

CIRCUIT DESCRIPTION

CD-31980-01
ISSUE 15D
APPENDIX 3A
DWG ISSUE 33A
DISTN CODE 2D99

14

STEP-BY-STEP SYSTEMS
NO. 355A
MISCELLANEOUS ALARM CIRCUIT
ALARM CONTROL AND SENDER CIRCUITS

CHANGES

D. Description of Changes

- D.01 Leads OMJ and OMN are reversed in Fig. 1.
The MJ1, MJ2, MJ3, and MN1 diodes are
renamed to M1, M2, M3, and M4, respectively.
- D.02 The ORM lead connection is changed to
supply a better release magnet alarm
indication.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5242-GFC

WE DEPT 4311-JMS-WEA-GLW

13

STEP-BY-STEP SYSTEMS
NO. 355A
MISCELLANEOUS ALARM CIRCUIT
ALARM CONTROL AND SENDER CIRCUITS

CHANGES

D. Description of Changes

- D.1 Option YN is added and rated standard to provide connection to the Miscellaneous Alarm Circuit-Aisle Pilots when the aisle pilot relays are used on a once-per-aisle basis. It is recommended that offices presently equipped with aisle pilot relays on a once-per-frame basis continue the use of that arrangement for additions and maintenance. Option YN is intended for offices installing new aisle pilot systems.
- D.2 Option YO is designated and option YP is added; both are rated standard. Option YP allows Fig. 35 to be used as a + 24 volt fuse alarm relay.
- D.3 References to options YN, YO and YP are added to Notes 103 and 105 and the Option Used Index. Notes 127 and 128 are added.
- D.4 Connecting information is added to Fig. 32 for ANI systems.
- D.5 Figs. 51,52,64 & 60 are changed, Fig. 66 is added and Notes 206,207 & 208 are added to reflect the above changes.

BELL TELEPHONE LABORATORIES, INCORPORATED

Dept 5245-HNS
WECO Dept 5152-JMS-WEA

STEP-BY-STEP SYSTEMS
NO. 355A
MISCELLANEOUS ALARM CIRCUIT
ALARM CONTROL AND SENDER CIRCUITSCHANGESA. Changed or Added Functions

A.1 To send CSACS alarm indications when major, minor, alarm battery, call block or release magnet alarms occur.

B. Changes in ApparatusB.1 Added

- 5 - 446F diodes (MN1), (MJ1), (MJ2), (MJ3) in Fig. 1 and (AB) in Fig. 20 - Option YK
- 1 - AK47 relay (BS1, BS2), Fig. 25, option YH
- 1 - U997 relay (ASP), Fig. 17, option YH
- 1 - M1 lamp (ABPF), Fig. 17, option YH

D. Description of Changes

- D.1 Options YG and YH are expanded to provide +48 volt operation of "A&M ONLY" rated alarm sending equipment on this drawing.
- D.2 Option YJ is designated and rated standard and option YK is added and rated standard. Option YK provides connections to the CSAC System for major, minor, alarm battery, call blocked and release magnet alarms. Option YK also allows for CSACS control of the remote and local alarm function as shown in Figs. 28 and 19 and the audible signal buzzer of Fig. 24.
- D.3 The 2Y lamps on this circuit are changed to M1 lamps on a line-out basis.
- D.4 The (AB) buzzer of Fig. 24 is changed from a 7F type to a 7F 49 type on a line-out basis.
- D.5 Option YL is designated and rerated to A&M ONLY and option YM is added and rated standard. Option YM allows selector fuses to be recognized as major fuse alarms.
- D.6 References to options YG, YH, YJ, YK, YL and YM are made in the circuit requirements table, the options used index and notes 103 and 105. New notes 122, 123, 124, 125 and 126 are added.
- D.7 A drafting correction is made in Fig. 1 to separate the MJ-MJR and MN-MNR loop closure pairs.

STEP-BY-STEP SYSTEMS
 NO. 355A
 MISCELLANEOUS ALARM CIRCUITS
 ALARM CONTROL AND SENDER CIRCUITS

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of Less Importance	5	<u>1. PURPOSE OF CIRCUIT</u>	
CAMA, COMMON CONTROL, OR NONCOMMON		1.01 This circuit is used to receive alarm	
CONTROL "TOUCH-TONE" ALARMS	5	indications from various central office	
ALARM CHECKING TERMINAL	5	circuits and to transmit them to the operator	
<u>2. EXTENSION ALARM CIRCUIT</u>		office. The circuit is also arranged to set	
(FIGS. 3 AND 8)	5	up certain conditions to indicate the nature	
<u>3. LAMP-IN-SWITCHBOARD ALARM CIRCUIT</u>		of the alarm when an operator dials the alarm	
(FIGS. 6 AND 7)	6	checking terminals of this office.	
<u>4. ALARM SENDER CUTOFF KEY</u>	6		

2. GENERAL DESCRIPTION OF OPERATION

2.01 If no Alarm Sender per Fig. 2, Extension Alarm Circuit per Fig. 3, or Lamp-in-Switchboard Alarm per Fig. 6 is provided, no alarms are sent to the operator office when trouble conditions occur. Instead, the operator must dial a test number at intervals to determine whether there are trouble conditions existing. If a trouble condition exists in the office, the operator will hear a specific signal indicating the importance and nature of the trouble condition.

