

## HOUSE EXCHANGE SYSTEMS Nos. 3 AND 4

### Description of Equipment

**1. Scope of Instruction.**—This Instruction describes the various items of equipment used on the House Exchange Systems (H.E.S.) Nos. 3 and 4. The definitions of terms and facilities for the H.E.S. No. 3 are described in Q 1011 and for the H.E.S. No. 4 in Q 1015. Installation of the H.E.S. No. 3 is described in Q 3011 and the H.E.S. No. 4 in Q 3015.

#### 2. Contents.

Telephone, Intercom., No. 3/1 (H.E.S. No. 3)	3
Telephone, Intercom., No. 4/1 (H.E.S. No. 4)	4
Block, Terminal, No. 37 .. .. .	5
Box, Connexion, No. 6A .. .. .	6
Box, Connexion, No. 7A .. .. .	7
Wall-mounted relay-units .. .. .	8
Relay-unit Q 405 .. .. .	9
Relay-unit Q 410 .. .. .	10
Relay-unit Q 415 .. .. .	11
Relay-unit Q 516 .. .. .	12
Relay-unit Q 519 .. .. .	13
Relay-unit Q 524 .. .. .	14
Relay-units mounted in Telephones, Intercom.	15
Relay-unit Q 408 .. .. .	16
Relay-unit Q 409 .. .. .	17
Relay-unit Q 527 .. .. .	18
Relay-unit Q 528 .. .. .	19
Two-wire circuit control—units at main stations .. .. .	20
Control-unit Q 535 .. .. .	21
Control-unit Q 537 .. .. .	22
Non-multiple extension telephone .. .. .	23
Extension bells etc. .. .. .	24
Additional receivers .. .. .	25
Labels .. .. .	26
Instrument cords and connectors .. .. .	27
Cable .. .. .	28
Power equipment .. .. .	29
Ringing supply .. .. .	30

**3. Telephone, Intercom., No. 3/1.**—This telephone is used at a H.E.S. No. 3 installation which caters for one exchange line and up to five stations. The telephone is basically a Telephone No. 710 and has a cover (Part No. 6/DCO/627) which is provided with two lenses; it is fitted with a self-locking BELL OFF button in position A, an EXCH button in position B and two split buttons in each of positions C and D.

The moulded base (a standard item) is fitted with a special gravity switch and has been coded Part No. 4/DBA/107.

Fitted between the gravity-switch pillars is a sub-assembly known as a Switch, Composite, No. 1A, which consists of a spring contact unit wired to a Strip, Connexion, No. 155B, the assembly having seven flexible spade-ended leads for connexion to the telephone circuit. The contact unit is held in position between the gravity-switch pillars by four screws and

the connexion strip is held at the rear of the pillars by two locating pins and a spring clip.

The plungers and spring contacts located in positions C and D of the latch-plate assembly form the intercom signalling circuits. The spring contacts and plunger in position B are contacts KX of the exchange line circuit, and these may be released either by replacing the handset or by pressing any one of the four buttons in positions C and D. The spring contacts in position A which are adjacent to position B, are contacts KH and these also operate when contacts KX are operated, but they can only be released by replacing the handset; these form the hold circuit of the exchange line. The remaining spring contacts in position A control the magneto bell cut-off or additional facilities. These springs are operated by a special plunger which is fixed to the latch plate by a bracket. The spring assembly is illustrated in Dgm. Q (L) 422 and the button arrangement is shown in Dgm. Q (L) 424.

Fixed on the sides of the gravity-switch pillars are two Lamp-fittings, No. 16 (incomplete); viewed from the front of the telephone, the fitting on the left-hand side contains a Lamp No. 26H which provides the red lamp signals for the exchange line, whilst in the fitting on the right-hand side is a Lamp No. 26J which provides the engaged signal for the intercom circuit.

The d.c. buzzer for intercom calling is fitted onto the cord grommet frame and the complete assembly has been coded Buzzer No. 2B-2.

