

Diesel Engine

Contents of this section are listed in Index below:

Subject	Page No.
General Information	203
Teflon Hoses	204
Engine Accessories	205
Engine Replacement	209
Exhaust Muffler Replacement	213

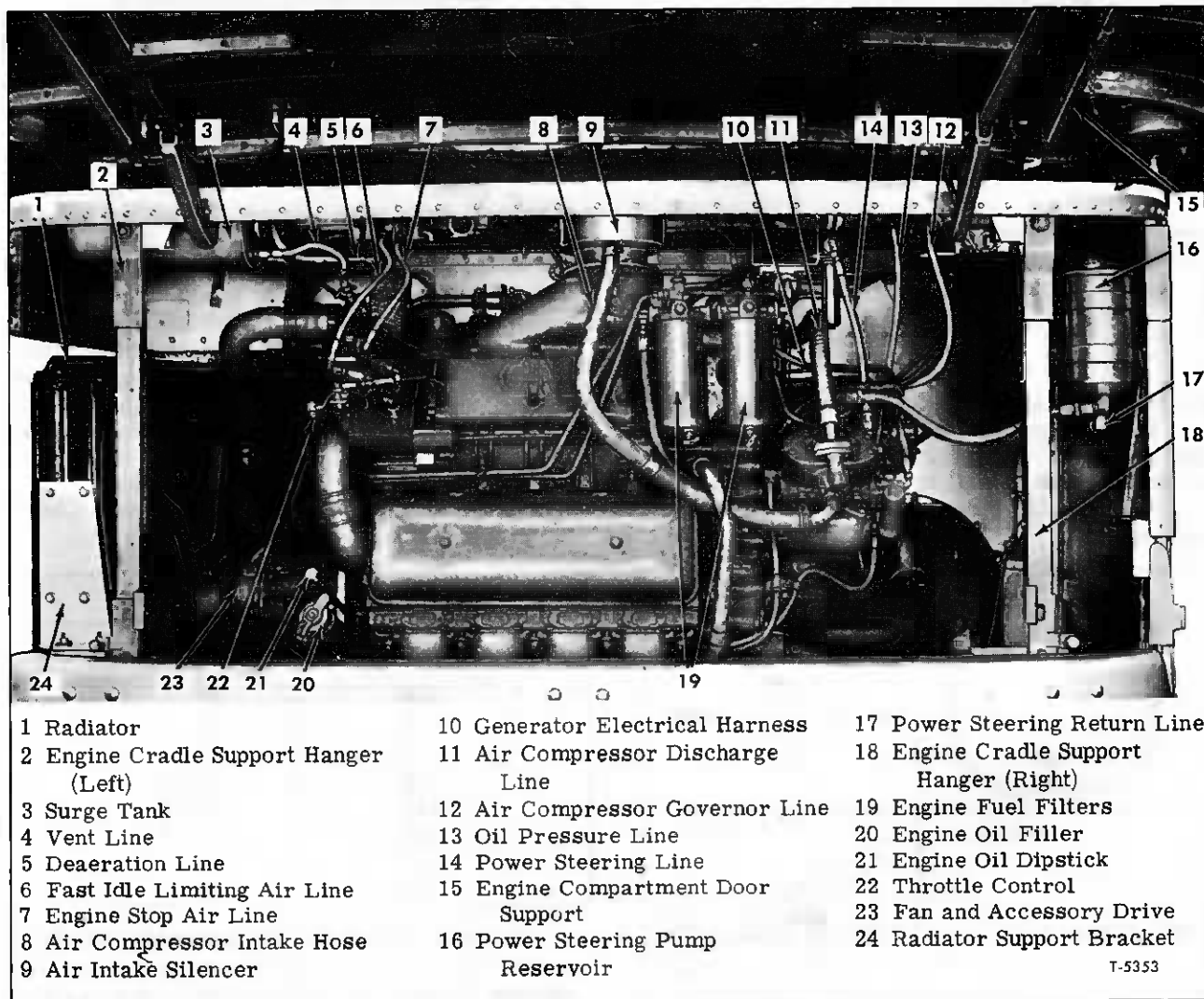
GENERAL INFORMATION

Coach is powered by an 8V-71N diesel engine. Engine, clutch, and transmission comprise a unit power plant which is supported on engine cradle assembly and installed transversely in engine compartment at rear of coach (fig. 1).

This section of the manual covers description

and maintenance of engine accessories which are not included in the current DIESEL ENGINE MAINTENANCE MANUAL, or in other sections of this manual. Also included is the procedure for replacing the complete power plant and cradle assembly.

Engine general data is given at end of this section.



