

DIAGRAM NOTES (ISSUE 1)

CONCERNING

GBW.13830

TITLED

REVERTIVE RINGING RELAY SET

FOR

SHARED SERVICE SUBSCRIBERS AND FAULTSMEN

GENERAL

The diagram shows the circuit of a relay set which enables the separate parties on shared-service or party lines to call each other, and for faultsmen in both conditions to obtain the appropriate ring back for the telephone from which they call.

NU tone is provided for incorrect dialling.

- NOTE 1 The description is sectioned so that, by choice of section, any routine may be analysed.
- 2 The diagram is considered to be divided into four areas by a horizontal line drawn between relays BA and RR, and a vertical line drawn between resistor R1 and contact unit AS2. The number against a designation shows its area of location.

FACILITIES

- 1 Access via selector levels.
- 2 Earth tested.
- 3 Hold and guard earth.
- 4 Digit discrimination.
- 5 NU tone for faulty dialling.
- 6 Ringing:-
 - a. to both telephones for revertive call.
 - b. to the calling telephone only for ring back.
- 7 Battery feed to both telephones for revertive calls.
- 8 On release:-
 - a. preceding circuits release.
 - b. period of unguard.
 - c. release guard.
- 9 Throw-off for delayed answering.

CIRCUIT DESCRIPTION

GENERAL

The relay set is designed for use in earth-testing exchanges, to be accessible via selector levels to give ringing on both legs for revertive calling and over one leg for ring back.

A uniselector-type switch is incorporated into the circuit to provide a means of selection of the separate services required, and the spare positions on this switch provide means of supplying NU tone supervision to warn calling parties who may have misdialed.

To prevent undue holding of a line during conditions other than speaking, a throw-out circuit is provided. This is controlled by the exchange 6-minute S and Z pulses.

By means of straps that are specially provided for, the basic circuit can be used for shared-service working (two separate line circuits per shared line), or for party-line working (one line circuit with two users on one line).

OUTLINE

For revertive calling, either party on the line lifts the handset and dials the revertive call number (90). At the end of dialling the handset is replaced.

Ringling current from one of the exchange supplies is transmitted to the called telephone, and from a second supply (out of phase with the first supply) ringing current operates the calling ringer.

The called party trips the ringing by lifting the handset of the called telephone. The cessation of ringing tells the calling party that the call has been answered, and the handset of the calling telephone is lifted to complete the connection.

To clear down, the handsets of both telephones must be replaced on the cradles.

For ring back, the lineman lifts the handset of the telephone to be tried out, dials the appropriate number, and replaces the handset.

Ringling current is transmitted to the calling telephone only. When satisfied, the lineman lifts the handset to trip the ringing, then replaces the handset to clear the loop and release the relay set.

DETAIL

ALL CALLS

All calls start with the same routine.

Relay A(b-c and d-e) operates when the calling loop is extended, and contacts A2-3(4) operate relay B.

B(4) operated via A2-3, BS23-24.
B1-2(1) provide hold and guard earth.
B3-4(3) prepare relay E hold circuit.
B5-6(3) prevent premature operation of relay H.
B21-22(1) prepare the NU tone feed.
B23-24(1) operate relay BA.

BA(1) operated via B24-23.
BA1-2(4) prepare relay CD operate, and magnet CS pulse circuit.
BA3-4-5(1) disconnect the release guard circuit and prepare relay F(a-b) hold circuit.
BA6-7-8(4) disconnect switch CS homing circuit and prepare relay RR circuit.
BA21-22(3) prepare relay AS(a-b) operate circuit for the alarm delay.
BA23-24(3) disconnect switch CS homing circuit.
BA26-27(3) provide a general earth.

Calling party dials "9"

Relay A releases and operates to the break and make of the dial springs, relay CD operates at the first pulse and magnet CS responds to the pulses. Relays B and CD are slow-release to hold through the interruptions of pulsing.

CD(4) operated via magnet CS, arc CS3, BA2-1, A1-3, BS23-24.
CD1-2(4) prepare the pulse-maintenance circuit for magnet CS.
CD3-4(3) prevent premature operation of relay E.
CD21-22(1) disconnect the NU tone feed.

End of digit "9"

Relays A and B remain operated and CD releases.

Contacts CD3-4(3) operate relay E.

E(3) operated via arc CS4, CD3-4, BS21-22, F1-2, BA27-26.
 E1-2(3) hold relay BA when contacts B24-23 release.
 E3-4(1) provide hold and guard earth when contacts B2-1 release.
 E5-6(1) prepare relay F(a-b) hold circuit.
 E21-22(3) prepare relay H circuit.
 E23-24(3) hold relay E via contacts 3-4.
 E25-26(2) disconnect certain NU tone feeds.

