

New Series of Manual L. B. Switchboards with Cords

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U.D.C. 621.395.33

The work of development that is constantly going on even in respect of manual telephone exchanges has now resulted in L M Ericsson's new series of extensible L. B. cord switchboards, differing rather considerably from those hitherto produced. By the introduction of brighter colours and softer lines, for instance, the character of the new switchboards as pieces of furniture has been brought out to a greater degree than was formerly the case. Moreover, as regards the component parts a distinct departure in respect of choice of material and methods of manufacture has taken place in the direction of modern moulding materials and die-casting practice. Lastly, the assembling into units of components organically associated has been still further developed. In this way there have been produced switchboards that are aesthetically attractive, durable, simple to operate and easy to extend.

The new series of L M Ericsson's L. B. cord switchboards comprises the following types of single position telephone switchboards:

wall switchboards for up to 50 lines,
floor switchboards » » » 100 »
» » » » » 200 »

For multi-position telephone switchboards with up to 800 lines there will in addition be set up:

multiple switchboards, 1-position, 2-panel,
multiple annex, combined with cable-turning section.

The whole of the new series may be said to be based on fairly extensive new designing work in respect of the component parts, especially the calling and connecting devices.

When this work of designing was started the goal set was the attainment of certain minimum requirements, which may be summarised as follows:

- 1) The calling and connecting devices of the lines to be assembled in units of 10 devices.
- 2) The equipment for a cord circuit to be assembled in a compact and easily manipulated unit.
- 3) All visual signals to be flush mounted but distinct and their restoration to be combined with other necessary operations.
- 4) The life of the cords to be lengthened by the introduction of plugs with protective spirals and if possible lighter pulleys.
- 5) Brighter surface finish of all woodwork to be introduced and particular attention devoted to form.
- 6) The advantages of bakelite to be taken into consideration for non-metallic parts requiring good insulation, hard-wearing surface or a complicated shape.
- 7) The complete switchboards, out of consideration for freight and customs charges, should be of small volume and light in weight.
- 8) The switchboards should be easy to erect and easy to extend.

In their present state the new series of L. B. switchboards very well fulfil the demands imposed.

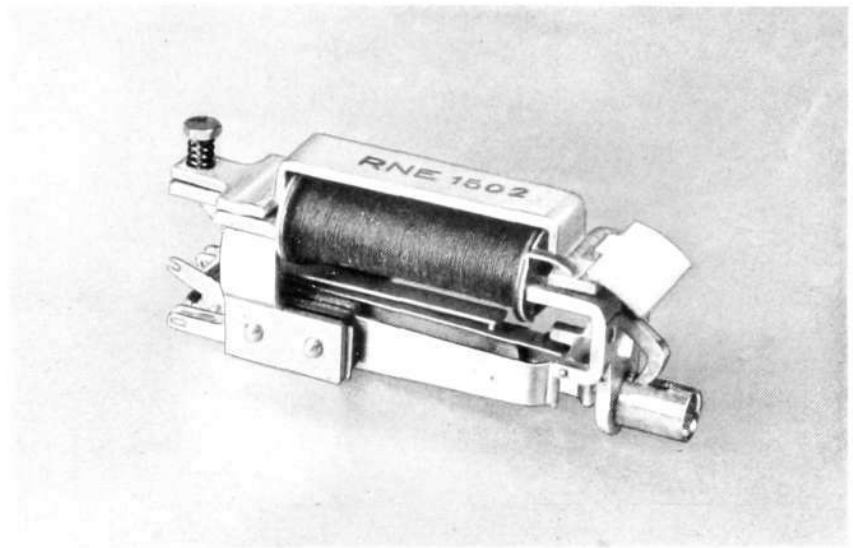


Fig. 1
Drop-indicator jack type RNE 15

X 6215

Components

The device that mainly sets its mark on the new L. B.-switchboards is undoubtedly the new drop indicator such as is used both as calling device on the lines or as clearing signal device on the cord circuit. The calling and connecting device for the lines has been made as a drop-indicator jack. Fig. 1 shows the new drop-indicator jack, which has been given the designation *RNE 15*. It comprises two main parts: the calling indicator and the connecting jack.

