Manual No. : KM-CCBE
Vol. No. : WCCBE-00

Workshop Manual

ZAXIS 180W

Wheeled Excavator

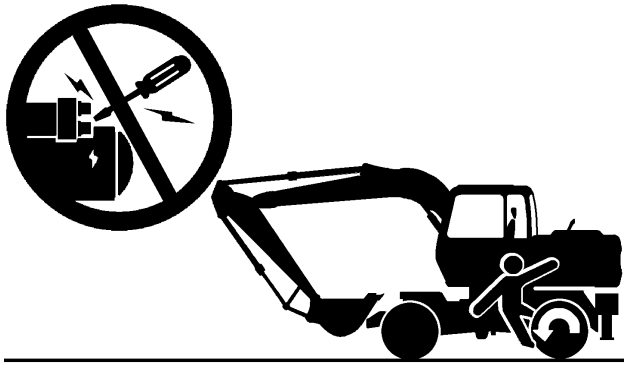
Service Manual (Manual No. KM-CCBE) consists of the following three separate volumes;

Technical Manual (Operational Principle)	: Vol. No. TOCCBE
Technical Manual (Troubleshooting)	: Vol. No. TTCCBE
Workshop Manual	: Vol. No. WCCBE

HITACHI

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-084

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

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 selecltor 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.

REMOVE PAINT BEFORE WELDING OR HEATING

SA-029

- 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.

511-E01A-0029

PREVENT BATTERY EXPLOSIONS

SA-032

- 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.

512-E01C-0032

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.

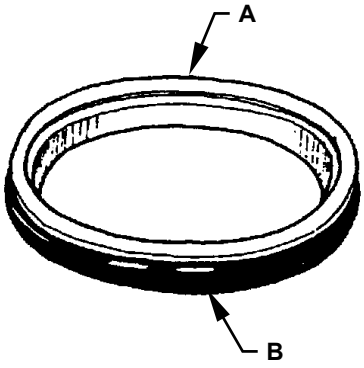
2. If incorrectly assembled, oil leakage or damage will occur. Be sure to do the following, to prevent trouble.

   (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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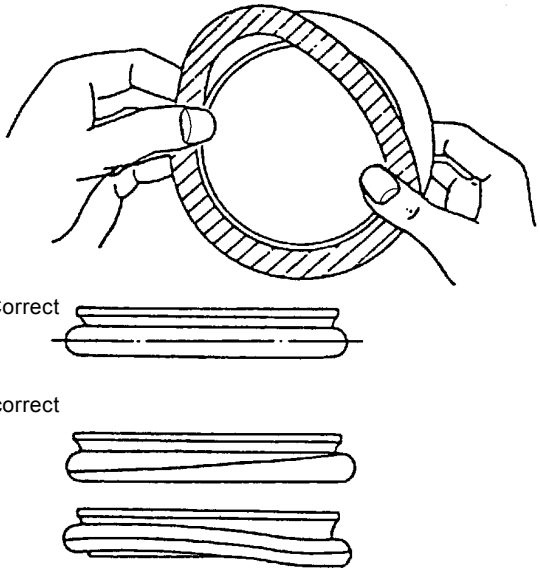

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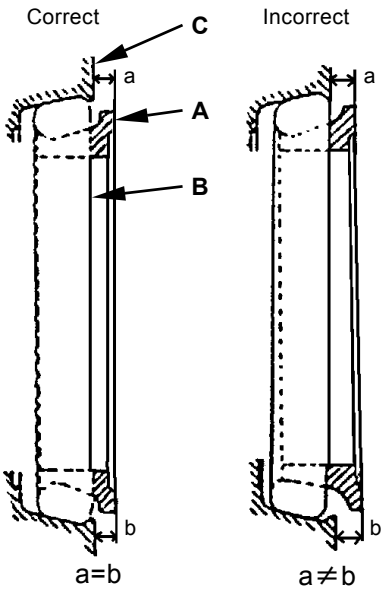
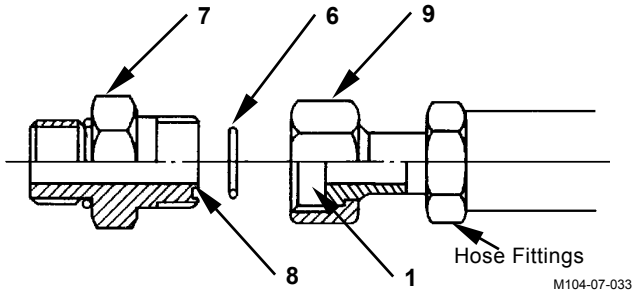


W110-03-05-004

O-ring Seal Joint

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

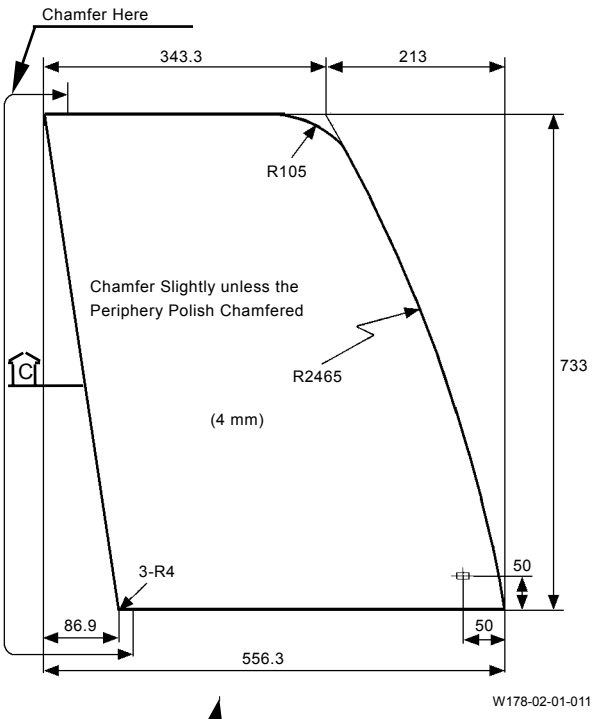
IMPORTANT:
1. **Be sue to replace O-ring (6) with a new one when reconnecting.**
2. **Before tightening nut (9), confirm that O-ring (6) is seated correctly in O-ring groove (e). Tightening nut (9) with O-ring (6) displaced will damage O-ring (6), resulting in oil leakage.**
3. **Take care not to damage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



Wrench Size mm	Wrench Size mm	Tightening Torque
Union Nut	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)

MEMO

Unit: mm



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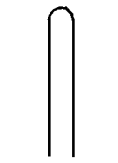

Section C and D

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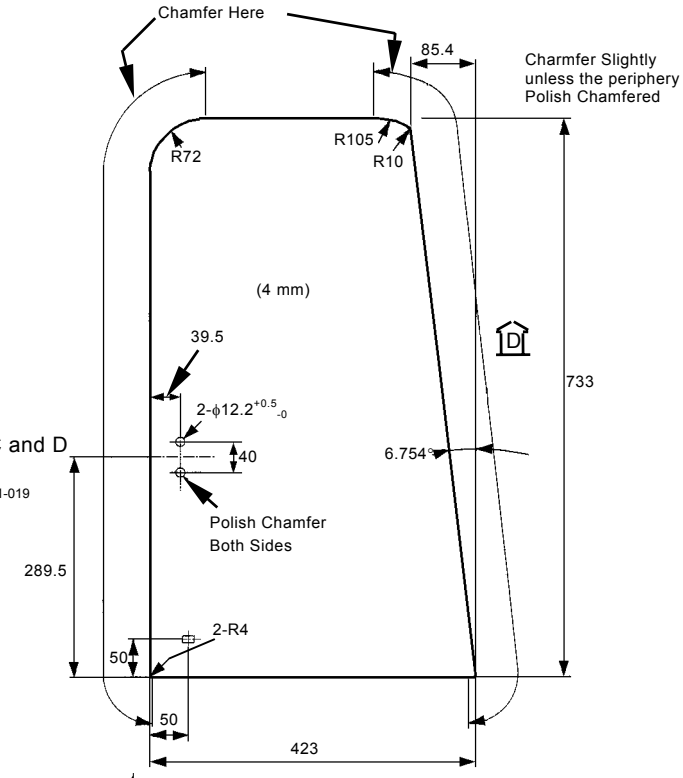

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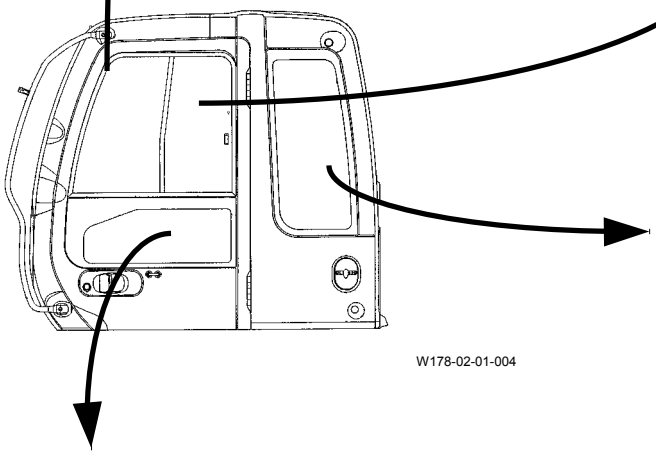

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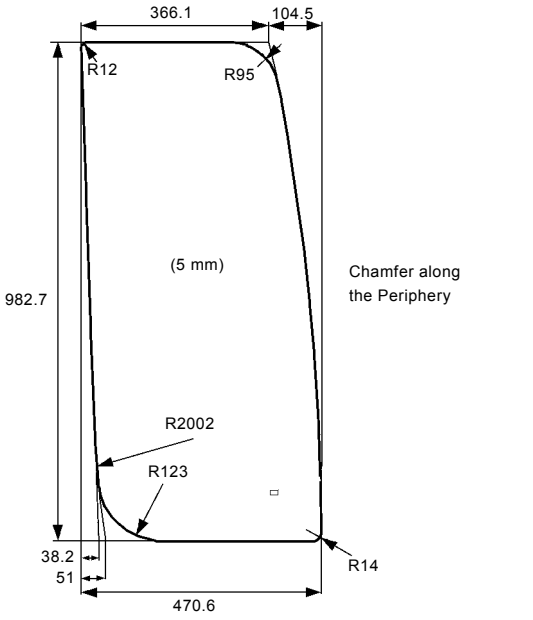

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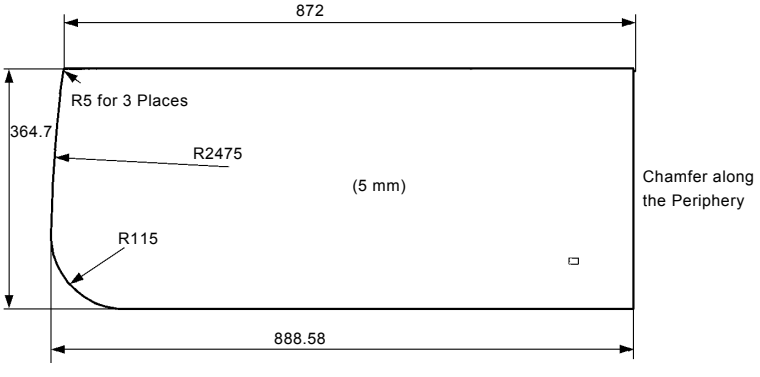
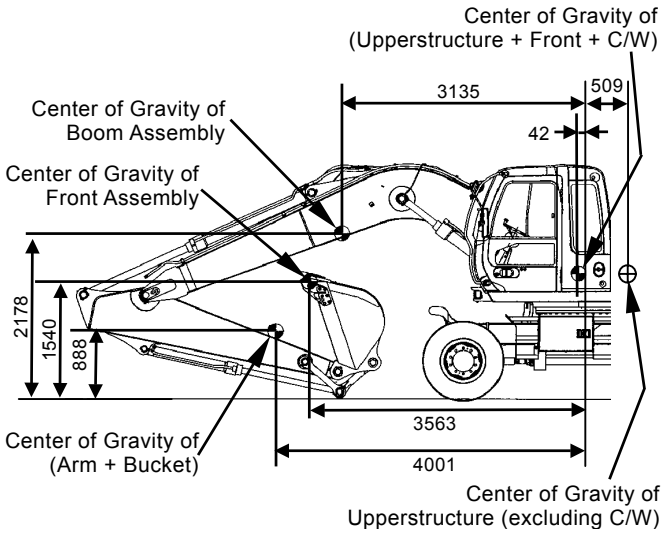


W178-02-01-010

CAUTION: Front attachment assembly weight:
Monoblock boom: 3000 kg (6600 lb)
2-Piece boom: 3500 kg (7700 lb)

6. Install front attachment assembly. Then, fill with hydraulic oil.
   (Refer to “Remove and Install Front Attachment” group on page W4-1-2.)
   : 27 mm
   : 78 N·m (8.0 kgf·m, 58 lbf·ft)
   : 30 mm
   : 540 N·m (55 kgf·m, 400 lbf·ft)
   : 36 mm
   : 175 N·m (18 kgf·m, 129 lbf·ft)

7. Start the engine and set the front attachment in posture for checking hydraulic oil level in its tank. Inspect the hydraulic oil level and check if any oil leakage is available.



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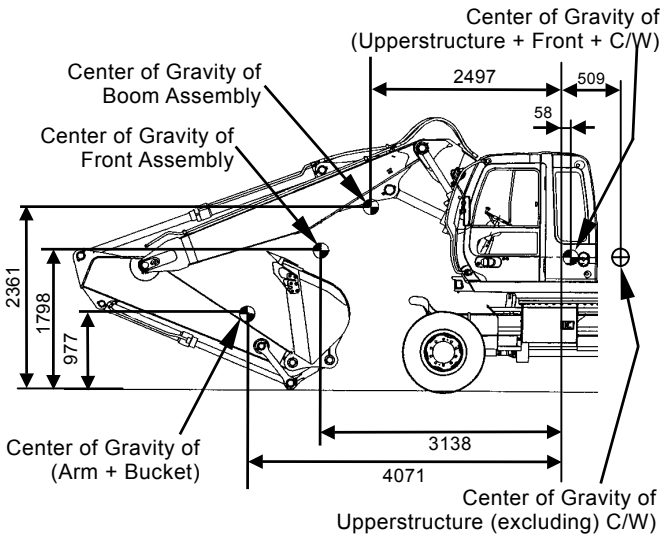

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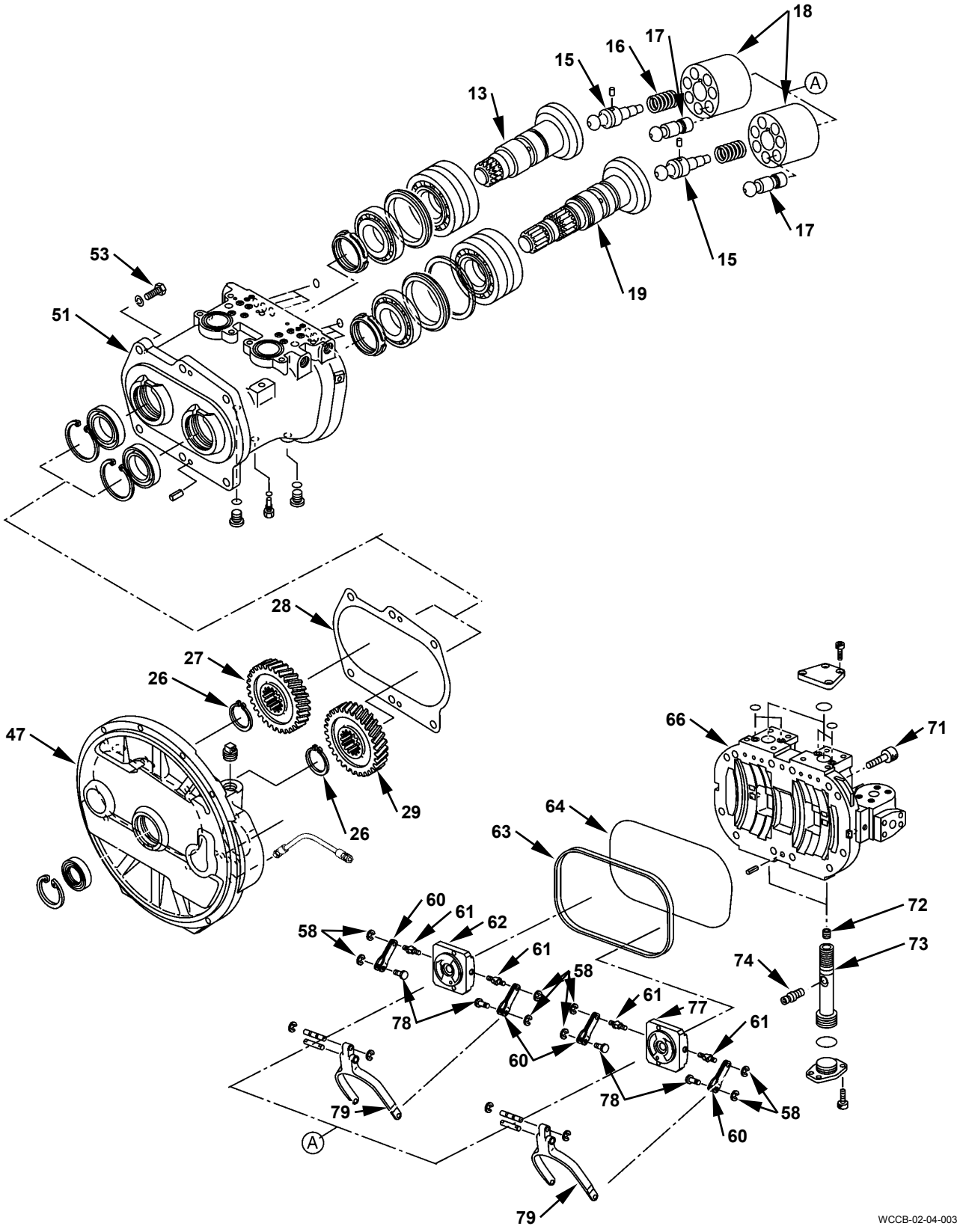
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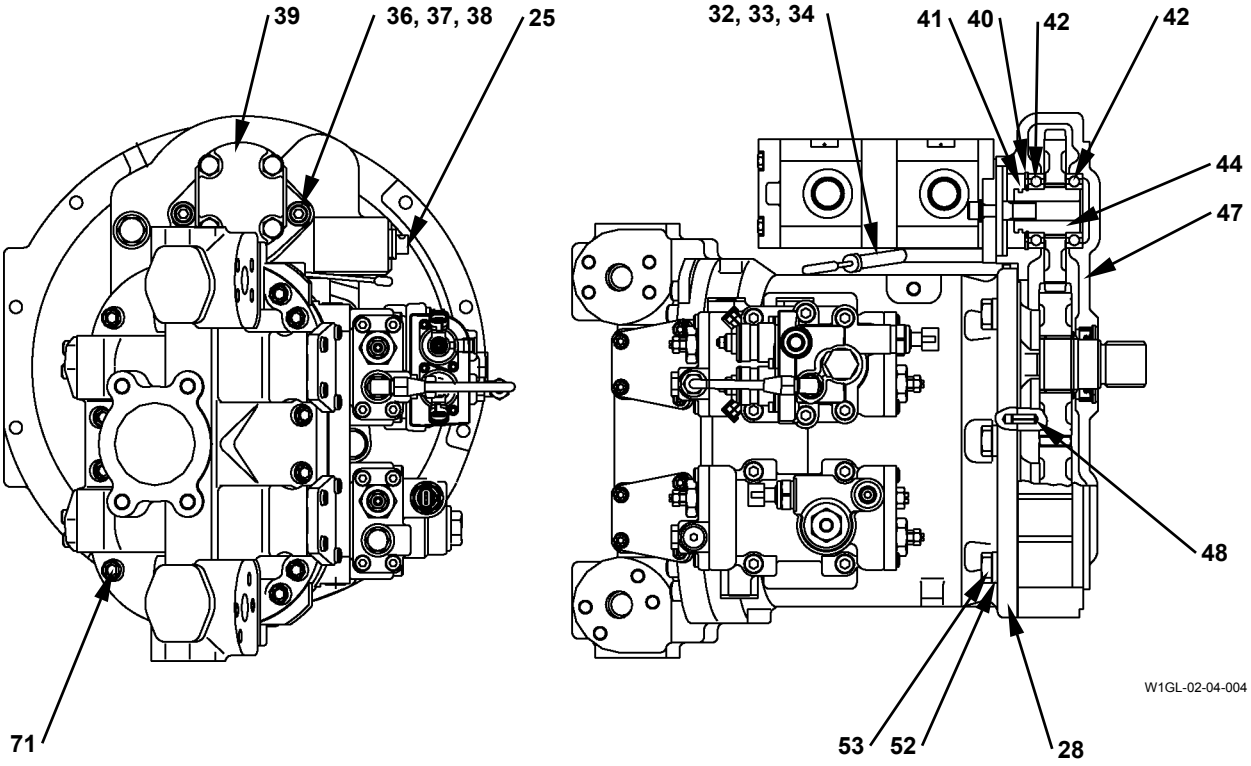
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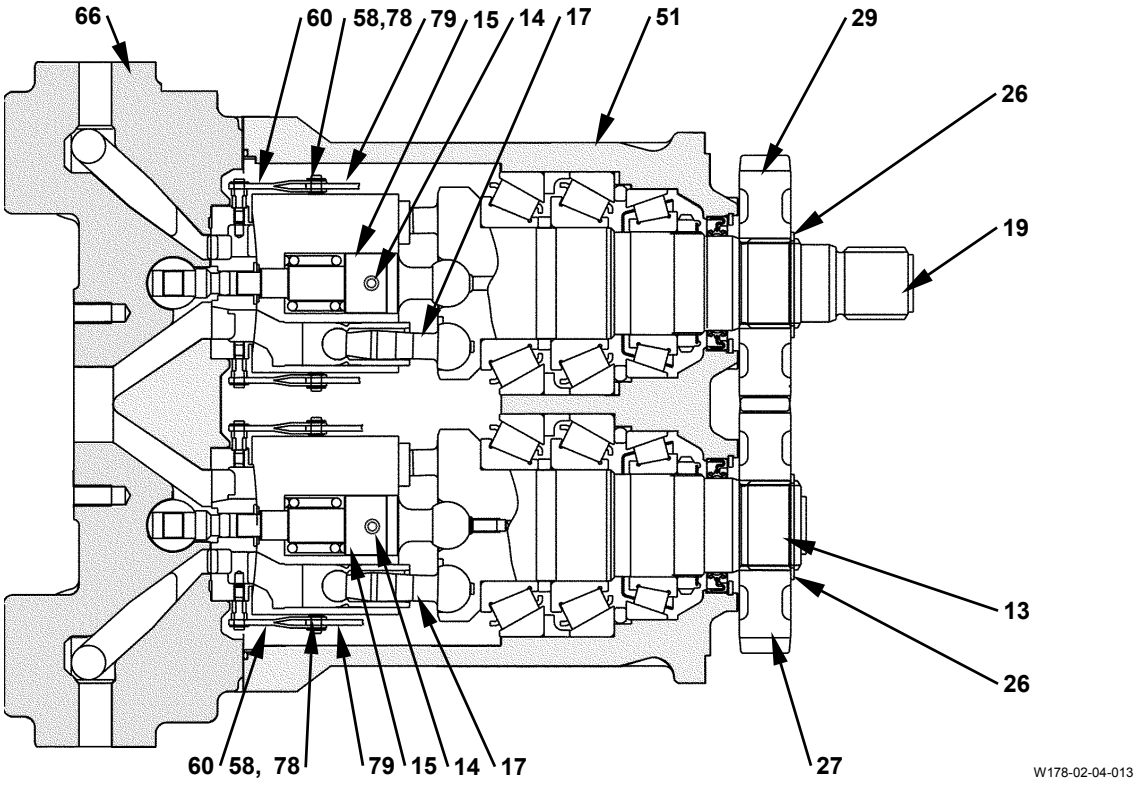
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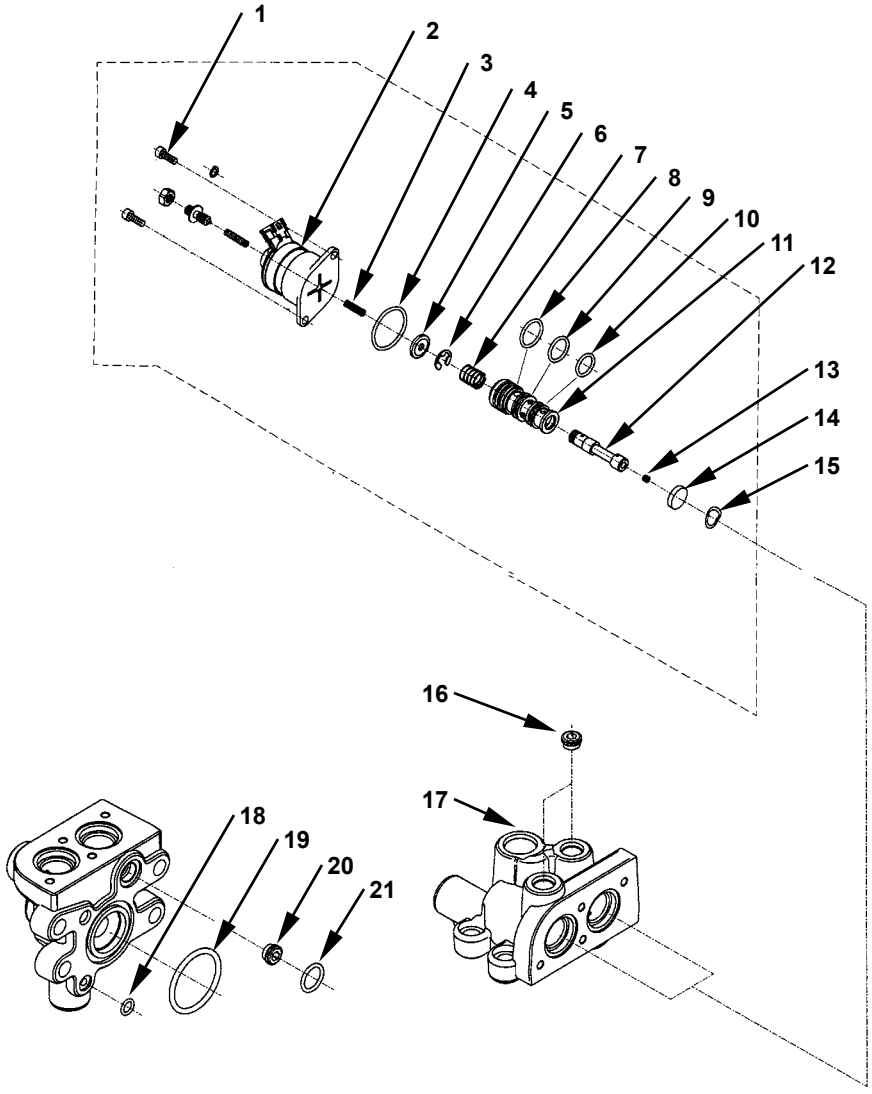
W178-02-04-013

DISASSEMBLE SOLENOID VALVE

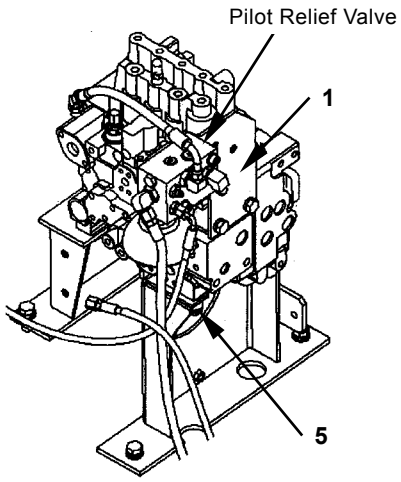


W178-02-04-050

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

CAUTION: Control valve weight: 136 kg (300 lb)

5. Remove control valve mounting bolts (5) (4 used). Install eyebolts (M14, Pitch 2.0 mm) (2 used) into bolt hole (6) on the top of control valve (1). Lift control valve (1) off.
   : 22 mm
   : 140 N·m (14.3 kgf·m, 103 lbf·ft)



W1F3-02-05-001

Installation

NOTE: Refer to "Removal" section above for wrench sizes and tightening torques.

