

# OPERATING INSTRUCTIONS

## Victorian Railways 'NA' Class 2-6-2T



### Safety First

1. Please read all the instructions thoroughly before running for the first time.
2. Do not pick up the engine by the bodywork, chimney or boiler, especially when hot. Only pick up the engine by the buffer beams and when hot, use the gloves provided or a cloth.
3. Avoid positioning your face directly over the model as steam and hot water may be released from the stack or safety valve unexpectedly.
4. The firing system has been designed to use butane gas only. Never use any other gas (including propane or butane/propane mix).
5. Always refuel the engine in a well-ventilated area and away from other working live-steam models. The fuel filling system allows a small amount of gas to vent off as the fuel tank is being filled. A passing engine can ignite this bleed-off gas, causing a potentially hazardous situation and No Smoking
6. Butane gas is heavier than air so may settle into any depressions below or around the model. After fuelling blow around the model to disperse any residual gas that may have 'puddled' under or around it.
7. As in full size locomotive practice, the fire and the water within the model must be monitored for safe operation.
  - Make sure the fire remains within the fire tube.
  - The boiler must be full to the correct level before starting a run.
  - Under some circumstances the gas may outlast the water.
  - Should the boiler water run low, extinguish the fire immediately and let the boiler cool before adding water.
8. The model should only be handled or operated by an adult who is familiar with the model and it's functioning, who fully appreciates all the Hazards associated with it and who has the knowledge and the ability to minimise the Risks involved in its operation.

**Argyle Loco Works Pty Ltd**

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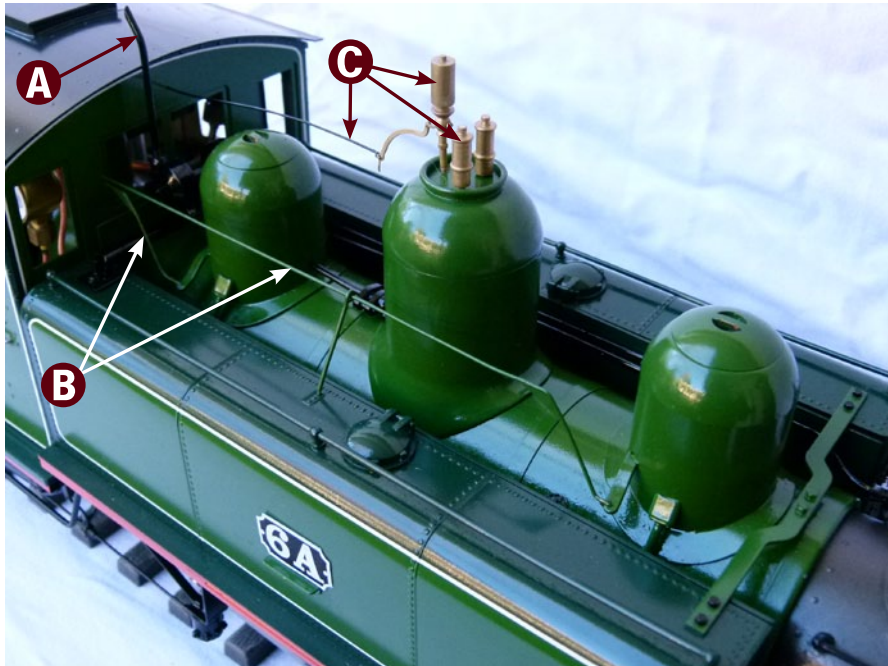
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## Preparing the engine

The following parts have been removed for transport and will require fitting to complete the model

- A** The exhaust from the electric generator.
- B** The 'Sanding rods'. These are the fine wires that run from the cab front to the two smaller domes.
- C** The dummy safety valves, whistle and the whistle pull wire. To fit these items unscrew the cap from the top of the dome, then install the dummy whistle and safety valve and reassemble the dome. Connect the Whistle pull wire.
- D** The front headlight.



*Always service the engine in the following order - first Gas, then Oil then Water.*

## Gas

Your model burns butane gas. The gas tank is located inside the cab on the left hand side. Butane gas can be purchased at most hardware stores as camping stove fuel or as cigarette-lighter refills. Depending on the type of refill canister you are using you may require a special adaptor to transfer the gas to the model.

