Chassis kit for Hornby/Dapol L.Y.R. 'Pug'

GENERAL NOTES ON CONSTRUCTION

This kit is designed for use with the Dapol (later Hornby) L.Y.R. Pug. This charismatic model has, over the years, been very popular although performance (especially at slow speeds) was never its strong point. Designed to take Alan Gibson (ref. G4836P) or Sharman (12mm Pug) wheels and a Mashima 1024 can motor, our kit allows you to open up the whole cab area and includes a prototypical firebox, backhead along with various other detailing parts. The Airfix Pug kit is not suitable for use with this chassis.

A review of this kit appears in *The Model Railway Journal*, and includes a good deal of useful prototype information.

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. 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 . . .

Body work

The first job is to unclip the cab. This is easily done by simultaneously pushing the front and sides inwards and lifting the cab away from the footplate (see Figure 1). Remove the screw that holds the motor in place, cut the motor wires, remove the motor, then undo the two keeper plate fixing screws and take the plate off to reveal the body fixing screws. Take these out and separate the chassis from the body. Carefully prise the motor from the footplate, along with it's plastic housing and then open out the central circular hole in the footplate to 5mm diameter, as shown. Take care when handling the footplate - it is very fragile at this stage.

To remove the cylinder assembly from the chassis, spring off the slidebar covers and store them. Now remove the cylinder securing bolt and then spring the clip at the centre of the motion bracket - as you lift the assembly off, the connecting rods should slide out from the ends of the slidebars.

Solder an M2 nut into the centre of the half-etched circular recess on the bottom of the cab floor (1). Bend up the small lugs on the floor, strengthen the bends with solder then use epoxy to secure it in place on the model - this will add strength to the footplate. Use the rectangular cutaway at the rear to position the floor, butt it up against the saddle tank and check front is exactly in line with the sides of the saddle tank. When the glue is dry, enlarge the motor cutaway in the footplate, so it matches the opening in the cab floor etch, as shown.

Bend up the chassis front section (2) and glue it to the underside of the body making sure it is central and butted right up to the rear face of the front bufferbeam.

Unless your chosen prototype dictates that you keep it, cut away the cab sheet previously used to hide the motor and clean up the inside face of the cab. Now grind the cab handrails flush inside the cab. Bend up the bunkers (3 & 4), following the sequence (A to D) shown in figure 1. When doing this, bend face 'A' slightly beyond 45° so it can be pulled back to the correct position when the bunker top (B) is folded down.

Solder lengths of 0.4mm wire into the grooves in the bunkers then bend and fit the injector operating levers (5 x2) to the tops of the wires, soldering them to the bunkers for extra strength, before trimming the wires slightly proud of the levers. Glue the bunker assemblies inside the cab - they should sit at least 0.5mm from the bottom edge (to allow clearance for the cab floor) with their tops almost flush with the bottom of the cab opening, and the front edges butted up against the cab front. Now try the cab in place on the footplate. If necessary, make a small chamfer on the inside bottom edge of the cab rear, which will assist when fitting (see Figure 1).

Bend the firebox wrapper (6) to shape using the firebox former (7) as a guide. Solder it to the former and then file the excess wrapper flush with the back face of the former. Drill out the ends of the lost wax steam turret (8) to 0.5mm diameter, as shown in Figure 1. Solder the steam turret in place, on top of the firebox, and grind the locator pin flush on the inside. Now solder the safety valve (9) to the firebox and trim the locator as above. Run lengths of 0.5mm wire down from the holes at the sides of the turret, illustrated in Figures 2 and 7, and solder them into the turret, and to the sides of the firebox where they touch.

Drill out the holes in the cast backhead (10) to suite the components shown in Figure 1. Solder the lost wax gauge glasses (11 x2) in place. Carefully solder of glue short lengths of wire into the firebox doors, with about 0.7mm protruding at the front. Push another length of this wire into the backhead to form the regulator pivot, then bend the end of the regulator (12) through 90 degrees and fix it onto the wire before trimming the wire slightly proud of the etch.

Assembling the Chassis

The chassis can be built either rigid, or with a rocking front axle to provide compensation - this is easy to effect and will greatly improve the running quality of the model.

Refer to Figure 3. For a rigid chassis, ream out all the axle bush locations in the chassis frames (13 & 14) and solder the 1/8in axle bush bearings in place. For a compensated chassis, solder only the rear axle bearings in place. Modellers building to 16.5mm gauge should file the rear axle bushes flush with the inside of the frames to allow clearance for the gearbox.

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 front axle locations. Use a cutter in your minidrill, 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 MJT hornblocks at the correct height. Now ream out the hole 'E' in the midway spacer (16) so a length of 1.5mm rod is a tight fit.

For all types of chassis, select the spacers (15 - 17) for the gauge in which you model. Note - the small dimples (used to line up parts 25 and 26) should be on the inside of the chassis frames. Bend up and fit the front L-shaped spacer (15) followed by the midway spacer (16) taking care not to accidentally remove the tiny location lugs at the sides of this part. Fit the rear spacer (17) making sure that the small drill start is situated to the left of the chassis, and solder in place. Bend down the sides then the front of the cylinder support (18 - this is the same part for all gauges). Slot it into the frames and the front spacer and then solder it in place making sure the top is level as you do so.

Layer up the coupling rods (19 x4) and connecting rods (20 - 23) as illustrated in Figure 5, and then ream out the holes to suit the crankpin bushes. When assembled, the clearance between the crosshead and leading crankpin will be limited in P4 (and to a lesser extent in EM). To prevent them touching, the front layer of the rods can be cut as shown (best done before layering the rods) and the crankpin bush reversed after having been filed to length. If this is done, the bushes on the other crankpins should also be reversed, so the connecting rods run parallel to the frames.

For a compensated chassis, assemble the MJT hornblocks according to the manufacturer's instructions. Use the coupling rods, in conjunction with axle jigs, to position the front hornblocks - you'll need to trim about 0.5mm from the leading edge of the hornblock etch (see Fig. 3) which can be easily done with sharp scissors. The front axle pivots on a length of 1.5mm rod, which locates in the midway spacer (16). To set the ride height, slot a short length of rod into the hole 'E' in the spacer and then fit the axles into the frames. Sit the ends of the axles on lengths of bar and chock the front of the chassis until it is level, then solder the rod into the spacer making sure the rod rests centrally on the axle.

