

**DIAGRAM NOTES RELATING TO**  
**GBW 15960**  
**GROUP SELECTOR FOR UAX NZ 13**

**1. GENERAL**

This diagram shows the circuit of the 100 outlet group selector of the 2000-type used at a UAX NZ 13.

Diagrams to be considered in conjunction with this circuit are :-

GBW 13910 Subscriber's Line Finder & Control Relay Set.  
GBW 13900 Final Selector 2 - 10 PBX type.

**2. FACILITY SCHEDULE**

PROVISION IS MADE FOR :-

- 2.1 Transmission of dialling tone to the calling party.
- 2.2 Transmission of NU tone to the calling party should :-
  - (a) The level dialled be spare.
  - (b) A CCB or MP subscriber dials a "barred" level.
- 2.3 Transmission of OFBT to the calling subscriber if all outlets are engaged, and the operation of the overflow meter.
- 2.4 Application of forced release conditions (under time pulse control) if the selector is held :-
  - (a) To a permanent loop.
  - (b) On NU tone.
  - (c) On OFBT (All outlets engaged).
- 2.5 Extension of calling party's loop when a free outlet is found.
- 2.6 Extension of a discriminating signal if the selector is taken into use by :-
  - (a) A CCB or MP subscriber.
  - (b) An I/C junction.
- 2.7 Automatic busying and the bringing in of an alarm should the selector fail to release due to a mechanical defect.

### 3. **CIRCUIT DESCRIPTION**

#### OUTLINE

The extension of the calling line from the line-finder causes the group selector to be seized. On receipt of dialling impulses the selector wipers are stepped vertically until positioned outside the bank at the required level. At this point discrimination is introduced and one of the following conditions is satisfied :-

- (a) The call is available to all subscribers ; in which case the call is allowed to proceed.
- (b) The level is available only to ordinary subscribers; in which case NU tone is transmitted if the call originates from a CCB or MP subscriber, calls from an ordinary subscriber are allowed to proceed.
- (c) The level is spare; in which case NU tone is returned to the caller.

If the call is allowed to proceed, automatic rotary stepping commences and the selector tests for a free outlet. When a free outlet is found, rotary stepping is discontinued and the call is switched through on that outlet. If no free outlets are found on that level, rotary stepping continues until the wipers reach the 11th contact. The S mechanical springs operate, and OFBT is returned to the caller.

The selector can also be taken into use on an incoming call from a distant exchange. In this case positive battery is connected to the M wire to provide for route unbarring and/or trunk offering. When the selector switches to a free outlet, this positive battery is extended via the M wire to an outgoing junction relay set for route unbarring or to a final selector for trunk offering.

### 4. **CIRCUIT DETAILS**

#### 4.1 SEIZURE

A loop across the -ve and +ve lines operates relay A.

Relay A operating

A1 operates relay B.

Relay B operating

B1 Operates Release Alarm relay.

B2 Prepare an operate circuit for relay CC.

B3 Removes a 150 ohm earth from P wire, and connects an earth to guard against intrusion.

B4 Prepares an operate for the vertical magnet.

B5 Operates relay CD.

Relay CD operating

CD1 Operates relay CC

CD2 Prepares to extend dial tone to the calling party.

CD3 Prepares a circuit for the vertical magnet.

### Relay CC operating

- CC1 Disconnects the rotary drive circuit.
- CC2 Ineffective at this stage.
- CC3 Extends dial tone to the calling subscriber.
- CC4 Ineffective at this stage.
- CC5 Prepares a circuit for relay TM.

## 4.2 IMPULSING

The subscriber dials and relay A releases and reoperates corresponding to the dial impulses.

### Relay A releasing

- A1 Short circuits relay B, rendering it slow to release, and extends earth from B4 to energise the 3 ohm coil of relay CD and the vertical magnet.

The first operation of the vertical magnet steps the wipers up to the first level and causes the operation of the off-normal springs.

### N springs operated

- N1 Ensures that a 150 ohm battery is not connected to the P wire until the selector restores to normal.
- N2 Disconnects the operate circuit for relay CD.
- N3 Prepares a rotary drive circuit.
- N4 Prepares a circuit for relay TM

### Relay A reoperating

- A1 removes the short circuit from relay B and allows it to re-energise; disconnects earth from the vertical magnet and the 3 ohm coil of relay CD.

The vertical magnet releases. As each of the remaining impulses in the pulse train is received the vertical magnet is energised and released until the wipers have been raised to the desired level.

Relay CD is re-energised by each pulse of current to the vertical magnet. Relays B and CD hold by virtue of their slow-release features, throughout the train of impulses.

When the last impulse is received relay A reoperates and remains held to the subscriber's loop.

Relay CD releases slowly; relay B remains operated.

### Relay CD releases

- CD1 Makes relay CC dependant upon the condition on the vertical marking bank.
- CD2 Disconnects dial tone from the calling party.
- CD3 Prevents any further operation of the vertical magnet.

Should the level be available to all subscribers, when relay CD releases, relay CC will also release.

#### 4.3 ROTARY HUNTING & TESTING

##### Relay CC releasing

- CC1 Completes a circuit for the rotary magnet.
- CC2 Ineffective at this stage.
- CC3 Prevents the return of NU tone to the calling subscriber.
- CC4 Ineffective at this stage.
- CC5 Disconnects the timing circuit.

