

DIAGRAM NOTES (issue 1)

CONCERNING

GBW.13970

TITLED

U.A.X. N.Z. 13.

OUTGOING JUNCTION TO NON-DEPENDENT AUTO EXCHANGE

GENERAL.

The diagram shows the circuit of the equipment which is used on outgoing junctions from a U.A.X. No. N.Z. 13 as a tandem centre for routing these calls to the Parent Exchange operator (level 0)

Relays or relay contacts not mentioned at the time of operation or release are not effective at that particular stage.

Typical diagrams to be considered in conjunction with this equipment are:-

GBW.13890 Group Selector.
GBW.13920 Route Discriminating and timing circuit.
GBW.13980 Incoming junction from non-dependent exchanges.

FACILITY SCHEDULE.

Provision is made for:-

- 1 Reception of dialled impulses and transmission to auxiliary equipment and to the junction.
- 2 Transmission of N.U. Tone to the calling party should a barred or spare code be dialled.
- 3 Transmission of Busy tone to the calling party if the called subscriber's line is engaged or if the completion of the dialling code necessitates the use of common auxiliary equipment which is already in use.
- 4 Manual Hold.
- 5 Single or Multi fee metering to be applied to the M wire by means of the Auxiliary apparatus when the called subscriber replies.
- 6 Forced release of the Junction by means of a time pulse under Permanent Loop or C.S.H. conditions.
- 7 Guarding against intrusion when the equipment is being used for an I/C call.

CIRCUIT OUTLINE.

The circuit can be employed for calls to subscribers on the non-dependent exchange or on any exchange to which access is given via the non-dependent exchange, by ordinary subscribers, C.C.B. subscribers or from an inter dialling exchange.

The routing of such calls is similar, except that in the case of calls from C.C.B. subscribers and inter-dialling exchanges distinctive signals are forwarded over the M lead which by means of the auxiliary apparatus restrict the routing in the case of a C.C.B. subscriber and over-ride the normal route barring equipment in the case of the inter-dialling exchange call.

Dialled impulses are received and relayed via the outgoing junction loop to the selectors at the distant exchange and to the auxiliary equipment for the purpose of providing route discrimination.

Incoming calls from the distant exchange may be routed through the circuit to the incoming equipment without any circuit operation other than for the purpose of busying the relay set on the Selector levels when the circuit is not employed on an outgoing call.

CIRCUIT DETAIL.

Call from an ordinary subscriber or an inter-dialling exchange.

Relay A operates to the calling loop extended from the previous selector.

- A1 extends the D loop and at a later stage repeats the dialled impulses to the junction.
- A2 operates relay B.

Relay B operating.

- B1 prepares a circuit for relay CD.
- B2 prepares a circuit for reversal of battery potential when relay DD operates.
- B3 operates relay BA.

Relay BA operating.

- BA1 See Manual Hold.
- BA2 Extends a guard earth to the P wire to busy the equipment.
- BA3 Prepares a circuit for relay BB.
- BA4 Operates relay HA via the Auxiliary Junction equipment.

Relay HA operating.

- HA1 completes the circuit to start the Time pulse.
- HA2) extend the loop condition over the junction to the
- HA3) distant exchange.
- HA5 changes over the connection to the P wire I.D.F. from relay CC to earth.
- HA4 see "Design Details".

Impulsing.

Relay A functions under the control of the received impulses.

- A1 repeats the impulses to the junction loop.
- A2 repeats the impulses via the FU lead to the unselector magnet in the auxiliary apparatus and also operates relay CD.

Relay CD operates on the first dialled impulse and by virtue of its heel end slug remains operated throughout the impulse train.

- CD1 short circuits the transmission bridge and provides a non-inductive path for the impulse currents.
- CD2 operates relay CC.
- CD3 operates relay BB.
- CD4 see Manual Hold.

Relay BB operating.

- BB1 completes a hold circuit for relay BB.
- BB2 see Design Details.
- BB3 disconnects the time pulse start (permanent loop) circuit
- BB5 see Design Details.
- BB4 completes the Ringer Start circuit.

At this stage dialled impulses may be received.

Relay CC operates.

- CC1 See Manual Hold.
- CC2 Disconnects earth from the C lead to the Auxiliary apparatus until the completion of the impulse train.
- CC3 See Design Details.

At the end of impulse transmission relays CD & CC release.

- CD1 restoring removes the short circuit from relay D.

(a) Called Subscriber free. When the called subscriber answers:-

Relay D is operated by the reversed line potential.

- D1 covers contact A1.
- D2 operates relay DD.

Relay DD operates.

- DD1 } see "Design Details".
- DD2 }
- DD3 completes the circuit of relay DA to operate on the "S" pulse.
- DD4 } reverse the potentials to the
- DD5 } calling party.

Relay DA operates to the "S" pulse.

- DA1 completes a hold circuit for relay DA prior to the reception of the Z pulse.
- DA2 completes the circuit of relay DB to the Z pulse.
- DA3 extends the metering lead.
- DA4 see "Design Details".

Relay DB operates to the first "Z" pulse following the operation of relay DA.

- DB1 connects earth to TS lead to start metering cycle.
- DB2 disconnects the discriminating relays and extends the M wire through to the auxiliary equipment to receive the meter pulse or pulses.
- DB3 removes the short circuit from the locking coil of relay DB.
- DB4 see "Design Details"
- DB5 see Manual Hold.
- DB6 operates relay DC.

