

GE Transportation

# Compressed Air Supply System, PH37ACmi PowerHaul<sup>®</sup> Series Locomotives

Document No. GEK-114516, Rev. B



imagination at work

© 2012 General Electric Company. All rights reserved. The information contained in this publication is the property of General Electric Company and is disclosed in confidence. This publication is intended for use by GE customers solely for purposes of operating and performing routine maintenance of purchased or licensed GE products, and it shall not be reproduced, redistributed, retransmitted, translated, abridged, adapted, condensed, revised or otherwise modified, in any form, in whole or in part, or used for any other purpose, or disclosed to third parties, without the express written consent of GE. However, if a GE customer ("Customer") requires additional copies of this publication or portions thereof for internal use, GE hereby grants to Customer a limited right to reproduce this publication, in whole or in part, and Customer agrees to use such authorized copies ("Copies") solely for its intended purposes. Any Copies made under this limited reproduction right shall contain this notice and any other legal notices appearing in this publication. The Customer shall be responsible for complying with U.S. export control laws with respect to distribution of all Copies.

GE and Customer agree that the information contained herein does not purport to cover all details or variations in GE products or to provide for every possible contingency with installation, operation or maintenance. Should further information be desired or should particular problems arise that are not covered sufficiently for the user's purposes, the matter should be referred to General Electric Company. Any applicable Federal, State or local regulations or company safety or operating rules must take precedence over any information or instructions given in the Technical Documentation. GE has no obligation to keep the material up to date after the original publication.

GENERAL ELECTRIC COMPANY EXPLICITLY DISCLAIMS ALL WARRANTIES OF ACCURACY, MERCHANTABILITY OR FITNESS FOR ANY PURPOSE IN CONNECTION WITH THIS PUBLICATION AND USE THEREOF.

If you are not an authorized recipient of this publication, you are hereby notified that any perusal, use, distribution, copying or disclosure is strictly prohibited. If you have received this publication in error, please immediately return to GE at the following address: GE Transportation, Technical Publications Department, Building 14, 2901 East Lake Rd., Erie, PA 16531.

#### Revision History

| Rev | Date     | By      | Description   |
|-----|----------|---------|---|
| NEW | Jul-2009 | DAT/PAB | Initial release of publication.   |
| A   | Sep-2011 | DAT     | Revised Figure 11, Figure 12, and Section 4.2 ONE-WAY CHECK VALVES (SALEM 998). |
| B   | Oct-2012 | AMB     | Revised Table 1 and Section 5. Removal and Replacement per workflow # 78250093. |

## TABLE OF CONTENTS

| Section  | Page      |
|--|-----------|
| <b>1. GENERAL INFORMATION .....</b>                    | <b>1</b>  |
| 1.1. INTRODUCTION .....                                | 1         |
| 1.2. RELATED PUBLICATIONS .....                        | 1         |
| 1.3. SAFETY INFORMATION .....                          | 1         |
| <b>2. CONTROLS AND INDICATORS.....</b>                 | <b>1</b>  |
| <b>3. FUNCTIONAL DESCRIPTION .....</b>                 | <b>1</b>  |
| 3.1. LOCOMOTIVE COMPRESSED AIR BLOCK DIAGRAM .....     | 1         |
| 3.2. AIR COMPRESSOR .....                              | 8         |
| 3.3. MAIN RESERVOIRS .....                             | 10        |
| 3.4. SALEM 994 SERIES AIR DRYER .....                  | 11        |
| 3.5. ONE-WAY CHECK VALVE .....                         | 11        |
| <b>4. SCHEDULED MAINTENANCE .....</b>                  | <b>13</b> |
| 4.1. AIR COMPRESSOR .....                              | 13        |
| 4.2. ONE-WAY CHECK VALVES (SALEM 998) .....            | 14        |
| <b>5. REMOVAL AND REPLACEMENT .....</b>                | <b>16</b> |
| 5.1. REMOVING AIR COMPRESSOR FROM THE LOCOMOTIVE ..... | 16        |
| 5.2. AIR COMPRESSOR INSTALLATION PROCEDURES .....      | 22        |
| <b>6. SUMMARY DATA.....</b>                            | <b>23</b> |

**LIST OF FIGURES**

| <b>Figure</b> |   | <b>Page</b> |
|---------------|---|-------------|
| 1             | Locomotive Compressed Air Block Diagram (Part 1 of 6) ..... | 2           |
| 2             | Locomotive Compressed Air Block Diagram (Part 2 of 6) ..... | 3           |
| 3             | Locomotive Compressed Air Block Diagram (Part 3 of 6) ..... | 4           |
| 4             | Locomotive Compressed Air Block Diagram (Part 4 of 6) ..... | 5           |
| 5             | Locomotive Compressed Air Block Diagram (Part 5 of 6) ..... | 6           |
| 6             | Locomotive Compressed Air Block Diagram (Part 6 of 6) ..... | 7           |
| 7             | Air Compressor .....  | 9           |
| 8             | Typical Flange Style Check Valve .....                      | 12          |
| 9             | Salem 994 Series Air Dryer .....                            | 12          |
| 10            | Cross Section View of Typical One-way Check Valve .....     | 13          |
| 11            | Cross Section of 998 Series Check Valve .....               | 15          |
| 12            | One-way Check Valve Cartridge Maintenance Procedure .....   | 15          |
| 13            | Air Compressor Oil Drain .....                              | 17          |
| 14            | Air Compressor and Fuel Filter Access Doors .....           | 17          |
| 15            | Air Filter Housing .....                                    | 18          |
| 16            | Fuel Filter Housing .....                                   | 18          |
| 17            | Junction Box and Drive Motor .....                          | 19          |
| 18            | Oil Cooling Lines .....                                     | 20          |
| 19            | Un-loader Feed and Cooling Lines .....                      | 20          |
| 20            | Main Discharge Pipe .....                                   | 21          |
| 21            | Mounting Bolts .....  | 21          |
| 22            | Compressor in Car Body .....                                | 22          |
| 23            | Drive Motor Step .....                                      | 23          |

## 1. GENERAL INFORMATION

### 1.1. INTRODUCTION

This publication covers the Air Supply System and Air Compressor equipment. Consult the latest revision of the parts catalog to determine the correct part numbers for equipment on this locomotive. The equipment discussed in this publication consists of the following components or assemblies:

- Air Compressor
- Compressor Drive Motor
- Compressor Safety Valve
- Main Reservoirs
- Automatic Main Reservoir Drain Valve
- Manual Main Reservoir Drain Valve
- Main Reservoir Safety Valve
- Main Reservoir Pressure Transducer Switch
- Salem 994 Series Air Dryer
- One-Way Check Valves

### 1.2. RELATED PUBLICATIONS

When using related publications, use the highest letter revision publication for current information. Check with the GE Representative or GE website for the current letter revision of the publication.

| PUBLICATION NUMBER | PUBLICATION NAME  |
|--------------------|---|
| GEK-114620         | WABCO 3-CWM Air Compressor                                    |
| GEK-114513         | Radiator Cab Equipment, PH37ACmi PowerHaul® Series Locomotive |
| GEK-114501         | Scheduled Maintenance Intervals                               |

### 1.3. SAFETY INFORMATION

Safety precautions and warnings that must be observed when working on locomotive maintenance appear throughout this publication. WARNINGS indicate the potential for personal injury. CAUTIONS indicate the potential for equipment damage.

## 2. CONTROLS AND INDICATORS

Not applicable.

## 3. FUNCTIONAL DESCRIPTION

### 3.1. LOCOMOTIVE COMPRESSED AIR BLOCK DIAGRAM

Figure 1 through Figure 6 depicts the locomotive compressed air block diagram. The figures are interconnected by references to PART. PART indicated the figure number the air circuit continues on.

Revisions are indicated by margin bars.

