5

COMMON SYSTEMS
TWO-WAY TRUNK CIRCUIT
TO SUBSCRIBER LINE CIRCUIT
INCOMING RINGDOWN OUTGOING AUTOMATIC OR
2 WAY RINGDOWN TO OTHER DESKS
LOCAL TEST CABINET NO. 3
KEY CABINET NO. 20 OR 21 - LT DESK NO. 14
CGT TEST BOARD - MASTER TEST FRAME
CHIEF SWITCHMAN'S DESK SENDER M. B. FRAME
TEST SUPERVISOR'S PRIVATE DESK
REPAIR SERVICE DESK NO. 2
CABLE TEST DESK NO. 3 OR
ESS NO. 1 MASTER CONTROL CENTER

CHANGES

D. Description of Changes

D.1 Leads RC and RN to the No. 1 ESS Line and TRK Test Circuit are changed as follows:

Lead RC now designated lead R, CA, or CA1
Lead RN now designated lead B, GRD.

The connecting information on these leads is enlarged to now include "Key Telephone System No. 1A2 503A1 Key Service Unit."

D.2 The multipling information on leads L and LU to No. 1 ESS office alarm circuit is changed to read: "To all similar circuits on same frame."

D.3 CADs Fig. 56, 57, and 58 are changed and Fig. 59 is added.

D.4 The above information was previously furnished to the Western Electric Company in the form of an SDC-(16A).

F. Changes in CD Sections

F.1 Under 4. CONNECTING CIRCUITS, add:

(ag) Key Telephone System No. 1A2 - 503A1 Key Service Unit - SD-69518-01 (typical).

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 2366-JEK-RMW

COMMON SYSTEMS
2-WAY TRUNK CIRCUIT
TO SUBSCRIBER LINE CIRCUIT
INCOMING RINGDOWN OUTGOING AUTOMATIC OR
2-WAY RINGDOWN TO OTHER DESKS
LOCAL TEST CABINET NO. 3
KEY CABINET NO. 20 OR 21 - L.T. DESK NO. 14
OGT. TEST BOARD - MASTER TEST FRAME
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SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

This circuit is for use in originating and receiving calls over a subscriber line circuit.

SECTION II - DETAILED DESCRIPTION

1. INCOMING CALL (Fig. 1 and A)

When ringing voltage is applied across the tip and ring the ac component of this voltage flows through the D capacitor and in a few cycles reduces the resistance of the 1A thermistor sufficiently to permit the R relay to operate on its secondary winding. Surges on the line are of short duration and do not sufficiently reduce the resistance of the thermistor to operate the R relay. The A varistor is poled in such a direction as to effectively shunt the R relay secondary winding when the voltage is of the polarity to oppose the primary winding ampere turns. When the polarity is such as to aid the primary winding the varistor is high resistance and the R relay operates on its secondary winding and locks on its primary winding. Since the varistor permits only adding current flow in the secondary winding the alternating current does not tend to release the relay differentially. The R relay operated causes the auxiliary signal circuit to indicate an incoming call and the lamp to light steady (K or Y option) or flashing (K, R, or X option).

When N option is provided, the incoming signal can be prevented from locking in, when the office is unattended at night or when incoming calls are transferred to another desk or switchboard by means of a key in the desk transfer circuit, the audible alarm circuit, the alarm transfer circuit, or the alarm sending circuit. The key removes the locking ground for the primary winding of relay R and incoming signals will not lock in.

1.1 Incoming Call Answered

When the associated key is operated, ground on the "K" lead operates the K relay and a low resistance bridge is placed across the tip and ring which will trip any machine ringing and will give off-hook supervision. The T and R resistors and W and Z options provide a minimum resistance to limit the acoustic disturbance to any calling subscriber during the tripping or ringing. The K relay operated releases the R relay, removes the bridge including the R relay secondary winding from across the tip and ring, and lights the lamp steady as a busy signal with T and X option. It also lights the lamp steady as a busy signal with J option except when the traffic is transferred. This option is used where the associated desk requires a busy signal but the location to which the traffic is transferred must not have a steady lamp as a busy signal.

A option provides 48 volts or ZA option provides 24 volts for use with J option when the associated trunk transfer circuit is equipped with a "B" lead.

1.2 Disconnect

When the associated key is released, the K relay releases and the bridge is removed from across the tip and ring restoring the circuit to normal.

