STEP BY STEP SYSTEMS
No. 1, 350A, 355A OR 35E97
ROTARY OUT TRUNK
SWITCH CIRCUIT
3 OR 4 WIRE
ARRANGED FOR PRE-SELECTION

CHANGES

D.1 Description of Changes

D.1 Lead designation F is added to the A, C, or EC leads in Fig. 1, 8, 15, and 16.

D.2 "Or Miscellaneous Alarm Circuit (SXS PBX)" is added to the connecting information for lead P in Fig. 13.

F. Changes in Description of Operation

F.1 In SECTION III add the following under 4.01:

(u) 701A or 711A Miscellaneous Alarm Circuit - SD-66384-01.

(v) 701B, 701PK, 711B, or 711PK Miscellaneous Alarm Circuit - SD-65761-01.

(w) 740E Alarm Circuit - SD-65660-01.

(x) PBX Selector Circuit - SD-65950-01.

(y) 701A, 701B, 701PK, 711A, 711B, 711PK, or 740E First Selector Circuit - SD-66359-01 (typical).

(z) Central Office Trunk Circuit - SD-5E001-01 (typical).

(ab) Tie Trunk Circuit - SD-65718-01 (typical).

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5641-MKD-RMW

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SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit is used to distribute the traffic of small trunk groups from selectors over a large group of outgoing trunks, and when used with auxiliary trunks, to concentrate traffic from the associated auxiliary trunks to a smaller number of outgoing trunks.

SECTION II - DETAILED DESCRIPTION

1. PRESELECTION OF OUTGOING TRUNK

1.01 When the trunk on which the selector is standing is made busy, ground over the sleeve lead makes this circuit busy at the selector circuit banks through the primary winding of relay SL and operates relay TK. Relay TK operates the ST relay of this circuit and other rotary selector circuits standing on bank terminals associated with the trunk made busy. Relay ST short circuits the primary winding of SL to guard against accidental operation of that relay. ST also operates the stepping magnet S which releases ST in turn releasing the stepping magnet. The switch then steps to the next terminal. If this terminal is also busy (grounded), the same action is repeated until an idle terminal is reached or, if all trunks are busy, until terminal 22 is reached. Terminal 22 of arc 4 is normally grounded but this ground is removed when all trunks are busy. It is therefore evident that an idle selector always stands on or hunts for an idle trunk unless all trunks appearing on its banks are busy.

1.02 When Fig. 16 is furnished, relay ST also operates the multiple cutoff relay MC of this figure. The slow release MC relay, which holds during rotary stepping removes the incoming tip and ring leads from the S selector brushes and puts direct ground on the sleeve towards the local selector banks or Auxiliary Trunk Circuit. Opening the tip and ring leads prevents any impulse noise associated with these leads from interfering with busy trunks during preselection.

1.03 When an all trunks busy condition occurs, the parallel circuits through the contacts of relays TK release the normally operated relay C to prevent the selector from hunting unnecessarily. Relay TB of Fig. 5, when furnished, also operates to provide an all trunks busy indication to associated auxiliary trunk circuits. Where this circuit is used with a trunk incoming from a step-by step office Fig. 6 is used where the number of outgoing trunks is great enough to require two groups of ROT switches. In this case trunks of the two groups are connected to alternate selector bank terminals in the originating office. If all the outgoing trunks of one group are busy, the make busy circuit connected to Fig. 6 will make busy the selector bank appearances of the trunks connected to that group of ROT switches, and the selectors will therefore pass over those trunks to select a trunk in another group.

2. SEIZURE THROUGH FIG. 8, 9, OR 15

2.01 When this circuit is seized by a connecting circuit, ground on sleeve lead operates SL in series with TK. SL operates and locks to the sleeve lead before TK operates to break its contact and open the circuit to resistor TK. The operation of SL opens the circuit of ST to prevent hunting and short circuits the operating winding to reduce the sleeve resistance.

3. TEST JACKS

FIG. 8

3.01 The test jack in Fig. 8 provides for making this trunk appear busy to incoming calls and routine tests of this circuit. When a plug is inserted into the jack, ground appears on the S lead to make this trunk appear busy.

FIG. 9 (MFR. DISC.)

3.02 A test jack and a make busy jack are provided when the outgoing trunk conductors appear directly on the banks of this switch or when the outgoing circuit does not return ground on the sleeve. This is necessary to provide for stepping the selector by direct operation of its magnet when making continuity and polarity tests of these trunks, since they do not return ground on the sleeve when the tip and ring circuit is closed. When this method of testing is used, ground is not connected to the sleeve of the rotary switch bank, hence only the switch under test steps during this test. Also, since the test circuit uses a high resistance polar relay, which does not operate the line relay in the distant office, a series of false starts of the line link circuits is avoided.

FIG. 15

3.03 The test jack in Fig. 15 provides for making routine tests of this circuit. When a plug is inserted into the jack, ground appears on lead B and lead S is opened to the Auxiliary Trunk. Ground on lead B alerts the Auxiliary Trunk that the ROT switch it is associated with is out of service. The Auxiliary Trunk will then block all calls to the ROT switch.

