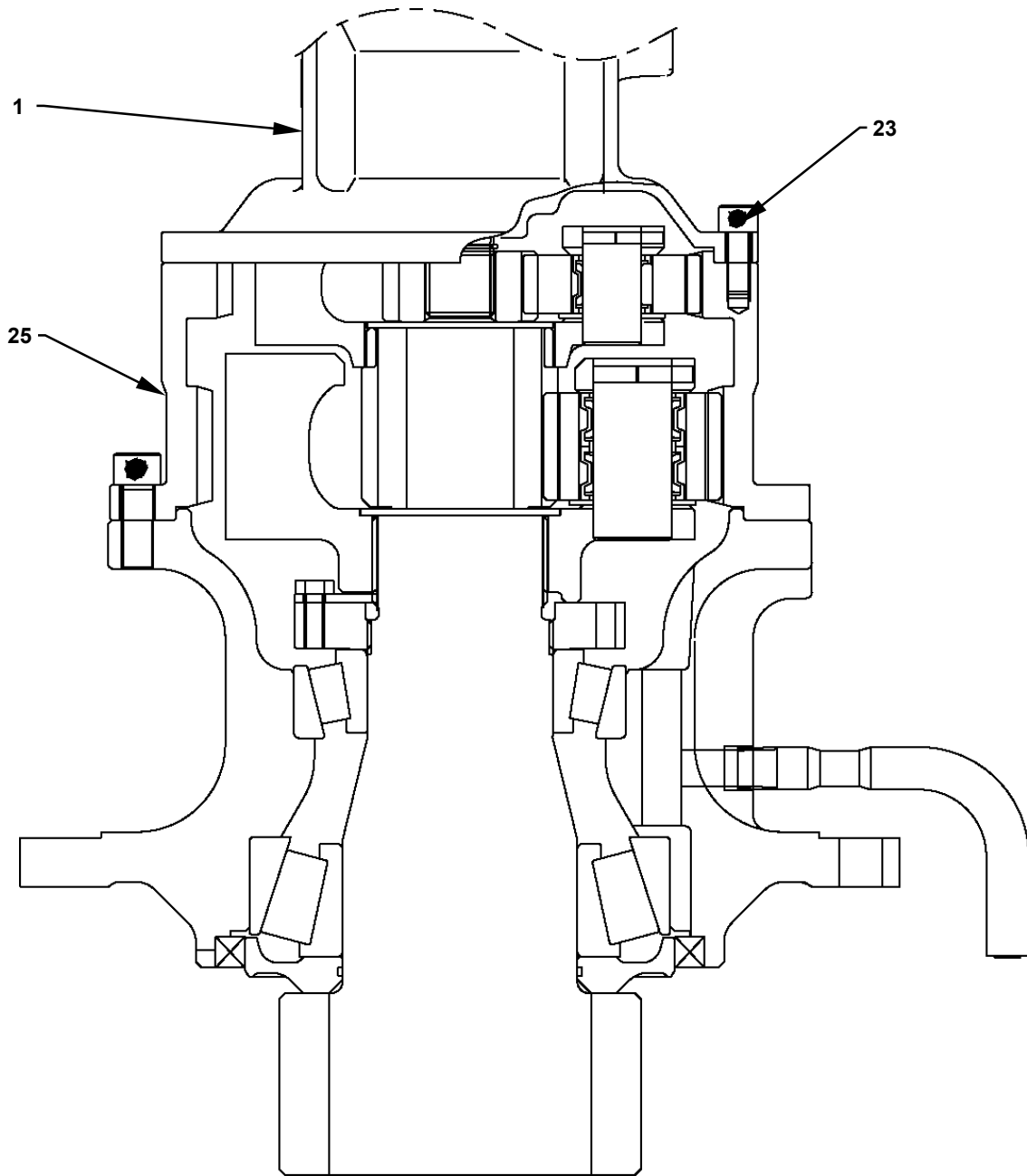
ZX240-3 class: 9.1 L (2.4 US gal.)

ZX270-3 class: 11.7 L (3.1 US gal.)

37. Clean old adhesive. Apply THREEBOND #1212 (or LOCTITE # 5020) onto the motor (1) mounting surface on ring gear (25).

# UPPERSTRUCTURE / Swing Device

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## UPPERSTRUCTURE / Swing Device




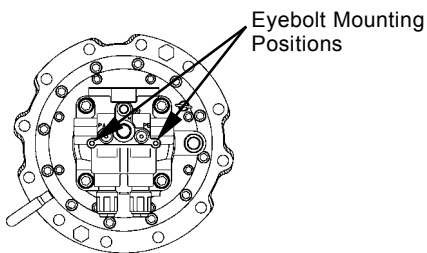
**CAUTION: Motor (1) weight:**  
**ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class: 48 kg (105 lb)**  
**ZX270-3 class: 70 kg (155 lb)**

38. (ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)

Install eyebolts (M10, Pitch 1.5 mm) (2 used) to motor (1). Hoist motor (1). Align the matching marks and install motor (1) to ring gear (25) with socket bolts (23) (8 used).

 : 10 mm


 : 90 N·m (9.0 kgf·m, 66 lbf·ft)




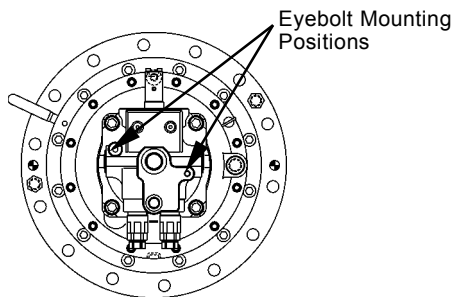
W178-02-06-005

(ZX270-3 class)

Install eyebolts (M12, Pitch 1.75 mm) (2 used) to motor (1). Hoist motor (1). Align the matching marks and install motor (1) to ring gear (25) with socket bolts (23) (8 used).

 : 10 mm

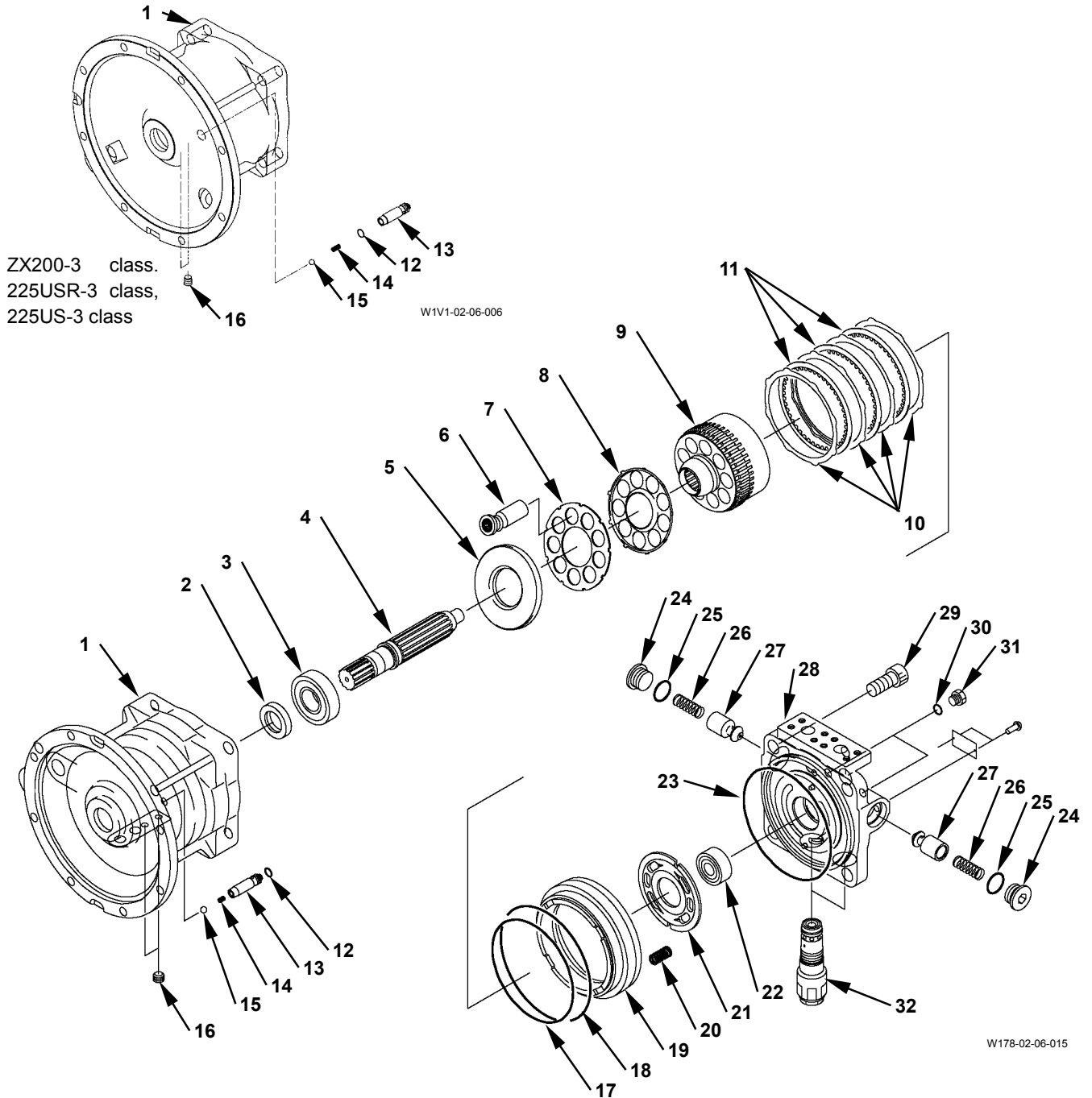
 : 90 N·m (9.0 kgf·m, 66 lbf·ft)



W1V1-02-06-013

## UPPERSTRUCTURE / Swing Device

### DISSASSEMBLE SWING MOTOR (ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)



- |                      |                              |                       |                            |
|----------------------|------------------------------|-----------------------|----------------------------|
| 1 - Casing           | 9 - Rotor                    | 17 - O-Ring           | 25 - O-Ring (2 Used)       |
| 2 - Oil Seal         | 10 - Plate (4 Used)          | 18 - O-Ring           | 26 - Spring (2 Used)       |
| 3 - Bearing          | 11 - Friction Plate (3 Used) | 19 - Brake Piston     | 27 - Poppet (2 Used)       |
| 4 - Shaft            | 12 - O-Ring                  | 20 - Spring (24 Used) | 28 - Valve Casing          |
| 5 - Shoe Plate       | 13 - Piston                  | 21 - Valve Plate      | 29 - Socket Bolt (4 Used)  |
| 6 - Plunger (9 Used) | 14 - Spring                  | 22 - Bearing          | 30 - O-Ring (2 Used)       |
| 7 - Plate            | 15 - Ball                    | 23 - O-Ring           | 31 - Plug (2 Used)         |
| 8 - Retainer         | 16 - Plug (2 Used)           | 24 - Plug (2 Used)    | 32 - Relief Valve (2 Used) |


## UPPERSTRUCTURE / Swing Device

**Disassemble Swing Motor**  
(ZX200-3 class, 225USR-3 class, 225US-3 class,  
240-3 class)


**CAUTION:** The swing motor assembly weight: 48 kg (105 lb)

**IMPORTANT: Do not disassemble relief valve (32).**

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


 : 41 mm

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

 : 14 mm

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

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

 : 17 mm

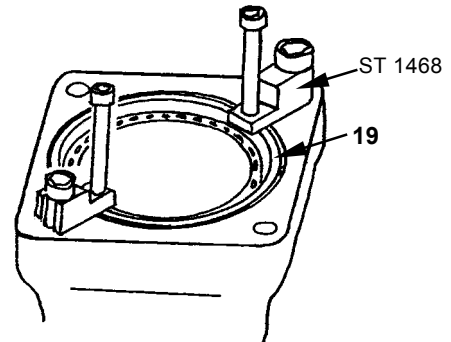
**IMPORTANT: Do not remove bearing (22) unless necessary.**

5. Remove valve casing (28) from casing (1). As valve casing (28) may be with valve plate (21) attached, do not drop valve plate (21). Remove O-ring (23).

**IMPORTANT: Do not damage the mating surfaces when separating valve plate (21) from valve casing (28) or rotor (9) by using a screwdriver.**

6. If valve plate (21) is still attached on rotor (9) in step 5, remove valve plate (21) from rotor (9). Remove springs (20) (24 used).

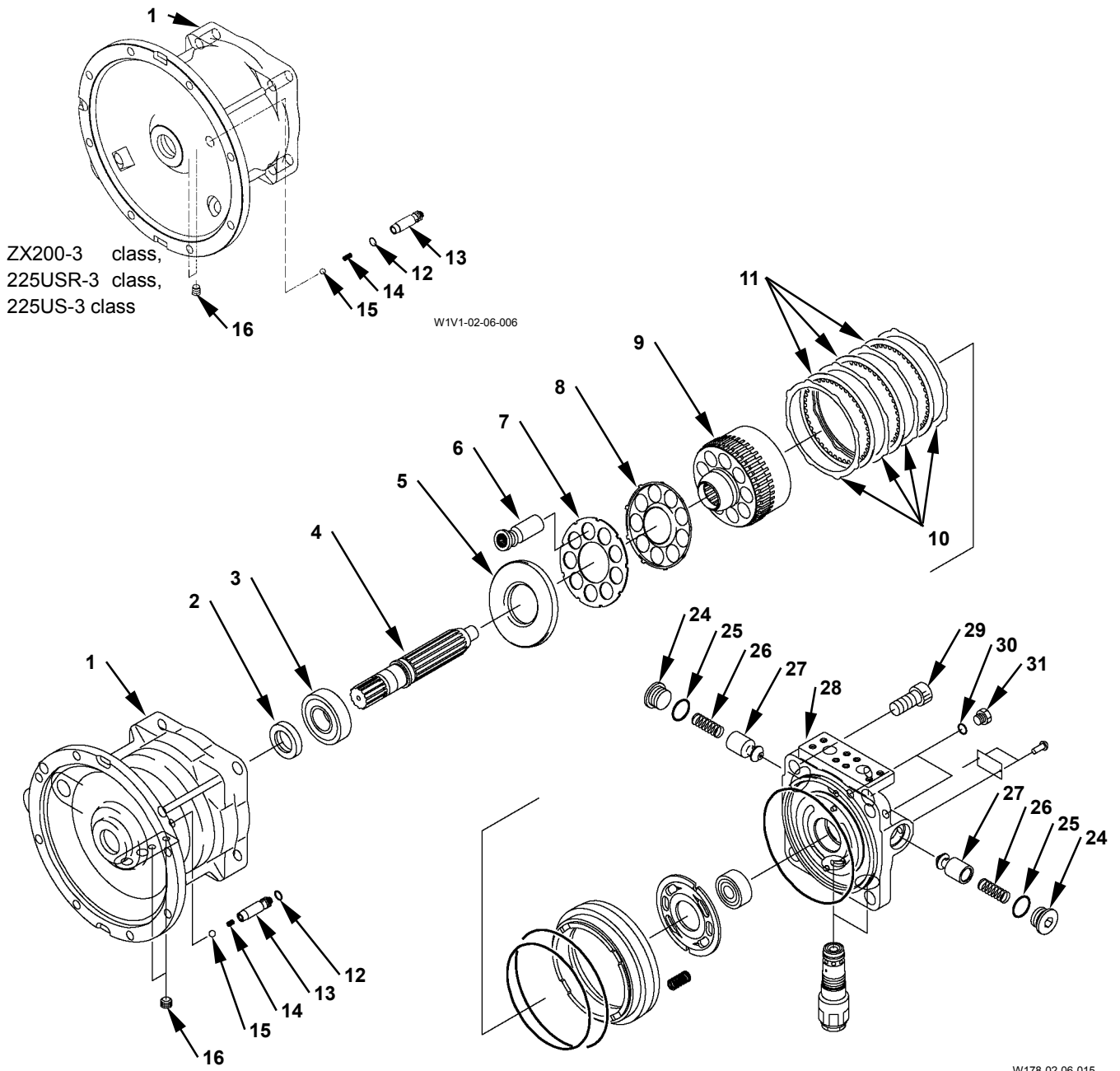
7. Attach the claw of special tool (ST 1468) onto the groove in brake piston (19). Remove brake piston (19) from casing (1) upward and straightly.



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8. Remove O-rings (17, 18) from casing (1).

# UPPERSTRUCTURE / Swing Device



## UPPERSTRUCTURE / Swing Device

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**IMPORTANT: Do not damage the sliding surfaces of rotor (9) and plunger (6).**

9. Place casing (1) horizontally. Remove rotor (9), retainer (8), plate (7) and plungers (6) (9 used) from shaft (4).

10. Remove plates (10) (4 used) and friction plates (11) (3 used) from casing (1).

**IMPORTANT: Do not damage the sliding surface of shoe plate (5).**

11. Remove shoe plate (5) from casing (1).

12. Lightly tap and remove shaft (4) from casing (1) by using a plastic hammer.

13. Remove oil seal (2) from casing (1).

14. Remove the outer race of bearing (3) from casing (1) by using a bar.

15. Remove the inner race of roller bearing (3) from shaft (4) by using a press.


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

**If the inner parts of piston (13) are replaced, replace piston (13) as an assembly.**

16. Remove piston (13) from casing (1) by using a pair of pliers.

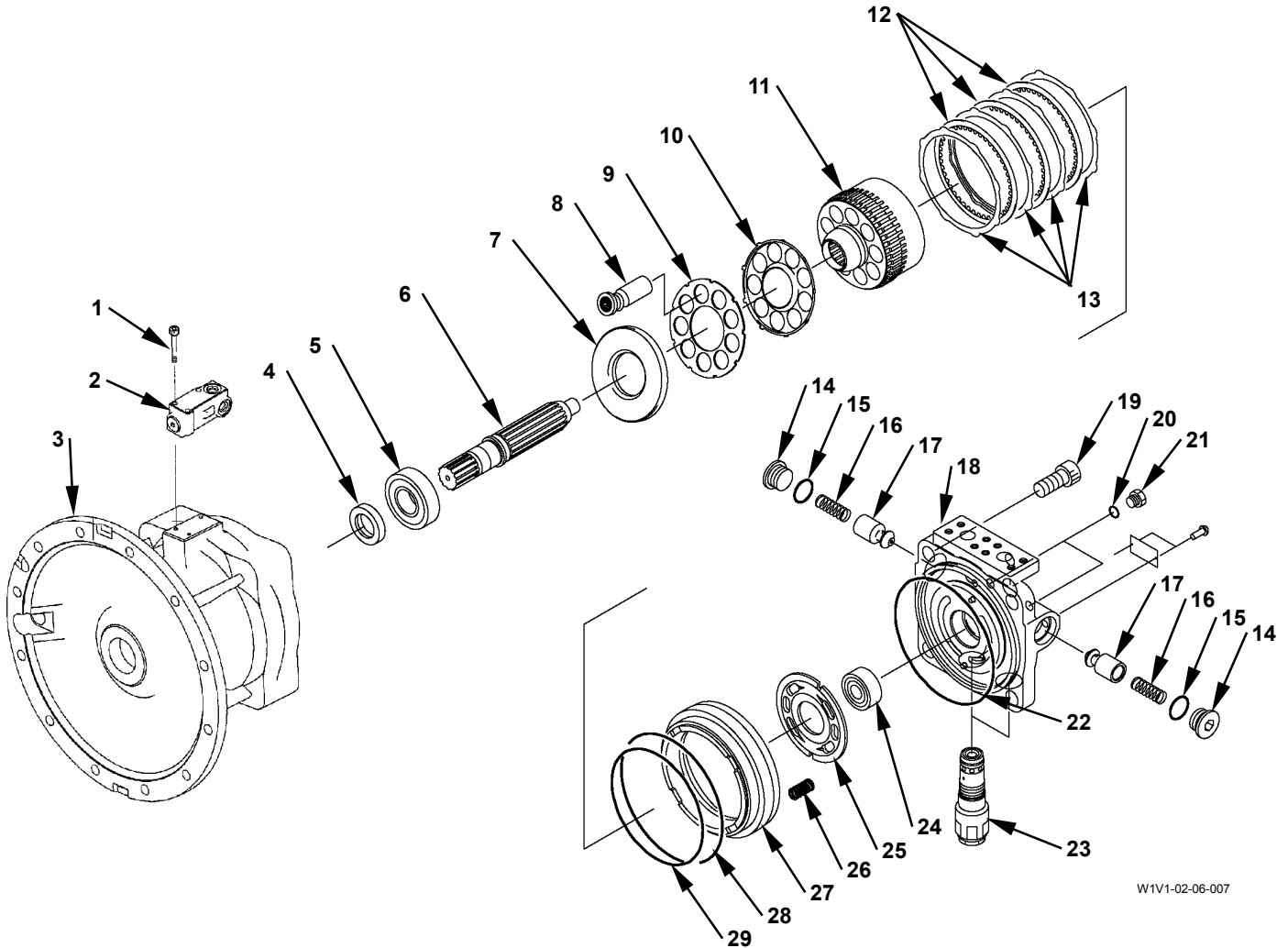
17. Remove spring (14) and ball (15) from casing (1).

18. Remove plugs (16) (2 used) from casing (1).

 : 6 mm

## UPPERSTRUCTURE / Swing Device

### DISASSEMBLE SWING MOTOR (ZX270-3 class)



W1V1-02-06-007

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



## UPPERSTRUCTURE / Swing Device


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### Disassemble Swing Motor (ZX270-3 class)


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

**IMPORTANT:** Do not disassemble relief valve (23).

1. Remove relief valves (23) (2 used) from valve casing (18).


 : 41 mm

2. Remove plugs (14) (2 used) from valve casing (18).

 : 17 mm

3. Remove springs (16) (2 used) and poppets (17) (2 used) from valve casing (18).

4. Put the matching marks at the jointed surface between valve casing (18) and casing (3). Remove socket bolts (19) (4 used). Record the clearance between valve casing (18) and casing (3).

 : 17 mm

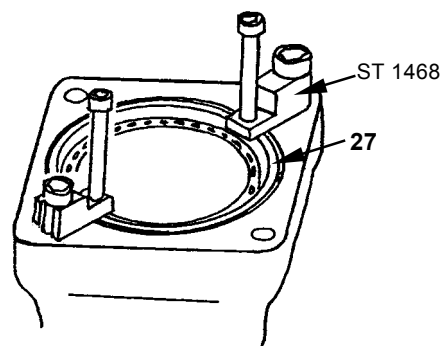
**IMPORTANT:** Do not remove bearing (24) unless necessary.

5. Remove valve casing (18) from casing (3). As valve casing (18) may be with valve plate (25) attached, do not drop valve plate (25). Remove O-ring (22).

**IMPORTANT:** Do not damage the mating surfaces when separating valve plate (18) from valve casing (25) or rotor (11) by using a screwdriver.

6. If valve plate (25) is still attached on rotor (11) in step 5, remove valve plate (25) from the rotor (11) side. Remove springs (26) (20 used) from brake piston (27).

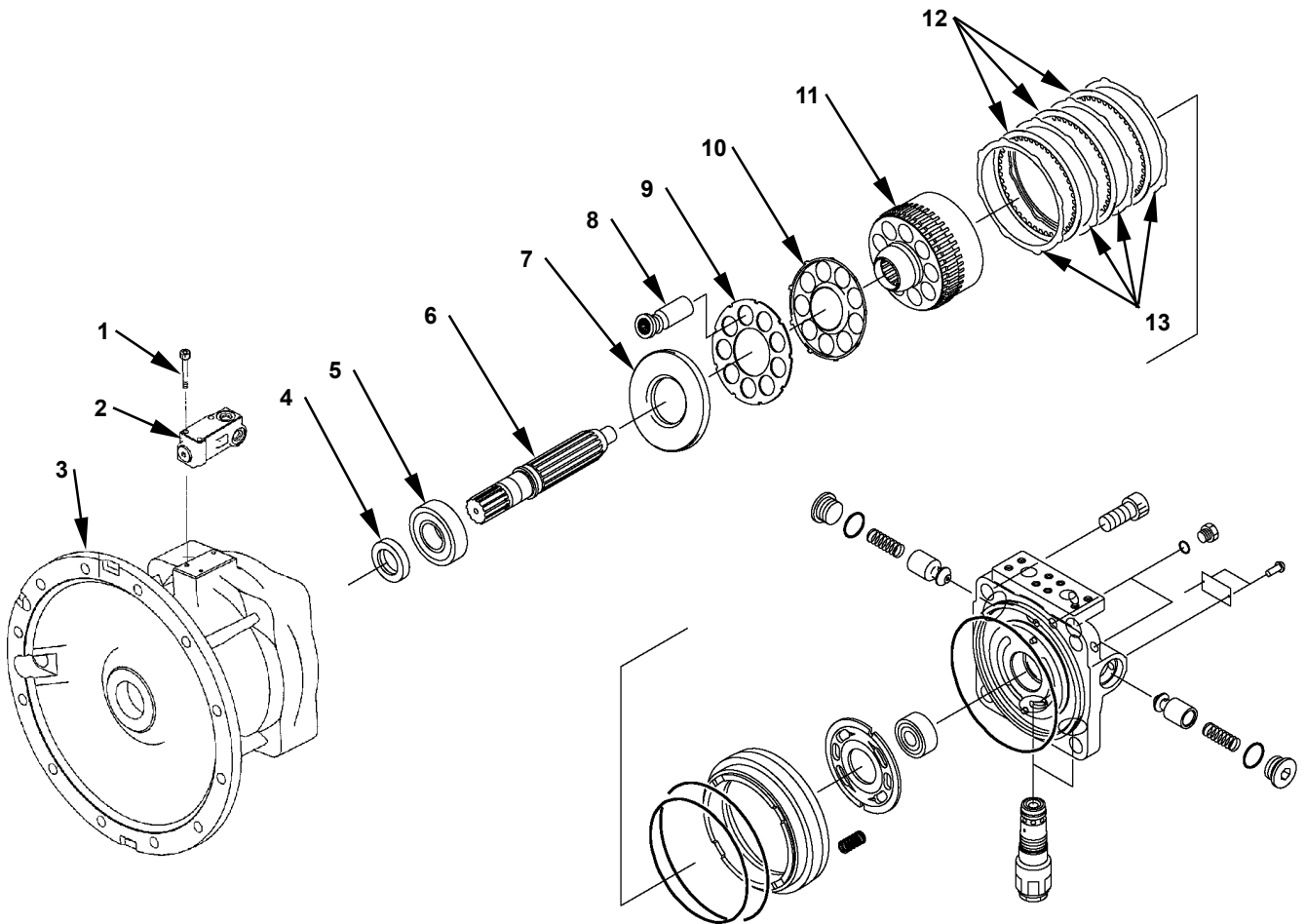
7. Attach the claw of special tool (ST 1468) onto the groove in brake piston (27). Remove brake piston (27) from casing (3) upward and straightly.



W1HH-02-06-006

8. Remove O-rings (28, 29) from casing (3).

# UPPERSTRUCTURE / Swing Device



W1V1-02-06-007


## UPPERSTRUCTURE / Swing Device

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

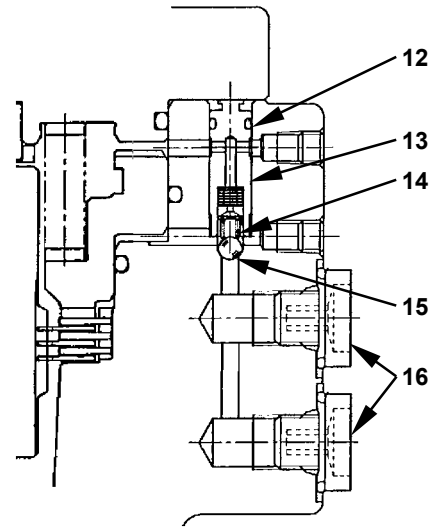
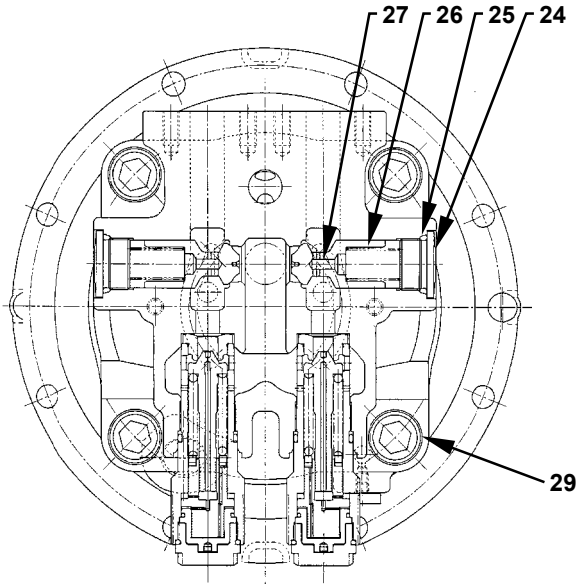
9. Place casing (3) horizontally. Remove rotor (11), retainer (10), plate (9) and plungers (8) (9 used) from shaft (6).
10. Remove plates (13) (4 used) and friction plates (12) (3 used) from casing (3).

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

11. Remove shoe plate (7) from casing (3).
12. Lightly tap and remove shaft (6) from casing (3) by using a plastic hammer.
13. Remove oil seal (4) from casing (3).
14. Remove the outer race of bearing (5) from casing (3) by using a bar.
15. Remove the inner race of roller bearing (5) from shaft (6) by using a press.
16. Remove socket bolts (1) (3 used) from swing parking brake switch valve (2). Remove swing parking brake switch valve (2) from casing (3).  
 : 5 mm

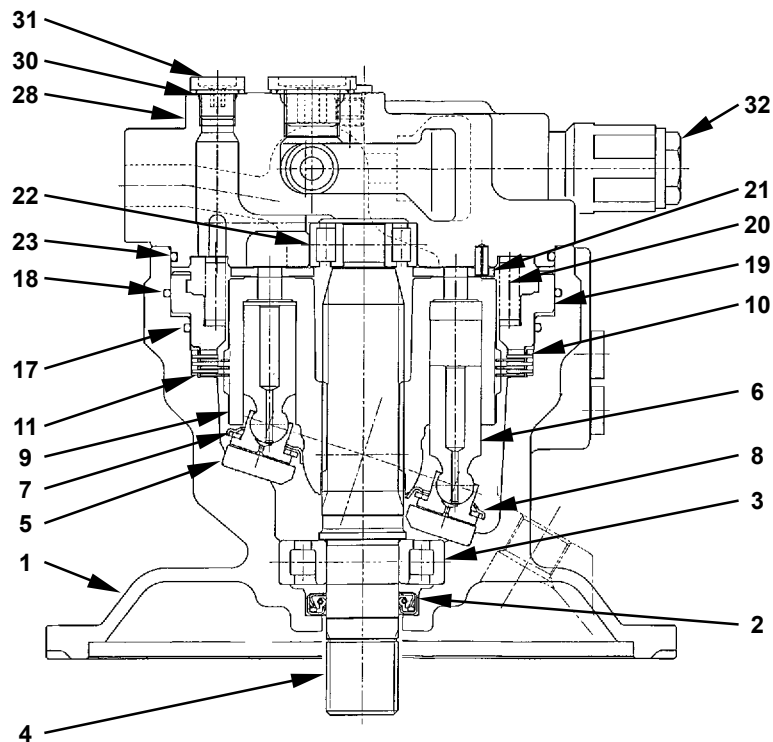
## UPPERSTRUCTURE / Swing Device

### ASSEMBLE SWING MOTOR (ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)



W178-02-11-152

W178-02-11-151



W178-02-11-153


- |                      |                              |                       |                            |
|----------------------|------------------------------|-----------------------|----------------------------|
| 1 - Casing           | 9 - Rotor                    | 17 - O-Ring           | 25 - O-Ring (2 Used)       |
| 2 - Oil Seal         | 10 - Plate (4 Used)          | 18 - O-Ring           | 26 - Spring (2 Used)       |
| 3 - Bearing          | 11 - Friction Plate (3 Used) | 19 - Brake Piston     | 27 - Poppet (2 Used)       |
| 4 - Shaft            | 12 - O-Ring                  | 20 - Spring (24 Used) | 28 - Valve Casing          |
| 5 - Shoe Plate       | 13 - Piston                  | 21 - Valve Plate      | 29 - Socket Bolt (4 Used)  |
| 6 - Plunger (9 Used) | 14 - Spring                  | 22 - Bearing          | 30 - O-Ring (2 Used)       |
| 7 - Plate            | 15 - Ball                    | 23 - O-Ring           | 31 - Plug (2 Used)         |
| 8 - Retainer         | 16 - Plug (2 Used)           | 24 - Plug (2 Used)    | 32 - Relief Valve (2 Used) |

## UPPERSTRUCTURE / Swing Device

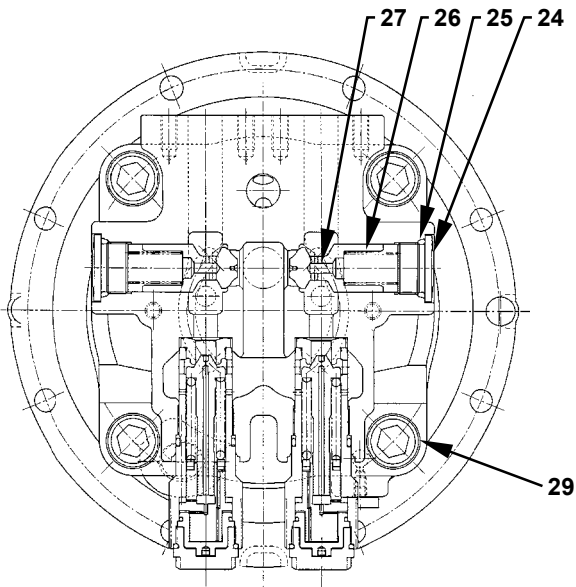
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### Assemble Swing Motor

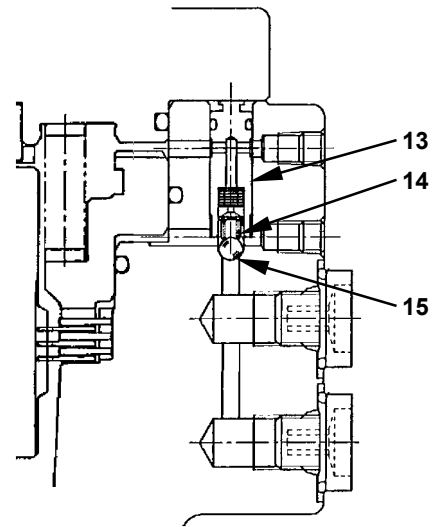
(ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)

1. Install the inner races of bearings (3, 22) into shaft (4) by using a press. Install the inner race of bearing (3) with the flange facing to the step part of shaft (4).
  2. Install oil seal (2) to casing (1) by using a plate with the lip facing upward.
  3. Install the outer race of bearing (3) to casing (1) by using a bar.
  4. Wind the tape onto the spline at the end of shaft (4) in order not to damaging oil seal (2). Place casing (1) horizontally. Install shaft (4) into casing (1).
  5. Place casing (1) vertically with the valve casing (28) mounting side facing upward. Install shoe plate (5) to casing (1) with the chamfered surface facing inside.
  6. Align the notches on plate (7) and retainer (8). Install plungers (6) (9 used). Install retainer (8) to plunger (6) with the notch facing to shoe plate (5).
  7. Apply hydraulic oil into the plunger hole in rotor (9). Insert the plunger (6) assembly into rotor (9).
  8. Place casing (1) horizontally. Install the rotor (9) assembly to shaft (4).
- IMPORTANT: There are 4 notches on the outer side of plate (10). There are 4 notches on the spline teeth side of friction plate (11).**
9. Place casing (1) vertically. Alternately install plates (10) (4 used) and friction plates (11) (3 used) to casing (1) and align each notch at the same place.
  10. Install O-rings (17, 18) to casing (1).
  11. Align the matching marks and install brake piston (19) to casing (1).
-  **NOTE:** *If it is not easy to install O-rings (17, 18) to brake piston (19) due to the resistant force from O-rings (17, 18), tap brake piston (19) evenly by using a plastic hammer.*
12. Install springs (20) (24 used) to brake piston (19).

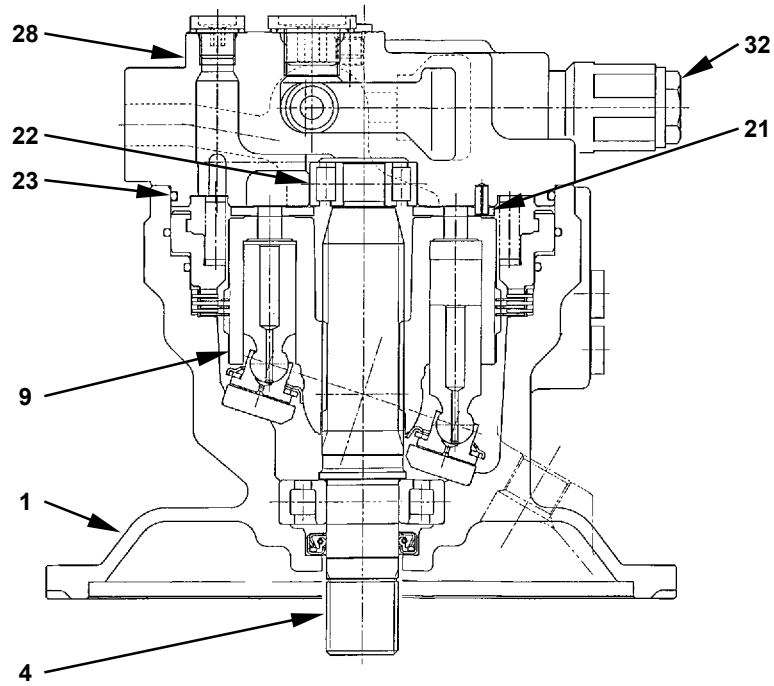
# UPPERSTRUCTURE / Swing Device



W178-02-11-151



W178-02-11-152



W178-02-11-153

## UPPERSTRUCTURE / Swing Device

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**IMPORTANT: If the inner parts of piston (13) are replaced, replace piston (13) as an assembly.**


13. Install ball (15), spring (14) and piston (13) to housing (1), and align the end of piston (13) with that of casing (1).
14. Tap the outer race, the bearing type indicated surface of bearing (22) into valve casing (28) by using a plastic hammer.

**IMPORTANT: Check the surfaces of valve plate (21).**


15. Install O-ring (23) to valve casing (28). Install valve plate (21) to valve casing (28) with the notch in port facing to rotor (9).  
Apply grease onto valve plate (21) in order to drop from valve casing (28).
16. Apply grease onto the needle part on bearing (22) in order to install shaft (4) into bearing (22) easily.
17. Align the matching marks on valve casing (28) and casing (1) and place valve casing (28) onto casing (1). Check that the clearance between valve casing (28) and casing (1) is equal to that before disassembling. If the clearance is larger than that before disassembling, repeat the installation from step 5.


18. Install valve casing (28) to casing (1) with socket bolts (29) (4 used).

 : 17 mm


 : 431 N·m (44 kgf·m, 320 lbf·ft)


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

 : 14 mm

 : 334 N·m (34 kgf·m, 245 lbf·ft)

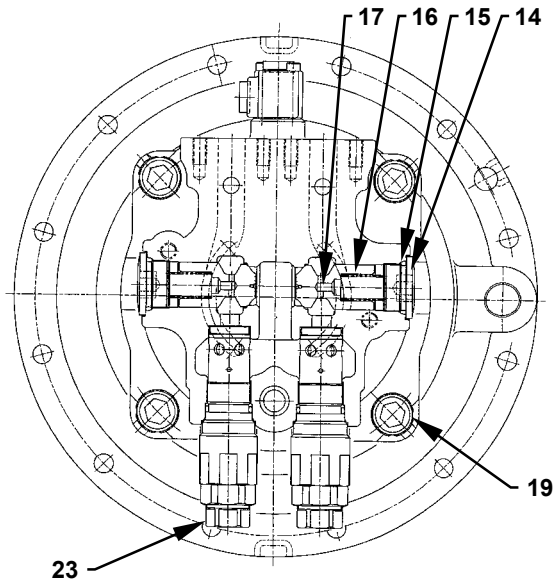
20. Install relief valves (32) (2 used) to valve casing (28).

 : 41 mm

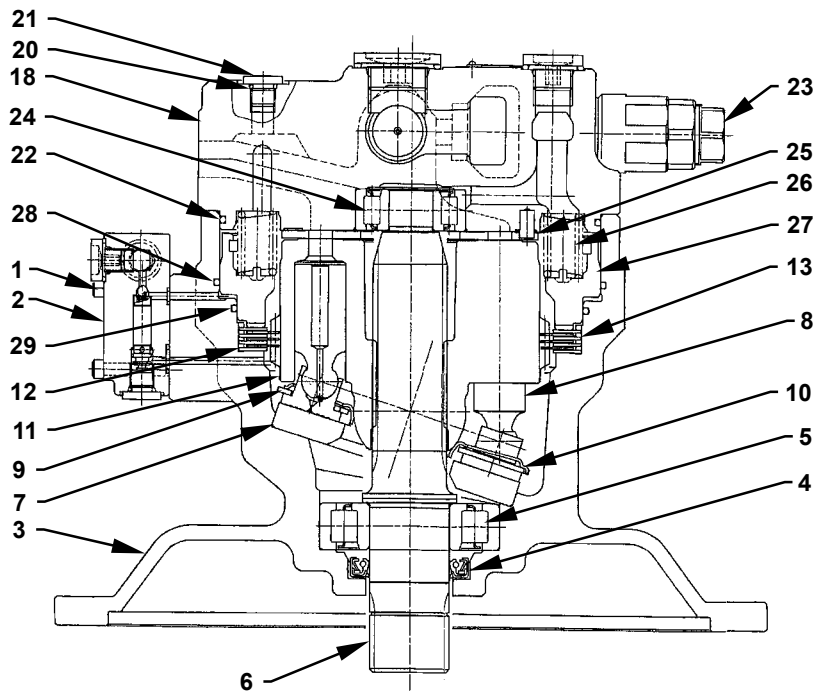
 : 177 N·m (18 kgf·m, 130 lbf·ft)

# UPPERSTRUCTURE / Swing Device

## ASSEMBLE SWING MOTOR (ZX270-3 class)



W1V1-02-06-008



W1V1-02-06-009



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



## UPPERSTRUCTURE / Swing Device

---

### Assemble Swing Motor (ZX270-3 class)


1. 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, 9 lbf·ft)
2. Install the inner races of bearings (5, 24) into shaft (6) by using a press. Install the inner race of bearing (5) with the flange facing to the step side of shaft (6).
3. Install oil seal (4) into casing (3) by using a plate with the lip facing upward.
4. Install the outer race of bearing (5) to casing (3) by using a bar.
5. Wind the tape onto the spline at the end of shaft (6) in order not to damaging oil seal (4). Place casing (3) horizontally. Install shaft (6) into casing (3).
6. Place casing (3) with the valve casing (18) mounting side facing upward. Install shoe plate (7) with the chamfered surface facing inside.
7. Align the notches on plate (9) and retainer (10). Install plungers (8) (9 used). Install retainer (10) to plunger (8) with the notch facing to shoe plate (7).
8. Apply hydraulic oil into the plunger hole in rotor (11). Insert the plunger (8) assembly into rotor (11).
8. Place casing (3) horizontally. Install the rotor (11) assembly to shaft (6).

**IMPORTANT: There are 4 notches on the outer side of plate (13). There are 4 notches on the spline teeth side of friction plate (12).**

10. Place casing (3) vertically. Alternately install friction plates (12) (3 used) and plates (13) (4 used) and align each notch at the same place.

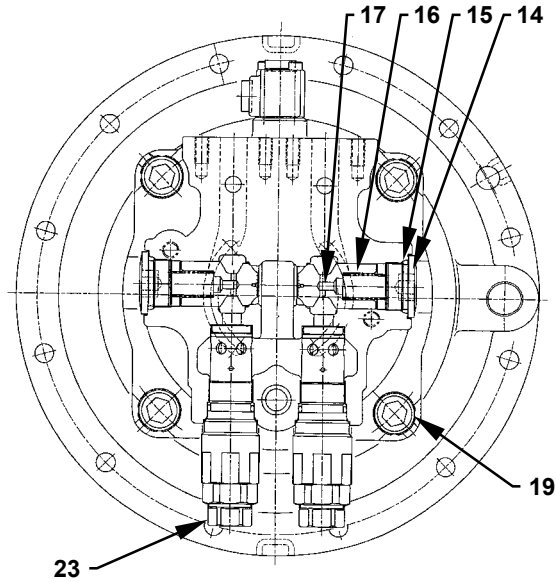
11. Install O-rings (28, 29) to casing (3).

12. Align matching marks and install brake piston (27) to casing (3).

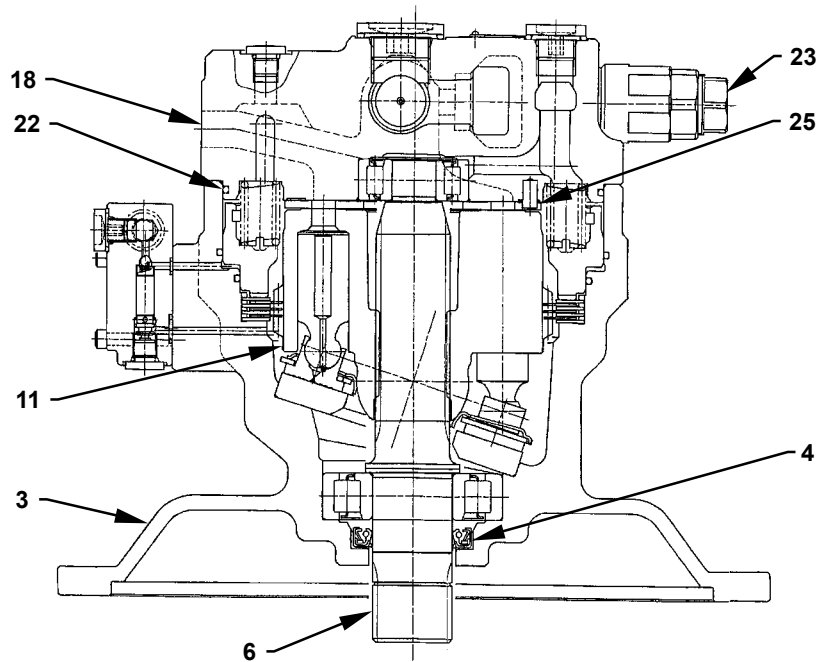
 **NOTE:** *If it is not easy to install O-rings (28, 29) into brake piston (27) due to the resistant force from O-rings (28, 29), tap brake piston (27) evenly by using a plastic hammer.*

13. Install springs (26) (20 used) to brake piston (27).

# UPPERSTRUCTURE / Swing Device



W1V1-02-06-008



W1V1-02-06-009

## UPPERSTRUCTURE / Swing Device

---

14. Tap the outer race, the bearing type indicated surface of bearing (24) into valve casing (18) by using a plastic hammer.

**IMPORTANT: Check the surfaces of valve plate (25).**


15. Install O-ring (22) to valve casing (18). Install valve plate (25) to valve casing (18) with the notch in port facing to rotor (11).


Apply grease onto valve plate (25) in order to drop from valve casing (18).

16. Apply grease onto the needle part on bearing (24) in order to install shaft (6) into bearing (24) easily.


17. Align the matching marks on valve casing (18) and casing (3) and place valve casing (28) onto casing (3). Check that the clearance between valve casing (18) and casing (3) is equal to that before disassembling. If the clearance is larger than that before disassembling, repeat the installation from step 5.


18. Install valve casing (18) to casing (3) with socket bolts (19) (4 used).

 : 17 mm


 : 430 N·m (44 kgf·m, 320 lbf·ft)


19. Install poppets (17) (2 used) and springs (16) ( 2 used) to valve casing (18). Install plug (14) with O-ring (15) attached.

 : 17 mm

 : 539 N·m (55 kgf·m, 400 lbf·ft)

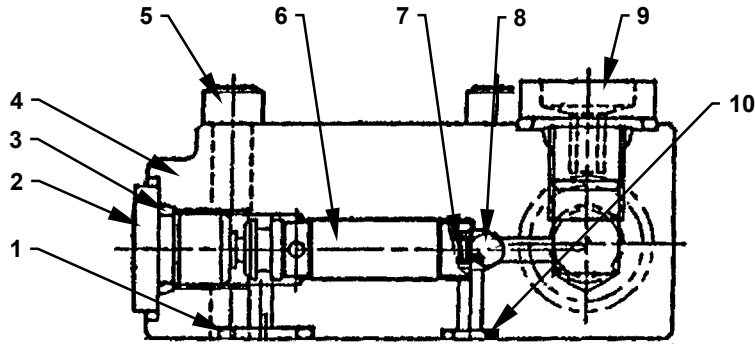
20. Install relief valves (23) (2 used) to valve casing (18).

 : 41 mm

 : 177 N·m (18 kgf·m, 130 lbf·ft)

## UPPERSTRUCTURE / Swing Device

### STRUCTURE OF SWING PARKING BRAKE SWITCH VALVE (ZX270-3 class)



W1V1-02-06-010

Item	Parts	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)	(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

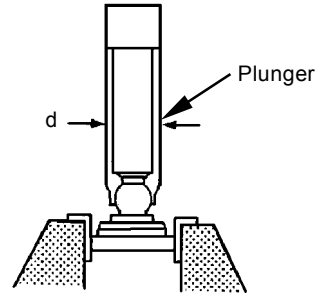
## MAINTENANCE STANDARD

### Swing Motor

1. Clearance between plunger outer diameter and rotor inner bore  
(ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)

Unit: mm (in)

	Standard	Allowable Limit
D-d	0.027 (0.001)	0.052 (0.002)

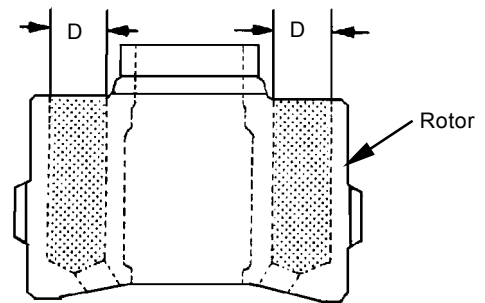


W178-02-11-155

(ZX270-3 class)

Unit: mm (in)

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

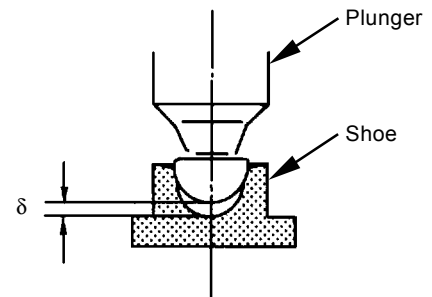


W178-02-11-156

2. Clearance between plunger and shoe

Unit: mm (in)

	Standard	Allowable Limit
	0 (0)	0.3 (0.012)



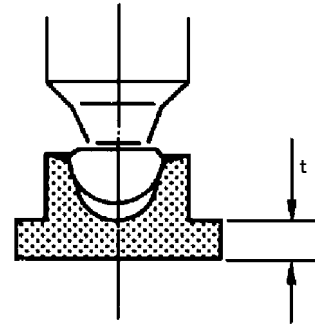
W107-02-06-140

## UPPERSTRUCTURE / Swing Device

### 3. Shoe thickness

Unit: mm (in)

Standard	Allowable Limit
5.5 (0.217)	5.3 (0.209)



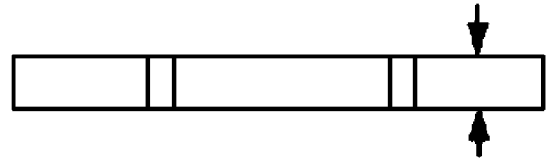
W178-02-11-157

### 4. Friction plate thickness

(ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)

Unit: mm (in)

Standard	Allowable Limit
2.0 (0.079)	1.8 (0.071)



W178-02-11-158

(ZX270-3 class)

Unit: mm (in)

Standard	Allowable Limit
2.0 (0.079)	1.6 (0.063)

## UPPERSTRUCTURE / Pilot Valve


### REMOVE AND INSTALL PILOT VALVE

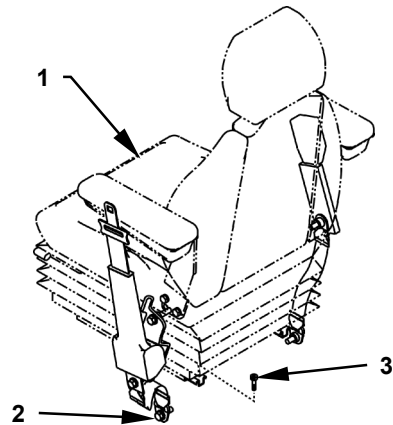
**⚠ CAUTION:** Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

#### Remove Left Pilot Valve

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


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

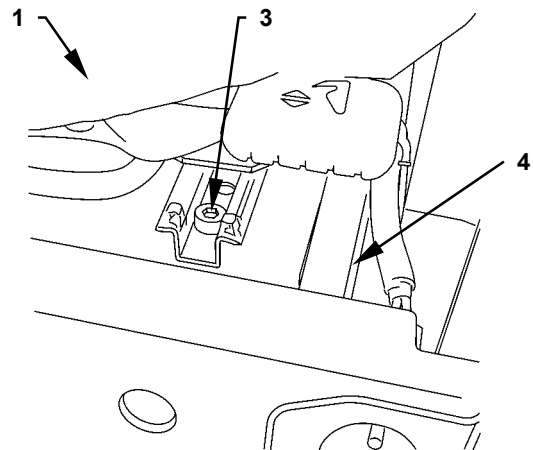
 : 16 mm



W1JB-02-01-008

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

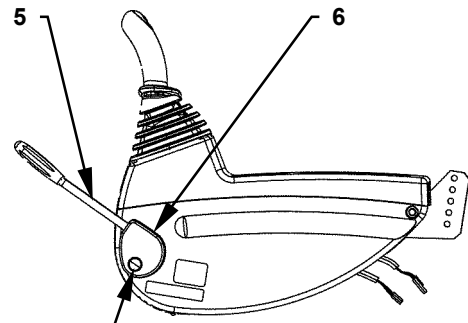
 : 6 mm




W1JB-02-07-007

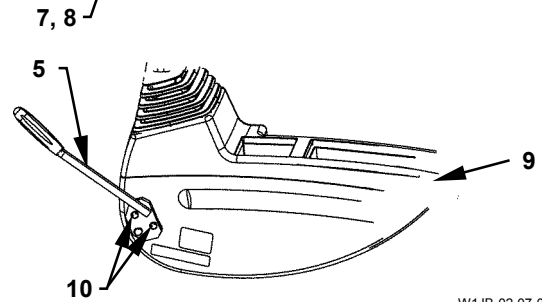
## UPPERSTRUCTURE / Pilot Valve

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



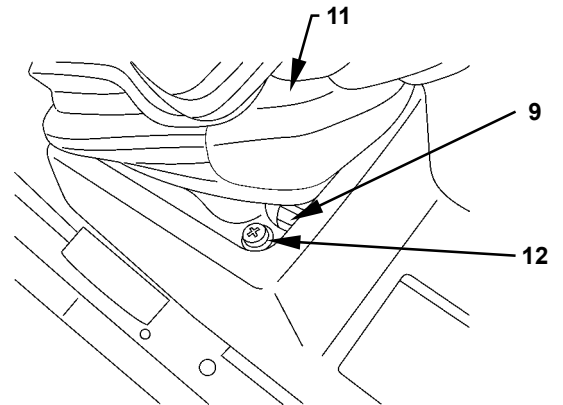
W1JB-02-07-013

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



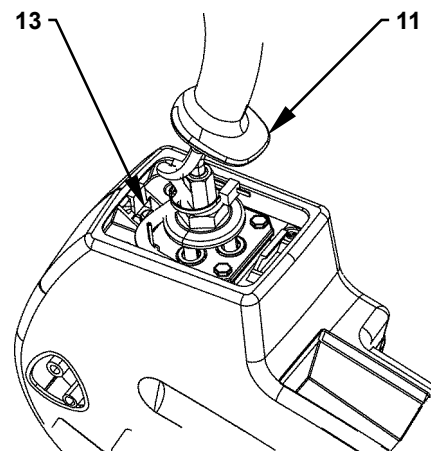
W1JB-02-07-012

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



W1JB-02-07-002

6. Remove screw (13).




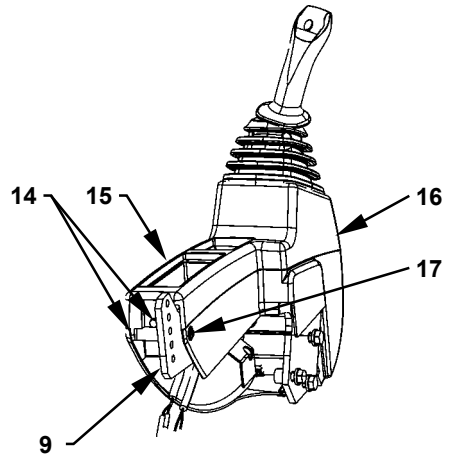
W1JB-02-07-014



## UPPERSTRUCTURE / Pilot Valve

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


 : 10 mm

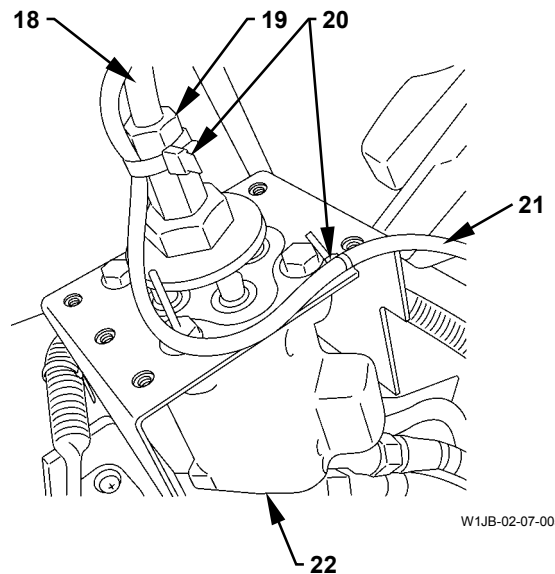


W1JB-02-07-011

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


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

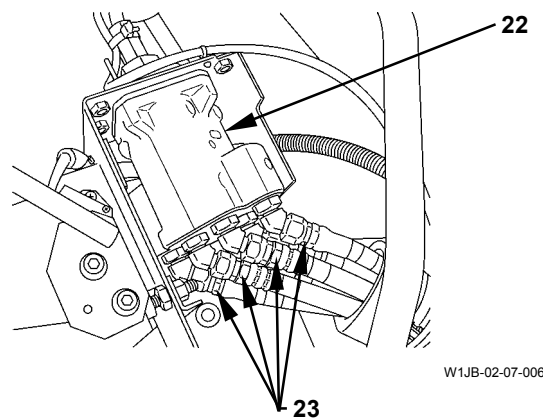
 : 19 mm, 22 mm



W1JB-02-07-005

10. Remove hoses (23) (6 used) from pilot valve (22).  
Attach an identification tag onto the removed hoses for assembling. Cap the open ends.

 : 19 mm




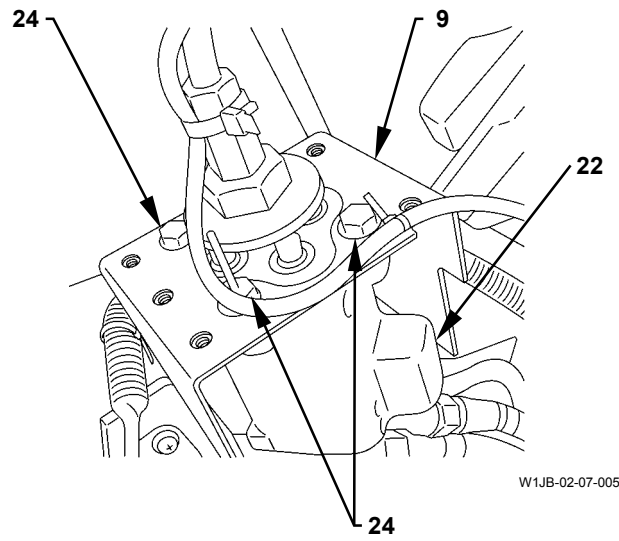
W1JB-02-07-006

## UPPERSTRUCTURE / Pilot Valve

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

 : 13 mm





W1JB-02-07-005

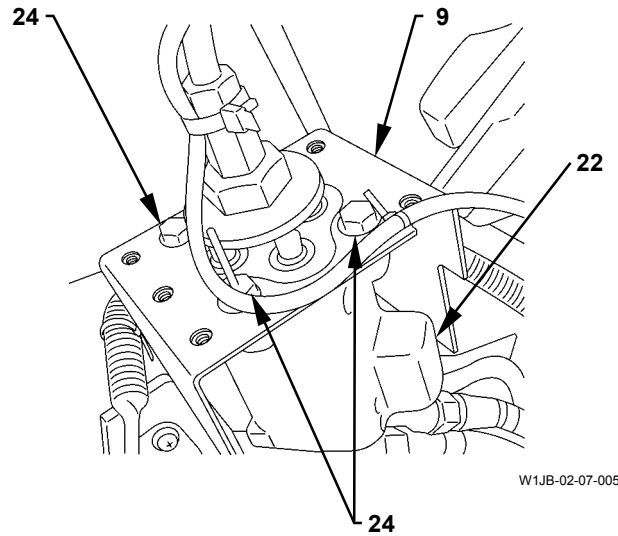
## UPPERSTRUCTURE / Pilot Valve

### Install Left Pilot Valve


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


 : 13 mm

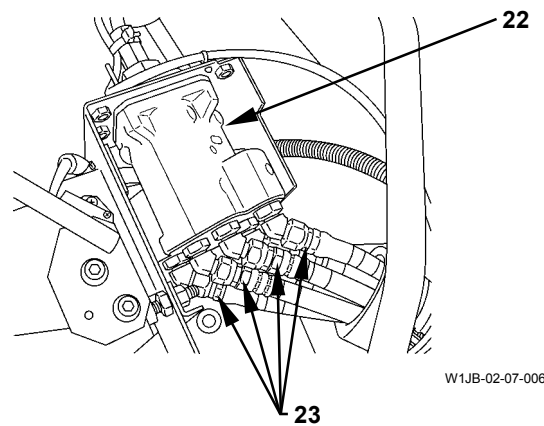
 : 20 N·m (2 kgf·m, 15 lbf·ft)




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


 : 19 mm

 : 29.5 N·m (3 kgf·m, 22 lbf·ft)



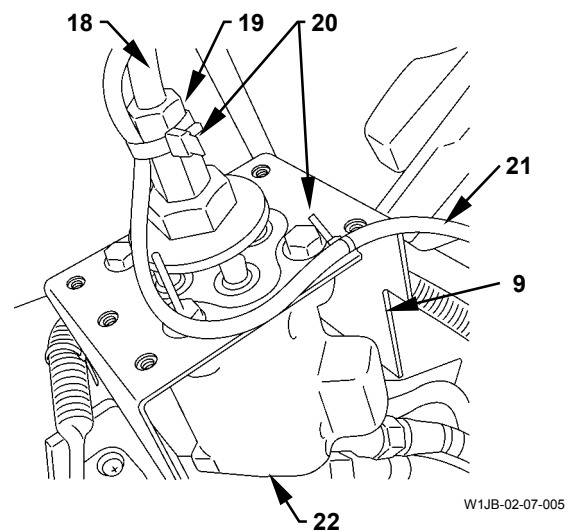
3. Install the lever (18) assembly to pilot valve (22). Secure the lever (18) assembly to pilot valve (22) with lock nut (19).

 : 22 mm

 : 55 N·m (5.5 kgf·m, 41 lbf·ft)


4. Connect the connector of wire (21).


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



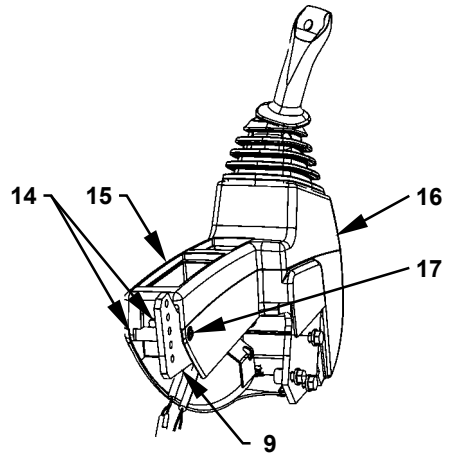
## UPPERSTRUCTURE / Pilot Valve

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

 : 10 mm

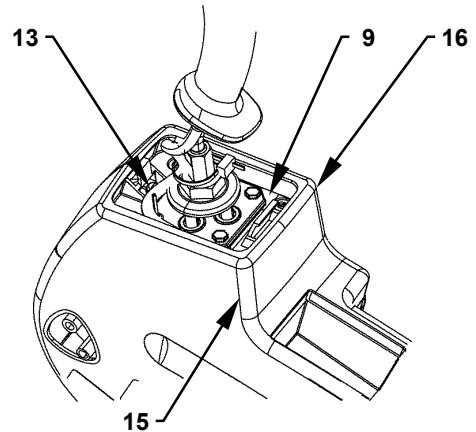
 : 3.3 to 4.2 N·m

(0.3 to 0.4kgf·m, 2.4 to 3.1 lbf·ft)



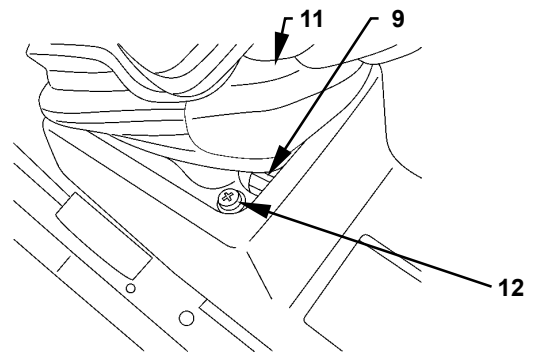
W1JB-02-07-011

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




W1JB-02-07-014


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

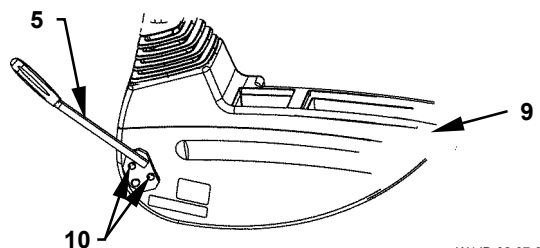


W1JB-02-07-002

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

 : 13 mm

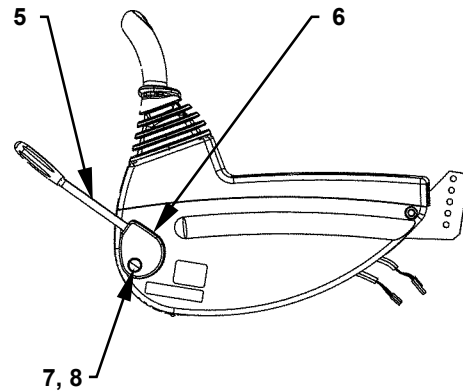
 : 20 N·m (2 kgf·m, 15 lbf·ft)



W1JB-02-07-012

## UPPERSTRUCTURE / Pilot Valve


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




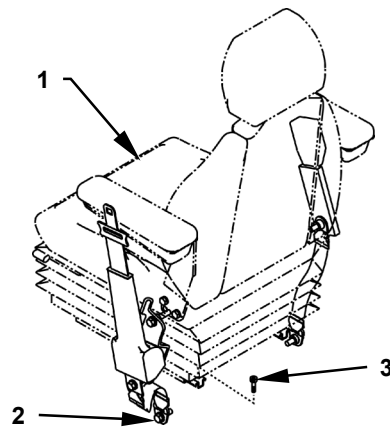
W1JB-02-07-013

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

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


 : 6 mm


 : 20 N·m (2 kgf·m, 15 lbf·ft)

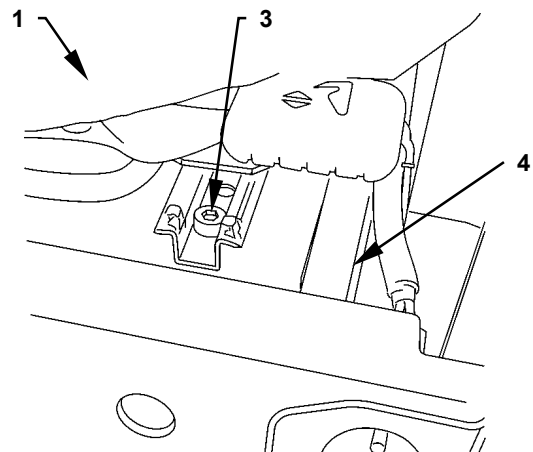


W1JB-02-01-008

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

 : 16 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

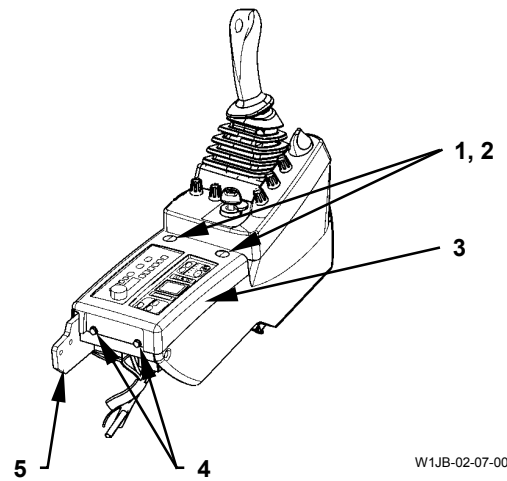


W1JB-02-07-007

## UPPERSTRUCTURE / Pilot Valve

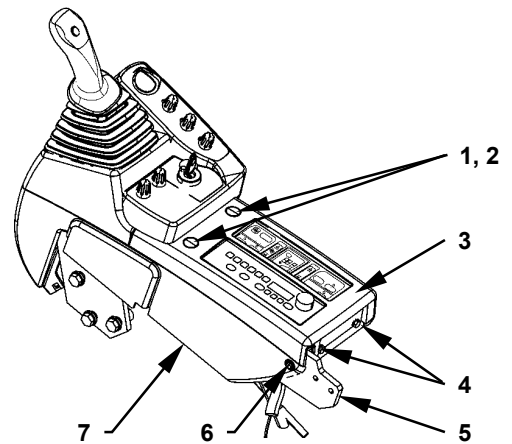
### Remove Right Pilot Valve

1. Remove the seat. (Refer to W2-7-1.)
2. Remove caps (1) (2 used). Remove screws (2, 4) (2 used for each). Remove cover (3) from bracket (5).



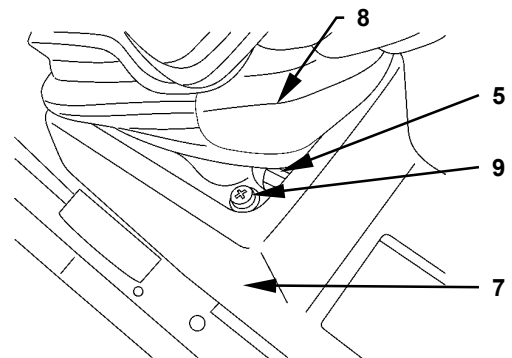
W1JB-02-07-009

3. Remove screw (6).

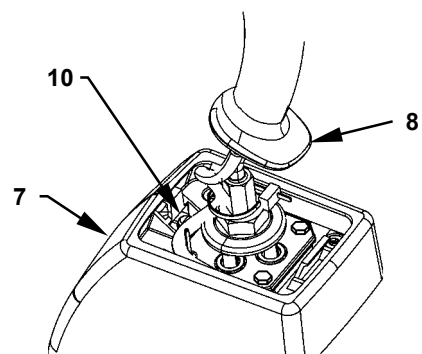


W1JB-02-07-008

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



W1JB-02-07-002




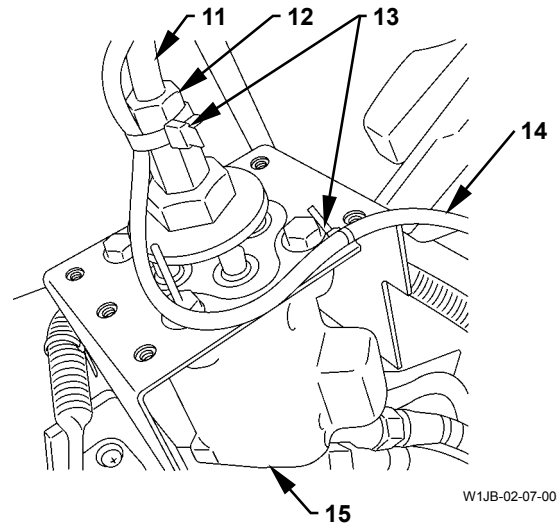
W1JB-02-07-016

## UPPERSTRUCTURE / Pilot Valve


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

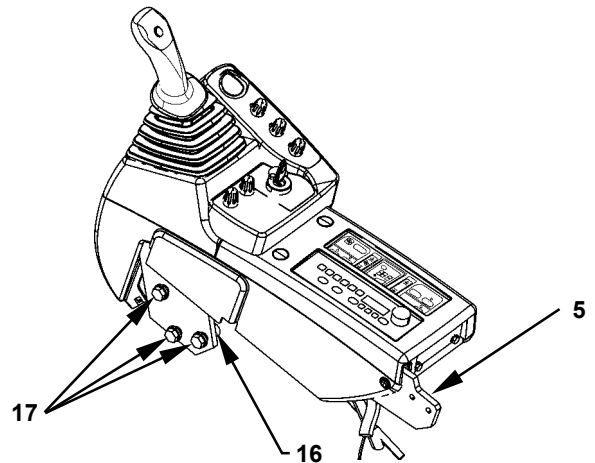
7. Loosen lock nut (12). Remove the lever (11) assembly from pilot valve (15).

 : 19 mm, 22 mm




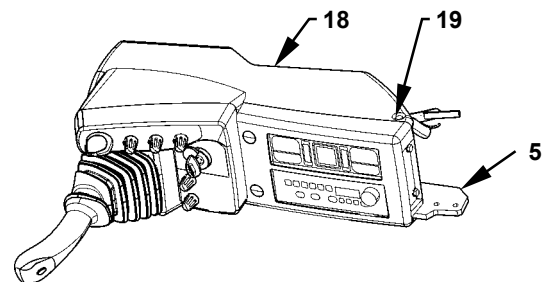
8. Remove bolts (17) (3 used). Remove the bracket (5) assembly from stand (16). Lay down the bracket (5) assembly.

 : 17 mm




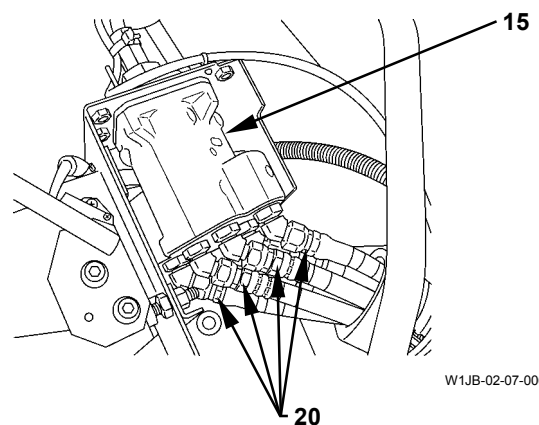
9. Remove bolt (19). Remove cover (18) from bracket (5).

 : 10 mm



10. Remove hoses (20) (6 used) from pilot valve (15). Attach an identification tag onto the removed hoses for reassembling. Cap the open ends.


 : 19 mm

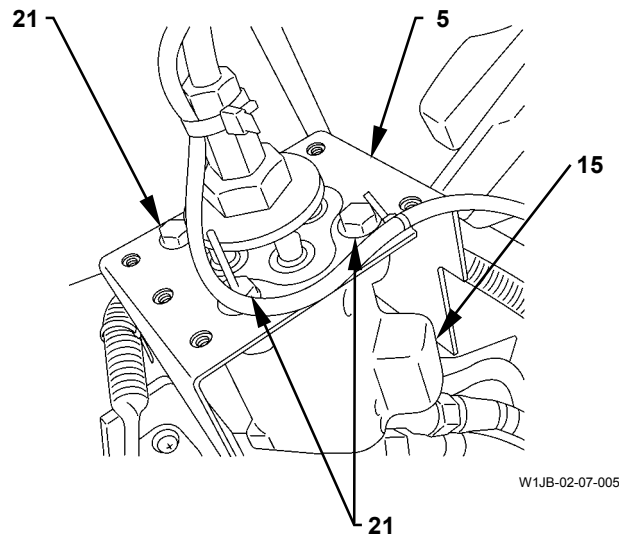


## UPPERSTRUCTURE / Pilot Valve

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

 : 13 mm




W1JB-02-07-005




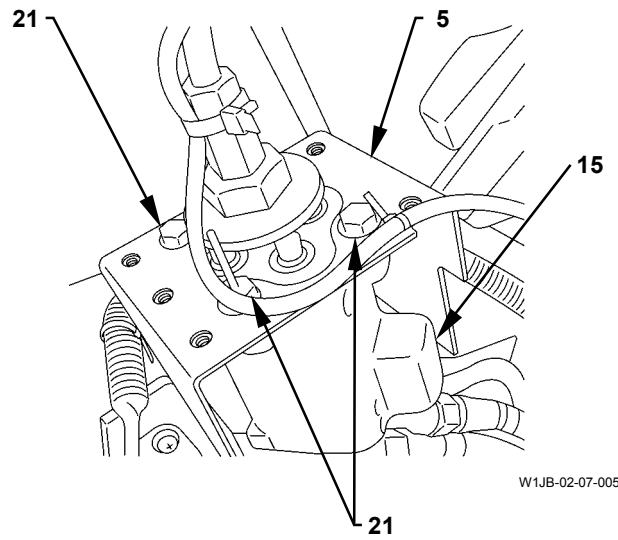
## UPPERSTRUCTURE / Pilot Valve

### Install Right Pilot Valve


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


 : 13 mm

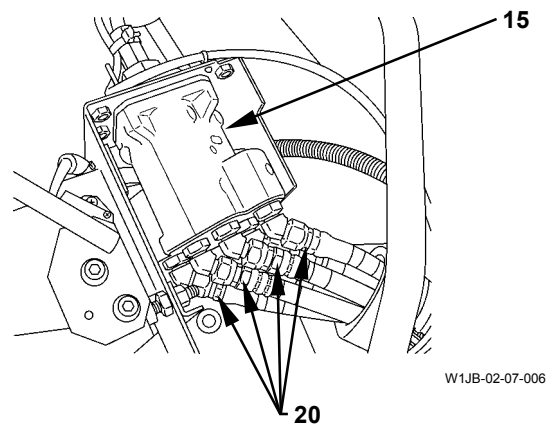
 : 20 N·m (2 kgf·m, 15 lbf·ft)



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


 : 19 mm


 : 29.5 N·m (3 kgf·m, 220 lbf·ft)



## UPPERSTRUCTURE / Pilot Valve

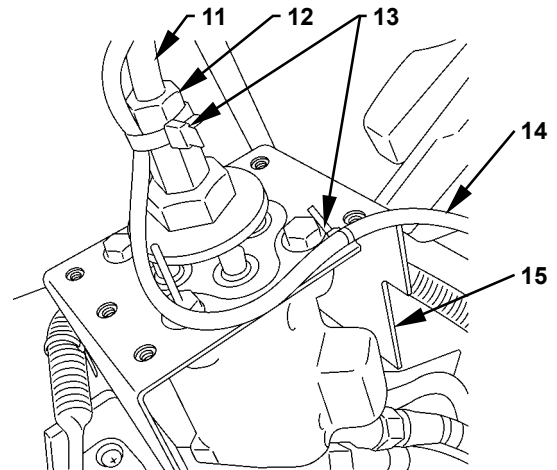
3. Install the lever (11) assembly to pilot valve (15).  
Secure the lever (11) assembly to pilot valve (15)  
with lock nut (12).

 : 22 mm

 : 56 N·m (5.5 kgf·m, 41 lbf·ft)


4. Connect the connector of wire (14).


5. Install wire (14) to pilot valve (15) and bracket (5)  
with clip bands (13) (2 used).



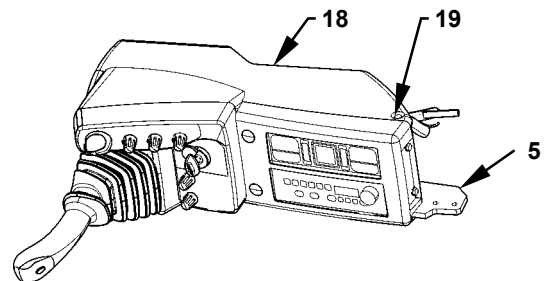
W1JB-02-07-005

6. Install cover (18) to bracket (5) with bolt (19).

 : 10 mm

 : 3.3 to 4.2 N·m


(0.3 to 0.4 kgf·m, 2.4 to 3.1 lbf·ft)




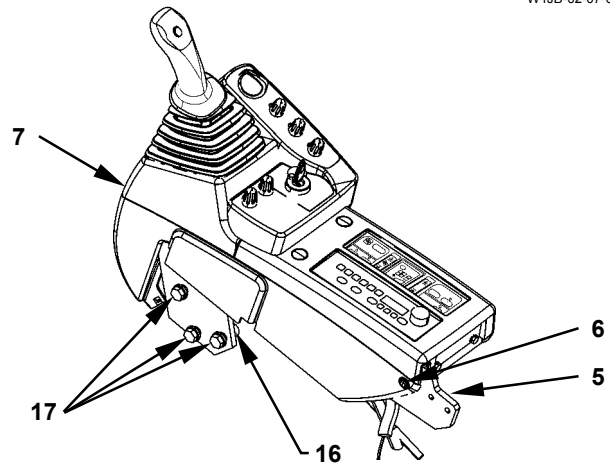
W1JB-02-07-010

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

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

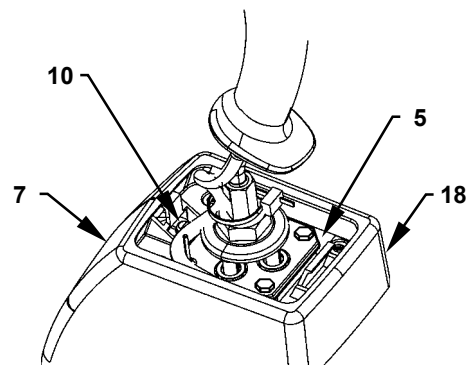
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



W1JB-02-07-008

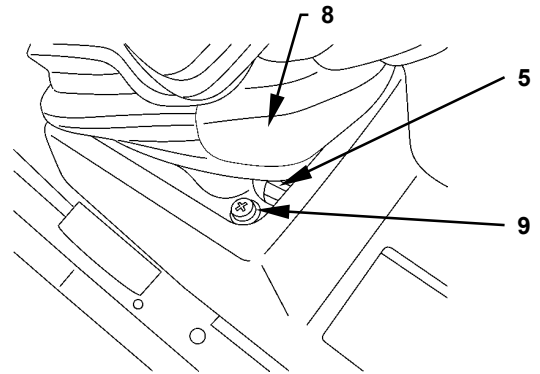
9. Install covers (18, 7) to bracket (5) with screw  
(10).



W1JB-02-07-016

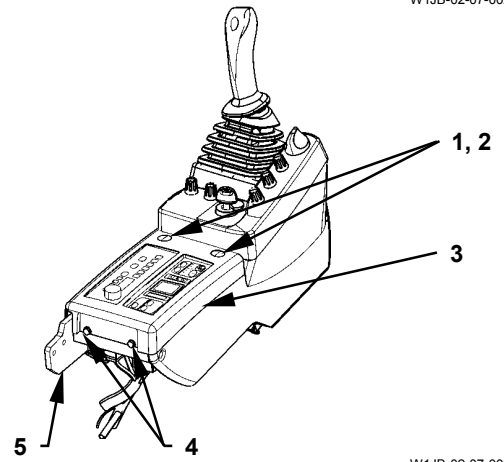
## UPPERSTRUCTURE / Pilot Valve

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



W1JB-02-07-002


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




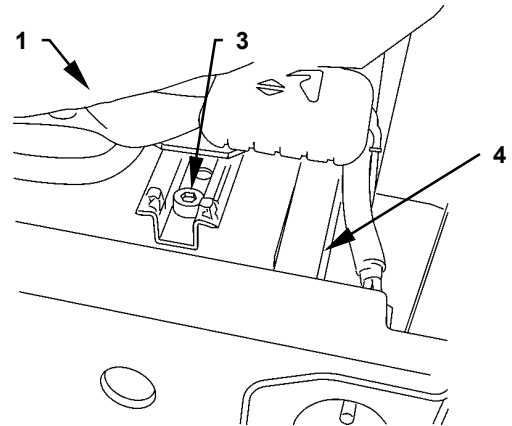
W1JB-02-07-009

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

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


 : 6 mm


 : 20 N·m (2 kgf·m, 15 lbf·ft)

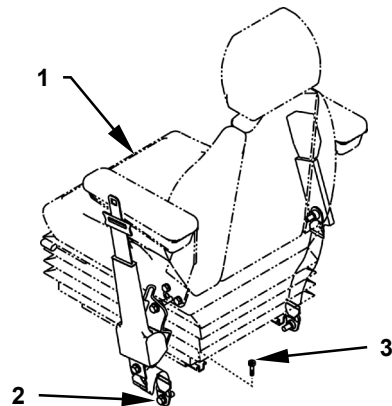


W1JB-02-07-007

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

 : 16 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)




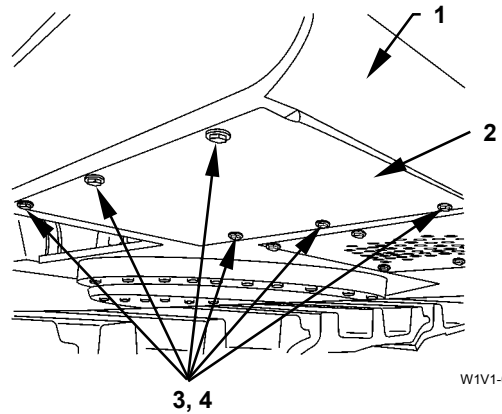
W1JB-02-01-008

## UPPERSTRUCTURE / Pilot Valve

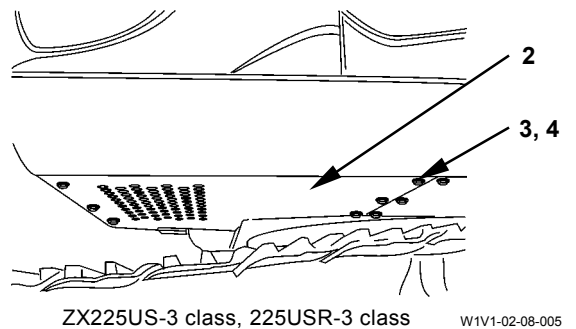
### Remove Travel Pilot Valve

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


 : 17 mm

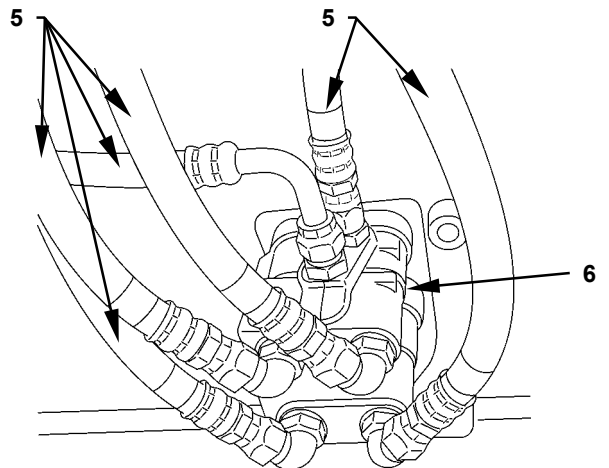


ZX200-3 class, 240-3 class, 270-3 class

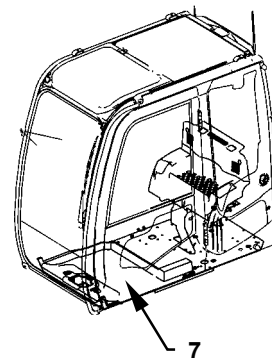


2. Remove hoses (5) (6 used) from pilot valve (6). Attach identification tags to the removed hoses for reassembling. Cap the open end.

 : 17 mm, 19 mm




3. Remove floor mat (7).

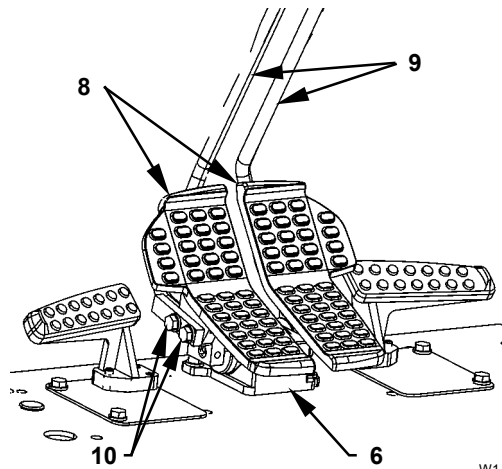


## UPPERSTRUCTURE / Pilot Valve

---


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

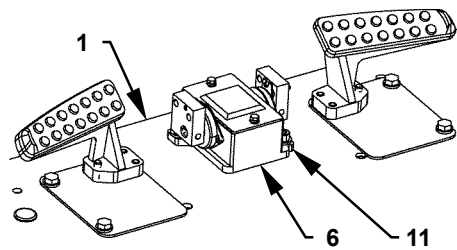
 : 17 mm



W1JB-02-07-003

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

 : 8 mm





W1JB-02-07-004

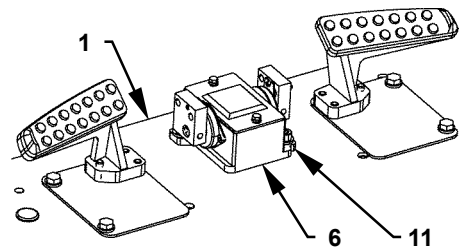
## UPPERSTRUCTURE / Pilot Valve

### Install Travel Pilot Valve

1. Install pilot valve (6) to main frame (1) with socket bolts (11) (2 used).


 : 8 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

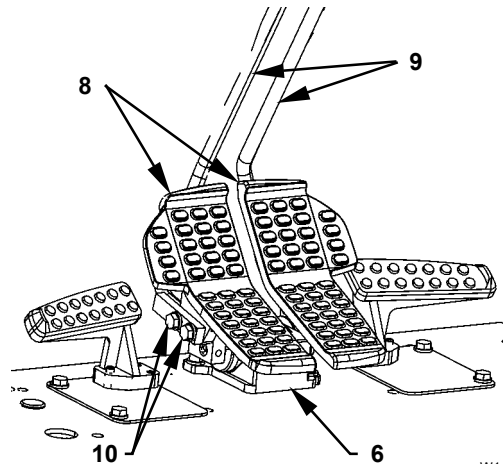


W1JB-02-07-004

2. Install levers (9) (2 used) and pedals (8) (2 used) to pilot valve (6) with bolts (10) (4 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)





W1JB-02-07-003

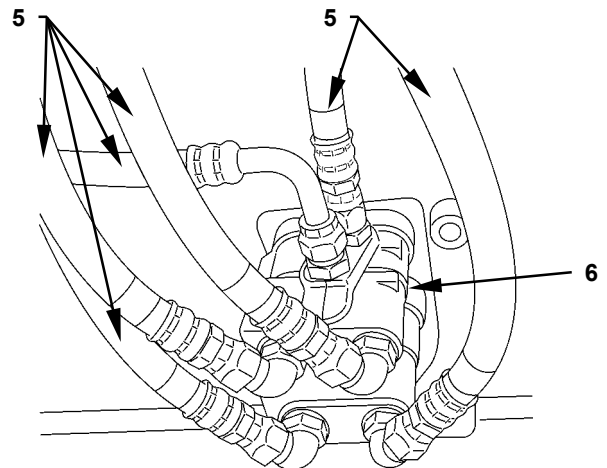
3. Install hoses (5) (6 used) to pilot valve (6).

 : 17 mm

 : 24.5 N·m (2.5 kgf·m, 18 lbf·ft)

 : 19 mm


 : 29.5 N·m (3 kgf·m, 22 lbf·ft)




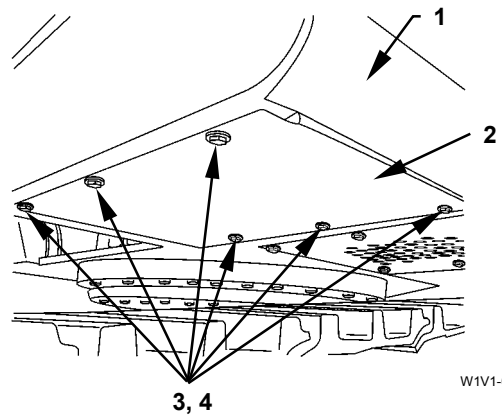
W1JB-02-07-001

## UPPERSTRUCTURE / Pilot Valve

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

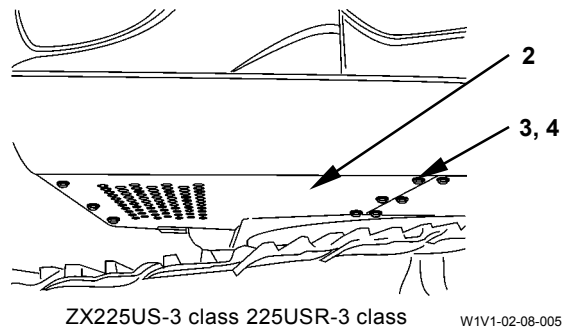
 : 17 mm

 : 50 N·m (5.1 kgf·m, 37 lbf·ft)



W1V1-02-08-002

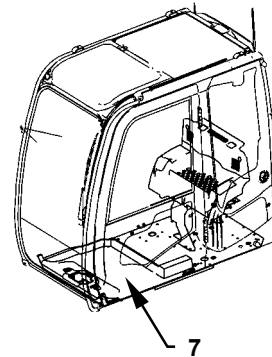
ZX200-3 class, 240-3 class, 270-3 class



ZX225US-3 class 225USR-3 class

W1V1-02-08-005

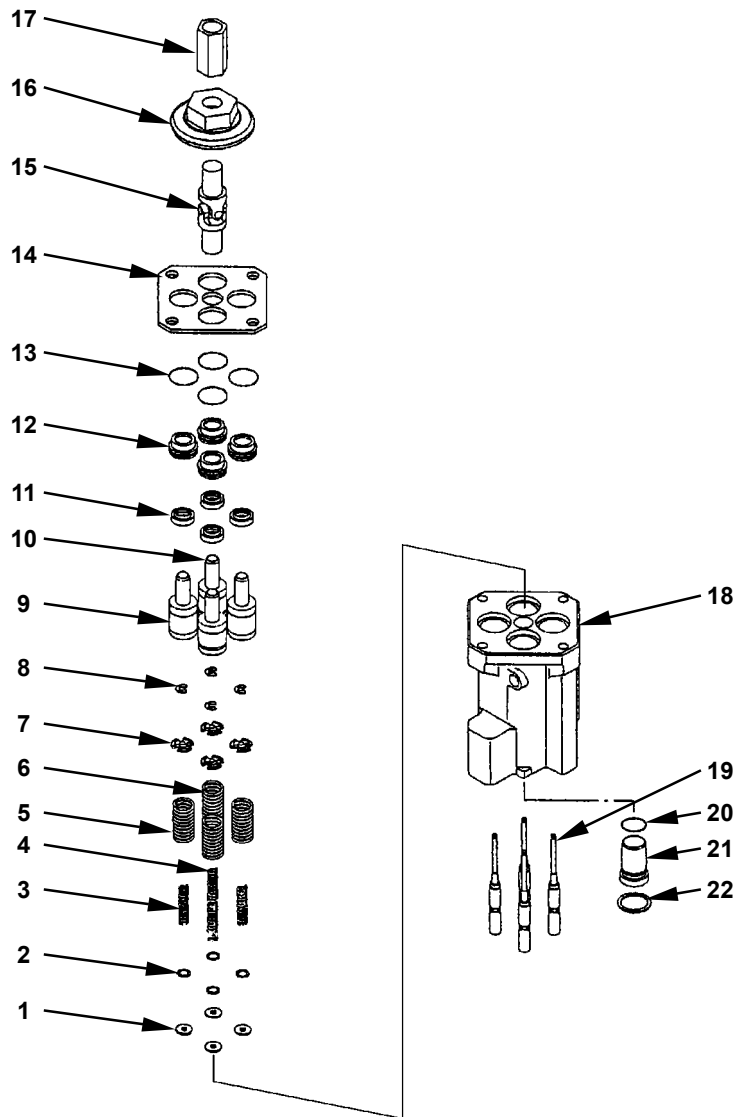
5. Install floor mat (7).



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).

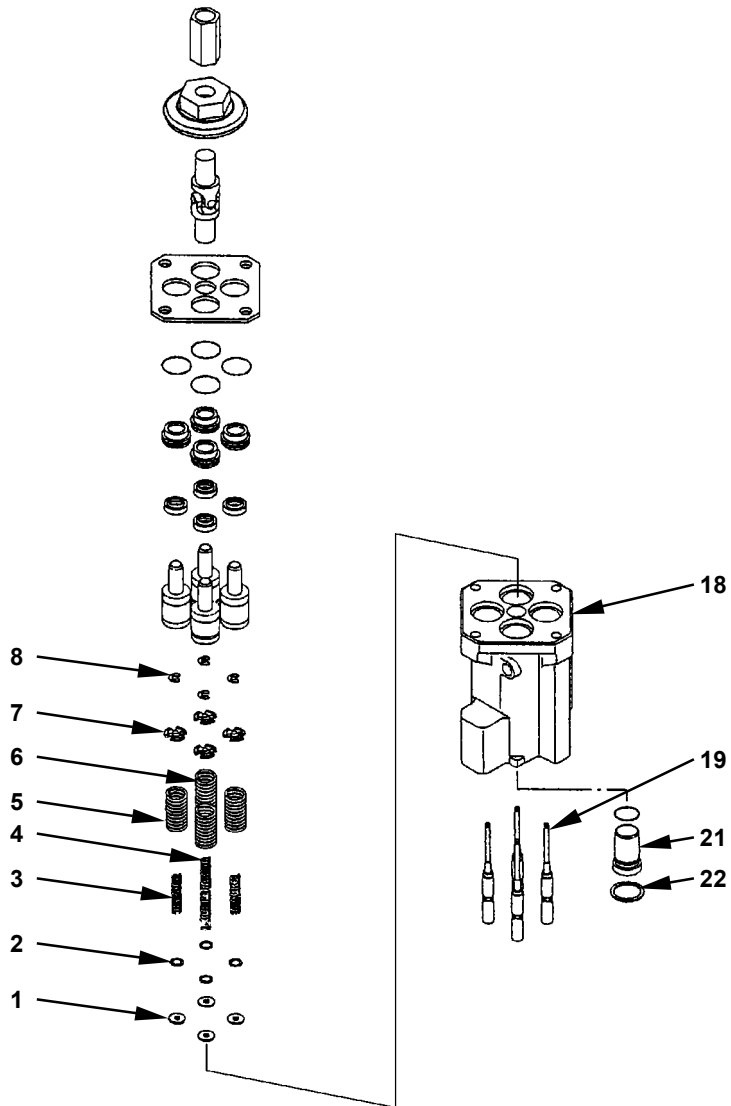
**IMPORTANT:** Do not damage the surface of sleeve (12). Insert a soft rubber between sleeve (12) and the tool. Oil seal (11) cannot be removed from sleeve (12). Sleeve (12) and oil seal (11) must be replaced as an assembly.

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

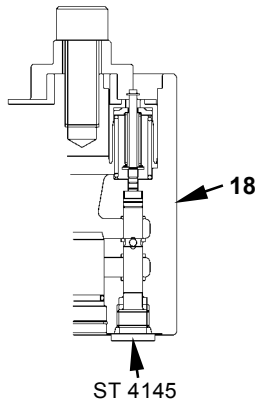


W178-02-07-064

## 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.

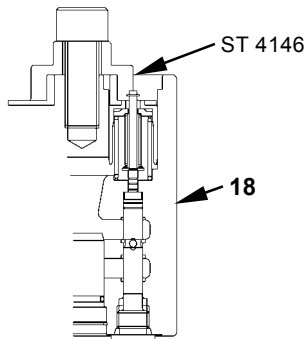
 : 6 mm



W178-02-07-048

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



W178-02-07-048

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

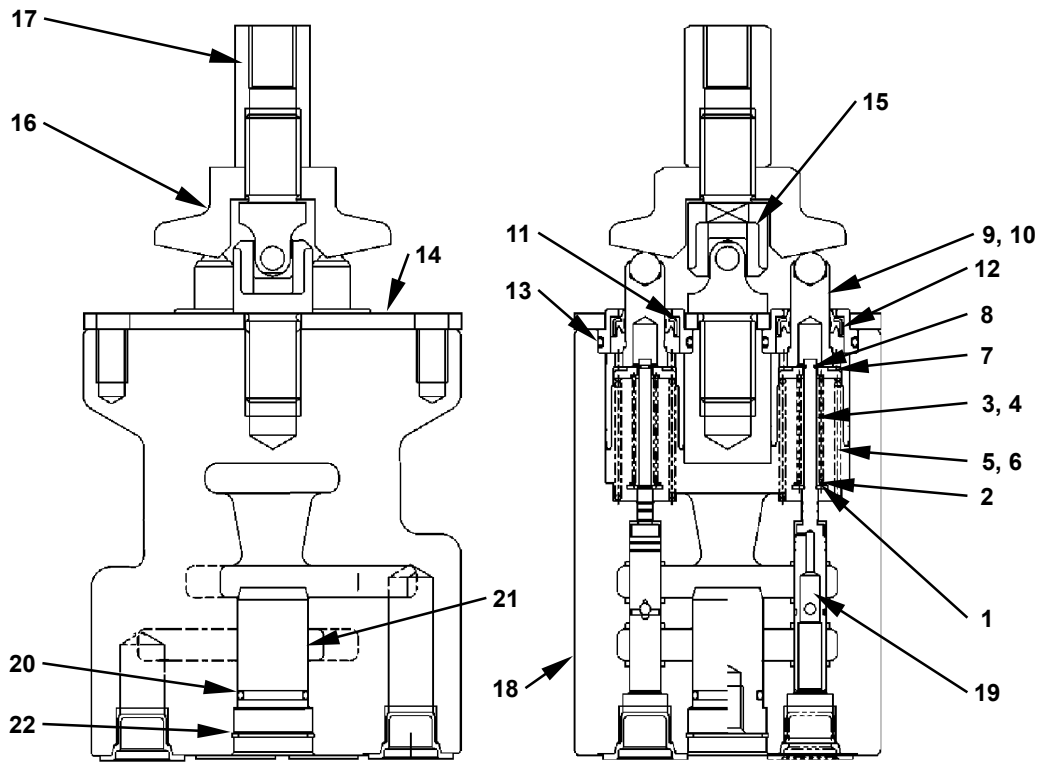
**IMPORTANT:** Retaining ring (22) may come off while disassembling. Do not drop retaining ring (22) inside casing (18). If retaining ring (22) falls inside casing (18), remove retaining ring (22) completely. Retaining ring (22) cannot be reused.

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.

 **NOTE:** Table below shows the relations between each port and the components. Do not confuse them when assembling.


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

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


1. Check the port 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).

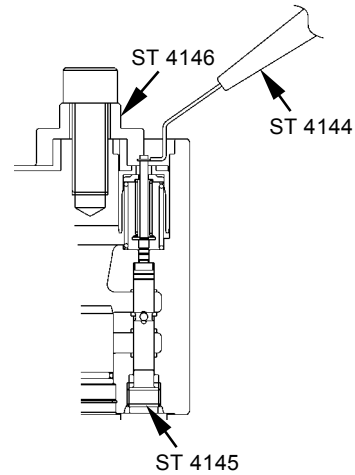
 **NOTE:** Spool (19) has been selected to match the port hole. Spool (19) and casing (18) must be replaced as an assembly.

2. 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.

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

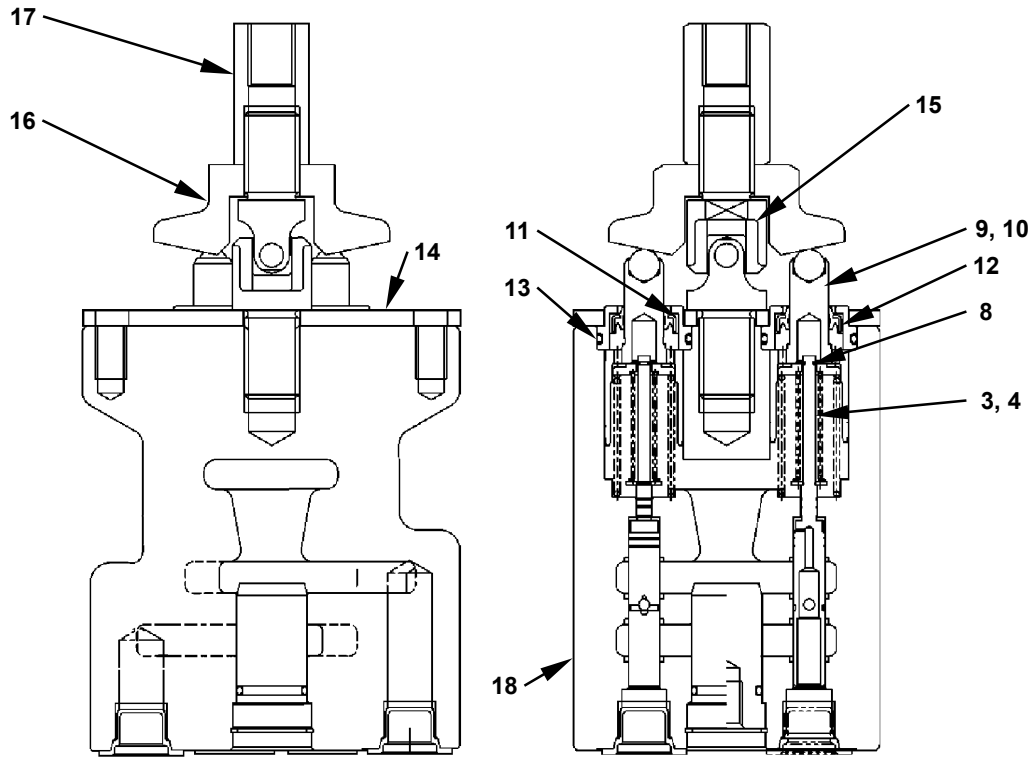


W178-02-07-049

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

# UPPERSTRUCTURE / Pilot Valve

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W1V1-02-07-001

## UPPERSTRUCTURE / Pilot Valve

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


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

8. Install pushers (9, 10) (2 used for each).  
After pushing pushers (9, 10) (2 used for each) by hand, remove them. Check if retaining ring (8) falls off or balance springs (3, 4) (2 used for each) are located correctly.  
After checking, install pushers (9, 10) (2 used for each) to casing (18).

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

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

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


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


12. Install oil seals (11) (4 used) to sleeves (12) (4 used). Push the sleeves (12) (4 used) assembly by hand until O-ring (13) is inserted into the hole on sleeves (12) (4 used).

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

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

14. Apply LOCTITE #262 to the thread part of universal joint (15). Place plate (14) on casing (18) and install universal joint (15).


 : 17 mm


 : 24.5 N·m (2.5 kgf·m, 18 lbf·ft)

**IMPORTANT: Check the tightness of cam (16).**

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

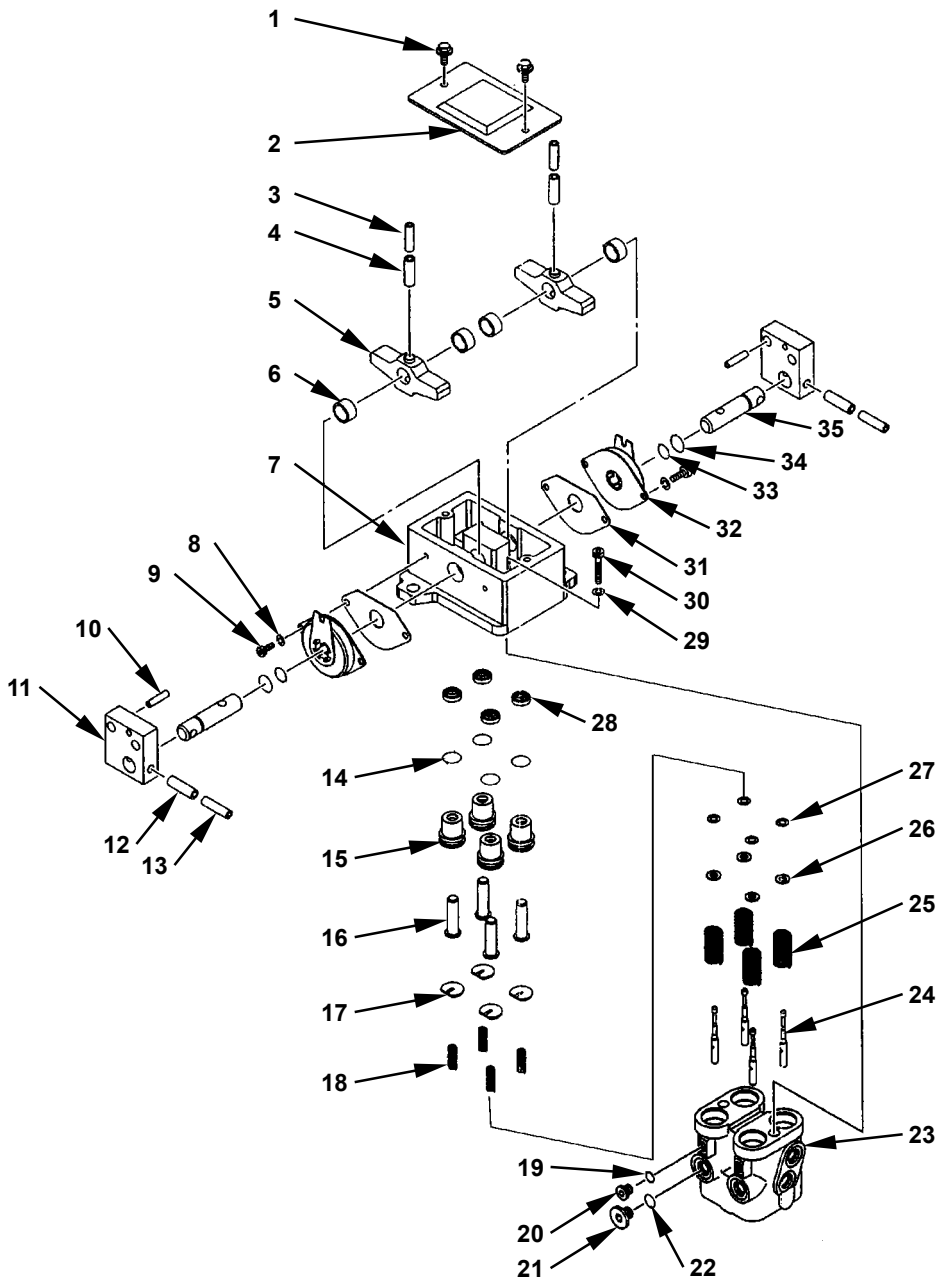
16. Secure cam (16) by using a spanner. Tighten screw joint (17) by using a spanner.

 : 19 mm, 32 mm

 : 68.4 N·m (6.98 kgf·m, 50 lbf·ft)

# 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 - 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

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### 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.

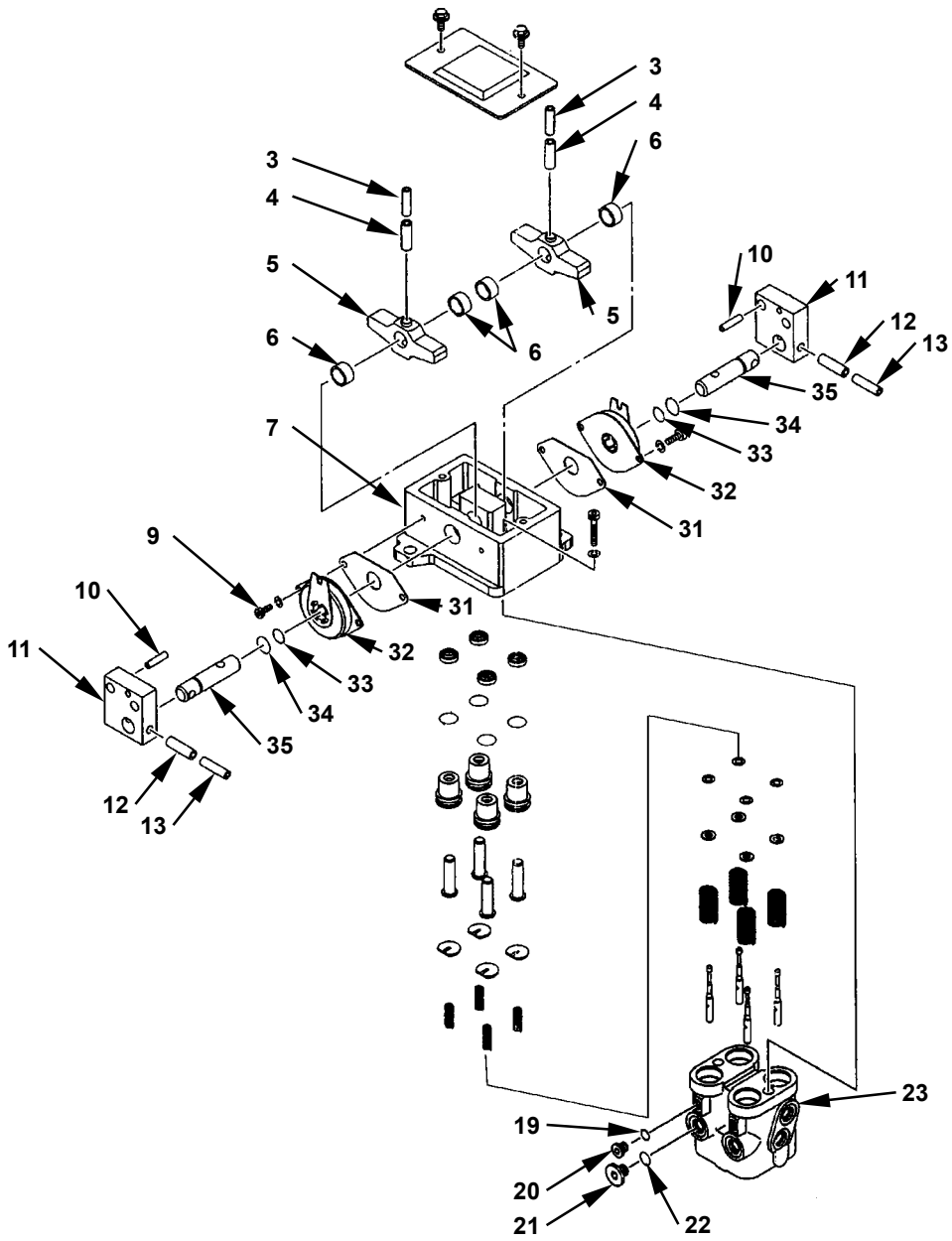
 **NOTE:** Spool (24) has been selected to match the hole of casing (23). Replace spool (24) and casing (23) as an assembly.