- | | | |
|---------------------------------------|------------------------------------|---|
| 1 Radiator | 10 Generator Electrical Harness | 17 Power Steering Return Line |
| 2 Engine Cradle Support Hanger (Left) | 11 Air Compressor Discharge Line | 18 Engine Cradle Support Hanger (Right) |
| 3 Surge Tank | 12 Air Compressor Governor Line | 19 Engine Fuel Filters |
| 4 Vent Line | 13 Oil Pressure Line | 20 Engine Oil Filler |
| 5 Deaeration Line | 14 Power Steering Line | 21 Engine Oil Dipstick |
| 6 Fast Idle Limiting Air Line | 15 Engine Compartment Door Support | 22 Throttle Control |
| 7 Engine Stop Air Line | 16 Power Steering Pump Reservoir | 23 Fan and Accessory Drive |
| 8 Air Compressor Intake Hose | | 24 Radiator Support Bracket |
| 9 Air Intake Silencer | | |

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Figure 1—Power Plant Installed (Typical)

DIESEL ENGINE

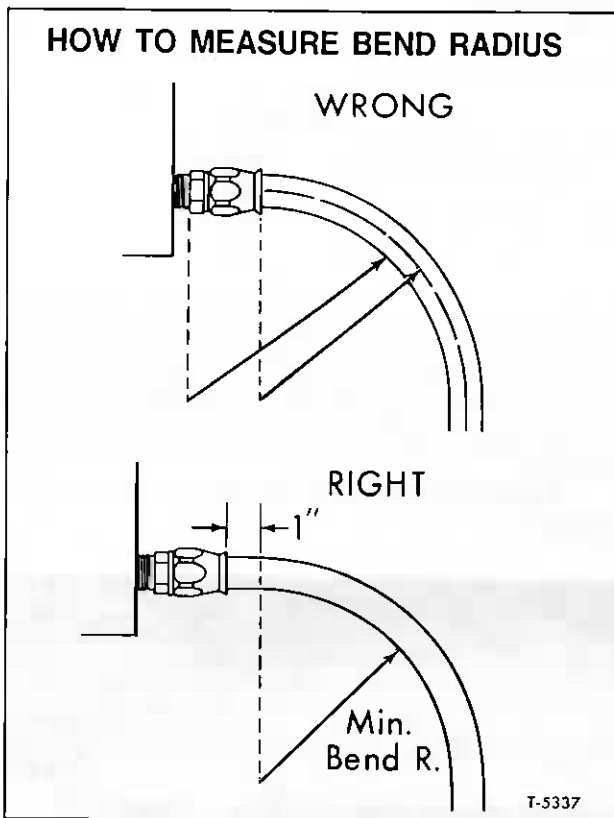


Figure 2—Installation of Teflon Hose to Ensure Proper Bend Radius

TEFLON HOSES

PROPER INSTALLATION

1. Attach the hose first to the more inaccessible end of its routing. Finger tighten connection so that the hose is free to turn during installation.
2. Attach the other end of the hose in the same manner.

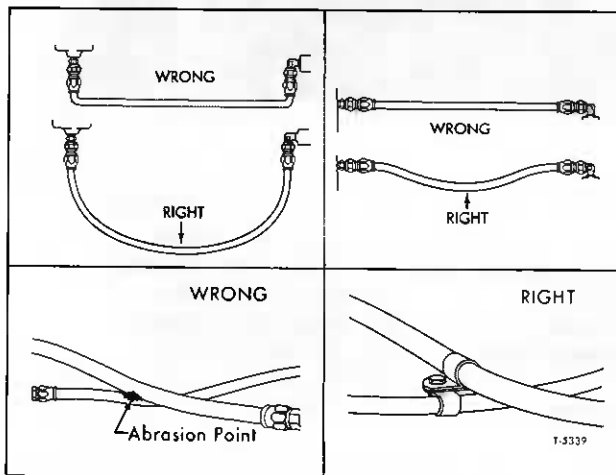


Figure 3—Proper Installation of Teflon Hoses

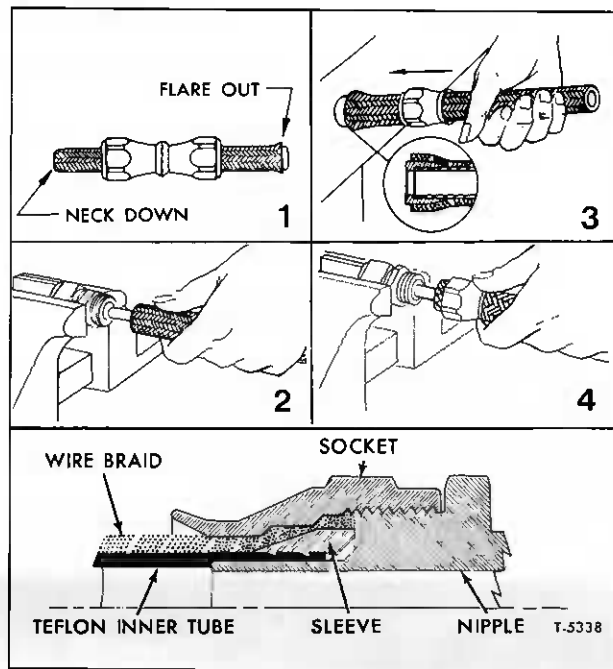


Figure 4—Teflon Hose Assembly

3. Should you find that the hose line is not tightened sufficiently, loosen the swivel (female) end before tightening the male end.

