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14. 26 M PANEL SYSTEMS INCOMING SELECTOR CIRCUIT FROM TOLL SWITCHING SYSTEM NO. 4 INDIVIDUAL, 2 OR 4 PARTY SELECTIVE OR 4 PARTY SEMI-SELECTIVE RINGING GROUND CUT-OFF RELAY OFFICE

CHANGES

B. Changes in Apparatus

B.1	Superseded	Superseded By
		118 Poststance

llA Resistance llB Resistance Lamp Lamp

D. Description of Changes

D.1 The "Mfr Disc." llA resistance lamp is superseded by the llB resistance lamp.

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PANEL SYSTEMS INCOMING SELECTOR CIRCUIT FROM TOLL SWITCHING SYSTEM NO. 4 INDIVIDUAL, 2 OR 4 PARTY SELECTIVE OR 4 PARTY SEMI-SELECTIVE RINGING GROUND CUT-OFF RELAY OFFICE

CHANGES

D. DESCRIPTION OF CHANGES

D.1 YK option is added in Fig. A to provide ringing in position 14 instead of position 12. This allows the circuit to function properly with 8A announcement trunks.

D.2 YJ option provides the existing arrangement.

D.3 YJ and YK options are added in the Option Used Table.

D.4 Circuit Note 119 is added.

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PANEL SYSTEMS INCOMING SELECTOR CIRCUIT FROM TOLL SWITCHING SYSTEM NO. 4 INDIVIDUAL, 2- OR 4-PARTY SELECTIVE OR 4-PARTY SEMI-SELECTIVE RINGING GROUND CUTOFF RELAY OFFICE

CHANGES

B. CHANGES IN APPARATUS

B.1 Superseded Superseded by

11L Multiple Brush 11N Multiple Brush

B.2 Added:

D 420G Diode "YG" Option L 400E Diode "YI" Option

D. DESCRIPTION OF CHANGES

D.1 "YG" option is added to provide additional slow release characteristic to the D relay in order to hold over the A relay release and reoperation during S1 relay operation or release.

D.2 "G" option is added to prevent surges from the updrive magnet from falsely operating the L relay.

D.3 The llL multiple brush is rated Mfr Disc. and is superseded by the llN multiple brush to reduce transmission noise and eliminate distortion of the brush tips due to snagging.

All other headings, no change.

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CIRCUIT DESCRIPTION SWITCHING SYSTEMS DEVELOPMENT DEPARTMENT CD-21917-01 Issue 3-D Appendix 3-D Dwg. Iss. 6-D

PANEL SYSTEMS INCOMING SELECTOR CIRCUIT FROM TOLL SWITCHING SYSTEM NO. 4 INDIVIDUAL 2 OR 4 PARTY SELECTIVE OR 4 PARTY SEMI-SELECTIVE RINGING GROUND CUT-OFF RELAY OFFICE

B. CHANGES IN APPARATUS

- B.1 Removed Fig. 2 1-Bllll (TD) Relay 1-E1715 (TC) Relay 1-0.1 M.F. (T) Capacitor
- C. CHANGES IN CIRCUIT REQUIREMENTS OTHER THAN THOSE APPLYING TO ADDED OR REMOVED APPARATUS

C.l Adjustment "A" for relay (TD) is designated and rated "Mfr. Disc." and is superseded by adjustment "B." D. DESCRIPTION OF CIRCUIT CHANGES

- D.1 Fig. 2 is rated "Mfr. Disc."
- D.2 The following is removed from Note 102:

Toll Identifying Tone At "A" Bd. Required Fig. 2 Not Heq. Fig. 3

D.3 This change is added to Note 103 for record purposes.

All other headings, no change.

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CIRCUIT DESCRIPTION SWITCHING SYSTEMS DEVELOPMENT DEPARTMENT

PANEL SYSTEMS INCOMING SELECTOR CIRCUIT FROM TOLL SWITCHING SYSTEM NO.4 INDIVIDUAL 2 OR 4 PARTY SELECTIVE OR 4 PARTY SEMI-SELECTIVE RINGING GROUND CUT-OFF RELAY OFFICE

CHANGES

B. CHANGES IN APPARATUS

B.1 Added

120CS	Rep.	Coil	(YC	opt.)
120DS	Rep.	Coil	(YD	opt.)
3J Cor	nmutat	tor (1	For	pt.)

