

DIAGRAM NOTES (ISSUE 1.)

CONCERNING

DIAGRAM GBW13950

TITLED

U.A.X. N.Z.13

OUTGOING JUNCTION TO DEPENDENT U.A.X.

(TERMINAL TRAFFIC ONLY)

GENERAL.

1. This diagram shows the connections and circuit arrangements of the equipment used at a U.A.X. N.Z.13 for terminating an outgoing junction to a dependent U.A.X. to which only terminal traffic is allowed.
2. Typical diagrams of equipment used in conjunction with this equipment are:-

GBW13890:- U.A.X. NZ13 Group Selector.

GBW13990:- U.A.X. NZ13 Incoming Junction from Dependent U.A.X.

FACILITY SCHEDULE.

Provision is made for:-

1. Unidirectional junction working, or Bothway junction working in conjunction with incoming equipment.
2. The reception and retransmission of dialling pulses from the calling circuit to the distant auto equipment and to the route restricting uniselector.
3. Discriminating on the initial digit dialled on outgoing calls to restrict access to subscribers only.
4. Multi fee metering - together with repeat metering when required.
5. Releasing the junction and transmitting N.U. tone to the calling circuit on barred calls.
6. Over-riding the barring feature on digits "1 and "0" on calls from the parent exchange, to cater for routine testing.
7. Trunk offering on calls from the parent exchange.
8. Guarding the outgoing selector level multiple against seizure:-
 - (i) For the duration of an incoming call.
 - (ii) During the release period of the U.A.X. equipment following the release from an outgoing call.
 - (iii) During the period that the route restricting uniselector is off normal.
9. Repeating supervisory signals to the calling party.
10. The forced release of the circuit in 3-6 mins. in the following circumstances.
 - (i) Permanent loop, (seizure without pulsing).
 - (ii) C.S.H.
11. Release of the preceding selector when the circuit is seized from a faulty (earth connected) parent junction.
12. Busying the circuit from the associated M.D.F. busying strip.

13. Association with a routine tester.

CIRCUIT DESCRIPTION.

1. Location.

It should be imagined that this diagram is divided into four equal sections which will be referred to as follows:-

Top Left (TL) Top Centre (TC) Top Right (TR)
Bottom Left (BL) Bottom Centre (BC) Bottom Right (BR)

Each relay coil and relay contact is immediately followed by an indication of its location in an abbreviated form as shown in the brackets above.

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

Circuit Outline.

The circuit is arranged for P wire battery testing and forward loop seizure.

On calls from local subscribers no discrimination is made between ordinary and coin box users, and the M wire OCB discriminating signal is ineffective. On calls from the parent exchange however, a positive battery discriminating signal is connected to the M wire to operate relay TO to cater for trunk offering and digit unbarring.

When the calling loop is extended, the pulsing circuit is prepared, and the distant equipment is seized. As loop-disconnect impulses are received they are simultaneously transmitted to the junction (to step the distant selectors), and to the route restricting uniselector (for barring purposes).

All digits other than those corresponding to the initial numbers of the dependent U.A.X. numbering scheme are barred to local subscribers. Digits 1 and 0 are unbarred on calls from the parent exchange to cater for routine testing the "0" and "111" services.

When the called subscriber answers, the answered supervisory signal is repeated to the calling circuit by a reversal of the line potentials. Fourth wire battery metering is effected in the case of calls from local subscribers - normally "unit fee" is required though provision is made for a maximum of 4 fee registration, and also for repeat metering.

Should the called party be engaged, busy tone is returned to the calling circuit and on calls from the parent exchange provision is made for "trunk train" trunk offering.

Incoming calls are routed via this circuit to the incoming junction equipment and the outgoing selector multiple is busied for the duration of the call.

On the barred calls the junction is released (for use on incoming calls) during the first inter-train pause, and NU tone is returned to the calling party.

A forced release feature is provided, and forced release of the circuit is effective in 3 to 6 minutes should the circuit be held under P.G. or C.S.H. conditions etc.

