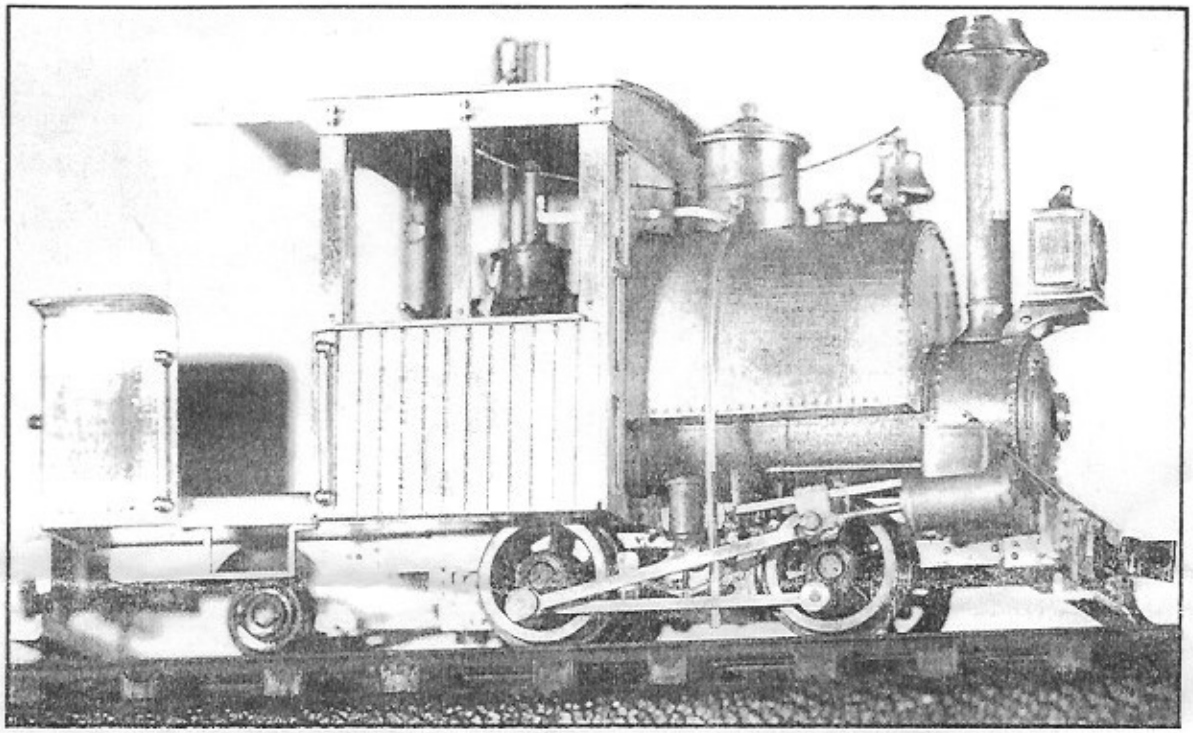
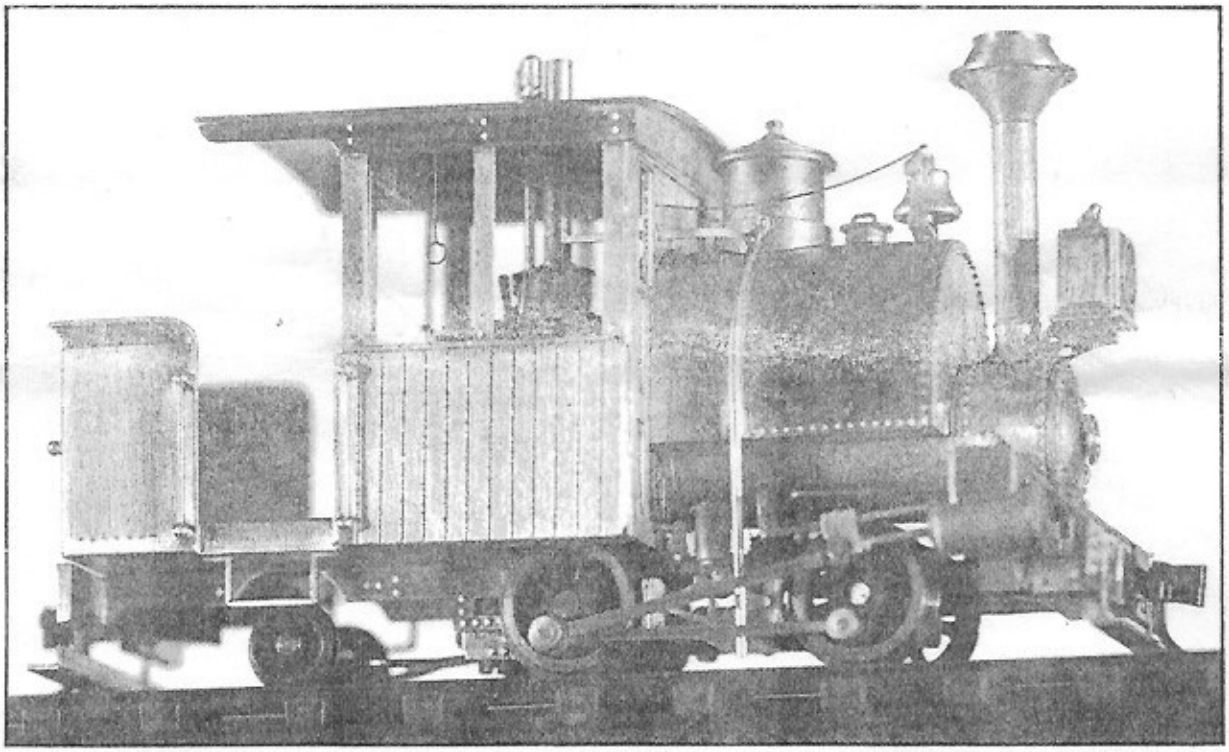


0-4-2ST
OPEN CAB



Sn3 PORTER 0-4-0ST AND 0-4-2ST PART NUMBER CHECKLIST

KEY: (NS) Nickel silver fret. (B) Brass fret. (WM) Whitemetal casting. (LWB) Lost Wax Brass casting.

CHASSIS COMPONENTS:

1) CHASSIS MAINFRAME (NS)
2) EQUALISING BEAMS (B)
3) INNER PILOT BEAMS (NS)
4) PICK-UP CROSSMEMBER (NS)
5) PILOT BEAM GUSSET (NS)
6) CYLINDER SADDLE (WM)
7) COUPLING RODS (NS)
8) CONNECTING RODS (NS)
9) SLIDEBARS (NS)
10) CROSSHEADS (LWB)
11) CYLINDERS (WM)
12) INTERMEDIATE PILOT BEAMS (B)
13) OUTER PILOT BEAMS (B)
14) PILOT FOOTBOARDS (B)
15) BRAKE CYLINDER PAD (NS)
16) BRAKE ASSEMBLY (LWB)
17) REVERSING ROD/CAM (B)
18) VALVE ROD CAMS (B)

CAB COMPONENTS. 0-4-2ST ALL WEATHER CAB

19) MAIN CAB ETCH (B)
20) CAB SIDE OVERLAYS (B)
21) CAB FRONT OVERLAY (B)
22) CAB REAR OVERLAY (B)
23) EAVE TRIM. SIDES (B)
24) EAVE TRIM. FRONT/REAR (B)
25) FLOOR INSERT (B)
26) WINDOW SILL (B)
27) CAB ROOF (B)
28) INNER WINDOW FRAMES (B)
29) DOOR PANELS (B)
30) DOOR OVERLAYS (B)
31) DOOR SLIDERS (B)
32) ROOF VENT (B)
33) CAB STEPS (B)

CAB COMPONENTS: 0-4-2ST OPEN CAB

19) MAIN CAB ETCH (B)
20) CAB SIDE OVERLAYS (B)
21) CAB FRONT OVERLAY (B)
22) CAB REAR (B)
23) CAB REAR OVERLAY (B)
24) EAVE TRIM. SIDES (B)
25) EAVE TRIM. FRONT/REAR (B)
26) FLOOR INSERT (B)
27) WINDOW SILLS (B)
28) CAB ROOF (B)
29) CAB STEPS (B)

CAB COMPONENTS: 0-4-0ST

19) MAIN CAB ETCH (B)
20) CAB SIDE OVERLAYS (B)
21) CAB FRONT OVERLAY (B)
22) CAB REAR OVERLAY (B)
23) EAVE TRIM. SIDES (B)
24) EAVE TRIM. FRONT/REAR (B)
25) FLOOR INSERT (B)
26) WINDOW SILLS (B)
27) CAB ROOF (B)
28) INNER WINDOW FRAMES (B)

CAB DETAIL COMPONENTS:

34) FIREBOX (B)
35) FIREBOX TOP (WM)
36) STEAM DOME (WM)
37) WHISTLE (LWB)
38) SIGHT FEED (LWB)
39) BRAKE VALVE (LWB)
40) THROTTLE LEVER (B)
41) THROTTLE BRACKET (B)
42) REVERSER (B)
43) REVERSER RATCHETS (B)
44) FIREHOLE DOOR (WM)

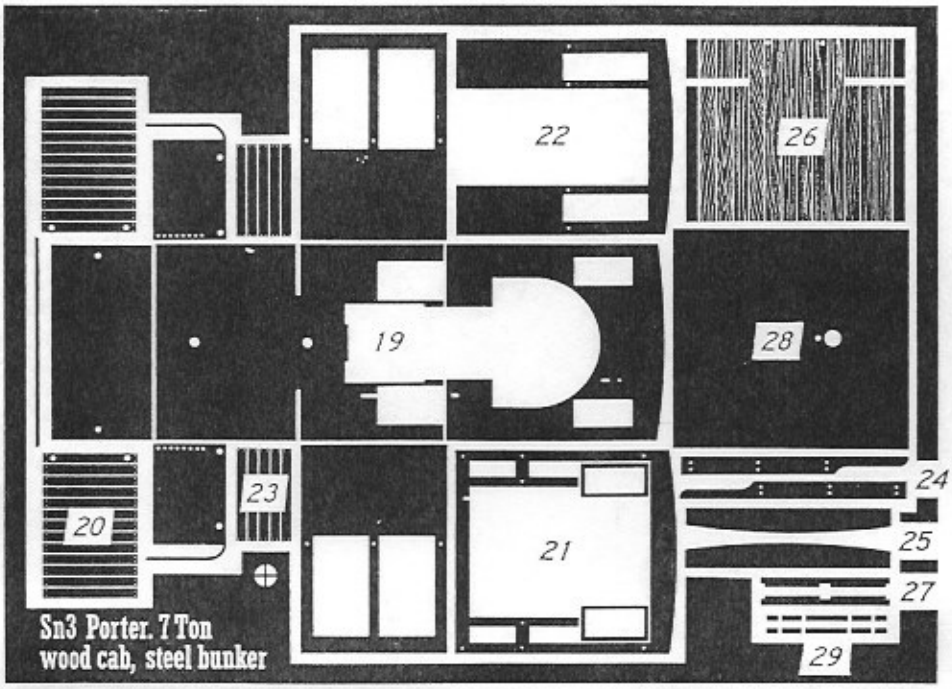
BODY COMPONENTS:

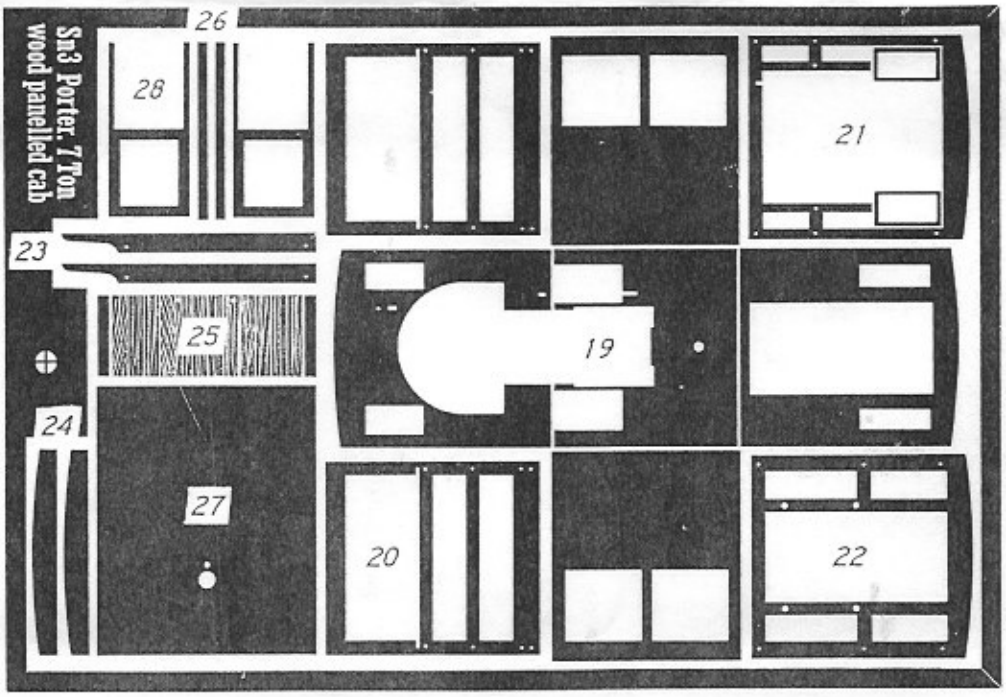
45) SADDLE TANK FORMER (B)
46) TANK FRONT OVERLAY (B)
47) TANK WRAPPER (B)
48) SAND DOME (WM)
49) FILLER HATCH (WM)
50) BELL (LWB)
51) BOILER/SMOKEBOX (WM)
52) FIREBOX FRONT PANEL (B)
53) SMOKEBOX DOOR (WM)
54) CHIMNEY STACK (WM)
55) HEADLIGHT BRACKET (B)
56) HEADLIGHT PLINTH (B)
57) HEADLIGHT (LWB)
58) SANDING LEVER (B)
59) SANDING CAM (B)
60) RUNNING BOARDS (B)

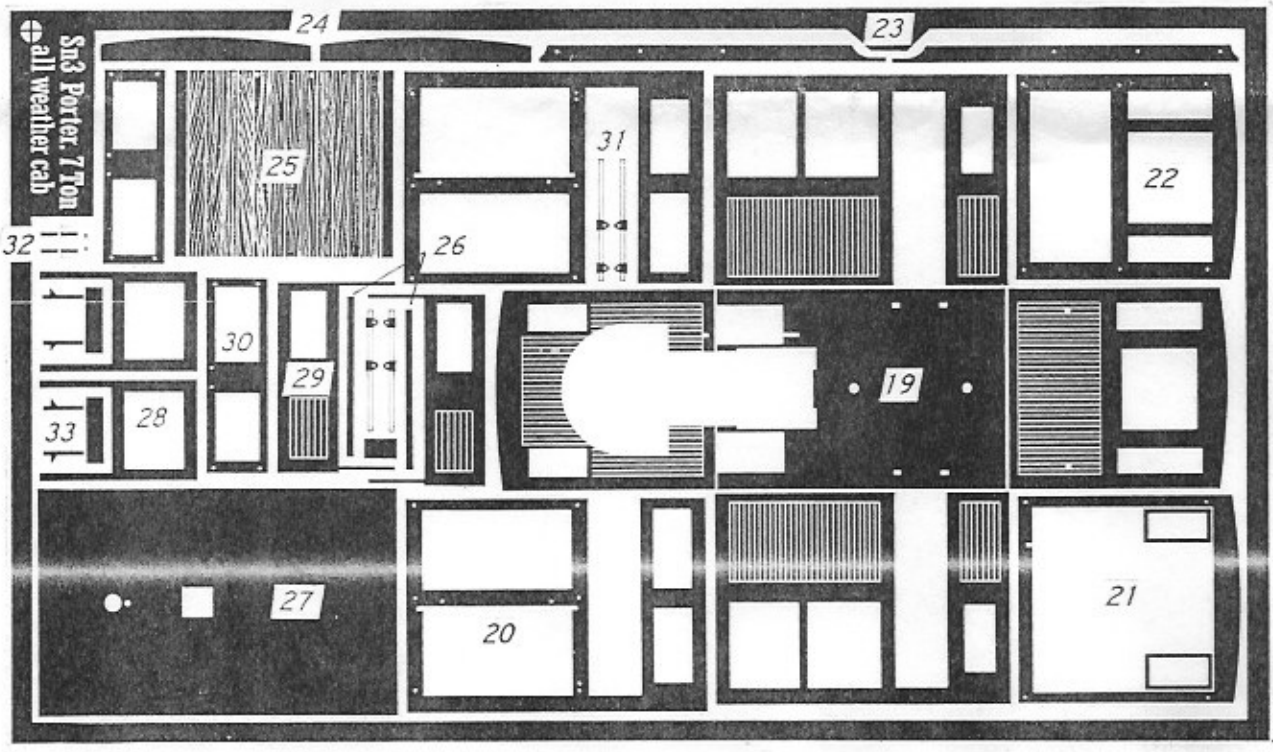
MISCELLANEOUS:

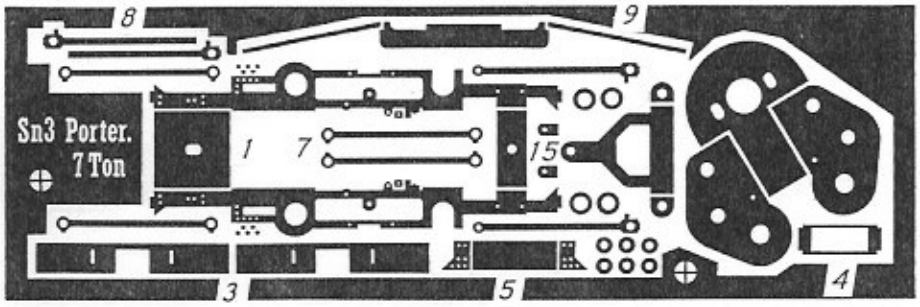
HANDRAIL KNOBS
WIRE 0.45mm
WIRE 0.7mm
BRASS ROD 1mm
12BA NUTS & SCREWS
STEEL RIVETS
2mm DIA. STEEL AXLE STOCK
DRIVING WHEELS
BOGIE WHEELS AND AXLE (if appropriate)
GEARS AND LAYSHAFTS
PICK-UP ASSEMBLY

CAB COMPONENTS.
(B) Brass fret.







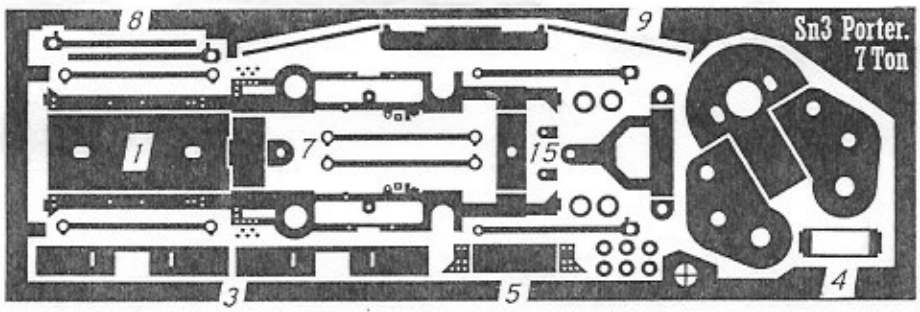


0-4-0ST

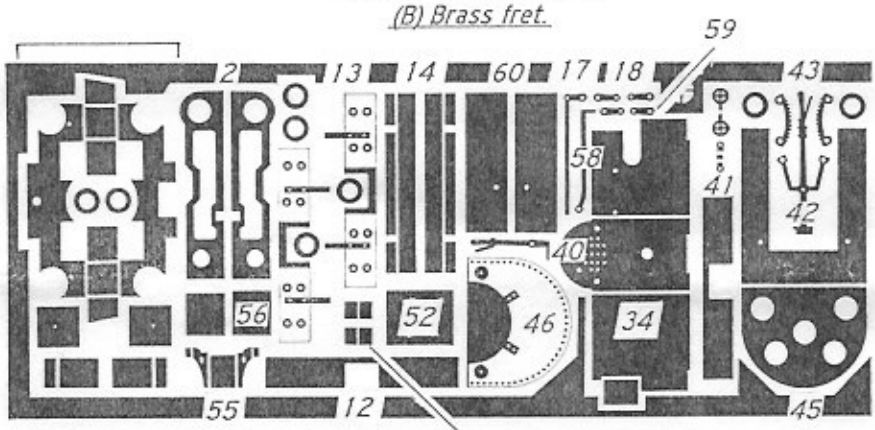
BOGIE FRAME
UNNECESSARY
ON 0-4-0ST
PORTER

CHASSIS COMPONENTS:
(NS) Nickel silver fret.

