DX27Z

Shop Manual

K1028288E

Serial Number 5001 and Up

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This documentation may include attachments and optional equipment that is not available in your machine's package. Please call your distributor for additional items that you may require.

Illustrations used throughout this manual are used only as a representation of the actual piece of equipment, and may vary from the actual item.

K1028288E Shop Manual
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SAFETY PRECAUTIONS

CAUTION!

Follow all safety recommendations and safe shop practices outlined in the front of this manual or those contained within this section.

Always use tools and equipment that are in good working order.

Use lifting and hoisting equipment capable of safely handling the load.

Remember, that ultimately safety is your own responsibility.

APPLICABLE MODELS

The contents of this section apply to the following models and serial number ranges.

MODEL	SERIAL NUMBER RANGE
DX27Z	5001 and Up
DX35Z	5001 and Up

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GENERAL SPECIFICATIONS

COMPONENT			SPECIFICATION			
			STANDARD (1.1m ARM)	**1.1m ARM+Q/C**	**1.3m ARM**	**1.3m ARM+Q/C**
Bucket capacity	SAE (CECE)		0.08 m^3 (0.07 m^3)			
Operating weight			2.71 tons			
Engine	Model		3TNV82A-SDB			
	Displacement (Total dis. Volume)		1,331 cc			
	Rated power		22.1 hp @ 2,200 rpm			
			16.5 kW @ 2,200 rpm			
Front Attachment	Boom length		2,000 mm			
	Arm length (Standard)		1,100 mm			
	Arm length (Option)		1,300 mm			
Transport Dimension	Length		4,043 mm			
	Height		2,465 mm			
	Height (Boom)		1,488 mm			
	Width		1,620 mm			
Performance	Max.digging force	Bucket	2,020 kgf	1,637 kgf	2,020 kgf	1,637 kgf
		Arm	1,404 kgf	1,283 kgf	1,263 kgf	1,164 kgf
	Traveling speed	1-speed	2.4 km/h			
		2-speed	4.3 km/h			
	Swing speed		9.63 rpm			
	Drawbar pull		2,400 kg			
Hydraulic pump	Type		Variable displacement axial piston pump			
	Max. flow rate		26.4 x 2 liters/min + 18.9 liters/min (Gear pump: 11.2 liters/min)			
	Main relief set pressure		220 kg/cm^2			
Track	Shoe width		300 mm			
	Tumbler distance		1,550 mm			
Control	Lever control type		Hydraulic pilot			
	Lever pattern		SAE			
Tank	Fuel tank		30 liters			
	Hydraulic tank		30 liters			
Ground pressure			0.26 kg/cm^2			

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REMOVAL

CAUTION!

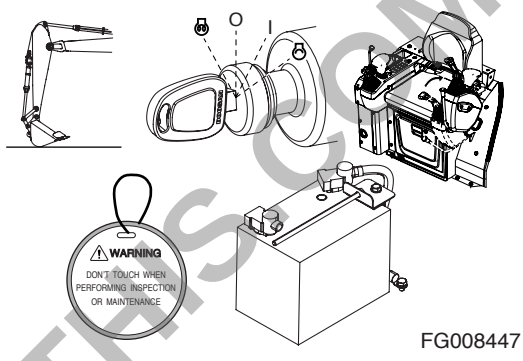
Avoid disassembling cabin if there are strong wind gusts, which could catch large surface area of cabin shell and push it sideways during lift.

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!

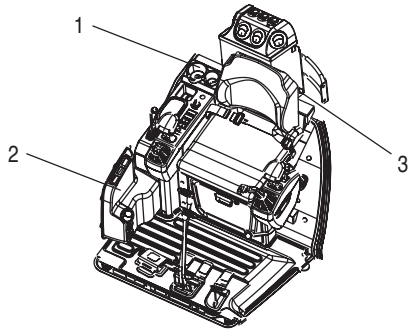
If engine must be run while performing maintenance, use extreme care. Always have one person in the cabin at all times. Never leave the cabin with the engine running.

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. Remove floor mat.
12. Disconnect main harness connector after removing cup holder (1, Figure 2).
13. Remove heater cover.
14. Disconnect harness connector for switches and heater hoses before removing heater cover (2, Figure 2).



