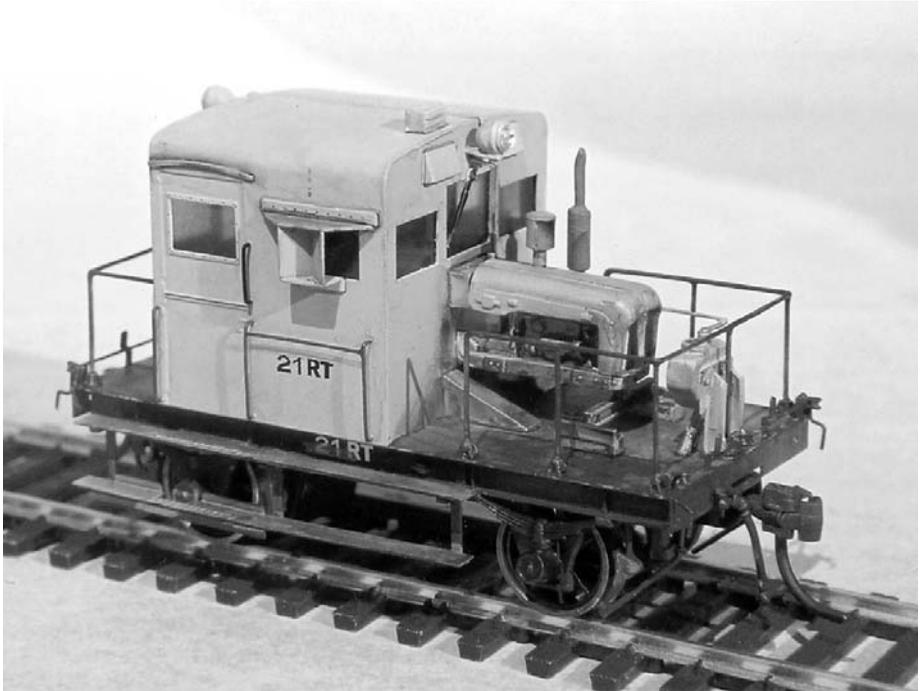


## VICTORIAN RAILWAYS RT RAIL TRACTOR



Model illustrated has been fitted with couplers (not included).

### Prototype Notes

The first rail tractor came into service in 1932 and was primarily used for line construction. This unit was relatively low powered and was given the first number in the series. It is currently preserved at the North Williamstown Railway Museum.

With the introduction of diesel traction throughout the 1950s and the rationalisation of goods pilot working following the retirement of steam shunters and light lines engines, rail tractors were introduced to undertake shunting operations in stations throughout the state that still required wagon marshalling capability.

It was intended that these rail tractors be used within the confines of the station yard to make up or break down freight trains where it was not considered economic to station a locomotive permanently for that purpose. The rail tractors were fitted with a farm tractor engine on a modified four wheel wagon underframe, and were operated by station staff not otherwise qualified as locomotive engine drivers.

The RT was able to pull a maximum load of between eight to ten loaded four wheel wagons, and then only on level ground. The only braking provided was a large ratcheted lever in the cab, mechanically coupled to the existing wagon brake rigging. The limited braking capability meant that the RTs were generally confined to the station yard limits.

In recent times the closure of many branch lines, together with the increased use of train engines to undertake what limited shunting was required with "block" train operation, has meant that many RTs have been withdrawn. However, a small number of RTs still perform useful service and one or two have even been converted to standard gauge!



Approximately 50 such tractors were built from 1957 to the late 60's. Over this time there were many variations on the original design, as it seemed the concept was under constant review. There were changes to the shape and size of the windows, powering of the axles, position of the sandboxes and in some, a newer motor was fitted. It is therefore difficult to make the model cater for all numbers in the range. This kit covers some of the tractors from RT 19 onwards. This particular kit is faithfully modeled after 39 RT as of December 2002, when it was sitting in a siding at North Melbourne sadly awaiting its fate.

Over the years the RT has had a number of colour schemes. The original colour was bright red, however by the 70's most had been repainted yellow, similar to that being used on the GY wagons. At least one was known to be painted white, and 49 RT, one of the later series not covered by this model, has been repainted in the yellow and green Freight Australia scheme.



## General Assembly Notes

While this kit is highly detailed, it is a model of a quite small prototype. Therefore many parts are very small and fiddly to fit. In an effort to minimise the difficulty in assembling the parts into a successful and satisfying model, tabs and slots are used to locate both etchings and castings in their correct relative position. In every case pay particular attention to remove any extraneous lumps or flaws from the castings and small burs from the etchings, to ensure that the parts are located correctly before securing them in place.

The majority of this kit is brass, therefore the method of choice for assembly is soldering. However this does not preclude the use of Epoxy Resin glues or Cyanoacrylate for assembly. Solder is very strong and it is not necessary to wait for an assembly to reach full strength before moving on to the next step. The kit designer highly recommends the use of solder paste rather than wire for assembly. It has a number of advantages. It is clean, easy to place small quantities using a pin and because it can be placed before use of the iron, leaves one hand free to hold parts. The use of a resistance soldering kit or hot air gun is also recommended when using paste.