2.02 If different classes of alarms are present when the test terminal is dialed, the most important alarm takes precedence. The alarms are classified in importance as follows:

<u>Type of Alarm</u>	<u>Indication</u>
Major (SXS)	No Tone
Line Concentrator	Busy Tone at 120 IPM
Major (CAMA, SXS Common Control or SXS Noncommon Control with TOUCH-TONE Dialing)	High Tone
Excessive Number of Permanent Signals or Low Cable Resistance (Optional)	Dial Tone
Minor (CAMA, SXS Common Control or SXS Noncommon Control With TOUCH-TONE Dialing)	High Tone at 120 IPM
Minor (SXS)	Busy Tone at 60 IPM
MJ Mobile Radio	2000 Hz Tone
Permanent Signal Alarm (SXS)	Code 1 Ringing
No Trouble	Code 2 Ringing

2.03 If audible alarms are provided, either in connection with or without Aisle Pilots, and the key of Fig. 12 or 9 (or a similar key shown on the Aisle Pilot Circuit), is operated, any alarm condition except permanent or supervisory signals will bring in an audible alarm. This is accomplished by the operation of relays E, M, and S, when Option ZJ is furnished.

2.04 If an alarm sender per Fig. 2 is provided, the alarm sender initiates

a call to the operator office on an idle trunk and provides busy tone (Z wiring) or no tone (V or W wiring) to the operator when she answers. With V wiring, when she disconnects, the trunk is freed and the alarm is retired. With W wiring, the trunks will not be freed when the operator disconnects unless she has dialed the alarm checking terminal. To determine the class of alarm, the operator must dial the alarm checking terminal number and listen to the tone.

2.05 After the operator has answered a trunk call from the sender on an alarm and retired the alarm, an alarm of more importance will cause the sender to signal the operator again. When an Extension Alarm Circuit is used, the alarms sent to the master office are of two characters: Class A Alarms, which may be caused by a major alarm condition or a multiple permanent signal or low cable insulation resistance alarm condition, and Class B Alarms, which correspond to minor alarms. Single permanent signal alarms are not transmitted. When the lamp-in-switchboard alarm circuit is used, the same classification is used.

SECTION II - DETAILED DESCRIPTION

1. ALARM CONTROL AND ALARM SENDER

PERMANENT SIGNAL ALARM (FIGS. 1 AND 29 WITH OPTION ZT, AND FIG. 2 OR 27)

1.01 When lead PS in Fig. 1 or 29 is grounded from a connecting circuit through a lamp, relay R in Fig. 1 or PS in Fig. 2 operates, in turn operating A, which grounds the STL lead to the Permanent Signal Timing Circuit, closes through the circuit of C to the PAL lead and provides a locking circuit for B and C. C operates over the PAL lead through its P winding, locks under control of A through its S winding, opens the PAL lead and closes the PB2 lead to the winding of B. When ground on lead PB2 from the timing circuit operates B, it locks under control of A, applies code-1 ringing to the tip of the alarm checking terminal, with Option W or V removes ground from lead STL, opens lead PB2, and, if the alarm is to be sent to the operator office, operates relay H in Fig. 2 (Option PS).

1.02 Relays A and C in Fig. 2 are operated when the trunks to which they are connected are busy and prevent the operation of B and D, respectively. When H operates, it in turn operates J, which grounds lead MS to the Power Ringing Circuit (Option Z), operates B if trunk No. 1 is not busy and

if D does not operate first, and provided a locking path to lead 6 for E and F. B closes through the T2 and R2 leads to the Trunk Circuit or Trunk Release Circuit through windings 1-2 of repeat coil A (Option Z) and closes lead A to the Trunk Circuit or Trunk Release Circuit.

1.03 When Option Z is provided, the following operation occurs: When the operator answers, ground is supplied to lead A, which in turn operates E. E closes the BT lead through to winding 3-4 of repeat coil A and closes an operating circuit for F. F does not operate, since its primary winding is short-circuited by ground over lead A. Busy tone is applied to leads T2 and R2 of the trunk. When the operator disconnects, ground is removed from lead A, which in turn removes the shunt on F. F operates in multiple with E under control of J. F releases B or D, removes ground from lead MS to remove the start signal from the Power Ringing Circuit, and disconnects busy tone from repeat coil A.

1.04 If Option V is provided, the operation is the same, except that no tone is applied to the trunk and no start signal is applied to the power ringing circuit.

1.05 If Option W is provided, the operation is the same, except that E operates only when the operator dials the alarm checking terminal before disconnecting. Otherwise, the alarm sender will remain connected to the trunk and will cause the line lamp to relight when she disconnects. When the operator dials the alarm checking terminal, G operates and causes E and F of Fig. 2 to operate and lock. When F operates, it causes B or D to release and disconnect the alarm sender from the outgoing end of the trunk. This causes disconnect supervision to the operator, who will disconnect.

