ORIGINATING TROUBLE INDICATOR ALARM ROUTINE NO. 1 CROSSBAR OFFICES

1. GENERAL

1.01 This section covers the method of reading the information displayed by the indicating lamps on the originating trouble indicator frame.

1.02 The purpose of the originating trouble indicator is to point as nearly as is practicable, to the source of trouble that interfered with completion of a connection between a sender and an outgoing trunk. The trouble indicator is used in case the marker cannot complete its normal function of setting up a connection between a district junctor and a desired outgoing trunk or overflow. It is also used in case of false grounds on certain leads when the marker is normal. When the originating trouble indicator is used to make manual tests of the originating marker, the lamp indications provide a means of checking the operation of the marker.

1.03 The indicator lamp panel is arranged to display the following:

(a) Code dialed.

(b) The service class.

(c) The first, second or third trial by the sender.

(d) The number of the particular marker from which a record has been taken.

(e) The marker connector frame, marker connector position on the frame and sender position in the connector.

(f) The office link frames and trunk level on the frames.

(g) The location on the office frame of the outgoing trunk selected.

(h) The district junctor frame and the particular switch and select magnet on the district link frame which are associated with the district junctor.

(i) The particular group of office junctors and the pattern relay involved, if any.

(j) The district and office links.

(k) The charge condition.

(l) The progress lamps.

(m) The transmitting information.

(n) Various cross-detecting lamps.

1.04 The progress lamps as shown in tables 1 and 2 are arranged so as to follow the natural sequence of operative functions of the various features involved when setting up a call. While it is possible for two troubles to occur simultaneously, this condition is unlikely, therefore but one trouble is considered when analyzing the record taken by the indicator, otherwise the information received would not point to the source of trouble with any degree of accuracy.

2. METHOD

2.01 If, in response to a minor intermittent or major alarm, a lighted TI lamp on the originating trouble indicator frame is found, operate the LP key and obtain a record of the trouble being indicated by the lamps listed in 2.03.

Note: An accurate record of the trouble should be obtained since in some cases it may be necessary to have records of repeated indications in order to locate the trouble.

2.02 Restore the LP key and momentarily operate the RL key to restore the trouble indicator to normal.

Caution: Release the trouble indicator as soon as possible, since a second trouble indicator record cannot be obtained as long as the trouble indicator is busy. If a marker attempts to seize the trouble indicator while it is busy, the major alarm is sounded.

2.03 The various lamps associated with the trouble indicator circuit appearing on the originating trouble indicator frame are listed below with the general information to be obtained from each lamp. There are other lamps, such as those associated with the connector alarms, appearing on this frame which are described in other B.S.P. sections. It should be noted that the progress lamps do not necessarily remain lighted beyond the stage the particular lamp indicates, so that a lamp being extinguished may also indicate still further progress especially in conjunction with simultaneously lighted lamps, or the following progress lamps. Certain of these lamps light on a satisfactory condition, hence a failure would result in the failure of the particular lamp to light. These lamp designations are listed below and on Tables 1 and 2 in the order as determined by the location on the frame starting at the top and going from left to right on each

row. This arrangement of lamps is also intended to correspond with the progress of the call through the marker. It is necessary, in general, to analyze these lamp indications collectively as is covered later in Tables 1 and 2 in order to obtain a trouble indication.

