Subscribers' Group Service

Introduction.

This system was introduced in the early part of 1934 with the object of providing a cheaper telephone service to those members of the public who make comparatively few calls per day. The system provides for full secrecy, and Fig. 290 shows the scheme in outline. The lines from the main exchange terminate on a small relay-set, situated at a control point which is the centre for a group of subscribers. Each subscriber is provided with a pair of wires to this relay-set, line economics demanding that the length of this wire should not exceed 0.1 mile. The operations of all the relays in the control point relay-set are controlled over the two pairs of wires connecting the control point to the exchange, so that no provision for a battery at this point is necessary. The relay-set is contained in a weatherproof box, provided with a silica gel de-hydrator, capable of being mounted on a telephone pole or in a street pillar.

Each subscriber is given an individual number in the exchange numbering scheme. For originating traffic, one subscriber's line circuit provides the necessary outlet. While the circuit is in use by one subscriber, none of the others is able either to receive or to make a call. For this reason, the maximum number of subscribers connected to one control point is eight.

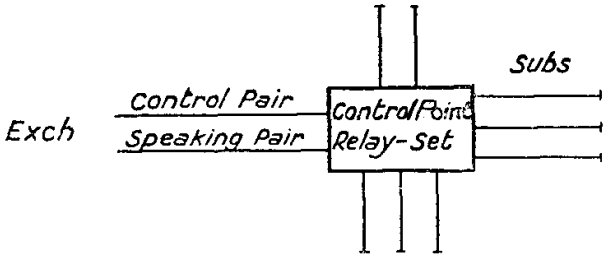

FIG. 290. SCHEMATIC DIAGRAM OF SUBSCRIBERS' GROUP SERVICE

With eight residential telephones connected to the circuit, and with the average calling rate for this type of line, a subscriber would be unable to make a call, because of the circuit being in use by another subscriber in the group, about once in three weeks on the average.

Circuit and Operation.

Outgoing Call.

Fig. 291 shows the connexions of the control unit used in automatic exchanges, whilst Fig. 292 shows the connexions of the associated control point relay-set. The P-wire connexion of each multiple number is associated with discriminatory control relays, and six of these relays control the eight discriminations required.

In the following circuit explanation it will be assumed that subscriber No. 4632 is calling.

When the subscriber removes the receiver, relay L operates from earth, one coil of relay DD, subscriber's loop, DD2, CNl, HH3, etc., negative wire, relay L, to battery. L3 operates relays G and GG, which apply engaged conditions to the P- wires of all the multiples in the group. L2 operates relay B and B1 completes a circuit through LI to the line relay of the subscribers' common line circuit.

Relay DD commences to operate in series with relay L and with the operation of DD4 completes its operation from battery through relays P and Q. DD3 disconnects the negative wire from all the

subscribers' spurs, and DD2 connects the negative spur of subscriber 4632 to the negative wire; DD5 disconnects relay CN from the positive wire. The resistance of the second coil of relay DD is of such a value as to operate only relay P at the exchange (over the (C-wire), whilst the resistance applied to the D-wire operates both relays R and S. The contacts of relays P, R, and S are arranged so that the simultaneous operation of these relays connects the meter associated with subscriber 4632 to the metering circuit.

Meanwhile, the completion of the earth connexion of the subscriber's common line circuit via B1 and LI results in the seizure of a first selector and the consequent return of earth over the P-wire. This earth operates relay Z through B2; Z1 disconnects relay L and switches the negative wire from the control point through to the line circuit. Relays G and GG are held by the earth on the P-wire. Z4 takes over the control of relay B after the release of L2; Z6 operates relay BA. The subscriber receives dialling tone from the first selector and dials the number in the ordinary way.

