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TRAFFIC MANAGEMENT SYSTEMS
OBSERVING LINE CIRCUIT
FOR OBSERVING ORIGINATING SERVICE
FOR USE IN PANEL BATTERY CUT-OFF RELAY OFFICES
OR CROSSBAR NO. 1 OFFICES

CHANGES

D. Description of Changes

- D.1 All features used for observing on accuracy of billing are rated Mfr Disc. to agree with the Local Dial Observing Circuit (SD-90647-01), in which these features are now rated Mfr Disc.
- D.2 Option N wiring was first designated on this issue and is applied to the wiring of the M2 and MA leads in Fig. 1 and 6, the MR leads in Fig. A and B, and the A lead in Fig. 6; therefore, Circuit Note 115 was added.
- D.3 To remove the billing accuracy check features, the following have been rated Mfr Disc.: options Q and N and Circuit Notes 112, 113, and 114.
- D.4 Title has been changed to agree with other similar Traffic Management Systems circuits.

F. Changes in Description of Operation

- F.1 Under 3. FUNCTIONS, rate 3.14 Mfr Disc.
- F.2 Add the following section:

12. MANUFACTURING TESTING REQUIREMENTS

This circuit shall perform in accordance with the specifications described in 3. FUNCTIONS.

BELL TELEPHONE LABORATORIES, INCORPORATED
DEPT 5223-RWU-COR

PANEL SYSTEMS
OBSERVING LINE CIRCUIT
FOR OBSERVING ORIGINATING SERVICE
FROM CENTRAL SERVICE OBSERVING DESK
FOR USE IN PANEL BATTERY CUT-OFF RELAY OFFICES
OR CROSSBAR NO. 1 OFFICES

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 A feature is added to permit this circuit to function with lines that are arranged for automatic number identification

B. CHANGES IN APPARATUS

B.1 Superseded Superseded by
E897, (A) relay, E6058, (A) relay,
Option "R"-Fig. 1 Option "S"-Fig. 1

D. DESCRIPTION OF CIRCUIT CHANGES

D.01 The "F or F1" lead showing connection from Fig. 1 to the service observing circuit formerly was designated "F", and now shows reference to circuit Note 114.

D.02 The "ORE or ORO" lead, Option "Q", is added to Fig. 1 to show connection to the service observing circuit.

D.03 In Fig. 1, the E897 code used for relay (A), Option "R", is rated Mfr. Disc. for use in this circuit and is superseded by the E6058 code, Option "S".

D.04 Lead "S", Option "Q", is added to Figs. A and B to show connection to Fig. 1.

D.05 Circuit Note 111 is modified to include Options "Q", "R" and "S".

D.06 Circuit Notes 112, 113, and 114 are added.

D.07 The Options Used table is modified to include Options "Q", "R" and "S".

D.08 Reference to Notes 112 is added to Figs. A and B.

D.09 Apparatus Options "U" and "X" are rated "A&M Only" for use in this circuit.

D.10 Circuit Note 107 is modified to include the use of "X" and "W" options.

D.11 Figs. IL & AL, IL & BL changed to include new leads. Fig. 51 was added on Issue 19-D but equipment was never issued.

Fig. 51 changed to agree with new equipment and cabling. Equipment information on Sheet 1 changed to agree with latest information.

All other headings under Changes, no change.

1. PURPOSE OF CIRCUIT

1.1 This circuit is designed for use in connection with a common observing circuit at the local office end and a trunk and position circuit at a central observing bureau, for observing originating traffic on panel subscriber's lines in battery cut-off relay offices and on crossbar lines in crossbar offices.

2. WORKING LIMITS

2.1 This circuit is intended to function with panel subscriber's lines in battery cut-off using the B1093 (LF) relay and having the following external circuit loop.