1.06 Relays A and C are made slow release to ensure that the trunk is restored to normal before being resealed by the alarm sender circuit after use on a regular call. With Option E, if the fuse of one of the associated trunks is operated, it will not be seized, since B or D will not operate. When Fig. 21 or 25 is provided, it supplies battery to the trunk. If the main discharge fuse fails, relay BS releases and supplies ABS battery to the trunk to transmit the alarm originated by failure of the main discharge fuse.

1.07 If both trunks which are connected to the alarm sender are busy on outgoing calls when the main battery supply fails, ground through the release magnets of all off-normal switches is connected through the

associated selector E relay winding to the sleeve of each trunk. This prevents release of relays A and C with Option B, unless Option ZI is also provided. With Option ZI, failure of the main battery supply allows relay A to release. Before relay A can release, relay P operates and locks to the A lead until the operator disconnects. When the operator disconnects, relay P releases. Release of relays A and P allows relay B to operate and signal the operator.

MINOR ALARM - DELAYED (FIG. 1, AND 2 OR 27)

1.08 When ground is applied to lead PC, P, SL, or RLS, N operates on the S winding. N operated closes the circuit of the P winding of P to lead PA, provides a locking path for P and M, and grounds lead ST of the Permanent Signal Timing Circuit. When ground is received over the PA lead, P operates through its P winding and locks on its S winding under control of N, opens the PA lead from its P winding, and closes the PBL lead through to the S winding of M. When ground is received over the PBL lead, M operates through its S winding and locks under control of N. M operated opens the PBL lead through its S winding, closes the P winding of the N (Option X) to the PC, RLS, and SL leads to light the series alarm lamps, grounds the MN lead to Fig. 2, which operates M in Fig. 2 (unless there is a major alarm or multiple permanent signal alarm condition in existence), and connects the LTL-60 IPM BT lead through to the checking terminal. If Option Y is provided, M connects direct ground to the PL lead to light the aisle pilot lamp. When M in Fig. 2 operates, it releases H in Fig. 2 if it had been operated, operates J, and ground lead 3, which returns over lead 6 to provide for locking E when it operates after the operator answers. J operated operates B or D as described in paragraphs 1.01 through 1.07.

MINOR ALARM - NO DELAY (FIG. 1, AND 2 OR 27)

A. Audible Alarm Sounded

1.09 When battery is connected to leads MT, CF, or FA from another circuit, D operates (Option X) and operates M on its P winding. Ground on lead F or MA or a loop closure using leads MN and MNR of Fig. 1 will operate M directly. The circuit then functions as described in 1.01 through 1.08, except that P and N do not operate and the alarm is sent immediately. When aisle pilots are furnished, direct ground is put on leads MT, CF, or FA to operate M directly.

B. Audible Alarm Not Sounded (Option H)

1.10 When ground is connected to lead MN, M1 operates, connecting busy tone to the alarm checking terminal as a minor alarm indication and connecting ground to lead MN, which causes a minor alarm to be transmitted to the operator office or switchboard as described in 1.08.

C. Minor Alarm Following a Permanent Signal Alarm

1.11 When this occurs, ground on the MN lead operates M, which releases H, which is slow to release. With M and H operated, ground on lead 3 is opened, releasing E and F. The release of E and F operates B or D, as described in 1.08.

MULTIPLE PERMANENT SIGNAL ALARM - FIG. 1, AND 2 OR 27

1.12 When ground is applied to lead MP from the Cable Insulation and Permanent Signal Alarm Circuit as an indication that there is an excessive number of simultaneous permanent signals or that the cable insulation resistance is low, S operates. S operated connects dial tone to the alarm checking terminal and operates K in Fig. 2 over lead MP. When K in Fig. 2 operates, it releases Mor H, if either has been operated, and operates J. J operated allows B or D to operate as described in 1.01 through 1.07.

1.13 When Fig. 27 is provided, the action of the alarm sender is as described for Fig. 2 in 1.12 and 1.01 through 1.07, but J connects ground to the Permanent Signal Timing Circuit over lead ST1. After an interval of 0 to 30 minutes, if the timer is already operating, or 20 to 30 minutes, if the timer was not formerly operating, ground will be removed from the A1 lead, releasing E and F and thus allowing B or D to reoperate and repeat the alarm. This action will be repeated every 20 to 30 minutes until the trouble is cleared.

D. Multiple Permanent Signal Alarm Following a Minor Alarm

1.14 When this occurs, ground over lead MP operates K, releasing M, which is slow to release. With K and M operated, ground on lead 3 is opened, releasing E and F. With E and F released and K operated, the circuit functions as described in 1.12 and 1.13.

MAJOR ALARM - DELAYED (FIG. 1, AND 2 OR 27)

1.15 This alarm is used for blocked calls in line finders or for a permanent signal on an auxiliary Line Circuit for emergency reporting. When Aisle Pilots are not provided, Option X is used; when lead CB or ER is grounded through a lamp, T operates through its S winding and, in turn, operates J. J grounds lead ST to the Permanent Signal Timing Circuit and closes lead PA to L. When ground is applied to lead PA, L operates and provides a locking path for itself under control of J and closes lead PBL through to K. When ground is received on lead PBL, K operates, locks under control of L, operates E, opens lead ST to the Permanent Signal Timing Circuit, and closes the P winding of T to lead CB to light an alarm lamp on the line finder frame, or closes the P winding of T to lead ER to light an alarm on the auxiliary Line Circuit unit. E operated grounds lead 2 to Fig. 2, removes tone from the alarm checking terminal, and opens leads 3 and 6 to Fig. 2.