B.2	Superseded	Superseded	By

B415 Relay	B392 Relay
B403 "	
B144 "	** **
E6176 "	E859 "
E545 "	E572 "

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Notes 116, 117 and 118 are added.

D.2 The use of the B415, B403, B144, E6176 and E545 relays are superseded by the B392, E859 and E572 relays to show realistic ratings for obsolescent apparatus.

D.3 Circuit Note 104 is revised to include 120CS (YC option) and 120DS (YB option) Rep. coils.

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D.4 Note 102 is revised to specify use of the 3A commutator (YD option) with 50% Party Line Ringing and the 3J commutator (YF option) with 25% Party Line Ringing. Use of Fig. G is specified when Free Line Circuits are used in office. Use of Fig. H is apecified when Free Line Circuits are not used in office.

D.5 Note 103 is revised to show relays and options YD, YE, YF, YB & YC.

D.6 Fig. G was formerly rated "A&M only".

D.7 Options YB, YC, YD, YE and YF are added to options used table.

E. CHANGES IN TRANSMISSION REQUIREMENTS

E.1 Data for the 120CS and 120DS Rep. Coils is added to Transmission Test Requirements Table.

All other headings, no change.

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CD-21917-01 Issue 3-D Appendix 1-D Dwg. Issue 4-D

PANEL SYSTEMS INCOMING SELECTOR CIRCUIT FROM TOLL SWITCHING SYSTEM NO. 4 INDIVIDUAL, 2 OR 4 PARTY SELECTIVE OR 4 PARTY SEMI-SELECTIVE RINGING GROUND CUT-OFF RELAY OFFICE

CHANGES

B. CHANGES IN APPARATUS

B.1 Added

(A) resistance, 100,000 ohms per KS-13490, L1 ("YA" option).

- C. CHANGES IN CIRCUIT REQUIREMENTS OTHER-THAN THOSE APPLYING TO ADDED OR REMOVED APPARATUS
- C.1 "SS4-L" is added in the Block or Insulate column for the (L) relay.

D. DESCRIPTION OF CIRCUIT CHANGES

D.l The (A) resistance is connected across the tip and ring when "YA" wiring is furnished. This resistance is provided to discharge the trunk conductors between selections and thus prevent the possibility of false operation of the sender stepping relay on final units selection when the final selectors are equipped with a 3M or 3G commutator and the cable exceeds 6 miles as covered in PEM 1917.

D.2 Circuit Note 115 is added explaining the use of "YA" option.

D.3 Reference to "YA" option is added to note 103 and the options used table. D.4 In the table for working limits 50,000 ohms is added for the trunk min. ins. res.

All other headings, no change.

2. WORKING LIMITS

2.1 The maximum external circuit loop for selections shall not exceed 1488 ohms resistance and shall not include more than 12 miles of cable.

2.2 The maximum external circuit loop resistance for trunk supervision is 7540 ohms.

2.3 The minimum trunk insulation resistance is 30,000 ohms with "YA" option not provided. When "YA" option is provided the minimum trunk insulation resistance is 50,000 ohms.

2.4 The maximum external circuit loop resistance for subscriber supervision is 1500 ohms.

- 2.5 The minimum subscriber line insulation resistance is 10,000 ohms.
- 2.6 Tripping ranges:

The maximum subscriber tripping range is as follows:

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Page

ripping Relay	A-c Voltage	Silent Int. Voltage	Ran Ringing Interval	ge Silent Interval	Earth Pot.	Sub. Set
114AK 114AK 114AK 114BL 114KA 114KA 114KA	95-110 95-103 84-88 72-80 84-88 84-88 84-88 84-88	46-52 46-52 46-52 60-75 46-52 46-52 46-52	450w 800w 1350w 970w 1000w or 1500w 1000w 1500w	730w 730w 800w \$50w 1000w or 1500w 1000w 1500w	±1.5V ±5V	TUBE TUBE

