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STEP BY STEP SYSTEMS
NO. 1 OR 350A
2-WIRE TRUNK CIRCUITS
FROM SELECTOR AND CONNECTOR MULTIPLE
TO REPAIR SERVICE DESK NO. 2

CHANGES

D. Description of Changes

- D.1 Connecting information has been revised in this issue to show connection to the Park On Circuit.
- D.2 Fig. 64 and 65 have been added and Fig. 51, 57, and 58 have been revised to reflect these changes.
- D.3 This circuit has been rated A&M Only for 350A in this issue.

F. Changes in Description of Operation

- F.1 Under 4. CONNECTING CIRCUITS, add:
 - 4.12 Common Systems - Park On Trunk Circuit - SD-99374-01.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5641-WCB-RMW

STEP-BY-STEP SYSTEMS
NO. 1 OR 350A
2 WIRE TRUNK CIRCUITS
FROM SELECTOR AND CONNECTOR MULTIPLE
TO REPAIR SERVICE DESK NO. 2

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Option X, lead TT1 is added in Fig. 1 and the connecting information to the Transfer and Make Busy Circuit is added at the bracket for leads T, R, S, and TT1.

D.2 In Fig. A, former lead MB is changed to read MB or 3 and shown as connecting to Fig. 4 or Fig. 1, and "or Transfer Control Relay" is added to the title and the relay is designated MB or TC in place of MB.

D.3 Lead 3 connecting to Fig. A is added in Fig. 1.

D.4 Figs. 3, 4 and 5 are rated A&M Only and Fig. 2 is rated Mfr. Disc.

D.5 Note 102 is revised and Notes 103, 104 and 105 are added.

All other headings under Changes, no change.

1. PURPOSE OF CIRCUIT

1.1 The purpose of this circuit is to provide a trunk outgoing from local selector multiple to the No. 2 repair service desk arranged for transfer to a switchboard not in the same building with the desk. It is also arranged to combine the traffic from a connector multiple normally associated with the two-way trunk at the desk with the traffic of a selector multiple trunk when transferred, and to make busy trunks which are not transferred.

2. WORKING LIMITS

2.1

	Max. Ext. Ckt. Loop	Min. Insulation Resistance
Relay (L)	2500 ohms	15,000 ohms
Relay (MB) or (TC)	4990 ohms	30,000 ohms
Relay (B)		
20-28V	1715 ohms	30,000 ohms
45-50V	4650 ohms	30,000 ohms

3. FUNCTIONS

3.01 To provide transmitter battery to calling subscribers in the same

office on the calls to selector multiple trunk.

3.02 To hold selector multiple calls under control of calling subscriber.

3.03 To guard selector multiple against reseizure until repair service desk disconnects (trunk not transferred).

3.04 To transfer selector multiple trunk to switchboard.

3.05 To combine a connector multiple trunk with the selector trunk when transferred.

3.06 To connect ground and battery to the outgoing tip and ring when the circuit is seized.

3.07 To hold connector multiple calls under control of the calling subscriber.

3.08 When transferred with selector multiple and connector multiple trunks combined, to make connector multiple busy on calls from selector multiple and vice versa.

3.09 On calls from connector to trip ringing when the operator answers.

3.10 To hold trunk transferred while a call is in progress if transfer key is restored.

3.11 To provide for making all trunks which are not to be transferred busy during periods when some trunks are transferred.

4. CONNECTING CIRCUITS

4.01 Selector Circuit - SD-30200-01*.

4.02 Connector Circuit - SD-30201-01*.

4.03 Connector Bank Multiple Circuit - SD-32128-01.

4.04 Transfer and Make Busy Key Circuit - SD-90620-01.

4.05 One Way Incoming Trunk at No. 2 Repair Service Desk - SD-90036-01.

- 4.06 Two-Way Trunk at No. 2 Repair Service Desk - SD-96221-01.
- 4.07 Incoming Trunk Circuit at Switchboard - SD-90451-01.
- 4.08 Subscriber Line Circuit - SD-32133-01*.
- 4.09 Incoming Trunk Circuits to Toll Swbd. - SD-64754-01*.
- 4.10 Selector Bank Multiple Circuit - SD-32123-01.
- 4.11 Transfer and Make Busy Circuit - SD-32314-01.