CAUTION: Control valve weight: 130 kg (290 lb)

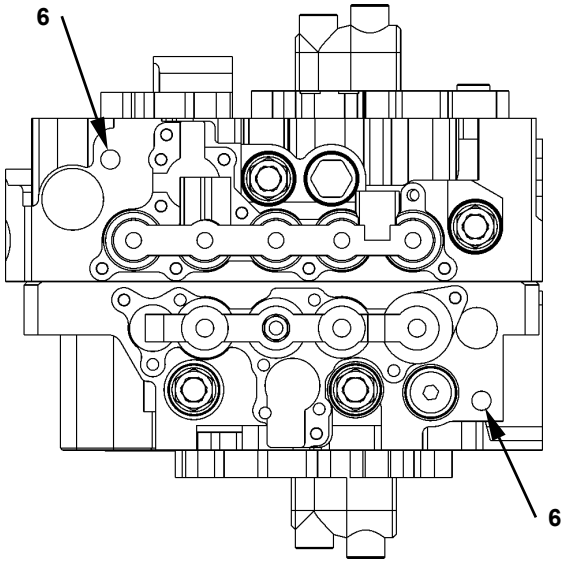
1. Lift control valve (1) and install control valve (1) with bolts (5) (4 used).

2. Connect all hoses, pipes and connectors to control valve (1).

3. Install signal control valve (2) with bracket (3) to control valve (1) with bolts (4) (3 used).

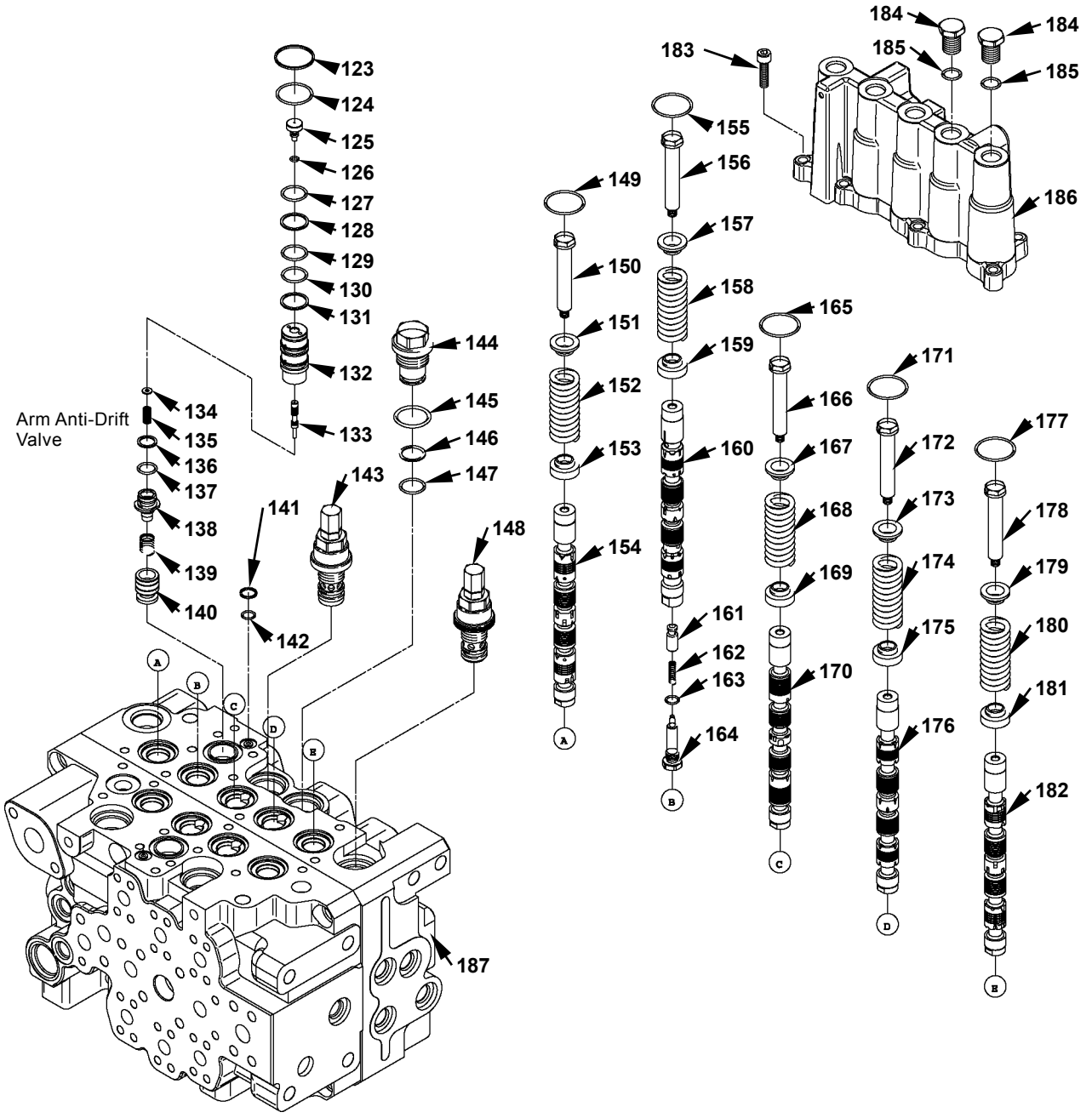
4. Connect all hoses and pipes to the 4-unit solenoid valve unit, pilot relief valve and signal control valve (2). (Refer to W2-9-1, W2-11-1 and W2-12-1)

IMPORTANT: After completing installation, check hydraulic oil level. Add oil as necessary. Run the engine. Check the component for any oil leaks.



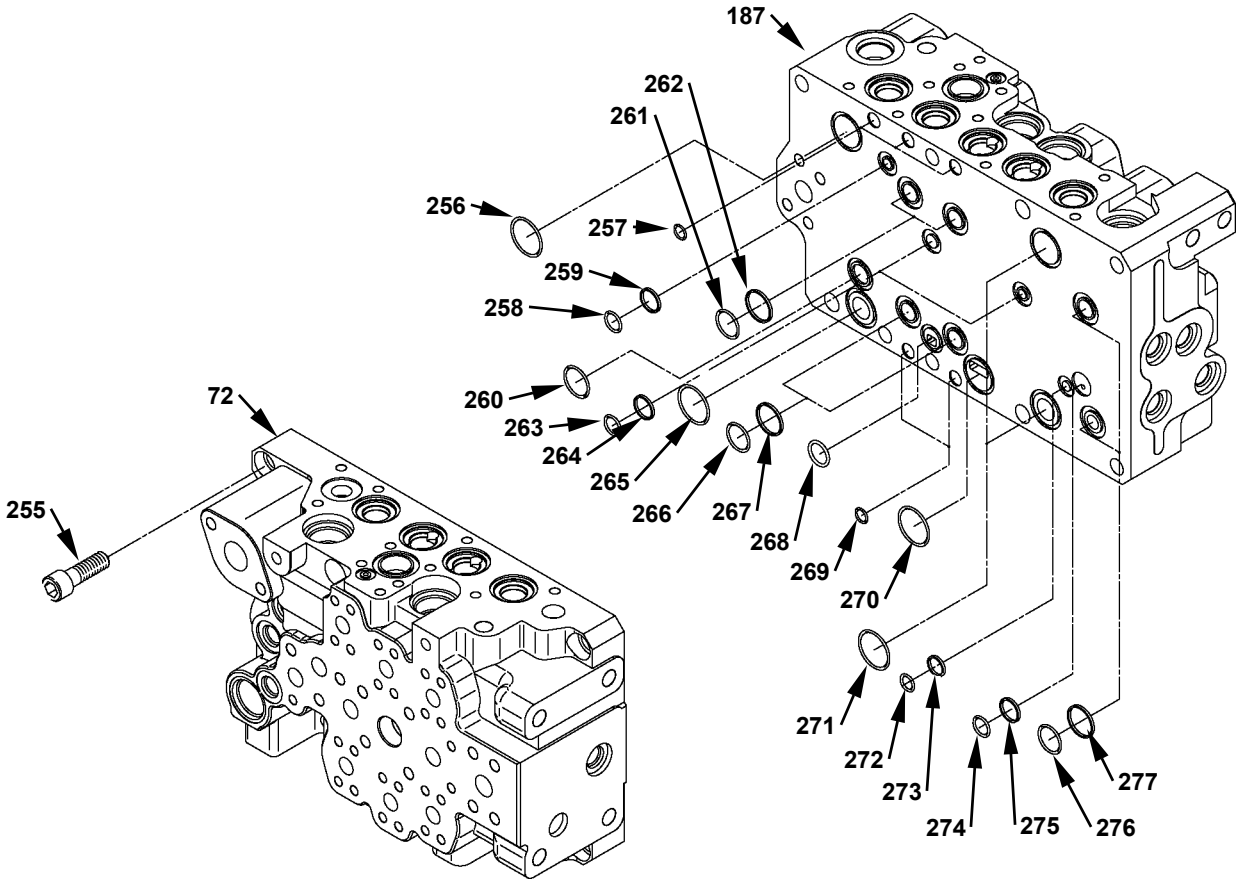
WCAB-02-05-003

DISASSEMBLE 5-SPOOL CONTROL VALVE



WCAB-02-05-005

SEPARATE AND COMBINE 4-SPOOL AND 5-SPOOL CONTROL VALVES



W176-02-05-015

72 - Housing
187 -Housing
255 -Socket Bolt (9 Used)
256 -O-Ring
257 -O-Ring
258 -O-Ring
259 -Backup Ring
260 -O-Ring
261 -O-Ring
262 -Backup Ring
263 -O-Ring
264 -Backup Ring
265 -O-Ring
266 -O-Ring
267 -Backup Ring
268 -O-Ring
269 -O-Ring
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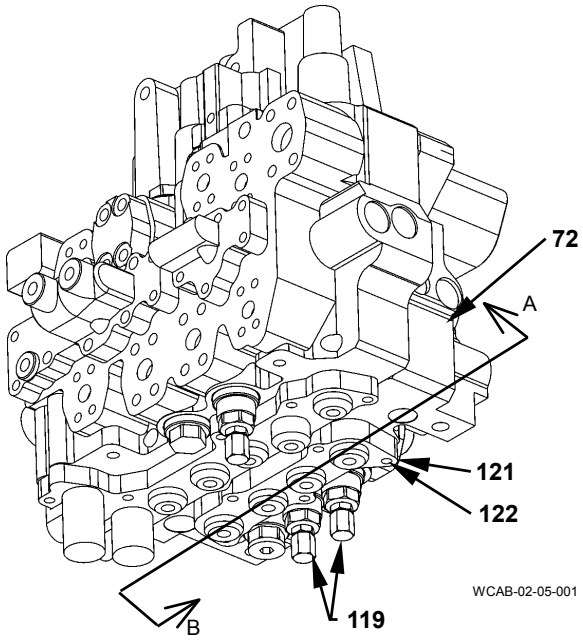
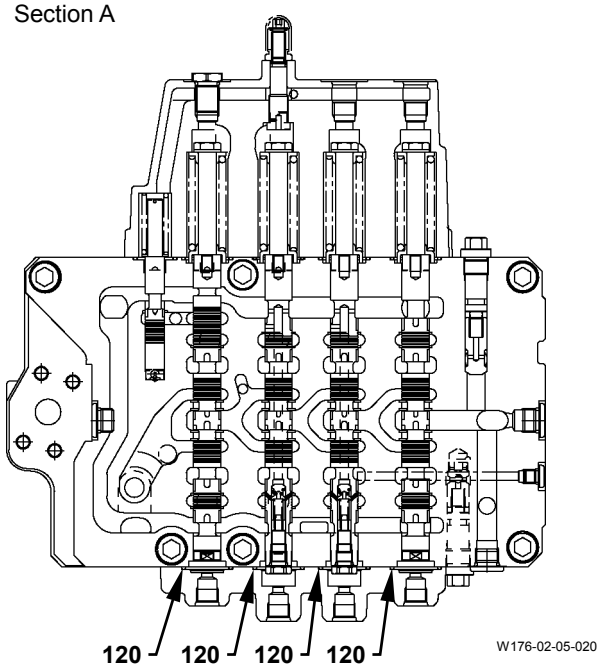
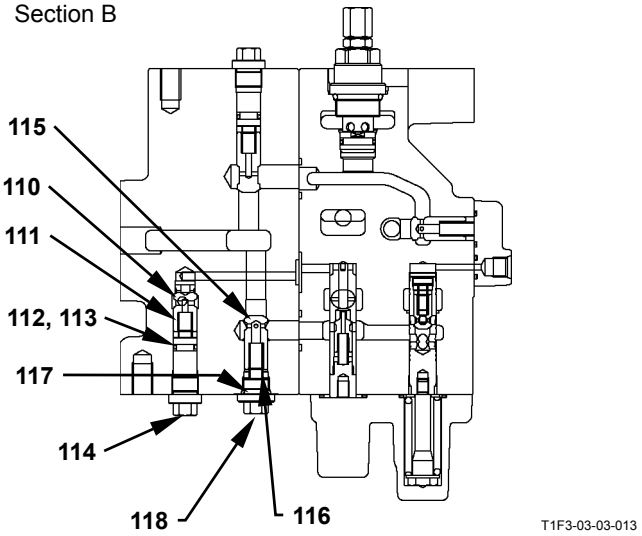
271 -O-Ring
272 -O-Ring
273 -Backup Ring
274 -O-Ring
275 -Backup Ring
276 -O-Ring
277 -Backup Ring



Section A

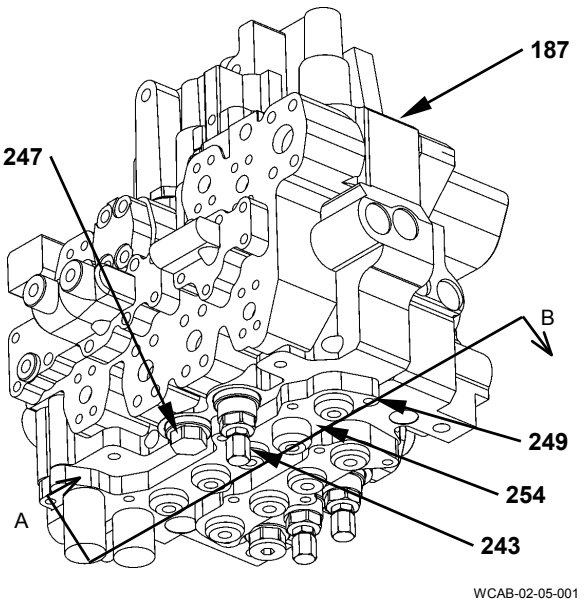


Section B



Aux. Flow Rate
Control Valve

72 - Housing
110 -Poppet
111 -Spring
112 -O-Ring
113 -Backup Ring
114 -Plug
115 -Poppet
116 -Spring
117 -O-Ring
118 -Plug
119 -Overload Relief Valve
120 -O-Ring
121 -Pilot Housing
122 -Socket Bolt (5 used)



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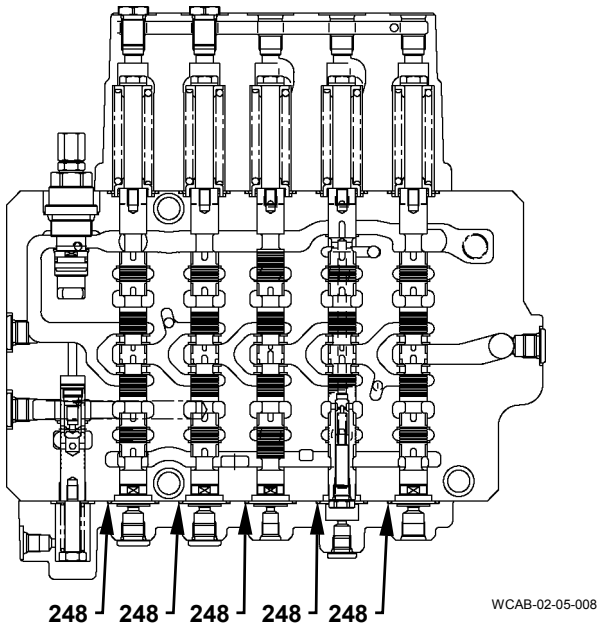
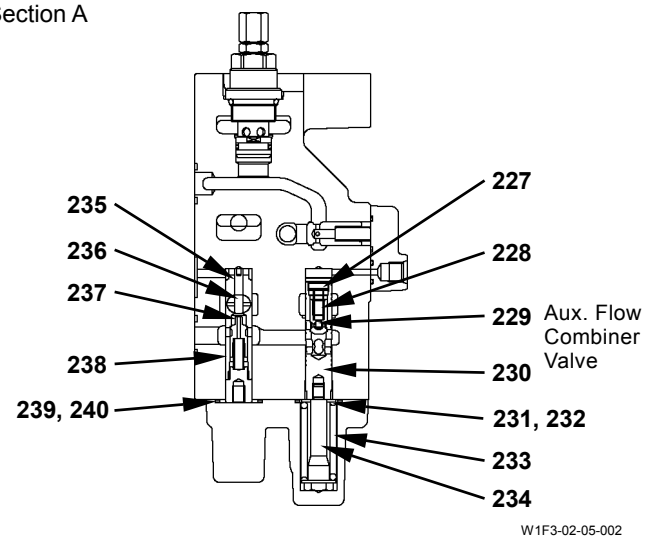


Section A



187 - Housing
227 - Plug
228 - Spring
229 - Poppet
230 - Spool
231 - O-Ring
232 - Washer
233 - Spring
234 - Bolt
235 - Plug
236 - Spring
237 - Poppet
238 - Spool
239 - O-Ring
240 - Washer
243 - Overload Relief Valve
244 - *O-Ring
245 - *Backup Ring
246 - *O-Ring
247 - *Plug
248 - O-Ring
249 - Socket Bolt (9 Used)
250 - *O-Ring (2 Used)
251 - *Plug (2 Used)
252 - *O-Ring
253 - *Plug
254 - Pilot Housing

*NOTE: As for mark *, refer to W2-5-20.*

Installation

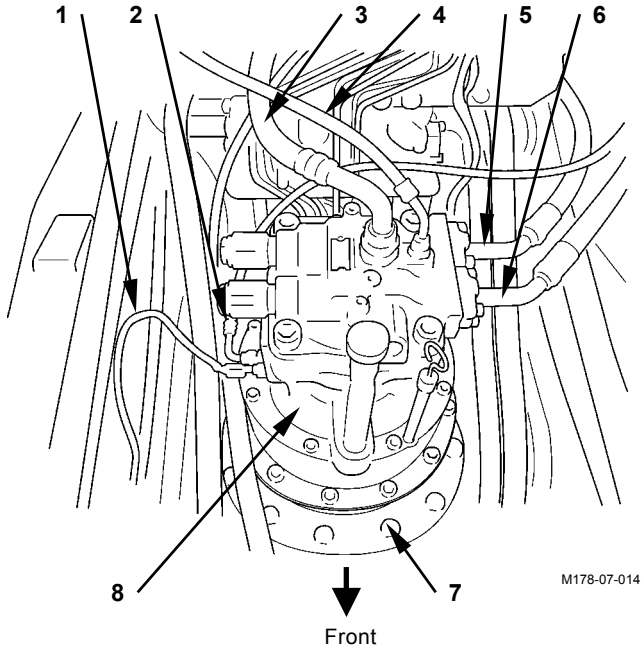
CAUTION: Swing device weight: 220 kg (485 lb)

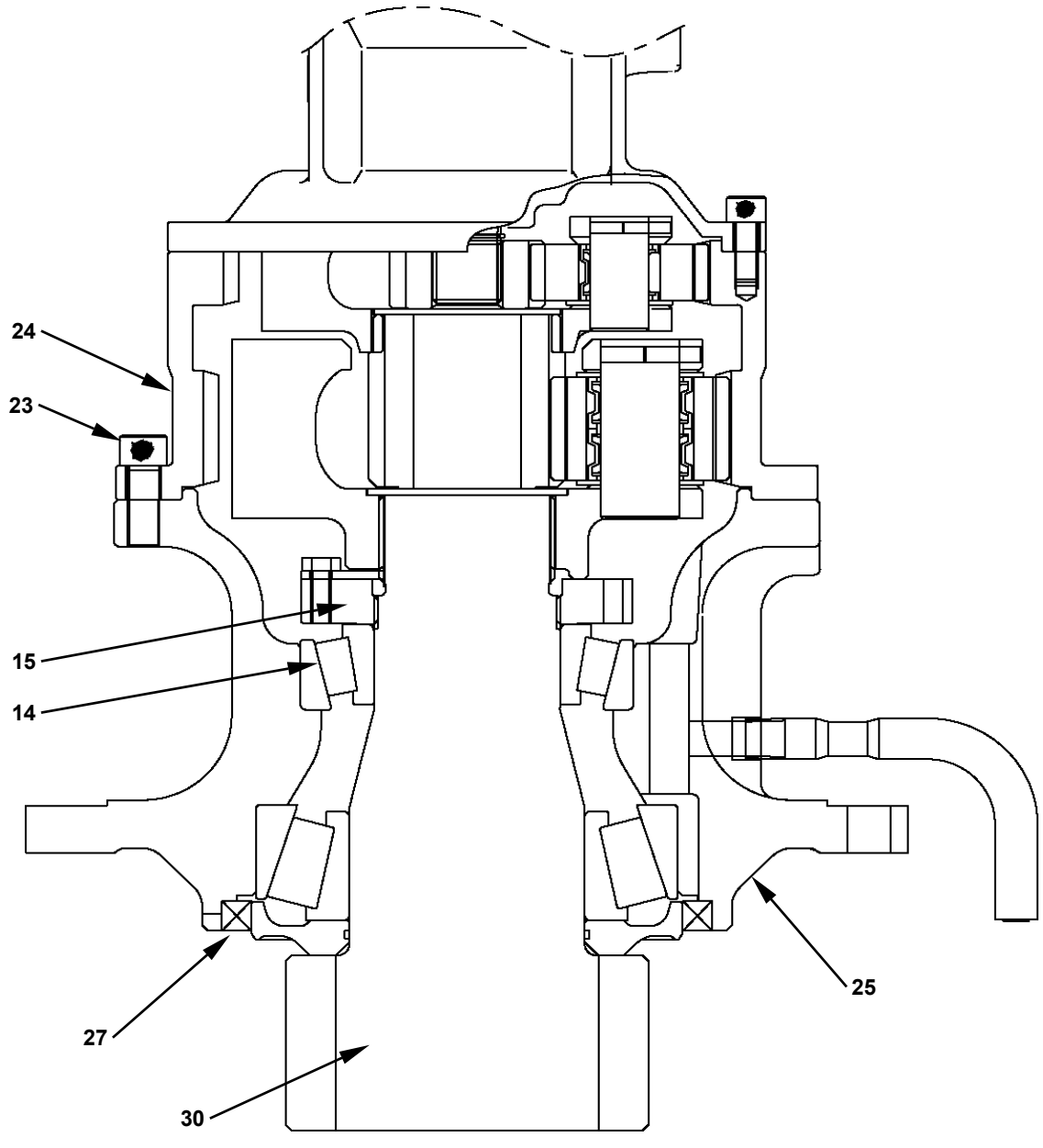
1. Install the swing device with bolts (7) (12 used).
   : 30 mm
   : 500 N·m (50 kgf·m, 360 lbf·ft)

IMPORTANT: Apply liquid packing to both mounting surfaces on the swing device and frame.

2. Connect hoses (2 to 6) and the harness (1) connector.
   : 36 mm
   : 175 N·m (18 kgf·m, 130 lbf·ft)
   : 17 mm
   : 25 N·m (2.5 kgf·m, 18 lbf·ft)
   : 19 mm
   : 29.5 N·m (3.0 kgf·m, 21.5 lbf·ft)
   : 8 mm
   : 50 N·m (5.1 kgf·m, 37 lbf·ft)

IMPORTANT: Be sure to fill the swing motor with hydraulic oil after installing it. After completing installation, check hydraulic oil level. Add oil as necessary. Run the engine and check the component for any oil leaks.





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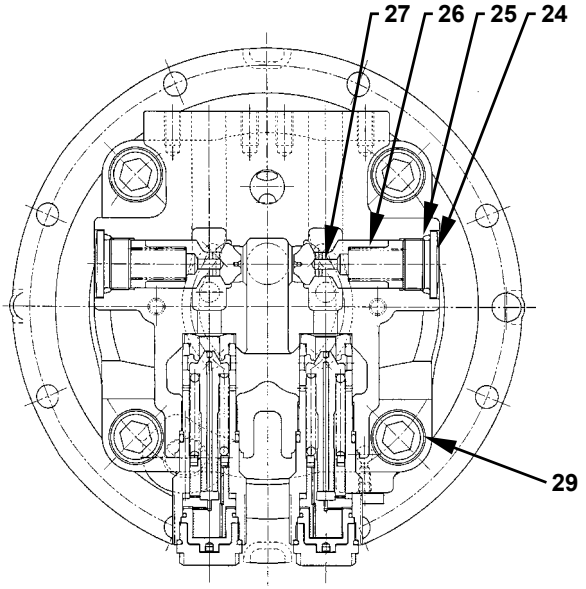
ASSEMBLE SWING MOTOR



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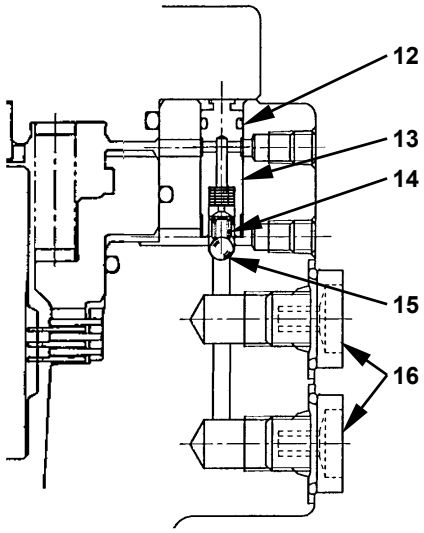

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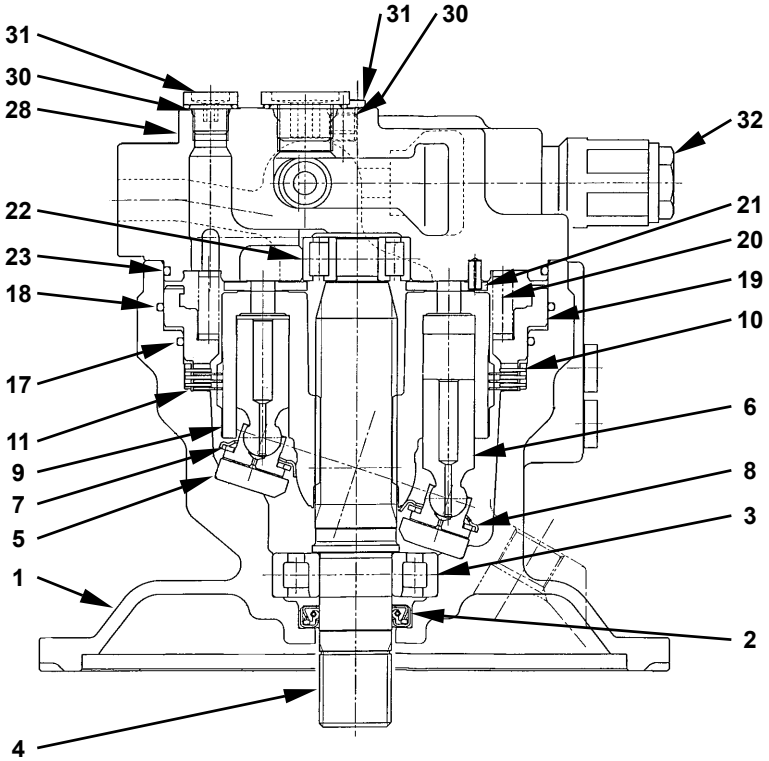


T178-03-02-002

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

CAUTION: Be sure to bleed air from hydraulic oil tank before starting the work. (Refer to "Bleeding Air from Hydraulic Oil Tank" on page W1-4-1.)

