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POST OFFICE TELECOMMUNICATIONS HEADQUARTERS

DIAGRAM NOTES AT 60078C

SPECIFICATION T 60078C

PULSE SUPPLY, & MONITORING FOR LOCAL CALL TIMING INCLUDING ROUTINE-TEST UNBARRING CONTROL UAX NO. 13

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1. GENERAL

The diagram shows the connexions of the equipment used at UAXs No. 13 for:-

(a) the supply of periodic negative-battery pulses to local call timing equipment TP relays and coin and fee checking equipment TP relays.

(b) the supply of periodic negative-battery pulses to DC junction signalling equipment and WB oscillators where pulse repetition to distant exchange(s) is required.

(c) the supply of periodic negative-battery pulses to supply pulse check circuit at exchange(s) where a supply pulse generator is required.

(d) making a remote check of the local negative-battery pulse supplies.

(e) unbarring the level '1' and '0' circuits to incoming junction calls, so permitting remote routine testing of the STD and assistance circuits to the GSC.

The following typical diagrams, or their equivalents, should be considered in conjunction with this diagram:-

AT 4082	UNIT AUTO. EXCHANGES NO. 13. MISCELLANEOUS CIRCUITS.
AT 60085	FINAL SELECTOR 2-10 TYPE. UNIT AUTO. NO. 13. (AT 5279 MODIFIED).
AT 60090	SHELF JACK WIRING CONNEXIONS FOR RECEIVER CARRIER WB NO. 700A. UAX NOS. 12, 13 & 14.
AT 60528	OUTGOING SIGNAL CONVERSION RELAY SET FOR LOCAL CALL TIMING PULSE DISTRIBUTION DC JUNCTION SIGNALLING. 2000 TYPE.
AT 60529	INCOMING SIGNAL CONVERSION RELAY SET FOR LOCAL CALL TIMING PULSE DISTRIBUTION DC JUNCTION SIGNALLING 2000 TYPE.
AT 60638	PULSE GENERATOR. MULTI-PHASE PULSE SUPPLY FOR LOCAL CALL TIMING. 2000 TYPE.

AT 60713	SHELF JACK FOR SUPPLY PULSE GENERATOR FOR LOCAL CALL TIMING WITHOUT STANDBY EQUIPMENT UAX's & SAX's. 2000 TYPE
AT 60720	SUPPLY PULSE CHECK CIRCUIT FOR LOCAL CALL TIMING WITHOUT STANDBY EQUIPMENT SAX's AND UAX's.
AT 60721	CONTROL AND ALARM FOR LOCAL CALL TIMING WITHOUT STANDBY SAX's AND UAX's. 2000 TYPE.
WB/WBW 24158	OSCILLATOR UNIT WB NO. 700.
WB/WBW 24160	RECEIVER CARRIER WB NO. 700A.

2. FACILITY SCHEDULE

Provision is made for:-

2.1 Receiving the master pulses in the form of earth pulses from the Signalling System WB 700 equipment, or its equivalent (e.g. DC junction signalling equipment or a supply pulse generator).

2.2 Separate master pulses and associated local pulse supply for ordinary and CCB metering rates.

2.3 Producing from the master pulses, local negative-battery pulses of 250 ms minimum duration to operate or in readiness to operate:-

(a) The TP distribution relays whenever a call is set up in the UAX.

(b) The supply pulse check circuit at exchange(s) with supply pulse generator.

2.4 Continuous pulse supplies to WB oscillators and DC junction signalling equipment where pulse repetition to distant exchange(s) is required.

2.5 Monitoring the local negative-battery pulses by seizing a final selector multiple test number and listening to NU tone interrupted at the periodicity of the local negative-battery pulses being fed to the distribution relays. A separate test number is necessary for ordinary and CCB pulse supplies.

2.6 The barring condition to be removed from the level '1' and '0' circuits which normally prevents access to the GSC via levels '1' and '0' from an incoming junction at the UAX.

2.7 A key for the disconnexion of the supply pulse generator from the distribution for generator maintenance.

3. CIRCUIT DESCRIPTION

3.1 Outline

3.1.1 Pulse Supply and Distribution (Fig. 1, 10A and 10B)

Master pulses to control the local pulse-supply relays are obtained from the Signalling System WB 700 network or equivalent source, (eg junction signalling equipment or pulse supply generator), which make provision for separate pulse supplies for ordinary and CCB tariffs. The circuit is started by the 'ringer start' signal when a call is set up in the UAX and a start signal is extended to the Receiver of the WB carrier 700A, or equivalent. This results in the return of earth connected master pulses. These pulses are used

to control the Generation of timed battery pulses which in turn are used to control the distribution relays, and dc junction signalling relay set, where provided. Separate guarded feeds from each source are also provided when pulse repetition to distant exchange(s) via the WB system is required.

3.1.2 Pulse Supply Monitoring (Fig. 2)

Seizure of a pulse supply monitoring test number causes connexion of the odd feed from the particular local pulse supply (i.e. ordinary or CCB), which interrupt the MU tone on the test number at the periodicity of the pulses from the supply. A remote aural check can thus be made of the functioning of the local pulse supply circuit at the UAX.