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PANEL SYSTEMS INCOMING SELECTOR CIRCUIT FROM TOLL SWITCHING SYSTEM NO. 4 INDIVIDUAL, 2 OR 4 PARTY SELECTIVE OR 4 PARTY, SEMI-SELECTIVE RINGING GROUND CUT-OFF RELAY OFFICE

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.l This circuit has been changed to provide for connections of

B. CHANGES IN APPARATUS

B.1

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Replaced

Seq.	Sw.	A,	D-159894	"M" option
Seg.	Sw.	В,	D-159895 D-159893 D-159896	"ZQ" option "K" option "ZR" option

Replaced By (Special)

ringing supply to the tip side of the final terminal to permit in-

creasing the number of subscriber

stations without the addition of

D-178384 "ZV" option D-178385 "ZW" option D-178383 "ZX" option D-178382 "ZX" option

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Option "ZU" and "ZV", "ZW", "ZX" or "ZY" have been added to arrange for connection of ringing current to the tip side and ringing ground to the ring side toward the final terminal.

D.2 Option "ZZ" is added to permit circuits that have been modified to provide ringing on the tip side to be converted to provide ringing on the ring side without changing the sequence switch.

D.3 "ZT" option shows the original arrangement to provide ringing on the ring side.

D.L The sequence switch legend is extended to show "ZV", "ZW", "ZX" and "ZY" options.

D.5 Circuit note JO3 and the options used table are extended to refer to options "ZT", "ZU", "ZV", "ZW", "ZX", "ZY" and "ZZ".

D.6 Circuit notes 113 and 114 are added.

D.7 The fusing information for the ringing lead formerly was 1-1/3 amp.

All óther headings under "Changes", no change.

1. PURPOSE OF CIFCUIT

final terminals.

1.1 This circuit is for use in the completion of calls from crossbar toll to subscribers in panel office areas.

2. WORKING LIMITS

2.1 The maximum external circuit loop for selections shall not exceed 1438 ohms resistance and shall not include more than 12 miles of cable.

2.2 The maximum external circuit loop resistance for trunk supervision is 7540 ohms.

2.3 The minimum trunk insulation resistance is 30,000 ohms.

2.4 The maximum external circuit loop resistance for subscriber supervision is 1500 chms.

2.5 The minimum subscriber line insulation resistance is 10,000 ohms.

2.6 Tripping ranges:

The maximum subscriber tripping range is as follows:

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Tripping Relay	A-C Voltage	Silent Int. Voltage	Ringing Interval	Range	Silent Interval	Earth Pot.	Sub- set
114AK 114AK 114AK 114BL 114KA 114KA 114KA	95-110 95-103 84-88 72-80 84-88 84-88 84-88	46-52 46-52 46-52 60-75 46-52 46-52 46-52	450w 800w 1350w 970w 1000w or 1500w 1000w 1500w		730w 730w 800w 850w 1000w cr 1500w 1000w 1500w	±15V ±5V	TUBE TUBE

3. FUNCTIONS

3.01 Recognizes selection.

3.02 Makes brush selection.

3.03 Trips the selected brush.

3.04 Makes group selection.

3.05 Selects, and centers the multiple brushes on the terminals of the first idle trunk in the selected group.

3.06 Grounds the sleeve terminal of the selected trunk as a busy indication as soon as it is seized and maintains the condition until the switch advances beyond the talking position.

3.07 Closes the "T" lead of the incoming trunk to the "T" lead of the final selector and connects ground to the "B" lead of the incoming trunk during the time the final selector is making selections.

3.08 Recognizes the completion of final selections and signals the sender that all selections have been completed.

3.09 Recognizes trunk closure from the toll outgoing trunk circuit.

3.10 Transmits audible ringing tone to the calling subscriber while the celled subscriber is being signalled with machine ringing current.

3.11 Opens the ringing circuit when the receiver is removed from the switchhook at the called station or when the toll trunk releases this circuit.

3.12 Furnishes talking battery to the called station from the time when the ringing circuit is opened until the connection is released.

3.13 Signals the originating toll operator when the called subscriber removes the receiver from the switchhook on answer and when the receiver is replaced on the switchhook on disconnect. 3.14 Furnishes repeating coil and condenser transmission during the time the calling and called stations are connected.

