DX235LCR

Shop Manual

950106-00081E

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.

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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 load.

Remember, that ultimately safety is your own personal responsibility.

APPLICABLE MODELS

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

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DX235LCR	5001 and Up

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GENERAL SPECIFICATIONS

Shipping Weight	24.2 metric tons (53,572 lb), includes fuel 10%, boom, 5,700 mm (18' 8"), arm 2,900 mm (9' 6"), standard bucket and standard shoes
Operating Weight	Add weight of full fuel tank and operator.
Shipping Weights with Optional Track Shoe	Subtract 560 kg (1,235 lb) for 600 mm (24")
	Subtract 275 kg (606 lb) for 700 mm (28")
	Add 290 kg (639 lb) for 900 mm (35")
Major Component Weights	2,900 mm (9' 6") Arm 680 kg (1,499 lb)
	2,400 mm (7' 10") Arm 600 kg (1,323 lb)
	Boom Cylinders 200 kg (441 lb) each
	Arm Cylinder 235 kg (518 lb)
	Bucket Cylinder 155 kg (342 lb)
	Counterweight 6,500 kg (14,330 lb)
	Upper Turntable 5,440 kg (11,993 lb) (Excluding Counterweight and Front)
	Lower - 8,235 kg (18,155 lb) (Including Swing Bearing)
Digging Forces (At Power Boost):	
Bucket Cylinder	14,200 kg (31,306 lb) - (with either 2,900 mm [9' 6"] or 2,400 mm [7' 10"] arm)
Arm Cylinder	10,800 kg (23,810 lb) with 2,900 mm (9' 6") arm
Fuel Tank Capacity	320 liters (84.5 U.S. gal)
Hydraulic System Capacity	230 liters (60.8 U.S. gal)
Hydraulic Reservoir Capacity	190 liters (50.2 U.S. gal)
Bucket Heaped Capacity Range	PCSA 0.51 - 1.28 m^3 (0.67 - 1.67 yd^3)
	IMPORTANT: Refer to the Load Weight, Bucket and Arm Length Compatibility Table for information on which bucket sizes may be used safely with which arm length, for load material weights.
Shoe Type	Triple Grouser
Shoe Width and Optional Sizes	800 mm (31") - standard
	600 mm (24") - optional
	700 mm (28") - optional
	900 mm (35") - optional
Ground Pressure Ratings:	
Standard 800 mm (31") shoe	0.38 kg/cm^2 (5.4 psi)
Optional 600 mm (24") shoe	0.50 kg/cm^2 (7.1 psi)
Optional 700 mm (28") shoe	0.43 kg/cm^2 (6.1 psi)
Optional 900 mm (35") shoe	0.34 kg/cm^2 (4.8 psi)
Transport Dimensions	
Overall Shipping Length (standard boom and arm)	8,955 mm (29' 5")

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HYDRAULIC SYSTEM CLEANLINESS AND OIL LEAKS

Maintenance Precautions for Hydraulic System Service

Whenever maintenance, repairs or any other type of troubleshooting or service is being performed, it's important to remember that the hydraulic system - including both the interior and exterior surfaces of assemblies, and every drop of operating fluid - must be protected from contamination.

Dust and other foreign contaminants are major contributors to premature wear in hydraulic circuits. The narrow tolerances, rapidly moving parts and high operating pressures of the system require that fluid be kept as clean as possible. The performance and dependability of the machine (and the service lift of individual components) can be noticeably reduced if proper precautions are not observed:

- Use a safe, noncombustible, evaporative type, low-residue solvent and thoroughly clean exterior surfaces of assemblies before any part of the circuit is opened up or disassembled.

  NOTE: *It's just as important to clean the cap and reservoir top before routine fluid changes or quick checks as it is before major repairs. (Accumulated dirt attracts moisture, oil and other fluids - and more dirt.)*

- Keep dismantled parts covered during disassembly. Use clean caps, plugs or tape to protect the disconnected openings of flanges, manifolds and piping.
- Do not allow cleaning solvents or other fluids to mix with the oil in the system. Use clean oil to flush any traces of solvent or other residue before reassembly.
- If metal or rubber fragments are found in the system, flush and replace all fluid in the system and troubleshoot the circuit to identify the source of contamination.

