

## A New Private Automatic Branch Exchange at Messrs. D. H. Evans' Store, London.

THE London store which bears the name of its founder, D. H. Evans, was established at 322 Oxford Street, in the year 1879. With subsequent growth, the business eventually occupied two buildings fronting Oxford Street, situated at the East and West corners of Old Cavendish Street. On the West side, which is an island site bounded by Oxford Street, Old Cavendish Street, Henrietta Street and Chapel Place, a new building has been erected, half of which was opened for business during 1936 and the remainder early in 1937. It comprises 100 departments in which all kinds of women's and children's apparel to-day take the place of the goods of the original silk mercers' business, and in which a staff of 2000 gives some indication of the growth since the days when two assistants sufficed. Six floors devoted to retail business provide a selling space of about six acres and are served by lifts and escalators.

Of the many examples of modern equipment employed to facilitate the general conduct of the business, the telephone system is of special importance, touching as it does upon all aspects of the organisation—internal administration, inter-communication between departments, contact with the public and contact with suppliers. Telephone service is provided by a private automatic branch exchange, of which the automatic equipment and the manual

switchboard are installed in adjacent rooms on the sixth floor

The P.A.B.X. is equipped for 310 internal extensions and is designed to provide capacity for 475. Of the present total number of lines, 250 are connected to the automatic equipment, intercommunication between them being effected automatically, whilst the remaining 60 are terminated on the manual board and are available for use by members of the public whilst in the store, their requirements being attended to by the operators. The line equipment is completed by three tie-lines to private branch exchanges auxiliary to the main system. The P.A.B.X. itself is linked with the London network by 71 bothway exchange lines from the manual switchboard to Mayfair exchange, and by nine outgoing lines from the automatic equipment to Langham and Grosvenor exchanges.

The circuit arrangements enable an operator to extend any calling extension to Mayfair exchange upon request but also provide an exchange-prohibition feature whereby such connexions are barred to certain predetermined extensions. Approximately 80 internal lines may obtain access to the London system over the direct-out circuits from the automatic equipment without the intervention of an operator

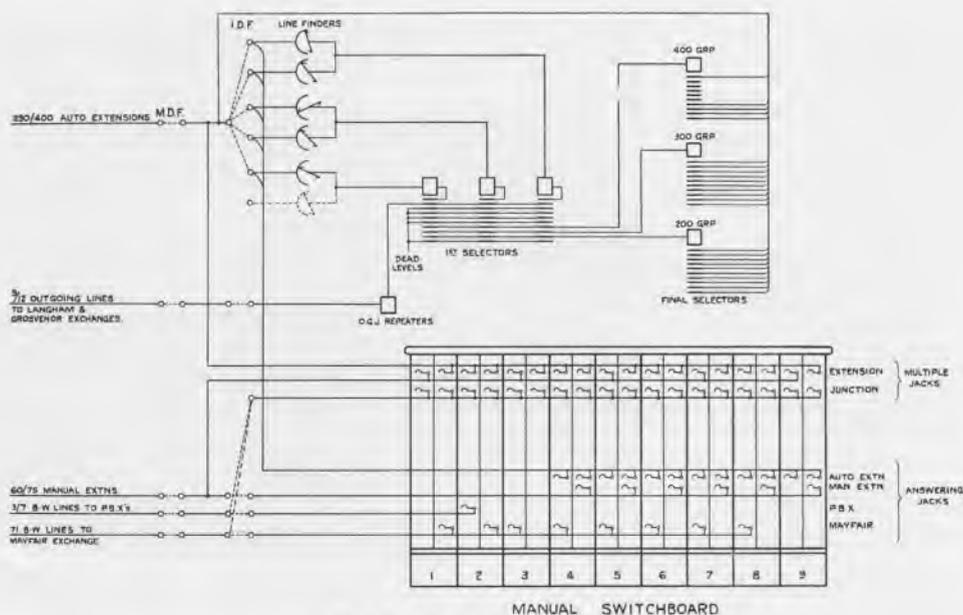


Fig. 1.—Trunking Diagram.

