

Check Valve

Before air enters the main air tank it passes through a one way check valve. This check valve is installed to keep the main air tank pressurized when the air compressor is not delivering compressed air. The check valve must be installed so that the arrow stamped on the valve body is pointing in the direction of air flow.

Main Air Tank

The main air tank stores compressed air and supplies air pressure to the various air circuits as required. The pressure in the air tank is controlled by the air governor, which maintains air pressure of 115-135 psi (730-930 kPa). The air tank is equipped with a safety valve which prevents the maximum air pressure in the tank from exceeding 175 psi (1200 kPa). Mounted below the tank is an automatic/manual drain valve to eject excess moisture that condenses inside the air tank.

Safety Valve

The safety valve protects the air system against excessive air pressure above 175 psi (1200 kPa). It is installed on the main air tank.

If main pressure below the ball valve rises to a point above the setting of the safety valve, the pressure developed will overcome spring force holding the ball on its seat and the ball will lift. This action permits air to pass up into the spring cage and exhaust to atmosphere through the exhaust port. As soon as excess pressure in the air tank has been reduced to safety valve setting, the regulating spring forces the ball back on its seat, stopping the exhaust of air. Normally the safety valve remains closed. It functions only when air pressure rises above 175 psi (1200 kPa).

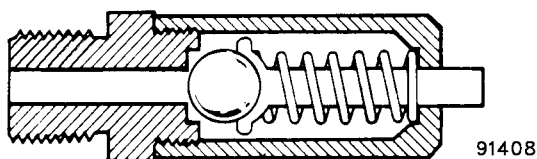


FIGURE 2-2. SAFETY VALVE

Automatic/Manual Drain Valve

The air system is equipped with an automatic drain valve that incorporates a manual drain valve.

The air governor supplies an air signal to the moisture ejection valve to eject moisture. Each time the air governor unloads the air compressor, air is directed into the drain valve at Port "A". (Refer to Figure 2-3). Also, the drain valve is operated when these air signals are removed. Each time air is applied or removed at Port "A" the piston in the drain valve is cycled allowing moisture collected within Port "B" to be exhausted to atmosphere. Manual draining can be accomplished by turning the manual shut-off handle clockwise until air is exhausted out Port "C". Further advance of the manual shut-off handle will block the air escape opening, thus trapping the air in the main air tank.

NOTE: The automatic/manual drain valve should be manually activated after every 8-10 hours of operation.

When the operator manually drains or opens the valve, the handle should be turned clockwise until moisture begins to eject, then turned an additional 1/2 turn clockwise to allow all moisture to eject. The handle is then turned fully counterclockwise. If there is pilot pressure from the air governor on Port "A", the manual valve will not drain air. After operating manual valve, be certain to turn it fully counterclockwise.

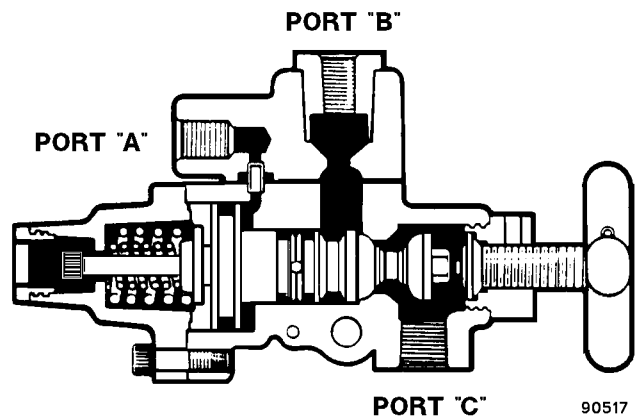


FIGURE 2-3. AUTOMATIC/MANUAL DRAIN VALVE

Air Governor

Air pressure from the air tank enters the inlet port (4, Figure 2-4) of the governor, passes through a filter and acts on the bottom of the piston and valve.

When air pressure reaches 135 psi (931 kPa), the piston moves upward unseating the valve. Air pressure flows through the drilled passage in the piston and out the unloader port (3, Figure 2-4) to the compressor intake valve.

As the pressure drops to 115 psi (793 kPa), force exerted by air pressure on the bottom of the piston (1) will be reduced so that the spring force will move the piston down. The inlet valve closes and the exhaust valve opens allowing pressure in the unloader line to vent through the exhaust port (2). With pressure released in the unloader line, the compressor will pressurize the air tank.

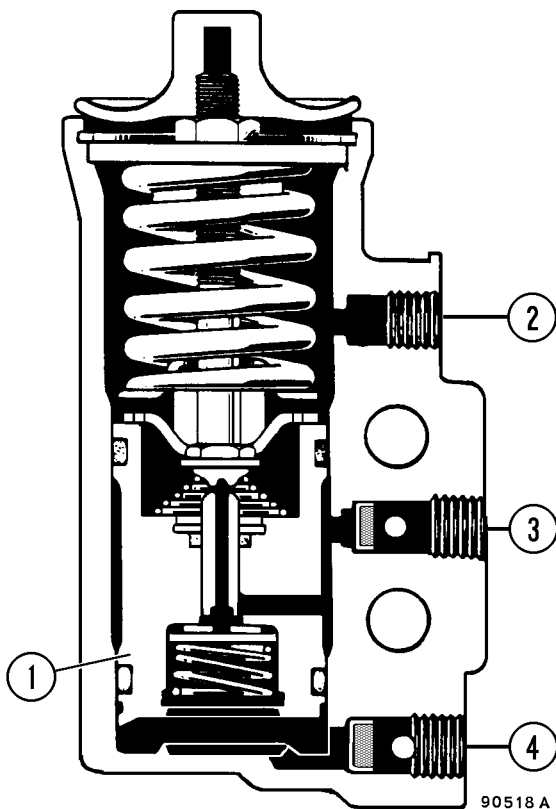


FIGURE 2-4. AIR GOVERNOR

- | | |
|-----------------|------------------|
| 1. Piston | 3. Unloader Port |
| 2. Exhaust Port | 4. Inlet Port |

Radiator Pressure Regulating Valve (Detroit Diesel Engine Only)

The Radiator Pressure Regulating Valve is used to maintain a constant pressurization on the engine cooling system and is located on the top left rear corner of the radiator top tank. It is used to reduce system air pressure being delivered to the top tank.

A positive pressure of 9 psi (62 kPa) is maintained in the radiator to prevent cavitation of the water pump during cold start conditions. The regulating valve has an adjusting screw for adjusting and maintaining the air pressure.

Main air system pressure is supplied to a solenoid valve which opens when the key switch is in the "On" position. When energized, the solenoid allows air to flow to the regulator inlet port. The outlet is adjusted to 9 psi (62 kPa) and is piped into the radiator surge tank.

When the key switch is turned "Off", the solenoid is de-energized and air flow is blocked. The solenoid allows removal of the radiator cap without loss of air system pressure.

WARNING

The radiator cap should not be removed until the key switch has been turned "Off" and the engine allowed to cool. Unless the pressure is first released, removing the radiator cap after the engine has been running for a time can result in hot coolant being expelled from the radiator. Serious scalding and Burning can result.

90 psi (622 kPa) Air Regulating Valve For Contact Relays

The Air Pressure Regulating Valve for Contact Relays is used to reduce system pressure to 90 psi (622 kPa) for actuating the Forward, Reverse, and Propulsion Contactors.