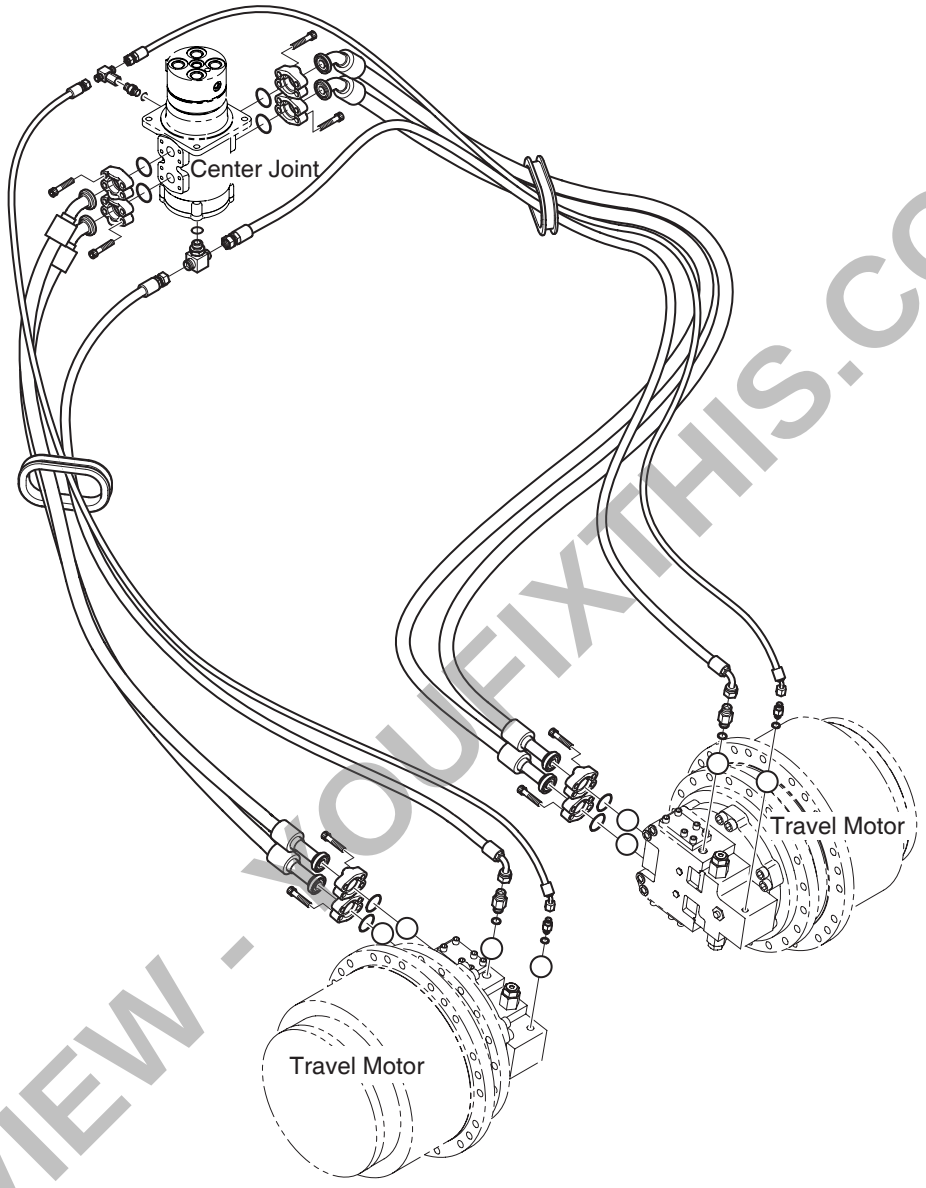
IMPORTANT

Make sure that cleaning solvents will be compatible with rubber materials used in the hydraulic system. Many petroleum based compounds can cause swelling, softening, or other deterioration of system sealing elements, such as O-rings, caps and other seals.

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HYDRAULIC SYSTEM - GENERAL NOTES



FG001322

Figure 1

The hydraulic system has several improvements over conventional hydraulic systems - including cross-sensing total horsepower control - to maximize output efficiency.

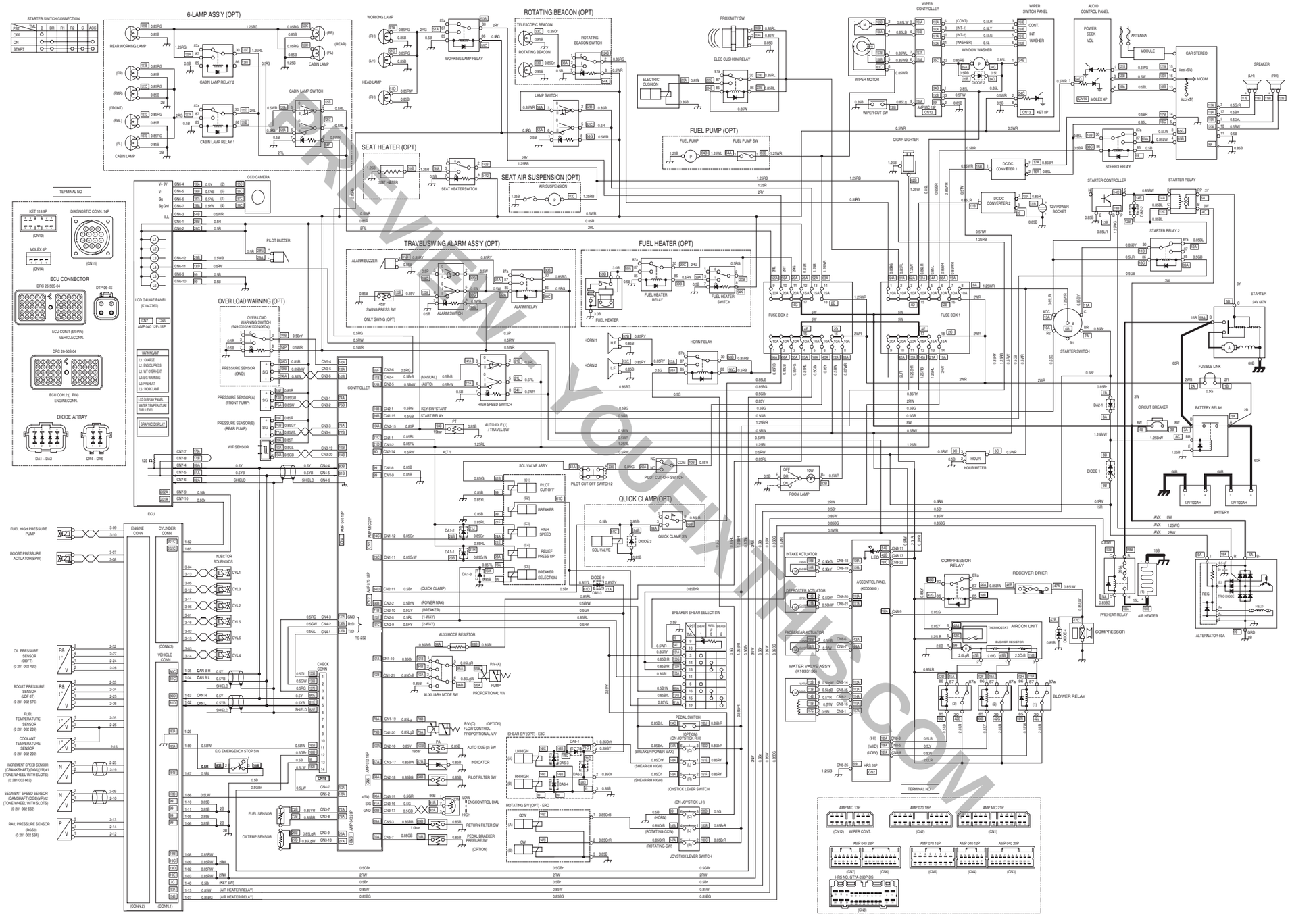
The system features an electronically controlled output optimization system, which allows the operator to choose between two, distinctly different power modes: high-output/rapid cycling maximum speed power mode, and a standard power mode for most types of general operation.

