Chassis Kit for GWR 56XX

The 56xx and 66xx 0-6-2Ts of 1924-8 were an advance on the existing 0-6-2T engines developed for South Wales mineral traffic by the Rhymney, Barry and Taff Vale Railways. They were designed under C.B. Collett's supervision and, like most Great Western engines of the period, were pretty standardised; 200 in total were delivered, all from Swindon except for the final 50 locomotives (6650-99) built in 1928 by Armstrong Whitworth & Co of Newcastle-upon-Tyne.

Compared with the standard Swindon product, there were minor differences of detail among the Armstrong engines of which the most (and perhaps only) visually obvious was the absence of the prominent 'J'-shaped spring hangers. Confusingly, some photographs show that in BR days this feature was occasionally absent from Swindon-built engines suggesting that some earlier members of the class may have been modified to follow the later design. Both patterns are provided in this kit.

The Bachmann body moulding represents a 56xx/66xx in later condition and the chassis is primarily designed to meet the needs of the BR-period modeller. Modelling one of the early examples in as-built condition may call for some research if you want an accurate representation of the inside motion, – a major design fault was discovered when the first member of the class was given a test steaming at Swindon in December 1924, leading to a significant change to the way in which the ends of the valve spindles were supported. Engines under construction were modified with an improvised cross-member bridging the frames immediately over the valve spindle ends to support new crossheads and guides bolted underneath the cross member. Subsequent construction incorporated a heavy steel casting to fulfil this function, and this is the form in which the chassis kit has been designed.

Early 56xx class locomotives in GW days had narrow tapered buffers rather than the chunky parallel pattern fitted later, and the front steps (and the corresponding handrail on the running plate) were level with the sandbox – in due course these were resituated, centrally over the leading driving wheels. On the upper half of the boiler an ungainly oil feed pipe led from the driver's side of the cab to the smokebox; this was later removed. The initial deliveries had small crescent-shaped balance weights on the driven axle only but many if not all engines later acquired intermediate-sized balance weights on all wheels; in the post-war years these appear in most cases to have changed to the large, squared-off pattern found in our kit.

As first built and for some years afterwards the 56/66xx locos lacked cab shutters, the inset for the lamp bracket on the bunker rear (one handrail only on the LH side), steam-heat piping along the LH valance and ATC gear. In 1930 a start was made on fitting sliding cab shutters and, although the work went on until 1939, the majority had received them by 1934. The recess in the bunker rear for the upper lamp iron began to appear in 1934-5, but it took until 1956 for this feature to be added to most of the class, and a handful of engines seem never to have been modified in this way. Starting in 1956, the upper lamp iron on the top of the smokebox was moved down to the smokebox door, but this alteration may not have been applied to every members of the class.

Although the overwhelming majority of these engines worked in South Wales, especially on the Valleys lines where they regularly handled local passenger trains as well as mineral traffic, occasional examples of the class were from the outset seen elsewhere on the GWR; however, having 'Red' route availability, they were confined to main lines. The exiles were based at Bristol (St Philips Marsh), Swindon, Westbury and Slough but after Nationalisation in 1948 some were allocated to Wolverhampton district sheds such as Oxley, Banbury, Leamington and Stourbridge. The situation was little changed ten years later although their sphere of operations had extended to Southall, Didcot and Reading; again, only a dozen or so émigrés were involved and 95% of the class were still fluent Welsh speakers.

The class was still intact in 1961 but wholesale withdrawals soon followed and the Valleys were fully dieselised by 1964. This rendered large numbers of these engines redundant; a round dozen found their way to Dai Woodham's scrapyard in Barry which, ironically, ensured the long-term survival of eight of them (the ninth still-extant example, No 6697, was bought directly from BR). One or two members of the class lasted a couple of years longer in the Birmingham area but the final survivors worked freight and pilot duties off Croes Newydd shed in Wrexham. Boundary changes had ensured that, by a bizarre twist, the last ex-GW engines in service anywhere in the country were all allocated to London Midland Region sheds.

Though it dates back to the early 1980s, Mainline's highly detailed 56xx/66xx bodyshell (subsequently remanufactured and improved by Bachmann) stands comparison with the best of today's RTR models but has always been let down by its relatively crude chassis. Our new etched chassis kit brings you state-of-the-art

design technology that will lift your model to new heights and give you an 0-6-2T to be proud of. Requiring only minimal modifications to the moulded body, it offers alternative spring detail and other features typical of BR-period locomotives. As with all High Level chassis kits, it comes with its own gearbox custom-designed gearbox and our much-praised 'thirty-second' hornblocks. 00/EM/P4 chassis spacers and other alternative components are included to suit your preferred gauge.

Our thanks to Martin Goodall for help with compiling this information

The loco takes a 4ft $7^1/_2$in diameter 14 spoke driving wheel, with 3ft 8in 10 spoke for the pony truck. These are available from:

Alan Gibson, PO Box 597, Oldham, OL1 9FQ. Tel. 0161 678 1607 (alangibsonworkshop.com)

Markits Ltd. PO Box 40, Watford, Hertfordshire. WD2 5TN. Tel. 01923 249711 (www.markits.com). These are self-quartering wheels available in OO and EM gauge only.

Ultrascale. Tel. 01462 685327 (www.ultrascale.co.uk) There's usually a long waiting list for their products, which are manufactured to order.

GENERAL NOTES ON CONSTRUCTION

Read the instructions carefully - preferably more than once - before starting work. Study the diagrams until you become familiar with all the parts and the assembly sequence. We have tried to make these instructions as comprehensive as possible, which may make some assembly sequences appear more complex than they actually are.

Leave the parts in the fret until they are required for use. This will protect them and makes identification simpler. Pay particular attention when removing the brake parts, some of which are contained within a separate fret – this fret makes into a Jig and becomes an integral part of the assembly sequence and so must be removed in one piece.

Small holes can be drilled more easily while the parts are still attached. Where an accurate hole size is specified, holes are etched undersized so they can be drilled or reamed out to the correct diameter.

We want you to enjoy building your kit, but remember that even railway modelling has its risks. Frets contain sharp edges, soldering irons get very hot, adhesives may give off toxic fumes, knives and files are designed for cutting. Please be careful . . .

ASSEMBLING THE CHASSIS

The chassis can be built rigid, or with full compensation so the wheels follow the undulations of the track.

Before you start punching out the rivet detail in the frames, it’s a good idea to practice the technique using the row of rivets provided along the side of the fret. Once you’ve got the hang of this, remove the Chassis Frames (1&2) from the fret and refer to figures 1, 2 and 3

The layout of the rivets differs, depending on spring hanger arrangement: For Swindon pattern ‘J Hangers’, you should ignore rivets ‘A’ and form rivets ‘B’ (See Fig. 2).

Armstrong Whitworth-built engine springs (Fig. 3) were anchored directly to the frames, above the spring ends, so rivets ‘A’ should be formed and rivets ‘B’ omitted. All the other rivet detail on the chassis is the same for both types.

After forming the rivets, straighten the frames as necessary, then remove the spring hangers (3 x4, 4 x2) from the fret. These parts also differ, depending on the loco type – Swindon type ‘J’ hangers should be left as they are; for Armstrong Whitworth type, carefully snip through the small tags ‘C’, then bend the side pieces ‘D’ back and forth until they snap off (see Fig. 3).

For both types, use flat-nosed pliers to fold over the spring hangers to make them double thickness (Fig.1) noting that, unlike most bending operations, the fold lines should be on the outside of the bend. When these parts are absolutely flat (this can be done by gently tapping them between two flat pieces of hardwood) they can be soldered in place on the chassis, behind the springs, before cleaning off any excess solder.

Once in place, drill out all the holes in the bottom of the hangers and solder lengths of 0.5mm wire into them, then trim the ends of the wire as shown in Figure 2 or 3. For engines with ‘J’ hangers, leave the rearmost holes free for the time being - the rear ‘J’ hanger for the trailing spring (part 80) is a separate piece which will be fitted later, after the brakes.

For a rigid chassis, ream out all the axle bush locations in the chassis frames and solder the 1/8in axle bush bearings in place.

If you're going to fit plunger pick-ups (Alan Gibson, ref. 4M62) open out the holes 'E' so the plastic outer sleeve of the pick-up is a tight push-fit.

For a compensated chassis, read all of the following carefully. To make the hornblock cutaways, carefully make a slot up the centre lines of the axle locations, taking care not to damage the springs. Use a cutter in your mini-drill, a fine fret saw, or a needle file. Now bend the sides of these cuts back and forth, until the metal snaps off to form the rough cutaway shape. Dress up the sides with a file using the remainder of the half-etched marks as a guide. Don't file anything from the top horizontal edge of the slot - this is used to set the hornblocks at the correct height. Finally, use a 0.4mm bit to open out the datum holes (F).

For all types of chassis, select the spacers (parts 5 - 10) for the gauge in which you model. Open out the hole ‘G’ parts 8 and 9, to suit 1.5mm wire, then bend the parts through 90 degrees, then make the bends at the rear of the frames, so they match the taper on the top face of the spacer ‘9’, but do not fit the spacer yet. Open out the holes in the cylinder front face (part of the front L-shaped spacer) to suit the wires shown in figure 5. Bend up the front spacer - all bends are 90 degrees - and solder it in place. Follow up with the Dogleg Spacer (9) and if you’re planning to compensate the chassis the, Motor Support (8). Spring the frames apart slightly and clip in the motion bracket and the midway spacer, then finish off the basic structure by bending out the small pony truck stops, on the rear L-shaped spacer, fold the spacer through 90 degrees and solder it in place.

See Figures 1 and 7. Carefully open out the holes in the rear circular spring damper mounts (H) to 0.8mm diameter then bend them through 90 degrees. Push a length of wire through each of the holes in the spacers, situated directly above the mounts. Continue down through the damper mounts until there’s about 4mm protruding from the bottom of the mounts, then solder the wire securely in place, top and bottom. Trim the wire flush at the top, drill out the damper casting (11 x4) - this is best done when they are still on the sprue - and add them to the underside of the damper mounts before trimming the wires so about 0.5mm protrudes down below the castings.

