ACCEPTANCE TESTS

NO. 5 CROSSBAR OFFICES

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1. GENERAL

1.01 Acceptance tests are a series of manual tests used primarily for the acceptance of added No. 5 crossbar equipment after installation.

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 Acceptance tests emphasize verification of the interaction of added equipment with existing equipment and confirmation of functions where defects are not readily apparent to the maintenance force at turnover.

1.04 The tests are organized by frame and are conducted using standard maintenance facilities. The majority of tests require one person. On several tests two persons are needed.

1.05 In general the tests are not restricted to a special shift, however a few tests should be applied during light traffic.

2. APPARATUS

2.01 Apparatus to be used for Acceptance Tests are called out in the individual paragraphs.

3. LINE LINK, CONNECTOR AND MARKER CONNECTOR

3.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
130V	—48V	Frame	Frame FA—Aisle MJ
PF	130	PRTD	
	—48V	Frame	

3.02 Verify that all fuses appear in the Fuse Record Book.

3.03 With the use of a volt-ohmmeter and appropriate test cords verify the potential at the 130V and 48V test battery.

3.04 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle or MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on test cord will start and release the call respectively from the RC jack.

(d) ***Make-Busy Jack*** - Insert a 349A make-busy plug into LMB jack on frame upright. Verify lamps LMB (RED) on frame upright and aisle MJ (RED) light and major alarm sounds.

Verify relay MB in line link connector preference control make-busy circuit (SD-26039-01) associated with line link under test is operated.

At MTF originate a dial tone class of test using line link frame under test. Verify that trouble record card is taken after marker timeout. Verify that LFK is not perforated. At MTF set up an originating class of test to an outgoing trunk using line link frame under test. Verify that test call route advances to register busy back (BT-OF lights).

Remove 349A make-busy plug and verify lamps LMB and MJ are extinguished, major alarm is silenced, and relay MB in the line link connector and preference circuit is released.

TIMING

3.05 Manually operate MK relay, verify that in 5 to 10 seconds CA relay operates and locks. Verify that in master test frame JK, LP, and key circuit LLMC_ lamp lights and a major alarm sounds. Operate MCAR key, verify that CA relay releases, LLMC_ lamp extinguishes, and major alarm is silenced. Timing tests should be applied as listed in timing requirement tables of SD drawing.

TRAFFIC REGISTERS

(Does not apply if paired line link operation is provided)

3.06 At the line link frame, connect GRD to terminal 01 of HGBR terminal strip. Manually operate HGB 0-9 relays in turn. Verify associated LD registers operate in turn over PL leads 0-9. Registers should be assigned per Traffic Register Assignment List.

SL JACK MULTIPLE

3.07 There is one set of SL jacks for each two vertical groups on a line link (LL) frame. The ten jacks associated with like numbered vertical groups on even numbered line link frames are multipled and connected to the assigned scanning switch crosspoints at the traffic usage recorder.

There is a separate multiple of jacks, similarly wired, for the odd numbered line link frames.

3.08 Considering the above multiplying arrangement, make a continuity and cross test of the SL jacks. When more than two EVEN and/or ODD frames are installed, each multiple must be tested between frames and to the first existing EVEN or ODD number working LL frame to insure that a double reversal does not exist. Also one test to the originating end, LL-00 (EVEN) and LL-01 (ODD) shall be performed.

SO JACKS

3.09 Make a continuity and cross test of the T, R, and S leads between the "A" and "B" SO jacks at the line link frame and the associated jacks at the SO jack bay as shown in connecting Fig. FS9 of SD-26030-01 and Fig. 2 of SD-25860-01, observing line circuit.

TL JACKS

3.10 Make a continuity and cross test of the T, R, and S leads between the "A" and "B" TL jacks at the line link frame and the associated TL jacks at the SO jack bay as shown in the connecting Fig. FS9 of SD-26030-01 or Fig. 10 of SD-27943-01 and Fig. 17 of SD-96068-01.

L-LEADS TO TRAFFIC USAGE RECORDER (SD-95738-01)

3.11 Make a continuity and cross test of the 20 L-leads from the line link frame to their assigned crosspoints on the scanning switches of the traffic usage recorder. Test these leads at either the HGB relay contacts or the junctor switch link sleeves as shown in Table A. Must consult T-430 drawing for H/V assignment on TUR.

LINE LINK IDENTIFICATION LAMP

3.12 At the master test frame jack, lamp, and key bay, operate key BAT to position ON. If alarm sending is provided, key SB-NTR-DB should be in NTR position.

3.13 Manually operate relay MCB or MB2 in the nonwire-spring or wire-spring line link connector associated with the added line link. Verify lamp LLC_ associated with the added line link lights.

3.14 Release MCB or MB2 relay. LLC_ lamp is extinguished.

LINE LINK AND LINE LINK MARKER CONNECTORS

A. Transfer of Start Lead on Alternate Calls

3.15 From traffic schematic (-240 drawing or equivalent), determine first and second choice marker assignments for line link marker connector associated with line link under test.

3.16 At the master test frame jack, lamp, and key bay, check that none of the dial tone markers are made busy and operate DMTCA and DMTCB keys to disable the LLMC traffic control circuit. DMTCA and DMTCB lamps should light.

3.17 In marker preference control circuit on LLMC frame associated with line link under test, block normal the first and second choice marker MS_ and CB_ relays.

3.18 In line link marker connector control circuit on line link frame under test, block normal TM, TM1, and CA relays. Also release W and Z relays if they are operated.

3.19 On line link frame block operated the highest equipped VGS_ relay. With a screwdriver or other suitable iron object, test for magnetic pull on the MS_ relay of first choice marker in preference control circuit and absence of pull on second choice MS_ relay.

3.20 Momentarily operate and release multicontact MA_ relay of first choice marker in LLMC. Check that MK relay in marker connector control on LL frame operates and releases and that relays W and Z are operated. Also check that magnetic pull has been transferred from first choice marker MS_ relay to second choice marker MS_ relay in preference control circuit.

3.21 Operate and release, in turn, MA_ relay of second choice marker in LLMC. Check that W and Z relays operate and release alternately with each operation of an MA_ relay.

3.22 Manually release W relay if it is operated at end of test.

TABLE A

TEST POINTS AT LINE LINK FRAME FOR CHECKING L LEADS TO TUR							
LEAD	TEST AT HGB-REL OR JCTR SW LINK SL			LEAD	TEST AT HGB-REL OR JCTR SW LINE SL		
	MAKE CONTACT 40 of HGB-REL	SLEEVE LEAD OF JCTR SW	LEV		MAKE CONTACT 40 of HGB-REL	SLEEVE LEAD OF JCTR SW	LEV
LO-0	0	0	0	L5-0	0	5	0
LO-1	1	0	1	L5-1	1	5	1
LO-2	2	0	2	L5-2	2	5	2
LO-3	3	0	3	L5-3	3	5	3
LO-4	4	0	4	L5-4	4	5	4
LO-5	5	0	5	L5-5	5	5	5
LO-6	6	0	6	L5-6	6	5	6
LO-7	7	0	7	L5-7	7	5	7
LO-8	8	0	8	L5-8	8	5	8
LO-9	9	0	9	L5-9	9	5	9

B. Trouble Release Features

3.23 In preference control unit check that MS_ relay of first choice marker in LLMC is energized and that ground is present on terminal strip MA terminal 51 of LLMC and is not present on terminal 50.

3.24 In marker connector control unit on LL frame, operate TRL relay by applying ground through a test receiver to 2U of TRL relay. Check that TR relay is operated and that first choice marker MS_ relay is no longer energized.

3.25 Remove ground from TRL relay. Check that TR1 relay operates and TR relay remains operated. Check that ground is now present on terminal 50 and not on terminal 51.

3.26 Manually operate and release MK relay. Check that TR and TR1 relays release, W and Z relays operate and that second choice marker MS_ relay in preference control circuit is energized.

3.27 Operate TRL relay by applying ground through a test receiver to 2U of TRL relay. Check that TR relay operates and that MS_ relay of second choice marker in preference control circuit is no longer energized.

3.28 Release, and then operate and release TRL relay several times. Check that TR1 relay operates on first release of TRL relay and that thereafter TR and TR1 relays remain operated.

3.29 Operate and release MK relay. Check that TR and TR1 relays release.

3.30 At MA terminal strip of line link marker connector for line link under test, momentarily apply ground through a test receiver to terminal 03. Check that TRL and MK relays in connector control unit on line link frame operate when ground is applied.

C. Transfer Start and TM Lead Test

3.31 Release W and Z relays in marker connector control circuit, if operated, and manually

operate TRS relay. Check that second choice marker MS_ relay is energized in preference control circuit. Operate W and Z relays and again operate TRS relay. Check that first choice marker MS_ relay is energized. Check that TRS relay is normal then unblock TM and TM1 relays in marker connector control circuit on LL frame. Check that TM and TM1 relays operate and in 5 to 10 seconds CA relay is energized. (***Note:*** TRS may operate if IM operates long enough to fire TRS tube).

3.32 Unblock VGS_ relay in LL frame. Check that TM and TM1 relays release and that CA relay is no longer energized. Momentarily operate each equipped VGS_ relay. Verify that DT relay operates and releases with each operation of a VGS_ relay. Unblock CA relay in control circuit and MS_ and CB_ relays of first and second choice markers in preference control circuit.

D. Local Locking Paths of TC and TC1 Relays

3.33 Block normal Z relay and block operated W relay. Check that TC relay locks operated and TC1 does not operate. Block normal W relay and block operated Z relay. Check that TC relay releases and TC1 relay operates. Block operated DT relay, block normal Z relay and block operated W relay. Manually operate TC and TC1 relays. Check that TC relay locks and TC1 relay releases. Block normal W relay and block operated Z relay. Manually operate TC and TC1 relays. Check that TC1 locks and TC relay releases. Unblock Z, W, and DT relays. TC1 relay should release. At master test frame jack, lamp, and key panel, release keys DMTCA and DMTCB. Remove blocking tools from CB_ and MS_ and VGS_ relays.

MASTER TRAFFIC CONTROL LEADS (SD-26020-01) (APP FIG. 1 & 3)

A. FG, FG1, FB, FB1, TC, and TC1 Leads

3.34 At line link frame under test, block W and Z relays normal and short contacts 1 fixed to 1 make of TC relay. If DT relay is not furnished (short cycle gate not provided) also short contacts 12 fixed to 12 make of TC relay.

3.35 At master traffic control circuit (MA TR CONT) associated with LLMC for line link frame under test, block ALA and ALB relays normal. Manually operate TCA relay a few times for two seconds each time, (***Note:*** Do not keep TCA relay operated for more than two seconds). At line link frame under test, observe that TC relay operates each time TCA relay in the MA TR CONT is manually operated. Check for steady ground on 10 make and 10 fixed of MK relay. Remove short or shorts from TC relay. Check that steady ground is removed from 10 fixed but remains on 10 make of MK relay.

3.36 Short contacts one fixed to one make of TC1 relay. If short cycle gate is not furnished, also short contacts 12 fixed to 12 make of TC1 relay. At MA TR CONT circuit associated with LLMC for line link frame under test, manually operate TCB relay a few times, for two seconds each time, (***Note:*** Do not keep TCB relay operated for more than two seconds).

3.37 At line link frame under test, observe that TC1 relay operates each time TCB relay in the MA TR CONT is manually operated. Check for steady ground on contact two fixed and two make of MK relay. Remove short or shorts from TC1 relay. Check that steady ground is no longer on two fixed but remains on two make of MK relay. Remove blocks from W and Z relays.

3.38 At MA TR CONT, remove blocks from ALA and ALB relays.

B. TCA and TCB Leads

3.39 At MA TR CONT circuit associated with all line link marker connectors or at associated MA TR CONT circuit, when graded dial tone markers are provided connect battery to four fixed of TMA and TMB relays. Block operated AMB relay. ***Caution: In the following test sequence do not leave TM relay operated for more than two seconds.***

3.40 At line link frame under test, block TM1 relay normal, and insulate eight fixed of TC1 relay. With above caution in mind, manually operate TM relay.

3.41 At MA TR CONT circuit, verify that TCA relay is operated steadily while TM relay is operated. (TCB relay may operate intermittently if regular dial tone connections are in progress). At line link frame under test operate TC relay. At MA TR CONT observe that TCA relay is no longer operated steadily when TM is operated, but may be operating intermittently if regular dial tone

connections are being established. Release TC relay, remove insulation from eight fixed contact of TC1 relay, and insulate eight fixed of the TC relay. Again with preceding caution in mind manually operate TM relay.

3.42 At MA TR CONT circuit, verify that TCB relay is operated steadily while TM relay is operated (TCA relay may operate intermittently if regular dial tone connections are in progress). At line link frame under test operate TC1 relay. At MA TR CONT observe that TCB relay is no longer operated steadily but may be operating intermittently if regular dial tone connections are being established.

3.43 At line link frame under test, release TC1 relay. Remove insulation from eight fixed contact of TC relay, and unblock TM1 relay.

3.44 At MA TR CONT circuit, remove block from AMB relay and battery from four fixed contacts of TMA and TMB relays after making sure TC and TC1 in line link are nonoperated.

C. CWA and CWB Leads

3.45 At master test frame jack, lamp, and key circuit operate the DMTCA and DMTCB keys. Verify that lamps DMCGA and DMCGB light. At line link frame under test, block normal Z and TM1 relays and momentarily operate TM relay. At MA TR CONT circuit associated with line link frame under test, apply battery for three seconds to lower winding of CWA relay. Verify that CWA relay operates steadily while TM is operated and ALA is normal. Verify that CWB relay does not operate steadily while TM is operated. CWB relay may operate intermittently if regular dial tone connections are being established.

3.46 At line link frame under test, change the state of the Z relay from blocked normal to blocked operated.

3.47 Verify that CWB relay operates steadily while TM is operated and ALB is normal. Verify that CWA relay does not operate steadily while TM is operated. CWA relay may operate intermittently if regular dial tone connections are being established. At line link frame under test remove blocks from Z and TM1 relays.

D. IM Lead

3.48 Block operated IM relay in the MA TR CONT circuit associated with the line link frame under test (see Table D if graded markers are provided).

3.49 At line link frame under test, block TM1 relay normal and block TM relay operated. Verify that TM relay operates in the line link frame. Manually operate and release in turn TC and TC1 relays and verify that IM relay does not release. Simultaneously operate and release TC and TC1 relays. Verify that IM relay releases when both relays are operated. At the MA TR CONT circuit remove block from IM relay.

3.50 At line link frame under test, verify that IM relay released, unblock TM and TM1 relays. Apply ground to 6F of TC relay in line link frame under test. Using a test receiver, verify that the ground multiples to no more than three other line link IM relays as shown in wiring list 5810. Remove ground from 6F of TC relay.

3.51 At jack, lamp, and key circuit, restore DMTCA and DMTCB keys.

CB RELAY CHAINS LLMC

A. CB Relay Operating and Locking Paths

3.52 These tests should be made when the dial tone markers are not in use, preferable on an off shift. CB relays for unequipped markers should be blocked in a permanent manner in the LLMC associated with line link under test before these tests are applied.

3.53 At the master test frame jack, lamp, and key panel, operate DMTCA and DMTCB keys to disable the associated master traffic control circuit.

3.54 At LLMC associated with line link under test, ground terminal on terminal strip A of connector control unit associated with line link, as indicated in Table B, for dial tone marker 0. This should provide a CB relay locking ground on the LCB lead of connector control circuit.

3.55 Apply ground through a test receiver to upper winding of CB_ relay of each marker unit in turn. Check that each relay operates and

TABLE B

TERMINALS GROUNDED FOR CB RELAY TESTS

GROUND APPLIED TO TS (A) CONTROL UNIT					
TERM	CONN				MARKER
51	0	5	10	15	
52	1	6	11	16	
53	2	7	12	17	0
54	3	8	13	18	
55	4	9	14	19	

TABLE C

LCB LEAD GROUND TEST AT LLMC-FR

TEST FOR GROUND AT TS (A) CONTROL UNIT					
TERM	CONN				MARKER
51	0	5	10	15	
52	1	6	11	16	
53	2	7	12	17	
54	3	8	13	18	0
55	4	9	14	19	

locks without buzzing. Reverse CB relay winding leads will cause it to buzz. When the last CB_ relay is operated all others should release.

3.56 Repeat preceding paragraph enough times so that the CB_ relay for each marker will be the last one operated. This should include the CB_ relays on the SLLMC frame if furnished.

3.57 Remove ground from terminal.

B. LCB Lead Grounds

3.58 AT the LLMC, and the SLLMC frame, if furnished, manually operate and release, in turn, each MA_ relay in connector associated with line link under test. Check that as each relay is operated, ground is present on the associated LCB terminal punching in connector control unit for marker 0. Refer to Table C.

3.59 At LL frame under test, manually operate and release, in turn, TM, TRS, and TR relays. Check that as each relay is operated, ground is present on the LCB terminal of the associated connector control unit for marker 0 in the LLMC frame. Refer to Table C.

MS RELAY CHAINS LLMC

MS Preference (Table D)

3.60 From traffic schematic (-240 drawing) or equivalent, determine preferred and alternate preferred markers for LLMC, associated with line link under test.

3.61 At associated LLMC block normal all MS_ and CB_ relays.

3.62 At line link frame under test, momentarily apply battery to marker connector control circuit unit terminal strip A, terminal MS-A. With a screwdriver or suitable iron object, check that MS relay of preferred marker in associated marker preference control circuit on LLMC frame is momentarily energized.

3.63 Momentarily apply battery to terminal MS-B on same terminal strip. Check that MS_ relay of alternate preferred marker in associated marker preference control circuit is momentarily energized.

3.64 Block operated CB_ relay associated with MS_ relay of alternate preferred marker and again momentarily apply battery to MS-B terminal at line link frame. Check that succeeding marker MS_ relay is momentarily energized.

3.65 Continue in this manner until the MS_ relay of each equipped marker in the connector has been energized from the MS-B terminal at line link frame. MS_ relays should energize in numerical sequence of markers, returning to the MS_ relay of marker 0 after MS_ relay of highest numbered

TABLE D

GRADED DIAL TONE MARKERS

	GRADING POINTS			5 DT MKRS EQUIPPED		6 DT MKRS EQUIPPED		MASTER TRAFFIC CONTROL ASSOC TO DT MKR AND LL'S	ALL DIAL TONE MARKERS BUSY CIRCUIT ASSOC
				LINKS SERVED BY MKR NO		LINKS SERVED BY MKR NO			
	A	B	C	FULL ACCESS	GRADED	FULL ACCESS	GRADED		
HIGHER NUMBERED LINE LINK FRAMES	20-44	25-54	30-59	0 1 2	3	0 1	2 3	TRAFFIC CONTROL CIRCUIT LLMC-A	AMB CIRCUIT D-MKR-A
HIGHER NUMBERED TRUNK LINK FRAMES	10-22	13-28	15-29	0 1 2	3	0 1	2 3		
LOWER NUMBERED LINE LINK FRAMES	00-19	00-14	00-29	0 1 2	4	0 1	4 5	TRAFFIC CONTROL CIRCUIT LLMC-B	AMB CIRCUIT D-MKR-B
LOWER NUMBERED TRUNK LINK FRAMES	00-09	00-12	00-14	0 1 2	4	0 1	4 5		

equipped marker has been tested. Unblock CB relays on completion of test.

3.66 Release keys DMTCA and DMTCB after test.

LIT RUN-THROUGH TEST

3.67 This test checks the ability of the line insulation test control circuit to progress through a full cycle of test.

3.68 Momentarily operate S1 key. S1 lamp lights. After a 50 second warm-up period, the line insulation test control circuit seizes each idle line not marked for skipping.

3.69 Observe that the LIT frame is capable of seizing line link frame under test.

Note: If order specifies that installer is to arrange certain line circuits for skipping by the LIT frame, make a visual observation to verify that the respective resistors are installed.

3.70 Record and investigate any stops associated with line link frames under test. When test cycle completes, check that line insulation test control circuit restores to normal, S1 lamp is extinguished and associated marker is made idle.

3.71 Check each line for dial tone from MDF. Make only one channel available at a time by inserting MB plugs into JS0-JS9 jacks. Vary available channel so that all channels and junctors are used during test. At LL, observe correct vertical is operated for each call. At associated LLC, manually transfer preference circuit so that half the calls are made using regular preference chain and half use the emergency preference chain.

LINE LOAD CONTROL

3.72 In line link frame under test, block operated DT relay. Verify in 5 to 8 seconds CWT relay operates. At line load control circuit, verify the G lamp associated with line link under test lights. Remove blocked DT relay. Verify CWT relay releases and the G lamp of service extinguishes.

3.73 From office records determine which vertical groups on line link frame under test are assigned to "A", "B" and "C" vertical group class of service.

> ***Note:*** If order specifies special options are to be applied to certain line circuits on frame, such as tandem appearances, ground start, etc, verify that the correct options have been applied.

3.74 At line load control circuit operate CLB and B keys associated with line links under test. Verify B lamps light. When above keys are operated, major alarm will sound. Silence alarm by operating AR key at line load control circuit. At line links under test originate a dial tone call from each equipped vertical group. Verify that from only the "A" and "C" vertical groups, calls can be originated and that from the even vertical groups associated with "B", calls cannot be originated. At line load control circuit, release CLB and B keys and operate CLC and C keys associated with line link under test. Verify B lamp is extinguished and C lamp lights. Major alarm will again sound. Silence alarm by operating AR key at line load control circuit. At line links under test, originate a dial tone call from each equipped vertical group. Verify that from only "A" and "B" vertical groups, calls can be originated and that from the odd vertical groups associated with "C", calls cannot be originated. At line load control circuit release CLC and C keys. Verify C lamp is extinguished.

