Private Automatic Telephone Systems Nos. 5000 and 5100.

THE development of a new private intercommunication system, fully automatic in operation but employing simplified circuits and a minimum of equipment, has enabled The General Electric Company still further to enlarge their series of Private Automatic Exchanges by the addition of two small units of a comparatively inexpensive type, suitable in particular for use in factories, offices, hospitals, hotels, and other organisations of definitely limited size. By the adoption of new circuit principles it has been possible to effect considerable economy in the design of these exchanges, and as a result the advantages of an internal automatic telephone system are now brought within the reach of even the smallest business house.

These new P.A.X. units, listed under Systems Nos. 5000 and 5100, provide capacity for 15 lines and 25 lines respectively. They employ only standard types of apparatus, as used in public automatic exchanges, thus ensuring the reliability and efficiency which is characteristic of all G.E.C. systems. As will be seen from Figs. 1 and 2 they are simple and yet robust in construction, while the apparatus is compact but very accessible. Each unit is complete with a single cover which encloses the whole of the component parts and gives adequate protection against dust or damage.

The 15-line type, the overall dimensions of which are $18\frac{3}{4}'' \times 12\frac{7}{8}'' \times 8\frac{1}{2}''$, is designed for mounting on a shelf or table, while the larger size, measuring $23\frac{1}{4}'' \times 16'' \times 10\frac{1}{2}''$, is provided with battens by means of which, as an alternative to table mounting, the unit can be secured to a wall.

As in the case of larger exchanges each of the new units can be equipped with less than its full complement of apparatus. A No. 5000 System, for example, may be installed to give intercommunication between, say, five points only, and extended as and when required to provide service between a total of fifteen points. Similarly, a No. 5100 System can commence with as few as ten extensions and be increased gradually in size until the full capacity of twenty-five lines is reached. In every case a unit equipped initially for the

Fig. 1.—Cat. No. 5015 15-line P.A.X. The cover for this unit is of pressed steel.

connection of a smaller number of lines than the ultimate capacity of the system is prepared and fully wired for the fitting of the additional apparatus necessary when an extension is to be made. Details of the various standard forms in which the units are available, together with the corresponding catalogue numbers, are given in the accompanying table. The number of through connections which can be effected simultaneously, *i.e.*, the number of independent conversations that can take place at one time, is indicated by the link equipment.

Both systems are designed for operating from a 12-volt storage battery, suitable capacities being as follows :—

System No. 5000 (15 lines)—12 amp. hours
System No. 5100 (25 lines)—18 amp. hours

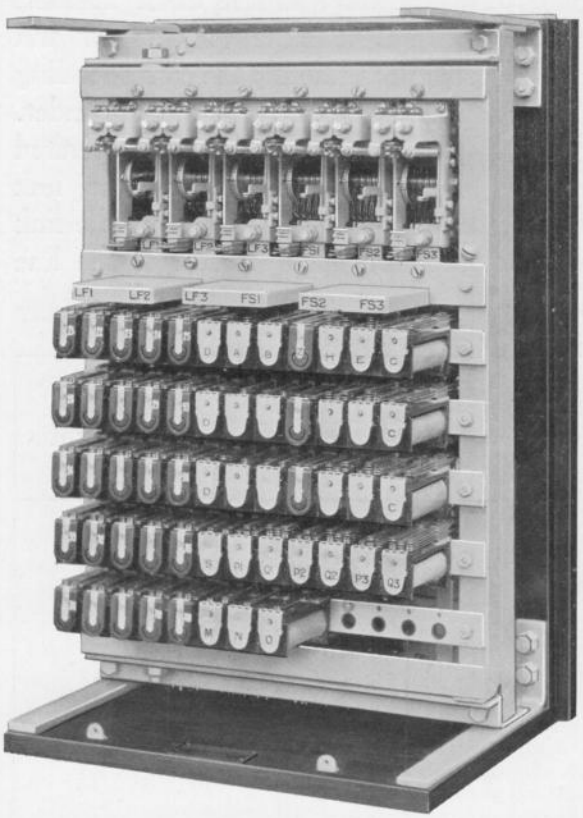


Fig. 2.—Cat. No. 5125 25-line P.A.X. (wood cover removed).

Fig. 3.—Cat. No. 90 Automatic Telephone, desk type, for use on P.A.X. Systems Nos. 5000 and 5100.

Where a main D.C. supply is used for charging purposes it is advisable to employ duplicate sets of batteries so that one may be on charge whilst the other is in service, but if A.C. mains are available, one battery only need be provided and a suitable form of trickle charger installed, incorporating a dry plate rectifier Charging panels of a simple and inexpensive type are listed as accessories to the P.A.X. units and can be supplied for operation on any specified power circuit.

The telephone instruments for use on these small systems are of the GEC PHONE type, generally similar to that employed for public service but fitted with a D.C. trembler bell in place of the A.C. ringer. This instrument, which is illustrated in Fig. 3, is supplied either for table use or with brackets for wall mounting.

Circuit Operation.

The two systems are identical as regards operation and circuit arrangements, the only difference appearing in the construction of the switching units and the method of mounting the apparatus. For the purpose of illustrating the circuit operation reference will be made to the 15-line unit as shown fully equipped in Fig. 1.