1.16 When Aisle Pilots are provided, Option Y is used; when lead FB is grounded, J operates, causing L and K to function as described in 1.15. K connects ground to lead PL to light an aisle pilot lamp. When leads 3 and 6 are opened by E of Fig. 1, E and F in Fig. 2 release, if they have been operated. When E and F release, G operates over lead 2. G operates J, provides a locking circuit for itself and a locking circuit for E and F. J operated operates B or D as described in 1.01 through 1.07.

1.17 When Fig. 27 is provided instead of Fig. 2, the action is as described in 1.15 and 1.16 and in 1.01 through 1.07. The alarms will be repeated every 20 to 30 minutes as described in 1.13.

MAJOR ALARM - NO DELAY (FIG. 1, AND 2 OR 27)

F. Audible Alarm Sounded

1.18 When the PG lead of the Power Ringing, Aisle Pilot, or Power Alarm Circuit; the MJA lead of the Audible and Visual Alarm and Alarm Transfer Circuit for Combined Toll and 355A Dial Offices; Line Load Control Circuit, or Permanent Signal Timing Circuit; the DL lead of the Extension Alarm Circuit; or the DF lead of the power discharge circuit is grounded, or F operates over lead DF or PG, or a loop is closed on the MJ and MJR leads of Fig. 1, E operates. The operation of the circuit with respect to Fig. 2 or 27 is the same as that described in 1.15 through 1.17. However, in this case, the alarm is transmitted immediately.

G. Audible Alarm Not Sounded

1.19 When ground is connected to lead MJ, E1 operates, opening the tone lead to the alarm checking terminal as a major alarm indication, opens lead 3 and grounds lead 2 to Fig. 2, 3, 6, or 15. This causes the circuit to function as described in 1.18 to transmit a major alarm to the operator office or switchboard as described in 1.15 through 1.17.

H. Major Alarm Following an Alarm of Less Importance

1.20 When this condition occurs, relay E in Fig. 1 opens ground between leads 3 and 6 to release E. Ground is connected to lead 2 to operate G. M, if operated, remains operated. The circuit then functions as described in 1.15 through 1.19.

CAMA, COMMON CONTROL, OR NONCOMMON CONTROL TOUCH-TONE ALARMS

1.21 A trouble condition requiring a major alarm connects ground to lead MJ in Fig. 1 or 31 or completes a loop between the MJCC and MJR leads of Fig. 31, operating relay CMJ or MJ, which connects steady HT1 tone to the alarm checking terminal, grounds lead 2 to the Extension Alarm Circuit, and grounds the AL lead for an audible signal or for Aisle Pilots. A trouble condition requiring a minor alarm connects ground to lead MN in Fig. 1 or 31 or closes a loop between the MNCC and MNR leads of Fig. 31, operating relay CMN or MN, which connects HT1 tone interrupted at 120 ipm to the alarm checking terminal, grounds lead MN to the Extension Alarm Circuit, and grounds the AL lead for an audible signal or for Aisle Pilots.

ALARM CHECKING TERMINAL (FIG. 1 AND 31)

1.22 When the first alarm checking terminal of Fig. 1 is dialed, G operates from ground on the S conductor. G grounds lead MS to the Power Ringing Circuit, grounds lead SR directly with Option ZX to release the Cable Insulation and Permanent Signal Alarm Circuit if it has been operated, and operates F of Fig. 2 if E is operated for the purpose described in 1.01 through 1.07. Where Fig. 32 is employed, G, in operating, operates G1, which grounds lead SR and also removes ground from lead LK to the Translator Connector Circuit. Where Fig. 32 and 33 are used, the operation of G1 removes ground from lead AR to the line concentrator, and provides a lockup path for the LC relay.

1.23 When the second alarm checking terminal of Fig. 31 is dialed, Ge operates from sleeve ground and grounds lead MS and lead 8 to the Common Control Jack, Key, and Lamp Circuit. When the connector rings, the peak of the ringing current will break down the gas-filled tube B of Fig. 1 or A of Fig. 31, and the ring trip relay of the connector will operate. The tube will then become nonconducting and, therefore, the called party supervisory relay will not operate.

1.24 After ringing is tripped, the calling operator or testman will hear the tone on the T conductor. Code 1 ringing indicates a permanent signal condition; code 2 indicates no trouble; busy tone at 60 ipm indicates a step-by-step minor trouble; busy tone at 120 ipm indicates a line concentrator trouble; high tone interrupted at 120 ipm indicates a minor CAMA, common control, or TOUCH-TONE non-common control trouble; dial tone indicates an excessive number of simultaneous permanent signals or low cable insulation resistance; steady high tone indicates a CAMA, common control, or TOUCH-TONE non-common control major trouble; and no tone indicates a major step-by-step trouble condition. The step-by-step major alarm condition will be obtained if the ringing machine has failed. G, on releasing, removes tone from the T conductor and ground from the MS lead.