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Figure 1



FG008448

Figure 2

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TORQUE VALUES FOR STANDARD METRIC FASTENERS

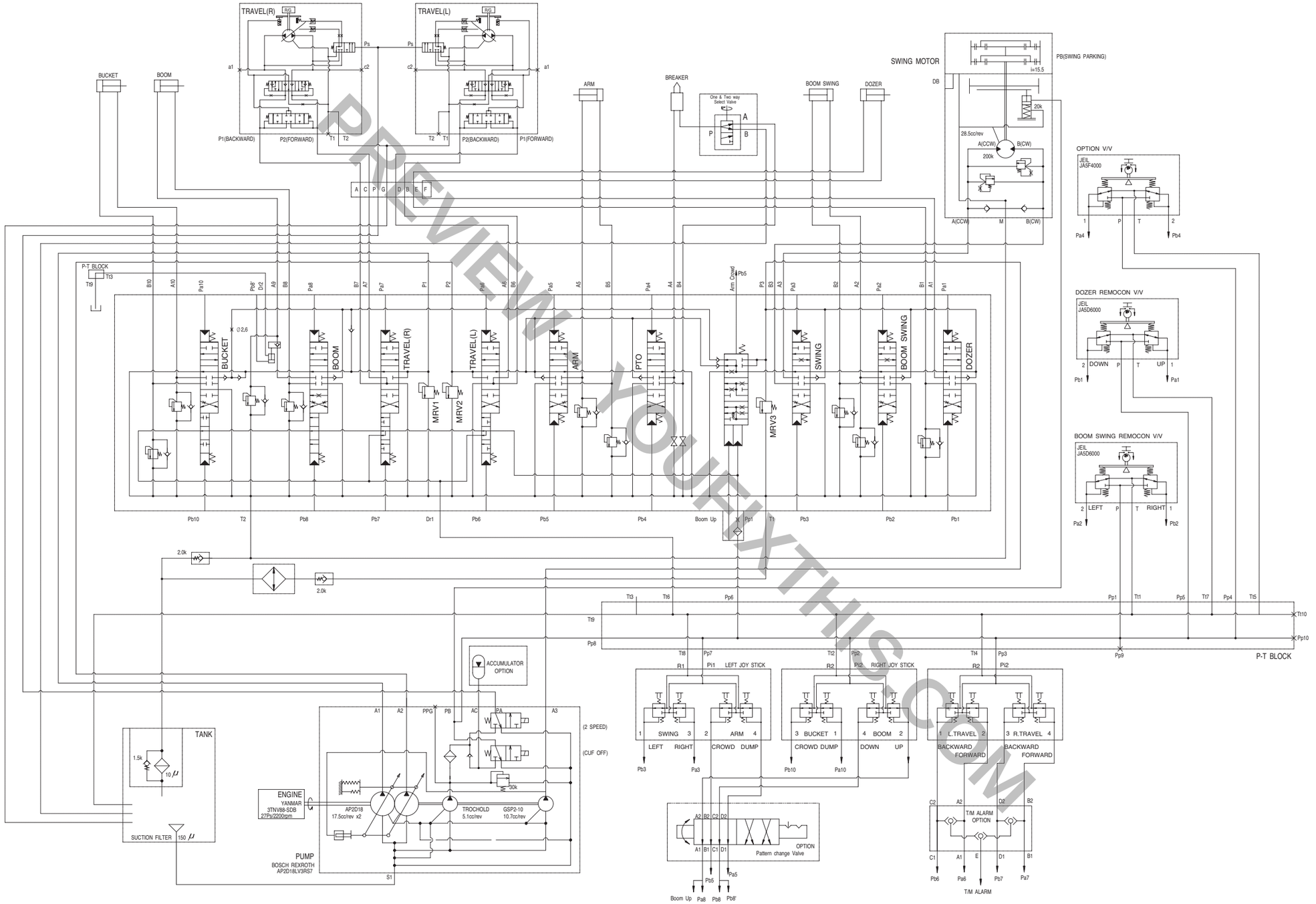
NOTE: *The units for the torque values are kg•m (ft lb).*

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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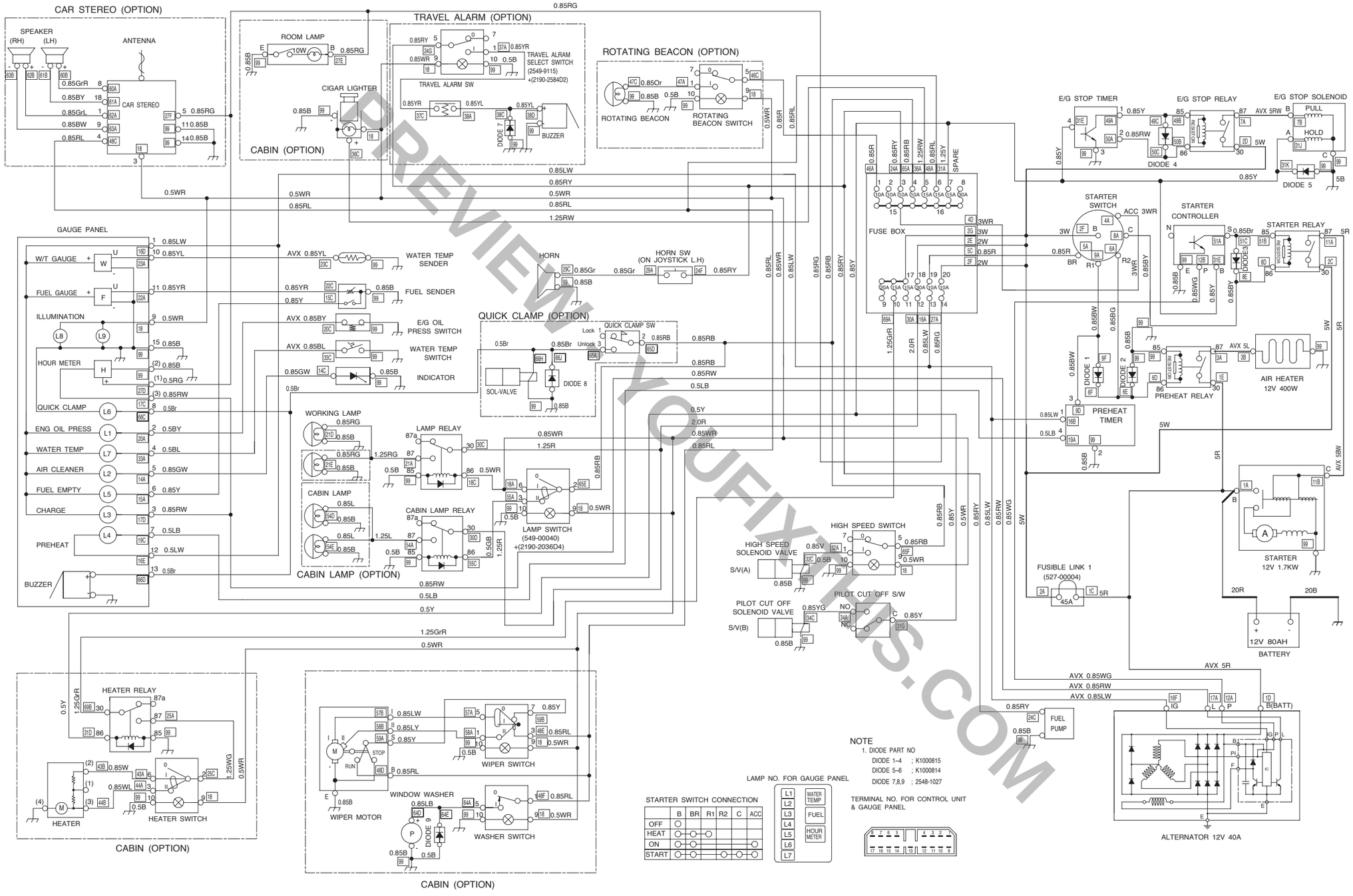
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Figure 1