2.11 Non-Coin Individual Line

Max. external	
ckt. loop res.	1500Ω
Min. insulation res.	10000Ω
Max. earth potential	

2.12 Non-Coin 2-Party Line

Max. external	
ckt. loop res.	1300Ω
Min. insulation res.	10000Ω
Max. earth potential	± 20 volts

2.13 Coin Post Payment Line

Max. external	
ckt. loop res.	1330Ω
Min. insulation res.	10000Ω
Max. earth potential	± 20 volts

2.14 Coin Prepayment Line

Max. external	
ckt. loop res.	560Ω
Min. insulation res.	10000Ω
Max. earth potential	-4 + 20 volts
Max. external conductor loop res.	0Ω
Min. insulation res.	10000Ω
Max. earth potential	-8 + 20 volts

- 2.15
- | | PBX | |
|---------------------------|----------------|----------------|
| | Out | Dial |
| Max. ext. cond. loop res. | 1350 ω | 260 ω |
| Min. ins. res. | 20000 ω | 20000 ω |
| Max. earth potential | ± 10 | ± 20 |
- 2.2 This circuit is intended to function with panel or crossbar subscriber's lines in panel or crossbar offices using the B1000 or L504 (LF) relays and having the following external circuit loops.

2.21 Non-Coin Individual Line

Max. ext. loop res. 1500 ω
Min. insulation res. 10000 ω

2.22 Non-Coin 2-Party Line

Max. ext. loop res. 1300 ω
Min. insulation res. 10000 ω
Max. earth potential $\pm 20V$

2.23 Coin Post Payment Line

Max. ext. loop res. 1300 ω
Min. insulation res. 10000 ω
Max. earth potential $\pm 20V$

2.24 Coin Prepayment Line

Max. ext. res. to GRD 1970 ω
Max. ext. ckt. loop res. 1500 ω
Min. insulation res. 10000 ω
Earth Potential $\pm 12V$

2.25 PBX Out Dial Line

Max. ext. cond. res. 1340 ω 200 ω
Min. insulation res. 20000 ω 20000 ω
Max. earth potential $\pm 10V$ $\pm 20V$

3. FUNCTIONS

- 3.01 To connect to a panel subscriber's line at the IDF terminals by means of a plug and cord.
- 3.02 To connect to a crossbar subscriber's line at the crossbar switch terminals by means of a plug and cord.
- 3.03 To provide means for automatically connecting one subscriber's line at a time, to the trunk to the central observing bureau and excluding all others, if there is an idle position at the observing bureau that is occupied.
- 3.04 To prevent a subscriber's line from being connected to the trunk to the central observing bureau, if all observing positions are busy or unoccupied.
- 3.05 To transmit a signal to the common observing circuit when a call is originated.

3.06 To connect the "T", "R" and "MR" terminals of the subscriber's line circuit to the common observing circuit.

3.07 To close the register circuit for identifying the particular individual observing line circuit that is connected to the trunk to the central observing bureau.

3.08 To transmit a signal to the common observing circuit as soon as the subscriber's line is associated with a district selector.

3.09 To release from the common observing circuit automatically or under the control of an operator at the central observing bureau.

3.10 To provide for testing the individual observing line circuits after an observing connection has been released, in order to insure that an individual observing line circuit may be locked to the trunk to the central observing bureau, only at the time a call is originated on the associated subscriber's line circuit.

3.11 To prevent individual observing line circuits that are associated with subscribers' lines on which terminating traffic is taking place, from being locked to the common observing circuit.

3.12 To prevent stray battery pulses in the service observing equipment from operating message registers.

3.13 To transmit a signal over the "LO" lead to the subscriber sender when the subscriber's line is connected to the sender for dial tone.

3.14 To transmit a signal over the "ORE" or "ORO" lead to the ANI observing network, via the service observing circuit, to indicate an ANI line is connected up for observation.