4. Properly orient the hose along its routing and install the required line support clamps.

5. Do not exceed minimum bend radius during handling, storage, or installation. If the bend radius is exceeded, the hose will tend to flatten and kink. Having an adequate bend radius will help prevent collapsing of the line or restriction of flow as shown in figure 2.

Refer to the "Minimum Bend Radius Chart" for proper teflon hose bend radius.

MINIMUM BEND RADIUS CHART	
HOSE SIZE	MINIMUM BEND RADIUS
- 4	2"
- 5	3"
- 6	4"
- 8	5-1/4"
-10	6-1/2"
-12	7-3/4"
-16	9"
-20	16"

6. When installing, the assembly should be positioned so that the flexible portion of the hose extends at least one and one-half times the hose diameter before the bend of the hose as shown in figure 2.

DIESEL ENGINE

7. Remember the hose will change in length when pressurized. Provide slack or bend in the hose to compensate for any changes which might occur as shown in figure 3.

8. Rotate and clamp hose to prevent it from contacting another hose line or abrasion point as shown in figure 3.

CAUTION: In securing the line support clamps, care should be exercised in distributing hose slack between the hose connections and the clamps. Do not bend or force the hose to a sharp angle at any location. Be sure that gradual curves are used for all routing. Installation of clamps must never pinch the hose line or cause it to be subjected to tension, torsion, compression or shear stress. Installation of undersize or oversize hose support clamps must be avoided.

9. Tighten the fitting connection and clamps.

TEFLON HOSE REPLACEMENT**Disassembly**

Refer to figure 4 for sectional view of teflon hose.

1. Unscrew and remove the nipple.
2. Slide the socket back on the hose by tapping against a flat surface.
3. Remove the sleeve from the teflon hose with pliers.

Assembly

Refer to figure 4 for sectional view of teflon hose.

1. Wrap hose with masking tape at cut-off

point and cut squarely to length through the taped area using a sharp cut-off wheel or a fine-toothed hacksaw.

2. Remove tape and trim any loose wires flush with the tube stock. Any burrs on the bore of the tube stock should be removed with a knife. Sometimes wire braid will tend to "neck down" on one end and "flare out" on the opposite end. This is a characteristic of wire braid hose and can be used to an advantage in the assembly of the fittings (item 1, fig. 4).

3. Slip two sockets back-to-back over the "neck down" end of the hose. Position the sockets approximately three inches from each end (item 1, fig. 4).

4. Mount nipple hex in a vise. Work the hose bore over the nipple to size the tube and aid separating the braid from the teflon inner tube. Remove the hose from the nipple (item 2, fig. 4).

5. Push the sleeve over the end of the inner tube and under the wire braid by hand. Complete positioning of the sleeve by pushing the hose end against a flat surface (item 3, fig. 4).

6. Visually inspect to see that the tube stock butts against the inside shoulder of the sleeve. Set the sleeve barbs into the teflon tube by pushing a tapered punch into the end of the sleeve and tube.

7. Lubricate nipple and socket threads (for stainless steel fittings, use carbon tetrachloride; other material combinations use standard petroleum lubricants).

8. Hold nipple hex in a vise. Push the hose over the nipple with twisting motion until seated against the nipple chamfer (item 4, fig. 4).

9. Push socket forward, and hand-start threading of socket to nipple. Wrench-tighten nipple hex until clearance with socket hex is 1/32" or less. Tighten further to align corners of the nipple and socket hexes.

ENGINE ACCESSORIES**OIL PRESSURE GAUGE**

An oil pressure gauge is installed in oil pressure sending manifold on engine compartment bulkhead (fig. 5) for convenience when working on engine. The registering gauge at driver's instrument panel is electric-type, interconnected with sending unit at oil pressure manifold in engine compartment. Electric oil gauge circuit is operative only when the "ENGINE" switch is in "RUN" position. See "Alarm and Signal Wiring Diagram" in "Wiring Diagrams" booklet X-6814A.

TEST

In case electric oil gauge fails to function or if it gives an apparent false reading, system may be checked as follows:

1. Disconnect wire from engine unit and connect a test lamp of not more than 2 C.P. between battery terminal of starter solenoid and body of the unit. If lamp fails to light, the unit is not grounded, and the threaded hole and the threads on the unit should be checked for metal-to-metal contact. If the lamp lights the unit can be considered grounded. (DO NOT USE A LAMP OF OVER 2 C.P.)

2. Remove the wire from the unit terminal and connect the test lamp between the unit terminal and the battery post on the starter solenoid. If the lamp lights, start engine and observe if the lamp changes intensity. A satisfactory unit will change the lamp intensity at different engine speeds (changes in oil pressure).

