

LINE LINK DOUBLE CONNECTIONS ON ORIGINATING CALLS NO ALARM INDICATIONS NO. 1 CROSSBAR DIAL OFFICES

1. GENERAL

1.01 This section covers methods to be followed in connection with line link double connections on originating calls in case no alarm indications are given.

1.02 This section is reissued to cover double connections resulting from a false continuity of an A or B lead at the DF relay, and to revise the general form of the section. The text has been revised generally, and therefore the arrows usually employed to indicate changes have been omitted.

2. INDICATIONS OF TROUBLE CONDITIONS

HM Relay Crosses

2.01 Crosses on the HM O-9 leads at the HM relays will cause two primary hold magnets to operate in parallel. Reports of this condition generally are obtained from subscribers' reports of a busy line, double connection or a click condition in place of dial tone. The condition may be reported by an operator in the event that a call to the A board is established and a double connection exists.

DA or DB Relay Crosses

2.02 Crosses on the SH O-9 leads at the DA or DB relays will cause two secondary hold magnets to operate. If the falsely operated hold magnet is associated with a busy district junctor, a double connection will result and the call just started will be routed to permanent signal. This condition will be reported by an operator or a subscriber. Misdirected calls and partial dial stuck senders may result from two subscribers dialing simultaneously on the same connection.

DF Relay Crosses

2.03 False continuity of an A or B lead at the DF relay contacts will result in double connections at the primary switch, at the secondary switch associated with the affected lead and at other line link secondary switches having access to the same group of ten district juncctors. Double connections on busy district juncctors or line links will result in permanent signals. Misdirected routings and partial

dial stuck senders may result from two subscribers dialing simultaneously on the same connection. In the event that the permanent signal trunks become overloaded, originating trouble indications will appear.

3. REACTIONS DUE TO TROUBLE

HM Relay Crosses

3.01 On HM relay contact crosses, lines in the same horizontal group and having the same file number will be doubled up on originating calls. While these lines are busy, none of the other lines having the same file number in the line link will be able to originate calls as the sleeve ground will operate the hold magnet, prematurely releasing the line relay and thus releasing the line link controller circuit. Under this condition the subscriber will receive a click condition instead of dial tone. As long as the subscriber leaves the receiver off the hook he will deny dial tone to those subscribers having a lower preference position on the same horizontal group of the line link.

DA or DB Relay Crosses

3.02 On DA or DB relay crosses, two district juncctors are connected to one line. If the district junctor falsely connected is not busy nothing occurs until this junctor is selected for service. If it is busy, the two district juncctors being bridged together cause a double connection between two subscribers and if they do not release the connection, a permanent signal will result.

DF Relay Crosses

3.03 A cross on the normally open contacts of the DF relay, providing a false continuity for the A or B lead, will cause the associated DA or DB relay to operate when the controller grounds the related lead. If this relay is the one desired for the particular call no trouble will result. If one of the other four relays of like designation is desired, a double connection will result on the primary switch by the operation of two primary select magnets. This may or may not cause interference depending on the busy or idle condition of the link associated with the falsely

operated select magnet. If the link is idle, the next originating call on the same horizontal group will cause interference provided the first connection is still held. Double connections may occur simultaneously at the secondary switches of the line link in trouble and at another line link originating a call to the affected group of ten district junctors. This is caused by grounds backing up over the SH 0-9 leads when the DA or DB relays representing the same district junctor group are operated on two line link frames, resulting in more than one hold magnet being operated on a switch. In some cases a group of ten district junctors are multiplied on the same line link frame. In this case double connections may appear at two or more secondary switches on the same line link frame.

3.04 Double connections may route to permanent signal and may cause an overload of the permanent signal trunks which results in originating trouble indications. These indications are identified by the lighted PS1 and TB5 lamps and provide the location of the equipment involved.