The automatic equipment comprises linefinders, 1st selectors and final selectors, the circuits of which incorporate B.P.O. 3000 type relays throughout. A standard type relay fitted with two armatures is employed in the line circuits and performs the functions of the usual line and cut-off relays.

The trunking diagram (Fig. 1) shows that linefinders are of the 50 point type, operated in pairs, each pair serving 100 lines in two groups of 50. The groups are designated A and B and the thirteen linefinders serving each group are allotted in turn by two assignment switches, one acting upon the finders in the A group and the other upon finders in the B group. These preselect a disengaged linefinder so that there is normally a finder ready for use when a call is originated in any group. The appropriate linefinder of a pair is then switched to the associated 1st selector by means of a switching relay in the finder circuit.

The provision of two assignment switches enables two finders to stop simultaneously should simultaneous calls occur in associated A and B groups, whilst the fact that a line is found by a finder taking no more than 50 steps gives the arrangement—with 100 line groups—the same speed of hunting as in 50 line groups.

Levels 2, 3 and 4 of the 1st selectors give access to final selectors in an initial numbering scheme ranging from 200 to 440. The 35 group selectors installed are seen in Fig. 2, which also shows a second group-selector rack carrying banks for additional switches if these should prove necessary. In the background is the final selector rack equipped with 27 switches and 30 banks.

The manual switchboard is of nine operator's positions, each of two panels. Answering equipment is provided on eight positions for the 71 bothway exchange lines, on one position for the P.B.X. tie lines, and on six positions for the manual

and automatic extensions. The outgoing multiple of these extensions occupies the top rows of the equipment (Fig. 3). Beneath is the outgoing multiple of the exchange lines, incorporating also equipment for the tie-lines to private branch exchanges.

The exchange line multiple employs *Free Line Signals* (F.L.S.) the object of which is to indicate to operators free junctions, as distinct from the older practice of indicating junctions which are engaged. A positive indication is thus given of junctions which may be seized, a practice which has psychological advantages over the negative indication of those junctions which must not be taken into use.

The multiple (four panel) appears four times over the board with a further

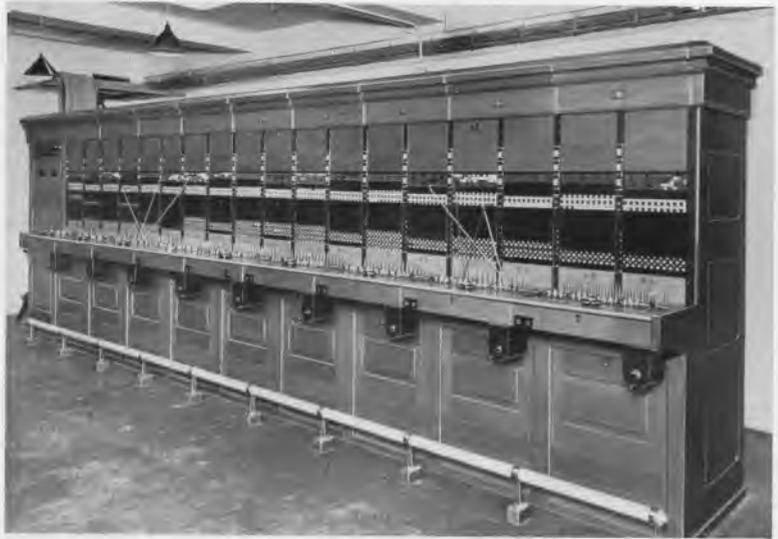


Fig. 3.—Manual switchboard.

appearance of the lines on panels 1 and 2 at position 9. It is the object of F.L.S. working to indicate throughout the multiple the next free junction but since if only one were indicated there would be distinct possibility of simultaneous seizure by two or more operators, a number of free junctions are signalled. The exchange lines are divided into groups of five and the next free junction in each group is indicated. Depending upon the traffic, there may thus be a choice of up to fourteen free junctions offered to an operator, considerably reducing the prospect of simultaneous seizure.

