FORMS AND FORMING BOARDS

This E.I. covers types and uses of forming boards and jigs and the making-up of forms for various wiring conditions, repetition work on main frames, switchboard multiples, inter rack, rack tie, and supervisory cables. Manufacturing processes are also illustrated and indications given as to economies which can be effected by using the principles outlined.

INDEX.

1. FORMING BOARDS AND JIGS.

1.1 Forming boards can be grouped as follows -

Class 1. Forming boards which are manufactured on the job.

Class 2. Forming boards which are designed for specific purposes. These are standard tool kit items for use on repetition work.

Class 3. Forming jigs.

1.2 Class 1 - Forming Boards. Examples of this type are the forming boards used for forming out lead-covered cables before termination on main frames. These are generally made from packing case timber, with suitably positioned nails to provide the necessary forming links (see Fig. 1). The forming out of lead-covered cable must be done on the installation to avoid fracture of the lead sheath which would be unavoidable if these forms were assembled in an installation depot and transported to the work. For this reason, lead-covered cables for M.D.F's must be formed only in the exchange in which they will be installed.

Another example of this type of forming board is the piece of plywood, suitably shaped, with the forming holes drilled and countersunk, used for forming out the wires for meter plates (see Fig. 2).

1.3 Class 2 - Forming Boards. This type is used for constant repetition work, for example, making-up forms for multiple jack strips, rack tie cables, alarm and classification group tie cables, common services, etc. Suitable types are shown in Figs. 3 and 11. These forming boards should be part of the Installation Division tool kit. Stockpiles of all forms made on these boards must be manufactured in the Departmental Workshops as required so that supplies may be drawn on demand by the various Installation Groups. This will reduce the forming work required on the job.

1.4 Class 3 - Forming Jigs. These are mainly of fabricated steel and are similar to Class 2 in design and use but have special limited applications; an example is the jig used for forming switchboard multiples. See Fig. 4. Another example is the jig used to form wires before terminating on Siemens 17 type equipment as shown in Fig. 5. The jig used for forming out before termination on the bank contacts of a motor uniselector is shown in Figs. 6 to 9.

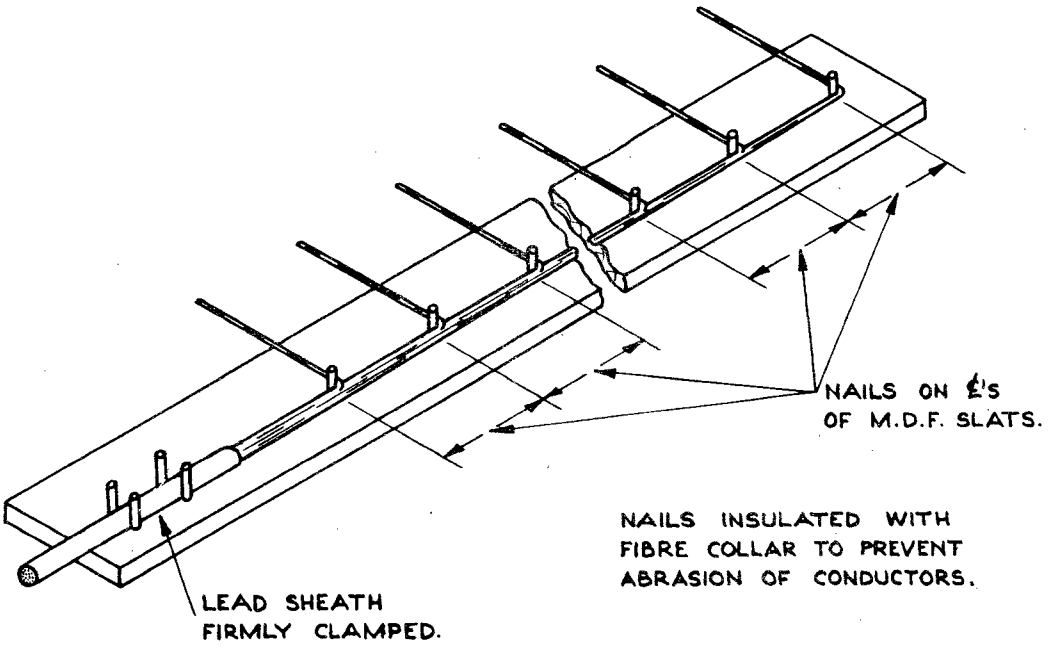


FIG. 1. TYPICAL CLASS 1 FORMING BOARD.

