



There's wisdom in

better communications . . .

Nigel Edwards
194 1158

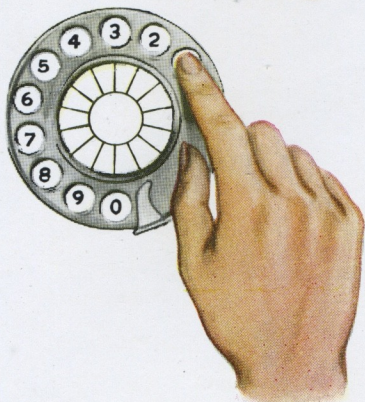
Internal telephone service is essential . . .

IN INDUSTRIAL OR COMMERCIAL ORGANISATIONS, telephone links between departments are no less essential than the telephone link with the outside world. And yet, although familiar with the swift and reliable service obtained from public automatic telephone exchanges, many organisations are tolerating less efficient methods of routing internal calls despite the fact that internal calls outnumber external calls and therefore provide greater scope for saving time and increasing efficiency.

This publication describes modern automatic telephone equipment—as used for public service—which has been adapted and further developed for private use. The equipment enables the advantages of private automatic telephony to be enjoyed by organisations varying in size from those needing as few as ten telephones to those needing telephone service on a scale such as would be required by a small town.

. . . a private automatic exchange is the obvious choice

The advantages of a private automatic exchange



A PRIVATE AUTOMATIC TELEPHONE EXCHANGE offers advantages unequalled by any other method of making inter-departmental telephone calls.

By relieving switchboard operators of internal calls a private automatic exchange enables them to handle external calls with promptness and courtesy.

The use of separate (private automatic) telephones for internal calls keeps the public telephones free for incoming public exchange calls which can immediately be recognised as such and answered without delay. Information required by a public exchange caller can be obtained from other departments without risk of cutting off the public exchange call.

An internal telephone can be given to those members of the staff whose work does not involve the use of the public telephone but would benefit from the facility of inter-departmental communication.

A private automatic exchange will provide full intercommunication between as few as ten or many hundreds of telephones, and will cater for future growth in telephone service requirements. In addition, a private automatic exchange offers a number of optional 'special services', every one of which has been developed to do a useful job in the modern organisation.

Automatic intercommunication... in *five seconds*

A PRIVATE AUTOMATIC TELEPHONE EXCHANGE employs switching apparatus and technique as used for public automatic telephone service by the British Post Office and many telephone administrations overseas. The exchange, which may be located at any convenient point on the premises, is linked to the various telephone instruments by pairs of wires—one pair to each instrument. Each telephone is fitted with a dial switch and any telephone user may call any other user by dialling the appropriate number. The exchange equipment operates, in response to the digits dialled, to make the required connection. The average time taken, from the commencement of dialling to the application of ringing current to the required line, is approximately five seconds. All the usual 'tones' are automatically applied to the lines to indicate the progress of calls.

Automatic dial telephone instruments

THE DESK TELEPHONES supplied for use with Strowger private automatic telephone exchanges are Type 332. This is basically the British Post Office standardised type, of which there are a number of variations. It has a moulded plastic body which is light in weight yet extremely durable. The dial switch is mounted at a convenient angle on the front face. The instrument is entirely self-contained, the ringer and induction coil being accommodated, together with other components, on a metal plate inside the base of the instrument.

The Type 332 Telephone is available in black, red, ivory and jade green, and with a transparent plastic body which is illuminated from within when the handset is off the rest. The transparent instrument is equipped with a neon lamp,

TOP: Type 332 desk telephone, red

CENTRE: Type 332 desk telephone, ivory

LOWER: Type 332 desk telephone, jade green



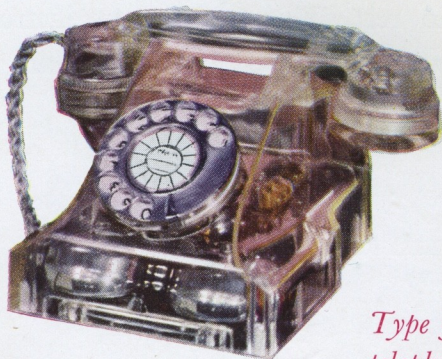


The 'Automaster'

wired in series with the bell, to give visual as well as audible indication of an incoming call.

A wall-mounting telephone is available for use where desk space is limited, or where a desk instrument would be subjected to rough treatment. This has a black moulded plastic base and hinged case. The component parts are identical with those of the Type 332 desk telephone.

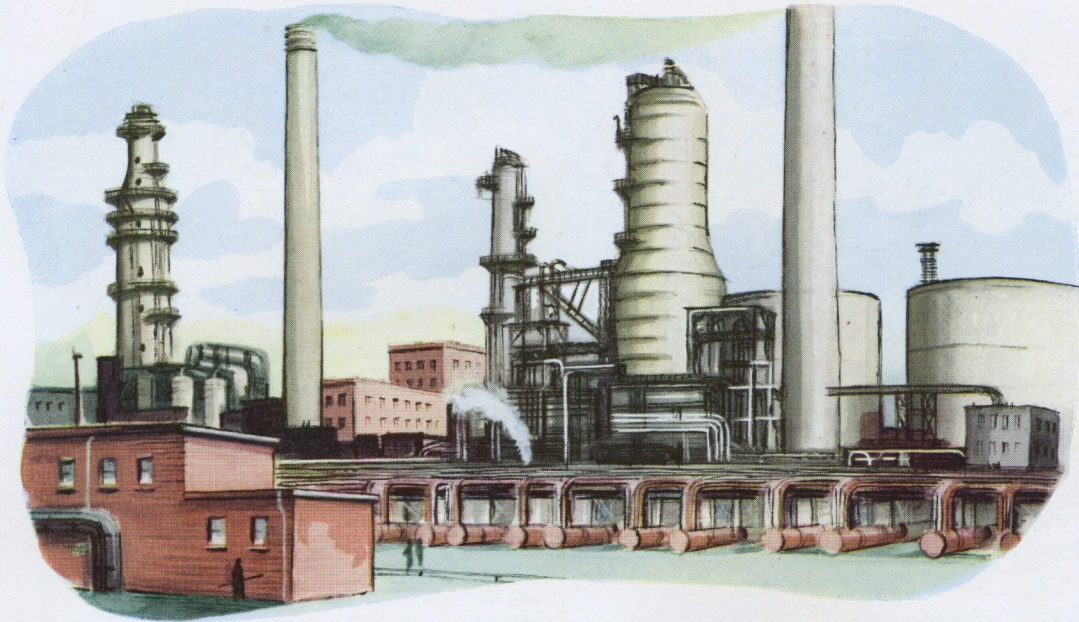
All the special service facilities likely to be required by executives can be combined in the 'Automaster'. This is a handsome desk instrument which provides the loudspeaking telephone facilities described on page 10. To these can be added key-calling, secretarial, and conference facility which