Electronic management of hydraulic control valves assists in optimizing the application speed and overall operator control of hydraulic actuators and functions.

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DX235LCR



FG016307

Figure 1

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Reference Number	Description
1	Counterweight
2	Muffler
3	Fuel Tank
4	Fuel Tank Fill Cap
5	Engine Bonnet
6	Hydraulic Oil Tank
7	Engine
8	Swing Motor
9	Radiator and Oil Cooler
10	Center Joint
11	Swing Bearing
12	Battery
13	Air Cleaner
14	Cabin
15	Seat
16	Boom Cylinder
17	Work Lever (Joystick) Controls
18	Travel Lever
19	Arm Cylinder

Reference Number	Description
20	Boom
21	Arm
22	Bucket Cylinder
23	Guide Link
24	Push Link
25	Bucket
26	Tooth Point
27	Side Cutter
28	Idler
29	Track Adjuster
30	Control Valves
31	Track Link and Shoe
32	Return Filter
33	Suction Filter
34	Track Guide
35	Lower Roller
36	Upper Roller
37	Pumps
38	Travel Motor

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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. Prepare cabin shell for removal by disconnecting wiring connectors for:
    A. Cabin harness - main harness connections.
    B. Left / right control stand wiring harness connections.
    C. Air conditioner harness connections and control duct wiring connection.
    D. Washer hose connections.
    E. Cabin floor ground.

    NOTE: *Control stand 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.*

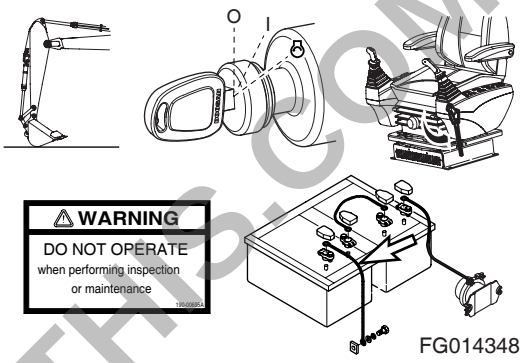


Figure 1

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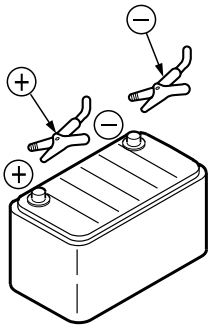
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Boost Starting or Charging Engine Batteries

If any mistake is made in the method of connecting the booster cables, it may cause an explosion or fire. Always do the following:

- Turn off all electrical equipment before connecting leads to the battery. This includes electrical switches on the battery charger or boost starting equipment.
- When boost starting from another machine or vehicle do not allow the two machines to touch. Wear safety glasses or goggles while required battery connections are made.
- 24 volt battery units consisting of two series connected twelve volt batteries have a cable connecting one positive terminal on one of the 12 volt batteries to a negative terminal on the other battery. Booster or charger cable connections must be made between the nonseries connected positive terminals and between the negative terminal of the booster battery and the metal frame of the machine being boosted or charged. Refer to the procedure and illustration in “Starting Engine With a Booster Cable” on page 3-7 of this manual.
- Connect positive cable first when installing cables and disconnect the negative cable first when removing them. The final cable connection, at the metal frame of the machine being charged or boost started, should be as faraway from the batteries as possible.