3.75 At jack, lamp, and key circuit, make all but one marker busy for line link frame under test. At line link under test manually operate each VGS_ relay one at a time. Verify for each operated VGS relay a trouble record is taken. Trouble record should indicate FT_ and FU_ for line link under test, VGT_ for manually operated VGS_ relay and DR_ for idle marker. Also, verify that there is no HGT_ nor VFT_ perforations.

3.76 From office records determine that the correct TG0 to TG5 corresponding to D, MR, R0 to R3 is perforated for the vertical group (VGS_) under test. At line link frame under test, block operated TR1 and TRS relays. Manually operate VGS00 relay. Verify that the TRL, MK, TC, and TC1 relays in line link operate. Also, verify that trouble record is taken. Check for 2TR and TRS perforations. Repeat above test for each DT marker associated with line link under test.

3.77 At master test frame set up dial tone class of test. Operate REC, HG_, FT_, and FU_ keys corresponding to line link under test. Operate VG00 and VF0 keys. Operate ST key. Verify DT, TC1, LK2, MRL, and DISI lamps light and record is taken.

3.78 From office records determine what the class of service and rate treatment should be for the selected vertical group and vertical file. The class of service and rate treatment perforated on the trouble card should agree with that assigned for VG00 and VF0. Repeat above test for all equipped vertical groups and vertical files 0 through 4 on line link under test, except VG02 VF0 which is no test connector.

3.79 At master test frame set up dial tone class of test. Operate the NTC key. Select an assigned line link location using HG4 on the line link frame under test. Operate ST key and verify call completes satisfactorily without a trouble record. At the no-test connector switch, make busy the no-test vertical serving HG0-4 of the line link frame under test by temporarily grounding No. 3 spring (NT lead) of no test vertical. The hold magnet operates. Operate ST key. Verify that NTB and TRL lamps light and that a trouble record card is perforated without LXPI being punched.

3.80 At master test frame release HG4 key and operate HG9 key. Operate ST key and verify call completes satisfactorily without a trouble record. At the no-test connector remove make-busy serving HG0-4 and make busy vertical serving HG5-9. The hold magnet operates. Operate ST key. Verify that NTB and TRL lamps light and that a trouble record card is perforated without LXPI being punched. Remove make-busy at no-test connector.

MP AND E CHAIN

3.81 At master test frame set up a dial tone class of test using FT_ and FU_ keys corresponding to line link under test. At line link connector associated with line link under test, verify TR key is normal and MP relay chain is in control. Operate ST key. Verify that call completes satisfactorily. Repeat test for each equipped dial tone marker having access to line link under test. At master test frame set up an originating class of test using FT_ and FU_ keys corresponding to line link under test. Operate ST key. Verify that call completes satisfactorily. Repeat test for each equipped completing marker.

3.82 At line link connector associated with line link under test, operate TR key allowing E chain to be in control. Repeat above test to line link using all markers. Verify that test calls complete satisfactorily.

3.83 At line link connector associated with line link under test, momentarily insulate 8 and 12 break of each equipped marker E relay and verify as each contact is insulated that the CH relay momentarily operates, the TR relay operates, and the TR_ relays release. Also verify the minor alarm sounds and the CH lamp lights. Prior to insulating the next contact, momentarily operate the AR key and verify that the TR relay releases, the TR_ relays reoperate, the alarm is silenced, and the CH lamp goes out.

3.84 Release the operated TR key. Repeat 3.82 and 3.83. Where TR_ relays are supposed to release, for this test they will operate. Also instead of insulating at the E relay contacts, the MP relay contacts should be insulated and the same results obtained.

JUNCTOR DISTRIBUTION

3.85 From office records determine the office size. From J specification 27651 or BSP 819-220-150, refer to Fig. 1 through 28 to determine which figure corresponds to office size. Using the selected Fig., buzz the T, R, and S conductors from each vertical of each line link junctor switch of line link under test, to each trunk link junctor horizontal as indicated in the selected figure.

PAIRED LINE LINK

A. Paired Line Link, Early Busy

3.86 Operate ORIG, MT_, STP2, REC, MFEB, line location, class of service, code and digits lever keys or switches as required to set up original type test call. Operate ST key, verify that ORIG, RA1, and RBT1 lamps light, and trouble card has STP2 and JG1 punched. Operate RL key.

B. Paired Line Link, Simulation Busy

3.87 Repeat 3.86 except release MFEB and operate MFSB key. Operate ST key. Verification will be the same as indicated in 3.86. Operate RL key.

C. Paired Line Link Selection

3.88 Operate ORIG, MT_, STP2, line location, class of service, code and digits lever keys or switches as required to set up original type test call. Make above test selecting CH 0-9 to each line link frame under test. Repeat test to each completing marker. Operate ST key, verify that ORIG, LK2, DISI, and MRL lamps light at MTF. At all frames for line link under test, verify MPP relay for mate frame operates. Operate RL key.

3.89 Buzz the T, R, and S conductors from each vertical of each line link junctor switch of line link under test, to AUX line link vertical associated with line link under test; even line links go to right half side of AUX line link, odd line links go to the left half side of AUX line link.

VERIFICATION OF LL TO NG FRAMES

3.90 Verify that new added line links are stenciled properly in all NG frames.

3.91 Wire up spare number to L field in each number group frame.

3.92 Match line number in 3.91 at MTF. Verify that FT and FU punch on TBL record shows added line link frame.

NS LEADS

3.93 Verify that line link hold magnet operates by grounding number group sleeve lead. (NS lead located on MDF or NG sleeve relay rack bay.)

VERIFICATION OF AMA TRANSLATOR FIELD

3.94 Verify that the added line link is stenciled properly in the respective AMA translator frames.

3.95 In the translator frame, wire a test cross-connection to a line location appearing on the added line link frame. Use office 0-0000.

3.96 At the master test frame, make a translator test using the line and verify for office 0-0000 that there is a translation match.

3.97 Remove test cross-connection.

4. TRUNK LINK AND CONNECTOR

4.01 Locate the following fuses and verify that the appropriate fuse alarm operates.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM	AUDIBLE ALARM
PF	48V	Frame	Frame FA—Aisle MJ	Major

4.02 With the use of a volt-ohmmeter and appropriate test cords, verify the potential of the 48V test battery.

4.03 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle or MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on test cord will start and release the call respectively from the RC jack.

MAKE-BUSY

4.04 Insert a 349A make-busy plug in TMB jack on trunk link.

4.05 Verify TMB lamp lights on frame upright and TLMB_ lamp lights in master test frame jack bay.

4.06 Block operated BC_ relay (Table E) in each marker in marker group.

4.07 Verify FB_ relay (Table E) operates for trunk link under test.

4.08 Remove make-busy plug. Verify TMB & TLMB lamps are extinguished and FB relay released in marker. Remove blocking tool from BC_ relay in each marker.

TUR ASSIGNMENTS (LL AND LR LEADS)

4.09 This test is made from the assigned scanning terminals at the traffic usage recorder to the trunk link frame when the TUR is idle.

4.10 At the traffic usage recorder, apply ground through a test receiver in turn, to each scanning switch terminal assigned to LL_ and LR_ leads for added trunk link frame. Check that as each terminal is grounded, the associated hold magnet on trunk link frame junctor switch 0 or 5 operates as shown in Table F. (Check 430 drawing for LL_ and LR_ assignments.)

4.11 Reapply test to each added trunk link frame.

FTC LEADS TO MARKERS

4.12 From trunk link frame assignments, determine that FTC_ leads have been assigned to trunk groups (FTC_ to FT_ cross-connections) on each added trunk link frame. (Make marker busy while doing this test.)

4.13 Have first combined or completing marker made busy.

4.14 Manually operate and release in turn, each route relay in marker. Check that as each route relay associated with an assigned FTC_ lead on trunk link frames under test is operated, the

TABLE E

TL FRAME	TL TENS	TL UNITS	TL FRAME	TL TENS	TL UNITS	TL FRAME	TL TENS	TL UNITS
0		FB0	10		FB10	20		FB20
1		FB1	11		FB11	21		FB21
2		FB2	12		FB12	22		FB22
3		FB3	13		FB13	23		FB23
4	BC-0	FB4	14	BC-10	FB14	24	BC-20	FB24
5		FB5	15		FB15	25		FB25
6		FB6	16		FB16	26		FB26
7		FB7	17		FB17	27		FB27
8		FB8	18		FB18	28		FB28
9		FB9	19		FB19	29		FB29

Note: See Fig. 1 for typical operating path of TL's 0-2 on Trunk Link Connector 0. Same will apply for TL's 3-5, 6-8, etc. on Trunk Link Connectors 1, 2, etc. respectively.

marker FTC_ relays associated with trunk link frames under test operates. Also check that FTC_ relay does not operate when route relays associated with unassigned FTC_ leads on trunk link frames are operated.

4.15 Return marker to service.

4.16 Apply tests using each combined or completing marker. For WS dial tone markers check operation of FTC_ relay for added trunk link frames by manually operating the FC-0, FC-10, or FC-20 relay according to the number of the trunk link frames being tested.

TRUNK LINK IDENTIFICATION LAMP

4.17 At the master test frame jack, lamp, and key bay, operate BAT key to ON position. If alarm sending is provided, SB-NTR-DB key should be in NTP position. Manually operate MCD or M relay in the nonwire-spring or wire-spring trunk link connector associated with the added trunk link. Verify the TLC lamp associated with the added trunk link lights. To avoid dropping trouble record, make busy marker associated with operated connector relay.

4.18 Release MCD or M relay. TLC lamp is extinguished.

4.19 Seize originating registers assigned to frame and verify correct location on trouble recorder card. Repeat for each DT marker.

4.20 Make test calls using trunks assigned to frame. Select trunks so that at least two calls (one "A" side and one "B" side) are made per trunk frame and that every level on the trunk frame is used at least once. Verify correct location on trouble recorder card.

4.21 Verify the TB_ punch is on the trouble recorder card for all levels.

4.22 At MTF, make ORIG class call selecting trunk link under test. Vary the originating line link frame location so as to include each line link frame in the office. Verify that each call completes satisfactorily.

4.23 Set up ORIG class marker test. Select completing marker. Make busy marker selected at jack, lamp, and key circuit. In made-busy marker block nonoperated TBTB relay. Select an outgoing assigned code. Operate NTFS and NTTS

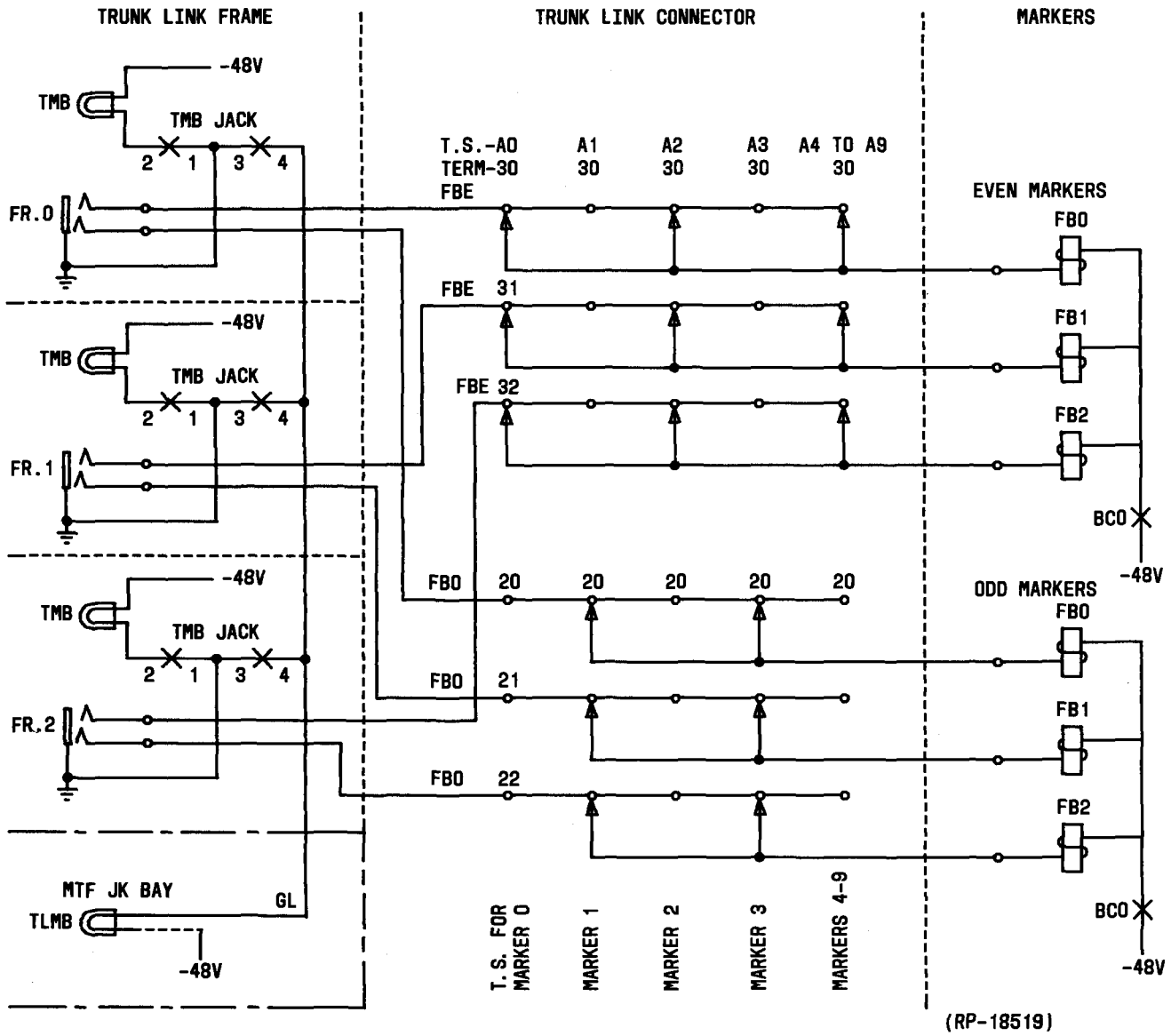


Fig. 1—Trunk Link Frame Busy Circuit

keys. Operate FS_ corresponding to trunk link under test. Do not operate any TS_ keys. At trunk link under test apply ground at FA02 terminal. Verify that FA02 relay operates. With remote control operate ST key. Trouble record taken. Remove ground at FA02 terminal. Verify trouble record card shows FAK, LCO, and LV2 perforated. Repeat above for each FA_ and FB_ relay, one at a time. Verify corresponding FAK, FBK, LC_, and LB_ perforations. Remove block from TBTB relay and release marker for service.

4.24 Make busy an originating register, appearing on trunk link under test. Set up a dial tone class of test. Operate NTFS and NTTS lever keys and select originating register made busy by

TABLE F

ASSOCIATION OF TUR LL & LR LEADS WITH TL JTR SW HOLD MAGNETS											
LEAD	SW	V	LEAD	SW	V	LEAD	SW	V	LEAD	SW	V
LL00	0	0L	LR00	0	0R	LL50	5	0L	LR50	5	0R
LL01	0	1L	LR01	0	1R	LL51	5	1L	LR51	5	1R
LL02	0	2L	LR02	0	2R	LL52	5	2L	LR52	5	2R
LL03	0	3L	LR03	0	3R	LL53	5	3L	LR53	5	3R
LL04	0	4L	LR04	0	4R	LL54	5	4L	LR54	5	4R
LL05	0	5L	LR05	0	5R	LL55	5	5L	LR55	5	5R
LL06	0	6L	LR06	0	6R	LL56	5	6L	LR56	5	6R
LL07	0	7L	LR07	0	7R	LL57	5	7L	LR57	5	7R
LL08	0	8L	LR08	0	8R	LL58	5	8L	LR58	5	8R
LL09	0	9L	LR09	0	9R	LL59	5	9L	LR59	5	9R

operating corresponding FS_ and TS_ keys. Start test call and verify that DISI and MRL lamps light. Release NTFS and NTTS lever keys and operate FS and TS lever keys. Start test call and verify that marker route advances. Release made-busy originating register.

4.25 This test requires that no service calls should have access to trunk link under test. At trunk link frame under test verify that there are no crosses between level leads RSK, RS0-9, CN, TT, SI, TC, TP, and RC for each level. This test should be made at the trunk side at top of frame. During heavy traffic, monitor each of the above terminals and verify that there is never a false battery on these leads.

4.26 Using trunk link cross-connection information, visually verify all FTC_ cross-connections. Also verify that there are no additional cross-connections added.

MP AND E CHAIN

4.27 At trunk link connector control circuit associated with trunk link frame under test, verify that TR key is normal and MP relay chain is in control. At MTF set up a dial tone class of test. Operate FS_ key and FS lever key as required to direct call to trunk link frame under test. Operate ST key. Verify that call completes satisfactorily. Repeat this test using each dial tone marker which has access to trunk link under test.

4.28 At MTF, set up an originating class of call. Operate FS_ key and FS lever key as required to direct call to trunk link under test. Operate ST key. Verify that call completes satisfactorily. Repeat this test using each equipped completing marker.

4.29 At trunk link connector control, operate TR key associated with trunk link frame under test. TR_ relays operate indicating E chain is in control. Repeat test calls for 4.27 and 4.28 for dial tone and completing markers.

4.30 At trunk link connector control circuit associated with trunk link under test, momentarily insulate 8 and 12 break of each equipped marker E relay and verify as each contact is insulated, the CH relay momentarily operates, the TR relay operates, and the TR_ relays release. Also verify that the minor alarm sounds and the CH lamp lights. Prior to insulating the next contact, momentarily operate the AR key and verify that the TR relay releases, the TR_ relays

reoperate, the alarm is silenced, and the CH lamp goes out.

4.31 Release the operated TR key. Repeat 4.30. Where TR_ relays are supposed to release, for this test, they will operate. Instead of insulating at the E relay contacts, the MP relay contacts should be insulated and the same results should be obtained.

JUNCTOR DISTRIBUTION

4.32 From office records determine the office size. From J specification 27651 or BSP 819-220-150 refer to Fig. 1 through 28 to determine which Fig. corresponds to office size. Using the selected figure, buzz the T, R, and S conductors from each horizontal of each junctor switch of trunk link under test, to each line link frame vertical as indicated in the selected Fig.

PATTERN CROSS-CONNECTIONS (This test does not apply for 5 TLF and 10 TLF sizes)

4.33 From office records determine the office size. Originate a dial tone class of test call to the trunk link frame under test. Operate FS_ key and FS lever key as required to select trunk link under test. Set up call from line link frame as indicated in Table G to ground L0 lead. Operate REC key. Operate ST key. Call is completed satisfactorily and trouble record is taken. Verify from the pattern cross-connection assignments in BSP 819-220-150 of figure corresponding to office size, that the correct P0 to 9 is perforated on trouble record card for the line link frame selected and the L_ lead under test. Repeat above test, changing line link frame selection as required in order to verify each assigned L_ lead in the trunk link frame under test. Repeat above test for each dial tone marker. Change MTF setup to select a basic originating class of test to an idle outgoing trunk on the trunk link under test. Repeat above test using all completing markers.

4.34 If office is a single frame operation, use column 20F for only those line link frames equipped adjacent to L0 to L8.

4.35 If office has paired trunk link frame operation and marker's office size cross-connection is 2, 2/3, 3, 4, 5TLF, use column 20F. If office size is 6, 7, 8, 9 or 10TLF, use column 40F.

TABLE G

L CROSS CONN		20F LL	20F FR	40F LL	40F FR	60F LL	60F FR
L	0	0	0	0	0	0	0
L	1	0	2	0	4	0	4
L	2	0	4	0	8	0	8
L	3	0	6	1	2	1	2
L	4	0	8	1	6	1	6
L	5	1	0	2	0	2	0
L	6	1	2	2	4	3	6
L	7	1	4	2	8	4	2
L	8	1	6	3	2	4	8

If office is a single frame operation use column 20F for only those line link frames equipped adjacent to L0 to L8.

If office has paired trunk link frame operation and marker's office size cross connection is 2, 2/3, 3, 4, 5TLF use column 20F. If office size is 6, 7, 8, 9 or 10TLF use column 40F.

If office is triple trunk link frame operation and office size is 2, 2/3, or 3TLF use column 20F; 4, 5, or 6TLF use 40F; 7, 8, 9 or 10TLF use 60F.

4.36 If office is triple trunk link frame operation and office size is 2, 2/3, or 3TLF, use column 20F; 4, 5, or 6TLF use 40F; 7, 8, 9 or 10TLF use 60F.

JUNCTOR SEQUENCE AND SUBGROUP SELECTION

4.37 At MTF set up a dial tone class of test. Operate FS_ key and FS lever key as required to select trunk link frame under test. From office records determine if any of the BSP figures (Fig. 1 through 28) apply for the office junctor distribution. Using Table H, operate JSQ, and STP1 or STP2 keys as indicated to select subgroup of junctors. When other than 10TLF size is required, operate FT_ and FU_ keys as indicated in the associated figures (Fig. 1 through 28) to direct the operation for each JC_ relay in

each junctor subgroup. Operate ST key. Verify the correct G_ relay operates in the trunk link connector and the correct JC_ relay operates in the trunk link frame. Repeat above test for all dial tone markers. Change setup to an originating class of test to an idle outgoing trunk on the trunk link frame under test. Repeat above for all completing markers.

5. TRUNKS

5.01 This section of the acceptance tests is used to verify, by using the master test frame and by performing manual tests, that the trunks just added can perform certain functions properly.

