SUPPORT INFORMATION

Your new Yale Industrial Truck is important to you and to your dealer for Yale lift trucks. You measure the return on the investment in your lift truck through the performance of those lift trucks, the drivers who operate them and the mechanics who service them safely and efficiently. The following information and programs are made to help fill your needs:

SERVICE PARTS ORDERING INSTRUCTIONS

How To Order Service Parts

In order to prevent delay, and to have your orders filled correctly, quickly and at the lowest cost, do the following procedure to order replacement parts.

When Ordering Parts

Your authorized dealer for Yale lift trucks needs the following information:

1. Your Purchase Order number.
2. Complete addresses for sending the invoice and parts.
3. Tell us how you want your parts sent. If we do not get this information, we will send the parts using the lowest priced method.
4. Correct part numbers and descriptions. Use your parts manual as a reference.
5. Model and serial number of the truck.

SPECIAL TOOLS

Yale makes a variety of special tools for servicing lift trucks. They are available to users who do their own maintenance. Your dealer for Yale lift trucks is ready to help.

TECHNICAL SERVICE PUBLICATIONS

Technical literature, with detailed information, is available at a nominal fee to assist users to effectively maintain Yale Industrial Trucks in a safe, useful condition. Parts Manuals with complete replacement parts identification, Operators Manuals which provide operating procedures and additional copies of this Service Maintenance Manual can be obtained from your Yale Industrial Truck Dealer.

OPERATOR TRAINING

The Yale "Basic Operator Training' program helps industrial truck users increase their materials handling production and safety through correct lift truck operation, training and motivation. The Yale program is based upon real life experience - not theoretical concepts. We developed a "complete' program that is totally self-contained - incorporating the most modern instructional techniques, including elements of self-stu-dy, audio-visual support (both video and slides), and classroom study.

DAILY OPERATOR CHECK-OFF LISTS

According to OSHA requirements, lift truck operators must examine their industrial trucks before each shift of operation. The OPERATOR'S DAILY CHECK LIST can help operators comply with the these OSHA regulations and give a fast easy inspection system that can be completed efficiently. A sample of the OPERATOR'S DAILY CHECK LIST is shown on the following page.

SERVICE TRAINING COURSES

Operators and dealer for Yale lift trucks service technicians can improve their technical ability for maintaining and repairing Yale Industrial Trucks and decrease repair time and cost by taking the Yale Service Training courses. Different types of mechanical, electric and electronic subjects are available. Courses are available at customer and Dealer locations in addition to regularly scheduled courses which are held at Yale Corporate Headquarters in

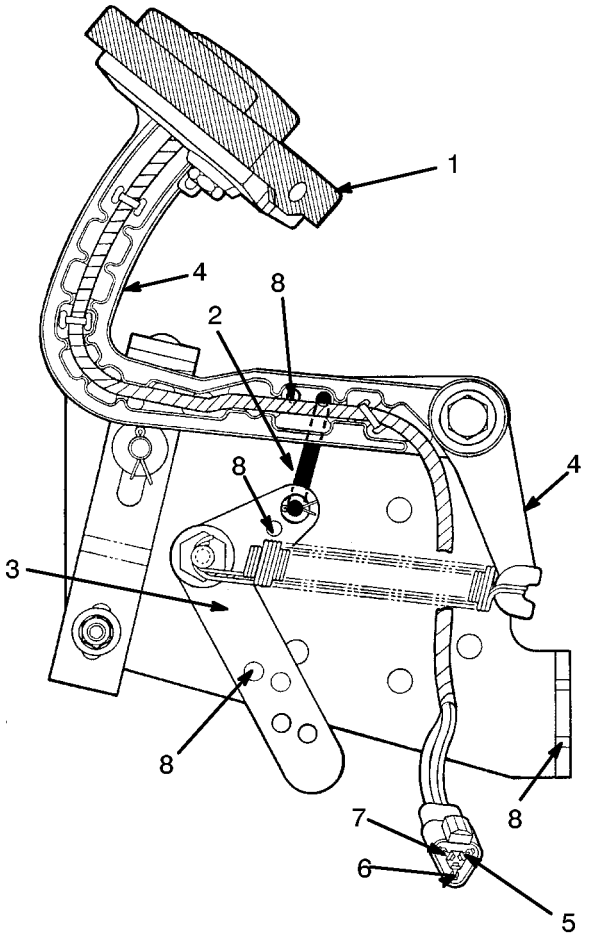


Figure 2-8. Throttle Arrangement, GP/GLP/GDP 040-065 RF/TF
FOOT DIRECTIONAL CONTROL PEDAL SHOWN

1. **PEDALPAD**
2. **LINK**
3. **CRANK**
4. **PEDAL FRAME**
5. **FORWARD SOLENOID (BLACK WIRE)**
6. **BATTERY (RED WIRE)**
7. **REVERSE SOLENOID (YELLOW WIRE)**
8. **CORRECT HOLES FOR THE LINKAGE**

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
The engine will not start.	The fuel tank is empty.	Fill fuel tank.
	The battery is not fully charged.	Charge battery.
	The connections at the battery are loose or they have corrosion.	Check and tighten battery connections.
	The starter system has a problem.	Check electrical circuit for starter.