3.1.3 Routine-Test Unbarring Control (Fig. 2)

Under normal circumstances levels '1' and '0' at the UAX are barred to incoming junction calls. This circuit however permits operators at the parent exchange to disconnect the barring condition in order that remote routine testing of the level '1' and '0' junction circuits may be carried out.

The first pulse-supply test number is dialled and MU tone received, the operator then applies the trunk offering signal and holds the connexion. The re-application of ring-return battery to the test number equipment results in the removal of barring conditions from the level 1 and 0 relay sets.

3.1.4 Generator Receive Maintenance (Fig. 2)

The operation of the generator receive maintenance key disconnects the supply pulse generator ordinary and CCB tariff rate feeds from the pulse distribution.

3.2 Detail

If, in describing the operation or release any relay or contact is not mentioned, it should be assumed that it performs no useful function at that stage.

3.2.1 Pulse Supply (Figs. 1, 10A and 10B)

The circuit operation for the ordinary tariff rate only is described, as that for the CCB tariff rate is identical.

Whenever an earth is applied to the UAX Ringer-start Common relay PS operates, except where pulse repetition to distant exchange(s) or a supply pulse generator is provided, when relay PS is not used.

Relay PS operating,
PS1 connects earth to the Start-earth Connexion to start the master pulse device supplied to relays PO and PC.

Where pulse repetition to distant exchange(s) is provided, earth is connected direct to the Start-earth Connexion.

Where a supply pulse generator is provided the Start-earth connexion is not required.

Relay PO operating periodically,
PO1)
PO2) operating relay PC.

to control the Generation of timed battery pulses which in turn are used to control the distribution relays, and dc junction signalling relay set, where provided. Separate guarded feeds from each source are also provided when pulse repetition to distant exchange(s) via the WB system is required.

3.1.2 Pulse Supply Monitoring (Fig. 2)

Seizure of a pulse supply monitoring test number causes connexion of the odd feed from the particular local pulse supply (i.e. ordinary or CCB), which interrupt the NU tone on the test number at the periodicity of the pulses from the supply. A remote aural check can thus be made of the functioning of the local pulse supply circuit at the UAX.

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Under normal circumstances levels '1' and '0' at the UAX are barred to incoming junction calls. This circuit however permits operators at the parent exchange to disconnect the barring condition in order that remote routine testing of the level '1' and '0' junction circuits may be carried out.

The first pulse-supply test number is dialled and NU tone received, the operator then applies the trunk offering signal and holds the connexion. The re-application of ring-return battery to the test number equipment results in the removal of barring conditions from the level 1 and 0 relay sets.

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The operation of the generator receive maintenance key disconnects the supply pulse generator ordinary and CCB tariff rate feeds from the pulse distribution.

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3.2.1 Pulse Supply (Figs. 1, 10A and 10B)

The circuit operation for the ordinary tariff rate only is described, as that for the CCB tariff rate is identical.

Whenever an earth is applied to the UAX Ringer-start Common relay PS operates, except where pulse repetition to distant exchange(s) or a supply pulse generator is provided, when relay PS is not used.

Relay PS operating,
PS1 connects earth to the Start-earth Connexion to start the master pulser which supplied to relays PO and PC.

Where pulse repetition to distant exchange(s) is provided, earth is connected direct to the Start-earth Connexion.

Where a supply pulse generator is provided the Start-earth connexion is not required.

Relay PO operating periodically,
PO1)
PO2) operates relay PC.

Relay POR	operating,
POR1	disconnects earth from and prepares to connect a 150 battery to the ORO wire.
POR2	disconnects earth from and prepares to connect a 150 o battery to the ORB wire. Also disconnects a 1000 ohm earth from and prepares to connect 1150 ohm battery to the OWB wire when provided.
Relay PO	releasing when the master pulse terminates,
PO1) PO2)	complete the circuits prepared by contacts POR1 and POR2 and also disconnect relay POR which releases.
Relay POR	releasing slowly,
POR1	disconnects the 150 ohm battery from, and re-connects earth to, the ORO wire.
POR2	disconnects the 150 ohm battery from, and re-connects earth to, the ORB wire. Also disconnects the 1150 ohm battery from, and re-connects a 1000 ohms earth to, the OWB wire when provided.

Relays PO and POR continue pulsing as described, either continuously, where pulse repetition to distant exchange(s) or a supply pulse generator is provided, or until earth is removed from the Ringer-start Common, when relay PS releases.

Relay PS	releasing,
PS1	disconnects earth from the Start-earth Connexion to stop the repetition of master pulses to relays PO and PC.

3.2.2 Pulse Supply Monitoring (Fig. 2)

Seizure of the ordinary pulse supply monitoring test number by a final selector operates relay TS to an earth on the P1 wire.

The 270 ohm battery on the -1 wire trips the ringing in the final selector circuit, resulting in earth being extended via the final selector D relay and the +1 wire to operate relay SW. The current is insufficient to operate relay D in the final selector circuit.

