ORIGINATING MARKER RECEIVING LEAD PERMANENTLY CLOSED
ORIGINATING MARKER CONNECTOR
NO. 1 CROSSBAR OFFICES

1. GENERAL

1.01 This section covers methods to be followed when one of the originating marker receiving leads is permanently closed at a DMA or SA relay of an originating marker connector.

1.02 This section is revised to describe a method of holding the originating sender to permit observation of crosspoints or relays at the time a receiving lead trouble occurs within the sender.

2. INDICATIONS OF TROUBLE CONDITION

2.01 Originating trouble indicator displays.

3. REACTIONS DUE TO TROUBLE

3.01 Calls involved in trouble indications are completed on second trial if a marker receiving lead is permanently closed at a DMA relay.

3.02 Calls may be completed on second trial, may be routed to overflow, or may be routed to the sender monitor operator as a result of a stuck sender condition if a marker receiving lead is permanently closed at an SA relay.

4. IMMEDIATE PROCEDUE TO FOLLOW

4.01 Analyze the trouble indicator records. ▶Typical displays are shown in Fig. 1. Preliminary analysis of significant groups of indications as shown in Fig. 1 are as follows:

- Group A—Marker 5 fails in various connectors. Other markers fail in connector 4-0. Some indications fail to show the connector because it released before a record could be obtained.
- Group B—Note that lamp DF4 is not shown.
- Group C—Note indications 1 and 4 where all D and F lamps are lighted. This is an indication of a ground on some D or F lead.
- Group D—Note AK and SR lamps in every case. This indicates that the marker placed a locking ground on the AK and DC leads.
- Group E—Note MS lamp in every case. On indications 1, 3 through 5, 8, and 9 this is a false indication as the marker is still in communication with the connector.
- Group F—Indicates that XDC relay was closed to the DC lead before the connector released.
- Group G—The lighted transmitting relay lamps indicate that the CK6 relay reoperated before or while the indicator was engaged.

In conclusion, as marker 5 fails in various connectors, and other markers fail in one connector (4-0), it can be assumed that marker 5 and connector 4-0 are involved in the cross. As all register relay lamps will be lighted at some time in the A or D and F register, it can be assumed that one of the leads associated with this register check lead is crossed.

4.02 In the example shown in Fig. 1, remove marker 5 from service.◀ In general, when one marker is involved in XDC trouble indications in various connectors and other markers are involved in XDC trouble indications in a particular connector, remove the former marker from service.

4.03 When all senders except one in a particular connector are involved in XDC or receiving lead check failure trouble indications, remove from service the sender that fails to indicate trouble.

5. ANALYSIS OF TROUBLE

DMA Relay

5.01 If an A1-5, D1-8, F1-10, SGR, AR, OF or TP marker receiving lead is permanently closed at a marker connector DMA relay, XDC

trouble indications will result at a particular stage of the operation of the marker circuit when the marker connector in trouble is engaged on a call. These indications occur when the marker having the closed lead is engaged on a call in a connector while another marker is engaged on a call in the connector having the closed lead. Either marker must be at the sender release stage of its operation but prior to the release of the connector circuit, and must have the receiving lead connected through the sender register circuit to the marker CK1 or CK3 and CK4 check leads. The corresponding receiving lead of the other marker must be connected to ground, either through the attached sender register circuit and over the CK1 or CK3 and CK4 leads to ground at the marker check relays, or through the attached sender register circuit to ground in this sender. This ground is connected by means of the permanently closed lead to the receiving lead of the marker at the sender release stage and causes all of this marker's register relays associated with the particular check lead to operate through the attached sender register circuit. The CK1 or CK3 relay operates and releases the CK6 relay which connects the XDC relay to the DC lead. If the SR relay operates at this instant, it locks the AK and AK1 relays and extends ground over the district link AK lead which is connected to the DC lead. The XDC operates to this ground and summons the trouble indicator. With the CK6 relay normal and the SR relay operated, the ST3 relay is operated and opens the circuit for releasing the sender and marker connector. If the sender DRL relay does not have sufficient time to operate, the connector and sender record is displayed at the trouble indicator. If the DRL relay has sufficient time to operate, the connector and sender record is not displayed. The trouble indicator display is further affected by the duration of the ground on the permanently closed lead. If the ground is still present when the trouble indicator is engaged, all the trouble indicator register relay lamps, associated with the checking lead which is connected to the permanently closed lead, will be lighted. If the ground is not present when the indictor is engaged, only the registered code, frame, and class relays will be lighted. The ground is usually removed before or while the indicator is engaged and therefore the marker CK6 is reoperated and the transmitting relay lamps appear in the trouble indicator display.

