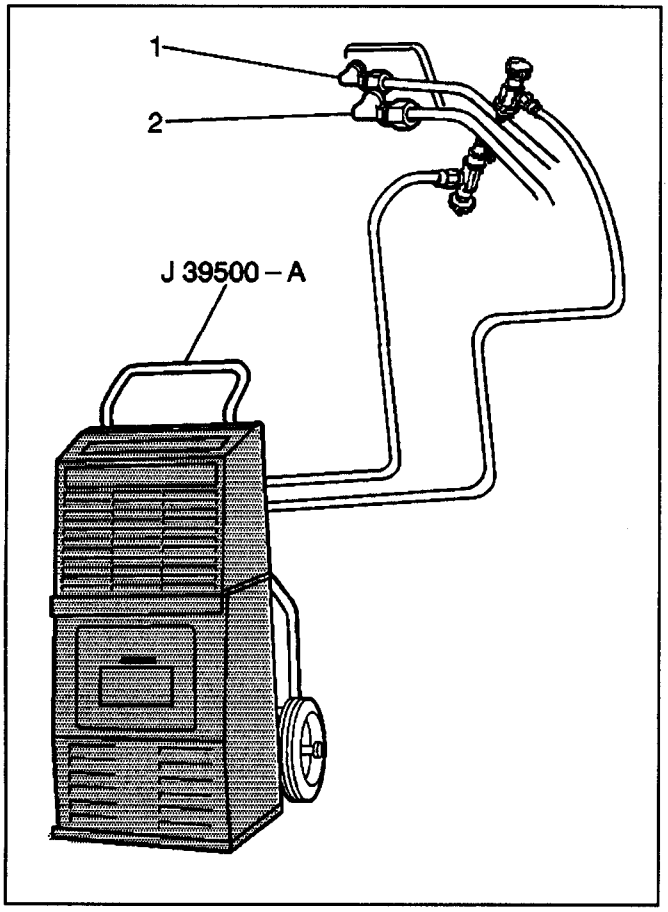
System Performance Chart

Tools Required

J 39500

1. Park the vehicle inside a building or in a shaded area.
2. Place the transmission in PARK or NEUTRAL.
3. Open the hood.
4. Secure the hood.
5. Remove the low pressure hose cap.
6. Remove the high pressure hose cap.



229676

7. Connect the low pressure hose (1).
8. Connect the high pressure hose (2).
9. Start the engine.
10. Stabilize the engine to a normal idling condition.
11. Press the button in the ON position.
12. Press the MAX/REC/RC button in the ON position.
13. Adjust the blower speed to HI.
14. Adjust the temperature control to full COLD.
15. Carefully follow the manufacturer's instructions.

The normal temperature guideline for pressures readings is approximately 25—30°C (77—86°F).

The normal pressure guideline at ambient for the low pressure side is approximately 127—265 kPA (18.5—38.4 psi).

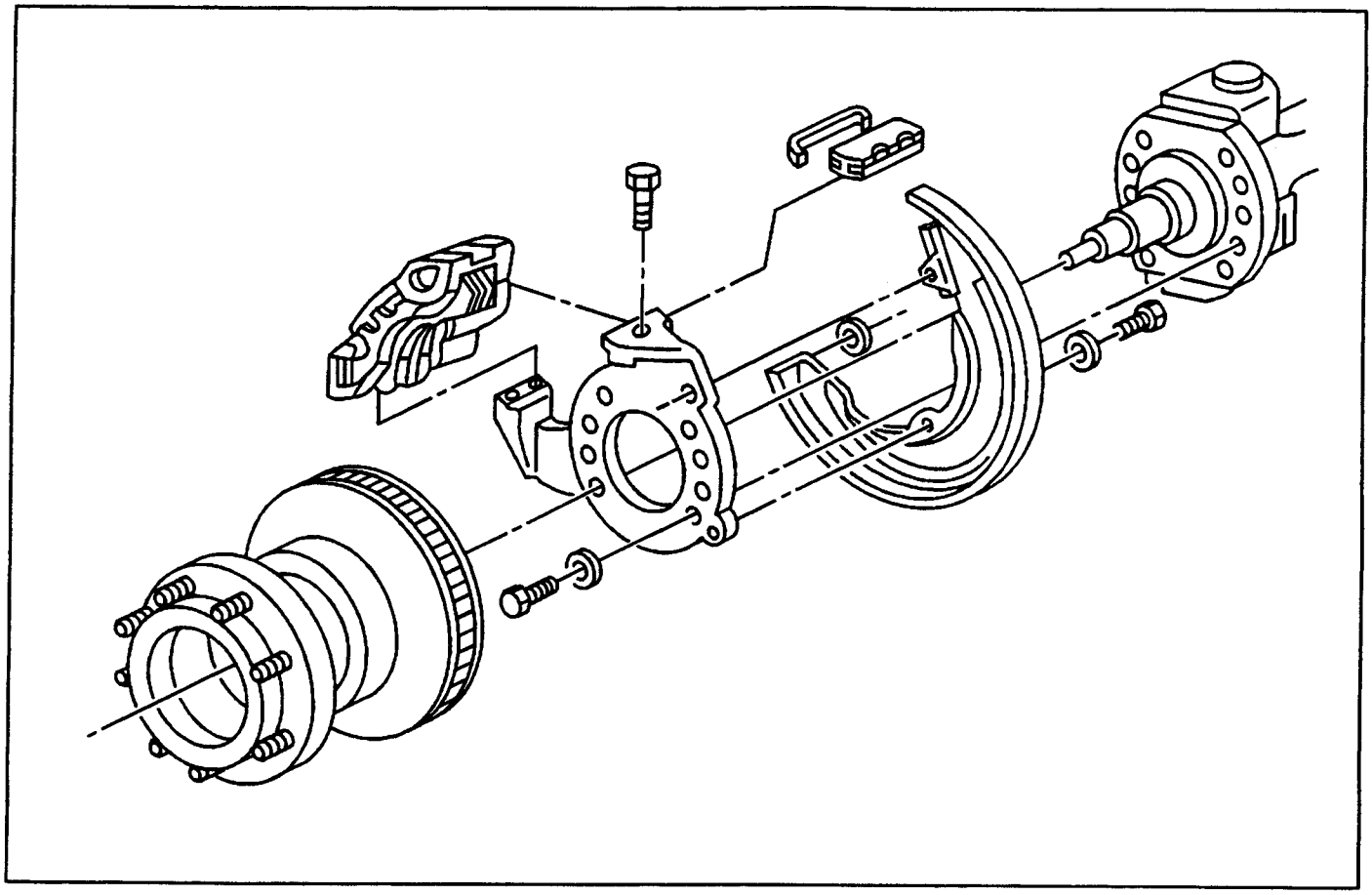
The normal pressure guideline at ambient for the high pressure side is approximately 1,373—1,765 kPA (199—255.9 psi).

System Performance Chart

Pressure		Temperature	
(kPa)	(psi)	(°C)	(°F)
36	5.3	-20	-4.4
67	9.7	-15	5
104	15	-10	14
147	21	-5	23
196	28	0	32
255	37	5	41
314	45	10	50
392	57	15	59

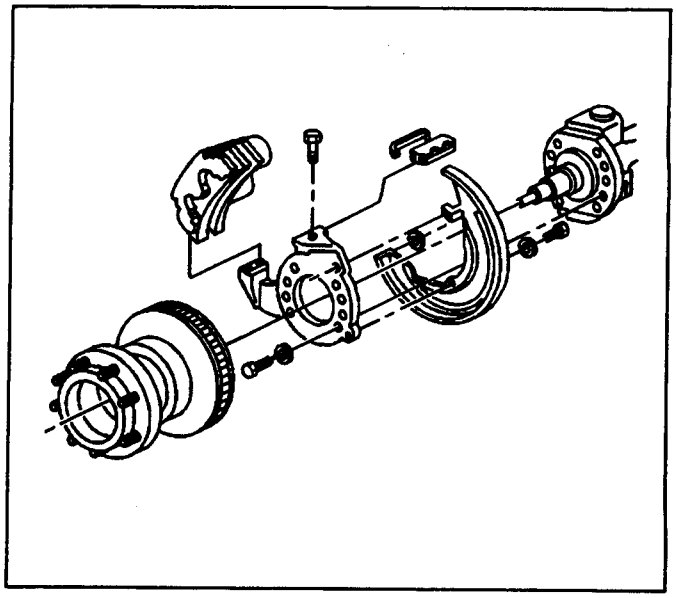
Description and Operation

Disc Brakes System Description (Front)



237270

All hydraulic foundation brakes are disc brake type. The Dayton-Walther rail slider type disc brake caliper is used on the 8,100 lb front axle. All other axles use the Bendix® rail slider type disc brake caliper.