3. Replace the wire and check wiring for open circuit between unit and gauge on instrument panel,

DIESEL ENGINE

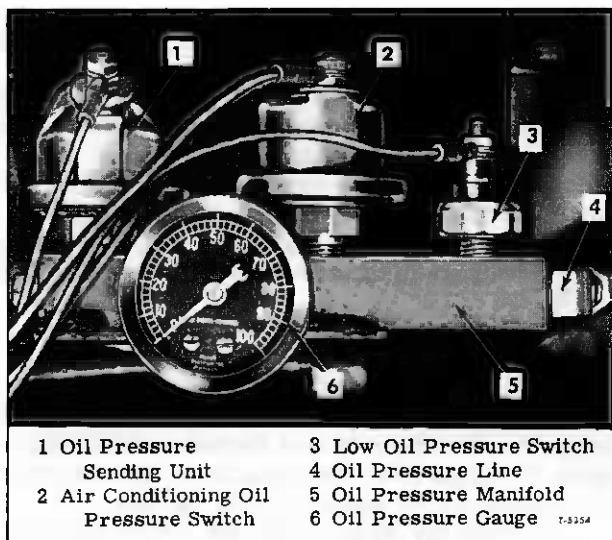


Figure 5—Oil Pressure Manifold and Gauge

referring to "Alarm and Signal Wiring Diagram" in "Wiring Diagrams" booklet X-6814A.

4. If units and circuits pass previous tests, replace the gauge and check for operation at various engine speeds.

5. Do not attempt repairing gauge or sending unit. When replacing sending unit do not use thread compound as this will prevent proper ground and cause faulty gauge reading.

LOW OIL PRESSURE SWITCH

Low oil pressure electrical switch is installed

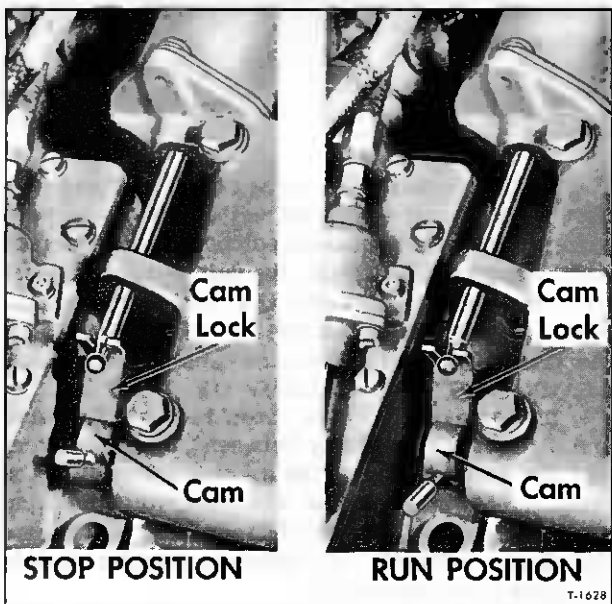


Figure 6—Emergency Stop Mechanism

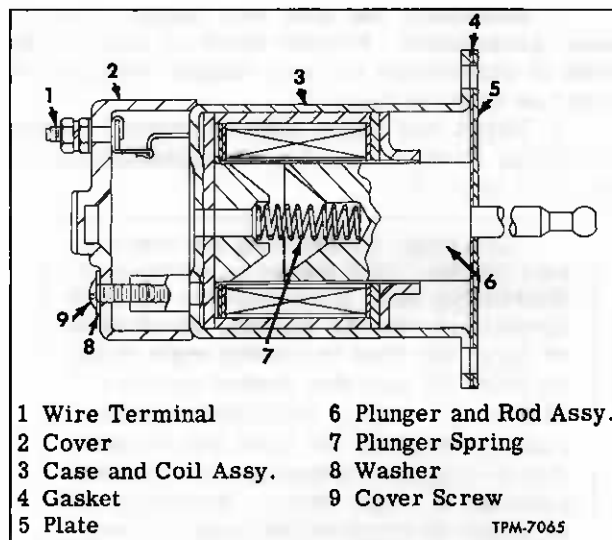


Figure 7—Emergency Stop Solenoid

in oil pressure sending manifold (fig. 5), which is mounted on engine compartment bulkhead. Manifold is connected with engine oiling system by a flexible tube.

When engine is running, the oil pressure acts upon a diaphragm to hold a pair of switch contacts open. However, if pressure should drop below 3 to 4 lbs., points will close completing circuit. When points close, alarm buzzer sounds, and low oil tell-tale light illuminates. Whenever alarm buzzer sounds or low oil tell-tale lights, stop engine immediately and correct cause of low pressure.

CIRCUIT TEST

Low oil pressure indicating system is interconnected with control switch so that system is inoperative when control switch is off.

With "ENGINE" switch in "RUN" position, and engine not running, low oil pressure tell-tale light should be illuminated and buzzer should sound. If buzzer sounds and light does not illuminate, replace bulb. If light is illuminated and buzzer does not sound, check the alarm buzzer.

If light fails to illuminate and buzzer fails to sound with "ENGINE" in "RUN" position, momentarily connect the two wire terminals at pressure switch. Failure of tell-tale lights or buzzer to sound indicates that the circuit to these units is at fault. Refer to "Alarm and Signal Wiring Diagram" in "Wiring Diagrams" booklet X-6814A for electrical circuit.