2. ORIGINATED CALL

When the associated key is operated a low bridge is placed across the tip and ring originating a call through the subscriber line circuit, the same as from a subscriber line, and ground is received over the "K" lead operating the K relay. The K relay operated removes the bridge through the R relay secondary winding from across the tip and ring and with J, T, or X option lights the lamp steady as a busy signal. On release of the key the bridge is removed from across the tip and ring, releasing the connection. The release of the key also releases the K relay restoring the circuit to normal.

3. ELECTRICAL HOLD (FIG. 4)

With the associated trunk TALK key operated, the position hold key in the connecting circuit is momentarily operated and then the associated trunk key is thrown back to normal, releasing relay K. The hold key in operating, shorts the S winding of the A relay and the A relay operates through its P winding. When the A relay operates the B relay operates in turn operating the C relay. This condition is electrically held until the associated key is operated to the talk position again. This will cause the K relay to operate. When the K relay operates, ground is removed and the B relay releases. The A relay releases and then the C relay releases and the hold condition is released.

If the distant end disconnects while the hold condition exists, the hold condition will release and restore the circuit to normal.

4. GROUPING OF TRUNKS (FIG. 2 AND 3)

During periods of light traffic it may be required to group trunks. Operating the GRP key will cause relay G to operate, transferring an incoming call to a test supervisor's private desk or to the light load position at the local test desk.

5. OPERATION AT NO. 1 ELECTRONIC SWITCHING SYSTEM OFFICE (FIG. 1 AND B)

5.1 Incoming Call

When connection to a No. 1 ESS master control center is provided, an incoming call will cause relay R to operate on ringing as previously described in 1.

Relay R in operating will:

(a) Lock operated over leads "L" and "LU" if a key at the master control center has been operated, or just follow ringing if this key is released.

(b) Close leads "ST" to "LG" as a start signal to the key telephone system interrupter circuit.

(c) Close leads "RC" to "RN" to the line and trunk test circuit.

An interrupted battery will be applied to lead "LF" by the interrupter circuit causing the lamp associated with this trunk at the key telephone set to flash as an incoming call signal.

5.2 Incoming Call Answered

When the key associated with the flashing lamp is operated and the handset is removed from the switchhook of the telephone set, a talking connection is established and ground from lead "A1" is closed to lead "A" causing relay K to operate. Relay K in operating will:

(a) Release relay R.

(b) Change the flashing lamp to a steady lamp condition over leads "L" and "LG" to the key telephone system interrupter circuit.

5.3 Disconnect

When the call is completed and the key at the key telephone set is released, relay K will release restoring the circuit to normal.

5.4 Originated Call

The procedure for making an outgoing call is the same as for answering an incoming call, in that the pickup key associated with this trunk must be operated. This will operate relay K which will cause the associated lamp to light steady as a busy signal. Relay R will remain in a released condition while the call is in progress. Releasing the key at the completion of a call will cause a disconnect, as described in 5.3.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.1 Maximum Extension Loop Resistance - 1500 ohms.

1.2 Minimum Insulation Resistance - 10,000 ohms.

2. FUNCTIONAL DESIGNATIONS

None.

3. FUNCTIONS

The functions of this circuit are:

3.1 To provide a talking connection through a subscriber line circuit.

3.2 To lock in the signal on incoming calls when ringing current is received.

3.3 To provide a flashing lamp on an incoming call (K or X option).

3.4 To provide a steady lamp on an incoming call (M or Y option).

3.5 To operate the auxiliary signal on an incoming call.

3.6 To prevent false incoming signals on line surges.

3.7 To extinguish the line signal and release the auxiliary signal circuit when the call is answered.

3.8 To light the line lamp steady as a busy signal while the associated trunk key is operated. (J, T, S, or X option)

3.9 To prevent locking in the incoming signal when the desk traffic is transferred. (N option)

3.10 To prevent lighting the lamp steady as a busy signal when the desk traffic is transferred. (J option)

3.11 To provide for grouping the wire chief's central office lines to the supervisory and light load position of the local test desk.

3.12 To provide for controlling the locked-in signal when used with an audible alarm circuit, an alarm transfer circuit, or an alarm sending circuit. (N option)

3.13 To provide means for holding a trunk electrically.

3.14 In ESS offices, to provide loop closure on all control leads.

3.15 In ESS offices, to cause key telephone system (interrupter circuit) to operate to supply interrupted battery for flashing a lamp on incoming calls.