5.02 The marker in trouble is determined as the one displaying XDC trouble indications in all connectors except the one in trouble. Other markers identify the connector in trouble by displaying XDC indications in only this connector.

5.03 Should the CK6 relay release, due to the permanently closed lead, prior to the operation of the SR relay, no ground is found on the DC lead as the AK and AK1 relays are not locked and therefore the XDC relay does not operate. The operation of all the register relays, attached to a particular checking lead, causes the release of the route relay along with the CK6 relay. This releases the office and district frames and the marker returns to its initial checking stage. When the ground is removed from the permanently closed lead after approximately a half a second (time required for the other marker to proceed to the marker stage), the register relays are released in the marker which then proceeds to complete the call.

5.04 If the marker is in the marker stage when ground is connected to the permanently closed lead, the ground will not affect the operation of the marker.

5.05 If the permanently closed lead is connected to ground in the sender and is being used by the marker at the sender release stage to establish a call, the supplementary ground, connected over the closed lead from the other marker, has no effect on the call.

5.06 A permanently closed B1-5 or C1-5 lead does not result in XDC trouble indications but may delay calls momentarily in the marker by an action similar to that explained in 5.03.

SA Relay

5.07 If an A1-5, D1-8, F1-10, SGR, AR, OF or TP marker receiving lead is permanently closed at a marker connector SA relay, XDC trouble indications will result at a particular stage of the operation of the marker circuit when a sender, other than the one in trouble, is engaged on a call in the connector in trouble. The marker engaged on this call must be at the sender release stage of its operation and the permanently closed lead must be grounded in the register circuit of sender in trouble while the marker SR relay is operating. The subsequent action is as outlined in 5.01. However, as the ground on the permanently closed lead will be constant, all the register relay lamps

PRINTED IN U.S.A.

ORIGINATING TROUBLE INDICATOR RECORD
NO. 1 CROSSBAR OFFICES

FORM E-2623 (4-67)
BSP 216-102-301

OFFICE _____

DATE _____ SHEET NO. _____

GROUP A / GROUP B

NO.	DR	GO	G 100	RTR	DL GO	DL G 100	3DT	CF	CN	PDI	CC	SN	OF	TL	KEL	KOL	KER	KOR	G	GT1	GT3	GS	DF	SW	M	JC	P	CHL	CHR	MI OR Z	MIPS OR ZJ1	MICK OR ZCK	ZO	ZL	ZK	PS1	NC1	OT1	TC1	TCK	TP1	RP1	TPK	ZR	NO.
1	4				5			4	0			0	5	14				5	2	✓			0	4	0	11	1		4						✓				✓						1
2	4												4	2		3							11	6	2	9	8	3						✓				✓						2
3	5							1	0			2	1	2		4			11				8	4	4	3	1		4					✓			✓								3
4	3							4	0			1	3	2			0		0				3	4	9	6	9	1						✓				✓						4
5	5							4	1			2	5	0			9		10				7	5	0	10	7		2					✓				✓						5
6	4												2	0	9								3	3	8	4	7	5						✓		✓								6
7	4				5								0	8	1								11	5	2	0	1	2						✓				✓						7
8	5							1	2			4	2	10		3			9				0	9	8	4	4		0					✓				✓						8
9	1							4	0			4	1	12				4	5				0	5	8	3	3		1					✓				✓						9
10	5							4	1			2	5	0			9		10				7	5	0	10	7		2					✓				✓						10