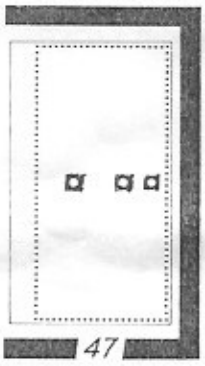
0-4-2ST



DETAIL COMPONENTS:
(B) Brass fret.



TANK WRAPPER
SUPPLIED PRE-FORMED



APART FROM THE
TWO WASHERS
THESE PARTS
ARE NOT
NECESSARY

THESE TWO COMPONENTS WERE
INCLUDED TO SECURE THE
CROSSHEADS ONTO THE SLIDEBARS
BUT PROVED UNNECESSARY

TOOLS REQUIRED

- CRAFT KNIFE
- SWISS FILES
- SMALL SCREWDRIVER
- PIN CHUCK AND SMALL DRILLS
- FLAT NOSE PLIERS
- TWEEZERS
- TAPER BROACHES, VARIOUS. (USED FOR REAMING ETCHED HOLES TO CORRECT SIZE)
- 12BA TAP
- SMALL SIDECUTTERS OR SNIPS
- FIBREGLASS ERASER (SCRATCH BRUSH)
- MINI DRILL AND ABRASIVE PAD
- CUTTING OR SLITTING DISC FOR DRILL
- EPOXY OR 'SUPERGLUE' ACC.
- 25W SOLDERING IRON (40W WILL DO FINE)
- VARIOUS SOLDERS 240°, 145° and 70°
- FLUX
- SMALL HAMMER
- SCRIBER

With perhaps the exception of soldering equipment, most of the above tools can be found in the average modeller's toolkit. It's fair to say that the bulk of this or any other metal kit can be assembled using a combination of proprietary adhesives, but there comes a time when recourse to soldering is inescapable. Still with me?

Soldering is the hurdle at which most would-be loco builders baulk. Don't ask me why. I'm one of those modellers who've long since forgotten what it was like to break into a cold sweat at the mere mention of the 'black art'. Soldering to me, like airbrushing, is one of those techniques best mastered after regular practice. Once you get the hang of it, it's hard to imagine doing things any other way.

For the uninitiated, I've taken the liberty of including a brief explanation of basic soldering which I include in my U.K. kits. Some of the brand names may be alien to U.S. modellers, but if you don't recognise any products or can't identify any U.S. branded equivalents, give me a ring and I'll see if I can organize shipment of the necessary utensils to anyone interested.

The photograph in this kit shows my pre-production 0-4-2ST which was completely solder assembled apart from locking the drive gear onto the rear axle with a drop of acc. You might want to keep the actual soldering to a minimumum, in which case only the barest essentials can be soldered - obviously the electrical connections - along with a few obvious structural joints where extra strength is perhaps desirable.

HINTS AND TIPS

- A fibreglass scratch brush makes short work of cleaning up over-zealous soldering and restores brass to untarnished condition.

- If soldering, keep flux away from steel wheel rims and axles - steel rusts at the sight of flux. It's beneficial to give steel components a light wipe of lubricating oil during construction to help prevent rusting. The scratch brush restores steel to its original condition.

- A cheap set of folding bars can be fabricated from two steel rules gripped in a vice or Workmate. Etched components can be folded by placing them between the rules, aligning the half-etched fold line with the rule edge, then folding the component over using pressure from a smooth block of steel or wood.

- Kadee N-scale couplers are a clip-fit into the etched cut-outs in the bufferbeams. Our scheduled compatible rolling stock to complement these Porter's will feature similar coupler pockets. If you want to fit larger couplers, some experimentation will be necessary.

INTRODUCTION

Designing and building these models was a lot of fun. I can honestly say that my approach to kit design is to make a model buildable - at least within the confines of the chosen prototype - and these Porters are amongst the simplest of prototypes. No complex Walschaert's or Baker's valve gear. No flycranks to worry about. Just plain old coupling and connecting rods. As such, these kits are perhaps an ideal introduction to locomotive construction. If you've steered clear of this aspect of your hobby, here's the perfect opportunity to prove it's possible for even a relative novice to get a result from their kit. If ever anything beat the hell out of paying mega bucks for a ready-to-run model, it's the satisfaction gained from building and showing your own handiwork.

To be honest, here in the U.K. we're slightly nonplussed at many U.S. modellers reluctance to construct their motive power, perhaps the substantial import market for brass loco's has led to a situation where no demand exists for kit-built models. This contrasts markedly with every other aspect of narrow gauge modelling where rolling stock and structures are handbuilt from kits or scratch down to the last nut/bolt/washer. I can understand a reluctance towards kitbuilding a K36 or similar, but there's nothing to fear from a project as simple and practical as these Porters. Anyone can assemble the body, and the chassis should prove to be within anyone's grasp if the simple instructions and techniques are adhered to. If I still haven't convinced you, I'll gladly part you from your hard earned cash if you'd prefer a factory assembled chassis or even a completed model.

The state-of-the-art components included in the Porter kits are designed to help such small prototypes operate reliably. As well as photo-etched and cast brass components, whitemetal parts are supplied to help increase the tractive weight of these relatively small locos. The 80:1 two-stage reduction gearbox and micro motor offers superb performance and excellent slow speed capability. Electrical pick-up - always a problem with as few as four wheels - is enhanced via a supremely simple equalised chassis giving three point suspension. It's half the battle if all four wheels stay put on the track, right?

The suspension is based upon a proven system which is incorporated into many state-of-the-art U.K. kits, so I can testify to its worthiness. My pre-production models of the Porters performed flawlessly with this practical - but oh so simple - system installed. You'll love it, believe me.

So confident am I of this kit's user-friendly virtues, that the bulk of the assembly procedure - particularly the body - can be depicted solely by exploded diagrams. Granted, you may encounter one or two fiddly aspects of chassis construction, but this is down to the small size of the prototype, and I shall fully cover any tricky areas of its construction with written instructions to supplement the drawings.

EQUALISED 'THREE POINT' SUSPENSION - AN OVERVIEW

A Godsend this - and so simple you wouldn't believe it.

In order for any loco to maintain good electrical pick up, it helps if all, or most, of the wheels maintain contact with the track. On a locomotive with only four drivers, such as these Porters, maintaining this aspect is mandatory.

Often, the simplest solution will give optimum results. Such is the case with your Porter kit. Mounting the rear driven axle in fixed bearings, and allowing the leading axle a limited degree of vertical travel, whilst supported at its centre via a fulcrum, creates a chassis that will always sit squarely on its four wheels. This simple amendment eliminates the possibility of building the chassis out-of-true and allows the loco to negotiate less than perfectly laid right of way. We've all seen four wheeled vehicles 'rock' if slightly out of whack, right? With this system, you kiss such unwelcome hassles goodbye.

In order to achieve a working equalised chassis, these Porters include an 'inner' chassis consisting of a pair of beams which duplicate the outer bar frames. These mount inboard of the main frames, being pivotted from the rear axle, only the merest gap being appreciable between the 'inner' beams and the bar frames. By passing the leading axle through the bearings in the front of each beam it is possible to impart a degree of vertical travel whilst still maintaining the exact distance between the leading and trailing drivers. The fulcrum on which the leading axle bears is a short length of brass rod extending rearwards from the cylinder saddle. This is fitted and adjusted until the chassis sits horizontally when viewed side on, and allows the chassis its unique flexibility. Only a mere fraction of the total amount of vertical travel available to the leading axle will ever be utilised in order for all four wheels to maintain contact with the track.

GEARBOX

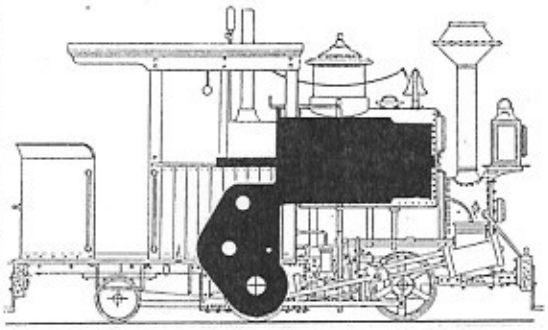
Assemble the gearbox as per the diagram. Note that the geartrain is offset in relation to the central position of the motor.

Begin by slightly enlarging each of the four etched holes in the sideframes with a taper broach to accept the 2mm diameter layshafts. These should be a snug fit as they are eventually secured with a tiny amount of acc. Similarly slightly enlarge the axle holes to accept the 2mm bearings supplied. Remove any burrs from the holes by rubbing the etch on fine abrasive paper.

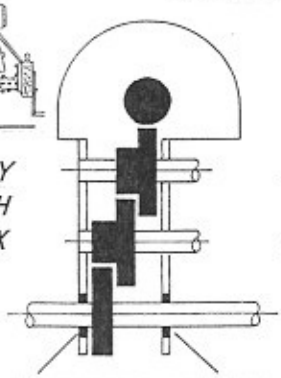
Fix the bearings into their holes (solder recommended), then file them flush on the inside and outside of the gearbox. This is where a small abrasive pad in a minidrill comes in handy, but a Swiss file will suffice. Check that the bearing holes freely accept the 2mm axle, and remove burrs if necessary.

Fold up the gearbox, noting the fold lines are to the inside.

When fitting the gears and shafts, test for free running at each stage of assembly. Do not move on to the next stage until you are satisfied everything runs freely. Ensure your work area is free from filings and other debris



GEARBOX ASSEMBLY DIAGRAM
80:1 REDUCTION RATIO
ATTACH MOTOR WITH 'FLATS' TOP AND BOTTOM



WORM

20T/10T GEAR FREELY ROTATING ON FIXED 2mm SHAFT

20T/10T GEAR FREELY ROTATING ON FIXED 2mm SHAFT

20T GEAR FIXED TO AXLE RUNNING IN BEARINGS

LAYSHAFTS SHOULD IDEALLY BE FILED FLUSH WITH OUTSIDE OF GEARBOX

FILE BEARINGS FLUSH WITH INSIDE AND OUTSIDE OF GEARBOX SIDES

and that the gearbox components are spotlessly clean. The gears are installed loosely onto their shafts which are carefully acc'd into their holes in the gearbox sideframes. Only the final 20 tooth drive gear is an interference fit onto the axle. The two 2mm layshafts can be cut to exact length or left to protrude on one side of the gearbox. Note that the layshafts should be flush on one side of the gearbox in order to fit within the confines of the firebox.