Removal of Blade/Stabilizer Pilot Valve

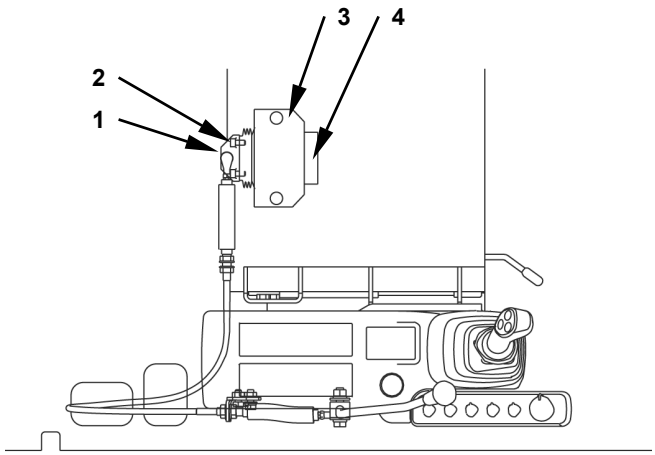
1. Remove the under cover.
   : 17 mm

2. Remove socket bolts (2) (2 used) and remove the bracket (1) assembly from pilot valve (4).
   : 6 mm

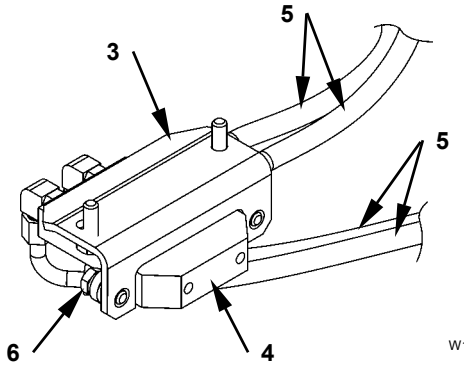
IMPORTANT: Attach identification tags to disconnected hoses for re-assembly.

3. Disconnect hoses (5) (4 used) from pilot valve (4). Cap all open ends.
   : 19 mm, 22 mm

4. Remove bolts (6) (2 used) and remove pilot valve (4) from bracket (3).
   : 17 mm



W1F3-02-07-006



W1F3-02-07-005

Installation of Blade/Stabilizer Pilot Valve

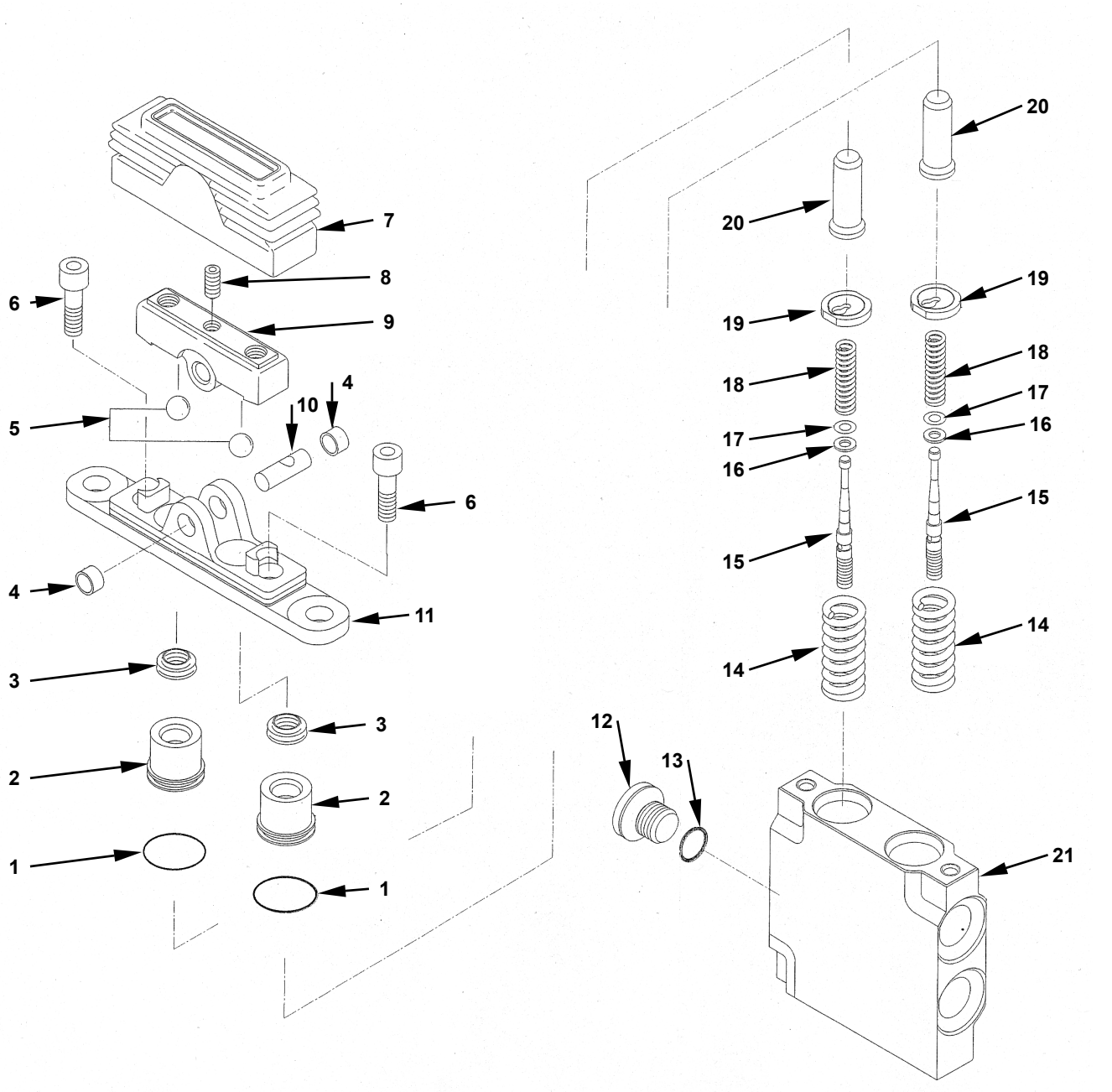
1. Install pilot valve (4) on bracket (3) with bolts (6) (2 used).
   : 17 mm
   : 50 N·m (5.1 kgf·m, 37 lbf·ft)

2. Connect hoses (5) (4 used) to pilot valve (4).
   : 19 mm
   : 29.5 N·m (3.0 kgf·m, 21.5 lbf·ft)
   : 22 mm
   : 39 N·m (4.0 kgf·m, 28.5 lbf·ft)

3. Install the bracket (1) assembly to pilot valve (4) with socket bolts (2) (2 used).
   : 6 mm
   : 20 N·m (2.0 kgf·m, 15 lbf·ft)

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

DISASSEMBLE TRAVEL, POSITIONING / AUXILIARY, BLADE / STABILIZER PILOT VALVE

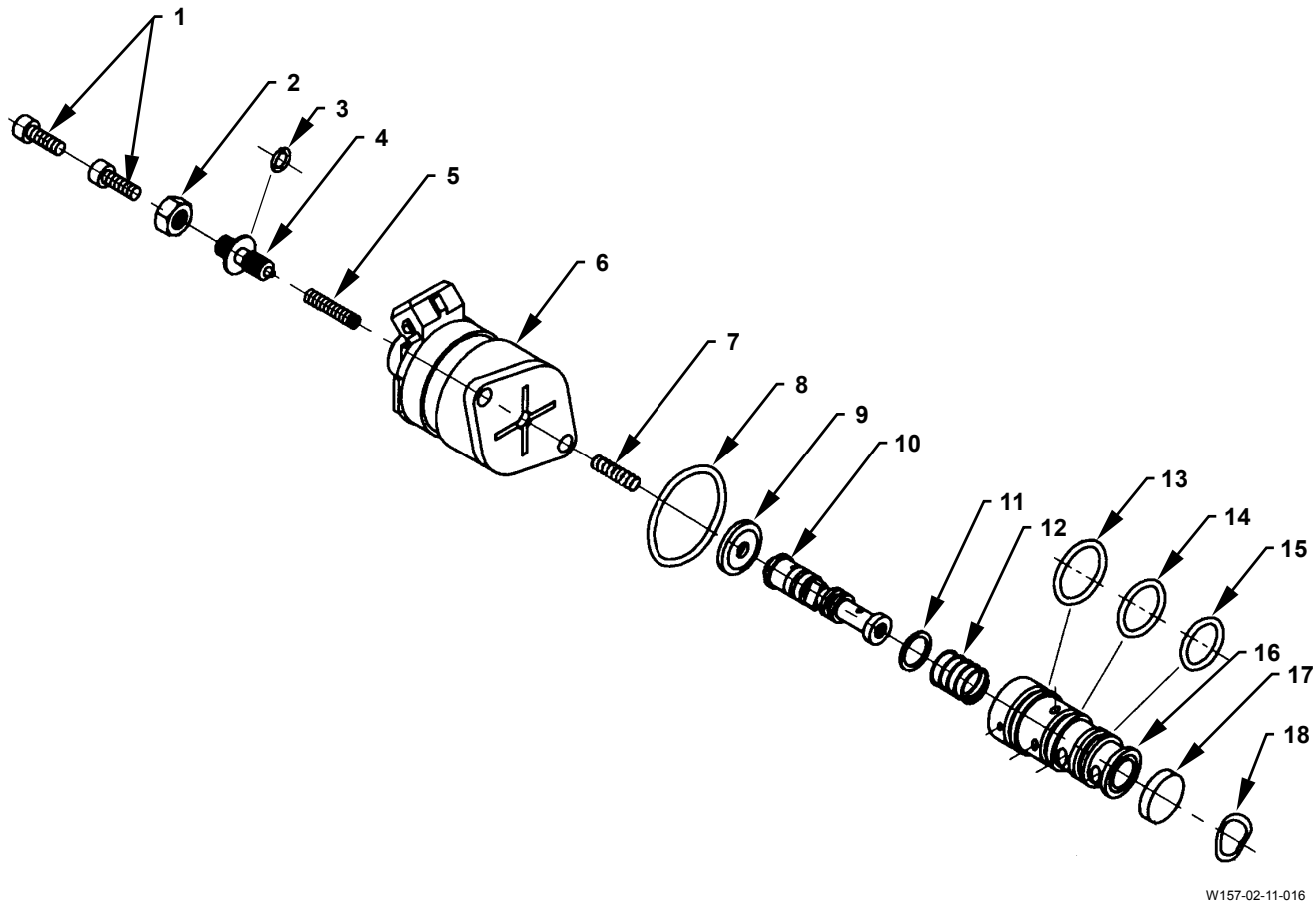


W1LA-02-06-001

1 - O-Ring (2 Used)
2 - Bushing (2 Used)
3 - Packing (2 Used)
4 - Bushing (2 Used)
5 - Steel Ball (2 Used)
6 - Socket Bolt (2 Used)
7 - Boot
8 - Set Screw
9 - Cam
10 - Pin
11 - Cover
13 - Plug
14 - O-Ring
15 - Spring (2 Used)
16 - Spool (2 Used)
17 - Washer (2 Used)
19 - Shim (2 Used)
20 - Spring (2 Used)
21 - Spring Guide (2 Used)
22 - Pusher (2 Used)
23 - Casing

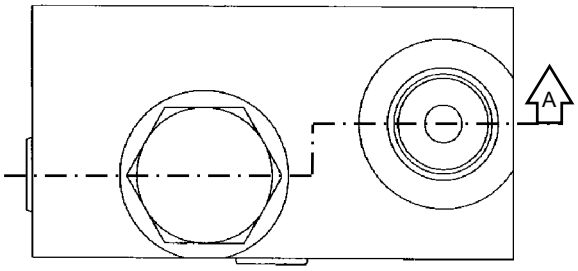
(Blank)

DISASSEMBLE PROPORTIONAL SOLENOID VALVE



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

CONSTRUCTION OF PILOT RELIEF VALVE



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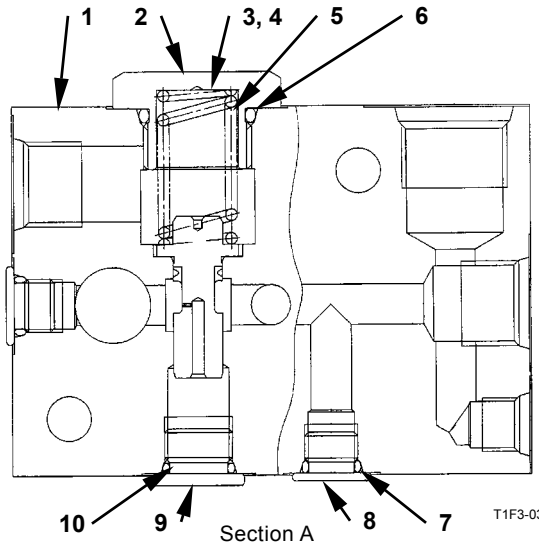
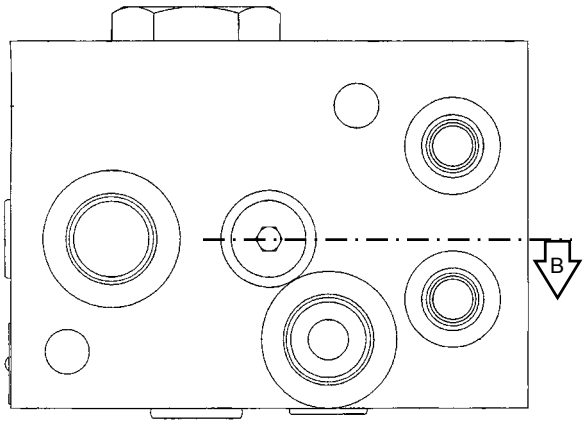


T1F3-03-08-002



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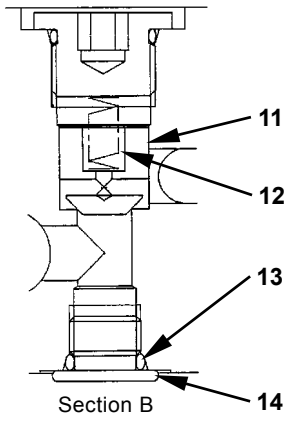
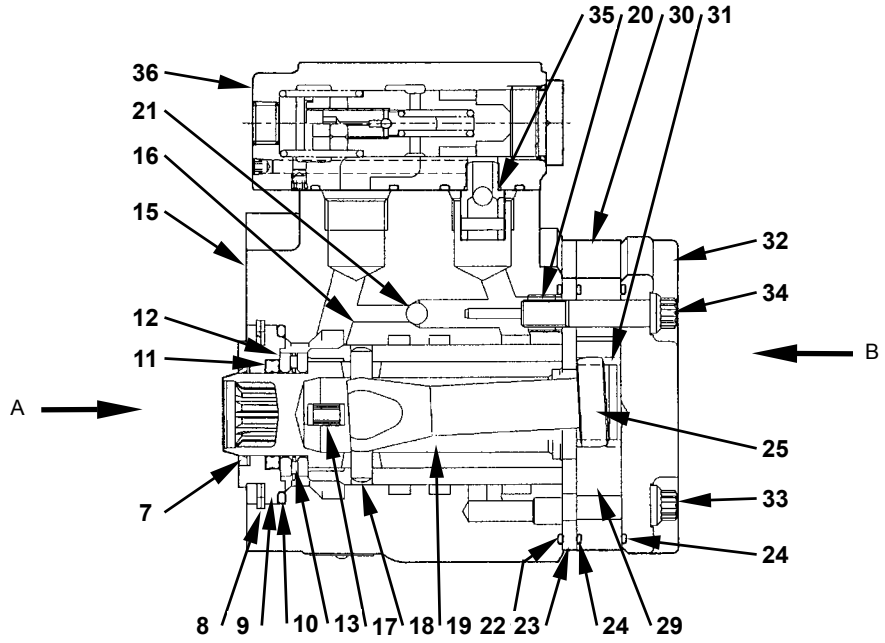


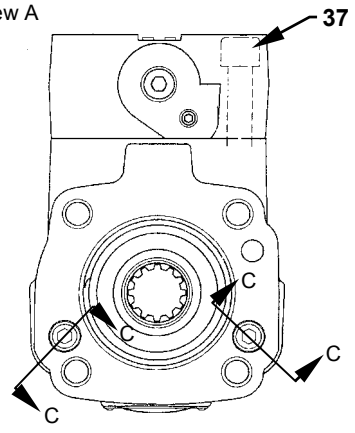
T1F3-03-08-003

Item No.	Part Name	Q'ty	Wrench Size (mm)	Tightening Torque			Remark
				N·m	(kgf·m)	(lbf·ft)	
1	Body	1					
2	Plug	1		59±5.9	(6.0±0.6)	(44±4.4)	
3	Shim	1					0.5 mm
4	Shim	1					0.2 mm
5	Spring	1					
6	O-Ring	1					1B P24
7	O-Ring	3					1B P11
8	Plug	3		26.5±3.0	(2.7±0.3)	(19.5±2.2)	
9	Plug	1		39±4.0	(4.0±0.4)	(28.5±3.0)	
10	O-Ring	1					1B P14
11	Check Valve	1					
12	Spring	1					
13	O-Ring	1					1B
14	Plug	1		49±4.9	(5.0±0.5)	(36±3.6)	



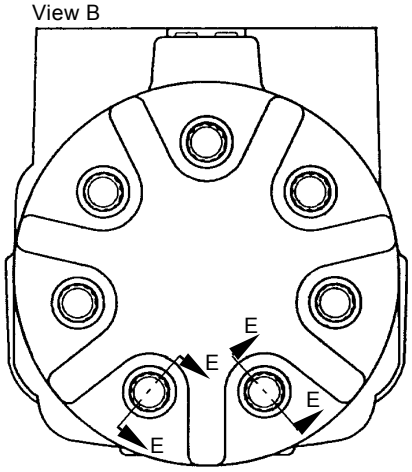
TCCB-03-07-003

View A



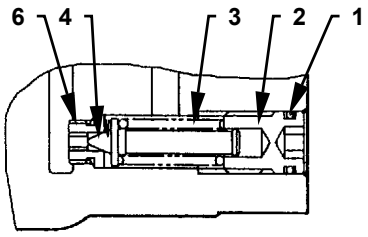
WCCB-02-13-002

View B



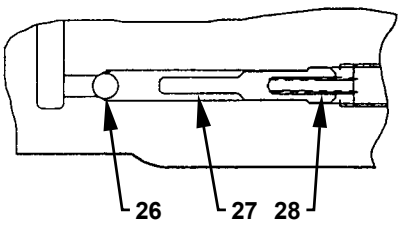
T487-03-02-005

View C-C



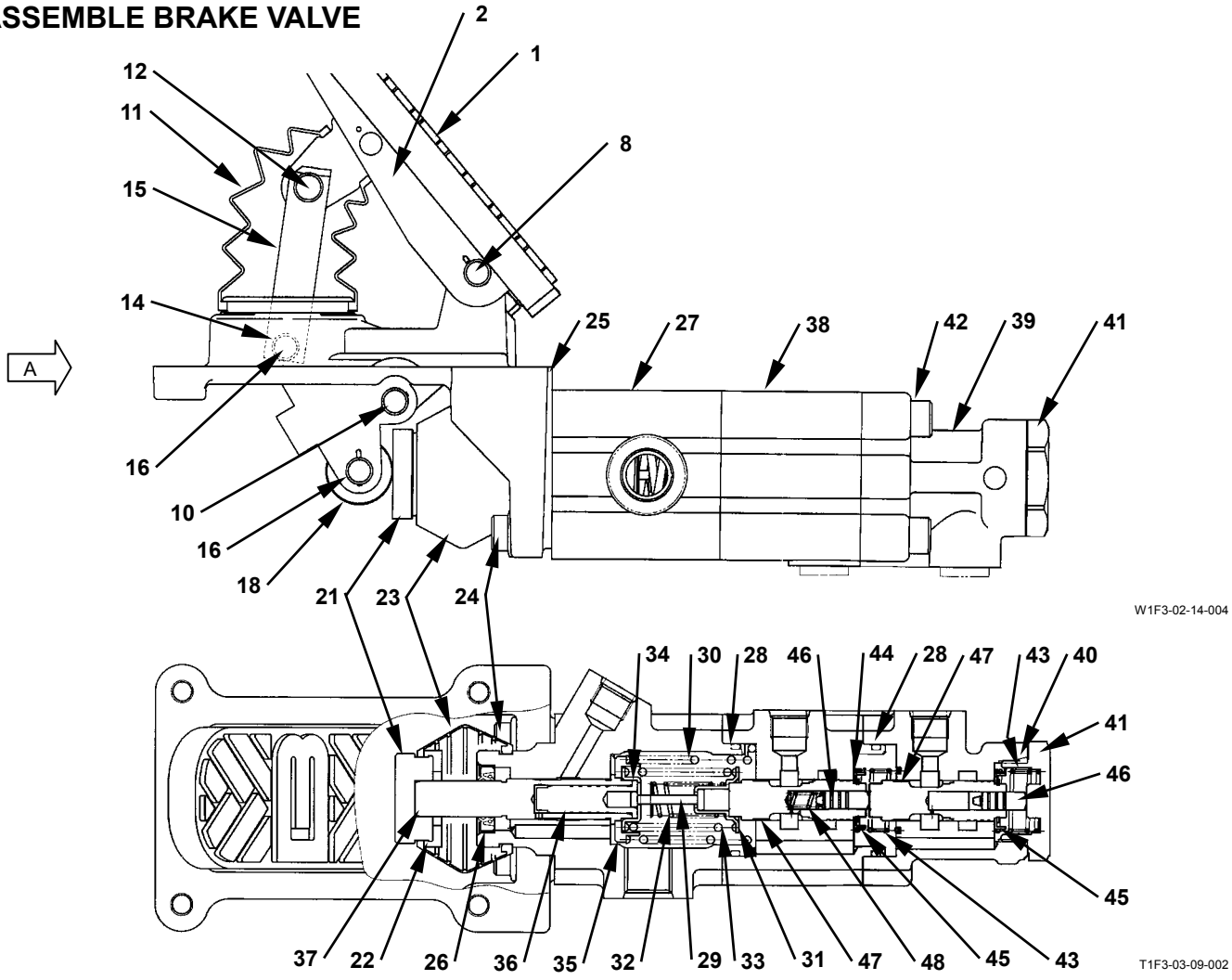
TCCB-03-07-004

Section E-E



T487-03-02-006

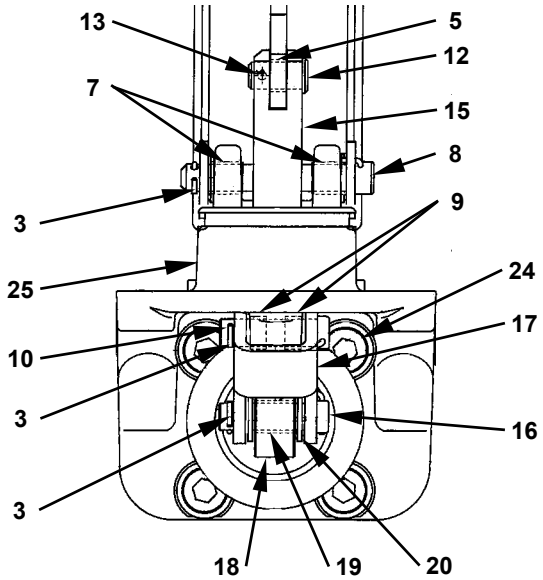
ASSEMBLE BRAKE VALVE



W1F3-02-14-004

T1F3-03-09-002

View A



W1F3-02-14-005

(Blank)

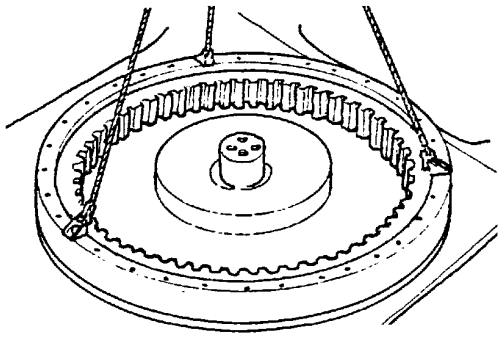
Installation
Clean the matching surfaces of the chassis and swing bearing.

