TERMINATING MARKER SD-25283-01
AND TERMINATING MARKER APPLIQUE SD-27765-01
MISCELLANEOUS TESTS
NO. 1 CROSSBAR OFFICES

1. GENERAL

1.01 This section describes methods of making miscellaneous tests on terminating markers and terminating marker applique circuits.

1.02 This section is reissued to revise Test C to provide for marker speedup features.

This reissue does not affect the Equipment Test List.

1.03 The tests covered are:

A. ***Test of XT Jack Functions.***

B. ***Test of Cross-Detection Features Not Involving the XT Jack.***

C. ***Use of XT Jack in Testing Leads to the Marker.***

D. ***Start Lead Tests.***

E. ***Check of Pattern Features.***

F. ***Line Overload Control Features.***

G. ***Test of Marker Timing Start.***

H. ***Early Release of Number Group Connector.***

I. ***All Markers Busy Signal.***

J. ***Test of Cross-Detection Features in the Terminating Marker Applique Circuit***

1.04 The tests outlined in this section should preferably be made during periods of light traffic.

1.05 Local instructions should be followed with reference to recording any register operations caused by performing these tests.

1.06 ***Lettered Steps:*** A lettter a, b, c, etc, added to a step number in Part 3 or 4 of this section, indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

1.07 Where a test for the presence or absence of battery or ground is to be made, the test receiver is used.

2. APPARATUS

2.01 716C receiver attached to a W2AB cord equipped with two 360A tools (2W21A cord), a 411A tool (test pick) and a KS-6278 tool (connecting clip).

2.02 Two 893 cords, 6 feet long, equipped with four 360A tools (1W13B cord) and four KS-6278 tools (connecting clips).

2.03 419A tool (test connector).

2.04 442A tool equipped with 2Y lamp and two 419A tools.

2.05 322A (make-busy) plugs as required.

2.06 P3D cord, 6 feet long, equipped with two 309 plugs (3P3A).

2.07 Two S3A cords, 6 feet long, equipped with two 309 plugs.

2.08 32A remote control test set.

3. PREPARATION

STEP	ACTION	VERIFICATION
All Tests		
1	Insert a 322A make-busy plug into the DB jack of the marker under test. *Note:* When a make-busy plug is in the DB jack of a special marker, a call requiring special marker functions on the companion marker will release a special test call that may be in progress on the marker under test.	
2	Except for Tests C and I, insert a 322A make-busy plug into the associated TIB jack at the trouble indicator frame.	
3	Connect the 32A test set to the remote control jack at the marker under test for use in releasing trouble indicator alarms which may be brought in during the tests.	

4. METHOD

STEP	ACTION	VERIFICATION
A. Test of XT Jack Functions		
4	Insert a make-busy plug into the XT jack of the marker under test.	
5	Connect one clip of the 442A tool to the XT punching located on the A cross-connection terminal strip and the other clip to 48-volt battery.	
6	Momentarily ground the punchings indicated in Table A.	Lamp of 442A tool lighted while ground is applied.
7a	If marker speedup is not provided— Momentarily apply 48-volt battery to the punchings indicated in Table A.	Lamp of 442A tool lighted while battery is applied.
8	Move the clip of the 442A tool from the XT punching to the X punching on the A cross-connection strip.	Lamp of 442A tool lighted.

STEP	ACTION	VERIFICATION

TABLE A

LEAD	TERMINAL STRIP	PUNCHING	CROSS-DETECTION RELAYS USED
LL	LC-C	00	XT, XT1, X
LJ	LC-C	30	XT, XT1, X
EH	LC-C	40	XT, XT1, X
OH	LC-C	50	XT, XT1, X
OR	IMC	10	XT, XT1, X
OL	IMC	20	XT, XT1, X

Note: When making tests of the EH and OH leads on special markers, it may be necessary to block relays EH and OH operated in these markers, if not already operated.

9 Momentarily ground the punchings or relay contact indicated in Table B.

Lamp of 442A tool extinguished while ground is applied.