Trim off the trailing motor shaft after first taping over the brush apertures to prevent stray filings entering the motor internals. A cut-off disc in a mini drill is perfect for this job as the hardened steel motor shaft is otherwise difficult to remove. The shaft should be removed totally flush with the motor bearing. The cut-off disc will grind it until it is so.

Remove the tape from the motor and put a tiny drop of lubricating oil on each bearing. Install the motor using the screws provided, then carefully add the push-fit worm, positioning it centrally over the first stage gear. Adjust the gear mesh, then tighten the motor screws fully.

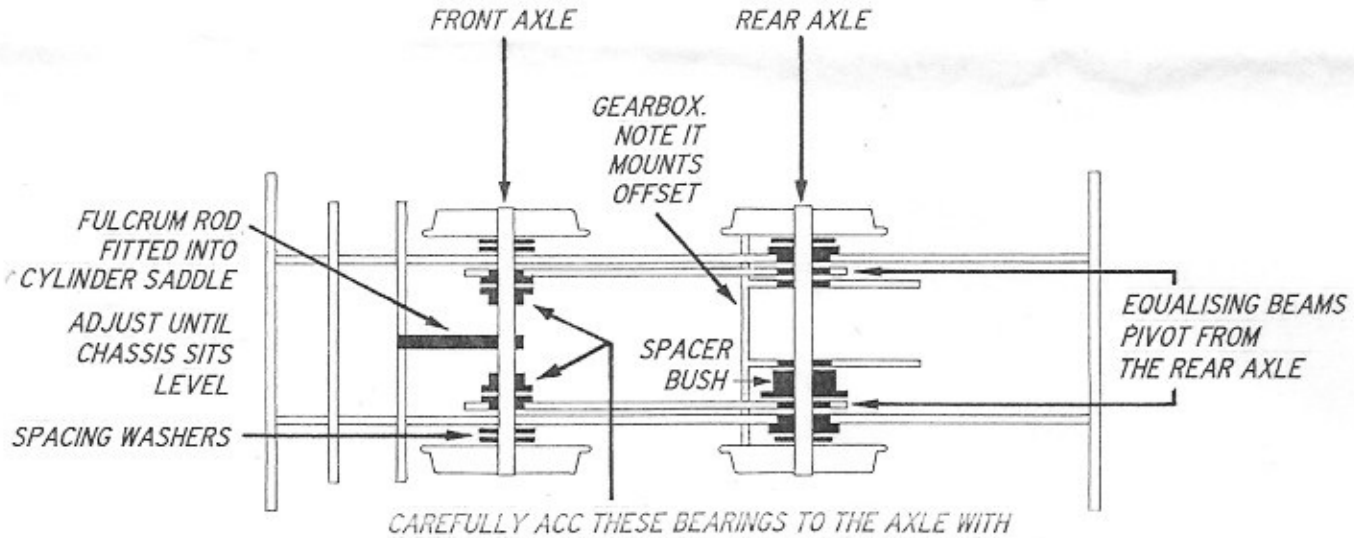
Both motor tags should be to the right side of the locomotive, so adjust one to suit. Ensure the tags are bent closely to the brush housing as room inside the saddle tank is at a premium and we don't want them shorting out by contacting any metal.

LUBRICATION

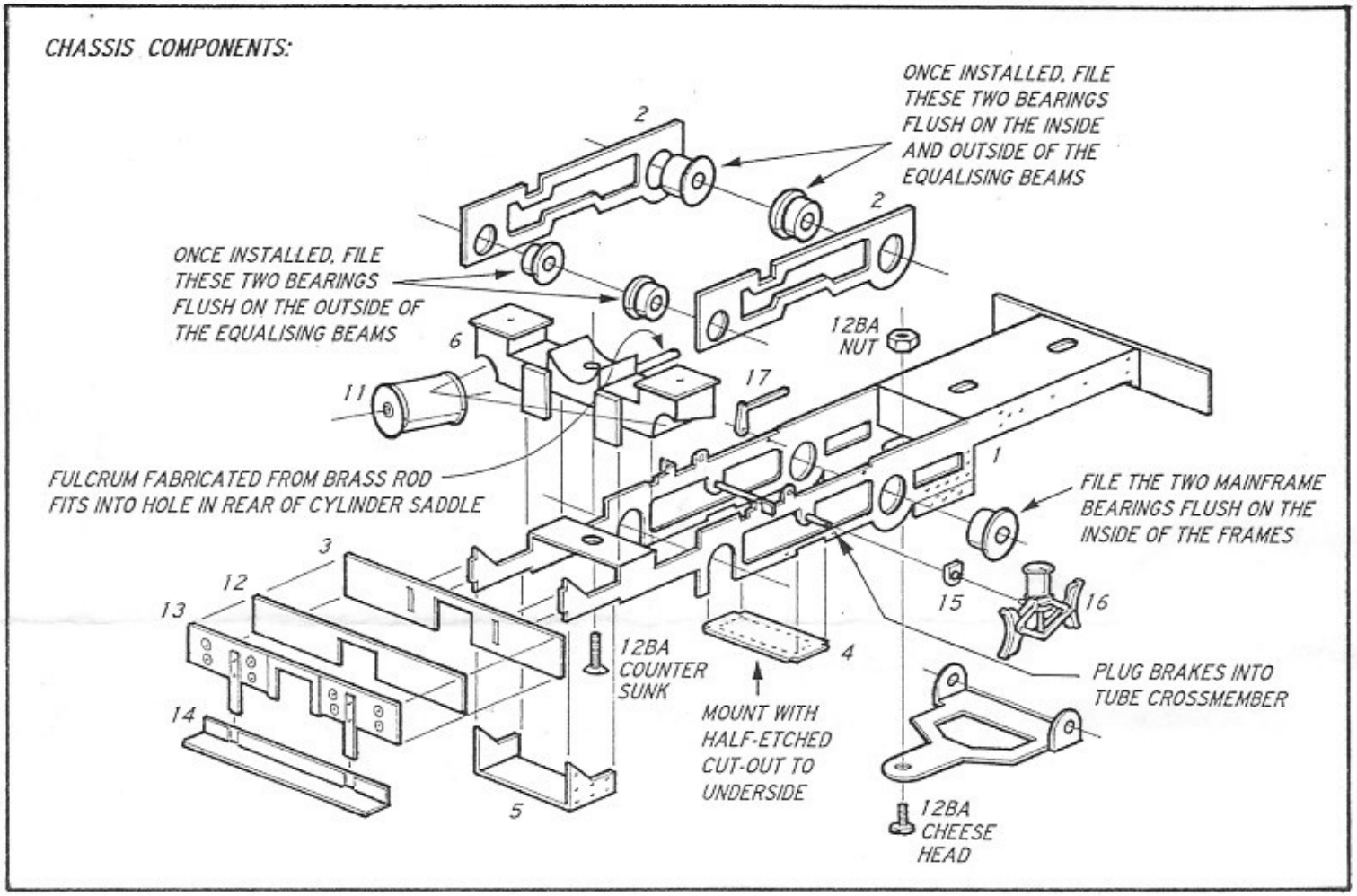
These gearboxes are precision components. For best results and minimum noise levels use a Teflon-based grease such as Tri-Flow or Pronature. Also suitable are Labelle 102 Gear Lubricant or 106 Grease.

PORTER 0-4-0 CHASSIS
PLAN VIEW FROM BELOW

THIS VIEW INDICATES HOW AND WHETHER THE BEARINGS ARE FILED FLUSH AFTER THEY HAVE BEEN INSTALLED



CAREFULLY ACC THESE BEARINGS TO THE AXLE WITH A TINY SPOT OF ACC SO THEY HOLD THE EQUALISING BEAMS PARALLEL TO THE MAIN FRAMES WITH ONLY A SMALL AMOUNT OF PLAY BETWEEN THE BEAMS AND FRAMES



CHASSIS CONSTRUCTION

Emboss all rivet detail before commencing construction.

Fit the two 2mm axle bearings into the rear holes in the sideframes (1), filing them flush on the inside of the chassis. Similarly add the two smaller 2mm bearings into the front holes and the larger 2mm bearings into the rear holes of the equalising beams (2). The rear bearings file flush on both the inside and outside of the beams, while the front ones file flush on the outside only.

Fold the chassis sideframes squarely to 90°, and tab the front and rear pilot beams (3) and the pick-up mounting crossmember (4) to their slotted locations. The half-etched rebate in the crossmember faces downwards. If you are building an 0-4-2ST, fold down the bogie mounting tag and add a 12BA captive nut above the screw fixing hole.

HINT: Captive nuts are best attached by passing a screw up through the hole in question, then adding the nut. Tighten up fully. Flow a small amount of flux around the base of the nut where it contacts the component, being careful not to get any on the protruding screw thread. Apply a clean hot iron to the joint, feeding in a small amount of solder. Soon as the solder flows, remove the iron. Once the solder cools, it is possible to remove the screw, leaving the captive nut securely attached.

Add the strengthening gusset (5) below the front of the chassis, butting it against the rear of the pilot beam.

Check that the axles pass uninterrupted through all the bearings. Relieve any bearings that are tight with the merest twist of a taper reamer.

