

COMMON SYSTEMS
CIVIL AIR DEFENSE WARNING SYSTEM
DIAL PULSE RECEIVING AND
CODE DISTRIBUTING CIRCUIT
KEYPOINT TO WARNING STATIONS

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Options "ZE" is added, and option "ZD" is designated.

D.2 Reference to options "ZD" and "ZE" is added to Notes 102, 105 and to the options used table.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 2313-RDW-RLL-GK

CIRCUIT DESCRIPTION
SWITCHING SYSTEMS DEVELOPMENT DEPARTMENT

1884
CD-95678-01
Issue 6-D
Appendix 1-B
Dwg. Issue 7-B

COMMON SYSTEMS
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CHANGES

C. CHANGES IN CIRCUIT REQUIREMENTS OTHER THAN THOSE APPLYING TO ADDED OR REMOVED APPARATUS

C.1 The test clip data for the secondary winding of relay (W) is changed to remove the test set preparation.

C.2 Test Notes 3 and 4 are added to Page 5.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Option "ZC" is added and option "ZB" is designated.

D.2 Reference to options "ZB" and "ZC" is added to Note 105 and to the Options Used Table.

D.3 The title previously read "Civil Air Raid Warning System."

D.4 The rating was previously "AT&T Co. Provisional."

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 2313-RDW-RLL-WG

COMMON SYSTEMS
CIVIL AIR RAID WARNING SYSTEM
DIAL PULSE RECEIVING AND
CODE DISTRIBUTING CIRCUIT
KEYPOINT TO WARNING STATIONS

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 The function of sending a continuous white alert is added.

B. CHANGES IN APPARATUS

B.1 Added

(S) 297 type jack (Fig. 6)
(DP ALM) 2Y lamp (Fig. 7)
(TST) 2Y lamp (Fig. 7)
(WD) 2Y lamp (Fig. 7)

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Figures 6 and 7 are added.

D.2 Options "A", "ZA", "B" and "D" are added.

D.3 Reference to options "A", "ZA", "B" and "D", and to Figures 6 and 7 is added to Notes 102 and 105 and to the options used table.

D.4 Reference to Figures 6 and 7 is added to Note 101.

D.5 Note 106 is added.

D.6 The connecting information for leads "+ BAT", "TRNS" and "RS" previously read "To Air Raid Warning System Aux. Ring Supply & Bat. Distg. Ckt."

D.7 Leads "WD" and "TST" to Figure 7 are added to Figure A, and lead "ALM" to Figure 7 is added to Figure 1.

All other headings under Changes, no change.

1. PURPOSE OF CIRCUIT

1.1 This circuit is designed for use in a Civil Air Raid Warning Network for disseminating alert signals from keypoints to important warning stations. The circuit is arranged to receive and record dial pulses sent from a keypoint, to check that these pulses correspond to an alert code to transmit alert information to a public signal control circuit, and to transmit code ringing alert signals to a maximum of 200 important warning stations.

2. WORKING LIMITS

(L) Relay
"S" Option "T" Option

Max. Ext.Ckt.		
Loop Res.	2,000 ω	1,200 ω
Min. Insulation Res.	15,000 ω	15,000 ω

3. FUNCTIONS

3.01 To count the number of dial pulses received in a digit.

3.02 To recognize the digit 4,6,8 or 0 as a legitimate alert priming digit when received as the first digit.

3.03 To compare an initial priming digit with a second digit to determine whether the two digits are the same.

3.04 To recognize the digits 4-4 as an indication to transmit the "Yellow" alert code ringing signal to the warning stations.

3.05 To recognize the digits 6-6 as an indication to transmit the "Blue" alert code ringing signal to the warning stations.

3.06 To recognize the digits 8-8 as an indication to transmit the "Red" alert code ringing signal to the warning stations.

3.07 To recognize the digits 0-0 as an indication to transmit the "White" alert code ringing signal to the warning stations.

3.08 To recognize the digit 2 as an indication to stop sending alert code ringing signals and to restore to normal.

3.09 To recognize the digit 9 as an over-all system test indication and to light a test lamp as an indication that the test was received.

