

This Method of Operation was Prepared from Issue 16 of Drawing T-501319.

METHOD OF OPERATION

District Finder Circuit - To be used with Subscriber's Districts and Operator's Dialing Districts - Panel System

DEVELOPMENT

1. PURPOSE OF CIRCUIT

This circuit is used to find district selectors which are held up due to stuck senders.

2. WORKING LIMITS

None.

OPERATION

3. PRINCIPAL FUNCTIONS

The principal functions are as follows:

- 3.1 Gives exact location of stuck senders.
- 3.2 Finds district selectors which are stuck.
- 3.3 Indicates selectors which are in use.

4. CONNECTING CIRCUITS

- 4.1 Any standard sender.
- 4.2 Any standard subscribers' or operators' dialing districts.

DESCRIPTION OF OPERATION

- 5. The operation of a start key connects ground through the windings of the (TO-1) and (TO-2) relays to battery operating both relays. The operation of the (TO-1) and (TO-2) relays opens the leads to the windings of the (T) relays to insure the release of any (T) relay which was operated during the test. The operation of the start key also closes a circuit from ground through the break contact of the (KC) relay and make contact of the (ST) key, to battery through the winding of the (ST-1) relay, and selector lamp 1 in series with the 240 ohm resistance. The (ST-1) relay operates and locks through its make contact to ground thru

( 4 Pages, Page 2 )  
Issue 5 BT-501319  
December 7, 1931.  
Replacing all previous  
issues.

the break contact of the (S-1) relay (E wiring) or in series with the winding of the (KC) relay, (D wiring) and the selector lamp 1 lights as a signal that the first selector is now being used. When the start key is released, the short-circuit is removed from the (KC) relay, which operates in series with the (ST-1) relay, and ground is closed through the break contacts of the start keys make contact of the (ST-1) relay, break contact of the selector magnet, and winding of the (MD-1) relay to battery, operating the (MD-1) relay. The (KC) relay operated, removed ground from the start keys, thereby preventing a second selector circuit from functioning, in case the second start key is operated before the first selector circuit has returned to normal. The (MD-1) relay operated, connects ground through its make contact operating the selector magnet. The operation of the magnet opens the circuit through the winding of the (MD-1) relay which releases and removes the ground from the winding of the magnet. The release of the magnet advances the selector to terminal 1 and again closes the circuit through the winding of the (MD-1) relay, repeating the operation as before. The circuit continues to function in this way, advancing the selector step by step until terminal 21 is reached, or until a grounded terminal is encountered in the group associated with the particular key depressed. If terminal 21 is reached, a circuit is closed from ground through terminal 21 and the brush of selector bank 1, contacts of the (TO-1) relay, to battery through the winding of the (T-1) relay. The (T-1) relay operates and connects ground through the break contacts of (ST) keys through the make contact of the (T-1) relay, (R-1) lamp, brush and contacts 21 of selector bank 6, to battery through the winding of the (S-1) relay, operating the (S-1) relay. The ground through the other make contact of the (T-1) relay and make contact of the (ST-1) relay and the winding of the (MD-1) relay, holds the (MD-1) relay operated, which in turn holds the selector magnet operated, preventing the selector from advancing. The operation of the (S-1) relay releases the (ST-1) relay and extinguishes lamp 1 if (X) wiring is used. If (A) and (Y) wiring is used the (S-1) relay operated, operates the (ST-2) relay and lights lamp 2. The (ST-2) relay operated, releases the (ST-1) relay, extinguishes lamp 1 and locks to ground through its make contact, break contact of the succeeding (ST) and (S) relays and winding of the (KC) relay. The (ST-1) relay released, opens the circuit through the (MD-1) relay which also releases and disconnects ground from the selector magnet. The magnet releases, advancing selector 1 to its normal position where the (S-1) relay also releases. Ground from the (ST) keys, through the contacts of the (ST-2) relay and the selector magnet 2 operates the (MD-2) relay which connects ground to the magnet. The magnet operates, opening the circuit through the (MD-2) relay which releases, opening the circuit through the magnet. The magnet releases, advancing the selector brushes to position 1, and the hunting is repeated as for selector 1.

