

NOTES

1. This diagram with circuit operation notes is of a typical installation with one private circuit and one or more non-multiple extensions. The private circuit is numbered extension 10.
2. Relay Unit Q 524 must be fitted beyond the last multiple station, see Dgms. Q 502 and 503.
3. Only when the extension of exchange calls over the private circuit is authorized on the Advice Note should straps between terminals 74-84 and 75-85 be provided.
4. When NIGHT SERVICE extension of exchange calls over the private circuit is required strap terminals 78-88, 80-90, for Exchange Line 1 and 79-89, 80-90, for Exchange Line 2.
5. For arrangement of straps in Relay Unit Q 524 see Dgms. Q 503 and 561.

CIRCUIT OPERATION

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### CIRCUIT OPERATION

#### 1.0 OUTGOING CALL ON TIE-LINE (PRIVATE CIRCUIT)

At a multiple station, lifting the handset and overpressing the local key connects earth to B wire, resistance battery to A wire, of multiple pair to Relay Unit Q 524. Relay RC (via diode D1) and relay F operate. Contact F1 operates relay FR. Contact FR2 operates relay RR via Contacts F6 and RC3. Contacts RR2 and RR3 extend ringing current to line. Release of overpress of local key at multiple station connects normal conditions, earth A wire, battery B wire, and telephone circuit, to multiple pair of Relay Unit Q 524. Relay RC releases. Contact RC3 releases relay RR. Contacts RR2 and RR3 disconnect ringing current from line circuit and connect relays LA and LB.

#### 1.1 DISTANT END ANSWERS

Earth on B wire, battery on A wire, of line operates relays LA and LB. Contact LB2 operates relay RO. Conversation can now take place.

#### 2.0 INCOMING CALL ON TIE-LINE (PRIVATE CIRCUIT)

Incoming ringing current operates relay AC. Contact AC1 operates relay RC. Contact AC2 holds relay AC when ringing current is disconnected. Contact RC2 lights call lamp, contact RC1 operates buzzer, in Control Unit Q 537. Main station answers by lifting handset and operating local key which connects earth A wire, battery B wire, telephone circuit between wires, to multiple pair of Relay Unit Q 524. Relay F operates. Contact F4 disconnects call lamp and buzzer in Control Unit Q 537. Contact F5 releases relay AC. Contact AC1 releases relay RC. Contact RC4 operates relay FR. Contacts FR4 and FR5 disconnect relay AC from line circuit, and connect relays LA and LB. Relays LA and LB operate. Contact LB2 operates relay RO. Conversation can now take place.

#### 2.1 TRANSFER OF CALL TO (a) MULTIPLE STATION, OR (b) NON-MULTIPLE EXTENSION

(a) CONNECT and TEST key is operated on Control Unit Q 537. Relay F releases when main station calls the wanted station. Relay FR holds to earth on S wire from Control Unit Q 537 via contacts F1, EL2, ELR5 and FR2. Relay F will re-operate when station seizes circuit. CONNECT and TEST key is now restored.

(b) As in (a) CONNECT and TEST key is operated and relay F will release whilst non-multiple extension is being called. When extension answers, its CONNECT and TEST key is operated to complete speech path.

#### 2.2 RECALL OF MAIN STATION BY MULTIPLE STATION

Overpress of local key at multiple station connects earth to B wire, resistance battery to A wire, of multiple pair, holding relay F and operating relay RC. Contact RC2 lights call lamp, RC1 operates buzzer in Control Unit Q 537. Release of overpress restores normal conditions to multiple pair, releasing relay RC. Contacts RC2 and RC1 disconnect call lamp and buzzer.

#### 2.3 CLEARING

##### MULTIPLE STATION CALL

(a) Distant end clears first. Removal of earth from B wire and battery from A wire of line circuit release relays LA and LB. Contact LB2 releases relay RO. When handset at multiple station is replaced, relay F releases. Contact F1 releases relay FR. Circuit now normal.

(b) Multiple station clears first. Replacing of handset releases relay F. Contact F1 releases relay FR. Contacts FR4 and FR5 disconnect relays LA and LB from line circuit and connect relay AC. Relays LA and LB release. Contact LB2 releases relay RO. Circuit now normal.

##### NON-MULTIPLE EXTENSION CALL

(c) Distant end clears first. Removal of earth from B wire and battery from A wire of line circuit release relays LA and LB. Contact LB2 releases relay RO. Contact RC4 operates relay RC via CONNECT and TEST key contacts in Control Unit Q 537. Contacts RC2 and RC1 light call lamp and operate buzzer in Control Unit Q 537. When the CONNECT and TEST key is restored relays RC and FR release. Contacts RC2 and RC1 disconnect call lamp and buzzer. Circuit now normal.