Side Rods

Refer to the fret diagram, and to Figure 6. Open out the holes in the rods (12 - 16) to suit the components shown in the diagram, and layer them up. Make the holes a fairly tight fit - you can always open them out a touch more later. Take the middle sections of the rods (12 x2 & 15 x2) and then add the inner and outer layers. Use the fret diagram to identify the parts, remove them from the fret in pairs and solder them to the middle layers, building one rod at a time to avoid confusion.

The rods have an articulated knuckle joint which uses a 0.8mm valve gear rivet as the pivot. For a smooth running chassis, it is essential that these rivets are a good fit in their holes. When the front and rear rod sections are assembled, lightly countersink the holes at the rear of the 'forks'. Put a small amount of oil on the 'tongue' of one of the front rods and slide this into place in the 'fork' on the rear rod. Slot a rivet through the assembly and, very carefully, secure in place by soldering it to the rear rod sections only. Finally, trim the rivet almost flush at the back. Check the joints pivot freely. Do the same for both sides.

For a compensated chassis, bend up six hornblock etches, using the separate instructions supplied with them. When the units are fitted, the horizontal tab which protrudes from their front face, butts up against the top edge of the frame cutaways.

If you’re planning to use our compensation system with a ‘OO’ chassis, then you’ll need SpaceSaver hornblock (available from High Level) for the driven axle, in order to gain some extra clearance for the gearbox. Follow their instructions as if you were fitting CSBs, but fit the OO Beam Stop (17 in Fig.10) instead of the CSB tag, filing it flush at the sides, as you would for the tag.

For EM/P4 models, before fitting the bearings into the etches, file off the circular boss from the back of the hornblock bearings for the middle axles to allow clearance for the gearbox. The other bearings can be left as they are, or filed to match the others if you prefer.

Position a hornblock assembly at the middle driver location, making sure you include a 1/8in brass hornblock bearing, which should be lightly oiled to prevent it from being soldered to the etch. Use a short length of 0.4mm wire slotted through the axle box datum holes ('F' in Figure 1) to locate it, check it sits vertically and then solder the etch in place. Position an etch and bearing at the opposite side, slot an axle through the bearings, adjust the etch so the axle is at right angles to the frames and then solder the etch in place.

Use the coupling rods in conjunction with axle jigs, to position remaining pairs of hornblock assemblies (complete with lightly oiled bearings, as above) in the chassis and, after having made a final check that everything is as it should be, solder the etches in place. Although the rod assemblies look identical, there could be slight dimensional differences between them, so it's best to label them left and right, and then use them exclusively for that particular side of the loco.

Inside motion

The inside motion (shown in Figures 4, 5 &11) is highly detailed and greatly enhances the model. Some parts are more visible than others and, if you wish, you can simplify things. This may be the most sensible option for 'OO' models where it's difficult to see between the narrower frames.

Punch out the rivet detail on the valve chest cover (18 – Fig 5) and then use two lengths of lightly-oiled 0.8mm wire to locate the part on the front spacer, as shown. Solder the cover in place and remove the wires.

Take the Top Slidebars (19 & 20 - marked left and right) and bend down the sides of the crosshead sliders (part of the bar etch) to about 30 degrees. Punch out the rivet detail and straighten them as necessary, making sure you don't flatten the rivets as you do so.

To fit the bars, work from below, holding the left hand bar (19) at an angle, push the rear end as far as it will go into its location in the motion bracket, then swing the front end up and locate it in the front spacer. Now push the bar fully forward, into the front spacer, and solder it in place.

The opposite bar is fitted differently: slot the front end into its location in the front spacer, far enough forward to allow you to swing the rear end up past the front face of the motion bracket. Slide the bar back into its location slot in the bracket, as far as it will go, and solder the part in place at both ends.

Now you can fit the Bottom Slidebars (21 & 22) but before doing this, bend the crosshead details (also part of the bar etch) through 90 degrees, then use a short length of 0.8mm wire to detail the LHS crosshead. Solder the wire in place and file it so it's slightly proud at the front (the side with the detail and bend line) but make sure it's flush with the etch at the back. Manoeuvre the bars forward, into their locations in the front spacer, then swing the back ends up and push them fully back into their locations in the motion bracket, before soldering them in place. To finish off the slidebars, locate the LHS Connecting Rod (23) flat up against the left face of the LHS crosshead – the top of the part butts up to the underside of the lower slidebar with the front edge locating behind the small notch on the bar – and solder it in place.

Bend up the sides of the Lubricator Support Bracket (24) to form a channel-section, and then solder this in place across the top of the chassis, as shown in Figure 1. Refer back to figure 5 and layer up the valve rods (25 x4) to make two identical pairs, try a length of 0.7mm wire through the rear ends – the wire should be a sliding fit – then slot one of the rods through the rectangular opening in the motion bracket, locating the front end in one of the notches in the lubricator support bracket. Slide a length of 0.7mm wire through the frames at holes 'J' (see Fig. 1) and through the rear end of the rod – this will support it, as well as setting the angle.

Check the rod locates fully home in the underside of the bracket, and that it runs parallel to the frames, then solder it to the bracket, but leave the support wire free. Carefully slide out the wire at the rear, then repeat this whole process for the second rod. When both rods are in place, solder the support wire into the frames, and then solder the rear end of both rods to the wire. Trim the wire flush with the outside of the frames.

Run a square file through the support bracket channel to smooth off the excess tags protruding above the top surface, then use two short lengths of 0.7mm wire - these will represent oil pots - to locate the Lubricator Bracket Detail (26) in the channel. Solder this in place, then trim the tops of the wires flush with the side edges of the channel.

The valve tails (just visible) can be represented using lengths of 0.8mm wire slotted through the front spacer. Butt them up against the valve rods (under the lubricator bracket) and solder the wire into the front spacer, then trim off the excess at the ends where they protrude through the front spacer.

To finish the valve gear, solder the Motion Bracket Rear Layer (27 in Figure 1) to the rear face of the motion bracket to give it a prototypically heavy appearance.

Select the Brake Spacer Tabs (28 x6 or 29 x6 – see Fig.1) you require (the shorter ones are for P4) make the bends and slot them into their locations, making sure the tails are facing in the right direction inside the chassis. Once in place, solder the back portions hard up to the frames' inside faces, using the small holes for solder access.

Bend over the spacing tabs along the top edge of the ashpan sides (30 & 31) then locate one of the sides into the small notch, situated at the bottom corner of the midway spacer '7'. As you do this, slide a length of 0.7mm wire through hole 'K' in the frames, and then do the same for the other side as you push the wire out through the opposite frame. Check the parts are level, and that the tabs are pushed hard up to the frames, then solder them in place before grinding the wire flush with the outside of the frames.

Cut three lengths of 1mm O.D. tube, so they are slightly longer than the distance across the outside edges of the spacer tabs, then slot these through their holes in the chassis. Locate the brake pivot details (32 x6) over the tubes, position the tubes so an equal amount protrudes at either side then, after checking the details are straight, solder the tubes and details in place. Trim the outer edges of the tubes so they are perfectly flush with the outer faces of the brake spacer tabs, being careful not to file anything off the tabs themselves.

Open up the holes in the brakeshaft journals (33 & 34) and the large alignment holes in the tags 'L' on the frames (see Figs 1 &17) to suit 1mm wire. Locate the journals on the dogleg spacer; when in position, bend over the small tabs at the tops, to lock them in place – you can also see this in Figure 12. Now use a length of lightly-oiled 1mm wire, slotted through alignment holes 'L' and the journals, to accurately position the parts and then solder the journals securely to the spacer. Slide out the wire, but don't trim the alignment tabs off yet as they will be used later to set up the brakes.

Solder the front bufferbeam webs (35 x2) in place, making sure they are level and straight. There are two types of Small Footplate Supports (36 x3 & 37 x3)) which are specific to their location in the chassis. Slot these parts into place and, after making sure the bend lines face right way, fold over the tabs at the inside of the chassis before securing with solder. Working back along the chassis, solder the Large Footplate Supports (38 x2, 39 x2) in place. Now make the main bend (but not the smaller bends at the ends of location tabs) on the Rear Bufferbeam Webs (40 & 41) and slot these into their locations at back corners of the chassis. Once in place, you can bend over the ends of the tabs on the inside and solder the webs in place.

If you have a rivet press, carefully punch out the rivet detail in the railguards (42 - 45). Solder the guards in place at the ends of the frames, as shown in the diagram, make the 45 degree bends and then strengthen these with a small amount of solder. Add the Hornstays (46 x2) centrally, to the bottom of the rear wheelset openings.

Note the position of the rivets on the various rivet details (47- 49) – the right and left sides of the chassis are mirror images of one another. Add the river details to the chassis using solder, but be quick with the iron to avoid melting the solder that holds the webs in place. If you don't feel confident about doing this, then you can attach the details later, using glue.

With the main chassis assembly pretty much done, clean up the etches, but leave painting until after you've made the brakegear.

Fixing the body

Try the chassis in place. The body is supported by the top edges of the chassis, at the front and rear only. Check for mould pips on the underside of the body; smooth out uneven areas and remove any obstructions. The rear face of the cylinders (part of the front spacer) protrudes up between the front splashers, so the detail is visible when the body is fitted. Figure 11 shows the position of the etches when the body is fastened in place.

To make room for the gearbox, you'll need to hacksaw about 9mm from the rear end of the cast metal boiler section. Offer up the chassis with the gearbox and motor temporarily fitted, to check the clearance. The rear weight/bunker casting can be glued in place, but make sure that its tapped screw hole lines up with the hole in the plastic body, as this will be used to fasten the chassis.