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

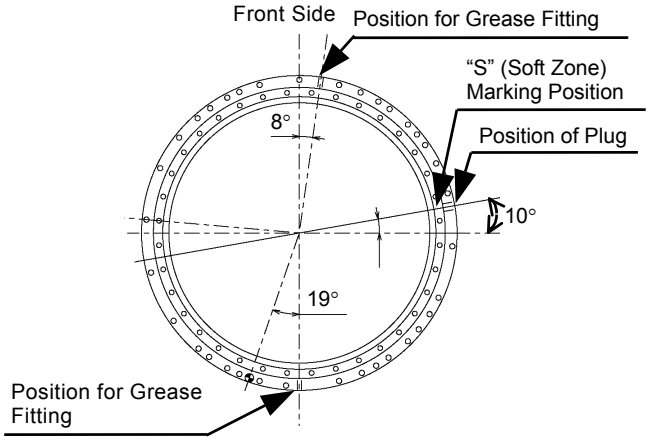
CAUTION: Swing bearing weight: 220 kg (490 lb)

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

2. Lift the swing bearing. Align the mating marks both on the chassis and swing bearing.

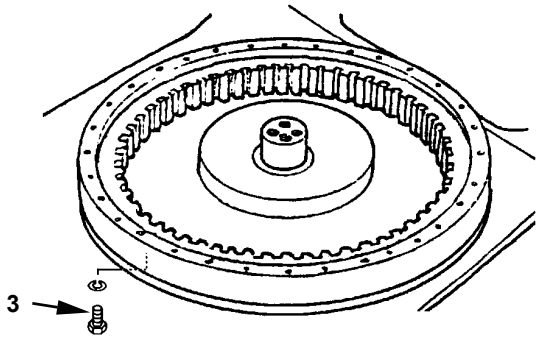


W110-03-01-004



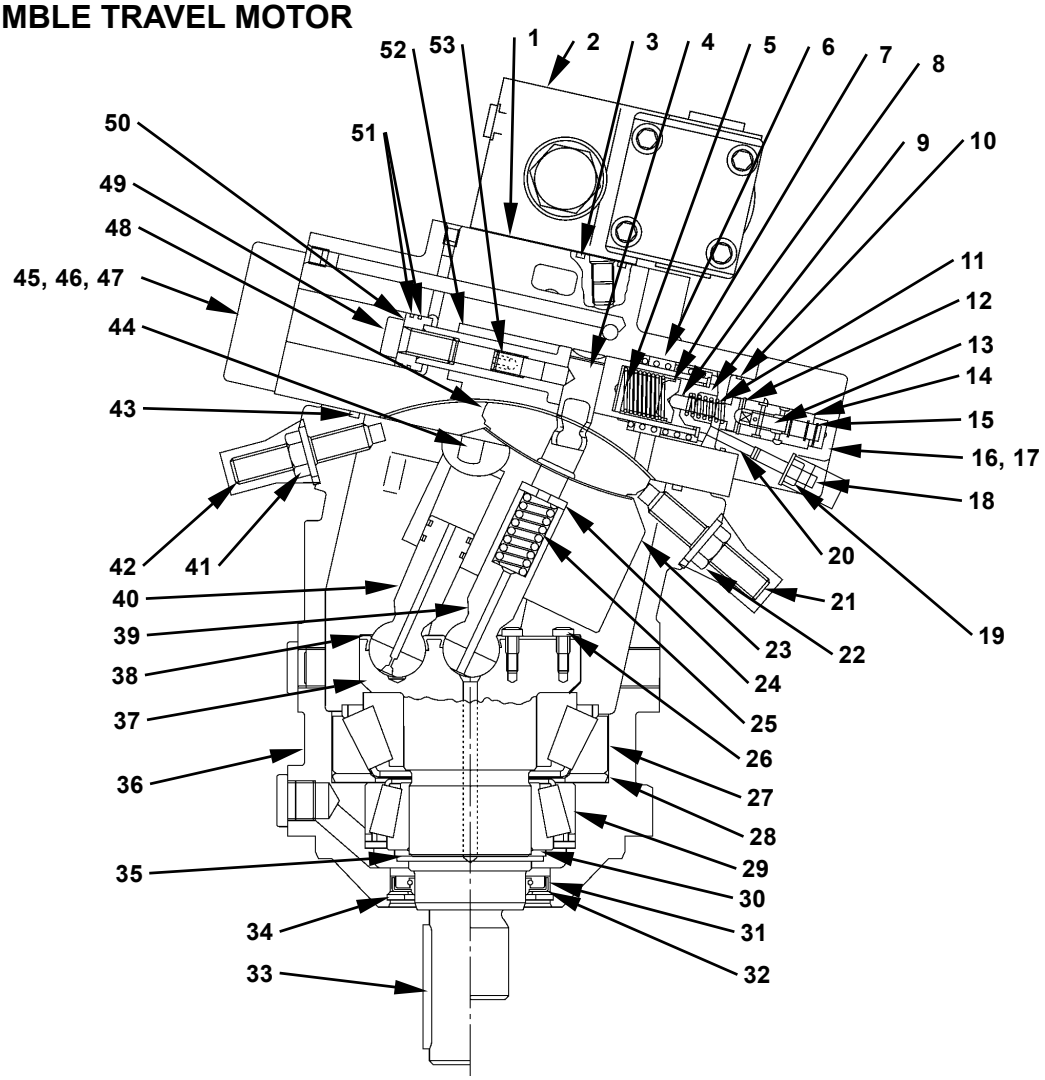
W178-03-01-001

3. Install bolts (3) (36 used) to the inner race of the swing bearing and tighten to specification.
   : 30 mm
   : 490 N·m (50 kgf·m, 360 lbf·ft)

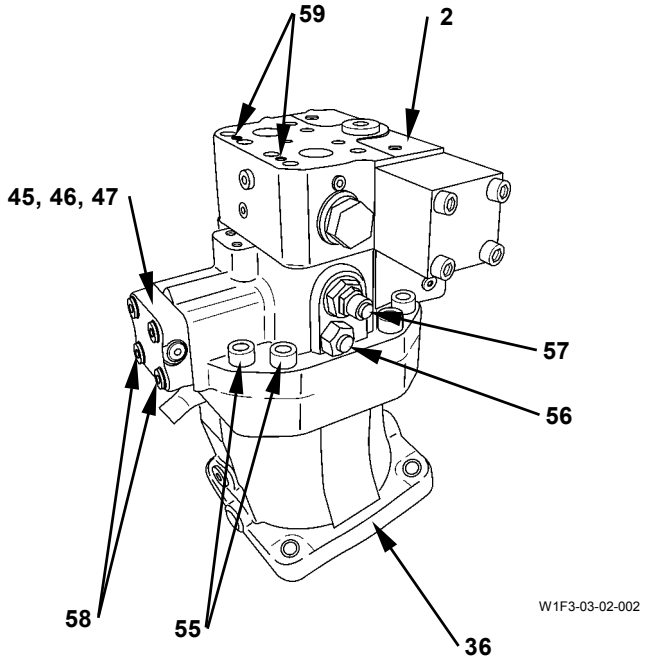


W158-03-01-001

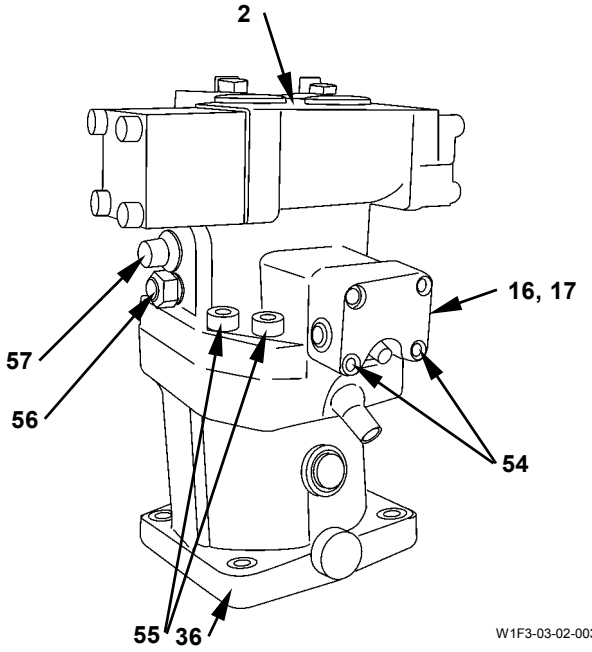
DISASSEMBLE TRAVEL MOTOR



W1GL-03-02-007



W1F3-03-02-002



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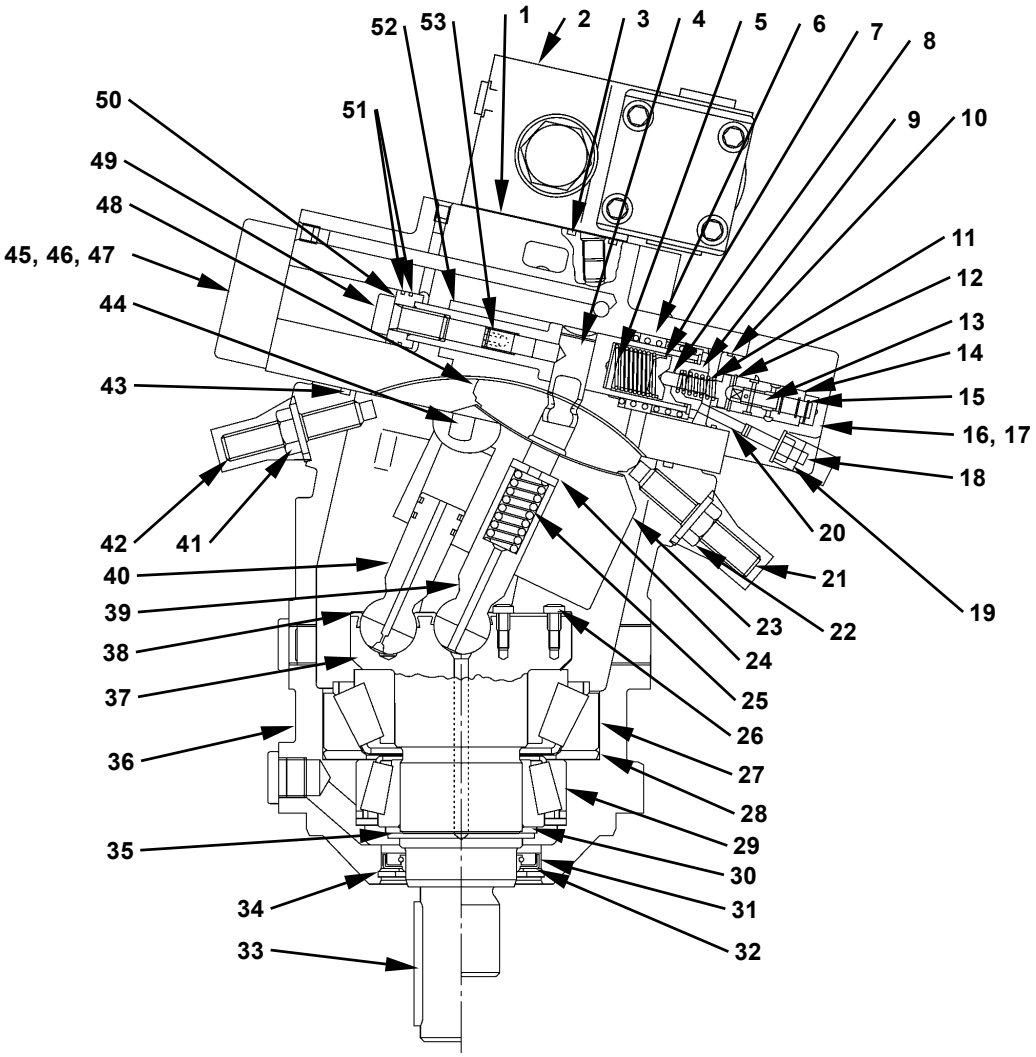

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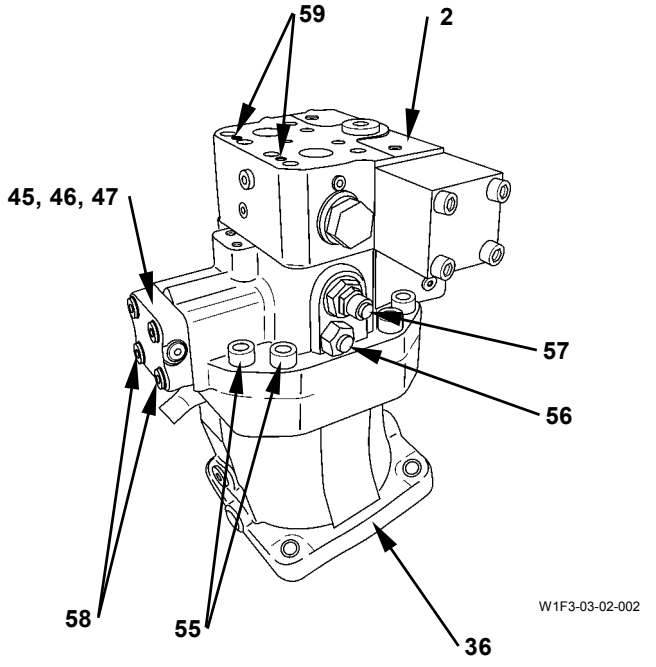

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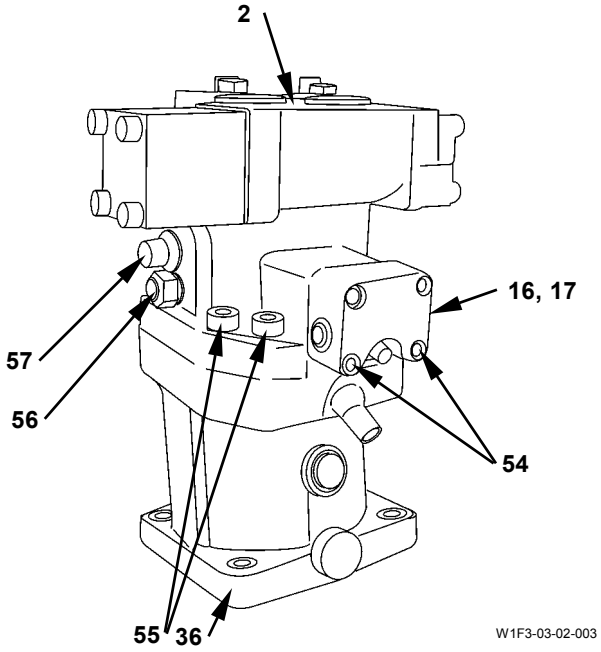


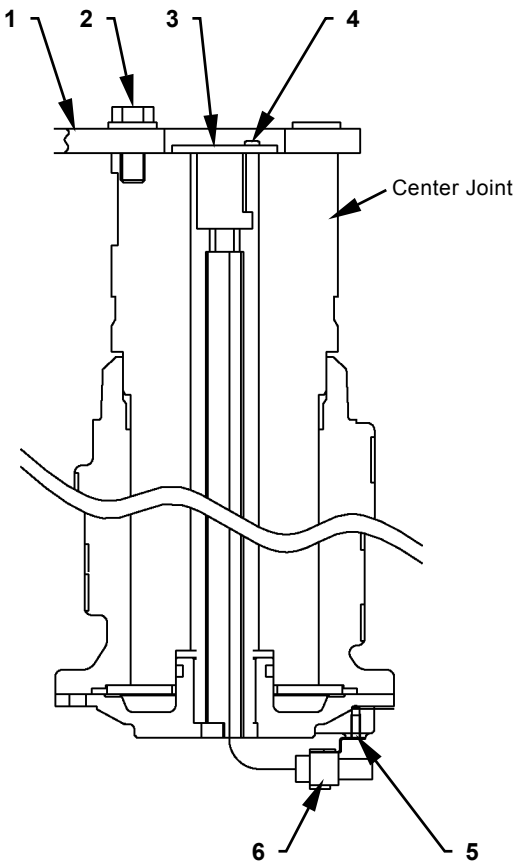
W1F3-03-02-003

7. Install eyebolts (M16, Pitch 2.0 mm) (2 used) into the bolt (2) holes.

CAUTION: Center joint assembly weight: 93 kg (210 lb).

IMPORTANT: The propeller shaft and transmission are under the center joint. When lifting the center joint while disassembling, be careful not to damage the propeller shaft and transmission.

8. Remove bolts (7) (4 used), and then lift the center joint assembly.
   : 22 mm



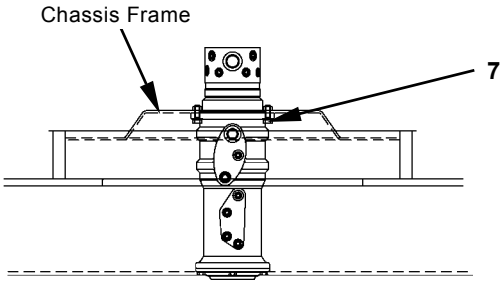
T1F3-03-10-014

Installation

CAUTION: Center joint assembly weight: 93 kg (210 lb).

IMPORTANT: The propeller shaft and transmission are under the installation position of center joint. When lifting the center joint, take care not to damage the propeller shaft and transmission.

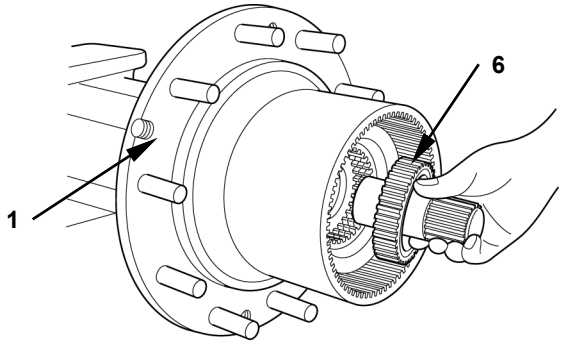
1. Apply LOCTITE to bolts (7) (4 used). Lift the center joint, then install the center joint on the chassis frame with bolts (7) (4 used).
   : 22 mm
   : 180 N·m (18.5 kgf·m, 130 lbf·ft)



W1F3-03-03-002

2. Connect hoses (37 used) to the center joint.
   : 17 mm
   : 24.5 N·m (2.5 kgf·m, 18 lbf·ft)
   : 19 mm
   : 29.5 N·m (3.0 kgf·m, 22 lbf·ft)
   : 22 mm
   : 39 N·m (4.0 kgf·m, 29 lbf·ft)
   : 27 mm
   : 78 N·m (8.0 kgf·m, 58 lbf·ft)
   : 36 mm
   : 175 N·m (18 kgf·m, 129 lbf·ft)

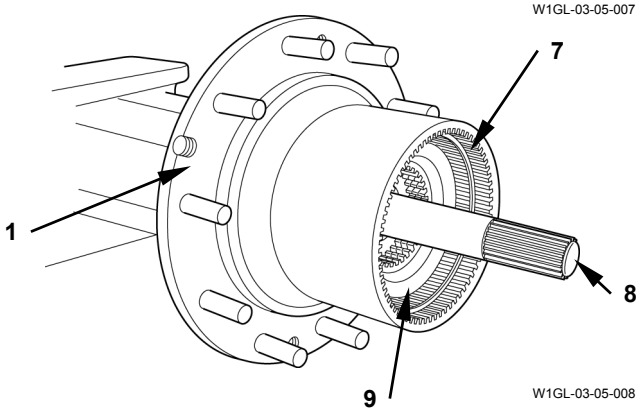
5. Remove the gear (6) assembly from axle housing (1).



W1GL-03-05-007

6. Pull axle shaft (8) from axle housing (1).

7. Remove retaining ring (7) from axle housing (1) to remove plate (9).



W1GL-03-05-008

8. Remove plugs (16, 17) to drain oil.
   : 12 mm

9. Remove propeller shaft (18).
   : 14 mm

10. Disconnect hoses (10) (2 used), (11) (2 used) and hose (22) from travel motor (19).
    : 19 mm, 22 mm, 27 mm
    : 12 mm

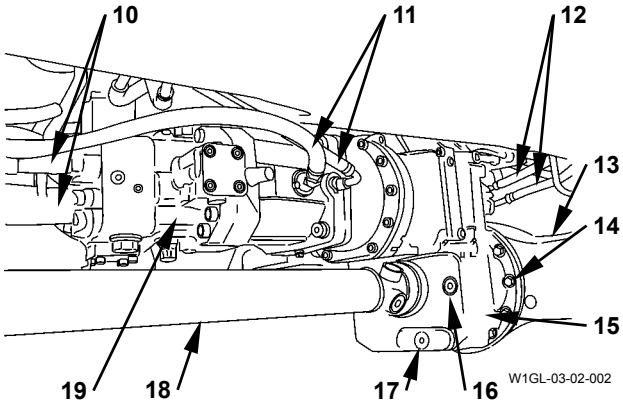
IMPORTANT: Attach identification tags to hoses to aid re-assembly.

11. Disconnect hoses (12) (2 used) and cap the hose ends.
    : 22 mm

12. Remove nut (24) and bolt (23) to remove cover (25).

13. Disconnect connectors (20, 26) from transmission (15).
    : 13 mm

14. Disconnect hose (21) from transmission (15) and cap the hose end.
    : 22 mm



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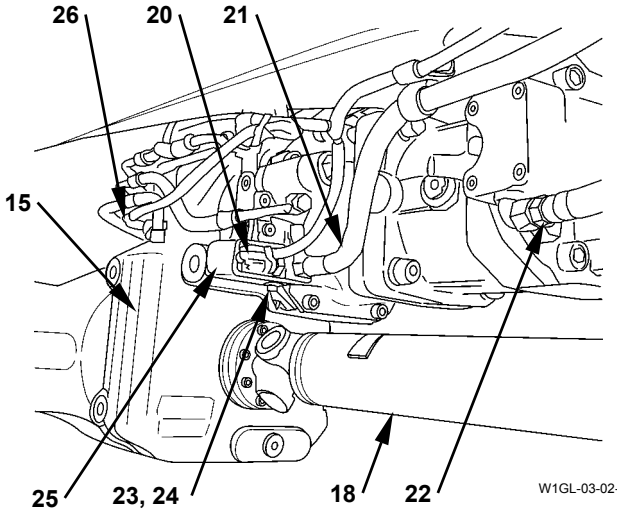

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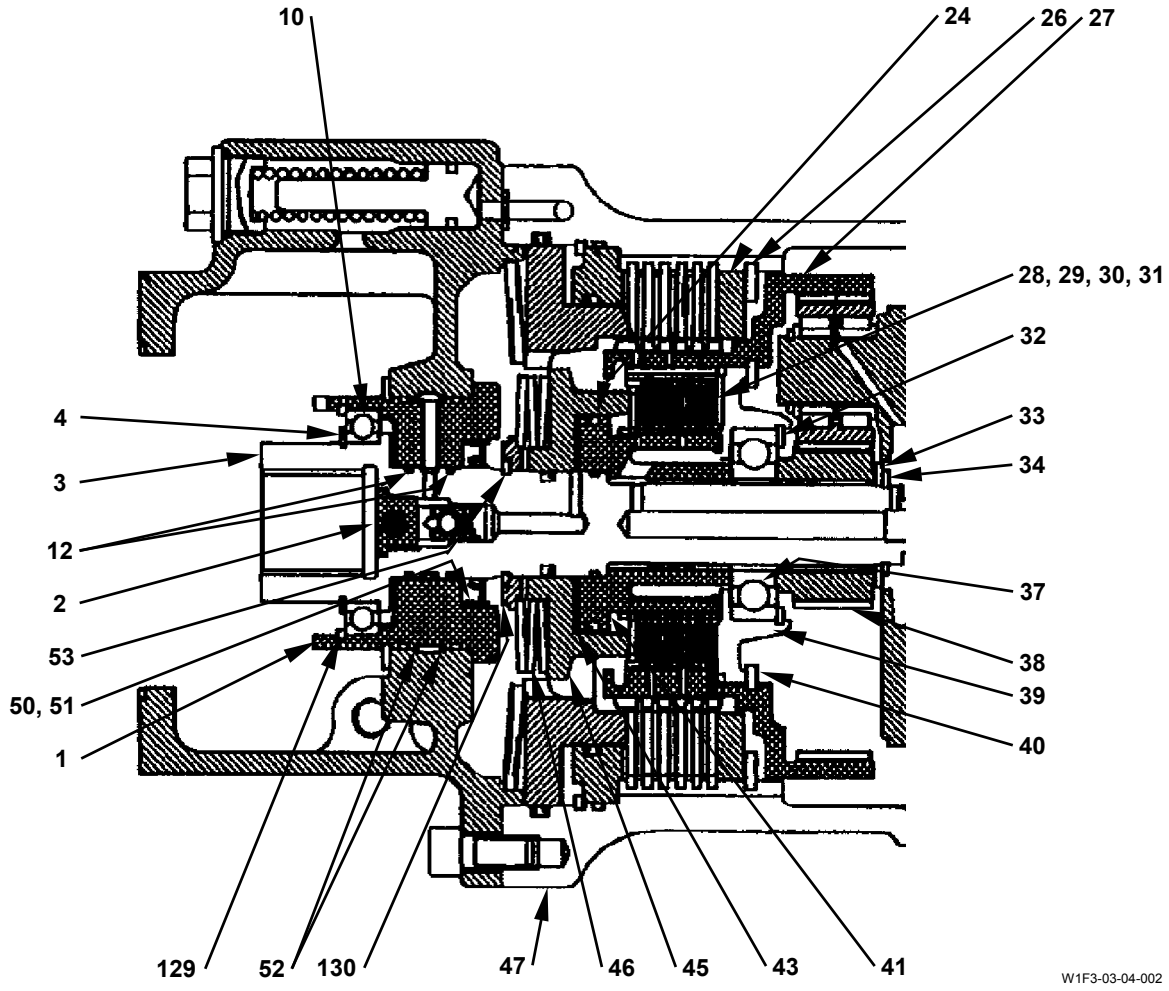
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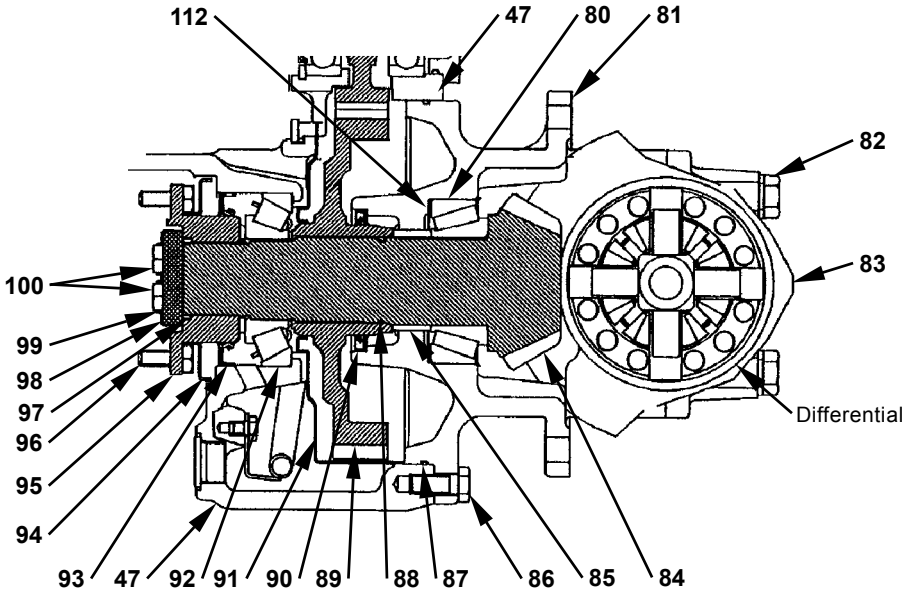

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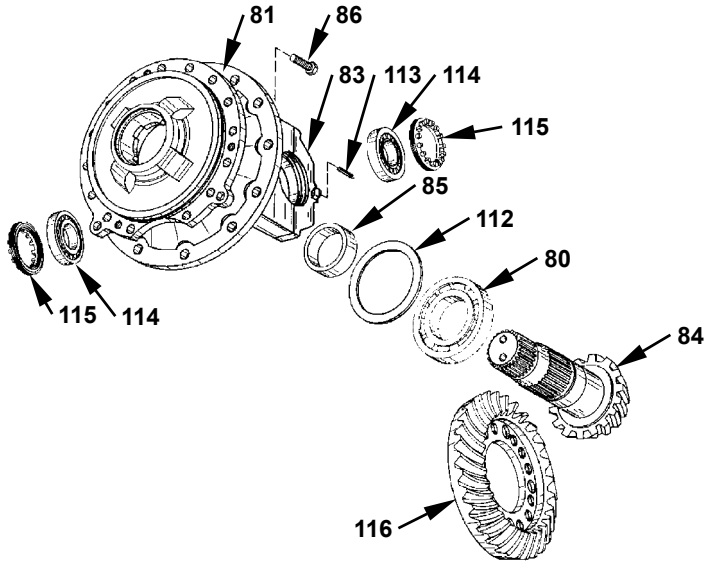

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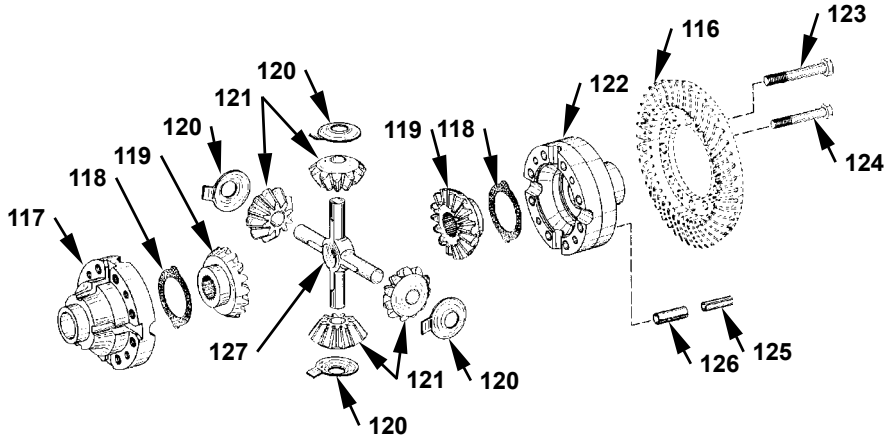