3.15 Returns the elevator to normal, resets the multiple brushes, and advances the sequence switch to normal when released by disconnect of the toll trunk.

3.16 Registers each revolution of the sequence switch.

3.17 If all of the trunks in the selected group are busy when the selector hunts for an idle trunk, the elevator stops on the top set of terminals in the group (known as the overflow terminals) and the selector functions as follows:

 (a) Signals the toll sender that an overflow condition exists thereby causing the associated trunk circuit to transmit an overflow flash toward the originating toll operator.

(b) Recognizes trunk closure.

- (c) Registers the overflow condition.
- (d) Returns to normal when released by the toll trunk circuit.

3.18 When the elevator travels to the top of the frame on a trouble condition (telltale) the circuit functions as follows:

- (a) Release the UP-drive magnet.
- (b) Signals the sender as on an overflow condition.
- (c) Recognizes trunk closure.
- (d) Returns to normal, when released by the toll trunk circuit.
- 3.19 Returns to normal if the switch is advanced off normal marually.

3.20 Transmits a line busy flash and tone toward the toll office when the called line is busy.

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3.21 Provides for giving a tone signal to the "A" swbd. operator on intercepted calls to indicate they are from toll.

3.22 Provides a charging circuit for condenser (P) before trunk closure occurs.

. CONNECTING CIRCUITS

When this circuit is shown on a key sheet, the connecting information thereon is to be followed.

This circuit functions with:

- 4.1 Toll key pulsing sender circuits. SD-68018-01 (Typical)
- 4.2 Trunk circuit from toll switching system #4. SD-68011-01 (Typical)
- 4.3 Final selector circuit arranged to operate with ground on cut off relay. ES-239664 (Typical)
- 4.4 Trunk circuits for blank incoming multiple. ES-240037 (Typical)
- 4.5 Miscellaneous register circuit. SD-20141-01
- 4.6 Standard test circuits for testing incoming selectors. SD-20042-Cl (Typical)

DESCRIPTION OF OPERATION

5. SEIZURE

When the associated toll trunk is selected by a crossbar marker and the associated sender is ready for selections the (L) relay operates over the fundamental circuit in series with the "stepping relay" of the sender and advances the sequence switch to position 2.

6. BRUSH SELACTION

With the switch in position 2, the UP-drive magnet operates, causing the selector to move upward for brush selection. As the selector moves upward, carrying the commutator brushes over the commutator segments, the A segments and brush intermittently connect ground to the tip side of the fundamental circuit, alternately closing and opening a short circuit around the stepping relay of the sender circuit, thus releasing and permitting the reoperation of the stepping relay. When sufficient impulses have been sent back to satisfy the sender for this selection, the fundamental circuit is opened by the sender, releasing the (L) relay, and consequently opening the circuit through the UP magnet; which stops the upward movement of the selector, and the switch advances to position 3 where a circuit is closed for operating the TRIP magnet.

7. GROUP SELECTION

When the fundamental circuit is again closed in the sender, the (L) relay operates, advancing the switch to position 4. The UP magnet is again operated and the selector moves upward for group selection tripping the previously selected brush. As the selector moves upward the B commutator segments and brush intermittently connect ground to the tip side of the fundamental circuit, alternately closing and opening a short circuit around the sterping relay of the sender circuit, thereby releasing and permitting the reportion of the stepping relay, until sufficient impulses have been sent back to satisfy the sender. The fundamental circuit is then opened by the sender; releasing the (L) relay which opens the circuit through the UP magnet, stopping the upward movement of the selector, advancing the switch to position 5. As the switch leaves position 4 the TRIP magnet releases.