The calling indicator magnetic field is the same in principle as earlier drop indicators. The winding space, however, has been diminished by about 25 %, thus making the whole indicator shorter. At the rear end the armature is pivoted on two guide pins and the width of stroke is determined by a lug bent out from the supporting flange of the coil frame.

The sensitivity is regulated by adjusting screw and spring in the rear of the indicator. The shutter itself has been given a form that allows it to lie flush and protected when the jack is fitted in its strip. In home position the shutter hangs on a hook formed on the front edge of the armature, while at the same time it keeps the alarm contact open. When the armature is attracted

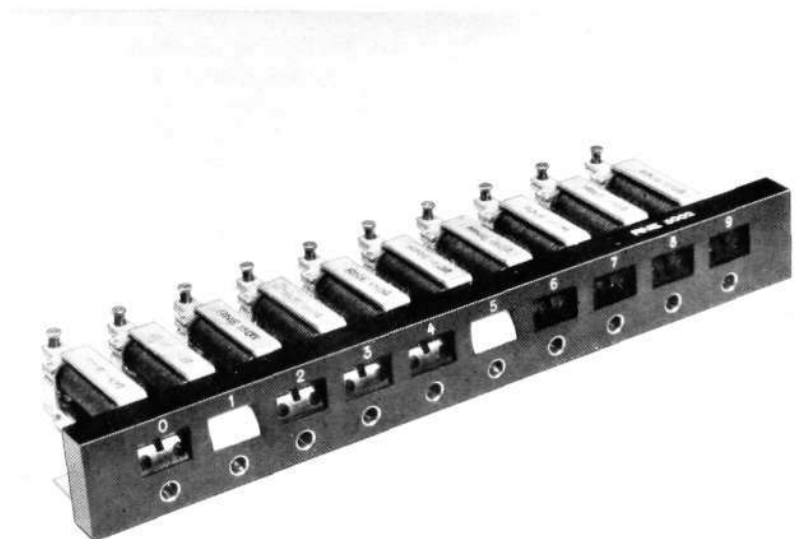


Fig. 2
Drop-indicator jack assembly type RNE 50

X 6213

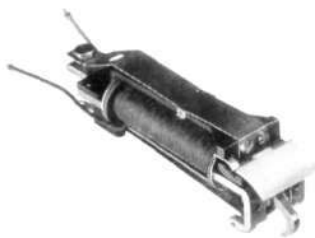


Fig. 3
Clearing indicator type RNA 17

X 4446

the shutter is released and falls by its own weight, on which the alarm contact is made. Restoration is done automatically when a plug is inserted in the jack. The calling indicator is normally wound with 0.10 TE, giving app. 7000 turns and 500 ohm. It works reliably for a delivered power of app. 0.04 W.

The connecting jack is built up in the usual manner with insulation inset of pure bakelite. The alarm contact is built on to the jack and has had its soldering tags so shaped that bare-wire connection between adjoining indicator jacks is possible. The connecting jack is attached to the indicator by a single screw. The jack is only made for 5.76×23.8 mm plug, which is our present standard.

A special strip has been designed for the mounting of the indicators jacks. It is moulded of bakelite and holds 10 jacks. For each indicator jack there is a circular hole for the jack sleeve and a rectangular opening for the shutter. The indicator jack is fixed in the strip by two screws. The 10 calling devices in a strip are always numbered from 0 to 9. The figures are engraved and filled up with white.

Fig. 2 shows the complete indicator jack assembly, which has been given the designation RNE 50. The dimensions of the front piece are: length 281.5 mm, height 36 mm, depth 80 mm. The assembly is therefore 12 mm lower than the old one. The weight of the complete indicator jack assembly is 830 g and a single indicator jack weighs 70 g, i. e., half the weight of the old one.

The clearing indicator, with designation RNA 17, is built up in principle like the calling indicator for the indicator jack. There has had to be arranged, however, a special alarm contact which, in view of the indicator's vertical position in the cord pair strip must also serve as tension spring for the shutter, which of course cannot in this case fall by its own weight. Moreover the armature has been so shaped that it prevents the release of the shutter by jars or knocks. Fig. 3 shows the appearance of the clearing indicator.