3.10 To ground the "ST" lead to start the code generating circuit whenever an alert signal is to be sent to the warning stations.

3.11 To bring in a wrong digit alarm and prevent any alert from being

originated if a digit 1, 3, 5 or 7 is received, if a digit over 0 is received, or if a second digit is not the same as an initial priming digit.

3.12 To ground the "ST" lead to start the code generating circuit whenever a priming digit or a wrong digit is received to start a timing interval to time out that digit.

3.13 To continuously check the loop incoming to this circuit for trouble conditions such as opens or grounds, and to bring in a central office alarm and an alarm lamp when a trouble occurs or when the system is used.

3.14 To provide means for denying both the Blue and Yellow alert signals to any warning stations.

3.15 To provide means for denying either the Blue or the Yellow alert signal to any warning stations in the first group of 50 lines.

3.16 To transmit alert information to a public signal control circuit.

4. CONNECTING CIRCUITS

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

4.1 Code Generating Circuit - SD-95677-01

4.2 Auxiliary Ringing Supply and Battery Distributing Circuit - SD-81202-01

4.3 One Way Receiving Circuit, One Way Sending Circuit, Alarm Circuit, and Jack Circuits - SD-95683-01

4.4 Crossbar Office

4.41 Aisle Pilot Circuit - SD-25087-01 (Crossbar No. 1)

4.42 Alarm Circuit - SD-25671-01 (Crossbar No. 5)

4.5 Panel Office

4.51 Audible Alarm Circuit for Floor Alarm Board - SD-21819-01

4.52 Floor Alarm Board Miscellaneous and Auxiliary Alarm Circuit - SD-21203-01 (Battery Cut-Off)

4.53 Miscellaneous Alarm Circuit - ES-226189 (Ground Cut-Off)

4.6 Step-by-Step Office

4.61 Audible and Visual Alarm Circuit - SD-96188-01 (SXS No. 1)

4.62 Pilot Lamp Circuit - SD-31548-01 (SXS No. 1)

4.63 Audible Alarm Circuit - SD-31551-02 (SXS No. 1 or 350A)

4.64 Pilot Lamp and Power Alarm Lamp Circuit - SD-31573-01 (No. 350A)

4.65 Miscellaneous Alarm Circuit for Aisle Pilots - SD-31970-01 (No. 355A)

4.66 Miscellaneous Alarm Circuit for Alarm Control - SD-31980-01 (No. 355A)

4.7 Manual Office

4.71 Annunciator Circuit - SD-15443-01 (Typical)

4.8 Application Schematic - SD-95684-01

4.9 Public Signal Control Circuit - SD-95688-01

4.10 Station Line Test and Alarm Cut-off Circuit - SD-95746-01

DESCRIPTION OF OPERATION

5. GENERAL METHOD OF OPERATION

5.1 When this circuit is normal the incoming loop is closed and the (L) relay is operated. When the attendant at the keypoint sends an alert signal by dialing a pair of digits, relay (L) follows the dial pulses. The number of pulses in the digit is counted by means of relay (LC), (LD), (LE) and (P1) to (P6).

5.2 At the end of the train of pulses for the first digit, one of the checking relays (Y4), (B6), (R8) or (W0) operates and locks under control of the release relay (RL).

5.3 At the end of the train of pulses for the second digit, one of the register relays (Y), (B), (R), or (W) operates and locks under control of the release relay (RL).

5.4 The operation of one of the register relays starts the code generating circuit, closes a circuit to the public signal control circuit, and closes the circuit for operating the appropriate multicontact relays under control of the ground signals from the code generating circuit. Ringing current is applied through the make contacts of the multicontact relays to the line conductors of the warning stations; thereby transmitting the corresponding code ringing alert signals to the warning stations.

5.5 When the attendant at the keypoint sends the stop signal by dialing the

digit 2, the release relay (RL) operates which releases the operated register and checking relays. The release of the register relay stops the code generator, opens the circuit to the multicontact relay, and restores the circuit to normal.

