2026

Annual Inspection
Diesel Locomotive

Feather River Rail Society

WP1503

Make:	EMD	Serial Number:	72692-3
Model:	SW1500	Manufacture Date:	May 1973
Prime Mover:	12-645E	Fuel Oil Capacity:	1100 Gallons
Main Generator:	D32	Lube Oil Capacity:	284 Gallons
Alternator:	N/A	Coolant Capacity:	230 Gallons
Auxiliary Generator:	A-10	Hour Meter:	N/A
Traction Motors:	D77 (4)		
Air Compressor:			

With reference to manufacturer's service literature, this locomotive has been inspected, serviced, repaired and otherwise made ready for the service type indicated below:

Signature - Nicholas Manos, CMO

Mechanic Initials	Full Name
NM	Nicholas Manos
EM	Eric Manos

Service Type	Approved (Y/N)	Date of Approval	Limitations
Run A Locomotive			
Yard switching			
Caboose train			

Feather River Rail Society

WP1503 2026 Inspection Record

Item	Section	Task	Required Tools	INSP INIT	Date
1	Pre-movement	Drain condensate from oil sump	• Wrench, 12” adjustable • Bucket, waste		
2	Pre-movement	Drain condensate from fuel sump	• Wrench, 12” adjustable • Bucket, waste		
3	Pre-movement	Remove any exhaust stack covers			
4	Safety	Secure locomotive in place by setting handbrake and chocking wheels	• Chocks, wheel		
5	Safety	Shutdown locomotive, if running. Remove reverser handle and lockout and/or tag the generator field switch in OFF position. Verify isolation switch is in ‘START/ISOLATE’ position and tag. Verify main battery switch is ‘OFF’ and tag. Remove starter fuse	• Tags • Marker		
6	Safety	Secure track and locomotive with BLUE FLAG to notify other personnel of the presence of workmen	• Flag(s), Blue		
7	Battery	Inspect battery cases for cracks, swelling or other damage. Inspect battery wells/boxes for spills and corrosion. Wash out any corrosion with baking soda solution, followed by clean water rinse	• Gloves, insulated/chemical resistant • Shield, face		
8	Battery	Verify all battery connections are tight and corrosion free. USING APPROPRIATE INSULATED GLOVES AND TOOLS, Disassemble and clean any corroded contacts and coat with dielectric grease before reassembly	• Gloves, insulated • Wrench, 3/4” insulated		
9	Battery	Inspect electrolyte levels in all cells. Electrolyte level should be 1/4” from bottom of fill tube. Fill with distilled water ONLY	• Gloves, insulated/chemical resistant • Shield, face		
10	Battery	Replace all battery caps and check physical battery installation. Shim with wood, as needed	• Gloves, insulated/chemical resistant • Shield, face		
11	Battery	Charge batteries a minimum of 24 hours, 72 hours is ideal. Post flag while charging to alert personnel of the potential presence of hydrogen gas	• Flag, “Batteries Charging”		
12	Battery	Remove charger. Close and secure battery boxes			
13	Walk Around	Inspect pilots and footboard soundness and mounting security			
14	Walk Around	Verify pilot clearance over top of rail is at least 2.5”	• Measure		
15	Walk Around	Inspect condition of brake hoses and glad hands, replacing any worn or damaged gaskets			
16	Walk Around	Inspect condition of MU hoses and fittings			
17	Walk Around	Inspect condition and operation of MU valves			
18	Walk Around	Inspect sander piping, hose and fittings for condition and security			
19	Walk Around	Verify all number boards, markings and stencils are sound, legible and accurate			
20	Walk Around	Inspect stairwells, walkways and all access doors/panels. Verify all latches, floor and stair tread, toe plates and handrails are secure and sound			

Item	Section	Task	Required Tools	INSP INIT	Date
21	Walk Around	Inspect folding walkway bridge, rails and safety chains. Verify all mounts are secure and that all hinges and latches are in place and operable			
22	Walk Around	Inspect physical condition of all lights and housings			
23	Walk Around	Verify all grab bars are securely mounted and sound. Verify minimum 2.5” clearance to mounting surface	• Measure		
24	Walk Around	Verify all cab doors open and close properly. Lube hinges. Verify lock operation. Lube lock with dry graphite.			
25	Walk Around	Verify cab and engine room fire extinguishers are present and properly and securely mounted. Verify ‘FIRE EXTINGUISHER INSIDE’ stenciling or signage is present and legible on engine room door. Verify extinguisher has been serviced within the past year. Schedule service, as needed, keeping in mind it must be qualified through the end of the operating season			
26	Walk Around	Inspect seats and armrests. Verify secure mounting and proper range of adjustment			
27	Walk Around	Inspect all glass for cracks and/or breakage			
28	Walk Around	Verify all mirrors and armrests are in place and sound			
29	Walk Around	Replace all windshield wiper rubber			
30	Couplers	Inspect coupler, coupler mounting and draft gear for excessive wear and broken or cracked components			
31	Couplers	Inspect cutting lever(s) for secure mounting, soundness and proper operation			
32	Couplers	Center the coupler. Close and lock the knuckle. Verify there is a minimum of 1.75” of travel between pin lift rod and pin lift eye	• Measure		
33	Couplers	Verify the center of the pin lift rod is no more than 3.75” beyond the rear face of the coupler horn	• Measure		
34	Couplers	Inspect coupler height. From the top of the rail, the center of the coupler must be between 31.5” and 34.5”	• Measure • Level, box		
35	Couplers	Engage coupling lever and verify smooth opening of the knuckle			
36	Trucks	Inspect overall truck for any dragging or loose equipment, missing securements or any physical damage			
37	Trucks	Inspect all sanding pipes and pipe clips			
38	Trucks	Inspect truck frame for cracks or damage			
39	Trucks	Inspect swing hanger for breaks, bends and cracks			
40	Trucks	Inspect swing hanger pin or bushing clearance (.125” MAX)			
41	Trucks	Inspect swing hanger bearing block wear (.125” MAX between halves)			
42	Trucks	Inspect leaf springs for cracks, breaks or other damage			

Item	Section	Task	Required Tools	INSP INIT	Date
43	Trucks	Inspect leaf springs for weakness, indicated by a gap of more than .125” underneath end of second longest leaf			
44	Trucks	Inspect spring plank to safety strap clearance for MIN .375” clearance			
45	Trucks	Inspect all journal box coil springs for breaks			
46	Trucks	Fill both truck center plate cups full with journal oil			
47	Suspension Journals	Not applicable to this unit			
48	Suspension Journals	Not applicable to this unit			
49	Suspension Journals	Not applicable to this unit			
50	Suspension Journals	Not applicable to this unit			
51	Suspension Journals	Not applicable to this unit			
52	Suspension Journals	Not applicable to this unit			
53	Hyatt Journals	Inspect for loose or broken bolts and pedestal liners			
54	Hyatt Journals	Inspect journal box to pedestal liner clearance (.375” MAX each side)	• Measure		
55	Hyatt Journals	Visually inspect oil condition. Gold coloring indicates excessive brass wear material is present and the oil should be drained			
56	Hyatt Journals	Inspect oil level. Fill to overflow using journal oil, available in pitcher marked ‘JOURNAL OIL’ on the mechanic’s workbench	• Oil, journal		
57	Wheels	Inspect wheels for cracks or breaks			
58	Wheels	Inspect each wheel for flat spots. Using a wheel defect gauge, check for any single spot larger than 2.5” or any two adjoining spots greater than 2” each. Record result in Appendix A	• Gauge, wheel defect		
59	Wheels	Inspect wheel for shelling. Using a wheel defect gauge, check for any single spot larger than 2.5” or any two adjoining spots greater than 2” each. Record result in Appendix A	• Gauge, wheel defect		
60	Wheels	Inspect wheel for any chips or gouges in the flange that exceeds 1.5” in length and .5” in width, as measured at the top of the flange. Record result in Appendix A	• Gauge, wheel defect		
61	Wheels	Measure for thin flange condition with wheel defect gauge. Holding gauge at 90 degree angle to back face of rim, slide the 7/8” slot over the flange. The gauge must NOT slide down to the point of contact with the wheel tread. Record result in Appendix A	• Gauge, wheel defect		
62	Wheels	Using wheel condemning gauge, check for a high flange. Hold gauge against back face of rim and tip should contact wheel tread, showing flange is less than 1.5” tall. If the gauge is stopped by contact with the top of the flange, the tread has worn and the flange is too high. Record result in Appendix A	• Gauge, wheel condemning		

