MAINTENANCE INSTRUCTION

SELF CENTERING REVERSER 3-MOTOR 8219399; 2-MOTOR 8204340; 4-MOTOR 8200041

DESCRIPTION

The reverser is a heavy duty pneumatic-electric switching device designed to conduct the main generator output to the traction motor fields. It functions to change the direction of current flow through the traction motor fields for either forward (FOR) or reverse (REV) position, or to open the circuit to the fields in the centered position (OFF), Fig. 1.

The centering, or open circuit position is used as a protective feature to prevent any regenerative effect between the traction motors while the locomotive is being towed by another source of power. In this position the movable drum segment contacts are separated from the stationary contacts. No current will flow to the traction motor fields, and the locomotive cannot be moved under its own power.

With adequate control air pressure available (90 p.s.i.) and the control circuits energized, movement of the reverser control lever in the cab will cause the reverser drum to assume a position corresponding to that of the lever, thereby establishing directional movement of the locomotive, or disconnecting the traction motors fields from the power source in the OFF (centered) position. An air engine consisting of two cylinders placed at 180° to each other and having a free piston in each cylinder is mounted on the top of the reverser, Fig. 2. A rack and gear assembly between the cylinders is actuated by the movement of the pistons when air pressure is applied. The air engine furnishes the power to move the movable contact segments from one position to another. Magnet valves are mounted on the air engine portion of the reverser and are energized by 74 volt control circuits, Fig. 3.

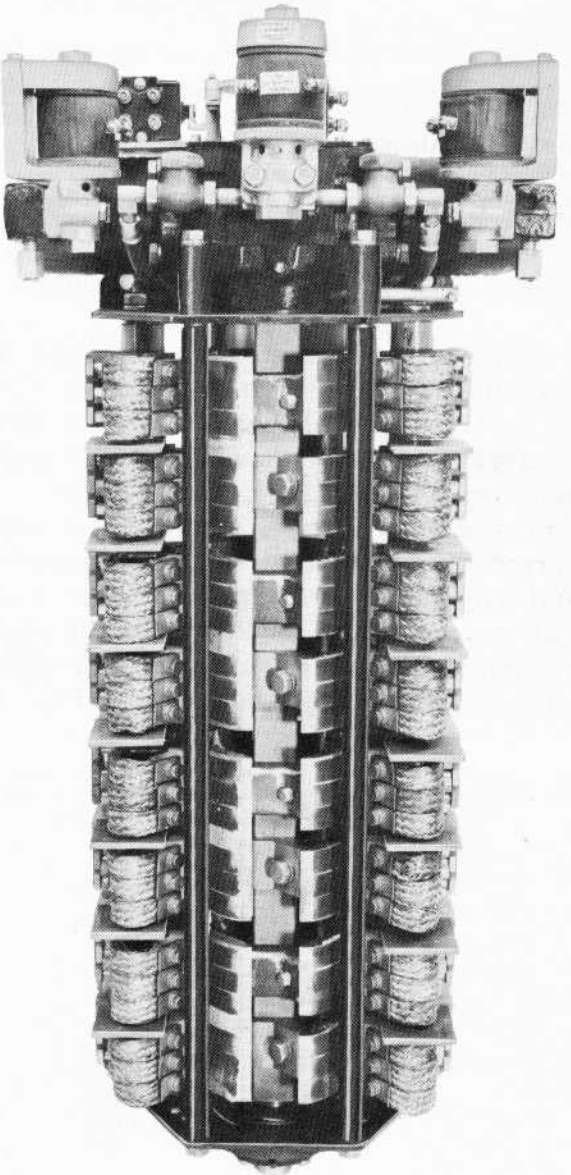
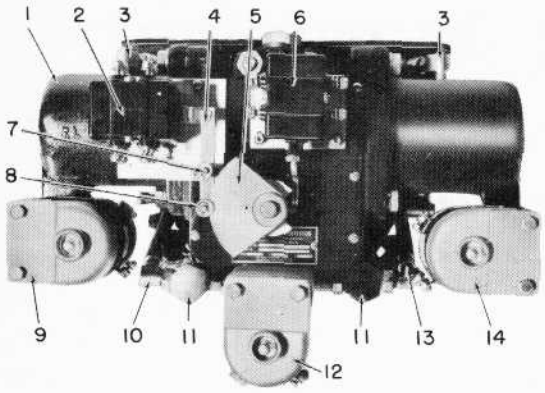


