Brassmasters Scale Models

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GREAT WESTERN RAILWAY
ABERDARE 2-6-0
LOCOMOTIVE KIT

Designed by Martin Finney

4MM SCALE
OO - EM - P4

INSTRUCTIONS
AND PROTOTYPE NOTES

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SECTION 1: BRIEF HISTORICAL DETAILS

Introduced in 1900, it was a Dean design with very obvious Churchward influences, they were a development of the "Krugers".

The first locomotive 2600 (originally 33) differed from the rest of the class in its arrangement far the pony truck compensation beams and so cannot be easily modelled using the kit.

The next 40 locomotives (2621 - 2660) were built new with the smaller standard number 2 boiler. They had however all been re-boilered with the standard number 4 boiler by 1910.

The remaining locomotives (2661 - 2680 and 2601 - 2620) were built new (between 1902 and 1907) with the standard number 4 boiler.

So from approximately 1908 to the end of their lives (the last was withdrawn in 1949) the class had a basically standard appearance with the number 4 boiler, except of course for 2600.

The kit represents a locomotive in this "standard" appearance.

There are however many detail differences both between individual locomotives and as the class changed through time.

For an accurate model it is important that photographs are used. The variations apparent from studying photographs are:-

Various chimneys were used. The chimney provided represents a type unique to the class.

The cab portholes above the firebox were blanked over in the late 1920s.

Riveting on both the front and back smokebox rings.

Different, smaller, sandboxes.

Frame patches.

Short safety valve bonnets from the late 1920s. This appears on only a small proportion of the class.

Top feed from 1911 onwards.

Different buffers.

A.T.C. equipment fitted to all the class between June 1930 and October 1931.

Some of these variations are possible with the kit as supplied others will require alternative components.

Tenders

When built the locomotives were fitted with standard Dean 3000 gallon tenders.

From 1929 onwards a large proportion of the class were fitted 4000 gallon tenders of Great Central design made redundant by the scrapping of R.O.D. 2-8-0s. These tenders were fitted with vacuum brake and had no water scoops fitted.

There are many sources of photographs including:

Great Western Engines by J.H.Russell - OPC
The Locomotives of the Great Western Railway - part 7 - R.C.T.S.
Locomotives Illustrated number 45 - lan Allan

Another excellent source is www.rail-online.co.uk

SECTION 2: CHASSIS KIT DETAILS

Before construction starts you have to decide which particular chassis you are going to construct. The options are:

1. Gauge 00, EM or 18.83
2. Suspension rigid, sprung or compensated
3. Pickups scraper, plunger or using loco for one side and the tender for the other
4. Inside motion whether with or without

No pickup material is provided. The options are:

- Scrapers attached to the middle frame spacer using printed circuit board.
- Plunger. Open out holes P and fit according to the manufacturer's instructions.
- Using the loco as one side and the tender as the other. This means the plastic wheels will need shorting out either by using conductive paint or shorting wires down the back of a spoke. The draw bar between loco and tender can be used to carry the current.

The working inside motion can only be fitted to the EM & 18.83 versions of the chassis,

It is not possible to use plunger pickups if you wish to fit the inside motion because they will foul each other.

SECTION 3: FRAMES

Having decided which chassis to construct you can now start construction by preparing the frames (parts 1 & 2).

For a rigid chassis, then simply open out the main axle holes to accept the top hat bushes and solder them in place.

If you are going to fit sprung horn blocks, you should remove all of the axle boxes by cutting up the half-etched lines, leaving a standard 6mm wide slot. Then follow the instructions that come with the hornblocks.

For the compensated chassis **without inside motion**, remove only the leading and centre axle boxes on each frame and solder two 1/8" top hat bearings from the outside into the trailing boxes,

For the compensated chassis **with inside motion** proceed as follows:

Remove all the axle boxes.

Carefully widen the slot in the rear hornblocks (part 11) until the flexichas bearings are a good fit. I find a significant variation in the bearings and once I have fitted a hornblock to a bearing I mark the bearing and hornblock so that they can be later assembled together. A good fit between hornblock and bearing is essential if the chassis is to run well.

Solder the hornblocks to the inside of the frames aligning them with the bottom of the frames and using the etched marks on both frames and hornblock to get them central in the axlebox slots, You will appreciate that the bearings are wider than the slots and will consequently need reducing in width until they are a nice sliding fit, This gives bearings that do not rotate in their hornblocks.

Now open up the following holes in the frames:

P only if plunger pickups are being used
B for brake hanger pivots
R for reversing lever cross shaft
C for reversing cylinder mounting pin
A for compensation beam pivot

The last job on the frames is to emboss the rivets marked by half-etched holes

(a) on the ashpan sides
(b) above the reversing lever cross shaft bracket
(c) adjacent to the slot to accommodate part 10.

This can by using either a special rivet embossing tool or by placing the frame on a sheet of lead and carefully embossing the rivet with a blunt scriber.

SECTION 4: FRAME SPACERS AND ASSEMBLING THE CHASSIS

Remove the spacers to suit, your chosen gauge, and fold them up carefully, making sure that the etch fold line is on the inside always and that each, bend is a right angle.

Make sure that the small tab on the front spacer (part 8) is bent at right angles to the spacer and that the small holes clear the spring-wire provided for the pony truck side control. Solder one of the 10 B.A. screws in the hole between the two small holes so that the slot in its head is in line with the two small holes. This ensures that the spring-wire, when inserted, will pass through one hole in the spacer, down the slot in the screw, and out of the other hole, low solder the spring wire-to the small tab.

The large slot in the front spacer must now be enlarged sufficiently to allow one of the 10.B.A. screws to pass completely through. This screw will be used to attach the body to the chassis.

If you are fitting **inside motion** to a **compensated** chassis them modify the centre frame spacer (part 7) as follows:-

Open up the two holes to clear the 1/16" brass rod, Remove the pieces indicated on the diagram (fig. 1).

Check that all tabs on the spacers fit properly in their corresponding chassis slots so that the rest of the spacer is hard up against the inside of the frames.

How assemble the frames and spacers. Don't fit part 9 at this stage, Start by tack soldering the rear spacer to both sides, low check that everything is square and that the spacers are hard against the frames. Put an axle (or better a longer piece of 1/8" rod) through the rear bearings and place the chassis on a piece of graph paper to check that the axle is square to the frames. If all is well solder the remaining spacers to the frames. It is important to check constantly that the chassis is square and that the frames are straight,

If you are **not fitting inside motion**, part 9 can now be fitted between the frames in the slots above the front spacer.

SECTION 5: COUPLING RODS

The coupling rods should now be made up so that we can use them as a jig for fitting the sub-hornblocks (parts 12 & 13), accurately into place.

First drill out all the crankpin holes to a convenient size which is well undersize for the crankpins. Remove all burrs caused by the drilling. Now drill the same drill into a suitable small block of wood and leave the drill in the wood with its shank projecting. This projecting shank is used as a mandrill to accurately align the two laminations of each rod.

Now tin well the front face of all the inner laminates and the back face of all the outer laminates.

For the left side leading rod, carefully thread the rear boss on the inner laminate (part 50) over the mandrill followed by the rear boss on the outer laminate (part 48). Now using plenty of flux solder the two laminates together. You should now have a rod with the bosses on each laminate perfectly aligned.

Repeat with the other pairs of laminates.

The rods have been deliberately etched too large so that the thin etched edges can be carefully filed so that the 'laminated' effect is lost and the rods appear to be made from one piece of metal.

The crankpin holes now need carefully opening out until they just fit, with no free play, the ends of the hornblock alignment jigs (available from London Road Models or Markits).

SECTION 6: FITTING THE FLEXICHAS HORIBLOCKS

Those building a rigid chassis or using sprung hornblocks should ignore this section.

First prepare the hornblocks (parts 12 & 13) and the Flexichas bearings as described in Section 3.

Now reduce the width of the front face of each bearing so that they are an easy fit in the 6mm, slot in the chassis frames.

When all four bearings and hornblocks are prepared, slide them over the hornblock alignment jigs with the spring between the bearings. Carefully compress the spring and clip each pair between the frames into the appropriate cut-out in the leading and centre axle box positions – the spring automatically pushes the hornblock hard up against the inside of the frame. Fit the final jig through the rear bearings, and place the prepared coupling rods over the ends of the jig, **ensuring the leading rod overlaps the trailing rod** on the centre axle.

Your axle centres are now perfectly matched to your coupling rod centres - the basis of perfect running.

Make sure the hornblocks are square to the chassis and that their bottom aligns with the lower edge of the chassis frames.

When everything is aligned correctly carefully solder the hornblocks to the chassis.

Now remove the jigs.

If you are **not fitting inside motion** the bearings should now be retained in their hornblocks. For the centre bearings use (part 32) soldered to the chassis beneath the hornblocks. For the front use short pieces of 0.45mm wire.

Now use a 1/8" reamer to lightly ream through the bearings and then check the axles for a satisfactory fit.

Solder 0.45mm through frame holes B to form the brake hanger pivots.

Remove the sections of wire between the frames.

SECTION 7: CHANGING THE PORTESCAP GEARBOX

Disassembly of the existing gearbox.