Noting that they are handed, and that the raised boss in the centre faces inwards, solder the motion access doors (24 & 25) against the cutaways at either side of the chassis - the small dimples in these parts line up with the location marks etched onto the frames. Add 1mm lengths of 0.4mm diameter wire to the holes to represent the handles. Bend and fit the dummy inside motion (26 & 27) - these are also handed parts.

Cut two lengths of 1mm OD tube, so their length is equal to distance 'F' (see Fig. 3) on the brake stretchers (this dimension depends on the gauge) and solder these into the chassis at holes 'G' so equal amounts protrude at either side.

Open out the central hole in the Dapol cylinder assembly, so an M2 bold will slide easily through it, and then fit the motion bracket (28 - see Fig. 5) onto the ends of the slidebars by springing the bars together. Now try the cylinder assembly in position in your new chassis - the motion bracket locates in the slot behind the

midway spacer and is secured using a 14BA nut and bolt. Offer up the chassis to the body, as shown in Figure 7. Make any adjustments necessary, and then lightly secure the chassis using with an M2 bolt , cut to length, at the rear. Take care when tightening this bolt as it could push up and distort the cab floor.

It may be possible to drill and tap an M2 fixing hole into the underside of the boiler - this will depend on the amount of material around the cutaway 'H' - using the hole in the cylinder assembly as a drilling guide and (if you don't have a tap) a bolt to cut the thread.

If there is insufficient material available for the above method, then you can fit a 'stud', as shown in Figure 7. To do this, cut the head from an M2 bolt and then slot this 'stud' up thought the cylinder support, through the cylinder assembly and up into the boiler cavity, as shown in Figure 7. The stud should run vertically - if it doesn't then you may need to remove some material from the front edge of the cutaway 'H'. Continue to push the stud up into the boiler (if it doesn't slide easily thought the cylinders then you won't be able to get the chassis off) until about 2mm protrudes below the cylinder support. Make a final check that the chassis is central and then glue the stud to the inside front face of the boiler/tank cavity using a generous amount of strong epoxy. This can be applied, with the chassis in place, through the rear of the saddle tank. When the glue has set, remove the body and the cylinder assembly.

Referring to figures 5 and 6, lightly oil the slidebars, then push a connecting rod retaining bush (these look remarkably similar to crankpin bushes!) through the slidebars, and into the front end of one of the connecting rod assemblies, noting that the rods are handed. Nip the bush up to the rod together, so the rod is a sliding fit in the slidebars, and then solder the bush into the rod only. File the bush flush with the rear face of the rod. Do the same for both sides.

Select the appropriate firebox bottom (29 - OO or 30 - EM/P4). Carefully form the rivets (some practice rivets have been etched up the side of the fret) and then bend it to shape (see Figure 3). Locate the slot in the rear of the firebox assembly onto the tab protruding from the chassis' rear spacer whilst springing the tabs at the front into their slots in the frames. Position the firebox centrally in the frames, solder the tabs in place and trim off any excess from the outside. Note - in 'OO', the sides of the firebox should be right up against the frames to allow room for the gearbox. Make the radius in the ashpan (31 or 32) slot it in place and then solder it to the firebox, as shown.

Make a 45° kink in the front railguards, which are part of the chassis ('J' in figure 3). Do the same - this time at about 30° - for the separate rear railguards (33 & 34) then solder these onto the rear of the chassis, using the slots as a guide to their position. When they are in place, carefully solder the webs (35 x2) into the slots.

If you wish to fit plunger pickups (Alan Gibson, ref. 4M62) to the model open out the pilot holes ('K', Fig 3) to suit your pick-ups. Read the pick-ups section (below) before deciding.

Brakegear Assembly

This method of assembly creates a set of brakegear that is fully removable as well as totally prototypical in appearance. If it seems over-elaborate - some of the parts are very small - you can always simplify the arrangements. Do not solder anything until the instructions specifically say so. The cutaway view in Figure 6 shows the completed brakegear assembly fitted to the chassis.

The first step is to drill out all brakegear components (36 -52) to accommodate the various wires shown in figure 3. Make absolutely sure these wires will pass through their holes without being forced.

Solder the handbrake lever halves (36 & 37) together then open out the large hole in the lever, so it slots onto a length of 1mm wire. Clean out the slot in the lever, so a length of 0.4mm will slide into it, but do not solder the wire in place. Solder the two steambrake lever halves (38 & 39) together, trapping a length of 0.5mm wire into the slot as you do so, and then clean out the larger 1mm hole, as above.

To represent the cross-shaft, thread a length of 1mm wire, approximately 25mm long, through the chassis, and include the actuators (40 x2) and the steambrake lever assembly, which all go between the frames - the wire in the steambrake lever should slot up into the hole in the rear spacer. Slide the actuators away from the frames and solder the brakeshaft centrally into the chassis, making sure the actuators are still free to rotate on the shaft. Push the brakeshaft details (41 x2) webs (42 x2) and journals (43 x2) over the ends of the shaft and solder them in place, hard up against the chassis.

Slot the handbrake lever assembly over the end of the brakeshaft at the right hand side. Make a sharp bend in a length of 0.4mm wire and push it through a 7mm length of 1/32 (0.8mm) diameter tube. Locate the wire into the slot in the lever, with the top sitting in the small notch in the chassis, as shown. Position the lever at the correct angle (just below horizontal) and solder it in place, hard up against the chassis. Solder the wire

into the lever, and into the chassis, and then trim the bottom of the wire, so about 0.5mm protrudes down beyond the lever, then cut the excess from the top.

Set the actuators so they lean very slightly forward, as shown, and solder them to the crosshaft, hard up against the inside of the frames. Finally, trim the brakeshaft so it is slightly proud at the ends.

Slot a short length of 0.5mm wire through the central holes in the front layer of the brake hangers (44 x4) use this to locate the rear layers (45 x2 and 46 x2) and solder them together. Trim the wire flush at the back and leave it very slightly proud at the front. Do this for all the hangers, so you have two handed pairs.
Fit the wheels and include any spacer washers necessary to eliminate all sideplay. Select the brake stretchers (47 & 48 or 49 & 50 or 51 & 52) to suit the gauge of your chassis. Make a very slight curve in a length of 0.5mm wire and slot this into the rear brake hanger tubes in the chassis. Take a handed pair of hanger assemblies and slot them onto the protruding ends of the wire. Now locate the holes at the bottom of the hangers onto the pins at the ends of the rear stretcher, nipping the hangers between your finger and thumb to hold everything in place. Push the brakes up to the wheel, making sure the hangers are lying vertically when viewed from the front of the loco, and that the face of the stretcher is sitting square (see diagram). When you're happy with this, carefully solder the ends of the stretcher into the bottom of the brake hangers and trim the protruding pins slightly proud of the hanger. Do the same for the front hangers.

