

## 5

CROSSBAR SYSTEMS  
NO. 3  
OUTGOING PLUG-ENDED TRUNK  
CIRCUIT  
REPAIR SERVICE DESK NO. 2  
HIGH-LOW SUPERVISION

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<u>SECTION I - GENERAL DESCRIPTION</u>		<u>SECTION II - DETAILED DESCRIPTION</u>
<u>1. PURPOSE OF CIRCUIT</u>		<u>1. NORMAL OPERATION - SC1</u>
1.01 This trunk circuit is used to connect a line to a repair service desk or a local test desk. Optionally, this trunk can remotely be made busy or transferred from the desk to a switchboard. The circuit is arranged for high-low supervision.		1.01 After the marker has determined that a trunk of this type is required, it finds and selects an idle trunk in the following manner:
		(a) Ground supplied by the trunk over the FT lead indicates to the marker that

at least one trunk in the required group on the associated trunk switch and connector circuit is idle.

(b) Ground supplied by the marker is looped through the idle trunk on leads TG and TT and is directed by the marker connector, trunk block, and trunk group relays to operate one of 12 TT- relays.

(c) Battery supplied by the marker and directed by the marker connector, trunk block, and TT- relay through lead TF, operates the F relay in the trunk.

1.02 The operation of relay F:

- (a) Operates the BY relay.
- (b) Opens the ring lead battery to the R lead through the CS relay winding.
- (c) Grounds the SW lead.
- (d) Transfers the incoming T and R leads from this circuit to the T1 and R1 leads, respectively.
- (e) Operates the S1 relay.
- (f) Transfers the incoming S lead from this circuit to the SL lead.
- (g) Locks its own winding to the TF lead.
- (h) Grounds the JC lead.

1.03 The operation of relay BY:

- (a) Opens the loop through leads TT and TG.
- (b) Opens the FT lead.
- (c) Opens the F relay operating path.

1.04 The operation of relay S1:

- (a) Supplies a holding ground for later use on the S lead.
- (b) Supplies a holding ground for the BY relay.
- (c) Provides its own lock path through a contact on the S relay.

1.05 When the marker has connected the line through the network to the trunk it:

- (a) Tests the T and R leads for continuity.
- (b) Tests the S lead for a false ground.
- (c) If above tests are successful, it releases the F relay.

(d) Releases itself.

1.06 The release of relay F operates the S relay over the customers loop.

1.07 The operation of relay S:

- (a) Operates the A relay.
- (b) Provides a holding ground for the S1 relay.

1.08 The operation of relay A:

- (a) Provides a holding ground for the TR1 relay, option 3.
- (b) Grounds the T lead through the CS relay winding.
- (c) Opens the operating path of the F relay.
- (d) Opens the loop through leads TT and TG.
- (e) Supplies battery to the R lead through the CS relay winding.
- (f) Opens the FT lead.
- (g) Provides its own locking circuit through contacts on the CS1 and TR1 relays, option 3.

1.09 The off-hook signal (ground on T and battery on R) alerts the desk attendant who answers the call. This loop closure operates the CS relay.

1.10 The operation of relay CS operates the CS1 relay.

1.11 The operation of relay CS1:

- (a) Operates the CS2 relay.
- (b) Partially closes the locking path for the A relay, option 3.

1.12 The operation of relay CS2 provides an operating circuit for the BY relay. The trunk is now in the talking state.

1.13 When the customer hangs up the S relay releases.

1.14 The release of relay S:

- (a) Releases the A relay.
- (b) Releases the S1 relay.

1.15 The release of relay A sends an on-hook signal to the desk circuit.

- 1.16 The release of relay S1 releases the channel between the line and trunk.
- 1.17 The on-hook signal alerts the desk attendant, who disconnects which releases the CS relay.
- 1.18 The release of relay CS releases the CS1 relay.
- 1.19 The release of relay CS1 releases the CS2 relay.
- 1.20 The release of relay CS2 releases the BY relay restoring the trunk to its idle state.

## 2. LINE RETURNS TO ON-HOOK BEFORE OPERATOR ANSWERS - SC2

- 2.01 When the customer hangs up the S relay releases.
- 2.02 The release of relay S:
  - (a) Releases the A relay.
  - (b) Releases the S1 relay.
- 2.03 The release of relay A replaces the off-hook signal with an on-hook signal to the desk circuit.
- 2.04 The release of relay S1:
  - (a) Releases the channel between the line and trunk.
  - (b) Releases the BY relay restoring the trunk to its idle state.

