

**SOUTHERN PACIFIC COMPANY
(PACIFIC LINES)
INSTRUCTIONS FOR THE LUBRICATION OF LOCOMOTIVE VALVES AND CYLINDERS,
AND DRIFTING SUPERHEATED LOCOMOTIVES
MECHANICAL CIRCULAR No 25 (3 Pages)**

Issued November 15, 1932

Revised February 1, 1933

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HYDROSTATIC LUBRICATION

1. The main and auxiliary (booster) steam valves to lubricator should be wide open at all times when engine is in use. Lubricator should be working properly 5 minutes before starting on trip to insure that valves and cylinders will receive proper lubrication.
2. The lubrication is carried by means of steam from the booster valve and delivered to steam chests and cylinders through steam pipe just above steam chest, and depends upon steam for atomization and distribution over the surface to be lubricated. Enginemen should watch closely the condition of lubrication on piston and valve rods, as they indicate the degree of lubrication on the walls of the cylinders and valve chambers. Engine oil must not be used on piston or valve rods at any time.
3. Enginemen should frequently note the working of lubricator while on the road, as weather conditions affect its operation: a cold draft through the cab may nearly stop the feeds. The oil should be of sufficient quantity and regularly fed, the amount to be used depending on piston speed and operating conditions. Enginemen should endeavor to keep within the amount allowed to make the trip.

Mechanical Lubrication

4. On Locomotives equipped with mechanical lubricator, the lubrication is carried to valves and cylinders by forcing oil into steam pipe just above steam chest in liquid form and depends upon steam for atomization and distribution over the surfaces to be lubricated.
5. Engineer should watch closely the condition of lubrication on piston and valve rods and if at the beginning or during the trip, when stopped, these appear dry, he should supply oil by "cranking" the lubricator, which is accomplished by turning handle of lubricator to the right several turns.
6. Roadhouse Foreman must see that feeds are properly adjusted and operating parts are in condition to deliver the required lubrication.

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GENERAL

7. Drifting throttle must be used at all times while engine is in motion to provide sufficient steam to atomize and distribute the oil or it will accumulate on the valve spools and on the bottom of the valve chambers between bushings in considerable quantity, depending upon the length of time this condition prevails.

When steam is again used, any accumulation of oil will be suddenly boiled and partially vaporized, flushed out and wasted, coating the exhaust passages of cylinders, valves and exhaust nozzles. To prevent air from entering cylinders while hot which would furnish the necessary oxygen for combustion resulting in destroying the lubrication in steam chests and cylinders, carbonizing oil on the steam chest and cylinders passages, cylinders cocks should not be left open while drifting or immediately after a stop is complete.

It must be borne in mind that oxygen must be present to support combustion and the use of a small amount of steam at all times will prevent the entry of air and consequent combustion.

8. When engine is moving at high speed more drifting throttle will be required to furnish necessary steam than when moving at slow speed to prevent vacuum being formed in the cylinders which will result in drawing flue gases down through exhaust nozzle into steam chests and cylinders. When a point is reached where the use of steam is not necessary and engine can be allowed to drift, the throttle should be closed gradually to a point where the amount of steam entering cylinders is just sufficient to break the vacuum. As speed decreases throttle opening should be reduced accordingly. On engines equipped with back pressure gage, an effort should be made to maintain gage as close to the zero point as possible, never allow hand to indicate vacuum. Preferably the hand should indicate a slight pressure.
9. When making a stop, as engine slows down the pressure in the cylinders will increase. However, the throttle should not be shut off completely until engine stops.
10. Engines should not be drifted at high speed with valves in short cut-off as this causes undue stresses to be set up in machinery, track and road bed. This condition is indicated by excessive vibration and rough riding of locomotive.
11. With the Walschaert Valve Gear, after arriving at point where locomotive is to be drifted, throttle should be left slightly open and reverse lever placed in full forward position.
12. With Stephenson Link or Baker Valve Gear, while drifting, the reverse lever should be adjusted according to speed; at high speed it should be moved forward, but never to full forward position, making sure that drifting throttle is used.

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13. When long runs are made working short cut-off, **which should never be less than 25%**, it is advisable to change the cut-off about every 20 miles, for about 20 seconds. By this the valves are given a longer travel and the rings are given additional lubrication by picking up the oil which has collected on the valve bushings.
14. The water level in the boiler should be carefully regulated and not carried at a point higher than necessary for safety, depending upon grade conditions. Carrying water too high will cause priming resulting in water being carried over to valves and cylinders and, if resulting in no other damage, will wash off and destroy the lubrication.
15. Upon arrival at terminal, Engineer should make notation on Form 2323 showing condition of lubrication on valve stems and piston rods observed during trip.
16. Roundhouse Foreman must compare condition of lubrication with that stated by the Engineer. If it is found that an engine has not been properly lubricated, investigation should be made to determine whether this was due to lubricator and attachments out of repair, improperly adjusted or improper handling. In case lubricator is found to be in adjustment and in condition to furnish proper lubrication it indicates that engine had not been properly handled. This condition should be called to the attention of the Engineer by either the Master Mechanic or Road Foreman of Engines who should instruct him accordingly.
17. Road Foreman of Engines must maintain constant check on condition of lubrication on all engines operating on his Division. If engines are not properly lubricated he should investigate and determine whether it was due to faulty handling or condition of lubricator and advise the Roundhouse Foreman in order that proper adjustment will be made. In case of improper handling he should give the Engineer necessary instructions

(SIGNED G. McCormack ?

General Supt. Motive Power

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Transcribed 3 August 2010