HAOA310L

Figure 46

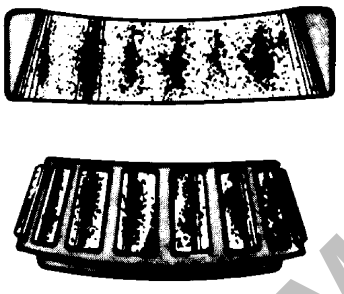
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Fatigue Spalling

Flaking of surface metal resulting from fatigue.

Replace bearing - clean all related parts.



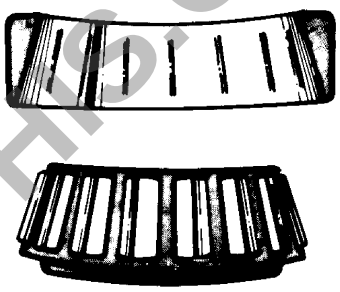
HASA530S

Figure 10

Brinelling

Surface indentations in raceway caused by rollers either under impact loading or vibration while the bearing is not rotating.

Replace bearing if rough or noisy.



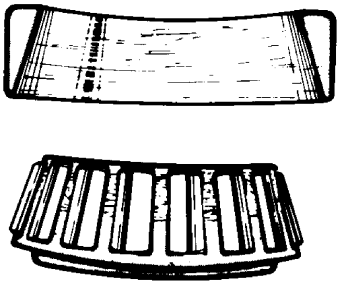
HASA540S

Figure 11

Cage Wear

Wear around outside diameter of cage and roller pockets caused by abrasive material and inefficient lubrication.

Replace bearings - check seals.



HASA550S

Figure 12

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FRONT IDLER ROLLER

Parts List

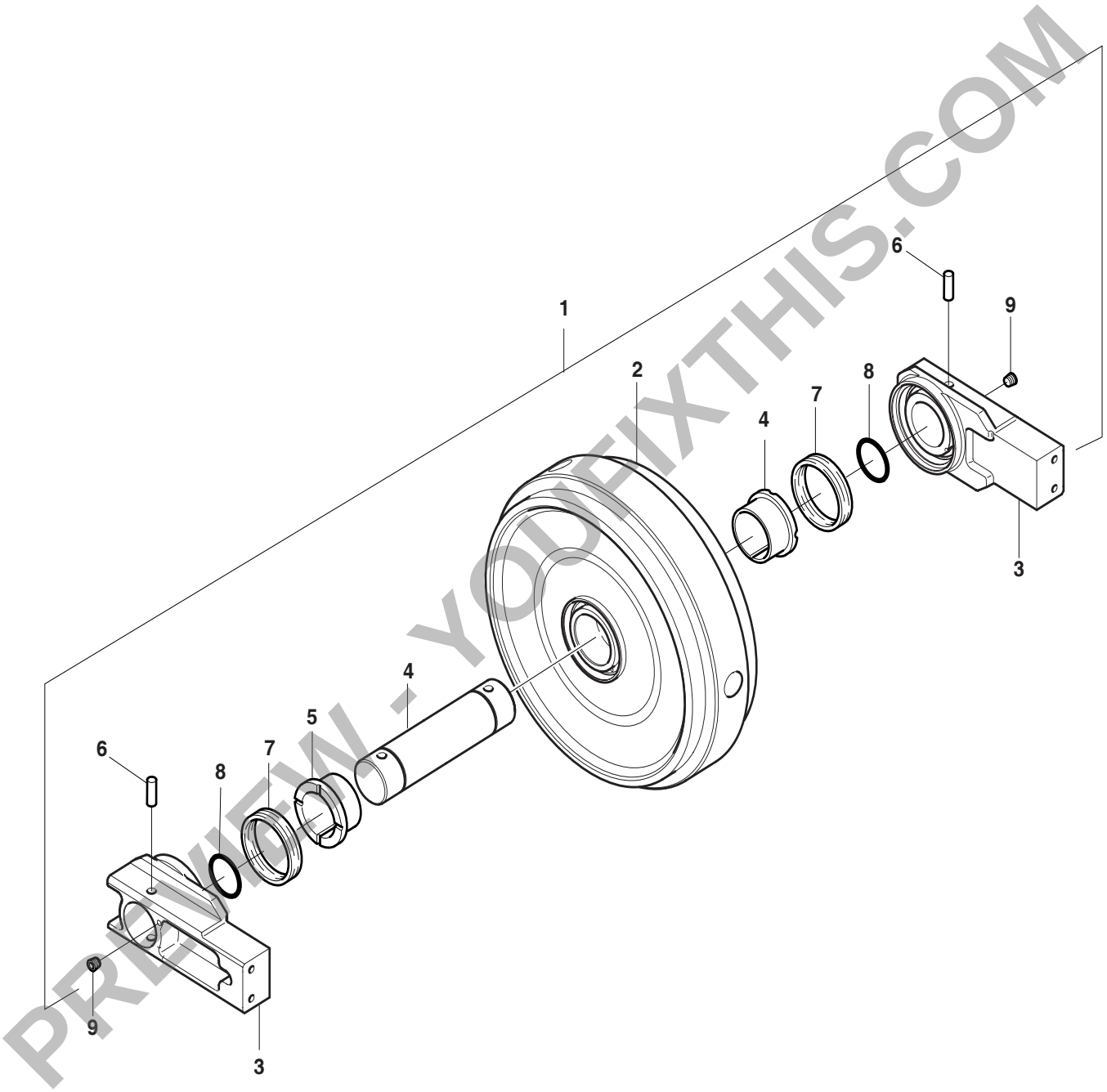


Figure 14

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PRESSURE UP VALVE

Checks and Adjustments

WARNING

This procedure should be done with two people. To reduce the chance of accident or unintended start-up, one person should remain at the operator's control stand while checks and adjustments are made.

