



## SCHEDULED MAINTENANCE PROGRAM BLOWER-TYPE GP & SD MODEL LOCOMOTIVES (645 ENGINES)

### INTRODUCTION

This Maintenance Instruction provides average recommendations which should ensure satisfactory locomotive operation and economical maintenance cost where average load factors and average climatic conditions are encountered. It is intended to serve as a guide when establishing maintenance schedules that will meet the particular requirements of individual operations, and planned economic life of the locomotive.

These recommendations are based on the following conditions:

1. Fuel oil used will meet the specifications of Maintenance Instruction 1750.
2. Lubricating oil used will meet the specifications of the applicable Maintenance Instructions, and will be changed at the intervals specified in this M.I.
3. Engine coolant used will meet the specifications in Maintenance Instruction 1748.

4. Lubricating oil filters will be of a quality equal to original equipment and will be changed at the intervals specified in this M.I.
5. Procedures listed in M.I. 1705 or 1707 will be followed for new locomotives and newly installed replacement assemblies.

### INSTRUCTION REFERENCES

Abbreviations are used in this instruction to reference publications that contain information related to maintenance. The following examples are provided to aid in understanding the abbreviations used.

LSM	means Locomotive Service Manual
EMM	means Engine Maintenance Manual
M.I.	means Maintenance Instruction

\*This bulletin is revised and supersedes previous issues of this number.

**ONE WEEK OR 3500 MILES**

**LUBE OIL FILTERS**

Check lube oil filter tank pressure.

LSM. Checks can be made weekly or oftener at fueling or turnaround points. Replace filter elements if tank pressure so indicates.

**FUEL FILTER**

Check pressure differential at rack mounted filter gauge.

LSM. Same note as immediately above. Use only pleated cotton-paper element.

**TRACTION MOTOR SUPPORT BEARINGS**

Check lubricant level.

Fill to overflow. M.I. 1756.

**TRACTION MOTOR GEAR CASE**

Maintain lubricant at sufficient level to provide full gear tooth dip into grease.

M.I. 1756

**AUTOMATIC COOLING SYSTEM DRAIN  
(If Equipped)**

Check drain valve operation.

M.I. 582

**ONE MONTH OR 15,000 MILES**

**LUBE OIL**

Take sample for analysis.

The services of a competent laboratory may help to monitor the suitability of the oil for continued use.

**ENGINE PROTECTOR**

Check operation.

EMM, LSM, M.I. 259 or M.I. 260

**GENERATOR PIT DRAIN ASPIRATOR**

Inspect and clean, if needed.

LSM

**AIR BOX DRAINS**

Check operation and clean, if necessary.

EMM

**BATTERY**

Check electrolyte level.

Check specific gravity.

Wash out battery boxes.

**MAIN GENERATOR**

Inspect diode fuses, replace diodes and fuses as required (Where Used).

M.I. 3317-2. Whenever generator air box panels are removed, clean the inspection windows, and inspect collector rings and brushes.

**ONE MONTH OR 15,000 MILES (CONT'D)****ENGINE AIR FILTER-PANEL TYPE  
OIL BATH (Where Used)**

Check oil level. LSM

**ENGINE AIR FILTER-CYCOIL TYPE  
(Where Used)**

Check oil level. LSM

**ENGINE AIR FILTER-PAPER OR  
FIBERGLASS TYPE (Where Used)**

Check indicator. If tripped, take manometer readings, and replace elements if necessary. LSM

**ANNUNCIATOR MODULE (Where Used)**

*Monitor annunciator and record lighted indicators.* LSM

*Perform checks or maintenance indicated by lights.*

*Set annunciator switch to test position and observe that all annunciator lamps are lighted.*

*Set annunciator switch to reset position.*

**JOURNAL BOX**

Maintain lubricant to fill plug level. M.I. 1756, M.I. 1552

**TWO MONTHS OR 30,000 MILES****LUBE OIL FILTER**

Change filter elements. LSM

Clean lube oil strainer. EMM. Fill strainer housing with oil before starting engine.