1. See Figure 3-14. Inspect the stem of each valve for wear. Use a micrometer to measure the outside diameter of the stem. The minimum dimension for an intake valve is 7.980 mm (0.3142 in). The minimum dimension for an exhaust valve is 7.975 mm (0.3140 in).

2. Inspect the valves for cracks, burned faces and distortion. Inspect the seat face of the valves for wear and damage. Measure the thickness of the valve head. See Figure 3-14. The minimum thickness for an intake valve is 0.5 mm (0.020 in). The minimum thickness for an exhaust valve is 1.0 mm (0.040 in).

3. If the valves need grinding the correct surface angle is 30 degrees for both intake and exhaust valves.

VALVE SPRINGS

Check the valve springs for damage. See Figure 3-15. Measure the free length of the outer valve springs. The minimum length of an intake spring is 44.3 mm (1.74 in) for the FE engine and 46.3 mm (1.823 in) for the F2 engine. The minimum length of an exhaust spring is 50.8 mm (2.00 in) for the FE engine and 50.6 mm (1.992 in) for the F2 engine. Check the outer valve springs for being square. See Figure 3-15. If the measurement is more than 1.81 mm (0.071 in), replace the valve spring(s).

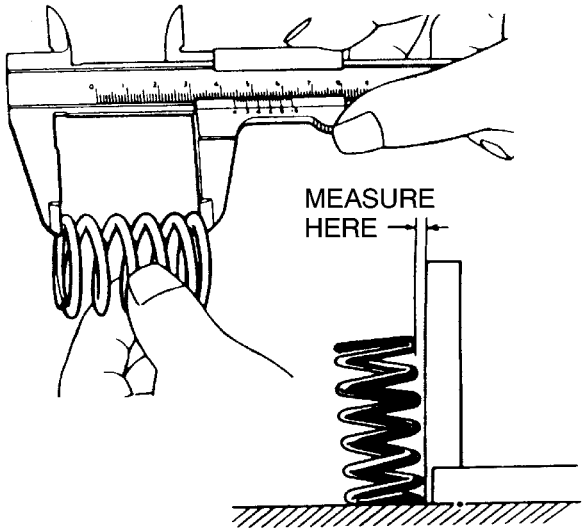


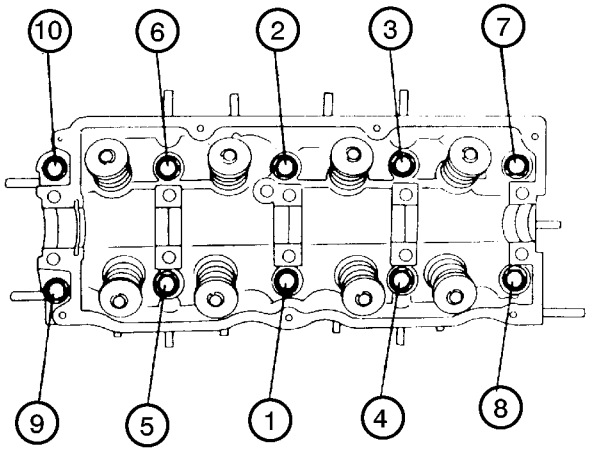
Figure 3-15. Inspect The Valve Springs

Cylinder Head, Installation

1. Clean the surface of the cylinder head and the surface of the block.

2. Install a new cylinder head gasket to the block. Install the cylinder head.

3. Install the capscrews and washers for the cylinder head. Tighten the capscrews to 82 to 88 Nm (59 to 64 lbf ft) as shown in Figure 3-16.



2. Measure the clearance between the piston ring and the groove in the piston as shown in Figure 3-31. The correct dimensions are as follows:

Top Piston Ring - 0.03 to 0.07 mm (0.0012 to 0.0028 in)

2nd Piston Ring - 0.03 to 0.07 mm (0.0012 to 0.0028 in)

Maximum clearance is 0.15 mm (0.0059 in)

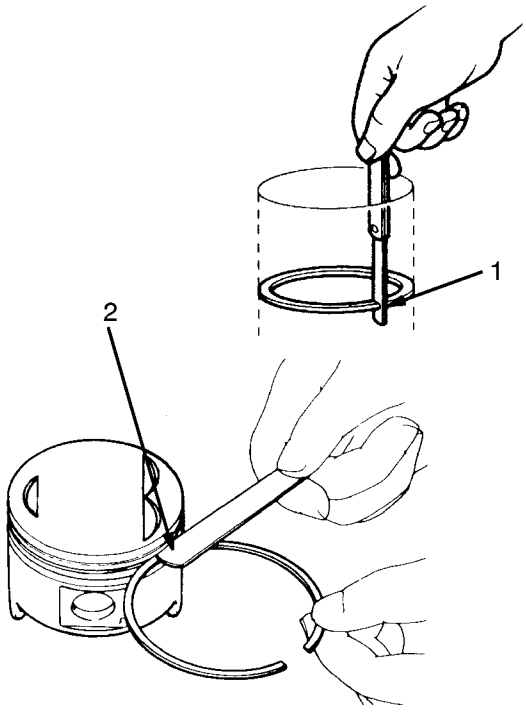


Figure 3-31. Measuring The Piston Rings

1. **PISTON RING END CLEARANCE**
2. **PISTON RING GROOVE CLEARANCE**

CONNECTING RODS AND BEARINGS

1. Use a special machine to check the connecting rods for being straight. The maximum amount of distortion per 100 mm (4.0 in) is 0.04 mm (0.0016 in). If the amount of distortion is greater than the specification, use a press to straighten the connecting rod.