TABLE B

LEAD	TERMINAL STRIP	PUNCHING	CROSS-DETECTION RELAYS USED
SM	LC-B	20, 30, 40, 50	XSM, X
NF	NG-B	40, 50	XS, X
LEAD	**RELAY**	**CONTACT**	**CROSS-DETECTION RELAYS USED**
TIN	FS	1T	XIN, X

10 Disconnect the 442A tool and remove the make-busy plug from the XT jack.

11 Remove ground from SSA relay and block SSB relay operated.

12 Repeat Step 10.

13 Remove blocking tools from SSB and SON relays.

14 Remove insulators from 6M of XSS relay and 8M of SON relay.

STEP	ACTION	VERIFICATION
Crossed LF Leads		
15	Momentarily ground punchings shown in Table C, one at a time.	Lamp lighted while ground is applied.

TABLE C

LEAD	PUNCHING (SEE NOTE 2)
OSG-0	05
OSG-1	06
OSG-2	07
OSG-3	08
OSG-4	09
OSG-5	10

Note 2: TS EA-G for MKR 0, 2, 4, 6, or 8

TS EB-G for MKR 1, 3, 5, 7, or 9

Crossed S Leads		
16	Momentarily ground punching 77 on TS EA-F for markers 0, 2, 4, 6, 8 or TS EB-F for markers 1, 3, 5, 7, and 9.	Lamp lighted while ground is applied.
B. Test of Cross-Detection Features Not Involving the XT Jack		
4	Manually operate X relay.	DL relay operated immediately.
5	Release X relay.	DL relay released.
6	Connect one clip of the 442A tool to the X punching on the A cross-connection strip and the other clip to 48-volt battery.	Lamp of 442A tool lighted.
7	Operate and release PN, TN, and PTN relays one at a time.	Lamp remains lighted.
8	Operate and release TN and PN relays together.	Lamp extinguished while both relays are operated. Lamp lighted when relays are normal.
9	Operate and release TN and PTN relays together.	Lamp extinguished while both relays are operated. Lamp lighted when relays are normal.
10	Operate and release PN and PTN relays together.	Lamp extinguished while both relays are operated. Lamp lighted when relays are normal.

STEP	ACTION	VERIFICATION
XL Relay—L Lead		
11	Operate L-0 relay.	L-0 relay locks operated. Lamp extinguished.
12	Manually operate and release CK8 relay.	L-0 relay releases. Lamp lighted.
X0B Relay—Overflow and Busy Leads		
13	Operate TMBN or TMBL relay, and ground 6T spring of the operated relay.	Lamp extinguished while ground is applied.
14	Restore to normal the operated relay.	
15	Momentarily ground the 3T contact of any HT relay.	Lamp extinguished while ground is applied.
XP Relay—JP Leads		
16a	If junctor pattern relays are provided— Block LLB relay operated.	
17a	Using an 893 cord, ground the JPN punching on the F cross-connection terminal strip.	
18a	Ground the JP punching associated with the first equipped JP relay.	Lamp extinguished.
19a	Momentarily remove the ground from the JPN punching.	Lamp lighted.
20a	Repeat Steps 17a, 18a, and 19a for each equipped JP relay.	
21a	Remove ground from JPN and JP punchings and blocking tool from LLB relay.	
XHG and XHG1 Relays—TK Lead		
22	Block CK7 relay operated.	
23	Momentarily ground 11T spring of JPN relay.	Lamp extinguished.
24	Remove blocking tool from CK7 relay.	Lamp lighted.
25b	If junctor pattern relays are not provided— Block CK7 relay operated.	
26b	Momentarily ground 12B spring of LIL relay.	Lamp extinguished.
27b	Remove blocking tool from CK7 relay.	Lamp lighted.