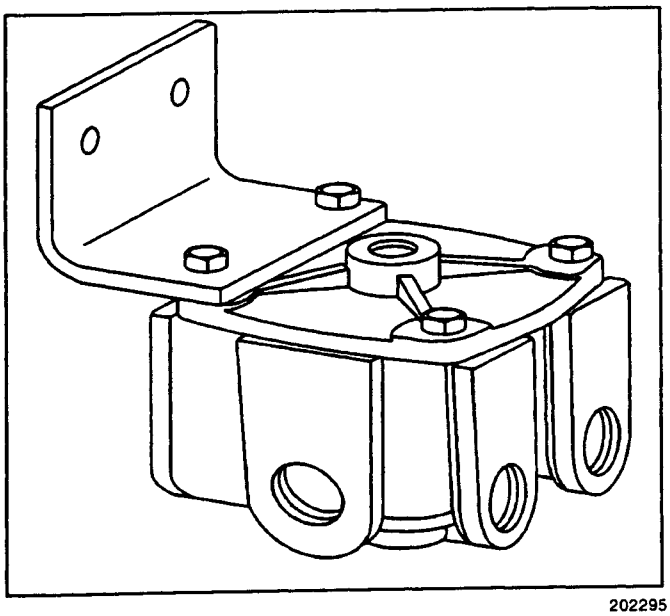
237266

Rear Air Brake Relay Valve Test (Operational Check)

1. Block the wheels.
2. Start the engine.
3. Charge the air supply to the air compressor governor cut-out point.
4. Stop the engine.
5. While you check each wheel, ask an assistant to apply the brakes hard and then release the brakes several times.
   - Ensure that the brakes apply and release promptly at each wheel.
   - If the brakes do not apply and release promptly, overhaul or replace the relay valve.
6. Remove the wheel blocks.

Rear Air Brake Relay Valve Test (Leakage Test)

1. Block the wheels.
2. Start the engine.
3. Charge the air system to the air compressor governor cut-out point.
4. Stop the engine.
5. Release the brake pedal.



202295

6. Inspect the exhaust port and the area around the exhaust port retaining ring for air leakage. Air leakage less than a 25.4 mm (1 in) bubble in 3 seconds is acceptable.

   If air leakage is excessive, overhaul or replace the relay valve.
7. Ask an assistant to apply the brake pedal firmly.
8. Inspect the exhaust port for air leakage. Air leakage less than a 25.4 mm (1 in) bubble in 3 seconds is acceptable.

   If air leakage is excessive, overhaul or replace the relay valve.
9. Inspect the outside of the valve where the cover joins the valve body for air leakage. Air leakage is not pemissable.

   If any bubbles appear, overhaul or replace the relay valve.
10. Remove the wheel blocks.

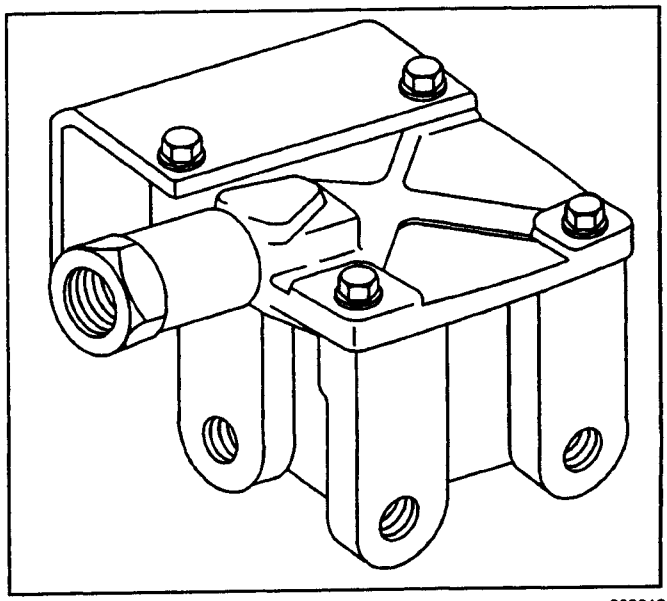
Rear Air Brake Relay Double Check Valve Test (Operational Check)

1. Block the wheels.
2. Start the engine.
3. Charge the air supply to the air compressor governor cut-out point.
4. Stop the engine.
5. While you check each wheel, ask an assistant to apply the brakes hard and then release the brakes several times.
6. Insure that the brakes apply and release promptly at each wheel.

   If the brakes do not apply and release promptly, overhaul or replace the relay valve (double check type).
7. Remove the wheel blocks.

Rear Air Brake Relay Double Check Valve Test (Leakage Test)

1. Start the engine.
2. Charge the air system to the air compressor governor cut-out point.
3. Stop the engine.
4. Release the brake pedal.
5. Pull out the park control knob.