Type 332 desk telephone, transparent

Wall-mounting telephone

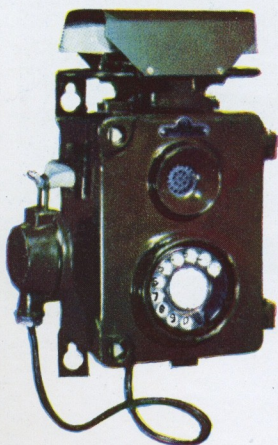




enables the user to key-call and speak simultaneously to up to 10 persons within a predetermined group of 20.

Where telephone facilities outdoors are required, in large plants, for example, ironclad weatherproof automatic telephones can be provided. These are designed to withstand usage in exposed situations, and are equipped with sealing glands for the receiver cord and line cable.

Intrinsically safe telephones, either of the Type 332 or the ironclad weatherproof type are available for use in petroleum atmospheres. By means of auto-repeater coupling equipment full intercommunication between 'safe'



telephones and 'unsafe' telephones is made possible. The arrangement overcomes the restrictions applying to telephone communication at many oil wharves and refineries, and has been approved by the Factories Department.

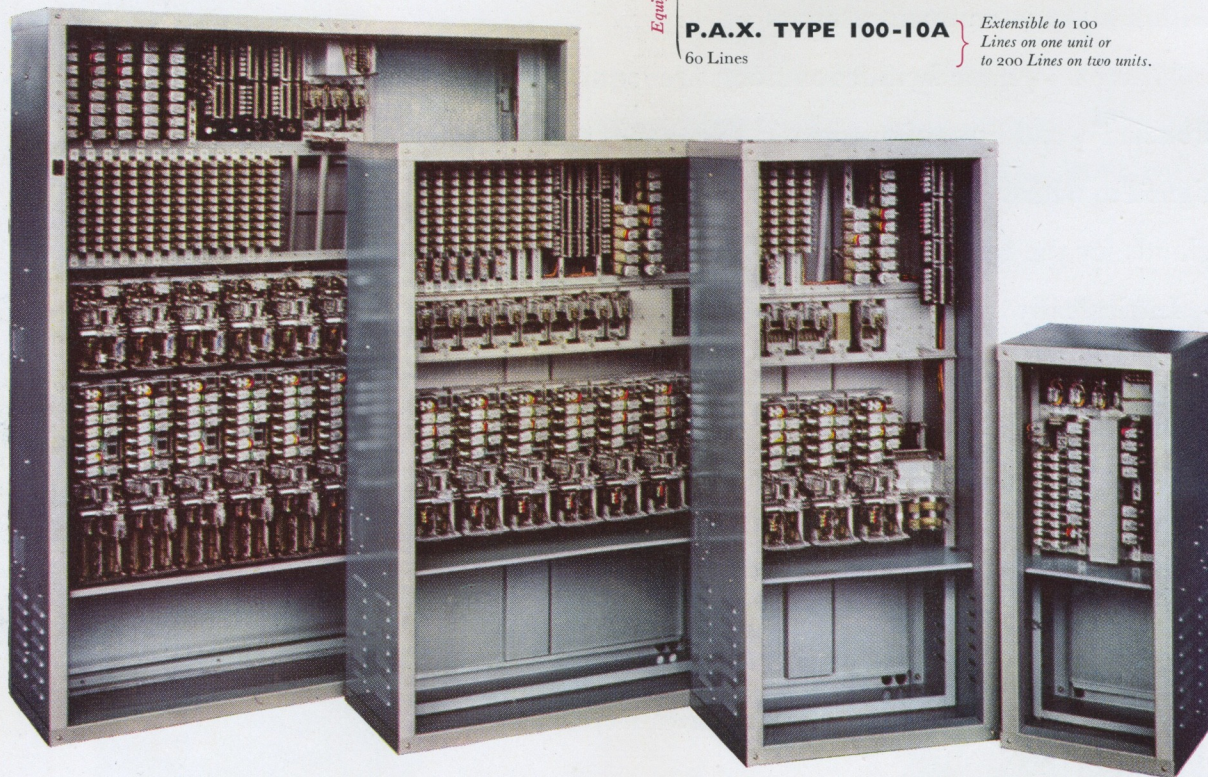
Ironclad weatherproof automatic telephone

Dimensions: Height 14½" (0.295 m.), Depth 6½" (0.165 m.), Width 10" (0.254 m.)

From 10 telephones upwards . . .

STANDARD CABINET-TYPE PRIVATE AUTOMATIC EXCHANGES are available with capacities for 10, 25, 50, 100 or 200 lines. These may be supplied equipped to cater for present needs and subsequently extended, in multiples of 5 or 10 lines, to the full capacity in step with expansion of premises or increase in staff.

- | | | |
|---------------------------------|--|---------------------------------|
| | P.A.X. TYPE 10-2 | } <i>Not extensible</i> |
| | 10 Lines | |
| } <i>Equipped initially for</i> | P.A.X. TYPE 25-4A | } <i>Extensible to 25 Lines</i> |
| | 15 Lines | |
| | P.A.X. TYPE 50-7A | } <i>Extensible to 50 Lines</i> |
| | 30 Lines | |
| P.A.X. TYPE 100-10A | } <i>Extensible to 100 Lines on one unit or to 200 Lines on two units.</i> | |
| 60 Lines | | |