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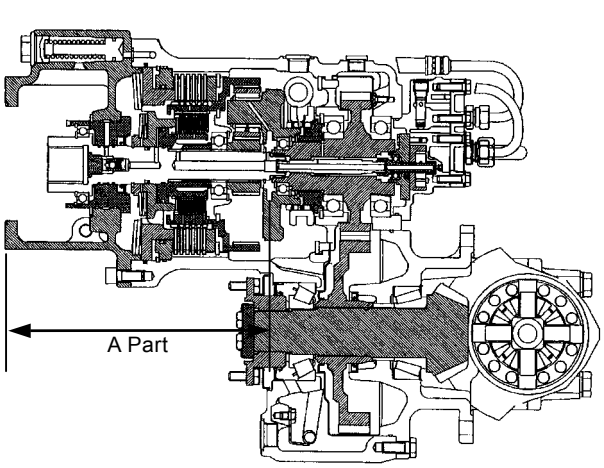

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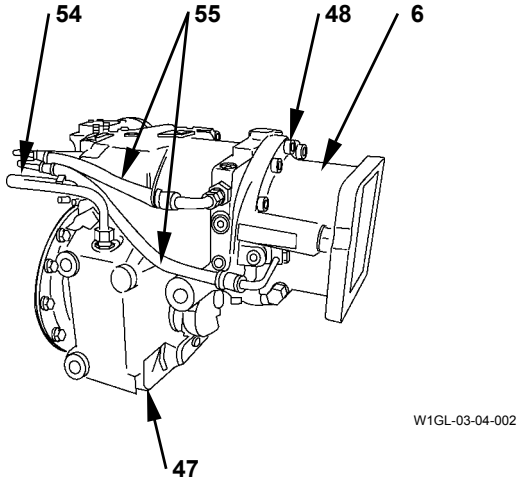

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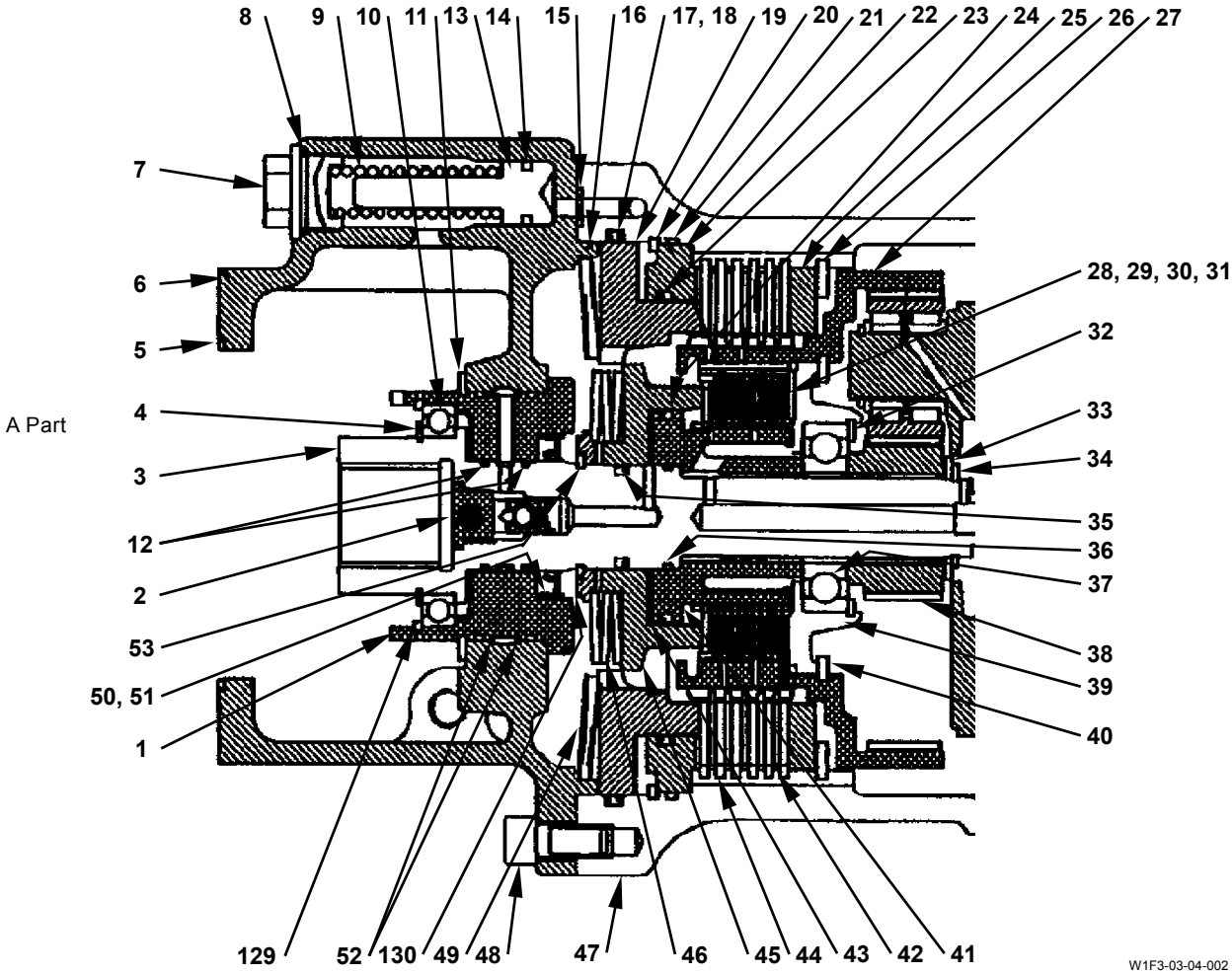
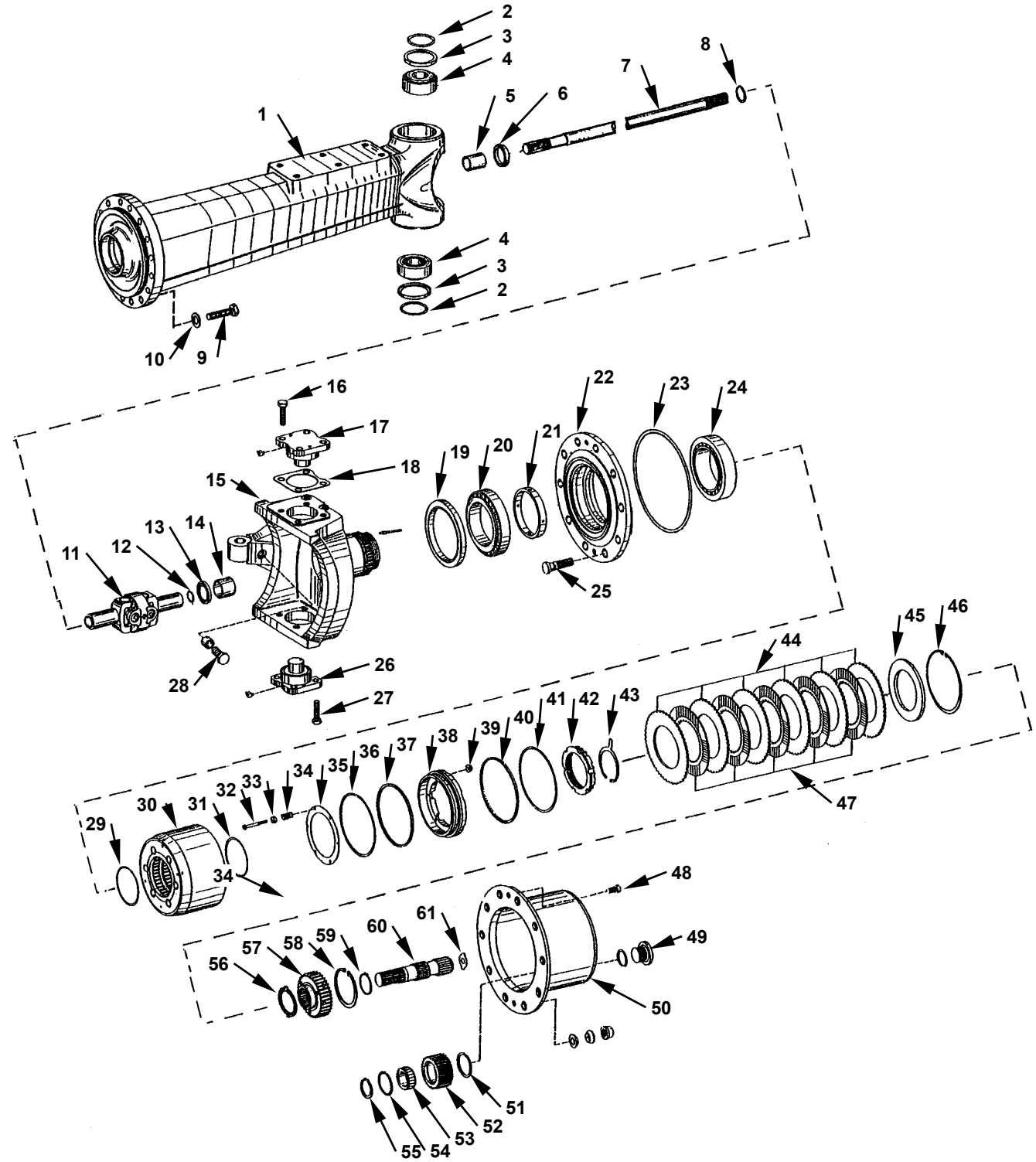


W1F3-03-04-002

DISASSEMBLE FRONT AXLE



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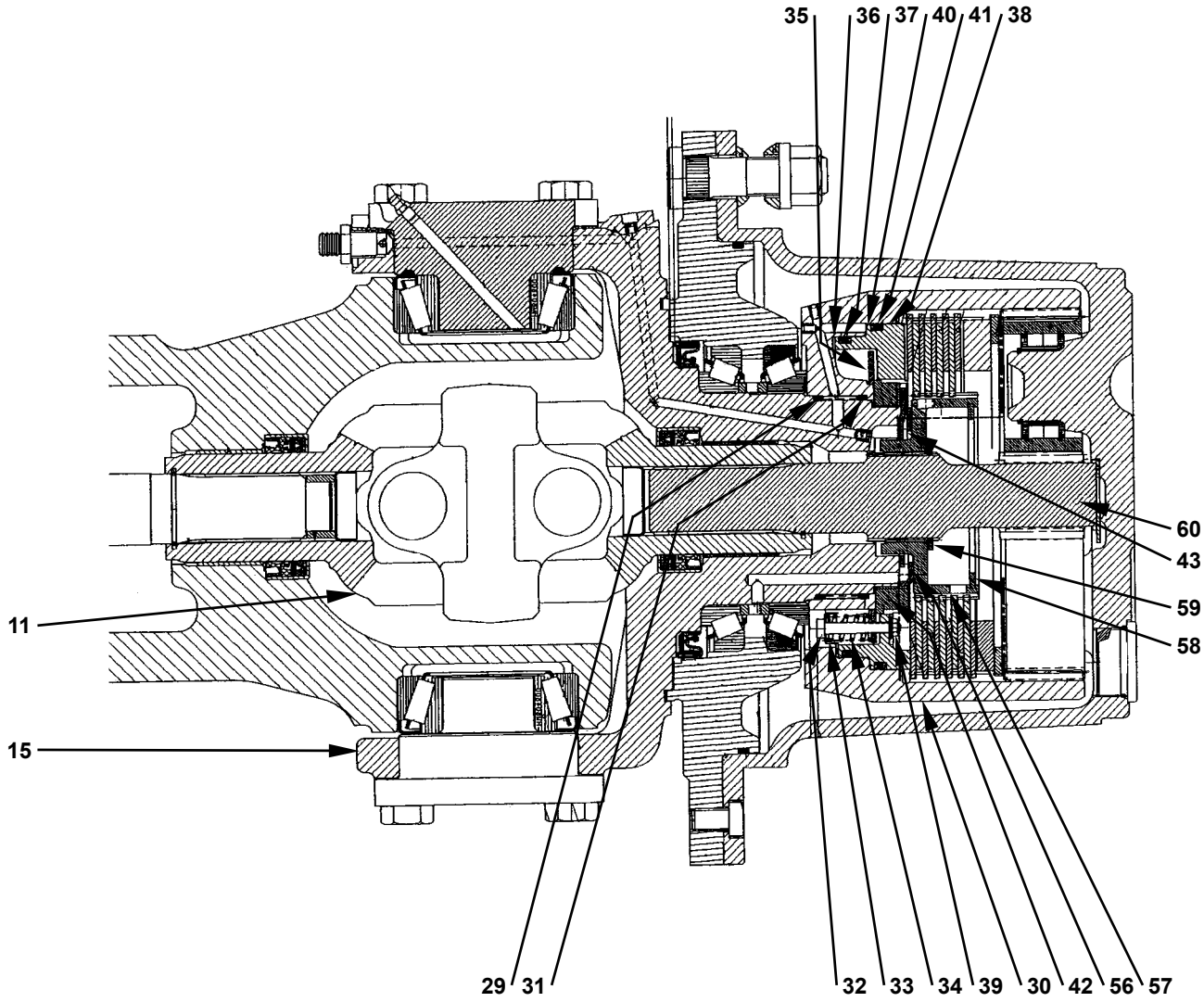

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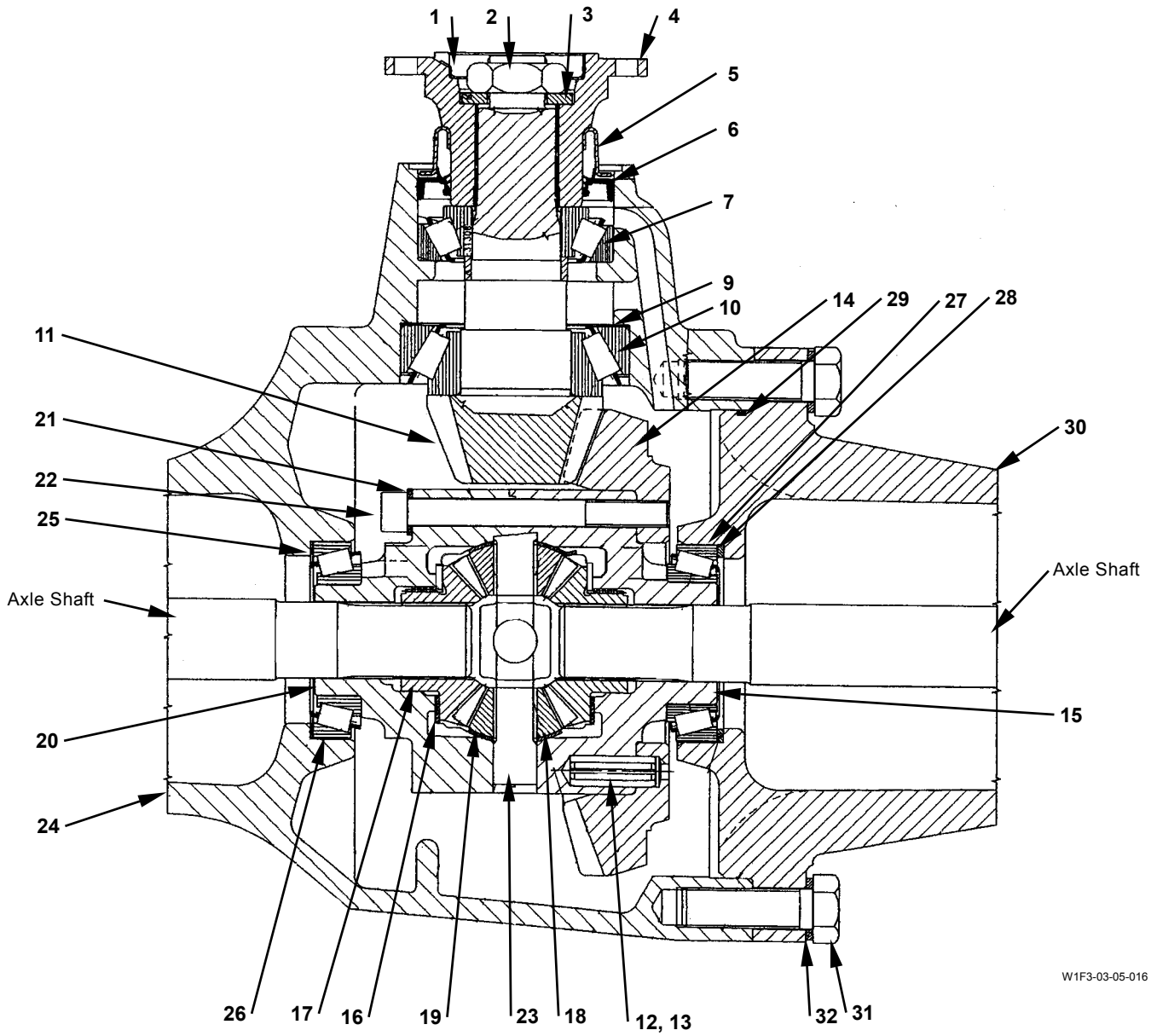
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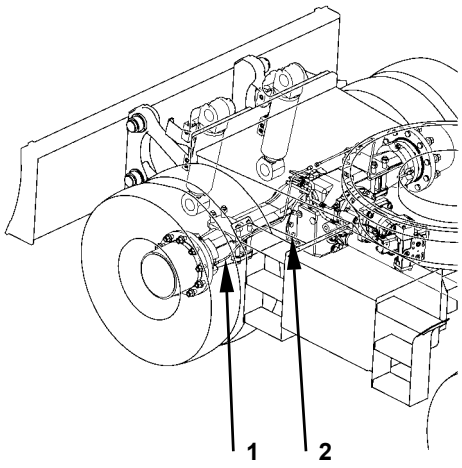

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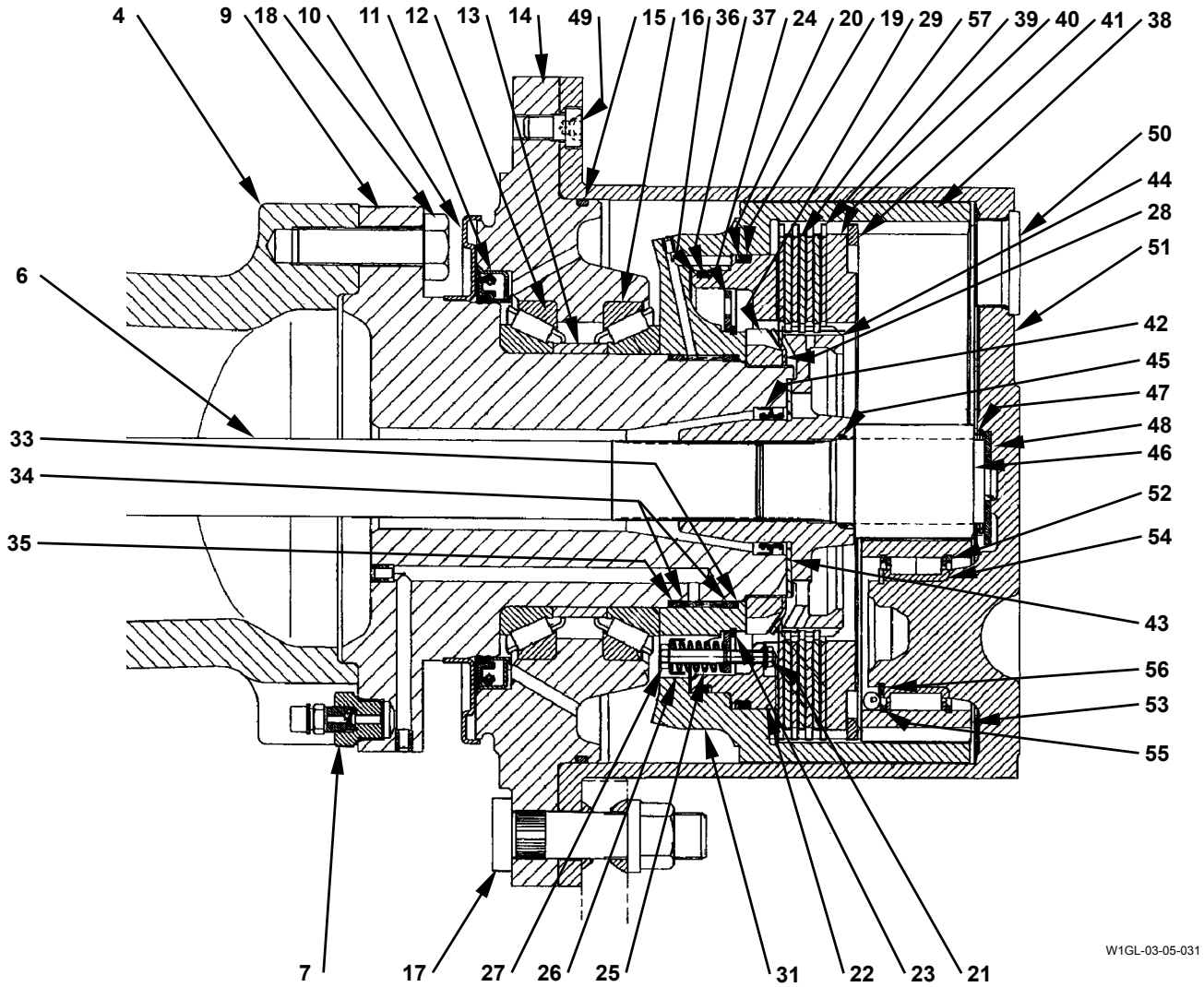

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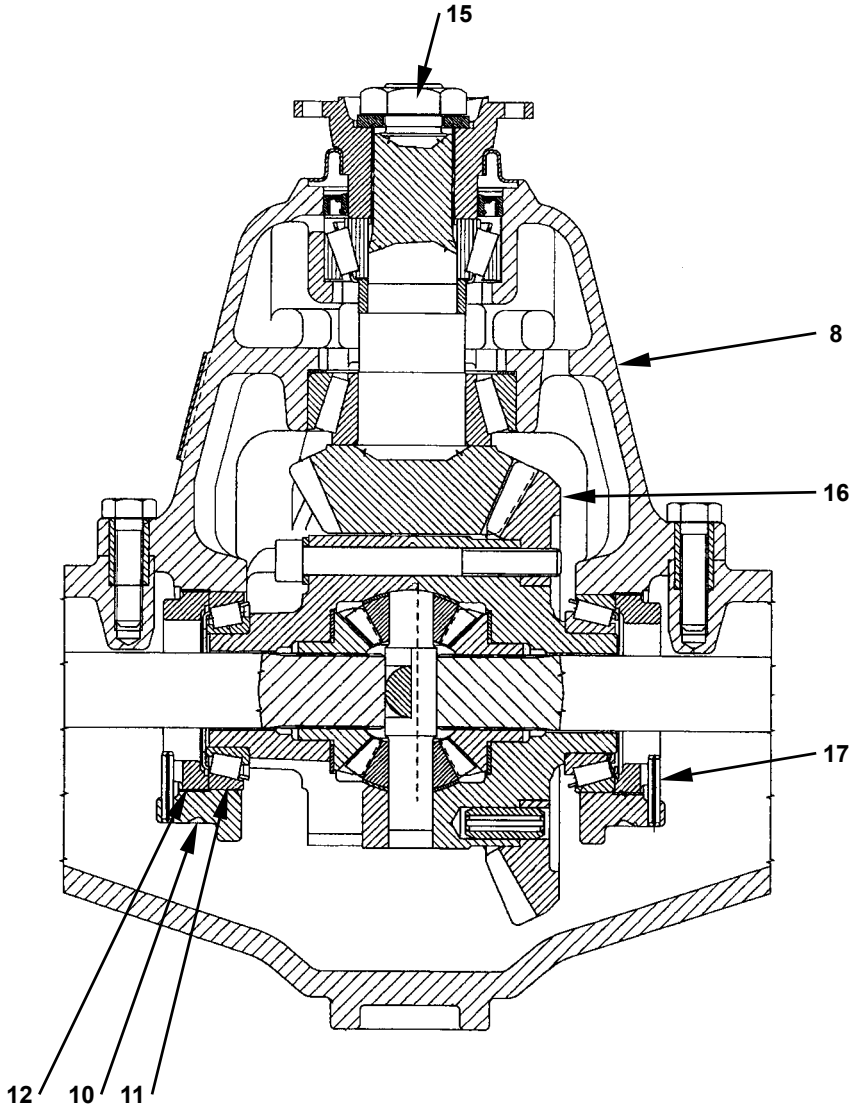
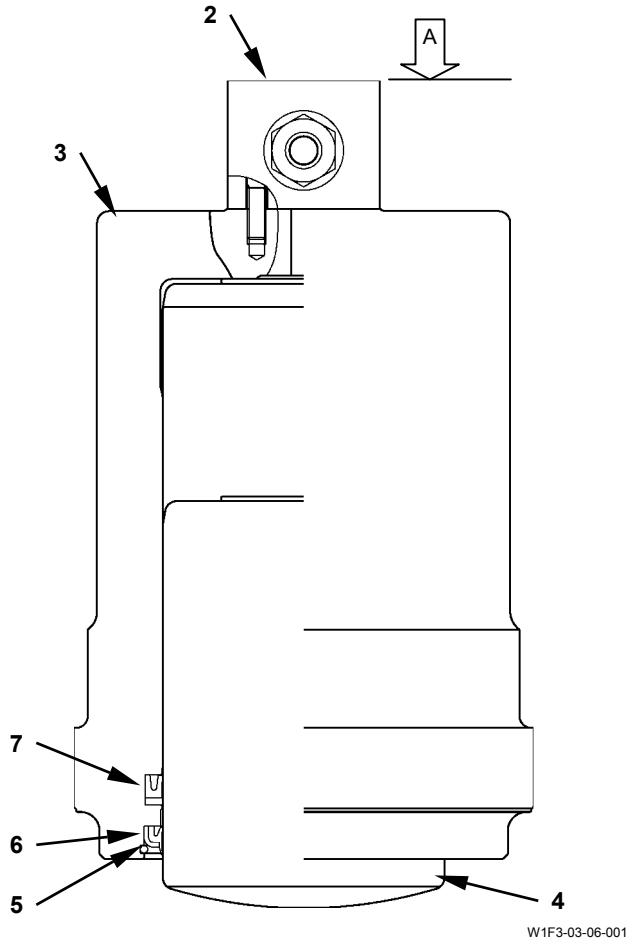
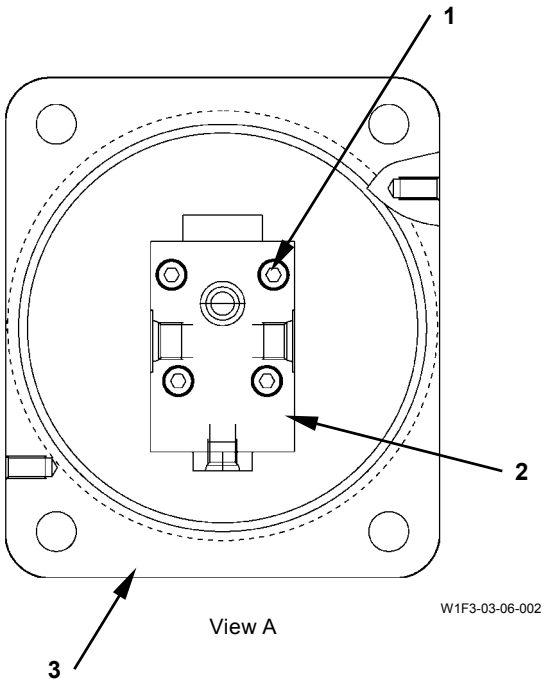