5.02 This section is divided into three parts:

A. Incoming Trunks

B. Outgoing Trunks

C. Intraoffice Trunks

5.03 The part(s) that should be performed depends on the type of trunks that have been added. Provided within each part is a test chart to be used when performing these tests.

A. Incoming Trunks

5.04 Before performing any tests, the information listed below must be obtained from office

TABLE H

JUNCTOR SEQUENCE AND SUBGROUP SELECTION

NUMBER OF TRK LK FRAMES			JUNCTOR SUBGROUP SELECTED (JG)											
			STP1 KEY						STP2 KEY					
			JSQ – KEY OR SWITCH OPERATED						JSQ – KEY OR SWITCH OPERATED					
SINGLE	PAIRED	TRIPLES	0	1	2	3	4	5	0	1	2	3	4	5
2	4	6	0	1	2	0	1	2	3	4	3	4	3	4
2-3	4-6	6-9	0	1	2	0	1	2	1	2	0	1	2	0
3	6	9	0	1	2	0	1	2	3	3	3	3	3	3
4	8	12	0	1	0	1	0	1	2	2	2	2	2	2
5	10	15	0	1	0	1	0	1	1	0	1	0	1	0
6	12	18	0	0	0 or 1*	0	0	0 or 1*	1	1 or 2=	0 or 1=	1 or 2=	1	0 or 2=
7	14	21	0	0	0	0	0	0 or 1*	1	1 or 2=	1	1 or 2=	1	0 or 2=
8	16	24	0	0	0	0	0	0	1	1	1	1	1	1
9	18	27	0	0	0	0	0	0	1	1	1	1	1	1
10	20	30	0	0	0	0	0	0	—	—	—	—	—	—

* JG0 operates if 3 junctor subgroups exist betweeen the LL and TL. JG1 operates if 2 junctor subgroups exist between the LL and TL.

= The higher numbered JG— relay operates if 3 junctor subgroups exist between the LL and TL. The lower numbered JG— relay operates if 2 junctor subgroups exist between the LL and TL.

records and recorded in the appropriate spaces on the test charts, that are provided at the end of this section, for incoming trunks.

Trunk Link Location

Relay Rack Location

Coded Ringing Feature Provided

5.05 For the manual tests included in this section, it will be necessary to indicate on the test charts the terminal number of certain leads on the trunk terminal strip(s). Table I can be used for this purpose. If the lead information for the trunk under test is not listed in the table, it will have to be obtained from the trunk SD drawing.

Master Test Frame

Incoming Trunk Test

5.06 This test verifies, by use of the master test frame (MTF), the circuit identification, timed disconnect, transmission, ringing, PU relay operation over the PU lead, return to originating office of answer indication, tandem (if provided), and by-link (if provided) capabilities of a new incoming trunk. The results from these tests should be indicated in the appropriate spaces in Table J.

(a) If trunk at originating office is not made busy, have it made busy.

(b) Check that A relay of trunk is not operated, then patch T jack on trunk unit to ITT jack on relay rack frame.

(c) Incoming Trunk Test Setup: The basic keys and switches are as follows:

- ITNP
- TTL
- TLK
- Select ringing combination.If coded ringing is provided, select coded ringing, if not, select 01.
- LS
- SXS
- If directing digit or digits are required, select digits as required for incoming class of trunk under test.
- REC

(d) Operate ST key.

1. ***Verification:***

- TS lamp lighted.
- Ringing lamp (R–, R+, T–, or T+) flashes.
- Ringing tone heard in unison with ringing lamp flashes.
- If coded ringing is provided - verify that the first ringing cycle is identical to the second and third. (Check of PU relay.)

TABLE I

SD	PB LEAD	PC LEAD OR PC–T LEAD & PC–L LEAD			RC LEAD	TC LEAD
26070-01	15	34	—	—	32	24
26071-01	15	—	65	34	32	24
26077-01	—	—	65	34	32	24
27686-01	34 (B) TS	35 (B) TS	—	—	32 (C) TS	24 (C) TS
27687-01	—	—	44 (C) TS	34 (C) TS	32 (B) TS	24 (B) TS

- Verify trunk link location of trunk on trouble card.

(e) Restore LS key. Operate ANS key. Start timing if delay charge feature is provided.

1. ***Verification:***

- High tone heard.
- Ringing lamp extinguished.
- Ringing tone silenced.
- If immediate charge feature is provided, OGT-CS lamp lighted.
- If delayed charge feature is provided, in five to eight seconds, OGT-CS lamp lighted.

(f) Restore TLK key, start timing.

1. ***Verification:***

- OGT-CS lamp extinguished.
- High tone silenced.
- In 13 to 32 seconds, TS lamp extinguished.

(g) Momentarily operate RL key. Restore REC and ANS keys. Operate TLK key.

(h) If coded ringing is provided, operate LS key and momentarily operate ST key and verify that the first and second ringing cycles are identical. Momentarily operate RL key. See Note.

(i) If trunk is arranged for tandem completion, select digits for tandem outgoing office code and select TAN subclass of test. Momentarily operate ST key.

1. ***Verification:***

- DIS1, LK2, MRL lamps lighted.

(j) Operate ANS key.

1. ***Verification:***

- OGT-CS lamp lighted.
- High tone heard.

(k) Restore ANS key. Momentarily operate RL key.

(l) If by-link operation is provided, insulate contact six of R relay at relay rack frame of trunk, and momentarily operate ST key.

1. ***Verification:***

- Overflow tone heard.

(m) Momentarily operate RL key.

Note: This verifies that first test of PU relay did not accidently start at first cycle without waiting for pickup relay to operate.

Manual

Incoming Trunk Tests

5.07 These tests verify by manual methods, the PB and PC leads to the traffic register circuit, the RC and TC leads to the trunk link circuit, and the T and R leads to the main frame. These tests are performed at the relay rack location of the trunk and at the main frame. The results from these tests should be indicated in the appropriate spaces on the test charts.

Tests at Trunk Relay Rack Location

- ***PB Lead Test:*** Using test picks, verify that a ground is received, with the CO relay blocked operated, on the PB lead.

  Note: Some trunks have no PB lead.

- ***PC Lead Test:*** This is a two person test, one person at the trunk relay rack location, and one person at the traffic register circuit. Verify that the traffic register for proper trunk group can be pegged from the PC lead on the trunk under test. This can be accomplished during slow traffic periods by momentarily grounding the PC terminal on the trunk. If this test is being performed during a heavy traffic period, it may be necessary to hold a ground on the PC terminal and verify that the traffic register stops pegging.

- Trunks that are used for tandem completing have PCT and PCL leads instead of a PC lead.

- ***RC Lead Test:*** Using test picks, momentarily apply ground to RC lead terminal. This test is successful if the RC relay does ***not*** operate.

- ***TC Lead Test:*** Using test picks, check for battery on the TC lead terminal. This test is successful if ***no*** battery is detected on the TC lead.

Tests at Main Distributing Frame

- ***T and R Lead Test:*** This is a two person test, one person at the trunk relay rack location, and the other person at the main distributing frame (MDF). The test person at the MDF shorts the T and R leads together and the test person at the trunk relay rack location verifies that the A relay in the incoming trunk under test operates.

B. Outgoing Trunks

5.08 Before performing any tests, the information listed below must be obtained from office records and recorded in the appropriate spaces on the tables that are provided for outgoing trunks.

Trunk Link Location
Relay Rack Location
MTF Jack Number
Office Code
Translation
Class of Service
Rate Treatment
Route Relay Number
Trunk Features Provided
  Coin Operation
  Message Register Operation
  AMA Operation (Recorder Number, Trunk Number)

5.09 For the manual tests included in this section, it will be necessary to indicate on the test charts, the terminal number of certain leads on the trunk terminal strip(s). If the lead information for the trunk under test is not listed in Table K, it will have to be obtained from the trunk SD drawing.

Master Test Frame

OGT Trunk Test

5.10 This test verifies, by use of the master test frame (MTF), the circuit identification, F relay operation over F lead, transmission, timed disconnect, test and make-busy jacks on MTF jack bay, tandem (if provided), and overflow tone capabilities of a new outgoing trunk. If the trunk under test is arranged for AMA, COIN, or MESSAGE REGISTER operation, these features are checked also. The results from these tests should be indicated in the appropriate spaces on Table L.

(a) Make trunk under test idle.

(b) Outgoing Trunk Test Setup: The basic keys and switches are as follows:

- REC, OGT
- KY
- Select marker.
- TLK
- Select translation as required (LT, LT1, etc.) If CL_ switch is provided, set to OR-DP, or OR-MF.
- Select class of service and rate treatment as required. (If trunk is arranged for COIN operation, operate CN key and select coin class of service. If trunk is arranged for AMA operation, select AMA class of service.)
- Select A_, B_, C_ digits for office code of trunk under test.
- Select route advance 00. If trunk group is allotted, operate GPA or GPB key as required.
- Select trunk under test (FS_, TS_, FS, TS).
- Select D_, E_, F_, and G_ digits of any test line in terminating office.

(c) Operate ST key.

1. ***Verification:***

- AS lamp lighted.

TABLE J

POST TEST
INCOMING TRUNKS

	TRUNK LINK LOC.		
	RELAY RACK LOC.		
	CODED RINGING		
MTF TESTS		STEP NO.	
	SEIZURE	c	
	ANSWER	d	
	TIMED DISC.	e	
	CODED RINGING	g	
	TANDEM	h	
	TANDEM ANS.	i	
	BY-LINK	k	
MANUAL TESTS	PB LEAD	TERM. NO.	
		TEST RESULTS	
	PC LEAD	TERM. NO.	
		TEST RESULTS	
	RC LEAD	TERM. NO.	
		TEST RESULTS	
	TC LEAD	TERM. NO.	
		TEST RESULTS	
	T + R LEAD TEST		

- Verify trunk link location of trunk on trouble card.
- If trunk is arranged for AMA operation, IE_, RN_ (recorder number), T_, U_ (trunk number) lamps lighted.

(d) Operate ANS key, start timing.

1. ***Verification:***
   - OGT-CS lamp lighted.
   - High tone heard.
   - If trunk is arranged for AMA operation, in two to six seconds, AE lamp lighted.

TABLE K

SD	ST LEAD	OFT LEAD
26065-01	56TS	65TS
26085-01 WITHOUT AMA	56TS	65TS
26085-01 WITH AMA	36 (B) TS	26 (B) TS
26086-01	56 (A) TS	65 (A) TS
26087-01	56 (A) TS	65 (A) TS
27546-01	36 (B) TS	26 (B) TS
27550-01	36 (A) TS	26 (A) TS
28062-01	55 (B) TS	45 (B) TS
28063-01	55 (B) TS	45 (B) TS

- If trunk is arranged for message register operation, in two to six seconds, RP lamp lighted.

(e) Restore ANS key, start timing.

1. ***Verification:***

- OGT-CS lamp extinguished.
- High tone silenced.
- In 13 to 32 seconds, AS lamp extinguished.
- If trunk is arranged for coin operation, CC lamp momentarily lighted, and CND lamp lighted.
- If trunk is arranged for AMA operation, and if disconnect entry is provided, DE lamp lighted.

(f) Momentarily operate RL key. If CN key is operated, momentarily restore CN key. Restore REC key.

(g) Insert make-busy plug into OGT-MB jack of trunk under test. Momentarily operate ST key.

1. ***Verification:***

- TB lamp lighted.

(h) Momentarily operate RL key. If CN key is operated, momentarily release CN key. Operate ROT key. Operate NTFS, NTTS keys. Momentarily operate ST key.

1. ***Verification:***

- AS lamp lighted.
- Overflow tone heard.

(i) Momentarily operate RL key. If CN key is operated, momentarily restore CN key. Restore ROT key.

(j) Patch T1 jack of voltmeter test circuit to T jack associated with trunk under test. Operate RG, FEMF, and VMT1 keys.

1. ***Verification:***

- Steady voltmeter reading indicating proper voltage and polarity.

Note: If there is a steady voltmeter reading to the left of 0 volt, operate T1 REV key. Verification as shown above should now be observed.

(k) Change class of test from OGT to MISC. Momentarily operate ST key.

1. ***Verification:***

- Voltmeter reading of 0 volt.
- Expected response from selected test line in terminating office.
- AS lamp lighted.

(l) Momentarily operate RL key. If CN key is operated, release CN key.

(m) If trunk is arranged for tandem operation, change class of test from MISC to OGT.

(n) If office is arranged for tandem screening or CAMA, select TAN_ incoming class with LT translation.

(o) If office is arranged for CAMA screening, select PCD incoming class with LT translation.

(p) Momentarily operate ST key.

1. ***Verification:***

- AS lamp lighted.
- OGT-CS lamp not lighted.

(q) Operate ANS key.

1. ***Verification:***

- OGT-CS lamp lighted.
- High tone heard.

(r) Restore ANS key.

1. ***Verification:***

- OGT-CS lamp extinguished.
- High tone silenced.

(s) Restore TLK key.

1. ***Verification:***

- AS lamp extinguished.

(t) Momentarily operate RL key.

Manual

OGT Trunk Tests

5.11 These tests verify, by manual methods, the ST lead to the interrupter circuit, the SC lead to the outgoing sender link, and the FT_ to FTC_ cross-connection on the trunk link frame of a new OGT trunk. These tests are performed at the relay rack location of the trunk, at the outgoing sender link, and at the trunk link frame, respectively. The results from these tests should be indicated in the appropriate spaces on Table L.

Test at Trunk Relay Rack Location

1. ***ST Lead Test:*** Using test picks, with the OF relay in the trunk released, check for ground on the ST lead terminal.

- If ground is present, listen for overflow tone on the OFT lead terminal. The presence of overflow tone is positive verification.
- If ground is not present, listen for overflow tone on the OFT lead terminal while manually operating OF relay. Overflow tone should be received as verification.

Test at Outgoing Sender Link

1. ***SC Lead Test:*** Verify that the SC terminal corresponding to the trunk under test is only cross-connected to the SC terminal for the proper switch.

Test at Trunk Link Frame

1. ***FT_ to FTC_ Cross-Connection Test:*** Verify that the FTA/B_ terminal corresponding to the trunk under test is cross-connected, either directly or indirectly, to the proper FTC_.

TABLE L

POST TEST
OUTGOING TRUNKS

TRUNK LINK LOC.			
RELAY RACK LOC.			
MTF JACK NO.			
OFFICE CODE			
TRANSLATION			
CLASS OF SERVICE			
RATE TREATMENT			
ROUTE RELAY NO.			
TRUNK FEATURES	COIN		
	MESSAGE REG.		
	AMA REC. NO.		
	AMA TRUNK NO.		
MTF TESTS		STEP NO.	
	SEIZURE	b	
	ANSWER	c	
	TIMED DISC.	d	
	BUSY TEST	f	
	REORDER TEST	g	
	TEST JACK TEST	i	
	THRU TEST	j	
	TANDEM	o	
	TANDEM ANS.	p	
	TERM. REL.	q	
	ORIG. REL.	r	
MANUAL TESTS	ST LEAD TEST ST LEAD TERM		
	ST LEAD TEST OFT LEAD TERM		
	ST LEAD TEST TEST RESULTS		
	SC LEAD TEST		
	FT- TO FTC-		

C. Intraoffice Trunks

5.12 Before performing any tests, the information listed below must be obtained from office records and recorded in the appropriate spaces on the tables that are provided for intraoffice trunks.

Trunk Link Location (A and B appearances)
Relay Rack Location
Office Code
Translation
Class of Service
Rate Treatment
Route Relay Number
Trunk Features Provided
  Coin Operation
  Message Register Operation
  AMA Operation (Recorder Number, Trunk Number)
  Coded Ringing

5.13 For the manual tests included in this section, it will be necessary to indicate on the table, the terminal number of certain leads on the trunk terminal strip(s). If the lead information for the trunk under test is not listed in Table M, it will have to be obtained from the trunk SD drawing.

Master Test Frame

IAO Trunk Test

5.14 This test verifies, by use of the master test frame (MTF), the circuit identification, F relay operation over F lead, transmission, PU relay operation over PU lead, and timed disconnect of a new IAO trunk. If the trunk under test is arranged for AMA, COIN, or message register operation, these features are checked also. The results of these tests should be indicated in the appropriate spaces on Table N.

(a) Wait until trunk under test is idle.

(b) IAO Trunk Test Setup—The basic keys and switches are as follows:

- IAO
- Select Marker.
- TLK
- TTL
- A_, B_, C_ digits for office code of trunk under test.
- Select route advance 00. If trunk group is allotted, operate GPA/GPB key as required. IF CL_ switch is provided, set to OR-DP or OR-MF.
- Select translation as required (LT, LT1 etc).
- Select class of service and rate treatment as required. (If trunk is arranged for coin operation, operate CN key and select coin class of service. If trunk is arranged for AMA operation, select AMA class of service.)
- Select ringing combination. (If coded ringing is provided, select coded ringing, if not, select 01.)

TABLE M

SD	RC LEAD	S1 LEAD	PU LEAD
26060-01	32TS	34TS	56TS
26061-01	32TS	34TS	56TS
26062-01	32 (A) TS	34 (A) TS	56 (A) TS
26064-01	32 (A) TS	34 (A) TS	56 (A) TS
27685-01	32 (B) TS	34 (A) TS	56 (B) TS

- REC
- Select trunk under test (FS_, TS_, FS, and TS).

(c) Operate ST key.

1. ***Verification:***

- AS, TS lamps lighted.
- Ringing lamp (R-, R+, T-, T+) flashes.
- Ring tone heard in unison with ringing lamp flashes.
- Verify trunk link location of trunk A and B appearances on trouble cards.
- If coded ringing is provided, verify that first ringing cycle is identical to second and third, using ringing lamps (R-, T-, R+, T+).
- If trunk is arranged for AMA operation, IE, RN_, (recorder number), T_, U_ (trunk number) lamps lighted.

(d) Operate ANS key, start timing.

1. ***Verification:***

- Ringing lamp extinguished.
- High tone heard.
- If trunk is arranged for AMA operation, in two to six seconds, AE lamp lighted.
- If trunk is arranged for message register operation, in two to six seconds, RP lamp lighted.

(e) In seven to nine seconds, restore ANS key, start timing.

1. ***Verification:***

- High tone silenced.
- In 13 to 32 seconds, AS and TS lamps extinguished.
- If trunk is arranged for COIN operation, CC lamp momentarily lighted, and CND lamp lighted.
- If trunk is arranged for AMA operation and disconnect entry is provided, DE lamp lighted.

(f) Momentarily operate RL key. If CN key is operated, momentarily restore CN key. Restore REC key.

(g) If coded ringing is provided, momentarily operate ST key and verify that first and second ringing cycles are identical. Momentarily operate RL key.

Manual

IAO Trunk Tests

5.15 These tests verify, by manual methods, the MBL lead to miscellaneous circuit, the PU lead to the power ringing and tone distribution circuit, the RC and S1 leads to the trunk link frame, and the FT_ to FTC_ cross-connection of a new IAO trunk. These tests are performed at the relay rack location of the trunk and at the trunk link frame. The results from these tests should be indicated in the appropriate spaces on Table N.

Tests at Trunk Relay Rack Location

- ***RC and S1 Lead Test:*** Using test picks, momentarily apply ground to the RC and S1 lead terminals. This test is successful if the RC and S1 relays do ***not*** operate.
- ***PU Lead Test:*** (This test is only applied to trunks with a PU relay.) Using test picks, verify that a ground is received every six seconds on the PU lead terminal.
- ***MBL Lead Test:*** If any trunks on the same relay rack frame with the trunk under test are made busy, block operated the CH relay in these trunks. (Do not block the CH relay in the trunk under test.) With the MB switch on the trunk under test operated to MB, the MB lamp on the frame should be lighted. With the MB switch on the trunk under test operated to N, the MB lamp should be extinguished. Both

TABLE N

POST TEST
INTRAOFFICE TRUNKS

TRUNK LINK LOCATION	A app.		
	B app.		
RELAY RACK LOC.			
OFFICE CODE			
TRANSLATION			
CLASS OF SERVICE			
RATE TREATMENT			
ROUTE RELAY NO.			
TRUNK FEATURES	COIN		
	MESAGE REG.		
	AMA REC. NO.		
	AMA TRUNK NO.		
	CODED RINGING		
MTF TESTS		STEP NO.	
	SEIZURE	b	
	ANSWER	c	
	TIMED DISC.	d	
	CODED RINGING	f	
MANUAL TESTS	RC LEAD	TERM NO.	
		TEST RESULTS	
	S1 LEAD	TERM NO.	
		TEST RESULTS	
	PU LEAD	TERM NO.	
		TEST RESULTS	
	MBL LEAD TEST		
	FT- TO FTC-		

positions of the MB switch should be checked. If there are no other trunks to be tested on the same relay rack frame, remove blocking tools from the CH relays.

Tests at Trunk Link Frame

FT_ to FTC_ Cross-Connection Test: Verify that the FTA/B_ terminal corresponding to the trunk under test is cross-connected, either directly or indirectly to the proper FTC_ terminal.

6. ORIGINATING REGISTER

6.01 Locate the following fuses and verify that the appropriate fuse alarms operate (miscellaneous circuit).

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
130V	+130	PRTD	Frame FA—Aisle MJ
—48	—48		Frame FA—Aisle MJ
PF	—48	ORLM Frame	Frame FA—Aisle MJ

6.02 Verify that all fuses on the PRTD frame appear in the fuse record book.

6.03 With the use of a volt-ohmmeter and appropriate test cords verify the potential at the +130V and 48V test battery jacks.

6.04 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle or MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on test cord will start and release the call respectively from the RC jack.