FIG. 11

3.04 When testing 4-wire switches, jack OUT is patched to jack TST and the test set is patched to jack IN. The incoming A lead terminal at the unit terminal strip is connceted to jack A. If the A lead is continuous through the ROT switch to the associated trunk circuit, relay AT will operate closing the ring and the test will then proceed as for 3-wire switches. If however, the A lead is open on any trunk tested, the ring lead will be open at AT and the switch will not step off the defective trunk. When it is desired to test 4-wire switches and omit the test of the A lead, they are tested the same as 3-wire switches.

4. ALARM

FIG. 2 (A&M ONLY)

4.01 If the tip and ring of any selector becomes short circuited or if the ring becomes grounded, the associated repeater or outgoing trunk circuit, if provided, will return ground over the sleeve, operating TK and if turn ST and causing the selector to step to the next terminal, and if that is busy to trunk hunt for an idle terminal. This operation is repeated on each idle trunk until the 22nd terminal is reached, when ST is held operated thus preventing further stepping of the switch. ST operates F grounding lead P which, after a predetermined time interval, will cause the associated alarm circuits to bring in audible and visual alarms. The same action also takes place if relay ST remains continuously operated for any other reason or if the selector hunts continuously.

4.02 If an SL relay should be operated while a switch is standing on the 22nd terminal, that switch would not step off when the 22nd terminal of arc 4 is again grounded. However, relay A Fig. 2 will operate in series with the 1200-ohm winding of SL, in turn operating F which will bring in an alarm after a predetermined time interval. The switch in trouble can be detected by observing which switch is on terminal 22. The SL relay may be released by operating key A, if provided, or by momentarily opening springs 5 and 6B of relay SL.

FIG. 12

4.03 If an SL relay should be operated while a switch is standing on the 22nd terminal, that switch would not step off when the 22nd terminal of arc 4 is again grounded. However, relay A will operate in series with the 1200-ohm winding of SL. The A operated will operate the R. The R operated will open the operate path of A thereby releasing A, lock to ground under control of the R1 and operates the R1. The R in opening the operate path of A removes the low resistance winding of the A from across the R1. The high resistance winding of R1 is now effectively connected in series with the parallel combination of the 1200-ohm winding of the SL and battery through a make of the R. The R1 operated releases the R and keeps the operate path of the A open. The R released removes the battery which was in parallel with the 1200-ohm winding of the SL. The high resistance winding of R1 in series with the SL winding through an SL make contact causes the SL to release. The SL is slow to release, when it does release the R1 also releases and the circuit is restored to normal.

4.04 The R is slow to operate. This is to prevent its operation on momentary operations of the A relay. This may occur when the all trunks busy condition is present and the preceding selectors are hunting over busy terminals. The selector puts momentary battery through a relay on the sleeve, which would cause the momentary operation of the A when the idle switches are camped on terminal 22.

4.05 The contact protection network is furnished to make the R1 slow to release thereby allowing the R1 to hold until the SL has released completely.

FIG. 13

4.06 Same operation as described in 4.01.

FIG. 16

4.07 When Fig. 16 is furnished, the alarm conditions described in 4.01 are the same except that the selector is not stepped to the 22nd bank terminal. With Fig. 16, ST operates relay MC which transfers the incoming ring and tip leads of the selector to battery through the ST winding and ground, respectively. If the tip and ring are short circuited or if the ring is grounded, relays ST and MC remain operated, thus preventing further stepping of the switch. Relay ST operates the F relay as before causing an alarm to be brought in. The operated MC grounds the incoming sleeve lead to make this circuit busy and prevents the trouble condition from interfering with the trunk circuit beyond the selector. The circuit bringing in the alarm is then identified by the operated MC relay.

5. TRUNK CIRCUIT

5.01 Provision is made for connecting some of the trunks directly to the local selector banks. The purpose of this is to reduce the number of ROT switches required for handling a given amount of traffic.

5.02 Provision is also made for multipling any trunk into two groups of switches. When less than 21 trunks are required for a group of switches, the remaining terminals are multipled to trunks in another group in case there is more than one group of switches. In case there is only one group, then the available trunks are multipled over the 21 terminals of the switches in that group. However, any one trunk may have only two appearances and any sleeve terminal not connected to a working circuit shall be cross-connected to ground.

6. LAST SWITCH BUSY REGISTER

6.01 The connection to 2T of SL is brought out to a terminal to provide means for operating a traffic register when required for traffic observation. This register is connected when used only on the switch serving the last terminal of a selector level.

7. ALL TRUNKS BUSY REGISTER

7.01 A traffic register connected to lead OF of Fig. 4 will register the number of times all trunks accessible through a group of switches are busy simultaneously.

8. DIODES

8.01 The V diode in Fig. 14 shunts the SL relay to prevent its operation on reverse current over lead S when the ROT switch is resting on a busy trunk.