4. CONNECTING CIRCUITS

4.1 Service observing circuit for observing local originating service at a central observing desk - SD-90647-01.

4.2 Standard panel subscribers' line circuits in battery cut-off relay offices - SD-21712-01.

4.3 Standard crossbar subscribers' line circuits in crossbar offices - SD-25553-01.

DESCRIPTION OF OPERATION

5. CALL ORIGINATED FIGS. 1 AND A OR B, OR FIG. 6

When a call is originated on a subscriber's line that is connected up for observation, the (LF) relay of the

associated individual observing line circuit operates through normal contacts of the (SL) relay, in parallel with the line relay over the subscriber's loop. The (LF) relay operated, connects the "G" lead through normal contacts of the (A) relay and primary winding of the (YK) relay over the "B" lead to battery in the common observing circuit. If the common observing circuit is in a condition to accept originated calls and is not already locked to another individual observing line circuit associated with a subscriber's line, direct ground is encountered on the "G" lead and the (YK) relay operates through its primary winding. The (YK) relay operated, closes a locking path through its secondary winding and make contacts, in parallel with the winding of the (A) relay over the "P" or "Fl" lead and through a relay in the common observing circuit to ground. This closure operates the (A) relay of the individual observing line circuit and the relay in the common observing circuit, which disconnects battery from the primary windings of all the (YK) relays and thereby prevents the operation of another (YK) relay. The operation of the (YK) relay, opens the series locking path for the (YK) relays of all succeeding circuits, closes the tip and ring of the line through make contacts to the common observing circuit and connects the "G" lead through another set of make contacts to the "P" lead to operate a relay in the common observing circuit to close the timing leads in that circuit. When figures 1 and A or B are used, the (A) relay operated, (1) disconnects the "G" lead from the primary winding of the (YK) relay, (2) closes the "MR" terminals of the line circuit through the 300 ohm resistance if provided to the common observing circuit and (3) closes the "TN" and "U" leads to operate the proper register relays in the common observing circuit. When this circuit is required to function with lines that are arranged for automatic number identification (ANI), Option "Q" is provided. If the subscriber line connected up for observation is arranged for ANI, a 5800 cycle signal from the ANI equipment is connected to lead "S" of Fig. A or B. In this case, the operation of relay (A): (1) performs the same functions 1 through 3 mentioned above and (2) connects the 5800 cycle signal on lead "S" to lead "ORE" or "ORO" for transmittal to the common observing circuit. This signal is subsequently cut through the common observing circuit to the ANI service observing network as an indication that this particular ANI line is connected up for observation. When figure 6 is used, the (A) relay operated, (1) disconnects the "G" lead from the primary winding of the (YK) relay, (2) connects the "LO" lead of figure 7 through the "MA" lead to the common observing circuit, (3) connects ground from a back contact of the (SL) relay over the "A" lead to operate

a relay in the common observing circuit and (4) closes the "TN" and "U" leads to operate the proper register relays in the common observing circuit.

6. DISTRICT SELECTOR CONNECTED TO LINE FIG. A

As soon as the line circuit on which a call has been originated, is associated with a district selector, ground is connected to the sleeve of the subscriber's line and the (SL) relay operates in parallel with the subscriber's cut-off relay. The (SL) relay operated, disconnects the (LF) relay from the ring of the line, thereby releasing it. The release of the (LF) relay, disconnects the ground over the "G" lead from the "P" lead, which removes the shunt from a relay in the common observing circuit, allowing the relay to operate.

7. DISTRICT JUNCTON CONNECTED TO LINE FIGS. B OR C

As soon as the line circuit on which a call has been originated, is associated with a district junctor, ground is connected to the sleeve of the subscriber's line and the (SL) relay operates in parallel with the line switch hold magnet. The (SL) relay operated, disconnects the (LF) relay from the ring of the line, thereby releasing it. The (SL) relay also operates the (SR) relay. The release of the (LF) relay, disconnects the ground over the "G" lead from the "P" lead, which removes the shunt from a relay in the common observing circuit, allowing the relay to operate. The (SR) relay is made slow release to take care of the difference in releasing time between the hold magnet and the (SL) relay as the (LF) relay will operate falsely if it is not shunted by the line relay. When figure 6 is used, operation of the (SL) relay also removes ground from the "A" lead causing the relay in the common observing circuit to release. Release of this relay in the common observing circuit, causes a timed ground closure to be sent over the "MA" and "LO" leads to the subscriber sender to indicate that a subscriber's line is being observed.