Remove the two screws which hold the motor to the gearbox and put the motor to on side. Using a 1.7mm drill countersink the ends of the three brass spacers ensuring that no swarf contacts the gears, Using firm pressure prise the gear box side plates apart. Note the order of the three gear sets and lift them off their axles, then drift the axles out of the side plates.

Preparing the new side plates (part 31).

Using the diagram (fig.2) identify the different holes arid open out as follows:

Spacer centres : 1.5mm (drill size #53)

Gear axle centres : 1.5mm (drill size #53)

Final drive centre: 4mm

On one side plate, open motor mounting holes to clear the motor mounting screws. On the other side plate carefully open holes enough to enable the steel screws to self-tap a thread.

Using a piece of fine emery paper remove all burrs from the side plates, then solder the 1/8" bearings (removed from the old side plates) into the final drive holes ensuring that the side plates present two mirror images.

Reassembly

Place the 3 brass spacers into their corresponding holes in one of the new side plates. Insert the three axles into their respective holes. The axles **should be a tight fit**. If not, use a small drop of Superglue to locate one end of the axle only, then fit the second side plate temporarily in place to align the axles while the Superglue dries. Place the gear sets back onto their axles and fit the second side plate. Lightly centre punch the spacers to retain them. Attach the motor to the gearbox using the old steel screws.

SECTION 8: COMPENSATION BEAM (S) & PIVOT(S)

The compensation design as you have probably already appreciated is different depending on whether inside motion is fitted or not. The reason for this is that the conventional arrangement used in most models of 6-coupled engines has the rear axle fixed and a beam between the frames and between the leading and centre axles.

This arrangement is fine when no inside motion is required and is the arrangement used in the kit.

This arrangement will not work when inside motion is modelled as the beam occupies the very space required!

So with inside motion the single beam is replaced by two beams, one on each side, between the inside and outside frames where they are not visible. This gives two points of the three point suspension so the third point is the beam on which the rear driven axle pivots.

(i) **For a chassis with no inside motion**

Prepare a piece of 1/16" bore brass tube so that it fits between the frames, Clean up the ends so that it revolves freely on the 1/16" brass rod and cut a piece of rod so that it fits through the holes A and is flush with the outside face of the chassis frames, Solder two compensation beams (part 14) together and open up the hole to accept the brass tube. Solder the two beams centrally onto the brass tube.

Now temporarily fit beam between the frames.

Fit all the wheels and axles temporarily so that the beam is resting on top of the leading arid centre axles and check if the chassis is sitting level.

Adjust the height of the front of the chassis by gently filing from the bottom faces of the beam if it is too high and by soldering on pieces of part 71 to the bottom faces of the beam if it is too low.

(ii) **For a chassis with inside motion**

Solder a piece of the 1/16" brass rod through holes A. The ends of the rod should align with the outside faces of the spacers 5, 7 & 8. Check this with a rule and then remove the section of rod which is between the frames, low prepare two pieces of 1/16" bore brass tube so that they are slightly shorter than the projecting brass rods, Open up the hole to accept the brass tube in each of two compensation beams (part 14) and solder the beams to the pieces of tube close to one end of the tube.

The third beam is a piece of 1/16" wire (use the piece removed earlier) through the two holes in spacer 7 and projecting to the rear. The rear of the engine is supported on this beam resting on the front spacer of the new Portescap gearbox. Cut the wire so that it does not foul the gears in the gearbox.

Fit all the wheels and axles temporarily so that the front beams are resting on top of the leading and centre axles and the rear beam is resting on the gearbox spacer. Confirm that the compensation works properly and check if the chassis is sitting level.

Adjust the height of the front of the chassis by gently filing from the bottom faces of the front beams if it is too high and by soldering on pieces of part 71 to the bottom faces of the front beams if it is too low.

Adjust the height of the rear of the chassis by carefully bending the rear beam.

SECTION 9: PONY TRUCK

Choose the appropriate parts (16 & 18 for 00) or (15 & 17 for EM/18.83).

Open up the axle holes to accept the 2mm top hat bearings and the mounting hole to accept the 10 B.A, top hat bearing.

The folding of the pony truck is quite complex as some of the folds are 90 degrees with the fold line on the inside and some 180 degrees with the fold line on the outside, However by reference to the diagram (fig. 3) and the isometric drawing, success should be possible.

Forming the frame

First fold piece A, on both sides, through 180 degrees with the fold line (a) on the **outside**.

Next fold the pieces B, on both sides, through 90 degrees with the fold lines (d) on the **inside**. Now fold the guard irons, E, through 180 degrees with the fold line (c) on the **outside**.

Now fold through 90 degrees along fold lines (b) on both sides with the fold lines on the **inside**.

Lastly the half-etched struts D are formed. First, bend through approximately 75 degrees the end of the strut marked by two very small nicks in the side then bend up the strut so that it meets the front of piece C is under the end of the folded guard iron. Check all the folds for squareness, then solder all the pieces together and solder the top hat bearings in place.

Drill out all the small holes to accept 0.45mm wire, including the front hole in piece C which has the strut D attached underneath, Solder short pieces of 0.45mm, wire through these holes to represent the bolts and nuts that hold the frame together,

The rear of the frame is folded along (e) and (f) with the lines on the **inside** so that the mounting hole is level with the top of the front frame.

Forming the top

Emboss the rivets on piece A and open up the spring control wire hole on piece B to be an easy fit on the wire.

The first fold is (a) folding centre plate C through 90 degrees with the fold line on the **inside**.

Now fold front A and back B along fold lines (b) through 90 degrees with the fold line **inside**, and then solder centre plate C to back B.

The stays D are first folded over through 180 degrees along (c) with the fold line **outside** and then through approximately 45 degrees along (d) with the fold lines **inside**.

Solder the piece of the stay between the two folds to the back B and finally fold the ends of the stays through approximately 60 degrees along (e) with the fold line **inside**.

The top and frame are now soldered together with the back of the top aligned with the rear of frame top and struts on the top are soldered on top of the rear frame.

To finish, solder a 4mm length of 1/8" bore brass tube to the top of the centre plate to represent the coil spring housing, form the guard irons and mount the wheels in place on the axle.

SECTION 10: INSIDE MOTION

Making the crank axle

First drill holes (so that 0.45mm wire is a force fit) in the brass eccentrics so that their centre lines are at 120° to each other.

Open out the holes in the eccentric sheaths (part 57) to be a good fit on the brass eccentrics.

Clean up the steel cranks and open out the axle holes so that the axles are a force fit. Mount a crank and an eccentric pair on the axle and drill the crank through the small hole in the eccentric. The crank and eccentrics can now be pinned together with a short piece of wire. Repeat for the other crank and eccentric pair.

The cranks and eccentrics together with the eccentric sheaths are now force fitted on the axle with the cranks set apart by a distance which corresponds to the cylinder holes in part 64 and with the right side crank leading by 90°, It may help the spacing of the cranks to make a spacer to fit between the eccentric pairs.

When you are satisfied with the setting of all the components carefully **silver solder** the cranks and eccentrics to the axle. The eccentric sheaths **must of course remain free**.

Now remove the axle between the crank webs. A carborundum disc in a mini drill works well.

File back the flexichas bearings for the centre axle until the axle will fit with a small amount of side play.

Cylinders

Parts 63, 64, 65 and 66 have a half-etched line running down two edges, File back to the half-etched line if you are modelling in EM gauge.

Check the fit of the slide bars (part 66) in the holes in part 64. File the edges of the slide bars to get a good fit. Bend the slide bars at right angles and fit to the cylinder block front (part 64) so that the valve rod holes align and the slide bars with the 3 half-etched dimples are upwards. Fit 10mm lengths of 1/16" outside diameter brass tube for the cylinders so that they are perpendicular to the cylinder front and protrude by 1½ mm.

Detail the cylinder fronts by attaching cylinder cavers (part 70) and piston rod glands (part 69) using 0.45mm wire to represent the studs.

Fix the mounting bracket (part 63) so that the tab fits in. the slot in part 66 and the cylinders will be inclined at 1 in 6. Use the drawing as a guide.

Tap the small hole in the mounting bracket 10 BA and attach it to part 9 with a screw. Check fit of assembly between frames. When satisfied, solder spacer 9 in position.

Crossheads and connecting rods

Lay a crosshead face (part 67) face down on a piece of balsa wood or similar and push the spike of a slide shoe (part 68) through the slots provided, have the half-etched surface of the spike facing toward the centre of the crosshead. Insert the other slide arid check they are parallel and the correct distance apart using the slide bar as a gauge. You should aim for a nice close fit with minimal slop. When satisfied, flow solder well into the slots so that they cannot be seen after the spikes have been snapped off and the joint cleaned up. Repeat for the other crosshead face.

Cut the steel piston rod wire in half. Solder a 2mm length of the cylinder tube to the end of each piece of wire. Insert the piston rod into the cylinder and push it half way in, slide on the crosshead and insert the piece of tubing on the rod between the small projections at the front of the crosshead. Carefully solder the rod to the crosshead and check the assembly for free but not sloppy movement.

File the U-shaped bearings in the connecting rods (part 56) until they are a free fit on the cranks. Form the joggle in the rods with the fold lines inside so that a pair of rods back to back will clear the crosshead. Solder the rods together after first fitting them over the cranks. Attach the connecting rods to the crossheads using 0.45mm wire as pins.

