

INSIDE MOTION KIT - TYPE C - BULLDOG TYPE

Making the crank axle

First ream out the holes in both the cranks and the eccentrics so that they are a tight fit on the axle. Then carefully open out the small holes in the eccentrics, preferably with a small taper broach, so that the 0.45mm wire is a force fit in the holes.

Check the fit of the eccentric sheaths on the eccentrics. Cut a small notch to fit the 0.45mm wire in the web of the cranks.

The crank and eccentrics can now be pinned together with a short piece of 0.45mm wire.

The cranks and eccentrics together with the eccentric sheaths are now force fitted on the axle with the cranks set apart by a distance which corresponds to the cylinder holes in part 157 and with the right side crank leading by 90°. The correct spacing is achieved by using the spacing washers part 165.

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

Now very carefully remove the axle between the crank webs, A carborundum disc in a mini drill works well and allows very gentle pressure to be used, I suggest you don't use a hacksaw!

The axle bearings will need to be filled back so that there is clearance for the cranks with a little side play on the axle.

Cylinders

Parts 157, 159 and 160 have a half-etched line running down two edges. File back to the half etched line if you are modelling in EM gauge.

Bend the slide bars at right angles and fit to the cylinder block front (part 157) so that the valve rod holes align and the slide bars with the two half-etched dimples are upwards.

Fit lengths of 1/16" outside diameter brass tube for the cylinders so that they are perpendicular to the cylinder front and protrude by 1½ mm.

Detail the cylinder fronts by attaching cylinder covers (part 164) and piston rod glands (part 163) using 0.45mm wire to represent the studs.

Fix the mounting bracket (part 158) so that the tab fits in the slot in part 160 and the cylinders will be inclined at 1 in 10. Use the drawing as a guide. Tap the small hole in frame spacer (part 11) 10 BA. Check fit of assembly between frames attaching it with the 10 BA screw.

Attach the snifting valve casting.

Crossheads and connecting rods

Lay a crosshead face (part 161) face down on a piece of wood or similar and push the spike of a slide shoe (part 162) through the slots provided, have the half etched surface of the spike facing toward the centre of the crosshead. Insert the other slide and check they are parallel and the correct distance apart using the slide bar as a gauge. You should aim for a nice close fit with minimal slop, When satisfied, flow solder well into the slots so that they cannot be seen after the spikes have been snapped off and the joint cleaned up. Repeat for the other crosshead face.

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

Form the joggle in the connecting rods (part 149) with the fold lines inside so that a pair of rods back to back will clear the crosshead. Solder the rods together after first fitting them over the cranks. Attach the connecting rods to the crossheads using 0.7mm wire as pins.

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

Motion bracket and valve gear

Check the fit of the valve rods (part 156) in the small rectangular holes in both the motion bracket (part 159) and cylinder block front (part 157). Aim to get a close fit by either opening out the holes slightly or filing the edges of the rods or both.

Fold up part 166 and attach to the motion bracket as shown in the diagram. Accurate positioning is essential to avoid fouling the valve rods.

Fit the motion bracket into the half etched grooves in the slide bars. Before soldering in position check the crosshead clearance. Solder short lengths of 0.7mm. wire into the dimples in the slidebars to represent the oil cups.

Form the joggle in the valve rods as shown in the diagram. The joggle must be close to the end of the rod.

Rivet the eccentric sheaths (part 150), expansion links (part 155) and valve rods together paying particular attention to the direction of the rivets - see diagram. Make the right side a mirror image of the left.

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

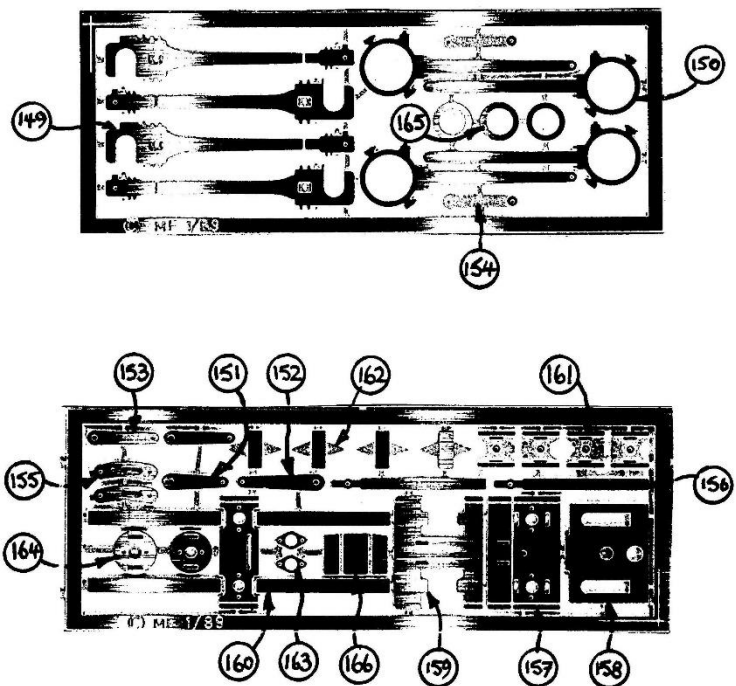
Finally, using the diagrams, assemble and fix the reversing mechanism. The two remaining rivets are used to attach part 153 to part 154.

