

DIAGRAM NOTES

concerning

GBW 16830 (ISSUE 4)

titled

UAX NZ13 OUTGOING JUNCTION TO NON-DEPENDENT  
AUTO EXCHANGE WITH INCOMING JUNCTION BARRING FACILITY

An explanation of the above circuitry is covered under the following headings:

1. GENERAL
2. FACILITIES
3. CIRCUIT OUTLINE
4. CIRCUIT DETAIL
5. RELEASE
6. BOTHWAY WORKING
7. BARRED ACCESS
8. DESIGN DETAILS



## 1. GENERAL.

The diagram GBW 16830 shows the circuit of an outgoing junction relay set provided at a UAX NZ13 to which access is gained via selector levels.

## 2. FACILITIES.

Provision is made for -

- 2.1 Transmission bridge
- 2.2 N.U. Tone
- 2.3 Seizing and guarding the circuit from intrusion
- 2.4 Batt testing
- 2.5 Barretter feed to calling loop
- 2.6 Ringing machine start lead
- 2.7 Time Pulse release
- 2.8 Detection of called subscriber answering
- 2.9 Discriminating lead "M"
- 2.10 Guarding the circuit during release of junction
- 2.11 Relaying forward to the junction the dialled pulses from calling subscriber.
- 2.12 Manual hold

## 3. CIRCUIT OUTLINE.

Access to this circuit is made via selector levels.

Selector level seizure of this circuit causes access to be made to an outgoing junction to a non-dependent auto exchange. Dialling takes place with pulse repetition to the distant exchange. If a successful call is made ring tone is returned from the distant selector via the transmission bridge.

The "called subscriber answer" causes a reversal of junction potential which is detected by the D relay. Potential reversal is then provided from the calling side of the circuit for supervisory purposes. Conversation called to calling subscriber may now take place.

Manual hold condition is provided by a signal over the +ve junction wire, whereby the circuit is guarded and held from the distant exchange when the calling subscriber clears.

A route barring facility is provided by signalling on the "M" lead. A pos. batt signal on the "M" lead operates relay NU and transmits NU Tone back to the calling party and releases the junction

An incoming junction relay set or group selector can be associated with this circuit, to which access from a non-dependent auto exchange can be made. Gaining access in this manner prevents access to this circuit via selector levels.

Time pulse release is provided once the called subscriber has cleared or NU tone has been returned to calling party.

#### 4. CIRCUIT DETAIL.

4.1 Seizure. The circuit is seized via selector level if the 150 ohm batt is present on the "P" wire. The group selector tests into the "P" wire and switches causing the -ve and +ve leads to be looped by the calling subscriber's telephone.

Relay A operates,

- A1 prepares to extend loop to junction
- A2 completes operate path for relay B

Relay B operating,

- B1 prepares operate path for relay CD
- B3 completes operate path for relay BA

Relay BA operating,

- BA1 prepares loop to junction
- BA2 disconnects 150 ohm test batt and extends guard eth to "P" lead to prevent intrusion by other circuits
- BA3 prepares operate path for BB & DD relays
- BA4 completes operate path for relay HA which operates

Relay HA operating,

- HA1 spare
- HA2) extend the loop forward to junction to
- HA3) seize the distant incoming selector
- HA4 prepares alternative hold path for HA relay
- HA5 extends busy eth to P lead (IDF LOCAL)

Seizure of the circuit is complete and is followed by dialled pulse trains over the -ve and +ve leads from the selector level.

4.2 Receipt of dialled pulse trains. Relay A pulses and on the first release of A2, relay CD operates (Eth, A2, B1, 500CD, Batt).

CD relay operating,

- CD1 s/c the secondary windings of transformer T1 to provide a clean loop to the junction
- CD2 completes operate path for CC relay and applies guard eth to P1
- CD3 completes operate path for relay BB
- CD4 provides additional guard eth to "P" lead

Relay CC operating,

CC2 spare

Relay BB operating,

BB1 completes hold path for relay BB

BB3 spare

BB4 spare

BB5 completes circuit to Ringing Machine Start

Relays B and CD hold during the pulse train and at the end of the train relay CD releases removing the s/c on the T1 secondary at CD1 and releasing relay CC at CD2 (relay CC is ineffective at this stage).

4.3 Called Subscriber Answers. This condition is signalled by a potential reversal of the junction.

Relay D operates due to the configuration of MR 1 and MR3

D1 s/c the A1 contact unit to cover the flick of relay A when relay DD operates.

