



SCHEDULED MAINTENANCE PROGRAM EXPORT STATIONARY POWER UNITS WITH TURBOCHARGED ENGINES

INTRODUCTION

This Maintenance Instruction provides average recommendations which should ensure satisfactory engine 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 engine and associated equipment.

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 Maintenance Instructions 1762 and 1764 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. Operating load limitations will be adhered to.
6. Torquing procedures contained in this M.I. will be followed for new engines and newly installed replacement assemblies.

This Maintenance Instruction is divided into three sections. The first section is maintenance performed before and after each start, the second section is performed on a "calendar period" basis, and the third section is performed on a "running time" basis. Because operating requirements for this equipment can vary from standby, to periodic, to continuous usage, the maintenance procedures must be modified to suit individual requirements.

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.

EMM	means Engine Maintenance Manual
OM	means Operating Manual
M.I.	means Maintenance Instruction

This bulletin is intended for export application only, and supersedes information contained in M.I. 1728.

NOTE

The following recommendations are applicable to stationary power units used for emergency power.

1. Unit should be operated at least once a week.
2. Operate unit at idle for a sufficient period of time to allow coolant temperature to stabilize at 49° C (120° F) or higher.

If minimum temperature cannot be obtained at idle speed, gradually apply load until temperature stabilizes.

3. Operate unit at full speed, full load for a minimum of one hour.

BEFORE EACH START

(NON-AUTOMATIC START UNITS)

LUBE OIL SYSTEM

Check for lube oil in pan and strainer housing. Add oil if required. EMM

COOLING SYSTEM

Check coolant level and add coolant if required. OM

FUEL SYSTEM

Check fuel supply and open fuel supply valves. OM

Prime system. OM

AIR SYSTEM

Drain condensate. OM

Check system pressure. OM

Check oil supply in air line lubricator. EMM

ENGINE

Open cylinder test valves and manually bar over engine one complete revolution, check for liquid ejected from valves, and close test valves. If fluid discharge is observed from any cylinder, find the cause and make necessary repairs prior to starting the engine.

EMM

Prelube engine if unit has been shut down for over 48 hours.

GOVERNOR

Check lube oil level. EMM

IMMEDIATELY AFTER EACH START**(NON-AUTOMATIC START UNITS)****INSPECT FOR LEAKS**

Cooling system
 Fuel system
 Lube system
 Exhaust system

LUBE OIL SYSTEM

Check lube oil level in pan with engine at idle. EMM

Check lube oil pressure at engine. OM

ENGINE

Check cylinder test valves for leakage. Tighten if required. EMM

Check handhole covers for leakage. Tighten if required. EMM

Check air box drains for proper operation and clean, if necessary. EMM. If drains are kept closed, drain every 4 hours.

PERFORM THE FOLLOWING ITEMS ON CALENDAR TIME BASIS**DAILY****(NON-AUTOMATIC START UNITS)****INSPECT FOR LEAKS**

Cooling system
 Fuel system
 Lube oil system
 Exhaust system
 Air system

LUBE OIL SYSTEM

Check lube oil level in pan. EMM

COOLING SYSTEM

Check coolant level. OM

FUEL SYSTEM

Check fuel supply.

DAILY (CONT'D)

(NON-AUTOMATIC START UNITS)

AIR SYSTEM

Drain condensate from lines and tanks.

GOVERNOR

Check oil level and add oil if required. EMM

WEEKLY

(AUTOMATIC START UNITS)

ENGINE SHUT DOWN

LUBE OIL SYSTEM

Check for lube oil in pan and strainer housing. Add oil if required. EMM

COOLING SYSTEM

Check coolant level and add coolant if required. OM

FUEL SYSTEM

Check fuel supply. OM

AIR SYSTEM

Drain condensate. OM

Check system pressure. OM

Check oil supply in air line lubricator. EMM

ENGINE

Prior to maintenance start, open cylinder test valves and manually bar over engine one complete revolution, check for liquid ejected from valves, and close test valves. If fluid discharge is observed from any cylinder, find the cause and make the necessary repairs prior to starting the engine.

Prelube engine if unit has been shut down for over 48 hours. EMM

GOVERNOR

Check lube oil level. EMM

WEEKLY (CONT'D)**ENGINE RUNNING****INSPECT FOR LEAKS**

Cooling system
 Fuel system
 Lube system
 Exhaust system
 Air system

LUBE OIL SYSTEM

Check lube oil level in pan with engine at idle. EMM

Check lube oil pressure at engine. OM

ENGINE

Check cylinder test valves for leakage. Tighten if required. EMM

Check handhole covers for leakage. Tighten if required. EMM

Check air box drains for proper operation and clean, if necessary. EMM. If drains are kept closed, drain every 4 hours.