2. Check the clearance between the rod bearings and the journals of the crankshaft. Clean the rod bearings and journals. Use a plastic gauge material as shown in Figure 3-32. For the FE engine, tighten the capscrews for the rod caps to 51 to 56 Nm (37 to 41 lbf ft). For the F2 engine, tighten the capscrews for the rod caps to 66 to 70 Nm (48 to 51 lbf ft). The correct clearance is 0.027 to
0.067 mm (0.0011 to 0.0026 in). If the clearance is greater than the specifications, replace the bearings.

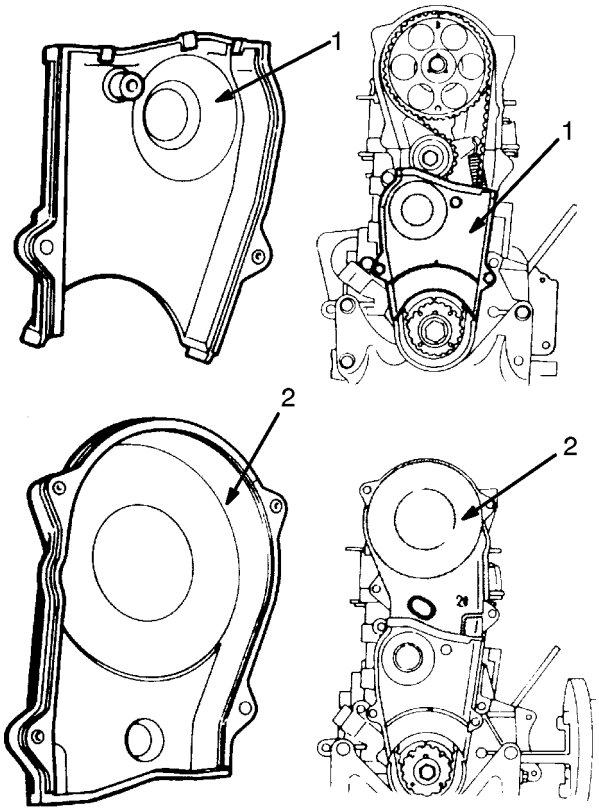


Figure 5-3. Timing Belt Covers

1. **LOWER TIMING BELT COVER**
2. **UPPER TIMING BELT COVER**

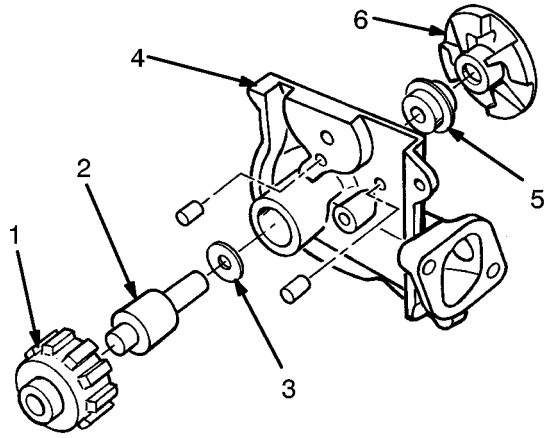


Figure 5-4. Water Pump

1. **PULLEY**
2. **SHAFT AND BEARING ASSEMBLY**
3. **WASHER**
4. **HOUSING**
5. **SEAL**
6. **IMPELLER**

Disassembly And Repair (See Figure 5-4.)

1. Use a puller to remove the pulley from the shaft.

2. Use a press to remove the impeller from the shaft and the bearing assembly from the housing. Remove the water seal from the housing.

14. **GASKETS**
15. **IDLE SOLENOID (FUEL SHUT-OFF)**
16. **IDLE MIXTURE SCREW**
17. **THROTTLE BODY**
18. **CHOKE ACTUATOR ASSEMBLY**
19. **CHOKE RELEASE**

11. Remove the four screws and washers from the cover of the accelerator pump. Carefully remove the cover, diaphragm and return spring from the float bowl housing.

12. Remove the idle control actuator and the solenoid valve from the float bowl housing.

13. Remove the idle mixture screw and spring from the throttle body.

Cleaning

WARNING
The solvent for cleaning carburetors is very flammable. Carefully follow the instructions of the manufacturer.

WARNING
Compressed air can cause small particles to enter your skin. Always wear protective goggles when using compressed air.

CAUTION
Do not use cleaning solvent to clean the float, choke diaphragm, accelerator pump diaphragm, solenoid valve and the idle control actuator. Do not use cleaning fluid on the 0-rings at the idle compensa-tor port and the accelerator pump nozzle. Remove the 0-rings before cleaning the carburetor. Be careful when cleaning the plastic and nylon parts on the carburetor. Follow the instructions of the cleaning solvent manufacturer for cleaning plastic and nylon.

CAUTION
Do not use a wire brush to clean any parts of the carburetor. Do not use a drill or wire to clean the lets or passages of the carburetor.

Dirt or water inside or outside the carburetor is often the cause of carburetor problems. It is important that the carburetor be completely cleaned before assembly.

Wash all the metal carburetor parts with a carburetor cleaning solvent. Use compressed air to clean the jets and passages of the carburetor. Do not use compressed air on the diaphragms.