| ITEM | DESCRIPTION                        | QNTY | ITEM | DESCRIPTION                      | QNTY | ITEM | DESCRIPTION               | QNTY |
|------|------------------------------------|------|------|----------------------------------|------|------|---------------------------|------|
| 1A   | INLET FILTER                       | 1    | 31   | GASKET, 2 IN (2 IN PIPE)         | 13   | 108  | CUT-OUT COCK, 1 IN VENTED | 1    |
| 1B   | INLET FILTER                       | 1    | 32   | FLANGE, 2 IN (1.25 IN PIPE)      | 1    | 150  | HOSE, CMV                 | 1    |
| 2    | COMPRESSOR                         | 1    | 33   | FLANGE, 2 IN (1 IN PIPE)         | 2    | 151  | HOSE, DVMV                | 1    |
| 3    | AFTERCOOLER                        | 1    | 50   | MAGNET VALVE                     | 19   | 152  | HOSE, CVMV 1              | 1    |
| 4    | HOSE, 2 IN                         | 1    | 52   | SAND TRAP                        | 8    | 153  | HOSE, CVMV 2              | 1    |
| 5    | MAIN RESERVOIR                     | 1    | 54   | HORN ORIFICE, SOFT               | 4    | 154  | HOSE, STMV                | 1    |
| 6    | BRAKING RESERVOIR                  | 2    | 55   | HORN, 370 HZ                     | 2    | 155  | HOSE, SKMV1               | 1    |
| 7    | DEFLECTOR                          | 3    | 56   | HORN, 311 HZ                     | 2    | 156  | HOSE, SKMV2               | 1    |
| 8    | CHECK VALVE                        | 2    | 57   | QUICK DISCONNECT                 | 1    | 157  | HOSE, SKMV3               | 1    |
| 9    | FLANGE, CHOKE                      | 2    | 58   | DUST CAP (WITH CHAIN)            | 1    | 158  | HOSE, SHMV1               | 1    |
| 10   | DRAIN VALVE                        | 3    | 59   | VALVE, WIPER CONTROL             | 159  | 159  | HOSE, SHMV2               | 1    |
| 11   | AIR DRYER                          | 1    | 60   | WIPER MOTOR                      | 170  | 170  | HOSE, INBOARD SAND        | 4    |
| 12   | FINAL FILTER                       | 1    | 61   | SAND NOZZLE AND BRACKET, FRONT   | 4    | 171  | HOSE, OUTBOARD SAND       | 4    |
| 13   | MAIN RESERVOIR PRESSURE TRANSDUCER | 2    | 62   | HORN ORIFICE, LOUD               | 4    | 172  | HOSE, BRAKE CYLINDER      | 2    |
| 14   | PRESSURE REGULATOR (100 PSI)       | 2    | 63   | SAND NOZZLE AND BRACKET, REAR    | 4    | 173  | HOSE, PARKING BRAKE       | 2    |
| 15   | PRESSURE REGULATOR (80 PSI)        | 1    | 80   | CUT-OUT COCK                     | 2    | 174  | HOSE, MRP (END)           | 2    |
| 16   | PRESSURE REGULATOR (55 PSI)        | 1    | 81   | CUT-OUT COCK                     | 2    | 175  | HOSE, BP (END)            | 2    |
| 17   | MR RELIEF VALVE (150 PSI)          | 1    | 82   | NPT FEMALE, 1-11.5 TO 1-11 MBSPP | 4    | 176  | HOSE, AIR                 | 4    |
| 18   | DISCHARGE CHECK VALVE              | 1    | 101  | CUT-OUT COCK, 0.5 IN NONVENTED   | 1    | 200  | BRAKE UNIT                | 1    |
| 19   | RELIEF VALVE (160 PSI)             | 1    | 102  | CUT-OUT COCK, 0.5 IN VENTED      | 2    | 201  | EMERGENCY BRAKE VALVE     | 2    |
| 20   | CHECK VALVE                        | 1    | 103  | CUT-OUT COCK, 0.5 IN VENTED      | 3    | 210  | SWITCH, PARK BRAKE        | 1    |
| 21   | DUPLEX CHECK VALVE                 | 1    | 104  | CUT-OUT COCK, 0.5 IN VENTED      | 1    | 221  | SERVICE BRAKE, RHS        | 4    |
| 22   | CHECK VALVE                        | 2    | 105  | CUT-OUT COCK, 0.5 IN VENTED      | 8    | 222  | FLEX-PARK BRAKE, RHS      | 2    |
| 23   | 0.125 ORIFICE                      | 2    | 106  | CUT-OUT COCK, 0.75 IN VENTED     | 2    | 223  | SERVICE BRAKE, LHS        | 4    |
| 30   | FLANGE, 2 IN                       | 1    | 107  | CUT-OUT COCK, 1 IN VENTED        | 1    | 224  | FLEX-PARK BRAKE, LHS      | 2    |

E-51615

Figure 1. Locomotive Compressed Air Block Diagram (Part 1 of 6)



Figure 2. Locomotive Compressed Air Block Diagram (Part 2 of 6)

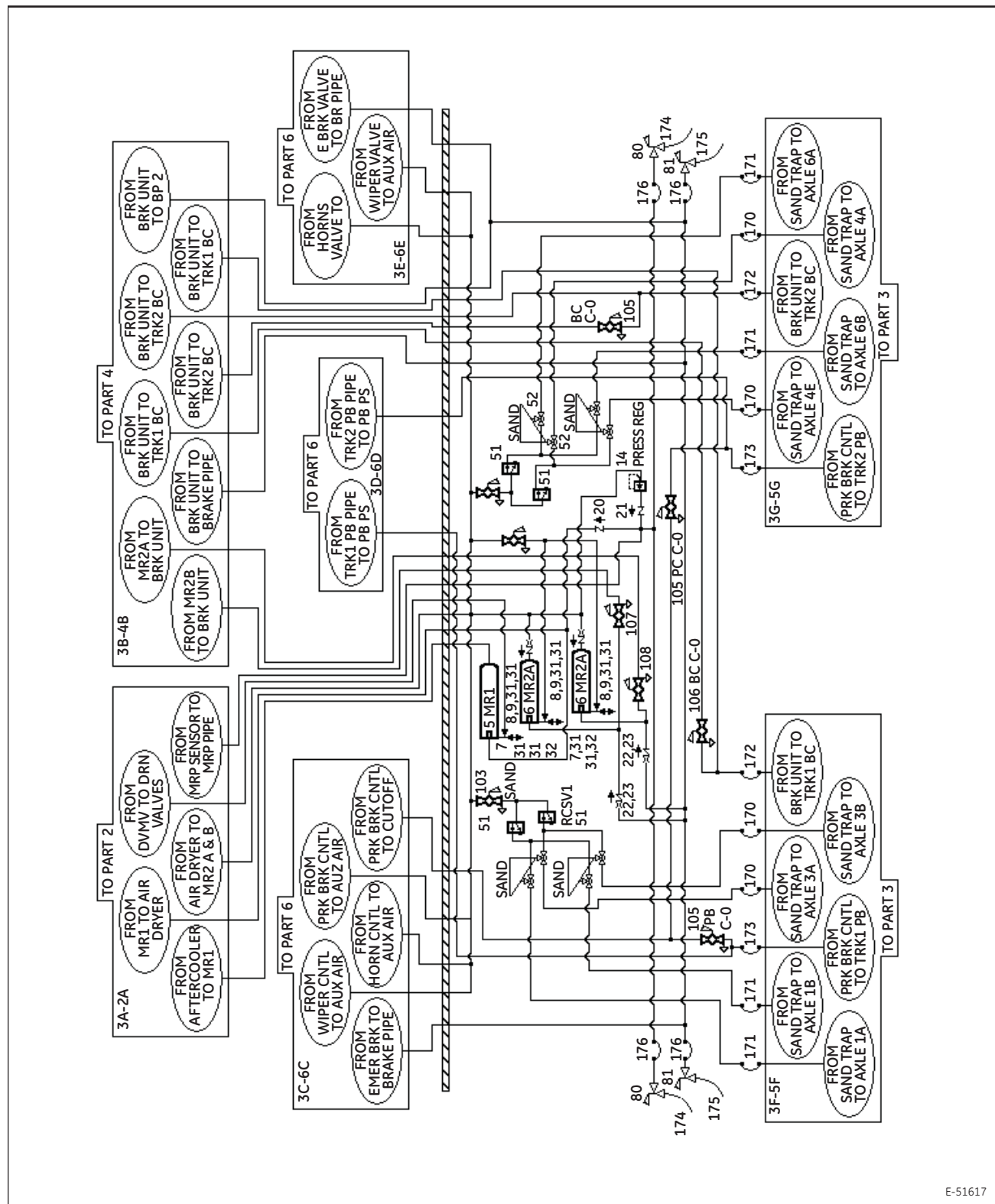


Figure 3. Locomotive Compressed Air Block Diagram (Part 3 of 6)

E-51617



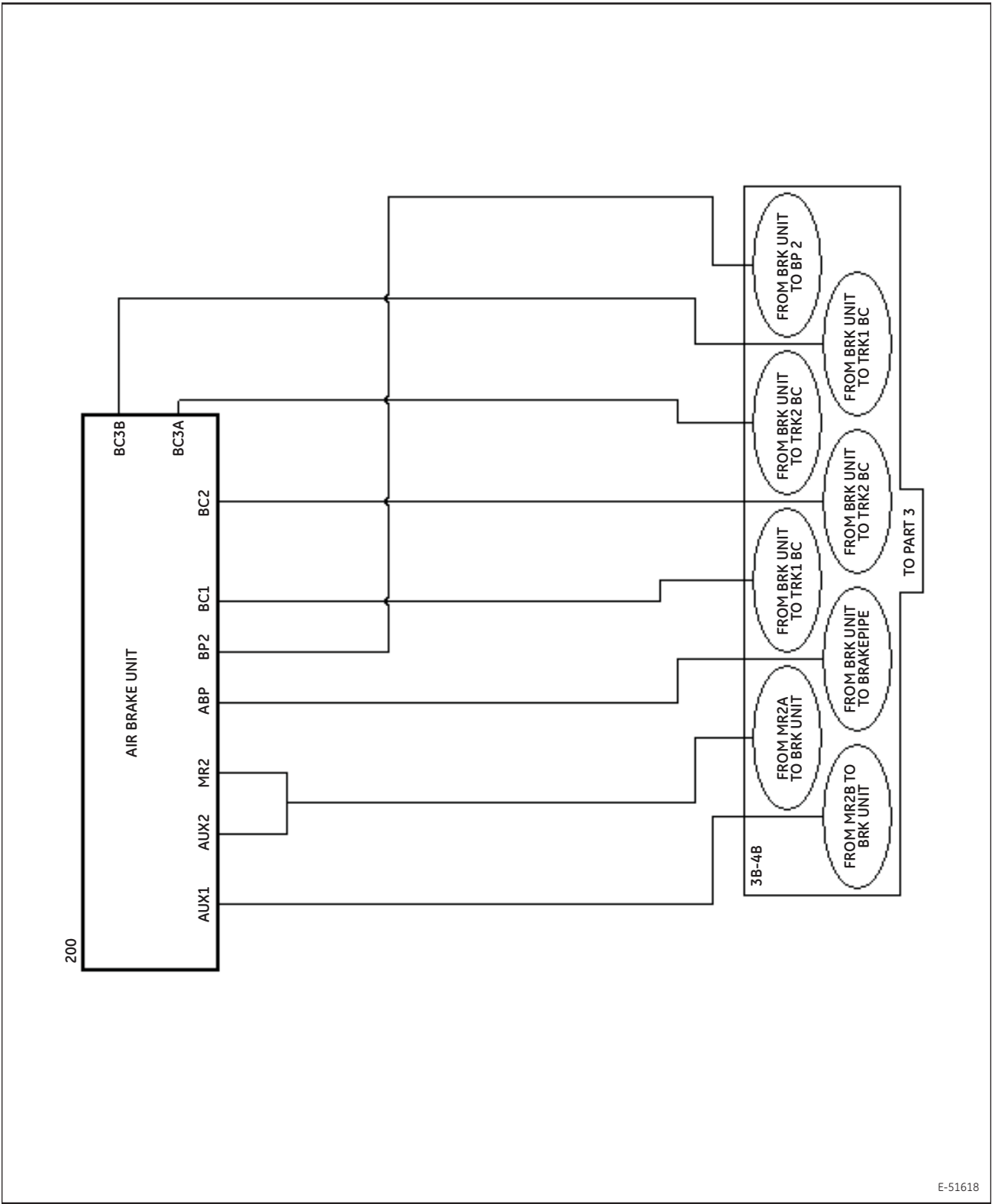
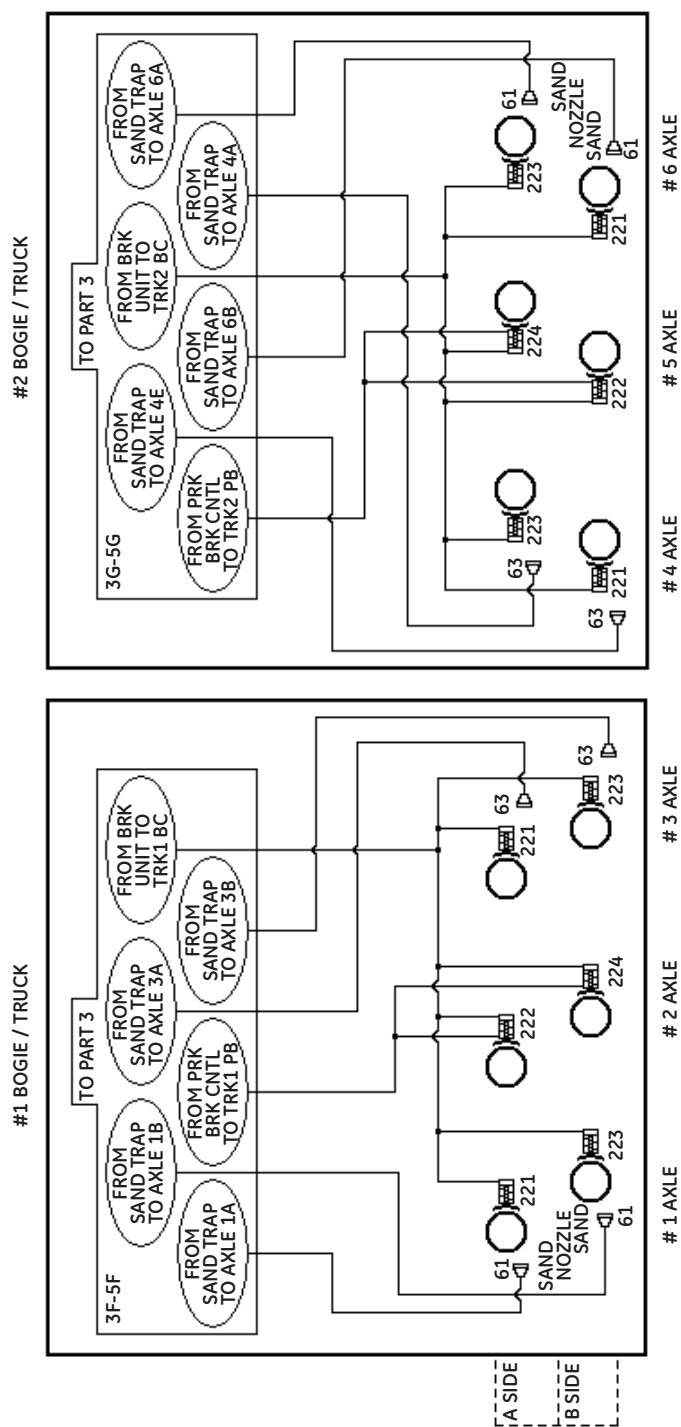