The regulator is located near the center of the rear wall of the electrical control cabinet. System air pressure is supplied to the inlet port of the regulator. The outlet port is connected to the Forward, Reverse, and Propulsion Contactors.

Air System Lubricator (If Equipped)

Current model trucks do not have an air lubricator. If equipped, the air lubricator injects an oil mist into the air system providing internal lubrication of the components within the system. Air flowing through the restricted passage creates a lower pressure in the chamber containing the siphon tube than in the reservoir. The pressure difference between reservoir and restricted passage causes oil to move up the siphon tube, past the check valve, and across the oil feed adjustment screw. Drops of oil from the drip tube will flow into the restricted passage where high velocity air breaks the oil droplets into a fine mist which is carried throughout the air system.

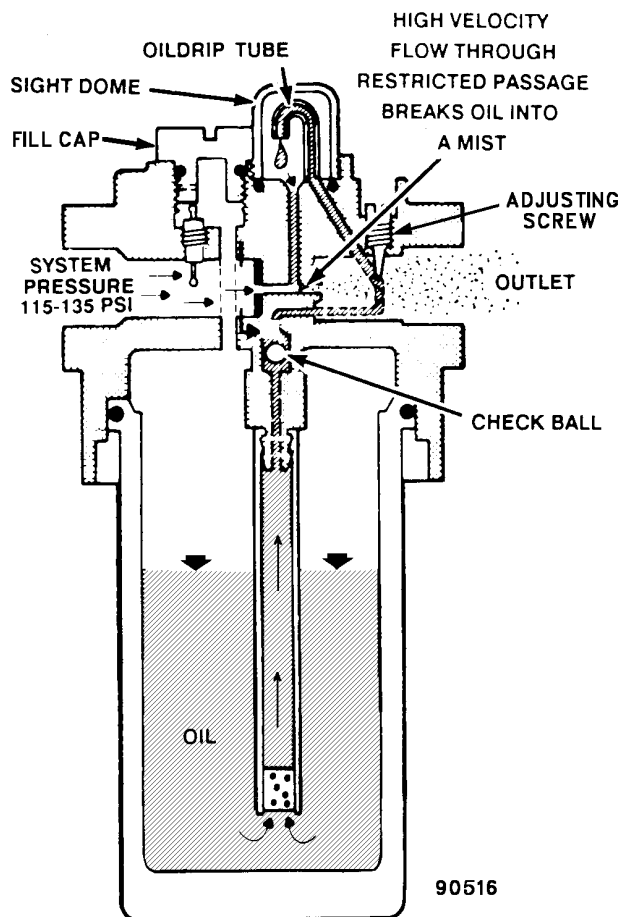


FIGURE 2-5. AIR LUBRICATOR

Shop Air Quick Disconnect

The quick disconnect for an external air supply is usually located on the left front frame, opposite the engine. The quick disconnect is provided to charge the main air system in the event the air pressure has been discharged for maintenance, or the truck has been out of service for an extended period of time. The air system can be charged with shop air, from the air system of an operating truck, or a portable compressor. The air system should be fully charged to provide sufficient volume of air for the air start system (if equipped). Make sure the protective cap is always in place, to prevent contamination of the air system.

NOTES:

AIR SYSTEM COMPONENT REPAIR

AIR COMPRESSOR SERVICE

The air compressor is a component of the engine assembly. Refer to the engine manufacturer's service manual for removal and repair instructions.

AIR DRYER/AFTERCOOLER

Due to several different customer options for Air Dryers and/or Aftercooler, service for this component is not covered in this section. When Aftercooler or Air Dryer service is required, refer to Section "M", Options and Accessories, in this manual.

SAFETY VALVE



Exhaust ALL air pressure from the main air tank PRIOR TO safety valve removal.

The Safety Valve can be disassembled, cleaned and assembled, but normal procedure is to replace the valve.

NOTE: Figure 3-1. may not represent the exact valve on the truck, but represents the internal working of most valves.

Operating Test

With air system fully charged 135 psi (930 kPa), test the safety valve to insure its operating capability. Pull out on the exposed end of the valve stem. This will relieve spring load on the ball valve and let it unseat. Air should exhaust from the valve when the valve stem is pulled out; if not, remove the safety valve and disassemble and clean or replace valve assembly.

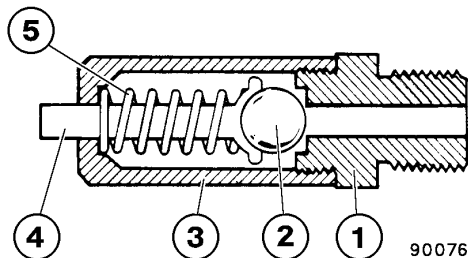


FIGURE 3-1. SAFETY VALVE

- | | |
|----------------|-----------|
| 1. Body | 4. Stem |
| 2. Valve Ball | 5. Spring |
| 3. Spring Cage | |

AIR GOVERNOR

Disassembly

1. Loosen and remove top cover (17, Figure 3-2).
2. Remove the spring assembly retaining ring (12) and lift out spring assembly.
3. Remove locknut (10) and upper spring guide (9) from adjusting screw (11).
4. Remove pressure setting spring (7), spring guide (6) and spring guide (8) from adjusting screw.
5. Remove the exhaust stem (13) and its spring (14) from top of piston (3).

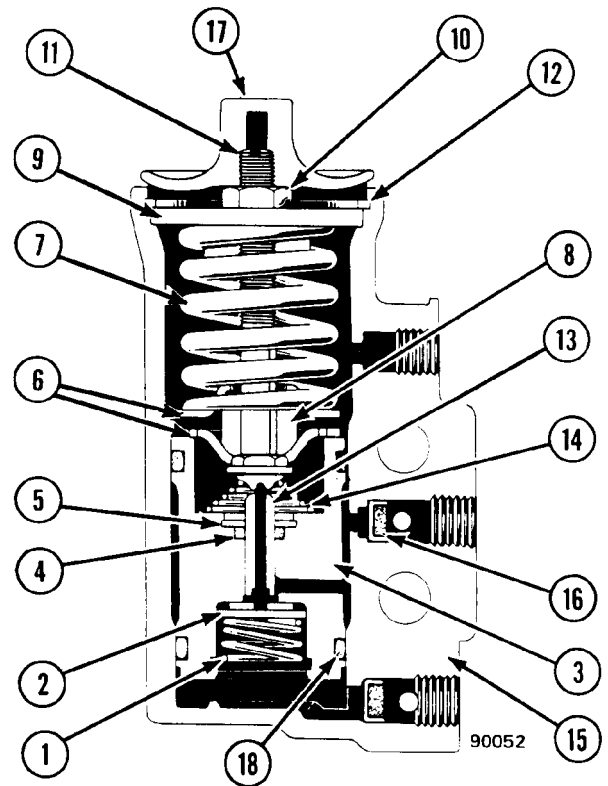


FIGURE 3-2. AIR GOVERNOR

- | | |
|--------------------------|-------------------------|
| 1. Valve Spring | 10. Locknut |
| 2. Inlet & Exhaust Valve | 11. Adjusting Screw |
| 3. Piston | 12. Retaining Ring |
| 4. Grommet | 13. Exhaust Stem |
| 5. Washer | 14. Exhaust Stem Spring |
| 6. Spring Guide (Lower) | 15. Body |
| 7. Spring | 16. Filter |
| 8. Spring Guide | 17. Cover |
| 9. Spring Guide (Upper) | 18. O-Ring |

6. Turn body over, tap lightly and piston should fall out.
7. Remove valve spring (1) and valve (2) from the piston.
8. Remove the two piston O-rings (18) and remove the exhaust stem grommets (4).
9. Clean or replace filters (16).