**IMPORTANT:** The quantity of shim (27) has been determined during the performance testing at the factory. Keep shim (27) 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 springs (25) (4 used) from casing (23).

# UPPERSTRUCTURE / Pilot Valve

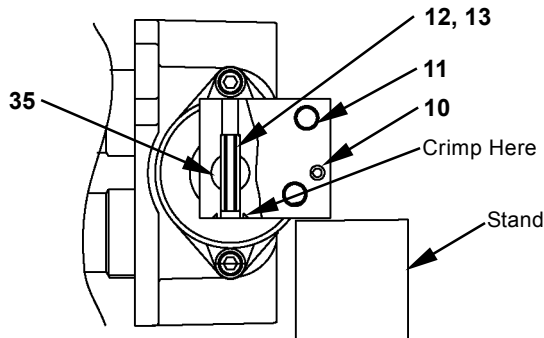


W178-02-07-063

## 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.



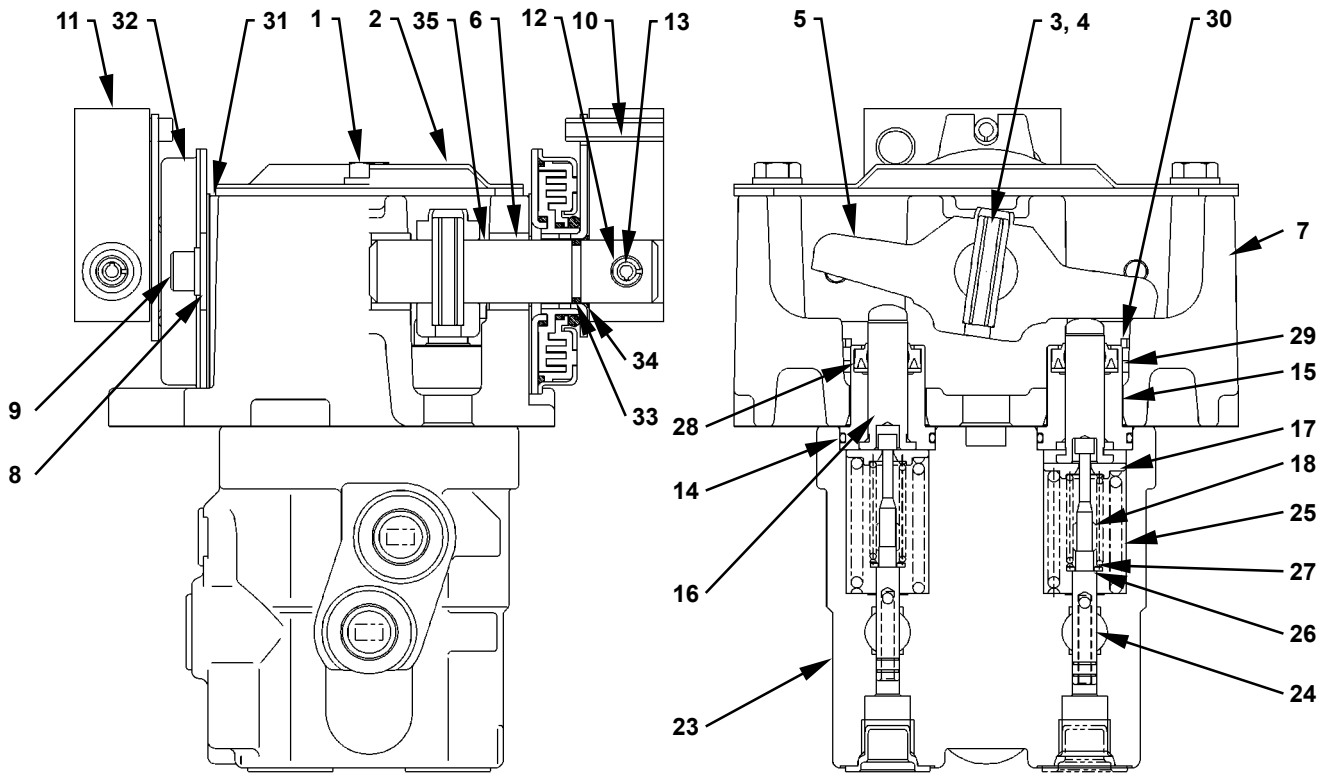
W176-02-07-019

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 - 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).**

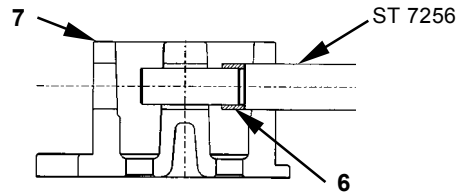
1. Assemble spools (24) (4 used) into the assembly.
  - Insert spacers (26) (2 used), shims (27) (12 used) and balance springs (18) (4 used) into spools (24) (4 used) in this order. Install shim (27) as the same condition before disassembling.
  - Push balance springs (18) (4 used) by hand. Install spring 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 springs (25) (4 used) into casing (23).
3. Insert the spool (24) assembly into the former port before disassembling. Turn and install the spools (24) 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) and pushers (16) (4 used) to bushings (15) (4 used).
  - Apply grease to the head of pushers (16) (4 used).
5. Insert the pushers (16) (4 used) assembly into casing (23).
6. If bushing (6) has been removed from holder (7), install bushings (6) (4 used) to holder (7) by using special tool (ST 7256) in the following procedures.

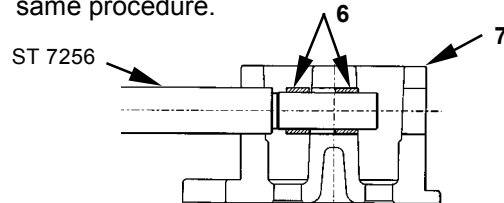
 **NOTE:** Bushings (6) (4 used) are identical.

- Insert bushings (6) (4 used) into special tool (ST 7256). Tap special tool (ST 7256) and install bushing (6) into the hole of holder (7) by using a hammer. Stop tapping when the bushing (6) end is flush with the inside wall.



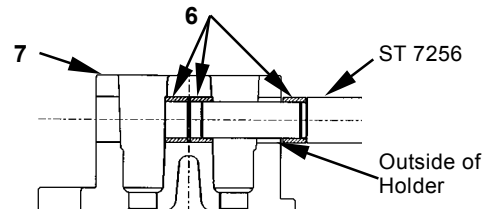
W176-02-11-310

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



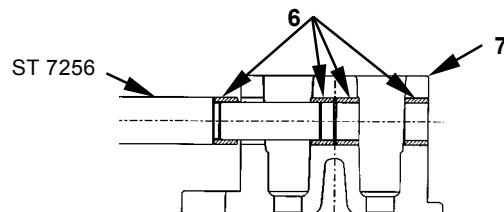
W176-02-11-311

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



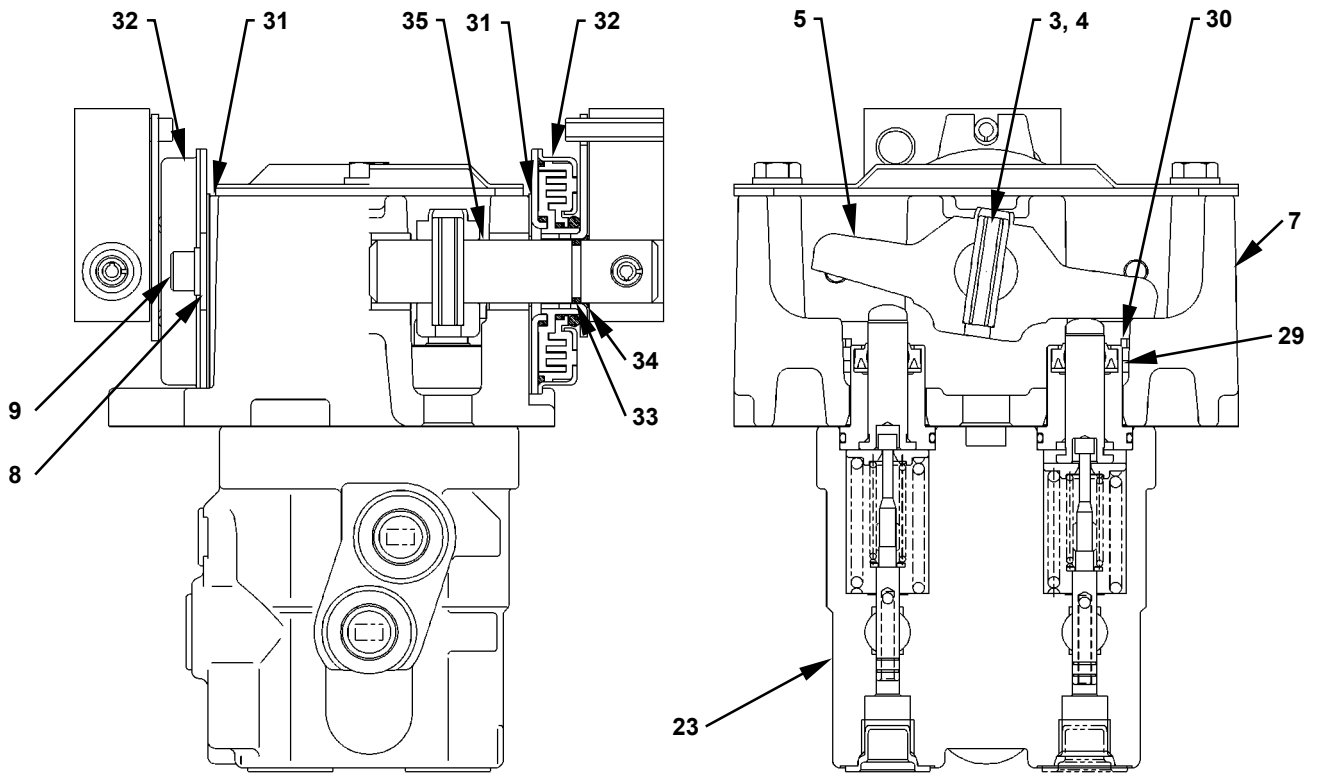
W176-02-11-312

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



W176-02-11-313

# UPPERSTRUCTURE / Pilot Valve



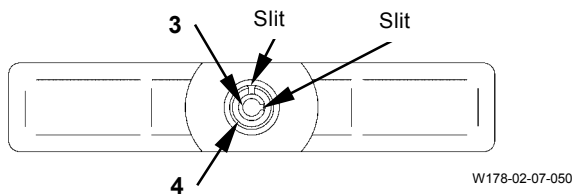
W178-02-11-316

## UPPERSTRUCTURE / Pilot Valve

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

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


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



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

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

 : 8 mm


 : 49 N·m (5 kgf·m, 36 lbf·ft)


11. Install rubber seats (31) (2 used) to pin (35).

**IMPORTANT: Check the direction of damper (32). The inner bore of damper (32) is edged-shape. If damper (32) is pried when installing, O-ring (33) will be damaged.**

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

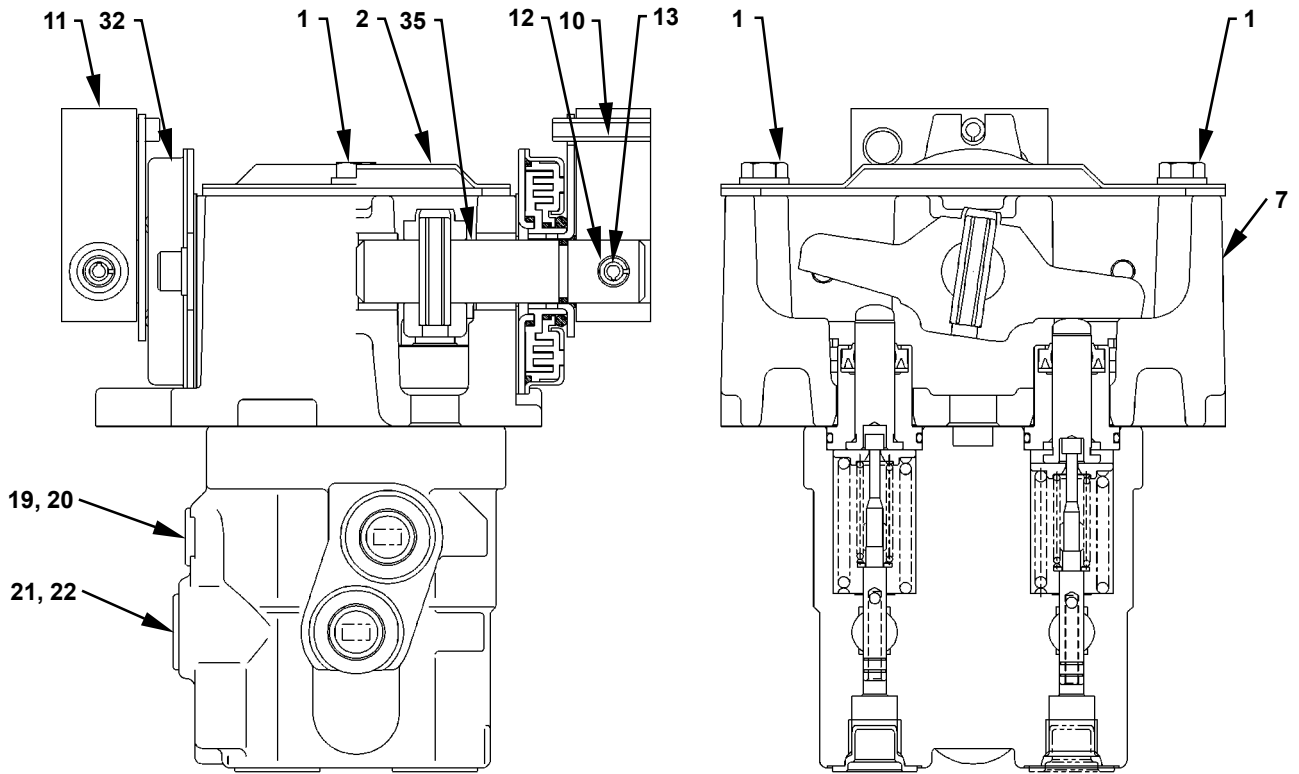
13. Secure damper (32) and rubber seat (31) to holder (7) with socket bolts (9) (4 used) and spring washers (8) (4 used).

 : 5 mm

 : 6.9 N·m (0.7 kgf·m, 5.1 lbf·ft)

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

# UPPERSTRUCTURE / Pilot Valve



W178-02-11-316

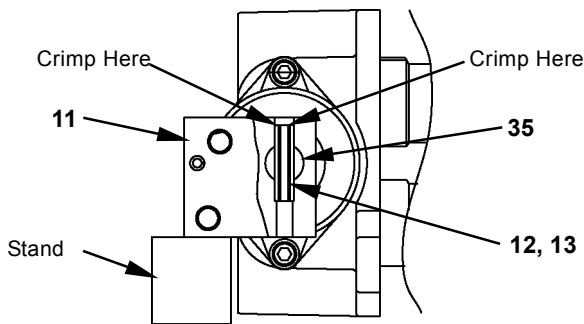


## UPPERSTRUCTURE / Pilot Valve

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

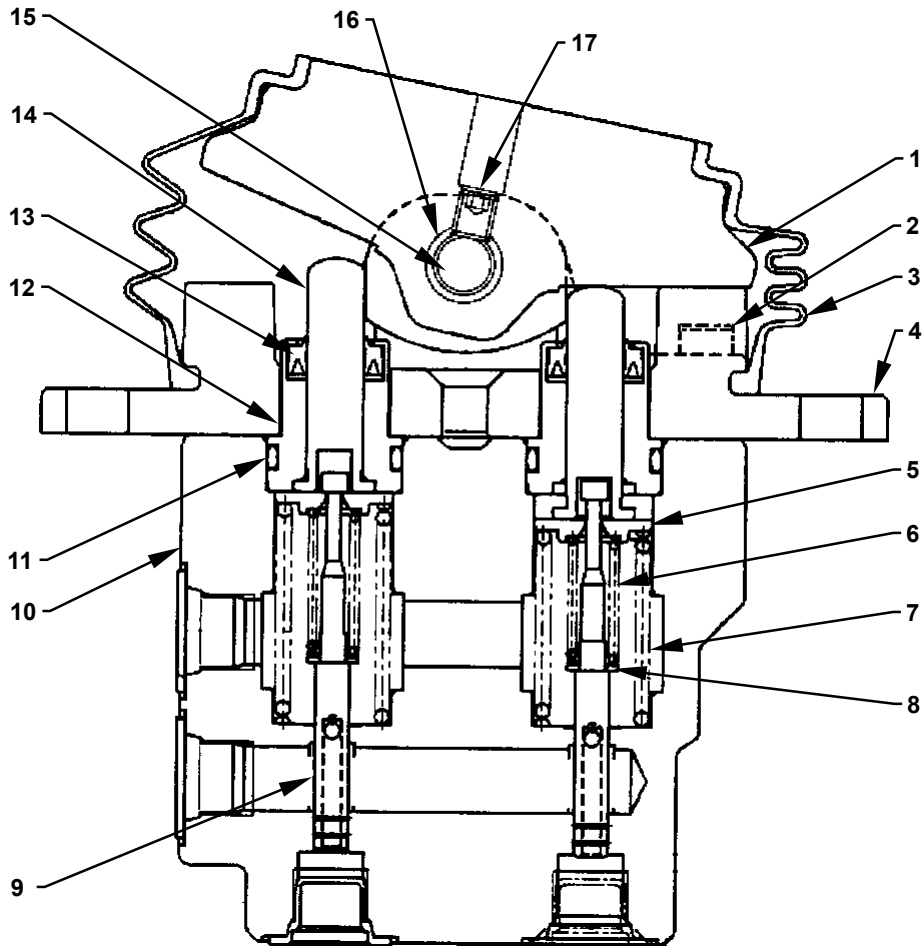
22. Install O-rings (22) (2 used) to plugs (21) (2 used). Install plugs (21) (2 used) to casing (23).

 : 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

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### 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

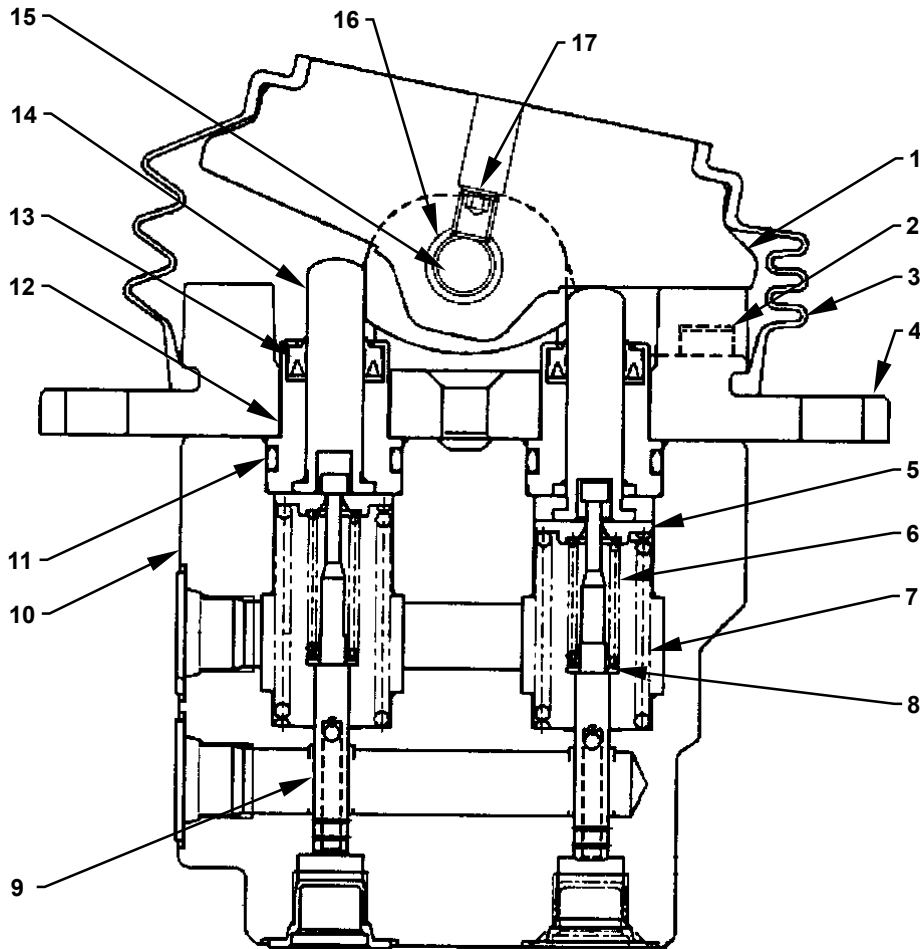
4. Remove bushings (12) (2 used), O-rings (11) (2 used) and oil seals (13) (2 used) from pushers (14) (2 used).

**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) (2 used) assembly 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

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## 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) from cover (2) on bottom of the cab. Remove cover (2) from the main frame.


 : 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).

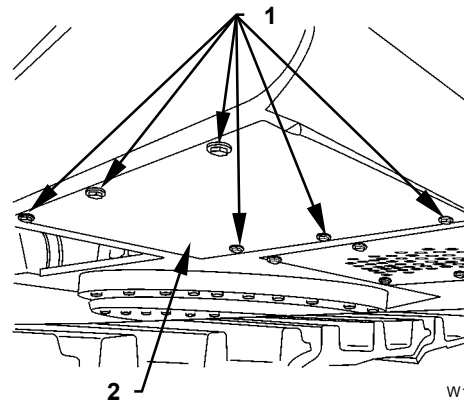
 : 22 mm

 : 48.5 N·m (4.9 kgf·m, 36 lbf·ft)

3. Install cover (2) to the main frame with bolts (1) (6 used).

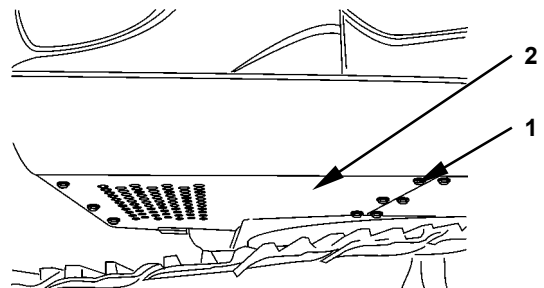
 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)



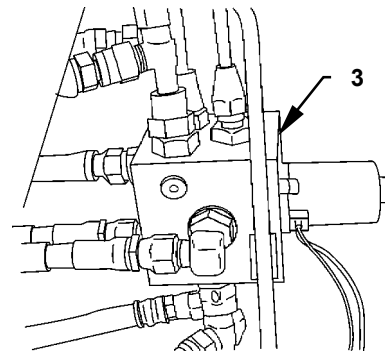
ZX200-3 class, 240-3 class, 270-3 class

W1V1-02-08-002

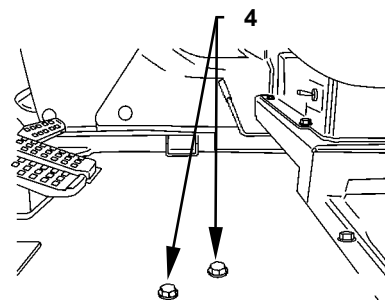


ZX 225US-3 class, 225USR-3 class

W1V1-02-08-005



W1V1-02-08-004



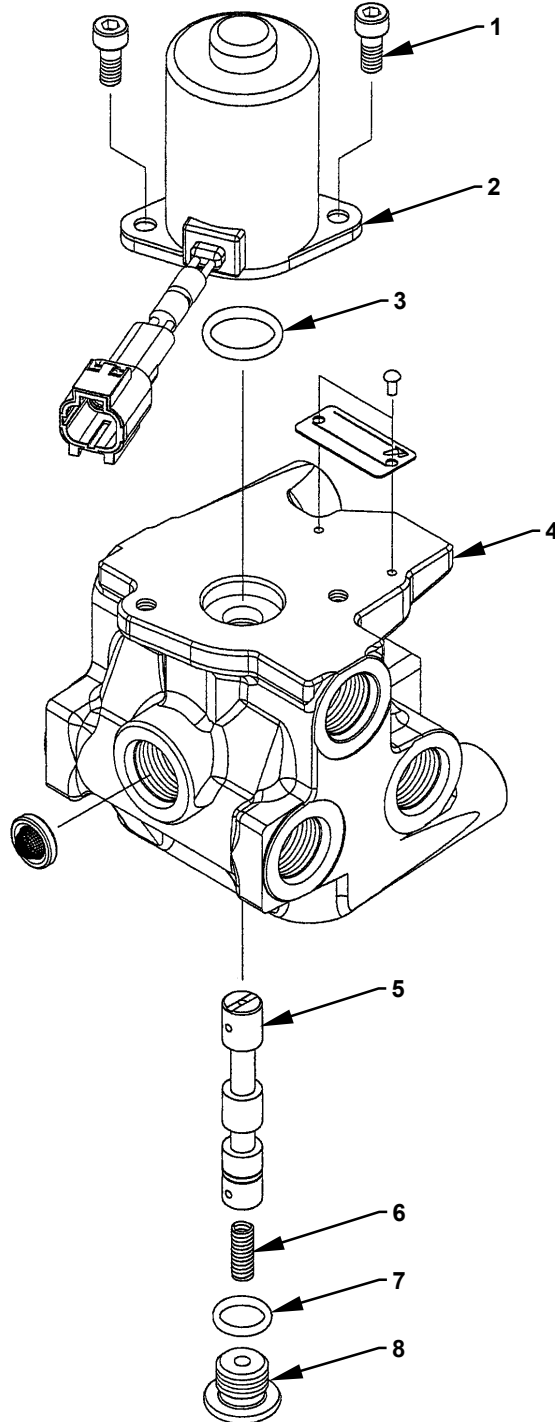
W1V1-02-08-003

# UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve

DISASSEMBLE  
SOLENOID VALVE

PILOT

SHUT-OFF



W1V1-02-08-001

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


---

### 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

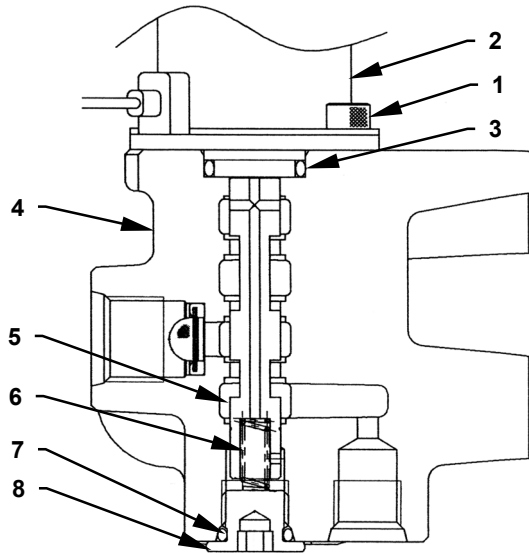
2. Remove plug (8) from body (4). Remove O-ring (7) from plug (8).

 : 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


 :  $26.5 \pm 2.7$  N·m  
( $2.7 \pm 0.3$  kgf·m,  $19.5 \pm 2.0$  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.*

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

 : 4 mm

 :  $3.92 \pm 0.4$  N·m  
( $0.4 \pm 0.04$  kgf·m,  $2.9 \pm 0.30$  lbf·ft)

**UPPERSTRUCTURE / Pilot Shut-Off Solenoid Valve**

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(Blank)


## UPPERSTRUCTURE / Signal Control Valve

### REMOVE AND INSTALL SIGNAL CONTROL VALVE (ZX200-3 class, 240-3 class, 270-3 class)


**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) (4 used). Remove cover (2).


 : 17 mm

2. Remove bolt (6). Remove the clip band.


 : 17 mm

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


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

 : 19 mm, 22 mm


4. Attach a nylon sling onto the body of signal control valve (3). Hold signal control valve (3).

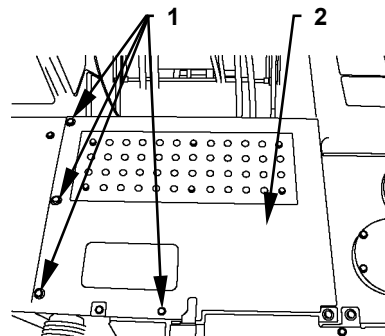
 **CAUTION: Signal control valve (3) + bracket (5) weight: 21 kg (46 lb)**

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

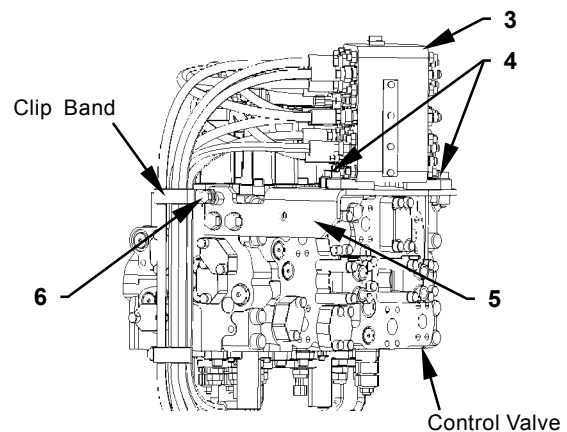
 : 22 mm

6. Remove socket bolts (4) (4 used). Remove signal control valve (3) from bracket (5).

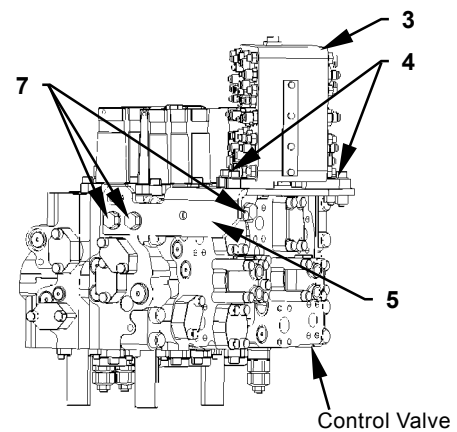
 : 8 mm



W1V1-02-10-003



W1V1-02-09-001





W1V1-02-09-002

# UPPERSTRUCTURE / Signal Control Valve

## Installation

1. Install bracket (5) to signal control valve (3) with socket bolts (4) (4 used).


 : 8 mm


 : 65 N·m (6.5 kgf·m, 48 lbf·ft)




**CAUTION: Signal control valve (3) + bracket (5) weight: 21 kg (46 lb)**


2. Attach a nylon sling onto the body of signal control valve (3). Hoist signal control valve (3). Install the signal control valve (3) assembly to the control valve with bolts (7) (3 used).


 : 22 mm


 : 140 N·m (14 kgf·m, 103 lbf·ft)

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


 : 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 (5) with bolt (6).

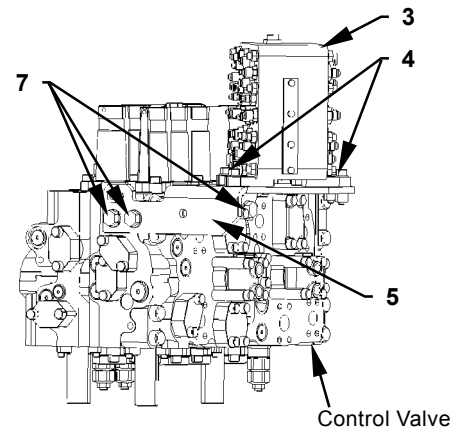
 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

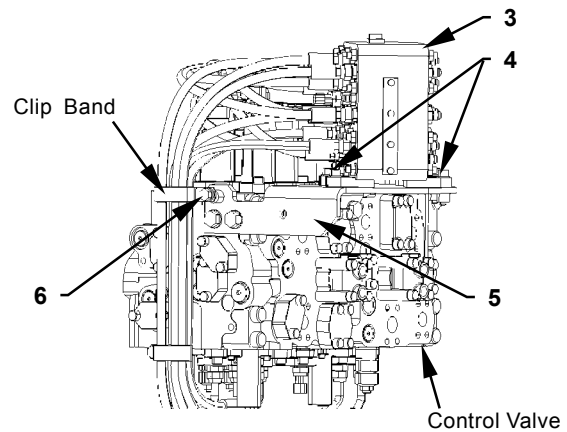
5. Install cover (2) with bolts (1) (4 used).

 : 17 mm

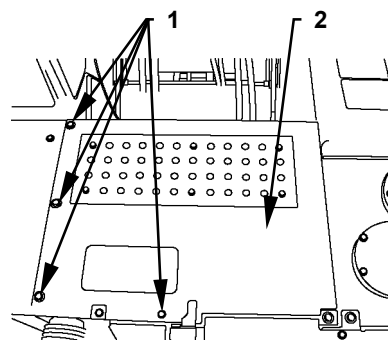
 : 50 N·m (5.0 kgf·m, 37 lbf·ft)



W1V1-02-09-002



W1V1-02-09-001




W1V1-02-10-003

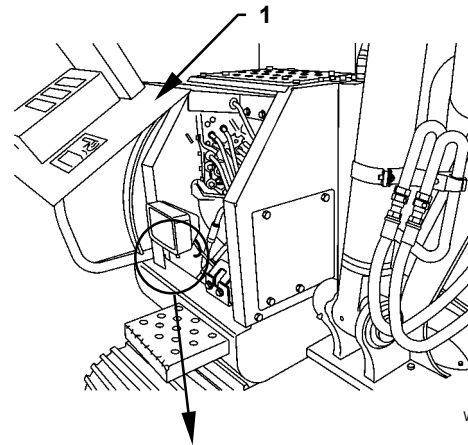
## UPPERSTRUCTURE / Signal Control Valve

### REMOVE AND INSTALL SIGNAL CONTROL VALVE (ZX225USR-3Class, 225US-3 Class)

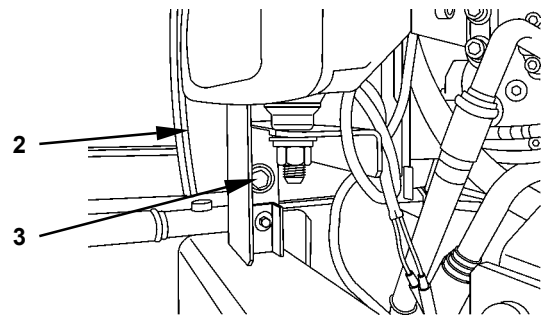
#### Removal

1. Open and lock front cover (1).
2. Remove bolt (3). Open side cover (2).

 : 17 mm




W1V1-02-05-075




W1V1-02-05-076


3. Remove bolts (5, 7) (2 used for each). Remove brackets (6) (2 used) from upper cover (9).

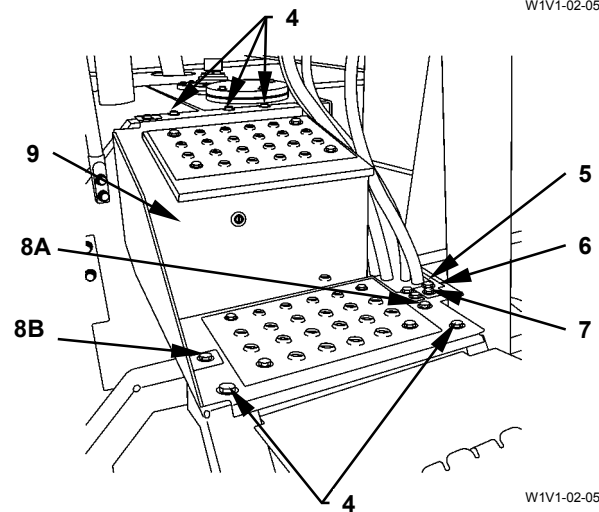
 : 17 mm

4. Remove bolts (4) (5 used). Remove upper cover (9).

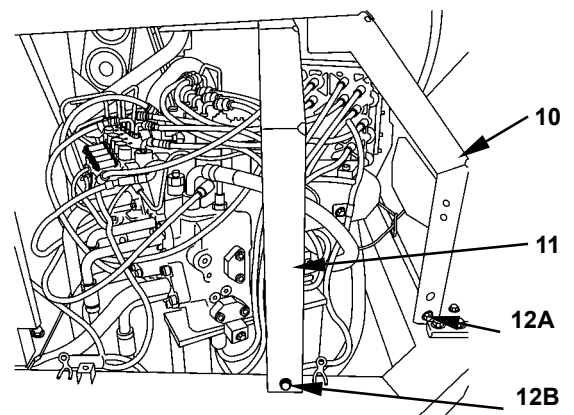
 : 17 mm

5. Remove bolts (8A, 8B, 12A, 12B). Remove brackets (10, 11).

 : 17 mm



W1V1-02-05-078




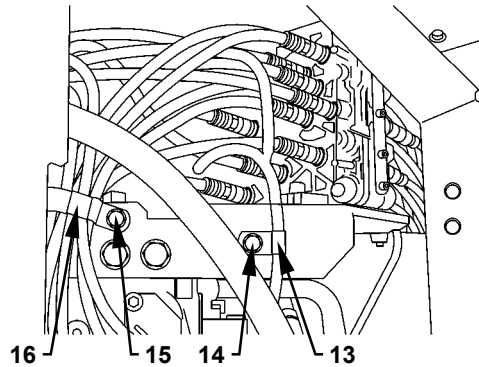
W1V1-02-05-079

## UPPERSTRUCTURE / Signal Control Valve

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6. Remove bolts (14, 15). Remove clips (13, 16).

 : 17 mm




W1V1-02-09-004

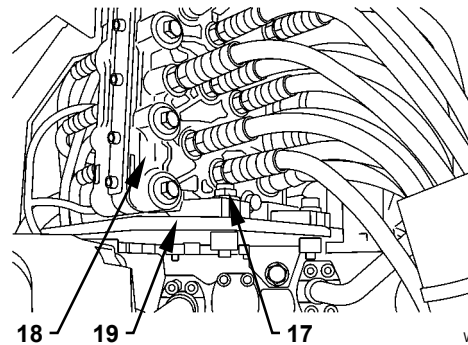
7. Remove all hoses from signal control valve (18). Attach an identification tag onto the removed hoses for assembling. Cap the hose and the open ends.

 : 19 mm, 22 mm

8. Attach a nylon sling to signal control valve (18) and hold signal control valve (99).

9. Remove socket bolts (17) (4 used) from signal control valve (18). Remove signal control valve (18) from bracket (19).

 : 8 mm




W1V1-02-09-005




## UPPERSTRUCTURE / Signal Control Valve


### Installation


1. Install signal control valve (18) to bracket (19) with socket bolts (17) (4 used).


 : 8 mm


 : 65 N·m (6.5 kgf·m, 48 lbf·ft)

2. Install all hoses and connectors to signal control valve (18).


 : 19 mm


 : 30 N·m (3.0 kgf·m, 22 lbf·ft)

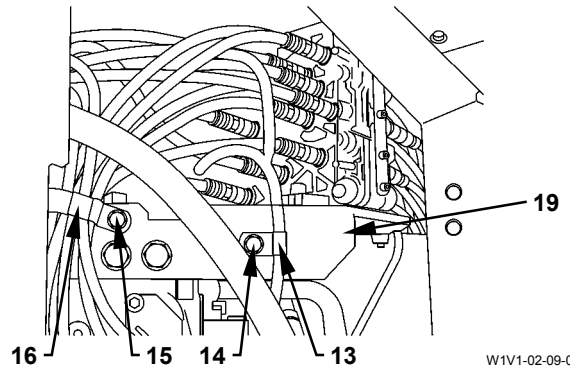
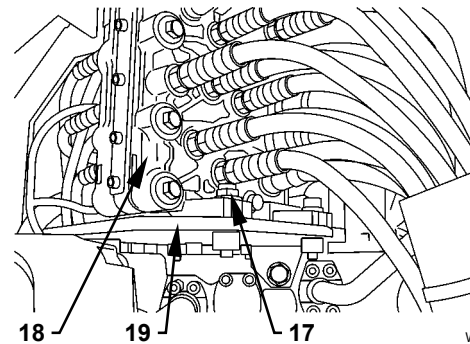
 : 22 mm

 : 40 N·m (4.0 kgf·m, 30 lbf·ft)

3. Install clip bands (13, 16) to bracket (19) with bolts (14, 15).


 : 17 mm


 : 50 N·m (5.0 kgf·m, 37 lbf·ft)




## UPPERSTRUCTURE / Signal Control Valve


4. Install bracket (11) to the main frame with bolts (8B, 12B).

 : 17 mm


 : 50 N·m (5.2 kgf·m, 37 lbf·ft)


5. Install bracket (10) to the main frame with bolts (8A, 12A).

 : 17 mm


 : 50 N·m (5.2 kgf·m, 37 lbf·ft)


6. Install upper cover (9) with bolts (4) (5 used).

 : 17 mm


 : 50 N·m (5.2 kgf·m, 37 lbf·ft)


7. Install brackets (6) (2 used) to upper cover (9) with bolts (5, 7) (2 used for each).

 : 17 mm

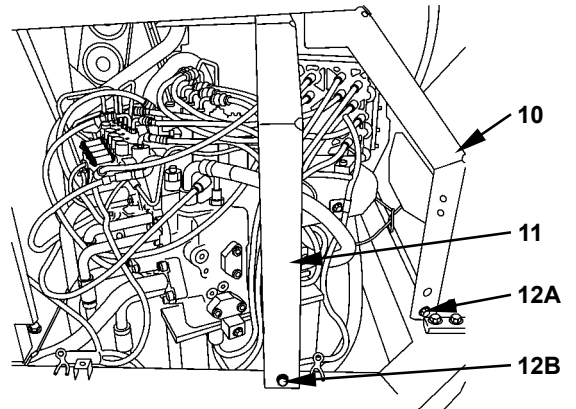
 : 50 N·m (5.2 kgf·m, 37 lbf·ft)

8. Shut side cover (2). Install bolt (3).

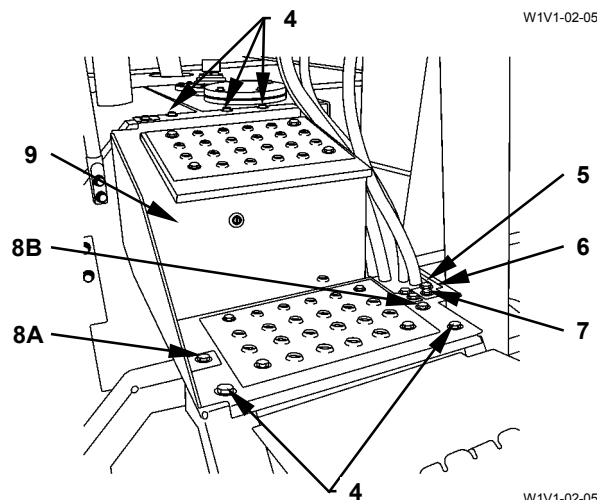
 : 17 mm

 : 50 N·m (5.2 kgf·m, 37 lbf·ft)

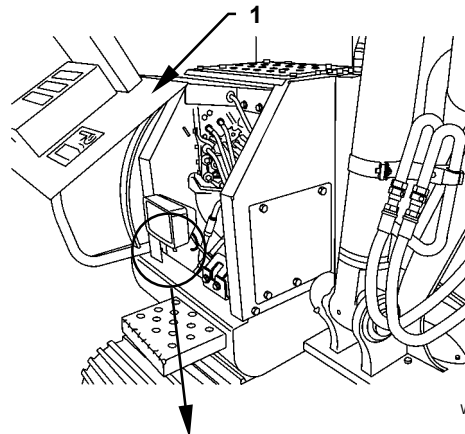
9. Shut front cover (1).



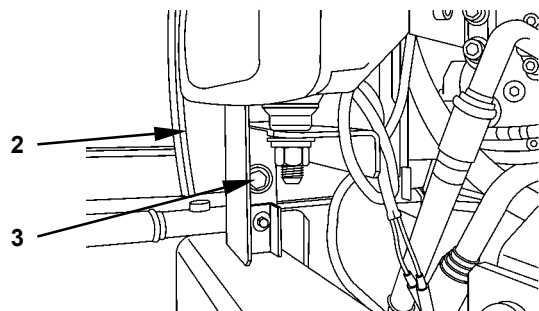
W1V1-02-05-079



W1V1-02-05-078



W1V1-02-05-075



W1V1-02-05-076

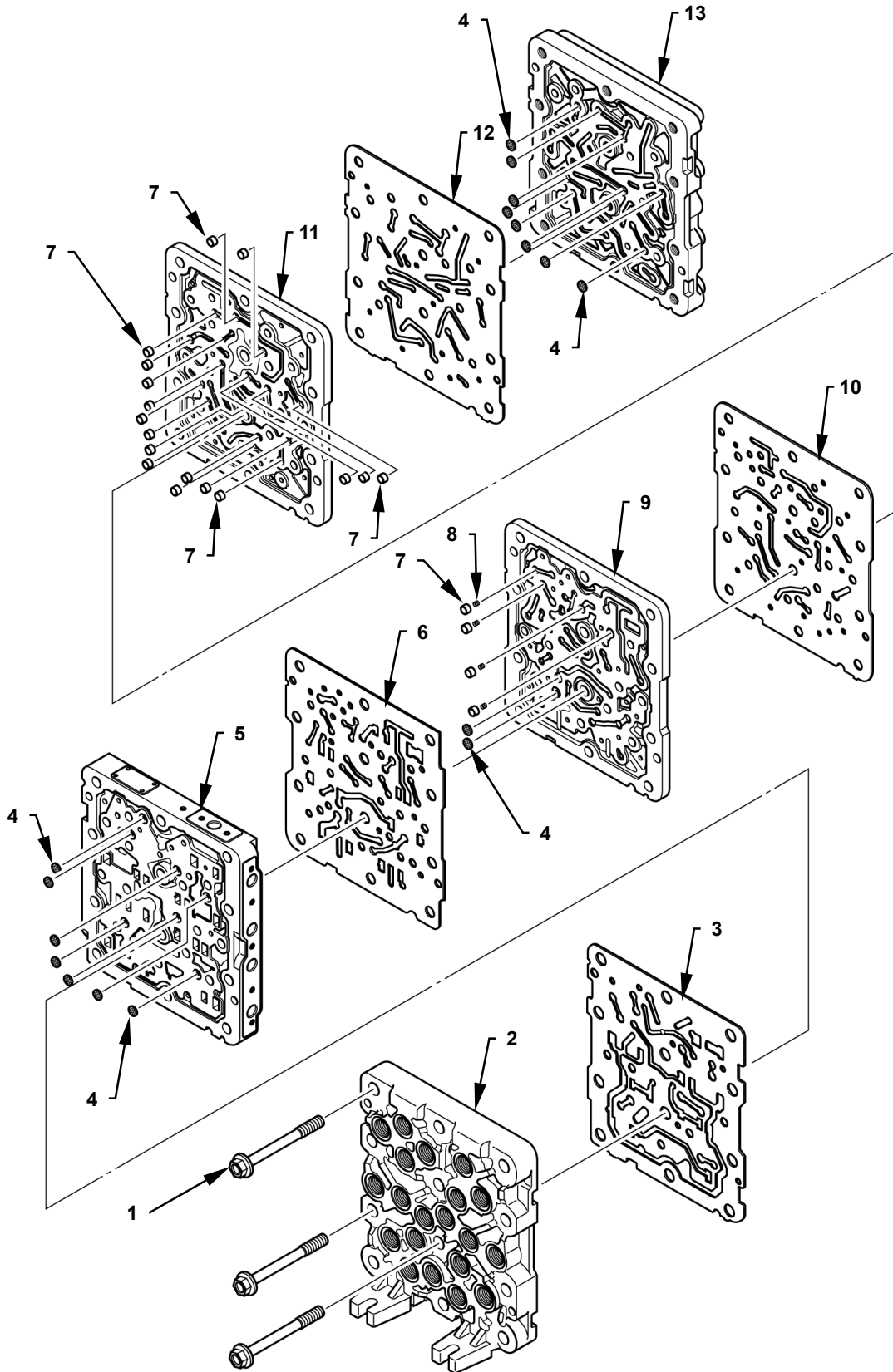
## UPPERSTRUCTURE / Signal Control Valve

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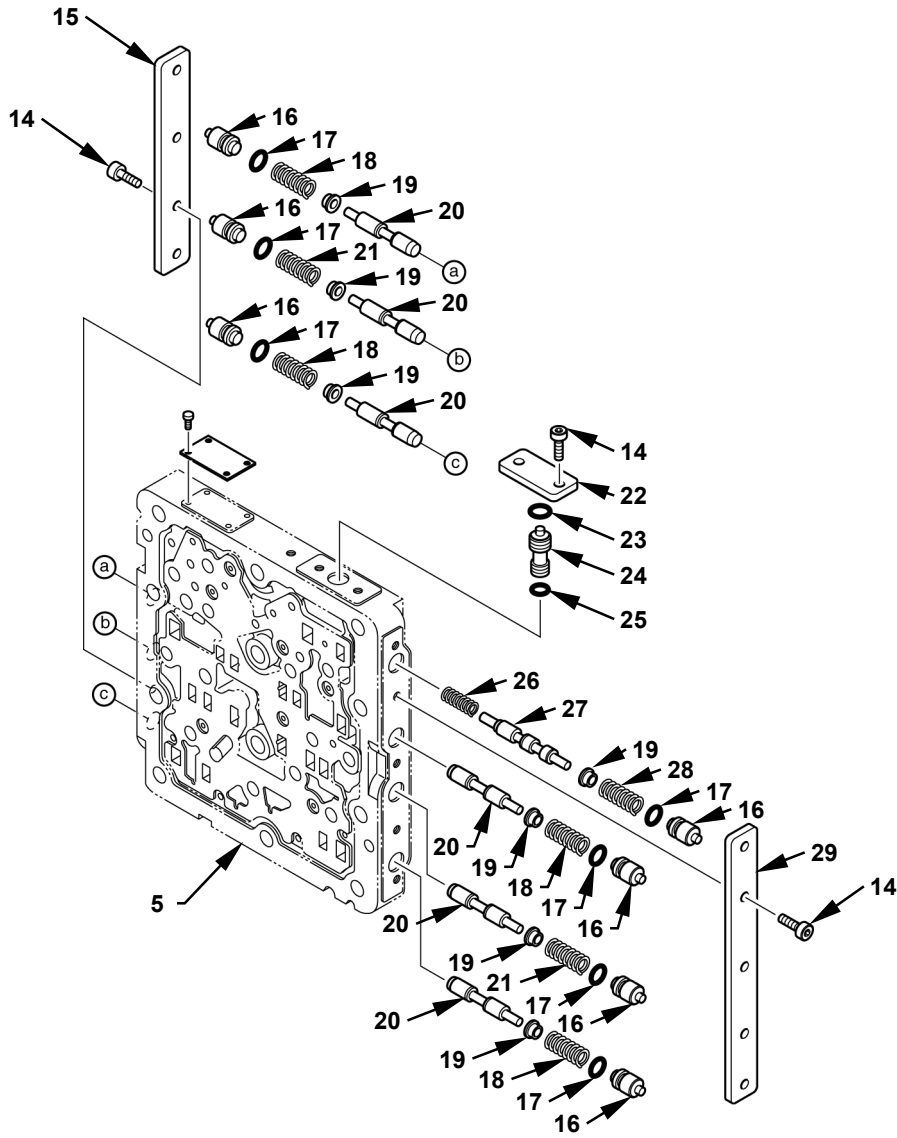
# UPPERSTRUCTURE / Signal Control Valve

## STRUCTURE OF SIGNAL CONTROL VALVE



W1JB-02-10-002

# 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

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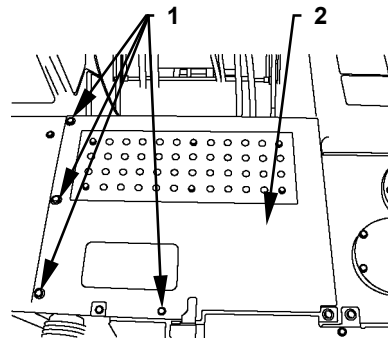
## UPPERSTRUCTURE / 4-Spool Solenoid Valve Unit

### REMOVE AND INSTALL 4-SPOOL SOLENOID VALVE UNIT (ZX200-3 CLASS, 240-3 CLASS, 270-3 CLASS)

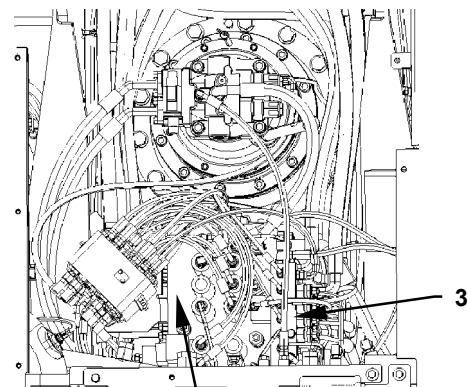
**IMPORTANT:** Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

#### Removal

1. Open the engine cover. Remove bolts (1) (4 used). Remove cover (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 (3). Cap all the hoses.  
 : 17 mm, 19 mm
3. Remove socket bolts (4) (2 used). Remove 4-spool solenoid valve unit (3) from the control valve.  
 : 8 mm











W1V1-02-10-003

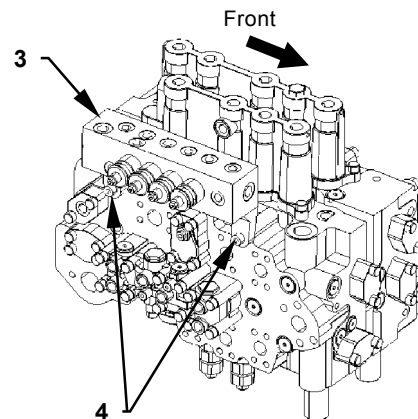


Control Valve

W1V1-02-05-021

#### Installation

1. Install 4-spool solenoid valve unit (3) to the control valve with socket bolts (4) (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 (3).  
 : 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 cover (2) with bolts (1) (4 used).  
 : 17 mm  
 : 50 N·m (5.0 kgf·m, 37 lbf·ft)



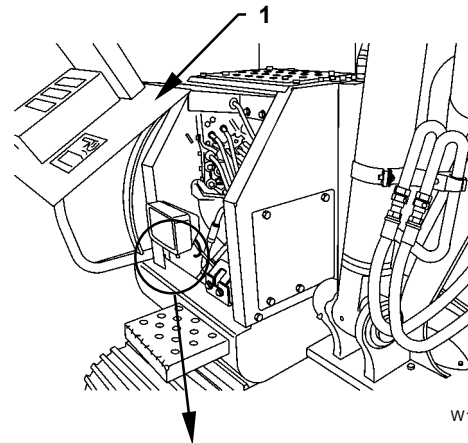
W1V1-02-10-004

## UPPERSTRUCTURE / 4-Spool Solenoid Valve Unit

### REMOVE AND INSTALL 4-SPOOL SOLENOID VALVE UNIT (ZX225US-3 CLASS, 225USR-3 CLASS)


#### Removal

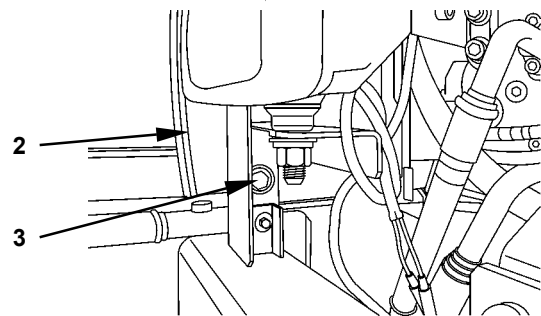
1. Open and lock front cover (1).



W1V1-02-05-075


2. Remove bolt (3). Open side cover (2).

 : 17 mm




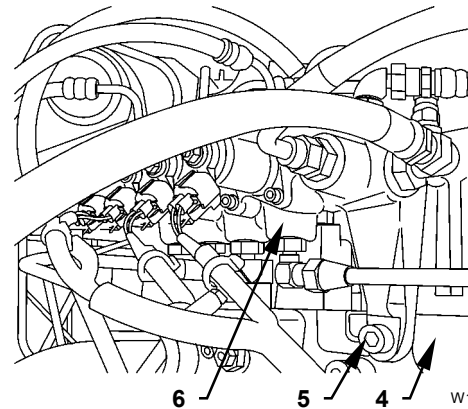
W1V1-02-05-076

3. Remove all hoses from 4-spool solenoid valve unit (6). Cap the hoses and open ends.

 : 17 mm, 19 mm

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

 : 8 mm




W1V1-02-10-005




## UPPERSTRUCTURE / 4-Spool Solenoid Valve Unit


### Installation


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


 : 8 mm


 : 50 N·m (5.1 kgf·m, 37 lbf·ft)

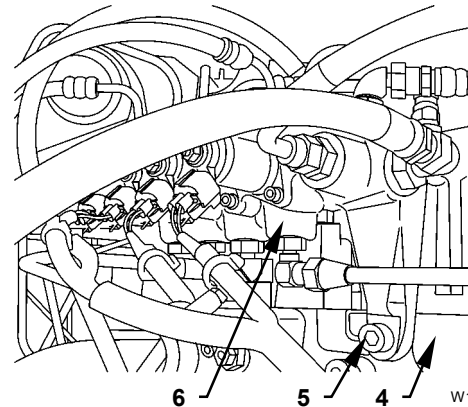
2. Install all hoses and connectors to 4-spool solenoid valve unit (6).

 : 17 mm

 : 25 N·m (2.5 kgf·m, 18 lbf·ft)


 : 19 mm


 : 30 N·m (3.0 kgf·m, 22 lbf·ft)



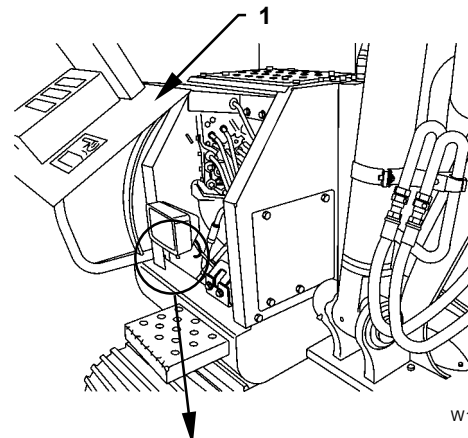
W1V1-02-10-005

3. Close side cover (2). Install bolt (3).

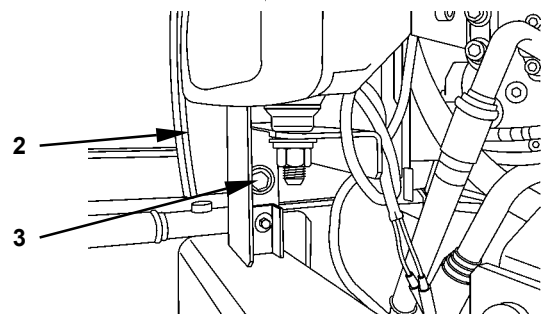
 : 17 mm

 : 50 N·m (5.1 kgf·m, 37 lbf·ft)

4. Close front cover (1).



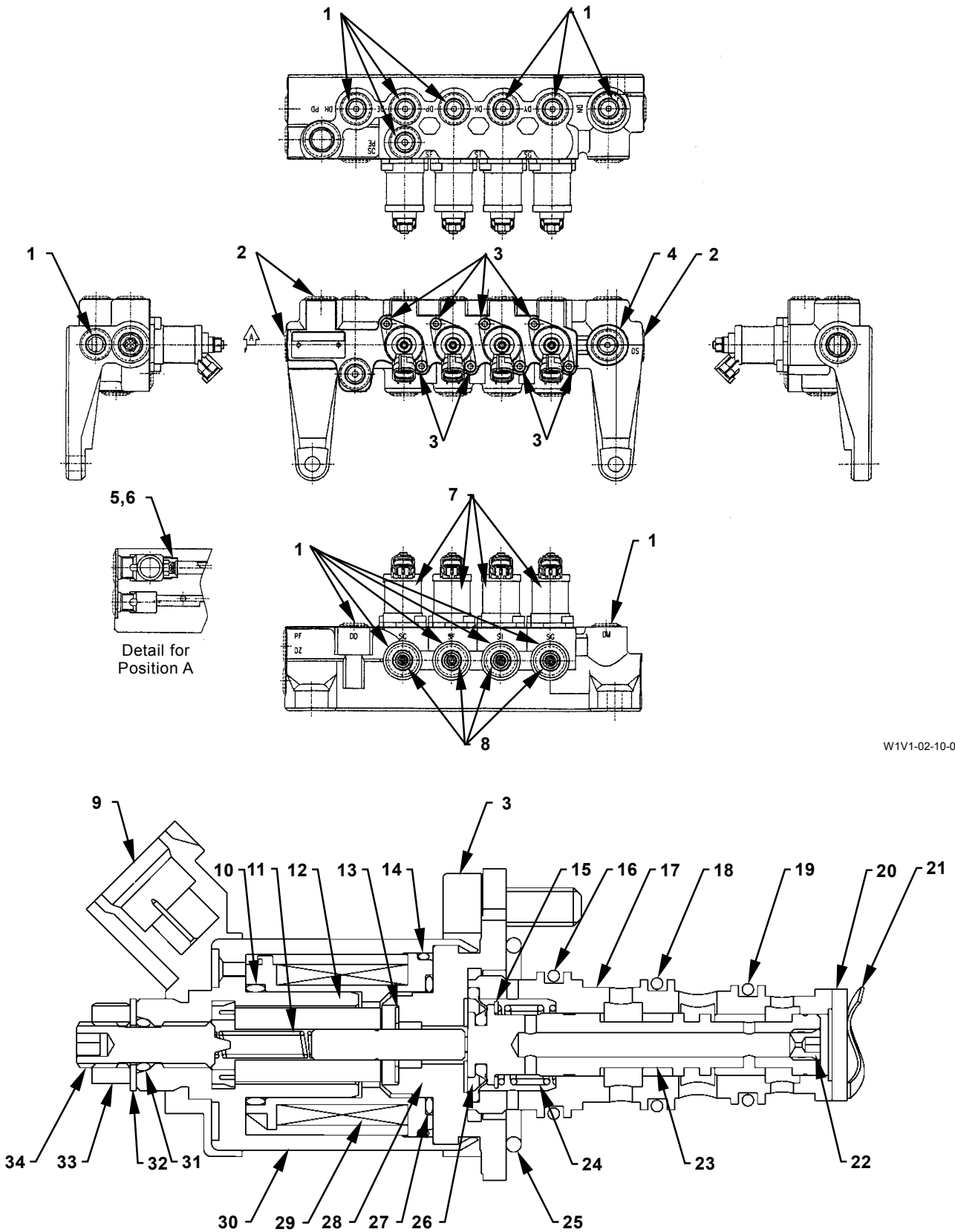
W1V1-02-05-075



W1V1-02-05-076

# 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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(Blank)

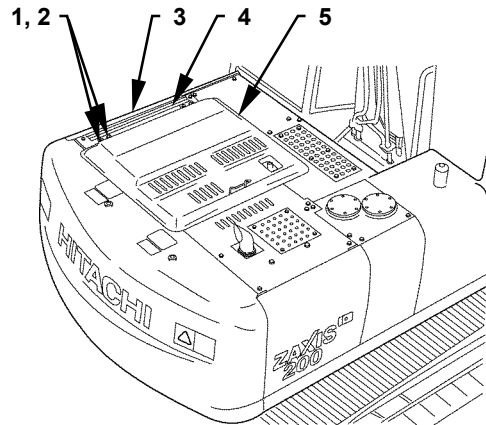
## UPPERSTRUCTURE / Engine

### REMOVE AND INSTALL ENGINE (ZX200-3 CLASS, 240-3 CLASS, 270-3 CLASS)

#### Removal

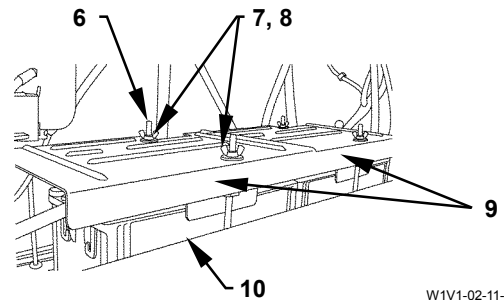
1. Open cover (3).
2. Open cover (5). Remove the pin and washer from the stopper. Remove the stopper from cover (5).
3. Attach a nylon sling to cover (5) and hoist cover (5). Remove nuts (1) (4 used) and spring washers (2) (4 used) from cover (4). Hoist and remove cover (5) from cover (4).

 : 17 mm




W1V1-02-11-001

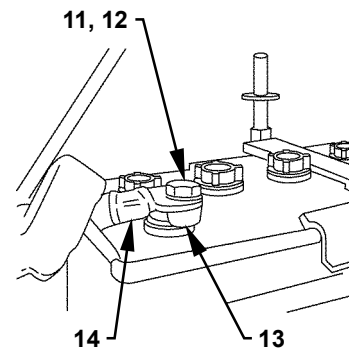
4. Remove wing nuts (7) (4 used) and washers (8) (4 used) from bolts (6) (4 used). Remove covers (9) (2 used) from batteries (10) (2 used).



W1V1-02-11-004

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


 : 17 mm

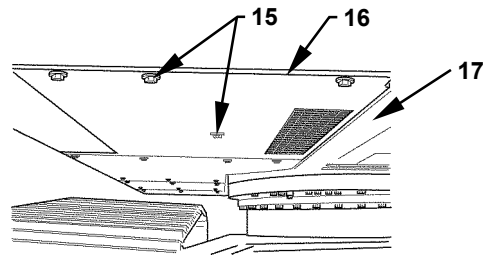


W1V1-02-11-005

## UPPERSTRUCTURE / Engine


6. Remove sems bolts (15) (7 used) from cover(16).  
Remove cover (16) from main frame (17).

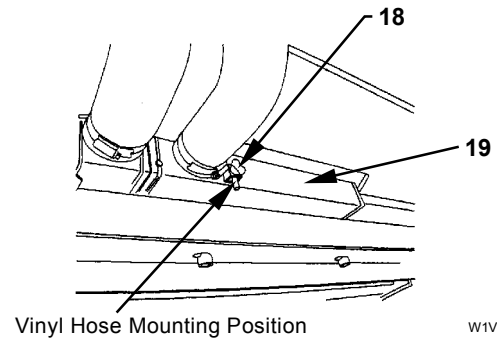
 : 17 mm



W1V1-02-11-027


7. 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.

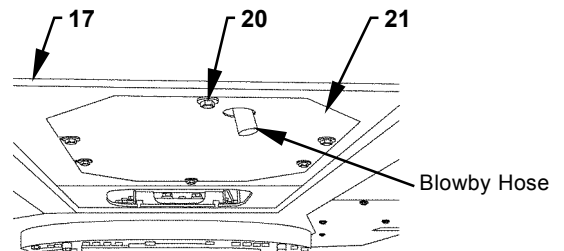
 **NOTE:** This procedure can be done from the battery space side.



W1V1-02-11-034


8. Remove sems bolts (20) (6 used) from cover (21).  
Remove cover (21) from main frame (17).

 : 17 mm

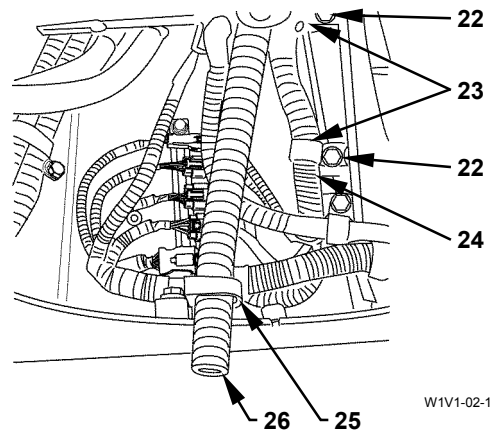


W1V1-02-11-026

9. Remove sems bolts (22) (2 used) from clamps (23) (2 used). Make wire harness (24) free.


 : 17 mm

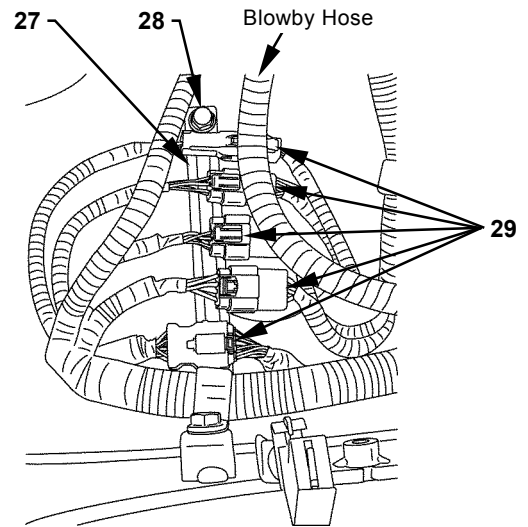
10. Open band (25). Remove blowby hose (26) from band (25). Move blowby hose (26) to the right.



W1V1-02-11-029

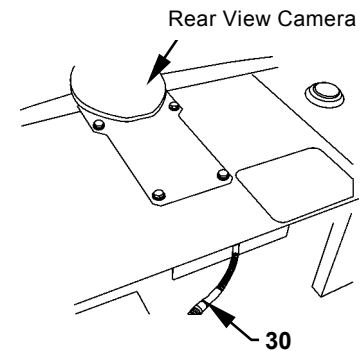
## UPPERSTRUCTURE / Engine

11. Remove sems bolts (28) (2 used) from plate (27).  
Remove connectors (29) (5 used) from plate (27).  
 : 17 mm



W1V1-02-11-030

12. Remove connector (30) in the rear view camera.

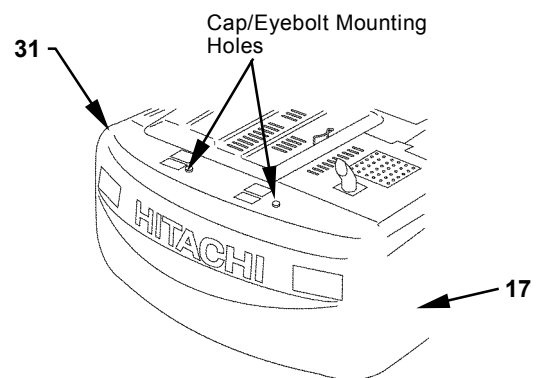


W1V1-02-02-001



**CAUTION: Counterweight (31) weight:**  
ZAXIS 200-3, 200LC-3: 4350 kg (9590 lb)  
ZAXIS 210H-3, 210LCH-3: 4750 kg (10472 lb)  
ZAXIS 210K(B)-3, 210LCK(B)-3: 4750 kg (10472 lb)  
ZAXIS 210K(HG)-3, 210LCK(HG)-3: 5360 kg (11817 lb)  
ZAXIS 210LCN-3, 240N-3: 5510 kg (12147 lb)  
ZAXIS 240-3, 240LC-3: 5400 kg (11905 lb)  
ZAXIS 250H-3, 250LCH-3: 6100 kg (13448 lb)  
ZAXIS 250K-3, 250LCK-3: 6500 kg (14330 lb)  
ZAXIS 250LC-3, 250LCN-3: 6100 kg (13448 lb)  
ZAXIS 270-3, 270LC-3: 6100 kg (13448 lb)  
ZAXIS 280LC-3, 280LCN-3: 6100 kg (13448 lb)

13. Remove counterweight (31) from main frame (17).  
As for removal and installation of the counterweight, refer to the Remove and Install Counterweight group (W2-2-2).




W1V1-02-11-002

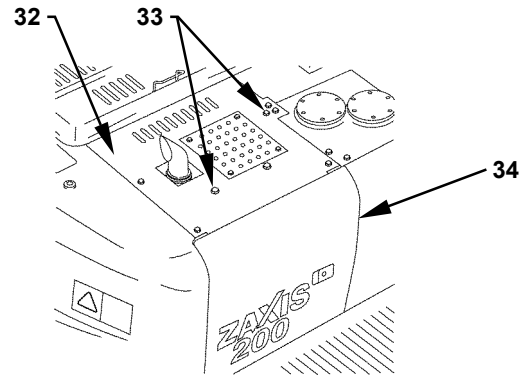
## UPPERSTRUCTURE / Engine

**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.)

14. Open cover (34).


15. Remove sems bolts (33) (9 used) from cover (32). Remove cover (32).

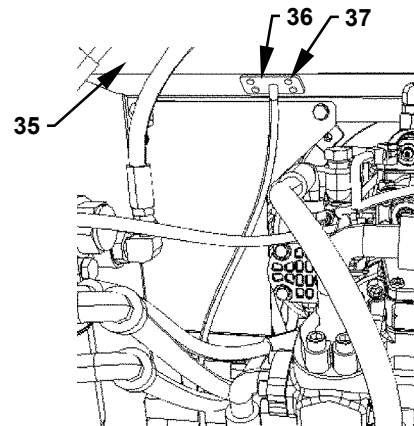
 : 17 mm



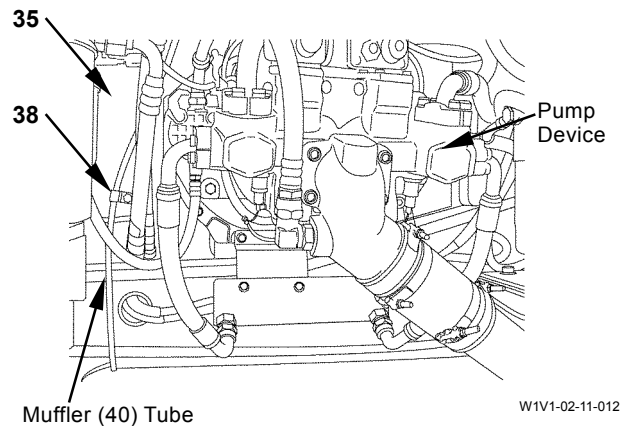
W1V1-02-11-003

16. Remove bolts (37) (4 used) from muffler bracket (35) in the pump space. Remove cover (36). Remove clamp (38). Make the muffler (40) tube free.

 : 17 mm




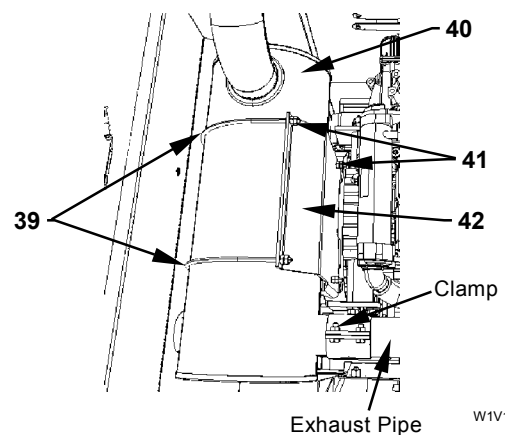
W1V1-02-04-008



W1V1-02-11-012

17. Remove nuts (41) (8 used) and U-bolts (39) (2 used) from bracket (42). Remove the clamp.

 : 14 mm, 17 mm




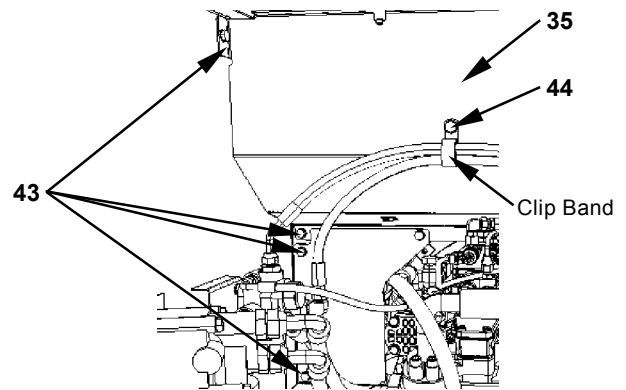
W1V1-02-04-006



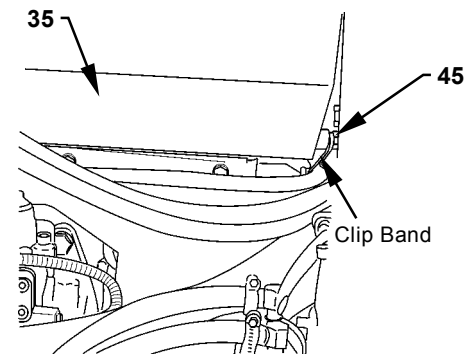
## UPPERSTRUCTURE / Engine

18. Remove bolt (44) and bolt (45), which are installed to the hydraulic oil tank, from muffler bracket (35). Remove the clip bands (2 used).

 : 17 mm




W1V1-02-04-007

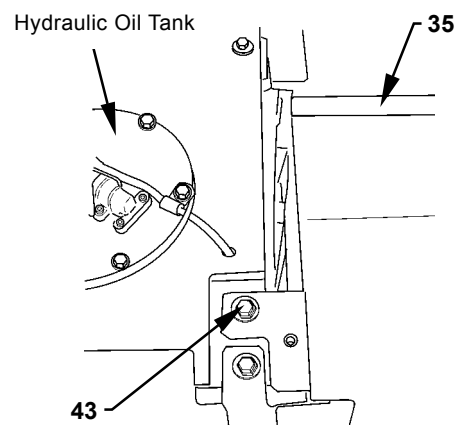


W1V1-02-04-016

**IMPORTANT: When removing the muffler bracket (35) assembly, do not damage the parts and hoses.**

19. Remove bolts (43) (5 used) from the pump space and the upper side of machine. Remove the muffler bracket (35) assembly.

 : 17 mm





W1V1-02-04-017

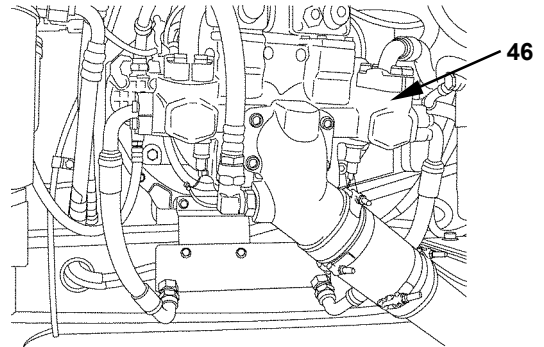
## UPPERSTRUCTURE / Engine

20. Remove all connectors, hoses and pipes connecting to pump device (46).

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


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

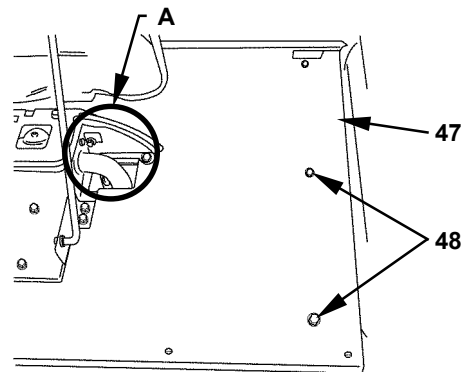
 : 8 mm, 10 mm



W1V1-02-11-012


21. Remove sems bolts (48) (5 used) from cover (47).

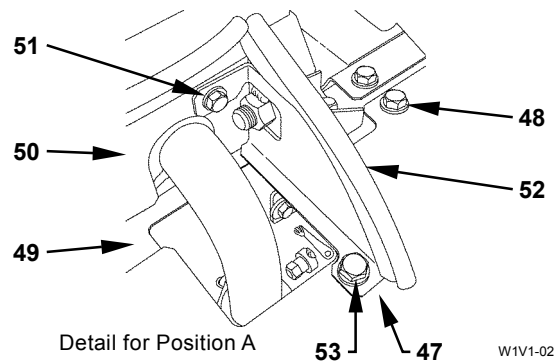
 : 17 mm



W1V1-02-11-007


22. Remove sems bolts (51, 53) from bracket (52).  
Remove bracket (52) from covers (47, 50).  
Remove cover (47) from bracket (49).

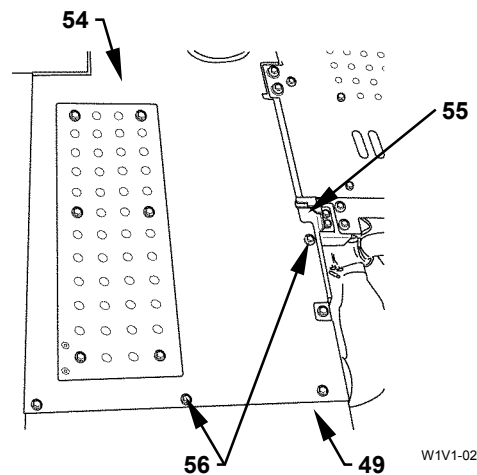
 : 13 mm, 17 mm



W1V1-02-11-008

23. Remove sems bolts (56) (4 used) from cover(54).  
Remove control upper cover (54) from cover (55)  
and bracket (49).

 : 17 mm




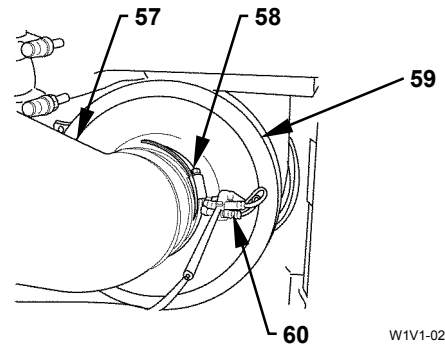
W1V1-02-11-006

## UPPERSTRUCTURE / Engine

24. Remove connector (60) from air cleaner (59).


25. Remove band (58) from rubber hose (57).

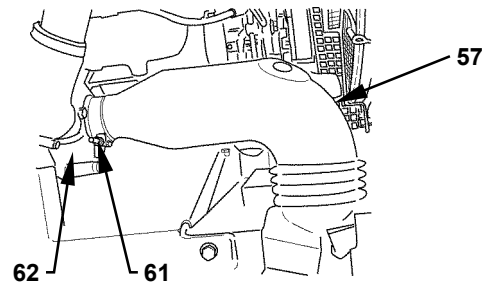
 : 7 mm



W1V1-02-11-014


26. Remove clamp (61) from rubber hose (57).  
Remove rubber hose (57) from turbocharger (62)  
and air cleaner (59).

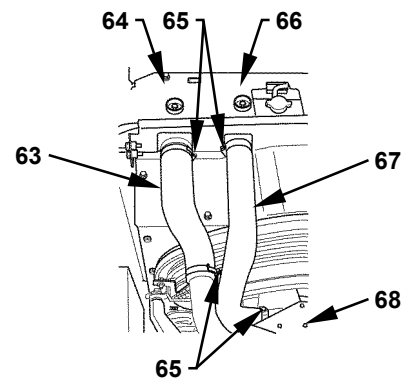
 : 11 mm



W1V1-02-11-013


27. Loosen clamps (65) (4 used) from rubber hoses  
(63, 67). Remove rubber hoses (63, 67) from  
intercooler (64), radiator (66) and engine (68).

 : 7 mm, 8 mm




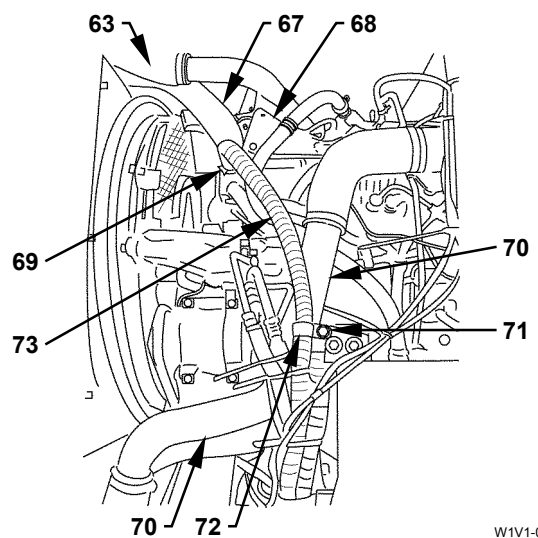
W1V1-02-11-009

28. Loosen clamps (69) (2 used) of heater hoses (73)  
(2 used). Remove heater hose (68) from engine  
(68).

 : 7 mm

29. Remove sems bolt (71) from clamp (71). Remove  
heater hose (73) from pipe (70).

 : 17 mm




W1V1-02-11-019

## UPPERSTRUCTURE / Engine

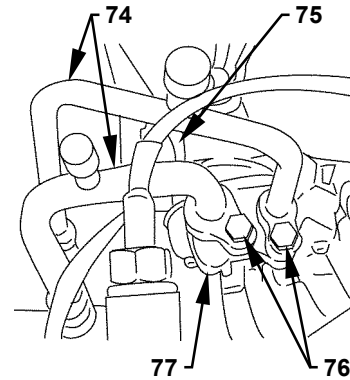
**IMPORTANT:** Before removing pipe (74), release the gas. Refer to Air Conditioner/ Troubleshooting in Technical Manual (T1G6-JAC-00).

30. Remove sems bolts (76) (2 used) from pipes (74) (2 used). Remove pipes (74) (2 used) from air conditioner pump (77).

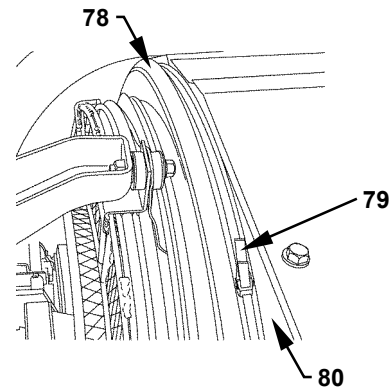
 : 13 mm

31. Remove connector (75).

32. Remove band (79) from rubber (78). Remove rubber (78) from shroud (80).




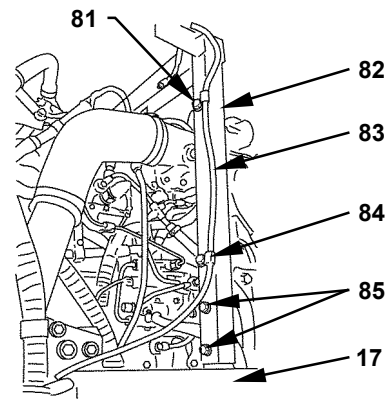
W1V1-02-11-018



W1V1-02-11-010


33. Remove sems bolts (81) (2 used) from clamps (84) (2 used). Remove wiring (83) from support (82).

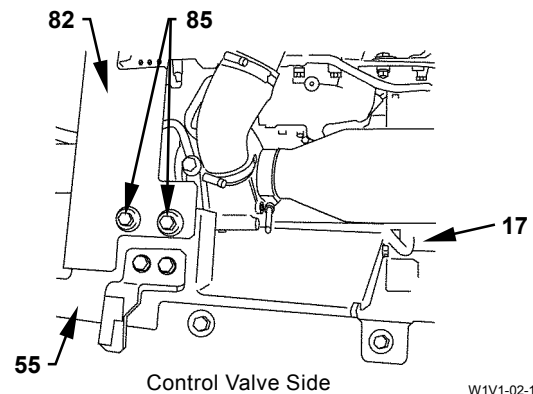
 : 17 mm



W1V1-02-11-016

34. Remove sems bolts (85) (4 used) from support (82). Remove support (82) from main frame (17) and cover (55).


 : 17 mm

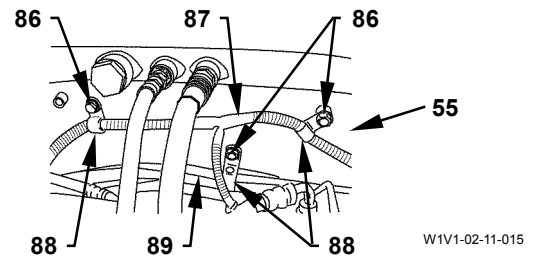


W1V1-02-11-028


## UPPERSTRUCTURE / Engine

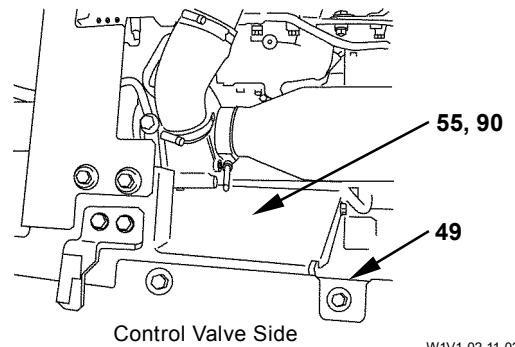
35. Remove sems bolts (86) (4 used) from clamps (88) (4 used). Remove wiring (87) and pilot hose (89) from cover (55).

 : 17 mm

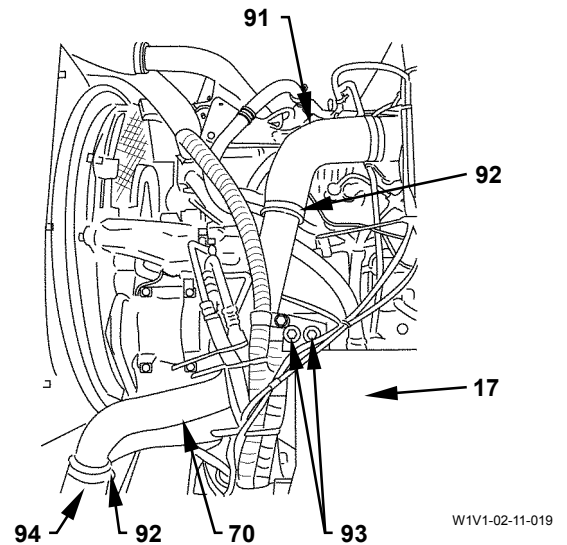


36. Remove sems bolts (90) (6 used) from cover (55). Remove cover (55) from bracket (49).


 : 17 mm

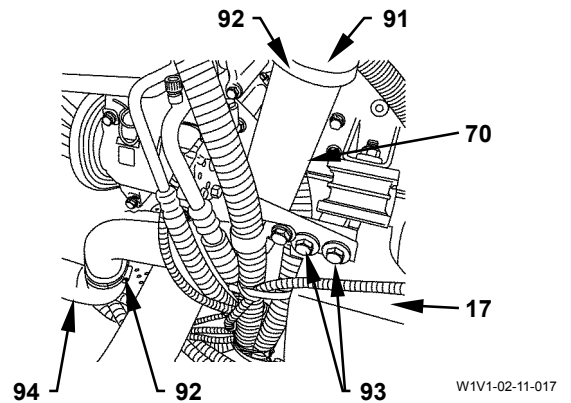


37. Loosen clamps (92) (2 used) from rubber hoses (91, 94). Remove rubber hoses (91, 94) from pipe (70).




38. Remove sems bolts (93) (2 used) from pipe (70). Remove pipe (70) from main frame (17).

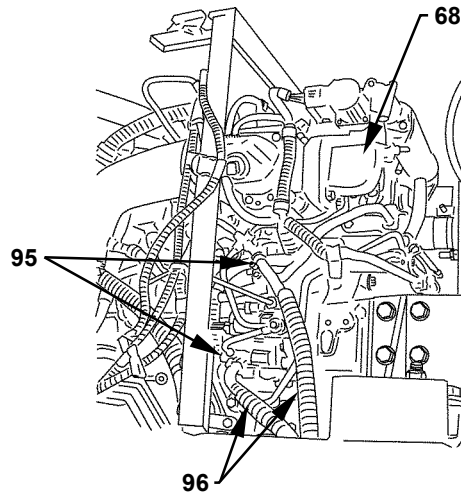
 : 17 mm



## UPPERSTRUCTURE / Engine


39. Loosen clamps (95) (2 used). Remove fuel hoses (96) (2 used) from engine (68). Install a plug to the open ends. Keep fuel hoses (96) (2 used) in order not to leak fuel.

 : 7 mm




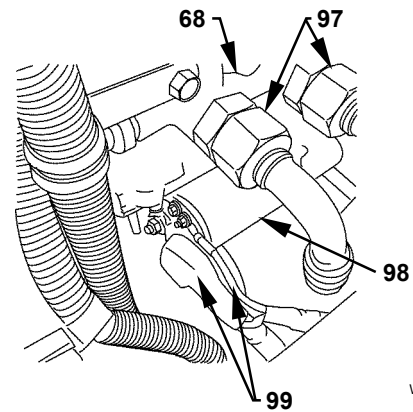
W1V1-02-11-020

40. Remove hoses (97) (2 used) from engine (68). Cap the open ends.

 : 36 mm


41. Remove wirings (99) (2 used) from starter motor (98).

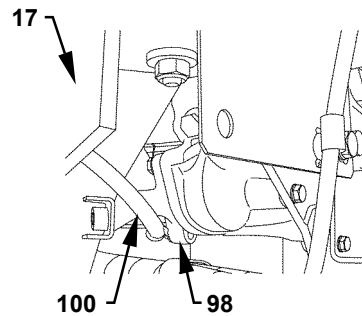
 : 8 mm, 14 mm



W1V1-02-11-021

42. Remove ground line (100) from main frame (17).


 : 17 mm

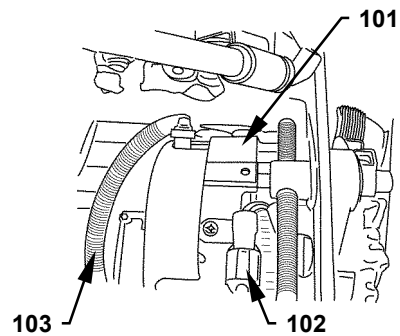


W1V1-02-11-031

43. Remove connector (102) from alternator (101).

44. Remove wirings (103) (2 used) from (101).

 : 12 mm



W1V1-02-11-024

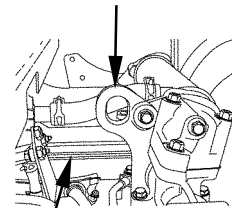
## UPPERSTRUCTURE / Engine



**CAUTION: The engine (68) assembly weight: 643 kg (1418 lb)**

45. Install the shackles (2 used) to the lifting hole for engine (68). Attach a nylon sling onto the shackles (2 used). Hoist and hold engine (68).

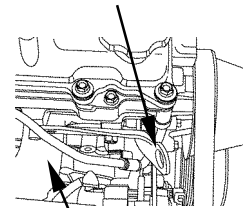
Shackle Mounting Hole on Pump Side



68

W1V1-02-11-032


Shackle Mounting Hole on Fan Side




68

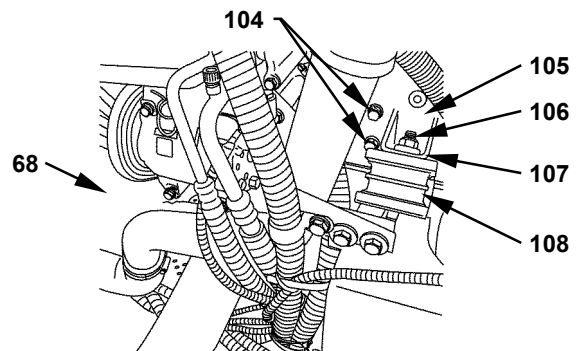
W1V1-02-11-033

46. Remove nuts (106) (2 used) and spacers (107) (2 used) from rubber vibration isolators (108) (2 used).

 : 22 mm


47. Remove sems bolts (104) (4 used) from bracket (105) on the counterweight (31) side.

 : 17 mm




W1V1-02-11-017

48. Remove nuts (111) (2 used) and spacers (112) (2 used) from rubber vibration isolators (113) (2 used).

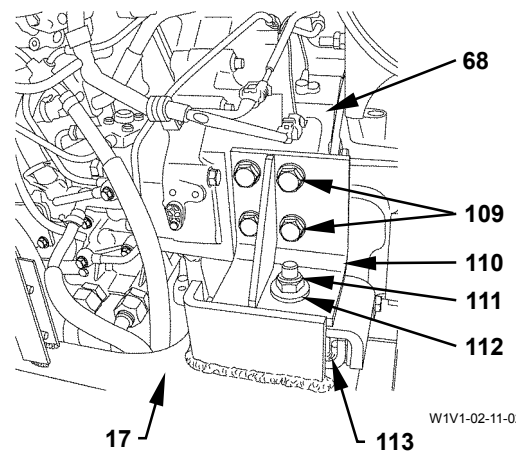
 : 27 mm

49. Remove sems bolts (109) (4 used) from bracket (110) at the counterweight (31) side.

 : 24 mm

50. Hoist the engine (68) assembly 15 mm. Remove brackets (105, 110) from engine (68) and rubber vibration isolators (108, 113).

51. Check if brackets (105, 110) are removed from rubber vibration isolators (108, 113) at the right with the engine (68) assembly 15 mm above. Move the engine (68) assembly 50 mm to the pump side and remove the engine (68) assembly from main frame (17).



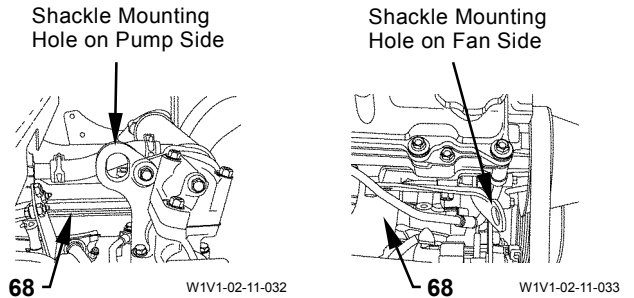
W1V1-02-11-022

# UPPERSTRUCTURE / Engine

## Installation


**CAUTION:** The engine (68) assembly weight: 643 kg (1418 lb)


1. Install the shackles (2 used) to the lifting hole for engine (68). Attach a nylon sling onto the shackles (2 used). Hoist and hold engine (68).

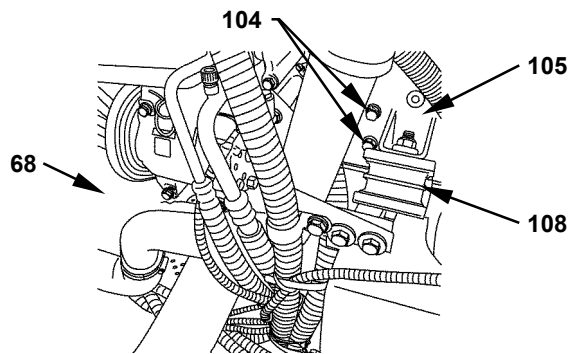


2. Hoist and hold the engine (68) assembly 15 mm above the mounting hole. At this time, check if the holes on brackets (105, 110) at the right are aligned with the centers of rubber vibration isolators (108, 113).


3. Apply LOCTITE #262 to sems bolts (104) (4 used). Install bracket (105) to engine (68) with sems bolts (104) (4 used).


 : 17 mm

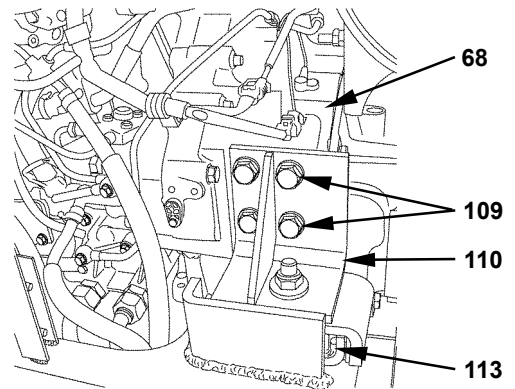
 : 65 N·m (7 kgf·m, 48 lbf·ft)



4. Apply LOCTITE #262 to sems bolts (109) (4 used). Install bracket (110) to engine (68) with sems bolts (109) (4 used).


 : 24 mm


 : 270 N·m (28 kgf·m, 199 lbf·ft)

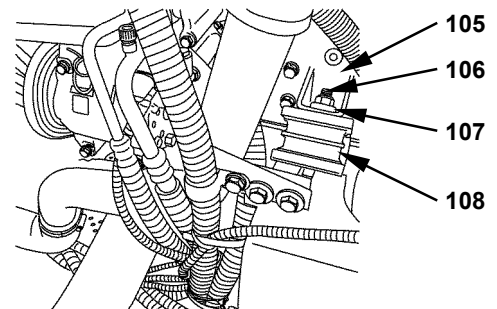


5. Lower the engine (68) assembly.

6. Install brackets (105) (2 used) to rubber vibration isolators (108) (2 used) with nuts (106) (2 used) and spacers (107) (2 used).

 : 22 mm


 : 140 N·m (14 kgf·m, 103 lbf·ft)




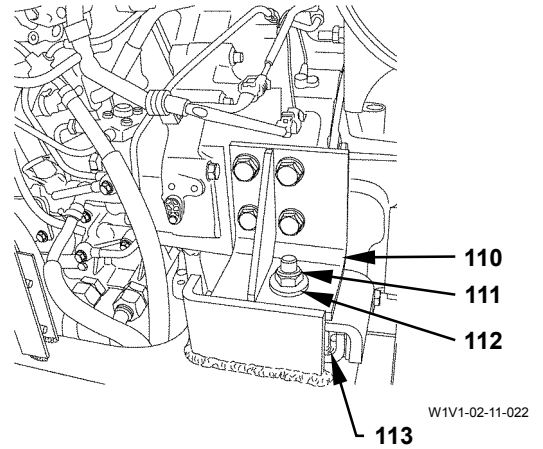


## UPPERSTRUCTURE / Engine


7. Install brackets (110) (2 used) to rubber vibration isolators (113) (2 used) with nuts (111) (2 used) and spacers (112) (2 used).


 : 27 mm


 : 400 N·m (41 kgf·m, 295 lbf·ft)




8. Install wirings (99) (2 used) to starter motor (98).


 : 8 mm

 : 14 mm


 : 10 N·m (1 kgf·m, 7 lbf·ft)


9. Install hoses (97) (2 used) to engine (68).

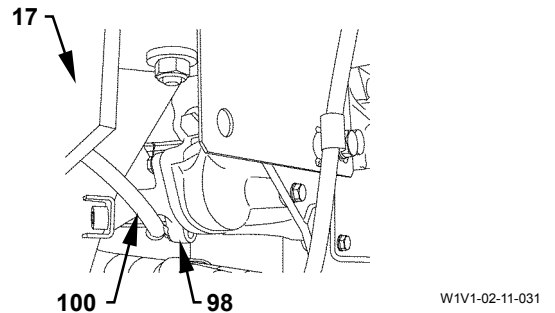
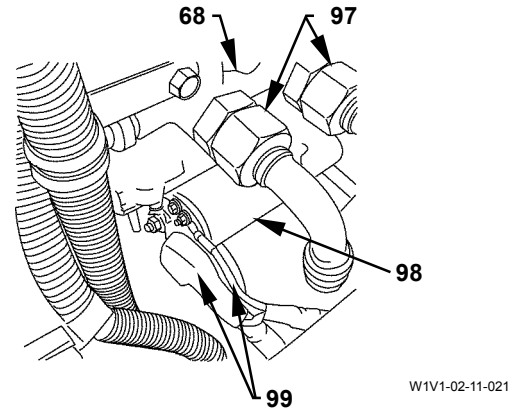
 : 36 mm

 : 205 N·m (21 kgf·m, 151 lbf·ft)


10. Install ground line (96) to main frame (98).


 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

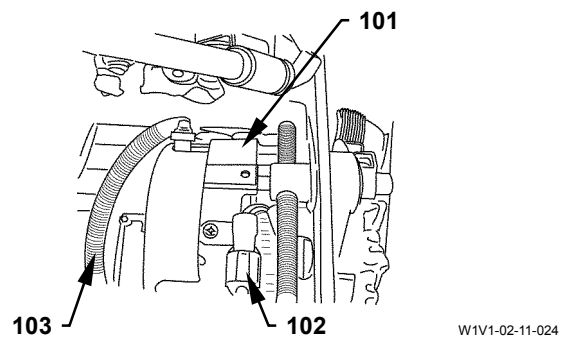


11. Install wiring (103) to alternator (101).

 : 12 mm


 : 10 N·m (1 kgf·m, 7 lbf·ft)


12. Install connector (102).

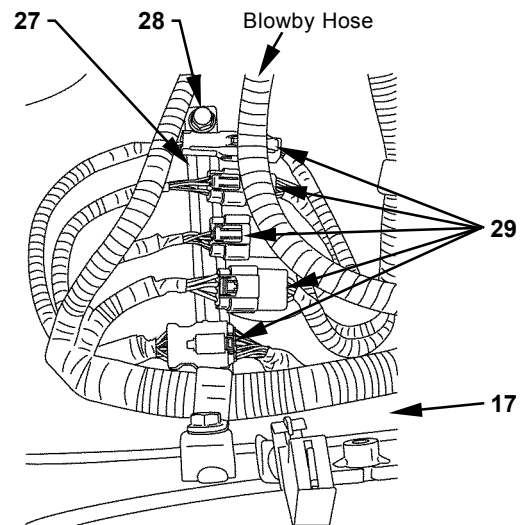


## UPPERSTRUCTURE / Engine

13. Install connectors (29) (5 used). Install plate (27) to main frame (17) with sems bolts (28) (2 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

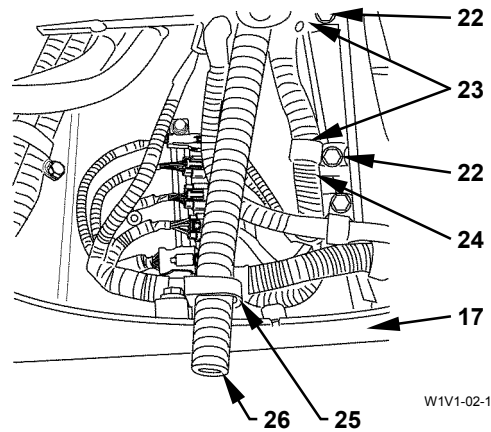


W1V1-02-11-030

14. Secure blowby hose (26) to band (25).
15. Secure wire harness (24) to main frame (17) with sems bolts (22) (2 used) and clamps (23) (2 used).


 : 17 mm

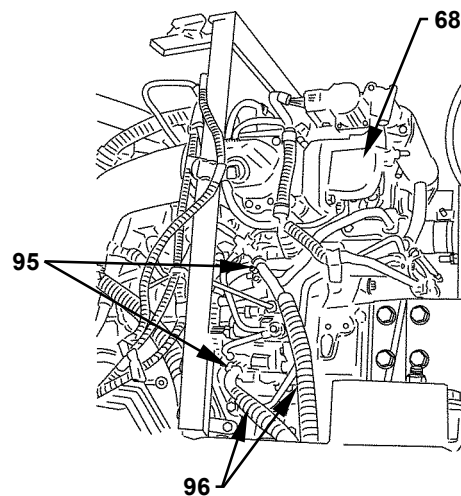
 : 50 N·m (5 kgf·m, 37 lbf·ft)



W1V1-02-11-029

16. Secure fuel hoses (96) (2 used) to engine (68) with clamps (95) (2 used).

 : 7 mm

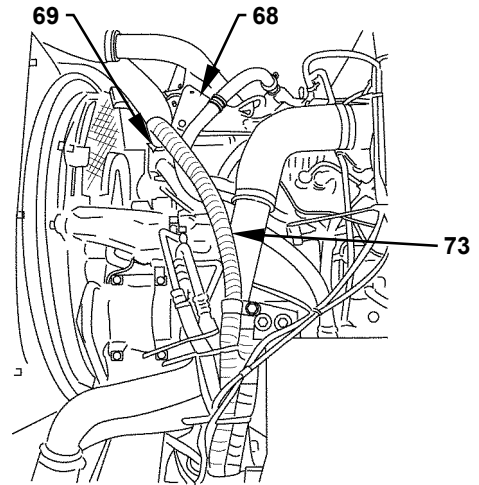


W1V1-02-11-020

## UPPERSTRUCTURE / Engine

17. Install heater hoses (73) (2 used) to engine (68) with clamps (69) (2 used).


 : 7 mm




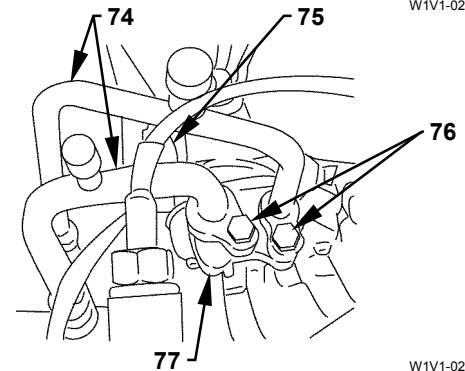
18. Install connector (75) to air conditioner pump (77).