Figure 4. Locomotive Compressed Air Block Diagram (Part 4 of 6)



E-51619

Figure 5. Locomotive Compressed Air Block Diagram (Part 5 of 6)

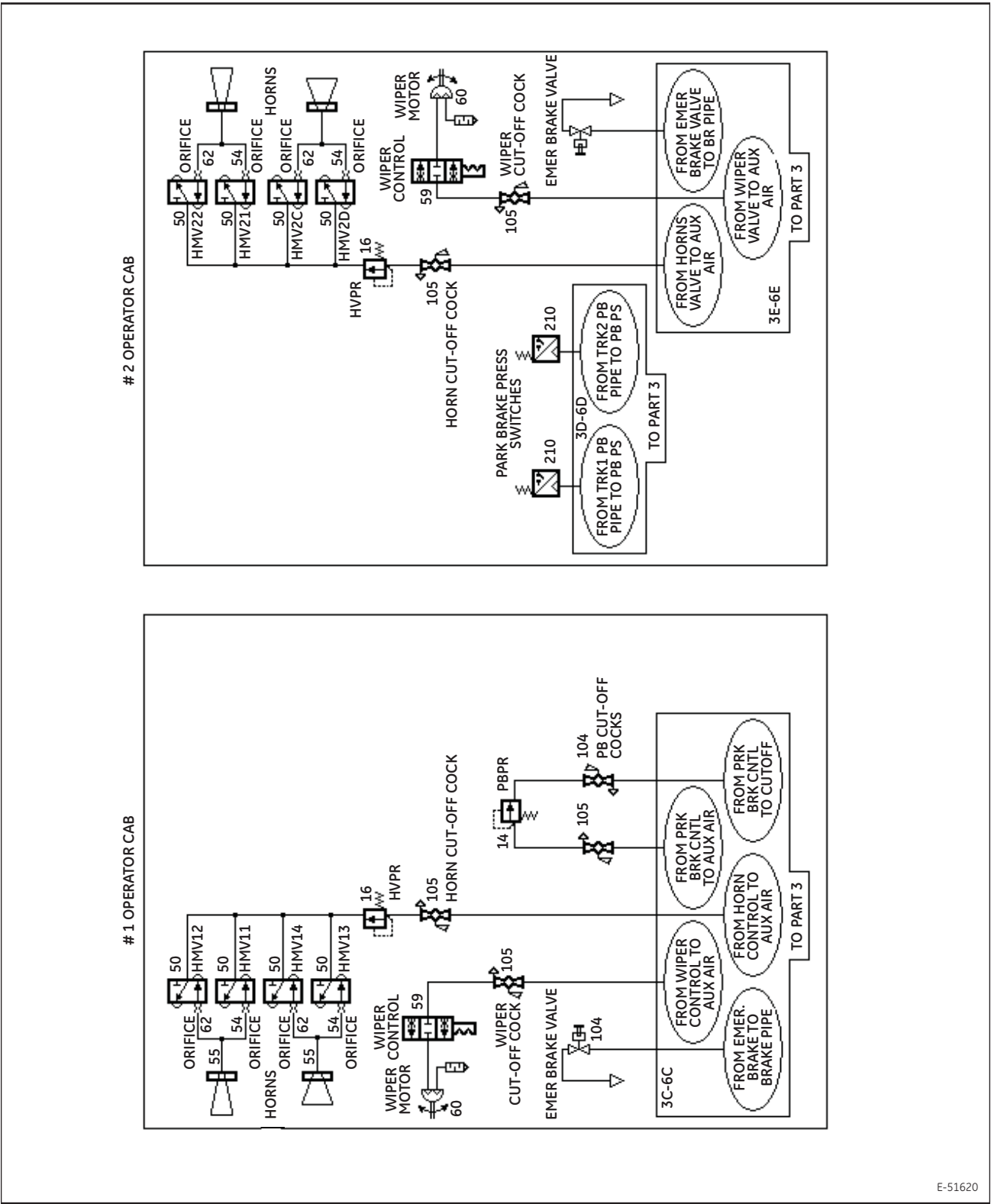


Figure 6. Locomotive Compressed Air Block Diagram (Part 6 of 6)

### 3.2. AIR COMPRESSOR

**WARNING**

*Use caution when working with pressurized air. Do not attempt to service, repair, or break any connections or air lines without bleeding all the pressure from this device and all lines leading to or from it. Failure to do so can result in personal injury.*

This locomotive uses a water-cooled compressor. The air compressor (Figure 7) is a three-cylinder, two-stage, water-cooled machine with two low-pressure cylinders and one high-pressure cylinder. The high and low pressure pistons are driven by connecting rods that rotate about a common crankshaft.

Compression heats the air and increases the amount of moisture per cubic foot of air. The compressor intercoolers serve to cool air between two compression stages; increasing the compressor efficiency. The air is further cooled by an external after-cooler as it leaves the compressor.

The air supply subsystem (Figure 1 through Figure 6) supplies compressed air to the air brake subsystem, the MR1 sensor, and the other air-operated devices (horn, bell, windshield wipers, etc.).

#### 3.2.1. Air Compressor Drive Motor

The air compressor drive motor (CDM) is an AC electric motor mounted directly on the air compressor crankcase. An Auxiliary inverter is used to power the compressor three phase AC drive motor. Motor rotation is counter clockwise (CCW) looking at the compressor end of the motor.

##### 3.2.1.1. Starting The Drive Motor

The air compressor start sequence is a two step process. The first step is to start the motor and the second step is to load the air compressor.