Now fit crank axle and cylinder assembly and check that everything works with no binding.

Motion bracket and valve gear

Check the fit of the valve rods (part 62) in the small rectangular holes in the motion plate (part 65). File the edges of the valve rods until you get a good fit.

Fit the motion bracket into the half-etched grooves in the slide bars. Before soldering in position check the crosshead clearance. Solder short lengths of 0.45mm wire into the dimples in the slidebars to represent the oil cups.

Splice a piece of 0.45mm wire to extend the valve rods and form the joggle as shown in the diagram. Rivet the eccentric sheaths, expansion links (part 61) and valve rods together paying particular attention to the direction of the rivets - see diagram. Make the right side a mirror image of the left.

Thread the crank axle assembly into the cylinders and check that everything works. Success? Relax and enjoy the motion!

Finally, using the diagrams assemble and fix the reversing mechanism-. The two remaining rivets are used to attach part 59 to part 60.

SECTION 11: OUTSIDE CRANKS AND MECHANICAL TEST

The outside cranks are made from a triple lamination as shown in the diagram. If, as recommended, you are using the Ultrascale axles then proceed as follows:

Open the large holes in part 21A so that the axle is a tight fit.

Solder the three laminations (2 of 21A and 1 of 21B) together.

Open the hole in part 21B until the shouldered extension on the axle passes through. The crank should now be a tight fit on the axle.

Remove the excess length of the axle.

Open up and countersink the crankpin hole and solder in the crankpin.

File flush any part of the crankpin screw head protruding.

Fold outside axle boxes through 180° with the fold line **outside**, and carefully solder together.

Open out the axle holes to be a sloppy fit on the axle. These axle boxes are simply cosmetic.

Check that these axle boxes are an easy fit in the slots in the outside frames and ease if necessary.

Permanently fix the wheels to the axles, not forgetting the gearbox on the rear axle, ensuring that the axles extend equally on each side.

Place the outside axle boxes on the axles.

Solder all the outside cranks to the axles along one side of the locomotive. (The outside crank on the crank axle is at 180° to the inside crank).

Solder the other crank to the rear axle at 90° to the first crank with the right hand crank leading.

Attach the second centre crank using "Loctite". This allows the crank to be adjusted whilst holding it firmly enough to allow the chassis to be tested.

If you have made inside motion, put the all the axles in the chassis.

Fit the compensation beam(s).

Attach the rear coupling rods. Turn the wheels slowly and if any tight spots occur adjust the crank on the centre axle until they run smoothly.

Solder the crank to the centre axle.

Remove the rear coupling rods and repeat the above procedure between the centre and leading axle to quarter the leading axle.

Replace all the coupling rods and check the chassis again.

Connect the motor to the pickup system you have chosen and test run the chassis.

SECTION 12: FOOTPLATE, BUFFER BEAM, DRAG BEAM, BRAKE HANGERS AND OUTSIDE FRAMES

Emboss the rivets in the footplate (part 72) and fold down the edges all round with the fold lines inside. Ensure the footplate is flat and check the fit of it on the chassis. If it does not sit on the chassis in contact with the top of the frames relieve the edges until it does.

Emboss the rivets on the drag beam (part 25) and attach the rubbing plates (part 88).

Solder the buffer beam (part 24) and drag beam (part 25) to the frames so that they are central and their top edges are level with the top edge of the correctly fitting footplate.

Assemble the brake hangers and shoes (parts 26 & 27) using 0.45mm wire, Attach the brake hangers to the pivots already fitted and check alignment carefully ensuring no contact with the wheel treads, Solder 0.45mm wire through the bottom holes in the hangers to form cross shafts leaving 2mm protruding at each end.

Emboss the four rivets on the left side outside frame. They are on the vacuum pipe clips.

Attach rivet strip (part 74) to top of outside frames flush with rear of frame, The rivet pattern is not symmetrical - there is a longer gap between the two rivets directly above each axlebox,

Fold up steps (parts 78 & 79) and attach to frames. The four holes correspond to the four rivets attaching the upper steps and should be used to aid alignment.

Using photographs as a guide (Great Western Engines Vol.2 – J.H.Russell - page 24) form the vacuum pipe, which runs down the top of the left side frame, from 0.80mm wire.

Cut the strip (part 89) into four equal pieces. Attach the vacuum pipe using this strip passed through the holes in the frame to form the clips.

Place an outside frame in position over the outside axle boxes ensuring the compensation beam(s) are fitted. Align the top of the frame with the buffer beam and drag beam and tack solder to the spacers 5 and 8. Ensure the axles move freely and check fit the footplate. When satisfied, complete the soldering to all the spacers. Fold angle pieces (parts 92 & 93) at right angles along etched dotted line. Attach part 92 between frame and buffer beam and part 93 between frame and drag beam fitting it below part 74.

Repeat to fit second outside frame.

SECTION 13: FINISHING THE CHASSIS

Secure the balance weights in positon using photographs as a guide to position.

Solder the two halves (part 20) of the longitudinal pony truck compensation beam together and solder in place in the slot on part 10, Solder the two halves (part 19) of the transverse beam together. This then fits through part 20. Check the fit but do not attach.

The cast spring dampers are in two sizes. The smaller ones are used for the centre axle. Shorten the attaching 'stems' to about 4mm and then file the 'stem' to a half-round section. Attach the dampers behind the frames as shown in the diagram - the etched rivets give a good guide to position. The front damper on the leading axle is longer than the others and like the other damper on the leading axle is mounted at an angle to the vertical. For this damper remove the stem completely and drill a clearance hole for the 0.45mm wire in the top. Use a short piece of 0.45mm wire to make a new 'stem' and fix the damper in place. Again there are rivets to indicate alignment.

Form sandpipes from 0.45mm wire and attach to spacers 5 and 8.

The transverse beam (part 19) can now be attached through part 20 and between the front dampers.

FITTING THIS BEAM, HOWEVER, MEANS THE PONY TRUCK CANNOT BE FITTED SO IT SHOULD BE DONE AFTER ALL PAINTING IS COMPLETE.

Attach the buffers, vacuum pipe, vacuum pipe clip (part 87), coupling hook (part 30), coupling (part 95) and brake pull rods (part 28).

Emboss the rivets on the outside frame axlebox retaining plates (part 23) and attach to the frames under the hornguides.

Fix the ATC shoe under spacer (part 6) and the ATC battery box to the right side frame just in front of the rear step.

This completes the chassis.

The worst is over! Now for the body.

SECTION 14: FOOTPLATE

Fold-up the inside frame extensions on the footplate. Form the joggle in the frames just behind the leading splasher position. Fold up the five lamp brackets.

Prepare the footplate overlay (part 73) by embossing the rivets under the lamp brackets and the pony truck bell housing. Place the overlay over the footplate so the lamp brackets pass through the holes provided and the chassis fixing points align. Temporarily hold them together with 10 B.A. bolts and nuts whilst you solder them together all round. Also solder the overlay to the front frame extensions so that the footplate is flush underneath. Solder the frame extensions to the footplate.

Solder the splasher fronts (part 75) to the footplate edge so that the tops are level with the top edge of the frame extension.

Curve the splasher tops by rolling underneath a suitable rod or dowel on a soft surface - a piece of rubber sheet or carpet, Attach the splasher tops - two widths, part 82 for the front, and part 81 for the centre and rear.

The frame cut-out fillers (part 80) can **NOW** be fitted if you are **not** building to 00 gauge, if you are then omit them -the cut-outs are there to give your wheels clearance.

Attach the cylinder cover overlays (part 77) to the outside of the front frame extensions as shown in the diagram.

Fix the front sandbox operating levers (part 86) in place on the front frame extensions. The rear of the lever is attached over the half-etched dimple.

Solder a 10 BA nut over the rear body fixing hole.

SECTION 15: FIREBOX AND CAB

The cab front (part 120) must first be modified to clear the rear splashers. File two appropriate slots so that it will fit at the back of the half-etched locating grove in the footplate.

The firebox rear (part 35) should now be checked for fit in the same grove in front of the cab front.

Solder together the three laminations of the firebox front (parts 33 & 34) ensuring the holes in part 33 align and that the notch in the motor clearance cut-out will be on the right of the firebox. This notch is to allow the wires from the Portescap motor to pass into the firebox and hence to the chassis. Open up the upper two holes in front to be a smooth fit on the 1/16" wire.

The firebox rear and front must now be spaced apart by using suitable long bolts and washers through the pairs of holes in both front and rear. Best is to use, as I do, some old brass chassis spacers joined together with studding, When correctly spaced apart, the front should fit behind the frame extensions and the rear in the front of the footplate groove.

Emboss the rivets on the firebox wrapper (part 104) - four for the ends of the cladding fixing bands and four for the mudhole door attachment bolts.

In pencil, mark the wrapper centre on its inside and outside, Using the notch, in the top of the formers as a guide centre the wrapper and mark in pencil the position of the top bends. Form the bends over a suitable rod or dowel held in a vice. Repeat to form the lower bends.

When happy with the forming, solder the wrapper to the formers ensuring a large fillet of solder around the front join.