DR 0-7	Marker registering a trouble
GO	Marker group zero
G100	Marker group 100
DL GO 0-7	Marker in group 0 attempting to seize the trouble indicator when busy
DL G100 0-7	Marker in group 100 attempting to seize the trouble indicator when busy
CN 0-2	Marker connector on frame
CF 0-9	Marker connector frame
SN 0-9	Sender position in marker connector
OF 0-9	Pair of office link frames
TL 0-14	Trunk level on office secondary switch - TL10 to TL14 apply to build out secondary switches
KEL 0-9) KOL 0-9) KER 0-9) KOR 0-9)	Outgoing trunk position on office secondary switch
G 0-11	Outgoing trunk sub-group, dependent upon successive seizures of decoder marker
GT1)) GT3)	1st Sub-group) Trouble occurred while 2nd Sub-group) testing 1st or 2nd sub-group. Only two sub-groups in the trunk group. Testing of the sub-groups alternates on successive calls, but GT1 and GT2 do not.
GS 1-4	Ground supply, indication of trunk groups found busy
DF 0-19	District link frame, also indicates district junctor frame
SW 0-9	Primary switch on district link frame
M 0-9	Select magnet on district link frame primary switch, also indicates district junctor
JC 0-19	Office junctor group
P 0-13	Office junctor pattern
CHL 0-9	Channel selected on left side of the switches
CHR 0-9	Channel selected on right side of the switches
ZA1-ZJ1	Zone charge required
ZCK	Zone charge selection checked
ZO	Zone charge unit not available
ZL	Zone charge locking circuit closed
ZK	Indicates that both district link and multiple charge circuit have released
PS1	Permanent signal call
NC1	No charge) Talking indication sent to district junctor
OT1	Operator)
TC1	Transmission)
	Talking Charge)
TCK	Talking charge check, checks that charge desired has been recorded in the district junctor
TP1	Tip party indication to district junctor
RP1	Ring party indication to district junctor
TPK	Tip party check, checks that tip party indication has been recorded in the district junctor
A 0,1,2,4,5	First digit) Code dialed)
B 0,1,2,4,5	Second digit)
C 0,1,2,4,5	Third digit)
D 0,1,2,4,8	Subscribers' Service Class)
F 0,1,2,4,5,10	District link frame)
AR	Second trial by sender attempting seizure of alternate route, if any) Receiving Leads
OF	Third trial by sender attempting seizure of overflow trunks)
TP	Tip party)
CKG	Check ground
K4	CK4 relay operated, leads associated with check leads CK1 and CK3 closed
K5	CK5 relay operated, leads associated with check lead CK2 closed
SPE	Split even) Even or odd office
SPO	Split odd) frame seized.
NSE	Non-split) Trunk multiple on
	even) office secondary
NSO	Non-split) split or non-
	odd) split.
DK	District check, district link frame seized
AK	'A' channel check, sender DC and district F relays operated, district links ready for test
TKE	Lamp lighted indicates outgoing trunk not selected
TK	Transmission information to sender checked
SR	Sender release, marker notifies sender to release marker connector
RL	Release of sender; ground actually on RL lead and not cut off by cross-detecting relay, test calls only
MS	Marker stage, decoder functions completed, marker stage in progress
CK	'C' channel check, office link LC relay operated closing circuit to C links
BK	'B' channel check district link JC relay operated closing circuit to office junctors

CHE	Channel ready for seizure, lamp lighted indicates channel not seized
A	District link hold magnet closed and free of false ground
C	Office link hold magnet closed and free of false ground
S	S lead closed, office primary and secondary hold magnets operated and office link closed through to outgoing trunk
SL	SL lead closed thru district link primary and secondary hold magnets, district junctor F relay and zone charge, talking charge and party check relays in the marker
B	S and SL leads closed and ready for closure of holding ground from the district junctor. Leads free from false grounds.
MR	Message register lead closed
S1K	Ground applied by office SH magnet to outgoing trunk busy lead S1
MRL	Marker release at completion of marker functions
ZS	Zone start lead closed on test call
Z	Zone charge lead closed on test call
OT	Operator talking lead closed on test call
TC	Talking charge lead closed on test call
TP2	Tip party lead closed on test call
NM	No marker on test call, key set sender to direct trunks
RO	Reorder, signal to "A" operator
TB5	Trunks busy, overflow or P.S. group
CRL	Immediate release on account of channels busy, an attempt had been made to reach a trunk on both frames in the pair of office frames
DT3	Immediate release on account of outgoing trunk stolen by panel office, or trunk falsely selected due possibly to open sleeve lead
MR1	No line message register ground-test call only
TRL	Trouble release - test calls only
EC	End of cycle - test calls only
XOB	Office brush) Cross or
XOG	Office group) false
XSB	Second office brush) ground in
XSG	Second office group) transmit-
XCR	Compensating resist-) ting re-
	ance) lay wind-
XCL	Class) ings in
	) marker
XTL	Cross in trunk level relay winding leads in marker
XX1	Trouble cross, transmitting relays or line message register lead
XZ	Crossed zone charge leads
XZS	False ground on zone start lead
XC	Falsely grounded or crossed zone charge, talking charge, operator transmission and key pulsing relay windings
XT	Falsely grounded or crossed transmitting leads
XTC	False ground or cross on talking charge, operator talking or tip party leads
XS	False ground on S lead
XS1	False ground on S1 leads
XGS	Falsely grounded or crossed group start leads in marker
XGE	Falsely grounded or crossed group end leads in marker
XCH	False ground on A, B, C channel leads to district and office link frames, when marker is normal
XSM	False ground on select magnet control leads, SML and SMR to office link frames
XTL1	False ground or cross on trunk level leads to office link frame
XLC	False ground or cross on office link group control leads, LC 0-9 to office link frame
XSL	False ground on SL lead
XOF	False ground or cross on office frame relay windings in marker or false seizure of two pair of frames
XSS	Cross between secondary select magnet control leads SML or SMR to office link frame
XK	Cross or false ground on check leads AK, BK, CK, DK, SPE, SPO, NSE and NSO, when marker is normal.
XRL	False ground on RL or TRL lead
SDT	Trouble associated with sender test circuit
OB 1,2,4	First Office Brush)
SD, SD1	Stations Delay)
OG 1,2,4,5	First Office Group)
SO	Skip first office)
SB 1,2,4	Second office brush)
CR 6, 7	Second office com-) Information
	pensating resist-) tion
	ance) transmit-
SG 1,2,4,5	Second office group) ted to
SSO	Skip second office) the send-
CR 1-5	Compensating resist-) er.
	ance and trunk)
	test relay)
CL 1-4	Class of call)
TW	Two wire office or)
	reversed operators trunk)

