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

## CHANGES

### D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The lead from 4 (M) was formerly connected to 2B (E). This resulted in failure to transmit a multiple permanent signal alarm while a minor alarm condition exists. This condition is remedied by connecting 6-7 (K) in this lead.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 2313-OCH-RLL-MM

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# NO. 355A
# MISCELLANEOUS ALARM CIRCUIT
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## CHANGES

### D. DESCRIPTION OF CIRCUIT CHANGES

D.1 In Fig. 26, connecting information for "BG" leads "GROUND" was formerly "GRID".

D.2 In Fig. 1 connecting information for lead "CF" was "to "O" carrier telephone application schematic for OB1 Carr. Terminal", and the lead was designated "DL". An "SR" lead formerly shown, was removed.

D.3 "Where "DF" lead furnished ground" was added to connecting information for "DF" and "F" leads and "where "DF" lead of power circuit furnished battery" was added to connecting information for "DF or PG" leads which connects to (F) relay.

D.4 In Fig. 28, lead "AU" to Fig. 7 is added, "ZL" option was "ZJ" and springs 3-4 and 5-6 bottom of relay AB were 5-6 and 3-4, respectively.

D.5 In Note 103, the first item was "Alarm Control Circuit and battery supply" and included reference to Fig. 17. "Battery supply and alarm cut off circuit" with reference to Figure 28 and option ZL was added at the end of Note 103.

D.6 The above changes are made to agree with W.E. Co. manufacturing information, to clarify connecting information for the "DF" lead, and to correct connecting information for the "O" and "N" Carrier Telephone Terminal Circuits.

D.7 Cross-Connection Figs. 52 and 64 are revised to show new information for connecting to N and O Carrier Telephone Systems.

All other headings under Changes, no change.

## 1. PURPOSE OF CIRCUIT

1.1 This circuit is used to receive alarm indications from various central office circuits and to transmit them to the operator office. It is also arranged to set up certain conditions to indicate the nature of the alarm when an operator dials the alarm checking terminal of this office.

## 2. WORKING LIMITS

2.1 None.

## 3. FUNCTIONS

3.01 To provide immediate major, multiple permanent, and minor alarms.

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

3.03 To provide means of extending alarms received from outlying PBX's 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 To provide means for transmitting an alarm over one of two trunks to an operator office by means of an alarm sender circuit and to originate a new alarm should an alarm of greater importance occur after one of lesser importance has been sent and answered, and, where Fig. 27 is provided, to repeat the transmission of major and multiple permanent signal alarms every 20 to 30 minutes until the trouble is cleared.

3.05 To provide means consisting of an extension alarm circuit for transmitting alarms over a separate two wire trunk.

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

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

3.08 Provides for extending selected alarms as described in 6.62 without sounding the audible alarm.

3.09 To provide 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 To provide a cut-off key to prevent the alarm sender, extension alarm

or lamp-in-switchboard alarm from sending alarms; or, optionally, to cause the sending of a class A alarm in the case of the extension alarm circuit.

3.11 To provide 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 cut-off key, with associated guard lamp, for use when aisle pilots are not furnished.

3.14 With Fig. 28, to cancel the functions of 3.10 to 3.13 20 to 30 minutes after the Audible Alarms are made effective.

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

3.16 Provides means of keeping 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 lock-out 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 48V, and 24V fuse alarms.

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

4. CONNECTING CIRCUITS

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

4.01 Power Ringing Circuit SD-80780-01.*
*Typical Circuit

4.02 Line Finder and Control Circuit - SD-31909-01, SD-31922-01.*

4.03 Switch Trouble Alarm Circuit for Trunk Finders - SD-31514-01.

4.04 Audible and Visual Alarm and Alarm Transfer Circuit for Combined Toll and 355A Dial Offices - SD-95075-01.*

4.05 Line Circuit - SD-31777-01.

4.06 Power and Power Alarm Circuits.

4.061 Charge and Discharge Circuits - SD-80722-01, SD-80720-01, SD-80702-01, SD-81134-01.*

4.062 A-c Power Alarm Circuit - SD-80893-01.*

4.063 130-Volt Power Supply Circuit - SD-80760-01.