(d) ***Make-Busy Jack and Group Busy***

- ***Make-Busy Jack*** - Insert 322A make-busy plug in the ORMB jack. Verify MB relay operates in register under test.
- ***Group Busy*** - At originating register group busy circuit under test (refer to 579 Wiring List "OVL" Assignment Chart or job Drawing -411 "OVL" Assignment Chart or Drawing -440), operate RB1 relay associated with originating register under test and verify operation of OVL relay in that originating register.

(e) ***Originating Register Test Jack (ORT)*** - Using two test receivers and cords, check continuity between ORT jacks to other originating register frames if automatic monitor is not provided.

TIMING TESTS

6.05 Timing tests should be applied as listed in timing requirement tables of SDs, DT, TM, TPT, CT, CR, CR1, and CR2.

REGISTER TIME-OUT AND ALARM

6.06 At register under test, block operated TM relay. At MTF jack, lamp, and key circuit, verify TO lamp lights and 10-20 seconds later R-S-TOA lamp lights and major alarm sounds.

6.07 Insert 322A plug into MB jack associated with lighted TO lamp. R-S-TOA lamp extinguishes and alarm is silenced.

6.08 Release TM relay and remove 322A plug.

TRAFFIC REGISTERS

6.09 With the use of the telephone company's traffic register assignment list, apply the following test to originating register per options furnished.

6.10 Station an observer at the traffic cabinet during operation tests to verify that only the proper register scores. Interference from other tests in progress, causing the operation of traffic registers, must be considered.

6.11 Table O provides the traffic register operating lead and its associated frame, terminal strip, terminal, and relay contacts for trouble locating purposes.

A. Abandoned Partial Dial Peg Count (APD)

6.12 At the originating register under test, block MST and MSTA relays nonoperated then block ON relay operated.

6.13 Manually operate P2A relay in the same register. PD relay locks operated.

6.14 Release ON relay, P2A and PD relays should also release. Verify that one call should be scored on the APD-PC register.

B. APPB Peg Count With XB Option

6.15 Repeat test per 6.12. Operate P2A and MF relays, release ON relay, verify that APPB register scores once.

> ***Note:*** MF relay is locked operated by PD relay. ON relay released puts PD relay in slow release condition. Therefore, MF relay should be operated as soon as ON relay is released.

6.16 Verify APPB-PC register scores.

C. FAPD Peg Count With TV Option

6.17 Repeat test per 6.12 and operate KS relay, release ON relay, and verify FAPD-PC register scores.

D. Announcement Request For Coin Deposit

6.18 Momentarily operate CNT3 relay and verify PC traffic register scores.

6.19 Unblock MST and MSTA relays when all tests are complete.

TUR ASSIGNMENTS

6.20 Check the assignment of the RBM and RB leads to TUR per 430 wiring list assignment chart.

IDENTIFICATION VIA CONNECTOR

6.21 This test is intended to check the FR, CN, and RG leads to the trouble recorder via the originating register marker connector.

6.22 At the originating register under test, hold MST and SR relays operated until the trouble recorder delivers a card.

TABLE O

TRAFFIC TYPE	REGISTER DESIGN	DESCRIPTION OF REGISTER	LEAD	REGISTER OPERATING PATH				
				FRAME	TS	TERM	RELAY	CONTACT
PC	APD	Partial Dial	APD	OR	ME	21-28	TM1	2B
PC	APPB	Partial Dial (TOUCH-TONE®)	APPB	OR	ME	41-48	MF	3M
*PC	PC	Ann. Requests for Coin Deposit	PC	OR	S	16	CNT3	7M
*PC	FAPD	Partial Dial (Foreign Area)	FAPD	OR	ME	31-38	KS	5M
* Optional								

6.23 The card punches should indicate the correct connector frame, connector and register number as follows:

ORMC Frame No.	FR (0-2)
Connector No.	CN (0-3)
Register No.	RG (0-19)

IDENTIFICATION VIA PRETRANSLATOR

6.24 At the originating register under test hold operated PST relay. Two trouble record cards (1st trial and 2nd trial) should be delivered.

6.25 A short time after second trial is completed PRL relay in the register operates and locks. Release PST relay. PRL relay releases after pretranslator restores to normal. (Consult 5790 drawing for assignment.)

6.26 Verify that a trouble record was made of each trial. Cards should indicate ITR/TRK or 2TR/TR2 along with the following punches.

PRT	Pretranslator Record Request
DR0-2	Pretranslator Seized
CN	Originating Register Subgroup
RG	Originating Register Position
FR	Connector Number

IDENTIFICATION VIA MONITOR

6.27 At the originating register to be tested, block M relay operated. At automatic monitor block operated MCA relay. Momentarily operate TRR1 relay. The trouble recorder should deliver a card.

6.28 The card punches should indicate the correct connector frame, connector and register number to identify the register under test, as follows:

ORMC Frame No.	FR (0-2)
Connector No.	CN (0-3)
Register No.	RG (0-19)

6.29 This test is intended to check the FR, CN, and RG leads to the trouble recorder via the automatic monitor circuit and the monitor M relay in the register.

6.30 Release register M relay and monitor MCA relay.

ORIGINATING REGISTER IDENTIFICATION LAMP

6.31 At the master test frame jack, lamp, and key bay, operate BAT key to ON position. If alarm sending is provided, SB-NTR-DB key should be in NTR position. Manually operate RC relay in the nonwire-spring or RB relay in the wire-spring originating register marker connector, register part, associated with added originating register. Verify ORP/CCP lamp associated with added originating register lights. Release RC or RB relay. ORP/CCP lamp is extinguished.

ORIGINATING REGISTER RS CHAIN

6.32 Make-busy all registers in ORMC associated with register under test at the jack, lamp, and key circuit. Block operated CB_ relays for all markers in ORMC associated with register under test. Block TM relay nonoperated in ORMC associated with register under test.

6.33 Block TMA relay nonoperated in register under test.

6.34 Block operated MST and SR relays in register under test. RS, RA, RB, RC, RD, RE, and RF relays, as provided, operate for register under test.

6.35 At register directly preceding register under test, in the ORMC chain, block nonoperated the TMA relay and block operated MST and SR relays; verify that RS, RA, RB, RC, RD, RE, and

RF relays, as provided, do not operate for this register.

6.36 Release MST and SR relays in register under test. Verify that this registers RS and R_ relays release, and RS and R_ relays for preceding register in chain operate.

6.37 At register under test block operated MST and SR relays. Verify that the registers RS relay operates but the R_ relays do not operate.

6.38 Release TMA, MST and SR relays in register preceding register under test. Verify that this registers RS and R_ relays release and R_ relays for register under test operate.

6.39 At register directly succeeding register under test, in the ORMC chain, block nonoperated the TMA relay and block operated the MST and SR relays. Verify that the RS relay operates but the R_ relays do not operate for this register.

6.40 Release MST and SR relays in register under test. Verify that the R_ relays in the succeeding register operate and RS and R_ relays in register under test release.

6.41 Operate the MST and SR relays in register under test. Verify that RS and R_ relays for register under test do not operate.

6.42 Release all blocked relays and make-busy plugs at jack, lamp, and key circuit.

PRETRANSLATOR CONNECTOR CHAIN

(Must be done in light traffic periods unless all registers in the connector can be made busy.)

6.43 Make busy all registers in the pretranslator connector associated with the register under test.

6.44 Block nonoperated TM, CA, GS_ relays in the pretranslator connector associated with the subgroup made busy.

6.45 At the originating register frame where the first register in pretranslator connector subgroup associated with register under test is located, strap together punchings 32 and 36 of the PRA (TS) at top of frame.

6.46 At the register under test, operate the PST relay, verify that the PRS and PRA relays momentarily operate, and the PRL relay locks operated.

6.47 Release the PST relay and verify that the PRL relay releases.

6.48 At the PRA (TS) mentioned above, remove strap from punchings 32 and 36 and strap punchings 35 and 36.

6.49 At register under test, operate the PST relay, verify that the PRS and PRA relays momentarily operate, and the PRL relay locks operated.

6.50 Release the PST relay and verify that the PRL relay releases. At the PRA (TS) mentioned above, strap punching 32 to 35 (35 and 36 remain strapped).

6.51 At register under test block PRL relay nonoperated and PST relay operated. Verify that the PRS and PRA relays operate.

6.52 At succeeding register in connector chain, block operated the PST relay, verify that the PRS relay in succeeding register operates, and there is no change in register under test.

6.53 At register under test, remove block from PRL relay, verify that in register under test the PRL operates, and the PRS and PRA relays release. In succeeding register verify that PRL is operated.

6.54 At succeeding register remove block from PST relay and verify that PRL releases.

6.55 At register under test, block nonoperated PRL relay and block operated PST relay. Verify that the registers PRS and PRA relays operate.

6.56 At preceding register in connector chain, block operated the PST relay. Verify that there is no change in preceding register and in the register under test.

6.57 At register under test, remove block from the PRL relay. Verify that the registers PRL relay operates and locks, and the PRS and

PRA relays release. Verify that in the preceding register the PRL relay is operated.

6.58 Remove blocks from the PST relays in the register under test and in the preceding register. Remove straps from the PRA (TS) punchings 32, 35, and 36.

6.59 Remove block from TM, CA, and GS_ relays in pretranslator connector. Release all registers for service.

REGULAR CALL

6.60 Make register under test busy.

6.61 Select a line location on the highest line link frame and the highest vertical group assigned on that frame. Select office code and class of service for a flat rate call having access to register under test. Operate remaining D to L digits, NTC, OR, RAO, MT_ (dial tone).

6.62 Select register under test by operating register group, FS_, TS_, FG_, NTFS, or NTTS.

6.63 If test set testing is provided, release TALK key at MTF, insert hand test cord into PLS jack on test set. Patch ORT jack on test set to ORT jack on trunk test circuit, patch RC jack on test set to RC jack on MTF. For TOUCH-TONE® patch IRT jack on test set to IRT jack on MTF. At test set place L switch to 0. Operate PB and RP keys. For dial pulse, place L switch to 1. (No keys or IRT jack necessary at test set.)

6.64 If automatic monitor is provided, operate STT and 24 MAX keys.

6.65 For test set testing, operate STT key at test circuit.

6.66 AS lamp lights.

6.67 Using 20 PPS dial pulse digits, set up on A-L keys. Verify AS lamp is extinguished and call completes without trouble record.

6.68 For automatic monitor operate ST key.

6.69 Verify OK lamp lights at test frame without trouble record.

PRETRANSLATOR TM CHECK

6.70 Repeat Steps 6.60 through 6.69.

6.71 After the third digit is pulsed into register under test, verify that the TM relay in the corresponding pretranslator connector operates.

ORMC TM CHECK

6.72 Repeat Steps 6.60 through 6.69.

6.73 After the required digits are pulsed into register under test, verify that the TM relay in the corresponding ORMC operates.

DIAL TONE AND BUSY OR OVERFLOW TONE

6.74 Repeat Steps 6.60 through 6.63.

6.75 If test set testing is provided, operate RBT and RLT keys. Patch telephone set into PLS jack of register test set.

6.76 Operate SST key. Verify dial tone is heard.

6.77 Using 20 PPS dial pulse digits, set up on A-L keys. Verify dial tone is removed after first digit dialed.

6.78 Verify after last digit dialed, overflow or line busy tone heard. In 20-32 seconds tone removed and AS lamp extinguished.

6.79 If automatic monitor is provided, operate SCO, RBT, and MOTL key.

6.80 Operate ST key.

6.81 Verify dial tone is heard.

6.82 Release SCO key.

6.83 Verify dial tone is not heard. After last digit is outpulsed by automatic monitor, overflow or line busy tone is heard. In 20-32 seconds tone is removed and OK lamp lights.

BUSY AND IDLE REGISTER TEST

6.84 Make all registers busy on the same trunk link frame as the register under test.

6.85 Restore NTFS and NTTS keys and operate FS and TS keys.

6.86 Repeat steps 6.60 through 6.69.

6.87 If test set testing operate STT key on test set.

6.88 Verify that trunk busy indication is made.

6.89 If automatic monitor is provided, operate ST key on MTF.

6.90 Verify that trunk busy indication is made.

6.91 Release made-busy condition for register under test.

6.92 Repeat steps 6.60 through 6.69.

LL LEAD CHECK

6.93 Make-busy the dial tone marker selected in 6.60, block nonoperated the DT marker, TCH1 through TCH9 relays.

6.94 Repeat steps 6.60 through 6.69.

6.95 Verify at the ORLM appearance of register under test that LL4 and LL7 reed relays momentarily operate.

6.96 If test set testing, operate TRR key. Repeat steps 6.60 through 6.69.

6.97 Verify that completing marker trouble record has indicated the same LL— punches for dial tone channel selected.

6.98 If automatic monitor is used at register under test, insulate 8F of the TMI relay and 11F of the M relay.

6.99 Operate REC key.

6.100 Repeat steps 6.60 through 6.69.

6.101 Verify that completing marker trouble records indicate the same LL_ punches for dial tone channel selected.

6.102 At dial tone marker used in test, remove block from TCH1 relay and block TCH0 relay operated.

6.103 Repeat steps 6.60 through 6.69.

6.104 Verify at ORLM that LL0 and LL1 momentarily operate.

6.105 If test set testing, operate TRR key. Repeat steps 6.60 through 6.69.

6.106 Verify that completing marker trouble record has indicated the same LL_ punches for dial tone channel selected.

6.107 If automatic monitor is used at register under test, insulate 8F of the TMI relay and 11F of the M relay.

6.108 Repeat steps 6.60 through 6.69.

6.109 Verify that completing marker trouble records indicate the same LL_ punches for dial tone channel selected.

6.110 At dial tone marker used in test, remove block from TCH2 relay and block TCHI relay operated.

6.111 Repeat steps 6.60 through 6.69.

6.112 Verify at ORLM that LL0 and LL2 momentarily operate.

6.113 If automatic monitor is used at register under test, insulate 8F of the TMI relay and 11F of the M relay.

6.114 Repeat steps 6.60 through 6.69.

6.115 Verify that completing marker trouble records indicate the same LL_ punches for dial tone channel selected.

6.116 Repeat for LL3-9 indications.

6.117 If office has TOUCH-TONE originating registers, select OR class of test, dial tone marker, and first originating register under test.

6.118 If automatic monitor is provided, operate STT, PB, SDC, SSLB, and MOTL keys. Operate ST key (overflow tone in test circuit receiver). Repeat above with SSRB key operated. Repeat for each added originating register.

6.119 If test set testing is provided, patch ORT jack on test set to ORT jack on trunk test circuit, patch RC jack on test set to RC jack on MTF, patch IRT jack on test set to IRT jack on MTF, and patch telephone set into PLS jack on test set. Set L switch to 0. Operate 4W, RP, and PB keys. Operate STT key (dial tone heard in telephone set). Operate RS key (overflow tone heard). Repeat above with KP key instead of RS. Repeat for each added originating register.

7. ORIGINATING REGISTER MARKER CONNECTOR

7.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
130V	−48V	PRTD	Frame FA—Aisle MJ
	130	PRTD	
	−48V	Frame	

7.02 Verify that all fuses appear in the Fuse Record Book.

7.03 With the use of a volt-ohmmeter and appropriate test cords, verify potential at the 48V test battery.

7.04 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle of MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on the test cord will start and release the call respectively from the RC jack.

(d) ***Make-Busy Jack*** - At jack, lamp, and key circuit, insert MB plug into the marker MB jacks associated with ORMC_ under test.

- Verify that as each MB plug is inserted, the respective CB_ relay operates in the connector under test.
- Remove MB plugs. Verify that the CB_ relays release.

7.05 Timing tests should be applied as listed in timing of SDs.

PLANT AND TRAFFIC REGISTERS

7.06 There are no registers associated with the originating register marker connector.

CB RELAY CHAIN

7.07 Verify that CB relays for unequipped completing markers are block operated in a permanent manner in ORMC_ under test. At jack, lamp, and key circuit, make all originating registers associated with the connector busy, by inserting MB plugs into the respective ORMB jacks.

7.08 Temporarily ground terminal 43 of terminal strip A of marker connector control unit under test. This will provide a CB relay locking ground on the LCB lead for all marker CB relays in the connector.

7.09 Apply ground through a test receiver, in turn, to U winding terminal of each CB_ relay in the marker preference control unit for the connector under test. Check that each relay operates without buzzing and locks. (Reversed CB_ relay winding leads will cause it to buzz). When the last CB_ relay is operated verify that all others release.

7.10 Repeat above test enough times so that CB_ relays for each marker will be the last one operated.

7.11 Remove temporary ground from terminal 43 of terminal strip A of marker connector control unit under test.

7.12 At jack, lamp, and key circuit remove MB plugs from ORMB jacks.

MS RELAY CHAINS

7.13 At the jack, lamp, and key circuit make the first completing marker associated with the connector under test busy, by inserting an MB plug into the MMB jack.

7.14 At made-busy completing marker, block the MAK, MCK and MSK relays operated.

7.15 At connector under test, insulate contacts of MS_ relay associated with marker made busy, as indicated in Table P. Verification should be as indicated in Table P.

7.16 Verify that the MAK, MCK and MSK chain circuits for each marker in the connector under test agree with the office wiring list drawing for completing markers TXXXX-587-.

7.17 At succeeding connector (lowest preferred), insulate MS_ relay contacts 10B (AF 154 relay provided) or 6B (AF 105 relay provided) associated with the made-busy marker. Verify in connector under test, that ground is present on 9M and not on 9F (AF 154 relay provided) or on 6M and not on 6F (AF 105 relay provided). Remove insulated contacts from MS_ relays. Repeat above test for each marker in connector. At made-busy marker unblock MAK, MCK and MSK relays.

LCB LEAD GROUNDS

7.18 At jack, lamp, and key circuit make all originating registers busy associated with connector under test, by inserting MB plug into the respective ORMB.

7.19 At connector under test, block nonoperated associated CB_ relays.

7.20 Manually operate and release, in turn, TR and TRS relays in the connector control unit. Using a test receiver, verify that as each relay is operated, ground is present on terminal 43 of unit terminal strip A.

7.21 At each associated originating register frame, manually operate and release, in turn, multicontact RC relay of each assigned originating register in the connector under test.

7.22 Verify that as each relay is operated ground is present on terminal 43 of terminal strip A of marker connector under test. Remove blocks from CB_ relays.

7.23 At jack, lamp, and key circuit, remove MB plugs from ORMB jacks.

MS PREFERENCE

7.24 From traffic schematic determine preferred and alternate preferred markers for marker connector under test.

TABLE P

MS–RELAY CODE	INSULATE MS–RELAY CONTACT	CHAIN CIRCUIT TESTED	WITH CONTACTS INSULATED VERIFY FOR	
			BATTERY ON	GROUND ON
AF154	10B	MSK	10B	10F
AF154	12B	MCK	12F	12B
AF154	2B	MAK	2F	2B
AF105	6B	MSK	6B	6F
AF105	8B	MCK	8B	8F
AF105	4B	MAK	4B	4F

7.25 At marker connector under test, momentarily apply battery through a test receiver to terminal 57 of terminal strip B on marker connector control unit. Verify that the MS_ relay of preferred marker in connector under test operates momentarily.

7.26 Momentarily apply battery to terminal 58 of same terminal strip. Verify that the MS_ relay of the alternate preferred marker in connector under test operates momentarily.

7.27 In connector under test, block operated CB_ relay associated with MS_ relay of alternate preferred marker and again apply battery to terminal 58. Verify that succeeding marker MS_ relay operates momentarily.

7.28 Continue in this manner until the MS_ relay of each equipped marker in the connector has been operated from terminal 58 of the connector control unit for connector under test. MS_ relays should operate in numerical sequence of markers, returning to the MS_ relay of marker 0 after MS_ relay of highest numbered equipped marker has been tested. Unblock CB relays on completion of test.

TRANSFER START LEAD ON ALTERNATE CALLS

7.29 From traffic schematic (-240 drawing or equivalent) determine first and second choice marker assignments for ORMC under test.

7.30 At jack, lamp, and key circuit, make busy all originating registers associated with the ORMC under test, by inserting MB plugs into the respective ORMB jacks.

7.31 At the master test frame, check that none of the completing markers are made busy and operate the CMTCA and CMTCB keys to disable the associated master traffic control circuit. In the marker preference control circuit for ORMC under test, block nonoperated the first and second choice marker MS_ relays, and the TM and CA relays. Also release W and Z relays if they are operated.

7.32 In first originating register associated with ORMC under test, block operated SR and MST relays. Block nonoperated TMA relay.

7.33 In the ORMC under test, with an iron object, check for magnetic pull on the MS_ relay of the first choice marker and the absence of pull on the second choice MS_ relay. Also verify that the GT relay in the connector control circuit is operated.

7.34 Momentarily operate and release multicontact MD_ relay (R option) or MC_ (S option) in ORMC under test.

7.35 Check that W and Z relays operate and lock. Also check that magnetic pull has been transferred from first choice marker MS_ relay to second choice marker MS_ relay in preference control circuit.

7.36 Operate and release MD_ or MC_ relays of each remaining marker in connector under test. Check that W and Z relays operate and release alternately with each operation of an MD_ or MC_ relay.

7.37 Manually release W relay if it is operated at end of test.

TROUBLE RELEASE FEATURES

7.38 In preference control unit, check that MS_ relay of first choice marker in ORMC under test is energized and that ground is present on terminal strip MA, terminal 02, and no ground is present on terminal 01.

7.39 In marker connector control unit of ORMC under test, block operated TRL relay. Check that TR relay is operated and that first choice marker MS_ relay is no longer energized.

7.40 Unblock TRL relay. Check that TR1 relay operates and TR relay remains operated and that ground is present on terminal strip MA, terminal 01, and no ground is present on terminal 02.