Vent hydraulic pressure from the reservoir to install an in-line "T-style" adapter and test gauge (60 bar/1,000 psi) at the pilot pump signal port relief valve outlet.

Start the engine and turn the engine speed dial to maximum. When normal operating temperature is reached:

- Check pilot pressure and readjust it, if required:
- Select the Instrument Panel rear pump "pressure display".
- Select Power Mode.
- Stall the boom cylinder (towards the extend side).
- Read rear pump pressure on the Instrument Panel display.

Repeat all tests with and without "pressure up" selected through the console rocker switch and joystick button.

If the two-stage main relief valve was not set correctly and main relief high-stage pressure ("pressure up") is outside the tolerance range, begin valve adjustment by loosening the outside (widest diameter) lock nut on the relief valve. Turn the adjusting screw clockwise to increase pressure, or counterclockwise to decrease it. Pressure must be 370 bars (5,263 psi), or up to 10 bars (145 psi).

Because one adjustment can affect the other, check low-stage main relief pressure by repeating the cylinder stall test without "pressure up." Readjust standard relief pressure by turning the innermost (smallest diameter) screw clockwise to increase the setting, or counterclockwise to decrease it. Pressure should be at least 350 bars (5,075 psi), but less than 355 bars (5,149 psi).

IMPORTANT

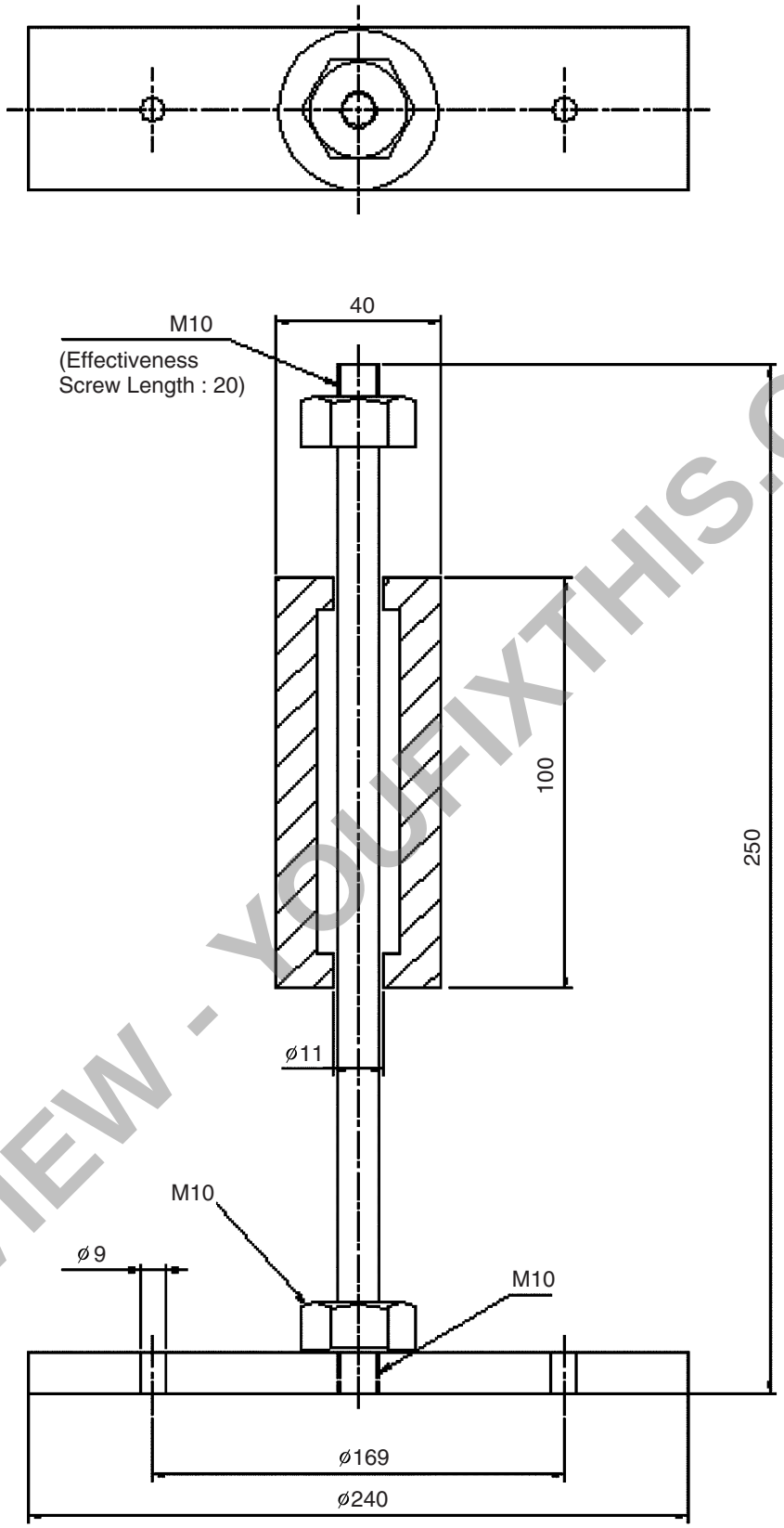
Pressure adjustments and checks cannot be made if pilot pressure is outside the specified range. Refer to the pilot pump adjustment procedure if required, then proceed with any necessary adjustments to main relief pressure settings.

