M.I.1704
*Rev. A

MAINTENANCE INSTRUCTION

SERVICE DEPARTMENT · ELECTRO-MOTIVE DIVISION · GENERAL MOTORS · LA GRANGE, ILLINOIS

SCHEDULED MAINTENANCE PROGRAM

ALL SWITCHER MODELS
ALL PASSENGER MODELS
ALL "F" MODELS
ALL GP7 - GP9 MODELS
ALL SD7 - SD9 MODELS

INTRODUCTION

Maintenance Instruction 1704 comprises average recommendations which we believe will insure satisfactory locomotive operation and economical maintenance costs where average load factors and average climatic conditions are encountered. It is intended to serve as a basis which users of EMD locomotives can use to establish maintenance schedules that will meet the specific requirements of their own particular operations.

In previous issues of this Maintenance Instruction we listed five fundamental requirements that are important to any successful maintenance program. We still consider them important and, since only the railroads can provide them, we are again listing them here:

1. Enough and well-trained supervision and quality workmen.
2. Mechanical forces with proper maintenance facilities and tools.
3. Sufficient time for scheduled maintenance to be completed before a locomotive is released for its next assignment.
4. Fuel, lubricating oil, and water treatment that is equal to or better than that required to insure satisfactory engine and steam generator performance.
5. A well-scheduled maintenance program, including an adequate set of maintenance records.

We call your attention to the following special maintenance item not included in the scheduled maintenance program.

After a cylinder assembly equipped with a copper-asbestos cylinder head to liner gasket has been serviced, it is important that this assembly receive the following attention after the first 1,000 miles or 72 hours of operation, or as near thereto as possible:

a. Retorque all liner and crab stud nuts while engine is hot.

b. Visually inspect blade rod bearing surface.

c. Recheck injector timing and rack setting.

d. Make a complete top deck and air box inspection for leaks which may have been previously overlooked.

* This bulletin is revised and supersedes previous issues of this number.

Section 1 covers Maintenance Recommendations for locomotives used in Passenger and Freight service. Section 2 covers Maintenance Recommendations for locomotives used in Switching service. Section 3 covers Scheduled Lubrication Recommendations.

SECTION 1

LOCOMOTIVE MECHANICAL AND ELECTRICAL MAINTENANCE SCHEDULE (SCHEDULE LOCOMOTIVES ACCORDING TO TYPE OF SERVICE)

FREIGHT 2 WEEKS OR 5,000 MILES	PASSENGER 2 WEEKS OR 10,000 MILES	REMARKS
MECHANICAL		
1. INSPECT ENGINE		Engine Maintenance Manual
a. Crankcase		567A and B Engines Only
b. Pistons and liners		
c. Cylinder head mechanism with engine idling.		See Item 14 for other model engines.
2. ENGINE AIR FILTERS		See Items 10, 22 and 31 for other type filters.
a. Change filters (Impingement type only)		
3. CHECK ENGINE LUBE OIL FOR DILUTION OR WATER		Engine Maintenance Manual M.I. 1752
4. CHECK ENGINE COOLING SYSTEM		Engine Maintenance Manual M.I. 580, 4102
a. Water inhibitor		
b. Cooling fans		
c. Shutter operation		
5. CHANGE LUBE OIL FILTERS		More frequent maintenance will be required if fuel and lube oil used do not meet EMD specifications, M.I. 1750 and 1752.
a. Clean lube oil strainers		
6. CHANGE CARBODY AND ELECTRICAL CABINET AIR FILTERS		
7. CHECK CONDITION AND TENSION OF BELTS		Where used - M.I. 904
8. CLEAN RADIATOR ORIFICE VENTS		Where used

FREIGHT 1 MONTH OR 10,000 MILES	PASSENGER 1 MONTH OR 20,000 MILES	REMARKS
	MECHANICAL	
9. CHANGE OR CLEAN FUEL FILTERS		M.I. 732 and 741 - More frequent maintenance will be required if fuel used does not meet EMD specifications - M.I. 1750
a. Sintered bronze		
b. Suction and discharge		
10. ENGINE AIR FILTERS		See Items 2, 22 and 31 for other type filters.
a. Check oil level - add if required (Oil bath type)		M.I. 431
b. Remove and clean panels (Centrifugal type)		Soak panels in mild alkali solution, rinse and blow dry.
11. CHECK CONDITION AND OPERATION OF FAN CLUTCH		Where used
	ELECTRICAL	
12. VISUALLY INSPECT AND CLEAN WHERE REQUIRED		M.I. 586, 1317, 5328, 5374, 4312, 5105, 5300.
a. Controller		
b. Dynamic brake grids		
c. Equipment in electrical cabinet		
13. WASH OUT BATTERY BOXES AND GREASE BATTERY TERMINALS		If battery gravity is low or water usage high, check operation of voltage regulator - Item 27.
a. Check battery water level and gravity.		
FREIGHT 3 MONTHS OR 30,000 MILES	**PASSENGER 3 MONTHS OR 60,000 MILES**	
	MECHANICAL	
14. INSPECT ENGINE		Engine Maintenance Manual 567 AC, BC, and C Engines ONLY. See Item 1 for other models.
a. Crankcase		
b. Pistons and liners		
c. Cylinder head mechanism with engine idling		