The key, Fig. 4, is of our normal execution type RMA 10. An innovation is that the frame is now die-cast in zinc thus producing a more rigid frame with greater precision of construction than formerly. The pivoting of the lever arm has also been improved and as regards the switch handle plastic material has been adopted.



Fig. 4
Key type RMA 10

X 4447

The plug and cord, Fig. 5, have also been re-designed. The chief change in appearance consists in the addition of protective spiral. The shape and size of the plug itself have been retained, but the method of manufacture has been changed, moulding now being employed. A new method has been applied for the attachment of the cord to the plug, no screw being now required. The new plug, which has been given the number RPR 3526, is always made three-pole. Despite the addition of the protective spiral, the length is no more than 90 mm and the diameter app. 10.5 mm.

The equipment for a cord circuit has been combined in one unit, called the cord circuit strip, Fig. 6. The frame of the cord circuit strip is moulded of bakelite and space is provided for the following devices, counting from the front:

- 1 clearing indicator
- 1 speaking and ringing key
- 1 lamp (not shown on Fig. 6)
- 2 plugs
- 2 cord clip terminals.

The clearing indicator has been furnished with an iron sheath to prevent cross-talk. A mechanical coupling has been arranged between shutter and key enabling restoration of the shutter by means of the key.

The cord circuit strip RNV 10 has the following dimensions: length 185 mm, width 25 mm, depth 85 mm. The weight of a complete unit is app. 300 g.



Fig. 5
Cord (above) and plug RPR 3526

X 4448

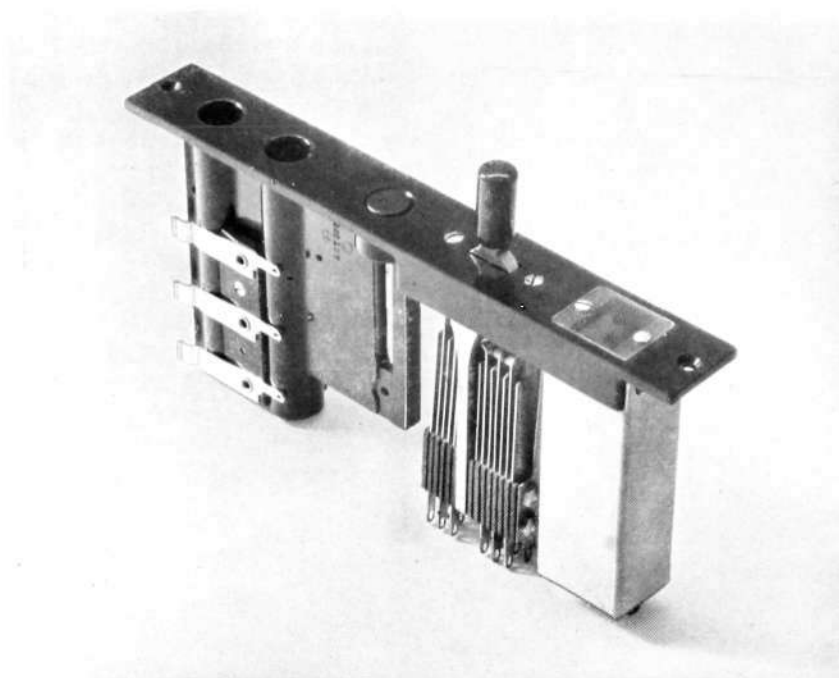


Fig. 6
Cord circuit strip type RNN 10

X 6216

Wall switchboard

The smallest size single position telephone switchboard, see Fig. 7, is normally made for mounting on a wall. It has a capacity of 50 lines and 10 cord pairs. The switchboard is of light oak and all corners and edges are rounded. The front is dominated by a vertical panel for the line units and the position set, together with a projecting inclined table for the switching sets. The back consists of a hinged door, strengthened to meet the stresses when suspending the switchboard on the wall. In exceptional cases where local conditions do not permit of hanging on the wall the switchboard may be placed on a special stand, see Fig. 8.

The 10-line unit, Fig. 9, comprises a completely wired unit for the calling devices of ten lines. It consists of an indicator jack assembly *RNE 5001*, a terminal block *NEM 1001* with screw terminals and a connecting cable. All the 10-line units in the wall switchboard are alike, both in respect of the numbering of the jacks and of the form of cable.

