DIAGRAM NOTES (ISSUE 1)

concerning

GBW.13890

titled

U.A.X. N.Z. 13

GROUP SELECTOR

GENERAL.

This diagram shows the circuit of the 100 outlet group selector of the 2000 type used at a U.A.X. N.Z. 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 Type.

FACILITY SCHEDULE.

Provision is made for:-

.1 Transmission of dialling tone to the calling party.

.2 Transmission of N.U. tone to the calling party should:-

(a) The level dialled be spare.

(b) A C.C.B. or M.P. subscriber dial a "barred" level.

.3 Transmission of O/F B.T. to the calling subscriber if all outlets are engaged, and the operation of the overflow meter.

.4 Application of forced release conditions (under time pulse control) if the selector is held:-

(a) To a permanent loop.

(b) On N.U. tone.

(c) On O/F B.T. (All outlets engaged).

.5 Extension of calling party's loop when a free outlet is found.

.6 Extension of a discrimination signal if the selector is taken into use by

(a) A C.C.B. Subscriber.

(b) An incoming junction.

.7 Automatic busying and the bringing in of an alarm should the selector fail to release due to a mechanical defect.

CIRCUIT OUTLINE.

The extension of the calling line from the line-finder causes the group selector to be seized. On receipt of dialled 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:-

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(a) The level 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 N.U. tone is transmitted if the call originates from a C.C.B. or M.P. subscriber, calls from an ordinary subscriber being allowed to proceed.

(c) The level is spare; in which case N.U. 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 spring sets operate, and O/F B.T. 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, this positive potential is extended via the M wire to an outgoing junction relay set for route-unbarring or to a final selector for trunk offering.

1. CIRCUIT DETAIL.

Seizure.

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

Relay A operating

A1 Operates relay B

Relay B operating

B1 Prepares an operate circuit for the vertical magnet.
B2 Prepares an operate circuit for relay CC.
B3 Operates relay CD.
B4 Operates Release Alarm relay.
B5 Removes a 150 ohm battery from P wire, and connects an eth to guard against intrusion.

Relay CD operating

CD1 Prepares a circuit for the Vertical magnet.
CD2 Prepares to extend dial tone to the calling party.
CD3 Operates relay CC.

Relay CC operating

CC1 Extends dial tone to the calling subscriber.
CC2 See 'All outlets on a level engaged'.
CC3 Disconnects the rotary drive circuit.
CC4 Prepares a circuit for relay TM.
CC5 Ineffective at this stage.

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 B1 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 springset 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.

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 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 loop.

Relay CD releases slowly; relay B remains operated.

Relay CD releasing.

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

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

3. ROTARY HUNTING & TESTING.

Relay CC releasing.

CC1 Prevents the return of N.U. tone to the calling subscriber.
CC2 Ineffective at this stage.
CC3 Completes a circuit for the Rotary Magnet.
CC4 Disconnects the timing circuit.
CC5 Ineffective at this stage.

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

NR1 Prepares an operate 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 an earth to the P wire for guarding, and short circuits relay HX.
H2)
H3) Extend the positive and negative wires, releasing relay A.

H4 Provides a hold circuit for relay H, against the release of relay HX.
H5 Extends the M wire to the next selector or relay set.
H6 Provides a hold circuit for the release alarm relay.
H7 Disconnects the rotary drive circuit.

Relay CC operating.

CC5 Extends a discriminatory signal (depending upon the auxiliary bank strapping) to the succeeding stage of the call.

All other contacts are non-effective.

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.

CC5 Extends the M wire to the next stage.

4. ALL OUTLETS ON LEVEL ENGAGED.

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

S springset operating.

S1 Prepares to extend eth to the Overflow Meter.
S2 Prepares to extend O/F B.T. to the calling subscriber.

Relay HX operates via the circuit:- (Eth, B3, HX, P wiper, R1/R2, Batt.)

Relay HX operating.

HX1 Disconnects the rotary drive circuit and operates relay CC.

Relay CC operating.

CC1 Transmits busy tone to the calling subscriber.
CC2 Operates the overflow meter.
CC4 Completes the Timing circuit.

5. C.C.B. and M.P. 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, Auxiliary bank and wiper, U21, to a 150 ohm battery on the C.B. M.P. lead (extended from linefinder).

Relay CD releasing.

CD1 Prevents further impulsing of the vertical magnet.
CD2 Extends N.U. tone to the calling party.
CD3 Ineffective at this stage.

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

6. SPARE LEWEL DIALLED.

When relay CD releases at the end of vertical stepping, relay CC is held via NR1, U22, auxiliary bank & wiper, U23, to 2000 ohm R4 battery on the CBO lead.

Relay CD in releasing performs the same functions as in para. 5.

7. FORCED RELEASE (BY TIME PULSE).

If the selector is held:-

(a) to a permanent loop.

(b) on N.U. tone.

(c) on O/F B.T. (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 1-5 minutes.

Relay CC operated

CC4 Completes the time pulse start circuit.

Relay TM operating (via TP start lead)

TM1 Holds relay TM to the "time pulse hold" lead.
TM2 Prepares an operate circuit for relay H.

After the prescribed period has elapsed, earth is applied to the 'time pulse release' lead and relay H operates.

(a) Permanent loop conditions.

Relay H operating.

H1 Ineffective at this stage.
H2)
H3) Release relay A.
H4)
H5) Ineffective at this stage.
H7)
H6 Holds 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.
B5 Removes a guarding earth from the P wire to release relay H in the linefinder.

All other contacts are ineffective at this stage.

Relay CD releasing is non-effective.

Relay CC releasing

CC4 Releases relay TM.

All other contacts are ineffective at this stage.

Relay TM releasing.

TM2 Releases relay H.

Relay H releasing.

H7 Completes the rotary drive circuit, and the selector restores to normal.

(b) Spare Level dialled.

Relay H operating (via Time Pulse release).

H2)
H3) Release relay A.

Relay A releasing

A1 Releases relay B.

Relay B releasing.

B2 Releases relay CC.
B5 Removes a guarding earth from the P wire to release relay H in the linefinder.

Relay CC releasing.

CC4 Releases relay TM.

Relay TM releasing.

TM2 Releases relay H.

Relay H releasing.

H7 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) Spare Level dialled.

8. DESIGN DETAILS.

Relay B is made slow to release by a short circuit to prevent its release during impulsing, and to maintain earth on the P wire until 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 positive battery supply on an incoming call, prior to dialling. These rectifiers have to withstand the full exchange voltage.

END.