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SECTION 4. INSTRUCTION LEAFLETS.
### 4. I. II.   WIRE & RAIL BENDING OPERATIONS.

PROTOFOUR

INTRODUCTION

There are many situations in which accurately-bent small wire sections may be used in model railway construction. Typical are locomotive handrails and valances, station awnings, bridge railings, water pipes and, using scale rail section, buffer stops and other prototype structures built from old rails.

Shaped metal sections and wires are extremely difficult to bend accurately owing to the uneven stresses set up in them by the bending forces. To overcome this problem, sections must be bent by winding them on a form of the desired radius which additionally prevents the section from collapsing sideways. The Protofour Wire Bending Tool performs these operations with extreme simplicity and is the first tool of its kind to be made available to the modeller; its use enables novice and expert alike to produce evenly-formed wire and rail radii to professional standards, and increases their modelling capabilities accordingly.

PROTOFOUR WIRE BENDING TOOL

LEVER

WIRE SECTION
CLAMP SCREW

FORM SCREW
FORMS
FORM TOOL
RECTANGULAR CARRIER
CARRIER PEG
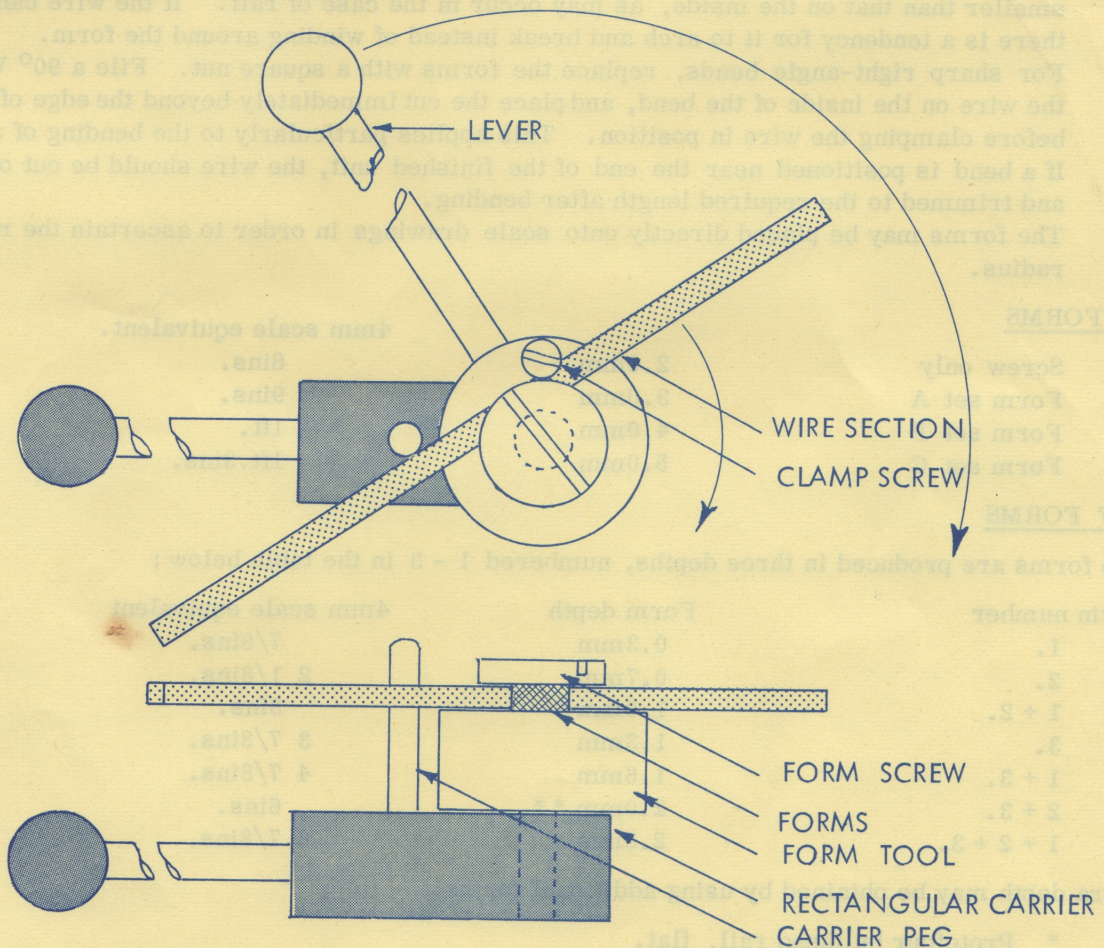
SETTING UP THE TOOL

It is recommended that only plain wire be used in the tool until the principle and manner of its operation is fully understood.

1. Select a length of wire and determine its diameter.
2. Determine the radius of the required bend and select the set of forms of matching radius.
3. Combine the forms to give a depth equal to the diameter of the wire, allowing minimal additional clearance.
4. Place the forms on the shaft of the form screw, which is then fitted into the centre threaded hole of the circular form tool and screwed home.
5. Hold the circular form tool in the left hand with the lever to the left, and place the wire under the heads of the clamp screw and form screw so that it lies as shown in the illustration.
6. Attach the rectangular carrier to the pivot of the form tool from below, with the carrier lever and peg in the position shown in the illustration.

7.   Rotate the form tool lever clockwise until the carrier peg contacts the wire.

8.   Screw down the clamping screw to prevent movement of the wire.

9.   Rotate the form tool lever clockwise until the wire is bent to the desired angle.

10. Release the carrier, release the clamping screw and remove the wire carefully from the tool.

NOTES

* Radius must be measured to the INSIDE of the bend.

* With springy materials the carrier may have to be rotated past the nominal angle of bend in order to ensure that the correct angle is obtained when the bending force is released. Particularly springy materials may, in addition, require a smaller nominal form radius for the correct final radius to be obtained.

* Clamping of the wire is most important where the section on the outside of the bend is smaller than that on the inside, as may occur in the case of rail. If the wire can move, there is a tendency for it to arch and break instead of winding around the form.

* For sharp right-angle bends, replace the forms with a square nut. File a 90° V-cut in the wire on the inside of the bend, and place the cut immediately beyond the edge of the nut before clamping the wire in position. This applies particularly to the bending of rail.

* If a bend is positioned near the end of the finished unit, the wire should be cut oversize and trimmed to the required length after bending.

* The forms may be placed directly onto scale drawings in order to ascertain the required radius.

RADII OF FORMS

		4mm scale equivalent.
Screw only	2.0mm	6ins.
Form set A	3.0mm	9ins.
Form set B	4.0mm	1ft.
Form set C	5.0mm	1ft.3ins.

DEPTH OF FORMS

The forms are produced in three depths, numbered 1 – 3 in the table below :

Form number	Form depth	4mm scale equivalent
1.	0.3mm	7/8ins.
2.	0.7mm	2 1/8ins.
1 + 2.	1.0mm *	3ins.
3.	1.3mm	3 7/8ins.
1 + 3.	1.6mm	4 7/8ins.
2 + 3.	2.0mm **	6ins.
1 + 2 + 3.	2.3mm	6 7/8ins.

Extra depth may be obtained by using additional forms.

* Protofour bullhead rail, flat.

** Protofour bullhead rail, upright, or two rail sections laid flat.