Fig. 1 - Reverser (4-Motor) In Centered Position



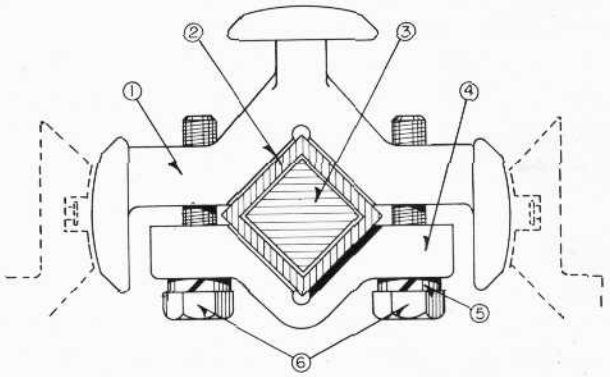
1. Reverse Air Cylinder
2. Aux. Interlocks
3. Elbow – Airline
4. Operating Lever
5. Cam Plate
6. Reverser Interlocks
7. Fulcrum Pin
8. Cam Roller
9. Reverse Magnet Valve
10. Air Hose
11. Check Valve
12. Centering Valve
13. Elbow – Airline
14. Forward Magnet Valve

Fig. 2 - Top View Of Air Engine

Movable contacts are mounted on a shaft and are insulated from the shaft by an insulating sleeve, formed to fit a squared section of the shaft. The movable contacts, Fig. 4, are clamped to this insulating sleeve. The shaft is supported by double row, grease lubricated self-aligning ball bearings at each end. The gear segment is keyed to the shaft extension above the top bearing, which meshes with the rack shaft, Fig. 5.

The stationary contacts are clamped to insulated support bars which extend through the top and bottom end plates of the reverser assembly. Each stationary contact assembly consists of three contacts with individual flexible shunts, each of which is bolted to a common support. The supports are furnished with cap screws for connection to the power cables.

The stationary contact assemblies are clamped to insulating sleeves applied to the support bars and are insulated from each other with barriers



1. Movable Contact Segment
2. Shaft Insulation
3. Square Shaft
4. Clamp
5. Lockwasher 1/2"
6. Clamping Bolts 1/2"-13 × 2"