**IMPORTANT: Before installing pipe (74), charger refrigerant. Refer to Air Conditioner/ Troubleshooting in Technical Manual (T1G6-JAC-00).**

19. Install pipes (74) (2 used) to air conditioner pump (77) with sems bolts (76) (2 used).

 : 13 mm


 : 20 N·m (2 kgf·m, 15 lbf·ft)




W1V1-02-11-019


20. Install pipe (70) to rubber hoses (91, 94) with clamps (92) (2 used).


21. Install pipe (70) to main frame (17) with sems bolts (93) (2 used).

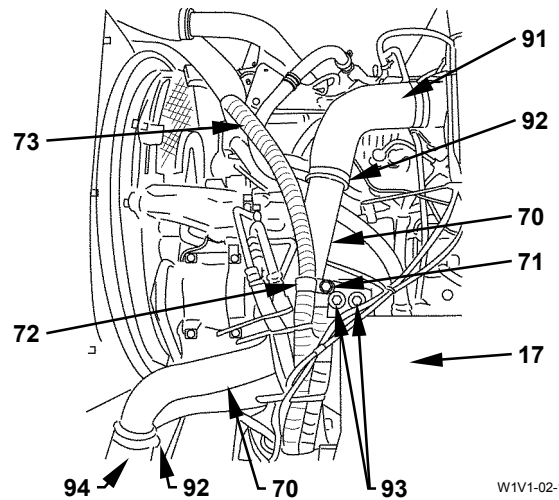
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

22. Install heater hose (73) to pipe (70) with clamp (72) and sems bolt (71).

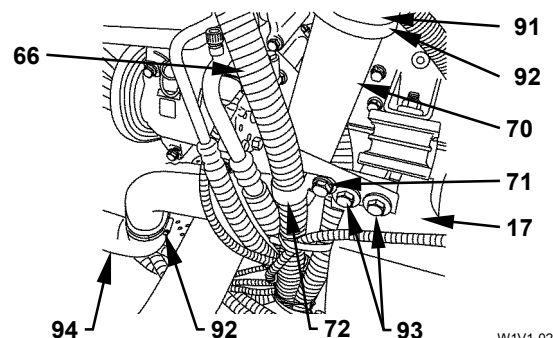
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



W1V1-02-11-018


W1V1-02-11-019




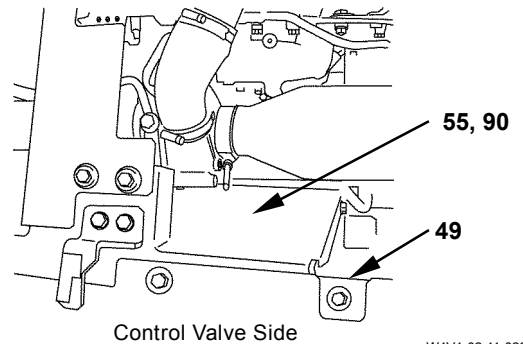
W1V1-02-11-017

## UPPERSTRUCTURE / Engine


23. Install cover (55) to bracket (49) with sems bolts (90) (6 used).


 : 17 mm

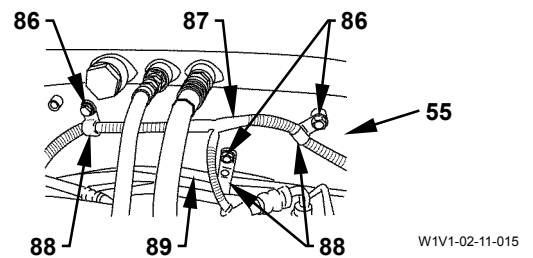
 : 50 N·m (5 kgf·m, 37 lbf·ft)




24. Install wiring (87) and pilot hose (89) to cover (55) with sems bolts (86) (4 used) and clamps (88) (4 used).


 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)





25. Install support (82) to main frame (17) and cover (55) with sems bolts (85) (4 used).

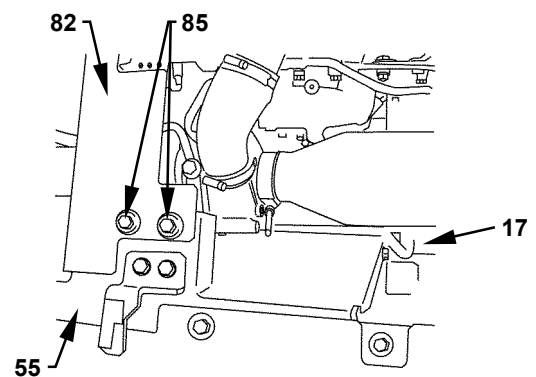
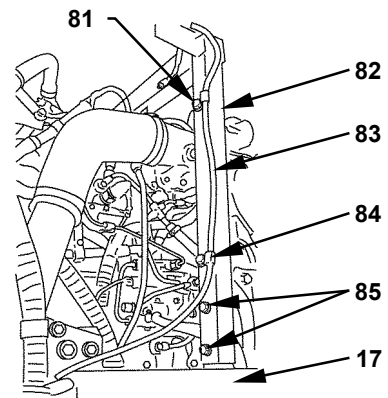
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

26. Install wiring (83) to support (82) with sems bolts (81) (2 used) and clamps (84) (2 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)



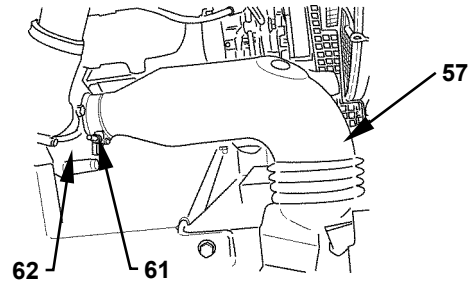
## UPPERSTRUCTURE / Engine

27. Install rubber hose (57) to turbocharger (62) and air cleaner (59) with clamps (58, 61).

 : 11 mm

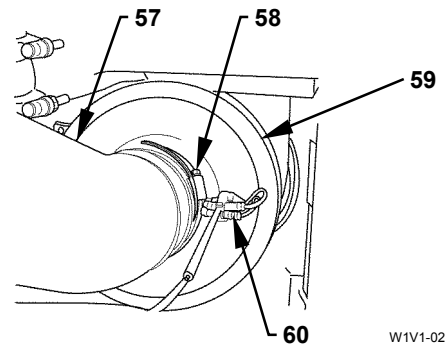
 : 3.3 to 4.2 N·m

(0.3 to 0.4 kgf·m, 2.4 to 3.1 lbf·ft)



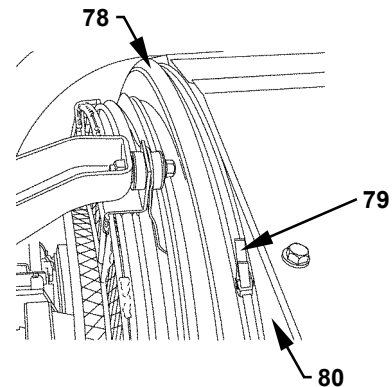
W1V1-02-11-013

28. Install connector (60) to air cleaner (59).



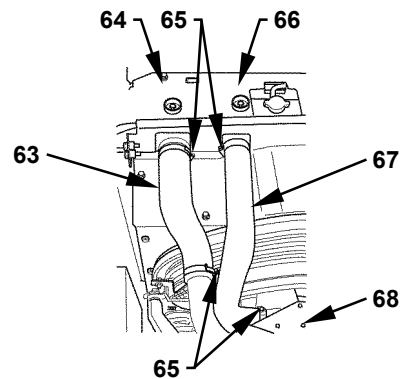
W1V1-02-11-014

29. Install rubber (78) to shroud (80). Secure rubber (78) to shroud (80) with band (79).



W1V1-02-11-010

30. Install rubber hoses (63, 67) to engine (68), intercooler (64) and radiator (66).

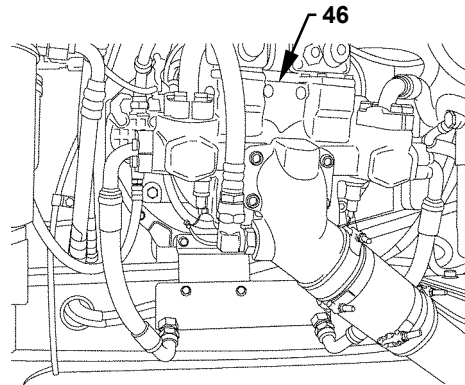


W1V1-02-11-009

## UPPERSTRUCTURE / Engine

31. Install all connectors, hoses and pipes to pump device (46).



-  : 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)
-  : 8 mm
-  : 50 N·m (5 kgf·m, 37 lbf·ft)
-  : 10 mm
-  : 90 N·m (9 kgf·m, 66 lbf·ft)



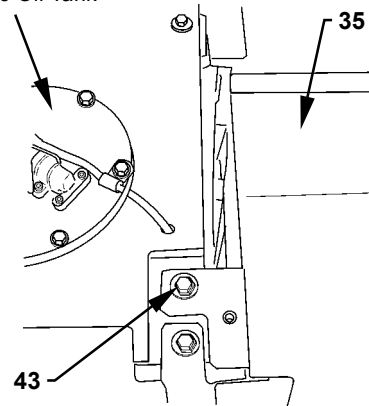
W1V1-02-11-012

**IMPORTANT: When installing the muffler bracket (35) assembly, do not damage the parts and hoses.**

32. Install the muffler bracket (35) assembly with bolts (43) (5 used).



-  : 17 mm
-  : 50 N·m (5 kgf·m, 37 lbf·ft)

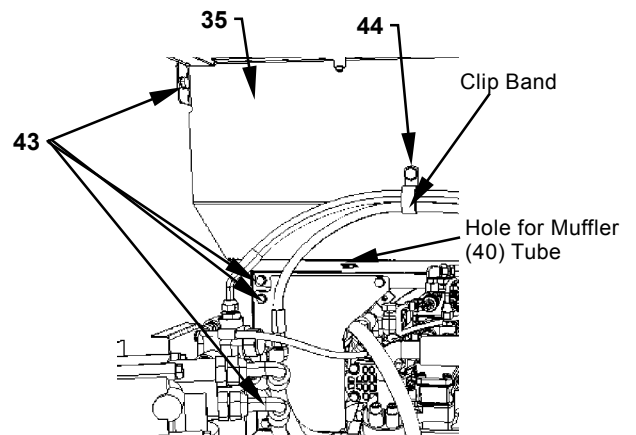
Hydraulic Oil Tank



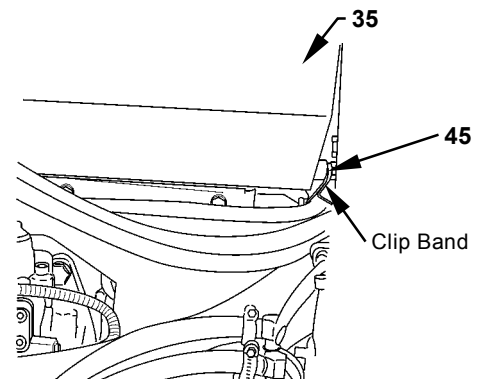
W1V1-02-04-017

33. Secure the clip bands (2 used) to the muffler bracket (35) assembly with bolts (44, 45).

-  : 17 mm
-  : 50 N·m (5 kgf·m, 37 lbf·ft)




W1V1-02-04-007




W1V1-02-04-016


## UPPERSTRUCTURE / Engine

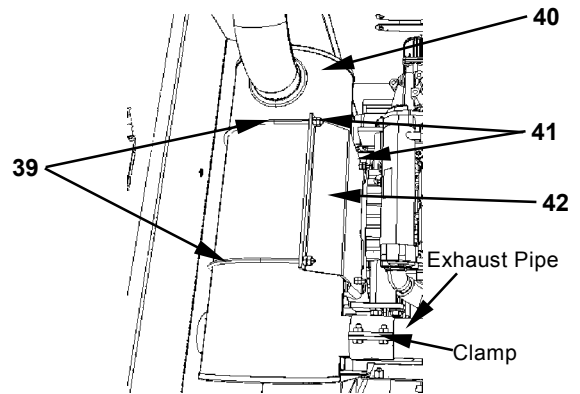
34. Install muffler (40) to the exhaust pipe. Install the clamp to the connection part.

 : 14 mm

35. Secure muffler (40) to bracket (42) with U-bolts (39) (2 used) and nuts (41) (8 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

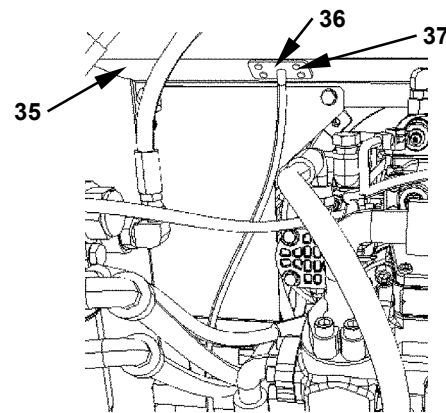


W1V1-02-04-006

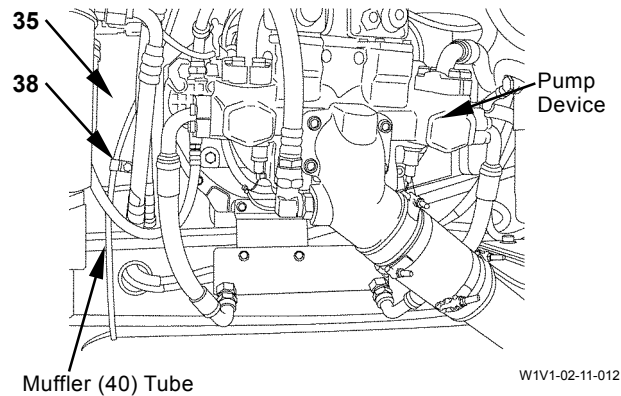
36. Pass the muffler (40) tube through the muffler bracket (35) assembly in the pump space. Install cover (36) with bolts (37) (4 used). Secure the muffler (40) tube to the muffler bracket (35) assembly with clamp (38).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)




W1V1-02-04-008




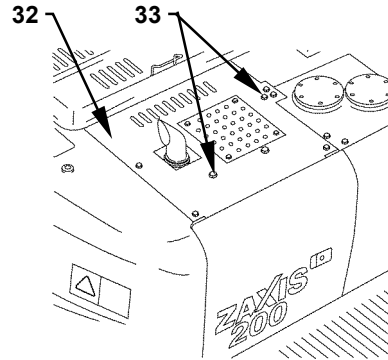
W1V1-02-11-012

## UPPERSTRUCTURE / Engine

37. Install cover (32) with sems bolts (33) (9 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

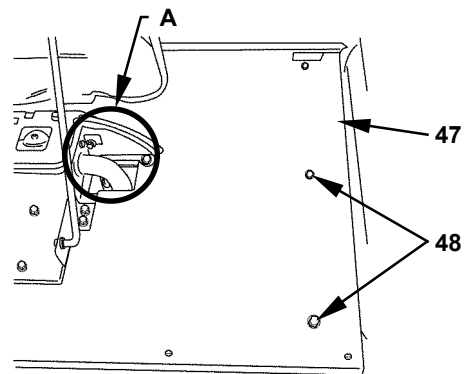


W1V1-02-11-003

38. Install cover (47) to bracket (49) with sems bolts (48) (5 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)





W1V1-02-11-007

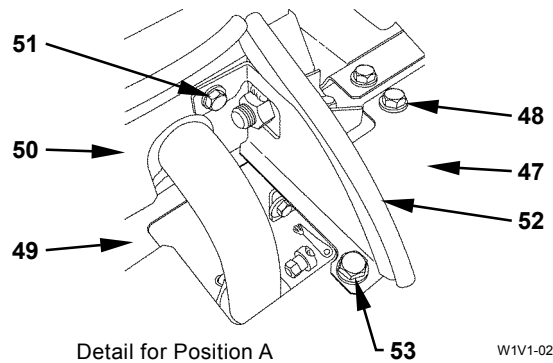
39. Install bracket (52) to covers (47, 50) with sems bolts (51, 53).

 : 13 mm

 : 20 N·m (2 kgf·m, 15 lbf·ft)

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)





W1V1-02-11-008

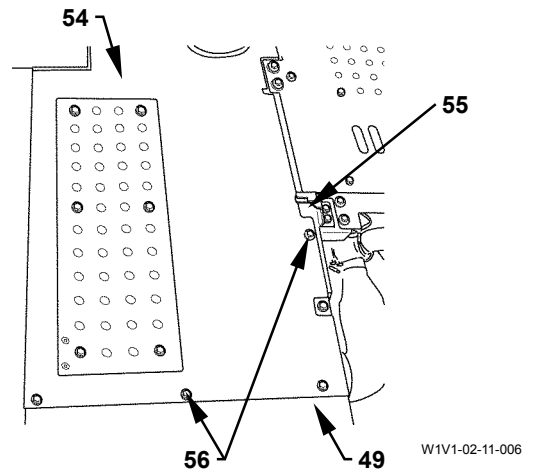


## UPPERSTRUCTURE / Engine

40. Install cover (54) to cover (55) and bracket (49) with sems bolts (56) (4 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



**CAUTION: Counterweight (31) weight:**

ZAXIS 200-3, 200LC-3: 4350 kg (9590 lb)

ZAXIS 210H-3, 210LCH-3: 4750 kg (10472 lb)

ZAXIS 210K(B)-3, 210LCK(B)-3: 4750 kg (10472 lb)

ZAXIS 210K(HG)-3, 210LCK(HG)-3: 5360 kg (11817 lb)

ZAXIS 210LCN-3, 240N-3: 5510 kg (12147 lb)

ZAXIS 240-3, 240LC-3: 5400 kg (11905 lb)

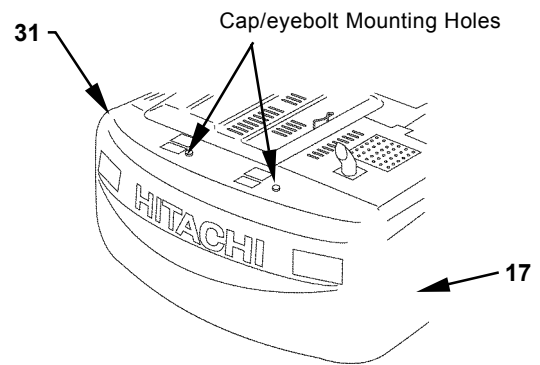
ZAXIS 250H-3, 250LCH-3: 6100 kg (13448 lb)

ZAXIS 250K-3, 250LCK-3: 6500 kg (14330 lb)

ZAXIS 250LC-3, 250LCN-3: 6100 kg (13448 lb)

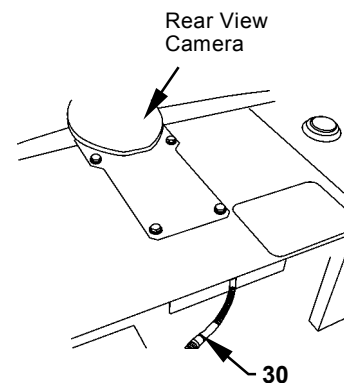
ZAXIS 270-3, 270LC-3: 6100 kg (13448 lb)

ZAXIS 280LC-3, 280LCN-3: 6100 kg (13448 lb)




41. Install counterweight (31) to main frame (17). As for removal and installation of the counterweight, refer to the Remove and Install Counterweight group (W2-2-2).


42. Install connector (30) of the rear view camera.

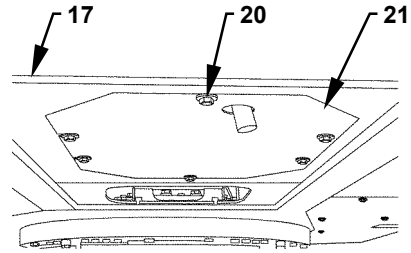


## UPPERSTRUCTURE / Engine

43. Install cover (21) to main frame (17) with sems bolts (20) (6 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

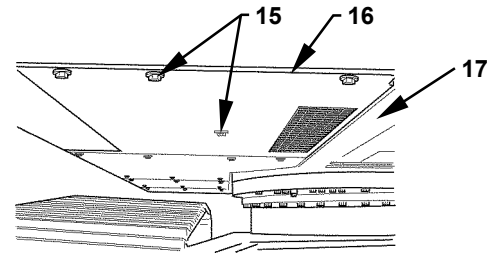


W1V1-02-11-026

44. Install cover (16) to main frame (17) with sems bolts (15) (7 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

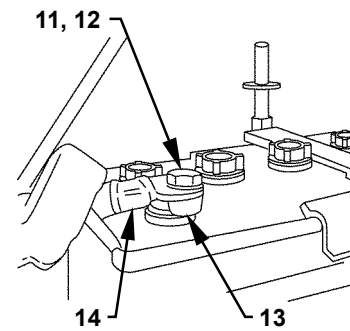


W1V1-02-11-027

45. Install ground code (14) to terminal (13) with bolt (11) and washer (12).

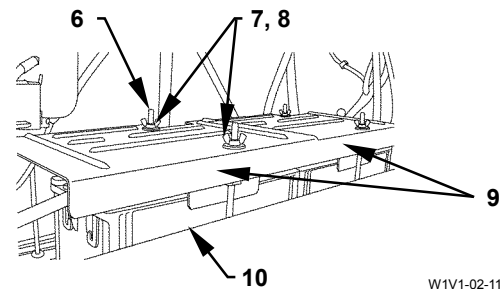
 : 17 mm

 : 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 (3) (4 used) with washers (8) (4 used) and wing nuts (7) (4 used).





W1V1-02-11-004

## UPPERSTRUCTURE / Engine

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47. Attach a nylon sling onto cover (5). Hoist cover (5) and align the mounting hole on cover (4). Install cover (5) to cover (4) with washers (2) (4 used) and nuts (1) (4 used).

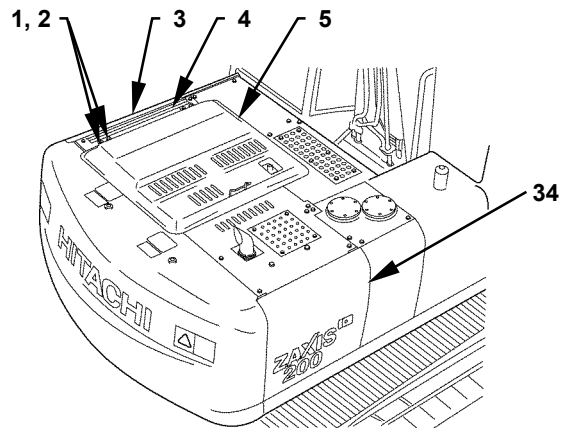
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

48. Install the stopper to cover (5). Secure the stopper to cover (5) with the washer and pin.

49. Add coolant into the radiator.

50. Close covers (1, 2, 34).



W1V1-02-11-001

## UPPERSTRUCTURE / Engine

### REMOVE AND INSTALL ENGINE (ZX225US-3 CLASS)

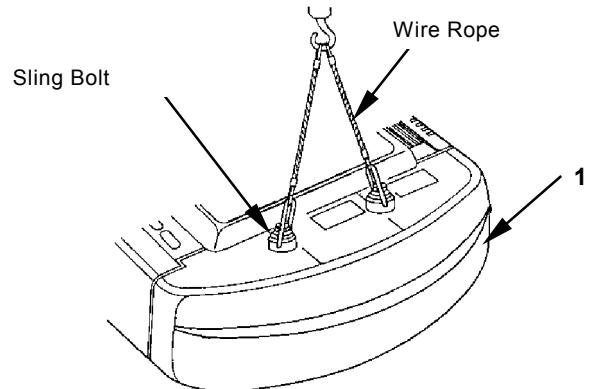
**IMPORTANT:** Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

#### Removal




**CAUTION:** Counterweight (1) weight: 7570 kg (16689 lb)

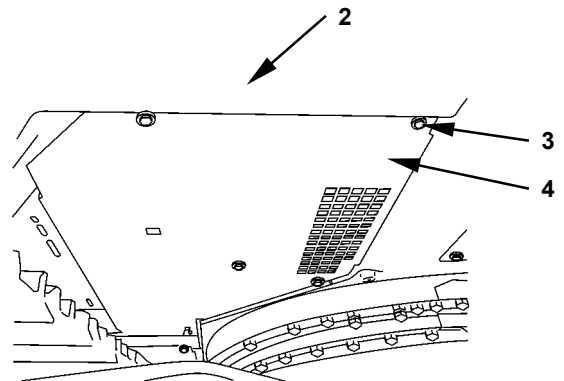
1. Remove counterweight (1) from the main frame (2). (Refer to REMOVE AND INSTALL COUNTERWEIGHT on W2-2-1.)



W178-02-11-067

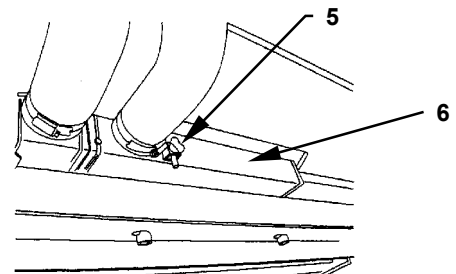
2. Remove bolts (3) (6 used) from cover (4) under the radiator. Remove cover (4) from the main frame (2).

 : 17 mm



W1V1-02-11-035


3. Loosen cock (5) and drain off water from radiator (6). Close cock (5).

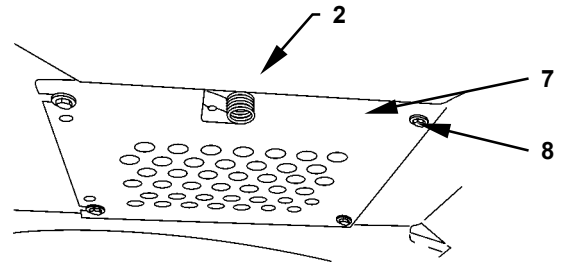


W1V1-02-11-034

## UPPERSTRUCTURE / Engine

- Remove bolts (8) (4 used) from cover (7) under the engine. Remove cover (7) from main frame (2).


 : 17 mm

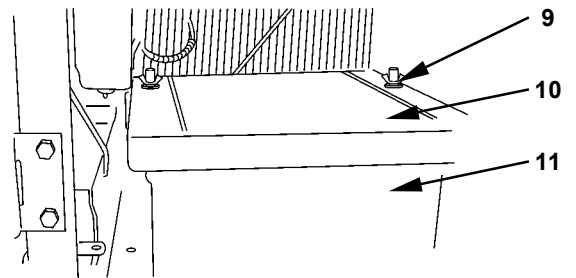


W1V1-02-11-053

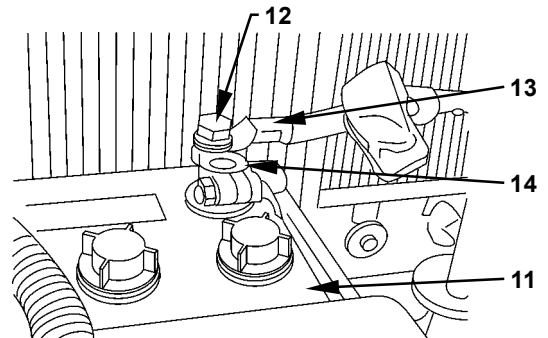
**IMPORTANT: Remove and Install the engine with ground line (13) in battery (11) disconnected. If the starter is removed or installed with ground line (13) connected to battery (11), the circuit may be shorted.**

- Open the door in air cleaner space. Remove wing nuts (9) (2 used). Remove covers (10) (2 used) from battery (11). Remove bolt (12) from ground terminal (14) in battery (11). Remove ground line (13) from ground terminal (14).

 : 17 mm




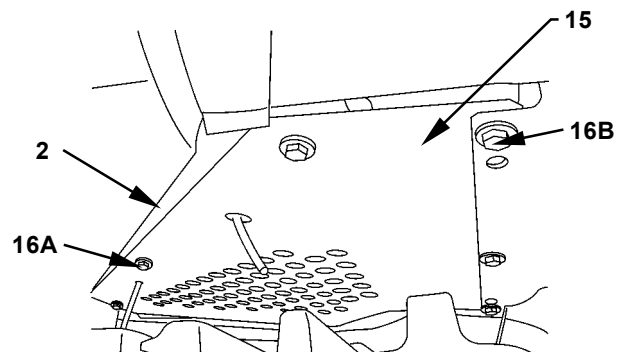
W1V1-02-11-037



W1V1-02-11-038

- Remove bolts (16A, 16B) (3 used for each) from cover (15) under the pump device. Remove cover (15) from main frame (2).


 : 17 mm

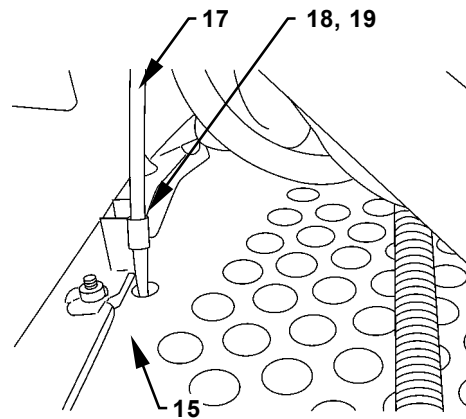


W1V1-02-11-029

## UPPERSTRUCTURE / Engine


7. Loosen bolt (18) in clamp (19) from the cover (15) mounting side. Remove hose (17) from clamp (19).

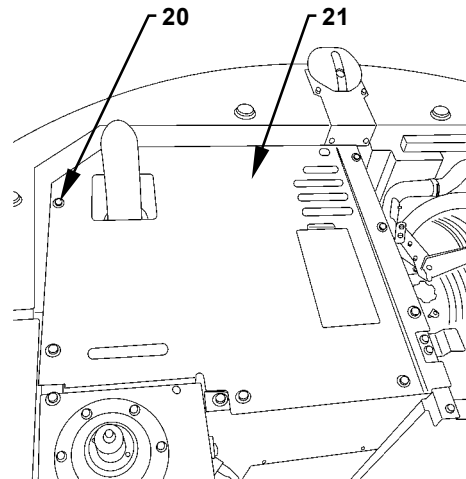
 : 17 mm



W1V1-02-04-021

8. Remove bolts (20) (7 used) from cover (21). Remove cover (21).


 : 17 mm

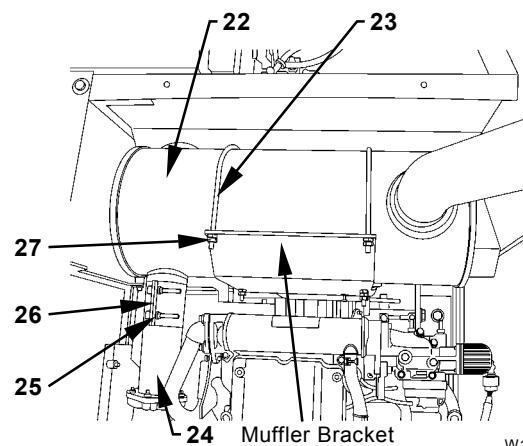


W1V1-02-04-028

9. Loosen nuts (25) (2 used) on clamp (26). Move clamp (26) to the exhaust pipe (24) side.

10. Attach a nylon sling to muffler (22) and hold muffler (22). Remove nuts (27) (8 used) from U-bolts (23) (2 used). Hoist and remove muffler (22) from the muffler bracket.

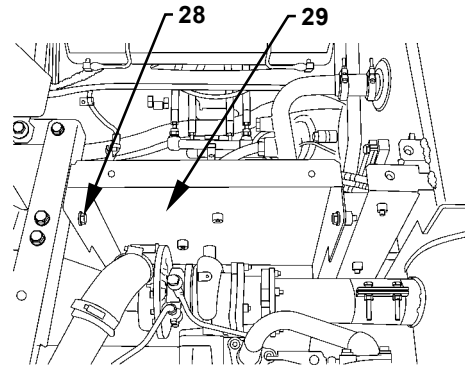
 : 17 mm



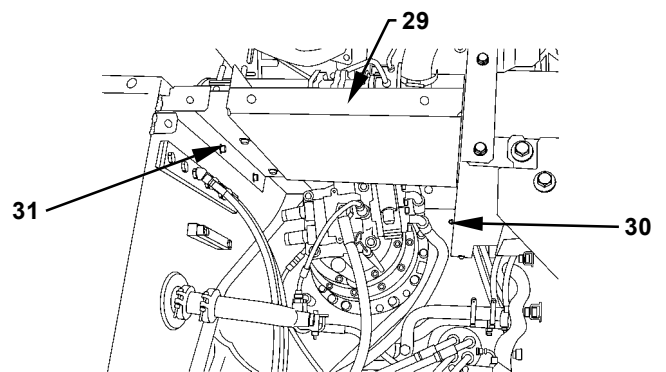
W1V1-02-04-022

## UPPERSTRUCTURE / Engine

11. Remove bolts (28), (30) (2 used) and (31) (3 used) from cover (29). Remove cover (29).




W1V1-02-11-054




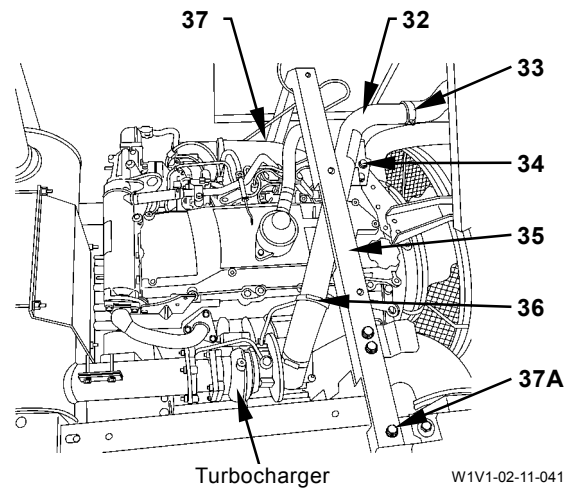
W1V1-02-11-055

12. Remove bolts (37A) and (37B) (2 used) from both ends of bracket (35). Remove bracket (35).

 : 17 mm

13. Remove bolts (34) (2 used) from pipe (32). Loosen bands (33, 36). Remove pipe (32) from the hose in intercooler and turbocharger.

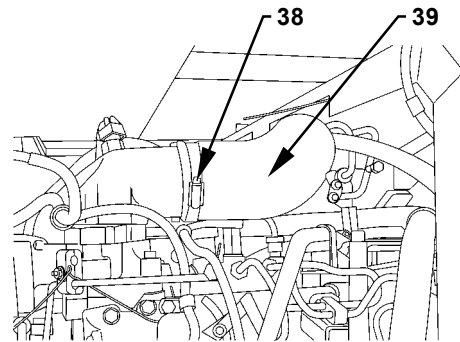
 : 17 mm



W1V1-02-11-041

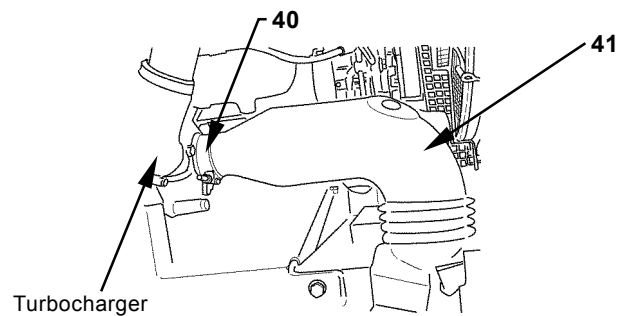
## UPPERSTRUCTURE / Engine

14. Loosen band (38) in hose (39). Remove hose (39) from the pipe in engine.

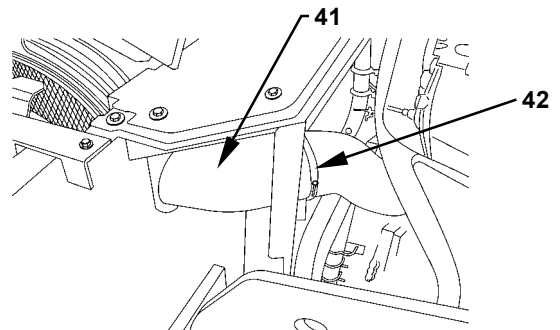


W1V1-02-11-042

15. Loosen bands (40, 42) in hose (41). Remove hose (41) from the pipes in turbocharger and air cleaner.

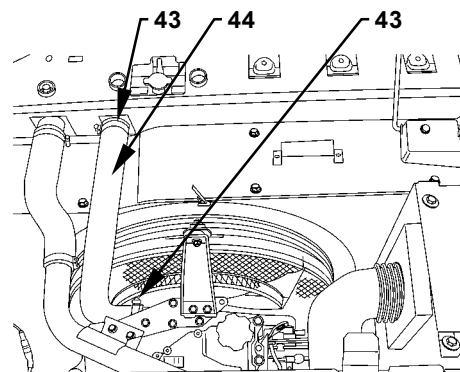


W1V1-02-11-013



W1V1-02-11-043

16. Loosen bands (43) (2 used) in hose (44). Remove hose (44) from the pipes in radiator and engine. Cap the hoses and pipes.

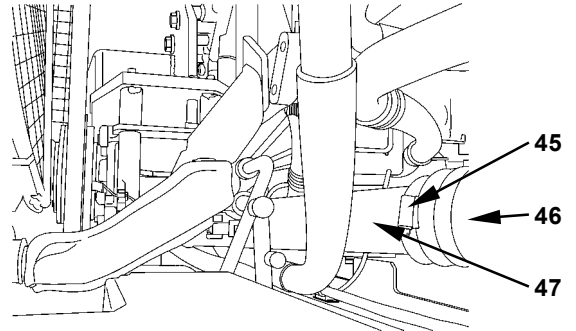


W1V1-02-11-044




## UPPERSTRUCTURE / Engine

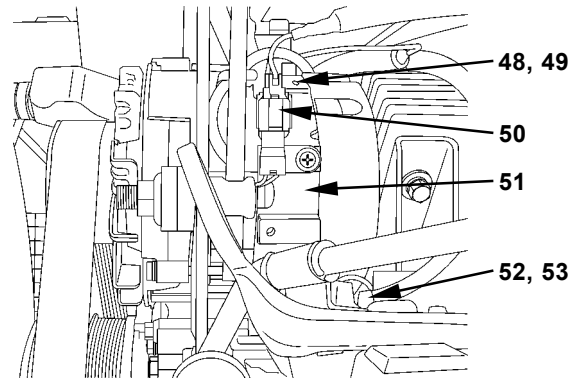
17. Loosen band (45) in hose (46). Remove hose (46) from pipe (47). Cap the hoses and pipes.



W1V1-02-11-045


18. Remove nuts (48, 52) from the terminal in alternator (51). Remove wirings (49, 53) from the terminal. Disconnect connector (50).


 : 6.5 mm

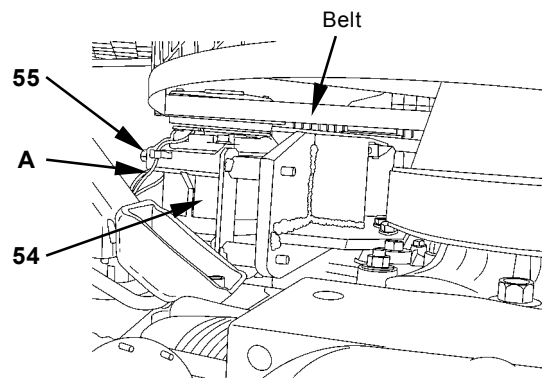


W1V1-02-11-046

19. Fully loosen the adjusting bolt through the cover (4) mounting side under the radiator. Attach a nylon sling to compressor (54) and hold compressor (54). Disconnect the connector (A) in compressor (54). Remove bolts (55) (4 used) from compressor (54). Remove the compressor belt and compressor (54) from the engine.

 **NOTE:** Remove and install the engine with compressor (54) hoisted outside the engine space.

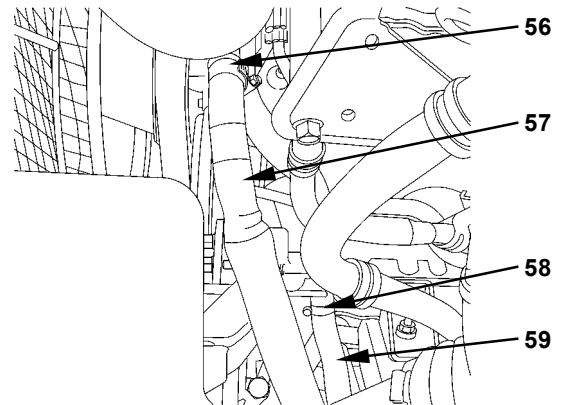
 : 13 mm



W1V1-02-11-047


## UPPERSTRUCTURE / Engine

20. Loosen bands (56, 58) in hoses (57, 59) through the counterweight mounting side. Remove hoses (57, 59) from the heater pipes (2 used) in engine. Cap the hoses and pipes.

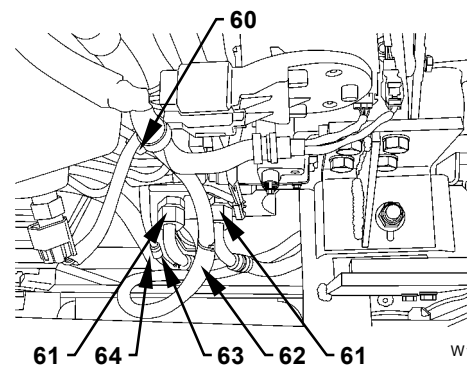


W1V1-02-11-048

21. Remove hoses (61) (2 used) from the engine oil filter pipes (2 used) in engine through the counterweight mounting side. Cap the hose.

 : 36 mm


22. Loosen bands (60, 64) in hoses (62, 63) through the counterweight mounting side. Remove hoses (62, 63) from the fuel pipe in engine. Cap the hose and pipe.




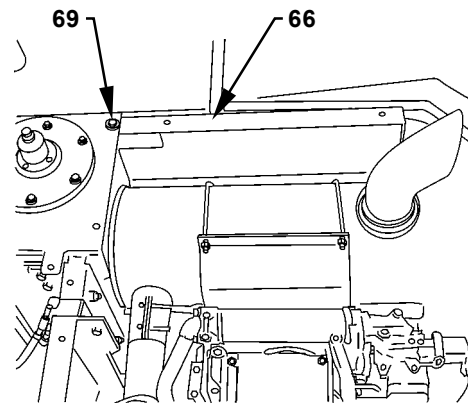
W1V1-02-11-049

## UPPERSTRUCTURE / Engine

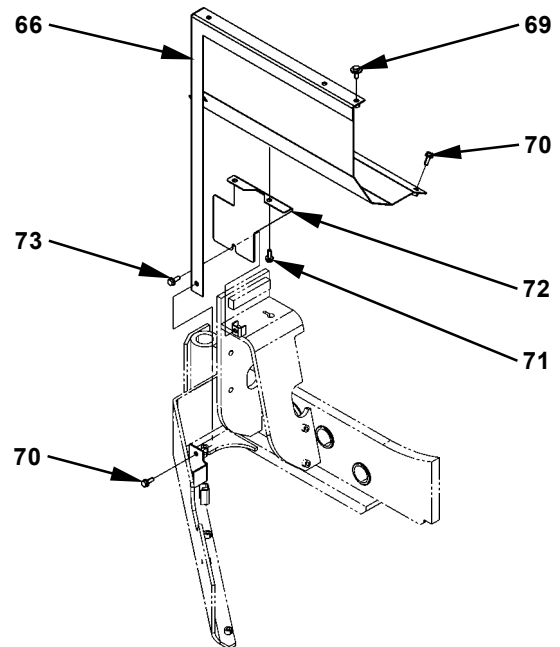
23. Remove bolts (69), (70) (2 used) from cover (66).  
Loosen bolt (73) in cover (72). Remove covers  
(66, 72) from the main frame.

 **NOTE:** As cover (66) is removed with cover (72)  
together, do not remove bolts (71) (2 used).

 : 17 mm




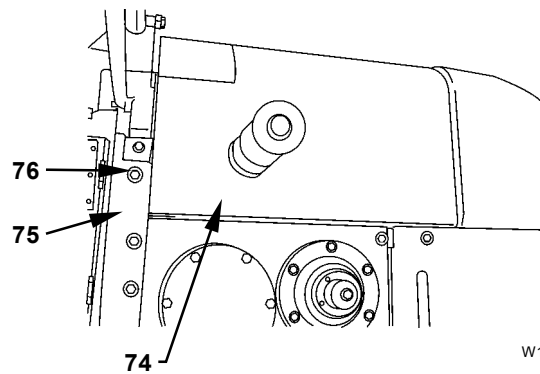
W1V1-02-11-056



W1V1-02-04-045

24. Remove bolts (76) (3 used) from bracket (75).  
Remove bracket (75) from fuel tank (74).


 : 17 mm

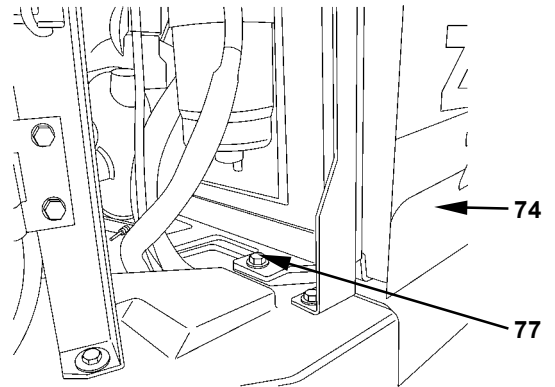


W1V1-02-04-031

## UPPERSTRUCTURE / Engine

25. Remove bolts (77) (2 used) from fuel tank (74).

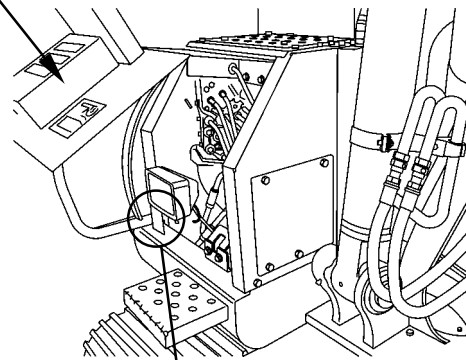
 : 24 mm



W1V1-04-11-030

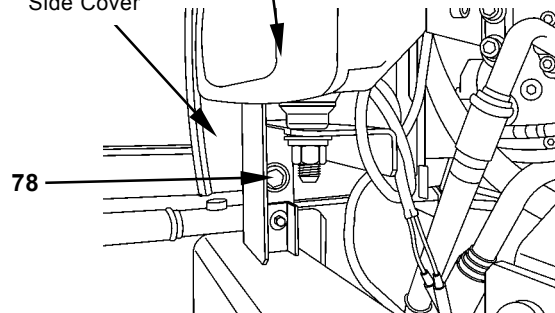
26. Open the front cover. Remove bolt (78) from the side cover. Open the side cover.

Front Cover




W1V1-02-05-075

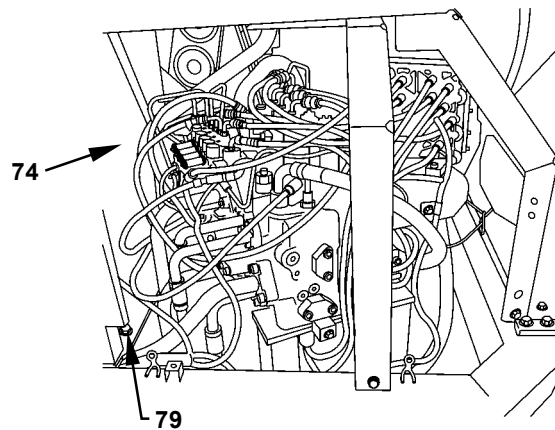
Side Cover



W1V1-02-05-076

27. Remove bolts (79) (2 used) from fuel tank (74).

 : 24 mm



W1V1-02-05-079

## UPPERSTRUCTURE / Engine

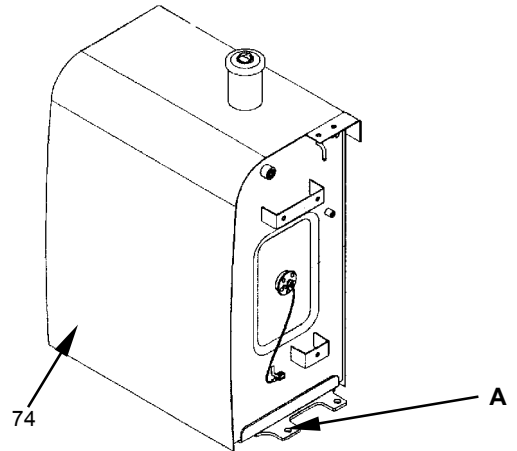


**CAUTION:** Fuel tank (74) weight: 110 kg (243 lb)

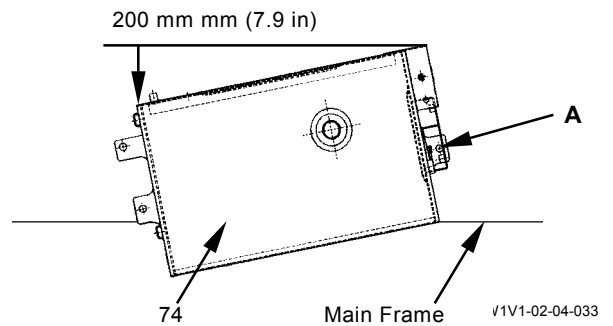
**IMPORTANT:** After fuel tank (74) is moved, attach a nylon sling to fuel tank (74) and hold fuel tank (74) in order not to turn over.

**Check if the fuel cock does not come in contact with the main frame through the cover mounting side under fuel tank (74).**

28. Attach a nylon sling to fuel tank (74). Hoist and move fuel tank (74) 15 mm (0.6 in) to the counterweight mounting side. Rotate fuel tank (74) 200 mm (7.9 in) outside at center of position A of fuel tank (74).





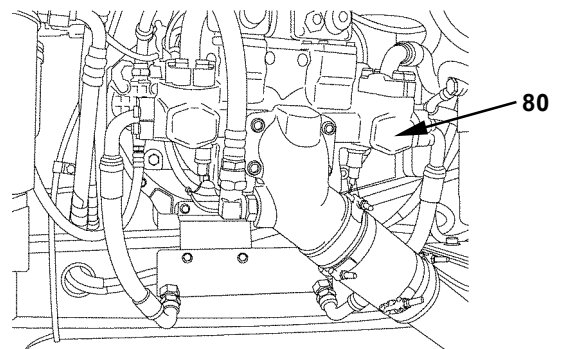
W1V1-02-04-032



V1V1-02-04-033


29. Remove all hoses and pipes from pump device (80). Attach an identification tag onto the removed hoses for assembling. Cap the open ends of hose, pipe and pump device.

 : 19 mm, 22 mm, 27 mm, 36 mm  
 : 8 mm, 10 mm



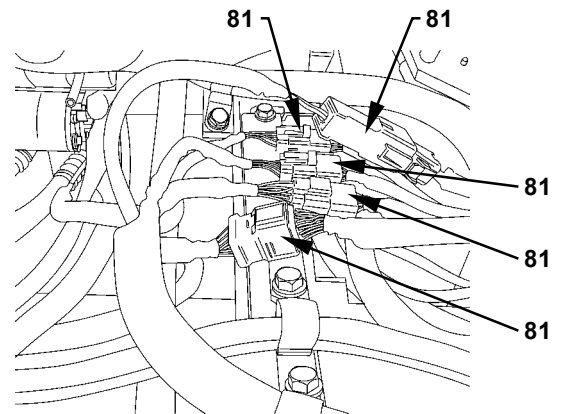
W1V1-02-11-012

30. Remove all wirings from pump device (80).

 : 17 mm


## UPPERSTRUCTURE / Engine

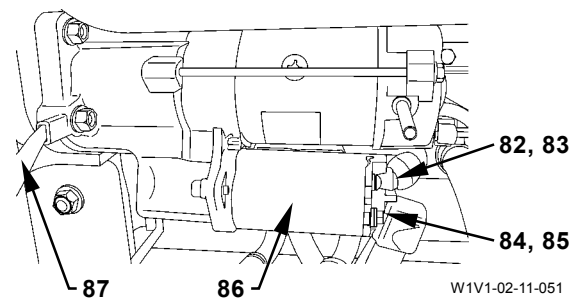
31. Disconnect connectors (81) (5 used) from the cover mounting side under engine.



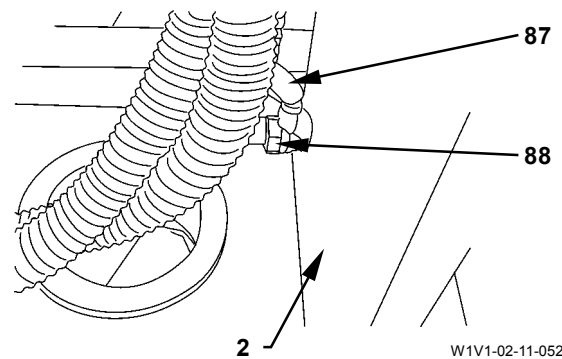
W1V1-02-11-050

32. Remove nuts (82, 84) in the starter (86) terminal from the cover mounting side under engine. Remove wirings (83, 85) from the terminal. Remove bolt (88) from main frame (2). Remove ground line (87).

 : 17 mm, 22 mm

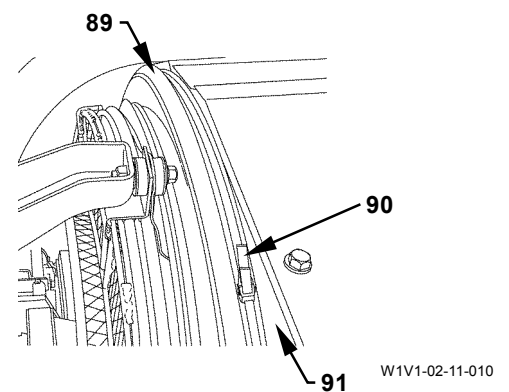


W1V1-02-11-051



W1V1-02-11-052


33. Loosen band (90) in rubber (89). Remove rubber (89) from shroud (91).

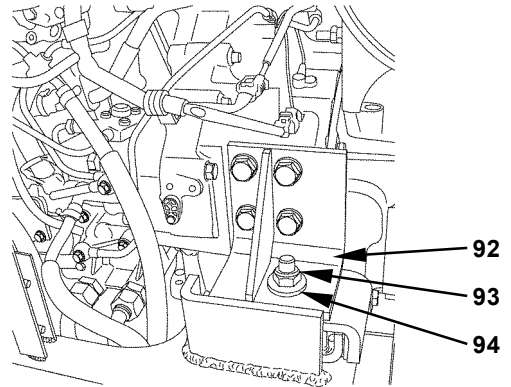


W1V1-02-11-010

## UPPERSTRUCTURE / Engine


34. Remove nuts (93) (2 used) and washers (94) (2 used) from engine brackets (92) (2 used) at pump device side.

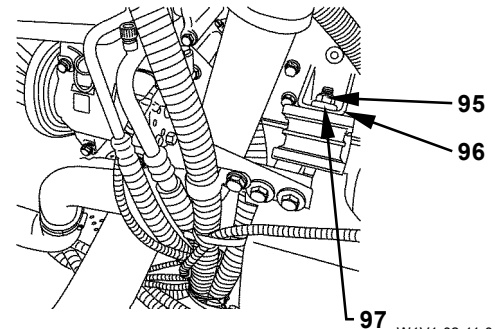
 : 27 mm



W1V1-02-11-022

35. Remove nuts (95) (2 used) and washers (97) (2 used) from engine brackets (96) (2 used) at radiator side.

 : 22 mm

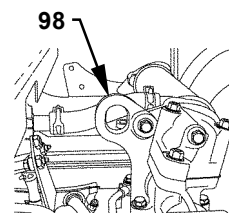


W1V1-02-11-017

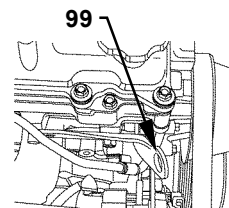
 **CAUTION:** Engine+ pump+ fan guard weight:  
650 kg (1433 lb)

**IMPORTANT:** Before hoisting the engine assembly, check if the hoses, pipes and wirings are removed from the engine and pump. If the engine assembly is hoisted with them connected, they may be damaged.

36. Install the shackles (2 used) to lifting holes (98, 99) for the engine. Hold the engine by using a wire rope. Adjust the wire rope and make the engine and pump device horizontal.



W1V1-02-11-032

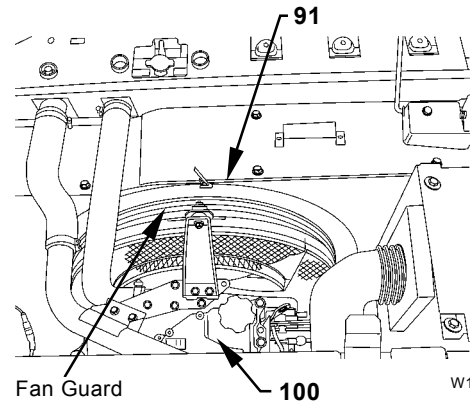


W1V1-02-11-033

## UPPERSTRUCTURE / Engine

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37. Hoist engine/pump assembly (100) 15 mm (0.6 in.) horizontally and vertically. Move engine/pump assembly (100) to the pump side horizontally until the fan guard part in engine is removed from shroud (91). Hoist and remove engine/pump assembly (100) from the main frame.



W1V1-02-11-044

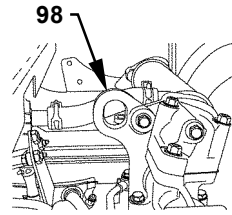


## UPPERSTRUCTURE / Engine

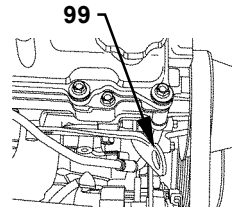
### Installation

**CAUTION:** Engine+ pump+ fan guard weight:  
650 kg (1433 lb)

1. Install the shackles (2 used) to lifting holes (98, 99) for the engine. Hold the engine by using a wire rope. Adjust the wire rope and make engine/pump assembly (100) horizontal. Move the engine to the engine mounting position in main frame.

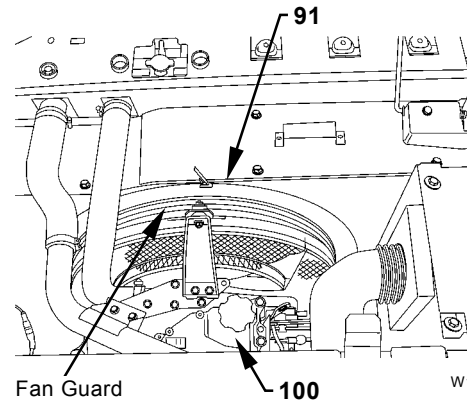


W1V1-02-11-032




W1V1-02-11-033


2. Insert the fan guard in engine to shroud (91) first. Lower engine/pump assembly (100) to the engine mounting position in main frame.

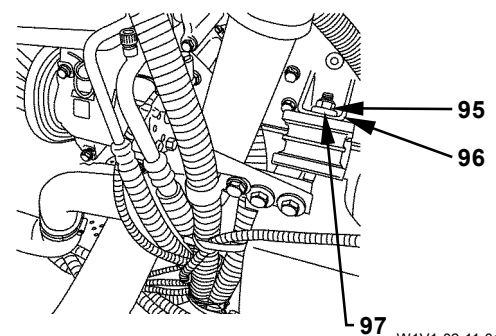


W1V1-02-11-044

3. Install engine brackets (96) (2 used) at radiator side to the main frame with washers (97) (2 used) and nuts (95) (2 used).

 : 22 mm


 : 180 N·m (18.4 kgf·m, 133 lbf·ft)




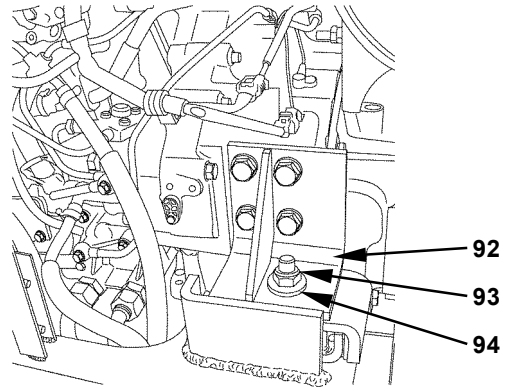
W1V1-02-11-017

## UPPERSTRUCTURE / Engine

4. Install engine brackets (92) (2 used) at pump side to the main frame with washers (94) (2 used) and nuts (93) (2 used).

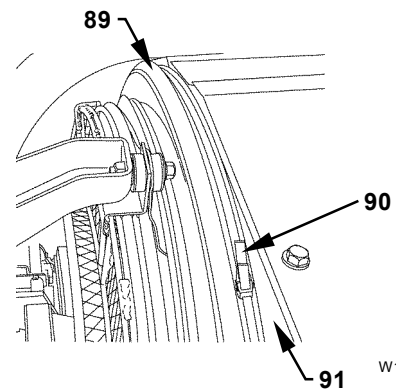
 : 27 mm

 : 400 N·m (41 kgf·m, 295 lbf·ft)




W1V1-02-11-022


5. Cover shroud (89) with rubber (91). Secure rubber (89) with band (90).

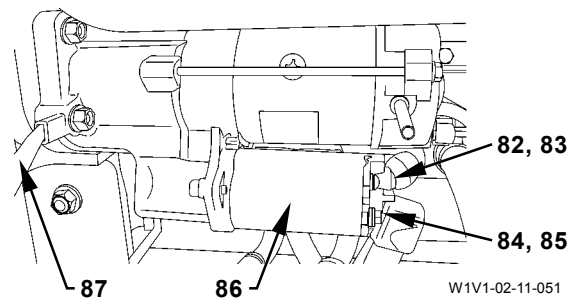


W1V1-02-11-010

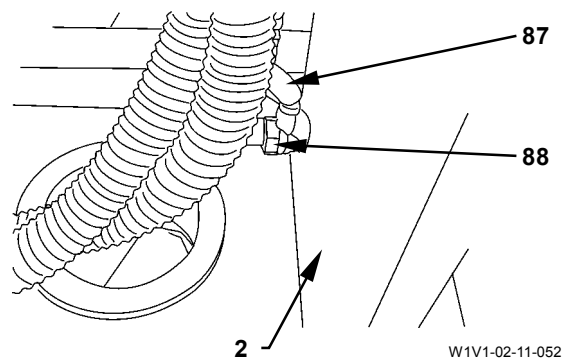
6. Install wirings (82, 84) to the starter (86) terminal through the cover mounting side under engine with nuts (83, 85). Install ground line (87) to main frame (2) with bolt (88).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



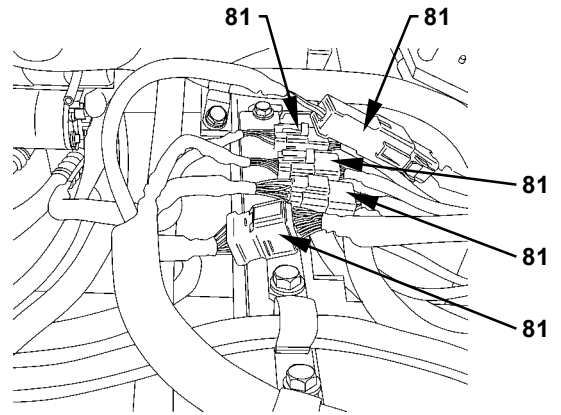
W1V1-02-11-051



W1V1-02-11-052


## UPPERSTRUCTURE / Engine


7. Install connectors (81) (5 used) through the cover (81) mounting side under engine.

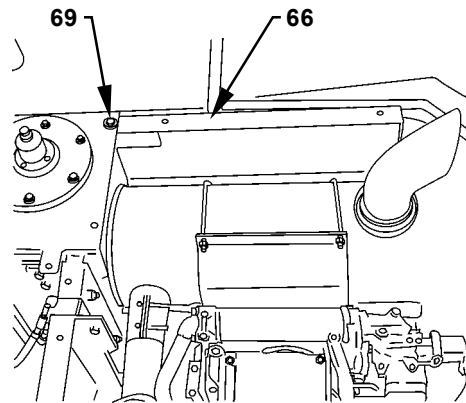


W1V1-02-11-050

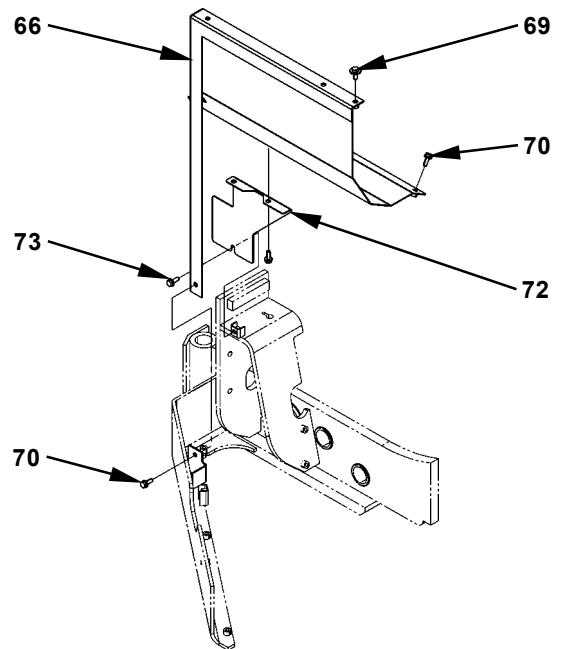
8. Open and lock the door in pump space. Install covers (66, 72) to the main frame with bolts (69), (70) (2 used) and (73).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



W1V1-02-11-056

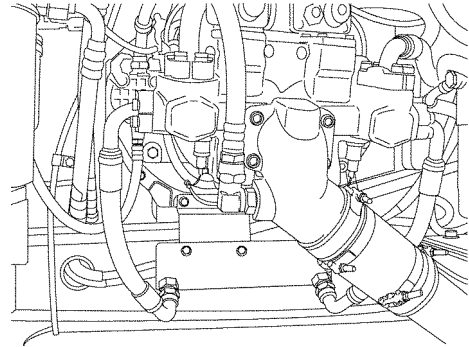


W1V1-02-04-045

## UPPERSTRUCTURE / Engine

9. Install all hoses and pipes to the pump device.



-  : 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)
-  : 8 mm
-  : 10 mm
-  : 90 N·m (9.0 kgf·m, 66 lbf·ft)

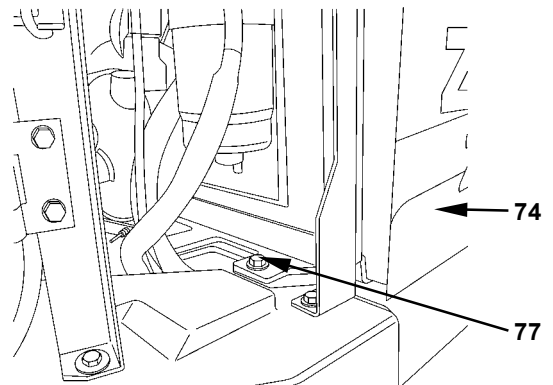


W1V1-02-11-012

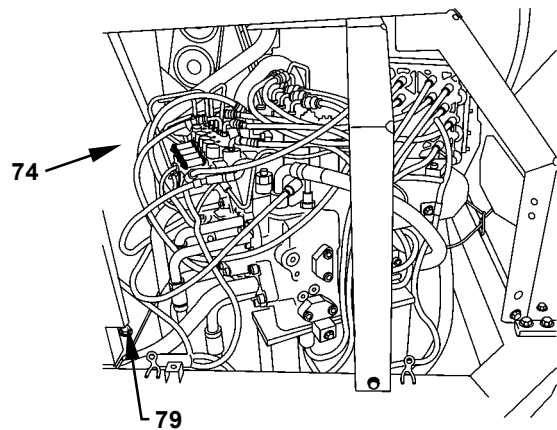
10. Install all connectors and clamps to the pump device.

11. Hoist and move fuel tank (74) to the mounting position in the main frame. Install fuel tank (74) to the main frame with bolts (77, 79) (2 used for each).

-  : 24 mm
-  : 270 N·m (27.5 kgf·m, 199 lbf·ft)




W1V1-04-11-030




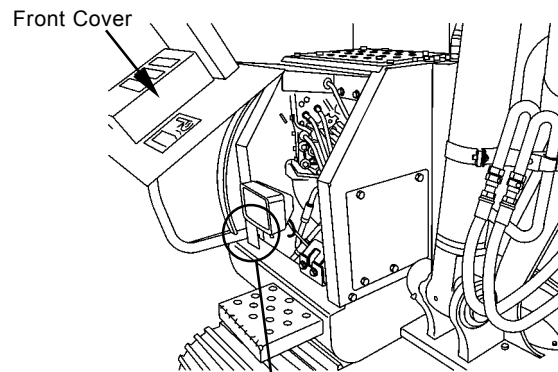
W1V1-02-05-079

## UPPERSTRUCTURE / Engine

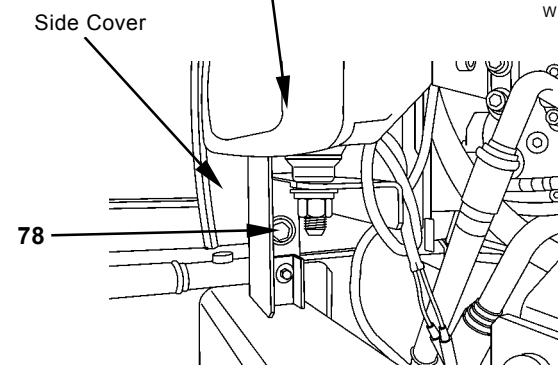
12. Close the side cover. Secure the side cover with bolt (78). Close the front cover.

 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 lbf·ft)




W1V1-02-05-075




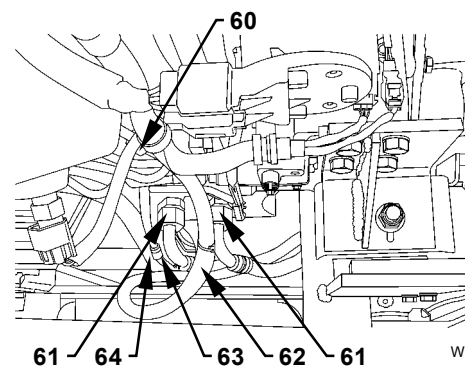
W1V1-02-05-076

13. Install hoses (62, 63) to the fuel pipe in engine through the counterweight mounting side. Tighten hoses (62, 63) with bands (60, 64).

14. Install hoses (61) (2 used) to the oil filter pipes (2 used) in engine through the counterweight mounting side.

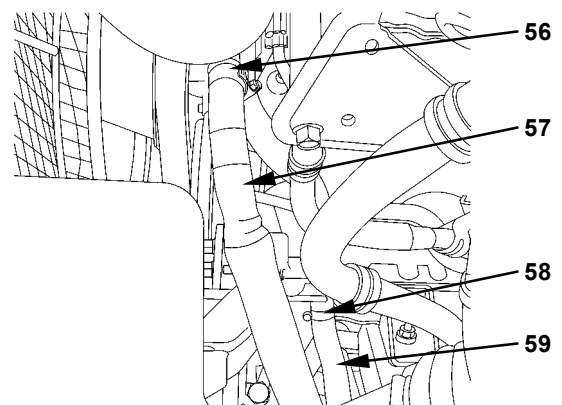
 : 36 mm

 : 205 N·m (21 kgf·m, 151 lbf·ft)



W1V1-02-11-049


15. Install hoses (57, 59) to the heater pipe in engine through the counterweight mounting side. Tighten hoses (57, 59) with bands (56, 58).




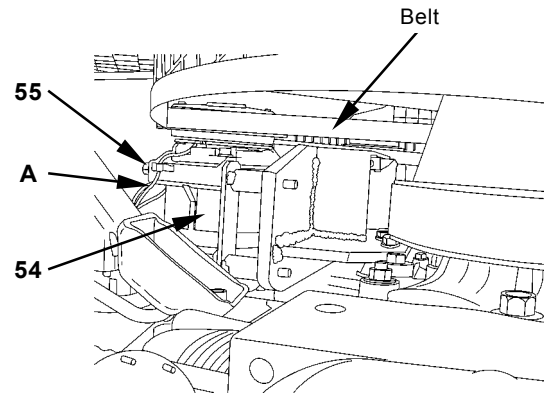
W1V1-02-11-048

## UPPERSTRUCTURE / Engine

16. Install compressor (54) to the engine through the counterweight mounting side with bolts (55) (4 used). Install the connector in wiring (A).

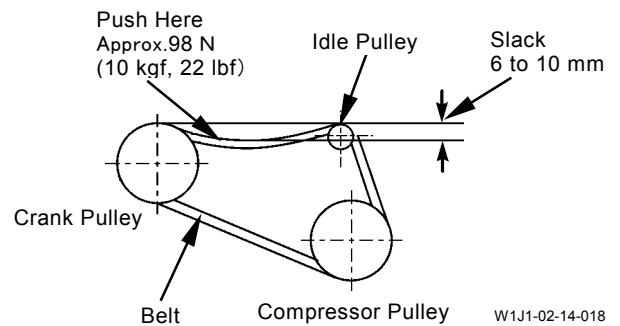
 : 13 mm

 : 30 N·m (30 kgf·m, 22 lbf·ft)



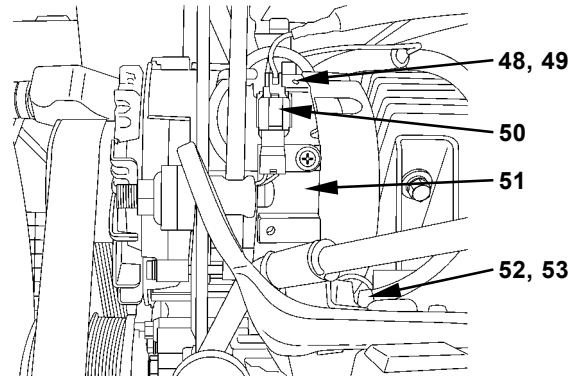
W1V1-02-11-047

17. Adjust the compressor belt through the counterweight mounting side or the cover (4) mounting side under radiator by using the idle pulley adjusting bolt.



W1J1-02-14-018

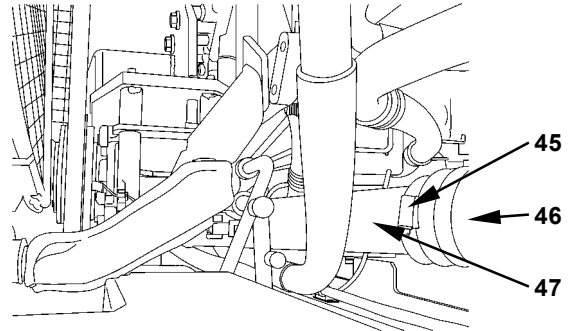
18. Install wirings (49, 53) to the terminal in alternator (51) with nuts (48, 52). Install connector (50).



W1V1-02-11-046

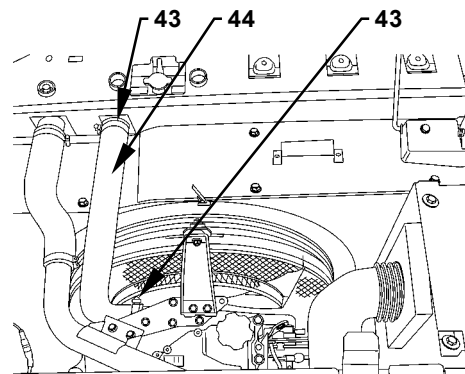
## UPPERSTRUCTURE / Engine

19. Install hose (46) to pipe (47) in engine. Tighten hose (46) with band (45).



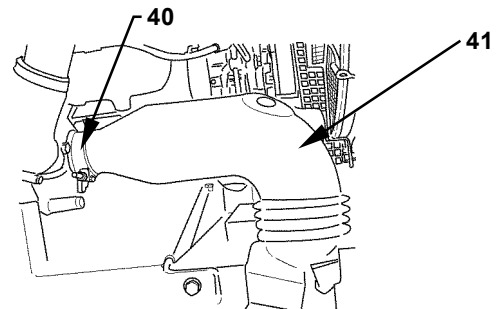
W1V1-02-11-045

20. Install hose (44) to the pipes in engine and radiator. Tighten hose (44) with bands (43) (2 used).

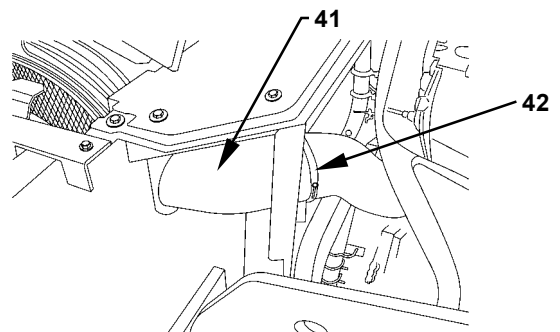


W1V1-02-11-044

21. Install hose (41) to the pipes in turbocharger and air cleaner. Tighten hose (41) with bands (40, 42).



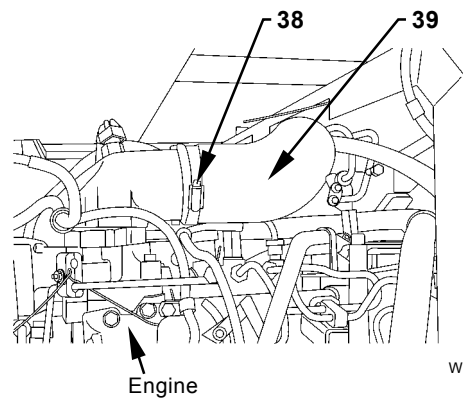
W1V1-02-11-013



W1V1-02-11-043


## UPPERSTRUCTURE / Engine


22. Install hose (39) to the pipe in engine. Tighten hose (39) with band (38).




W1V1-02-11-042


23. Install pipe (32) to the hoses in intercooler and turbocharger. Tighten hose (32) with bands (33, 36). Install pipe (32) to the engine with bolts (34) (2 used).

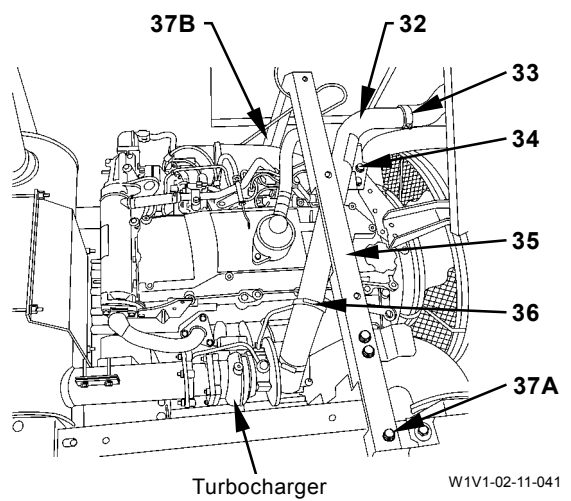
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

24. Install both ends of bracket (35) to the main frame with bolts (37A) and (37B) (2 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)





W1V1-02-11-041

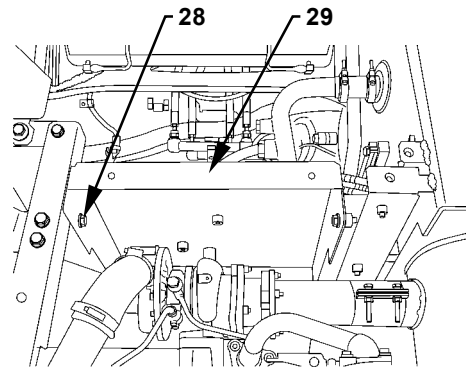


## UPPERSTRUCTURE / Engine

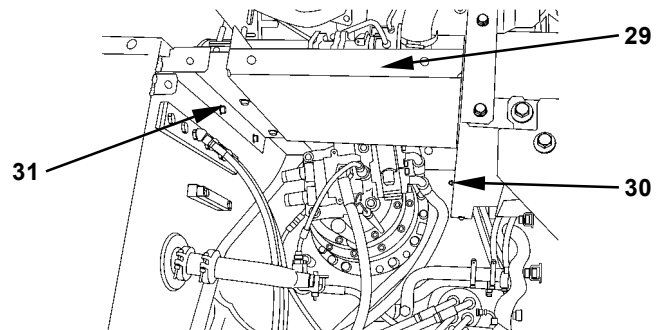
25. Install cover (29) to the main frame with bolts (28), (30) (2 used) and (31) (3 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37lb·ft)





W1V1-02-11-054

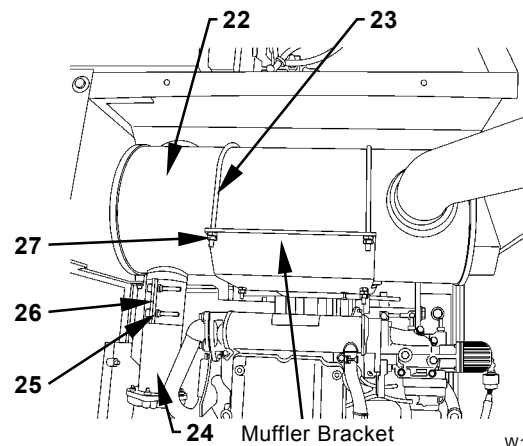


W1V1-02-11-055

26. Attach a nylon sling to muffler (22) and hold muffler (22) above the bracket. Temporarily tighten muffler (22) to the muffler bracket with U-bolts (23) (2 used) and nuts (27) (4 used). Move clamp (26) to the connection part of muffler (22) pipe and exhaust pipe (24). Tighten clamp (26) with bolts (25) (2 used). Tighten muffler (22) with U-bolts (23) (2 used) and nuts (27) (8 used).

 : 17 mm


 : 50 N·m (5 kgf·m, 37lb·ft)




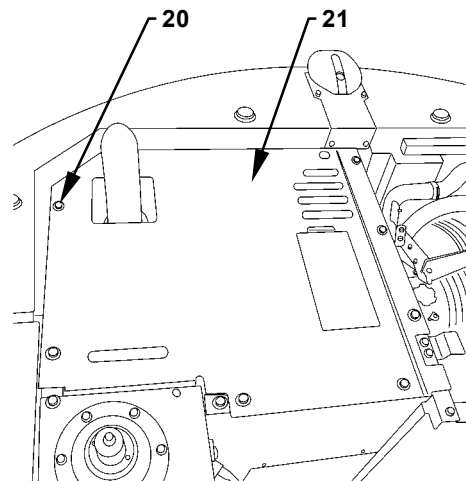
W1V1-02-04-022

## UPPERSTRUCTURE / Engine

27. Install cover (21) to the main frame with bolts (20) (7 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37lb·ft)

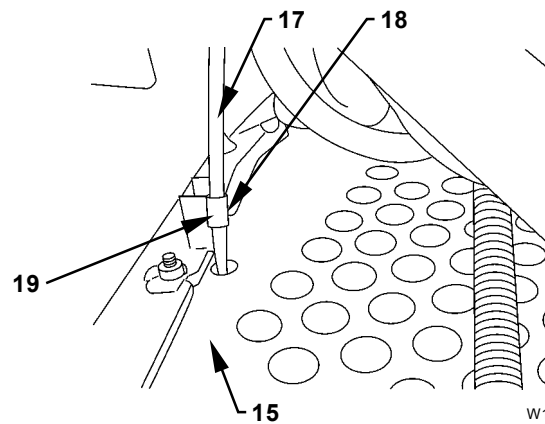


W1V1-02-04-028

28. Insert hose (17) into clamp (19) through the cover mounting side under pump. Tighten clamp (19) with bolt (18).


 : 17 mm


 : 50 N·m (5 kgf·m, 37lb·ft)

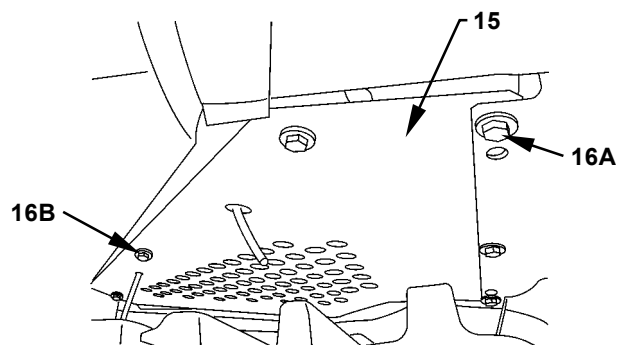


W1V1-02-04-021

29. Install cover (15) to main frame (2) under the pump with bolts (16A, 16B) (3 used for each).

 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)




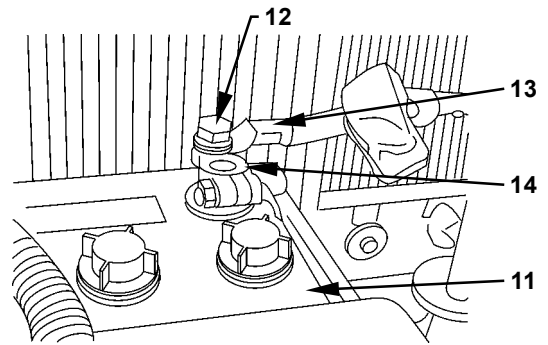
W1V1-02-11-029

## UPPERSTRUCTURE / Engine

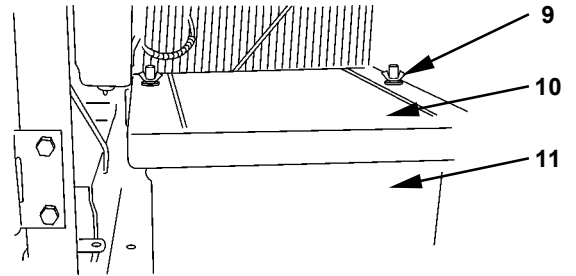
30. Open and lock the door in air cleaner space.  
Install ground line (13) in battery (11) with bolt  
(12). Install covers (10) (2 used) with wing nuts  
(9) (2 used).

 : 17 mm

 : 20 N·m (2 kgf·m, 15 lbf·ft)





W1V1-02-11-038

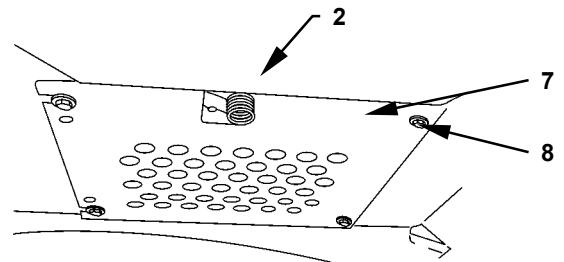


W1V1-02-11-037

31. Install cover (7) to main frame (2) under the  
engine with bolts (8) (4 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

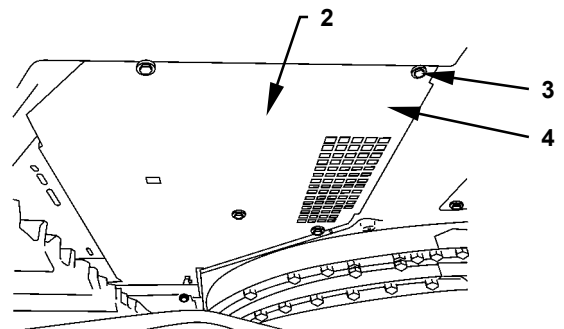


W1V1-02-11-053

32. Install cover (4) to main frame (2) under the  
radiator with bolts (3) (4 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



W1V1-02-11-035

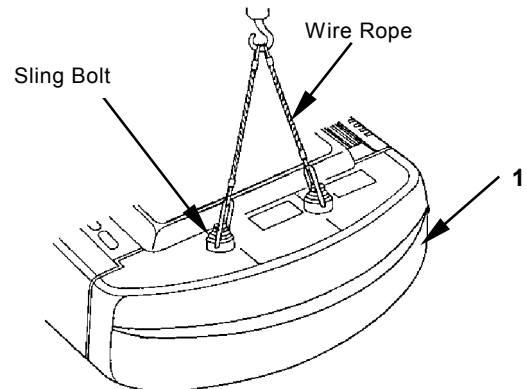
## UPPERSTRUCTURE / Engine

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**CAUTION: Counterweight (1) weight: 7570 kg (16689 lb)**

33. Install the counterweight to the main frame. (Refer to REMOVE AND INSTALL COUNTERWEIGHT on W2-2-1.)
34. Add coolant into the radiator.
35. Unlock and close the engine cover. Close the doors in pump space and air cleaner space.



W178-02-11-067

## UPPERSTRUCTURE / Engine

### REMOVE AND INSTALL ENGINE (ZX225USR-3 CLASS)

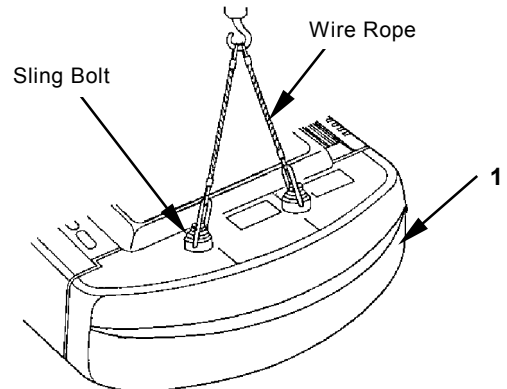
**IMPORTANT:** Release any pressure in the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

#### Removal




**CAUTION:** Counterweight (1) weight: 6650 kg (14661 lb)

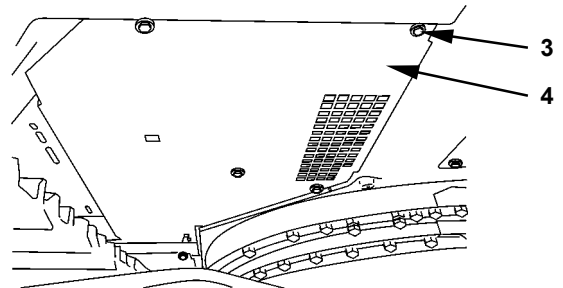
1. Remove counterweight (1) from the main frame. (Refer to REMOVE AND INSTALL COUNTERWEIGHT on W2-2-1.)



W178-02-11-067

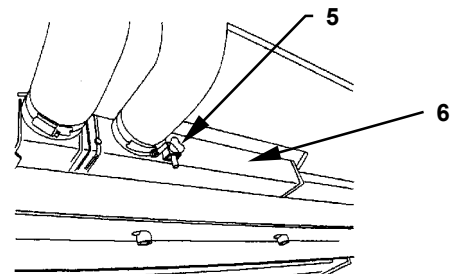
2. Remove bolts (3) (6 used) from cover (4) under the radiator. Remove cover (4) from the main frame.

 : 17 mm



W1V1-02-11-035


3. Loosen cock (5) and drain off water from radiator (6). Close cock (5).

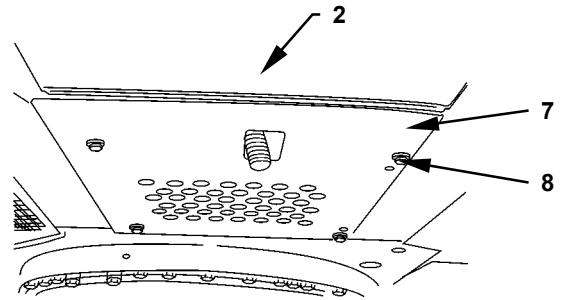


W1V1-02-11-034

## UPPERSTRUCTURE / Engine

- Remove bolts (8) (4 used) from cover (7) under the engine. Remove cover (7) from main frame (2).


 : 17 mm

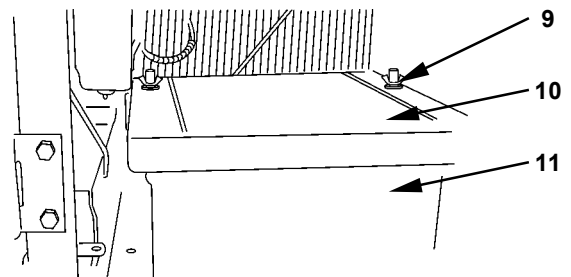


W1V1-02-11-036

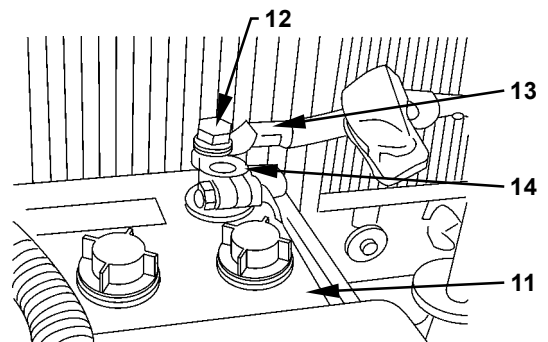
**IMPORTANT:** Remove and Install the engine with ground line (13) in battery (11) disconnected. If the starter is removed or installed with ground line (13) connected to battery (11), the circuit may be shorted.

- Open the door in air cleaner space. Remove wing nuts (9) (2 used). Remove covers (10) (2 used) from battery (11). Remove bolt (12) from ground terminal (14). Remove ground line (13) from ground terminal (14).

 : 17 mm




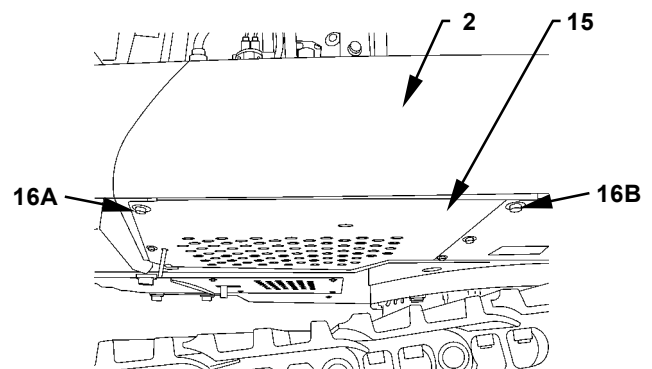
W1V1-02-11-037



W1V1-02-11-038

- Remove bolts (16A, 16B) (3 used for each) from cover (15) under the pump device. Remove cover (15) from main frame (2).


 : 17 mm

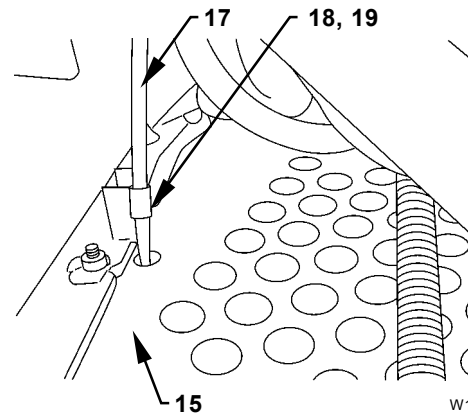


W1V1-02-11-020

## UPPERSTRUCTURE / Engine

7. Loosen bolt (18) in clamp (19) from the cover (15) mounting side. Remove hose (17) from clamp (19).

 : 17 mm




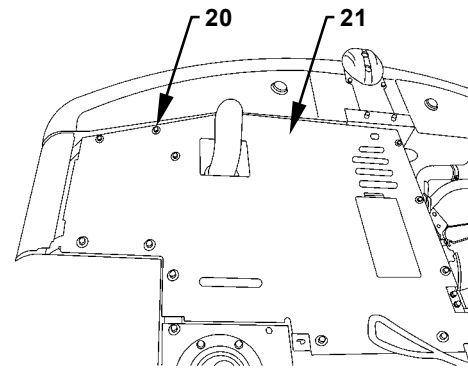
W1V1-02-04-021



**CAUTION: Cover (21) weight: 23 kg (51 lb)**

8. Remove bolts (20) (11 used) from cover (21). Attach a nylon sling onto cover (21). Hoist and remove cover (21).


 : 17 mm

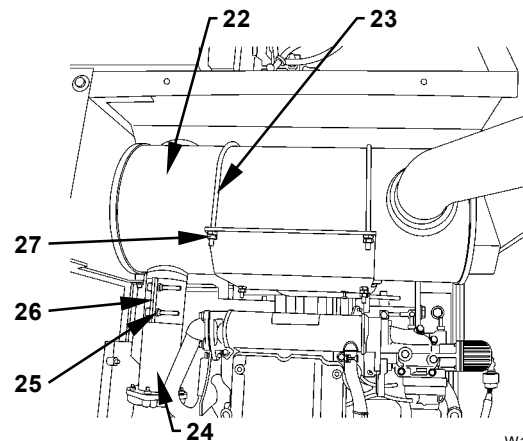


W1V1-02-04-019

9. Loosen nuts (25) (2 used) on clamp (26). Move clamp (26) to the exhaust pipe (24) side.

10. Attach a nylon sling to muffler (22) and hold muffler (22). Remove nuts (27) (8 used) from U-bolts (23) (2 used). Hoist and remove muffler (22).

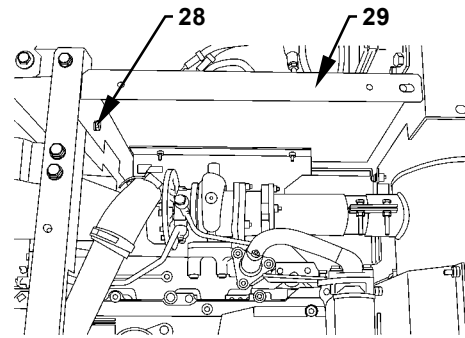
 : 17 mm



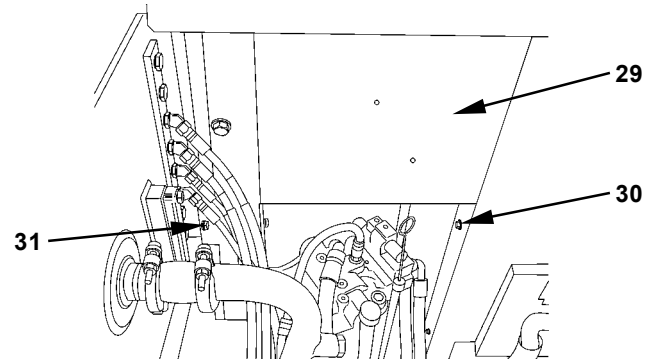
W1V1-02-04-022

## UPPERSTRUCTURE / Engine

11. Remove bolts (28), (30) (2 used) and (31) (3 used) from cover (29). Remove cover (29).




W1V1-02-11-039




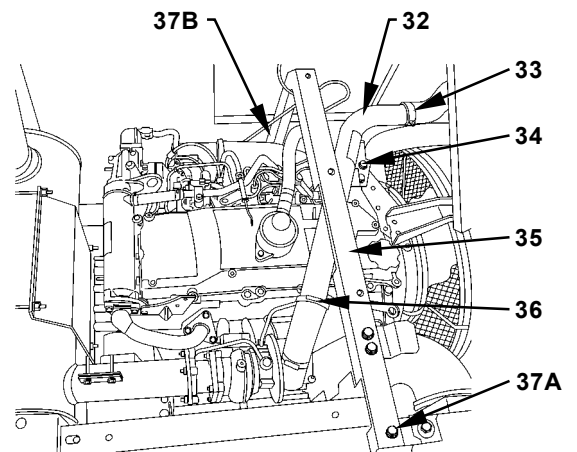
W1V1-02-11-040

12. Remove bolts (37A) and (37B) (2 used) from both ends of bracket (35). Remove bracket (35).

 : 17 mm

13. Remove bolts (34) (2 used) from pipe (32). Loosen bands (33, 36). Remove pipe (32) from the hoses in intercooler and turbocharger.

 : 17 mm

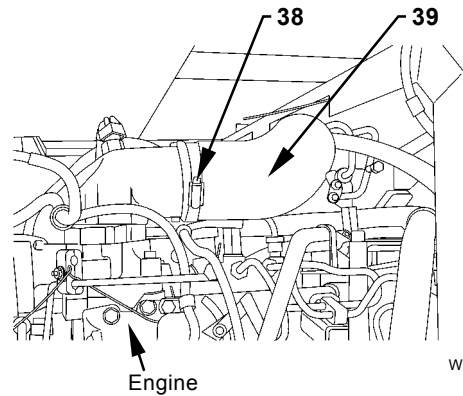


W1V1-02-11-041



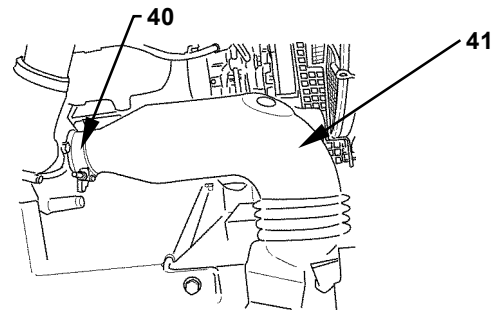
## UPPERSTRUCTURE / Engine

14. Loosen band (38) in hose (39). Remove hose (39) from the pipe in engine.

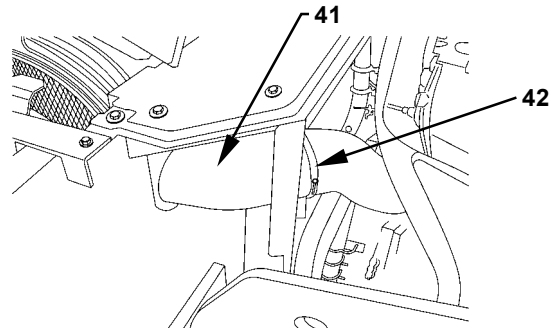


W1V1-02-11-042

15. Loosen bands (40, 42) in hose (41). Remove hose (41) from the pipes in turbocharger and air cleaner.

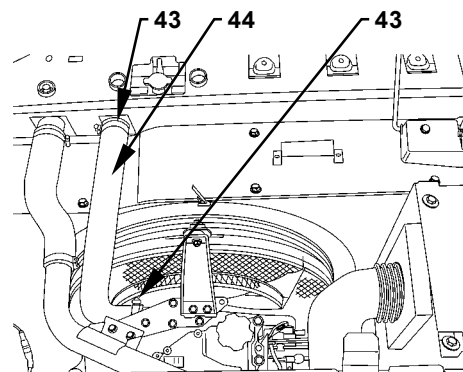


W1V1-02-11-013



W1V1-02-11-043

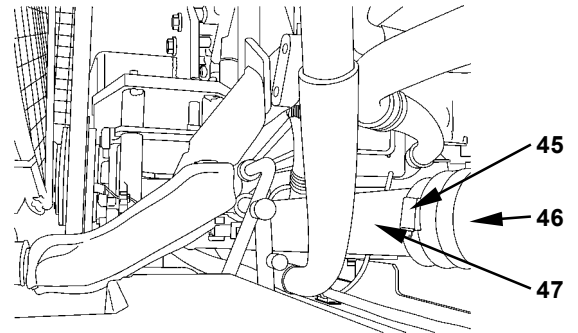
16. Loosen bands (43) (2 used) in hose (44). Remove hose (44) from the pipes in radiator and engine. Cap the hoses and pipes.



W1V1-02-11-044


## UPPERSTRUCTURE / Engine

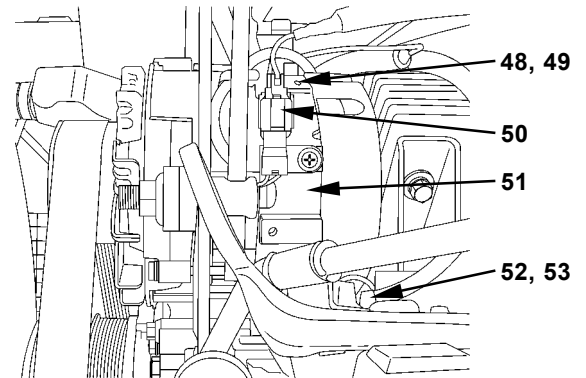
17. Loosen band (45) in hose (46). Remove hose (46) from pipe (47). Cap the hoses and pipes.



W1V1-02-11-045


18. Remove nuts (48, 52) from the terminal in alternator (51). Remove wirings (49, 53) from the terminal. Disconnect connector (50).


 : 6.5 mm

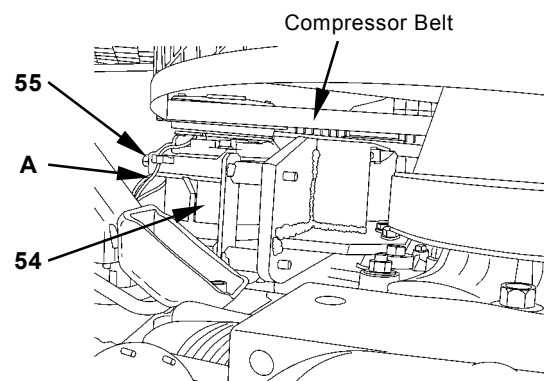


W1V1-02-11-046

19. Fully loosen the adjusting bolt for compressor belt from the cover (4) mounting side under the radiator. Attach a nylon sling to compressor (54) and hold compressor (54). Disconnect the connector in wiring A in compressor (54). Remove bolts (55) (4 used) from compressor (54). Remove the compressor belt and compressor (54) from the engine.

 **NOTE:** Remove and install the engine with compressor (54) hoisted outside the engine space.

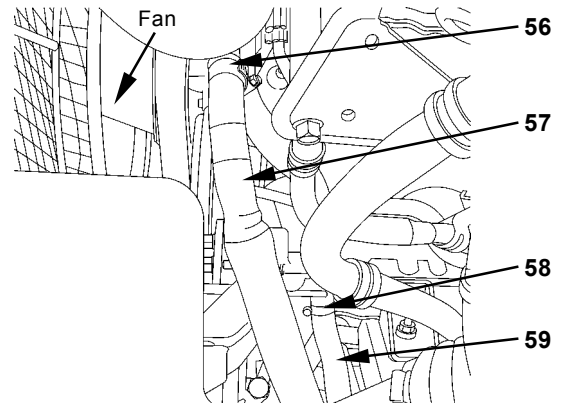
 : 13 mm



W1V1-02-11-047


## UPPERSTRUCTURE / Engine

20. Loosen bands (56, 58) in hoses (57, 59) through the counterweight mounting side. Remove hoses (57, 59) from the heater pipes (2 used) in engine. Cap the hoses and pipes.

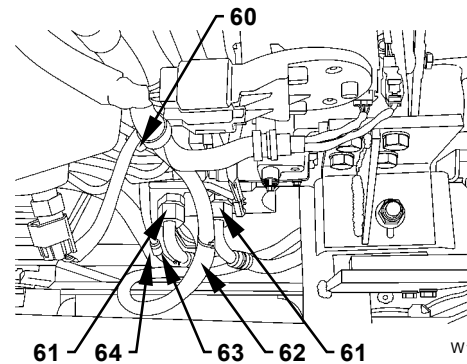


W1V1-02-11-048

21. Remove hoses (61) (2 used) through the counterweight mounting side. Cap the hose.


 : 36 mm

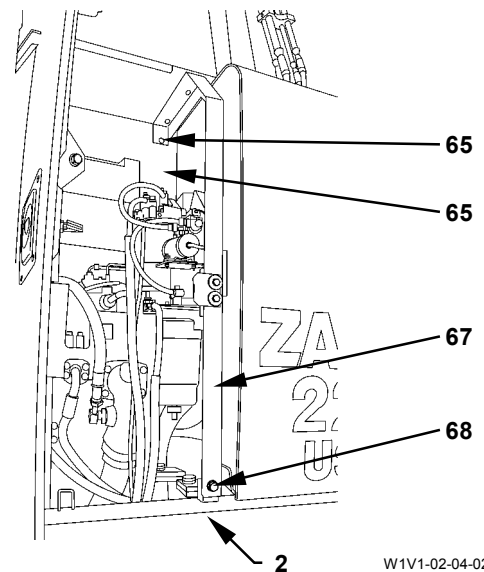
22. Loosen bands (60, 64) in hoses (62, 63) through the counterweight mounting side. Remove hoses (62, 63) from the fuel pipe in engine. Cap the hose and pipe.



W1V1-02-11-049

23. Open and lock the door in pump space. Remove bolts (65, 68). Remove bracket (67) from main frame (2) and cover (66).


 : 17 mm




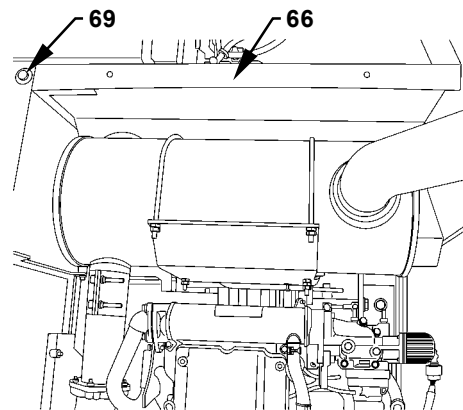
W1V1-02-04-024

## UPPERSTRUCTURE / Engine

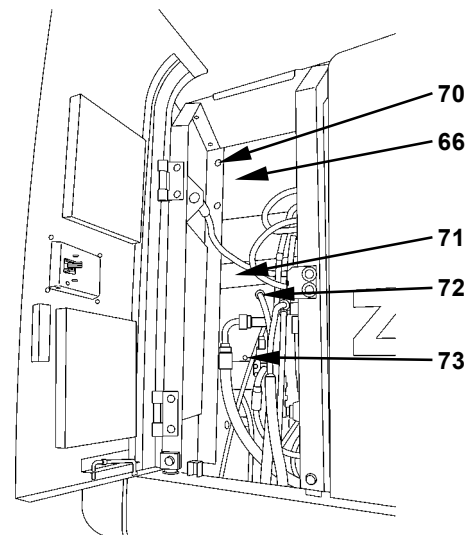
24. Remove bolts (69), (70) (3 used) from cover (66).  
Loosen bolt (73) in cover (71). Remove covers  
(66, 71) from the main frame.

 **NOTE:** As cover (66) is removed with cover (71)  
together, do not remove bolts (72) (2 used).

 : 17 mm




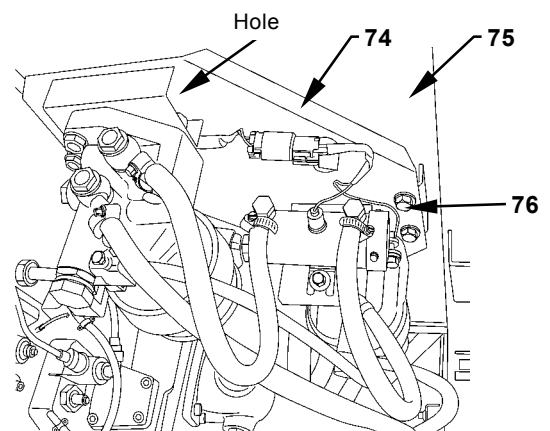
W1V1-02-04-022



W1V1-02-04-025

25. Attach a nylon sling to the bracket (74) hole and  
hold bracket (74). Remove bolts (76) (4 used).  
Remove bracket (74) from fuel tank (75) and hold  
bracket (74) outside the machine.


 : 17 mm




W1V1-02-04-023


## UPPERSTRUCTURE / Engine

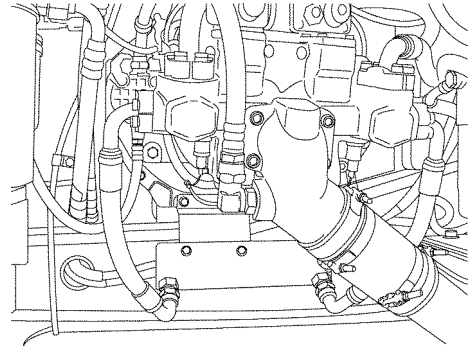
26. Remove all hoses and pipes from the pump device. Attach an identification tag onto the removed hoses for assembling. Cap the hose, pipe and open ends in pump device.

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

 : 8 mm, 10 mm

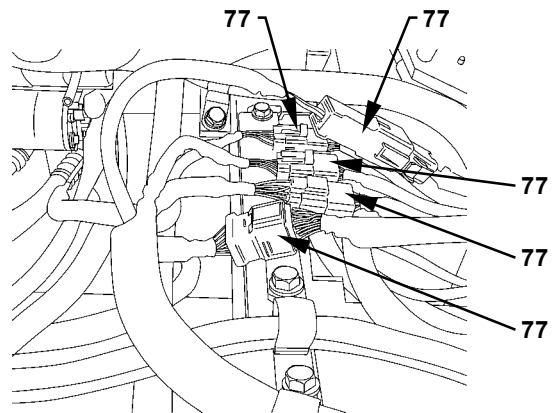
27. Remove all wirings from the pump device.

 : 17 mm




W1V1-02-11-012

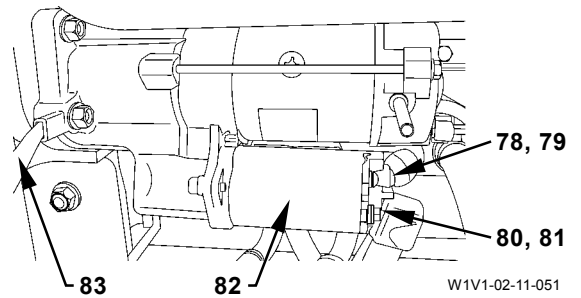
28. Disconnect connectors (77) (5 used) from the cover mounting side under engine.



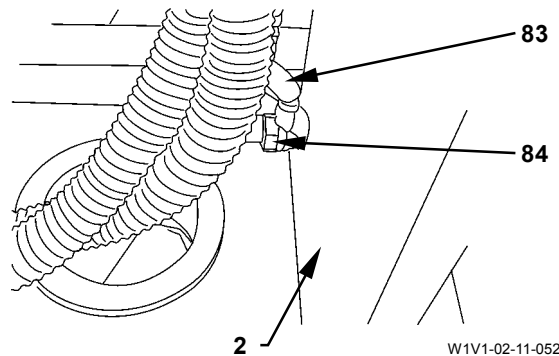
W1V1-02-11-050

29. Remove nuts (78, 80) in the starter (82) terminal from the cover mounting side under engine. Remove wirings (79, 81) from the terminal. Remove bolt (84) from main frame (2). Remove ground line (83).

 : 17 mm, 22 mm



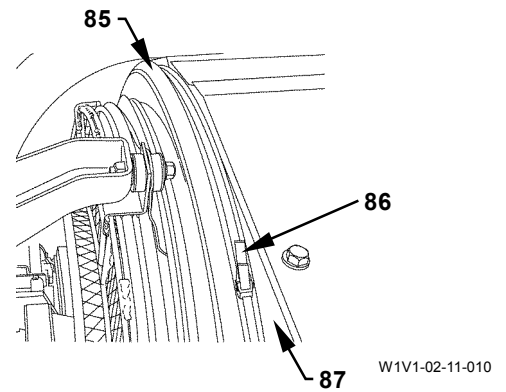
W1V1-02-11-051




W1V1-02-11-052

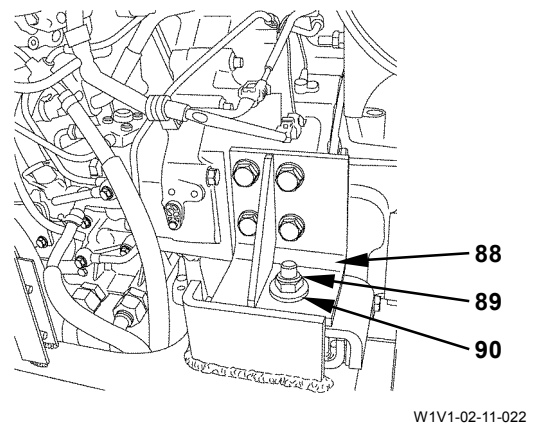
## UPPERSTRUCTURE / Engine

30. Loosen band (86) in rubber (85). Remove rubber (85) from shroud (87).




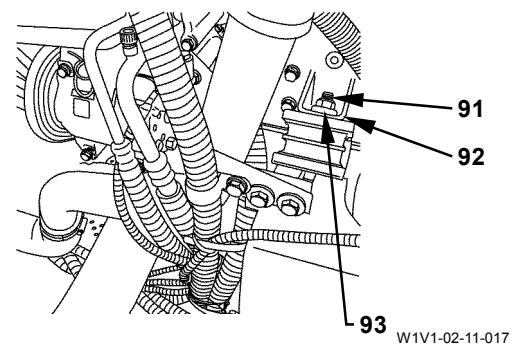
31. Remove nuts (89) (2 used) and washers (90) (2 used) from engine brackets (88) (2 used) at pump device side.

 : 27 mm



32. Remove nuts (91) (2 used) and washers (93) (2 used) from engine brackets (92) (2 used) at radiator side.

 : 22 mm

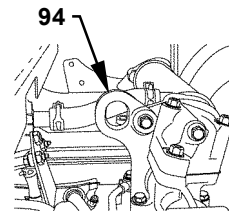


## UPPERSTRUCTURE / Engine

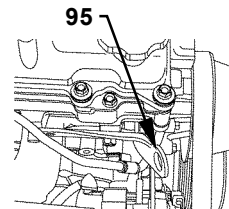
**CAUTION:** Engine+ pump+ fan guard weight:  
650 kg (1433 lb)

**IMPORTANT:** Before hoisting the engine assembly, check if the hoses, pipes and wirings are removed from the engine and pump. If the engine assembly is hoisted with them connected, they may be damaged.

33. Install the shackles (2 used) to lifting holes (94, 95) for the engine. Hold the engine by using a wire rope. Adjust the wire rope and make the engine and pump device horizontal.

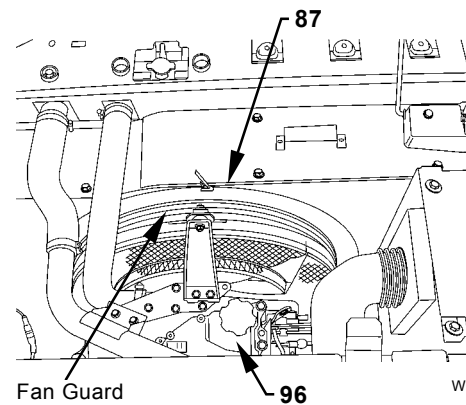


W1V1-02-11-032



W1V1-02-11-033

34. Hoist engine/pump assembly (96) 15 mm (0.6 in) horizontally and vertically. Move engine/pump assembly (96) to the pump side horizontally until the fan guard part in engine is removed from shroud (87). Hoist and remove engine/pump assembly (96) from the main frame.



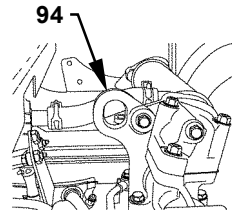
W1V1-02-11-044

## UPPERSTRUCTURE / Engine

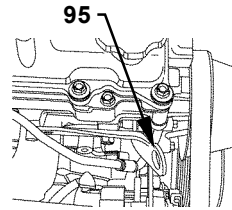
### Installation

**CAUTION:** Engine+ pump+ fan guard weight:  
650 kg (1433 lb)

1. Install the shackles (2 used) to lifting holes (94, 95) for the engine. Hold the engine by using a wire rope. Adjust the wire rope and make engine/pump assembly (96) horizontal. Move the engine to the engine mounting position in main frame.

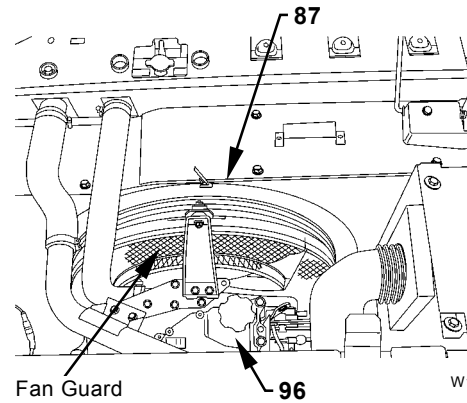


W1V1-02-11-032




W1V1-02-11-033


2. Insert the fan guard in engine to shroud (87) first. Lower engine/pump assembly (96) to the engine mounting position in main frame.