EVERY TWO WEEKS**CAUTION**

Perform the following maintenance at this time if the only available fuel oil does not meet the sulfur content or distillation recovery specifications contained in M.I. 1750.

The use of good quality, high alkaline reserve lubricating oil is strongly recommended where only high sulfur fuels are available.

LUBE OIL SYSTEM

Take sample for analysis.

The services of a competent laboratory should be used to monitor the suitability of the oil for continued use according to M.I. 1762.

EVERY MONTH

LUBE OIL SYSTEM

Take sample for analysis.

The services of a competent laboratory should be used to monitor the suitability of the oil for continued use according to M.I. 1762.

LUBE OIL CIRCULATING PUMP AND MOTOR (Where Used)

Check for proper operation.

OM

IMMERSION HEATER (Where Used)

Check for proper operation.

OM

CAUTION

Perform the following maintenance at this time if the only available fuel oil does not meet the sulfur content or distillation recovery specifications contained in M.I. 1750.

The use of good quality, high alkaline reserve lubricating oils is strongly recommended where only high sulfur fuels are available.

AUXILIARY TURBOCHARGER FILTER (Where Used)

Replace elements.

OM

EVERY TWO MONTHS

AUXILIARY TURBOCHARGER FILTER (Where Used)

Replace elements.

IN-LINE "Y" OIL STRAINER (Where Used)

Clean strainer screen.

EVERY YEAR

LUBE OIL CIRCULATING PUMP AND MOTOR (Where Used)

Inspect and clean with dry air.

Replace brushes.

If equipped with DC motor.

Remove and clean check valve.

EVERY TWO YEARS**LUBE OIL FILTERS**

Change filter elements.

EMM. Unless filter change, on a running time basis, has occurred first.

Clean lube oil strainer.

EMM. Fill strainer housing with oil before starting engine.

TURBOCHARGER OIL FILTER

Replace filter elements.

EMM. Unless filter change, on a running time basis, has occurred first.

**SOAK BACK OIL FILTER
(Where Used)**

Replace filter element.

EMM. Unless filter change, on a running time basis, has occurred first.

FUEL FILTERS

Change engine mounted filter elements.

EMM. Unless filter change, on a running time basis, has occurred first.

Clean or replace suction strainer element.

OM. Unless maintenance, on a running time basis, has occurred first.

ENGINE PROTECTOR

Recondition.

M.I. 259. Qualify on test stand after renewing springs, "O" rings, and diaphragms.

**LUBE OIL CIRCULATING PUMP
AND MOTOR (Where Used)**

Recondition.

EVERY THREE YEARS**COOLING SYSTEM THERMOSTATIC
VALVE**

Replace "O" rings and thermostatic elements. EMM, M.I. 581

EVERY FOUR YEARS**COOLING SYSTEM PRESSURE CAP**

Replace. Unless 16,000 hour replacement has occurred first.

EVERY SIX YEARS

ENGINE

Replace top deck cover seals and check latches.

EMM. Unless 8000 hour replacement has occurred first.

Replace cylinder head grommets, inlet and outlet seals, and lower liner seals.

EMM. Unless cylinder assembly replacement has occurred first.

MAIN GENERATOR

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

Unless 48,000 hour lubrication has occurred first. M.I. 3327 for EMD generator. If generator is other than EMD, refer to manufacturer's manual.

PERFORM THE FOLLOWING ITEMS ON RUNNING TIME BASIS

AFTER THE FIRST 350 HOURS OF OPERATION

ENGINE NUT AND BOLT TIGHTNESS CHECK

Torque to values specified in EMM.

Cylinder head crab nuts.

Exhaust manifold flange bolts.

Cylinder liner water inlet line nuts and bolts.

Head frame to crankcase bolts.

Turbocharger to air duct bolts, aftercooler to air duct bolts, and air duct to crankcase bolts.

EVERY 350 HOURS

FUEL FILTER

Check fuel pressure gauge with engine at rated RPM.

On units where gauge is connected to filter input side, change filter elements if pressure is greater than 50 psi.

On units where gauge is connected on filter output side, change filter elements if pressure is less than 12 psi.

LUBE OIL FILTER

Check lube oil pressure at filter cover with engine at rated RPM.

Change filter elements if input pressure is greater than 25 psi.