1. CIRCUIT DETAIL.

The following operational details are described:-

- 1.1 Outgoing call from an ordinary or a C.C.B. local subscriber, or an inter dialling exchange.
 - 1.2 Outgoing call from an ordinary local subscriber or an inter dialling exchange where repeat metering is required.
 - 1.3 Called subscriber engaged.
 - 1.4 Outgoing call from the parent exchange.
 - 1.5 Trunk offering and the completion of a trunk call to a busy U.A.X. subscriber.
 - 1.6 Route restriction.
 - 1.7 Release of the circuit from an unanswered call.
 - 1.8 Release of the circuit from an answered call.
 - 1.9 Incoming call.
 - 1.10 Release of the circuit from an incoming call.
 - 1.11 Forced release (delayed and immediate) of the circuit.
- 1.1 Outgoing call from an ordinary or a CCB local subscriber or an interdialling exchange.

The circuit is seized from the selector level.

A loop condition is extended over the selector level negative and positive wires, and relay A operates.

Relay A(TL) operating.

- A1(TR) extends the transmission bridge positive wire to contact B2.
- A2(BC) operates relay B.

Relay B(BC) operating.

- B1(TR) operates relay BA.
- B2(TR) completes the D loop forward to contacts HA2 and HA3.
- B3(BR) prepares a circuit for operating relay CD, and for pulsing the route restricting uniselector magnet MM.
- B4(TL) prepares a circuit for reversal of battery potentials when called subscriber answers.

Relay BA(TR) operating.

- BA1(BR) prepares an operate circuit for relays B, DD, TS and FR, see also "Design Details".
- BA2(TL) disconnects the "testing in" battery and connects earth to I/C P wire to hold preceding equipment.
- BA3(BL) prepares an operate circuit for uniselector magnet MM.
- BA4(BL) operates relay HA.

Relay HA(BL) operating.

- HA1(BL) prepares an alternative hold circuit for relay HA and the discriminating relays TO, MA or EF (Required during the release of the circuit). See also "Design Details".
- HA2(TR)) extend the signalling loop via relay D to the junction.
- HA3(TR))

HA4(BR) completes the time pulse start circuit.
 HA5(TR) disconnects relay CC from, and connects a guarding earth to the P wire associated with the M.D.F. busyng strip.

The required number is dialled.

Relay A responds to the loop-disconnect pulses transmitted from the U.A.X. subscribers dial.

Relay A(TL) pulsing.

A1(TR) repeats loop-disconnect pulses to the distant equipment.
 A2(BC) operates relay CD during the first break pulse and repeats earth-disconnect pulses to the route restricting uniselector magnet.

Magnet MM(BL) pulsing, steps the uniselector wipers according to the digit dialled.

Relay CD(BC) operating.

CD1(TR) operates relay CC.
 CD2(BR) operates relay BB.
 CD3(TR) short circuits relay D to provide a non-inductive pulsing loop.

Relay CC(TR) operating

CC1(BL) disconnects earth from the MM2 arc of the route restricting uniselector to prevent the premature operation of the discriminating relays MA or EF.
 CC2(BL) disconnects the operates circuit of relay TO. See also "Design Details".

Relay BB(BR) operating.

BB1(BR) completes the ringer start circuit.
 BB2(BR) See "Design Details".
 BB3(BR) provides a hold circuit for relay BB.
 BB4(BR) covers contact B3.
 BB5(TR) prepares a hold circuit for relay DB. See also "Design Details".

During the first intertrain pause, relay CD releases.

Relay CD(BC) releasing.

CD1(TR) releases relay CC.
 CD2(BR) ineffective due to BB3 being operated.
 CD3(TR) disconnects the short circuit across relay D.

Relay CC(TR) releasing,

CC1(BL) extends earth to operate relay MA or EF. See para. 1.5

Assuming the call is not barred, contact CC1 operates relay MA.

Relay MA(BL) operating.

MA1(BL) completes the circuit of the uniselector magnet and the uniselector self-drives to its home contact.
 MA2'x'(BL) holds relay MA.
 MA3(BC) disconnects the pulsing circuit of the uniselector magnet.

