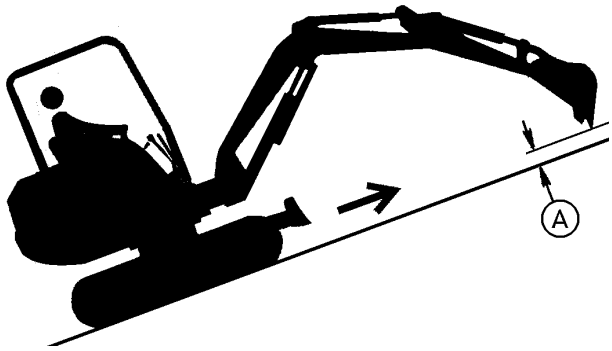
DRIVE MACHINE SAFELY

- Before driving the machine, always confirm that the travel levers/pedals direction corresponds to the direction you wish to drive.

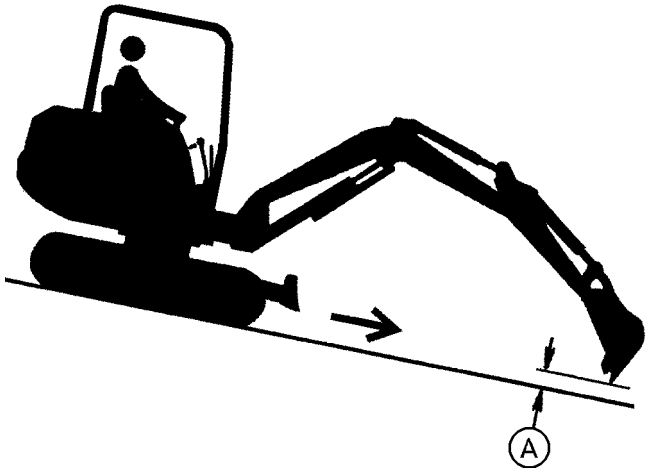
  - Be sure to detour around any obstructions.
  - Avoid traveling over obstructions. Soil, fragments of rocks, and/or metal pieces may scatter around the machine. Don't allow personnel to stay around the machine while traveling.



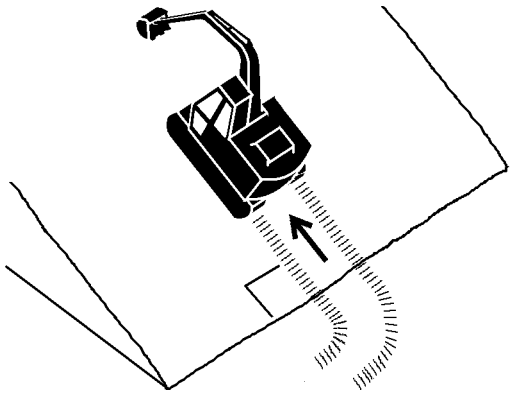
SA-663

- Driving on a slope may cause the machine to slip or overturn, possibly resulting in serious injury or death.

  - When driving up or down a slope, keep the bucket facing the direction of travel, approximately 200 to 300 mm (A) above the ground.
  - If the machine starts to skid or becomes unstable, immediately lower the bucket to the ground and stop traveling.



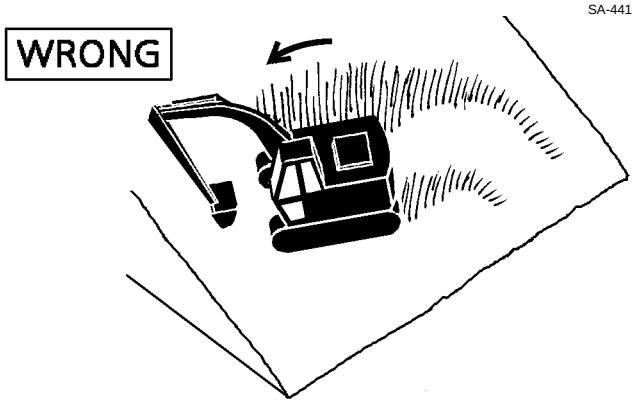
SA-664



SA-441

  - Driving across the face of a slope or steering on a slope may cause the machine to skid or turnover. If the direction must be changed, move the machine to level ground, then, change the direction to ensure sage operation.

019-E01D-0492



SA-589

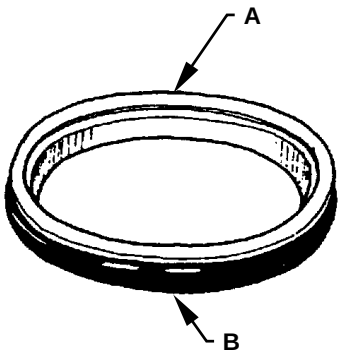
Floating Seal Precautions

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.



W105-03-05-019

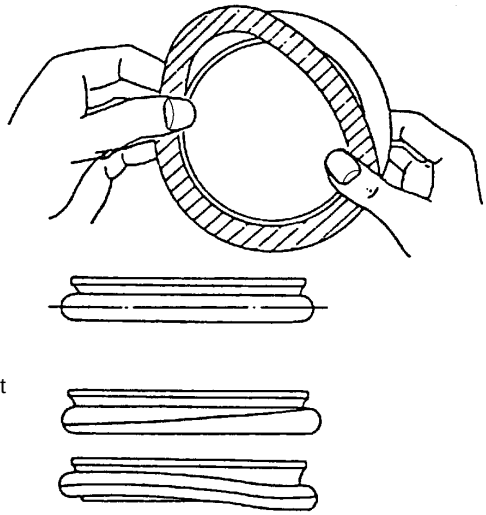
2. If incorrectly assembled, oil leakage or damage will occur. Be sure to do the following, to prevent trouble.

