



LCP31 Chassis pack for Thompson LNER B1 4-6-0

Components recommended to construct a complete chassis
6 off Markits 6'2" driving wheels (WH210)
3 axles 6 crankpins and washers (RM2)
2 sets 3'2" 10 spoke bogie wheels (WH31A)
GB5/20 gearbox and Drive Extender
Mashima MH1624 or 1626 motor

As supplied this chassis pack is suitable for the Replica/Bachmann body moulding. The pack contains sideframes, brake gear, cylinders, crossheads, coupling and connecting rods, valve gear and bogie to produce a detailed chassis of correct scale dimensions and appearance which can be used as a substitute for a kit or RTR chassis. A separate fret of 00 spacers is included, which can be exchanged for EM (LS10) or P4 (LS60) by returning them to us in a stamped, self-addressed envelope. We recommend the Mashima MH1624 or 1626 motor with our gearbox GB5 and Drive Extender for this model and can supply the latter two together with Markits wheels if required.

Etched parts list

1	Frames x2	16	Motion support bracket
2	Spring overlays x6	17	Motion support bracket inner pivots x2
3	Coupling rods x2	18	Combination levers x2
4	Coupling rod overlays x2	19	Union links x2
5	Brake hangers x6	20	Valve rods x2
6	Brake hanger overlays x6	21	Valve rod rear overlays x2
7	Brake pull rods x2	22	Expansion links x2
8	Brake pivot brackets x2	23	Expansion link overlays x2
9	Cylinder stretcher	24	Return cranks x2
10	Valve spindle crosshead guides x2	25	Eccentric rods x2
11	Cylinder front cover plates x2	26	Reverser lifting arm
12	Slide bars x2	27	Trunnion covers x2
13	Front cross frame bracket	28	Cylinder drain cock operating levers x2
14	Connecting rods x2	29	Cylinder side cover plates x2
15	Connecting rod overlays x2		

Whitemetal castings

Cylinder sides x2	Rear valve chests x2
Front valve chests x2	Piston rod packing glands x2

Lost wax brass castings

Crossheads x2

Please note that all bends should be made with the half-etched lines to the inside and reinforced with a fillet of solder. The kit is designed to be built up as a set of sub-assemblies and finally brought together as a running chassis. At several points in the process, you are strongly advised to check for fit and function before proceeding. All references to left and right hand are given as from the cab looking forward.

Assembly Instructions

Chassis

1. The frames may be assembled rigid, or with sprung axles using our hornblocks and springs (code LS55). If you wish to spring the chassis cut through the spring hangers using a piercing saw and remove them together with the centre portion of etch within the hornway. The sides of the hornways are etched at 5.85mm approx. so as to ensure that any slight variations in the width of the machined grooves in the hornblocks do not result in any one of them having a loose fit within the hornway. Each hornway must be carefully dressed with a file to achieve a good sliding fit to each hornblock, which should then be marked up or placed into a labelled bag to ensure it is assembled only into the hornway to which it has been precisely matched. Take time and care over this stage, removing material slowly and from

each face equally. The hornblock must drop in freely under gravity but must not show any fore and aft play which might cause the coupling rods to bind. This might sound daunting, but the patient builder will be rewarded with a chassis having superior ride, track holding and traction compared to an unsprung chassis.