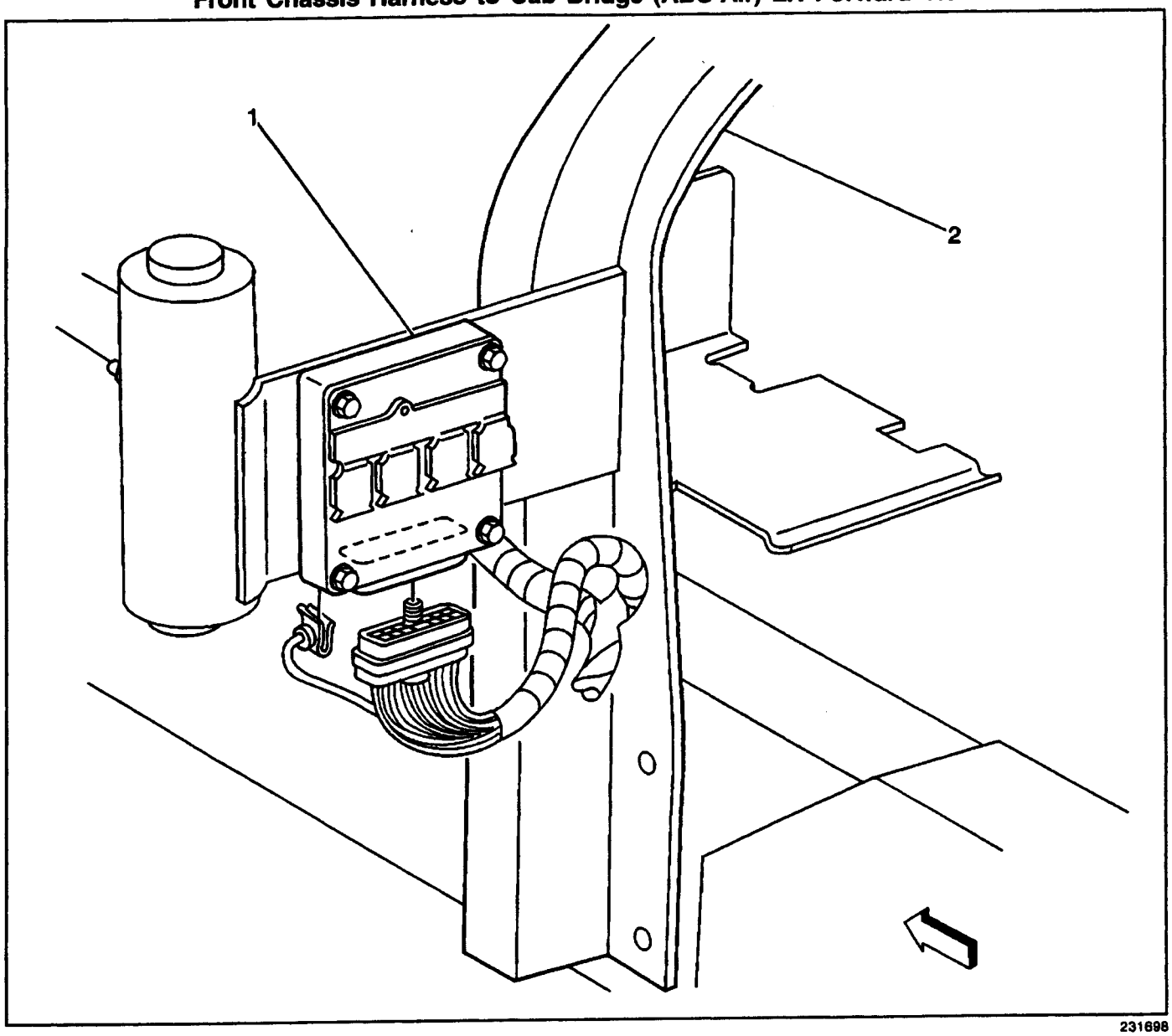


202312

6. Inspect the exhaust port and inspect the area around the exhaust port retaining ring for air leakage. Air leakage less than a 25.4 mm (1 in) bubble in 3 seconds is acceptable.

   If air leakage is excessive, overhaul or replace the relay valve.

Front Chassis Harness to Cab Bridge (ABS-Air) LH Forward View

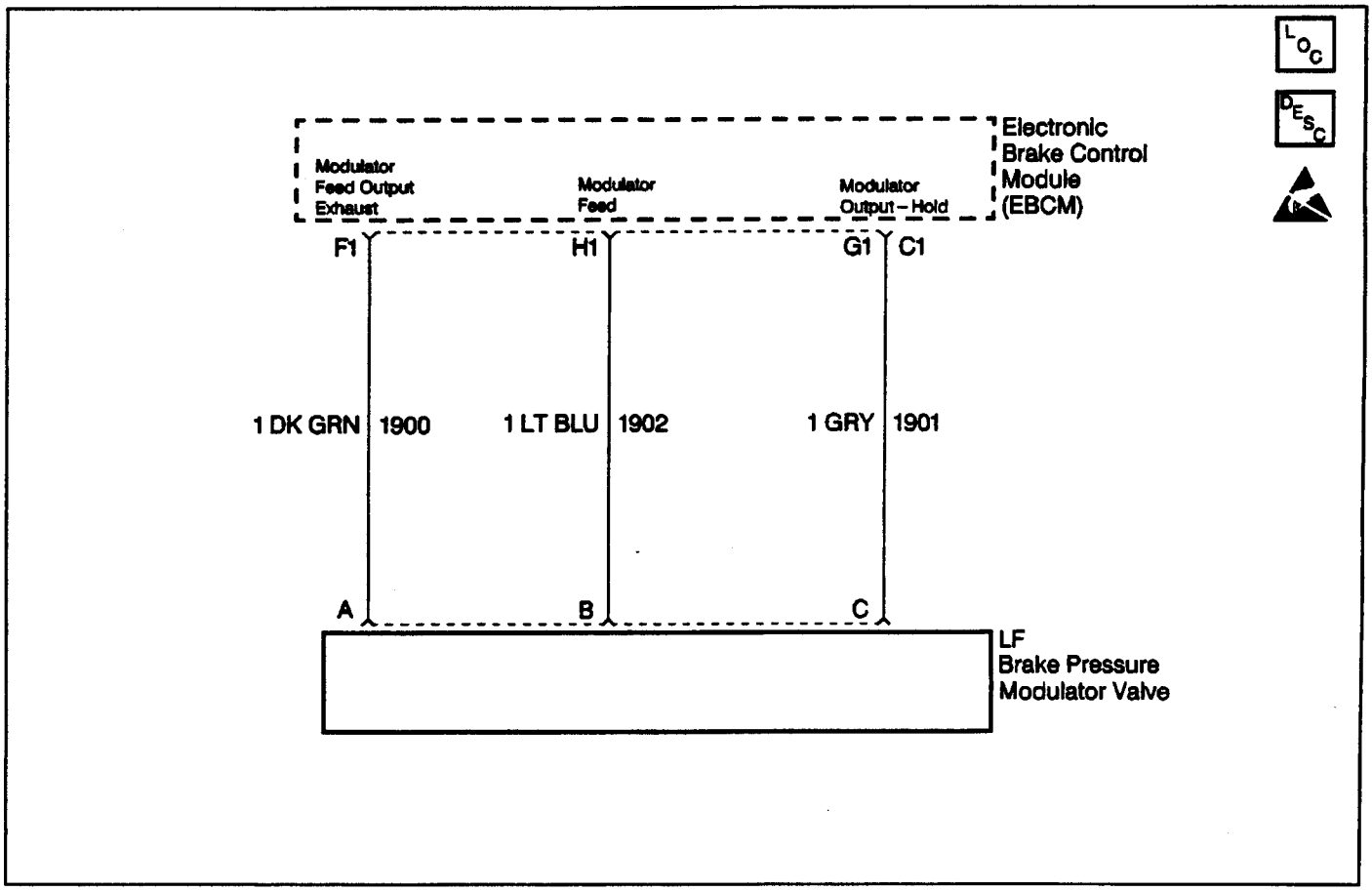


Legend

(1) Electronic Brake Control Module (EBCM) (ABS-Air)

(2) Cab Bridge

Status Lamps Illuminated - Left, Front, and Mod



325410

Circuit Description

The red diagnostic status lamps latches on to indicate a permanent or intermittent open or short circuit in the solenoids of one of the four modulators or the wiring connecting it to the system.

Conditions for Illuminating Diagnostic Status Lamps

- Open in modulator valve solenoid or modulator valve wiring
- Short in modulator valve solenoid or modulator valve wiring

Action Taken When Diagnostic Status Lamps Illuminate

- The ABS indicator lamp is illuminated
- The ABS is disabled

Conditions for Clearing Diagnostic Status Lamps

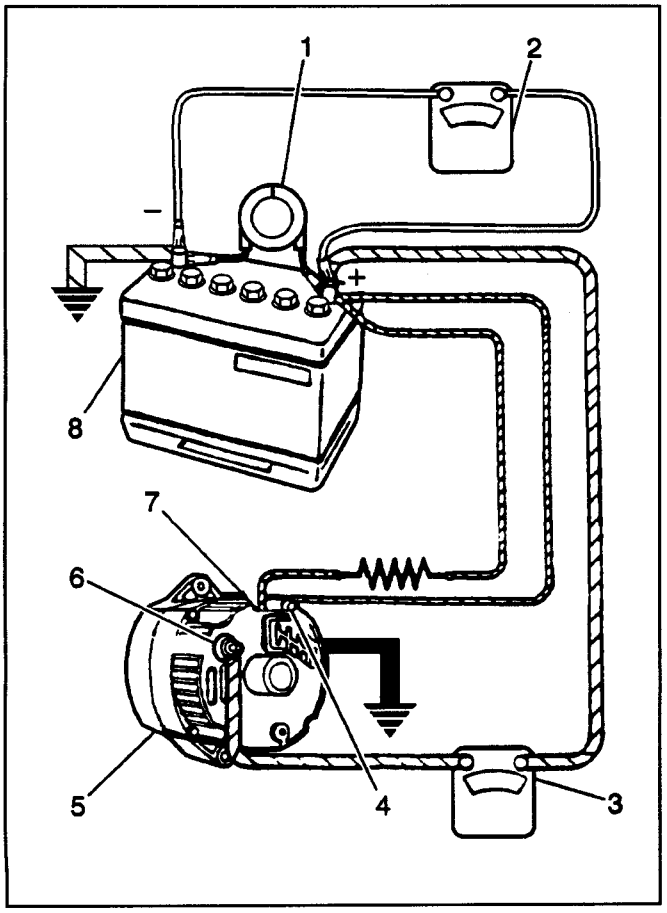
- Repair the condition responsible for illuminating status lamps
- Reset the EBCM (see Diagnostic Status Lamps)