2. EXTENSION ALARM CIRCUIT (FIG. 3 AND 8)

2.01 When an extension alarm circuit per Fig. 3 is provided and lead MP or 2 is grounded from Fig. 1, B operates and in turn opens the circuit to the WCT and WCR leads to the central office, which gives an indication of a class A alarm condition. If lead MN is grounded, A operates and reversed the battery and ground to the WCT and WCR leads to the central office and gives a class B alarm condition. The extension alarm cutoff key BG in Fig. 8 is provided to turn on the audible and visual alarms of the extension alarm cabinet, and to group extension alarms from all outlying offices into the extension alarm cabinet whence they may be extended into Fig. 1 on leads DS, F, or AF by operation of a key. When the office is not attended and the key of Fig. 8 is not closed, alarms from outlying offices transmitted to an alarm cabinet in this office cause grounds to be placed on the AA and AB leads (for class A and class B alarms, respectively) of Fig. 3, 6, or 15 and thus to be transmitted to the operator office without appearing on the alarm checking terminal. This arrangement is used for outlying offices with alarm checking terminals.

3. LAMP-IN-SWITCHBOARD ALARM CIRCUIT
(FIG. 6 AND 7)

3.01 When a central office switchboard is located in the same building with the alarm equipment, Fig. 6 may be furnished to transmit an alarm to the switchboard multiple. When lead MP or 2 is grounded from the alarm circuit of Fig. 1 or lead AB from Fig. 20 or the Power Alarm Circuit, the ring lead of a Trunk or Line Circuit appearing at the switchboard is grounded to light the line lamp and give an indication of a major alarm condition. If lead MN is grounded, the ring lead of a second Line or Trunk Circuit is grounded to light its line lamp to indicate a minor alarm condition. Fig. 7 is furnished with Fig. 6 when it is desired to prevent alarms being sent to the switchboard while the office is attended. The operation of A opens the ring lead to the switchboard Trunk Circuits and prevents an alarm from lighting the line lamps.

4. ALARM SENDER CUTOFF KEY

4.01 The alarm sender cutoff key in Fig. 5 or 17 is provided to remove battery from the alarm sender circuit in Fig. 2, the Extension Alarm Circuit in Fig. 3, or to operate relay A in Fig. 7 when alarm signals are not to be transmitted to the operator office. The SDR-GD lamp lights while the cutoff key is operated. When S or ZF wiring is provided, the operation of the AS key will cause the sending of a class A alarm where Fig. 3 is used.

5. ALARM SENDER BATTERY SUPPLY (FIG. 4)

5.01 The battery supply shown in Fig. 4 is connected directly to Fig. 3 when the alarm cutoff key of Fig. 5 is not required.

6. ALARM SENDER BATTERY SUPPLY AND CUTOFF KEY (FIG. 17)

6.01 To ensure an alarm when the main ABS fuse fails, Fig. 17 is provided to supply signal battery to Fig. 1, and 2 or 3 when the ABS fuse fails. Normally, ABS battery is supplied to these figures through normally operated relay AB. When the ABS fuse fails, AB releases to supply signal battery to Fig. 1 and 2, and grounds lead G to Fig. 1 to send a major alarm, grounds lead AB to Fig. 20 to sound an audible alarm, and grounds lead PL to light a pilot lamp where pilot lamps are used.

7. PERMANENT SIGNAL AND RINGING MACHINE START CIRCUIT (FIG. 9)

7.01 When lead M1 is grounded, relay RM operates, in turn operating RML. RML starts the ringing machine, grounds lead ST to Fig. 1 to start the Permanent Signal Timing Circuit for the kickoff of first selectors, grounds the JW lead so that if there is an all-finders-busy condition in the line finders and RML remains operated on a permanent signal condition, an alarm will be brought in. Also, RML grounds the AF lead to bring in a permanent signal alarm.

7.02 The RM relay is designed to hold for 3 to 4 seconds so that it will not allow the ringing machine to stop during dialing when the shelf supervisory relays may release and so that, when the first selector releases, line finders connected to permanent signal lines not equipped with permanent signal lockout relays, the permanent signal alarm will not be lost before the permanent line is again connected to a first selector.

7.03 The RM relay holding over interruptions is also used with the Interrupter Relay Circuit in order to keep the ringing machine running to furnish 60 ipm interruptions to message rate lines with delayed charge. The R capacitor or network is provided to reduce radio interference in case the permanent signal alarm relays, which ground lead M1, should follow pulsing. The network also provides contact protection for those relays.

8. TONE COIL (FIG. 10)

8.01 The tone coil of Fig. 10 is provided to furnish LT2 tone to operator office and postpay coin trunk circuits for class of service tone or to the Tone Interrupter Circuit for interrupted tone.

9. AUDIBLE ALARM BELL AND AUDIBLE ALARM CUTOFF (FIG. 11 AND 19)

9.01 When Aisle Pilots are not furnished, the bell in Fig. 11 is provided and sounds when a trouble condition occurs. This bell may be silenced by operating the AUD key in Fig. 12 or the AIM key of Fig. 19 to its off position. With the AUD key in its off position, battery is connected to the Coin Trunk Timed Release Circuit over lead SC, permitting this circuit to function.