2. For rigid axle assembly, carefully open out the axle bearing holes in the frames until the bearings are a close fit, ensuring the bearing flanges fit snugly against the frames. This is best done using a five sided broach. If you are using our chassis jigs (see below), DO NOT solder the bearings in place at this stage. Open out the holes for the brake cross-shafts to 0.75mm.
3. If you are springing the chassis drill out the holes at each side of the hornways and those in the separate spring etches to 0.5mm as shown in sketch 3. The suggested layout for the frame spacers is shown in sketch 1. Those spacers which are used for attaching sub-assemblies should have the nuts soldered to them as shown *before* fixing them to the frames. Solder the spacers to one side of the chassis then assemble by clamping the other side to the first using the wheelsets to check the alignment before soldering the second side frame. This crucial stage of the assembly can be achieved more easily and with greater accuracy by using our frame assembly jigs (code LS16 for 00, LS17 for EM and LS61 for P4). Full instructions are provided with them. If you are springing the chassis please note that you will need a set of four turnings (code LS59) which are intended to locate in the hornways during this stage in the assembly. Recommended fixing points for the Bachmann body are at the rear using the original retaining screw and at the front with the tongue and groove method shown in sketch 2.
4. For a sprung chassis insert the spring and hornblock, ensuring that they are placed into their correct hornways only. Note that the grooves in the hornblock are not on the centre line. This allows you to choose a greater or lesser amount of sideplay on each axle. Use 0.45mm wire to locate the spring detail and solder in place using a minimum of flux. This captures the hornblock and the protruding centre shackle should ensure that the bottom of the hornblock is slightly above the bottom edge of the chassis giving approximately 1.0mm of movement only. Do not be tempted to file too much material from the top of the centre shackle. Greater travel should not be necessary and there is then a risk that the spring could become dislodged if there is too much downward travel.
5. Solder lengths of 0.7mm wire through the brake hanger holes. Solder the brake overlays to the brake rear etches (sketch 4) then thread on and solder in place. Alignment of them is made easier if something of suitable thickness is used to space out the brake shoe from the frame, with a wheelset fitted to ensure correct spacing relative to the wheel treads.
6. Lengths of 0.7mm wire are next threaded through the bottom brake hanger holes on one side of the chassis, through both sets of brake pull rods (7 L/R), ensuring that they are the correct way round, and then through the second set of brake hangers. Solder the wire to the brake hangers, then slide the pull rods outwards to line up with the inner edges of the frames and solder them to the wire. Thread 0.7mm wire through the rear hole in the pull rod, capture the two rear brake pivot brackets (8) then pass the wire through the other pull rod. With the brackets inside the frames solder the wire to the pull rods. Ensuring that they are vertical, solder the brackets to the inside faces of the frames. If you prefer greater prototype accuracy at the expense of greater strength you can decide to solder the two pull rods together and fix this assembly along the chassis centreline. However, as well as being more fragile, this will also make it more difficult to arrange pick up from the underside of the chassis.
7. Some locos had extra plates added to the balance weights. These are as represented on the etches. If the plain type is required then they should be reversed. Strictly speaking, the straight edge should be slightly concave. Fit them to the wheels opposite the crank pin positions with the larger pair on the centre drivers. Fit the crankpins. Laminate the coupling rods (3R/L and 4R/L). It is recommended that the rods are split rather than rigid as this aids in setting up the chassis and gives greater freedom when running. There is the option to assemble them to pivot on the knuckle joint or on the crank pin (sketch 5). Fit the wheels to the chassis followed by the coupling rods. The rods can be held in place on the crank pins with short lengths of plastic insulation cut from electrical wire. Check that the chassis is free running. With split rods the process can be carried out as two separate sets of four-coupled wheels. When satisfied the motor and gearbox can be fitted and the chassis checked out under power. Check again the fit to the body. When thoroughly satisfied, retain the rods on the front and rear crankpins with their washers.

