

Workshop Manual

ZAXIS

110 **125US**
120 **135US**
 135UR

Excavator

Service Manual (Manual No. KM-187E) consists of the following three separate volumes;

Technical Manual (Operational Principle)	: Vol. No. TO187E
Technical Manual (Troubleshooting)	: Vol. No. TT187E
Workshop Manual	: Vol. No. W187E

HITACHI

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

SAFETY

OPERATE ONLY FROM OPERATOR'S SEAT

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



SA-444

012-E01B-0444

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

PRACTICE SAFE MAINTENANCE

To avoid accidents:

- Understand service procedures before doing work.
- Keep 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 / acceleration selector 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.

SAFETY

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.

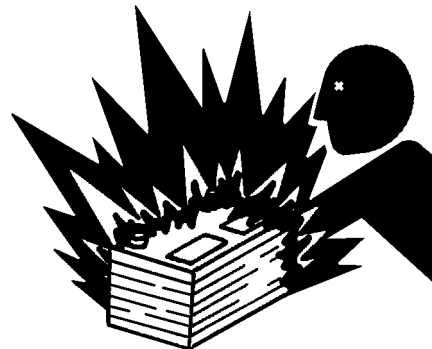


SA-029

511-E01A-0029

PREVENT BATTERY EXPLOSIONS

- Battery gas can explode.
 - Keep sparks, lighted matches, and flame away from the top of battery.
 - Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.
 - Do not charge a frozen battery; it may explode. Warm the battery to 16 °C (60 °F) first.
 - Do not continue to use or charge the battery when electrolyte level is lower than specified. Explosion of the battery may result.
 - Loose terminals may produce sparks. Securely tighten all terminals.
- Battery electrolyte is poisonous. If the battery should explode battery electrolyte may be splashed into eyes, possibly resulting in blindness.
 - Be sure to wear eye protection when checking electrolyte specific gravity.



SA-032

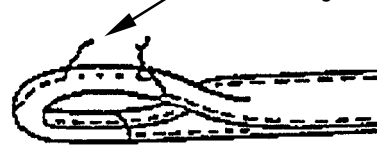
512-E01C-0032

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

Fuzz



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



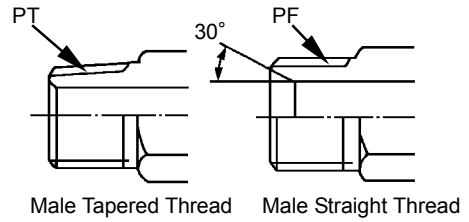
W162-01-01-008

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

Seal Tape Application

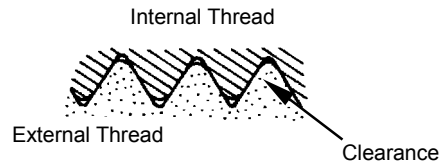
Seal tape is used to seal clearances between male and female threads, so as to prevent any leaks between threads.

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

- Application Procedure

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

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



W105-01-01-019

Low-Pressure-Hose Clamp Tightening Torque

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

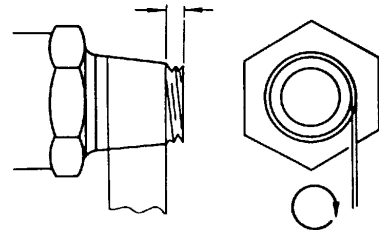
T-Bolt Type Band Clamp:

4.4 N·m (0.45 kgf·m, 3.25 lbf·ft)

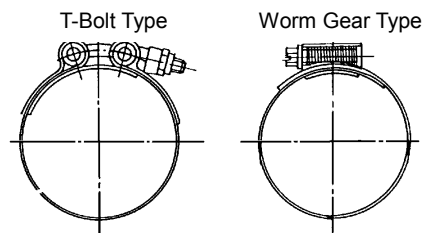
Worm Gear Type Band Clamp:

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

Leave one to two pitch threads uncovered



M114-07-041

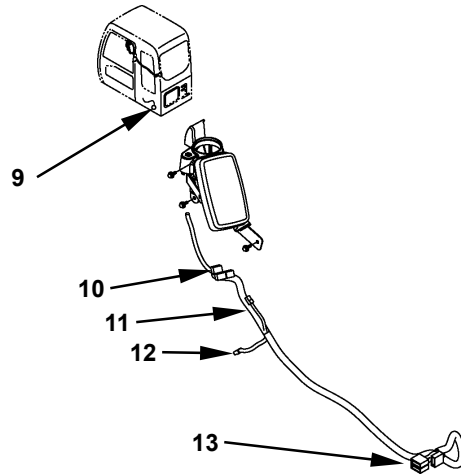


M114-07-043

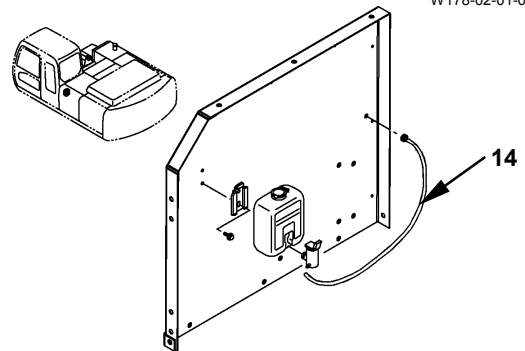
M114-07-042

UPPERSTRUCTURE / Cab

5. Disconnect cable connectors (10, 11, 12, and 13) on the right back side in the cab and ground (9) at rear inside of the cab.

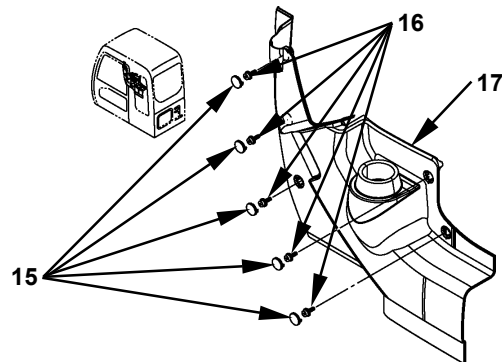


6. Remove washer vinyl hose (14) at rear inside of the cab.




W178-02-01-014

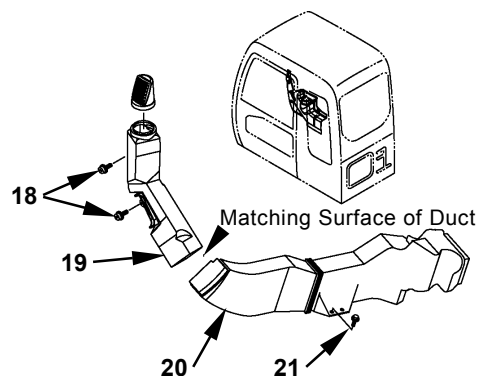
7. Remove cap (15) from duct cover (17) with a screwdriver. Use a screwdriver to loosen screws (16) to remove duct cover (17).



W178-02-01-015

8. Remove screw (18) and bolt (21) to remove duct (19) and duct (20).

 : 17 mm



W178-02-01-016

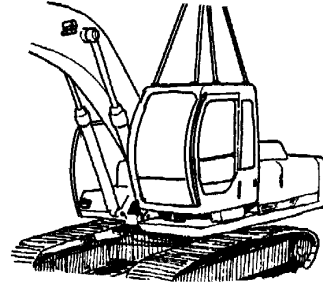
W178-02-01-017

UPPERSTRUCTURE / Cab

Installation (ZAXIS125US, 135US)







 **CAUTION: Cab weight: 270 kg (595 lb)**

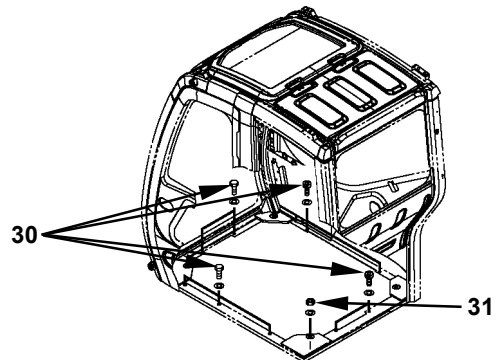
1. Attach lifting straps to top of the cab (4 places).
Hoist the cab by crane and place it on the frame.



W157-02-01-001

2. Install cab mounting bolts (30) and nuts (31).



-  : 17 mm
-  : 50 N·m (5.1 kgf·m, 37 lbf·ft)
-  : 24 mm
-  : 210 N·m (21.5 kgf·m, 155 lbf·ft)
-  : 8 mm
-  : 50 N·m (5.1 kgf·m, 37 lbf·ft)

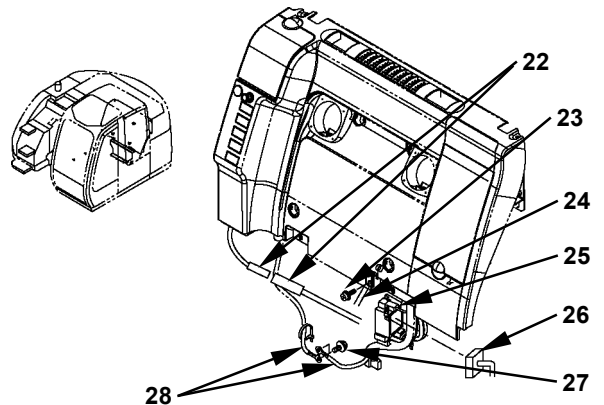


W15E-02-01-10

3. Connect grounds (28) with bolt (27).
Put junction box (harness side) (26) onto the junction box.

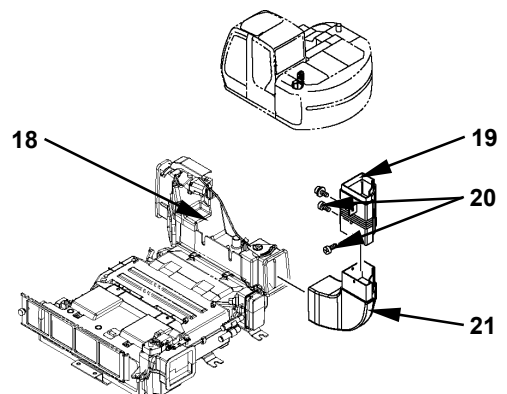
- Install connectors (25) (6 used).
- Install ground (24) with screw (23).
- Connect radio antenna feeders (22).

-  : 13 mm
-  : 10 N·m (1.0 kgf·m, 7.4 lbf·ft)



W15E-02-01-09

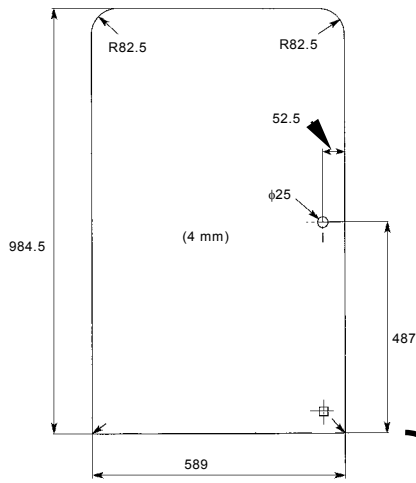
4. Install duct (21) into duct (18) and duct (19) with screws (20) (2 used).



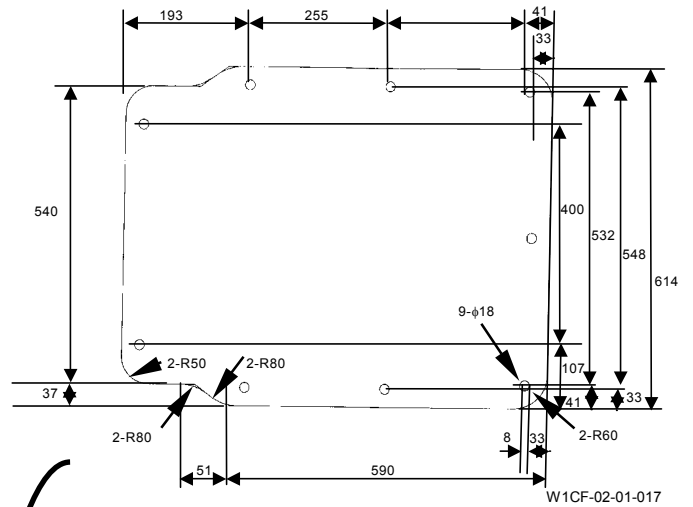
W15E-02-01-008

UPPERSTRUCTURE / Cab

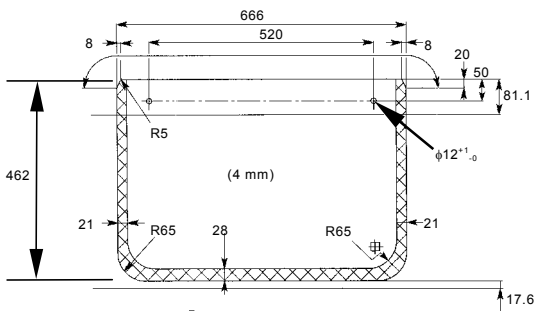
Unit: mm (1 mm=0.039 in)



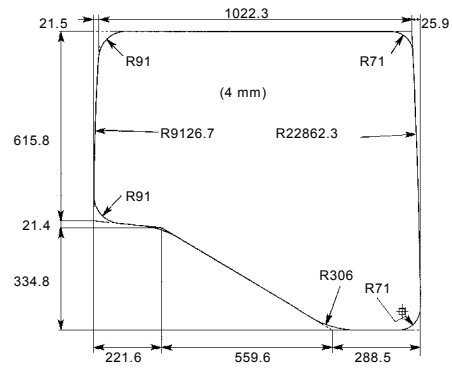
W1CF-02-01-015



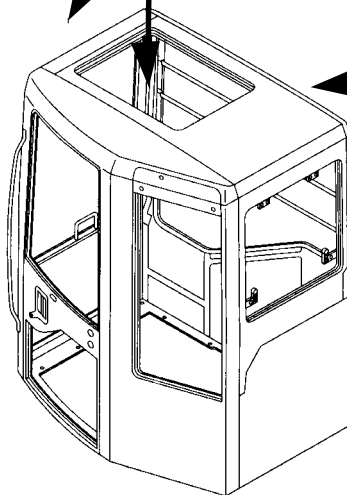
W1CF-02-01-017



W1CF-02-01-014

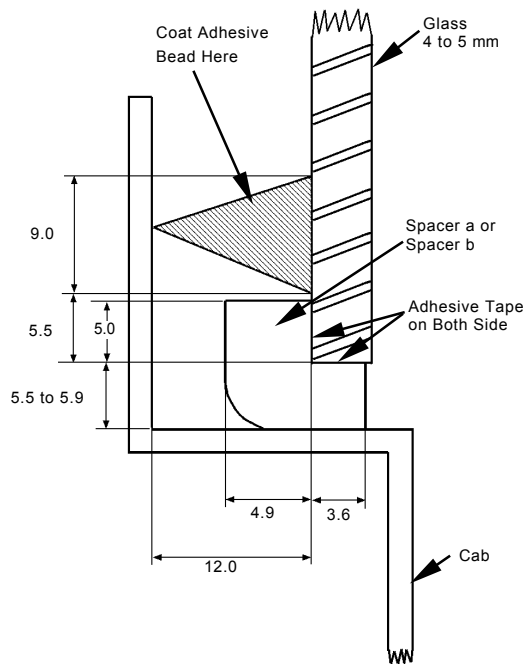


W1CF-02-01-016



W197-02-01-005

UPPERSTRUCTURE / Cab



Unit: mm

W1SE-02-01-022

13. The quantity of adhesive and primer should be used.(Just for reference)

Glass	Adhesive: SUNRISE MSI SR Seal U90 (4463876) 320 mL Cutridge	Primer: SUNRISE MSI Primer 24 (for coating) Primer 35 (for glass) 150 mL in Each Bottle
Right-Hand Glass (1 Piece)	1 used	1/10 used for each Bottle
Rear Left-Hand Glass (1 Piece)	1/2 used	1/20 used for each Bottle
Lower Glass for the Door (1 Piece)	1/3 used	1/50 used for each Bottle

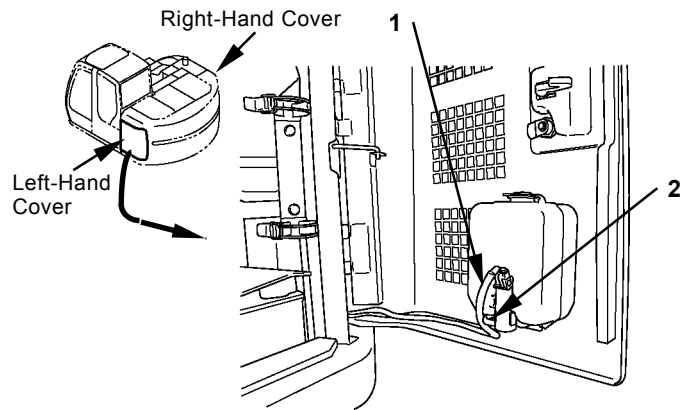
IMPORTANT: Rear left-hand glass is arched-fringed type. If this glass needs to be replaced, contact the nearest HITACHI Office to replace it as a unit.

UPPERSTRUCTURE / Counterweight

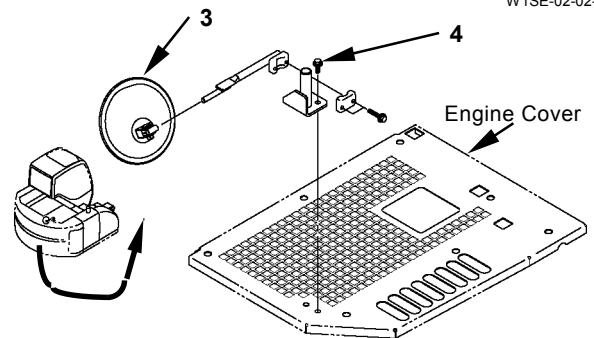
Removal (ZAXIS125US, 135US, 135UR)

CAUTION: Counterweight weight:
3150 kg (6950 lb) (ZAXIS125US, 135UR)
3670 kg (8090 lb) (ZAXIS135US)

1. Remove harness (1) and vinyl hose (2) from the washer tank.
2. Remove bolts (4) (2 used) from the engine cover to remove mirror (3).

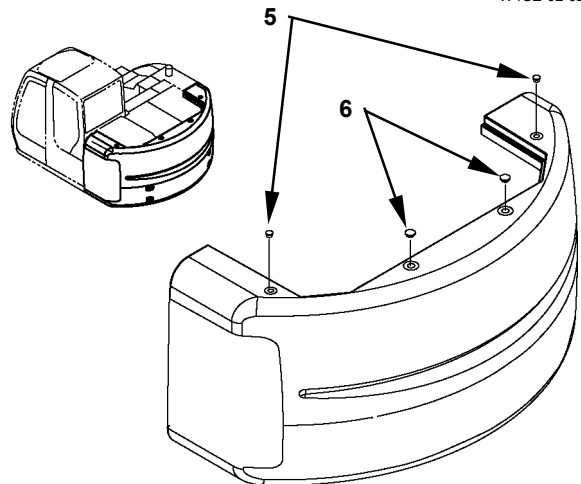


W1SE-02-02-005



W1SE-02-02-006

3. Remove caps (5, 6) (each 2 used) and install sling bolts (Fleno Ring Bolts: B-27: M27, Pitch 3.0 mm and B-36: M36, Pitch 4.0 mm) to the counterweight.









W1SE-02-02-001

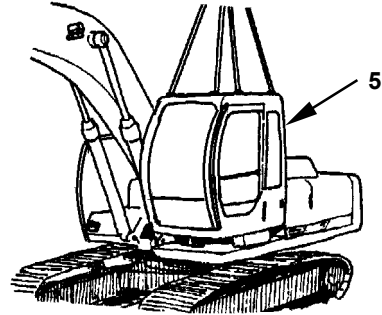
UPPERSTRUCTURE / Main Frame



CAUTION: Cab weight:
290 kg (640 lb) (ZAXIS110, 120)
270 kg (600 lb) (ZAXIS125US, 135US)
218 kg (481 lb) (ZAXIS135UR)

5. Install cab (5).
(Refer to "Remove and Install Cab" in this section.)

-  : 24 mm
-  : 205 N·m (21 kgf·m, 159 lbf·ft)
-  : 17 mm
-  : 50 N·m (5.1 kgf·m, 36.89 lbf·ft)
-  : 8 mm
-  : 50 N·m (5.1 kgf·m, 36.89 lbf·ft)







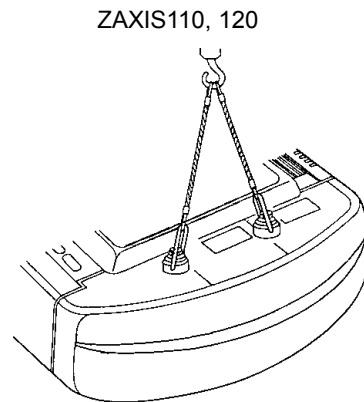
W157-02-01-001



CAUTION: Counterweight weight:
1800 kg (3970 lb) (ZAXIS110)
2450 kg (5400 lb) (ZAXIS120)
3150 kg (6940 lb) (ZAXIS125US, 135UR)
3670 kg (8090 lb) (ZAXIS135US)

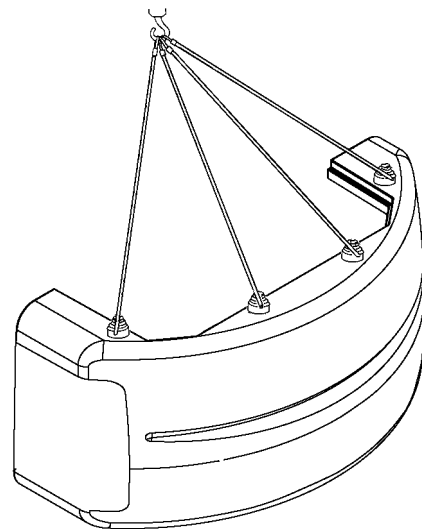
6. Install counterweight (6).
(Refer to "Remove and Install Counterweight" in this section.)