8.02 The MC diode in Fig. 16 electrically isolates the MC relay from stepping magnet S during release. This prevents the MC relay from releasing prematurily.

9. OPERATION IN A NO. 35E97 OFFICE

9.01 Operation in a 35E97 office is restricted to use with nonbattery searching selectors. Circuit operation is the same as described in the preceding paragraphs.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 Maximum sleeve resistance from this circuit to the selector bank multiple and to the outgoing repeater or trunk circuit 10 ohms.

2. FUNCTIONAL DESIGNATIONS

None.

3. FUNCTIONS

3.01 To preselect an idle outgoing circuit.

3.02 To make the outgoing circuit busy to all other selectors and connecting circuits as soon as this circuit is seized.

3.03 To stop hunting when all outgoing trunks in its group become busy.

3.04 To stop any selector having an excessive leak from ring to ground, or having a short circuited tip and ring on the 22nd terminal, and to bring in an alarm.

3.05 To bring in an alarm if any selector trunk hunts continuously for a predetermined length of time.

3.06 To bring in an alarm if any SL relay operates while a switch is standing on the 22nd terminal.

3.07 To operate a traffic register when all trunks on the banks of the switch become busy.

3.08 To operate a last trunk busy register when required.

3.09 To give an indication to outgoing repeaters in distant offices when all trunks on the banks of this switch are busy.

3.10 To provide for making busy any outgoing trunk not equipped with a repeater or trunk circuit in case such trunk is in trouble. (Mfr Disc.)

3.11 To automatically release any SL relay that operates while a switch is standing idle on the 22nd terminal.

3.12 To open the incoming tip and ring leads during preselection.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed on a keysheet the connecting information thereon is to be followed.

(a) Selector Bank Multiple Circuit - SD-32123-01.

(b) Local Selector - SD-30200-01 (typical) SD-30976-01 (typical).

(c) Auxiliary Trunk - SD-30865-01 (typical).

(d) Automatic Ticketing Trunk - SD-31949-01 (Mfr Disc.)

(e) Outgoing Repeater - SD-31779-01 (typical).

(f) Outgoing Trunk Circuit - SD-31795-01 (typical), SD-32136-01 (typical).

(g) Traffic Register Circuit - SD-31109-01.

(h) Switch Trouble Alarm Circuit - SD-31518-01.

(i) Miscellaneous Alarm Circuit, Alarm Control - SD-31980-01.

(j) Miscellaneous Alarm Circuit (Aisle Pilots) - SD-31970-01.

(k) Make Busy Trunk Circuit in Distant Office - SD-31225-01.

(l) Trunk Test Set - SD-90469-02.

(m) Test Circuit for ROT Switches Associated With Automatic Ticketing Trunks - SD-30875-01. (Mfr Disc.)

(n) Miscellaneous Alarm Circuit (Registers) - SD-31976-01.

(o) Incoming Tandem Trunk Circuit - SD-68480-01 and SD-27014-01.

(p) Auxiliary Trunk Circuit (To Complete Service Code and CAMA Calls) - SD-32281-01.

(q) Auxiliary Trunk Circuit (To Complete Special Toll and Operator Assistance Traffic) - SD-32341-01.

(r) Outgoing Trunk Circuit - SD-32342-01.

(s) Outgoing Coin Trunk Circuit - SD-32344-01.

(t) Pulse Correcting Repeater Circuit - SD-32346-01

SECTION IV - REASONS FOR REISSUE

A. Changed and Added Functions

A.1 This circuit is arranged to open the incoming tip and ring leads during preselection.

A.2 Functions applying to automatic ticketing operation are removed since automatic ticketing features no longer apply.

B. Changes in Apparatus

B.1 ADDED:

MC Diode
446F Fig. 16

MC Relay
1/2 AK41 Fig. 16

C. Changes in Circuit Requirements Other Than Those Caused by Changes in Apparatus

C.1 The test operate current for the (A) relay, which was shown in error is changed to read 25 ma.

D. Description of Changes

D.1 The MC relay and MC diode are added to prevent tip and ring lead impulse noise from interfering with busy trunks during preselection.

D.2 Test jacks per Fig. 9 are rated Mfr Disc. superseded by test jacks per Fig. 8, when Fig. 16 is to be furnished.

D.3 With the addition of Fig. 16, alarm relays per Fig. 2 are superseded by alarm and release relays per Fig. 12 and 13, hence, Fig. 2 is rated A&M Only for additions to existing units.

D.4 Trunk make busy jacks per Fig. 7 are rated Mfr Disc. due to no demand.

D.5 The A lead designation in Fig. 5 is changed to agree with associated WECo drawings.

D.6 The connecting information for the ROTS bank terminals is changed to show connection to the Pulse Connecting Repeater Circuit and the Auxiliary Trunk Circuit.

D.7 Circuit Notes 101, 102, and 103 are modified and Notes 106, 209, 210, and 211 are added to show the above changes.

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