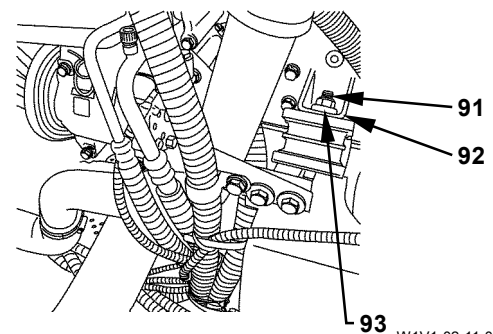


W1V1-02-11-044

3. Install engine brackets (92) (2 used) at radiator side to the main frame with washers (93) (2 used) and nuts (91) (2 used).

 : 22 mm

 : 180 N·m (18.4 kgf·m, 133 lbf·ft)





W1V1-02-11-017

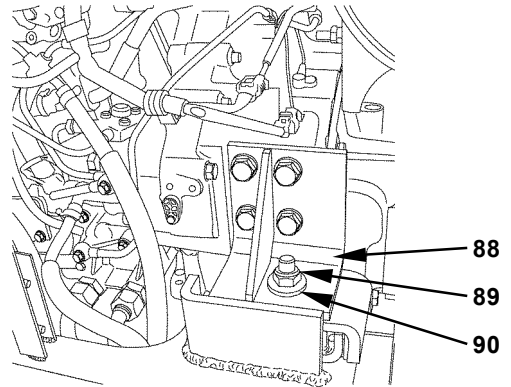


## UPPERSTRUCTURE / Engine

4. Install engine brackets (88) (2 used) at pump side to the main frame with washers (90) (2 used) and nuts (89) (2 used).

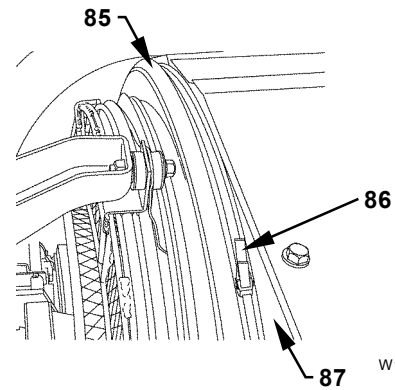
 : 27 mm

 : 400 N·m (41 kgf·m, 295 lbf·ft)




W1V1-02-11-022


5. Cover shroud (87) with rubber (85). Secure rubber (85) with band (86).

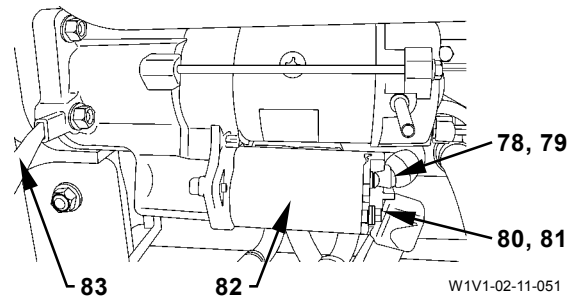


W1V1-02-11-010

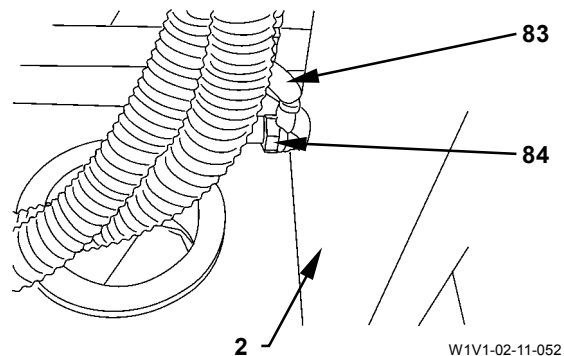
6. Install wirings (79, 81) to the starter (82) terminal through the cover mounting side under engine with nuts (78, 80). Install ground line (83) to main frame (2) with bolt (84).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



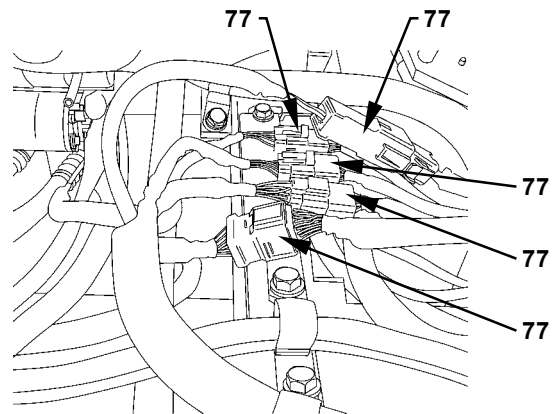
W1V1-02-11-051



W1V1-02-11-052


## UPPERSTRUCTURE / Engine


7. Install connectors (77) (5 used) through the cover (7) mounting side under engine.

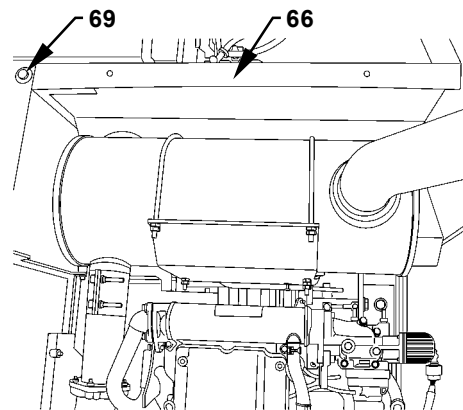


W1V1-02-11-050

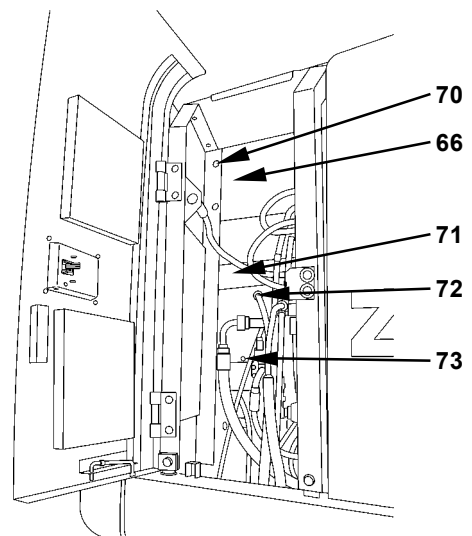
8. Open and lock the door in pump space. Install covers (66, 71) to the main frame with bolts (69), (70) (3 used) and (73).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



W1V1-02-04-022

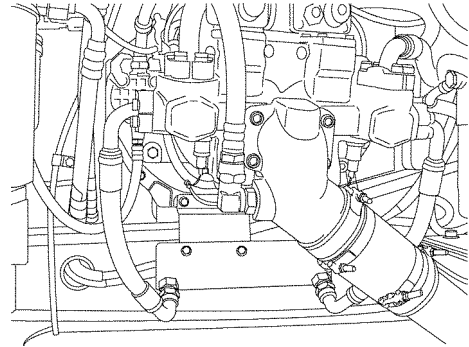


W1V1-02-04-025

## UPPERSTRUCTURE / Engine

9. Install all hoses and pipes to the pump device.



-  : 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)
-  : 8 mm
-  : 50 N·m (5.0 kgf·m, 37 lbf·ft)
-  : 10 mm
-  : 90 N·m (9.0 kgf·m, 66 lbf·ft)

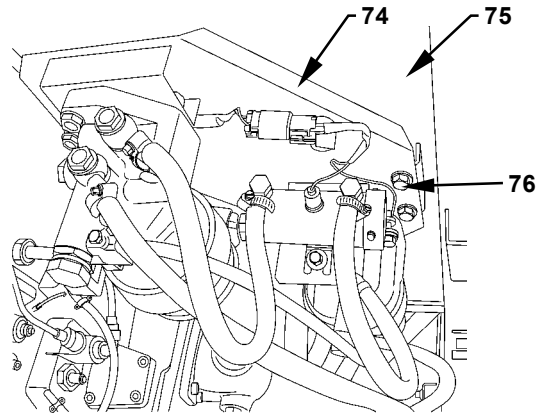


W1V1-02-11-012

10. Install all connectors and clamps to the pump device.



11. Install bracket (74) to fuel tank (75) with bolts (76) (4 used).

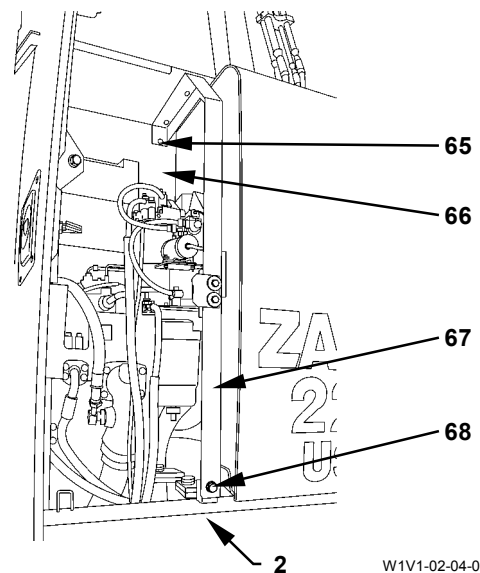
-  : 17 mm
-  : 50 N·m (5 kgf·m, 37 lbf·ft)



W1V1-02-04-023

12. Install bracket (67) to main frame (2) and cover (66) with bolts (65, 68).

-  : 17 mm
-  : 50 N·m (5 kgf·m, 37 lbf·ft)





W1V1-02-04-024

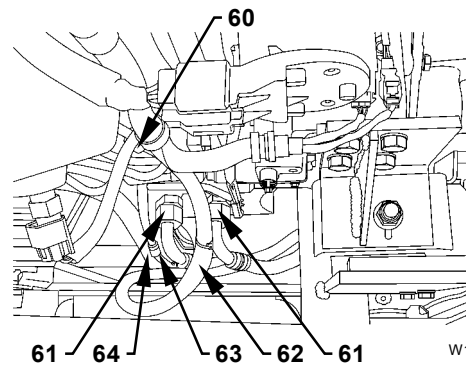
## UPPERSTRUCTURE / Engine

13. Install hoses (62, 63) to the fuel pipe in engine through the counterweight mounting side. Tighten hoses (62, 63) with bands (60, 64).

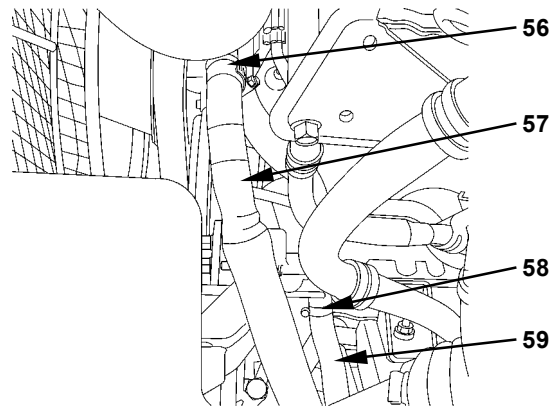
14. Install hoses (61) (2 used) to the oil filter pipes (2 used) in engine through the counterweight mounting side.

 : 36 mm


 : 205 N·m (21 kgf·m, 151 lbf·ft)




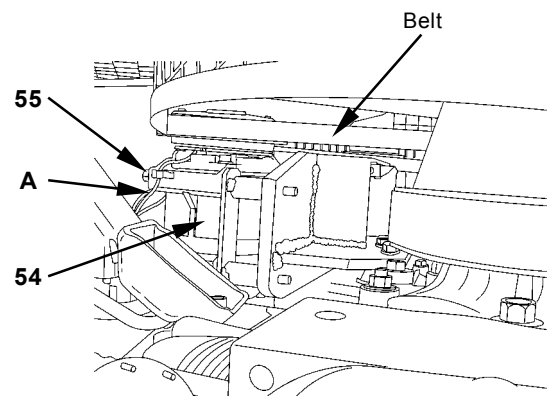
15. Install hoses (57, 59) to the heater pipe in engine through the counterweight mounting side. Tighten hoses (57, 59) with bands (56, 58).



16. Install compressor (54) to the engine through the counterweight mounting side with bolts (55) (4 used). Attach a belt to compressor (54). Install the connector in wiring (A) to compressor (54).

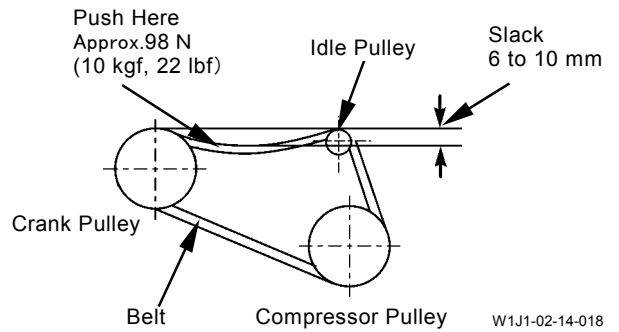
 : 13 mm

 : 30 N·m (30 kgf·m, 22 lbf·ft)

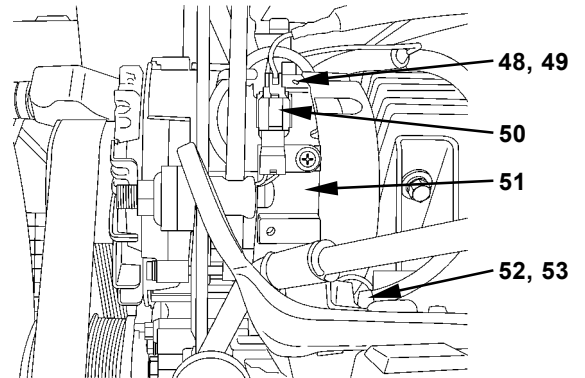


## UPPERSTRUCTURE / Engine

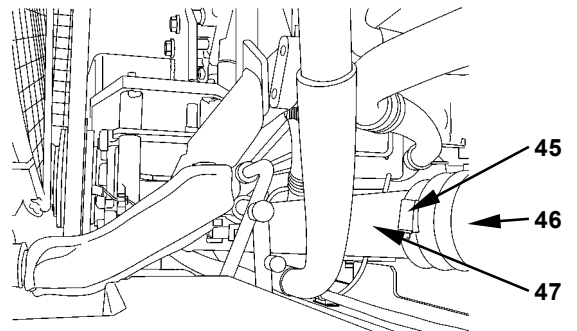
17. Adjust the compressor belt through the counterweight mounting side or the cover (4) mounting side under radiator by using the idle pulley adjusting bolt.



18. Install wirings (49, 53) to the terminal in alternator (51) with nuts (48, 52). Install connector (50).



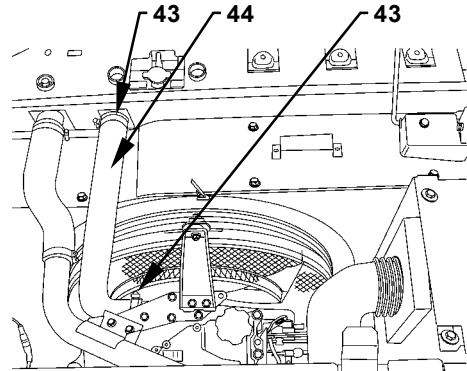
19. Install hose (46) to pipe (47) in engine. Tighten hose (46) with band (45).



## UPPERSTRUCTURE / Engine

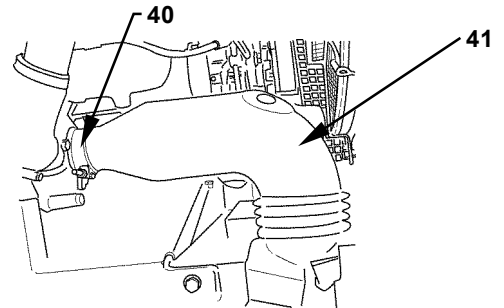
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20. Install hose (44) to the pipes in engine and radiator. Tighten hose (44) with bands (43) (2 used).

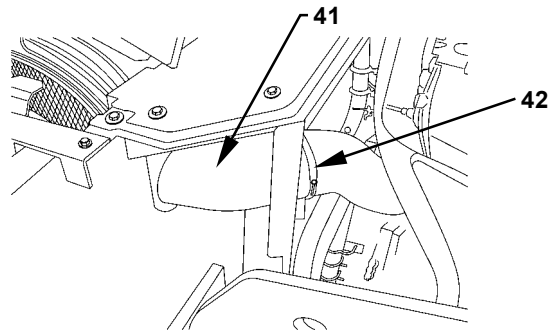


W1V1-02-11-044

21. Install hose (41) between the pipes in turbocharger and air cleaner. Tighten hose (41) with bands (40, 42).



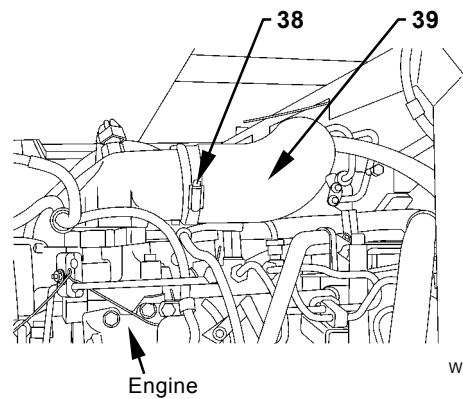
W1V1-02-11-013



W1V1-02-11-043


## UPPERSTRUCTURE / Engine


22. Install hose (39) of intercooler to the pipe in engine. Tighten hose (39) with band (38).




W1V1-02-11-042


23. Install pipe (32) between the hoses in intercooler and turbocharger. Tighten hose (32) with bands (33, 36). Install pipe (32) to the engine with bolts (34) (2 used).

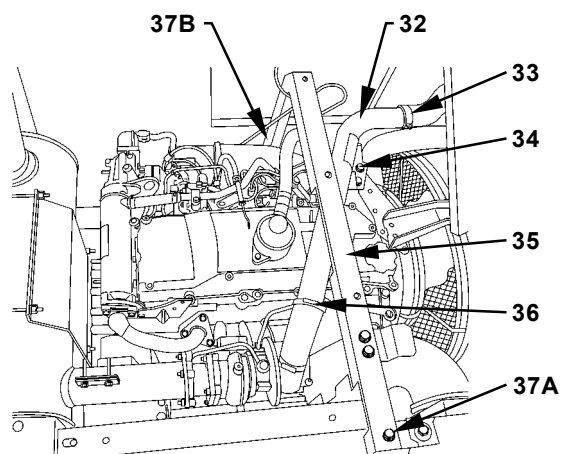
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

24. Install both ends of bracket (35) to the main frame with bolts (37A) and (37B) (2 used).

 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)




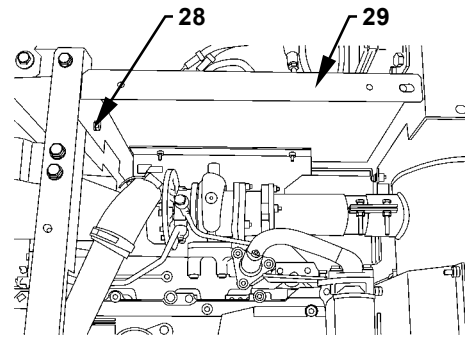
W1V1-02-11-041

## UPPERSTRUCTURE / Engine

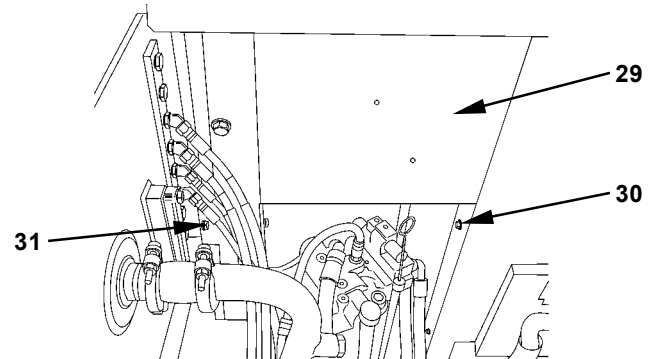
25. Install cover (29) to the main frame with bolts (28), (30) (2 used) and (31) (3 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)





W1V1-02-11-039

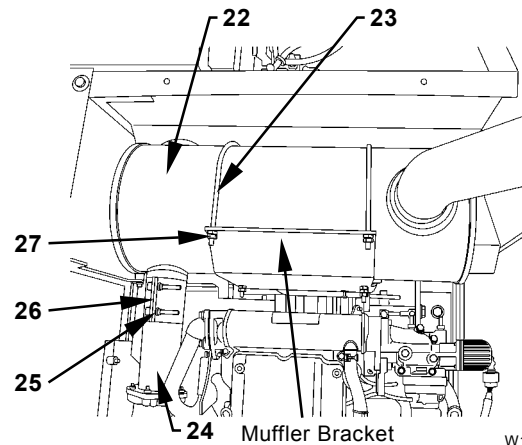


W1V1-02-11-040

26. Attach a nylon sling to muffler (22) and hold muffler (22) above the bracket. Temporarily tighten muffler (22) to the muffler bracket with U-bolts (23) (2 used) and nuts (27) (4 used). Move clamp (26) to the connection part of muffler (22) pipe and exhaust pipe (24). Tighten clamp (26) with bolts (25) (2 used). Tighten muffler (22) with nuts (27) (8 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)




W1V1-02-04-022




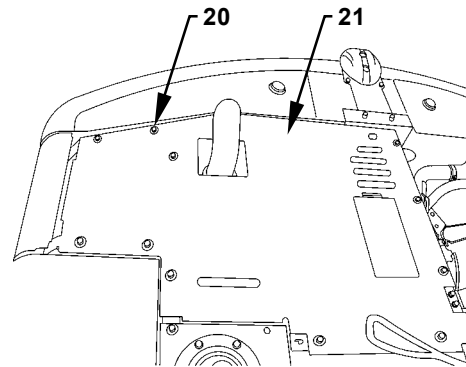
## UPPERSTRUCTURE / Engine

**CAUTION:** Cover (21) weight: 23 kg (51 lb)

27. Install cover (21) to the main frame with bolts (20) (11 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

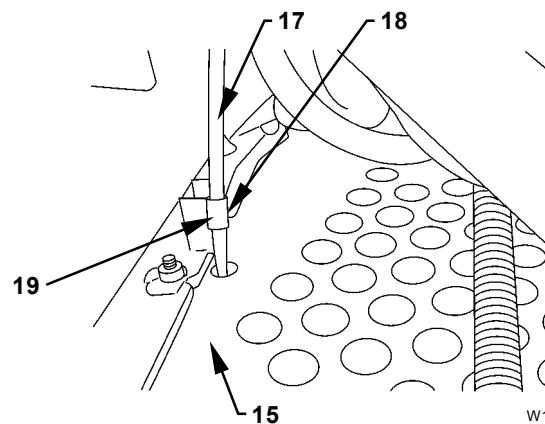


W1V1-02-04-019

28. Insert hose (17) into clamp (19) through the cover mounting side under pump. Tighten clamp (19) with bolt (18).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

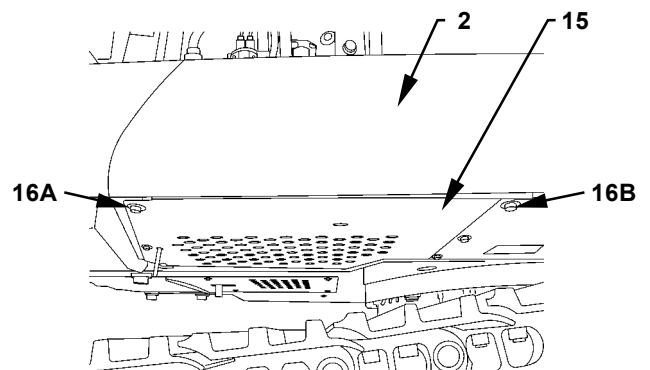


W1V1-02-04-021

29. Install cover (15) to main frame (2) under the pump with bolts (16A, 16B) (3 used for each).

 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)




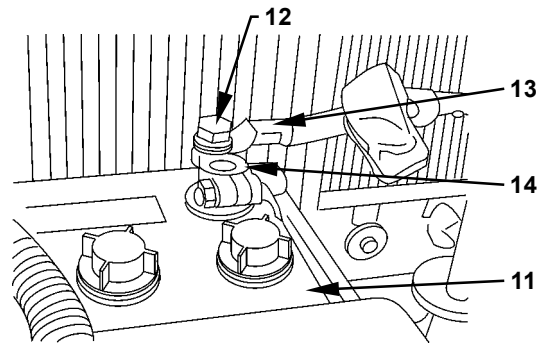
W1V1-02-11-020

## UPPERSTRUCTURE / Engine

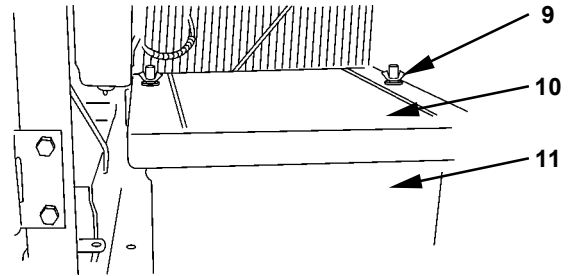
30. Open and lock the door in air cleaner space.  
Install ground line (13) to ground terminal (14) in  
battery (11) with bolt (12). Install covers (10) (2  
used) to battery (11) with wing nuts (9) (2 used).

 : 17 mm

 : 20 N·m (2 kgf·m, 15 lbf·ft)





W1V1-02-11-038

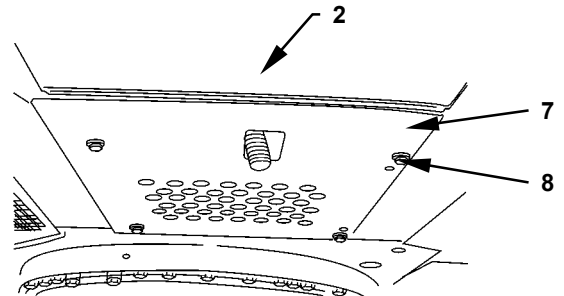


W1V1-02-11-037

31. Install cover (7) to main frame (2) under the  
engine with bolts (8) (4 used).


 : 17 mm


 : 50 N·m (5 kgf·m, 37 lbf·ft)

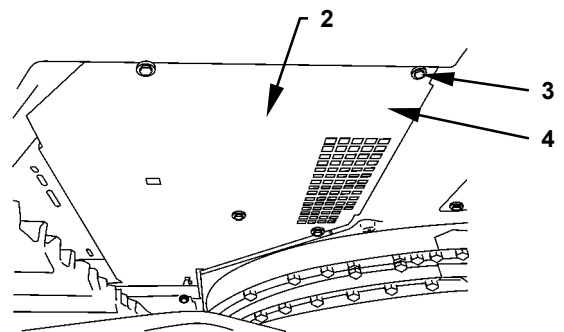


W1V1-02-11-036

32. Install cover (4) to main frame (2) under the  
radiator with bolts (3) (4 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

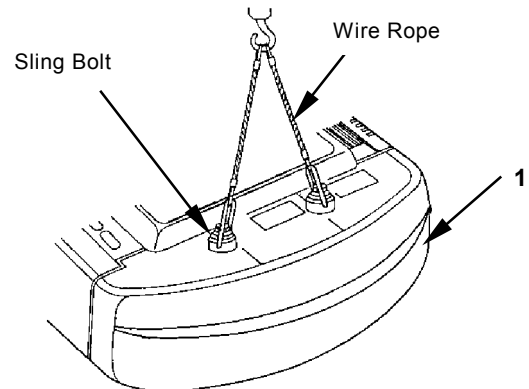


W1V1-02-11-035

## UPPERSTRUCTURE / Engine

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33. Install the counterweight to the main frame.  
(Refer to REMOVE AND INSTALL COUNTERWEIGHT on W2-2-1.)
34. Add coolant into the radiator.
35. Unlock and close the engine cover. Close the doors in pump space and air cleaner space.



W178-02-11-067

## UPPERSTRUCTURE / Engine

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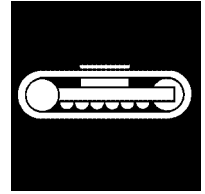




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# SECTION 3 UNDERCARRIAGE



## — 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
List of Weight .....	W3-2-3
Disassemble Travel Device.....	W3-2-4
Assemble Travel Device.....	W3-2-16
Disassemble Travel Motor	
(ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class).....	W3-2-32
Disassemble Travel Motor	
(ZX270-3 class) .....	W3-2-36
Assemble Travel Motor	
(ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class).....	W3-2-40
Assemble Travel Motor	
(ZX270-3 class) .....	W3-2-46
Disassemble Brake Valve	
(ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class).....	W3-2-52
Disassemble Brake Valve	
(ZX270-3 class) .....	W3-2-54
Assemble Brake Valve	
(ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class).....	W3-2-56
Assemble Brake Valve	
(ZX270-3 class) .....	W3-2-58
Maintenance Standard .....	W3-2-60

### 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 .....	W3-4-4
Assemble Track Adjuster.....	W3-4-10

### Group 5 Front Idler

Remove and Install Front Idler.....	W3-5-1
Disassemble Front Idler.....	W3-5-4
Assemble Front Idler .....	W3-5-8
Maintenance Standard .....	W3-5-12

### 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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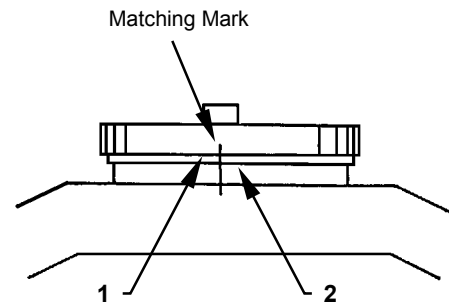
## UNDERCARRIAGE / Swing Bearing

### 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 (W2-3-1). 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 (4) and track frame (2).




W105-03-01-001

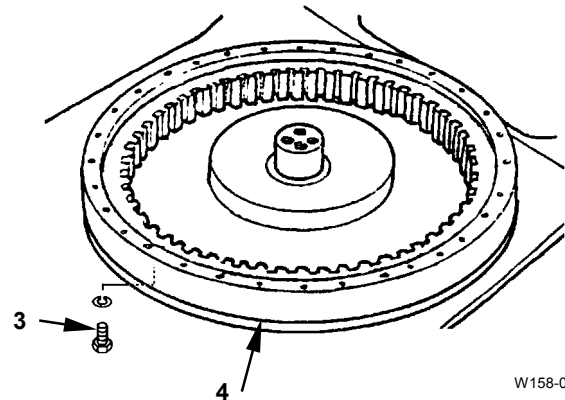
2. Remove bolts (3) (36 used) from inner race (1) of swing bearing (4).

ZX200-3 class, 225US-3 class, 225USR-3 class

 : 30 mm

ZX240-3 class, 270-3 class

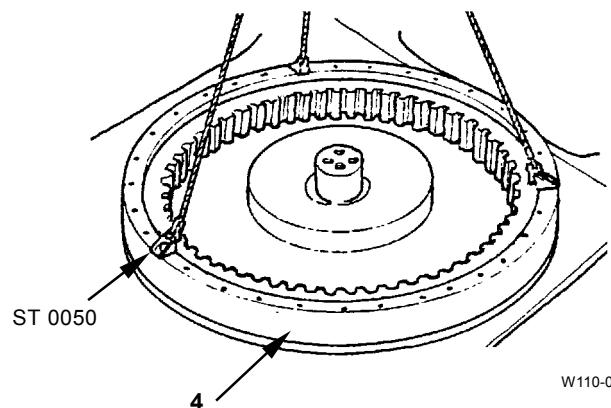
 : 32 mm



W158-03-01-001

**CAUTION:** Swing bearing (4) weight:  
ZX200-3 class, 225US-3 class, 225USR-3 class: 226 kg (500 lb)  
ZX240-3, 270-3 class: 324 kg (715 lb)

3. Attach the lifting tools (ST 0050) (3 used) to swing bearing (4). Hoist swing bearing (4).



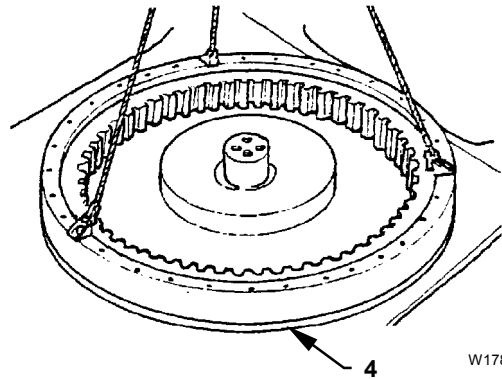
W110-03-01-004

# UNDERCARRIAGE / Swing Bearing

## Installation

Clean the mounting surfaces of track frame and swing bearing (4).

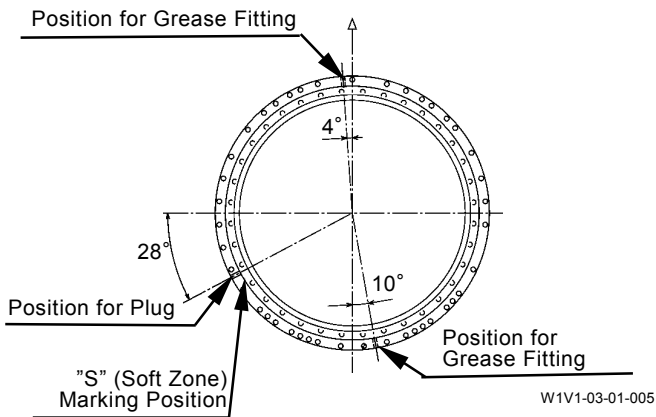
1. Apply THREEBOND #1102 onto the mounting surfaces of swing bearing (4) and track frame.



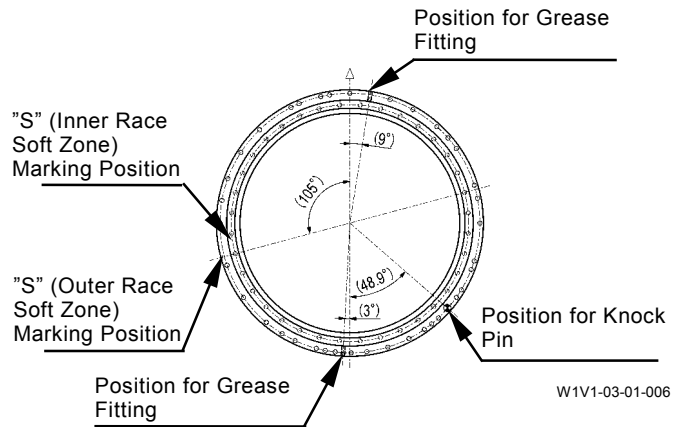
W178-02-11-190

## Soft Zone and Grease Fitting Positions

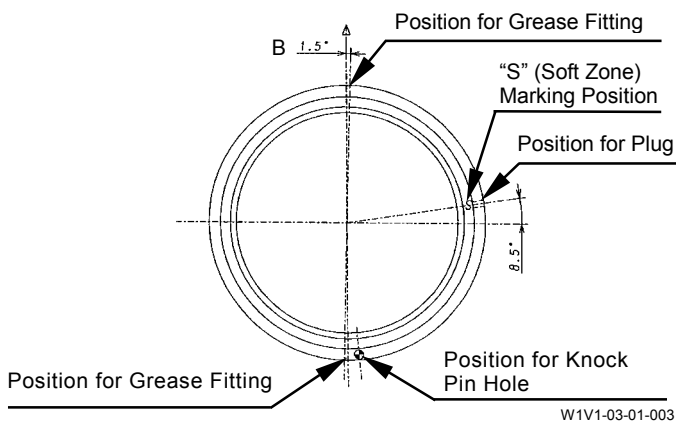
### ZX200-3 class



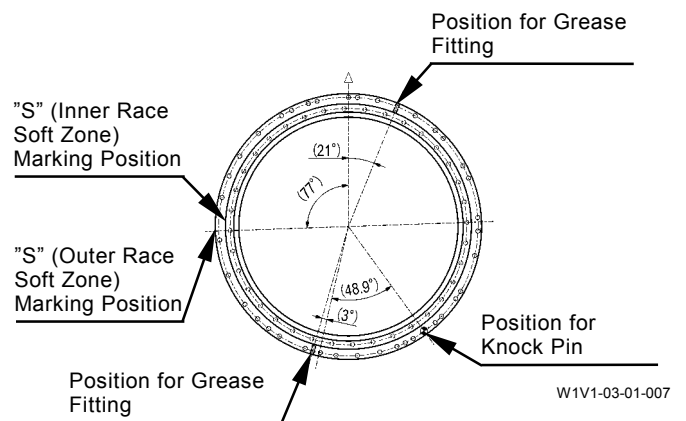
### ZX225US-3 class



### ZX240-3 class, 270-3 class



### ZX225USR-3 class



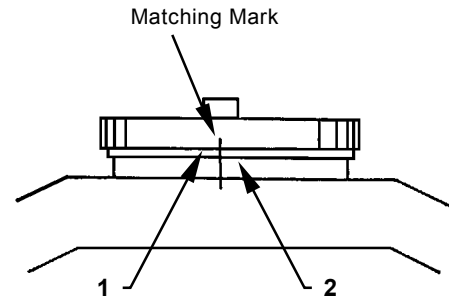
## UNDERCARRIAGE / Swing Bearing



**CAUTION:** Swing bearing (4) weight:  
ZX200-3 class, 225US-3 class, 225USR-3 class: 226 kg (500 lb)  
ZX240-3 class, 270-3 class: 324 kg (715 lb)

**IMPORTANT:** If the matching marks do not align, the position of soft zone of inner race (1) will be dislocated.

2. Hoist swing bearing (4). Align the matching marks on track frame (2) and inner race (1) of swing bearing (4).



W105-03-01-001

3. Install swing bearing (4) to track frame (2) with socket bolts (3) (36 used).

ZX200-3 class, 225US-3 class, 225USR-3 class

: 30 mm

: 510 N·m (52 kgf·m, 375 lbf·ft)

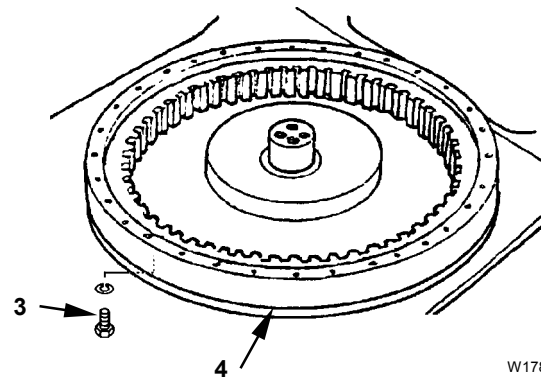
ZX240-3 class, 270-3 class

: 32 mm

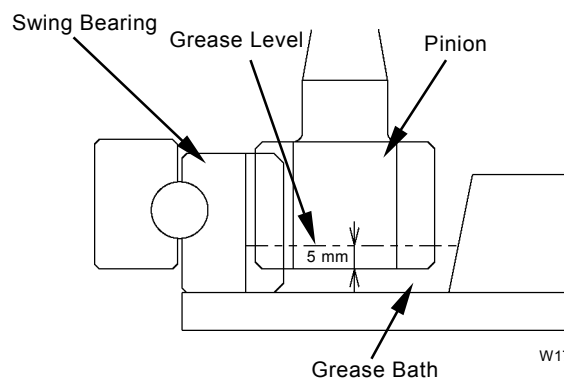
: 650 N·m (65 kgf·m, 480 lbf·ft)

4. After installing swing bearing (4), add the grease bath with grease (Shell Alvania EP2 or equivalent) until the pinion of swing bearing is covered 5 mm in grease.

Amount of grease: 17 L (4.5 US gal.)



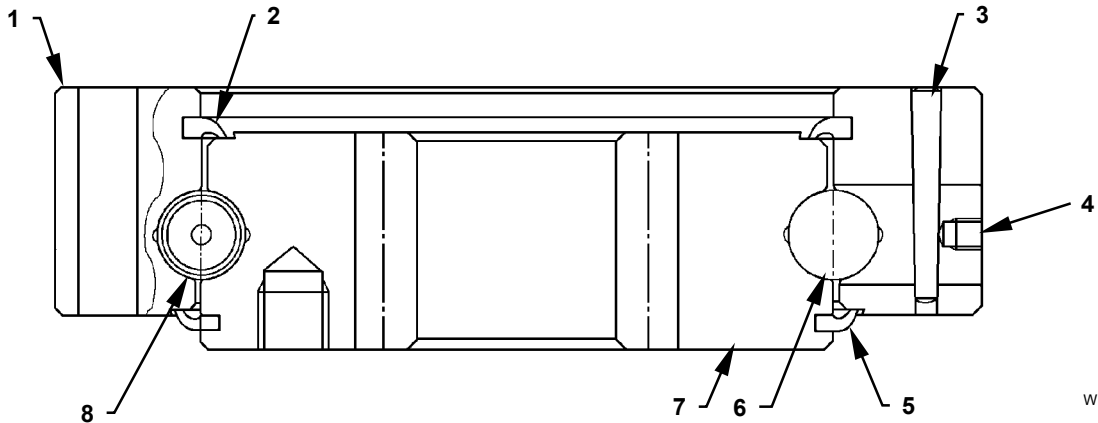
W178-02-11-192



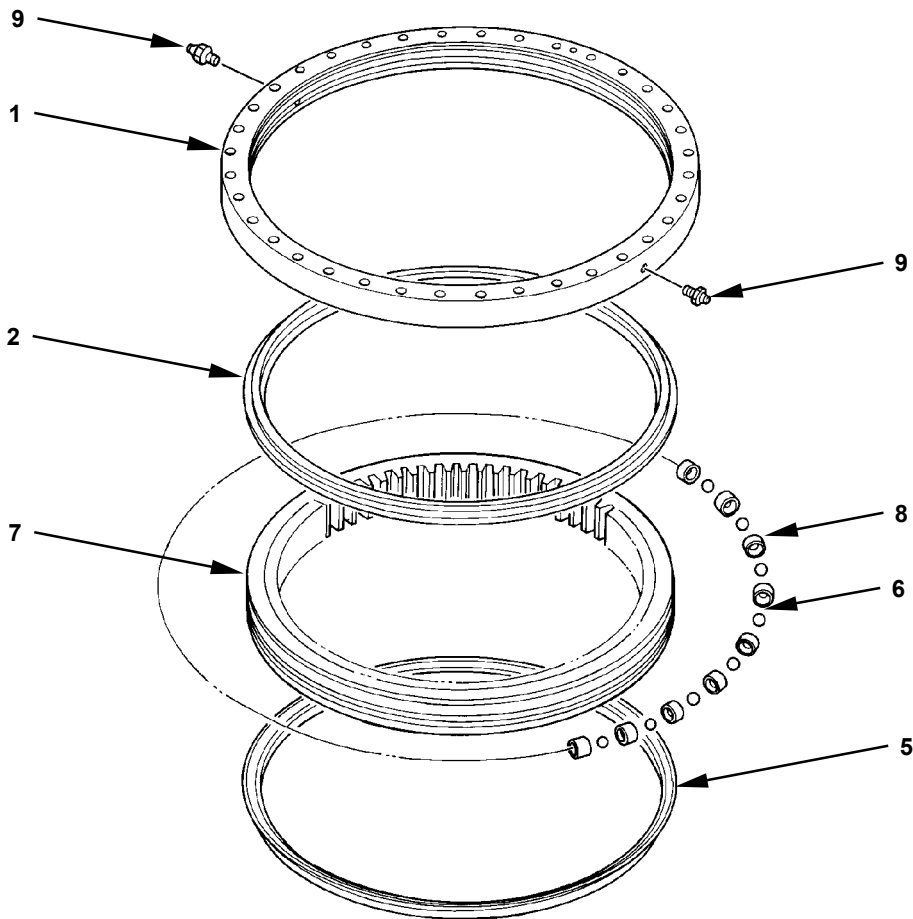
W175-03-01-002

# UNDERCARRIAGE / Swing Bearing

## DISASSEMBLE SWING BEARING



W178-02-11-193



W178-02-11-194

1 - Outer Race  
2 - Seal  
3 - Pin

4 - Plug  
5 - Seal

6 - \*Ball  
7 - Inner Race


8 - \*Support  
9 - Grease Fitting (2 Used)

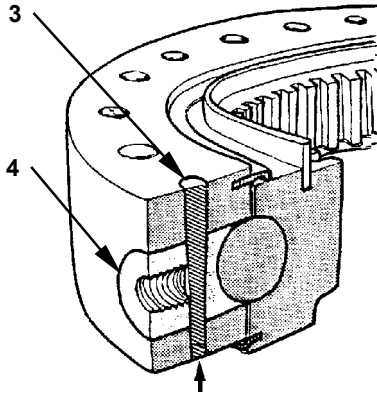
**NOTE:** \*6 ZX200-3 class, 225US-3 class,  
225USR-3 class: 111 used, ZX240-3 class,  
270-3 class: 99 used  
\*8 ZX200-3 class, 225US-3 class,  
225USR-3 class: 111 used, ZX240-3 class,  
270-3 class: 99 used

# UNDERCARRIAGE / Swing Bearing

## Disassemble Swing Bearing


1. Tap stopper pin (3) of plug (4) upward from the bottom side.

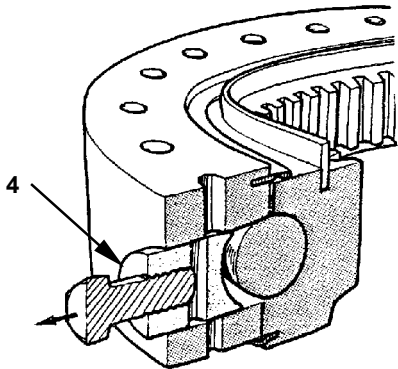
 **NOTE:** After installing pin (3), pin (3) was crimped. Grind off the crimped part.



W178-02-11-195

2. Pull plug (4) out.

 **NOTE:** Install the bolt into the screw hole (M10, Pitch 1.5 mm) of plug (4). Tap or pull out the bolt from the inner side.

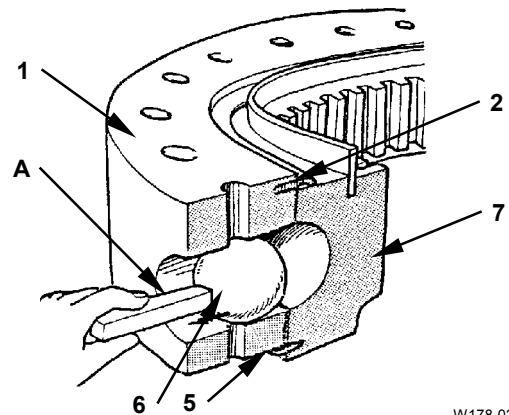


W178-02-11-196

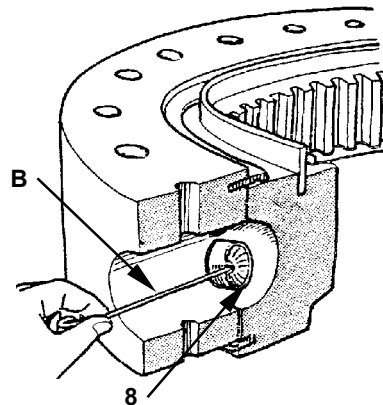


**CAUTION:** Swing bearing weight:  
ZX200-3 class, 225US-3 class, 225USR-3 class: 226 kg (500 lb)  
ZX240-3 class, 270-3 class: 324 kg (715 lb)

3. Hoist outer race (1) of the swing bearing by using lifting tool (ST 0050) horizontally. Remove seals (2, 5) from outer race (1).
4. Place inner race (7) of the swing bearing onto the wooden block. Attach a nylon sling to outer race (1) and hold outer race (1).
5. Remove balls (6) (111 used / 99 used) and supports (8) (111 used / 99 used) from the plug (4) hole while rotating outer race (1). When removing ball (6), use rod magnet (A). Use wire (B) and remove support (8).



W178-02-11-197

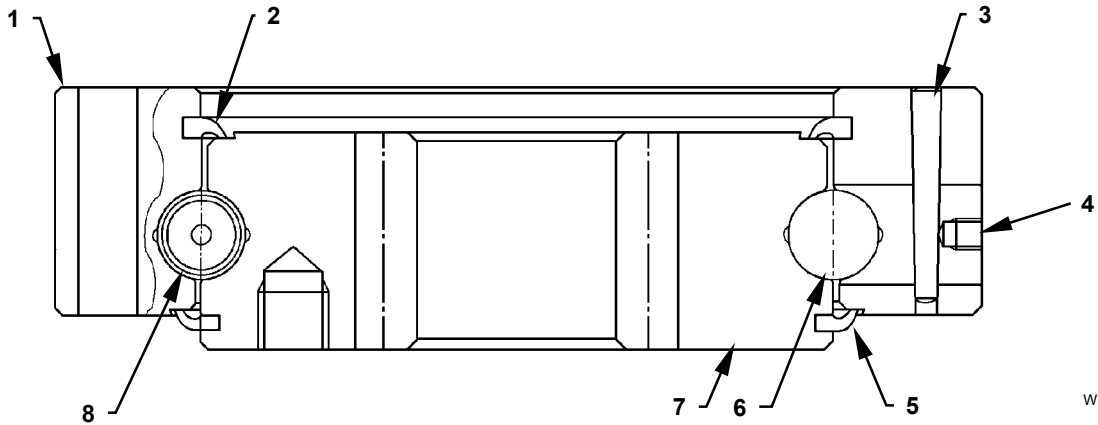


W178-02-11-198

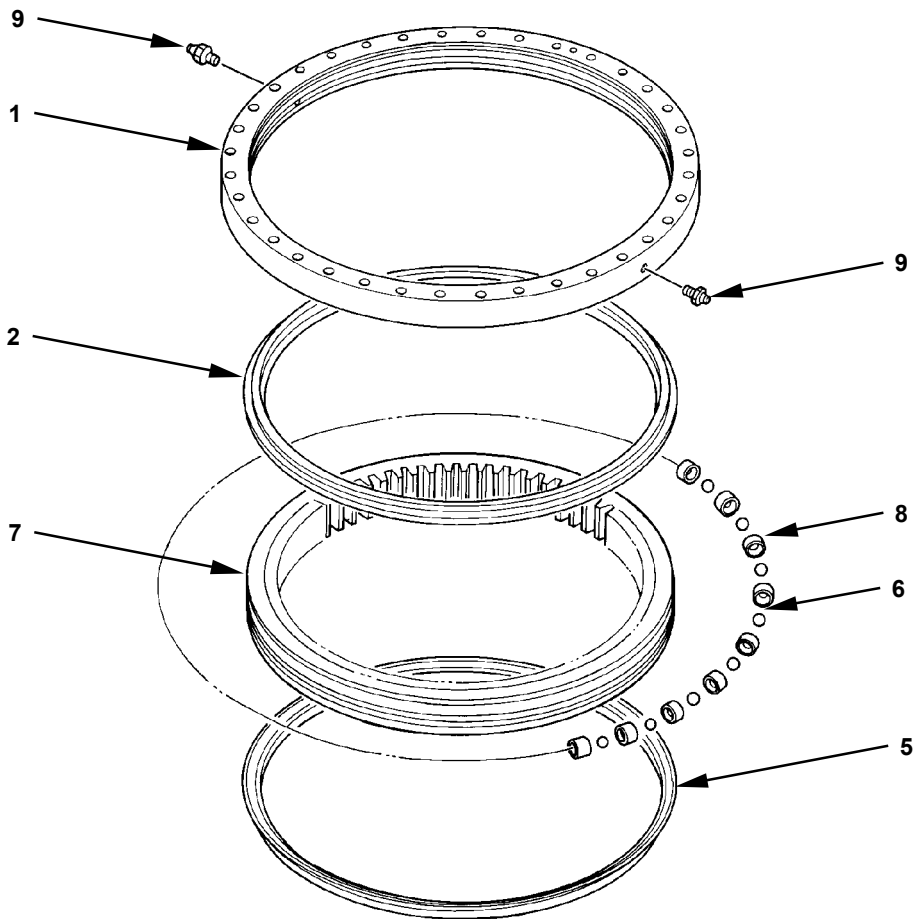
6. Remove seals (2, 5) from outer race (1) and inner race (7) by using a scraper.

# UNDERCARRIAGE / Swing Bearing

## ASSEMBLE SWING BEARING



W178-02-11-193



W178-02-11-194

- 1 - Outer Race
- 2 - Seal
- 3 - Pin

- 4 - Plug
- 5 - Seal

- 6 - \*Ball
- 7 - Inner Race

- 8 - \*Support
- 9 - Grease Fitting (2 Used)

**NOTE:** \*6 ZX200-3 class, 225US-3 class, 225USR-3 class: 111 used, ZX240-3 class, 270-3 class: 99 used  
 \*8 ZX200-3 class, 225US-3 class, 225USR-3 class: 111 used, ZX240-3 class, 270-3 class: 99 used

# UNDERCARRIAGE / Swing Bearing

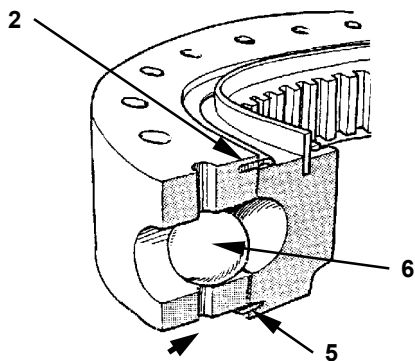
## Assemble Swing Bearing

**IMPORTANT:** Apply grease to balls (6) and supports (8).

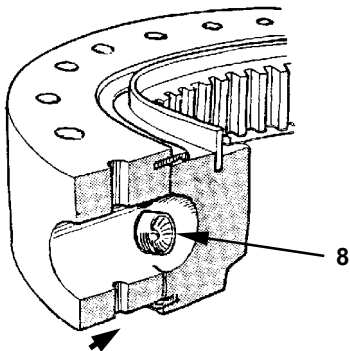


**CAUTION:** Swing bearing weight:  
ZX200-3 class, 225US-3 class, 225USR-3 class: 226 kg (500 lb)  
ZX240-3 class, 270-3 class: 324 kg (715 lb)

1. Hoist outer race (1) horizontally and align outer race (1) with inner race (7) coaxially. While rotating outer race (1), insert balls (6) (111 used / 99 used) and supports (8) (111 used / 99 used) into the plug (4) hole one by one by using a round bar.

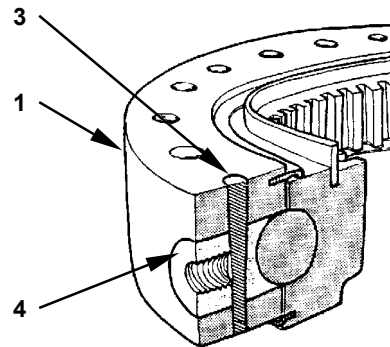


W178-02-11-199




W178-02-11-200

2. Tap and install plug (4) into outer race (1). Install pin (3) into outer race (1). Crimp the head of pin (3) by using a punch.



W178-02-11-201

3. Install lifting tool (ST 0050) to outer race (1) and hoist outer race (1). Thoroughly clean the slots for seals (2, 5). Apply THREEBOND #1530D. Install seals (2, 5).
4. Add grease (Alvania EP2 grease or equivalent) into the swing bearing through grease fitting (9). At this time, rotate outer race (1) and add grease. Amount of grease: 17 L (4.5 US gal.)

 **NOTE:** Add grease at 2 places.

## UNDERCARRIAGE / Swing Bearing

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## 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 (7) (6 used). Remove cover (6) from track frame (3).

 : 17 mm

2. Remove hoses (1, 2, 8 and 9) from travel device (5). Cap the open ends.


Attach an identification tag onto the removed hoses for assembling.

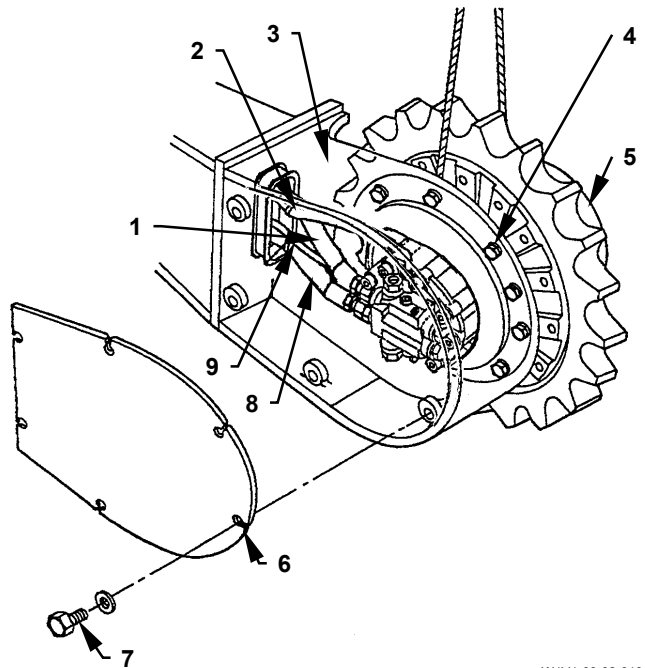
 : 19 mm, 22 mm, 27 mm, 36 mm



**CAUTION:** Travel device (5) weight:  
Refer to the List of Travel Device (5) Weight.

3. Remove bolts (4) (ZX200-3 class, 225USR-3 class, 225US-3 class: 14 used, ZX240-3 class: 16 used, ZX270-3 class: 20 used). Hoist and remove travel device (5) from track frame (3).

 : 30 mm



W1V1-03-02-010

#### List of Travel Device (5) Weight:

Unit: kg (lb)


Model	Weight
ZX200-3, 200LC-3, 210H-3, 210LCH-3, 210K-3, 210LCK-3, 225USR-3 class, 225US-3 class	310 (685)
ZX210LCN-3, 240N-3	325 (720)
ZX240-3 class	330 (730)
ZX270-3 class	460 (1015)


## UNDERCARRIAGE / Travel Device

### Installation


**CAUTION:** Travel device (5) weight:  
Refer to the List of Travel Device (5) Weight  
on W3-2-1.


1. Install travel device (5) to track frame (3) with bolts (4) (ZX200-3 class, 225USR-3 class, 225US-3 class: 14 used, ZX240-3 class: 16 used, ZX270-3 class: 20 used).


 : 30 mm


 : 630 N·m (64 kgf·m, 4653 lbf·ft)


2. Install hoses (1, 2, 8 and 9) to travel device (5).


 : 19 mm


 : 30 N·m (3.0 kgf·m, 22 lbf·ft)


 : 22 mm

 : 40 N·m (4.0 kgf·m, 29.5 lbf·ft)


 : 27 mm


 : 80 N·m (8.0 kgf·m, 59 lbf·ft)

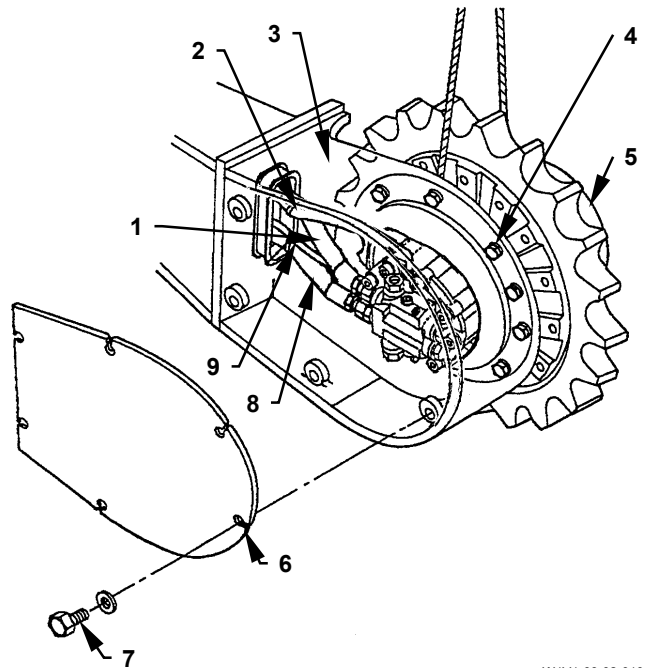
 : 36 mm

 : 180 N·m (18 kgf·m, 133 lbf·ft)

3. Install cover (6) to track frame (3) with bolts (7) (6 used).

 : 17 mm

 : 50 N·m (5.0 kgf·m, 37 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 (5) 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

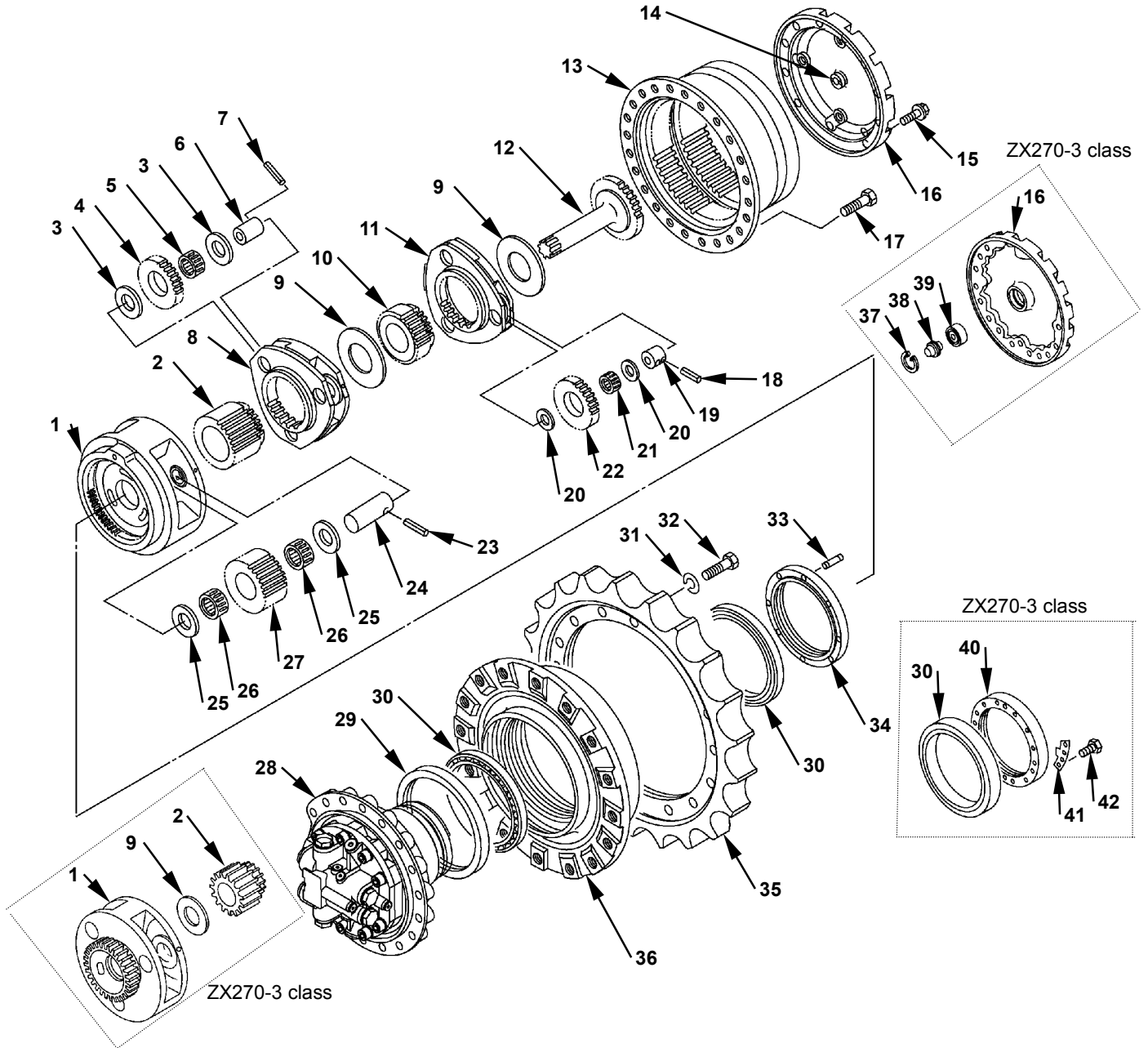
### LIST OF WEIGHT

Unit: kg (lb)

Model	Parts Name	Weight
ZX200-3, 200LC-3, 210H-3, 210LCH-3, 210K-3, 210LCK-3, 225USR-3 class, 225US-3 class	Travel device	310 (685)
	Ring gear (13)	40 (88)
	Third stage carrier (1) assembly	40 (88)
	Sprocket (35)+ Drum (36)	100 (220)
ZX210LCN-3, 240N-3	Travel device	325 (720)
	Ring gear (13)	50 (110)
	Third stage carrier (1) assembly	40 (88)
	Sprocket (35)+ Drum (36)	90 (198)
ZX240-3 class	Travel device	330 (730)
	Ring gear (13)	40 (88)
	Third stage carrier (1) assembly	40 (88)
	Sprocket (35)+ Drum (36)	105 (230)
ZX270-3 class	Travel device	460 (1015)
	Ring gear (13)	55 (120)
	Third stage carrier (1) assembly	52 (115)
	Sprocket (35)+ Drum (36)	140 (310)

# UNDERCARRIAGE / Travel Device

## DISASSEMBLE TRAVEL DEIVCE



W1V1-03-02-001

## UNDERCARRIAGE / Travel Device

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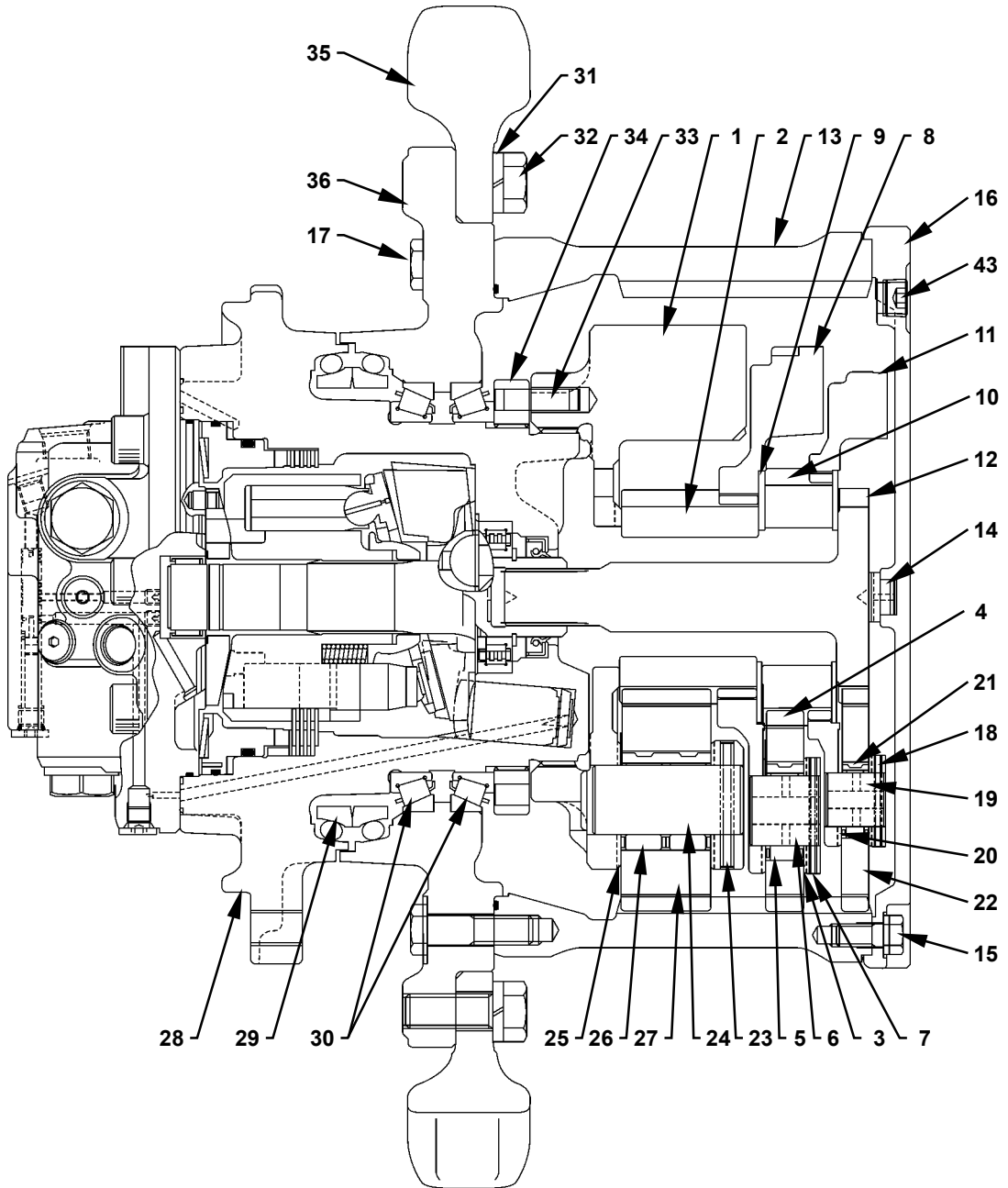
1 - Third Stage Carrier	12 - Shaft	23 - Spring Pin (3 Used)	34 - Bearing Nut
2 - Sun Gear	13 - Ring Gear	24 - Pin (3 Used)	35 - Sprocket
3 - Thrust Plate (6 Used)	14 - Stopper	25 - Thrust Plate (6 Used)	36 - Drum
4 - Planetary Gear (3 Used)	15 - Bolt *1	26 - Needle Bearing (6 Used)	37 - Retaining Ring
5 - Needle Bearing (3 Used)	16 - Cover	27 - Planetary Gear (3 Used)	38 - Stopper
6 - Pin (3 Used)	17 - Bolt *2	28 - Motor	39 - Ball Bearing
7 - Spring Pin (3 Used)	18 - Spring Pin (3 Used)	29 - Floating Seal	40 - Bearing Nut
8 - Second Stage Carrier	19 - Pin (3 Used)	30 - Roller Bearing (2 used)	41 - Lock Plate
9 - Spacer *5	20 - Thrust Plate (6 Used)	31 - Spring Washer *3	42 - Bolt (2 Used)
10 - Sun Gear	21 - Needle Bearing (3 Used)	32 - Bolt *4	*43 - Plug (3 Used)
11 - First Stage Carrier	22 - Planetary Gear (3 Used)	33 - Knock Pin	

**NOTE:** As for parts with \*, refer to W3-2-18.

Model	Q'ty
ZX200-3, 200LC-3, 210H-3, 210LCH-3, 210K-3, 210LCK-3, 225USR-3 class, 225US-3 class	Spacer (9): 2 used Bolt (15): 12 used, Bolt (17): 24 used, Spring Washer (31): 18 used, Bolt (32): 18 used
ZX240-3 class	Spacer (9): 2 used Bolt (15): 12 used, Bolt (17): 28 used, Spring Washer (31): 20 used, Bolt (32): 20 used
ZX270-3 class	Spacer (9): 3 used Bolt (15): 16 used, Bolt (17): 28 used, Spring Washer (31): 24 used, Bolt (32): 24 used

# UNDERCARRIAGE / Travel Device

ZAXIS210LCN-3, 240N-3



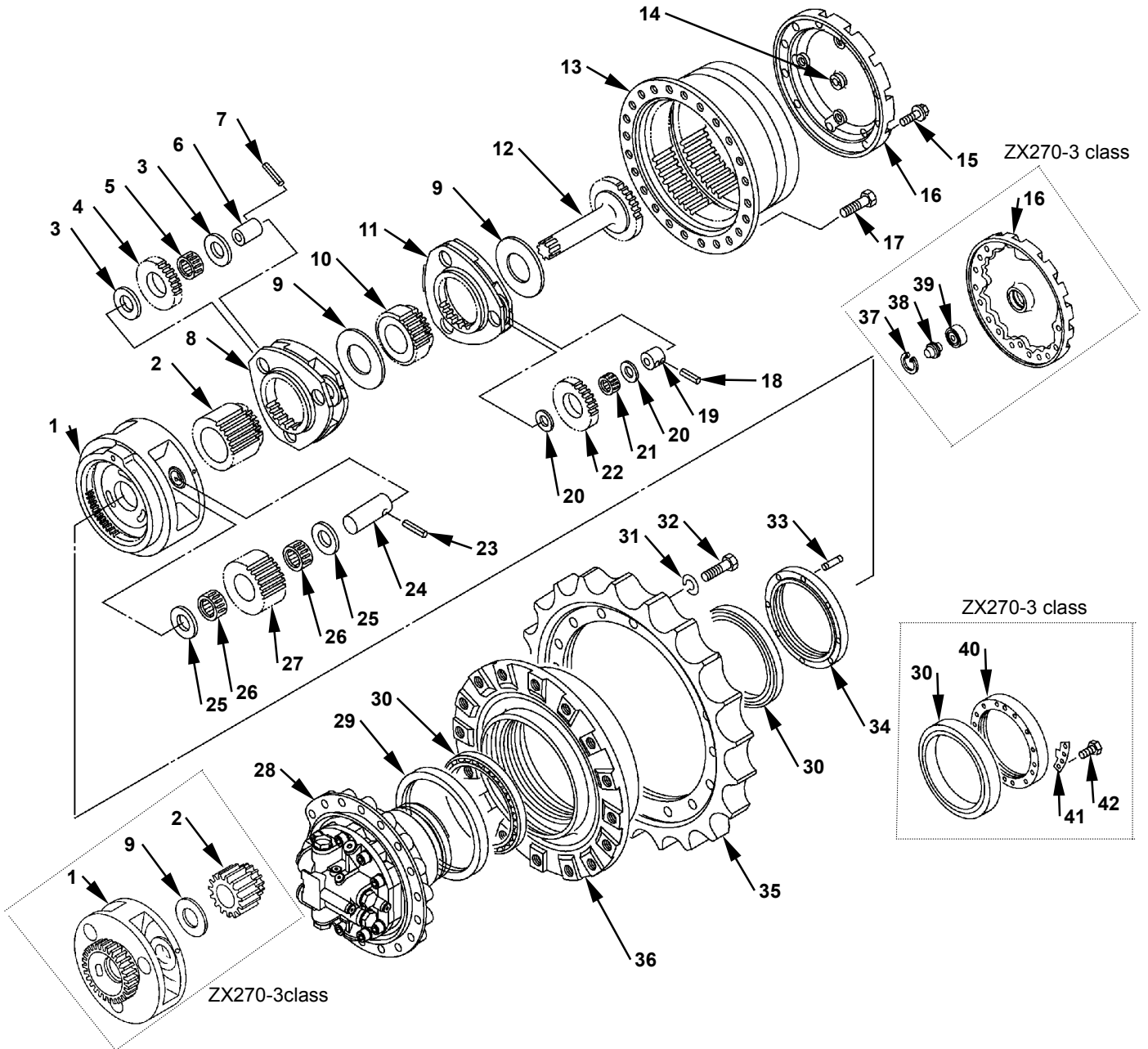
W1V1-03-02-011

## UNDERCARRIAGE / Travel Device

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1 - Third Stage Carrier	12 - Shaft	23 - Spring Pin (3 Used)	34 - Bearing Nut
2 - Sun Gear	13 - Ring Gear	24 - Pin (3 Used)	35 - Sprocket
3 - Thrust Plate (6 Used)	14 - Stopper	25 - Thrust Plate (6 Used)	36 - Drum
4 - Planetary Gear (3 Used)	15 - Bolt (16 Used)	26 - Needle Bearing (6 Used)	43 - Plug (3 Used)
5 - Needle Bearing (3 Used)	16 - Cover	27 - Planetary Gear (3 Used)	
6 - Pin (3 Used)	17 - Bolt (20 Used)	28 - Motor	
7 - Spring Pin (3 Used)	18 - Spring Pin (3 Used)	29 - Floating Seal	
8 - Second Stage Carrier	19 - Pin (3 Used)	30 - Roller Bearing (2 used)	
9 - Spacer (2 Used)	20 - Thrust Plate (6 Used)	31 - Spring Washer (18 Used)	
10 - Sun Gear	21 - Needle Bearing (3 Used)	32 - Bolt (18 Used)	
11 - First Stage Carrier	22 - Planetary Gear (3 Used)	33 - Knock Pin	

# UNDERCARRIAGE / Travel Device



W1V1-03-02-001




## UNDERCARRIAGE / Travel Device

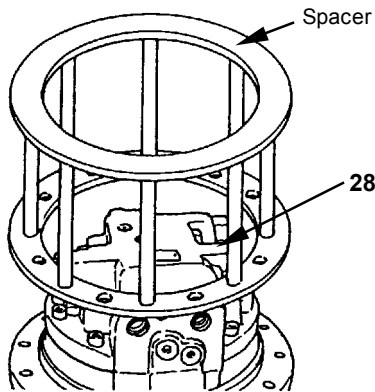
### Disassemble Travel Device

**CAUTION:** There may be pressure accumulated inside of the travel device. Loosen air bleed plug (43) slowly. Release any remaining pressure completely. Remove drain plug (43) and drain off gear oil. As the plug or gear oil gush out, do not loosen air bleed plug (43) suddenly. Keep away from the plug.

**CAUTION:** Travel device weight:  
Refer to the List of Weight on W3-2-3.

1. Hoist the travel device. Place the travel device on the workbench with the motor (28) side facing upward. Install the spacer to the travel device with the bolts (M20, Pitch 2.5 mm) (2 used).

 : 30 mm




W105-03-02-007


ZX200-3 class, 225USR-3 class, 225US-3 class,  
240-3 class: Spacer ST 5090  
ZX270-3 class: Spacer ST 5102


**CAUTION:** Travel device weight:  
Refer to the List of Weight on W3-2-3.


2. Attach a nylon sling onto the body of travel device and hoist the travel device. Place the travel device on the workbench with the motor (28) side facing downward.


 **NOTE:** Secure the spacer to the workbench tightly in order to receive the reaction force when disassembling.

3. Remove bolt (15) and plugs (43) (3 used). Remove cover (16) from ring gear (13).

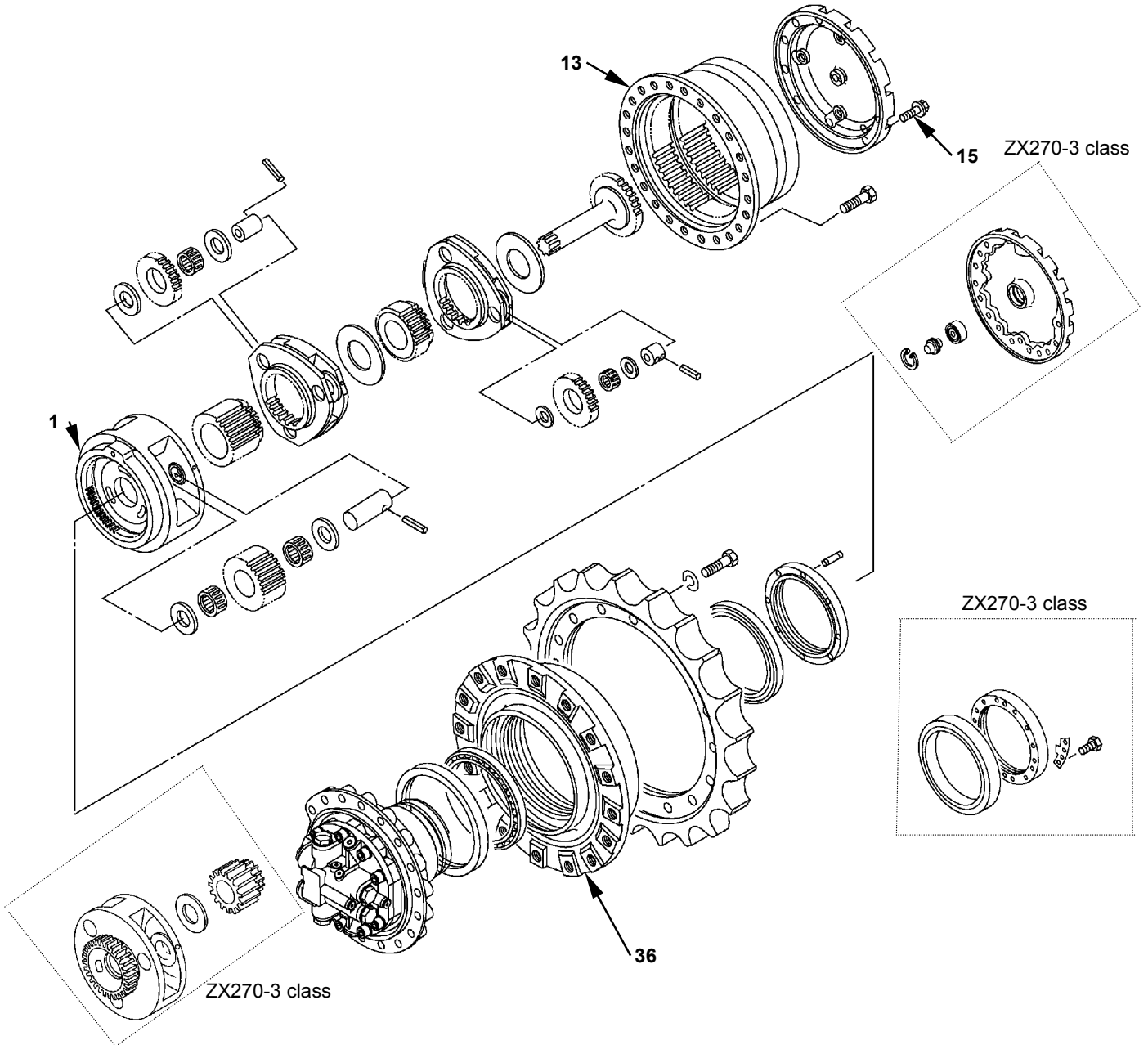
 : 19 mm

 **NOTE:** *THREEBOND #1215 or LOCTITE #5020 (ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class), THREEBOND #1389B (ZX270-3 class) have been applied between cover (16) and ring gear (13). Insert a chisel between cover (16) and ring gear (13), tap a chisel for easy removal. Do not remove stoppers (14, 38) attached with cover (16) unless damage and wear are found.*

4. Remove shaft (12) and the first stage carrier (11) assembly from the second stage carrier (8) assembly.
  5. Remove sun gear (10) from second stage carrier (8).
  6. Remove the second stage carrier (8) assembly from ring gear (13).
  7. Remove sun gear (2) from the third stage carrier (1) assembly.
  8. Remove bolt (17).
-  : 24 mm

 **NOTE:** *(ZX270-3 class only) LOCTITE #262 or THREEBOND #1386B has been applied to bolt (17).*

# UNDERCARRIAGE / Travel Device



W1V1-03-02-001

## UNDERCARRIAGE / Travel Device

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**CAUTION: Ring gear (13) weight:  
Refer to the List of Weight on W3-2-3.**

9. Install eyebolts (M12, Pitch 1.75 mm) (2 used) into the bolt (15) hole on ring gear (13). Hoist ring gear (13). Remove ring gear (13) from drum (36).

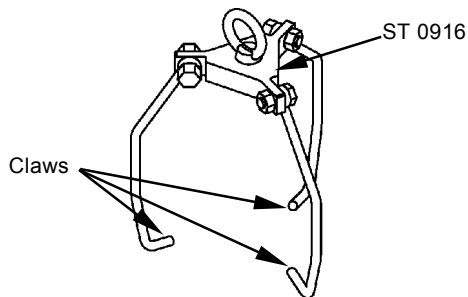


**NOTE:** *THREEBOND #1215 or LOCTITE #5020 (ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class), THREEBOND #1389B (ZX270-3 class) have been applied between ring gear (13) and drum (36). When it is difficult to remove, use a screwdriver.*



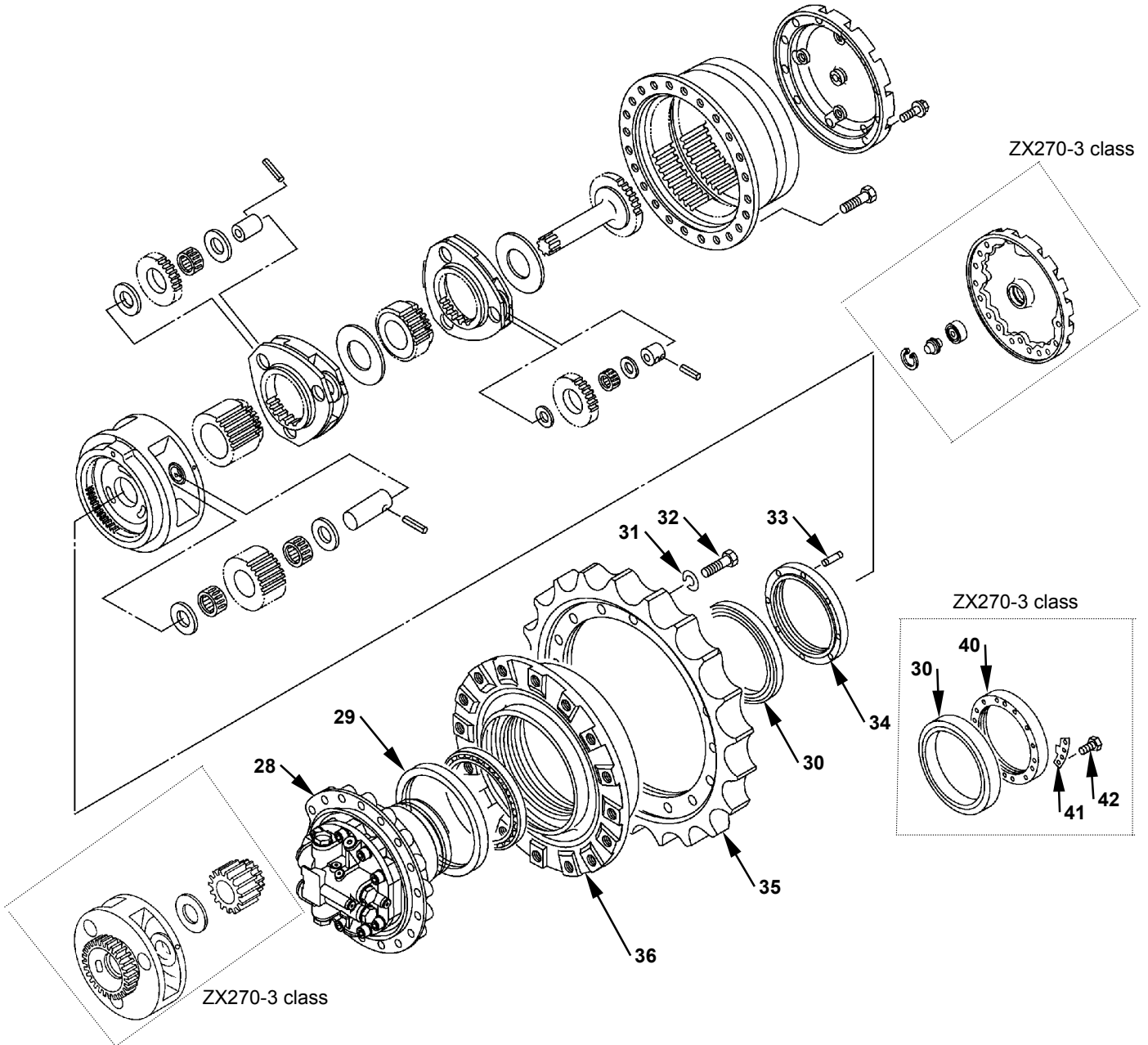
**CAUTION: The third stage carrier (1) assembly weight:  
Refer to the List of Weight on W3-2-3.**

10. Hook the claws of special tool (ST 0916) to the outer surface of third stage carrier (1). Hoist third stage carrier (1). Remove the third stage carrier (1) assembly from drum (36).



W178-02-11-203

# UNDERCARRIAGE / Travel Device

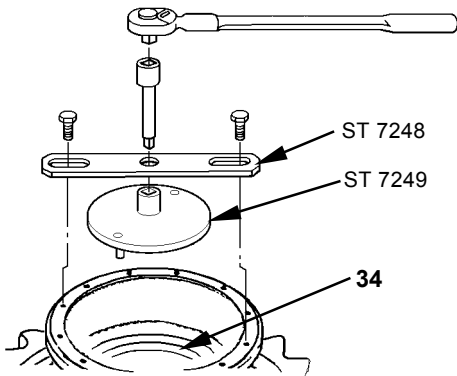


W1V1-03-02-001

## UNDERCARRIAGE / Travel Device

11. (ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)

Remove bearing nut (34) from the motor (28) housing by using special tool (ST 7248, ST 7249). Do not remove knock pin (33) in bearing nut (34) unless necessary.




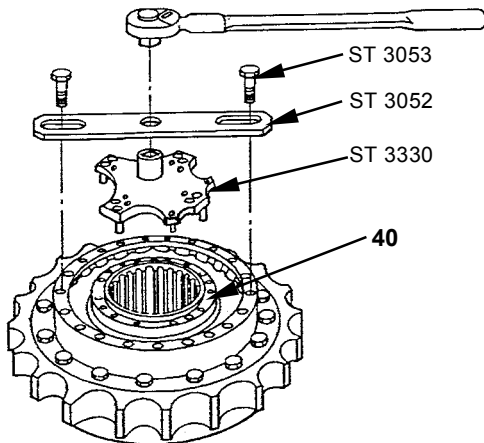
W178-03-02-013

(ZX270-3 class)

Remove bolt (42). Remove lock plate (41) from bearing nut (40).

Remove bearing nut (40) by using special tools (ST 3330, ST 3051, ST 3052).

 : 19 mm




W1V1-03-02-009



**CAUTION: Sprocket (35) + Drum (36) weight: Refer to the List of Weight on W3-2-3.**

**IMPORTANT: The motor side of drum (36) is a seal sliding surface for motor (28). After removing drum (36), place drum (36) onto the wooden block.**

12. Install eyebolts (M16, Pitch 2.0 mm) (2 used) to drum (36). Hoist drum (36). Remove drum (36) from motor (28).

 **NOTE: When it is difficult to remove, rotate sprocket (35).**

13. Remove floating seal (29) from motor (28).

14. Remove the inner race of roller bearing (30) from drum (36).





**CAUTION: Sprocket (35) weight: Refer to the List of Weight on W3-2-3.**

15. Remove sprocket (35) from drum (36) according to the followings.

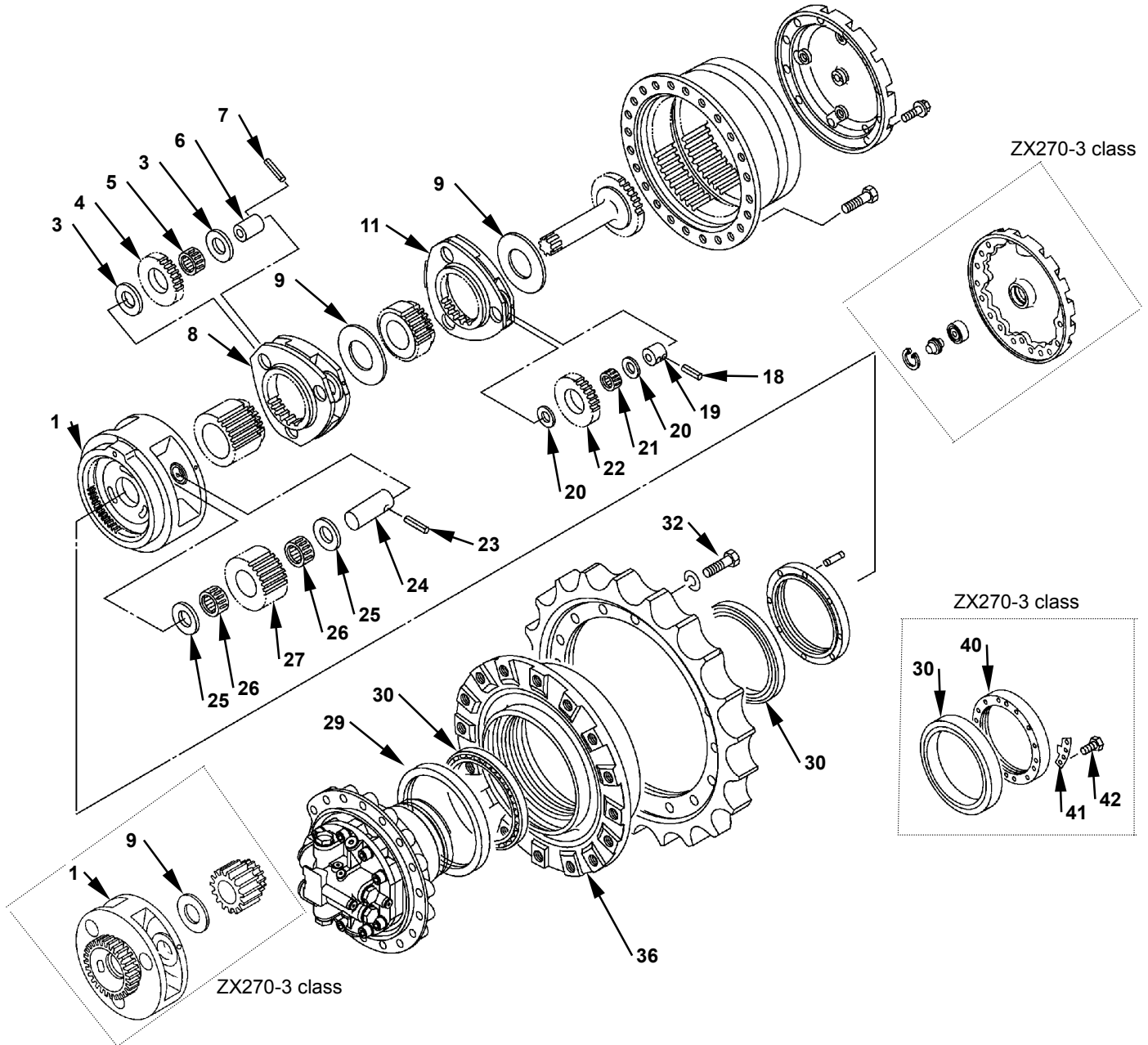
- Remove all bolts (32). Refer to W3-2-5.

- Attach a nylon sling onto sprocket (35) and hoist sprocket (35). Remove sprocket (35) from drum (36).

 : 30 mm

 **NOTE: LOCTITE #262 or THREEBOND #1386B has been applied onto bolt (32).**

# UNDERCARRIAGE / Travel Device



W1V1-03-02-001


## UNDERCARRIAGE / Travel Device

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**CAUTION: Drum (36) weight:  
Refer to the List of Weight on W3-2-3.**

16. Install eyebolt (M20, Pitch 2.5 mm) into the bolt (32) hole on drum (36). Hoist and turn over drum (36).
17. Remove floating seal (29) from drum (36).
18. Tap the back of outer race evenly by using a hammer and remove the outer races (2 used) of roller bearing (30) from drum (36). Do not remove the outer race unless necessary.

 **NOTE:** *Do not remove the inner race of roller bearing (30) in the motor (28) side unless necessary.*

19. Disassemble the first stage carrier (11) assembly.
  - Remove spring pin (18) from first stage carrier (11) by using pulling-out pin (ST 1391). (3 place)
  - Remove pins (19) (3 used), thrust plates (20) (6 used), planetary gears (22) (3 used), needle bearings (21) (3 used) and spacer (9) from first stage carrier (11).

20. Disassemble the second stage carrier (8) assembly.

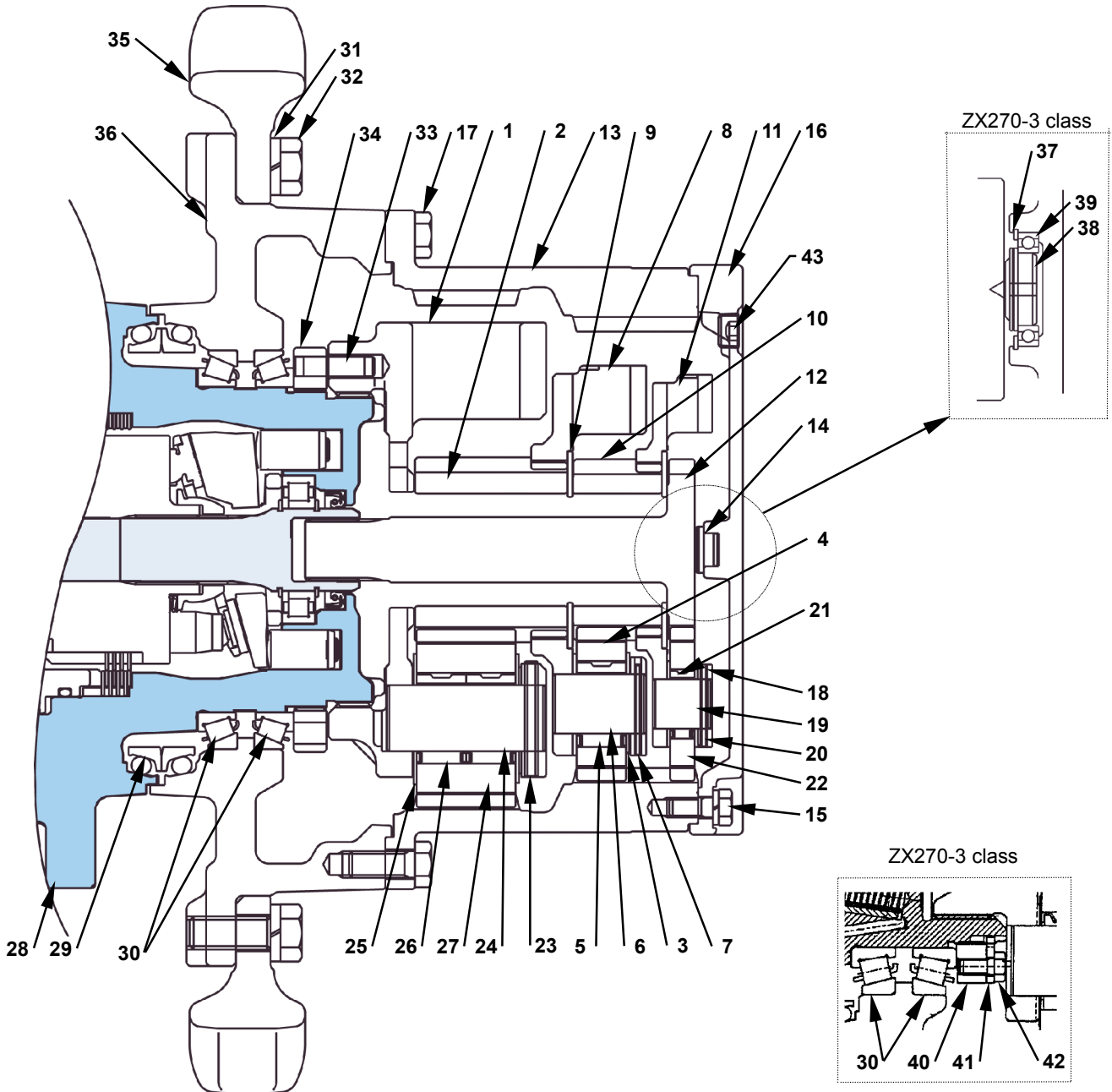
- Remove spring pin (7) from second stage carrier (8) by using pulling-out pin (ST 1391). (3 place)
- Remove pins (6) (3 used), thrust plates (3) (6 used), planetary gears (4) (3 used), needle bearings (5) (3 used) and spacer (9) from second stage carrier (8).

21. Disassemble the third stage carrier (1) assembly.

- Remove spring pin (23) from third stage carrier (1) by using pulling-out pin (ST 1463). (3 place)
- Remove pins (24) (3 used), thrust plates (25) (6 used), planetary gears (27) (3 used) and needle bearings (26) (6 used) from third stage carrier (1). (ZX270-3 class only)
- Remove spacer (9).

# UNDERCARRIAGE / Travel Device

## ASSEMBLE TRAVEL DEVICE



W1V1-03-02-002



## UNDERCARRIAGE / Travel Device

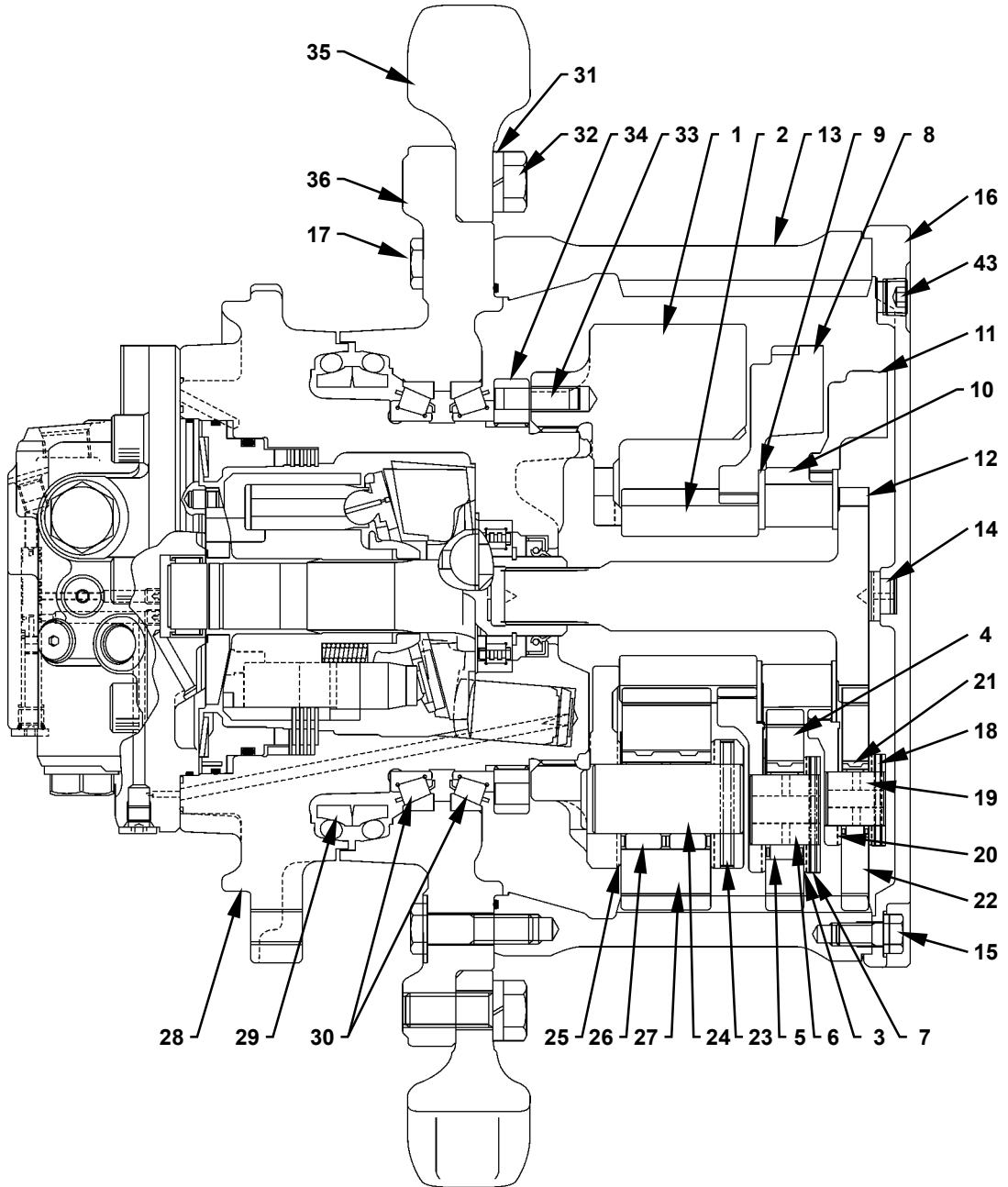
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1 - Third Stage Carrier	12 - Shaft	23 - Spring Pin (3 Used)	34 - Bearing Nut
2 - Sun Gear	13 - Ring Gear	24 - Pin (3 Used)	35 - Sprocket
3 - Thrust Plate (6 Used)	14 - Stopper	25 - Thrust Plate (6 Used)	36 - Drum
4 - Planetary Gear (3 Used)	15 - Bolt	26 - Needle Bearing (6 Used)	37 - Retaining Ring
5 - Needle Bearing (3 Used)	16 - Cover	27 - Planetary Gear (3 Used)	38 - Stopper
6 - Pin (3 Used)	17 - Bolt	28 - Motor	39 - Ball Bearing
7 - Spring Pin (3 Used)	18 - Spring Pin (3 Used)	29 - Floating Seal	40 - Bearing Nut
8 - Second Stage Carrier	19 - Pin (3 Used)	30 - Roller Bearing (2 used)	41 - Lock Plate
9 - Spacer (2 Used)	20 - Thrust Plate (6 Used)	31 - Spring Washer	42 - Bolt (2 Used)
10 - Sun Gear	21 - Needle Bearing (3 Used)	32 - Bolt	43 - Plug (3 Used)
11 - First Stage Carrier	22 - Planetary Gear (3 Used)	33 - Knock Pin	

Model	Q'ty
ZX200-3, 200LC-3, 210H-3, 210LCH-3, 210K-3, 210LCK-3, 225USR-3 class, 225US-3 class	Spacer (9): 2 used Bolt (15): 12 used, Bolt (17): 24 used, Spring Washer (31): 18 used, Bolt (32): 18 used
ZX240-3 class	Spacer (9): 2 used Bolt (15): 12 used, Bolt (17): 28 used, Spring Washer (31): 20 used, Bolt (32): 20 used
ZX270-3 class	Spacer (9): 3 used Bolt (15): 16 used, Bolt (17): 28 used, Spring Washer (31): 24 used, Bolt (32): 24 used

# UNDERCARRIAGE / Travel Device

ZAXIS210LCN-3, 240N-3



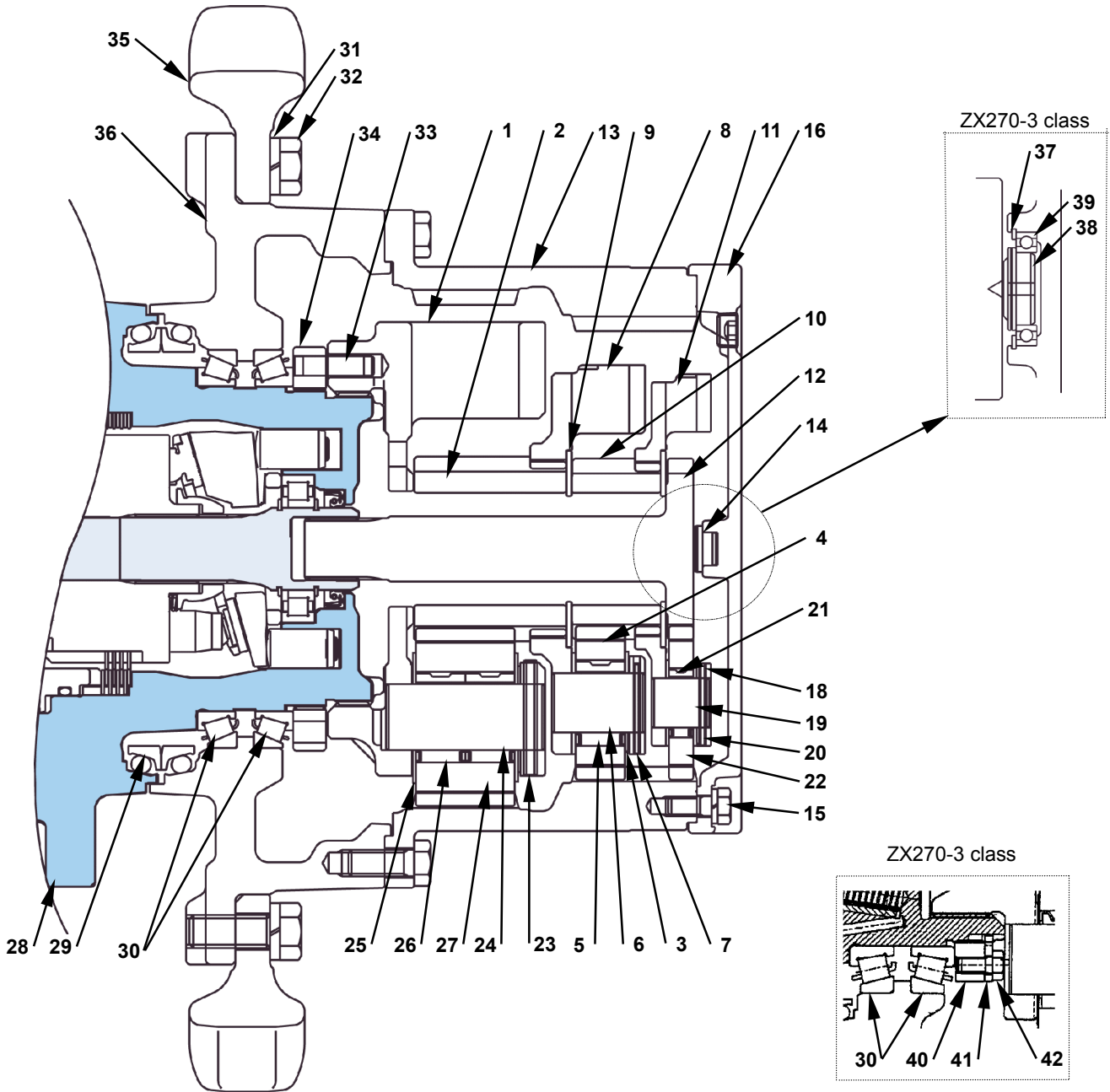
W1V1-03-02-011

## UNDERCARRIAGE / Travel Device

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1 - Third Stage Carrier	12 - Shaft	23 - Spring Pin (3 Used)	34 - Bearing Nut
2 - Sun Gear	13 - Ring Gear	24 - Pin (3 Used)	35 - Sprocket
3 - Thrust Plate (6 Used)	14 - Stopper	25 - Thrust Plate (6 Used)	36 - Drum
4 - Planetary Gear (3 Used)	15 - Bolt (16 Used)	26 - Needle Bearing (6 Used)	43 - Plug (3 Used)
5 - Needle Bearing (3 Used)	16 - Cover	27 - Planetary Gear (3 Used)	
6 - Pin (3 Used)	17 - Bolt (20 Used)	28 - Motor	
7 - Spring Pin (3 Used)	18 - Spring Pin (3 Used)	29 - Floating Seal	
8 - Second Stage Carrier	19 - Pin (3 Used)	30 - Roller Bearing (2 used)	
9 - Spacer (2 Used)	20 - Thrust Plate (6 Used)	31 - Spring Washer (18 Used)	
10 - Sun Gear	21 - Needle Bearing (3 Used)	32 - Bolt (18 Used)	
11 - First Stage Carrier	22 - Planetary Gear (3 Used)	33 - Knock Pin	

# UNDERCARRIAGE / Travel Device




W1V1-03-02-002

## UNDERCARRIAGE / Travel Device


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### Assemble Travel Device

1. When replacing roller bearing (30), heat the inner race of roller bearing (30) to temperature 50 to 70 °C by using a heater and install the inner race to motor (28). Cool roller bearing (30) 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 (29) on floating seal (29). Install one side of floating seal (29) to motor (28). Apply gear oil onto the sliding surface of floating seal (29).

 **NOTE:** When it is difficult to install O-ring of floating seal (29), push O-ring in the circumference by using a bamboo spatula.

#### **IMPORTANT: Tap the outer race only.**

3. When replacing roller bearing (30), tap the outer race by using a bar evenly and install the outer race of roller bearing (30) to the bearing nut (34) in drum (36) completely.

 **NOTE:** Tap and listen to ring in order to check that roller bearing (30) is installed completely.




**CAUTION: Drum (36) weight:**  
Refer to the List of Weight on W3-2-3.

4. Install eyebolt (M20, Pitch 2.5 mm) into the bolt (32) hole on drum (36). Hoist and place drum (36) with the mounting side for ring gear (13) facing downward.

#### **IMPORTANT: Tap the outer race only.**

5. Tap the outer race by using a bar and hammer evenly and install the outer race of roller bearing (30) to the motor (28) in drum (36) completely.

 **NOTE:** Tap and listen to ring in order to check that roller bearing (30) is installed completely.


6. Apply grease to O-ring on floating seal (29). Install one side of floating seal (29) to drum (36).
7. Install eyebolt (M20, Pitch 2.5 mm) into the bolt (32) hole on drum (36). Hoist and place drum (36) with the mounting side for motor (28) facing downward.




**CAUTION: Sprocket (35) weight:**  
Refer to the List of Weight on W3-2-3.

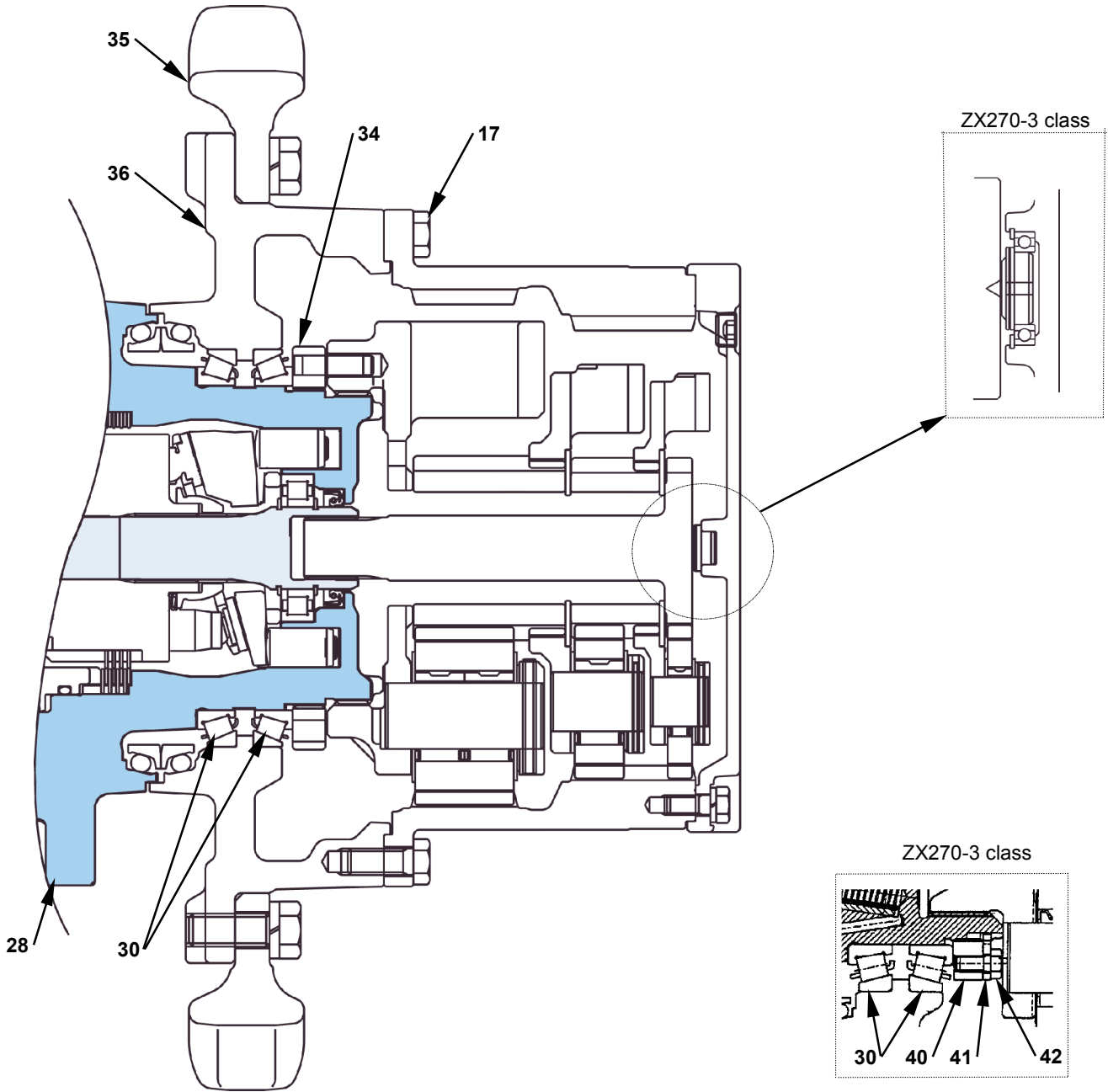
#### **IMPORTANT: Align the chamfered side of sprocket (35) with the drum (36) side.**

8. Attach a nylon sling onto sprocket (35) and hoist sprocket (5). Place sprocket (35) onto drum (36). Clean and apply LOCTITE #262 or THREEBOND #1386B to bolts (32) (ZX200-3 class, 225USR-3 class, 225US-3 class: 18 used, ZX240-3 class: 20 used, ZX270-3 class: 24 used). Clean the bolt (32) hole on drum (36). Tighten sprocket (35) to drum (36) with bolt (32) and spring washer (31).