8. Refer to sketch 6 to identify the parts for the cylinders and motion and to sketch 7 for the drilling guide. Before removing them from the fret, drill out the holes in the following components to 0.85mm - the combination levers (18), union links (19), front end of the valve rods (20 R/L), the bottom of the expansion links (22), the smaller end of the return cranks (24) and the smaller end of the eccentric rods (25 R/L). Drill out to 0.7mm the middle hole of the expansion links (22) and the middle hole of the valve rods. Drill out the big end of the return cranks to 1.1mm.
9. Sufficient components are provided to enable the expansion link to be modelled as a triple sandwich as per the prototype. If you wish to do this, drill out to 0.75mm the holes in the inner and outer overlays (23) then bend the extensions through 180 degrees. Feed the three parts onto a length of 0.7mm wire and solder them together top and bottom, but do not solder in the wire. Drill out to 0.75mm the valve rod overlays (21) located in the front cross frame bracket (13). Remove them from the fret and bend the ends through 180 degrees with the half-etched line to the outside. Using a short length of 0.7mm wire to locate the overlay over the middle hole of the valve rod, solder it to the outside of the rod to form a fork, again do not solder in the wire. Feed this fork through the gaps in the expansion link sandwich then feed 0.7mm wire through the holes. Check that the link is free to articulate on the rod. If it is stiff then file a little from the back of the rod and the front of the rod overlay (final assembly is as described in step 19 but with the expansion link as a sandwich rather than a single thickness component). Continue with riveting the motion components together as described in 10 below.
10. Laminate the two halves of the connecting rods (14R/L and 15R/L). Drill out the small end to take the crosshead pin and the large end to 1.1mm for the crank pin. Refer to sketch 9. Remembering that the following sub-assemblies are handed, rivet together the union link, combination lever and the valve rod. Then rivet together the expansion link, eccentric rod and return crank. Keep these assemblies safe for later. Solder the reversing lever arm (26) to the rear end of the left hand valve rod. It should be at right angles with respect to the running plate. Remove the rear end of the right hand valve rod beyond the half-etched line.
11. Refer to sketch 10. Clean up and straighten the piston rod on the crosshead casting. Cut the narrow section of the rod down to 16mm then drill the centre to take the supplied pin and the drop link to 0.85mm. Clean out the slot to take the connecting rod so that the front end will fit, articulate and that the holes are aligned. If necessary the end of the connecting rod can be thinned down slightly. Fix the connecting rod into the cross head and retain it with the pin, soldering it from the back and cutting off the excess. Rivet the union link onto the drop link.
12. Refer to sketch 11. Drill out the rear valve chest to 1.2mm and the piston rod packing gland casting to 1.5mm. Check that the piston rod will pass through the packing gland. Remove the cylinder stretcher (9) from the fret and open up the holes in the rear face to take the spigots of the rear valve chest and packing gland. Also check that the front valve chest will fit in the upper hole in the cylinder front face. Remove the break off sections as appropriate for EM or P4 frame widths. Fold up the stretcher ensuring that the faces are parallel and at right angles to the top mounting plate then reinforce the fold with a fillet of solder.
13. Whilst still in the fret, drill out the holes in the centre of the valve spindle crosshead guides (10) to 1.2mm. Fold up and fix the overlays ensuring that they are aligned and will be on the outside of the part when formed. Fold up the guide to make a 'U' shape and reinforce the folds with solder. Fix the guide to the back face of the rear valve chest, lining up the holes. If necessary clean out the holes to ensure the end of the valve rod is an easy fit.
14. Refer to sketch 12. Fold up the slide bars (12 R/L) and shape the support bracket as shown. Check the fit of all the parts that are to be assembled into the rear face of the cylinders as beyond this point it will be difficult to alter them. Fit the cross head assembly into the slide bars and check that it will slide easily by temporarily fitting the front end of the slide bars into the cylinder face. Feed the packing gland over the piston rod and tape it up against the cross head to keep it out of the way of the following operations.
15. Solder in the slide bars on the inside of the cylinders with the stops hard against the rear face, ensuring that they are not twisted and are at right angles in both the horizontal and vertical planes. When completely satisfied carefully file away the stops. Slide the packing gland along the piston rod into its location, check the movement of the piston rod, then fix it in place. File a small flat on the bottom of the rear valve chest assembly and fix it in place. The end of the valve rod can now be fed through the hole by rotating the rods around the drop link pivot.