Type 100-10A

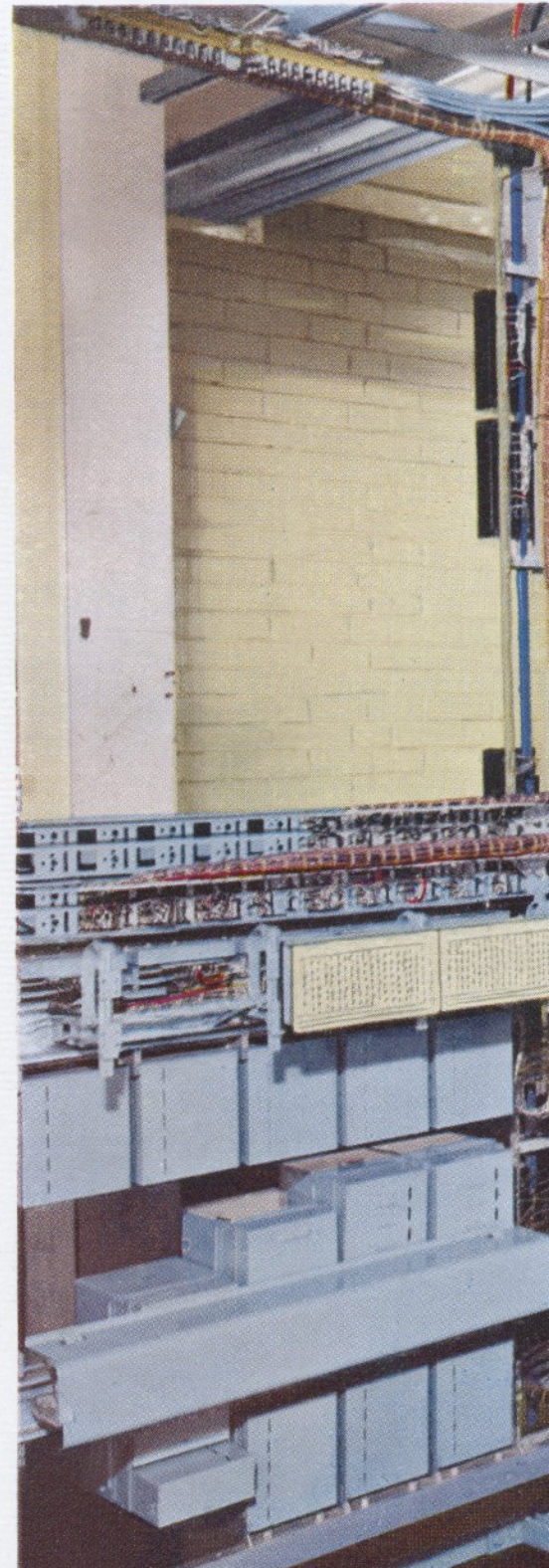
Type 50-7A

Type 25-4A

Type 10-2

. . . *there's no limit*
to the size of
a private
automatic exchange

FOR ORGANISATIONS requiring more than 200 lines the switching apparatus is mounted on open-type racks. Any number of these racks can be grouped together and equipped to cater for any number of telephones and any volume of traffic. Exchanges of this type may be extended at any time by the addition of standard units.



**SPECIAL
SERVICES**

A *private automatic*

exchange is v

Loudspeaking service

PAGES 9
and 10

Key-calling service

PAGE 11

Secretarial service

PAGE 12

Code call service

PAGE 13

Tie line service

PAGE 14

Priority service

PAGE 15

Interception service

PAGE 16

Watchman's service

PAGE 17

Fire alarm service

PAGE 18

PRIVATE AUTOMATIC
SERVICE has no restriction
upon it; in consequence

limited scope for the facilities

Services', which modern au

phone switching technique

providing. These 'Special S

cribed in the following pages

additions to the full interco

facilities between dial teleph

or all may be specified when

equipment is first supplied,

later date when the need ar

Speaking, and listening, with freedom

**LOUDSPEAKING
SERVICE**



LLOUDSPEAKING SERVICE enables an executive to dispense with the telephone handset and carry on a telephone conversation as freely and naturally as a face-to-face talk.

If necessary he can refer to files, documents, etc. while the conversation is in progress.

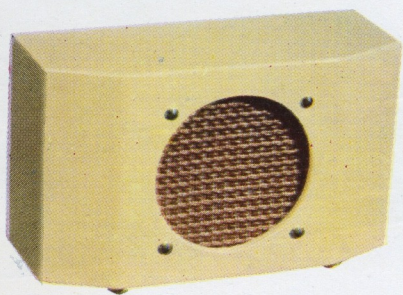
The executive's speech is 'picked up' by a microphone attached to his telephone, and the other person's speech is relayed to him over a loudspeaker. This latter is very convenient if any visitors the executive may have are concerned with both sides of the conversation. When the executive does not wish incoming speech to be overheard by a visitor, he can use the telephone handset to make or answer calls. The lifting of the telephone handset automatically disconnects the loudspeaker.

E Q U I P M E N T

required for Loudspeaking Service:



SR53 Loudspeaking telephone



*Cabinet loudspeaker associated with
SR53 loudspeaking telephone*

EQUIPMENT

required for Key-calling Service:



Key-calling cabinet

Instant contact with key men

KEY-CALLING
SERVICE



THE MAJORITY of an executive's internal telephone calls are usually made to a particular group of individuals consisting of other executives or heads of departments. Key-calling service gives the executive the ability to call any one individual in such a group without the necessity of dialling and, incidentally, without having to memorise or look up telephone numbers. He has only to flick the appropriate key on his key-caller and connection is established immediately—even if the line is engaged. He may also communicate, by dialling, with any other line while the key-called individual is 'holding on'. The service provides for the key-calling of either 10 or 20 predetermined lines.

When you are 'not to be disturbed'

SECRETARIAL
SERVICE



AN EXECUTIVE may have the convenience of outgoing telephone service without having to deal with a heavy volume of incoming telephone calls, some of which may be comparatively unimportant. This can be achieved by means of Secretarial service, of which there are a number of variations to suit individual requirements. The executive may receive all calls in the usual way, and have facilities for switching his line through to his secretary when he is holding a conference. The secretary can ring the executive back if a call is really important.



Alternatively, all calls incoming to the executive may be filtered by the secretary, who uses her discretion as to which calls should be switched through.

The executive may have an extra line connected to his telephone for the purpose of receiving calls from other executives direct, or for making outgoing calls when his normal line is occupied by a call with which his secretary is

EQUIPMENT

required for Secretarial Service:



Secretarial service, control unit



Secretarial service, terminal unit

dealing. Additionally, or alternatively, the secretary may be given an extra line over which to make and receive calls which would otherwise occupy the executive's line.

A secondary but useful feature of the service is that the executive and his secretary can call each other by buzzer and converse without using the automatic exchange. The speech facility may also be used while 'holding' an incoming call, and the buzzer may be used alone for pre-arranged code signalling.