7.41 Manually operate and release MK relay. Check that TR and TR1 relays release. Block operated Z relay and check that MS_ relay of second choice marker is energized.

7.42 Block operated TRL relay. Check that TR relay is operated and that MS_ relay of second choice marker is no longer energized.

7.43 Release and then operate and release TRL relay several times. Check that TR1 relay

operates on first release of TRL relay and that thereafter TR and TR1 relays remain operated.

7.44 Operate and release MK relay. Check that TR and TR1 relays release. At MB terminal strip of ORMC under test, momentarily apply ground through a test receiver to terminal 04. Check that TRL and MK relays in connector control operate when ground is applied.

TRANSFER START FROM TRS RELAY

7.45 Release W and Z relays in connector control circuit if operated and block operated TRS relay. Check that second choice marker MS_ relay is energized in preference control circuit.

7.46 Operate W and Z relays. Check that first choice marker MS_ relay is energized and that TM relay is not energized. Then manually operate TM1 relay.

7.47 Verify that TM1 relay locks.

7.48 Release TRS relay. Verify that TM1 relay releases and TM relay is energized.

OPERATING AND LOCKING PATHS TC AND TC1 RELAYS

7.49 Block normal W and Z relays. Manually operate and release, in turn, multicontact MC_ relay of each marker in connector. Check that TC and TC1 relays operate as each MC relay is operated.

7.50 Block operated W relay, momentarily operate TC and TC1 relays. Verify that TC relay locks and TC1 releases. Block W relay normal and Z operated, momentarily operate TC and TC1 relays.

7.51 Verify that TC1 relay locks and TC releases.

7.52 Unblock W and Z relays. Verify TC1 relay releases.

TM AND RGB LEADS

7.53 Unblock SR, MST and TMA relays in first originating register in connector under test. Check that TM relay is no longer energized and GT relay is released. Block SR and MST relays in second circuit in connector. Check that TM relay and first choice marker MS relay are energized. Also check that GT relay is operated.

7.54 Manually operate TR relay. Check that TR relay locks.

7.55 Unblock SR and MST relays. Verify that TR relay releases and TM and MS_ relays are no longer energized.

7.56 Apply above tests to each register in the marker connector under test. Unblock TM, CA, and MS_ relays in connector and preference control circuits.

BT AND MRL LEADS

7.57 Momentarily apply ground through a test receiver to marker connector multicontact relay terminal strip MC, terminal 01, for ORMC under test. Check that CA relay operates and locks.

7.58 Manually release CA relay and apply ground to terminal strip MC, terminal 12.

7.59 Check that CA relay operates and locks.

7.60 Release CA relay, block operated GT relay and check that battery is no longer present on terminal strip MC, terminals 01 and 12.

7.61 Unblock GT relay and manually operate and release MK relay. Check that GT relay operates and releases.

TRAFFIC CONTROL ORMC, IRMC, AND TRMC

A. Setup (See Fig. 2)

7.62 At master test frame jack, lamp, and key circuit, operate CMTCA and CMTCB keys. Verify that CMTCA and CMTCB lamps are lighted.

B. Frame Traffic Control FB and FB1 Leads

7.63 At connector under test block TM1 relay nonoperated, and W, Z, TC, and TM relays operated. At the master traffic control circuit, manually operate TCA relay for two seconds. (Do not keep the TCA relay operated for more than two seconds). In the connector under test, verify that FC relay operates steadily and FC1 relay does not operate at all while the TCA relay of the master

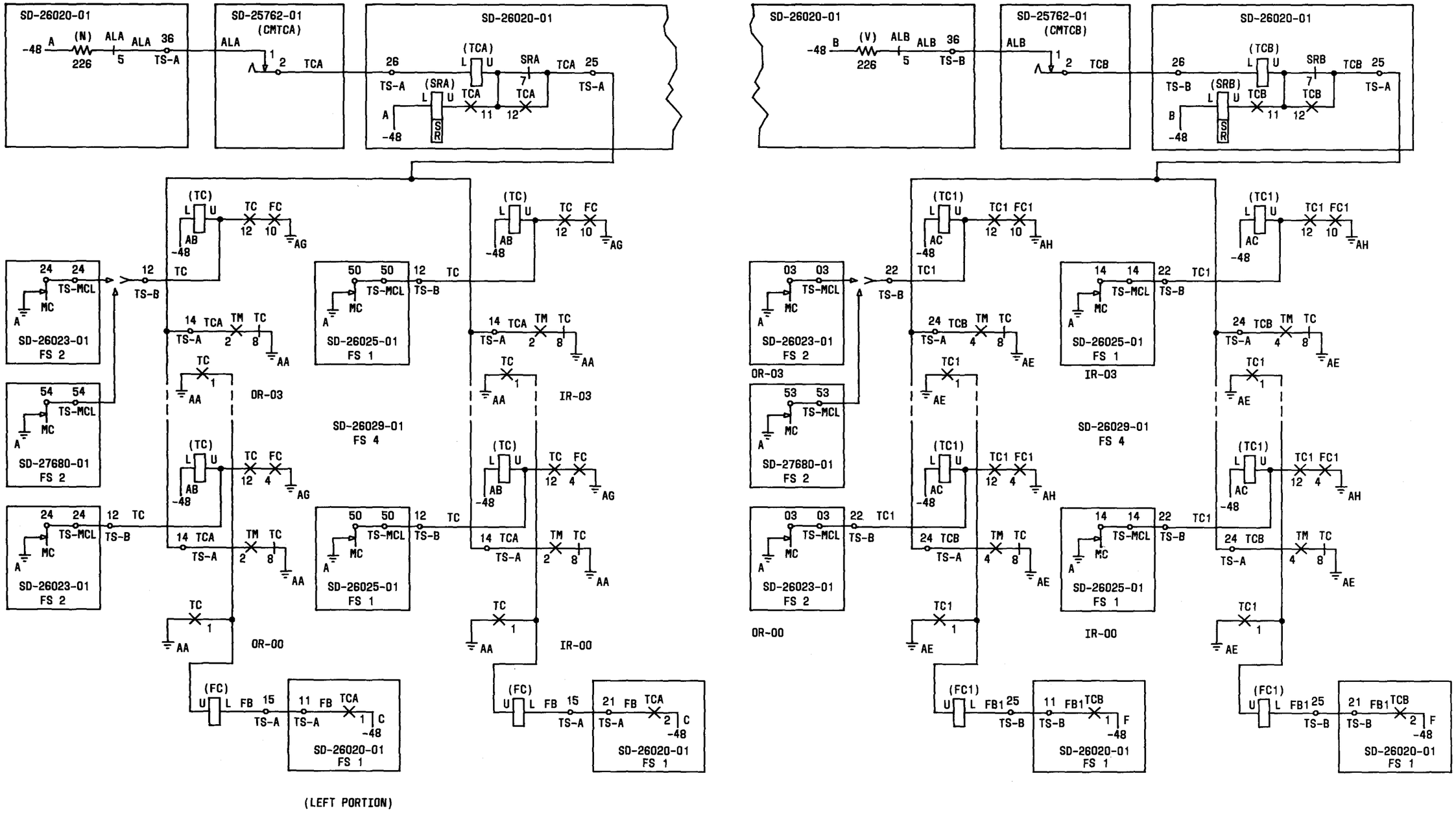


Fig. 2—Traffic Control for Originating Incoming and Transfer Register Marker Connectors

test control is manually operated. Remove block from TC relay. Change state of W and Z relay from blocked operated to blocked normal. Block TC1 relay operated. At the master traffic control circuit, manually operate TCB relay for two seconds. (Do not keep TCB relay operated for more than two seconds). In the connector under test, verify that FC1 relay operates steadily and FC relay does not operate at all while the TCB relay of the master traffic control is manually operated.

C. TCA and TCB Leads

7.64 Change state of TC1 relay from blocked operated to blocked normal. At the master traffic control circuit, apply battery for two seconds to the lower winding of TCB relay. Verify that TCB relay operates steadily while battery is applied. Apply battery to lower winding of TCA relay. Verify that TCA relay does not operate steadily while battery is applied. (TCA relay may operate intermittently while battery is applied if calls are being processed).

7.65 At connector under test, remove block from TC1 relay. Change state of W and Z relays from blocked normal to blocked operated. Block TC relay normal. At master traffic control circuit, apply battery for two seconds to the lower winding of TCA relay. Verify that TCA relay operates steadily while battery is applied. Apply battery to lower winding of TCB relay. Verify that TCB relay does not operate steadily while battery is applied. (TCB relay may operate intermittently while battery is applied if calls are being processed). At the connector under test remove blocks from W, Z, and TC relays.

D. TC, TC1 Leads

7.66 In the following test procedure, do not keep FC or FC1 relays operated for more than two seconds.

7.67 In the connector under test, block FC relay operated. Manually operate TC and TC1 relays. Verify that TC relay locks and TC1 relay does not. Remove block from FC relay, verify that TC relay releases. Block FC1 relay operated. Manually operate TC and TC1 relays. Verify that TC1 relay locks and TC relay does not. Remove block from FC1 relay, verify that TC1 relay releases.

E. CWA and CWB Leads

7.68 In the connector under test block TM1, W, and Z relays nonoperated. Block TM relay operated. At the master traffic control circuit momentarily apply battery to the lower winding of CWA relay. Verify that CWA relay operates steadily while battery is applied. Apply battery to lower winding of CWB relay, verify that CWB relay does not operate steadily while battery is applied. (CWB relay may operate intermittently while battery is applied if regular calls are in progress).

7.69 In the connector under test, change state of W and Z relays from blocked nonoperated to blocked operated.

7.70 At the master traffic control circuit momentarily apply battery to lower winding of CWB relay. Verify that CWB relay operates steadily while battery is applied. Apply battery to lower winding of CWA relay, verify that CWA relay does not operate steadily while battery is applied. (CWA relay may operate intermittently while battery is applied if regular calls are in progress).

7.71 At connector under test remove blocks from W and Z relays.

F. WCWA and WCWB Leads (Wideband)

7.72 In connector under test block operated SPLP relay.

7.73 Repeat 7.68 to 7.71 with WCWA and WCWB relays referred to instead of CWA and CWB relays.

G. IM Lead

7.74 In the master traffic control circuit, block operated IM relay. In the connector under test verify that IM relay operates. Manually operate and release in turn TC and TC1 relays. Verify that IM relay does not release. Simultaneously operate and release TC and TC1 relays, check that IM relay releases when both relays are operated.

7.75 In the master traffic control circuit unblock the IM relay and release it momentarily. In the connector under test, verify that IM relay releases when the IM relay of the traffic control circuit is momentarily released.

H. BWM Lead (Wideband)

7.76 In connector under test, operate SPLP relay. Verify that IM relay operates.

7.77 In traffic control circuit, operate BWM relay.

7.78 In connector under test, verify that IM relay releases. Release SPLP relay.

7.79 In traffic control circuit, release BWM relay.

I. Restore Circuit to Normal

7.80 In the connector under test, unblock TM and TM1 relays.

7.81 At jack, lamp, and key circuit, restore CMTCA and CMTCB keys, verify that CMTCA and CMTCB lamps are extinguished.

CALL THROUGH CONNECTOR

7.82 Operate NTTS, NTFS, TS, and FS keys to select an originating register assigned to the connector under test.

7.83 Select a line location, office code, and class of service for access to register under test. Operate remaining D to L digits, NTC, OR, RAO, MT_ (dial tone).

7.84 If test set testing is provided, release TALK key at MTF, insert hand test cord into PLS jack on test set. Patch ORT jack on test set to ORT jack on trunk test circuit, patch RC jack on test set to RC jack on MTF. For TOUCH-TONE, patch IRT jack on test set to IRT jack on MTF. At test set, place L switch to 0. Operate PB and RP keys. For dial pulse, place L switch to 1. (No keys or IRT jack necessary at test set).

7.85 At connector under test, block operated all CB_ relays associated with completing markers appearing in the connector except one.

7.86 If automatic monitor is provided, operate STT and 24 MAX keys.

7.87 For test set testing, operate STT key at test circuit. AS lamp lights.

7.88 Using 20 PPS dial pulse digits, set up on A-L keys. Verify AS lamp is extinguished and call completes without trouble record.

7.89 If automatic monitor is provided, operate ST key. Verify OK lamp lights at test frame without trouble record.

7.90 Verify that on the above call, each of the MA to MF relays equipped for the made available marker (per 7.85) operate, and the MA to MF relays for other markers do not.

7.91 Repeat above tests for each of the remaining markers in the connector under test, by manipulating the blocked CB_ relays (per 7.85) to allow each marker to be the only one available on at least one test call.

7.92 Remove blocks from CB_ relays.

7.93 At jack, lamp, and key circuit, release all originating registers assigned to the connector under test by removing MB plugs inserted in 7.30.

8. INCOMING REGISTER

8.01 Locate the following fuses and verify that the appropriate fuse alarms operate (miscellaneous circuit).

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
PF	−48V	PRTD	Frame FA—Aisle MJ
	130V	PRTD	Frame FA—Aisle MJ

8.02 Verify that all fuses appear in the fuse record book.

8.03 With the use of a volt-ohmmeter and appropriate test cords, verify the potential at the 130V and 48V test battery.

8.04 Place an operational test on the following jacks.

(a) ***SP, NN, MX, SP CAL, SP RLS And LEV CAL Jacks*** - Verify the jack multiples for continuity and absence of crosses between new frame and an existing frame.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a sample test call set up on the master test frame, verify that the white and red buttons on test cord will start and release the call respectively from the RC jack.

(d) ***Make-Busy Jack*** - At the master test center (jack bay or trouble recorder bay), insert a 322A make-busy plug into MB jack associated with register under test. Verify that MB and RB relays operate, also verify associated RB_ relays in position assigned in IRL or IRLs for that register are operated.

Momentarily move (wiggle) the resistor in the register corresponding to the operate path of the RB_ relay in the IRL. Verify that the RB_ relay does not release. Repeat test for each operated RB relay. Momentarily short the LO lead at the RP_ relay associated with the operated RB relay. Verify that only the RB relay associated with the operated RP relay releases. Repeat test for each RB relay. For each RB relay in the IRLs verify that there is an associated lead and resistor in the register.

(e) ***Incoming Register Jack*** - Using two test receivers and cords as required, verify continuity and absence of crosses in the IRT multiple.

Note: Use Fig. 147 of SD-25574-01 for numbering and location of terminals.

TRANSFER OF FILAMENT SUPPLY

8.05 (If SD-99498-01, signal receiving circuit, is provided, do not do.) Hold the transfer circuit TST key operated and verify the transfer circuit AC FAIL and TR lamps light. Failure of a TR lamp to light indicates that the associated group of 6 or less receivers, seven receivers if Fig. B is provided, have not had their filament circuits connected in series, either due to failure of a relay to operate or to an open circuit in the wiring between receivers. The office alarms operate. Operate ALM CO key. Observe that the filaments in associated MF receiver are lighted. Locate the ac supply fuse and verify that this will transfer to the essential service.

8.06 Release the transfer circuit TST key. The AC FAIL, DC, PWR, and TR lamps are extinguished and the associated receiver heater circuits again operate from ac power.

PLANT REGISTERS

8.07 Plant registers listed in the following paragraphs are located in the MTF recorder plant register cabinet. Repeat tests, as applicable on each added circuit.

A. Transfer Register Reorder Registers (Centrex)

8.08 Record the reading of the TRR0, TRR1, and TRR2 plant registers. In unison, momentarily manually operate and release ON and RO relays in transfer register under test.

8.09 Plant register assigned to transfer register group associated with transfer register under test should score once for each operation of ON and RO relays.

B. FSP Receiver Registers SD-27625-01

8.10 Record readings of R1F and R2F plant registers associated with receivers to be tested.

8.11 Manually operate and release RR relay. The R1F register should score only once when RR relay is operated and released.

8.12 Manually operate and release ATC relay. The R2F register should score only when RR relay is operated and released.

TRAFFIC REGISTERS

8.13 With the use of the telephone company traffic register assignment list, verify the operation of the proper traffic register.

8.14 Table Q provides the traffic register operation lead, its terminal strip terminal, and relay contacts. A continuity test to the traffic register circuit should locate most troubles.

A. (PS), (PD), and (PD1) Registers for DP & MF Incoming Registers

Note: Apparatus Fig. 7 is required in the MF register, SD-26042-01, and the DP register SD-26041-01, for this test.

8.15 In the MF or DP register under test, block normal MST relay. If the register under test is MF, block operated TOL, TM1, and AS relays. If the register under test is DP, block operated TMB, TOL, and AS relays.

8.16 Manually operate and release TM relay (RO in SD-26041-01) of the register several times. Verify that each time TM or RO relay is operated and released, the assigned PS traffic register scores once.

8.17 Unblock AS relay.

8.18 Manually operate and release TM or RO relay several times. Verify that each time the relay is operated and released the assigned PD traffic register scores once.

8.19 If the register under test is MF, unblock all relays.

8.20 If DP incoming register is equipped for CAMA operation, repeat the test with TMA and CAMA0 or CAMA1 relays blocked operated. Verify that each time RO relay is operated, the traffic register associated with PDI lead operates. Unblock all relays.

B. PC for FSP Register

8.21 Manually operate ON1 relay with CK relay nonoperated. Associated traffic register scores.

TUR ASSIGNMENT

8.22 Check assignment of RB and RBM leads to TUR per 526 Wire Assignment Chart or 430 drawing.

INCOMING REGISTER RS CHAIN

8.23 Make-busy all registers in IRMC, associated with register under test, at the jack, lamp, and key circuit. Block all CB_ relays operated

TABLE Q

TRAFFIC REGISTER DESCRIPTION

SCHEMATIC	TYPE DESIG.	REGISTER	LEAD	FRAME	TS	TERM	RELAY	CONTACT
26041-01	PC TR—PS	Inc. Reg Perm Signal	PS	TR	MA	24	AS	12M
	PC TR PD	Inc. Reg Partial Dial	PD	TR	MA	14	AS	12B
	PC TR PD1	Inc. Reg CAMA	PD1	TR	MA	34	CAMA	9
26042-01	PC IR PS	Inc. Reg Perm Signal	PS	IR	MA	24	AS	6M
	PC IR PD	Inc. Reg Partial Dial	PD	IR	MA	14	AS	6B
27625-01	PC IR PC	Inc. Reg Peg Count	PC	IR	C	33	CK	8

(PS) (PD) and (PD1) Registers for DP & MF Inc. Registers

Note: Apparatus Fig. 7 is required in the MF register, SD-26042-01 and the DP register SD-26041-01 for this test.

and TM relay nonoperated in IRMC associated with register under test.

8.24 Block operated TC2 (MF) or TC1 (RP) relay in register under test. RS, RA, RB, RD, RE, and RF relays, as provided, operate for register under test.

8.25 At register directly preceding register under test, in the IRMC chain, block operated TC2 (MF) or TC1 (RP) relay, verify that RS, RA, RB, RC, RD, RE, and RF relays, as provided, do not operate for this register.

8.26 Release TC2 or TC1 relay in register under test. Verify that this registers RS and R_ relays release, and RS and R_ relays for preceding register in chain operate.

8.27 At register under test, block operated TC2 (MF) or TC1 (RP) relay. Verify that the registers RS relay operates and the R_ relays do not operate.

8.28 Release TC2 or TC1 in register preceding register under test. Verify that this register RS and R_ relays release and R_ relays for register under test operate.

8.29 At register succeeding register under test, in the IRMC chain, block operated the TC2 (MF) or TC1 (BP) relay. Verify that the RS relay operates and the R_ relays do not operate for this register.

8.30 Release TC2 or TC1 relay in register under test. Verify that the R_ relays in the succeeding register operate and RS and R_ relays in register under test release.

8.31 Operate the TC2 (MF) or TC1 (RP) relay in register under test. Verify that RS and R_ relays for register under test do not operate.

8.32 Release all blocked relays and made-busy registers at jack, lamp, and key circuit.

REGISTER IRL CHAIN

8.33 Make register under test busy at jack, lamp, and key circuit. At register under test, block nonoperated relays TC2, RLK, CK, H, and TRL. Apply ground to terminals as follows: (C-12 for the RP) (D-45 for MF) and (B-45 for DP). From Fig. 3, 4, 5, and 6 determine with what type of IRL arrangement the register under test is associated. Also, determine what level in the selected figure the register under test is assigned.

8.34 Using the Table on the figure selected, determine that the correct potential is present at the first appearance in the RP chain circuit for the following:

Lead LK - Battery
Lead BL - Ground
Lead B - Battery
Lead TF - Ground
Lead SM - Battery
Lead LO - Ground

8.35 Insulate the corresponding contact for the lead under test of the first RP relay in the chain. Verify potential is removed from the succeeding RP relay contact in the chain. Remove insulator from first RP relay contact. Verify potential is present on the contact of succeeding RP relay in the chain.

8.36 Repeat the preceding procedure sequentially for each RP relay in the chain. Repeat for each lead through the RP chain for register under test. Remove all blocking tools and ground straps, and restore register to service.

IDENTIFICATION VIA CONNECTOR

8.37 This test is intended to check the FR, CN, and RG leads to the trouble recorder via the incoming register marker connector.