Check fit on the footplate. You will probably find the firebox sides are too long (better than too short!), so remove the excess to get a neat fit.

Remove the temporary spacers and the part of the front held on by the five half-etched tags. This creates the space for the motor.

Round the front edges of the firebox with a file referring to photographs for the correct shape.

Make the firebox band joining clips by folding part 119 at right angles near the small hole. Solder them in place, from the inside, through the four slots in the top of the firebox and complete by using a short piece of 0.3mm wire through the holes to represent the tightening bolt.

Solder part 106 around the rear edge of the firebox and trim off the excess length.

Solder the firebox to footplate ensuring that the cab front can be still fitted in the footplate groove.

Emboss the rivets on the cab front. The portholes can either be opened up or blanked off using part 115. Attach part 109 to the top edge of the cab front. Solder the cab front in position. Plenty of flux and a hot iron over the two holes in the back of the firebox works well.

The 'whistle manifold' - strictly my terminology - appears on photographs of locomotives in later life. Attach part 47B to represent same.

Prepare the cab sides (part 114) by attaching the cut-out beading (part 113) fitting the etched grove on the edge of the cabside. When correctly aligned, the handrail between the beading and the footplate will be aligned with the rear or the cabside. Trim off the excess length at the top. Form and fit the cabside handrails from 0.3mm wire and file off smooth on the inside.

Assemble the cab seats (parts 43 and 94). They are designed to be working, low remove the seat from the bracket and solder the bracket to the inside of the cabside. Use the rivets on the outside to aid alignment.

Solder the cabsides in position. They are correctly aligned when the cabside handrails are vertical. Fit the cabside handrails.

Solder part 112 between the rear edges of the cabsides. Curve the cab roof (part 91) and solder in place with the front edge in line with the cabsides. Part 110 is soldered to the rear edge of the cab roof to form the strengthening angle.

Bend part 116 to form the cab floor support and solder it in place. Drill two new holes in the cab floor further forward than the etched holes. Slightly curve the fall plate (part 101). Hinge the fall plate to the floor as shown in the diagram. Solder the floor in place.

SECTION 16: THE BOILER

Emboss the rivets on the coned boiler section wrapper (part 105), Form the boiler by rolling. This forming may be helped if the brass is first annealed by gently heating it to a dull red and then allowing it to cool naturally. The wrapper is now checked for fit around the formers, parts 36 and 37. You will probably find that the wrapper is a little too long. Correct this by removing equal amounts from each end.

Solder the wrapper ends together with the aid of part 107. The formers are now soldered in place absolutely flush with the back and front of the boiler section with the notch on the top of the rear former in line with the midline of the wrapper and the motor wire notch matching that on the firebox front. Solder two short pieces of 1/16" rod into the two holes in the rear former to act as dowels to locate the boiler and firebox. Check the boiler/firebox fit.

Prepare the smokebox/boiler wrapper (part 111) by first drilling the two missing handrail knob holes in line with the etched holes and 5mm from the rear of the wrapper. The riveting of the front and rear smokebox rings is now embossed - look at photographs of your chosen prototype to see if this is appropriate. Roll wrapper, check fit on formers (parts 38 and 39), solder wrapper ends using part 109 and solder in formers **absolutely flush** with the back and front of the wrapper with the hole for the front handrail knob in the front spacer in line with the

wrapper midline. The other hole in the front former is for the steam lance cock and is on the left looking from the front.

Emboss the four rivets on the smokebox front (part 40) and attach to the front of the smokebox aligning the handrail and lance cock holes.

Tap the hole in part 38 10 BA and open out the hole in Part 37 to clear 10 BA. With a 10 BA screw, bolt the two boiler sections together and when satisfied with their alignment solder them together. Solder part 41 to rear of bailer aligning its top with the half etched lines on part 36. Again check the boiler/firebox fit and alignment,

Bend up the lower smokebox saddle (part 84). Emboss the rivets on the front of the upper saddle (part 45), if required, and fold-up. Solder a 10 BA nut over the hole on the upper saddle.

Attach the two saddles to the footplate with the 10BA mounting screw. Locate the boiler on the firebox and check the smokebox/saddle fit and alignment; remember the bottom of the boiler is horizontal and so parallel to the footplate and the rear of the saddle is in line with the rear of the smokebox. When satisfied with the alignment tack solder the upper saddle to the smokebox. Remove the boiler/saddle unit and complete the soldering. Attach the smokebox saddle side plates - two alternatives are provided. Now solder the upper and lower saddles together. The sloping-plate (part 85) is fitted to some of the class. If your chosen prototype has it, then solder the plate to part 84 so that it will slope down to the front footplate and be parallel to the top of the front frame extension.

Emboss the two rivets in part 99 and solder to part 44B to form the regulator lubricator pipe cover. Attach to right side of smokebox/boiler in the gap between the embossed rivets on the rear smokebox ring.

Attach safety valve/top feed. Form top feed pipes from 0.8mm wire so that they 'disappear' behind the frame extension. Solder the wire in place in the etched groove.

Bend up smokebox step (part 83) after first embossing two rivets. Solder-in place under smokebox front.

Solder lamp bracket (part 96) to top/front of smokebox after first embossing two rivets.

Attach the chimney, steam lance cock, smokebox door and dart.

Fix medium handrail knobs in the six holes in the boiler/smokebox. Open out the holes in four of the small knobs so that the handrail wire, 0.45mm, is an easy fit and fix these knobs in the holes in the firebox. Form the handrail to shape, thread on the front medium knob, and fix the handrail to the boiler unit only. This means the boiler can still be removed and replaced by threading the handrail back through the firebox knobs.

Solder parts 98, 117 and 118 to the firebox front so that they 'disappear' behind the frame extensions. Use photographs to help correct positioning.

SECTION 17: FINAL DETAILING

Form spring shackles (part 76) to a 'U'-shape and solder on a short length of 0.45mm wire, Fix the shackles through the holes in the footplate tack soldering the wire to the lower footplate edge. Remember the front shackles are not vertical, Attach the springs - two sizes - the smaller ones are for the centre. Now solder the shackle wires permanently to the footplate overlay and cut-off flush with the underside the shackle wires and springs.

Drill out the holes in the top of the sandboxes to accept short handrail knobs. Fit the knobs and handrails and attach the sandboxes to the footplate.

Fix the pony truck bell housing and lubricator in place. Solder the mudhole doors in place on the firebox.

Cut off the whistle 'stems' and drill the base of the whistles to accept 0.3mm wire. Solder the wire to the whistles and form the wire to shape and solder to the whistle 'manifold'.

The cab interior is largely based on the photograph of a Bulldog cab (Great Western Engine's Vol. 2 – J.H.Russell - page 2). This engine has steam reverse as had, of course, all the Aberdares.

Open out the three small holes in part 46 and carefully solder through each hole a piece of 0.45mm wire to form the fixing stays. Cut the stays to length and fix the lever in place on the right cabside.

Attach parts 44A, 97 and the injector to the firebox backhead and fix the backhead in place,

Fix the ATC bell in place high on the right cabside and the gauges (part 47A) to the cab front.

Lastly, replace the tip-up cab seats.

Painting is not a subject upon which I wish to sermonise. Much good advice has been given in articles in the model railway press. All I will say is that with such a complex model as this thought must be given to when painting is done as many parts can only be painted before final assembly,

I hope you enjoy building and running your 'Aberdare' as much as I have enjoyed researching and designing it.

Best wishes

Martin Finney
May 1987

If you have any problem with the kit or any criticisms or suggestions please feel free to contact Brassmasters.

COMPONENT DESCRIPTION - 0.018" BRASS

1	Inside frame - Left
2	Inside frame - Right
3	Outside frame - Left
4	Outside frame - Right
5	Frame spacer - Rear
6	Frame spacer - A.T.C. shoe mounting
7	Frame spacer - Centre
8	Frame spacer - Front
9	Frame spacer - Body mounting
10	Frame spacer - Pony truck compensation beam mounting
11	Hornblocks - Rear
12	Hornblocks - Centre
13	Hornblocks - Front
14	Compensation beam - (2)
15	Pony truck frame - (EM & 18.83 mm gauge)
16	Pony truck frame - (00 gauge)
17	Pony truck top - (EM & 18.83 mm gauge)
18	Pony truck top - (00 gauge)
19	Transverse pony truck compensation beam - (2)
20	Longitudinal pony truck compensation beam - (2)
21A	Outside crank - large hole - (12)
21B	Outside crank - small hole - (12)
22	Outside frame axlebox - (6)
23	Outside frame axlebox retaining plate - (6)
24	Buffer beam
25	Drag beam
26	Brake hanger - (12)
27	Brake shoe - (6)
28	Brake pull rod - (2)
29	Balance weight - (6)
30	Coupling hook
31	Portescap gearbox side - (2)
32	Inside frame axlebox retaining plate/springs - (2)
33	Firebox front - (2)
34	Firebox front top
35	Firebox rear
36	Boiler former (coned section) rear
37	Boiler former (coned section) front
38	Boiler / smokebox former (parallel section) rear
39	Smokebox front former (inner)
40	Smokebox front (outer)
41	Firebox front (lower insert)
42	Firebox top (inner)
43	Cab seat - (2)
44A	Regulator lever
44B	Regulator lubricator cover
45	Smokebox saddle (upper)
46	Steam reverse lever
47A	Cab pressure gauge - (2)
47B	Whistle manifold