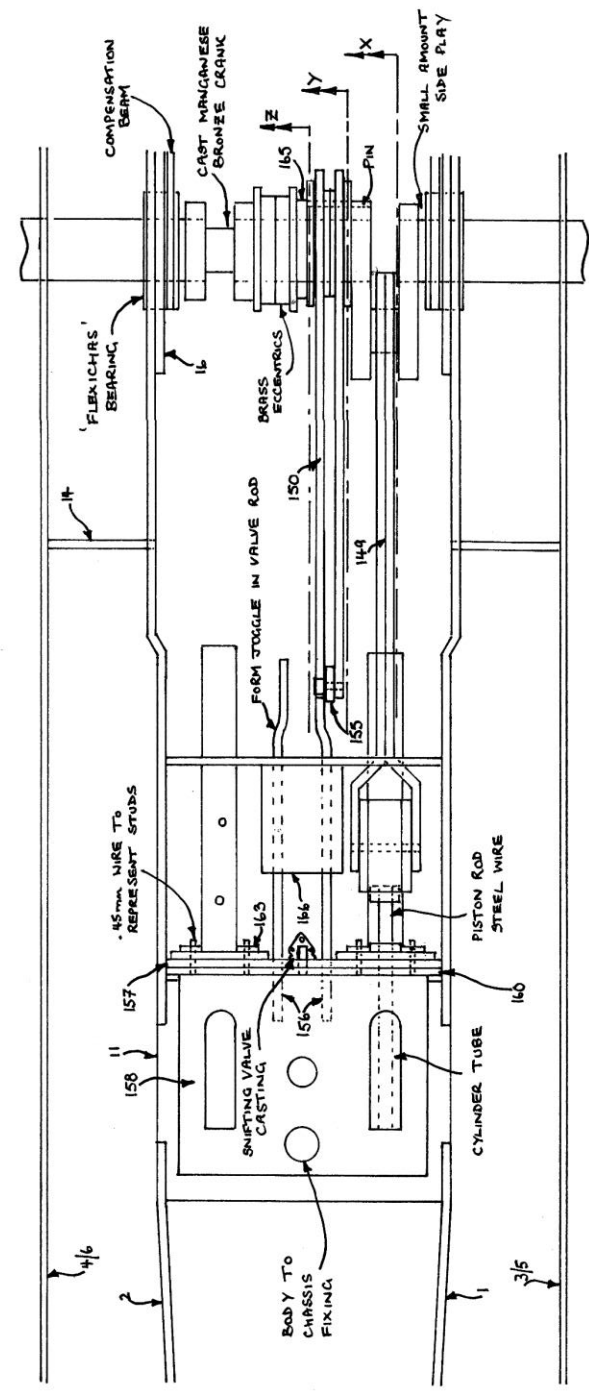
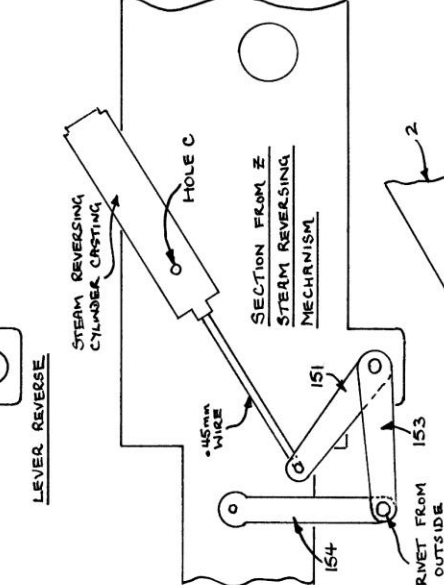
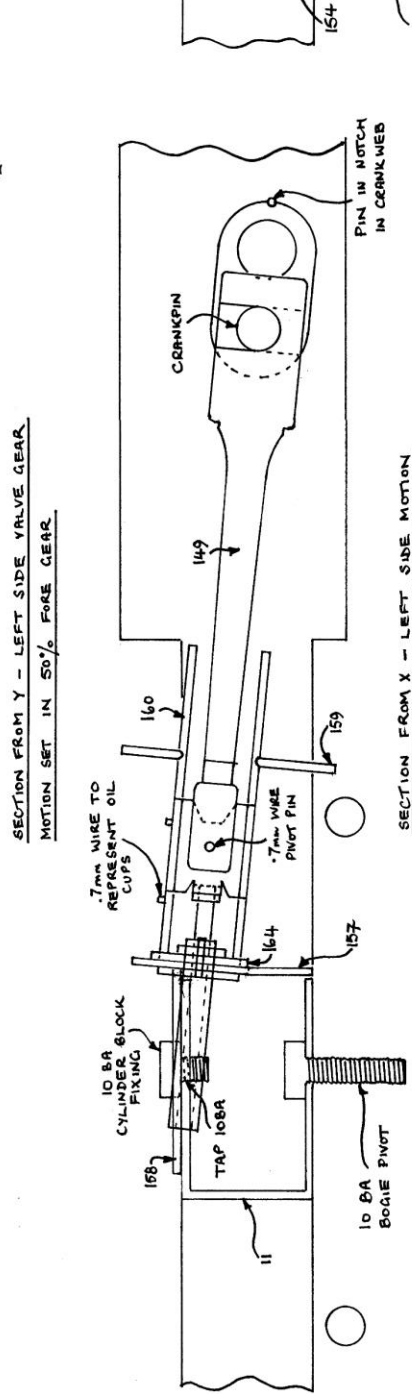
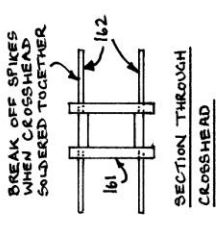
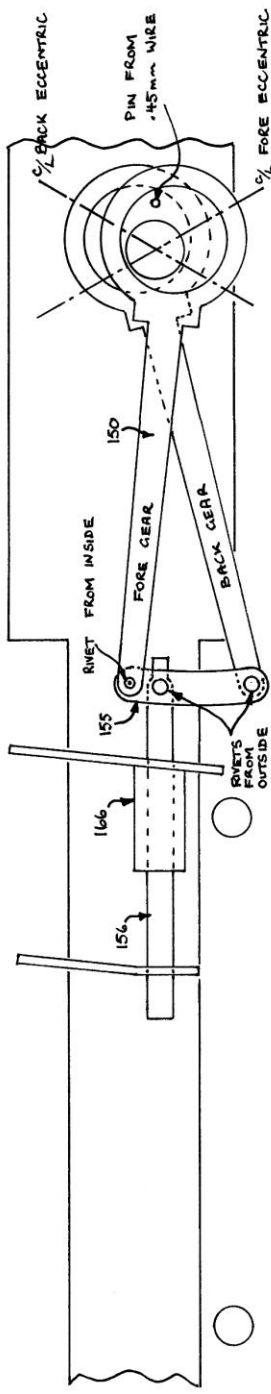
ETCHED COMPONENTS