Item	Section	Task	Required Tools	INSP INIT	Date
63	Wheels	Measure rim thickness by placing wheel gauge against back face of rim. Lower gauge until the front of gauge touches the flange and then read the thickness on the back gauge scale. Thickness must be .75” or greater for switcher, 1” or greater for road locomotive. Record result in Appendix A	• Gauge, wheel condemning		
64	Brakes	Inspect all brake rigging - levers, bushings, pins, clips and other fasteners			
65	Brakes	Inspect all brake pipes and pipe clips			
66	Brakes	Inspect truck air isolation valves and verify operation			
67	Brakes	Verify brake cylinder is securely fastened to truck			
68	Brakes	Inspect brake shoe alignment. Shoes must make full contact with wheel tread. Mis-aligned shoes indicate worn, broken or improperly assembled rigging			
69	Brakes	Inspect brake shoe condition. Replace any damaged shoe (broken, excessive cracking or missing material)			
70	Brakes	Inspect brake shoe thickness. Replace any composite shoe that has friction material thickness less than .375“. Replace any cast iron shoe that has friction material thickness less than .5”. Record shoe thickness in Appendix A	• Measure		
71	Brakes	With brakes released, verify brake shoe to wheel clearance is .75” MAX	• Measure		
72	Brakes	Inspect handbrake operation after removing cover. Clean and lubricate, as needed. Replace cover			
73	Air Reservoirs	Inspect reservoirs for physical damage			
74	Air Reservoirs	Confirm reservoirs are securely fastened to frame			
75	Air Reservoirs	Verify no signs of leakage or corrosion at tattle-tales			
76	Air Reservoirs	Replace centrifugal aftercooler filter	• Filter, centrifugal aftercooler air • Ratchet, 3/8” drive • Extension, 3/8” drive 6” • Socket, 3/8” drive 9/16”		
77	Fuel Tank	Verify all gauges and gauge glasses are clean and operational with appropriate scale attached. Check gauges for leaks. All gauges should provide the same reading			
78	Fuel Tank	Verify all shutoff valves are operational. Leave gauge shutoff valves fully open after exercise. Check for leaks			
79	Fuel Tank	Inspect fuel tank body for damage and/or leaks			
80	Fuel Tank	Verify tank is securely mounted with no broken or loose fasteners			
81	Fuel Tank	Verify vent pipes are clean, open and securely fastened in place			
82	Fuel Filters	Not applicable to this unit			
83	Fuel Filters	Replace engine mounted fuel filters	• Filter(s), spin-on engine fuel		

Item	Section	Task	Required Tools	INSP INIT	Date
84	Fuel Filters	Remove and clean fuel sight glasses, if not clear. Reinstall with new gaskets	• Gasket, fuel glass		
85	Fuel Pump	Remove fuel pump motor cover and inspect motor brushes. Replace any brush that does not have at least one wear limit line visible OR has length less than 1/4 of original	• Brush(es), fuel pump motor		
86	Fuel Pump	Inspect commutator for wear, scoring, pitting or abnormal discoloration. Clean as needed, using compressed air at 40PSI and/or a clean lint-free cloth. Use NO solvents. Secure fuel pump motor cover when done	• Compressed air, 40PSI		
87	Fuel Test	Notify all personnel working on the engine, then remove tag from main battery switch before closing switch. Activate fuel pump and prime fuel system. Prime until no bubbles are seen in sight glass nearest the engine. Verify there is no fuel present in other glass			
88	Fuel Test	While running fuel pump (may need a helper), open top deck covers and inspect all fuel rail and connections to each injector. Verify no fuel leaks are visible in the lines or at the injector(s)			
89	Fuel Test	Verify no fuel leaks are visible in supply, return and filter fuel lines external to the engine. Pay particular attention to the fuel filter chest and the sight glass bases			
90	Fuel Test	Turn off fuel pump, open main battery switch and restore tag to switch			
91	Cleaning	Remove all debris, trash, discarded parts, rags, cans, etc from the locomotive			
92	Cleaning	Using compressed air at 40PSI, dust all components under cab and in electrical lockers. Dust reverser and relay arc chutes. Dust from top to bottom and allow 10 minutes for any dust to settle. Do not secure doors or panels at this time	• Compressed air, 40PSI		
93	Cleaning	Vacuum entire cab, under cab and electrical locker areas	• Vacuum		
94	Cleaning	Replace all car body filters	• Filter media, car body		
95	Cleaning	Clean all engine exhaust carbon traps			
96	Cleaning	Clean all oily buildup from top of engine valley between cylinder banks	• Mineral spirits		
97	Cleaning	Clean top deck cover areas of excessive runoff from engine valley	• Mineral spirits		
98	Cleaning	Clean engine air boxes. Avoid disturbing intake port surfaces to prevent pushing carbon into cylinders. Verify all air box drains are clean and clear. Do not secure air box covers at this time	• Mineral spirits		
99	Cleaning	Clean engine room floor of any grease, oil or coolant. Note location and severity of any excessive fluid leaks for later repair. Do not clean engine at this time	• Mineral spirits		
100	Cleaning	Drain pollution tank (if equipped) into suitable waste bucket			
101	Cooling Fill	Check cooling system gauge glass. Clean if dirty. Verify gauge scale is legible, if installed			
102	Cooling Fill	Close all drains, replace water pump and compressor drain plugs. Open overflow drain and both gauge glass valves	• Wrench, 12” adjustable		

Item	Section	Task	Required Tools	INSP INIT	Date
103	Cooling Fill	Fill cooling system until gauge glass level is approximately 1” below FULL mark of dead engine scale. If no scale exists, fill approximately 3/4 of the gauge glass. DO NOT OVERFILL. Use previously recovered coolant or clean water. If using clean water, make note to apply water treatment after locomotive is released for service			
104	Cooling Test	Remove crankcase covers			
105	Cooling Test	Close overflow drain valve and replace any fill caps/plugs. Using compressed air, pressurize system to 20PSI. Maintain for at least 10 minutes	• Compressed air, 20PSI		
106	Cooling Test	Inspect cooling system for leaks. Check all pipes, hoses, radiators and manifolds. Check head seals and pipes, as installed, at top deck. Check cylinder liner walls, manifolds and connections in air box. Check lower liner seal area in crankcase.			
107	Cooling Test	Note and correct any leakage. Some minor seepage is acceptable at this point but must be checked after engine is (later) warmed to operating temperature. DO NOT run engine at this time			
108	Cooling Test	Remove air supply and de-pressurize cooling system			
109	Lube Oil Filter	Assuming engine has not run in the previous 12 hours, loosen all nuts on the lube oil filter housing. Allow any trapped oil to drain, then remove nuts and open housing. Remove retainer (if present) and old filter elements, then clean housing and retainer. Note any metal or other objects in bottom of housing	• Ratchet, 1/2” drive • Extension, 1/2” drive 6” • Adapter, 1/2” to 3/4” drive • Socket, 3/4” drive 1 1/4”		
110	Lube Oil Filter	Clean and check housing cover gasket and mating surface. Replace if damaged	• Gasket, lube oil filter cover		
111	Lube Oil Filter	Install new oil filter elements, being sure to seat them fully. If provided, apply retainer and tighten nut by hand, then 1/8 turn with wrench	• Filters, engine lube oil • Wrench, 12” adjustable		
112	Lube Oil Filter	Close filter housing door and run down all nuts by hand. Tighten nuts to **30 foot-pounds** in a star pattern. Repeat using final torque of **60 foot-pounds**	• Torque wrench, 1/2” drive • Extension, 1/2” drive 6” • Adapter, 1/2” to 3/4” drive • Socket, 3/4” drive 1 1/4”		
113	Lube Oil Filter	Clean housing and drip tray. Renew Pigmat in bottom of drip tray			
114	Lube Oil Strainer	Open oil strainer chest cover to access the coarse suction strainer. Clean with solvent and brass brushes. Examine strainer for damage and repair or replace, as needed			
115	Lube Oil Strainer	Undo hand-wheel holding lube oil strainer crab in place. Remove crab and fine lube oil strainers. Clean with solvent and brass brushes. Examine strainer for damage and repair or replace, as needed			
116	Lube Oil Strainer	Clean strainer housing and all mating surfaces. Renew gaskets on housing and strainers. Re-install strainers	• Gasket kit, lube oil strainer		
117	Lube Oil Strainer	Install strainer crab and hand-wheel. Tighten hand-wheel firmly. Install suction strainer chest cover and clean entire top of strainer housing			