## 3. OPERATOR DISCONNECTS FIRST - SC3

- 3.01 When the desk attendant disconnects, the CS relay releases.
- 3.02 The release of relay CS releases the CS1 relay.
- 3.03 The release of relay CS1 releases the CS2 relay.
- 3.04 When the customer hangs up, the S relay releases, causing the sequence of operations per 2.02 to 2.04 which restores the trunk to its idle state.

## 4. REMOTE MAKE BUSY (OPTIONS 2 AND Y) - SC4

- 4.01 The circuit is arranged so that a group of trunks can be made busy from the desk position. A selected trunk of the

group is provided with option 2 and is referred to as the control trunk. This trunk and all other trunks in the group are provided with option Y.

4.02 When the desk attendant operates the make-busy key, battery is placed on the T lead and ground is placed on the R lead of the control trunk. This operates the P relay in the control trunk.

4.03 Operation of relay P operates the TR relay in the control trunk.

4.04 Operation of relay TR in the control trunk operates the BY relay in all trunks in the group making them all busy.

4.04 Release of the make-busy key, releases the P, TR, and BY relays in tandem, restoring the trunks to their idle state.

## 5. REMOTE TRANSFER (OPTIONS 2, Y, 3, X, S, AND T) - SC4

5.01 The circuit is arranged so that all but one of a group of trunks can be transferred from the desk to a switchboard. A selected trunk of the group is provided with options 2 and Y and is referred to as the control trunk. All other trunks in the group are provided with options 3 and X.

5.02 When the desk attendant operates the transfer key, battery is placed on the T lead and ground is placed on the R lead of the control trunk. This operates the P relay in the control trunk.

5.03 Operation of relay P operates the TR relay in the control trunk.

5.04 Operation of relay TR in the control trunk:

- (a) Operates the BY relay in the control trunk making it busy.
- (b) Operates the TR1 relay in all other trunks in the group.

5.05 Operation of relay TR1 in the non-control trunks:

- (a) Transfers the T and R leads from the desk to the switchboard. With option T, separate cables are used for the desk and switchboard connections. With option S, a common cable pair is used for connection to the desk, which is then transferred at the desk location to connect to the switchboard.

(b) Locks itself to a contact on the A relay.

(c) Provides a locking ground for the A relay.

5.06 Release of the transfer key, releases the P, TR, and BY and TR1 relays in tandem, restoring the trunks to their idle state.

## 6. TESTING

6.01 Testing of this trunk is performed by setting up a test connection to this trunk from a test line. Routine operations are performed from the test line to the distant desk attendant in the same manner as for a regular service call.

## 7. MISCELLANEOUS

7.01 Capacitors T and R are provided to isolate the incoming and outgoing circuits.

7.02 Network S is provided to protect the diodes in the line circuits.

## SECTION III - REFERENCE DATA

### 1. WORKING LIMITS

1.01 See the No. 3 crossbar keysheet for customer line supervision limits.

### 2. FUNCTIONAL DESIGNATIONS

#### 2.01 Relays

<u>Designation</u>	<u>Meaning</u>
A	Auxiliary (Customer)
BY	Busy
CS	Called Subscriber
CS1	Called Subscriber Auxiliary
CS2	Called Subscriber Auxiliary
F	Frame

<u>Designation</u>	<u>Meaning</u>
P	Polarized
S	Subscriber
Sl	Sleeve
TR	Transfer
TR1	Transfer Auxiliary

### 3. FUNCTIONS

3.01 See SECTION I and II for functions of this circuit.

### 4. CONNECTING CIRCUITS

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

- (a) Trunk Switch and Connector Circuit - SD-26383-01.
- (b) Traffic Usage Recorder Circuit - SD-96494-01.
- (c) Test Circuit - SD-26411-01.
- (d) Incoming Trunk Circuit - Repair Service Desk - SD-95782-01.
- (e) Transmission and Make-Busy Circuit - Repair Service Desk - SD-90620-01.
- (f) Incoming Trunk Circuit - Switchboard - SD-64754-01.

### 5. MANUFACTURING TESTING REQUIREMENTS

5.01 This circuit shall be capable of performing all the functions listed in this Circuit Description and meeting the requirements listed in the Circuit Requirements Tables.

### 6. TAKING EQUIPMENT OUT OF SERVICE

6.01 If it is desired to remove this trunk from service for trouble or other reasons, the test circuit is arranged to ground the MB lead which operates the BY relay. This sets the trunk in the busy state.

6.02 The test circuit can ground the MB lead by either of the following methods:

(a) Insertion of a make-busy plug in the associated TRK-MB jack.

(b) Operation of the remote make-busy facilities if they are provided.

6.03 Removal of ground from the MB lead will restore this circuit to service.

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