With the brake hangers in place, make a sharp bend in two lengths of 0.5mm wire and cut one end to about 1mm in length. Run these wires from the inner holes in the rear stretcher, hooking the short ends of the wire into the actuators. Position the rear hangers, so the brake shoes are about 0.3mm from the tyres, solder the wires into the stretchers and trim off the excess. Now run two straight lengths of the same wire, between the outer holes in the front and rear stretchers. Set the position of the front brake hangers, so they match the rear, and solder the wire into the stretchers. Trim off any excess wire, where it protrudes beyond the stretcher faces. For extra detail, you may add the optional adjuster 53 x4) to the wires - for strength, these are best soldered in place, but this is not and easy job. Position the front adjusters so they are central between the front and rear wheels, with the rear ones near the actuator so they clear the curved ashpan.

Trim the wires at the top of the hangers, so they protrude by about 0.4mm beyond the hangers, then remove the brakegear by sliding the wires from their tubes, and springing the rear brakerod wires from the actuators. Leave the wheels in place, then attach the body to the chassis in order to position the rear sandboxes.

With the loco inverted, position the sandboxes (54 & 55) so their outer face is about 0.5mm from the footplate side face (see Fig 7) - this is the same for all gauges and wheel types. The longitudinal position of the sandboxes will depend on the gauge, as well as the wheel profile. For P4 wheels, there should be a gap of about 0.8mm between the trailing face of the sandbox and the chassis web ('L' in Figure 8). This should be the same for EM gauge, if finescale flanges are fitted. For course scale EM wheels, you have the option of either moving the sandbox away from the wheel (closer to the web) or, removing some material from the back face of the sandbox (nearest the chassis side) to provide clearance. For OO gauge, there should be enough clearance for the wheels behind the sandbox and so it can be positioned as for P4.

When the sandboxes are glued in place, drill out their bottom holes, fit lengths of annealed 0.4mm wire into them, as shown, and then bend them to shape to represent the rear sandpipes. The front sandpipes can be made by soldering (or gluing) lengths of the same wire to the faces of the front brake hangers and running them down to the wheels.

Remove the chassis, break it down into the various sub-assemblies and paint them, along with the cab interior and firebox assembly. If you wish, you can use the drill-starts and make 0.3mm holes in the gauges (56 x2 -see Figures 1 & 2) and then run lengths of fuse wire into them to represent the feed pipes. After painting, add the gauges to the cab front, as shown.

108:1 Gearbox assembly
Study Figs 4 - 7. Before cutting the gearbox etches (57 & 58) from the fret, progressively drill out or ream each of the holes to accommodate the shafts or bushes shown in Figure 4. 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 on the bottom section of the gearbox with the larger-diameter shoulders on the same side of the etch to the bend lines. Now cut the etches from the fret with a heavy blade and trim off the tabs. The gearbox parts can now be folded up as indicated in Fig 4. All bend lines are on the inside of the gearbox.

Using a carborundum disc in a mini-drill, cut the gearshafts to size - all shaft lengths should be equal to the overall width of the gearbox, apart from the stage one shaft, which should be about 12- 13 mm long. 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 the shafts 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.

Refer to figure 4. Solder the stage one spacer (59) into its location in the top section of the gearbox, using the gearshaft to position it. De-flux the gearbox parts by scrubbing with household cleaner, rinse and allow to dry. Check that the gears themselves are free from any dust or swarf left over from manufacture. Cut the insulated wire (not supplied) into two equal lengths and solder to the motor brush tags. For testing, connect the other ends to the output leads of your controller.

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. 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. When fitting the worm, make sure you grip the motor by the shaft and not the casing, otherwise you could push the back out of the motor.

Fit the worm onto the motor shaft (at the mounting screw end) so it's mid-point is about 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). Grind off the excess motor shaft and screw the motor onto the mounting plate, on the top section of the gearbox.

The upper and lower sections of the gearbox use the stage 1 gearshaft (which is never fixed permanently) to locate and hold them together. Slot the lower section of the gearbox, up between the sides of the upper section and fit the first-stage gearshaft, along with the double gear (see final assembly, below) - this gear will be either 30/10T (60:1) 20/10T (80:1) or 27/10T (108:1) - and test under power. To adjust the mesh, loosen the motor fixing screws slightly and move the gearbox relative to the motor until you have a good mesh - neither too tight nor too loose. When satisfied, tighten the motor screws but do not fix the shaft in place.

Fit the second stage gearshaft into the lower section of the gearbox, along with the 20/10T. gear. Test under power and then glue this shaft in place. Fit the idler shaft along, with the single thin 16T. gear (the larger boss on this gear goes up against the gearbox side) and include the spacer washers (60 x3) making sure the washers are smooth and flat. When all the parts are in place, check all the gears rotate freely and then glue the idler shaft in place.

Temporarily fit a 1/8in axle along with the final brass 20T. (making sure the latter is correctly meshed with the idler gear) and test the gearbox under power.

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 Seuthe ultra-adhesive oil.

Pick-ups

Most modellers have their own preferred method of fitting pick-ups. Plunger pick-ups are one option and these will need to be fitted before the wheels. An alternative would be suitably shaped wiper pick-ups made from phosphor-bronze or 0.33mm hard brass wire. These can be run to the wheel rims from a strips of gapped copperclad and are best fitted after the wheels. Make sure you allow adequate clearance around the chassis components to prevent shorting.

Whichever method you use, you may wish to consider fitting some sort of detachable connector arrangement for the pick up leads - this will allow you to remove the chassis.

Final assembly.

When the gearbox is completed you are ready for the final assembly sequence (Figs. 5 & 7). Hold the lower gearbox section inside the chassis and, as you fit the rear axle, slip on the final drive gear but do not mesh it yet. Fit and quarter the wheels - the right hand cranks lead by 90degrees. The kit includes axle washers of varying thicknesses, which should be used to eliminate sideplay. Aim for running clearance only. Fit the bushes to the crankpins, add the coupling rods and check for free running. Fit the securing nuts to the front crankpins and trim them to length.

Push the front of the connecting rod ends into the slidebars, as shown in Figures 5 and 6 - for a OO chassis, it may be necessary to induce a slight 'dogleg' shape into the rods, so they line up with the crankpins. Slot the rear end of the rods over the rear crankpin bushes, as you manoeuvre the cylinder/motion bracket

assembly into position in the chassis. Secure it in place using a 14BA nut and bolt and make sure the chassis runs smoothly, without any tight spots. Once satisfied, cut off the surplus crankpins and secure the nuts with a tiny drop of Loctite 601 retainer.