Second digit

Relay A responds to the dialled pulses, operates relay CD and pulses magnet CS. Relays B and CD hold through the pulsing, as before.

CD(4) operated.

CD1-2(4) prepare magnet CS pulse, and relay CD hold circuit.
 CD3-4(3) prevent premature operation of relay H.
 CD21-22(1) disconnect the tone feed.

End of second digit

Relays A and B remain operated and CD releases.

CD(4) released.

CD1-2(4) prevent further pulsing of magnet CS, because CD operate circuit is now disconnected.
 CD3-4(3) provide earth for the control relays.
 CD21-22(1) prepare the tone feed.

NOTE 3 At this stage, the routine depends on the value of the second digit, and the equipment of the exchange.

REVERTIVE CALLING (90)

From Note 2:-

For revertive ringing calls in all applications, the calling party dials "90" and switch CS rests on position 12/24.

At position 12/24 arc CS5(1), with contacts E25-26 operated, no tone is connected to relay A(a-b).

At position 12/24 arc CS4(3), relay H circuit is prepared.

At position 12/24 arc CS2(3), relay RR circuit is prepared.

Calling party replaces handset.

At the end of dialling, the calling party releases relay A(b-c and d-e) by replacing the handset of the calling telephone. Contacts A2-3(4) release relay B.

B(4) released.

B3-4(3) release relay E, but E is slow-release.
 B5-6(3) operate relay H.
 B21-22(1) disconnect the tone feed.

H(3) operated via B5-6, E22-21, arc CS4, CD3-4, BS21-22, F1-2, BA27-26.

H1-2(3) hold relay E before E releases.
 H3-4(3) spare.
 H5-6-7(1)) switch the calling loop from relay A(b-c and d-e) to the exchange
 H23-4-5(1)) ringing current feed No. 3.
 H21-22(4) prepare for relay RR to respond to ringing current from the exchange feed No. 1.

By the use of two separate feeds, the calling loop and relay RR receive current alternately.

The ringing current from feed No. 3 is transmitted via the calling loop positive wire, then relay RR operates and contacts RR1-2(4) operate relay RS.

RS(4) operated via RR2-1, CD3-4, BS21-22, F1-2, BA27-26.
 RS1-2-3(2) switch from feed interrupted ringing current No. 3. to feed No. 1.
 RS4-5-6(1) switch the line negative wire from relay F to ring return feed No. 1.
 RS23-4-5(1) switch the line positive wire from ring return feed No. 3 to relay F.

Ringing current is now being transmitted via the calling loop negative wire.

By this means, the **calling** and called telephones are rung alternately, and relay F is ready to act as ring-trip relay for either (the calling party may decide to cancel the call).

Called party answers.

Relay F(d-e) operates when the handset of the called telephone is lifted to loop the line.

F(2) operated via resistor R1, RS6-5, H7-6, loop, H24-25, RS24-25, RS2-3
 or
 resistor R4, RS23-24, H25-24, loop, H6-7, RS5-4, RS2-1.

F1-2(3) release relay H, and the 6-minute throw-off circuit.
 F3-4(3) disconnect the 6-minute S pulse feed because the response has been made within the alarm delay period.
 F21-22(2) remove the short circuit, and relay F(a-b) holds to arc CS1.

H(3) released.

H1-2 cut off one hold for relay E.
 H5-6-7 (1) } switch the called loop to relay A(b-c and d-e). A operates.
 H23-4-5(1) }
 H21-22(4) release relay RR.

Contacts RR1-2(4) release relay RS.

Contacts A2-3(4) operate relay B.

B(4) operated.

B1-2(1) provide hold and guard earth.
 B3-4(3) hold relay E before E has released.
 B23-24(1) hold relay BA.

When the calling party hears the ringing cease, the handset of the calling telephone is lifted.

The relay set is now established, with relay A feeding transmitter current to the calling/called line. A is of high impedance to prevent leakage of speech currents.

FAULTSMAN'S CALL (shared service and 2-P.L. with meter discrimination).

From Note 2:-

For exchanges with separate line circuits and meter discrimination circuit GBW.12070, or where one line circuit is used with meter discrimination circuit GBW.12080 the faultman's ring-back number is "92" and switch CS rests on position 10/22.

At position 10/22 arc CS5(1), with contacts E25-26(2) operated, there is no NU tone connected to relay A(a-b).

At position 10/22 arc CS4(3), relay H circuit is prepared.