2.04 While all the indicating lamps referred to above are vitally important in locating the source of an actual trouble con-

dition, they are only of secondary importance until the progress lamps as shown in Tables 1 and 2 have been consulted, unless the nature of the trouble immediately points to some particular cross detecting lamp which may be lighted.

2.05 Whenever a cross detecting lamp is lighted it indicates a cross on the leads associated with the lamp as described in the list above. The various link frames which are responsible for the trouble indication may also be obtained from lighted lamps. If the cross is between two contacts on a link connector relay so that a lead going to one marker is permanently connected to a lead within one of the link connector circuits, the trouble indication may give misleading information pointing to a wrong relay. It may also occur very infrequently since to bring in a trouble indication it may be necessary to have the marker in trouble serving a call thru a link connector not associated with the trouble and at the same time another marker must be serving a call thru the link connector in trouble. Under this condition both markers may attempt to seize the trouble indicator. However, only one would seize it and regardless of which marker left a trouble indication it would not indicate the connector relay in trouble. The indicator may show either the wrong marker or the wrong link connector, hence from analysis the wrong link connector relay. The second marker in attempting to seize the trouble indicator would light a DL - lamp. Repeated records showing two markers and one connector and the one cross indication, would show one particular marker in each indication but possibly several connectors. Hence it may be necessary to inspect all connector relays associated with the marker reported on each trouble indication on all link connector frames for crosses to the leads indicated.

2.06 After the progress lamps have been referred to, information regarding the actual sender, marker connector, marker, district junctor, district or office link frame, trunk level, outgoing trunk and channel selected, trunk or channel group, charge condition or particular cross detecting relay should be obtained from the other lamps on the indicator lamp panel.

2.07 The descriptions accompanying indications 1 to 44 in Tables 1 and 2 give general information which points to probable causes for the trouble. However, no attempt is made to cover all possible causes for these troubles. To assist in determining the lamps shown in Tables 1 and 2, which would be lighted under the various conditions, their positions are marked by a + sign and when a lighted lamp is involved in a particular indication its position is marked by a + sign underlined, thus, ±. Also when an unlighted lamp is involved in an indication its position is indicated by a - sign. To further assist in checking these indications code 322, service class 3, and district junctor frame 4 are used as shown in indications 15-18.

2.08 To expedite the location of the point at which the progress of the marker was blocked, the progress lamps may be divided into two distinct groups as follows: If lamp MS which has a red cap is lighted, it is an indication that a call has proceeded to the marker stage and that lamps peculiar to the decoder stage which may be lighted, should ordinarily be disregarded. However, if lamp MS is not lighted all lamps peculiar to the marker stage should be disregarded. A further subdivision of both decoder and marker stage lamps may then be made to also assist in locating the trouble.

2.09 When the red MS lamp is not lighted, indicating that the call is in the decoder stage, then if one or two of lamps SPE, SPO, NSE or NSO are lighted, it is an indication that the code has been translated and an attempt has been made to seize an office link frame, but if none of these lamps are lighted, then it may be assumed that the code had probably not been completely translated and reference to Table 1 for assistance in reading the indication should be made. If, however, one or two of lamps SPE, SPO, NSE or NSO are lighted, the lamps covered by table 1 may be disregarded and reference should then be made to Table 2 which covers the progress lamps pertaining to the remaining functions of the marker.