*Typical Circuit.

DESCRIPTION OF OPERATION

5. SELECTOR MULTIPLE TRUNK NOT TRANSFERRED

5.1 Seizure

When this trunk is seized by a selector the (L) relay operates, operating (SR) and (R). (SR) connects ground to the sleeve to hold the preceding switches. (R) locks to the sleeve and connects battery and ground through the (B) relay to the trunk. This causes a signal to appear at the distant end of the trunk. (B) may not operate until the attendant answers the call. However, when it operates it performs no useful function. When this circuit is connected to the transfer and make busy circuit, ground is extended on the sleeve lead to that circuit as a busy indication.

5.2 Release

If the subscriber is first to disconnect, (L) releases, releasing (SR). (SR) disconnects ground from the sleeve lead, releasing the preceding selectors and (R). The release of (R) disconnects battery and ground from the trunk and bridges the (B) relay across the trunk. The circuit at the distant end of the trunk functions and connects battery to the ring and ground to the tip, operating (B) which connects ground to the sleeve lead in order to make the trunk busy. When the attendant at the desk disconnects, battery and ground are disconnected, from the trunk, releasing (B) and restoring the circuit to normal. If the attendant is first to disconnect, (B) may release but performs no useful function. When (R) releases (B) will release if operated.

5.3 Make Busy Circuit, Figs. 1, A, 3, 4 & 5

One trunk in a group of trunks to a position in the repair service desk is equipped with the (MB) relay. When the

make busy key at the desk is operated, battery is connected to the tip of the trunk and ground to the ring, operating (MB) which is bridged across the trunk in series with (B). (MB) connects ground to the (MB) lead of Fig. 4. The (MB1) relay of Fig. 4 connects ground to the "S" leads of all the trunks (not to be transferred) in the group. (MB) also operates (T) of Fig. 5, which operates the transfer relays (TR) and (TR1) of Figs. 2 and 3. This causes all the circuits not to be transferred, and which are idle, to test busy.

5.4 Make Busy Circuit - Make Busy Key Located in Distant Office or in Local Office.

5.41 Make Busy Key Located in Distant Office - Fig. 1, A and X Option.

When the make busy key is at a desk in the distant office and this circuit is used as the control circuit in the group of circuits to be made busy, battery is connected to the tip and ground to the ring operating (TC), Fig. A, (TC) is bridged across the trunk in series with (B). (TC) operated connects ground on lead T11 to the transfer and make busy circuit as an operate signal to that circuit. (B) operated in series with (TC) grounds the sleeve to make this circuit test busy.

5.42 Make Busy Key Located in Local Office and Trunk Not Used as Control Circuit - Fig. 1.

When the make busy key is located at a desk in the local office, operation of the key operates the transfer and make busy circuit directly. Circuits in the group to be made busy that are idle at the time will be made busy by the transfer and make busy circuit from ground on the S lead. Those that are busy at the time the transfer and make busy circuit is activated have ground on the S lead. When the circuit becomes idle, removing this ground the circuit is then made busy over the S lead from the transfer and make busy circuit after a sufficient interval to permit the preceding switches to release.

5.5 Release with Circuit Made Busy

If a group of trunks is made busy while a connection is up, the subscriber can release as described in Paragraph 5.2. When (R) releases the circuit is made busy under control of the make-busy circuit.

5.6 Combined Trunk

If the selector multiple trunk is arranged to have a connector multiple trunk combined with it when transferred, the operation when not transferred is the same as described in Paragraph 5.1 and 5.2.

6. THE SELECTOR MULTIPLE TRUNK (WITHOUT CONNECTOR MULTIPLE) TRANSFERRED

6.1 Transfer - Figs. 1, 3, 5, A

When the transfer and make-busy key at the repair service desk is operated, (TR) operates as described in Paragraph 5.3, transferring the outgoing tip and ring to the trunk to the switchboard.