Solder an M2 nut into the recess in the Body Fixing Plate (50) using a lightly-oiled bolt to position it. Remove the bolt and fold the part to shape, then strengthen the bends with solder. De-grease the assembly and then use epoxy to glue it into the cavity under the smokebox. Position the assembly so the bottom surface is level with the underside of the footplate, and push it as far forward as it will go. Before the glue sets fully, offer up the chassis to check the hole lines up and adjust as necessary, then allow the adhesive to dry.

Now secure the body - the front fixing uses an M2 bolt (cut to length) but the rear utilises the model's original fixing screw, which fastens into the underside of the rear bunker/weight casting.

To accommodate the front wheelsets, P4 Modellers should carefully grind away material from the inside faces of

the splashers. The amount removed will depend on how much sideplay you'll need, but 0.5mm per side should be ample – any more and you risk breaking through the splasher front.

Compensation
This model features our unique, low-friction, 'Floating Beam' system with full 4-point suspension. In this set-up, the weight-bearing, radial pony truck pivots in all directions at single point.

To fit the compensation beams, cut 2 lengths of 1.6mm O.D. tube, so they fit snugly between the frames, but without being tight. Ream out the central hole in the compensation beams (51 x2) so the tube is a good fit, and then open out the beam pivot wire hole 'M' in the frames to 0.8mm diameter.

Position the beams 1mm from the edge of the tubes, and secure the tubes in place with a good strong fillet of solder. Manoeuvre the assemblies into position, so the 'feet' sit on top of the brass hornblock bearings at the front and middle wheel locations - this is illustrated in the cutaway view in Figure 11 - and then slot a length of 0.8mm wire through the holes ('M' in Fig. 1) in the chassis, and through the tubes. Because of the valve gear, there's not a lot of clearance above the beam, but there is enough, as long as all components are square and straight. Once in place, check the beams pivot freely - if they don't, look for obstructions: tabs or wires which may be protruding inside the frames; beams catching on the hornblock etches. Ensure that the beams sit parallel to the frame sides. It's essential that the beams and hornblocks work correctly together, in a smooth see-saw motion with no tight spots. Don't fix the pivot wire in place just yet as you may need to make adjustments.

Rear Pony Truck
This is illustrated in Figures 11 and 12. For **both rigid and compensated** set-ups, open out the hole at the front end of the Pivot Arm so the small brass Pivot Bush is a good fit. Push the bush fully home into the hole, then file the smaller diameter end so there is about 0.2mm standing proud of the etch.

Bend up the Axle Carrier (52 – 'OO, EM or P4) to make a 3-sided box-shape, solder it together, then ***very carefully*** open out the bearing holes and solder the 2mm axle bushes in place. Bend the small locator tab 'N' down through 90 degrees

Bend the strengthening ribs at the sides of the Pivot Arm up through 90 degrees, then fold the central reinforcement (the fold lines are on the outside of this bend) and solder this flat to the underside of the arm. Now fold the end of the Pivot Arm through 90 degrees and push this end up through the Axle Carrier, with the small locator 'N' registering in the slot, then nip the two parts together as you solder them to make a solid unit.

For a **rigid chassis**, solder the Wire Anchor Plate (54) in place, centrally on the axle carrier etch, as shown, You won't be using the beam, instead, locate the tab on the Fulcrum Plate (55) into the small notch in the underside of the dogleg spacer and solder the part hard up to the rear, vertical face.

For **all types** and gauges, invert the chassis and manoeuvre the Pony Truck Assembly into position. Once the bogie's in place you can fit the pivot bush in place and slot a 14BA nut and bolt through the pivot, then tighten the nut and trim off the excess bolt length. The pony truck should be free to move sideways, with a small amount of vertical movement.

To make the 'Floating Beam' for a **compensated chassis**, cut a length of silver steel bar to 35 mm long and remove the burrs. Bend the Beam Anchor (56) to shape: make the inner, right angle bends first, followed by the outer bends, the latter being 180 degrees with the bend lines on the ***outside*** of the fold (so the Xs on the etch go together). Once you've soldered the layers solid, check the 2mm bar will pass through the top holes.

Temporarily fit an axle to the rear driver location and position the Beam Anchor on the axle. To keep it in place you can slot a length of 0.4mm wire through the bottom hole – on the final assembly, the ends of the wire can be bent over to prevent keep the anchor in place on the axle.

To fit the beam, slot the silver steel bar between the sides of the opening in the rear spacer, continuing through the holes in the various components, until the bar sticks out just beyond the front of the beam anchor. Use a non-corrosive flux to solder the bar into the anchor.

For a **rigid chassis**, the pony truck needs to be independently sprung. Slide a length of spring wire (not supplied, but guitar strings are ideal and come in a variety of thicknesses) through the small hole in the Wire Anchor Plate (on the pony truck) and continue to thread the wire through the Fulcrum Plate, over the rear driver's axle, and finally into one of the vertical row of holes in the Midway Spacer. When you're setting up the chassis for the final time, you can adjust the down-force on the truck by altering which holes you use.

Setting up the chassis
To allow the course wheel flanges to fit inside the splashers, the original model's footplate has been raised by about 1mm, with a corresponding amount being added to the bottom edge of the bufferbeams and the buffers dropped down the beams. Consequently, when the High Level chassis is fitted, the buffers will sit too low. If you wish to correct this, you'll need to reposition the buffers 1mm higher up the beams. You can also remove 1mm of material from the bottom edge of the beam if you wish, although you will loose some rivet detail if you do this.

The Pony truck wheelset should be washered between the back of the wheel and the axle bush, to eliminate all axle sideplay in the truck itself. The movement of the truck is limited, either by the wire (for a rigid chassis) or by compensation beam, as they touch the stops on the rear spacer. Check the pony truck wheels cannot touch the frames and, if the do, add packing pieces to the stops.

Temporarily fit the driving wheels, including any washers that may be necessary to eliminate sideplay and then try pushing the chassis around your curves, to see how much sideplay you actually need - this applies to both rigid and compensated chassis. In OO and EM gauges, we've allowed for up to 0.5mm sideplay (total 1mm) on the middle driver. For P4, the sideplay should be no more than 0.3mm either side. If the chassis still won't go around your curves, allow a small amount of sideplay at the outer driving axles.

For a rigid chassis, the ride height and levels shouldn't really need adjusting, but you fine-tune this by adding packing between the body and chassis top. If you're building a compensated chassis, then you may need to make some very fine adjustments. You can alter the height at the front of the loco, either by filing the ends of the compensation beam to lower the front end (e.g. for Ultrascale wheels which are slightly larger diameter) or, you can raise it by attaching a small amount of packing onto the tops of the hornblock bearings. The rear end of the loco can be raised by adding a small piece of packing to the top surface of the axle carrier. It may be wise to fit the body at this stage, so you can check the overall levels.

When the chassis sits level, and at the correct height, trim the compensation beam pivot wire to length (to the same overall width as the chassis) and then fix it into the firebox with a small amount of glue at one end only. Make sure the glue doesn't penetrate into the tube. Leave the wheels in place.

Brakegear assembly
This method of assembly creates a set of brakegear that is fully removable, as well as totally prototypical in appearance. Do not solder anything until the instructions specifically say so. Figures 11 and 12 show the how the completed brakegear assembly integrates with the chassis. Take particular care not to damage the assembly jig, which is also part of the main fret, when removing the components contained within it. The jig is shown shaded on the fret diagram.

Remove the rear pony truck assembly, then study Figures 13 – 16. Clip out the parts from the fret as you need them. Start off by bending the detail at the front end of the Rear Brake Rod (57 in Fig 13) through 180 degrees, noting that the bend line is on the ***outside*** of the bend. Make sure the layers are flat and then add a small amount of solder to make the end solid. Slide the Trailing, LHS Detail (58) as far as it will go along the Trailing Brake Stretcher (59 - OO, EM or P4). Follow this up with the rear end of the Rear Brake Rod, pushing it along the stretcher until it clips into its small location notch and butts up to the detail. This may not be easy at first – the parts may be tight on the stretcher - but a good fit is essential for a strong and accurate job. Persevere, easing the rods along the stretcher a bit at a time, then add the Trailing RHS Rod Detail (60- identifiable by the small dot) to the outside face of the rod.

Remove the remainder of the brake parts from the fret, identifying each one as you do so. Cut three 35mm lengths of 0.5mm diameter wire, bend about 5mm over at one end to make an L-shape, and file a point at the opposite end of the wire.

The brake building jig is provided to ease assembly, and to ensure that the finished brake rod assembly is square, straight and dimensionally correct. Take the brake jig (which you've previously removed from the fret) and fold up the 6 crosswire anchors 'P', as shown in Figure 14.

Push the pointed end of one of the pre-cut, L-shaped lengths of wire through one of the holes 'P' at the rear stretcher location in the jig. Hold the rear brakegear assembly (the bit you've just done) in place in the jig, as you twist the wire, sliding it along the grooves in the stretcher, and through the semi-circular locations at the bottom of the various bits which make up the rod's rear end. If this proves difficult, perhaps because the wire's too tight, run a 0.5mm drill bit or tapered broach through the locations to open them slightly. Concentrate on getting the rod end correctly positioned in the notches, but don't worry too much about the details as they can be put right later. Continue to push the wire, until the outer end clears the jig's outer edge at the opposite side, by about

3mm. Once you've done this, put the assembly to one side and turn your attention to the front brake rod.

Bend the details over at the front end of the Front Brake rod (61) – again, the bends are 180 degrees and on the ***outside***. After soldering the end's layers solid, open up the small holes 'Q' in the rod using a 0.5mm drill, then assemble all the parts onto the Midway Stretcher (62 - OO, EM or P4) in exactly the same way as you did for the rear: Left Detail (63) then the rear end of rod itself, followed by the Right Detail (64) then refer to Figure 15. This illustrates the assembly being added to the jig, with the front end of the rear rod assembly locating in the notch on the midway stretcher. Once in place, slot the wire through the jig to secure the parts, as before.