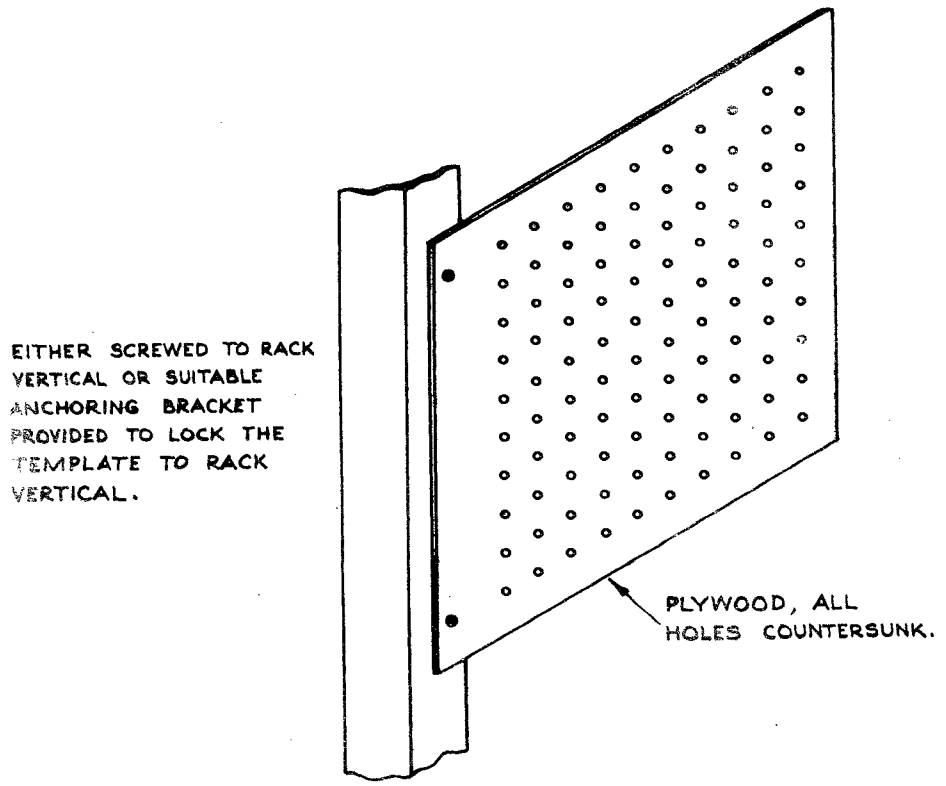
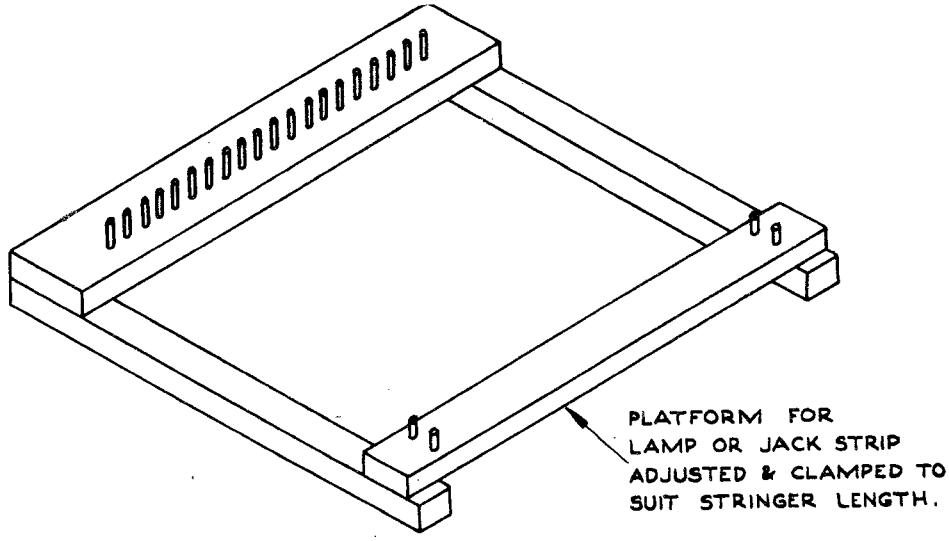
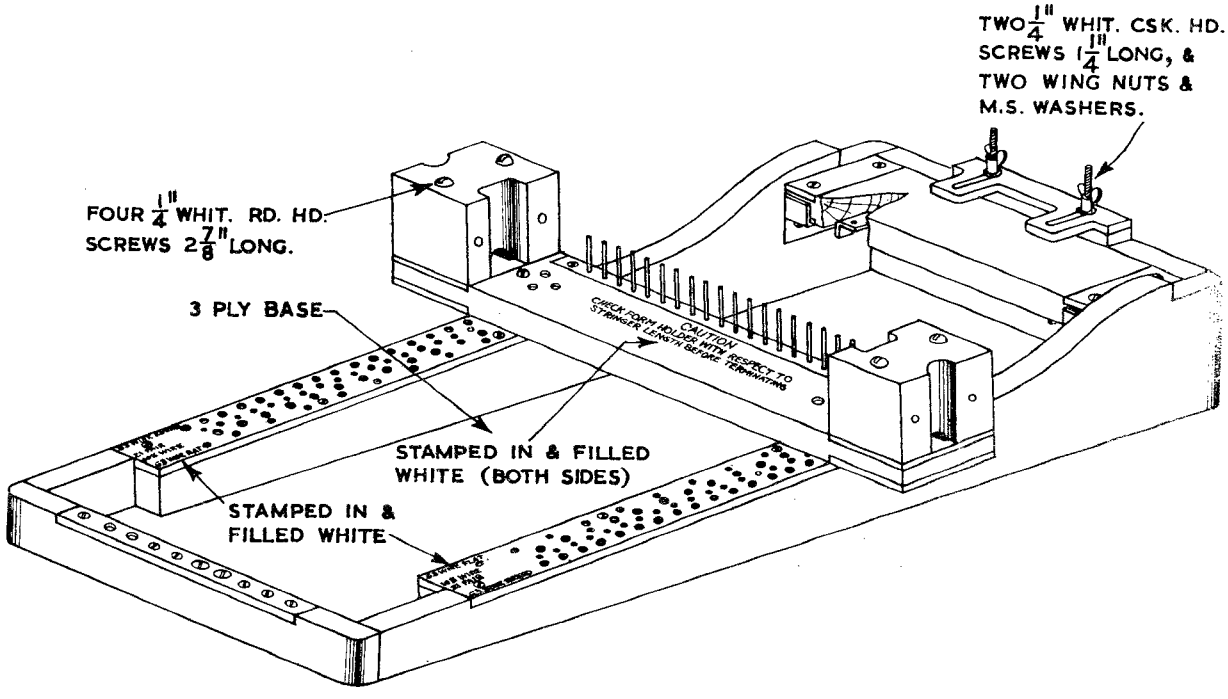