6.2 Transfer Circuit - Transfer Key Located in Distant Office or in Local Office

6.21 Transfer Key Located in Distant Office, Fig. 1, A and X Option

When the transfer key is at a desk in the distant office and this circuit is used as the control circuit in the group of circuits to be transferred, battery is connected to the tip and ground to the ring operating (TC), Fig. A. (TC) is bridged across the trunk in series with (B). (TC) operated connects ground on lead T11 to the transfer and make-busy circuit as an operate signal to that circuit. (B) operated in series with (TC) grounds the sleeve to make this circuit test busy.

6.22 Transfer Key Located in Local Office and Trunk Not Used as Control Circuit - Fig. 1

When the transfer key is located at a desk in the local office, operation of the key operates the transfer and make-busy circuit directly. Circuits in the group to be transferred that are idle at the time will be transferred immediately. Circuits that are busy at the time have ground on the S lead preventing the transfer relay in the transfer and make-busy circuit from operating. When the circuit becomes idle, this ground is removed from the S lead allowing the transfer relay to operate completing the transfer of the T, R and S leads of this circuit.

6.3 Seizure

The operation is as described in Paragraph 5.1.

6.4 Release

When the calling subscriber disconnects, (L) releases, releasing (SR) which disconnects ground from the sleeve lead, releasing the preceding selectors and (R), and removes the holding circuit for (TR), or the associated transfer and make-busy circuit over lead S. (R) released removes battery and ground from the outgoing ring and tip, releasing (B) and giving the operator a disconnect signal.

7. CONNECTOR MULTIPLE TRUNK NOT TRANSFERRED (FIGS. 1, 2 AND 3)

7.1 Until transferred this circuit does not function on the calls to the repair service desk.

8. TRUNK FROM SELECTOR MULTIPLE AND TRUNK FROM CONNECTOR MULTIPLE TRANSFERRED AND COMBINED (FIGS. 1, 2 AND 3)

8.1 Transfer

When the transfer and make-busy key at the repair service desk is operated, (TR) and (TR1) operates as described in Paragraph 5.3. (TR) operated transfers the outgoing tip and ring from the trunk to the repair service desk to the switchboard. (TR1) operated transfers the connector multiple from the repair service desk to the switchboard.

8.2 Calls from Selector Multiple Thru Figs. 1 and 2

8.21 Seizure

When this trunk is seized by a selector, (L) operates, operating (SR) and (R). (SR) connects ground to the sleeve to hold (TR) and the preceding switches, and operates (SS). (SS) disconnects (CS) from the connector sleeve and grounds the connector sleeve to make it busy. (R) locks to the sleeve lead and connects battery and ground through (B) to the trunk. This causes a signal to appear at the distant end of the trunk. (B) operates when the operator answers but performs no useful function.

8.22 Release

When the calling subscriber disconnects, (L) releases, releasing (SR) which disconnects ground from the sleeve lead, releasing the preceding selectors. (SR) also releases (R) and (SS) and removes the holding circuit for (TR). (R) released removes battery and ground from the outgoing ring and tip, releasing (B) and giving the operator a disconnect signal. (SS) released removes ground from the connector multiple sleeve and connects (CS) to the sleeve.

8.3 Calls from Connector Multiple

8.31 Seizure

When this circuit is seized by a connector, (CS) operates, disconnecting (SS) from the sleeve of the associated selector multiple, grounding the selector sleeve, and operating (R) and (TP). (TP) opens the talking circuit and prepares the circuit for tripping ringing when the operator answers. (R) connects battery and ground thru the (B) relay to the trunk causing a signal to appear at the distant end of the trunk. (RG) will operate on ringing current from the connector but performs no useful function as this time.