The Leading Brake Stretcher (65 - OO, EM or P4)) can now be added. As you offer up the stretcher to the jig, locate the front end of the leading rod into the square notch in the stretcher. Lock all the parts in place on the stretcher using a length of 0.5mm wire – this runs through the jig, along the groove and through the small holes 'Q' in the lower end of the rod.

Once the parts are locked in the jig, you can line them up accurately. Push the stretchers to one side - it doesn't matter which - so they butt up against one of the inside edges of the jig. Run a straight edge along the opposite side to check alignment. Check that the brake rods are located in their notches in the stretchers, adjust as necessary then, after re-checking the alignment of the stretchers, carefully tack the ends of the rods in place using small amounts of solder. Before soldering everything up solid, make a slight bend at the small tab (tab 'R' at the rear of part 58) so it runs parallel to the side of the jig. Make a final check that all the rod details are hard up to the rod ends, then solder all the parts in place - don't forget to do the overlap (not visible behind the wheels) between the front and rear rods. Invert the jig and solder the wires into the grooves in the stretchers, taking care not to solder anything to the sides of the jig.

This brake assembly should now be pretty solid and so can be removed from the jig, but first, make a final check that the jig is still straight and true, then re-check the brakegear, carefully applying heat to any joints that might need adjustment. Once you're sure everything is straight and square, cut the jig in half at the front and rear, which will allow you to slide it away from the ends of the stretcher wires.

To make the brake hanger assemblies (see Fig. 1) locate the brake hanger front a rear layers together (66 x6, 67 x3, 68 x3) using a length of 0.7mm wire pushed the central hole, then solder the layers together. Trim the wire flush at the front, leaving about 1mm protruding at the back. Do this for all the hangers, so you have three handed pairs, and then check the top and bottom holes are free from solder.

If you wish, add the very small (and optional) hanger Pin Lock Details (69 x6) to the tops of the hangers - if you are considering using these parts, try the hangers and siderods in place to determine the clearances. Once you've cleaned up all of the above brakegear assemblies, set them aside, ready to be fitted to the chassis.

Drill out the small holes in the Steambrake Lever (70) along with its outer layers (71 x2) to 0.5mm diameter, then use short lengths of wire to locate the parts together but leave the rearmost hole free. Solder the layers together and trim the outsides of the wires slightly proud of the etch faces and then ream out other two large holes in the assembly to suit brakeshaft diameter. Now fit the Steambrake Piston Rod (72) to the fork at the rear of this assembly and slot a short wire through the holes. Carefully solder, or glue, then wire into the lever only, so the rod can swivel on the lever.

Use lightly-oiled wires (so they can be removed) to locate actuator halves together (73 x2) and solder them to one another. Open out the holes in the Brake Set-up Bars (74 x2) to suit the wires shown in the Figure 17.

To make the adjustor rod assembly, refer to Figure 13. Drill out the small holes in the Adjuster Rods (75 & 76) to 0.5mm and layer up the two halves of using lengths of lightly-oiled wire to locate them - the rear of the rod should form a forked joint. Remove the wires and add the Adjuster Cants (77 x2). When the rod is complete, check that the actuator can be slotted into its location, and that a length of 0.5mm wire will pass through the holes. Offer up the Adjuster to the rear of the brake assembly and test-fit a length of 0.5mm wire, through both the rod and tab 'R' on the stretcher. Once you're confident the parts will fit together (they are difficult to get at when the brakes are in place) separate them, ready for fitting.

Fitting the Brakegear

Slide a 30mm length of 1mm wire through the alignment tabs 'L' in the frames and journals, as before, but this time include the actuator and the steambrake assembly as you go – double-check the diagram to be sure they are in the correct order (Figures 1, 12 and 17) – the actuator is to the right of the lever when viewed from above the chassis. Centralise the wire in the chassis and solder it into the journals only, but not the tabs 'L'. The actuator should be left free to rotate on the shaft and the ends of the brakeshaft (1mm wire) should ***not be trimmed*** until the instructions specify doing so.

Move the steambrake lever and piston rod assembly to the centre of the chassis and then swing the rear end of the piston rod up and slot a length of 0.7mm wire through holes 'S' in the chassis, and through the end of the rod to set the angle. Check the lever is absolutely central in the chassis and solder it in place, to the shaft only.

Trim the support wire (in holes 'S') flush with the chassis sides but do not fix it permanently into the chassis – this is to allow the piston rod to swing down so you can fit and remove the pony truck. During final assembly you can secure one end of the wire with a small amount of glue.

It's preferable to have at least one wheelset in place as you fit the brakegear, so you can check the brake block clearance. Slide a length of 0.5mm wire into the hanger pivot tube at the front wheel location - do not solder in place – and hook a handed pair of brake hangers onto the wire (you can bend the ends of the wire over to prevent the hangers from falling off). Offer the complete brake rod assembly up to the underside of the chassis (the crosswires on the stretchers should be on the bottom) and hook the front stretcher's wire ends into the bottoms of the front hangers. To temporarily hold the hangers in place as you assembly the rest of the brakes, try pushing some Blu-tack, or tight-fitting plastic wire insulation over the ends of the crosswires.

With the front hangers in place, swing up the rear end of the pull rod assembly, add the rear pair of hangers to the outsides of the crosswires and slot the top wires into the tubes. Push the set-up bars (74 in Figure 17) over the protruding ends of the brakeshaft, locating the bars over the ends of the rear hangers' crosswires as you go. Slide the set-up bars hard up to the rear hangers, check they run parallel to the chassis, and then tack-solder the bars in place at the outer ends of the brakeshaft only.

The angle and position of the brakes is now set, so you can go on to fix the parts in place. Push the front hangers hard up to the spacer tabs (28 or 29), to the tubes in the chassis and to the stretchers, so they sit vertical relative to the frames (Fig. 18). Note that the short length of 0.7mm wire at the back of the hanger butts up to the tabs, which prevents the hangers from moving too close to the wheels. Solder the hangers to the bottom wires/stretcher but do not solder the top wires in place. Do the same at the rear hangers, and then finally the middle pair.

To fit the adjuster, take this assembly and locate the front end into the notch in the rear stretcher (Fig. 13). Add the Adjuster Rod End Detail (78) then slot a short length of 0.5mm wire through Tab 'R', and through all the parts to lock them together. Swing the actuator into position, so it locates into the forked rear end of the adjuster, and then slide a lightly oiled length of 0.5mm set-up wire through the set-up bars (74), the tabs (L), and the adjuster rod end and actuator assemblies. Check the position of the parts – the adjustor should run parallel to the frames, but off-centre by about 1.6mm.

Solder the front of the adjuster securely to the main brake assembly and trim the wire (through 'R') slightly proud of the etches at both sides to represent a pivot. Now solder the actuator to the brakeshaft only, but ***do not*** solder it to the adjuster. The set-up wire (which should always be removable from the actuators) can be clipped off at the tabs 'L', but leave some wire in the actuators to retain the adjuster. This wire can be trimmed to exact length later.

Clip off the outer ends of the brakeshaft, just behind the set-up bars and remove the bars. Trim all the crosswires at the bottom of all the hangers so they are very slightly proud at both sides. Do the same for the top wires, which should always be removable.

Go to Figure 7. Carefully grind away the Alignment Tags 'L' from the frames and tidy up the edges – while you're doing this you can also trim the brakeshaft to length, but make sure you leave enough length at the ends to allow the handbrake lever to be fitted (see below).

Bend over the small circular layers at the end of the handbrake lever (79 – see Fig. 1) solder them solid, then open out the slot so a length of 0.5mm wire will pass through. Bend the lever to shape – the bends should be 45 degrees – strengthen the bends with solder and then add the part to the left side of the brakeshaft. Bend a length of wire into an 'L' shape, then slot this into the lever and locate the top end of the wire into notch 'T' in the chassis – if you wish you can detail the wire using a 5mm length of 1mm O.D. tube to represent the adjuster. Solder the lever in place, hard up to the LH journal.

Set the loco down and view the brakegear, paying particular attention to the clearances between the shoes and the wheels - the hangers should be set at the correct distance from the wheels. Remove the brakegear by pulling the wire out from the actuator, and sliding out the loose wire from the tops of the hangers. Once the brakes are removed, trim the short length of wire at the front of the adjuster, so it is slightly proud at both sides, then clean up the complete assembly. For Armstrong Whitworth type locos (without the 'J' Hangers) grind the outer ends of both ends of the brakeshaft, so the shaft is very slightly proud of the etches.

For engines, with ‘J’ type hangers, trim the right side the brakeshaft slightly proud, as above, but make the left side flush with the handbrake lever face. Now drill out the holes in the separate Rear Spring Anchors (80), then add them to the inside of the chassis. Once soldered in place, slot a length of wire up through these assemblies, solder the wire into the holes and trim the ends so they match the others.

With the brakegear still off, remove the wheels and use epoxy to attach the balance weights (81X 2, 82 x2 & 83 x2) making sure the half-etched grooves are nearest the wheels, and that the etches lie flat and don't foul the rods. Note the position of the weights (illustrated in Figure. 1) relative to the crankpins and spokes. *The sides should mirror one another?*

Pre-drill the holes at the bottom of the front sandbox castings (84 & 85) and secure them to the underside of the footplate using Epoxy. Fit the chassis to get their position right – just ahead of the front brake hangers, and butted up to the inner edge of the plastic valance. Once the glue has set, invert the loco and slot lengths of 0.4mm wire into the pre-drilled holes in the front sandboxes. Shape the wire so it runs down to the wheels, as illustrated in Figure. 19. Check the brakegear can be fitted and removed without the pipes getting in the way.

