

DIAGRAM NOTES (ISSUE 1)

concerning
DIAGRAM G. B. W. 14190
titled
50/1200 LINE P. A. B. X.

INTER-SWITCHBOARD PRIVATE WIRE CIRCUIT

(GENERATOR AND BALANCED BATTERY SIGNALLING)

1. GENERAL

This diagram shows the inter-switchboard private wire circuit for use with Private Automatic Branch Exchanges.

The following diagrams should be considered in conjunction with this diagram:-

Manual Ring and Alarm Circuit (GBW.14230)
Cord Circuits (GBW.14210)

2. FACILITY SCHEDULE.

Provision is made for:-

- (1) Bothway working with generator or balanced battery signalling.
- (2) Incoming calls to light the line lamp and cause an audible alarm to be given.
- (3) Access to and from the circuit via the P. A. B. X. Manual Board.
- (4) Generator clear.
- (5) A flashing supervisory facility on inward clear and re-call.
- (6) Public Exchange prohibition.
- (7) Busy conditions to be extended to the multiple jacks when the circuit is in a calling condition.
- (8) Calling facilities to be disconnected under night service conditions.

3. CIRCUIT DESCRIPTION

3.1 Outline

Incoming calls over the inter-switchboard line cause the associated line lamp to glow. At the same time an audible alarm is given on the switchboard. Ring tone is returned to caller.

The operator answers the call by operating the Speak Key of a cord-circuit and inserting the answer plug into the line jack. The call is then connected via the calling cord of the cord circuit.

The operator may originate outgoing calls over the circuit by inserting the plug of a calling cord into the line jack and operating the ring key. This connects a calling signal to the line.

The call may be connected to an extension as previously described.

The circuit cannot be used under night service conditions.

3.2 Detail.

Incoming calls.

The connection of the calling signal, generator or

balanced battery (see table on diagram), causes relay AC to operate.

Relay AC operating

AC1 operates relay CR

Relay CR operating

CR1 completes a hold circuit for relay CR from earth on SR2.
CR2 completes a circuit to light the line lamp
CR3 connects earth to the audible supy. lead, thereby sounding the audible alarms.
CR4 prevents the operation of relay BS should the P.A.B.X. operator enter the circuit whilst the calling signal is connected.
CR5 applies earth to sleeve of jack in order to busy the circuit.
CR6 returns ring tone to caller.
CR7 connects earth to ring start lead.

The operator answers by operating the Speak Key of a cord circuit and inserting the plug of the answering cord into the inter-switchboard line jack.

The auxiliary springs of the jack operate relay SR

Relay SR operating

SR1 prepares an operate circuit for relay S.
SR2 disconnects holding circuit for relay CR which releases.
SR3 prepares a circuit for relay BS, and disconnects operating circuit for relay CR.
SR4 disconnects calling lamp and completes a bridge network for relay S.
SR5 disconnects line impedance used to stabilise line when repeatered circuits are employed.

Relay CR releasing

CR1 further disconnects hold circuit for relay CR.
CR2 further disconnects calling lamp.
CR3 disconnects the audible alarm.
CR4 further prepares operating circuit for relay BS.
CR5 further disconnects original busying earth on sleeve of jack.
CR6 disconnects ring tone.
CR7 disconnects earth on ringer start lead.

An earth is extended from the sleeve of the plug to operate relay S.

Relay S operating

S1 } extend the cord circuit ring and tip connections.
S2 }

Relay AS in the cord circuit sleeve operates in series with battery via resistors R2 and R3. The 1200 ohm loop (R5 and R6) across the tip and ring operate the LA relay in the cord circuit thereby extinguishing the supervisory lamp.

The P.A.B.X. operator is now able to speak to the calling operator and ascertain the number of the required extension.

Connection to the extension is effected via the associated

calling cord in the normal manner.

Release.

(a) Called extension releases.

In this event a clearing signal is given by the cord circuit supervisory lamp in the normal manner. The operator then re-enters the circuit, connects a clearing signal to the line (see call signal "Outgoing call") and removes the plugs to clear down the connection. Relays S and SR release and the circuit is then available for use on other calls.

(b) Calling operator clears the connection.

If the calling operator clears the connection, a clearing signal is connected to the line in a similar manner to that in which the calling signal was connected.

Relay AC re-operating

AC1 completes an operate circuit for relay BS.

Relay BS operating

BS 1 disconnects the normal operate circuit for relay CR and prepares a hold circuit for relay BS should the P.A.B.X. operator remove the plug whilst the clearing signal is connected.

BS2 connects an earth to the tip and ring of the plug via 600 ohm resistor thereby operating the differentially connected D relay. The supervisory lamps flash.

The P.A.B.X. operator re-enters the circuit and after challenging removes the plug to release the circuit as previously described.

Outgoing call.

When the operator originates an outgoing call over the circuit, a calling plug is inserted into the jack, operating relays S and SR as previously described.

The ring key is then operated which connects continuous ringing to the tip and ring of the cord to call the distant switchboard. Ringing current flows through the primary windings of transformer TR1, capacitor and is rectified by rectifier MR2 to operate relay RR. During the time the ring key is operated the supervisory lamp on the manual board is lighted.

Relay RR operating

RR1 disconnects earth to prevent the false operation of relay BS and operates relay RL.

RR2 disconnects the shunt load of transformer TR and connects both primaries of transformer TR in parallel in order to reduce the impedance in series with relay RR.

Relay RL operating

RL1) disconnect relay AC and connect either generator
RL2) or balanced battery to the A and B lines depending upon the method of signalling employed.

The connection of the calling conditions to the line causes a calling signal to be given at the distant switchboard

and the operator may then restore the Ring Key.

Connection to an extension and clearing are effected as described for incoming call.

Public Exchange prohibition.

By virtue of being a Private circuit, the connection of calls to the Public Exchange lines is not permitted.

If the operator attempts to extend a call to an Exchange Line, an earth via 150 ohm resistance is connected to the sleeve of the jack by the cord circuit. Relay S is then in a balanced condition and on releasing opens the connection to the manual board.

Night Service Conditions.

Before leaving the switchboard, the operator operates the Night Service Key causing certain circuits to be switched for unattended operation. Under these conditions earth is disconnected from the Night Service Key to prevent relay CR from operating if an incoming call occurs.

END.