Fit the top section of the gearbox, as described above, mesh the final drive gear, secure it with Loctite and test the chassis under power. When the chassis is running smoothly, remove the stage one gear and shaft, which will release the upper gearbox section.

The motor leads pass through the motor mount and down inside the gearbox to the pick-ups. With the leads pushed through the hole 'M' in the motor mount, slide the upper gearbox section, complete with motor and worm, into the boiler, as illustrated in Figure 7. This assembly should be free to move slightly, even when the body is fixed. Now offer up the chassis to the body - the lower part of the gearbox slots through the opening in the cab floor, and up between the sides of the upper section of the gearbox, as before. As soon as the first couple of millimetres of the upper and lower sections have located into one another, introduce the stage one gear into the box, and then continue to slide the sections together (joggling the gear as necessary to prevent it from becoming trapped) until the stage one shaft can be pushed though all the locations, including the stage one gear.

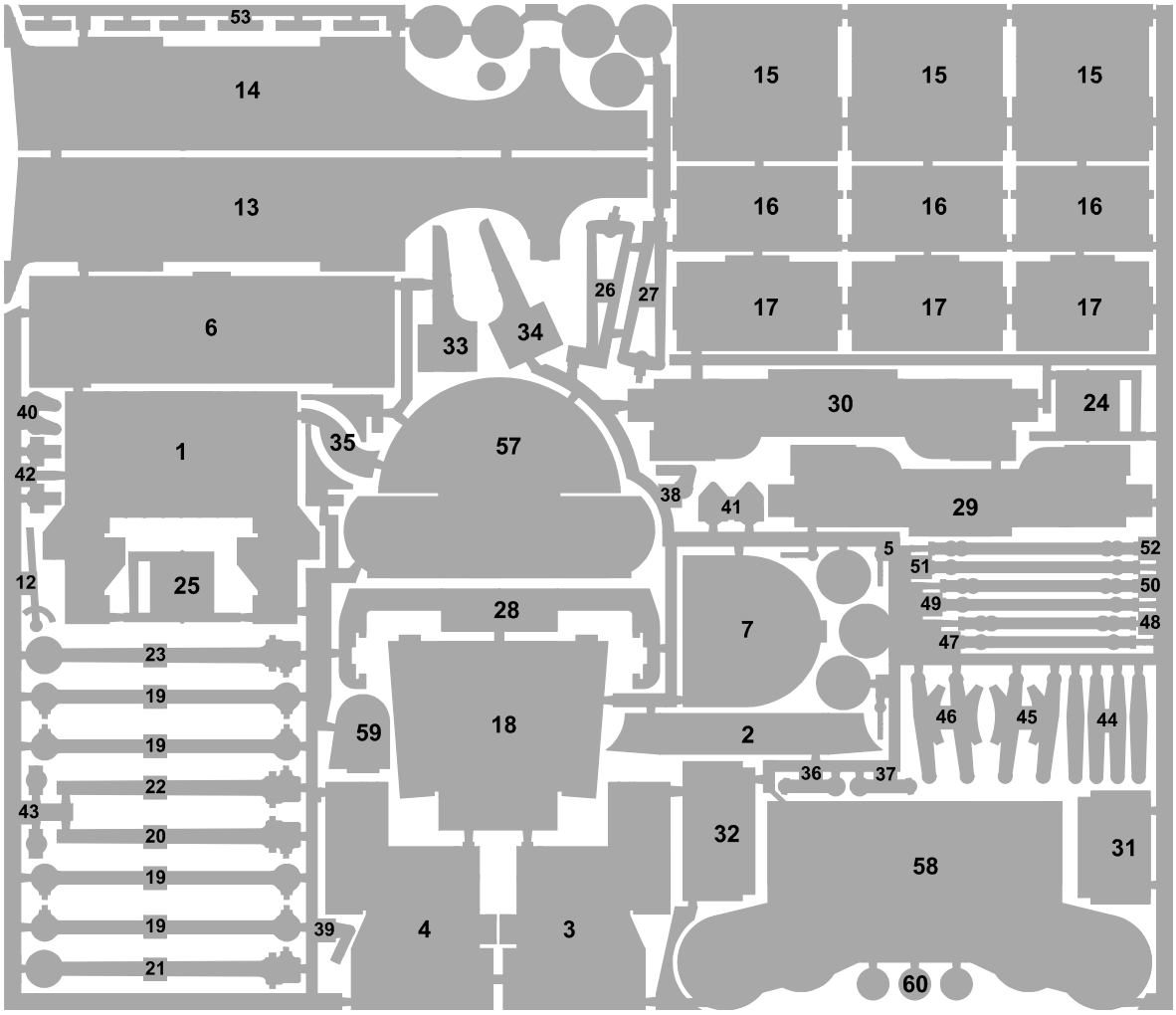
Thread the motor leads down through the right hand side of the gearbox, and out at the bottom, as shown in figure 6, making absolutely sure they do not foul the gears. Secure the body using the bolts M2 fixings and test under power once more.

To complete the chassis, refit the brakegear, as described previously and trim the ends of the top wires so they protrude slightly beyond the hangers at either side - the curve in the wires should be sufficient to hold them in place in the tubes.

Attach the motor leads to the pick ups. Fit the firebox assembly onto the footplate, butting it hard up to saddle tank and the floor. Hold it in place and slot lengths of wire through the lugs and into the firebox - they will hold the firebox in place - then bend up sharply the ends of the wires and trim, as shown.

Push the plastic Dapol handbrake stanchion into it's location in the cab floor. All that remains is to clip the cab onto the footplate which will prevent the firebox retaining wires from working loose.