The telephone is fitted with a Cord, Inst., No. 20/03AJ, ..., 72 in. which is terminated with the multiple cables onto a Block, Terminal, No. 37....

The telephone is normally fitted with a Handset No. 3.

The C.B. telephone has a Dial, Auto., Dummy, No. 6A, ....

The complete circuit of the telephone is shown in Dgm. Q(L) 422 and the wiring of the Switch, Composite, No. 1A only in Dgm. Q(L) 423. The instrument cord and cable connexions for the telephone are shown in Dgm. Q(L) 424.

The telephone is available in black, grey and ivory.

**4. Telephone, Intercom., No. 4/1.**—This telephone is used at a H.E.S. No. 4 installation which caters for one or two exchange lines and up to ten stations (exceptionally eleven stations).

The telephone mechanism is mounted on a metal base and is enclosed by a moulded plastic cover (Part No. 1/DCO/683).

The telephone when issued is fitted with a Handset No. 3 and a Connector No. 1046A. The overall dimensions of the telephone are approximately 11½ in. × 6¾ in. × 4¾ in. high.

Above the front sloping face of the cover containing the dial aperture, is an almost horizontal face in which is a rectangular aperture for the press-buttons of the key unit. Over the rectangular aperture and surrounding the press-buttons is a separate escutcheon which is sprung into place and clips onto the metal face of the key unit. This escutcheon contains the station identification labels with their clear plastic covers and the lenses for the exchange line lamps. The labels and plastic covers are removed by pressing at the end of the plastic cover with the blunt end of a pencil or similar object; this causes the middle to bow upwards where the cover and label may be gripped and pulled gently upwards. If the label does not rise with the cover it may be eased up by inserting a pin at the middle by the side of the label and levering gently upwards. The escutcheon is removed by inserting a thin blunt edged blade, or finger tip under the chamfered edge at the back and springing it off the rear clip, then lifting upwards to release the front spring clip. In front of the handset rest there is provision for four press-buttons which are used to control the bell cut-off facility and any additional facilities that may be provided.

The telephone cover is fixed by two screws in the handset rest and by a screw in the front of the dial mounting.

The press-buttons are in two rows, from left to right there are the two ivory exchange line buttons engraved 1 or 2, two smaller ivory exchange line release buttons engraved R; ten grey press-buttons for signalling and speaking to other stations over the intercom circuits, and the single ivory conference button engraved C.

At the front of the base are two bell gongs, over which Relay-units Q 527 and Q 528 (see pars. 18 and 19) may be mounted as required. The magneto bell is a Bell No. 59A with long flexible leads and has been coded Bell No. 59A-2.

Behind the bell and across the base is a printed circuit board with the components of a standard 700-type telephone transmission circuit.

The key unit is in two parts; a metal frame carrying spring-sets for the exchange lines and intercom circuits, and a press-button assembly.

The metal frame screwed to the base of the telephone, carries on each side, the spring assembly of an exchange line and a printed board with spring contacts riveted to it, for intercom signalling and speaking.

At the end of the frame near the exchange line spring contacts is a plunger assembly which operates on second and subsequent overpresses of an exchange press-button. The plunger operates a spring-set to provide operator-recall facility to either exchange line circuits. A second spring assembly inside the frame operates when the station press-buttons are overpressed and provides the intercom signalling condition.

At the end of the frame near the conference button are a number of 'polytags' carrying resistors associated with lamp circuits etc.

On the top, near each of the four corners of the frame, is a lug which carries a Lamp-fitting No. 19 and a Lamp No. 41E. The press-button mechanism is held in the frame by a countersunk screw at each corner of the top plate.

On the left-hand side of the base, beneath the dial mounting, is a metal bracket which carries a d.c. buzzer (Buzzer No. 2B-3) for intercom calling.