8. SIMULTANEOUS CALLS ON MORE THAN ONE LINE

When simultaneous calls are originated on several subscribers' lines that are connected up for observation, the (LF) relay of each of the individual observing line circuits, operates in parallel with the line relay of the respective line circuit. The (LF) relays operated, connect ground from the "G" lead through their make contacts, normal contacts of the (A) and primary windings of the associated (YK) relays and over the "B" lead to battery in

the common observing circuit. This closure causes the operation of each of the (YK) relays associated with the operated (LF) relays. The operation of each (YK) relay however, opens the series locking path for all succeeding (YK) relays, and as soon as battery is removed from the "B" lead by the operation of a relay in the common observing circuit in series with the winding of the (A) relay and secondary winding of the (YK) relay of the lowest numbered individual observing line circuit connected in parallel to the MF lead to the common observing circuit, all the (YK) relays release except the one associated with the lowest numbered individual observing line circuit. This circuit arrangement insures that only one individual observing line circuit is locked to the common observing circuit at a time.

9. RELEASE OF INDIVIDUAL OBSERVING LINE CIRCUIT

When an individual observing line circuit that has been locked to the common observing circuit is released automatically or under control of an operator at the central observing bureau, ground is removed from the "F" or "F1" lead and ground through a high resistance test relay is connected to the "G" lead by the operation of the release relay in the common observing circuit. The removal of ground from the "F" or "F1" lead causes the (YK) and (A) relays of the individual observing line circuit and a relay in the common observing circuit to release. The (YK) and (A) relays released, disconnects the "T", "R" and "MR" terminals of the subscribers' line from the common observing circuit and opens the "TN" and "U" leads to the register relays in the common observing circuit.

10. TEST TO INSURE THAT LINE CIRCUITS ARE LOCKED TO THE COMMON OBSERVING CIRCUIT ONLY AT THE TIME OF THE ORIGINATION OF A CALL

The release of the relay in the common observing circuit that was operated in series with the (YK) and (A) relays of the individual observing line circuit, connects battery to the "B" lead. If there are one or more calls in progress at this time on any of the line circuits connected up for observation, and the sleeve of the line has not yet been grounded by a district, the (LF) relay of each of the individual observing line circuits associated with

these lines will be operated. Battery on the "B" lead from the common observing circuit is therefore connected through the primary windings of the (YK), normal contacts of the (A) and make contacts of the (LF) relays that are operated and over the "G" lead to ground through a high resistance test relay in the common observing circuit. This closure operates the high resistance test relay in the common observing circuit, but the (YK) relays of the individual observing line circuits are marginal and do not operate under this condition. The operation of the high resistance test relay in the common observing circuit holds the release relay operated and prevents direct ground from being connected to the "G" lead to lock an individual observing line circuit to the common circuit, until all the operated (LF) relays of the individual observing line circuits have released and permitted the high resistance test relay of the common observing circuit to release and open the holding path for the release relay. When this condition occurs, that is, all (LF) relays of the individual observing line circuits and the test and release relays of the common observing circuit have release, direct ground is connected over the "G" lead from the common observing circuit to the armatures of all the (LF) relays of the individual observing line circuits, and the next call originated on any one of the line circuits, that are connected up for observation, is locked to the common observing circuit by the operation of the (LF) relay of the individual observing line circuit associated with that particular line.