   (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.

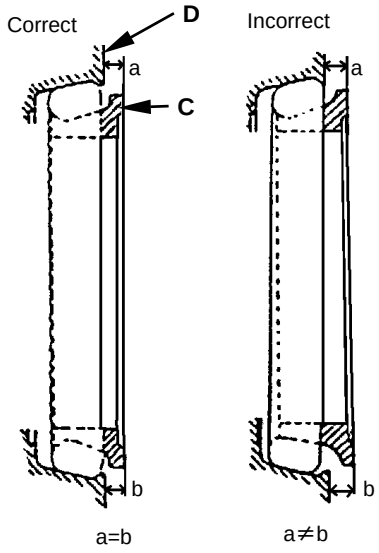
   (2) Clean the floating seal and seal mounting bores. Check the bore surface for scuffing or scoring by touching the surface with touch.

   (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.



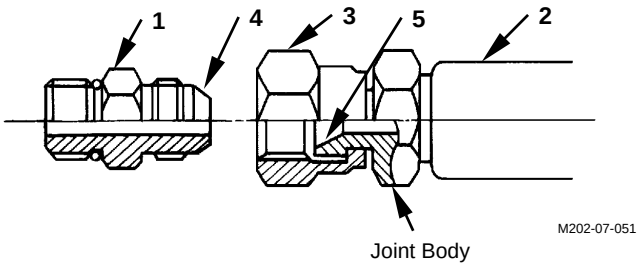
W105-03-05-020



W110-03-05-004

PIPING JOINT

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

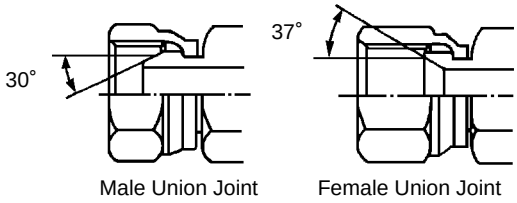


M202-07-051

Union Joint

Metal sealing surfaces (4) and (5) of adapter (1) and hose (2) fit together to seal pressure oil. Union joints are used to join small-diameter lines.

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



W105-01-01-017

Description	Wrench Size mm	Wrench Size mm	Tightening Torque
	Union Nut	Hose Fittings	N·m (kgf·m, lbf·ft)
30° male	17	17	24.5 (2.5,18)
	19	19	29.5 (3.0,22)
	22	22	39 (4.0,28.5)
	27	27	64 (6.5,47)
	32	32	137 (14,101)
	36	36	175 (18,129)
	41	41	205 (21,151)
37° female	17	14	24.5 (2.5,18)
	19	17	29.5 (3.0,22)
	22	19	39 (4.0,28.5)
	27	22	64 (6.5,47)
	32	27	137 (14,101)
	36	32	175 (18,129)
	41	36	205 (21,151)

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

Assemble Pump Device

IMPORTANT: When replacing ball bearing (6), install ball bearing (6) onto shaft (5) first and install retaining ring (7).

1. Install ball bearing (6) onto shaft (5) and install retaining ring (7). Insert the shaft assembly into body S (10).

2. Apply grease onto O-ring (2) on the outer diameter on seal holder (3) and oil seal (4) lip part. Install oil seal (4) and O-ring (2) onto seal holder (3). Install seal holder (3) onto shaft (5) by using special tool (ST 7274). Install retaining ring (1).

3. Install O-ring (9) onto plug (8). Install plug (8) into body S (10).
   : 6 mm

NOTE: As for plug (8) and O-ring (9), refer to W2-3-4.

4. Install spring (13) and stopper pin (14) to body S (10).

5. Apply grease onto ceramic balls (15) (2 used) and swash plate (16) sliding surface. Install ceramic balls (15) (2 used) into body S (10) and install swash plate (16).

6. Install washer (23), spring (24), and washer (25) to cylinder block (22) in this order.

7. Push washer (25) and spring (24) by using a press and install retaining ring (26).

8. Turn cylinder block (22) upside down and install needles (21) (3 used). Install washer (20) and holder (19).

9. Install plungers (17) (11 used) and retainer (18) into cylinder block (22).

10. Align the hole in swash plate (16) on body S (10) with the spherical part of spring holder (29). Install spring holder (29) and spring (30).

