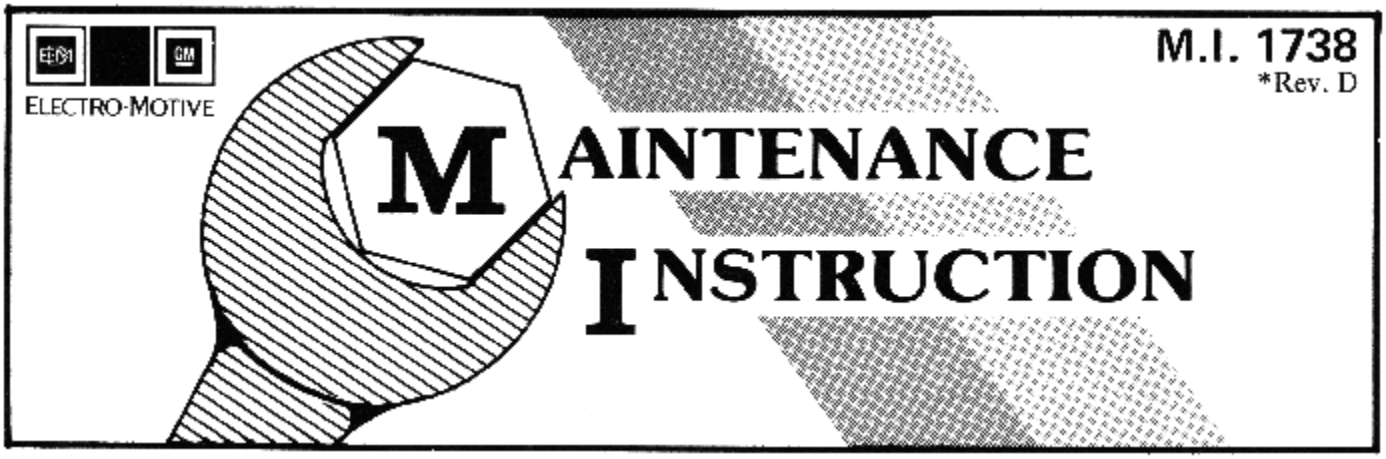

SCHEDULED MAINTENANCE PROGRAM BLOWER-TYPE GP & SD MODEL LOCOMOTIVES (645 ENGINES)

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.

DE-L July 1978

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

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.

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 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 equalto original equipment.
Change rack mounted filter.	LSM. Use only pleated cotton-paper element.

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

COOLING SYSTEM

Check inhibitor concentration.	M.l. 1748

FUEL TANK

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

TRACTION MOTORS

Replace brushes (in sets only).	M.l. 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.

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	LSM necessary.

ENGINE AIR FILTERS--FIBERGLASS

Replace elements.

BATTERY

Wash cell tops and apply petroleum jelly to terminals.

LOW VOLTAGE ELECTRICAL SYSTEM

Check for grounds.	LSM

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

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	EMM idling and at operating temperature.
Inspect engine fuel lines and connections for	EMM leaks.
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.	

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

RADIATORS	
Clean air passages.	LSM. 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. 3317-2 Reverse polarity of collector rings.
D32/D14	
Inspect collector rings and brushes.	M.I. 3302 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 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.	
HANDBRAKE	
Check operation and lubricate.	M.I. 1577

ONE YEAR 180,000 MILES

ENGINE BOLT AND NUT RETORQUING

Cylinder head crab nuts.	Loosen, and then torque to value specified in EMM.
Main lube oil and piston cooling oil pump	EMM shaft nut.
Head frame to crankcase bolts.	EMM

ENGINE

Replace top deck cover seals and check latches.	
Qualify injectors.	
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 over.	EMM harmonic balancer while engine is being barred

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	LSM elements. Do not attempt to clean elements.
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 (Cycoil)	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 M.I. 926 and test.

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

Check timing of time delay devices.

AUXILIARY GENERATOR

Inspect and replace brushes when required. Normal auxiliary generator brush life is between

Replace in sets. 21 and 24 months.

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.

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 M.I. 4122 if necessary.

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

Replace or recondition shutter magnet valves.

RADIATORS

Clean or renew header screens after first year of operation. Condition of screen at this

The presence of metal chips at first cleaning or after engine parts have been renewed is not an inspection can provide a basis for future abnormal condition. cleaning.

DYNAMIC BRAKE GRIDS (Where Used)

Inspect and blow clean with dry air.

DYNAMIC BRAKE BLOWER MOTOR (Where Used)

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

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

MAIN GENERATOR

AR10/D14

Replace collector ring brushes.

D32/D14

Replace collector ring and commutator brushes.

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 M.I. 2703 engagement.

COOLING SYSTEM

Inspect and perform pressure test. LSM

Replace pressure cap if defective.

GOVERNOR

Change oil. 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.

TWO YEARS OR 360,000 MILES

LUBE OIL COOLER

Check temperature differential between lube oil and cooling water into engine.	LSM M.I. 927. Clean cooler, if necessary.

HOT OIL DETECTOR

Remove and check for operation at proper	LSM temperature.

GOVERNOR

Renew diaphragm.	EMM

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

Replace.	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
On module equipped locomotives, qualify modules and related circuits.	LSM

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

AIR COMPRESSOR

Recondition valves.	M.I. 1144, LSM

TRACTION MOTORS

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

MAIN GENERATOR--AR10

Remove rectifier assemblies from air box. Remove fuses and thoroughly wash heat sink and diodes.	M.I. 3317-2. CAUTION: Never use a caustic solution.

COOLING SYSTEM

Replace flexible coupling seals.

BATTERY BOXES

Clean and paint.

SHUTTER AIR CYLINDERS

Replace piston, piston rod, and cylinder seals.	Air test cylinder after seal replacement.

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.	M.l. 4101, M.1. 4110
AUXILIARY GENERATOR	
Replace.	M.1. 1753. Replacement should be EMD Unit Exchange or equivalent.
Replace drive couplings.	M.1. 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.l. 1144
Recondition drive coupling.	M.l. 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	EMM and test.
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 over heating. 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