

Argyle Loco Works / Accucraft Trains

New South Wales  
Government Railways

# 'C38' LOCOMOTIVE AND 'HUB' COACH COMPENDIUM

1:32 SCALE



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## Introduction

By Michael Ragg

From 2012 to 2020 Argyle Loco Works worked with Accucraft Trains USA to produce the most exact replica NSW express steam passenger train in 1:32 scale. The train was to comprise a live steam C38 locomotive and an all metal HUB Coach set.

As the project developed, the range of locomotives expanded to 18 different versions of the C38 and a complete set of seven HUB coaches as used on the Sydney to Newcastle express. The locomotives were delivered in October 2018 and the HUB coach sets in mid 2020



# The C38 Project

## Argyle Loco Works / Accucraft Trains

By David Fletcher



Well it is true – the Argyle Loco Works/Accucraft Gauge 1, live steam NSW Government Railways C38 production models are in Australia and have been shipped to their new owners. The story of the development of these live steam and electric models involved local expertise, global cooperation and constant vigilance. The C38 models are probably the most complex and accurate model yet developed at Accucraft and certainly the most accurate production model of a C38 yet. The models are highly detailed, very powerful and are a summation of the expertise that went into developing them.

The C38 (especially the streamlined C3801) is arguably Australia's most famous mainline locomotive, the Auzzie 'Flying Scotsman' you could say, (although the Scotsman was once the most famous engine in the world, this has been replaced by Hogwarts Castle, a GWR Hall class! from Harry Potter fame).

The Argyle Loco Works C38 story began in 2012 when Michael and Lesley Ragg, Owners of Argyle Loco Works, approached me with the idea to develop a uniquely Australian live steam project as Argyle/Accucraft's first collaboration. Michael's suggestions for possible locomotives was clear, the first model would be either the NSWGR C38 or the NA Class 2-6-2 'Puffing Billy'. After some discussion it was agreed that the NA class would be done first and I proceeded to draw up the detailed prototype drawings for the Argyle NA class project. The C38 however remained a high interest option, and so while we were developing the NA, I also obtained the C38 detailed card set on CD from the ARHS NSW in 2012. In October 2014, with the delivery of the NA class models, we made a start on the C38 project. In November 2014, I visited Sydney and the Thirlmere Railway Museum to photograph and measure relevant parts of 3820 and 3830. Michael also arranged a special visit to the Chullora Workshops where the stripped down C3801 was undergoing restoration. There I met with Craig Mackey and Ross Verdich; both were to become critical peer reviewers for the accuracy of the drawing set I would go on to produce.

Using the 100s of detail photos I took, plus a huge set of erection cards of the original locomotive from the NSW archives, (these were many small detailed drawings of the many locomotive components), I developed the detailed set of drawings from which to design the model; I even drew by hand the NSW coat of arms for the tender decals on some of the liveries, as well as the NSWGR monogram, plus I drew by hand the famous Waratah that graces the nose of the C3801 model, although the Bumble Bee is too hard to see at this scale! I also drew the two different builder's plates to be used on the models, both have a lot of detail, with a Phoenix on one plate and the NSW crest on the other.

By early 2015 the seven sheets of B1 drawings were ready and the project commenced in the US and China with Accucraft Trains.



The historical prototype details and livery were my responsibility, while the model engineering was undertaken by Gordon Watson, Michael Ragg and engineers in China with the whole project under the direction of Channing Cheng in China. Michael and Lesley managed the entire process in Australia.

The locomotive's model engineering had some firsts as well as some experimental options as developed by Gordon. First of all, the valve gear design, lengths and format of the expansion links and combination levels were literally scaled down from the archival drawings - the components were that good, they proved to be just as efficient in 1:32 scale as the real thing.

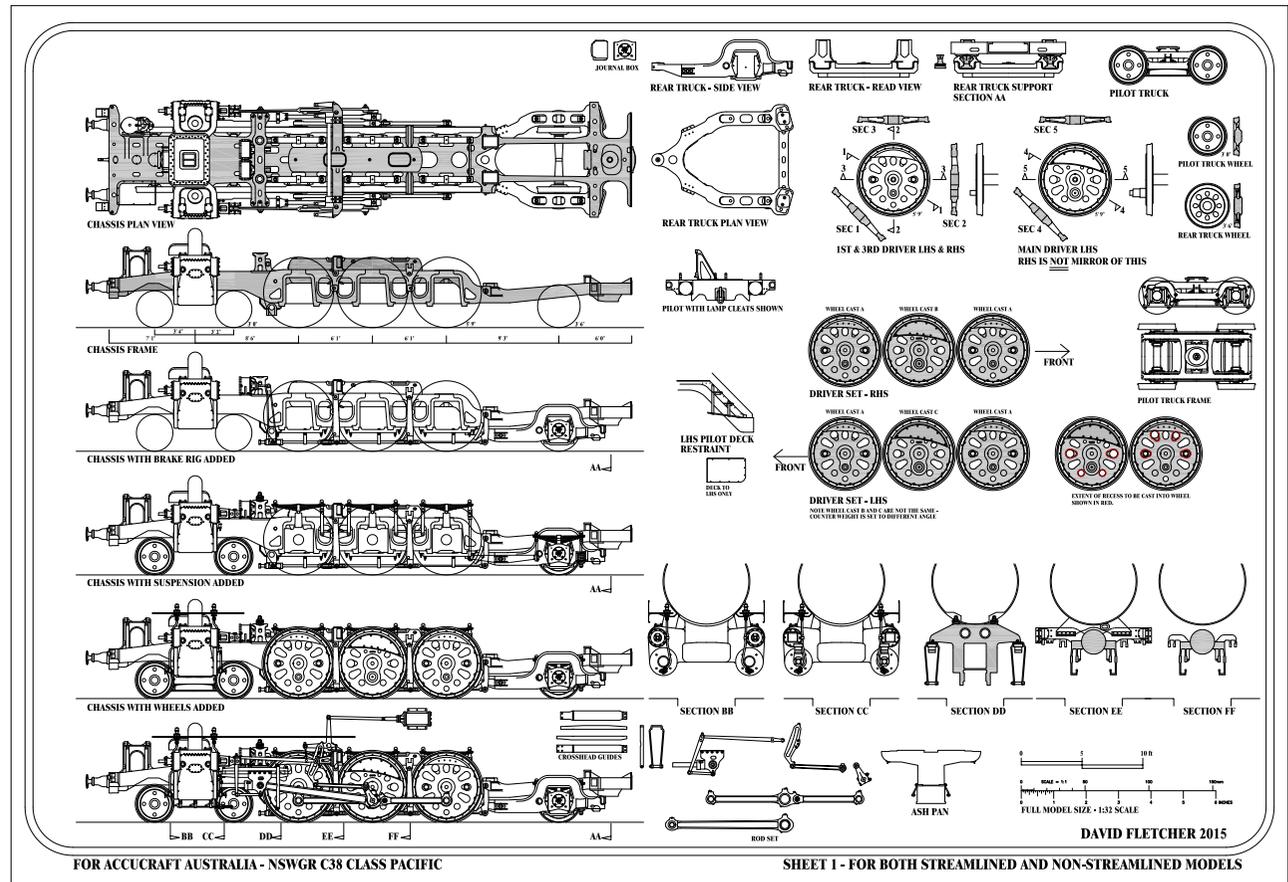
Gordon also developed an adjustable lubricator behind the smokebox and a firing system using common components that could be equally used for gas firing or alcohol firing.