11. Install the cylinder block (22) assembly to body S (10). Install coupling (45) onto the end of shaft (5).

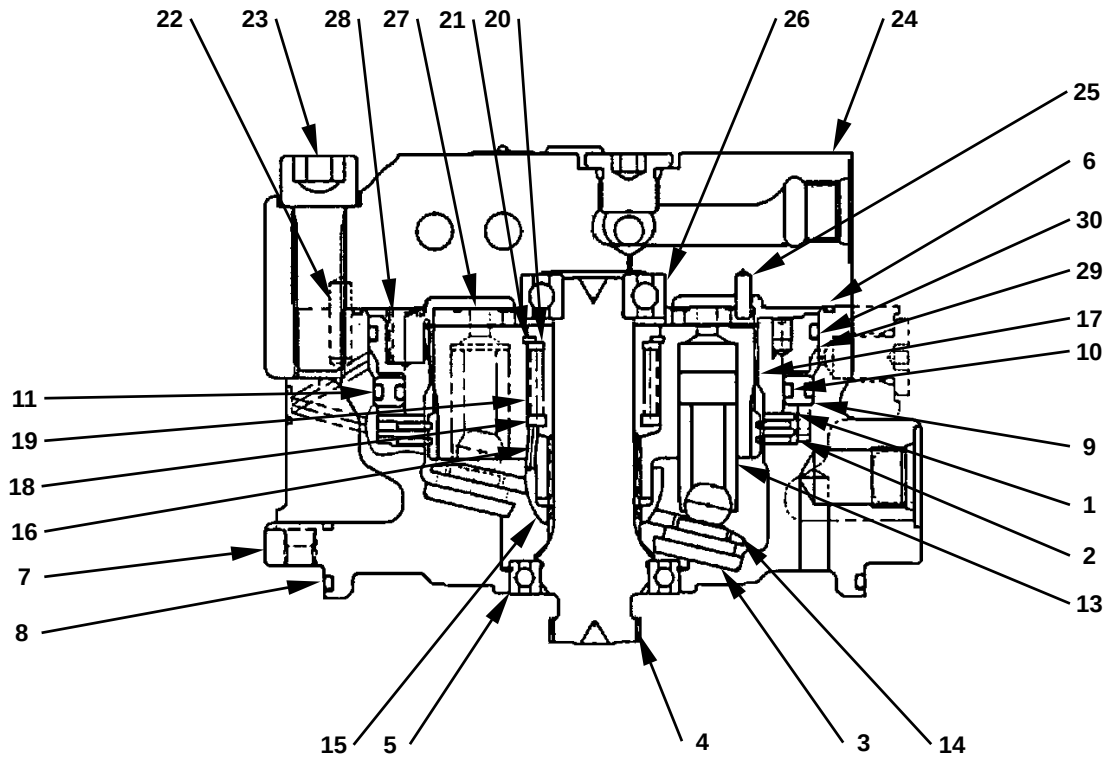
12. Install O-ring (42) onto plug (43). Install choke (41) and plug (43) into body H (37).
    : 4 mm (choke)
    : 6 to 9 N·m
    (0.6 to 0.9 kgf·m, 4.4 to 6.6 lbf·ft)
    : 5 mm (plug)
    : 15 to 20 N·m
    (1.5 to 2 kgf·m, 11 to 14.5 lbf·ft)

13. Install O-ring (34) onto sleeve (33). Install sleeve (33) into body H (37). Install control piston (32) into sleeve (33).
    : 35 mm (sleeve)
    : 50 to 60 N·m
    (5.1 to 6.1 kgf·m, 37 to 44 lbf·ft)

14. Install knock pin (35) for valve plate (27), valve plate (27), spring guide (31), knock pins (12) (2 used), and gasket (11) into body H (37).

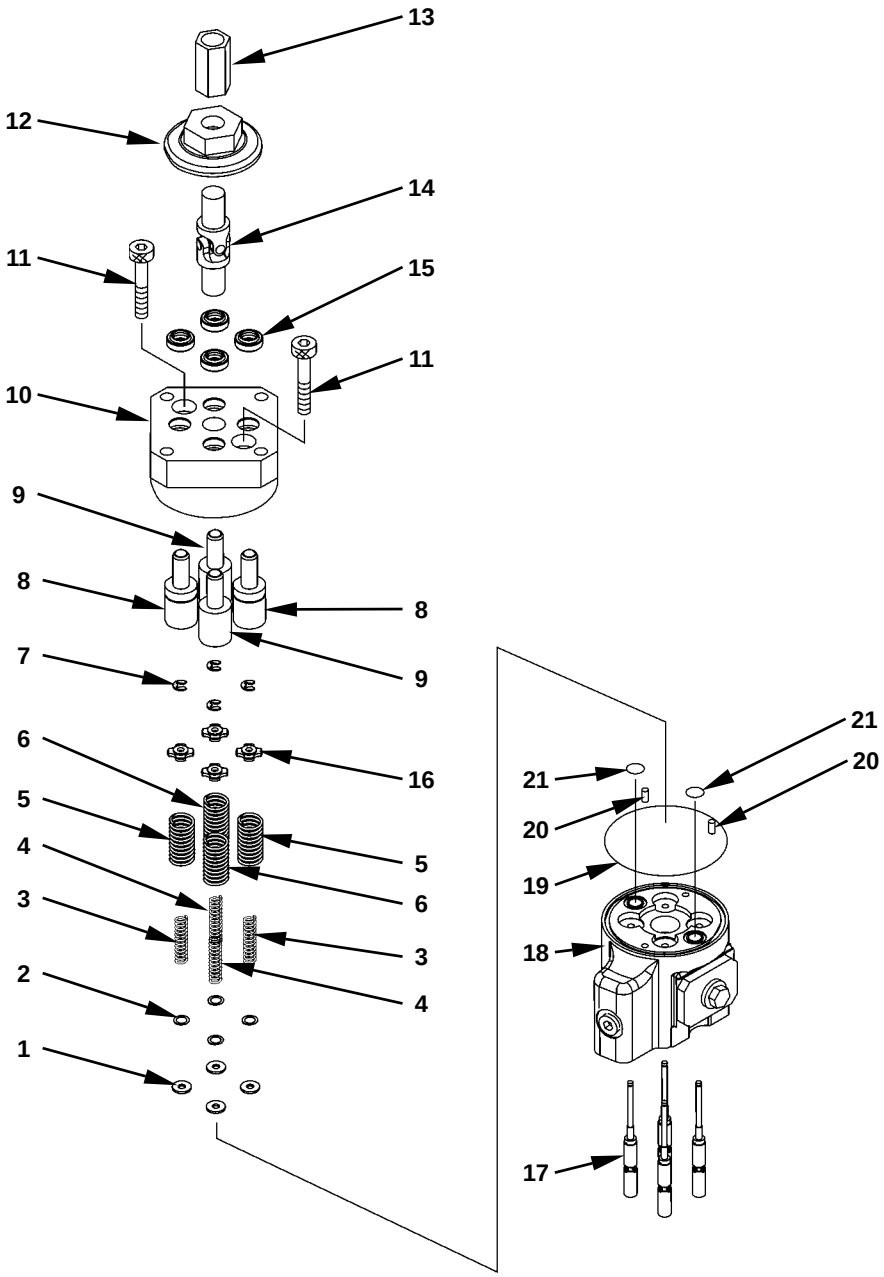
NOTE: As for knock pin (12), refer to W2-3-4.