GROUP C / GROUP D / GROUP E

NO.	A	B	C	D	F	AR	OF	TP	EA	LA	SGR	TD VK	CKG	K4	K5	SPE	SPO	NSE	NSO	DK	AK	TKE	TK	SR	RL	MS	CK	BK	CHE	A	C	S	SL	B	MR	S1K	MRL	TK1	ZS	Z	OT	TC	TP2	TM6	NM	RO	TB5	CRL	DT3	MR1	TRL	EC	NO.
1	6	8	2	ALL	ALL								✓	✓	✓			✓	✓	✓	✓		✓	✓		✓	✓	✓																								✓	1
2																		✓	✓	✓	✓		✓	✓		✓	✓	✓																								✓	2
3	2	1	1	1	8								✓	✓	✓			✓	✓	✓	✓		✓	✓		✓	✓	✓																								✓	3
4	2	3	2	ALL	ALL								✓	✓	✓			✓	✓	✓	✓		✓	✓		✓	✓	✓																								✓	4
5	6	8	3	1	7								✓	✓	✓			✓	✓	✓	✓		✓	✓		✓	✓	✓																								✓	5
6																		✓	✓	✓	✓			✓		✓	✓	✓							✓																✓	6
7																		✓	✓	✓	✓			✓		✓	✓	✓																								✓	7
8	5	6	5	1	0								✓	✓	✓			✓	✓	✓	✓		✓	✓		✓	✓	✓																								✓	8
9	9	6	2	1	0								✓	✓	✓			✓	✓	✓	✓		✓	✓		✓	✓	✓																								✓	9
10																		✓	✓	✓	✓			✓		✓	✓		✓																							✓	10

GROUP F / GROUP G

NO.	X	SDT	ANI	PTK	IT GO	IT G100	AN	GO ANO	GO ANE	G100 ANO	G100 ANE	OB	SD	SD1	OG	SO	OBT	BM	AIOD	AIDK	ODN	7DG	SK2	SK3	SG5	OB5	CR	CL	TW	AMA MI	AMA 2L	AMA MIN	OTHER ALARMS	ANALYSIS	RECORDED BY	TIME	DATE	NO.
1	XDC												✓	✓	5	✓											3, 4	1								3:54 PM		1
2	XDC																																			4:35 PM		2
3	XDC												✓	✓	5	✓											3, 4	3, 4								4:37 PM		3
4	XDC											2	✓	✓	5														✓							4:38 PM		4
5	XDC											1, 2	✓	✓		✓											3, 4, 5									10:06 AM		5
6	XDC																																			10:40 AM		6
7	XDC																																			1:55 PM		7
8	XDC											2	✓	✓		✓											3, 4									2:23 PM		8
9	XDC											1, 2	✓	✓		✓											4, 5									4:37 PM		9
10	XDC																																			9:58 PM		10

NO.	TICKET NO.	TROUBLE FOUND OR ACTION TAKEN	MKR. NO. → PREVIOUS READINGS → DTR REGISTER READING	BY	TIME	DATE	NO.
1							1
2							2
3							3
4							4
5							5
6							6
7							7
8							8
9							9
10							10

Analysis Of Indications: See 4.01
Immediate Procedure To Follow: See 4.02
Procedure To Locate And Clear Trouble: See 6.07

Fig. 1—Originating Trouble Indicator Record, Form E-2623

of the particular check lead will be lighted and the transmitting and TK lamps will not be lighted at the trouble indicator display panel.

5.08 If any marker receiving lead, including the B1-5 and C1-5 leads, is permanently closed at a marker connector SA relay, receiving lead check failure trouble indications will result when any sender, other than the one in trouble, is engaged on a call in the connector in trouble with a marker at any stage of its decoder stage operation other than as outlined in 5.01. The sender in trouble connects ground from its register circuit to the permanently closed lead. If this lead in the connector is not grounded by the register circuit of the sender engaged in the connector, the ground connects through the register circuit of the sender not in trouble to the CK1, CK2, CK3 or CK4 check leads and operates all the register relays in the marker associated with the particular check lead. The marker route relay is released, if operated, the office and district frames are released, if engaged, and the marker returns to its initial checking stage. It subsequently times out and leaves a display on the trouble indicator.