The coolest design however was an automatic blower, which would adjust automatically with the locomotive's motion. The system worked extremely well, and the componentry is still in the supplied models, but after extensive testing it was agreed to decommission this feature because there would always be times when the model might stop with the regulator open leaving the boiler without a 'draft' to draw the combustion gasses through it. In the hands of an inexperienced operator this could cause problems.

Channing Chen visited Australia in late 2015 with components of the first C3801 sample. This was a very worthwhile visit, with the completed sample arriving in August 2016. This was followed by a second sample in 2017.

Both of these samples enabled considerable refinement of engineering, leading to the first of the production models also being used as a test sample. At this time, Gordon visited China to oversee the initial construction of the models, assisting the crew in manufacturing and engineering, all while he was recovering from the Shingles!

Finally when all the models were shipped in batches of 20 in late 2018, Michael and Gordon inspected, tested and refined each and every model prior to delivery.



One of the seven B1 sheets of drawings developed of the C38 – this one showing the chassis details



The Argyle C38 team together in late 2015 – Left to Right:  
 David Fletcher – Detailed drawings and prototypical accuracy  
 Michael Ragg – Argyle Loco Works owner and manager of the project  
 Channing Cheng – Product development manager, Accucraft Trains, manager of the entire design, construction and delivery of the product in China  
 Gordon Watson – Mechanical engineering and engineering design for the model



Close up of the working parts of the 2016 sample



The 2017 sample





**Gordon at work in Accucraft's China factory, with Channing Cheng and the Accucraft engineers, May 2018**

Between Michael, Gordon and I, four livery options were originally intended – that of the Verdant Green C3801, a Black 3803, a Black 3820 and a NSW Special Green 3813. With the input of Ross Verdich and Craig Mackey, the four livery options became 5, with the addition of Ross' choice of an Olive Green 3830. Ross and Craig also developed a spreadsheet of the five livery options, clearly stating for each option which parts were lined, which parts were green or black etc. The liveries are very exacting and surprisingly complicated. These liveries were then reviewed by David Oram, who has written extensively on C38 liveries, and his detail livery input became essential throughout the project, along with accuracy of the models generally. With David Oram, not only were the five liveries refined, but David requested a sixth livery, that of the Special Green C3830 with green smokebox cladding. All six livery options went into production, each offered as Alcohol fired, gas fired, electric or static for a total range of 24 different model offerings.



**Michael Ragg and David Fletcher with the first batch of production models – all six liveries are shown, Oct 2018**

This is by far the most difficult locomotive I've ever drawn or worked on, the most detailed and the most modern (my specialty is pre 1900!) The models run powerfully and had a deep chuff, Gordon's fine design work coming into play in tandem with Channing's crew in China.

Here is a line-up of the 6 different model types as photographed at Argyle Loco Works. The Olive Green version, offered after special request by Ross Verdich, I find particularly stunning....and onto the next one....



Ross' livery request – the 3830 in Olive Green



# History of the C38 and the Model Liveries

By David Oram

## History

That the 38 class were built in the form we know them is quite an achievement, as the CME at the time, had wanted an articulated design based on the passenger Algerian Garratt, that was powerful and capable of running at high speed. However, the Railway Commissioner at the time felt that the design was 'too revolutionary' and directed a more conventional locomotive be designed.

The subsequently named 38 class Pacifics were designed during a period when train travel was at its zenith. The 1930s were the era of fast, sleek and powerful express trains around the world, and the 38 class were designed during this period with the 'streamlining' creating an impression of power and speed.

They were designed during 1938 to eliminate the increasingly uneconomic practice of double heading on interstate trains. Clyde Engineering were awarded the contract to build 5 partially streamlined locomotives. However due to wartime conditions, class leader 3801 was not delivered until January 1943 and 3805 in March 1945.

The NSW Railways subsequently took over the construction of a further 25 locomotives, however these locomotives did not have the 'bullet' nose or top cowling. The design incorporated 'best locomotive engineering practice' at the time, and was heavily influenced by contemporary US railways. Amongst the features were a cast steel frame, which avoided the cracking problems of plate frames, roller bearings throughout to reduce friction, high capacity boiler, streamlined steam passages, long travel valves with a precision cut off via a power reverse.

The 30 locomotives were all in service by September 1949, and starting with 3805 in May 1946, they were painted in a striking green livery, which in the case of the streamliners was further enhanced by 'speed striping'. They presented as a sleek and powerful locomotive when viewed head on, and featured widely in NSWGR publicity material.

The 38 class revolutionised long distance passenger working to Albury in particular, and on the Sydney –Newcastle line, where they achieved some formidable speeds. Whilst they maintained their premier mainline passenger status until 1960, the inroads of dieselisation, which had up till now been confined to freight working, saw the 38 s relinquish some of these roles, especially after the standard gauge to Melbourne went through in 1962.

38s also started to be allocated away from their previous home depot of Eveleigh, to Lithgow and Broadmeadow, after electrification of lines from Sydney were increased. As well they started to appear on goods trains, displacing 36 class.

3801 was initially withdrawn from service in December 1962, however a change in policy favouring the use of these locomotives on goods trains, saw 3801 enter workshops in March 1963 for a full overhaul and boiler change, emerging in August 1963, resplendent in green livery, fully lined in the style of 1947, though in a lighter shade. Other withdrawn 38 class followed 3801 through workshops to continue in revenue service during the remainder of the 60s until, 29 December, 1970, 3820 became the last of the class in revenue service, working

the evening Flyer from Newcastle right through to Sydney without a change to electric traction at Gosford.

Fortunately, by this time, 3801 and 3813 had been preserved in working order for special train working, and 3820 soon joined the ranks. As well 3830, withdrawn in October 1967 was preserved for the Museum of Applied Arts and Sciences, to become the Powerhouse Museum. At that time, there were no plans for its restoration to operational condition.

3801 became the first steam locomotive to cross the continent in August 1970, with 3813 as far as Port Augusta. Interstate visits then saw 3801 and 3820 to Melbourne in April 1973 and 3813, worked to South Brisbane in January 1973, the first such working since 1944. Sadly administrative changes within the NSW Railways saw 3813 dismantled in January 1973, for an over haul, which was subsequently cancelled, and 3801 and 3820 left Enfield locomotive depot for the relocated new home of the NSWRTM in June 1975, 3820 to not run again, and 3801 only briefly in late 1976.

Fortunately, 10 years later 3801 was fully overhauled by the Hunter Valley Training Company at the State Dockyard in Newcastle, and ran for the next 20 years throughout Australia.

3830 was fortunate to be restored to operations in October 1997, and became 3801s running mate until November 2007, when 3801 was retired for a full overhaul and new boiler.

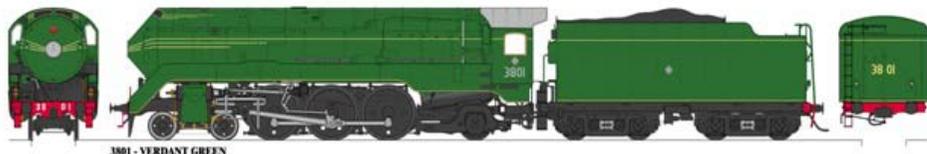
We all await 3801s return to service in 2018.



## LIVERIES

Whilst the 38 class are impressive in their own right, the liveries applied post WW2 certainly gave them a significant presence. The 6 liveries being covered by Argyle are presented in detail.