The wipers rotate around the bank until a free outlet is found. The NR springset operates on the first rotary step.

##### NR springset operates

- NR1 Prepares a circuit path for relay H.

When a free outlet is found relay HX operates to a 150 ohm battery on the P wire.

##### Relay HX operating

- HX1 Disconnects the rotary drive circuit and closes the circuit for relays H and CC.

##### Relay H operating

- H1 Extends the M wire to the next selector or relay set.
- H2) Extends the positive and negative wires, releasing relay A
- H3)
- H4 Disconnects the rotary drive circuit.
- H5 Provides a hold circuit for the release alarm relay.
- H6 Provides a hold circuit for relay H, against the release of relay HX
- H7 Extends an earth to the P wire for guarding, and short circuits relay HX.

##### Relay CC operating

- CC5 Extends a discriminating signal (depending upon the vertical marking bank strapping) to the succeeding stage of the call.

All other contacts are ineffective at this stage.

Relay HX releases, but is ineffective at this stage.

##### Relay A releasing

- A1 Connects a short circuit to relay B which releases slowly.

##### Relay B releasing

- B2 Releases relay CC

##### Relay CC releasing

- CC2 Extends the M wire to the next stage.

#### 4.4 ALL OUTLETS ON LEVEL ENGAGED

If all outlets are engaged, rotary hunting continues until the 11th step when the S springsets operate.

##### S Springset operating

- S1 Prepares to extend earth to the Overflow meter.
- S2 Prepares to connect OFBT to the calling subscriber.
- S3 Ineffective at this stage.

Relay HX operates via the circuit :- Earth, B5, HX coil, P wiper, R3, Battery.

##### Relay HX operating

HX1 Disconnects the rotary drive circuit and operates relay CC.

##### Relay CC operating

- CC3 Connects OFBT to the calling subscriber.
- CC4 Operates the overflow meter.
- CC5 Completes the force release timing circuit.

#### 4.5 CCB AND MP SUBSCRIBER DIALS A BARRED OR EXCESS FEE LEVEL

When relay CD releases at the end of vertical stepping, relay CC is held via NR1, U22, Vertical Marking Bank and Wiper, U21, to a 150 ohm battery on the CBMP lead (extended from Linefinder).

##### Relay CD releasing

- CD2 Connects NU tone to the calling party.
- CD3 Prevents further impulsing of the vertical magnet.

The equipment remains in this condition until the subscriber releases or is force released.

#### 4.6 SPARE LEVEL DIALLED

When relay CD releases at the end of vertical stepping, relay CC is held via NR1, U22, Vertical Marking Bank and Wiper, U23, to R4 2000 ohm battery on the CBO lead.

Relay CD in releasing performs the same functions as in para 4.5

#### 4.7 FORCED RELEASE BY TIME PULSE

If the selector is held :-

- (a) to a permanent loop.
- (b) on NU tone.
- (c) on OFBT (all outlets engaged).

Relay CC will be operated. When relay CC remains operated, forced release is applied by the time pulse after a period of 30 - 150 seconds.

Relay CC operated

CC5 Completes the time pulse start circuit.

Relay TM operating (via TP start lead)

TM1 Prepares an operate circuit for relay H.

TM2 Holds relay TM to the "T.P. HOLD" lead.

After the prescribed period has elapsed, earth is applied to the "T.P. RELEASE" lead and relay H operates

(a) Permanent Loop Conditions

Relay H operating

H2) Release relay A.

H3)

H5 Holds the release alarm relay against the release of relay B.

Relay A releasing

A1 Releases relay B, and energises the vertical magnet.

The selector takes one vertical step and relay CD releases.

Relay B releasing

B2 Releases relay CC

B3 Removes the guarding earth from the P wire to release relay H in the linefinder.

Relay CD releasing is non-effective

Relay CC releasing

CC5 Releases relay TM.

Relay TM releasing

TM1 Releases relay H

Relay H releasing

H4 Completes the rotary drive circuit, and the selector restores to normal.

(b) Spare Level Dialled

Relay H operating

H2) Release relay A.

H3)

Relay A releasing

A1 Releases relay B.

Relay B releasing

B2 Releases relay CC

B3 Removes the guarding earth from the P wire to release relay H in the linefinder.

Relay CD releasing is non-effective

Relay CC releasing

CC5 Releases relay TM.

Relay TM releasing

TM1 Releases relay H

Relay H releasing

H4 Completes the rotary drive circuit, and the selector restores to normal.

(c) All outlets on level engaged

Relay H operating

H1 Releases relay HX.

H2)

H3) Release relay A.

The circuit operation is now similar as for (b) above.

4.8 DESIGN DETAILS

Relay B Is made slow release by a short circuit to prevent its release during impulsing, and to maintain earth on the P wire until the earth is returned by succeeding equipment after switching.

Relay CD Is made slow to release by a heel end slug to prevent its release during impulsing.

Rectifiers MR1 & MR2 Prevent an unnecessary drain on the positive battery supply on an incoming call, prior to dialling. These rectifiers have to withstand the full exchange voltage.

END OF DIAGRAM NOTES