



M AINTENANCE I NSTRUCTION

LOCOMOTIVE STORAGE PROCEDURE

GENERAL

The following storage procedure applies to all models of General Motors locomotives and their component parts, and is designed for protection under the most adverse conditions of temperature and humidity. However, when stored for an extended period, it is recommended that locomotives be inspected every six months.

If, in the judgment of responsible railroad officials, the atmospheric conditions are such that corrosion damage will not readily occur, it may be pos-

sible to omit certain parts of this procedure.

A copy of this procedure should be placed in a conspicuous place in the locomotive so that anyone deprocessing a unit will be alerted to remove all materials used in processing.

Designations of materials for packaging and preservation are abbreviated in the text for simplicity, but are more fully described in the material list below. These materials can be obtained from any protective packaging company, however, for the customer's convenience, we are listing one vendor for each item.

MATERIAL LIST

Product	Vendor
Tectyl 823	National Refining Company Railway Sales Chicago, Illinois
Petroleum Jelly (Stanolind Petrolatum)	Standard Oil Company of Indiana Chicago, Illinois
V.P.I. - C (Vapor Phase Inhibitor Crystals)	Shell Oil Company Chicago, Illinois
V.P.I. - P (Vapor Phase Inhibitor Paper)	Shell Oil Company Chicago, Illinois
V.P.I. - B (Vapor Phase Inhibitor Moisture Barrier Paper 30-50-30)	Shell Oil Company Chicago, Illinois
Silica Gel (Protek-Sorb 121, Class I)	Davidson Chemical Corporation Baltimore, Maryland
Pressure-Sensitive Tape (Cloth Waterproof - Specify Color)	
Type #353	Dutch Brand Division Johns-Manville Sales Corporation Chicago, Illinois
or	
Type #20-202 (C505)	Arno Adhesive Tape Company Michigan City, Indiana

* THIS BULLETIN SUPERSEDES ALL ISSUES OF M.I. 2176.

Product	Vendor
Grade A Creped	
Penguin-Pak A2 or HPS Super Penguin-Pak A2	H. P. Smith Paper Chicago, Illinois
or	
PK 3230	Wrap-In-Wax Minneapolis, Minnesota
Sisal Kraft or Glass Wrap (220 Fibreen)	American Sisalkraft Corporation Chicago, Illinois

NOTE: Where V.P.I. paper is used it should be placed with the white side toward the surface to be protected. When the white surface turns brown its protective quality is gone, and fresh V.P.I. paper must be used.

V.P.I. crystals can be sprayed with a common dust gun, such as the Hudson duster or the moth crystal spray attachment on the domestic vacuum cleaner.

Indicator cards should be used with Silica Gel bags, and inspection made of the color of the card every six months. These bags should be renewed if color of card so indicates. Silica Gel bags must be placed so that if an excess of water accumulates in the bags the water will not drip on electrical equipment.

When processing several locomotive units or engines, the Tectyl 823 and VPI-C solutions can be reused provided they are filtered after each use. VPI-C solution should be kept in tightly covered containers if it is to be saved.

IMPORTANT: It is advisable to perform any maintenance necessary on engine or locomotive before storage preparations are made. The materials recommended will not cause deterioration of any seals or other equipment, and locomotives may be put into service without washing out the VPI-C and Tectyl 823 solutions.

CAUTION: Carbonaceous deposits often form in the oil pan and the top deck of engines that have been in service and when such engines are stored, the rust preventatives used tend to loosen such deposits. These deposits then peel away and clog important oil passages when the engine is again placed in service. To prevent this, the areas involved should be sprayed with diesel fuel oil to break up the deposits and then the oil system should be carefully flushed to remove this material.

PROCEDURE

A. Preliminary Preparations

Since the engine will have to be run for short intervals in processing the cooling and lube oil systems as well

as the air compressor, it is suggested that the preliminary preparations listed be followed in order to process them simultaneously during a single short run of the engine.