### 3801 Verdant Green – 1960s Scheme



3801 is presented in its August 1963 livery with unlined cylinders, verdant green and silver cab roof. Apart from the shade of green this is the style that the locomotive first appeared in after its May 1947 repaint, ending 4 years in 'austerity' grey. The shade applied then was called 'special green', first applied to 3806 in January 1946, and then subsequently became the standard until the mid 1950s. Starting with 3805 in May 1946 the 5 streamliners were painted green, with 3804 being the last to be completed in July 1948. 3805 appeared extensively at the time in NSW Railways promotional material.

3801 lost its green livery in July 1955 following an overhaul, appearing in black livery with red striping, until withdrawn in December 1962.

Following its restoration to green in August 1963, 3801 retained this livery after its next overhaul in November 1966, though it emerged with lining on the cylinders and a green cab roof. The tender lining was continuous yellow striping with no scalloping at corners. Its final NSW Railways paint occurred in August 1970, again in verdant green, with green cab roof and lined cylinders, for its trip to Perth. The yellow lining on the front nose cone appeared with less of a 'V' for the first time, which took away some of the illusion of speed.

After the locomotives move to Thirlmere, the locomotive was repainted again in verdant green, however the lining applied to the front nose cone was similar to that applied to 3805 in May 1946. In fact, a perusal of photographs of streamliners during the years 1946 to 1955 does show a number of variations in the nature of the 'V' on the nose cone.

The locomotive was again restored to green after its November 1986 dockyard overhaul, and over the years has also appeared in red lined black, and grey.

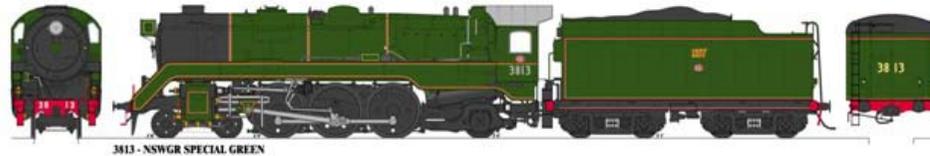
### 3803 Black with Red Lining



3803 entered traffic in September 1943 in 'austerity grey', not receiving 'special green' with full yellow lining until January 1948. It maintained this appearance until at least June 1955, after which it received the all black, red lining version of streamlined livery, and maintained this for the rest of its working life until withdrawn in February 1968.

The major difference in lining style for the red, compared to the yellow design, was that instead of the top horizontal stripe going the full length of the boiler across the cab, to line up with the tender, it stopped half way along the boiler. Also, the top of the valance had a red line, similar to the non-streamliners, whilst the tender was adorned in scalloped red lining with a vertical line on the tender front.

## 3813 NSW Special Green – 1955 Paint Scheme



The livery of 3813 reflects the paint scheme applied in August 1955, after a major overhaul and in readiness for its display at the NSWGRs Centenary celebrations in September 1955, at Central Station. This green was the same shade used on all the 38s in the preceding 10 years and last applied to 3808 in January 1954, in preparation for its use as a pilot locomotive during the February 1954 Royal Visit.

Unlike 3813's earlier liveries, on this occasion it received a black smokebox and lined green cylinders. For non-streamlined locomotives, lining was a combination of red and straw applied as separate parallel lines on tender, valances and boiler bands.

It maintained this appearance until after an accident at Concord West in January 1958, and after repairs it appeared with a green smokebox, and was again repainted in this all green livery in December 1959, including green cylinders. However, one week before the opening of the Gosford electrification, on 23 January, 1960, the smokebox reverted to black, and through repaints in October 1962 and November 1964, retained this form.

The only other significant change occurred after an overhaul at Cardiff workshops in January 1967, where upon its lining consisted of a horizontal yellow line along the length of the boiler and one line on the bottom of the valance, imitating the design applied to the streamliners. Perhaps it was done to provide a more uniform look when coupled behind 3801. Following its last overhaul at Cardiff in December 1968, the locomotive was outshopped in verdant green, full non-streamlined lining including boiler bands, silver roof and lined green cylinders.

Its last repaint was in August 1970, into verdant green again and full lining, however with a green cab roof. It was dismantled in this condition in January 1973.

## 3820 Black Lined Red



3820 entered traffic in November 1948, in the all green livery of the period with lined black cylinders. It remained this way until at least January 1954, with a full repaint in all green during 1952. Certainly by December 1954 it was recorded as being in the full black, red lining, including one red boiler band, at the point where the smokebox joined the barrel.

At various times, this red boiler band was omitted from non-streamlined locomotives, depending on the period. The tender was fully lined in red with scalloping on the corners.

3820 retained this all black, red lining for the rest of its working life. The only variations to occur were the size and position of the front buffer beam numbers after overhauls at Cardiff workshops, and following its last overhaul in December 1968, it was outshopped with a Garratt hemi spherical headlight, in place of the standard NSWGR unit.

It was the last 38 class in regular service, and after working the evening Newcastle Flyer to Sydney, without changing to electric traction at Gosford, on the 29 December 1970, entered the NSW Rail Transport Museum for tour working.

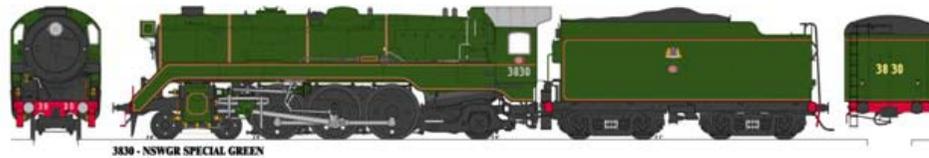
During early 1972, RTM members repainted the locomotive into red lined black, and during the preparation process exposed the original 'special green' on the tender. The locomotive was outshopped from this work, which also included replacement of the headlight with a standard NSWGR unit, in May 1972. Its first tour working was to Newcastle on 4 June 1972.

It subsequently became a popular tour locomotive, and accompanied 3801 to Melbourne, in April 1973, being part of the first visit of 38 class across the border.

It worked to Thirlmere in June 1975 as part of the relocation from Enfield. It was repainted in September 1980 to appear as part of the railways 125 years anniversary at Central.

Since then it has remained in this condition, on display at Thirlmere.

## 3830 All Green – September 1965



3830 entered traffic in September 1949, in grey, and following a period of running in, was painted all green in February 1950, with lined black cylinders and silver cab roof. It would have presented a majestic site hauling trains throughout NSW.

This livery was first applied to 3811 in August 1946, and represented a change from the livery applied to 3806 to 3810, in that they had black smokeboxes.

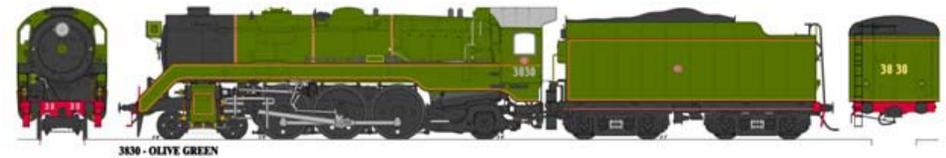
The all green livery subsequently became the standard for all non-streamlined locomotives up until December 1953, with the earlier locomotives also being repainted this way.

For 3830's last overhaul at Chullora workshops in September 1965, it again received the all green livery, though the shade of green appeared different to the original 'special green'. However, its cylinders, first painted green as part of its October 1961 overhaul remained.