11. TERMINATING TRAFFIC

Terminating calls on lines that are connected up for observation, are prevented from being locked to the common observing circuit by the operation of the (SL) relay of the individual observing line circuit in parallel with the subscriber's cut-off relay, at the time the line is seized and made busy by the final selector. The operation of the (SL) relay disconnects the (LF) relay from the ring of the line and prevents its operation. The (SL) relay remains operated until the busy condition is removed from the sleeve of the subscriber's line.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT. 2335-VJA-FBB-AC

PANEL SYSTEMS
OBSERVING LINE CIRCUIT
FOR OBSERVING ORIGINATING SERVICE
FROM CENTRAL SERVICE OBSERVING DESK
FOR USE IN PANEL BATTERY CUT-OFF RELAY OFFICES
OR CROSSBAR NO. 1 OFFICES

CHANGES

A. CHANGED AND ADDED FUNCTIONS

- A.1 A feature is added to permit this circuit to function with lines that are arranged for automatic number identification

B. CHANGES IN APPARATUS

- B.1 Superseded Superseded by
E897, (A) relay, E6058, (A) relay,
Option "R"-Fig. 1 Option "S"-Fig. 1

D. DESCRIPTION OF CIRCUIT CHANGES

- D.01 The "F or Fl" lead showing connection from Fig. 1 to the service observing circuit formerly was designated "F", and now shows reference to circuit Note 114.
- D.02 The "ORE or ORO" lead, Option "Q", is added to Fig. 1 to show connection to the service observing circuit.
- D.03 In Fig. 1, the E897 code used for relay (A), Option "R", is rated Mfr. Disc. for use in this circuit and is superseded by the E6058 code, Option "S".
- D.04 Lead "S", Option "Q", is added to Figs. A and B to show connection to Fig. 1.
- D.05 Circuit Note 111 is modified to include Options "Q", "R" and "S".
- D.06 Circuit Notes 112, 113, and 114 are added.
- D.07 The Options Used table is modified to include Options "Q", "R" and "S".
- D.08 Reference to Notes 112 is added to Figs. A and B.
- D.09 Apparatus Options "U" and "X" are rated "A&M Only" for use in this circuit.
- D.10 Circuit Note 107 is modified to include the use of "X" and "W" options.
- D.11 Figs. IL & AL, IL & BL changed to include new leads. Fig. 51 was added on Issue 19-D but equipment was never issued.

Fig. 51 changed to agree with new equipment and cabling. Equipment information on Sheet 1 changed to agree with latest information.

All other headings under Changes, no change.

1. PURPOSE OF CIRCUIT

- 1.1 This circuit is designed for use in connection with a common observing circuit at the local office end and a trunk and position circuit at a central observing bureau, for observing originating traffic on panel subscriber's lines in battery cut-off relay offices and on crossbar lines in crossbar offices.

2. WORKING LIMITS

- 2.1 This circuit is intended to function with panel subscriber's lines in battery cut-off using the BI093 (LF) relay and having the following external circuit loop.

2.11 Non-Coin Individual Line

Max. external	
ckt. loop res.	1500 ω
Min. insulation res.	10000 ω
Max. earth potential	

2.12 Non-Coin 2-Party Line

Max. external	
ckt. loop res.	1300 ω
Min. insulation res.	10000 ω
Max. earth potential	± 20 volts

2.13 Coin Post Payment Line

Max. external	
ckt. loop res.	1330 ω
Min. insulation res.	10000 ω
Max. earth potential	± 20 volts

2.14 Coin Prepayment Line

Max. external	
ckt. loop res.	560 ω
Min. insulation res.	10000 ω
Max. earth potential	-4 + 20 volts
Max. external conductor loop res.	0 ω
Min. insulation res.	10000 ω
Max. earth potential	-8 + 20 volts

