

Title: Magneto Rural Line - Adapter Circuit: U.A.X. N.Z. 13

1. General.

This diagram shows a both-way relay-set for calls between a rural line and a manual-board operator. Junction access is provided by means of a uniselector. Access to this circuit is obtained via a U.A.X. group selector level.

2. Facility Schedule.

Provision is made for -

- (a) a ring of at least three seconds' duration to originate a call to the parent manual board;
- (b) the junction hunter (JH) to search for an idle junction;
- (c) a calling signal to be sent to the parent exchange;
- (d) ringing tone if this circuit is associated with GEW.13930;
- (e) the clearing of the circuit in the event of all outlets being busy;
- (f) a ring-off to operate the cord circuit supervisory;
- (g) the circuit to clear when the operator withdraws the plug;
- (h) the return of busy tone to the operator when a call is being set up to a rural line;
- (i) the circuit to cut through and remove the busy tone when the operator rings forward;
- (j) extinguishing the cord circuit supervisory lamp;
- (k) code ringing the wanted party; and
- (l) for a ring-off to re-light the cord circuit supervisory lamp.

3. Circuit Outline.

A ring of at least three seconds' duration causes the junction hunter to extend the call to a free junction and when the call is answered to place this circuit under the control of the operator. The operator may set up a call to the rural line by dialling the digit of the appropriate group selector level. The operator should then receive busy tone, and if the junction is free, this busy tone should disappear if the ring key is operated. The wanted subscriber may now be called by means of a code ring.

4. Detailed Description.

4.1 Call to Manual Exchange.

When a subscriber rings, relay L operates.

Relay L operating

L1 operates relay LA after a delay of approximately $1\frac{1}{2}$ seconds.

Relay LA operating

LA1 operates relay LB.

LA2 no function at this stage.

LA3 prepares a circuit for relay LC.

Relay LB operating

LB1 prepares a circuit for relay LL.

LB2 disconnects relay LA which releases slowly ($1\frac{1}{2}$ seconds) and locks relay LB to L1.

LB3 prepares a circuit for relay LC.

Relay LA releasing

LA1 opens the original operating circuit for relay LB.

LA2 operates relay LL which locks to earth at TC5.

LA3 no function.

Relay LL operating

LL1 locks relay LL to earth at TC5.

LL2 prepares a circuit for relay H.

LL3 prevents the possible operation of relay TB (by an operator)

LL4)
LL6) no function at this stage.

LL5 operates relay KR which has no function at this stage.

When the ring ceases relay L releases.

Relay L releasing

L1 disconnects relay LB, operates relay H and also operates LC which has no function at this stage.

Relay H operating

H1 closes the JH drive circuit.

H2 closes the testing circuit.

When a free junction is reached, relay KA operates on its 11-ohm winding.

Relay KA operating

KA1 disconnects the JH drive circuit and operates relay KB.

Relay KB operating

- KB1 } connect relay DD to the + wiper to operate the calling signal.
- KB5 }
- KB2 prepares the circuit for the - wiper.
- KB3 disconnects relay II.
- KB4 prepares an operating and locking circuit for relays J, JB, DC and DK.
- KB6 spare.

Relay DD operating

- DD1 operates relay DC.
- DD2 no function at this stage.

Relay DC operating

- DC1 locks relay DC.
- DC2 prevents the possible operation of relay RR.
- DC3 prepares a circuit for relay J.
- DC4 locks relay H.
- DC5 closes the machine start circuit.
- DC6 } closes circuit for ring-tone.
- DC7 }
- DC8 prevents the operation of relay TB (by an operator).

4.2 Operator Answers.

As soon as a plug is inserted in the answering jack at the manual exchange, a disconnection is given on the + wire and relay DD releases.

Relay DD releasing

- DD1 operates relay J.
- DD2 no function.

Relay J operating

- J1 locks relay J.
- J2 prepares a circuit for relay JB.
- J3 connects earth to the - wire and relay DD again operates.
- J4 closes alternative circuit for relay DD.

Relay DD operating

- DD1 no function.
- DD2 operates relay JB.

Relay JB operating

- JB2 removes full earth from the - wire and substitutes relay D which operates.
- JB3 locks relay JB to earth at KB4.
- JB4 removes a short circuit across LL4 (ring-off).
- JB5 prepares a circuit for relay LL (ring-off).
- JB1)
JB6) removes ring-tone (if provided)
- JB7 disconnects machine start (if provided)

Relay D operating

- D1 operates relay DR.
- D2 spare.

Relay DR operating

- DR1 disconnects operate circuit of relay J.
- DR2 prepares a circuit for relay DK.
- Conversation may now take place.

4.3 Ring-off.

A ring-off signal operates relay L.

Relay L operating

- L1 operates relay LL.

Relay LL operating

- LL1)
LL2) No function.
LL3)
- LL4 • no function.
- LL5 operates relay KR.
- LL6 disconnects the + wire for supervisory purposes.

Relay KR operating

- KR1 opens operate circuit for relay DK and holds relay DR.
- KR2 disconnects relay J.