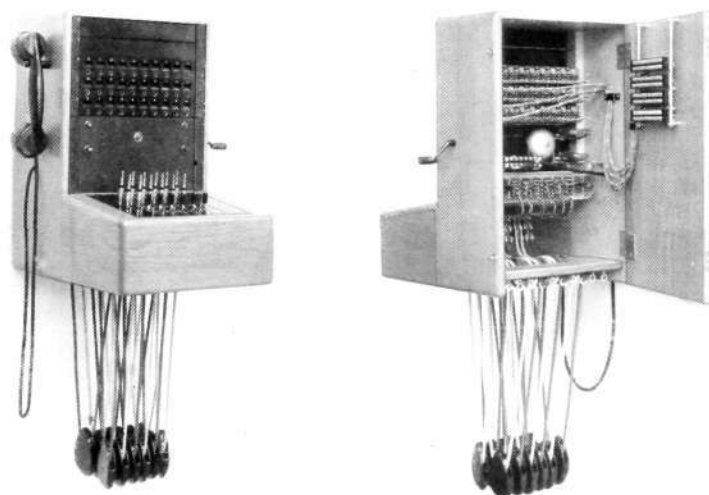


Fig. 7
Wall switchboard ABH 1605
for 50 lines and 10 cord circuits; left, with back
open

X 6211



Fig. 8
Wall switchboard ABH 1605
on stand

X 4444

The switching set, Fig. 10, contains the fixed parts of a cord circuit. It consists of a cord circuit strip *RNN 1001*, containing clearing indicator, key and cord clip terminals, together with a connecting cable terminating in a 20-pole plug. Corresponding 20-pole jacks are located on the position set. Connecting up of a switching set can therefore be done by simple plugging, without the employment of soldering irons.

The position set, Fig. 11, consists of a wood panel covered with paper bakelite, on which all components common to the switchboard are fitted. On it will be found the hand generator and the night bell, the keys for connecting in the pole-changer and the bell, the keys for ringing on and insulating the answering cord, together with terminal block for the handset and dial if any. In addition the position set contains the above-named 20-pole jacks, which may be said to comprise the assembly bars for the switching sets. Connections to batteries, pole changer and additional bell are drawn to a separate terminal block. The operator's telephone is an ordinary handset with key, attached to the switchboard.

The terminal strips for 10-line units and position set are located on the rear door of the wall switchboard, which also provides good space for incoming cables.

The new wall switchboard has been given the designation *ABH 1605*. The dimensions are:

height 490 mm (with cords and pulleys 870 mm)
width 335 mm (excl. crank and handset)
depth 415 mm.

The net weight of a fully assembled switchboard is app. 25 kg.

The floor stand for the wall switchboard has been given the designation *BAR 2510*. It is 480 mm high and weighs app. 7.5 kg.

Floor switchboards

The single position floor switchboards are made in two sizes, one with a capacity of 100 lines, Fig. 12, one with a capacity of 200 lines, Fig. 13, both of them with a maximum of 20 cord pairs. Variants are obtained by placing a low or a high upper part on the same lower part.