2.10 If lamp MS is lighted then of course all lamps in the decoder stage should be disregarded, unless it is later found that information regarding the actual code dialed on an overlapping call is necessary. If lamp CHE is not lighted, then a channel has been seized and the cause for not completing the connection would probably be in connection with operation of and checking the hold magnets and closure of their contacts. This partial subdivision is only for the purpose of assisting the maintenance man to analyze the situation and more readily recognize the trouble causing the blocked conditions.

2.11 Referring to Table 1 which shows typical conditions up to actual operation of some particular marker relay which may block a call, a brief explanation of several of the marker functions and the way they are recorded by the indicator lamps may be of assistance.

2.12 The first three trouble indications shown on Table 1 are open receiving leads A4, AR and OF. Table 1 shows that these troubles are similar, in that lamps B2, C2 and K5 are lighted. However, as the receiving leads A1 to TP are divided into three groups and associated with three check leads, leads A1 to A5, AR, OF and TP being

associated with lead CK1, leads B1 to C5 with lead CK2 and leads D1 to F10 with lead CK3 and since all of leads associated with check leads CK1 and CK3 must be closed to cause lamp K4 to light and further since lamps A4, AR and OF are not lighted under their respective indications, the inference is that these particular leads may be open somewhere in the sender, marker connector or marker.

2.13 Somewhat similar troubles are shown by indications 4 and 5 except that the open conditions are associated with leads D4 and F4.

2.14 A third set of trouble conditions, as shown by indications 6 and 7, involving leads B4 and C4 are different in that lamp K4 is lighted instead of K5, pointing at once to some lead associated with check lead CK2.

2.15 Indications 15 to 18 shown on Table 1 while differing in that they refer to the tip and ring parties and that the call is a first, second or third trial by the sender, are complete and if none of the lamps SPE to NSO in Table 2 are lighted, then the inference is that the trouble lies somewhere between the actual closure to operate the marker route relay or the closure of leads SPE to NSO by the office link frame.

2.16 Under the above conditions, the indications are such that the most logical lamps to check next would be the charge condition lamps PS1, NC1, OT1, TC1, ZA1 to ZJ1. If one of these lamps was lighted, it could then be assumed that the route relay was operated and the office link frame lamp OF 0-9 should then be checked to determine whether the office link frame had been seized. Ordinarily it would not be expected that one of the office link frame lamps would be lighted as one lamp refers to a pair of office link frames and it is not likely that one or both frames could be seized without having one of leads SPE to NSO closed.

2.17 Assuming that but one of lamps SPE to NSO is lighted then the assumption would be that one lead was not closed by the office link frame MCA or the trunk level TL or TR relays. In any case, if the call is a first trial, the marker will block when but one of leads SPE, SPO or NSE, NSO is closed, complete its timing and seize the trouble indicator to record where the call was blocked. However, if only one of leads SPE to NSO is closed on a second or third trial by the marker, then the marker will automatically make the offending office link frame busy and proceed with the call on one office link frame, otherwise all calls to the point reached by the trunks associated with this pair of office link frames would be blocked.

2.18 If two of lamps SPE to NSO are lighted, the inference then is that all conditions up to actual seizure of a pair of office link frames is satisfactory and further reference to the progress lamps shown in Table 1 will not be necessary unless information regarding the code dialed is required to determine whether the office link frames seized are proper for the code. The lamps shown on Table 1, while not generally referred to when the call has proceeded beyond the point where the office link frames are seized may be lighted when a record is taken any time up to actual release of the marker connector by the sender. Ordinarily, when the marker is in the marker stage the indication does not show the lamps per Table 1, but if a second call overlaps the first call and is in the decoder stage of this particular marker when a record is taken of the marker stage, it will indicate the progress of the overlapping call.

2.19 Tables 1 and 2 show other indications of trouble, some of which are similar to the troubles referred to, but each indication must be analyzed separately to determine the probable cause of failure.