SOLENOIDS

Emergency stop solenoid assembly (figs. 6 and 7) is installed at engine blower housing and releases a choke valve to shut off air and stop engine in case engine cannot be stopped normally.

DIESEL ENGINE

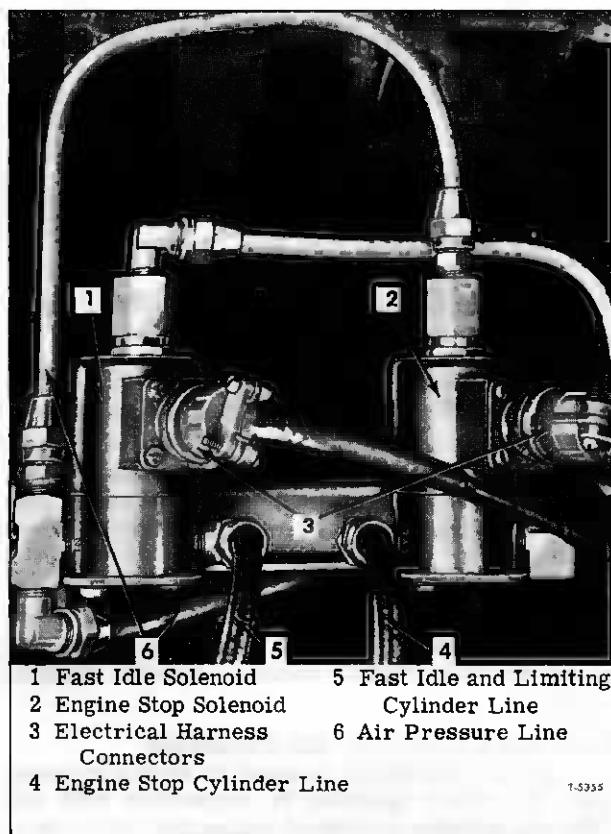


Figure 8—Engine Stop and Fast Idle Solenoids Installed on Bulkhead

For normal use to stop engine, a solenoid valve (fig. 8) on bulkhead in engine compartment is used to admit air pressure to air cylinder which actuates lever on governor housing and moves engine injectors to "NO-FUEL" position. This mechanism operates automatically when "ENGINE" switch is placed in "STOP" position.

A fast idle solenoid valve, mounted on engine bulkhead as shown in figure 8, is used to admit air to fast idle air cylinder and limiting cylinders. Solenoid valve is operative only when switch at left of driver is in "FAST IDLE" position and parking brake is applied.

EMERGENCY STOP SOLENOID

Key numbers in text refer to figure 7.

Solenoid assembly components can be replaced as necessary when repairing the assembly.

Disassembly

1. To remove solenoid assembly from engine, wires must be disconnected from terminal and cam lock must be removed. Remove two mounting bolts holding solenoid assembly to blower housing.

2. Bend tangs on case (3) to permit removal of plate (5). Remove plate and gasket (5 and 4).

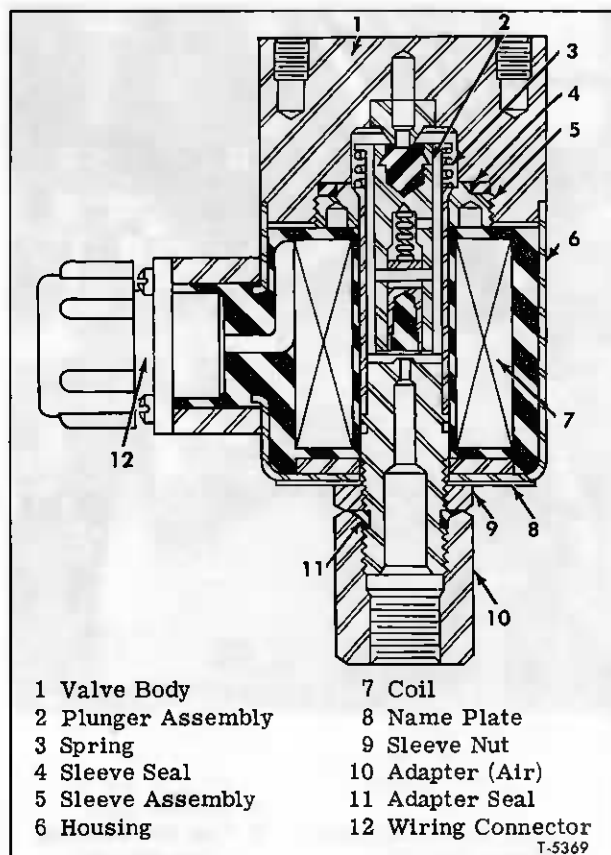


Figure 9—Engine Stop and Fast Idle Solenoid Valve

Remove plunger and rod assembly (6) from case and coil assembly (3). Remove spring (7).