4.07 Trunk Circuits - SD-31884-01.*

4.08 Permanent Signal Timing Circuit - SD-31844-01.

4.09 Connector Circuit - SD-31837-01.*

4.10 Extension Alarm Circuit - SD-96217-01.

4.11 Coin Trunk Timed Release Circuit - SD-31861-01.

4.12 Cable Insulation and Permanent Signal Alarm Circuit - SD-31912-01.

4.13 Trunk Circuit Release for Alarm Sender - SD-31993-01.

4.14 Rotary Line Switch with Lockout - SD-31898-01.

4.15 Signal Circuit - No Such Number Tone Supply - SD-96357-01.

4.16 Auxiliary Line Circuit for pre-postpay Service - SD-31873-01.

4.17 Tone Interrupter Circuit - SD-31825-01.

4.18 Two-way Line or Trunk Circuit - SD-32035-01.*

4.19 Line Load Control Circuit - SD-32069-01.

4.20 Individual Alarm Circuit - SD-95380-01.

4.21 Dial Tone Speed Register Circuit - SD-96403-01.

4.22 Miscellaneous Alarm Circuit for

Selectors - SD-32043-01
Selector Repeaters - SD-32102-01
Connectors - SD-32045-01
Prepay and Postpay Coin Box Trunks - SD-31975-01

Relay Rack Keys and Fuses - SD-31974-01
Aisle Pilots - SD-31970-01
Miscellaneous Switches and Switch Mounted Trunks - SD-32048-01.
Power Alarms - SD-31979-01
Message Rate Trunks - SD-31978-01

4.23 N1 Carrier Repeater Station Alarms - SD-95124-01.

4.24 355A Miscellaneous Alarm Circuit Alarm & Register Circuit - SD-31971-01.

4.25 Auxiliary Line Circuit For Public Emergency Reporting - SD-95661-01.

4.26 22 Point Trunk Finder - SD-31793-01.

4.27 "O" Carrier Telephone Application Schematic For OB1 Carrier Terminal - SD-95150-01.

4.28 2 Way Trunk to Sub. Line Ckt. - SD-96221-01.

4.29 Civil Air Raid Warning Circuits - SD-95678-01 - SD-95332-01.

*Typical Circuit

DESCRIPTION OF OPERATION

5. GENERAL

If no alarm sender per Figure 2, extension alarm circuit per Figure 3 or lamp-in-switchboard alarm per Figure 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 there is a major alarm condition at the time she dials the test terminal, she will receive no tone.

If there is an excessive number of simultaneous permanent signals or low cable insulation resistance, and the low cable insulation resistance and permanent signal alarm circuit is used, dial tone will be heard.

If there is a minor alarm condition, busy tone will be received.

If a single permanent signal condition exists code 1 ringing tone will be heard.

If no alarm condition exists, code 2 ringing tone will be received.

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:

1. Major Alarm.

2. Excessive Number of Simultaneous Permanent Signals or Low Cable Insulation Resistance (Optional).

3. Minor Alarm.

4. Permanent Signal Alarm.

If audible alarms are provided, either in connection with aisle pilots or separately, and the key of Figure 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 by the operation of relays E, M, and when ZJ option was furnished, S.

If an alarm sender per Figure 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.

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 again signal the operator. 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.

6. ALARM CONTROL AND ALARM SENDER

6.1 Permanent Signal Alarm - Figures 1 and 2 or 27

When lead "PS" is grounded from a connecting circuit through a lamp, relay (R) operates, in turn operating (A) which grounds the "ST1" lead to the permanent signal timing circuit, closes through the circuit of (C) to the "PA1" lead and provides a locking circuit for (B) and (C). (C) operates over the "PA1" lead through its "P" winding, locks under control of (A) through its "S" winding, opens the "PA1" 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, removes ground from

lead "ST1", opens lead "FB2" and if the alarm is to be sent to the operator office operates relay (H) in Figure 2 ("PS" wiring).

Relays (A) and (C) in Figure 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 ("Z" wiring) operates (B) if trunk No. 1 is not busy and if (D) does not operate first, and provides 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 winding (1-2) of repeat coil (A) ("Z" wiring only) and closes lead "A" to the trunk circuit or trunk release circuit.

When "Z" wiring 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), but (F) does not operate as 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), and (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).

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

If "W" wiring is provided, the operation is the same, except (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.

Relays (A) and (C) are made slow release to insure that the trunk is restored to normal before being reseized by the alarm sender circuit after use on a regular call.

With (E) option 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 are provided, they supply 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.

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 the (A) and (C) relays with B option unless ZI option is also provided.