-  : 41 mm (ZAXIS110, 120)
-  : 1150 N·m (115 kgf·m, 830 lbf·ft)
-  : 50 mm (ZAXIS125US, 135US, 135UR)
-  : 2250 N·m (230 kgf·m, 1660 lbf·ft)



W178-02-02-002

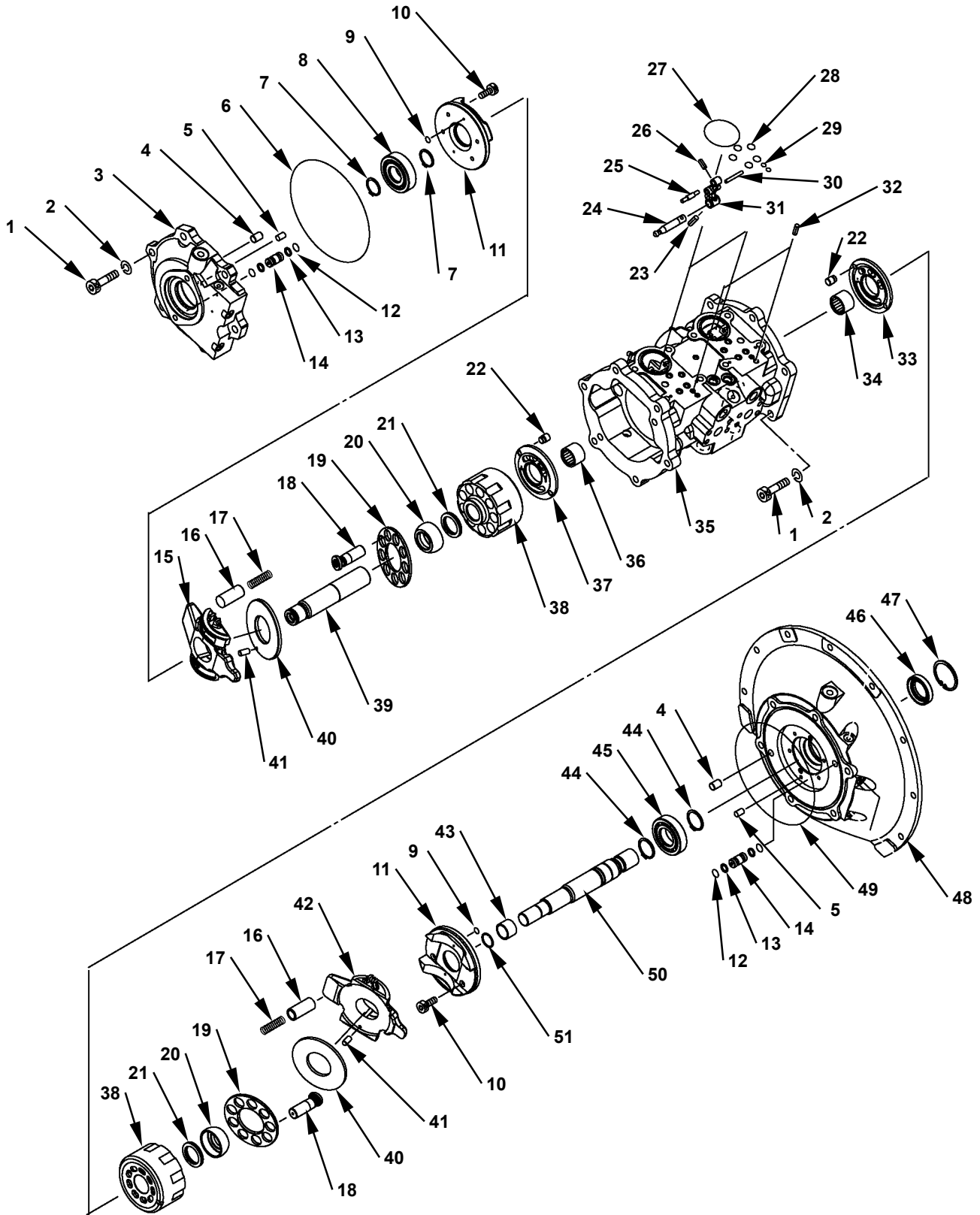
ZAXIS125US, 135US, 135UR



W15E-02-03-001

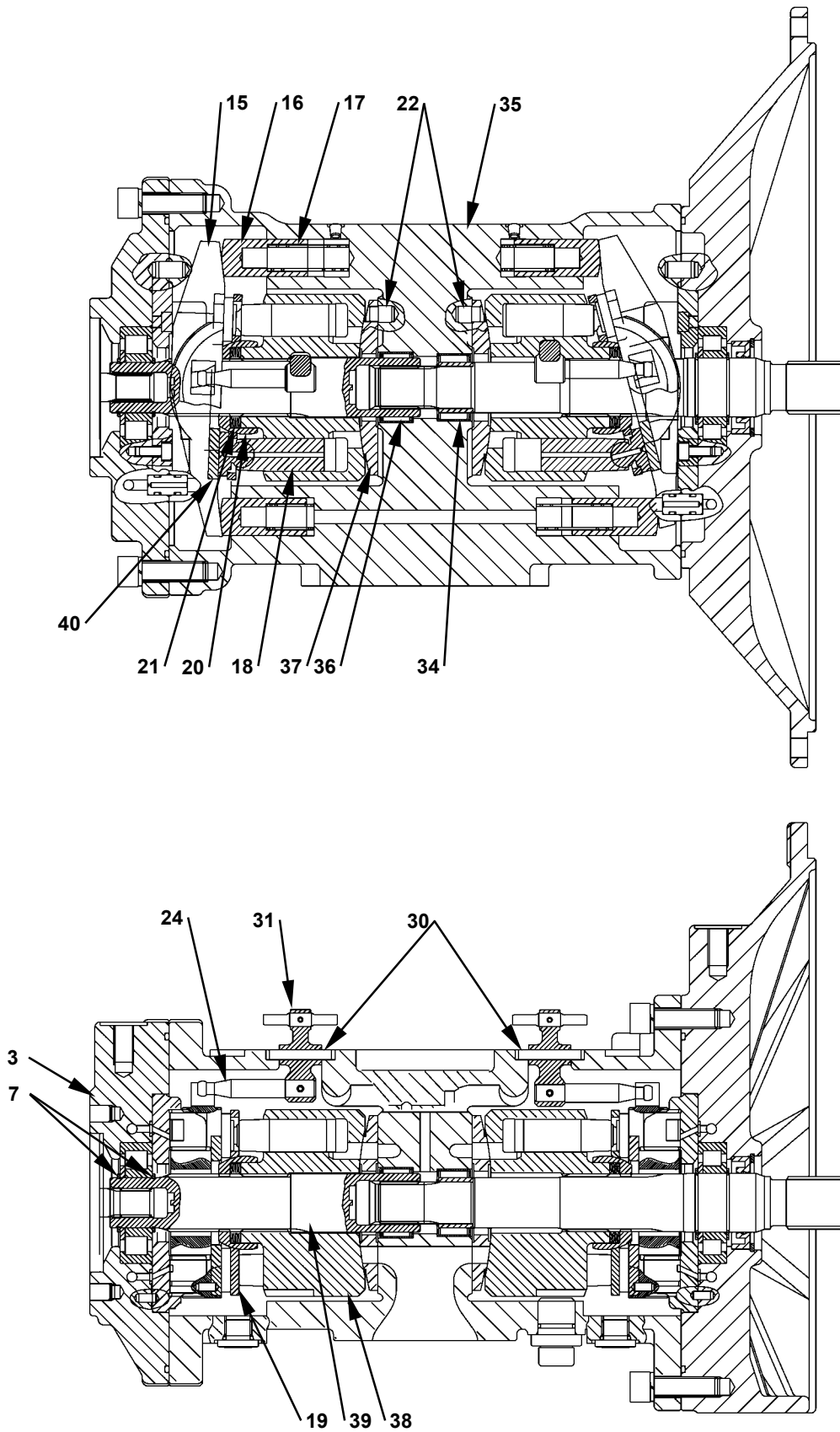
UPPERSTRUCTURE / Pump Device

DISASSEMBLE PUMP DEVICE



W176-02-04-005

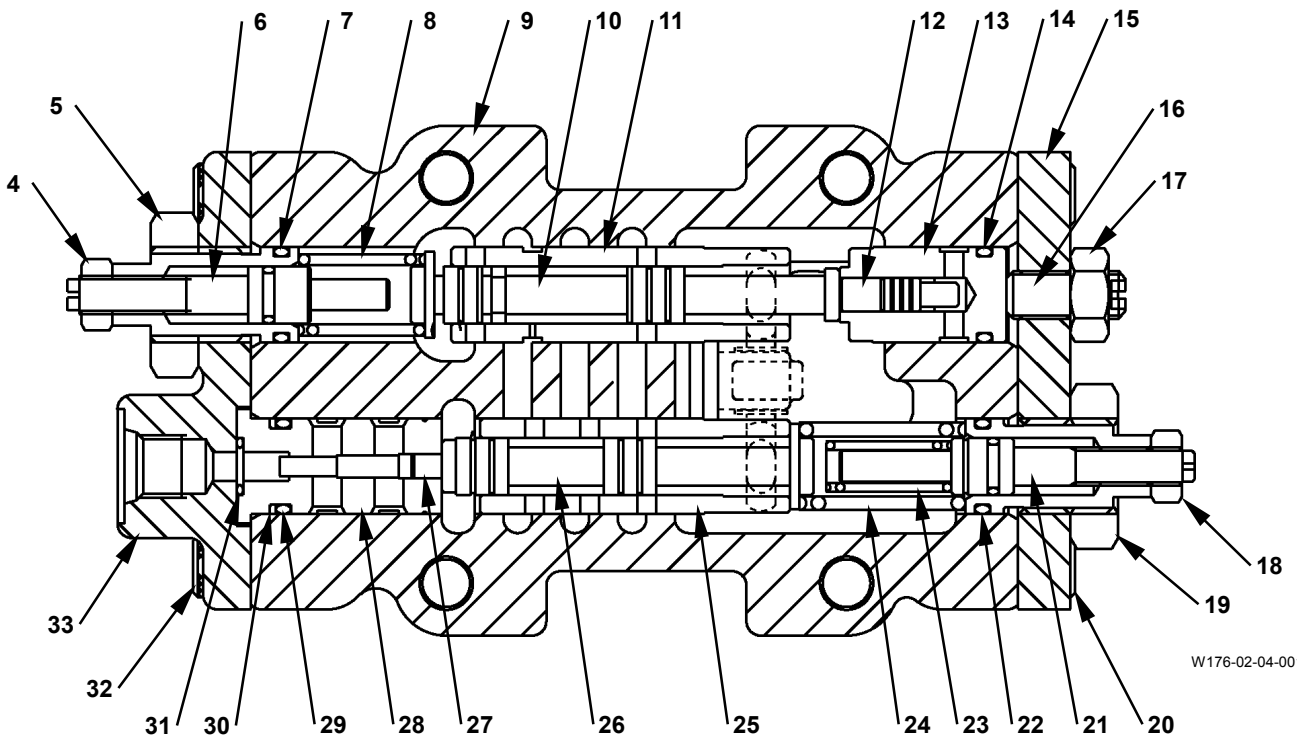
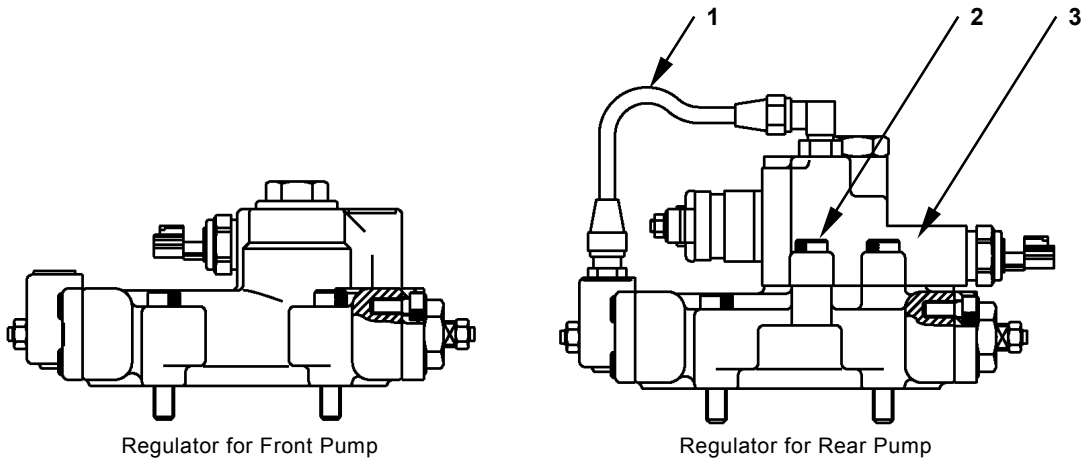
UPPERSTRUCTURE / Pump Device



W176-02-04-011

UPPERSTRUCTURE / Pump Device

DISASSEMBLE REGULATOR

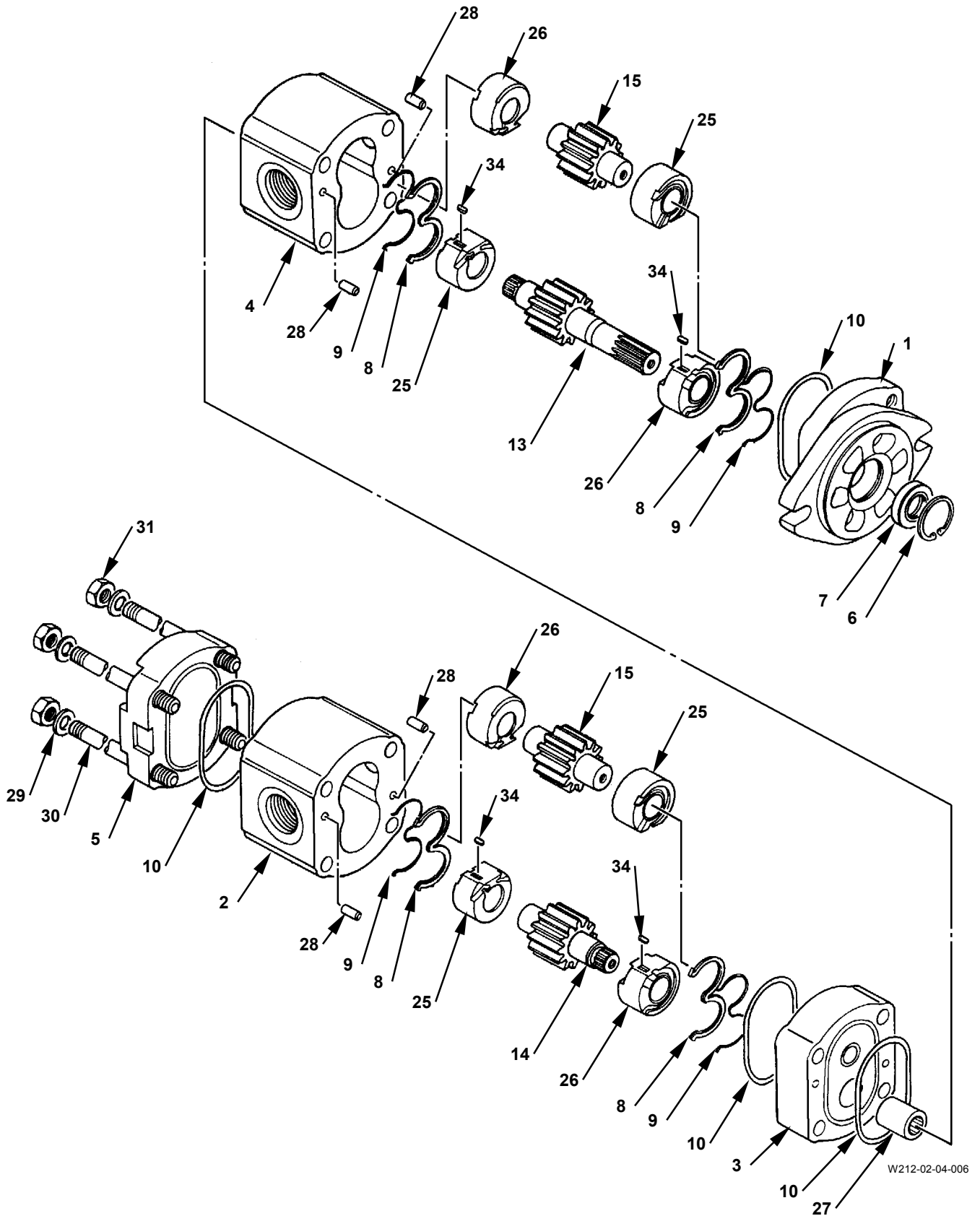


W176-02-04-001

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

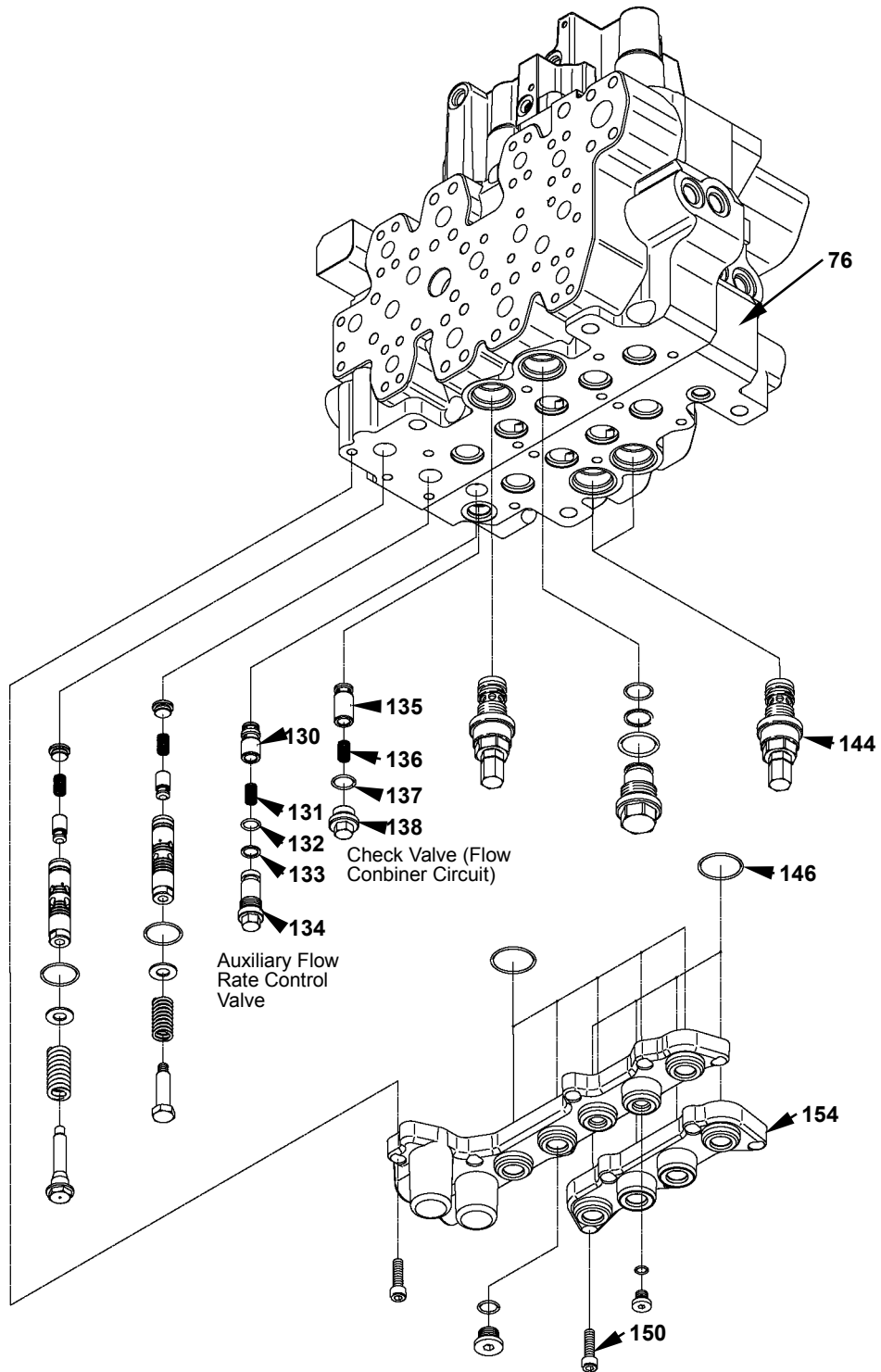
UPPERSTRUCTURE / Pump Device

DISASSEMBLE AND ASSEMBLE GEAR PUMP (ZAXIS135UR ONLY)



W212-02-04-006

UPPERSTRUCTURE / Control Valve



76 - Housing
 130 -Poppet
 131 -Spring
 132 -O-Ring
 133 -Backup Ring

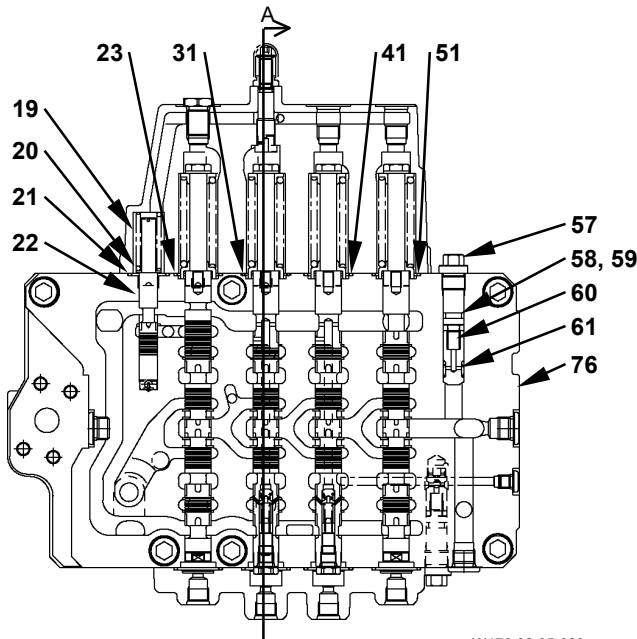
134 -Plug
 135 -Poppet
 136 -Spring
 137 -O-Ring
 138 -Plug

144 -Overload Relief Valve
 146 -O-Ring
 150 -Socket Bolt (9 Used)
 154 -Pilot Housing (5 Used)

W176-02-05-014

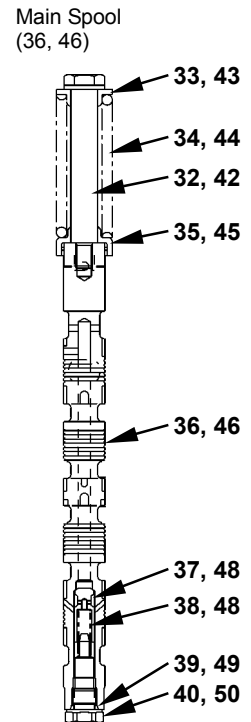
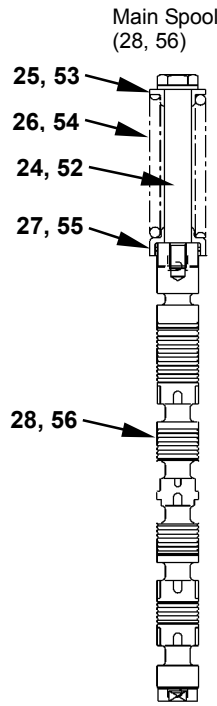
UPPERSTRUCTURE / Control Valve

