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.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>LSM</td>
<td>means Locomotive Service Manual</td>
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<tr>
<td>EMM</td>
<td>means Engine Maintenance Manual</td>
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<td>M.I.</td>
<td>means Maintenance Instruction</td>
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*This bulletin is revised and supersedes previous issues of this number.*

DE-L

December 1980
LUBE OIL FILTERS

Check lube oil filter tank pressure.

FUEL FILTER

Check pressure differential at rack mounted filter gauge.

TRACTION MOTOR SUPPORT BEARINGS

Check lubricant level.

TRACTION MOTOR GEAR CASE

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

AUTOMATIC COOLING SYSTEM DRAIN (If Equipped)

Check drain valve operation.

LUBE OIL

Take sample for analysis.

ENGINE PROTECTOR

Check operation.

GENERATOR PIT DRAIN ASPIRATOR

Inspect and clean, if needed.

AIR BOX DRAINS

Check operation and clean, if necessary.

BATTERY

Check electrolyte level.

Check specific gravity.

Wash out battery boxes.

MAIN GENERATOR

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

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

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

LSM

EMM

M.I. 3317-2. Whenever generator air box panels are removed, clean the inspection windows, and inspect collector rings and brushes.
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.
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.
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
M.I. 1738

SIX MONTHS OR 90,000 MILES (CONT’D)

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.
HANDBRAKE

Check operation and lubricate.

CAB SEATS

Lubricate cab seat posts and guide rails.

Lubriplate 630-2 or equivalent.

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.

Set injector timing and injector rack length.

Check engine speed.

Check overspeed trip.

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
AIR FILTERS

Carbody (Inertial)

Measure pressure drop. Clean if necessary.

Engine (Cycoil)

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.

LUBE OIL FILTER

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

MAGNET VALVES

Clean and replace seats.

ELECTRICAL CABINETS

Air Filter

Change filter element.

Door Seals

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

Contact Tips

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. Replace in sets.

Normal auxiliary generator brush life is between 21 and 24 months.

DYNAMIC BRAKE RHEOSTAT (Where Used)

Blow out with dry air.

Inspect contact brush and replace if necessary.

M.I. 4334
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
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
LUKE 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


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.
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

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. move 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.
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.

AIR COMPRESSOR
Recondition. M.I. 1144
Recondition drive coupling. M.I. 1753
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