Use a clean cloth for cleaning the parts that cannot be cleaned in solvent.

Inspection

Inspect the carburetor parts for correct operation, wear or damage. Replace the carburetor parts or the carburetor as necessary.

1. Inspect the carburetor body for cracks, distortion or other damage. Inspect each gasket surface for damage.

2. Inspect the choke plate, shaft and linkage for wear and damage. Check for rough edges on the choke plate. Make sure the choke plate moves freely. Inspect the choke return springs for distortion and damage. Inspect the vacuum break diaphragm and return spring for damage.

3. Inspect the throttle plate, shaft and linkage for wear or damage. Check for rough edges on the throttle plate. Make sure the throttle plate moves freely. Inspect the throttle bushings and return springs for damage.

4. Inspect the accelerator pump diaphragm and return spring for damage. Make sure the passage in the accelerator pump nozzle is open.

5. Check the operation of the power valve and piston. The power valve and piston must move freely in their bores. Make sure the piston and the piston bore are clean. Check the piston spring for damage. Inspect the spring and retainer clip on the power valve for damage.

6. Inspect the idle compensator valve and 0-ring for damage. Check the metal spring for damage. Replace the valve if it is in the open position.

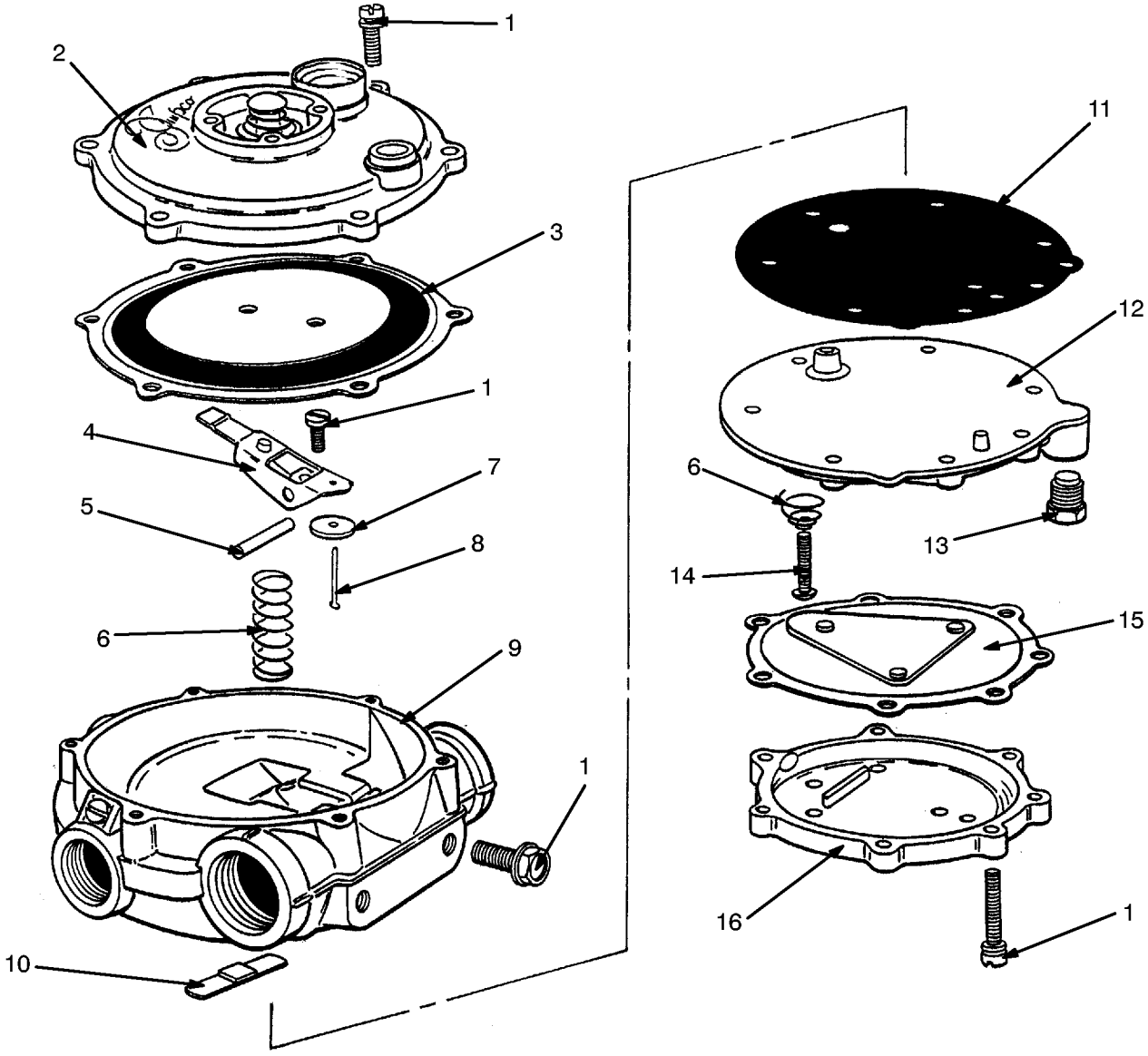


Figure 7-8. Parts Of The Vaporizer

1. **SCREW**
2. **COVER FOR VAPOR VALVE DIAPHRAGM**
3. **VAPOR VALVE DIAPHRAGM**
4. **VAPOR VALVE LEVER**
5. **PIVOT PIN**
6. **SPRING**
7. **VAPORVALVE PAD**
8. **PIN**
9. **HOUSING**
10. **PAD FOR PRESSURE REDUCER VALVE**
11. **GASKET**
12. **PLATE**
13. **PLUG**
14. **ACTUATING PIN**
15. **DIAPHRAGM FOR PRESSURE REDUCER VALVE**
16. **COVER**