- 2.15 PBX
Out Dial
- | | | |
|----------------------|----------------|----------------|
| Max. ext. cond. | | |
| loop res. | 1350 ω | 260 ω |
| Min. ins. res. | 20000 ω | 20000 ω |
| Max. earth potential | ± 10 | ± 20 |
- 2.2 This circuit is intended to function with panel or crossbar subscriber's lines in panel or crossbar offices using the B1000 or L504 (LF) relays and having the following external circuit loops.
- 2.21 Non-Coin Individual Line
- | | |
|----------------------|----------------|
| Max. ext. loop res. | 1500 ω |
| Min. insulation res. | 10000 ω |
- 2.22 Non-Coin 2-Party Line
- | | |
|----------------------|----------------|
| Max. ext. loop res. | 1300 ω |
| Min. insulation res. | 10000 ω |
| Max. earth potential | $\pm 20V$ |
- 2.23 Coin Post Payment Line
- | | |
|----------------------|----------------|
| Max. ext. loop res. | 1300 ω |
| Min. insulation res. | 10000 ω |
| Max. earth potential | $\pm 20V$ |
- 2.24 Coin Prepayment Line
- | | |
|----------------------|----------------|
| Max. ext. res. | |
| to GRD | 1970 ω |
| Max. ext. ckt. | |
| loop res. | 1500 ω |
| Min. insulation res. | 10000 ω |
| Earth Potential | $\pm 12V$ |
- 2.25 PBX Out Dial Line
- | | | |
|----------------------|----------------|----------------|
| Max. ext. cond. res. | 1340 ω | 200 ω |
| Min. insulation res. | 20000 ω | 20000 ω |
| Max. earth potential | $\pm 10V$ | $\pm 20V$ |

3. FUNCTIONS

- 3.01 To connect to a panel subscriber's line at the IDF terminals by means of a plug and cord.
- 3.02 To connect to a crossbar subscriber's line at the crossbar switch terminals by means of a plug and cord.
- 3.03 To provide means for automatically connecting one subscriber's line at a time, to the trunk to the central observing bureau and excluding all others, if there is an idle position at the observing bureau that is occupied.
- 3.04 To prevent a subscriber's line from being connected to the trunk to the central observing bureau, if all observing positions are busy or unoccupied.
- 3.05 To transmit a signal to the common observing circuit when a call is originated.

- 3.06 To connect the "T", "R" and "MR" terminals of the subscriber's line circuit to the common observing circuit.
- 3.07 To close the register circuit for identifying the particular individual observing line circuit that is connected to the trunk to the central observing bureau.
- 3.08 To transmit a signal to the common observing circuit as soon as the subscriber's line is associated with a district selector.
- 3.09 To release from the common observing circuit automatically or under the control of an operator at the central observing bureau.
- 3.10 To provide for testing the individual observing line circuits after an observing connection has been released, in order to insure that an individual observing line circuit may be locked to the trunk to the central observing bureau, only at the time a call is originated on the associated subscriber's line circuit.
- 3.11 To prevent individual observing line circuits that are associated with subscribers' lines on which terminating traffic is taking place, from being locked to the common observing circuit.
- 3.12 To prevent stray battery pulses in the service observing equipment from operating message registers.
- 3.13 To transmit a signal over the "LO" lead to the subscriber sender when the subscriber's line is connected to the sender for dial tone.
- 3.14 To transmit a signal over the "ORE" or "ORO" lead to the ANI observing network, via the service observing circuit, to indicate an ANI line is connected up for observation.

4. CONNECTING CIRCUITS

- 4.1 Service observing circuit for observing local originating service at a central observing desk - SD-90647-01.
- 4.2 Standard panel subscribers' line circuits in battery cut-off relay offices - SD-21712-01.
- 4.3 Standard crossbar subscribers' line circuits in crossbar offices - SD-25553-01.