FREIGHT 3 MONTHS OR 30,000 MILES	PASSENGER 3 MONTHS OR 60,000 MILES	REMARKS
15. CHANGE ENGINE LUBE OIL		Engine Maintenance Manual M.I. 926, 1757
a. Clean oil suction screen b. Clean scavenging oil screens c. Clean oil pan d. Change oil filters e. Clean filter housing f. Clean and inspect oil filter relief valves		More frequent maintenance will be required if fuel and lube oil used do not meet EMD specifications - M.I. 1750 and 1752.
16. CHECK OPERATION AND ADJUSTMENT		Engine Maintenance Manual
a. Overspeed trip b. Valve lash adjusters		
17. DRAIN CONDENSATE FROM FUEL TANK		
18. CHECK TRACTION MOTOR BLOWER DRIVE FOR SLACK AND WEAR OF CHAIN AND SPROCKET		Where used
19. CLEAN AND INSPECT LUBRICATING NOZZLE, NO. 2 TRACTION MOTOR BLOWER CHAIN DRIVE		Where used
20. CLEAN OIL COOLER BREATHERS		Where used
21. RENEW AIR COMPRESSOR UNLOADER DIAPHRAGMS		M.I. 1110
22. ENGINE AIR FILTERS (CENTRIFUGAL TYPE)		See Items 2, 10 and 31 for other type filters.
a. Remove and clean b. Inspect for missing or loose parts		
23. CHECK BELT DRIVEN TRACTION MOTOR BLOWER SPEED USING HAND TACHOMETER		Where used
ELECTRICAL		
24. INSPECT LEADS AND REPLACE BRUSHES		Experience with individual operations will dictate the frequency of this item. Brush life will vary from three (3) to six (6) months. depending on the type of service and operating conditions. M.I. 3900.
a. Auxiliary generators and alternators b. Traction motors and blower motors c. Headlight dynamotors d. Cooling fan motors		

FREIGHT 3 MONTHS OR 30,000 MILES	PASSENGER 3 MONTHS OR 60,000 MILES	REMARKS
25. MAKE SEQUENCE CHECK OF CONTROL CIRCUITS		
26. CHECK LOW VOLTAGE ELECTRICAL SYSTEM FOR GROUNDS		
27. CHECK OPERATION OF VOLTAGE REGULATOR		Regulator must be at operating temperature - M.I. 4510
28. CHECK COOLING FAN THERMOSTATIC SWITCH AND SHUTTER OPERATION		M.I. 5501, 5507, 5511
29. CHECK OPERATION OF AIR COMPRESSOR CONTROL SWITCHES		M.I. 5510
30. INSPECT AND CLEAN LOAD REGULATORS		M.I. 4504
a. Commutator and slip ring (vane type)		

FREIGHT 6 MONTHS OR 60,000 MILES	PASSENGER 6 MONTHS OR 120,000 MILES	
MECHANICAL		
31. ENGINE AIR FILTERS (OIL BATH TYPE)		See Items 2, 10 and 22 for other type filters. M.I. 431
a. Clean and change oil		
32. TIGHTEN NUTS AROUND OIL COOLER CORE		
33. CLEAN AND INSPECT AIR COMPRESSOR VALVES, SUCTION AND DISCHARGE		M.I. 1110
ELECTRICAL		
34. INSPECT MAIN GENERATOR LEADS AND REPLACE BRUSHES		See Item 24
35. CHECK OPERATION AND CALIBRATION		M.I. 5323, 5511, 5521, 5522, 6831
a. Transition meters		
b. Alarm devices		
1. High temperature		
2. Low oil pressure		
3. High oil suction		
4. No voltage		

FREIGHT 6 MONTHS OR 60,000 MILES	PASSENGER 6 MONTHS OR 120,000 MILES	REMARKS
36. CLEAN AND INSPECT ISOLATION SWITCH		M.I. 4907
37. INSPECT TRACTION MOTOR AIR DUCT BELLOWS		
a. Alignment		
b. Leakage		
c. Wear plates and arm		
38. BLOW DIRT OUT OF RADIATOR AIR PASSAGES		With fans running and shutters open.