ASSEMBLE SWING MOTOR



1 - Plate (2 Used)
2 - Friction Plate (2 Used)
3 - Swash Plate
4 - Shaft
5 - Bearing
6 - O-Ring
7 - Case
8 - O-Ring
9 - Collar
10 - O-Ring
11 - O-Ring
13 - Plunger (9 Used)
14 - Retainer
15 - Holder
16 - Pin (3 Used)
17 - Rotor
18 - Washer
19 - Spring
20 - Washer
21 - Retaining Ring
22 - Pin
23 - Socket Bolt (3 Used)
24 - Cover
25 - Pin
26 - Bearing
27 - Valve Plate
28 - Spring (22 Used)
29 - Brake Piston
30 - O-Ring

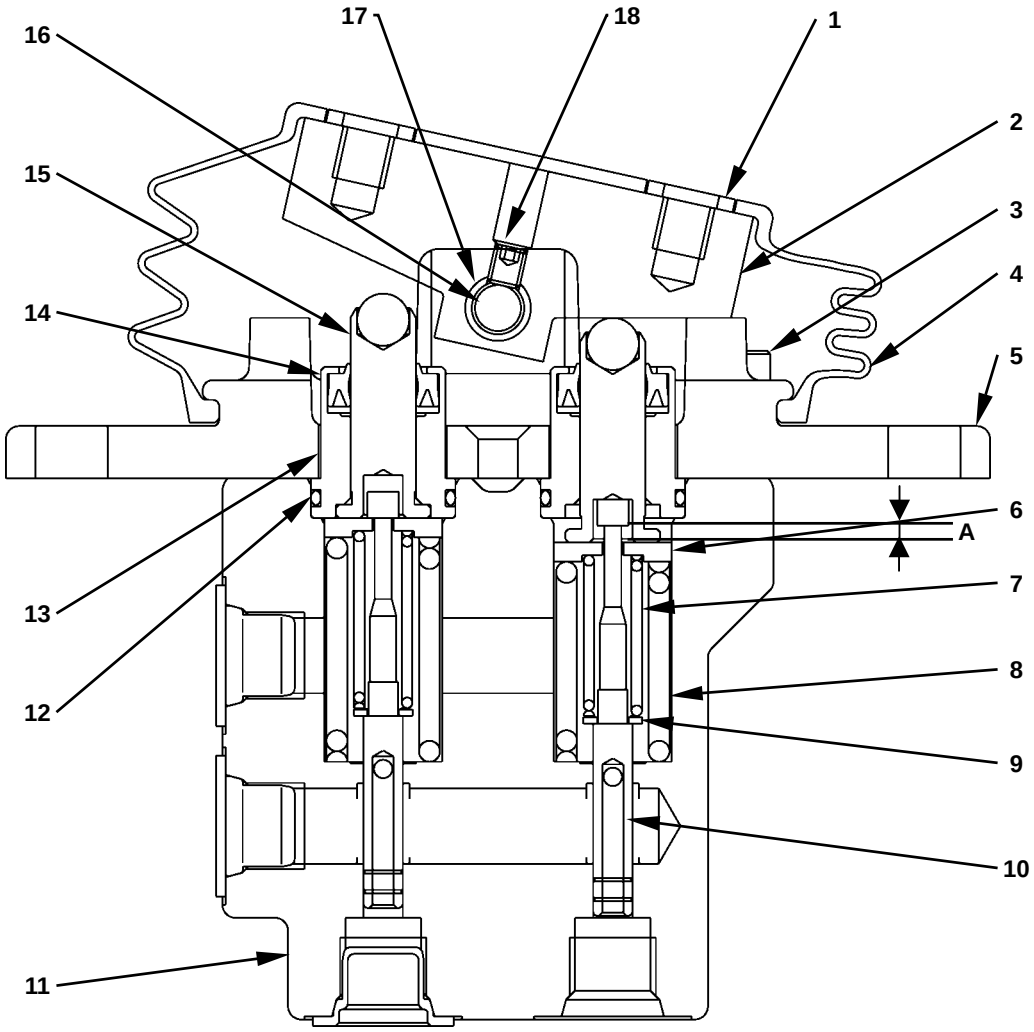
DISASSEMBLE FRONT PILOT VALVE



W567-02-06-002

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

ASSEMBLE BLADE PILOT VALVE



W1CF-02-07-001

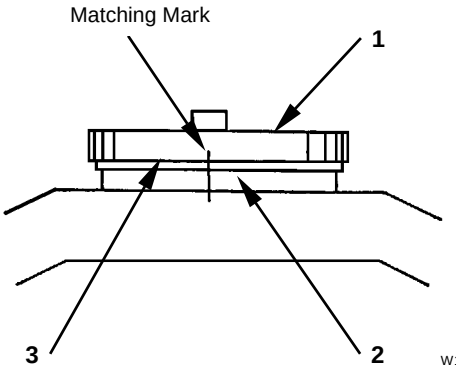
1 - Spacer (2 Used)
2 - Cam
3 - Socket Bolt (2 Used)
4 - Boot
5 - Holder
6 - Spring Guide (2 Used)
7 - Spring (2 Used)
8 - Spring (2 Used)
9 - Spacer (2 Used)
10 - Spool (2 Used)
11 - Casing
12 - O-Ring (2 Used)
13 - Bushing (2 Used)
14 - Oil Seal (2 Used)
15 - Pusher (2 Used)
16 - Pin
17 - Bushing (2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

REMOVE AND INSTALL SWING BEARING

In this section, the procedures start on the premise that the upperstructure has already been removed.