A balance line connects the air pressure side of the va-por diaphragm to an air inlet port at the carburetor. If the air filter has a restriction, the pressure decreases in the carburetor and in the vapor chamber of the vaporizer. When a balance line is not installed, this decrease can cause the diaphragm to move and open the vapor valve. When a balance tube is connected, the restriction causes an equal decrease on both sides of the dia-phragm. The balance line prevents an increase in the fuel mixture in the carburetor. A button in the housing can be used to manually open the vapor valve. LPG va-por then flows to the carburetor for starting the engine.

Removal

Idle Speed, "Closed Loop System'	FE/F2 Engine 0.0% @ 700 rpm, 0.05% @ 750 rpm
Governed Speed, Standard System	FE/F2 Engine 0.30% @ 2600 rpm, 0.80% @ 2700 rpm (No Load)
Governed Speed, "Closed Loop System'	FE/F2 Engine 0.0% @ 2600 rpm, 0.08% @ 2700 rpm (No Load)
Tilt Relief, Standard System	FE Engine 0.20% @ 2400 rpm F2 Engine 0.20% @ 2520 rpm
Tilt Relief, "Closed Loop System'	FE Engine 0.0% @ 2400 rpm F2 Engine 0.0% @ 2520 rpm
Stall (Torque Converter), Standard System	FE Engine 1.70% @ 1930 rpm, 2.30% @ 2050 rpm F2 Engine 1.7% @ 2100 rpm, 2.30% @ 2200 rpm
Stall (Torque Converter), "Closed Loop System'	FE Engine 0.0% @ 1930 rpm, .23% @ 2050 rpm F2 Engine 0.0% @ 2100 rpm, .23% @ 2200 rpm

4. Adjust the idle control actuator as follows:

   a. Run the engine until it is at normal operating tem-perature. Adjust idle speed and mixture as de-scribed in Step 2 or 3 above.

   b. Adjust the idle control screw (3) until there is 0.10 to 0.20 mm (0.004 to 0.008 in) clearance between the idle control screw and the actuator rod (4).

   c. Disconnect the vacuum hose (6) at the idle con-trol actuator (5). Put a plug in the hose. Check the speed of the engine. If speed is below 1400 30 rpm, no further adjustment is needed. If the speed is above 1400 30 rpm, adjust the idle control screw (3) until the engine speed is correct.

SOLENOID VALVE (See Figure 7-1.)

The solenoid valve is installed at the fuel inlet of the car-buretor. The valve opens to let fuel to the carburetor when the key switch is **ON.** When the key switch is **OFF,** the valve closes and fuel cannot flow to the carburetor.

The solenoid valve cannot be repaired. If the solenoid valve does not operate it must be replaced.

1. Disconnect the hose from the air cleaner to the carbu-retor inlet. Remove the fuel inlet hose. Disconnect the wires at the solenoid valve. Remove the solenoid valve.

2. Use a liquid thread sealant and install the solenoid valve on the carburetor. Connect the wires and fuel hose. Connect the hose to the air cleaner. Turn the key switch **ON** and **OFF** to check the operation of the sole-noid valve. Start the engine and check for leaks.

3. Check all fittings for leaks with a soap and water solu-tion. Make sure there is a minimum of 620 kPa (90 psi) in the system.

GOVERNOR (See Figure 7-16.)

The governor is installed between the carburetor and the intake manifold. The governor helps control the maximum speed of the engine.

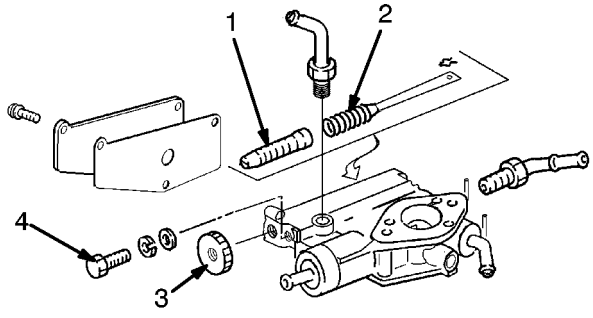


Figure 7-16. Governor

1. SECONDARY ADJUSTMENT SCREW
2. ADJUSTMENT SPRING
3. MAIN ADJUSTMENT WHEEL
4. LOCK SCREW AND WASHERS

the diaphragm in chamber C to expand and open the inlet valve between chambers B and C. This causes the pressure to drop in chamber B and relaxes the diaphragm in chamber B. This opens the inlet valve between chambers A and B. Fuel is supplied to the carburetor through chamber C, the idle bypass valve, and chamber D.

RESONATOR (See Figure 7-19., and Figure 7-21. through Figure 7-23.)

The resonator is connected by vacuum hoses to a special orifice fitting on the air filter discharge elbow (see Figure 7-19.) and to the resonator port of the regulator (see Figure 7-21.). The resonator port connects to vacuum chamber 2 (see Figure 7-23.).