Item	Section	Task	Required Tools	INSP INIT	Date
118	Lube Oil Pump	Remove pump cover for main lube oil pump. Tighten shaft nut to **325 foot-pounds**. Clean mating surfaces, replace gasket and secure pump cover. Tighten pump cover bolts to **24 foot-pounds.** Safety wire keyed bolt, if installed	• Gasket, lube oil pump cover • Torque wrench, 3/4” drive • Extension, 3/4” drive 6” • Socket, 3/4” drive 1 1/2” • Torque wrench, 3/8” drive • Ratchet, 3/8” drive • Extension, 3/8” drive 6” • Socket, 3/8” drive 9/16”		
119	Oil Separator	Clean the oil separator. Disconnect the blower suction hoses from the cover and remove the housing cover	• Screwdriver, 5/16” flat		
120	Oil Separator	Remove the screen element and clean with solvent			
121	Oil Separator	Inspect the cover gasket and clean the mating surface. Replace gasket, as needed	• Gasket, oil separator housing		
122	Oil Separator	Re-install the screen element and housing cover. Re-attach and secure blower suction hoses			
123	Air Intake	Inspect blower(s) for leaks, visible damage and loose mounting hardware			
124	Air Intake	Change engine air intake filters	• Filter(s), engine air intake • Ratchet, 3/8” drive • Extension, 3/8” drive 6” • Socket, 3/8” drive 9/16”		
125	Pre-Lube	Open all cylinder test valves. Verify smooth operation. DO NOT close at this time	• Wrench, test valve		
126	Pre-Lube	Connect external oil pump and fresh oil supply to the pressure fitting feeding the engine oil pump. Open valve located beyond fitting. Engage pump and verify oil flow	• Oil, engine lube		
127	Pre-Lube	After one minute of successful oil flow, bar engine over at least 360 degrees. Continue barring until pointer indicates 356 degrees	• Barring tool		
128	Pre-Lube	At approximately 3 minutes, check for oil flow at rocker arms, camshaft bearings and main bearings. Switch off pump when oil flow is verified			
129	Pre-Lube	If oil flow is not seen after 5 minutes, shut off pump and diagnose blockage. Repeat prime until successful			
130	Pre-Lube	Close valve for pre-lube fitting and remove external oil pump			
131	Pre-Lube	Check oil level. If below ‘FULL/Not running” mark, add oil to the suction strainer chest. If overfilled, drain from sump*. DO NOT RUN with overfilled sump. * Normal operation of the locomotive the previous season will result in some oil consumption, thus adding fresh oil during pre-lube will rarely, if ever, result in an overfilled condition	• Oil, engine lube		
132	Engine	Inspect layshaft linkage, seals and bearings. Operate layshaft to verify smooth operation. If resistance or sticking is felt, determine if cause is layshaft linkage or fuel injector rack. Repair linkage, if required, and address any fuel injector rack issues in the next step			

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133	Engine	The flywheel pointer should indicate 356 from previous work. If not, rotate flywheel until the pointer indicates 356. Starting with the first row of Appendix B (flywheel setting of 356), complete the letter column tasks on each cylinder indicated in the row. Letter column tasks are defined in Appendix C. Once a row is finished, reference the next row, rotate the flywheel to the position indicated and perform all tasks for cylinders listed in that row. Repeat until all rows in Appendix B have been worked			
134	Engine	Torque all crab nuts to **1800 foot-pounds** in banks of four, using an 'X' pattern.	• Torque multiplier, 12:1 • Torque wrench, 3/4" drive • Socket, 3/4 drive 2 3/4" (2)		
135	Engine	Torque all top deck frame bolts to **30 foot-pounds**	• Torque wrench, 3/8" drive • Extension, 3/8" drive 6" • Socket, 3/8" drive 9/16"		
136	Engine	Torque oil pan to crankcase mounting bolts to **450 foot-pounds**	• Torque wrench, 3/4" drive • Extension, 3/4" drive 6" • Socket, 3/4" drive 1 1/2"		
137	Engine	Clean seals and mating surfaces for air box inspection covers. Inspect seals and replace, as needed. Install cover and tighten firmly	• Gasket, engine inspection cover		
138	Engine	Clean seals and mating surfaces for crankcase inspection covers. Inspect seals and replace, as needed. Install cover and tighten firmly	• Gasket, engine inspection cover		
139	Engine	Clean seals and mating surfaces for top deck covers. Inspect seals and replace, as needed. Secure top deck covers and verify latches operate correctly and draw the cover down tight. Fasten in alternating pairs to prevent cover distortion			
140	Engine	Torque exhaust manifold base bolts to **130 foot-pounds**	• Torque wrench, 1/2" drive • Extension, 1/2" drive 6" • Socket, 1/2" drive 1 1/16"		
141	Engine	Inspect front engine accessories, identifying and repairing source(s) of any significant leaks			
142	Engine	Clean engine exterior, working top to bottom, front to back	• Mineral spirits		
143	Driveline	Inspect all drive shafts, drive shaft covers, gearing, pillow blocks, belts etc for any traction motor blowers, compressor drive and/or mechanical cooling fan. Verify satisfactory condition and security			
144	Driveline	Inspect mechanical traction motor blower ducts for proper mounting. Verify fan blade set screw is tight			
145	Driveline	Not applicable to this unit			
146	Governor	Inspect governor oil clarity. If oil appears diluted or discolored, drain governor oil			

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147	Governor	Inspect governor oil level. If governor oil gauge has two lines, fill governor to the topmost line. If gauge has only one line, then fill until oil is just above the line*. ALWAYS ADD GOVERNOR OIL SLOWLY. Use governor oil, available in pitcher marked 'GOVERNOR' on the mechanic's workbench. Add a small amount, then wait two full minutes for it to settle out. Two full minutes. Two minutes. * Single line gauges are meant to indicate proper level when engine is running and warm. Recheck these governors during run testing	• Oil, governor		
148	Governor	Inspect electrical signal plug for damage and secure connection			
149	Governor	Clean governor case and all name/scale plates. Verify oil release button is pressed IN (no red line showing)	• Mineral spirits		
150	Compressor	Check cylinders, heads, manifolds, intercoolers etc for damage or evidence of leaks			
151	Compressor	Change compressor air intake filter(s). Change compressor lube oil filter, if equipped	• Filter, compressor intake air • Filter, compressor lube oil		
152	Compressor	Inspect compressor oil clarity. If oil appears diluted or discolored, drain compressor oil			
153	Compressor	Inspect compressor oil level, adding oil until 'FULL' mark is reached. Use compressor oil, available in pitcher marked 'COMPRESSOR' on the mechanic's workbench	• Oil, Compressor lube		
154	Compressor	Clean breather, as needed			
155	Compressor	Inspect magnetic valves. switches and relays on equipment rack for leaks, damage, loose mounting or faulty connections			
156	Startup	Verify all cylinder test valves are still open	• Wrench, test valve		
157	Startup	Check all fluid levels - Coolant, engine oil, governor oil and compressor oil			
158	Startup	Notify all personnel working on or near engine of startup. Clear all tools and supplies. Verify barring tool is removed from flywheel. Install starter fuse and close battery switch			
159	Startup	Turn on control circuits, but do NOT activate fuel pump. Have a helper, if needed, hold layshaft fully OUT. Rotate engine 5-7 seconds to clear cylinders of any liquid. Release hold on layshaft			
160	Startup	Close all cylinder test valves	• Wrench, test valve		
161	Startup	Activate fuel pump and prime fuel system until no bubbles are seen in fuel sight glass. Crank engine until started, but not more than 10 seconds. If engine does not start within 10 seconds, wait 5 minutes before attempting another start			
162	Startup	Verify oil pressure is indicated within 45 seconds. Pressure for cold oil should be > 50psi			
163	Startup	Verify coolant level is still indicated in the gauge glass and it is within the 'running' range			
164	Startup	Verify governor oil is present within the gauge glass and between the two lines. If single line gauge, oil should show in glass but may not be up to the line			