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FG016225

Figure 13 Special Tool for Removing the Brake Piston

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Parts List

Reference	Parts
1	Rear Flange
23	Main Spool
24	Plug (for Main)
26	Plug (for Check)
27	Valve Check
28	Spring (for Main)
30	Spring (for Check)
31	Stopper A
32	Stopper B
33	Spool
34	Spring
36	O-ring
37	O-ring
38	O-ring
41	Paralell Pin
43	Socket Bolt
46	O-ring
52	RO Plug (PF1/4)
54	PT Plug
55	PT Plug (PF1/4)
63	RO Plug (PF1/2)
65	Spool (2-speed)
66	Spring (2-speed)
68	Steel Ball
71	Orifice
74	O-ring
79	Filter
89	Name Plate
90	Rivet Screw
91	Plug (PT1/8)
101	Spindle
102	Floating Seal
103	Carrier No.2
105	Hub
106	Distance Piece
107	Shaft Bearing (R)
108	Planetary Gear (F)
109	Thrust Washer (F)
110	Pin Spring
111	Needle Bearing
112	Floating Bush
113	Shaft Bearing

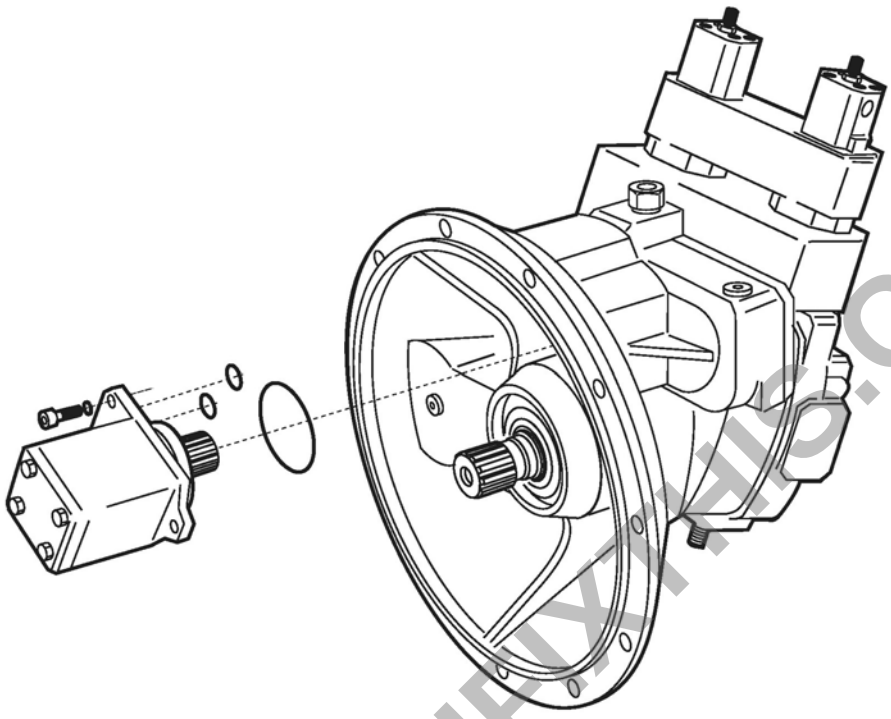
Reference	Parts
114	Sun Gear
115	Snap Ring
117	Planetary Gear (R)
118	Needle Bearing
121	Drive Gear
122	Pin Spring
123	Cover
124	Socket Bolt
125	A/Ball Bearing
126	O-ring
128	RO Plug
129	Seal Ring
130	O-ring
131	Thrust Washer (R)
132	Thrust Washer (M)
133	Thrust Plate (R)
134	Carrier No.1
136	Shim Plate
C	Control Part Assembly
C-1	Rear Flange Assembly
C-2	Rear Flange Kit
C-3	Stopper Assembly
R	Reduction Part
202	Drive Shaft
203	Swash Plate (B Type)
204	Cylinder Block
205	Piston
206	Shoe
207	Retainer Plate
208	Thrust Ball
209	Timing Plate
212	Piston (Parking)
213	Spring
214	Spring (Cylinder)
215	Friction Plate
216	Mating Plate
232	Oil Seal
235	O-ring
239	O-ring
242	Parallel Pin
247	Back up Ring
248	Back up Ring