As the air filter clogs, the intake vacuum increases for any relative throttle position. This increased vacuum has a similar increase in the vacuum of chambers C and 2. By increasing the vacuum of chambers C and 2 by the same level as the intake restriction, a balance is maintained and the relative position of the diaphragms remains unchanged. See Figure 7-23. This maintains a constant fuel mixture regardless of the air filter restriction.

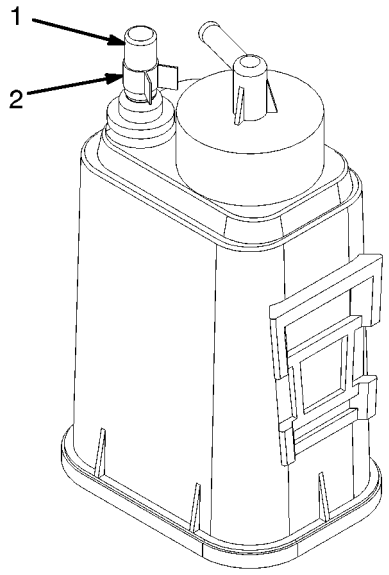


Figure 7-22. Resonator

Legend for Figure 7-22.

1. PLUG
2. CLIP

The special orifice fitting and the resonator act as vacuum dampeners. The air being drawn through the intake system does not flow in a constant stream, but rather in small pulses generated during the intake stroke of the pistons. Without the resonator and orifice, these pulses could be generated at a frequency that is a natural harmonic of the diaphragms. This would cause the diaphragm to vibrate uncontrollably and force the engine mixture to be either very rich or lean under certain operating conditions.

screws alternately to 3.9 0.5 Nm (34.5 4.5 lbf in). If this is a new regulator assembly, check and adjust according to the procedures in the **CHECKS AND ADJUSTMENTS** section in this manual.

4. Install the diaphragm as noted during disassembly. Install the cover and four screws on the main housing. Tighten the screws to 3.9 0.5 Nm (34.5 4.5 lbf in) in the order shown in Figure 7-29.

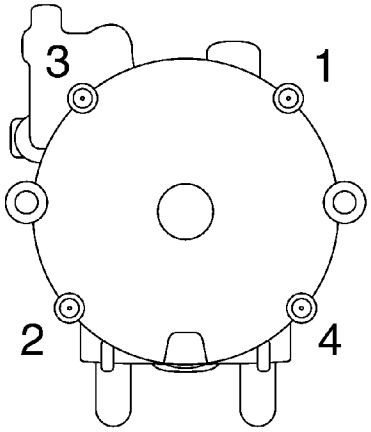


Figure 7-29.Diaphragm Cover Tightening Sequence

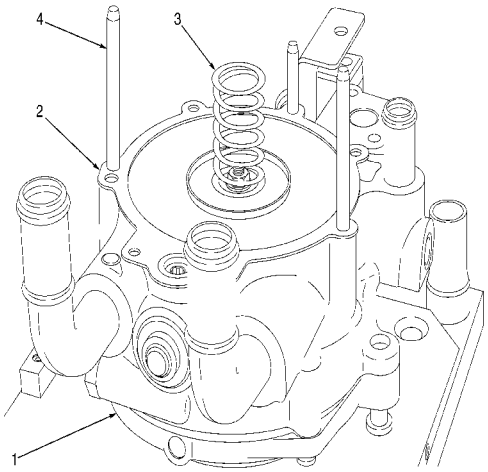


Figure 7-30. Alignment Pin Installation

5. Install the valve assembly in the main housing. Install the lever assembly and tighten the two screws alternately to 3.9 0.5 Nm (34.5 4.5 lbf in).

6. Position the diaphragm as noted during disassembly. Install the diaprhagm by hooking the shaft to the lever assembly. Install the four alignment pins in the main housing as shown in Figure 7-30.

7. Install the 0-ring, the spring, the fuel filter chamber, and three screws on the main housing. Do NOT tighten the three screws.

8 Remove the four alignment pins and install the four remaining screws. Tighten the seven screws to 3.9 0.5 Nm (34.5 4.5 lbf in) in the order shown in Figure 7-31.

(See Figure 7-42. and Figure 7-43.)

Slowly move the foot directional control pedal pad from Forward to Reverse and back to Forward. There must be some movement of the pedal pad before the pedal frame moves and the throttle opens.

ADJUST THE THROTTLE LINKAGE, GC 040-065 RF/TF and GC/GLC 040-065 RG/TG/ZG
(See Figure 7-43.)

NOTE: Each time the throttle linkage is disassembled, it is important to adjust the throttle cable.

1. Connect the throttle cable at the pedal. Tighten the jam nut at the pedal bracket.

2. Adjust the idle speed of the engine with the idle adjusting screw on the carburetor. The correct idle speed is 725 25 RPM.

3. Adjust the pedal height to 41.3 mm (1.63 in) using the pedal stop.

4. Connect the cable at the carburetor. Adjust the length of the cable housing so that the cable is not loose. With the engine running at the correct idle speed, change the position of the cable housing with the nuts at the bracket.