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165	Startup	Check lube oil strainers for proper operation. With engine at idle, slightly loosen the large wing nut holding the strainers in place. Carefully raise the strainer furthest from the engine. Oil should leak out around the top of the strainer flange. If no oil appears, shut down the engine and check oil supply passages and strainer seals. Secure strainers			
166	Startup	Verify all air drains are closed and air pressure is building in the system			
167	Startup	Allow engine to idle for 15 minutes, then re-check for safe levels of engine oil, coolant and governor oil. Leave engine running until temperature reaches 130 degrees Fahrenheit. This will take approximately 45 - 60 minutes, depending on ambient temperature. Continue with the next tasks in this chart. You will be instructed when to stop and check engine temperature			
168	Running Brake	Verify wheel chocks are securely in place and release handbrake			
169	Running Brake	Verify air system is charged. Verify equalizing reservoir is holding at 90 psi - adjust as needed and record value in Appendix A. Perform a full brake set using the independent brake control. Verify all brakes set with piston extension. Record independent pressure reading from gauge in Appendix A			
170	Running Brake	Inspect pistons on each truck. Check for any air leakage. Measure and record piston travel in Appendix A. Maximum allowable piston travel is set at total cylinder travel - 1.5”. In most cases, this mean maximum allowable travel is 6.5”	• Measure		
171	Running Brake	Perform a full brake release using the independent brake control. Verify all brakes release and all pistons retract fully. Verify independent gauge indicates 0 psi			
172	Running Brake	Perform a full service set using the automatic brake control. Verify all brakes are set. Verify both equalizing reservoir and brake pipe pressure read ~70 psi. Verify independent gauge indicates same pressure recorded previously			
173	Running Brake	Bail off the brake application by depressing the independent brake control. Verify all brakes release. Verify independent gauge indicates 0 psi. Return automatic to release position			
174	Running Brake	Perform a first service/minimum set using the automatic brake control. Verify equalizing reservoir and brake pipe are reduced 5-7 psi. Return automatic brake handle to release position			
175	Running Brake	Perform an emergency application with the automatic brake handle. Verify equalizing and brake pipe gauges indicate 0 psi and the PC light illuminates.			
176	Running Brake	Quickly return the automatic handle to the release position. Verify brake system DOES NOT reset			
177	Running Brake	Place the automatic handle in the emergency position and leave it there for 1 minute, then move it to the release position. Verify PC light extinguishes and pressure builds in the equalizing reservoir and brake pipe. Allow 2-3 minutes for system to charge.			
178	Running Brake	Open the emergency brake valve on the fireman’s side of the cab. Verify brake pipe and equalizing reservoir gauges go to 0 psi and PC light illuminates. Close emergency brake valve			

Item	Section	Task	Required Tools	INSP INIT	Date
179	Running Brake	Place the automatic handle in the emergency position and leave it there for 1 minute, then move it to the release position. Verify PC light extinguishes and pressure builds in the equalizing reservoir and brake pipe. Allow 2-3 minutes for system to charge.			
180	Running Brake	Reduce equalizing reservoir and brake pipe pressure 15 psi using the automatic handle. Turn the cutoff valve to “OUT” position. Observe and record brake pipe leakage for 60 seconds. Brake pipe loss must not exceed 5 psi total. Equalizing reservoir must show no loss during this test			
181	Running Brake	Turn brake pipe cutoff valve to “IN” and return automatic brake handle to release position			
182	Running Brake	Exit cab to rear of engine. While holding on to rear brake pipe hose firmly to prevent injury from flailing hose, open angle cock and dump all air pressure. Close angle cock and verify all brakes are set. Enter cab and verify PC light is illuminated and brake pipe and equalizing reservoirs indicate 0 psi.			
183	Running Brake	Place the automatic handle in the emergency position and leave it there for 1 minute, then move it to the release position. Verify PC light extinguishes and pressure builds in the equalizing reservoir and brake pipe. Allow 2-3 minutes for system to charge. Apply handbrake			
184	Running Air	Test horn and bell operation			
185	Running Air	Verify windshield wiper motor operation*. Clean and lubricate mechanism, as needed *DO NOT operate if rubber has not been replaced and/or verified good - window scratches may result			
186	Running Air	Verify automatic drain valves are exhausting periodically. If they are not exhausting at all, verify they are closed with a *counterclockwise* motion. If they are closed down with a *clockwise* motion they will stay closed and will not exhaust at all			
187	Running Air	Operate all manual drain valves until no visible moisture is observed			
188	Running Air	Verify compressor cut in occurs at 125-130 PSI and cut out occurs at 135-140 PSI, with an approximate 10 PSI differential. Adjust as needed and record value in Appendix A			
189	Lighting	Verify platform, ground, number, class and ditch lights are operational (when installed)			
190	Lighting	Verify forward and rear headlights function in all three intensities			
191	Lighting	Verify engine room lights are operational			
192	Lighting	Verify instrument and overhead cab lights are operational			
193	Running Cooling	Check coolant level. Mark running level on gauge glass with tie wrap. Level should be 1/2 to 3/4 of the RUNNING scale. Fill as required to reach this level, but DO NOT OVERFILL			
194	Running Cooling	Inspect radiator shutter pistons and linkage for damage. Verify secure mounting			
195	Running Cooling	Test radiator shutter operation, if not already observed. Use test handle near temperature switches in engine compartment. Verify prompt operation in full range of motion, with no binding. Restore test lever			

Item	Section	Task	Required Tools	INSP INIT	Date
196	Running Cooling	Inspect mechanical fan and idler pulleys and belts while operating, being observant for unusual vibration and/or noise			
197	Running Cooling	Not applicable to this unit			
198	Fluid Checks	Verify engine coolant temperature gauge indicates at least 130 degrees Fahrenheit			
199	Fluid Checks	Check governor oil level. Level should be at upper line of two line gauge, or at line of 1 line gauge. Add governor oil with engine at idle speed. ALWAYS ADD GOVERNOR OIL SLOWLY. Use governor oil, available in pitcher marked GOVERNOR on the mechanic's workbench. Add a small amount, then wait two full minutes for it to settle out. Two full minutes. Two minutes.	• Oil, governor		
200	Shutdown Test	Shutdown locomotive using emergency shutdown located on the RIGHT walkway*. After shutdown, set isolation switch to START/ISOLATE. Open battery switch and remove starter fuse. Tag out battery switch. Drain air reservoirs *If emergency shutdown switch is a manual pull cable, reset cutoff valve after actuation by pushing in the reset rod at the base of the valve. Valve is located on bottom front of fuel tank, at end of cable			
201	Fluid Checks	Check engine oil 5 minutes after engine shutdown. Add fresh oil to strainer chest to bring oil level to FULL mark. DO NOT OVERFILL	• Oil, engine lube		
202	Fluid Checks	Verify compressor oil indicates FULL	• Oil, compressor lube		
203	Injector Racks	Verify engine coolant temperature gauge indicates at least 130 degrees Fahrenheit			
204	Injector Racks	While engine is still warm, open top covers and prepare to set the fuel racks on each injector. Engine must be warm or rack settings will not be accurate. Perform this task with expediency immediately following engine shutdown			
205	Injector Racks	For governors with terminal shaft scales, install screw-type injector jack and set layshaft to indicate 1.00" on the scale. Secure jack and layshaft	• Jack, screw-type governor		
206	Injector Racks	For governors without terminal shaft scales, install clevis-type injector jack and hold layshaft in a position that provides a 7/16" power piston gap, as measured between the power piston clevis and the cylinder head. Secure jack and layshaft	• Jack, clevis-type governor • Gauge, 7/16" block		