Cleaning and Inspection

1. Clean all parts in fresh cleaning solvent. Check to make certain that all air passages in the body, exhaust stem and piston are not obstructed.



Follow solvent manufacturer's instructions.

2. Inspect all parts for excessive wear and replace if necessary.
3. Replace O-rings, grommet, and air filters.

NOTE: Valve body and piston must be replaced as a unit.

Assembly

Before proceeding with assembly, lubricate all parts with barium grease.

1. Install exhaust stem grommet (4, Figure 3-2) in stem bore of piston (3).
2. Install inlet and exhaust valve in place at bottom of piston.
3. Install the inlet valve spring (1) with its narrow end against the valve (2). Press down on spring until the large coil end snaps into the groove inside the piston.
4. Place exhaust stem spring (14) over the exhaust stem (13) and carefully press the stem into the stem bore of the piston. Make sure exhaust stem moves up and down freely.
5. Install O-rings (18) in grooves of the piston and install piston in body with largest bore of piston facing up.
6. Install lower spring guide (6), spring guide (8), pressure setting spring (7) and upper spring seat (9) on adjusting screw with locknut (10). Tighten the upper spring seat down until the dimension from top of seat to bottom of the stem head is approximately 1.88 in. (48 mm).
7. With exhaust stem (13) and spring (14) in place, install adjusting screw and spring assembly in the governor body.

8. Install retaining ring (12) to secure adjusting screw and spring assembly.
9. Install top cover (17) and new filters (16).

Adjustment

1. Install an accurate air gauge to monitor main air pressure. Start engine and allow air system to fully charge. Watch the air pressure gauge to determine the point at which the compressor "cuts-out" (stops delivering compressed air). This pressure should be 135 psi (930 kPa).
2. Open air drain valve to expend system air pressure and note at what pressure the compressor "cuts-in" (delivers compressed air). This pressure should be 115 psi (790 kPa).
3. If the above pressures are not at the recommended levels, adjust air governor valve as follows:
 - a. Remove cover (17, Figure 3-5).
 - b. Hold adjusting screw (11) with a screwdriver and loosen locknut (10).
 - c. Turn the adjusting screw counterclockwise to raise the "cut-out" pressure, clockwise to lower the "cut-out" pressure. The "cut-in" pressure should automatically follow to the correct level. Hold adjusting screw and tighten the locknut to secure. Cycle the compressor several times to check the "cut-out" and "cut-in" pressures. One turn of the adjusting screw changes pressure settings approximately 16 psi (110 kPa).
 - d. Replace cover (17).

Leakage Tests

With governor in "cut-out" position, check the exhaust port by applying soap suds to determine leakage at the exhaust valve.

Any leakage in the "cut-out" position could be at the upper piston grommet or exhaust valve.

With governor in "cut-in" position, check for leakage at the inlet valve by applying soap suds at the exhaust port.

Any leakage in "cut-in" position could be at the bottom piston grommet or inlet valve.

AUTOMATIC/MANUAL DRAIN VALVE

Removal

1. Block the truck securely to prevent any movement.
2. Release all air pressure from system.
3. Remove the air line and heater wire (if equipped) from the drain valve. Remove drain valve. Cap air line to prevent contamination.

Installation

1. Install valve assembly on main air tank and reconnect air lines.
2. Charge air system and check valve for leaks and proper operation.



Turning the handle fully clockwise will prevent the valve from ejecting moisture automatically.

Disassembly

1. Remove cap (2, Figure 3-3) with shut-off valve (1).
2. Remove capscrews (11) securing spring cap (14) to body (3).
3. If spring (15 or 16) needs replacing, remove dirt cap (12) and shoulder bolt (13).
4. Remove seat bolt and washer (4) securing valve seat (5) to seat spacer (6). Remove seat spacer and valve seat.
5. Slide piston (9) out of valve body. Replace all O-rings before reassembly.

Cleaning and Inspection

1. Wash all metal parts in cleaning solvent.
2. Inspect all parts for wear or deterioration.
3. Replace all O-rings and gaskets with new.

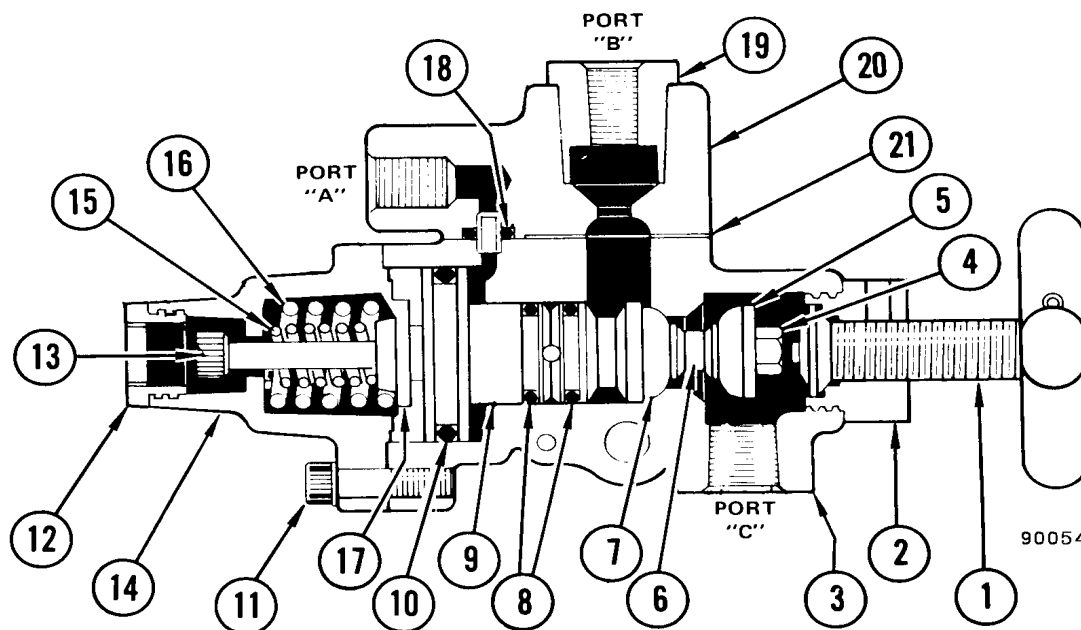


FIGURE 3-3. AUTOMATIC/MANUAL DRAIN VALVE ASSEMBLY

- | | | | |
|-----------------------|----------------|-------------------|------------------|
| 1. Shut-off Valve | 6. Seat Spacer | 11. Capscrew | 16. Large Spring |
| 2. Cap | 7. Valve Seat | 12. Dirt Cap | 17. Seat Washer |
| 3. Valve Body | 8. O-Ring | 13. Shoulder Bolt | 18. O-Ring |
| 4. Seat Bolt & Washer | 9. Piston | 14. Spring Cap | 19. Pipe Reducer |
| 5. Valve Seat | 10. O-Ring | 15. Small Spring | 20. Adapter |
| | | | 21. Gasket |

Assembly

1. Install valve seat (7, Figure 3-3) and slide piston (9) with new O-rings into valve body (3).
2. Install seat spacer (6) and valve seat (5) using seat bolt and washer (4).
3. If removed, install springs (15 & 16) and seat washer (17). Install spring cap (14) using cap-screws (11).
4. Install shoulder bolt (13) and replace dirt cap (12).
5. Install shut-off valve (1) and cap (2).