FREIGHT 1 YEAR OR 120,000 MILES	PASSENGER 1 YEAR OR 240,000 MILES	
MECHANICAL		
39. CHECK ENGINE CONTROL ADJUSTMENTS		Engine Maintenance Manual Readjust pilot valve setting if engine speed is changed.
a. Injector timing		
b. Injector rack setting		
c. Engine speed		
d. Pilot valve setting		
40. RENEW OIL PRESSURE AND SUCTION DIAPHRAGMS IN ENGINE GOVERNOR		
41. RADIATOR HEADER SCREENS		
a. Clean or renew		
42. CLEAN AND INSPECT SPEED RECORDER		
43. LUBE OIL COOLER CORE		
a. Check temperature differential between lube oil and cooling water into engine.		Clean oil cooler core if required.
44. INSPECT FOR LEAKS		Engine Maintenance Manual Operating Manual
a. Fuel system		
b. Cooling system		
c. Lube oil system		
d. Exhaust system		

FREIGHT 1 YEAR OR 120,000 MILES	PASSENGER 1 YEAR OR 240,000 MILES	REMARKS
45. CLEAN AIR COMPRESSOR FILTERS		M.I. 1110
a. Intake filter		
b. Separator screen		
c. Discharge filter (Pipe line filter)		
ELECTRICAL		
46. CHECK WHEEL SLIP AND GROUND RELAY OPERATION		M.I. 599, 2027, 5353, 5384
47. CHECK SETTING OF RELAYS IN AUTOMATIC TRANSITION CIRCUIT		M.I. 2044, 5360, 5497, 6825, 6829, 6833, 6834, 6835
48. CLEAN AND INSPECT MAGNET VALVES		M.I. 4704
a. Electro-pneumatic governor control		

PASSENGER 15 MONTHS OR 300,000 MILES	
49. UNIT EXCHANGE TRACTION MOTORS	

FREIGHT 18 MONTHS OR 180,000 MILES	PASSENGER 18 MONTHS OR 360,000 MILES	
MECHANICAL		
50. RECONDITION ALL CYLINDER ASSEMBLIES EQUIPPED WITH COPPER-ASBESTOS GASKETS		Engine Maintenance Manual 567A and 567B engines - See Item 51 for "C" engines
a. Renew head seals, gaskets and liner seals		
b. Renew piston rings		
c. Clean crankcase top deck, air box and oil pan		

FREIGHT 2 YEARS OR 240,000 MILES	PASSENGER 2 YEARS OR 480,000 MILES	REMARKS
MECHANICAL		
51. RECONDITION ALL CYLINDER ASSEMBLIES EQUIPPED WITH GROMMETS AND ALL-METAL GASKETS a. Replace grommets, all-metal gaskets and lower liner seals b. Renew piston rings c. Clean crankcase top deck, air box and oil pan		Engine Maintenance Manual 567AC, 567BC and 567C engines
52. TAKE COMPRESSION LEAD READINGS OF ALL CYLINDERS		Engine Maintenance Manual
53. REMOVE BATTERIES, CLEAN AND PAINT BATTERY BOXES		
54. RECONDITION ACCESSORY DRIVE GEAR (LEAF SPRING TYPE ONLY)		Engine Maintenance Manual Change to hardened face plates
55. UNIT EXCHANGE INJECTORS		
56. RECONDITION AIR COMPRESSOR CYLINDER ASSEMBLIES		
57. RECONDITION WATER PUMPS		Engine Maintenance Manual
58. RENEW ALL WATER HOSES		
ELECTRICAL		
59. RECONDITION FUEL PUMP AND MOTOR		M.I. 4101, 4110
60. RENEW VERNATHERM BULB ASSEMBLY #8081076		M.I. 5501

FREIGHT 2½ YEARS OR 300,000 MILES	REMARKS
ELECTRICAL	
61. UNIT EXCHANGE TRACTION MOTORS	
62. DYNAMIC BRAKE BLOWER MOTORS a. Inspect leads and replace brushes if required.	

FREIGHT 4 YEARS OR 480,000 MILES	PASSENGER 4 YEARS OR 960,000 MILES	REMARKS
63. INSTALL NEW THRUST COLLARS AND NEW LOWER MAIN BEARINGS		Engine Maintenance Manuals
64. UNIT EXCHANGE ENGINE GOVERNOR		
65. UNIT EXCHANGE ENGINE BLOWERS		
66. UNIT EXCHANGE COOLING FAN (TYPE I666 ONLY)		
FREIGHT 6 YEARS OR 720,000 MILES	**PASSENGER 6 YEARS OR 1,440,000 MILES**	
67. UNIT EXCHANGE ENGINE ASSEMBLY		567A and 567B engines only. See Item 73 for "C" engines
68. UNIT EXCHANGE MAIN GENERATOR		Experience may show Items 68 through 72 can be postponed to coincide with Item 73 on late model units.
69. UNIT EXCHANGE a. Auxiliary generator b. Dynamic brake blower motor - c. Cooling fan motors d. Traction motor blower motors		
70. RECONDITION ENTIRE AIR COMPRESSOR ASSEMBLY		M.I. 1065, 1110
71. CLEAN AND RECONDITION ENTIRE CARBODY		
72. CLEAN AND RECONDITION a. Fuel tank b. Water tank c. Battery boxes		