Behind the key unit frame is a 72-way double-sided terminal block. On the top side is the telephone wiring; both soldered and screwed terminations. The instrument cord, a Connector No. 1046A, and any straps that may be required are terminated on the underside and these terminals are exposed by removing a cover plate from the base.

Over the cord entries at the rear of the base is a metal bracket which carries the intercom transmission feed coil and its associated resistors and capacitor.

The telephone is connected to the multiple cabling via a Box, Connexion, No. 6A. The circuit and connector connexions of the telephone are shown in Dgm. Q(L) 540.

The telephone is available in black, grey and ivory.

The weight of the complete instrument is  $8\frac{1}{2}$  lb.

**5. Block, Terminal, No. 37...**—The Block, Terminal, No. 37... is used at H.E.S. No. 3 installations to terminate the multiple cables and Telephone, Intercom., No. 3/1 at multiple stations. It is also used with a Control-unit Q 535 (see par. 21) at a H.E.S. No. 4 installation.

The Block, Terminal, No. 37... consists of a moulded plastic base (Part No. 1/DBA/99) on which is mounted a terminal block (Part No. 1/DBL/91), containing 25 double-sided screw terminations; the tablet and base being enclosed by a moulded plastic cover (Part No. 1/DCO/625). At one end of the cover is a cut-out for cord entry and at the other end are three knockouts for cable entry.

The base has been modified to include a hole for back entry of cable and fixing holes for mounting the Block, Terminal, No. 37... over square type conduit outlet boxes, i.e. standard outlet boxes with  $2\frac{3}{4}$  in. fixing centres.

**6. Box, Connexion, No. 6A.**—The Box, Connexion, No. 6A has a base area of approximately  $6\frac{1}{4}$  in.  $\times$   $5\frac{3}{4}$  in. and is nearly 2 in. high. Mounted on the metal base is a Connector No. 203B55B, which is a 55-pin plug. Also fixed to the base on raised pillars are two 28-way terminal blocks (Part No. 1/DST/861). The inserts of the terminal blocks have screw terminals for multiple cabling on the front side, and solder terminals on the rear side which are wired to the pins of the Connector No. 203B55B. At the side of the connector is a bracket to retain the grommet of the telephone instrument cord (Connector No. 1046A). Also in the base is a hole for back entry of cables.

The grey moulded plastic cover is held on by two fixing screws, and the sides contain knockouts for

cable entry and a cut-out for the cord entry. Details of the wiring between the connector and terminal tablets are given in Dgm. Q(L) 510.

**7. Box, Connexion, No. 7A.**—The Box, Connexion, No. 7A is identical in size and shape to the Box, Connexion, No. 6A. The metal base of the Box, Connexion, No. 7A provides mounting on raised pillars for three 28-way double-sided terminal tablets (Part No. 1/DST/861). These tablets have screw terminals on front and rear sides. There is no provision in the base for back entry of cables. The sides of the moulded plastic cover contain knockouts for cable entry. Typical uses of the Box, Connexion, No. 7A are shown in Dgm. Q(L) 508.

**8. Wall-mounted relay-units.**—Two sizes of metal case have been introduced for use with H.E.S. No. 3 and No. 4.

Relay-unit Q 405 is contained in a Case No. 131... which has a mounting surface of 12 in.  $\times$  4 $\frac{3}{8}$  in. All other wall-mounted units are contained in Case No. 133... which has a mounting surface of 12 in.  $\times$  8 $\frac{11}{16}$  in. Both cases extend 7 $\frac{5}{16}$  in. from the mounting surface.

Circuit components are mounted on a metal plate which is hinged to the baseplate and the wiring from the components is terminated on a connexion strip, which is fixed to the baseplate. Cable entry is via a hole fitted with a grommet in the baseplate.

A clear space of 6 in. must be allowed on the left side of the units when fixing to the mounting surface. This space allows full movement of the hinged plate, with access to the wiring of the relays etc.

A description of each wall-mounted relay-unit is given in pars. 9 to 14.

