



SCHEDULED MAINTENANCE PROGRAM BLOWER-TYPE 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 operation, 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 MOTORS 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.

MAIN GENERATOR--AR10 OR AR6

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

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.

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

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

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

**CARBODY AIR FILTERS--IMPINGEMENT
TYPE (Where Used)**

Remove, clean, and reinstall. 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

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 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.

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.

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 MOTORS

Check operation.

LSM

ELECTRICAL CABINET PRESSURE TAPS

Check hoses and taps for leaks or obstructions.

**ENGINE AIR FILTERS--CYCOIL
(Shallow Sump)**

Change oil. Drain and fill only.

**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

THREE MONTHS OR 30,000 MILES OR 48,000 KILOMETERS (CONT'D)**ENGINE AIR FILTERS--FIBERGLASS**

Replace elements.

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

**SPEED INCREASER AND COOLING FAN
(Where Used)**

Check air clutch and piping.

LSM; M.I. 1207

Add oil to rotor seal assembly (if applicable).

M.I. 1207

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.

ENGINE

Check exhaust manifold base flange bolts for proper tightness.

STARTING MOTORS

Blow out with dry air.

EMM

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**AR6/D14**

Inspect collector rings and brushes.

M.I. 3323-1

Reverse polarity of collector rings.

D32/D14 Or D25

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.

ENGINE AIR FILTER--CYCOIL (Shallow Sump)

Change oil and clean sump.

Check operation of variflow valves.

Check condition of hoses.

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

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

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

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 harmonic balancer while engine is being barred over.	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

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

COMPRESSOR--EXHAUSTER

Replace compressor inlet filter element. LSM

Replace exhauster inlet filter element.

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 (Cycloil-Deep Sump)

Change oil and clean sump.

Check operation of variflow valves.

Check condition of hoses.

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

Change oil. Clean sump and filter media.

LUBE OIL FILTER

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

MAGNET VALVES

Clean and replace seats. M.I. 4707.

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.

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

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.

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

SPEED INCREASER AND COOLING FAN
(Where Used)

Drain oil, clean sump, and refill. Clean filter element in breather cap. LSM; M.I. 1207

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

MAIN GENERATOR

AR6/D14

Replace collector ring brushes. M.I. 3323-1

D32/D14 Or D25

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 or M.I. 3904.

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

ONE YEAR OR 120,000 MILES OR 192,000 KILOMETERS (CONT'D)**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 and M.I. 928. Clean cooler, if necessary.

**LUBE OIL COOLER BYPASS VALVE
(Where Used)**

Clean and test.

LSM

HOT OIL DETECTOR

Remove and check for operation at proper temperature.

LSM

GOVERNOR

Replace diaphragm.

EMM

FUEL PUMP AND MOTOR

Replace coupling spider.

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
--------------------	-----------

TRACTION MOTORS

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

MAIN GENERATOR--AR6

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

ENGINE BLOWERS

Recondition and qualify.	EMM
--------------------------	-----

BLOWER-TO-FILTER AIR DUCTS (Where Used)

Replace.	
----------	--

GOVERNOR

Recondition and qualify.	M.I. 4101, M.I. 4110
--------------------------	----------------------

FUEL PUMP AND MOTOR

Recondition and qualify.	
--------------------------	--

AUXILIARY GENERATOR

Recondition and qualify.	M.I. 3706, M.I. 3707
--------------------------	----------------------

Replace drive couplings.	M.I. 1753
--------------------------	-----------

INERTIAL AIR FILTER MOTOR

Recondition and qualify.	
--------------------------	--

COOLING FANS

Recondition and qualify.	M.I. 4102
--------------------------	-----------

**SPEED INCREASER AND COOLING FAN
(Where Used)**

Recondition and qualify.	M.I. 1207
--------------------------	-----------

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
-----------------------------	-----------

SIX YEARS OR 720,000 MILES OR 1,158,000 KILOMETERS (CONT'D)

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

AR6, OR D32 WITH LARGE BEARING

Remove bearing cover and inspect for grease contamination, excessive wear, and overheating. Apply new grease. M.I.3323-1, or M.I. 3302

MAIN RESERVOIR SYSTEM

Clean system and recondition valves.

EIGHT YEARS OR 960,000 MILES OR 1,544,000 KILOMETERSSPEED INCREASER AND COOLING FAN
(Where Used)

Replace drive couplings.

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

ENGINE

Recondition and qualify. EMM

MAIN GENERATOR

Recondition and qualify.

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

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

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