(For the operation of relay EF on a barred call and the subsequent circuit operations, see para. 1.5

During each subsequent intertrain pause, and on completion of pulsing relays CD & CC release as described above, except that contact CC1 is then ineffective.

If the called subscriber's line is free, ring tone is received and returned to the caller.

Called subscriber answers.

When the called subscriber answers, relay D operates to the reversal of potential on the junction.

Relay D (TC) operating.

D1(BR) operates relay DD.
 D2(TR) covers contact A1 which may flick due to the reversal of potential
 (See Design Details)

Relay DD(BR) operating.

DD1(BR) prepares a hold circuit for relay DA.
 DD3(TR) Completes "S" meter pulse circuit via relay DA.
 DD4(TL) } reverse the potentials of the selector level negative and
 DD5(TL) } positive wires for supervisory or metering conditions.

Relay DA operates to the next "S" meter pulse.

Relay DA(TR) operating.

DA1(TR) holds relay DA independently of the "S" meter pulse wire.
 DA2(TL) extends relays DA and DB to the "Z" meter pulse wire.
 DA3(B L) prepares to connect the requisite number of meter pulses to
 the M wire.
 DA4(BR) maintains earth on the ringer start wire independently of
 contact DB3.

Relay DB(TC) operating to the "Z" meter pulse.

DB2(TC) disconnects the short-circuit from the hold winding of relay DB.
 DB3(BR) leaves the control of the ringer start conditions dependent on
 contact DA4.
 DB4(BR) prevents the re-operation of relay DA by subsequent "S" meter
 pulses.
 DB5(BR) disconnects the auxiliary hold circuit of relay DA to allow the
 relay to release at the end of the "Z" meter pulse.
 DB6(BL) completes the circuit for extending meter pulses over the M
 wire.

During the "Z" meter pulse, meter pulses are extended over the M wire to operate the calling subscriber's meter the appropriate number of times.

On the completion of the "Z" meter pulse relay DA releases.

Relay DA(TR) releasing.

DA3(BL) disconnects the metering lead.
 DA4(BR) disconnects the ringer start circuit.

Speech conditions are established.

1.2 Repeat Metering.

Outgoing call from an ordinary or a CCB local subscriber or an interdialling exchange.

The circuit is seized from the selector level.

A loop condition is extended over the selector level negative and positive wires, and relay A operates:

Relay A(TL) operating.

A1(TR) extends the transmission bridge positive wire to contact B2.
 A2(BC) operates relay B.

Relay B(BC) operating.

B1(TR) operates relay BA.
 B2(TR) completes the D loop forward to contacts HA2 and HA3.
 B3(BR) prepares a circuit for operating relay CD, and for pulsing the route restricting uniselector magnet ME.
 B4(TL) prepares a circuit for reversal of battery potentials when called subscriber answers.

Relay BA(TR) operating.

BA1(BR) prepares an operate circuit for relays BB, DD, TS and PR, see also "Design Details".
 BA2(TL) disconnects the "Testing in" battery and connects earth to I/C P wire to hold preceding equipment.
 BA4(BL) operates relay HA.

Relay HA(BL) operating.

HA1(BL) prepares an alternative hold circuit for relay HA and the discriminating relays TO, MA or EF (Required during the release of the circuit). See also "Design Details".
 HA2(TR) } extend the signalling loop via relay D
 HA3(TR) } to the junction.
 HA4(BR) completes the time pulse start circuit.
 HA5(TR) disconnects relay CC from, and connects a guarding earth to the P wire associated with the H.D.F. busying strip.

The required number is dialled.

Relay A responds to the loop-disconnect pulses transmitted from the U.A.X. subscribers dial.

Relay A(TL) pulsing.

A1(TR) repeats loop-disconnect pulses to the distant equipment.
 A2(BC) operates relay CD during the first break pulse and repeats earth-disconnect pulses to the route restricting uniselector magnet.

Magnet ME(BL) pulsing, steps the uniselector wipers according to the digit dialled.

Relay CD(BC) operating.

CD1(TR) operates relay CC.
 CD2(BR) operates relay BB.
 CD3(TR) short circuits relay D to provide a non-inductive pulsing loop.

