



M.I. 1743
*Rev. B



MAINTENANCE INSTRUCTION

SCHEDULED MAINTENANCE PROGRAM TURBOCHARGED EXPORT 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 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 2500 MILES OR 4000 KILOMETERS

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, if so equipped.

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.

Use Caltex Crater Grade 2 in cold weather, and Caltex Crater Grade 5 in warm weather operation, or equivalent greases.

ONE MONTH OR 10,000 MILES OR 16,000 KILOMETERS

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

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.

EDUCTOR TUBE

Inspect for carbon deposits and clean, if necessary.

ONE MONTH OR 10,000 MILES OR 16,000 KILOMETERS (CONT'D)**MAIN GENERATOR**

Inspect diode fuses, replace diodes and fuses as required.

M.I. 3317-2 or M.I. 3323-5. 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.

ENGINE AIR FILTERS--PANEL TYPE OIL BATH (Where Used)

Check oil level.

LSM

ENGINE AIR FILTER--CYCOIL TYPE (Where Used)

Check oil level.

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

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

LSM

CARBODY FILTERS--FIBERGLASS TYPE (Where Used)

Replace

LSM

COMPRESSOR-EXHAUSTER, FILTERS AND SCREENS

Check oil level. Add oil if required.

M.I. 1100

Check compressed air and vacuum system filters and separator.

LSM. Clean if necessary.

AIR COMPRESSOR-SHALLOW SUMP

Check oil level.

M.I. 1144

ONE MONTH OR 10,000 MILES OR 16,000 KILOMETERS (CONT'D)

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.

Place annunciator switch to reset position.

JOURNAL BOX

Maintain to fill plug level.

M.I. 1756, M.I. 1552

TWO MONTHS OR 20,000 MILES OR 32,000 KILOMETERS

LUBE OIL FILTER

Replace filter elements.

LSM

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.

THREE MONTHS OR 30,000 MILES OR 48,000 KILOMETERS

FUEL FILTERS

Clean or replace suction strainer element.

LSM

Replace engine mounted filter elements.

EMM. Use only elements equal to original equipment.

Replace rack mounted filter element.

LSM. Use only pleated cotton-paper element.

THREE MONTHS OR 30,000 MILES OR 48,000 KILOMETERS (CONT'D)

COOLING SYSTEM

Check inhibitor concentration.

M.I. 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.I. 3900 or M.I. 3904. 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 suspension bearing wick lubricators for dirt plugging of the wick and for excessive wear.

Clean and replace as necessary.

INERTIAL FILTER BLOWER MOTOR

Check operation.

LSM

ELECTRICAL CABINET PRESSURE TAPS

Check hoses and taps for leaks or obstructions.

ENGINE AIR FILTERS--PANEL TYPE OIL BATH

Change oil. Drain and fill only.

M.I. 440

ENGINE AIR FILTERS--CYCOIL (Shallow Sump)

Change oil. Drain and fill only.

ENGINE AIR FILTERS--PAPER

Take manometer readings. Replace elements if necessary.

ENGINE AIR FILTERS--FIBERGLASS

Replace elements.

LSM

COMPRESSOR--EXHAUSTER

Change oil.

M.I. 1100

Remove and clean pre-filters and sump cups on exhauster discharge separator, vacuum system intake filter, and vacuum brake pipe intake filter.

LSM

TURBOCHARGER EXHAUST DIFFUSER

Visually inspect for evidence of warpage or damage.

THREE MONTHS OR 30,000 MILES OR 48,000 KILOMETERS (CONT'D)**BATTERY**

Wash cell tops and apply petroleum jelly to terminals.

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 60,000 MILES OR 96,000 KILOMETERS**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.

SIX MONTHS OR 60,000 MILES OR 96,000 KILOMETERS (CONT'D)**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.

STARTING MOTORS

Blow out with dry air.

EMM

ENGINE AIR FILTER--CYCOIL (Shallow Sump)

Change oil and clean sump.

Check operation of variflow valves.

Check condition of hoses.

ENGINE AIR FILTER--CYCOIL (Deep Sump)

Change oil. Drain and fill only.

AIR COMPRESSOR--SHALLOW SUMP

Change oil.

M.I. 1144

HANDBRAKE

Check operation and lubricate.

M.I. 1577

EXHAUST SYSTEM

Remove manifold screen and trap. Clean and check for cracks.

EMM

SIX MONTHS OR 60,000 MILES OR 96,000 KILOMETERS (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

Inspect collector rings and brushes.

M.I. 3317-1 or M.I. 3323-1.

Reverse polarity of collector 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

VOLTAGE REGULATOR (Where Used)

Check auxiliary generator output voltage.

LSM. M.I. 4522

Check auxiliary generator reference voltage.

VR MODULE (Where Used)

Check auxiliary generator output voltage.

LSM

TH MODULE (Where Used)

Check output voltage of VRR section.

LSM

GROUND RELAY

Check ground relay action.

LSM

ONE YEAR OR 120,000 MILES OR 192,000 KILOMETERS

ENGINE BOLT AND NUT RETORQUING

Cylinder head crab nuts.	Loosen, and then torque to values specified in EMM.
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.	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
Check pressure drop across aftercooler.	LSM, EMM. Clean air passages if necessary.
Remove oil pan handhole cover and inspect harmonic balancer or remove scavenging oil pump and inspect viscous damper while engine is being barred over.	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.	

ONE YEAR OR 120,000 MILES OR 192,000 KILOMETERS (CONT'D)**EXHAUST SYSTEM**

Inspect manifold connectors for liner cracks 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

COMPRESSOR-EXHAUSTER

Replace compressor inlet filter LSM

Replace exhauster inlet filter.