ASSEMBLE CONTROL VALVE 4-SPOOL SECTION

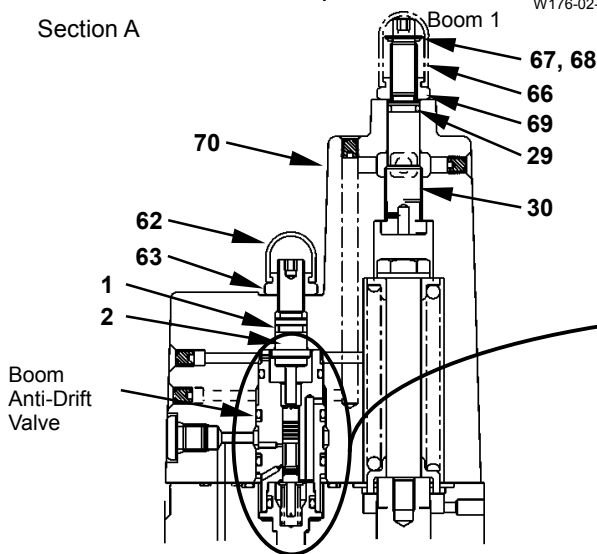


Section A

W176-02-05-020



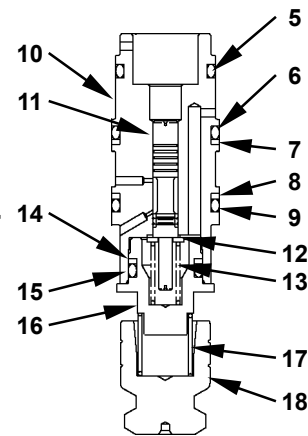
W176-02-05-024



Boom Anti-Drift Valve

W176-02-05-022

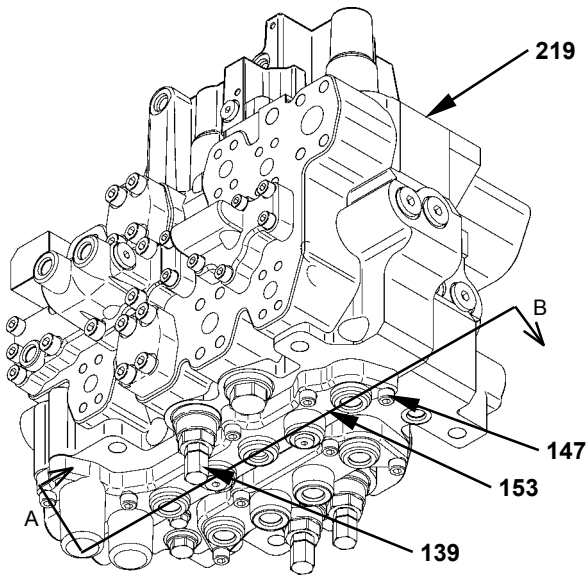
Boom Anti-Drift Valve



W176-02-05-025

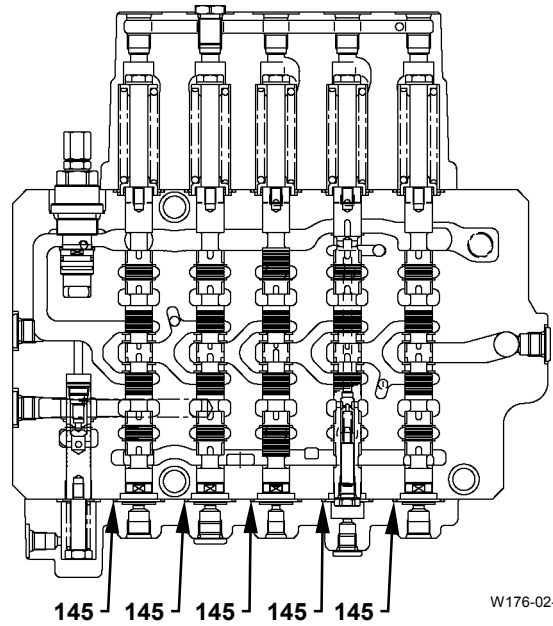
- | | | | |
|------------------|------------------|------------------|----------------------------|
| 1 - O-Ring | 20 - Washer | 39 - O-Ring | 58 - Backup Ring |
| 2 - Screw | 21 - O-Ring | 40 - Plug | 59 - O-Ring |
| 3 - Backup Ring | 22 - Spool | 41 - O-Ring | 60 - Spring |
| 4 - O-Ring | 23 - O-Ring | 42 - Bolt | 61 - Poppet |
| 5 - O-Ring | 24 - Bolt | 43 - Spring Seat | 62 - Cap |
| 6 - O-Ring | 25 - Spring Seat | 44 - Spring | 63 - Nut |
| 7 - Backup Ring | 26 - Spring | 45 - Spring Seat | 64 - Plug |
| 8 - Backup Ring | 27 - Spring Seat | 46 - Main Spool | 65 - O-Ring |
| 9 - O-Ring | 28 - Main Spool | 47 - Poppet | 66 - Cap |
| 10 - Sleeve | 29 - O-Ring | 48 - Spring | 67 - Retaining Ring |
| 11 - Spool | 30 - Screw | 49 - O-Ring | 68 - Shim |
| 12 - Washer | 31 - O-Ring | 50 - Plug | 69 - Nut |
| 13 - Spring | 32 - Bolt | 51 - O-Ring | 70 - Pilot Housing |
| 14 - Backup Ring | 33 - Spring Seat | 52 - Bolt | 71 - Socket Bolt |
| 15 - O-Ring | 34 - Spring | 53 - Spring Seat | 72 - Overload Relief Valve |
| 16 - Plug | 35 - Spring Seat | 54 - Spring | 73 - Overload Relief Valve |
| 17 - Spring | 36 - Main Spool | 55 - Spring Seat | 74 - Backup Ring |
| 18 - Poppet | 37 - Poppet | 56 - Main Spool | 75 - O-Ring |
| 19 - Spring | 38 - Spring | 57 - Plug | 76 - Housing |

UPPERSTRUCTURE / Control Valve



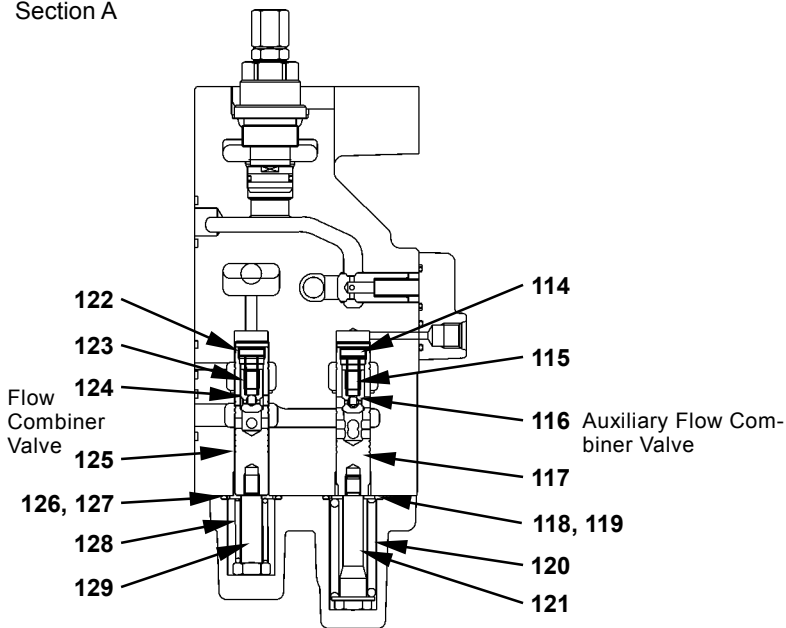
T176-03-03-036

Section B



W176-02-05-021

Section A



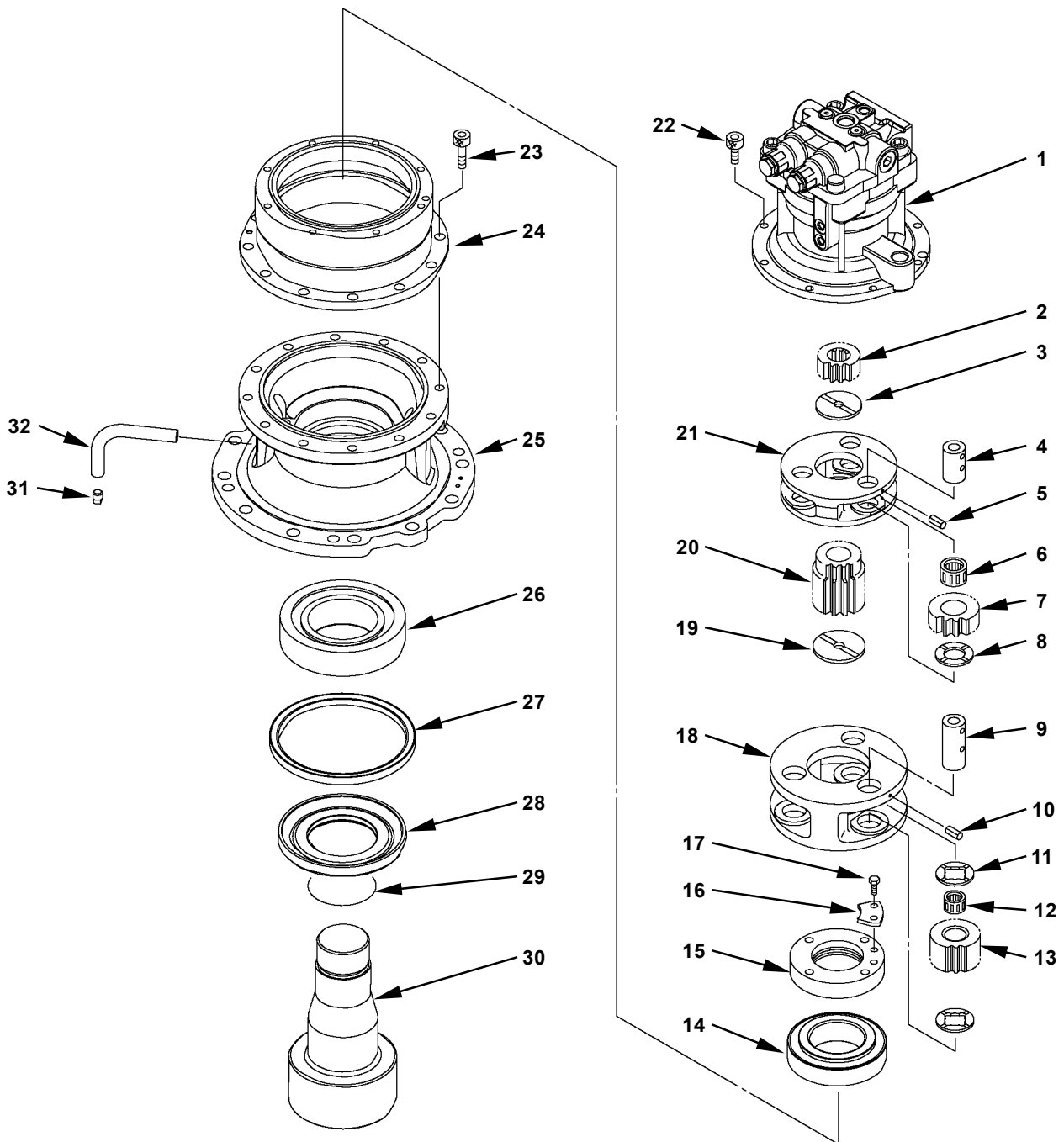
W176-02-05-028

- | | | | |
|--------------|--------------|-----------------------------|----------------------------|
| 114 - Plug | 122 - Plug | 115 - Bolt | 147 - Socket Bolt (9 Used) |
| 115 - Spring | 123 - Spring | 139 - Overload Relief Valve | 148 - O-Ring* |
| 116 - Poppet | 124 - Poppet | 140 - O-Ring* | 149 - Plug* |
| 117 - Spool | 125 - Spool | 141 - Backup Ring* | 151 - O-Ring* |
| 118 - O-Ring | 126 - O-Ring | 142 - O-Ring* | 152 - Plug* |
| 119 - Washer | 127 - Washer | 143 - Plug* | 153 - Pilot Housing |
| 120 - Spring | 128 - Spring | 145 - O-Ring (5 Used) | 219 - Housing |
| 121 - Bolt | | | |

NOTE: As for the item with a mark "*" refer to W2-5-14.

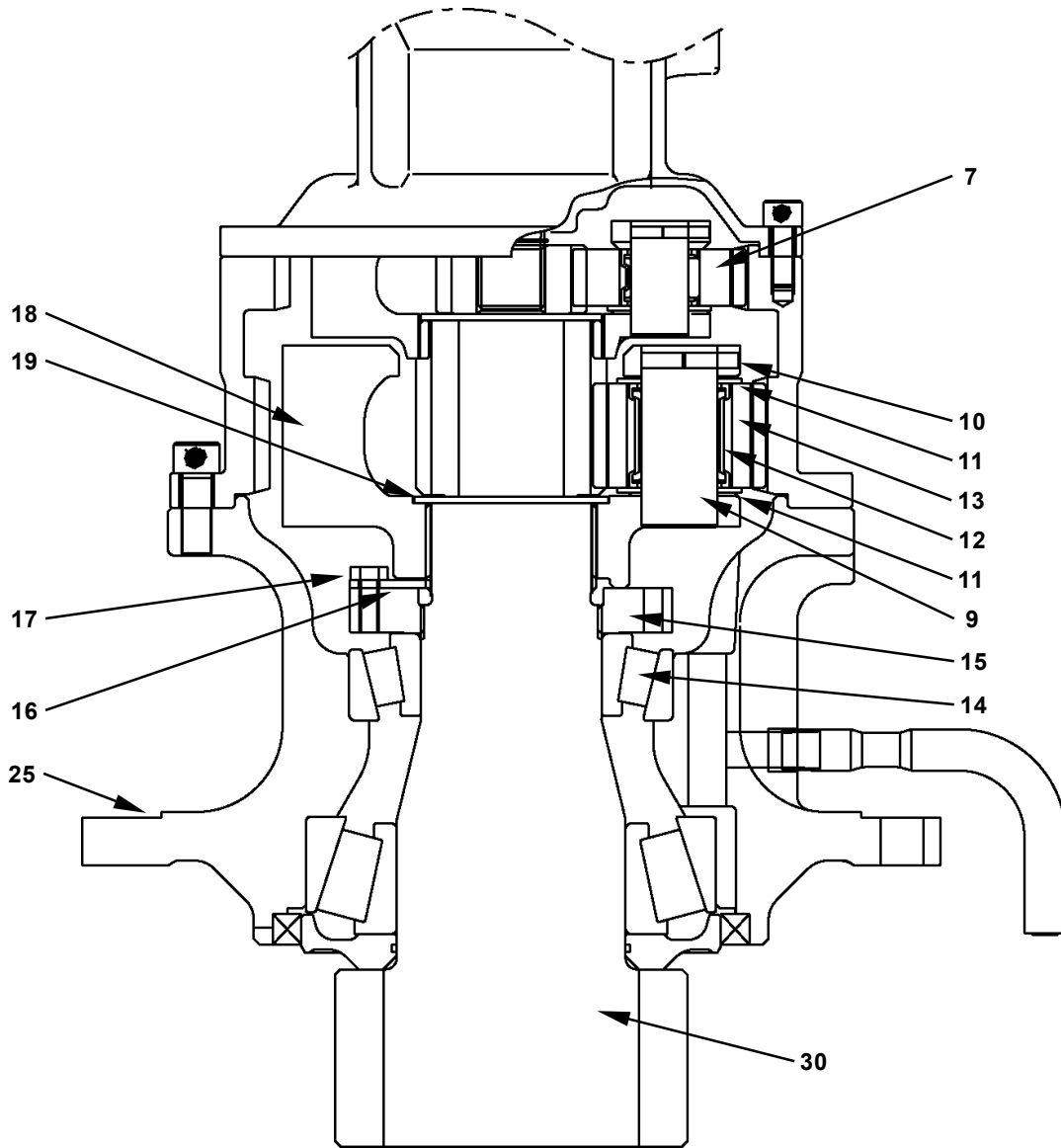
UPPERSTRUCTURE / Swing Device

DISASSEMBLE SWING DEVICE



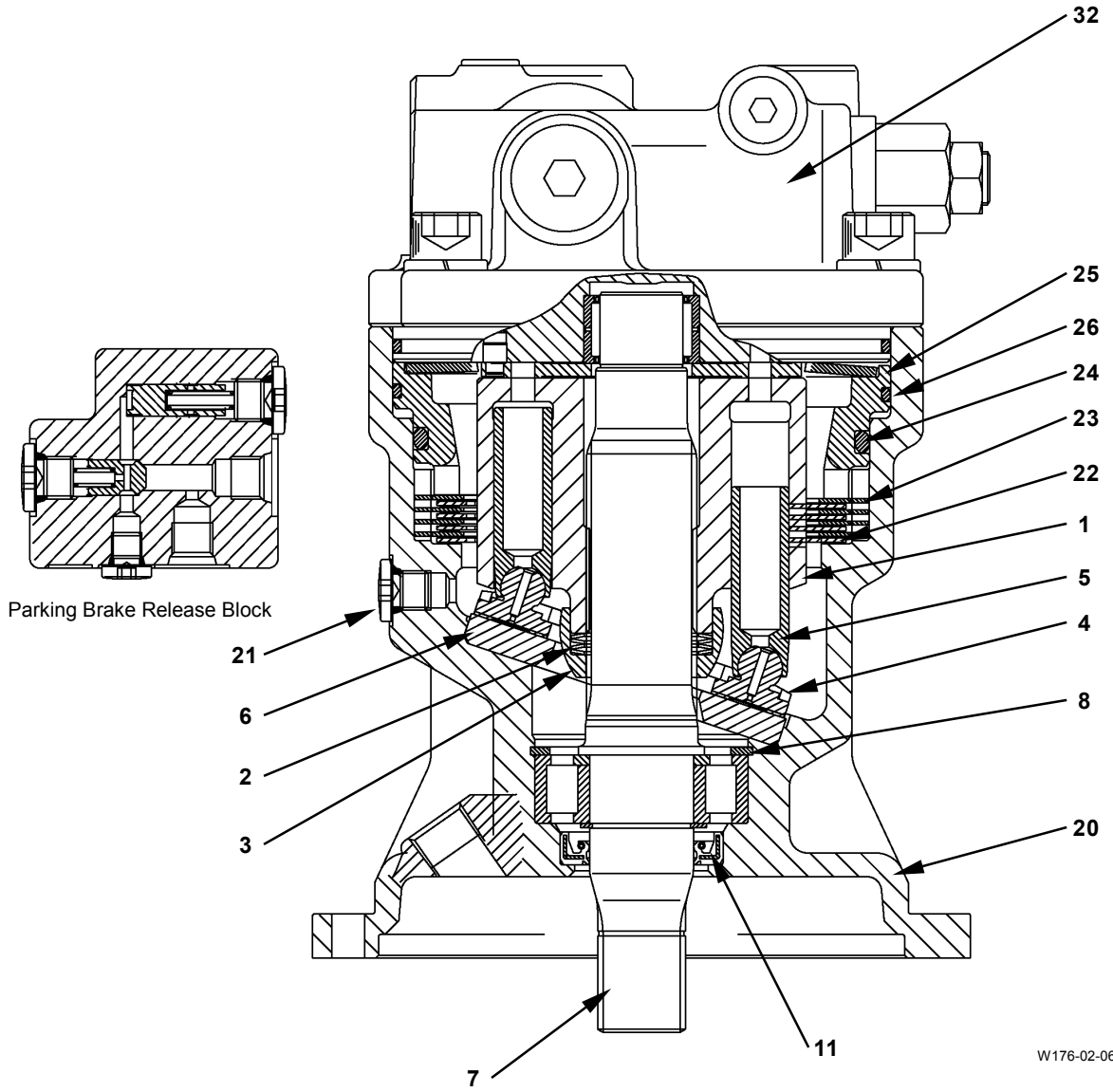
W176-02-06-003

UPPERSTRUCTURE / Swing Device



W176-02-06-004

UPPERSTRUCTURE / Swing Device



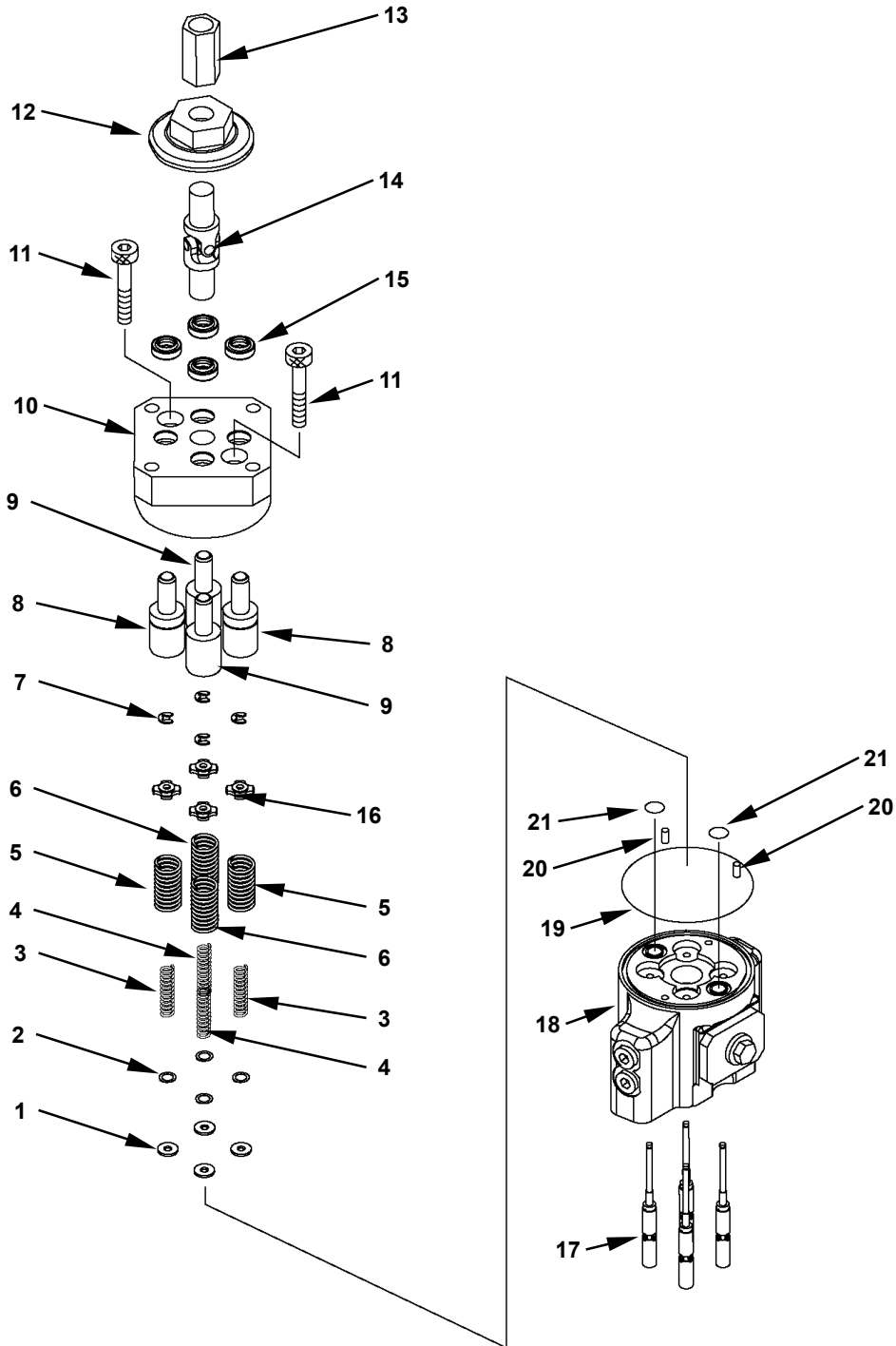
W176-02-06-012

UPPERSTRUCTURE / Swing Device

(Blank)

UPPERSTRUCTURE / Pilot Valve

DISASSEMBLE RIGHT AND LEFT PILOT VALVES




W176-02-07-001

- | | | | |
|-------------------------------|-----------------------------|----------------------------|-------------------------|
| 1 - Spacer (4 Used) | 7 - Retaining Ring (4 Used) | 12 - Cam | 17 - Spool (4 Used) |
| 2 - Shim | 8 - Push Rod A (2 Used) | 13 - Screw Joint | 18 - Housing |
| 3 - Balance Spring A (2 Used) | 9 - Push Rod B (2 Used) | 14 - Universal Joint | 19 - O-Ring |
| 4 - Balance Spring B (2 Used) | 10 - Block | 15 - Oil Seal (4 Used) | 20 - Knock Pin (2 Used) |
| 5 - Return Spring A (2 Used) | 11 - Socket Bolt (2 Used) | 16 - Spring Guide (4 Used) | 21 - O-Ring (2 Used) |
| 6 - Return Spring B (2 Used) | | | |


UPPERSTRUCTURE / Pilot Valve


- Loosen bolt (3) to remove pedal (4), levers (15) and (16).