Relay CC(TR) operating.

CC1(BL) disconnects earth from the ME2 arc of the route restricting uniselector to prevent the premature operation of the discriminating relays MA or EF.
 CC2(BL) disconnects the operate circuit of relay TO. See also "Design Details".

Relay BB(BR) operating.

BB1(BR) completes the ringer start circuit.
 BB2(BR) See "Design Details".
 BB3(BR) provides a hold circuit for relay BB.
 BB4(BR) covers contact B3.
 BB5(TR) prepares a hold circuit for relay DB. See also "Design Details".

During the first intertrain pause, relay CD releases.

Relay CD(BC) releasing.

CD1(TR) releases relay CC.
 CD2(BR) ineffective due to BB3 being operated.
 CD3(TR) disconnects the short circuit across relay D.

Relay CC(TR) releasing.

CC1(BL) extends earth to operate relay MA or EF. See para. 1.5.

Assuming the call is not barred, contact CC1 operates relay MA.

Relay MA(BL) operating.

MA1(BL) completes the circuit of the uniselector magnet and the uniselector self-drives to its homing contact.
 MA2"x"(BL) holds relay MA.
 MA3(BC) disconnects the pulsing circuit of the uniselector magnet.

(For the operation of relay EF on a barred call and the subsequent operations, see para. 1.5)

During each subsequent intertrain pause, and on completion of pulsing, relays CD & CC release as described above, except that contact CC1 is then ineffective.

If the called subscriber's line is free, ring tone is received and returned to the caller.

Called subscriber answers.

When the called subscriber answers, relay D operates to the reversal of potential on the junction.

Relay D(TC) operating.

D1(BR) operates relay DD.
 D2(TR) see "Design Details"

Relay DD(BR) operating.

DD1(BR) prepares a hold circuit for relay DA.
 DD3(TR) completes "S" meter pulse circuit via relay DA.
 DD4(TL) } reverse the potentials of the selector level negative and
 DD5(TL) } positive wires for supervisory or metering conditions.

Relay DA operates to the next meter pulse.

Relay DA(TR) operating.

DA1(TR) holds relay DA independently of the "S" meter pulse.
 DA2(TL) extends relay DA & DB to the "Z" meter pulse wire.
 DA3(BL) prepares to connect the requisite number of meter pulses to the M wire.
 DA4(TR) maintains earth on the ringer start independently of contact DB3.

Relay DB(TC) operating to the "Z" meter pulse.

DB2(TC) disconnects the short circuit from the hold winding of relay DB.
 DB3(BR) operates relay TS.
 DB4(BR) prevents re-operation of relay DA by subsequent "S" meter pulses.
 DB5(TR) disconnects the auxiliary hold circuit of relay DA to allow the relay to release at the end of the "Z" meter pulse.
 DB6(BL) completes the circuit for extending meter pulses over the M wire.

Relay TS(BR) operating.

TS1(BR) completes a hold circuit for relay TS.

TS2(BC) prepares a circuit for relay TM.
 TS3(BL) connects a start earth to the 6 sec. pulse equipment.
 TS4(TL) connects earth via TP4 to the MM5 wiper.
 TS5(BC) connects magnet MM via TP2 to the 6 sec. earth pulse.

The 6 sec. earth pulse operates magnet MM which steps its wipers onto the next contact. The wipers are then stepped round the bank at intervals of 6 secs. On the 23rd contact (i.e. 2 mins. 12 secs) relay WS operates via earth, TP4, TS4, wiper MM5, contacts 23-25, relay to batt.

Relay WS(TL) operating.

WS1(TL) completes a hold circuit for relay WS independent of wiper MM5.
 WS2(TL) prepares a circuit for relay TP via wiper MM5, contact 6.
 WS3(TC) connects Pip-pip-pip tone to wiper MM4.

On the 4th contact (2 mins. 48 secs) pip-pip-pip tone is extended via wiper MM4 to the centre winding of transformer TR1. This tone is induced into the line side of the transformer and transmitted to the subscriber, as a warning that after a further twelve (12) seconds, repeat metering will take place.