E Q U I P M E N T

required for Code-calling Service:



Visual code call indicator, pendant type

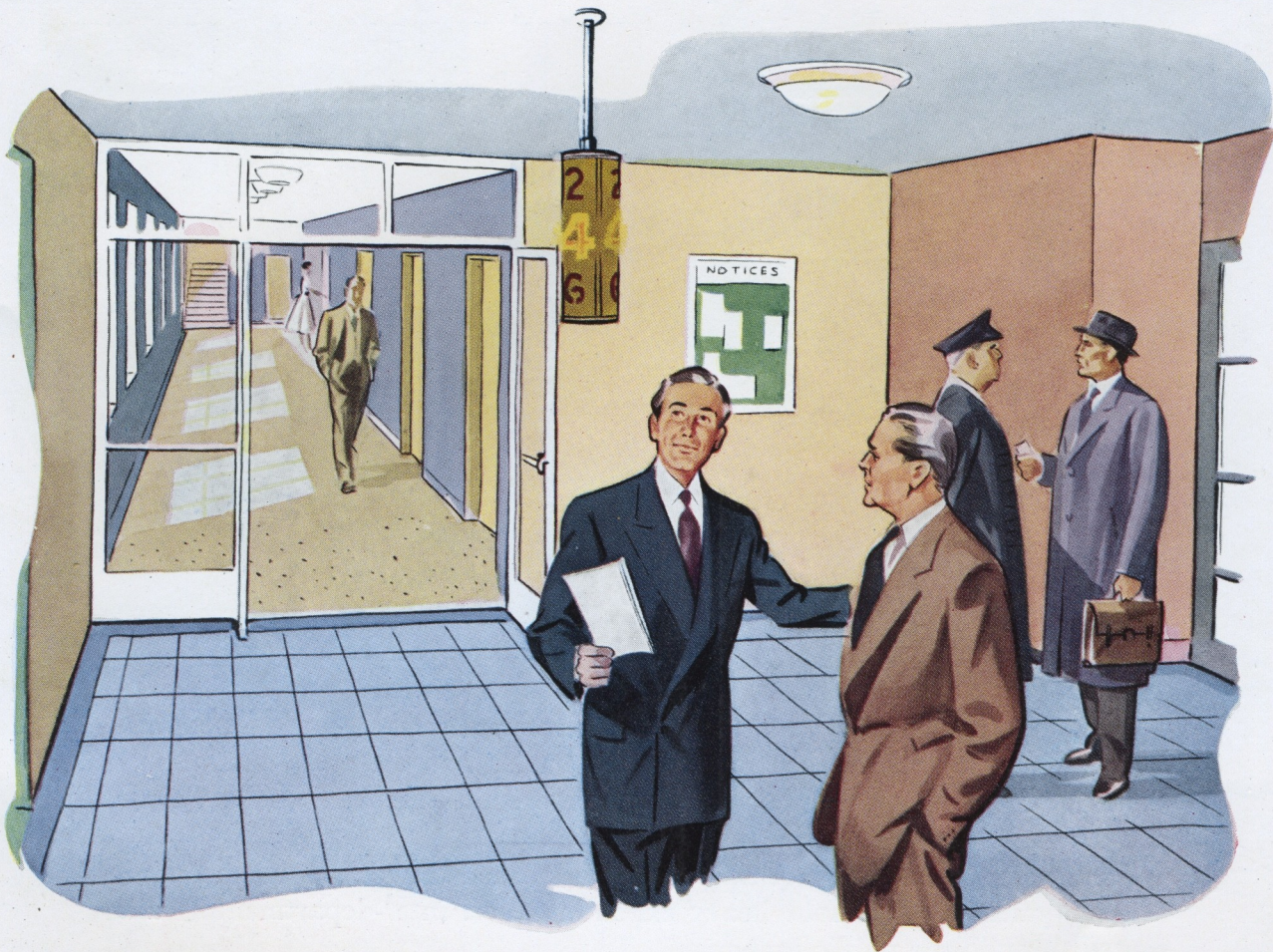


Visual code call indicator, wall type

The visual units illustrated are capable of transmitting up to a maximum of seven distinct codes. Alternative units can be supplied when a greater number of codes is required.

Finding the wanted man, quickly

CODE-CALL
SERVICE



CODE CALL SERVICE enables particular executives or members of the staff to be contacted swiftly by telephone whenever they are away from their offices or departments, and their whereabouts on the premises are unknown. On these occasions the dialling of the appropriate code call number automatically causes a coded signal to be broadcast, visually or audibly, throughout the premises.

On seeing or hearing his signal the required person proceeds to the nearest telephone and, on dialling the common answering number, is connected to the person who instituted the code call.

The service is particularly useful for locating those who have no fixed place of work, e.g. maintenance or messenger staff.