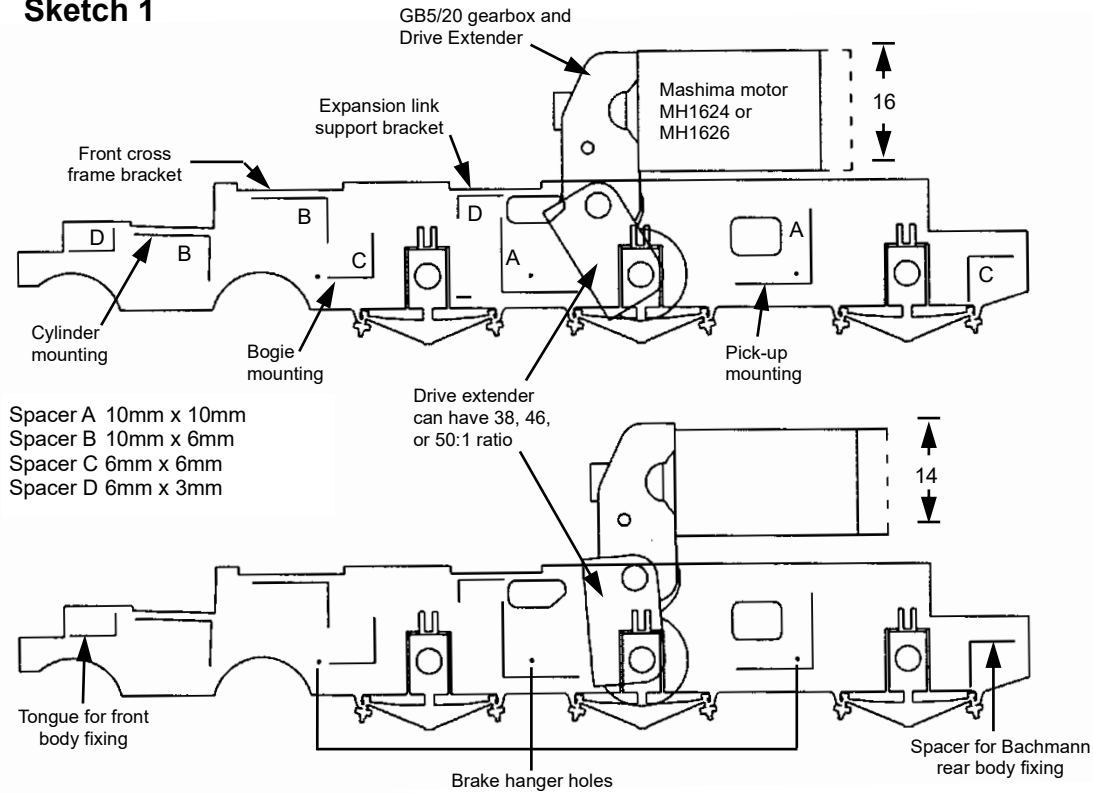
16. Fix the three-bolt cover plate (29) to the cylinder side casting. Fix the front valve chest (note that the tail rod extension may require shortening to clear the underside of the running plate). Fix the cylinder sides and then the front cover plate (11) noting that there is a slight flat in the circumference which should be lined up with the cylinder side. The holes in the cover plate and the cylinder front face should also line up. Fix a pin into the hole to represent the vacuum relief valve.
17. Refer to sketch 13. Whilst still in the fret, drill the holes in the motion support bracket (16) and the inner pivots (17R/L) to 0.75mm. Remove the parts and if appropriate remove the break off sections for EM/P4, then fold down the outer pivots on (16). Fit the inner pivots into their slots and feed a length of 0.7mm brass wire through all four holes. With the inner pivots parallel to the outer ones, solder them in place and remove the wire.
18. Refer to sketch 14. Remove the front cross frame bracket (13) from the fret. Remove and discard the valve rod overlays (21) if not already used in section 9 above. Remove and retain the trunnion covers (27). Fold down the small lugs at the front of the bracket.