Full red and straw lining was applied to locomotive and tender, and the cab was painted silver. It remained in this condition until withdrawn in October 1967, and was set aside for display by the Museum of Applied Arts and Sciences. Fortunately, the locomotive was restored to operation in October 1997, being outshopped in the style of livery first applied in October 1961, though a darker shade of green.

It remains in this condition today.

## 3830 Olive Green – October 1961 Paint Scheme



This particular shade of green, sometimes referred to as 'olive green' was only applied to 3830 and this was after a heavy overhaul on October 1961.

3830 was painted black in September 1954, in the standard red lining. However, by 1960 it had a unique style of red lining where all the boiler bands were red and there was only a single red line on the bottom of the valance.

When 3830 appeared with 3801 in the early 60s there was quite a contrast in the shades of green. It remained in this livery until September 1965.

# A Personal Appraisal

## Argyle / Accucraft 1:32 Scale Model - NSWGR C38

by Ross Verdich

I am a long-time admirer of NSWGR C38s and the first live C38 I saw was preserved black 3820 restarting a tour train out of Strathfield on a Saturday night in the early seventies. The track was steep out of Platform 2 and the 38 made a volcanic slippery start with the loco's chime whistle sounding as only it can.

Well Argyle Loco Works and Accucraft cannot reproduce the sound of 3820's chime whistle in their 1:32 scale model but it is very likely everything else will be a faithful reproduction. I can say this without any hesitation as I have now seen Argyle's pilot model of streamlined Verdant Green 3801. And I have viewed the YouTube footage of the pilot model under test. Argyle has been working on a model of the C38 since 2012 with the skilled David Fletcher drawing up the 1:32 model using original NSWGR drawings and field visits to observe and measure the remaining intact locomotives 3801, 3820 and 3830.

David's 3D drawings are meticulous works of art with all the shapes and detail clearly shown. For example, if there is one item that reflects his attention to detail it is the front upper grill cowling on 3801. David and Accucraft have absolutely nailed this difficult area to model correctly.

The YouTube footage proves also that Gordon Watson has done a masterful job of getting the live steam model to perform. The live steam fittings in the cab are carefully arranged and look very neat. The pull-out throttle handle is just like the real thing!

The 1:32 scale model is a superb rendition with only the cylinder relief valves being a clue that it is a live steam model. On the electric model, the live steam fittings and appliances are removed. Items such as the cylinder relief valves and the cab interior are replaced by appropriate miniatures as per the prototype.

Argyle are offering the Accucraft C38 in streamlined and standard versions with a choice of six authentic paint schemes. In the live steam range both gas and alcohol fired versions are offered. Electric and non-working 'mantelpiece' models are also available.



# OPERATING INSTRUCTIONS

1:32 SCALE

**New South Wales  
Government Railways  
'C38' Class 4-6-2  
Live Steam**



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Images in this handbook are of the pilot models and may vary from the production version. Specifications are subject to update as development and production proceed and may change without notice.

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## Safety First

1. Please read all the instructions thoroughly before running for the first time.
2. A miniature steam engine is an investment in precision model engineering. Its functions are designed to replicate the real thing. As an authentic reproduction of engineering standards and practice of a bygone era it may have exposed and unprotected moving parts and sharp edges. As a miniature, it is made up of many small parts and as a piece of functioning machinery it requires the application of substances or coatings that may be toxic if ingested or may irritate sensitive skin.
3. A steam engine carries and uses volatile and flammable fuels that require careful and informed handling. When lit, the fire within it may ignite other materials or fuels and the surfaces of the model become hot to touch and can burn. It carries hot water and steam under pressure within its boiler that may exhaust or emit from various apertures both predictably and not. Steam by its very nature is hot and may cause injury by scolding.
4. A miniature steam engine 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.
5. Avoid positioning your face directly over the model as steam and hot water may be released from the stack or safety valve unexpectedly. Operate the model in a quiet, well-ventilated space.
6. 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 box.
  - Maintain the water level to the correct level within the boiler.
  - Should the boiler water run low, extinguish the fire immediately and let the boiler cool before adding water. Injecting water into an overheated boiler will cause the water to flash into steam and may damage the model.

## Your C38 Model

Operating a model live steam locomotive is very different to running an electrically powered model. It is a hands-on, interactive experience. Operating this model is not a process of 'Set and Run'. It is an active process of monitoring the fire, the steam pressure and the consumables of water, fuel and lubrication for performance, safety and longevity. You must be both Driver and Fireman. The sound of the model is important. The more you listen to it the more it will tell you about how it is performing. The sound of the fire, the blower, the exhaust beat, the cylinder drain cocks and even the sound of the water clack valves can be heard.

### Boiler

This live steam C38 model has a multi-tube boiler that is common to both the alcohol and butane gas fired versions. A multi-tube boiler has a larger proportion of the internal boiler space occupied by fire tubes than a single flue model and therefore requires more careful monitoring of the water level. This boiler is known as a drafted 'C' type boiler and like the real C38 it requires a low pressure in the smoke box at the front of the loco to draw the fire through the boiler to heat the water. When lighting up you will need a suction fan (AP-28202) to draw the fire through the boiler tubes. Once steam pressure is available the locos internal steam blower is used to provide the draft through the boiler. When the loco is underway the exhaust steam from the cylinders will draw the fire through the boiler tubes. The harder the loco works, the more draft is created.

### Blower

The purpose of the loco's internal blower is to create a low pressure in the smoke box at the front of the loco to draw the heat from the fire through the boiler fire tubes when the loco is at rest. The Blower Valve is located in the cab (see Fig 10). During the transition from being stationary to rolling under its own power the blower needs to be progressively closed. Leaving the blower open when the loco is underway will cause excessive water consumption and may exceed the axle pump's capacity to maintain water level. If the loco comes to a halt with the blower closed there will be no draft to draw the fire through the boiler tubes and the fire may escape from the fire box and lick the underside of the model. If this condition is allowed to persist the paintwork around the rear of the boiler may become damaged. **A draft must be maintained through the boiler at all times when the fire is alight.** If there is insufficient water in the boiler the blower should be shut off and the fire immediately extinguished, and the boiler allowed to cool before introducing water into it. **The blower function described above applies equally to both the alcohol and gas fired versions of the model.**



## Water Pumps

The loco has two water pumps, an axle pump to replenish the boiler while it is under way and a hand pump in the tender to replenish the water at any time. The output of both water pumps is controlled by the Bypass Valve. When the bypass valve is open it allows the water to be returned to the tender. When closed, all the water is directed to the boiler. The bypass valve control is located under the left-hand side of the cab (Fig 1). Pushing the lever forward closes the valve thus directing water into the boiler.

It is good practice at the first steaming to use the hand pump to prime the water lines. Open the bypass valve (horizontal position) and use the hand pump to fill the water circuit until water is seen returning to the tender at the outlet just inside the water fill hatch.

