

This Method of Operation sheets made from T-502171 Issue 7.

METHOD OF OPERATION  
SELECTOR CIRCUIT - INCOMING  
FROM LOCAL TEST DESK - PANEL MACHINE SWITCHING SYSTEM.

DEVELOPMENT

1. PURPOSE OF CIRCUIT

- 1.1 This circuit is used to establish and hold testing connection through the final selectors between the test cord at the desk and the talking conductors of any subscriber's line in the same full mechanical exchange.

2. WORKING LIMITS

- 2.1 At its incoming end, this circuit functions with a cord ended Local test desk sender and test cord having a maximum sleeve resistance of 128 ohms to battery.

OPERATION

3. PRINCIPAL FUNCTIONS

- 3.1 This circuit establishes connections between a test desk cord and the talking conductors of any subscriber's line in the full mechanical exchange.
- 3.11 Selects final selector.
- 3.12 Gives busy signal to the test man.
- 3.13 Permits units selection on a "No Test" basis.
- 3.14 Provides audible and visual supervisory signals under control of the substation switchhook.
- 3.15 Returns to normal.

4. CONNECTING CIRCUITS

This circuit functions with the following circuits:

- 4.1 Any standard final selector.
- 4.2 Local Test Desk sender and recording key circuit and test circuit.

(5 Pages) Page #2.

Issue 2 - BT-502171.

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## DESCRIPTION OF OPERATION

5. When the plug of the test cord is inserted in a jack at the test board, battery over the S lead operates the (CO) relay. The (CO) relay operated, lights the red lamps in the test set as a busy signal. Battery through the inner winding of the (L) relay, through a high resistance to ground in the sender circuit, moves the sender out of normal, whereupon the resistance to ground in the sender circuit is reduced, and the (L) relay operates through the inner winding. The (L) relay operated, advances the switch to position 2. In positions 2 to 18, the busy or red lamps, remain lighted until the sequence switch returns to normal. In position 2, a circuit is closed to battery through the UP magnet which operates, moving the selector upward for brush selection.

### 6. INCOMING BRUSH SELECTION

As the selector moves upward in position 2, carrying the commutator brushes over the commutator segments, the A segment and brush intermittently connects ground to the (L) relay, holding it operated, and successively short-circuiting the stepping relay in the associated sender circuit, thus releasing and permitting its reoperation until the proper brush has been selected. When sufficient impulses have been sent back to satisfy the sender, the fundamental circuit is opened releasing the (L) relay. The (L) relay released, releases the UP magnet, stopping the upward movement of the selector and advances the switch to position 3. In position 3, the trip (TM) magnet operates and the (L) relay re-operates through its inner winding. The (L) relay operated, advances the switch to position 4. In position 4, the UP magnet is reoperated over the same circuit as previously described, moving the selector upward for group selection.

### 7. GROUP SELECTION

The trip magnet (TM) operated in positions 3 and 4 causes the previously selected set of brushes to trip as the selector starts upward. As the selector moves upward for group selection in position 4, carrying the commutator brushes over the commutator segments, the B segment and brush intermittently connects ground to the tip side of the fundamental circuit, through cam D, holding the (L) relay operated, successively short-circuiting the stepping relay in the associated sender circuit, thus releasing and permitting its reoperation, until the proper group has been selected. When sufficient impulses have been sent back to satisfy the sender, the fundamental circuit is opened, releasing the (L) relay. The release of the (L) relay releases the UP magnet, and advances the switch to position 5. In position 5, the (L) relay operates through its outer winding, advancing the switch to position 6.

### 8. TRUNK HUNTING

In position 6, the UP magnet operates, causing the selector to move upward for trunk selection. Should the first trunk in the group be idle,

the circuit through the (L) relay is opened, releasing the (L) relay and opening the circuit through the UP magnet, stopping the upward movement of the selector. If, however, the first trunk is busy the (L) relay is held operated through its inner winding to ground on the S terminal. The selector then continues to move upward until the idle trunk is found. When an idle trunk is found the inner winding of the (L) relay is opened, but the relay does not release immediately due to being locked through its outer winding, to ground on the C commutator brush and segment. When the brushes are properly centered on the test terminals, the circuit through the C commutator segment is opened, the (L) relay is released, releasing the UP magnet thus stopping the brushes on the terminals of the selected trunk. The release of the (L) relay, advances the switch to position 7, the A cam advancing the switch to position 6.