 : 17 mm


IMPORTANT: Attach identification tags on all disconnected hoses for reassembly.

- Disconnect pipes (5 and 6) and hoses (7 to 10).

 : 19 mm


 **NOTE:** Attach a cap on each disconnected hose end.


- Remove socket bolt (13), spring washer (12) and plain washer (11) to remove pilot valve (14).

 : 8 mm


Installation


- Install pilot valve (14) with socket bolt (13), spring washer (12) and plain washer (11).

 : 8 mm


 : 49 N·m (5.0 kgf·m, 36 lbf·ft)


- Connect pipe (5 and 6), hoses (7 to 10).

 : 19 mm

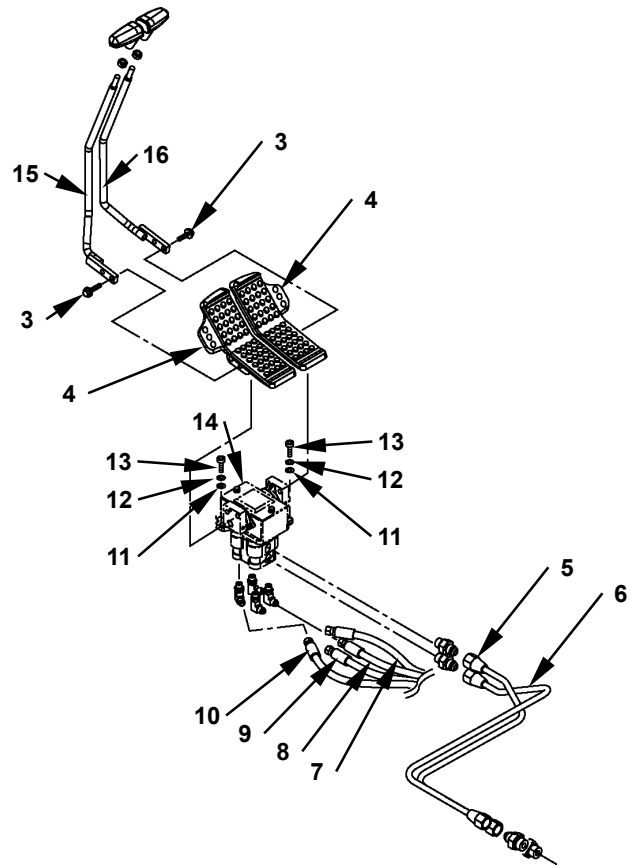
 : 29.5 N·m (3.0 kgf·m, 21.5 lbf·ft)

- Install pedal (4), lever (15) and (16) with bolt (3).

 : 17 mm

 : 49 N·m (5.0 kgf·m, 36 lbf·ft)

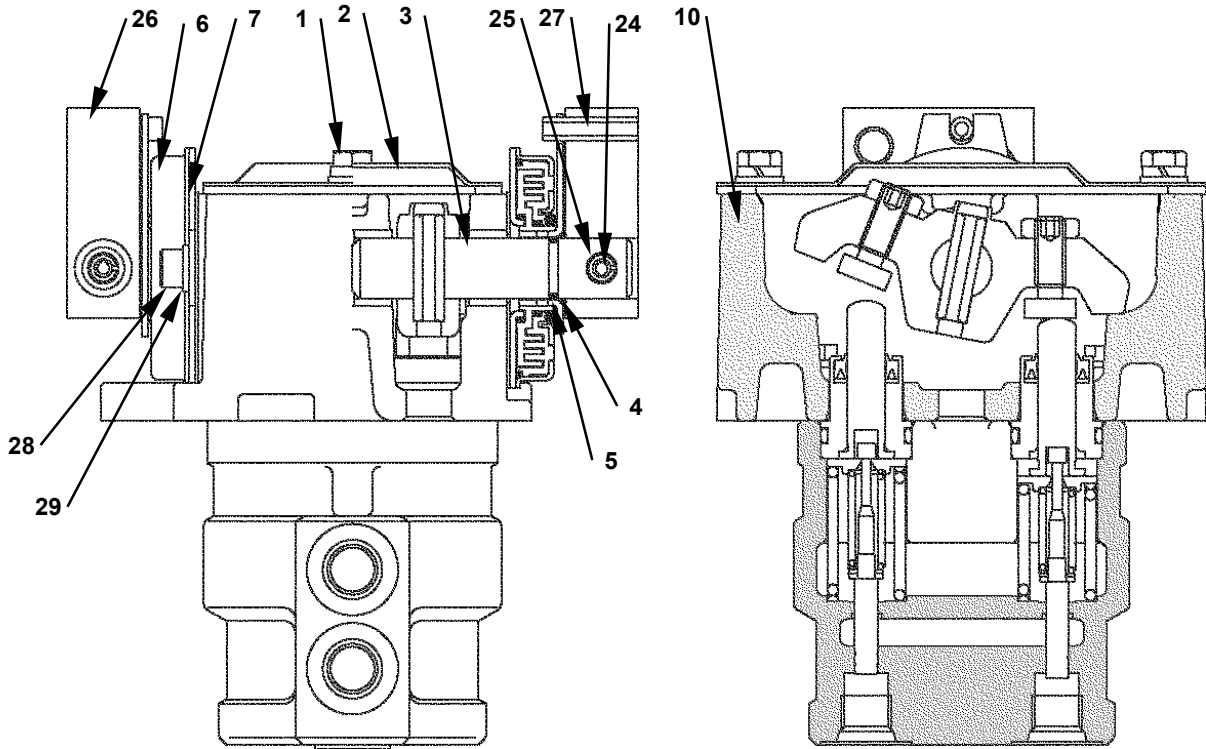
IMPORTANT: After installation, check the oil level. Start the engine and check for oil leaks.



W178-02-07-005

- 5 - Pipe: (To the pilot shut-off valve)
- 6 - Pipe: (From the pilot shut-off valve)
- 7 - Hose K: (To the signal control valve port K (right travel forward))
- 8 - Hose L: (To the signal control valve port L (right travel reverse))
- 9 - Hose J: (To the signal control valve port J (left travel reverse))
- 10 - Hose I: (To the signal control valve port I (left travel forward))

UPPERSTRUCTURE / Pilot Valve



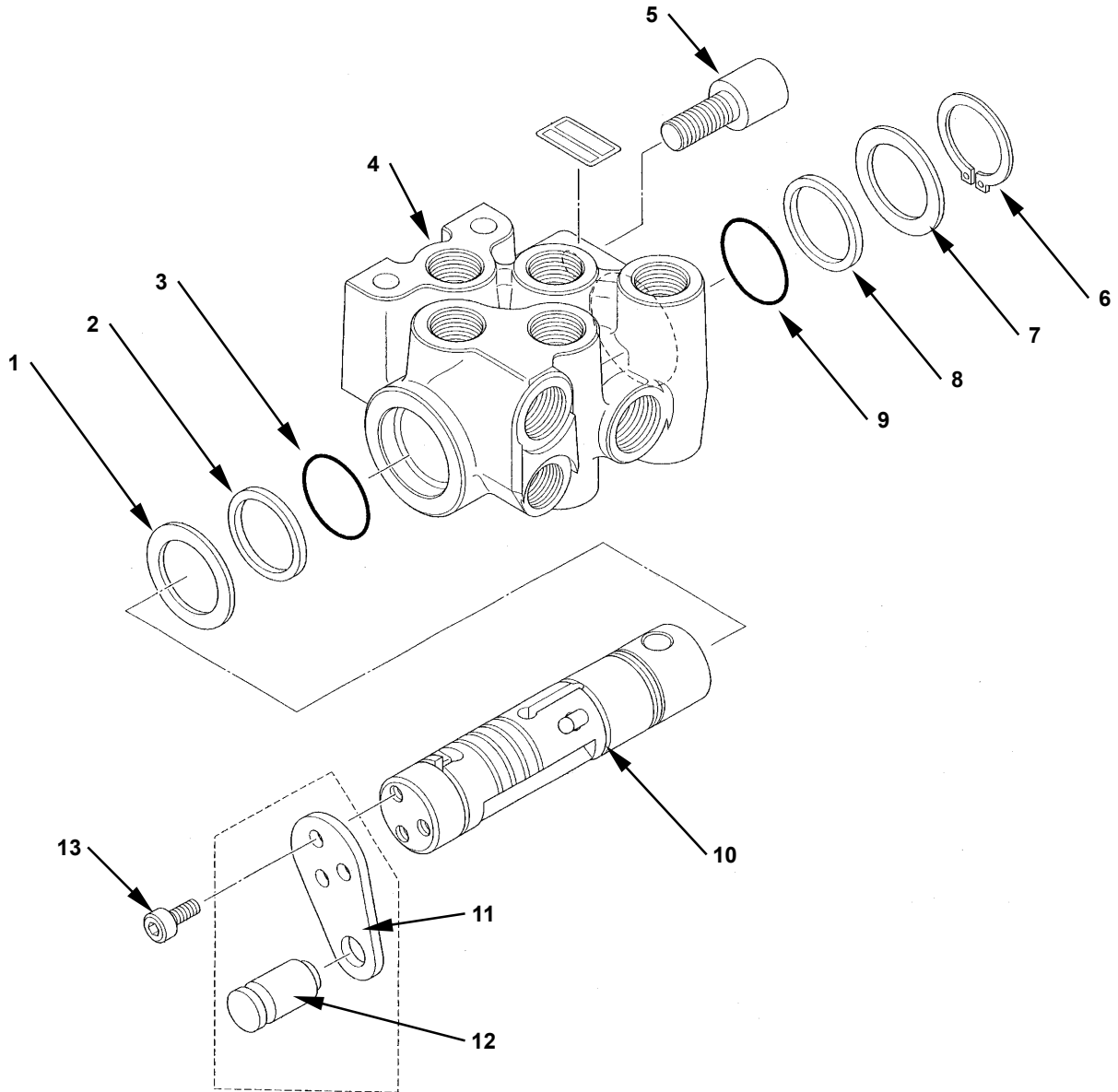
W176-02-07-010

UPPERSTRUCTURE / Pilot Valve

(Blank)

UPPERSTRUCTURE / Pilot Shut-Off Valve

DISASSEMBLE PILOT SHUT-OFF VALVE (ZAXIS110, 120)




W178-02-08-005

- | | | | |
|-----------------|--------------------|--------------|------------------|
| 1 - Washer | 5 - Socket Bolt | 9 - O-Ring | 13 - Socket Bolt |
| 2 - Backup Ring | 6 - Retaining Ring | 10 - Spool | |
| 3 - O-Ring | 7 - Washer | 11 - Bracket | |
| 4 - Body | 8 - Backup Ring | 12 - Pin | |


UPPERSTRUCTURE / Signal Control Valve

Removal

IMPORTANT: Attach tags to hoses and pipes to aid in assembly.





 **NOTE:** When removing pipe of signal control valve, if a SNAP-ON TOOL (GAN850812B: tool size: 19.05 mm) is used, it may be easier to remove the pipe.

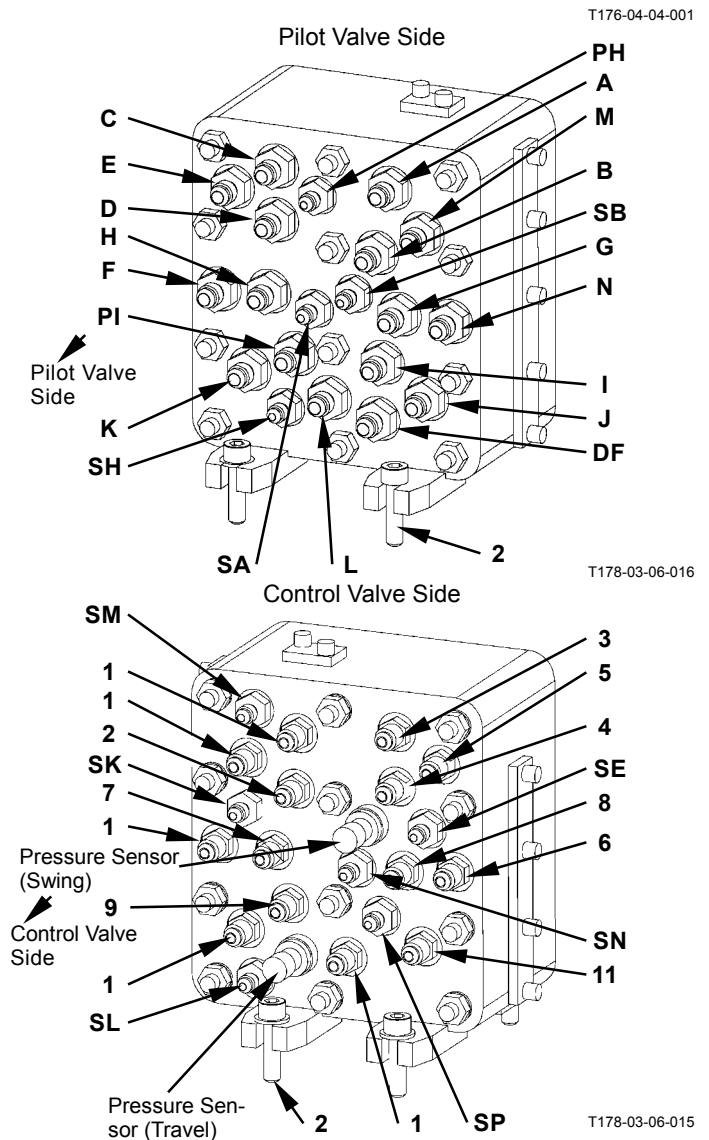
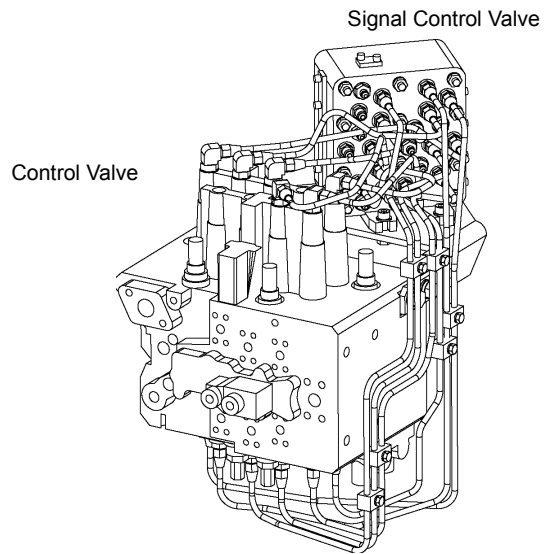
1. Disconnect all hoses and pipes from each port.
2. Remove the pressure sensors (swing, travel).
3. Remove socket bolt (20) to remove the signal control valve.

 : 8 mm

Installation

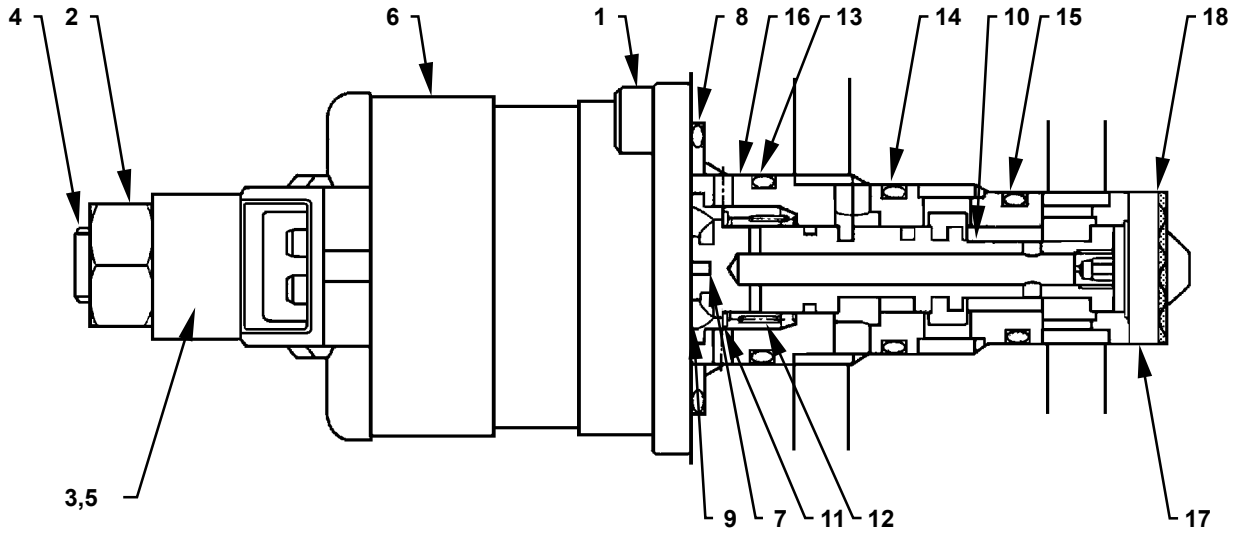
1. Apply LOCTITE to bolt (20) and install the signal control valve.
2. Connect all hoses and pipes to each port.
3. Install the pressure sensor (swing, travel).

Wrench size (mm)	Tightening Torque			Remark
	N·m	(kgf·m)	(lbf·ft)	
 : 17	25	(2.5)	(18)	Hose, pipe
 : 19	29.5	(3)	(21.5)	Hose
 : 24	16	(1.6)	(11.5)	Pressure sensor
 : 8	50	(5.1)	(37)	Socket Bolt



UPPERSTRUCTURE / Solenoid Valve

ASSEMBLE PROPORTIONAL SOLENOID VALVE



W157-02-11-001

1 - Socket Bolt (2 Used)
2 - Lock Nut
3 - O-Ring
4 - Adjusting Screw
5 - Spring

6 - Solenoid
7 - Spring
8 - O-Ring
9 - Diaphragm
10 - Spool

11 - Washer
12 - Spring
13 - O-Ring
14 - O-Ring

15 - O-Ring
16 - Sleeve
17 - Plate
18 - Washer

UPPERSTRUCTURE / Solenoid Valve

(Blank)

UNDERCARRIAGE / Swing Bearing

Installation

Clean the matching surfaces of the frame and swing bearing.


1. Apply THREEBOND # 1102 to the matching surfaces of the track frame and swing bearing.


⚠ CAUTION: Swing bearing weight: 157 kg (350 lb)

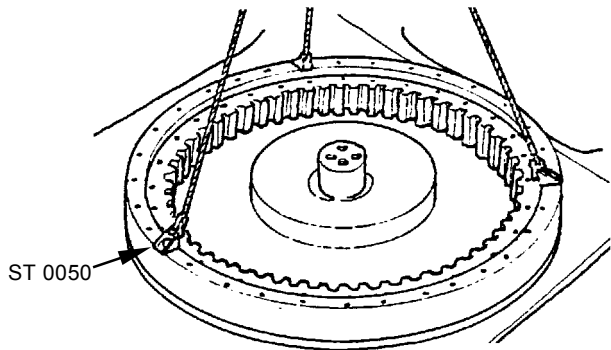
IMPORTANT: Failure to align the marks may result in misalignment of the inner race soft zone.

2. Hoist the swing bearing by crane. Align the alignment marks both on the track frame and swing bearing.

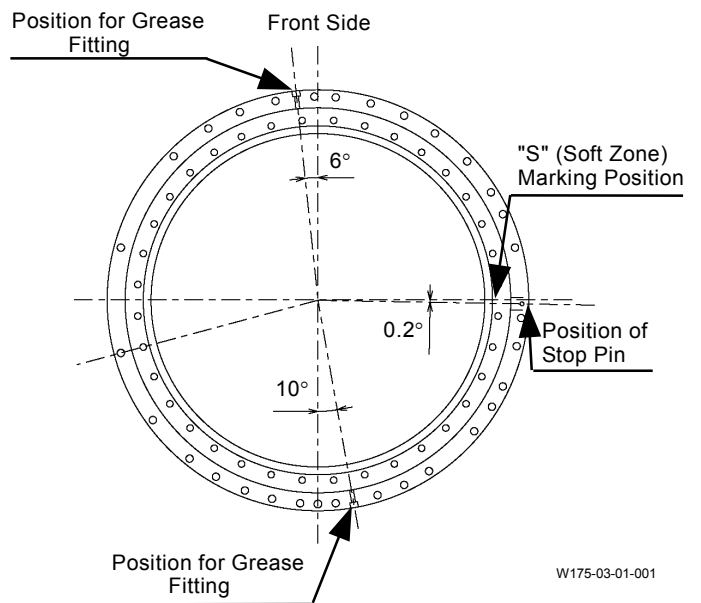
3. Install the mounting bolts (3) (36 used) to the inner race of the swing bearing and tighten to specification.

