GENERAL SPECIFICATIONS

Component			Specification	
			1.7 m (5' 7") Standard Arm	2.25 m (7' 5") Arm
Bucket Capacity	SAE / CECE		0.28 m^3 (0.37 yd^3) / 0.24 m^3 (0.31 yd^3)	0.20 m^3 (0.26 yd^3) / 0.18 m^3 (0.23 yd^3)
Operating Weight			8.38 tons	8.44 tons
Engine	Model		4TNV98-Z WDB8	
	Displacement (Total dis. Volume)		3,319 cc (202.54 in^3)	
	Rated Power (Net)		54.6 hp @ 2,000 rpm	
			40.7 kW @2,000 rpm	
Front Attachment	Boom Length		3,380 mm (11' 1")	
	Arm Length		1,700 mm (5' 7")	2,250 mm (7' 5")
Transport Dimension	Length		6,165 mm (20' 2")	6,265 mm (20' 7")
	Height		2,605 mm (8' 7")	
	Height (Boom)		2,085 mm (6' 10")	2,410 mm (7' 11")
	Width		2,300 mm (7' 7")	
Performance	Max.digging Force	Bucket (SAE/ISO)	4,907 kgf / 5,570 kgf (48.1 kN / 54.6 kN)	4,914 kgf / 5,575 kgf (48.2 kN / 54.7 kN)
		Arm (SAE/ISO)	4,032 kgf / 4,166 kgf (39.5 kN / 40.9 kN)	3,385 kgf / 3,474 kgf (33.2 kN / 34.1 kN)
	Traveling Speed	1-speed	2.9 km/h (1.8 MPH)	
		2-speed	4.6 km/h (2.9 MPH)	
	Swing Speed		9.8 rpm	
	Drawbar Pull		6,200 kg (13,668 lb)	
Hydraulic Pump	Type		Variable displacement axial piston pump	
	Max. Flow Rate		144 liters/min (38 gal/min) (Gear pump: 22 liters/min (5.8 gal/min))	
	Main Relief Set Pressure		280 kg/cm^2 (3,980 psi)	
Track	Shoe Width		450 mm (1' 6")	
	Tumbler Distance		2,200 mm (7' 3")	
Control	Lever Control Type		Hydraulic pilot	
	Lever Pattern		SAE / BHL	
Tank	Fuel Tank		110 liters (29.1 US gal.)	
	Hydraulic Tank		87 liters (23.0 US gal.)	
Ground Pressure			0.39 kg/cm^2 (5.55 psi)	

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The following General Torque Values must be used in all cases where **SPECIAL TORQUE VALUES** are not given.

NOTE: *Torque values listed throughout this manual are lubricated (wet) threads; values should be increased 1/3 for nonlubricated (dry) threads.*

Thread Size	Heat Treated Material Grade 5 and Grade 8			
	Grade 5 (3 Radial Dashes On Head)		Grade 8 (6 Radial Dashes On Head)	
	Foot Pounds (ft lb)	Newton Meter (Nm)	Foot Pounds (ft lb)	Newton Meter (Nm)
1/4" - 20	6	8	9	12
1/4" - 28	7	9	11	15
5/16" - 18	13	18	18	24
5/16" - 24	15	20	21	28
3/8" - 16	24	33	34	46
3/8" - 24	27	37	38	52
7/16" - 14	38	52	54	73
7/16" - 20	42	57	60	81
1/2" - 13	58	79	82	111
1/2" - 20	65	88	90	122
9/16" - 12	84	114	120	163
9/16" - 18	93	126	132	179
5/8" - 11	115	156	165	224
5/8" - 18	130	176	185	251
3/4" - 10	205	278	290	393
3/4" - 16	240	312	320	434
7/8" - 9	305	414	455	617
7/8" - 14	334	454	515	698
1" - 8	455	617	695	942
1" - 14	510	691	785	1064
1 1/8" - 7	610	827	990	1342
1 1/8" - 12	685	929	1110	1505
1 1/4" - 7	860	1166	1400	1898
1 1/4" - 12	955	1295	1550	2102
1 3/8" - 6	1130	1532	1830	2481
1 3/8" - 12	1290	1749	2085	2827
1 1/2" - 6	1400	2034	2430	3295
1 1/2" - 12	1690	2291	2730	3701
1 3/4" - 5	2370	3213	3810	5166
2" - 4 1/2	3550	4813	5760	7810

NOTE: *If any bolts and nuts are found loose or at values less than what the chart states, it is recommended that the loose bolt and/or nut be replaced with a new one.*