EVERY 700 HOURS**ENGINE PROTECTOR**

Check operation.

EMM, M.I. 259

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 FILTER -- CYCOIL TYPE
(Where Used)**

Check oil level.

EMM, M.I. 442

**ENGINE AIR FILTER -- PANEL TYPE OIL
BATH (Where Used)**

Check oil level.

EMM, M.I. 440

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

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

OM

HEAT EXCHANGER

Inspect corrosion zincs.

EMM

CAUTION

Perform the following maintenance at this time if the only available fuel oil does not meet the sulfur content or distillation recovery specifications contained in M.I. 1750.

The use of good quality, high alkaline reserve lubricating oils is strongly recommended where only high sulfur fuels are available.

LUBE OIL FILTERS

Change filter elements.

Clean lube oil strainers.

EMM. Fill strainer housing with oil, and perform engine prelube procedure before starting engine.

EVERY 700 HOURS (CONT'D)

TURBOCHARGER OIL FILTER

Replace filter element.

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.

SOAK BACK OIL FILTER (Where Used)

Replace filter element.

Same as above.

EVERY 1400 HOURS

LUBE OIL FILTERS

Change filter elements.

Clean lube oil strainers.

Fill strainer housing with oil before starting engine.

TURBOCHARGER OIL FILTER

Replace filter element.

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.

SOAK BACK OIL FILTER (Where Used)

Replace filter element.

Same as above.

PROTECTIVE DEVICES

Check operation.

EMM

CAUTION

Perform the following maintenance at this time if the only available fuel oil does not meet the sediment and ash specifications contained in M.I. 1750.

FUEL FILTERS

Clean or replace suction strainer element.

OM

Change engine mounted filter elements.

EMM. Use only elements equal to original equipment.

EVERY 1400 HOURS (CONT'D)**CAUTION**

Perform the following maintenance at this time if the only available fuel oil does not meet the sulfur content or distillation recovery specifications contained in M.I. 1750.

The use of good quality, high alkaline reserve lubricating oils is strongly recommended where only high sulfur fuels are available.

OIL SYSTEM

Change engine oil.

EMM. Depending upon fuel sulfur content and quality of lubricating oil, it may be necessary to change lube oil even more frequently.

Clean oil pan.

Clean filter housing.

Clean oil suction screens.

Clean scavenging oil screens.

Fill strainer housing with oil before starting engine.

EVERY 2000 HOURS**FUEL FILTERS**

Clean or replace suction strainer element.

OM

Change engine mounted filter elements.

EMM. Use only elements equal to original equipment.

COOLING SYSTEM

Check inhibitor concentration.

M.I. 1748

ENGINE AIR FILTERS -- CYCOIL TYPE

Change oil. Drain and fill only.

EMM, M.I. 442

ENGINE AIR FILTER -- PANEL TYPE OIL BATH

Change oil. Drain and fill only.

EMM, M.I. 440

ENGINE AIR FILTERS -- PAPER TYPE

Take manometer readings. Replace elements if necessary, or whenever the annunciator light indicates plugged filters.

EVERY 2000 HOURS (CONT'D)**ENGINE AIR FILTERS -- FIBERGLASS TYPE**

Replace elements.

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

EVERY 4000 HOURS**EXHAUST SYSTEM**

Remove manifold screen and trap. Check for cracks and clean.	EMM
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EDUCTOR TUBE (Exhaust Stack Mounted)

Inspect for carbon deposits and clean, if necessary.	EMM
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OIL SYSTEM

Change engine oil.	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.
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Clean oil pan.

Clean filter housing.

Clean oil suction screens.

Clean scavenging oil screens.

Fill strainer housing with oil before starting engine.

EVERY 4000 HOURS (CONT'D)

ENGINE

Check pressure drop across aftercoolers; oil bath filter equipped engines only. EMM. Clean air passages if necessary.

Check exhaust manifold base flange bolts for proper tightness. EMM

MAIN GENERATOR (Where Used)

Inspect collector rings and brushes, and replace brushes if required. M.I. 3327 for EMD generator. If generator is other than EMD, refer to manufacturer's manual.

Reverse polarity of collector rings.

GOVERNOR

Change oil. EMM

Lubricate linkage moving parts. EMM

Lubricate governor synchronizing motor, motor bearings. (Where Used.) EMM

EVERY 8000 HOURS

ENGINE NUT AND BOLT 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

EVERY 8000 HOURS (CONT'D)**ENGINE**

Replace top deck cover seals and check latches.	EMM
Qualify injectors.	EMM
Check injector timing and injector rack length.	EMM
Check engine speed.	EMM
Check overspeed trip.	EMM
Remove and clean oil separator element.	EMM
Check pressure drop across aftercooler.	EMM. Clean air passages if necessary.
Inspect viscous damper while engine is being barred over. (Where Used.)	EMM
Inspect vibration damper or harmonic balancer. (Where Used.)	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.	