STEP	ACTION	VERIFICATION
XFC and XFC-1 Relays—FC Lead		
28	Momentarily ground 2B contact of relay IK1.	Lamp momentarily extinguished, then relighted.
29	Ground 2B contact of relay IK1.	Lamp remains lighted.
30	Momentarily ground 1T contact of GT2 relay.	Lamp extinguished while ground is applied.
31	Momentarily ground punching 24 of TMC terminal strip.	Lamp extinguished while ground is applied.
XPS and XPS1 Relays—B Lead		
32c	When incoming link frames are arranged for 100 trunks— Block CK7 and CK8 relays operated.	
33c	Momentarily ground punching 51 of IMC terminal strip.	Lamp extinguished.
34c	Remove blocking tools from CK7 and CK8 relays.	Lamp lighted.
35d	When incoming link frames are arranged for 160 trunks, or 160 and 100 trunk combinations— Block CK7, CK8, and INC relays operated.	
36d	Momentarily ground punching 51 of IMC terminal strip.	Lamp extinguished.
37d	Remove blocking tools from CK7, CK8, and INC relays.	Lamp lighted.
XTMB Relay—CK Lead		
38	Block TMBN relay operated.	
39	Momentarily ground punching 55 of the NG-A terminal strip.	Lamp extinguished.
40	Remove blocking tool from TMBN relay.	Lamp lighted.
41	Block XF3 relay normal.	
42	Momentarily ground bottom winding connection of OFT relay.	Lamp extinguished while ground is applied.
43	Remove blocking tool from XF3 relay.	
44	Strap together punchings 00, 01, and 02 of the NG-C terminal strip.	

STEP	ACTION	VERIFICATION
45	Momentarily ground punching 00 of the NG-C terminal strip.	Lamp extinguished while ground is applied.
46	Remove strap placed in Step 44.	
	XC and XC1 Relays—HG Leads	
47	Strap punching 00 to 01 of the NG-D terminal strip.	
48	Momentarily ground punching 00.	Lamp extinguished while ground is applied.
49	Remove strap between punchings 00 and 01.	
	XTL Relay—TB Lead	
50	Momentarily ground punchings 25, 26, 27, 28, and 29 of terminal strip NG-A, one at a time.	Lamp extinguished while ground is applied.
	XS Relay—NS Lead	
51	Connect ground to punching 49 of the TMC terminal strip.	
52	Momentarily ground punching 20 of terminal strip NG-B.	Lamp extinguished while ground is applied.
	XHB and XHB-1 Relays—HB Lead	
53	Momentarily connect 48-volt battery to 2B spring of HN-0 relay.	Lamp extinguished and remains extinguished.
54	Remove ground from punching 49 of the TMC terminal strip.	Lamp lighted.
	XTB and XTB-1 Relays—TB Lead	
55	Connect ground to punching 49 of the TMC terminal strip.	
56	Block XS3 relay normal.	
57	Insulate 1T and 2T springs of CK7 relay.	
58	Momentarily apply 48-volt battery to 1B spring of HP-0 relay.	Lamp extinguished and remains extinguished.
59	Remove ground from punching 49.	Lamp lighted.
60	Remove blocking tool from relay XS3 and insulator from CK7 relay.	

STEP	ACTION	VERIFICATION
	X Relay—SL and AK Leads	
61	Momentarily ground punching 08 and 09 of the IMC terminal strip, one at a time.	Lamp extinguished while ground is applied.
62	Disconnect the 442A tool.	
	XJC Relay—JC Lead	
63	Connect ground to punching 45 of the NG-A terminal strip using an 893 cord.	
64	Strap together punchings 30 and 31 of the NG-A terminal strip and momentarily ground them.	JHA relay operated and JHB relay remains normal while ground is applied.
65	Remove strap between punchings 30 and 31 and remove ground from punching 45.	
	XR Relay—TC and RC Leads	
66	Block CK6 relay operated.	
67	Momentarily ground punchings 04 and 07 on the IMC terminal strip, one at a time.	XR relay operated each time ground is applied.
68	Remove blocking tool from CK6 relay.	
	XRL Relay—TRL and RL Leads	
69	Connect the 442A tool between 48-volt battery and punching 14 on the TMC terminal strip.	
70	Momentarily ground punching 04 on the TMC terminal strip.	Lamp lighted when ground is applied. Lamp extinguished when ground is removed.
71	Disconnect the 442A tool.	
	XS1, XS2, XS3, XS4 and XS5 Relays	
72	Operate CK7 relay.	XS3 relay operated.
73	With CK7 relay operated, operate CK5 relay.	XS1, XS2, XS4, and XS5 relays operated.
74	Release CK5 and CK7 relays.	XS1, XS2, XS3, XS4, and XS5 relays release.
	Trouble Indicator	
75	At terminating trouble indicator— Remove make-busy plug from TIB jack of marker under test.	