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Figure 1

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Travel Control Valve..... SP000839
Pedal Valve..... SP001073
Hydraulic Schematic (DX27Z)..... SP001104

Electrical System

Electrical System SP001142
Electrical Schematic (DX27Z) SP001144

Attachments

Working Attachments..... SP001105
Bucket..... SP001076

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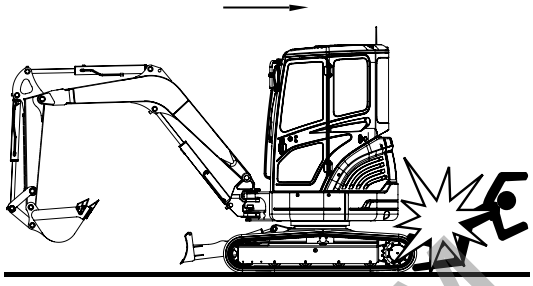
Precautions for Traveling in Reverse

Backing up is potentially dangerous because of restricted visibility.

Use a signalman when backing up.

- Watch for people nearby.
- Use horn or other signal to warn people nearby.
- Keep windows, mirrors and headlights clean and good repair at all times.

Slow down when visibility is poor because of dust, heavy rain, fog, or other conditions.

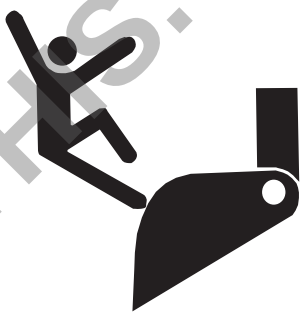


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Figure 26

Never Let Anyone Ride on Attachment

Never let anyone ride on any work attachment, such as the bucket, crusher, grapple, or clamshell (grab bucket). There is a danger of the person falling and suffering serious injury.



ARO1310L

Figure 27

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EXCAVATOR PERFORMANCE STANDARDS

Evaluation of equipment performance and operating condition can be made by running the excavator through a series of different tests, and recording results with a stop watch and tape measure.

Compare results of performance tests against the specifications and standards that follow, which are for equipment in new or renewed condition.

Test Conditions

1. All tests should be performed on a flat, level, firm supporting ground surface.
2. All recommended, applicable maintenance and adjustment service should be completed before testing.
3. Hydraulic fluid and engine oil should be of appropriate viscosity for ambient weather conditions. Warm up hydraulic oil to standard operating temperature, between 45°C - 55°C (112°F - 135°F).
4. Run all tests with the engine speed control set to maximum rpm.
5. Repeat tests with engine control settings at maximum rpm. Travel speed tests should also be repeated at both 1 and 2-speed.

Travel Speed and Travel Motor Balance (Steering Deviation) Tests

Speed Test

Prepare the excavator for travel speed tests by extending all hydraulic cylinders - boom, arm and bucket - to the fully extended position, shown in Figure 4.