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Gear Pump Sealing

1. Remove gear pump.

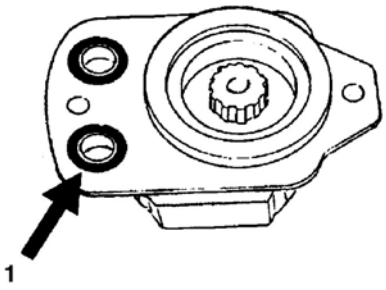


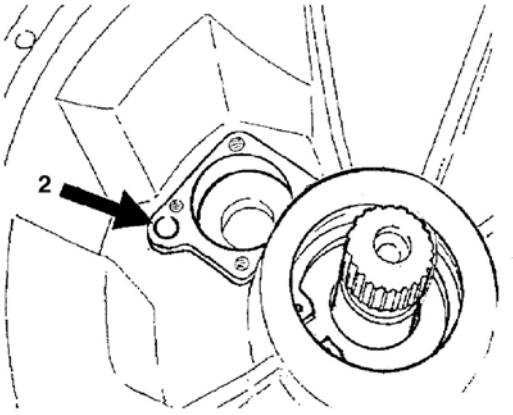
FG003079

Figure 23

Visual Check :

Reference Number	Description
1	O-ring
2	Sealing Surface of the Housing





FG003080

Figure 24

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Main Control Valve

Edition 1

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CAUTION

Removing a plug, when pressure is not fully released, or bucket is not lowered to ground, is very dangerous. A part in the valve may spring out and drop the bucket at the same time. Always lower bucket to ground and fully release pressure before disassembling.

1. Remove socket head bolt (75, four places per each section, width across flats: 8 mm) and flange (37, seven places).
2. Remove spring (35), poppet (34) (poppet (51)) and O-ring (36) from valve housing.

CAUTION

Be careful, there is not a poppet and spring in travel straight valve section (Section H-H).

3. Remove socket head bolt (75, width across flats: 8 mm) and flange (52, two places).
4. Remove spacer (53) from valve housing. Remove O-ring (54) and backup ring (55) from spacer (53).
5. Remove spring (35) and poppet (34) from valve housing.
6. Remove plug (72, width across flats: 8 mm) (Section C-C).
7. Remove spring (33) and poppet (32) from valve housing.
8. Remove plug (72, width across flats: 8 mm) (Section L-L).
9. Remove spacer (57), spring (33) and poppet (32) from valve housing.
10. Remove plug (92, width across flats: 36 mm) (Section G-G).
11. Remove socket head bolt (73, four places, width across flats: 8 mm) and flange (43).
12. Remove spring (45), poppet (44) and O-ring (36) from valve housing.
13. Remove plug (46, width across flats: 27 mm) and O-ring (47).
14. Remove spring (48) and poppet (49) from valve housing.
15. Remove socket head bolt (101, four places, width across flats: 8 mm) from body (96, one places).
16. Remove body (96) from valve housing. Remove sleeve (99), piston (97), spring (98), poppet assembly (100), backup ring (103), and O-ring (104).
17. Remove O-ring (36).

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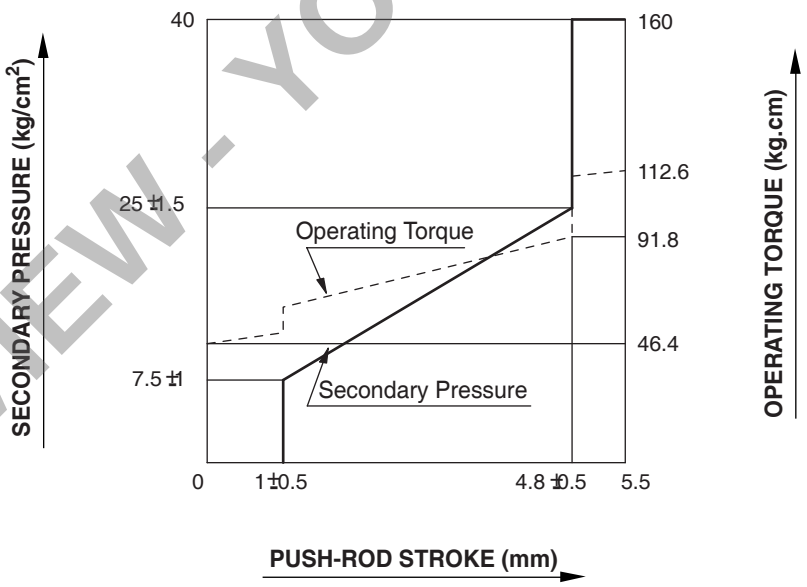
Deceleration Valve

1. In neutral position, the damper spool is pushed to the neutral position by return spring which is seated on the spring seat (and washer. As a result of the damper spool's switching function, the output port is connected to port T and the pressure at the output port and port T is the same.

2. When the cam of the remote control valve is operated and moved from the neutral position to the clockwise direction, the push rod and damper spool of port 1 is moved down within the constraints of washer 1, spring seat, secondary pressure select spring, washer 2 and washer 3. As a result port P and port 1 are connected and oil pressure from the pilot pump flows through port 1, generating pressure.

   When the pressure of port 1 reaches the selected pressure of the secondary pressure select spring, the oil pressure and the spring set pressure will equalize and the output pressure of port 1 is maintained at a constant rate.

