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METHOD OF OPERATION

Three Wire Office Selector Circuit - Two Calls Per Revolution of Sequence Switch - Panel Machine Switching System.

DEVELOPMENT

1. PURPOSE OF CIRCUIT

- 1.1 This circuit is for use in establishing connections between a panel machine switching office and miscellaneous local trunks, trunks to long distance or tandem offices and other central offices.

2. WORKING LIMITS

- 2.1 This circuit has an external circuit range for selections of 1225 ohms maximum resistance.

OPERATION

3. PRINCIPAL FUNCTIONS

- 3.1 This circuit is used in establishing calls between the district selector frame multiple bank and outgoing trunks terminating on the office frame multiple.
- 3.2 Selection to distant mechanical or manual office or to a distant or local operator.
- 3.3 Sequence switch arranged for two calls per revolution.
- 3.4 Self returning from position awaiting sender for group selection.

4. CONNECTING CIRCUITS

- 4.1 This office selector will function with senders, districts, incomings, two-wire office selectors or final circuits.

DESCRIPTION OF OPERATION

5. SEIZURE

When a district selector connects to the tip, ring and sleeve terminals of this selector in position 1 or 10, the fundamental circuit is

closed from battery through the 1100 ohm winding of the (L) relay contacts of cam E and F, over the tip side of the fundamental circuit to the associated district and sender circuits back over the ring side of the line, through both inner contacts of cam G to ground, operating the (L) relay. The (L) relay operated, connects ground under control of the district sleeve through the contacts of cam C to battery through the R magnet, advancing the switch to position 2 or 11. In position 2 or 11 the up-drive magnet is energized for brush selection. As the switch enters position 2 or 11 ground through the contacts of cam H is connected to the district sleeve terminal holding the selected trunk busy to all other district selectors. This busy ground is effective in position $2/2\frac{1}{2}-3\frac{3}{4}/7$ or $11/11\frac{1}{2}-12\frac{3}{4}/16$. In position $2\frac{1}{2}/3\frac{1}{2}$ or $11\frac{1}{2}/12\frac{1}{2}$ the busy condition is produced by a combination of 300 ohm ground and 400 ohm resistance to battery.

6. BRUSH SELECTION

As the selector moves upward a circuit is closed from ground on the A commutator brush and segment sending pulses back over the fundamental circuit to successively short-circuit and permit the reoperation of the stepping relay in the associated sender circuit until the proper brush has been selected. When sufficient pulses have been sent back to satisfy the sender the fundamental circuit is opened, causing the (L) relay to release. The (L) relay released, opens the circuit through the up-drive magnet which stops the upward movement of the selector. The release of the (L) relay also closes a circuit through the R magnet advancing the switch to position 3 or 12. When the switch reaches $2\frac{1}{2}$ or $11\frac{1}{2}$, ground from the district sleeve is closed through cam J to hold the S winding of the (L) relay shunted at this time. When the switch advances to position 3 or 12 ground over the fundamental tip will be closed to the P winding of the (L) relay which operates and moves the switch to position 4 for group selection. The trip magnet is energized in position $3/5$ or $12/14$ from ground at cam H. With the switch in position 4 or 13 the up-drive magnet is again energized moving the selector upward for group selection. The trip magnet being operated causes the previously selected brush to trip as the selector moves upward for group selection.

7. GROUP SELECTION

As the selector moves upward for group selection, a circuit is closed through the B commutator brush and segment and cam F, over which ground pulses are sent back over the fundamental circuit thus successively short-circuiting and permitting the reoperation of the stepping relay in the associated sender circuit until the proper group has been selected. When sufficient pulses have been sent back to satisfy the sender

the fundamental circuit is opened, releasing the (L) relay. The release of the (L) relay opens the circuit through the up magnet and closes a circuit for advancing the switch to position 5 or 14.

8. TRUNK HUNTING

With the switch in position 5 or 14 a circuit is closed from ground at cam I to battery through the 300 ohm winding of the (L) relay and 400 ohm resistance operating the (L) relay, advancing the switch to position 6 or 15. In position 6 or 15 trunk hunting takes place, the up-drive magnet being operated from ground at the armature of the (L) relay. If the first trunk of the group in which the selector hunts is busy the (L) relay is held operated through its 1100 ohm winding to ground on the sleeve terminal of the busy trunk. As long as the (L) relay is held operated due to this busy condition the circuit to the up-drive magnet is maintained and the selector will travel upward until an idle trunk is found. When an idle trunk is found the circuit through the 1100 ohm winding of the (L) relay is opened and the relay will not release immediately due to the circuit being closed through the C commutator segment and the 300 ohm winding of the relay. When the circuit through the C commutator is opened the (L) relay releases, opening the circuit through the up-drive magnet which stops the selector brush on the terminals of the selected trunk. The release of the (L) relay also closes the circuit for advancing the switch to position 7 or 16.