DESCRIPTION OF OPERATION

5. CALL ORIGINATED FIGS. 1 AND A OR B, OR FIG. 6

When a call is originated on a subscriber's line that is connected up for observation, the (LF) relay of the

associated individual observing line circuit operates through normal contacts of the (SL) relay, in parallel with the line relay over the subscriber's loop. The (LF) relay operated, connects the "G" lead through normal contacts of the (A) relay and primary winding of the (YK) relay over the "B" lead to battery in the common observing circuit. If the common observing circuit is in a condition to accept originated calls and is not already locked to another individual observing line circuit associated with a subscriber's line, direct ground is encountered on the "G" lead and the (YK) relay operates through its primary winding. The (YK) relay operated, closes a locking path through its secondary winding and make contacts, in parallel with the winding of the (A) relay over the "F" or "FI" lead and through a relay in the common observing circuit to ground. This closure operates the (A) relay of the individual observing line circuit and the relay in the common observing circuit, which disconnects battery from the primary windings of all the (YK) relays and thereby prevents the operation of another (YK) relay. The operation of the (YK) relay, opens the series locking path for the (YK) relays of all succeeding circuits, closes the tip and ring of the line through make contacts to the common observing circuit and connects the "G" lead through another set of make contacts to the "P" lead to operate a relay in the common observing circuit to close the timing leads in that circuit. When figures 1 and A or B are used, the (A) relay operated, (1) disconnects the "G" lead from the primary winding of the (YK) relay, (2) closes the "MR" terminals of the line circuit through the 300 ohm resistance if provided to the common observing circuit and (3) closes the "TN" and "U" leads to operate the proper register relays in the common observing circuit. When this circuit is required to function with lines that are arranged for automatic number identification (ANI), Option "Q" is provided. If the subscriber line connected up for observation is arranged for ANI, a 5800 cycle signal from the ANI equipment is connected to lead "S" of Fig. A or B. In this case, the operation of relay (A): (1) performs the same functions 1 through 3 mentioned above and (2) connects the 5800 cycle signal on lead "S" to lead "ORE" or "ORO" for transmittal to the common observing circuit. This signal is subsequently cut through the common observing circuit to the ANI service observing network as an indication that this particular ANI line is connected up for observation. When figure 6 is used, the (A) relay operated, (1) disconnects the "G" lead from the primary winding of the (YK) relay, (2) connects the "LO" lead of figure 7 through the "MA" lead to the common observing circuit, (3) connects ground from a back contact of the (SL) relay over the "A" lead to operate

a relay in the common observing circuit and (4) closes the "TN" and "U" leads to operate the proper register relays in the common observing circuit.

6. DISTRICT SELECTOR CONNECTED TO LINE FIG. A

As soon as the line circuit on which a call has been originated, is associated with a district selector, ground is connected to the sleeve of the subscriber's line and the (SL) relay operates in parallel with the subscriber's cut-off relay. The (SL) relay operated, disconnects the (LF) relay from the ring of the line, thereby releasing it. The release of the (LF) relay, disconnects the ground over the "G" lead from the "P" lead, which removes the shunt from a relay in the common observing circuit, allowing the relay to operate.

7. DISTRICT JUNCITOR CONNECTED TO LINE FIGS. B OR 6

As soon as the line circuit on which a call has been originated, is associated with a district junctor, ground is connected to the sleeve of the subscriber's line and the (SL) relay operates in parallel with the line switch hold magnet. The (SL) relay operated, disconnects the (LF) relay from the ring of the line, thereby releasing it. The (SL) relay also operates the (SR) relay. The release of the (LF) relay, disconnects the ground over the "G" lead from the "P" lead, which removes the shunt from a relay in the common observing circuit, allowing the relay to operate. The (SR) relay is made slow release to take care of the difference in releasing time between the hold magnet and the (SL) relay as the (LF) relay will operate falsely if it is not shunted by the line relay. When figure 6 is used, operation of the (SL) relay also removes ground from the "A" lead causing the relay in the common observing circuit to release. Release of this relay in the common observing circuit, causes a timed ground closure to be sent over the "MA" and "LO" leads to the subscriber sender to indicate that a subscriber's line is being observed.