The unit operates on the line-finder principle, standard rotary switches (uniselectors) being employed as line finders and

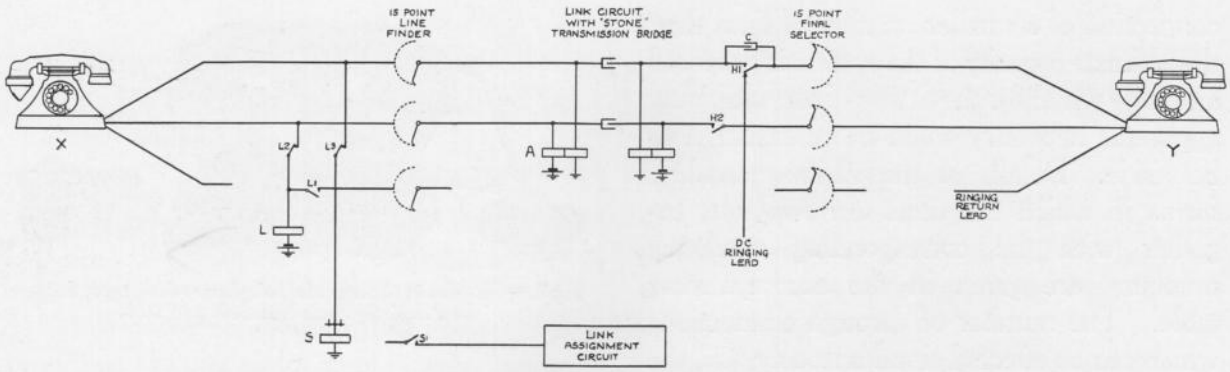


Fig. 4.—Simplified circuit diagram.

final selectors. In order to simplify the equipment to the greatest possible extent the line circuits have been so designed as to permit of the use of a single line relay, which is of the type fitted with two armatures. Either one or both armatures can be operated, according to the circuit conditions, and each actuates certain spring sets.

Direct current is employed for ringing, and interruption of the ringing current is obtained by a group of relays which, when operated, applies battery to a called line at fixed intervals.

The line between each instrument and the P.A.X. consists of three conductors, two of which form the dialling and speaking circuit, while the third conductor acts as the return lead of the D.C. ringing circuit.

In Fig. 4 a schematic diagram is given to illustrate briefly the operation of the equipment when one extension calls another Removal of the handcombination at X completes the line loop in the usual manner, causing relay L to close contacts L1 and apply a calling condition to the corresponding contact on the private bank of the line finder. The common start relay S is also operated and at contacts S1 introduces the link assignment circuit which selects an idle link and prepares for the operation of the line

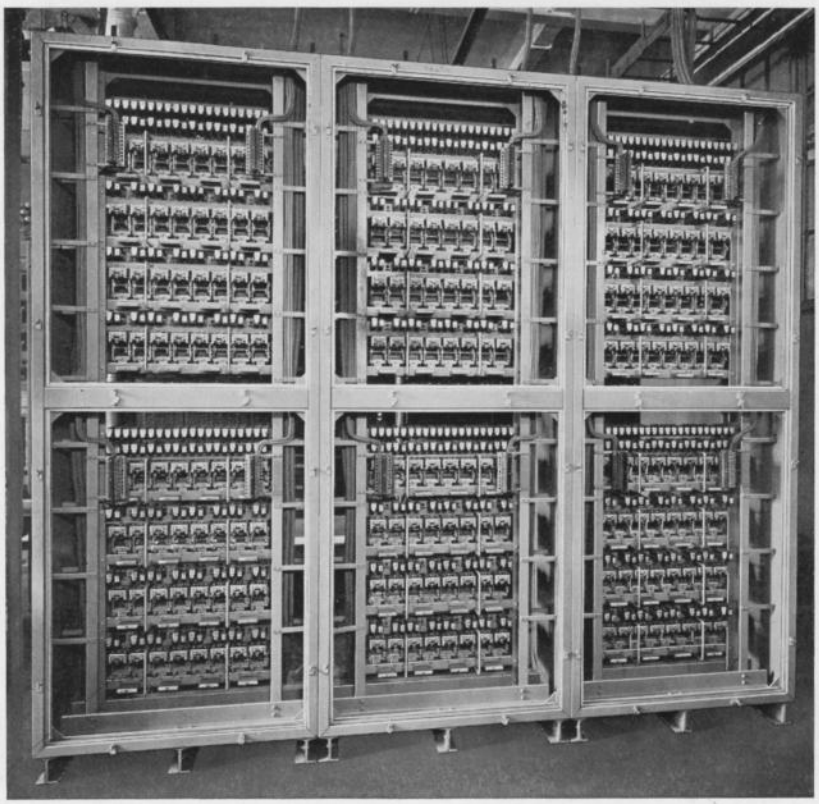
Reference Table.

Cat. No.	Line Circuits		Link Circuits		Dimensions Inches	Weight lbs.
	Wiring	Equipment	Wiring	Equipment		
5005	15	5	2	1	$18\frac{3}{4}\times12\frac{7}{8}\times8\frac{1}{2}$	48
5010	15	10	2	2		52
5015	15	15	2	2		55
5110	25	10	3	2	$23\frac{1}{4}\times16\times10\frac{1}{2}$	76
5115	25	15	3	2		79
5120	25	20	3	3		92
5125	25	25	3	3		94

finder. The latter commences to step by self-interruption and continues until the calling line is reached, when the switch is held. The remaining contacts L2 and L3 of the line relay are now operated and disconnect both line and start relays from the line, leaving the equipment prepared to receive impulses from the calling dial. When the required number is dialled the impulses are repeated by contacts of relay A and step the final selector to the wanted line. If this is found to be free, the ringing relay group is brought into operation and applies ringing current via one line of the speech circuit and the ringing return lead to operate the bell at Y. The make-and-break action of the bell armature produces a tone which is transmitted back to the calling line via the condenser C.

When the called party answers, the speech circuit is completed at H1 and H2, and ringing current disconnected. At the end of conversation the replacement of the telephone at X releases relay A which causes all circuits to revert to a normal condition.

Birmingham Repeater Station.



Semi-automatic cord circuit repeater apparatus cabinets recently installed by The General Electric Company at Birmingham Repeater Station.