



COMMON SYSTEMS  
KEY CABINET NO. 20  
LOCAL TEST DESK NO. 14  
REPAIR SERVICE DESK NO. 2  
TEST SUPERVISOR'S PRIVATE DESK  
CABLE TEST DESK NO. 3, CHIEF SWITCHMAN'S  
DESK, OUTGOING TRUNK TEST BOARD  
OR SENDER MAKE BUSY FRAME  
2 WAY 2 WIRE AUTOMATIC TRUNK CIRCUIT

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

- D.1 The "F" lead formerly connected to the back contact of the interrupter only and the information in the box was as follows: "Misc. ckt. for misc. int. fr." In note 106 the interrupters in figs. A & B are designated "panel" and fig. C for crossbar is added. Prior to issue 2-D the note under figs. A, B & C was as follows: "Provide fig. A when this int. is available otherwise provide fig. B."
- D.2 Prior to issue 2-D the information at the "T" & "R" leads was "To 2 wire 2 way automatic trunk per fig. 1 in same or connecting desk".

All other headings under "Changes", no change.

1. PURPOSE OF CIRCUIT

- 1.1 This circuit is designated to provide a 2 way talking connection, which is automatic in operation, between two maintenance desks in different buildings over a 2 wire circuit.

2. WORKING LIMITS

- |     |                              |             |
|-----|------------------------------|-------------|
| 2.1 | Relay (A) - 40-56V           | 45-50V      |
|     | Max. Ext. Res. - 1735 ohms   | 2275 ohms   |
|     | Min. Ins. Res. - 30,000 ohms | 30,000 ohms |
|     | Earth potential - $\pm$ 20V  | $\pm$ 20V   |

3. FUNCTIONS

- 3.1 To provide a talking connection between two maintenance desks in different buildings.
- 3.2 To flash the associated lamp on an incoming call when "M" or "F" wiring is used.

- 3.3 To cause the associated lamp to light steadily on an incoming call when "N" wiring is used.
  - 3.4 To cause the associated lamp to light steadily when a call is answered and until both ends have disconnected when "Z" wiring is used.
  - 3.5 To extinguish the associated lamp when a call is answered and "Z" wiring is omitted.
  - 3.6 To cause the auxiliary signal circuit to function on an incoming call.
  - 3.7 To retire the auxiliary signal when the call is answered.
  - 3.8 To signal the distant end when a call is originated over this circuit.
  - 3.9 To cause the associated lamp to light steadily when a call is originated and "Z" wiring is used.
  - 3.10 To prevent the extinguishing of the busy lamp signals in both connecting desks while either end remains connected and to extinguish the busy lamp signal when both ends have disconnected.
  - 3.11 To restore to normal when both ends have disconnected at the termination of a call.
  - 3.12 To restore to normal upon disconnection of a call that was not answered.
4. CONNECTING CIRCUITS
- 4.01 Key and Lamp of Tel. Ckt. - Repair Service Desk No. 2.
  - 4.02 Key and Lamp of Tel. Ckt. - Test Supervisors' Private Desk.
  - 4.03 Key and Lamp of Tel. Ckt. - Local Test Desk No. 14.
  - 4.04 Key and Lamp of Tel. Ckt. - Cable Test Desk No. 3.
  - 4.05 Key and Lamp of Tel. Ckt. - Key Cabinet No. 20.
  - 4.06 Key and Lamp of Tel. Ckt. - Sender Make Busy Frame.
  - 4.07 Key and Lamp of Tel. Ckt. - Chief Switchman's Desk.
  - 4.08 Key and Lamp of Tel. Ckt. - Outgoing Trunk Test Board.
  - 4.09 Auxiliary Signal Ckt.

- 4.10 Miscellaneous ckt. for miscellaneous interrupter frame.  
(Panel office)
- 4.11 Interrupter Frame Circuit. (Crossbar office)
- 4.12 2-Way 2 Wire Automatic Trunk Ckt. in a distant building.
- 4.13 Flashing Circuit.

## DESCRIPTION OF OPERATION

### 5. GENERAL

This circuit is designed to operate with a circuit identical to this one. In connecting these two circuits together, the "T" and "R" leads of one is connected to the "R" and "T" leads, respectively, of the other.

### 6. ORIGINATING A CALL

When the key in the associated telephone circuit is operated to the "TALK" position ground is connected to the "K" lead operating relay (K). The operation of relay (K) (a) closes the ring conductor in part and (b) causes relay (K1) to operate. Relay (K1) operating (a) connects battery ("Z" wiring) to lead "L" which causes the associated lamp to light as a busy signal and (b) closes the ring conductor causing relay (A) to operate in series with the (A) relay in the connecting circuit which as described above, is a circuit identical to this one. Relay (A) operating operates relay (A1) which closes a locking ground for relay (K1). The (A) relay in the connecting circuit at the other end also operates causing its (A1) relay to operate which signals the distant end of the incoming call.

### 7. CALL ANSWERED

When the call is answered at the other end, the (K) and (K1) relays in the connecting circuit operate. These relays operating close a circuit from battery thru the "P2" winding of relay (A) of the connecting circuit to ground thru the "P1" winding of relay (A) of the end originating the call. Both (A) relays have been already energized, as described above and this condition therefore is set up to take care of the disconnect feature as hereinafter described.

### 8. INCOMING CALL

When a call is originated at the other end relay (A) operates from battery received thru the tip conductor. Relay (A) operating causes relay (A1) to operate which connects intermittent battery supplied over the "F" lead from the flashing circuit ("M" wiring) or supplied from the miscellaneous interrupter frame ("F" wiring) or connects direct

battery to the "L" lead ("N" wiring) causing the associated lamp to flash or light steadily as a signal that the call is incoming. The operation of the (A1) relay also connects ground to the "A" or "A1" lead causing the auxiliary signal circuit to function.

#### 9. INCOMING CALL ANSWERED

When the key in the associated telephone circuit is operated, relay (K) operates causing relay (K1) to operate. Relay (K1) operated (a) retires the auxiliary signal (b) disconnects intermittent or steady battery from lead "L", (c) connects direct battery to this lead where "Z" wiring is used causing the lamp to light steadily as a busy condition or extinguishes the lamp where "Z" wiring is omitted and (d) locks to ground on a make contact of relay (A1).

#### 10. DISCONNECTION

When the key in the associated telephone circuit at one end of the trunk is restored to normal but the key at the other end is not restored, the following action takes place. The release of the associated key removes a ground from lead "K" causing relay (K) to release. Relay (K) releasing (a) opens the circuit consisting of winding "P2" of relay (A) at one end and winding "P1" of relay (A) at the other end and (b) opens the operating circuit to relay (K1). Relays (A) and (K1) however do not release as relay (A) is held operated over its "P1" winding and relay (K1) is held locked to ground on contact of relay (A1). Under this condition, the busy lamp signals at both ends remain unchanged.

If a call which is originated at one end is not answered, restoring of the associated key in the telephone circuit causes relay (K) to release as heretofore described. Relay (K) releasing causes relay (A) to release which in turn causes relay (A1) to release. Relay (A1) releasing causes relay (K1) to release thus restoring the circuit to normal.

In order to restore the circuit to normal after a completed connection has been set up, the associated keys at both ends of the trunk should be released. Under this condition the (K) relays at both ends of the trunk release opening both sides of the trunk. This allows both (A) relays to release, in turn permitting both (A1) relays to release. The release of the (A1) relays permit both (K1) relays to release. The (K1) relays released, extinguishes the lamps at both ends of the trunk thus restoring both circuits to normal.