1. Air Compressor And Exhauster
 - a. Drain all air lines and sumps of water and moisture.
 - b. Drain oil from crankcase.
 - c. Charge crankcase with 3 gallons of Tectyl 823.
2. Engine Cooling System
 - a. Drain cooling system including cab heater piping.
 - b. Prepare a 2% solution of VPI-C (3 ounces per gallon of cold water).
 - c. Fill system with solution to "G" valve level.
3. Engine Lube Oil System
 - a. Drain lube oil system including strainer and filter housings.
 - b. Charge system with Tectyl 823.
4. Engine Fuel System
 - a. If a good grade of fuel has been used as recommended in Maintenance Instruction 1750, it will provide the necessary protection for the injector, fuel pump and other system components.
 - b. If fuel grade is not considered satisfactory, drain tank and add a sufficient quantity of high quality fuel for use during the short engine run period.
5. Engine Governor
 - a. If the governor has been operating with turbine type oil recommended in Maintenance Instruction 1752, having adequate rust and oxidation prevention properties, it will provide satisfactory governor protection.
 - b. If governor oil is not considered satisfactory, drain and refill with three (3) pints of Tectyl 823.
6. Start engine and run at idle speed for about 15 minutes without load. While running, perform the following operations:
 - a. The load regulator vane motor should be flushed by energizing and de-energizing the governor ORS solenoid.
 - b. Prior to stopping the engine, remove the air compressor intake filter, and with compressor loaded (pumping), spray approximately two (2) teaspoonfuls of VPI-C into the intake.
7. After completing all of the preliminary items above, stop the engine and complete the following detailed processes.
 - B. Air Compressor And Exhauster
 1. Replace intake filter on compressor and wrap with VPI-B, then Grade A Creped paper. Seal with pressure-sensitive tape.
 2. Drain Tectyl from crankcase.
 3. Remove crankcase breather cap and spray one (1) heaping teaspoonful of VPI-C into crankcase.
 4. Replace breather cap and wrap with Grade A Creped paper applied well down on filter body. Tape with pressure-sensitive tape.
 5. Wrap entire air filter and all safety valves with VPI-B paper and tape.
 - C. Engine Cooling System
 1. Drain VPI-C solution from cooling system.
 2. Close all valves in system, plug filler pipes and close off vent holes in roof filler cap.
 - D. Engine Lube Oil System
 1. Drain Tectyl 823 solution from lube oil system including filter and strainer housings.

2. Disconnect and drain oil pressure line to governor.
3. Remove filter elements and spray filter housing thoroughly with VPI-C. Tighten cover securely.
4. Wrap lube oil cooler vent (where used) with VPI-B and secure with pressure-sensitive tape.

E. Engine Fuel System

1. Drain fuel tank. Remove filler caps and spray about four (4) teaspoons of VPI-C into tank. Replace filler caps and plug fuel tank vents.
2. Remove filter elements and clean housings. Replace filter housing covers.

F. Engine Governor

1. Drain oil or Tectyl 823 from governor.
2. Remove cover and place one (1) square foot of VPI-P over power pack. Replace cover.
3. Wrap entire governor with Grade A Creped paper and seal with pressure-sensitive tape.

G. Engine

1. Remove top deck covers.
2. Remove breather-shields to gear train at blower end and spray VPI-C into gear train.
3. Spray VPI-C through grilled openings into the accessory drive end of engine.
4. Place three (3) square yards of VPI-P over rocker arms on both sides of engine.
5. Replace top deck covers and fasten down securely. Tape all edges with pressure-sensitive tape.
6. Remove inspection cover over lube oil relief valve and spray VPI-C into accessory drive housing. Replace cover.

7. Remove camshaft inspection cover from overspeed trip housing and spray interior with VPI-C. Replace cover.

8. Remove air box inspection covers, open cylinder test valves and bar engine over, spraying VPI-C thoroughly into each cylinder through the liner ports. Place three (3) square yards of VPI-P in each side of air box, replace covers and close cylinder test valves.