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TORQUE VALUES FOR STANDARD METRIC FASTENERS

NOTE: *The units for the torque values are kg•m (ft lb).*

Dia. x Pitch (mm)	Grade										
	3.6 (4A)	4.6 (4D)	4.8 (4S)	5.6 (5D)	5.8 (5S)	6.6 (6D)	6.8 (6S)	6.9 (6G)	8.8 (8G)	10.9 (10K)	12.9 (12K)
M5 x Std.	0.15 (1.08)	0.16 (1.15)	0.25 (1.80)	0.22 (1.59)	0.31 (2.24)	0.28 (2.02)	0.43 (3.11)	0.48 (3.47)	0.50 (3.61)	0.75 (5.42)	0.90 (6.50)
M6 x Std.	0.28 (2.02)	0.30 (2.16)	0.45 (3.25)	0.40 (2.89)	0.55 (3.97)	0.47 (3.39)	0.77 (5.56)	0.85 (6.14)	0.90 (6.50)	1.25 (9.04)	1.50 (10.84)
M7 x Std.	0.43 (3.11)	0.46 (3.32)	0.70 (5.06)	0.63 (4.55)	0.83 (6.00)	0.78 (5.64)	1.20 (8.67)	1.30 (9.40)	1.40 (10.12)	1.95 (14.10)	2.35 (16.99)
M8 x Std.	0.70 (5.06)	0.75 (5.42)	1.10 (7.95)	1.00 (7.23)	1.40 (10.12)	1.25 (9.04)	1.90 (13.74)	2.10 (15.18)	2.20 (15.91)	3.10 (22.42)	3.80 (27.48)
M8 x 1	0.73 (5.28)	0.80 (5.78)	1.20 (8.67)	1.00 (7.23)	1.50 (10.84)	1.35 (9.76)	2.10 (15.18)	2.30 (16.63)	2.40 (17.35)	3.35 (24.23)	4.10 (29.65)
M10 x Std.	1.35 (9.76)	1.40 (10.12)	2.20 (15.91)	1.90 (13.74)	2.70 (19.52)	2.35 (19.99)	3.70 (26.76)	4.20 (30.37)	4.40 (31.18)	6.20 (44.84)	7.20 (52.07)
M10 x 1.25	1.50 (10.84)	1.60 (11.57)	2.50 (18.08)	2.10 (15.18)	3.10 (22.42)	2.80 (20.25)	4.30 (31.10)	4.90 (35.44)	5.00 (36.16)	7.00 (50.63)	8.40 (60.75)
M12 x Std.	2.40 (17.35)	2.50 (18.08)	3.70 (26.76)	3.30 (23.86)	4.70 (33.99)	4.20 (30.37)	6.30 (45.56)	7.20 (52.07)	7.50 (54.24)	10.50 (75.94)	12.50 (90.41)
M12 x 1.25	2.55 (18.44)	2.70 (19.52)	4.00 (28.93)	3.50 (25.31)	5.00 (36.16)	4.50 (32.54)	6.80 (49.18)	7.70 (55.69)	8.00 (57.86)	11.20 (81.00)	13.40 (96.92)
M14 x Std.	3.70 (26.76)	3.90 (28.20)	6.00 (13.23)	5.20 (37.61)	7.50 (54.24)	7.00 (50.63)	10.00 (72.33)	11.50 (83.17)	12.00 (86.79)	17.00 (122.96)	20.00 (144.66)
M14 x 1.5	4.10 (29.65)	4.30 (31.10)	6.60 (47.73)	5.70 (41.22)	8.30 (60.03)	7.50 (54.24)	11.10 (80.28)	12.50 (90.41)	13.00 (94.02)	18.50 (133.81)	22.00 (159.12)
M16 x Std.	5.60 (40.50)	6.00 (43.39)	9.00 (65.09)	8.00 (57.86)	11.50 (83.17)	10.50 (75.94)	15.50 (112.11)	17.90 (129.47)	18.50 (133.81)	26.00 (188.05)	31.00 (224.22)
M16 x 1.5	6.20 (44.84)	6.50 (47.01)	9.70 (70.16)	8.60 (62.20)	12.50 (90.41)	11.30 (81.73)	17.00 (122.96)	19.50 (141.04)	20.00 (144.66)	28.00 (202.52)	35.50 (256.77)
M18 x Std.	7.80 (56.41)	8.30 (60.03)	12.50 (90.41)	11.00 (79.56)	16.00 (115.72)	14.50 (104.87)	21.00 (151.89)	27.50 (198.90)	28.50 (206.14)	41.00 (296.55)	43.00 (311.01)
M18 x 1.5	9.10 (65.82)	9.50 (68.71)	14.40 (104.15)	12.50 (90.41)	18.50 (133.81)	16.70 (120.79)	24.50 (177.20)	27.50 (198.90)	28.50 (206.14)	41.00 (296.55)	49.00 (354.41)
M20 x Std.	11.50 (83.17)	12.00 (86.79)	18.00 (130.19)	16.00 (115.72)	22.00 (159.12)	19.00 (137.42)	31.50 (227.83)	35.00 (253.15)	36.00 (260.38)	51.00 (368.88)	60.00 (433.98)
M20 x 1.5	12.80 (92.58)	13.50 (97.64)	20.50 (148.27)	18.00 (130.19)	25.00 (180.82)	22.50 (162.74)	35.00 (253.15)	39.50 (285.70)	41.00 (296.55)	58.00 (419.51)	68.00 (491.84)
M22 x Std.	15.50 (112.11)	16.00 (115.72)	24.50 (177.20)	21.00 (151.89)	30.00 (216.99)	26.00 (188.05)	42.00 (303.78)	46.00 (332.71)	49.00 (354.41)	67.00 (484.61)	75.00 (542.47)
M22 x 1.5	17.00 (122.96)	18.50 (133.81)	28.00 (202.52)	24.00 (173.59)	34.00 (245.92)	29.00 (209.75)	47.00 (339.95)	52.00 (44.76)	56.00 (405.04)	75.00 (542.47)	85.00 (614.80)
M24 x Std.	20.50 (148.27)	21.50 (155.50)	33.00 (238.68)	27.00 (195.29)	40.00 (289.32)	34.00 (245.92)	55.00 (397.81)	58.00 (419.51)	63.00 (455.67)	82.00 (593.10)	92.00 (655.43)
M24 x 2.0	23.00 (166.35)	35.00 (253.15)	37.00 (267.62)	31.00 (224.22)	45.00 (325.48)	38.00 (202.52)	61.00 (441.21)	67.00 (484.61)	74.00 (535.24)	93.00 (672.66)	103.00 (744.99)

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REMOVAL

CAUTION

Avoid disassembling cabin if there are strong wind gusts, which could catch large surface area of cabin shell and push it sideways during lift.

1. Park on firm and level ground.
2. Lower front attachment (bucket) to ground.
3. Shut down engine.
4. Set safety lever on "RELEASED" position.
5. Turn starter switch to "I" (ON) position.

WARNING

If engine must be run while performing maintenance, use extreme care. Always have one person in the cabin at all times. Never leave the cabin with the engine running.

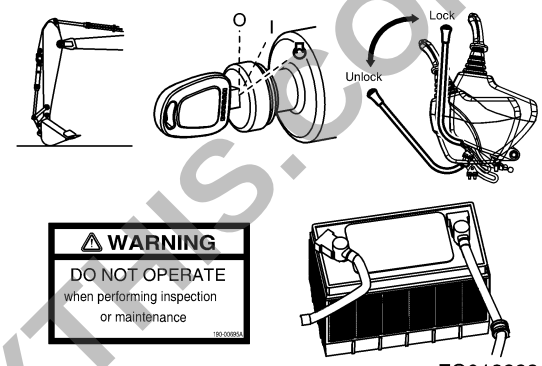


Figure 1

6. Fully stroke work levers (joysticks) in all directions to relieve pressure from accumulators.
7. Set safety lever on "LOCK" position.
8. Turn key to "O" (OFF) position and remove from starter switch.
9. Hang maintenance warning tag on controls.
10. Disconnect the battery cable from the negative (-) battery terminal.
11. Prepare cabin shell for removal by disconnecting wiring connectors for:
    A. Main harness.
    B. Left stand harness.
    C. Right stand harness.
    D. Harness passing next to the air conditioner box.