COUPLING RODS

48	Outer laminate - leading - left
49	Outer laminate - trailing - left
50	Inner laminate - leading - left
51	Inner laminate - trailing - left
52	Outer laminate - leading - right
53	Outer laminate - trailing - right
54	Inner laminate - leading - right
55	Inner laminate - trailing - right
56-71	Items on separate Inside Motion etch

COMPONENT DESCRIPTION - 0.012" BRASS

72	Footplate
73	Footplate overlay
74	Outside frame rivet strip - (2)
75	Splasher front - (6)
76	Spring shackle - (12)
77	Cylinder cover overlay - (2)
78	Step - small - (6)
79	Step - large - (2)
80	Frame cut-out filler - (4)
81	Splasher top - rear and centre - (4)
82	Splasher top - front - (2)
83	Smokebox step
84	Smokebox saddle - lower
85	Sloping plate
86	Sandbox operating lever - front - (2)
87	Bufferbeam vacuum pipe clip
88	Drag beam rubbing plate - (2)
89	Vacuum pipe clip strip
90	Cab floor
91	Cab roof
92	Angle bracket - frame to bufferbeam - (2)
93	Angle bracket - frame to drag beam - (2)
94	Cab seat bracket - (2)
95	Coupling
96	Lamp bracket - (2)
97	Firehole door lever
98	Reversing cylinder operating lever
99	Regulator lubricator cover overlay
100	Drawbar - 2 different lengths
101	Fall plate
102	Smokebox saddle side plates - un-riveted - (2)
103	Smokebox saddle side plates - riveted - (2)
104	Firebox wrapper
105	Coned boiler section wrapper
106	Angle between firebox and cab front
107	Coned boiler jointing strip
108	Smokebox / parallel boiler jointing strip
109	Cab front rivet overlay
110	Angle - rear of cab roof
111	Smoke box / parallel boiler wrapper
112	Support - rear of cab roof
113	Cab side cut-out beading - (2)
114	Cab side - (2)
115	Cab porthole blanking plate - (2)
116	Cab floor support
117	Sandbox operating lever - rear - left
118	Sandbox operating lever - rear - right
119	Firebox band joining clip - (6)
120	Cab front

OTHER COMPONENTS FOR CHASSIS

1/8" bore top hat bearings - (2)
(4 more needed for rigid chassis)
1/8" bore Flexichas bearings - (4)
2mm bore clearance small top hat bearings - (2)
10 BA bore clearance small top hat bearing - (1)
Brass 10 BA C/H screws - (3)
Brass 10 BA nuts - (3)
Crankpins, bushes and nuts - (6)
Spring wire for pony truck
1/8" inside diameter brass tube for pony truck
1/16" brass wire for compensation beam pivot
1/16" inside diameter brass tube for compensation beams
Brass wire 0.45mm for brake hanger pivots & pony truck detailing
Brass wire 0.80mm for vacuum pipe

COMPONENTS NOT SUPPLIED

Driving wheels with extended axles
(prototype - 4' 7 ½" diameter 14-spoke outside crank)
- Ultrascale
- Alan Gibson
- Markits

Pony truck wheels (1 pair)
(prototype -2' 8" diameter 10-spoke)
- Ultrascale
- Alan Gibson
- Markits

Motor and gearbox
- Hi-Level
- Branchlines
- Portescap 1219 (available second hand only)

Suitable pickups

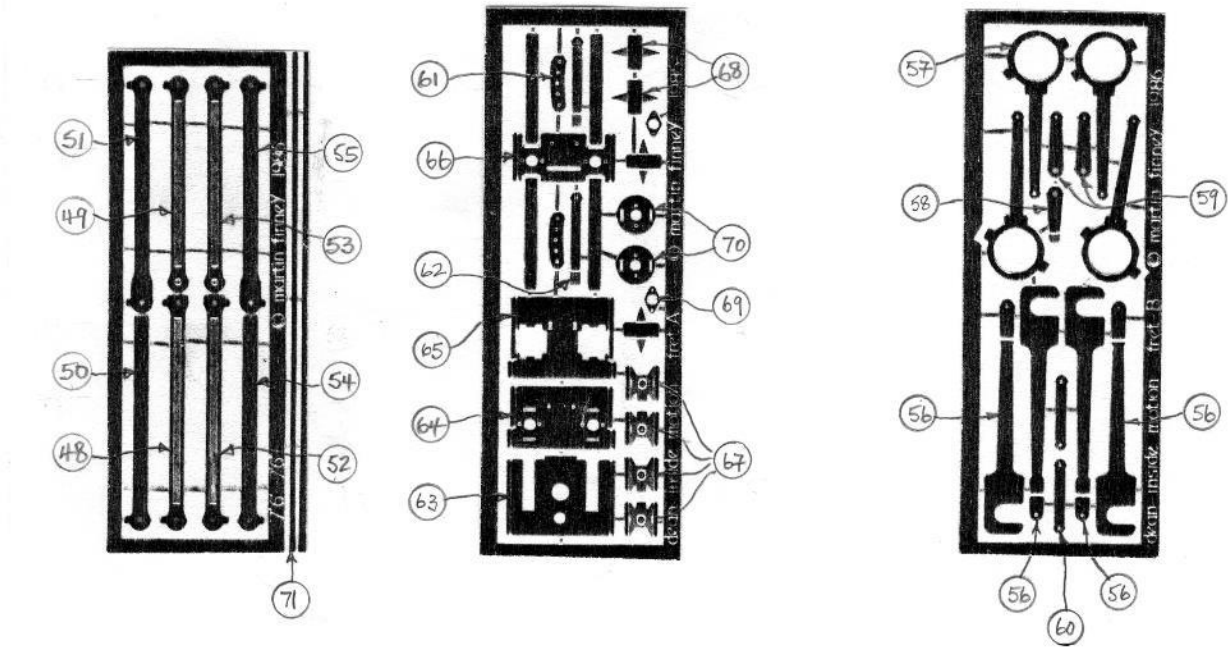
OTHER COMPONENTS FOR BODY

Brass wire 0.45mm for handrails
Brass wire 0.30mm for whistles and cab side handrails
Brass wire 0.80mm for top feed pipes
Small handrail knobs - (8)
Medium handrail knobs - (7)
Whistles - (2)
Mud hole doors - (4)