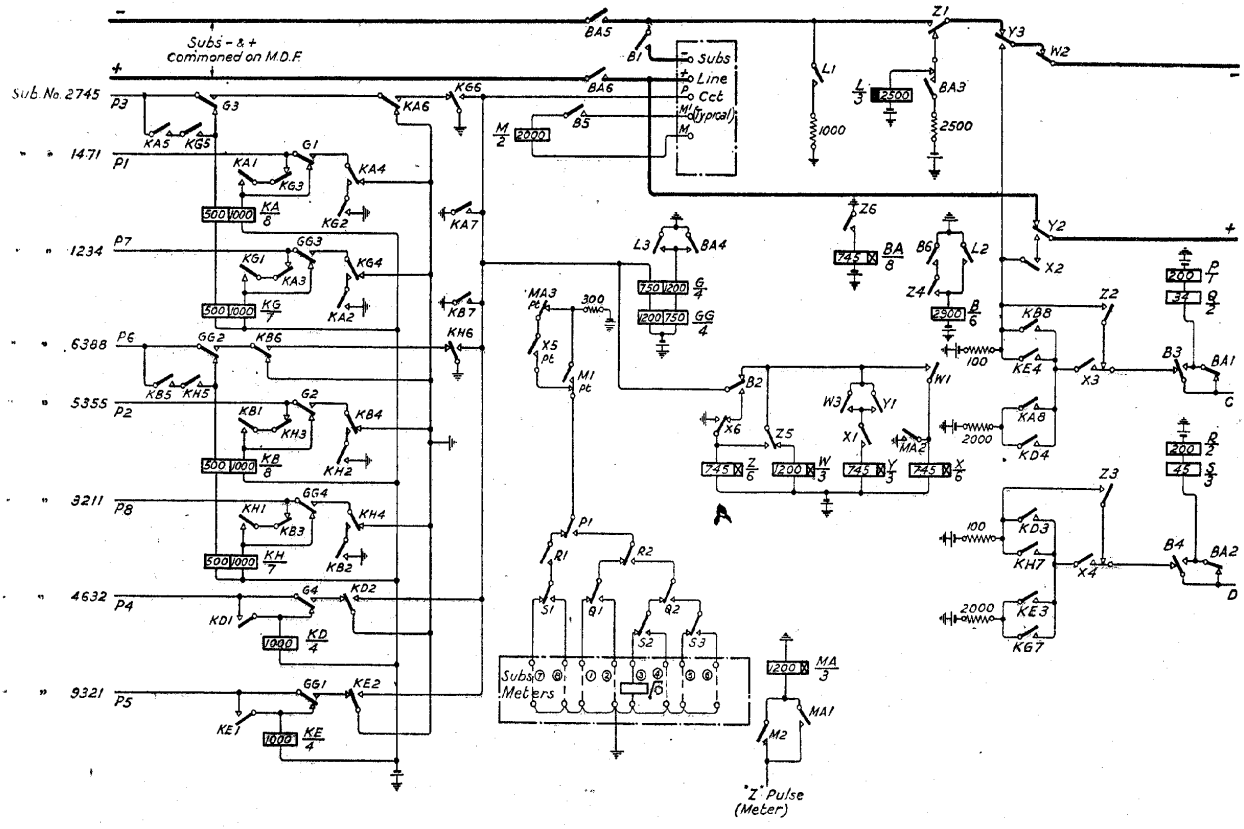

FIG. 291. EXCHANGE CONTROL UNIT

When metering conditions are returned over the M-wire, relay M responds to the pulses from the exchange meter pulse machine. Relay MA is operated by M2 to the Z pulse from the pulse machine, and is held operated for the duration of this pulse through its own contacts. MA2 operates relay X, which, at X6, maintains the circuit for relay Z. The calling subscriber's meter is operated by Ml, the number of operations being determined by the fee value of the call as interpreted by the multi-metering circuit. On completion of the metering cycle, relay M is released, and relay MA releases when the Z pulse terminates. MA3 re-connects a circuit for the subscriber's meter through X5, whilst MA 2 disconnects relay X. Thus, during the release lag of relay X, the meter is re-operated and an extra unit is recorded on any type of metered call. This is necessary on account of the special fees laid down for group service subscribers.

The circuit is controlled from the calling subscriber's gravity switch in the usual way and, when the receiver is replaced, the train of selectors is released, and the earth removed from the P-wire to release relay Z. Z2 and Z3 disconnect the C and D wires, so releasing DD at the control point and relays P, R, and S at the exchange control unit. Z4 releases relay B and Z6 releases relay BA. Relays G and GG maintain engaged conditions on the multiples until relay BA has released. BA3 connects battery through Z1 to the negative wire to charge the subscribers' condensers, so that, on the release of BA3 to re-apply relay L to the line, there shall be no possibility of relay L being flicked up by any condenser surge.