Diagnostic Aids

An intermittent malfunction may be caused by a poor connection, rubbed through wire insulation, or a wire that is broken inside the insulation. If the LEFT, FRONT and MOD diagnostic status lamps are on only during moist environmental changes (rain, snow, vehicle wash), all modulator valve circuitry should be thoroughly inspected for signs of water intrusion. Use the following procedure. Spray the suspected are with a 5% salt water solution (two teaspoons of salt to 12 oz. of water). Test drive the vehicle over various road surfaces (bumps, turns, etc.) above 24 km/H (15 mph) for at least 30 seconds. If condition returns, replace suspected harness.

Any circuitry that is suspected of causing the intermittent complaint should be thoroughly checked for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wiring connections or physical damage to the wiring harness.

When inspecting a modulator valve, inspect the sensor terminals and harness connector for corrosion and/or water intrusion. If evidence of corrosion or water intrusion exists, replace the modulator valve. Refer to *Modulator Valve Replacement - Front* in this section.



203666

4. Connect a carbon pile across the battery.
5. Operate the engine at 2500 RPM.

   Important: Residual magnetism in the rotor causes the initial voltage buildup. Increase the engine speed as necessary in order to obtain the maximum current output.
6. Adjust the carbon pile as necessary in order to obtain the maximum current output.
7. If the ampere output is within 10 amperes of the rated output stamped on the generator frame, the generator functions properly.
8. If the ampere output is not within 10 amperes of the rated output stamped on the generator frame, repair the generator. Refer to *Generator Replacement.*

Charging System Check (Battery Testing)

Tools Required

- Battery Terminal Adapters
- *J 39200* Digital Multimeter

Perform the following procedures in order to test batteries.

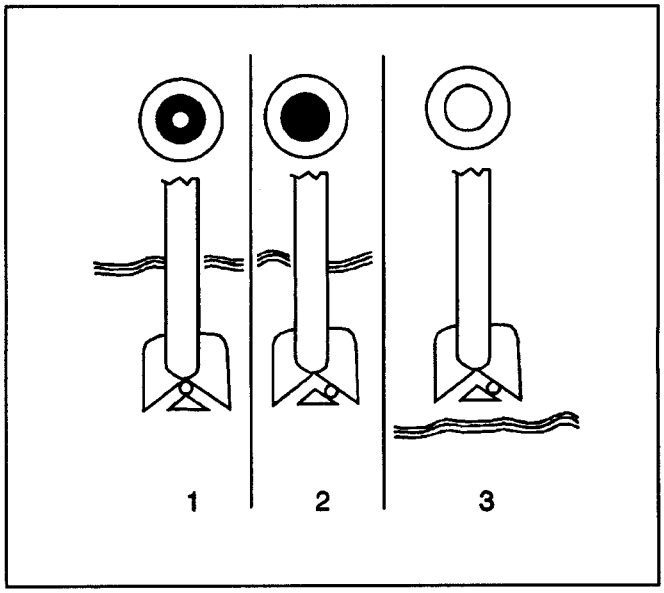
Visual Inspection Procedure

1. Inspect for obvious damage that may permit the loss of electrolyte.

   A cracked or broken battery case is an example of the above damage.
2. Determine the cause of the damage.
3. Correct the damage as necessary.

   If no obvious damage exists, proceed to the Hydrometer Inspection.

Hydrometer Inspection



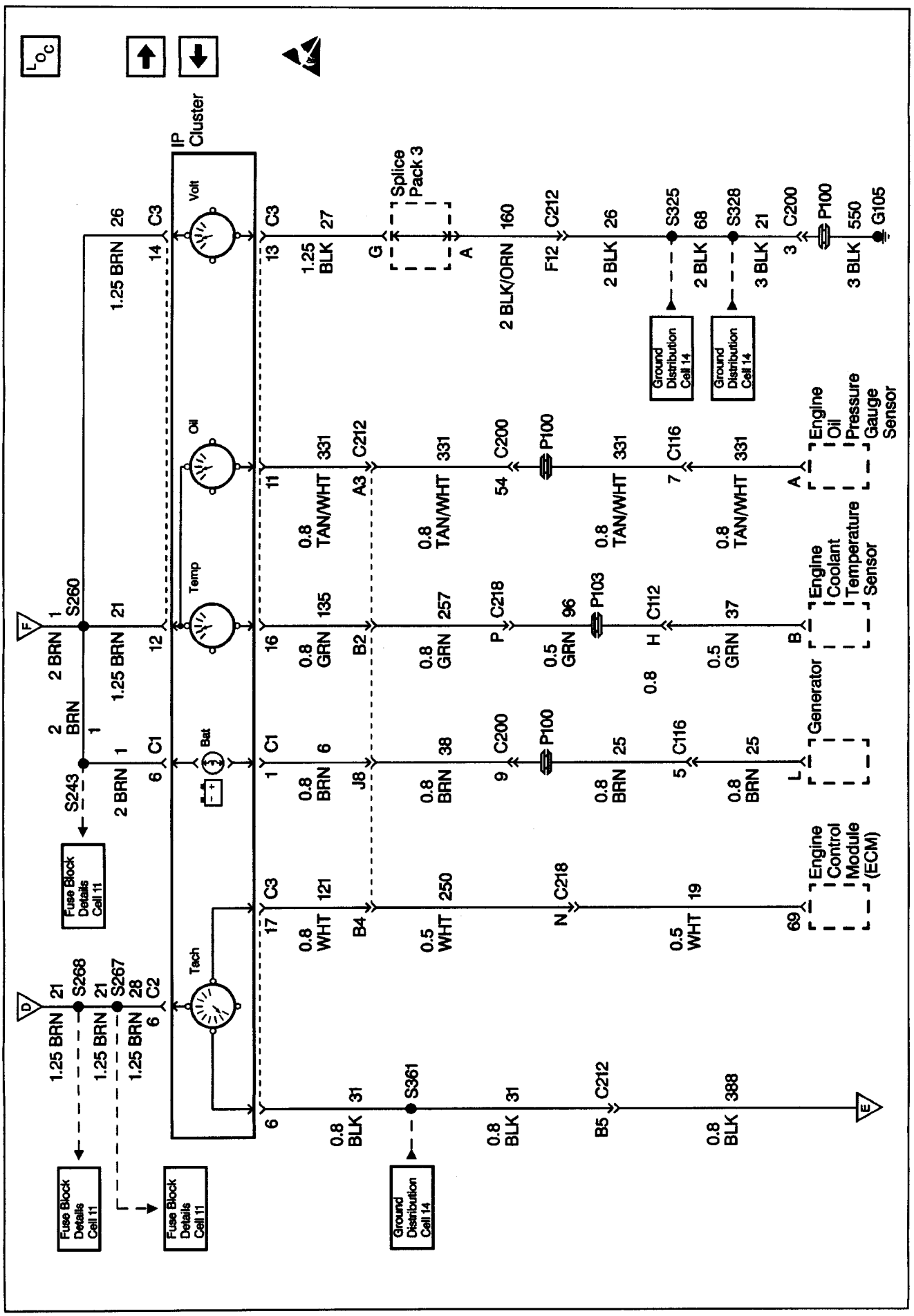
181056

1. Inspect for green dot visibility (1).

   If the green dot is visible (1), proceed to Battery Load Testing.
2. Inspect for darkness (2). (The green dot is not visible.)