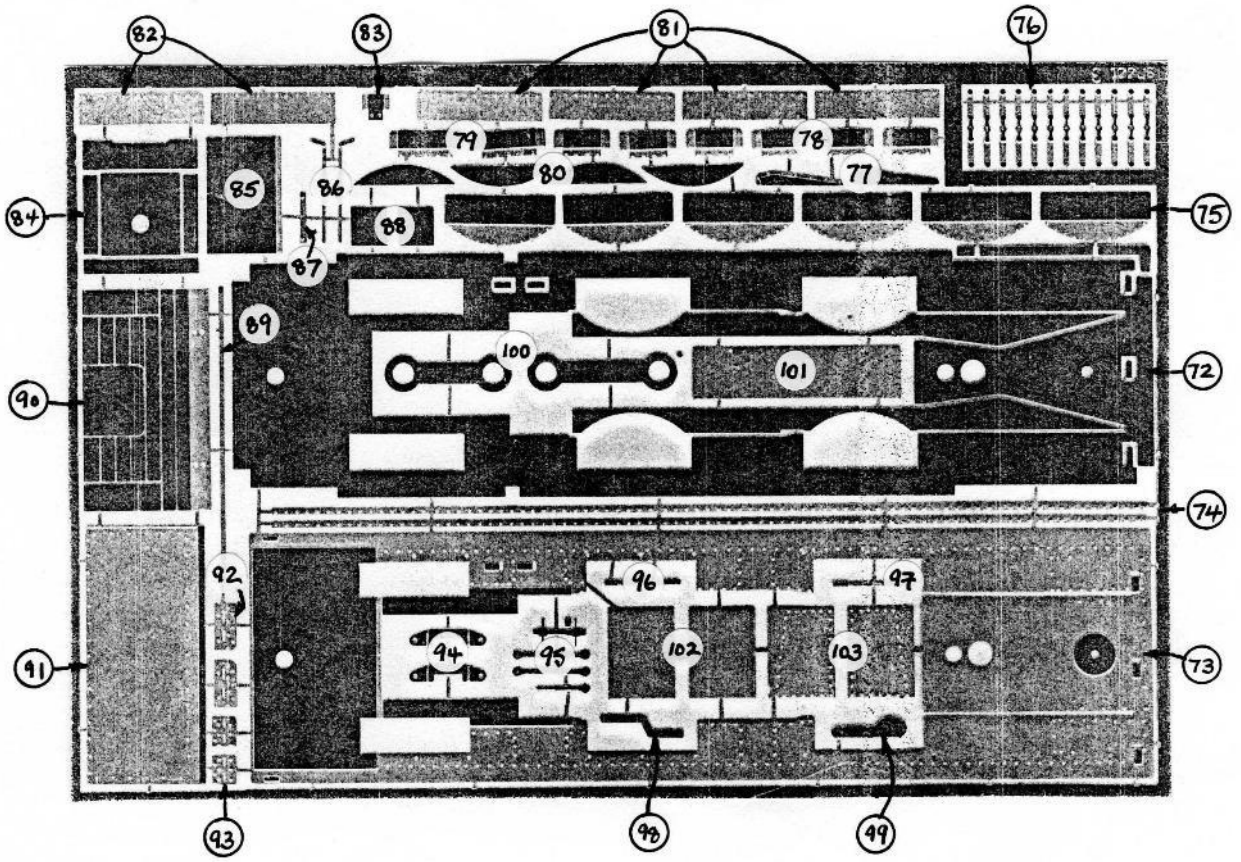
WHITEMETAL CASTINGS

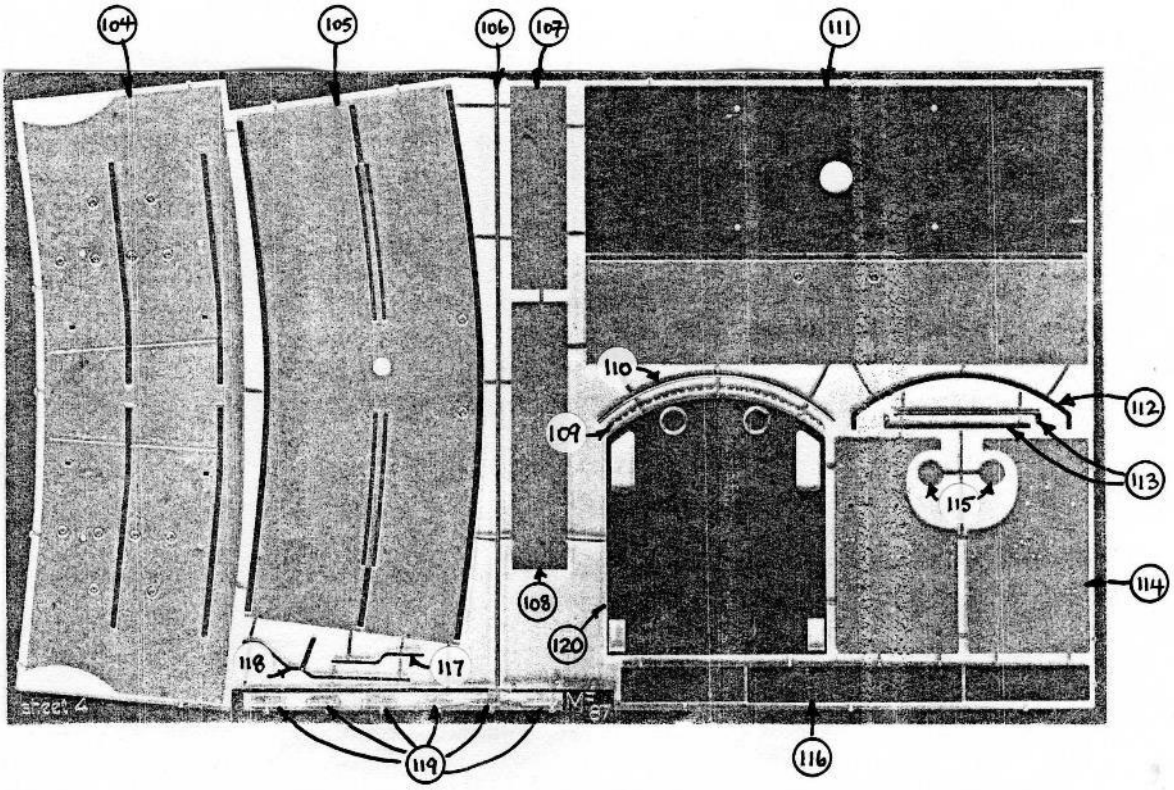
Safety valve
Chimney
Firebox backhead and injector
A.T.C. bell
Large springs - (4)
Smaller springs - (2)
Pony truck bell housing
Sand boxes - (2)
Smokebox door
Smokebox door dart
Steam lance cock
Lubricator
Reversing cylinder
A.T.C. shoe
A.T.C. battery box
Vacuum pipe
Large spring dampers - (8)
Smaller spring dampers - (4)
Buffers - (2)