Check filter media of exhauster discharge separator, vacuum system intake filter, and vacuum brake pipe intake filter. Clean if necessary. LSM

Check operation and settings of compressor control switch.

AIR FILTERS

Carbody (Inertial) LSM

Measure pressure drop. Clean if necessary.

Engine (Panel Type Oil Bath) LSM, M.I. 440

Change oil and clean sump.

Clean filter panel assembly and filter.

Engine (Cycoil-Deep Sump)

Change oil and clean sump.

Check operation of variflow valves.

Check condition of hoses.

LUBE OIL FILTER

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

MAGNET VALVES

Clean and replace seats. M.I. 4707

ONE YEAR OR 120,000 MILES OR 192,000 KILOMETERS (CONT'D)

ELECTRICAL CABINETS

Air Filter LSM

Replace filter elements.

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. 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

Blow out with dry air.

Inspect contact brush and replace if necessary.

M.I. 4504 or M.I. 4505

FUEL PUMP MOTOR

Inspect and clean with dry air.

Replace brushes.

M.I. 4101

STARTING MOTORS (Where Used)

Disassemble, clean and lubricate.

EMM

Inspect brushes and replace if necessary.

EMM

CAB HEATER BLOWER MOTOR

Replace brushes.

ONE YEAR OR 120,000 MILES OR 192,000 KILOMETERS (CONT'D)

AIR CONDITIONER (Where Used)

Inspect compressor motor brushes and replace if necessary (DC motor only). 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

Recondition shutter magnet valves. M.I. 4707

RADIATORS

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

M.I. 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.

DYNAMIC BRAKE BLOWER MOTOR (Where Used)

Inspect in place; replace 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. 3317-1 or M.I. 3323-1

TRACTION MOTOR

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

Replace support bearing wick lubricators. M.I. 3900 or M.I. 3904

ONE YEAR OR 120,000 MILES OR 192,000 KILOMETERS (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.

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 240,000 MILES OR 384,000 KILOMETERS**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.

HOT OIL DETECTOR

Remove and check for operation at proper temperature. LSM

GOVERNOR

Replace diaphragm. EMM

FUEL PUMP AND MOTOR

Replace coupling spider.

SOAK BACK PUMP

Replace coupling spider.

TWO YEARS OR 240,000 MILES OR 384,000 KILOMETERS (CONT'D)

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

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

AIR COMPRESSOR (Gear Type Oil Pump)

Replace oil filter. M.I. 1144

THREE YEARS OR 360,000 MILES OR 576,000 KILOMETERS

ENGINE

Recondition and qualify cylinder assemblies. EMM

Recondition and qualify 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

COMPRESSOR--EXHAUSTER

Recondition valves. M.I. 1100

THREE YEARS OR 360,000 MILES OR 576,000 KILOMETERS (CONT'D)

TRACTION MOTORS

Overhaul

M.I. 3950 or M.I. 3952. Refer to non-scheduled maintenance section of this M.I.

MAIN GENERATOR

Remove rectifier assemblies from air box.
Remove fuses and thoroughly wash heat sink and diodes.

M.I. 3317-2 or M.I. 3323-5.

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.

TRUCKS

Replace shock absorbers. (Where Used.)

M.I. 1504, M.I. 1505, M.I. 1506

FOUR YEARS OR 480,000 MILES OR 768,000 KILOMETERS

DYNAMIC BRAKE BLOWER

Recondition and qualify.

M.I. 4104

TURBOCHARGER

Recondition and qualify.

EMM. Average individual operating conditions will determine frequency.

TURBOCHARGER-TO-FILTER AIR DUCT
(Where Used)

Replace

GOVERNOR

Recondition and qualify.

FUEL PUMP AND MOTOR

Recondition and qualify.

M.I. 4101, M.I. 4110

SOAK BACK PUMP AND MOTOR

Recondition and qualify.

M.I. 4101, M.I. 4110

AUXILIARY GENERATOR

Recondition and qualify.

M.I. 3706, M.I. 3707

Replace drive couplings.

M.I. 1753.

FOUR YEARS OR 480,000 MILES OR 768,000 KILOMETERS (CONT'D)

INERTIAL AIR FILTER MOTOR

Recondition and qualify.

COOLING FANS

Recondition and qualify.

M.I. 4102

SIX YEARS OR 720,000 MILES OR 1,158,000 KILOMETERS

AIR COMPRESSOR

Recondition and qualify.

M.I. 1144

Recondition drive coupling.

M.I. 1753

COMPRESSOR-EXHAUSTER

Recondition and qualify.

M.I. 1100

Recondition drive coupling.

M.I. 1753

ENGINE

Recondition and qualify crankshaft harmonic balancer. (Where Used.)

EMM

Recondition and qualify 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

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

M.I. 3317-1, M.I. 3323-1

(Small bearing.) Replace bearing and bearing housing.

M.I. 3317-1

MAIN RESERVOIR SYSTEM

Clean system and recondition valves.

NINE YEARS OR 1,080,000 MILES OR 1,737,000 KILOMETERS

ENGINE

Replace crankshaft viscous damper. (Where Used.) EMM

TWELVE YEARS OR 1,440,000 MILES OR 2,317,000 KILOMETERS

ENGINE

Recondition and qualify. EMM

MAIN GENERATOR

Recondition and qualify. M.I. 3322, M.I. 3323

HIGH VOLTAGE CABLING

Replace.

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

Replace.

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. 1519

AXLE GEAR

Check for involute profile wear.

Magnaflux. M.I. 1519

AXLE

Magnaflux with wheels and inner races removed. M.I. 1519

TRACTION MOTOR

Check bearings using heat and noise test. M.I. 3900 or M.I. 3904. 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 or M.I. 3904. 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 or 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. 1504, M.I. 1505, M.I. 1506, M.I. 1508