When you do come to refit the brakegear, slot in wires at the tops of the hangers (you can put a slight bend in the wires to make them tighter in the tubes) and trim them so they protrude slightly beyond the hanger, to represent the pivot. Fit a short length of wire to locate the forked adjuster on the actuator at the rear - the tension in the brakegear should be enough to hold it in place and, failing that, a blob of paint will undoubtedly do the job but, if it still works loose, secure it with tiny amount of glue.

Gearbox assembly

Study Figure 8. Before cutting the gearbox etch (86) from the fret, progressively drill out or ream each of the holes to accommodate the shafts and bushes shown in the diagram. Components should be offered up until they are a tight push-fit in their holes. Once the gearbox is assembled, the shafts are fixed but the gears are free to revolve.

Remove burrs by inserting the tip of a drill bit (of much larger diameter than the hole) and gently rotating it between your fingers. Solder the 1/8in bushes into place with the larger-diameter shoulders on the same side of the etch as the bend lines. At this stage you can file the non-shouldered face of the bushes flush with the etch or, alternatively, leave the bushes full length for now, then trim them to size later (they should fit between the hornblocks or bearings with enough clearance to allow the gearbox a little sideways movement)

Cut the etch from the fret with a heavy blade and trim off the tabs. Bend the gearbox shell to shape, as indicated - a three-sided box with all bend lines on the inside of the gearbox - and then strengthen the inside corners with fillets of solder.

Solder the stage one spacer (87) into its location, using a length of gearshaft to position it, then file off the protruding tab flush at the rear, so the motor mounting plate is smooth.

Using a carborundum disc in a mini-drill, cut two 2mm gearshafts, so their lengths equal the overall width of the gearbox. Wear effective eye protection – cutting discs can and do disintegrate if they snag. Remove any burrs with a fine file. Offer up the shafts to their respective holes. Because they are a tight fit, you will only be able to pass them through both sides of the gearbox if it is truly square. If they won't go through, then the gearbox hasn't been folded accurately. Light finger-tweaking should put things right.

De-flux the gearbox by scrubbing with household cleaner, then rinse and allow to dry. Check that the gears themselves are free from any dust or swarf left over from manufacture. Cut a length of insulated wire into two equal lengths and solder to the motor brush tags. Insulate the terminals with tape. For testing, connect the other ends to the output leads of your controller.

The stage 1 double gear will be one of three types - 15/10T (30:1), 20/10T (40:1) or 27/10T (54:1) - depending on the overall reduction ratio of the gearbox. Fit the stage 1 gearshaft and the double gear and fix the shaft using a small amount of glue at one end.

Slide in the idler gearshaft, slipping on the thin 20T. gear, and a 2mm spacer washer (88) (Note that the boss on this gear runs nearest the gearbox side). Secure the shaft to the gearbox sides and then turn the gears by hand - the gears should run smoothly, without resistance. Temporarily fit the axle, along with the brass 20T. gear and test again for smoothness.

Some brass worms supplied to us are fractionally tighter than others and if they aren’t an easy push-fit, they can be gently forced onto the shaft in a vice. Hold the motor by the rear of the shaft and don’t use excessive force or

the shaft may bend. Instead, use a broach to ease the fit of the worm and then, if necessary, secure the brass worm with a small drop of Loctite 601 at the outer end of the motor shaft.

Fit the worm onto the motor shaft (at the mounting screw end) so it's mid-point is about 5.5mm from the motor face (i.e. - so the worm lines up with the stage 1 gearshaft when the motor is fitted into the gearbox). Sight through the opening in the gearbox sides to check the mesh with the worm - there should be daylight between the gear and the worm, but avoid having too much backlash. If necessary, loosen the motor fixing screws, adjust the mesh and then lightly glue the shaft in place at both ends. Now test the gearbox under power and then, when all is well, remove the driven axle and brass gear.

The gears are effectively self-lubricating but a little plastics-compatible grease will do no harm. Do not use general-purpose modelling oil, which attracts dust and grit. Metal-on-metal contact areas (motor bearings, axle bushes) should be lubricated with a tiny amount of ultra-adhesive oil.

Fit the motor pivot pin, using a length of 1.5mm diameter wire, slotted through the holes 'G' (Figure 1). The length will depend on the motor you use – to determine this, carefully open out the Motor Anchor (89 – see Fig 17) until it is a tight, push-fit over the boss on the rear of the motor (14 series Mashima) and adjust the smaller hole so the 1.5mm wire is a sliding fit. Push the anchor over the motor's rear boss then try the motor/gearbox unit in place. Adjust the position of the wire until it protrudes about 2mm forward of the Motor Anchor, then solder the wire into the motor support and rear, then trim it just behind the hole in the spacer.

Final Assembly
Once you've painted all the parts they can be assembled for the final time.

Refitting the Pony Truck is more difficult now the brakeshaft is in place. To do this, first, remove the support wire (through 'S') which allows the Steambrake Piston Rod to swing down below the chassis. Invert the chassis and, holding the truck assembly on its side, position the narrow, front (pivot) end in the space between the brakeshaft and the dogleg spacer's (9) bottom face. Start to turn the truck as you move the assembly forward, guiding one of the rear corners of the truck into the opening for the axle cutaway in the frame. Continue to move forward as you twist the bogie into the horizontal plane then, once it's in place, add the pivot bush and fixings. Test the movement of the bogie and when you're happy that all is well, swing up the Piston Rod, refit the support wire and secure one end of the wire with a tiny amount of glue.

Re-fit the wheels, but this time, include the gearbox and motor. Hold the unit in position, with the motor anchor located over the pivot, and slot the driven axle through the frames, along with the gearbox and final drive gear, but do not tighten the grubscrew yet.

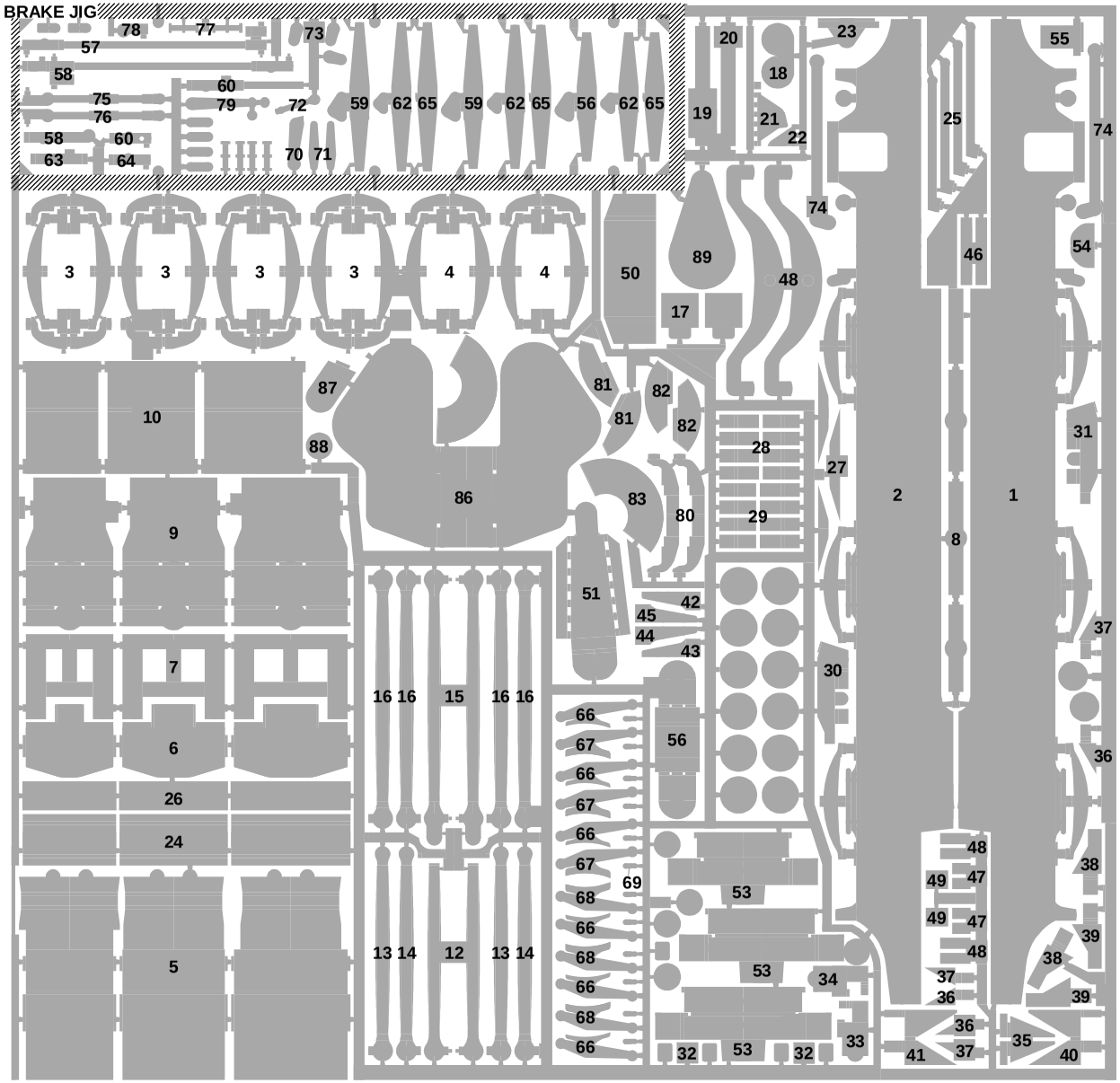
The kit includes axle washers of varying thicknesses, which can be used to limit axle sideplay. Fit all the wheelsets, complete with crankpins, and quarter the wheels, - the right hand cranks lead by 90 degrees. Now add the bushes to the crankpins, followed by the coupling rods, and check for free running before fitting the securing nuts.

If you haven't already done so, check the pony truck wheels don't touch the frames, adding packing as necessary to adjust the sideplay (see above). Push the chassis along your track, to check for free-running. Once you're sure there are no obstructions or tight spots, centralise the driven axle and the gearbox in the chassis, tighten up the grubscrew in the brass gear, and then test the chassis under power.