ETCHED COMPONENTS 0.020" NICKEL SILVER

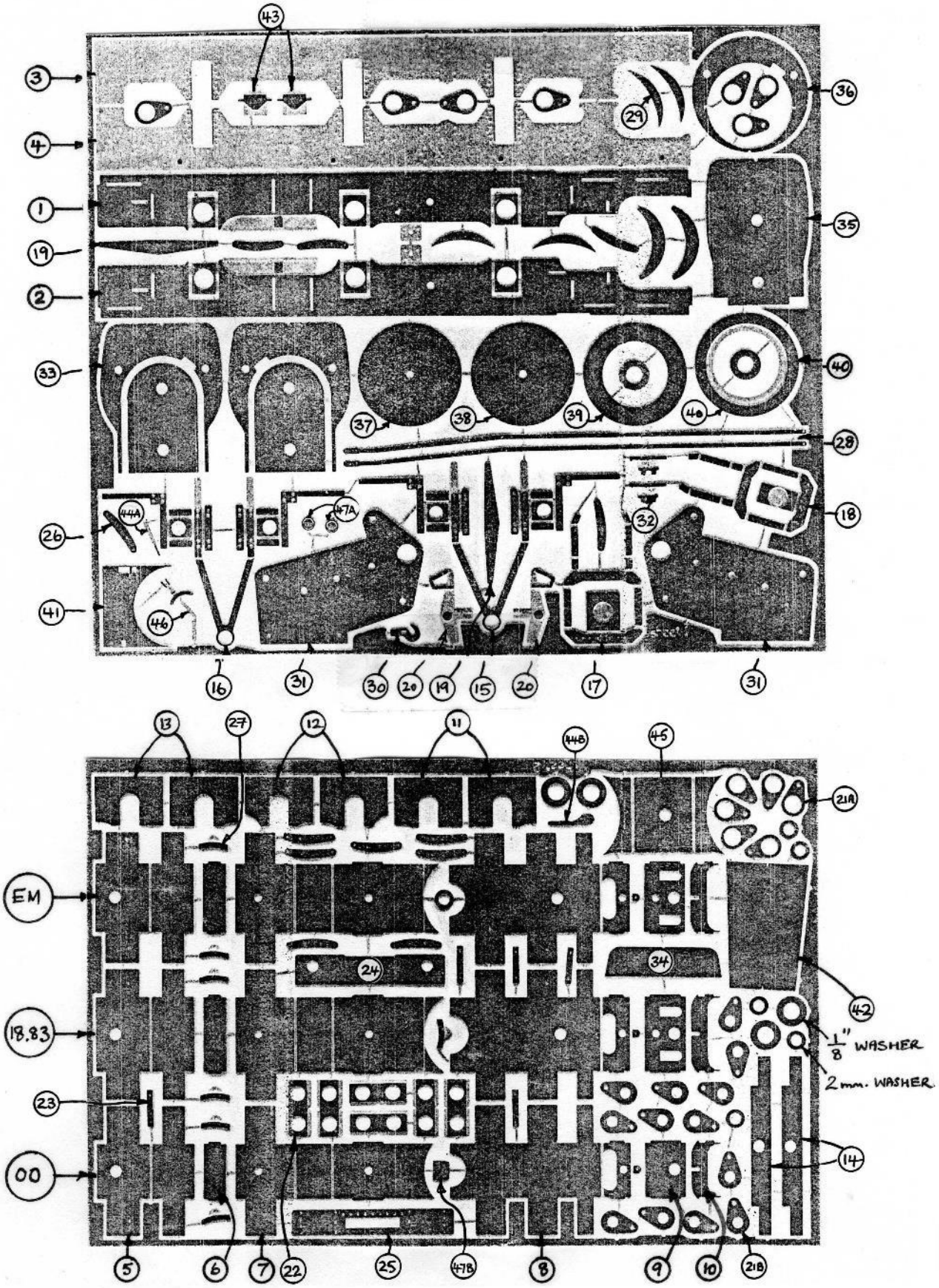


ETCHED COMPONENTS 0.012" BRASS





ETCHED COMPONENTS 0.018" BRASS



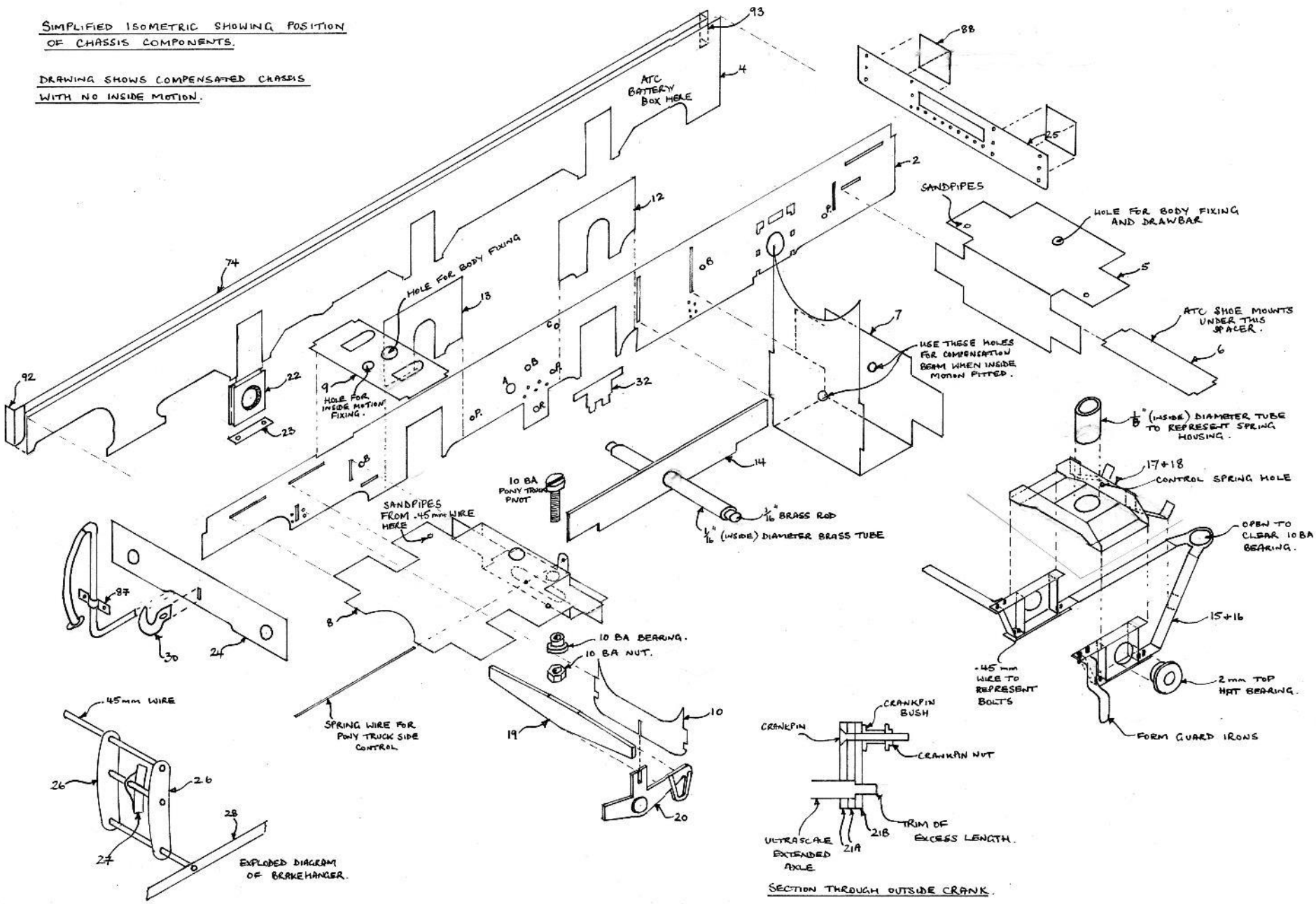

SIMPLIFIED ISOMETRIC SHOWING POSITION OF CHASSIS COMPONENTS.
DRAWING SHOWS COMPENSATED CHASSIS WITH NO INSIDE MOTION.
93
88
4
ATC BATTERY BOX HOLE
25
2
SANDPIPES
HOLE FOR BODY FIXING AND DRAWBAR
5
74
12
HOLE FOR BODY FIXING
13
ATC SHOE MOUNTS UNDER THIS SPACER.
6
7
USE THESE HOLES FOR COMPENSATION BEAM WHEN INSIDE MOTION FITTED.
92
22
9
HOLE FOR INSIDE MOTION FIXING.
23
32
10 BA PONY TRUCK PIVOT
14
1/16" BRASS ROD
1/16" (INSIDE) DIAMETER BRASS TUBE
1/8" (INSIDE) DIAMETER TUBE TO REPRESENT SPRING HOUSING.
17+18
CONTROL SPRING HOLE
OPEN TO CLEAR 10 BA BEARING.
SANDPIPES FROM .45mm WIRE HERE
87
30
24
8
10 BA BEARING.
10 BA NUT.
15+16
.45mm WIRE TO REPRESENT BOLTS
2mm TOP HAT BEARING.
FORM GUARD IRONS
SPRING WIRE FOR PONY TRUCK SIDE CONTROL
19
10
20
.45mm WIRE
26
26
28
27
EXPLODED DIAGRAM OF BRAKEHANGER.
CRANKPIN BUSH
CRANKPIN
CRANKPIN NUT
TRIM OF EXCESS LENGTH.
21B
21A
ULTRASCALE EXTENDED AXLE
SECTION THROUGH OUTSIDE CRANK.

FIG. 2.

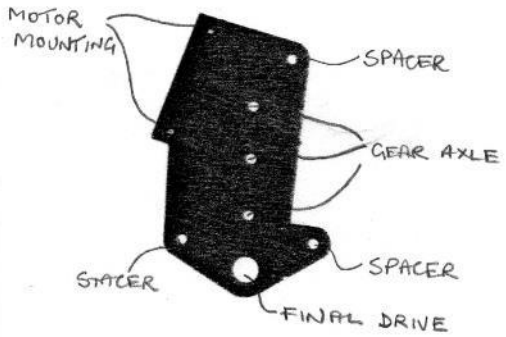
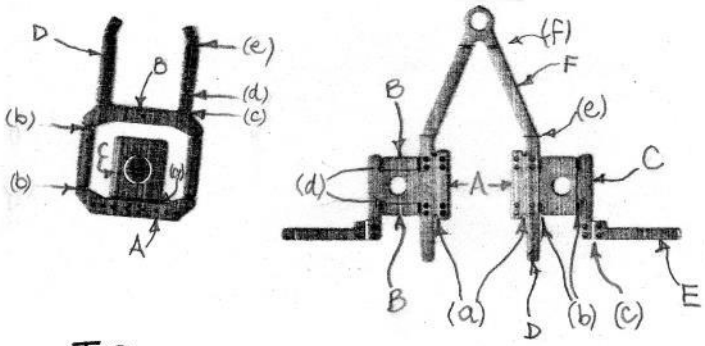
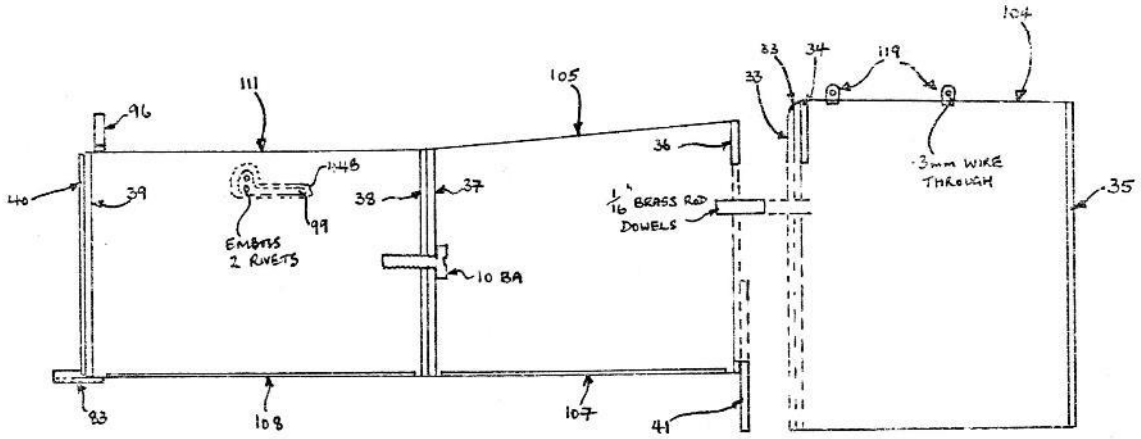
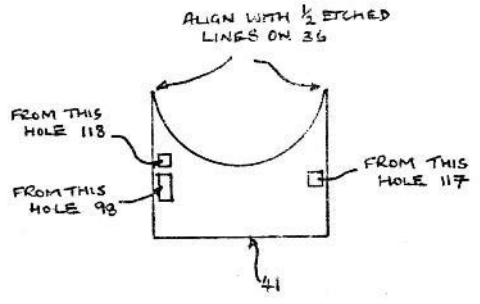


FIG. 3.