 : 30 mm

 : 500 N·m (50 kgf·m, 370 lbf·ft)

# UNDERCARRIAGE / Travel Device



W1V1-03-02-002

## UNDERCARRIAGE / Travel Device

**CAUTION:** Sprocket (35) + drum (36) weight:  
Refer to the List of Weight on W3-2-3.

9. Install eyebolts (M16, Pitch 2.0 mm) (2 used) into the bolt (17) hole on drum (36). Place drum (36) onto motor (28) vertically. At this time, check if the clearance between motor (28) and drum (36) is equal.

10. Push and install drum (36) to motor (28).

11. Install the inner race of roller bearing (30) to motor (28). Install the inner race of roller bearing (30) by using a bar and hammer.

**NOTE:** Until the inner race side is inserted three threads in the hole for bearing nut (34), repeat steps 10, 11.

12. Apply grease to the thread part of bearing nut (34).


**NOTE:** If no grease is applied, it cannot be tightened to the specified torque.

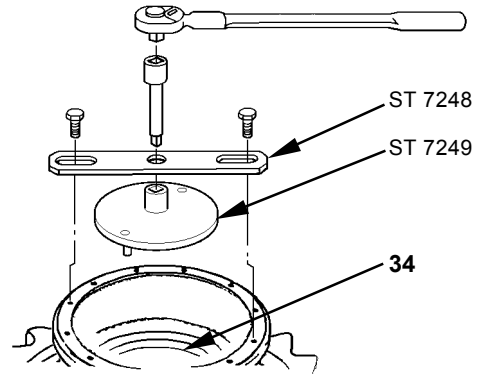
**IMPORTANT:** Install bearing nut (34) with the stepped part facing inside.

13. Install bearing nut (34) to motor (28) and tighten by hand.

14. (ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)

Install special tools (ST 7248, ST 7249) to bearing nut (34) and tighten by using a torque wrench.


 : 800 N·m (80 kgf·m, 590 lbf·ft)

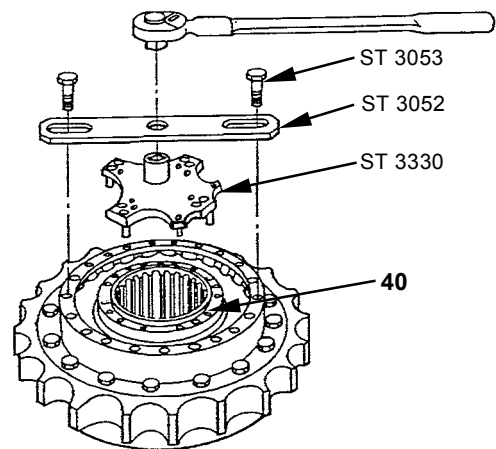


W178-03-02-013

(ZX270-3 class)

Install special tools (ST 3053, ST 3050, ST 3052) to bearing nut (40) and tighten by using a torque wrench.

 : 800 N·m (80 kgf·m, 590 lbf·ft)

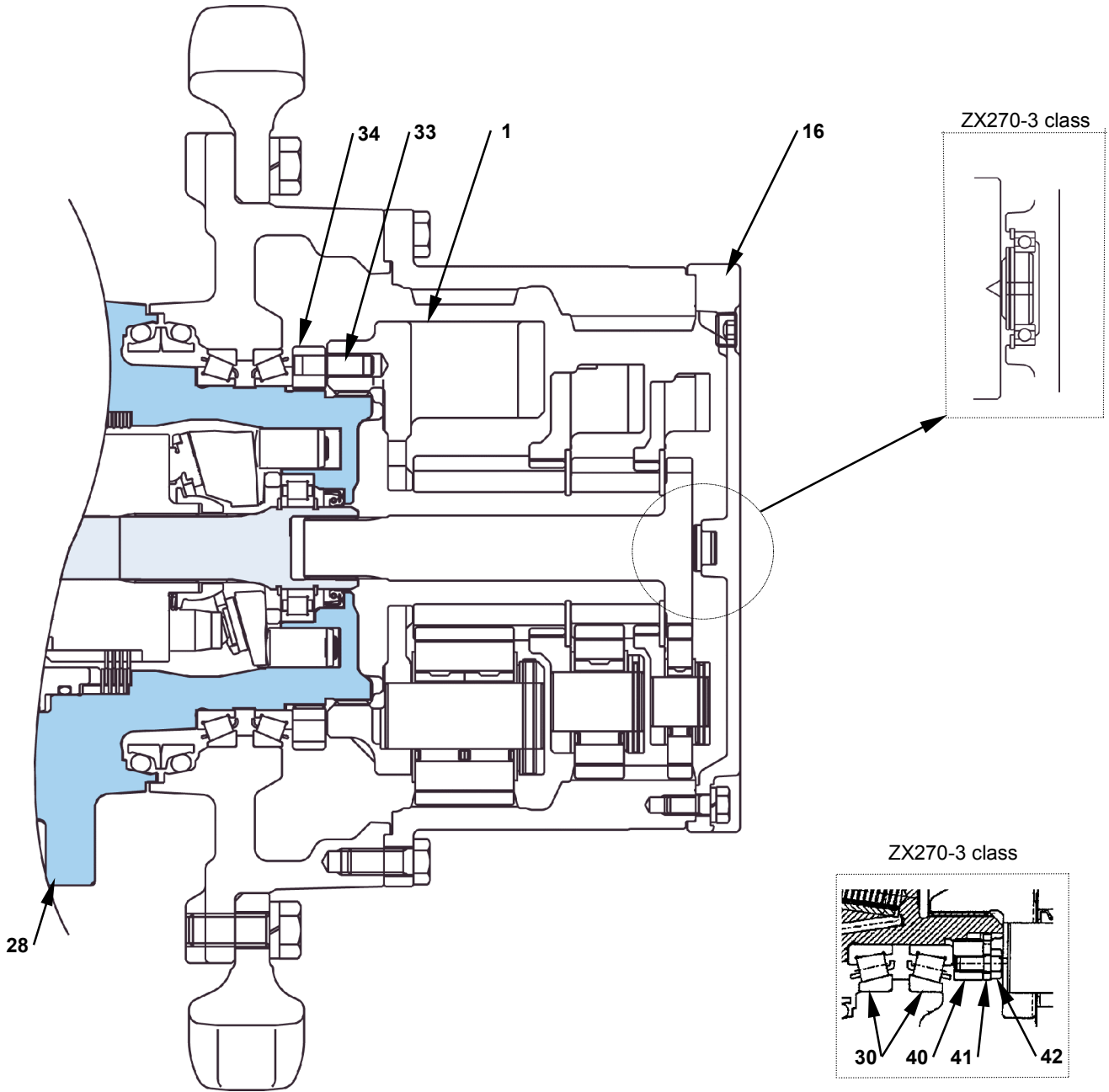


W1V1-03-02-009

15. After tighten bearing nuts (34, 40) to the specified torque and tap the sprocket (35) end by using a hammer in order to reduce play. Rotate sprocket (35) both clockwise and counterclockwise 4 to 5 turns.

16. Repeat steps 14, 15.

# UNDERCARRIAGE / Travel Device




W1V1-03-02-002




## UNDERCARRIAGE / Travel Device

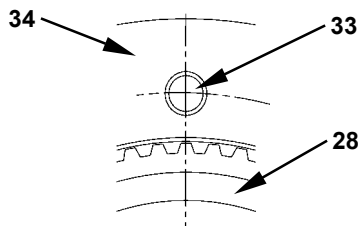
17. Repeat step 14 again. Tighten bearing nuts (34, 40) to the specified torque.

 : 800 N·m (80 kgf·m, 590 lbf·ft)

18. (ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)

Align the spline center of motor (28) with the center of knock pin (33). If not, tighten bearing nut (34) in order to align.

 **NOTE:** This procedure is done in order to align the spline position of third stage carrier (1) with knock pin (33). If the procedure is continued without aligning, cover (16) cannot be installed correctly.




W178-02-11-208


(ZX270-3 class)

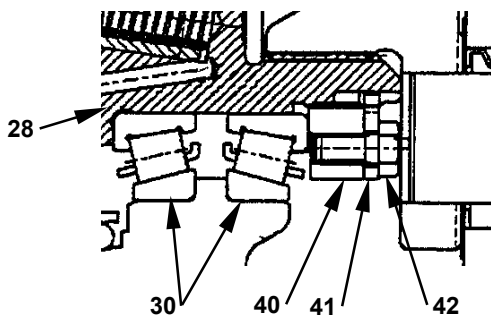
Clean bolts (42) (2 used). Apply LOCTITE #262 or THREEBOND #1386B to bolt (42). Clean the bolt (42) hole on bearing nut (40).

Install lock plate (41) to bearing nut (40) so that the convex part of lock plate (41) can be aligned with the concave part (one of 2 places) of motor (28). Tighten with bolts (42) (2 used).

If the bolt hole on lock plate (41) is not aligned, tighten bearing nut (40) in order to align.

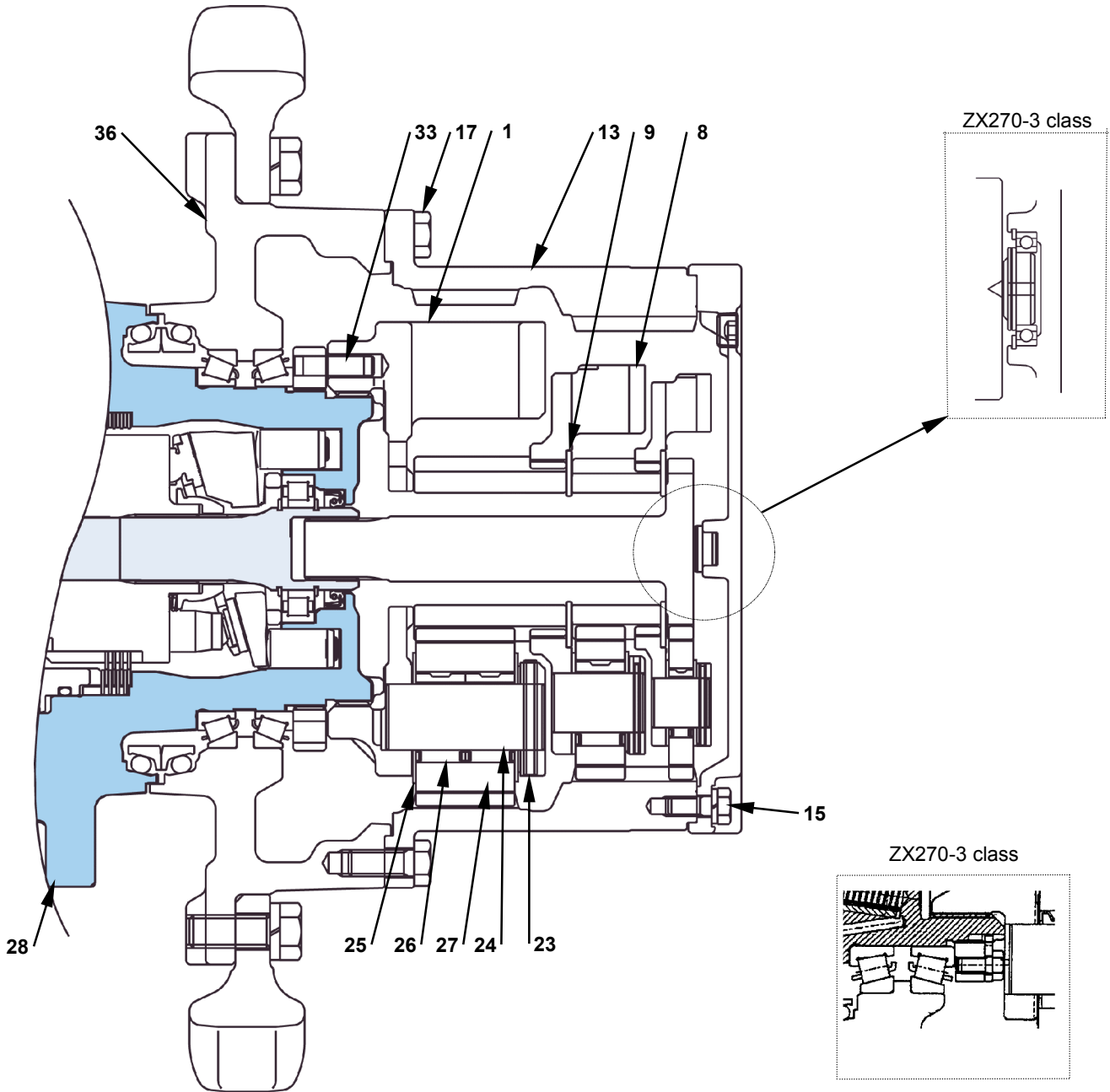
 : 19 mm

 : 90 N·m (9.0 kgf·m, 66 lbf·ft)



W1V1-03-02-003

# UNDERCARRIAGE / Travel Device



W1V1-03-02-002

## UNDERCARRIAGE / Travel Device

**IMPORTANT:** There is an identification groove on one side of planetary gear (27). Install with the identification groove facing to the spring pin (23) hole.

19. Assemble third stage carrier (1) into an assembly in the following procedure.
  - Install spacer (9) to third stage carrier (1). (ZX270-3 class only)
  - Install needle bearings (26) (2 used) to planetary gear (27).
  - Clamp planetary gear (27) with thrust plates (25) (2 used). Insert planetary gear (27) into third stage carrier (1).
  - Insert pin (24) into third stage carrier (1). Align the spring pin (23) holes and secure planetary gear (27).
  - Install spring pin (23) into third stage carrier (1). At this time, face the slit of spring pin (23) to the end of pin (24) (the second stage carrier (8) side).



W178-02-11-210

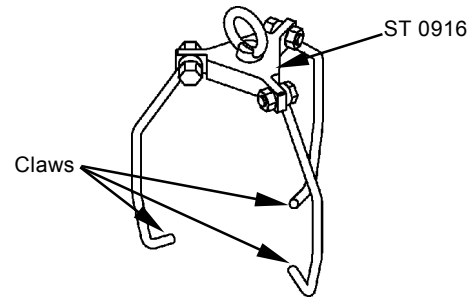
- Install the other planetary gears (27) (2 used) to third stage carrier (1) in the same procedures.

**CAUTION:** The third stage carrier (1) assembly weight: Refer to the List of Weight on W3-2-3.

**CAUTION:** When knock pin (33) is inserted into third stage carrier (1), third stage carrier (1) falls off. Take care not to clamp the fingers.

20. (ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)

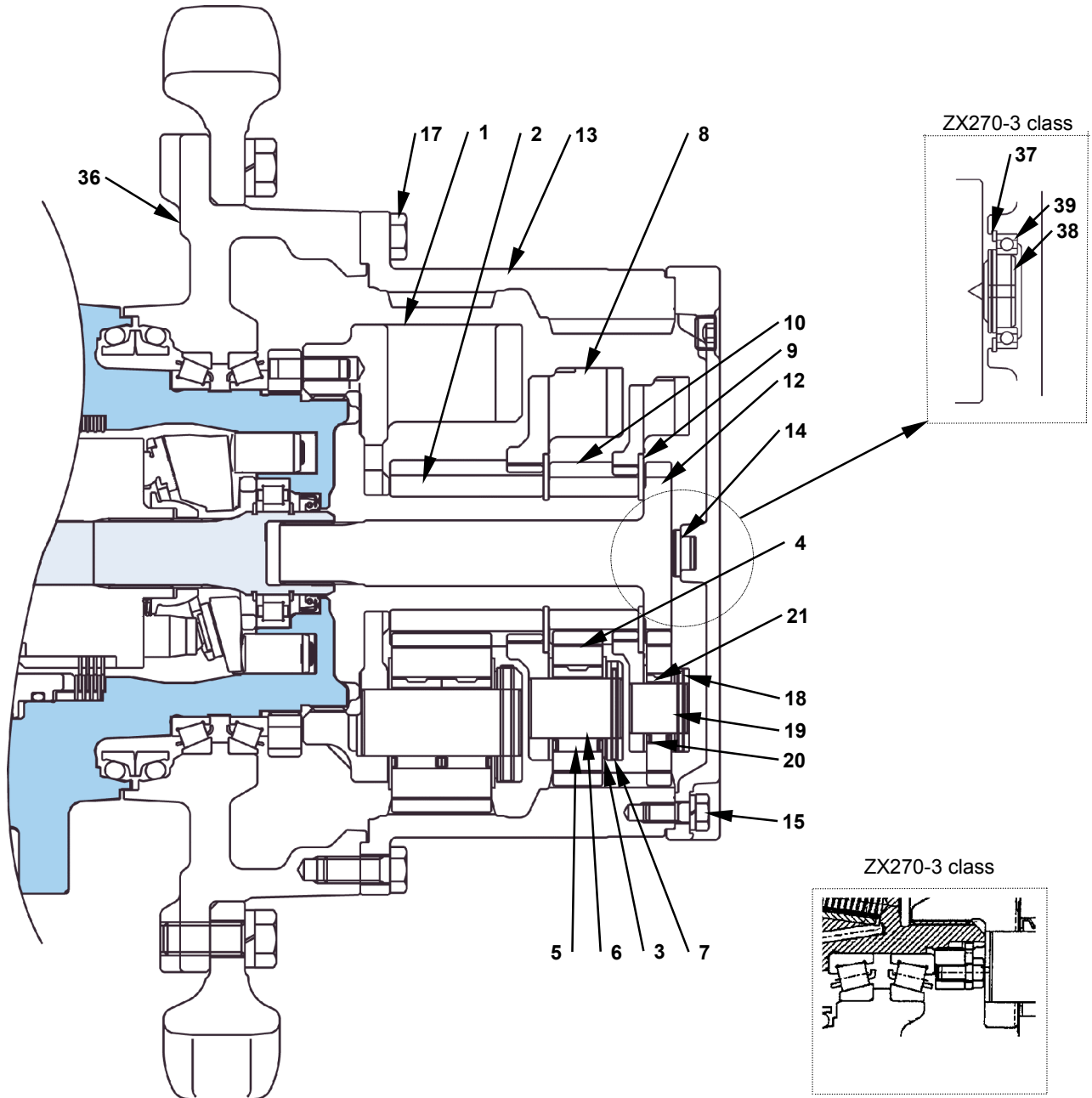
Hook the claws of special tool (ST 0916) to the outer surface of the third stage carrier (1) assembly. Hoist the third stage carrier (1) assembly. Install the third stage carrier (1) assembly to the spline in motor (28). If the splines were not aligned in step 18, knock pin (33) cannot be installed to third stage carrier (1).



W178-02-11-211

21. Clean the mating surfaces on drum (36) and ring gear (13). Apply THREEBOND #1215 or LOCTITE #5020 (ZA200-3 class, 225USR-3 class, 225US-3 class, 240-3 class), THREEBOND #1389B (ZX270-3 class). (ZX210LCN-3, 240N-3, 270-3 class only)  
After cleaning the mating surfaces on drum (36) and ring gear (13), clean the bolt (17) hole on drum (36). Clean bolt (17) and apply LOCTITE #262 or THREEBOND 1386B to bolt (17).

# UNDERCARRIAGE / Travel Device



W1V1-03-02-002

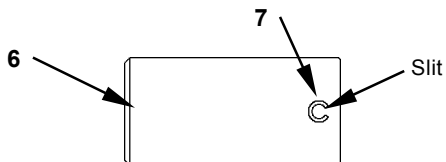
## UNDERCARRIAGE / Travel Device

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**CAUTION: Ring gear (13) weight: Refer to the List of Weight on W3-2-3.**

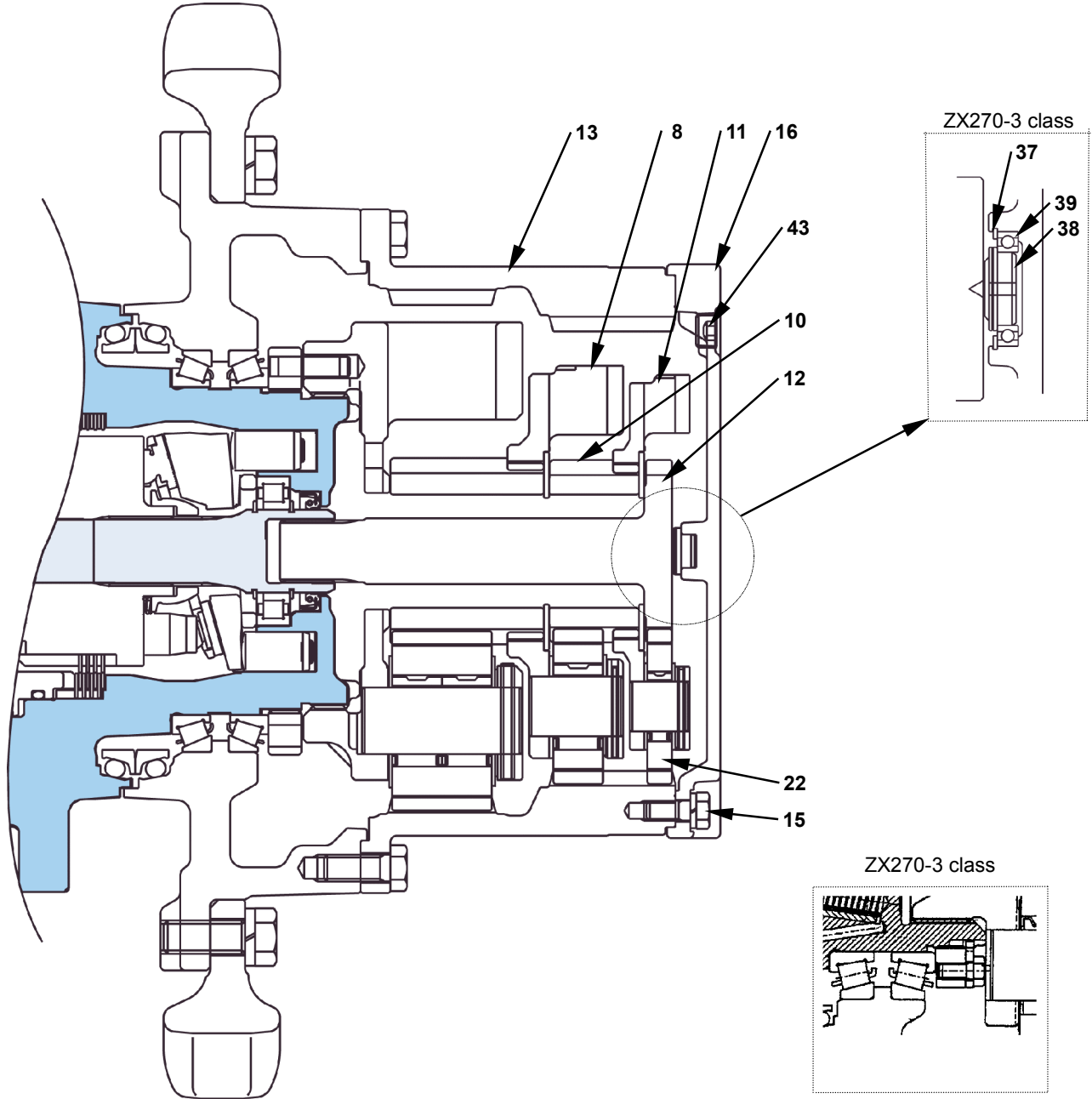
22. Install eyebolt (M12, Pitch 1.75 mm) to the bolt (15) hole on ring gear (13). Hoist ring gear (13). Align the bolt (17) holes and place ring gear (13) onto drum (36).
23. Install ring gear (13) to drum (36) with bolt (17).
24. Install sun gear (2) to third stage carrier (1) with the thinner side of outer diameter facing upward.
25. Assemble second stage carrier (8) into an assembly in the following procedure.
  - Install spacer (9) to second stage carrier (8).
  - Install needle bearing (5) to planetary gear (4).
  - Clamp planetary gear (4) with thrust plates (3) (2 used). Insert planetary gear (4) into second stage carrier (8).
  - Insert pin (6) into second stage carrier (8). Align the spring pin (7) hole and the pin (5) hole on second stage carrier (8).
    - Install spring pin (7) into the hole on second stage carrier (8). At this time, face the slit of spring pin (7) to the end of pin (6) (the cover (6) side).



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- Install the other planetary gears (4) (2 used) to second stage carrier (8) in the same procedures.
26. Install the second stage carrier (8) assembly to ring gear (13).
  27. Install sun gear (10) to second stage carrier (8) with the thinner side of outer diameter facing upward.





# UNDERCARRIAGE / Travel Device



W1V1-03-02-002

## UNDERCARRIAGE / Travel Device

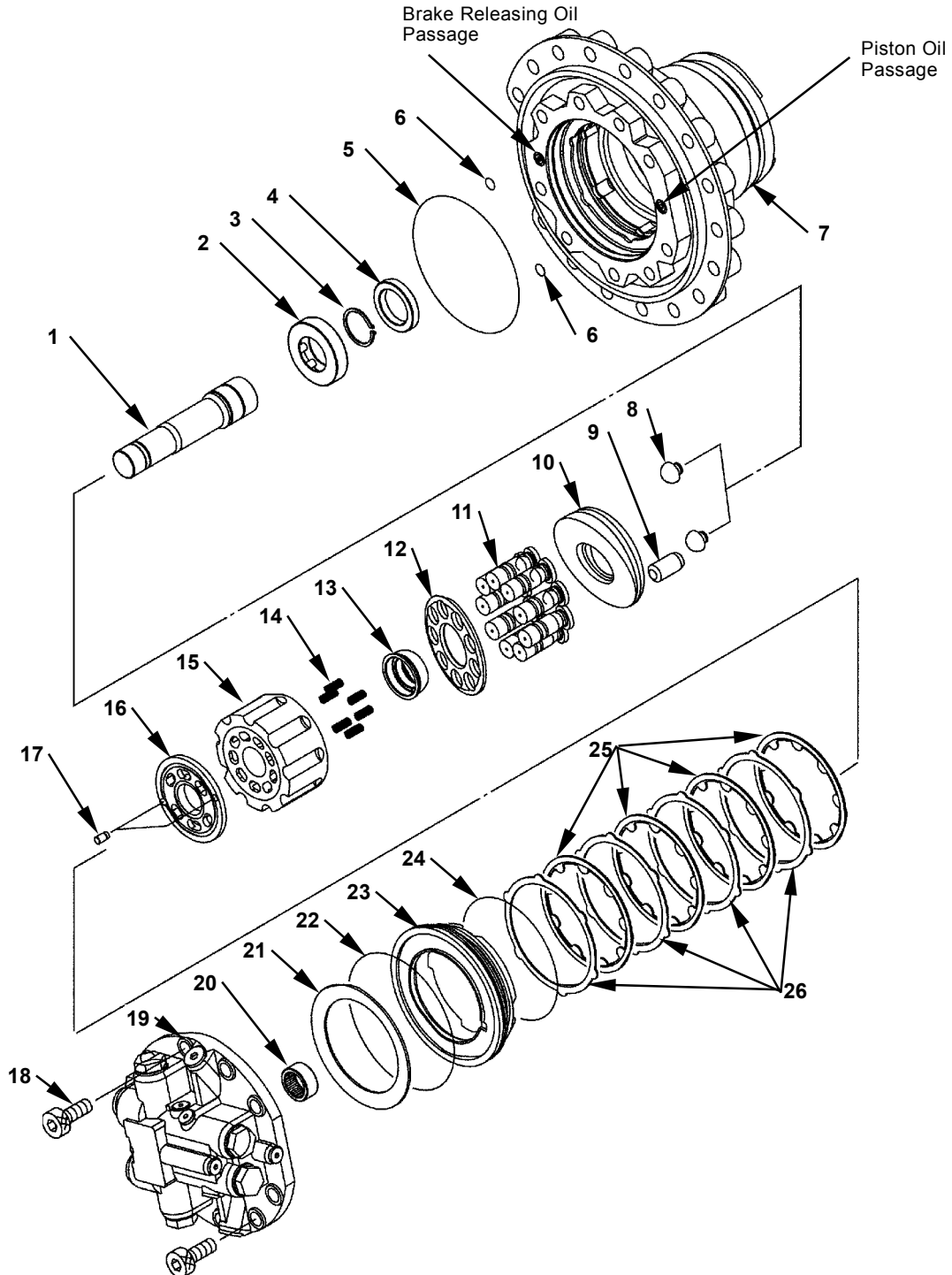
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28. Assemble first stage carrier (11) into an assembly in the same procedures as second stage carrier (8).
29. Install the first stage carrier (11) to ring gear (13).
30. Insert the spline of shaft (12) into the center of sun gear (10) while aligning with the spline of motor (28). Rotate sprocket (35) by hand slowly and insert sprocket to motor (28) and planetary gear (22).
31. Add gear oil into ring gear (13).  
Gear oil: ASE #90 (GL-4)  
ZX200-3 class, 225USR-3 class, 225US-3 class:  
6.8 L (1.8 US gal.)  
ZX240-3 class: 7.8 L (2.1 US gal.)  
ZX270-3 class: 9.2 L (2.4 US gal.)
32. Clean the mating surfaces on ring gear (13) and cover (16). Apply THREEBOND #1215 or LOCTITE #5020 (ZA200-3 class, 225USR-3 class, 225US-3 class, 240-3 class), THREEBOND #1389B (ZX270-3 class).
33. Clean bolt (15). Apply LOCTITE #262 or THREEBOND #1386B to bolt (15). (ZX270-3 class only) Install cover (16) to ring gear (13) with bolt (15).  
 : 19 mm  
 : 110 N·m (11 kgf·m, 82 lbf·ft)  
ZX200-3 class, 225USR-3 class, 225US-3 class,  
240-3 class: Bolt (15): 12 used  
ZX270-3 class: Bolt (15): 16 used
34. Wind the seal tape onto plugs (43) (3 used) in cover (16). Install plugs (43) (3 used) to cover (16).  
 : 10 mm  
 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

# UNDERCARRIAGE / Travel Device

## DISASSEMBLE TRAVEL MOTOR

ZX200-3 class, 225USR-3 class, 225US-3 class  
240-3 class



- |                     |                       |                           |                              |
|---------------------|-----------------------|---------------------------|------------------------------|
| 1 - Shaft           | 8 - Ball (2 Used)     | 15 - Rotor                | 21 - Disc Spring             |
| 2 - Roller Bearing  | 9 - Piston            | 16 - Valve Plate          | 22 - O-Ring                  |
| 3 - Retaining Ring  | 10 - Swash Plate      | 17 - Knock Pin (2 Used)   | 23 - Brake Piston            |
| 4 - Oil Seal        | 11 - Plunger (9 Used) | 18 - Socket Bolt (9 Used) | 24 - O-Ring                  |
| 5 - O-Ring          | 12 - Retainer         | 19 - Brake Valve          | 25 - Friction Plate (4 Used) |
| 6 - O-Ring (2 Used) | 13 - Bushing          | 20 - Needle Bearing       | 26 - Plate (4 Used)          |
| 7 - Housing         | 14 - Spring (6 Used)  |                           |                              |

W178-02-11-216



## UNDERCARRIAGE / Travel Device


### Disassemble Travel Motor

(ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)

**CAUTION:** Travel motor weight: 91 kg (200 lb)

**IMPORTANT:** Remove the brake valve (19) assembly from the motor. Valve plate (16) is removed with brake valve (19) together. Do not drop valve plate (16).

1. Hoist and place the travel motor vertically. Remove socket bolts (18) (9 used). Remove brake valve (19) from housing (7).

 : 14 mm

**IMPORTANT:** As valve plate (16) is easily cracked and scratched, handle with care.

2. Remove valve plate (16) from brake valve (19). Do not remove needle bearing (20) unless necessary. As knock pins (17) (2 used) are inserted tightly, knock pin (17) cannot be removed.

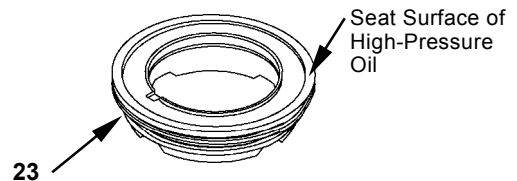
**NOTE:** Remove needle bearing (20) by using a small puller. As the outer race is deformed, needle bearing (20) cannot be reused.

3. Wrap the tape on the thrust surface of shaft (1) for needle bearing (20) in order to protect.
4. Remove disc spring (21) from housing (7). Remove O-rings (5), (6) (2 used) from housing (7).

**CAUTION:** When removing brake piston (23), cover with a cloth in order not to fly out brake piston (23).

5. Apply 100 to 300 kPa (1.0 to 3.0 kgf/cm<sup>2</sup>, 14 to 43 psi) pressure air to brake releasing oil passage in housing (7). Float and remove brake piston (23). Remove O-ring (24) from brake piston (23).

**NOTE:** The upper surface of brake piston (23) is the seat surface of high-pressure oil. Place brake piston (23) with the seat surface of high-pressure oil facing upward.



W178-02-11-215

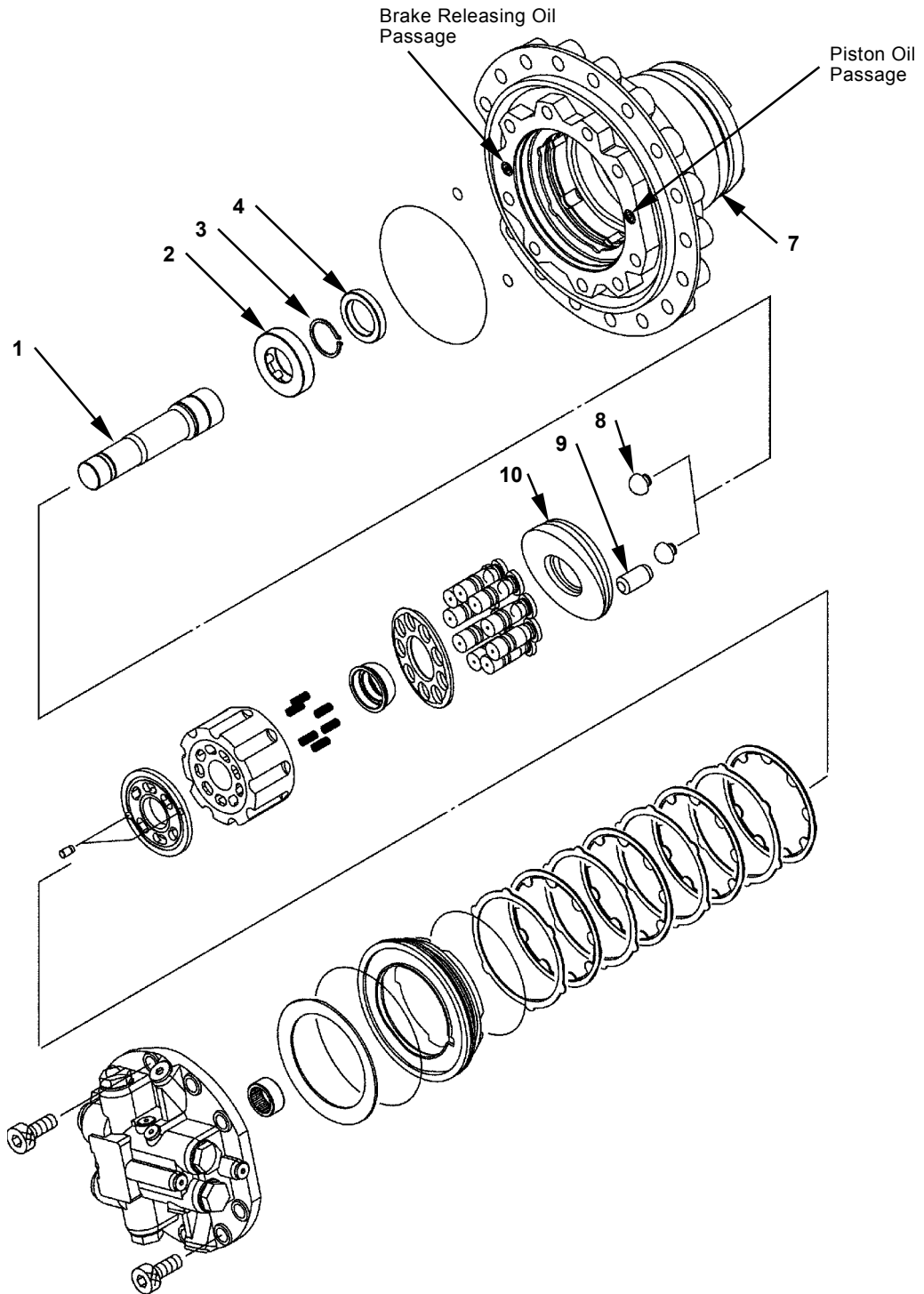
6. Remove plates (26) and friction plates (25) (4 used for each) from housing (7).
7. Remove rotor (15), springs (14) (6 used), bushing (13), retainer (12) and plungers (11) (9 used) from housing (7) in this order.

**CAUTION:** Housing (7) weight: 50 kg (110 lb)

8. Place housing (7) horizontally with the brake releasing oil passage facing downward.

**NOTE:** When facing the brake releasing oil passage upward, the thicker part of swash plate (10) faces upward. When placing housing (7) horizontally, swash plate (10) suddenly may come out.


# UNDERCARRIAGE / Travel Device



W178-02-11-216

## UNDERCARRIAGE / Travel Device


9. Remove swash plate (10) from housing (7).

 **NOTE:** When swash plate (10) cannot be removed, apply 100 to 300 kPa (1.0 to 3.0 kgf/cm<sup>2</sup>, 14 to 43 psi) pressure air through the piston oil passage port. Swash plate (10) and piston (9) are removed together. Cover piston (9) with a cloth in order not to fly out. Swash plate (10) can be removed by using a bicycle pump.

10. Remove balls (8) (2 used) and piston (9) from housing (7) by using a magnet.

11. Attach a bar onto the bottom side on inner spline hole of shaft (1). Tap by using a plastic hammer and remove shaft (1) attached with roller bearing (2) from housing (7).

12. Insert a screwdriver into the shaft (1) hole on housing (7). Remove oil seal (4).

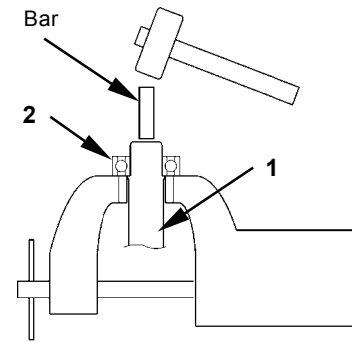
 **NOTE:** *THREEBOND #1104 or #1215 is applied onto the outer surface of oil seal (4). Oil seal (4) cannot be reused.*

13. Remove retaining ring (2) from shaft (1).



**CAUTION:** When shaft (1) is removed from roller bearing (2), do not drop shaft (1).

14. Clamp the inner race of roller bearing (2) remained on shaft (1) in a vise. Tap shaft (1) and remove roller bearing (2) by using a bar and plastic hammer.

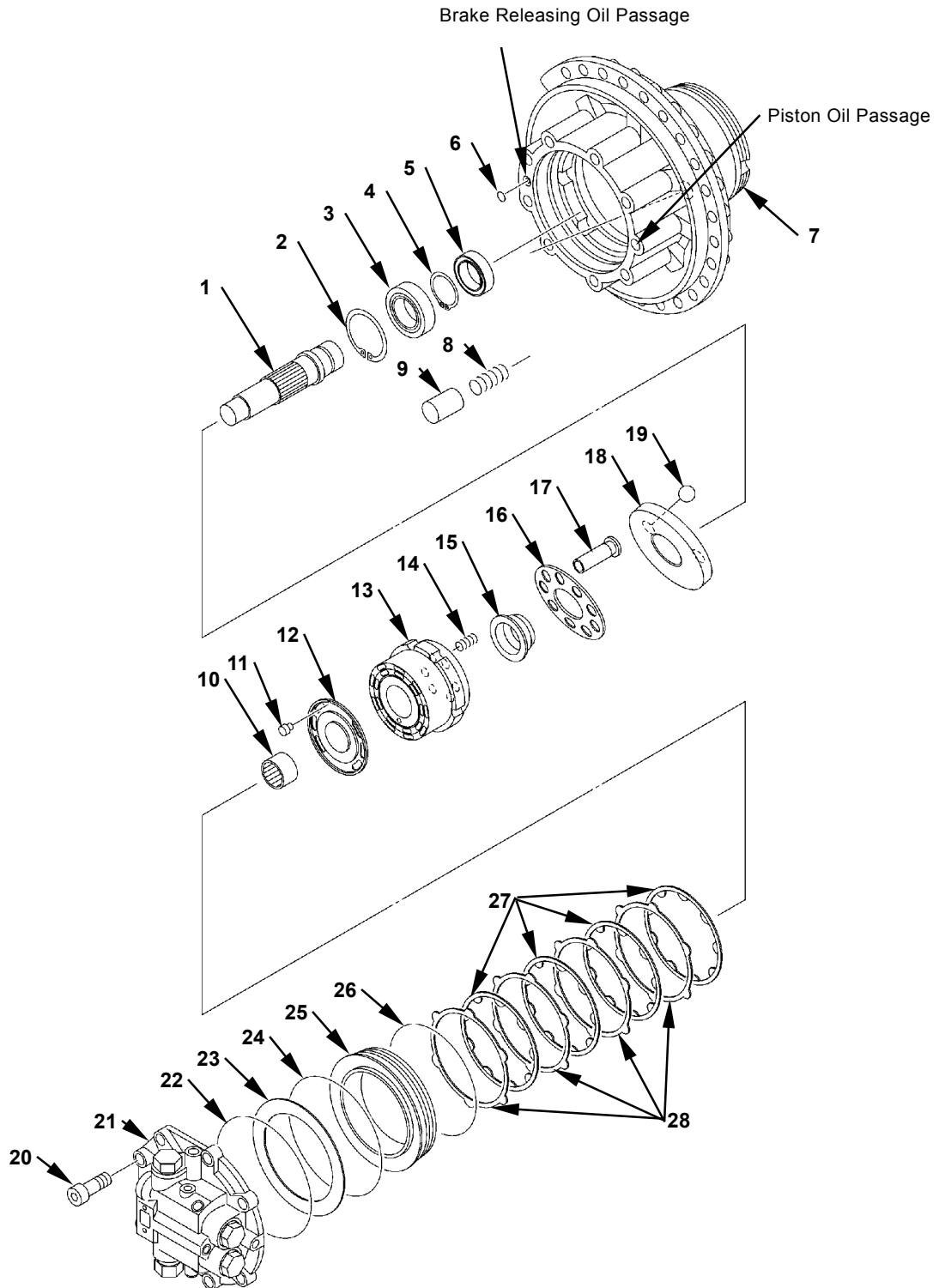


W178-02-11-212

# UNDERCARRIAGE / Travel Device

## DISASSEMBLE TRAVEL MOTOR

ZX270-3 class




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


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### Disassemble Travel Motor (ZX270-3 class)

 **CAUTION:** Travel motor weight: 135 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 (21).

1. Hoist and place the travel motor vertically. Remove socket bolt (20). 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 disc spring (23) from housing (7). Remove O-rings (6) (2 used) from housing (7).

 **CAUTION:** Apply air into housing (7) and remove brake piston (25). Cover with a cloth in order not to fly out brake piston (25).


5. Apply 100 to 300 kPa (1.0 to 3.0 kgf/cm<sup>2</sup>, 14 to 43 psi) pressure air to the brake releasing oil passage in housing (7).

 **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) and friction plates (27) (4 used for each) from housing (7).

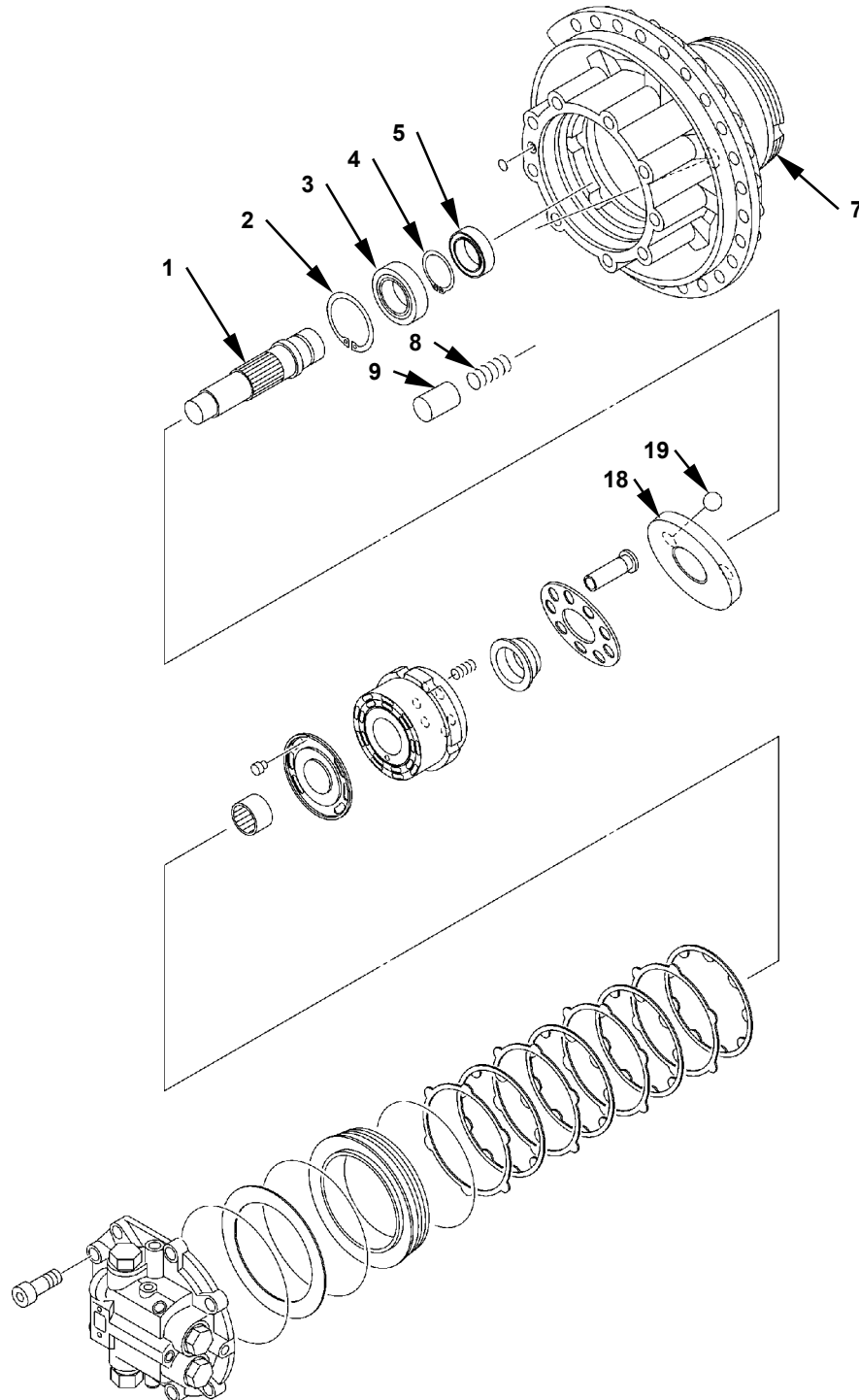
 **CAUTION:** Housing (7) weight: 87 kg (190 lb)

8. Place housing (7) horizontally with the brake releasing oil passage facing downward.

 **NOTE:** When facing the brake releasing oil passage facing 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).

# UNDERCARRIAGE / Travel Device




W178-02-11-219

## UNDERCARRIAGE / Travel Device


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12. Attach a bar onto the bottom side on inner spline hole of shaft (1). Tap by using a plastic hammer and remove shaft (1) attached with roller bearing (3) from housing (7).

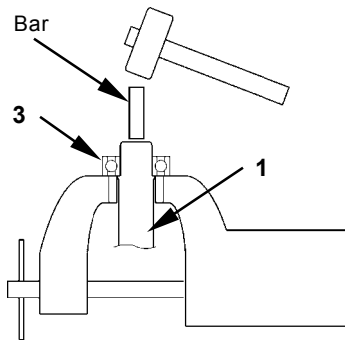
13. Insert a screwdriver into the shaft (1) hole on housing (7). Remove oil seal (4).

 **NOTE:** As oil seal (4) has been covered with *THREEBOND #1104 or #1215*, oil seal (4) cannot be reused.

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. Tap shaft (1) and remove roller bearing (3) by using a bar and plastic hammer.

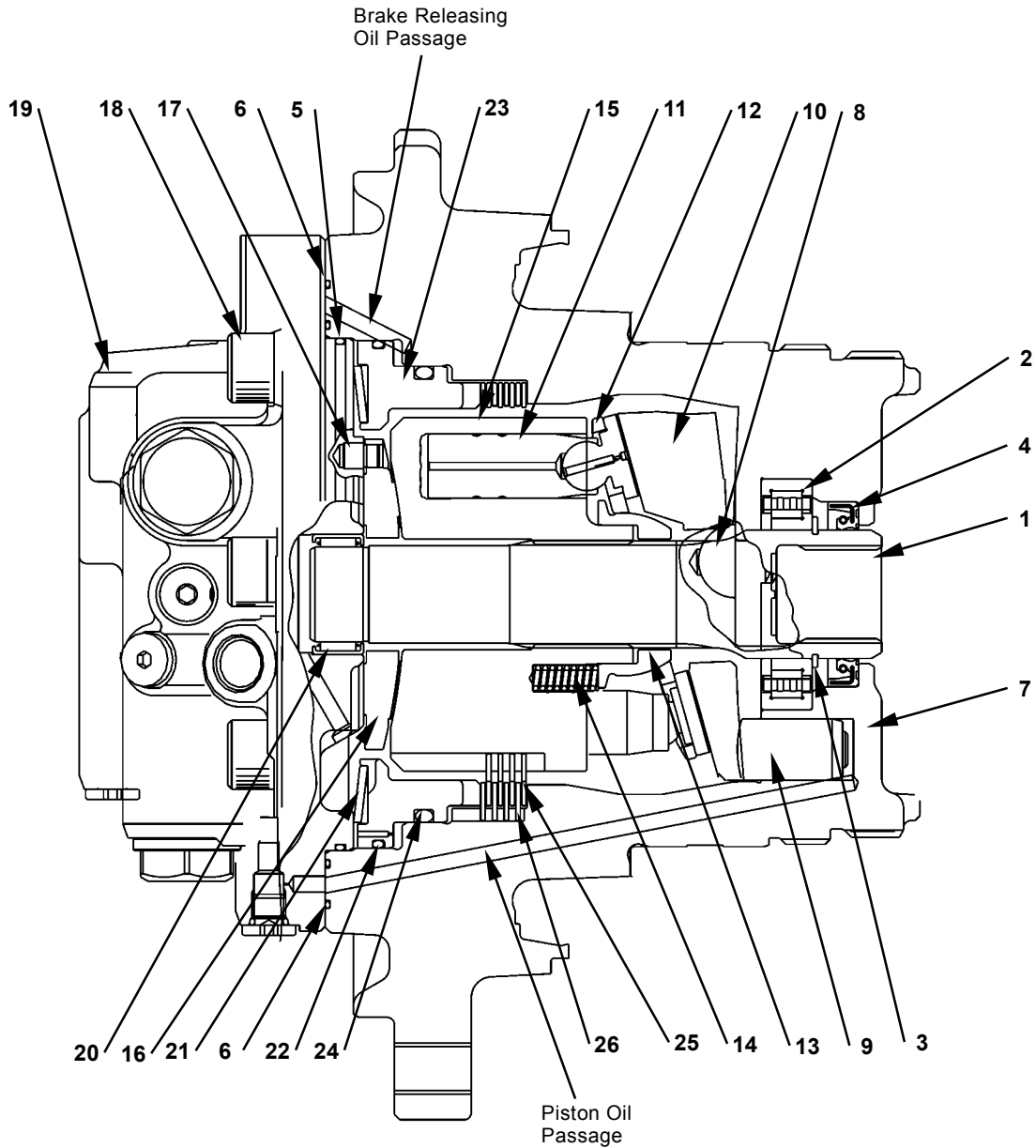


W178-02-11-212

# UNDERCARRIAGE / Travel Device

## ASSEMBLE TRAVEL MOTOR

ZX200-3 class, 225USR-3 class, 225US-3 class,  
240-3 class



W178-03-02-029

- |                     |                       |                           |                              |
|---------------------|-----------------------|---------------------------|------------------------------|
| 1 - Shaft           | 8 - Ball (2 Used)     | 15 - Rotor                | 21 - Disc Spring             |
| 2 - Roller Bearing  | 9 - Piston            | 16 - Valve Plate          | 22 - O-Ring                  |
| 3 - Retaining Ring  | 10 - Swash Plate      | 17 - Knock Pin (2 Used)   | 23 - Brake Piston            |
| 4 - Oil Seal        | 11 - Plunger (9 Used) | 18 - Socket Bolt (9 Used) | 24 - O-Ring                  |
| 5 - O-Ring          | 12 - Retainer         | 19 - Brake Valve          | 25 - Friction Plate (4 Used) |
| 6 - O-Ring (2 Used) | 13 - Bushing          | 20 - Needle Bearing       | 26 - Plate (4 Used)          |
| 7 - Housing         | 14 - Spring (6 Used)  |                           |                              |



## UNDERCARRIAGE / Travel Device

### Assemble Travel Motor

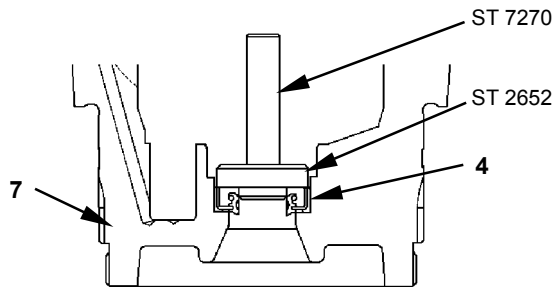
(ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)

**CAUTION:** Housing (7) weight: 50 kg (110 lb)

1. Hoist and place housing (7) with the brake valve (19) mounting surface facing upward.

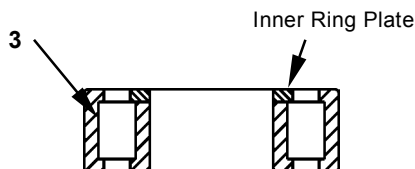
**IMPORTANT:** Apply OCEAN grease #7 to the inner surface of oil seal (4) and apply THREEBOND #1104 or #1215 to the outer surface of oil seal (4).

2. Clean the oil seal (4) mating part of housing (7). Tap and install oil seal (4) into housing (7) by using special tools (ST 2652, ST 7270) and a plastic hammer.



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3. Install the inner ring plate to roller bearing (2) with the stamped mark facing outside.



W178-02-11-221

4. Tap and install roller bearing (2) to shaft (1) from the large diameter side of shaft (1) by using special tool (ST 2654) and a hammer.

5. Install retaining ring (3) to shaft (1).

6. Install piston (9) to housing (7) with the stepped side facing inside.

**IMPORTANT:** The small diameter side of shaft (1) is matched with the inner race on needle bearing (20). Do not damage the inner race.

7. Tap and install shaft (1) into housing (7) by using a plastic hammer.

**NOTE:** Shaft (1) can be inserted without tapping when aligning them correctly.

8. Install balls (8) (2 used) to housing (7).

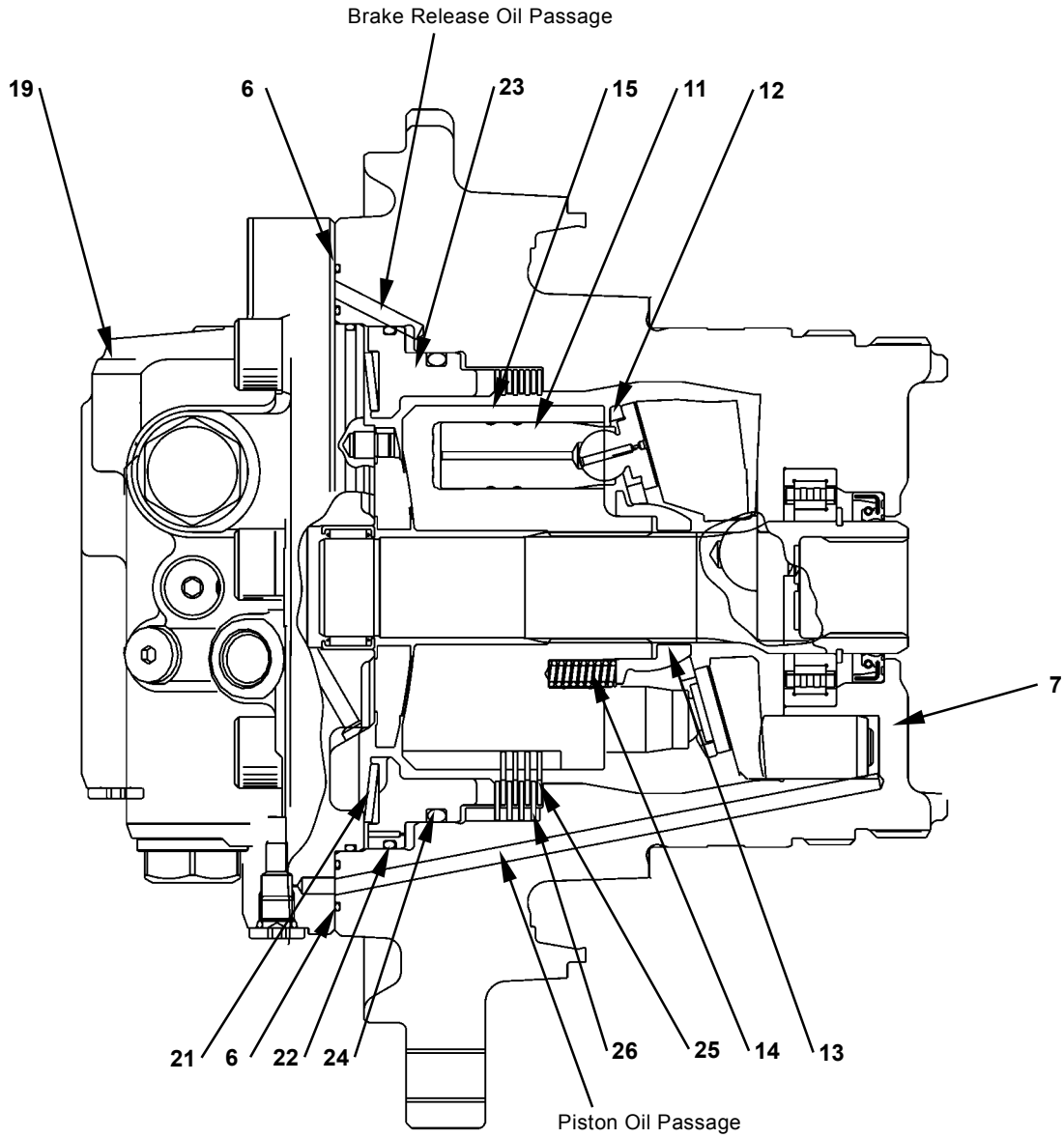
9. Apply grease to the ball (8) hole on swash plate (10). Align the positions of balls (8) (2 used) and install swash plate (10) to housing (7).

**CAUTION:** Housing (7) weight: 50 kg (110 lb)

10. Hoist and place housing (7) horizontally with the brake releasing oil passage facing downward.

**NOTE:** If the brake releasing oil passage faces upward, swash plate (10) may come off.

# UNDERCARRIAGE / Travel Device

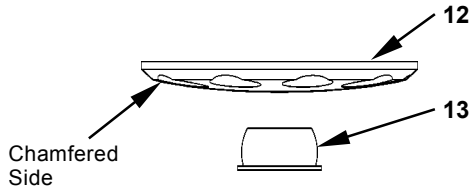


W178-03-02-029

## UNDERCARRIAGE / Travel Device

**IMPORTANT:** Face the chamfered side of retainer (12) to the bushing (13) side.

11. Install springs (14) (6 used), bushing (13), retainer (12) and plungers (11) (9 used) to rotor (15) in this order.



W178-02-11-225

12. Install the rotor (15) assembly to housing (7).



**CAUTION:** Housing (7) weight: 50 kg (110 lb)

13. Hoist and place housing (7) with the brake valve (19) mounting surface facing upward.

**IMPORTANT:** Check the order to install friction plate (25) and plate (26).

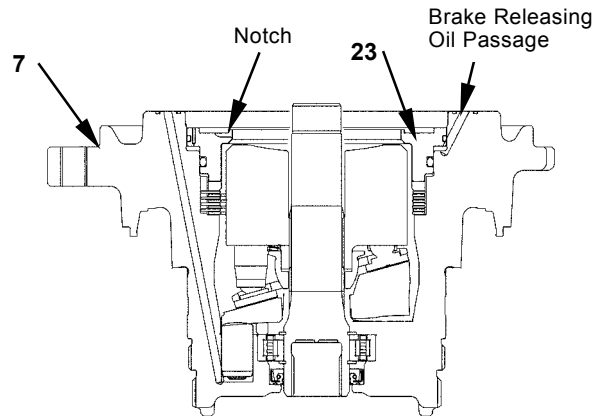
14. Install friction plates (25) (4 used) and plates (26) (4 used) to housing (7) alternately. Install friction plate (25) first.
15. Apply grease to O-rings (22, 24). Install O-rings (22, 24) to brake piston (23).

**IMPORTANT:** As the upper surface of brake piston (23) is the seat surface of high-pressure oil, do not damage the seat surface.

**IMPORTANT:** Install brake piston (23) so that the notch on disc spring (21) mounting surface is located opposite the brake releasing oil passage.

16. Tap brake piston (23) into housing (7) by using special tools (ST 7272, ST 7273) and a hammer.

**NOTE:** As O-ring (22) is positioned around brake piston (23), brake piston (23) cannot be fully inserted. When installing brake valve (19), tighten brake piston (23) by using the bolt.



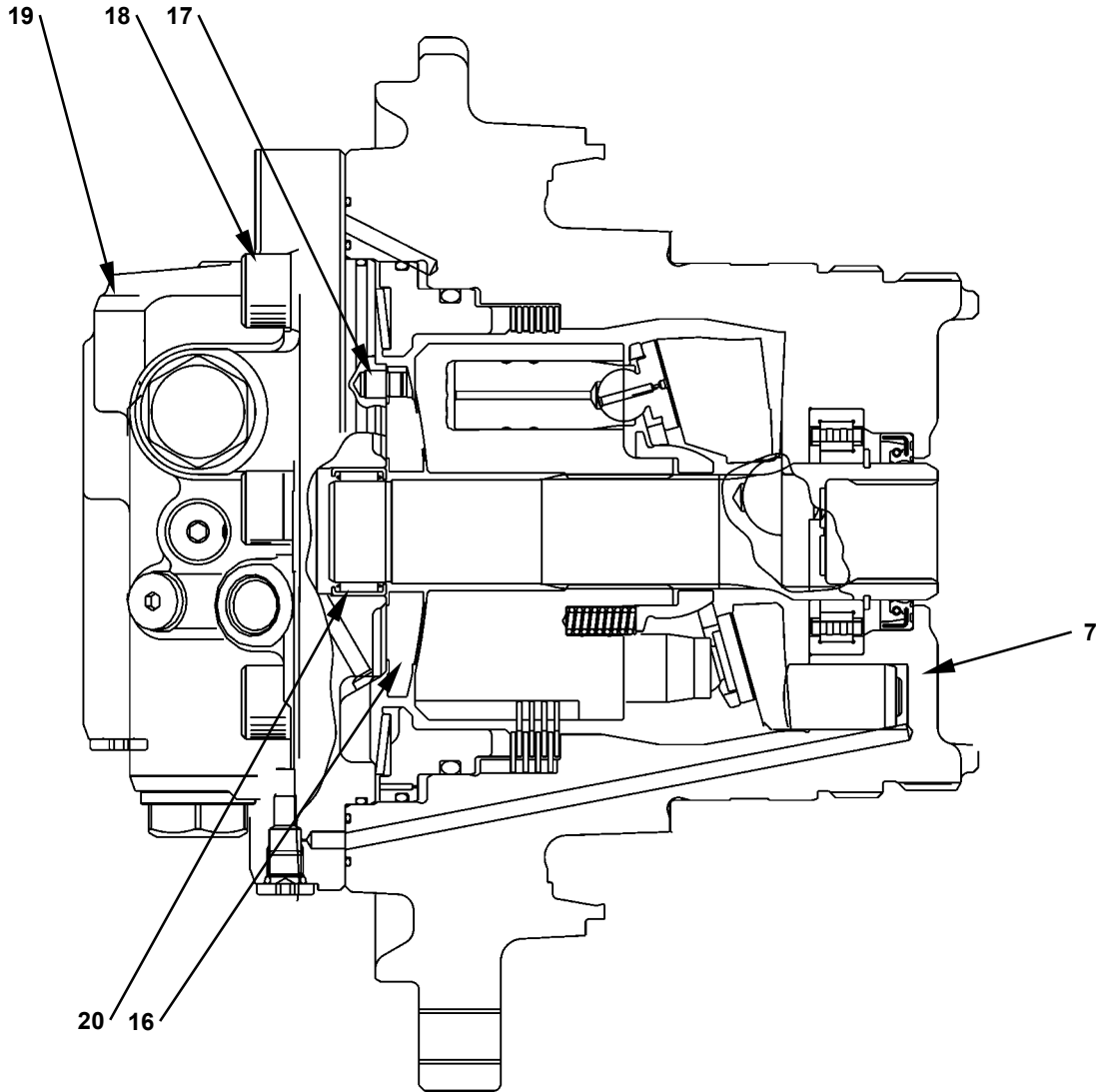
W1V1-03-02-004

**IMPORTANT:** Check the direction to install disc spring (21).

17. Place disc spring (21) on brake piston (23) with the inner diameter facing to brake piston (23).
18. Install O-rings (6) (2 used) to housing (7).
19. Add hydraulic oil into housing (7) until plate (26) is submerged.

# UNDERCARRIAGE / Travel Device

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W178-03-02-029

## UNDERCARRIAGE / Travel Device

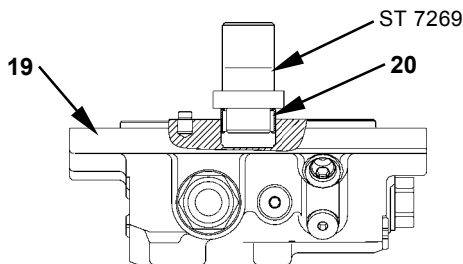
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**IMPORTANT: Check the direction to install knock pin (17).**

20. Install knock pins (17) (2 used) to brake valve (19).  
Insert the large diameter side of knock pin (17) into the pin hole on brake valve (19).


**IMPORTANT: Check the direction to install the outer race of needle bearing (20).**

21. Tap and install the outer race of needle bearing (20) to brake valve (19) by using special tool (ST 7269) and a hammer. Install the outer race of needle bearing (20) with the stamped mark facing outside.




W178-02-11-227


22. Apply grease onto the flat surface of valve plate (16). Install valve plate (16) to brake valve (19) while aligning the position of knock pins (17) (2 used).

 **NOTE:** Valve plate (16) is secured to brake valve (19) tightly in order not to drop brake valve (19) when turning over.

**IMPORTANT: Do not drop valve plate (16). If valve plate (16) is damaged, oil leakage will occur.**

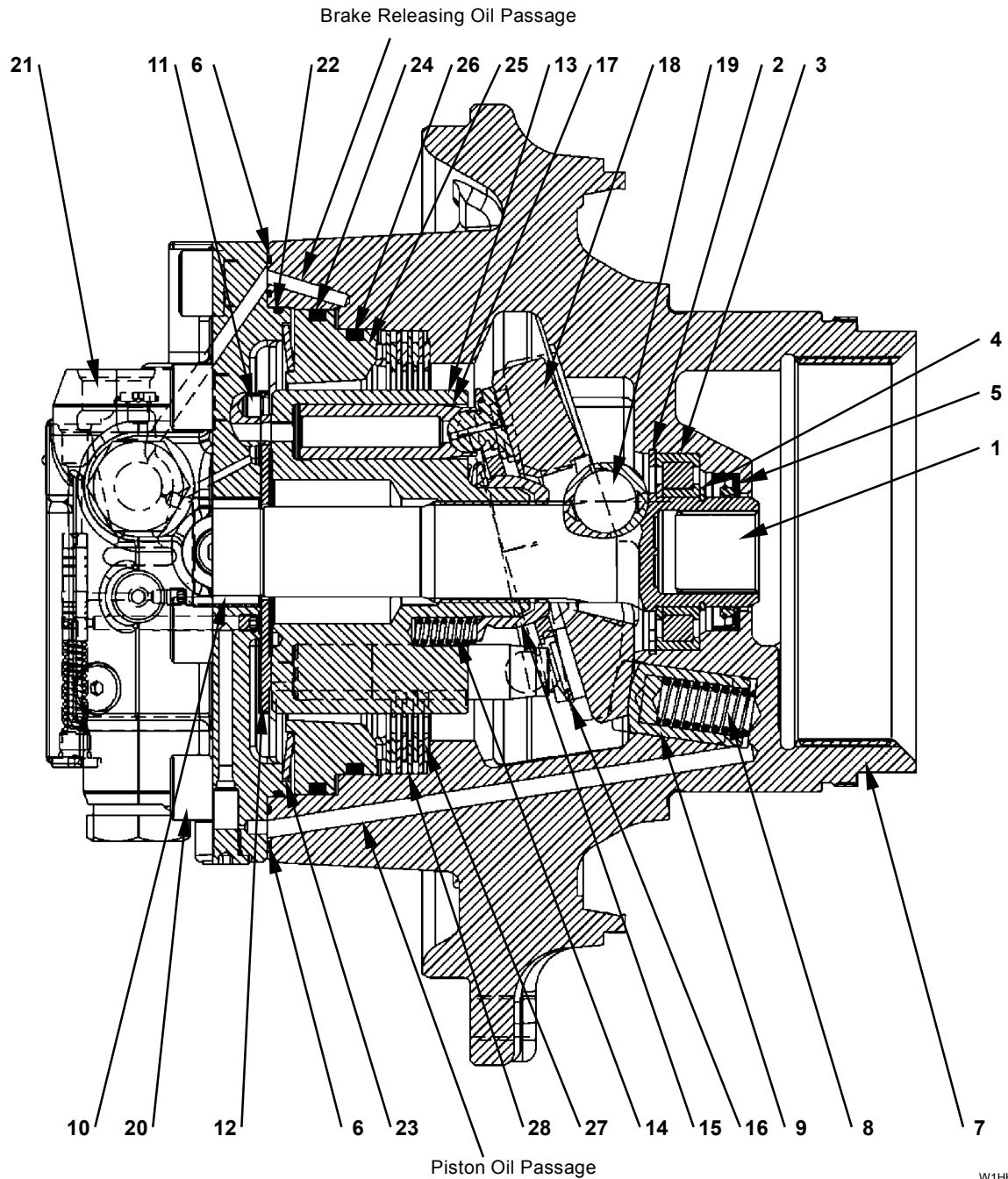
23. Install brake valve (19) to housing (7) with socket bolts (18) (9 used).

 : 14 mm

 : 300 N·m (31 kgf·m, 220 lbf·ft)

# UNDERCARRIAGE / Travel Device

## ASSEMBLE TRAVEL MOTOR ZX270-3 class



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

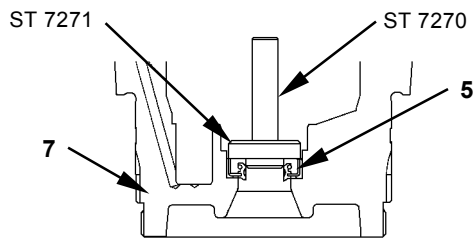
### Assemble Travel Motor (ZX270-3 class)

**CAUTION:** Housing (7) weight: 87 kg (190 lb)

1. Hoist and 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 (5).

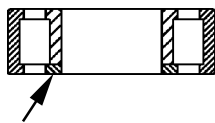
2. Clean the oil seal (5) mating part of housing (7). Install oil seal (5) to housing (7) by using special tools (ST 7270, ST 7271).



W176-03-02-007

**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 small diameter side in shaft (1).

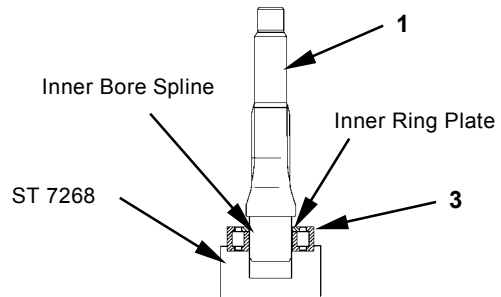


Marked Surface on  
Inner Ring Plate

W178-02-11-324

**IMPORTANT:** Check the direction to install roller bearing (3).

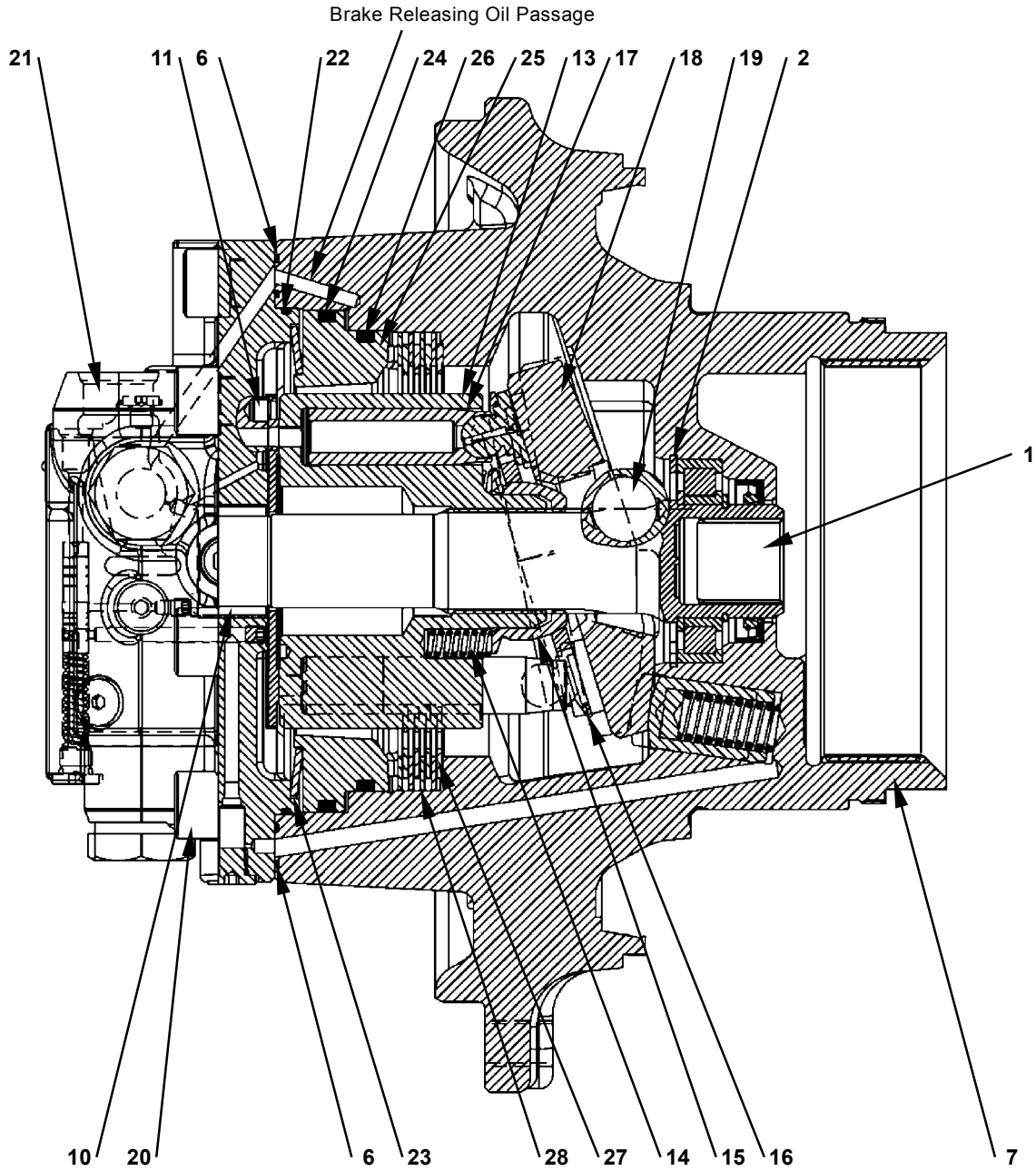
4. Insert the inner ring plate side of roller bearing (3) into the inner bore spline end of shaft (1) until roller bearing (3) comes into the tight fitting part. Do not damage the seal lip surface of shaft (1).
5. Insert the inner bore spline end of shaft (1) into special tool (ST 7268). Tap the opposite end of shaft (1) by using a plastic hammer and install roller bearing (3) to shaft (1).



W178-02-11-230

6. Install retaining ring (4) to shaft (1). Do not damage the sliding surface of oil seal (5).
7. Apply grease to the ball (19) surface sufficiently. Install balls (19) (2 used) to housing (7).
8. Install spring (8) and piston (9) to housing (7). Face piston (9) with the hole inside.

# 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. 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).
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).

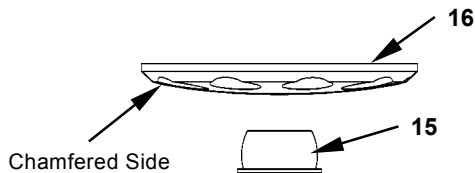
**CAUTION:** Housing (7) weight: 87 kg (190 lb)

12. Hoist and 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 (7) weight: 87 kg (190 lb)

15. Hoist and 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) alternately. Install friction plate (27) first.
17. Apply grease to O-rings (24, 26). Install O-rings (24, 26) to brake piston (25).
18. Evenly tap and install brake piston (25) into housing (7) by using a plastic hammer.

**NOTE:** As O-ring is positioned around brake piston (25), brake piston (25) cannot be fully inserted.

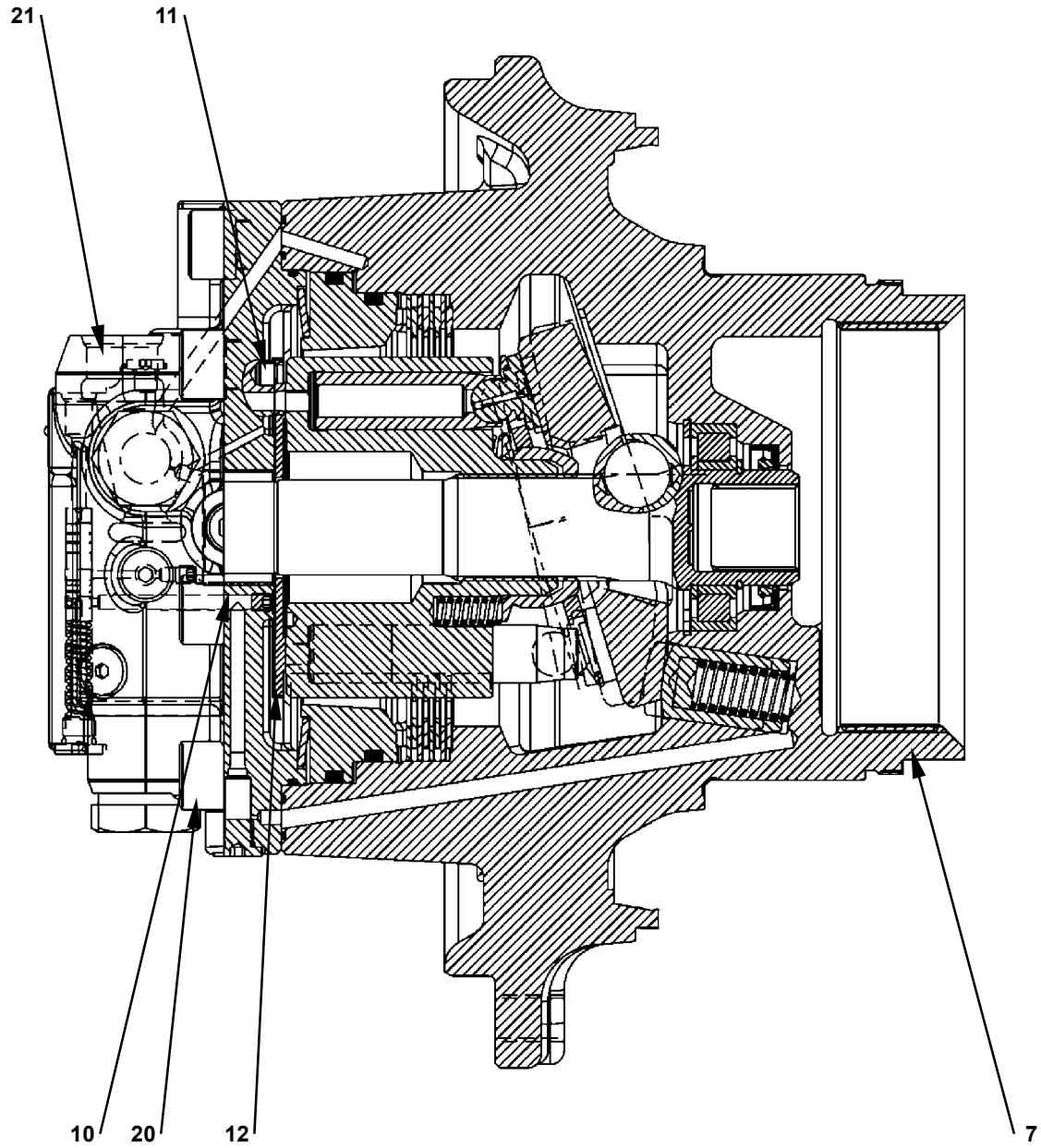
**IMPORTANT:** Check the direction to install disc spring (23).

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



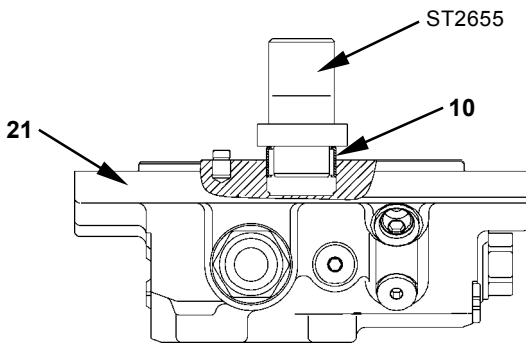
W1HH-03-02-006

## UNDERCARRIAGE / Travel Device

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**IMPORTANT:** Check the direction to install the outer race of needle bearing (10).

23. Tap and install the outer race of needle bearing (10) to brake valve (21) by using special tool (ST 2655) 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).

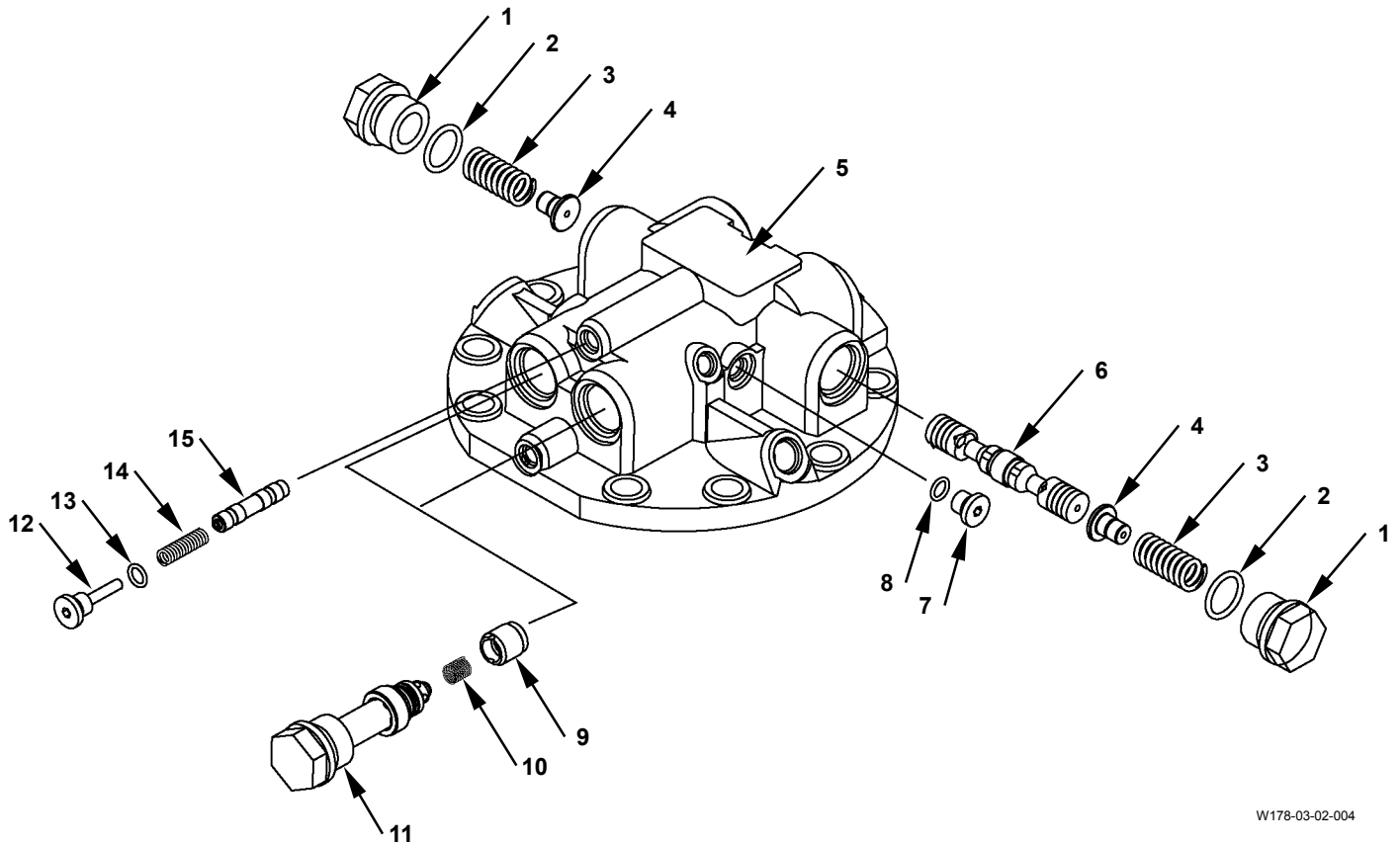
 : 17 mm

 : 400 N·m (41 kgf·m, 295 lbf·ft)

## UNDERCARRIAGE / Travel Device

### DISASSEMBLE BRAKE VALVE

ZX200-3 class, 225USR-3 class, 225US-3 class,  
240-3 class







W178-03-02-004

- |                      |                   |                            |             |
|----------------------|-------------------|----------------------------|-------------|
| 1 - Plug (2 Used)    | 5 - Valve Housing | 9 - Poppet (2 Used)        | 13 - O-Ring |
| 2 - O-Ring (2 Used)  | 6 - Spool         | 10 - Spring (2 Used)       | 14 - Spring |
| 3 - Spring (2 Used)  | 7 - Plug          | 11 - Relief Valve (2 Used) | 15 - Spool  |
| 4 - Stopper (2 Used) | 8 - O-Ring        | 12 - Plug                  |             |

## UNDERCARRIAGE / Travel Device

### Disassemble Brake Valve


(ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)

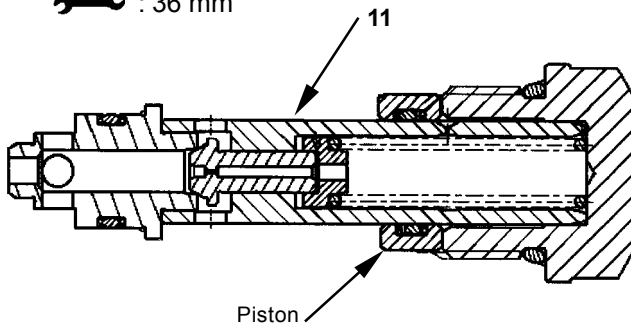
1. Remove plug (1) from valve housing (5). (2 places)  
 : 36 mm
2. Remove spring (3) and stopper (4) from valve housing (5) by using a magnet. (2 places)
3. Remove spool (6) from valve housing (5) by using a magnet.
4. Remove plug (7) from valve housing (5).  
Plug (7) inserted into the hole has been applied by using LOCTITE. Do not remove plug (7) unless necessary.  
 : 6 mm
5. Remove relief valves (11) (2 used) from valve housing (5).  
 : 36 mm
6. Remove spring (10) and poppet (9) from valve housing (5) by using a magnet. (2 places)
7. Remove plug (12) from valve housing (5).  
 : 6 mm
8. Remove spring (14) and spool (15) from valve housing (5) by using a magnet.

**IMPORTANT: Do not disassemble relief valve (11). When the relief valve is disassembled, the set pressure is changed.**

**IMPORTANT: Do not move the piston installed to the outer surface of relief valve (11). O-ring may be damaged by the hole on cartridge.**

5. Remove relief valves (11) (2 used) from valve housing (5).

 : 36 mm

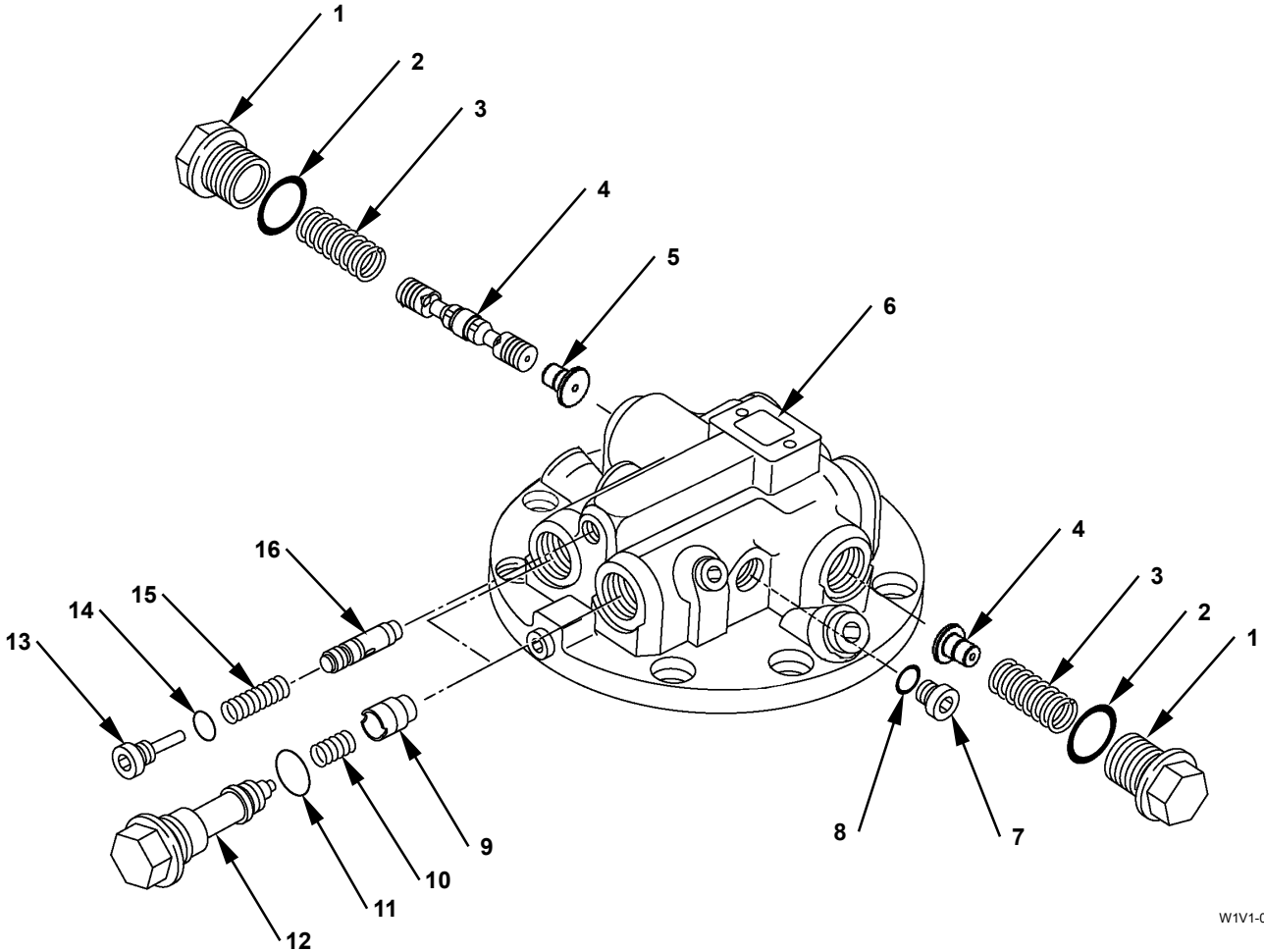


W1V1-03-02-008

# UNDERCARRIAGE / Travel Device

## DISASSEMBLE BRAKE VALVE

ZX270-3 class






W1V1-03-02-006

- |                      |                   |                            |             |
|----------------------|-------------------|----------------------------|-------------|
| 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

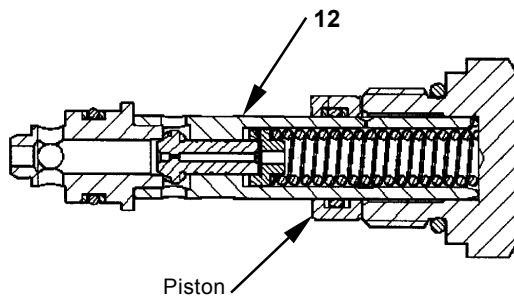
### Disassemble Brake Valve (ZX270-3 class)

1. Remove plugs (1) (2 used) from valve housing (6).  
 : 41 mm
2. Remove springs (3) (2 used) and stoppers (4) (2 used) from valve housing (6) by using a magnet.
3. Remove spool (5) from valve housing (6) by using a magnet.
4. Remove plug (7) from valve housing (6).  
Plug (7) inserted into the hole has been applied by using LOCTITE. Do not remove plug (7) unless necessary.  
 : 6 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

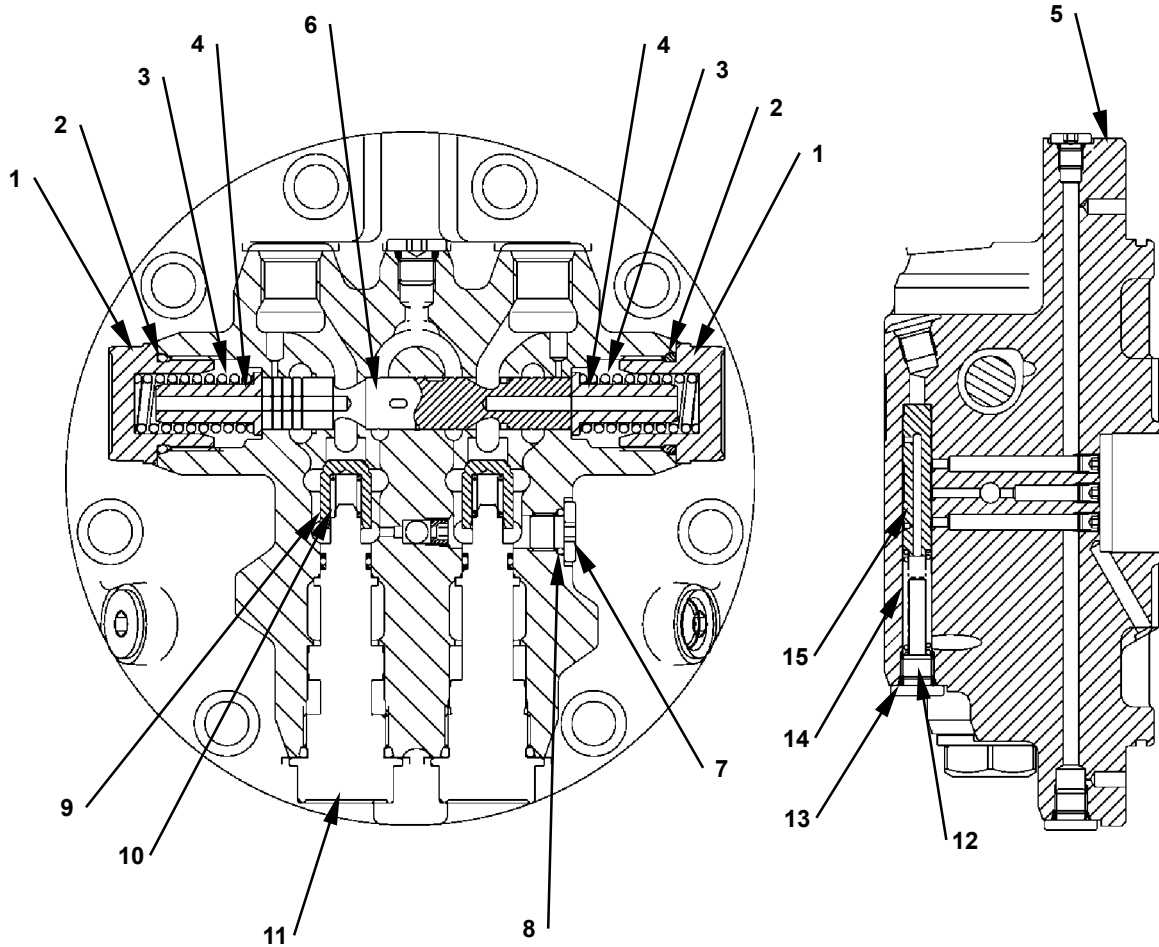


W1V1-03-02-007

# UNDERCARRIAGE / Travel Device

## ASSEMBLE BRAKE VALVE

ZX200-3 class, 225USR-3 class, 225US-3 class,  
240-3 class



W178-02-11-234

- |                      |                   |                            |             |
|----------------------|-------------------|----------------------------|-------------|
| 1 - Plug (2 Used)    | 5 - Valve Housing | 9 - Poppet (2 Used)        | 13 - O-Ring |
| 2 - O-Ring (2 Used)  | 6 - Spool         | 10 - Spring (2 Used)       | 14 - Spring |
| 3 - Spring (2 Used)  | 7 - Plug          | 11 - Relief Valve (2 Used) | 15 - Spool  |
| 4 - Stopper (2 Used) | 8 - O-Ring        | 12 - Plug                  |             |




## UNDERCARRIAGE / Travel Device

---



### Disassemble Brake Valve



(ZX200-3 class, 225USR-3 class, 225US-3 class, 240-3 class)

1. Insert spool (6) approximately half way into valve housing (5).
2. Install O-ring (2), spring (3) and stopper (4) to plug (1) at one side. Install the plug (1) assembly to valve housing (5). Install plug (1) into valve housing (5) with a thread left out.


 **NOTE:** If plug (1) is fully installed, it is difficult to install plug (1) to other side as spool (6) is pushed.

3. Install O-ring (2), spring (3) and stopper (4) to plug (1) at other side. Install the plug (1) assembly to valve housing (5). Tighten plug (1) by hand.

4. Tighten plug (1) on both sides by using a spanner.  
 : 36 mm  
 : 450 N·m (46 kgf·m, 330 lbf·ft)


5. Install O-ring (8) to plug (7). Install plug (7) to valve housing (5).  
 : 6 mm  
 : 35 N·m (3.6 kgf·m, 26 lbf·ft)

6. Install springs (10) (2 used) to poppets (9) (2 used). Install poppets (9) (2 used) in the hole of valve housing (5) completely.

 **NOTE:** If poppet (9) is installed into the farthest end, spring (10) may come off on the way.

7. Install relief valves (11) (2 used) to valve housing (5) while pushing poppet (9).

 : 36 mm


 : 450 N·m (46 kgf·m, 330 lbf·ft)


**IMPORTANT: Check the direction to install spool (15).**

8. Install spool (15) to valve housing (5) with the hole end facing to the front.

9. Insert spring (14) into valve housing (5).

10. Install O-ring (13) to plug (12). Install plug (12) to valve housing (5).

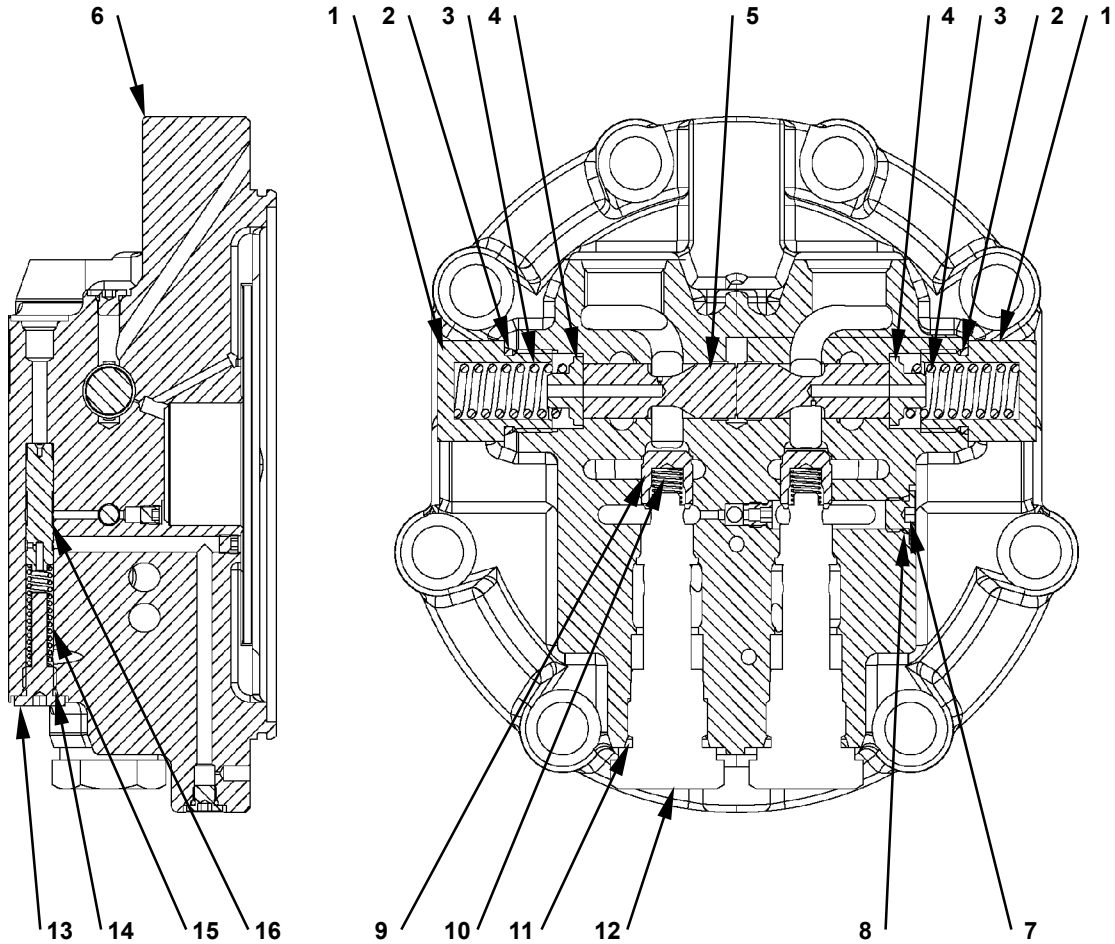
 : 6 mm

 : 35 N·m (3.6 kgf·m, 26 lbf·ft)

# UNDERCARRIAGE / Travel Device

## ASSEMBLE BRAKE VALVE

ZX270-3 class



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


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### Assemble Brake Valve (ZX270-3 class)

1. Install spool (5) approximately half way into valve housing (6).
2. Install O-ring (2), spring (3) and stopper (4) to plug (1) at one side. Install the plug (1) assembly to valve housing (6). Install plug (1) into valve housing (6) with a thread left out.



 **NOTE:** If plug (1) is fully installed, it is difficult to install plug (1) to other side as spool (5) is pushed.

3. Install O-ring (2), spring (3) and stopper (4) 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  
 : 350 N·m (36 kgf·m, 260 lbf·ft)
5. Install O-ring (8) to plug (7). Install plug (7) to valve housing (6).  
 : 6 mm  
 : 35 N·m (3.6 kgf·m, 26 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.

 **NOTE:** If poppet (9) is installed into the farthest end, spring (10) may come off on the way.

7. Install O-rings (11) (2 used) to relief valves (12) (2 used).
8. Install relief valves (12) (2 used) to valve housing (6) while pushing poppet (9).  
 : 41 mm  
 : 450 N·m (50 kgf·m, 330 lbf·ft)

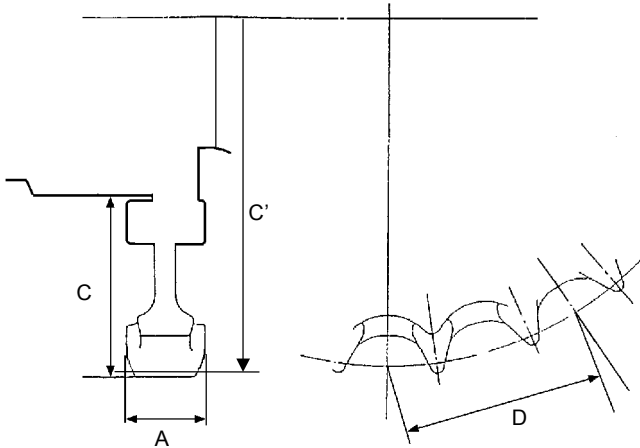
### **IMPORTANT:** Check the direction to install spool (16).

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  
 : 35 N·m (3.6 kgf·m, 26 lbf·ft)

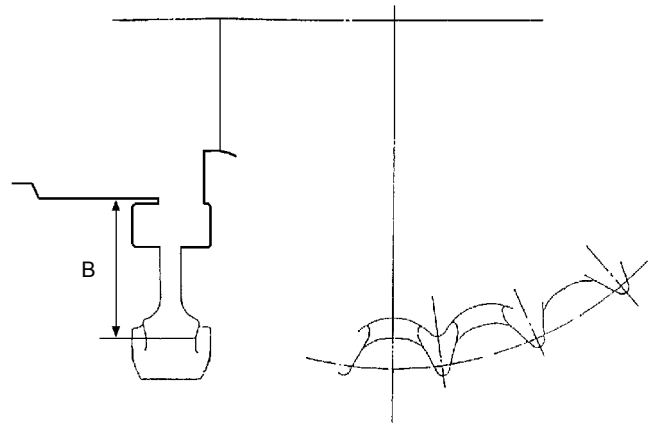
# UNDERCARRIAGE / Travel Device

## MAINTENANCE STANDARD

### Sprocket



W178-02-11-235



W178-02-11-236

ZX200-3 class, 225USR-3 class, 225US-3 class

Unit: mm (in)

	Standard	Allowable Limit	
A	70 (2.8)	[62 (2.4)]	Build-up weld and finishing
B	80.3 (3.2)	75.3 (3.0)	
C	119.7 (4.7)	114.7 (4.5)	
C'	644.6 (25.4)	-	
D	190.0 (7.5)	-	

ZX270-3 class

Unit: mm (in)

	Standard	Allowable Limit	
A	87 (3.4)	[77 (3.0)]	Build-up weld and finishing
B	89.15 (3.5)	84.15 (3.3)	
C	133.55 (5.3)	128.55 (5.1)	
C'	732.5 (28.9)	-	
D	216.0 (8.5)	-	

ZX240-3 class

Unit: mm (in)

	Standard	Allowable Limit	
A	70 (2.8)	[62 (2.4)]	Build-up weld and finishing
B	74.3 (2.9)	69.3 (2.7)	
C	113.7 (4.5)	108.7 (4.3)	
C'	644.6 (25.4)	-	
D	190.0 (7.5)	-	

NOTE: Values in [ ] are just for reference.

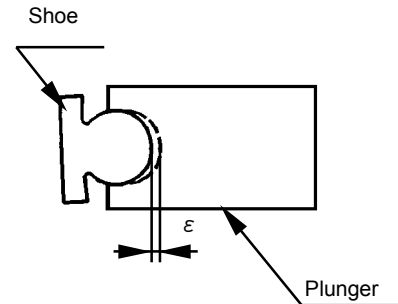
## UNDERCARRIAGE / Travel Device

### Travel Motor

#### 1. Clearance between plunger and shoe bottom

Standard	Allowable Limit
0	0.5 mm (0.020 in)

$$\epsilon \leq 0.2 \text{ mm}$$

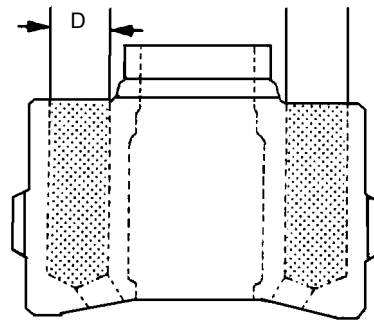


W1V1-03-02-005

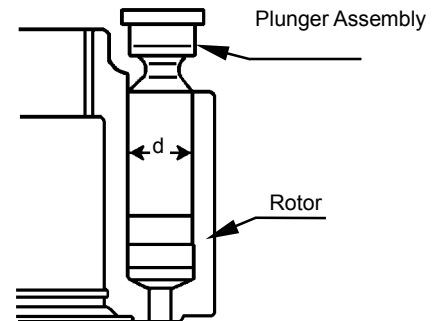
#### 2. Clearance between plunger outer diameter and rotor inner bore

Standard	Allowable Limit
0	0.08 mm (0.003 in)

$$D - d \leq 0.08 \text{ mm}$$



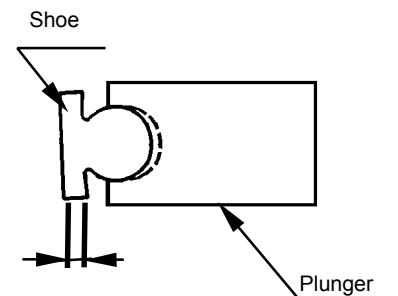
W105-02-06-134



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

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(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.


ZX200-3 class, 225US-3 class, 225USR-3 class  
240-3 class

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

ZX270-3 class


 : 17mm, 27mm, 41 mm

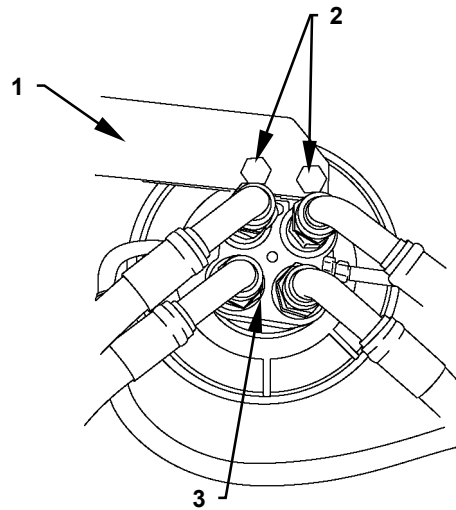
2. Remove bolts (2) (2 used) from lock plate (1).  
Remove lock plate (1) from center joint (3).

 : 22 mm

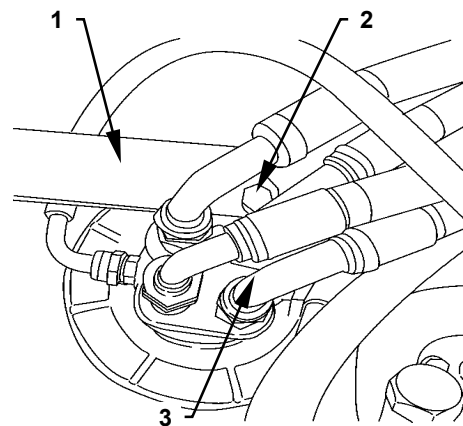
 **CAUTION:** Center joint (3) weight: 26.5 kg (58 lb)

3. Install eyebolt into the bolt (2) hole. Attach a wire rope to eyebolt and hold center joint (3).  
Remove bolts (4) (4 used) from center joint (3).  
Slowly lower and remove center joint (3) from the track frame.