D2 completes the operate path for relay DD

Relay DD operating,

DD1 completes operate path for relay CB which operates

DD3 further disconnects time pulse start

DD4) reverses call side of transmission bridge potentials

DD5) for supervisory purposes

Relay CB operating,

CB1 completes hold path for CB relay

CB2 removes start eth from Ringing Machine start

CB3 prepares time pulse start circuit

Conversation may now proceed between called and calling subscribers

5. RELEASE.

5.1 Called Subscriber releases. Junction potentials are restored to normal by the release of the called subscriber.

Relay D releases,

D2 disconnects circuit to relay DD which releases

DD relay releasing,

DD3 completes circuit to "time pulse start" (Eth, DD3, CB3, 1000TM, TM1, Time Pulse Start)

5.2 Time Pulse Release. If the calling subscriber fails to release after called subscriber, when the time pulse release signal arrives and operates relay PR - PR1 contact unit disconnects the busy eth back to the incoming "P" lead and the circuit clears down. Relay TM locks to the time pulse hold lead via TM1.

5.3 Calling Subscriber clears. Assuming the called subscriber has cleared followed by the release of the calling subscriber. The loop to the A relay is removed and A relay releases.

A relay releasing,

A1 disconnects loop to junction to release the distant equipment  
A2 completes the operate path for CD relay via B1/BBZ and releases the B relay. During the release time of relay B the CD relay is held.

Relay CD operated,

CD2 completes operate path for CC relay  
CD3 completes further hold path for relay BB  
CD4 maintains eth on P lead

Relay CC operating,

CC1 provides alternative hold path for HA relay  
CC2 spare  
CC3 holds off the test batt from the "P" lead

After its slow release period, relay B releases.

Relay B releasing,

B3 releases BA and CB relays

Relay BA releasing,

BA1 extends MH relay via R8 to the +ve leg of the junction  
BA2 prepares test batt circuit to "P" lead  
BA3 disconnects eth to BB relay which starts to release

Relay CB releasing,

CB2 applies eth to ringing M/C start lead  
CB3 releases relay TM (if operated)

Relay BB releasing,

BB2 disconnects hold path for CD relay which releases  
BB3 spare  
BB4 spare

CD relay, releasing,

CD2 removes hold path for CC relay which releases  
CD4 removes busy eth off incoming "P" lead

Relay CC releasing,

CC1 disconnects hold path to HA relay which releases  
CC2 spare  
CC3 restores 150 ohm test batt to incoming "P" lead

Relay HA releasing,

- HA1 spare
- HA2) restore -ve and +ve leads
- HA3) to normal
- HA5 connects P & P1 leads through and removes busy eth off P lead (IDF LOC.)

The circuit has now restored to normal the incoming "P" lead having been busied during the release time of B-BA-BB-CD and CC relays to ensure that the equipment at the distant end of the junction has restored before a follow on call can take place.

6. BOTHWAY WORKING.

The foregoing has traced a call outgoing from selector levels, but the junction to the non-dependent auto exchange can be used in a bothway mode.

Calls from the non-dependent auto exchange terminate in the UAX via the junction on incoming junction relay sets or on a UAX13 group selector (GBW 15960).

A call to the incoming junction relay set or selector causes an eth to be extended back over the P1 lead operating relay CC.

Relay CC operating,

- CC2 spare
- CC3 disconnects 150 ohm test batt from 'P' lead to busy the circuit to the incoming selector levels

7. BARRED ACCESS.

Circuit is seized in the normal way, relays A-B-BA operate

The barred access condition is signalled on the 'M' lead by the provision of a pos. batt signal. Relay NU operates.

Relay NU operating,

- NU1 prepares alternative eth path to ringing M/C start lead
- NU2 provides hold path for NU relay (BA4-NU2-2000NU-Batt)
- NU3 completes operate path for relay CB (Eth, B3, NU3, 2000CB, Batt)
- NU4 extends NU tone to tone winding of transmission bridge transformer T1.

Relay CB operating,

- CB1 completes alternative hold path for relay CB
- CB2 extends start eth to Ringing Machine start lead
- CB3 completes 'time pulse start' lead in preparation for possible 'timed pulse release' of the circuit

The calling party receives NU tone and is thus 'barred access' to calls outgoing to the non dependent auto exchange. Should the calling party attempt to dial further digits then at the first operation of

relay CD, relay BB operates and locks. Earth to the ringing M/C start lead is now maintained via NU1, BB5.

8. DESIGN DETAILS.

1. C3 and R6 combined form a spark quench unit which is wired across A1 and A2 relay contacts to reduce sparking and thus increase the useful life of the contacts.
2. Test Jacks TJ1 - 8 are provided to facilitate maintenance.
3. R7 is provided as a current limiter on junctions of less than 200 ohms.
4. R8 is provided to guarantee the release of distant A relays under manual hold condition.
5. MR2 is provided to ensure that NU relay will only operate to a positive battery potential.
6. RB1 is provided to limit microphone current to subscribers' instruments when used on short subscribers' lines. It also reduces impulse distortion of relay A.
7. Relays CD and B have heel end copper slugs fitted on the coils to hold to pulses from the A relay during dialling.
8. The 2K NI windings across relays B and CD reduce sparking at the A22-A23 and A21 and A22 contacts, as well as increasing the release of these relays.

END OF DIAGRAM NOTES