5.6 If the digit 1, 3, 5, or 7, or a digit over 0, or a wrong sequence of digits is received, the wrong digit (WD) relay will operate and prevent any alert from being originated. It will not, however, interfere with any alert which may be in the process of being transmitted. This condition will time out or may be removed by dialing 2.

5.7 When the digit 9 is received by this circuit, a test lamp (TST) will be lighted from relay (TST) to indicate that an overall system test has been made.

6. PULSE COUNTING - FIG. 1

6.1 When the keypoint attendant dials an alert signal, the loop to this circuit is opened a number of times corresponding to the digit dialed. The (L) relay releases when each open or pulse occurs and reoperates when the loop closes again. Relay (L1) follows the pulses of relay (L): when (L) releases (L1) operates, and when (L) reoperates (L1) releases. When (L1) operates on the first pulse, (RA) operates which in turn operates (RAL). (RA) is slow release so that it will hold operated during a train of pulses. The pulses from the front contact of relay (L1) are counted by relays (LC), (LD), (LE) and (P1) to (P6).

6.2 The first closure of contacts 3-4B of (L1) operates relay (LC). When (L1) releases, (LE) operates in series with (LC). Both relays hold to the locking ground supplied by (RA). The second closure of contacts 3-4B of (L1) operates (LD). This releases (LC), but (LE) holds in series with (LD). When (L1) releases (LD) and (LE) release. However, (LD) has a holding circuit through a make contact of (LC), so that (LD) will keep the winding circuit of (LC) open until it has released. The third closure of contact 3-4B of (L1) will operate (LC) again and the cycle will be repeated. Pulses 1, 3, 5, 7 and 9 will cause (LE) to operate, and pulses 2, 4, 6, 8 and 10 will cause (LE) to release.

6.3 The first time (LE) operates, it closes a circuit through contacts of (P4), (P2), (P3) and (P5) to the primary winding of (P1), operating (P1). Relay (P1) locks through its secondary winding to ground supplied by (RAL). When pulse No. 2 releases (LE), (P2) operates and locks and (P1) releases. Pulse No. 3 operates (LE), thus operating (P3) which locks and releases (P2). On pulse No. 4 (LE) releases, operating (P4) which locks and releases

(P3). Pulse No. 5 operates (LE), operating (P5) which locks and releases (P4). Pulse No. 6 releases (LE), operating (P6) which locks but does not release (P5). Pulse No. 7 operates (LE), operating (P1) which locks and releases (P5). Relay (P6) remains operated. Pulse No. 8 releases (LE), operating (P2) which locks and releases (P1). Pulse No. 9 operates (LE), operating (P3) which locks and releases (P2). Pulse No. 10 releases (LE), operating (P4) which locks and releases (P3). The following table shows the relays operated after any pulse.

Pulse No.	Relays Operated
1	LC, LE, P1
2	P2
3	LC, LE, P3
4	P4
5	LC, LE, P5
6	P5, P6
7	LC, LE, P1, P6
8	P2, P6
9	LC, LE, P3, P6
10	P4, P6

The pulse count will, of course, stop when the keypoint dial reaches its normal position, so that any (P-) relay or relays may remain operated as shown in the table.

6.4 When a train of pulses for a priming digit ends, the (L) relay will remain operated and (L1) will remain released. After a short interval (RA) will release. (RA) released, connects ground through the contacts of (P1) to (P6) to one of the leads connected to the checking relays. (RA) released also opens the operating circuit to (RAL) and the holding circuit to (LC) and (LE). After a short interval (RAL) releases, releasing any operated (P-) relays. During the release time of the (RAL) and (P-) relays ground is connected to one of the checking leads.

7. CHECKING ALERT SIGNALS - FIG. A

7.1 When the (RA) relay releases after the first alert digit, ground is connected through contacts of relays (P1) to (P6) and through a back contact of relay (PD) to operate relay (Y4), (B6), (R8), or (WO) from battery at the contacts of relay (WD). When relay (RAL) and the (P-) relays release, ground is removed from the checking lead, and relay (PD) operates in series with the operated checking relay to ground at relay (RL) through contacts of relay (ZA).