NOTE: *Control console wiring harnesses and hydraulic piping lines that pass through the floor of the cabin do not need to be disassembled.*

NOTE: *If unit is equipped with a cabin protective structure (for forestry, or hazardous working conditions), it must be removed.*

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PERFORMANCE TESTS

1. Main Relief Pressure

   Working: 300 kg•cm^2

   Travelling: 300 kg•cm^2

2. Actuator Speeds

Operation		Unit	Cycle Time
Boom	Up	sec	3.2 ± 0.3
	Down	sec	3.0 ± 0.4
Arm	Dump	sec	2.9 ± 0.3
	Crowd	sec	3.8 ± 0.3
Bucket	Dump	sec	2.1 ± 0.3
	Crowd	sec	3.3 ± 0.4
Swing (3 Revolutions)		sec	6.25
Dozer	Up	sec	2.4 ± 0.4
	Down	sec	2.9 ± 0.4
Boom Swing	Left	sec	6.9 ± 0.4
	Right	sec	8.6 ± 0.4
Jack-up Speed (3 Turns)	High	sec	14.59 ± 2.0
	Low	sec	23.05 ± 1.5
Travel Speed	High	km/h	4.6
	Low	km/h	2.9
Travel Deviation (20 m)		mm	60

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Condition	Specification
Engine Model	4TNV98-ZW DB8
Barometric Pressure	760 mmHg (20°C (68°F))
Alternator	12V x 60A
Air Cleaner	Installed
Muffler	Installed

Performance Standard	DIN 6270
Power	54.9 ps @ 2,000 rpm (54.1 hp @ 2,000 rpm)
Max. Torque	22.74 - 24.76 kgf•m @ 1,300 rpm (164.48 - 179.09 ft lb @ 1,300 rpm)
Fuel Consumption (100% Load)	180 g/ps•h (6.52 oz/hp•h)

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COMPONENT LOCATIONS

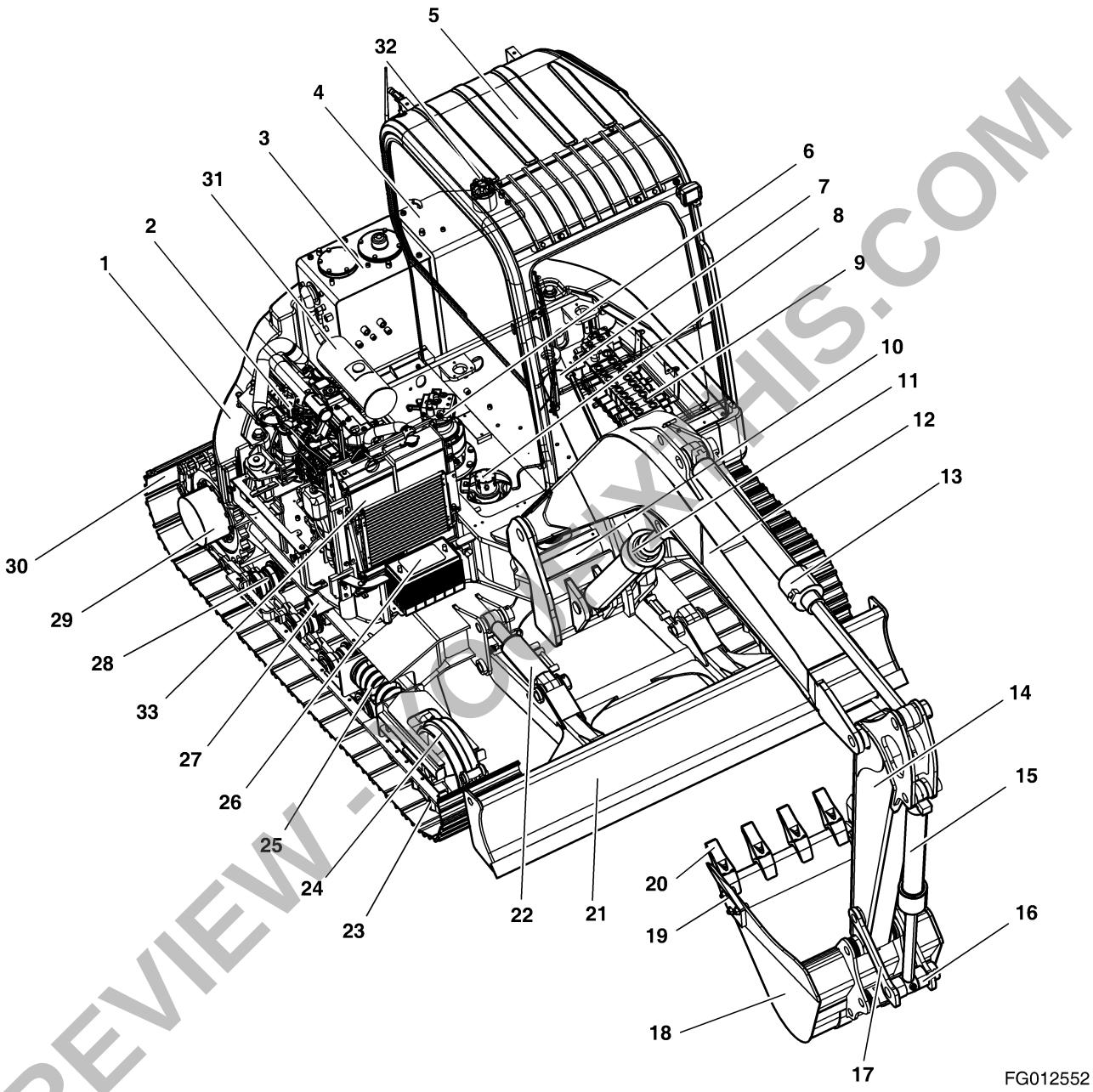


Figure 1

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SP001631

Track Excavator Safety

Edition 1

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Remote Control Valve (Work Lever / Joystick) SP001649
Travel Control Valve.....SP001650
Dozer Valve SP001651
Pedal Valve.....SP001652
Hydraulic Schematic SP001694