**THREE MONTHS OR 45,000 MILES****FUEL FILTERS**

Clean or replace suction strainer element. LSM

Change engine mounted filter elements. EMM. Use only elements equal to original equipment.

Change rack mounted primary filter. LSM. Use only pleated cotton-paper element.

**THREE MONTHS OR 45,000 MILES (CONT'D)****COOLING SYSTEM**

- Check inhibitor concentration. M.I. 1748
- Check for proper automatic cooling system drain operation (If Equipped).

**FUEL TANK**

- Drain condensate. LSM. More frequently during periods of high humidity or rapid temperature change.

**TRACTION MOTORS**

- Replace brushes (in sets only). M.I. 3900. Depending upon type of service and operating conditions, brush life will range from 3 to 6 months.
- Clean creepage areas and blow out with clean dry air.
- Visually inspect support bearing wick lubricators for dirt plugging of the wick and for excessive wear. Clean and replace as necessary.

**INERTIAL FILTER BLOWER MOTOR**

- Check operation. M.I. 3614

**ELECTRICAL CABINET PRESSURE TAPS**

- Check hoses and taps for leaks or obstructions.

**ENGINE AIR FILTERS-CYCOIL**

- Change oil. Drain and fill only. LSM

**ENGINE AIR FILTER-PANEL  
TYPE OIL BATH**

- Change oil. Drain and fill only. LSM

**ENGINE AIR FILTERS-PAPER**

- Take manometer readings. Replace elements if necessary. LSM

**ENGINE AIR FILTERS-FIBERGLASS**

- Replace elements.*

**BATTERY**

- Wash cell tops and apply petroleum jelly to terminals.
- Inspect battery boxes for damage or rust. Repair and paint if necessary.

**THREE MONTHS OR 45,000 MILES (CONT'D)****LOW VOLTAGE ELECTRICAL SYSTEM**

Check for grounds. LSM

**ENGINE**

Inspect air box. EMM

Inspect crankcase. EMM

Inspect crankshaft and connecting rods. EMM

Inspect pistons and piston rings. EMM

Inspect cylinder liners. EMM

Inspect cylinder head mechanism with engine idling and at operating temperature. EMM

Inspect engine fuel lines and connections for leaks. EMM

Inspect engine water system for leaks. EMM, LSM

**SPEED RECORDER AND DRIVE CABLE**

Lubricate. This item is not required for grease lubricated recorders. Refer to speed recorder manufacturer's bulletins.

**DOOR HARDWARE**

Lubricate hinges, latches, and linkage. M.I. 1756

**SIX MONTHS OR 90,000 MILES****OIL SYSTEM**

Change engine oil. LSM, EMM. Evaluation of engine and oil condition should dictate the frequency of this item. Type of service, type of oil, quality of filter elements, and condition of engine will influence the frequency of oil change.

Clean oil suction screens. EMM

Clean scavenging oil screens. EMM. Fill strainer housing with oil before starting engine.

Clean oil pan.

Clean filter housing.

**ENGINE**

Check exhaust manifold base flange bolts for proper tightness. EMM

## RADIATORS

Clean air passages.

LSM and M.I. 549. Operation in certain sections of the country and during certain seasons will require more frequent cleaning due to airborne seeds and leaves.

## MAIN GENERATOR

## AR10/D14

Inspect collector rings and brushes.

M.I. 3317-1

Reverse polarity of collector rings.

## D32/D14

Inspect collector rings and brushes.

M.I. 3302 or M.I. 3304

Reverse polarity of collector rings.

Inspect commutator brushes.

Blow out with air and clean creepage surfaces.

## MAIN RESERVOIR

Replace air filter element.

LSM

Check operation of automatic drain valves.

LSM

## IDAC (Where Used)

Check operation.

LSM

## MODULE TESTING (Where Used)

Perform self-test on modules.