To fill with gas invert the gas can over the filler valve atop the tank and press down firmly. Support the model with your other hand while doing this. Make sure that the gas regulator valve is closed. You will hear the gas transferring and will see a little gas bleeding out of the valve. When the tank is full, the gas will begin to splutter and liquid gas will flow from the valve.

## Lubrication

Oil all external moving parts, including wheel bearings with a high grade, lightweight machine oil like 3-in-1. A single drop of oil on each moving joint is all that is needed.

The internal moving parts inside the cylinders and valve chests are lubricated from oil picked up from the lubricator is in the cab. As the steam passes through it, a small amount will condense into water. This water will sink to the bottom of the lubricator, forcing a similar quantity of oil into the steam line and thus to the cylinders. Remove the lubricator's cap and draw out any water from the previous run with a syringe. Fill the lubricator to the top of the steam pipe passing through it. This will allow a small air space between the oil and the cap. It is essential that you only use proper Steam Cylinder Oil for the internal lubrication of the cylinders.

## Water

Unscrew the filler plug inside the cab and fill the boiler to the top with water then pull out 40 ml with the large syringe. Use only distilled water in your engine's boiler. Tap water contains minerals that will leach out and ultimately affect the performance of the engine.

## Lighting Up

Make sure the throttle is closed and the model is in mid gear. The engine's burner resides at the back of the flue inside the boiler. Open the hinged smokebox door at the front of the engine and you'll be able to see the flue. To light up, strike a match and hold it at the open smokebox door then open the gas valve slowly until the gas ignites. You should hear the gas coming into the burner. Opening the valve too much may blow out the flame or cause the fire to burn inside the smokebox.

The fire should flash back and burn inside the fire tube at the back of the boiler with a quiet "pop". If it wants to burn in the smokebox or in the forward part of the flue, slowly close the gas valve until it flashes back to the burner. Don't allow the fire to burn in the smokebox, it will damage your model.

The fire can be observed by carefully looking inside the smoke box from a safe distance. The fire should burn under the burner in a crescent-shaped flame, which should be clearly visible through the smokebox door. The flame should be bright blue and should burn steadily. In some circumstances the flame may be a little unstable until the model starts to warm up.

The object is to run the burner at the lowest setting possible to operate the engine, thereby increasing the efficiency of the engine and the duration of the run. You'll get the hang of this with practice.

After a few minutes you should start to notice the pressure registering on the pressure gauge. The safety valve is under the steam dome (the middle dome). It has been set at the factory to release at 60 pounds per square inch steam pressure. It is good practice to always check the correct operation of the safety valve at the first steaming of the day. The safety valve can be accessed for inspection by unscrewing the dome cap and gently easing the dome from its mounting base. Never tamper with the safety valve.

When the pressure on the gauge reaches 40psi, the engine can be run.

## Running

Open the cab roof for access to the controls. Move the reversing lever to the forward position. With the engine on the track, and without a train, open the throttle. Because the cylinders are cold, the hot steam entering them will condense into water and be exhausted through the stack. The engine may need to be pushed backward and forward a few times (use the reverser to change directions) to clear the cylinders. After a few moments it should move off smoothly on its own.

Once the engine is running smoothly a train can be coupled on and the run can proceed. As this is manually controlled engine you will need to remain within controlling distance to make any adjustments to its performance. Keep your eye on the water glass. When the water level approaches the bottom of the glass, shut the engine down and service it to replenish the Gas, Oil and Water. The accuracy of the water gauge glass may be affected by air bubbles and capillary action.

## Extending the Run Time

Extended runs can be achieved by replacing the water fill plug with a water top up valve or 'Goodall Valve' (P/n AP-21766) and using a water top up bottle (P/n AP-21767) to inject replacement water directly into the boiler against steam pressure. Keep an eye on the water gauge and try to run between  $\frac{1}{3}$  and  $\frac{3}{4}$  of a glass. Refill the gas tank and lubricator every 20 minutes to half an hour.

## Shutting Down

To shut the engine down, simply close the gas valve to extinguish the fire. Your job as an engineman (or woman) does not finished here. As it cools perform the following functions.

