DIAGRAM NOTES (Issue 1)

concerning

DIAGRAM GBW 13760(1)

titled

U.A.X. N.Z. 13
RINGING CODES FOR 5 PARTY LINES

GENERAL.

The diagram shows the circuit arrangement of the common equipment for the generation of ringing code pulses as installed in U.A.X. N.Z. 13 exchanges.

The diagram should be considered in conjunction with the following diagrams or their equivalents:-

GBW 13720(1)	Ringing Tones and pulses.
GBW 13750	5-party line relay set, loop dialling.
GBW 13770	Revertive call relay set.
GBW 14410	5-party line relay set, simplex dialling.

FACILITY SCHEDULE.

Provision is made for -

1. The extension of machine start to the Ringing Tones and pulses circuit.

2. The generation of ring start and hold pulses, and five different "groups" of ringing code pulses.

3. The generation, by a vibrator circuit, of alternating current suitable for operating a polarised ringer.

CIRCUIT DESCRIPTION.

Outline

The equipment incorporates a time pulse circuit for generation of the ringing start, hold and code pulses, also a vibrator circuit to generate ringing current.

The time base for the time pulse circuit is a mutually interacting chain of relays.

Circuit Detail

1. **Machine Start**

Earth on the machine start lead from a revertive call or 5-party line relay set operates relay PL.

Relay PL operating -

PL1	starts the X, Y, Z relay timing chain.
PL2 & PL3	start the ringing vibrator.
PL4	connects earth to the "Ring M/c Start Batt" lead to the Ringing tones and pulses circuit.

The various units will now be considered separately.

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2. Relay Timing Chain.

In order to obtain a time base for the ringing start, hold and code pulses, relay X, Y and Z are connected so as to be mutually interrupting.

The relays have comparable characteristics and are connected so that -

Relay X releases to operate relay Z at contact X1
Relay Z operates to release relay Y at contact Z1
Relay Y releases to operate relay X at contact Y1
Relay X operates to release relay Z at contact X1
Relay Z releases to operate relay Y at contact Z1
Relay Y operates to release relay X at contact Y1

When contact PL1 makes to start the chain, all the relays attempt to operate. Since the three relays are not completely identical, one of them operates first and by the second step the above sequence is operating. The relays are timed so that the complete cycle repeats every 300 milliseconds (mS).

The inductive windings of the relay are shunted by non-inductive windings in order to render the relays slow-to-release and also to act as a spark quenches to guard the contacts.

Each relay carries an extra contact unit, connected as follows:-

(a) X2 causes the Ringing code switch CS to step once every 300 mS.

(b) Y2 and Z2 are spare.

3. Ringing Codes.

The Ringing code switch CS steps once every 300mS. Single ended wipers are used so that the switch has effectively 50 bank contacts.

Every time the wipers are in position 1, 18 or 35 earth is connected to the Ring Start lead for 300mS by wipers CS7 and CS8.

Wipers CS7 and CS8 then connect earth to the Ring Hold lead for the next 8 contacts (i.e., for 2.4 secs.).

During these 2.4 sec. periods earth is connected to the Ring Code leads A, R, S, M & D by wipers CS1, 2, 3, 4, 5 and 6 as determined by the bank wiring.

A diagram showing the codes used and the duration of the pulses is inset on the diagram.

4. Ringing Current.

Ringing current is produced by the battery driven vibrator VB1.

When contacts PL2 and PL3 make, earth is extended via VB springs 2 and 3 to energise the VB coil. The spring-loaded armature VB1 is attracted and in moving, it breaks the circuit of the coil VB (i.e., springs 2 and 3 break) causing it to be released. The armature, therefore, vibrates continuously with a periodicity of about 23 c.p.s. as determined by its weight and the spring tension.

As the armature vibrates the two contacts VBL (i.e., springs 2 & 4 and 2 & 1) make alternately and pulses of direct current flow alternately in each half of the primary winding of the transformer TR1, inducing an alternating current in the secondary winding.

The mid-point of the primary winding of transformer TR1 is connected to battery via a choke L1 which prevents high-frequency ripple from passing into the main battery feeds.

One side of the secondary winding is earthed and the other side is connected to the continuous ringing current feed circuit. The capacitors C8 are to reduce the harmonic content of the ringing current.

5. CIRCUIT NOTES.

(a) Network RSC (& RSV)

The network of chokes and capacitors is fitted to prevent the generation of radio interference.

(b) Contacts PL2 & PL3

Contacts PL2 and PL3 in series prevent arcing at either contact when the highly inductive vibrator circuit is broken. Wear on the contacts is thereby much reduced.

(c) Rectifier MR1

Ringing code 'R' is Ringing Code 'A' with one additional 300mS pulse at the end. The rectifier MR1 prevents this additional pulse appearing at the end of Ringing Code 'A'.

END