

DIAGRAM NOTES

concerning

DIAGRAMS GBW's 13230 & 13241

titled

20, 35 & 49 LINE P.A.B.X. - MARKER & ATTENDANTS CIRCUITS

1. GENERAL

Diagram GBW. 13241 shows the circuit arrangements of the attendants cabinet used with the 20, 35 and 49 line P.A.B.X's.

The Marker Circuit (GBW. 13230) shows the circuit arrangements enabling the attendant to extend an incoming main exchange line call to any extension by depressing the keys on the key strip corresponding to the required extensions number.

2. FACILITY SCHEDULE

Provision is made for :-

1. Call and supervisory signals to be received on the line lamps associated with the Exchange and attendant's circuits.
2. The operator to speak on either the extension or the line side of exchange lines.
3. Ringing extensions connected via exchange line or the attendant's circuit.
4. A visual engaged test on exchange lines.
5. Dialling outgoing calls.
6. Flashing and cancelling outgoing calls.
7. Keying extensions.
8. Releasing keyed extensions.
9. Paraling the line finder of keyed circuit if an unobtainable number is keyed.
10. Rapid consecutive testing of extensions.
11. Trunk offering to a busy extension.
12. Visual and audible alarm.
13. Audible alarm cut off.
14. The operator to speak on only one circuit at a time.
15. The operator's transmitter to be disconnected when all speak keys are normal.
16. Night Service operation.

3. DETAILS

The circuit operation is more easily understood by referring to the various keys and lamps mounted on the switchboard.

3.1 Line Lamps

Associated with each exchange line and 'O' level circuit is a line lamp which is used to provide both calling and supervisory signals. The connection of earth or interrupted earth to the appropriate LW lead, causes the line lamp to glow or flash as required.

3.2 Exchange Line Speak Keys

When the attendant wishes to enter a circuit, the associated speak key is operated and extends an earth over the appropriate SK lead. One or more relays in the circuit concerned operate in series with the SK lead earth to the battery connected on the OP lead. These relays in operating, extend the attendant's telephone circuit over the "IN" and "OUT" leads and extend the common leads Z, ML, DON, EK and TO to the circuit. The holding circuit for the relays is transferred to the S lead, and relay S operates.

Relay S operating

- S1 prepares part of circuit of relays RX and RY.
- S2 disconnects the battery from the OP lead.
- S3 disconnects the buzzer circuit.

The disconnections of battery from the OP lead prevents the operation of switching relays in any other circuits should a second speak key be thrown and ensures that circuits are not inter-connected via the common leads of the marker circuit.

3.3 Splitting Keys (KSS and KSE)

When the operator enters an exchange line circuit by throwing the "speak" keys, both the exchange sub and the extension may speak to the attendant and also to each other. The attendant may, however, split the connection and speak to one side only by throwing the splitting key to "speak exchange" or "speak extension". If the key is thrown to "speak exchange", the "IN" +ve and -ve leads are disconnected and the operator may speak over the "OUT" leads to the main exchange. If the key is thrown to "speak extension" the "OUT" +ve and -ve leads are disconnected and the attendant is left connected to the extension via the "IN" leads. Trunk offering can be accomplished by operating this key when busy flash is received on the line lamp.

3.4 Digit Keys

Mounted on the switchboard is a strip of ten non-locking digit keys by means of which the operator may key the extensions.

When an exchange line call is received, (see circuit description of Exchange Line Circuit GBW. 14690) the attendant operates the key associated with the calling exchange line lamp. Relays SA and SB in the exchange line circuit operate. The Z, ML, FK, IN, OUT, TO, and DON leads are extended to the exchange line circuit and the Marker Circuit S relay operates as described in 3.2. The attendant may now speak to the main exchange sub and ascertain the number of the extension he requires. Assume extension 75 is required.

3.4.1 Keying the extension

The attendant presses the key corresponding to the tens digit 7 and extends an earth from the key, via the CD lead and contact RX5 to operate relay CX. Earth from the key is also extended to operate relay BX via the B lead and contact RX3.

Relay CX operating

- CX1 completes a circuit to hold relay CX and operate relay RX to the earth at key KR1 when digit key 7 is released, removing the short circuiting earth.
- CX2 prepares part of operate circuit of relay CD to 1st digit lead 7.
- CX3 no function at this stage (used for digit 3).

Relay BX operating

- BX1 prepares to extend relay CD via contacts CX2 and AX2 to M bank of EF switch.
- BX2 prepares a locking circuit for relay BX via RX.

When the digit key is released relay RX operates.

Relay RX operating

- RX1 completes a circuit to operate relay ST from earth at key KR1 via contact S1.
- RX2 switches A lead from relays AX to AY.
- RX3 switches B lead from relays BX to BY.

RX 4 switches C lead from relays CX to CY.
 RX5 switches CD lead from relays CX to DY.

Relay ST operating

ST1 prepares to earth the D lead to the exchange line circuit to drive the line finder switch EF, in that circuit.
 ST2 prepares to earth the ML lead.
 ST3 removes earth from key KR1 on Z lead.
 ST4 prepares alternative hold circuit for relays RX and CX etc. against operation of relay K.
 ST5 completes the circuit of relay CD to the M bank of the EF switch.

The attendant then presses the second key corresponding to the units digit 5 and extends the earth at the digit key 5 to operate relay AY via lead A, RX2 and RY2, and relay BY via lead B, RX 3 and RY 3.

Relay AY operating

AY1 locks relay AY in series with relay RY to earth at key KR1. Relay RY operates directly the digit key is released.
 AY2 prepares part of circuit relay CD to M bank of EF switch.
 AY3 not effective on this digit.