A word regarding quartering of the drivers may now be beneficial, as this is another area that gives many a would-be loco builder cause for unnecessary concern. Just remember, it can't get any easier than an 0-4-0 mechanism, and as these Porters have only four drivers - that means only one wheel has to be accurately adjusted. That's right, ***ONLY ONE WHEEL.*** *Simply add both left wheels to their axles. Slide the rear axle through its bearings in the frames, adding the gearbox onto the axle together with the necessary spacing washers. Refer to the diagram for this. Slide the front axle through its bearings, adding the spacing washers together with the inside bearings. Add the right side leading driving wheel, ensuring the crank pin is approximately 90° corresponding to that of its opposite left side driver - it doesn't have to be exactly 90°, close enough will do just fine. Temporarily add the left side coupling rod, securing it loosely with nuts. Now, fit the right rear driver to its axle,* ***ADJUSTING ONLY THIS ONE,*** *until it is possible to fit the right side coupling rod over the crankpins. Don't forget to accurately check the wheel back-to-back distances with the correct gauge.*

The inside bearings on the front axle locate just inboard of the equalising beams and ensure the beams remain parallel to the main frames. I recommend sliding a piece of paper between the equalising beams and mainframes which provides sufficient clearance, then the bearings can be slid against the inside of the beams and secured to the axle with the tiniest drop of acc. When the bearings are secure, remove the paper shim which will allow the equalising beams to function.

Drill out the holes for the fulcrum rod and fixing screw in the cylinder saddle (6). Add the fulcrum rod, made from the brass stock provided, ensuring it does not protrude far enough into the casting so that it will impede passage of the fixing screw. 70° low melt solder is recommended for attaching the fulcrum rod to the cylinder saddle. Test fit the cylinder saddle to the chassis.

If there's anything remotely approaching a critical factor in the construction of the chassis, it's adjusting the fulcrum rod until the chassis sits square and true. Once attached, do not attempt to adjust the fulcrum rod without first gripping it with pliers close to the point where it locates into the cylinder saddle, otherwise you may fracture the saddle. Grip the rod securely in the pliers then bend the protruding rod accordingly.

I suggest temporarily installing the 12BA countersunk screw to locate the saddle, using a 12BA nut to tighten the assembly down while you check how much to adjust the fulcrum in order to get the chassis sitting level. Once you are satisfied, trim the fulcrum rod so it extends only 1mm behind the leading axle.

With the coupling rods temporarily installed, it should now be possible to check that the chassis is free from any minor binds. A little light lubrication of the axle bearings will be beneficial. A cautionary word here; during free-running tests, beware that the loosely fitted crankpin nuts do not tighten themselves during rotation causing the rods on one side to bind. When you are satisfied, remove the coupling rods.

Assemble the coupling (7) and connecting rods (8) from the nickel silver laminations supplied, filing them top and bottom to minimise any joint lines. Ensure the holes are able to pass freely over the crankpins. If not, relieve them

slightly with a drill or broach. Check that the leading holes in the connecting rods accept the tails of the steel rivets which pivot them to the crossheads.

Add the coupling rods to the crankpins. Note that for the time being, only the front crankpin retainers should be fitted as the connecting rods and spacing washers have not yet been installed onto the rear crankpins. ***IMPORTANT NOTE.*** Reduce the thickness of the leading crankpin retaining nuts to an absolute minimum in order to avoid them contacting the rear of the crossheads during driving wheel rotation. I suggest solder or acc to secure the retaining nuts, after which they can be dressed with a file to minimal thickness.

Prepare the slidebar etch (9) by filing away the 'cusp' on the finely etched bars until the crossheads are a good sliding fit along their length. The bars themselves are supplied over-length and must be snipped so they are 13mm long. After folding the bars at 90° to their bracket, reinforce the tiny bends with a neat solder fillet. Put the slidebars aside until later.

The crossheads (10) attach to the connecting rods using tiny steel rivets. The rivets are first soldered into the crossheads, then the rods are added onto the protruding rivet tails. The rivets can then be tapped closed with a small hammer until their tails have splayed sufficiently to secure the rods in place. See the diagram for how best to perform this task. ***IMPORTANT NOTE.*** The splayed tail of the rivet should be dressed so that only minimal material retains the connecting rods. This is necessary to allow sufficient clearance between the rear of the crossheads and the leading crankpin retainer during rotation of the driving wheels.

Test fit the piston rods through the cylinders (11). Push the pistons fully home so the crossheads butt against the body of the cylinders. Use a scriber to indicate where you should drill a shallow hole in the rear face of the cylinders to accept the ends of the slidebars. Your scribe mark should be centred between the slidebar channels of the crossheads. Using the scribed marks as a guide, drill a shallow hole 1mm deep in the rear of each cylinder.

Fit the cylinders to their saddle, ensuring the shallow slidebar holes are at top dead centre. Test fit the slidebars. They locate astride the chassis top, butting against the tiny folded-out brackets, with the bars themselves loosely plugged into the locating holes drilled in the rear of the cylinders. Ensure you install them at the correct angle – i.e. same as the cylinders. Check that the crossheads are an uninterrupted sliding fit along the length of the slidebars when the piston rods are fed through the cylinders. When you are satisfied, install the slidebars permanently.

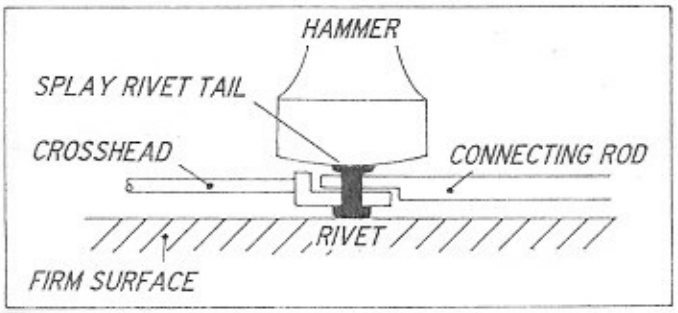
You can now permanently install the crossheads onto the slidebars, popping the trailing ends of the connecting rods over the rear crankpins along with the necessary spacing washers. I installed two washers per crankpin – one thick, one thin, – which are supplied on the nickel silver fret. These fit between the coupling and connecting rods, ensuring the rods are parallel. Once installed, add the rear crankpin retaining nuts. You might want to reduce their thickness with a file for a better appearance.

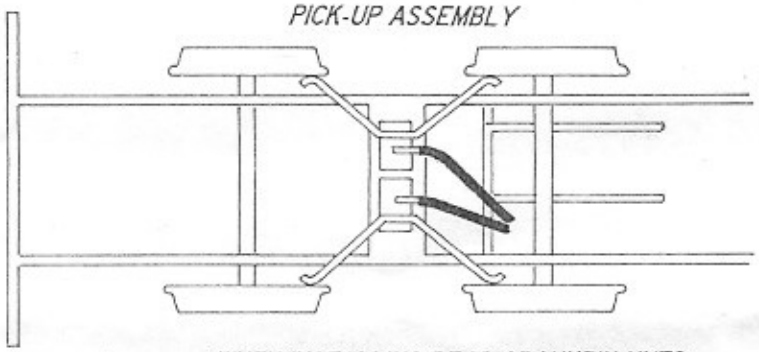
Note that the over-length piston rods on the crossheads should be snipped so they protrude 2mm through the cylinder fronts when the slidebars are at the furthest point forwards of their travel. Dress the ends of the pistons neatly to remove any burrs. This will be sufficient to hold the crossheads on the slidebars without any means of retaining device which would rob the model of valuable clearance – a commodity which is in short supply between the rear of the crossheads and the leading crankpin retainers. It should now be possible to hook the motor up to a power supply and give the chassis a test run in order to check your handiwork. Light lubrication of all bearing surfaces will be beneficial.

FITTING THE PICK-UPS

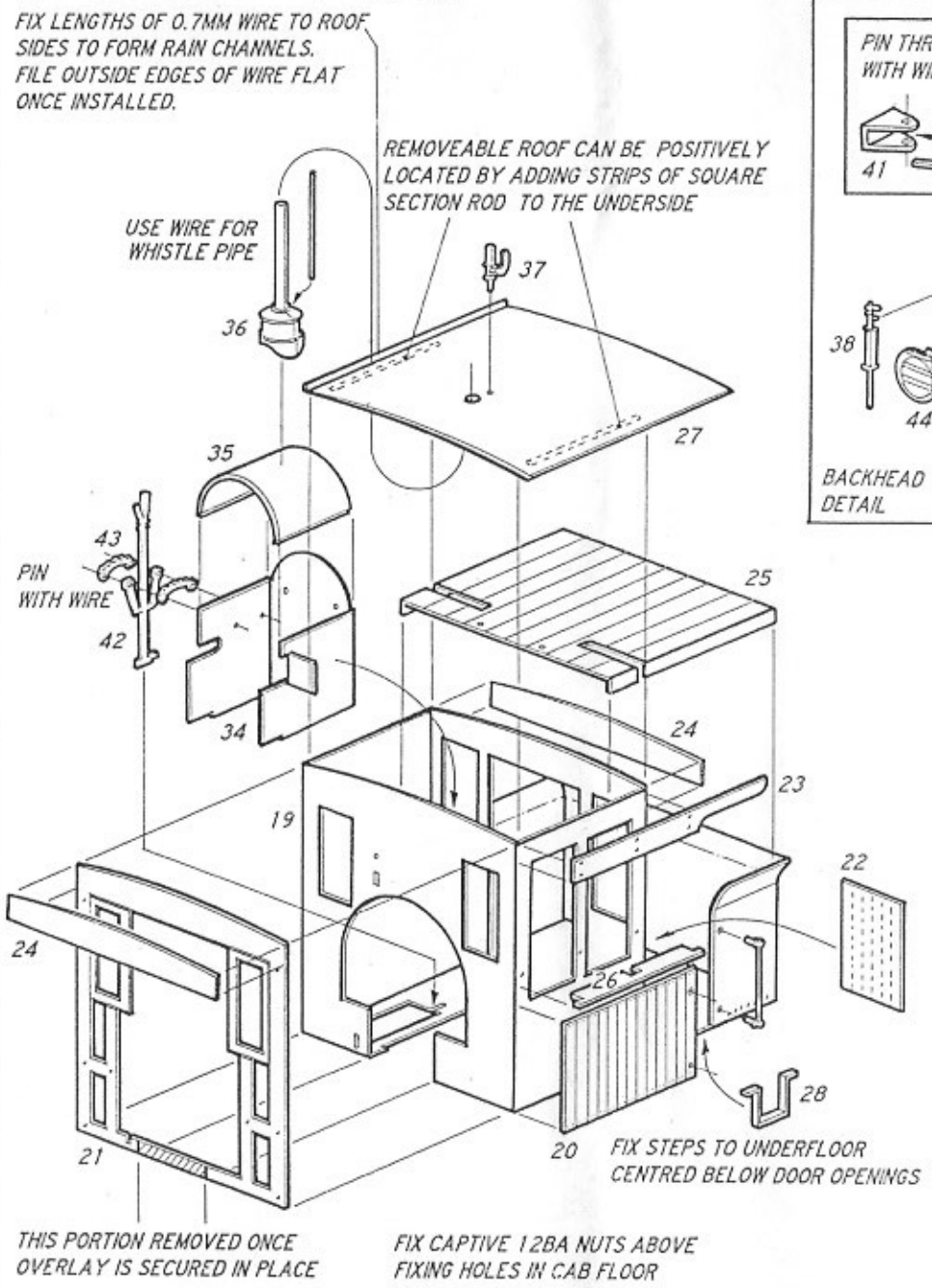
Pick-up wipers have been fabricated from phosphor-bronze wire and are provided mounted to a copper-clad paxolin insulated strip. The paxolin strip locates into the half etched rebate beneath the pick-up crossmember on the chassis and is secured using acc. The diagram explains the set-up clearly. It is necessary to route the feed wires, which are supplied over-length, up through the firebox and through the slot, then to the motor tags where they can be soldered in place. Note that this wire is uniquely robust yet highly flexible. It will prove almost impossible to strip back the insulation conventionally without harming the conductor core. I recommend applying the tip of a soldering iron to the wire in order to melt the insulation away leaving a small section of exposed conductor which is easily soldered. Once the completed pick-up assembly has been acc'd to the chassis crossmember, adjust the wipers so only the necessary amount of pressure on the wheel rims is achieved. Patience and attention will pay dividends throughout this process.