3. Remove screw (9) and washer (8) to permit inspection of coil wire attached to terminal (1).

Assembly

1. Be sure coil wire is securely attached to lug on terminal (1), then install cover (2), on case and coil assembly (3), and attach with two screws (9) and washers (8).

2. Place spring (7) in counterbore in plunger, then insert plunger into place in case and coil assembly. Slide plate (5) with gasket (4) on solenoid rod and bend tangs on case to hold plate (5) in place.

3. Insert plunger rod through guide on blower housing, and install two mounting bolts. Engage cam lock with plunger rod and bolt lock to blower housing. Attach wire to terminal (1). Figure 6 shows the solenoid and mechanism installed.

NOTE: Cam (fig. 6) must be set in "RUN POSITION" before engine can be started.

ENGINE STOP AND FAST IDLE SOLENOID VALVES

Solenoid valves are shown in figure 8. Key numbers in following text refer to figure 9.

DIESEL ENGINE

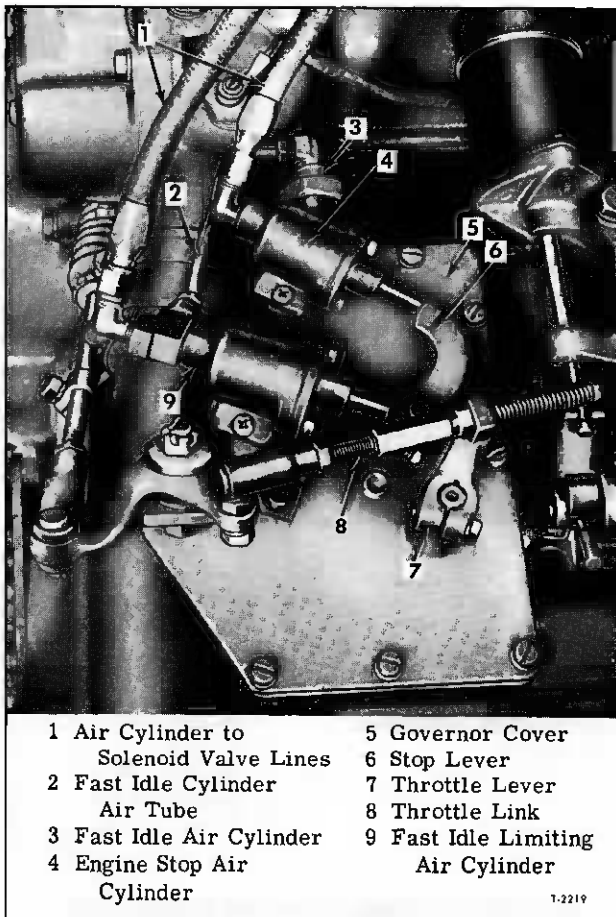


Figure 10—Governor Cover and Controls

Disassembly

1. Remove threaded connector (10) and seal (11) from bottom of valve assembly, then remove thin nut (9) which holds housing and coil assembly to sleeve assembly (5).

2. Remove housing and coil assembly by sliding off lower end of sleeve assembly.

3. Using spanner wrench (Skinner #VO-233) remove sleeve, plunger, and spring (5, 2, and 3) from valve body (1).

4. Separate plunger and spring from sleeve and remove seal (4) from valve body.

NOTE: Seals (4 and 11) should be discarded and new seals should be obtained for use when assembling valve.

Assembly

Examine valve seats and mating surfaces and check condition of spring. Obtain new parts as required and follow directions below to assemble.

1. Assemble spring (3), on plunger (2), then insert plunger into sleeve assembly (5).

2. Place new seal (4) in valve body, then screw sleeve into body using spanner wrench.

3. Assemble housing and coil assembly over sleeve, then install nameplate (8) and sleeve nut (9).

4. Place new seal (11) in groove in sleeve, then install connector (10) and tighten while holding nut (9).

CAUTION: Overtightening nut (9) will put excessive stress on sleeve, tighten nut only as necessary to seat parts solidly.

ENGINE CONTROL AIR CYLINDERS

ENGINE STOP AIR CYLINDER

Engine shut-off cylinder is mounted on governor (fig. 10) with piston rod aligned with stop lever on governor shaft. When "ENGINE" control switch is turned to "STOP" position, the engine stop solenoid valve on engine compartment bulk-head panel (fig. 8) is de-energized and spring moves valve plunger to close exhaust passage and open air inlet passage in valve. With air pressure applied to shut-off cylinder the piston pushes rod out against governor lever and moves engine injector racks to "NO-FUEL" position, thereby stopping engine.

FAST IDLE LIMITING AIR CYLINDER

An air cylinder is mounted on engine governor (fig. 10) which operates in conjunction with fast idle air cylinder to control engine fast idle rpm at terminals. Whenever fast idle air cylinder operates to increase engine rpm, air is also applied to limiting cylinder and plunger comes against throttle control lever to limit engine rpm.

ENGINE STOP AND LIMITING AIR CYLINDER REPAIR

Key numbers in text refer to figure 11.