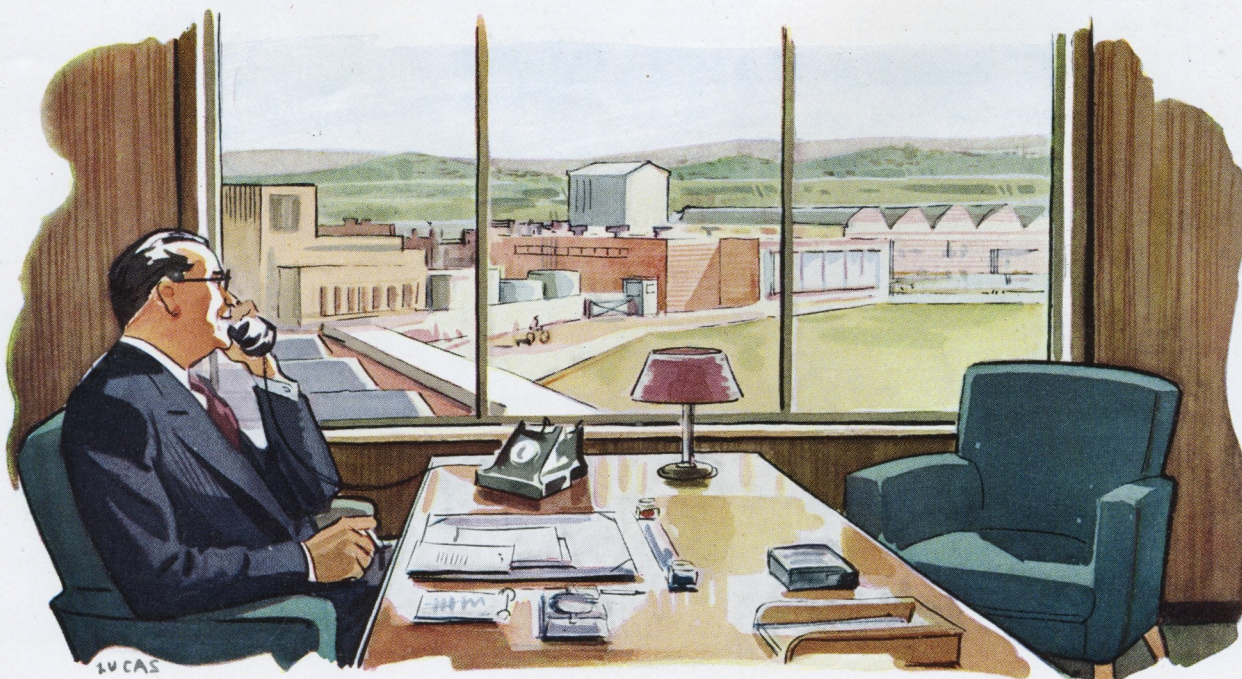
Close contact between distant premises

TIE-LINE
SERVICE



WHEN AN ORGANISATION occupies separate buildings, perhaps some miles apart, Tie Line service enables telephone calls between the buildings to be made as readily and as economically as calls between departments in any one of the buildings. Each of the buildings is equipped with a private automatic exchange of suitable capacity, and the private automatic exchanges are linked together by one or more tie lines, depending on the volume of calls from building to building.

The service enables close contact to be maintained between remote premises of an organisation, without heavy expenditure on inter-departmental calls routed through the public exchange.



Priority for executives' calls

PRIORITY
SERVICE



PRiority service eliminates any possibility of delay on calls from executives to subordinates due to the required telephones being engaged when dialled. The persons to whom the service is given can secure immediate connection with any of the telephones connected to the private automatic exchange.

A priority caller does not sever established calls but is able to cut-in on the conversation either to speak to the required person or, if he does not wish to be overheard by the third person, request them both to replace their receivers. When the third person has been disconnected, the telephone of the required person is automatically rung and is answered in the normal way.



Secretary common to four executives

INTERCEPTION SERVICE

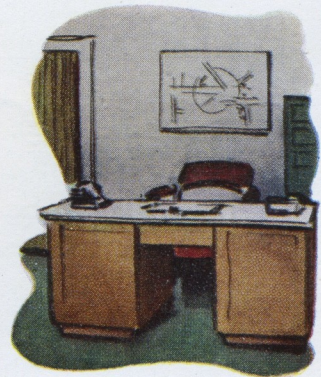
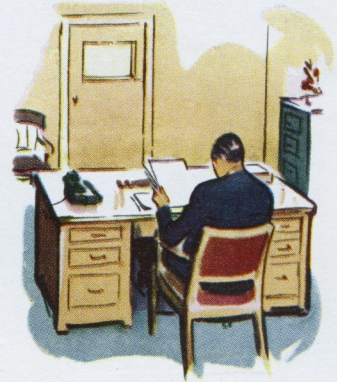


INTERCEPTION SERVICE enables one secretary, seated in her own office, to supervise and, if necessary, to answer telephone calls incoming to four other offices.

A call incoming to any one of the four offices flashes the appropriate lamp on the secretary's interception unit.

When it becomes apparent that the call is not being answered, the secretary can answer the call by lifting her telephone handset and pressing the appropriate push-button on the interception unit. When the secretary knows that the office is unattended she can answer the call immediately.

The interception unit is equipped with an additional telephone line to enable the secretary to make and receive calls on her own behalf.



EQUIPMENT

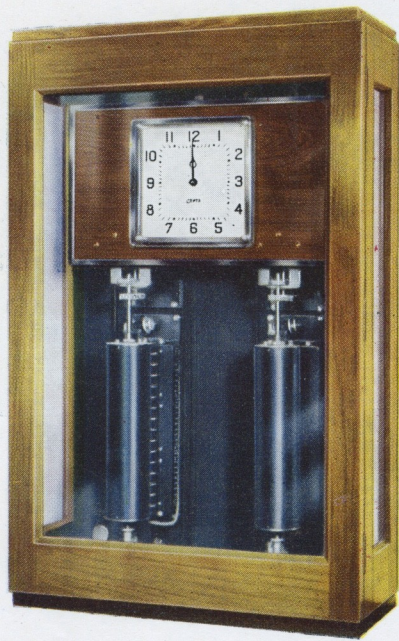
required for Interception Service:



Five-line interception unit

E Q U I P M E N T

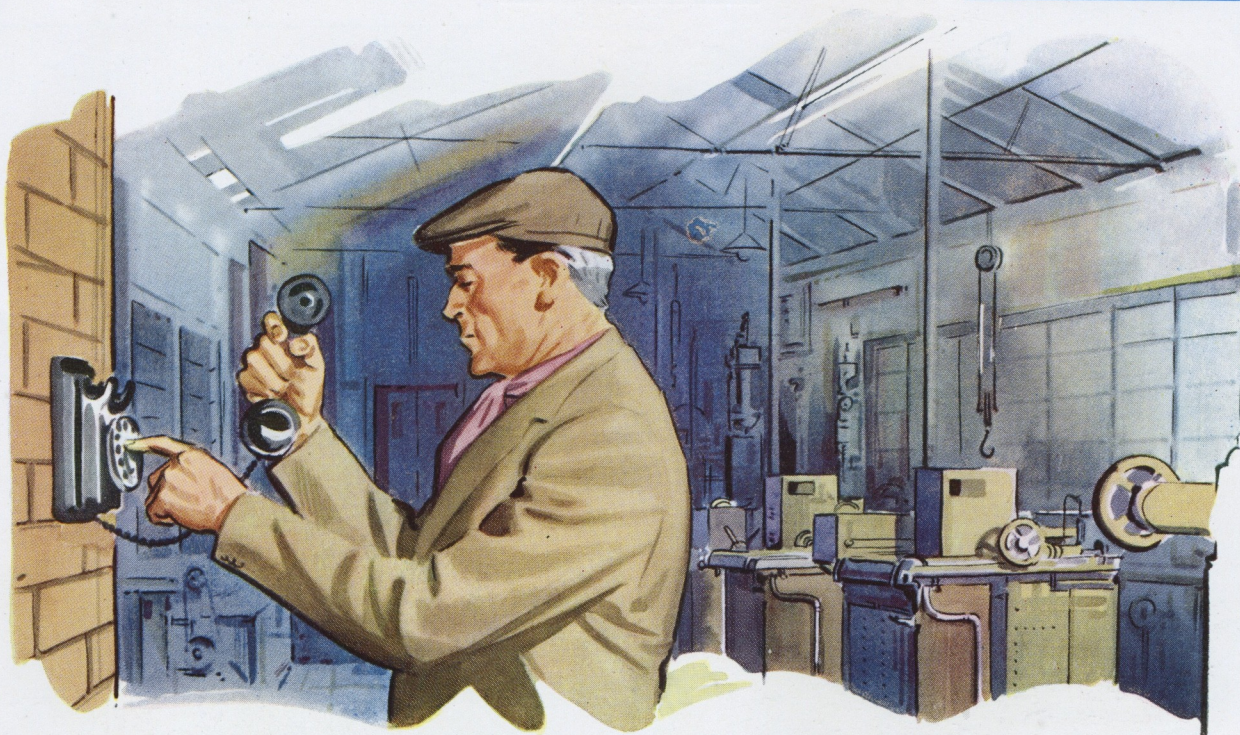
required for Watchman's Service:



Watchman's clock

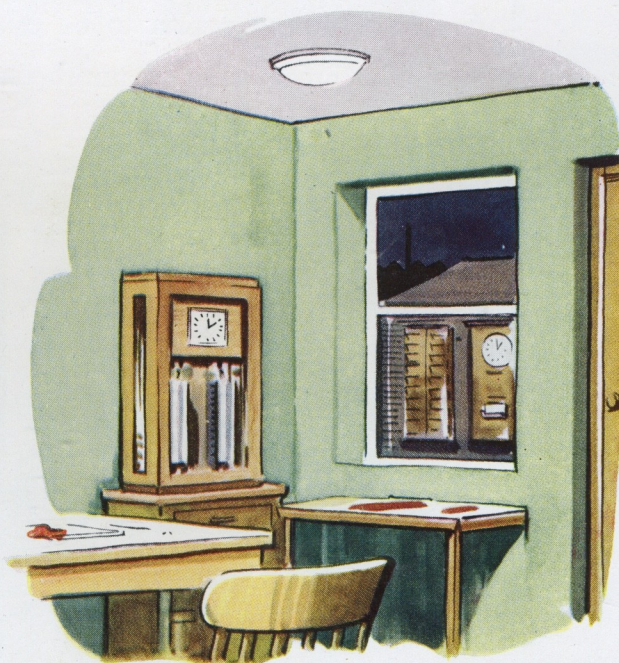
Recording the watchman's patrol

WATCHMAN'S
SERVICE



WHEREVER WATCHMEN ARE EMPLOYED to patrol an organisation after business hours, selected private automatic telephone instruments can be used as watchmen's reporting stations. The service both supervises the watchmen in the performance of their duties and secures them early assistance in the event of sudden illness, or attack by intruders.

Each watchman dials a predetermined number from each of the reporting telephones on the route of his patrol. This causes a permanent record of the time and location of the report to be made on a chart. If required an alarm signal can be automatically operated by the private automatic equipment if a watchman is unduly delayed in making a reporting call.



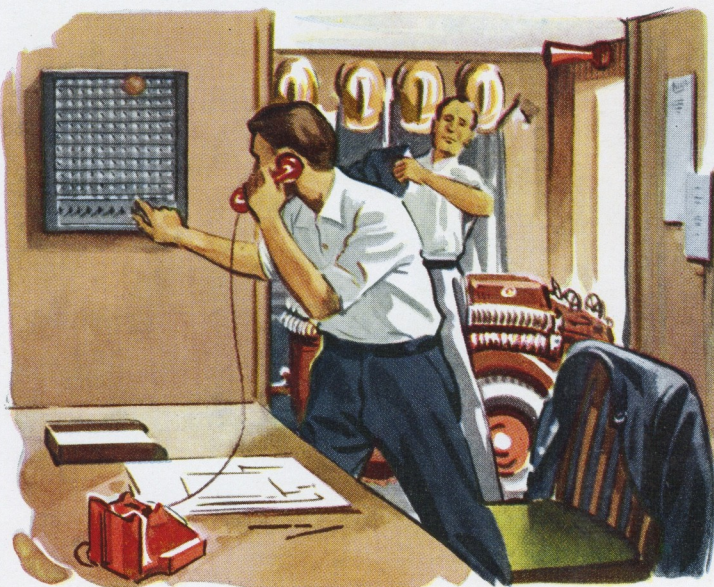
Emergency!

FIRE-ALARM
SERVICE



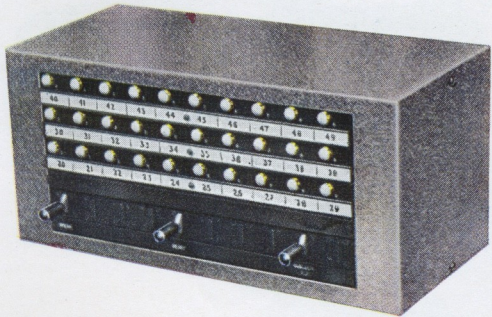
EVERY TELEPHONE connected to the private automatic exchange may be used to give swift warning of an outbreak of fire and its location, thus enabling prompt action to be taken to deal with the emergency. The dialling of a predetermined number automatically sounds an alarm in the fire chief's office and gives him a visual indication of the number of the reporting telephone.

The audible alarm and the visual indication remain operated if the originator of the alarm 'rings off' as may be necessary due to the serious nature of the fire.

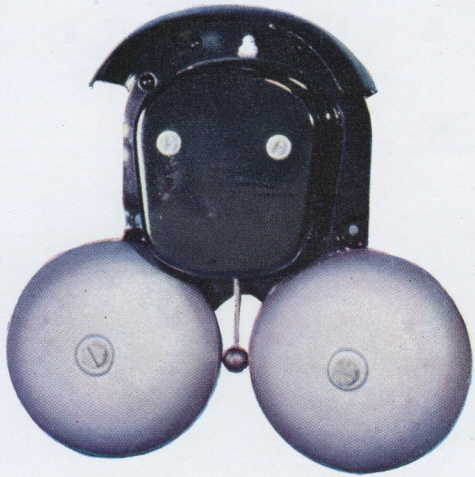


E Q U I P M E N T

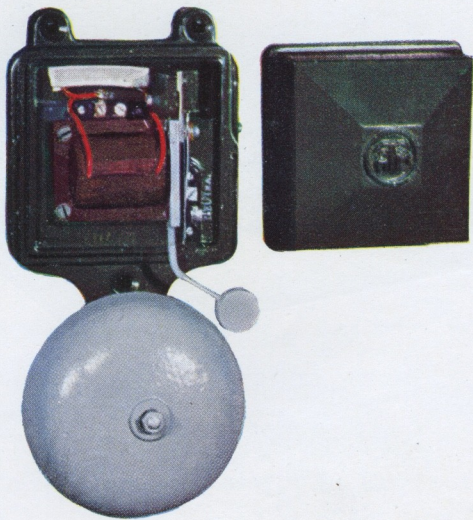
required for Fire Alarm Service:



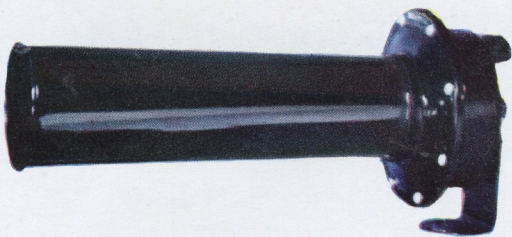
Fire alarm signal lamp cabinet



Double gong weatherproof extension bell



Loud-ringing weatherproof mains-operated bell



Horn for direct or alternating current

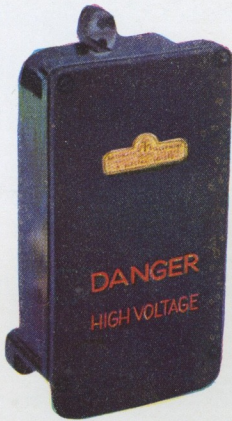
Calling devices

NORMALLY, incoming private automatic exchange calls are announced by the ringing of a bell housed in the base of the telephone instrument. Where it may on occasions be desirable to mute the telephone bell a 'silent call' telephone can be employed. This is fitted with a bell-muting switch and a visual indicator to draw attention to incoming calls. Where quietness is essential at all times, calls can be announced by a visual call indicator. This consists of a neon lamp mounted in a rubber moulding for placing on the desk. Ringing current is applied to the lamp which gives a series of brilliant flashes until the call is answered.

Where it is necessary to attract the attention of persons working outdoors, to the ringing of a telephone indoors, some distance away, a weatherproof extension bell connected in series with the ordinary bell can be employed.

Where greater sound output is required as, for example, in noisy workshops, a mains-operated bell or horn can be employed in conjunction with a contactor.

These mains-operated bells and horns may also be employed for giving audible code call signals, as described on page 13. Alternatively, visual code call signals may be given by means of coloured lamps or illuminated figures.



Contactors for use with mains-operated bell or horn



'Silent Call' telephone



Directory holder



The 'Teletable'

Directory holder

THIS is a neat transparent plastic holder designed to carry lists of private automatic telephone numbers. It measures 5" x 5" with a 1"-wide base, and takes up very little desk space. Using both sides it will hold a complete directory for an exchange of 100 lines or less. Where the exchange exceeds 100 lines, the holder can carry lists of numbers most frequently called by the individual user.

The teletable

THIS USEFUL ADDITION to the office furniture houses all the telephone equipment, thus leaving the desk entirely free for papers, etc. The top shelf will accommodate the public telephone as well as the private automatic telephone and the directory holder. There are special compartments for the key caller, loudspeaker and amplifier, and shelves to accommodate reference books and filing trays. The standard finish is light oak, but mahogany or walnut finish can be supplied to order.

Equipment Data

Climatic protection

All the component parts of standard equipment are protected by special finishes and the entire equipment is suitable for use under sub-tropical conditions.

If equipment is required for operation under full tropical conditions or where it may be subjected to severe sandstorms or attacks by insects, full particulars should be given, so that modifications to various components and the general assembly can be made to ensure the most satisfactory operation.

Power supply

The direct current operating voltage limits of the equipment are: maximum 55 volts; minimum 45 volts. For 10, 25, 50, 100 and 200-

line installations on which A.C. supply mains are available, a 'battery eliminator' is provided to supply direct current for the whole of the apparatus.

Alternatively a single battery 'float' system can be used. This method has the advantage that most of the energy used is taken direct from the mains via a float charger which automatically maintains the battery in a charged condition and ready to take up the full load in the event of a mains failure.

Charging panels

Where the electricity supply is direct current, duplicate batteries are employed, together with a suitable charging panel, the eliminator being omitted.

Table 1: Standard capacities and equipment

Type of private automatic exchange	Wired for ultimate capacity		Equipped initially with	
	Local telephone circuits	Connecting links	Local telephone circuits	Connecting links
10-2	10	2	10	2
25-4A	25	4	15	3
50-7A	50	7	30	5
100-10A	100	10	60	7
200-20A	200	20	120	14

Note The figures shown for the connecting links depict the ideal quantities for the number of lines for which the exchange is equipped. With the exception of the 10-line exchange, auxiliary units may be added to increase the total number of connecting links available. Special consideration required.

Table 2: Space units available for special service apparatus

P.A.X.	Space Units	
10-line	7 in upper cabinet	} Can be increased by the addition of a special service cabinet.
25-line	12 in upper cabinet	
50-line	20 in upper cabinet	
100-line	8 on existing frame	
200-line	2 Groups of 8 on existing frame	

Table 3: Combinations of special services

Special service	10 line	25 line	50 line	100 line	200 line	Space units required
Key calling 10 line 20 line	1 –	4 2	6 3	8 4	10 5	3 for 10 lines 4 for 20 lines <i>See Note 6</i>
Conference 10 or key calling 20 lines	1	1	1	1	1	6 for 10 lines 10 for 20 lines <i>See Note 1</i>
Secretarial	Yes	Yes	Yes	Yes	Yes	Nil
Priority	Yes	Yes	Yes	Yes	Yes	Nil <i>See Note 2</i>
Tie lines	1 <i>See Notes</i>	<i>See Notes</i>	<i>See Notes</i>	<i>See Notes</i>	<i>See Notes</i>	Nil
Code call audible	–	1	1	1	1	5 <i>See Note 3</i>
Code call visual colour code	–	1	1	1	1	8 <i>See Note 3</i>
Fire alarm	–	1	1	1	1	4
Party line working	Yes	Yes	Yes	Yes	Yes	Nil <i>See Note 4</i>
Discriminatory ringing	Yes	Yes	Yes	Yes	Yes	–
Fuse alarm	Yes	Yes	Yes	Standard	Standard	–
Release alarm	–	Yes	Yes	Standard	Standard	–
Watchman's	–	–	–	–	–	– <i>See Note 5</i>