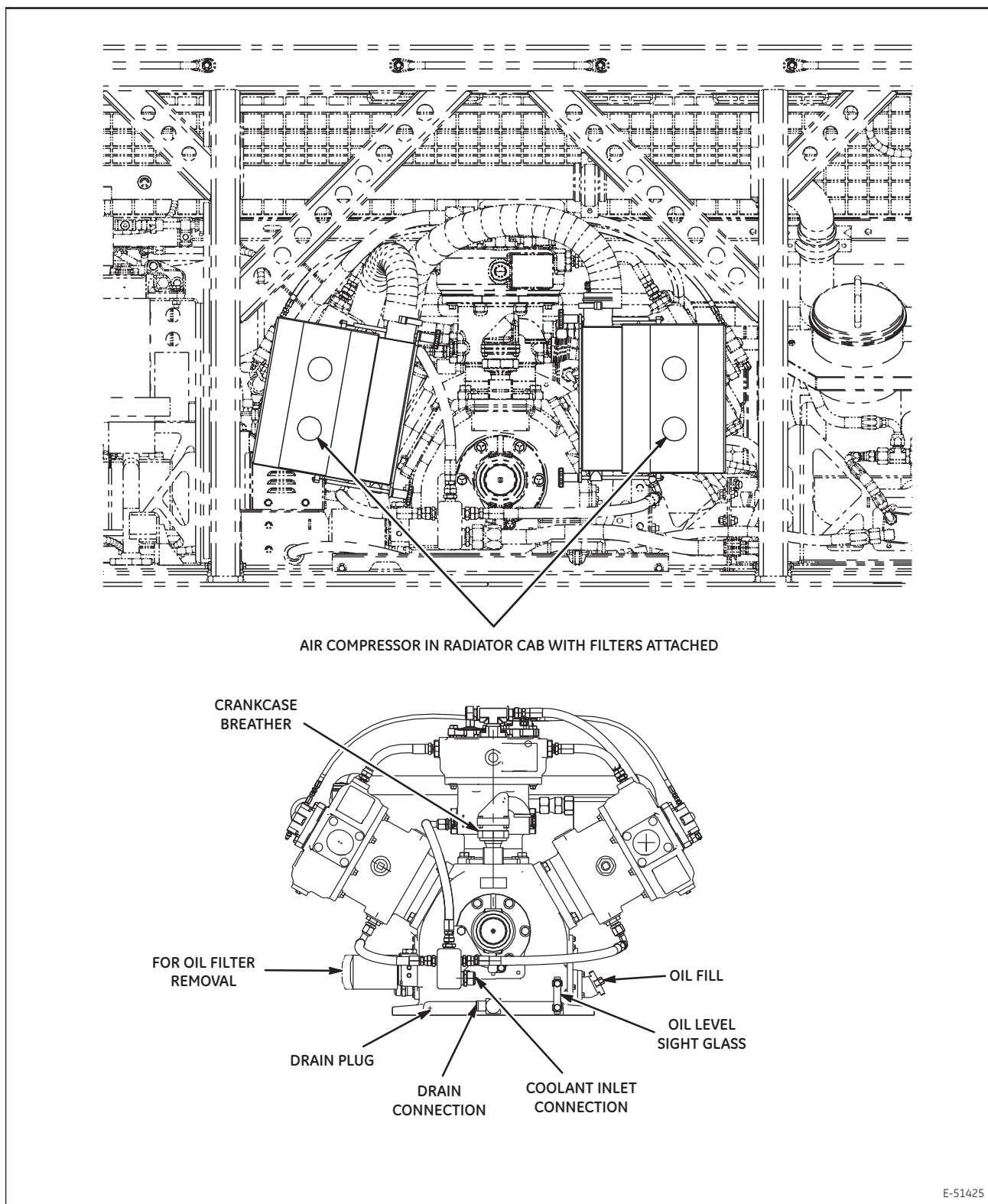
- Main Reservoir No. 1 Pressure Transducer Sensor Signal - When the main reservoir pressure drops below the MR1 setting (open), MR1 sends a signal to the control system to start and load the air compressor. When main reservoir pressure reaches the MR1 setting (closed), MR1 sends a signal to the control system to unload the air compressor and stop the motor 30 seconds after receiving the signal.
- Air Synchronization Signal - When another locomotive energizes its air compressor and trainline synchronization is enabled the control system will start and load the air compressor.

When the control system receives one of the above signals, the compressor drive motor begins operation.

The control system will not permit the motor to start if:

- The alternator blower is not operating or is in a starting or speed-increasing transient condition.
- The radiator fan or equipment blower is in a starting or speed-increasing transient condition.
- The engine water temperature is too low for compressor oil pick-up.
- A communication link fault occurs.

**NOTE:** *If the air compressor motor has not begun to rotate within two seconds of the start command, the motor will shut down.*

*Figure 7. Air Compressor*

### 3.2.1.2. Loading The Air Compressor

After the signal has been given to start the motor, the control system waits until the compressor reaches approximately 540 rpm before de-energizing the compressor magnetic valve (CMV) to load the air compressor. This prevents the air compressor from loading until the drive motor reaches synchronous speed.

### 3.2.2. Compressor Magnet Valve (CMV)

The CMV is de-energized to load the air compressor and energized to unload the air compressor. When the CMV is energized, compressed air is permitted to flow from main reservoir to the compressor unloader valves, keeping the suction valves open and preventing the compressor from pumping air (the compressor is unloaded). When the CMV is de-energized, compressed air to the unloader valve is exhausted through the CMV and the compressor suction valves are able to operate normally to compress air (the compressor is loaded).

### 3.2.3. Safety Valve

A safety valve is located at the outlet of the first main reservoir to prevent the air pressure from exceeding 155 psi (10.69 bar). This valve should be checked to ensure proper operating pressure.

## 3.3. MAIN RESERVOIRS



*This is a compressed air device. Compressed air is extremely dangerous if not handled carefully. Do not attempt to service, repair, or break any connections or air lines without bleeding all the pressure from this device and all lines leading to or from it. Failure to do so can result in personal injury.*

The PowerHaul® locomotive is equipped with three main reservoirs that have a minimum capacity of 850 L. MR1 shall have a minimum capacity of 27,460 cubic inches (450 L). MR2A and MR2 B shall have a minimum capacity of 12,200 cubic inches (200 L) each. Each has an internal rust preventative coating and is identified with a serial number.

Reservoirs are supplied with tell-tale holes pre-drilled from the outside of the reservoir as specified by FRA regulations. If leakage is heard, check for a break in the reservoir shell at one of the holes. A deflector will be used at the reservoir outputs to prevent the air from passing straight through the reservoirs. Follow all government regulations and Railroad Operating Procedures when replacing the reservoir.

Compressed air is also routed to main reservoir No. 2A and 2B through a flange style check valve. The valve prevents air from flowing backwards to the first main reservoir. Consequently, main reservoir No. 1 can lose air while main reservoir No. 2 maintains pressure for the air brakes.

### 3.3.1. Main Reservoir Water Drain Valve

The reservoirs are sloped towards the drain valve when installed on locomotives to enable drainage of condensate. Automatic or manual blow-down devices are applied at the end of each reservoir to expel this moisture.

### 3.3.2. Main Reservoir Sensor

A pressure transducer is located at the outlet of main reservoir No. 1. This is a sensor operating at a pressure range of 0 to 200 psi (0 to 1,379 kPa). This safety valve monitors the main reservoir (MR) pressure. The MR1 sensor shall be located in the Radiator Cab near the compressor and magnet valve panel. A vented isolation cock shall be provided for the MR1 sensor. A quick disconnect fitting shall be applied in the MR1 sensor line for the purpose of checking MR1 sensor accuracy. Opening pressure should be checked periodically.

For most applications, if the MR pressure exceeds 150 psi (1,034 kPa), the valve will open. For specific customer requested applications, the safety valve opens at 160 psi (1,103 kPa).

**NOTE:** *Safety valve operation can be an indication of a faulty pressure sensor, a faulty compressor unloader system or a faulty safety valve.*

### 3.4. SALEM 994 SERIES AIR DRYER



#### **WARNING**

*This is a compressed air device. Compressed air is extremely dangerous if not handled carefully. Do not attempt to service, repair or break any connections or air lines without bleeding all the pressure from this device and all lines leading to or from it. Failure to do so can result in personal injury.*

The 994 series air dryer (Figure 9) uses a modular design incorporating a coalescing filter, a remote liquid drain and auto-adjust purge valve, an inlet diverter/exhaust valve, an outlet shuttle/purge check valve, a control box and twin desiccant towers. The dryer is installed in amounting bracket that is permanently attached to air piping below the locomotive platform. This arrangement allows the dryer to be easily removed for servicing without disturbing the main pipe connections.

The air dryer has an indicator that informs the maintainer about the operation of the air dryer. Blue signifies that the dryer is working correctly. Any other color such as lavender, white, yellow, or brown indicates that further dryer inspection is required. Figure 9 shows the location of the indicator on the air dryer.

Main reservoir air is further cleaned by an air filter (Salem 975-075). The air, cooled and cleaned, is now available for use by the air brake equipment.

### 3.5. ONE-WAY CHECK VALVE

**NOTE:** *Letters in parenthesis ( ) refer to items found in Figure 10 in this publication, unless otherwise noted.*

One way check valves are used in the piping system to allow for failure accommodation. In the air piping system there are two types of check valves: the flange style (Figure 8), and the in line style (Figure 9). The flange style is used at the inlets to MR2A and MR2B. An 1 inch (25.4 mm) in-line valve is used to fill the MR system from the MRP train line in the event of a compressor failure of the locomotive. Two 0.375 inch (9.525 mm) in-line valves are used to fill the MR2A and MR2B from the Brake Pipe to ensure there is air in the reservoirs for braking.

Within the one-way check valve, air enters at the inlet port, moving shuttle (A) off its seat (B) and out the outlet port (Figure 10). Reverse air flow is checked by the shuttle. Spring (C) assures the shuttle will seat regardless of the position of the valve. Approximately 0.75 psi (5.2 kPa) of air pressure at the inlet port is required to lift the shuttle off its seat.

