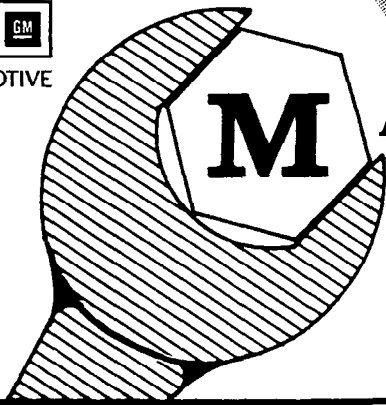




M.I. 1740

*Rev. J



MAINTENANCE INSTRUCTION

SCHEDULED MAINTENANCE PROGRAM TURBOCHARGED F, GP, & SD MODEL LOCOMOTIVES (645E3 THRU 645E3C 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

ETG means Electrical Troubleshooting Guide

*This bulletin is revised and supersedes previous issues of this number.
Areas of change are indicated by vertical bars.

M.I. 1740

I

FUEL STOP

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.

45 DAYS

ENGINE PROTECTOR

Check operation.

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

AIR BOX DRAINS

I Check operation and clean, if necessary.

EMM

45 DAYS (CONT'D)**BATTERY**

Check electrolyte level.

Check specific gravity.

Wash out battery boxes.

MAIN GENERATOR

Inspect diode fuses, replace diodes and fuses as required.

M.I. 33 17-2. Whenever generator air box panels are removed, clean the inspection windows, and inspect collector rings and brushes.

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.

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

Clean lube oil strainer.

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.

90 DAYS

GENERATOR PIT DRAIN ASPIRATOR

Inspect and clean, if needed. LSM

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 filter(s). LSM. Use only pleated cotton-paper elements.

COOLING SYSTEM

Check inhibitor concentration. M.I. 1748

Check for proper cooling system drain operation (Where Used).

FUEL TANK

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

MAIN GENERATOR

Inspect rectifier banks. Clean as necessary to minimize dirt accumulation.

TRACTION MOTORS

Replace brushes (in sets only). M.I. 3900. Depending upon type of service and operating conditions, brush life will range from 6 to 12 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.

INTERNAL FILTER BLOWER MOTOR

Check operation.

DOOR HARDWARE

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

90 DAYS (CONT'D)**ENGINE AIR FILTERS – PAPER**

Take manometer readings. Replace elements if necessary. LSM

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. EMM

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.

SIX MONTHS

I

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.

ENGINE

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

LSM. Clean air passages if necessary.

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.

EMM

I

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

Inspect collector rings and brushes.

M.I. 33 17-2

Reverse polarity of collect rings.

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, ETG

SIX MONTHS (CONT'D)

VOLTAGE REGULATOR (Where Used)

Check auxiliary generator output voltage. LSM, ETG

Check auxiliary generator reference voltage.

VR MODULE (Where Used)

Check auxiliary generator output voltage. LSM, ETG

TH MODULE (Where Used)

Check output voltage of VRR section. LSM

GROUND RELAY

Check ground relay action. LSM

HANDBRAKE

Check operation and lubricate. M.I. 1577

CAB SEATS

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

ONE YEAR

ENGINE BOLT AND NUT RETORQUING

Cylinder head crab nuts. Follow torquing procedures as outlined in the EMM. (All except those equipped with plate type crabs.)

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

Head frame to crankcase bolts. EMM

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

ENGINE

Replace top deck cover seals and check latches. EMM

Qualify injectors. EMM. Perform "Pop" test.

Set injector timing and injector rack length. EMM

I

ONE YEAR (CONT'D)

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.

ONE YEAR (CONT'D)**MAGNET VALVES**

Clean and replace seats. M.I. 4707

ELECTRICAL CABINETS**Pressure Taps**

Check hoses and taps for leaks or obstructions.

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 – COMMUTATOR TYPE

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

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

ONE YEAR (CONT'D)**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. M.I. 4104
(Replace brushes in sets.)

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

I 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

TWO YEARS**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

TWO YEARS (CONT'D)**SOAK BACK PUMP**

Replace coupling spider.

COOLING SYSTEM PRESSURE CAP

Replace cap. LSM

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, "O" rings, and diaphragms. Replacement can be EMD Unit Exchange.

HOT OIL DETECTOR

Remove and check for operation at proper temperature. LSM

FUEL PUMP AND MOTOR

Replace coupling spider.

STARTING MOTORS

Disassemble, clean, and lubricate. EMM

Inspect brushes and replace if necessary. EMM

AIR COMPRESSOR (Gear Type Oil Pump)

Replace oil filter. M.I. 1144

FUEL OIL PREHEATER (Where Used)

Renew thermostatic valve element.

ENGINE

I Recalibrate injectors and check lash adjusters. EMM

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. ETG

THREE YEARS

ENGINE

- Replace cylinder assemblies. EMM
- Replace injectors. EMM. Replacement should be EMD Unit Exchange or equivalent.
- 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
- Qualify lash adjusters and valve bridges. EMM
- Check exhaust valve timing. EMM
- Replace water pump seals and all worn parts. EMM
- Inspect lower liner inserts and replace 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

- Remove rectifier assemblies from air box. M.I. 33 17-2.
- Remove fuses and thoroughly wash heat sink and diodes.

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.

M.I. 1740

FOUR YEARS

DYNAMIC BRAKE BLOWER

Replace.

Replacement should be EMD Unit Exchange or equivalent.

TURBOCHARGER

Unit Exchange.

EMM. Average individual operating conditions will determine frequency.

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

Replace.

GOVERNOR

Replace.

Replacement should be EMD Unit Exchange or equivalent.

FUEL PUMP AND MOTOR

Recondition.

M.I. 4101, M.I. 4110

SOAK BACK PUMP AND MOTOR

Recondition.

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

AIR COMPRESSOR

Recondition.

M.I. 1144

Recondition drive coupling.

M.I. 1753

SIX YEARS (CONT'D)

HEAD END GEAR BOX (Where Used)

Recondition.	M.I. 1252
Recondition drive coupling.	M.I. 1753

ENGINE

Replace or recondition oil pumps.	EMM. Replacement can be EMD Unit Exchange.
Remove oil pressure relief valve; clean, inspect, and test.	EMM
Replace lower liner inserts.	EMM
Inspect injector control linkage. Replace links, seals, and bearings if required.	EMM

MAIN GENERATOR

(Large bearing) Remove bearing cover and inspect for grease contamination, excessive wear, and overheating. Apply new grease.	M.I. 3317-I
(Small bearing) Replace bearing and bearing housing.	M.I. 3317-I

MAIN RESERVOIR SYSTEM

Clean system and recondition valves.

NINE YEARS

ENGINE

Replace crankshaft viscous damper (Where Used).	EMM. Replace with gear type damper.
Remove crankshaft gear type damper (Where Used).	EMM. Inspect, qualify, & recondition, if necessary.

TWELVE YEARS

ENGINE

Replace.	Replacement should be EMD Unit Exchange or equivalent.
----------	--

MAIN GENERATOR

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. M.I. 3900. Whenever truck assembly is removed from locomotive, check traction motors for unusual bearing noise or heat at maximum 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 (cylindrical rollers). M.I. 1552

Remove and requalify (tapered rollers). 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

•• • • A Service Department Publication ••••

Electro-Motive Division Of General Motors La Grange, Illinois 60525