   If the hydrometer is dark (2), charge the battery. Refer to *Battery Charging.* Proceed to Battery Load Testing.
3. Inspect for a clear or yellow color (3).

   If a clear or yellow color exists (3), replace the battery.


Engine Controls Schematics (Cell 20 - Engine Controls, IP Cluster)
301667
IP Cluster
Volt
Temp
Oil
Bat
Tach
Fuse Block Details Cell 11
Ground Distribution Cell 14
Splice Pack 3
Engine Control Module (ECM)
Generator
Engine Coolant Temperature Sensor
Engine Oil Pressure Gauge Sensor
S243
S260
S268
S267
S361
S325
S328
C1
C2
C3
C200
C212
C116
C112
C218
P100
P103
G105
1.25 BRN
2 BRN
0.8 BRN
0.8 WHT
0.8 BLK
0.8 TAN/WHT
0.8 GRN
0.5 GRN
0.5 WHT
1.25 BLK
2 BLK/ORN
2 BLK
3 BLK
3 BLK 550

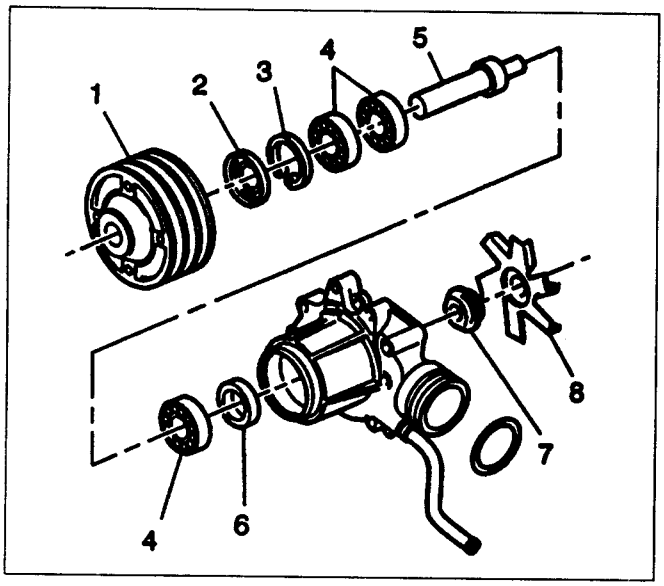
SPECIFICATIONS

GENERAL ENGINE SPECIFICATIONS

MODEL	6HK1-TC
Type	Inline 6, 4 stroke
Induction	Turbocharged Combustion
Combustion	Direct Injection
Bore	115 mm (4.5276 in.)
Stroke	125 mm (4.9213 in.)
Displacement	7.8L (475.1 Cu. In.)
Compression Ratio	16.8:1
Firing Order	1-5-3-6-2-4
Valve Clearance, Cold (Intake and Exhaust)	0.4 mm (0.16 in.)
Full Flow Oil Filter	Cartridge Type
Oil Capacity	14.0L (14.79 Qts) *
Oil Pressure (Minimum at an Idle)	100 kPa (14 psi)
Compression at 200 RPM (Production)	3240 kPa (469 psi)
Compression at 200 RPM (Service Limit)	2157 kPa (313 psi)
Difference between each cylinder	Less than 196 kPa (28 psi)
* Includes full flow filter, which should be changed at each oil change.	

FASTENER TIGHTENING SPECIFICATIONS

Application	N·m	Lb Ft	Lb In.
Camshaft Bearing Cap Nut	27.5	20	—
Camshaft Gear Bolt	142	105	—
Camshaft Thrust Bracket Bolt (No. 1, and No. 7)	27.5	20	—
Charge Air Pipe Bolt	37	7	—
Connecting Rod Bolt (Apply Molybdenum disulfide grease)			
First Stage	39	29	—
Second Stage	plus 60 deg	plus 45 deg	—
Third Stage	plus 30 deg	plus 30 deg	—
Crankshaft Balancer Bolt and Washer	200	148	—
Crankshaft Pulley Bolt and Washer	48	35	—
Cylinder Body Lower Crankcase (M10)	37	27	—
Cylinder Body Lower Crankcase (M14) (Apply Molybdenum disulfide grease)			
First Stage	98	72	—
Second Stage	132	98	—
Third Stage	plus 45 deg	plus 45 deg	—
Cylinder Head Bolt (M14) (Apply Molybdenum disulfide grease)			
First Stage	98	72	—
Second Stage	147	108	—
Third Stage	plus 30 deg	plus 30 deg	—
Cylinder Head Bolt (M10)	39	29	—
Engine Mounting Bolt to the Frame	36	26	—
Engine Mounting Nut to the Frame	83	61	—
Engine Mount Through Bolt	294	217	—
Exhaust Manifold Nut and Bolt	34	25	—
Exhaust Pipe Adapter to the Exhaust Manifold	52	38	—



Legend
(1) Pulley
(2) Dust Thrower
(3) Snap ring
(4) Bearings and Spacer
(5) Spindle
(6) Front Seal
(7) Seal Unit
(8) Impeller

Figure 1 – Water Pump Component

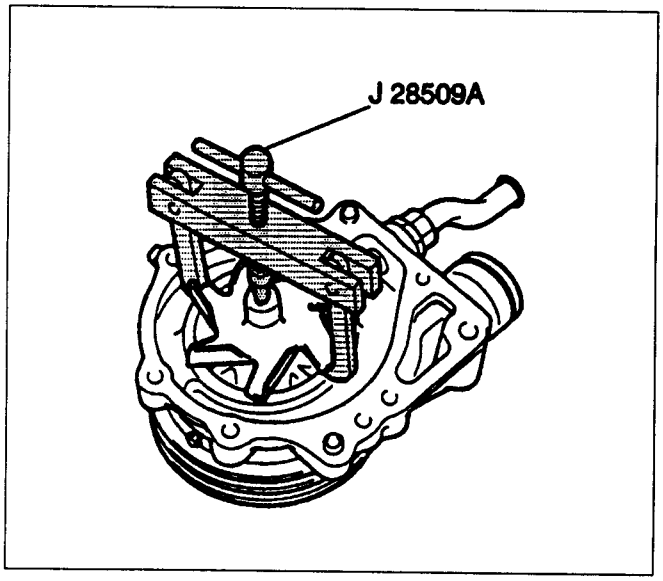


Figure 2 – Impeller Removal

7. Pulley using a bench press.

CAUTION: To protect the bearings and housing during this procedure, the press must contact the impeller side of the pump shaft and the pulley.