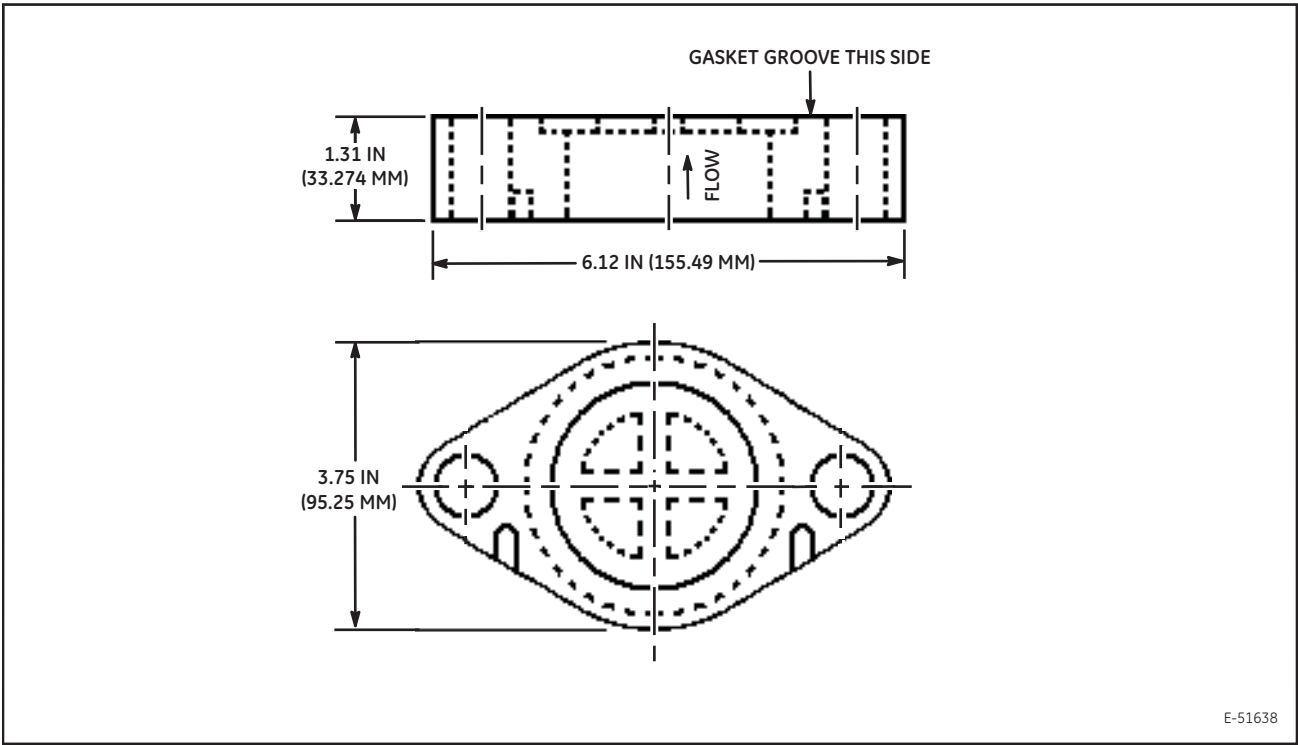


Figure 8. Typical Flange Style Check Valve.

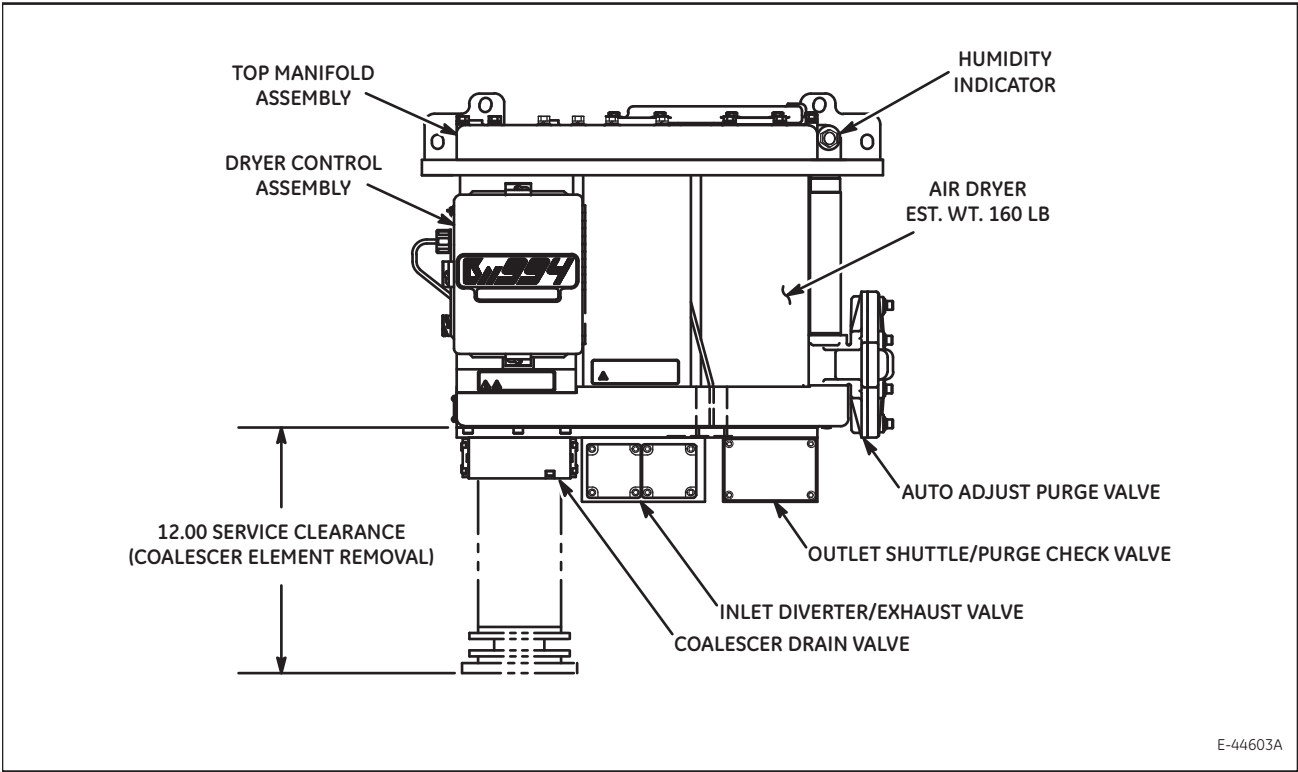


Figure 9. Salem 994 Series Air Dryer



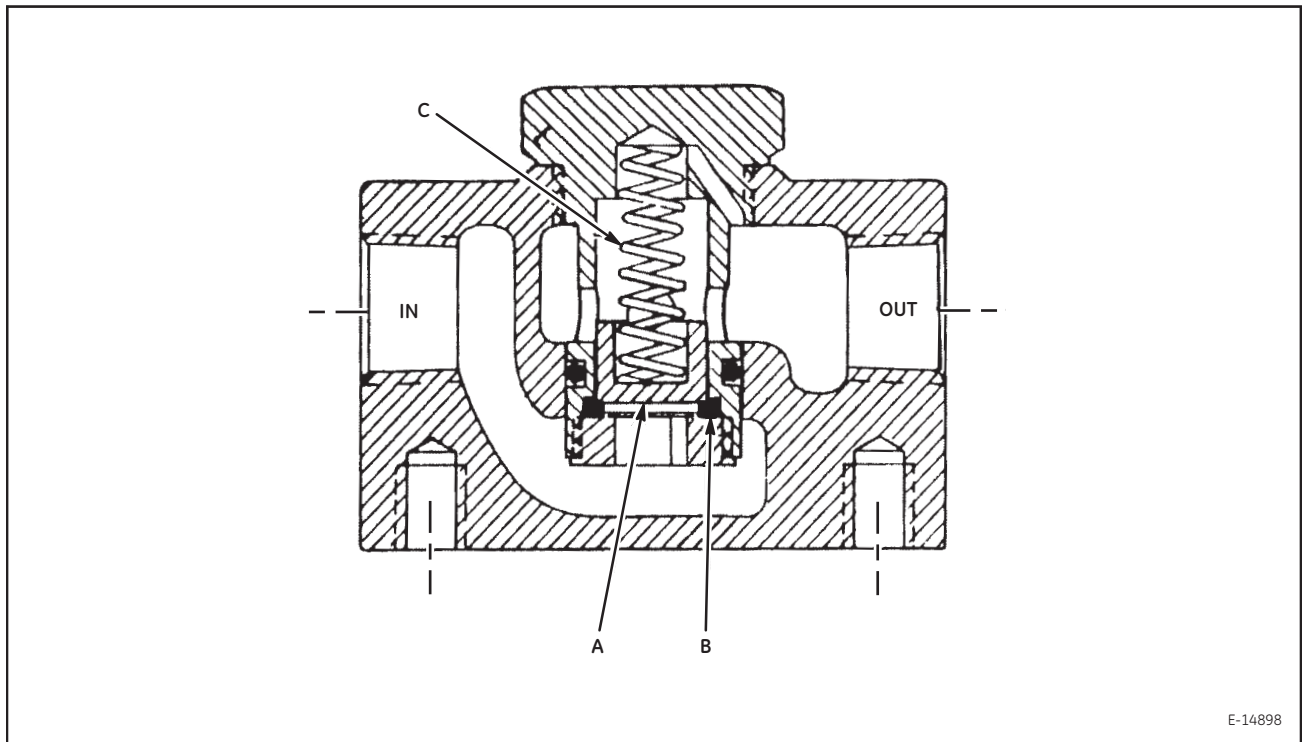


Figure 10. Cross Section View of Typical One-way Check Valve

## 4. SCHEDULED MAINTENANCE

### 4.1. AIR COMPRESSOR

Refer to the appropriate **AIR COMPRESSOR** publication for additional information concerning air compressor scheduled maintenance procedures.

#### 4.1.1. Checking Oil Level

The air compressor is equipped with an oil level sight glass (Figure 7). Add oil as indicated.

#### 4.1.2. Cooler Drain Cocks




**WARNING** *The air compressor could start at any time. Disable the compressor drive contactors by opening the Local Control circuit breaker before servicing the air compressor. Failure to do so could result in personal injury.*


Check that the after cooler petcock is opened each time the oil level is checked. The pet cock is located at the bottom of the after cooler outlet flange. This cock allows for accumulated moisture and small amounts of lubricant to be automatically exhausted during the compressor unload cycle. Close the petcock if there is a continual air leak and inspect the check valve at the earliest convenience.

The intercooler has a purge valve which will automatically exhaust accumulated water and oil each time the compressor is unloaded.

#### 4.1.3. Changing Lubricating-Oil

 **WARNING** *The air compressor could start at any time. Disable the compressor drive contactors by opening the Local Control circuit breaker before servicing the air compressor. Failure to do so could result in personal injury.*

The air compressor oil drain is located at the bottom of the compressor as shown in Figure 7 and is drained out the underside of the locomotive. When draining the oil use a receptacle of sufficient capacity to hold 16 gal (60.56 L). The locomotive drain is located in the same area as the engine water and oil drains.


 **WARNING** *Do not use gasoline or kerosene to clean the air compressor crankcase. Doing so can result in an explosion inside the device.*

When changing the oil, thoroughly clean the crankcase. Dirt and sludge, if left in the crankcase, will be picked up by the pump and, if allowed to accumulate, will eventually plug the pump suction. Lubrication will be obstructed and possible damage to moving parts will result.