**9. Relay-unit Q 405.** Relay-unit Q 405 is provided at H.E.S. No. 3 installations which have multiple stations only. The unit contains the circuits which control the lamp signals in the Telephone, Intercom., No. 3/1, and the transmission feed relay for the intercom circuit. The wiring of the unit and the multiple cable terminate on a connexion strip (Part No. 1/SST/7), the cable being connected to the screw terminals.

Wiring details are shown in Dgm. Q(L) 405 and in Dgm. LD 174, which is pasted inside the cover.

Cable connexions are shown in Dgms. Q(L) 403 and Q(L) 404.

When a H.E.S. No. 3 is working subsidiary to a switchboard with a low-power ringing source, it may be necessary to provide a local ringing supply, the output of which is controlled by relay contact RG2. Dgm. Q(L) 417 shows details of alternative ringing arrangements when working a H.E.S. No. 3 subsidiary to a switchboard or when more than five bells are to be rung.

The complete unit weighs approximately 5 $\frac{1}{2}$  lb.

**10. Relay-unit Q 410.** Relay-unit Q 410 replaces Relay-unit Q 405 at H.E.S. No. 3 installations when a non-multiple extension is required. In addition to the components and circuits of the Relay-unit Q 405, the Relay-unit Q 410 also contains the components and circuits which connect the two-wire line of a non-multiple extension to the multiple wiring of the system.

In this unit there is no spare contact on relay RG, and when a H.E.S. No. 3 with a non-multiple extension is worked subsidiary to a switchboard which has a low-power ringing source, it will be necessary to change relay RG. The relay should be changed, in a local workshop, for a Relay No. 9871, and the additional contact wired as shown in Dgm. Q(L) 417, which gives details of alternative ringing arrangements. The relay RG must also be changed and wired to Dgm. Q(L) 417, when more than five magneto bells are to be rung at any installation.

The unit wiring and the multiple cable are terminated on a connexion strip (Part No. 1/SST/71), with the cable connected to the screw terminals.

Wiring details of the Relay-unit Q 410 are shown in Dgm. Q(L) 410 and in Dgm. LD 175, which is pasted inside the cover.

The complete unit weighs approximately 14 lb.

**11. Relay-unit Q 415.** The Relay-unit Q 415 is provided when an inter-switchboard or private circuit is included in a H.E.S. No. 3 installation, and is fitted in addition to Relay-unit Q 405 or Q 410.

Relay-unit Q 415 contains a number of circuit elements, which may be strapped according to the type of signalling being used on the circuit.

The wiring, details of Relay-unit Q 415 are shown in Dgm. Q(L) 415 and in Dgm. LD 180, which is pasted inside the cover.

The connexions required when using the Relay-unit Q 415 are shown in Dgms. Q(L) 441 to Q(L) 447. Signalling limits for this unit are the same as for a Unit, Auxiliary Apparatus, No. 97 and are given in Dgm. N 705.

The unit wiring and multiple cables together with the required strappings shown in Dgm. Q(L) 441 are terminated on two Strips, Connexion, No. 121D mounted back to back; these are all soldered connexions.

The complete unit weighs approximately 15 lb.

**12. Relay-unit Q 516.** The Relay-unit Q 516 is fitted to all H.E.S. No. 4 installations, and contains the components and circuits which control the lamp signals and exchange line ringing signals at a Telephone, Intercom., No. 4/1 fitted at a multiple station. Relay contacts within the unit are also available, when required, to extend signal and start conditions to the relay-units of non-multiple extensions or private circuits.

Current through each of the series connected exchange line engaged lamp circuits of a Telephone,

Intercom., No. 4/1 is controlled by a transistor circuit. The transistor is mounted on a heat sink which also carries the associated resistors, capacitor and rectifier; this complete assembly has been coded Regulator No. 4A.