: 24 mm

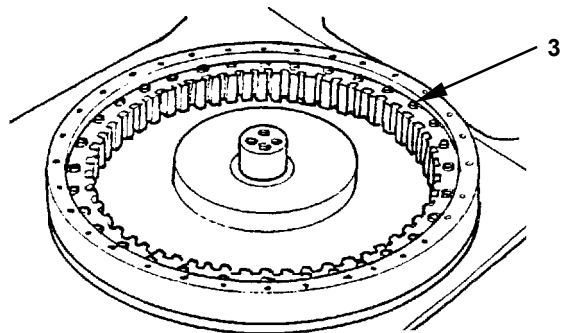
: 270 N·m (27.5 kgf·m, 200 lbf·ft)



W105-03-01-003



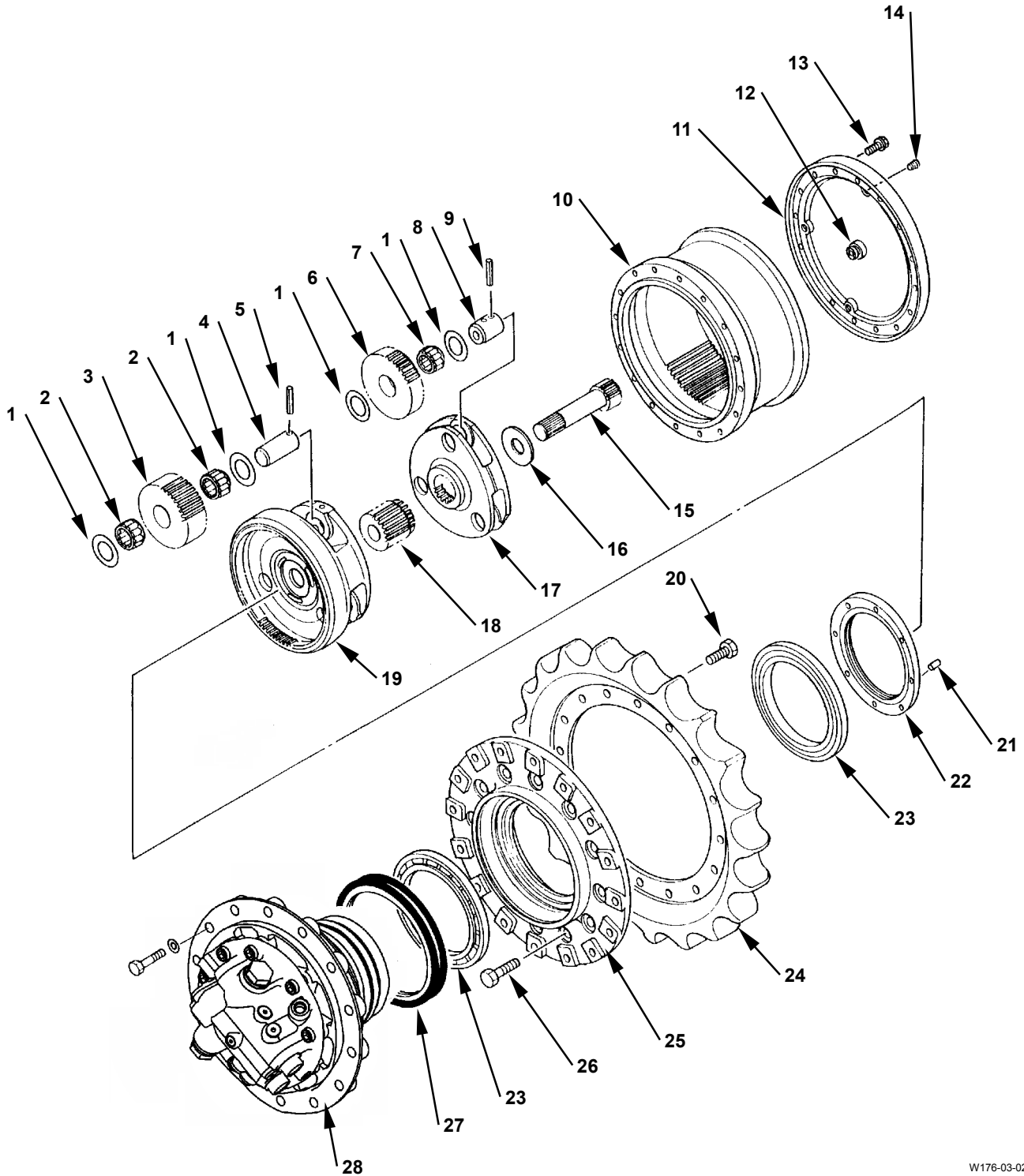
W175-03-01-001



W105-03-01-002

UNDERCARRIAGE / Travel Device

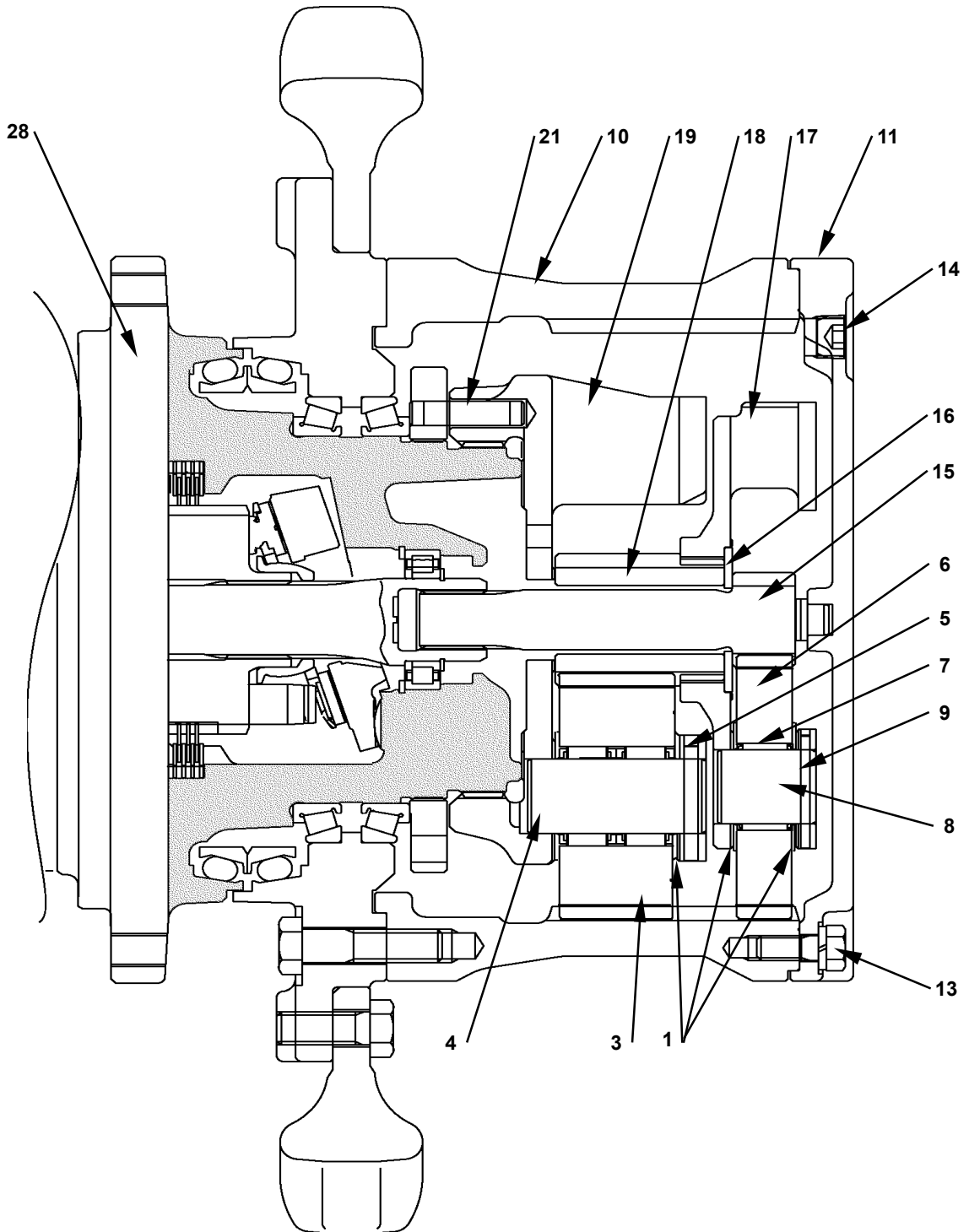
DISASSEMBLE TRAVEL DEVICE



W176-03-02-001

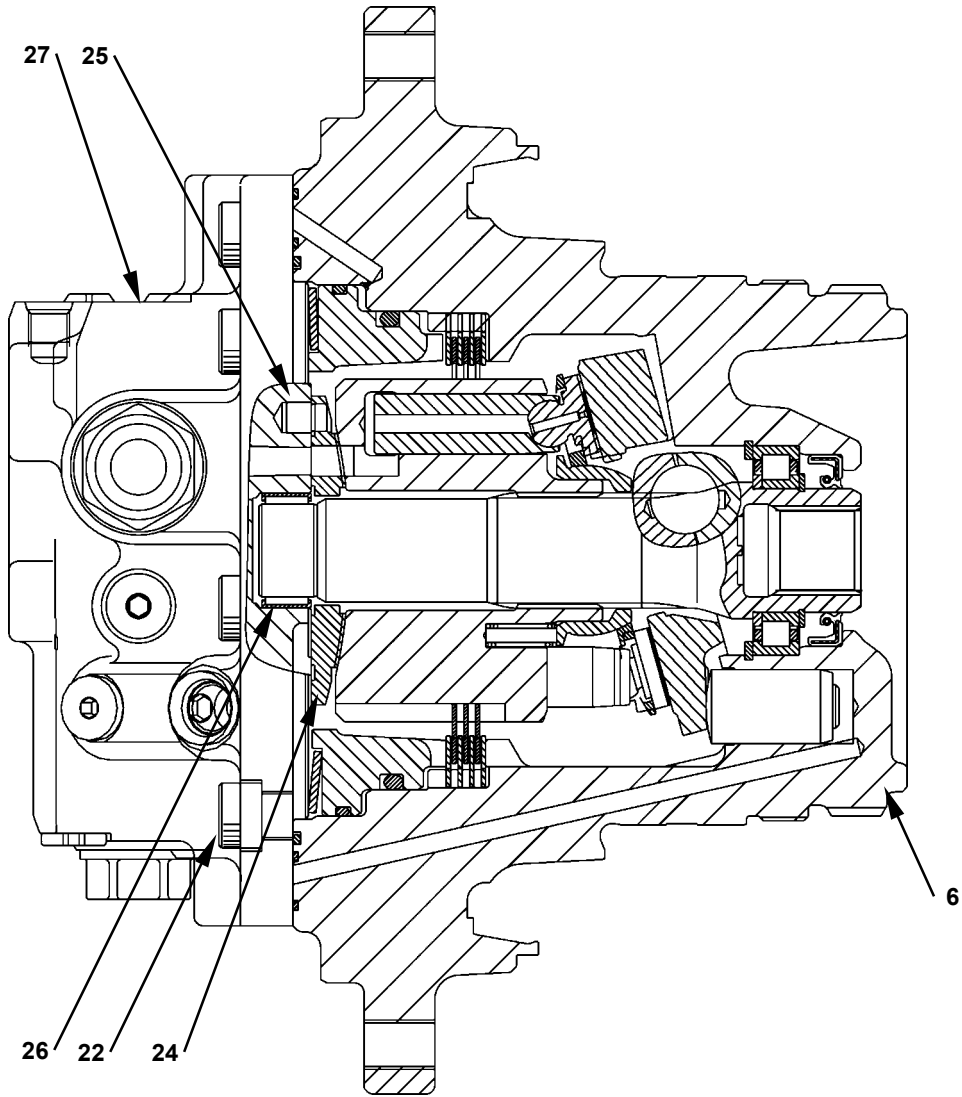
- | | | | |
|--|-------------------------|---------------------------|------------------------------|
| 1 - Thrust Plate (12 Used) | 8 - Pin (3 Used) | 15 - Propeller Shaft | 22 - Bearing Nut |
| 2 - Needle Bearing (6 Used) | 9 - Spring Pin (3 Used) | 16 - Spacer | 23 - Roller Bearing (2 Used) |
| 3 - Second Stage Planetary Gear (3 Used) | 10 - Ring Gear | 17 - First Stage Carrier | 24 - Sprocket |
| 4 - Pin (3 Used) | 11 - Cover | 18 - Sun Gear | 25 - Drum |
| 5 - Spring Pin (3 Used) | 12 - Stopper Pin | 19 - Second Stage Carrier | 26 - Bolt (16 Used) |
| 6 - First Stage Planetary Gear (3 Used) | 13 - Bolt (12 Used) | 20 - Bolt (16 Used) | 27 - Floating Seal |
| 7 - Needle Bearing (3 Used) | 14 - Plug (3 Used) | 21 - Knock Pin | 28 - Motor |

UNDERCARRIAGE / Travel Device



W176-03-02-002

UNDERCARRIAGE / Travel Device



W176-03-02-006

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

UNDERCARRIAGE / Center Joint

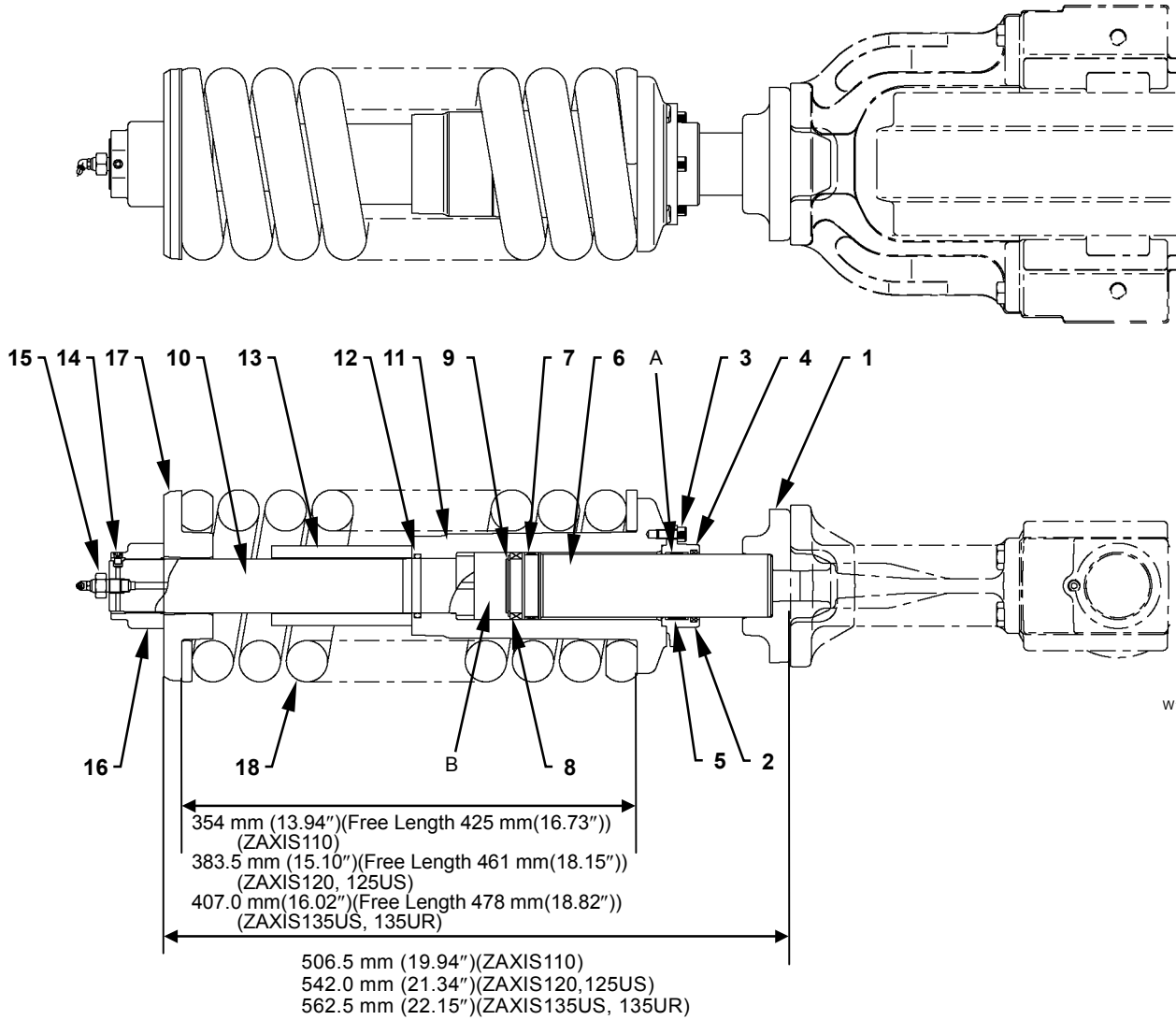
(Blank)

UNDERCARRIAGE / Center Joint

(Blank)

UNDERCARRIAGE / Track Adjuster

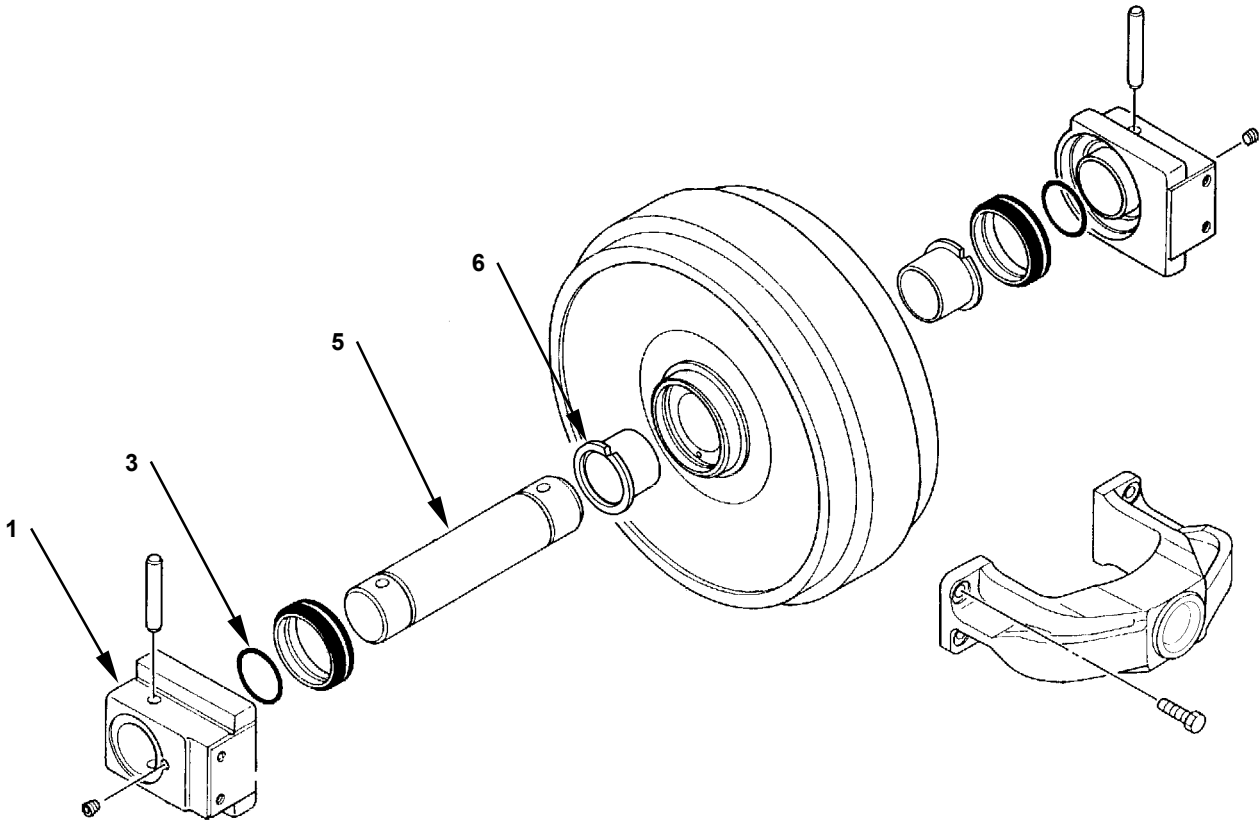
ASSEMBLE TRACK ADJUSTER



W178-03-04-002

- | | | | |
|--------------------------|--------------------|---------------|-------------|
| 1 - Holder | 6 - Piston Rod | 11 - Cylinder | 15 - Valve |
| 2 - Dust Seal | 7 - Wear Ring | 12 - O-Ring | 16 - Nut |
| 3 - Socket Bolt (3 Used) | 8 - U-Ring | 13 - Spacer | 17 - Washer |
| 4 - Flange | 9 - Retaining Ring | 14 - Plug | 18 - Spring |
| 5 - Wear Ring | 10 - Rod | | |

UNDERCARRIAGE / Front Idler

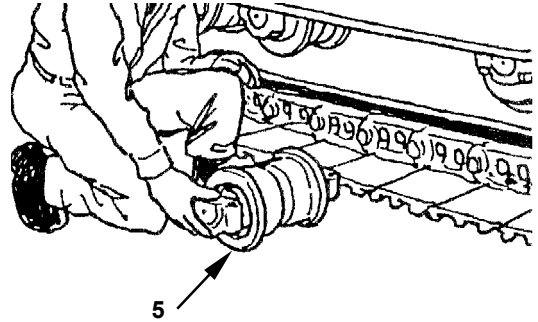


W178-03-05-003

UNDERCARRIAGE / Upper And Lower Roller

CAUTION: Lower roller weight: 21 kg (46 lb)

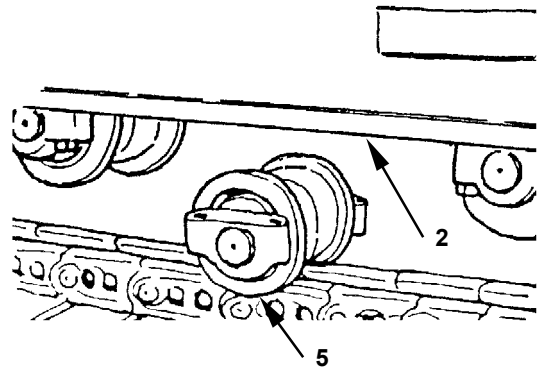
4. Remove lower roller (5) by fork lift, and etc.



W105-03-06-010

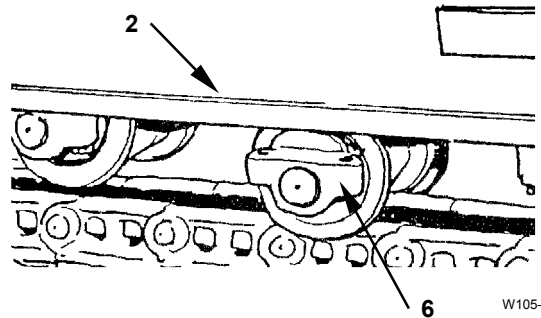
Installation

1. Place lower rollers (5) under the tracks (2) as illustrated by fork lift, etc.




W105-03-06-011


2. Lower track frame (2) enough to gain a little clearance between collar (6) and track frame (2).

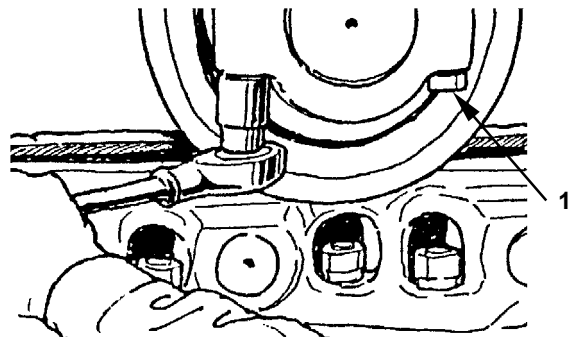


W105-03-06-012

3. Align the bolt holes and tighten bolt (1).

 : 24 mm

 : 300 N·m (31 kgf·m, 225 lbf·ft)



W105-03-06-008

UNDERCARRIAGE / Track

- Remove retaining ring (6), which is used to prevent the master pin from coming off.

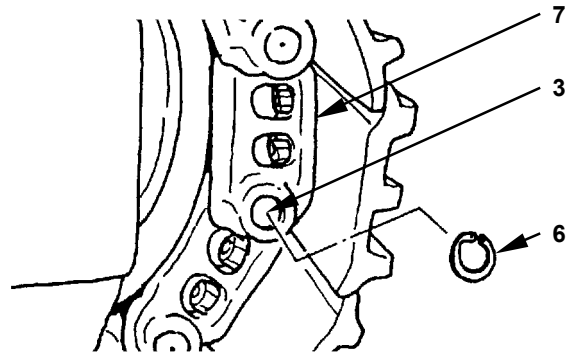
NOTE: If retaining ring (6) interferes with master link (7), drive master pin (3) in to make clearance between retaining ring (6) and master pin (3), before attempting to remove retaining ring (6).

CAUTION: The front idler may jump out of position due to strong spring force when the tracks is disconnected.

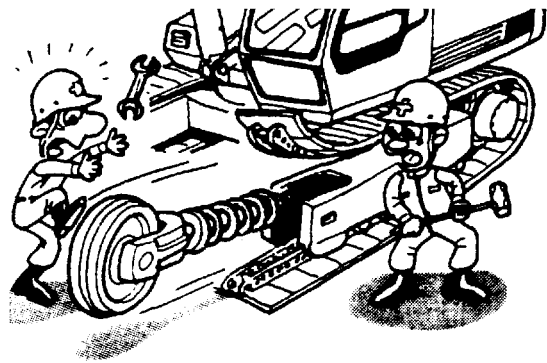
Especially, the strong spring force is always applied to the thread portion of the rod. If the rod and/or thread are damaged, metal fragments may fly when the tracks is disconnected. Take necessary precautions to prevent any personal injury from occurring.

IMPORTANT: Master pin is directional. Be sure to strike the pin in or pull it out in correct direction.