Fig. 4 - Movable Contact Drum Assembly

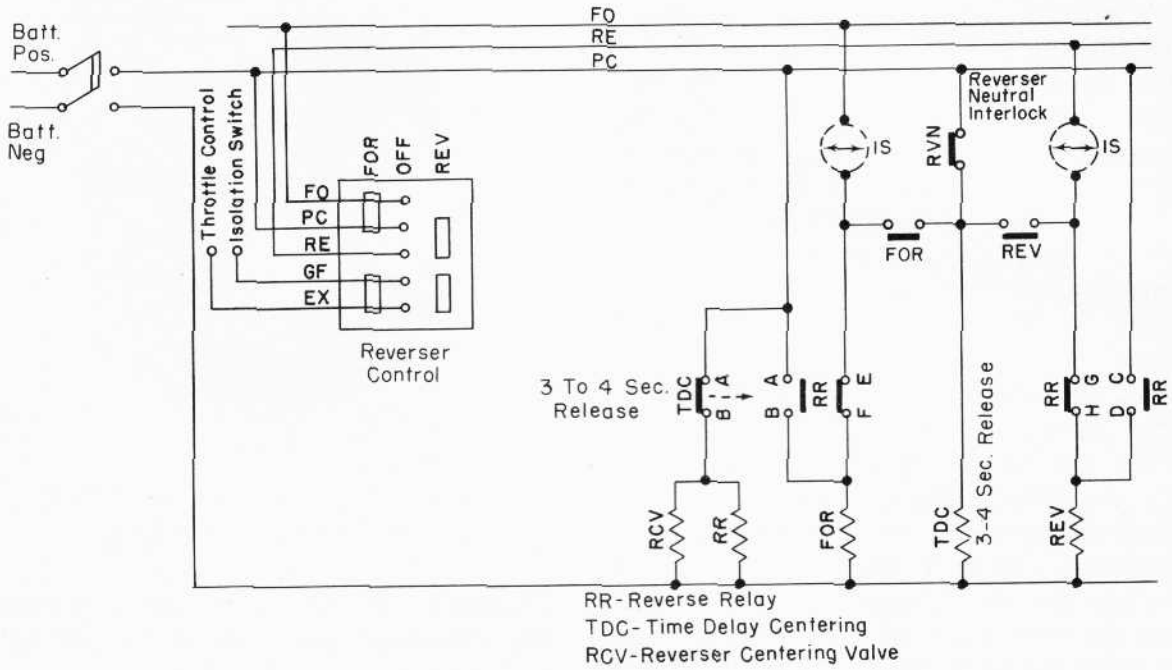


Fig. 3 - Schematic Of Electrical Controls

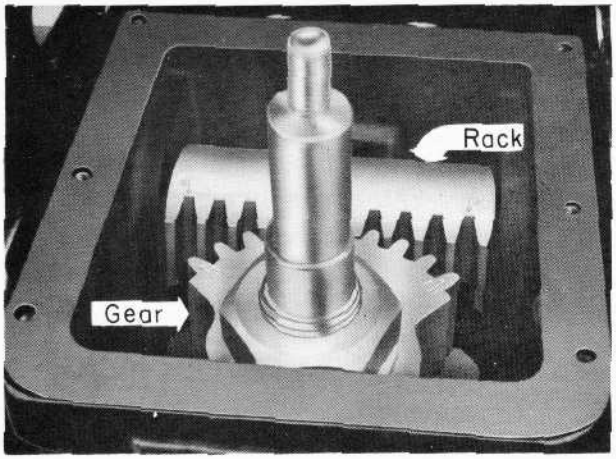


Fig. 5 - Rack And Gear Assembly

of insulating material placed between them, Fig. 6

Control circuit interlocking switching devices are mounted on the top of the rack and gear housing. Their movable contacts are actuated by mechanical means consisting of cam plates attached to the segment shaft, and connecting shafts, or levers, Fig. 2.

OPERATION

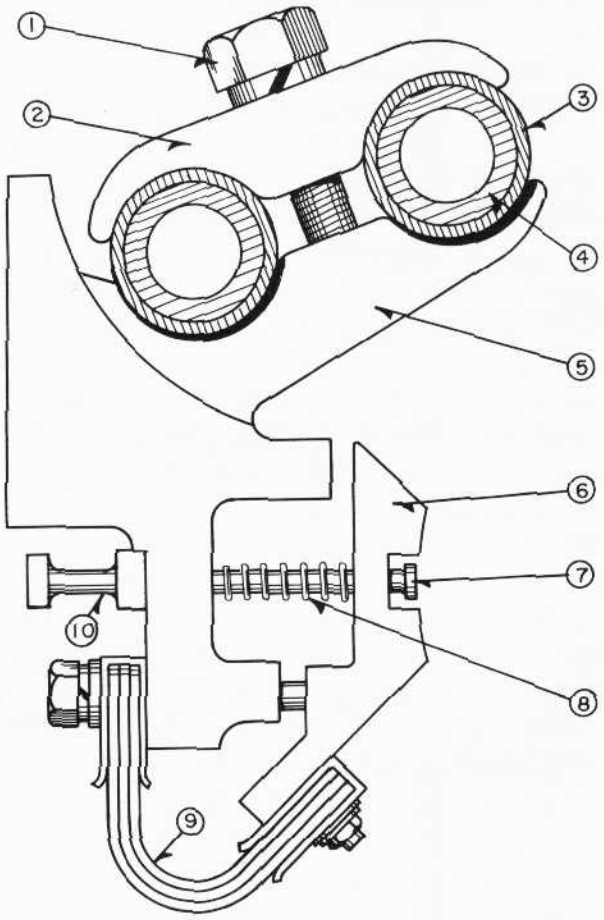
The magnet valves are energized by control circuits which are established by the position of the reverser control lever; forward, reverse, or off. When energized, the magnet valve operates to admit compressed air into the cylinder to which it is attached. The piston is forced inward toward the gear housing, moving the rack shaft with it, and at the same time, moving the opposing piston outward toward the end of the cylinder. The rack shaft is meshed with the gear segment, causing it to turn the contact segment shaft. The main stationary contacts are then in contact with the segments for that particular position, Fig. 7.

When the opposite magnet valve is energized, the piston moves the rack shaft to the other extreme and the segment shaft is rotated to the opposite position.

In order to center the reverser, a centering magnet valve RCV is energized simultaneously with the FOR and REV valves.