7.2 The operation of relay (PD) lights lamp (PD), connects lead "Z4" from the code generating circuit to relay (WA), connects ground from relay (STC) to operate relay (STT) and ground lead "ST" to start the code generating circuit, and grounds a holding path for relay (WA). Relay (STT)

operated, opens the operating path of relay (PU) of the code generating circuit to prevent any alert codes from being sent out before the code generator has recycled. The code generating circuit functions at this time to operate relays (WA) and (ZA) over lead "Z4" to time out the priming condition (release relay (PD) and the operated checking relay). The operation of relays (WA) and (ZA) will be described later.

7.3 When the (RA) relay releases after the second alert digit has been dialed into this circuit, ground is connected through relays (P1) to (P6), and through make contacts of relays (PD) and the operated checking relay to one of the register leads.

8. REGISTERING ALERT SIGNALS - FIGS. 1 AND 2

8.1 Yellow Alert Registration

When the (RA) relay releases after the second digit 4 has been dialed into this circuit, ground is connected through a break contact of (P6), a make contact of (P4), a make contact of (PD) and a make contact of (Y4) to operate register relay (Y) on its primary winding. (Y) locks operated on its secondary winding. (Y) operated operates relay (STC), connects battery to the "YB" lead to the public signal control circuit, and connects battery to the windings of the (Y1) and (Y2) multicontact relays. The operation of relay (STC) removes ground from lead "ST" to release the code generating circuit, and opens the operating path of relay (STT). After a short time (STT) releases to reclose ground to the "ST" lead to restart the code generating circuit and close the operating path of the (PU) relay of the code generating circuit over leads "PU" and "PU1".

8.2 Blue Alert Registration

When the (RA) relay releases after the second digit 6 has been dialed into this circuit, ground is connected through a make contact of (P6), a make of (P5), a make of (PD) and a make of (B6) to operate register relay (B) on its primary winding. (B) locks operated on its secondary winding. (B) operated, operates relay (STC), connects battery to the "YB" lead to the public signal control circuit, connects battery to the windings of the (B1) and (B2) multicontact relays, and operates (TR). (TR) operates (TR1). Where the warning stations are equipped with visual indicators, the operation of (TR1) transfers the ringing potential from negative to positive superimposing battery. The operation of (STC) performs the same functions as described in paragraph 8.1.

8.3 Red Alert Registration

When the (RA) relay releases after the second digit 8 has been dialed into this circuit, ground is connected through a make contact of (P6), a make of (P2), a make of (PD), and a make of (R8) to operate register relay (R) on its primary winding. (R) locks operated on its secondary winding. (R) operated, operates relay (STC), connects battery to the "R" lead to the public signal control circuit, and connects battery to the windings of the (RW1) and (RW2) multicontact relays. The operation of relay (STC) performs the same functions as described in paragraph 8.1.

8.4 White Alert Registration

When the (RA) relay releases after the second digit 0 has been dialed into this circuit, ground is connected through a make contact of (P6), a make of (P4), a make of (PD), and a make of (W0) to operate register relay (W) on its primary winding. (W) locks operated on its secondary winding. (W) operated, operates relay (STC), connects battery to the "W" lead to the public signal control circuit, connects battery to the windings of the (RW1) and (RW2) multicontact relays, and operates (TR). (TR) operated transfers the control of the (RW1) and (RW2) relays from the "R1" and "R2" leads to the "W1" and "W2" code generator leads, and also operates (TR1). Where the warning stations are equipped with visual indicators, the operation of (TR1) transfers the ringing potential from negative to positive superimposing battery. The operation of relay (STC) performs the same functions described in paragraph 8.1.