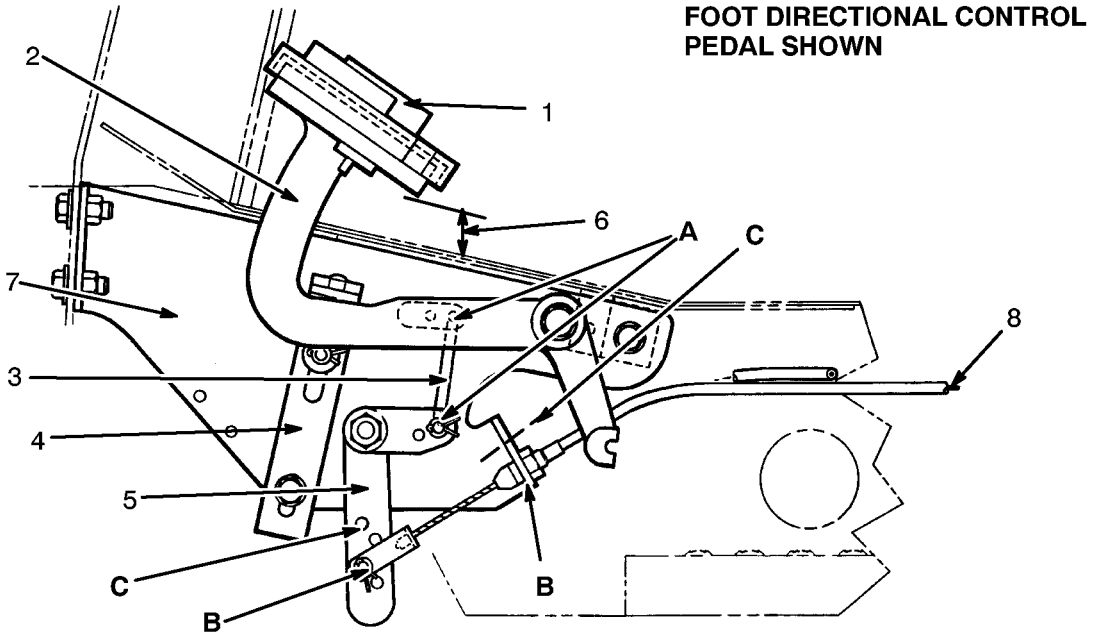


Figure 7-43. Throttle Arrangement, GC 040-065 RF/TF and GC/GLC 040-065 RG/TG/ZG

Legend for Figure 7-43.
1. **PEDALPAD**
2. **PEDAL FRAME**
3. **LINK**
4. **PEDAL STOP**
5. **CRANK**
6. **PEDAL HEIGHT**
7. **PEDAL BRACKET**
8. **THROTTLE CABLE**

Linkage Connections for Figure 7-43.
A = All Units
B = Gasoline/LPG Units
C = Diesel Units

When the throttle valve is opened slightly, the demand for fuel at the carburetor causes a slight vacuum at the output port of the regulator. This vacuum causes the diaphragm in chamber C to depress. This opens the inlet valve between chambers B and C, allowing fuel to flow from chamber B to chamber C. This allows large amounts of fuel to flow to the carburetor for complete combustion.

Idle Mode

See Figure 7-48. In the idle mode, the demand for fuel at the carburetor is low and the vacuum is absent at the fuel outlet port. This causes the diaphragm in chamber C to relax and close the inlet valve between chambers B and C. Pressure in chamber B builds up to 24.5 to 34.5 kPa (7.2 to 10.1 inHg), causing the diaphragm in chamber B to expand and close off the fuel supply. A balance is reached between the amount of vaporizing (liquid) through chamber A and amount of vapor escaping past the idle mixture adjusting screw in chamber D.

The idle mixture adjusting screw is set for a lean mixture at the factory. The fuel injector supplies additional fuel to the carburetor at idle. The ECU controls the fuel injector by using inputs from the oxygen sensor and vacuum switch #1.

Run Mode

See Figure 7-48. In the run mode, the throttle valve on the carburetor is opened, creating a vacuum at the fuel outlet port. This causes the diaphragm in chamber C to expand and open the inlet valve between chambers B and C. This causes the pressure to drop in chamber B and relaxes the diaphragm in chamber B. This opens the inlet valve between chambers A and B. Fuel is supplied to the carburetor through chamber C, the idle bypass valve, and chamber D.

RESONATOR
(See Figure 7-44., and Figure 7-46. through Figure 7-48.)

The resonator is connected by vacuum hoses to a special orifice fitting on the air filter discharge elbow (see Figure 7-44.) and to the resonator port of the regulator (see Figure 7-46.). The resonator port connects to vacuum chamber 2 (see Figure 7-48.).

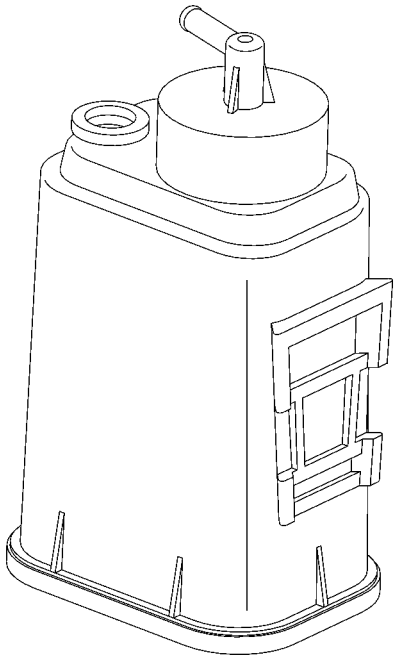


Figure 7-47. Resonator

As the air filter clogs, the intake vacuum increases for any relative throttle position. This increased vacuum has a similar increase in the vacuum of chambers C and 2. By increasing the vacuum of chambers C and 2 by the same level as the intake restriction, a balance is maintained and the relative position of the diaphragms remains unchanged. See Figure 7-48. This maintains a constant fuel mixture regardless of the air filter restriction.