Use a railroad approved solvent and clean, lint-free cloths to wipe out the crankcase.

Refill the crankcase with approved lubricating oil per GE Specification. Refer to the appropriate **AIR COMPRESSOR** publication for air compressor lubricating oil capacity.


#### 4.1.4. Changing Air Inlet Filters


 **WARNING** *The air compressor could start at any time. Disable the compressor drive contactors by opening the Local Control circuit breaker before servicing the air compressor. Failure to do so could result in personal injury.*

Proper air filtration is important to the life of the air compressor. The air inlet filters (Figure 7) should be changed at regular intervals. Refer to the appropriate **AIR COMPRESSOR** publication for inlet filter maintenance intervals. When replacing the air inlet filters, ensure the filters are properly seated and the mounting nuts are securely tightened so all air entering the compressor is filtered.

 **CAUTION** *Use only approved air filters. The use of other filters may damage the compressor or accelerate compressor wear.*

#### 4.2. ONE-WAY CHECK VALVES (SALEM 998)

 **WARNING** *This is a compressed air device. Compressed air is extremely dangerous if not handled carefully. Do not attempt to service, repair or break any connections or air lines without bleeding all the pressure from this device and all lines leading to or from it. Failure to do so can result in personal injury.*

 **CAUTION** *Do not lubricate the shuttle, only lubricate the static seal when reassembled.*

Check and clean all parts (Figure 11 and Figure 12). Complete check valve cartridge assembly can be removed for maintenance without disturbing the pipe connections.

**NOTE:** *Bleed all air pressure from piping upstream and downstream from the check valve.*

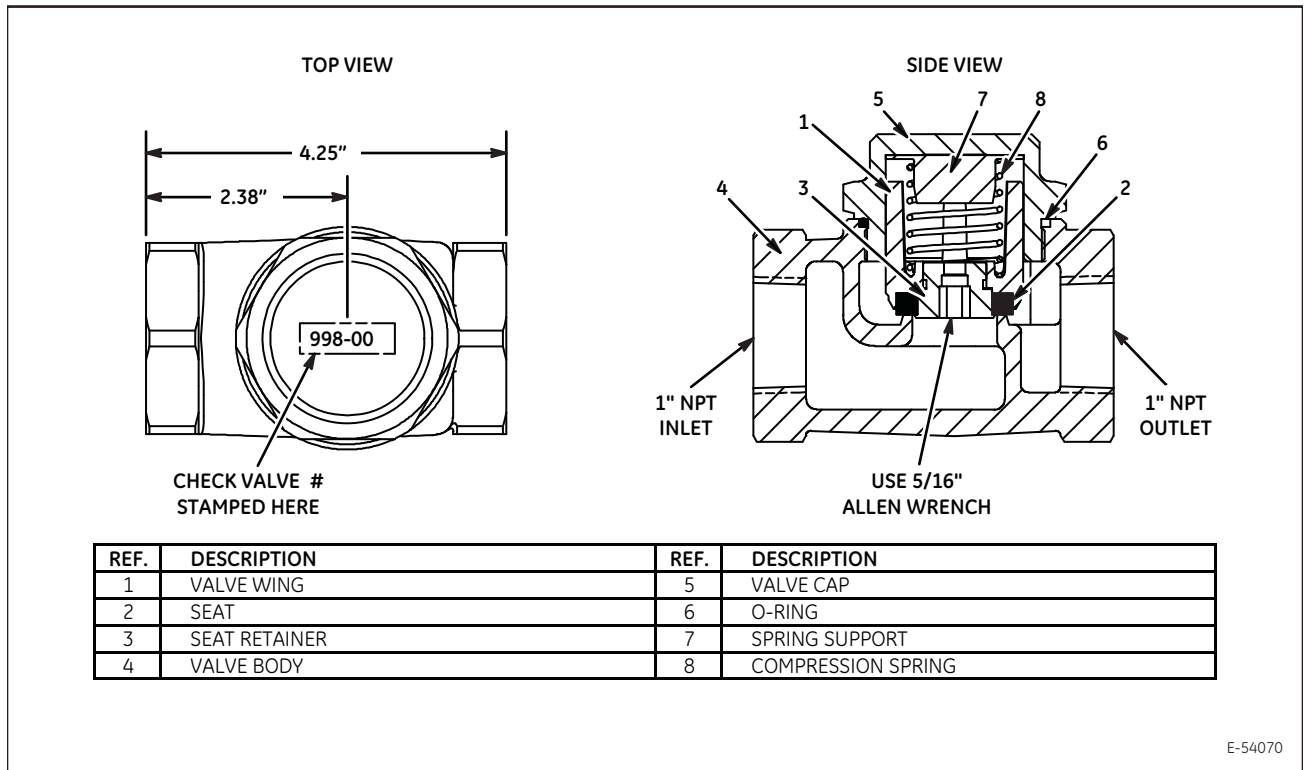


Figure 11. Cross Section of 998 Series Check Valve

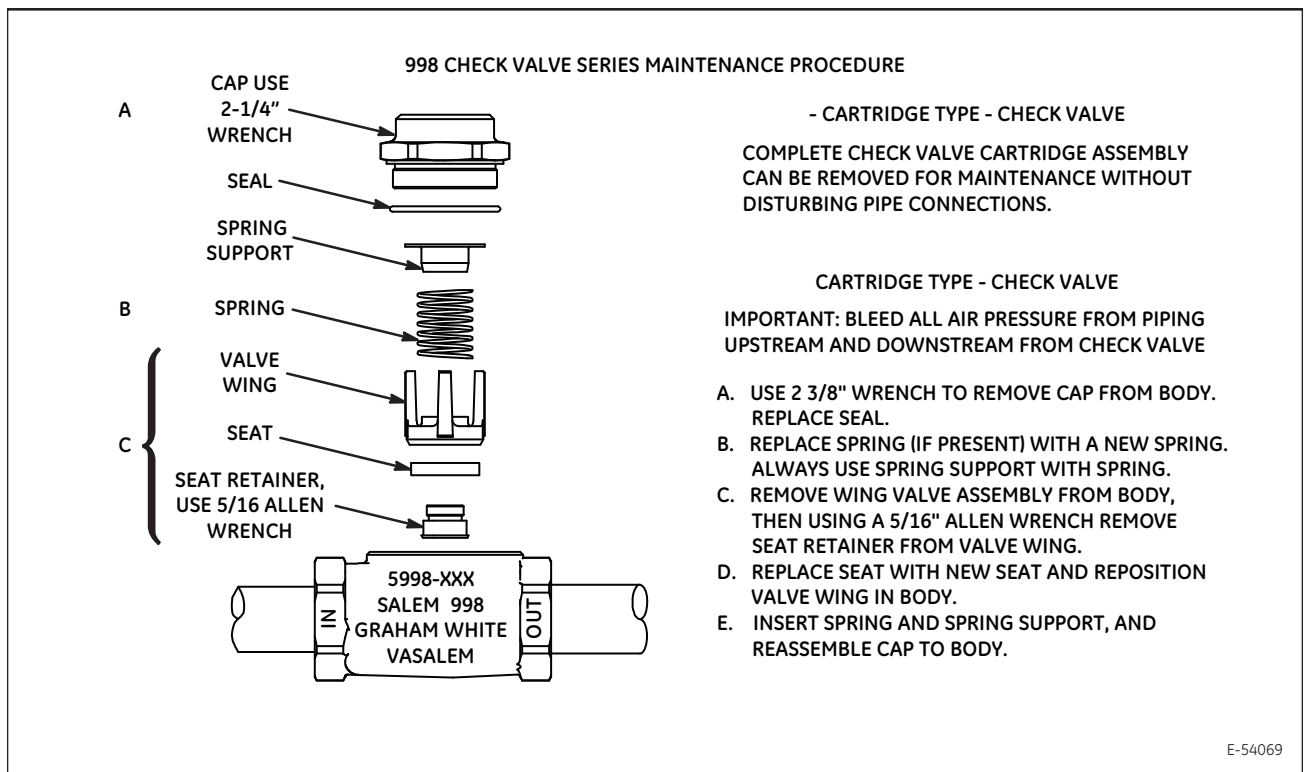





Figure 12. One-way Check Valve Cartridge Maintenance Procedure


1. Use 2 3/8" wrench to remove the cap from the body, then replace the seal.
2. Replace spring (if present) with a new spring. Always use a spring support.
3. Remove the wing valve assembly from the body.
4. Using a 5/16" Allen wrench remove the seat retainer from the valve wing.
5. Replace the seat with a new seat and reposition the valve wing in the body.
6. Insert the spring and the spring support, then reassemble the cap to the body.

## 5. REMOVAL AND REPLACEMENT


 **WARNING** *A lifting and support mechanism capable of safely handling 3000 pounds (1360.8 kilograms) is to be used during compressor removal.*

 **WARNING** *Allow the compressor to cool to ambient temperature to minimize the risk of personal injury.*

 **WARNING** *Make certain that all air pressure has been vented from the compressor intercooler and all associated piping prior to continuing.*

 **WARNING** *Before attempting to remove the compressor from the locomotive, perform the follows tasks:*

- *Apply locomotive handbrake and/or parking brake.*
- *All power to the compressor is to be cut off.*
- *Wheel shocks are to be applied to the wheels to prevent vehicle movement.*

 **WARNING** *Placecards are to be place on and about the vehicle indicating that work is to be performed.*

### 5.1. REMOVING AIR COMPRESSOR FROM THE LOCOMOTIVE

1. Drain the oil from the compressor crank case and remote reservoir. Drain is located between the #2 truck and sand box "A" side (Figure 13).
2. Remove the access doors from the car body by removal of the door hinge pins, store access doors in a location safe from damage. Place hinge pins back in car body hinge half to prevent loss (Figure 14).
3. Remove the filter assemblies from the low pressure heads (Figure 15).
4. Remove APU cooling line (Figure 15) from fuel filter housing, (Figure 16) and place to the side way from the front of compressor.