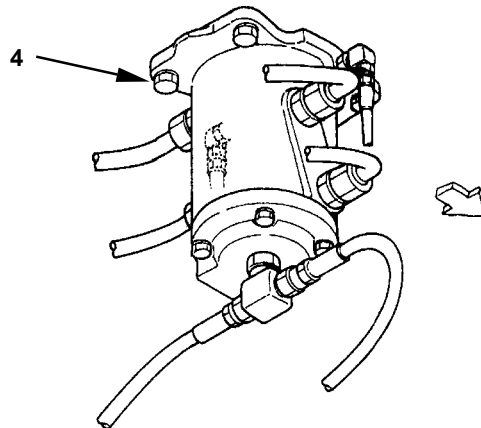
 : 19 mm



ZX200-3 class, 240-3 class, 270-3 class W1V1-03-03-001



ZX225US-3 class, 225USR-3 class W1V1-03-03-002



W178-02-11-238


# UNDERCARRIAGE / Center Joint


## Installation

**CAUTION:** Center joint (3) weight: 26.5 kg (58 lb)


1. Eyebolt (M 14, Pitch 2.0 mm) into the bolt (2) hole. Attach a wire rope to eyebolt. Hoist and hold the center joint (3) to the track frame position.


2. Install center joint (3) with bolts (4) (4 used).

 : 19 mm


 : 90 N·m (9.0 kgf·m, 66 lbf·ft)


3. Install lock plate (1) to center joint (3) with bolts (2) (2 used).


 : 22 mm


 : 140 N·m (14 kgf·m, 103 lbf·ft)


4. Install all hoses to center joint (3).


 : 17 mm


 : 25 N·m (2.5 kgf·m, 18 lbf·ft)


 : 19 mm

 : 30 N·m (3.0 kgf·m, 22 lbf·ft)


 : 27 mm


 : 95 N·m (9.5 kgf·m, 70 lbf·ft)

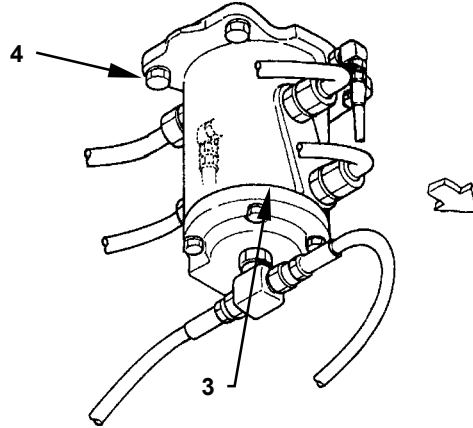
 : 36 mm

 : 180 N·m (18 kgf·m, 133 lbf·ft)

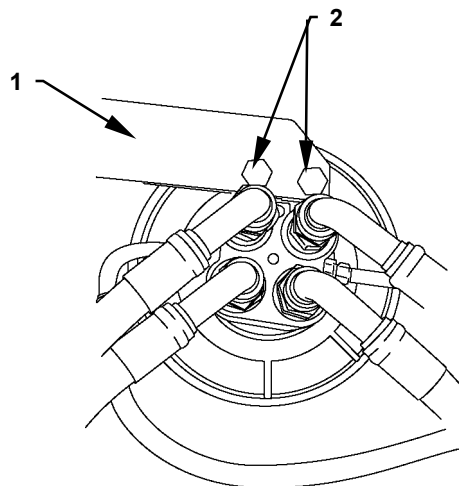
(ZX270-3 class only)

 : 41 mm

 : 210 N·m (21 kgf·m, 155 lbf·ft)

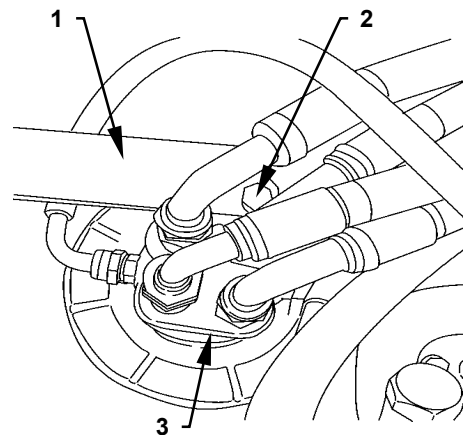


W178-02-11-238



W1V1-03-03-001

ZX200-3 class, 240-3 class, 270-3 class



ZX225US-3 class, 225USR-3 class

W1V1-03-03-002

**IMPORTANT:** After completing the work, start the engine and check for any oil leaks.



## **UNDERCARRIAGE / Center Joint**

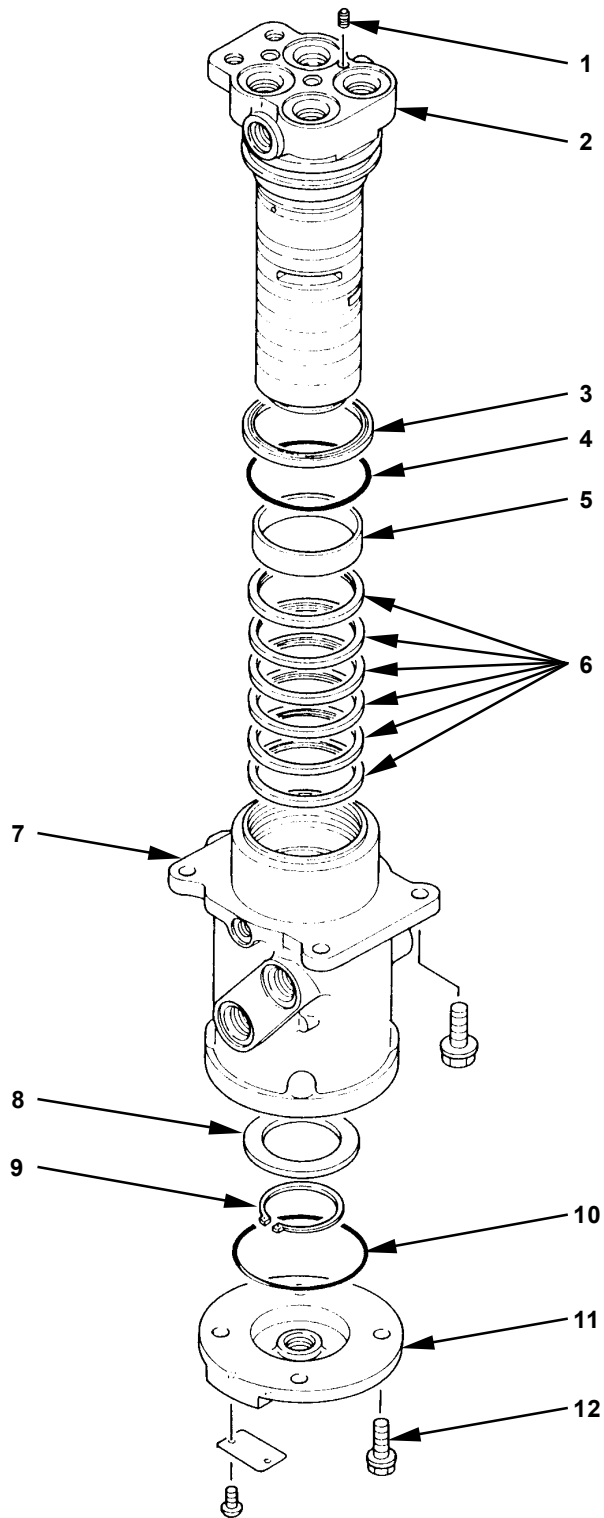
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# UNDERCARRIAGE / Center Joint

## 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 - Body  
8 - Ring  
9 - Retaining Ring

10 - O-Ring  
11 - Cover  
12 - Bolt (4 Used)

## UNDERCARRIAGE / Center Joint


### Disassemble Center Joint



**CAUTION:** Center joint weight: 26.5 kg (60 lb)


1. Install eyebolt (M10, Pitch 1.5 mm, Length 18 mm) to body (7). Hoist and place the center joint on a workbench.

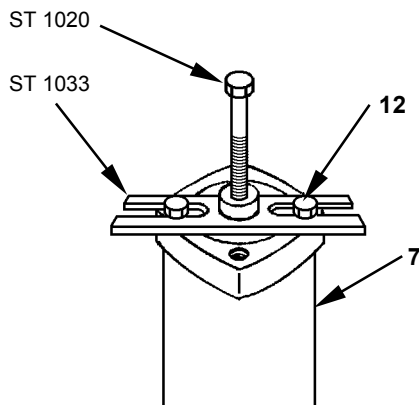
2. Put the matching marks on body (7) and spindle (2). Remove bolts (12). Remove cover (11) from body (7).

 : 17 mm

3. Remove O-ring (10), retaining ring (9) and ring (8) from body (7).

4. Install special tools (ST 1033, ST 1020) to body (7) with bolts (12) (2 used) on cover (11).

 : 17 mm



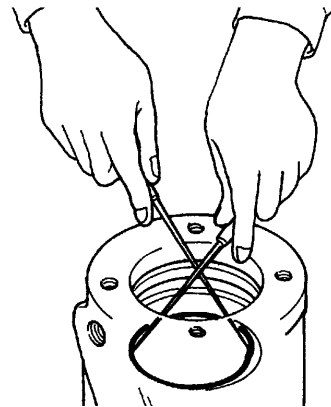
W506-03-03-002

**IMPORTANT:** Do not damage the seal sliding surface of spindle (2).

5. Remove spindle (2) from body (7).

**IMPORTANT:** For easy removal, use the pins (2 used) when removing oil seals (6). Do not damage the seal groove by the pins.

6. Remove oil seals (6) (6 used) and O-ring (4) from body (7).



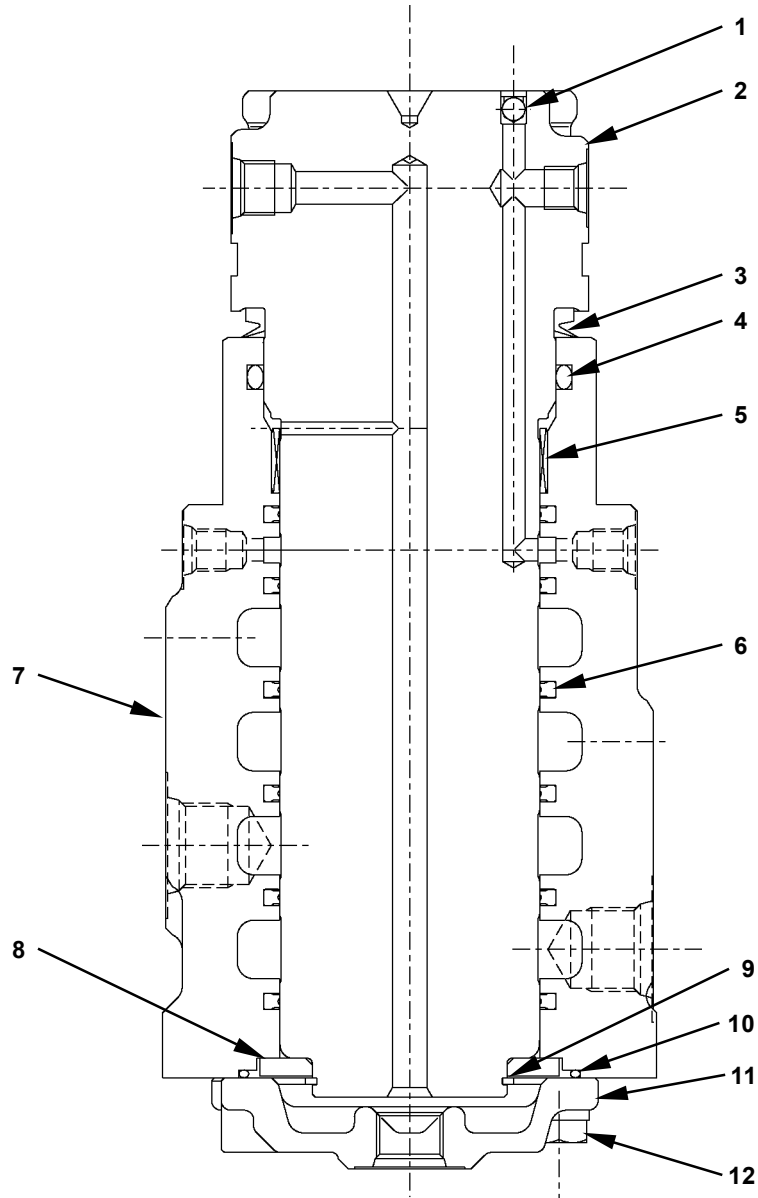
W105-03-03-015

**IMPORTANT:** While welding, cover the seal surface in order to prevent it from being spattered.

7. 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 - Body  
8 - Ring  
9 - Retaining Ring

10 - O-Ring  
11 - Cover  
12 - Bolt (4 Used)

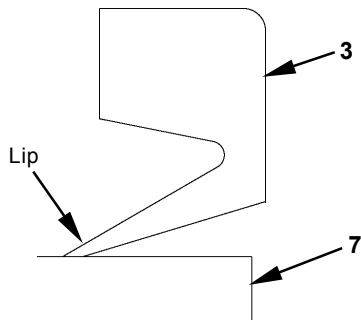
## UNDERCARRIAGE / Center Joint

### Assemble Center Joint

**IMPORTANT:** If bushing (5) is removed, install bushing (5) first. (Refer to page W3-3-8.)

**IMPORTANT:** Install dust seal (3) with its lip side facing to body (7).

1. Install dust seal (3) to spindle (2).

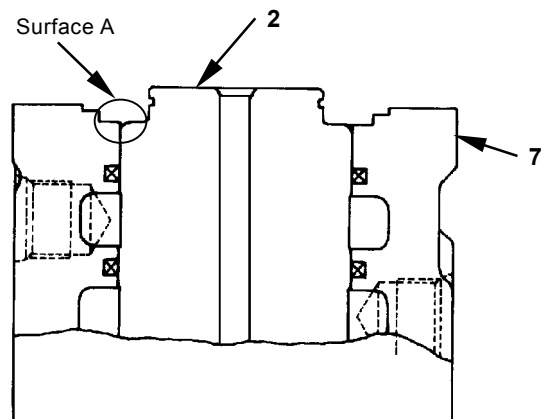


W178-03-03-002

2. Install oil seals (6) (6 used) and O-ring (4) to body (7).
3. Place spindle (2) on a workbench. Align the matching marks made when disassembling and install body (7) to spindle (2).

**IMPORTANT:** There is little clearance between body (7) and spindle (2). Install body (7) along axis of spindle (2) straightly.


If body (7) is rapidly pushed in, the seal may be damaged. Slowly push body (7). Install body (7) so that surface A (the ring (8) mounting position) is flat.




W800-03-03-002

**IMPORTANT:** Install ring (8) with the chamfered side facing to the spindle.

4. Install ring (8) and O-ring (10) to body (7).
5. Install retaining ring (9) to spindle (2).
6. Install cover (11) to body (7) with bolts (12) (4 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 36 lbf·ft)

## UNDERCARRIAGE / Center Joint

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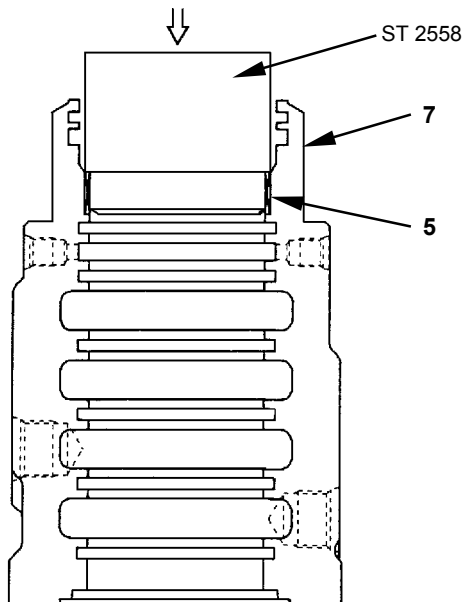
When replacing body (7) with the new one, the following procedures are required.

**IMPORTANT: When installing bushing (5) into body (7), grease or molybdenum disulfide shall be applied to the fitting surface.**

### In case of Body (7)

Install bushing (5) into body (7).

1. Clean body (7) and bushing (5).
2. Install bushing (5) into body (7) by using a press.  
Pushing force: 0.5 to 1.5 t (1100 to 3300 lb)  
Pushing tool: ST 2558



W178-02-11-242

## 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).

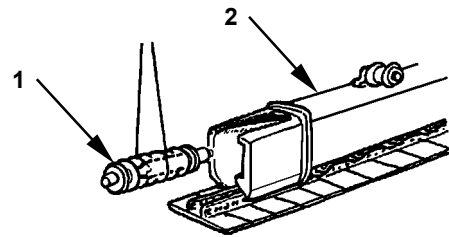
In this section, the procedure starts on the premise that the tracks and front idler have already been removed.

#### Removal

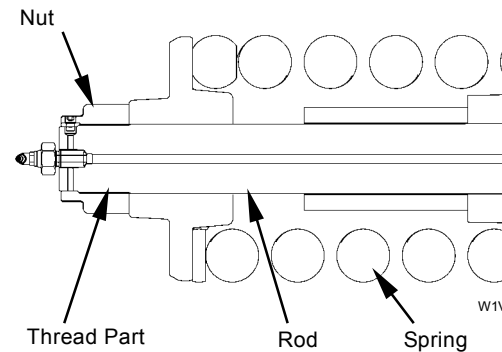
**CAUTION:** Track adjuster (1) weight:  
ZX200-3 class, 225US-3 class, 225USR-3 class: 125 kg (280 lb)  
ZX240-3 class: 135 kg (300 lb)  
ZX270-3 class: 185 kg (410 lb)

**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 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

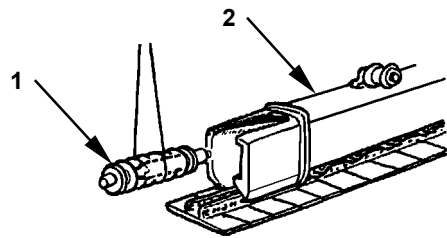
## UNDERCARRIAGE / Track Adjuster

### Installation

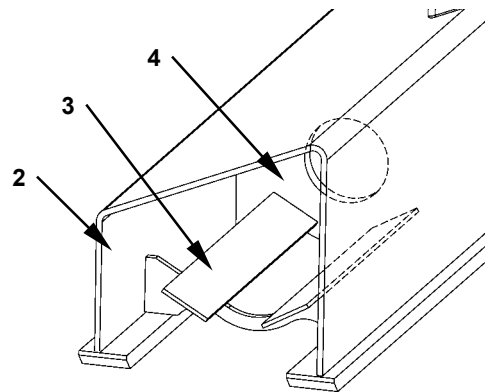


**CAUTION:** Track adjuster (1) weight:  
ZX200-3 class, 225US-3 class, 225USR-3  
class: 125 kg (280 lb)  
ZX240-3 class: 135 kg (300 lb)  
ZX270-3 class: 185 kg (410 lb)

1. Hoist track adjuster (1). Insert track adjuster (1) into spring guide (3) in track frame (2). At this time, check that the end of track adjuster (1) comes into contact with that of plate (4).
2. Install the front idler.  
Refer to "Remove and Install Front Idler" (W3-5-1).
3. Install the track.  
Refer to "Remove and Install Track" (3-7-1).



W157-03-04-003



W1V7-03-04-008



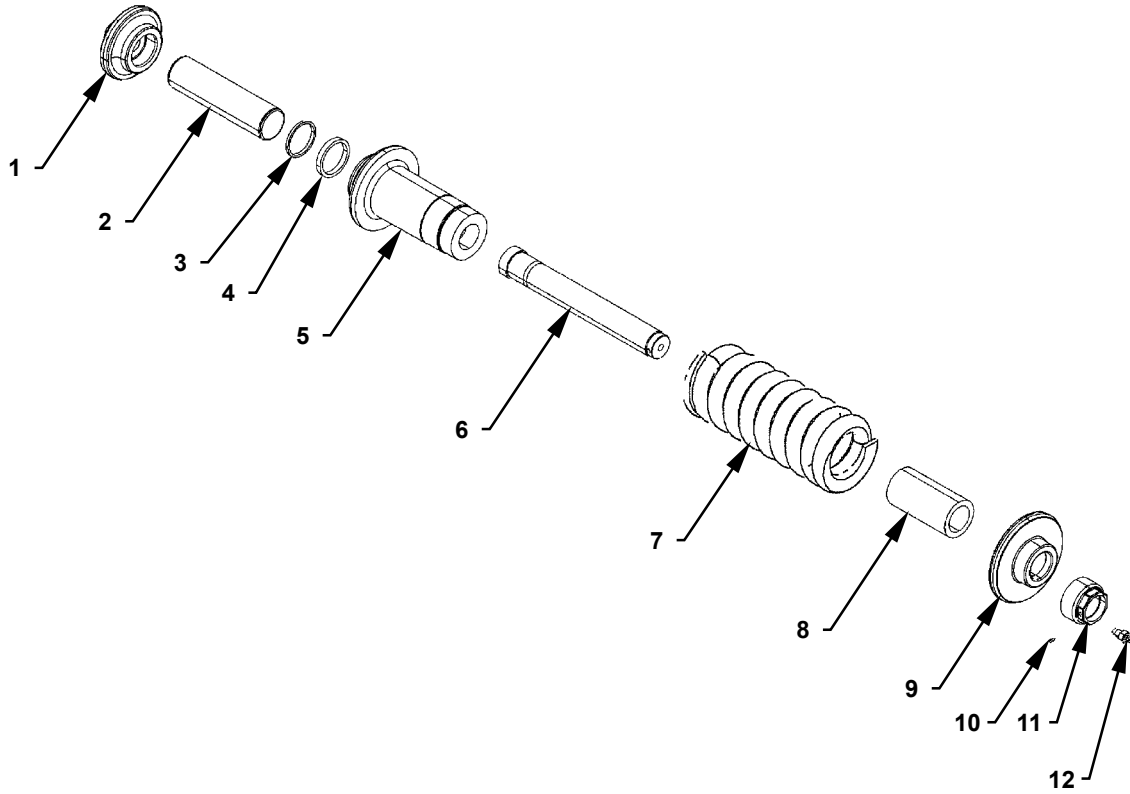
## UNDERCARRIAGE / Track Adjuster

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# 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

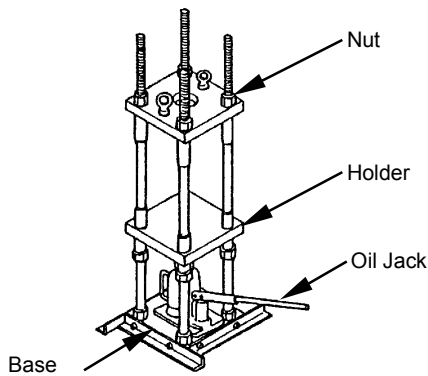
## Disassemble Track Adjuster

**IMPORTANT:** Use special tool (ST 4920) when assembling and disassembling the track adjuster.

**CAUTION:** As the spring force of track adjuster is extremely large, carry out the disassembly and assembly work carefully. Inspect the special tool for any damage thoroughly in order to perform the work safely.


**CAUTION:** Special tool (ST4920) weight: Approx. 225 kg (496 lb)

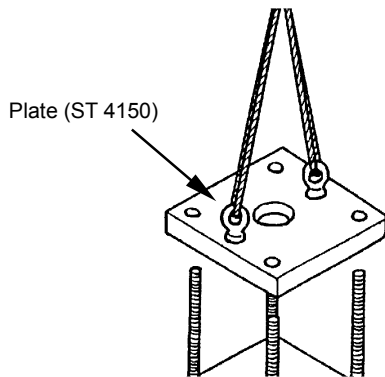
1. Place an oil jack (30 t) between the holder and base.



W105-03-04-006

2. Remove the nuts (4 used) from special tool (ST 4920). Attach a nylon sling onto eyebolt in plate (ST 4150). Hoist and remove plate (ST 4150).

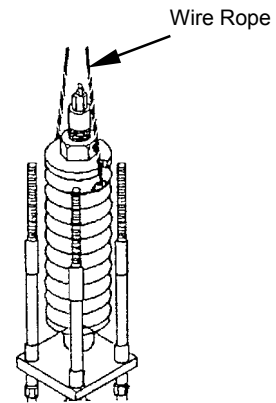
 : 46 mm



W105-03-04-007

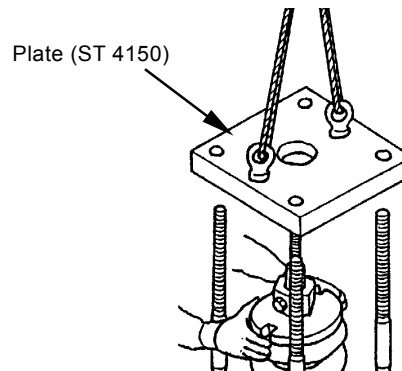
**CAUTION:** Track adjuster weight:  
ZX200-3 class, 225US-3 class, 225USR-3 class: 125 kg (280 lb)  
ZX240-3 class: 135 kg (300 lb)  
ZX270-3 class: 185 kg (410 lb)

3. Attach a wire rope onto the track adjuster as illustrated. Hoist and place the track adjuster onto the holder of special tool (ST 4920).



W105-03-04-009

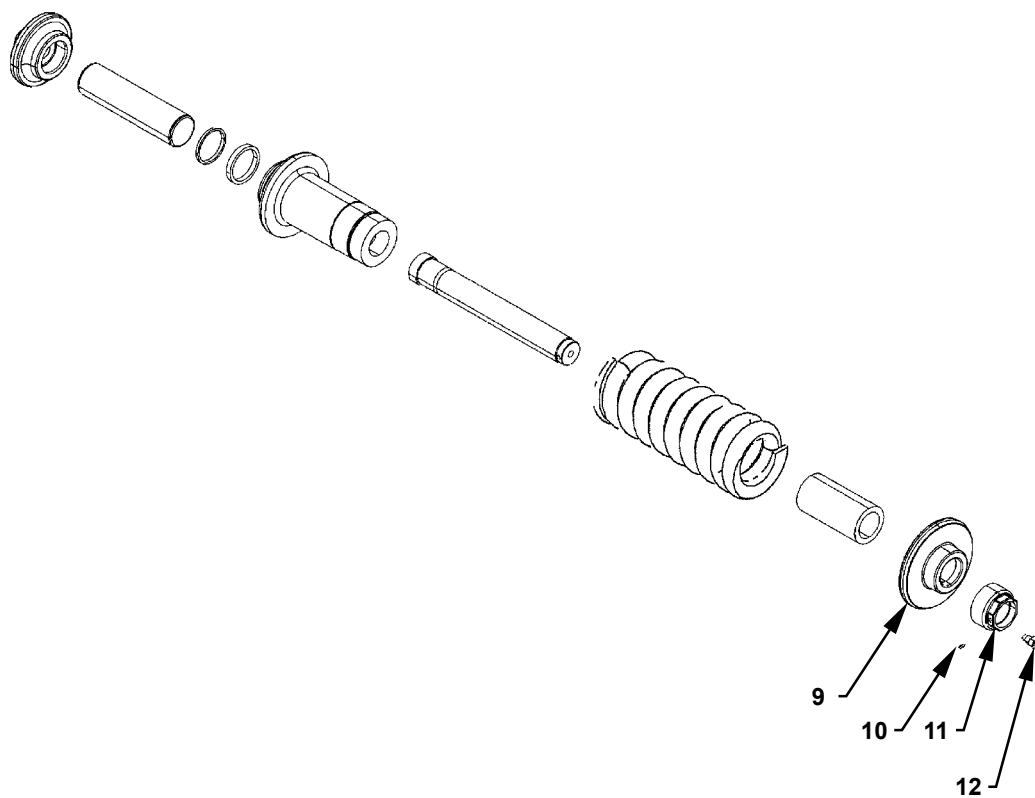
4. Install plate (ST 4150) on the track adjuster.



W105-03-04-011

# UNDERCARRIAGE / Track Adjuster

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W1V7-03-04-001

## UNDERCARRIAGE / Track Adjuster

**⚠ CAUTION:** As spring (7) is compressed, a strong force is applied. Check if the track adjuster assembly is installed correctly when jacked up.

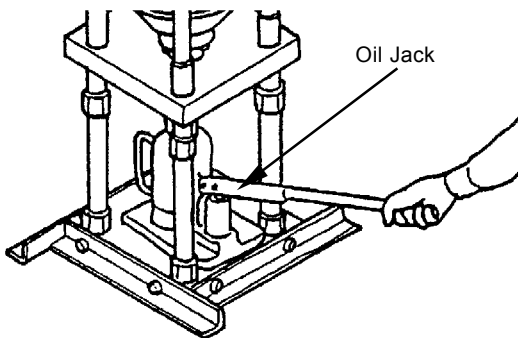
5. Operate an oil jack. Jack up until nut (11) comes out of the center hole on plate (ST 4150).

Spring (7) compressed length:

ZX200-3 class, 225US-3 class, 225USR-3 class:  
Spring free length 606 mm (23.9 in)–Spring set length 490 mm (19.3 in)–Spring compressed length 116 mm (4.6 in)

ZX240-3 class:  
Spring free length 641 mm (25.2 in)–Spring set length 525 mm (20.7 in)–Spring compressed length 116 mm (4.6 in)

ZX270-3 class:  
Spring free length 666.8 mm (26.3 in)–Spring set length 557 mm (21.9 in)–Spring compressed length 109.8 mm (4.3 in)

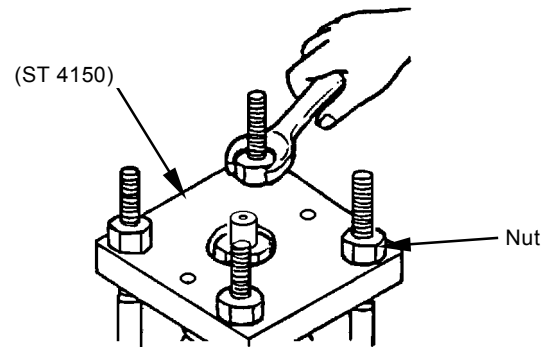


W105-03-04-013

6. Tighten the nut of special tool (ST 4920) and secure the track adjuster.

Operate the oil jack and compress the track adjuster until a clearance is observed between washer (9) and nut (11). (Approximately 10 mm (0.4 in))

: 46 mm



W105-03-04-012

7. Remove plug (10) from nut (11). Remove nut (11) and valve (12) from rod (6).

: 5 mm

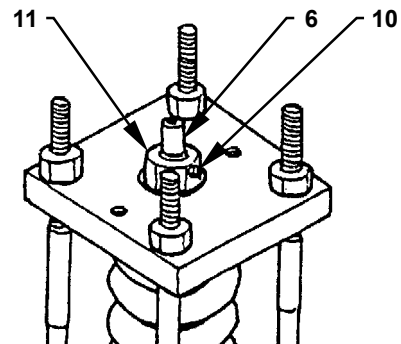
: 24 mm

ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class

: 75 mm

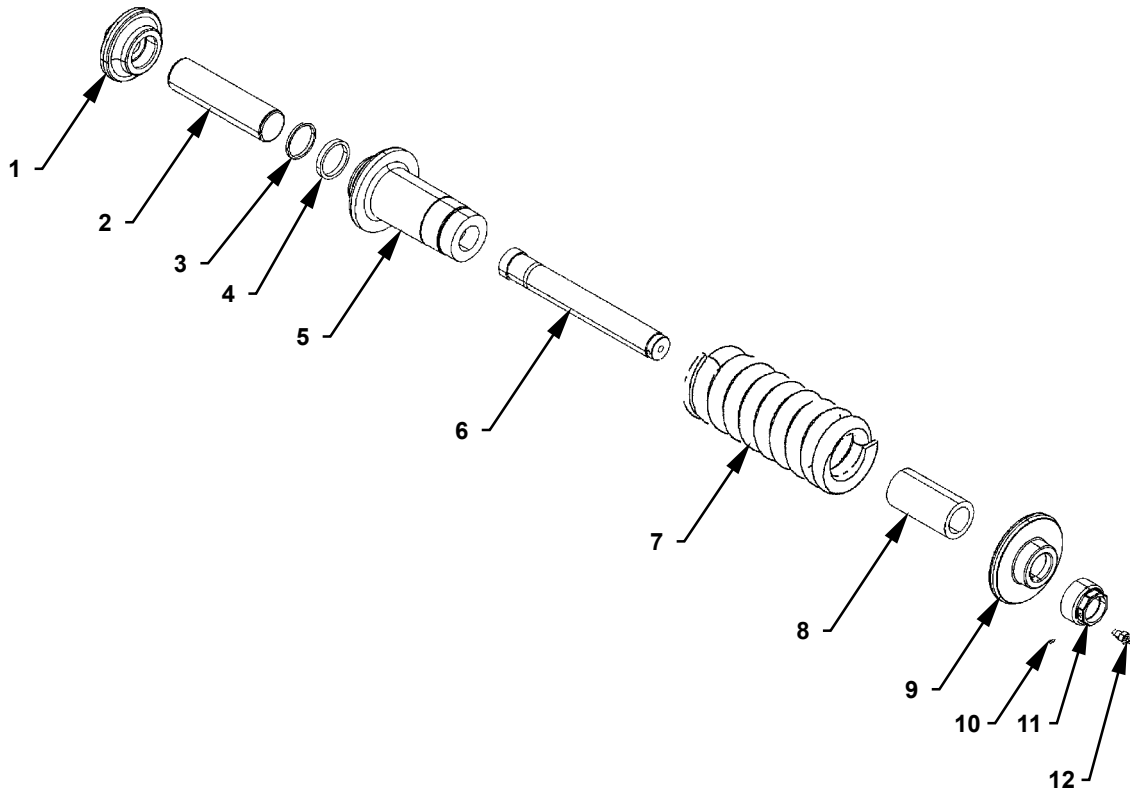
ZX270-3 class

: 85 mm



W105-03-04-014

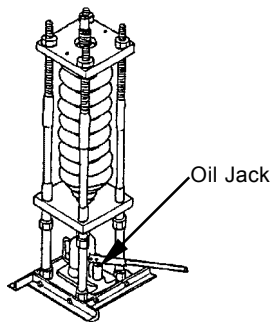
# UNDERCARRIAGE / Track Adjuster



W1V7-03-04-001

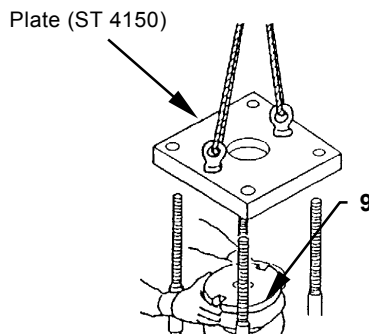
## UNDERCARRIAGE / Track Adjuster

8. Lower the oil jack.



W105-03-04-015

9. Remove the nut of special tool (ST 4920) and remove plate (ST 4150) and washer (9).



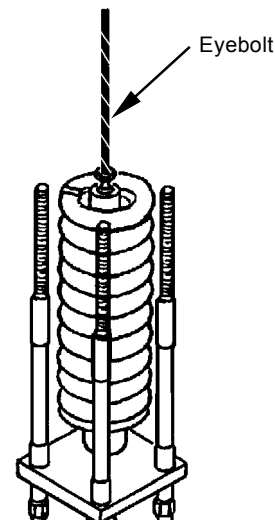
W105-03-04-016

**CAUTION:** The spring (7) assembly weight:  
ZX200-3 class, 225US-3 class, 225USR-3 class: 110 kg (240 lb)  
ZX240-3 class: 120 kg (265 lb)  
ZX270-3 class: 170 kg (375 lb)

10. Install eyebolt (M16, Pitch 1.5 mm) to rod (6). Hoist and remove the spring (7) assembly from special tool (ST 4920).

**CAUTION:** Spring (7) weight:  
ZX200-3 class, 225US-3 class, 225USR-3 class: 65 kg (145 lb)  
ZX240-3 class: 71 kg (160 lb)  
ZX270-3 class: 90 kg (200 lb)

11. Remove eyebolt. Remove spring (7) from the rod (6) assembly.



W105-03-04-017

12. Remove spacer (8) from rod (6).

**CAUTION:** Holder (1) is pushed into piston rod (2).

13. Remove piston rod (2) from cylinder (5).

14. Remove holder (1) from piston rod (2) by using a press.

**CAUTION:** Rod (6) is installed into cylinder (5).

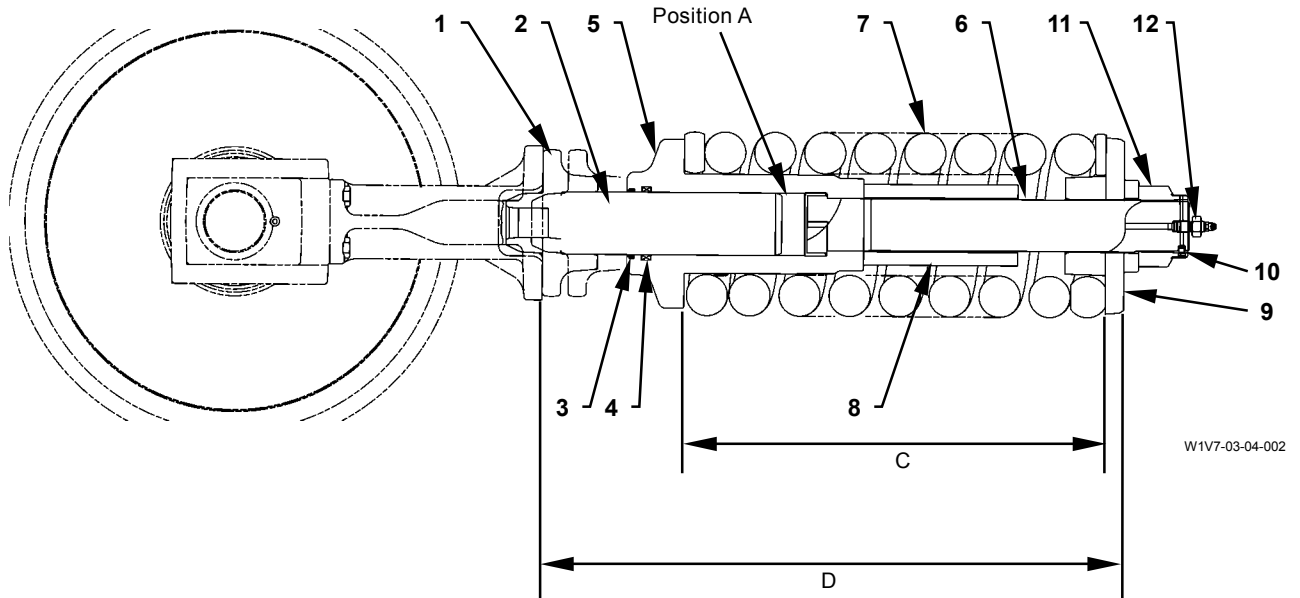
15. Remove rod (6) from cylinder (5).

**IMPORTANT:** Do not damage dust seal (3) and U-ring (4).

16. Remove dust seal (3) and U-ring (4) from cylinder (5).

# UNDERCARRIAGE / Track Adjuster

## ASSEMBLE TRACK ADJUSTER



- |                |              |            |            |
|----------------|--------------|------------|------------|
| 1 - Holder     | 4 - U-Ring   | 7 - Spring | 10 - Plug  |
| 2 - Piston Rod | 5 - Cylinder | 8 - Spacer | 11 - Nut   |
| 3 - Dust Seal  | 6 - Rod      | 9 - Washer | 12 - Valve |

Unit: mm (in)

	ZX200-3 class, ZX225US-3 class, ZX225USR-3 class	ZX240-3 class	ZX270-3 class
C	490 (19.3) [Free Length 606 (23.9)]	525 (20.7) [Free Length 641 (25.2)]	557 (21.9) [Free Length 666.8 (26.3)]
D	673 (26.5)	708 (27.9)	775 (30.5)



# UNDERCARRIAGE / Track Adjuster

## Assemble Track Adjuster



**CAUTION: Cylinder (5) weight:**  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 20 kg (44 lb)  
ZX270-3 class: 31 kg (68 lb)

**The cylinder (5) assembly weight:**  
ZX200-3 class, 225US-3 class, 225USR-3 class: 30 kg (66 lb)  
ZX240-3 class: 31 kg (68 lb)  
ZX270-3 class: 47 kg (104 lb)

1. Install rod (6) to cylinder (5). Install U-ring (4) and dust seal (3) to cylinder (5). Apply grease to inner surfaces of U-ring (4) and dust seal (3). Fill grease into position A in cylinder (5).
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 rod (6).



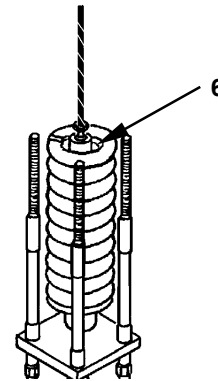
**CAUTION: Spring (7) weight:**  
ZX200-3 class, 225US-3 class, 225USR-3 class: 65 kg (145 lb)  
ZX240-3 class: 71 kg (160 lb)  
ZX270-3 class: 90 kg (200 lb)

5. Install spring (7) to the rod (6) assembly.



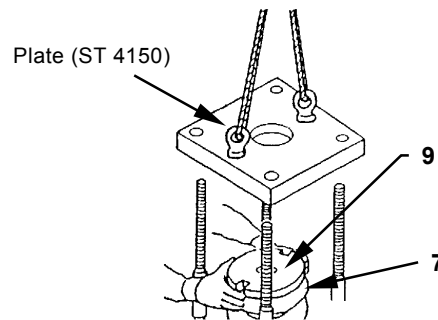
**CAUTION: The spring (7) assembly weight:**  
ZX200-3 class, 225US-3 class, 225USR-3 class: 110 kg (240 lb)  
ZX240-3 class: 120 kg (265 lb)  
ZX270-3 class: 170 kg (375 lb)

6. Install eyebolt (M16, Pitch1.5mm) to rod (6). Hoist and place the spring (7) assembly onto special tool (ST 4920).



W105-03-04-017

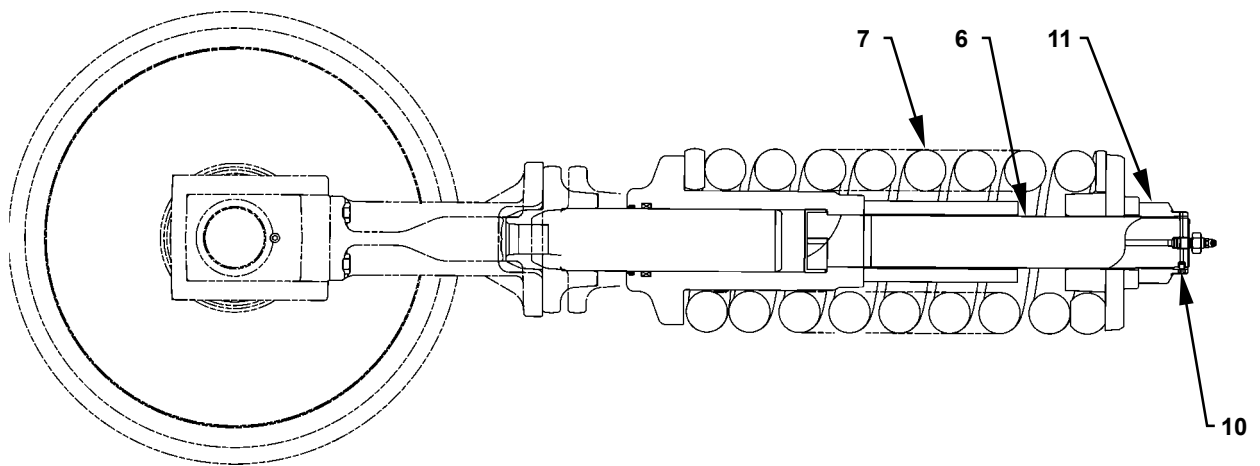
6. Remove eyebolt. Place washer (9) to spring (7). Install plate (ST 4150).



W105-03-04-016

# UNDERCARRIAGE / Track Adjuster


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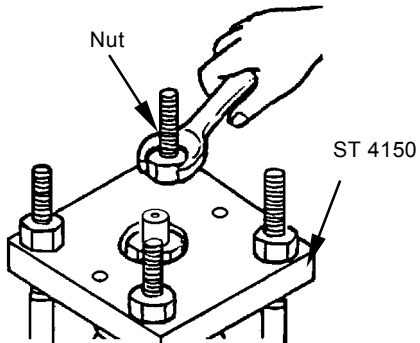


W1V7-03-04-002

## UNDERCARRIAGE / Track Adjuster

8. Tighten the nut of special tool (ST 4920) and secure the spring (7) assembly.

 : 46 mm



W105-03-04-012

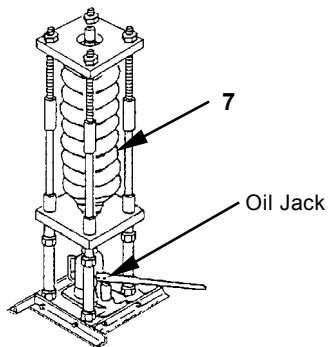
9. Operate the oil jack and compress spring (7) to the specification.

Specified Length:

ZX200-3 class, 225US-3 class, 225USR-3 class:  
490 mm (19.3 in)


ZX240-3 class: 525 mm (20.7 in)


ZX270-3 class: 557 mm (21.9 in)




W105-03-04-026

10. Install nut (11) to rod (6). Install plug (10).


 : 5 mm

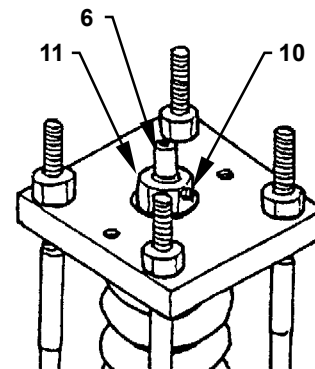
 : 14.8 N·m (1.5 kgf·m, 11 lbf·ft)

ZX200-3 class, 225US-3 class, 225USR-3 class,  
240-3 class

 : 75 mm

ZX270-3 class

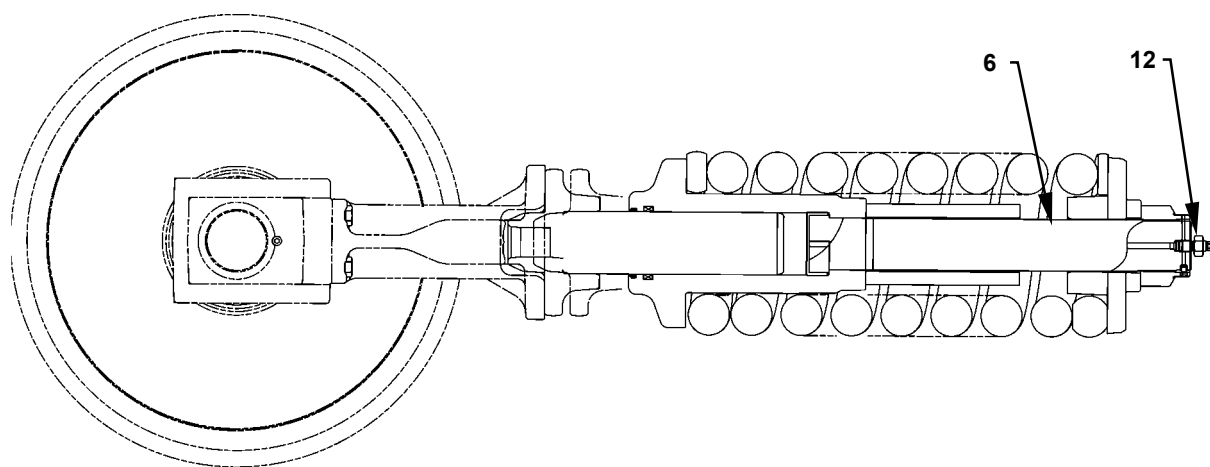
 : 85 mm



W105-03-04-014

# UNDERCARRIAGE / Track Adjuster


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


W1V7-03-04-002

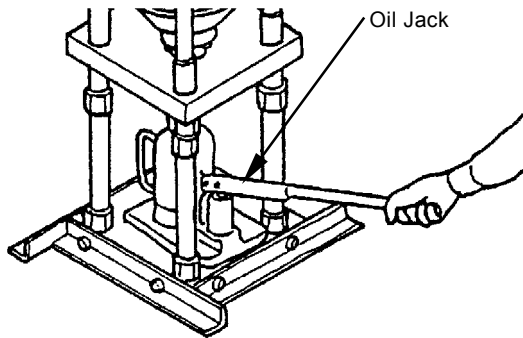
## UNDERCARRIAGE / Track Adjuster

11. Install valve (12) to rod (6).

 : 24 mm


 : 88 N·m (9.0 kgf·m, 65 lbf·ft)

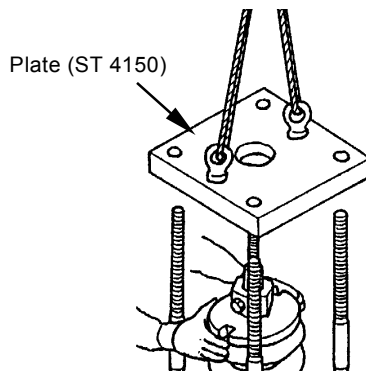
12. Lower the oil jack.



W105-03-04-013

12. Remove the nut of special tool. Attach a nylon sling onto eyebolts (2 used). Hoist and remove plate (ST 4150).

 : 46 mm



W105-03-04-011



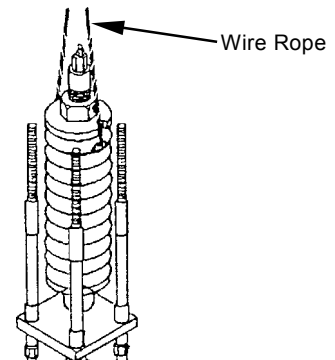
**CAUTION:** Track adjuster weight:

ZX200-3 class, 225US-3 class, 225USR-3 class: 125 kg (280 lb)

ZX240-3 class: 135 kg (300 lb)

ZX270-3 class: 185 kg (410 lb)

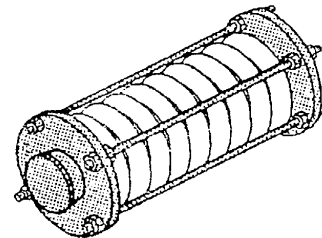
14. Attach a wire rope onto the track adjuster. Hoist and remove the track adjuster from special tool (ST 4920).



W105-03-04-009



**CAUTION:** If only the track adjuster is transported, use special tool as illustrated in order to carry the track adjuster safely.



W105-03-04-028

## UNDERCARRIAGE / Track Adjuster

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## 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).

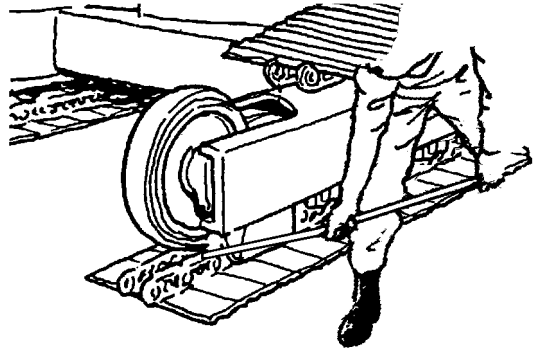
In this section, the procedure starts on the premise that the tracks have already been removed.

#### Removal

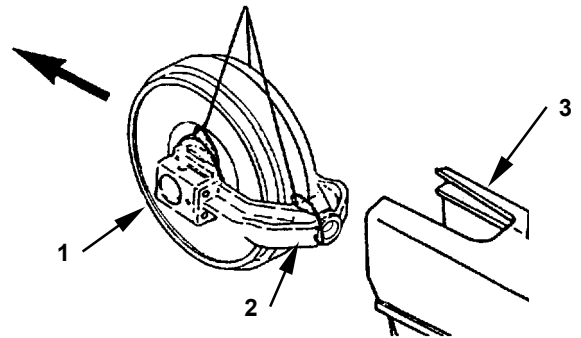
**CAUTION:** Front idler (1) weight:  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 119 kg (260 lb)  
ZX270-3 class: 187 kg (412 lb)

**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.

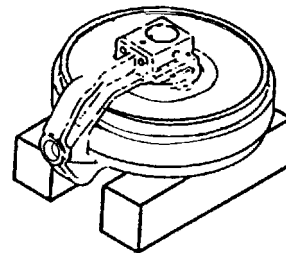
1. Pry and remove front idler (1) and yoke (2) from track frame (3) by using a pry bar.
2. Attach a sling belt to the bearing and yoke (2) sections in front idler (1) as illustrated. Remove the front idler (1) assembly from track frame (3).
3. When storing front idler (1), place front idler (1) on the wooden block as illustrated.



W110-03-05-001



W178-03-05-001



W178-03-05-002

## UNDERCARRIAGE / Front Idler

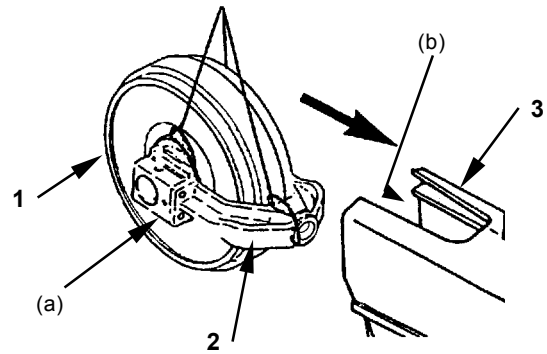
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### Installation



**CAUTION:** Front idler (1) weight:  
ZX200-3 class, 225US-3 class, 225USR-3  
class, 240-3 class: 119 kg (260 lb)  
ZX270-3 class: 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



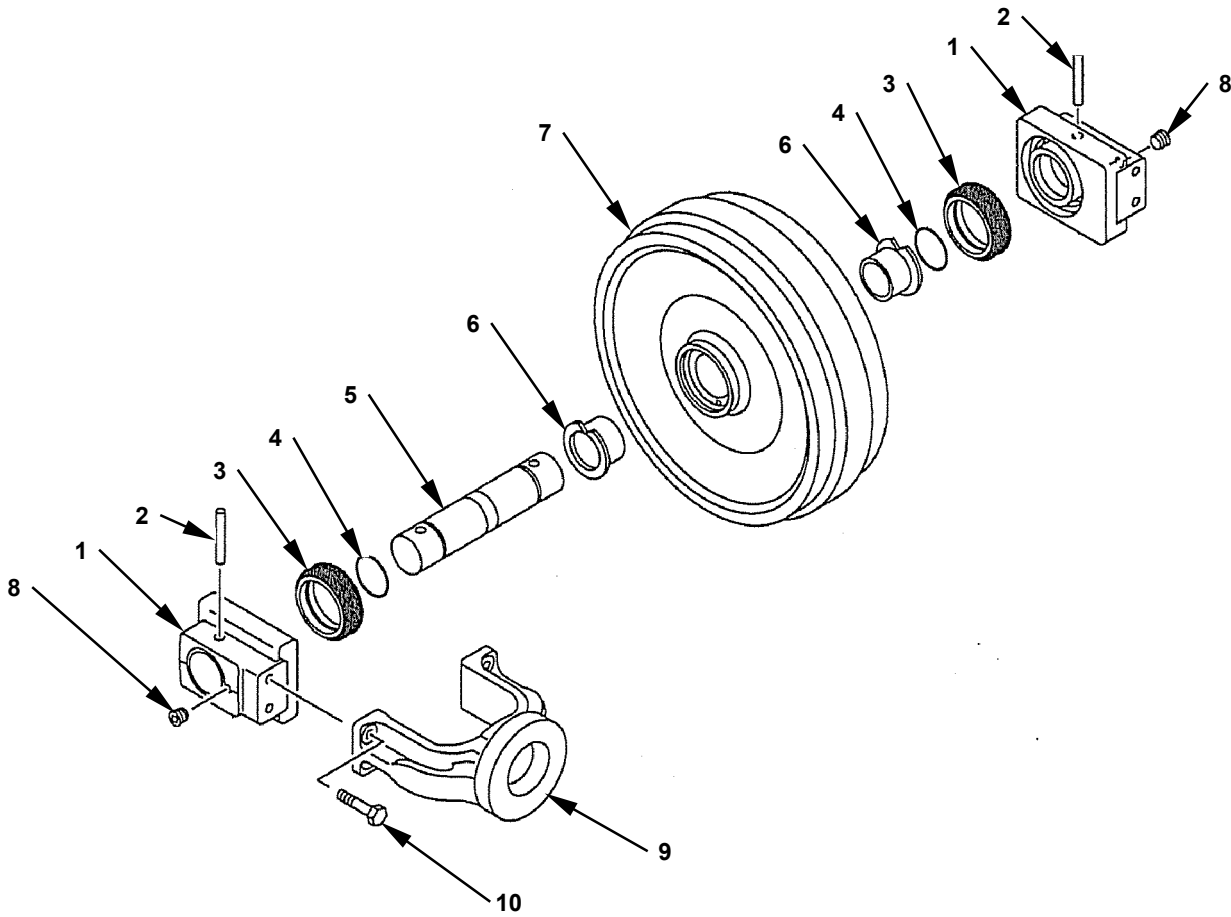
## UNDERCARRIAGE / Front Idler

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## 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:**  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 17 kg (37 lb)  
ZX270-3 class: 25 kg (55 lb)


1. Attach a nylon sling to yoke (9) and hold yoke (9). Remove bolts (10) (4 used). Remove yoke (9) from the idler (7) assembly.

 : 24 mm



**CAUTION: The idler (7) assembly weight:**  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 102 kg (225 lb)  
ZX270-3 class: 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.

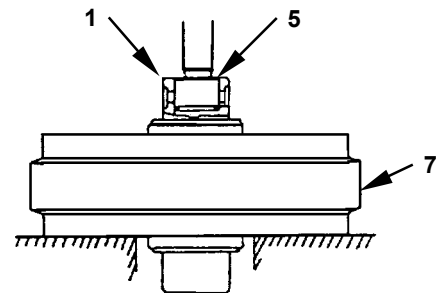
 : 6 mm

3. Remove pin (2) from bearing (1) on the upper side by using a round bar (Dia.: 16 mm) and hammer.



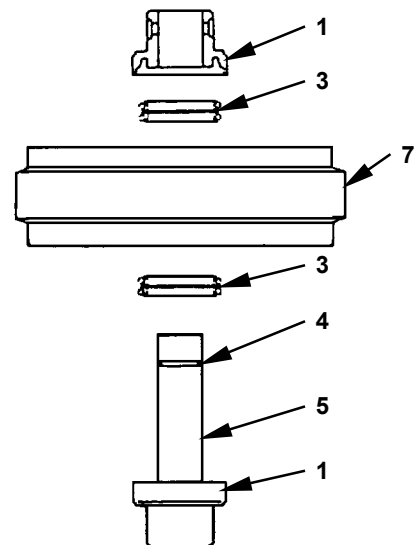
**CAUTION: The axle (5) assembly weight:**  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 21 kg (46 lb)  
ZX270-3 class: 31 kg (68 lb)

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.



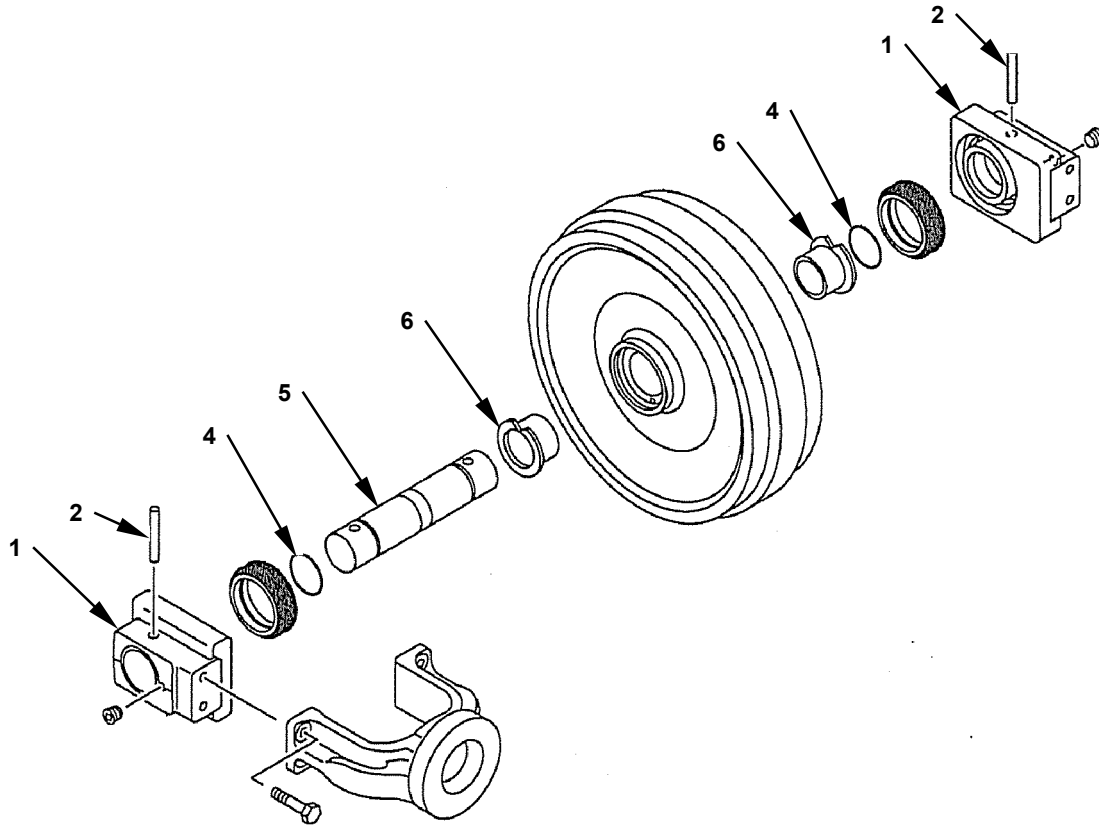
W105-03-05-008

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

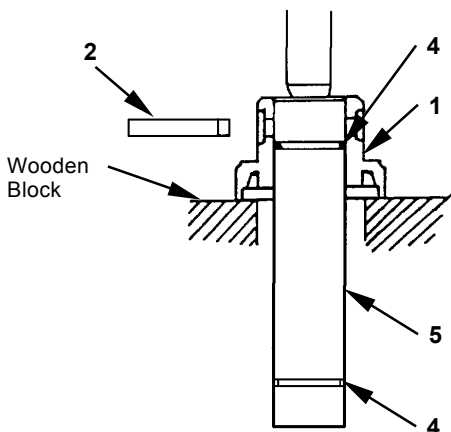
## UNDERCARRIAGE / Front Idler



**CAUTION:** The axle (5) assembly weight:  
ZX200-3 class, 225US-3 class, 225USR-3  
class, 240-3 class: 21 kg (46 lb)  
ZX270-3 class: 31 kg (68 lb)

**IMPORTANT:** Place the wooden block under bearing (1) in order not to damage bearing (1).

1. Wind a nylon sling onto the axle (5) assembly. Hoist and place bearing (1) onto the wooden block.
2. 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:  
ZX200-3 class, 225US-3 class, 225USR-3  
class, 240-3 class: 69 kg (152 lb)  
ZX270-3 class: 116 kg (260 lb)

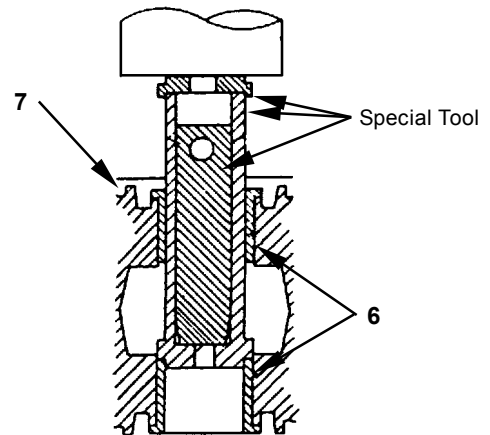
**IMPORTANT:** Do not remove bushing (6) unless necessary.

8. When replacing bushing (6), remove bushing (6) by using special tool and a press.

Special Tool:

ZX200-3 class, 225US-3 class, 225USR-3 class,  
240-3 class: ST 1425

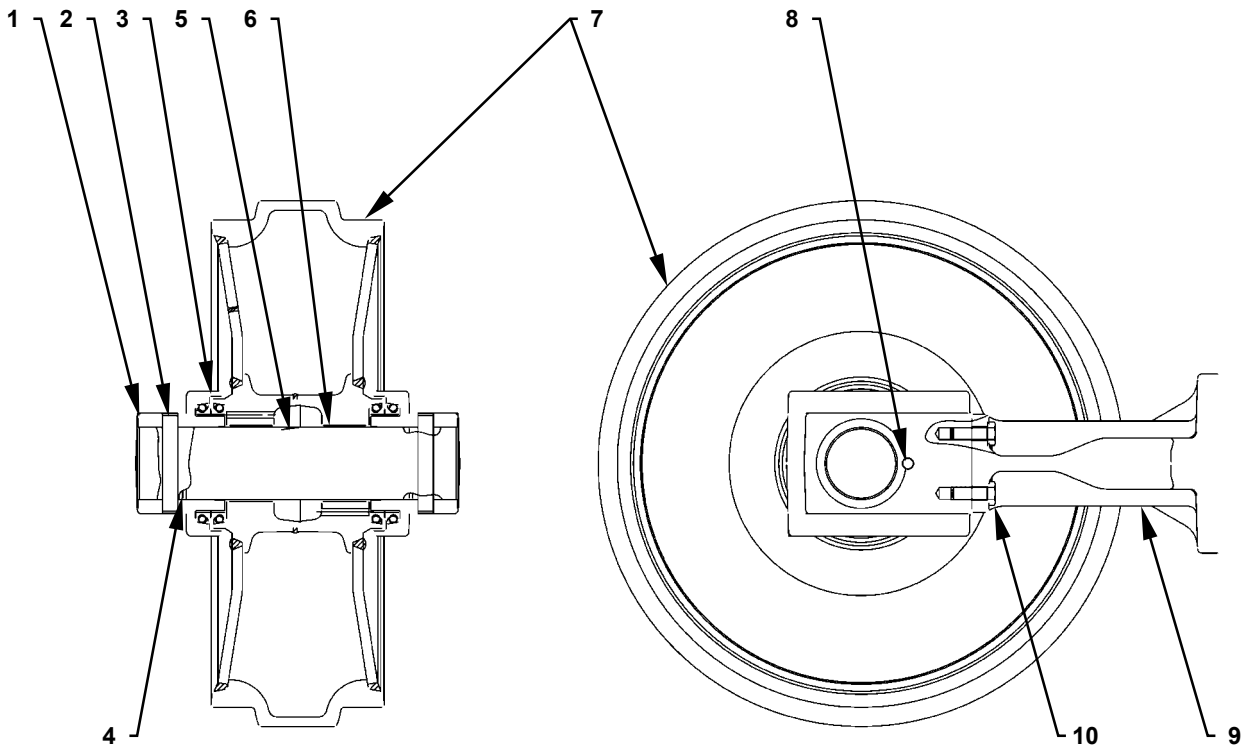
ZX270-3 class: ST 1973



W105-03-05-011

## UNDERCARRIAGE / Front Idler

### ASSEMBLE FRONT IDLER



W1V7-03-05-002

- |                            |                      |                   |                    |
|----------------------------|----------------------|-------------------|--------------------|
| 1 - Bearing (2 Used)       | 4 - O-Ring (2 Used)  | 7 - Idler         | 9 - Yoke           |
| 2 - Pin (2 Used)           | 5 - Axle             | 8 - Plug (2 Used) | 10 - Bolt (4 Used) |
| 3 - Floating Seal (2 Used) | 6 - Bushing (2 Used) |                   |                    |

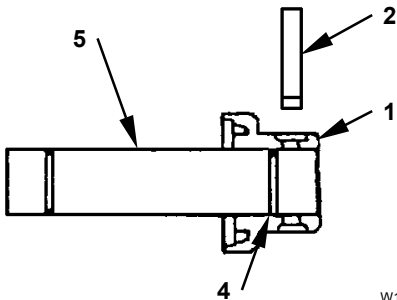
## UNDERCARRIAGE / Front Idler

### Assemble Front Idler



**CAUTION: Idler (7) weight:**  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 69 kg (152 lb)  
ZX270-3 class: 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.



W105-03-05-014



**IMPORTANT: For handling of the floating seal, refer to the Precaution for Floating Seal Handling section on W1-1-4.**

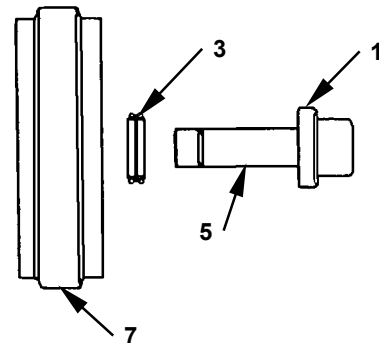
4. Apply grease to O-ring of floating seal (3). Install a pair of floating seals (3) to idler (7) and bearing (1).



**CAUTION: The axle (5) assembly weight:**  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 21 kg (46 lb)  
ZX270-3 class: 31 kg (68 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).

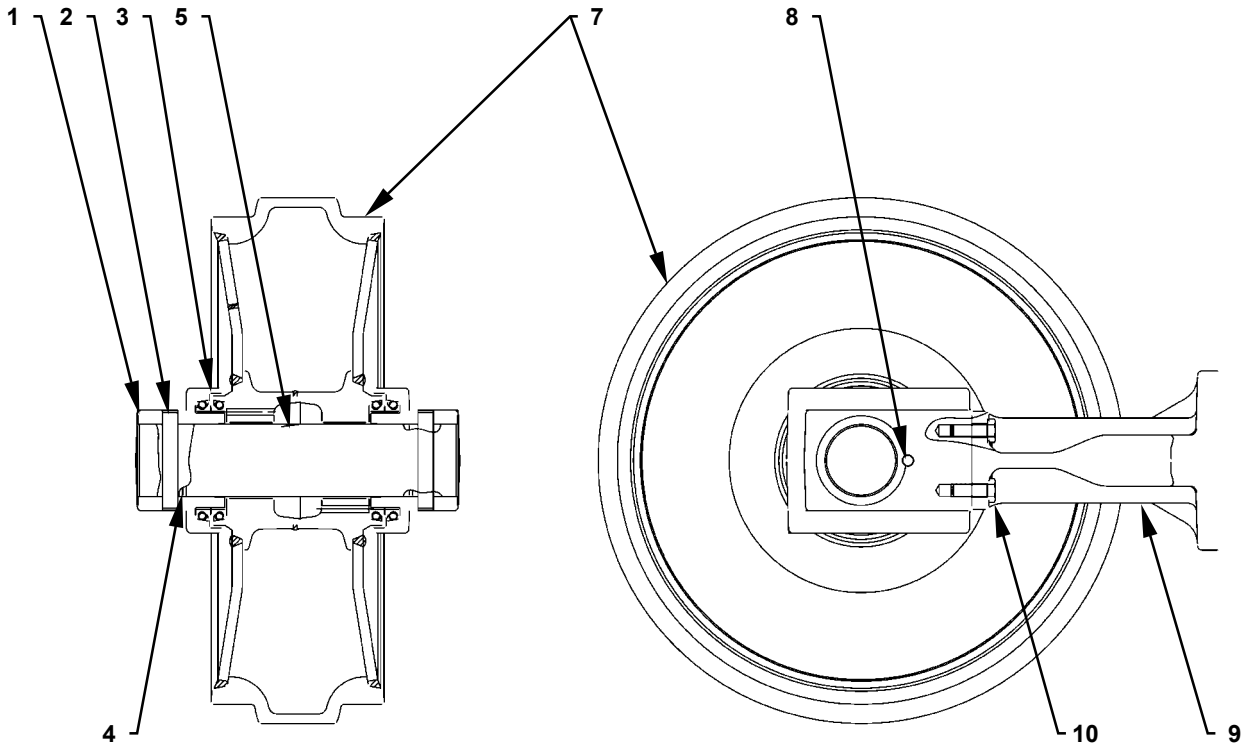
 : 6 mm  
 : 29.5 N·m (3.0 kgf·m, 22 lbf·ft)



W157-03-05-006

# UNDERCARRIAGE / Front Idler

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W1V7-03-05-002



## UNDERCARRIAGE / Front Idler

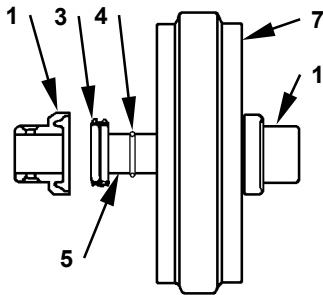


**CAUTION: The idler (7) assembly weight:**  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 90 kg (200 lb)  
ZX270-3 class: 148 kg (326 lb)

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:  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 265 mL (0.07 US gal.)  
ZX270-3 class: 300 mL (0.08 US gal.)

10. 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)



**CAUTION: Yoke (9) weight:**  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 17 kg (37 lb)  
ZX270-3 class: 25 kg (55 lb)

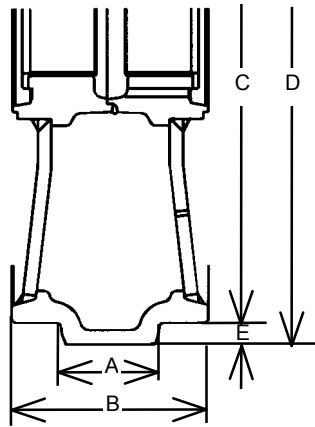
11. Wind a nylon sling onto yoke (9). Hoist yoke (9). Align the bolt (10) holes on both bearings (1) and yoke (9).

12. Install yoke (9) to bearing (1) with bolts (10) (4 used).

 : 24 mm  
 : 206 N·m (21 kgf·m, 150 lbf·ft)

## UNDERCARRIAGE / Front Idler

### MAINTENANCE STANDARD



W166-03-05-001

Unit: mm (in)

	Standard		Allowable Limit		Remedy
	ZX200-3 class, ZX225US-3 class, ZX225USR-3 class, ZX240-3 class	ZX270-3 class	ZX200-3 class, ZX225US-3 class, ZX225USR-3 class, ZX240-3 class	ZX270-3 class	
A	84 (3.31)	102 (4.0)	[68 (2.67)]	[82 (3.22)]	Build-up weld and finishing
B	159 (6.26)	204 (1.64)	-	-	
C	500 (19.69)	572 (22.5)	[488 (19.21)]	[558 (21.96)]	
D	538 (21.18)	617 (24.3)	-	-	
E	19 (0.75)	22.5 (0.89)	25 (0.98)	29.5 (1.16)	

### Axle and Bushing

Unit: mm (in)

		Standard		Allowable Limit		Remedy
		ZX200-3 class, ZX225US-3 class, ZX225USR-3 class, ZX240-3 class	ZX270-3 class	ZX200-3 class, ZX225US-3 class, ZX225USR-3 class, ZX240-3 class	ZX270-3 class	
Axle	Outer Dia.	75.0 (2.95)	85.0 (3.35)	[74.2 (2.93)]	[84.2(3.31)]	Replace
Bushing	Inner Dia.	75.0 (2.95)	85.2 (3.35)	[76 (2.997)]	[86.0 (3.39)]	
	Flange Thickness	2 (0.08)	2.0 (0.08)	[1.2(0.05)]	[1.2 (0.05)]	

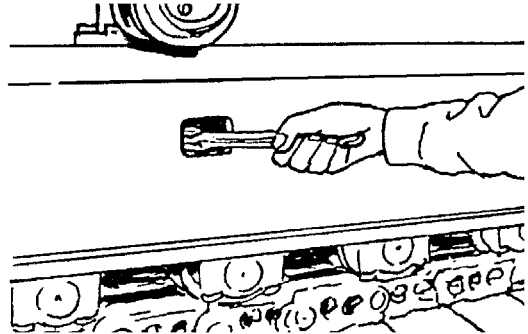
NOTE: Values in [ ] are just for reference.

## 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).

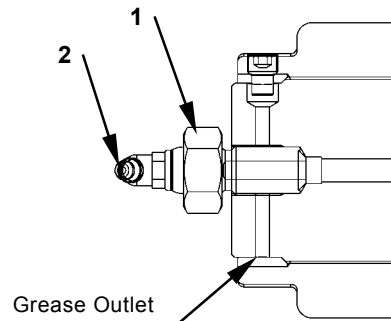


W105-03-06-001

**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.

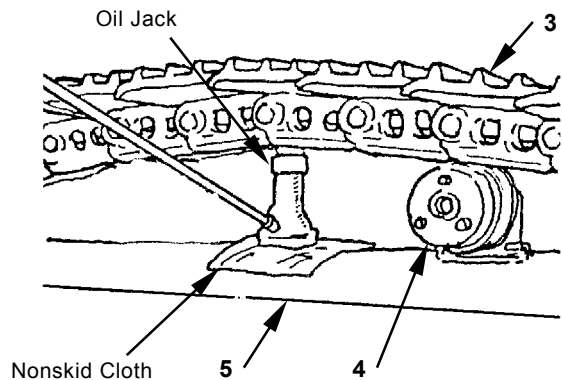
 : 24 mm



W1V7-03-04-006

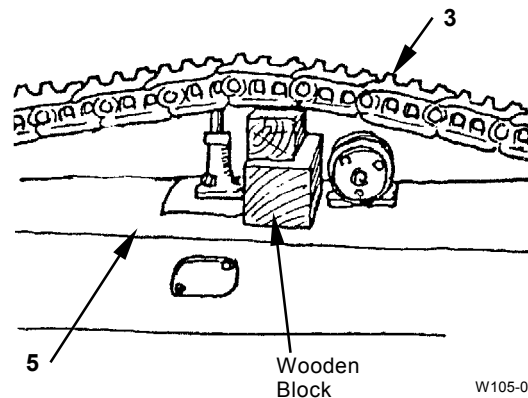
- CAUTION:** Use a nonskid cloth between track frame (5) and oil jack in order not to slip.

2. Jack up track (3) in order to get enough clearance between upper roller (4) and track (3).



W105-03-06-002

3. Insert the wooden blocks between track (3) and track frame (5).




W105-03-06-003


## UNDERCARRIAGE / Upper And Lower Roller

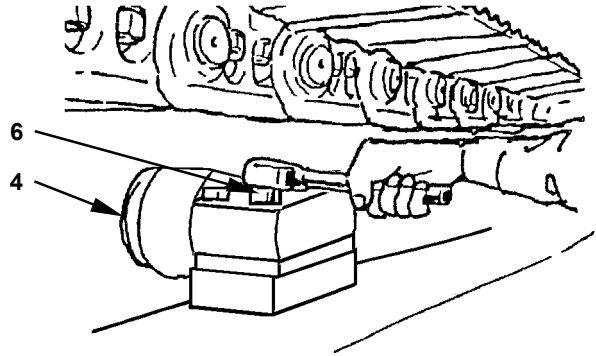
4. Attach a nylon sling onto upper roller (4). Hold upper roller (4). Loosen bolts (6) (4 used) on upper roller (4).

ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class:

 : 24 mm

ZX270-3 class:

 : 27 mm



W1V7-03-06-001



**CAUTION: Upper roller (4) weight:**  
 ZX200-3 class, 225US-3 class, 225USR-3, class 240-3 class: 21 kg (46 lb)  
 ZX270-3 class: 35 kg (77 lb)

5. Remove upper roller (4) from track frame (5).


### Installation




**CAUTION: Upper roller (4) weight:**  
 ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 21 kg (46 lb)  
 ZX270-3 class: 35 kg (77 lb)


1. Install upper roller (4) to track frame (5) with bolts (6) (4 used).


ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class:

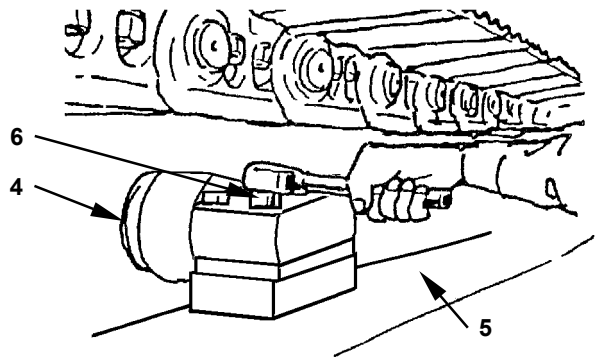
 : 24 mm

 : 270 N·m (27 kgf·m, 200 lbf·ft)

ZX270-3 class:

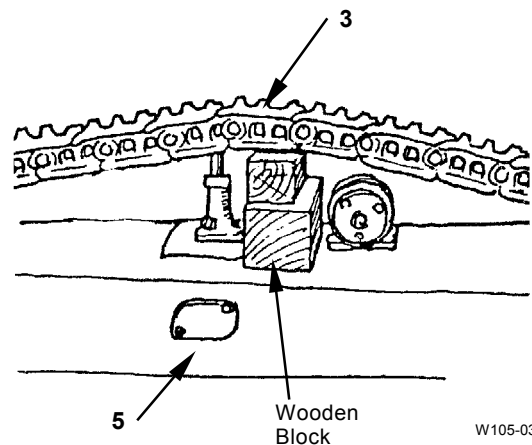
 : 27 mm

 : 460 N·m (46 kgf·m, 340 lbf·ft)



W1V7-03-06-001


2. Remove the wooden blocks and oil jack between track (3) and track frame (5).




W105-03-06-003

## UNDERCARRIAGE / Upper And Lower Roller

3. Tighten valve (1) on the track adjuster.

 : 24 mm

 : 88.3 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):

ZX200-3 class, 225US-3 class, 225USR-3 class,  
240-3 class: 300 to 335 mm (11.8 to 13.2 in)

ZX270-3 class: 340 to 380 mm (13.4 to 15.0 in)

6. Lower the machine.

**IMPORTANT: Replace upper roller (4) as an assembly.**

7. Add engine oil (API CD class SAE#30) to the plug (8) hole on cover (7).


Oil Amount:

ZX200-3 class, 225US-3 class, 225USR-3 class,  
240-3 class: 65 mL (0.017 US gal.)


ZX270-3 class: 95 mL (0.025 US gal.)

**IMPORTANT: Apply LOCTITE #503 to plug (8).  
(Sealant is applied to new plug (8).)**


8. Tighten plug (8).

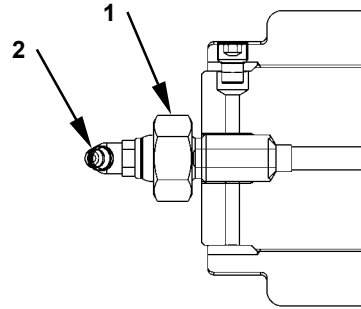
 : 6 mm

ZX200-3 class, 240-3 class:

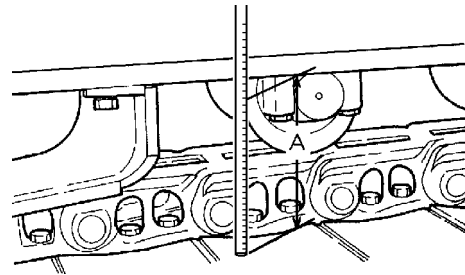
 : 20 N·m (2.0 kgf·m, 15 lbf·ft)

ZX270-3 class:

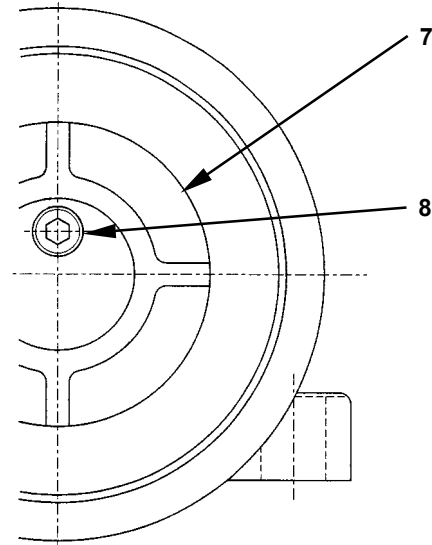
 : 29.5 N·m (3.0 kgf·m, 22 lbf·ft)



W1V7-03-04-006



W800-03-06-001



W158-03-06-001


# UNDERCARRIAGE / Upper And Lower Roller

## REMOVE AND INSTALL LOWER ROLLER


### Removal

1. Remove the bolt from the track guard. Remove the track guard. Remove bolts (2) (4 used) from lower roller (1).

ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class

 : 27 mm

ZX270-3 class:

 : 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.




**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.

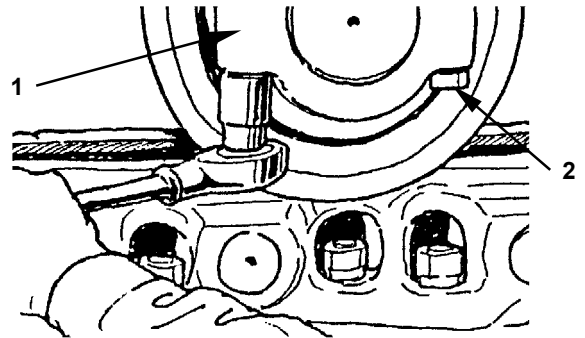
Keep body parts and face away from valve (4) and loosen valve (4) carefully.

Do not loosen grease fitting (5).

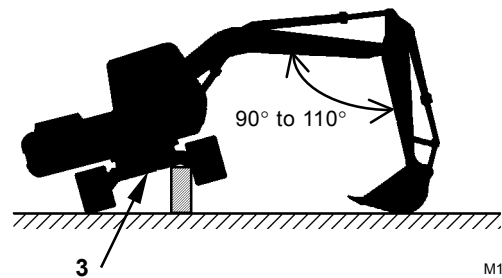
**IMPORTANT:** It is enough to loosen valve (4) by 1 to 1.5 turns. Do not loosen the valve (4) over that degree.

3. Loosen valve (4) on the track adjuster. Drain grease. Get enough clearance in the track in order to remove lower roller (1).

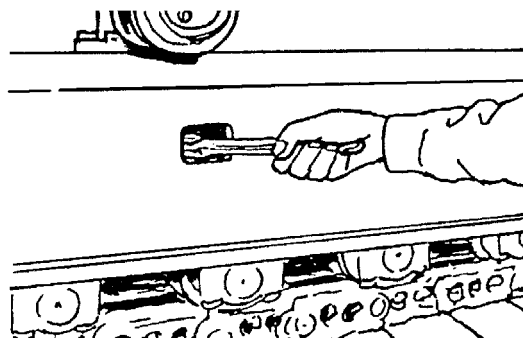
 : 24 mm



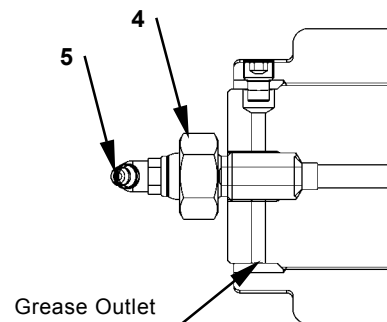
W105-03-06-008



M104-07-067



W105-03-06-001



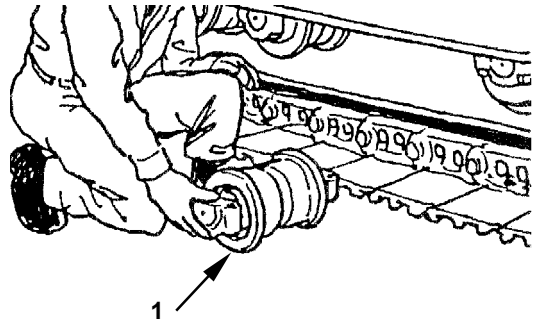
W1V7-03-04-006

## UNDERCARRIAGE / Upper And Lower Roller



**CAUTION:** Lower roller (1) weight:  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 35 kg (77 lb)  
ZAXIS270-3 class: 57 kg (127 lb)

4. Remove lower roller (1) from track frame (3) by using a fork lift.



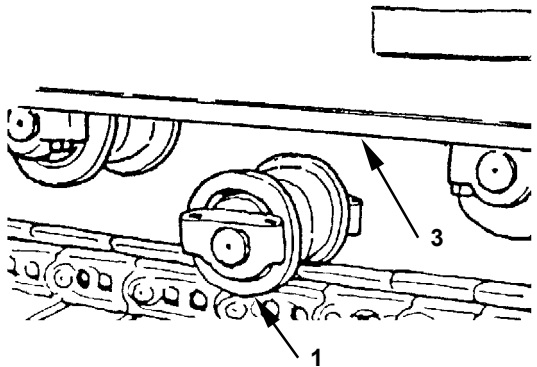
W105-03-06-010

### Installation



**CAUTION:** Lower roller (1) weight:  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 35 kg (77 lb)  
ZAXIS270-3 class: 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).


ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class:

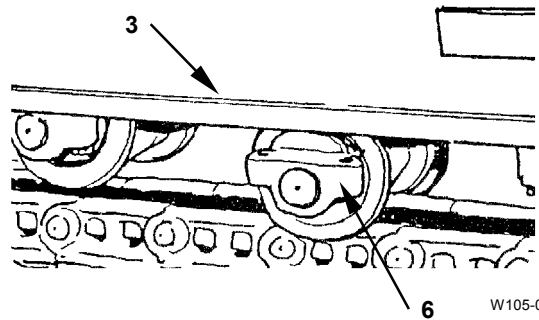
 : 27 mm

 : 460 N·m (46 kgf·m, 340 lbf·ft)

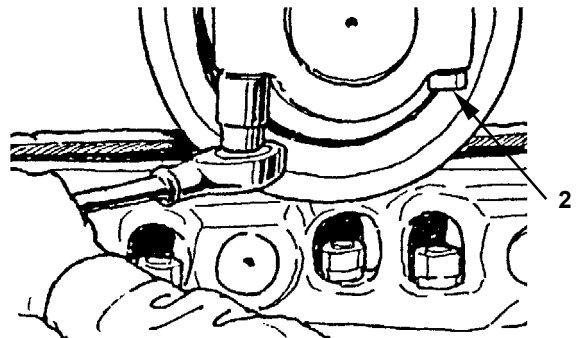
ZX270-3 class:

 : 32 mm

 : 840 N·m (86 kgf·m, 620 lbf·ft)




W105-03-06-012




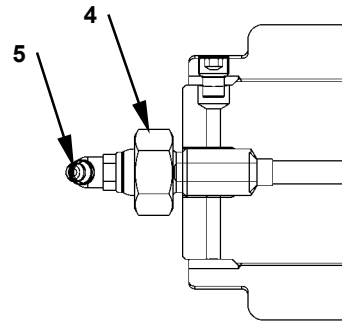
W105-03-06-008

## UNDERCARRIAGE / Upper And Lower Roller

- Tighten valve (4) on the track adjuster.

 : 24 mm

 : 88.3 N·m (9.0 kgf·m, 55 lbf·ft)



W1V7-03-04-006



**CAUTION: Support the jacked up machine firmly by using wooden blocks.**

- Jack up the track to be adjusted and rotate the track in the reverse direction a little.

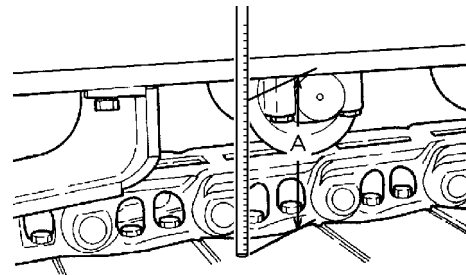
- Apply grease through grease fitting (5) and adjust the track tension.

Track sag specifications (A):

ZX200-3 class, 225US-3 class, 225USR-3 class,

240-3 class: 300 to 335 mm (11.8 to 13.2 in)

ZX270-3 class: 340 to 380 mm (13.4 to 15.0 in)



W800-03-06-001



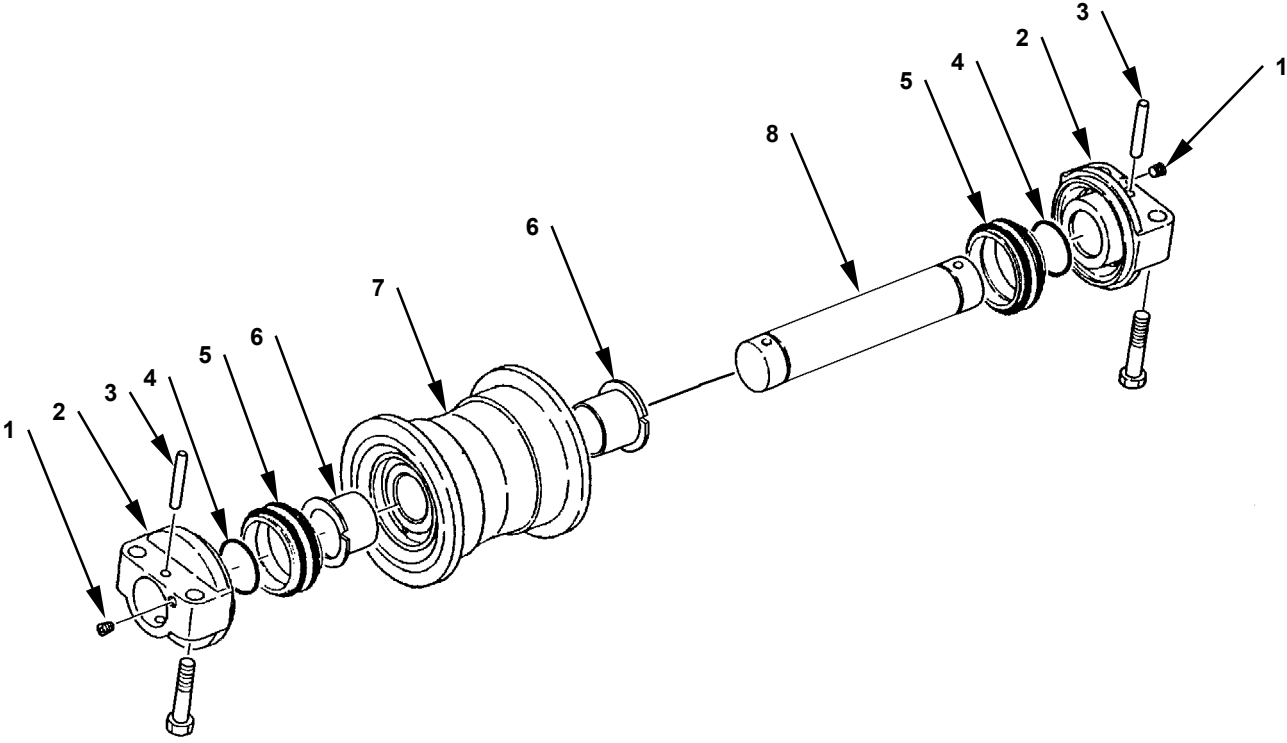
## **UNDERCARRIAGE / Upper And Lower Roller**

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# UNDERCARRIAGE / Upper And Lower Roller

## DISASSEMBLE LOWER ROLLER



W157-03-06-004

- 1 - Plug (2 Used)
- 2 - Collar (2 Used)
- 3 - Pin (2 Used)
- 4 - O-Ring (2 Used)
- 5 - Floating Seal (2 Used)
- 6 - Bushing (2 Used)
- 7 - Roller
- 8 - Axle


# UNDERCARRIAGE / Upper And Lower Roller

## Disassemble Lower Roller

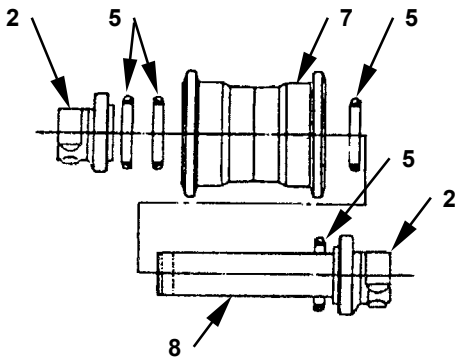


**CAUTION: Lower roller weight:**  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 35 kg (77 lb)  
ZX270-3 class: 57 kg (126 lb)

1. Remove plug (1) from the end of collar (2). Drain oil in roller (7).

 : 6 mm

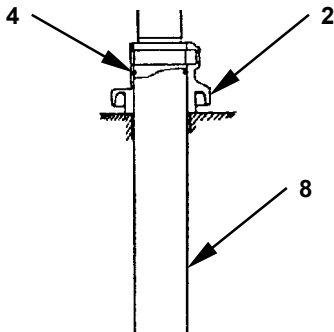
2. Put the matching marks on collar (2) and axle (8). Remove pin (3) from collar (2) at one side by using a round bar (Dia.: 14 mm) and hammer. Remove axle (8) from roller (7), from the side where pin (3) was removed by using a press. At this time, pin (3) and collar (2) at opposite side are removed together.



W105-03-06-026

3. Remove floating seals (5) (2 used) from both sides of roller (7) and collars (2) (2 used) respectively.

4. Remove pin (3) from the axle (8) assembly. Remove axle (8) from collar (2) by using a press.



W178-02-11-268

5. Remove O-rings (4) (2 used) from axle (8).

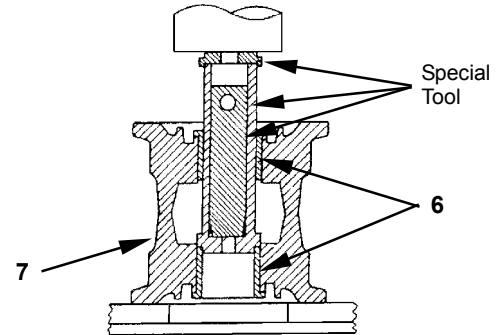


**CAUTION: Roller (7) weight:**  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: 21 kg (46 lb)  
ZX270-3 class: 34 kg (75 lb)

6. When replacing bushing (6), remove bushing (6) by using special tool and a press.

Special tool when removing bushing:

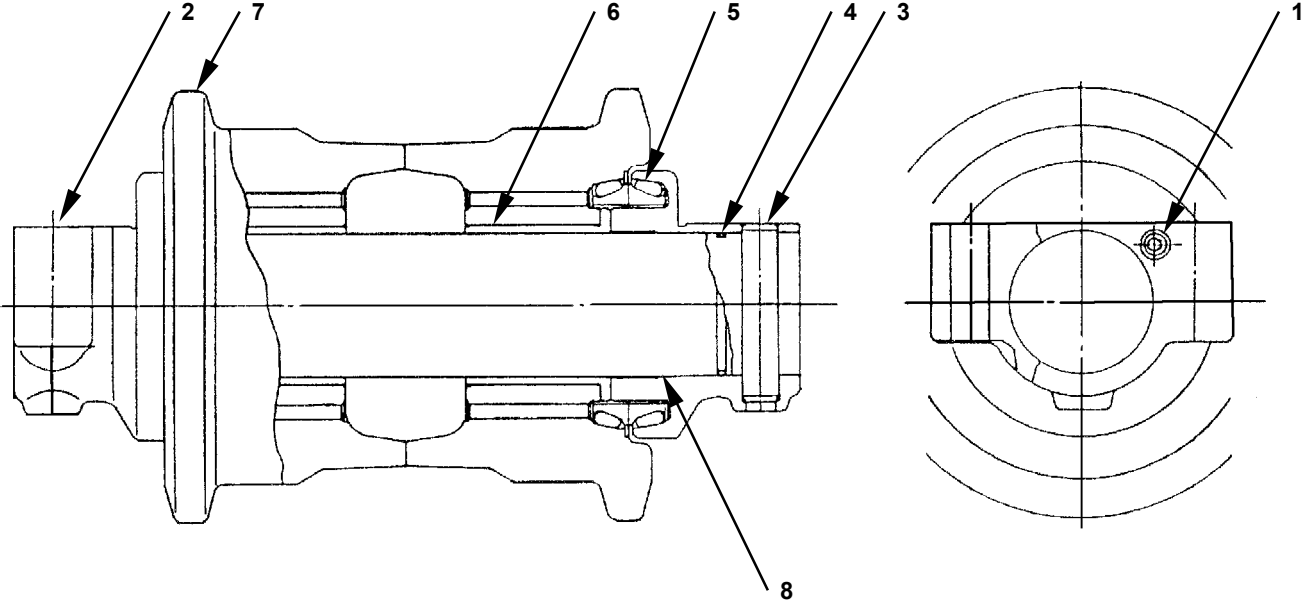
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class: ST 1955  
ZX270-3 class: ST 1475



W178-02-11-269

# UNDERCARRIAGE / Upper And Lower Roller

## ASSEMBLE LOWER ROLLER



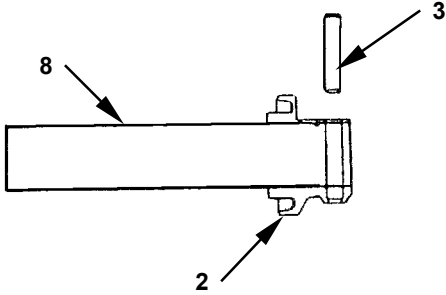
W105-03-06-023

- 1 - Plug (2 Used)
- 2 - Collar (2 Used)
- 3 - Pin (2 Used)
- 4 - O-Ring (2 Used)
- 5 - Floating Seal (2 Used)
- 6 - Bushing (2 Used)
- 7 - Roller
- 8 - Axle

# UNDERCARRIAGE / Upper And Lower Roller

## Assemble Lower Roller

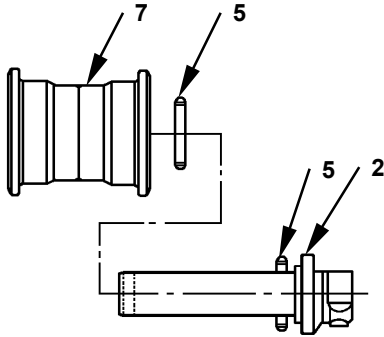
1. Install bushings (6) (2 used) to roller (7).  
Do not dent the flange surface of bushing (6).  
Apply grease to O-ring (4). Install O-ring (4) to axle (8) to axle (8).
2. Align the pin holes and install collar (2) at one side to axle (8) with pin (3).  
Do not damage O-ring (4) at this time.



W105-03-06-031

**IMPORTANT: For handling floating seal (5), refer to the section "Precautions for Handling Floating Seal" on page W1-1-4.**

3. Install floating seal (5) to roller (7) and collar (2).





W157-03-06-008

4. Insert axle (8) to roller (7). Apply grease to O-ring (4). Install O-ring (4) to the roller (7) assembly. Install other collar (2) in the same procedures with pin (3).

**IMPORTANT: Apply LOCTITE # 503 or equivalent to plug (6). (Sealant is applied to new plug (6).)**

5. Add engine oil through the plug (6) hole on collar (2). Tighten plug (6).

 : 6 mm

 : 29.5 N·m (3.0 kgf·m, 22 lbf·ft)

ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class

Lubricant Oil: Engine oil: API CD class, SAE30

Oil Amount: 0.26 L (0.07 US gal.)

ZX270-3 class

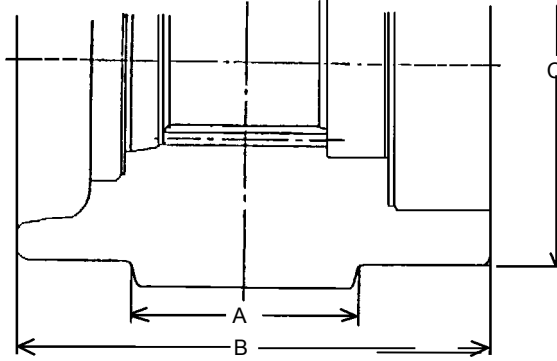
Lubricant Oil: Engine oil: API CF class, SAE15W-40

Oil Amount: 0.42 L (0.11 US gal.)

# UNDERCARRIAGE / Upper And Lower Roller

## MAINTENANCE STANDARD

### Upper Roller



W1V7-03-06-002

ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	84 (3.3)	-	Replace
B	165 (6.5)	-	
C	120 (4.7)	[110 (4.3)]	

NOTE: Values in [ ] are just for reference.

ZX270-3 class

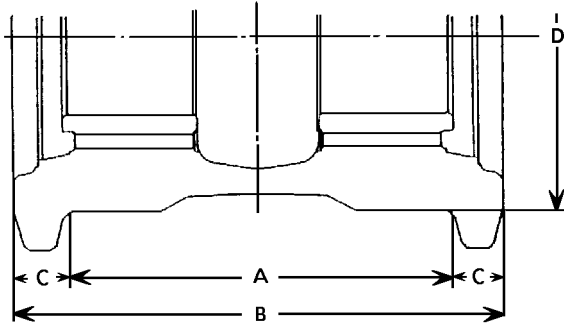
Unit: mm (in)

	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



W157-03-06-003

## Roller

Unit: mm (in)

	Standard		Allowable Limit		Remedy
	ZX200-3 class, ZX225US-3 class, ZX225USR-3 class, ZX240-3 class	ZX270-3 class	ZX200-3 class, ZX225US-3 class, ZX225USR-3 class, ZX240-3 class	ZX270-3 class	
A	169.0 (6.7)	199.0 (7.8)	[187 (7.4)]	[217 (8.5)]	Cladding by welding and finish or replace
B	218.0 (8.6)	256.0 (10.1)	-	-	
C	24.5 (1.0)	28.5 (1.1)	[15.5 (0.6)]	[19.56 (0.8)]	
D	150.0 (5.9)	180.0 (7.1)	132 (5.2)	162.0 (69.4)	

NOTE: Values in [ ] are just for reference.

## Axle and Bushing

Unit: mm (in)

		Standard		Allowable Limit		Remedy
		ZX200-3 class, ZX225US-3 class, ZX225USR-3 class, ZX240-3 class	ZX270-3 class	ZX200-3 class, ZX225US-3 class, ZX225USR-3 class, ZX240-3 class	ZX270-3 class	
Axle	Outer Dia.	65 (2.6)	75 (3.0)	[64.2 (2.5)]	[74.2 (2.9)]	Replace
	Inner Dia.	65 (2.6)	75 (3.0)	[66.0 (2.6)]	[76.0 (3.0)]	
Bushing	Flange Thickness	2 (0.08)	2 (0.08)	[1.2 (0.05)]	[1.2 (0.05)]	

NOTE: Values in [ ] are just for reference.

## **UNDERCARRIAGE / Upper And Lower Roller**

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## 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).




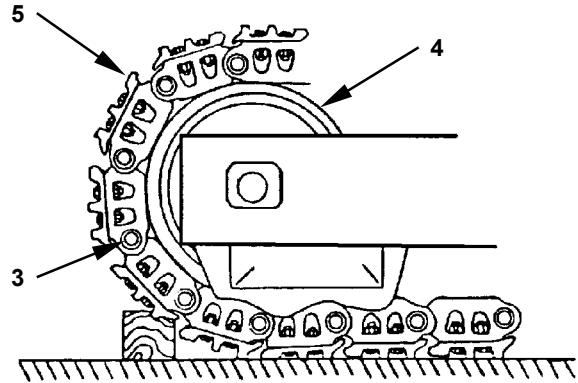
**CAUTION:** Grease pressure in the adjuster cylinder is high. Do not loosen valve (1) quickly or too much as valve (1) may fly off or high-pressure grease in the cylinder may gush out.

Keep body parts and face away from valve (1) and loosen valve (1) carefully. Do not loosen grease fitting (2).

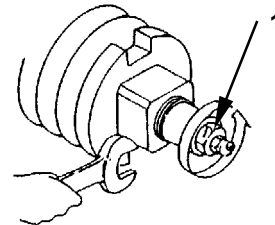
1. Loosen the track tension.

 : 24 mm

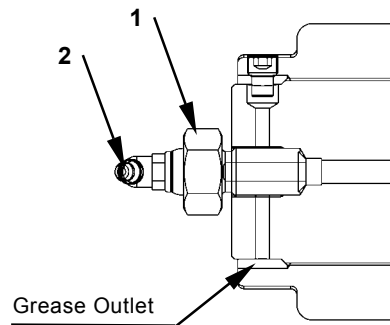
 **NOTE:** When rotating valve (1) in the track adjuster only one turn, grease can be drained from the grease outlet.



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.

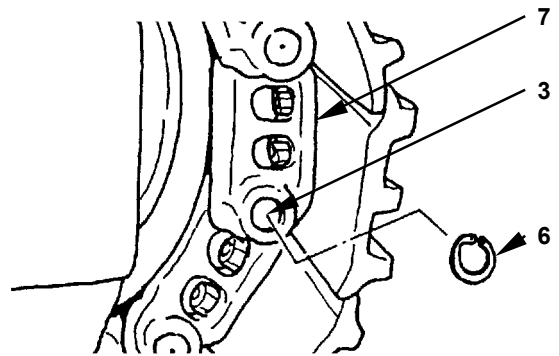
 **NOTE:** If snap ring (6) interferes with master link (7), push in master pin (3) to the removal direction in order to make clearance between snap ring (6) and master pin (3).

 **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.

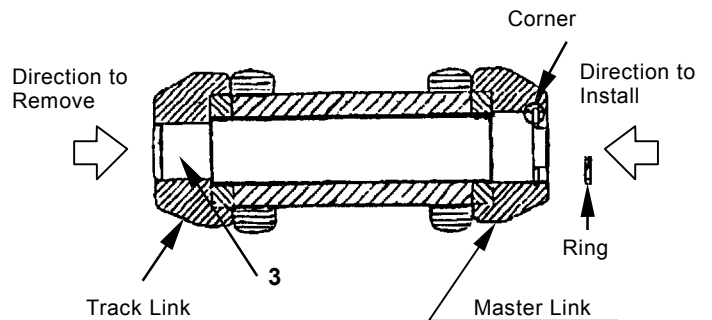
 **CAUTION:** Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

**IMPORTANT:** Master pin (3) can be removed to only one direction. Check the removal direction.

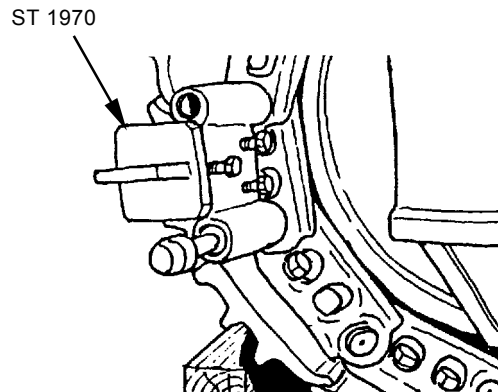
1. Remove master pin (3) by using special tool (ST 1970).



W105-03-07-009



W105-03-07-010



W1V1-03-07-001

## UNDERCARRIAGE / Track

- 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 200-3: 1260 kg (2780 lb)

ZAXIS 210H-3, 210K-3, 240-3: 1330 kg (2930 lb)

ZAXIS 210LCN-3: 1350 kg (2980 lb)

ZX225US-3 class, 225USR-3 class: 1300 kg (2870 lb)

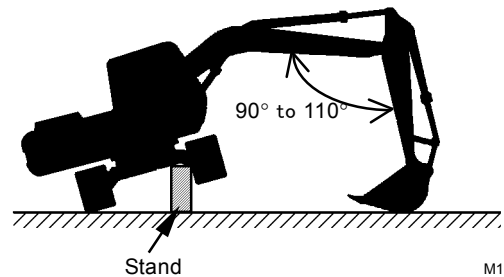
ZAXIS 240LC-3: 1440 kg (3175 lb)

ZAXIS 250H-3, 250K-3: 1370 kg (3020 lb)

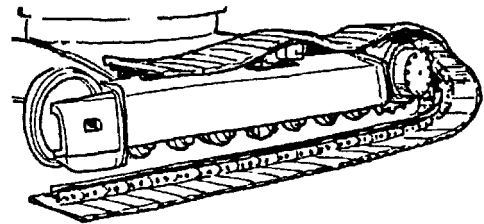
ZAXIS 250LCH-3, 250LCK-3, 250LC-3, 250LCN-3: 1490 kg (3285 lb)

ZAXIS 270-3: 1710 kg (3770 lb)

ZAXIS 270LC-3, 280LC-3, 280LCN-3: 1820 kg (1010 lb)



M104-07-067



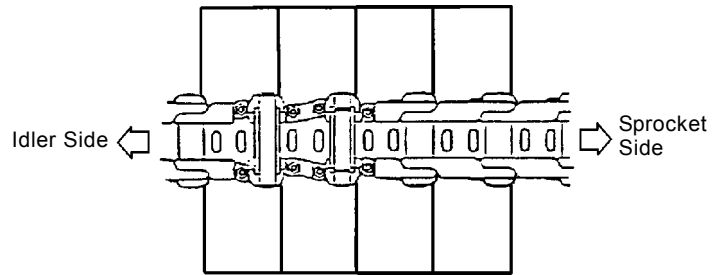
W105-03-07-011

- Slowly operate travel lever on the side with track being removed to the reverse position and extend the track.

## UNDERCARRIAGE / Track

### Installation

1. 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.
2. Set the track under the machine so that the sprocket meshes with the track end. Check the direction of track at this time.



W178-02-11-271



**CAUTION:** The track assembly (standard spec.) weight:

ZAXIS 200-3: 1260 kg (2780 lb)

ZAXIS 210H-3, 210K-3, 240-3: 1330 kg (2930 lb)

ZAXIS 210LCN-3: 1350 kg (2980 lb)

ZX225US-3 class, 225USR-3 class: 1300 kg (2870 lb)

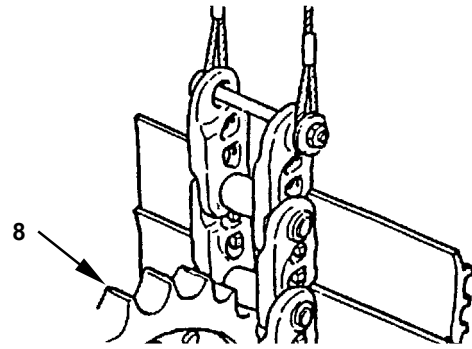
ZAXIS 240LC-3: 1440 kg (3175 lb)

ZAXIS 250H-3, 250K-3: 1370 kg (3020 lb)

ZAXIS 250LCH-3, 250LCK-3, 250LC-3, 250LCN-3: 1490 kg (3285 lb)

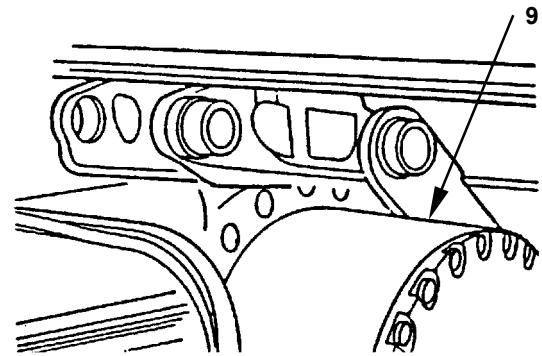
ZAXIS 270-3: 1710 kg (3770 lb)

ZAXIS 270LC-3, 280LC-3, 280LCN-3: 1820 kg (1010 lb)



W105-03-07-014

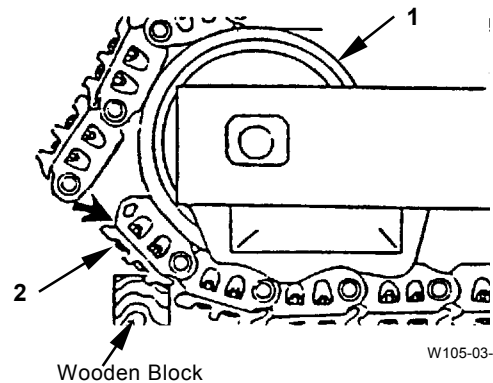
3. Hoist and place the track on sprocket (8).