LSM

## VOLTAGE REGULATOR (Where Used)

LSM, M.I. 4522

Check auxiliary generator output voltage.

Check auxiliary generator reference voltage.

## VR MODULE (Where Used)

LSM

Check auxiliary generator output voltage.

## TH MODULE (Where Used)

LSM

Check output voltage of VRR section.

## GROUND RELAY

LSM

Check ground relay action.

**SIX MONTHS OR 90,000 MILES (CONT'D)****HANDBRAKE**

Check operation and lubricate. M.I. 1577

**CAB SEATS**

Lubricate cab seat posts and guide rails. Lubriplate 630-2 or equivalent.

**ONE YEAR OR 180,000 MILES****ENGINE BOLT AND NUT RETORQUING**

Cylinder head crab nuts. Follow torquing procedures as outlined in the EMM.

Main lube oil and piston cooling oil pump shaft nut. EMM

Head frame to crankcase bolts. EMM

**ENGINE**

Replace top deck cover seals and check latches.

Qualify injectors. EMM

Set injector timing and injector rack length. EMM

Check engine speed. EMM

Check overspeed trip. EMM

Check governor pilot valve setting. EMM. If engine speed is changed, reset on governor stand.

Remove and clean oil separator element. EMM

Remove oil pan handhole cover and inspect harmonic balancer while engine is being barred over. Follow inspection procedures as outlined in the EMM.

**EXHAUST SYSTEM**

Clean spark retention trap.

Tighten bands connecting manifold sections.

**AIR COMPRESSOR**

Clean air intake screen. (Where Used). LSM

Clean air filter housing and replace air filter elements. Do not attempt to clean elements. LSM

Change oil. M.I. 1756

**ONE YEAR OR 180,000 MILES (CONT'D)****AIR FILTERS**

Carbody (Inertial) LSM

Measure pressure drop. Clean if necessary.

Engine (Cycloil) LSM

Change oil and clean sump.

Check operation of variflow valves.

Check condition of hoses.

Engine (Panel Type Oil Bath)

Change oil. Clean sump and filter media. LSM

**LUBE OIL FILTER**

Remove oil filter bypass valve; clean, inspect and test. M.I. 926

**MAGNET VALVES**

Clean and replace seats. M.I. 4707

**ELECTRICAL CABINETS**

Air Filter LSM

Change filter element.

Door Seals

Check for damage and leakage. Replace if necessary. Adjust lock keeper, if required.

Contact Tips LSM and applicable M.I.

Visually inspect tips of all power contactors, reversers, and brake transfer switches. Replace as required.

Check timing of time delay devices. LSM and applicable settings chart drawing.

**AUXILIARY GENERATOR**

Inspect and replace brushes when required. Normal auxiliary generator brush life is between 21 and 24 months.  
Replace in sets.

**DYNAMIC BRAKE RHEOSTAT (Where Used)**

Blow out with dry air.

Inspect contact brush and replace if necessary. M.I. 4334

**ONE YEAR OR 180,000 MILES (CONT'D)****LOAD REGULATOR-PLATE TYPE**

Blow out with dry air.

Inspect contact brush and replace if necessary. M.I. 4505

**FUEL PUMP MOTOR**

Inspect and clean with dry air.

Replace brushes. M.I. 4101

**STARTING MOTORS (Where Used)**

Blow out with dry air. EMM

**CAB HEATER BLOWER MOTOR**

Replace brushes.

**AIR CONDITIONER (Where Used)**

Inspect compressor motor brushes and replace if necessary. M.I. 4122

Inspect blower motor brushes and replace if necessary.

Clean evaporator return air filter.

Clean condenser coils.

**COOLING FANS AND ENGINE TEMPERATURE SWITCHES**

Check for proper operation and setting. LSM. M.I. 5511 or 5524.

Replace or recondition shutter magnet valves. M.I. 4707

**RADIATORS**

Clean or renew header screens after first year of operation. Condition of screen at this inspection can provide a basis for future cleaning.