Electrical System

Electrical System SP001687
Electrical Schematic (DX60R/DX80R) SP001688

Attachments

Boom and Arm.....SP001653
Bucket.....SP001643

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MEMO

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UPPER ROLLER

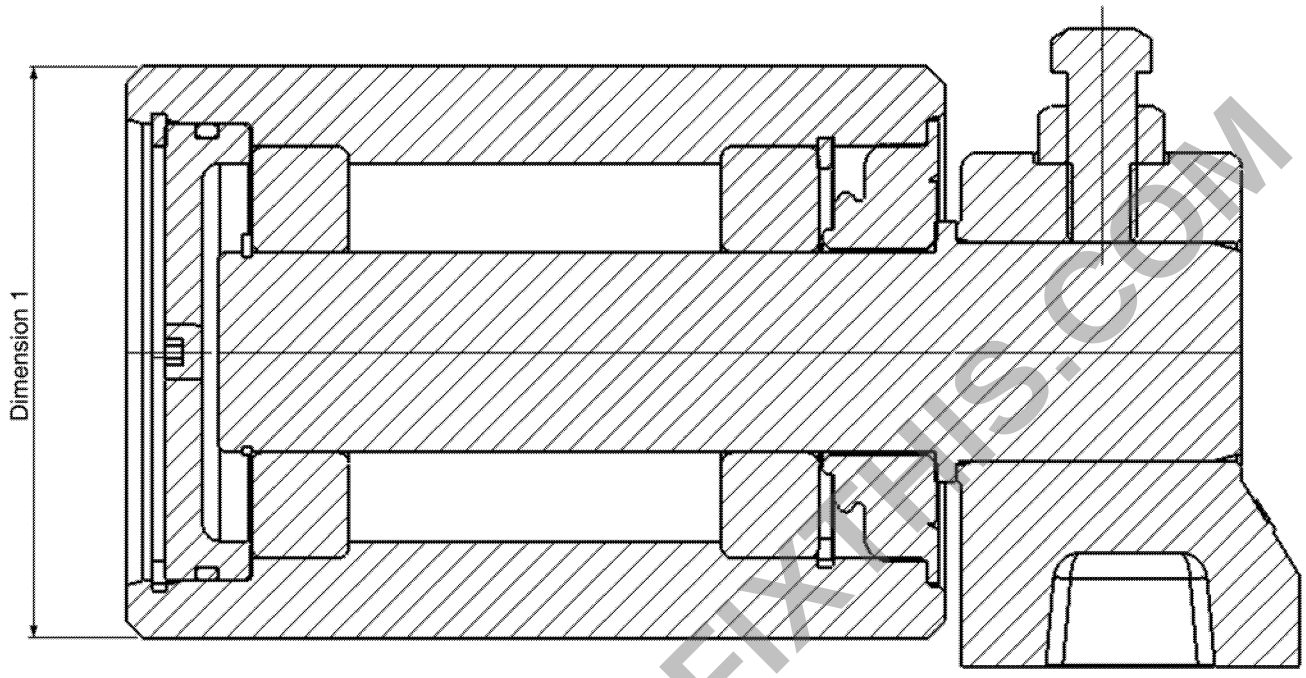


Figure 18

Wear Limits

Wear Chart	Section		Standard Dimension	Wear Limit (Repair)	Wear Limit (Rebuildability)
Dimension 1	Link	mm	100	95.2	94
		inch	3.94	3.75	3.70

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CAUTION

Never hold the key in the START position for longer than 15 seconds or the starter motor will overheat.

CAUTION

Make sure the engine is installed on a level surface. If a continuously running engine is installed at an angle greater than 30° (in any direction) or if an engine runs for short periods of time (less than three minutes) at an angle greater than 35° (in any direction) engine oil may enter the combustion chamber causing excessive engine speed and white exhaust smoke. This may cause serious engine damage.

CAUTION

Make sure the engine is installed on a level surface. If a continuously running engine is installed at an angle greater than 30° (in any direction) or if an engine runs for short periods of time (less than three minutes) at an angle greater than 35° (in any direction) engine oil may enter the combustion chamber causing excessive engine speed and white exhaust smoke. This may cause serious engine damage.

CAUTION

Observe the following environmental operating conditions to maintain engine performance and avoid premature engine wear:

Avoid operating in extremely dusty conditions.

Avoid operating in the presence of chemical gases or fumes.

Avoid operating in a corrosive atmosphere such as salt water spray.

Never install the engine in a floodplain unless proper precautions are taken to avoid being subject to a flood.

Never expose the engine to the rain.

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Check and Adjust Cooling Fan V-Belt

The V-belt will slip if it does not have the proper tension. This will prevent the alternator from generating sufficient power. Also, the engine will overheat due to the engine coolant pump pulley slipping.

Check and adjust the V-belt tension (deflection) as follows:

1. Press the V-belt down with your thumb with a force of approximately 22 ft•lb (98 N•m; 10 kgf) to check the deflection.
   There are three positions to check for V-belt tension (A, B and C, Figure 78). You can check the tension at whichever position is the most accessible. The proper deflection of a used V-belt at each position is:

Used V-Belt Tension		
A	**B**	**C**
3/8 - 1/2 in. (10 - 14 mm)	1/4 - 3/8 in. (7 - 10 mm)	5/16 - 1/2 in. (9 - 13 mm)

   NOTE: *A "Used V-Belt" refers to a V-belt which has been used on a running engine for five minutes or more.*

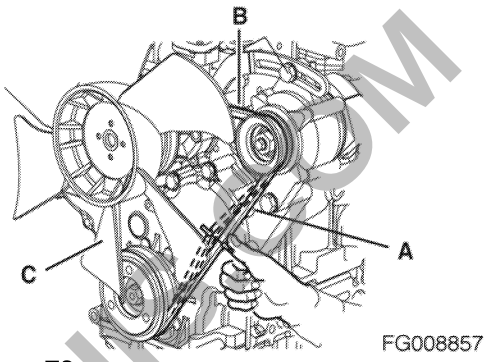


Figure 78

2. If necessary, adjust the V-belt tension. Loosen the adjusting bolt (1, Figure 79) and move the alternator (2, Figure 79) with a pry bar (3, Figure 79) to tighten the V-belt to the desired tension. Then tighten the adjusting bolt.

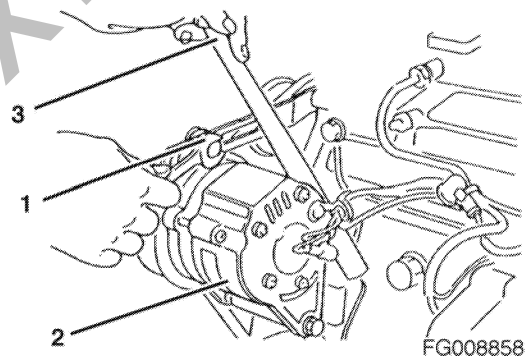


Figure 79

3. Tighten the V-belt to the proper tension. There must be clearance (1, Figure 80) between the V-belt and the bottom of the pulley groove. If there is no clearance (2, Figure 80) between the V-belt and the bottom of the pulley groove, replace the V-belt.
4. Check the V-belt for cracks, oil or wear. If any of these conditions exist, replace the V-belt.
5. Install the new V-belt. Refer to the table for proper tension.