The special orifice fitting and the resonator act as vacuum dampeners. The air being drawn through the intake

Tighten the sensor to 39 Nm (29 lbf ft).

VACUUM SWITCHES

NOTE: Vacuum switch #1 has a white body with a gray top. Vacuum switch #2 has a white body with a white top. This procedure is used for both switches.

Removal and Installation

1. Disconnect the vacuum hose.

2. Disconnect the electrical connector from the vacuum switch.

3. Remove the mounting clamp and the capscrew. Remove the vacuum switch.

4. Install the switch in reverse order.

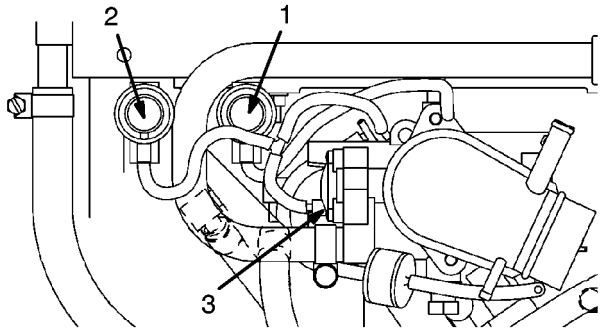


Figure 7-53. Vacuum Switches

Legend for Figure 7-53.
1. **VACUUM SWITCH #1 (IDLE)**
2. **VACUUM SWITCH #2 (WIDE-OPEN THROTTLE)**
3. **CARBURETOR**

Inspection

1. Connect an ohm meter to the vacuum switch.

2. Apply a vacuum to the switch. The contacts of vacuum switch #1 should close at -29.0 to -33.3 kPa (-8.5 to -9.8 in Hg). The contacts of vacuum switch #2 should close at -16.0 to -20.0 kPa (-4.7 to -5.9 inHg).

3. Release the vacuum. The switch contacts should open.

RESISTOR

Removal and Installation

Disconnect the electrical connector. Then remove the mounting screw and the resistor. Install the resistor in reverse order.

Inspection

Use an ohm meter to check the resistor for continuity. The coil resistance should be 5.4 to 6.6 ~.

CHECKS AND ADJUSTMENTS

ADJUST THE CARBURETOR AND NEW REGULATOR
Idle Speed and Fuel Mixture (See Figure 7-54.)

WARNING

	The idle mixture adjusting screw is clogged with tar.	Replace the regulator.
	The fuel injector is clogged with tar.	Clean the fuel injector.
The engine does not idle smoothly. (Rich fuel/air mixture)	The resonator hose is either damaged or disconnected.	Replace a damaged hose or reconnect a disconnected hose.
	The resonator is damaged.	Replace the resonator.
	The fuel injector pulse rate does not drop at idle.	Check fuel injector and wiring, vacuum hose, vacuum switch #1, oxygen sensor, and ECU.
	The idle mixture adjusting screw on the regulator is out of adjustment.	Replace the regulator.
The engine does not idle smoothly. (Idle speed too low)	The idle air bypass adjusting screw on the carburetor may be clogged.	Clean or replace the idle air bypass adjusting screw and clean the tar from the carburetor.
	The idle air bypass adjusting screw on the carburetor is out of adjustment.	Perform the adjustment procedures located in **Checks and Adjustments.**
	The idle mixture adjusting screw on the regulator is out of adjustment.	Replace the regulator.
The engine does not idle smoothly. (Idle speed too high)	The idle air bypass adjusting screw on the carburetor is out of adjustment.	Perform the adjustment procedures located in **Checks and Adjustments.**
	The idle mixture adjusting screw on the regulator is out of adjustment.	Replace the regulator.

TROUBLESHOOTING

PROBLEM	**POSSIBLE CAUSE**	**CORRECTIVE ACTION**
There is engine hesitation, surge, knocking, or loss of power due to lean or rich fuel/air mixture.	A vacuum hose is either damaged or disconnected.	Replace a damaged hose or reconnect a disconnected hose.
	The main fuel shutoff solenoid valve is clogged.	Clean the main fuel shutoff solenoid valve.
	The idle fuel shutoff solenoid valve is clogged.	Clean the idle fuel shutoff solenoid valve.
	The fuel hose is damaged.	Replace the fuel hose.
	The fuel filter is clogged.	Replace the fuel filter and clean the tar from the regulator.
	The idle mixture adjusting screw may be clogged.	Clean or replace the regulator as necessary.
	There is tar accumulation in the regulator.	Remove the drain plug and drain the tar from the regulator.
	There is an air leak between the carburetor and governor.	Replace the gasket if it is broken or tighten the mounting nuts to the correct torque.
	The carburetor is out of calibration.	Perform the checking procedure located **in Checks and Adjustments**. If out of calibration, replace the carburetor.
	The idle mixture adjusting screw may be out of adjustment.	Replace the regulator.