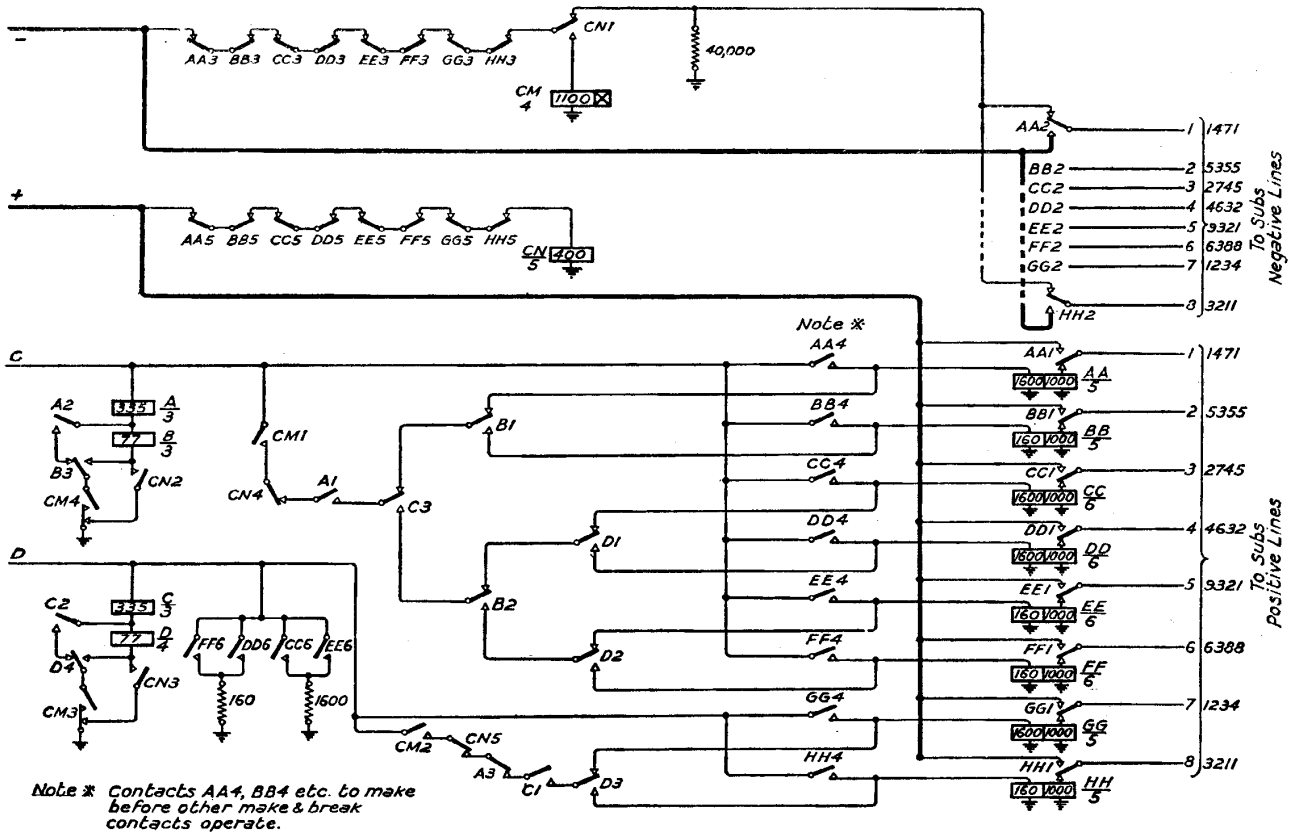

FIG. 292. CONTROL POINT RELAY-SET

Incoming Call

Incoming calls to the group are routed over ordinary final selectors, which test the multiple of the called line in the usual way. Thus, a final selector testing to multiple No. 2745 would, providing no other subscriber in the group was engaged on a call, switch in to the coils of relays KA and KG in series, and both these relays operate. KA5 and KG5 lock their respective relays under the control of relay H in the final selector which has seized the line. Relays G and GG are operated by KG6 and apply earth to the remaining P-wires associated in the group. KG6 and KA7 operate relay K in the line circuit and complete a circuit for the group of relays W, X, T, and Z. Relay W operates relay X, which completes a circuit for both relays Y and Z. Z5 releases relay W, which, in turn, after a delay period, releases relay X; X1 releases relay Y. During this cycle of operations, conditions are applied to the wires to the control point relay-set which effect the selection of the called subscriber.

Thus, during the releasing lag of relay W, with relays X and Y operated, battery is applied to the positive wire to operate relay CN, and CN2 and CN3 complete circuits to the discriminating relays. As subscriber 2745 is being called, and relays KG and KA are operated, a 2000-ohm battery is applied to

the G and D wires through X3 and X4. These high resistance batteries operate only relays A and G, which, at A1 and C3, prepare an operating circuit for relay CC. A2 and C2 prepare alternative circuits for relays A and G, such that when relay CM operates, relays B and D are disconnected.

When relay W releases, and during the releasing lag of relay X, relay CM is operated over the negative wire through CN1. The function of CM3 and CM4 is to prevent the operation of any other discriminating relays when a low resistance battery is connected to the C and D wires at a later stage. When relay X has released, and during the releasing lag of relay Y, battery is disconnected from the positive wire and relay CN releases. CN1 disconnects relay CM, but this relay, by reason of its slug, remains operated for a short period, during which a circuit is completed from the low resistance battery applied to the C wire on release of X3, through CM1, CN4, A1, C3, B2, D1, to relay CC which operates and holds at CC4. On the release of relay CM, the discriminating relays and the operating circuit for relay CC are disconnected, but relay CC is retained through CC4. The selection and operation of relay CC connects the spur to subscriber 2745 to the positive and negative wires, at the same time disconnecting the remaining subscribers. The negative and positive wires are connected through to the final selector multiple when relay Y releases, since relay BA is operated by Z6.

On the release of the connexion by the calling subscriber, relays KA and KG release, thus releasing relay Z and relay K in the line circuit. The release of relay Z disconnects the negative, C, and D wires, so releasing relay CC at the control point and relay BA at the exchange control unit. The release of relay BA connects the wires through in readiness for another call, and releases relays G and GG to remove the guard from the final selector multiples.