Used V-Belt Tension		
A	**B**	**C**
5/16 - 7/16 in. (8 - 12 mm)	3/16 - 5/16 in. (5 - 8 mm)	1/4 - 7/16 in. (7 - 11 mm)

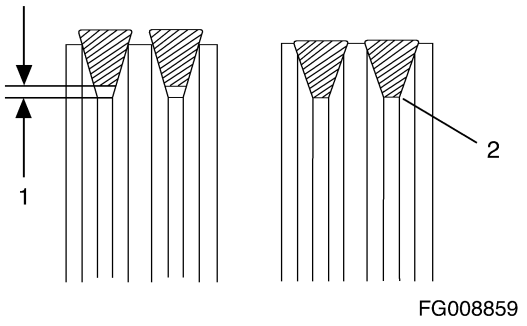


Figure 80

6. After adjusting, run the engine for 5 minutes or more. Check the tension again using the specifications for a used V-belt.

Used V-Belt Tension		
A	**B**	**C**
3/8 - 1/2 in. (10 - 14 mm)	1/4 - 3/8 in. (7 - 10 mm)	5/16 - 1/2 in. (9 - 13 mm)

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Reassembly of Cylinder Head

1. Carefully clean both the combustion surface of the cylinder head and the top surface of the cylinder block. Then place a new cylinder head gasket (2, Figure 153) on the cylinder block.
2. Position the cylinder head on the on the cylinder head gasket.

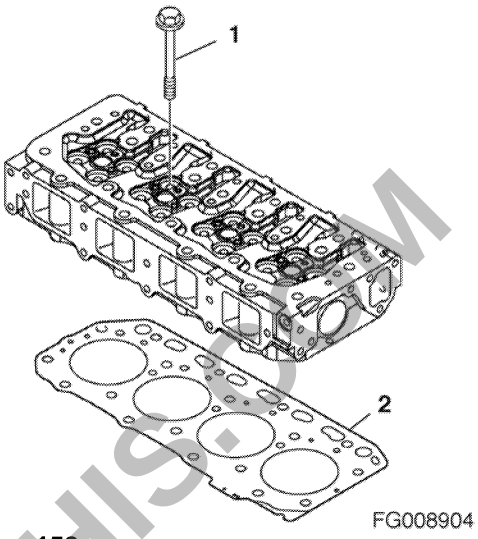


Figure 153

3. Lightly oil the threads of the cylinder head bolts (1, Figure 153). Tighten the bolts to the specified torque in two steps as shown in the chart below. Tighten in the sequence shown in (Figure 154). See “Special Torque Chart” on page -101 for specification.

First Step	1/2 of final torque
Second Step	Final torque

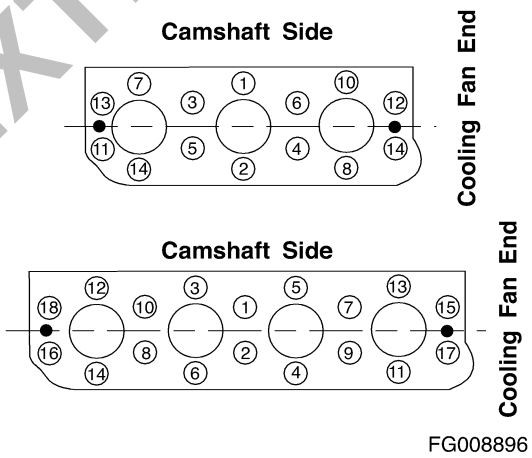


Figure 154

Reassembly of Rocker Arm Assembly

1. Reinstall the valve bridges (3, Figure 155) in their original locations and ensure each seat (4, Figure 155) is in place.
2. Insert the push rods (2, Figure 155) in their original locations.

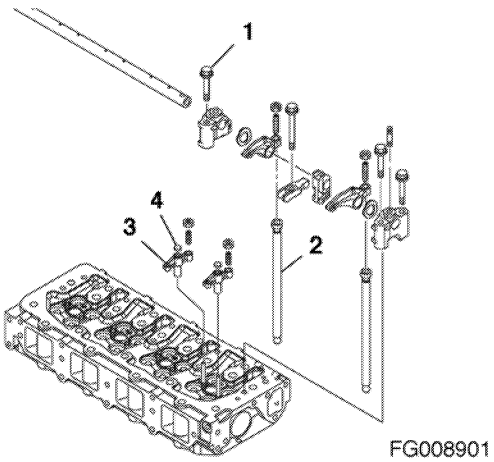


Figure 155

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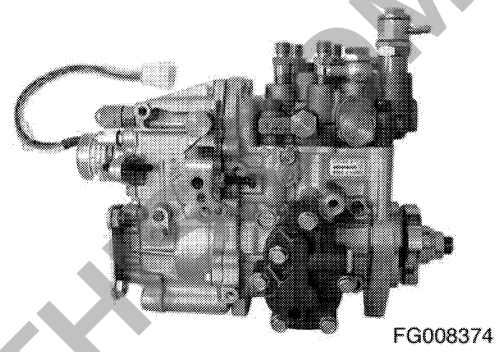
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Introduction

This section of the Service Manual describes the procedures necessary to remove, install, and time the MP fuel injection pump and its associated system components. This fuel injection pump is representative of the fuel injection pumps used on other TNV DI model engines.

Fuel Injection Pump

NOTE: *If the MP fuel injection pump itself requires servicing, it must be taken to an authorized DOOSAN dealer or DOOSAN after soles service.*



FG008374

Figure 245

⚠ CAUTION

Never remove or attempt to remove the tamper-proof devices from the full-load fuel adjusting screw or the high-speed throttle limit screw on the fuel injection pump and governor assembly. These adjustments have been made at the factory to meet all applicable emissions regulations and then sealed.

Never attempt to make any adjustments to these sealed adjustment screws. If adjustments are required, they can be made only by a qualified fuel injection shop that will ensure the injection pump continues to meet all applicable emissions regulations and then replace the tamper-proof seals.

The following describes the features of the MP fuel injection pump, manufactured by DOOSAN.

The fuel injection pump is a very important component of the engine. It is capable of making very precise fuel delivery adjustments according to the varied loads applied to the engine.

All of the fuel injection pump components are very precisely machined. It is extremely important to follow good service practices and maintain cleanliness when servicing the fuel injection pump.