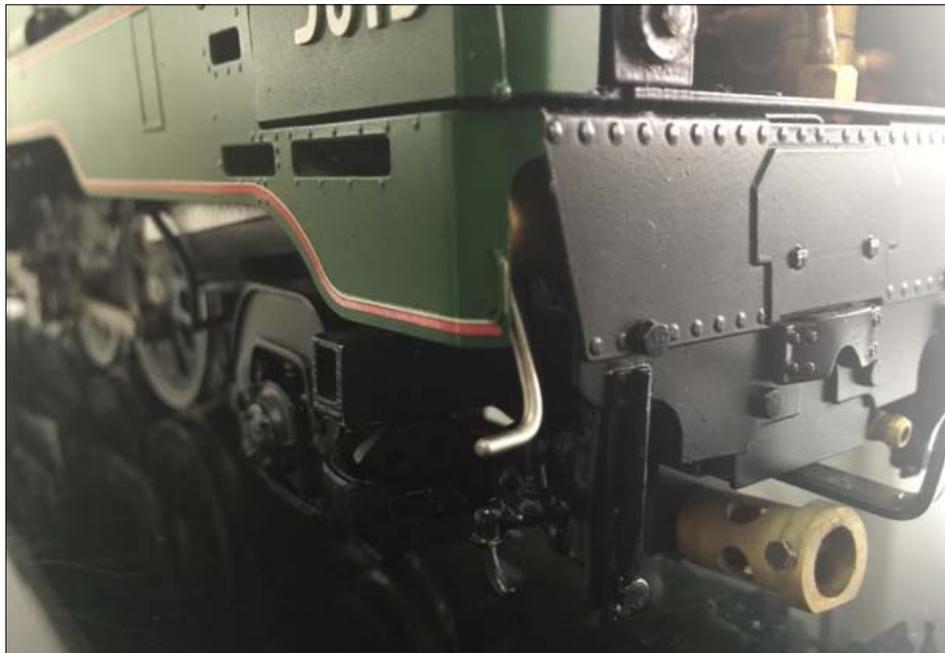


Fig 1 - Water Bypass Valve

## Water Gauge Glass

Use the water gauge glass to monitor the boiler water level. **Maintain the boiler water level to within the top half of the glass.** The gauge glass is fitted with a 'Blow Down' valve to momentarily drain the glass and help clear any bubbles that may affect its operation. The blow down valve lever is located under the right-hand side of the cab (Fig 2). Be aware that small gauge glasses such as these are affected by viscosity, water surface tension and any restrictions in the free flow of water to it from the boiler. Watch the gauge glass as you fill the boiler and monitor its performance to become familiar with its characteristics.



Fig 2 - Water Gauge Blow Down Valve

## Valve Gear

Your model is fitted with fully functioning Walschaerts valve gear which enables the driver to operate the steam engine in a continuous range of settings from maximum economy to maximum power within the limitations of a 1:32nd scale model operating a fraction of the boiler pressure of the real C38.

The valve gear is operated through a screw reverser from within the cab. (Clockwise = Forward) When selecting full gear (forward or reverse) move the reverser to its full travel then back it off one turn so the mechanism is not operating fully against the limit of its travel. The valve travel can be 'Linked Up' to economise on steam by progressively adjusting the valve gear towards the neutral position. Experiment with this to find the smoothest running position for the load.

## Water

Use only distilled water in your engine's boiler. Tap water contains minerals that will be deposited within the boiler. The boiler can be filled from the boiler fill plug inside the cab when there is no steam pressure. Subsequent filling is by the tender hand pump or the axle pump.

## Cylinder Drain Cocks

Each cylinder is fitted with drain cocks to allow the release of condensed water and to warm the cylinders (Fig 3). Water in the cylinders will cause the pistons to lock and prevent the wheels from turning and could damage the model. The cylinder drain cocks should be opened when starting the loco (lever vertical) and closed once the water is cleared and the cylinders have warmed (lever horizontal).

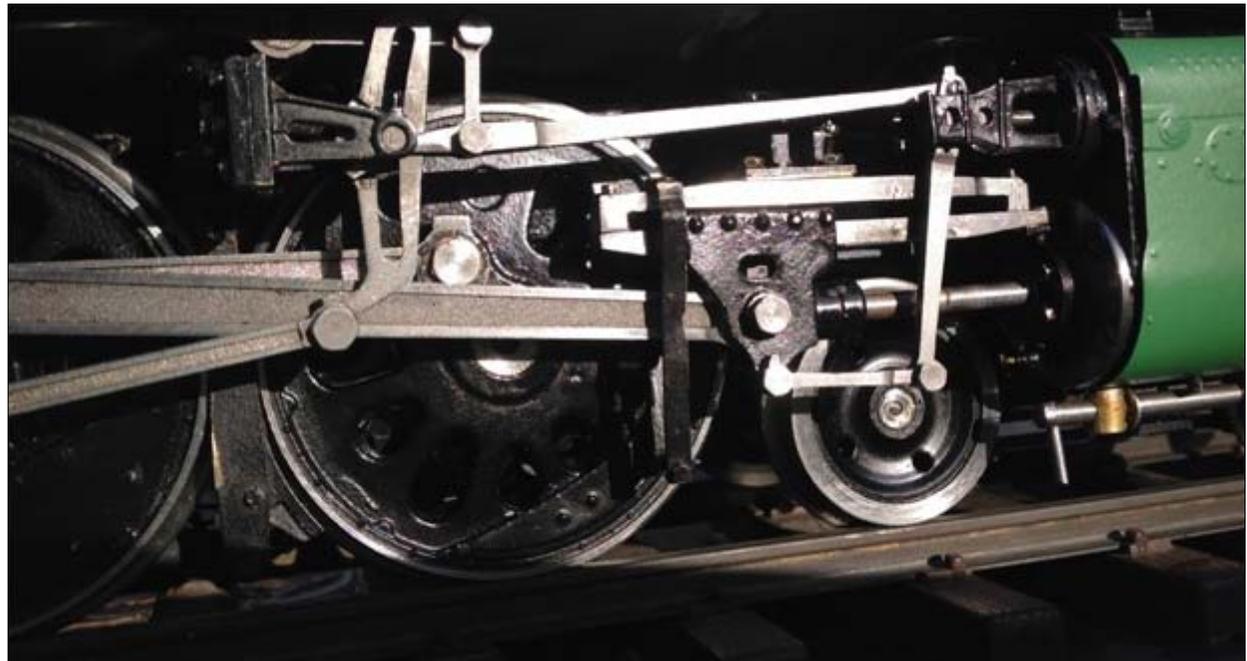


Fig 3 - The model is in Mid Gear and the Cylinder Drain Cocks are open (Vertical Position)

## Lubrication

The loco needs two types of lubrication - internal lubrication of the cylinders and the valves and external lubrication of all the external moving parts.

**Internal Lubrication** is provided by a displacement lubricator that is accessible from the RHS running board (fig 4). As steam enters the lubricator it condenses into water and sinks to the bottom of the lubricator, displacing a similar quantity of oil back into the steam line and thus to the cylinders. When servicing the lubricator any water within it must be removed before refilling with steam oil.

The model is fitted with an adjustable lubricator to regulate the amount of oil released into the steam lines. The adjusting screw is located under the boiler and is accessible from the LHS just above the valve spindle (fig 5).



Fig 4 - Displacement Lubricator

### Calibrate the lubricator adjustment as follows:

1. Empty the lubricator and leave the cap off.
2. Place the valve gear in mid (neutral) position and open the cylinder drain cocks.
3. Raise steam as described below then crack open the steam regulator. You should see and hear steam exhausting from the open lubricator.
4. Turn the lubricator adjusting screw to provide a soft and steady, but not excessive flow of steam.
5. During subsequent runs monitor the oil consumption by measuring the proportion of water to oil in the lubricator. This is especially important while you are becoming familiar with your model and during its 'running-in' period.