*

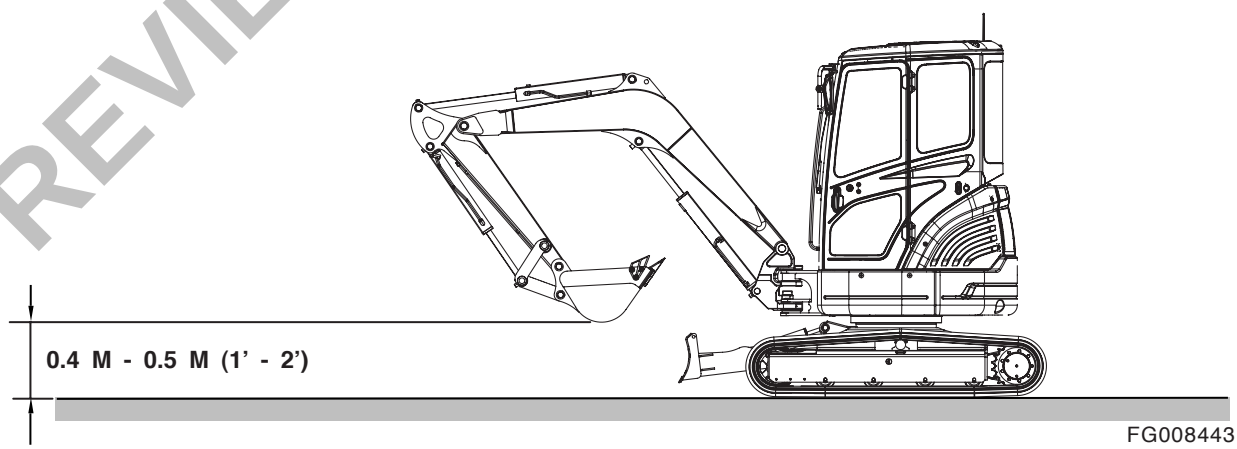


Figure 4

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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

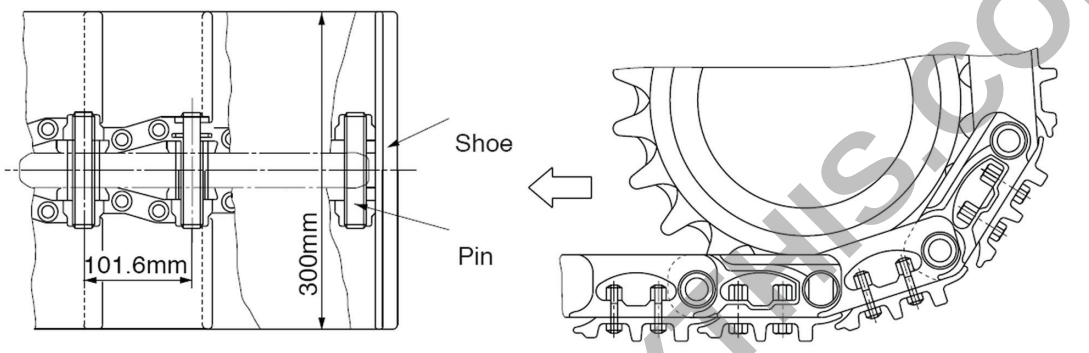
NOTE: *If any bolts and nuts are found loose or at values less than what the chart states, it is recommended that the loose bolt and/or nut be replaced with a new one.*

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Specification and Construction