FREIGHT 8 YEARS OR 960,000 MILES	PASSENGER 8 YEARS OR 1,920,000 MILES	SWITCHER 8 YEARS	REMARKS
73. UNIT EXCHANGE ENGINE ASSEMBLY			567 AC, 567 BC and 567 C engines
74. RENEW HIGH VOLTAGE CABLE			It is recognized that this work (Items 74 and 75) is normally scheduled with other major repairs and not at this particular time or mileage. Shop efficiency may require this operation at time of engine and generator unit exchange.
75. RENEW LOW VOLTAGE WIRING			

NON-SCHEDULED MECHANICAL AND ELECTRICAL MAINTENANCE

A definite schedule for the items listed below cannot be established due to variation in wheel life and truck overhaul periods. This rework to be performed at wheel change time or when truck is removed for reconditioning.

1. MAGNAFLUX a. Pinion gears b. Axles gears c. Axles with inner races removed	M.I. 1518
2. CHECK TRACTION MOTOR ARMATURE BEARINGS	Whenever truck assembly is removed from locomotive, check traction motors for any unusual bearing noise or heat at not less than 1500 RPM. M.I. 3900
3. CLEAN AND RECONDITION HYATT JOURNAL BOXES	M.I. 1552

SECTION 2

LOCOMOTIVE MECHANICAL AND ELECTRICAL MAINTENANCE SCHEDULE

SWITCHER
2 WEEKS

MECHANICAL

1. ENGINE AIR FILTERS a. Change filters (Impingement type only)	See Items 9, 13, 19 and 27 in this section for other type filters.

SWITCHER 1 MONTH	REMARKS
MECHANICAL	
2. CHECK ENGINE LUBE OIL FOR DILUTION OR WATER	Engine Maintenance Manual M.I. 1752
3. CHECK ENGINE COOLING SYSTEM	Engine Maintenance Manual
a. Water inhibitor b. Cooling fans c. Shutter operation	
4. CHANGE LUBE OIL FILTERS	More frequent maintenance will be required if fuel and lube oil used do not meet EMD specifications - M.I. 1750 and 1752.
a. Clean lube oil strainers	
5. CHANGE CARBODY AIR FILTERS	
6. INSPECT TRACTION MOTOR AIR DUCT BELLOWS	
a. Alignment b. Leakage c. Wear plates and arm	
7. BLOW DIRT OUT OF RADIATOR AIR PASSAGES	With fans running and shutters open.
8. CHECK CONDITION AND TENSION OF BELTS	M.I. 904
9. ENGINE AIR FILTER (CENTRIFUGAL TYPE)	Soak panels in mild alkali solution, rinse and blow dry. See Items 1, 13, 19, and 27 for other type filters.
a. Remove and clean panels.	
ELECTRICAL	
10. WASH OUT BATTERY BOXES AND GREASE BATTERY TERMINALS	If battery gravity is low and water usage is high, check operation of voltage regulator, Item 24.
a. Check battery water level and gravity	

SWITCHER 3 MONTHS	REMARKS
MECHANICAL	
11. INSPECT ENGINE	Engine Maintenance Manual
a. Crankcase b. Pistons and liners c. Cylinder head mechanism with engine idling	
12. CHANGE OR CLEAN FUEL FILTERS	M.I. 732, 741 - More frequent maintenance will be required if fuel used does not meet EMD specifications - M.I. 1750
a. Sintered bronze b. Suction and discharge	
13. ENGINE AIR FILTERS (OIL BATH TYPE)	See Items 1, 9, 19 and 27 for other type filters. M.I. 431
a. Check oil level - add if required	
14. DRAIN CONDENSATE FROM FUEL TANK	
15. CLEAN AIR COMPRESSOR FILTERS AND SCREENS	M.I. 1110
a. Intake filter b. Separator screen c. Discharge filter (Pipe line filter)	
16. CHECK OPERATION AND ADJUSTMENT	Engine Maintenance Manual
a. Overspeed trip b. Valve lash adjusters	
17. CLEAN OIL COOLER BREATHERS	
18. RENEW AIR COMPRESSOR HIGH AND LOW PRESSURE UNLOADER DIAPHRAGMS	M.I. 1110
19. ENGINE AIR FILTERS (CENTRIFUGAL TYPE)	See Item 1, 9, 13 and 27 for other type filters.
a. Remove and clean b. Inspect for loose or missing parts	
ELECTRICAL	
20. CHECK COOLING FAN THERMOSTATIC SWITCH AND SHUTTER OPERATION	M.I. 5501, 5507