(d) Non-multiple extension clears first. Clear from extension will cause main station to restore CONNECT and TEST key on Control Unit Q 537. Relay FR releases. Contacts FR4 and FR5 disconnect relays LA and LB from line circuit. Relays LA and LB release. Contact LB2 releases relay RO. Circuit now normal.

#### 3.0 EXCHANGE CALLS (Note 3)

Exchange calls may be extended to tie-line from (a) exchange line 1, or (b) exchange line 2. Distant end is first called as in paras.1.0 and 1.1.

(a) Exchange Line 1. CONNECT and TEST key is operated on the Control Unit Q 537, followed by operation of TRANSFER 1 key. Earth via 10 X 1 lead operates relay EA. Contact EA6 operates relay EL to resistance battery on LA lead from Relay Unit Q 516. Contact EL1 operates relay ELR. Contact EL4 earths XA multiple lead, EL5 earths LPAC multiple lead. Contacts ELR1 and ELR2 switch speech path to exchange line, ELR3 and ELR4 disconnect

intercom, release relay F, and apply busy condition to C wire. Contact ELR5 operates relay RC to earth via CONNECT and TEST key. Contacts RC2 and RC1 light call lamp and operate buzzer in Control Unit Q 537. TRANSFER 1 and CONNECT and TEST keys are restored, relay RC releases. Contacts RC2 and RC1 disconnect call lamp and buzzer. When handset is replaced, or release button operated, on multiple station, exchange line is connected to circuit. Distant end now holds exchange line. Clearing of the distant end releases relays LA and LB. Contact LB2 releases relay RO. Contact RO1 releases exchange line. Contact RO3 releases relay EL. Contact RO5 releases relay EA. Contact EL1 releases relay ELR, EL2 releases relay FR. Contacts EL4 and EL5 remove earths from XA and LPAC multiple leads. Circuit now normal.

(b) Exchange Line 2. CONNECT and TEST key is operated on Control Unit Q 537, followed by operation of TRANSFER 2 key. Earth via 10 X 2 lead operates relay EB. Contact EB7 operates relay EL, via LB lead, to resistance battery in Relay Unit Q 516. Contact EL1 operates relay ELR. Contact EL4 earths XB lead, EL5 earths LPBC lead, in multiple cable. Contacts ELR1 and ELR2 switch speech circuit to exchange line. Contacts ELR3 and ELR4 disconnect intercom, release relay F, and apply busy condition. Contact ELR5 operates relay RC to earth via CONNECT and TEST key. Contacts RC2 and RC1 light call lamp and operate buzzer in Control Unit Q 537. TRANSFER 2 and CONNECT and TEST keys are restored, relay RC releases. Contacts RC2 and RC1 disconnect call lamp and buzzer. When handset is replaced, or release button operated, on multiple station, exchange line is connected to circuit. Distant end now holds exchange line. Clearing of the distant end releases relays LA and LB. Contact LB2 releases relay RO. Contact RO1 releases exchange line. Contact RO3 releases relay EL, RO5 releases relay EB. Contact EL1 releases relay ELR, EL2 releases relay FR. Contacts EB1 and EB2 remove earths from XB and LPBC multiple leads. Circuit now normal.

#### 4.0 NIGHT SERVICE (Note 4)

Exchange calls can be extended from either or both exchange lines. Circuit operation below assumes that both exchange lines are strapped for night service. When the NIGHT SERVICE key on Control Unit Q 537 is operated relays FR and ELR will operate to earth on NL1 lead.

(a) Exchange Line 1 calls. Incoming ringing current detected in Relay Unit Q 516 causes earth, in cadence with ringing, to be applied to NA1 lead. Earth on NA lead, via NIGHT SERVICE key in Control Unit Q 537 operates relay EA. Contact EA3 holds relay EA, EA7 extends NA lead earth to operate relay RR. Contacts RR2 and RR3 connect ringing current to the line circuit. When the distant end answers relay LA and LB will operate. Contact LB2 operates relay RO. Contact RO1 loops the exchange line, RO3 operates relay EL. Contacts EL4 and EL5 earth the XA and LPAC multiple leads. The distant end now holds the exchange call and conversation can take place. When the distant end clears, relays LA and LB release. Contact LB2 releases relay RO.