- (a) If the calling subscriber does not replace his receiver; on the 6th contact (3 mins) relay TP operates via earth TP4, TS4, MM5 wiper, contact 6, WS2, relay TP to batt.

Relay TP(TL) operating.

TP1(TC) connects an earth to the "e" tag of relay DB causing it to release.
 TP2(BC) disconnects magnet MM from the 6 sec. earth pulse and connects it via MM1 wiper and bank.
 TP3"x"(BL) completes a hold circuit for relay TP to earth via MM1 wiper/bank.
 TP4(TL) disconnects the circuit for relay WS which releases.
 MM unselector homes, relay TP releases and timing sequence for repeat metering recommences.

Relay WS(TL) releasing.

WS1(TL) disconnects relay WS hold circuit.
 WS2(TL) disconnects relay TP operate circuit.

Relay DB(TC) releasing.

DB2(TC) short circuits hold coil of relay DB.
 DB4(BR) completes the circuit for relay DA to the "S" meter pulse.
 DB6(BL) disconnects the M wire from the meter pulse lead.

Relay DA(TL) operating to the "S" meter pulse.

DA1(TR) holds relay DA independently of the S meter pulse wire.
 DA2(TL) extends relays DA & DB to the "Z" meter pulse wire.
 DA3(BL) prepares to re-connect the requisite number of meter pulses to the M wire.

Relay DB(TC) operating to the "Z" meter pulse.

DB2(TC) disconnects the short circuit from the hold winding of relay DB.
 DB6(BL) completes the circuit for extending meter pulses over the M wire.

During the "Z" meter pulse, meter pulses are extended over the M wire to operate the calling subscriber's meter the appropriate number of times.

On the completion of the "Z" meter pulse relay DA releases.

Relay DA(TR) releasing.

DA3(BL) disconnects the metering lead.
 DA4(BR) disconnects the ring start lead.

(b) If the calling subscriber replaces the receiver after receiving Pip-pip-pip tone, relay A releases due to the loop being disconnected and the circuit is restored to normal.

1.3 Called subscriber engaged.

Should the called subscriber be engaged, busy tone is received over the junction from the dependent U.A.X.

The following relays are held operated at this stage (tone period assumed):-

A, B, BA, BB, HA and HA.

1.4 Outgoing call from the parent exchange.

On seizure of the circuit on this type of call, a positive battery discriminating condition is extended over the M wire to operate relay DS.

Relay DS(BL) operating.

DS1(BL) disconnects relay EF., thus unbarring calls otherwise barred to ordinary subscribers.

DS2(BL) completes an operate circuit for relay TO.

DS3"x"(BL) completes a hold circuit for relay DS.

DS4(BL) disconnects the meter pulse lead from the M lead.

DS5(BR) disconnects the circuit for relay TS (used only when Repeat Metering is required - see note 3 on diagram)

Relay TO(BL) operating.

TO1(BL) holds relay TO to contact BA4.

TO2(TL) } disconnect the short circuits from the windings of relay OC.

TO3(TL) } relay OC does not operate because of its differential connection.

TO4"y"(TL) disconnects the M wire operate circuit of relay TO to prevent the transmission of meter pulses when the called subscriber answers and to prevent positive battery drain. See also "Design Details".

The call then proceeds as in the case of a call from a subscriber.

1.5 Trunk offering and the completion of a trunk call to a busy U.A.X. subscriber.

Busy conditions are returned from the dependent U.A.X.

The following relays are held operated at this stage. (Busy conditions assumed):-

B, BA, CD, CC, HA, DD, and BB.

To offer a trunk call, the parent exchange operator momentarily operates the ring key causing an earth condition to be connected to the calling loop which operates and releases the differentially connected relay OC.

Relay OC(TL) operating.

OC2(TR) earths the calling loop to the dependent U.A.X.

The earth condition connected to the dependent U.A.X. junction operates the differential relay OC in the U.A.X. final selector which causes the latter to switch to the busy line, disconnect busy tone, and reverse the potentials of the junction circuit. On restoration of the ring key by the parent exchange operator relay OC releases.