Use a piercing saw or heavy-duty side cutters to remove the brass castings from their feed sprues. Trim the remains of the feed sprue with a file.

As a general rule the half etched line used to locate folds in etched parts goes to the **inside** of the fold. The only exception is one of the folds in the shunter's step support frame.

If you are not comfortable with soldering, the next choice would be an epoxy resin glue such as Araldite, or finally a medium cure speed super glue. There is no shame in using adhesives to assemble the kit, in fact it is recommended for some parts of the kit that are simply too difficult to solder. A soldering iron will definitely be required to make the electrical connections, however.

Some parts require you to drill or open up holes using fine diameter twist drills. This should always be done by hand using a pin vise to hold the twist drills. Do not use a Dremel or electric drill as it is very easy to drill too far and ruin the part.

The kit does not contain paints or couplers. It is designed to accept Kadee No 5 or No 56 couplings. The mounting is designed to place both coupler types at the correct height.

***A parts list is on the back page.***

## Tools Required or Recommended

Sharp knife, such as a Stanley knife with snap-off blades, or a scalpel.

Fine pointed tweezers.

A set of needle files in assorted shapes.

Wooden pegs for holding parts during soldering.

Wire cutters.

Needle nose pliers.

Small model maker's vice with smooth jaws.

Pin vise for holding twist drills.

A 150mm single cut mill file.

Super glue, such as Mxbon 108.

Super Strength Araldite or other epoxy resin glue

Soldering iron for electrical connections and/or kit assembly.

Piercing saw.

Glass fibre burnishing tool.

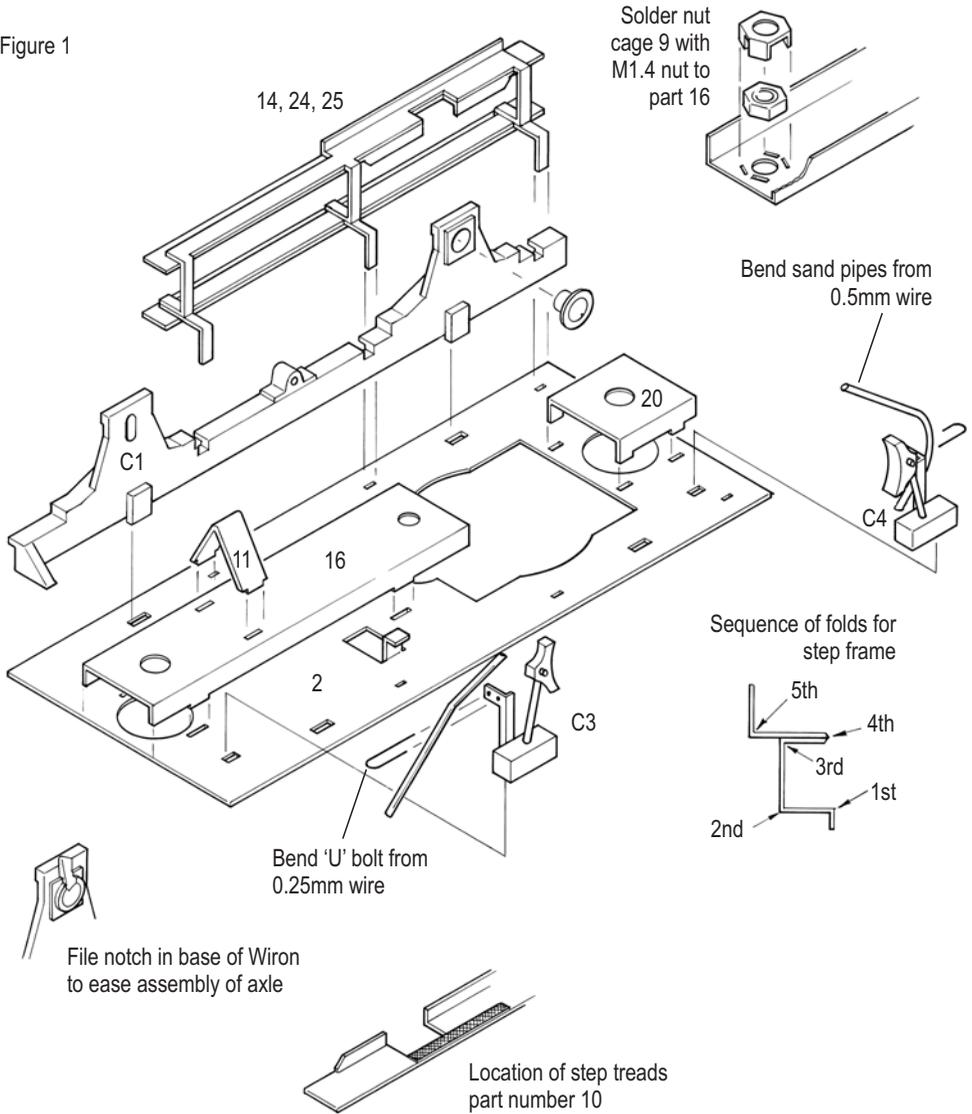
Emery paper, 300 and 600 grit.