There should always be evidence of oil around the chimney rim when running.

**Use only Grade 460 Steam Cylinder Oil.**

**External Lubrication.** Oil all external moving parts of the engine and tender with a high grade, lightweight motor oil (see consumables list). The main driving wheel axle boxes have oil holes with felt inserts in their top. To lubricate turn the wheels until the larger hole in the wheel disc is towards the top and insert a drop of oil into the oil well on the top of the brass axle box.



Fig 5 - Lubricator Adjusting Screw (Clockwise = Close)

## Operating the Gas Fired Model

This model is designed to use Butane Gas. Butane gas canisters can be purchased at most hardware stores as camping stove fuel. It is usually available in 200g disposable canisters. Depending on the type of refill canister you are using you may require a special adaptor to transfer gas to the model.

The gas tank, the gas filling valve and the gas control valve are all in the tender under the dummy coal load.

**Make sure that the fire is out before you refuel the model and do it in a well-ventilated area and away from other working live-steam models and No Smoking.** 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. To fill with gas, invert the gas can over the filler valve and press down gently. Make sure that the gas regulator valve is closed. Support the model with your other hand while doing this. You will hear the gas transferring. When the tank is full, the gas will begin to splutter and liquid gas will flow from the valve. Butane gas is heavier than air so may settle inside the water space in the tender or in any depressions below or around the model. After fuelling blow over and around the model to disperse any residual gas that may have 'puddled' in or around it. **Be sure that any residual gas has dispersed before lighting the burner.**

The ceramic burner is under the cab and straddles the rear truck axle.

The sequence for lighting the fire is as follows.

1. Prepare the engine as described below.
2. Mount the draft fan on to the smoke stack and switch it on.
3. Ignite the lighting up wand or gas lighter and position it under the burner that is above the rear truck axle (see Fig 6).
4. Open the gas valve.

You should hear the fire ignite with a mild roaring sound. Evidence of a successful light up will be warmth from the draft fan and a mild combustion smell. The fire will also be visible through the firebox window.

The intensity of the fire in a gas fired model is controlled by the gas control valve.

Adjust the flame size to provide just enough steam for the load. Excessive heat will consume gas and water at a greater rate and may exceed the capacity of the axle pump to deliver replacement water to the boiler. At the end of a run simply close off the gas valve to extinguish the fire and keep the blower open to relieve steam pressure. Keep the steam regulator closed to prevent oil being sucked back into the boiler as the steam condenses. If the water level in the boiler is noticed to be very low the fire should be extinguished immediately, and the boiler allowed to cool before adding water.

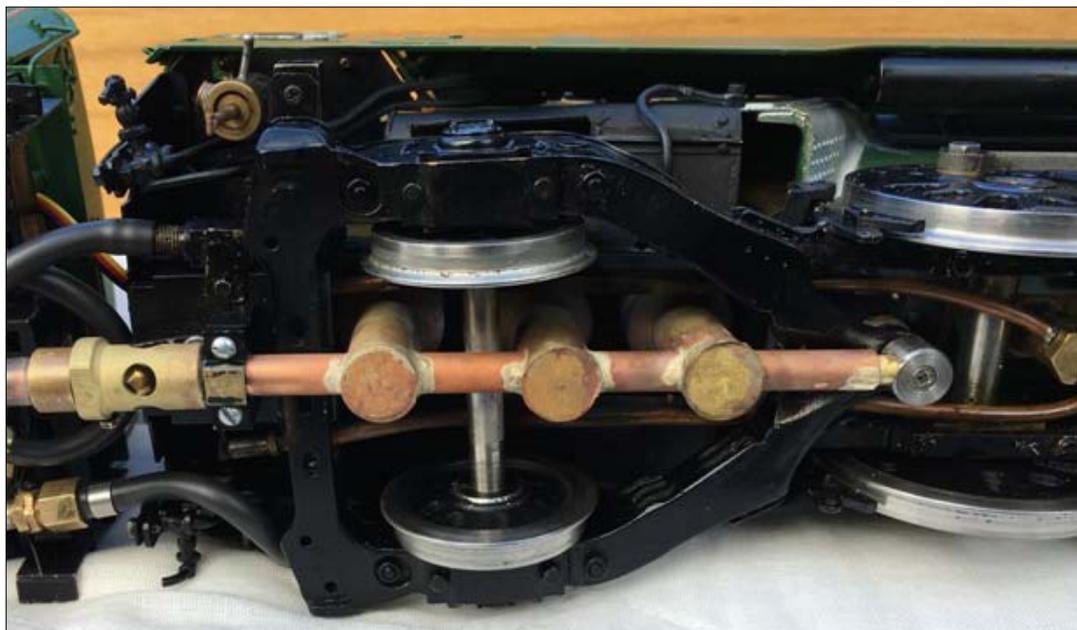


Fig 6 - The ceramic gas burner is under the cab and straddles the rear truck axle. The alcohol burner is in the same position.

## 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 it may be caused by a blocked gas jet. If this is the case then the jet will have to be removed and cleaned. The gas jet can be seen through the air hole in Fig 6 above. Disconnect the tender from the loco, loosen the small clamping screw that holds the jet into the burner pipe and remove the gas jet from the burner pipe. Unscrew the jet from the flexible tube from the tender. Place the jet nozzle against a gas can nozzle and clear the jet with a blast of gas. Under no circumstances use a wire, this will damage the jet hole. Reassemble the gas jet into the loco.

## Operating the Alcohol Fired Model

This model is designed to use Denatured Alcohol. Often referred to as 'Methylated Spirits' it is usually available in 1 litre bottles from most hardware and grocery shops. The fuel tank, the filling plug and the fuel control valve are all in the tender under the dummy coal load. The fuel is delivered to the wicks via a 'chicken feed' device that meters the fuel to match the rate it is consumed.

**The control valve must be closed before the fill valve is opened.** Failure to do this will result in the wicks becoming flooded and puddling of the fuel under the loco. This is an obvious fire risk. Make sure that the fire is out before you refuel the model and do it in a well-ventilated area and away from other working live-steam models. Allow a small air space above the fuel then replace the filler plug. The fuel control valve can then be opened to allow the fuel to wet the wicks in readiness for lighting. Open the fuel valve on the tender one turn. Wait until the burner wicks are saturated with fuel. The wicks are under the cab and straddle the rear truck axle. **Be sure to check for leaks or fuel spillage under or around the model before lighting up.**

The sequence for lighting the fire is as follows:

1. Prepare the engine as described below.
2. Open the fuel control valve.
3. Mount the draft fan on to the smoke stack and switch it on.
4. Ignite the lighting up wand or gas lighter and position it under the burner that is above the rear truck axle (see Fig 6).

You should hear the fire ignite with a mild roaring sound. Evidence of a successful light up will be warmth from the draft fan and a mild combustion smell. The fire will also be visible through the firebox window however an alcohol flame may be difficult to see under bright conditions. The intensity of the fire inside an alcohol fired model will automatically adjust according to the amount of draft through the boiler. It therefore does not require adjusting other than shutting off the supply at the end of a run.

Be aware that after the fuel is shut off the fire will continue to burn until it consumes the residual alcohol in the feed line and the wicks. If the water level in the boiler is noticed to be very low the fire should be extinguished immediately, and the boiler allowed to cool before adding water. **We strongly recommend that a fully charged Mini CO2 Extinguisher is at hand every time the loco is in steam.** When directed down the chimney the blast of CO2 quickly extinguishes the fire. (fig 7).