With ZI option failure of the main battery supply allows the (A) relay to release. Before the (A) can release, relay (P) operates and locks to the "A" lead until the operator disconnects. When the operator disconnects the (P) relay releases. Release of the (A) and (P) relays allows the (B) relay to operate and signal the operator.

6.2 Minor Alarm - Delayed - Figures 1 and 2 or 27

When ground is applied to lead "PC", "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 the "ST" lead 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, closes the "PB1" lead through to the "S" winding of (M). When ground is received over the "PB1" lead, (M) operates through its "S" winding and locks under control of (N). (M) operated, opens the "PB1" lead, through its "S" winding, closes the "P" winding of the (N) ("X" wiring) to the "PC", "RLS" and "SL" leads, to light the series alarm lamps, grounds the "MN" lead to Figure 2 which operates (M) in Figure 2 unless there is a major alarm or multiple permanent signal alarm condition in existence, and connects the "LT1-60 IPM BT" lead through to the checking terminal. If "Y" wiring is provided, (M) connects direct ground to the "PL" lead to light the aisle pilot lamp. When (M) in figure 2 operates it opens the circuit of lead 2 which releases (E) and (F) if they have been operated previously, releases (H) in Figure 2 if it had been operated and operated (J). The release of (E) and (F) operates (B) or (D) as described in Paragraph 6.1.

6.3 Minor Alarm - No Delay - Figures 1 and 2 or 27

6.31 Audible Alarm Sounded

When battery is connected to leads "MT", "CF" or "FA" from another circuit (D) operates ("X" wiring) and operates (M) on its "P" winding. Ground on lead "F" or "MA" will operate (M) directly. The circuit then functions as described in paragraphs 6.1 and 6.2 except (P) and (M) 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.

6.32 Audible Alarm Not Sounded

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 6.2.

6.4 Multiple Permanent Signal Alarm - Figures 1 and 2 or 27

6.41 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) operates connects dial tone to the alarm checking terminal and operates (K) in Figure 2 over lead "MP" unless a major alarm condition already exists. When (K) in Figure 2 operates it opens the circuit over lead 3 to release (E) and (F) if they have been operated previously, releases (M) or (H) if either has been operated, and operates (J). (E) and (F) released allow (B) or (D) to operate as described in paragraph 6.1.

6.42 When Fig. 27 is provided, the action of the alarm sender is as described for Fig. 2 above, and in paragraph 6.1, 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, thus allowing B or D to reoperate and repeat the alarm. This action will be repeated every 20-30 minutes until the trouble is cleared.

6.5 Major Alarm - Delayed - Figures 1 and 2 or 27

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 "X" option is used and 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 "PB1" through to (K). When ground is received on lead "PB1" (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" finder frame, or closes the "P" winding of (T) to lead "ER" to light an alarm lamp on the auxiliary line circuit unit. (E) operated grounds lead 2 to Figure 2, removes tone from the alarm checking terminal and opens leads 3 and 6 to Figure 2.

When aisle pilots are provided "Y" option is used and when lead "FB" is grounded (J) operates causing (L) and (K) to function as described above. (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 Figure 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 previously in paragraph 6.1.

When Fig. 27 is provided instead of Fig. 2, the action is as described above, and in 6.1. The alarms will be repeated every 20-30 minutes as described in 6.42.

6.6 Major Alarm - No Delay - Figures 1 and 2 or 27

6.61 Audible Alarm Sounded

When the "PG" lead of the power ringing, aisle pilot or power alarm circuit; the "MJA" lead of the audible and visual alarm; 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", (E) operates and the operation of the circuit with respect to Figure 2 or 27 is the same as described in paragraph 6.5. However, in this case the alarm is transmitted immediately.

6.62 Audible Alarm Not Sounded

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 6.61 to transmit a major alarm to the operator office or switchboard as described in 6.5.

6.7 Alarm Checking Terminal - Figure 1

When the alarm checking terminal is dialed, (G) operates from ground on the "S" conductor. (G) grounds lead "MS" to the power ringing circuit, grounds lead "SR" to release the cable insulation and permanent signal alarm circuit if it has been operated and operates (F) of Figure 2 if (E) is operated for the purpose described in paragraph 6.1.

When the connector rings, the peak of the ringing current will break down the gas-filled tube (B) and the ring trip relay of the connector will operate. The tube will then become non-conducting and therefore the called party supervisory relay will not operate.