NOTE: Engine stop and fast idle limiting air cylinders are the same except limiting cylinder uses a return spring. Limiting cylinder is identified by an "X" stamped on cylinder cap (4).

Disassembly

1. Disconnect air line from air cylinder.

2. Remove two socket-head bolts which mount cylinder on governor cover, then remove air cylinder.

3. Remove two screws and lock washers (7 and 8) which secure cap (4) on cylinder (1). Remove cap (4) and spring (3 limiting cylinder) from piston rod.

4. Pull piston and rod assembly out of cylinder.

5. Clean and inspect components.

Assembly

1. Lubricate piston cup (2) and bore in cylinder (1).

2. Insert piston and rod assembly into cylinder bore using care to prevent damage to piston cup (2).

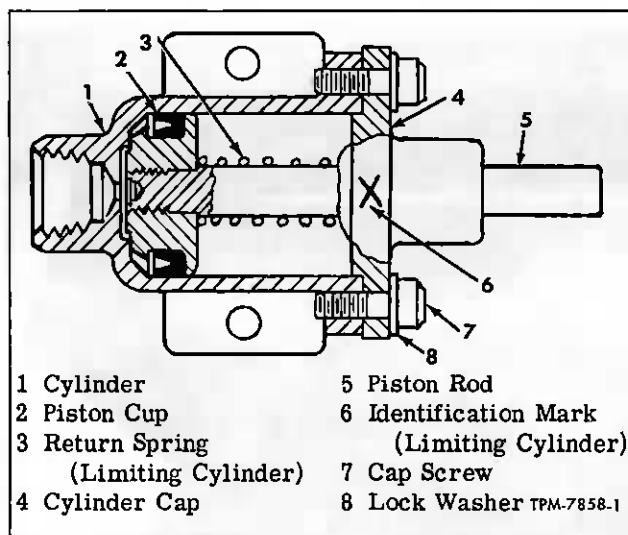


Figure 11—Engine Stop and Fast Idle Limiting Air Cylinder

3. Install spring (3 - limiting cylinder) on piston rod, then install cap (4) on cylinder. Use lock washers (8) under heads of cap screws (7) and tighten screws to secure cap (4) on cylinder (1).

4. Install the cylinder assembly on governor cover, and connect air line to cylinder.

FAST IDLE AIR CYLINDER

Fast idle air cylinder is installed in governor as shown in figure 10. Function of cylinder is to accelerate engine speed when vehicle is stopped at terminals. The additional engine rpm are required to keep air conditioning system functioning during terminal stops.

Air cylinder operates only when a toggle switch at left of driver is in "FAST IDLE" position and parking brake is in applied position.

REPAIR

Key numbers in text refer to figure 12.

Disassembly

1. Disconnect air line from cylinder.
2. Loosen jam nut (3), then thread assembly out of governor housing.
3. Remove plunger (2) from cylinder.

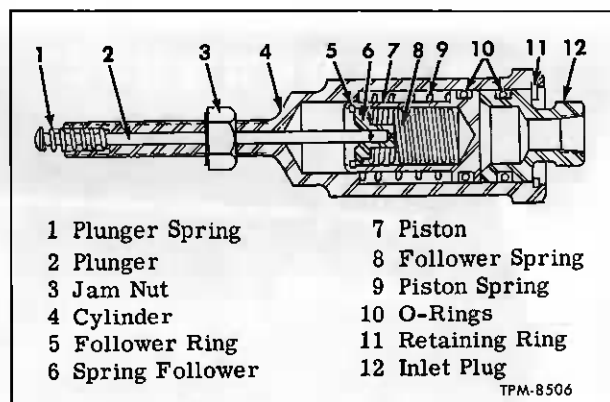


Figure 12—Fast Idle Air Cylinder

4. Remove retainer ring (11) from end of cylinder.

5. Remove inlet plug (12) and O-ring (10) from cylinder.

6. Remove piston (7), and O-ring (10) assembly, also spring (9).

7. Remove follower retaining ring (5) from piston, then remove follower (6), and spring (8) from piston.

8. Remove O-ring from inlet plug and piston, and discard.

Assembly

1. Clean all parts in suitable cleaning fluid to remove all trace of oil or dirt, then dry.

2. Lubricate cylinder walls and new O-rings with Lubriplate or equivalent.

3. Install spring (8), and follower (6) in piston and secure with ring (5).

4. Install new O-rings (10) in piston and inlet plug.

5. Locate piston spring (9) in cylinder, then install piston assembly and inlet plug. Secure inlet plug and piston in cylinder with retaining ring (12).

6. Install plunger spring (1) and plunger (2) in cylinder.

7. Thread assembly into governor housing. Start engine and adjust in same manner as described for "Buffer Spring Adjustment" in "ENGINE TUNE-UP" section of DIESEL ENGINE MAINTENANCE MANUAL.

ENGINE REPLACEMENT

Power plant including engine, clutch, and transmission is mounted on engine cradle and is installed transversely at rear of vehicle (fig. 1).