9. CODE DISTRIBUTION - FIGS. 3, 4, AND 5

9.1 Yellow Alert Signal

With the (Y) register relay operated, battery is connected to one side of the windings of the (Y1) and (Y2) multicontact relays. When the code generating circuit starts functioning, the (Y1) and (Y2) relays follow the code ground signals on the "Y1" and "Y2" leads, respectively. (Y1) operated connects ringing potential through resistance lamps 1 to 25 to the ring conductors of the odd numbered lines in the first group of 50 warning stations. Similarly, when (Y2) is operated ringing potential and generator ground are connected to the even numbered lines in the first group of 50 warning stations. The ground signals from the code generator circuit are arranged so that when (Y1) is operated (Y2) is released, and vice versa; so that ringing potential is applied to only half the number of lines in a group at any one time. Where the warning stations are equipped with

both ringers and visual indicators ("Z" option), negative superimposed ringing potential is applied to the ring conductors for the Yellow alert signal. Where more than 50 warning station lines are required, one or more Figs. 5 are provided. In this case, (YB3) and (YB4) follow the operation and release of the (Y1) and (Y2) relays respectively, and connect code ringing signals to the 2nd, 3rd and 4th groups of 50 warning station lines in a manner similar to that for the 1st group of 50 lines.

9.2 Blue Alert Signal

With the (B) register relay operated, battery is connected to one side of the windings of the (B1) and (B2) multicontact relays. When the code generating circuit starts functioning, the (B1) and (B2) relays follow the code ground signals on the "B1" and "B2" leads, respectively. (B1) operated connects ringing potential through resistance lamps 1 to 25 to the ring conductors and generator ground to the tip conductors of the odd numbered lines in the first group of 50 warning stations. Similarly, when (B2) is operated ringing potential and generator ground are connected to the even numbered lines in the first group of 50 warning stations. The ground signals from the code generating circuit are arranged so that when (B1) is operated (B2) is released, and vice versa; so that ringing potential is applied to only half the number of lines in a group at any one time. Where the warning stations are equipped with both ringers and visual indicators ("Z" option), positive superimposed ringing potential is applied to the ring conductors for the Blue alert signal. Where more than 50 warning station lines are required, one or more Figs. 5 are provided. In this case, (YB3) and (YB4) follow the operation and release of the (B1) and (B2) relays respectively, and connect code ringing signals to the 2nd, 3rd, and 4th groups of 50 warning station lines in a manner similar to that for the 1st group of 50 lines.

9.3 Red Alert Signal

With the (R) register relay operated, battery is connected to one side of the windings of the (RW1) and (RW2) multicontact relays. When the code generating circuit starts functioning, the (RW1) and (RW2) relays follow the code ground signals on the "R1" and "R2" leads, respectively. (RW1) operated connects ringing potential through resistance lamps 1 to 25 to the tip conductors and generator ground to the ring conductors of the odd numbered lines in the first group of 50 warning stations. Similarly, when (RW2) is operated, ringing potential and generator ground are connected to the even numbered lines in the first group of 50 warning stations. The ground

signals from the code generator circuit are arranged so that when (RW1) is operated (RW2) is released, and vice versa; so that ringing potential is applied to only half the number of lines in a group at any one time. Where the warning stations are equipped with both ringers and visual indicators ("Z" option), negative superimposed ringing potential is applied to the tip conductors for the Red alert signal. Where more than 50 warning stations are required one or more Figs. 5 are provided. In this case, (RW3) and (RW4) follow the operation and release of the (RW1) and (RW2) relays respectively, and connect code ringing signals to the 2nd, 3rd and 4th groups of 50 warning stations in a manner similar to that for the 1st group of 50 lines.