Relay OC(TL) releasing.

OC2(TR) disconnects the earth condition from the junction loop. Relay D operates.

Relay D(TC) operating.

D1(BR) operates relay DD.

Relay DD operates, relays DA and DB operate and relay DA subsequently releases as previously described under "Called subscriber answers" in para. 1.1.

The trunk call may now be offered to the busy U.A.X. subscriber and if it is accepted, both parties are asked to clear. When the required line is free, normal potentials are restored to the junction circuit at the U.A.X. and relay D releases.

Relay D(TC) releasing.

D1(BR) releases relay DD.

Relay DD(BR) releasing.

DD4(TL) } restore normal potentials to the selector level negative and
DD5(TL) } positive wires to cater for a clearing supervisory signal at the originating manual switchboard.

The parent exchange operator momentarily re-operates the ring key causing an earth condition to be connected to the calling loop, which operates and releases relay OC as previously described.

Relay OC(TL) re-operating.

OC2(TR) earths the D loop to the dependent U.A.X. Relay OC in the distant U.A.X. final selector operates.

The operation of relay OC in the dependent U.A.X. final selector causes ringing current to be extended to the required subscriber's line.

Relay OC(TL) releasing.

OC2(TR) disconnects the earth condition from the D loop. Relay OC in the U.A.X. final selector releases.

Ring tone is received.

The called subscriber answers.

The potential of the junction is reversed at the dependent U.A.X. and relay D operates.

Relay D(TC) operating.

D1(BR) operates relay DD.

Relay DD(BR) operating.

DD4(TL) } reverse the potentials of the selector level negative and
DD5(TL) } positive wires to cater for supervisory conditions.

Speech conditions are established.

1.6 Route restriction.

Route restricting facilities are provided by connecting contacts on the MM2 arc corresponding to the initial digits of the dependent U.A.X. numbering scheme to the "permissible code" discriminating relay MA, and by connecting the remaining contacts (except those corresponding to digits "1" and "0") to the "barred code" discriminating relay EF.

During the first pulse train, earth-disconnect pulses are repeated to the unselector magnet MM, and the wipers are stopped around the arc accordingly. On the release of contact CC1 during the first inter-train pause earth is

extended to the MM2 wiper to operate relay EF or EA depending on the strapping of the bank contact to which the wipers have been stepped. Assuming a permissible code strapping, relay MA operates.

Relay MA(BL) operating.

MA1(BL) completes the homing circuit for the uniselector.
 MA2"x"(BL) holds relay MA to contact BA4.
 MA3(BC) disconnects the stepping circuit of the uniselector magnet.

The call then proceeds normally, as shown in para. 1.1

Should a barred code be dialled, relay EF operates.

Relay EF(BL) operating.

EF1(BC) disconnects the stepping circuit of the uniselector magnet.
 EF2(TC) extends N.U. tone via the tone winding of transformer TR1 to the calling party.
 EF3(BL) releases relay HA and holds relay EF to contact BA4.

Relay HA(BL) releasing.

HA2(TR) } disconnect the outgoing circuit from and connects the incoming
 HA3(TR) } equipment to the junction.
 HA4(BR) } disconnects the time pulse start circuit.
 HA5(TR) } disconnects the guarding earth from, and reconnects relay CC to
 the P wire associated with the M.D.F. busying strip.

Following the release of release CD and CC in the inter-train pause, nothing further happens.

The circuit remains held in this condition until the calling subscriber clears. N.U. tone is being returned to the caller, but incoming calls from the junction can be received.

The relays held operated at this stage are:-

A, B, BA and EF.

1.7 Release of the circuit from an unanswered call.

Before the release of the circuit, the following relays are held operated:-

A, B, BA, BB, MA and HA.

The calling subscriber clears.

Relay A releases to the disconnection on the selector level negative and positive wires.

Relay A(TL) releasing.

A1(TR) disconnects the positive junction wire, thus releasing the distant equipment.
 A2(BC) operates relay CD, releases relay B.

Relay CD(BC) operating.

CD1(TR) operates relay CC.