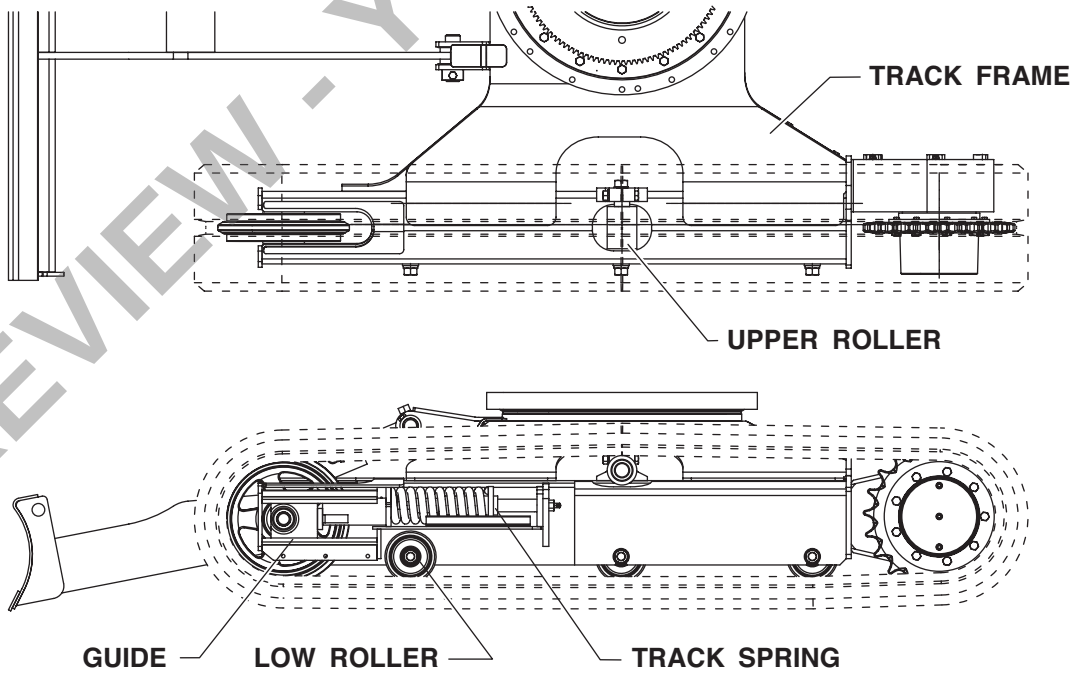
Steel Crawlers



FG008456

Figure 1

Track Frame



FG008721

Figure 2

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Assenbly

Hydraulic motore section

1. Press-fit the bearing (217) and spring pin (224) into the body H (201).

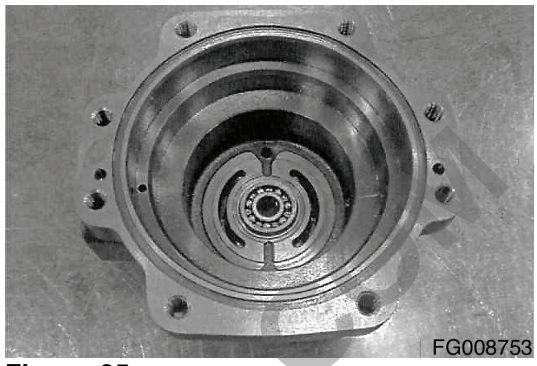


Figure 35

2. nsert the two check valves (246) (1 pc.side), two springs (248) (1pc/side) and two plugs (247) (1pc/side) with 0 rong (249) in that orfer into the body H (201).

   Tool

   Hexagon bar wrench : 8mm

   Torque wrench

   NOTE: *Apply grease slightly to the 0 ring and assemble to pay attention not biting the seals.*

   Plug tightening torque:58.8 ± 2.9 N•m {6 ± 0.3 kef•cm}

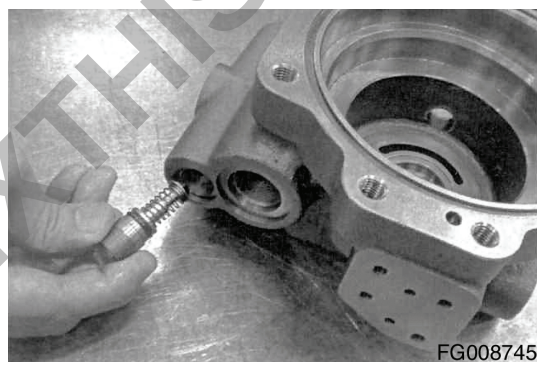
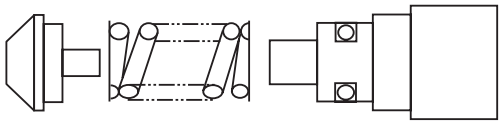


Figure 36



FG008754

Figure 37

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CAUTION!

On changing lubricant, unfasten the drain plug slowly while bleed reduction unit of air.

If unfasten the plug at a stretch, the lubricant may pull out.

Inspection

Check the following points before installing the motor.

1. Are there ant portions of the motor missing or damaged by transportation?
2. Is there any looseness in the tightening portions?
3. Are port flange faces and drain port completely sealed to prevent debris from entering into the motor?

Direction of Rotation

The relation between the flow direction of hydraulic fluid and the direction of rotation is shown in the following table.

Inlet Port	Outlet Port	Direction of Rotation (View from B side edge of the reduction gear)
P1	P2	A : Counterclockwise Rotation
P2	P1	C : Clockwise Rotation

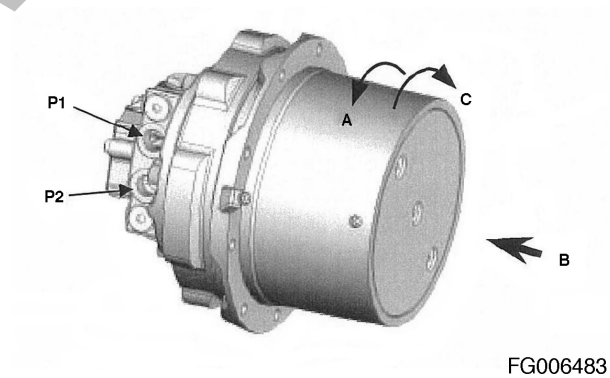


Figure 17 Direction of Rotation

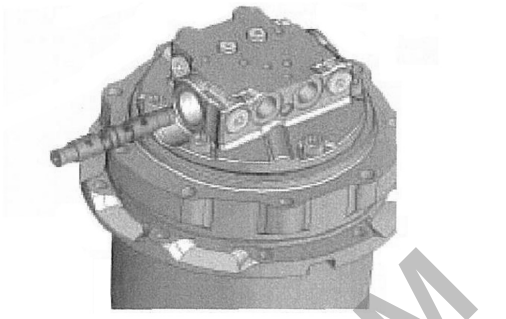
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34. Install plunger assembly on base plate.

Install it while turning to prevent it from sticking.

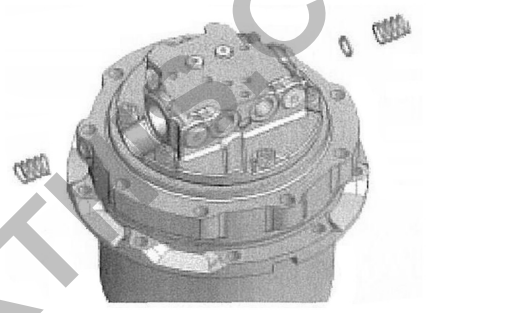
Apply hydraulic oil to plunger assembly before installation.