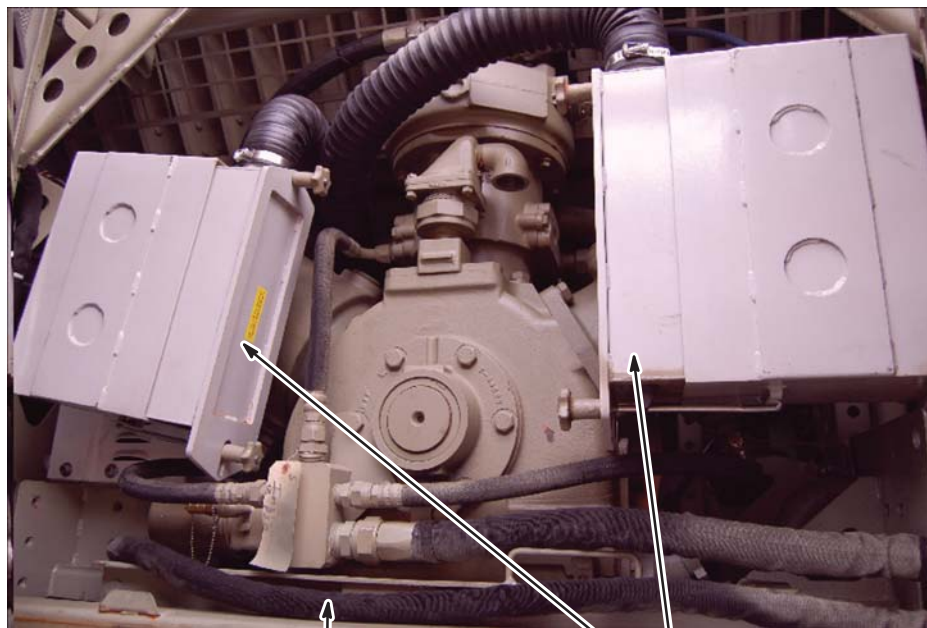


Figure 13. Air Compressor Oil Drain



Figure 14. Air Compressor and Fuel Filter Access Doors





COOLING LINE

AIR FILTER HOUSING

E-55352

Figure 15. Air Filter Housing



FUEL FILTERS

APU COOLING LINE

E-55353

Figure 16. Fuel Filter Housing

5. Disconnect the electrical wiring to the drive motor, mark location of connectors (Figure 17). Pull the wiring from the junction box.

**NOTE: Always mark connects to corresponding terminal for re-assembly.**

6. Remove, and mark location of oil cooling lines from the compressor crank case housing (Figure 18).
7. Disconnect un-loader air feed line from low pressure head, and cooling line from High Pressure head (Figure 19).
8. Dis-connect main discharge pipe (Figure 20), located on back side of High Pressure head.
9. Remove the mounting bolts from the mount feet (4 places), (Figure 21).

**NOTE: The lube oil spin filter must be removed to access mounting bolt, (Figure 21).**

**NOTE: If using an overhead crane, the air compressor needs to be slid out of car body before lifting.**

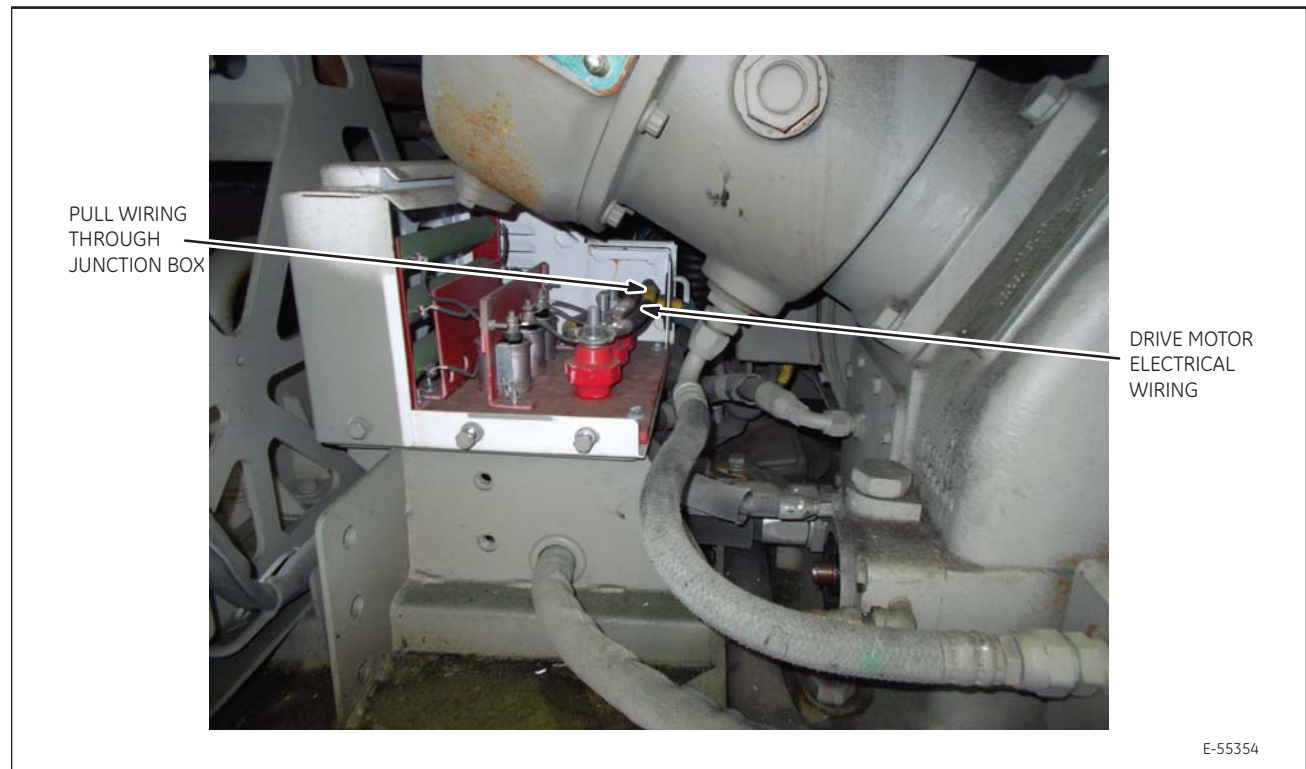
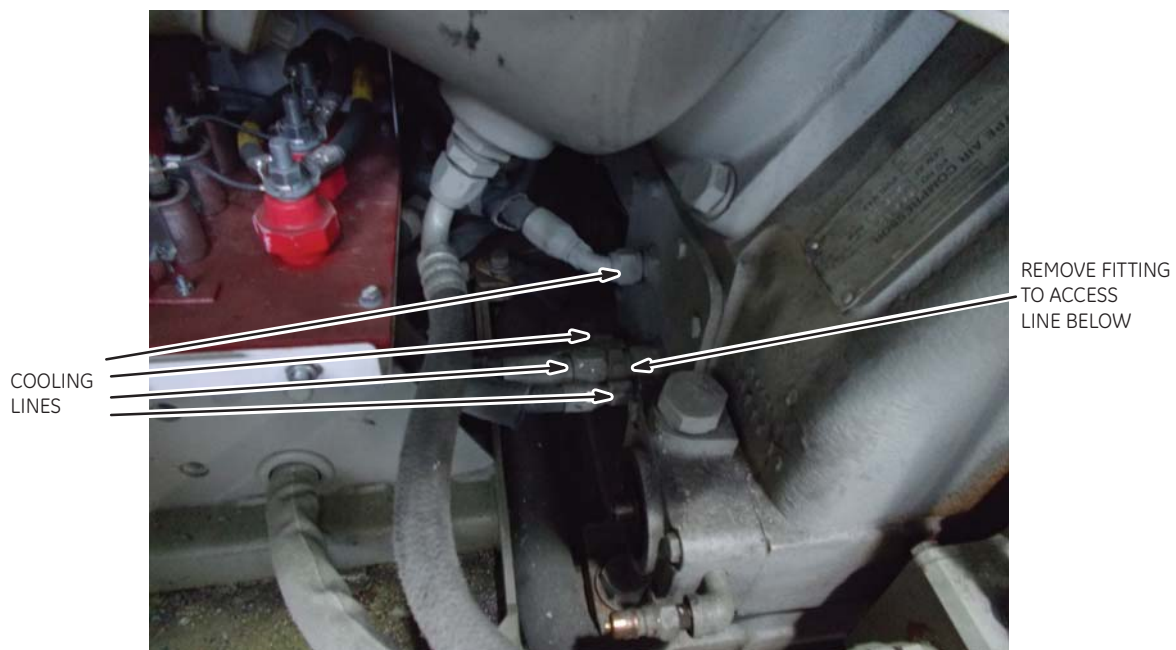
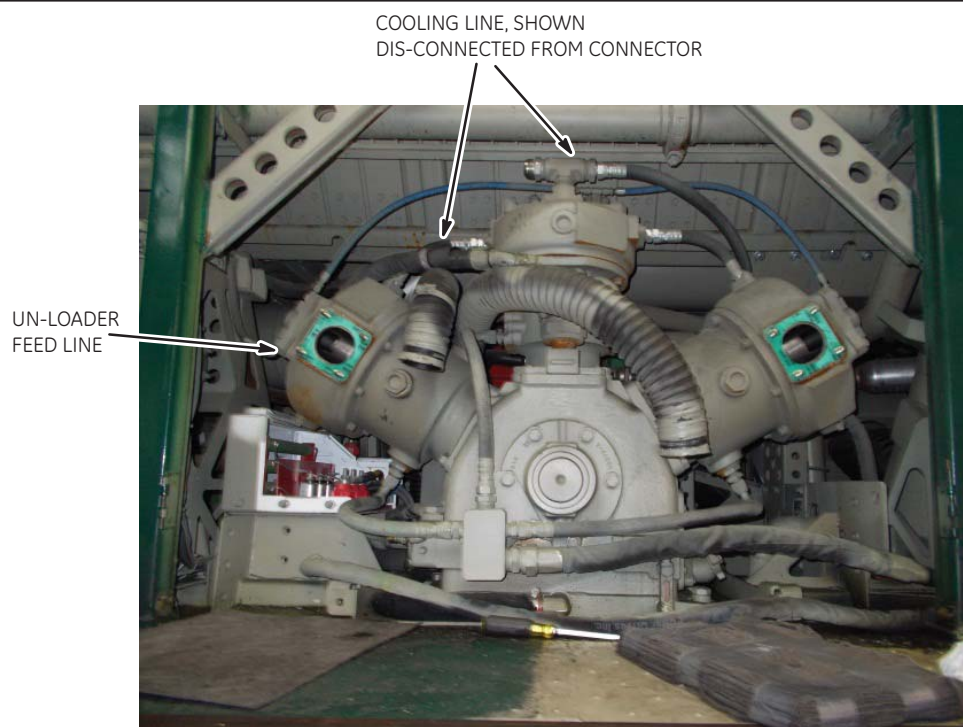