6. When a grounded terminal is found, a circuit is established through the selector brush, and the contacts of the (TO-1) or (TO-2) relay to battery through the winding of the (T) relay corresponding to the selector bank in which the grounded terminal is located. The (T) relay operates and connects ground from the (ST) keys through the make contacts of the (ST) relay which is operated at that time, to battery through the winding of the (MD) relay. This holds the (MD) relay operated, and ground from the make contact of the (MD) relay holds the corresponding selector magnet operated, preventing the selector from advancing. The (MD) relays are slow in releasing to allow the (T) relay sufficient time to operate before the selector magnet can release, and advance the selector to the next position. The operation of the (T) relay also closes ground through the (R) lamp brush and arc 6 of the associated selector to battery through the corresponding (T) lamp. The lamps light indicating the group and number of the grounded (SC) lead. The number of the selector is indicated by the selector lamp, the bank of the selector by the (R) lamp, and the terminal by the (T) lamp. When the ground has been removed from the terminal the (T) relay is released, extinguishing the (T) and (R) lamps and releasing the (MD) relay. The release of the (MD) relay removes the ground from the selector magnet, which releases and advances the selector to the next position. Ground from the start keys through the contacts of the (ST) relay and the magnet again operates the (MD) relay, and the selector starts hunting until another ground is found on terminal 21 of the selector reached. A permanent ground on the 21st terminal of selector bank, operates the (T-1) relay. The circuit from this point on functions as previously described under paragraph 5.
7. The operation of the circuit for transferring from selector 2, to 3, and from selector 3 to 4 is the same as from selector 1 to 2, and when the grounded terminal is found in the first selection, the transfer takes place after the ground has been removed. If it is necessary to test the remaining terminals, before clearing the first ground, operation of the start key will remove the ground from the (MD) relay, and the selector will advance to the next position and resume hunting. The (SC) leads from the senders are grounded momentarily in normal operation and the stuck sender selector may stop momentarily on such a terminal but unless the ground is permanent, the selector will just pause and then resume its hunting until a permanent ground is encountered.
8. When terminal 21 of the last selector is reached, the (T1) relay operates operating the (S) relay as in paragraph 5. Under this condition the operation of the (S) relay releases the associated (ST) relay

( 4 Pages, Page 4 )  
Issue 5 BT-501319  
December 7, 1931.  
Replacing all previous  
issues.

since no holding ground is provided as in paragraph 5. The release of the (ST) relay de-energizes the associated stepping magnet stepping the selector to terminal 22, releasing the (T-1) and (S) relay, extinguishing the lamp and restoring the circuit to normal.

ENG.  
E.L.F.  
12-7-31  
B.A.S.

CHK'D. ELF

APP'D. A. PENROD  
S.C.E.

CIRCUIT REQUIREMENTS

	<u>OPERATE</u>	<u>NON-OPERATE</u>	<u>RELEASE</u>
B301 (T-1 to T-5)	Test .0031 amp. Readj. .0029 amp.	Test .0020 amp. Readj. .0022 amp.	
E597 (SP-1)	Through relay wdg. Test .031 amp. Readj. .018 amp. Through parallel combination. Test .107 amp. Readj. .062 amp.		Through relay wdg. Test .001 amp. Readj. .002 amp. Through parallel combination. Test .0034 amp. Readj. .0069 amp.
E630 (SP-2) (SP-3)	Through relay wdg. Test .030 amp. Readj. .016 amp. Through parallel combination. Test .103 amp. Readj. .055 amp.		Through relay wdg. Test .0028 amp. Readj. .003 amp. Through parallel combination. Test .0096 amp. Readj. .0103 amp.
E935 (MD-1) (MD-2) (MD-5)	Test .021 amp. Readj. .020 amp.		Test .0009 amp. Readj. .001 amp.
E1022 (ST-2)	Through relay wdg. Test .032 amp. Readj. .021 amp. Through parallel combination. Test .110 amp. Readj. .073 amp.		Through relay wdg. Test .0028 amp. Readj. .003 amp. Through parallel combination. Test .0096 amp. Readj. .0103 amp.
E1216 (TO-2)	Through relay wdg. Readj. .007 amp. Through parallel combination. Test .029 amp. Readj. .015 amp.	Through relay winding Readj. .0047 amp. Through parallel combination. Test .0092 amp. Readj. .0099 amp.	
E1393 (S-1) (S-2) (S-3)	Test .018 amp. Readj. .0072 amp.	Test .0046 amp. Readj. .0049 amp.	
E1483 (TO-1)	Through relay wdg. Readj. .018 amp. Through parallel combination. Test .040 amp. Readj. .036 amp.	Readj. .012 amp.  Test .022 amp. Readj. .024 amp.	