Fig 7

## Preparing the Engine

1. Lubricate all external moving parts of the engine and tender (see 'External Lubrication' above).
2. Connect the tender to the loco. (see Fig 6) This is best done with the model resting on its side on a well-padded bench. Couple the tender to the loco then connect the two water lines then the fuel line. An 8mm spanner will be required to tighten the water delivery connection. Hold the adjacent end of the connection to prevent it being distorted while tightening the coupling nut. The water lines should be flexible enough to allow the model to negotiate corners without stressing the pipes. For the gas fired version, insert the gas jet fully into the burner opening under the loco and use the small clamping screw to secure it into position.
3. Fill the displacement lubricator with steam cylinder oil (see 'Internal Lubrication' above).
4. Use the filler plug inside the cab to fill the boiler with water. Fill the boiler completely then withdraw approx 20 to 30ml to create a steam space above the water.
5. Fill the tender with water to just below the level of the water return pipe. (visible inside the water hatch)
6. Open the bypass valve and use the hand pump to prime the water lines and check that water is returning to the tender via the return pipe. (visible inside the water hatch)
7. Fuel the model according to the type of fuel required (see above).

## Raising Steam

See above instructions for lighting up (gas or alcohol).

The draft fan is used to draw the heat through the boiler fire tubes until steam is raised. Make sure the throttle and the blower valve are both closed and the model is in mid gear. Keep the draft fan operating until steam pressure appears on the pressure gauge. It will take approximately 7 minutes to raise pressure. Once the gauge reaches 20 psi the engines internal blower can be opened and the draft fan can be removed. Carefully check for a hot draft from the chimney as evidence that the blower is working. Be aware that if the boiler has been over filled hot water may eject from the chimney at this stage.

## Moving Off and Running

When operating steam pressure is achieved (50 psi) open the cylinder drain cocks (Fig 3). When you are ready, select full forward or reverse gear then back it off one full turn so the mechanism is not operating fully against the limit of its travel. Open the regulator slightly to allow steam to enter and warm the cylinders while maintaining a draft from the blower. The model can now be driven off but go gently until it is fully warmed and is able to settle into a steady pace. Close the cylinder drain cocks when the cylinders are clear of water. Monitor the boiler water level and maintain it to within the top half of the gauge glass. Closing the water bypass valve will direct the full capacity of the axle pump into the boiler. Additional filling of the boiler is achieved with the hand pump. Once the model is run in and the operator is familiar with its operation it can be kept in steam according to the following schedule:

Action	Minimum Frequency
Check the boiler water level (gauge glass)	Every 2 minutes
Replenish the water in the tender	Every 10 minutes
Service the steam oil reservoir	Every 20 minutes

If the model comes to a stop for no apparent reason immediately investigate the following possibilities:

- If the boiler is low on water shut down the fire immediately and let it cool before injecting water into the boiler.
- If the boiler water level is OK and the fire is still going, open the blower and check that there is a draft coming from the chimney.

## Shutting Down

Close off the fuel supply and extinguish the fire (see instructions above for Gas and Alcohol fired models). As it cools perform the following functions.

1. Open the blower valve to relieve boiler pressure and keep the steam regulator closed to prevent oil being sucked back into the boiler as the steam condenses.
2. Use a small syringe to suck out the water from the lubricator and replenish the steam oil.
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.



## Remote Control

A single channel remote control 'mechanical fittings kit' for the steam regulator is offered with this model. The kit provides the necessary mechanical mounts and linkages to install the RC servo inside the cab.

Fig 8 - RC Mechanical Mountings Kit Components

Item	Qty	Description	C38 RC Fitting Kit
1	1	Link	
2	1	Pin	
3	1	Spacer	
4	1	Nut	
5	1	Arm, Steam Regulator. Replaces manual regulator handle	
6	1	Bracket, Servo Mount. Mounts to screw reverser block	
7	2	Screw	
8	2	Bolt	
9	2	Washer	
10	2	Nut	
11	1	Sheet, Ceramic Insulation. Install between servo body and steam regulator manifold	
12	1	'O' Ring	



Fig 9 - RC Servo Mounted in Cab



Fig 10 - RC Electronics installed in tender. White Insulation sheet is visible between the servo and the boiler. The blower control valve is between the water gauge glass and the black servo unit.

An electronics package is available from 'Remote Control Systems' in Australia. For details of the package go to their web site at: [www.rcs-rc.com](http://www.rcs-rc.com) and click on the image of the green 3801.

<b>Consumables &amp; Accessories</b>	
<b>Recommended items for servicing and operating your live steam model</b>	
➤ Draft Fan P/n AP-28202 (required for both Gas and Alcohol models)	
➤ Alcohol fired locos <ul style="list-style-type: none"> <li>- Denatured Alcohol (Methylated Spirits)</li> <li>- Mini CO2 Extinguisher P/n ALW MINI CO2</li> <li>- CO2 Cylinders (pack of 4) P/n ALW CO2 CYL</li> </ul>	
➤ Gas fired locos <ul style="list-style-type: none"> <li>- Butane Gas canister</li> <li>- Gas Filling Adaptor</li> </ul>	
➤ Gas stove lighter or a lighting up wand	
➤ Treadmill Roller Qty 3 (one per main axle) P/n AP-28301	
➤ Steam Cylinder Oil Grade 460	
➤ External Lubrication - SAE 30 or 40 motor oil	
➤ Distilled Water. Avoid using De-ionized water as it can cause long term problems by slowly removing zinc from the brass fittings - commonly called 'de-zincification'	
➤ 8mm open-ended spanner for connecting the tender water feed	

<b>Technical Specifications - Live Steam Version</b>	
<b>Scale:</b> 1:32	<b>Valve Gear:</b> Full working Walschaerts
<b>Gauge:</b> 45mm	<b>Cylinders:</b> two, slide valves, drain cocks
<b>Length over buffers:</b> 756mm (29.8 inches)	<b>Boiler:</b> copper, drafted multi tube type 'C'
<b>Width:</b> 91mm (3.6 inches)	<b>Working Pressure:</b> 60psi
<b>Height:</b> 133mm (5.2 inches)	Safety valve, pressure gauge, water gauge with blow down, automatic blower
<b>Min Radius:</b> 3m	Axle water pump, bypass valve, hand pump
<b>Fuel:</b> Butane Gas or Alcohol	<b>Construction:</b> Copper boiler, Brass boiler jacket, Brass cab, Brass tender, Steel drivers

<b>Technical Specifications - Electric Version</b>
<b>As above for Scale, Gauge and Dimensions</b>
<b>Voltage:</b> 24V DC

## Locomotive Original Packaging

We recommend that all the original locomotive packaging, both outer and inner boxes and any other types such as shaped polystyrene should be retained. Should you need to return your model for any reason it must be securely packed in its original packaging to prevent damage in transit.

## Acknowledgments

This model is a collaboration between Argyle Loco Works (Australia) and Accucraft Trains (USA). Original research and design by David Fletcher, Mechanical design by Gordon Watson. For additional livery, technical advice and design review we gratefully acknowledge the assistance of David Oram and Ross Verdich. We also thank 3801 Ltd and the NSW Rail Transport Museum for providing access to the preserved 38 class locomotives.