Relay CC(TR) operating.

CC2(BL) holds relay HA independently of contact BA4.

Relay B(BC) releasing.

B1(TR) releases relay BA.
 B2(BL) disconnects D loop and connects relay JG to +ve line.

B3(BC) performs no useful function at this stage due to relay BB being operated.

Relay BA(TR) releasing.

BA1(BR) releases relay BB.
 BA2(BL) disconnects the guard earth to the P wire from selector levels.
 BA4(BL) Completes the homing circuit for the route restricting equipment.

The Route Restricting uniselector homes.

Relay BB(TR) releasing.

BB1(BR) disconnects the ringer start circuit.

Relay CD(BC) releasing.

CD2 releases relay CC.

Relay CC(TR) releasing.

CC2(BL) releases relay HA and MA.
 CC3(TL) reconnects the "testing in" battery to the selector level wire.

Relay HA(BL) releasing.

HA2(TR) } disconnect the outgoing circuit from, and re-connects the
 HA3(TR) } incoming circuit to the junction.
 HA5(TR) disconnects earth from the P wire associated with the M.D.F. busying strip.

Relay MA(BL) releases.

The circuit has now completely released and is free for further use.

1.8 Release of the circuit from an answered call.

Assume the calling subscriber clears first.

Before the release of the circuit the following relays are held operated:-

A, B, BA, HA, MA, DB, BB, D & DD.

Relay A releases to the disconnection on the selector level negative and positive wires.

Relay A(TL) releasing.

A2(TC) releases relay B and operates relay CD.

Relay B(BC) releasing.

B1(TR) releases relay BA.
 B2(TR) disconnects the positive junction wire releasing relay D and the distant equipment. Reconnects relay JG to the +ve line.

Relay D(TC) releasing.

D1(BR) releases relay DD.

Relay CD(BR) operating.

CD1(TR) operates relay CC.

Relay CC(TR) operating.

CC2(BL) holds relays HA and MA independently of contact BA4.

CC3(TL) disconnects the "testing in" battery

Relay BA(TR) releasing.

BA1(BR) disconnects the circuit of relay BB.
 BA2(TR) disconnects the guard earth to the P wire from selector levels.

Relay BB(BR) releasing.

BB5(TR) releases relay DB.

If the release lag of the distant B relay (or equivalent) is greater than the release lags of relay B, BA & BB in this circuit, and the called subscriber has not cleared relay JG will operate in series with the distant A relay which will not operate. (see relay JG under "Design Details") Assuming relay JG operates.

Relay JG(TR) operating.

JG1(BR) holds relays CD which in turn holds CC.

The "testing-in" battery remains disconnected at CC3 and so the circuit cannot be re-seized.

When the battery condition is disconnected from the positive junction wire relay JG releases.

Relay JG(TR) releasing.

JG1(BR) releases relay CD which in turn releases CC.

Relay CD(BR) releasing.

CD1(TR) releases relay CC.

Relay CC(TR) releasing.

CC2(BL) releases relays HA and MA.
 CC3(TL) reconnects the "testing in" battery to the selector level P wire.

Relay HA(BL) releasing.

HA2(TR) } reconnect the incoming relay
 HA3(TR) } set to the junction.

HA5(TR) disconnects earth from the P wire associated with the M.D.F. busy strip.

Relay MA(BL) releases.

All relays have now released and the circuit is free for further use.

1.9 Incoming call.

On seizure of the circuit at the distant exchange, a loop condition is extended over the junction to seize the incoming equipment which is associated with this circuit. An earth is returned over the incoming P wire to operate relay CC.

Relay CC(TR) operating.

CC3(TL) disconnects the "testing-in" battery from the selector level P wire.

1.10 Release of the circuit from an incoming call.

When the calling party clears, the loop condition is disconnected from the junction, to release the U.A.K. selectors. Earth is disconnected from the incoming P wire, and relay CC releases.

Relay CC(TR) releasing.

CC3(TL) reconnects the "testing in" battery to the selector level P wire marking the circuit free for outgoing calls.

The circuit has now completely released and is awaiting further use.