STEP	ACTION	VERIFICATION
76	Momentarily operate RL key.	
77	At marker under test— Manually operate and release X relay.	At terminating trouble indicator— TI lamp lighted.
78	Operate LP key.	X and DR lamps lighted.
79	Momentarily operate RL key.	All lamps extinguished.
80	Remove all test cords, test connectors, and blocking tools from the circuit.	
81	Make a test call using the trouble indicator to determine that the marker is operating satisfactorily.	
82	Restore the marker to service.	
C. Use of XT Jack in Testing Leads to the Marker		
4	Remove plug from TIB jack.	
5	Insert make-busy plug into XT jack.	No trouble indications.
6	Using 411A and 419A tools attached to an 893 cord, connect 419A tool to 1B contact of SDT relay.	
7	Using 411A tool, apply 226-ohm battery to 5T contact of all LC_ relays provided in marker one at a time. ***Note:*** A false indication of trouble on the SM leads may be received if an attempt to complete an originating call is made during this test. When making tests of the EH and OH leads from special markers, it may be necessary to block relays EH and OH operated, if not already operated.	If marker speedup features are not provided— No trouble indications due to leads SMA-0 through SMD-9, NF0-19, TB0-4 being grounded, or leads 0-9L, 0-9R, LJ0-9, EH0-9, OH0-9, and LL0-9 being crossed with battery or ground. ▶If marker speedup features are provided— No trouble indications due to leads SMA-0 through SMD-9, NF 0-19, TB0-4, 0-9L, 0-9R, LJ0-9, EH0-9, OH0-9, and LL0-9 being grounded.◀
8a	If marker speedup is not provided— Using the 716C receiver, connect the KS-6278 clip to midpoint of BD resistance or 24-volt battery.	
9a	For approximately one second, apply test pick to 8T and 5B contacts of LLGA, LLGB, LLGC, and LLGD relays, one at a time.	No false grounds or crosses on LEA-D and LOA-D leads.
10	Repeat Steps 6 and 7 while applying test pick to 7B contact of LLGA, LLGB, LLGC, and LLGD relays, one at a time.	No false grounds or crosses on LRA-D leads.

STEP	ACTION	VERIFICATION
11	Remove all test cords, receiver cords from circuit and remove plug from XT jack.	
12	Restore the marker to service.	

D. Start Lead Tests

Incoming Link Start Lead

4	Connect one cord of the 442A tool to 48-volt battery and connect the other cord to the IK punching on the A cross-connection terminal strip.	
5	Block CK7 relay operated.	
6	Manually operate and release NK relay.	Lamp lighted while relay is operated.
7	Manually operate and release PU1 relay.	Lamp lighted while relay is operated.
8	Block PU1 relay operated.	Lamp lighted.
9	Manually operate and release SDT relay.	Lamp extinguished while relay is operated.
	Note: It is desirable to hold to a minimum the period of time during which the PU1 relay is blocked operated as incoming trunk frame 0 is held out of service to other markers while the PU1 relay is operated.	
10	Remove blocking tool from CK7 relay.	Lamp extinguished.

Number Group Start Lead

11	Disconnect cord of the 442A tool from IK punching and connect it to NK punching.	
12	Block FH-0 relay operated and TM10 relay normal.	Lamp remains extinguished.
13	Block HN-0 relay operated.	Lamp lighted.
14	Manually operate and release TM7 relay.	Lamp extinguished while relay is operated.
15	Remove blocking tool from TM10 relay.	
16	On special markers, block LK0 relay normal.	
17	Block SPL relay operated.	Lamp extinguished.
18	Remove blocking tool from LK0 relay and operate it.	Lamp lighted.

