PROCEDURUE

This LVOP is a guide only and for detailed procedures the following two publications should be referred to -:

Department Of Railways
New South Wales
Mechanical Branch
The Operation and Management of Steam Locomotives

A Guide and Book Of Special Instructions For Locomotive Engine Drivers, Firemen and Trainee Enginemen
1961

By Authority
F.P. Heard
Chief Mechanical Engineer

Department Of Railways
New South Wales
Mechanical Branch
A Guide and Book Of Special Instructions For Locomotive Engine Drivers, Firemen and Trainee Enginemen
Part 2
1964

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These books are commonly referred to as the “Blue Books” and were compiled as a comprehensive guide and training manual for the operation of Steam Locomotives in New South Wales.

It should also be noted that suitable practical training under the guidance of qualified Drivers and Firemen shall be provided by the Lachlan Valley Railway.

NOTE; For the purpose of clarity the word Fireman/Firemen refers to Male or Female and is used for clarity given the age of the books referenced above.

This LVOP is divided into four parts-:

1. Locomotive Kit and Equipment
2. Fireman’s Preparation
3. Drivers Preparation
4. Special Instructions.

STEAM LOCOMOTIVE KIT AND EQUIPMENT

The following items shall be supplied as a minimum standard on all operational locomotives outside of the bounds of a Locomotive Depot.

- 1 Hand Signal Lamp/Torch
- 2 Torches and/or Flare Lamps
- 1 Loco Firing Shovel
- 1 Square Can containing Loco Bearing Oil
- 1 Round can containing Super Heated Cylinder Oil.
- 3 Spare Lamps for Marker and Gauge Lights Etc.
- 2 Oval Feeders
- 1 Drum of Kerosene
- 1 Straw Broom
- Sundry Spanners including 12, 14 and 24 inch Shifting Spanners and Department of Railways Monkey Wrench
- 1 Axle Box Lid Lifter
- 1 Combined Coal Pick and Hammer
- 1 tin of Compressor oil for the lubricator on the Westinghouse Air Compressor
- 1 Axle Box Syringe
- 1 Air Hose Spanner
- 1 Pair of Trimming Tongs
- 1 Tin containing lubrication trimmings
- 1 Cold Chisel
- 1 Brake Valve Spanner
- 1 “C” Spanner for Air Compressor
- 1 Pin Punch
- 1 Red Emergency Box containing 24 detonators, 2 red flags, 1 green flags and 3 approved track circuit shorting clip.
- 1 First Aid Kit
- 1 Two Way Radio
- 1 Towing Chain
- 1 White Disc
- 1 spare ETOM
- 1 spare 25mm and 32mm train air brake coupling hoses
- 4 chocks
- 1 fire extinguisher
- 4 Fire Irons consisting of 1Dart, 1 Short fire iron, 1Long fire iron and 1 Long Rake.

This equipment is located in the storage areas in the locomotive cab, in the Tender Back Box or on the tender.

SAFETY FIRST

BEWARE OF OVERHEAD WIRES AND OTHER HAZARDS WHEN ACCESSING THE TENDER BACK BOX.

It should also be noted that on Heritage Trains other than Light Engine movements some of this equipment and additional tools are carried on the train.

FIREMAN'S PREPARATION

This preparation procedure is based on the fact that the locomotive is in steam.

Water Gauges;

Upon entering the cab check the water gauges noting that -:

1. The water gauge glass protectors are in position.
2. The level of the water in the boiler.
3. Test the water gauges noting the action of the water during the test.

Fire Box

1. Check the condition of the firebox looking for the following items-:
2. Leaking tubes, stays or fusible plugs these are detected by traces of water or steam.
3. That the brick arch is in good condition.
4. That the fire grates are in good condition, in the correct alignment and the rocking mechanism is in working order.
5. That the fire hole door is in good condition and operates correctly.
6. Also check the condition of the fire.

Smoke Box

Leaving the cab the smoke box is the next part of the loco to be examined, for safety the following procedure should be followed-:

1. Close the fire hole door and open the blower steam valve. This is to prevent back draft into the cab when the smoke box door is opened.
2. Open the smoke box door slowly so as to allow any smoke and gases to escape this is especially necessary where a blocked spark arrestor is suspected.

The examination of the smoke box is now possible checking the following -:

1. Check for water or steam leaks from boiler tubes and steam pipe joints.
2. Check that the spark arrester is clean and in good condition.
3. Make sure that all ash has been removed.
4. Observe that the foundation is in good condition.
5. On locomotives with self cleaning smoke boxes make sure that the draft or apron plate is in right position and the cotter pins are inserted.
6. Make sure that the smoke box door ring is clean and free of ashes.
7. After closing and tightening the door it should be checked by running a flare lamp around the outside a loose or badly sealed door would draw the flame inwards towards the smoke box.

Westinghouse Air Compressor

Oiling the Westinghouse Air Compressor is carried out whilst at the front of the locomotive using the oil provided in the kit specifically for the compressor.

NOTE: that the correct oil is to be used in the different parts of the compressor. i.e Round Oil for the steam side and a unique type of oil for the air side.