Item	Section	Task	Required Tools	INSP INIT	Date
207	Injector Racks	Measure injector fuel rack using injector rack gauge tool*. Place tool over the rack and push the gauge firmly against the injector body, or if the injector has a calibrating slide, against the calibrating slide. Observe the indicator. If pointer is centered, rack setting is correct If pointer is offset toward injector, rack is too long. Using wrenches, loosen linkage locknut and then turn linkage adjusting nut until pointer is centered If pointer is offset away from injector, rack is too short. Adjust nut until pointer passes center and indicates too long, then adjust back to center. This helps compensate for backlash. While holding adjusting nut in place with one wrench, tighten locknut with the other. Check with gauge once more to verify no deviation occurred when tightening locknut. Check rack setting with gauge once more to verify no deviation occurred when tightening locknut. Repeat for all injectors *Gauge pointer should be centered when measuring 1”. Use 1” gauge block to calibrate if gauge reading is suspect	• Gauge, injector rack • Wrenches, 7/8” box (2)		
208	Injector Racks	Once all injector racks have been set, remove governor jack and verify layshaft operates freely			
209	Running Governor	Open flywheel access panel and place reflector for photo tachometer	• Photo tachometer		
210	Running Governor	Restore starter fuse, close battery switch and start engine. Allow idle to stabilize and air to pump up. Apply full independent brake and verify handbrake is set and wheels are chocked			
211	Running Governor	Verify engine coolant temperature is AT LEAST 130 degrees Fahrenheit before proceeding			
212	Running Governor	Verify generator field switch is set to OFF. Set isolation switch to RUN. Verify reverser is inserted and centered			
213	Running Governor	Beginning with Idle and working up through each throttle position, record the RPM of the engine at each throttle position in Appendix A. DO NOT run engine above position 4 for any extended period of time. Use a helper and have one person work the throttle and one person record RPM readings, QUICKLY. Return engine to idle and set isolation switch to START/ ISOLATE			
214	Running Governor	With one person remaining at the flywheel and observing RPM, move to the governor. Smoothly move the layshaft at a moderately slow rate to increase engine RPM until the overspeed trips and engine shuts down*. Gently allow the layshaft to return to idle position. Record RPM of overspeed trip in Appendix A and reset the overspeed trip lever. Remove photo tachometer indicator and restore flywheel access panel. Restart engine at idle * DO NOT rev engine more than 50 RPM above MAX RPM listed, regardless of overspeed trip actuation			

Item	Section	Task	Required Tools	INSP INIT	Date
215	Running Governor	Test governor low oil shutdown feature by pressing in on lube oil diaphragm screw. This screw is located on the engine side of the governor, directly opposite the low oil shutdown button. Hold the screw in and use a timer to determine the interval from first press until the low oil shutdown button pops, exposing the red line. Alarm bell should sound and engine should shutdown immediately. Verify shutdown occurs within 30 - 50 seconds. Release screw and push low oil button back in. Restart engine at idle			
216	Running Governor	Test low water shutdown on engine protection device (EPD) equipped locomotives. While engine is idling, close the water test valve under the EPD. The low water button on the EPD should immediately pop and lube oil pressure will drop to 0 psi. After 30 - 50 seconds, the governor button will pop, exposing the red line*. The alarm bell will sound and the engine should immediately shutdown. Open test valve, push button and restart engine at idle *DO NOT let the engine continue running in the event the governor does not shut the engine down			
217	Running Governor	Verify generator field switch is set to OFF. Set isolation switch to RUN. Move throttle to position 4. Repeat low water shutdown test and verify the governor button pops and engine shuts down as soon as the water test valve is closed, with almost no delay*. Open test valve and push in low oil button. Set isolation switch to START/ISOLATE and restart engine at idle *DO NOT let the engine continue running in the event the governor does not shut the engine down			
218	Handbrake	Verify full independent brake is applied and handbrake is set. Remove wheel chocks and notify personnel of possible locomotive movement			
219	Handbrake	Release independent brake. Verify 0 psi cylinder pressure. Set isolation switch to RUN. Set generator field switch to ON. Move reverser to select FORWARD. Move throttle to position 1 and note any movement. Locomotive should not move, but if it does, return throttle to IDLE and locomotive should immediately stop. If it stops, handbrake is effective. If it does not stop, apply full independent.			
220	Handbrake	Adjust handbrake, as needed, and repeat test until handbrake is tested effective. Set handbrake when finished			
221	Emergency Shutdown	Shutdown locomotive using emergency shutdown located on the LEFT walkway*. After shutdown, set isolation switch to START/ISOLATE and open battery switch. Tag out battery switch and remove starter fuse and reverser. Drain air reservoirs *If emergency shutdown switch is a manual pull cable, reset cutoff valve after actuation by pushing in the reset rod at the base of the valve. Valve is located on bottom front of fuel tank, at end of cable			
222	Emergency Shutdown	Verify red border and stencils for ‘EMERGENCY STOP’ or ‘FUEL CUTOFF’ are present and legible on both sides of engine			
223	Electrical	VERIFY engine is stopped and battery switch is open and tagged out			

Item	Section	Task	Required Tools	INSP INIT	Date
224	Electrical	With battery switch open, measure battery voltage at battery switch and record in Appendix A. LEAVE SWITCH OPEN			
225	Electrical	Inspect all wiring for arcing, loose connections, damages connectors. damaged insulation, improper bends and insufficient mechanical protection at frame mounts and passages. Repair, as needed			
226	Electrical	Inspect condition of all knife switches and fuse holders paying particular attention to battery switch			
227	Electrical	Inspect all relays (ER, FPC, PCR, RCR, FOR, FPR, etc) paying close attention to condition of coils, interlocks and wire connections. Replace interlock contacts, as needed. Repair or replace damaged covers, as needed	• Screwdriver, #2 Phillips • Screwdriver, 5/16” flat • Screwdriver, 1/4” flat		
228	Electrical	Inspect power contactors (BF, ST, etc). Remove arc chutes and check contactor tips for wear. Verify contactor tips are secure and no base metal is visible on the tips. Discoloration, pitting, etc is allowed so long as no base metal is visible. DO NOT attempt to sand or clean contact tips. Inspect interlocks and replace contacts, as needed	• Screwdriver, #2 Phillips • Screwdriver, 5/16” flat • Screwdriver, 1/4” flat		
229	Electrical	Clean reverser armature and check for free rotation. Rotate cam in both directions, by hand. Assure brushes have adequate travel			
230	Electrical	Inspect reverser interlocks for proper connection. Adjust interlock contacts, as needed			
231	Electrical	Inspect reverser cam pivot points and/or bearings. Lubricate as needed/equipped			
232	Electrical	Secure all electrical locker doors and panels			
233	Electrical	Verify all high voltage cabinets are clearly labeled with legible “DANGER 600 Volts” or “DANGER HIGH VOLTAGE” signs or decals. Renew, as needed			
234	Load Regulator	VERIFY engine is stopped and battery switch is open and tagged out			
235	Load Regulator	Inspect load regulator wiring and connection security			
236	Load Regulator	Inspect load regulator rheostat to verify it is not cracked and shows no sign of burning or overheating (discoloration)			
237	Load Regulator	Verify brush is not cracked, broken or missing. Verify flexible connection from brush to arm is sound and secure			
238	Load Regulator	Inspect any terminal boards for damage or evidence of overheating/burning. Clean with compressed air	• Compressed air, 40PSI		
239	Main Generator	VERIFY engine is stopped and battery switch is open and tagged out			
240	Main Generator	Remove generator covers to expose internal workings. Inspect all latch tension and mounting			
241	Main Generator	Using compressed air at 40PSI, clean interior thoroughly	• Compressed air, 40PSI		
242	Main Generator	Inspect commutator for threading. Threading is characterized by multiple lines across the copper bar and is caused by abrasive brushes, dirty air flow, heavy sparking or loss of commutator film			