SWITCHER 3 MONTHS	REMARKS
ELECTRICAL	
21. INSPECT AND CLEAN LOAD REGULATOR a. Commutator and slip ring (Vane type) b. Slip ring, contact button and brushes (Face plate type)	M.I. 4504, 4511
22. CHECK OPERATION OF AIR COMPRESSOR CONTROL SWITCHES	M.I. 5510
23. MAKE SEQUENCE CHECK OF CONTROL CIRCUIT	M.I. 5388, 5380, 6826, 6833, 6835
24. CHECK OPERATION OF VOLTAGE REGULATOR	Must be at operating temperature M.I. 4510
25. VISUALLY INSPECT AND CLEAN WHERE REQUIRED a. Controller b. Dynamic brake grids c. Equipment in electrical cabinet	M.I. 586, 1317, 2040, 4312, 5300 and 5374
SWITCHER 6 MONTHS	
MECHANICAL	
26. CHANGE ENGINE LUBE OIL a. Clean lube oil strainers b. Clean scavenging oil screens c. Clean oil pan d. Change oil filters e. Clean filter housing f. Clean and inspect oil filter relief valves	Engine Maintenance Manual - More frequent maintenance will be required if fuel and lube oil used do not meet EMD specifications - M.I. 1750 and 1752.
27. ENGINE AIR FILTERS (OIL BATH TYPE) a. Clean and change oil	See Items 1, 9, 13 and 19 for other type filters M.I. 431

SWITCHER 6 MONTHS	REMARKS
ELECTRICAL	
28. INSPECT LEADS AND REPLACE BRUSHES a. Main and auxiliary generators b. Alternators c. Traction motors and traction motor blower motors. d. Headlight dynamotors e. Dynamic brake blower motors	Be certain that locomotive will operate until next inspection period before brush condemning limit is reached.
SWITCHER 1 YEAR	
MECHANICAL	
29. TAKE COMPRESSION LEAD READINGS OF ALL CYLINDERS	Engine Maintenance Manual
30. CHECK ENGINE CONTROL ADJUSTMENTS	Readjust pilot valve setting if engine speed is changed.
31. RENEW OIL PRESSURE AND SUCTION DIAPHRAGMS IN ENGINE GOVERNOR	
32. INSPECT AND CLEAN AIR COMPRESSOR VALVES	M.I. 1110
33. RADIATOR HEADER SCREENS a. Clean or renew	
34. CLEAN AND INSPECT SPEED RECORDER	If used.
ELECTRICAL	
35. CHECK WHEEL SLIP AND GROUND RELAY OPERATION	M.I. 599, 2027, 5353, 5384
36. CHECK SETTINGS OF RELAYS IN AUTOMATIC TRANSITION CIRCUIT	M.I. 2044, 5360, 6825, 6829, 6833
37. INSPECT AND CLEAN ISOLATION SWITCH	M.I. 4907
38. CHECK LOW VOLTAGE ELECTRICAL SYSTEM FOR GROUNDS	

SWITCHER 1 YEAR	REMARKS
ELECTRICAL	
39. CHECK OPERATION AND CALIBRATION a. Transition meters b. Alarm devices 1. High temperature 2. Low oil 3. High suction 4. No voltage	M.I. 5511, 5521, 5522, 5323, 6831
SWITCHER 2 YEARS	
MECHANICAL	
40. LUBE OIL COOLER CORE a. Check temperature differential between lube oil and cooling water into engine.	Clean oil cooler core if required
41. REMOVE BATTERIES AND PAINT BOXES	
ELECTRICAL	
42. RENEW DIAPHRAGMS (Pneumatic-Hydraulic Governor) a. Transmitter - Controller b. Receiver - Governor	Engine Maintenance Manual
SWITCHER 3 YEARS	
MECHANICAL	
43. RECONDITION ALL CYLINDER ASSEMBLIES EQUIPPED WITH COPPER ASBESTOS-GASKET a. Renew head seals, gaskets, and liner seals b. Renew piston rings c. Clean crankcase top deck, air box and oil pan	Engine Maintenance Manual 567A and 567B engines only. See Item 47 for "C" engines.

SWITCHER 3 YEARS	REMARKS
MECHANICAL	
44. UNIT EXCHANGE INJECTORS	Engine Maintenance Manual
45. RECONDITION AIR COMPRESSOR CYLINDER ASSEMBLIES	M.I. 1065, 1110 Experience may show that Items 44 and 45 can be postponed to coincide with engine cylinder assembly reconditioning (Item 47) on late model units.
46. RECONDITION WATER AND FUEL PUMPS	Engine Maintenance Manual M.I. 4110
SWITCHER 6 YEARS	
MECHANICAL	
47. RECONDITION ALL CYLINDER ASSEMBLIES EQUIPPED WITH GROMMETS AND ALL-METAL GASKETS a. Replace grommets, all-metal gaskets, and lower liner seals b. Renew piston rings c. Clean crankcase top deck, air box and oil pan	Engine Maintenance Manual 567AC, 567BC, and 567C engines
48. RECONDITION ACCESSORY DRIVE GEAR (LEAF SPRING TYPE ONLY)	Engine Maintenance Manual Change to hardened face plates
49. INSTALL NEW THRUST COLLARS AND NEW LOWER MAIN BEARINGS	Engine Maintenance Manual
50. UNIT EXCHANGE ENGINE GOVERNOR	
51. UNIT EXCHANGE ENGINE BLOWERS	
52. RENEW COOLING FAN BEARING	Switcher type only
SWITCHER 8 YEARS	
53. UNIT EXCHANGE ENGINE ASSEMBLY	567A and 567B engines only