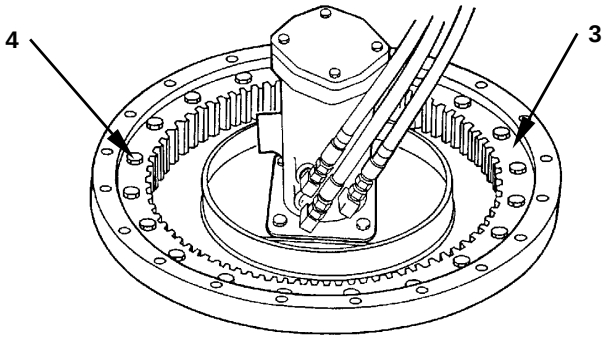
Removal

1. Put the matching marks on inner race (3) of swing bearing (1) and track frame (2).



W105-03-01-001

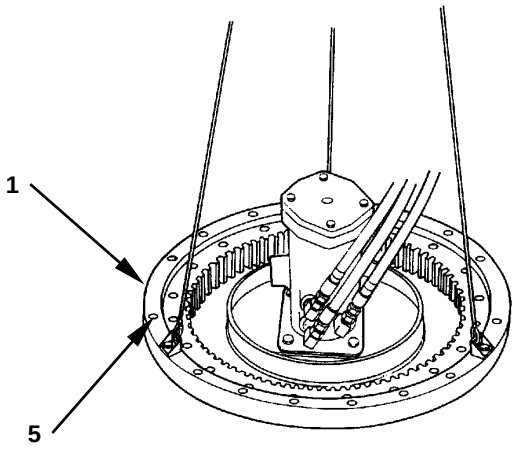
2. Remove inner race (3) mounting bolts (4) (20 used) from swing bearing (1).
   : 19 mm



W507-02-03-002

CAUTION: Swing bearing weight: 55 kg (121 lb)

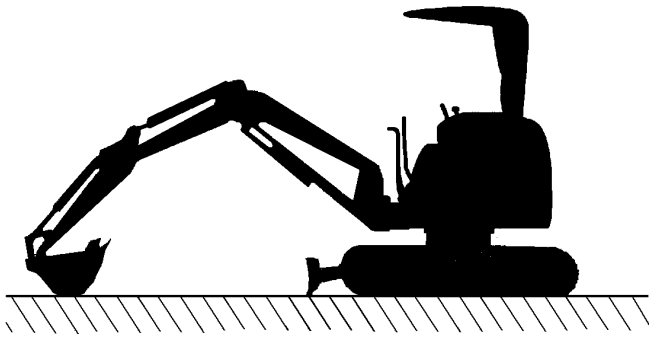
3. Install eyebolt with nut into bolt hole (5) on swing bearing (1). Hoist and remove swing bearing (1).



W507-03-01-001

REMOVE AND INSTALL CENTER JOINT

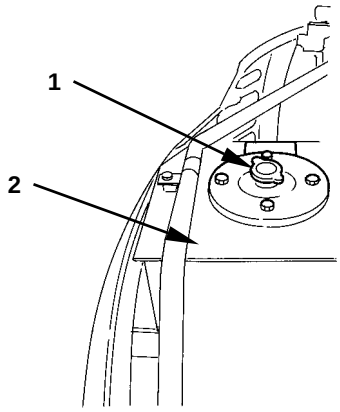
CAUTION: Escaping fluid under pressure may penetrate the skin and eyes, and cause serious injury. Release the pressure before removing the hydraulic or other lines.
Hot hydraulic oil just after operation may spurt and cause severe burns. Wait for oil in order to cool before starting any work.
Do not turn the cap on hydraulic oil tank quickly.
The cap may fly off by internal pressure. Release any remaining pressure and remove the cap.



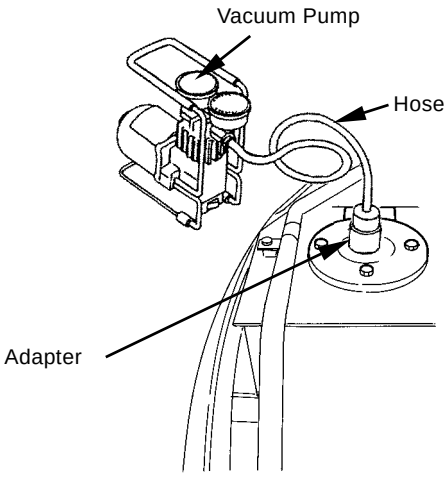
M570-07-005

Preparation

1. Place the machine on a level, solid surface. Lower the front attachment onto the ground.
2. Stop the engine. Loosen cap (1) on hydraulic oil tank (2) and release any remaining pressure.
3. Remove cap (1) on hydraulic oil tank (2).
4. Install a vacuum pump to the hole without cap (1) and maintain negative pressure in hydraulic oil tank.
   Run the vacuum pump continuously while working.