The following procedure shall apply:

1. Remove the cap nut on the compressor lubricator.
2. Fill the lubricator to within a quarter of an inch (6.5mm) of the top.
3. Replace the cap nut back onto the lubricator being careful not to allow any dirt or sand to enter the lubricator.

Sandbox's

Before leaving the front of the locomotive check the sand boxes making sure that they are full with clean dry sand and that the strainers where provided are in position.

On returning to the cab the following procedure should be adopted to start the Westinghouse Air Compressor-:

1. Providing the steam pressure is above 30 PSI place the Brake Valve handle into the lap position.
2. Open the valve for the air compressor slightly and slowly to prevent water hammer damage.
3. Allow the compressor to warm and slowly start to pump.
4. When around 40 PSI of Main Reservoir Air pressure is reached open the valve fully.

Spare Gauge Glass

Whilst starting the compressor, check that the spare Gauge Glass is on hand in the container on the locomotive and it is intact.

Spreading the Fire

The fire can now also be spread keeping in mind that enough steam pressure must be maintained to operate the compressor and that a full head of steam will also be needed to test the correct pressure settings of the safety valves the following should be taken into account.

1. The boiler pressure at the time of spreading the fire.
2. The amount of water already in the boiler.

Ash Pan

1. Leaving the cab the Ash pan should be checked next and the following items noted-:
2. The fire grates where they can be seen are in good condition and proper position.
3. The Ash pan is clear of accumulated ash.
4. The cages where fitted are in position and secured.
5. The hopper doors are properly closed and the locking mechanism is functioning correctly.
6. The dampers are fully opened.
7. That any spark arrester mesh over air openings where fitted is in good condition.
8. The general condition of the Ash pan for any irregularities that may allow ash to escape.

Oiling Duties

The fireman is also responsible for oiling parts of the locomotive and these are set out below.

Below the footplate the following should be oiled with loco bearing oil -:

1. Eccentric Straps
2. Expansion Links
3. Valve Spindle Glands
4. Knuckle Joints
5. Spring Gear Equipment

Above the footplate the following should be oiled

1. The Precision Air Reversing Gear Lubricator and the piston rod of the same (where fitted)
2. Spot oil the reversing shaft universal coupling pins
3. Reach rod brackets
4. Regulator Gland on the side of the smoke box
5. Whistle valve air piston
6. The spindles of the steam valves for the compressor, blower and injectors
7. The tender brake gear bearings
8. The fire hole door hinge pins and air operating cylinder

Parts to be lubricated with Cylinder Oil

1. Super heater Damper door Cylinder.
2. The auxiliary oil cups for the piston rods and valve spindles of the locomotive.

Mechanical Lubricator

The mechanical lubricator should be examined checking the following-:

1. The level of the oil in the sight glass or on the dipstick.
2. Rotate the ratchet handle 12 times to prime the lubricator.

WARNING

DO NOT ATTEMPT TO REMOVE THE FILLING PLUG IF THERE IS ANY SIGN OF STEAM PRESSURE.

Testing Injectors

Testing the injectors is to be conducted as part of the fireman's locomotive preparation the following method is to be applied -:

1. Steam Pressure is to be at working pressure or 20PSI below
2. Check that the hot water service hose valve is closed
3. Note that the hot water service hose is connected and in good condition
4. Make sure that the Ash pan flushers are closed
5. Make sure that there is no one standing near the Injector overflow pipe
6. Open the water valve fully
7. Open the steam valve at least one full turn
8. Close and quickly reopen the water valve at which time the injector should pick up water

9. Whilst the injector is running check all valves, pipe work and joints for water and steam leaks
10. At the completion of the test shut off the injector by first closing the steam valve and then the water
11. If after shutting off the injector steam continues to blow from the overflow this may indicate a fault in the clack valve or the steam valve

Turbo Generator

Starting the Turbo Generator should be the next part of the preparation when starting the turbo generator care should be taken to open the steam valve slightly for a few seconds to allow the turbo generator to warm and exhaust any water that has accumulated.

A short circuit would be indicated by a braking effect on the turbo generator and dimmed lights.

1. The lights should be tested and examined and the provision of spare lamps checked.
2. Marker lights should also be checked and correctly set.

Couplings

The locomotive couplings should be checked and tested the automatic couplings are to be tested by closing and opening the jaw thus testing the locking and release mechanisms.

Screw couplings are to be tested to make sure that all moving parts move freely and the coupling secured on the side hook provided. Three link couplings are to be checked and secured on the side hook provided.

Watering the Locomotive

Ensure the level of water in the tender is sufficient to supply water to the injectors. When water is to be taken prior to departure or supplied from a water column, care is to be taken to ensure a reduced flow of water in order to fill the last portion of the tender or tanks. This will allow the water to be turned off quickly and avoiding damage to the column or the water supply pipe work.

WARNING

IF THE LOCOMOTIVE IS TO WORK INTO AN AREA WHERE THERE IS OVERHEAD WIRING THE TENDER TANK LID MUST BE LEFT OPEN.

Piloting of Locomotives

The fireman's preparation is now complete with the exception of piloting the movement of the locomotive whilst inside the bounds of loco points of any depot this includes on to and off turntables.