After ringing is tripped the calling operator or test man will hear the tone on the (T) conductor. Code 1 ringing indicates a permanent signal condition; Code 2 indicates no trouble; Busy tone indicates a minor trouble; dial tone indicates an excessive number of simultaneous permanent signals, or low cable insulation resistance; and no tone indicates a major trouble condition. The major alarm condition will, of course, be obtained if the ringing machine has failed. (G) on releasing removes tone from the (T) conductor and ground from the "MS" lead.

7. EXTENSION ALARM CIRCUIT - FIGURES 3 AND 8

When an extension alarm circuit per Fig. 3 is provided and lead "MP" or "2" is grounded from Figure 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 reverses the battery and ground to the "WCT" and "WCR" leads to the central office and gives a class "B" alarm condition. The extension alarm cut-off key (BG) in Figure 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 office 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.

8. LAMP IN SWITCHBOARD ALARM CIRCUIT - FIGURES 6 AND 7

When a central office switchboard is located in the same building with the alarm equipment Figure 6 may be furnished to transmit an alarm to the switchboard multiple. When lead "MP" or "2" is grounded from the alarm circuit of Figure 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 gives 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. Figure 7 is furnished wit Figure 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.

9. ALARM SENDER CUT-OFF KEY

The alarm sender cut-off key in Fig. 5 or 17 is provided to remove battery from the alarm sender circuit Figure 2, the extension alarm circuit in Fig. 3 or to operate relay (A) in Figure 7 when alarms signals are not to be transmitted to the operator office. The (SDR-GD) lamp lights while the cut-off 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.

10. ALARM SENDER BATTERY SUPPLY - FIGURE 4

The battery supply shown in Figure 4 is connected directly to Figure 3 when the alarm cut-off key of Figure 5 is not required.

11. ALARM SENDER BATTERY SUPPLY AND CUT-OFF KEY - FIG. 17

To insure an alarm when the main ABS Fuse fails, Fig. 17 is provided to supply signal battery to Figs. 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 Figs. 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.

12. PERMANENT SIGNAL AND RINGING MACHINE START CIRCUIT - FIGURE 9

When lead "M1" is grounded, relay (RM) operates, in turn operating (RM1). (RM1) starts the ringing machine, grounds lead "ST" to Figure 1 to start the permanent signal timer circuit for the kick-off of first selectors, grounds the "JW" lead so that if there is an all finders busy condition in the line finders and (RM1) remains operated on a permanent signal condition, an alarm will be brought in. Also (RM1) grounds the "AF" lead to bring in a permanent signal alarm.

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 lock-out relays, the permanent signal alarm will not be lost before the permanent line is again connected to a first selector.

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) condenser 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.

13. TONE COIL - FIGURE 10

The tone coil of Figure 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.

14. AUDIBLE ALARM BELL AND AUDIBLE ALARM CUT-OFF - FIGURES 11 AND 19

When aisle pilots are not furnished, the bell in Figure 11 is provided and sounds when a trouble condition occurs. This bell may be silenced by operating the (AUD) key in Figure 12 or the (ALM) key of Figure 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.

15. DIAL TONE SUPPLY FOR SELECTOR REPEATERS - FIG. 16

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.

16. AUDIBLE ALARM FOR ABS BATTERY FAILURE - FIGURES 20, 22, 23 AND 24

In case of failure of the main ABS battery fuse, or of fuse G, relay (AB), Fig. 17, will release as described in paragraph 11, 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 Figs. 24 (if 2 are provided). The (E1) relay 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.

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 above.

17. GROUND CUT OFF RELAY - FIG. 26

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.

18. TIMED CUT OFF OF ALARM SENDER - FIG. 28

This figure provides for supplying signal battery for alarm transmission in case of failure of ABS battery, for making effective the audible and visual alarms, and cutting off the prepay coin trunk release circuit and the transmission of alarms. It also will cancel all the above operations, except disabling the audible alarms, at the end of 20 to 30 minutes. 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.

18.1 Signal Battery Supply.

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.

18.2 Alarm Cut Off.

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 thru key RA, removes battery from the alarm sender and the coin trunk timed release circuit, and, when ZL option 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, ZL option is omitted, 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 PA1. If that circuit is in operation, lead PA1 will be grounded after a time interval of 0 to 30 minutes. With PA1 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. 20 to 30 minutes after PA1 is grounded, PB2 will be grounded, operating B1 which locks to keys ACO and RA. B1 furnishes battery to the Bell and Guard lamp of Figs. 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. 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, and also 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.

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