- 149 Connecting rod (4)
- 150 Eccentric sheath - (4)
- 151 Reversing lever - steam reverse
- 152 Reversing lever - screw reverse
- 153 Reversing arm - (2)
- 154 Lifting link - (2)
- 155 Expansion link - (2)
- 156 Valve rod - (2)
- 157 Cylinder block front
- 158 Cylinder block mounting bracket
- 159 Motion bracket
- 160 Slide bar assembly
- 161 Crosshead face - (4)
- 162 Crosshead slide shoe - (4)
- 163 Piston rod gland - (2)
- 164 Cylinder cover - (2)
- 165 Washer - to space out the eccentrics - (3)
- 166 Valve rod guide

OTHER COMPONENTS

- 1/16" outside diameter brass tube for cylinders
- Steel wire - 0.8mm - for piston rods
- Rivets - (8)
- Brass wire - 0.7mm - for crosshead pins
- Brass wire - 0.45mm - for pinning eccentrics to cranks
- 10 BA CH screw
- Brass wire - 0.9mm - for reversing cross shaft
- Cast manganese bronze cranks - (2)
- Brass eccentrics - (4)
- Snifting valve





SCHEMATIC DRAWING SHOWING THE ARRANGEMENT OF THE REVERSING MECHANISM

GWR 'BULLDOG' 4-4-0
INSIDE MOTION
MARTIN FINNEY 25-3-89