3. REPORTS

3.01 The required record for these alarms should be entered on the proper form.

TABLE I

Progress Indicating Lamps
Receiving Loads

Indication No.	Code A					Code B					Code C					Service Class D					Dist. Fr. F						Misc. Leads			Check Leads		
	0	1	2	4	5	0	1	2	4	5	0	1	2	4	5	0	1	2	4	8	0	1	2	4	5	10	AR	OF	TP	CKG	K4	K5
1		±	±	-	±			+					+				±	±	±	±		±	±	±	±	±	±	±	±	+	-	+
2		±	±	±	±			+					+				±	±	±	±		±	±	±	±	±	-	±	±	+	-	+
3		±	±	±	±			+					+				±	±	±	±		±	±	±	±	±	±	-	±	+	-	+
4		±	±	±	±			+					+				±	±	-	±		±	±	±	±	±	±	±	±	+	-	+
5		±	±	±	±			+					+				±	±	±	±		±	±	-	±	±	±	±	±	+	-	+
6		+	+				±	±	-	±		±	±	±	±		+	+						+						+	+	-
7		+	+				±	±	±	±		±	±	-	±		+	+						+						+	+	-
8		±	±	±	±			+					+				+	+						+			±	±	±	±	±	+
9		+	+				±	±	±	±		±	±	±	±		+	+						+						±	+	±
10		+	+					+					+				±	±	±	±		±	±	±	±	±				±	±	+
11		±	±	±	±		±	±	±	±		±	±	±	±		±	±	±	±		±	±	±	±	±	±	±	±	-	-	-
12		±	±	-	-			+					+				±	±	±	±		±	±	±	±	±	-	-	-	+	-	+
13		+	+	+	+			+					+				±	±	-	-		-	-	±	-	-	+	+	+	+	-	+
14		+	+				-	±	-	-		-	±	-	-		+	+						+						+	+	-
15		+	+					+					+				+	+						+						+	+	+
16		+	+					+					+				+	+						+					+	+	+	+
17		+	+					+					+				+	+						+			+		+	+	+	+
18		+	+					+					+				+	+						+			+	+	+	+	+	+

\+ Indicates Lighted Lamp.
± Indicates Lighted Lamp Associated with Trouble.
\- Indicates Non-Lighted Lamp Associated with Trouble.

Probable Cause of Trouble

1. Open A4 Lead.
2. Open AR Lead.
3. Open OF Lead.
4. Open D4 Lead.
5. Open F4 Lead.
6. Open B4 Lead.
7. Open C4 Lead.
8. Gr'd on CK1 or crossed A1-A5, AR, OF, TP.
9. Gr'd on CK2 or crossed B1-C5.
10. Gr'd. on CK3 or crossed DI-F10.
11. CKG Lead Open.
12. CK1 Lead Open.
13. CK3 Lead Open.
14. CK2 Lead Open.
15. Rec. Leads Checked. Ring Tip. Party. 1st Trial
16. " " " " " " "
17. " " " " " 2nd "
18. " " " " " 3rd "

TABLE 2

Indication No.	Progress Indicating Lamps SPE	SPO	NSE	NSO	DK	AK	TKE	TK	SR	RL	MS	CK	BK	CHE	A	C	S	SL	B	MR	SlK	MRL
19	±	-					+							+								
20	-	±					+							+								
21			±	-			+							+								
22			-	±			+							+								

Probable Cause of Trouble

19. Even office link frame seized but odd office link frame not completely checked. Due to SP lead not being closed to or through trunk level relays. Outgoing trunks on split basis.
20. Odd office link frame seized but even office link frame not completely checked. Due to similar trouble per indication 19. Outgoing trunks on split basis.
21. Even office link frame seized but odd office link frame not completely checked. Similar trouble to indication 19. Outgoing trunk on non-split basis using NS lead.
22. Odd office link frame seized but even office link frame not completely checked. Similar trouble to indication 19. Outgoing trunk on non-split basis using NS lead.

TABLE 2 (Continued)

Indication No.	Progress Indicating Lamps																				
	SPE	SPO	NSE	NSO	DK	AK	TKE	TK	SR	RL	MS	CK	BK	CHE	A	C	S	SL	B	MR	SLK	MRL
23	±	±			-		+							+								
24	±	±			±	-	±	±						+								
25	±	±			±	±	±	±						+								
26	±	±			±	±	-	-	-					+								
27	±	±			±	±	-	±	-					+								
28	+	+			+	+	-	±	±		-			+								
29	+	+			+	+	-	-	±		±	-		+								
30	+	+			+	+	-	-	±		±	±	-	+								
31	+	+			+	+	-	-	±		±	±	±	±								
32	+	+			+	+	-	-	±		±	±	±	-								
33	+	+			+	+	-	-	±		±	±	±	-	-	±						
34	+	+			+	+	-	-	±		±	±	±	-	±	-						
35	+	+			+	+	-	-	±		±	±	±	-	±	±	-	-				
36	+	+			+	+	-	-	±		±	±	±	-	±	-	±	-		±		
37	+	+			+	+	-	-	±		±	±	±	-	-	±	-	±		±		
38	+	+			+	+	-	-	+		±	±	±	-	-	-	±	-		±		
39	+	+			+	+	-	-	+		±	±	±	-	-	-	-	±		±		