At position 10/22 arc CS2(3), the wiper gives no circuit for relay RR. The ringing, therefore, is standard so far as this circuit is concerned.

The faultsmen dials from the telephone requiring attention, then replaces the handset. The "X" line circuit is connected directly and the telephone receives the ringing current via the negative wire. The "Y" line circuit is connected via a cross-over jumper and the "Y" telephone receives ringing current via the positive wire. In this way, only the calling telephone receives the ring-back.

When one line circuit is used with meter discrimination circuit GBW.12080, ringing is fed to the negative or positive line, depending on whether the "Y" relay in GBW.12080 is operated or not.

Cleardown.

When satisfied, the **faultsman** lifts the handset to loop the line and to trip the ringing (as detailed for revertive calling), then replaces the handset to release the circuit.

FAULTSMANS CALL (party-line working).

From Note 3:-

For exchanges where one line circuit is used to serve two telephones without meter discrimination, the faultsman dials according to the telephone requiring ring back:-

Exclusive lines dial "92".
 X - party lines dial "93".
 Y - party lines dial "94".

Exclusive lines (dial "92").

Switch CS rests on position 10/22.

Arcs CS5(1) and CS2(3) give no circuit.

At position 10/22 arc CS4 (with the special strap provided for this application) the circuit for relay H is completed, but no other control relay is affected.

The standard ringing only is transmitted when the faultsman restores the handset.

To clear, the faultsman lifts the handset to trip the ringing, then restores the handset.

X party line (dial "93").

From Note 3:-

Switch CS rests on position 9/21.

With the modified strapping called for in Note 3 on the diagram (and with contacts E25-26(2) operated) arc CS5(1) gives no circuit.

Arc CS2(3) gives no circuit.

Arc CS4 (with strapping modified per Note 3) completes relay H circuit, but affects no other relay.

Standard ringing is transmitted, and cleardown repeats that for exclusive lines.

Y party line (dial "94").

From Note 3:-

Switch CS rests on position 8/20.

Arcs CS5(1) and CS2(3) give no circuit.

At position 8/20 arc RS4(3) relay RS operates.

RS(4) operated via arc CS4, CD3-4, BS21-22, F1-2, BA27-26.
 RS4-5-6(1) switch the negative wire to ring return battery.
 RS21-22(4) complete relay H circuit via the special strap.
 RS23-4-5(1) switch the positive wire to ringing current via relay F.

This is the polarity for Y telephones, and cleardown repeats the routine for exclusive lines.

RELEASE FROM REVERTIVE CALL

Relay A (b-c and d-e) releases when both parties have cleared, and contacts A2-3(4) release relay B.

B(4) released.
 B1-2(1) cut off one hold and guard earth.
 B3-4(3) release relay E.
 B23-24(1) cut off one hold for relay BA.

E(3) released.
 E1-2(3) release relay BA.
 E3-4(1) cut off hold and guard earth to release the preceding circuits.

BA(1) released.
 BA3-4-5(1) release relay F(a-b), and provide release guard earth from arc CS1.
 BA6-7(4) } home switch CS.
 BA23-24(3) }

When switch CS reaches the next home position, the release guard earth is cut off, and the relay set is free for the next call.

FAULTY DIALLING.

Should the pulsing fail to step switch CS to a working position, arc CS5 is strapped to provide NU tone.

When contacts CD21-22(1) release at the end of dialling, NU tone is connected to relay A(a-b), and tone is induced into the calling line.

When equipped as for a note 2 exchange, the strapping leaves positions 90 (12/24) and 92(10/22) as working positions. When equipped as for a note 3 exchanges, positions 93(9/21) and 94(8/20) are additional working positions.

LRGW-OFF.

To prevent undue holding of the line before completing a set-up, a delay circuit is operated by the exchange 6-minute S and Z pulses.

Contacts BA21-22(4) prepare relay AS(a-b) circuit.

Relay AS(a-b) operates to the 6-minute S pulse.

AS(3) operated via BS1-2, F3-4, BA22-21, S pulse.
 AS1-2(3) hold relay AS(d-e) via contacts BS3-5.
 AS3-4(4) start the 6-minute delay circuit.
 AS21-22(4) prepare relay BS(a-b) operate circuit.

Relay BS(a-b) operate to the 6-minute Z pulse.

BS(3) operated via AS22-21, Z pulse.
 BS1-2(3) disconnect the 6-minute S pulse feed.
 BS3-4-5(3) release relay AS(d-e) and hold relay BS(d-e) via contacts F1-2.
 BS21-22 release relays E and H, if operated.
 BS23-24 release relay B.

The relay set, and the connection, are released.

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