RADIATOR PRESSURE REGULATING VALVE (Detroit Diesel Engine Only)

Removal

1. Bleed air pressure from the system by opening the drain valve on the automatic/manual drain valve.
2. Disconnect lines at inlet and outlet ports. Remove check valve at outlet port. Cap hoses to prevent entrance of foreign material. Remove regulator from bracket.

Installation and Adjustment

1. Remove pipe plug (21, Figure 3-4) and install an air pressure gauge.
2. Connect air supply to inlet side of regulator.
3. Rotate the adjusting screw clockwise to increase delivery pressure, or counter-clockwise to reduce delivery pressure.

NOTE: Gauge will register delivery pressure.

4. Rotate adjusting screw until a pressure of 9 psi (62 kPa) is obtained. Tighten the jam nut.
5. Remove air line and pressure gauge. Replace pipe plug and tighten securely.
6. Position regulator on the mounting bracket and secure in place with screws. Install check valve in outlet port. Connect lines at inlet and outlet. Tighten all connections securely.

Disassembly

1. Clean the exterior of the valve thoroughly.
2. Loosen jam nut (2, Figure 3-4) and remove adjusting screw (1).
3. Remove screws (3) and lift off bonnet (4).
4. Remove spring seat (5) spring (6), and diaphragm follower (7).
5. Remove diaphragm (8). Remove screws (9) and baffle (10).
6. Remove gasket (11), valve seat (12), O-ring (13) and gasket (14).
7. Pull plunger (15) from body (20) and remove O-ring (16), spring (17), washer (18) and O-ring (19).

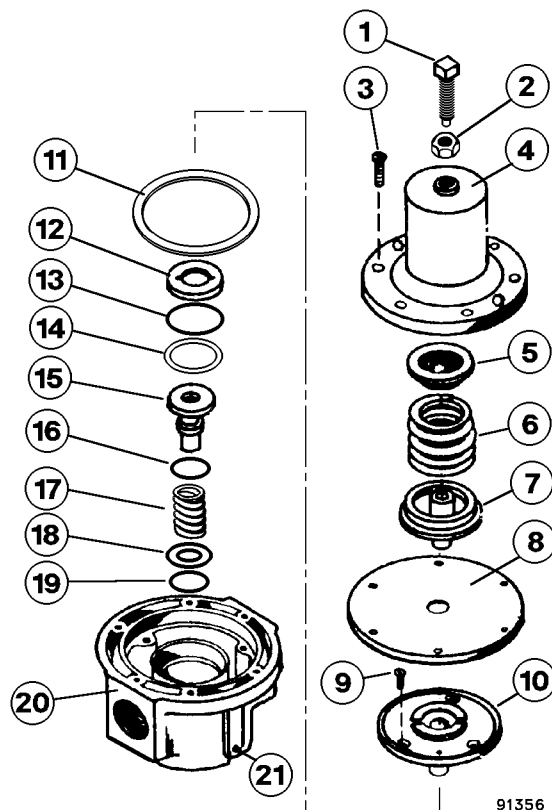


FIGURE 3-4. PRESSURE REGULATING VALVE

- | | |
|-----------------------|----------------|
| 1. Adjusting Screw | 12. Valve Seat |
| 2. Jam Nut | 13. O-Ring |
| 3. Screw | 14. Gasket |
| 4. Bonnet | 15. Plunger |
| 5. Spring Seat | 16. O-Ring |
| 6. Spring | 17. Spring |
| 7. Diaphragm Follower | 18. Washer |
| 8. Diaphragm | 19. O-Ring |
| 9. Screw | 20. Body |
| 10. Baffle | 21. Pipe Plug |
| 11. Gasket | |

Cleaning and Inspection

1. Discard all O-rings and gaskets.
2. Clean all metal parts with a cleaning solvent and blow dry with low pressure air.
3. Inspect all parts for wear or damage. Pay particular attention to the diaphragm (8, Figure 3-4), valve seat (12), and plunger (15).
4. Lubricate all metal surfaces with number 7 Lubriplate and all rubber parts with Dow Corning Number 55 Pneumatic grease.

Assembly

1. Install O-ring (19, Figure 3-4), washer (18), spring (17). Position O-ring (16) on plunger (15) and install plunger.
2. Position gasket (14), O-ring (13) and valve seat (12) in body (20).
3. Install gasket (11), baffle (10). Secure baffle in place with screws (9).
4. Install diaphragm (8), diaphragm follower (7), spring (6) and spring seat (5). Install bonnet (4) and secure in place with screws (3).
5. Install adjusting screw (1) with jam nut (2). Do not attempt to tighten adjusting screw at this time. Refer to "Adjustment".

AIR PRESSURE REGULATING VALVE FOR CONTACT RELAYS [90 psi (622 kPa)]

Removal

1. Bleed air pressure from the system by opening the drain valve on the automatic/manual drain valve.
2. Disconnect line at inlet port. Cap hoses to prevent entrance of foreign material. Unscrew regulator from threaded coupler.

Installation

1. Screw regulator inlet port onto threaded coupler.
2. Connect tee fitting and air hoses to outlet port.

Disassembly

1. Clean the exterior of the valve thoroughly.
2. Loosen jam nut (13, Figure 3-5) and remove adjusting screw (12).
3. Remove screws (14) and lift off bonnet (8).

4. Remove spring button (11) spring (6).
5. Remove diaphragm (9) and plate (5).
6. Remove cap (6), washer (3), spring (4), and poppet (10).

Cleaning and Inspection

1. Discard all O-rings and gaskets.
2. Clean all metal parts with a cleaning solvent and blow dry with low pressure air.
3. Inspect all parts for wear or damage. Pay particular attention to the diaphragm (9), plate (5), and poppet (10).
4. Lubricate all metal surfaces with number 7 Lubriplate and all rubber parts with Dow Corning Number 55 Pneumatic grease.