Now wire up the Pick-ups. For wiper pick-ups, attach short lengths of copperclad strip to the suitable mounting points, using epoxy to secure them, and then solder the pick-up wires to the strips, so they make light contact with the wheel treads. For plungers, wire up feeds from the plungers to the motor,

Give the chassis a good run on the track. If there's a tight spot, don't try winding up the controller in an attempt to blast through it, or you'll be asking for trouble! Better to investigate and, if necessary, dismantle the mechanism, working backwards through the assembly sequence, testing at each stage until you find the cause. Once the loco is running smoothly, fit the brakes as described above.

CHASSIS KIT FOR GWR 56XX



PARTS LIST

1. Chassis Frame - LHS
2. Chassis Frame – RHS
3. Spring, Front, Middle (x 4)
4. Spring, Rear (x2)
5. Front Spacer
6. Motion Bracket
7. Midway spacer
8. Motor Support
9. Dogleg spacer
10. Rear Spacer
11. Rear Spring Dampers (x4)
12. Front Coupling Rod, Middle Layer (x2)
13. Front Coupling Rod, Inner Right, Outer Left (x2)
14. Front Coupling Rod, Inner Left, Outer Right (x2)
15. Rear Coupling Rod, Middle Layer (x2)
16. Rear Coupling Rod, Outer Layer (x4
17. ‘OO’ Beam stop (x2)
18. Valve Chest Cover
19. Top Slidebar – LHS
20. Top Slidebar – RHS
21. Bottom Slidebar – LHS
22. Bottom Slidebar – RHS
23. Connecting Rod
24. Lubricator Support Bracket
25. Valve Rods (x4)
26. Lubricator Bracket Detail
27. Motion Bracket Rear Layer
28. Brake Spacer Tab - ‘OO’, EM
29. Brake Spacer Tab - P4
30. Ashpan – LHS
31. Ashpan – RHS
32. Brake Pivot Details (x 6)
33. Brakeshaft Journal – LHS
34. Brakeshaft Journal – RHS
35. Front Bufferbeam Web (x2)
36. Small Footplate Support, LHS front and mid, LHS rear
37. Small Footplate Support, RHS front and mid, RHS rear
38. Large Footplate Support LHS (x2)
39. Large Footplate Support RHS (x2)
40. Rear Bufferbeam Web – LHS
41. Rear Bufferbeam Web – RHS
42. Railguard, Front LHS
43. Railguard, Front RHS
44. Railguard, Rear LHS
45. Railguard, Rear RHS
46. Hornstay (x 2)
47. Small Web Rivet Detail (x6)
48. Large Web Rivet Detail (x4)
49. Front Corner Rivet Detail (x2)
50. Body Fixing Plate
51. Compensation Beams (x2)
52. Pivot arm
53. Axle Carrier (OO, EM or P4)
54. Wire Anchor Plate
55. Fulcrum Plate
56. Beam Anchor
57. Rear Brake Rod
58. Trailing Rod LHS Detail
59. Trailing Brake Stretcher (OO,EM,P4)
60. Trailing Rod RHS Detail
61. Front Brake Rod
62. Midway Brake Stretcher (OO,EM,P4)
63. Midway Rod LHS Detail
64. Midway Rod RHS Detail
65. Leading Brake Stretcher (OO,EM,P4)
66. Brake Hanger Rear Layer (x6)
67. Brake Hanger Front – LHS
68. Brake Hanger Front – RHS
69. Pin Lock Details
70. Steambrake Lever
71. Steambrake outer layer (x2)
72. Steambrake piston Rod
73. Actuator half (x2)
74. Set-up Bars (x2)
75. Adjuster Rod – LHS
76. Adjuster Rod RHS
77. Adjuster Cant (x2)
78. Adjuster Rod End Detail
79. Handbrake Lever
80. Swindon ‘J’ Hanger (x2)
81. Balance Weight – Front, Rear, LHS x2
82. Balance Weight – Front, Rear, RHS x2
83. Balance Weight – Middle x2
84. Sandbox LHS
85. Sandbox – RHS
86. Gearbox
87. Stage 1 Spacer
88. Idler Shaft Washer
89. Motor Anchor

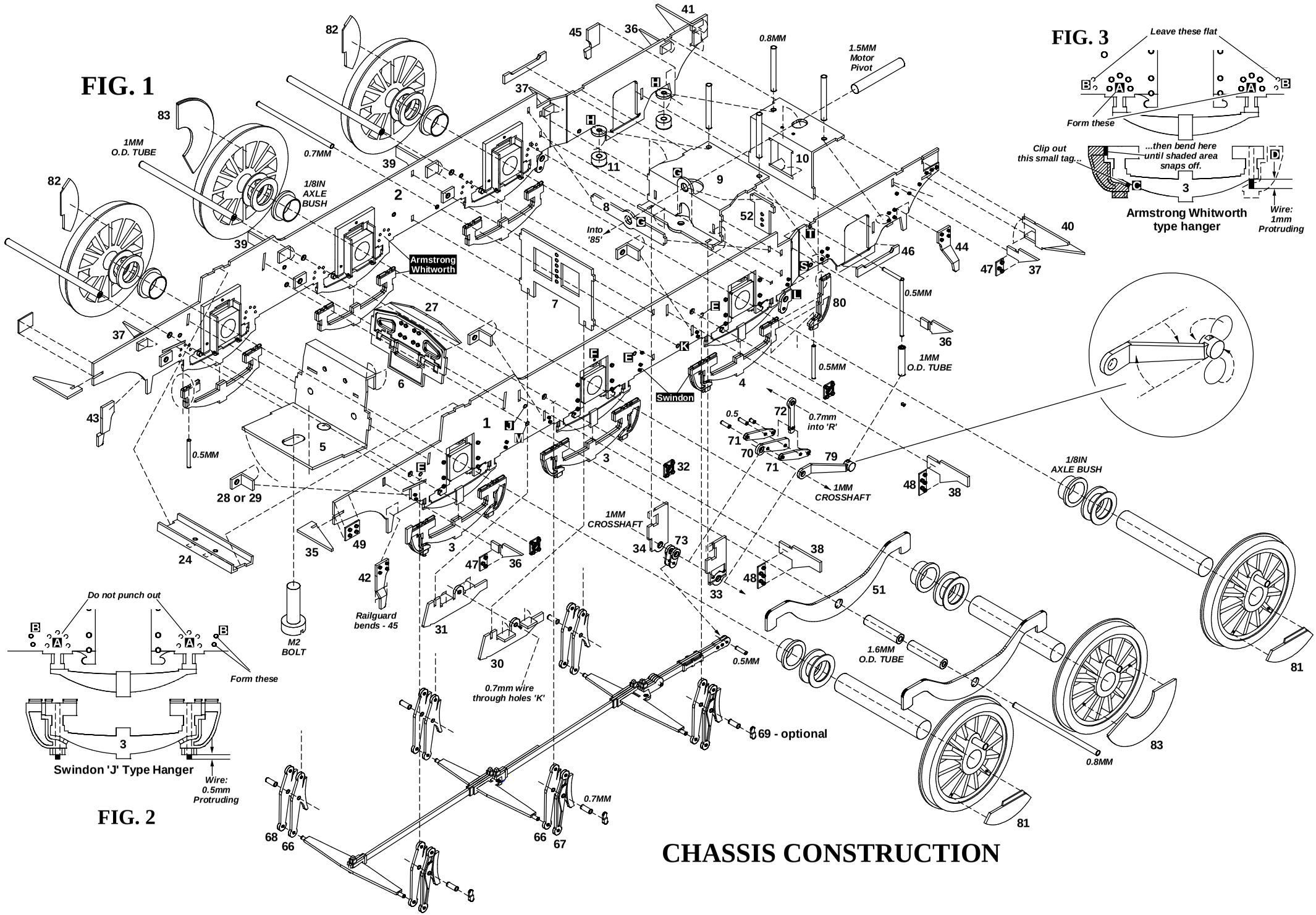


FIG. 1
FIG. 2
FIG. 3
CHASSIS CONSTRUCTION
Armstrong Whitworth
Swindon
Swindon 'J' Type Hanger
Armstrong Whitworth type hanger
Leave these flat
Form these
Clip out this small tag...
...then bend here until shaded area snaps off.
Wire: 1mm Protruding
Wire: 0.5mm Protruding
Do not punch out
Railguard bends - 45
M2 BOLT
0.7mm wire through holes 'K'
69 - optional
1MM O.D. TUBE
1/8IN AXLE BUSH
1.5MM Motor Pivot
0.8MM
0.7MM
0.5MM
1MM CROSSHAFT
1.6MM O.D. TUBE
0.7mm into 'R'
Into '85'
28 or 29