FIG. 2. TYPICAL CLASS 1 FORMING BOARD. FORMING OUT FOR TERMINATION ON A METER PLATE.



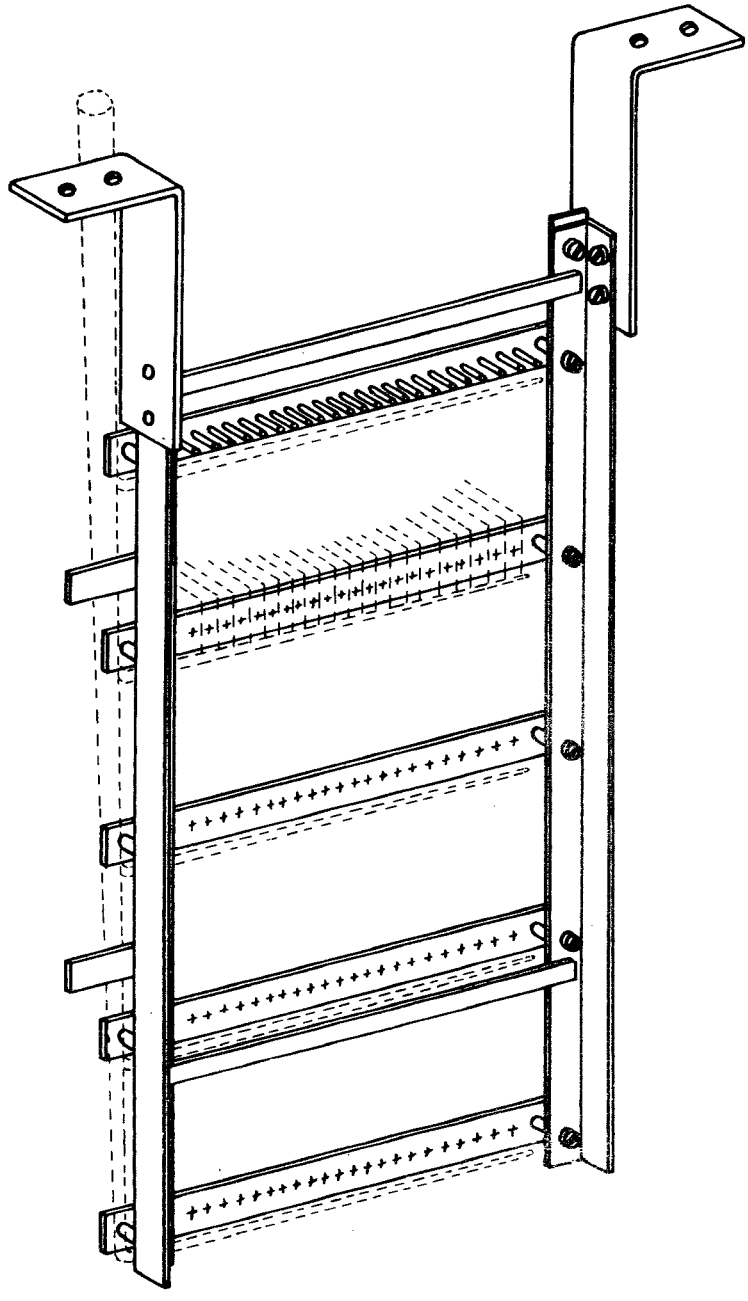
TYPICAL CLASS 2 FORMING BOARD.

FIG. 3.



TYPICAL CLASS 3 FORMING BOARD.

FIG. 4.