At this point all the sub-assemblies are complete and the chassis can be fully assembled

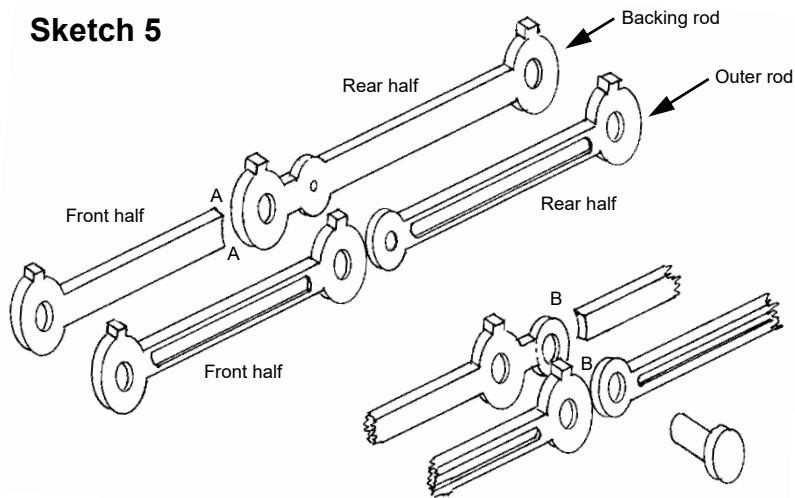
19. Secure the cylinder and motion support bracket to their spacers. Refer to sketch 15. Pass a short length of 0.7mm brass wire through the outer pivot of the motion support bracket capturing first the expansion link then the valve rod, and through the inner pivot. Secure the wire on the inside. File the outer end flat and fit the trunnion cover (27).
20. Fit the connecting rod over the middle driver crank pin then the big end of the return crank. With the crank pin at bottom dead centre, solder the crank to the pin with about a 10 degree 'lead'.
21. Secure the front cross frame bracket onto its spacer. Pass the vacuum release valve lever through the valve spindle cross head guide but to the outside of the valve rod and the piston rod as shown in sketch 16. Fix the top end to the lug on the front of the bracket. If desired, the tang of the triangular slide bar support bracket can be soldered to the slots in the rear of the bracket but this is probably not necessary. Remove the top part of the tang which protrudes above the bracket.
22. Build and fit the front bogie in accordance with the instructions provided.

Our preference is for wiper pick-ups made from 28swg phosphor bronze wire as per sketch 17. The wire is soldered to PCB strip which is bolted to a frame spacer. We recommend that, if possible, you arrange for the pick-up to be "bolt-on:" since this allows for easy removal and adjustment of the wire wipers. Pack LS23 provides all the parts.

Sketch 1



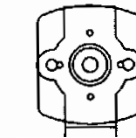
Sketch 5



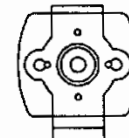
To split the rods over the centre crankpin cut the backing rod at A-A, solder to the corresponding halves of the outer rods and connect both halves at the centre crankpin.

To split the rods on the knuckle joint first drill through the half-etched centres on the knuckle and cut the backing rod at B-B. Solder the inner and outer halves together then join the front and back halves of the rods using a pin or rivet (not supplied) so that the rods are articulated behind the centre crankpin.

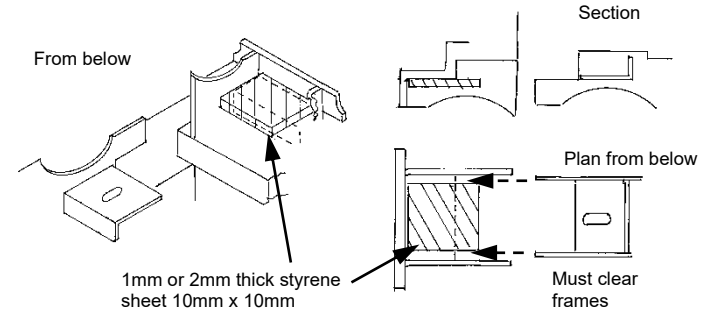
Sketch 2: front fixing



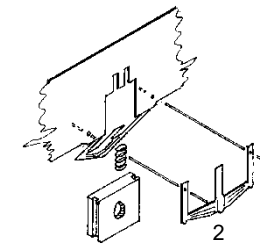
The motor can be fixed in the vertical orientation...