9.4 White Alert Signal

With the (W) register relay operated, battery is connected to one side of the windings of the (RW1) and (RW2) multicontact relays. When the code generating circuit starts functioning, the (RW1) and (RW2) relays follow the code ground signals on the "W1" and "W2" leads, respectively. (RW1) operated connects ringing potential through resistance lamps 1 to 25 to the tip conductors and generator ground to the ring conductors of the odd numbered lines in the first group of 50 warning stations. Similarly, when (RW2) is operated, ringing potential and generator ground are connected to the even numbered lines in the first group of 50 warning stations. The ground signals from the code generating circuit are arranged so that when "D" option is used, (RW1) is operated when (RW2) is released, and vice versa; so that ringing potential is applied to only half the number of lines in a group at any one time. However, when "B" option is used, the ground signals from the code generating circuit are arranged so that relays (RW1) and (RW2) are operated continuously; so that ringing potential is applied to all lines in a group simultaneously. This requires that the odd numbered lines in a group of 50 be connected to one group of 25 resistance lamps and that the even numbered lines in the group be connected to another group of 25 resistance lamps. Where the warning stations are equipped with both ringers and visual indicators ("Z" option), positive superimposed ringing potential is applied to the tip conductors for the White alert signal. Where more than 50 warning stations are required, one or more Figs. 5 are provided. In this case, (RW3) and (RW4) follow the operation and release of the (RW1) and (RW2) relays respectively, and connect code ringing signals to the 2nd, 3rd, and 4th groups of 50 warning stations in a manner similar to that for the 1st group of 50 lines. When option "B" is used and the (RW-) relays are operated continuously, only one figure 5

may be used because of the limited number of ringing leads which may be carried through key (RCO).

9.5 Denying Yellow and Blue Alert Signals

In the line connector circuit for the 1st group of 50 lines, optional arrangements are provided to deny certain alert signals to any warning station in the group. Omission of "N" option denies the Yellow alert signal; omission of "Q" option denies the Blue alert signal; omission of both "N" and "Q" option denies both the Yellow and Blue alert signals.

In the line connector circuit for the 2nd, 3rd and 4th groups of 50 lines, optional arrangements are provided to deny both the Yellow and Blue alert signals to any warning station in these groups by omitting "W" option and providing "V" option.

9.6 The following table shows the ringing codes transmitted to the warning stations for the various alert signals, together with the type of superimposed ringing current and the connections to the line conductors for proper operation of the visual indicators.

Alert Signal	Ringing Code	Type of Super-imposed Ringing Current	Ringing Connected to the
Yellow	1/2 sec. on, 1/2 sec. off, 1/2 sec. on, 2-1/2 secs off.	Negative	Ring
Blue	1/2 sec. on, 1/2 sec. off, 1/2 sec. on, 1/2 sec. off, 1/2 sec. on, 1-1/2 sec. off	Positive	Ring
Red	1/2 sec. on, 1/2 sec. off. (60 IPM)	Negative	Tip
White ("D" Option)	16 secs. on, 16 secs. off.	Positive	Tip
White ("B" Option)	Continuous	Positive	Tip

10. STOPPING ALERT SIGNALS

10.1 When the keypoint attendant dials the "stop" signal (digit 2) into this circuit, the pulses are counted as covered in paragraph 6. When the (RA) relay releases at the end of the digit, ground is

connected through a break contact of (P6) and a make of (P2) to operate the release relay (RL). (RL) operated opens the locking path for any operated register relay (Y), (B), (R) or (W). The register relay released disconnects battery from the corresponding multicontact relays in the line connector circuit for the 1st group of 50 lines, and disconnects ground from the "ST" lead to the code generator circuit, and disconnects battery from the lead to the public signal control circuit. The release of register relays (B) or (W) also releases (TR) which in turn releases (TR1). The release of the multicontact relays for the 1st group of 50 lines, releases the corresponding relays in the 2nd, 3rd and 4th groups of 50 lines, if provided.

10.2 The operation of relay (RL) also opens the holding paths for relays (PD) and (WD) and allows those relays to release if they are operated.

11. OVERALL SYSTEM TEST

11.1 When it is desired to make an overall system test, the digit 9 is dialed into the civil air raid warning network. When the (RA) relay of this circuit releases at the end of the digit, ground is connected through a make contact of (P6), and a make of (P3) to operate relay (TST) on its primary winding. (TST) locks operated on its secondary winding under control of key (TST). (TST) operated, lights lamp (TST). The operation of relay (TST) has no effect upon the ability to receive alert digits or transmit alert signals.