3. TRUNK HUMTING

In position 5, the (L) relay operates through its secondary winding, advancing the switch to nosition 6. the first trunk in the group is idle when the switch advances from position 5 the (L) relay releases, connecting ground thru cam P to the S terminal of the trunk to hold the trunk busy and advancing the switch to position 7. If the first trunk of the group is busy when the switch enters position 6, the (L) relay holds operated through its primary winding from ground on the S terminal and the UP magnet operates, causing the selector to move upward. When an idle trunk is found the holding circuit through the primary winding of the (L) relay is opened, but the (L) relay does not release immediately because of a circuit closed through the "C" com-mutator brush and segment. The adjustment of the "C" commutator brush with relation to the tripped sleeve multiple brush, is such that it does not break contact with the "C" commutator segment until slightly after the holding circuit through the primary 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 (L) relay and the UP magnet therefore remain operated and the selector continues to travel upward until the "C" commutator brush breaks contact with the metal segment. At this time the brushes are slightly above the center of the selector terminals and a holding pawl enters the notch in the

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rack attached to the brush support rod. With the circuit to ground thru the "C" commutator opened, the (L) relay releases, disconnecting ground from the commutator feed bar "G" and releasing the UP magnet. The selector then drops back upon the holding pawl, thus centering the brushes on the line terminals. During trunk hunting, ground is connected to the "G" commutator through cam C and the front contact of the (L) relay. This is to prevent the reoperation of the (L) relay, by the closing of a circuit from ground through the "C" commutator brush and segment as the selector drops into place. The release of the (L) relay advances the switch to position 7.

9. SELECTION BEYOND

In position 7, the (L) relay operates through its primary winding, advancing the switch to position 8, where the (L) relay holds over the ring side of the trunk to ground in the final selector. The tip of the fundamental is closed through cam F from the final trunk to the sender and ground through the contact of the (L) relay is connected to the ring in order to complete the fundamental circuit.

10. INCOMING ADVANCE

After selection beyond "Final Selection" has been completed, the final selector functions and disconnects ground from the ring conductor, causing the release of the (L) relay which advances the switch to position 9. The (L) relay reoperates in position 9 over the fundamental circuit. This time the direction of the current over the tip and ring of the fundamental circuit is reversed and causes the sender to function and prepares for dismissal.

The (L) relay operated, advances the switch through position 10, releasing the 'L) relay. The A cam also provides a path for advancing the switch to position 11.

11. TRUNK CLOSURE

With this switch in position 11, battery and ground closure is provided thro the (A) relay to the trunk which will cause the toll sender to function and in turn cause the associated outgoing trunk circuit to close thru the polarized relay bridge, after which the sender will release. The (A) relay in this circuit will operate thru the sender bridge and will be held operated thru the bridge in the toll trunk circuit. The (A) relay operated will cause operation of the (D) relay which will operate the (L) relay advancing the switch to position 12. The (L) relay locks operated in position 11 to insure advance of the switch on abandoned calls.

12. RINGING

12.1 General

Then options "ZT" and "K", "D" "ZQ" or "ZR" or "ZZ" and "ZV", "ZW", "ZX" or "ZY" are used, the circuit operation provides for connection of ringing supply to ring conductor toward the final selector for signaling the called station.

Options "ZU", and "ZV", "ZV", "ZX" or "ZY" are provided when ringing supply is to be connected to the tip conductor toward the final selector for signaling the called station. This arrangement may be used when it is desired to increase the number of subscriber stations without the addition of final terminals. This will be accomplished by the use of an additional (Theoretical) office code with its incoming selectors arranged to connect ringing supply to the tip conductor toward the final selectors. The same final terminal can be reached by dialing either office code but signaling a station on opposite sides of the line. Such an arrangement will permit providing a maximum of two stations rer final terminal by using the final selectors common to two groups of incoming selectors, each of which is associated with a sevarate office code.

12.2 Individual or Two Party Selective Ringing

When figure A for this type of ringing is provided the sequence switch will stop in position 1? where interrupted machine ringing is connected thru the winding of the (R) relay and contacts of the (L) relay to the subscribers line to ring the bell at the called station. Audible ringing tone is provided to the calling party thru cam G condenser (A) and the repeating coil windings as an indication that ringing current is connected to the called line.

12.3 Four Party Semi Selective Ringing

12.31 When figure B for this type of ringing is provided and the station celled is to be signaled with the one ring code, the "P" commutator circuit will be open and the (P) relay will not operate. Under this condition the sequence switch will stop in position 12 where interrupted machine ringing with a two second ring duration will be connected thru the winding of the "R" relay and contacts of the (L) relay to the subscribers line to ring the bell at the called station.