The Regulator No. 4A is fixed by two screws to the hinged plate and joined to the circuit by three flexible spade-ended leads. Care must be taken to ensure that these leads are correctly connected otherwise the transistor may be seriously damaged. The regulator is adjusted during manufacture to pass  $100 \pm 5$  mA under load conditions, and should any component become faulty, the complete regulator must be changed.

Mounted on the baseplate of the relay-unit is a clip to hold a Connector No. 203C55C, which is a 55-way connector that has been provided with a number of straps between certain sockets, and is intended for use at multiple stations where a Telephone, Intercom., No. 4/1 has been disconnected for repair or replacement. By replacing the telephone socket with a Connector No. 203C55C the series circuits of the installation are maintained and service is continued at all other stations. The connexions provided in the Connector No. 203C55C are shown in Dgm. Q(L) 510.

Wiring details of the Relay-unit Q 516 are shown in Dgm. Q(L) 516 and in Dgm. LD 192, which is pasted in the cover.

The complete unit weighs approximately 12 lb.

**13. Relay-unit Q 519.** The Relay-unit Q 519 is provided at a H.E.S. No. 4 installation to connect the two-wire line of a non-multiple extension to the multiple wiring.

Circuits in the unit provide the non-multiple extension with most of the facilities of a multiple station; these facilities are fully described in Q 1015.

A Strip, Connexion, No. 121M provides the terminating point for the unit wiring, multiple cables and strappings as required. Straps that may be needed should be connected on the permanent wiring side of the Strip, Connexion, No. 121M, and the multiple cables terminated on the opposite side.

Details of the wiring are shown in Dgm. Q(L) 519 and in Dgm. LD 195, which is pasted inside the cover.

When a Relay-unit Q 519 is provided, a Control-unit Q 535 or Q 537 (see pars. 21 and 22) is always fitted at the main station and the operation of the Relay-unit Q 519 should be studied in conjunction with the operation of the Control-unit Q 535 or Q 537. Circuit elements and explanatory notes are shown in diagrams in the Q(L) 5... series.

The complete unit weighs approximately 17 lb.

**14. Relay-unit Q 524.** The Relay-unit Q 524 is provided at a H.E.S. No. 4 installation to connect the two wires of a private circuit to the multiple wiring.

The unit contains circuit elements which may be

connected by strappings on the Strip, Connexion, No. 121M, to terminate the circuit at the H.E.S. No. 4 according to the type of signalling to be used. The cable connexions and straps required for various signalling groups are shown in Dgms. Q(L) 561 to Q(L) 567.

Wiring details of the unit are shown in Dgm. Q(L) 524 and in Dgm. LD 194, which is pasted inside the cover.

Signalling limits for the Relay-unit Q 524 are the same as for a Unit, Auxiliary Apparatus, No. 97 and these are shown in Dgm. N 705.

Straps should be connected on the permanent wiring side of the Strip, Connexion, No. 121M and cabling should be terminated on the opposite side.

The complete unit weighs approximately 17 lb.

**15. Relay-units mounted in Telephones, Intercom.—** Certain facilities that are available to both H.E.S. No. 3 and No. 4 installations are provided by fitting a small relay-unit into a Telephone, Intercom., No. 3/1 or No. 4/1 and modifying the instrument cord connexions.

These units consist of a Relay No. 16/... mounted on a metal mounting plate which is secured over a bell gong.

Other components may also be included, terminated on 'polytags' pressed into the metal mounting plate.

The various relay-units for fixing inside Telephones, Intercom., are described in pars. 16 to 19.

**16. Relay-unit Q 408.** The Relay-unit Q 408 is provided in a Telephone, Intercom., No. 3/1 when the instrument is to have restricted exchange service.

The unit consists of a Relay No. 16/1 and two diodes (Valves, Electronic, CV 7040) on a mounting plate (Part No. 1/DMO/102), and has spade-ended flexible leads for connexion to the telephone circuit.

Dgm. Q(L) 408 shows the wiring of the unit and the connexions within the telephone.