1. Open the oil drain valve beneath the lubricator and use the residual steam pressure to blow out the water condensate from the lubricator. Don't forget to refill the lubricator before the next run.
2. Open the boiler vent valve and leave it open. This will relieve the boiler of what little pressure remains and prevent a vacuum from forming inside the boiler that could draw lubricating oil into the boiler if the throttle valve is not fully closed.
3. Wipe the engine down with a soft cloth to remove any steam-cylinder oil that has been exhausted from the stack.
4. Wipe any grit and excess oil from the wheels and running gear and oil if necessary.



## Servicing a Hot Engine

After a full run, a complete Gas, Oil and Water service must be carried out. Be sure the gas valve is closed and the fire has been extinguished.

It can be difficult transferring gas from a cool refill canister to a warm engine. This is because the pressure is higher in the loco gas tank than in the refill canister. This can be overcome by warming the canister in a bath of warm (max temperature 40 deg C) water prior to filling.

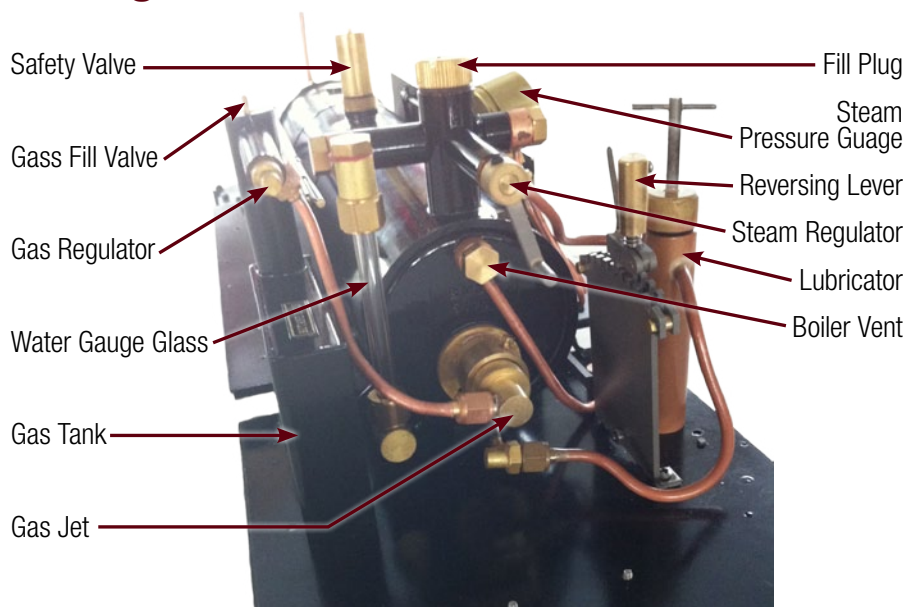
## Blocked Gas Jet

Gas fired models may occasionally suffer from a blocked gas jet. If you have difficulty raising steam or the model is lacking performance this may be due to a blocked gas jet. If this is the case then the jet will have to be removed and cleaned.

This process is easiest done with the cab removed from the model. The cab is held in place with 6 screws which are accessible from under the model. After you have removed the cab, use a spanner to 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 pricker wire, this will damage the jet hole. Replace the jet in the jet 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 for gas leaks with a 50/50 mixture of washing up liquid and water. Reinstall the cab.

The best insurance against a blocked gas jet is good housekeeping. Keep your gassing equipment separate to your other steaming tools, be scrupulous with their cleanliness and only use quality gas from a reputable, branded supplier.