CHASSIS KIT FOR DAPOL/HORNBY LYR 'PUG'



PARTS LIST

1. Cab floor
2. Chassis front section
3. Bunker - LHS
4. Bunker - RHS
5. Injector operating levers (x2)
6. Firebox wrapper
7. Firebox former
8. Steam turret
9. Safety valve
10. Cast backhead
11. Gauge glasses
12. Regulator
13. Chassis frames - LHS
14. Chassis Frame RHS
15. Spacer - front
16. Spacer - middle
17. Spacer - rear
18. Cylinder support
19. Coupling rods x4
20. Conn rod, inner layer - LHS
21. Conn rod, outer layer - LHS
22. Conn rod, inner layer - RHS
23. Conn rod, outer layer - RHS
24. Motion access door - LHS
25. Motion access door - RHS
26. Inside motion - LHS
27. Inside motion - RHS
28. Motion bracket
29. Firebox bottom - OO
30. Firebox bottom - EM/P4
31. Ashpan - OO
32. Ashpan - EM/P4
33. Rear railguards - LHS
34. Rear railguard - RHS
35. Web (x2)
36. Handbrake lever inner halve
37. Handbrake lever outer halve
38. Steambrake lever halve - LHS
39. Steambrake lever halve - RHS
40. Actuator (x2)
41. Brakeshaft details (x2)
42. Brakeshaft web (x2)
43. Brakeshaft journal (x2)
44. Brake hanger - front layer (x4)
45. Brake hanger, rear layer - LHS (x2)
46. Brake hanger, rear layer - RHS (x2)
47. Brake stretcher, front - OO
48. Brake stretcher, rear - OO
49. Brake stretcher, front - EM
50. Brake stretcher, rear - EM
51. Brake stretcher, front - P4
52. Brake stretcher, rear - P4
53. Brake adjuster (x4)
54. Sandbox - LHS
55. Sandbox - RHS
56. Pressure Gauge (x2)
57. Gearbox - top section
58. Gearbox - bottom section
59. Stage 1 spacer
60. Idler shaft spacer washer (x3)

BODY PREPARATION

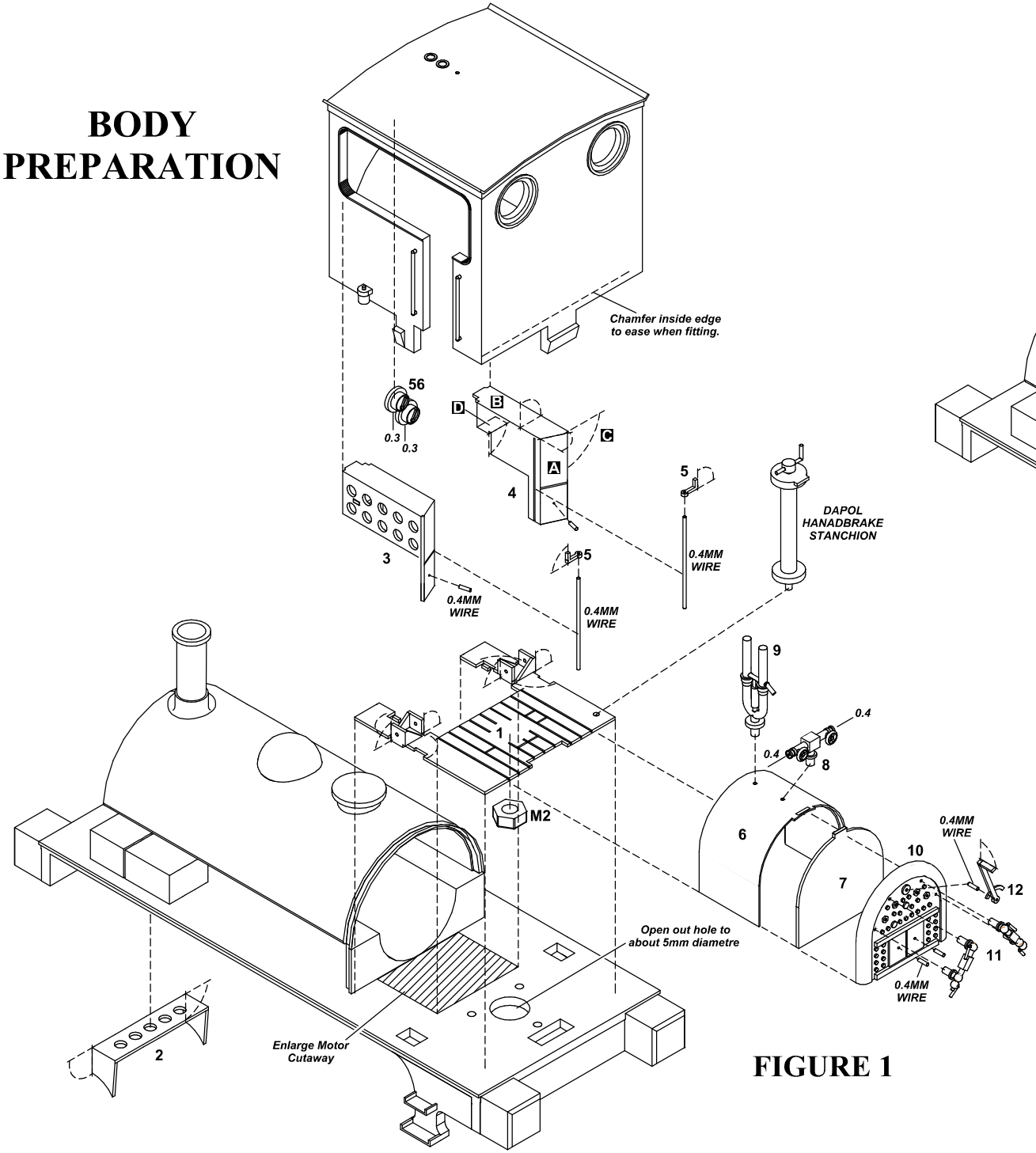
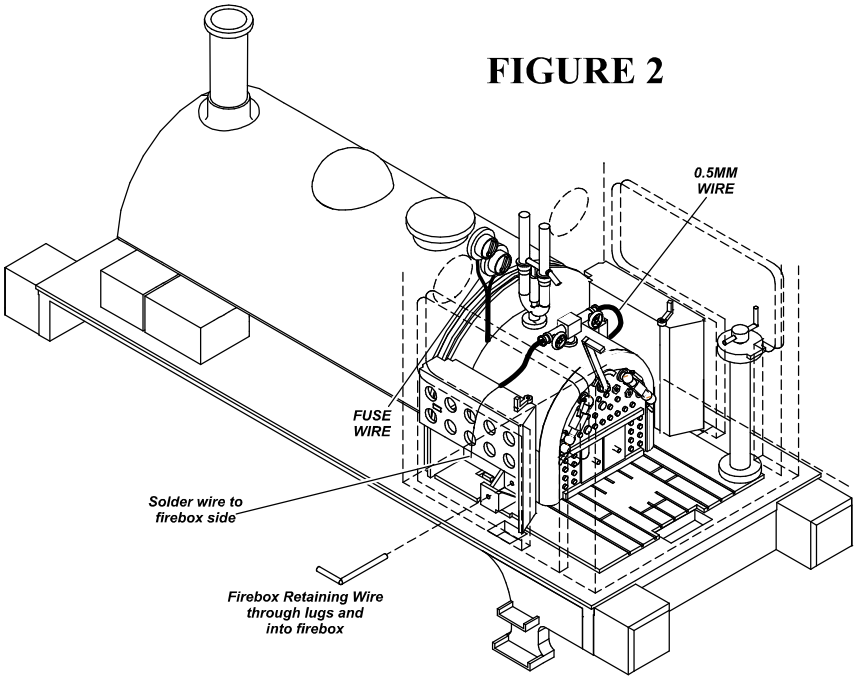