SWITCHER 8 YEARS	REMARKS
54. UNIT EXCHANGE MAIN GENERATOR	Experience may show that Items 55 through 61 can be postponed to coincide with Item 62 on late model units
55. UNIT EXCHANGE TRACTION MOTORS	
56. UNIT EXCHANGE a. Auxiliary generator b. Dynamic brake blower motors c. Cooling fan motors d. Traction motor blower motors	
57. RECONDITION ENTIRE AIR COMPRESSOR ASSEMBLY	M.I. 1110
58. CLEAN AND RECONDITION HOOD AND CAB	
59. CLEAN AND RECONDITION a. Fuel tank b. Battery boxes	
60. RENEW HIGH VOLTAGE CABLE	It is recognized that this work is normally scheduled with other major repairs and not at this particular time or mileage. Shop efficiency may require this operation at time of engine and generator unit exchange.
61. RENEW LOW VOLTAGE WIRING	It is recognized that this work is normally scheduled with other major repairs and not at this particular time or mileage. Shop efficiency may require this operation at time of engine and generator unit exchange.
SWITCHER 12 YEARS	
62. UNIT EXCHANGE ENGINE ASSEMBLY	567AC, 567BC, and 567C engines

NON-SCHEDULED MECHANICAL AND ELECTRICAL MAINTENANCE

A definite schedule for the items listed below cannot be established due to variation in wheel life and truck overhaul periods. This rework to be performed at wheel change time or when truck is removed for reconditioning.

1. MAGNAFLUX a. Pinion gears b. Axle gears c. Axles with inner races removed	M.I. 1518
2. CHECK TRACTION MOTOR ARMATURE BEARINGS	Whenever truck assembly is removed from locomotive, check traction motors for any unusual bearing noise or heat at not less than 1500 RPM. M.I. 3900
3. CLEAN AND RECONDITION HYATT JOURNAL BOXES	M.I. 1552

SECTION 3

LOCOMOTIVE LUBRICATION SCHEDULE AND LUBRICANTS

The frequency of the lubricating periods indicated in this Section has been established by information received from those Railroads following EMD lubrication recommendations. It may be found that more or less frequent lubrication may be necessary than indicated herein. This is not necessarily an indication that the information is in error or that the equipment is defective. Final schedules must be determined from operating conditions, using the specified periods as a guide.

The following assemblies now have factory sealed bearings which require no further lubrication. When older types of these assemblies having unsealed bearings are replaced, the Unit Exchange or Repair and Return order should specify the installation of sealed bearings.

a. Fuel pump motors, headlight dynamotors, and cab heater motors.
b. Cooling fan motors.
c. Traction motor blower motors.
d. Dynamic brake blower motors.
e. Auxiliary generators
f. Traction motors.

FREIGHT 1 WEEK OR 2,500 MILES	SWITCHER 1 WEEK	REMARKS
1. TRACTION MOTOR - Armature Bearing (Oil Type - 12 tooth pinion only)		See M.I. 1756. Add 6 ounces to each bearing.

PASSENGER 1 WEEK OR 5,000 MILES	SWITCHER 1 MONTH	REMARKS
2. TRACTION MOTOR - Support Bearings		See M.I. 1756. Fill to 5". Capacity 5 quarts. Do not overfill.
3. TRACTION MOTOR - Gear Case		Sinclair Jet TM. or equivalent. Add as inspection indicates. Keep teeth from becoming bright.
4. TRACTION MOTOR - Blower Chain Case (E7 - No. 1 engine only)		See M.I. 1756. Check level, add oil as necessary.
5. JOURNAL BOX - Roller Bearing Type		See M.I. 1756. Maintain to fill plug level. Use gauge 8084927.
6. JOURNAL BOX - Friction Type		See M.I. 1756. Maintain to proper level. Capacity 2 quarts.
7. SPEED RECORDER - Drive Cable		Per manufacturer's instructions.
FREIGHT 2 WEEKS OR 5,000 MILES		
8. TRACTION MOTOR - Support Bearings		See M.I. 1756. Fill to 5". Capacity 5 quarts.
9. TRACTION MOTOR - Gear Case		Sinclair Jet TM or equivalent. Add as inspection indicates. Keep teeth from becoming bright.
10. JOURNAL BOX - Roller Bearings		See M.I. 1756. Maintain to fill plug level. Use gauge 8084927.
11. SPEED RECORDER - Drive Cable		Per manufacturer's instructions.
12. COUPLER - Standard and fixed types		Ball bearing grease. Apply grease at fittings as required.
PASSENGER 2 WEEKS OR 10,000 MILES		
13. TRACTION MOTOR - Armature Bearings - Oil Type		See M.I. 1756. Add 6 ounces to each bearing.