W105-03-07-015

4. Slowly operate the lever for the track to be installed in the forward direction. Turn travel device (9) and wind the track.

5. Hoist the track link and wind the connection of track link to the front idler (1) side through the upper roller. Lower the machine. Place a wooden block under shoe (2) and support shoe (2).

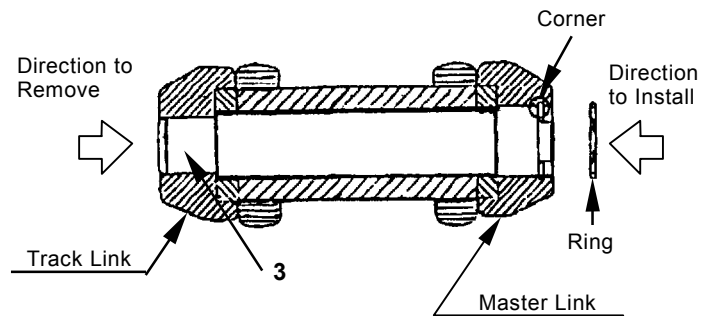


W105-03-07-016

## UNDERCARRIAGE / Track

**IMPORTANT:** Master pin (3) can be installed to only one direction. Check the installation direction.

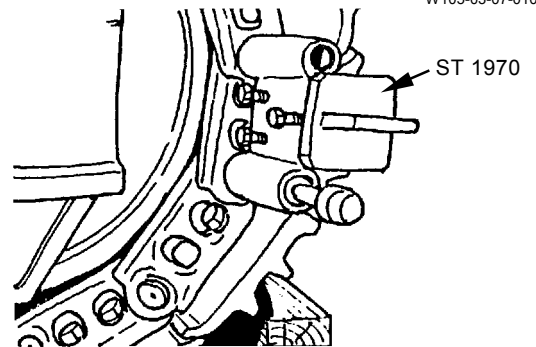
6. Install special tool (ST 1970). Install master pin (3).



W105-03-07-010

**IMPORTANT:** As snap ring (6) may be deformed, replace snap ring (6) with a new one.

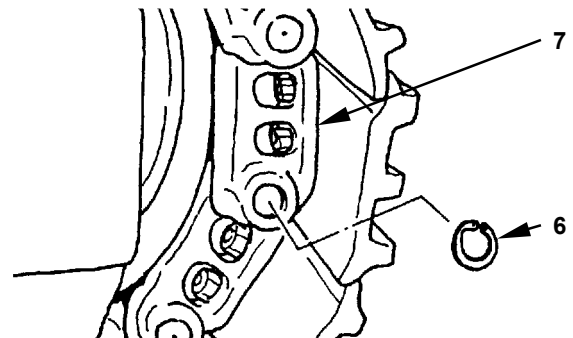
7. Install snap ring (6).  
Snap ring (6) can be installed to only one direction. Install a pair of pliers to the groove in master link (7) with the flat surface on hole facing forward.



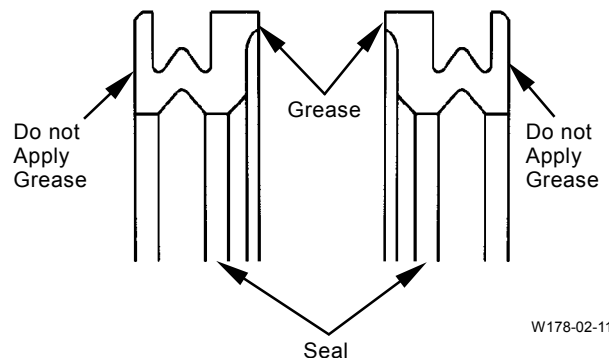
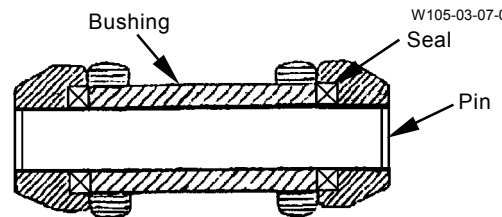
W1V1-03-07-002

**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

8. Tighten valve (1) in the adjuster. Apply grease through grease fitting (2) and adjust the track tension.

 : 24 mm

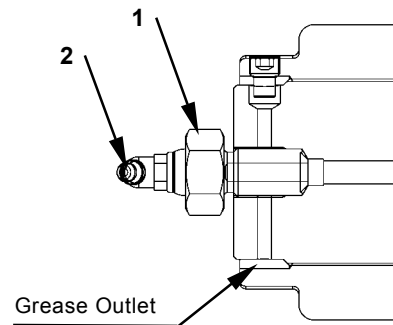
 : 88 N·m (9 kgf·m, 65 lbf·ft)

Track sag specifications (A):

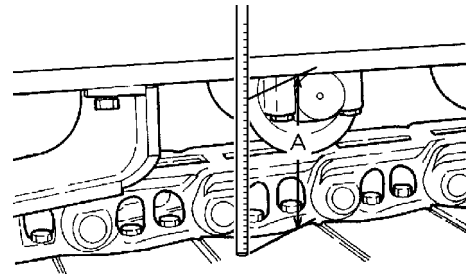
ZX 200-3 class, 225US-3 class, 225USR-3 class,

240-3 class: 300 to 335 mm (11.8 to 13.2 in)

ZX 270-3 class: 340 to 380 mm (13.4 to 15.0 in)



W1V7-03-04-006



W800-03-06-001

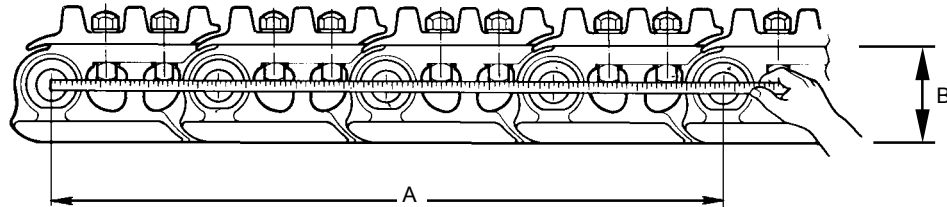
## UNDERCARRIAGE / Track

### 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

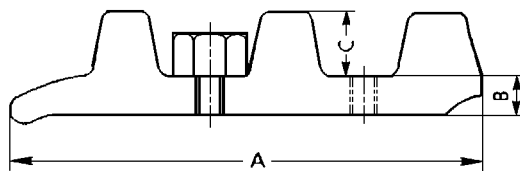
ZX 200-3 class, 225US-3 class, 225USR-3 class, 240-3 class Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	762 (30.0)	[796 (32)]	Cladding by welding and hand finishing, or replace
B	105 (4.1)	[98 (3.9)]	

ZX 270-3 class Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	866 (34)	[904 (36)]	Cladding by welding and hand finishing, or replace
B	116 (4.6)	[109 (4.3)]	

#### Grouser Shoe



W105-03-07-024

ZAXIS 200-3 Unit: mm (in)

Shoe Size	600 mm Grouser Shoe		
	Standard	Allowable Limit	Remedy
A	219 (8.6)	-	Cladding by welding or replace
B	8.5 (0.34)	-	
C	26 (1.02)	[18 (0.71)]	

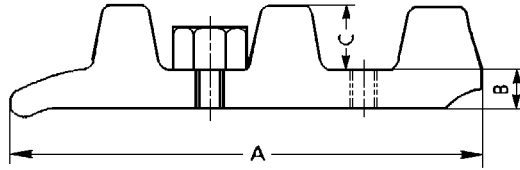
ZAXIS 210H-3, 210K-3 Unit: mm (in)

Shoe Size	600 mm Grouser Shoe		
	Standard	Allowable Limit	Remedy
A	219 (8.6)	-	Cladding by welding or replace
B	10 (0.39)	-	
C	26 (1.02)	[18 (0.71)]	

NOTE: Values in [ ] are just for reference.

## UNDERCARRIAGE / Track

### Grouser Shoe



ZAXIS 210LCN-3 Unit: mm (in)

500 mm Grouser Shoe			
Shoe Size	Standard	Allowable Limit	Remedy
A	219 (8.9)	-	Cladding by welding or replace
B	10 (0.39)	-	
C	26 (1.02)	[18 (0.71)]	

ZAXIS 250H-3, 250LCH-3, 250K-3, 250LCK-3, 250LC-3, 250LCN-3 Unit: mm (in)

600 mm Grouser Shoe			
Shoe Size	Standard	Allowable Limit	Remedy
A	217.5 (8.6)	-	Cladding by welding or replace
B	10 (0.39)	-	
C	26 (1.02)	[18 (0.71)]	

ZAXIS 280LC-3, 280LCN-3 Unit: mm (in)

600 mm Grouser Shoe			
Shoe Size	Standard	Allowable Limit	Remedy
A	247 (9.7)	-	Cladding by welding or replace
B	11 (0.43)	-	
C	36 (1.41)	[27 (1.06)]	

W105-03-07-024

ZAXIS 240-3, 240LC-3, 225US-3, 225USLC-3, 225USR-3, 225USRK-3, 225USRLC-3, 225USRLCK-3

Unit: mm (in)

600 mm Grouser Shoe			
Shoe Size	Standard	Allowable Limit	Remedy
A	217.5 (8.6)	-	Cladding by welding or replace
B	9.0 (0.35)	-	
C	26 (1.02)	[18 (0.71)]	

ZAXIS 270-3, 270LC-3 Unit: mm (in)

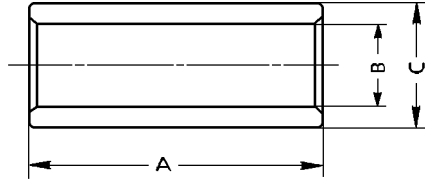
600 mm Grouser Shoe			
Shoe Size	Standard	Allowable Limit	Remedy
A	250 (9.84)	—	Cladding by welding or replace
B	11 (0.43)	—	
C	30 (1.18)	[21 (0.83)]	

NOTE: Values in [ ] are just for reference.



## UNDERCARRIAGE / Track

### Master Bushing



W105-03-07-023

ZX 200-3 class, 225US-3 class, 225USR-3 class,  
240-3 class

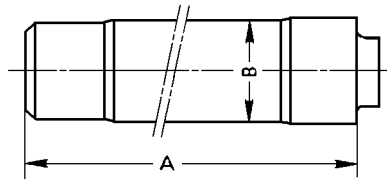
	Standard	Allowable Limit	Remedy
A	129.2 (5.08)	-	Replace
B	38.7 (1.52)	[41.7 (1.64)]	
C	59 (2.32)	[54 (2.13)]	

ZX 270-3 class

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	148.3 (5.84)	-	Replace
B	45.45 (1.79)	[48.5 (1.9)]	
C	66.91 (2.63)	[61.9 (2.4)]	

### Master Pin



W105-03-07-021


ZX 200-3 class, 225US-3 class, 225USR-3 class,  
240-3 class

	Standard	Allowable Limit	Remedy
A	203 (7.99)	-	Replace
B	38.4 (1.51)	[34.4 (1.35)]	

ZX 270-3 class

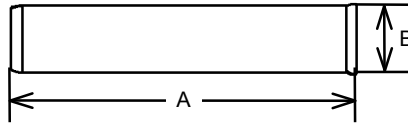
Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	227.5 (8.96)	-	Replace
B	45.0 (1.77)	[42.0 (1.7)]	

 NOTE: Values in [ ] are just for reference.

## UNDERCARRIAGE / Track

### Pin



W142-03-07-004

ZX 200-3 class, 225US-3 class, 225USR-3 class,  
240-3 class

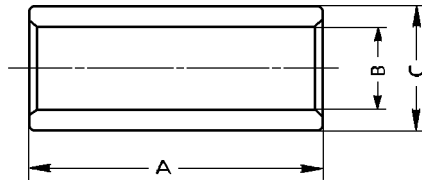
	Standard	Allowable Limit	Remedy
A	212 (8.35)	-	Replace
B	38 (1.50)	[35 (1.4)]	

ZX 270-3 class

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	242 (9.53)	-	Replace
B	44.69 (1.76)	[41.7 (1.64)]	

### Bushing



W105-03-07-023

ZX 200-3 class, 225US-3 class, 225USR-3 class,  
240-3 class

	Standard	Allowable Limit	Remedy
A	137.5 (5.41)	-	Replace
B	38.7 (1.52)	[39.7 (1.56)]	
C	59 (2.32)	[54 (2.13)]	

ZX 270-3 class

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	158.9 (6.26)	-	Replace
B	45.45 (1.79)	[46.5 (1.83)]	
C	66.91 (2.63)	[61.9 (2.44)]	

**NOTE:** Values in [ ] are just for reference.

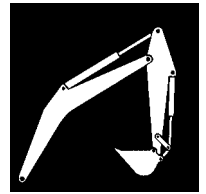




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# SECTION 4 FRONT ATTACHMENT



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## FRONT ATTACHMENT / Front Attachment

### LIST OF WEIGHT

Unit: kg (lb)

Parts Name	Model	Weight
Front attachment total of mono boom except boom cylinder	ZAXIS200-3, 200LC-3, 210LCN-3, 240N-3	3450 (7610)
	ZAXIS 210H-3, 210LCH-3, ZX225US-3 class, 225USR-3 class	3650 (8050)
	ZAXIS 210K-3, 210LCK-3	3800 (8380)
	ZAXIS 240-3, 240LC-3	4360 (10210)
	ZAXIS 250H-3, 250LCH-3	4600 (10140)
	ZAXIS 250K-3, 250LCK-3	4710 (10380)
	ZAXIS 250LC-3, 250LCN-3	4300 (9480)
	ZAXIS 270-3, 270LC-3	4730 (10430)
	ZAXIS 280LC-3, 280LCN-3	4920 (10850)
Front attachment total of 2-piece boom except boom cylinder	ZAXIS 210LCN-3, 240N-3	3280 (7230)
	ZAXIS 250LC-3, 250LCN-3	4530 (9990)
	ZAXIS 280LC-3, 280LCN-3	4820 (10630)
Boom cylinder	ZX200-3 class, 225US-3 class, 225USR-3 class	180 (397 lb)
	ZX240-3 class	220 (485 lb)
	ZX270-3 class	245 (540 lb)

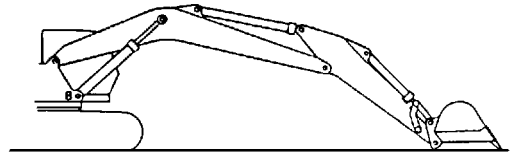
## FRONT ATTACHMENT / Front Attachment

### 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.

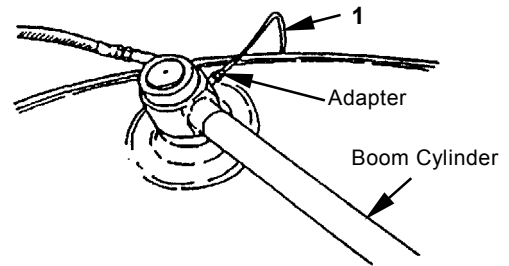


W105-04-02-001

#### Removal

1. Remove pipe (1) of lubrication pipes to the front attachment on the boss at the boom cylinder rod side from the adapter. (2 places on both left and right)


 : 17 mm

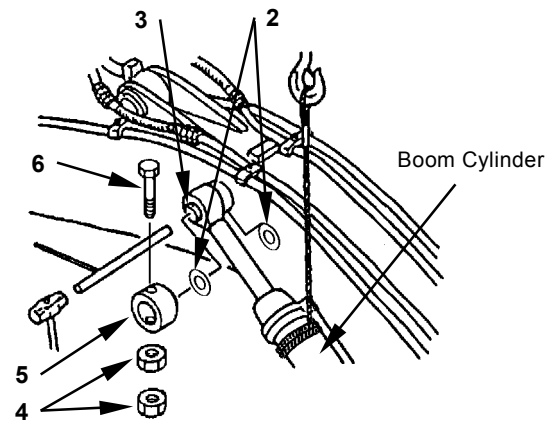


W105-04-01-002

**CAUTION:** Boom cylinder weight: Refer to the List of Weight on W4-1-1. Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

2. Hoist and hold the boom cylinder. Remove nut (4) and bolt (6) from boom cylinder rod front pin (3). Remove stopper (5). (2 places on both left and right)

 : 30 mm




W178-04-01-004



## FRONT ATTACHMENT / Front Attachment

- By using a bar and hammer tap pin (3) into the position where thrust plate (2) can be removed. Remove pin (3) and thrust plate (2).

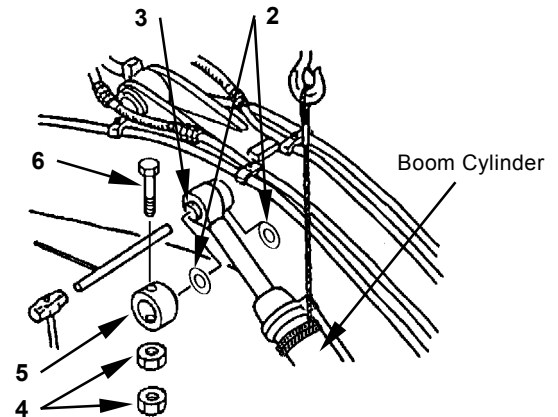
 **NOTE:** When pin (3) is impossible to remove, start the engine and operate the boom lever. Adjust the piston rod pin hole on boom cylinder while hoisting/lowering the front attachment.

- Place the tube top of boom cylinder on a stand of 1 m (39.4 in) height. Start the engine. Operate the boom lever and retract the boom cylinder. In order not to extend the rod, pass a wire through the rod hole and secure the rod to the cylinder tube.

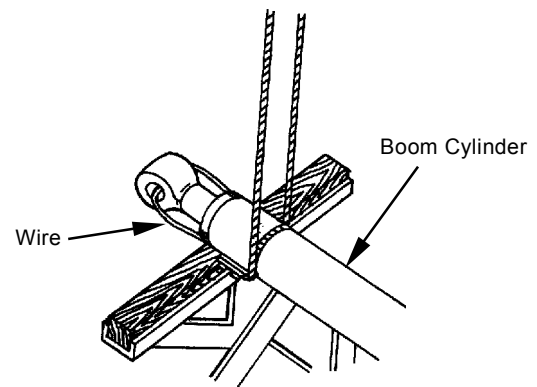
- Stop the engine. Remove the boom cylinder. Refer to "Remove Boom Cylinder" on W4-2-12.

- Remove other boom cylinder in the same procedures as steps 2 to 5.

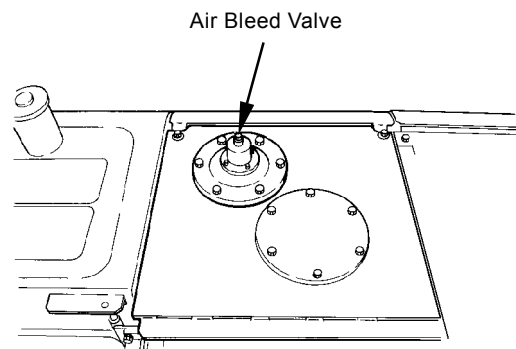
- After stopping the engine, push the air bleed valve. Release any pressure in the hydraulic oil tank and remove the cap. Completely release the pressure in the hydraulic circuit. Refer to "Hydraulic Circuit Pressure Release Procedure" on W4-2-1.



W178-04-01-004




W178-02-11-274




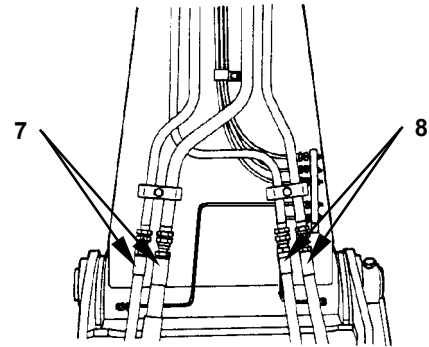
W1V1-04-01-008

## FRONT ATTACHMENT / Front Attachment

8. Remove hoses (7, 8) of the bucket cylinder and arm cylinder. Cap the removed hoses and pipes.

 : 36 mm, 41 mm


 **NOTE:** The pipe position and shape are different due to each class. The illustration in the right shows for ZX200-3 class, 240-3 class, 270-3 class. The pipes of ZX225US-3 class, 225USR-3 class are located at the right side of boom.




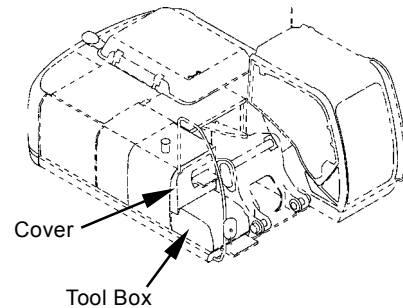
W1V1-04-01-001

(ZX200-3 class, 240-3 class, 270-3 class)

9. Remove the mounting bolts (9 used) for tool box and cover. Remove the tool box and cover.  
(ZX200-3 class, 240-3 class, 270-3 class)


 : 17 mm

 **NOTE:** The removal / installation procedures of tool box are different due to each class. Perform step 9 for ZX200-3 class, 240-3 class, 270-3 class. Perform step 10 to 13 on W4-1-5 for ZX225US-3 class, 225USR-3 class.




W1V1-04-01-002

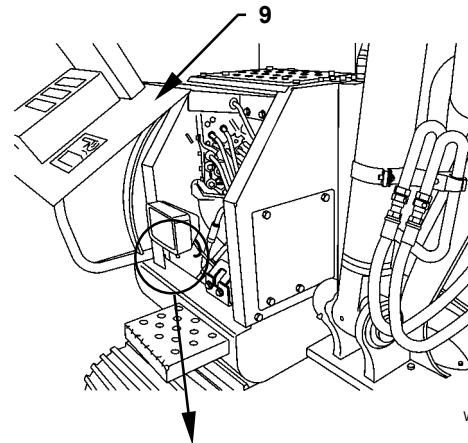
## FRONT ATTACHMENT / Front Attachment

 **NOTE:** Steps 10 to 13 are the removal/ installation procedures of tool box (control valve box) for ZX225US-3 class, 225USR-3 class.

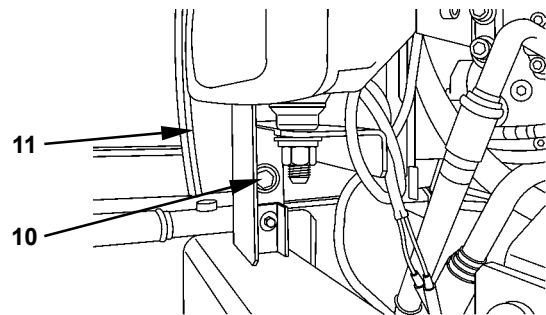
10. Open and lock front cover (9).

11. Remove bolt (10). Open side cover (11).

 : 17 mm




W1V1-02-05-075




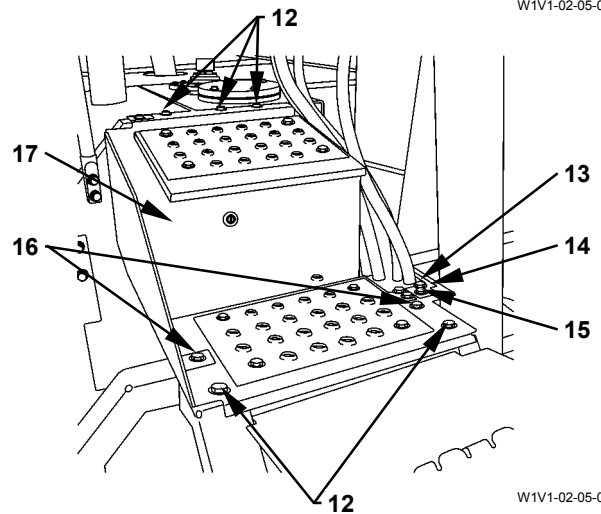
W1V1-02-05-076

12. Remove bolts (13, 15) (2 used for each). Remove brackets (14) (2 used) from upper cover (17).

 : 17 mm

13. Remove bolts (12) (5 used). Remove upper cover (17).

 : 17 mm




W1V1-02-05-078


## FRONT ATTACHMENT / Front Attachment

14. Remove bolt (14), washer (15), plate (13) and block (12) from the plate of boom foot pin (11).

ZX200-3 class, 225US-3 class, 225USR-3 class

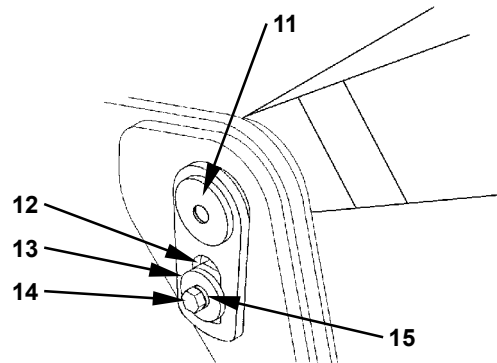
 : 27 mm

ZX240-3 class, 270-3 class

 : 32 mm

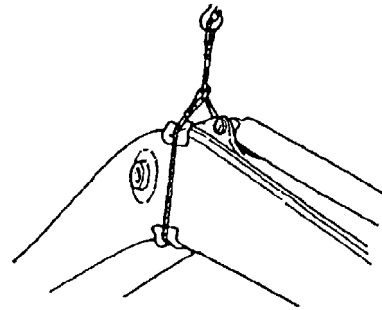


**CAUTION: The front attachment assembly weight: Refer to the List of Weight on W4-1-1.**



W178-02-11-280

15. Attach a wire rope to the boom. Take up slack of wire ropes.



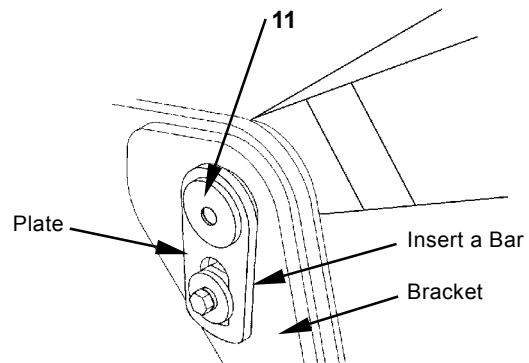
W178-02-11-281

16. Insert a pry bar between the plate of boom foot pin (11) and the bracket. Slightly pull out the plate.



**CAUTION: Boom foot pin (11) weight: 62 kg (137 lb)**

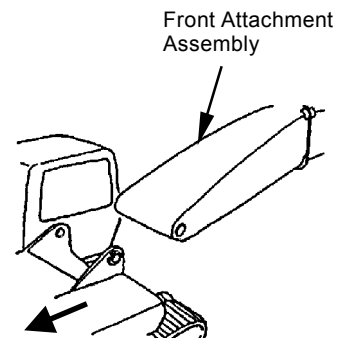
17. Turn the plate upward by hand. Turn the plate left and right and pull out boom foot pin (11). (Adjust the position by using the lifting rope for the front attachment.)



W178-02-11-280

18. Hoist the front attachment assembly and move the machine backward.

19. Place the wooden block. Place the front attachment assembly onto the wooden block.



W178-02-11-282

## FRONT ATTACHMENT / Front Attachment

### Installation

**CAUTION:** The front attachment assembly weight: Refer to the List of Weight on W4-1-1.

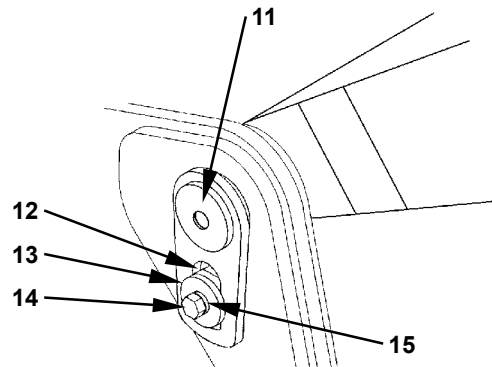
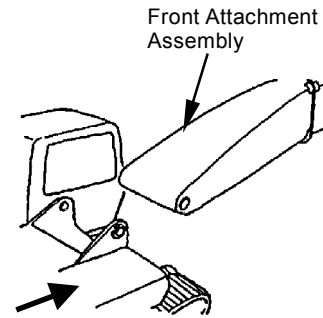
1. Hoist the front attachment assembly. Move the machine forward and align the boom foot with the mounting hole for frame.  
Insert the thrust plate into the left and right sides of boom and adjust the clearance between plate and frame within 1 mm.  
(Adjust the position by using the lifting rope for 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 (11). Install bolt (14), washer (15), plate (13) and block (12).  
ZX200-3 class, 225US-3 class, 225USR-3 class  
🔧 : 27 mm  
🔩 : 392 N·m (40 kgf·m, 290 lbf·ft)  
ZX240-3 class, 270-3 class  
🔧 : 32 mm  
🔩 : 750 N·m (77 kgf·m, 553 lbf·ft)

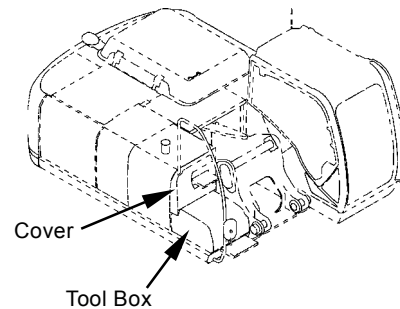
3. Install the tool box and cover with the bolts (9 used). (ZX200-3 class, 240-3 class, 270-3 class)  
🔧 : 17 mm  
🔩 : 50 N·m (5.0 kgf·m, 37 lbf·ft)

**NOTE:** The removal / installation procedures of tool box are different due to each class. Perform step 3 for ZX200-3 class, 240-3 class, 270-3 class. Perform steps 4 to 7 on W4-1-8 for ZX225US-3 class, 225USR-3 class.



W178-02-11-282


W178-02-11-280




W1V1-04-01-002


## FRONT ATTACHMENT / Front Attachment


4. Install upper cover (17) with bolts (12) (5 used).

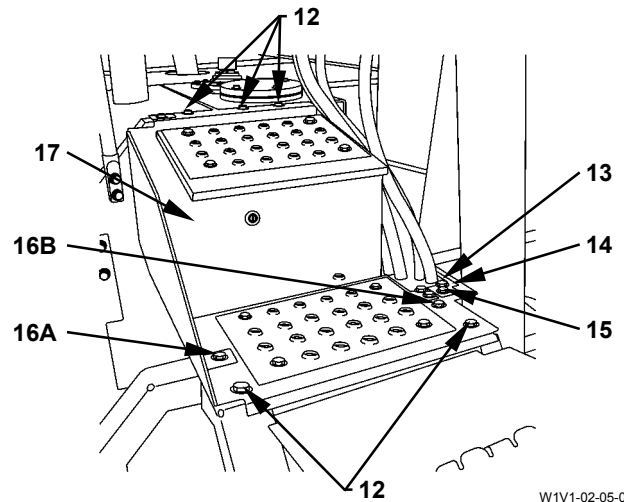
 : 17 mm

 : 50 N·m (5.2 kgf·m, 37 lbf·ft)


5. Install brackets (14) (2 used) to upper cover (17) with bolts (13, 15) (2 used for each).


 : 17 mm

 : 50 N·m (5.2 kgf·m, 37 lbf·ft)

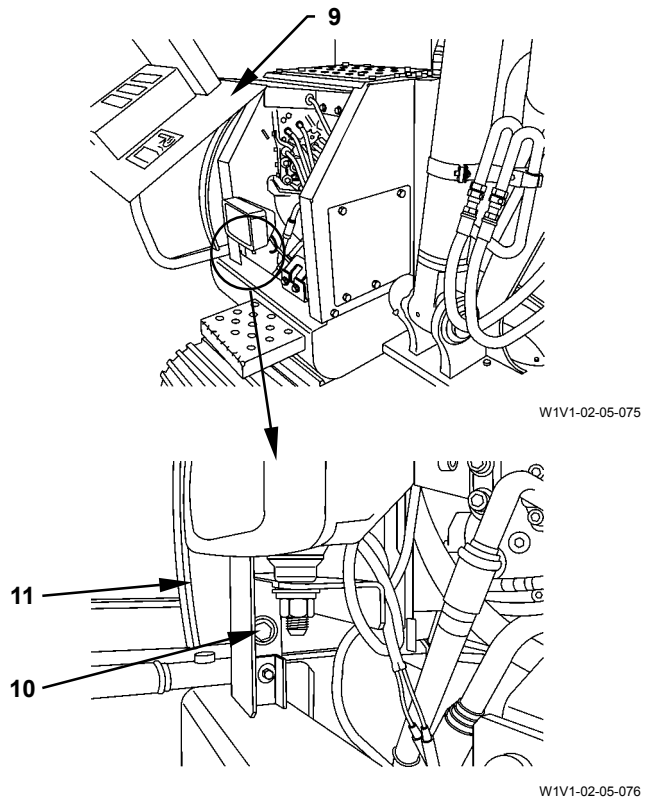


6. Close side cover (11). Install bolt (10).

 : 17 mm


 : 50 N·m (5.2 kgf·m, 37 lbf·ft)


7. Close front cover (9).





## FRONT ATTACHMENT / Front Attachment


8. Remove the caps from hoses and pipes. Install hoses (7, 8) of the bucket cylinder and arm cylinder.

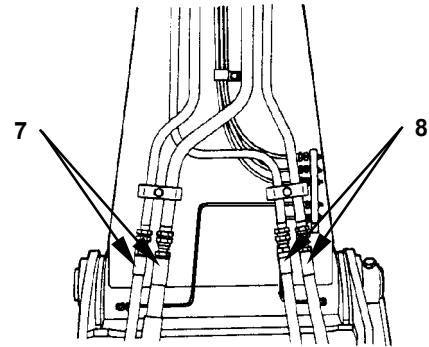
 : 36 mm

 : 180 N·m (18 kgf·m, 133 lbf·ft)

 : 41 mm

 : 210 N·m (21 kgf·m, 155 lbf·ft)

 **NOTE:** The pipe position and shape are different due to each class. The illustration in the right shows for ZX200-3 class, 240-3 class, 270-3 class. The pipes of ZX225US-3 class, 225US-3 class are located at the right side of boom.



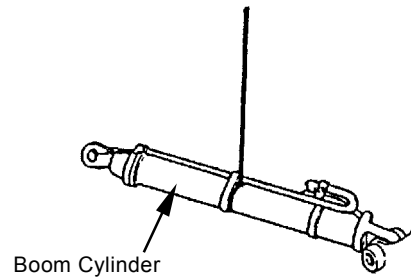
W1V1-04-01-001

(ZX200-3 class, 240-3 class, 270-3 class)



**CAUTION: Boom cylinder weight:  
Refer to the List of Weight on W4-1-1.**

9. Hoist and install the boom cylinder.  
Refer to "Install Boom Cylinder" on W4-2-16.



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.


10. Hoist and hold the boom cylinder. Insert thrust plates (2) (2 used). Install pin (3). Install the boom cylinder on both sides.


11. Install stopper (5). Tighten with bolt (6) and nuts (4) (2 used). (2 places on both left and right)

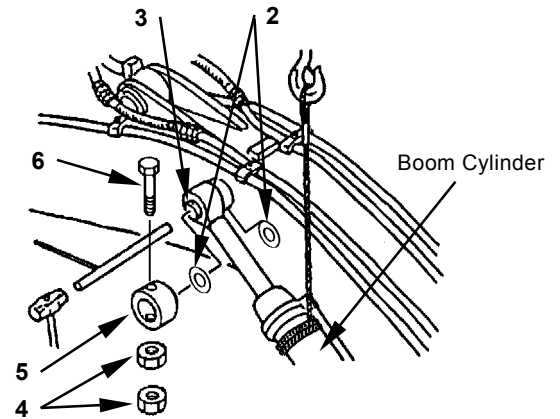
 : 30 mm

 : 550 N·m (55 kgf·m, 405 lbf·ft)

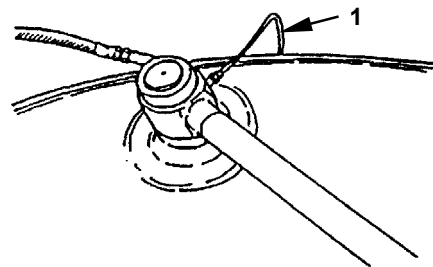
12. Install lubrication pipe (1) to the rod side of boom cylinder. (2 places on both left and right)

 : 17 mm

 : 30 N·m (3.0 kgf·m, 22 lbf·ft)

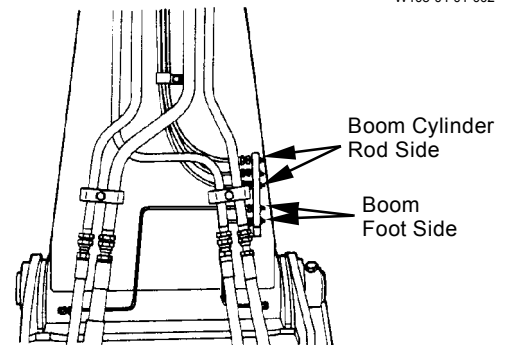


W178-04-01-004



W105-04-01-002

13. Apply grease to the rod side, bottom side and boom foot side of boom cylinder.



W1V1-04-01-001



## FRONT ATTACHMENT / Front Attachment

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**IMPORTANT:** When removing the arm from the boom, perform the following steps when installing the arm.

14. Install thrust plates (14) into left and right sides of arm. Adjust total clearance of left and right within 1.5 mm.
15. Install the rod side of arm cylinder to the arm. Apply grease to grease fittings (15, 16) on the boom connecting boss of arm and the arm cylinder rod side.

**IMPORTANT:** For handling of HN bushing for the front attachment, check the followings.

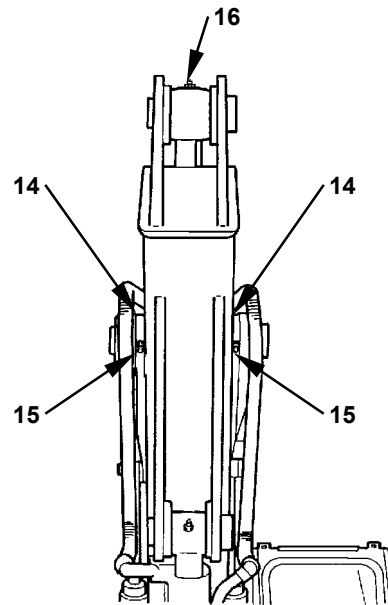
Precautions when installing the bushing  
If a hammer is used, the bushing may be damaged.  
Use a press.

Precautions when reinforcing the arm  
The heat when welding in order to reinforce the arm may cause oil leakage and decrease lubrication performance.  
When lubrication oil leaks, replace the bushing.

Use special tool when removing or installing the bushing.

Special tool:

- ZX200-3 class, 225US-3 class, 225USR-3 class:  
ST 1454
- ZX240-3 class, 270-3 class: ST 1477



W178-02-11-285

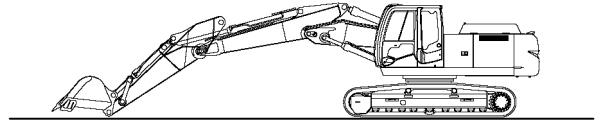
## FRONT ATTACHMENT / Front Attachment

### 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.



W1V1-04-01-013


#### Removal

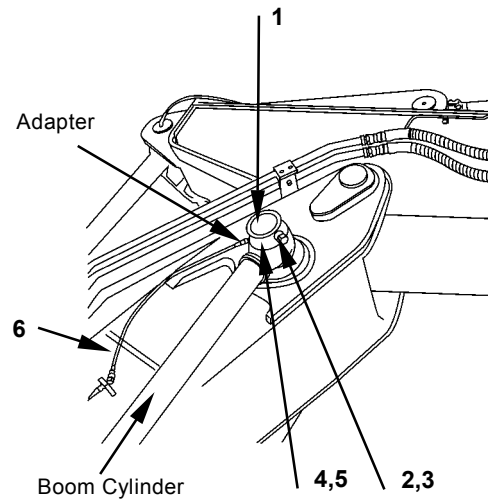
1. Remove pipe (6) of lubrication pipes to the front attachment on the boss at the boom cylinder rod side from the adapter.  
(2 places on both left and right)  
 : 17 mm

 **CAUTION:** Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

 **CAUTION:** Boom cylinder weight:  
Refer to the List of Weight on W4-1-1.

2. Hoist and hold the boom cylinder. Remove nut (3) and bolt (2) from boom cylinder rod front pin (1). Remove stopper (4). (2 places on both left and right)


 : 30 mm



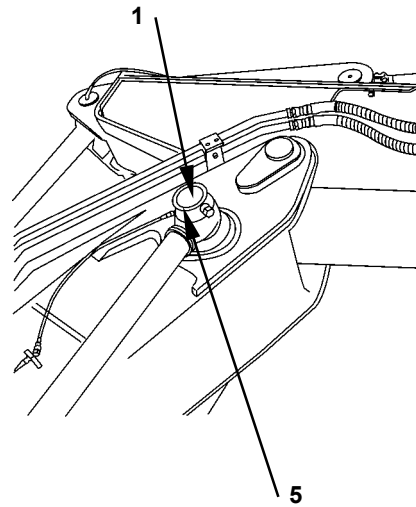
W1V1-04-01-003

## FRONT ATTACHMENT / Front Attachment

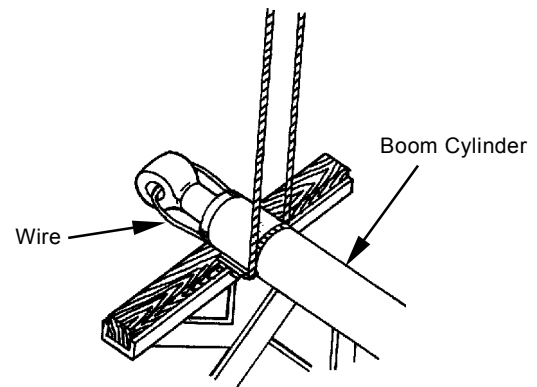
3. By using a bar and hammer tap pin (1) into the position where thrust plate (5) on the boom side can be removed. Remove thrust plate (5).

 **NOTE:** When pin (1) is impossible to remove, start the engine and operate the boom lever. Adjust the piston rod pin hole on boom cylinder while hoisting / lowering the front attachment.

4. Place the tube end of boom cylinder on a stand of 1 m (39.4 in) height. Start the engine. Operate the boom lever and retract the boom cylinder. In order not to extend the rod, pass a wire through the rod hole and secure the rod to the cylinder tube.
5. Stop the engine. Remove the boom cylinder. Refer to "Remove Boom Cylinder" on W4-2-12.
6. Remove other boom cylinder in the same procedures as steps 2 to 5.



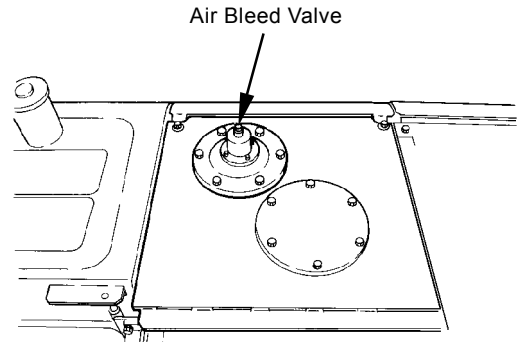
W1V1-04-01-003



W178-02-11-274


## FRONT ATTACHMENT / Front Attachment

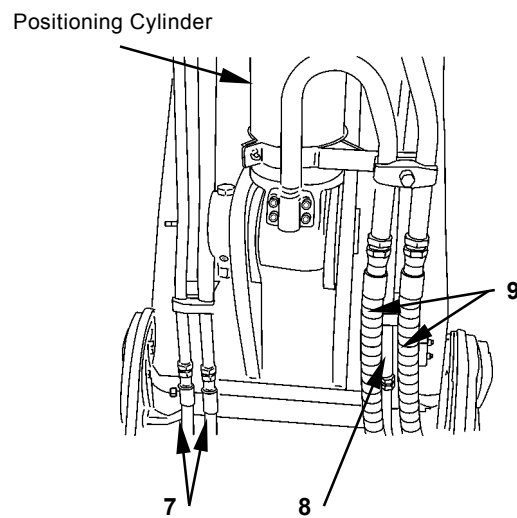
- After stopping the engine, push the air bleed valve. Release any pressure in the hydraulic oil tank and remove the cap. Completely release the pressure in the hydraulic circuit. Refer to "Hydraulic Circuit Pressure Release Procedure" on W4-2-1.



W1V1-04-01-008


- Remove hoses (7, 8) (4 used) from the bucket cylinder and arm cylinder, and remove hoses (9) (2 used) from the positioning cylinder. Cap the removed hoses and pipes.

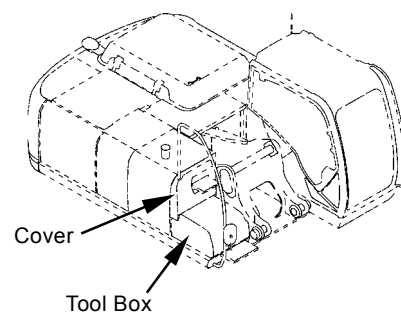
 : 36 mm, 41 mm



W1V1-04-01-004

- Remove the mounting bolts (9 used) for tool box and cover. Remove the tool box and cover.

 : 17 mm




W1V1-04-01-002


## FRONT ATTACHMENT / Front Attachment

10. Remove bolt (12), washer (11), plate (13) and block (14) from the plate of boom foot pin (10).

ZX200-3 class

 : 27 mm

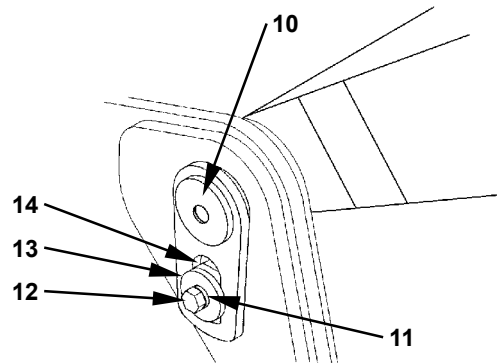
ZX240-3 class, 270-3 class

 : 32 mm



**CAUTION:** The front attachment assembly weight: Refer to the List of Weight on W4-1-1.

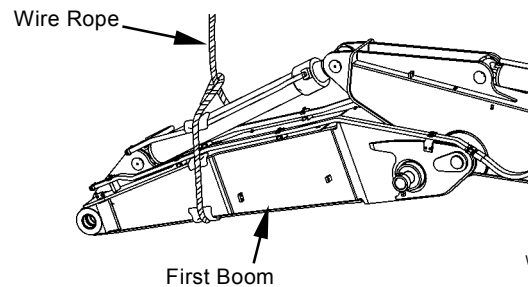
11. Attach a wire rope to the first boom. Take up slack of wire ropes.



W178-02-11-280

12. Insert a pry bar between the plate of boom foot pin (10) and the bracket. Slightly pull out the plate.

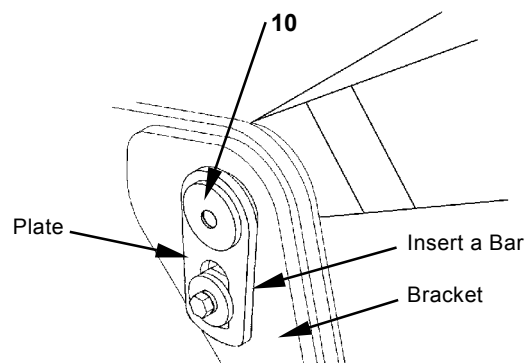
13. Turn the plate upward by hand. Turn the plate left and right and pull out boom foot pin (10).  
(Adjust the position by using the lifting rope for the front attachment.)



W1V1-04-01-007

14. Hoist and hold the front attachment assembly. Move the machine backward.

15. 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: Refer to the List of Weight on W4-1-1.

1. Attach a wire rope to the first boom. Hoist and hold the front attachment assembly. Move the machine forward and align the boom foot with the mounting hole for frame.


Insert the thrust plate into the left and right sides of boom and adjust the clearance between plate and frame 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 (10). Install bolt (12), washer (11), plate (13) and block (14).


ZX200-3 class

 : 27 mm


 : 392 N·m (40 kgf·m, 290 lbf·ft)


ZX240-3 class, 270-3 class

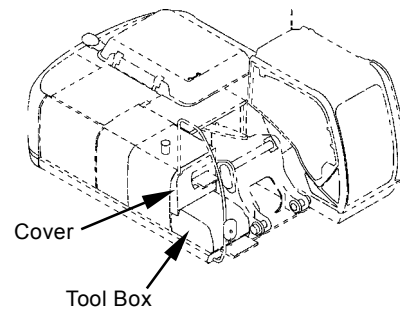
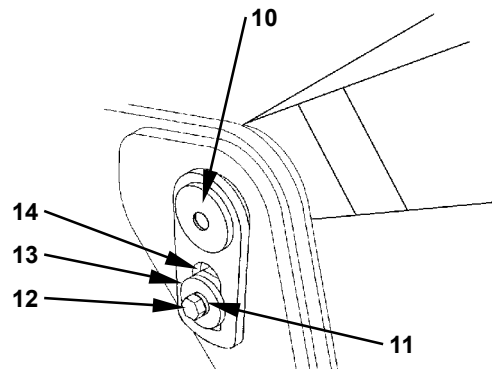
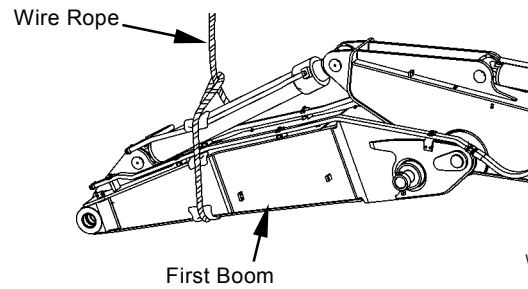
 : 32 mm

 : 750 N·m (77 kgf·m, 553 lbf·ft)

3. Install the tool box and cover with the bolts (9 used).


 : 17 mm


 : 50 N·m (5.0 kgf·m, 37 lbf·ft)





## FRONT ATTACHMENT / Front Attachment

4. Remove the cap from hose and pipe. Install hoses (7, 8, 9) to the bucket cylinder, arm cylinder and positioning cylinder.

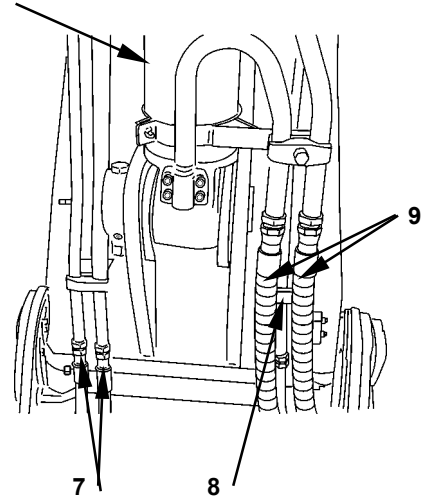
 : 36 mm

 : 180 N·m (18 kgf·m, 133 lbf·ft)

 : 41 mm

 : 210 N·m (21 kgf·m, 155 lbf·ft)

Positioning Cylinder

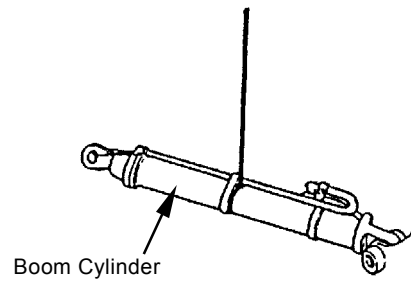


W1V1-04-01-004



**CAUTION: Boom cylinder weight:  
Refer to the List of Weight on W4-1-1.**

5. Hoist and install the boom cylinder.  
Refer to "Install Boom Cylinder" on W4-2-16.



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 the boom cylinder. Insert thrust plates (5) (2 used). Install pin (1). Install the boom cylinder on both sides.


7. Install stopper (4) and tighten with bolt (2) and nuts (3) (2 used). (2 places on both left and right)

 : 30 mm

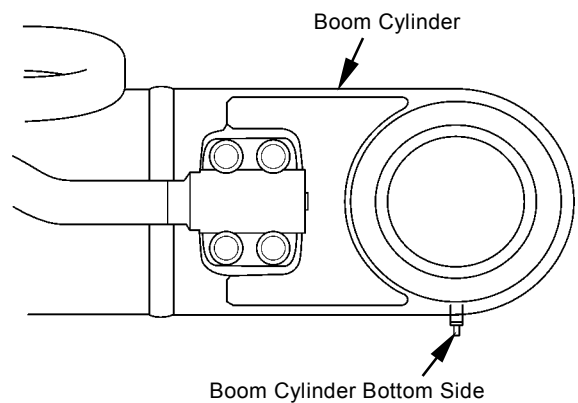
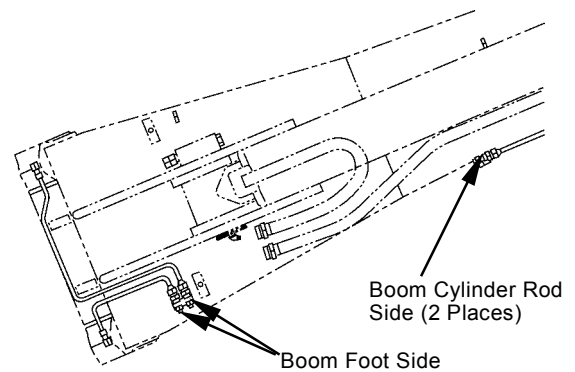
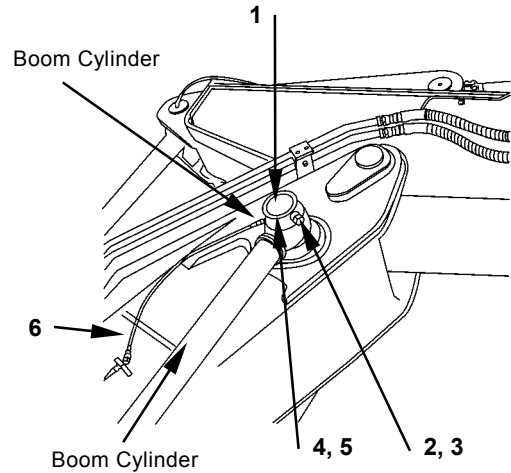
 : 550 N·m (55 kgf·m, 405 lbf·ft)

8. Install lubrication pipe (6) to the rod side of boom cylinder. (2 places on both left and right)

 : 17 mm

 : 30 N·m (3.0 kgf·m, 22 lbf·ft)

9. Apply grease to the rod side, bottom side, (at both right and left sides) and boom foot side of boom cylinder.





## FRONT ATTACHMENT / Front Attachment

**IMPORTANT: When removing the arm from the boom, perform the following steps when installing the arm.**

10. Install thrust plates (15) into left and right sides of arm. Adjust total clearance of left and right within 1.5 mm.
11. Install the rod side of arm cylinder to the arm. Apply grease to grease fittings (14, 16) in the first boom connecting boss of arm and the rod side of arm cylinder.

**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 press.

Precautions when reinforcing the arm

The heat when welding in order to reinforce the arm may cause oil leakage and decrease lubrication performance.

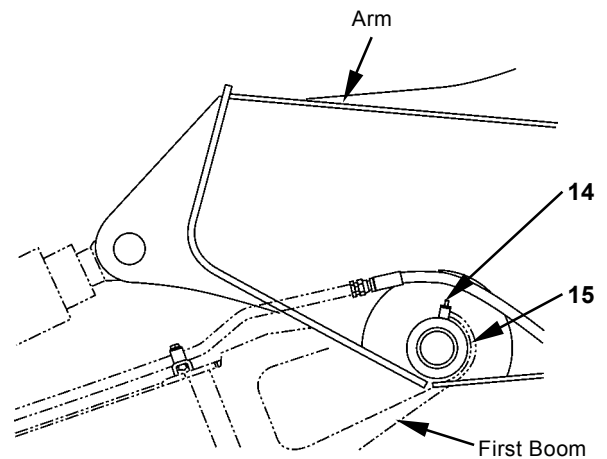
When lubrication oil leaks, replace the bushing.

Use special tool when removing or installing the bushing.

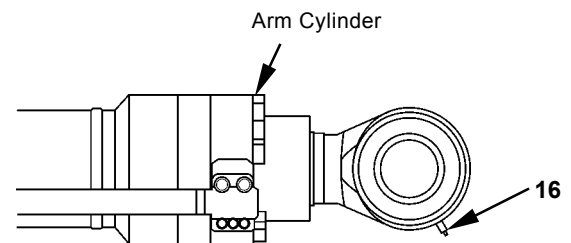
Special tool:

ZX200-3 class: ST 1454

ZX240-3 class, 270-3 class: ST 1477



W1V1-04-01-010

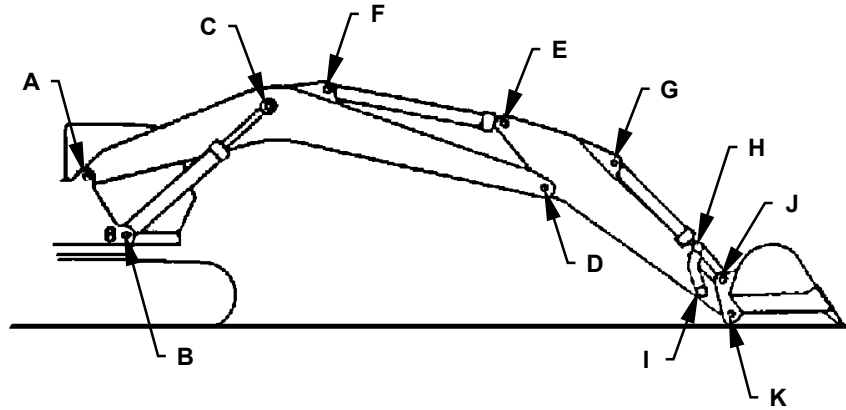


W1V1-04-01-009

## FRONT ATTACHMENT / Front Attachment

### MAINTENANCE STANDARD (MONO BOOM)

#### Pin and Bushing ZX200-3 class



W1V1-04-01-012

				Unit: mm (in)
				Remedy
	Item	Standard	Allowable Limit	
A	Pin	90 (3.54)	89.0 (3.50)	Replace
	Boss (Main Frame)	90 (3.54)	91.5 (3.60)	
	Bushing (Boom)	90 (3.54)	91.5 (3.60)	
B	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Main Frame)	80 (3.15)	81.5 (3.21)	
	Bushing (Boom Cylinder)	80 (3.15)	81.5 (3.21)	
C	Pin	90 (3.54)	89.0 (3.50)	
	Bushing (Boom Cylinder)	90 (3.54)	91.5 (3.60)	
	Boss (Boom)	90 (3.54)	91.5 (3.60)	
D	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Boom)	90 (3.54)	91.5 (3.60)	
	Bushing (Arm)	90 (3.54)	91.5 (3.60)	
E	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Arm)	80 (3.15)	81.5 (3.21)	
	Bushing (Arm Cylinder)	80 (3.15)	81.5 (3.21)	
F	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Boom)	80 (3.15)	81.5 (3.21)	
	Bushing (Arm Cylinder)	80 (3.15)	81.5 (3.21)	

## FRONT ATTACHMENT / Front Attachment

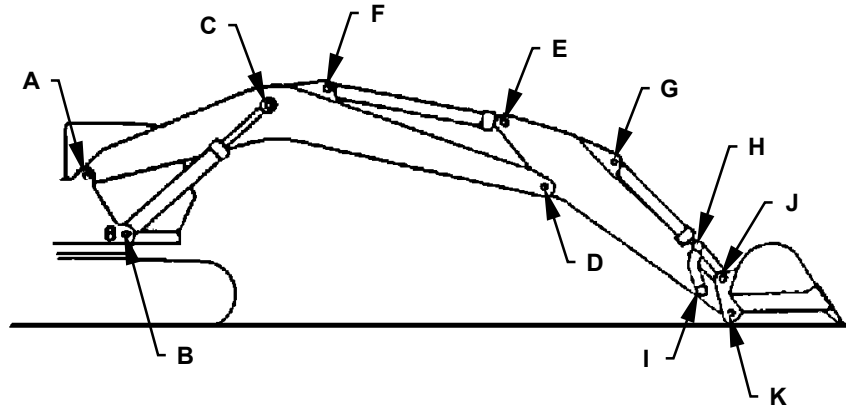
				Unit: mm (in)
	Item	Standard	Allowable Limit	Remedy
G	Pin	71 (2.80)	70.0 (2.76)	Replace
	Boss (Arm)	71 (2.80)	72.5 (2.85)	
	Bushing (Bucket Cylinder)	71 (2.80)	72.5 (2.85)	
H	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Link B)	80 (3.15)	79.0 (3.11)	
	Bushing (Link A)	80 (3.15)	81.5 (3.21)	
	Bushing (Bucket Cylinder)	80 (3.15)	81.5 (3.21)	
I	Pin	71 (2.80)	70.0 (2.76)	
	Boss (Arm)	71 (2.80)	72.5 (2.85)	
	Bushing (Arm)	71 (2.80)	72.5 (2.85)	
J	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Bucket)	80 (3.15)	79.0 (3.11)	
	Bushing (Link A)	80 (3.15)	81.5 (3.21)	
K	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Bucket)	80 (3.15)	79.0 (3.11)	
	Bushing (Arm)	80 (3.15)	81.5 (3.21)	

**IMPORTANT:** When replacing HN bushing for the front attachment, install it by using a press.

## FRONT ATTACHMENT / Front Attachment

### Pin and Bushing

ZX225US-3 class, 225USR-3 class



W1V1-04-01-012

Unit: mm (in)

	Item	Standard	Allowable Limit	Remedy
A	Pin	90 (3.54)	89.0 (3.50)	Replace
	Boss (Main Frame)	90 (3.54)	91.5 (3.60)	
	Bushing (Boom)	90 (3.54)	91.5 (3.60)	
B	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Main Frame)	80 (3.15)	81.5 (3.21)	
	Bushing (Boom Cylinder)	80 (3.15)	81.5 (3.21)	
C	Pin	90 (3.54)	89.0 (3.50)	
	Bushing (Boom Cylinder)	90 (3.54)	91.5 (3.60)	
	Boss (Boom)	90 (3.54)	91.5 (3.60)	
D	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Boom)	90 (3.54)	91.5 (3.60)	
	Bushing (Arm)	90 (3.54)	91.5 (3.60)	
E	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Arm)	80 (3.15)	81.5 (3.21)	
	Bushing (Arm Cylinder)	80 (3.15)	81.5 (3.21)	
F	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Boom)	80 (3.15)	81.5 (3.21)	
	Bushing (Arm Cylinder)	80 (3.15)	81.5 (3.21)	

## FRONT ATTACHMENT / Front Attachment

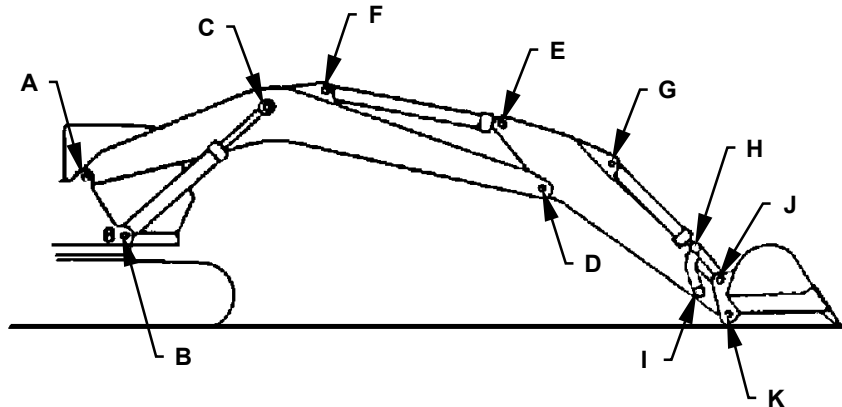
				Unit: mm (in)
	Item	Standard	Allowable Limit	Remedy
G	Pin	71 (2.80)	70.0 (2.76)	Replace
	Boss (Arm)	71 (2.80)	72.5 (2.85)	
	Bushing (Bucket Cylinder)	71 (2.80)	72.5 (2.85)	
H	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Link B)	80 (3.15)	79.0 (3.11)	
	Bushing (Link A)	80 (3.15)	81.5 (3.21)	
	Bushing (Bucket Cylinder)	80 (3.15)	81.5 (3.21)	
I	Pin	71 (2.80)	70.0 (2.76)	
	Boss (Arm)	71 (2.80)	72.5 (2.85)	
	Bushing (Arm)	71 (2.80)	72.5 (2.85)	
J	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Bucket)	80 (3.15)	79.0 (3.11)	
	Bushing (Link A)	80 (3.15)	81.5 (3.21)	
K	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Bucket)	80 (3.15)	79.0 (3.11)	
	Bushing (Arm)	80 (3.15)	81.5 (3.21)	

**IMPORTANT:** When replacing HN bushing for the front attachment, install it by using a press.

## FRONT ATTACHMENT / Front Attachment

### Pin and Bushing

ZX240-3 class



W1V1-04-01-012

				Unit: mm (in)
	Item	Standard	Allowable Limit	Remedy
A	Pin	100 (3.94)	99.0 (3.90)	Replace
	Boss (Main Frame)	100 (3.94)	101.5 (4.00)	
	Bushing (Boom)	100 (3.94)	101.5 (4.00)	
B	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Main Frame)	90 (3.54)	91.5 (3.60)	
	Bushing (Boom Cylinder)	90 (3.54)	91.5 (3.60)	
C	Pin	90 (3.54)	89.0 (3.50)	
	Bushing (Boom Cylinder)	90 (3.54)	91.5 (3.60)	
	Boss (Boom)	90 (3.54)	91.5 (3.60)	
D	Pin	100 (3.94)	99.0 (3.90)	
	Boss (Boom)	100 (3.94)	101.5 (4.00)	
	Bushing (Arm)	100 (3.94)	101.5 (4.00)	
E	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Arm)	90 (3.54)	91.5 (3.60)	
	Bushing (Arm Cylinder)	90 (3.54)	91.5 (3.60)	
F	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Boom)	90 (3.54)	91.5 (3.60)	
	Bushing (Arm Cylinder)	90 (3.54)	91.5 (3.60)	

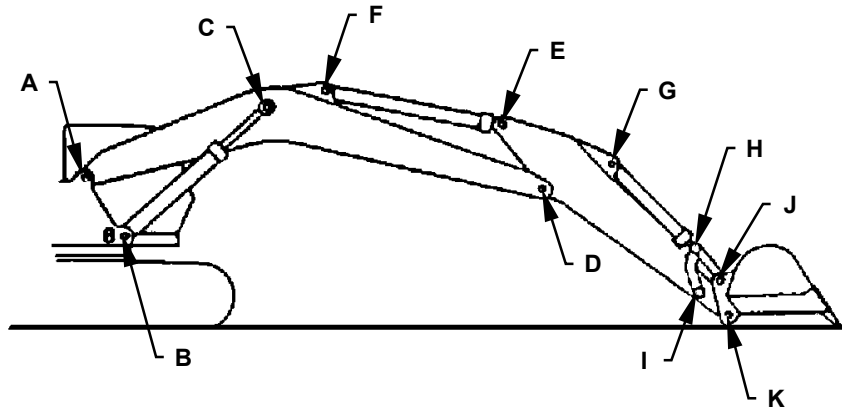
## FRONT ATTACHMENT / Front Attachment

				Unit: mm (in)
	Item	Standard	Allowable Limit	Remedy
G	Pin	80 (3.15)	79.0 (3.11)	Replace
	Boss (Arm)	80 (3.15)	81.5 (3.21)	
	Bushing (Bucket Cylinder)	80 (3.15)	81.5 (3.21)	
H	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Link B)	90 (3.54)	91.5 (3.60)	
	Bushing (Link A)	90 (3.54)	91.5 (3.60)	
	Bushing (Bucket Cylinder)	90 (3.54)	91.5 (3.60)	
I	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Arm)	80 (3.15)	81.5 (3.12)	
	Bushing (Arm)	80 (3.15)	81.5 (3.21)	
J	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Bucket)	90 (3.54)	91.5 (3.60)	
	Bushing (Link A)	90 (3.54)	91.5 (3.60)	
K	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Bucket)	90 (3.54)	91.5 (3.60)	
	Bushing (Arm)	90 (3.54)	91.5 (3.60)	

**IMPORTANT:** When replacing HN bushing for the front attachment, install it by using a press.

## FRONT ATTACHMENT / Front Attachment

**Pin and Bushing  
ZX270-3 class**



W1V1-04-01-012

				Unit: mm (in)
				Remedy
	Item	Standard	Allowable Limit	
A	Pin	100 (3.94)	99.0 (3.90)	Replace
	Boss (Main Frame)	100 (3.94)	101.5 (4.00)	
	Bushing (Boom)	100 (3.94)	101.5 (4.00)	
B	Pin	100 (3.94)	99.0 (3.90)	
	Boss (Main Frame)	100 (3.94)	101.5 (4.00)	
	Bushing (Boom Cylinder)	100 (3.94)	101.5 (4.00)	
C	Pin	100 (3.94)	99.0 (3.90)	
	Bushing (Boom Cylinder)	100 (3.94)	101.5 (4.00)	
	Boss (Boom)	100 (3.94)	101.5 (4.00)	
D	Pin	100 (3.94)	99.0 (3.90)	
	Boss (Boom)	100 (3.94)	101.5 (4.00)	
	Bushing (Arm)	100 (3.94)	101.5 (4.00)	
E	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Arm)	100 (3.94)	101.5 (4.00)	
	Bushing (Arm Cylinder)	100 (3.94)	101.5 (4.00)	
F	Pin	100 (3.94)	99.0 (3.90)	
	Boss (Boom)	100 (3.94)	101.5 (4.00)	
	Bushing (Arm Cylinder)	100 (3.94)	101.5 (4.00)	



## FRONT ATTACHMENT / Front Attachment

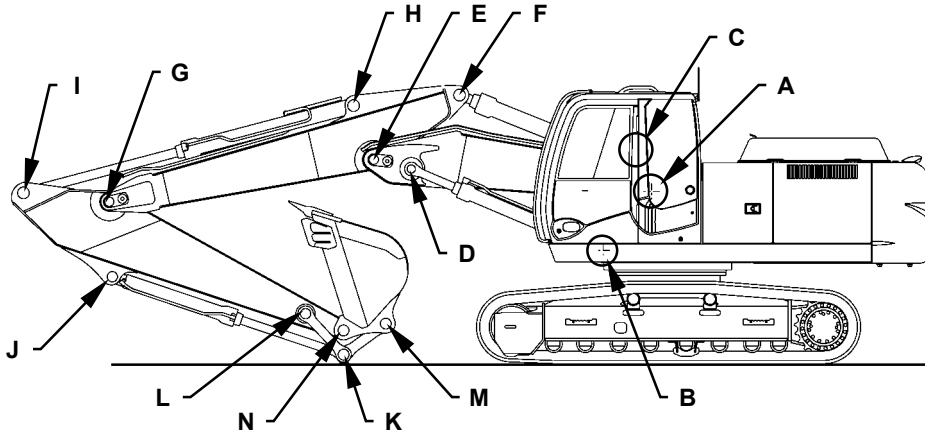
				Unit: mm (in)
	Item	Standard	Allowable Limit	Remedy
G	Pin	80 (3.15)	79.0 (3.11)	Replace
	Boss (Arm)	80 (3.15)	81.5 (3.21)	
	Bushing (Bucket Cylinder)	80 (3.15)	81.5 (3.21)	
H	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Link B)	90 (3.54)	91.5 (3.60)	
	Bushing (Lin A)	90 (3.54)	91.5 (3.60)	
	Bushing (Bucket Cylinder)	90 (3.54)	91.5 (3.60)	
I	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Arm)	80 (3.15)	81.5 (3.21)	
	Bushing (Arm)	80 (3.15)	81.5 (3.21)	
J	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Bucket)	90 (3.54)	91.5 (3.60)	
	Bushing (Link A)	90 (3.54)	91.5 (3.60)	
K	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Bucket)	90 (3.54)	91.5 (3.60)	
	Bushing (Arm)	90 (3.54)	91.5 (3.60)	

**IMPORTANT:** When replacing HN bushing for the front attachment, install it by using a press.

## FRONT ATTACHMENT / Front Attachment

### MAINTENANCE STANDARD (2-PIECE BOOM)

**Pin and Bushing**  
**ZX200-3 class**



W1V1-04-01-006

				Unit: mm (in)
	Item	Standard	Allowable Limit	Remedy
A	Pin	90 (3.54)	89.0 (3.50)	Replace
	Boss (Main Frame)	90 (3.54)	91.5 (3.60)	
	Bushing (First Boom)	90 (3.54)	91.5 (3.60)	
B	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Main Frame)	80 (3.15)	79.0 (3.11)	
	Bushing (Boom Cylinder)	80 (3.15)	81.5 (3.21)	
C	Pin	90 (3.54)	89.0 (3.50)	
	Bushing (Positioning Cylinder)	90 (3.54)	91.5 (3.60)	
	Boss (First Boom)	90 (3.54)	91.5 (3.60)	
D	Pin	90 (3.54)	89.0 (3.50)	
	Bushing (Boom Cylinder)	90 (3.54)	91.5 (3.60)	
	Boss (First Boom)	90 (3.54)	92.0 (3.62)	
E	Pin	100 (3.94)	99.0 (3.90)	
	Boss (First Boom)	100 (3.94)	101.5 (4.00)	
	Bushing (Second Boom)	100 (3.94)	101.5 (4.00)	
F	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Second Boom)	90 (3.54)	91.5 (3.60)	
	Bushing (Positioning Cylinder)	90 (3.54)	91.5 (3.60)	

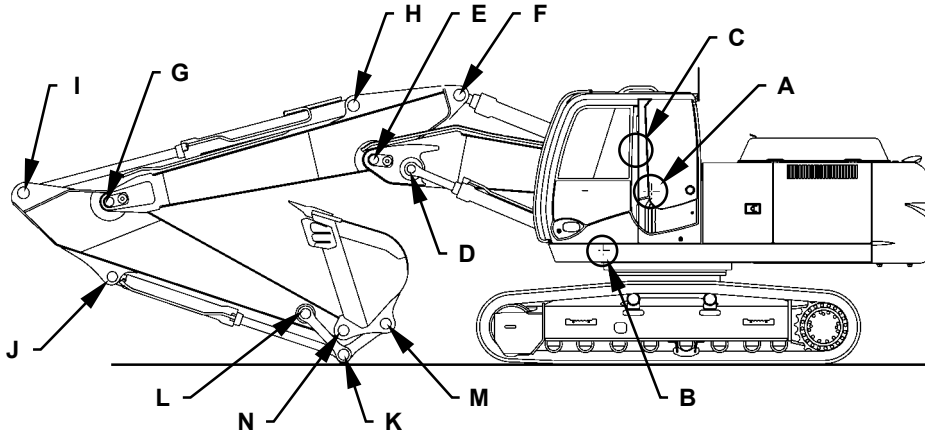
## FRONT ATTACHMENT / Front Attachment

				Unit: mm (in)
	Item	Standard	Allowable Limit	Remedy
G	Pin	90 (3.54)	89.0 (3.50)	Replace
	Boss (Second Boom)	90 (3.54)	91.5 (3.60)	
	Bushing (Arm)	90 (3.54)	91.5 (3.60)	
H	Pin	80 (3.15)	79.0 (3.11)	
	Bushing (Arm Cylinder)	80 (3.15)	81.5 (3.21)	
	Boss (Second Boom)	80 (3.15)	81.5 (3.21)	
I	Pin	80 (3.15)	79.0 (3.11)	
	Bushing (Arm Cylinder)	80 (3.15)	81.5 (3.21)	
	Boss (Arm)	80 (3.15)	81.5 (3.21)	
J	Pin	71 (2.80)	70.0 (2.76)	
	Bushing (Arm Cylinder)	71 (2.80)	72.5 (2.85)	
	Boss (Arm)	71 (2.80)	72.5 (2.85)	
K	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Link B)	80 (3.15)	81.5 (3.21)	
	Bushing (Link A)	80 (3.15)	81.5 (3.21)	
L	Pin	71 (2.80)	70.0 (2.76)	
	Boss (Link B)	71 (2.80)	72.5 (2.85)	
	Bushing (Arm)	71 (2.80)	72.5 (2.85)	
M	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Bucket)	80 (3.15)	81.5 (3.21)	
	Bushing (Link A)	80 (3.15)	81.5 (3.21)	
N	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Bucket)	80 (3.15)	81.5 (3.21)	
	Bushing (Arm)	80 (3.15)	81.5 (3.21)	

**IMPORTANT:** When replacing HN bushing for the front attachment, install it by using a press.

## FRONT ATTACHMENT / Front Attachment

ZX240-3 class



W1V1-04-01-006

				Unit: mm (in)
				Remedy
	Item	Standard	Allowable Limit	
A	Pin	100 (3.94)	99.0 (3.90)	Replace
	Boss (Main Frame)	100 (3.94)	101.5 (4.00)	
	Bushing (First Boom)	100 (3.94)	101.5 (4.00)	
B	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Main Frame)	90 (3.54)	91.5 (3.60)	
	Bushing (Boom Cylinder)	90 (3.54)	91.5 (3.60)	
C	Pin	90 (3.54)	89.0 (3.50)	
	Bushing (Positioning Cylinder)	90 (3.54)	91.5 (3.60)	
	Boss (First Boom)	90 (3.54)	91.5 (3.60)	
D	Pin	100 (3.94)	99.0 (3.90)	
	Bushing (Boom Cylinder)	100 (3.94)	101.5 (4.00)	
	Boss (First Boom)	90 (3.54)	92.0 (3.62)	
E	Pin	100 (3.94)	99.0 (3.90)	
	Boss (First Boom)	100 (3.94)	101.5 (4.00)	
	Bushing (Second Boom)	100 (3.94)	101.5 (4.00)	
F	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Second Boom)	90 (3.54)	91.5 (3.60)	
	Bushing (Positioning Cylinder)	90 (3.54)	91.5 (3.60)	

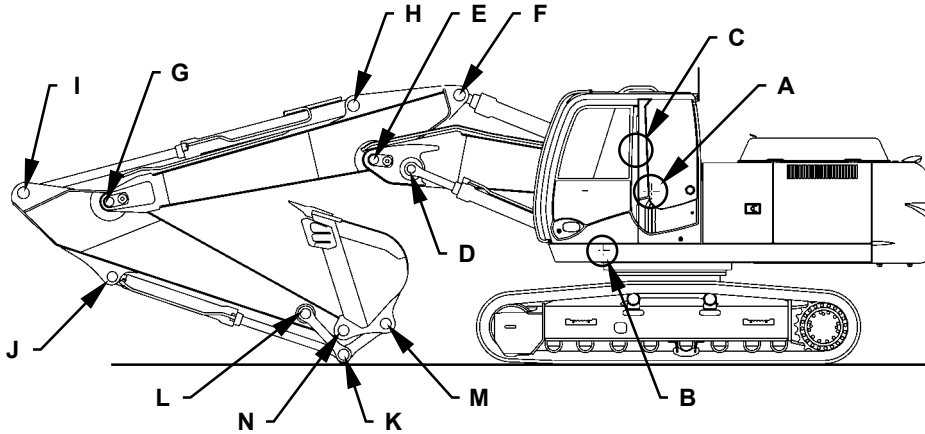
## FRONT ATTACHMENT / Front Attachment

				Unit: mm (in)
	Item	Standard	Allowable Limit	Remedy
G	Pin	100 (3.94)	99.0 (3.90)	Replace
	Boss (Second Boom)	90 (3.54)	91.5 (3.60)	
	Bushing	100 (3.94)	101.5 (4.00)	
H	Pin	90 (3.54)	89.0 (3.50)	
	Bushing (Arm Cylinder)	90 (3.54)	91.5 (3.60)	
	Boss (Second Boom)	90 (3.54)	91.5 (3.60)	
I	Pin	90 (3.54)	89.0 (3.50)	
	Bushing (Arm Cylinder)	90 (3.54)	91.5 (3.60)	
	Boss (Arm)	90 (3.54)	91.5 (3.60)	
J	Pin	80 (3.15)	79.0 (3.11)	
	Bushing (Bucket Cylinder)	80 (3.15)	81.5 (3.21)	
	Boss (Arm)	80 (3.15)	81.5 (3.21)	
K	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Link B)	90 (3.54)	91.5 (3.60)	
	Bushing (Link A)	90 (3.54)	91.5 (3.60)	
L	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Link B)	80 (3.15)	81.5 (3.21)	
	Bushing (Arm)	80 (3.15)	81.5 (3.21)	
M	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Bucket)	90 (3.54)	91.5 (3.60)	
	Bushing (Link A)	90 (3.54)	91.5 (3.60)	
N	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Bucket)	90 (3.54)	91.5 (3.60)	
	Bushing (Arm)	90 (3.54)	91.5 (3.60)	

**IMPORTANT:** When replacing HN bushing for the front attachment, install it by using a press.

## FRONT ATTACHMENT / Front Attachment

ZX270-3 class



W1V1-04-01-006

				Unit: mm (in)
				Remedy
	Item	Standard	Allowable Limit	
A	Pin	100 (3.94)	99.0 (3.90)	Replace
	Boss (Main Frame)	100 (3.94)	101.5 (4.00)	
	Bushing (First Boom)	100 (3.94)	101.5 (4.00)	
B	Pin	100 (3.94)	99.0 (3.90)	
	Boss (Main Frame)	100 (3.94)	101.5 (4.00)	
	Bushing (Boom Cylinder)	100 (3.94)	101.5 (4.00)	
C	Pin	90 (3.54)	89.0 (3.50)	
	Bushing (Positioning Cylinder)	90 (3.54)	91.5 (3.60)	
	Boss (First Boom)	90 (3.54)	91.5 (3.60)	
D	Pin	100 (3.94)	99.0 (3.90)	
	Bushing (Boom Cylinder)	100 (3.94)	101.5 (4.00)	
	Boss (First Boom)	100 (3.94)	101.5 (4.00)	
E	Pin	100 (3.94)	99.0 (3.90)	
	Boss (First Boom)	100 (3.94)	101.5 (4.00)	
	Bushing (Second Boom)	100 (3.94)	101.5 (4.00)	
F	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Second Boom)	90 (3.54)	91.5 (3.60)	
	Bushing (Positioning Cylinder)	90 (3.54)	91.5 (3.60)	

## FRONT ATTACHMENT / Front Attachment

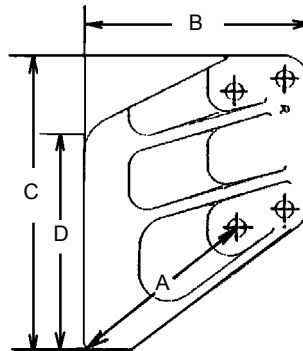
				Unit: mm (in)
	Item	Standard	Allowable Limit	Remedy
G	Pin	100 (3.94)	99.0 (3.90)	Replace
	Boss (Second Boom)	100 (3.94)	101.5 (4.00)	
	Bushing	100 (3.94)	101.5 (4.00)	
H	Pin	100 (3.94)	99.0 (3.90)	
	Bushing (Arm Cylinder)	100 (3.94)	101.5 (4.00)	
	Boss (Second Boom)	100 (3.94)	101.5 (4.00)	
I	Pin	80 (3.15)	79.0 (3.11)	
	Bushing (Arm Cylinder)	80 (3.15)	81.5 (3.21)	
	Boss (Arm)	80 (3.15)	81.5 (3.21)	
J	Pin	80 (3.15)	79.0 (3.11)	
	Bushing (Bucket Cylinder)	80 (3.15)	81.5 (3.21)	
	Boss (Arm)	80 (3.15)	81.5 (3.21)	
K	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Link B)	90 (3.54)	91.5 (3.60)	
	Bushing (Link A)	90 (3.54)	91.5 (3.60)	
L	Pin	80 (3.15)	79.0 (3.11)	
	Boss (Link B)	80 (3.15)	81.5 (3.21)	
	Bushing (Arm)	80 (3.15)	81.5 (3.21)	
M	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Bucket)	90 (3.54)	91.5 (3.60)	
	Bushing (Link A)	90 (3.54)	91.5 (3.60)	
N	Pin	90 (3.54)	89.0 (3.50)	
	Boss (Bucket)	90 (3.54)	91.5 (3.60)	
	Bushing (Arm)	90 (3.54)	91.5 (3.60)	

**IMPORTANT:** When replacing HN bushing for the front attachment, install it by using a press.

# FRONT ATTACHMENT / Front Attachment

## Side Cutter

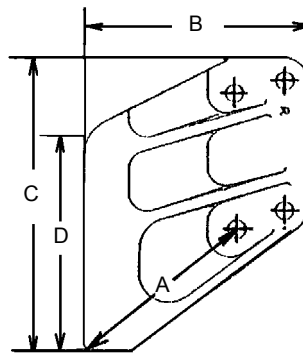
ZX200-3 class, 225US-3 class, 225USR-3 class



W155-04-01-002

	Standard	Allowable Limit	Unit: mm (in) Remedy
A	278 (10.9)	181 (7.1)	Replace
B	295 (11.6)	-	
C	433 (17.0)	-	
D	135 (5.3)	-	

ZX240-3 class, 270-3 class



W155-04-01-002

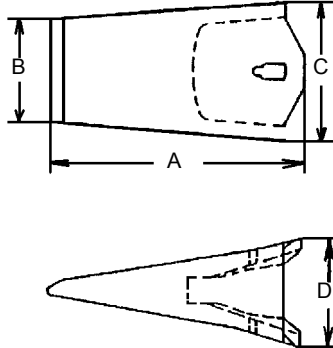
	Standard	Allowable Limit	Unit: mm (in) Remedy
A	290 (11.4)	180 (7.0)	Replace
B	300 (11.8)	-	
C	400 (15.7)	-	
D	300 (11.8)	-	



## FRONT ATTACHMENT / Front Attachment

**Point**

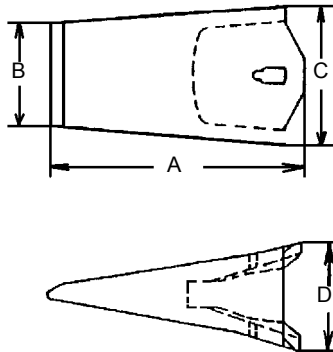
ZX200-3 class, 225US-3 class, 225USR-3 class



			Unit: mm (in)
	Standard	Allowable Limit	Remedy
A	215 (8.47)	107.5 (4.23)	Replace
B	95 (3.74)	-	
C	108 (4.25)	-	
D	95 (3.74)	-	

W105-04-01-020

ZX240-3 class, 270-3 class



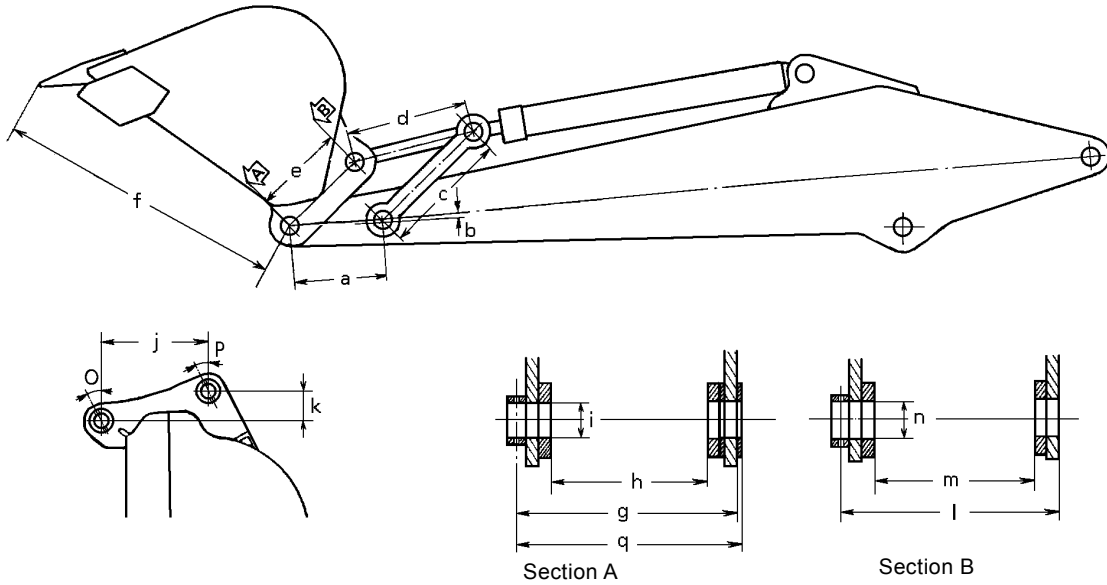
			Unit: mm (in)
	Standard	Allowable Limit	Remedy
A	240 (9.45)	120 (4.72)	Replace
B	96 (3.78)	-	
C	130 (5.12)	-	
D	105 (4.13)	-	

W105-04-01-020

## FRONT ATTACHMENT / Front Attachment

### STANDARD DIMENSIONS FOR ARM AND BUCKET CONNECTION

**IMPORTANT:** If the front attachment of a previous model machine is used, use the grease intervals for previous model machine.



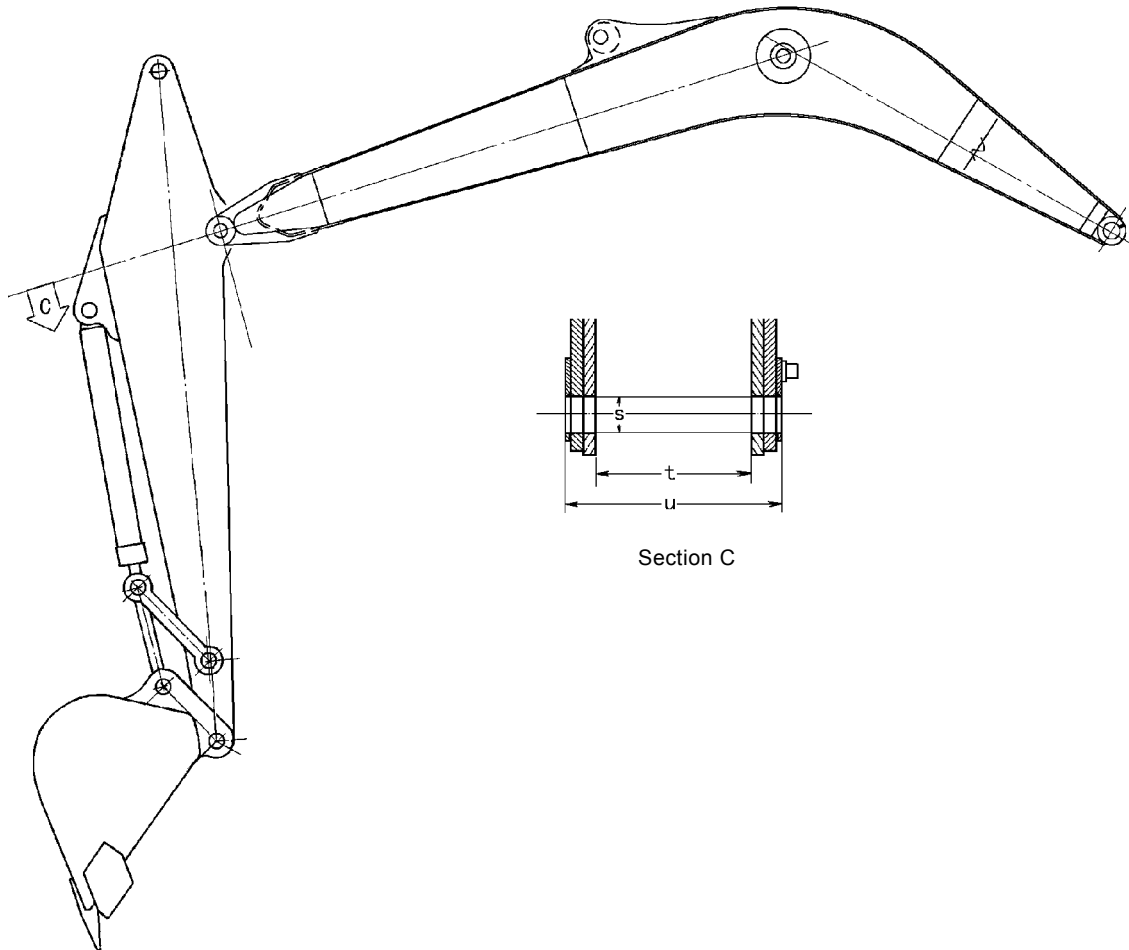
W187-04-01-003

Unit: mm (in)

	ZX200-3 class, 225US-3 class, 225USR-3 class	ZAXIS200 ZAXIS225US	ZX240-3 class	ZAXIS230	ZX270-3 class	ZAXIS270
a	450 (17.7)	←	460 (18.1)	←	475 (18.7)	←
b	0 (0)	←	5 (0.2)	←	0 (0)	←
c	604 (23.8)	←	620 (24.4)	←	622 (24.5)	←
d	580 (22.8)	←	580 (22.8)	←	600 (23.6)	←
e	476 (18.7)	←	475 (18.7)	←	←	←
f	1471 (57.9)	←	1560 (61.4)	1547 (60.9)	1560 (61.4)	1558 (61.3)
g	433 (17.0)	←	549 (21.6)	←	←	555 (21.9)
h	326 (12.8)	←	409 (16.1)	←	←	←
i	80 (3.2)	←	90 (3.5)	←	←	←
j	475 (18.7)	←	470 (18.5)	←	←	←
k	31 (1.2)	←	69 (2.7)	←	←	←
l	433 (17.0)	←	549 (21.6)	←	←	555 (21.9)
m	307 (12.1)	←	410 (16.1)	←	←	←
n	80 (3.2)	←	90 (3.5)	←	←	←
o	3.7°	←	45°	←	←	←
p	3.7°	←	45°	0°	45°	←
q	449 (17.7)	←	565 (22.2)	←	←	571 (22.5)

## FRONT ATTACHMENT / Front Attachment

### STANDARD DIMENSIONS FOR ARM AND BOOM CONNECTION



W178-02-11-286

Unit: mm (in)

	ZX200-3 class, 225US-3 class, 225USR-3 class	ZAXIS200 ZAXIS225US ZAXIS225USR	ZX240-3 class	ZAXIS230	ZX270-3 class	ZAXIS270
s	90 (3.5)	←	100 (3.9)	←	100 (3.9)	←
t	352 (13.9)	←	369 (14.5)	←	409 (16.1)	←
u	490 (19.3)	←	532 (20.9)	←	578 (22.8)	←

**IMPORTANT:** If the front attachment of a previous model machine is used, use the grease intervals for previous model machine.


**FRONT ATTACHMENT / Front Attachment**

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## FRONT ATTACHMENT / Cylinder

### HYDRAULIC CIRCUIT PRESSURE RELEASE PROCEDURE

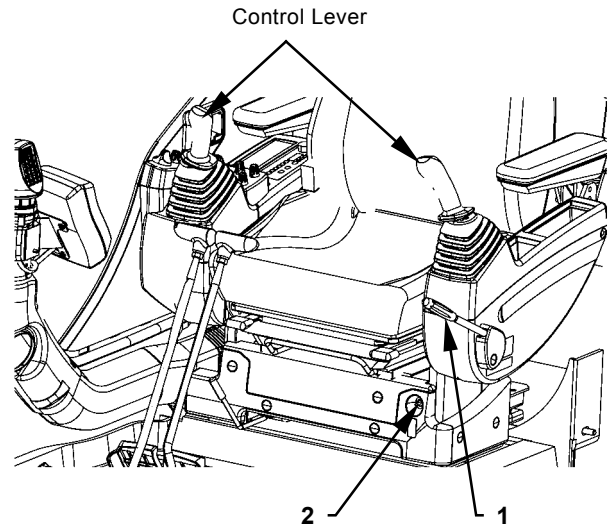
 **NOTE:** Operate the pilot pump by using the power from battery without starting the engine and deliver the pilot pressure to the spool of control valve.

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 blocks (3) (2 used) 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 plates (5) (4 used).

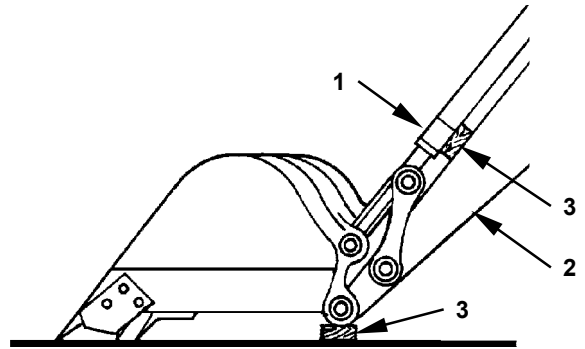
 : 30 mm

3. Operate the bucket lever and retract bucket cylinder (1). In order not to extend rod (8), pass wire (9) through the cylinder rod hole and secure rod (8) to the bucket cylinder (1) tube.

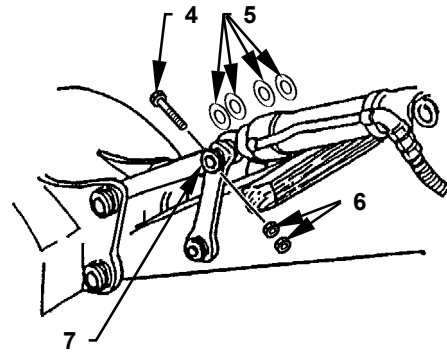
4. Stop the engine. Push the air bleed valve and release any remaining pressure in the hydraulic oil tank. Remove the cap.

Release the bucket circuit pressure.

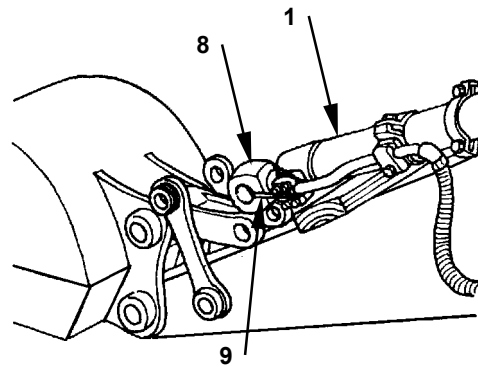
Refer to the Hydraulic Circuit Pressure Release Procedure section on W4-2-1.



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.

ZX200-3 class, 225US-3 class, 225USR-3 class,  
240-3 class

 : 36 mm

ZX270-3 class

 : 41 mm




**CAUTION: Bucket cylinder (1) weight:**  
ZX200-3 class, 225US-3 class, 225USR-3  
class: 150 kg (330 lb)  
ZX240-3 class: 195 kg (430 lb)  
ZX270-3 class: 210 kg (465 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. Hoist bucket cylinder (1). Remove nuts (13) (2 used) and bolt (15). Remove pin (11). Remove thrust plates (10) (2 used).

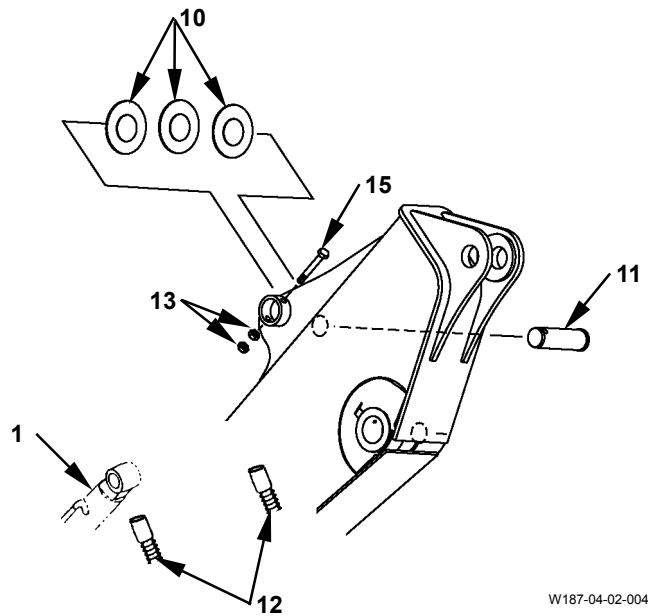
ZX200-3 class, 225US-3 class, 225USR-3 class

 : 24 mm

ZX240-3 class, 270-3 class

 : 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:  
ZX200-3 class, 225US-3 class, 225USR-3 class: 150 kg (330 lb)  
ZX240-3 class: 195 kg (430 lb)  
ZX270-3 class: 210 kg (465 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 cylinder mounting hole on arm. Install thrust plates (10) (2 used) and pin (11).


2. Install bolt (15) to stopper (14) and pin (11) in the arm with nuts (13) (2 used).


ZX200-3 class, 225US-3 class, 225USR-3 class

 : 24 mm


 : 270 N·m (27.5 kgf·m, 200 lbf·ft)


ZX240-3 class, 270-3 class

 : 30 mm


 : 550 N·m (56 kgf·m, 405 lbf·ft)


3. Install hoses (12) (2 used) to bucket cylinder (1).  
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class

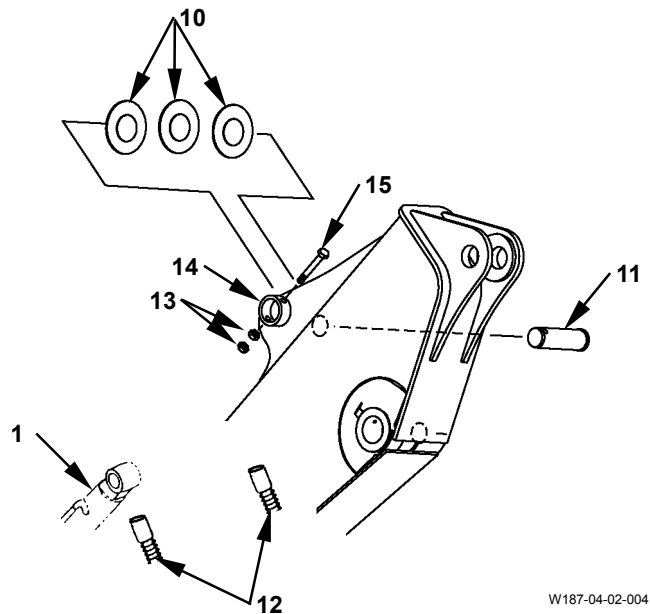
 : 36 mm

 : 175 N·m (18 kgf·m, 130 lbf·ft)

ZX270-3 class

 : 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).



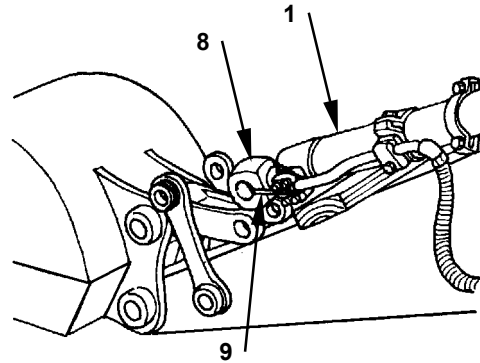
**CAUTION:** Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

**IMPORTANT:** Fill hydraulic oil to specified level. Start the engine and check for any oil leaks.

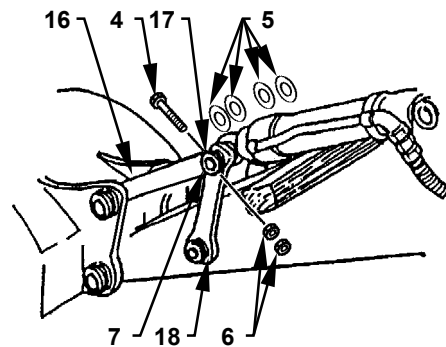
5. Start the engine and operate the bucket lever. Align the hole on cylinder rod side with those of links A (16), B (18). Insert thrust plates (5) (4 used) and pin (7).
6. Install bolt (4) to stopper (17) and pin (7) with nuts (6) (2 used).
-  : 30 mm
-  : 550 N·m (56 kgf·m, 405 lbf·ft)

**IMPORTANT:** In case link (18) has been removed from the arm, insert thrust plate (19) when installing.

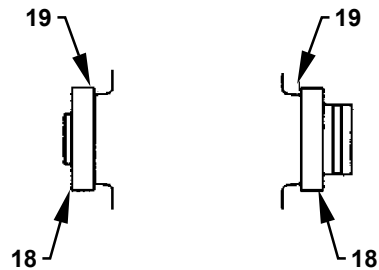
**IMPORTANT:** After completing the work, operate the bucket cylinder several times to the stroke end and release the pressure in the circuit.



W102-04-02-005






W158-04-02-006



W178-02-11-289

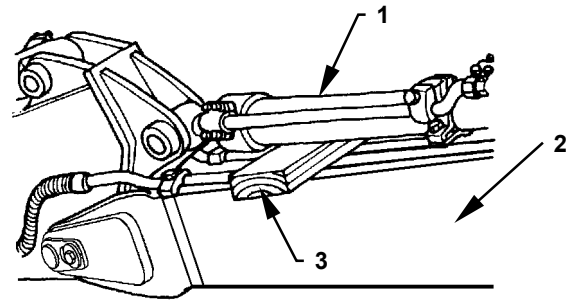
## FRONT ATTACHMENT / Cylinder

### Remove Arm Cylinder

1. Insert wooden block (3) between arm cylinder (1) and boom (2).
2. (ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class)  
Remove nuts (8) (2 used) and bolt (10) from pin (5) at the rod side in arm cylinder (1).  
(ZX270-3 class)  
Remove bolt (10) and plate (19) from the rod side in arm cylinder (1)  
ZX200-3 class, 225US-3 class, 225USR-3 class  
 : 30 mm  
 ZX240-3 class  
 : 32 mm  
 ZX270-3 class  
 : 27 mm

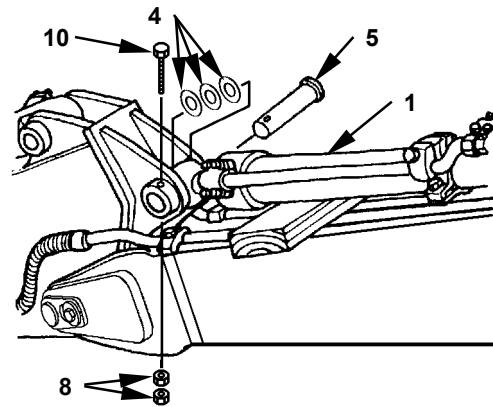
**CAUTION:** Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

3. Remove pin (5). Remove thrust plates (4) (2 used).
4. Operate the arm lever and retract arm cylinder (1). In order not to extend rod (6), pass wire (7) through the cylinder rod hole and secure rod (6) 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.



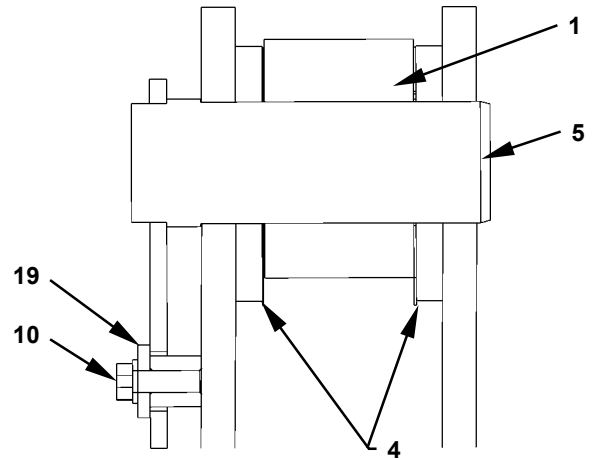
W187-04-02-005

ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class

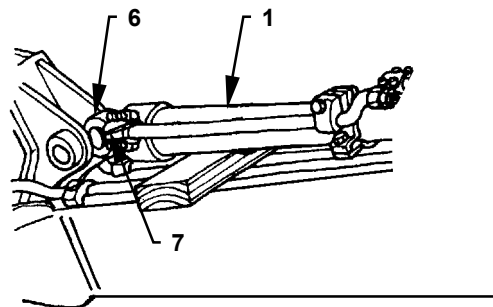


W187-04-02-006

ZX270-3 class (Section of Pin (5))




W1V1-04-02-018




W187-04-02-010

## FRONT ATTACHMENT / Cylinder

6. Remove hoses (11) (2 used) and lubrication pipe (12) at the bottom of arm cylinder (1). Cap the open ends.

 : 17 mm, 41 mm

ZX200-3 class, 225US-3 class, 225USR-3 class,  
240-3 class only

 : 36 mm

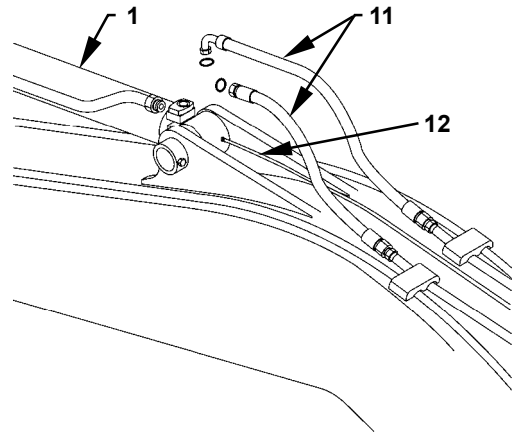


**CAUTION: Arm cylinder (1) weight:**

**ZX200-3 class, 225US-3 class, 225USR-3 class: 250 kg (550 lb)**

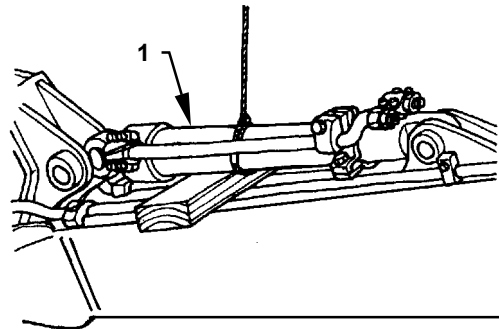
**ZX240-3 class: 290 kg (640 lb)**

**ZX270-3 class: 350 kg (770 lb)**



W178-02-11-290

7. Attach a nylon sling to arm cylinder (1) and hold arm cylinder (1).



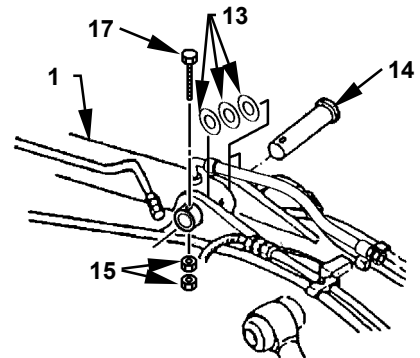
W102-04-02-016

## FRONT ATTACHMENT / Cylinder



**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.

ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class



W187-04-02-007


8. (ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class)

Remove nuts (15) (2 used) and bolt (17) from the bottom side in arm cylinder (1).


(ZX270-3 class)

Remove bolt (17) and plate (20) from the bottom side in arm cylinder (1).


ZX200-3 class, 225US-3 class, 225USR-3 class

 : 30 mm

ZX240-3 class

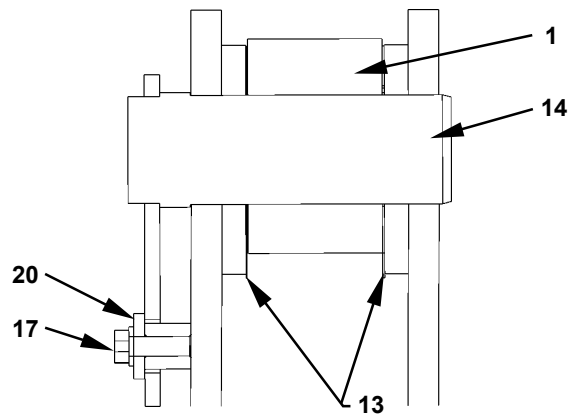
 : 32 mm

ZX270-3 class

 : 27 mm

9. Remove pin (14). Remove thrust plates (13) (2 used). Hoist and remove arm cylinder (1).

ZX270-3 class (Section of Pin (14))



W1V1-04-02-018

## FRONT ATTACHMENT / Cylinder

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(Blank)

## FRONT ATTACHMENT / Cylinder

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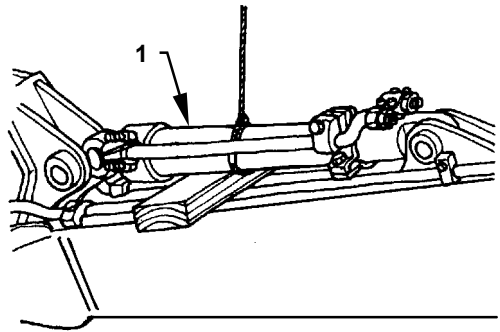
### Install Arm Cylinder

**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:  
ZX200-3 class, 225US-3 class, 225USR-3 class: 250 kg (550 lb)  
ZX240-3 class: 290 kg (640 lb)  
ZX270-3 class: 350 kg (770 lb)

1. Hoist arm cylinder (1). Align the cylinder bottom side hole with the cylinder mounting hole on the boom.



W102-04-02-016

## FRONT ATTACHMENT / Cylinder



**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.


ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class


2. Install thrust plates (13) (2 used) and pin (14).
3. (ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class)  
Install bolt (17) to pin (14) and stopper (16) with nuts (15) (2 used).

(ZX270-3 class)


Install plate (20) to pin (14) with bolt (17).