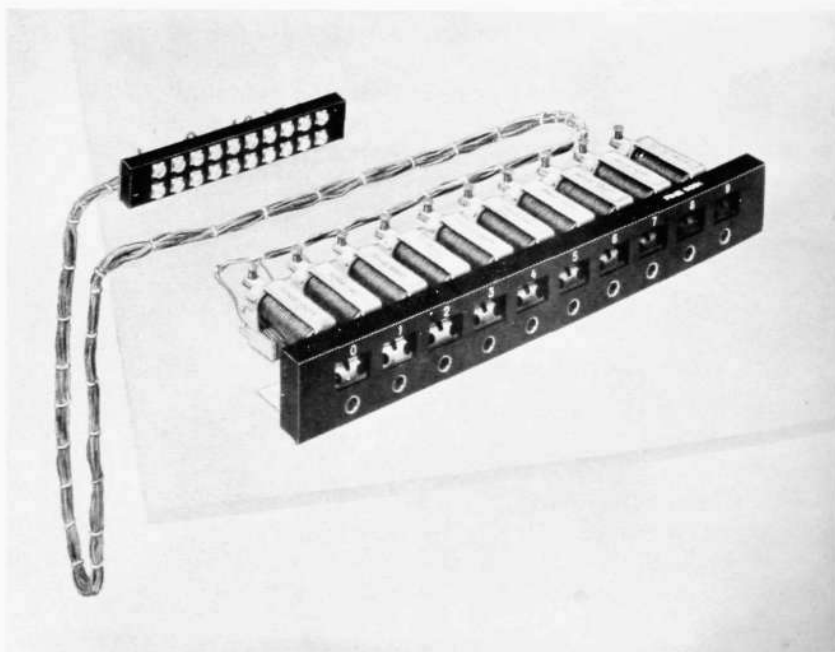


Fig. 9
Line unit

X 6212

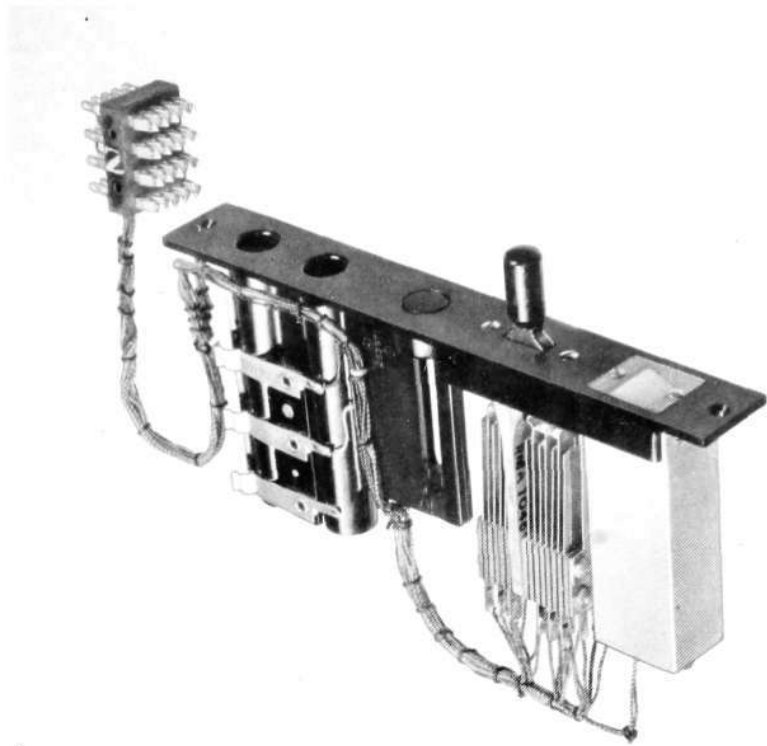


Fig. 10
Switching set

X 6223

The switchboards are executed in light oak veneer on core of laminated wood, with the exception of the back doors which consist of light-coloured wood fibre sheet with wood frames. The desk top is covered with green linoleum, constituting an excellent writing underlay. Below the desk-top a compartment has been provided for the operator's private belongings. The height from the floor to the desk-top, in conformity with Swedish standards for office furniture, is 770 mm. At the bottom the switchboard has been fitted with kick protection of sheet metal. Corners and edges have been rounded to some extent and in other respects too considerable attention has been devoted to colour and form.

The 10-line unit for the floor switchboard differs from the unit of the wall switchboard only in respect of the shape of the connecting cable. Here too all the component units of the switchboard are alike. Thus right-hand and left-hand executions are no longer to be had.