Relay BY operating

BY1 prepares to lock relay BY.
 BY2 further prepares circuit of relay CD to M bank of EF switch.
 BY3)
 BY4) not effective on this digit.
 BY5)

Relay RY operating

RY1 closes circuit to drive EF switch in Exchange line circuit.
 RY2 open circuits A lead to AY.
 RY3 open circuits B lead to BY.
 RY4 open circuits C lead to CY.
 RY5 open circuits CD lead to DY.

The exchange line EF switch drives until the M wiper (earthed by a contact of SB) reaches the "70" contact to operate relay CD.

Relay CD operating

CD1 removes the earth from the D lead, cutting the drive circuit of the EF switch, and operating relay SD, via ST1, K5, RY1, CD1, SD2.

Relay SD operating

SD1 prepares to operate relay K.
 SD2 locks relay SD to earth at ST1.
 SD3 prepares to connect relay CD to 2nd digit M bank.
 SD4 releases relay CD by disconnecting from the 1st digit M bank and prepares an operate circuit to the 2nd digit M bank.

Relay K is made slow to operate in order to prevent possible operation at this stage should contact SD1 make before CD1 releases.

The release of relay CD re-establishes the drive circuit of EF from the earth at ST1. The switch drives until the wipers reach the contact corresponding to "75" when relay CD again operates from the earth on the M bank via lead "5", BY2, AY2, DY1, SD3 and SD4 and ST5. Relay CD cuts the drive circuit of the EF switch as previously explained. Relay CD remains operated to the earth on the M bank and operates relay K from the earth at ST1.

Relay K operating

- K1 earths the Z lead to exchange line circuit to hold relay M in the exchange line circuit.
- K2 breaks the circuit of relay ST, which releases.
- K3 breaks the alternative hold circuit for storage relays RY, AY, and BY.
- K4 completes an earth circuit to the ML lead to operate relay M in exchange line circuit during release period of relay ST.
- K5 completes locking circuit for relay K from ST1 earth, against the release of relay RY.

Relay ST releasing

- ST1 disconnects hold circuit for relays K and SD, which release.
- ST2 removes earth from the ML lead.
- ST3 connects alternative earth to the Z lead to hold M in exchange line circuit.
- ST4 breaks remaining hold circuit for storage relays RY, AY and BY, which release.
- ST5 breaks circuit of relay CD, which releases.

If the called extension is free, the operation of relay M in the exchange line circuit will connect ringing to the extension's line. The attendant may now restore the speak key and retire from the call.

3.4.2 Rapid consecutive testing of extensions

If the keyed extension is engaged, or if for any reason the attendant requires another extension, she simply presses the digit keys corresponding to the number of the second extension. The circuit functions are as described in 3.4.1, and when relay ST operates, the earth is disconnected from the Z lead allowing the exchange line circuit M relay to release.

When the exchange line finder reaches the second extension, relay M is re-operated as before by the earth from ST extended over the ML lead.

3.4.3 Release Key (KR)

By means of this key the attendant may release a keyed extension. When the key is operated, the earth is removed from the Z lead to release M in the exchange line circuit.

3.4.4 Flash and Cancel Key (KF)

The Flash and Cancel key is non-locking and enables the attendant to flash or cancel outgoing calls. When the key is operated KF1 disconnects the IA retard coil loop from the 'out' +ve and +ve leads and KF2 extends an earth via the FK lead to the exchange line circuit which short circuits relay CA, and releases the exchange line circuit.

If the exchange line circuit is connected to a manually operated main exchange, the attendant can flash the main exchange without releasing the call by intermittently operating the KF key.

3.4.5 Engaged Test Key (KT)

This key enables the attendant to determine which of the exchange line circuits are in use.

When the key is thrown an earth is extended via the EB lead to the exchange line circuit. The EB lead is common to all exchange line circuits and is connected on all circuits in use, via an operated contact of the BR relay, to the LW lead. Hence, the line lamps of all busy exchange line circuits will light.

3.4.6 Audible Alarm Key (KAA)

This key connects a buzzer so that audible alarm is given when a calling signal is connected to a line lamp. The calling exchange line causes a relay, EC, to connect an earth to the Audible Alarm key KAA1. When KAA is operated the buzzer circuit is completed.

3.4.7 Alarm cut-off key (KCO)

When this key is operated, the alarm buzzer is disconnected. The key extends an earth which operates relay A0 in the Misc. Circuits (GBW. 14720) to disconnect the buzzer. The buzzer remains disconnected until the fault is cleared. Operation as per 3.4.6 is not affected.

3.4.8 Night Service Key (KNS)

When this key is operated KNS1 disconnects the earth to the NA relay in the Misc. circuit (GBW. 14720.). The release of this relay switches certain circuits in the equipment for night service operation (see Misc. circuits GBW. 14720). At the same time KNS1 disconnects the earth supply to the attendants cabinet equipment, and KNS2 disconnects the battery.

3.5 Alarm Lamps

3.5.1 Auto Alarm (LP.14)

This alarm is provided to give a visual indication of a blown fuse, or ringing failure in the P.A.B.X. equipment. The alarm buzzer is operated under these conditions, until KCO is operated (3.4.7). No audible alarm given when on night service.

3.5.2 P.G. Pilot (LP. 13)

When a connecting circuit is seized, the P relay in the Misc. circuit is operated, which prepares to operate a thermal relay taking approx. 30 sec. to operate. When this relay operates, the PG relay operates. A contact of PG extends an earth to light the PG lamp LP. 13. The PG lamp remains lit until the connecting circuit is released.