Item	Section	Task	Required Tools	INSP INIT	Date
243	Main Generator	Inspect commutator for grooving. Grooving is characterized by one or more grooves across the copper and is caused by low brush current (defective/low spring pressure) or dust particles			
244	Main Generator	Inspect commutator for copper drag. Copper drag is characterized by a very thin skin of copper being dragged from the bars into the slots between the bars. This indicates brush friction is too high, possibly caused by excessive spring tension			
245	Main Generator	Inspect commutator for bar edge burning. This condition presents as a rough trailing edge on the commutator bars and is caused by sparking			
246	Main Generator	Inspect brush holders for any signs of arcing or damaged connections. Verify all brush leads are intact and their connections to the holder are tight			
247	Main Generator	Verify brush holder mounting to motor frame is secure and sound. Verify brush holder clearance to commutator is between .125” and .1875”	• Measure		
248	Main Generator	Replace any brushes that are cracked or broken. Replace any National brush not showing at least two wear limit lines. Replace any Carbone brush not showing at least one wear limit line. Replace any unmarked brush that is less than 1/4 of its original length. Sand-in new brushes with 00 grade sandpaper pulled in direction of rotation	• Brush(es), main generator • #00 sandpaper		
249	Main Generator	Verify brush is moving free within holder. Work brushes up and down several times to free them and remove any foreign matter			
250	Main Generator	Inspect brush spring tension. Operate each brush spring and note that it moves smoothly with firm tension. If any spring is loose or sticks while moving, replace the brush holder. Spring tension must be the same for all brushes. Adjust spring tension, as needed (4 - 4.5 lbs)	• Measure • Gauge, spring		
251	Main Generator	Not applicable to this unit			
252	Main Generator	Not applicable to this unit			
253	Main Generator	Not applicable to this unit			
254	Main Generator	Not applicable to this unit			
255	Main Generator	Not applicable to this unit			
256	Main Generator	Replace and secure generator covers			
257	Auxiliary Generator	VERIFY engine is stopped and battery switch is open and tagged out			
258	Auxiliary Generator	Remove generator covers to expose internal workings. Inspect all latch tension and mounting	• Screwdriver, 5/16” flat		
259	Auxiliary Generator	Using compressed air at 40PSI, clean interior thoroughly	• Compressed air, 40PSI		
260	Auxiliary Generator	Inspect commutator for threading. Threading is characterized by multiple lines across the copper bar and is caused by abrasive brushes, dirty air flow, heavy sparking or loss of commutator film			
261	Auxiliary Generator	Inspect commutator for grooving. Grooving is characterized by one or more grooves across the copper and is caused by low brush current (defective spring pressure) or dust particles			

Item	Section	Task	Required Tools	INSP INIT	Date
262	Auxiliary Generator	Inspect commutator for copper drag. copper drag is characterized by a very thin skin of copper being dragged from the bars into the slots between the bars. This indicates brush friction is too high, possibly caused by excessive spring tension			
263	Auxiliary Generator	Inspect commutator for bar edge burning. This condition presents as a rough trailing edge on the commutator bars and is caused by sparking			
264	Auxiliary Generator	Inspect brush holders for any signs of arcing or damaged connections. Verify all brush leads are intact and their connections to the holder are tight			
265	Auxiliary Generator	Verify brush holder mounting to motor frame is secure and sound. Verify brush holder clearance to commutator is .125”	• Measure		
266	Auxiliary Generator	Replace any brushes that are cracked or broken. Replace any National brush not showing at least two wear limit lines. Replace any Carbone brush not showing at least one wear limit line. Replace any unmarked brush that is less than 1/4 of its original length. Sand-in new brushes with #00 grade sandpaper pulled in direction of rotation	• Brush(es), generator aux • Sandpaper, #00		
267	Auxiliary Generator	Verify brush is moving free within holder. Work brushes up and down several times to free them and remove any foreign matter			
268	Auxiliary Generator	Inspect brush spring tension. Operate each brush spring and note that it moves smoothly with firm tension. If any spring is loose or sticks while moving, replace the brush holder. Spring tension must be the same for all brushes. Adjust spring tension, as needed (1.5 - 2.5 lbs)	• Measure • Gauge, spring		
269	Auxiliary Generator	Replace and secure generator covers	• Screwdriver, 5/16” flat		
270	Alternator	Not applicable to this unit			
271	Alternator	Not applicable to this unit			
272	Alternator	Not applicable to this unit			
273	Alternator	Not applicable to this unit			
274	Alternator	Not applicable to this unit			
275	Running Move	Restore starter fuse, close battery switch and start engine. Allow idle to stabilize and air to pump up. Apply full independent brake and remove wheel chocks			
276	Running Move	Verify engine coolant temperature is AT LEAST 120 degrees Fahrenheit before proceeding			
277	Running Move	Release handbrake and relocate engine with its full length over the inspection pit			
278	Running Move	Apply full independent and turn off the generator field. Set handbrake			
279	Voltage Regulator	With engine running idle, connect voltmeter negative lead to negative side of battery switch. Connect positive lead to the top end of the auxiliary generator fuse	• Voltmeter		
280	Voltage Regulator	With engine at throttle 4, adjust the voltage regulator rheostat until the voltage indicated is 74VDC. Apply dab of Duco cement to rheostat to hold setting	• Voltmeter • Cement, Duco		
281	Voltage Regulator	Check voltage in all throttle positions and confirm voltage is between 73 and 75 VDC. Avoid prolonged operation at throttle settings above position 4	• Voltmeter		

Item	Section	Task	Required Tools	INSP INIT	Date
282	Voltage Regulator	If voltage regulator is equipped with 72VDC reference tap, move positive lead of voltmeter to to the positive terminal of the tap. Set engine to throttle 8 and confirm voltage is between 71.5 and 72.5 VDC. Avoid prolonged operation at throttle 8. Voltage is not externally adjustable. If out of spec, make a note for regulator repair	• Voltmeter		
283	Voltage Regulator	Remove voltmeter and secure lockers			
284	Traction Motors	Secure locomotive in place by chocking wheels			
285	Traction Motors	Shutdown locomotive. Remove reverser handle and lockout and/or tag the generator field switch in OFF position. Verify isolation switch is in 'START/ISOLATE' position and tag. Verify main battery switch is 'OFF' and tag. Remove starter fuse and drain air reservoirs			
286	Traction Motors	Secure track and locomotive with BLUE FLAG to notify other personnel of the presence of workmen			
287	Traction Motors	Inspect all traction motor cables for condition of bent, squeezed, overheated, burnt or damaged insulation. Verify all mounting is secure and that wear plates, grommets and seals are providing adequate protection for cables and traction motor			
288	Traction Motors	Verify ground wire is properly secured from the motor frame to the locomotive frame			
289	Traction Motors	Verify all traction motor cable splices have protective sleeves in place. Sleeves must be free of damage and extend at least 2 inches beyond each side of the connection			
290	Traction Motors	Inspect all blower bellows and ducts for integrity			
291	Traction Motors	Remove all traction motor brush inspection covers	• Ratchet, 3/8" drive • Extension, 3/8" drive 6" • Socket, 3/8" drive 9/16"		
292	Traction Motors	Using compressed air at 40PSI, clean interior thoroughly	• Compressed air, 40PSI		
293	Traction Motors	Inspect commutator for threading. Threading is characterized by multiple lines across the copper bar and is caused by abrasive brushes, dirty air flow, heavy sparking or loss of commutator film			
294	Traction Motors	Inspect commutator for grooving. Grooving is characterized by one or more grooves across the copper and is caused by low brush current (defective spring pressure) or dust particles			
295	Traction Motors	Inspect commutator for copper drag. copper drag is characterized by a very thin skin of copper being dragged from the bars into the slots between the bars. This indicates brush friction is too high, possibly caused by excessive spring tension			
296	Traction Motors	Inspect commutator for bar edge burning. This condition presents as a rough trailing edge on the commutator bars and is caused by sparking			
297	Traction Motors	Inspect brush holders for any signs of arcing or damaged connections. Verify all brush leads are intact and their connections to the holder are tight			
298	Traction Motors	Verify brush holder mounting to motor frame is secure and sound. Torque brush holder to frame bolts to **150 foot-pounds**	• Torque wrench, 3/4" drive • Extension, 3/4" drive 3" • Socket, 3/4" drive 1 5/16"		