FORMING JIG - MOTOR UNISELECTOR, SIEMENS 17 EQUIPMENT.

FIG. 5.

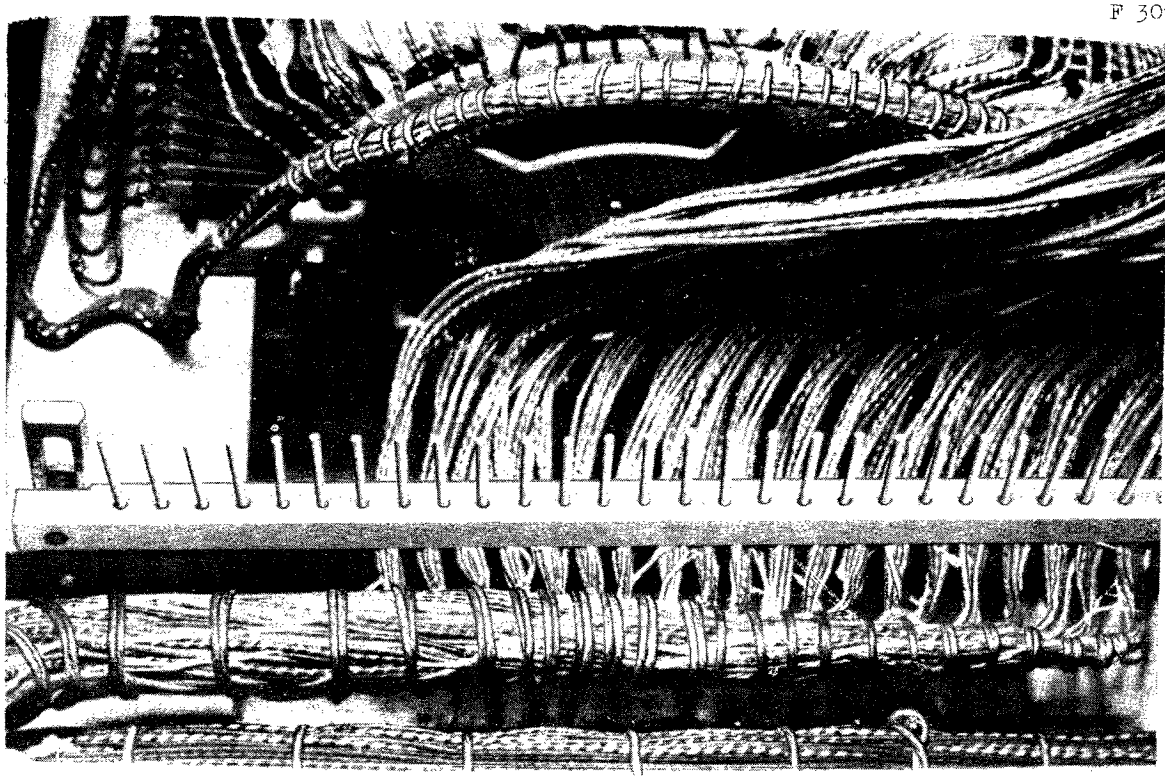


FIG. 6. MOTOR UNISELECTOR FORMING JIG - FIRST STAGE COMPLETED AND LACED FORM INSERTED UNDER PIN BAR AFTER FORMING.