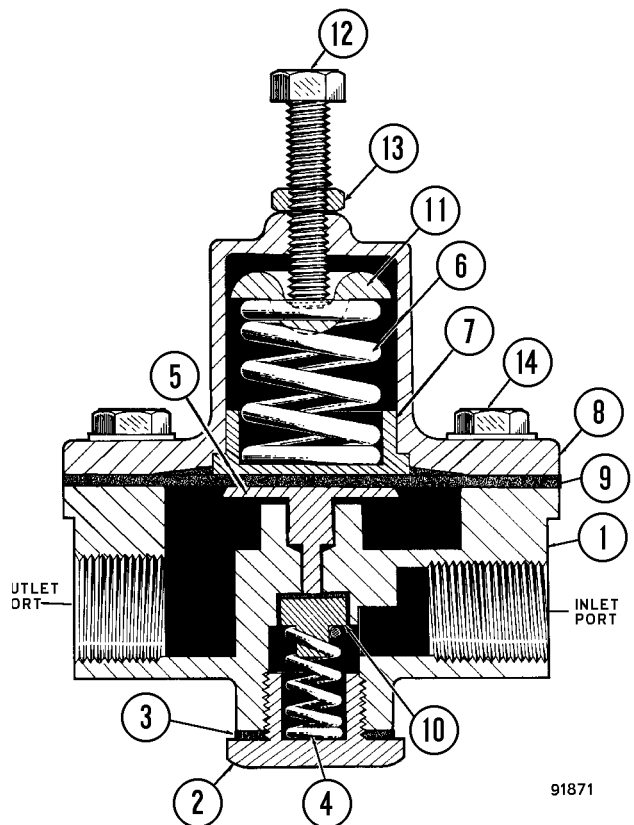


FIGURE 3-5. 90 PSI (622 KpA) REGULATING VALVE

- | | |
|----------------------|---------------------|
| 1. Body | 8. Bonnet |
| 2. Cap Nut | 9. Diaphragm |
| 3. Gasket | 10. Poppet |
| 4. Spring | 11. Button |
| 5. Diaphragm Plate | 12. Adjusting Screw |
| 6. Regulating Spring | 13. Jam Nut |
| 7. Spring Plate | 14. Capscrew |

Assembly

1. Install poppet (10, Figure 3-5) and spring (4) in bore of body (1).
2. Install cap (2) with gasket (3) and tighten.
3. Place diaphragm plate (5) in body as shown.
4. Lay diaphragm (9) on top of diaphragm plate and body assembly.
5. Place spring (6) and button (11) on top of diaphragm. Install bonnet (8) and secure in place with screws (14).
6. Install adjusting screw (12) with jam nut (13). Do not tighten adjusting screw at this time. Refer to "Adjustment".

Adjustment

1. Screw regulator inlet port onto threaded coupler.
2. Disconnect an air hose close to the outlet port of the regulator. Install a tee fitting and reconnect the air hose. Install a 0-300 psi (0-2.1 MPa) gauge into tee fitting.
3. Start the engine and allow the air system to build up to system pressure.
4. Pressure should be 90 ± 5 psi (622 ± 34 kPa). If not, rotate the adjusting screw (12, Figure 3-5) clockwise to increase pressure, or counterclockwise to reduce pressure. Hold adjusting screw and tighten jam nut (13).
5. Actuate forward and reverse relays several times and check pressure again. Adjust if necessary.
6. Remove test equipment and restore lines to normal hookup.

AIR STARTER CIRCUIT (If Equipped)

Due to many different customer options for starters, service for this component is not covered in this section. When starter service is required, refer to either Section "M", Options and Accessories, in this manual, or to the engine manufacturer's shop manual.

AIR SYSTEM LUBRICATOR (If Equipped)

Service

1. With engine shut down and air pressure released, remove fill cap (Figure 3-6).
2. Removal of cap will release any pressure inside of canister and allow access to the fill hole. Fill with SAE 10W oil.
3. Replace fill cap to pressurize canister.

Adjustment

1. Turn adjusting screw in as far as possible.
2. Back adjusting screw out 1 to 1 1/2 turns.

NOTE: As a general rule lubricator should be adjusted to produce one drop of oil per minute at 90 psi (620 kPa) and 20 CFM (0.6 cmm) air flow.

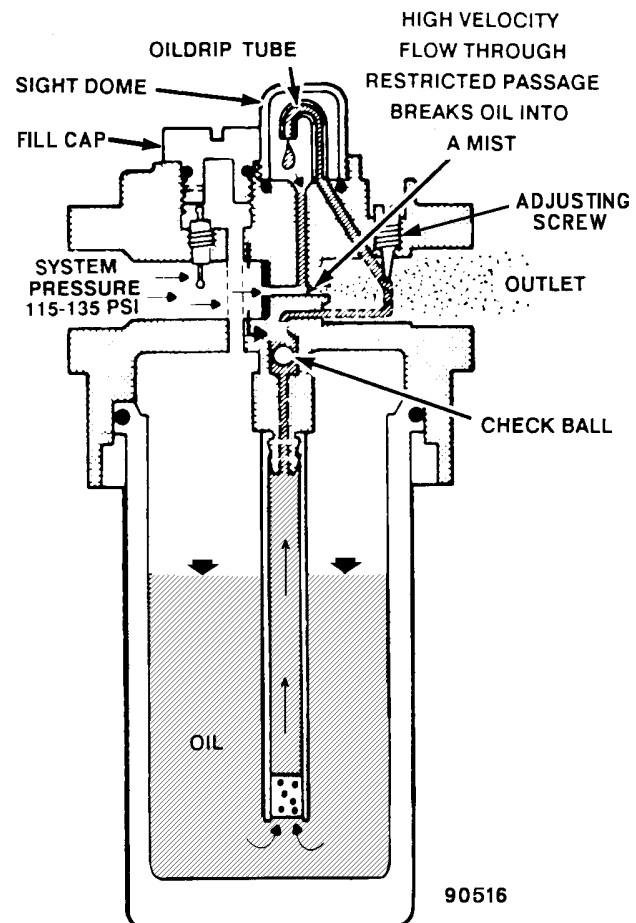


FIGURE 3-6. AIR LUBRICATOR

AIR STARTER CIRCUIT

Air pressure from the main air tank is ported to the dump valve. Air pressure through internal porting is allowed to pass through the dump valve to the air start solenoid. Air is blocked at these valves until actuated by the key switch. When the key switch is turned to the start position, the air start solenoid valve opens and air pressure engages the air starter bendix. After the bendix is engaged, pilot pressure from the bendix housing is ported to the dump valve.

The pilot pressure opens the dump valve allowing main system air pressure to be ported to the starter. When the key switch is released, the air starter solenoid valve closes, cutting off air to the starter and allowing the bendix to disengage. Once the engine starts, an engine oil pressure switch will open the electrical circuit to the air start solenoid, preventing re-engagement of the starter during engine operation.