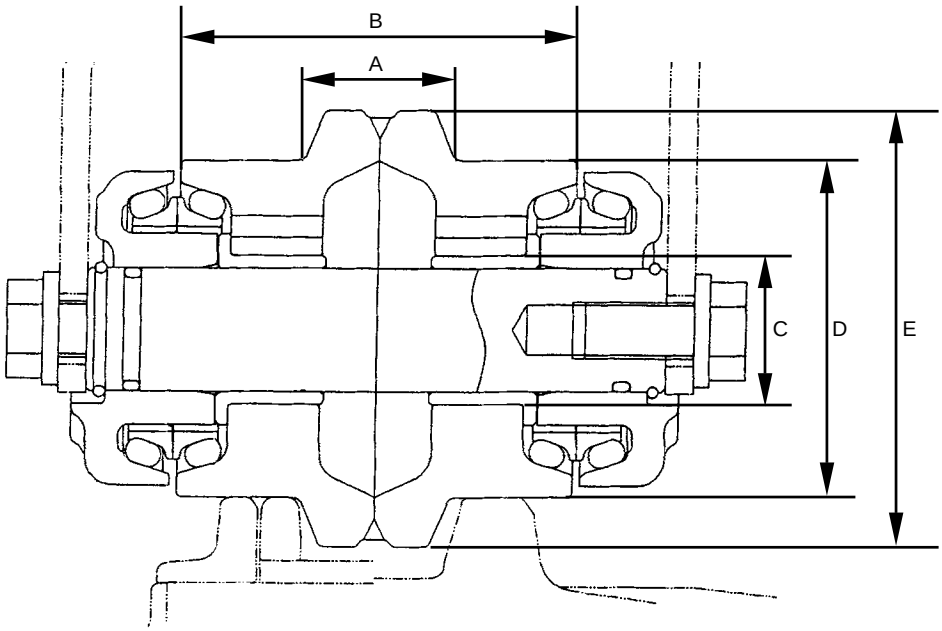


W1LD-01-03-001



W1LD-01-03-002

Lower Roller



W1LA-03-06-001

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	41(1.61)	[35 (1.38)]	Cladding by welding and finish or replace
B	110 (4.33)	-	
C	42 (1.65)	-	
D	95 (3.70)	87 (3.42)	
E	123 (4.84)	-	

Axle and Bushing

Unit: mm (in)

		Standard	Allowable Limit	Remedy
Axle	Outer Dia.	35.0 (1.38)	-	Replace
Bushing	Inner Dia.	35.0 (1.38)	-	
	Flange Thickness	-	-	

NOTE: Values in [ ] are just for reference.

Lubricant Oil

Engine oil: SAE30 CD class.
Engine oil amount: 70 mL (0.0154 US gal)

IMPORTANT: If the air in a cylinder is suddenly compressed, the temperature inside will rise. As the temperature of hydraulic oil will rise, the seals and rings may be damaged.

4. Retract the cylinder rod to the stroke end. Start the engine. Extend the cylinder rod slowly. Align the pin (8) holes on boom swing cylinder (6) and the swing post.

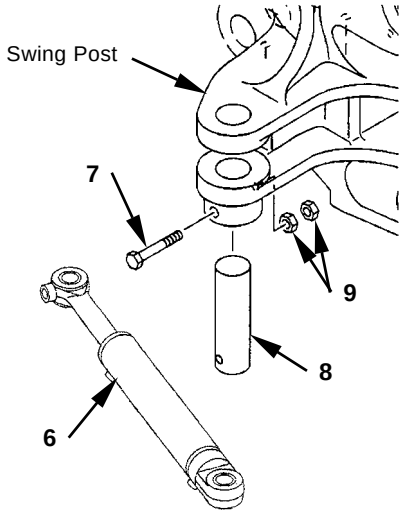
NOTE: When the work in step 4 is finished, almost all air in the cylinder has been released.

5. Apply grease onto the surface of pin (8). Align the bolt (7) holes on swing post and pin (8). Install pin (8).

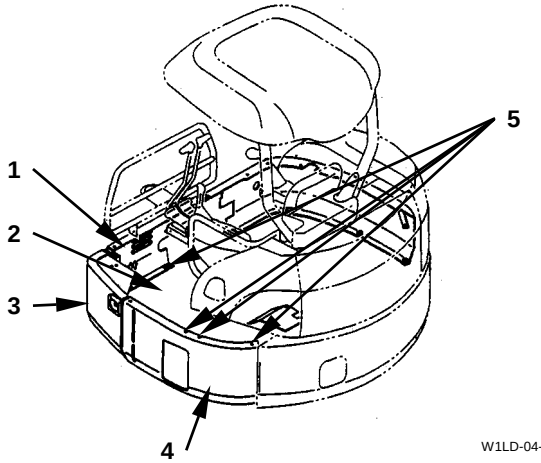
6. Apply LOCTITE #262 onto nuts (9) (2 used). Install bolt (7). Install nuts (9) (2 used) so that the clearance between the boss of swing post and nut (9) is 2 to 3 mm (0.08 to 0.12 in).
   : 19 mm
   : 90 N·m (9.2 kgf·m, 66 lbf·ft)

7. Install covers (1, 3, 4) onto main frame (2) with bolt (5).
   : 13 mm
   : 19.5 N·m (2.0 kgf·m, 15 lbf·ft)
   : 6 mm
   : 29.5 N·m (3.0 kgf·m, 22 lbf·ft)
   : 8 mm
   : 64 N·m (6.5 kgf·m, 47 lbf·ft)

8. After completing the work, fill hydraulic oil to the specified level. Operate every cylinder to the stroke end several times and release the pressure in the circuit. Check for any oil leaks.

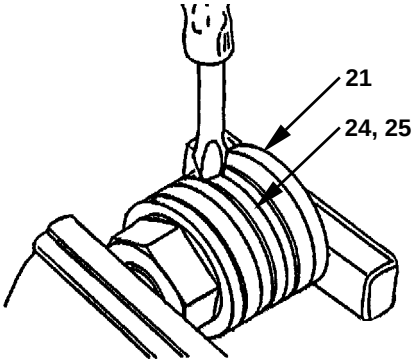


W1LA-04-02-004



W1LD-04-02-011

11. Insert a screwdriver between piston (21) and seal ring (24). Raise seal ring (24). Cut seal ring (24) by using a pair of pliers and remove seal ring (24) from piston (21).
    Remove O-ring (25) in the same procedures. Do not damage piston (21) when removing the seals.