Fig. 11
Position set

X 7417

for wall switchboard, right seen from behind

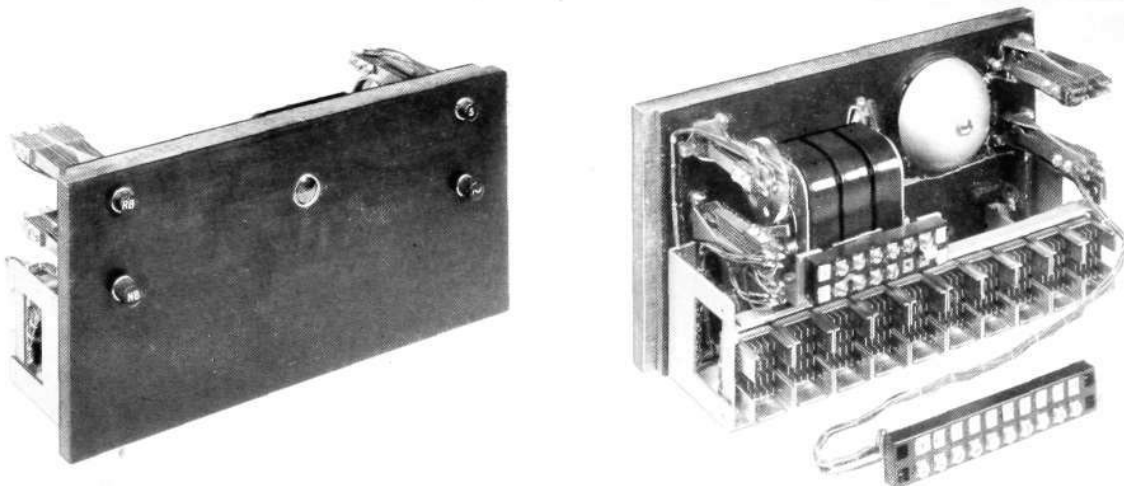
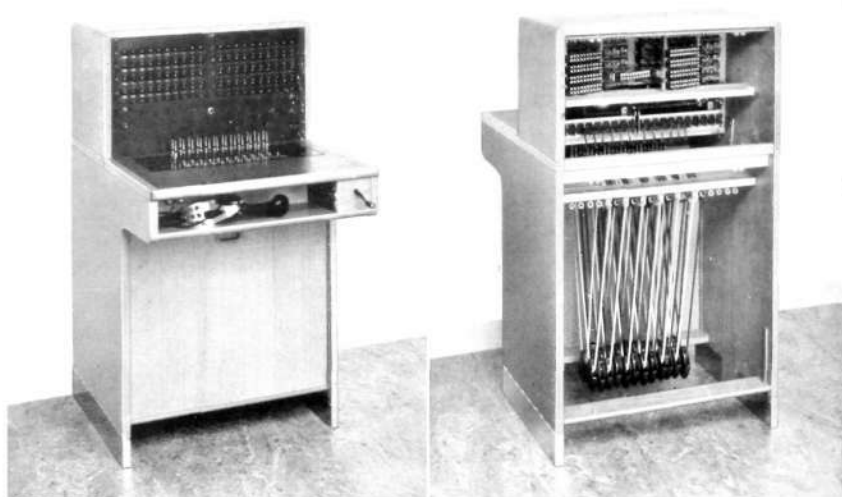


Fig. 12
Floor switchboard ABK 2010
for up to 100 lines and 20 cord circuits, at right
with back removed

X 6210



The switching set for the floor switchboard is exactly the same as for the wall switchboard, see Fig. 10.

The position set, Fig. 14, for the floor switchboard is in the main the same as the unit for the wall switchboard. For practical reasons, however, the hand generator has been taken out and placed in front in the desk top. In addition, the connection of the operator's telephone has been made with 4-pole plug, located at the left under the desk top. The floor switchboard is normally delivered with the new headpiece transmitter-receiver, but of course a handset can also be used.

The terminal blocks for the 10-line units and position unit are fitted so that they are easily accessible from the back of the switchboard.

The new floor switchboard has been given the designations *ABK 2010* and *ABK 2020* for the 100 och 200 line switchboards respectively. The dimensions are: height 1110 mm and 1290 mm resp. width 634 mm depth 765 mm.

The net weight for a switchboard *ABK 2010* with 100 lines and 12 cord circuits is app. 66 kg. The corresponding switchboard *ABK 2020* is app. 5 kg heavier, while an *ABK 2020* with 200 lines and 19 cord circuits weighs app. 86 kg.

As stated earlier, all these switchboards are capable of extension. Consequently in a switchboard not completely fitted up the unoccupied space must be covered in one way or another. For this purpose special covering strips of bakelite have been designed, one for a 10-line unit and one for a switching set.

Circuit diagram

The switchboards without multiple, i. e., wall switchboard *ABH 16* and floor switchboard *ABK 20* are connected up according to the same diagram, Fig. 15. The dial *D* and the relay *DR* are not normally comprised in the switchboards. They are provided only in those isolated cases when the switchboard is to be equipped with exchange lines to automatic main exchange, in which event the dotted connections are also fitted.