ZX200-3 class, 225US-3 class, 225USR-3 class

 : 30 mm


 : 550 N·m (56 kgf·m, 405 lbf·ft)


ZX240-3 class

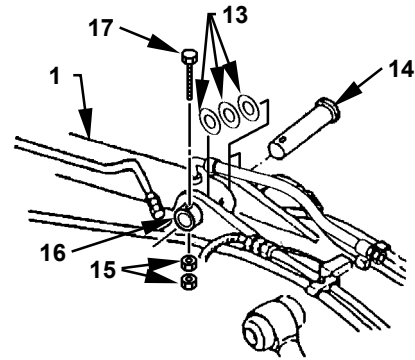
 : 32 mm

 : 750 N·m (77 kgf·m, 555 lbf·ft)

ZX270-3 class

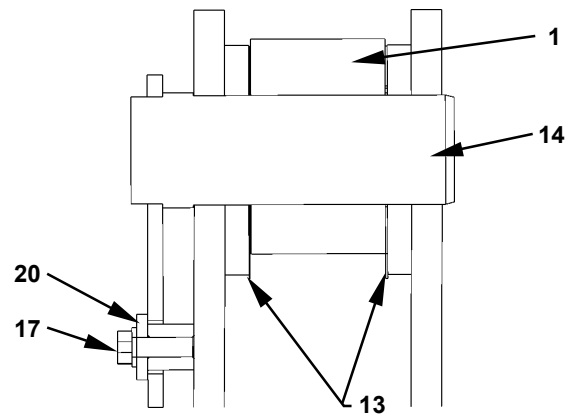
 : 27 mm

 : 400 N·m (41 kgf·m, 295 lbf·ft)



W187-04-02-007


ZX270-3 class (Section of Pin (14))





W1V1-04-02-018


## FRONT ATTACHMENT / Cylinder

4. Install lubrication pipe (12) and hoses (11) (2 used) to arm cylinder (1).


 : 17 mm


 : 25 N·m (2.5 kgf·m, 18 lbf·ft)

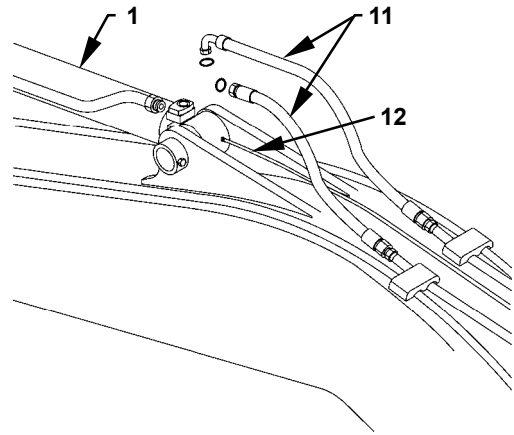
 : 41 mm

 : 205 N·m (21 kgf·m, 150 lbf·ft)

ZX200-3 class, 225US-3 class, 225USR-3 class  
240-3 class only

 : 36 mm

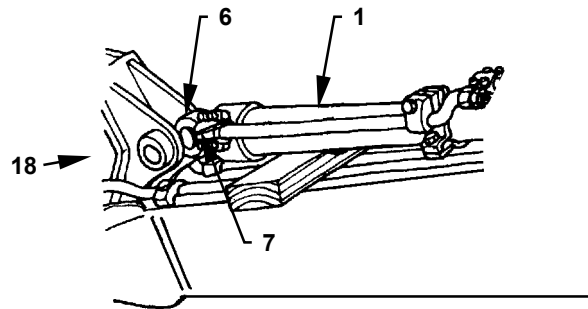
 : 175 N·m (18 kgf·m, 130 lbf·ft)



W178-02-11-290

**IMPORTANT: Fill hydraulic oil to specified level. Start the engine and check for any oil leaks.**

5. Remove wire (7) from rod (6) 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 mounting hole on arm (18).









W187-04-02-010



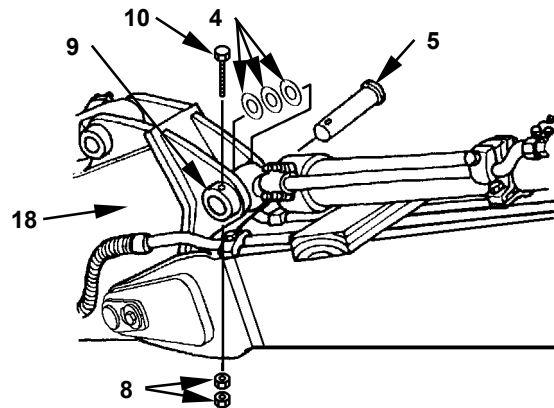
## FRONT ATTACHMENT / Cylinder



**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 plates (4) (2 used) and pin (5).
7. (ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class)  
Install bolt (10) to pin (5) and stopper (9) with nuts (8) (2 used).  
(ZX270-3 class)  
Install plate (19) to pin (5) with bolt (10).  
ZX200-3 class, 225US-3 class, 225USR-3 class  
 : 30 mm  
 : 550 N·m (56 kgf·m, 405 lbf·ft)  
 ZX240-3 class  
 : 32 mm  
 : 750 N·m (76.5 kgf·m, 555 lbf·ft)  
 ZX270-3 class  
 : 27 mm  
 : 400 N·m (41 kgf·m, 295 lbf·ft)

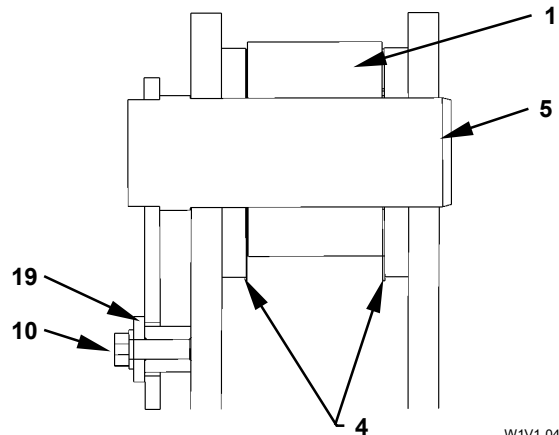
ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class



W187-04-02-006

ZX270-3 class (Section of Pin (5))

**IMPORTANT:** When completing the work, operate the arm cylinder several times to the stroke end and release the pressure in the circuit.




W1V1-04-02-018

## FRONT ATTACHMENT / Cylinder

### Remove Boom Cylinder

1. Remove lubrication pipe (1) from boom cylinder (2).

 : 17 mm



**CAUTION: Boom cylinder (2) weight:**  
ZX200-3 class, 225US-3 class, 225USR-3 class: 170 kg (375 lb)  
ZX240-3 class: 210 kg (465 lb)  
ZX270-3 class: 250 kg (550 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.**

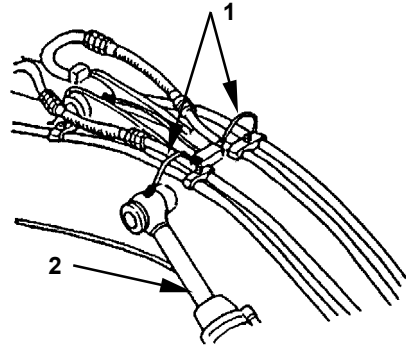
3. Remove nuts (5) (2 used), bolt (7) and stopper (6) from the boom cylinder (2) rod side. Push pin (4) into the boom.

Remove thrust plates (3) (2 used).

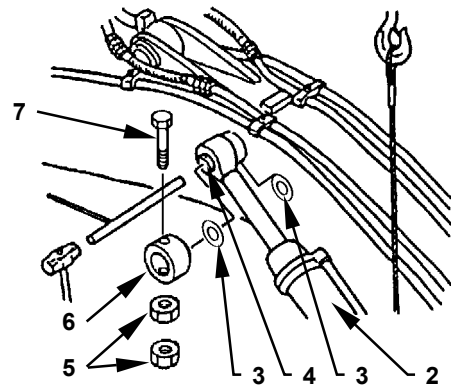
 : 30 mm

4. Place boom cylinder (2) on a stand. Remove the other boom cylinder in the same procedures.

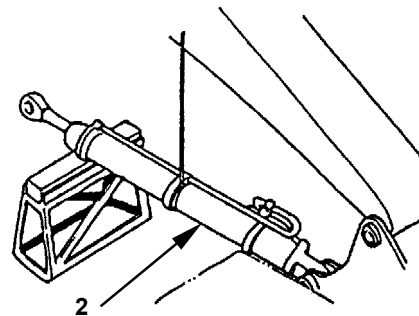
5. Operate the boom lever and retract boom cylinder (2). In order not to extend the rod, pass a wire through the cylinder rod hole and secure the rod to the cylinder tube.



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 (12) (4 used) from the bottom of boom cylinder (2). Cap the open ends.

 : 36 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 nuts (10) (2 used) and bolt (8) from the cylinder bottom side.


Remove pin (9).

Remove thrust plates (11) (4 used).

ZX200-3 class, 225US-3 class, 225USR-3 class

 : 24 mm

ZX240-3 class, 270-3 class

 : 30 mm



**CAUTION: Boom cylinder (2) weight:**

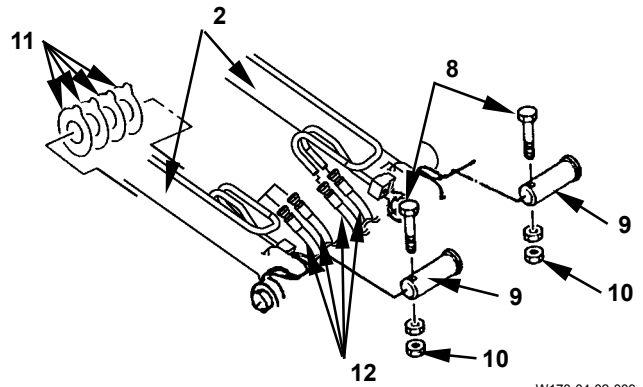
ZX200-3 class, 225US-3 class, 225USR-3 class: 170 kg (375 lb)

ZX240-3 class: 210 kg (465 lb)

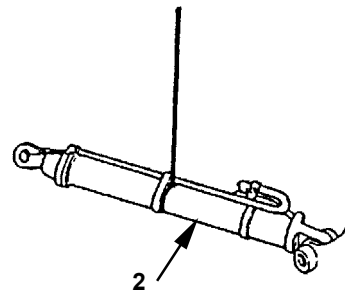
ZX270-3 class: 250 kg (550 lb)

9. Hoist and remove boom cylinder (2).

10. Remove the other boom cylinder in the same procedures.



W178-04-02-009



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:  
ZX200-3 class, 225US-3 class, 225USR-3 class: 170 kg (375 lb)  
ZX240-3 class: 210 kg (465 lb)  
ZX270-3 class: 250 kg (550 lb)


1. Hoist boom cylinder (2). Align the hole at boom cylinder tube side with the 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 plates (11) (4 used) and pin (9). Install bolt (8) to pin (9) with nuts (10) (2 used).


ZX200-3 class, 225US-3 class, 225USR-3 class

 : 24 mm

 : 270 N·m (27.5 kgf·m, 200 lbf·ft)


ZX240-3 class, 270-3 class


 : 30 mm


 : 550 N·m (56 kgf·m, 405 lbf·ft)


3. Install the other boom cylinder in the same procedures.

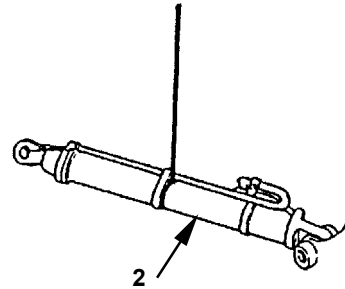
4. Install hoses (12) (4 used) to boom cylinders (2) (2 used).

 : 36 mm

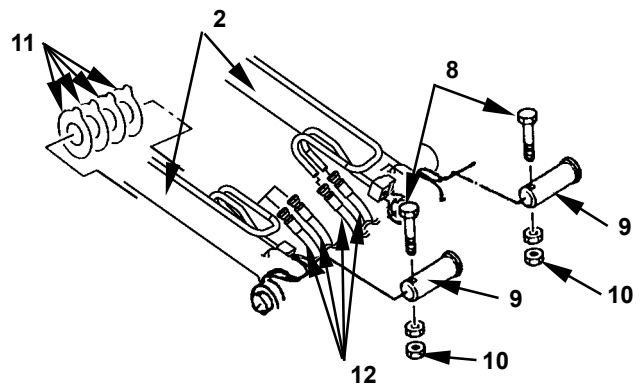
 : 175 N·m (18 kgf·m, 130 lbf·ft)

 : 41 mm

 : 205 N·m (21 kgf·m, 150 lbf·ft)



W105-04-02-040



W178-04-02-009





## FRONT ATTACHMENT / Cylinder

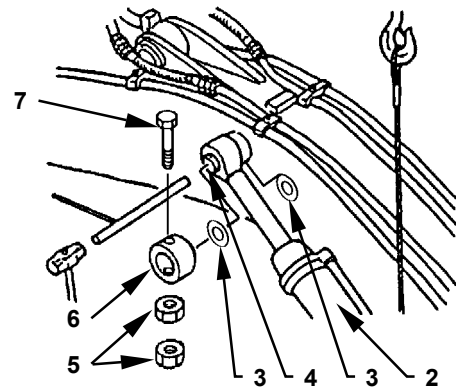
**IMPORTANT:** Fill hydraulic oil to specified level.  
Start the engine and check for any oil leaks.

- 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 mounting hole on boom.

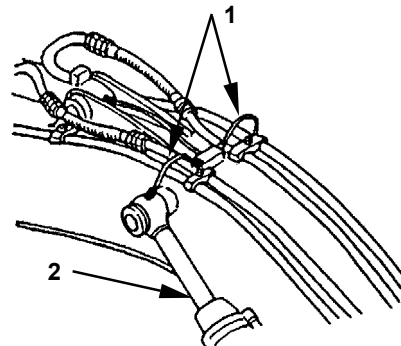


**CAUTION:** Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.

- Install thrust plates (3) (2 used) and pin (4).
- Install bolt (7) to pin (4) and stopper (6) with nuts (5) (2 used).
  -  : 30 mm
  -  : 550 N·m (56 kgf·m, 405 lbf·ft)
- Install lubrication pipe (1) to boom cylinder (2).
  -  : 17 mm
  -  : 25 N·m (2.5 kgf·m, 18 lbf·ft)
- Install the other boom cylinder in the same procedures.



W158-04-02-013



W105-04-02-032

**IMPORTANT:** When all work is completed, operate the boom cylinder for several times to stroke end and bleed air from the circuit.


## FRONT ATTACHMENT / Cylinder

### Remove Positioning Cylinder



**CAUTION: Positioning cylinder (3) weight:**  
ZX200-3 class: 270 kg (595 lb)  
ZX240-3 class, 270-3 class: 280 kg (620 lb)

1. Attach a nylon sling to positioning cylinder (3) and hold positioning cylinder (3).

2. Remove nuts (4) (2 used) and bolt (5) from pin (6).  
 : 32 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.**

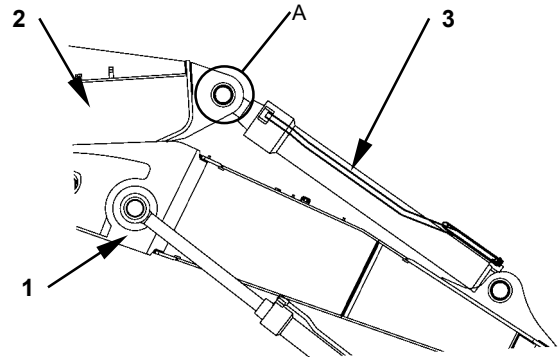
3. Remove pin (6) from second boom (2). Remove thrust plate (7).

4. In order not to extend the rod (3) in positioning cylinder (3), pass the wire through the cylinder rod hole and secure the rod to the positioning cylinder (3) tube.

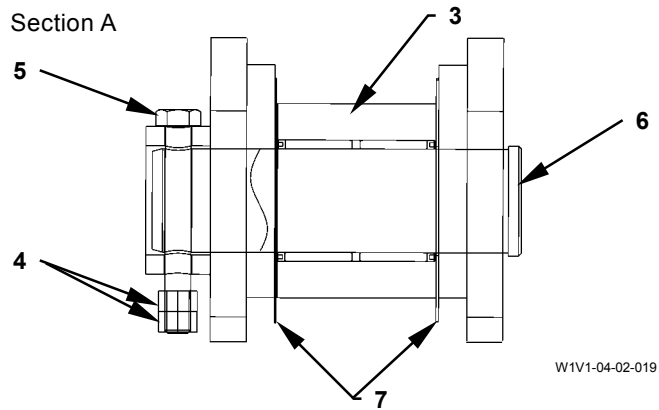
5. Stop the engine. Push the air bleed valve and release any remaining pressure in the hydraulic oil tank.

Release the circuit pressure.

Refer to the Hydraulic Circuit Pressure Release Procedure section on W4-2-1.



W1V1-04-02-017




W1V1-04-02-019


## FRONT ATTACHMENT / Cylinder

6. Remove all hoses from positioning cylinder (3).


Cap the open ends.

 : 19 mm


ZX200-3 class

 : 36 mm

ZX240-3 class, 270-3 class

 : 41 mm

7. Remove nuts (8) (2 used) and bolt (9) from pin (10).

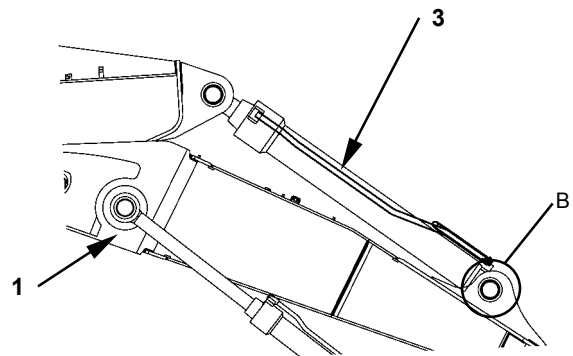
 : 32 mm



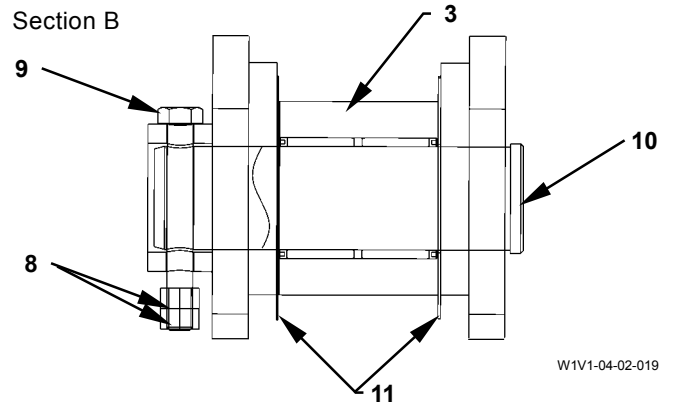
**CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, hard hats, etc in order to prevent personal injury.**

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



W1V1-04-02-019

## FRONT ATTACHMENT / Cylinder

### Install Positioning Cylinder


**CAUTION:** Positioning cylinder (3) weight:  
ZX200-3 class: 270 kg (595 lb)  
ZX240-3 class, 270-3 class: 280 kg (620 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) and align the pin holes on the cylinder bottom side and first boom (1).


Insert thrust plate (11) and pin (10).


2. Install bolt (9) to pin (10) with nuts (8) (2 used).

 : 32 mm


 : 750 N·m (76.5 kgf·m, 555 lbf·ft)


3. Install all hoses to positioning cylinder (3).

 : 19 mm


 : 30 N·m (3.0 kgf·m, 22 lbf·ft)


ZX200-3 class

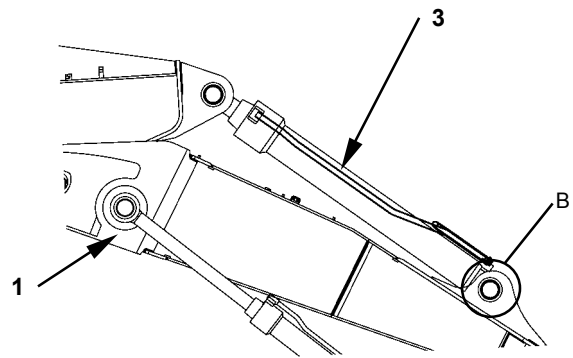
 : 36 mm

 : 175 N·m (18 kgf·m, 130 lbf·ft)

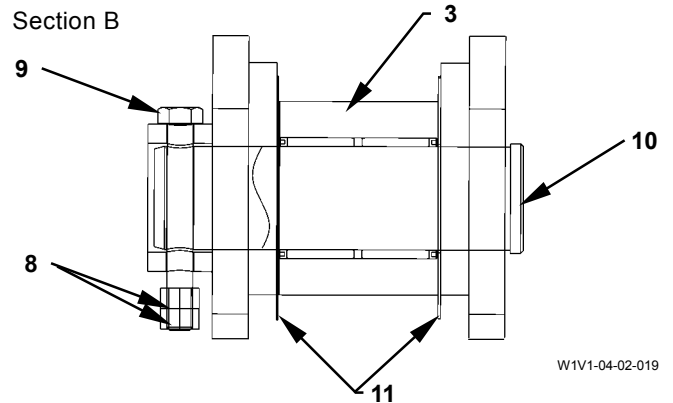
ZX240-3 class, 270-3 class

 : 41 mm

 : 205 N·m (21 kgf·m, 150 lbf·ft)



W1V1-04-02-017



W1V1-04-02-019





## FRONT ATTACHMENT / Cylinder

**IMPORTANT:** Fill hydraulic oil to specified level.  
Start the engine and check for any oil leaks.

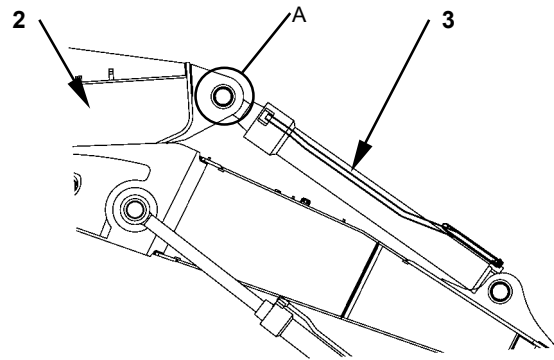
4. Remove the wire from the rod side of positioning cylinder (3). Start the engine. Operate the positioning lever and align the hole at cylinder rod side in positioning cylinder (3) with the pin hole on second boom (2). Insert thrust plates (7) and pin (6).

5. Install bolt (5) to pin (6) with nuts (4) (2 used).

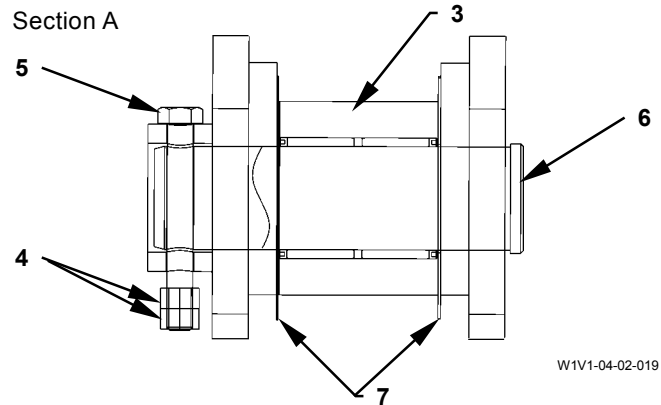
 : 32 mm

 : 750 N·m (76.5 kgf·m, 555 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

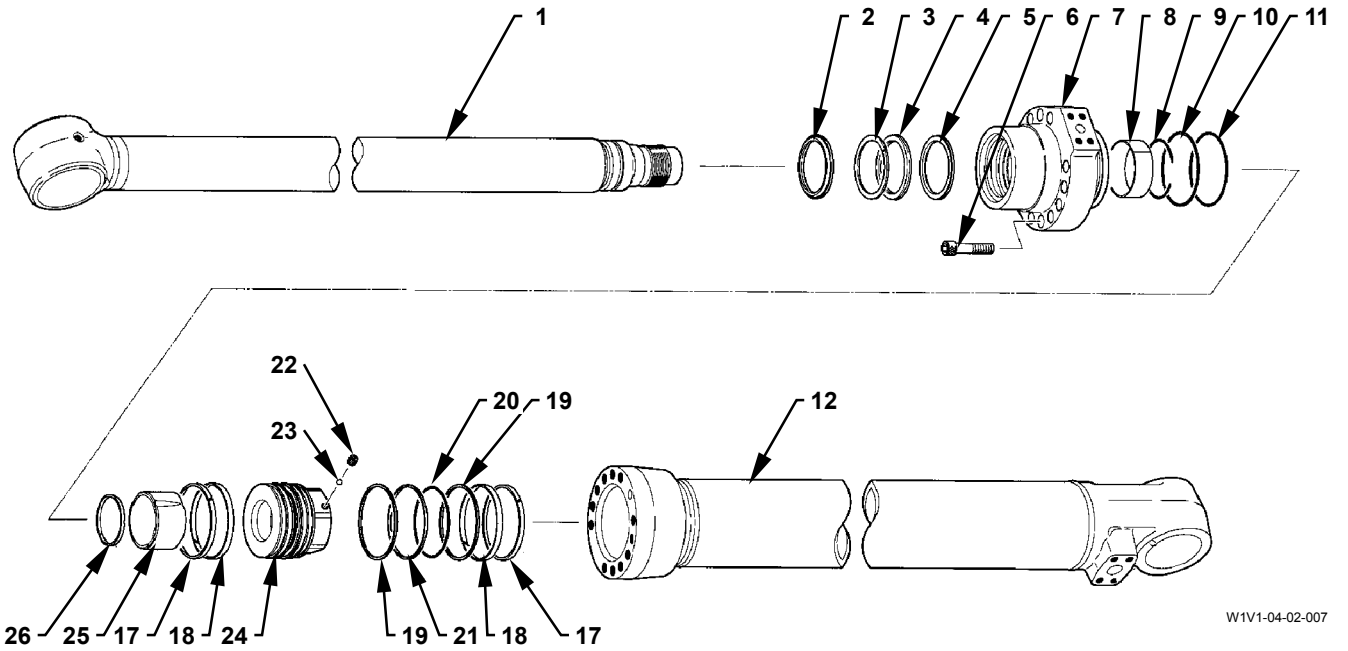


W1V1-04-02-019

# FRONT ATTACHMENT / Cylinder

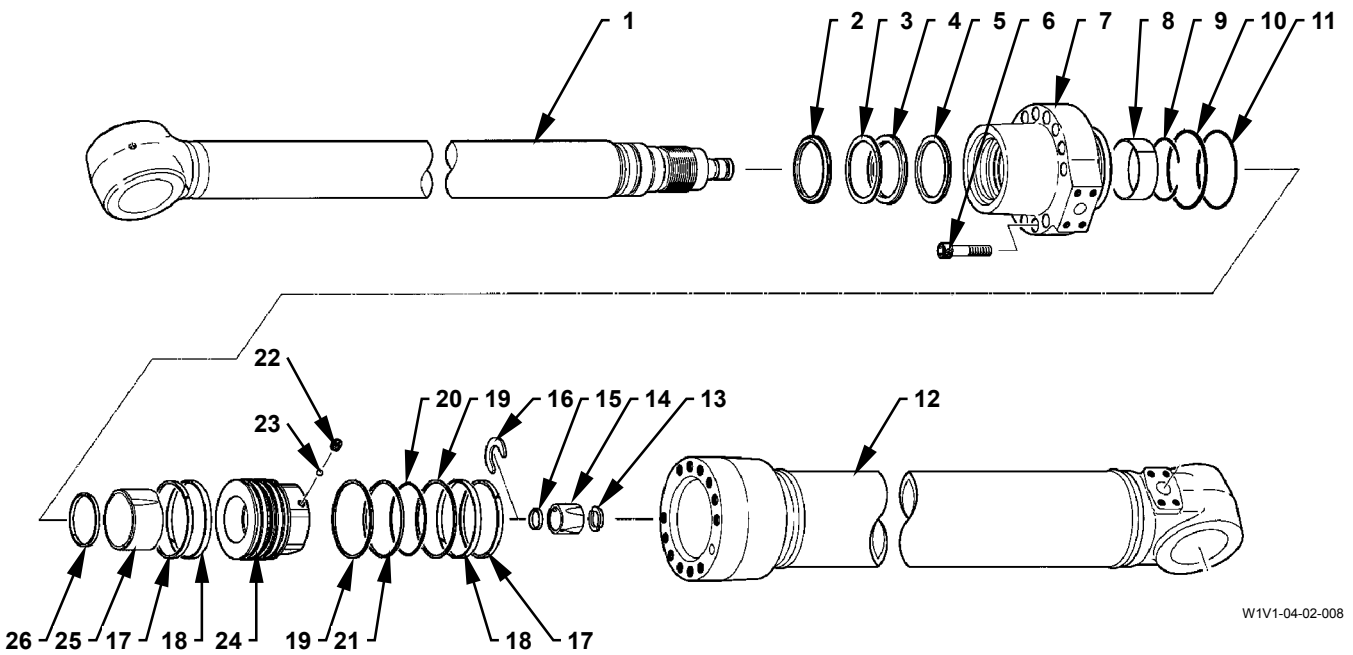
**DISASSEMBLE BOOM, ARM, BUCKET  
CYLINDERS**  
(ZX200-3 class, 225US-3 class, 225USR-3  
class, 240-3 class)

## Boom Cylinder



W1V1-04-02-007

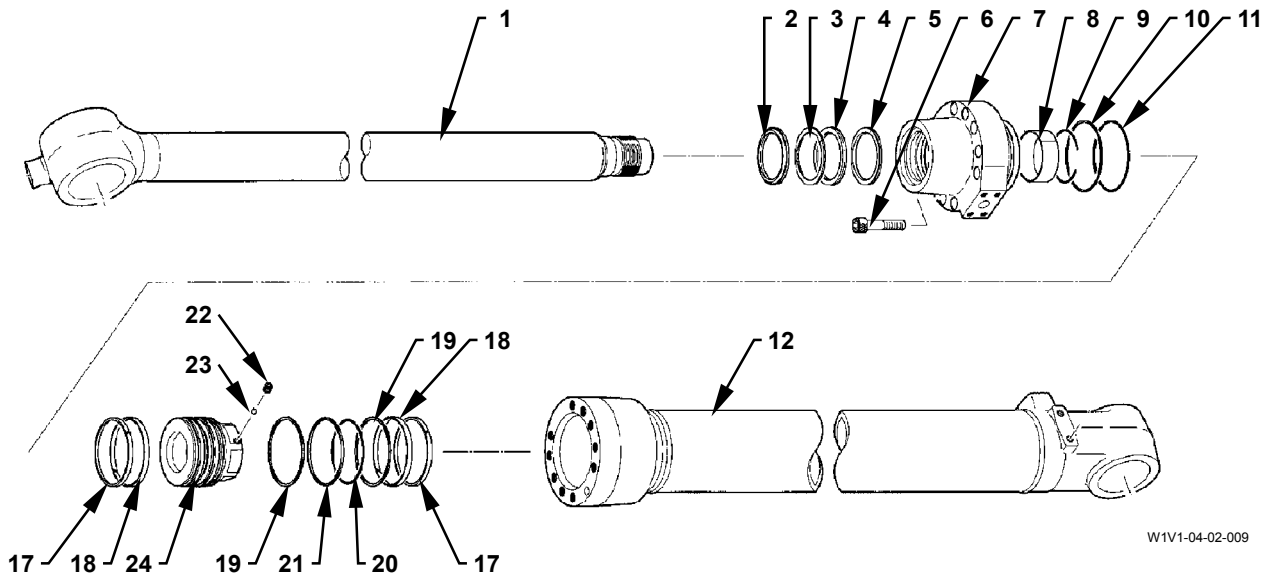
## Arm Cylinder



W1V1-04-02-008

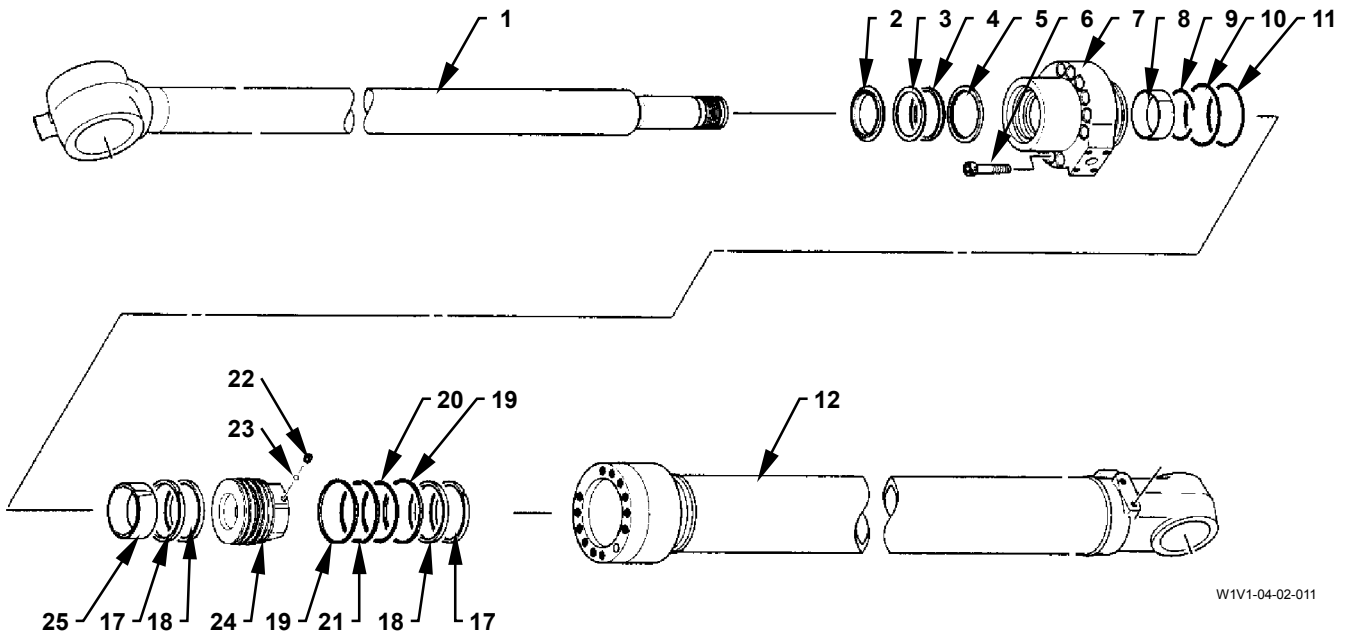
# FRONT ATTACHMENT / Cylinder

## Bucket Cylinder except ZAXIS210K-3



W1V1-04-02-009

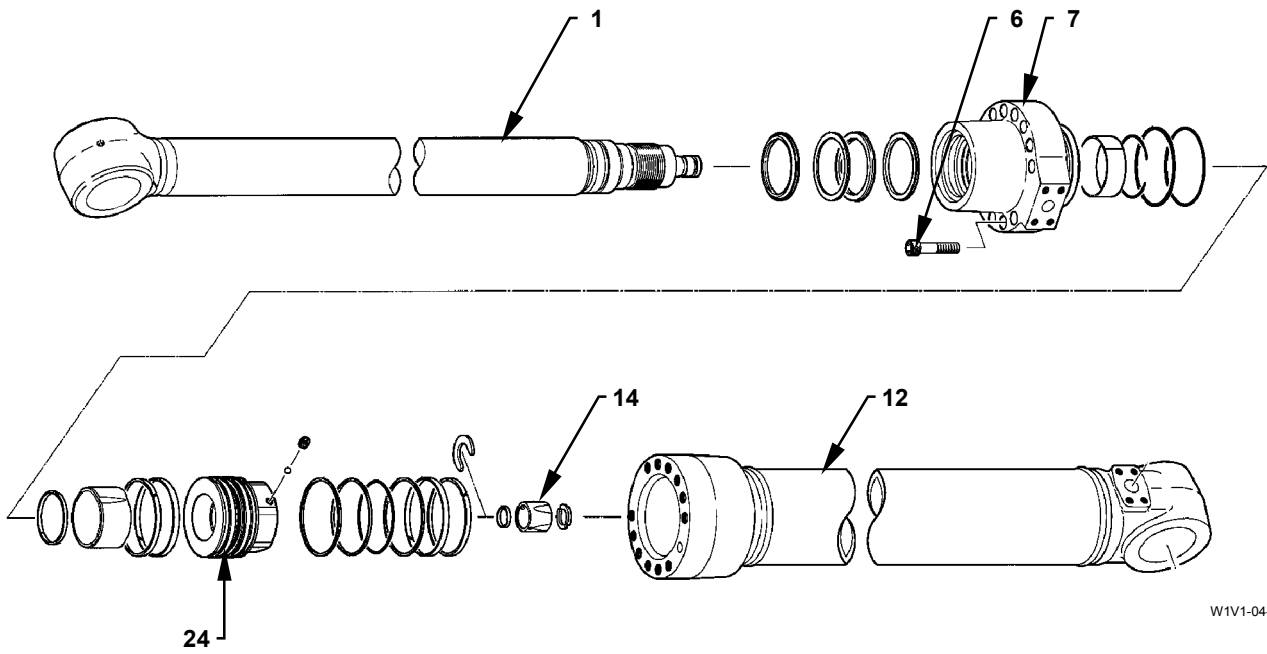
## Bucket Cylinder (ZAXIS210K-3 only)



W1V1-04-02-011

- |                           |                       |                           |                      |
|---------------------------|-----------------------|---------------------------|----------------------|
| 1 - Piston Rod            | 8 - Bushing           | 15 - Cushion Seal         | 21 - Seal Ring       |
| 2 - Wiper Ring            | 9 - Snap Ring         | 16 - Snap Ring            | 22 - Set Screw       |
| 3 - Backup Ring           | 10 - Backup Ring      | 17 - Slide Ring (2 Used)  | 23 - Steel Ball      |
| 4 - U-Ring                | 11 - O-Ring           | 18 - Slide Ring (2 Used)  | 24 - Piston Nut      |
| 5 - Buffer Ring           | 12 - Cylinder Tube    | 19 - Backup Ring (2 Used) | 25 - Cushion Bearing |
| 6 - Socket Bolt (12 Used) | 13 - Stopper (2 Used) | 20 - O-Ring               | 26 - Cushion Seal    |
| 7 - Cylinder Head         | 14 - Cushion Bearing  |                           |                      |

# FRONT ATTACHMENT / Cylinder




W1V1-04-02-008

## FRONT ATTACHMENT / Cylinder

### Disassemble Boom, Arm, Bucket Cylinders (ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class)

- 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:**

ZX200-3 class, 225US-3 class, 225USR-3 class: 170 kg (375 lb)

ZX240-3 class: 210 kg (465 lb)

ZX270-3 class: 250 kg (550 lb)

#### **Arm cylinder weight:**

ZX200-3 class, 225US-3 class, 225USR-3 class: 250 kg (550 lb)

ZX240-3 class: 290 kg (640 lb)

ZX270-3 class: 350 kg (770 lb)

#### **Bucket cylinder weight:**

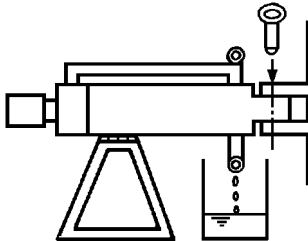
ZX200-3 class, 225US-3 class, 225USR-3 class: 150 kg (330 lb)

ZAXIS210K-3 only: 170 kg (375 lb)

ZX240-3 class: 195 kg (430 lb)


ZX270-3 class: 210 kg (465 lb)

1. Hoist and place the cylinder on a workbench horizontally. Drain hydraulic oil from the cylinder.



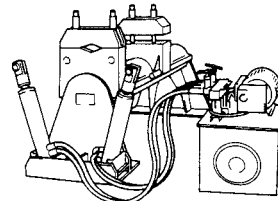
W102-04-02-027

2. Fully extend and support piston rod (1). Remove socket bolts (6) (12 used) from cylinder head (7).

 : 14 mm

**IMPORTANT:** Pull out piston rod (1) straightly in order not to damage the sliding surface.

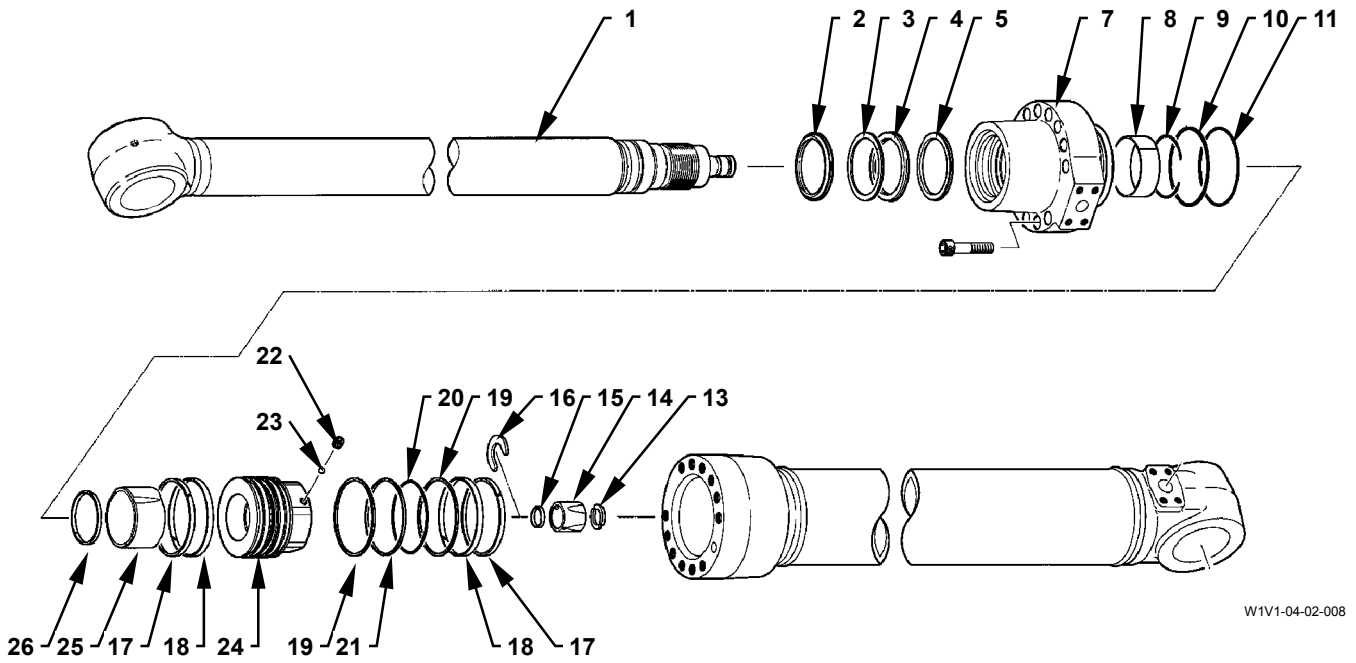
3. Tap and remove cylinder head (7) with piston rod (1) together from cylinder tube (12) by using a plastic hammer.
4. Secure piston rod (1) on special tool (ST 5908). Put the matching marks on piston rod (1) and the end of piston (24) (arm cylinder: cushion bearing (14)).



Special Tool: ST 5908

W158-04-02-022


# FRONT ATTACHMENT / Cylinder




W1V1-04-02-008

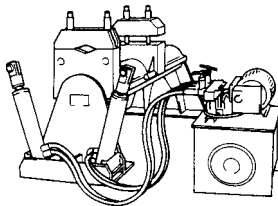
## FRONT ATTACHMENT / Cylinder

5. Cut away the crimped position by using a hand drill and remove set screw (22). Remove steel ball (23).

 **NOTE:** Set screw (22) has been caulked by using a punch at two places after installing.

 : 6 mm

6. Remove piston nut (24) by using special tool (ST 5908) and special tool for piston nut (24). Remove cushion bearing (25) and cushion seal (26) from piston rod (1).  
(Cushion bearing (25) is not equipped for the bucket cylinder except ZAXIS210K-3. Cushion seal (26) is not equipped for the bucket cylinder. Special tool when turning piston nut:  
ST 3244: 90 mm (3.5 in)  
ST 3245: 95 mm (3.7 in)  
ST 3246: 100 mm (3.9 in)  
ST 3331: 105 mm (4.1 in)  
ST 3249: 110 mm (4.3 in)  
ST 3247: 115 mm (4.5 in)



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 nut (24).
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 (rod outer diameter):

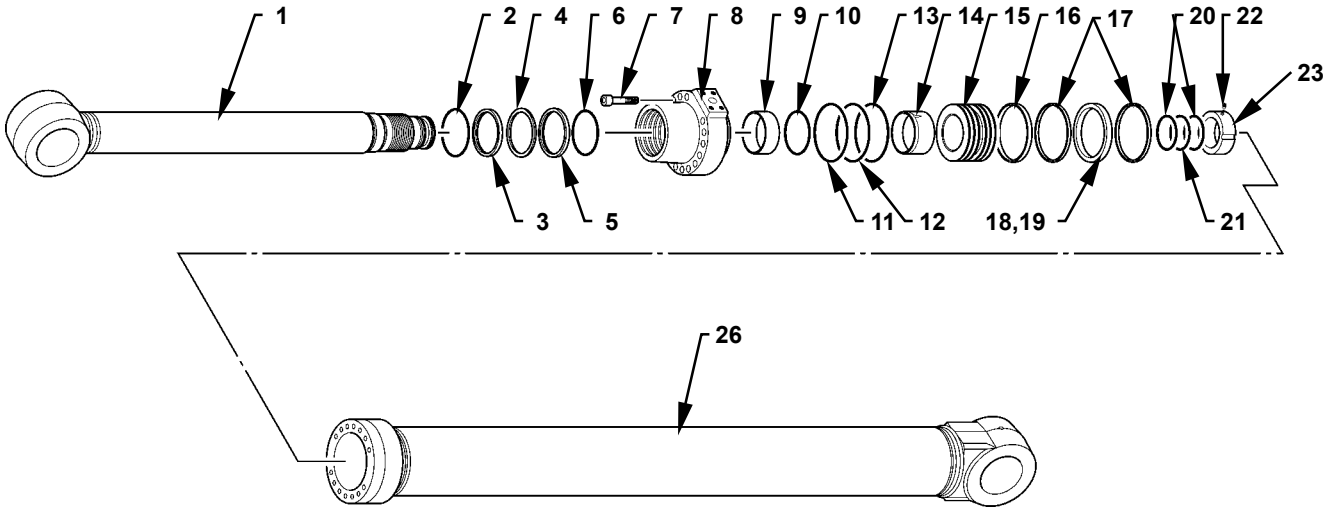
ST 8019: 80 mm (3.1 in)  
ST 8020: 85 mm (3.3 in)  
ST 8024: 90 mm (3.5 in)  
ST 8021: 95 mm (3.7 in)  
ST 8027: 100 mm (3.9 in)

10. (Arm cylinder only)  
Remove stoppers (13) (2 used) from piston rod (1) by using a screwdriver. Remove cushion bearing (14), cushion seal (15) and snap ring (16).

# FRONT ATTACHMENT / Cylinder

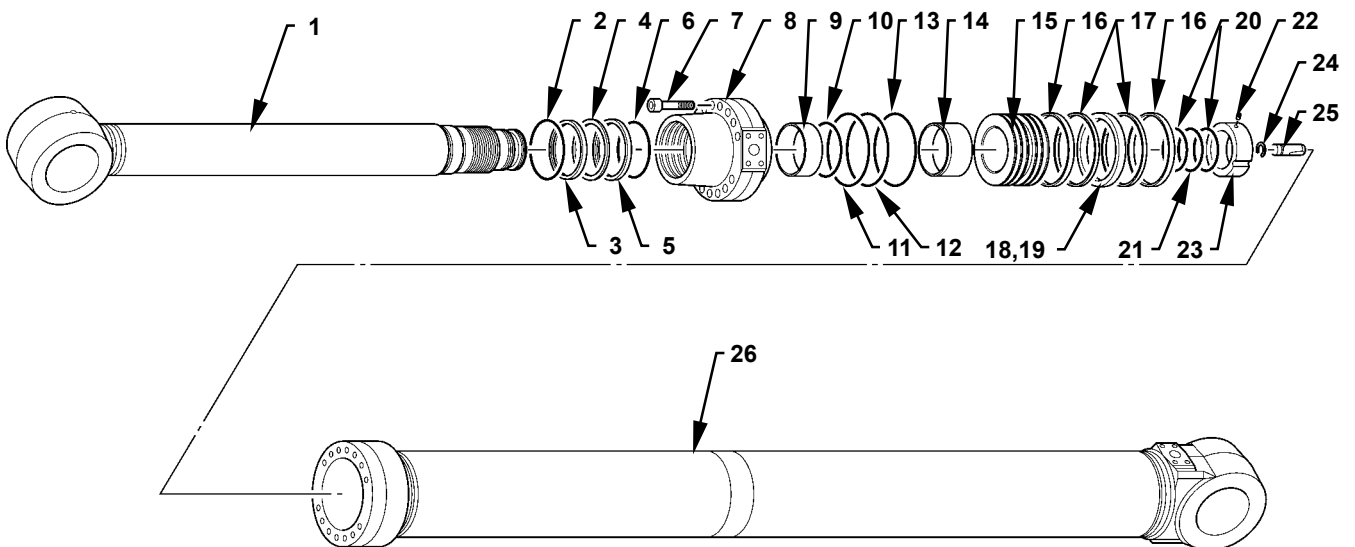
## DISASSEMBLE BOOM, ARM, BUCKET CYLINDERS (ZX270-3 class)

### Boom Cylinder



W1V1-04-02-013

### Arm Cylinder

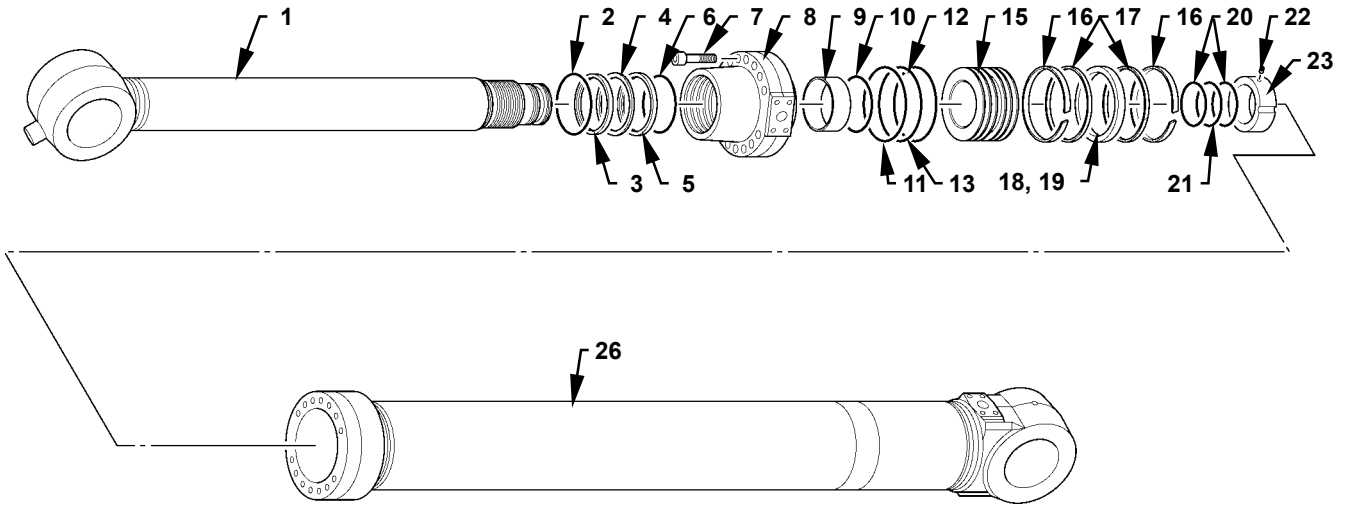


W1V1-04-02-014



## FRONT ATTACHMENT / Cylinder

### Bucket Cylinder

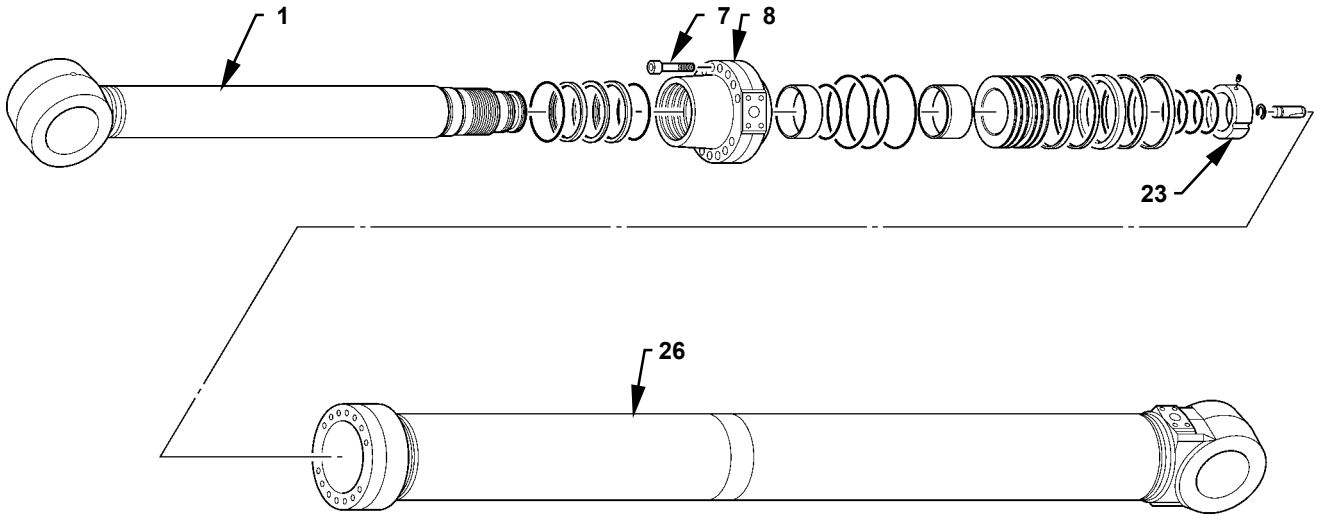


W1V1-04-02-015

- |                           |                      |                           |                      |
|---------------------------|----------------------|---------------------------|----------------------|
| 1 - Piston Rod            | 8 - Cylinder Head    | 15 - Piston               | 21 - O-Ring          |
| 2 - Retaining Ring        | 9 - Bushing          | 16 - Slide Ring (2 Used)  | 22 - Set Screw       |
| 3 - Dust Wiper            | 10 - Retaining Ring  | 17 - Wear Ring (2 Used)   | 23 - Piston Nut      |
| 4 - Backup Ring           | 11 - O-Ring          | 18 - Slipper Seal         | 24 - Stop Ring       |
| 5 - U-Ring                | 12 - Backup Ring     | 19 - Back Ring            | 25 - Cushion Plunger |
| 6 - Buffer Ring           | 13 - O-Ring          | 20 - Backup Ring (2 Used) | 26 - Cylinder Tube   |
| 7 - Socket Bolt (14 Used) | 14 - Cushion Bearing |                           |                      |

# FRONT ATTACHMENT / Cylinder

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W1V1-04-02-014

## FRONT ATTACHMENT / Cylinder

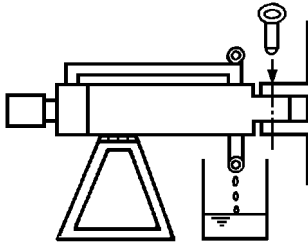
### Disassemble Boom, Arm, Bucket Cylinders (ZX270-3 class)

- 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: 250 kg (550 lb)  
Arm cylinder weight: 350 kg (770 lb)  
Bucket cylinder weight: 210 kg (465 lb)

1. Hoist and place the cylinder on a workbench horizontally. Drain hydraulic oil from the cylinder.



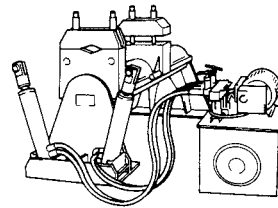
W102-04-02-027

2. Fully extend and support piston rod (1). Remove socket bolts (7) (14 used) from cylinder head (8).  
 : 14 mm

**IMPORTANT:** Pull out piston rod (1) straightly in order not to damage the sliding surface.

3. Tap and remove cylinder head (8) with piston rod (1) together from cylinder tube (26) by using a plastic hammer.

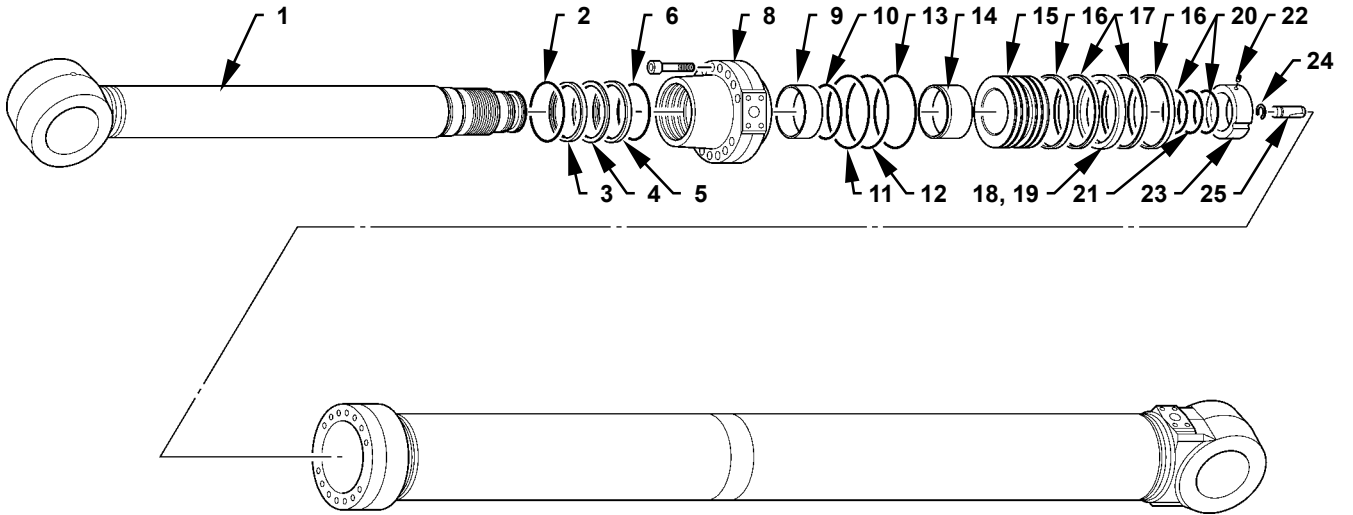
4. Secure piston rod (1) on special tool (ST 5908). Put the matching marks on piston rod (1) and the end of piston nut (23).



Special Tool: ST 5908

W158-04-02-022

# FRONT ATTACHMENT / Cylinder





W1V1-04-02-014

## FRONT ATTACHMENT / Cylinder

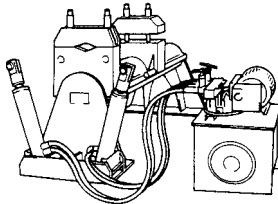
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5. Cut away the crimped position by using a hand drill and remove set screw (22).

 **NOTE:** Set screw (22) has been caulked by using a punch at two places after installing.

 : 6 mm

6. Remove piston nut (23) by using special tool (ST 5908) and special tool for piston nut (23).



Special Tool: ST 5908

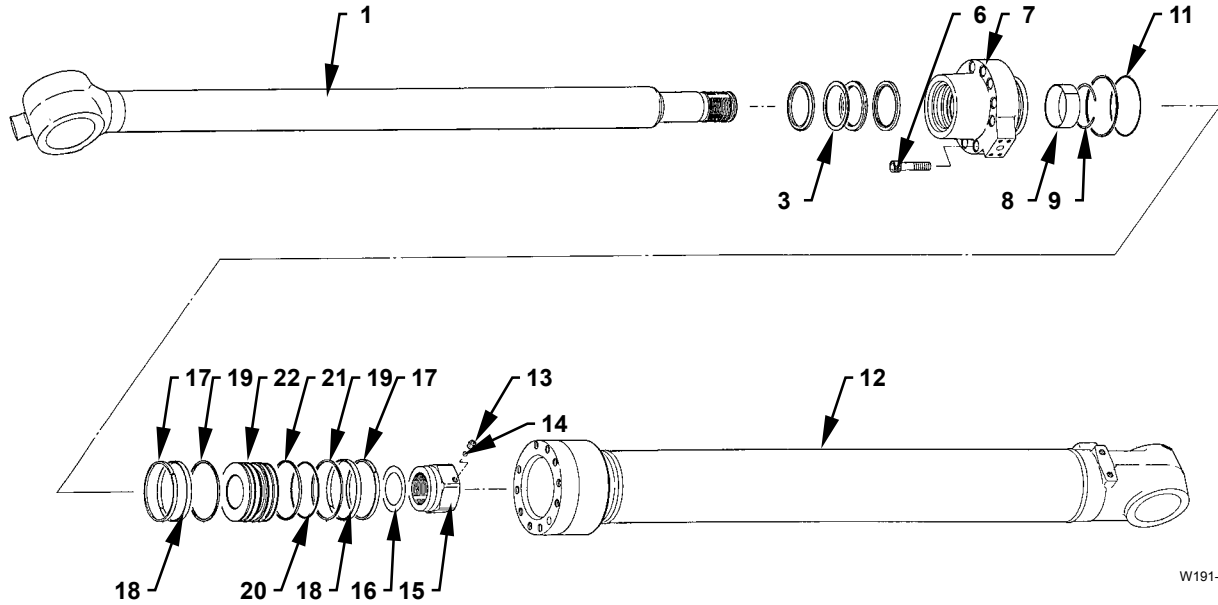
W158-04-02-022

7. Remove piston (15) by using special tool (ST 3328). Remove cushion bearing (14) from piston rod (1). (Cushion bearing (14) is not equipped for the bucket cylinder.)
8. Remove slide rings (16) (2 used), wear rings (17) (2 used), slipper seal (18), back ring (19), backup rings (20) (2 used) and O-ring (21) from piston (15).
9. Remove cylinder head (8) from piston rod (1).
10. Remove retaining ring (2), dust wiper (3), backup ring (4), U-ring (5), buffer ring (6), bushing (9), retaining ring (10), O-ring (11), backup ring (12) and O-ring (13) from cylinder head (8).

**IMPORTANT: Stop ring (24) and cushion plunger (25) cannot be disassembled.**

# 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

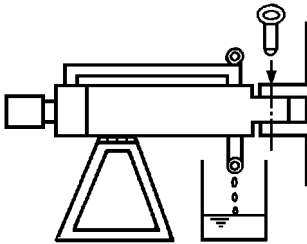
## Disassemble Positioning Cylinder

- The disassembling procedure starts on the premise that the hydraulic lines and the bands securing lines have been removed.




**CAUTION: Positioning cylinder weight:**  
**ZX200-3 class: 270 kg (595 lb)**  
**ZX240-3 class, 270-3 class: 280 kg (620 lb)**

1. Hoist and place the cylinder on a workbench horizontally. Drain hydraulic oil from the cylinder.



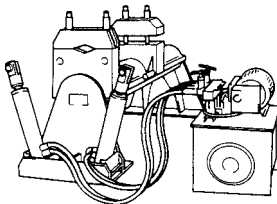
W102-04-02-027

2. Fully extend and support piston rod (1). Remove socket bolts (6) from cylinder head (7).

 : 17 mm

**IMPORTANT: Pull out piston rod (11) 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

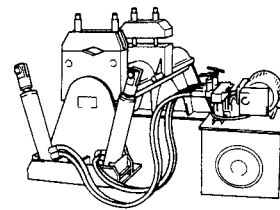
W158-04-02-022

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.

 : 6 mm

6. Remove nut (15) by using special tools (ST 5908, ST 3246). 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).

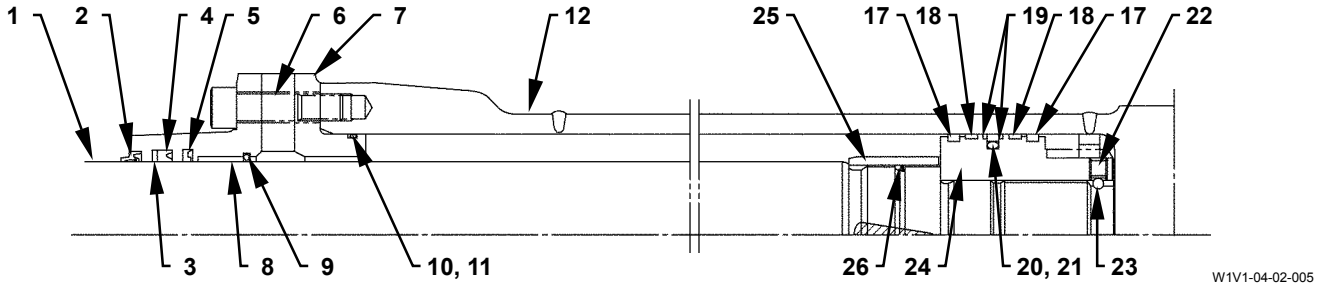
9. Remove O-rings (11) and backup rings (10, 3) from cylinder head (7). Remove wiper ring (2), U-ring (4), buffer ring (5), snap ring (9) and bushing (8).

Special tool when removing bushing: ST 8026

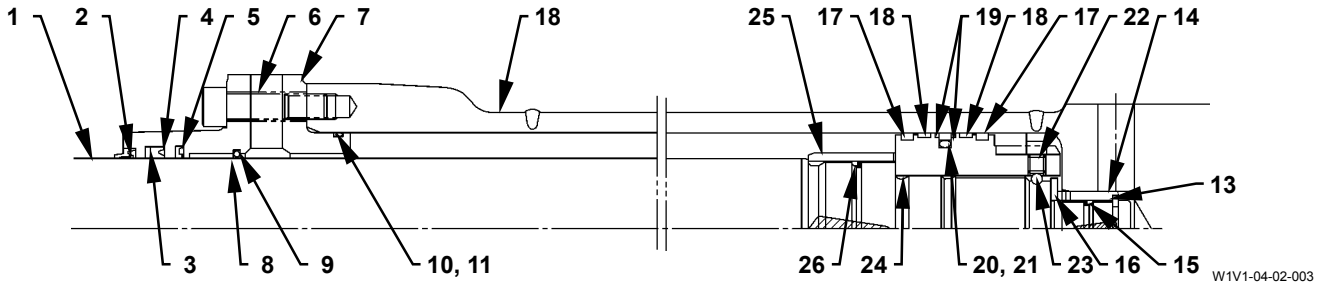
# FRONT ATTACHMENT / Cylinder

**ASSEMBLE BOOM, ARM, BUCKET  
CYLINDERS (ZX200-3 class, 225US-3  
class, 225USR-3 class, 240-3 class)**

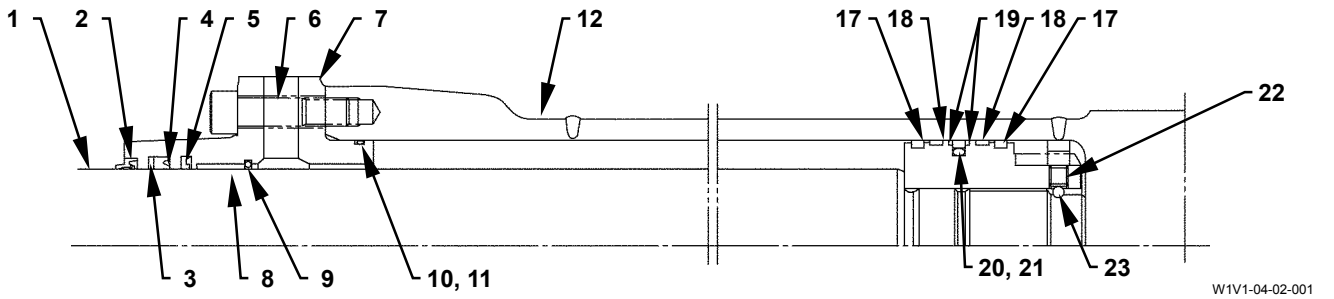
## Boom Cylinder



## Arm Cylinder



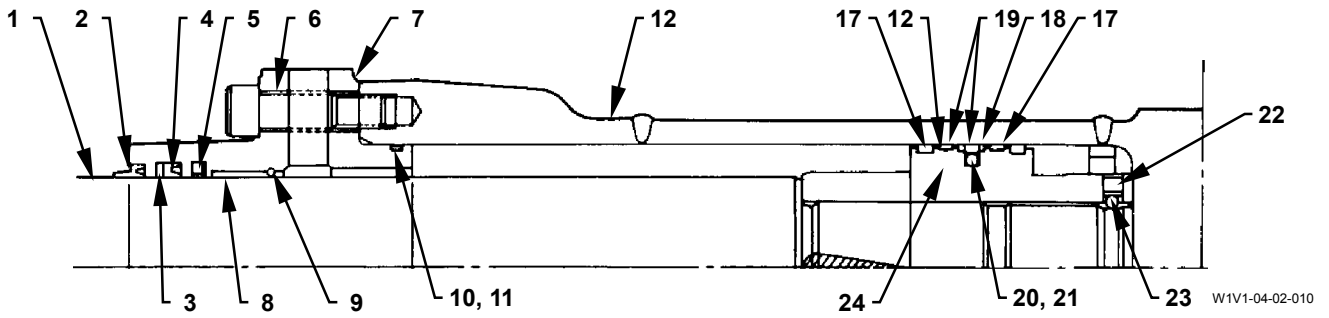
## Bucket Cylinder except ZAXIS210K-3





## FRONT ATTACHMENT / Cylinder

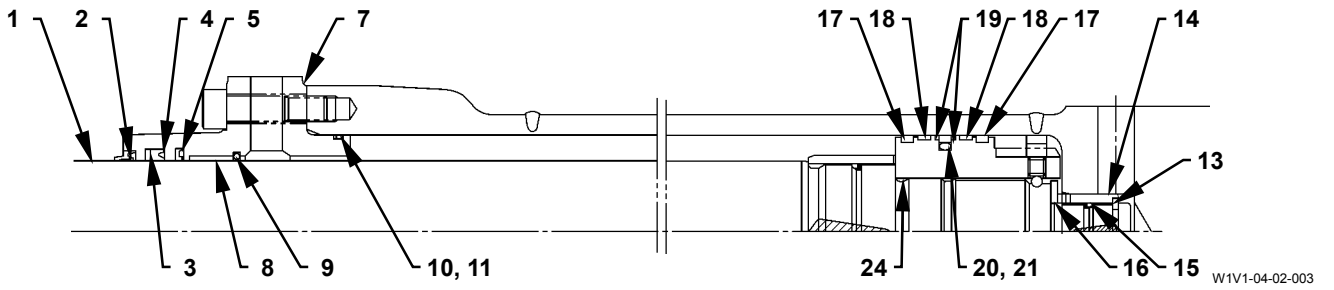
### Bucket Cylinder (ZAXIS210K-3 only)



- |                           |                       |                           |                      |
|---------------------------|-----------------------|---------------------------|----------------------|
| 1 - Piston Rod            | 8 - Bushing           | 15 - Cushion Seal         | 21 - Seal Ring       |
| 2 - Wiper Ring            | 9 - Snap Ring         | 16 - Snap Ring            | 22 - Set Screw       |
| 3 - Backup Ring           | 10 - Backup Ring      | 17 - Slide Ring (2 Used)  | 23 - Steel Ball      |
| 4 - U-Ring                | 11 - O-Ring           | 18 - Slide Ring (2 Used)  | 24 - Piston Nut      |
| 5 - Buffer Ring           | 12 - Cylinder Tube    | 19 - Backup Ring (2 Used) | 25 - Cushion Bearing |
| 6 - Socket Bolt (12 Used) | 13 - Stopper (2 Used) | 20 - O-Ring               | 26 - Cushion Seal    |
| 7 - Cylinder Head         | 14 - Cushion Bearing  |                           |                      |

# FRONT ATTACHMENT / Cylinder


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## FRONT ATTACHMENT / Cylinder

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**Assemble Boom, Arm, Bucket Cylinders (ZX200-3 class, 225US-3 class, 225USR-3 class, 240-3 class)**

 **NOTE:** *The procedure for arm cylinder is an example.*

1. Install bushing (8) into cylinder head (7).  
Special tool when installing bushing (rod outer diameter):  
ST 8019: 80 mm (3.1 in)  
ST 8020: 85 mm (3.3 in)  
ST 8024: 90 mm (3.5 in)  
ST 8021: 95 mm (3.7 in)  
ST 8027: 100 mm (3.9 in)

**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 (rod outer diameter):  
ST 8019: 80 mm (3.1 in)  
ST 8020: 85 mm (3.3 in)  
ST 8024: 90 mm (3.5 in)  
ST 8021: 95 mm (3.7 in)  
ST 8027: 100 mm (3.9 in)
4. Install O-ring (11) and backup ring (10) to cylinder head (7).

5. Install O-ring (20) and seal ring (21) to piston nut (24) by using special tool A.  
After installing seal ring (21), adjust seal ring (21) by using special tool B.  
Special tool A, Special tool B (tube inner diameter):  
ST 2963, ST 2207: 115 mm (4.5 in)  
ST 2964, ST 2208: 120 mm (4.7 in)  
ST 2965, ST 2088: 125 mm (4.9 in)  
ST 2966, ST 2089: 130 mm (5.1 in)  
ST 2978, ST 2535: 135 mm (5.3 in)  
ST 2967, ST 2090: 140 mm (5.5 in)

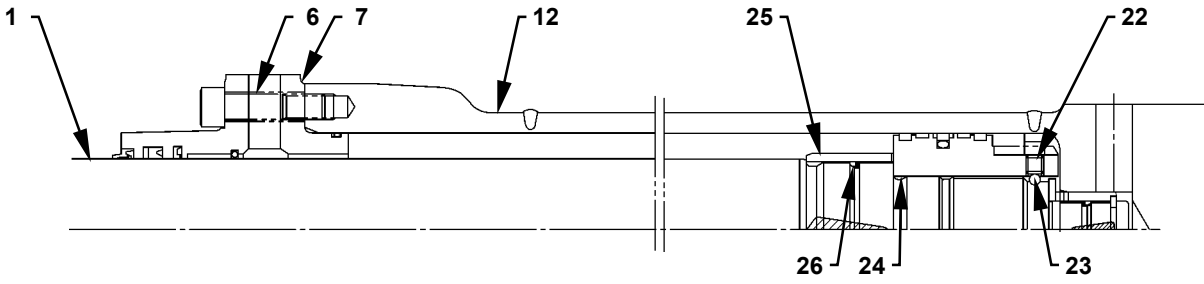
6. Install back up rings (19) (2 used), slide rings (17) (2 used) and (18) (2 used) to piston nut (24).
7. Install the cylinder head (7) assembly to piston rod (1).  
Special tool when inserting cylinder head (rod outer diameter):  
ST 8019: 80 mm (3.1 in)  
ST 8020: 85 mm (3.3 in)  
ST 8024: 90 mm (3.5 in)  
ST 8021: 95 mm (3.7 in)  
ST 8027: 100 mm (3.9 in)

**IMPORTANT: Face the slit in cushion seal (15) to the piston. Check the direction of oil groove in cushion bearing (14).**

8. (Arm cylinder only)  
Install snap ring (16) and cushion seal (15) to piston rod (1). Install cushion bearing (14) and stoppers (13) (2 used).

# FRONT ATTACHMENT / Cylinder

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W1V1-04-02-003

## FRONT ATTACHMENT / Cylinder

**IMPORTANT: Face the slit in cushion seal (26) to the piston. Check the direction of oil groove in cushion bearing (25).**


8. Install cushion seal (26) and cushion bearing (25) to piston rod (1).

(Cushion bearing (25) is not equipped for the bucket cylinder (ZAXIS210K-3). Cushion seal (26) is not equipped for the bucket cylinder.)


10. Align the matching marks before disassembling and tighten piston nut (24) by using special tool (ST 5908).

Special tool when turning piston nut:


ST 3244: 90 mm (3.5 in)

 : 5600 N·m (571 kgf·m, 4130 lbf·ft)


ST 3245: 95 mm (3.7)

 : 5150 N·m (525 kgf·m, 3800 lbf·ft)


ST 3246: 100 mm (3.9 in)

 : 5650 N·m (576 kgf·m, 4170 lbf·ft)


ST 3331: 105 mm (4.1 in)

 : 7500 N·m (765 kgf·m, 5530 lbf·ft)


ST 3249: 110 mm (4.3 in)


 : 8860 N·m (904 kgf·m, 6535 lbf·ft)

ST 3247: 115 mm (4.5 in)

 : 8890 N·m (907 kgf·m, 6560 lbf·ft)

11. Install steel ball (23) to piston rod (1) and tighten with set screw (22). Crimp set screw (22) by using a punch (2 places).

 : 6 mm


 : 57 N·m (5.8 kgf·m, 42 lbf·ft)




**CAUTION: Align the piston rod (1) assembly with the center of cylinder tube (12) and insert 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. Install cylinder head (7) to cylinder tube (12) with socket bolts (6) (12 used) (ZX200-3 class, 225US-3 class, 225USR-3 class except ZAXIS210K-3: 10 used).

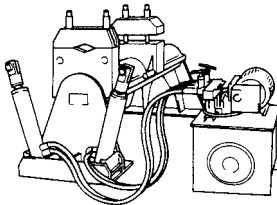
 : 14 mm

Boom cylinder, Bucket cylinder  
(ZX200-3 class, 225US-3 class, 225USR-3 class)

 : 267 N·m (27 kgf·m, 197 lbf·ft)

Arm cylinder, Bucket cylinder  
(ZX240-3 class)

 : 367 N·m (37 kgf·m, 270 lbf·ft)



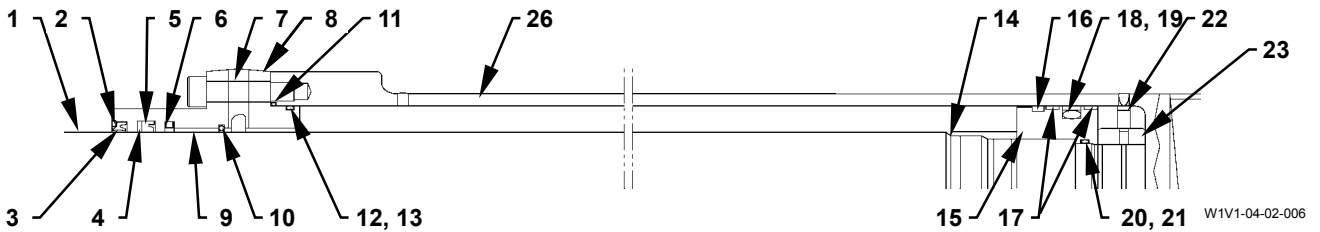
Special tool: ST 5908

W158-04-02-022

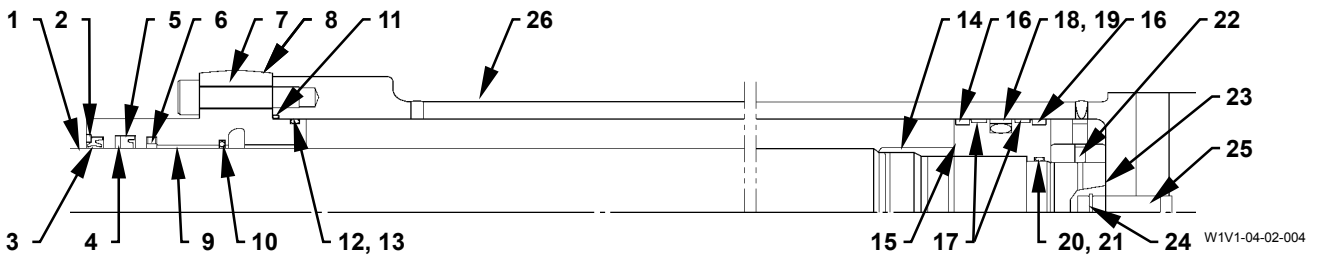
# FRONT ATTACHMENT / Cylinder

## ASSEMBLE BOOM, ARM, BUCKET CYLINDERS (ZX270-3 class)

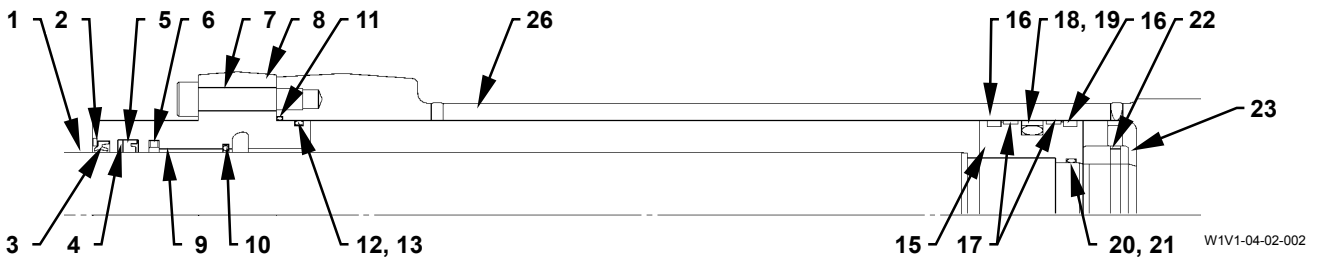
### Boom Cylinder



### Arm Cylinder



### Bucket Cylinder




- |                           |                      |                           |                      |
|---------------------------|----------------------|---------------------------|----------------------|
| 1 - Piston Rod            | 8 - Cylinder Head    | 15 - Piston               | 21 - O-Ring          |
| 2 - Retaining Ring        | 9 - Bushing          | 16 - Slide Ring (2 Used)  | 22 - Set Screw       |
| 3 - Dust Wiper            | 10 - Retaining Ring  | 17 - Wear Ring (2 Used)   | 23 - Piston Nut      |
| 4 - Backup Ring           | 11 - O-Ring          | 18 - Slipper Seal         | 24 - Stop Ring       |
| 5 - U-Ring                | 12 - Backup Ring     | 19 - Back Ring            | 25 - Cushion Plunger |
| 6 - Buffer Ring           | 13 - O-Ring          | 20 - Backup Ring (2 Used) | 26 - Cylinder Tube   |
| 7 - Socket Bolt (14 Used) | 14 - Cushion Bearing |                           |                      |

## FRONT ATTACHMENT / Cylinder

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### Assemble Boom, Arm, Bucket Cylinders (ZX270-3 class)



 **NOTE:** The procedure for arm cylinder is an example.

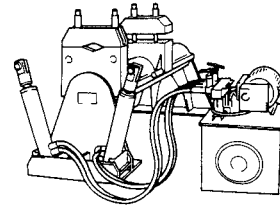
1. Install bushing (9) into cylinder head (8).  
Special tool when installing bushing: ST 2612

**IMPORTANT: Check the direction to install.**

2. Install U-ring (5), backup ring (4), buffer ring (6) and retaining ring (10) to cylinder head (8).
3. Install dust wiper (3) to cylinder head (8) by using a plastic hammer. Install retaining ring (2) to cylinder head (8).  
Special tools when installing dust wiper: ST 2614
4. Install O-rings (11, 13) and backup ring (12) to cylinder head (8).
5. Install back ring (19) and slipper seal (18) to piston (15) by using special tool (ST 2588).  
After installing slipper seal (18), adjust slipper seal (18) by using special tool (ST 2589).
6. Install wear rings (17) (2 used), slide rings (16) (2 used) (boom cylinder: 1 used), O-ring (21) and backup rings (20) (2 used) to piston (15).
7. Install the cylinder head (8) assembly to piston rod (1).  
Special tool when installing cylinder head: ST 2675

**IMPORTANT: Check the direction of oil groove in cushion bearing (14).**

8. Install cushion bearing (14) and the piston (15) assembly to piston rod (1). (Cushion bearing (14) is not equipped for the bucket cylinder.)  
Special tool when turning piston nut: ST 3328  
 : 981 N·m (100 kgf·m, 724 lbf·ft)
9. Align the matching marks before disassembling and tighten piston nut (23) by using special tool (ST 5908) and special tool for piston nut (23).  
Special tool when turning piston nut: ST 3327  
 : 1860 N·m (190 kgf·m, 1372 lbf·ft)

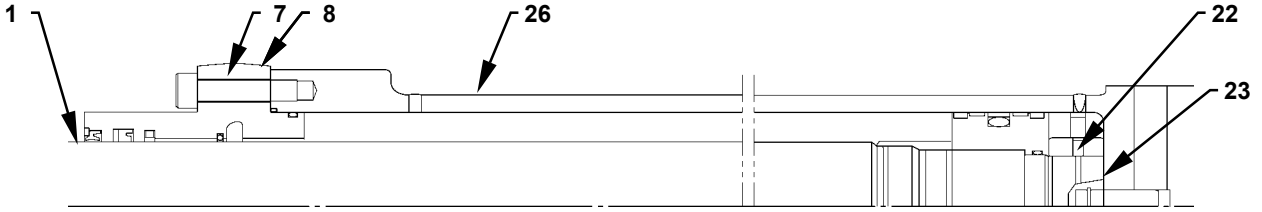


Special Tool: ST 5908

W158-04-02-022

# FRONT ATTACHMENT / Cylinder

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W1V1-04-02-004




## FRONT ATTACHMENT / Cylinder

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10. Tighten set screw (22) to piston nut (23). Crimp set screw (22) by using a punch (2 places).

 : 6 mm


 : 14.7 N·m (1.5 kgf·m, 10.8 lbf·ft)




**CAUTION: Align the piston rod (1) assembly with the center of cylinder tube (26) and insert in order not to damage the rings.**

11. Secure cylinder tube (26) horizontally on a workbench. Insert the piston rod (1) assembly into cylinder tube (26).

12. Tighten cylinder head (8) to cylinder tube (26) with socket bolts (7) (14 used).


 : 14 mm

Boom cylinder, Bucket cylinder

 : 343 to 363 N·m

(35 to 37 kgf·m, 253 to 268 lbf·ft)

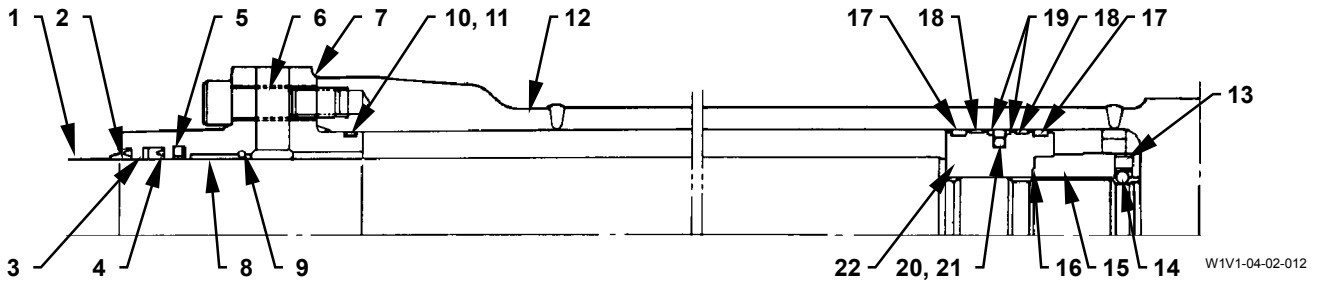
Arm cylinder

 : 471 to 491 N·m

(48 to 50 kgf·m, 347 to 362 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 8027

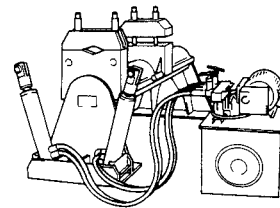
**IMPORTANT: Check the direction to install.**

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 8027
4. Install O-ring (11) and backup ring (10) to cylinder head (7).
5. Install O-ring (20) and seal ring (21) to piston (22) by using special tool (ST 2968). After installing seal ring (21), adjust seal ring (21) by using special tool (ST 2209).
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 8027

8. Install shim (16) to piston rod (1). Align the matching marks before disassembling and tighten nut (15) by using special tools (ST 5908, ST 3247).


 : 11620 N·m (1190 kgf·m, 8570 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).


 : 6 mm


 : 57 N·m (5.8 kgf·m, 42 lbf·ft)

 **CAUTION: Align the piston rod (1) assembly with the center of cylinder tube (12) and insert 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).

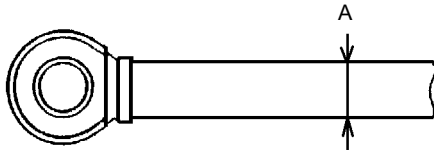
 : 17 mm

 : 520 N·m (53 kgf·m, 384 lbf·ft)

# FRONT ATTACHMENT / Cylinder

## MAINTENANCE STANDARD

### Rod



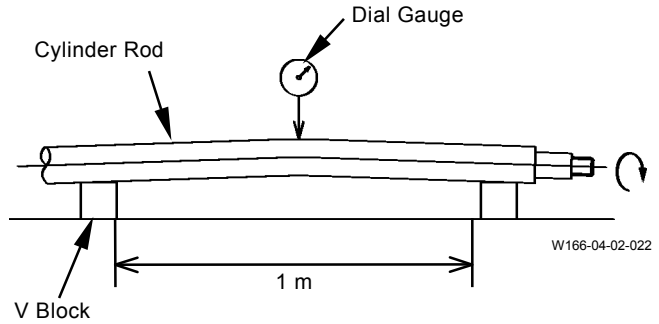
W105-04-02-094

ZX200-3 class, 225US-3 class, 225USR-3 class

Unit: mm

Cylinder Name	Recommended Size After Re-manufacturing (A)
Boom	85 <sup>-0.012</sup> -0.027
Arm	95 <sup>-0.012</sup> -0.027
Bucket	80 <sup>-0.01</sup> -0.023
Bucket (ZAXIS210K-3)	85 <sup>-0.012</sup> -0.027
Positioning	100 <sup>-0.012</sup> -0.027

### Rod Bend and Run Out



W166-04-02-022

Unit: mm (in)

Bend	Run Out	Remedy
0.5 (0.02)	1.0 (0.04)	Repair
1.0 (0.04)	2.0 (0.08)	Replace

ZX240-3 class

Unit: mm

Cylinder Name	Recommended Size After Re-manufacturing (A)
Boom	90 <sup>-0.012</sup> -0.027
Arm	100 <sup>-0.012</sup> -0.027
Bucket	90 <sup>-0.012</sup> -0.027
Positioning	100 <sup>-0.012</sup> -0.027

ZX270-3 class


Unit: mm

Cylinder Name	Recommended Size After Re-manufacturing (A)
Boom	95 <sup>-0.012</sup> -0.027
Arm	105 <sup>-0.012</sup> -0.027
Bucket	90 <sup>-0.012</sup> -0.027
Positioning	100 <sup>-0.012</sup> -0.027


NOTE: 1mm=0.039 in

## FRONT ATTACHMENT / Holding Valve

### HYDRAULIC CIRCUIT PRESSURE RELEASE PROCEDURE

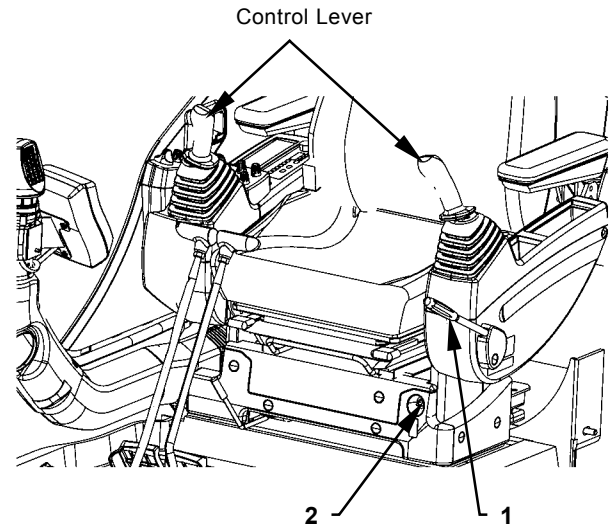
 **NOTE:** Operate the pilot pump by using the power from battery without starting the engine and deliver the pilot pressure to the spool of control valve.

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 / Holding Valve

### REMOVE AND INSTALL HOLDING VALVE FOR ARM CYLINDER



#### Removal



1. Remove hoses (5) (3 used) from holding valve (1).  
Cap the open ends.  
 : 17 mm, 19 mm, 27 mm







2. Remove socket bolts (4) (4 used) from pipe (3).  
Remove pipe (3) from holding valve (1). Cap the open ends.  
 : 10 mm

3. Remove socket bolts (2) (4 used) from holding valve (1). Remove holding valve (1) from arm cylinder (6).  
 : 10 mm

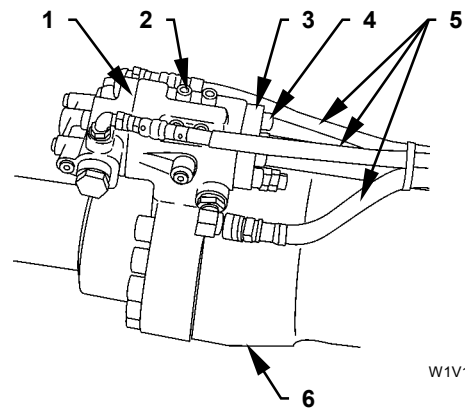
#### Installation

1. Install holding valve (1) to arm cylinder (6) with socket bolts (2) (4 used).  
 : 10 mm  
 :  $93\pm 18$  N·m (9.5±1.8 kgf·m, 69±13 lbf·ft)

2. Install pipe (3) to holding valve (1) with socket bolts (4) (4 used).  
 : 10 mm  
 :  $93\pm 18$  N·m (9.5±1.8 kgf·m, 69±13 lbf·ft)

3. Install hoses (5) (3 used) to holding valve (1).  
 : 17 mm  
 : 24.5 N·m (2.5 kgf·m, 18 lbf·ft)  
 : 19 mm  
 : 29.5 N·m (3 kgf·m, 22 lbf·ft)  
 : 27 mm  
 : 78 N·m (8 kgf·m, 58 lbf·ft)

**IMPORTANT:** Fill hydraulic oil to specified level. Start the engine. Check each connection of hoses for any oil leaks.






W1V1-02-05-083









## FRONT ATTACHMENT / Holding Valve

### REMOVE AND INSTALL HOLDING VALVE FOR POSITIONING CYLINDER

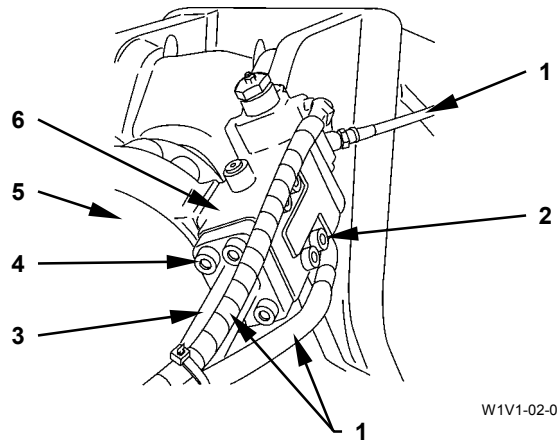
#### Removal

1. Remove hoses (1) (3 used) from holding valve (6).  
Cap the open ends.  
 : 17 mm, 19 mm
2. Remove socket bolts (4) (4 used) from pipe (3).  
Cap the open ends.  
 : 10 mm
3. Remove socket bolts (2) (4 used) from holding valve (6). Remove holding valve (6) from positioning cylinder (5).  
 : 10 mm

#### Installation

1. Install holding valve (6) to positioning cylinder (5) with socket bolts (2) (4 used).  
 : 10 mm  
 :  $93\pm 18$  N·m (9.5±1.8 kgf·m, 69±13 lbf·ft)
2. Install pipe (3) to holding valve (6) with socket bolts (4) (4 used).  
 : 10 mm  
 :  $93\pm 18$  N·m (9.5±1.8 kgf·m, 69± 13 lbf·ft)
3. Install hoses (1) (3 used) to holding 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)

**IMPORTANT:** Fill hydraulic oil to specified level. Start the engine. Check each connection of hoses for any oil leaks.




W1V1-02-05-082

## FRONT ATTACHMENT / Holding Valve

### REMOVE AND INSTALL HOLDING VALVE FOR BOOM CYLINDER


#### Removal

1. Remove hose (1) from boom cylinder (4). Cap the open ends.


 : 36 mm

2. Remove connector (8) from holding valve (5).


3. Remove pilot hoses (2) (3 used) from holding valve (5). Cap the open ends.

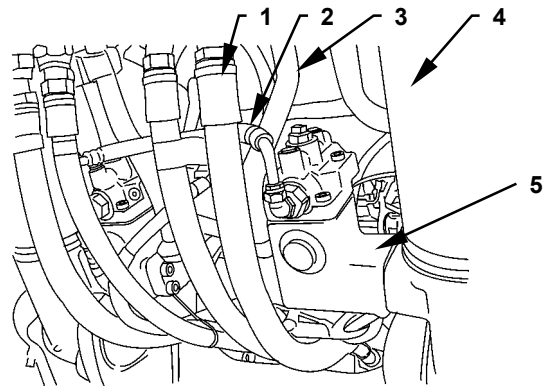
 : 19 mm

4. Remove sems bolt (9) from clamp (6). Remove clamps (6) (2 used) from pipe (3).

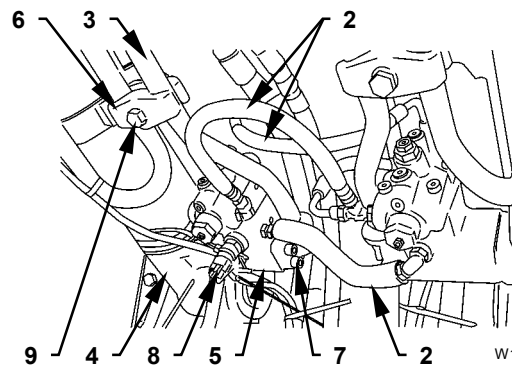
 : 22 mm

5. Remove socket bolts (7) (8 used) from pipe (3). Remove pipe (3) and holding valve (5) from boom cylinder (4).

 : 10 mm



W1V1-02-05-080




W1V1-02-05-081




## FRONT ATTACHMENT / Holding Valve


### Installation


1. Install holding valve (5) and pipe (3) to boom cylinder (4) with socket bolts (7) (8 used).

 : 10 mm


 :  $93\pm 18$  N·m (9.5±1.8 kgf·m, 69±13 lbf·ft)


2. Secure clamps (6) (2 used) to pipe (3) with sems bolt (9).

 : 22 mm


 : 137 N·m (14 kgf·m, 101 lbf·ft)


3. Install pilot hoses (2) (3 used) to holding valve (5).

 : 19 mm

 : 29.5 N·m (3 kgf·m, 22 lbf·ft)

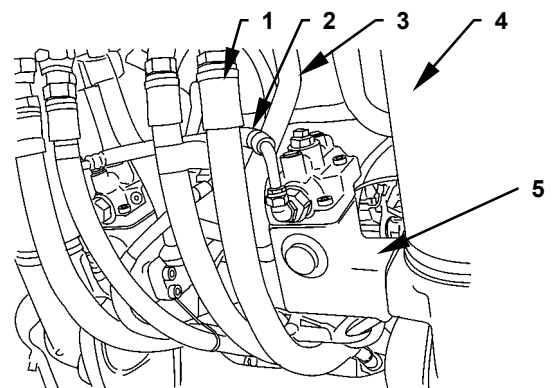
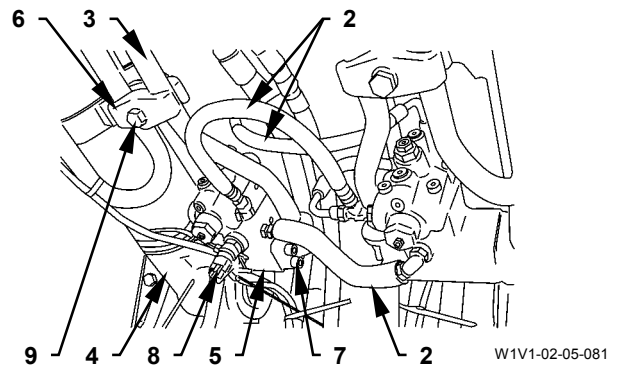
4. Install hose (1) to boom cylinder (4).

 : 36 mm

 : 175 N·m (18 kgf·m, 129 lbf·ft)

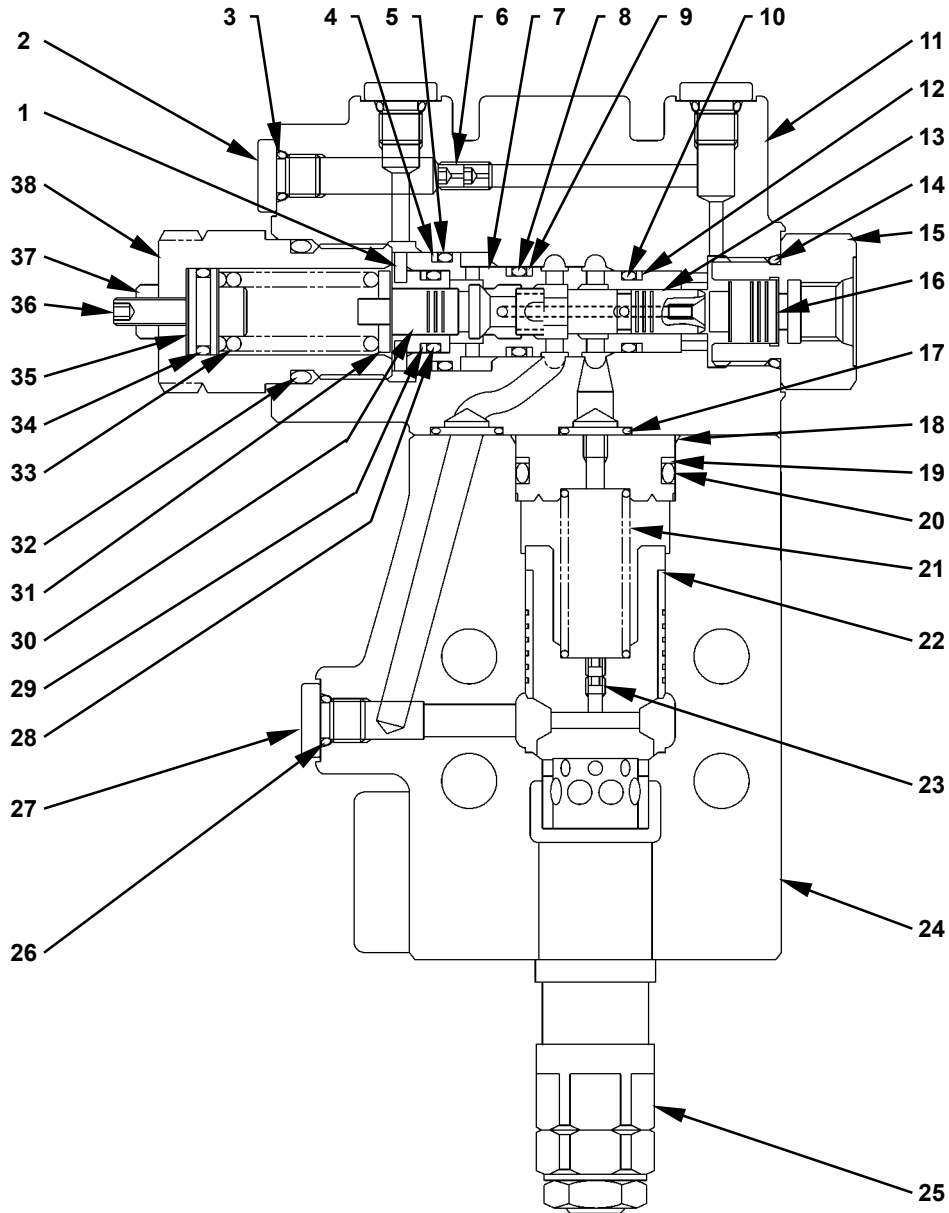
5. Install connector (8) to holding valve (5).

**IMPORTANT: Fill hydraulic oil to specified level. Start the engine. Check for any oil leaks.**



## FRONT ATTACHMENT / Holding Valve

### STRUCTURE OF HOLDING VALVE FOR ARM CYLINDER AND POSITIONING CYLINDER



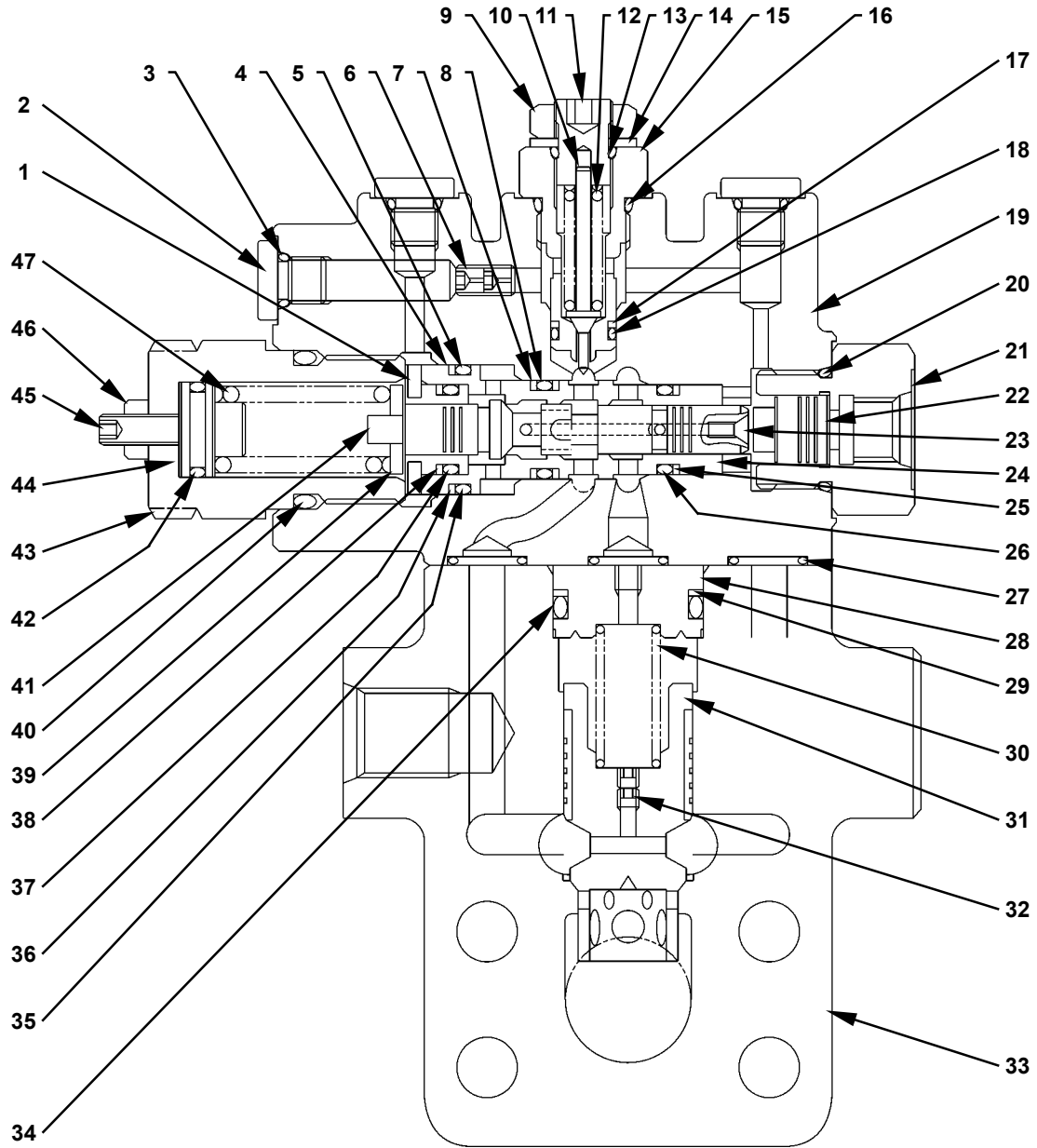
W1V1-04-03-002

## FRONT ATTACHMENT / Holding Valve

Item	Part Name	Q'ty	Wrench Size	Tightening Torque		Remark
				N·m	(kgf·m)	
1	Spacer	1				
2	Plug	3				
3	O-Ring	3				
4	Backup Ring	1				
5	O-Ring	1				
6	Orifice	2				
7	Sleeve	1				
8	O-Ring	1				
9	Backup Ring	2				
10	O-Ring	1				
11	Casing	1				
12	Backup Ring	1				
13	Spool	1				
14	O-Ring	1				
15	Plug	1				
16	Stopper	1				
17	O-Ring	2				
18	Plug	1				
19	Backup Ring	1				
20	O-Ring	1				
21	Spring	1				
22	Holding Valve	1				
23	Orifice	2				
24	Body	1				
25	Relief Valve	1				
26	O-Ring	1				
27	Plug	1				
28	O-Ring	1				
29	Backup Ring	1				
30	Piston	1				
31	Spring Seat	1				
32	O-Ring	1				
33	Spring	1				
34	O-Ring	1				
35	Stopper	1				
36	Set Screw	1				
37	Lock Nut	1				
38	Cover	1				






# FRONT ATTACHMENT / Holding Valve

## STRUCTURE OF HOLDING VALVE FOR BOOM CYLINDER

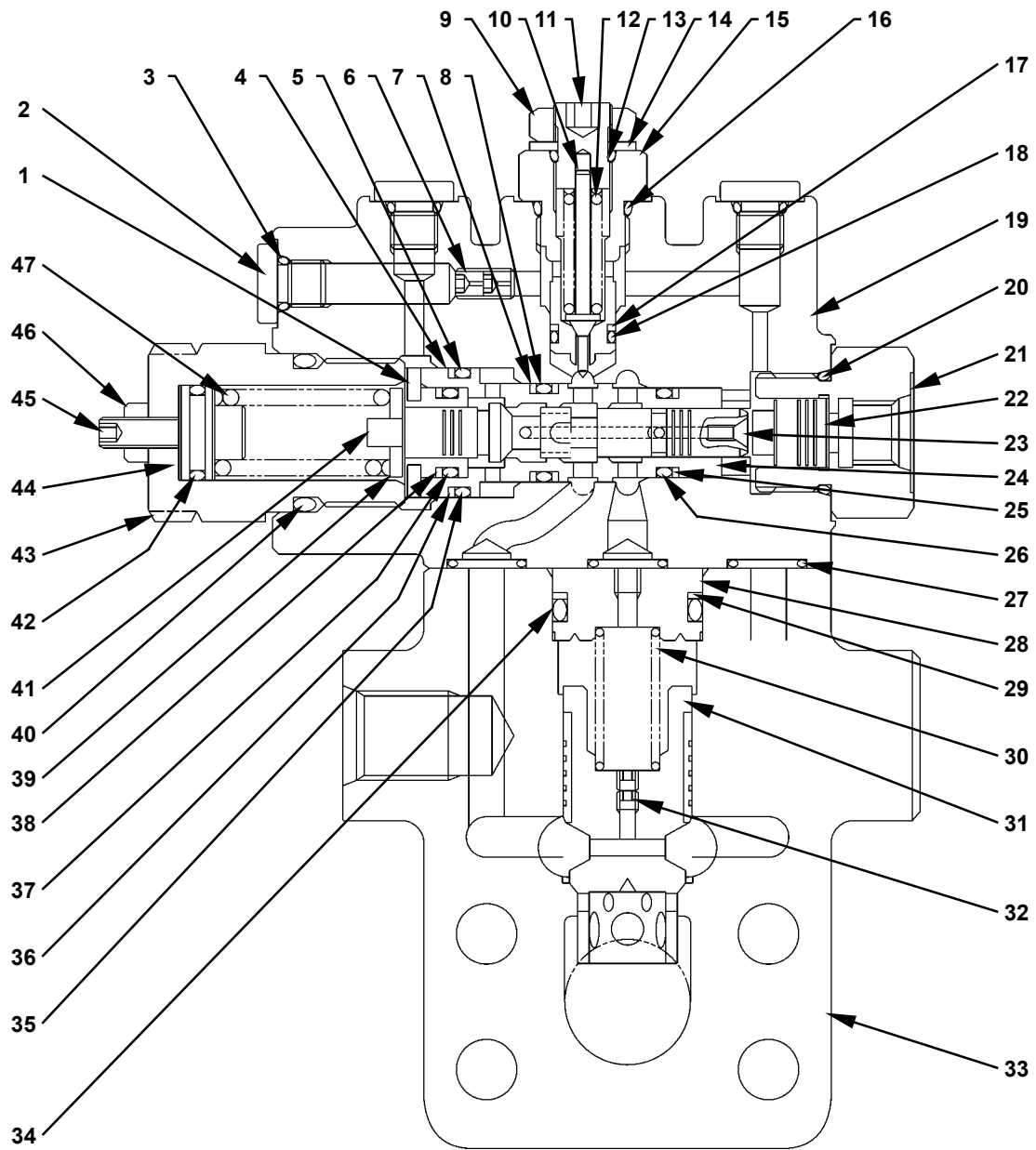


W1V1-04-03-001

## FRONT ATTACHMENT / Holding Valve




Item	Part Name	Q'ty	Wrench Size	Tightening Torque		Remark
				N·m	(kgf·m)	
1	Spacer	1				
2	Plug	3	 : 5 mm			
3	O-Ring	3				
4	Backup Ring	1				
5	O-Ring	1				
6	Orifice	2				
7	Backup Ring	2				
8	O-Ring	1				
9	Lock Nut	1	 : 17 mm			
10	Poppet	1				
11	Set Screw	1	 : 6 mm			
12	Spring	1				
13	O-Ring	1				
14	Washer	1				
15	Adapter	1	 : 24 mm			
16	O-Ring	1				
17	Backup Ring	1				
18	O-Ring	1				
19	Casing	1				
20	O-Ring	1				
21	Plug	1	 : 32 mm			
22	Stopper	1				
23	Spool	1				
24	Sleeve	1				
25	Backup Ring	1				
26	O-Ring	1				
27	O-Ring	3				
28	Plug	1				

# FRONT ATTACHMENT / Holding Valve



W1V1-04-03-001

## FRONT ATTACHMENT / Holding Valve

Item	Part Name	Q'ty	Wrench Size	Tightening Torque		Remark
				N·m	(kgf·m)	
29	Backup Ring	1				
30	Spring	1				
31	Holding Valve	1				
32	Orifice	2				
33	Body	1				
34	O-Ring	1				
35	O-Ring	1				
36	Backup Ring	1				
37	O-Ring	1				
38	Backup Ring	1				
39	Spring Seat	1				
40	O-Ring	1				
41	Piston	1				
42	O-Ring	1				
43	Cover	1	 : 32 mm			
44	Stopper	1				
45	Set Screw	1	 : 3 mm			
46	Lock Nut	1	 : 10 mm			
47	Spring	1				

## FRONT ATTACHMENT / Holding Valve

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