The reversing centering control system functions as follows:

1. When the reverser lever is moved from either forward or reverse to neutral the corresponding magnet valve (FOR or REV) is de-energized. (See Fig. 3.)
2. TDC Relay is de-energized.
3. After 3-4 second delay (time interval setting of TDC) the A-B interlock of of TDC closes. This energizes the RCV Magnet Valve and the RR relay coil.



1. Clamping Bolt
2. Contact Support Clamp
3. Insulating Tube
4. Stationary Support Bar
5. Contact Support Assembly
6. Contact Finger
7. Contact Finger Guide Screw
8. Compression Spring
9. Flexible Shunt
10. Special Adjusting Screw

Fig. 6 - Stationary Contact Assembly

4. RCR magnet valve opens to exhaust air pressure on cylinder having piston toward center of air assembly. RR relay picks up. A-B and C-D interlocks of RR relay close completing circuits to FOR and REV magnet coils causing valves to open.

5. Opening of the FOR and REV valves allows air flow to the pistons of both piston chambers. The air pressure builds up in cylinder chamber where piston is at outer end cylinder assembly. Air pressure can not build up in other cylinder assembly as this

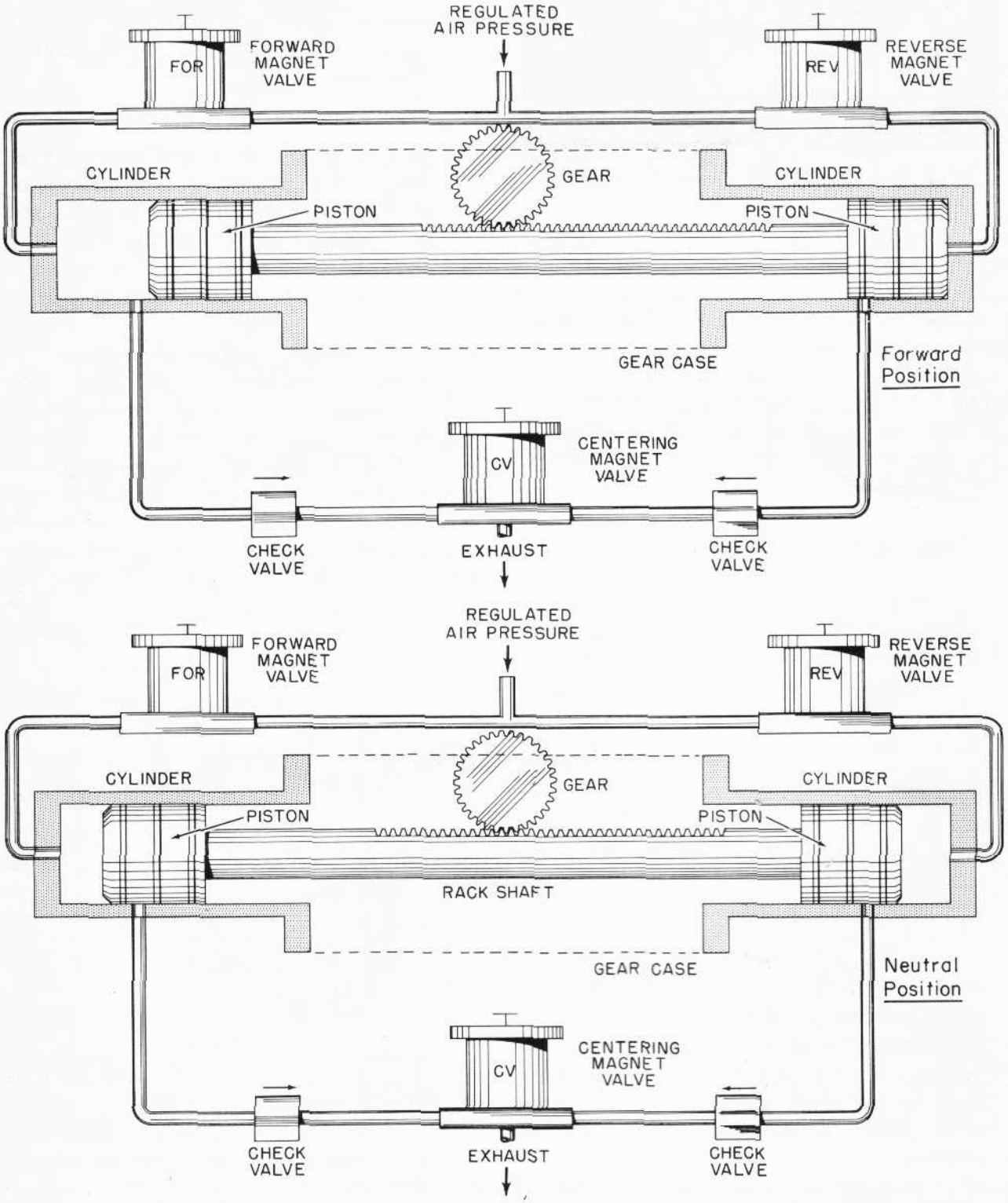


Fig. 7 - Schematic Air Piping

cylinder is being exhausted to atmosphere through the RCV magnet valve.

6. The air pressure building up in the one cylinder causes the piston to move the reverser assembly toward neutral. Before reaching the neutral position the cylinder assembly being vented through the open cylinder port is closed by the outward moving piston.

7. When the reverser reaches neutral position the RVN interlock closes completing a circuit to TDC.

8. TDC relay picks up opening A-B interlock of TDC instantaneously.

9. Opening of A-B interlock of TDC relay de-energizes RCV magnet valve and RR relay.

10. De-energizing RR relay causes A-B and C-D interlocks to open. These interlocks open, de-energizing FOR and REV magnet valves thus shutting off air supply to both cylinders leaving reverser in the neutral position. When the reversing lever is moved from forward to reverse position or from reverse to forward the reverser will follow without any delay in the direction to which reversing lever was moved.

MAINTENANCE

Blow any accumulated dirt and dust from the assembly with compressed air at intervals necessary to keep the equipment clean. Wipe the movable contact segments and stationary fingers clean and apply a small amount of lubriplate 8196886. Examine the flexible shunts and if more than 20% of the strands are broken, replace with a new shunt. Check all power cable connections and maintain them in a tight condition to prevent overheating. The stationary contacts are silver plated to increase electrical conductivity between them and the flexible shunts. This plating may wear away from the contacting surface, but this does not effect the efficiency of the part. To compensate for wear on the contact surfaces and maintain the specified contact pressure (14 to 17 pounds), special square head adjusting screws are provided in each stationary finger, Fig. 8.