9. C COMMUTATOR

NOTE:- The adjustment of the C commutator is such with relation to the tripped sleeve multiple brush that it does not break contact with the C commutator segment until slightly after the holding circuit through 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-drive magnet will, therefore, remain operated and continue to carry the selector upward until the brushes are properly centered on the trunk terminals.

10. TALKING

In position 7 or 16 the (L) relay operates through its P and S windings from ground at cam H and D in series with 400 ohm resistance (A), advancing the switch to position 8 or 17. When operated in position 7 or 16, the (L) relay locks to this same ground but in position 8/9 or 17/18 it locks to ground on the sleeve brush of the associated district circuit. In position 8 or 17 the talking circuit is closed through cams

F and G. The P and S windings in series with the 400 ohm resistance (A) is for the purpose of reducing current drain at this time.

11. RETURN TO NORMAL

At the completion of conversation the district selector is disconnected from the office selector opening the circuit through the P and S windings of the (L) relay which releases. When the (L) relay releases, ground is connected to the R magnet advancing the switch from position 8 or 17 to position 9 or 18. In position 9 or 18 ground is connected to the down drive magnet through the inner contacts of cam J, returning the selector to normal. When the selector reaches the bottom of the bank, ground on the Y commutator brush and segment is connected to the R magnet through cam B, advancing the switch to position 10 or 1.

11.1 Self Returning Feature in Position Awaiting Sender for Group Selection

If the selector is moved off normal by hand or advanced to position 3 falsely with the elevator off normal, (brushes above Y segment) it will return to normal. This is accomplished by operating the (L) relay through its secondary winding from ground on cam I in series with the 400 ohm resistance to battery. On regular calls the S winding will be shunted by ground from the district sleeve and the relay will function in a manner similar to that for brush selection.

12. REGISTRATION

In position 5 or 14 ground on cam L is closed to operate the selector group register.

13. OVERFLOW

If all the trunks in a group are busy the selector travels to the top of the group and rests on the overflow terminals. As there is no ground on the sleeve of the overflow terminal the (L) relay will release and cause the switch to advance to position 7 or 16 in which position the (L) relay again operates to ground on cam H and locks to the same ground as previously described, advancing the switch to position 8 or 17. In position 8 or 17 a circuit is closed from the ground on the Z commutator brush and segment, advancing the switch to position 9 or 18. As the switch passes through position 7 or 16

a circuit is closed to operate the overflow register. This circuit is traced from ground on the Z commutator brush and segment through cams E and F out over the tip of the selector to battery through the associated register circuit (not shown). When the switch advances to position 9 or 18 battery through the 1000 ohm resistance (a) is connected through cam G over the ring lead through the district and overflow relay in the sender circuit, back over the tip lead, contacts of cams F and E, to ground at the Z commutator. This circuit advances the sender and district and when the district sleeve is open the (L) relay releases. The release of the (L) relay connects ground to the down drive magnet returning the circuit to normal as described under paragraph 11.

14. O COMMUTATOR SEGMENT

The function of the O commutator segment is to maintain an idle condition at the multiple overflow terminals so that more than one selector may stop on overflow at one time. Otherwise the first selector reaching overflow would make the sleeve multiple terminals busy, thus causing the succeeding selectors to continue upward beyond the next group of trunks. The O segment is opened at overflow but the S bar is continuous. Both the O and S commutator brushes are permanently strapped together and wired to the multiple sleeve brush. When the selector is at overflow, the O commutator brush is resting on an open segment and as the busy ground is effective through the O commutator bar only, this arrangement maintains a non-busy condition on the sleeve terminals. When necessary to combine two or more groups of trunks the multiple sleeve overflow terminals between the combined groups are permanently made busy by being connected to ground. As the S commutator bar is closed at overflow the (L) relay is held operated at this time and the selector, therefore, hunts past the "made busy" terminal into the next group.

15. TELL-TALE

When the selector is driven to tell-tale a circuit is closed from ground through the X commutator segment and brush, cam B to battery through the R magnet, advancing the switch to position 7 or 16. The local operation of the (L) relay advances it to position 8 or 17. The X commutator again advances the switch to position 9 or 18. From this point on the circuit functions in the same manner as previously described under "Overflow". Except that the ground is supplied to the sender over the tip lead from the X commutator.

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BMS

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