# 'HUB' Coaches

By Michael Ragg

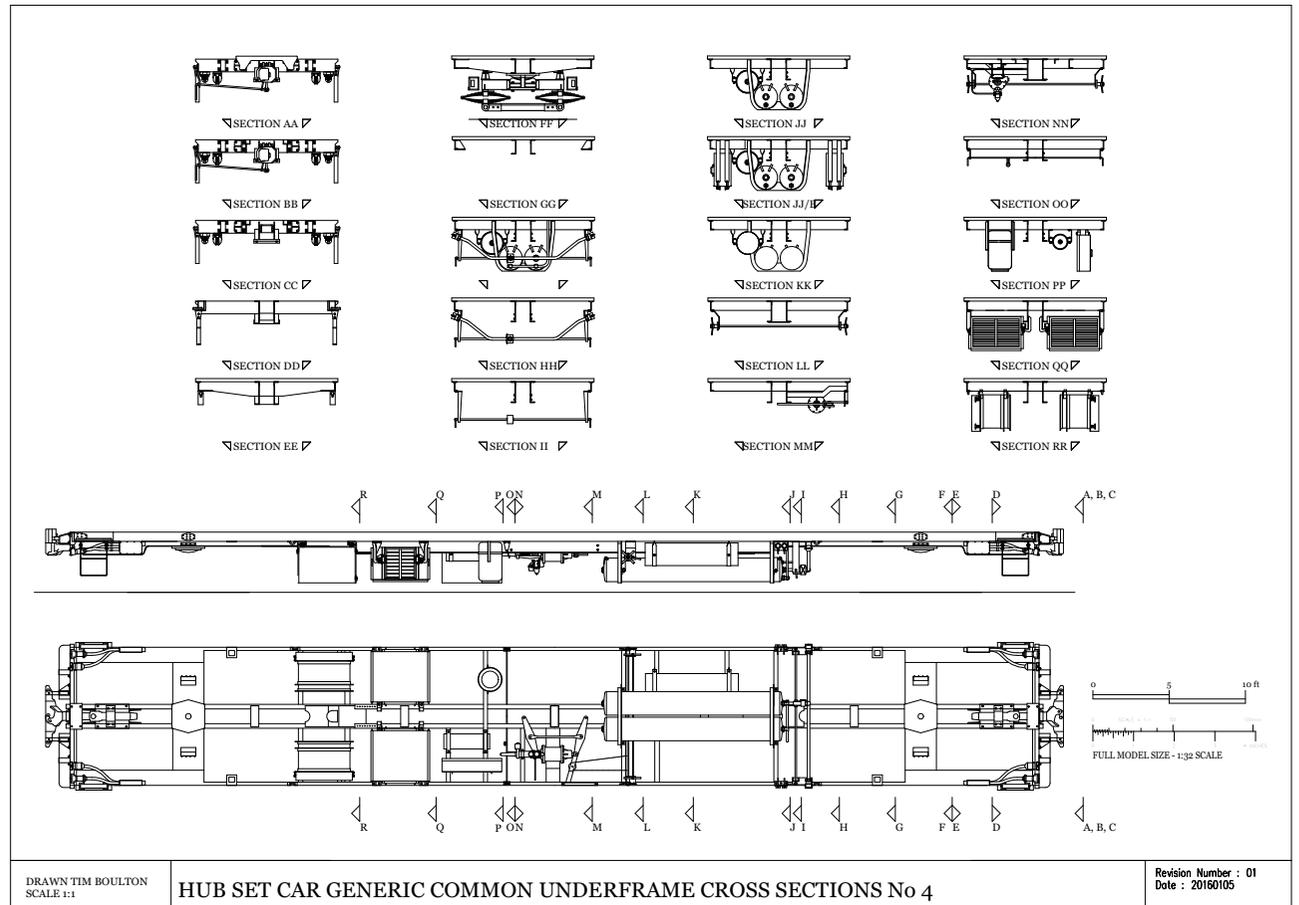
These air-conditioned coaches were formed into four set of seven carriages.

The 4 sets were numbered 116-119. The first set entered service in April 1948 on the Newcastle Express. They also saw service on the Riverina Express, South Coast Daylight Express and the Central West Express.

Each carriage was 19.83 metres in length. Thanks to Tim Boulton's meticulous research, we've been able to reproduce them in 1:32 scale.

**Argyle Loco Works and Accucraft Trains** has modelled the 'FH' Second Class Car #6 for the centre coaches and the 'HFH' Second Class Brake Car #1 for the end coaches. All 7 cars are fully decaled (car #, 'First', 'Second' and 'Buffet') and as a set or separately. Body length is 62cm and each coach weighs 3.7Kg.

[▶ Product Sheet](#)



DRAWN TIM BOULTON  
SCALE 1:1

HUB SET CAR GENERIC COMMON UNDERFRAME CROSS SECTIONS No 4

Revision Number : 01  
Date : 20160105

One of 21 sheets of drawings developed by Tim Boulton for the model HUB coach set  
– this one showing the chassis details





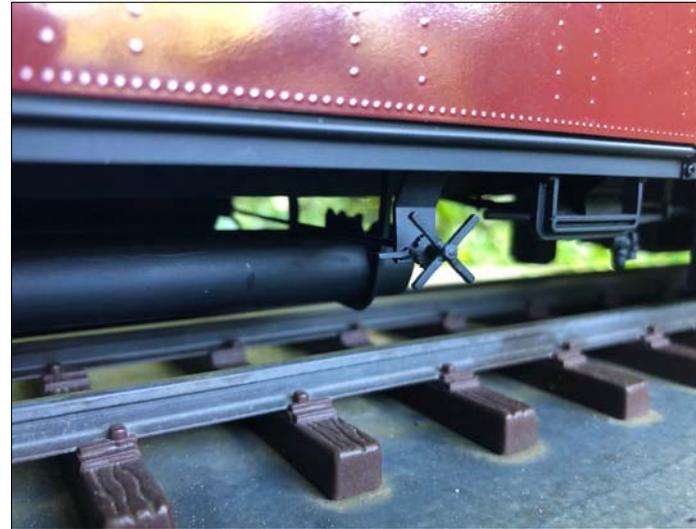
End Coaches (# 1 & 7) with curve profile roofs at loco/guard ends



Centre Coach



End Coach



Under floor detail



Maroon seats for second Class and Green seats for First Class

## Videos

### 24 Sep 2016

The first trial build sample. Alcohol fired '3801' in its August 1963 livery with unlined cylinders, verdant green and silver cab roof.

▶ [YouTube Link](#)

### 05 Nov 2016

'Great Southern Steam Up' '3801' Driving through RC on the steam regulator and pulling 29 wagons on a very oily track. Loco is alcohol fired.

▶ [YouTube Link](#)

### 29 April 2017

'Garden Rails in The Hunter' steam up Second trial build sample. Butane fired, ceramic burner. '3813' NSW Special Green – 1955 Paint Scheme

▶ [YouTube Link](#)

### 18 May 2018

'Southern Highlands Steamup' Bowral NSW '3801' First Production Sample, Alcohol fired

▶ [YouTube Link](#)

### Jan 2019

In the UK - 'Rushford Barn Models'

▶ [YouTube Link](#)

### Aug 2020

Alcohol fired 3801, Butane fired 3813 and Battery electric 3830 take turns hauling HUB set 116. Locomotive weight 9kg. HUB set 26kg. Total Train 35kg. Circuit length of 41m.

▶ [YouTube Link](#)