8.38 At the incoming register under test, hold TC2 relay operated until the trouble recorder delivers a card.

8.39 The card punches should indicate the correct connector frame, connector and register number as follows:

IRMC Frame No. FR (0-2)
Connector No. CN (0-3)
Register No. RG (1-19)

IDENTIFICATION VIA MONITOR

8.40 At the incoming register to be tested, block M relay operated.

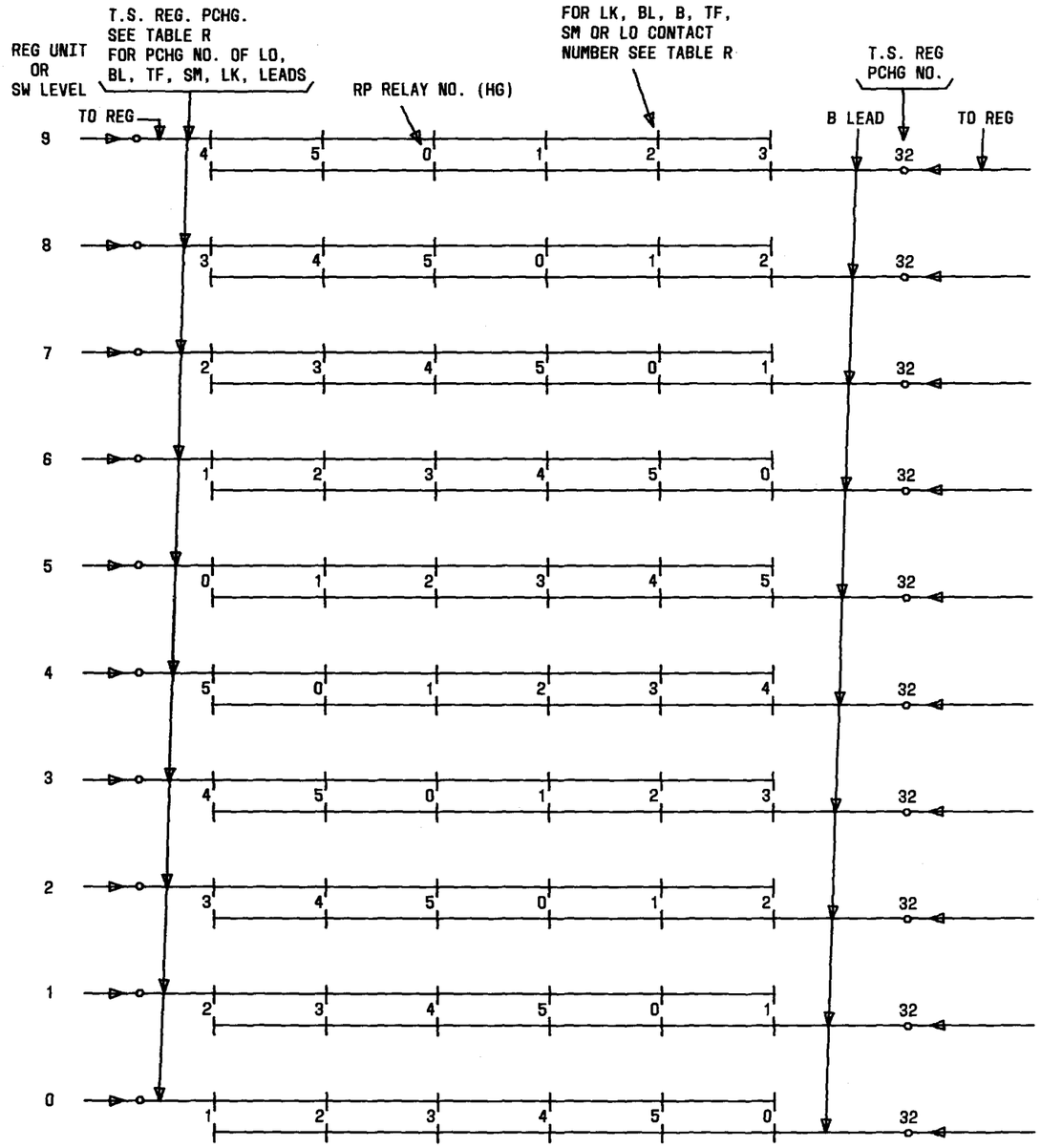


TABLE R

LEAD	T.S. REG. PCHG NO	RP RELAY CONTACT
LK	30	2
BL	31	4
B	32	6
TF	33	8
SM	34	10
LO	35	12
→ ←	DENOTES ORDER OF PREFERENCE	

Fig. 3—RP Relay Preference Chains, One IRL Frame, Six HG

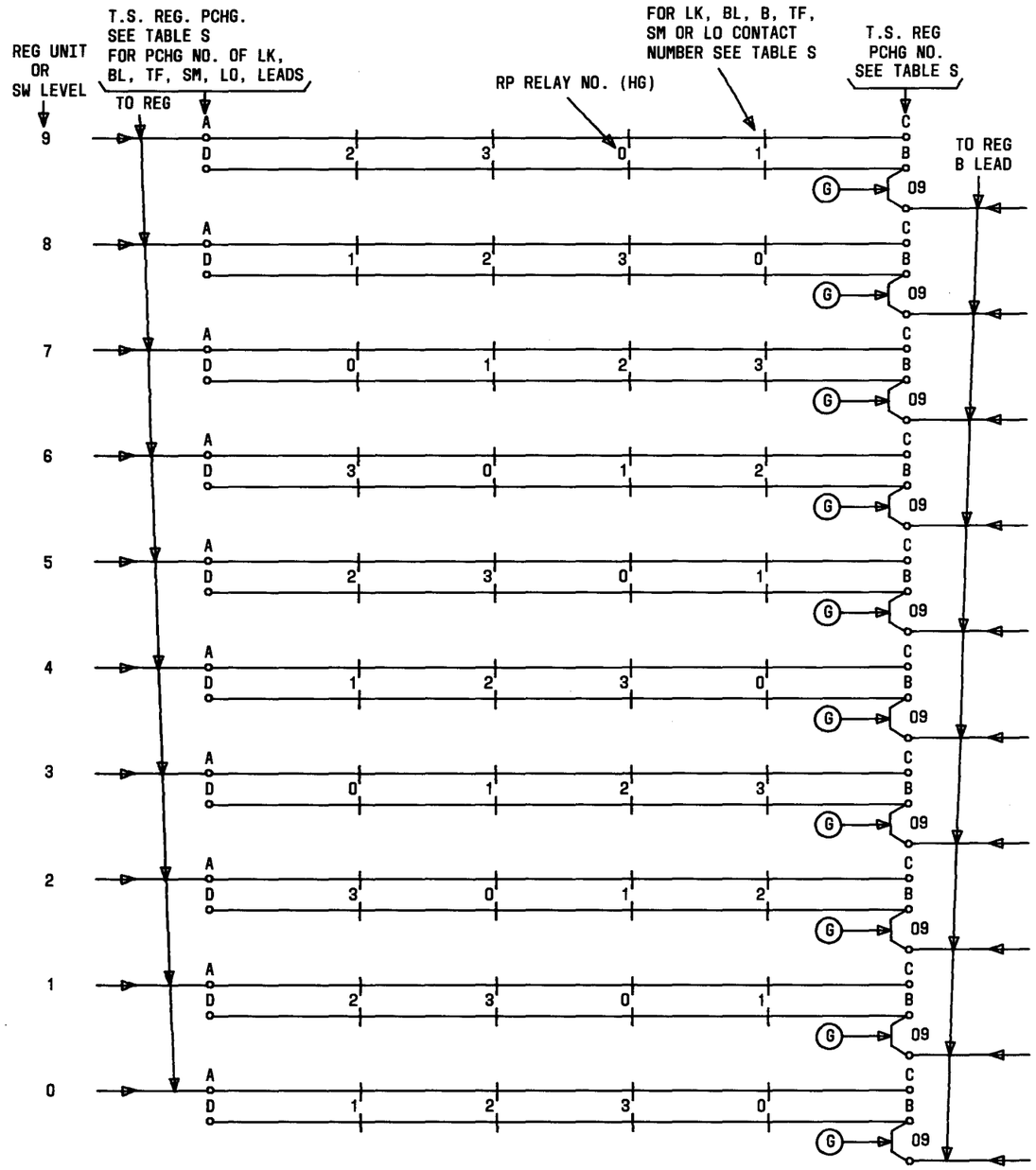


TABLE S

LEAD	T.S. REG. PCHG NO				RP RELAY CONTACT
	A	B	C	D	
LK	30		20		2
BL	31		21		4
B		22		32	6
TF	33		23		8
SM	34		24		10
LO	35		25		12
→ ←	DENOTES ORDER OF PREFERENCE				

Fig. 4—RP Relay Preference Chains, One IRL Frame, Four HG

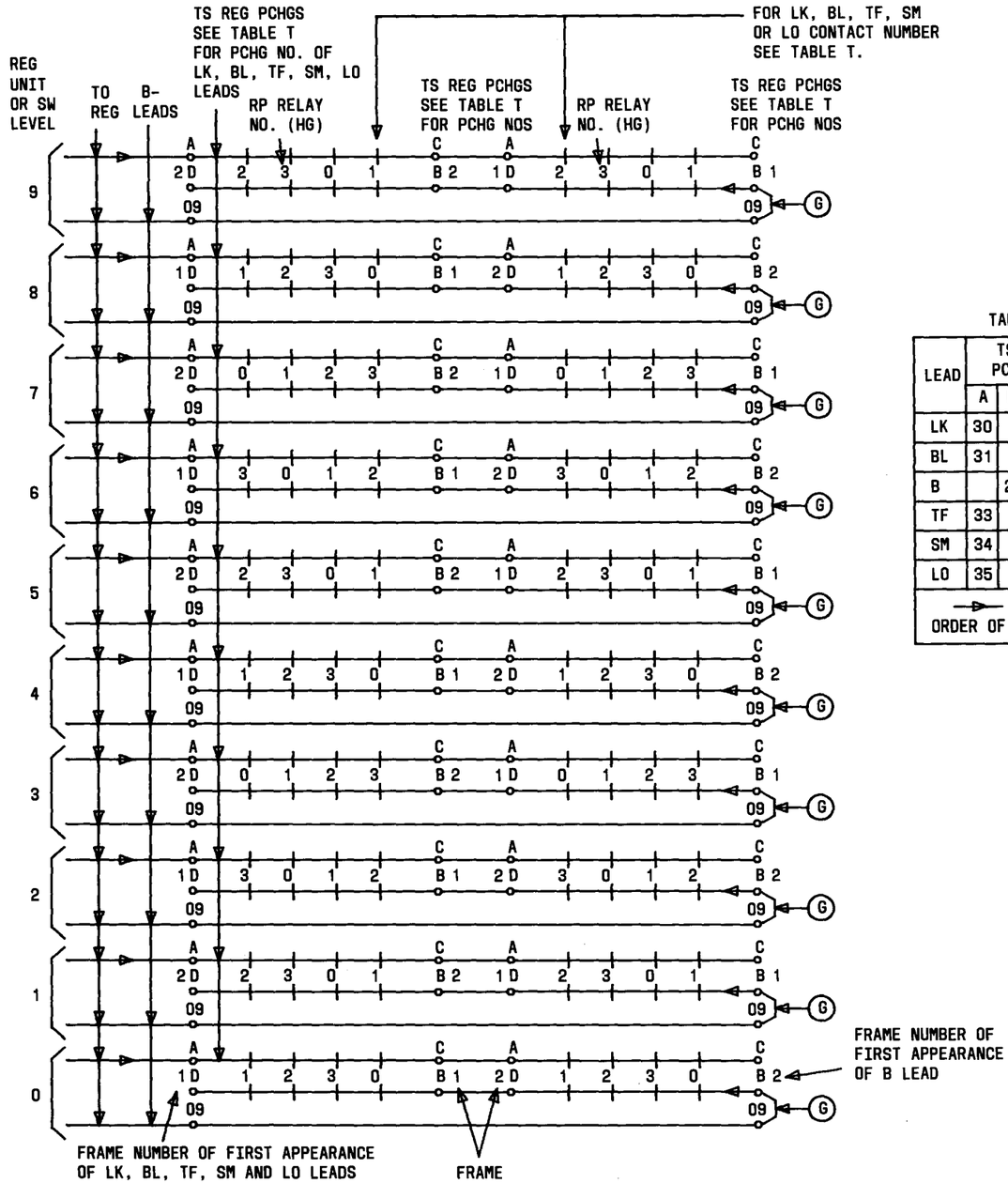


TABLE T

LEAD	TS REG PCHG NO.				RP REL CONT
	A	B	C	D	
LK	30		20		2
BL	31		21		4
B		22		32	6
TF	33		23		8
SM	34		24		10
LO	35		25		12

→ DENOTES ORDER OF PREFERENCE

Fig. 5—RP Relay Preference Chains, Two IRL Frames, Four HG

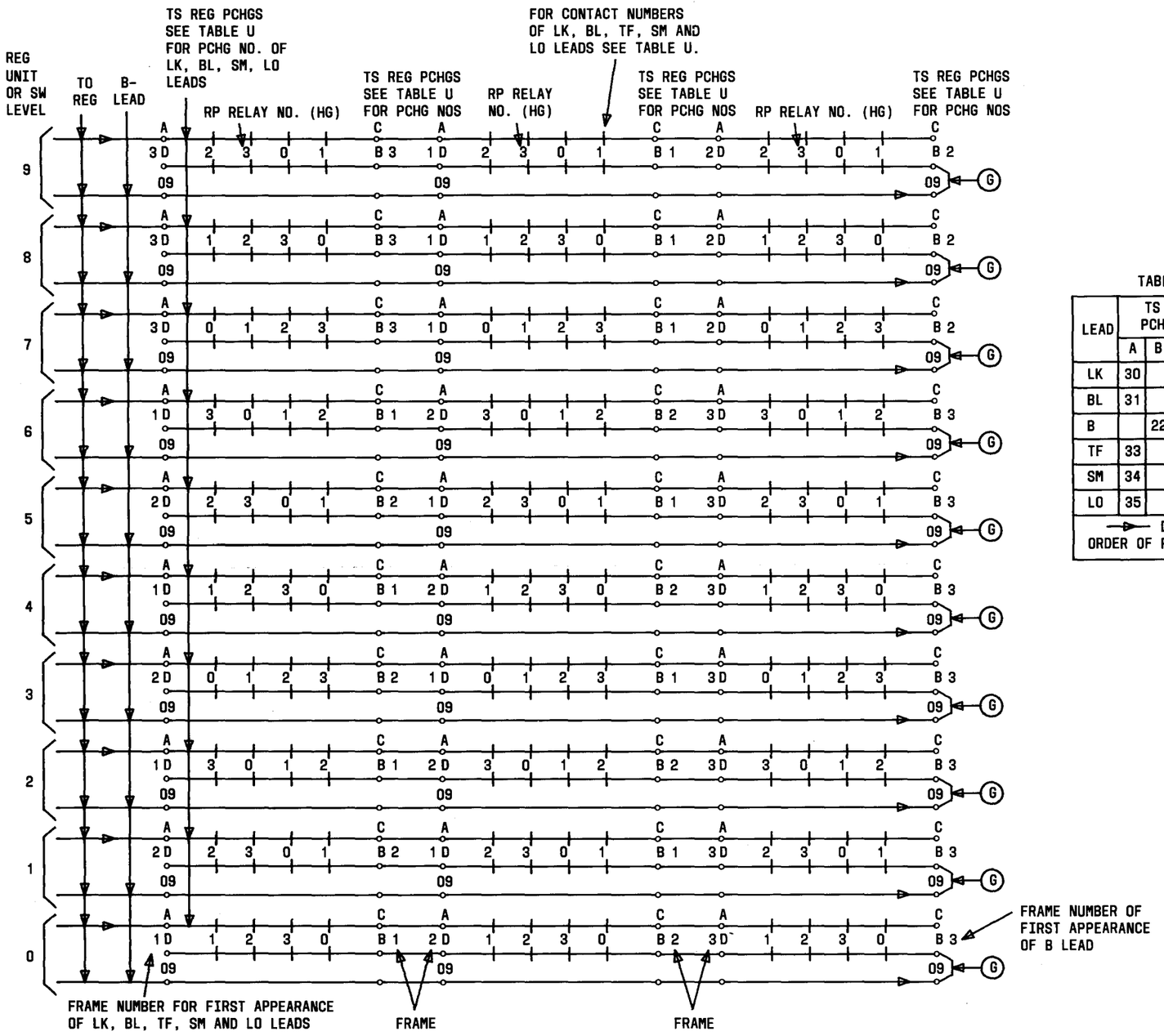


TABLE U

LEAD	TS REG PCHG NO.				RP REL CONT
	A	B	C	D	
LK	30		20		2
BL	31		21		4
B		22		12	6
TF	33		23		8
SM	34		24		10
LO	35		25		12

→ DENOTES ORDER OF PREFERENCE

Fig. 6—RP Relay Preference Chains, Three IRL Frames, Four HG

8.41 At automatic monitor block operated MCA relay.

8.42 Momentarily operate TRRI relay in automatic monitor until trouble record is taken.

8.43 The card punches should indicate the correct connector frame, connector and register number as follows:

IRMC Frame No. FR (0-2)
Connector No. CN (0-3)
Register No. RG (0-19)

CHECK OF TIME-OUT ALARMS

8.44 Check the time-out alarms as follows:

INC Register			Operate — Release			
	(DP)	26041-01	TM	—	10-20 Sec. R-S-TOA and Register TO Lamp Major Alarm	Insert MB plug In IRMB Jack Below Lighted TO Lamp or Verify R-S-TOA Lamp Extinguished
	(MF)	26042-01	TM	RO		
	(RP)	26043-01	TM			
	4W	26045-01	TM	RO		
	(FSP)	27625-01	TM	RO		
	(TR)	27667-01	TM	—		

INCOMING REGISTER GROUP BUSY

8.45 At jack, lamp, and key circuit, operate RDA key. Insert MB plugs into all jacks for incoming registers in associated group. (See Note in 8.48)

8.46 Verify that minor alarm sounds and the IRGB lamp lights.

8.47 At jack, lamp, and key circuit, remove MB plug from IRMB jack of register under test. Momentarily operate TRAR key and verify that the minor alarm is silenced and the IRGB_ lamp is extinguished.

8.48 Remove all MB plugs from IRMB jacks.

Note 1: If registers cannot be made busy because of traffic considerations, the GB lead can be buzzed from one register to another. Ground should be on last register in connector only. Place ground at first register to verify IRGB lamp extinguished after buzzing chain.

INCOMING REGISTER IDENTIFICATION LAMP

8.49 Make register busy at jack, lamp, and key circuit. Manually operate TC1 (RP) or TC2 (MF) relay in register under test. Verify that the incoming register position lamp lights (IRP_) in the jack, lamp, and key circuit corresponding to the register's position number in the incoming register marker connector chain. Restore register under test to service.

INCOMING REGISTER LINK IDENTIFICATION

8.50 Make register busy at jack, lamp, and key circuit.

A. Wire Spring IRL

8.51 At the basic IRL associated with register under test, short contacts 3F with 3M and 9F with 9M of the horizontal group RPO relay for register under test. At register under test, hold relay TC1 (RP) or TC2 (MF) operated until the trouble recorder delivers a card. The card punches should indicate RPO and RPB. Repeat test for horizontal group relays RP1, RP2, and RP3. Verify card punch indicates RP1, RP2, and RP3, with RPB respectively. Repeat the tests on the 1st and 2nd auxiliary IRL frames with the same results, except in place of RPB punches, RPAB and RPSA will be perforated for 1st and 2nd auxiliary IRL frames.

B. U and Y Type IRL

8.52 At the basic IRL associated with register under test, apply ground to 12T of the RPO relay associated with register under test. Trouble record card taken. Release ground. Verify that the punches on the trouble record card indicate RPO and RPB.

8.53 Repeat test for RP1 through RP4. Verify that punches indicate RP1 through RP4 and RPB respectively.

8.54 Repeat test for auxiliary IR. Same verification as above except RPAB is perforated instead of RPB.

8.55 Release register under test.

BASIC TEST CALL

A. Automatic Monitor Provided

8.56 Operate IR, IC_, A-K, SST, MAC, IRG_, SRS, and TCL_ keys. If by-link operation, operate BL key. If DP operation, operate 24 MAX key.

8.57 Operate ST key. Verify OK lamp lights.

B. Test Set Testing Provided

8.58 Patch IRT JK of test circuit to IRT jack of test box. Operate IR, TCL_, IRG_, ITRR, and SRS keys (if equipped).

8.59 If dial pulse operation, set L switch to 8. Operate STT key. Using 20 PPS key, dial maximum digits A-L as required for class selected. Verify trouble record card indicates the number dialed. If MF pulse operation, set L SW to OFF. Operate MF key and set MFL SW to MAX L. Operate STT key. Depress KP button, followed by A-L buttons as required for maximum digits corresponding to class selected, followed by ST button. Verify trouble record agrees with digits pulsed.

8.60 If RP operation, operate RP key. Operate STT key. Dial digits 4-3-4-9-9 followed by SF 1A key. Verify trouble record shows A-9, B-9, C-9, and D-9 for called number.

8.61 Repeat 8.56 to 8.60 as provided. Verify that the TM relay operates in the associated IRMC for the register under test when the register calls for a marker.

OPERATION TEST

8.62 After all preceding tests have been performed and the register is in satisfactory working condition, place the register in service and perform the following test.

8.63 At the IRL frame, block operated all RB_ relays except one for a particular horizontal group and for register under test. Block the remaining RB relays operated for all other registers and in the same horizontal group. Allow two calls to complete through the normal RB relay. Verify no trouble records and no delays in connection.

8.64 Repeat this test for each horizontal group.

9. INCOMING REGISTER LINK

9.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
PF	—48V	Frame	FA—Aisle MJ
	—48V		

9.02 Verify that all fuses appear in the fuse record book.

9.03 With the use of a volt-ohmmeter and appropriate test cords, verify the potential at the 48V test battery.

9.04 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle of MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on test cord will start and release the call respectively from the RC jack.