3.16 In ESS offices, causes key telephone system (interrupter circuit) to supply battery for lighting a lamp as a busy signal on outgoing or answered calls.

4. CONNECTING CIRCUITS

When this circuit is shown on a key-sheet the connecting circuit information thereon shall be followed.

(a) Key and Lamp of Telephone Circuit Repair Service Desk No. 2 - SD-90044-01 or SD-95717-01.

(b) Key and Lamp of Telephone Circuit - Test Supervisor's Private Desk - SD-90075-01 or SD-95722-01.

(c) Key and Lamp of Telephone Circuit - Local Test Desk No. 14 - SD-90050-01 or SD-95754-01.

(d) Key and Lamp of Telephone Circuit - Cable Test Desk No. 3 - SD-90271-01 or SD-95783-01.

(e) Key and Lamp of Telephone Circuit - Key Cabinet No. 20 - SD-95404-01.

(f) Key and Lamp of Telephone Circuit - Sender Make Busy Frame - SD-21702-01.

(g) Key and Lamp of Telephone Circuit - Chief Switchman's Desk - SD-95404-01.

(h) Key and Lamp of Telephone Circuit - Outgoing Trunk Test Board - SD-25107-01.

(i) Master Test Frame Telephone Key, Lamp and Jack Circuit - SD-25744-01.

(j) Key and Lamp of Telephone Circuit - SxS Manual Outgoing Trunk Test Frame - SD-32349-01.

(k) Master Test Frame - Jack, Lamp and Key Circuit - SD-25762-01.

(l) Miscellaneous Circuit for Miscellaneous Interrupter Frame - (Panel Office) - SD-21666-01 or SD-21667-01.

(m) Interrupter Frame Circuit (Crossbar Office) - SD-25062-01.

(n) Flashing Circuit - SD-90084-01 or SD-95725-01.

(o) Transfer and Auxiliary Circuit - SD-95407-01.

(p) Transfer and Make Busy Key Circuit - SD-90620-01 or SD-95736-01.

(q) Auxiliary Signal Circuit - SD-90628-01 or SD-95735-01.

(r) Subscriber Line Circuit (typical) - SD-25548-01.

(s) Repair Service Desk No. 2 Transfer Circuit - SD-90041-01, SD-95050-01, SD-95726-01 or SD-95729-01.

(t) Audible Alarm Circuit - SD-31551-01.

(u) Alarm Transfer Circuit Crossbar No. 1 - SD-25885-01.

(v) Alarm Transfer Circuit B.C.O. Panel - SD-20733-01.

(w) Alarm Transfer Circuit G.C.O. Panel - SD-20736-01.

(x) Alarm Sending Circuit Crossbar No. 5 - SD-95417-01.

(y) Auxiliary Signal, Flash and Transfer Key Circuit - SD-96230-01.

(z) Service Observing Circuit - SD-90266-01.

(aa) Key Telephone System 1A2 (Interrupter Circuit) - SD-69476-01.

(ab) ESS No. 1 - Office Alarm Circuit - SD-1A158-01.

(ac) ESS No. 1 - Line and Trunk Test Ckt - SD-1A132-01.

(ad) Toll Subscriber Line Circuit - SD-56389-01.

(ae) Key Telephone System 1A2 Key and Telephone Circuit - SD-69495-01.

(af) Key and Lamp Circuit Local Test Cable No. 3 - SD-96182-01.

SECTION IV - REASONS FOR REISSUE

CHANGES

B. CHANGES IN APPARATUS

B.1 Added:

K U1387 Relay, Fig. B.

B.2

Superseded	Superseded By
R UA63 Relay - U Option	R UA57 Relay - D Option

D. DESCRIPTION OF CHANGES

D.1 In Fig. 1 ZD option is designated and option ZE is added for use when connection is required for the No. 1 Electronic Switching System (ESS).

D.2 Fig. A which was formerly part of Fig. 1, is so designated.

D.3 Fig. B is added for use when connection is required for the No. 1 ESS.

D.4 Notes 101, 102, 103, and the Option Used index are changed and Notes 104, 106, and 107 are added to reflect changes on this issue.

D.5 The title is changed to add "ESS NO. 1 - Master Control Center".

D.6 CAD Fig. 54 and 55 are rated "Mfr Disc" and Fig. 56, 57, and 58 are added.

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