FIGURE 1

FIGURE 2



CAB DETAIL

CHASSIS ASSEMBLY

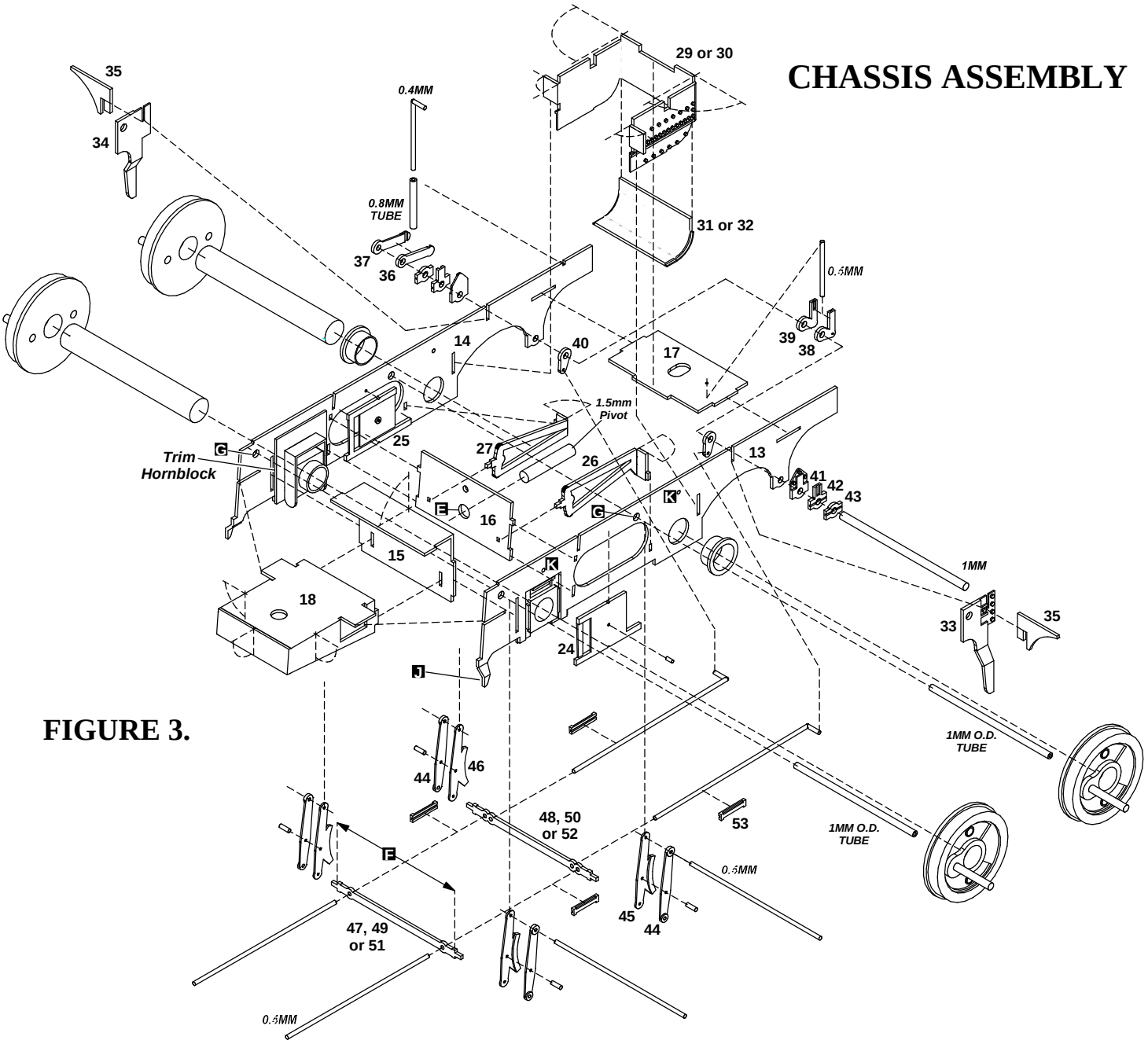


FIGURE 3.

GEARBOX

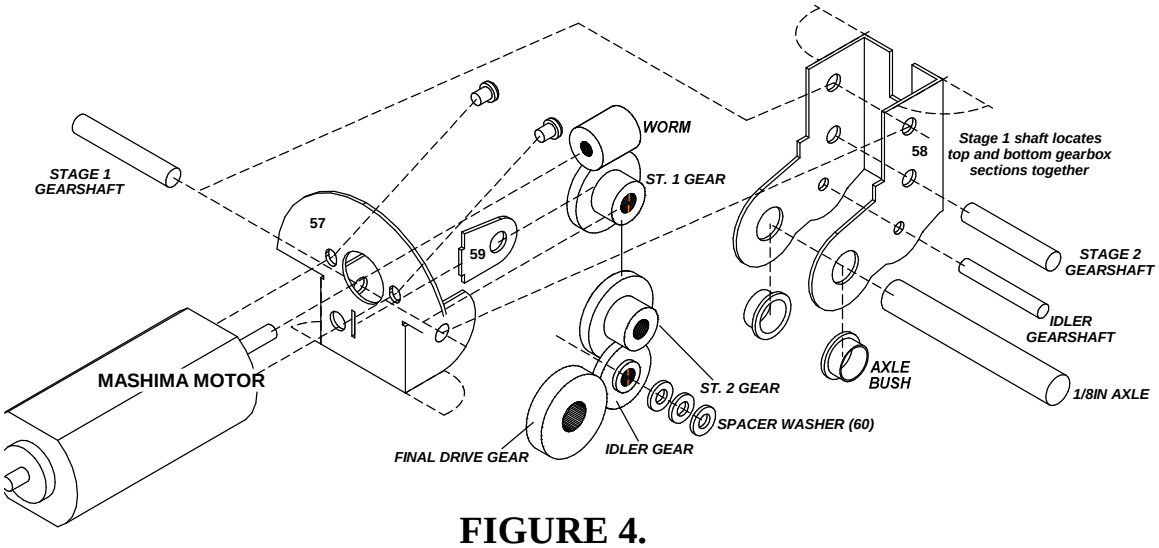


FIGURE 4.