Notes

1. A conference is limited to 10 participants who may be any predetermined 10 of those connected to the conference key calling cabinet.
 2. Standard priority service can interrupt key calling priority and vice versa.
 3. Code Call (Audible) and Code Call (Visual Colour Code) are alternatives.
 4. The following variations of party line service are available:
 - (a) Two-party selective ringing (standard); each party requires a separate number on the P.A.X.
 - * (b) Omnibus circuits with selective ringing; a maximum 10 instruments; special consideration required.
 - (c) Revertive calling may be applied to (a) or (b); special consideration required.
 5. Watchman's Service is available for each private automatic exchange except Type 10-2, but as individual requirements vary, special consideration must be given to each case before a quotation can be made.
 6. When the amount of special service apparatus required exceeds the space available (see space unit table) auxiliary cabinets can be provided.
- * This note does not apply to the 10-line exchange.

Tie line service

Between two or more private automatic exchanges; maximum loop resistance 750 ohms. Special 'Long Line' equipment is available for loop resistances above this figure. A relay group is inserted at the relevant line circuit and, as requirements vary, special consideration must be given before a quotation can be made.

The 25- and 50-line private automatic exchanges provide for connection between two or more exchanges by dialling either one or two digits for each group of tie lines.

When single digit tie lines are required the total number of extension lines available is reduced by ten for each group of tie lines in use.

When two digit tie lines are provided the total number of extension lines available is reduced by the equivalent number of tie lines fitted.

The 100-line and 200-line private automatic exchanges provide for connection between exchanges by means of single digit routing only. The total number of lines available for extensions is reduced by ten for each group of tie lines in use.

When tie line facilities are required at a 10-line installation the number of extension lines available is reduced to nine. Two tie lines to one other exchange only can be provided in exceptional cases.

Approximate weights and dimensions of equipment

	10 lines	25 lines	50 lines	100 lines	200 lines
Height	*3' 0" (0.914 metres)	*4' 6" (1.371 metres)	*4' 6" (1.371 metres)	5' 6" (1.676 metres)	5' 6" (1.676 metres)
Width	1' 3" (0.381 metres)	2' 0" (0.609 metres)	3' 2" (0.965 metres)	4' 6" (1.371 metres)	9' 3" (2.819 metres)
Depth	1' 4" (0.406 metres)	1' 4" (0.406 metres)	1' 4" (0.406 metres)	1' 4" (0.406 metres)	1' 4" (0.406 metres)
Floor space required including clearance for access	2' 9" × 5' 10" (0.838 metres) (1.778 metres)	3' 6" × 5' 10" (1.066 metres) (1.778 metres)	4' 8" × 5' 10" (1.422 metres) (1.778 metres)	6' 0" × 5' 10" (1.828 metres) (1.778 metres)	10' 9" × 5' 10" (3.276 metres) (1.778 metres)
Weight unpacked	96 lb. (43.5 kg.)	†196 lb. (88.9 kg.)	†248 lb. (112.4 kg.)	†528 lb. (239.4 kg.)	†1056 lb. (524.3 kg.)
Weight packed for shipment	268 lb. (121.5 kg.)	450 lb. (204.1 kg.)	†632 lb. (286.6 kg.)	†1166 lb. (528.8 kg.)	†1166 lb. (528.8 kg.)
Packing case	4' 4" × 2' 6" × 2' 6" (1.320 metres) (0.762 metres) (0.762 metres)	5' 8" × 3' 4" × 2' 8" (1.727 metres) (1.016 metres) (0.812 metres)	5' 8" × 4' 5" × 2' 8" (1.727 metres) (1.346 metres) (0.812 metres)	6' 9" × 5' 10" × 2' 9" (2.057 metres) (1.778 metres) (0.838 metres)	†6' 9" × 5' 10" × 2' 9" (2.057 metres) (1.778 metres) (0.838 metres)
Selectors and Finders	—	4 selectors	7 selectors	10 selectors & 10 finders	20 selectors & 20 finders
Unpacked	—	45 lb. (20.4 kg.)	78 lb. (3.54 kg.)	250 lb. (113.4 kg.)	500 lb. (226.8 kg.)
Packed for shipment	—	105 lb. (47.6 kg.)	215 lb. (97.5 kg.)	360 lb. (163.3 kg.)	†360 lb. (163.3 kg.)
Packing case	—	2' 4" × 1' 10" × 1' 4" (0.711 metres) (0.558 metres) (0.406 metres)	3' 2" × 2' 8" × 1' 2" (0.965 metres) (0.812 metres) (0.355 metres)	4' 2" × 2' 2" × 1' 2" (1.270 metres) (0.660 metres) (0.356 metres)	†4' 2" × 2' 2" × 1' 2" (1.270 metres) (0.660 metres) (0.356 metres)
Eliminators	10 lines	25 lines	50 lines	100 lines	200 lines
Unpacked	56 lb. (25.4 kg.)	56 lb. (25.4 kg.)	161 lb. (73 kg.)	161 lb. (73 kg.)	322 lb. (146 kg.)
Packed for shipment	82 lb. (37.2 kg.)	82 lb. (37.2 kg.)	213 lb. (96.6 kg.)	213 lb. (96.6 kg.)	†213 lb. (96.6 kg.)
Packing case	1' 8" × 1' 8" × 1' 8" (0.508 metres) (0.508 metres) (0.508 metres)	1' 8" × 1' 8" × 1' 8" (0.508 metres) (0.508 metres) (0.508 metres)	4' 3" × 1' 5" × 1' 3" (1.295 metres) (0.432 metres) (0.381 metres)	4' 3" × 1' 5" × 1' 3" (1.295 metres) (0.432 metres) (0.381 metres)	†4' 3" × 1' 5" × 1' 3" (1.295 metres) (0.432 metres) (0.381 metres)

* Top Extension, if necessary, for Special Services increases height of 10-line cabinet to 4' 2" (1.270 metres) 25- and 50-line cabinets to 5' 8" (1.725 metres). (An extension is not required for 100- or 200-line switchboards.)

† Switchboards fully equipped but less selectors and eliminators.

‡ 200-line Equipment is packed in two units each of weight, and dimensions given.

The above approximate weights and dimensions apply where standard eliminator operated exchanges are employed and are not applicable where additional special service cabinets are required.

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