   The damper spool in port 2 is in the neutral position, oil returning from the control valve is discharged through port T. In cases where the controls are operated to the maximum position, the push rod makes direct contact with the damper spool forcing port P to make a direct path with the discharge port, permitting the pressure to equalize at these ports.



FG003924

Figure 2

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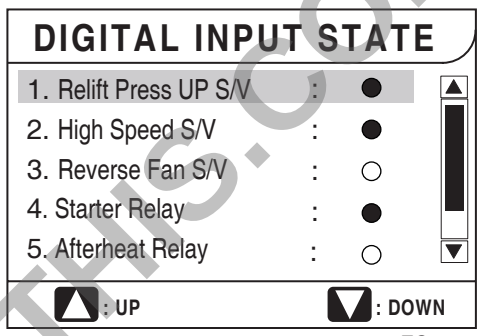
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Digital Outputs Descriptions

Digital Outputs Items	Mark	Remark
1. Relief Press. Up S/V	ON / OFF	Lights up when the relief press up solenoid valve is "ON."
2. High Speed S/V		Lights up when the high speed solenoid valve is "ON."
3. Reverse Fan S/V		N.A.
4. Starter Relay		When the starter relay is "ON."
5. After Heat Relay		N.A.

Menu Select

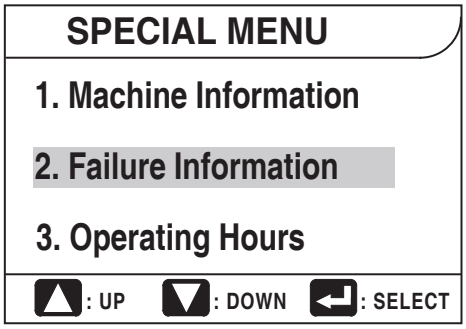


FG013612

Figure 32

Failure Information

1. Entering Sub-menus: When a cursor is located in "Failure Info" of special menu screen press enter button (↵, 3 on Figure 25) and "Failure Info" screen is displayed.
2. Exiting Sub-menus: If escape button (ESC, 4 on Figure 25) is pressed for more than 1 second, this information screen will be returned to previous screen.



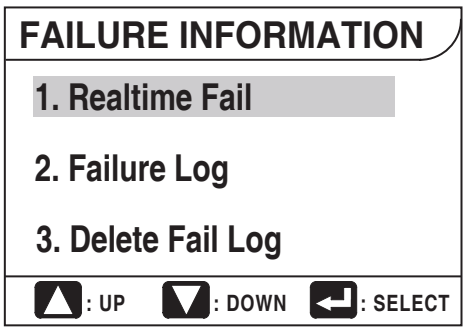
FG013613

Figure 33

* Real-time Failure:
Current status of failure is displayed.

* Failure Log:
Memorized record of past failure is displayed.

* Delete Fail Log:
This mode is used to delete all of the memorized record of past failure.



FG013614

Figure 34

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Coolant Flow Control Valve

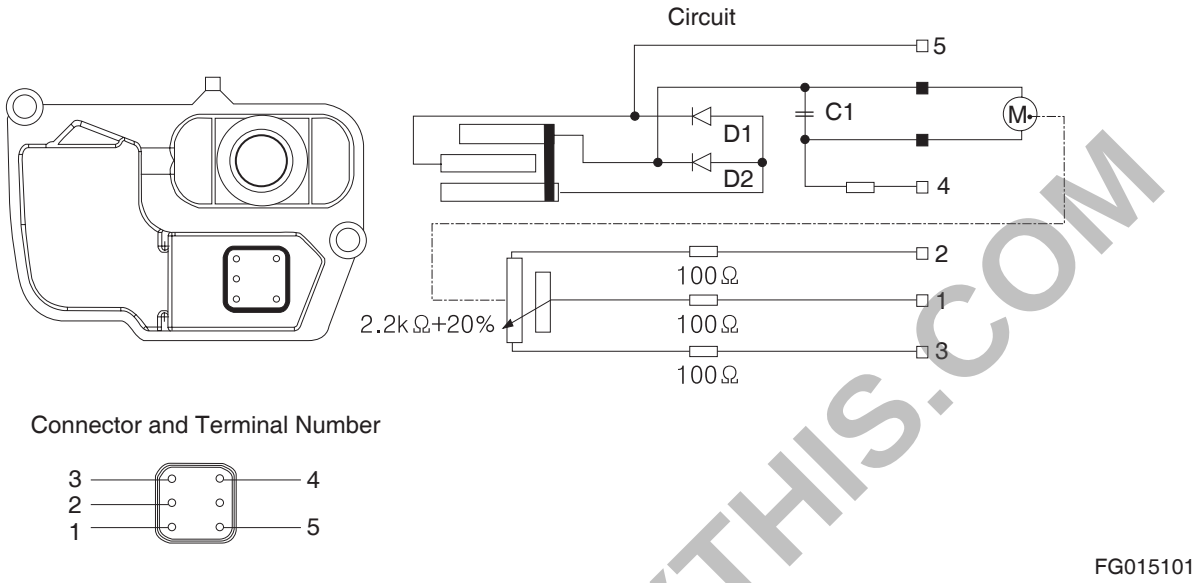


Figure 79

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