The connecting process for the establishment of a call is in the main as follows:

The suscriber calls the exchange by turning the crank of his telephone instrument. The ringing current thereby produced causes the calling indicator *CI* to drop, this providing a distinct visual signal for the operator. If the key *NB* is operated, there is also given at the same time an audible signal from the bell *B*. The operator takes an unoccupied cord circuit, connects the speaking and ringing key in position *SK* and plugs the answering plug *AP* in the calling

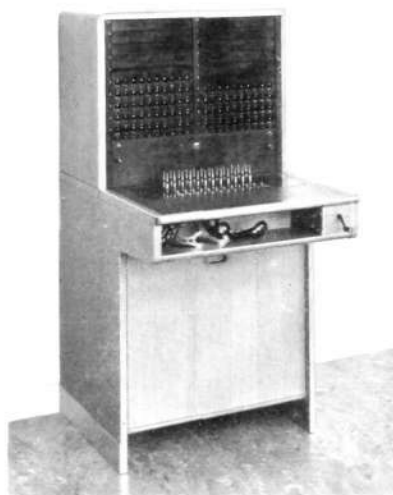


Fig. 13
Floor switchboard ABK 2020
for up to 200 lines and 20 cord circuits

X 4445

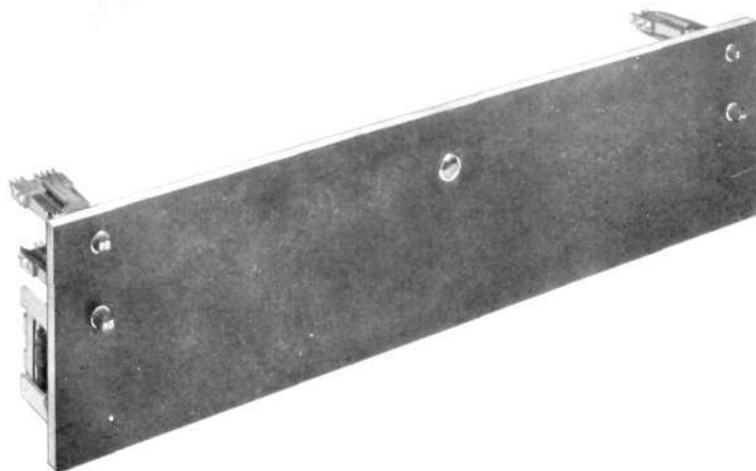


Fig. 14
Position set
for floor switchboard

X 6214

subscriber's connecting jack *J*. The action of plugging restores the drop indicator automatically, this being disconnected at the same time from the subscriber's line. The operator is now in connection with the calling subscriber and answers in appropriate manner.

Having received information of the line wanted, the operator by a quick glance sees what is the situation with this. If the line is busy, the subscriber is notified and disconnection takes place. If it is unoccupied the operator inserts ringing plug *RP* in the jack *J* of the wanted line and rings up.

Ringing may be done in two ways. One is, with the key thrown to position *SK*, to turn the crank of the switchboard's generator *HG*, whereupon ringing current is automatically transmitted over the ringing cord to the subscriber.