5.09 The sender in trouble is determined by elimination as all senders, except the one in trouble, will display XDC indications or receiving lead check failures in the connector in trouble.

5.10 If ground is connected to the permanently closed lead by the sender in trouble at a time when this lead is connected to ground in a register circuit of a sender not in trouble, the call is not affected.

5.11 See Section 216-526-301 covering the originating trouble indicator alarm routine for additional information on receiving lead check failure trouble indications.

5.12 ▶Receiving lead trouble other than the connector false closures covered in the section may occur due to wiring crosses or multiple crosspoint closures within the originating sender. Usually one sender will appear on the originating trouble indicator with "full" appearances on certain receiving lead lamps. This type of trouble may be intermittent, occurring only with certain combinations of switch position or call information relays.◀

6. SUGGESTED PROCEDURE FOR LOCATING AND CLEARING TROUBLE

DMA Relay

6.01 After removing the marker in trouble from service, test any originating sender in the connector in trouble with the originating sender test frame. Observe that a register relay operates momentarily in the marker removed from service. The lead associated with this register relay should be checked for a permanent closure at the DMA relay of this marker in the connector in trouble.

SA Relay

6.02 After removing the sender in trouble from service, check for a permanent closure of one of the receiving leads at the associated connector SA relay. The trouble indications will reveal the group in which the lead in trouble appears.

▶Trouble Within A Sender

6.03 Prepare a cord locally as shown in Fig. 2. Cut the cord about 6 inches from one end and splice in the diode with the arrow pointing toward the short end of the cord.

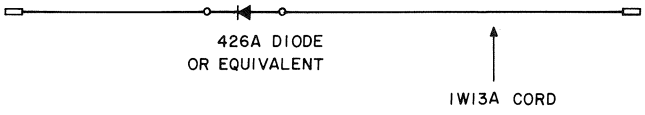

Fig. 2—Modified Cord Used to Hold Senders

6.04 Determine the sender and particular checking lead (CK1, 2, 3, 4) involved in the failure. Connect the cord and diode as specified in 6.05 or 6.06. Release the sender for service. The cord will have no effect on normal operation but will cause the sender to stick whenever the trouble condition appears. Do not use the cord and diode for originating sender test frame tests.

6.05 ***Flat spring sender SD-25012-01.*** At the rear of the sender connect the short end of the cord to the upper winding terminal of the F hold magnet on the crossbar switch. Connect the other end of the cord to any convenient vertical unit lug where the checking lead involved appears.

The entire register switch and certain other relays will be held when a checking lead failure occurs.

6.06 ***Wire-spring sender SD-27810-01.*** This sender will usually not progress far enough to produce a checking lead failure in the originating marker because of the 2-out-of-5 checking circuits in the sender. In the event it is desired to hold the sender for observation when a checking lead failure occurs, connect the short end of the cord to the upper winding terminal of the ON1 relay and the other end to a convenient CK 1, 2, 3 or 4 lead terminal as determined from FS 15 of SD-27810-01.◀

EXAMPLE SHOWN ON FIG. 1

6.07 Test any sender in connector 4-0 with originating sender test frame. Note that in this case, F4 register relay momentarily operates in the marker removed from service. The lead associated with the register relay should be checked for a cross at connector relay DMA-5.

7. TROUBLE CONDITIONS CAUSING REACTIONS MAY BE LISTED BELOW

7.01 37 contact (F4 receiving lead) fused at a DMA relay in a connector.

7.02 Any other A1-5, D1-8, F1-10, SGR, AR, OF or TP receiving lead permanently closed at a DMA relay in a connector.

7.03 Any marker receiving lead permanently closed at an SA relay in a connector.