1.11 Forced release (delayed and immediate) of the circuit.

Delayed forced release of the circuit is effected in the following circumstances.

(i) when the circuit and junction are seized and dialled pulses are not received.

In this condition contact HA4 is operated and contact BB2 is normal.

(ii) when the circuit and junction are held after the called subscriber has answered and cleared.

In this condition contact DB1 is operated, and contact DD3 is normal.

In each case, relay TM operates in series with relay TA in the common equipment time pulse circuit.

Relay TM(TL) operating.

TM1(BR) holds relay TM.
TM2(BR) prepares a circuit for operating relay PR to the time pulse release common wire.

After a period of 3 to 6 minutes earth is connected to the time pulse release common wire and relay PR operates.

Relay PR(BR) operating.

PR1(TL) disconnects the guarding and holding earth from the selector level P wire to release the preceding equipment.

The circuit is then free for further use.

Immediate forced release of the circuit is effected in the following circumstances:-

To prevent the possibility of false trunk offering should this circuit be seized by a faulty parent exchange junction such that relay OC operates on seizure of the circuit.

Relay OC(TL) operating.

OC1(BR) operates relay PR.

Relay PR(TR) operating.

PR1(TL) disconnects the holding earth from the selector level P wire causing the preceding equipment to release.

2. DESIGN DETAILS.

2.1 The following relays were made slow to release for the reasons given below:-

Relay B(BR) to hold during the pulsing of contact A2 and to provide part of the junction release guard period.

Relay CD(BR) to hold during a pulse train and to provide part of the junction release guard period.

Relay BB(BR) to provide the requisite release guard period.

2.2 Special features were provided on the following relays for the reasons given below:-

Relay OC(TL) is differentially connected to ensure that the relay will not operate to normal or reversed line potentials but will only operate to "earth loop" (trunk offering) signalling conditions on the selector level negative and positive wires.

Relay JG(TR) has a resistance of 7000 ohms to ensure the relay will hold in series with the distant line or pulsing relay without holding the latter.

The release guard relays which are controlled by contact JG1 guard the outgoing auto multiple against seizure until normal potentials are restored to the outgoing negative and positive wires.

3. The following relay contacts have special significance for the reasons given below:-

BB2(BR) prevents the operation of the time pulse start circuit during the period when relay HA is operated.

BB5(TR) provides a hold circuit for relay DB in the operated position, and in the normal position short-circuits 500 ohm "Z" pulse winding of relay DA, to disconnect metering conditions should the calling subscriber clear whilst the "Z" meter pulse is connected.

CC2(BL) to reduce positive battery drain, disconnects, at the commencement of pulsing, the circuit provided by relay TO normal on calls from interdialling exchanges.

The contact holds relay MA or EF operated until after the release of relay CC to prevent the energisation of the route restricting uniselector magnet via contacts A2 and JG1 during the release of the circuit.

DB1(TL) operates the time pulse controls under C.S.H. conditions.

DD1(BR) allows relay DA to release during the "S" meter pulse or in the period between the "S" and "Z" meter pulses, and thus prevents false metering should relay D flick to line transients or switch-hook vibrations, and flick relay DD, and thus operate relay DA to the "S" meter pulse.

D2(TR) subsequent to the called subscriber answering the call, maintains a short-circuit across contact A1.

When the called subscriber answers, contacts DD4 and DD5 reverse the potentials of the calling circuit and relay A flicks.

Without this contact, contact A1 would then release relay D and the subsequent release of relay DD would produce a further flick of relay A and a repetition of the interacting cycle.

HA1(BL) prevents an interaction between relay HA and CC which would otherwise occur on incoming calls from the dependent U.A.X.

TO4"y"(TL) was made a "y" action to ensure that relay TO is held via its hold winding, before contact TO4 disconnects the operate circuit.

4. The following rectifiers were provided for the reasons given below:-

MR1(TL)) provides an efficient means of rendering relay D operative to
MR2(TL)) current in one direction only whilst providing a signalling path for operating the line relays in the distant junction relay set.

MR3(BL) prevents the operation of relay DS to negative battery signals on the M wire.