

## Intermediate and Extension Telephones

**H**ERE are very many instances, especially among small businesses and large private houses, where the facility of communication with the public exchange is desired from two points, but which does not warrant the renting of two exchange lines. To meet such cases the Ericsson Company has, for a number of years, supplied instruments of various designs some of which included a separate switching set.



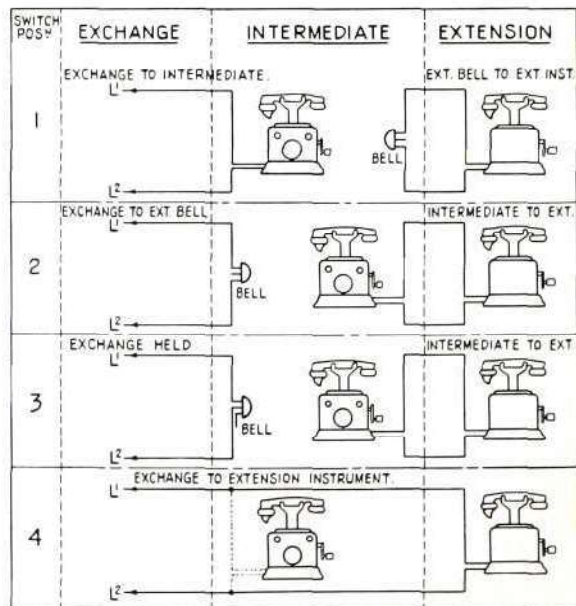
**The Auto Intermediate Instrument**

For whatever purpose, the table type of telephone is undoubtedly the more popular, and it was realized that such an instrument incorporating all the necessary apparatus for giving the facilities which enable communication on an exchange line from two different stations, with intercommunication also between the stations, would be extremely popular. The Ericsson intermediate table telephones for this purpose have therefore been vastly improved during recent years and, as may be seen from the illustrations, incorporate the switch,

indicator, and generator, with a bell in the terminal block or wall case, and a bakelite micro-telephone of high transmission and reception efficiency. This one-piece instrument is much more convenient to use than the separate telephone and bell set with switch, and therefore it is rapidly being standardized by the majority of large telephone administrations throughout the world. Four instruments are manufactured, the auto intermediate and the auto extension, and their C.B. counterparts.

In describing the facilities, reference will be made to the case of the exchange line of a busy executive whose private secretary or deputy answers all enquiries, and only passes forward to the executive calls definitely requiring his attention.

The intermediate instrument is for the secretary's use, and the extension instrument for the executive. All the switching is done by the secretary at the intermediate



**Schematic of Connections for each position of the Switch**

instrument and the various facilities controlled by the rotary four position switch on this instrument are as follows :—

*Switch Position No. 1.*

Exchange to Intermediate. This is the normal position of the switch, calls from the exchange ring the bell in the intermediate instrument and those from the extension the bell in the wall case. A differently toned bell is provided in the wall case to differentiate between a call from the extension and one from the exchange.

*Switch Position No. 2.*

Intermediate to extension. This allows intercommunication between executive and secretary. The signalling either way is by means of magneto generator, and speaking current is supplied by two or more local cells dependent upon the line resistance. Calls from the exchange, it will be noted, will now ring the bell in the wall case.

*Switch Position No. 3.*

Intermediate to extension, exchange held. This position holds the exchange line whilst speaking to the extension. The necessity for this condition often arises when the secretary receives an enquiry which necessitates consultation with the executive before replying.

*Switch Position No. 4.*

Exchange to extension. This puts the executive through to the exchange. To prevent interruption of the call by the secretary a star type indicator on the intermediate instrument is operated during the time the line is engaged. In this position of the switch it is sometimes required that the intermediate instrument is in parallel with the extension. This is accomplished on the terminal block by means of two straps which when removed gives secrecy of con-

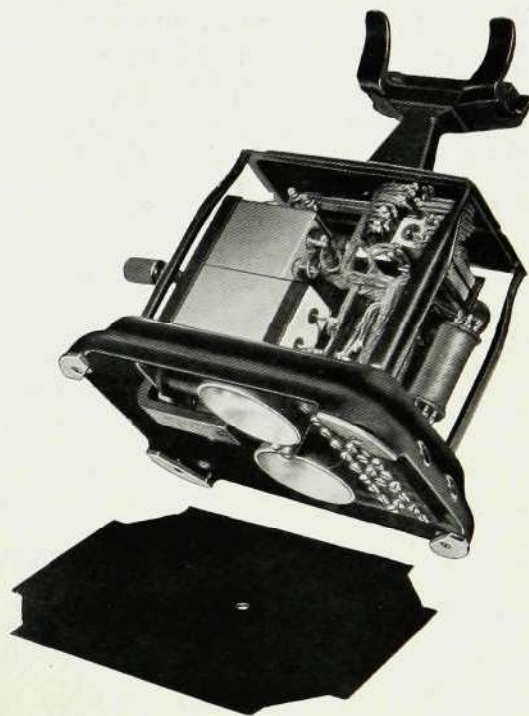
versation between the extension and exchange.



**The Auto Extension Instrument**

Both intermediate and extension instruments have the same constructional details, i.e. steel casework with moulded bakelite cradle stand and reinforced cradle, and being of robust design are capable of withstanding rough usage with the minimum amount of attention.

Removal of the single-hole-fixing plate gives access to the bell, terminal block, dial



**Interior of the Intermediate Instrument**

and desk cord connections, also the two screws fixing the main body cover, the latter may then be drawn upwards on the four corner pillars revealing the other components of the instrument.