STEP	ACTION	VERIFICATION
19	Restore SPL and LK0 relays to normal.	
20	Remove blocking tool from FH0 relay.	Lamp extinguished.
21	Remove blocking tool from HN0 relay.	
Line Choice Connector Start Lead		
22	Disconnect cord of the 442A tool from NK punching and connect it to LK punching.	
23	Block TMW relay normal. Block CK7, IK1, and LC-0 relays operated.	Lamp lighted.
24	Manually operate and release XC1, XF1, and SG relays, one at a time.	Lamp extinguished while each relay is operated.
25	Remove blocking tool from IK1 relay.	Lamp extinguished.
26	Block IK1 relay operated.	Lamp lighted.
27	Remove blocking tool from CK7 and TMW relays.	Lamp extinguished.
28	Remove blocking tools from IK1 and LC-0 relays. Remove 442A tool.	
29	Restore the marker to service.	
E. Check of Pattern Features		
4	Block LLB relay operated.	
5	Operate each JP relay provided.	Observe that proper AB relays operate according to local cross-connection records.
6	Remove blocking tool from LLB relay.	
7	Restore marker to service.	
F. Line Overload Control Features		
Cross-Connection Type		
4	Insert plug of an S3A cord into N jack.	
5	Connect ring conductor of cord to ground.	
6	Insert plug of another S3A cord into P jack.	
7	Test sleeve conductor of cord.	Ground present.

STEP	ACTION	VERIFICATION
8	Test ring conductor of cord.	Ground absent.
9	Remove plugs from P and N jacks.	
Plug and Jack Type		
10	Momentarily insert make-busy plug into P jack.	PJ relay operated when plug is inserted and released when plug is removed.
11	Insert plug of an S3A cord into N jack and test ring conductor of cord.	Ground absent.
12	Remove plug from N jack.	
13	Insert plug of an S3A cord into TH-1 jack and ground ring and sleeve conductors of cord.	
14	Insert plug of a P3D cord into TH-0 jack.	
15	Test sleeve of cord.	Ground present.
16	Test ring of cord.	Ground absent.
17	Remove plug of S3A cord from TH-1 jack and insert it into TH-2 jack.	
18	Remove plug of P3D cord from TH-0 jack and insert it into TH-1 jack.	
19	Repeat Steps 15 and 16.	
20	Test jacks TH-2 through TH-9 as in Steps 17, 18, and 19. ***Note:*** When testing the TH-9 jack, the plug of the S3A cord is inserted into the TH-0 jack of the next marker when this TH-0 jack is in the same jack strip. Test the ring and sleeve of the TH-9 jack for the absence of ground.	
21	Repeat tests specified as in Steps 13 through 20 for jacks U0 through 9.	
22	Repeat tests specified as in Steps 13 through 20 for jacks H0 through 9. ***Note:*** The test results are the same except when testing the H-4 jack in which case no ground is present on the sleeve of the cord.	
23	Insert plug of an S3A cord into T-1 jack and ground ring and sleeve conductors of cord.	

STEP	ACTION	VERIFICATION
24	Insert plug of P3D cord into T-0 jack.	
25	Test ring and sleeve of cord.	Ground absent.
26	Repeat tests specified as in Steps 23, 24, and 25 for jacks T-1 to T-9. ***Note:*** When testing, the T-9 jack, the plug of the S3A cord is inserted into the T-0 jack of the next marker when this T-0 jack is in the same jack strip. Test the ring and sleeve of the T-9 jack for the absence of ground.	
27	Insert plug of an S3A cord into OB jack and ground the ring and sleeve conductors of cord.	
28	Insert plug of the P3D cord into OA jack and test ring and sleeve of cord.	Ground absent.
29	Remove S3A cord from OB jack.	
30	Move the plug of the P3D cord from the OA jack to the OB jack.	
31	Test ring and sleeve of cord.	Ground absent.
32	Remove plug of P3D cord from OB jack.	
33	Test 1T spring of TNS and HNS relays.	Ground absent.
34	Momentarily operate U-1 relay.	U-1' relay remains normal.
35	With marker normal, observe U-1', U-2', U-4', U-5', and H-6 relays.	All relays normal.
36	Restore marker to service.	
G. Test of Marker Timing Start		
4	Block CK7 relay operated.	
5	Momentarily ground punching 27 of the TMC terminal strip.	TMS-1 relay operated immediately.
6	Remove blocking tool from CK7 relay.	
7	Restore marker to service.	
H. Early Release of Number Group Connector		
4	Block CK6 and BB relays operated.	YB relay operated.