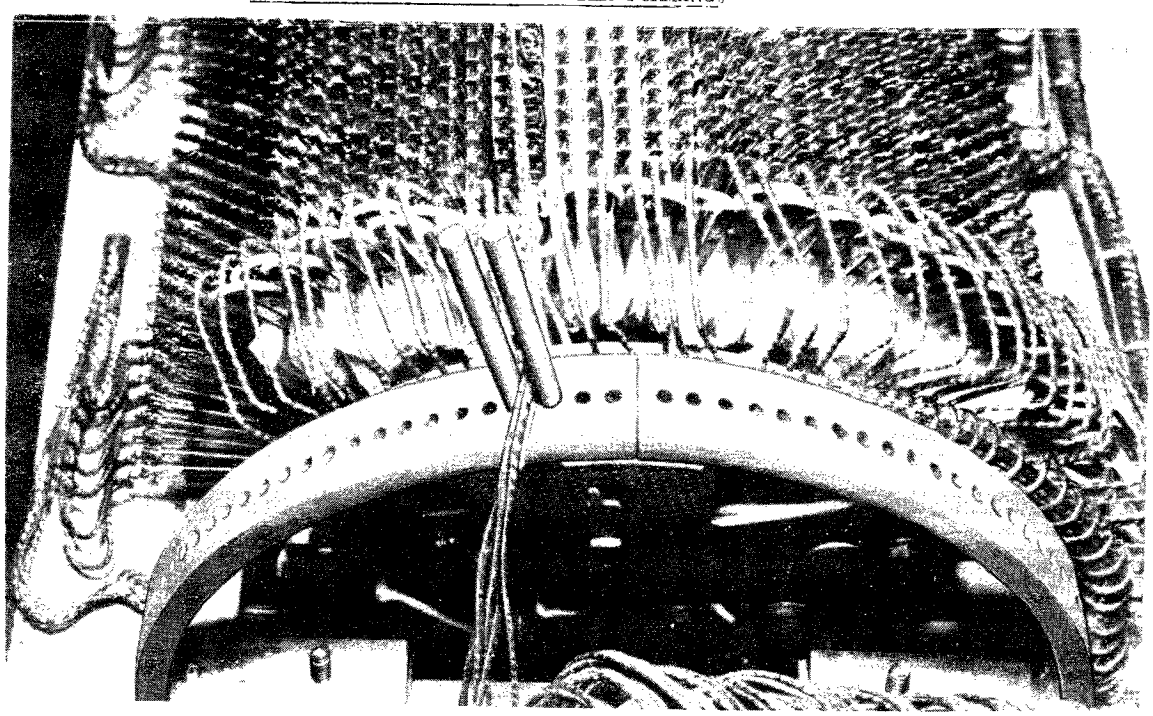


FIG. 7. MOTOR UNISELECTOR FORMING JIG - NOTE USE OF PINS FOR ARC FORMING.

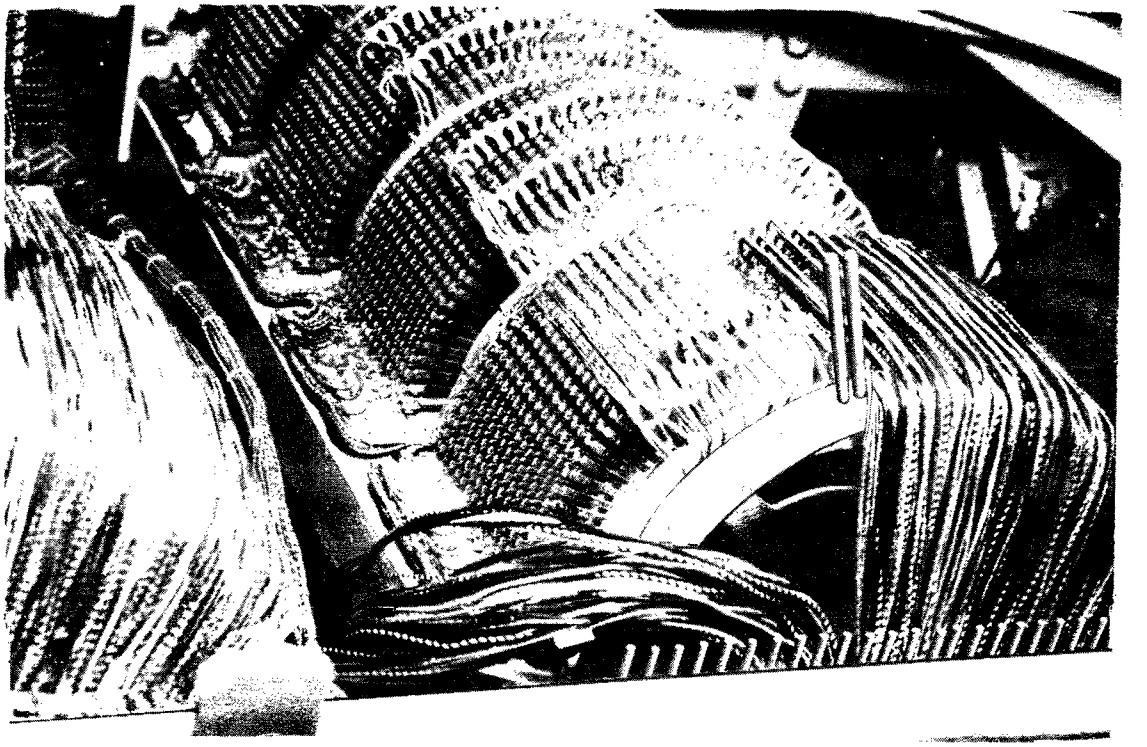


FIG. 8. MOTOR UNISELECTOR FORMING JIG - WIRES BEING TERMINATED.

