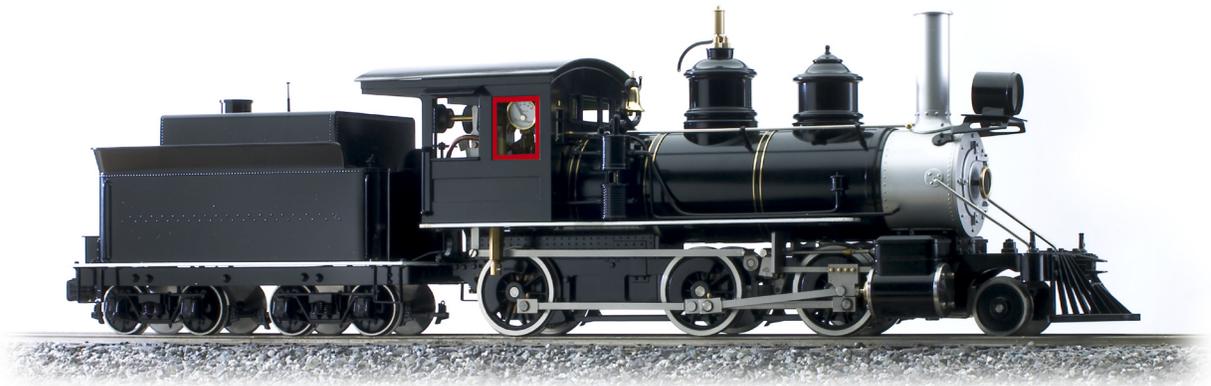


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## OPERATING INSTRUCTIONS

### Baldwin “Mogul” Live Steam

#### **INTRODUCTION:**

The Mogul was a small sized, inside frame locomotive that worked all over North and South America. These engines were built in the 1870's and 1880's. The Moguls shared many common parts with the 4-4-0's of the same period. The small drivers and wheel arrangement gave these engines greater pulling power than the 4-4-0's that were mainly built to pull short passenger trains of the day. Our prototype of our model can be seen at the California State Railroad Museum in Sacramento, California. It is located on the second floor of the main building.

#### **SAFETY FIRST:**

All our locomotives are safe to run, and will give many hours of pleasure, providing the following safety procedures are followed:

1. Please read the instructions thoroughly before running for the first time.
2. Always do a complete refill of gas, oil and water. Never refill just the gas to prolong the run.
3. Never let the engine run out of water.
4. When refilling the gas, do not have any naked flame present, and **NO SMOKING!**
5. Do not pick up the engine by the body-work, chimney or boiler, especially when hot.
6. Only pick up the engine by the buffer beams and, when hot, use old gloves or a cloth.
7. Do not stand over the chimney. Ejected boiling water or steam may cause serious injury.

### **GENERAL HINTS:**

As with all operating machinery, whether model or full size, wear will occur. In the model steam locomotive much can be done to help prolong its life and decrease the amount of time required in the workshop for servicing.

Keep the engine as clean as possible, and the motion free from dirt and garden debris. The valve gear, axles and crank pins should be oiled sparingly with light oil, e.g. "3-in-1 oil." Over-oiling attracts dirt and grit, which will increase wear.

Regularly check that all screws and motion bolts are firm. Do not over-tighten, as the strips threads and shears bolts. **When filling the lubricator, always use high temperature superheat steam oil, suitable for locos fitted with super heaters; this is available from garden railway product retailers. FAILURE TO USE THE CORRECT GRADE OF OIL CAN LEAD TO BLOCKED STEAM PIPES, AND WILL INVALIDATE THE GUARANTEE.**

When running your engine, avoid excessive speed and acceleration, both will cause premature wear in the valve gear. Prototypically, narrow gauge locomotives ran at a speed of between 10 and 20 m.p.h, and never should exceed 25 m.p.h.

### **END OF RUN:**

As previously mentioned, the locomotive will slow (due to pressure dropping) when the fire has gone out. Stop at a convenient place and open the lubricator drain valve. Blow out tall condensed water and the remaining oil. Leave the drain valve open and allow all the

remaining steam to blow out. The locomotive should be allowed to cool. When cool, clean the engine, check the motion and oil if necessary. The locomotives should always be put away in a clean condition, as it attracts less dust and is always ready for the next run (or to be shown to an admiring friend). It is advisable to store the loco where any residual drips of oil or water do not matter.

### **BLOCKED GAS JETS:**

If the gas jet becomes blocked with particles of dirt within the gas, the jet will have to be removed and cleaned. Using a spanner or pliers carefully undo the pipe union on the gas control valve. Remove the pipe and jet holder assembly from the burner. Holding the jet holder, gently in a vice, unscrew the jet. To clear, place the jet nozzle against the inverted gas can nozzle and clear the jet with a blast of gas. Under no circumstances use a wire, this will damage the jet hole. Replace the jet in the holder, ideally using a thread sealant sparingly on the threads. Ensure it is tightened up firmly. Replace the assembly into the burner and re-connect the pipe to the control valve. Ensure this is done up tightly, test **CAREFULLY** with a flame and the gas "just on," for gas leaks. Tighten if required.