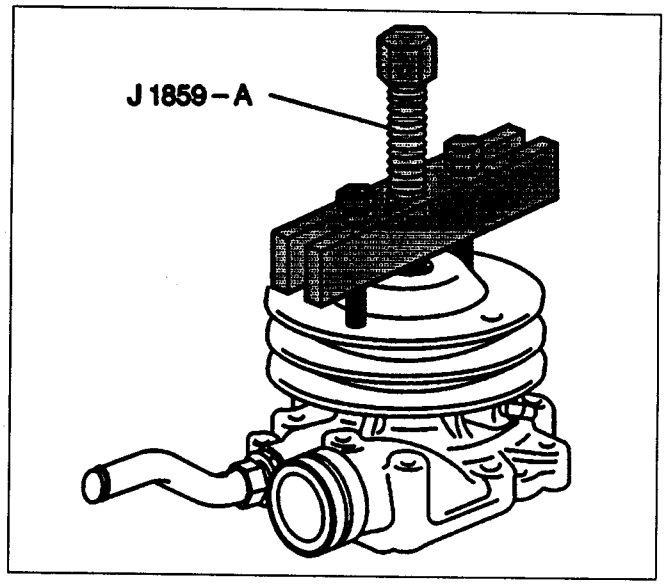


Figure 3 – Pulley Removal

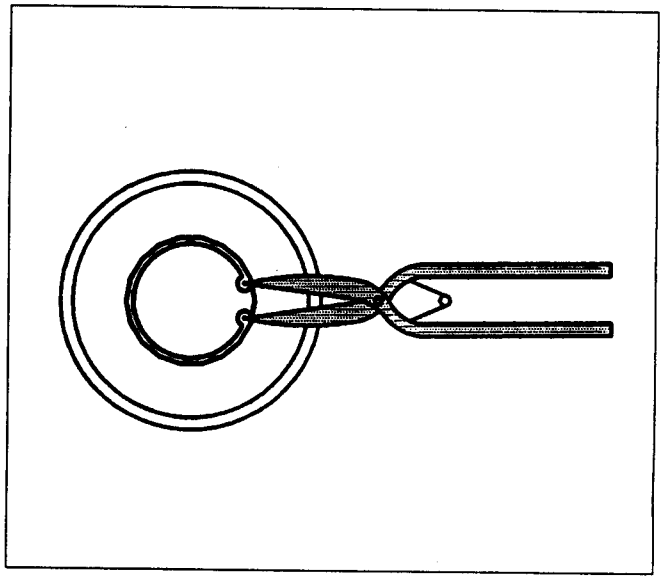


Figure 4 – Snap Ring Removal

8. Apply a thin coat of liquid gasket (Three Bond 1207C or equivalent) to the seal unit before installing.
9. Seal unit to the housing.

Measure

- Install seal unit to specified height using a bench press and installer.
- Seal height 11.0 – 11.6 mm (0.433 – 0.457 in.)

CAUTION: To protect the bearings and housing during this procedure, the press must contact the impeller and the pulley.

10. Impeller to the shaft using bench press, until the impeller bottoms out against the shaft.

SECTION 6D6

DIESEL ELECTRICAL

NOTICE: *Always use the correct fastener in the correct location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.*

CONTENTS

GENERAL DESCRIPTION

GLOW PLUGS

Diesel engines relay on the heat of compression to initiate combustion. Cold engine start-ups may require extra engine cranking time to create the necessary heat to ignite the diesel fuel. One of the devices available to aid in cold starting the diesel engine are glow plugs. Six glow plugs are used to preheat the combustion chambers as an aid to starting (Figure 1). The glow plugs (Figure 2) are 10.5 volt heaters, operated at 12 volts, when the engine control switch is turned to the "H" position. This provides a pre-heat feature to the combustion chamber and improves cold engine start ups.

NOTICE: ***Never manually spray starting aid fluids into the air intake where the fluid may come in contact with the heater element. This could result in an explosion and/or fire.***

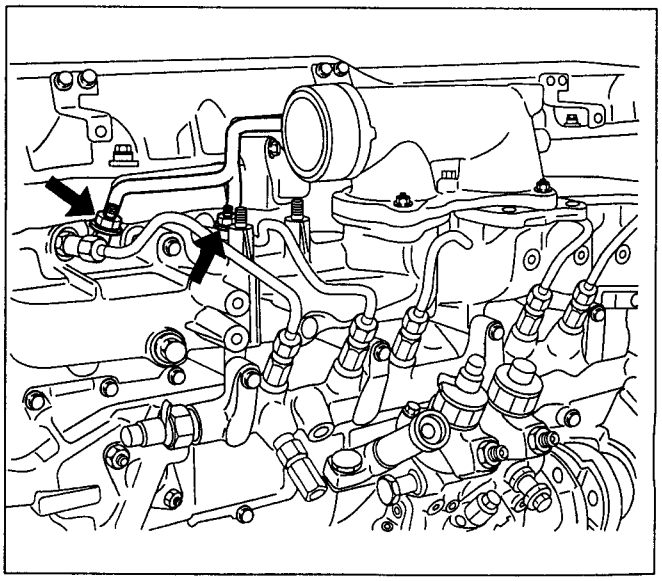


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Figure 1 – Glow Plugs

System Parts Description

Injection Pump

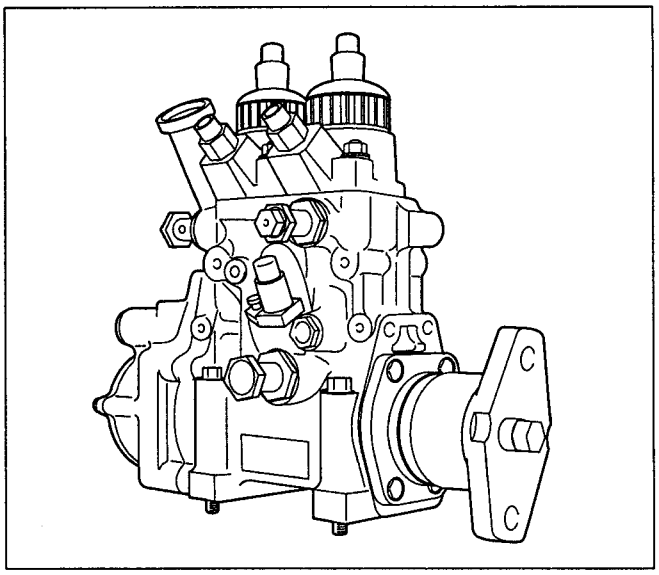
The injection pump comprised pump proper, feed pump, and coupling.

Engine output goes to idle gear, air compressor, and drive gear and is transmitted through coupling to the camshaft of injection pump.

Plunger is lubricated and cooled with fuel, be sure not to use any fuel other than specified one.

Injection Pump Unit

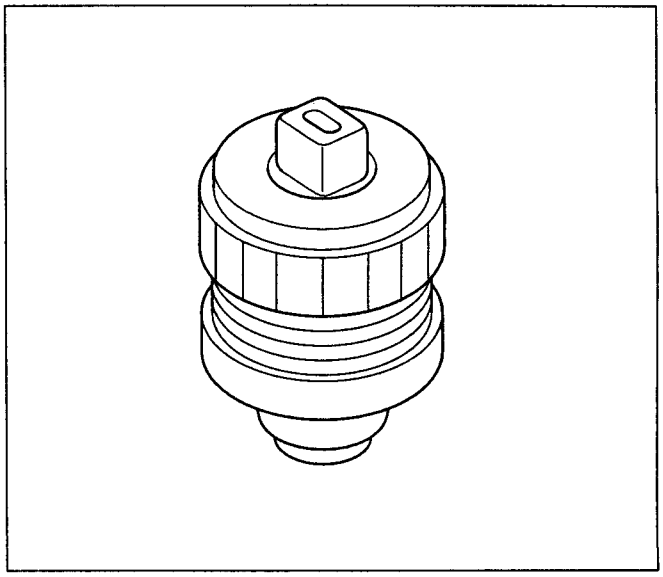
The injection pump unit comprises the same feed system as is used in the conventional duplex pump and two cylinders each having a pressure control valve (PCV). Using triple action cam has reduced the number of pump cylinders required to one third of the number of engine cylinders (2 cyl. pump in case of 6 cyl. engine). Further, the number of times of feeding to common rail is equal to that of injection, giving smooth, stable common rail pressure.



040MV033

Pressure Control Valve (PCV)

PCV is used to adjust injection pump discharge amount so as to adjust common rail pressure. Discharge amount from the injection pump to the common rail is determined by continuity timing to PCV.