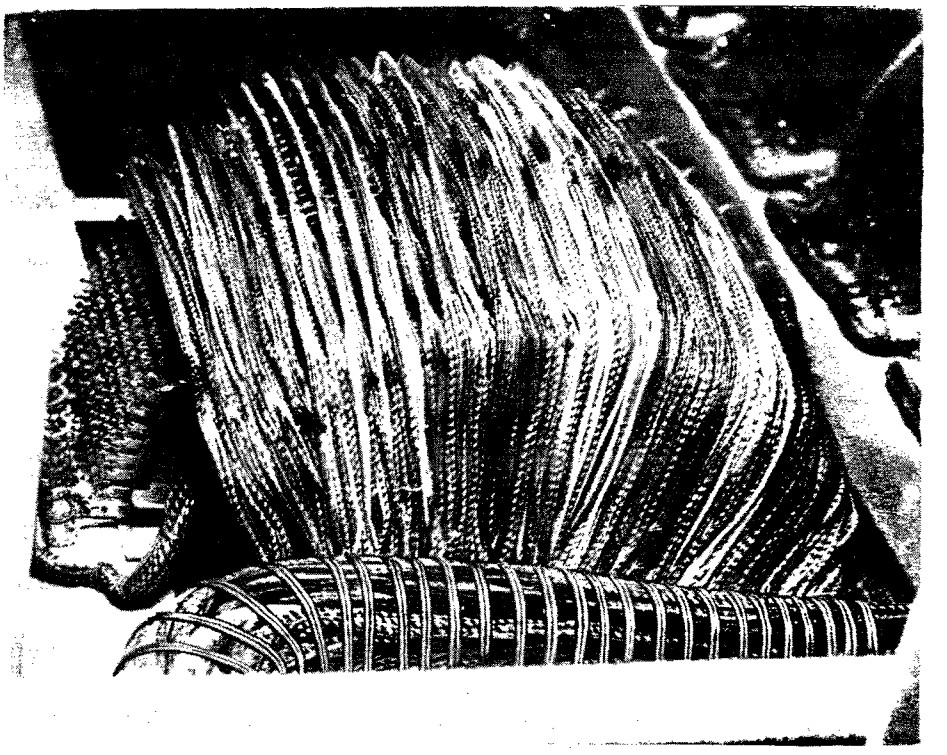


FIG. 9. MOTOR UNISELECTOR - COMPLETED FORM.

2. FORMS.

2.1 Forms can be made up from -

Reels of wire

Scrap wire

Switchboard cable partially stripped

Lengths of cable fully stripped.

2.2 Reels. Forms are prepared from reels of wire, i.e. where a selected colour code is required. Forms for switchboard key shelves are a typical instance.

2.3 Scrap Wire. Forms made from scrap wire are those which do not require any definite colour code and where the form can be more economically made than by wire from reels. Temporary forms must be made from scrap wire.

2.4 Partially Stripped Cable. This class of form is used mainly for manual exchange multiples, level common forms, alarm common services, etc.

When preparing switchboard cables for forming, all the cable wrappings must be removed and neatly trimmed at the butt. The lappings or outer braidings must not be tucked under the butt.

Where cable forms are laced, the wool whippings on triples must be removed at the point at which the skinners leave the form. Where cable forms are not laced, the whippings must be removed at the butt.

2.5 Fully Stripped Cables. These forms are used for cabling between racks, where braiding on the cable is not required and where the forms provide for interlinking of levels and there is no change of wire running direction. This type of form obviates wastage of wire as the wires are displaced lengthwise to correspond with the terminal assembly, while still maintaining the colour code sequence and the cable make-up configuration. (See Figs. 10-12.)

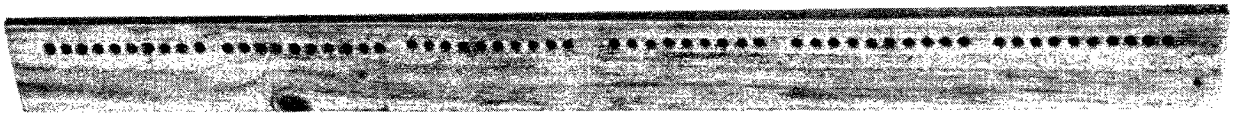


FIG. 10. STRIPPED CABLE FORMING BOARD - STAGE 1.

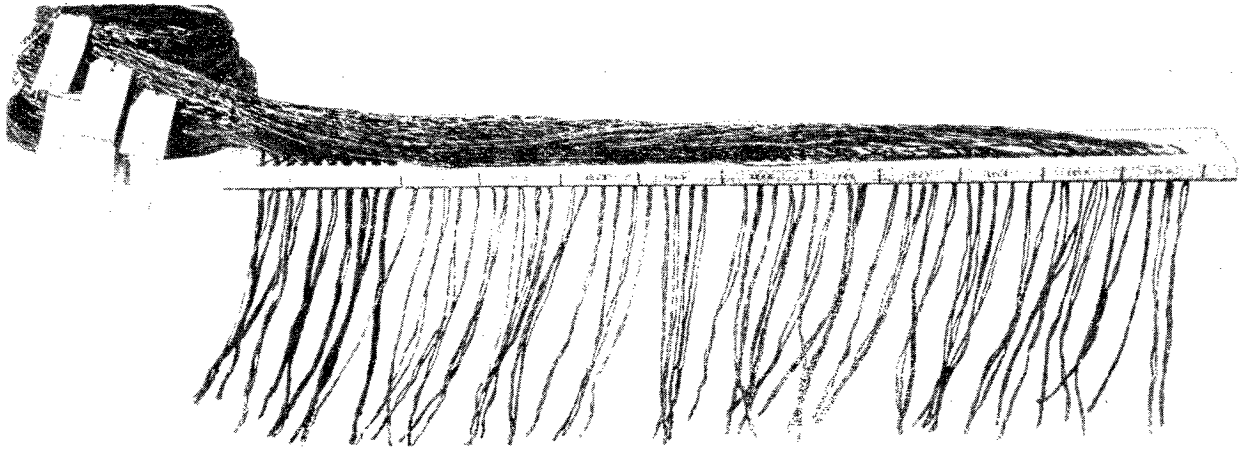


FIG. 11. STRIPPED CABLE FORM - STAGE 2.