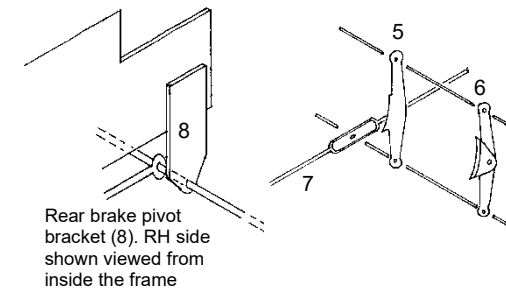
...or in the horizontal orientation



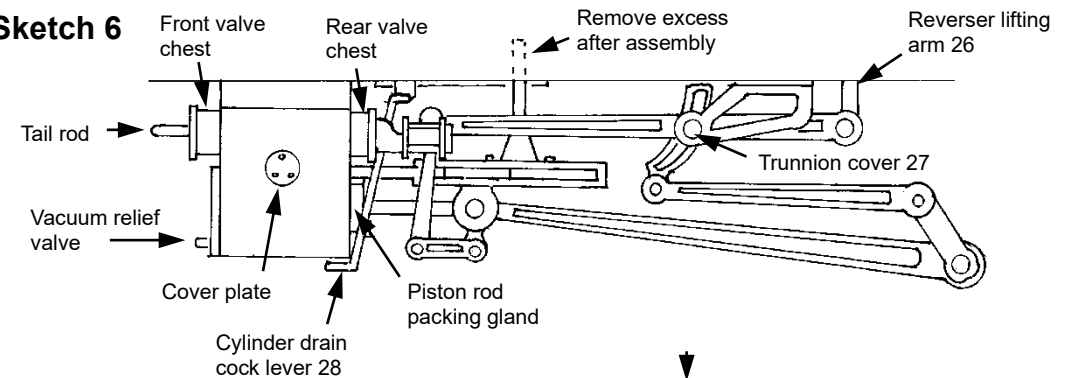
Sketch 3



Sketch 4

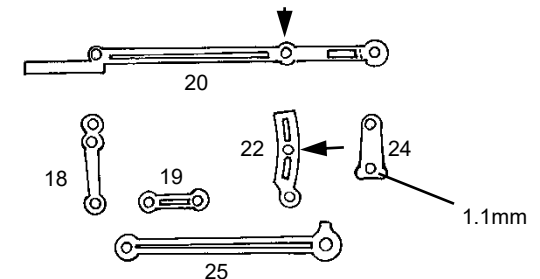


Sketch 6

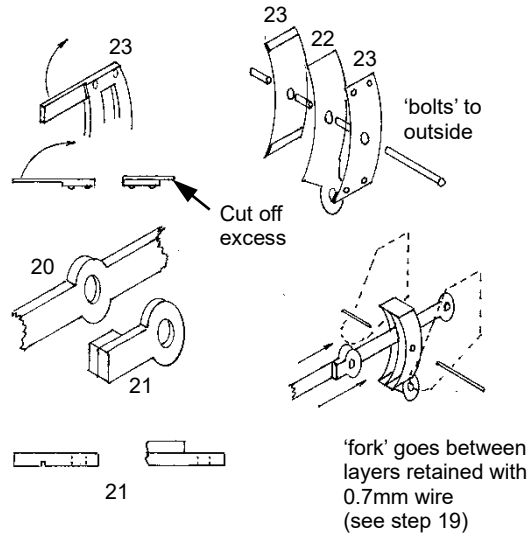


Sketch 7

Drill 0.75mm for 0.7mm wire where arrowed
Drill big end of return crank (24) to 1.1mm
Drill remainder 0.85mm for rivets