Item	Section	Task	Required Tools	INSP INIT	Date
299	Traction Motors	Verify brush holder clearance to commutator is between .125” and .1875”	• Measure		
300	Traction Motors	Replace any brushes that are cracked or broken. Replace any National brush not showing at least two wear limit lines. Replace any Carbone brush not showing at least one wear limit line. Replace any unmarked brush that is less than 1/4 of its original length. Sand-in new brushes with #00 grade sandpaper pulled in direction of rotation	• Brush(es), traction motor • Sandpaper, #00		
301	Traction Motors	Verify brush is moving free within holder. Work brushes up and down several times to free them and remove any foreign matter			
302	Traction Motors	Constant pressure brush holders do not need to have spring pressure checked unless there is evidence of overheating or flash damage. In this case, see MI 3900 for procedures			
303	Traction Motors	For older variable tension brush holders, Inspect brush spring tension. Operate each brush spring and note that it moves smoothly with firm tension. If any spring is loose or sticks while moving, replace the brush holder. Spring tension must be the same for all brushes. Adjust spring tension, as needed (9 - 11 lbs)	• Measure • Gauge, spring		
304	Traction Motors	Replace all traction motor inspection covers and secure hardware. Do not over torque	• Ratchet, 3/8” drive • Extension, 3/8” drive 6” • Socket, 3/8” drive 9/16”		
305	Traction Motors	Open gearbox access cover and inspect gear teeth for wear or damage. Check top of gear tooth dimension and verify at least .125” on pinion and .25” on axle	• Measure		
306	Traction Motors	If gears are lightly coated with grease that appears light brown, add two packs of crater. If gears appear well lubricated, add one pack of crater. Secure gearbox cover	• Grease, crater		
307	Deferred Repairs	Repair items listed in Appendix E which indicate a schedule of ‘annual’			
308	Conclusion	Once certain all work is completed, restore starter fuse and remove all tags. Clean locomotive of any remaining tools. Remove blue flag protection			
309	Conclusion	Review entire annual inspection packet, making sure all fields are marked, dated and signed, as needed. When complete, submit to CMO for inspection sign-off and release for service, if applicable			

Appendix A

WP1503 2026 Inspection Record

Wheel and Brake Condition

Wheel	Flat Spots (Y/N)	Shelling (Y/N)	Chips/ Gouges (Y/N)	Thin Flange (Y/N)	High Flange (Y/N)	Rim Thickness (in)	Shoe Thickness (in)	Piston Travel (in)	Air Leaks (Y/N)	Comments
L1										
L2										
L3										
L4										
R4										
R3										
R2										
R1										

Numbering: Wheel L1 is the front wheel on the fireman's side of the locomotive

645E Engine Speed

Throttle Position	Min RPM	Max RPM	Measured RPM
Idle	307	323	
1	307	323	
2	390	398	
3	475	483	
4	545	575	
5	645	653	
6	730	738	
7	800	830	
8	900	908	
Trip			

Air System

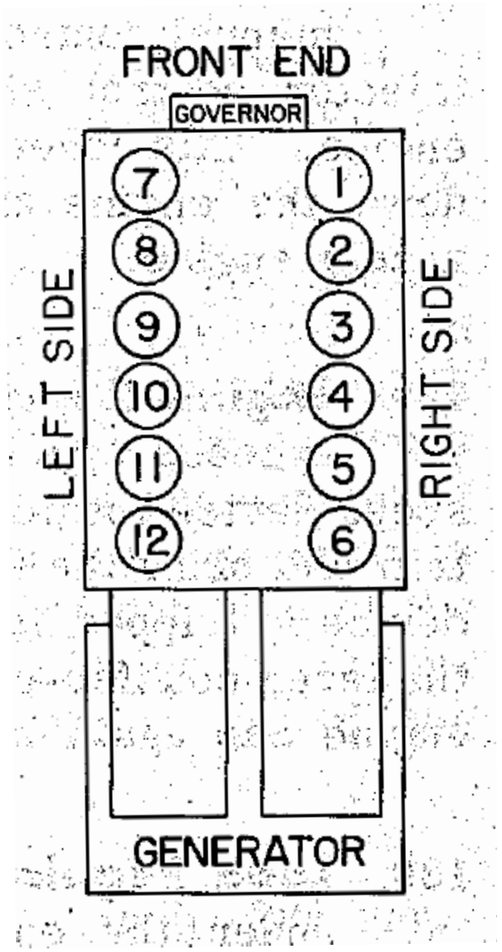
Parameter	Spec PSI	Measured PSI
Equalizing reservoir / brake pipe	90	
Independent (full application)	40	
Compressor cut in	130	
Compressor cut out	140	

Battery Voltage

Measurement	Spec DC Volts	Measured DC Volts
Engine stopped, battery switch open	64	
Engine running, throttle position 4	74	
Engine running, throttle position 8	73-75	
Fixed output, throttle position 8	72	

One Rotation Engine Inspection and Tune - V12 US Rail

	Perform Letter Tasks on Cylinder Number(s)					
Set Flywheel Position Pointer (TDC -4) *	**A-J, R, S**	**K**	**L**	**M**	**N**	**O, P, Q, S**
356	1	3	2	3,2	8	
15	12	10	11	10,11	4	5
41	7	9	8	9,8	3,6	2
66					10,1	11
90	4	5	6	5,6	9,12	8
116	3	2	1	2,1	7	
135	10	11	12	11,12	5	6
161	9	8	7	8,7	2,4	1
186				11,3		12
210	5	5	8	8,4	8,10	7
236	2	1	3	1,3	9	
255	11	12	10	12,10	6	4
281	8	7	9	7,9	1,5	3
306					12,2	10
330	6	4	4	4,5	7,11	9



* The flywheel is located on the rear of the engine. Rotate flywheel counterclockwise, as viewed facing rear of engine. Said differently, push flywheel down from the left side of the engine.

Rotation: Left (Counterclockwise)

Firing order: 1-12-7-4-3-10-9-5-2-11-8-6

Appendix C

WP1503 Annual Inspection Record

Procedure	Purpose	Description	Tools and Parts Required
A	Remove rocker arms	For all three rocker arms, loosen rocker arm adjusting screw locknut and rotate adjusting screw several turns counterclockwise. Remove the bolts and washers for the oil jumper at the camshaft pillow block. Remove the rocker arm shaft nuts and washers (if provided). Remove the rocker shaft caps, preserving original location (left/right). Remove rocker arm assembly and place in a secure and safe location, being careful not to scratch any machined surface	• Bar, 36” 3/4” drive breaker • Extension, 3/4” drive 3” • Socket, 3/4” drive 1 7/16” • Ratchet, 3/8” drive • Extension, 3/8” drive 6” • Socket, 3/8” drive 7/16” • Tray, magnetic parts • Screwdriver, 1/2” flat • Wrench, 15/16” box
B	Inspect valve bridges	Remove each valve bridge and inspect springs, seats, button and lash adjusters. Look for breakage, cracking and/or discoloration. Press lash adjusters to check for smooth action and spring return. Set aside, preserving original location each bridge was removed from (left/right)	
C	Inspect valve springs	Visually inspect all 4 valve assemblies, looking at condition of springs, seats and keepers. Look for breakage, cracking and/or discoloration	• Light, inspection • Mirror, inspection
D	Measure valve stem height	Using valve checking tram, verify all valves stem heights are within **1/16”** of each other. Clean head surface, valve stem end and tram feet prior to each measurement	• Tram, valve checking • Indicator, dial
E	Install valve bridges	Clean head bridge seat and replace valve bridge in the same location it was removed from with casting boss toward camshaft	
F	Inspect fuel injector	Visually inspect fuel injector and fuel jumper. Look for breakage, cracking and/or discoloration. Verify injector slide operates easily and smoothly (no binding). Verify injector slide is properly seated in rack. Tighten injector crab nut to **50 foot-pounds**. Tighten fuel jumper bolts at injector and fuel rail to **40 foot-pounds**	• Torque wrench, 3/8” drive 75ft/lb • Extension, 3/8” drive 6” • Socket, 3/8” drive 5/8” • Socket, 3/8” drive 15/16”
G	Tighten liner/head nuts	Tighten all head nuts to **240 foot-pounds*** beginning at topmost nut, followed by bottommost nut and then alternating in a clockwise fashion** **note: This is the correct torque for 645E, 567C, 567D liners and 567B type 3 liners. Type 3 liners can be identified by a 1/8” hole/dish drilled off center on the end of the liner stud. 567B type 1 and 2 liners are torqued to **300 foot pounds**. Use caution and check <u>each</u> cylinder in all 567B engines* ***note: this is **NOT** the correct sequence for installing a <u>new</u> head gasket. See EMD pointers April 15, 1968 for correct installation procedure*	• Torque wrench, 3/4” drive • Extension, 3/4” drive 8” • Socket, 3/4” drive 1 1/16”
H	Install rocker arms	Clean oil jumper gasket surface at camshaft pillow block and place a new gasket. Inspect rocker arm cam rollers and adjusting screws. Install rocker arm assembly. Install rocker arm shaft caps in original position, orienting the long end toward the camshaft. Fit washers (if provided) and nuts on rocker shaft studs. Run down rocker shaft nuts before tightening rocker shaft nuts to **150 foot-pounds** initial torque, then tighten to **300 foot-pounds** final. Install oil jumper bolts and lock washers and torque to **84 <u>inch</u>-pounds**	• Torque wrench, 3/4” drive • Extension, 3/4” drive 3” • Socket, 3/4” drive 1 7/16” • Torque Wrench, 3/8” drive in/pd • Extension, 3/8” drive 6” • Socket, 3/8” drive 7/16” • Scraper, carbide gasket • Gasket, oil jumper