FG006493

Figure 88

35. Place spring and spring seat in.



FG006492

Figure 89

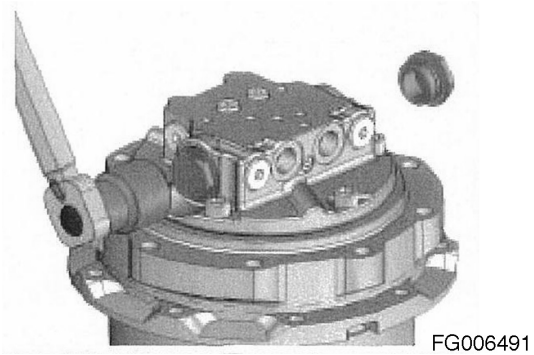
36. Tighten cap with O-ring.

Apply a slight grease to the O-ring.

Tools required : Torque wrench

Hexagonal bit for torque wrench

Tightening torque 240±5N•m



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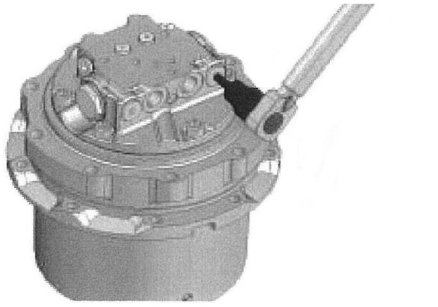
Figure 90

37. Tighten plug with O-ring and shipping plug.

Tools required: Torque wrench

Hexagonal bit for torque wrench

Tightening torque 53.9±4.9N•m



FG007223

Figure 91

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7. Remove the rotary Group.

   Remove the shim and the retaining ring.

   (For shafts; 18)

   Pliers for retaining rings

   (For shafts; Retaining ring for 18)

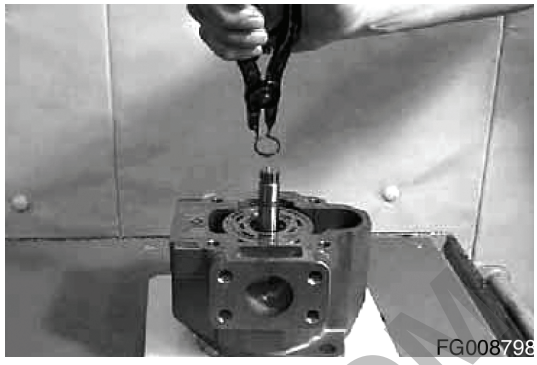


Figure 26

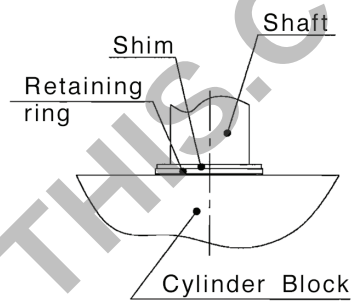


Figure 27

8. Push down sideways the pump. And takes out the rotary group from the shaft.

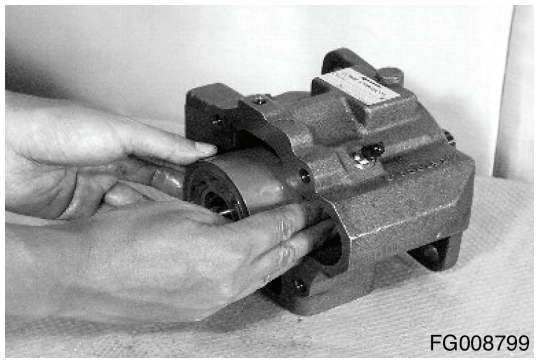


Figure 28

9. The parallel pins (3X17.8-3) may remain in the housing, when removing the rotary group.

   Please take out the parallel pins when they were left in the housing.

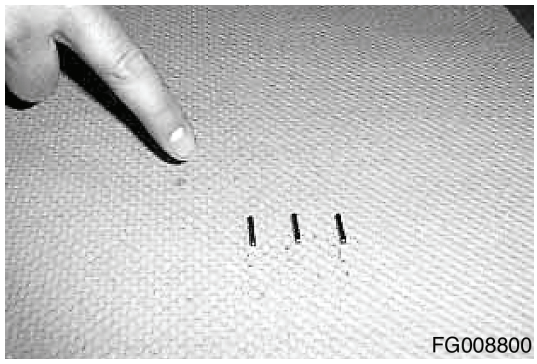


Figure 29

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INTRODUCTION

Outline

This manual contains safety instructions for the subject product.

Before using the product, you should first thoroughly read this manual to fully understand the operation, inspection, and maintenance matters.

Savethismanualsothatyoucanreaditimmediatelywhennecessary.

If you do not follow the instructions, there could be serious accidents.

Contents of This Manual

This manual gives a description of the use, usage precautions, maintenance, and inspection of the BCV35-QA10ControlValve.