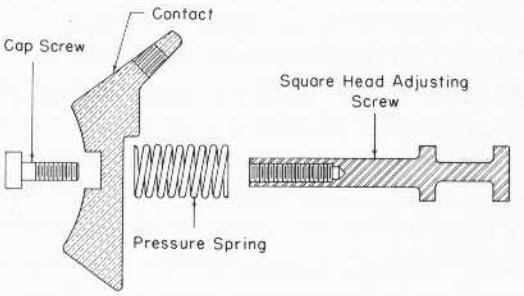


Fig. 8 - Contact Pressure Adjustment

Reverser contact pressure must be maintained without interference from the square head adjusting screw. Check at annual locomotive inspections in both FOR and REV full engagement positions and adjust if necessary to maintain 1/16" ± 1/64" lift. If this is not done, possible destruction of the contact surface may result.

Burrs or deep scratches on the segment or finger contact surfaces may be removed with a fine file and dressed with fine sandpaper. Always maintain the original contour of the piece.

Do not exceed the wear limits as established in the Maintenance Data Section of this bulletin. Should it become necessary to replace any of the stationary contact fingers, it is advisable to dismount the assembly support base (three fingers and flexible shunts) from the insulated supporting rods.

Disconnect the power cables from the support assembly, remove the clamp across the two supporting members at the back of the reverser, and move the assembly to a more convenient location for the re-work. However, in order to compensate for wear, it is only necessary to pull out the square adjusting screw far enough to clear the flat shoulder on the support base, and turn the screw

counter-clockwise a sufficient amount to restore the required lift, Fig. 8.

This procedure has the effect of extending the head of the 1/4" special stud and increasing the clearance between the head and the contact finger, Fig. 6.

The air engine should be disassembled at intervals as recommended in the Scheduled Maintenance Program M.I. 1704. Open the main battery switch and shut off control-air to electrical cabinet. Disconnect the control wiring from the magnet valves and remove the air lines. The magnet valves should be overhauled at this time. Examine the gaskets between the magnet valve mounting face and casting. Replace them if dry or otherwise defective. Dismount the air cylinders from the gear case, Fig. 9, using care that the free pistons do not slide out of the cylinders and become damaged. These free pistons have no rings and are machined to a sliding fit. Any rough handling may damage them to the extent that they must be replaced. Wipe the cylinder walls and pistons clean with a cloth. Fuel oil or a recommended solvent may be used as a cleaning agent. Wipe dry with a clean cloth and apply air engine grease 8196884, or equal. The grooves around the pistons should be filled with grease to furnish lubrication and also to act as a seal.