9. Remove oil pan inspection covers and spray VPI-C thoroughly into the lower end of each cylinder liner. Replace covers.

10. Remove, clean and replace engine air intake filters. Cover entire filter units with VPI-B then Grade A Creped paper and seal with pressure-sensitive tape.

11. Place one (1) square yard of VPI-P down each exhaust stack. Apply stack covers then seal with Grade A Creped paper and pressure-sensitive tape.

12. Spray or paint all exposed unpainted metal surfaces such as the flywheel and cylinder test valves with Tectyl 823.

H. Load Regulator

1. Drain oil from vane motor and governor oil connection piping.
2. On commutator type load regulators, remove cover and brushes then place one (1) square foot of VPI-P around commutator and replace cover. Wrap entire unit with VPI-B then Grade A Creped paper and seal with pressure-sensitive tape.
3. On face plate type load regulators, cover entire unit with VPI-B, then Grade A Creped paper and seal with pressure-sensitive tape.

I. Generators And Motors In Carbody

1. Main Generator
 - a. Remove brushes.

- b. Place 8 one-pound bags of Silica Gel in lower part at brush holder end (suspend so as not to contact metal).
- c. Place one (1) square yard VPI-P on each side at brush holder end and insert two (2) square yards around lower part of brush holders.
- d. Insert 4 one (1) square yard pieces of VPI-P thru openings between flywheel and generator.
- e. Wrap and cover each end of the generator using VPI-B and seal with pressure-sensitive tape.

2. Auxiliary Generator

- a. Remove brushes.
- b. Place 2 one-pound bags of Silica Gel under inspection cover, one on each side.
- c. Pack one (1) square foot VPI-B paper at each side of front end.
- d. Pack VPI-B paper around shaft between generator and engine.
- e. Cover both ends with VPI-B and seal with pressure-sensitive tape.

3. Auxiliary Motors And Blowers

- a. Traction Motor Blowers - place VPI-B paper over intakes of blowers and seal with pressure-sensitive tape. Cover outlet opening with plywood and seal.
- b. Dynamic Brake Blower Motors - remove brushes, wrap motor with VPI-B and tape.
- c. All Auxiliary Motors (Fuel Pump, Cab Heater, Steam Generator, etc.) - remove brushes, wrap motor with VPI-B and tape.

J. Electrical Cabinets

1. Pull all fuses and package. Open all switches. Grease with thin film

of petroleum jelly (switches, reverser drum, brake transfer switch, and all exposed interlocks).

2. Wrap all resistors with VPI-B and seal with pressure-sensitive tape.
3. Suspend 10 one-pound bags Silica Gel at various points in high voltage cabinet, and seal all openings with VPI-B and pressure-sensitive tape. Seal openings where cables come through from outside.
4. A.C. contactor cabinet - Place one-pound bag Silica Gel in cabinet and seal all openings with pressure-sensitive tape.

K. Electrical - Miscellaneous

1. Isolation Switch

- a. Apply petroleum jelly to contact fingers.
- b. Place one (1) square foot of VPI-P in cabinet and seal with pressure-sensitive tape.

2. Temperature Control Switches (Vernatherm, Relay or Thermostat types)

- a. Lubricate fingers or contacts with petroleum jelly.
- b. Wrap housing with VPI-B and seal with pressure-sensitive tape.

3. Compressor Control Switch

- a. Process as in Item 2 above.

4. Push Button Switch Box

- a. Process as in Item 2 above.

5. Seal external charge receptacles with pressure-sensitive tape.

6. Cover jumper cable receptacles with pressure-sensitive tape.

7. Cover ground light housings with VPI-B and seal with pressure-sensitive tape.

L. Throttle Stand

1. Grease all contact fingers and drums with thin film of petroleum jelly.

2. Place two (2) square feet VPI-P in stand and seal all openings with pressure-sensitive tape.
3. Coat metal control handles with Tectyl 823.