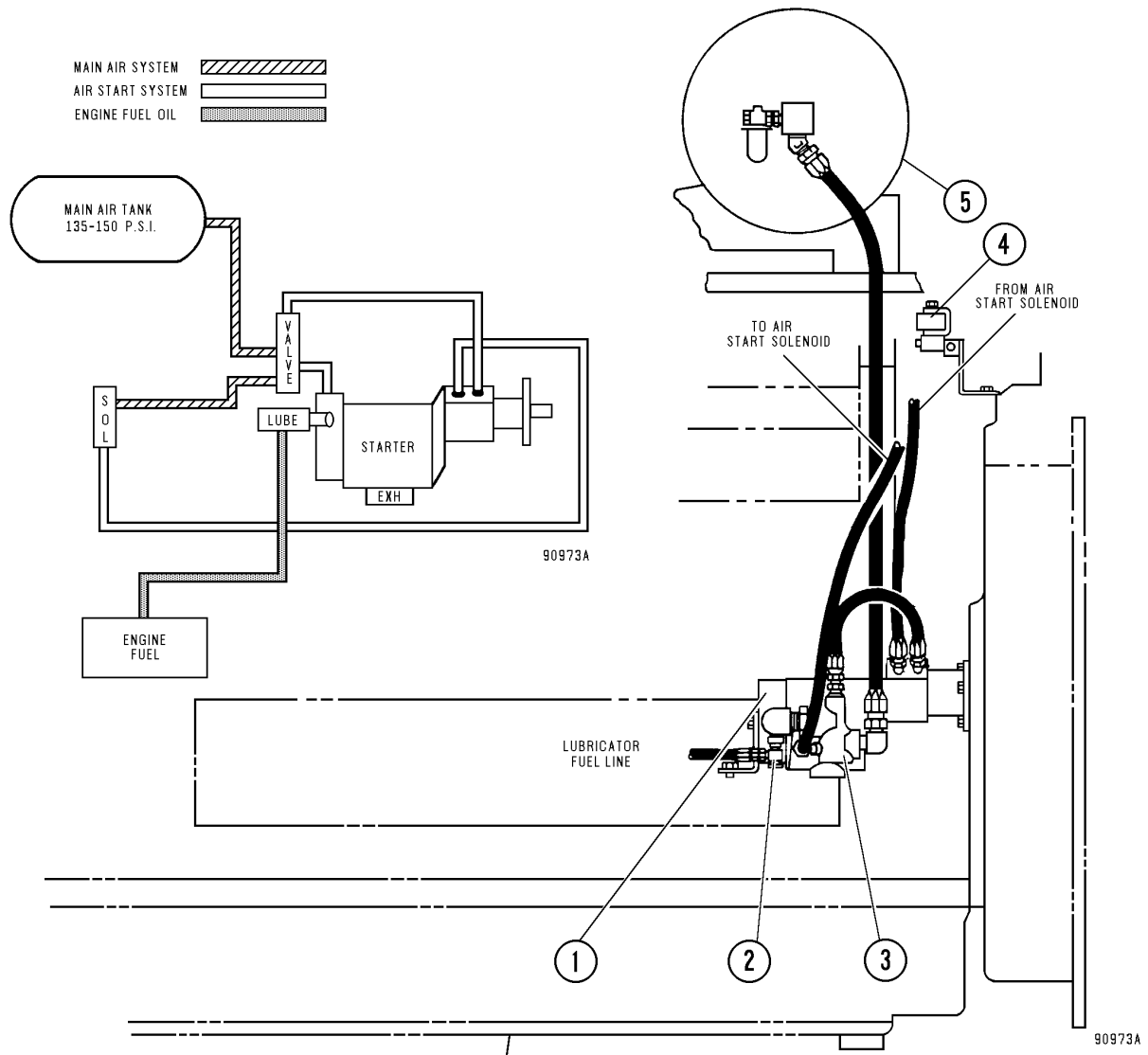


FIGURE 4-1. AIR STARTER CIRCUIT

1. Air Starter
2. Air Starter Lubricator

3. Dump Valve
4. Air Starter Solenoid

5. Main Air Tank

DUMP VALVE

The dump valve (3, figure 4-1) provides a quick "On", "Off" control of the starter motor. A pilot line connected from the starter bendix housing to the pilot port of the dump valve, applies air pressure to the end of the dump valve spool. The movement of the spool opens a passage within the valve to allow air pressure to pass from the main air tank (5) for operation of the starter motor.

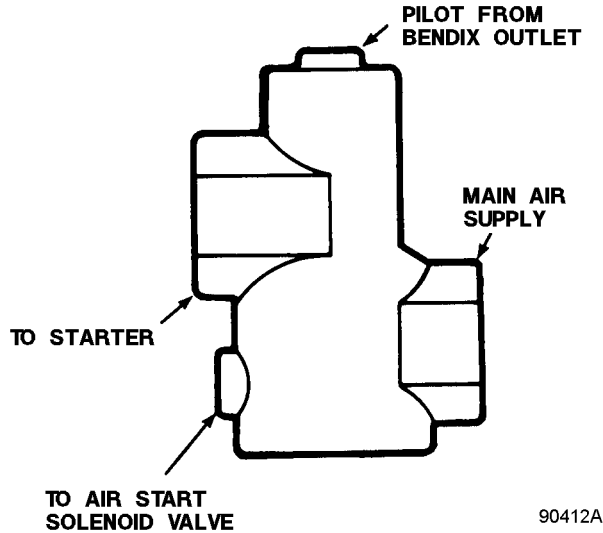


FIGURE 4-2. DUMP VALVE

90412A

AIR START SOLENOID VALVE

The solenoid valve (4, Figure 4-1) is an electrically operated air valve controlled by the key switch. When key switch is turned to "Start" position, the solenoid is energized and opens to allow air pressure to flow to the inlet port of the starter bendix insuring engagement of the pinion with the engine flywheel. Air pressure continues out the pinion outlet port to the dump valve and engages the air starter. Periodically check valve for air leaks and operation of solenoid.

AIR STARTER

The air starter (1) operation is controlled by the air starter solenoid valve and the dump valve.

Air pressure is ported to the bendix inlet, the pinion engages with the engine flywheel, air pressure through the dump valve is then ported through the starter to turn the engine flywheel. After the engine starts, the pinion retracts from the engine flywheel.

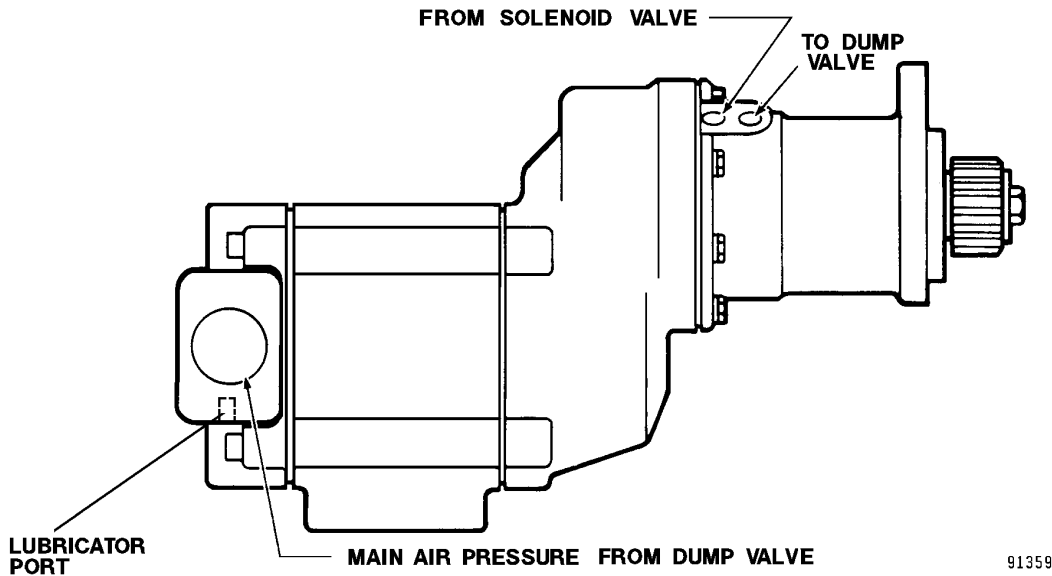


FIGURE 4-3. AIR STARTER

91359

AIR STARTER COMPONENT REPAIR



Relieve all air pressure from the air system prior to removing any components in the air circuit.