EXHAUST SYSTEM

Inspect manifold connectors for liner cracks and replace if necessary.	EMM
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MAIN GENERATOR

Visually inspect and clean.	M.I. 3327
Replace collector ring brushes.	

EVERY 8000 HOURS (CONT'D)**EXCITER**

Clean and visually inspect. M.I. 3706

Inspect and replace brushes when required.
Replace brushes in sets only.

STARTING MOTORS (Electric)

Blow out with dry air.

ENGINE AIR FILTER -- CYCOIL TYPE

Change oil and clean sump. EMM, M.I. 442

Check operation of variflow valves.

Check condition of hoses.

ENGINE AIR FILTERS -- PANEL TYPE OIL BATH

Change oil. Clean sump and filter media. M.I. 440

SOAK BACK PUMP MOTOR (Where Used)

Inspect and clean with dry air. OM

Replace brushes. OM

COOLING SYSTEM

Inspect and perform pressure test.

Replace pressure cap if defective.

LUBE OIL FILTER

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

CAUTION

Perform the following maintenance at this time if the only available fuel oil does not meet the sulfur content or distillation recovery specifications contained in M.I. 1750.

The use of good quality, high alkaline reserve lubricating oils is strongly recommended where only high sulfur fuels are available.

ENGINE

Recondition cylinder assemblies. EMM

EVERY 12,000 HOURS

CAUTION

Perform the following maintenance at this time if unit is being used on light load operation and/or lubricating oil does not meet the specifications contained in M.I. 1762.

TURBOCHARGER

Replace.

EMM. Average individual operating conditions will determine frequency.

EVERY 16,000 HOURS

STARTING MOTORS (Air)

Disassemble, clean, and lubricate.

Renew parts if necessary.

EMM

STARTING MOTORS (Electric)

Disassemble, clean, and lubricate.

EMM

Inspect brushes and replace, if necessary.

EMM

FUEL PUMP

Replace coupling spider.

SOAK BACK PUMP (Where Used)

Replace coupling spider.

FREQUENCY GENERATOR (Where Used)

Replace coupling spider.

COOLING SYSTEM

Replace pressure cap.

OM

Inspect filler neck for damage. Replace if damaged.

OM

Take cooling water sample for lab analysis and corrosion test.

EVERY 16,000 HOURS (CONT'D)

ENGINE

Recondition cylinder assemblies.	EMM
Recondition injectors.	EMM
Inspect and qualify connecting rod bearings.	EMM
Inspect and qualify piston cooling tubes.	EMM
Check rocker arms, rocker arm bushings, and cam followers.	EMM
Check lash adjusters.	EMM
Check exhaust valve timing.	EMM

EVERY 24,000 HOURS

ENGINE

Install new thrust collars.	EMM
Install new lower main bearings.	EMM
Replace water pump seals and all worn parts.	EMM

COOLING SYSTEM

Replace flexible coupling seals.

LUBE OIL COOLER

Inspect, clean, and test.	M.I. 927
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HEAT EXCHANGER

Inspect, clean, and test.	EMM
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EVERY 32,000 HOURS**TURBOCHARGER**

Replace.

EMM. Average individual operating conditions will determine frequency.

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

Replace.

GOVERNOR

Recondition.

GOVERNOR BOOSTER SERVO (Where Used)

Disassemble, clean, inspect, and replace O-ring seals.

EMM

FUEL PUMP

Recondition.

M.I. 4110

SOAK BACK PUMP AND MOTOR (Where Used)

Recondition.

M.I. 4101, 4110

EVERY 48,000 HOURS**ENGINE**

Replace vibration damper or harmonic balancer. (Where Used.)

EMM. Replace with viscous damper.

Recondition oil pumps.

EMM

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.

MAIN GENERATOR

Remove bearing cover and inspect for grease contaminations, excessive wear and overheating. Apply new grease.

M.I. 3327 for EMD generator. If generator is other than EMD, refer to manufacturer's manual.

EVERY 72,000 HOURS

ENGINE

Replace crankshaft viscous damper. (Where EMM
Used.)

EVERY 96,000 HOURS

ENGINE

Recondition.

GENERATOR

Recondition.

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