12.32 When the station called to be be signaled with the two ring code ground will be closed thru the "P" commutator operating the (P) relay in positions 10 to 12 1/4. With the (P)

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relay operated the sequence switch will advance thru position 12 to 13 and the ringing circuit will be held open to prevent a false ring while the switch is advancing thru position 12, a circuit from ground thru cams O and B will cause advance of the switch from position 13 to 14 and when ground closure from the pick up circuit thru contacts of the operated (I) relay occurs, the (P) relay will onerate indicating that the ringing power circuit is in a condition to provide a full cycle of ringing to the subscribers line. The (P) relay will lock orerated under control of the operated (L) relay and will close interrupted machine ringing with two one second rings thru the winding of relay (R) to the subscribers line to ring the bell at the called station. While ringing supply is connected to the line under either the one ring or two ring conditions audible ringing tone will be provided to the calling party thru cam G, condenser (A) and the repeating coil windings as an in-dication that the bell at the called station is being rung. Under the two ring condition when the called subscriber answers the (R) relay will operate and cause release of relay (L) which will in turn cause release of relay (P). Release of relay (J.) will cause the circuit operation as described in par. 13.

12.4 Four Party Selective Ringing

With this operation figures C or D are provided and the circuit will function as follows:

12.42 When the desired station is to be rung with + superimposed current the circuit to the P commutator is closed which will cause operation of the (P) relay in positions 10 to 12 1/4. The (P) relay operated will cause advance of the switch to position 13 and open the circuit to the ringing supply to prevent a false ring while the switch is advancing thru position 12. The (P) relay will release when the switch advances from position 12 1/4. Advance of the switch from position 13 to 14 will occur from ground closures thru caus 0 and F. In position 14, + superimposed machine ringing thru the winding of relay (R) and contacts of the (L) relay is closed to the subscribers line to signal the called station. When the called station is signalled with either - or + ringing supply audible ringing tone is provided to the calling subscriber thru condenser (A) cam G and the repeating coil windings as explained in paragraph 12.2.

13. TALKING

When the receiver is removed from the switchhook at the called station, the (R) relay will operate and cause re-lease of the (L) relay. The (L) relay released will under all conditions excent 4 narty ringing with the two ring code, disconnect the ringing circuit and the (R) relay from the line causing it to release. For the two ring con-dition release of relay (I) will cause release of relay (P) which will disconnect the ringing circuit and (R) re-lay from the line. Release of the (I) relay will cause advance of the switch to position 15. In position 14 3/4 to 15 the (L) relay will again operate thru winding S and will cause advance of the switch to position 16. From position 14 3/4 to 16 Talking battery and ground thru relay S and the repeating coil windings are connected to the subscribers line and the (5) relay will operate. Operation of the (5) relay will cause cheration of relay (S1) which will reverse the battery and ground connections from the (A) relay to the trunk, thereby transmitting a subscribers answer indication to the distant toll operator.

14. RETURN TO NORMAL

When the receiver is replaced on the switchhook at the called station, the (S) relay releases, releasing the (S1) relay. The release of the (S1) relay again reverses the battery and ground connected to the incoming trunk or supervisory purposes. When the holding bridge in the toll trunk is opened, the (A) relay releases, releasing the (D) relay. The (D) relay released re-leases the (L) relay and opens the cir-cuit from the ground winding of the (A) relay to the trunk to prevent interference by reseizing during return to normal. The release of the (L) relay advances the switch to position 18 where the DOWN magnet operates, causing the selector to move downward. When the selector reaches normal, ground through the Y commutator brush and segment, advances the switch to position 1, thus releasing the DOWN magnet. The TRIP magnet is energized in positions 17 1/2 to 18 to prevent snagging the multiple brush on the trip fingers when the elevator is returning to normal.