In each group of five, the circuit arrangements provide for cyclic distribution of traffic in order to equalise the use of the apparatus.

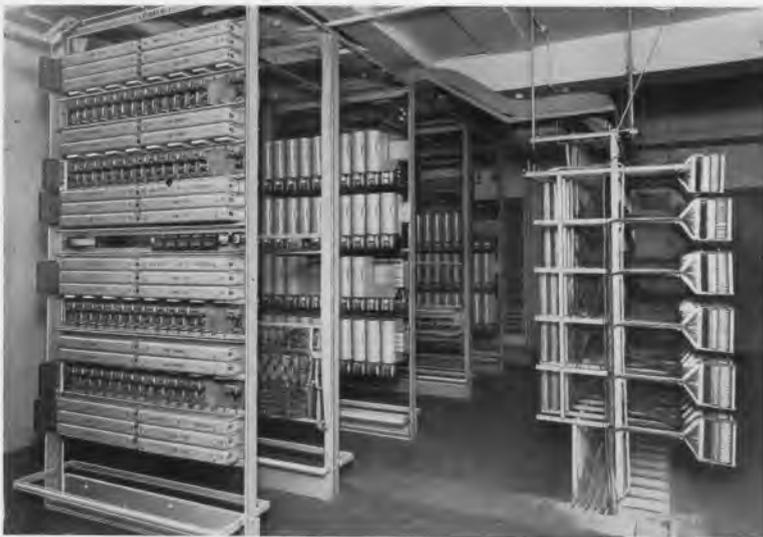


Fig. 2.—General view of automatic equipment.

Since it may be of interest, the circuit is given in Fig 4. With conditions at normal as shown, lamps of the first junction in the group glow in each multiple appearance. When this junction is seized by any operator the conditions are (a) on an incoming call—relay L operates to ringing current, locks at L1 and operates relay AA at L2. (b) on an outgoing call—relay COS operates to battery on sleeve of plug and operates relay AA at COS1. In each case relay AA locks at contact F1. Contact AA1 extinguishes the lamps of the first junction and lights those of the second. If this be taken into use its lamps are extinguished and those of the third glow. Should, say, the first junction then become free, its signals do not glow, since relay AA remains locked. Similarly, having once operated, relays AB, AC and AD remain locked until, when relay AE operates, a circuit is completed for relay F, which operates to release them, again lighting the lamps of the first junction in the group.

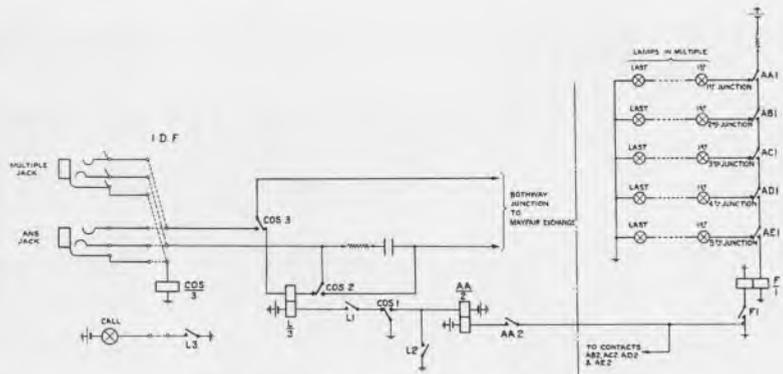


Fig. 4.—Junction termination circuit.

Calls are thus distributed evenly over the group. The operation of contact F1 short-circuits one coil of relay F, giving the relay a release period in which relays AA, AB, etc., are given time to release.

The telephone system as a whole, with automatic switching and modern practices incorporated in the manual board, has given completely satisfactory service since being placed in commission when the new store was first opened to the public. Traffic figures taken shortly after the opening, when 50 exchange lines were in use, show an average of 800 calls per day incoming to the manual board with 600 calls outgoing.