AIR START SOLENOID VALVE

Removal

1. Mark or tag electrical connections and air lines.
2. Open drain cock on main air tank and discharge air pressure from system.
3. Remove electrical leads and air lines.
4. Remove capscrews securing manifold to mounting bracket and remove valve assembly.

Installation

Install the air start solenoid to its mounting bracket and connect electrical leads and air inlet lines previously disconnected.

Disassembly

1. Remove breather (1, Figure 4-4) from yoke (2). Lift off yoke (2) and coil (3). Unscrew and remove coil pole (4) with spring (5) and plunger assembly (6).
2. Remove capscrews and lockwashers (7) securing valve body (8) to mounting bracket (11). Remove O-ring (10) in valve body.
3. Disassemble plunger assembly (6) by removing cap from plunger and remove seat, spacer and seat.

NOTE: Seats are reversible. Replace if necessary.

Cleaning and Inspection

1. Clean all parts in a good cleaning solvent and wipe dry.
2. Replace spring (5) if free height is less than 0.968 in. (24.5 mm).

NOTE: DO NOT stretch spring.

3. Inspect O-ring (10). Replace if necessary.
4. Inspect seats in plunger assembly (6). Inspect cap on plunger assembly for proper seating in valve.

Service

After each 5000 hours, disassemble valve, clean and inspect all parts. Replace O-ring seal and any part showing signs of damage or wear. If valve is damaged, replace valve as an assembly

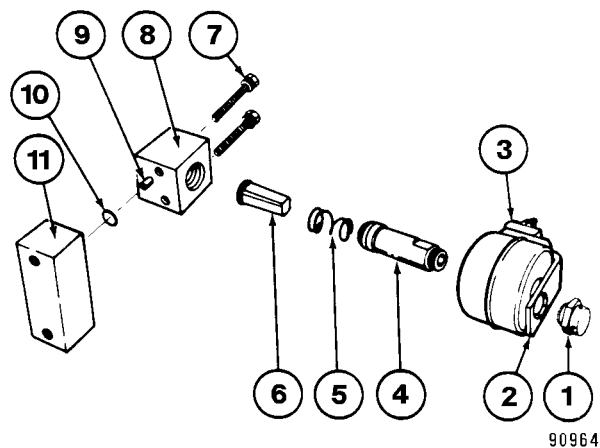


FIGURE 4-4. AIR START SOLENOID

- | | |
|---------------------|----------------------------|
| 1. Breather | 7. Capscrews & Lockwashers |
| 2. Yoke | 8. Valve Body |
| 3. Coil | 9. Roll Pin |
| 4. Coil Pole | 10. O-Ring |
| 5. Spring | 11. Mounting Bracket |
| 6. Plunger Assembly | |

Assembly

1. Install O-ring (10, Figure 4-4) around roll pin (9) on valve body (8). Align valve body to mounting bracket (11) and secure with capscrews and lockwashers (7).
2. Install spring (5) and plunger assembly (6) inside coil pole (4). Screw coil pole (4) into valve body (8). Install coil (3) and yoke (2) over coil pole (4).
3. Press coil lightly until threads of coil pole protrudes through coil. Install breather (1) onto coil pole. Tighten securely.

DUMP VALVE

Removal

1. Open drain cock on main air tank and discharge system air pressure.
2. Tag or mark air lines.
3. Remove pilot air pressure line and main air pressure inlet and outlet lines.

Installation

1. Connect air pressure inlet and outlet lines. Connect pilot pressure lines.
2. Apply shop air and charge air system; check for leaks.

AIR STARTER LUBRICATOR

Check for proper operation by placing a piece of paper over the exhaust port of the starter during the cranking cycle. If lubricator is operating properly, a fine mist should appear on the paper from the starter exhaust port. If this mist does not appear, clean or replace the lubricator.

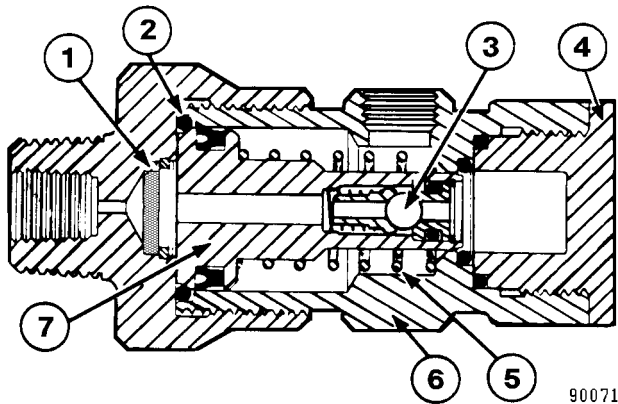


FIGURE 4-5. AIR STARTER LUBRICATOR

- | | |
|---------------------|-----------|
| 1. Filter | 5. Spring |
| 2. O-Ring | 6. Body |
| 3. Check Valve Ball | 7. Piston |
| 4. End Cap | |

Removal

1. Remove and cap diesel fuel line.
2. Remove lubricator.

Installation

1. Prelube lubricator with diesel fuel prior to installation.
2. Install lubricator into starter lubricator port.
3. Connect fuel line, loosen connection and bleed off any trapped air. Tighten fuel line.

NOTE: The lubrication fuel line is gravity fed and the lubricator connection must be below the engine connection with no loops or bends that could cause air locks.

AIR STARTER

Removal

1. Mark or tag all lines. Open drain cock on main air tank to discharge system air pressure.
2. Remove main air line between dump valve and air starter. Remove air lines connected to bendix housing and lubrication line.
3. Remove capscrews securing starter to engine flywheel housing. Remove starter from the truck and move to work area for repair.

Installation

1. Install starter onto engine with capscrews and tighten to standard torque.
2. Connect all air and fuel lines previously disconnected. Bleed off trapped air from fuel line before starting the truck.
3. Apply shop air and charge air system, and check air starter for leaks.