10. DIAL TONE SUPPLY FOR SELECTOR REPEATERS (FIG. 16)

10.01 Fig. 16 provides dial tone supply for selector repeaters. One 98A coil per shelf of selector repeaters, with or without a shunting resistor, is also provided in the associated miscellaneous alarm shelf circuit to provide the proper level of dial tone.

11. AUDIBLE ALARM FOR ABS BATTERY FAILURE
(FIG. 20, 22, 23, AND 24)

11.01 In case of failure of the main ABS battery fuse or of fuse G, relay AB (Fig. 17) will release as described in 6.01, grounding lead AB to Fig. 20 to operate ABS, which grounds lead DF to Fig. 1, AB to Fig. 6, and leads A to two Fig. 24 (if two are provided). Relay E1 of Fig. 1 transmits an alarm to the operator office and marks the alarm checking terminal. Fig. 6, if used, provides for lighting an alarm lamp in the switchboard. Fig. 24 provides a distinctive audible alarm for ABS battery failure.

11.02 If an ABS fuse other than the main fuse on fuse G fails, the lamp of Fig. 23 will light to indicate the fuse panel on which the fuse is located, and relay ABD (Fig. 22) will operate to ground lead PL, which, when Aisle Pilots are used, lights one. ABD also operates relay ABS (Fig. 20), which functions as described in 11.01.

12. POSITIVE FUSE FAILURE ALARMS (FIGS. 35 AND 36)

12.01 If Dial Long Lines circuits or Coin Service Improvement circuits are installed in an office, positive fuse failure alarms are required. Fig. 35 is used as an interface to convert positive fuse failure signals to a standard negative fuse failure signal. When a positive fuse fails, positive battery from the alarm bar is connected through the standard 2Y lamp and 700 ohm resistor to operate the FA+ relay. This relay operated sends a standard negative fuse failure signal by connecting a negative resistance battery to the fuse alarms in Fig. 1.

13. GROUND CUTOFF RELAY (FIG. 26)

13.01 When the AUD key of Fig. 12 or 19 or a similar key of the Aisle Pilot circuit is operated (which should be the case whenever the office is attended), relay PL is operated and supplies ground to any alarm or other circuits which require ground only while the office is attended.

14. TIMED CUTOFF OF ALARM SENDER (FIG. 28)

14.01 This figure provides for supplying signal battery for alarm transmission in case of failure of ABS or ABSP battery, for making effective the audible and visual

alarms, and cutting off the prepay coin release circuit and the transmission of alarms. At the end of 20 to 30 minutes, it will cancel all of these operations, except disabling the audible alarms. However, this latter feature may be omitted in offices attended on a regular schedule. Fig. 28 modifies Fig. 17 and replaces Figs. 8, 19, and 26.

SIGNAL BATTERY SUPPLY

14.02 If the ABS battery fails, relay AB releases, lighting lamp ABSF (and an aisle pilot lamp if provided), grounding lead AB to cause operation of the ABS alarm buzzer and lead G to cause transmission of an alarm by operating relay E1, and substitutes signal battery for ABS battery to certain alarm relays and circuits used in transmitting alarms.

ALARM CUTOFF

14.03 When a maintenance man enters the office, he should press key ACO, which will operate relay ACO and in turn PL and light lamp SDR CO. ACO locks to B1 through key RA, removes battery from the alarm sender and the Coin Trunk Timed Release Circuit, and, when Option ZL is provided, connects battery to C1. PL operated connects ground to the Extension Alarm Circuit, if provided, to permit its audible and visual signals to function when an alarm is received, connects ground to other circuits which require ground when the office is attended, connects battery to the guard lamp of Fig. 18 and the bell of Fig. 11 or of the Aisle Pilot Circuit, and to a relay and a floor pilot lamp of the Aisle Pilot Circuit. When the office is regularly attended on a part-time basis, Option ZL is omitted and the above conditions continue until key RA is operated. When the permanent signal 20-minute timer is not operating, there will be ground on lead PAL. If that circuit is in operation, lead PAL will be grounded after a time interval of 0 to 30 minutes.

14.04 With PAL grounded, C1 operates and locks to B1 and ACO and grounds lead ST1 to start the 20-minute timer if it is not already operating. After PAL has been grounded 20 to 30 minutes, PB2 will be grounded, operating B1, which locks to keys ACO and RA. B1 furnishes battery to the bell and guard lamp of Fig. 11 and 18 or of the Aisle Pilot Circuit, and releases ACO and in turn PL, extinguishing lamp SDR CO. ACO restores battery to the Coin Trunk Timed Release Circuit and to the alarm sender, permitting them to again function. The guard lamp of Fig. 18 or the Aisle Pilot Circuit will remain lit, and if a trouble occurs, the audible alarm will sound.

14.05 If the maintenance man remains in the office, he should again depress key ACO, which will release B1 and again operate ACO and PL as before. When leaving the office, the maintenance man should press key RA, releasing ACO and PL, as well as B1 and C1, if operated, and extinguishing the SDR CO lamp, if lit, and the guard lamp of Fig. 18 or the Aisle Pilot Circuit.

3.07 Provides an alarm if a specified number of permanent signals occur simultaneously.

3.08 Provides for extending selected alarms as described in 1.19 without sounding the audible alarm.

3.09 Provides means whereby an operator or maintenance man, by dialing the alarm checking terminal, can determine whether an alarm is existing and what type it is by means of the tone supplied.