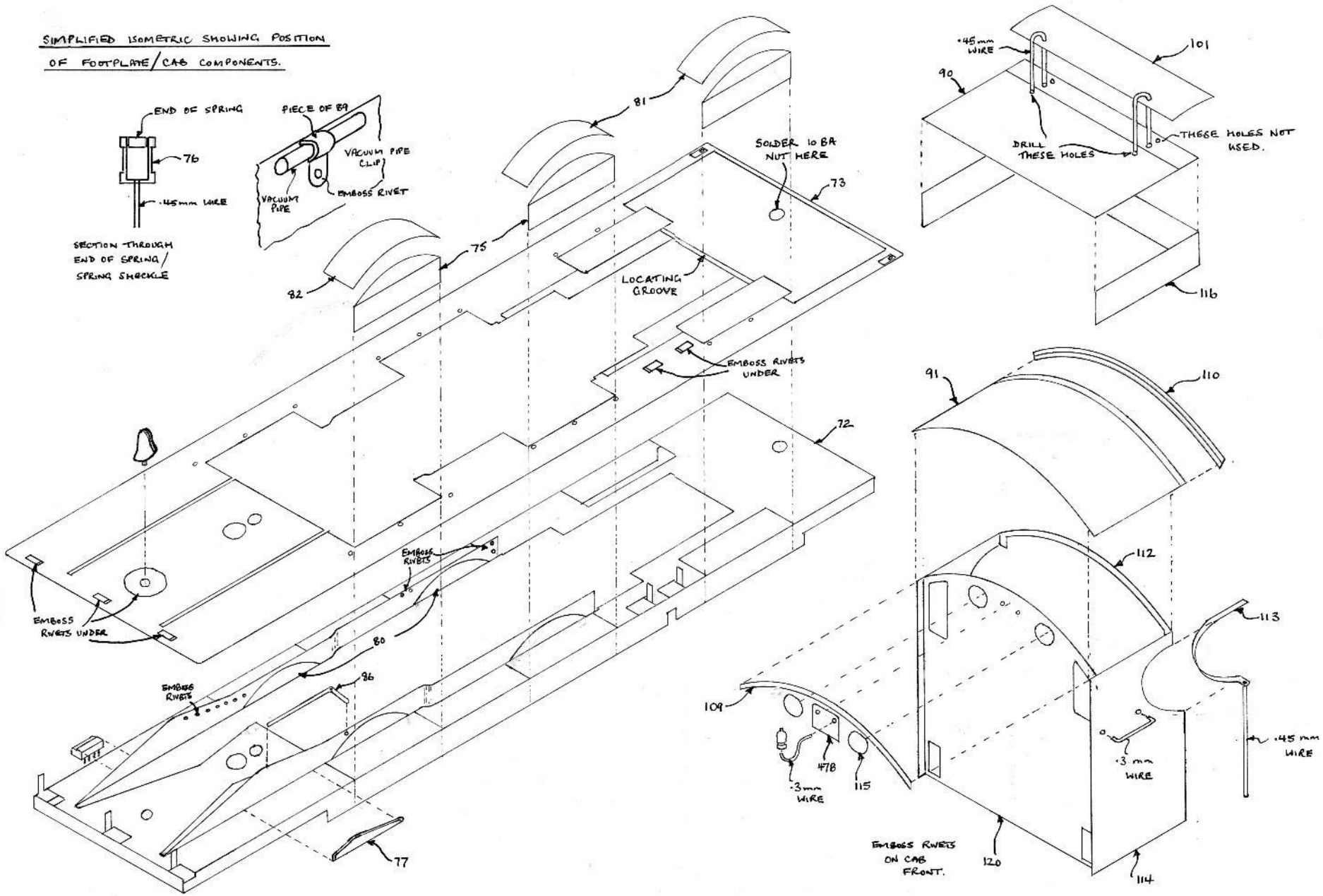


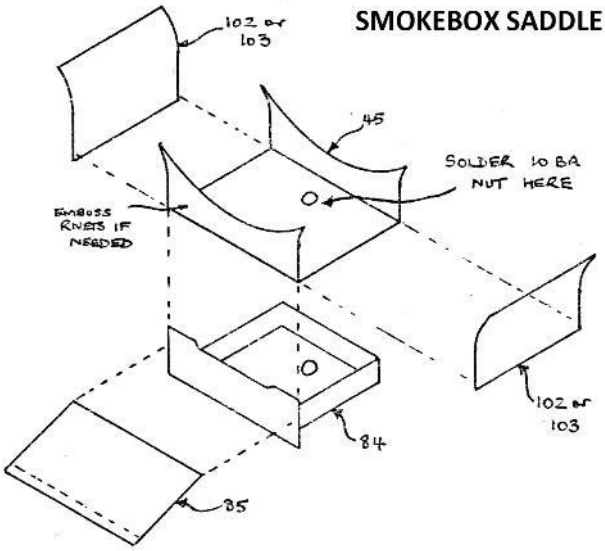


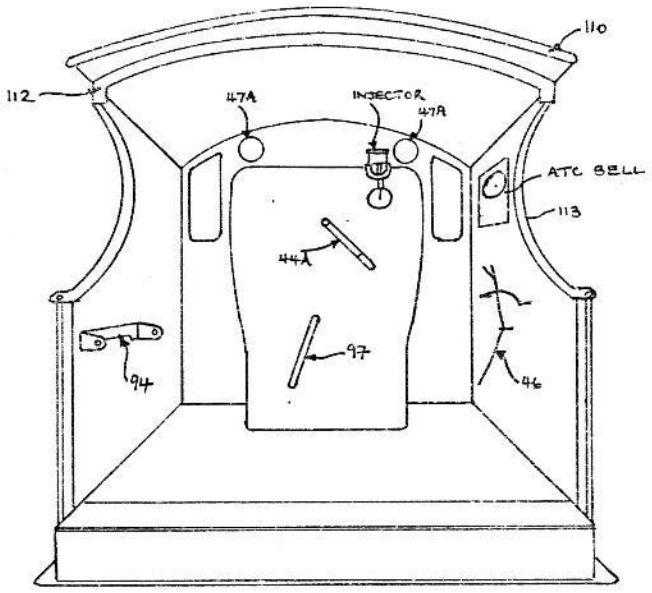
SECTION THROUGH BOILER/FIREBOX

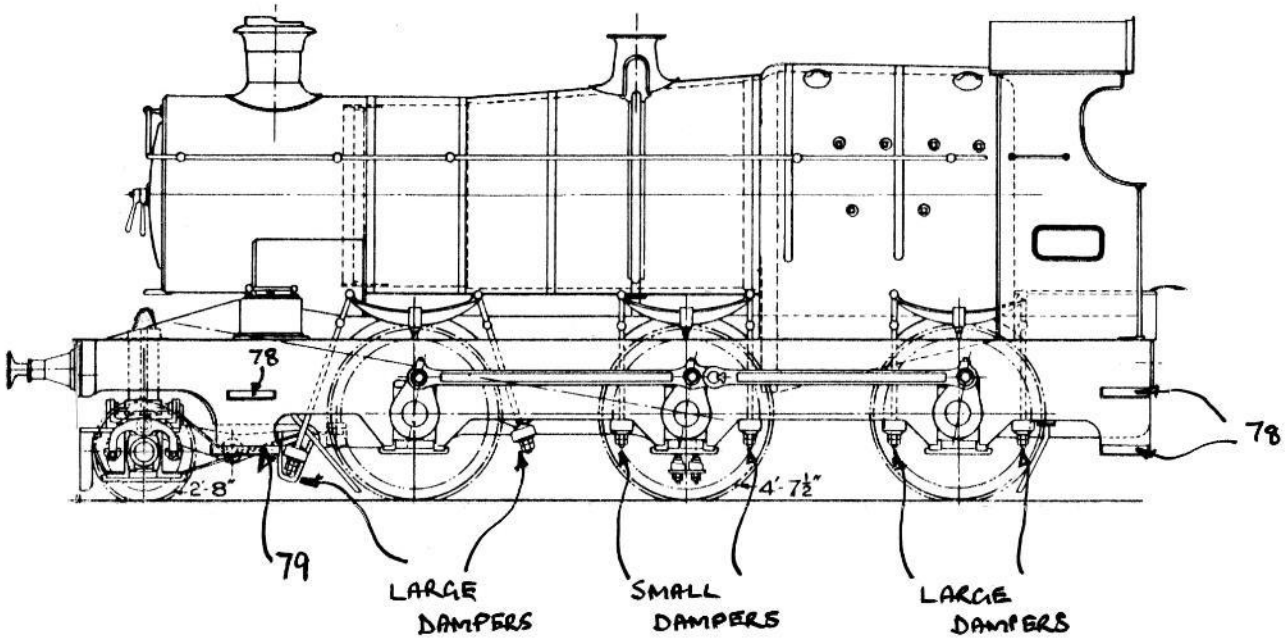


FIREBOX FRONT


SIMPLIFIED ISOMETRIC SHOWING POSITION OF FOOTPLATE/CAB COMPONENTS.
END OF SPRING
76
·45mm WIRE
SECTION THROUGH END OF SPRING/ SPRING SHACKLE
PIECE OF BA
VACUUM PIPE CLIP
VACUUM PIPE
EMBOSS RIVET
81
82
75
SOLDER TO BA NUT HERE
73
LOCATING GROOVE
EMBOSS RIVETS UNDER
72
EMBOSS RIVETS UNDER
EMBOSS RIVETS
80
86
EMBOSS RIVETS
77
·45mm WIRE
101
90
DRILL THESE HOLES
THESE HOLES NOT USED.
116
91
110
112
113
109
·3mm WIRE
478
115
·3 mm WIRE
·45 mm WIRE
EMBOSS RIVETS ON CAB FRONT.
120
114


SMOKEBOX SADDLE
102 or 103
45
SOLDER 10 BA NUT HERE
EMBOSS RIVETS IF NEEDED
84
102 or 103
85


110
112
47A
INJECTOR
47A
ATC BELL
113
44A
97
94
46
CAB INTERIOR


78
2'-8"
4'-7½"
78
79
LARGE DAMPERS
SMALL DAMPERS
LARGE DAMPERS