Examine the leather buffer washer on the piston face and replace if damaged. The neoprene seal rings placed in the recessed portion of the gear case should not be flattened or otherwise damaged. Replace with new rings if necessary before re-assembly. Examine the rack and gear assembly for any defect which may cause operational failure and repair or replace the defective part. Apply additional grease to gear case to assure proper lubrication during operation. Remove the 1/4" pipe plugs from top and bottom bearing housings and replace with pin type grease fittings. Supply a small amount of 8196884 grease to the bearings and replace the grease fittings with the pipe plugs. Reassemble the air engine and check operation before releasing for service. Check all electrical terminals for tight contact and replace any flexible shunts which have 20% or more of the strands broken.

Worn or damaged movable contacts may be replaced individually without dismantling the reverser. The segments should be replaced in pairs to give uniform lift to the mating contact fingers. When the drum segments have reached the maximum wear limits as specified in the Maintenance Data Section, unfinished segments may be obtained (Refer to Parts Catalog) and applied to the shaft. They must then be turned in a lathe and finished to proper dimensions. Finished segments are also available which may be applied individually without the necessity of disassembly of the reverser and the finishing procedure involved.

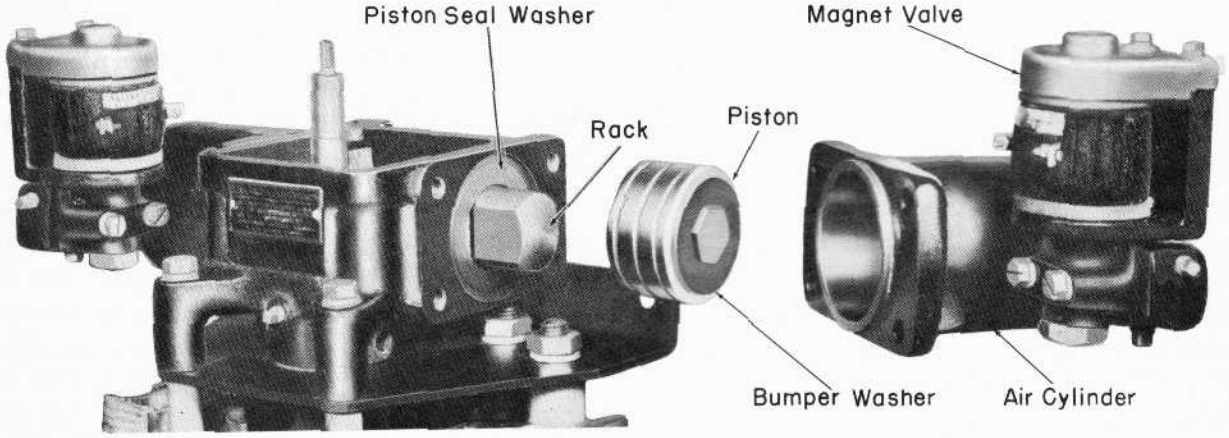


Fig. 9 - Exploded View Of Air Engine

MAINTENANCE DATA

Main Contact	
Pressure	14 to 17 pounds
Wear Limits	3/32"
Contact Lift	1/16" ± 1/64"
Lubricant	8196884
Contact Segments (Drum)	
Wear Limits	1/16"
Diameter	5-3/8" Minimum
Lubricant	8196884
Piston Wear Limits	* .005" Maximum
Cylinder Wear Limits	* .005" Maximum
Lubricant	8196884
Bearings	
Lubricant	8196884
Capacity of Lubricant	1 Ounce Approx.
Gear Box	
Lubricant	8196884
Capacity - Total	1/2 Pound Approx.
High Potential Test (Annual)	
Main Contacts to Frame	7400 V. RMS - 60 C. - 1 Min.
Main to Main Contacts	2400 V. RMS - 60 C. - 1 Min.
Auxiliary Contact to Frame	600 V. RMS - 60 C. - 1 Min.
Auxiliary Contact - Set to Set	600 V. RMS - 60 C. - 1 Min.

*These wear limits are not additive.