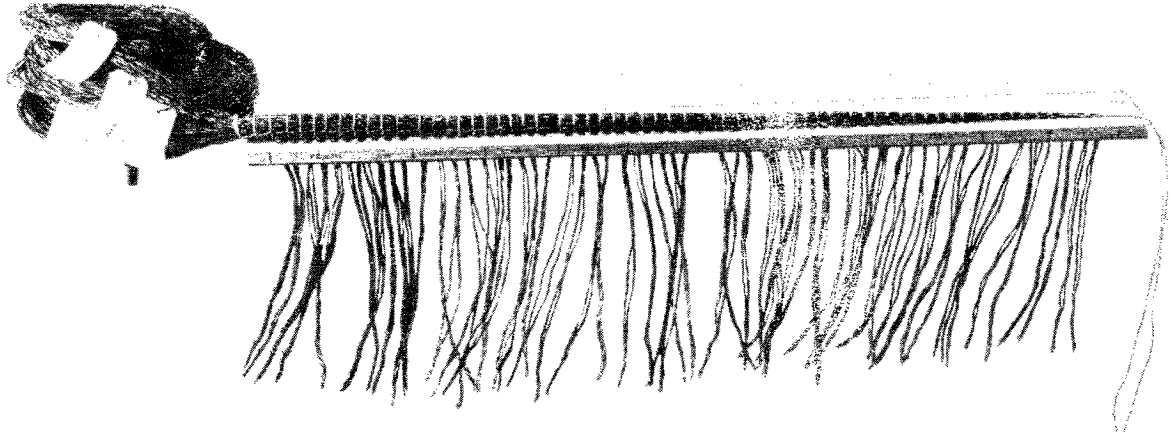


FIG. 12. STRIPPED CABLE FORM - STAGE 3.

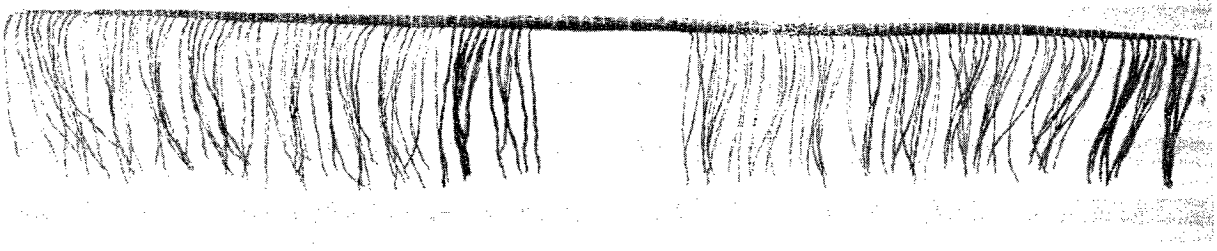


FIG. 13. COMPLETED FORM - STAGE 4.

3. MAKING-UP FORMS.

3.1 The following precautions must be observed when preparing or making-up forms:-

Stringers must have sufficient length to allow equipment to be removed for maintenance purposes and to avoid the straining and stretching of wires and to eliminate sharp bends.

All turning pins on forming boards must be of such a dimension that the twisting and untwisting of wires round the pins does not fracture the enamel.

All holes in forming boards must be countersunk to remove any sharp edges.

Flexible forms must be so shaped that subsequent movement of the form will not strain the wires.

The use of single wires, pairs, triples, etc., must be arranged in accordance with the circuit practice regarding speech or signalling conditions, etc.

The covering on each wire shall be carefully twisted to ensure a neat and tidy finish.

3.2 Humid Climates. In making up forms, particularly in humid working conditions, every effort must be made to avoid absorption, by the insulation coverings, of perspiration from the hands. The Supervising Officer (Officer-in-Charge) must, where possible, select staff who are free from unduly moist hands. Frequent washing of hands or the provision of an air-blowing device may be necessary.

3.3 Identity of Colour Codes. The Officer-in-Charge must see that the colour codes recorded on appropriate drawings are used. The colour codes must be checked during forming and again before terminating and soldering.