FREIGHT 1 MONTH OR 10,000 MILES	REMARKS
14. TRACTION MOTOR - Armature Bearing - Oil Type (All gear ratios except 65/12, see Item 1)	See M.I. 1756. Add 6 ounces to each bearing.

FREIGHT 1 MONTH OR 10,000 MILES	PASSENGER 1 MONTH OR 20,000 MILES	
15. CONTROLLER - Drum Type		Light oil. Add several drops to top oil holes.
16. WATER PUMPS - Diesel Engine		SAE #40 engine oil. See M.I. 1756. Fill cup on water pump.
17. BELL RINGER		SAE #10 oil. Add as required.
18. LINKAGE - Throttle, Governor and Shutter (where applicable)		Ball bearing grease and light oil. Sparingly apply appropriate lubricant as determined by fitting concerned.
19. TRUCK - Center Bearing (equipped with lubricator box).		See M.I. 1756. Soak up waste in oiler box.
20. DIAPHRAGM - Centering device, lower center stem and coupling centering device.		Ball bearing grease. Lubricate at grease fittings.
21. SPEED RECORDER UNIT		Per manufacturer's instructions.
22. COOLING FANS - Mechanical Driven		
a. FT		See M.I. 1756. Add oil to top of filler hole.
b. Grease packed SW & E7		Ball bearing grease. Add small amount of grease.
c. Well type SW & E7		See M.I. 1756. Fill to overflow plug.
23. COOLING FANS - Idler FT, SW, E7		Ball bearing grease. Add small quantity.

FREIGHT 1 MONTH OR 10,000 MILES	PASSENGER 1 MONTH OR 20,000 MILES	REMARKS
24. COOLING FANS - Jackshaft E7 - SW		
a. Grease type		Ball bearing grease. Add small quantity.
b. Oil type		See M.I. 1756. Fill to side level plug.
25. AIR COMPRESSOR - "Vortox" air cleaners (Switchers)		See M.I. 1756. Change when oil is dirty. Fill to level mark.

FREIGHT 1 MONTH OR 10,000 MILES	PASSENGER 1 MONTH OR 20,000 MILES	SWITCHER 1 MONTH	
26. COOLING FAN - 90° drive clutch (FT)			Ball bearing grease. Add small amount of grease to both clutch throw out bearings in sheave of fan drive at front of engine. See M.I. 1756. Apply oil to clutch pins and rollers.
27. TRACTION MOTOR BLOWER Bearing FT & E7			Ball bearing grease. Add small amount to shaft bearings.
28. HYDRO-PNEUMATIC DRAFT GEAR - E7			SAE #10 oil. Check oil level in tanks with gear at half travel. Fill to side level plug.
29. BATTERY - Terminals			Petroleum jelly. Maintain a liberal coating on terminals.

FREIGHT 1½ MONTHS OR 15,000 MILES	PASSENGER 1½ MONTHS OR 30,000 MILES	SWITCHER 6 MONTHS	
30. TRACTION MOTOR - Armature bearings, grease type - D7 - D7A			Lubrico M6 or Regal Starfax #2. Add 2 ounces to each bearing.

FREIGHT 3 MONTHS OR 30,000 MILES	PASSENGER 3 MONTHS OR 60,000 MILES	SWITCHER 3 MONTHS	
31. BRAKE BLOWER MOTOR - FT			Ball bearing grease. Add one shot from hand gun.

FREIGHT 3 MONTHS OR 30,000 MILES	PASSENGER 3 MONTHS OR 60,000 MILES	SWITCHER 3 MONTHS	REMARKS
32. MAIN GENERATOR - Bearing			Lubrico M6 or Regal Starfax #2. Add not over 1 ounce to bearing. Capacity 34 ounces.
33. FLEXIBLE COUPLINGS - Falk and Gear Types			NLGI #3 grease. Fill to capacity.
34. HAND BRAKE WHEEL			Light oil. Apply sparingly through oil hole provided.
35. BRAKE-SLACK ADJUSTER SCREWS			Graphite grease. Keep surfaces coated.
36. LINKAGE BEARINGS - Electrical contactors as required. Refer to specific Maintenance Instructions			Light machine oil. Apply sparingly to operating linkage. Wipe off excess.
37. CHANGE ENGINE LUBE OIL (Freight and Passenger only)			See M.I. 1752. Quantity depends on engine size. See specific operating manual.
38. CHANGE OIL IN AIR COMPRESSOR OIL BATH AIR FILTER			M.I. 1110

SWITCHER 6 MONTHS	
39. CHANGE ENGINE LUBE OIL	See M.I. 1752. Quantity depends on engine. See specific operating manual.