Disassembly and Assembly of the Product

Beforedisassembling and assembling the product, contact the manufacturer for the information about necessary special techniques, devices, and tools.

In case of disassembling and assembling the product, it is recommend to request the maintenance personnel to carry out the work.

The maintenance personnel should thoroughly read the items of disassembly and assembly before carrying out the work.

This document is produced for the reader with general knowledge of oil-hydraulics. This means that before disassembling and / or assembling the product, it is recommendable to have training of attaining the basic knowledge of oil-hydraulics.

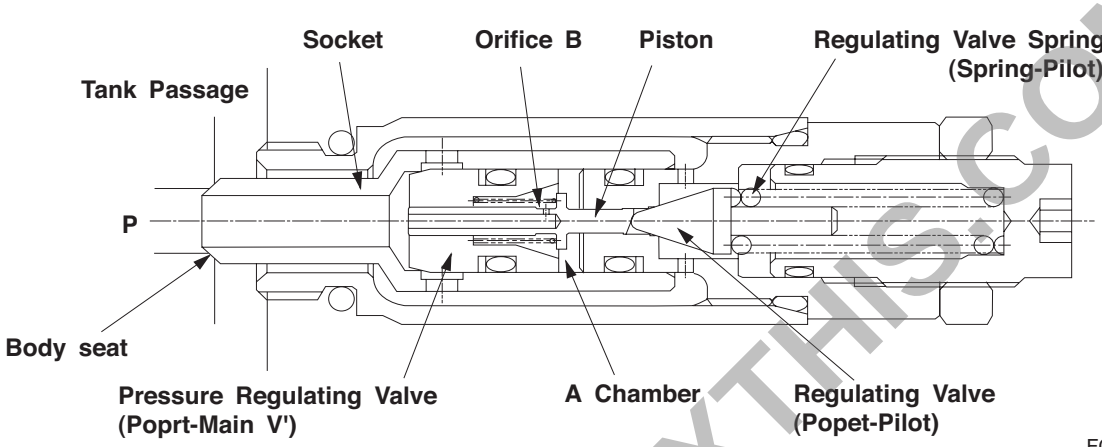
For consumables and spares, use our genuine or authorized parts.

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Overload Relief Valve (ORV) Operation

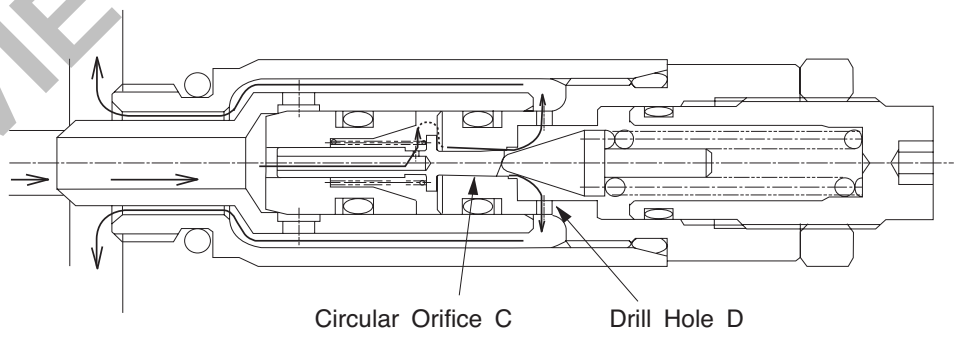
1. Pressure oil flows through the inside of the Piston built in the Pressure Regulating Valve (Popet-Main V) and the Orifice B and then into the internal A Chamber until it is filled up. The filled up pressure causes both of the Pressure Regulating Valve and Socket and the Socket and Body Seat to be seated surely.



FG008575

Figure 27

2. When the oil pressure at port P increases up to the setting pressure of Regulating Valve Spring, the pressure oil is applied to the Regulating Valve via the Piston to open the Regulating Valve. Then, the pressure oil flows through a passage in the direction of Piston inside → A Chamber → Circular Orifice C → Drill Hole D and the external of Socket and then into the Tank Passage.



FG008576

Figure 28

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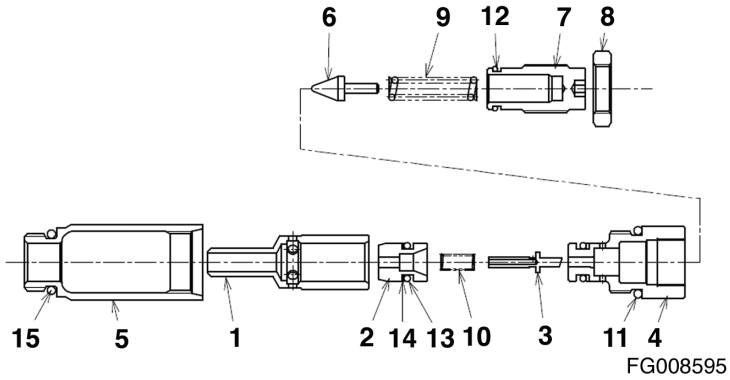


Figure 63

1. After checking that O-ring (12) is securely installed into grooves on the top of Adjustable Screw (7), assemble Regulating Valve Spring (9) and Regulating Valve (6) into the hole of Adjustable Screw (7).
2. After check that Regulating Body (4) is installed with Backup Ring (14) and O-rings (13,11), put the screw hole side of Regulating Body (4) on the Assembly that has been assembled in 1 and then tighten them with screws.