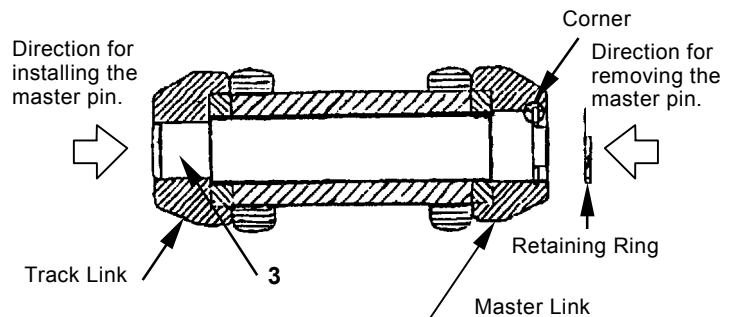
- Remove master pin (3) by using special tool (ST 1970).



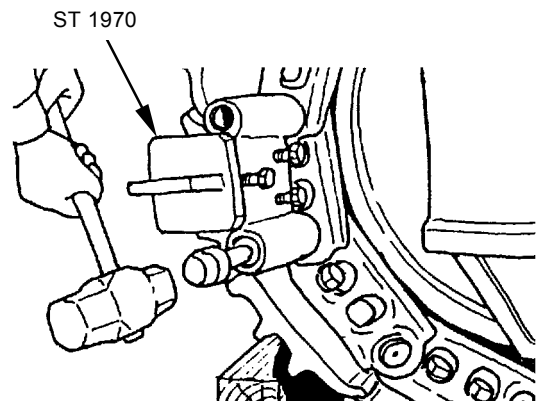
W105-03-07-009



W105-03-07-005



W105-03-07-010



W105-03-07-008

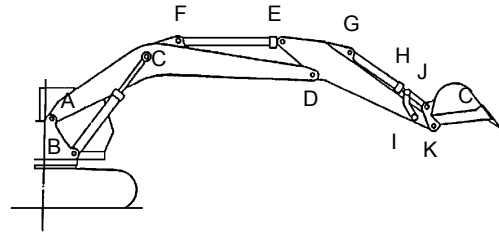
(Blank)

FRONT ATTACHMENT / Front Attachment

MAINTENANCE STANDARD

Pin and Bushing

ZAXIS110
ZAXIS120



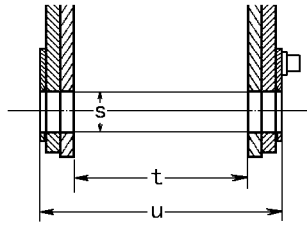
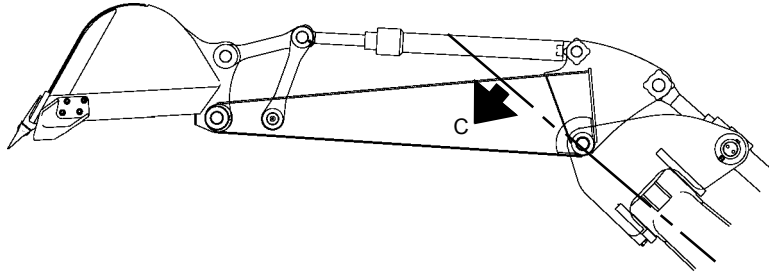
W105-04-01-018

Unit: mm (in)

	Part Name	Standard		Allowable Limit		Remedy
		ZAXIS120	ZAXIS110	ZAXIS120	ZAXIS110	
A	Pin	71 (2.8)	←	70.0 (2.8)	←	Replace
	Bushing	71 (2.8)	←	72.5 (2.9)	←	
B	Pin	71 (2.8)	←	70.0 (2.8)	←	
	Boss (Main Frame)	71 (2.8)	←	72.5 (2.9)	←	
	Bushing (Boom Cylinder)	71 (2.8)	←	72.5 (2.9)	←	
C	Pin	71 (2.8)	65 (2.6)	70.0 (2.8)	64.0 (2.5)	
	Bushing (Boom Cylinder)	71 (2.8)	65 (2.6)	72.5 (2.9)	66.5 (2.6)	
	Boss (Boom)	71 (2.8)	65 (2.6)	72.5 (2.9)	66.5 (2.6)	
D	Pin	71 (2.8)	65 (2.6)	70.0 (2.8)	64.0 (2.5)	
	Bushing	71 (2.8)	65 (2.6)	72.5 (2.9)	66.5 (2.6)	
E	Pin	71 (2.8)	65 (2.6)	70.0 (2.8)	64.0 (2.5)	
	Boss (Arm)	71 (2.8)	65 (2.6)	72.5 (2.9)	66.5 (2.6)	
	Bushing (Arm Cylinder)	71 (2.8)	65 (2.6)	72.5 (2.9)	66.5 (2.6)	
F	Pin	71 (2.8)	65 (2.6)	70.0 (2.8)	64.0 (2.5)	
	Boss (Boom)	71 (2.8)	65 (2.6)	72.5 (2.9)	66.5 (2.6)	
	Bushing (Arm Cylinder)	71 (2.8)	65 (2.6)	72.5 (2.9)	66.5 (2.6)	
G	Pin	60 (2.36)	←	59.0 (2.32)	←	
	Boss (Arm)	60 (2.36)	←	61.5 (2.42)	←	
	Bushing (Bucket Cylinder)	60 (2.36)	←	61.5 (2.42)	←	
H	Pin	65 (2.56)	←	64.0 (2.52)	←	
	Bushing	65 (2.56)	←	66.5(2.62)	←	
	Bushing (Bucket Cylinder)	65 (2.56)	←	66.5(2.62)	←	
I	Pin	65 (2.56)	←	64.0 (2.52)	←	
	Bushing	65 (2.56)	←	66.5(2.62)	←	
J	Pin	65 (2.56)	←	64.0 (2.52)	←	
	Bushing	65 (2.56)	←	66.5(2.62)	←	
K	Pin	65 (2.56)	←	64.0 (2.52)	←	
	Bushing	65 (2.56)	←	66.5(2.62)	←	

FRONT ATTACHMENT / Front Attachment

ZAXIS135UR



Section C

W187-04-01-008

Unit: mm (in)

	ZAXIS135UR	
s	71	(2.8)
t	273	(10.7)
u	403	(15.9)


FRONT ATTACHMENT / Cylinder


Install Arm Cylinder (ZAXIS 135UR)

CAUTION: Arm cylinder weight: 178 kg (390 lb)

CAUTION: Prevent personal injury. Metal fragments may fly off when a hammer is used to remove pins. Be sure to wear necessary protection, such as goggles, hardhat, etc.


1. Hoist arm cylinder (1) by crane to align the holes on both cylinder tube and cylinder stay (6). Install the thrust plate, pins (9) (2 used), bolts (8) (2 used), and nuts (7) (2 used) in this order.


 : 24 mm

 : 205 N·m (21 kgf·m, 152 lbf·ft)

IMPORTANT: After filling the hydraulic oil to the specified level, start the engine. Check the connections for any oil leakage.


2. Connect hoses (5) (2 used) to arm cylinder (1).


 : 36 mm

 : 175 N·m (18 kgf·m, 130 lbf·ft)

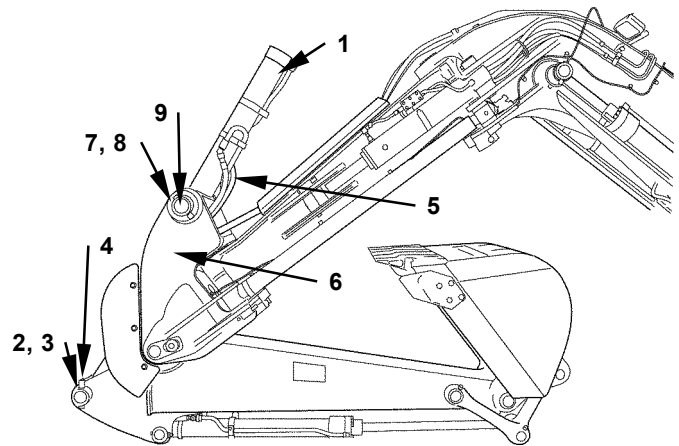
3. Remove a wire from the arm cylinder rod. Start the engine. Extend arm cylinder (1). Aligning the holes on both arm cylinder (1) rod and arm, install the thrust plate. Drive pin (4).

4. Aligning the holes on both stopper and pin (4), drive bolt (3) and install nut (2).

 : 30 mm

 : 400 N·m (41.0 kgf·m, 295 lbf·ft)

IMPORTANT: When all work is completed, run the arm cylinder several times to stroke end to bleed air from the circuit.

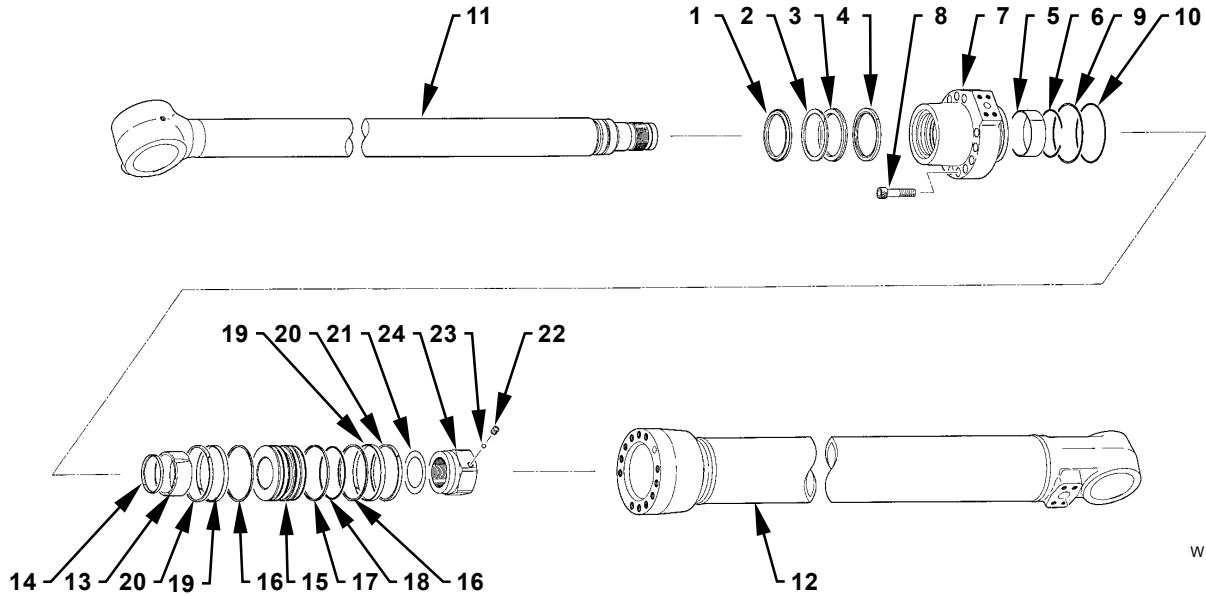


M1SM-05-009

FRONT ATTACHMENT / Cylinder

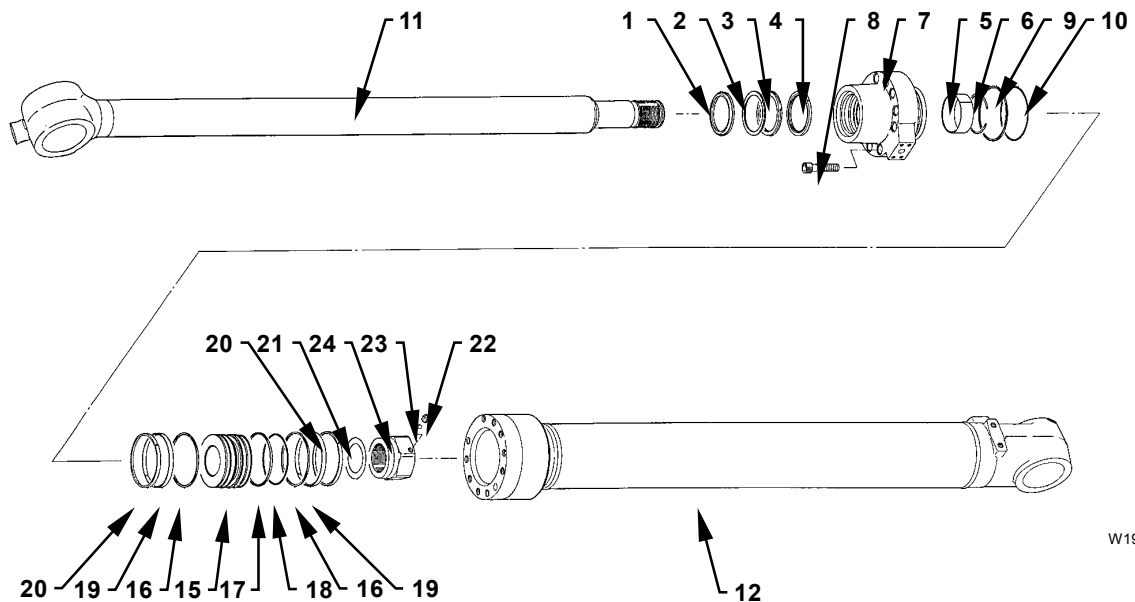
DISASSEMBLE CYLINDER

Boom Cylinder



W191-04-02-001

Bucket Cylinder

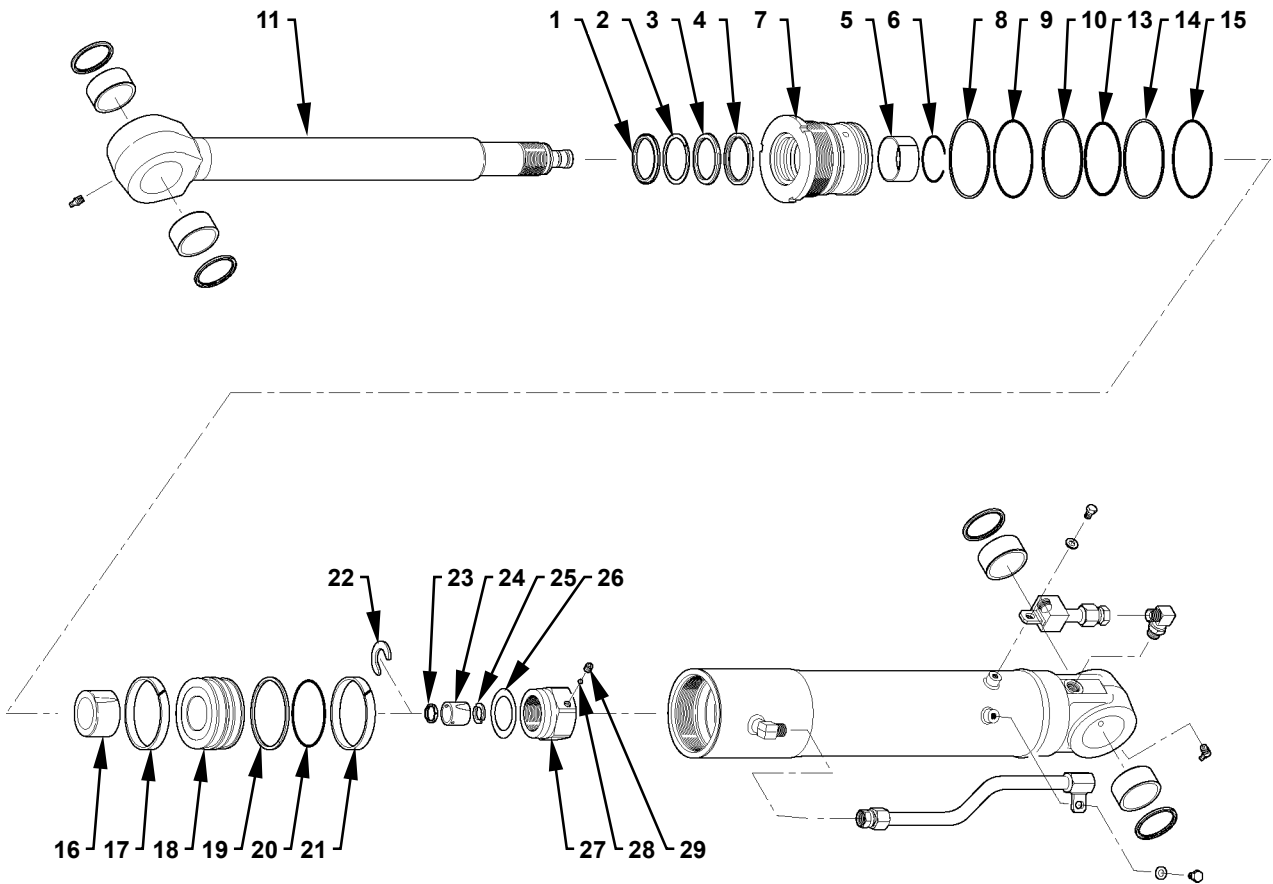


W191-04-02-002

- | | | | |
|-----------------|--|------------------------------|--------------------------|
| 1 - Wiper Ring | 7 - Cylinder Head | 13 - Cushion Bearing | 19 - Slide Ring (2 Used) |
| 2 - Backup Ring | 8 - Socket Bolt
(10 Used) (ZAXIS110, 125US, 135UR Bucket
Cylinder)
(12 Used) (ZAXIS120, 135US, Bucket Cylinder)
(10 Used) (ZAXIS110 Boom Cylinder)
(12 Used) (ZAXIS120, 125US, 135US, 135UR
Boom Cylinder) | 14 - Cushion Seal | 20 - Slide Ring (2 Used) |
| 3 - U-Ring | 9 - Backup Ring | 15 - Piston | 21 - Shim |
| 4 - Buffer Ring | 10 - O-Ring | 16 - Backup Ring (2
Used) | 22 - Set Screw |
| 5 - Bushing | 11 - Piston Rod | 17 - Seal Ring | 23 - Steel Ball |
| 6 - Snap Ring | 12 - Cylinder Tube | 18 - O-Ring | 24 - Nut |

FRONT ATTACHMENT / Cylinder


Offset Cylinder (ZAXIS135UR Only)

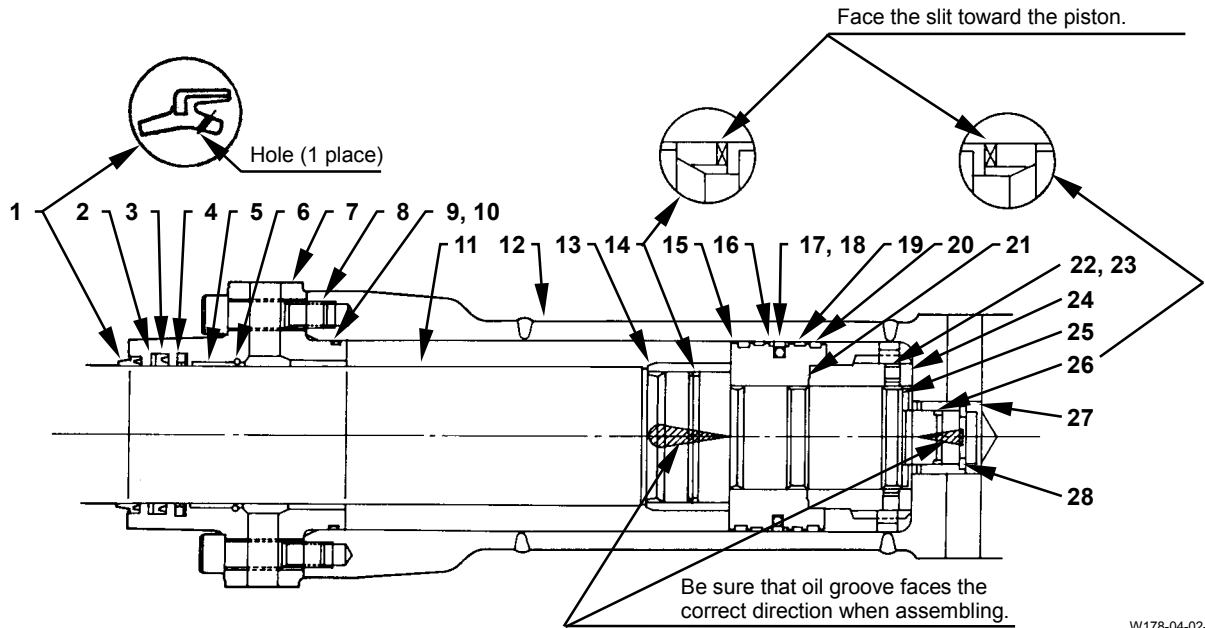


W198-04-02-002

FRONT ATTACHMENT / Cylinder

Arm Cylinder

 **NOTE:** The figure below shows ZAXIS110. Although cylinder tube (12) of ZAXIS135 UR is different, the disassembling procedure is same.