A range of metric twist drills including: 0.4mm, 0.5mm and 2.0mm.

## Spare Parts

There are some spare parts on the etched brass fret, particularly the very small parts that vanish in a ping and cannot be found until after the model is finished and painted.

Figure 1



**Chassis Assembly**

Please refer to figure 1.

Fold the sides of the long spine, part No.16, to form a channel section. Bend the tabs on the small nut cage, part No. 30 down and use it to attach the M1.4 hexagon nut to the inside of the spine. After fastening the cage to the spine, smooth the opposite face of the spine to remove any projections of the nut cages tags.

Prepare the chassis plate, part No. 2. Bend the two circuit board retaining lugs up at 90° and remove the strip of cabin handrails from the motor cut-out. Fasten the spine to the chassis plate, so that the tags locate in the slots in the plate and the spine covers the writing "chassis plate bottom" etched into the surface

Fold the small spine, part number 20 into a U shape and fasten it to the chassis plate. Orientate this part so that it is flush with the end of the chassis plate.

Remove the solebar castings from their feed sprue. Looking at the inside of the castings, you will see that the wheel axle bearing areas are of two different types. The front axle runs in a small vertically elongated slot, forming part of the front axle beam compensation, while the rear bearing surface has a 2mm diameter hole to accept a top hat pint-point bearing. Lightly draw file the square surface of the bearing seat where the top hat bearing will be installed sufficiently to provide a flat surface. With a 2mm drill in a pin vise, carefully clear out the hole for the top hat bearing. Test-fit the bearing and continue to ease out the hole until the bearing just fits flush with the axle box surface. Fasten the bearings in place. Use a triangular needle file to carefully cut a vee groove into the bearing from the bottom of each W iron, as shown in the detail view on figure 1. This step will make it easier to install the leading axle and the 'Black Bug' drive unit when the time comes.

Attach one solebar to the chassis plate so that the round bearing is adjacent to the motor cut-out. Make sure that the back surface is at 90° to the chassis plate and the ends are flush. Place the second solebar in position and temporarily install two axles between the bearings. Fasten the second solebar to the chassis and ensure that the axles spin freely and the front axle can slide up and down the bearing slots.

Bend the front axle compensation pivot, part No 11, to an approximately 55° included angle and fasten it to the spine.

Prepare the shunter's step frame assembly, part No. 9. Save the small components carried inside the frames in a receptacle for later. Fold the reinforcement angle in the bottom step first, and then make the rest of the folds in sequence, as shown on the detail view of fig. 1. Note that the half etch line is on the **outside** of the fourth fold.

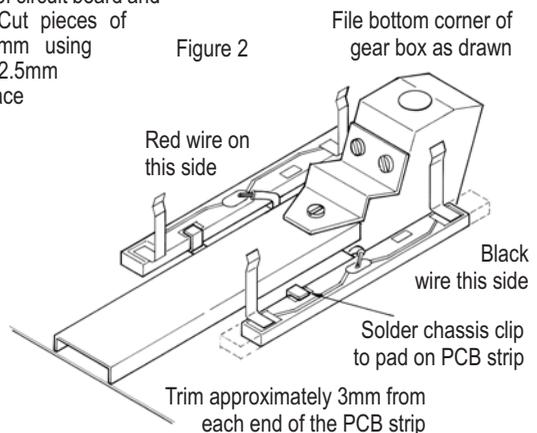
Bend up the two kickboards on the bottom running board, part No. 24. Attach the bottom running board first, lining it up exactly with the cut-out in the bottom step frame. Now attach the top board so that the ends are even with the bottom board. Attach the chequered anti-slip plates, No. 10, to the top and bottom boards on each side. They are located on the outer edge of the steps, directly above one another and as shown on the detail view of the right hand bottom step on figure 1. Each completed step assembly should now be attached to the chassis by gently inserting the topmost tags into the corresponding slots in the chassis, just inboard of the solebars. Make sure the step assembly snugs down into the 3 channels cast into the solebars as far as possible.

The four combination brake shoe / sand pipe hanger parts are handed. Attach the appropriate castings to the chassis plate, as drawn on Figure1. The brake shoes are cast into a position where they will be well clear of the wheels. Insert the front wheel set into the vee slots at the front by springing the frame open gently. Adjust the brake shoes toward the wheel so that the clearance is approximately 0.5mm. Reposition the wheel set to the rear axle and repeat the procedure. Bend sand pipes from the 0.5mm wire supplied. One end of each pipe locates against the junction of the chassis plate and the spine. Secure the pipes to the brackets with small 'U' bolts formed from 0.25mm wire, as shown on Fig 1. Solder the 0.25mm wires from behind the bracket before trimming off any excess. Again, temporarily install the plain wheelset into each end of the chassis to help form each sand pipe into a curve that ends near the rail adjacent to each wheel.