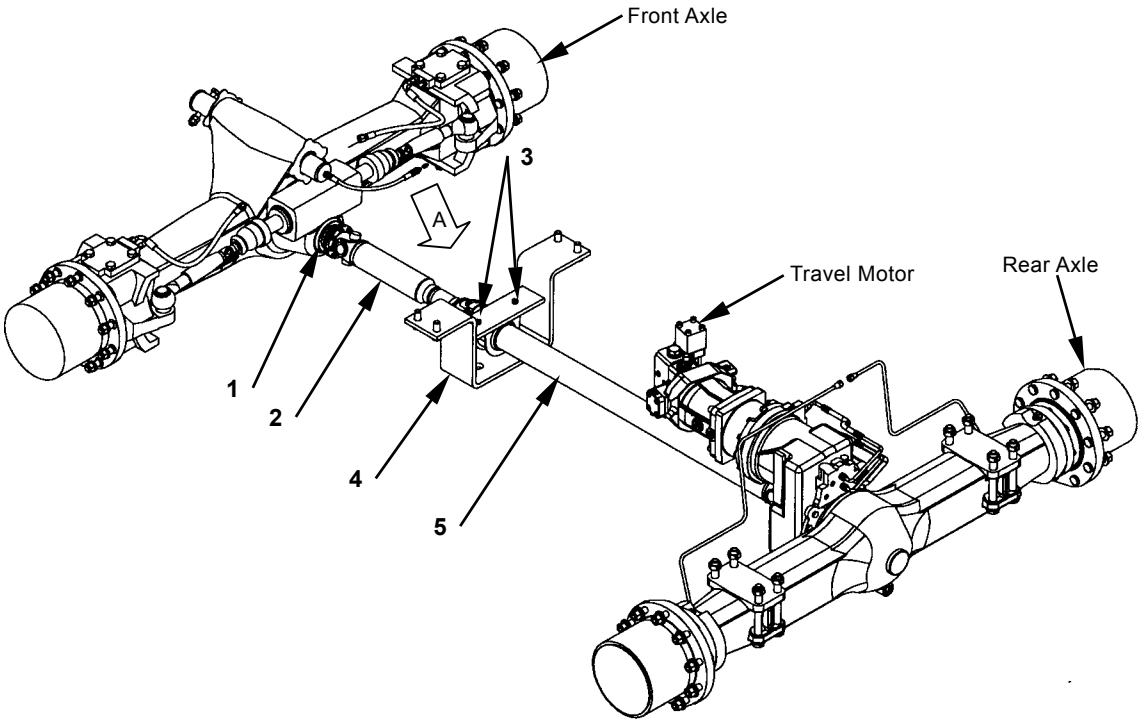
W1GL-03-05-034

DISASSEMBLE AND ASSEMBLE AXLE LOCK CYLINDER

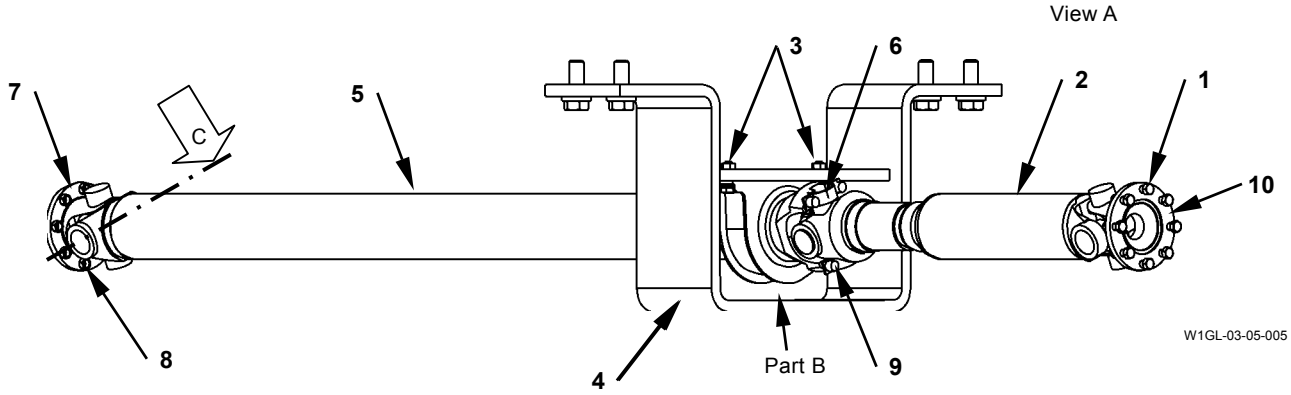




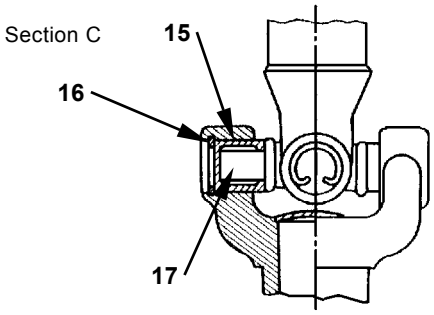
1 - Socket Bolt (4 Used)
2 - Check Valve
3 - Housing
4 - Rod
5 - Retaining Ring
6 - Dust Seal
7 - Seal

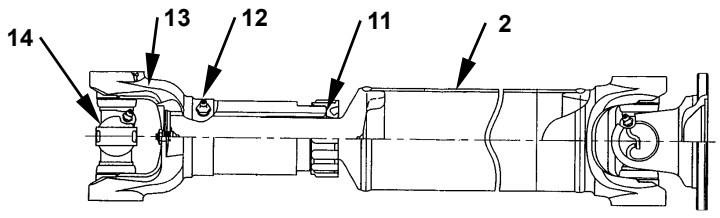


W1GL-03-08-001



W1GL-03-05-005

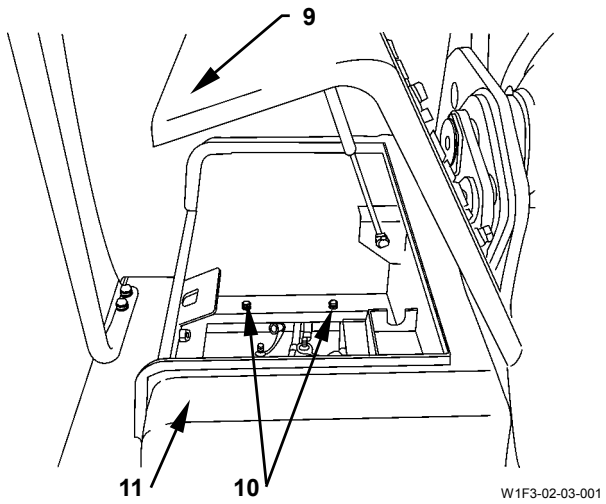




T1GL-03-05-003

T202-03-03-002

10. Open cover (9). Remove bolts (10) (4 used) and cover (11).
    : 17 mm

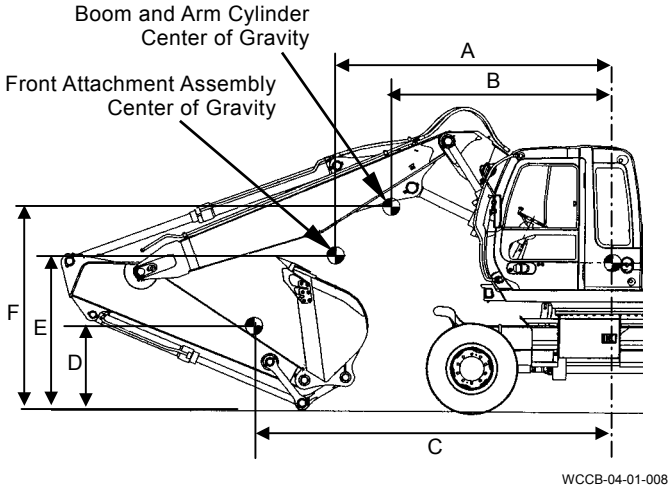


Installation

CAUTION: Prevent person from injury. Metal fragments may fly when a hammer is used to install the pins. Be sure to wear necessary protection, such as goggles, hardhat and etc.

CAUTION: Front attachment weight: 3551 kg (7830 lb)

1. Hoist the front attachment. Move the machine forward, aligning the boom foot pin holes.
   Insert the thrust plates into boom left and right sides and adjust the clearance between the plate and frame within 1 mm.
   (Adjust the position of the boom foot pin hole by hoisting and lowering the front attachment.)

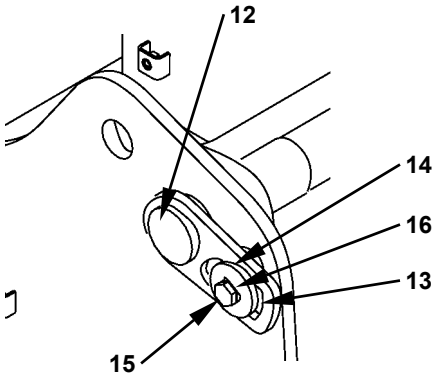


WCCB-04-01-008

Unit: mm (in)

A	3138 (123)
B	2497 (98)
C	4071 (160)
D	977 (38)
E	1798 (70)
F	2361 (93)

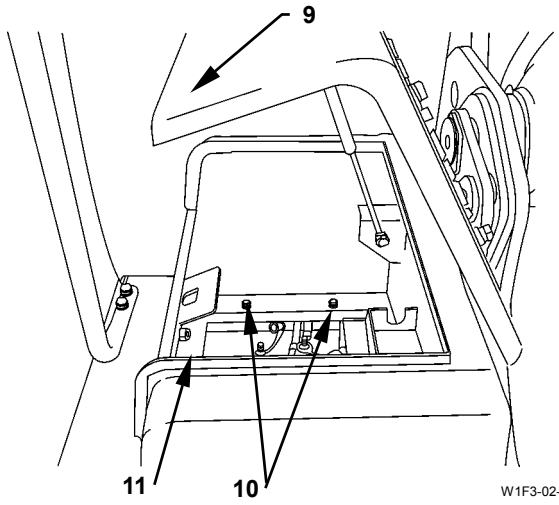
2. Drive in boom foot pin (12). Install stopper bolt (15), washer (16), plate (14) and block (13).
   : 27 mm
   : 400 N·m (41 kgf·m, 295 lbf·ft)



WCCB-04-01-010

3. Install cover (11) with bolts (10) (4 used).
   : 17 mm
   : 50 N·m (5.1 kgf·m, 37 lbf·ft)

4. Close cover (9).



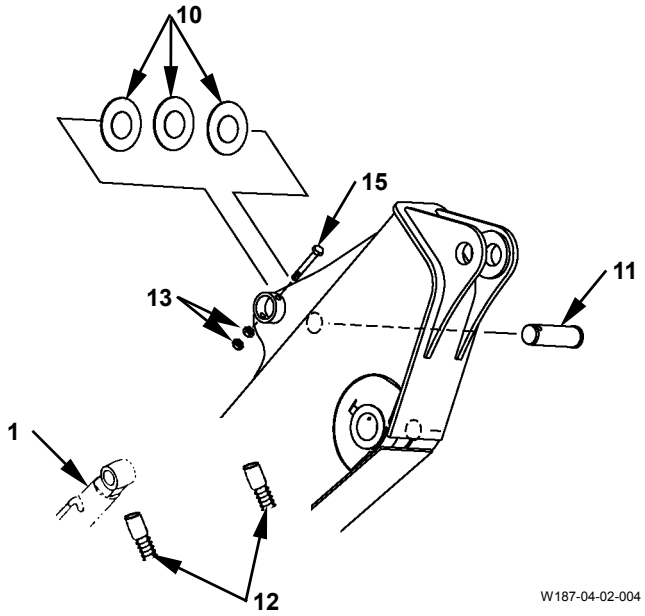
W1F3-02-03-001

5. Disconnect bucket cylinder hoses (12) (2 used) at the bucket cylinder (1) bottom. Attach caps onto the open ends.
   : 36 mm

CAUTION: Bucket cylinder weight: 132 kg (290 lb)

6. Lift bucket cylinder (1) off. Remove nut (13) and bolt (15). Push pin (11) out.
   Remove thrust plate (10).

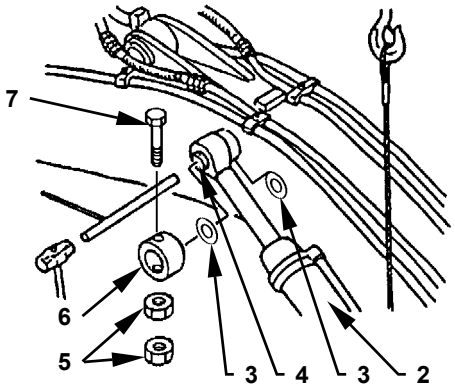
7. Remove bucket cylinder (1).



5. Lift boom cylinder (2). Operate the boom lever. Align the pin hole at cylinder rod side with the mounting hole of the boom cylinder.

6. Install thrust plate (3) and pin (4).

7. Install bolt (7) to pin (4) and stopper (6). Then install nut (5).
   : 30 mm
   : 550 N·m (56 kgf·m, 410 lbf·ft)



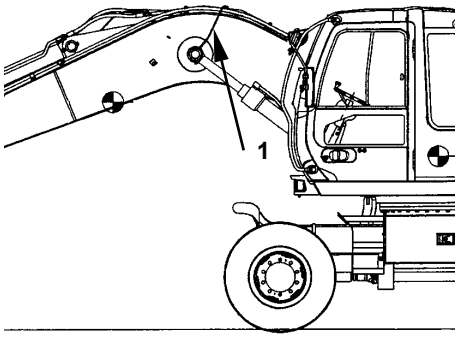
W158-04-02-013

8. Connect grease hoses (1).
   : 19 mm
   : 29.5 N·m (3 kgf·m, 21.5 lbf·ft)

9. Install the boom cylinder at other side by same method.

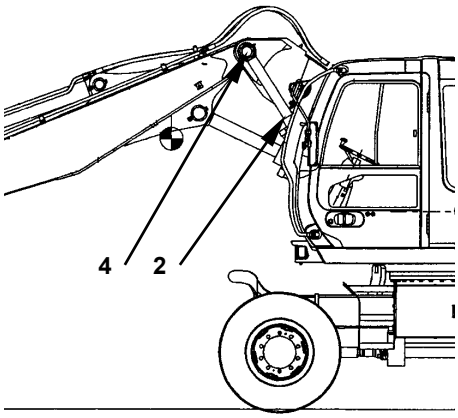
IMPORTANT: After installation, operate the cylinder several times to stroke end to bleed air from the circuit.

Monoblock Boom



WCCB-04-01-004

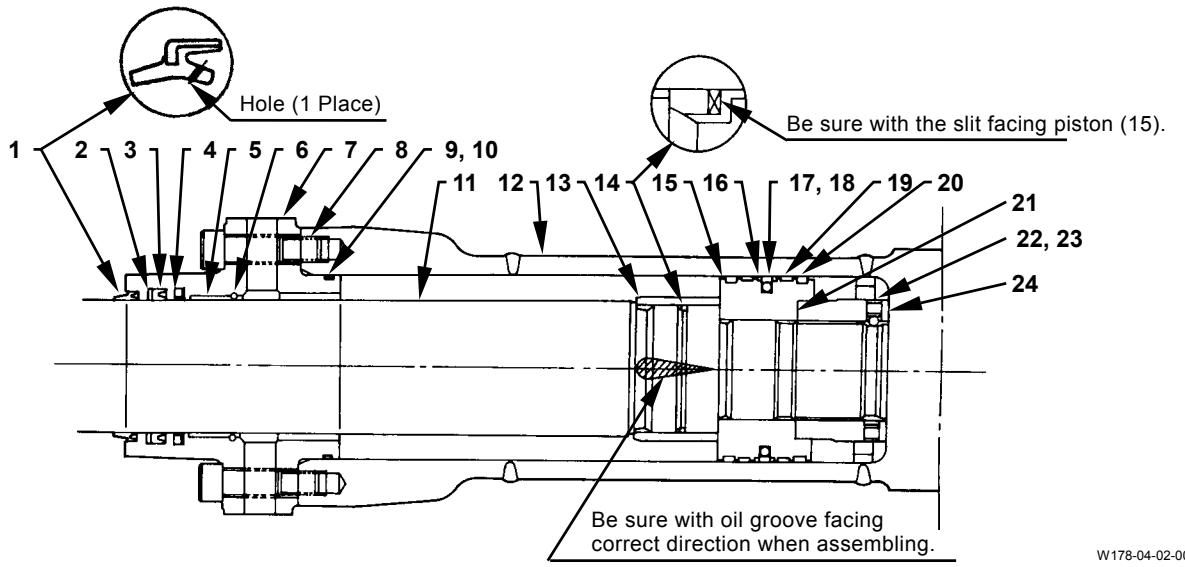
2-Piece Boom



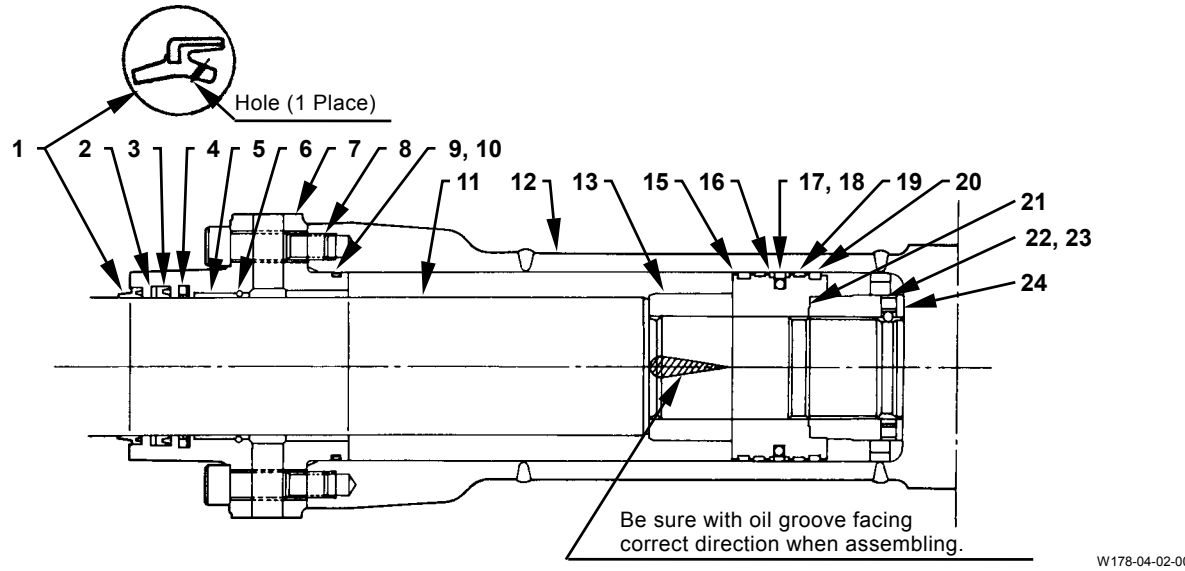
WCCB-04-01-006

ASSEMBLE CYLINDER (BOOM (MONOBLOCK/2-PIECE), POSITIONING, BUCKET)

Boom Cylinder (Monoblock/2-Piece Boom) Positioning Cylinder



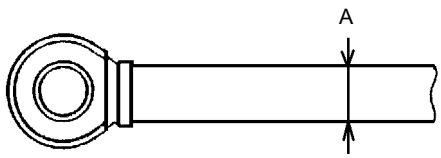
Bucket Cylinder



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

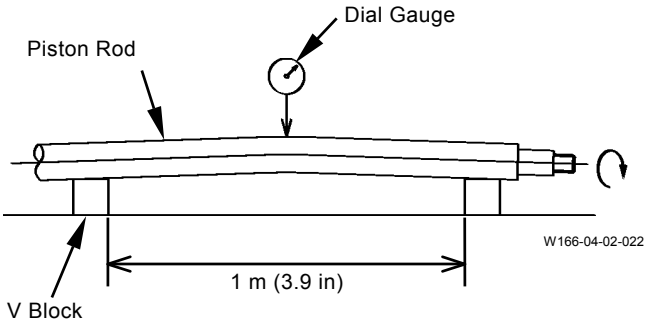
MAITENANCE STANDARD

Piston Rod



W105-04-02-094

Rod Bend and Run Out



Unit: mm (in)

Cylinder Name	Recommended Size After Re-manufacturing (A)
Boom	$85^{-0.012}_{-0.027}$ (3.35) $^{(-0.0005)}_{(-0.0010)}$
Positioning	$95^{-0.012}_{-0.027}$ (3.74) $^{(-0.0005)}_{(-0.0010)}$
Arm	$95^{-0.012}_{-0.027}$ (3.74) $^{(-0.0005)}_{(-0.0010)}$
Bucket	$80^{-0.010}_{-0.023}$ (3.15) $^{(-0.0003)}_{(-0.0009)}$

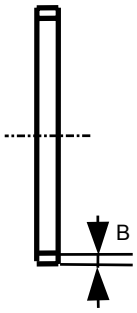
Unit: mm (in)

Bend	Run out	Remedy
0.5 (0.020)	1.0 (0.039)	Repair
1.0 (0.039)	2.0 (0.079)	Replace

Wear to thickness of slide Ring

Unit: mm (in)

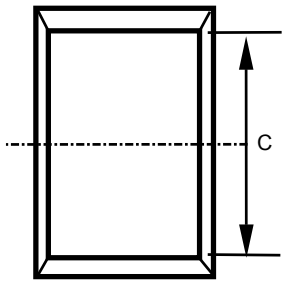
Standard Thickness (B)	Allowable Limit (B)	Remedy
2.42 to 2.48 (0.095 to 0.098)	2.37 (0.093)	Replace



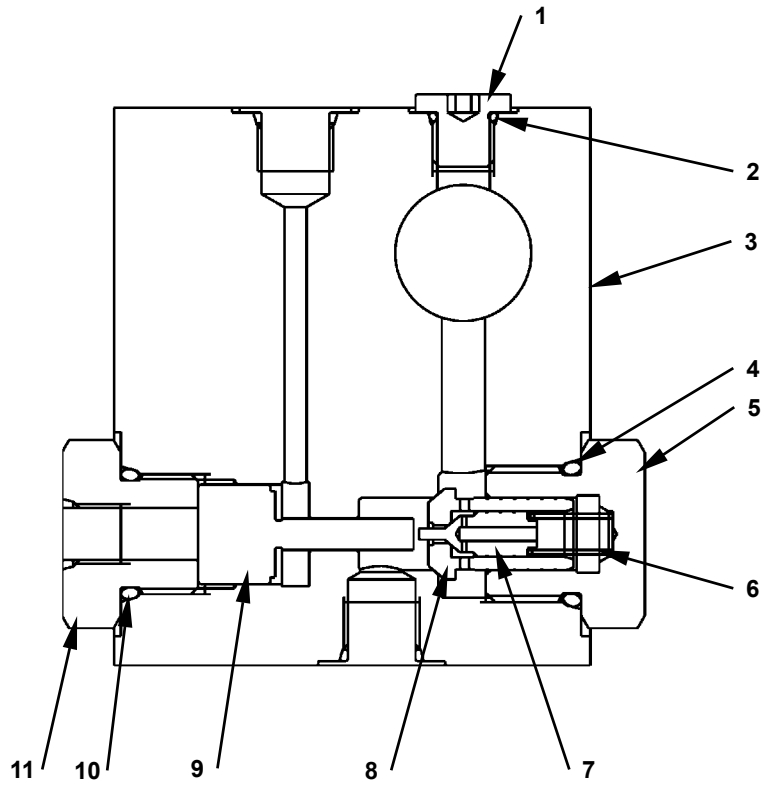
Wear to inner Diameter of Rod Bushing

Unit: mm (in)

Cylinder Name	Standard inner Dimeter (C)	Allowable Limit	Remedy
Boom	$85^{-0.06}_{-0.19}$ ($3.35^{-0.002}_{-0.007}$)	+0.3 (0.012)	Replace
Arm	$95^{-0.06}_{-0.19}$ ($3.74^{-0.002}_{-0.007}$)	+0.3 (0.012)	Replace
Bucket	$85^{-0.06}_{-0.19}$ ($3.35^{-0.002}_{-0.007}$)	+0.3 (0.012)	Replace
Posi-tioning	$95^{-0.06}_{-0.19}$ ($3.74^{-0.002}_{-0.007}$)	+0.3 (0.012)	Replace



CONSTRUCTION OF OPERATE-CHECK VALVE (FOR BLADE/STABILIZER)



T1F3-03-10-003

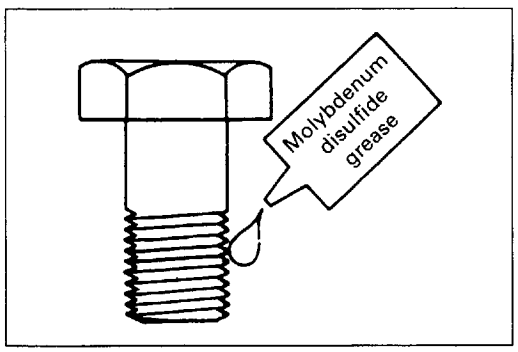
Item No.	Part Name	Q'ty	Wrench Size	Tightening Torque			Remark
				N·m	(kgf·m)	(lbf·ft)	
1	Plug	1	: 6 mm				
2	O-Ring	1					1B P11
3	Casing	1					
4	O-Ring	1					1B P26
5	Plug	1	: 36 mm	360±36	(37±3.7)	(265±26.5)	
6	Spring	1					ϕ1.0×ϕ8.5×31.0 mm
7	Poppet	1					
8	Check Valve	1					
9	Piston	1					
10	O-Ring	1					1B P24
11	Plug	1	: 36 mm	240±24	(24±2.4)	(175±17.5)	

MAIN DATA AND SPECIFICATIONS

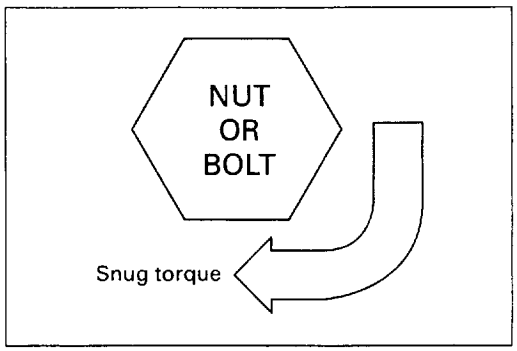
Item \ Engine Model		CC-4BG1TCG	BB-4BG1TRG
Engine type		Water cooled, four cycle, vertical in-line overhead valve	
Combustion chamber type		Direct injection	
Cylinder liner type		Dry	
No. of cylinders – bore × stroke	mm (in)	4 – 105 × 125 (4.13 × 4.92)	
Total piston displacement	L (cid)	4.329 (464)	
Compression ratio		18 to 1	
Engine dimensions Length × width × height	mm (in)	908 × 698 × 892 (35.7 × 27.5 × 27.5)	900 × 718 × 892 (35.4 × 28.3 × 35.1)
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)	
Injection timing (BTDC)	(deg)	10	9
Fuel filter type		Cartridge (spin-on)	
Water sedimentor	(If so equipped)	Sediment/water level indicating type	
Compression pressure (At warm)	MPa (kgf/cm^2/psi)	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	

ANGULAR NUT AND BOLT TIGHTENING METHOD

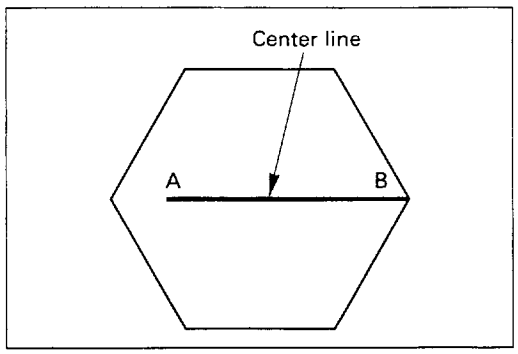
1. Carefully wash the nuts and bolts to remove all oil and grease.