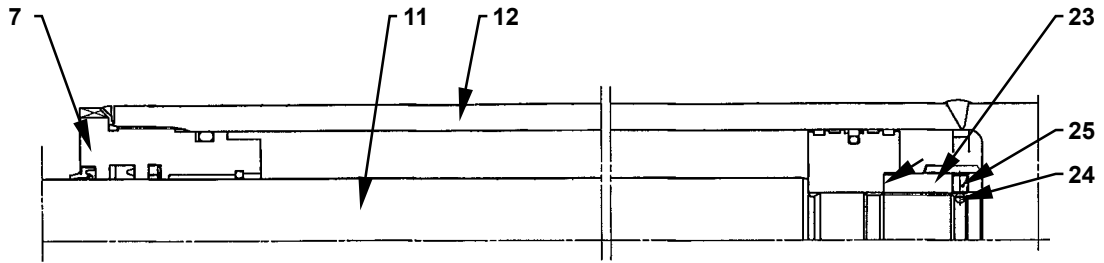


W178-04-02-005

- | | | | |
|-------------------|---|---------------------------|-----------------------|
| 1 - Wiper Ring | 8 - Socket Bolt
(12 Used) (ZAXIS110, 125US)
(10 Used) (ZAXIS120, 135US,
135UR) | 15 - Piston | 22 - Set Screw |
| 2 - Backup Ring | 9 - Backup Ring | 16 - Backup Ring (2 Used) | 23 - Steel Ball |
| 3 - U-Ring | 10 - O-Ring | 17 - Seal Ring | 24 - Nut |
| 4 - Buffer Ring | 11 - Piston Rod | 18 - O-Ring | 25 - Snap Ring |
| 5 - Bushing | 12 - Cylinder Tube | 19 - Slide Ring (2 Used) | 26 - Cushion Seal |
| 6 - Snap Ring | 13 - Cushion Bearing | 20 - Slide Ring (2 Used) | 27 - Cushion Bearing |
| 7 - Cylinder Head | 14 - Cushion Seal | 21 - Shim | 28 - Stopper (2 Used) |

FRONT ATTACHMENT / Cylinder

Blade Cylinder (ZAXIS135UR)

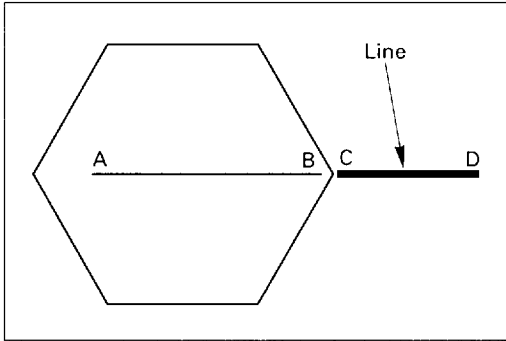


W198-04-02-004

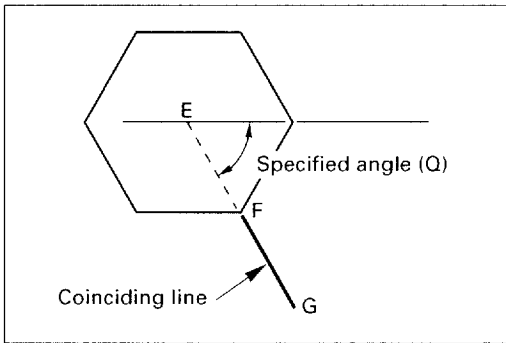
MAIN DATA AND SPECIFICATIONS

Item	Engine Model	CC-4BG1TCG	BB-4BG1TRG
Engine type		Water cooled, four cycle, vertical in-line overhead valve	
Combustion chamber type		Direct injection	
Cylinder liner type		Dry	
No. of cylinders – bore × stroke	mm (in)	4 – 105 × 125 (4.13 × 4.92)	
Total piston displacement	L (cid)	4.329 (464)	
Compression ratio		18 to 1	
Engine dimensions	mm (in)	908 × 698 × 892 (35.7 × 27.5 × 27.5)	900 × 718 × 892 (35.4 × 28.3 × 35.1)
Length × width × height			
Engine weight (Dry)	kg (lb)	370 (816)	360 (794)
Fuel injection order		1-3-4-2	
Specified fuel		Diesel fuel (ASTM D975 No. 2D)	
Injection pump		In-line plunger, Bosch A type	
Governor		Mechanical, RSV type	
Injection nozzle		Multi hole	
Injection starting pressure	MPa (kgf/cm ² /psi)	18.1 (185/2,630)	
Fuel filter type		Cartridge (spin-on)	
Water sedimentor	(If so equipped)	Sediment/water level indicating type	
Compression pressure	MPa (kgf/cm ² /psi) (At warm)	3.04 (31/441) at 200 min ⁻¹ at sea level	
Valve clearances (At cold)	Intake mm (in)	0.40 (0.016)	
	Exhaust mm (in)	0.40 (0.016)	
Lubrication method		Pressurized circulation	
Oil pump		Gear type	
Main oil filter type		Full flow, cartridge (spin-on)	
Engine oil capacity	OIL PAN L (US gal)	MAX 13.2 (3.49), MIN 10 (2.64)	
	TOTAL SYSTEM capacity	MAX 16.2 (4.28), MIN 13 (3.43)	
Oil cooler		Water cooled integral type	
Cooling method		Pressurized forced circulation	
Coolant volume (engine only)	L (US gal)	8.5 (2.25)	
Water pump		Belt driven impeller type	
Thermostat type		Wax pellet type	
Alternator	V-A	24-50	
Starter	V-KW	24-4.5	
Turbocharger manufacturer		MITSUBISHI	
Turbocharger model		TD04HL	

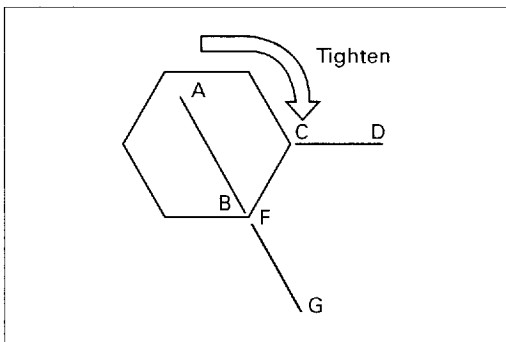
1-16 GENERAL INFORMATION



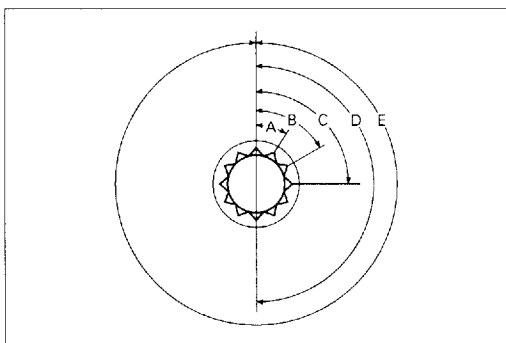
5. Draw another line (C-D) on the face of each of the parts to be clamped. This line should be an extension of the line [A-B].



6. Draw another line [F-G] on the face of each of the parts to be clamped. This line will be in the direction of the specified angle (Q) across the center [E] of the nut or bolt.



7. Use a socket wrench to tighten each nut or bolt to the point where the line [A-B] is aligned with the line [F-G].



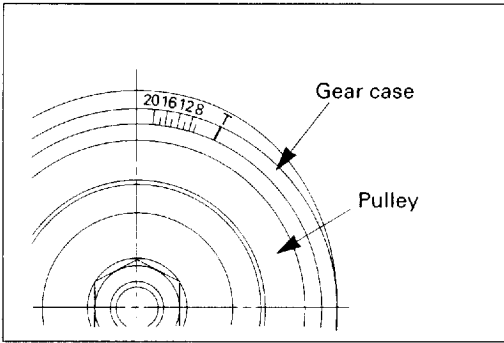
Example: Specified Angle and Tightening Rotation

A	30°	1/12 of a turn
B	60°	1/6 of a turn
C	90°	1/4 of a turn
D	180°	1/2 of a turn
E	360°	One full turn

MEMO

A series of horizontal dotted lines for writing.

2-10 MAINTENANCE



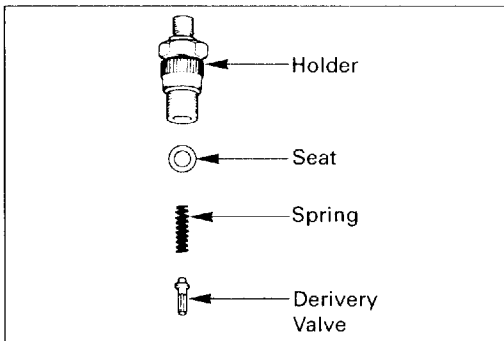
Degree

	CC-4BG1TCG	BB-4BG1TRG
Injection Timing B.T.D.C	10	9

Note:

Injection pump injection timing will vary among identical engines contact your machine supplier or nearest ISUZU engine service outlet for the specifications applicable to your engine.

These specifications have been set by ISUZU and the OEM manufacturer.



7. Remove the delivery valve holder from the No. 1 plunger.
8. Reinstall the delivery valve internal parts (seat, spring, and valve) to the delivery valve holder.
9. Reinstall the delivery valve holder assembly to the No. 1 plunger and tighten it to the specified torque.

N·m (kgf·m/lb.ft)

Delivery Valve Holder Torque	39-44 (4-4.5/29-33)
------------------------------	---------------------

10. Install the No. 1 cylinder injection pipe and tighten it to the specified torque.

N·m (kgf·m/lb.ft)



Injection Pipe Nut Torque	28-32 (2.9-3.3/21-24)
---------------------------	-----------------------

Note:

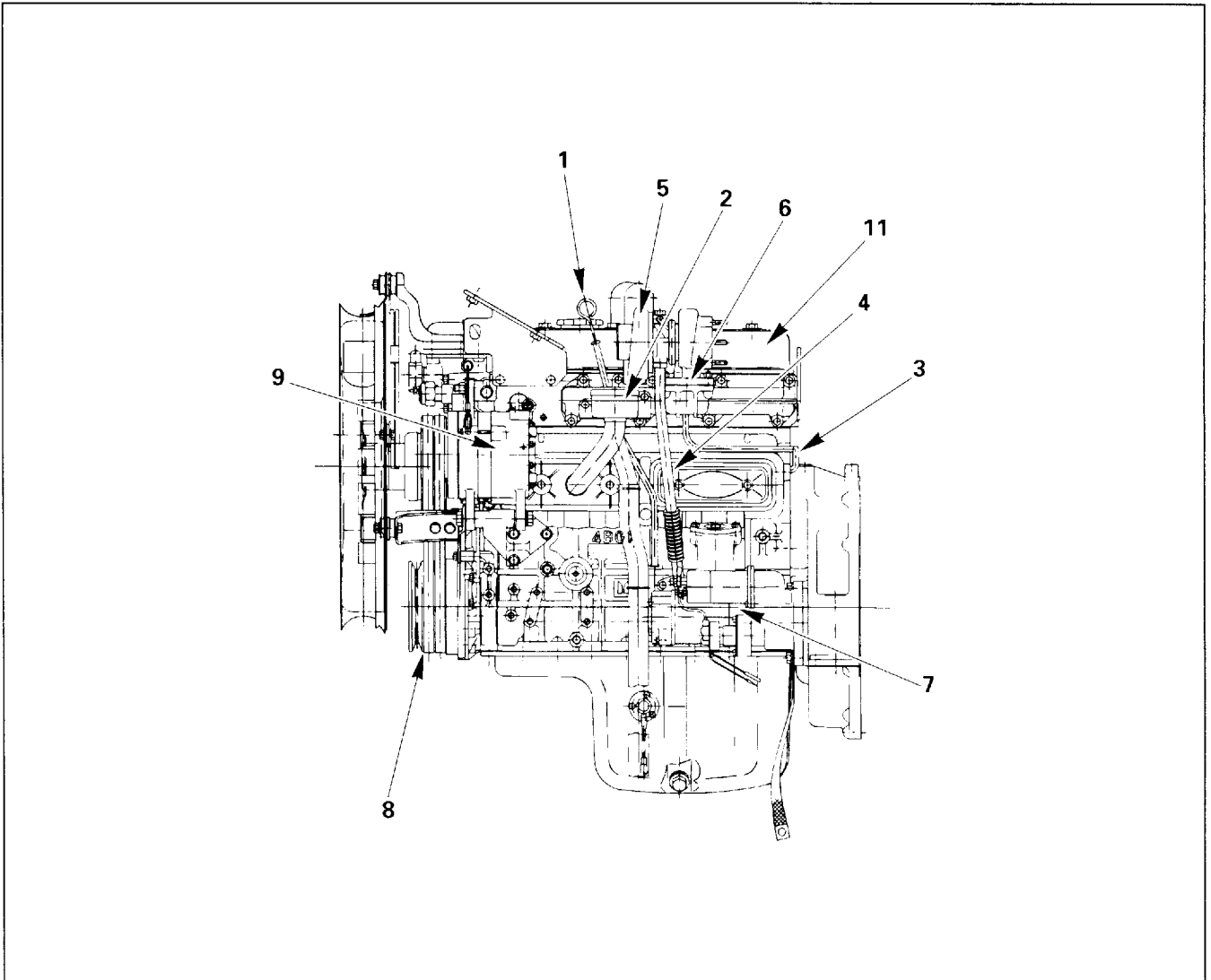
DO NOT OVERTIGHTEN THE INJECTION PUMP BODY. THE INJECTION PUMP BODY IS MADE OF ALUMINUM. OVERTIGHTENING WILL DISTORT THE INJECTION PUMP BODY SHAPE AND ADVERSELY AFFECT CONTROL RACK OPERATION.



EXTERNAL PARTS DISASSEMBLY STEPS

(Left-hand side)

MODEL CC-4BG1TRB

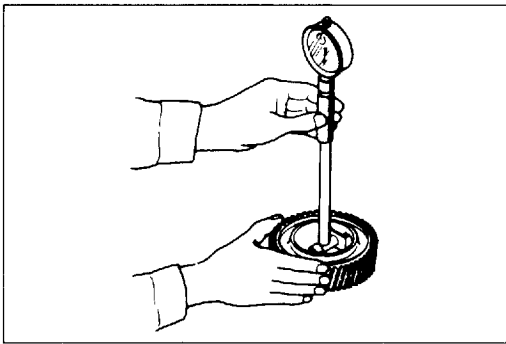


Disassembly Steps

- | | |
|----------------------------|-------------------------|
| 1. Dipstick and guide tube | 6. Gasket |
| 2. Air breather | 7. Starter |
| 3. Oil feed pipe | 8. Fan belt |
| 4. Oil drain pipe | 9. Alternator |
| ▲ 5. Turbocharger | 10. Fan pulley |
| | 11. Cylinder head cover |

MEMO

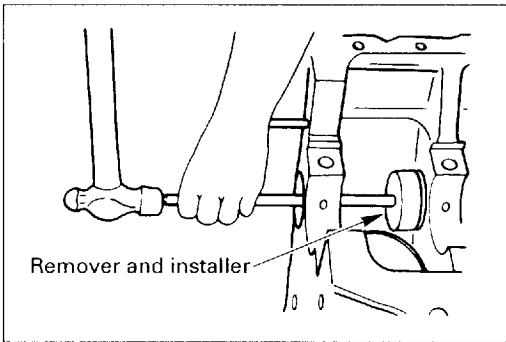
A series of horizontal dotted lines for writing.



- Use a dial indicator to measure the idler gear inside diameter.

mm (in)

	Standard	Limit
Idler Gear and Idler Gear Shaft Clearance	0.025–0.085 (0.001–0.003)	0.2 (0.008)



CAMSHAFT

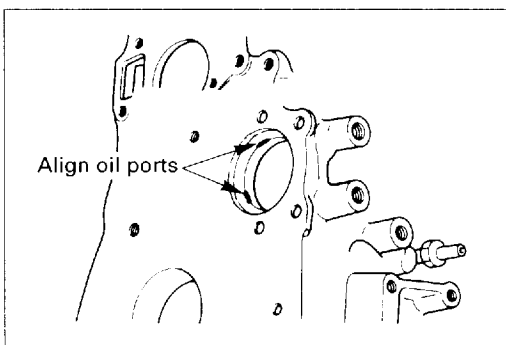
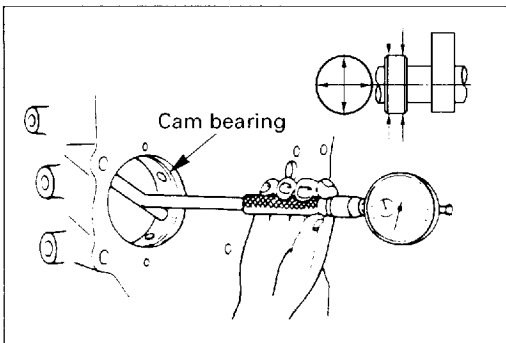
- Use the camshaft bearing remover and installer to remove camshaft bearing from the cylinder body.

Camshaft Bearing Remover and Installer: 9-8523-1818-0

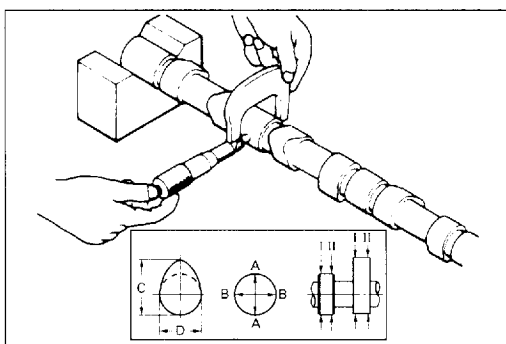
- Measure the clearance between the cam journal and the camshaft bearing.

mm (in)

	Standard	Limit
Cam Journal and Cam Bearing Clearance	0.03–0.09 (0.001–0.004)	0.15 (0.006)



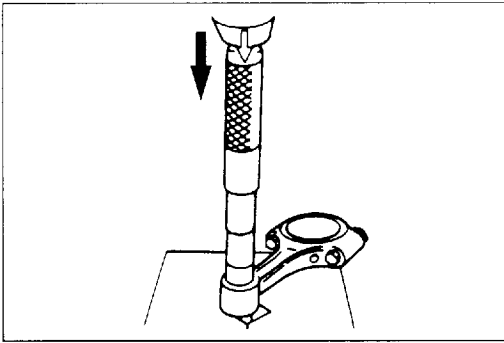
- Align the camshaft bearing oil holes with the mating oil ports (machined on the cylinder body camshaft bearing fitting bore).



- Use a micrometer to measure the cam lobe height. If the cam lobe height is less than the specified limit, the camshaft must be replaced.

mm (in)

	Standard	Limit
Cam Lobe Height (C-D)	7.71 (0.304)	7.21 (0.284)
Cam Journal Diameter	55.94–55.97 (2.202–2.204)	55.6 (2.189)



Connecting Rod Bushing Installation

Use the connecting rod bushing installer to install the connecting rod bushing.



Connecting Rod Bushing Installer: 9-8523-1369-0



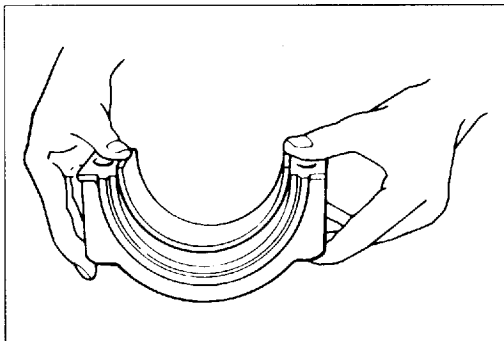
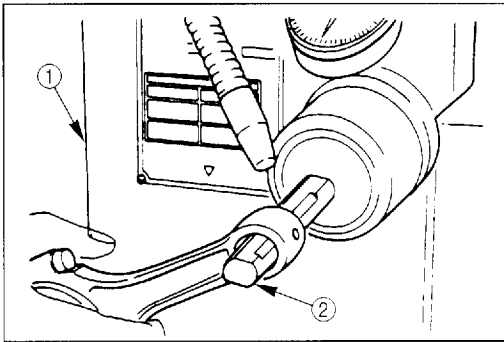
Note:

The connecting rod bushing oil port must be aligned with the connecting rod oil port.

- Use a piston pin hole grinder ① fitted with a reamer ② or an adjustable pilot reamer to ream the piston pin hole.

mm (in)

	Standard
Connecting Rod Bushing Inside Diameter	35.017–35.025 (1.3786–1.3789)



Connecting Rod Bearing Inspection

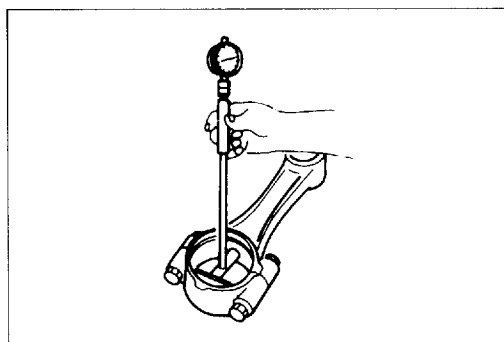


- Fit the connecting rod bearing lower half into the connecting rod bearing cap.
- Check the connecting rod bearing lower half tension. If the tension is insufficient, the bearing must be replaced.
- Tighten the connecting rod and the bearing cap to the specified torque.



N·m (kgf·m/lb.ft)

	1st step	2nd step
Connecting Rod and Bearing Cap Bolt Tightening Torque	39 (4/29)	60°–90°



- Use an inside dial indicator to measure the connecting rod inside diameter.

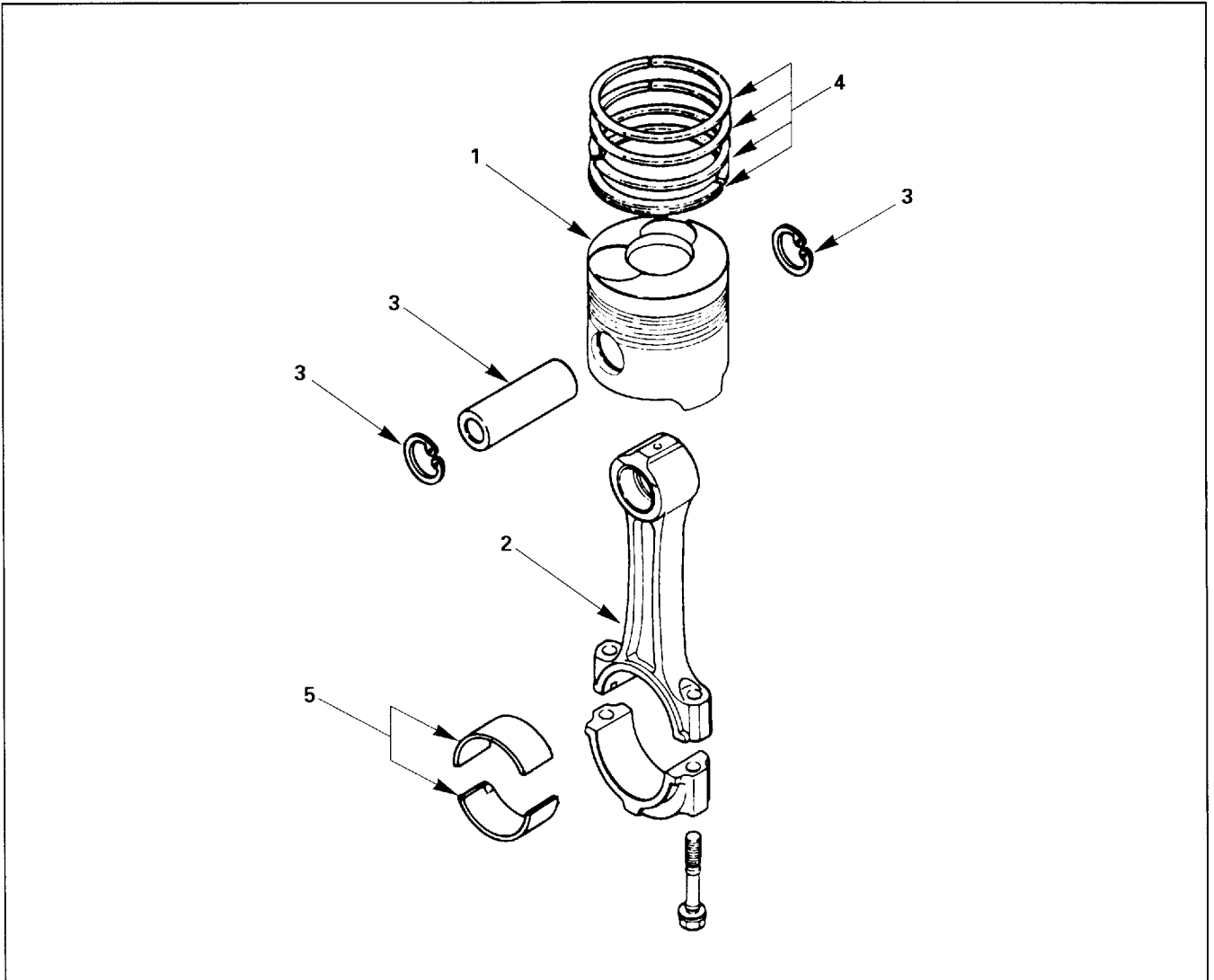
mm (in)

Connecting Rod Bearing Nominal Diameter	64 (2.520)
---	------------



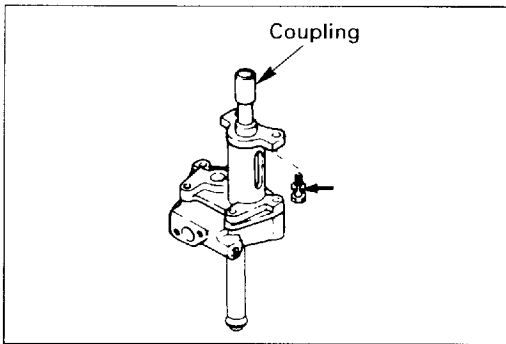
PISTON AND CONNECTING ROD REASSEMBLY STEPS

MIRROR COMPONENT



Reassembly Steps

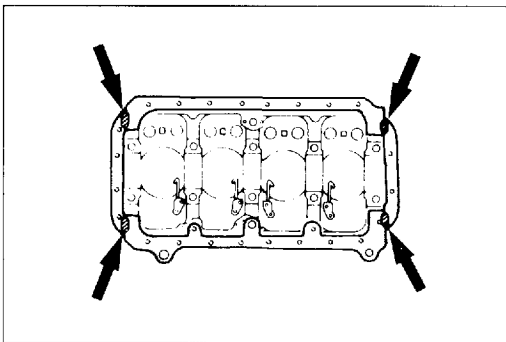
- ▲ 1. Piston
- ▲ 2. Connecting-rod
- ▲ 3. Piston pin, Snap ring
- ▲ 4. Piston ring
- ▲ 5. Connecting rod bearing



- 2) Install the oil pump with the coupling.
- 3) Tighten the oil pump bolts to the specified torque.