Finally, turn the chassis over and use a large file to remove any lumps or tags that project above the level of the chassis plate. Finish by rubbing it over a piece of 300 grit emery-paper that is laid on a flat surface.

## Electrical Pickups

Remove the burr from each edge of the pieces of circuit board and trim approximately 3mm from each end. Cut pieces of phosphor bronze approximately 1mm x 9mm using scissors or tin-snips. Make a 90° bend about 2.5mm from the end of each strip and solder them in place on the circuit boards, orientated as shown on figure 2. Pay particular attention that the pattern of tracks and pads is as drawn. Place each board along the edge of the chassis, fold the brass tag over and solder it to the isolated metal pad on the board.



## Bug Mounting Frame Assembly

Bend the 'Black Bug' mounting frame, part No. 17, to shape. Attach the frame to the 'Black Bug' using two M1.4 x 3mm screws. Now carefully feed the motor up through the opening in the chassis plate, flexing the W irons apart so that the axle pops into the bearings. Attach the lower end of the mounting frame to the chassis spine with another M1.4 x 3mm screw. Install the plain wheelset in the front axle position and check that the wipers are rubbing on the backs of the wheel tyres. Now feed the motor wires down through the opening in the chassis and solder a wire to the central pad on the circuit board on each side. Trim the wires so that there is no excess length. Test the operation on a length of track. It may be necessary to gently bend the pickup wipers to ensure that they rub on the backs of the tyres. Lift each end off the track in turn to test that all four wipers are working.

## Operators Cab Assembly

Please refer to Figure 3.

The sharp bends at the junction of the sides and roof have been preformed, but it is still necessary to gently roll a curve into the central section of the roof. This is best performed on a soft surface like a mouse mat, using a rod of between 6 and 8mm diameter. A screwdriver shaft of the right size works well. Gently roll the rod back and forth on the inside of the roof, applying light pressure. Tags are incorporated in the edges of the roof and sides, as well as the front and back of the cab. These are so designed that the parts will only interlock when placed in their correct relative position. Offer the front or rear wall up to the roof section and test the fit. To make the assembly painless, it is advisable to get the fit as close as possible before fastening the sections, particularly if you intend glueing the parts together. Repeat the rolling process, gently increasing the pressure a little at a time until the fit is satisfactory.

Place the roof section upside down in a wooden V block and mate up the rear wall to the roof. Carefully inspect the series of tags and rebates to make sure they are engaged fully. To minimise the dressing of the edges later, this step is important. Begin fastening the two parts at the centre of the roofline and work towards the sides, then down the sides to the floor.

Repeat the process for the front wall section. The tags should be slightly raised above the corners of the cabin, and will need to be dressed down flush. Remove most of the excess tag with a file and finish with fine emery paper.

Bend the mounting flange on the upper and lower mirror supports to 90°. Do not bend back the attachment tabs at this time. Bend the mirrors and test fit them into the slots in one of the supports. When everything fits correctly, fasten the three parts together. Dress down the mirror mounting tags on the outside surface of the mirror supports until flush, taking care not to damage the screw detail on the flange. Now fold the attachment tabs back, insert them into the cab sides and fasten from the inside of the cab. File off the excess tag from the bottom edges of the window, so that they can't interfere when the glazing is added later.

Fasten the rainstrips over each doorway using the small dots on the cab as a guide. The bottom of the rainstrip should just cover each dot, with the rear edge of the strip right up against the rear edge of the cab.

Next fit the lighting electrical conduit, which is to be formed from the 0.25mm 'wire wrap' wire provided. Grasp the end of the wire with pliers and gently strip the insulation with your fingernail. There are half etched guides provided on the front and rear walls for this conduit. It begins at the engine, winds its way up to the front headlight, straight across the rooftop and down to the rear headlight. Form the wire to follow the etched grooves as closely as possible and fasten in place when you are happy with the fit.