Mounted as a unit, the generator, star indicator, rotary switch and induction coil are positioned for maximum accessibility, and the cable form is designed to allow easy withdrawal of any piece of apparatus for inspection or adjustment.

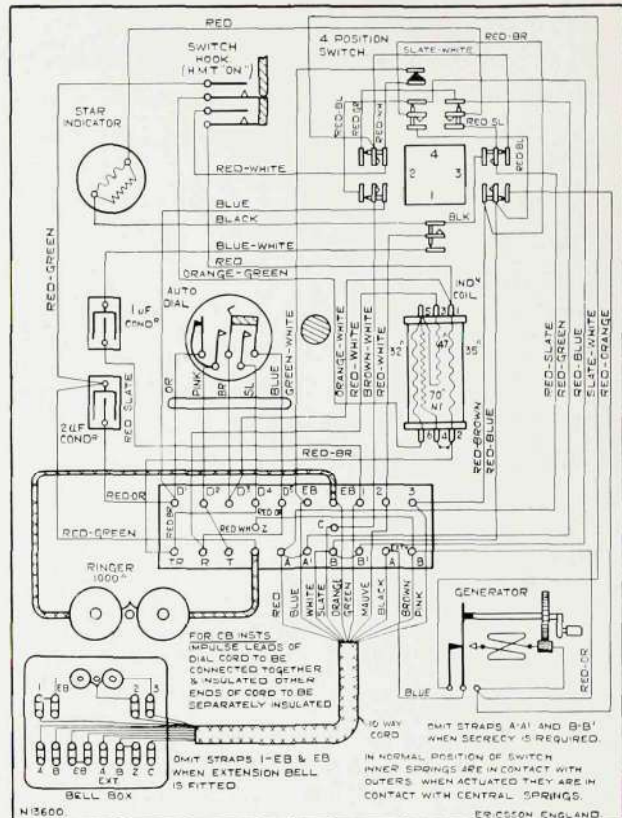
The dial is fitted with a moulded bakelite cover effectually protecting the mechanism from dust and to a certain extent mechanical injury, the complete assembly may be removed from the dial mounting without disturbing any other piece of apparatus.

The cradle switch is fitted to the metal top by the nut clamping the bakelite cradle stand, and the actual contact springs are mounted on a U shaped bracket giving a wide range of movement to allow easy adjustment. Movement of the bakelite cradle stand is prevented by two pressed indentations in the top engaging with suitable recesses moulded in the base of the stand.

Terminals are provided on the bell set or wall case of the intermediate instrument, and on the terminal block of the extension instrument, for the connection of an extension bell when required.

A diagram showing all connections and colours of cable-form wires is securely affixed to the metal base of each instrument.

All the apparatus used in the construction of the instruments is of well proved design, and where possible for reasons of standardization and service, is



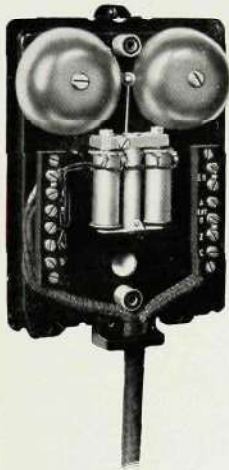
**Diagram of Connections**

of British Post Office type. The following components are fitted :—

- Generator, 3 magnet, resistance  $400\Omega$   
P.O. No. 4C
- Condenser,  $2\ \mu\text{F}$ . P.O. No. 102
- Condenser,  $1\ \mu\text{F}$ .
- Induction coil, resistance  
 $35\Omega + 47\Omega + 70\Omega$  N.I.
- Bell (in instruments) resistance  $1000\Omega$
- Bell (in wall case) resistance  $1000\Omega$   
P.O. No. 59A
- Star indicator, resistance  $75\Omega + 150\Omega$  N.I.
- Switch, 4 position P.O. No. 248
- Hand-microtelephone P.O. No. 164
- Dial P.O. 10FA.
- Terminal block P.O. Strip,  
4 terminal.

Most of the above components are too well known to warrant detailed descriptions ; therefore, for the purpose of this article only the less familiar apparatus will be mentioned.

in practice a very positive action. All the spring banks have a make before break action of the contacts to prevent interruptions on the exchange line when switching from one position to another.



The Bell-Set

The bakelite cased bell set associated with the intermediate instrument is an adaptation of B.P.O. Bell Set No. 25 with the induction coil and condenser omitted and terminal blocks arranged to accommodate the 10 way cord.

The base plate is a brass pressing mounting the bell movement, gongs, and the moulded bakelite cord guide. The polished moulded bakelite cover of modern design harmonises well with the black casework of the table set.

The four position rotary switch of the intermediate instrument is of particularly robust design and operates the various spring combinations through the medium of hardened stainless steel balls, providing



The Star Indicator

The star indicator has been specially designed to resist the detrimental effects of high temperature and excessive humidity. Except of course for the magnetic iron cores, armature, and rustless steel spindle, all the component parts are made from brass in contrast to the normal practice of employing zinc-base or similar alloys which are subject to rapid disintegration under severe tropical conditions.

The speaking circuit is the well known 4-winding induction coil circuit, used as standard on C.B. systems, and which when tested on the standard transmission circuit as specified by the British Post Office, i.e. toroidal repeater exchange system, 22 volt battery, and 300 ohms subscribers line, the efficiency as regards volume, intelligibility, articulation and side tone, is at least equal to that specified by the P.O. for telephone No. 162.