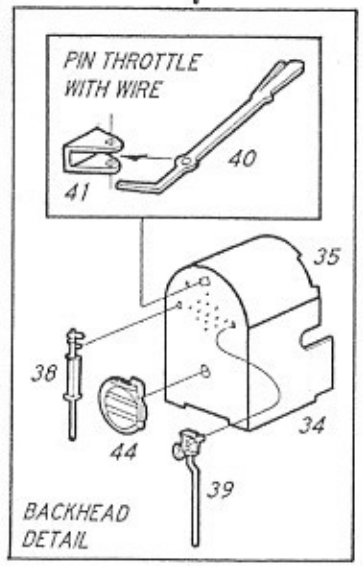
When you are satisfied with the running qualities of your model, add the remaining chassis details as per the exploded diagram.



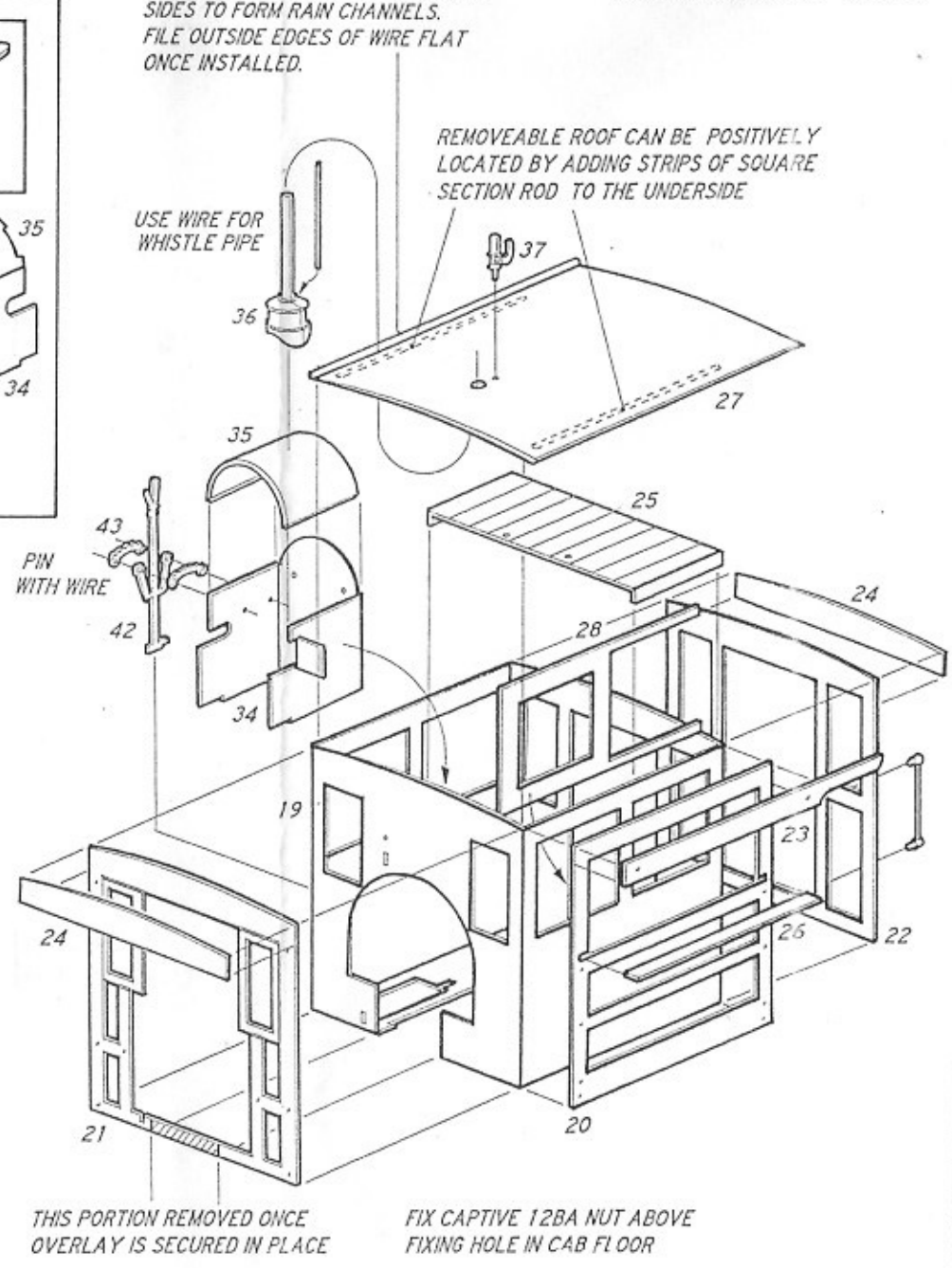


CAB COMPONENTS: 0-4-2ST OPEN CAB





CAB COMPONENTS: 0-4-0ST

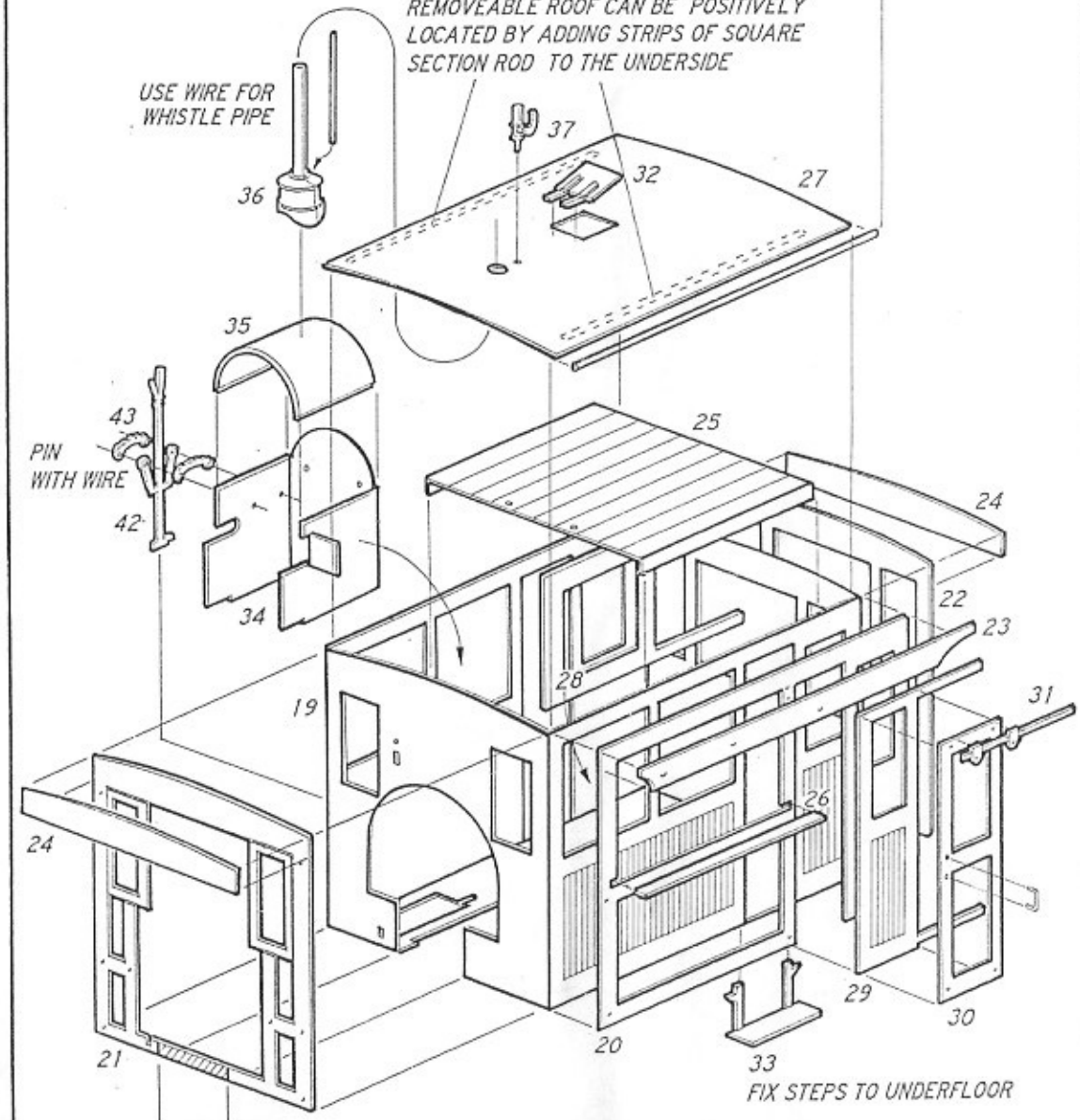


CAB COMPONENTS. 0-4-2ST ALL WEATHER CAB

FIX LENGTHS OF 0.7MM WIRE TO ROOF SIDES TO FORM RAIN CHANNELS. FILE OUTSIDE EDGES OF WIRE FLAT ONCE INSTALLED.