8. SIMULTANEOUS CALLS ON MORE THAN ONE LINE

When simultaneous calls are originated on several subscribers' lines that are connected up for observation, the (LF) relay of each of the individual observing line circuits, operates in parallel with the line relay of the respective line circuit. The (LF) relays operated, connect ground from the "G" lead through their make contacts, normal contacts of the (A) and primary windings of the associated (YK) relays and over the "B" lead to battery in

the common observing circuit. This closure causes the operation of each of the (YK) relays associated with the operated (LF) relays. The operation of each (YK) relay however, opens the series locking path for all succeeding (YK) relays, and as soon as battery is removed from the "B" lead by the operation of a relay in the common observing circuit in series with the winding of the (A) relay and secondary winding of the (YK) relay of the lowest numbered individual observing line circuit connected in parallel to the MF lead to the common observing circuit, all the (YK) relays release except the one associated with the lowest numbered individual observing line circuit. This circuit arrangement insures that only one individual observing line circuit is locked to the common observing circuit at a time.

9. RELEASE OF INDIVIDUAL OBSERVING LINE CIRCUIT

When an individual observing line circuit that has been locked to the common observing circuit is released automatically or under control of an operator at the central observing bureau, ground is removed from the "F" or "F1" lead and ground through a high resistance test relay is connected to the "G" lead by the operation of the release relay in the common observing circuit. The removal of ground from the "F" or "F1" lead causes the (YK) and (A) relays of the individual observing line circuit and a relay in the common observing circuit to release. The (YK) and (A) relays released, disconnects the "T", "R" and "MR" terminals of the subscribers' line from the common observing circuit and opens the "TN" and "U" leads to the register relays in the common observing circuit.

10. TEST TO INSURE THAT LINE CIRCUITS ARE LOCKED TO THE COMMON OBSERVING CIRCUIT ONLY AT THE TIME OF THE ORIGINATION OF A CALL

The release of the relay in the common observing circuit that was operated in series with the (YK) and (A) relays of the individual observing line circuit, connects battery to the "B" lead. If there are one or more calls in progress at this time on any of the line circuits connected up for observation, and the sleeve of the line has not yet been grounded by a district, the (LF) relay of each of the individual observing line circuits associated with

these lines will be operated. Battery on the "B" lead from the common observing circuit is therefore connected through the primary windings of the (YK), normal contacts of the (A) and make contacts of the (LF) relays that are operated and over the "G" lead to ground through a high resistance test relay in the common observing circuit. This closure operates the high resistance test relay in the common observing circuit, but the (YK) relays of the individual observing line circuits are marginal and do not operate under this condition. The operation of the high resistance test relay in the common observing circuit holds the release relay operated and prevents direct ground from being connected to the "G" lead to lock an individual observing line circuit to the common circuit, until all the operated (LF) relays of the individual observing line circuits have released and permitted the high resistance test relay of the common observing circuit to release and open the holding path for the release relay. When this condition occurs, that is, all (LF) relays of the individual observing line circuits and the test and release relays of the common observing circuit have release, direct ground is connected over the "G" lead from the common observing circuit to the armatures of all the (LF) relays of the individual observing line circuits, and the next call originated on any one of the line circuits, that are connected up for observation, is locked to the common observing circuit by the operation of the (LF) relay of the individual observing line circuit associated with that particular line.

11. TERMINATING TRAFFIC

Terminating calls on lines that are connected up for observation, are prevented from being locked to the common observing circuit by the operation of the (SL) relay of the individual observing line circuit in parallel with the subscriber's cut-off relay, at the time the line is seized and made busy by the final selector. The operation of the (SL) relay disconnects the (LF) relay from the ring of the line and prevents its operation. The (SL) relay remains operated until the busy condition is removed from the sleeve of the subscriber's line.

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