Probable Cause of Trouble

23. Office link frames seized but district link frame not seized. Due to failure to close start lead by the office link frame or by the marker relay DF0-DF19, or failure of district link frame to close check lead DK.
24. Office and district link frames seized but DC lead may not be closed between marker, marker connector, sender, district junctor, district link frame and again to the marker on lead AK.
25. Outgoing trunk not seized.
26. Outgoing trunk seized but transmitting relay check lead not closed.
27. Outgoing trunk selected, transmission check lead closed but marker SR relay not operated due to failure of office link frame to close the OK check lead.
28. Outgoing trunk seized and SR relay of marker operated to signal the sender to release the marker but failure of MS indicates that marker connector has not released. Cross condition on some lead may have caused relay XX1 to operate. RL lights only on test calls.
29. Release signal given to sender which has released marker connector releasing the decoder portion of marker to permit of overlapping call, but office link frame check lead CK not closed due to failure of office link frame LC relay or contact on office link frame MC relay. First call is now ready to start marker stage.
30. Check lead BK not closed due to failure of district link frame JC relay operating circuit or contact.
31. Channel not seized, due to failure of closure of chain contacts on ABL 0-9, CL 0-9, ABR 0-9 and CR 0-9 relays in marker.
32. Channel seized but due to cross condition and subsequent operation of relay XX2 in marker, district link or office link hold magnet circuits not closed.
33. District link hold magnet operating circuit open, or double connection on district link primary hold magnet, office link hold magnet operating circuit closed.
34. District link hold magnet circuit closed; office link hold magnet circuit open, or double connection on office link secondary hold magnet.
35. Office junctor hold magnet operating circuit not closed, due to failure of AC and AC1 relays to release.
36. Office junctor hold magnet operating circuit closed, closing office link primary and secondary hold magnets, but not fully closing district secondary hold magnet operating circuit.
37. Office junctor hold magnet circuit closed closing district primary and secondary hold magnets, but not fully closing office primary hold magnet operating circuit.
38. Office junctor hold magnet operating circuit closed, office primary and secondary hold magnets operated closing S relay circuit, district secondary hold magnet operated but SL relay in marker not operated due to open through district primary, district junctor F relay, district link frame LC relay, district link frame connector MCA relay, TPK, TP1, RP1, NC1, TCK or ZCK relay in marker.
39. Office junctor hold magnet, operating circuit closed, district primary and secondary hold magnets operated closing SL relay circuit, office primary hold magnet operated, but S relay not operated due to open through office secondary hold magnet, office link frame TL, MCA, or MCB relay, marker K - relays, AC1 or C relay.

TABLE 2 (Continued)

Indication No.	Progress Indicating Lamps																				
	SPE	SPO	NSE	NSO	DK	AK	TKE	TK	SR	RL	MS	CK	BK	CHE	A	C	S	SL	B	MR	S1K	MRL
40	+	+			+	+	-	-	+		±	±	±	-	-	-	±	±	-	±	±	
41	+	+			+	±	-	-	+		±	±	±	-	-	-	±	±	±	±	±	
42	+	+			+	-	-	-	+		±	±	±	-	-	-	±	-	±	±	±	-
43	+	+			+	-	-	-	+		±	±	±	-	-	-	±	-	-	±	-	-
44	-	-			-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	±

Probable Cause of Trouble

40. District and office link hold magnets operated but ground cross condition, prevents operation of B relay due to crossed leads, a double connection from falsely operated select magnets or falsely operated junctor connector JC relays causing interference between markers setting up calls on different frames.
41. Hold magnet holding circuit found clear but false ground on AK lead prevents release of sender DC relay, district link frame LC relay or district junctor F relay. Time out after trouble indication releases office and district link frames then causes the sender to time out.
42. District junctor F relay released, but failed to close ground to hold magnet holding circuit thus failing to release relay B for operation of the marker MRL relay.
43. Office link secondary hold magnet failed to close ground to outgoing trunk busy lead S1.
44. One of the DF 0-19, TL 0-14, TR, AR2, MR, XBE, XBO, JD, RL, OF1 or group start or group end relays which were operated on this call failed to release after the operation of MRL relay attempted to release the marker.