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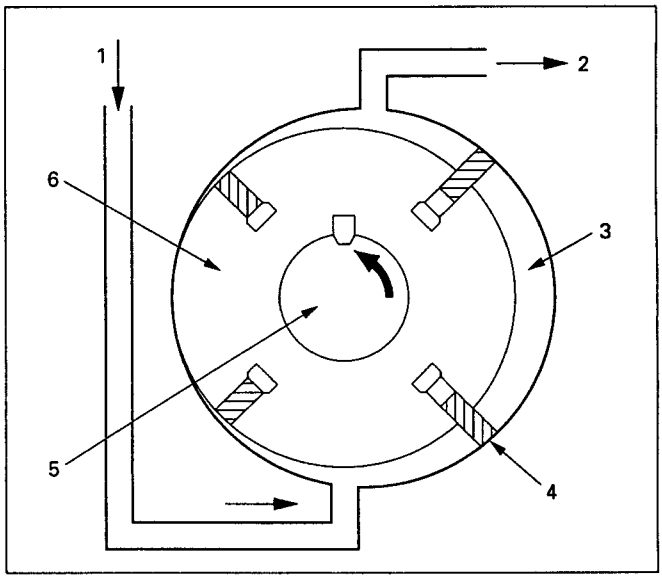
Feed Pump

The feed pump built in the injection pump to fuel pump up and supply fuel through fuel filter into the injection pump unit. Feed pump rotor is driven by camshaft. When the rotor starts to rotate, vanes are pushed outward by centrifugal force. As the rotor is eccentric with the pressure chamber, the fuel between the vanes are pressed to be pushed out of discharge port.



040MV050

Legend

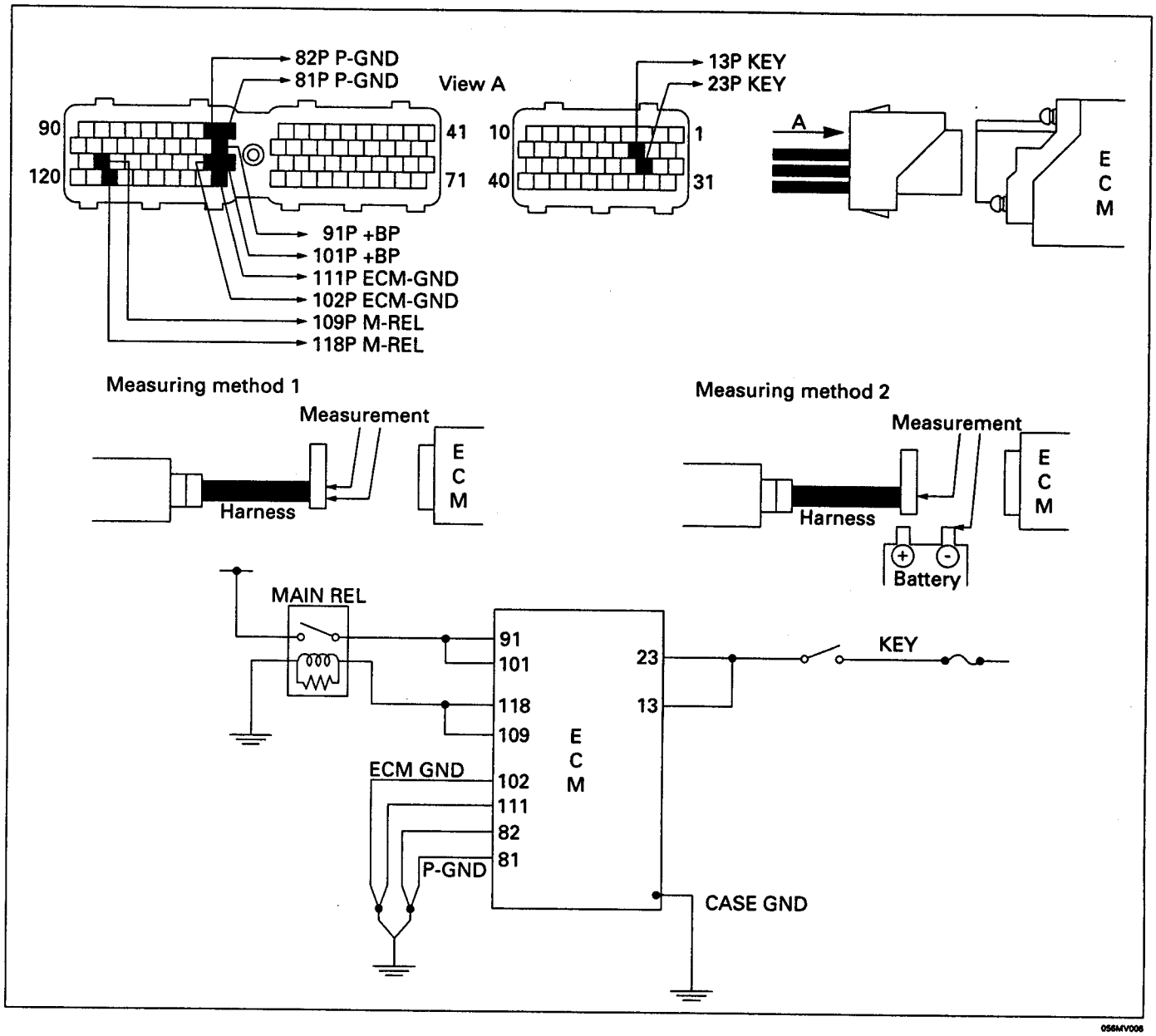
(1) From fuel tank
(2) To fuel filter
(3) Pressure chamber
(4) Vane
(5) Camshaft
(6) Rotor

DTC P24 Accelerator Sensor Error 1 and 2 (Trouble for accelerator sensor intermediate hold)

Note: The accelerator sensor is hole element type and non contact type, thus, when doing judgment to supplying voltage.

STEP	ACTION	VALUE	YES	NO
1	Does display DTC P24 while key switch "ON" or engine in operating?	—	Go to step 2	—
2	Measure voltage following points. (Measuring method 1) • Between pin number 41 (ACC1) and pin number 45 (ACC1–GND) at ECM side. • Between pin number 42 (ACC2) and pin number 46 (ACC2–GND) at ECM side. Is there voltage beyond compass from value?	At idling 0.95V to 1.05V At full around 4.5V (Max)	Go to step 4	Go to step 3
3	1. Repair incomplete contact on accelrator sensor harness. 2. Readjust accelerator sensor when idling voltage abnormally. Did repair/readjust above parts?	—	Go to step 13	Repair/readjust harness or accelerator sensor.
4	Measure voltage between pin number 41 (ACC1) and pin number 42 (ACC2) at ECM side when engine idling condition. (Measuring method 1)	0.2V or less	Go to step 6	Accelerator sensor intermediate hold error. Go to step 5
5	Does accelerator sensor voltage change when move the accelerator pedal?	—	Solved	Readjust accelerator sensor. Then Go to step 13
6	Measure voltage between pin number 41 (ACC1) and pin number 42 (ACC2) at ECM side when accelerator pedal moving idling to full acceleration condition. (Measuring method 1) Is voltage within value?	0.2V or less	Go to step 7	Repair accel. sensor harness connection condition or replace accelerator sensor. Then Go to step 15
7	1. Key switch "OFF". 2. Disconnect the accelerator sensor side connector. 3. Key switch "ON". 4. Measure voltage following point at ECM side. (Measuring method 2) • Between pin number 44 (ACC1–VCC) and pin number 45 (ACC1–GND). • Between pin number 54 (ACC2–VCC) and pin number 46 (ACC2–GND). Is voltage within value?	4V to 6V	Go to step 11	Go to step 8
8	1. Disconnect accelerator sensor harness from both ECM and sensor. 2. Measure resistance following points on the accelerator sensor harness. (Measuring method 3) • Between pin number 44 (ACC1–VCC) ECM side and pin number 4 sensor side. • Between pin number 45 (ACC1–GND) ECM side and pin number 6 sensor side. • Between pin number 54 (ACC2–VCC) ECM side and pin number 1 sensor side. • Between pin number 46 (ACC2–GND) ECM side and pin number 3 sensor side. Is resistance within value?	2Ω or less	Go to step 9	Repair/replace accelerator sensor harness. Then go to step 15

Power Supply System Inspection (Not available DTC)