M. Traction Motors

1. Remove brushes from traction motors and package in Grade A Creped paper, and seal with pressure-sensitive tape. Place in cab.
2. Spray approximately one (1) heaping teaspoonful of VPI-C in vents (pinion gear side), seal vents with VPI-B and pressure-sensitive tape.
3. Suspend 3 one-pound bags Silica Gel and place one (1) square yard VPI-P at commutator side. Replace covers and seal with pressure-sensitive tape.
4. Spray approximately one (1) heaping teaspoonful of VPI-C in each traction motor support bearing and gear box. Seal openings with pressure-sensitive tape.

N. Truck Journal Boxes

1. Roller Bearing Type
 - a. Spray approximately one (1) heaping teaspoonful of VPI-C in each journal box and seal any openings with pressure-sensitive tape.
 - b. Locomotives with roller bearing journal boxes must be moved periodically to prevent brinelling of the journals.
2. Friction Type
 - a. Jack up journal boxes, raise journal brass to permit complete spraying of VPI-C on the axle and replace the brass.
 - b. Place two (2) square feet VPI-P in each journal box and seal all openings and cover with pressure-sensitive tape.
 - c. Place oak wooden block between each journal box and tie bar and wire in place.

O. Air Brake Equipment

1. Spray one (1) teaspoonful of VPI-C into pipe leading to brake cylinders and into vent in underside of brake cylinders. Cover end of pipe and vent opening with VPI-B and seal with pressure-sensitive tape.

P. Batteries

1. Disconnect battery leads and tape ends.
2. Grease all terminals with petroleum jelly.
3. Used batteries (when stored) should be cleaned with sodium bicarbonate or soda ash to assure no leakage due to dirt.
4. Batteries should be fully charged, and should be checked and charged at 3-month intervals (specific gravity 1.250-1.275), or more often if experience warrants.
5. Clean and paint battery boxes.

Q. Fan And Speed Increaser Drive

1. Drain oil from gear case.
2. Remove inspection cover. Place one (1) square yard of VPI-B inside gear case and replace cover.
3. Cover traction motor blower fan inlet with VPI-B and seal using pressure-sensitive tape. Cover blower outlet with plywood and seal edges with caulking compound.

R. Carbody

1. Seal all fan and exhaust openings in roof with Sisal Kraft and pressure-sensitive tape.
2. Seal all air intake openings with Sisal Kraft and pressure-sensitive tape.
3. Empty sand boxes, place one (1) square foot VPI-P inside, and seal with pressure-sensitive tape.
4. Apply Tectyl 823 to door locks and hinges.

5. Boarding up of windows, hatches, grilles, etc. may or may not be necessary, depending on the length of storage and severity of conditions.

S. Miscellaneous

1. Bell

- a. Wrap the bottom of the bell with VPI-B and seal with pressure-sensitive tape.

2. Headlight - Mars Light

- a. Place one (1) square foot VPI-P in housings and seal with pressure-sensitive tape.

3. Belts And Sheaves

- a. Remove belts and store in flat position. Coat sheaves with Tectyl 823.

4. Water Coolers

- a. Automatic water coolers should be serviced according to manufacturer's instructions.

5. Air Filters

- a. All engine and carbody air filters should be cleaned and oiled before storage, and should be

reserviced when the locomotive is taken out of storage.

6. Steam Generators

- a. Refer to the manufacturer's instructions for protection of coils, valves, pumps, belts and sheaves, and electrical equipment.

7. Windshield Wipers

- a. Remove wiper blades, package, place in cab, and wrap wiper blade arms with VPI-B and seal with pressure-sensitive tape.

8. Speed Recorder

- a. Place one(1)square foot of VPI-P inside housing. Wrap with VPI-B and seal with pressure-sensitive tape.

9. General Couplings

- a. Spray with Tectyl 823, wrap with VPI-B, and seal with pressure-sensitive tape.

10. Cover gauge glasses in cab.

11. Air Hose

- a. Air hoses should be removed to prevent deterioration and the air pipes should be plugged.