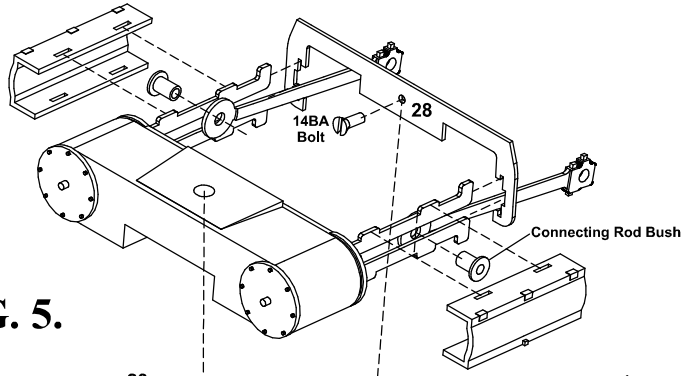
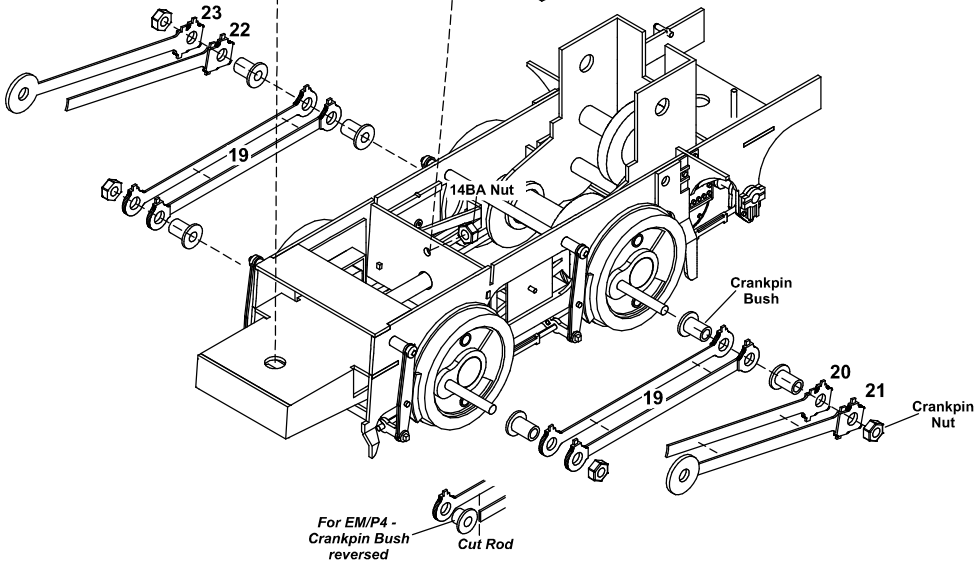


FIG. 5.



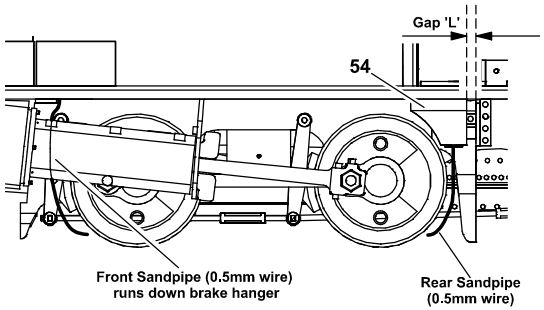


FIG. 8.

FINAL ASSEMBLY

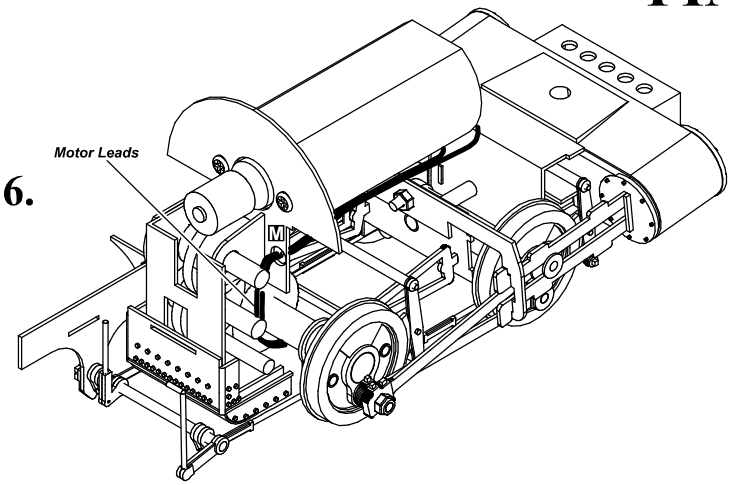


FIG. 6.