Relay J releasing

- J1)
J2) no function.
- J3 disconnects relay D from -ve lead.
- J4 further disconnects relay DD and connects relay D to -ve lead.
Relay D operates and remains operated until operator withdraws.

Relay L releasing

- L1 disconnects relay LL.

Relay LL releasing

LL1)
LL2)
LL3) no function
LL4)
LL6)

LL5 disconnects relay KR which releases slowly.

Relay KR releasing

KR1 disconnects alternative hold circuit for relay DR and prepares to operate relay DK.

KR2 no function.

4.4 Release.

As soon as the plug is withdrawn from the jack, relay D releases.

Relay D releasing.

D1 disconnects relay DR and operates relay DK.

D2 spare contact.

Relay DK operating.

DK1 temporarily locks relay DK.

DK2 disconnects relay KA and KB.

DK3 further disconnects relay LL.

DK4 disconnects relay H.

All operated relays now release and the junction hunter JH restores to normal.

4.5 All Junctions Busy.

In the event of all junctions being busy when a call is originated the junction hunter JH drives to the 25th terminal where relays KA and KB operate as previously described. Relay OF also operates via the DD battery.

Relay OF operating.

OF1 operates relay DR.

Relay DR operating.

DR1 no function

DR2 operates relay DK.

Relay DK operating restores the circuit to normal as previously described and the subscriber will not hear ringing tone.

4.6 Revertive Call.

Revertive calling is by means of the subscriber's hand generator. Any break in the ringing causes the operation of relay LC which locks and, at contact LC2, prevents the operation of relay LL. When the ringing ceases and both relays LA and LB release, then relay LC also releases and the circuit is normal.

4.7 Call from Manual Board to Rural Subscriber.

Relay A operates when the circuit is seized.

Relay A operating

A1 operates relay B.

Relay B operating.

B1 prepares an operating and locking circuit for relay TA, TB and TC.

B2 disconnects battery from, and connects earth to, the "P" wire.

B3 connects busy tone to the A relay.

B4 closes the machine start circuit.

On hearing the busy tone, the operator should ring on the circuit to operate relay OC and, if the circuit is not engaged on a call to the manual board, then busy tone will disappear.

Relay OC operating.

OC1 operates relay TA.

Relay TA operating.

TA1 locks relay TA.

TA3 prepares a circuit for relay TB.

TA2) closes transmission path
TA4)

Relay OC releasing.

OC1 operates relay TB (if the circuit is not already in use).

Relay TB operating

TB1 locks relay TB.

TB2 prepares a circuit for relay LL (ring-off).

TB3 operates relay TBA.

TB4 disconnects busy tone.

Relay TBA operating

TBA1 prepares a circuit for relay RR.

TBA2)
TBA3) reverses - and + for supervisory purposes.

The operator can now code-ring the wanted party. Relay OC follows the code ring.

Relay OC operating

OC1 no function

OC2 operates relay RR.

Relay RR operating

RR1 disconnects relay L.

RR2) disconnects the transmission path and connects continuous
RR3) ringing and ringing return earth to line.

Conversation may now take place.

4.8 Ring-off before operator withdraws plug.

Relay L operating

L1 operates relay LL.

Relay LL operating

LL1 temporarily locks relay LL.

LL2 no function.

LL3 disconnects relay TB.

LL4 operates relay TC.

LL5 no function.

Relay TC operating.

TC1 prevents the return of busy tone when TB releases.

TC2 further disconnects relay TB.

TC3 locks relay TC.

TC4 opens a possible circuit for relay H.

TC5 disconnects the locking circuit for relay LL.

TC6 disconnects the machine start circuit.

TC7 disconnects a possible circuit for relay LA.

Relay TB releasing

TB1)
TB2) no function
TB4)

TB3 disconnects relay TBA.

Relay TBA releasing

TBA1 no function.

TBA2)
TBA3) restores reversal of - ve and + ve leads.

4.9 Release.

As soon as the operator withdraws the plug, relay A releases which releases relay B. Contact B1 releases relays TA and TC and the circuit is again normal.

4.10 Ring-off after the Operator has withdrawn the Plug.

In the event of the operator withdrawing the plug before the subscriber rings off, the circuit will release as in 4.9 except that relay TB will also release when contact B1 opens. The subsequent ring-off will be ineffective.

5. Design Notes.

Relay LA with the assistance of an electrolytic condenser should have a combined operate and release time of three seconds.

Relay LB should have a release lag of 250-350 m.s.

Relay LL should have a 1 in. armature end slug and have a release lag of 100-150 m.s.

Relay H should have a $\frac{1}{2}$ in. armature end slug.

Relay DR should have a release lag of 200-300 m.s.

Relay DK should have a release lag of 200-300 m.s.

Relay B should have a release lag of 200-300 m.s.

Code ringing by the operator must be deliberate, particularly if this circuit is used in conjunction with GBW.14450. Because of the time taken for a U.A.X. ringer to reach full output, it must be left running from the time the circuit is seized by the U.A.X. group selector until a ring-off is received or until the operator withdraws the plug.

END OF NOTES