FREIGHT 6 MONTHS OR 60,000 MILES	PASSENGER 6 MONTHS OR 120,000 MILES	SWITCHER 6 MONTHS	
40. ISOLATION SWITCH - (all except Type P, refer to M.I. 4907)			Electric contact grease #8196884. Apply to contacts sparingly.
41. CONTROLLER SLIDING CONTACTS - (other than roller switch type)			Electric contact grease #8196884. Apply to contacts sparingly,
42. REVERSER CONTACTS			Electric contact grease #8196884. Apply to contacts sparingly.
43. CHANGE ENGINE GOVERNOR OIL			See M.I. 1752. Drain and refill. Capacity 3 quarts. Maintain level between marks on sight glass.

FREIGHT 6 MONTHS OR 60,000 MILES	PASSENGER 6 MONTHS OR 120,000 MILES	SWITCHER 6 MONTHS	REMARKS
44. VOLTAGE REGULATOR (Allis Chalmers Type)			Clock oil. One drop on each sector bearing and connecting pin.
45. ELECTRO-PNEUMATIC GOVERNOR CONTROL LINKAGE AND AIR CYLINDERS (FT, F2, E7, TR2)			Use engine oil on linkage and air engine oil on cylinders. Apply sparingly with hand oiler.
46. SWITCHES - Pressure and Temperature			Light oil. Oil moving parts sparingly.
47. SPEED RECORDER - Drive			Per manufacturer's instructions.
48. 90° FAN DRIVE - Gear Box (FT)			See M.I. 1756. Clean and change oil. Capacity 3 gallons.
49. TRACTION MOTOR BLOWER - Chain Drive (E7)			See M.I. 1756. No. 1 engine only. Drain, flush and refill.
50. CHANGE AIR COMPRESSOR OIL			See M.I. 1756. Drain and refill. Capacity depends on air compressor model. See M.I. 1110.
51. MARS HEADLIGHT			Ball bearing grease. Add 1 ounce to gear housing at push type fitting.
52. WINDSHIELD WIPER			Air engine oil. Lubricate air chamber parts.
53. DEFROSTER MOTOR			Light machine oil. Lubricate sparingly with hand oiler.
54. HARDWARE - Door and Window			Engine oil. Lubricate sparingly with hand oiler.
55. AIR COMPRESSOR UNLOADER - all metal type			Light machine oil. Lubricate moving parts when valves are inspected and cleaned.

FREIGHT 1 YEAR OR 120,000 MILES	PASSENGER 1 YEAR OR 240,000 MILES	SWITCHER 1 YEAR	
56. TRAIN CONTROL MOTOR GENERATOR (Where used)			Ball bearing grease. Per manufacturer's instructions.

FREIGHT 1 YEAR OR 120,000 MILES	PASSENGER 1 YEAR OR 240,000 MILES	SWITCHER 1 YEAR	REMARKS
57. AIR CYLINDERS - Reverser, Cam Switch, Braking and Power Contactors			Grease #8196884. Apply grease to cylinder walls. Use engine oil sparingly on push and clevis pin.
58. REVERSER & CAMSWITCH - Rack & Gear Shaft Ball Bearings - Rack & Gear			Ball bearing grease. Grease #8196884. Replace pipe plugs with grease fittings and lubricate sparingly. Apply lubricant on gear teeth.

SWITCHER 2 YEARS	
59. AIR COMPRESSOR - Flex Coupling Pilot	Ball bearing grease. Grease when coupling is removed for reconditioning.

LUBRICATION REFERENCE

Name	Part No.	Quantity	Part No.	Quantity
Texaco Regal Starfax #2 Grease	8035764	2 lbs.	8079816	25 lbs.
Texaco #691 Car Oil	8039278	5 gal.		
Lubriko M-6 Master Lubricants	8122383	1 qt.	8122384	1 gal.
*N. L. G. I. #3 Grade Grease	8102585	5 lbs.	8102587	25 lbs.
Shock Absorber Fluid	043046	1 gal.		
Clock Oil	8067552	1 gal.		
Speed Recorder Oil	8082436	1 gal.		
Petroleum Jelly	8099452	1 lb.		
Sinclair Jet Lube TM	8188793	35 lbs.	8188794	100 lbs.
Chevron OHT Grease	8190451	5 lbs.		
Lubriplate Aero Low Flow, High Melt Grease	8196884	1 lb.		
Lubriplate 630AA Non Flow, High Melt Grease	8196886	1 lb.		
Pioneer PO-10 Torque Motor Bearing Oil	8198167	6 oz.		
Shell Cyprina RA Grease	8249819	35 lbs.	8249820	120 lbs.
Air Engine Grease	8227283	1 gal.		
Graphite	8122392	5 lbs.		

*N. L. G. I. stands for National Lubricating Grease Institute.