2. Apply a coat of molybdenum disulfide grease to the threads and setting faces of the nuts and bolts.

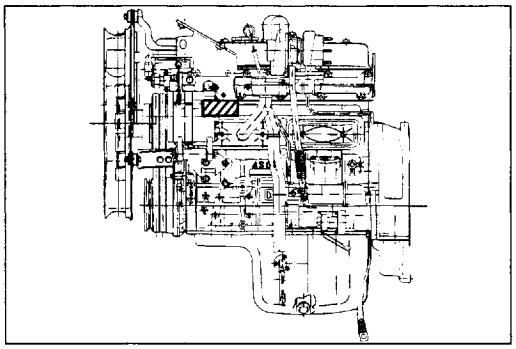


3. Tighten the nuts and bolts to the specified torque (snug torque) with a torque wrench.



4. Draw a line [A-B] across the center of each bolt.

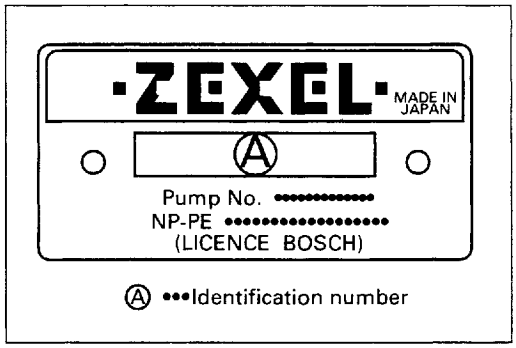
IDENTIFICATIONS



MODEL IDENTIFICATION

Engine Serial Number

The engine number is stamped on the front left hand side of the cylinder body.



INJECTION PUMP IDENTIFICATION

Injection Pump Number

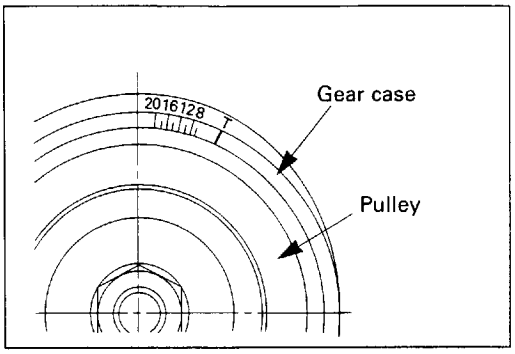
Injection volume should be adjusted after referring to the adjustment data applicable to the injection pump installed.

The injection pump identification number (A) is stamped on the injection pump identification plate.

Note:

Always check the identification number before beginning a service operation.

Applicable service data will vary according to the identification number. Use of the wrong service data will result in reduced engine performance and engine damage.



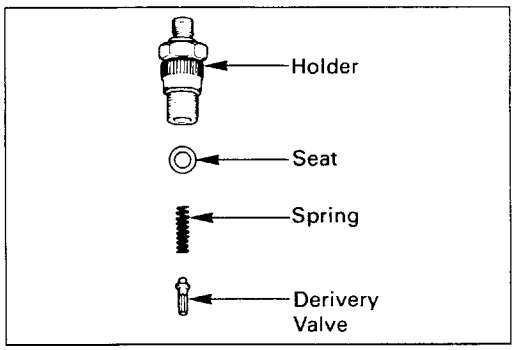
Degree

Engine Model	Injection Timing
AA-4BG1TCG-01	9
CC-4BG1TCG	10
BB-4BG1TRG	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)

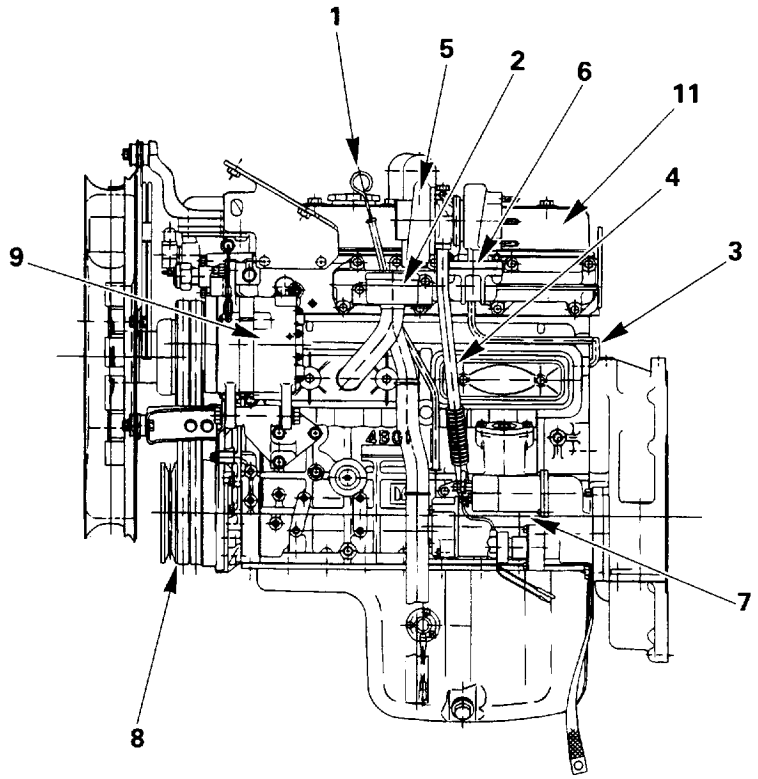
Note:

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)

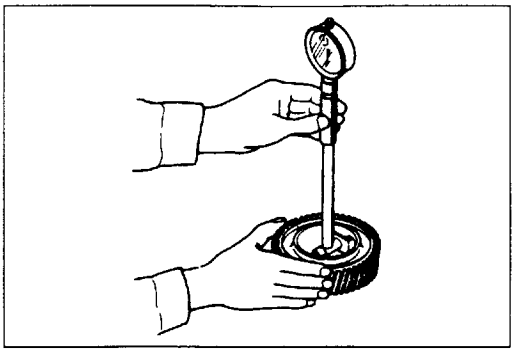
MODEL CC-4BG1TRB



Disassembly Steps

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

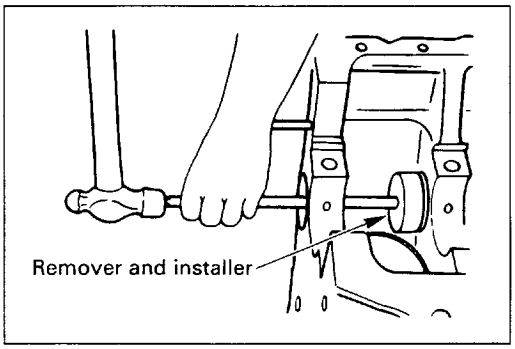
MEMO



2. 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

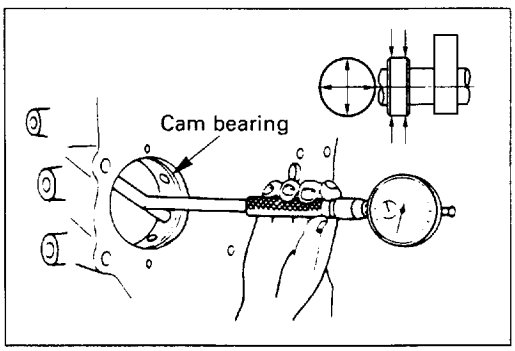
1. Use the camshaft bearing remover and installer to remove camshaft bearing from the cylinder body.

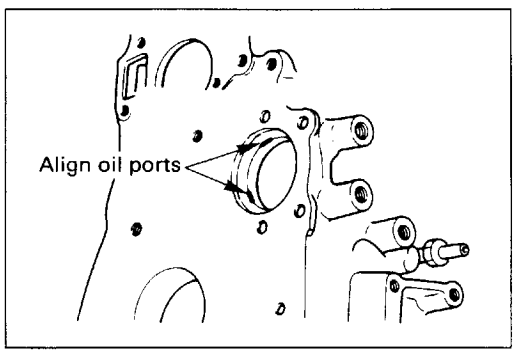
   Camshaft Bearing Remover and Installer: 9-8523-1818-0

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

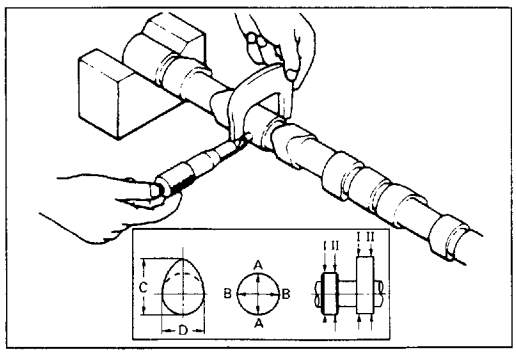
mm (in)

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





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

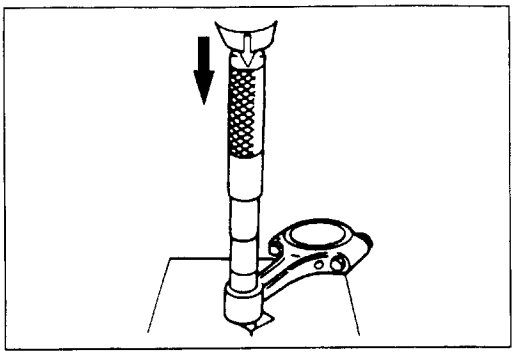


4. Use a micrometer to measure the cam lobe height.

   If the cam lobe height is less than the specified limit, the camshaft must be replaced.

mm (in)

		Standard	Limit
Cam Journal Diameter		55.94–55.97 (2.202–2.204)	55.6 (2.189)
Cam Nose Height (C-D)	In	7.34	6.82
	Exh	7.73	7.21



Connecting Rod Bushing Installation

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

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

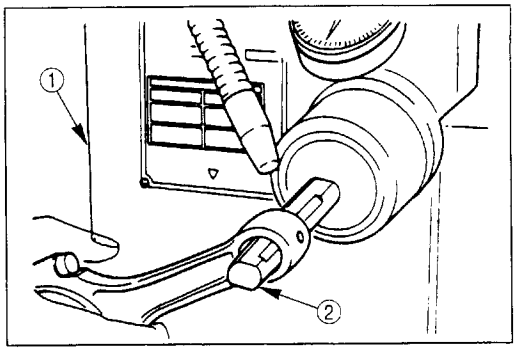
Note:

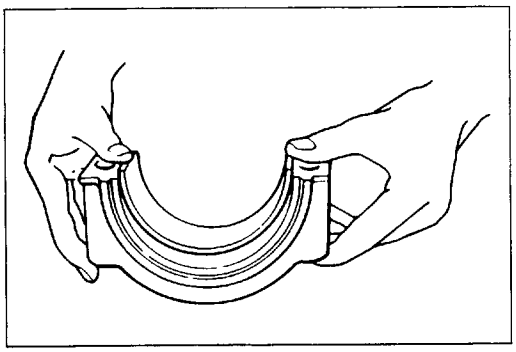
The connecting rod bushing oil port must be aligned with the connecting rod oil port.

3. 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)





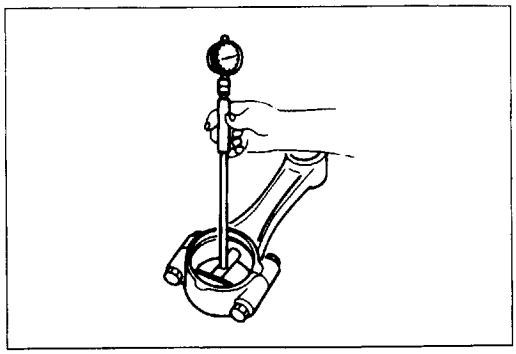
Connecting Rod Bearing Inspection

1. Fit the connecting rod bearing lower half into the connecting rod bearing cap.
2. Check the connecting rod bearing lower half tension.

   If the tension is insufficient, the bearing must be replaced.
3. 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°



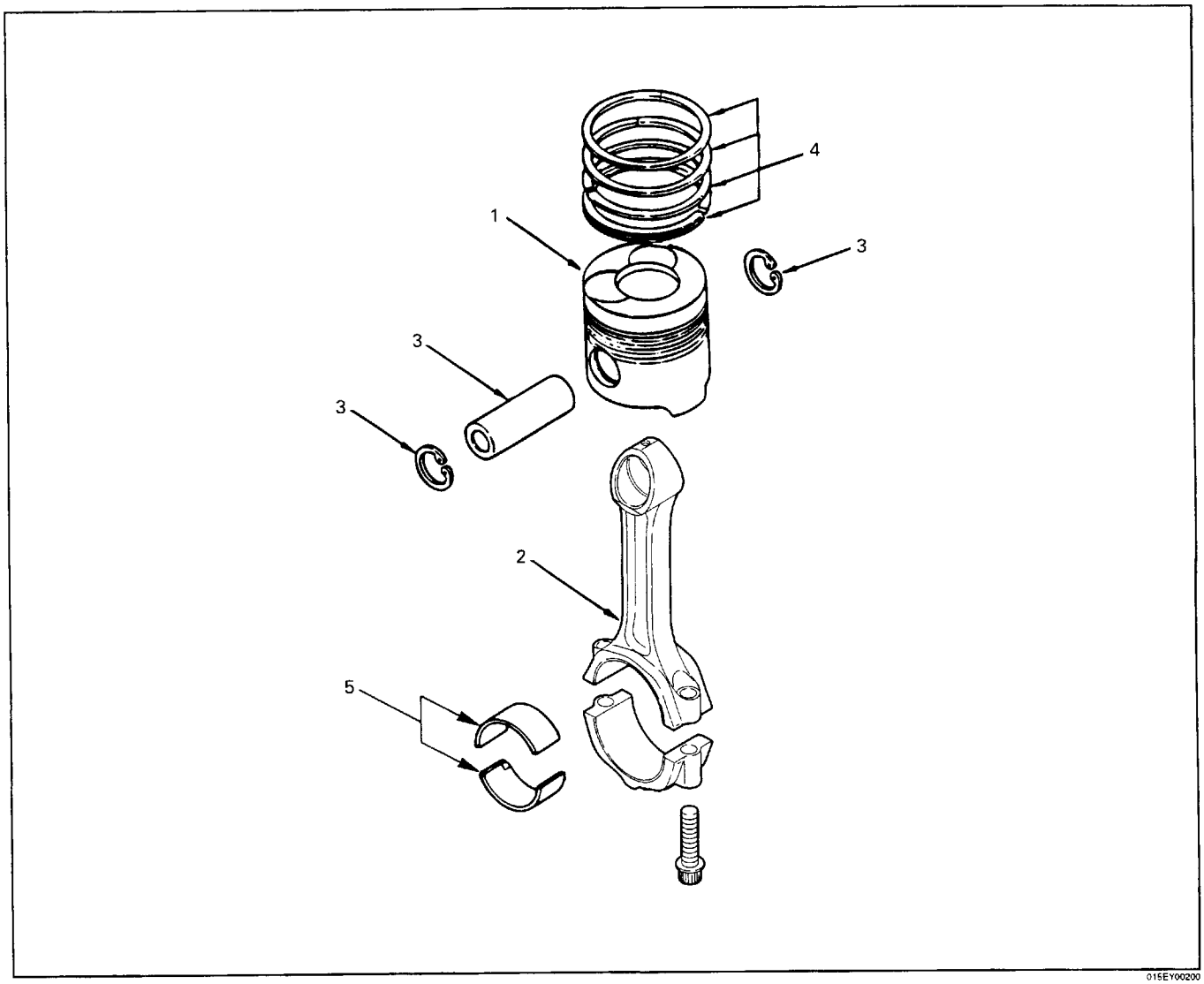
4. Use an inside dial indicator to measure the connecting rod inside diameter.

mm (in)

Connecting Rod Bearing Nominal Diameter	64 (2.520)

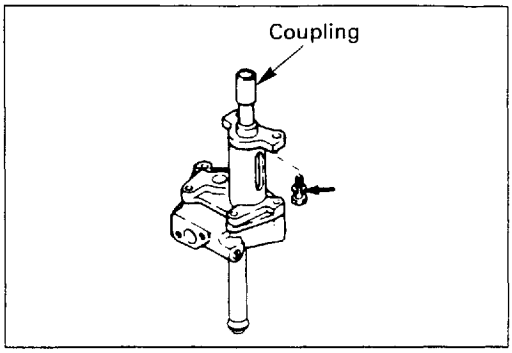
PISTON AND CONNECTING ROD REASSEMBLY STEPS

MIRROR COMPONENT



Reassembly Steps

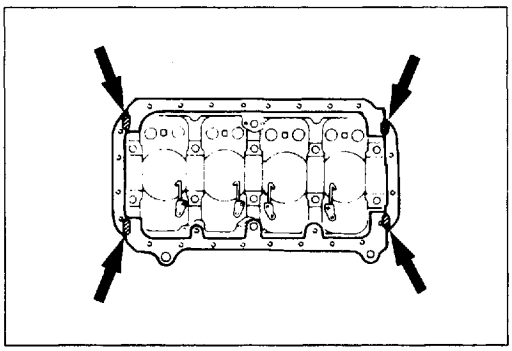
▲1. Piston
▲2. Connecting-rod
▲3. Piston pin, Snap ring
▲4. Piston ring
▲5. Connecting rod bearing



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)



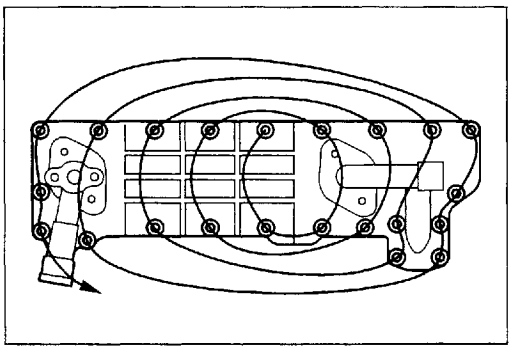
13. Oil Pan

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.

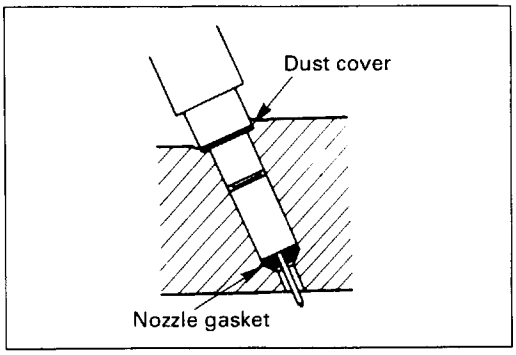
Tighten the oil cooler bolts to the specified torque.

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

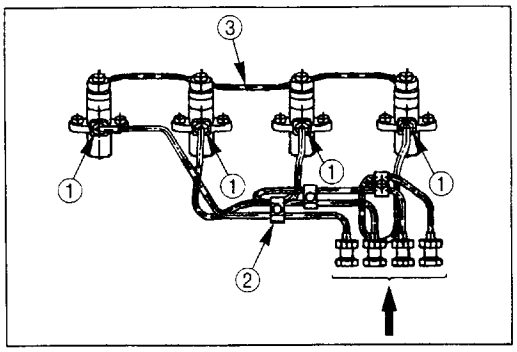
2. Injection Nozzle

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)

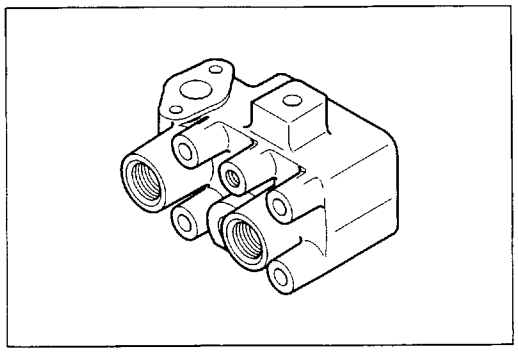
Injection Pipe Torque	28 – 32 (2.9 – 3.3/21 – 24)

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.



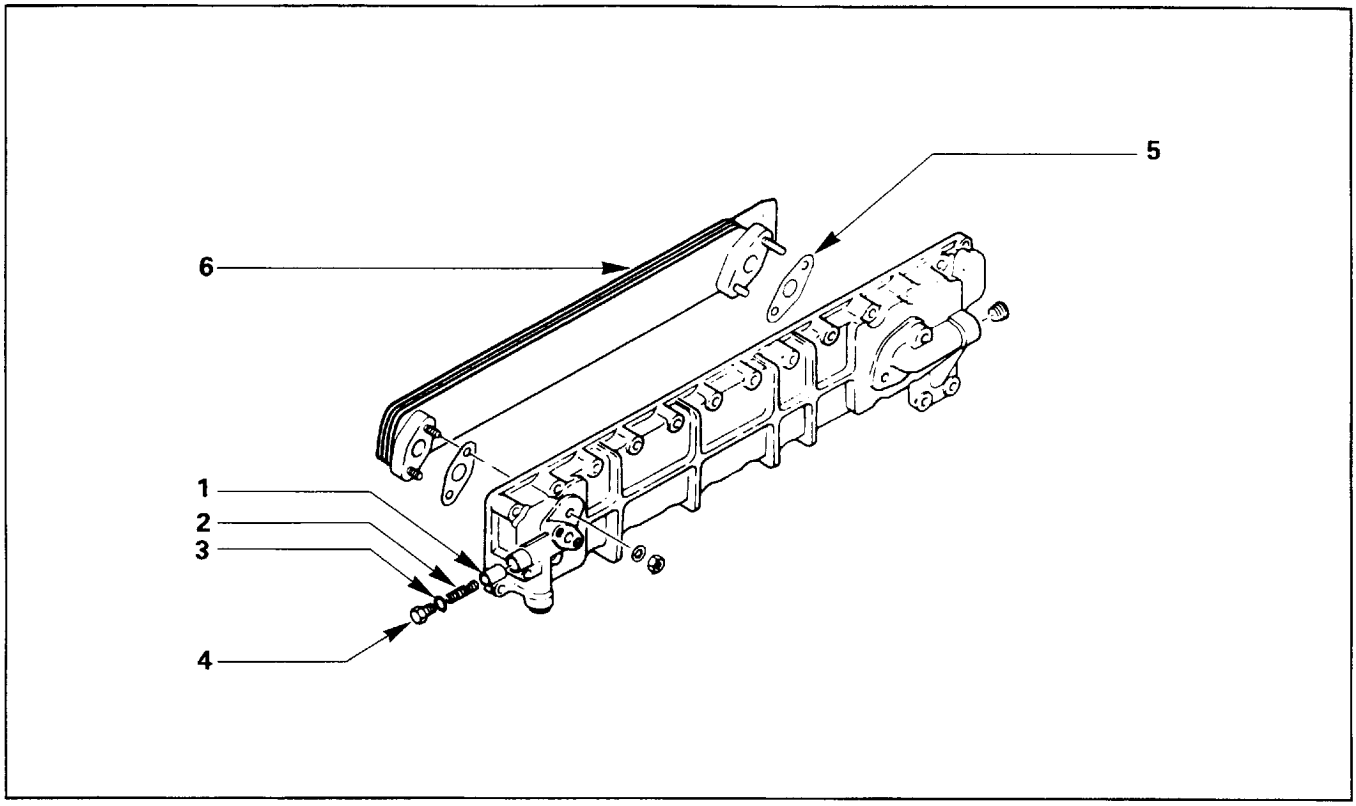
4. Oil port cover

Install the oil port cover with tightening the bolts securely.

N·m (kgf·m/lb.ft)

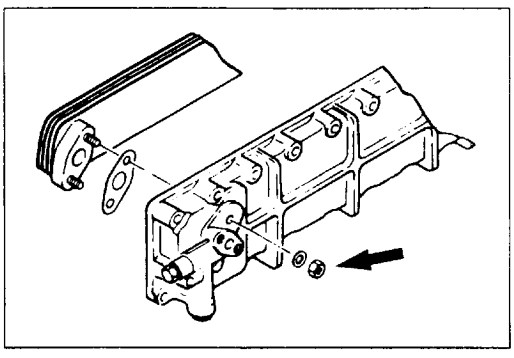
Oil Port Cover Bolt Torque	30 – 50 (3.1 – 5.1/22 – 37)

REASSEMBLY



Reassembly Steps

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



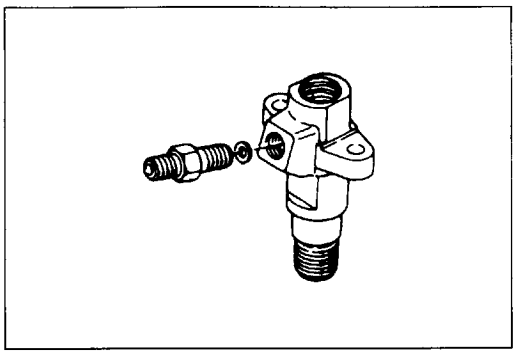
Important Operation

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)

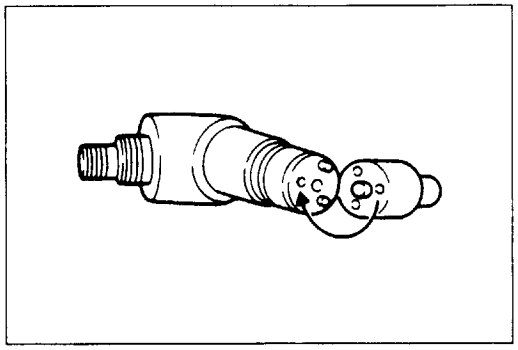


Important Operation

3. Injection Pipe Connector

N·m (kgf·m/lb.ft)

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

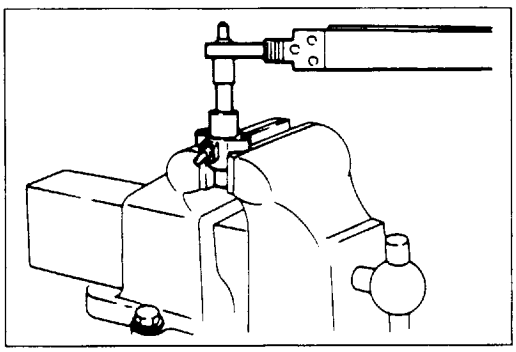


4. Injection Nozzle

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.

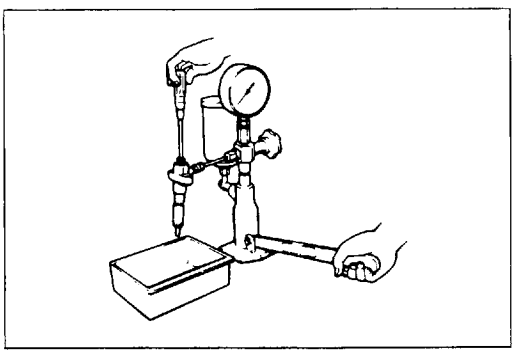
The nozzle dowel pin must be aligned with the dowel hole in the nozzle holder body.