DRIVERS PREPARATION

Setting the Locomotive for Examination and Oiling

A locomotive should be set for oiling and examination in the following manner with both cranks down that is the right hand side on the bottom back angle and the left hand side on the bottom front angle. Reversing gear should be centered, with the exception of a 59 class locomotive, where the reversing gear is placed in forward gear to enable the quadrant blocks to be oiled.

The cylinder drains are to be left open, handbrakes applied and wheels chocked at all times.

Examination of Locomotive and Tender

A systematic and thorough examination of the locomotive is to be made before oiling.

The following should be checked and examined

Smoke box	Spring pin cotters are in	Examine ash pan, fire grate and rocking bar equipment
Spark arrestors	Collar pins, studs & bolts (tight)	Drain the main reservoir into suitable container for disposal.
Westinghouse Air Compressor	Slide bars and bolts intact	
Valve box covers secure	Brake blocks and hangers in good order	
All moving parts of locomotive	Intermediate wedge between engine & tender is tight and properly pinned	
Gudgeon pins (tight)	Pull rods & Fulcrum Bars of the brake rigging	
Big End Bolts (tight)	Equalisers, links and compensators of spring gear	
Safety Cotters are in	Grease blocks on 59 class	

position		
Wedge Blocks (tight)	Lock nuts on eccentric straps (tight) split pin inserted	
Springs	Valve gear tapered pin are tight and opened	

Spare Gauge Glass

The box containing the spare gauge glass must be checked and the contents of 2 glasses, 4 conical rubber washers and the brass washers.

Water Gauge Class Protectors

Examine and check the gauge glass protectors for defects and that they are secured in the correct position.

WARNING

LOCOMOTIVES ARE NOT PERMITTED IN TRAFFIC WITH GAUGE GLASS PROTECTORS MISSING.

Inspection of Boiler, Tubes and Spark Arrestors

Drivers must inspect boiler tubes at both fire and smoke box ends for leaks and blockages as well as to ensure that no incrustation is developing on the firebox tube plates.

Brick arches and spark arrestors should be examined.

Oiling the Locomotive

The following procedure shall apply -:

1. Oil the top slide bar oil well
2. Before placing oil in oil cups or reservoirs check that the trimmings and pinfeeds are in good order
3. The oil level should not be above the siphon pipe
4. Corks should be inserted securely and care taken not to foul the siphon pipe
5. An axle box lid lifter should be used when oiling to avoid dirt going into the bearings and to avoid damage to feeder spouts
6. When oiling axle boxes it is essential to make sure that trimmings are properly inserted into the siphon pipe
7. It is necessary to be systematic during oiling as with the examination of engines to

avoid missing essential parts.
8. 59 class have coupled wheel axle boxes that are grease lubricated when the indicator shows that these are 7/8 inches/21mm from the journal they need attention
9. Driver should check and fill all tender axle boxes
10. When oiling the little ends, the plug trimmings should be withdrawn and oil allowed to enter the siphon pipe. The trimming is reinserted to pump the oil through.
11. Special attention must be given to oiling the quadrant blocks on 59 class locomotives.
12. Big end and coupling rod oil cups are fitted with pin feeds, it is essential that the oil is not filled past the top of the oil way as over filling restricts the functioning of the pin.

Hydrostatic Lubricator

The Hydrostatic Lubricator should be examined and filled as required with cylinder oil using the following procedure.

1. Close the steam valves supplying steam to the lubricator.
2. Close all the valves on the lubricator
3. Open the water drain valve
4. Remove the oil filling plug
5. Close the drain valve when sufficient water has drained to allow the cylinder oil to be poured into the lubricator.
6. Replace the oil filling plug and tighten.
7. Reopen the steam supply valves
8. Open the condensate, or water feed valve on the lubricator.

Starting the Hydrostatic Lubricator

The Driver is responsible for seeing that the lubricator is filled and working correctly before leaving the depot.

The lubricator should always be started 15 minutes before departure from the depot.

The Nathan Mechanical Lubricator

The driver must examine the driving mechanism to ensure it is in good order the lubricator is driven by a crank arm attached to the combination lever on a 59 class. The oil level should be checked and not be less than 8 pints. The oil pipes should be examined for leakage and the function of the lubricator heating system checked.

The compressor steam valve must be fully opened before leaving the depot and remain open whilst the engine is in service.

Ashpan Flushers

The driver is required to inspect the operating valves for the ash pan flushers and ensure that water is not flowing into the ash pan when the injector is operating. The driver is also responsible for ensuring:

- Prevention of water hammer in the cylinders
- Automatic water release valves fitted to cylinders and operational.
- Cylinder and steam chest drain valves are operational.

- Manually operated cylinder drain valves are operational.
- Steam operated “Okadee” cylinder drain valves are operational.
- Reversing screw bracket is not damaged and is fully operational.
- Turbo generators working and in good repair.
- The testing of the safety valves.
- Testing of the Westinghouse Air Brake equipment.
- Testing of sanding / de-sanding equipment.
- Checking engine and tender brake piston travel.
- Blowing down of locomotive boilers.

RELATED DOCUMENTS

LVOP 304