

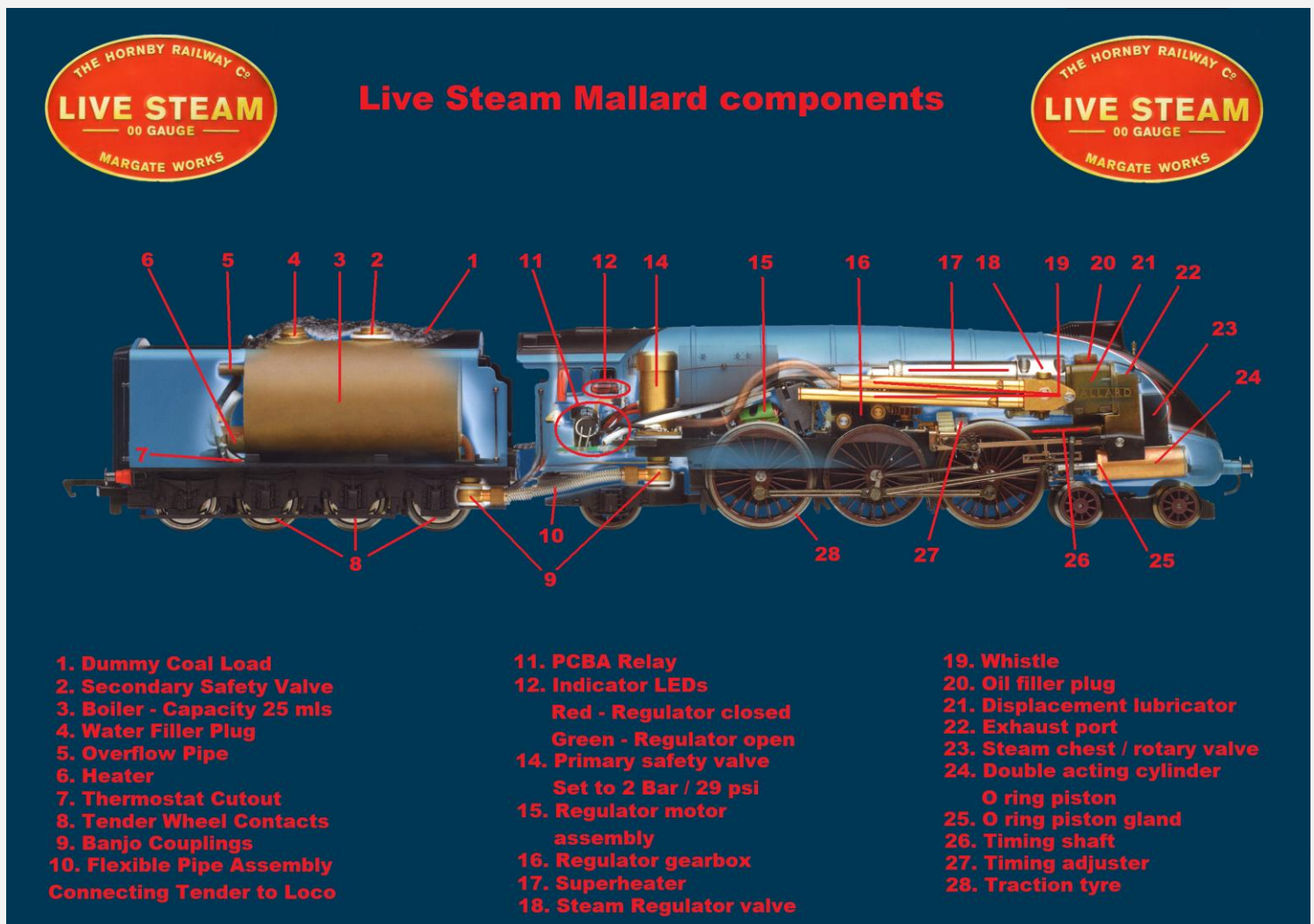
OOLS Loco Component Diagram and Explanatory Text.



These are postings that hopefully will help us to understand how our live steam locos work.

In this posting Michael Marshman provides a more detailed explanation of the individual parts of an OO Live Steam Loco.

This explanation was designed to be read with the Hornby diagram alongside the text. This can be achieved on some operating systems by opening two instances of the web browser side-by-side and choosing the relevant pages in each.



Explanatory text follows on next page

How a Hornby Live Steam Loco Works.

The **boiler (3)** is in the tender and this is where the water is heated to produce the steam for the loco. It is heated by an **immersion heater (6)** within the boiler by electricity picked up by the **tender wheels (8)**. The steam is taken to the loco by the **flexible pipe (10)** and it enters the **safety valve (14)**. This safety valve is set to 2 bar or 30 psi above atmospheric pressure, therefore the steam in the boiler being at the same pressure is at about 130 degrees centigrade. The steam leaves the safety valve and travels through the thin tube to the **superheater (17)** where the temperature of the steam is raised to about 280 degrees centigrade. *[For a detailed explanation as to why these high temperatures are necessary read the technical paper by Richard Hallam on steam generation.]*

The steam passes through the **steam regulator valve (18)** into the **displacement lubricator (21)** where it picks up a trace of oil and proceeds to the **steam chest (23)**. Within the steam chest is the rotary disc valve that distributes the steam to the two **double acting cylinders (24)**. Once used in the cylinders the steam exits through the rotary steam valve and out of the loco through the **exhaust port (22)** and the chimney.

The piston being propelled by the steam in the cylinder, drives the central axle and on this axle is the gear drive and **shaft (26)** to drive the rotary valve. This shaft has the **timing adjuster (27)** and a slip coupling that allows the difference in timing between forward running and reverse running.

The speed and direction control of the locomotive is achieved by interrupting the heater voltage on the rails by operating the lever on the controller. This replaces the 16 volts with a short pulse of about 6 volts of either positive or negative polarity depending on whether it is wished to speed up or slow the loco. On interrupting the heater voltage the **relay** on the **printed circuit board (11)** in the cab becomes de-energised and contacts are made that connect the **regulator motor (15)** to the power. It receives the pulse, the regulator motor spins and drives the **regulator gearbox (16)** which pushes or pulls a rod attached to the regulator valve slightly opening or closing it.

The only indication to the driver as whether the regulator valve is open or closed is the colour shown by the **two bulbs (12)** in the cab. Red indicates that the regulator valve is closed and green indicates that it is open. The unit for switching the red and green bulbs is a small printed circuit board mounted on the left side of the steam chest with a wiper attached to the regulator arm.

As the operator slows and stops the loco using the control box lever, the light changes from green to red. If the lever is continued to be operated in the same direction the whistle will blow and the regulator gearbox knocks the slip coupling into reverse position, the light will change from red to green and the regulator valve begins to open. The loco will now move off in reverse.

One question that is frequently asked is about whether the operator should be worried about running out of water. Hornby provided a thermostat cut-out (7) in contact with the boiler to prevent any damage. The water normally boils at 130 degrees centigrade and the thermostat is designed to cut-out at about 155 degrees centigrade. As the water level drops down and exposes the heating element, the temperature rises quickly and the cut-out operates. The control unit registers an increase in the resistance of the loco and sounds an alarm and switches off the power.