M.I. 549 and 550. The presence of metal chips at first cleaning or after engine parts have been renewed is not an abnormal condition.

**DYNAMIC BRAKE GRIDS (Where Used)**

Inspect and blow clean with dry air. M.I. 1601

**DYNAMIC BRAKE BLOWER MOTOR (Where Used)**

Inspect in place; renew brushes as necessary. (Replace brushes in sets.) M.I. 4104

**ONE YEAR OR 180,000 MILES (CONT'D)****MAIN GENERATOR****AR10/D14**

Replace collector ring brushes. M.I. 3317-1

**D32/D14**

Replace collector ring and commutator brushes. M.I. 3302 or M.I. 3304

**TRACTION MOTOR**

Check air duct bellows for alignment and leakage. Inspect wear plates and arm.

Replace support bearing wick lubricators. M.I. 3900

**ALIGNMENT CONTROL COUPLER  
(Where Used)**

Check for wear and alignment control engagement. M.I. 2703

**COOLING SYSTEM**

Inspect and perform pressure test. LSM

Replace pressure cap if defective.

**GOVERNOR**

Change oil. EMM, M.I. 1764

**BRAKE SLACK ADJUSTER SCREWS**

Coat threads, using graphite grease.

**TRUCK CENTER BEARING**

Add two quarts of oil. LSM

**AUTOMATIC MAIN RESERVOIR  
DRAIN VALVES**

Clean and repair.

**AUTOMATIC COOLING SYSTEM DRAIN  
(If Equipped)**

Recondition automatic drain valve. M.I. 582

**TWO YEARS OR 360,000 MILES****LUBE OIL COOLER**

Check temperature differential between lube oil and cooling water into engine.

LSM. M.I. 928. Clean cooler, if necessary, M.I. 927.

**HOT OIL DETECTOR**

Remove and check for operation at proper temperature.

LSM

**FUEL PUMP AND MOTOR**

Replace coupling spider.

**STARTING MOTORS (Where Used)**

Disassemble, clean and lubricate.

EMM

Inspect brushes and replace if necessary.

EMM

**AIR COMPRESSOR (Gear Type Oil Pump)**

Replace oil filter.

M.I. 1144

**COOLING SYSTEM PRESSURE CAP**

Replace cap.

LSM

Inspect filler neck for damage. Replace if damaged.

**ENGINE PROTECTOR**

Recondition and qualify.

M.I. 259 or M.I. 260. Qualify on test stand after renewing springs, "O" rings, and diaphragms.

**ELECTRICAL CONTROL CIRCUITS**

Check settings and operation of non-modular protective and regulating devices and circuits.

LSM and applicable settings chart drawing.

On module equipped locomotives, qualify modules and related circuits.

LSM

**FUEL OIL PREHEATER (If Equipped)**

Renew thermostatic valve element.

**THREE YEARS OR 540,000 MILES****ENGINE**

Replace cylinder assemblies.	EMM
Replace injectors.	EMM
Inspect and qualify connecting rod bearings.	EMM
Inspect and qualify piston cooling tubes.	EMM
Install new thrust collars.	EMM
Install new lower main bearings.	EMM
Check rocker arms, rocker arm bushings, and cam followers.	EMM
Check lash adjusters.	EMM
Check exhaust valve timing.	EMM
Replace water pump seals and all worn parts.	EMM
Inspect lower liner inserts.	Renew if necessary. EMM

**AIR COMPRESSOR**

Recondition valves.	M.I. 1144, LSM
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**TRACTION MOTORS**

Replace.	Replacement motors should be EMD Unit Exchange or equivalent. Refer to non-scheduled maintenance portion of this M.I.
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**MAIN GENERATOR-AR10**

Remove rectifier assemblies from air box. move fuses and thoroughly wash heat sink and diodes.	M.I. 3317-2
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**CAUTION**

Never use a caustic solution.