Procedure	Purpose	Description	Tools and Parts Required
I	Time injector	Insert injector timing gauge in provided hole of injector body. Tighten or loosen the rocker adjusting screw until gauge just passes over the injector follower. Tighten adjusting screw locknut while holding adjuster screw position. Recheck with gauge.	• Screwdriver, 1/2” flat • Wrench, 15/16” box • Gauge, injector timing
J	Adjust valve bridges	Starting with left valve bridge, turn the rocker arm adjusting screw clockwise until lash adjuster just touches the last valve. In other words, one valve will touch before the other - use the second touch (last) as the guiding event. Turn the adjusting screw 1 1/2 additional turns clockwise. Now, check that the valve bridge is firmly seated in the head with no looseness. If loose, turn adjusting screw clockwise until no looseness is felt, then turn 1/4 additional turn. Tighten adjusting screw locknut while holding adjuster screw position. Push rocker arm down several times to exercise the lash adjusters, then check each lash adjuster with the lash gauge, which should fully insert between the lash adjuster body and the end of the valve stem	• Screwdriver, 1/2” flat • Wrench, 15/16” box • Gauge, 1/16” lash
K	Inspect rings (up)	Rings should be bright in appearance and free in groove. Inspect for cracks or breaks. Inspect first ring for excessive loss of chrome. Inspect for evidence of blow-by on lower rings (brown streaks)	• Light, inspection
L	Inspect rings (down)	Rings should be bright in appearance and free in groove. Inspect for cracks or breaks. Inspect first ring for excessive loss of chrome. Inspect for evidence of blow-by on lower rings (brown streaks)	• Light, inspection
M	Check piston cooling oil pipe alignment	Install a gauge in the specified piston oil cooling pipe after all other work is completed for the current crankshaft position but before rotating flywheel into next position. Have a helper monitor gauge entry into piston passage while you slowly turn flywheel. Be careful as any misalignment will further bend and perhaps destroy the cooling pipe. Verify gauge enters piston inlet hole and can be turned freely once in position. Remove gauge following next crankshaft manipulation	• Gauge, piston cooling pipe alignment (2) • Light, inspection
N	Inspect piston skirt	Piston skirt should be free of scuffing, scoring and discoloration	• Light, inspection
O	Inspect piston top and upper liner wall	Top of piston should be dry, free of excessive carbon and show a starburst pattern indicating even fuel spray from the injector	• Light, inspection
P	Inspect upper liner wall	Liner wall should be free of scuffing, scoring and discoloration	• Light, inspection
Q	Inspect valve heads	Valve head should be free of cracks and discoloration	• Camera, Inspection
R	Inspect lower liner wall	Liner wall should be free of scuffing, scoring and discoloration	• Light, inspection
S	Inspect rod bearing	Inspect bearing surfaces for scoring, scuffing, discoloration or loss of tin	• Light, inspection

Inspection Notes

Item Number	Section	Note

Appendix D

WP1503 2026 Inspection Record

Item Number	Section	Note

Repair List

Item Number	Reported Issue	Date Reported	Action Needed	Scheduled Resolution	Actual Resolution
1	The fireman side electric cab heater is not working. The blower heater, not the strip heater	01/01/2025	Repair	2026 Annual	
2	Brake piston on engineer's side, third axle from the front is occasionally sticking on retraction/release. Needs cleaning and new cup		Repair	2026 Annual	
3	The gauge for the pollution tank is broken and always shows 'full'	01/01/2025	Replace	2026 Annual	
4	The speed recorder does not work	01/01/2025	Repair	Working	
5	The centrifugal air filter drain valve sticks. Needs to be cleaned after new filter installation		Repair	2026 Annual	
6	The fan shaft forward bearing is making noise and may need replacement	01/01/2025	Monitor	N/A	
7	Automatic brake reportedly charges brake pipe to main reservoir pressure on occasion when handle is moved from 'service' to 'release' position (can't duplicate)	06/01/2025	Monitor	N/A	
8	EPD is incorrect model for this unit, according to former CMO. No malfunctions noted	01/01/2025	Monitor	N/A	

Required Parts and Supplies

Part Number(s)	Quantity Required	Item	Description
570-020-025	**1**	Filter, car body	Koch filter pad, poly, dual-den, tac, 20”x2’5"x2", Box of 20
AB-10	**1**	Filter, centrifugal aftercooler air	Clark AB-10
PA1777	**1**	Filter, compressor intake air	Baldwin air filter, 5-31/32” x 8-5/32”
BT267	**1**	Filter, compressor lube oil	Baldwin oil filter, spin-on, full-flow
BA3964	**1**	Filter, engine intake air	Baldwin air filter, 18-3/4” x 5”, Pack of 4 (bag type)
P1510	**4**	Filter, engine lube oil	Baldwin oil filter, 29 3/8” L, 6 1/2” OD
BF971	**2**	Filter(s), spin-on engine fuel	Baldwin fuel filter, 7 1/8”, 3 11/16” OD
8496989	**1**	Gasket kit, lube oil strainer	
8291349	**AN**	Gasket, engine inspection cover	Round cover
8369658	**1**	Gasket, centrifugal aftercooler cap	
8104055	**2**	Gasket, fuel glass	
8330035	**AN**	Gasket, lube oil filter cover	
8029498	**1**	Gasket, lube oil pump cover	
8029167	**12**	Gasket, oil jumper	
8173851	**1**	Gasket, oil separator housing	
8025988	**AN**	Gasket, piston cooling tube	
8142354 / 40040025	**AN**	Gasket, manifold to water inlet tube	
8305815	**AN**	Seal, water inlet to cylinder liner	
8320144	**2**	Strainer, lube oil	
8308586	**1**	Strainer, scavenging	
	AN	Brush(es), fuel pump motor	
	AN	Brush(es), generator aux	
	AN	Brush(es), main generator	
	AN	Brush(es), traction motor	
235084	**AN**	Oil, engine lube	Chevron Delo 710LS 20w-40
235084	**AN**	Oil, governor	Chevron Delo 710LS 20w-40
	AN	Oil, journal	
	AN	Oil, compressor lube	SAE 30, Non-detergent
	AN	Grease, crater	
62435	**AN**	Cement, Duco	Duco household cement, 1oz tube
MAT440	**AN**	Mat, oil absorbent	Pigmat sorbent pad, 22 gal, 15 in x 20 in, oil, white, polypropylene 100ct
	AN	Mineral spirits	
	AN	Sandpaper, #00	

AN = As needed