STEP	ACTION	VERIFICATION
5	Test 2B contact of YB relay for battery.	Battery absent.
6	Remove blocking tool from CK6 and BB relays.	
7	Restore marker to service.	

I. All Markers Busy Signal

4	Remove plugs from all TIB jacks.	
5	Block operated the AMB relay of each marker in the group.	Within 40 to 60 seconds,— MBA lamp lighted. Audible signal received.
6	Remove blocking tool from all AMB relays.	
7	Operate RLA key.	MBA lamp extinguished. Audible signal silenced.
8	Restore marker to service.	

J. Test of Cross-Detection Features in Terminating Marker Applique Circuit

Crossed Transmitting Leads

4	Connect 442A tool between 48-volt battery and punching 34 on the EA-B (even numbered markers) or EB-B (odd numbered markers) terminal strip.	
5	Insulate 8M SON relay.	
6	Block SON relay operated.	
7	Apply momentary ground to punchings shown in Table D, one at a time.	Lamp lighted while ground is applied.

Crossed Sender Select Leads

8	Insulate 6M XSS relay.	
9	Block SSA relay operated.	
10	Apply momentary ground to punchings shown in Table E, one at a time.	Lamp lighted while ground is applied.

Check of NS Relay Matrix

11a	If NS relays are provided— Block marker CK10 relay operated.	

STEP ACTION VERIFICATION

TABLE D

LEAD	PUNCHING	TERMINAL STRIP (SEE NOTE 1)	FIELD
DL-1	10	EA-F or EB-F	MA 2
DL-2	11	EA-F or EB-F	MA 2
DL-3	12	EA-F or EB-F	MA 2
DL-4	13	EA-F or EB-F	MA 2
CL-2	50	EA-F or EB-F	MA 2
CL-3	51	EA-F or EB-F	MA 2
CL-4	52	EA-F or EB-F	MA 2
CL-5	53	EA-F or EB-F	MA 2
CL-35	54	EA-F or EB-F	MA 2
ART	14	EA-F or EB-F	MA 2
CLC-0	12	EA-F or EB-F	MA 1
CLC-1	13	EA-F or EB-F	MA 1
CLC-3	14	EA-F or EB-F	MA 1
ND	10	EA-F or EB-F	MA 1
RV	22	EA-G or EB-G	——

Note 1: TS (EA-F) and (EA-G) for MKR 0, 2, 4, 6, or 8. TS (EB-F) and (EB-G) for MKR 1, 3, 5, 7, or 9

TABLE E

LEAD	PUNCHING (SEE NOTE 2)
SS 0	12
SS 1	13
SS 2	14
SS 3	15
SS 4	16
SS 5	17
SS 6	18
SS 7	19
SS 8	20
SS 9	21

Note 2: TS EA-G for MKR 0, 2, 4, 6, or 8

TS EB-G for MKR 1, 3, 5, 7, or 9

STEP	ACTION	VERIFICATION
12a	Momentarily operate NS0, NS1, NS2, NS4 relays, one at a time.	Lamp lighted while one relay is operated.
13a	Momentarily operate NS0, NS1, and NS2 relays together.	Lamp lighted while three relays are operated.
14a	Repeat Step 18a, using these combinations of operated NS relays in place of 0, 1, and 2: 014, 024, 124.	
15a	Remove blocking tool from marker CK-10 relay.	
16	Disconnect 442A tool and restore marker to service.	