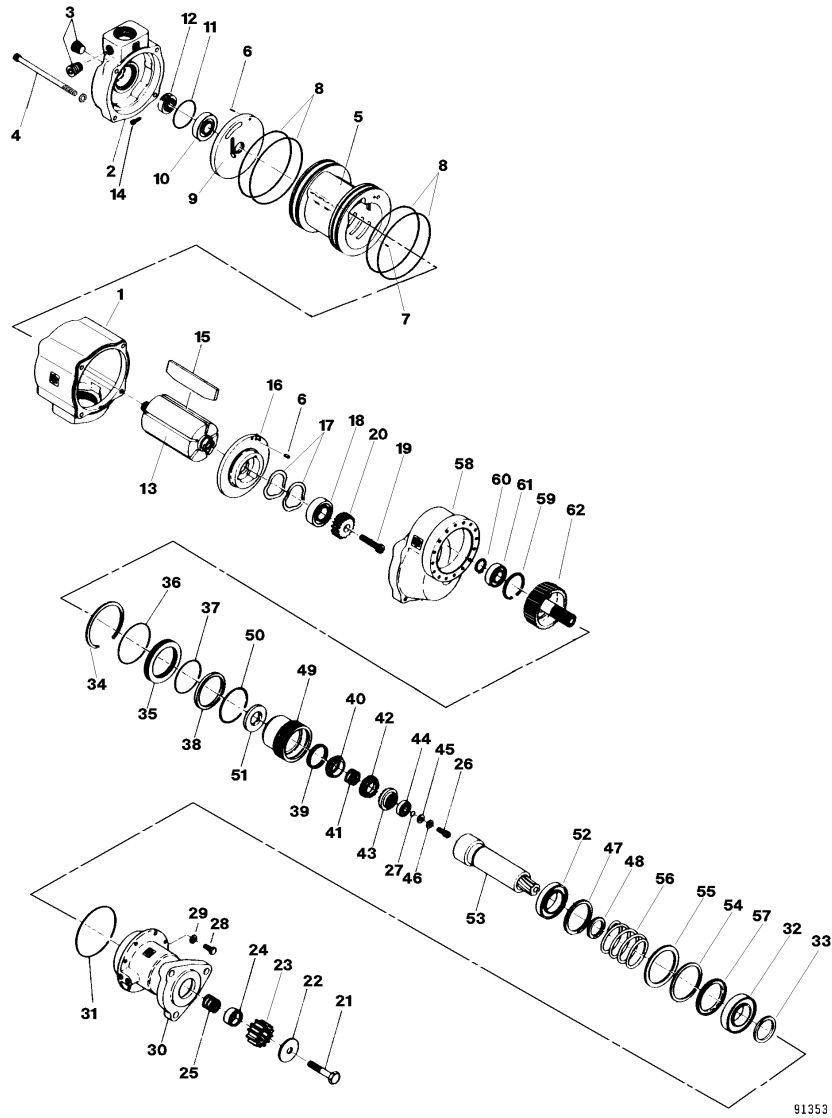
Disassembly Tips

The following are a few recommended procedures which will help aid in assembly of the air starter.

- Always mark adjacent parts on the motor housing cover, motor housing, gear case and drive housing, so these members can be located in the same relative position when the starter is reassembled.
- DO NOT remove any part which is a press fit in or on a sub-assembly unless the removal of that part is necessary for replacement or repairs.
- Never use old seals or O-rings.
- When grasping a part in a vise, always use leather covered or copper covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members.

Disassembly

1. Remove the rear motor housing cover plug (3, Figure 4-6) from the rear of the motor housing cover (2).
2. Grasp drive pinion (23) in a vise with the starter supported on the workbench.
3. Remove drive pinion retaining screw (21). Screw has left hand threads. Remove starter from vise.
4. Remove drive pinion washer (22) and drive pinion (23).



91353

FIGURE 4-6. AIR STARTER

- | | | | |
|------------------------|----------------------|-----------------------|----------------------|
| 1. Motor Housing | 17. Wave Washer | 33. Seal | 49. Piston |
| 2. Motor Housing Cover | 18. Bearing | 34. Bulkhead Retainer | 50. O-Ring |
| 3. Plug | 19. Retaining Screw | 35. Bulkhead | 51. Seal |
| 4. Capscrew & Washer | 20. Rotor Pinion | 36. O-Ring | 52. Bearing |
| 5. Cylinder | 21. Retaining Screw | 37. O-Ring | 53. Drive Shaft |
| 6. Alignment Pin | 22. Washer | 38. Piston Bumper | 54. Backup Ring |
| 7. Alignment Pin | 23. Drive Pinion | 39. Cup Retainer | 55. Piston Bumper |
| 8. O-Ring | 24. Spring Sleeve | 40. Spring Cup | 56. Return Spring |
| 9. End Plate | 25. Spring | 41. Clutch spring | 57. Spring Seat |
| 10. Bearing | 26. Drive Gear Screw | 42. Clutch Jaw | 58. Gear Case |
| 11. O-Ring | 27. O-Ring | 43. Clutch Jaw | 59. Bearing Retainer |
| 12. Clamp Nut | 28. Capscrew | 44. Bearing | 60. Bearing Retainer |
| 13. Rotor | 29. Lockwasher | 45. Washer | 61. Bearing |
| 14. Clamp Nut Screw | 30. Drive Housing | 46. Lockwasher | 62. Drive Gear |
| 15. Vane | 31. O-Ring | 47. Bearing Retainer | |
| 16. End Plate | 32. Bearing | 48. Bearing Retainer | |

5. Slide pinion spring sleeve (24) and pinion spring (25) off drive shaft (53).
6. Insert a 3/8 in. square drive extension through the motor housing cover to hold rotor (13) from turning. Using a 5/16 in. x 8 in. long hex head wrench inserted into the end of the drive shaft, unscrew drive gear screw (26).
7. Remove drive housing capscrews (28) and lockwashers (29).
8. Tap drive housing (30) with a plastic hammer to help dislodge it from gear case (58).

⚠ WARNING

Failure to follow the procedure in Step 9 could result in injury to personnel.

9. Place the drive housing in an arbor press, piston end up. Apply pressure to piston (49) to compress piston return spring (56) before removing bulkhead retainer (34).

⚠ CAUTION

Make sure the tension of the spring pushes the bulkhead out of the drive housing before removing the drive housing from the arbor press.

10. Using a screwdriver, remove the bulkhead retainer. Ease off the arbor press.
11. Remove bulkhead (35) from the piston.
12. Remove the outer bulkhead O-ring (36) and the inner bulkhead O-ring (37).
13. Remove rear piston bumper (38) from the piston.
14. Slide drive shaft (53) from the drive housing.
15. Pull piston return spring (56) off the drive shaft.
16. Remove front piston bumper (55) and bumper backup ring (54).

NOTE: DO NOT remove the front drive shaft bearing (32) or the drive housing seal (33) unless replacement is necessary and new parts are available. The bearing and/or seal will be damaged when removed from the drive housing.

17. Remove piston O-ring (50) from piston

⚠ CAUTION

The operation in Step 18 will damage the seal. Therefore, a replacement seal must be available.

18. Insert a large screwdriver blade through piston seal (51) so that it rests on top of the clutch spring cup (40). Pry the seal out of the piston.
19. Press clutch spring cup (40) down and using a screwdriver, remove clutch spring retainer (39).
20. Remove the clutch spring cup and clutch spring (41).
21. Remove the two clutch jaws (42) and driving clutch jaw (43).
22. Remove the front drive gear bearing (49), drive gear cup (45), drive gear lockwasher (46) and drive gear screw O-ring (27).
23. Remove the large drive shaft bearing retainer (47).
24. Press the rear drive shaft bearing and drive shaft (53) out of the piston.
25. Using a screwdriver, remove the small drive shaft bearing retainer (48).
26. Press the rear drive shaft bearing (52) off the drive shaft.
27. Remove motor housing cover capscrews (4).
28. Pull motor housing cover (2) from motor housing (1). It may be necessary to dislodge the motor housing cover by tapping it with a plastic hammer.
29. Tap gear case (58) with a plastic hammer to dislodge it from the motor housing.
30. Grasp the rotor pinion in a vise and using a wrench, remove rotor pinion retaining screw (19).
31. Remove the rotor pinion (20) from the rotor shaft.
32. Slide front end plate (16), front rotor bearing (18) and motor wave washers (17) off the rotor shaft.
33. Remove rotor (13) and rear end plate (9) from the cylinder.
34. Remove and examine each vane (15). Install a new set of vanes if any vane is cracked, spalled or worn to the extent that its width is 1.25 in. (32 mm) or less at either end.
35. Place the rotor in a copper covered vise and loosen rotor clamp nut screw (14). Remove rotor clamp nut (12).