The MP "Mono-Plunger" Fuel Injection Pump is a distributor type pump which consists of a single fuel supply plunger, a distributor shaft, a hydraulic head and a pump housing. The hydraulic head has a delivery valve for each cylinder. The fuel injection pump housing contains a governor and an internal camshaft.

The fuel is pressurized by the up and down motion of the camshaft-driven single plunger. It is then distributed to the proper fuel injector by the rotating distributor shaft.

There are two versions and sizes of the MP Fuel Injection Pump. The smaller of the two pumps, the MP2 pump, is used on the 3TNV88 model engines. The larger pump, the MP4 pump, which has a larger single plunger and a more aggressive cam profile, is used on the 4TNV94L -4TNV106T model engines.

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Starter Motor Troubleshooting

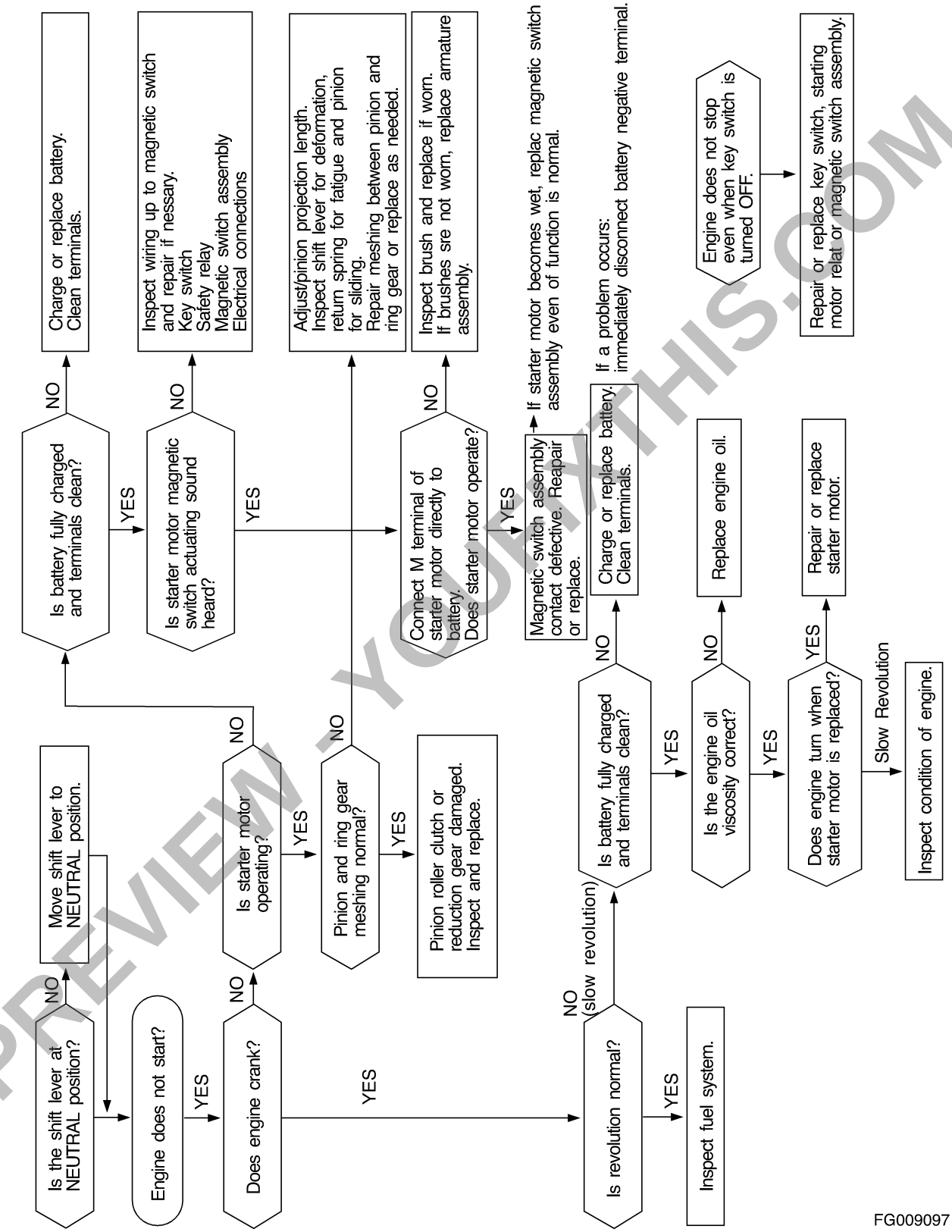


Figure 340

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Drive Coupling (Main Pump)

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7. Immobilize piston rod by inserting a wooden or other nonscoring, nonmetallic support through end of rod.

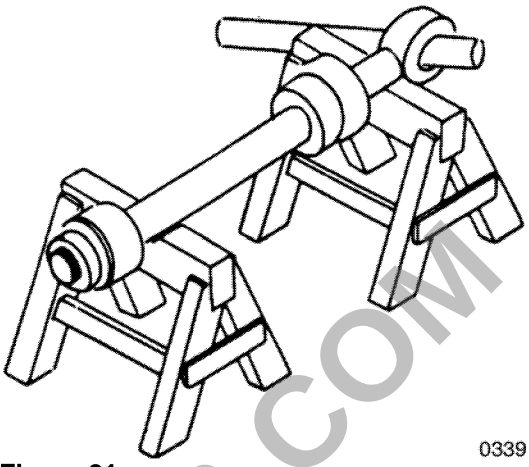


Figure 21

8. Remove set screw by using a socket wrench.

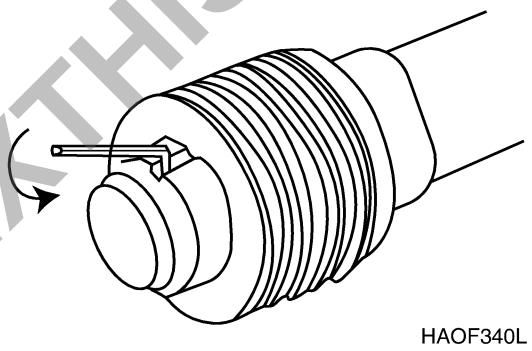


Figure 22

9. Fabricate or purchase a piston nut removal wrench. (Dimensions are called off at beginning of this procedure. This tool may also be ordered through your local DOOSAN Parts distributor). Remove nut from end of piston.