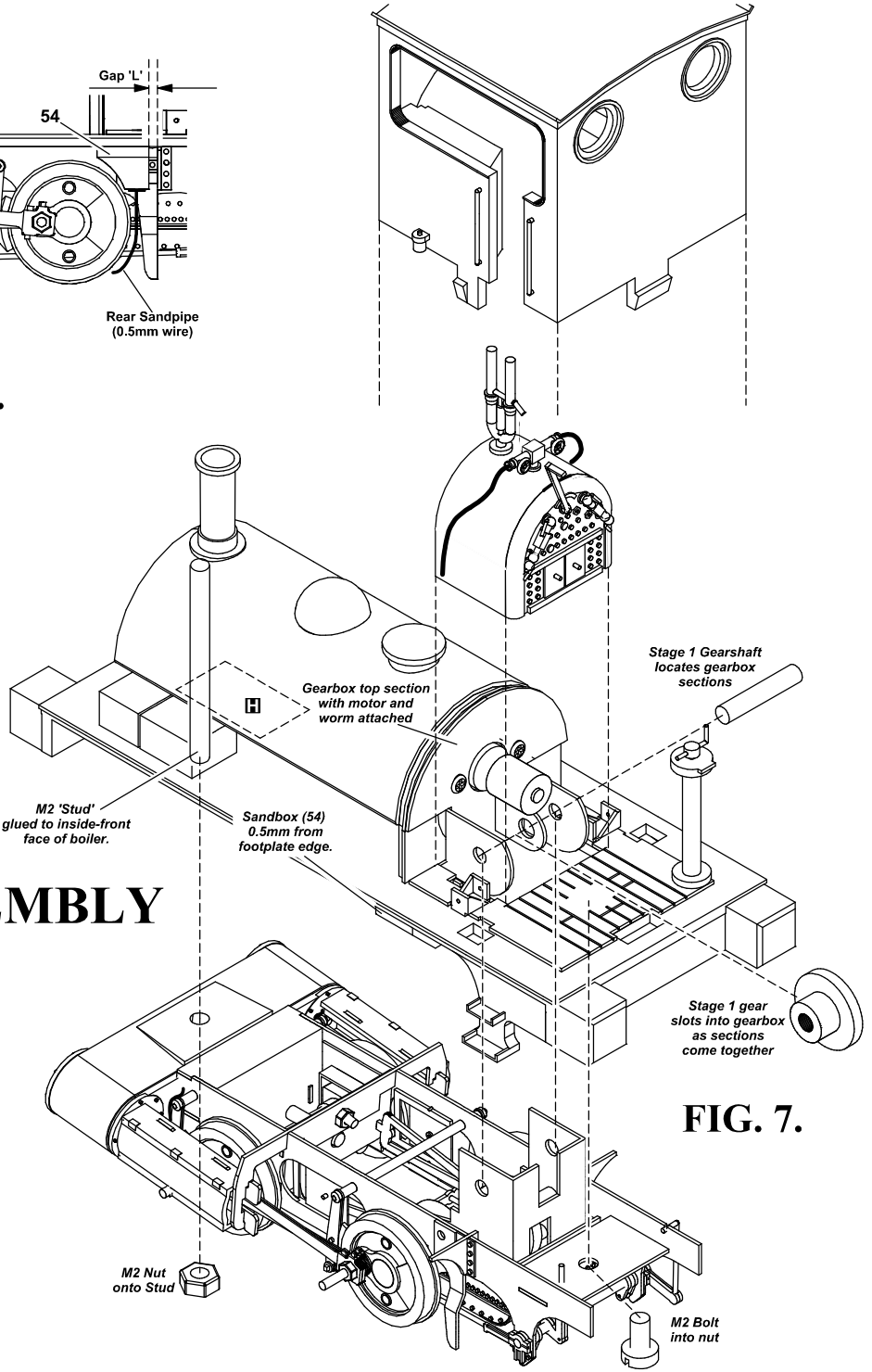


FIG. 7.

HIGH LEVEL

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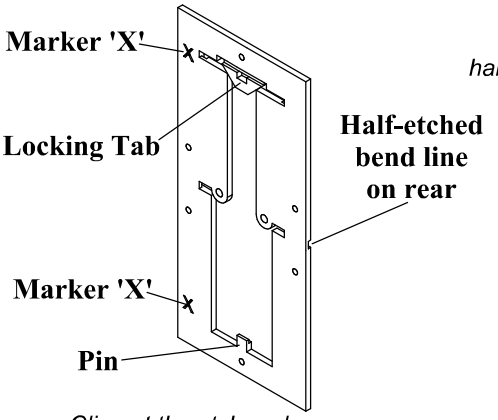
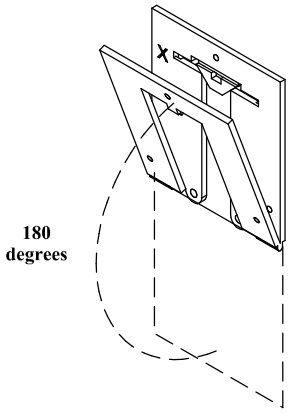


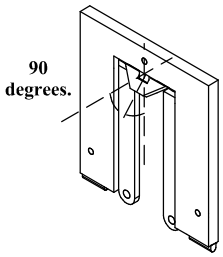
Clip out the etch and clean off any mounting tabs.

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

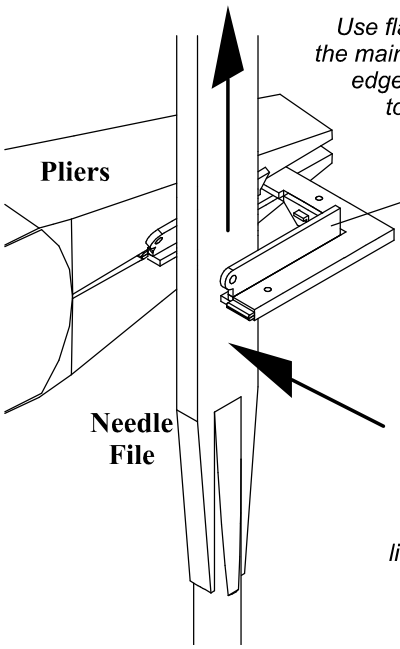


When it's folded, tap the layers between two pieces of hardwood, so they sit absolutely flat.

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

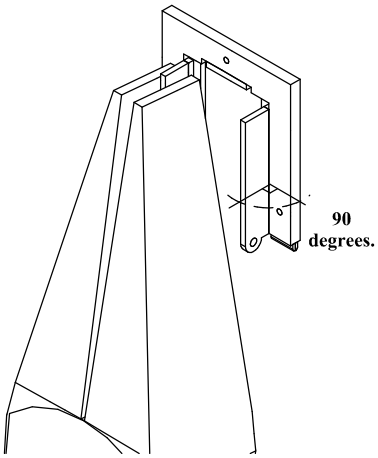


The end of a flat, pointed needle file is a good tool for this job. The tab locks the layers together, eliminating the need for solder.



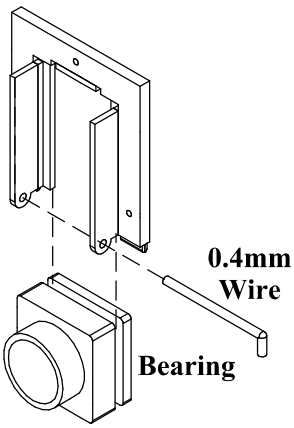
Use flat nose pliers to grip the main etch,with the straight edge of the pliers close to the bend line.

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



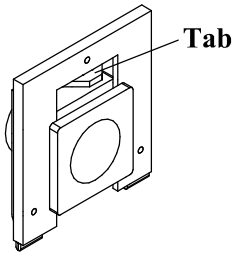
Finish off the horncheek bends so they are at 90 degrees. Check this through a magnifying glass and adjust as necessary.

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.



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

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 tab is designed to sit exactly 4mm above the axle centre line, with the loco on level track. The top edge of the cut-outs on most chassis is also 4mm above the axle centre, so the tab can be butted against the top of the cut-out to set the unit at the correct height.

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