REMOVEABLE ROOF CAN BE POSITIVELY LOCATED BY ADDING STRIPS OF SQUARE SECTION ROD TO THE UNDERSIDE

USE WIRE FOR WHISTLE PIPE



FIX STEPS TO UNDERFLOOR

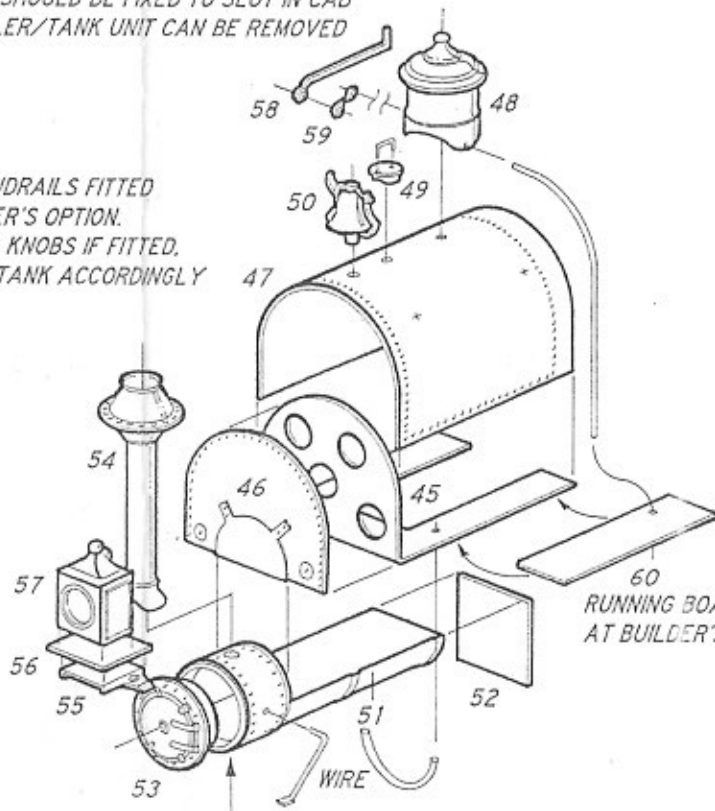
THIS PORTION REMOVED ONCE OVERLAY IS SECURED IN PLACE

FIX CAPTIVE 12BA NUTS ABOVE FIXING HOLES IN CAB FLOOR

BODY COMPONENTS:

FABRICATE SANDING LEVER AND CAM. PINNING THE ASSEMBLY WITH WIRE. LEVER SHOULD BE FIXED TO SLOT IN CAB SO BOILER/TANK UNIT CAN BE REMOVED

TANK HANDRAILS FITTED AT BUILDER'S OPTION. USE LONG KNOBS IF FITTED, DRILLING TANK ACCORDINGLY



RUNNING BOARDS FITTED AT BUILDER'S OPTION

DRILL OUT FIXING HOLE IN BOTTOM OF SMOKEBOX AND TAP 12BA TO ACCEPT FIXING SCREW

Rivetting

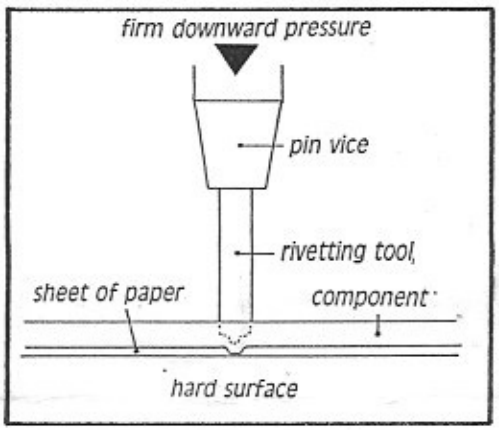
Tiny half etched holes are provided in certain components of the model. This is usually where it has not proved possible to half etch away the surface of the material in order to leave rivets or beading standing proud. Wherever this is the case, you will find that a half etched hole for the rivet appears on the INSIDE or UNDERNEATH of the component. Cabsides or bufferbeams are likely candidates for rivets, and they are substantially stronger if they are left full thickness and rivetted from the rear. This is preferable to a flimsy half etched cab or bufferbeam which may easily distort if not handled carefully.

The half etched holes are merely guides for the rivetting tool, (described shortly), and being half the thickness of the surrounding metal, allow the rivets to be embossed clearly. There are purpose built rivetting tools from the likes of US company North West Shortline, but unless you've around £30-£40 burning a hole in your pocket then I suggest you follow my example and substitute a perfectly acceptable alternative method of rivet forming. My rivetting tool is nothing more high-tech than a compass point from my old technical drawing set. However, the secret in my case, is that once the hardened steel point was removed from its compass, I discovered that the opposite end had a 'shouldered' point (see sketch).

This allowed its use as a perfect rivetting tool without the risk of over-embossing, or even piercing, the metal being rivetted. Furthermore, the shoulder minimised the tendency of the metal to 'curl' whilst being rivetted. This is fairly common where a female 'anvil' is not used in conjunction with a male form tool, as is the case with professional rivetting tools. Don't worry if the metal distorts and curls slightly - gentle manipulation is all that's needed to straighten or flatten the rivetted component(s).

Some modellers use nothing more sophisticated than a sharpened scriber or even a blunt needle for rivetting, but I suggest it's worth scouring the local graphic arts shop for a cheap replacement compass point similar to that described for best results.

Rivets are actually embossed using firm downward pressure with the component supported on a sheet of paper on a hard surface. A kitchen worktop offcut is ideal, but definitely not your best antique dining table top! A pin vice is ideal as a holder for the compass point rivetting tool, and practice will determine the downward pressure required for optimum rivet impressions. Under no circumstances be tempted to tap the tool with a hammer or similar or you risk breaking the hardened point. You have been warned by the voice of experience!

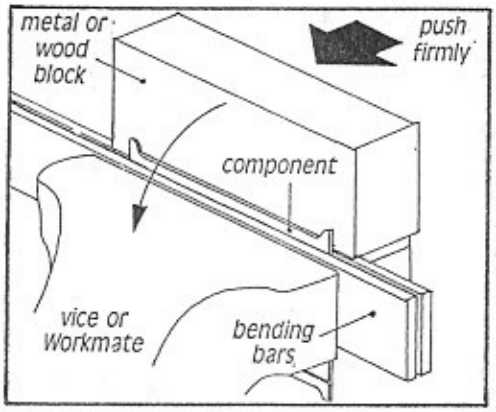


Folding

Where it is necessary to fold etched components, a half etched line will invariably be incorporated to determine the precise location of the fold. Unless specifically noted, the half etched line will always be on the inside of the fold. Only in very rare circumstances will my kits feature a half etched component that has to be critically marked then scored on the reverse before folding. Rest assured that this kit does not have this undesirable feature.

The use of half etched fold lines enables the metal to be weakened in the correct place for folds and bends to be formed. Experience will eventually determine whether it is easy enough to fold the part with fingers, pliers or tweezers, or whether recourse to bending bars is adviseable.

The golden rule for forming folds on long narrow parts such as this, is to pre-score the half etched line a few times with a craft knife. Press firmly whilst scoring until a distinct impression of the line can be seen on the outer face of the component between the running plate and valance itself. This scoring further weakens the metal, enabling a neater, sharper fold to be imparted. You might also want to remove any burrs from the scoring process by dressing the fold line with a few strokes from the edge of a triangular Swiss file. Now, using the home made bending bars, position the work between the bars (two steel rules in my case) so that the fold aligns with the top edge. The bars can then be gripped firmly in a vice or Workmate, ensuring all is aligned correctly. If necessary, adjust the set up until the etched fold line is located precisely. This is a one-shot operation, so get it right first time. With the work firmly secured in the bars, use a smooth block of metal or wood to push over the job to (in this case) 90°. Apply pressure firmly in one smooth movement to ensure a crisp fold,. Easy or what?



One potential hazard about folding is worth highlighting. Whilst brass or nickel silver are fairly forgiving metals, it is not usually possible to fold, unfold, and re-fold components without the risk of snapping the parts cleanly along the fold line. Folding is best carried out in one positive step, and if necessary, the fold itself can be further strengthened by the application of a neat solder fillet applied from behind. In general, folding is a straightforward operation, and as long as the above guidelines are adhered to, no problems will be encountered.

Annealing

Remember metalwork at school? This is one of the basic techniques taught to me that has proved worthwhile in modelling. I must admit that I have found it pretty much unnecessary ever to make another forged iron poker, or, for that matter, to wield an oxy-acetyline brazing torch in anger, but annealing - now that came in handy!

Annealing, you may remember, is the process by which heating metal softens it sufficiently so that it is easily formed.

We're not talking serious heat here, understand. Only enough to make the metal form easier.

Our electric cooker may be naff for cooking, being nowhere near as controllable as gas, but it's metal hot-plate hob is tailor made for annealing etched kit components. 10 minutes on maximum is all that's needed to prepare the parts for forming. Forget specific colours or exact temperatures the metal should reach - it's pretty safe to assume that exact science is not necessary here - 10 minutes and it's done. Gas users might want to support the components on a scrap piece of steel or similar to help the heat diffuse evenly into the etched components rather than risk deforming or even melting them in an open flame.

Once cooled, the parts are ready to be formed. Roofs are easy. You will need a few old newspapers stacked on top of one another, and the domestic rolling pin, or similar. On a firm surface such as the kitchen worktop, place the component on top of the stacked newspapers. With firm downward pressure, roll the rolling pin over the roof so that the curvature of the pin imparts the appropriate curve into the part. You will note that the roof is evenly curved, although it will invariably be curved too much. This is the good bit. Place the roof upside down on the kitchen worktop and press the assembled cab of the model firmly but carefully onto the roof, gently rocking the roof following the line of curvature. The annealing process will have softened the roof so that the 'spring' is gone from the metal and it is able to remain at the same curvature as the cab front and rear profiles. Easy or what?

Soldering

My intention with these instructions is to encourage in the modeller a positive attitude towards the 'hands on' approach to the simple tasks involved. This is more true with soldering than any other modelling technique, where 'hands on' experience is virtually obligatory to demonstrate that soldering is not difficult.