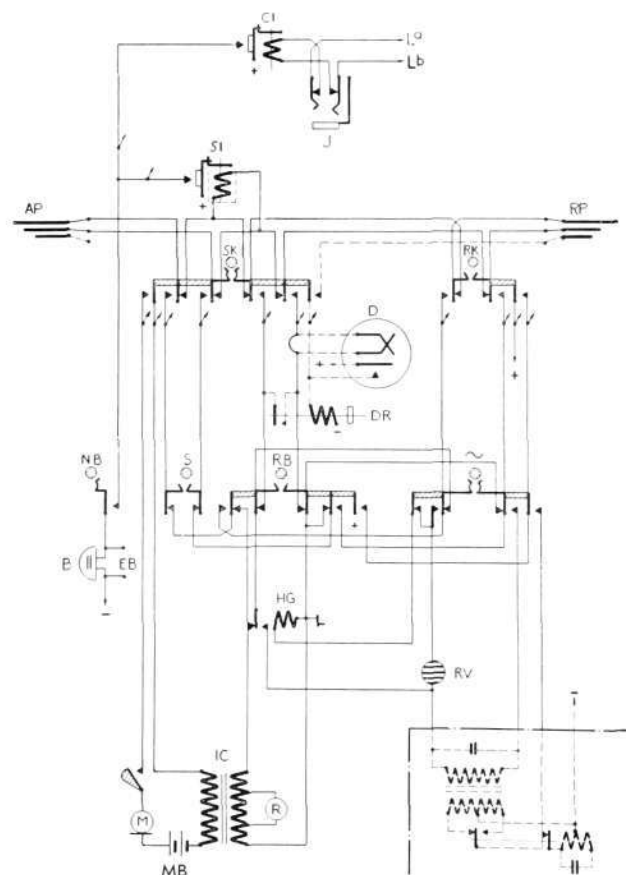


Fig. 15
Circuit diagram
for ABH 16 and ABH 20

X 6218

- AP answering plug with cord
- B bell
- EB extra bell
- CI calling indicator
- J connecting jack
- HG hand generator
- IC speech transformer
- L_q—L_b subscriber line
- MB microphone battery
- M—R micro-telephone
- NB night bell key
- RB ringing back key
- RK ringing key
- SK speaking key
- RP ringing plug with cord
- RV ringing visual
- S splitting key
- SI clearing indicator
- ~ pole-changer key

The other way, which requires that a pole-changer is connected, is to throw the key from position *SK* to position *RK* and keep it there as long as ringing signal is to be transmitted. In both cases the ringing visual shows white as sign that the line loop is closed and that ringing current is being transmitted. When ringing signal has been transmitted in one of these ways the key is restored to home position and the connection is established. On account of the poor supervision occurring with all L. B. switchboards the operator, however, should after 8—10 s break in on the cord circuit to make sure that the called subscriber has answered and that the call is proceeding.

During conversation the cord circuit clearing indicator is connected in between the speaking wires. Consequently when one of the subscribers rings off at the close of the conversation the clearing indicator falls, giving the operator a distinct visual signal and, if connected, an audible one as well. The operator connects herself in for a moment on the cord circuit by throwing the key to position *SK*, thereby restoring the clearing indicator. After the operator by listening has made sure that the call really is terminated disconnection may be carried out.

The above-described connecting process may be regarded as the normal. Its feature is that the operator speaks only with the A-subscriber and rings only to the B-subscriber. In exceptional cases, however, the operator may need to speak with the B-subscriber without the A-subscriber hearing and this is made possible by the splitting key *S*. In some cases it may be necessary for the operator to ring up the A-subscriber again and this is possible with the ring back key *RB*.

Accessories

A manual L. B. telephone switchboard of the kind described above is not complete without certain accessories, mainly current supplies of various kinds. Thus for the operator's speaking device there is required a microphone battery of 3 V, suitably made up of dry cells.

For the alarm circuit and pole-changer, if any, there is further required a signal battery of 4.5 V, this too consisting of dry cells. Pole-changer for producing the necessary ringing current is not absolutely necessary for the functioning of the switchboard, but it facilitates operation so considerably that it is advisable.

Packing

Owing to the extent to which the principle of units for lines, cord circuits and position equipment has been carried out, it is a very simple matter to fit up a telephone switchboard. It is also more easy to rationalise the manufacture of units and the keeping of stocks is facilitated very much, as in future it will not be necessary to hold complete switchboards in stock but the switchboards can be delivered in parts. The assembly of the switchboards can easily be done by a fitter with no other tool than a screwdriver.

A telephone switchboard with cords will in future be delivered in the following parts:

1. a switchboard frame, whole for wall switchboards and in two parts for floor switchboards;
2. a number of 10-line units, each one in its own carton;
3. a number of switching sets, likewise in cartons;
4. a position set, either packed in separate carton or inserted in the switchboard frame;
5. a number of cords and pulleys wrapped in parcels;
6. a carton with the requisite cover strips, handset hook, generator crank, screws etc.
7. miscellaneous accessories such as microtelephone, batteries, pole-changer etc.

The whole outfit is packed together in a suitable case. The new method of packing will also reduce risk of breakage in transport.