Engine is supported by three cushion type mountings. Clutch housing is bolted to engine and the complete power plant and rear bumper is supported on cradle. Two stabilizer rods (fig. 15) anchor the engine in position on cradle.

Brackets (fig. 13) at lower edge of bulkhead support the front side of cradle, while rear side is supported by two hanger assemblies (fig. 1) suspended from support beam at rear of coach body.

Instructions which follow describe method of replacing the complete power plant assembly. A special dolly must be used to support power plant

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DIESEL ENGINE

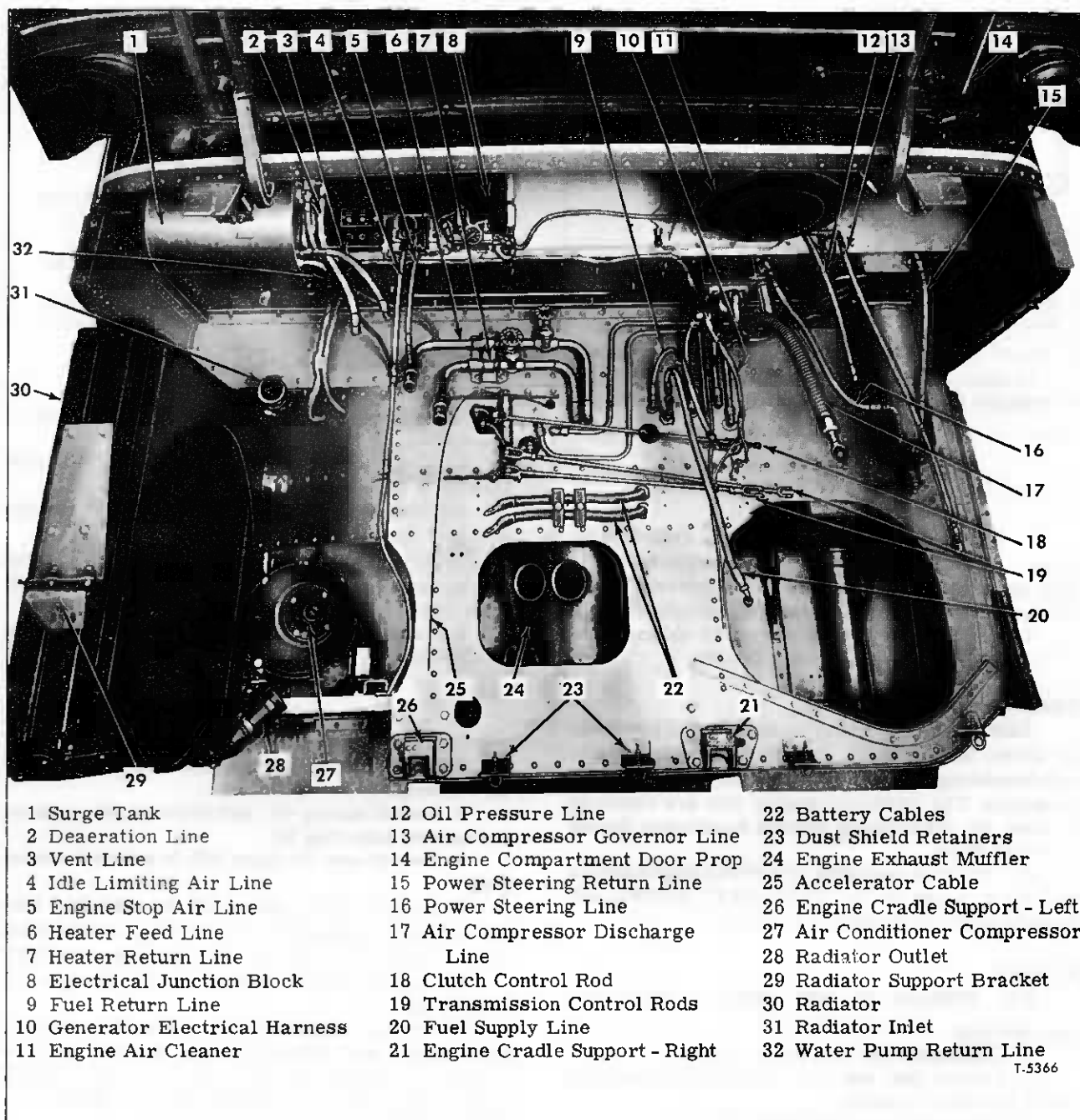


Figure 13—Engine Compartment Showing Disconnect Points (Typical)

and cradle, and provide a means of moving assembly out of engine compartment.

POWER PLANT REMOVAL

Key numbers in text refer to figure 13.

1. Remove dust shields below power plant, and drain cooling system, referring to COOLING SYSTEM (SEC. 6) for draining procedure.

NOTE: Before proceeding with removal operations,

disconnect battery cables and exhaust air from air system at tank located forward of rear axle.

2. Raise radiator closure door and closure door at right side of engine compartment.

3. Raise engine compartment rear door. Remove telescopic support prop (14) from cradle, retain door in full open position using suitable tie wires.