WARNING!

Pay attention to the positional relationship between O-ring (13) and Backup Ring(14). (Backup Ring is installed on the peripheral machined side of Regulating Body.)
If it is installed oppositely, there would be the squeezing out of O-ring or the like, resulting in internal leakage, malfunction, or damage to other hydraulic devices at worst.

Then, look in the inside from a small-diameter hole of Regulating Body (4) to check that Regulating Valve (6) is settled in the seat of Regulating Body(4). If the Regulating Valve is not settled, there will be no rise in pressure, resulting in malfunction.

3. Attach Nut (8) to the Adjustable Screw (7) sticking out from Assembly that has been assembled in 2.
4. After checking that O-ring (13) and Backup Ring (14) are securely installed into grooves on the peripheral of Regulating Valve (2), insert Regulating Valve (2) into Socket (1).

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Exemption from Responsibility

Be aware that we are not responsible for the following.

1. Force majeure, such as natural catastrophe, or external causes such as accidents
2. Wrong use or misuse
   - Use of the equipment for the purposes not intended.
   - Use of the equipment in the conditions not specified.
   - Execution of prohibited operations.
   - Execution of operations (handling, maintenance, and check sequence) not specified in the operation manual.
   - Failure to perform operations (handling, maintenance, and check sequence) specified in the operation manua.
3. Unsafety operation
4. Performance or functions of the equipment after disassembled / reassembled by you or a third party.

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ASSEMBLY

1. Install plug (2) to be assembled o-ring (3) into body (1).

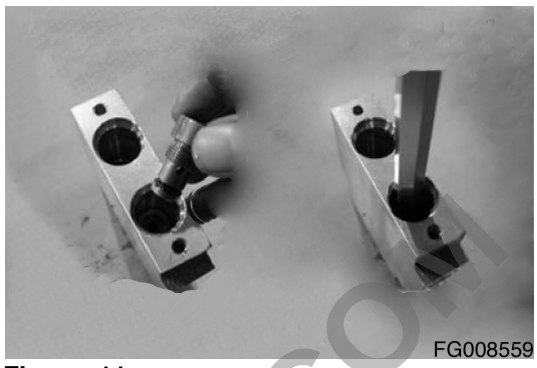


Figure 11

2. Install spring (9) into body (1).

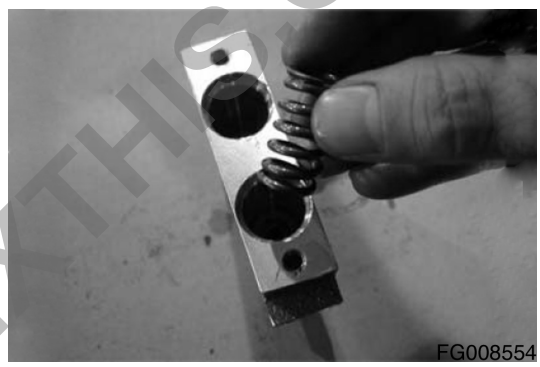


Figure 12

3. Take care when assembling spool kits assemblies. They should be assembled in same way.

   The assembly order is spool (4), spring seat (5), spring (6), spring seat (7) and stopper (8).

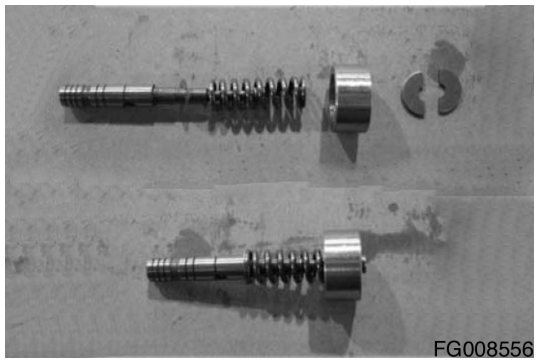


Figure 13

4. Install four spool kit assemblies into body (1).

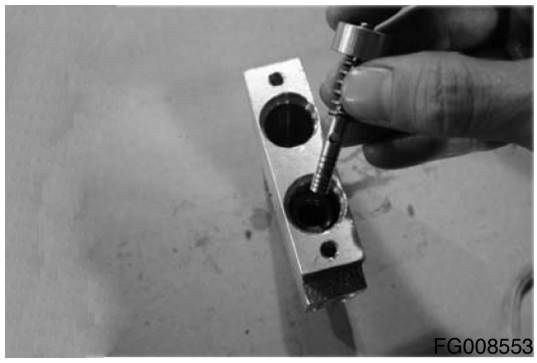


Figure 14

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Reference Number	Description
1	Battery
2	Fusible Link
3	Starter Switch
4	Fuse Box
5	Alternator
14	Preheat Timer
16	Instrument Panel
17	Engine Coolant Temperature Sensor

Reference Number	Description
18	Fuel sensor
19	Engine Oil Pressure Switch
20	Engine Coolant Temperature Switch
21	Air Cleaner Indicator
22	Quick Clamp Switch
23	Light Switch

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