**17. Relay-unit Q 409.** The Relay-unit Q 409 is provided in a Telephone, Intercom., No. 3/1 when the instrument is to have monitoring facilities.

The unit consists of a Relay No. 16/2 wired with spade-ended flexible leads on a mounting plate (Part No. 2/DMO/102).

Dgm. Q(L) 409 shows the wiring of the unit and the connexions within the telephone.

**18. Relay-unit Q 527.** The Relay-unit Q 527 is fitted in a Telephone, Intercom., No. 4/1 when the station is to have restricted exchange service.

When exchange service restriction applies to only one line the Relay-unit Q 527 should be used and connected to the appropriate line. When both lines are to be restricted the Relay-unit Q 527 should be connected to the line on position one of the telephone and a Relay-unit Q 528 (see par. 19) connected to the line on position two.

The Relay-unit Q 527 consists of a Relay No. 16/1 and two rectifiers (Valves, Electronic, CV 8308) on a mounting plate (Part No. 1/DMO/102), and has flexible spade-ended leads for connexion to the telephone. Details of the wiring and telephone connexions are given in Dgm. Q(L) 527.

**19. Relay-unit Q 528.** The Relay-unit Q 528 is fitted in a Telephone, Intercom., No. 4/1 when both lines are to have restricted exchange service. The unit includes a mounting plate (Part No. 1/DMO/122) for mounting over the left-side bell gong, but in all other respects the Relay-unit Q 528 is identical to the Relay-unit Q 527. Details of the Relay-unit Q 528 are included in Dgm. Q(L) 527.

**20. Two-wire circuit control-units at main stations.**—When a non-multiple extension or private circuit is fitted at a H.E.S. No. 4 installation a control-unit must be fitted at the main station. This unit provides the circuit calling and clearing supervisory, and exchange line testing circuits. There are two sizes of control-unit, Control-unit Q 535 which caters for one circuit and is described in par. 21, and Control-unit Q 537, which caters for up to four circuits and is described in par. 22.

**21. Control-unit Q 535.** The Control-unit Q 535 is a desk unit measuring approximately 3 in. wide  $\times$  5½ in. front to back and 2¾ in. high; it is fitted adjacent to the Telephone, Intercom., No. 4/1 at the main station.

The unit is contained in a Mounting D 92155 using a cover (Part No. 1/DCO/672, Grey), and a face plate (Part No. 1/DPL/2136). The 'EXCHANGE LINE' lenses are Caps, Lamp, No. 79C, Red and the 'EXTENSION' lens is a Cap, Lamp, No. 79C, White. The lamps used are Lamps No. 2-45V. The lamps and lenses are easily replaceable but other components are soldered in and should not normally be changed in subscribers' premises.

The cord associated with the unit is a Cord, Inst., No. 18/04AJ, Grey, 72 in. and this is terminated with the cabling onto a Block, Terminal, No. 37..., both must be ordered separately.

Dgm. Q(L) 535 shows the wiring details of the unit and Q 1015 explains the facilities of the unit.

The unit is available in grey only.

**22. Control-unit Q 537.** The Control-unit Q 537 is a desk unit measuring approximately 6 in. wide  $\times$  5½ in. front to back and 2¾ in. high; it is fitted adjacent to the Telephone, Intercom., No. 4/1 at the main station.

The unit is contained in a Mounting D 92199 using a cover (Part No. 1/DCO/676, Grey) and a face plate (Part No. 2/DPL/2135). In addition to the parts contained in Control-unit Q 535 (see par. 21) the Control-unit Q 537 contains four key circuits, which are used to connect non-multiple extensions and private circuits for intercom calls. When used

at an installation with 2nd choice main station facilities, the Part No. 2/DPL/2135 is changed (see Q 3015).