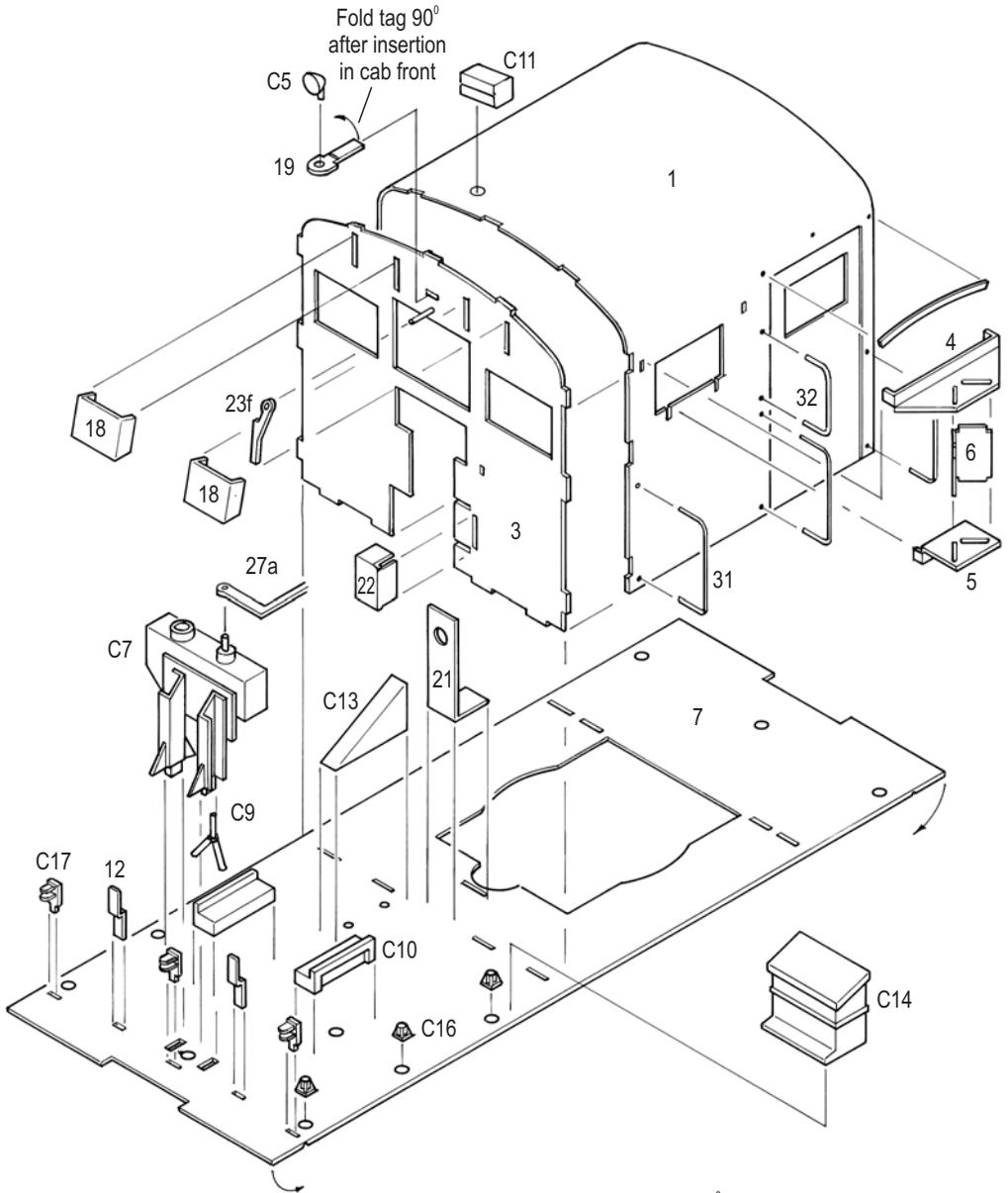
Insert the two headlight support brackets, part No. 19, through the slots in the top of the front and rear cab walls. Fold the excess tag over and fasten inside the cab. Fasten a headlight casting to each bracket.

Bend the sides of the two vent covers, part No. 18, at 90° and insert them in the slots in the cab front with the tapered sides at the bottom. The top edge is fitted hard up against wall and the bottom edge is open to whatever degree you wish.

Mount the horn enclosure on the roof with the louvres facing forward. Fold up the clutch guard, part No. 22 and fasten to the three slots in the lower right of the engine opening in the front wall. The guard should protrude about 0.5mm. Use a small length of 0.4mm brass wire to attach the windscreen wipers to the centre windows, front and rear. The shorter windscreen wiper goes on the front window. Trim the outside part of the wire flush to the wiper boss.

Finally, fit the four etched handrails to each side of the cab. This completes the assembly of the cab.

Figure 3



Note: Do not bend headstocks down at 90° until all items have been soldered to the footplate and the lower surface has been dressed smooth.

## Footplate Detail

Remove the nut cages, part No. 7 from the central hole in the footplate. Bend the tags down at 90° and use the cages to secure an M2 hex' nut to the bottom surface of the footplate at each end. Smooth the top surface of the footplate to remove any excess tag projecting.

**Do not** bend the headstocks down at this stage. There are a lot of parts to be added to the footplate and any projection below the bottom surface must be removed. It is much easier to do this if the headstocks are still flat.

If you are modeling an early version RT with buffers (available separately) this is a good time to open out the buffer beam holes to accept the buffer castings. Be very careful doing this if you do not want to twist the footplate into a nasty mess. We would highly recommend you use a set of tapered broaches to perform this tricky manoeuvre, definitely **not** an electric drill.

Fasten the triangular chain guard and the two cast engine supports to the footplate. Fit the stanchion base supports for the railings at this stage. There are seven at the front and three at the rear of the footplate. Also fit the support brackets for the uncoupling irons, with three each at front and rear. Note that it will be necessary to trim the vertical gusset off the rear of the uncoupler supports to allow them to fit neatly against the railing supports. Take care when attaching the supports not to get any solder or glue in the fold line for the buffer beam. If necessary, clean out this fold with a triangular needle file.

Bend a joggle in four lamp irons, part No. 12, and fit them to the front and rear of the footplate with the longer part into the slots and the step towards the front. Make 90° bends in the rear engine support, part No. 21, and fasten it to the footplate.