TP CHAIN AND RP, RB RELAYS

9.05 Block operated each RB relay associated with horizontal group under test.

9.06 At horizontal group 0 on IRL under test, place test pick battery on lower winding of TP00. Verify TP00 operates. Using a second test pick place battery on lower winding of TP01. Verify TP01 does not operate. Remove test pick battery from TP00. Verify TP00 releases and TP01 operates. Replace test pick battery to lower winding of TP00. Verify TP00 operates and TP01 remains operated. Remove test pick battery from lower winding of TP00. Verify TP00 releases. Place test pick battery on lower winding of TP02. Verify TP02 does not operate. Remove test pick battery from TP01. Verify TP01 releases and TP02 operates. Replace test pick battery to lower winding of TP01. Verify TP01 operates and TP02 remains operated. Remove test pick battery from lower winding of TP01. Verify that TP01 releases. Repeat sequence of tests for each TP02 through TP19 or TP39. Repeat test (9.05 and 9.06) for each equipped horizontal group of IRL under test.

9.07 If IRL frame is arranged for 160 trunk capacity, place battery on 9 fixed of the highest equipped relay (TP19 without supplementary switches or TP39 with supplementary switches). If IRL frame is arranged for 120 trunk capacity, place battery 8 fixed of TP19 in horizontal group under test. If horizontal group under test is not arranged for by-link operation, manually operate the TP (19) (39) relay in the group. Verify that this relay locks operated. Manually operate the next lower TP (18) (38) relay. Verify that this relay does not lock operated. Manually release the highest TP (19) (39) relay. Manually operate the next lower TP (18) (38) relay. Verify that this relay locks operated. Manually operate the highest TP (19) (39) relay. Verify that the lower relay releases and the highest relay locks operated. Release the highest TP (19) (39) relay. Repeat this sequence of tests for each TP relay in the horizontal group in decending order. If horizontal group is arranged for by-link operation, verify that battery is present on 8 fixed of TP18 and TP17. Manually operate TP19. Verify that battery is removed from 8 fixed of TP18 and TP17. Release TP19. Verify that battery is present on 8 fixed of TP17 and TP16. Manually operate TP18. Verify that battery is removed from 8 fixed of TP17 and TP16. Release TP18. Repeat above sequence of tests in decending order for each TP relay in horizontal group. Repeat test for each equipped horizontal group. Remove battery from 8 or 9 fixed of TP_ relay.

9.08 Strap ground to 2 fixed of the TP (19) (39) relay. Verify that ground is present on 1, 2, 3, 4, 6, and 11 fixed of each TP relay in the horizontal group under test. Verify that ground is not present on 1, 2, 3, 4, 6, and 11 make of TP relay.

9.09 Remove ground strap from 2 fixed of TP (19) (39) relay. Repeat above test on each equipped horizontal group of IRL under test.

9.10 Strap ground to 10 fixed of TP (19) (39) relay. Verify that no hold magnets operate. Operate the highest TP (19) (39) relay. Verify that only the corresponding hold magnet operates. Operate the next lower TP (18) (38) relay. Verify that nothing happens. Release TP (19) (39) relay. Verify the corresponding hold magnet to TP (19) (39) releases and corresponding hold magnet to TP (18) (38) operates. Repeat above in decending order verifying the proper hold magnets operate and release. (TP00 for horizontal group 0 on basic frame is a test vertical and the corresponding hold magnet will not operate.) Remove ground strap from TP relay.

9.11 Repeat preceding test for each horizontal group in IRL under test. Remove blocking tools from RB_ relays.

9.12 If IRL frame is an addition to an existing IRL link group, certain leads may be cabled between IRL frames prior to performing this test. If this is true, 9.12 should be performed during a very light traffic period, or 9.15 should be used if this test must be performed during busy traffic periods.

9.13 Block the corresponding RP relays nonoperated for the horizontal group under test. Block operated the highest TP (19) (39) relay in the associated horizontal group. With a metal object, verify that the preferred RP relay is energized. Momentarily operate the RB relay associated with the energized RP relay. Verify that the RB relay locks operated and the second preferred RP relay is energized. Momentarily operate the RB relay associated with the energized RP relay. Verify that the RB relay locks operated and the third RP relay is energized. Refer to Tables W or X for sequence of RP and RB relays. Repeat this procedure until the last RB relay in the chain is operated. At the momentary operation of the last RB relay, verify that all preceding operated RB relays release and the last RB relay in the chain locks operated. Remove blocks from TP and RP relays.

9.14 Repeat test for each equipped horizontal group on the IRL under test.

9.15 Block the corresponding RP relays nonoperated for the horizontal group under test. Block nonoperated RB relays for horizontal group under test. Block operated the highest TP (19) (39) relay in the associated horizontal group. With a metal object, verify that the preferred RP relay is energized. Momentarily operate the RB relay associated with the energized RP relay. Verify that the RB relay locks operated. Block that RB relay operated. Verify that second preferred RP relay is energized. Momentarily operate RB relay associated with the energized RP relay. Verify that RB relay locks operated. Block that RB relay operated. Verify the third RP relay is energized. Refer to Tables W or X for sequence of RP and RB relays. Repeat the above procedure until the last RB relay in the chain is operated. Just prior to operating the last RB relay, remove blocking tool from all RB relays. At the momentary operation of the last RB relay, verify that all preceding operated RB relays release and the last RB relay in the chain locks operated. Remove blocks from TP and RP relays. Repeat the above test for each equipped horizontal group on the IRL under test.

C AND CA RELAY

9.16 Using test picks verify that battery is not present on any of the fixed contacts of each C_ and CA_ relay for one equipped register. At horizontal group 0 register 0 insulate all contacts of C0 and CA0 if equipped. Block operated C0 and CA0 relays for register 0. Make register busy associated with operated C0 relay. Remove insulation from C0 contact 1 for the TF0 lead. Verify battery is present on C0 relay fixed contact 1 for each equipped register. Also verify that battery is not present on any of the other C0 relay fixed contacts 2 through 24 for each equipped register. Remove insulation from C0 contact 2 for the TF1 lead. Verify battery is present on C0 relay fixed contact 2 for each equipped register. Also verify that battery is not present on any of the other C0 relay fixed contacts 3 through 24 for each equipped register. Repeat the preceding sequence of tests for each contact of the C0 relay. Use Table V as a guide for the leads under test. C relay terminals 11 and 12 may or may not be assigned; therefore, battery may or may not be present. Also, terminals 13 through 23 will only have battery for those class leads which are assigned in the particular register associated with the link under test. Terminal 24 will not have battery but will be grounded when insulator is removed and it will appear at each registers C relay. If CA relays are furnished, remove insulation from contact 1 of CA0 relay. Verify battery is present on 1 fixed of the CA0 relay for each equipped register, and battery is not present on CA0 relay contacts 2 through 12. Repeat the same procedure for the CA0 relay as was done for the C0 relay. Remove blocking tools from C0 and CA0 relays. Repeat test for each horizontal group C_ and CA_ relays for register 0. Remove blocking tool from IR used in test.

RB OPERATING PATH

9.17 At the master test jack, lamp, and key circuit, insert a make-busy plug into the MB jack associated with the first register on the IRL under test. Verify that the associated RB relays operate in the IRL under test. Momentarily move (wiggle) the resistors in the register corresponding to the operate path of RB relays unless new short ceramic resistors are provided. Verify that the RB relays do not release. Momentarily short the L0 leads (12 fixed to 12 make) of the RP relays associated with the operated RB relays. Verify that only the RB relays release associated with the shorted RP relay. Repeat test for each equipped incoming register assigned to the IRL under test.

TABLE V

(C) RELAY			
TERM	LEAD	TERM	LEAD
12	*	24	FG—
11	*	23	CL10
10	TF9	22	CL9
9	TF8	21	CL8
8	TF7	20	CL7
7	TF6	19	CL6
6	TF5	18	CL5
5	TF4	17	CL4
4	TF3	16	CL3
3	TF2	15	CL2
2	TF1	14	CL1
1	TF0	13	CL0

(CA) RELAY REGISTERS WITH TRUNK NO.s ONLY				
TERM	LEAD		TERM	LEAD
12	LT*			
11	LT**	*LT0	for	CA0, 5
10	LU9	LT2	for	CA1
9	LU8	LT4	for	CA2
8	LU7	LT6	for	CA3
7	LU6	LT8	for	CA4
6	LU5	**LT1	for	CA0, 5
5	LU4	LT3	for	CA1
4	LU3	LT5	for	CA2
3	LU2	LT7	for	CA3
2	LU1	LT9	for	CA4
1	LU0			

* Mixed (by-link and direct pulse) link groups and/or link group serving trunk numbers lead will be DPG or BLG for mixed link group and REG or REG1 or SUP or SUP1 for trunk number horizontal groups.

TABLE W

REGISTER UNIT PREFERENCE OF EACH HORIZONTAL GROUP – 160 TRUNK IRL											
HOR. GRP. NO.	RP & RB REL. NO.	ORDER OF PREFERENCE REGISTER UNIT NO.									
3	3	3	7	0	4	8	1	5	9	2	6
2	2	2	6	3	7	0	4	8	1	5	9
1	1	1	5	9	2	6	3	7	0	4	8
0	0	0	4	8	1	5	9	2	6	3	7

TABLE X

REGISTER UNIT PREFERENCE OF EACH HORIZONTAL GROUP – 120 TRUNK IRL											
HOR. GRP. NO.	RP & RB REL. NO.	ORDER OF PREFERENCE REGISTER UNIT NO.									
5	5	5	0	6	1	7	2	8	3	9	4
4	4	4	5	0	6	1	7	2	8	3	9
3	3	3	9	4	5	0	6	1	7	2	8
2	2	2	8	3	9	4	5	0	6	1	7
1	1	1	7	2	8	3	9	4	5	0	6
0	0	0	6	1	7	2	8	3	9	4	5

REGISTER IRL CHAIN

9.18 Make busy first register assigned to IRL. At the made-busy register, block nonoperated TC2, RLK, CK, H, and TRL relays. Apply ground to terminals as follows: C-12 for the RP, D-45 for the MF, and B-45 for the DP. From Fig. 7, 8, 9, and 10, determine with what type of IRL arrangement the made-busy register is associated. Using the Table on the figure selected, determine that the correct potential is present at the first appearance in the RP chain circuit for the following:

Lead LK - Battery
Lead BL - Ground
Lead B - Battery
Lead TF - Ground
Lead SM - Battery
Lead LO - Ground

9.19 Insulate the corresponding contact for the lead under test of the RP relay in the chain. Verify potential is removed from the succeeding RP relay contact in the chain. Remove insulator from first RP relay contact. Verify potential is present on the contact of succeeding RP relay in the chain. Repeat the procedure sequentially for each RP relay in the chain. Repeat for each lead through the RP chain for register under test. Remove all blocking tools and ground straps and restore register to service. Repeat for each register assigned to IRL under test.

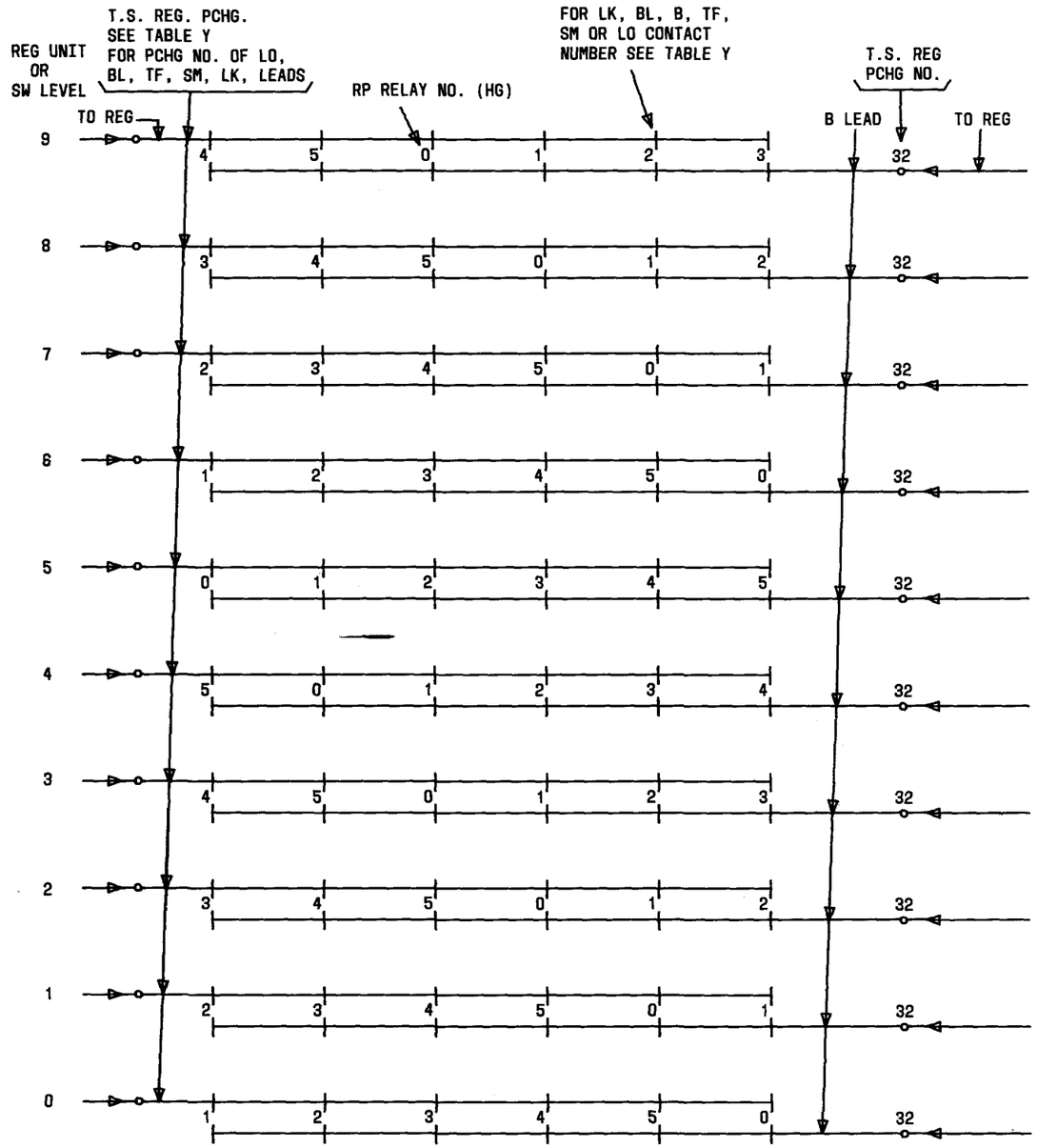


TABLE Y

LEAD	T.S. REG. PCHG NO	RP RELAY CONTACT
LK	30	2
BL	31	4
B	32	6
TF	33	8
SM	34	10
LO	35	12
→ ←	DENOTES ORDER OF PREFERENCE	

Fig. 7—RP Relay Preference Chains, One IRL Frame, Six HG

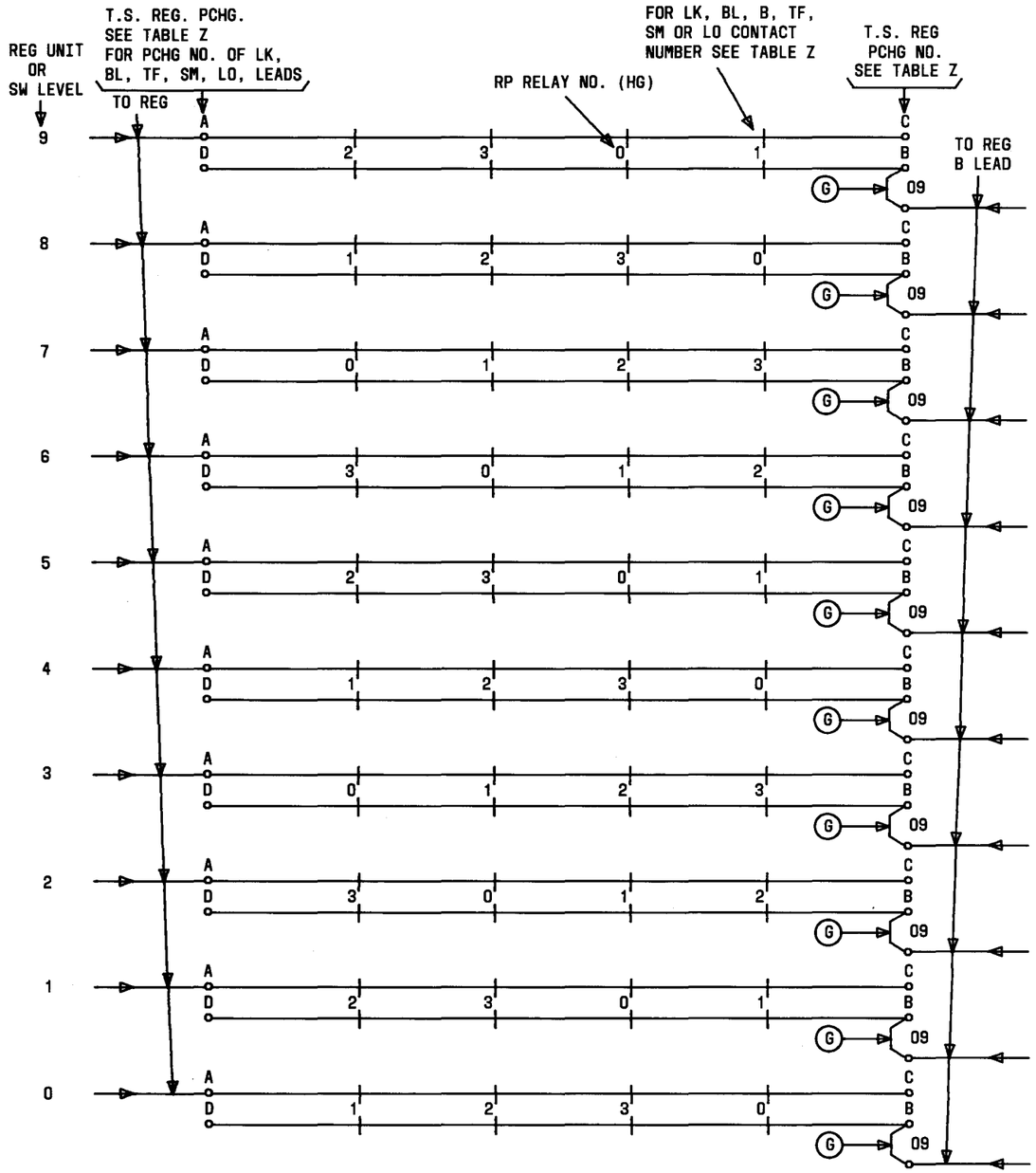


TABLE Z

LEAD	T.S. REG. PCHG NO				RP RELAY CONTACT
	A	B	C	D	
LK	30		20		2
BL	31		21		4
B		22		32	6
TF	33		23		8
SM	34		24		10
LO	35		25		12

→ ← DENOTES ORDER OF PREFERENCE

Fig. 8—RP Relay Preference Chains, One IRL Frame, Four HG

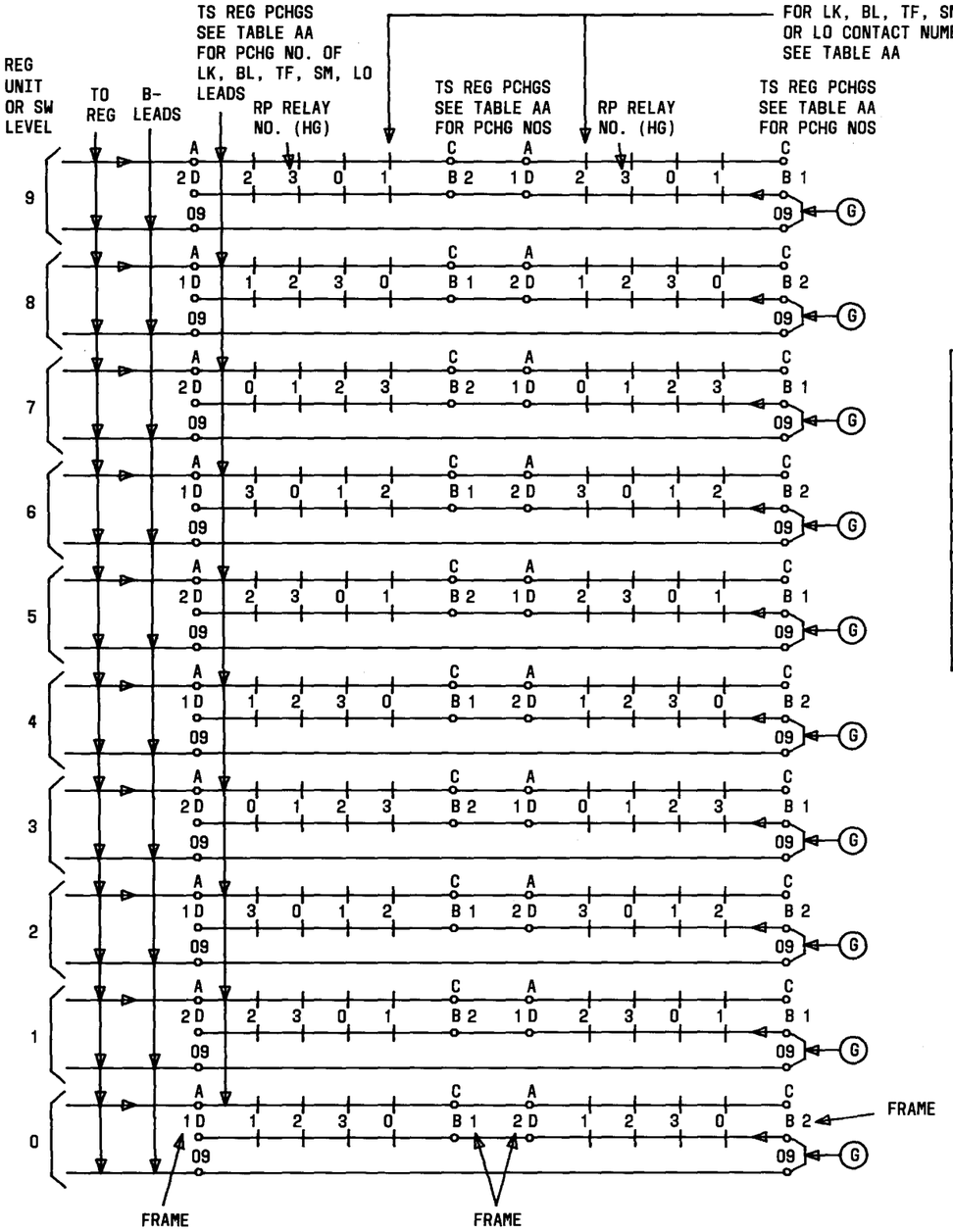


TABLE AA

LEAD	TS REG PCHG NO.				RP REL CONT
	A	B	C	D	
LK	30		20		2
BL	31		21		4
B		22		32	6
TF	33		23		8
SM	34		24		10
LO	35		25		12