### **PREPARATION FOR RUNNING:**

Always service the engine in the following order; gas, oil then water.

***To fill the gas tank:*** invert the gas can and apply the nipple to the gas inlet valve on the top of the tank turret. It is advisable to support the loco under the gas tank whilst filling, to prevent the engine tipping over. You will know when the tank is full; gas will blow back from the inlet valve in a strong jet. A small amount of gas and air will escape during filling, but the difference between this and when the tank is full is always clear. Always keep the gas can valve vertical when filling the gas tank.

***To fill the lubricator:*** as you will read in the instructions for the “end of the run”, the lubricator should be empty of oil and water with the valve left in the open position. Now close the valve and remove the filler cap. Fill-up the lubricator with steam oil to about a ¼ inch below the top. Leave the filler cap off for the present, so that any trapped air can escape. Remember to refit the cap after you have filled the boiler.

***To fill the boiler:*** remove the filler cap. Fill the boiler completely- ideally using distilled water, using the large syringe provided. When the boiler is full of water, pull out 20 ml. of water using the large syringe. This will allow space in the top of the boiler for steam to build. Replace the boiler filler cap. Filler caps should be firm finger tight. They are sealed with a trapped “O” ring and, therefore should not be over-tightened.

### **LIGHTING UP:**

Open the smoke box door; just pull it open by the door handle. Light your lighter/match etc.,

and gently open the gas control valve until a gentle hiss is heard in the burner. Apply your light in to the smoke box and the flame should ‘pop’ down the fire tube and ignite the burner inside the fire tube. If the gas valve is opened too much the flame will not pop back; it will either fail to ignite, will roar in flame out of the smoke box, or there will be a ball of flame around the front of the engine, which will then blow the whole fire out ( after giving the driver a fright)! When the fire sound has stabilized, after about 30 seconds the gas can be turned up until a healthy roar is heard. The smoke box door may be shut after about two minutes. Now leave the locomotive to raise steam.

### **RUNNING:**

When the engine has raised about 40 psi, you are ready to start running. It is advisable to run the engine in reverse first; it clears the condensed water from the cylinders best this way. Before commencing your first run of the day, it is advisable to put a cloth loosely over the chimney for a few minutes, as condensed water will be ejected from the chimney. This is quite normal; the motion of the engine will be jerky until all condensate has been ejected. **DO NOT stand over the chimney as ejected boiling water/steam could cause serious scalding.**

Place the direction lever into the reverse position, and then open the main steam valve. The engine should start to move off in the reverse direction. When starting from cold it will be jerky, this is normal, as it has to clear the condensate from the system. The more the main steam valve is opened, the faster the engine will go; our advice is to start slowly and learn the road with your engine.

After a minute or so, remove the cloth and continue running. In running it is correct practice to balance the boiler pressure against the load being pulled and the track conditions. With a light load and level track the pressure may need to be only 25-30 p.s.i. Therefore, turn the gas control down to keep this pressure. When running a heavy train with steep gradients, increase the pressure by turning up the gas. The ideal running pressure can be learnt by experience and is one of the pleasures of running a live steam engine. There is no need to have the safety valve constantly blowing off (it is what its name implies – a safety vent for excess steam pressure). In all our designs, the gas has been programmed to run out just

before the water, thus it is important not to refill with gas alone in order to lengthen the run by a few minutes. When the gas runs out a complete gas, oil and water service must be done (remember GOW, also remember to shut the gas regulator before refilling, and **DO NOT** refill with gas near any other live steam loco). When locomotive slows as the pressure falls at the end of a run, stop the engine. Gently open the lubricator valve and blow out any condensed water. If you intend to continue running, close the drain when you see oil coming out of it and carry out a general refill. If it is the last run of the day, leave the lubricator drain valve open and blow the lubricator completely clean.

### POSITIONS OF FILLERS AND DRAINS ETC.:

The cab roof slides back to give access to all fillers.

**The gas tank** is in the front nearside corner of the cab, the gas-filling valve is on the top of the gas tank turret. The gas control valve is attached to this turret, and can be operated through the nearside cab doorway.

**The lubricator** is in the offside front of the cab, just forward of the doorway and the reverse lever. The filler cap has a "T" bar in it to aid removal. The lubricator drain is directly beneath the lubricator. To drain, un-screw the drain valve through about ½ a turn.

**The boiler water filler** is on top of the steam turret on the boiler in the middle of the cab. Undo the knurled cap to fill with water. The main steam regulator valve is the wheel valve on the rear of the boiler-filling turret.

**The direction control** is the lever in the offside cab door. To operate, pull gently outwards and move to the desired direction. The control is "gated," and will therefore hold itself in the full forward or reverse position.