Relay TS	operating,
TS1	disconnects relay TT from the P2 wire and thus busies the CCB test number.
TS2	connects relay CP to the CRO wire.
TS3	connects NU tone to retard coil I.
TS4	prepares a hold circuit for relay SW.
Relay SW	operating,
SW1(x)	completes a hold circuit for relay SW to the earth on the P1 wire.
SW2	disconnects the ring-trip battery from, and connects retard coil I to, the -1 wire.
SW3	disconnects the operate circuit for relay SW from, and connects the retard coil I via capacitor C1 to, the +1 wire.
Relay CP	operating to the battery pulses on the ORO wire,
CP1	interrupts the NU tone supply to retard coil I at the periodicity of the ordinary pulse supply.

The interrupted NU tone returned to the caller gives a positive indication of the correct functioning of the local pulse supply.

When the caller clears, the earth is removed from the P1 wire. Relays TS and SW release.

Relay TS	releasing,
TS1	re-connects relay TT to the P2 wire.
TS2	disconnects relay CP from the ORO wire.
TS3	disconnects NU tone from retard coil I.

Seizure of the CCB pulse supply monitoring test number by a final selector results in a similar circuit operation. The exception is that relay TT is operated instead of relay TS and relay CP is connected to the CRO wire. NU tone to the caller is then interrupted at the periodicity of the CCB pulse supply.

3.2.3 Routine-Test Unbarring Control (Fig. 2)

On seizing the ordinary pulse supply monitoring test number the circuit functions as described in para. 3.2.2. If the circuit is seized by an operator, subsequent application of a trunk-offering signal releases relay F in the final selector circuit. Ringing and ring-return battery are re-connected to the -1 and +1 wires respectively and ring tone returned to the operator. The ring-return battery on the +1 wire operates relay CO.

Relay CO	operating,
CO1(x)	completes a hold circuit for relay CO to the earth on the P1 wire.
CO2	disconnects retard coil I from the final selector circuit.
CO3	connects earth to the COR wire to cause the removal of barring from the level '1' and '0' relay sets.

When the operator clears, the earth is removed from the P1 wire. Relays TS, SW and CO release.

Relay TS	releasing,
TS1	reconnects relay TT to the P2 wire.
TS2	disconnects relay CP from the ORC wire.
Relay CO	releasing,
CO3	disconnects earth from the COR wire to cause the restoration of barring on the level '1' and '0' relay sets.

3.2.4 Generator Receive Maintenance (Fig. 11)

A generator Receive Maintenance Key (KGM) is provided to disconnect the generator from the distribution for maintenance purposes.

Key KGM	
KGM1)	disconnect the ordinary and CCB tariff rate feeds
KGM2)	from relays PO and PC respectively.
KGM3	extends earths to the Control and Alarm circuits

4. DESIGN DETAILS

4.1 Relays

The following relays are made slow to operate for the following reasons:-

Relays PO and PC	to make them less likely to respond to extraneous transient conditions.

The following relays are made slow to release for the following rea

Relays PCR and PCR — to provide local supply pulses of a duration which is less dependent upon the duration of the master pulses.

Relay CP — to lengthen the MU tone interruption periods. This aids recognition of the pulses being monitored.

Relays with other special features are as follows:-

Relay SW — has a high resistance operate winding which permits it to operate in series with relay D in the final selector circuit without relay D itself operating.

Retard Coil I — has a high resistance line winding which prevents ring-trip in the final selector circuit when a trunk-offering signal is applied as in par. 3.2.3.

To ensure satisfactory operation of the circuit the static lags of relays which have timing requirements should be within the limits shown in the table below (excepting those marked NC). Limits marked NC are not critical for the correct operation of the circuit but will not normally be exceeded. All times quoted are in milliseconds.

Relay	Release Lag		Operate Lag	
	Min.	Max.	Min.	Max.
CP	400 NC	600 NC		
PO			40	80 NC
PC			40	80 NC
POR	250	375 NC		
PCR	250	375 NC		

4.2 Contacts

The following contacts, not fully described previously, are provided for the following reasons:-

Contact CO1 — 'x' - action reduces the tendency for relay CO to chatter when operating to the final selector circuit ring-return battery.

Contact TT5 — performs no useful function. It is provided however to cater for a possible additional facility.

4.3 Resistors

Resistor R6 — prevents the accumulation of a charge on capacitor C1 which could cause false operation of relay CO.

4.4 Rectifiers

Rectifier MR1 — assists in the operation of relay CO. A positive-going half-cycle of ringing current through relay CO is additive to the ring-return battery potential, whilst a negative-going half-cycle is suppressed.

4.5 Common Services

This circuit has been designed to work in conjunction with the following common services:-

MU Tone Earth	..... AT 60131
Ringer-Start Common	..... AT 5406

5. HISTORY

Issue A — Figures 3 to 9 deleted and transferred to AT 4082. Pulse repetition to distant exchange(s) provided. Editorial changes made.

Issue B — Pulse Output leads and note 2 amended. Editorial changes made.

Issue C — Figure 11 and Note 7 added, Editorial changes.

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END OF DIAGRAM NOTES