## Controls & Fittings



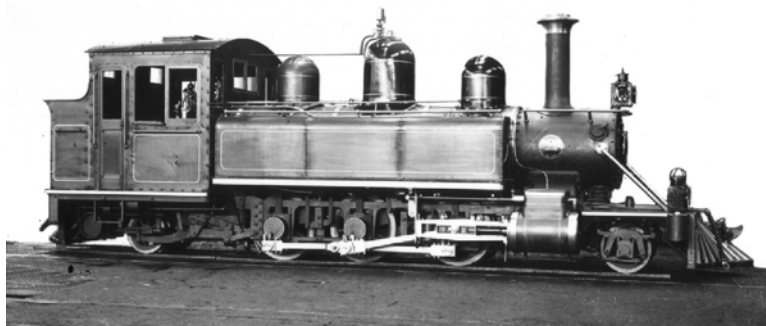
## Technical Specifications

<b>Scale:</b> 16mm to 1 foot (1:19.05)	Sprung axles
<b>Length:</b> 450mm (17.7 inches) over buffer beams	Insulated wheels (one side only)
<b>Width:</b> 135mm (5.3 inches)	<b>Boiler:</b> Centre Flue
<b>Height:</b> 180mm (7.1 inches)	<b>Working Pressure:</b> 60 psi
<b>Weight:</b> 6.6kg (14.6 lbs)	<b>Valve Gear:</b> Slide Valve with full working Stephenson Valve Gear
<b>Min Radius:</b> 1.2m (4 feet)	<b>Fuel:</b> Butane Gas
<b>Gauge:</b> Steam 45mm or 32mm, Electric 45mm only	<b>Boiler Fittings:</b> Safety valve, pressure gauge, water level glass, boiler vent valve

# Historical Supplement

By David Fletcher

## History



1A Builder's Photo

Photo courtesy of the Railroad Museum of Pennsylvania (PHMC), H.L. Broadbelt Collection.

The Victorian Railways (Australia) 'NA' class 2-6-2 tank locomotives were built to serve the 4 narrow gauge 2' 6" (762 mm) gauge branch lines in that state. Baldwin Locomotive Works in the United States supplied the first two 2-6-2 tank locomotives in 1898 as well as parts for a further two locos.

The original Baldwin Classification for the simple version of the VR 2-6-2 was: 10-20 1/4D Drawing 1 being the first design of this class.

The Victorian Railways Newport workshops assembled the parts supplied by Baldwin to give an additional two locos, and subsequently built a further 13 locomotives. The last one, number 17, was built in 1915. The locomotives weigh 36 tons (36.58 t) and produce a tractive effort of 12,170 lbf (54.1 kN), allowing them to haul loads of 90 tons (91.44 t) up grades of 1 in 30.

## Preservation

Two of the original 2'6" narrow gauge lines have been preserved -

**Puffing Billy Railway** The 24km (15 miles) of restored line between Belgrave and Gembrook in the scenic Dandenong Ranges 50 km east of Melbourne.

NA class locomotive numbers 6A, 7A, 8A, 12A, and 14A have been restored and operate on the 'Puffing Billy' Steam Railway. No. 3A is also preserved awaiting restoration.

**Walhalla Goldfields Railway** In South East Victoria's Gippsland alpine region the train journeys from the historic gold mining town of Walhalla and follows Stringer's Creek to where it joins the Thomson River, it then crosses the spectacular Thomson River Bridge to arrive at Thomson Station.

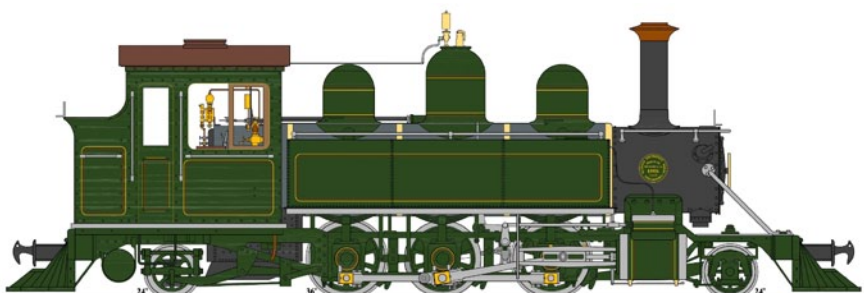
## Liveries

The liveries of the NA class locomotive are a significant historical and aesthetic element of the design. In brief summary, the NA class sported liveries in the time periods as follows:

1898 - 1900	Light Ivy Green and Gold, style 292 of the Baldwin Locomotive works (1A and 2A only)
1900 - 1903	Victorian Railways Two-Tone Green with white lining (3A - 6A)
1903 - 1921	Victorian Railways Canadian Pacific Red, Chocolate trim and white lining (7A-17A)
1921 onward	Plain black livery through to preservation in 1953

## Light Ivy Green and Gold

The first two NA class 2-6-2Ts delivered by the Baldwin works in Philadelphia were painted to a livery standard, known as the Baldwin 'Book of Styles'.