N·m (kgf·m/lb.ft)

Oil Pump Bolt Torque	42-62 (4.3-6.3/31-46)
----------------------	-----------------------



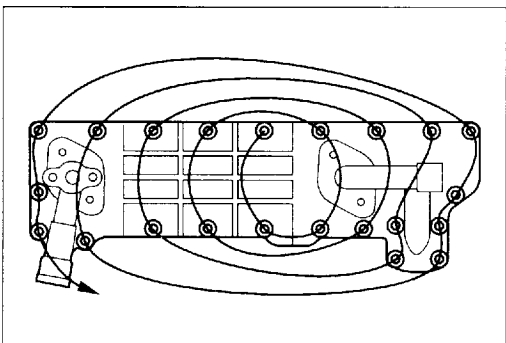
13. Oil Pan

- 1) Apply liquid gasket to the area indicated by the arrows in the illustration.
- 2) Install the oil pan gasket
- 3) Install the oil pan.

Tighten the oil pan bolts to the specified torque.

N·m (kgf·m/lb.ft)

Oil Pan Bolt Torque	21-30 (2.1-3.1/15-22)
---------------------	-----------------------



14. Oil Cooler

- 1) Apply liquid gasket to the oil cooler gasket.
- 2) Install the oil cooler gasket to the oil cooler body case.
- 3) Install the oil cooler.

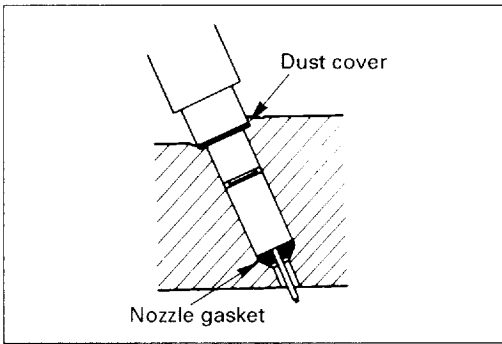
Tighten the oil cooler bolts to the specified torque.

Start from the middle and work out to either side.

Refer to the illustration

N·m (kgf·m/lb.ft)

Oil Cooler Torque	16-25 (1.6-2.6/12-19)
-------------------	-----------------------



Important Operation

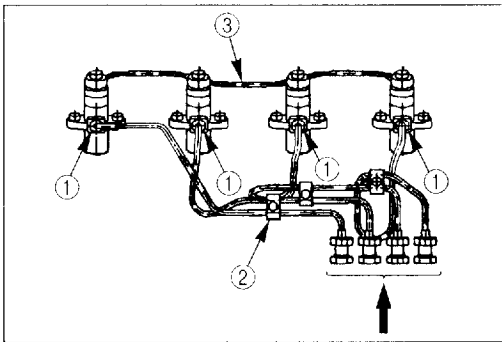
2. Injection Nozzle

Install the injection nozzles with the injection nozzle gaskets.

Be careful not to damage the nozzle tips.

N·m (kgf·m/lb.ft)

Injection Nozzle Bolt Torque	17 – 21 (1.7 – 2.1/12 – 15)
------------------------------	-----------------------------



3. Injection Pipe and Fuel Leak Off Pipe

1) Install the fuel injection pipes ① and tighten the bolts to the specified torque.

N·m (kgf·m/lb.ft)

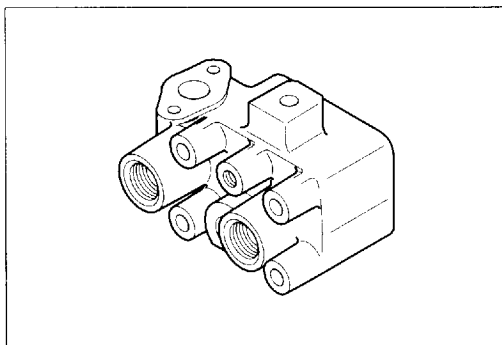
Injection Pipe Torque	28 – 32 (2.9 – 3.3/21 – 24)
-----------------------	-----------------------------

2) Carefully position and set the clips ②.

It is very important that each clip be positioned correctly.

An improperly positioned clip will result in objectionable fuel pulsing noise and injection pipe breakage.

3) Install the fuel leak off pipes ③.



4. Oil port cover

Install the oil port cover with tightening the bolts securely.

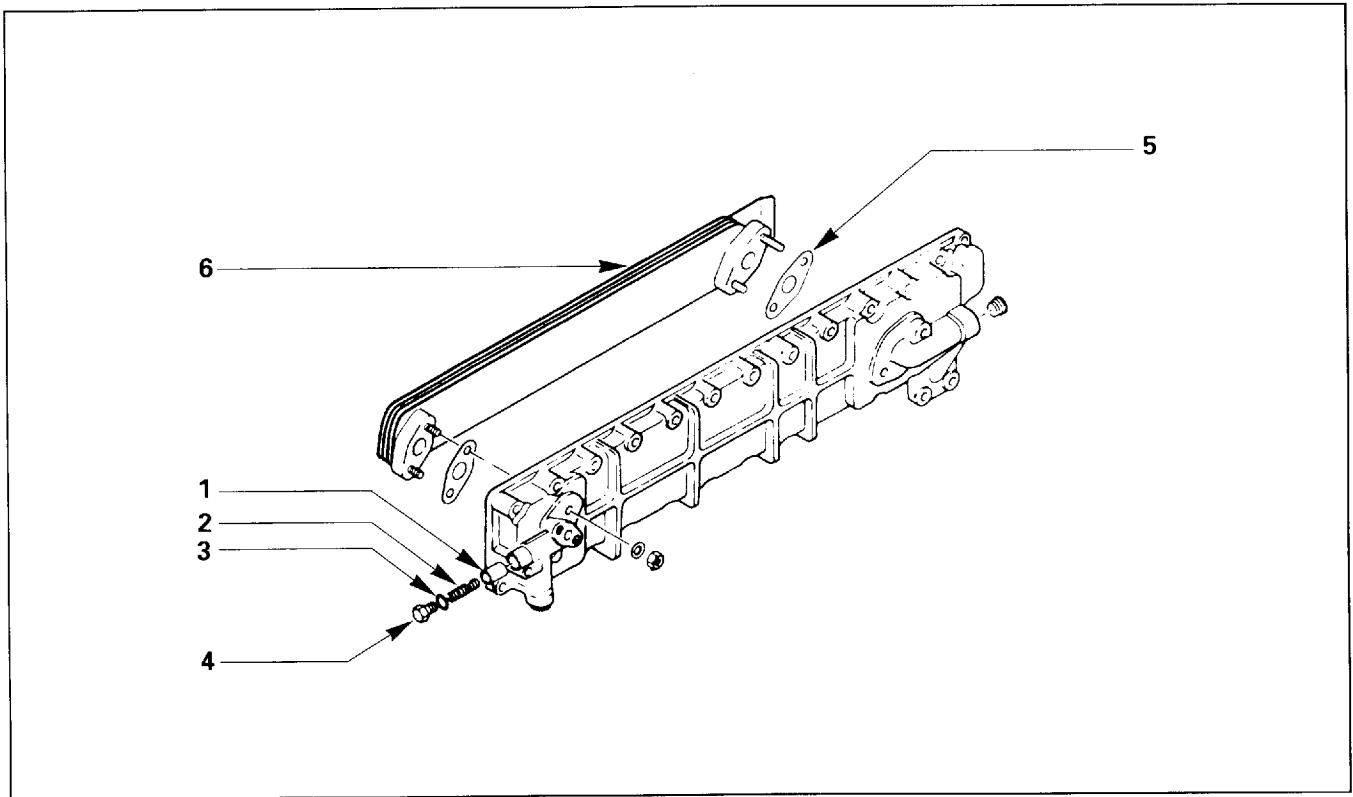
N·m (kgf·m/lb.ft)

Oil Port Cover Bolt Torque	30 – 50 (3.1 – 5.1/22 – 37)
----------------------------	-----------------------------



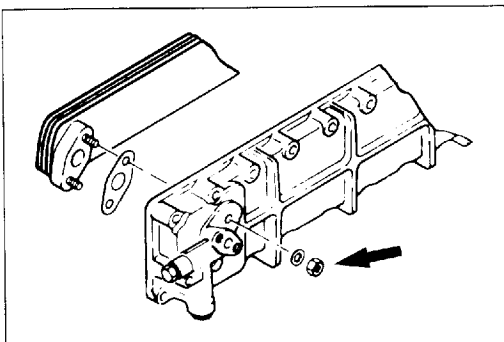


REASSEMBLY



Reassembly Steps

- | | |
|-------------------------|-------------------------|
| 1. By-pass valve | 4. By-pass valve plug |
| 2. By-pass valve spring | 5. Element gasket |
| 3. O-ring; plug | ▲ 6. Oil cooler element |



Important Operation

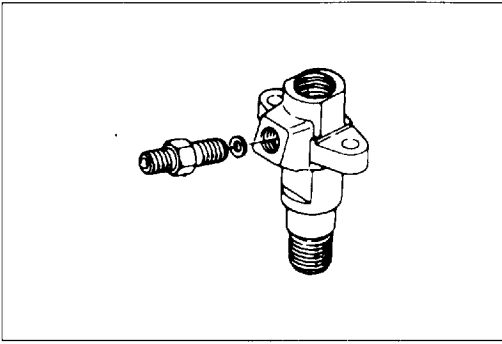


6. Oil Cooler Element

Install the oil cooler element to the oil cooler, and tighten the cooler element fixing nuts to the specified torque.

N·m (kgf·m/lb.ft)

Oil Cooler Element Fixing Nut Torque	20-26 (2.0-2.7/14-20)
---	-----------------------



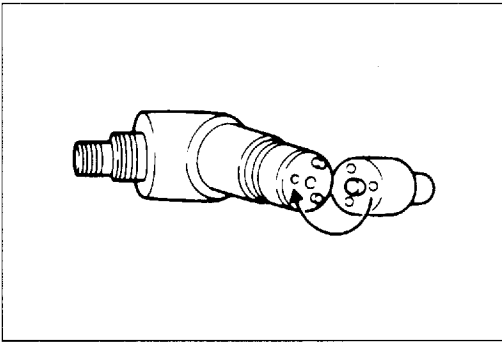
Important Operation

3. Injection Pipe Connector



N-m (kgf-m/lb.ft)

Nozzle Connector Torque	49 – 59 (5.0 – 6.0/36 – 43)
-------------------------	-----------------------------



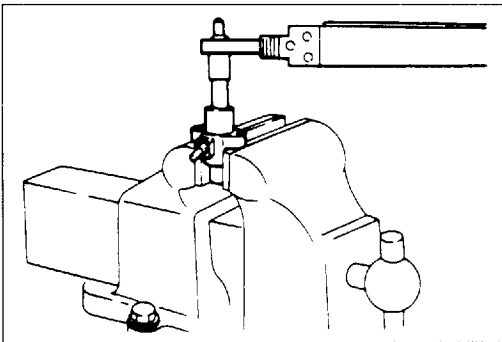
4. Injection Nozzle

There must be no oil on the contact surfaces of the injection nozzle and the injection nozzle holder.

Clean these contact surfaces with diesel fuel before installation.



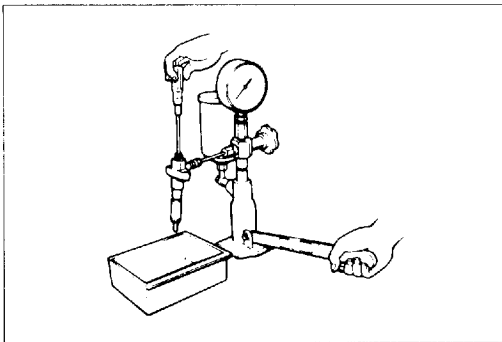
The nozzle dowel pin must be aligned with the dowel hole in the nozzle holder body.



5. Retaining Nut

N-m (kgf-m/lb.ft)

Nozzle Retaining Nut Torque	59 – 78 (6.0 – 8.0/43 – 58)
-----------------------------	-----------------------------



Injection Starting Pressure Adjustment

The injection nozzle injection starting pressure can be adjusted after the adjusting screw is installed.

Refer to "FUEL SYSTEM" on Page 2-4 of the "MAINTENANCE" Section of this Workshop Manual.

MPa (kgf/cm²/psi)

Injection Starting Pressure	18.1 (185/2630)
-----------------------------	-----------------

ITEM CONFIRMED ON TURBOCHARGER

Before removing the turbocharger, be sure to check the following items:

- (1) Oil leak from turbocharger
- (2) Abnormal noise from turbocharger
- (3) Acceleration is not felt. The engine is out of order.

Caution:

The turbocharger is heated hot right after the engine stops.

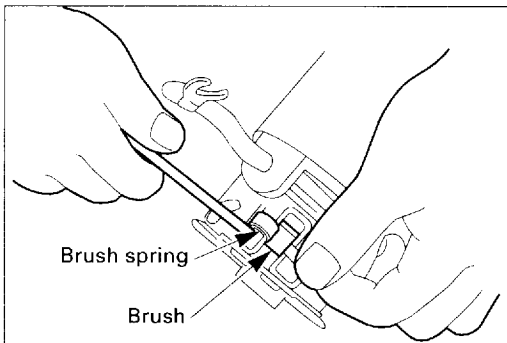
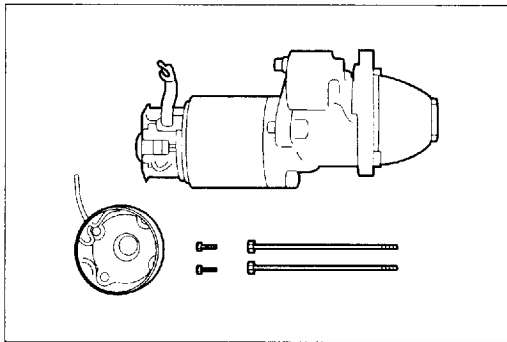
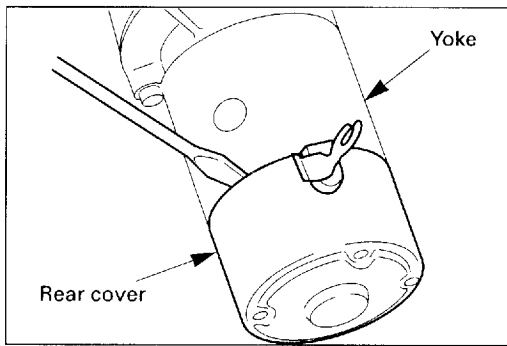
Be sure to cool the engine sufficiently for safety before inspection.

TURBOCHARGER CHECKING PROCEDURES

- (1) Idle the engine on the machine and visually check all parts around the turbocharger to find abnormal phenomena.

Record the phenomena and their locations if any.

- (2) Pay special attention to the states of the air inlet and outlet hoses of the turbocharger, and check that the bands are not loose and no oil is leaking.
- (3) Inspect the appearance of the turbocharger referring to the checkpoints for each problem (oil leak, abnormal noise, irregular acceleration and insufficient output).

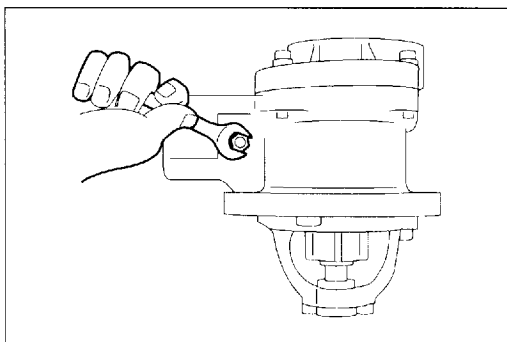
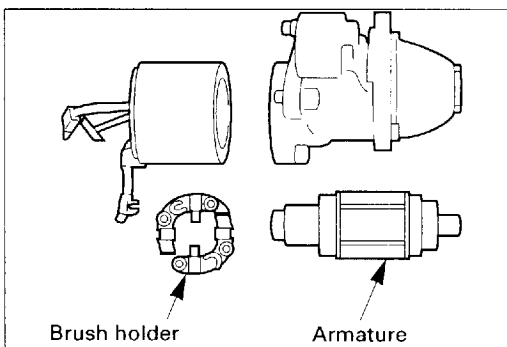


Removal of Brush Holder

For the brush on the (-) side, press the brush spring to the brush side to raise the brush from the commutator face of the armature.

For the brush on the (+) side, pull it out of the brush holder.

When the brush holder is removed, the yoke can be separated from the center bracket.



Removal of Shift Lever Pin

Remove the nut M10 (17 mm/0.669 in) and pull out the shift lever pin.

MAIN DATA AND SPECIFICATIONS

ALTERNATOR

Isuzu Part No.		1-81200-5301
Manufacturer's code No. (MITSUBISHI)		A004T05486
Rated voltage	(V)	24
Rated output	(A)	50
Rated speed	(min ⁻¹)	5000
Rated output at r.p.m	(Amp./Volt/min ⁻¹)	50/27/5000
No-load output at 0 Amp.	(Volt/min ⁻¹)	24/900
Direction of rotation as viewed from pulley side		Clockwise
Polarity grounded		(—)
Pulley diameter	mm (in.)	80 (3.15)
Coil resistance at 20°C		
Field coil	(Ω)	4.4-5.2
Regulator's applicable		
Isuzu part No.		1-81260-0170
Manufacturer's code No.		A866X38282

CURRENT OUTPUT TEST

The current output test determines whether or not alternator is capable of supplying its rated current output.

- (1) After the regulated voltage test is completed reduce the alternator revolution.
- (2) Close the switch 1. Be sure the lamp lights.
- (3) Set the load resistor in maximum resistance value position (Minimum current draw) and close the switch 2.
- (4) Increase and hold the alternator speed to 5000 min^{-1} and adjust the load resistor to obtain maximum current output.

Run the alternator for 15 minutes at this speed and output to rise in the alternator temperature.

After 15 minutes rotate the alternator to specified speed (2500 and 5000 min^{-1}) and adjust the load resistor to obtain maximum current output.

The output should be within specifications limits.

If the output is less than specifications limits, recheck the alternator as overed in [INSPECTIONS].

INSUFFICIENT POWER

Checkpoint	Trouble Cause	Remedy
Air cleaner	Clogged air cleaner element	Clean or replace the air cleaner element
OK	NG	NG
Fuel	Water particles in the fuel	Replace the fuel
OK	NG	NG
Fuel filter	Clogged fuel filter element	Replace the fuel filter element or the fuel filter cartridge
OK	NG	NG
Fuel feed pump	Defective fuel feed pump	Repair or replace the fuel feed pump
OK	NG	NG
Injection nozzle	Injection nozzle sticking	Replace the injection nozzle
OK	NG	NG
Fuel injection pipes	Injection nozzle injection starting pressure too low Improper spray condition	Adjust or replace the injection nozzle
OK	NG	NG
Fuel injection pipes	Fuel injection pipes damaged or obstructed	Replace the fuel injection pipes
OK	NG	NG

Continued on the next page

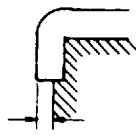
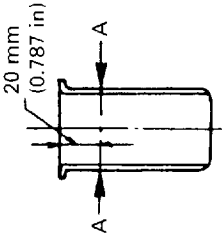
OIL PRESSURE DOES NOT RISE

Checkpoint	Trouble Cause	Remedy
Engine oil	NG Improper viscosity engine oil Too much engine oil	NG Replace the engine oil Correct the engine oil volume
OK		
Oil pressure gauge or unit Oil pressure indicator light	NG Defective oil pressure gauge or unit Defective indicator light	NG Repair or replace the oil pressure gauge or unit Replace the indicator light
OK		
Oil filter	NG Clogged oil filter element	NG Replace the oil filter element or the oil filter cartridge
OK		
Relief valve and by-pass valve	NG Relief valve sticking and/or weak by-pass valve spring	NG Replace the relief valve and/or the by-pass valve spring
OK		
Oil pump	NG Clogged oil pump strainer	NG Clean the oil pump strainer
OK		
Rocker arm shaft	NG Worn oil pump related parts	NG Replace the oil pump related parts
OK		
Rocker arm shaft	NG Worn rocker arm bushing	NG Replace the rocker arm bushing

Continued on the next page

13-2 REPAIR STANDARDS

Major Category	Name of Part	Inspection Item	Nominal Dimension	Assembly Standard Value	Limit	Repair Procedure	Comments
Time for engine disassembly and repair		Cylinder compression pressure MPa (kgf/cm ² /psi)	3.0 (31/440)		2.5 (26/370)	Disassemble and repair engine	Water temperature 70 – 85°C, (158 – 185°F) engine speed 200 min ⁻¹ (varies depending on altitude)
		Fuel consumption L/h	100%		140%		New engine performance is assumed 100%
		Lubricating oil consumption L/h	100%		200%		
Engine Body	Cylinder Block	Wear on liner bore Measured at A–A	Dia. 105 (4.1339)		Dia 105.2 (4.1417)	Upper step wear must be repaired, or replaced with standard dimension liner	(Ref) Cylinder & liner interference 0.001 – 0.019 (0.00004 – 0.0007)
		Liner projection		0.03 – 0.10 (0.001 – 0.004)		Some projection must be present	Difference in liner projection between neighboring cylinders not to exceed 0.03 (0.001)
		Cylinder block upper face warpage		0.05 or less (0.002)	0.2 (0.0079)	Must be repairable	
		Pressure test: 3 minutes kPa (kgf/cm ² /psi)		490 (5/71.1)		Leaks require repair or replacement	



13-12 REPAIR STANDARDS

Major Category	Name of Part	Inspection Item	Nominal Dimension	Assembly Standard Value	Limit	Repair Procedure	Comments	
Lubricating System	Oil pressure	Lubricating oil pressure kPa (kgf/cm ² /psi)		290 – 390 (3.0 – 4.0/43 – 57)	196 (2.0/28)			
		Clearance between pump body inner wall and gear teeth mm		0.075 – 0.150 (0.003 – 0.0059)	0.2 (0.0079)	Replace bushing, gear or body		
	Oil Pump and Relief Valve	Pumping rate L/min 1750 min ⁻¹ , SAE #30, pumping pressure 392 kPa (4 kgf/cm ² /57 psi) oil temp. 80°C (176°F)		47.6				
		End gap between pump cover and gear		0.040 – 0.094 (0.0016 – 0.0037)	0.15 (0.0059)	Replace gear or cover		
		Clearance between drive shaft and pump body		0.032 – 0.070 (0.0013 – 0.0028)	0.15 (0.0059)			
		Clearance between drive shaft and bushing		0.045 – 0.078 (0.0018 – 0.0031)	0.15 (0.0059)	Replace bushing		
	Oil filter	Diameter of drive shaft		Dia. 16 (0.6299)		Dia 15.9 (0.626)	Replace shaft	
			Initial operating pressure of relief valve kPa (kgf/cm ² /psi)		441 (4.5/64) 680 (7.0/100)			Reference value
		Clogging and damage to oil filter					Replace	Replace cartridge every 500 hours of operation
		Initial operating pressure of main oil filter relief valve kPa (kgf/cm ² /psi)			157 – 196 (1.6 – 2.0/23 – 28)			

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL