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
ETG means Electrical Troubleshooting Guide
LUBE OIL FILTERS

Check lube oil filter tank pressure. LSM. Checks can be made weekly or more often 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 elements.

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 (Where Used)

Check drain valve operation. M.I. 582

LUBE OIL

Take sample for analysis. The services of a competent laboratory may help to monitor the suitability of the oil for continued use according to M.I. 1752.

ANNUNCIATOR MODULE (Where Used)

Monitor annunciator and record lighted indicators. LSM, ETG

Perform checks or maintenance indicated by lights.

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

Place annunciator switch in reset position.

ENGINE PROTECTOR

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

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.

SOAK BACK PUMP AND MOTOR

Check operation.

With the engine shut down and soak back pump motor running, remove left rear handhole cover and check oil flow through gear train.

Observe camshaft bearings. If lube oil flows from camshaft bearings with soak back pump running and engine shut down, inspect turbo filter outlet check valve for proper operation.

JOURNAL BOX (CYLINDRICAL ROLLERS)

Maintain to fill plug level.

M.I. 1756, M.I. 1552. Oil level maintenance is dependent on type of service and may be required before the 45 day inspection.

LUBE OIL FILTER -SEVEN ELEMENTS

Change filter elements.

Clean lube oil strainer.

LSM. Oil filter changeout is dictated by filter pressure readings and may be required before the 45 day inspection.

EMM. Fill strainer housing with oil before starting engine.

TURBOCHARGER AND SOAK BACK OIL FILTERS

Replace elements.

Filter elements must be of a quality equal to original equipment. The interval of change for turbocharger and soak back filter elements is influenced by load factor, kind of lubricating oil, type of operation, climatic conditions, and maintenance of main lube oil filters.

Where these factors are favorable, it may be possible to extend the period to 3 months, but do not exceed this interval due to a possible loss of filter structural integrity.
GENERATOR PIT DRAIN ASPIRATOR
Inspect and clean, if needed.

FUEL FILTERS
Clean or replace suction strainer element.
Change engine mounted filter elements.
Change rack mounted filter(s).

COOLING SYSTEM
Check inhibitor concentration.
Check for proper cooling system drain operation (Where Used).

FUEL TANK
Drain condensate.

MAIN GENERATOR
Inspect rectifier banks.

TRACTION MOTORS
Replace brushes (in sets only).
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.

INTERIAL FILTER BLOWER MOTOR
Check operation.

DOOR HARDWARE
Lubricate hinges, latches, and linkage.
ENGINE AIR FILTERS – PAPER

Take manometer readings. Replace elements if necessary.

ENGINE AIR FILTERS – FIBERGLASS

Replace elements.

TURBOCHARGER EXHAUST DIFFUSER

Visually inspect for evidence of warpage or damage.

EDUCTOR TUBE

Inspect for carbon deposits and clean, if necessary.

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.

ENGINE

Inspect air box.

Inspect crankcase.

Inspect crankshaft and connecting rods.

Inspect pistons and piston rings.

Inspect cylinder liners.

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

Inspect engine fuel lines and connections for leaks.

Inspect engine water system for leaks.

SPEED RECORDER AND DRIVE CABLE

Lubricate

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

OIL SYSTEM

Change engine oil.

Clean oil suction screens.

Clean scavenging oil screens.

ENGINE

Check pressure drop across aftercoolers, oil bath filter equipped engines only.

Check exhaust manifold base flange bolts for proper tightness.

EXHAUST SYSTEM

Remove manifold adapter and screen assembly.
Check for cracks, clean screen and trap box. If foreign objects are found in trap, inspect turbine vanes and power assemblies.

RADIATORS

Clean air passages.

MAIN GENERATOR

Inspect collector rings and brushes.
Reverse polarity of collect rings.

MAIN RESERVOIR

Replace air filter element.
Check operation of automatic drain valves.

IDAC (Where Used)

Check operation.

MODULE TESTING (Where Used)

Perform self-test on modules.

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.

EMM

EMM. Fill strainer housing with oil before starting engine.

LSM. Clean air passages if necessary.

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.
VOLTAGE REGULATOR (Where Used)

Check auxiliary generator output voltage. 
Check auxiliary generator reference voltage.

VR MODULE (Where Used)

Check auxiliary generator output voltage.

TH MODULE (Where Used)

Check output voltage of VRR section.

GROUND RELAY

Check ground relay action.

HANDBRAKE

Check operation and lubricate.

CAB SEATS

Lubricate cab seat posts and guide rails.

ENGINE BOLT AND NUT RETORQUING

Cylinder head crab nuts.

Main lube oil and piston cooling oil pump shaft nut.

Head frame to crankcase bolts.

Turbocharger to air duct bolts, aftercooler to air duct bolts, and air duct to crankcase bolts, and turbine inlet link bolts.

ENGINE

Replace top deck cover seals and check latches.

Qualify injectors.

Set injector timing and injector rack length.
ENGINE (CONT'D)

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
Check pressure drop across aftercooler; paper and fiberglass filter equipped engines only.  LSM, EMM. Clean air passages if necessary.
Inspect crankshaft damping device.  EMM
Remove, clean, and inspect; replace if necessary.  EMM
Soak back check valve in the turbo filter inlet.
Soak back oil pressure relief valve in the soak back filter head.
Soak back filter bypass valve in the soak back filter head.
Turbo oil filter check valve in the turbo filter head.
Inspect oil pan.  Clean if prime painted surface is not visible.