Baldwin Book of Styles Livery - 'Light Ivy Green and Gold, Style 292'. Image courtesy David Fletcher

It was common for US and UK builders to provide new locomotives using works livery, rather than the specific corporate livery of the purchasing railway unless specifically requested of the builder. The two Baldwin built NA class locomotives were delivered in 'Light Ivy Green and gold, Style 292' livery. This was a Baldwin stock export livery of single green finish, lined with gold and red 'shadow line'. The green paint finish was used extensively on the locomotive, including the chassis bar frames and cranks. Baldwin's Ivy Green Style 292 had been extensively used on exports to South America since 1885. It is unknown whether the Victorian railways made any specific requests regarding the paint and decoration, however this livery would not have looked unusual in relation to the two tone green scheme then used by the Victorian Railways as their standard.

## VR Two-Tone Green

The standard Victorian Railways livery of two-tone green with white lining was applied to the first two NA class built at the Victorian Railways workshops in 1900. The origin of the two-tone green livery is unknown; however it probably evolved out of the many two-tone green schemes provided by UK builders through the 1880s and 1890s. Notably Baldwin records for other locomotive exports reveal the two-tone green scheme and white lining to be similar to that used by the Great Central Railway UK at that time. The Victorian Railways appears to have standardized on this livery around the mid 1890s and retained the scheme through to 1903.

All of the Victorian built NA class from 1900 and 1901 (3A-6A) were finished with the scheme and later even the two original Baldwin examples were so painted. According to the Heritage Manual utilized at the Puffing Billy Railway today, the two green colours are best matched to British Standard 381c Colours - B225 Light Brunswick Green and BS227 Dark Brunswick Green. The BS381c standard dates to 1931 and captures typical pre-mixed paint formula through the Victorian and Edwardian era, as used in Architecture, railway, carriage and other transport and agricultural equipment.

The Argyle locomotive Works NA class model depicted in VR two-tone green is based on the Heritage Manual and BS381c paint standard, reflective of the locomotive livery from 1900-1903 as well as key locomotives in preservation today.

## **VR Candian Pacific Red**

With the appointment of Thomas Tait as Chairman of Commissioners for the Victorian Railways in 1903 the two-tone green livery was abandoned. Thomas Tait had come from a successful career with the Canadian Pacific Railroad as their Assistant General Manager. His time at the Victorian Railways was relative short, resigning his commission in 1911 and returning to Canada. However he left his mark, notably with significant re-organisation of the Victorian Railways, application of electrification, introduction of the electric 'Tait' trains and the application of the 'Canadian Pacific Red' on the locomotive fleet. To be sure, the locomotive fleet was not painted in the Canadian Pacific Livery; the livery style remained similar in concept to the previous VR two-tone green scheme, but the greens were replaced with Canadian Pacific Red and Chocolate Brown. The white line work remained relatively unchanged.

The Heritage Manuals for the Puffing Billy Railway recommend colour BS540 'Crimson' approximating Canadian Pacific Red and BS412 Dark Brown for the Chocolate brown trim.

The NA class model offered by Argyle Locomotive Works is based on this Heritage paint advice and the use of the BS381c colours. Of note however is that the deep red painted NA locomotives of 2013 at Belgrave are painted in a deep maroon, rather than the British Standard colour advised for CPR red. The Argyle model more closely reflects the Canadian Pacific Red from the Puffing Billy Heritage manual which is closer to period examples such as heritage railway models.

## **Fade to Black**

The Canadian Pacific Red scheme would remain the standard livery for the VR from 1903 through to 1921, including the NA class locomotives. Notably all new NA class built from 7A onward (1905) were out-shopped in this livery, with all existing NA class repainted shortly after 1903. With the appoint of Tait's Prodigy, Harold Clapp, to Chairman of the Victorian Railways Commissioners in 1919, changes were again made and the locomotive stock repainted to plain gloss black from around 1921 onward. The plain black livery would remain in service through to preservation in 1953.

The plain black offering by Argyle Locomotive Works represents the NA class livery from 1921 onward as well as in preservation.

## **Further Reading**

'The Narrow Gauge' by Nick Anchen, tells the story of the Whitfield, Gembrook, Crowes and Walhalla railways, from construction right through to closure, and the eventual re-birth of the Puffing Billy and Walhalla Goldfields Railways. ISBN: 978-0-9807640-3-1 [www.sierraaustralia.com/the-narrow-gauge.html](http://www.sierraaustralia.com/the-narrow-gauge.html)

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