Note that the two sandbox castings are different. The stand with two gussets on the legs goes in the front position. Remove the two 'Y' shaped sand distributors from the sprue, cutting at the waist mark near the 'Y'. Dry fit the distributor into the hole in the bottom of the sand box and test fit the whole assembly to the footplate. Drill out the hole in the bottom of the sandbox to a depth of 1.5mm. Drop the distributor in the hole and then attach the whole assembly to the footplate. When placed the right way up, the distributor will drop down and sit on the footplate, its correct position. Fastening one pipe only to the footplate is sufficient.

You have now attached the last part to the footplate that actually fixes through it, except for the cabin. Now is the time to trim any protrusions off the bottom of the footplate. Gently file the bottom surface and dress with 400 grit emery paper. Ensure the footplate remains flat and straight.

Now attach the cabin, completed earlier, to the footplate. Trim any tag that projects below the bottom surface of the footplate.

## Tractor Engine Assembly

Separate the chassis rails from the sprue at the point where the circular runner stops, leaving as much of the u-channel frame as possible. Clear the inside of the u-channel of any flash. The front axle beam has a spigot that passes through the chassis rails and into the bottom of the radiator. Clear the holes and trim the length of the spigot so that the three parts fit together without a gap. Stand the assembly up on the rear of the cowl and align all parts in preparation for fastening. The axle beam should run transversely and the chassis rails should be parallel to the engine cowl. Blue tack is a very useful tool for holding the parts in place, or a piece of strip wood between the cowl and the chassis. When everything is correctly aligned, fasten the items together and put aside. Solder paste and a hot air gun is a useful technique for this stage.

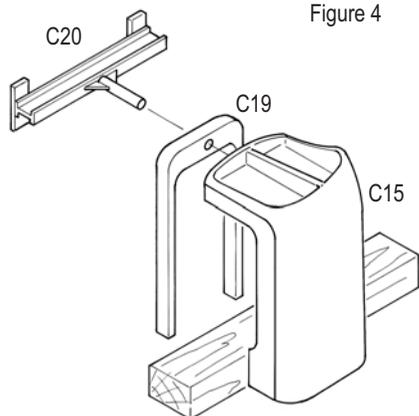
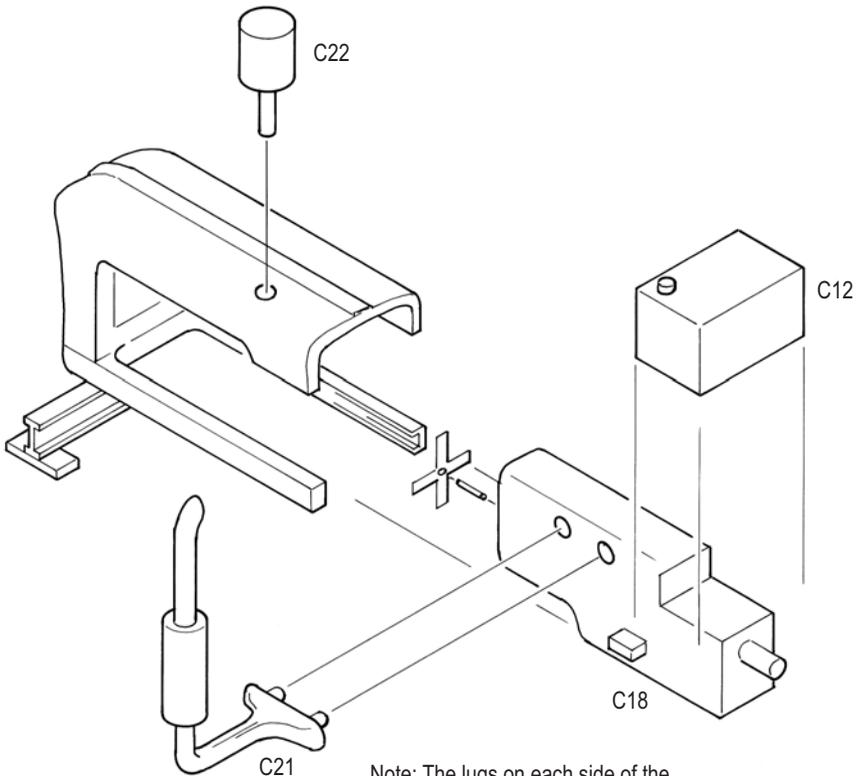


Figure 4

When soldering parts together, use a piece of strip wood to space cowl from chassis clip

Figure 5



Note: The lugs on each side of the engine/transmission engage in the channel in the chassis

When you remove the engine casting from its feed sprues, remove the top feed, but leave the bottom one about 3mm long. Fasten the fuel tank to the top rear of the engine block and transmission, as shown on figure 5. Also fit the exhaust manifold, locating the pegs in the holes in the left side of the engine block. To mount the fan, there is a small indentation in the front of the water pump on the front of the engine block. Open this out with a 0.4mm drill to a depth of 1.5mm. Thread the fan onto a short length of 0.4mm brass wire and fasten into the hole.