3.10 Provides a cutoff key to prevent the alarm sender, extension alarm, or lamp-in-switchboard alarm from sending alarms, or, optionally, causes the sending of a class A alarm in the case of the extension alarm circuit.

3.11 Provides a means of cutting off the Coin Trunk Timed Release Circuit when the audible alarm is in use.

3.12 Provides means of silencing the audible alarm in the extension alarm cabinet.

3.13 Provides an audible alarm and cutoff key, with associated guard lamp, for use when Aisle Pilots are not furnished.

3.14 Cancels the functions of 3.10 to 3.13 20 to 30 minutes after the audible alarms are made effective, with Fig. 28.

3.15 Provides means of starting the ringing machine when selectors are seized.

3.16 Provides means of keeping the ringing machine in operation when a subscriber dials into a selector.

3.17 Provides for holding in the permanent signal alarm during the time that the line finder is hunting a permanent line without lockout relay after the permanent signal has been released by the Permanent Signal Timing Circuits.

3.18 Provides a source of tone for operator office trunks for postpay coin trunks and selector repeaters.

3.19 Provides for ABS 48-volt and 24-volt fuse alarms.

3.20 Provides delay in lighting of individual circuit alarm lamps or aisle pilot lamps in case of delayed alarms.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 None

2. FUNCTIONAL DESIGNATIONS

2.01 None

3. FUNCTIONS

3.01 Provides immediate major, multiple permanent, and minor alarms, including those for step-by-step intertoll with CAMA.

3.02 Provides delays for major and minor alarms requiring delays and for permanent signals and supervisory signals from connectors.

3.03 Provides means for extending alarms received from outlying PBX or dial offices via Extension Alarm Circuits to the operator office. These alarms are indicated on the alarm checking terminal when the outlying office or PBX does not have an alarm checking terminal.

3.04 Provides means for transmitting an alarm over one of two trunks to an operator office by means of an alarm sender circuit and originates a new alarm should an alarm of greater importance occur after one of less importance has been sent and answered, and, where Fig. 27 is provided, repeats the transmission of major and multiple permanent signal alarms every 20 to 30 minutes until the trouble is cleared.

3.05 Provides means consisting of an Extension Alarm Circuit for transmitting alarms over a separate 2-wire trunk.

3.06 Provides means, consisting of the lamp-in-switchboard alarm circuit, for indicating class A or B alarms by means of line lamps before the operator.

3.21 Provides connection for MJ mobile radio telephone systems to terminate trouble alarm and transmit a distinctive tone (2000 cycle) to the alarm checking terminal.

4. CONNECTING CIRCUITS

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

- (a) Power Ringing Circuit - SD-80780-01 (typical)
- (b) Line Finder and Control Circuit - SD-31909-01, SD-31922-01 (typical)
- (c) Switch Trouble Alarm Circuit for Trunk Finders - SD-31514-01 (typical)
- (d) Audible and Visual Alarm and Alarm Transfer Circuit for Combined Toll and 355A Dial Offices - SD-95075-01 (typical)
- (e) Line Circuit - SD-31777-01
- (f) Power and Power Alarm Circuits
 - (1) Charge and Discharge Circuits - SD-80722-01, SD-80720-01, SD-80702-01, SD-81134-01 (typical)
 - (2) A-C Power Alarm Circuit - SD-80893-01 (typical)
 - (3) 130-Volt Power Supply Circuit - SD-80760-01
- (g) Trunk Circuits - SD-31884-01 (typical)
- (h) Permanent Signal Timing Circuit - SD-31844-01
- (i) Connector Circuit - SD-31837-01 (typical)
- (j) Extension Alarm Circuit - SD-96217-01
- (k) Coin Trunk Timed Release Circuit - SD-31861-01
- (l) Cable Insulation and Permanent Signal Alarm Circuit - SD-31912-01
- (m) Trunk Circuit Release for Alarm Sender - SD-31993-01
- (n) Rotary Line Switch with Lockout - SD-31898-01
- (o) Signal Circuit - No Such Number Tone Supply - SD-96357-01
- (p) Auxilliary Line Circuit for Prepostpay Service - SD-31873-01
- (q) Tone Interrupter Circuit - SD-31824-01
- (r) Two-Way Line or Trunk Circuit - SD-32035-01 (typical)
- (s) Line Load Control Circuit - SD-32069-01
- (t) Individual Alarm Circuit - SD-95380-01
- (u) Dial Tone Speed Register Circuit - SD-96403-01
- (v) Miscellaneous Alarm Circuit for:
 - (1) Selectors - SD-32043-01
 - (2) Selector Repeaters - SD-32102-01
 - (3) Connectors - SD-32045-01
 - (4) Prepay and Postpay Coin Box Trunks - SD-31975-01
 - (5) Relay Rack Keys and Fuses - SD-31974-01
 - (6) Aisle Pilots - SD-31970-01
 - (7) Miscellaneous Switches and Switch Mounted Trunks - SD-32048-01
 - (8) Power Alarms - SD-31979-01
 - (9) Message Rate Trunks - SD-31978-01
- (w) N1 Carrier Repeater Station Alarms - SD-95124-01
- (x) 355A Miscellaneous Alarm Circuit Alarm and Register Circuit - SD-31971-01
- (y) Line Circuit for Public Emergency Reporting - SD-95873-01
- (z) 22-Point Trunk Finder - SD-31793-01
- (aa) O Carrier Telephone Application Schematic for OBl Carrier Terminal - SD-95150-01
- (ab) Two-Way Trunk to Subscriber Line Circuit - SD-96221-01
- (ac) Civil Air Raid Warning Circuits - SD-95678-01, SD-95332-01
- (ad) Switch Trouble Alarm Circuit for Line Finders and Trunk Finders - SD-32239-01
- (ae) Automatic Number Identification Circuits:
 - (1) Outpulser Identifier Trunk Test Circuit (OITT) - SD-95815-01