W506-04-02-007

12. Remove stopper (11), connector (10), and retainer (12) from cylinder head (3).

13. Remove backup ring (13) and O-ring (14) from the outside of retainer (12).

14. Remove stopper (17), spacer (16), and cushion ring (15) from the inside of retainer (12).

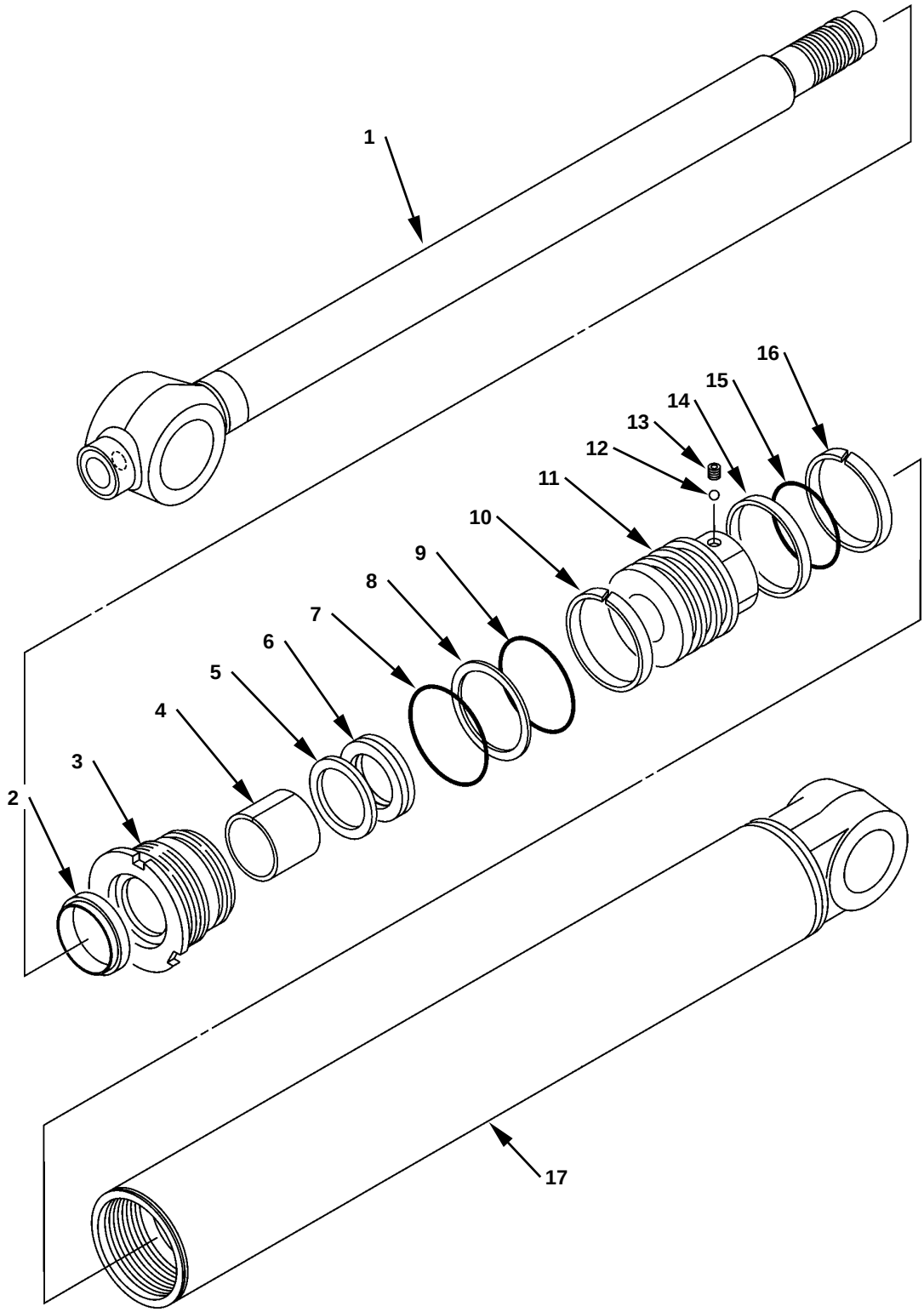
15. Remove wiper ring (2), U-ring (9), and backup ring (8) from the inside of cylinder head (3).

16. Remove O-ring (4), backup ring (5), and O-ring (6) from the outside of cylinder head (3).

IMPORTANT: Replace bushing (7) with the new one when removing bushing (7).