Dry fit the air cleaner into the hole in the top cowl. If it does not fit, ream it out gently with a broach until it is a slightly tight fit. Set the position such that 1.5mm of pipe is showing above the hole.

Mate the engine assembly with the radiator / cowl assembly by sliding the engine into the chassis rails from the rear. Two protruding tabs on the side of the transmission should slide into the u-channel of the chassis rails. Slide forward as far as possible until the engine stops with the cowl up against the fuel tank. If soldering, the best place is to solder the two items at the join between the chassis rails and the tabs. If using glue, then also glue at this point and, in addition, between the fuel tank and the back of the cowl.

## Final Assembly

Insert the engine rear spigot into the hole in the rear engine support and fasten the pads on the bottom of the front axle beam to the top surface of the cast support pads already fastened to the footplate. It is not really necessary to fasten the rear spigot to the bracket, the axle pads are sufficient, but you can if you wish.

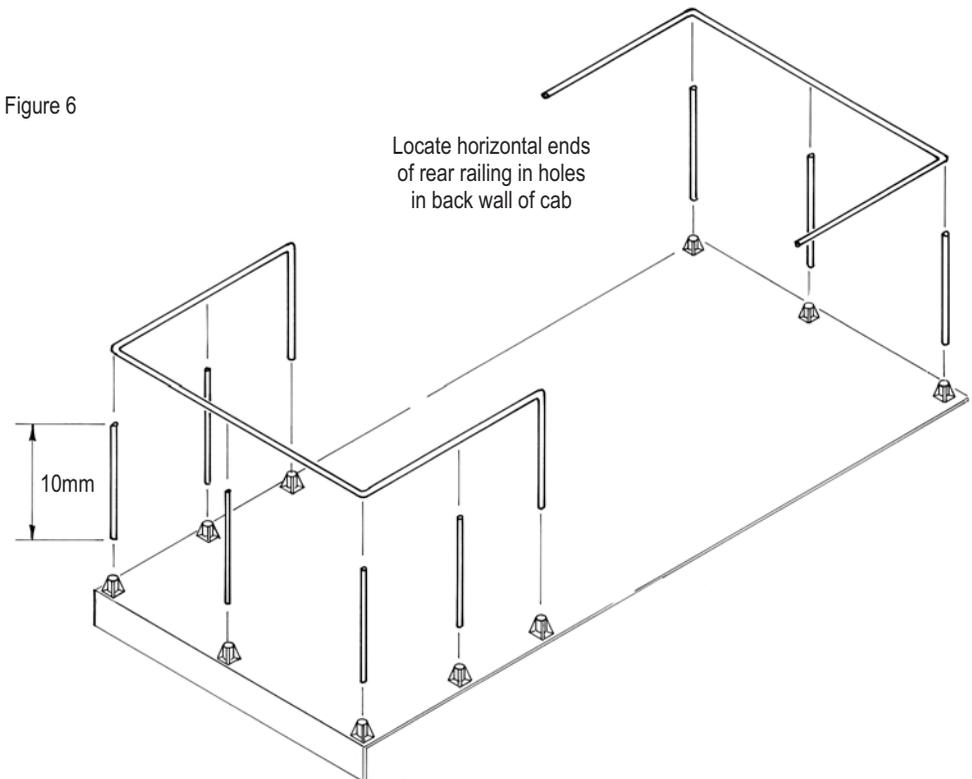
Prepare and fasten the cast battery box to the footplate up against the front left wall of the cab, as shown on figure 3.

Two flat iron push rods, parts Nos. 27a and 27b, are provided to operate the sanding gear. The rods have a small crank attached to one end. Drill out the sanding valve hole to 0.4mm and to a depth of 1.5mm. Dry fit the crank using a short piece of 0.4mm wire, running the rod to the small rectangular hole in the wall(s) of the cab. Mark the middle of the rod and put a 90° twist in the rod at the middle point. Fasten the rod and cranks at the sandbox end, but leave the cab end free to prevent it breaking when the footplate flexes. Leave any extra length in the rod inside the cab.

Now is the time to bend the buffer beams down at the end of the footplate. If there is any solder or glue in the fold line, clean it out with a triangular needle file before bending.

Attach buffers if you are modeling the earlier version of the RT, and fashion the uncoupling levers from 0.3mm brass wire as shown in the photos. Because the uncoupling lever brackets are closed, you will have to bend one end, insert the wire and carefully bend the other end. Fasten the brake pipe coupling hoses into the holes adjacent to the coupler openings.

The last task is to fit the railings around the footplate. A set of bending guides has been provided in the waste area of the fret to assist in bending the rails precisely. Beginning with the rear railing, make a bend in the 0.4mm wire 10mm long. Place this in the 'rear railing' hole in the guide and make the next bend to the notch. Cut the last section to 10mm also. Cut three lengths of wire 10mm long for the uprights.