- (2) Miscellaneous Circuit for Secondary Network and Bus Connector Frame - SD-95818-01
- (3) Miscellaneous Circuit for Identifier Frame - SD-95819-01
- (4) Miscellaneous Circuit for Outpulser Frame - SD-95820-01
- (5) Miscellaneous Circuit for OITT Frame - SD-95822-01
- (6) Miscellaneous Circuit for Trouble Ticketer Frame - SD-95823-01
- (7) Miscellaneous Circuit for Outpulser Link Frame - SD-95826-01
- (af) Emergency Ringback Circuit - SD-95083-01
- (ag) Step-by-Step Intertoll with CAMA Alarm Circuit - SD-32266-01
- (ah) Interrupter Relay Circuit - SD-31868-01
- (ai) CAMA Jack, Key, and Lamp Circuit - SD-32273-01
- (aj) Miscellaneous Circuit - Basic Frame ANI-D - SD-35018-01
- (ak) Common Control Alarm Circuit - SD-32361-01
- (al) Load Transfer Circuit - SD-98091-01
- (am) Pulse Generator and Counting Circuit SD-32310-01
- (an) Manual Outgoing Trunk Test Frame - SD-32349-01
- (ao) Automatic Trunk Test Circuit ANI - SD-32315-01
- (ap) T1 Carrier Application - SD-97080-01
- (aq) 24-Channel PCM Bank Type-D1 Application - SD-97060-01
- (ar) Miscellaneous Circuit Outpulser and Test Frame ANI Type-C - SD-32381-01
- (as) Power Systems Signaling Circuit - SD-81681-01
- (at) N Carrier Signaling Order Wire and Alarms - SD-95412-01
- (au) Line Concentrator - SD-96536-01
- (av) Power Systems - Battery Distributing Circuit - SD-80728-01
- (aw) Common Control Jack, Key, and Lamp Circuit - SD-32359-01
- (ax) Jack, Key, and Lamp Circuit for TOUCH-TONE Calling - SD-32333-01
- (ay) Translator Connector Circuit - SD-99320-01
- (az) MJ Mobile Radio Telephone System Alarm Circuit - SD-2R014-01
- (ba) 400 A Tone Generator Circuit - SD-99303-01
- (bb) MJ Mobile Radio Telephon System - Test Panel Circuit - SD-2R055-01
- (bc) Trap Applique Circuit - SD-32533-01
- (bd) Scanner Access - Miscellaneous Circuit - SD-1C211-01
- (be) Jack, Key and Lamp Circuit for TOUCH-TONE Calling - SD-32333-01
- (bf) Traffic Usage Recorder Circuit - SD-95378-01

SECTION IV - REASONS FOR REISSUE

A. Changed and Added Functions

- A.1 Provision is made for +48 Volt fuse failure alarms.
- A.2 Loop closures are added for major SXS, minor SXS, major Common and Non-Common Control TOUCH-TONE and minor Common and Non-Common Control TOUCH-TONE alarm.

B. Changes in Apparatus

- B.1 Added
 - 1 - 100C Resistor (FA), 700 ohms, Fig. 35
 - 1 - 221BC Relay (FA), Fig. 35
 - 1 - 100C Resistor, Fig. 36
 - 1 - 2Y Lamp, Fig. 36

D. Description of Changes

- D.1 Figure 35 is added and rated Standard to provide +48 Volt fuse failure alarms for five or less +48Volt fuse panels. Fig. 36 is added and rated Standard as +48Volt fuse panel alarm wiring.
- D.2 References to Figs. 35 and 36 are added to the Options Used Index, the Circuit Requirements Table, Notes 103 and 105, and in new Notes 117, 118, 119 and 120.

D.3 Loop closures are added to Figs. 1 and 31. Note 121 is added.

D.4 Figs. 27 and 28 are revised to correct inaccurate battery symbols and an incorrect relay coil resistance and contact illustration in Fig. 28. A positive battery symbol is added to the battery legend on page 2.

D.5 Connecting Information for Automatic Number Identification Circuits is relocated in Fig. 1 to assure that proper alarms will be operated in cases of ANI failure.

NOTE: This reissued Circuit Description incorporates changes stated in appendices to the previous Circuit Description.

BELL TELEPHONE LABORATORIES, INCORPORATED

WECO DEPT5152-JMS-WEA
DEPT 5225-LCB