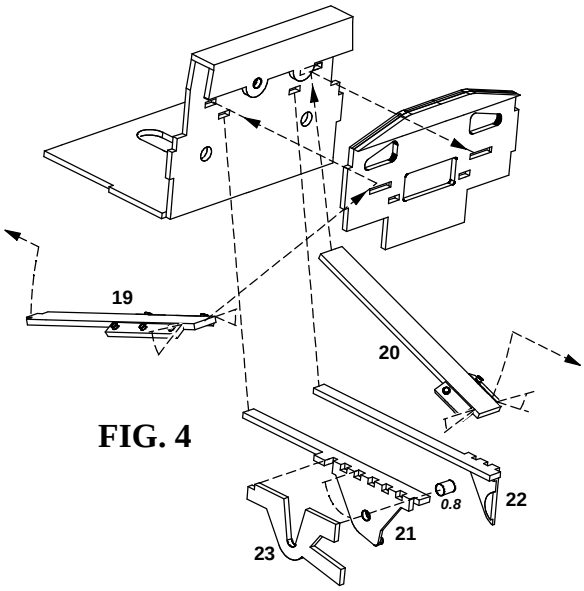


FIG. 4

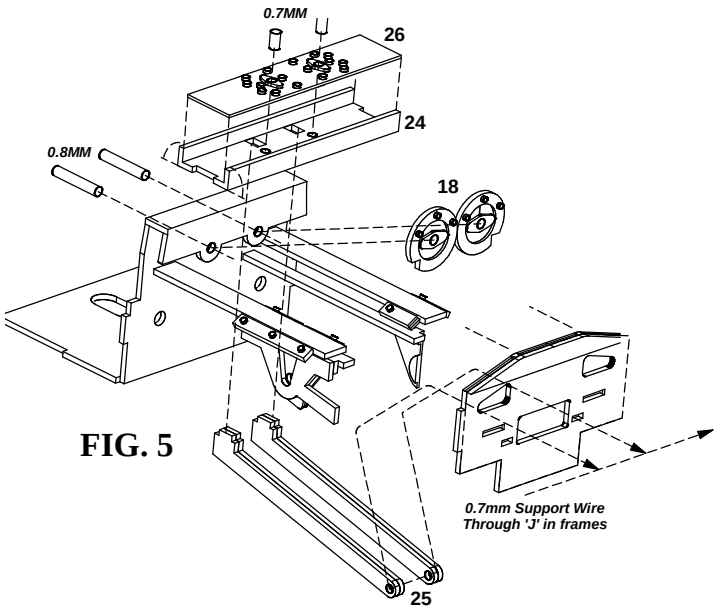


FIG. 5

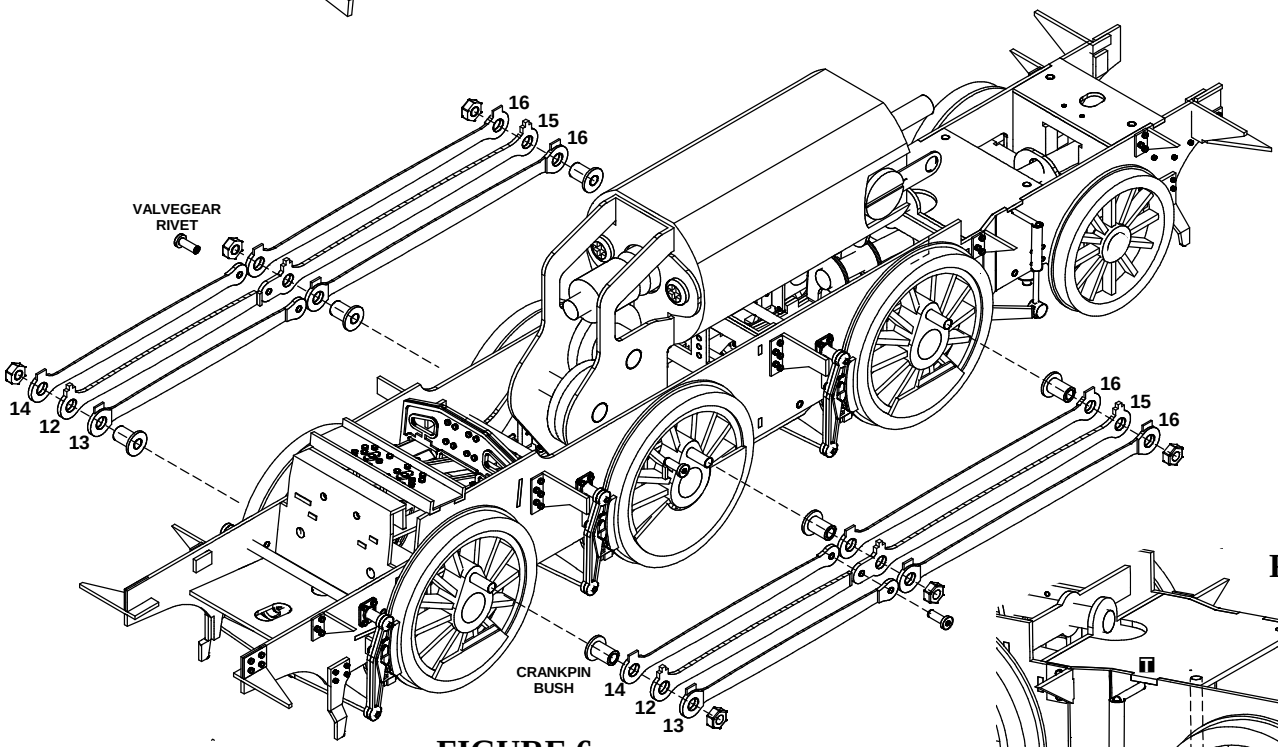


FIGURE 6

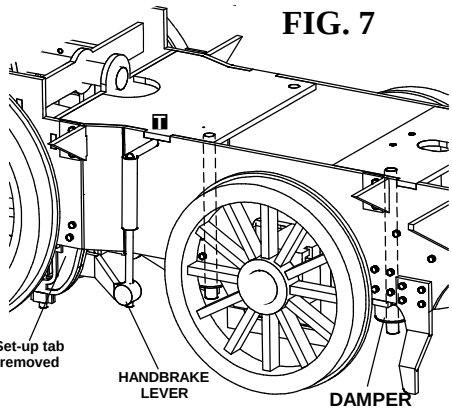


FIG. 7

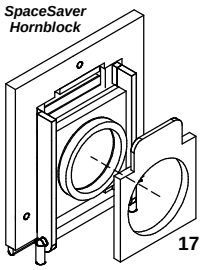


FIG. 10

FIG. 8

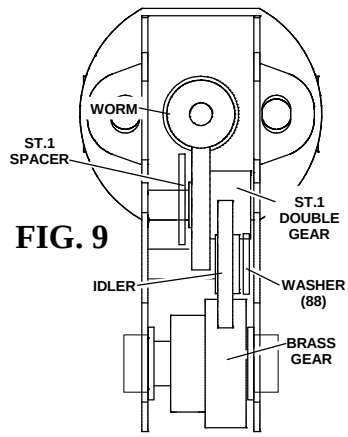


FIG. 9

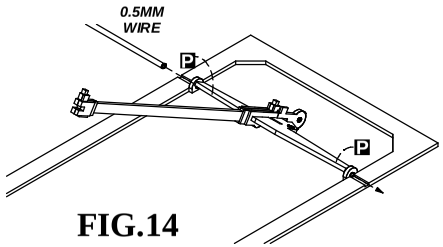


FIG.14

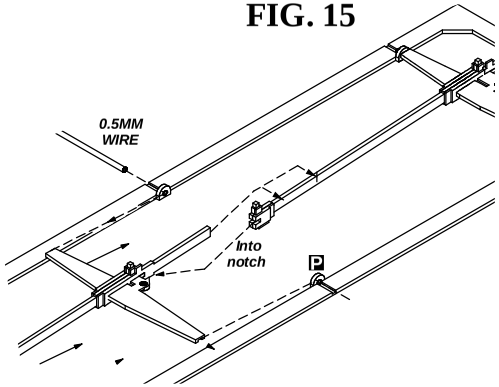


FIG. 15

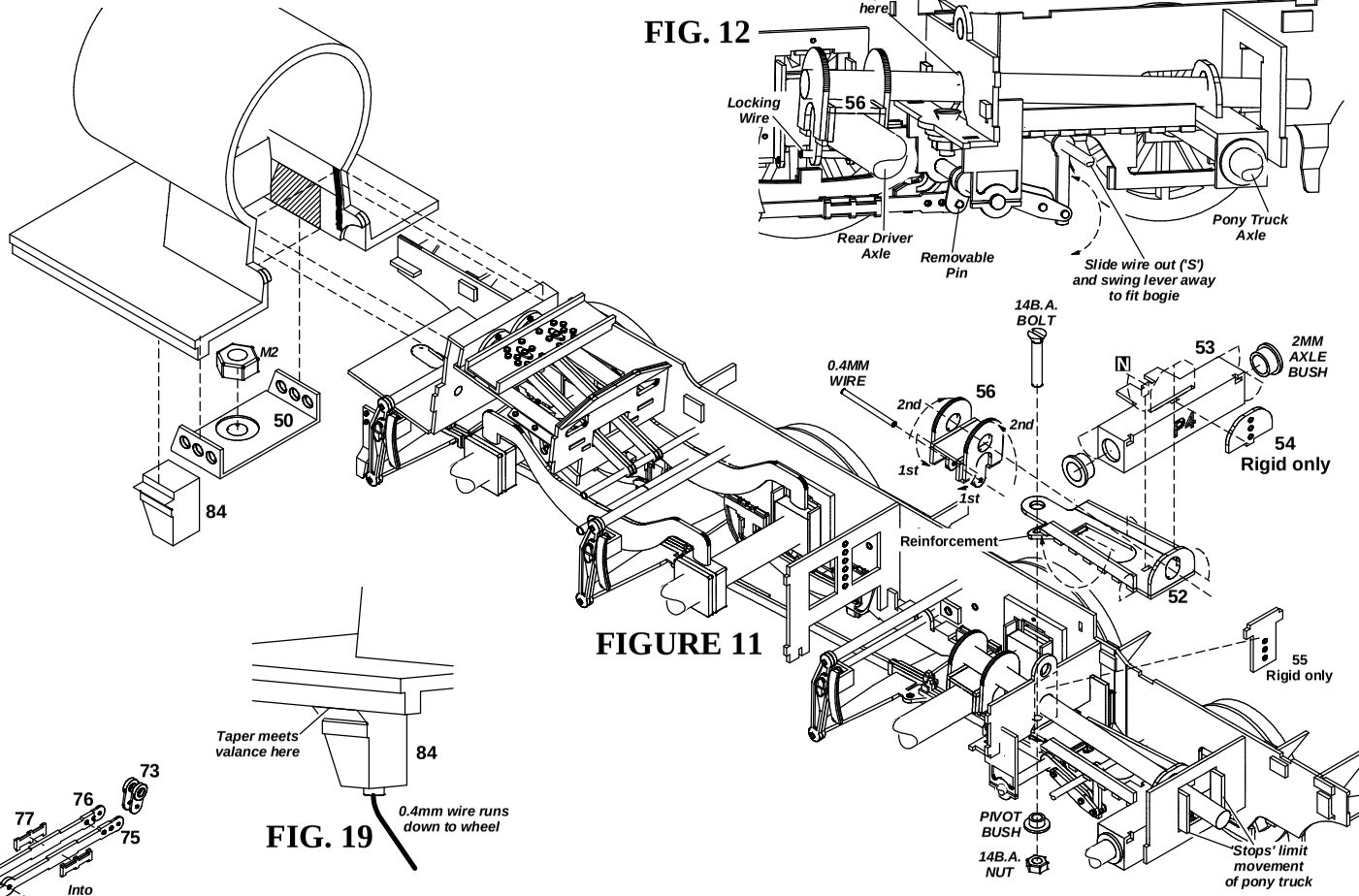


FIGURE 11

FIG. 12

FIG. 19

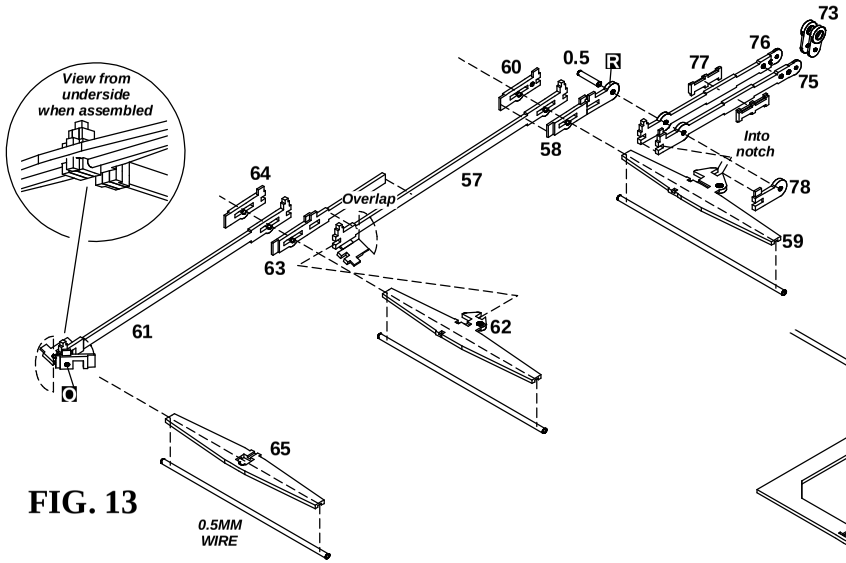


FIG. 13

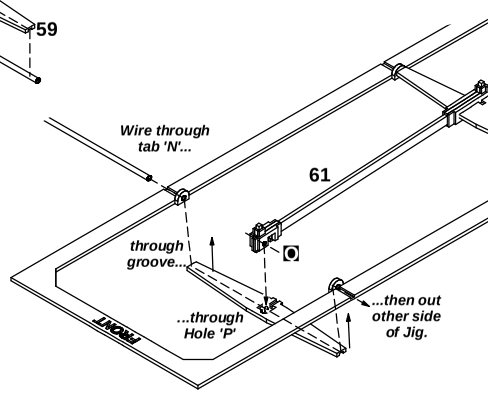


FIG. 16

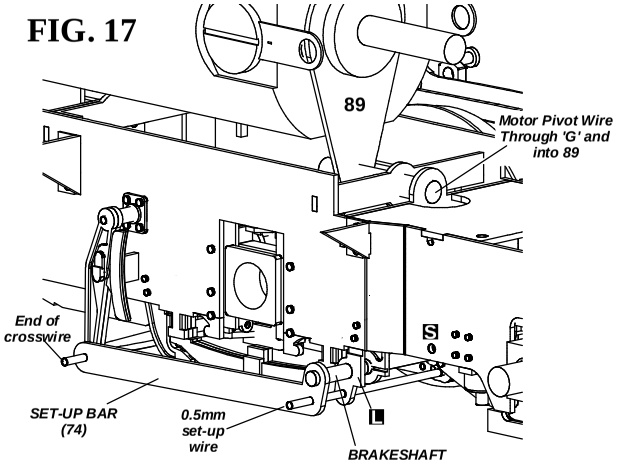


FIG. 17

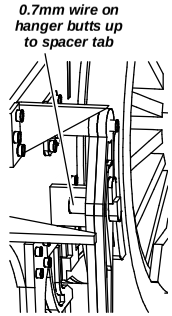


FIG. 18

HIGH LEVEL

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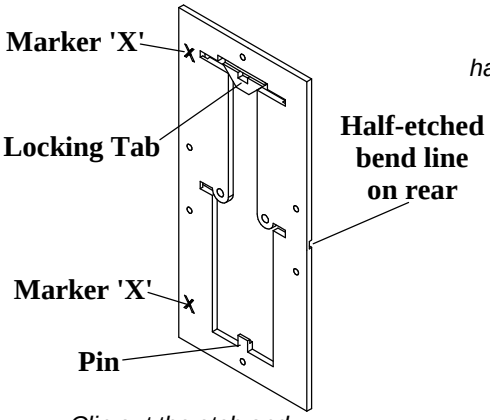
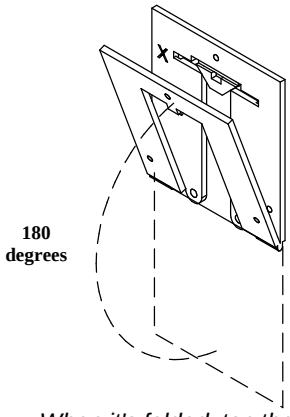


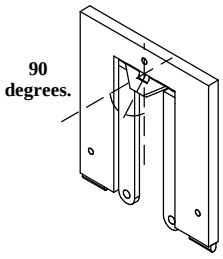
Clip out the etch and clean off any mounting tabs.

Fold the etch through 180 degrees, so the markers 'X' face each other. The half-etched line is on the outside of the fold.

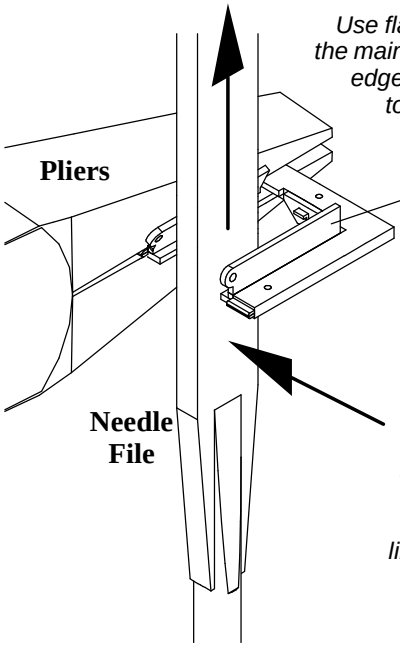


When it's folded, tap the layers between two pieces of hardwood, so they sit absolutely flat.

Hold the layers tightly together and fold the locking tab through 90 degrees, so it locates on the small pin.

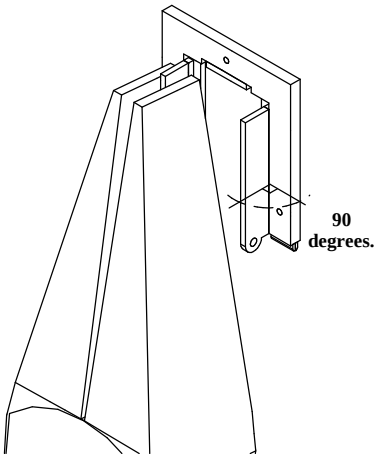


The end of a flat, pointed needle file is a good tool for this job. The tab locks the layers together, eliminating the need for solder.



Use flat nose pliers to grip the main etch,with the straight edge of the pliers close to the bend line.