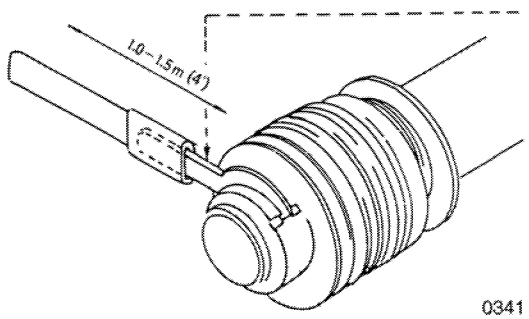


Figure 23

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18. Mount valve casing (2) to casing (1) and tighten hex socket bolts (33) to specification.

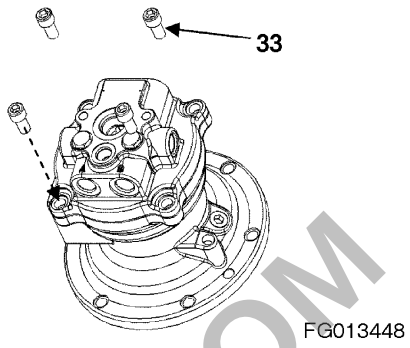


Figure 52

19. Assemble plunger (23) and spring (24) to casing (1) and tighten RO plug (25) with O-ring.

    Confirm the smooth movement of the plunger before installing the plug.

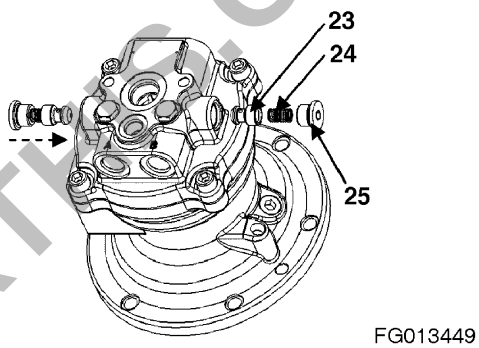


Figure 53

20. Assemble relief valve (37) with O-ring to valve casing (2).

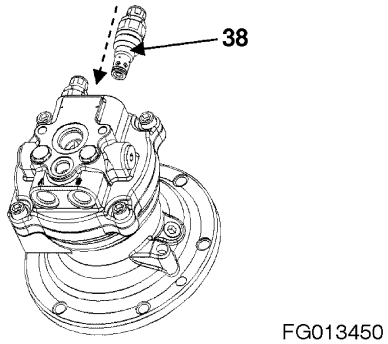


Figure 54

21. Assemble brake valve (38) to casing (1) and tightening the hex socket bolts to specified torque.

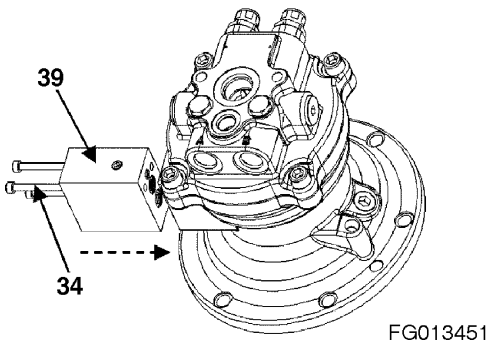


Figure 55

The assembly is completed.

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5. Draw out cylinder block (104) from shaft (102).

6. Remove the piston assembly (piston (105), shoe (106)) and retainer plate (107) from cylinder block (104).

   NOTE: *When removing the piston assembly, grip retainer plate (107) with both hands and remove together with the retainer plate. The piston assembly is a minimum unit. If replacement is necessary, replace the piston assembly as one unit.*