This unit is issued without a cord and Q 3015 describes the conditions governing which cord should be fitted. When a Cord, Inst., No. 18/04AJ, Grey, 72 in. is fitted, a Block, Terminal, No. 37... must be used to terminate the instrument cord and cable. When a Connector No. 1046A or No. 1052A is fitted, a Box, Connexion, No. 6A must be used to terminate the connector and cable.

Dgm. Q(L) 537 shows the wiring details of the unit and Q 1015 explains the facilities of the unit.

**23. Non-multiple extension telephone.**—A Telephone No. 710 is used to terminate the non-multiple extension. The components to be ordered separately and fitted in the telephone are fully described for the H.E.S. No. 3 in Dgm. Q(L) 420, and for the H.E.S. No. 4 in Dgm. Q(L) 550.

**24. Extension bells etc.**—Standard magneto bells, d.c. bells and buzzers are used when extension bells etc. are required. Dgm. Q(L) 419 shows the connexions for H.E.S. No. 3 and Dgm. Q(L) 545 shows the connexions for the H.E.S. No. 4.

**25. Additional receivers.**—A Receiver, Watch, No. 8T and a Hook, Receiver, AG are used.

**26. Labels.**—Particulars of dial labels for Telephones, Intercom., No. 3/1 and No. 4/1 are given in Q 3011 and Q 3015 respectively, and the labels are described in A 3202.

When issued, Telephones, Intercom., No. 4/1 are fitted with station identification labels (Labels No. 469/102), and these are described together with Labels No. 469 in Q 3015.

**27. Instruments cords and connectors.**—There are two instrument cords and two connectors available for use on H.E.S. No. 3 and No. 4 equipment.

Cord, Inst., No. 20/03AJ, ..., 72 in. is normally fitted to Telephones, Intercom., No. 3/1.

Cord, Inst., No. 25/04AJ, ..., 72 in. replaces Cord, Inst., No. 20/03AJ, ..., 72 in. when extra conductors are needed.

Both cords have at one end, 4½ in. spade-ended conductor tails for connexion to the telephone, and at the other end, have the spade-ended tails formed into two rows of ten. Each row is held in position by strips of flexible plastic, which are moulded over the shanks of the spade terminals. The remaining five conductors of the Cord, Inst., No. 25/04AJ, ..., 72 in. are left free. The plastic 'harness' assists in quick and accurate connexion of the conductors to the Block, Terminal, No. 37...

Each cord is stocked in three colours: black, grey and ivory, and in two lengths: 72 in. and 120 in.

The Connector No. 1046A is normally fitted to a Telephone, Intercom., No. 4/1 and may be fitted to a Control-unit Q 537 if required.

The Connector No. 1052A replaces Connector No. 1046A when extra conductors are needed.

Both connectors have at one end,  $4\frac{1}{2}$  in. spade-ended conductor tails for connexion to the telephone or control-unit. At the other end, soldered to the conductors, is a Connector No. 203C55A, which is a 55-way socket for connexion to the Box, Connexion, No. 6A.

Both connectors are stocked in three colours, black, grey and ivory, and in two lengths, 72 in. and 120 in. Connectors with 120 in. cords are coded Connectors No. 1046B and No. 1052B.

**28. Cable.**—The cable used for H.E.S. No. 3 and No. 4 installation is Cable, P.V.C. No. 1 (12W,

21W or 41W),  $6\frac{1}{2}$ . The size of cable to be used is given in Q 3011 for the H.E.S. No. 3 and Q 3015 for the H.E.S. No. 4.

**29. Power equipment.**—The H.E.S. No. 3 and No. 4 are mains operated installations, and standby batteries are not provided. A Power-unit No. 51A is provided for the H.E.S. No. 3 and a Power-unit No. 52A for the H.E.S. No. 4.

**30. Ringing supply.**—The Converter, Ringing, No. 7, which is mounted inside a Power-unit No. 51A or No. 52A is normally provided when a local ringing supply is required for a non-multiple extension or private circuit.

References:—A 3202, Q 1011, Q 1015, Q 3011, Q 3015 (S1/3)

END