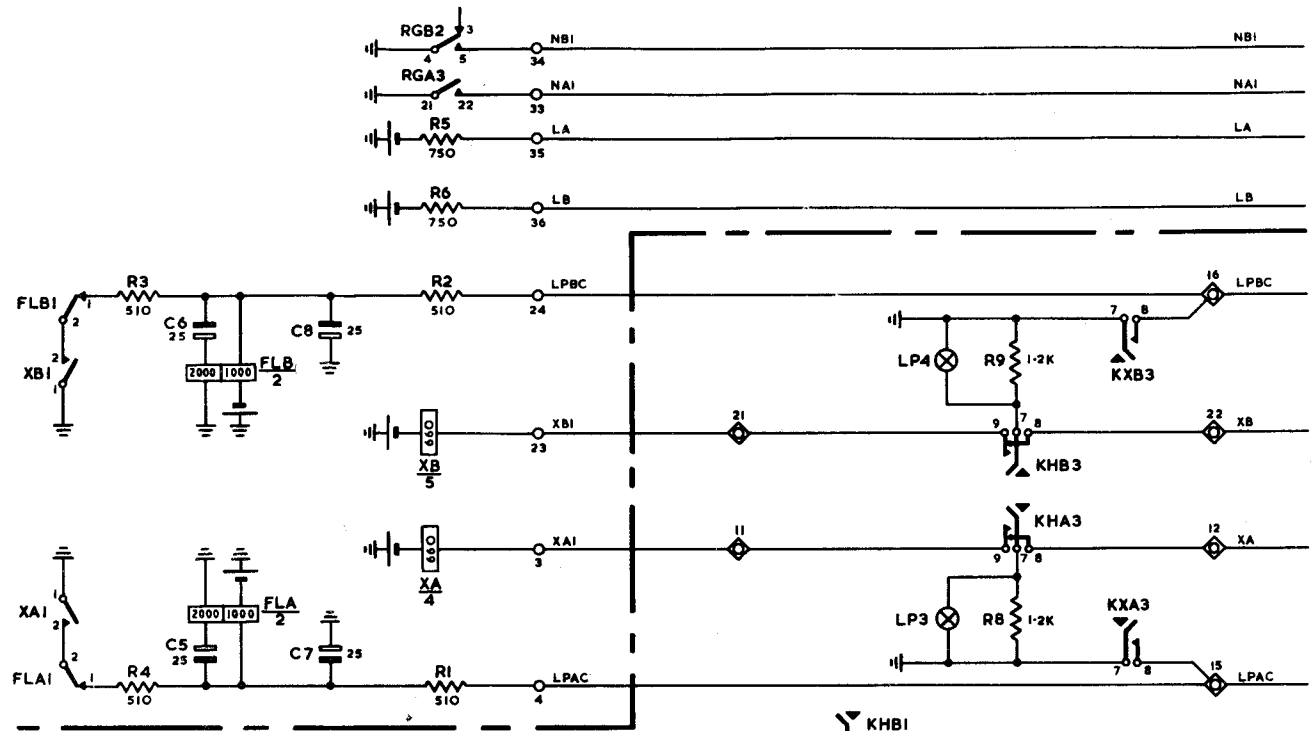
Contact RO1 releases the exchange line, RO5 releases relay EA. Contacts EA1 and EA2 remove the earths from the XA and LPAC multiple leads. Contact EA6 releases relay EL. Circuit now normal.

(b) Exchange Line 2 calls. Incoming ringing current detected in Relay Unit Q 516 causes earth, in cadence with ringing, to be applied to NB1 lead. Earth on NB lead, via NIGHT SERVICE key in Control Unit Q 537 operates relay RR and EB. Relay EB holds via contact EB6. Contacts RR2 and RR3 connect ringing current to the line circuit. When the distant end answers, relay LA and LB will operate. Contact LB2 operates relay RO. Contact RO1 loops the exchange line, RO3 operates relay EL. Contacts EL4 and EL5 earth the XB and LPBC multiple leads. The distant end now holds the exchange call and conversation can take place.

When the distant end clears, relays LA and LB release. Contact LB2 releases relay RO. Contact RO1 releases the exchange line, RO5 releases relay ER. Contacts EB1 and EB2 remove the earths from the XB and LPBC multiple leads. Contact EB7 releases relay EL. Circuit now normal.

(c) Simultaneous exchange line calls. If a call on one exchange line is being dealt with and a call on the other exchange line is signalled, contacts RO6 and RO7 prevent operation of relays RR and either EA or EB to cause interruption. The second call will be signalled when the first call is cleared.

RELAY UNIT Q516  
(DGM. Q516)



TELEPHONE, INTERCOM No. 4/1...  
(DGM. Q540)