**COOLING SYSTEM**

Replace flexible coupling seals.
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**BATTERY BOXES**

Clean and paint.
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**SHUTTER AIR CYLINDERS**

Replace piston, piston rod, and cylinder seals.	Air test cylinder after seal replacement.
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**FOUR YEARS OR 720,000 MILES****DYNAMIC BRAKE BLOWER**

Replace.

Replacement should be EMD Unit Exchange or equivalent.

**ENGINE BLOWERS**

Replace.

Replacement should be EMD Unit Exchange or equivalent.

**BLOWER-TO-FILTER AIR DUCT (Where Used)**

Replace.

**GOVERNOR**

Replace.

Replacement should be EMD Unit Exchange or equivalent.

**FUEL PUMP AND MOTOR**

Recondition and qualify.

M.I. 4101, M.I. 4110

**AUXILIARY GENERATOR**

Replace.

M.I. 1753. Replacement should be EMD Unit Exchange or equivalent.

Replace drive couplings.

M.I. 1753

**INERTIAL AIR FILTER MOTOR**

Replace.

Replacement should be EMD Unit Exchange or equivalent.

**COOLING FANS**

Replace.

Replacement should be EMD Unit Exchange or equivalent.

**SIX YEARS OR 1,080,000 MILES****AIR COMPRESSOR**

Recondition.

M.I. 1144

Recondition drive coupling.

M.I. 1753

**SIX YEARS OR 1,080,000 MILES (CONT'D)**

**ENGINE**

Replace crankshaft harmonic balancer. (Where Used)

Recondition and requalify.

Replace oil pumps.

Remove oil pressure relief valve; clean, inspect and test.

EMM

Replace lower liner inserts.

Inspect injector control linkage. Replace links, seals, and bearings, if required.

**MAIN GENERATOR**

**AR10 OR D32 WITH LARGE BEARING**

Remove bearing cover and inspect for grease contamination, excessive wear and overheating. Apply new grease.

M.I. 3317-1

**AR10 WITH SMALL BEARING**

Replace bearing and bearing housing.

M.I. 3317-1

**MAIN RESERVOIR SYSTEM**

Clean system and recondition valves.

**TWELVE YEARS OR 2,160,000 MILES**

**ENGINE**

Replace.

Replacement should be EMD Unit Exchange or equivalent.

**MAIN GENERATOR**

Replace.

Replacement should be EMD Unit Exchange or equivalent.

**HIGH VOLTAGE CABLING**

Renew.

It is recognized that this work may not be required at this particular time or mileage. However, shop efficiency may require this operation at time of engine and generator exchange.

**LOW VOLTAGE WIRING**

Renew.

Same remark as immediately above.

## NON-SCHEDULED MAINTENANCE

A definite time or mileage schedule for items listed below cannot be established due to variations in wear and component life related to operating conditions.

The following work is to be performed at wheel change time or when truck is removed for reconditioning.

### PINION

Check for involute profile wear.

Magnaflux. M.I. 1518

### AXLE GEAR

Check for involute profile wear.

Magnaflux. M.I. 1518

### AXLE

Magnaflux with wheels and inner races removed. M.I. 1518

### TRACTION MOTOR

Check bearings using heat and noise test.

M.I. 3900. Whenever truck assembly is removed from locomotive, check traction motors for unusual bearing noise or heat at not less than 1500 RPM.

Jigstone commutator and clean slots.

M.I. 3900. Restore smooth and concentric surface when inspection indicates need.

### **CAUTION**

Do not stone commutator by hand.

### JOURNAL BOXES/JOURNAL BEARINGS

Clean and recondition. M.I. 1552

### TRUCK ASSEMBLIES

Inspect, test, and repair or replace the following items as necessary; frame, bolster, wear plates, liners, springs, spring seats, snubbers, brake rigging, rubber bolster springs, shock absorbers, and sander guides.

M.I.'s 1501, 1504, or 1506

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