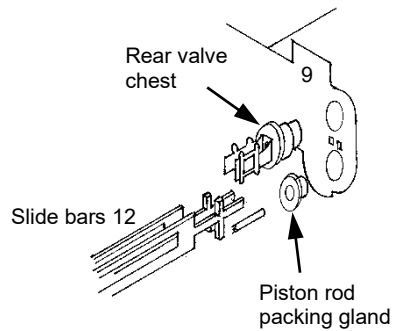
Sketch 8



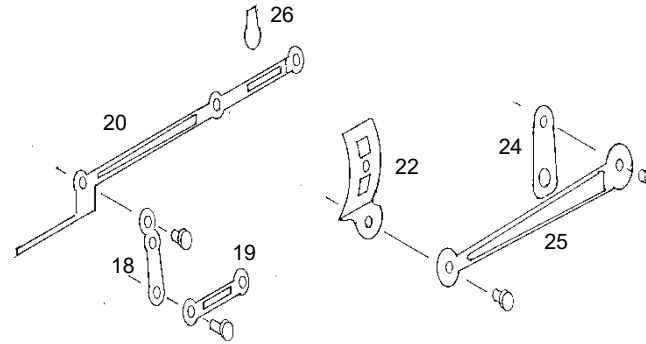
Section through slide bars at support brackets



Sketch 11

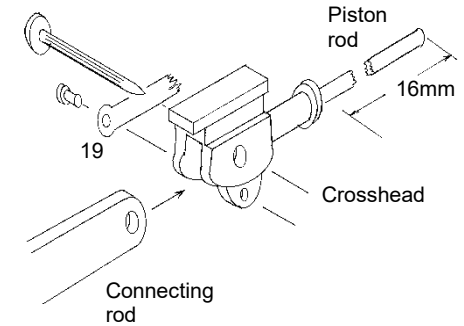


Sketch 9

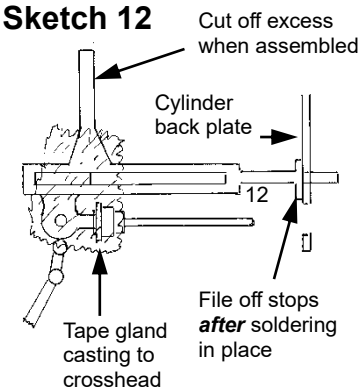


Sketch 10

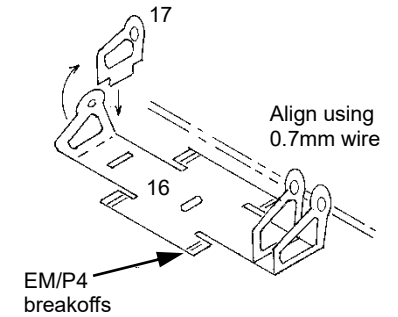
View from rear of assembly



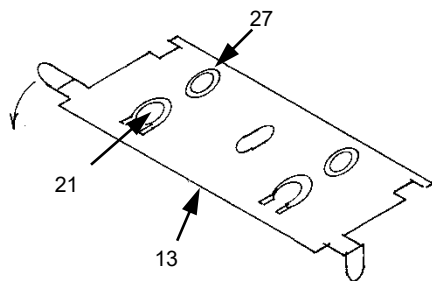
Sketch 12



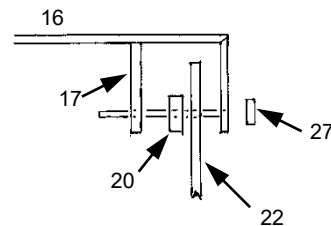
Sketch 13



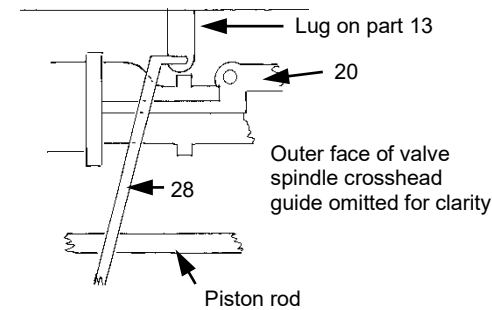
Sketch 14



Sketch 15



Sketch 16



Sketch 17