DB7 disconnects the holding coil of relay DA which enables it to release at the end of the "Z" pulse.

DB8 prevents the re-operation of relay DA by subsequent "S" pulse.

Relay DA releases at the end of the "Z" pulse.

DA3 disconnects the metering lead.

DA4 disconnects the Ringer Start circuit.

Relay DC operates and holds at DC1 and at DC2 prepares a circuit for relay TM.

(b) Called subscriber engaged.

Should the called subscriber be engaged busy tone is returned to the calling party.

(c) Manual Hold.

Should access be obtained to a Manual exchange via the non-dependent exchange, provision is made for the calling party to be held if necessary.

On the release of the calling party:-

Relay A releases.

A2 releases relay B, and operates relay CD.

Relay CD operates.

CD2 operates relay CC.

CD4 allows relay MB to operate (if called party has answered, i.e. DB5 operated) to the earth from the auxiliary equipment.

Relay MB operates if the call is to a manual operator.

MB1 completes holding circuit for relay MB

MB2 operated, allows MH 1 to hold relay CD.

MB3 connects the recall relay CH to the negative line.

MB4 supplies an alternative holding earth to the private lead.

MB6 changes the positive line connections to Manual Hold battery via resistor R2.

Relay B releases.

B3 releases relay BA.

Relay BA releases.

BA1 disconnects the D loop and connects relay MH to the positive line.

Relay MH operates to battery from the Manual exchange over the positive lead.

MH1 provides a hold circuit for relay CD on the release of BB2.

Relay CC operates-

CC1 provides a hold circuit for relay HA.

The calling subscribers connection is thus held until the operator withdraws the answering plug, but should the subscriber recall before the plug is withdrawn:-

Relay OH operates to the subscriber's loop.

OH1 re-operates relay DB.

OH2 re-operates relay A.

Relays A, B, BA, BB, D are re-operated as described when the call originated and relays CD, CC, MB and MH are released.

Operator clears:-

When the operator clears down relays MH, CD, CC, & MB release and the circuit is restored to normal.

(d) Forced release of Connection.

Should the calling subscriber seize the circuit and take no further action or delay dialling unduly, the junction is released after a period of from 3 to 6 minutes as follows:-

An earth is forwarded from MB5, BB3 via HA1 to the time pulse start circuit and should relay BB not be operated due to the commencement of an impulse train,

Relay TM will operate.

TM1 holds relay TM while earth is being supplied via MB5.

TM2 prepares a circuit for the operation of relay PR on the receipt of the time pulse release signal.

Relay PR operates to the time pulse release pulse

PR1 disconnects the selector private and enables the preceding train of switches and the holding circuit for the relay set to release.

Time pulse release will occur in a similar manner should the calling subscriber fail to replace his receiver at the completion of conversation (C.S.H.)

In this case the initial energisation of relay TM takes place over contacts DD3 DC2 to the time pulse start circuit.

(e) Call from a C.C.B. Subscriber.

The circuit functions are similar to those described for an ordinary subscriber's call excepting that

Relay CB is operated to the discriminating signal forwarded over the M lead. (low resistance negative battery).

CB1 holds relay CB.

CB2) extend discriminating conditions to the
CB3) auxiliary apparatus.

2. Functions of the Auxiliary Equipment.

During the transmission of impulses a corresponding number of impulses are transmitted to a uniselector in the auxiliary equipment over the PU wire. The release of contact CC2 at the end of each train of impulses extends an earth on the C lead to operate relays in the auxiliary equipment.

Depending upon the code dialled a meter pulse or pulses proper to the call will be returned on the M wire.

The contact CB2 controls the C.C.B. barred facility in the case of single fee calls.

If the call is from an ordinary subscriber, contact CB3 will be normal, and the call will be allowed to proceed, but if CB3 is operated auxiliary equipment bars the call.

Relay contacts not previously explained:-

- BA2 busy the P wire to other group selector levels.
- BB2 provides for the operation of relay CD on the first release of A2 during impulsing.
- BB5 provides a locking circuit for relay DB in the operated position and short circuits the holding coil of relay DA in its released position to disconnect the metering circuit should the calling subscriber release during the time that the Z pulse is being received.
- CC3 serves to disconnect the testing battery from the selector level private on an incoming call and during Manual Hold on an outgoing call.
- DA4 completes the Ringer Start Circuit for the duration of the "Z" pulse when the normal earth via DB4 has been removed.
- DB4 prevents the Ringer Start circuit from operation subsequent to metering (see also DA4).
- DB5 in conjunction with MB1 prevents operation of relay MB until "called party answer" signals are received. This prevents a relay interaction and junction lock-up should a remote U.A.X., C.C.B. or ordinary subscriber dial a "barred" manual code causing relay MB to operate and return a "manual hold" condition to the U.A.X. incoming equipment.
- DD1 is inserted in the locking circuit of relay DA to prevent false operations causing the relay to hold.
- DD2) prevents the release of relay D when the called subscriber answering. An
DD1) interaction between relays D, DD and A due to the operation of DD causing A to temporarily release and so disconnect the circuit for D at A1 is thereby prevented.
- HA4 prevents an interaction between relays HA and CC which would obtain on an incoming call from the non-dependent exchange.

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