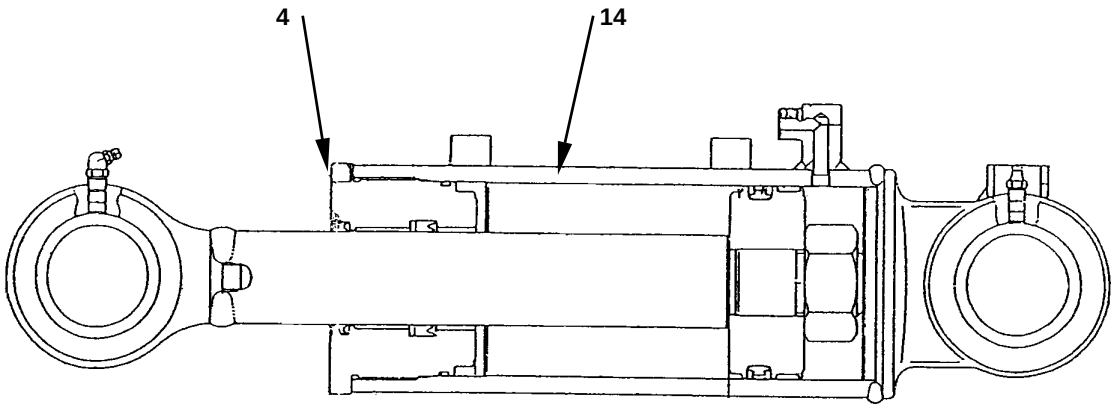
17. Remove bushing (7) from the inside of cylinder head (3) by using special tool (copper spatula).

DISASSEMBLE BOOM SWING CYLINDER



W1LD-04-02-008

1 - Piston Rod
2 - Wiper Ring
3 - Cylinder Head
4 - Bushing
5 - Backup Ring
6 - U-Ring
7 - O-Ring
8 - Backup Ring
9 - O-Ring
10 - Slide Ring
11 - Piston
12 - Steel Ball
13 - Set Screw
14 - Seal Ring
15 - O-Ring
16 - Slide Ring
17 - Cylinder Tube



W1LA-04-02-013

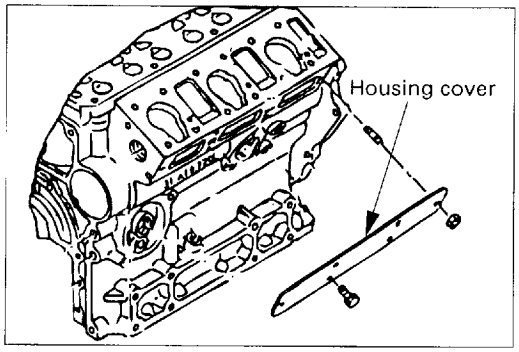


Fig. 156

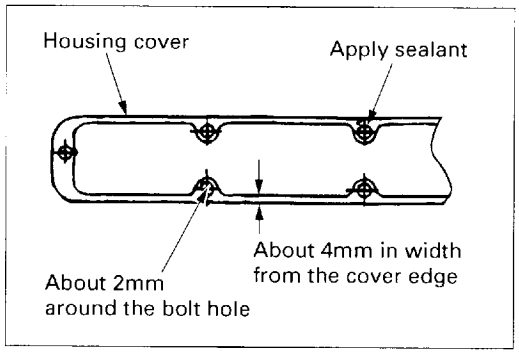


Fig. 157

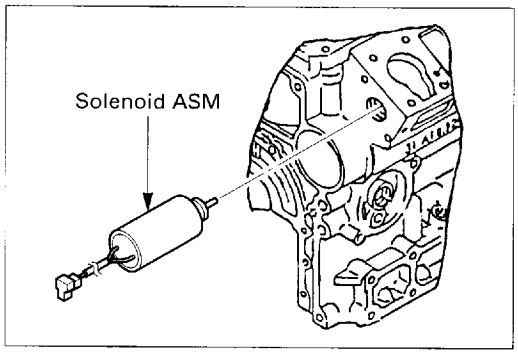


Fig. 158

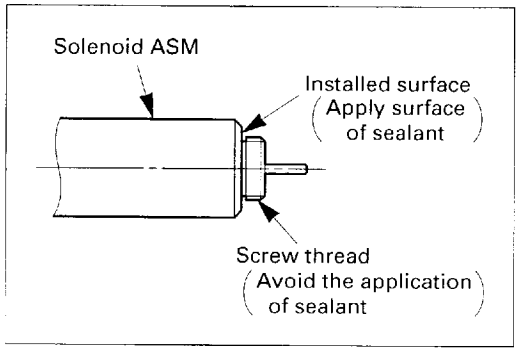


Fig. 159

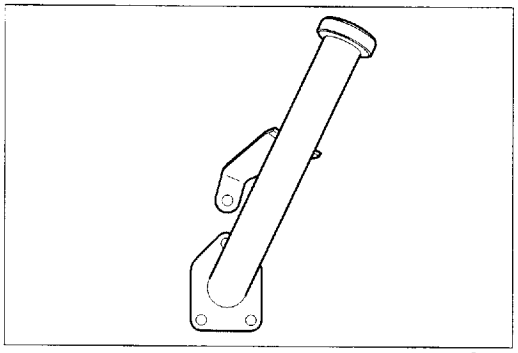


Fig. 160

050E100022

Injection pump housing cover

After applying sealant (TB1207B) to the housing cover, install it to the cylinder block by the side of the injection pump.

N·m (kgf·m/ft. lb)

Tightening torque	8 - 12 (0.8 – 1.2 / 6 – 9)

Note:

The areas of the housing cover to which sealant is applied are about 4 mm in width from the cover edge and about 2 mm around the bolts.

Solenoid assembly

1. Apply sealant (TB1207C) to the surface (bite groove) in which the solenoid is installed.

Note:

Avoid the application of sealant to the screw thread.

2. Screw in the solenoid from the rear of the cylinder block (the rear of the No. 4 injection pump rack), and then tighten it to the specified torque.

N·m (kgf·m/ft. lb)

Tightening torque	15 - 25 (1.5 – 2.5 / 11 – 18)

Oil filler

Apply a 2 mm bead of sealant TB1207B or equivalent to the flange of the oil filler.
Install the oil filler to the cylinder block, and tighten the nuts to the specified torque.

N·m (kgf·m/ft. lb)

Tightening torque	8 – 12 (0.8 – 1.2/6 –9)