056MV008

SECTION 6J

TURBOCHARGER

NOTICE: *Always use the correct fastener in the correct location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.*

CAUTION: *Turbochargers operate at high speeds and temperature. Do not operate the engine and/or turbocharger without all normally installed inlet piping and filters, along with all exhaust piping. Failure to install the above components could result in personal injury and damage to the vehicle.*

CONTENTS

GENERAL DESCRIPTION

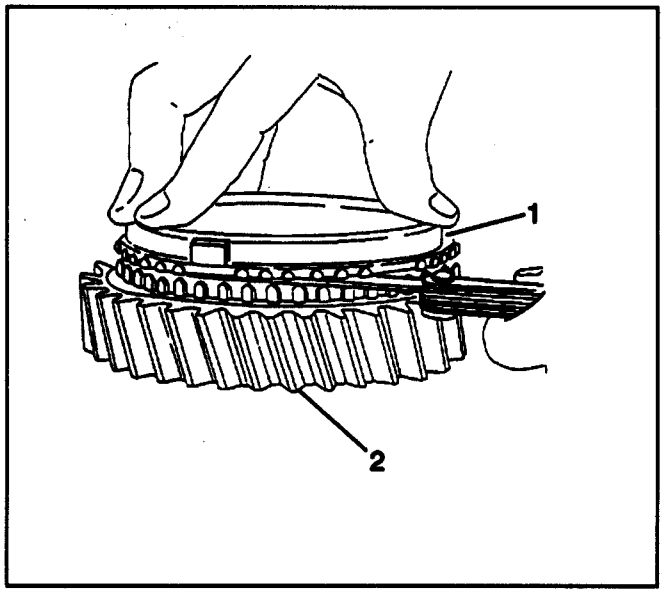
The turbocharger is used to increase the amount of air that enters the engines cylinders. This allows a proportional increase of fuel to be injected into the cylinders, resulting in increased power output, more complete combustion of fuel and increased cooling of the cylinder heads, pistons, valves, and exhaust gas. This cooling effect helps extend engine life.

Heat energy and pressures in the engine exhaust gas are utilized to drive the turbine. Exhaust gas is directed to the turbine housing. The turbine housing acts as a nozzle to direct the exhaust gas flow to the turbine wheel blades which drive the shaft wheel assembly. Since the compressor wheel is attached directly to the shaft, it rotates at the same speed as the turbine wheel. Clean air from the air cleaner and crankcase vapors are drawn into the compressor housing and wheel where it is compressed and delivered through a crossover pipe to the engine air intake manifold and then into the cylinders. The inside of the turbocharger compressor housing, compressor wheel, and the inside of the intake manifold can be quite oily due to the ingestion of the crankcase vapors. The amount of air pressure rise and air volume delivered to the engine from the compressor outlet is regulated by a waste gate valve in the exhaust housing.

The position of the waste gate valve is controlled by the amount of pressure built up on the intake side of the turbocharger. The diaphragm on the inside of the waste gate is pressure sensitive, and controls the position of the valve inside the turbocharger. The position of the valve will increase or decrease the amount of boost to the turbocharger.

The Charger Air Cooler also helps the performance of the ISUZU diesel. Intake air is drawn through the air cleaner and into the turbocharger compressor housing. Pressurized air from the turbocharger then flows forward through the charge air cooler (intercooler) located in the front of the radiator. From the charge air cooler (intercooler), the air flows back into the intake manifold.

The charger air cooler (intercooler) is a heat exchanger that uses air flow to dissipate heat from the intake air. As the turbocharger increases air pressure, the air temperature increases. Lowering the intake air temperature increases the engine efficiency and power.



Legend
(1) Ring, Blocker
(2) Gear

Figure 10—Measuring the Blocker Ring to Gear Clearance

UPPER QUADRANT BOX DISASSEMBLY

Disassemble (Figure 4)

1. Link rod.
2. Select cable arm, bracket, and bushings.
3. Key bolt and external washer.
4. Washer and oil seal.
5. Internal select lever.
6. Snap ring, external lever, seal, and bushing.
7. Internal shift lever.

Clean

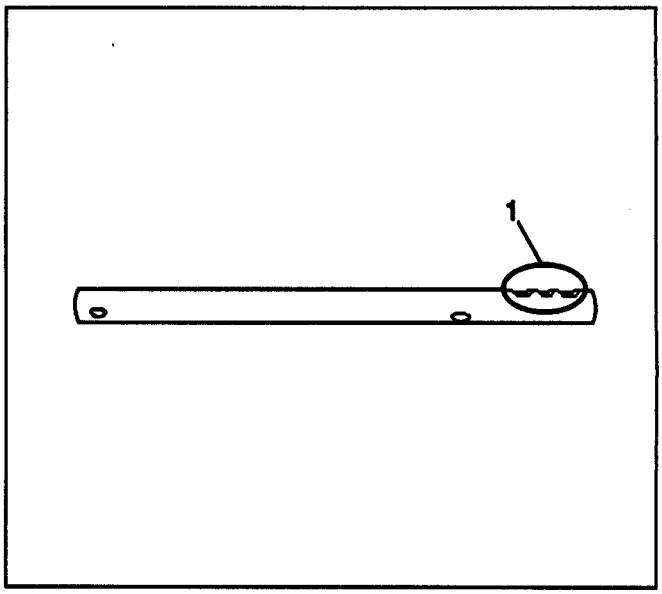
- Clean all parts with a cleaning solvent.

Inspect

- All parts for wear and damage.
- Seal surfaces for scratching and pitting.
- Shafts for rounding of detent shoulders (Figure 11).

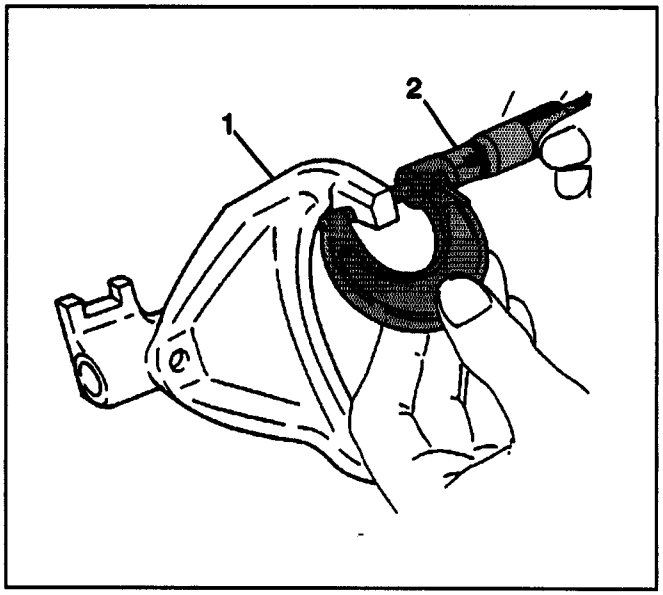
Measure (Figures 12 and 13)

1. Shift arm thickness (Figure 12).
   - The standard thickness of the shift arm is 11 mm (0.4331 in.).
   - The minimum thickness of the shift arm is 10 mm (0.3937 in.).
2. Detent spring length (Figure 13).
   - The standard length of the detent spring is 37.8 mm (1.4881 in.).
   - The minimum length of the detent spring is 34 mm (1.3385 in.).



Legend
(1) Shoulders

Figure 11—Shift Rod and Detent Shoulders



Legend
(1) Arm, Shift
(2) Micrometer

Figure 12—Shift Arm Thickness Measurement

UPPER QUADRANT BOX ASSEMBLY

Assemble (Figure 4)

- Apply a thin coat of transmission oil to all of the shift rods and bushings prior to installation.

1. Internal shift lever.
2. Bushing , seal, external lever, and NEW snap ring.
3. Internal select lever.
4. Oil seal and washer.
5. External washer and key bolt.
6. Bushings, bracket, and select cable arm.
7. Link rod.