EXHAUST SYSTEM

Inspect manifold sections for possible cracked leg baffles or expansion joints and replace, if necessary.

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)  LSM

Measure pressure drop. Clean if necessary.
MAGNET VALVES

Clean and replace seats. M.I. 4707

ELECTRICAL CABINETS

Pressure Taps

Check hoses and taps for leaks or obstructions.

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 – COMMUTATOR

Type

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 – LINEAR-TYPE RHEOSTAT

Blow out with dry air and clean windings, if necessary. M.I. 4506

Check rheostat operation and replace if necessary.

FUEL PUMP MOTOR

Inspect and clean with dry air. M.I. 4101

Inspect brushes. Replace if necessary.

STARTING MOTORS

Blow out with dry air. EMM
CAB HEAT 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 and applicable M.I.

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

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

SOAK BACK PUMP MOTOR

Inspect and clean with dry air. M.I. 4101

Replace brushes.

MAIN GENERATOR

Replace collector ring brushes. M.I. 3317-2

TRACTION MOTOR

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

HEAD END GEAR BOX (Where Used)

Change oil. M.I. 1252

Clean oil fill/ breather assembly.
ONE YEAR (CONT'D)

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.

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

OIL SYSTEM

Clean filter housing. Clean if prime painted surface is not visible.

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
(Where Used)

Recondition automatic drain valve. M.I. 582

LUBE OIL COOLER

Check temperature differential between lube oil and cooling water into engine. LSM, M.I. 927, M.I. 928. Clean cooler, if necessary.

LUBE OIL FILTER

Remove oil filter bypass valve; clean, inspect, and test. M.I. 926
SOAK BACK PUMP
Replace coupling spider.

COOLING SYSTEM PRESSURE CAP
Replace cap. Inspect filler neck for damage. Replace if damage.

ENGINE PROTECTOR
Replace or recondition and requalify. M.I. 259 or M.I. 260. Qualify on test stand after renewing springs, “0” rings, and diaphragms. Replacement can be EMD Unit Exchange.

HOT OIL DETECTOR
Remove and check for operation at proper temperature.

FUEL PUMP AND MOTOR
Replace coupling spider.

STARTING MOTORS
Disassemble, clean, and lubricate. Inspect brushes and replace if necessary.

AIR COMPRESSOR (Gear Type Oil Pump)
Replace oil filter.

FUEL OIL PREHEATER (Where Used)
Renew thermostatic valve element.

ENGINE
Recalibrate injectors and check lash adjusters.

ELECTRICAL CONTROL CIRCUITS
Check settings and operation of non-modular protective and regulating devices and circuits. On module equipped locomotives, qualify modules and related circuits.
ENGINE

Replace cylinder assemblies.

Replace injectors.

Inspect and qualify connecting rod bearings.

Inspect and qualify piston cooling tubes.

Install new thrust collars.

Install new lower main bearings.

Check rocker arms, rocker arm bushings, and cam followers.

Qualify lash adjusters and valve bridges.

Check exhaust valve timing.

Replace water pump seals and all worn parts.

Inspect lower liner inserts and replace if necessary.

AIR COMPRESSOR

Recondition valves.

TRACTION MOTORS

Replace.

MAIN GENERATOR

Remove rectifier assemblies from air box.

Remove fuses and thoroughly wash heat sink and diodes.

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.
M.I. 1740

FOUR YEARS

DYNAMIC BRAKE BLOWER
Replace.

TURBOCHARGER
Unit Exchange.

TURBOCHARGER-TO-FILTER AIR DUCT
(Where Used)
Replace.

GOVERNOR
Replace.

FUEL PUMP AND MOTOR
Recondition.

SOAK BACK PUMP AND MOTOR
Recondition.

AUXILIARY GENERATOR
Replace.

Replace drive couplings.

INERTIAL AIR FILTER MOTOR
Replace.

COOLING FANS
Replace.

M.I. 4101, M.I. 4110

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

M.I. 1753

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SIX YEARS

AIR COMPRESSOR
Recondition.
Recondition drive coupling.

M.I. 1144

M.I. 1753
HEAD END GEAR BOX (Where Used)

- Recondition.
- Recondition drive coupling.

ENGINE

- Replace or recondition oil pumps.
- Remove oil pressure relief valve; clean, inspect, and test.
- Replace lower liner inserts.
- Inspect injector control linkage. Replace links, seals, and bearings if required.

MAIN GENERATOR

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

(Small bearing) Replace bearing and bearing housing.

MAIN RESERVOIR SYSTEM

- Clean system and recondition valves.

SIX YEARS (CONT’D)

ENGINE

- Replace crankshaft viscous damper (Where Used).
- Remove crankshaft gear type damper (Where Used).

NINE YEARS

ENGINE

- Replace crankshaft viscous damper (Where Used).

EMM. Replace with gear type damper.

EMM. Inspect, qualify, & recondition, if necessary.

MAIN GENERATOR

- Replace.

Replacement should be EMD Unit Exchange or equivalent.

TWELVE YEARS

ENGINE

- Replace.

Replacement should be EMD Unit Exchange or equivalent.
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.  

Jigstone commutator and clean slots.  

M.I. 3900. Whenever truck assembly is removed from locomotive, check traction motors for unusual bearing noise or heat at maximum 1500 RPM.  

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 (cylindrical rollers).  

Remove and requalify (tapered rollers).  

M.I. 1552  

M.I. 1553

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