8.32 Call Answered

When the operator answers (B) operates operating (B1) which completes the circuit

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for tripping ringing through the (A) resistance, connects the (BR) retardation coil across the tip and ring of the connector multiple for supervision, releases the (TP) relay, and supplies a holding ground for (TR1). (TP) released removes the (A) resistance from across the tip and ring and closes the talking circuit. (TP) is slow to release to allow time for tripping ringing.

8.33 Calling End Disconnects Last

When the operator disconnects (B) releases releasing (B1) which opens the talking circuit and removes the (BR) retardation coil from across the tip and ring as a disconnect signal from the called end, and removes the holding ground from (TR1). (TP) operates at this time but performs no useful functions. When the calling end disconnects the connector releases, releasing (CS) which removes ground from the associated selector multiple sleeve, releases (R) and (TP), and reconnects (SS) to the selector multiple sleeve. (TR1) is still operated (unless ground has been removed from lead TT - See Paragraph 9.1). (R) released removes battery and ground through the (B) relay from the trunk.

8.34 Calling End Disconnects First

8.341 Local Connectors Arranged for Calling Party Control, and AB Toll or Reverse Battery Delayed Ringing Toll Train

When the calling end disconnects, ground is removed from the sleeve, releasing CS and in turn B1, which opens the Talking Circuit, opens the circuit to retard coil BR, and removes the holding ground for TR and TR1, (which remain operated if ground has not been removed from lead TT - See Paragraph 9.2). CS released, releases R, removes ground from the selector sleeve, and reconnects SS to the selector sleeve. R released removes battery and ground from B and the trunk as a disconnect signal to the operator. B releases when R releases.

8.342 Local Connectors Arranged for Joint Control and Wet-Dry Supervision Toll Train

No change occurs in this circuit when the calling party disconnects. When the repair service operator disconnects B releases, releasing B1 which opens the circuit to retard coil BR. This releases the connector, removing ground from the sleeve, which releases CS, and in turn R. (TP may operate momentarily when B1 releases, until CS releases.) CS removes ground from the selector sleeve, and connects SS thereto, restoring the circuit to normal.

9. TRANSFER AND MAKE-BUSY KEY RESTORED WHILE A CALL IS IN PROGRESS

9.1 On a call from selector multiple when Fig. 3 or Figs. 2 and 3 are provided and the key at the repair service desk is restored, (TR1) releases but (TR) remains operated over its primary winding until released by (SR) at the end of the call. When this circuit connects to the transfer and make busy circuit and the transfer and make busy key at the distant or local office is restored, ground on lead S from this circuit prevents the transfer relay from releasing until this circuit becomes idle.

9.2 On a call from the connector multiple, (TR1) is held by (B1) when the transfer and make-busy key is restored, and (TR) is held on its primary winding by (CS). At the end of the call both (TR) and (TR1) will release.

10. RESELECTION OF TRANSFERRED TRUNK BEFORE OPERATOR DISCONNECTS

10.1 After Call Thru Connector Multiple

10.11 Over Toll Train With Wet-Dry Supervision or Connector Arranged for Joint Control

On these calls, the trunk remains busy until both ends have disconnected and hence cannot be reselected until the circuit has restored to normal.

10.12 Over Toll Train With Reverse Battery Supervision or Connector Arranged for Calling Party Control

10.121 Call From Selector Multiple

The circuit may be reselected as soon as (CS) releases. When seized, (SS) and (L), and in turn SR operate. SS grounds the connector sleeve. SR grounds the selector sleeve and lead S to the transfer and make busy circuit. L holds or operates R, which maintains, or connects battery and ground to the trunk thru (B). The signal to the operator is the extinguishing of her cord circuit lamp.

10.122 Call From Connector Multiple

This circuit may be seized as soon as the connector removes ground from the sleeve. It is assumed that CS and B1 will be released. R and B may or may not have released. When seized, CS will

operate, holding or operating R and B and in turn operating B1. RG will also operate when ringing is received, and will operate TP to provide for tripping ringing when B1 operates. This is to prevent

ringing the operator in the ear. If ringing is not received until after B1 operates, retard coil BR will operate the connector trip relay. The signals to the operator are as described in 10.121.

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