4. IMMEDIATE PROCEDURE TO FOLLOW

General

4.01 Where double connections route to permanent signal trunks terminating at the sender monitor position, request the operator to employ the hold feature and to obtain the line numbers of the affected local office subscribers. As subscribers are held out of service, when the hold feature is employed on permanent signal trunks, it is important to notify the operator to restore the hold key as soon as the connection has been traced. Where permanent signal trunks terminate on the sender make-busy frame, request the attendant to obtain the line numbers. The double connection condition will be recognized by the presence of conversation or tone on the permanent signal trunk connection. The line numbers supplied by the operator or attendant can be converted to line equipment location by consulting the line record book. Trace the connection from the line equipment until a double connection is encountered. It is very important that multiple appearances of the same district junctor be checked for a double connection. In the event that the operator or attendant cannot supply the necessary line number information, trace the permanent signal trunk from the office secondary link switch and check for a double connection.

HM Relay Crosses

4.02 In the case of reports of no dial tone or clicks in place of dial tone affecting subscribers in the same line link frame, check the common HM 0-9 leads for a false battery or ground closure. Clear the cross condition.

DA or DB Relay Crosses

4.03 Where double connections are taking place on the same district junctor at two different line link secondary switches, determine which hold magnet is operated falsely and check for a cross on the associated SH 0-9 lead at the DA or DB relay. Clear the cross condition.

DF Relay Crosses

4.04 When double connections occur on the secondary switches of various line link frames and on the same horizontal number of various primary switches on one line link frame, determine the associated group of ten district junctors and remove them from service. Remove the associated secondary switch from service at the line link on which double connections are occurring at the same primary switch horizontal. Block the associated DA or DB relay normal. Release the double connections and determine that no further double connections occur. At the DF relay, check for a false continuity of the A or B lead associated with the blocked relay. Clear the trouble, remove the block and return all associated equipment to service.

5. ANALYSIS OF TROUBLE

HM, DA or DB Relay Crosses

5.01 Analysis of trouble on HM, DA and DB relay crosses is covered in 3.01 and 3.02.

DF Relay Crosses

5.02 A specific analysis of double connections resulting from a false continuity of the B lead at the DF relay is presented below.

5.03 Assuming that district junctor frame 4 group 3 (group of 10 district junctors) is cabled to line link frame 2 secondary switch 3, line link frame 5 secondary switch 5 and line link frame 8 secondary switch 1, and a series of double connections are detected, the relative information is compiled in the following typical arrangement:

<u>Line Link</u>			<u>District Junctor</u>		<u>Double Condition</u>
<u>Frame</u>	<u>Pri. Sw.</u>	<u>Sec. Sw.</u>	<u>Frame</u>	<u>Group</u>	
2		3	4	3	Two or more verticals closed on one horizontal
5		5	4	3	
8		1	4	3	
8	0		Vertical closed on		horizontal 3 & 1
8	0		"	"	" " 5 & 1
8	1		"	"	" " 7 & 1
8	1		"	"	" " 9 & 1
8	2		"	"	" " 5 & 1
8	2		"	"	" " 3 & 1

5.04 It is evident from the above information that double connections are occurring at all appearances of district junctor frame 4, group 3, and at various primary switches of line link frame 8, which has access to this district junctor group. As the number one horizontal is always involved on the various primary switches, analysis indicates that the operating lead of the associated select magnets is being grounded falsely, which may be caused by the false operation of the DBO relay. As the operating paths of the secondary switch hold magnets of line link frame 8, on which double connections have occurred, are connected through the DBO relay and as the district junctor group affected is associated with the DBO relay, the evidence is conclusive that the DBO relay is operating falsely. As the number one primary horizontal is always doubled with an odd numbered horizontal, analysis indicates

that the DBO relay is operated only when the common B lead of the line link control circuit is grounded. This points to a false continuity of the B lead at the DF relay, possibly due to a cross at the 1 and 2 top contacts of the DFO relay on line link frame 8.

5.05 Originating marker trouble indications may or may not reveal the group in trouble but they should be used for tracing and clearing double connections held by district junctors unable to reach permanent signal trunks.

6. SUGGESTED PROCEDURE FOR LOCATING AND CLEARING TROUBLE

6.01 Method of locating and clearing is covered in 4.01 to 4.04.

7. TROUBLE CONDITIONS CAUSING REACTION MAY BE LISTED BELOW

- 7.01 7 and 8 top HM relay crossed.
- 7.02 9 and 10 top DB relay crossed.
- 7.03 1 and 2 top DF relay crossed.