4. ECONOMIES.

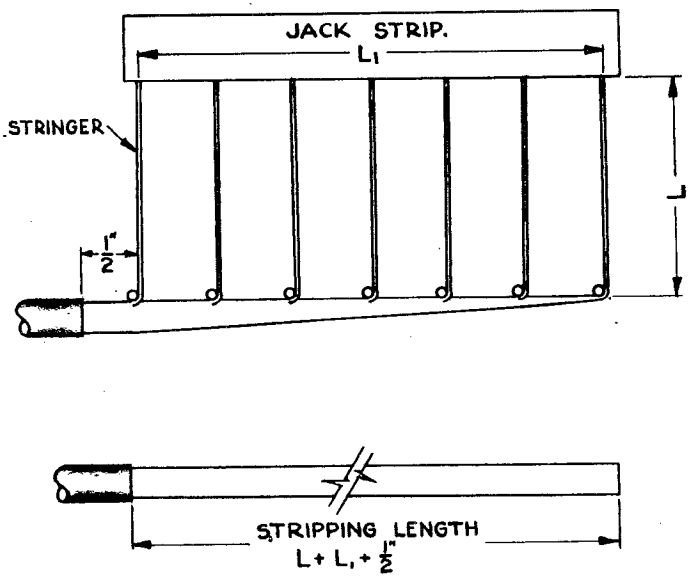
4.1 Manufacture of Stock Forms. Economies can be made by manufacturing large quantities of stock forms in Departmental Workshops, or by purchase from manufacturing organisations. Forms must not be made up on the job since this delays the actual installation work and is uneconomical.

In many instances the preparation of forms is an ideal training job and, where practicable, use must be made of the Technicians' Training School for this purpose.

4.2 Method of Forming. Economies can also be made in the preparation of forms for multiples wherein the length of braiding removed is twice the stringer length, plus the terminating tail length. Fig. 14 shows the existing uneconomical method. The method shown in Fig. 15 is economical and must be introduced immediately. Fig. 15 shows the dimensions to be considered. This method of forming must also be applied to the lead-covered cables terminating on main distributing frames but the resultant clockwise and anti-clockwise connections to the paper cable must be co-ordinated. Details for forming lead-covered cables are also described in E.I. INTERNAL PLANT INSTALLATION Practice F 7010.

4.3 Using Correct Number of Wires. The greatest economy is obtained where use is made of a cable of the right number of wires to the form requirements, that is, for a 4-wire circuit providing for 20 circuits, then an 84 wire cable should be used.

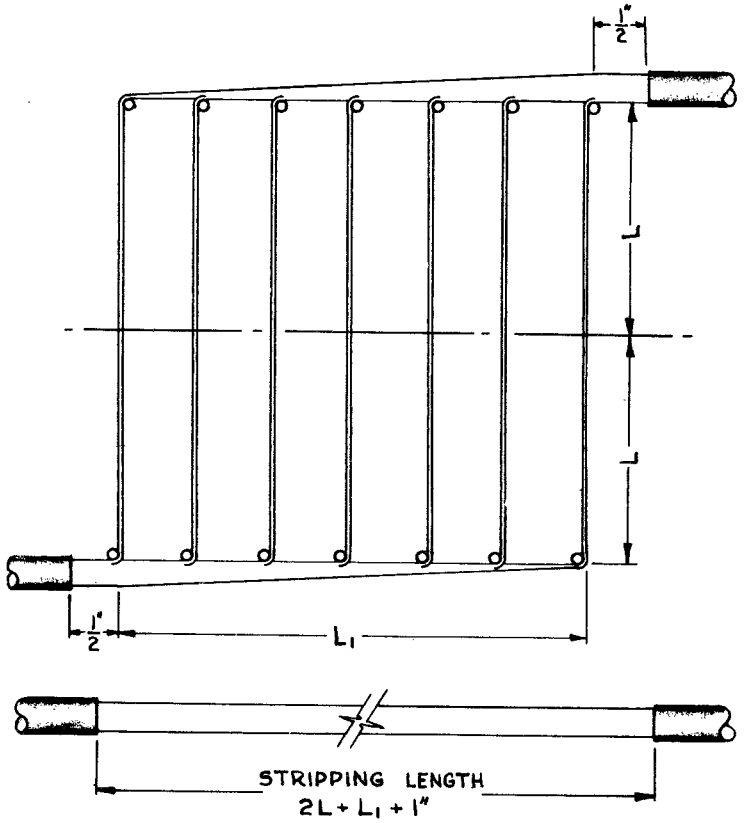
4.4 Removal of Enamel. Where a large number of repetition forms are prepared, remove the enamel with enamel solvents.



EXISTING METHOD OF FORMING SWITCHBOARD MULTIPLE.

FIG. 14.

(To be replaced by the method shown in Fig. 15.)



L = Length of Stringer plus ½" for Termination.
L_1 = Overall distance between Jack Strip Terminals.

PROPOSED METHOD OF FORMING SWITCHBOARD MULTIPLE.

FIG. 15.

Note. The introduction of the method of stripping illustrated in Fig. 15 as a standard practice compared with the method shown in Fig. 14 will effect considerable savings in quantity of cable used.

e.g. (i) four ends formed by method shown in Fig. 14 = $4\ (L + L1 + \frac{1}{2}")$ = $4L + 4L1 + 2"$

(ii) four ends formed by method shown in Fig. 15 = $2\ (2L + L1 + 1")$ = $4L + 2L1 + 2"$

Subtracting (ii) from (i) = $2L1$

therefore saving in cable = $2L1$ = 24" where L1 = 12".

END.