12. WRONG DIGIT OPERATION

12.1 Digit 1, 3, 5, or 7 Received

If a digit 1, 3, 5, or 7 is received by this circuit, when relay (RA) releases at the end of the digit, ground will be connected through contacts of relays (P1) to (P6) to operate relay (WD) on its primary winding. (WD) locks operated on its secondary winding under control of key (WD) and relays (RL), (WA), and (ZA). The operation of (WD) releases any checking relay (Y4), (B6), (R8) or (W0) that may be operated and relay (PD) if operated by removing battery from the windings of the checking relays. Relay (WD) operated also operates relay (WD1), connects lead "Z4" to relay (WA), connects ground from relay (STC) to the "ST" lead and to the winding of relay (STT) to operate that relay, and connects ground to the holding path of relays (WA) and (ZA). Relay (WD1) operated, locks to key (WD) and lights lamp (WD). The operation of relay (STT) performs the same functions as described in paragraph 7.2. The operation of relay (WD) will prevent the operation of any checking relay and therefore the operation of any register relay until it is

released by timing out, by operation of relay (RL) or by the operation of key (WD). The operation of relay (WD) will not interfere with the transmitting of any alert signal which was received prior to its operation.

12.2 Digit Greater Than 0 Received

If a digit greater than 0 is received by this circuit, when relay (P4) operates with relay (P6) operated and relay (LE) operates, ground is connected to the primary winding of relay (WD). Relay (WD) operates and locks on its secondary winding. The operation of relay (WD) performs the same functions as described in paragraph 12.1

12.3 Second Digit Different from Priming Digit

When a priming digit has been received by this circuit operating one of the checking relays (Y4), (B6), (R8), or (WO), and the second digit received is not the same as the first, relay (WD) will operate.

12.31 Second Digit 1, 3, 5, 7, or Greater Than 0

If the second digit received is a 1, 3, 5, or 7, or is greater than 0, relay (WD) will operate as described in paragraph 12.1 or 12.2 respectively.

12.32 Second Digit 4, 6, 8, or 0

If the second digit received is a 4, 6, 8, or 0 and different from the first digit, when relay (RA) releases at the end of the digit, ground is connected through contacts of relays (P1) to (P6), through a make contact of relay (PD) and a break contact of relay (Y4), (B6), (R8), or (WO) respectively, to operate relay (WD) on its primary winding. The operation of relay (WD) performs the same function as described in paragraph 12.1.

13. TIMEOUT

13.1 The operation of either relay (PD) or relay (WD) starts the code generating circuit for the purpose of timing out the priming condition or the wrong digit condition. When the (Z4) relay of the code generating circuit operates, ground is connected to lead "Z4" operating relay (WA) and holding relay (ZA) non-operated. 16 seconds later ground is removed from lead "Z4" allowing relay (ZA) to operate in parallel with relay (WA). 16 seconds later ground is reconnected to lead "Z4" to shunt down relay (WA) and hold relay (ZA) operated. When relay (WA) is released with relay (ZA) operated, the holding paths of relays (PD) and (WD) are opened allowing

either of those relays to release. The release of (WD) or (PD) opens the holding and operating paths of relays (WA) and (ZA) allowing relay (ZA) to release, and opens the operating path of relay (STT), allowing that relay to release. The release of (PD) or (WD) also removes ground from lead "ST" allowing the code generating circuit to restore to normal. After a short time relay (ZA) releases reclosing the holding paths of relays (PD) and (WD). Relay (WD1) does not release automatically and must be released by the operation of key (WD).

14. EXTENSION ALARM LAMPS - FIG. 7

14.1 The alarm lamps of figure 7 are provided as an extension of the (WD) and (TST) lamps of figure A and the (ALM) lamp of figure 1. These lamps are lighted whenever the corresponding lamp in figure 1 or A is lighted.

15. MISCELLANEOUS MAINTENANCE FEATURES

15.1 Jack (TST) provides ready access to the windings of relay (L) when applying current flow requirements to this relay. A dummy plug inserted in the (C) jack disconnects the operating winding of (L) from the loop, to prevent interference with the current flow readings. A dummy plug inserted in the (PLS) jack at this time, prevents (L1) from operating and falsely bringing in a loop failure alarm.