Let me say from the outset that the fear of soldering is one of the most irrational 'phobias' amongst modellers. The 'I could never do that' brigade have elevated soldering unjustly to a super-skill, limited to the preserve of super-modellers. Absolute bollocks! The only difference between those who can solder, and those who can't, is usually that the people who can, have at least tried without pre-judging it as impossible to master. How do you think the modellers who are proficient solderers achieved this status? Was it a gift from the Gods? A 'black art' secretly passed on amongst the chosen few? Nothing so fanciful mate. Truth is, all they did was to remember a few basic principles, and practise the techniques until they were competent at the basics of soldering. After that, they picked up the finer points of soldering as they went along, gaining further experience with each kit.

There's a world of difference between finding something difficult to master but sticking with it, compared to condemning something outright before ever attempting to learn. Remember your first driving lesson? Did that make you give up wanting to drive? No chance, I'll bet. Well why write off soldering as something you could never achieve? It's a damn sight easier than learning to drive ever was!

It is not my intention to give a blow-by-blow account of soldering in this kit. Especially since there are specific publications devoted to the entire subject. For example, 'The Art of Soldering' from soldering iron manufactureres Brewsters Ltd. who advertise in Railway Modeller; and a recent treatise by Iain Rice serialised in Modelling Railways Illustrated magazine (Vol 2, Nos 1-7) earlier this year. Both go into the subject in far more detail than I intend. To be frank, why bother duplicating these excellent sources of information. No, the intention of this kit is to concentrate on the basic soldering principles applicable to the job in hand. I do not intend to frighten off would be solderers with reams of prose, so I will highlight only enough to get you soldering successfully - certainly well enough to do this kit justice.

The only requirement is that you are receptive enough to want to seriously learn the basics, and that you at least try the simple techniques before writing yourself off as a terminal non-solderer. Practise is the secret, and with the basic soldering equipment listed in the 'Toolkit' section at your disposal, I see no reason why you can't be soldering successfully in about an hour's time.

These basic instructions definitely fall into the 'It worked for me' category, and may differ slightly from other preferred methods. Basically, you stick with what you know, and I've yet to hear any complaints about my soldering technique. That said, to my knowledge, good soldering depends upon three golden rules which apply to whoever is doing the teaching. Obey these three simple rules and you really can't go wrong.

RULE One. Always ensure the tip of the soldering iron bit is clean and pre-tinned with solder.

RULE TWO. Always ensure that the iron is hot enough to do the job.

RULE THREE. Always ensure the workpiece is clean and fluxed.

If you've tried soldering and found it wouldn't work for you, one or more of these golden rules were clearly broken. To a non-solderer, it's at this point that self-doubt would have set in, and the whole process would seem to be a waste of time. I remember my laughable first attempts. It's funny now, looking back to the night when I was chasing small balls of resin cored solder around one of my first kits with my soldering iron, rapidly loosing patience with the whole shooting match because it just didn't seem to want to melt and stay put on the joint I was pathetically trying to perform.

Looking back now, I guess I must have broken all three golden rules that first time. I had simply plugged in my brand new iron, waited for it to heat up, then applied it to the joint whilst feeding in a length of resin cored electrical solder. Oh the solder melted OK, but it simply wouldn't flow into the joint like I expected. After ten minutes of chasing the solder bead, my iron's tip was by now blackened, although at the time I figured it was still easily hot enough to perform such a simple joint. But try as I might, it was a waste of time. Back to the superglue and epoxy says I, disheartened.

If this scenario sounds familiar, that's probably because it's a very common experience amongst those modellers who have actually tried teaching themselves how to solder. Spectacularly unsuccessful - that sums up this sort of attempt in a nutshell. For me at least, it was a while before I had another go, only this time I was armed with a few basic principles passed on by friends and picked up in magazine articles.

I'd learned that it was imperative to pre-tin the tip of any soldering iron with solder. Shaking or wiping off excess solder would ensure that the full heating capabilities of the iron were likely to come into contact with the workpiece. Even the slightest blackening of the tip would considerably reduce the iron's potential to sufficiently and thoroughly heat the metal around the area being joined. RULES ONE AND TWO, remember.

Most importantly, I'd also deduced that before solder would successfully flow onto the workpiece, said area must be cleaned and fluxed to break down deposits on the metal's surface preventing the molten solder from adhering to the area being joined. RULE THREE, remember.

Amazingly, it worked this time! Granted, I was a little heavy handed with the solder, but I'd joined two pieces of metal without resorting to glue. After honing my skills on fret off-cuts, I'd just about sussed the best way to ensure that only enough solder to do the job was applied to the joint. Christ! So this was all there was to it!

And the surprising thing is, that's all there really was to it for me. In no time I'd discovered just how simple soldering actually was to learn. Oh sure, this was only basic stuff - harder exercises like soldering a second joint without the first one pinging apart took a bit more practise. But it's surprising how you soon get the hang of the 'tricks of the trade' once the first big hurdle is overcome. Remember, it's performing that first joint that locks you into soldering for ever. It's ten years ago now, and I wouldn't consider using any other method of assembling etched kits other than soldering. That doesn't mean superglues and epoxies don't have a use - after all I still use these to attach certain fittings, particularly whitemetal castings if they are not in a vulnerable location and likely to be knocked off the model. I solder other whitemetal fittings using low-melt 70° solder, but that's something to master once you get to grips with the easy stuff I'm telling you about here.

As regards this kit, there is nothing more complicated than everyday butt joints, or tab and slot joints to contemplate. Very low-tech stuff really, once you get the hang of soldering. And surprisingly, there are even easier ways for the beginner to master soldering. The use of Carrs 188° SOLDER PAINT makes it virtually infallible for anyone not to get a result from this kit. Used on its own or alongside ordinarly electrical resin cored solder, for which you will need Carrs GREEN LABEL FLUX, soldering this kit together becomes a practical proposition within anyone's capabilities.

Whereas resin cored electrical solder and flux are perfectly acceptable as a means of assembling any etched kits, Solder Paint is definitely more user friendly to the novice. I've already done my best to turn people on to this product, as it is virtually impossible not to be able to solder with it. I've sold many kits to 009 customers now who have reported taking me up on my recommendations for this product with a very high success rate. The product's title says it all. It's nothing more than a paint-like mixture of ground up solder suspended in flux. It's advantages are that it is applied cold to the area being joined, and in exactly the right quantity for the task in hand. The application of a hot, clean iron to the joint will immediately cause the solder paint to flow, rapidly penetrating the joint. As soon as the solder has melted into the joint, the iron can be removed and the joint supported for a few more seconds until it has cooled sufficiently for the solder to harden. Easy or what?

Solder Paint's advantages - as well as being virtually idiot proof - are that because it is easy to apply only enough to each joint, cleaning up afterwards is minimal. Most of the flux is burned off during application of the iron, and the finely ground solder particles flow extremely easily into a thin film only microns thick. Clean up usually consists of no more than a brisk rubbing over with a self-propelling fibre-glass burnishing pen. Apart from a tendency for spent fibre glass bristles to find their way into your finger tips with painful results, these brushes do a remarkable job of restoring the metal's original surface so that neat solder assembly is within the grasp of even novice solderers. Something which customers are frequently delighted with I've found when I get the chance to find out how their soldering techniques are coming along.

Solder paint is perfectly adequate for most jobs found in kit-building, but I personally use cored electrical solder and Carrs Green Label Flux for my building these days, for no better reason than I get the solder from my local store. Lazy or what? It's horses for courses, right? I have a tendency for one bad habit

which involves bringing the solder to the job on the tip of the iron. Not the way to do it, according to some books, but 'it works for me'. In most cases I simply pre-tin the iron's tip with ample cored solder, then smartly shake off the excess solder - just as if I was cracking a whip. The resulting tiny solder beads scattered on the worktop are perfect for picking up on the tip of the iron for application to joints where only minimal solder is required after the area has been fluxed in order to encourage the solder beads to flow. A tip worth mentioning I feel.

One final absolute must concerning soldering. Most fluxes - including solder paint - are a highly corrosive mixture of diluted phosphoric acid, usually 10% in water. Scrupulous cleaning of the job after each soldering session is necessary to neutralize the effects of the phosphoric acid solution. A scrub in hot water with household cleaner such as Jif, followed by a good rinse with clean water will do the job. Don't forget, it's the cleaning properties of the flux which allows the solder to flow exactly where the flux is applied. Bearing this in mind, use only the correct amount of flux when performing the joints you require, unless you relish the thought of cleaning up stray solder stains unnecessarily.

Now, get to those soldering irons and start practising on fret off-cuts. In no time you'll be soldering bits of the kit together and wondering what all the fuss was about!

SOME PERTINENT SOLDERING NOTES - THE DO's AND DONT's.

Always use a clean, hot iron to ensure the iron is operating efficiently.

Always clean the workpiece to promote solder flow and adhesion.

Apply only the right amount of solder and flux to do the job. This is something you learn with experience, and can only be determined when you become more proficient. Be prepared for some 'cleaning up' of excess solder and flux. Even experts have to do this occasionally. A selection of miniature screwdrivers make good solder scrapers, as do broken Swiss files.

Regularly wipe the iron's bit on a dampened sponge to remove burnt flux deposits and excess solder after each operation. This ensures that the iron's tip stays hot and clean. If the iron's tip becomes blackened no amount of wiping will clean it. You'll have to resort to a few file strokes back to clean metal before re-tinning the tip. A blackened tip will prove nigh on impossible to solder with, due to its refusal to accept solder or to transfer heat into the job efficiently.

Use a suitable soldering iron stand to park the iron during soldering sessions. This prevents the iron from over-heating by conducting some of the heat into the stand itself. Apart from anything else, it's safer too.

Clean up all traces of flux from the model once you have finished each soldering session. A thorough wash in Jif, followed by a clean rinse will do nicely. Old paint brushes make perfect clean-up tools and enable you to get into the awkward nooks and crannies.

Be aware that you are using a very hot tool and some potentially dangerous chemical solutions. Treat the whole process with the respect it deserves.

If at any time your soldering is not working according to my basic instructions, remember the three golden rules. One or more of the rules being broken will render the process unsatisfactory. Good soldering only depends upon these three simple rules being observed. And if you think that's beyond your capabilities, then it's time to consider stamp collecting or some other undemanding pastime!

HAPPY SOLDERING!