NOTE: The adjustment of the C commutator brush, with relation to the trip sleeve multiple brush is such, that it does not break contact with the C commutator segment until slightly after the holding circuit through the inner winding of the (L) relay is opened, by the sleeve brush leaving the busy terminal and making contact with the sleeve terminal of the idle trunk. The UP magnet, therefore, remains operated and the selector continues to travel upward until the brushes are carried slightly above the center of the trunk terminals, allowing the locking pawl to enter the notch on the rack attached to the brush support rod. At this time, the holding circuit through the outer winding of the (L) relay is opened at the C commutator, releasing the relay. The (L) relay released, disconnects ground from the commutator feed bar (G) and releases the UP magnet. The selector then drops into place, thus centering the brushes on the trunk terminals. During trunk hunting in position 6 only, the commutator feed ground is supplied through cam C, from ground on the armature of and under control of the (L) relay. This is to prevent the reoperation of the (L) relay by the closing of a circuit between the C commutator brush and segment, on the over-throw of the selector, or as it drops into place.

#### 9. SELECTION BEYOND

In position 8, the (L) relay operates through the inner winding, to ground in the final circuit. The (L) relay operated, advances the switch to position 9. When selection of the final circuit is completed, the circuit through the inner winding of the (L) relay is opened and the (L) relay releases. The (L) relay released, advances the switch to position 10. In position 10, the (L) relay operates through its outer winding and locks through its inner winding to ground through the winding of the advance relay in the associated sender circuit. The (L) relay operated, advances the switch to position 11. The operation of the (ADV) relay in the associated sender circuit, opens the locking circuit through the inner winding of the (L) relay, releasing it. The release of the (L) relay advances the switch to position 12. In position 12, the outer winding of the (CO) relay is short-circuited by ground on cam K, connected through cam L.

(3 Pages) Page 14.  
Issue 2 - BT-502171.  
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#### 10. NO TEST

The operation of the MT key in the sender connects battery from the sender in parallel with battery through the inner winding of the (L) relay, to the ring of the final selector. In position 9, therefore, the resistance to battery is sufficiently low to cause the operation of the (PBX) relay in the final selector, so that the desired line is seized whether or not it is busy.

#### 11. TESTING

In position 12, the T and R leads of the final are connected through cams G and F respectively to the tip and ring springs of the jacks of the test desk; if the (CO) relay is operated, there are not leads connected to the T and R conductors. If, however, the (CO) relay is released, due to the operation of certain keys in the test circuit, battery through the supervisory relays is connected to the ringside, and ground to the tip side of the trunk through the (CO) relay released, in order that a subscriber or an outside test man on the line may obtain supervision. Under this condition, when the receiver at the station of the line under test is removed from the switchhook, or the outside test man places a bridge across the tip and ring of the line, the (S) relay operates, flashing the white supervisory lamps intermittently. The operation of the (S) relay also closes a circuit through an auxiliary signal circuit. The white lamps continue to flash until the (S) relay is released, by the operation of the (CO) relay or by advancing the switch out of position 12.

#### 12. DISCONNECTION

After testing has been completed with the switch in position 12, the disconnect key is operated, operating the (D) relay, which locks to ground through cam I, and advances the switch to position 18. In position 18, the DOWN magnet operates to ground on cam K, restoring the selector to normal. When the selector has reached the bottom of the frame, ground on the Y commutator brush and segment, advances the sequence switch to position 1 or normal. The operation of the disconnect key restores the circuit to normal from positions 2 to 17 inclusive.

#### 13. DISCONNECTION BY WITHDRAWING THE PLUG

In all the positions except 12, disconnection and restoring the circuit to normal may be effected by withdrawing and plug of the test cord from the line jack. This releases the (CO) relay and operates the (D) relay. The (D) relay operated, locks as previously described, advancing the switch to position 18. The Y commutator brush and segment advances the switch to normal.

#### 14. OVERFLOW

Should all the trunks be busy, the selector while in position 6,

travels to the top of the group and rests on the overflow terminals. As the S terminal is open at overflow, the (L) relay releases and advances the switch to position 7. In position 7, ground is supplied through the X commutator brush and segment, advancing the switch to position 10. In position 10, the (L) relay operates through its outer winding, advancing the switch to position 11. The (L) relay locks through its inner winding to ground through the advance relay in the sender. The operation of the advance relay causes the overflow lamp in the sender circuit to light, notifying the desk man that an abnormal condition exists on the test line. When the plug of the test cord is withdrawn from the test line jack the circuit is restored to normal as described in paragraph 12.

15. TELL TALE

Should the selector travel to the top of the frame in positions 2 to 9, the switch advances to position 10, by means of ground through the X commutator brush and segment. When position 10 is reached a tell tale lamp flashes under control of the sender circuit until the circuit is restored to normal by the release of the (CO) relay as previously described.

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