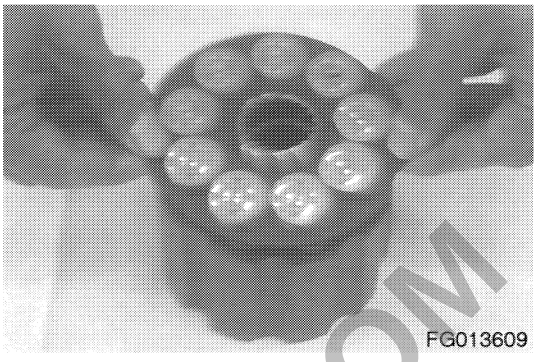


Figure 69

7. Remove piston assembly (9 PCS) (piston (105), shoe (106)) from retainer plate (107).

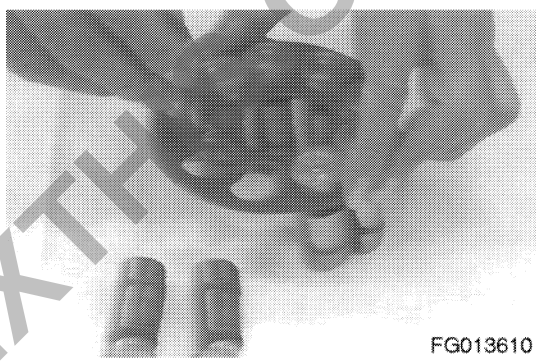


Figure 70

8. Remove thrust ball (108) from cylinder block (104).

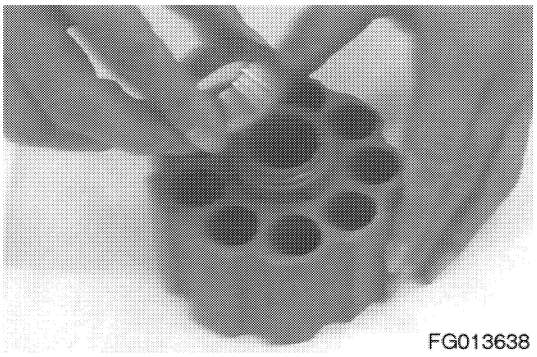


Figure 71

9. Remove washer (111), roller (151) (3 PCS) from cylinder block (104) .

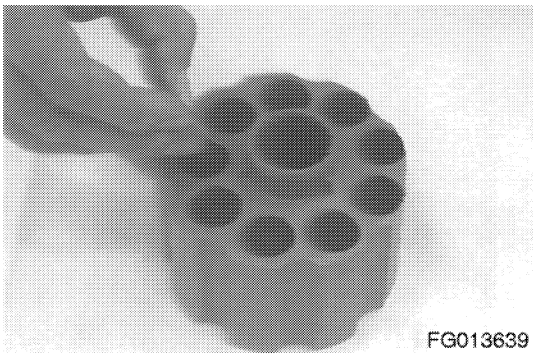


Figure 72

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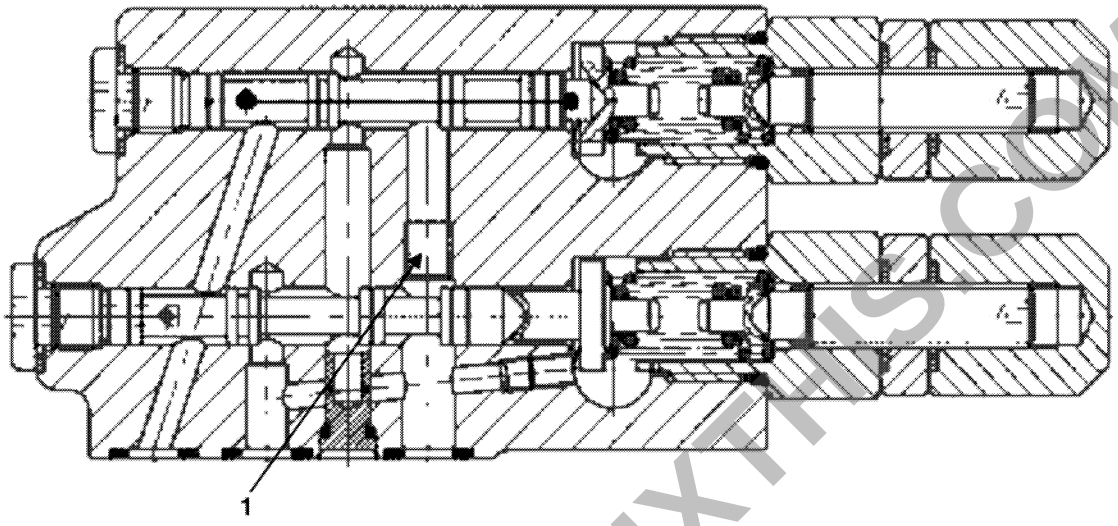
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A10, S0128 Regulator, Orifice of for Speed of Backstroking of Pump



BJS1530S

Figure 108

Reference Number	Description
1	Thread for orifice for pump backstroke (ø0.8)

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5. Assemble the plug kit (II).
Assemble the rod seal (II-11), O-ring (II-12) and push rod (II-13) to the plug (II-10) in this order.



Figure 15

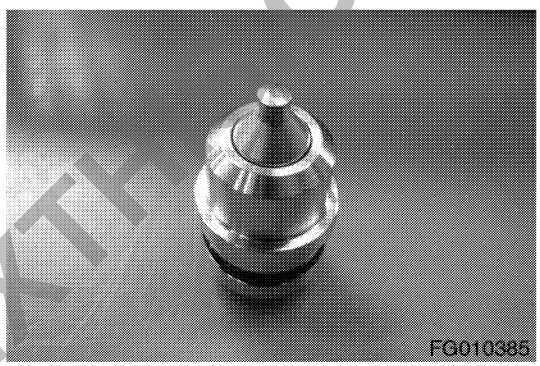


Figure 16

6. Assemble the plug kit (II) to the body (1).

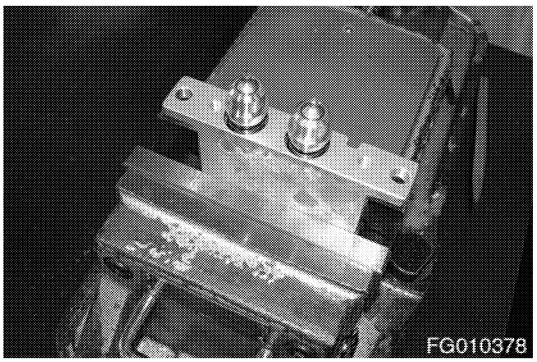
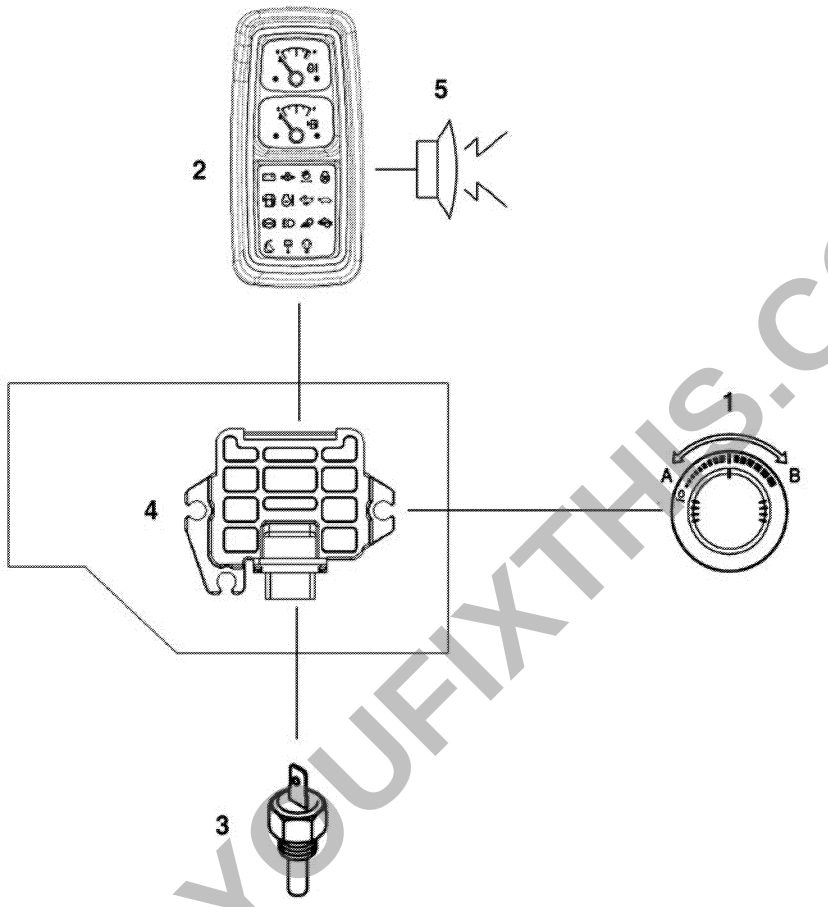


Figure 17

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Engine Overheat Protection System



FG011502

Figure 16

Reference Number	Description
1	Engine Control Dial
2	Instrument Panel
3	Engine Coolant Temperature Sensor

Reference Number	Description
4	ECU (Engine Control Unit)
5	Pilot Buzzer

The ECU detects engine coolant temperature from the sensor mounted in the coolant line.

When the engine coolant temperature increases to over 110°C, the overheat warning light in the instrument panel will be turned on and the pilot buzzer sounds simultaneously.

At this time the engine speed is set a low speed by the ECU.

When coolant temperature falls below 105°C, normal operation will resume.

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