15.2 Jack (C) provides means of plugging a dial hand test set into this circuit to permit local dialing tests to check the performance of this circuit.

15.3 Jack (PLS) besides providing means for silencing the central office alarm (see 17.2), also provides means for connecting a per cent break meter across the contacts of relay (L) for checking the pulses coming into this circuit.

15.4 Key (ADJ) is provided for use when checking relay current flow requirements or when adjusting relays. Operation of this key prevents false ringing alert signals from being transmitted to any of the warning stations, and also disconnects battery from the springs of the register relays to avoid blowing fuses when adjusting these relays.

15.5 Key (RCO) is provided for use when making local dialing tests of this circuit. This key should be operated before any testing is started in order to prevent false alert signals being transmitted to the warning stations.

15.6 Lamp (CO) is provided as a monitor indication that the (ADJ-RCO) key is operated or that a dummy plug is inserted in the (PLS) or (S) jack.

15.7 Jacks (TLO) and (TLE) provide means of connecting a station signal indicator set to this circuit when making local maintenance operation tests. Jack (TLO) provides access to an odd numbered test line and jack (TLE) provides access to an even numbered test line, so that both groups of code signals may be tested.

15.8 Resistor (TST) provides a marginal test of the ringing supply potential when making local maintenance operation tests.

15.9 Jack (S) provides means for shorting lead "S" to lead "Sl" when this circuit is taken out of service.

16. TAKING EQUIPMENT OUT OF SERVICE

16.1 When this circuit is taken out of service, all the warning stations controlled by this circuit and all the siren stations controlled by the associated Public Signal Control Circuit, if provided, are prevented from receiving warning alert signals from the keypoint control station. For this reason it is extremely important that the necessary work operations be completed with a minimum of delay and the circuit put back in service as quickly as possible.

16.2 In order that emergency arrangements may be made in case an air raid alert occurs while this equipment is out of service, the attendant at the keypoint control station and all telephone company personnel who may be concerned should be advised before any work is started.

16.3 To preserve continuity of service for the remainder of the civil air raid warning network and to avoid falsely sounding loop failure alarms at the various telephone central offices in the network, provision has been made for taking this equipment out of service in the following order: (a) By inserting a dummy plug (No. 258D) in the (PLS) jack; (b) Connecting terminal 20 to terminal 22 on the "B" terminal strip of the Code GEN and Dial PLS

REC unit or by inserting a dummy plug (No. 258D) in the (S) jack; and then (c) Inserting a plug in the (C) jack.

16.4 When the work operations are completed, the equipment should be restored to service in the reverse order by removing the plug from jack (C), removing the test connection from terminal strip "B", or the plug from jack (S), and then removing the plug from jack (PLS).

16.5 The attendant at the keypoint control station and the interested telephone company personnel should be informed when this equipment is restored to service.

17. DESCRIPTION OF ALARM FEATURES

17.1 When this circuit is normal, the incoming loop is closed and relay (L) is operated. If a trouble condition occurs on this loop, such as an open circuit or a false ground, or if dial pulses are introduced on the loop, relay (L) will release and operate (Ll). The operation of relay (Ll) operates relay (AL) which locks operated under control of key (CA). (AL) operated closes connections to the central office alarm equipment to bring in suitable audible and visual alarms as described in the circuit descriptions for the central office alarm circuits listed under connecting circuits. The operation of relay (AL) also lights lamp (ALM).

17.2 When the central office alarm is caused by a permanent condition on the incoming loop, the alarm may be silenced by placing a dummy plug in jack (PLS) and releasing relay (AL) by operating key (CA) momentarily.

17.3 If this circuit is located in an unattended office and it is desired to retire alarms from a master office option "ZA" is used which provides for locking relay (AL) operated under control of the Alarm Cut-Off Circuit. Operation of that circuit, releases (AL) and retires the alarms.

BELL TELEPHONE LABORATORIES, INC.

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