For the front railing, make a bend in the wire and place in the front railing guide hole. Bend at the same notch as for the rear railing. Now move to the left end of the fret and place one of the bends you have made between the guide-lines and bend the end over the notch. Flip the wire over and repeat. Cut another five uprights at 10mm long. First fasten the fixed ends, then mate the uprights to the bottom of the rail and fix with a small drop of solder or glue. As the rails are quite vulnerable, this is one area where we recommend soldering.

## And Finally

When solder assembly operations are complete, remove the 'Black Bug' from the chassis. The best way to do this is to unsolder the wires from the brush tags at the motor and remove the screw attaching the gearbox bracket to the chassis spine. The W irons can be gently sprung apart to allow the 'Black Bug' to be withdrawn with its bracket still attached.

The entire model can be immersed in a bath of methylated spirits to dissolve the flux prior to painting. After 30 minutes in the methylated spirits, place the model in a warm water bath with a little dishwashing liquid, swishing the water around for 2 to 3 minutes, rinse in clean running water then leave to air dry. **Do not immerse the motor, it will be ruined if you do.**

Paint the chassis with a coat of Steam Era Models Etch Black, or a 50/50 mix of black and grey. Paint the upper part of the model with Etch Grey. Apply a final coat of Passenger Car Red for models prior to 1960 or Wagon Yellow for later models. Keep the coats light to avoid loss of detail.

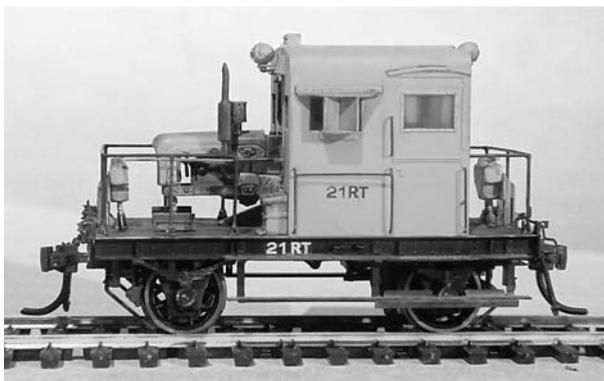
The engine should be mostly black as they were never clean, the exhaust manifold, pipe and muffler should be a rust colour. The wooden shunters steps should be a rusty brown with dirty silver on the aluminium anti-slip plates. The inside of the radiator cowl is black, and the bottom, thicker part of the sand distributors was rubber so can also be black. Paint the face of the headlight silver.

Apply the decals, locating the lettering as per the photos. If the body is red, then all lettering is white. In this case it will be necessary to cut and splice the numbers for the sides of the cabin. Following application of the decals apply a light coat of Testors Dullcoat.

Glaze the cabin windows with pieces of clear plastic film, secured with small drops of ACC. It will improve the appearance if the glazing is first very lightly sprayed with a wash of black on the inside face to help obscure the motor. The flywheel and wiring can also be carefully brush painted black. Lead weights can also be placed inside the cab, on top of the footplate and below the side windows.

Now fit the 'Black Bug' back in the chassis and secure with the M1.4 screw. Resolder the motor wires to the brush tags and brush paint the tags black. Fit the front wheelset and adjust all pickup positions. Place a small touch of 'moly grease' to the centre of the front axle at the compensation pivot.

Mate the top and bottom halves of the model and fit the couplers. It will be necessary to trim a small amount from the back of the coupler box at the rear end, so that it clears the 'Black Bug' gearbox. The M2 x 5mm screws provided are then used to hold the couplers and the two halves together. You may need to shorten the screws slightly, so that they don't bottom out against the footplate. **Do not** over-tighten these screws or you may pull a nut cage loose from the footplate.



## Parts List

1. Etched brass fret
2. Preformed cab sides/roof
3. Bag of brass investment castings, with the following sprues packed in the order below.

Sprue	Part No.	Description
1.	C1	L/H solebar
	C2	R/H solebar
2. x2	C3	L/H brake shoe and sand pipe support
	C4	R/H brake shoe and sand pipe support
	C5	Headlight
3.	C6	Rear sandbox and support
	C7	Front sandbox and support
4.	C8	Brake hose x 2
	C9	Sand distributor x 2
5.	C10	Engine support x 2
	C11	Horn cover
	C12	Fuel tank
6.	C13	Chain guard
	C14	Battery box
	C15	Engine cowl and radiator
7. x2	C16	Handrail bases
8.	C17	Uncoupling lever brackets
9.	C18	Engine block
	C19	Engine chassis
10.	C20	Engine axle beam
	C21	Engine exhaust
	C22	Engine air cleaner

4. Bag of components packed in the order listed.

Description	Quantity
23.8mm pinpoint axles	2
Brass top hat bearings	2
Fibreglass circuit boards	2
0.005" phosphor bronze	
M1.4 x 3mm screws	3
M1.4 Hexagon nut	1
M2 x 5mm screws	2
M2 Hexagon nuts	2

5. Wire

0.25mm straight brass wire  
0.30mm straight brass wire  
0.40mm straight brass wire  
0.50mm straight brass wire  
0.25mm wire wrap wire

6. Black Bug and 11.08mm 9spoke wheel-set packed in small cardboard box