15. OVERFLOW

If all of the trunks in the selected group test busy while trunk hunting in

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position 6, the selector will continue upward until the multiple brush contacts with the top set of terminals in the group, known as the overflow terminals. The sleeve commutator bar is open at overflow to prevent grounding the sleeve terminal of the multiple bank while the switch is moving out of trunk hunting position. The (I_r) relay releases when this terminal is reached and advances the switch out of position 6. In posi-tion 7 the (L) relay reoperates, advancing the switch to position 8 where it again releases, because the ring terminal is not connected to a final ground, advencing the switch to position 9. Reverse battery is connected to the fundamontal circuit as previously described, but since the sender has not yet made final selections, it is recognized by the sender as an overflow condition which causes the sender to dismiss and the toll outgoing trunk to provide the normal trunk closure bridge condition. The incoming (L) relay operates as in normal operation and causes advance of the switch to position 11. The incoming (A) relay then operates thru the toll trunk supervisory bridge as in normal operation, operating the (D) and (L) relays and thereby advancing the switch to position 12. Ground closure thru the Z commutator segment will advance the switch to position 17. As the switch advances thru positions 12/16 ground closure to the tip conductor will cause operation of the overflow register. Shen the holding bridge in the toll trunk is opened, the (A) (D) and (L) relays will release advancing the switch to position 18. In this position the down drive magnet operates causing return of the elevator to normal and advance of the switch to position 1 as described in par. 14.

16. TELL-TALE

If the selector travels upward to the top of the frame, known as "telltale" position, in any of the up-drive positions, ground through the X commutator and brush advances the switch to the next position. In position 3, the (L) relay operates over the fundamental circuit, advancing the switch to position 4, where the X commutator advances the switch to position 5. The (L) relay operates again, advancing the switch to position 6, ground through the λ commutator brush and segment, advancing the switch to position 7. The (L) relay operates as before, advancing the switch to position 8, the X commutator advancing the switch to position 9. The overflow signal is sent back to the sender which disconnects causing the toll trunk to provide trunk closure and advance of the incoming selector switch to position 12. In this rosition ground closure thru the X commutator segment will cause advance of the switch to position 17 and return to normal is described for the overflow condition.

17. SELECTOR GROUP REGISTER

As the sequence switch advances thru position 10 ground is connected to lead "GR" to the selector group register in order to record all of the calls which are completed through a group of trunks.

18. INTERCEPTED CALLS

When this circuit is used in an office equipped with a panel "A" switchboard arranged for the completion of intercepted calls, the (TD) and (TC) relays and associated equipment shown in Fig. 2 is used. Under this condition when a call is answered by the intercepting operator relay (TD) will operate to battery controlled from the cord circuit and will cause operation of relay (TC). Relay (TC) operated will close the tone circuit to the tip conductor thereby providing a tone to indicate to the intercenting operator that a toll call has been intercented. The (TC) relay operated will also short circuit windings 3 to 4 and 7 to 8 of the repeating coil and open the circuit to condenser (C). This arrangement is provided to prevent false closure of tone toward the toll office which might impair transmission over the associated toll line prior to answer of the called subscriber should the (TD) relay operate falsely as a result of earth potential at the substation with a coin in the box or in connection with dial type P.B.X. switchboards. When the tone key at the "A" position is overated the battery condition on the tip is changed to a bridge condition across tip and ring thereby causing operation of the (S) relay and in turn the (S1) relay in this circuit. When Fig. E or F is provided, the operation of the (S]) relay will close a short circuit around the (TD) relay causing it to release and in turn release the (TC) relay. When Fig. G or H is provided, the oper-ation of the (31) relay will short circuit and then open the operating path of the (TD) relay causing it to release and in turn release the (TC) relay. Release of the (TC) reley will disconnect. the tone ckt. and restore the repeating coil circuit to the talking condition. Operation of the (S1) relay also provides

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C-4137x L supervision to the toll operator as described in par. 13. Should the associated "A" switchboard circuits not be arranged for the completion of intercepted calls the (TD) relay and associated apparatus is not used. Under this condition when Fig. E or G is

furnished and when the intercepting operator answers the call a cord circuit condition of battery on the tip conductor will cause operation of the (S) relay in this circuit and thereby provide supervision to the toll operator as previously described.

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 $(f_{i_1}^{(1)}) \in (i_2, \dots, i_n)$ ি সামগ্র ৪৬৬৩৭ জ