Bend the horncheeks up through about 80 degrees, using a flat needle file to apply upward and sideways pressure simultaneously. In this case, the half-etched line is on the inside of the fold



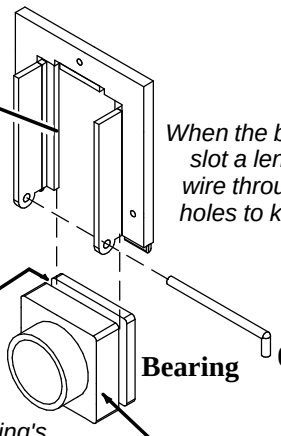
Finish off the horncheek bends so they are at 90 degrees. Check this through a magnifying glass and adjust as necessary.

Use fine emery to clean up the bearing, remove any burrs and then try it in place - the groove on the block locates on the front layer of the etches.

If the bearing's tight in the etch, check that these edges aren't 'bottoming out' in the groove...

...If they are, use a file to remove the sharp 'cusp' from the edge of the etch...

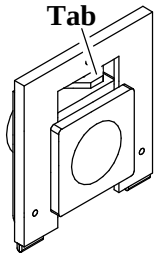
... so there is clearance in this groove...



When the bearing is fitted, slot a length of 0.4mm wire through the bottom holes to keep it in place.

...then polish the bearing's side faces until it's a smooth, sliding fit in the etch.

The completed assembly can now be soldered to the inside face of the chassis, using axle jigs. If you fit it with the bearing in place,make sure the sliding surfaces are lightly oiled, to prevent the bearing being soldered to the etch.



The top edge of the cut-outs on most loco chassis is 4mm above the axle centre. If the Standard Hornblock's tab is butted up to the top of the cut-out, the unit will sit at the correct height.

For MiniBlox, the top edge of the tab is 3mm above the axle centreline.

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