Figure 17. Junction Box and Drive Motor



E-55355

Figure 18. Oil Cooling Lines



E-55356

Figure 19. Un-loader Feed and Cooling Lines





Figure 20. Main Discharge Pipe

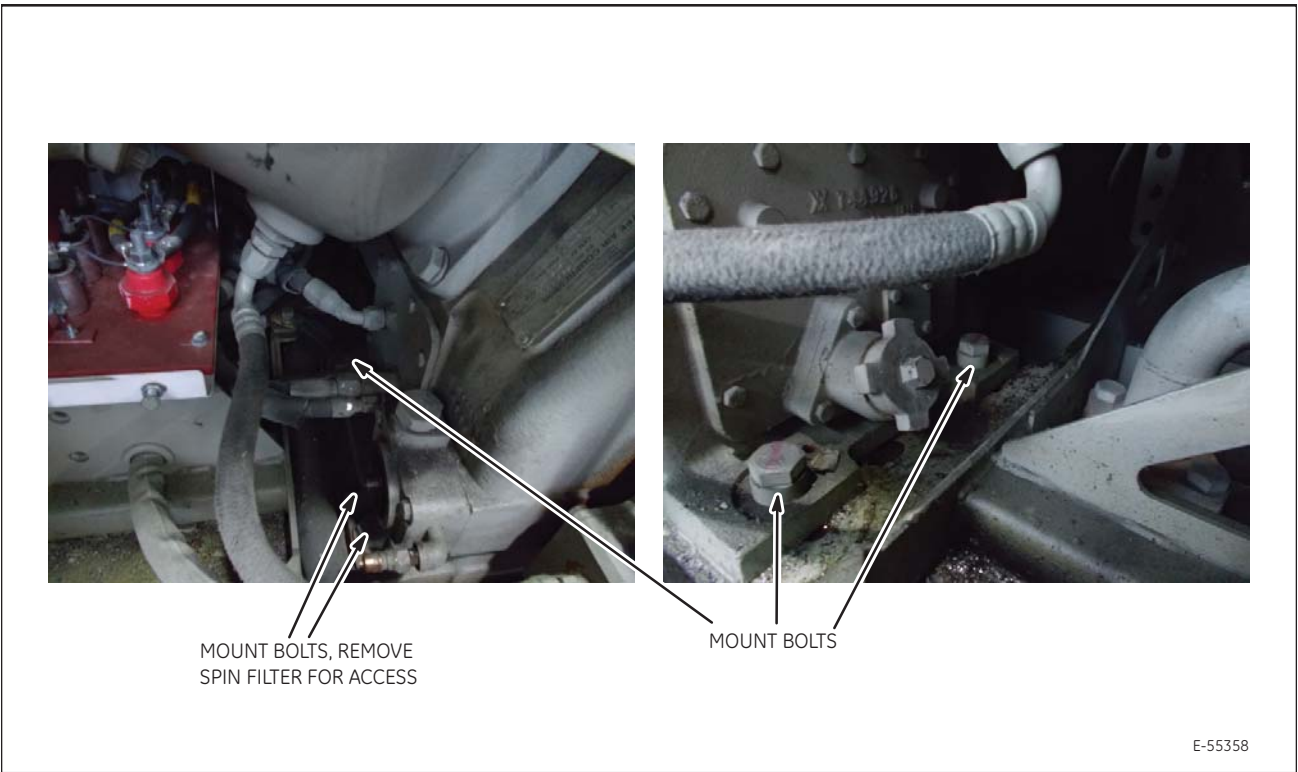


Figure 21. Mounting Bolts

10. Position a fork lift or equivalent lifting device alongside the platform (Figure 22).
11. Attach a come along to a solid anchor point and a lifting strap to the high pressure head (Figure 22).
12. Gently begin sliding compressor out of car body (Figure 22).

**NOTE:** *There is a step on the drive motor housing, compressor need to tilt slightly outward in order to clear the platform (Figure 23).*

13. Transport the removed compressor to the shop area for maintenance. The transporting mechanism must be able to support 3000 pounds (1360.8 kilograms).

## 5.2. AIR COMPRESSOR INSTALLATION PROCEDURES

1. Air compressor installation is the reverse of the removal procedure.

**NOTE:** *Before tightening the mounting bolts align the main discharge pipe with the High Pressure head fitting (Figure 20).*

2. Torque the mounting bolts to the proper specifications.

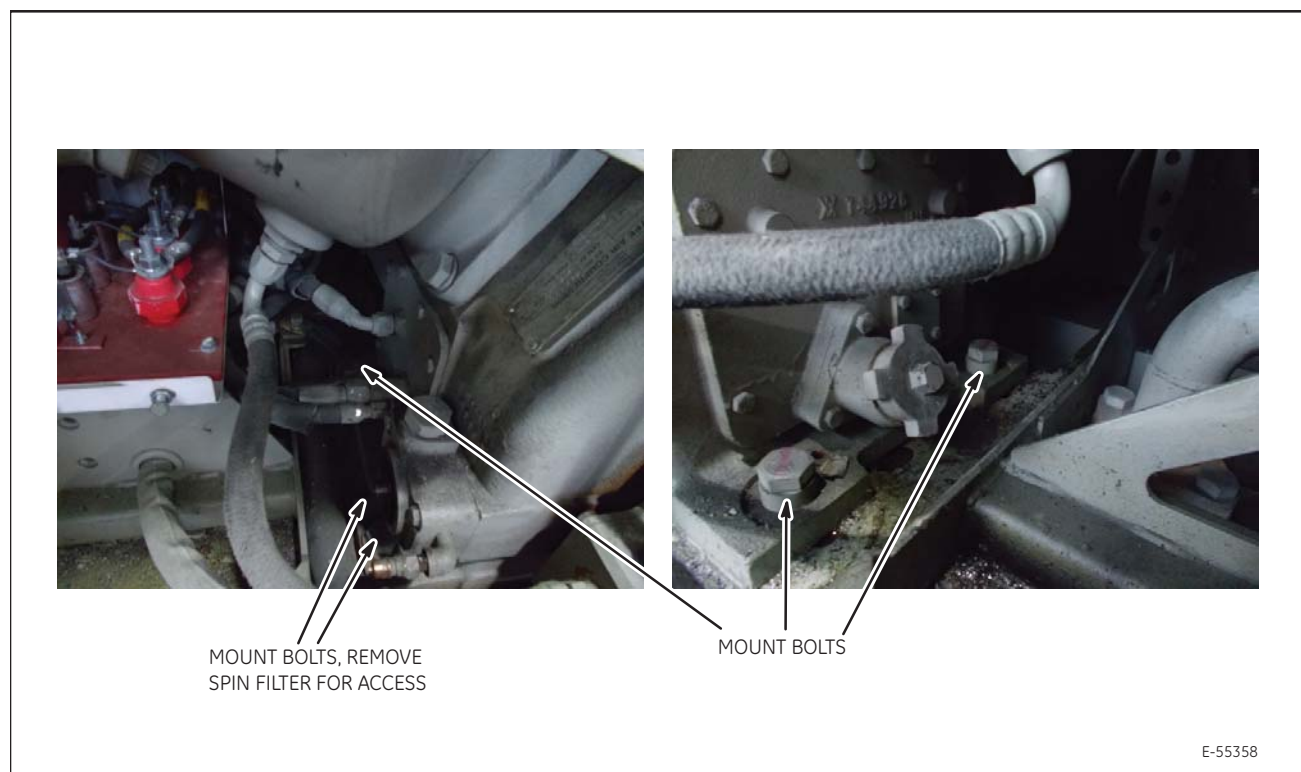


Figure 22. Compressor in Car Body



E-55359

Figure 23. Drive Motor Step

Table 1. Mounting Bolt Specifications

| Bolt Size | Grade 5            | Grade 8 Alloy      |
|-----------|--------------------|--------------------|
| 1/4 - 20  | 7 ± 1 ft.-lbs.     | 11 ± 1 ft.-lbs.    |
| 5/16 - 18 | 13 ± 1 ft.-lbs.    | 20 ± 1 ft.-lbs.    |
| 3/8 - 16  | 23 ± 1 ft.-lbs.    | 36 ± 2 ft.-lbs.    |
| 7/16 - 14 | 36 ± 2 ft.-lbs.    | 53 ± 3 ft.-lbs.    |
| 1/2 - 13  | 58 ± 2 ft.-lbs.    | 88 ± 5 ft.-lbs.    |
| 9/16 - 12 | 77 ± 4 ft.-lbs.    | 117 ± 6 ft.-lbs.   |
| 5/8 - 11  | 117 ± 6 ft.-lbs.   | 175 ± 10 ft.-lbs.  |
| 3/4 - 10  | 208 ± 10 ft.-lbs.  | 312 ± 16 ft.-lbs.  |
| 7/8 - 9   | 320 ± 16 ft.-lbs.  | 465 ± 25 ft.-lbs.  |
| 1 - 8     | 503 ± 26 ft.-lbs.  | 755 ± 40 ft.-lbs.  |
| 1 1/8 - 7 | 659 ± 35 ft.-lbs.  | 988 ± 52 ft.-lbs.  |
| 1 1/4 - 7 | 1007 ± 53 ft.-lbs. | 1510 ± 80 ft.-lbs. |

**NOTE:** Refer to GEK-114620 for oil fill procedures; make sure oil drain pipe is cut-out before filling.

## 6. SUMMARY DATA

Not applicable.