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

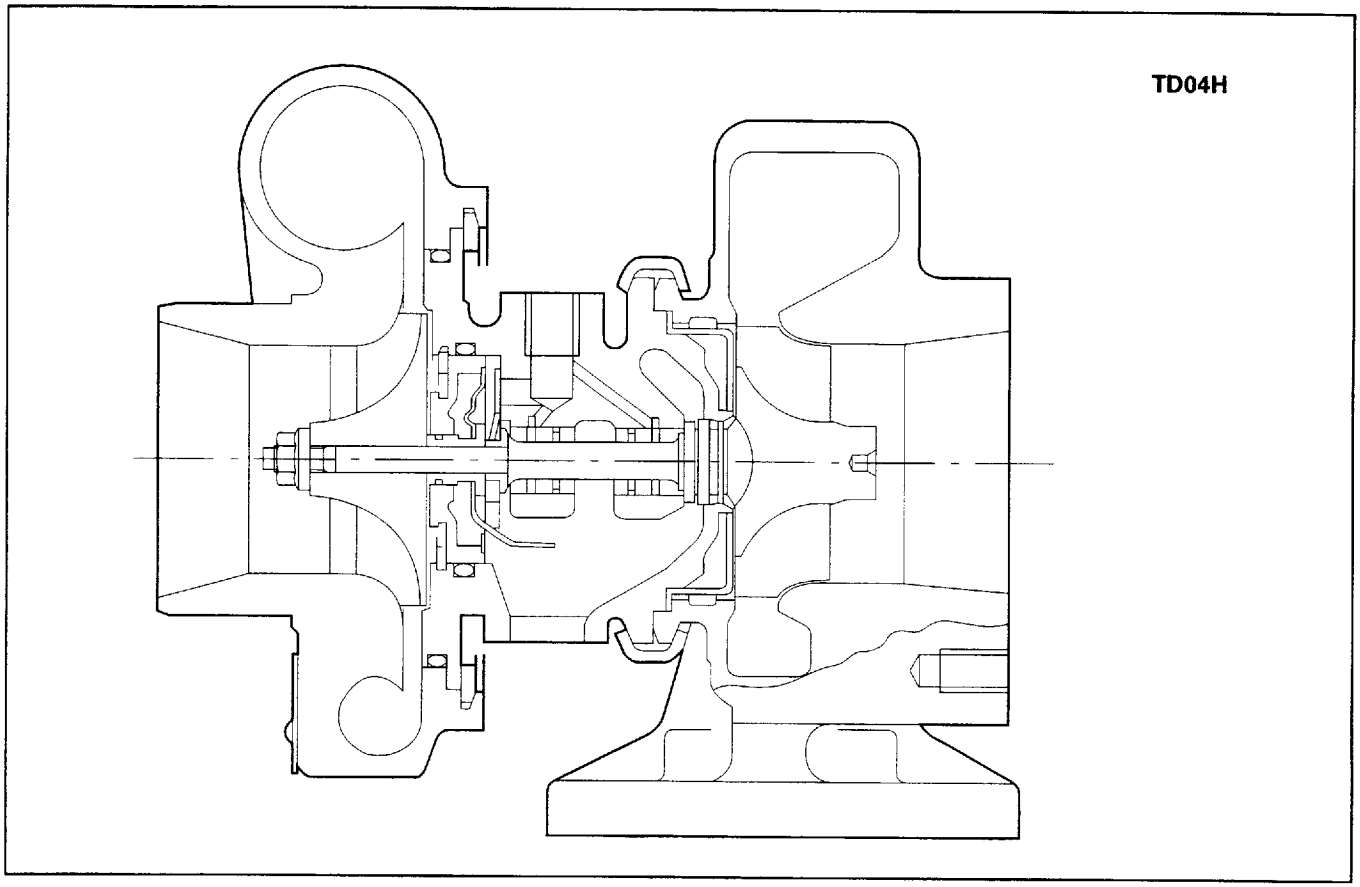
The injection nozzle injection starting pressure can be adjusted after the adjusting screw is installed.

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

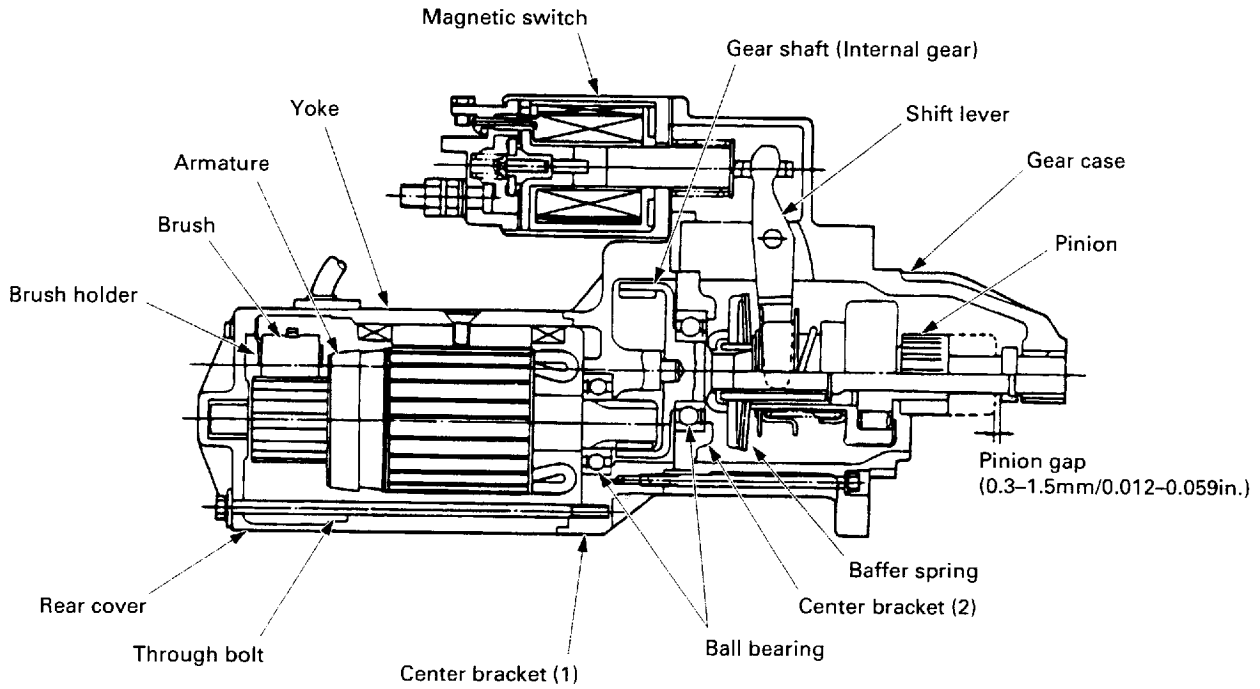
MPa (kgf/cm^2/psi)

Injection Starting Pressure	18.1 (185/2630)

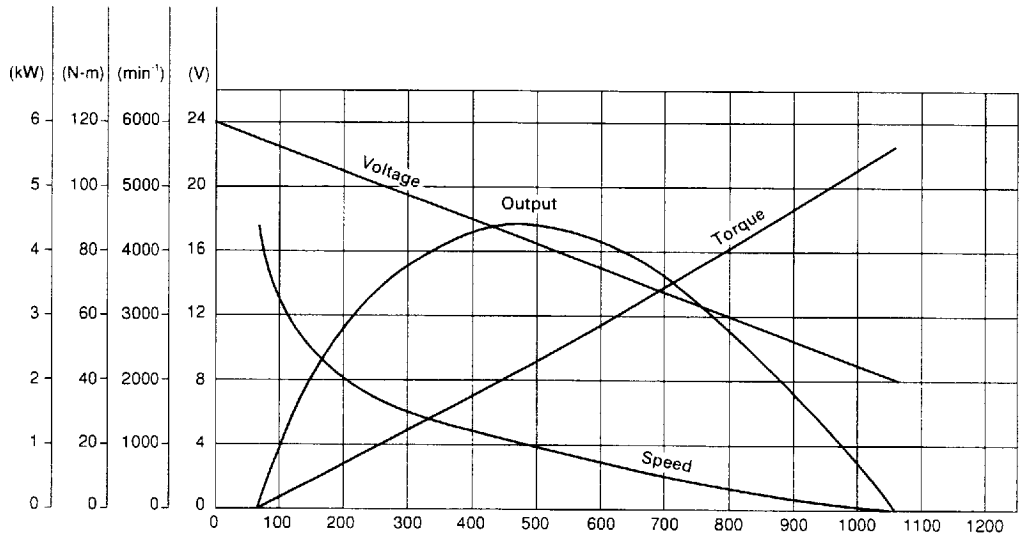
GENERAL DESCRIPTION



STARTER SECTIONAL VIEW



PERFORMANCE



PERFORMANCE TEST

For the performance test of the starter, a no-load test is conducted according to the procedures mentioned below.

Before the performance test, fix the starter on the test bench.

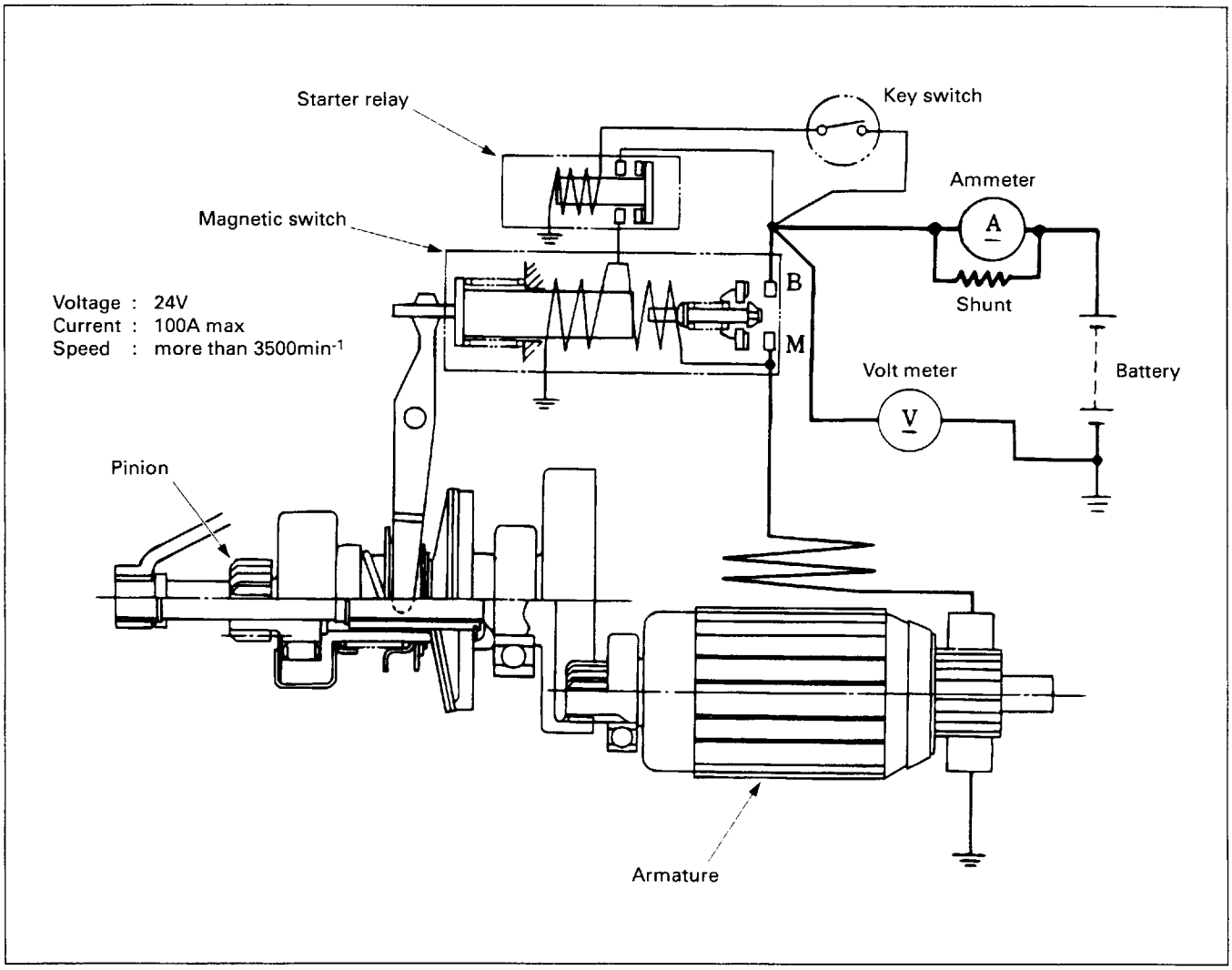
Note: Since the rated time is 30 sec., conduct the test promptly.

No-Load Test

See the following figure for connection.

Close the key switch, and the starter will be energized and will start rotating.

Then, measure the current and the number of revolutions.



REASSEMBLY

To reassemble the alternator, follow the reverse of disassembling procedure, and observe the following precautions:

(1) Lubrication is not required. Both bearing are prelubricated.

Note:

For the rotor bearing with resin bands, grease should not be applied. Remove oils completely to prevent creep of the bearing if found on the bearing box.

(2) High temperature solder (Melting point of 466° F) should be used.

Solder quickly, use a 180–270 watts soldering iron no more than about 5 seconds because the rectifier may be damaged if it is overheated.

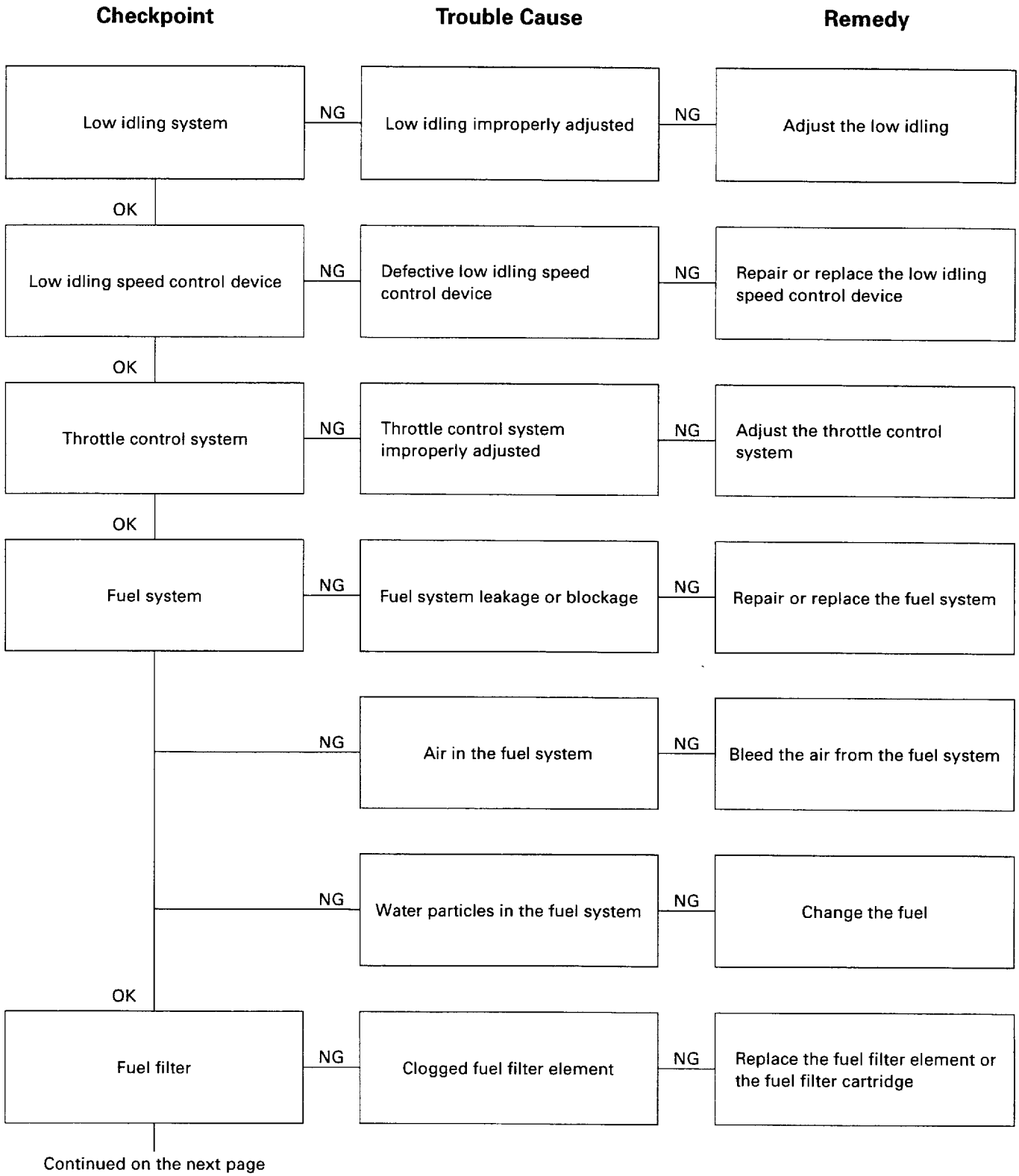
(3) Tightening torque.

- Pulley securing nut. : 147 N·m
- Through bolts. : 4.9 N·m
- Bearing retainer screws. : 3.4 N·m
- Coil assembly retaining screws. : 3.4 N·m
- Rectifier retaining screw. : 3.4 N·m
- Regulator retaining screws. : 3.4 N·m
- Nut for stud bolt. : 8.8 N·m

(4) To assemble the rear bracket / starter assembly and front bracket / rotor assembly.

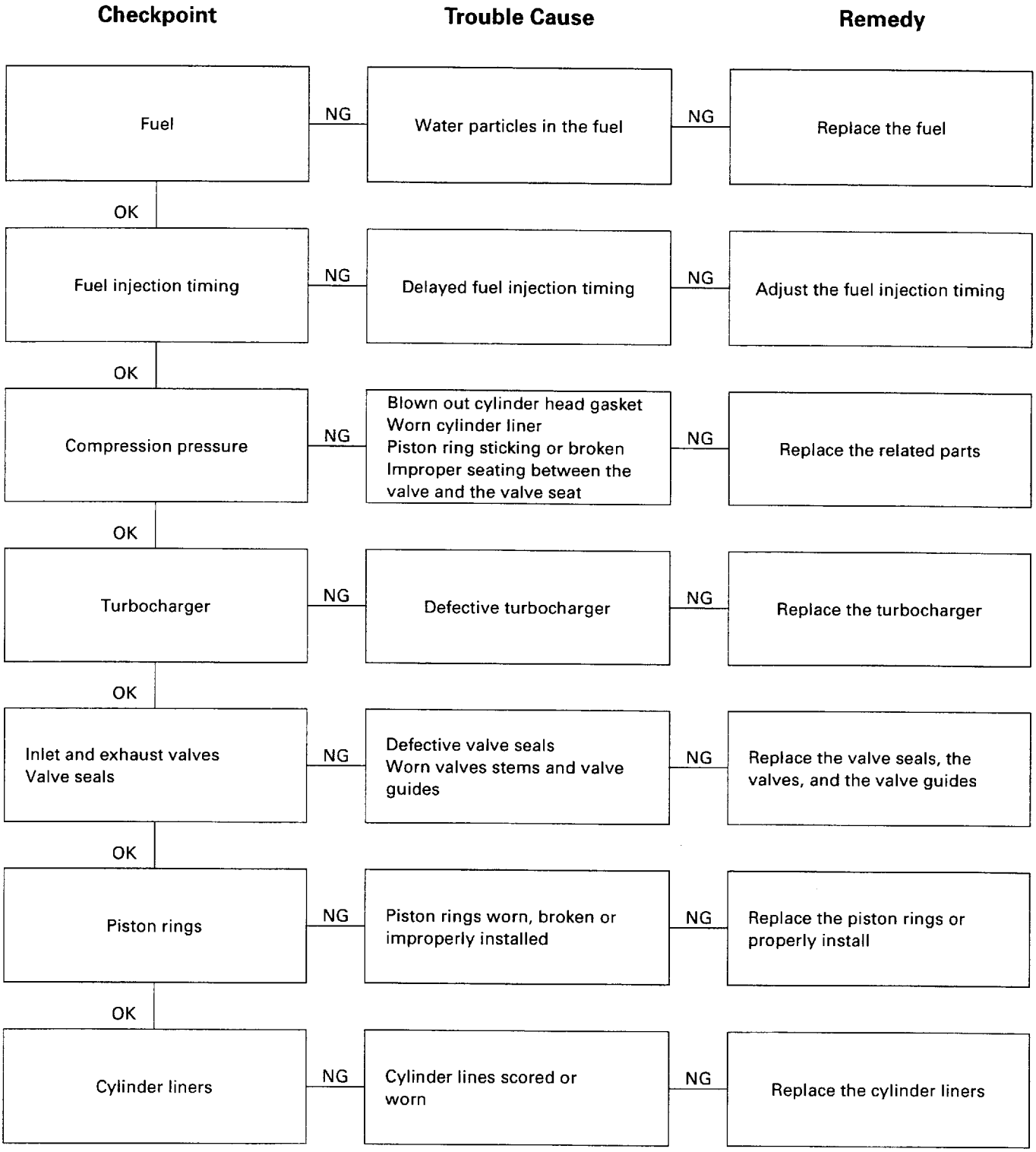
a. Since the rotor bearing and rear bracket fitting is tight, before installing the rotor into the rear bracket assembly, heat the area around the bearing box of the rear bracket to 122 to 144° F.
b. After the alternator has been completely assembled, rotate the pulley slowly by hand to be sure that the rotor turns smooyhly.

UNSTABLE LOW IDLING

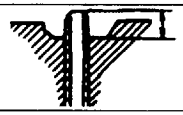


Continued on the next page

WHITE EXHAUST SMOKE



MEMO

Major Category	Name of Part	Inspection Item	Nominal Dimension	Assembly Standard Value	Limit	Repair Procedure	Comments
Valve System	Valves	Inlet valve stem wear	Dia. 9 (0.3543)		Dia. 8.88 (0.3496)	Replace valve and valve guide together	Measure valve stem at three positions
		Exhaust valve stem wear					
		Clearance between inlet valve stem and valve guide		0.039 – 0.071 (0.0015 – 0.0028)	0.20 (0.008)	Replace valve and valve guide together	
		Clearance between exhaust valve stem and guide		0.064 – 0.096 (0.0025 – 0.0038)	0.25 (0.0098)		
		Interference between valve guide and cylinder head		0.024 (0.0009)			Apply oil to valve guide and press in
		Valve thickness 	1.5 (0.059)		1.00 (0.039)	Replace valve and valve guide together	
		Height of valve guide above cylinder head 	14.1 (0.555)				Reference value
		Valve stem oil seal lip	Dia. 8.5 (0.335)		Dia. 8.8 (0.346)	Replace oil seal	Don't damage lip.
		Valve spring: Tension N (kgf/lb) (When compressed to installed length) 44.5mm(1.752in)		142 (14.5/30.9)	127 (13.0/28.7)	Replace valve spring	
		Valve spring: Free height mm (in)		60.6 (2.39)	58.0 (2.28)		
		Valve spring: Inclination mm (in) 		less than 1.9 (0.075)	2.7 (0.106)		

LENGTH

FEET TO METERS

ft.	0	1	2	3	4	5	6	7	8	9	ft.
	m	m	m	m	m	m	m	m	m	m	
—	—	0.305	0.610	0.914	1.219	1.524	1.829	2.134	2.438	2.743	—
10	3.048	3.353	3.658	3.962	4.267	4.572	4.877	5.182	5.486	5.791	10
20	6.096	6.401	6.706	7.010	7.315	7.620	7.925	8.230	8.534	8.839	20
30	9.144	9.449	9.754	10.058	10.363	10.668	10.973	11.278	11.582	11.887	30
40	12.192	12.497	12.802	13.106	13.411	13.716	14.021	14.326	14.630	14.935	40
50	15.240	15.545	15.850	16.154	16.459	16.764	17.069	17.374	17.678	17.983	50
60	18.288	18.593	18.898	19.202	19.507	19.812	20.117	20.422	20.726	21.031	60
70	21.336	21.641	21.946	22.250	22.555	22.860	23.165	23.470	23.774	24.079	70
80	24.384	24.689	24.994	25.298	25.603	25.908	26.213	26.518	26.822	27.127	80
90	27.432	27.737	28.042	28.346	28.651	28.956	29.261	29.566	29.870	30.175	90
100	30.480	30.785	31.090	31.394	31.699	32.004	32.309	32.614	32.918	33.223	100

METERS TO FEET

m	0	1	2	3	4	5	6	7	8	9	
	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	
—	—	3.2808	6.5617	9.8425	13.1234	16.4042	19.6850	22.9659	26.2467	29.5276	—
10	32.8084	36.0892	39.3701	42.6509	45.9318	49.2126	52.4934	55.7743	59.0551	62.3360	10
20	65.6168	68.8976	72.1785	75.4593	78.7402	82.0210	85.3018	88.5827	91.8635	95.1444	20
30	98.4252	101.7060	104.9869	108.2677	111.5486	114.8294	118.1102	121.3911	124.6719	127.9528	30
40	131.2336	134.5144	137.7953	141.0761	144.3570	147.6378	150.9186	154.1995	157.4803	160.7612	40
50	164.0420	167.3228	170.6037	173.8845	177.1654	180.4462	183.7270	187.0079	190.2887	193.5696	50
60	196.8504	200.1312	203.4121	206.6929	209.9738	213.2546	216.5354	219.8163	223.0971	226.3780	60
70	229.6588	232.9396	236.2205	239.5013	242.7822	246.0630	249.3438	252.6247	255.9055	259.1864	70
80	262.4672	265.7480	269.0289	272.3097	275.5906	278.8714	282.1522	285.4331	288.7139	291.9948	80
90	295.2756	298.5564	301.8373	305.1181	308.3990	311.6798	314.9606	318.2415	321.5223	324.8032	90
100	328.0840	331.3648	334.6457	337.9265	341.2074	344.4882	347.7690	351.0499	354.3307	357.6116	100

MILES TO KILOMETERS

miles	0	1	2	3	4	5	6	7	8	9	
	km	km	km	km	km	km	km	km	km	km	
—	—	1.609	3.219	4.828	6.437	8.047	9.656	11.265	12.875	14.484	—
10	16.093	17.703	19.312	20.921	22.531	24.140	25.749	27.359	28.968	30.577	10
20	32.187	33.796	35.405	37.015	38.624	40.234	41.843	43.452	45.062	46.671	20
30	48.280	49.890	51.499	53.108	54.718	56.327	57.936	59.546	61.155	62.764	30
40	64.374	65.983	67.592	69.202	70.811	72.420	74.030	75.639	77.248	78.858	40
50	80.467	82.076	83.686	85.295	86.904	88.514	90.123	91.732	93.342	94.951	50
60	96.560	98.170	99.779	101.388	102.998	104.607	106.216	107.826	109.435	111.044	60
70	112.654	114.263	115.872	117.482	119.091	120.701	122.310	123.919	125.529	127.138	70
80	128.747	130.357	131.966	133.575	135.185	136.794	138.403	140.013	141.622	143.231	80
90	144.841	146.450	148.059	149.669	151.278	152.887	154.497	156.106	157.715	159.325	90
100	160.934	162.543	164.153	165.762	167.371	168.981	170.590	172.199	173.809	175.418	100

KILOMETERS TO MILES

km	0	1	2	3	4	5	6	7	8	9	
	miles	miles	miles	miles	miles	miles	miles	miles	miles	miles	
—	—	0.621	1.243	1.864	2.485	3.107	3.728	4.350	4.971	5.592	—
10	6.214	6.835	7.456	8.078	8.699	9.321	9.942	10.563	11.185	11.806	10
20	12.427	13.049	13.670	14.292	14.913	15.534	16.156	16.777	17.398	18.020	20
30	18.641	19.262	19.884	20.505	21.127	21.748	22.369	22.991	23.612	24.233	30
40	24.855	25.476	26.098	26.719	27.340	27.962	28.583	29.204	29.826	30.447	40
50	31.069	31.690	32.311	32.933	33.554	34.175	34.797	35.418	36.039	36.661	50
60	37.282	37.904	38.525	39.146	39.768	40.389	41.010	41.632	42.253	42.875	60
70	43.496	44.117	44.739	45.360	45.981	46.603	47.224	47.845	48.467	49.088	70
80	49.710	50.331	50.952	51.574	52.195	52.816	53.438	54.059	54.681	55.302	80
90	55.923	56.545	57.166	57.787	58.409	59.030	59.652	60.273	60.894	61.516	90
100	62.137	62.758	63.380	64.001	64.622	65.244	65.865	66.487	67.108	67.729	100