→ DENOTES ORDER OF PREFERENCE

Fig. 9—RP Relay Preference Chains, Two IRL Frames, Four HG

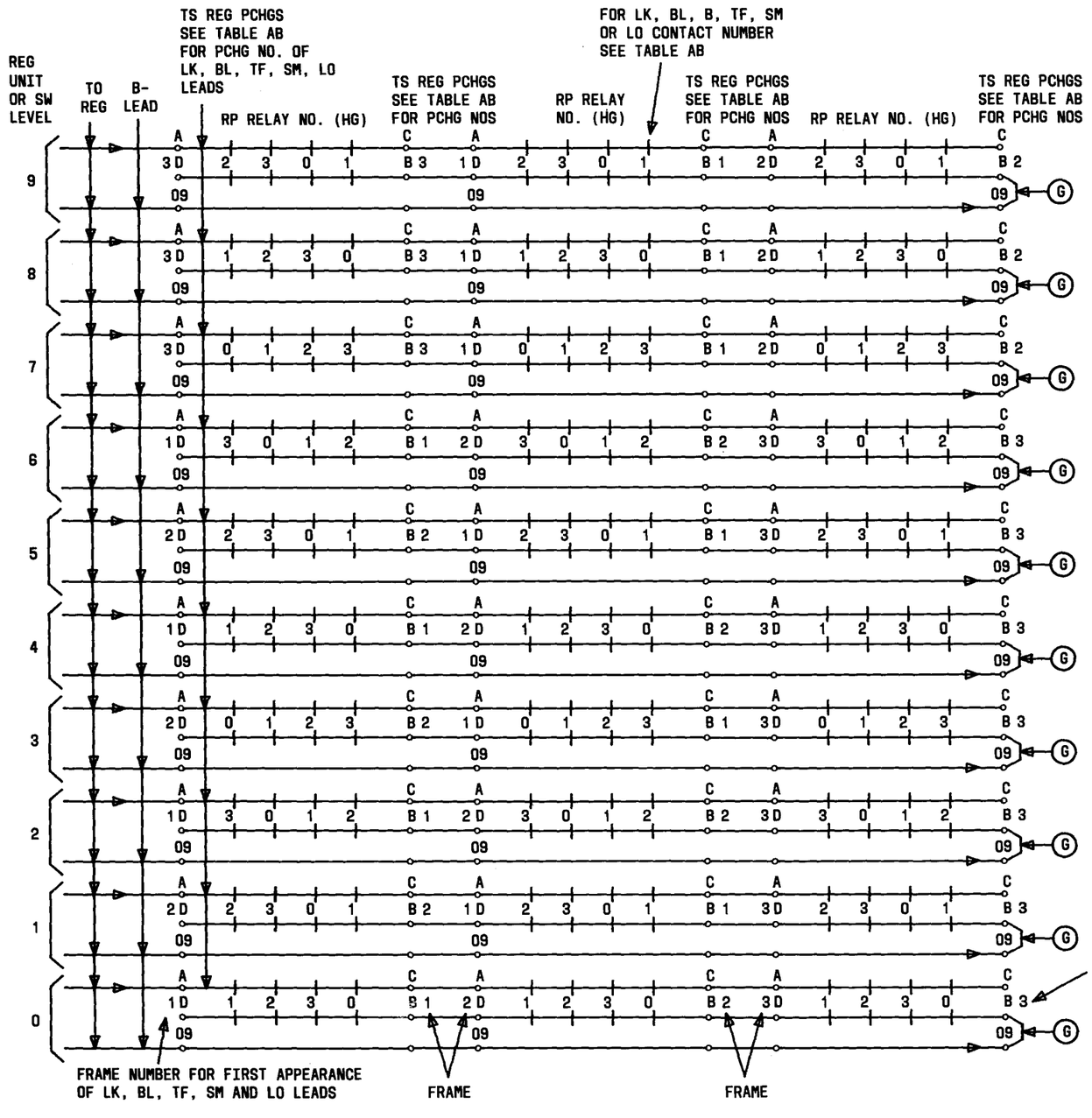


TABLE AB

LEAD	TS REG PCHG NO. A	B	C	D	RP REL CONT
LK	30		20		2
BL	31		21		4
B		22		12	6
TF	33		23		8
SM	34		24		10
LO	35		25		12

→ DENOTES ORDER OF PREFERENCE

Fig. 10—RP Relay Preference Chains, Three IRL Frames, Four HG

INCOMING REGISTER LINK IDENTIFICATION

9.20 Make busy any register associated with IRL under test. At the IRL short contacts 3F with 3M and 9F with 9M of the horizontal group RP0 relay for the register made busy. At the register made busy hold TC1(RP) or TC2(MF) relay operated until the trouble recorder delivers a card. The card punches should indicate RP0 and RPB. Repeat test for horizontal group RP1, RP2, RP3, RP4, and RP5 relays as furnished. Verify card punch indicates a corresponding RP_ designation with RPB respectively. ***Note:*** RPB for basic, RPAB, for 1st auxiliary, and RPSA for the 2nd auxiliary IRL frames.

RP PREFERENCE

9.21 Block ON relay nonoperated in each incoming register associated with the IRL under test. Manually operate any assigned TP_ relay except TP00. Check that TP relay locks and that RP0 and RB1 to RB5 relays, as equipped for register unit 0 of IRL frame under test, operate. RB0 relay of register unit 0 should not operate. Block operated RB0 relay of register unit 0.

9.22 RP0, RB1 to RB5 relays and operated TP relay should release. Again manually operate the TP relay in horizontal group 0. Verify the TP relay locks and the RP0 and RB1 to 5 operate in register unit which is next in order of preference for horizontal group 0 as shown in Table W for 160 trunk IRL frames or Table X for 120 trunk IRL frames. RB0 relay of seized register unit should not operate. Block operated RB0 relay associated with operated RP relay. Operated TP, RP and RB relays should release. Repeat steps in horizontal group 0 for each equipped register unit. If a register unit is not equipped on the IRL frame, the order of preference is to the next equipped unit in the preference chain for the horizontal group under test, as shown in Tables W and X. Unblock the RB0 relay in each register unit on IRL under test after all register units have been tested with horizontal group 0. Repeat above test on each horizontal group equipped on the IRL under test. The number of the RP relay which operates and the RB relay which does not operate in each register unit should correspond at all times to the number of the horizontal group under test.

TRUNK CROSS-CONNECTIONS

9.23 Using XRLs, verify visually that each assigned trunk is cross-connected as indicated and each vertical is wired per an assigned trunk. Also verify that each horizontal group cross-connection is correct per the XRL.

CROSSBAR SWITCH CROSSES

9.24 Using test receivers, verify that adjacent levels on the highest IRL horizontal group are free from crosses. Check between levels 0 and 1, 1 and 2, 2 and 3, etc, for each banjo wire.

10. INCOMING REGISTER MARKER CONNECTOR

10.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
130V	130	PRTD	Frame FA—Aisle MJ
PF	—48V	Frame	Frame FA—Aisle MJ

10.02 Verify that all fuses appear in the fuse record book.

10.03 With the use of a volt-ohmmeter and appropriate test cords, verify the potential of the 48V test battery.

10.04 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle or MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame,

verify that the white and red buttons on the test cord will start and release the call respectively from the RC jack.

(d) ***Make-Busy Jack*** - At jack, lamp, and key circuit, insert MB plug into the marker MB jacks associated with IRMC-under test.

Verify that as each MB plug is inserted, the respective CB_ relay operates in the connector under test.

Remove MB plugs. Verify that the CB_ relays release.

10.05 Timing tests should be applied as listed in Timing Requirement Tables of SDs.

PLANT AND TRAFFIC REGISTERS

10.06 There are no registers associated with the incoming register marker connector.

CB RELAY CHAIN

10.07 Verify that CB relays for unequipped completing markers are blocked operated in a permanent manner in IRMC_ under test. At jack, lamp, and key circuit, make busy all incoming registers associated with the connector, by inserting MB plugs into the respective IRMB jacks.

10.08 Temporarily ground terminal 43 of terminal strip A of marker connector control unit under test. This will provide a CB relay locking ground on the LCB lead for all marker CB_ relays in the connector.

10.09 Apply ground through a test receiver, in turn, to upper winding terminal of each CB_ relay in the marker preference control unit for the connector under test. Check that each relay operates without buzzing and locks. (Reversed CB_ relay winding leads will cause it to buzz.) When the last CB_ relay is operated verify that all others release.

10.10 Repeat above test enough times so that CB_ relays for each marker will be the last one operated.

10.11 Remove temporary ground from terminal 43 of terminal strip A of marker connector control unit under test.

10.12 At jack, lamp, and key circuit, remove MB plugs from IRMB jacks.

MS RELAY CHAINS

10.13 At the jack, lamp, and key circuit, make busy the first completing marker associated with the connector under test, by inserting an MB plug into the MMB jack. At made-busy completing marker, block the MAK, MCK, and MSK relays operated. At connector under test insulate contacts of MS_ relay associated with marker. Make busy as indicated in Table AC. Verification should be indicated as in Table AC.

TABLE AC

MS–RELAY CODE	INSULATE MS–RELAY CONTACT	CHAIN CIRCUIT TESTED	WITH CONTACTS INSULATED VERIFY FOR	
			BATTERY ON	GROUND ON
AF154	10B	MSK	10B	10F
AF154	12B	MCK	12F	12B
AF154	2B	MAK	2F	2B
AF105	6B	MSK	6B	6F
AF105	8B	MCK	8B	8F
AF105	4B	MAK	4B	4F

10.14 Verify that the MAK, MCK, and MSK chain circuits for each marker in the connector under test agree with the office wiring list drawing for completing markers T-XXXX-587-.

10.15 At succeeding connector (lowest preferred), insulate MS_ relay contact 10B (AF 154 relay provided) or 6B (AF 105 relay provided) associated with the made-busy marker. Verify in connector under test, that ground is present on 9M and not 9F (AF 154 relay provided) or on 6M and not on 6F (AF 105 relay provided). Remove insulated contacts from MS_ relays. Repeat test for each marker in connector. At made-busy marker unblock MAK, MCK, and MSK relays. Remove make-busy plug from MMB jack for marker used in test.

LCB LEAD GROUNDS

10.16 At jack, lamp, and key circuit, make busy all incoming registers associated with connector under test by inserting MB plug into the respective IRMB jacks.

10.17 At connector under test, block associated CB_ relays nonoperated and manually operate and release, in turn, TR and TRS relays in the connector control unit. Using a test receiver, verify that as each relay is operated ground is present on terminal 43 of unit terminal strip A.

10.18 At each associated incoming register frame, manually operate and release, in turn, multicontact RA, RC, and RD relays of each assigned incoming register in connector under test.

10.19 Verify that as each relay is operated ground is present on terminal 43 of terminal strip A of marker connector under test. Remove blocks from CB_ relays. At jack, lamp, and key circuit, remove MB plugs from IRMB jacks.

MS PREFERENCE

10.20 From traffic schematic determine preferred and alternate preferred markers for marker connector under test.

10.21 At marker connector under test, momentarily apply battery through a test receiver to terminal 57 of terminal strip B on marker connector control unit. Verify that the MS_ relay of preferred marker in connector under test operates momentarily.

10.22 Momentarily apply battery to terminal 58 of same terminal strip. Verify that the MS_ relay of the alternate preferred marker in connector under test operates momentarily.

10.23 In connector under test, block operated CB_ relay associated with MS_ relay of alternate preferred marker, and again apply battery to terminal 58. Verify that succeeding marker MS_ relay operates momentarily.

10.24 Continue in this manner until the MS_ relay of each equipped marker in the connector has been operated from terminal 58 of the connector control unit for connector under test. MS_ relays should operate in numerical sequence of markers, returning to the MS_ relay of marker 0 after MS_ relay of highest numbered equipped marker has been tested. Unblock CB_ relays on completion of test.

TRANSFER START LEAD ON ALTERNATE CALLS

10.25 From traffic schematic (-240 drawing or equivalent) determine first and second choice marker assignments for IRMC under test.

10.26 At jack, lamp, and key circuit, make busy all incoming registers associated with the connector under test, by inserting MB plugs into the respective IRMB jacks.

10.27 At the master test frame, check that none of the completing markers are made busy, and operate the CMTCA and CMTCB keys to disable the associated master traffic control circuit. In the marker preference control circuit for connector under test, block nonoperated the first and second choice marker MS_ relays, and the TM and CA relays. Also release W and Z relays if they are operated.

10.28 In the first incoming register associated with the connector under test block operated relays per Table AD.

10.29 In the connector under test, with an iron object, check for magnetic pull on the MS_ relay of the first choice marker and the absence of pull on the MS_ relay for the second choice marker.

10.30 Verify that the GT relay in the connector control circuit is operated.

TABLE AD

RELAYS TO BLOCK FOR START LEAD TESTS		
TYPE INC. REG	BLOCK NORMAL	BLOCK OPERATED
DP, MF, TAN	—	TC2
RP	MRL	TC1
IMG SDR	—	LR, AV

10.31 Momentarily operate and release multicontact MA_ (R option) or MC_ (S option) relay in IRMC under test.

10.32 Check that W and Z relays operate and lock. Also check that magnetic pull has been transferred from first choice marker MS_ relay to second choice marker MS_ relay in preference control circuit.

10.33 Operate and release MA_ or MC_ relays of each remaining marker in connector under test. Check that W and Z relays operate and release alternately with each operation of an MA_ or MC_ relay.

10.34 Manually release W relay if it is operated at end of test.

TROUBLE RELEASE FEATURES

10.35 In preference control unit, check that MS_ relay of first choice marker in IRMC under test is energized, and that ground is present on terminal strip MD, terminal 12, and no ground is present on terminal strip MD terminal 11. In marker connector control unit of IRMC under test, block operated TRL relay. Check that TR relay is operated and that first choice marker MS_ relay is no longer energized.

10.36 Unblock TRL relay. Check that TR1 relay operates, TR relay remains operated, and that ground is present on terminal strip MD, terminal 11, and no ground is present on terminal strip MD, terminal 12.

10.37 Manually operate and release MK relay. Check that TR and TR1 relays release. Block operated Z relay and check that MS_ relay of second choice marker is energized.

10.38 Block operated TRL relay. Check that TR relay operates and the MS_ relay of second choice marker is no longer energized.

10.39 Release and then operate and release TRL relay several times. Check that TR1 relay operates on first release of TRL relay and that thereafter TR and TR1 relays remain operated.

10.40 Operate and release MK relay. Check that TR and TR1 relays release. At MC terminal strip of IRMC under test, momentarily apply ground through a test receiver to terminal 30. Check that TRL and MK relays in connector control operate when ground is applied.

TRANSFER START FROM TRS RELAY

10.41 Release W and Z relays in connector control circuit if operated and block operated TRS relay. Check that second choice marker MS_ relay is energized in preference control circuit.

10.42 Operate W and Z relays. Check that first choice marker MS_ relay is energized and that TM relay is not energized. Manually operate TM1 relay. Verify that TM1 relay locks.

10.43 Release TRS relay. Verify that TM1 relay releases and TM relay is energized.

OPERATE AND LOCKING PATHS OF TC AND TC1 RELAYS

10.44 Block normal W and Z relays. Manually operate and release, in turn, multicontact MC_ relay of each marker connector. Check that

TC and TC1 relays operate as each MC relay is operated.

10.45 Block operated W relay, momentarily operate TC and TC1 relays. Verify that TC relay locks and TC1 releases.

10.46 Block W relay normal and Z relay operated. Momentarily operate TC and TC1 relays. Verify that TC1 relay locks and TC relay releases.

10.47 Unblock W and Z relays. Verify TC1 relay releases.

TM AND RBG LEADS

10.48 Unblock relays per Table AD in first incoming register in connector under test. Check that TM relay is no longer energized and GT relay is released. Block relays per Table AD in second circuit in connector. Check that TM relay and first choice marker MS_ relay are energized. Also check that GT relay is operated.

10.49 Manually operate TR relay. Check that TR relay locks.

10.50 Unblock relays per Table AD. Verify that TR relay releases and TM and MS_ relays are no longer energized.

10.51 Apply tests to each register in the marker connector under test. Unblock TM, CA, and MS_ relays in connector and preference control circuits.

BT AND MRL LEADS

10.52 Momentarily apply ground through a test receiver to marker connector multicontact relay terminal strip MB, terminal 51, for IRMC under test. Check that CA relay operates and locks.

10.53 Manually release CA relay and apply ground to terminal strip MB, terminal 52.

10.54 Check that CA relay operates and locks.

10.55 Release CA relay, block operated GT relay and check that battery is no longer present on terminal strip MB, terminals 51 and 52.

10.56 Unblock GT relay and manually operate and release MK relay. Check that GT relay operates and releases.

SPL RELAY FEATURES (If Provided)

10.57 Manually operate and release SPL relay in connector control circuit under test. Verify that ground is present on marker connector terminal strip MD, terminal 00, while the SPL relay is operated.

10.58 Block TM relay nonoperated and apply ground to marker connector control unit terminal strip A, terminal 53.

10.59 Verify that TM1 relay does not operate.

10.60 Manually operate and release SPL relay. Check that TM1 relay operates when SPL relay is operated. Remove ground from terminal strip A and unblock TM relay. Momentarily apply ground to terminal 14 of RA terminal strip of 1st register, RB terminal strip for 2nd register and, RC terminal strip for 3rd register in bay. Verify that as each of the terminals for associated registers in the connector are grounded, the SPL relay operates in the connector under test.

TRAFFIC CONTROL ORMC, IRMC AND TRMC

A. Setup (Fig. 11)

10.61 At master test frame jack, lamp, and key circuit, operate CMTCA and CMTCB keys. Verify that CMTCA and CMTCB lamps are lighted.

B. Frame Traffic Control FB and FB1 Leads

10.62 At connector under test block TM1 relay nonoperated, and W, Z, TC and TM relays operated. At the master traffic control circuit, manually operate TCA relay for 2 seconds. (Do not keep TCA relay operated for more than 2 seconds.) In the connector under test, verify that FC relay operates steadily and FC1 relay does not operate at all while the TCA relay of the master test control is manually operated. Remove block from TC relay. Change state of W and Z relays from blocked operated to blocked normal. Block TC1 relay operated. At the master traffic control circuit, manually operate TCB relay for 2 seconds. (Do not keep TCB relay operated for more than 2 seconds.) In the connector under test, verify that

FC1 relay operates steadily and FC relay does not operate at all while the TCB relay of the master traffic control is manually operated.

C. TCA and TCB Leads

10.63 Change state of TC1 relay from blocked operated to blocked normal. At the master traffic control circuit, apply battery for 2 seconds to the lower winding of TCB relay. Verify that TCB relay operates steadily while battery is applied. Apply battery to lower winding of TCA relay. Verify that TCA relay does not operate steadily while battery is applied. (TCA relay may operate intermittently while battery is applied, if calls are being processed.)

10.64 At connector under test, remove block from TC1 relay. Change state of W and Z relays from blocked normal to blocked operated. Block TC relay normal. At master traffic control circuit, apply battery for 2 seconds to the lower winding of TCA relay. Verify that TCA relay operates steadily while battery is applied. Apply battery to lower winding of TCB relay. Verify that TCB relay does not operate steadily while battery is applied. (TCB relay may operate intermittently while battery is applied if calls are being processed.) At the connector under test remove blocks from W, Z, and TC relays.

D. TC and TC1 Leads

10.65 In the following test procedure, do not keep FC or FC1 relays operated for more than 2 seconds.

10.66 In the connector under test, block FC relay operated. Manually operate TC and TC1 relays. Verify that TC relay locks and TC1 relay does not. Remove block from FC relay and block FCI relay operated. Manually operate TC and TCI relays. Verify that TCI relay locks and TC relay does not. Remove block from FCI relay and verify that TCI relay releases.

E. CWA and CWB Leads

10.67 In the connector under test, block TM1, W, and Z relays nonoperated. Block TM relay operated. At the master traffic control circuit, momentarily apply battery to the lower winding of CWA relay. Verify that CWA relay operates steadily while battery is applied. Apply battery to lower winding of CWB relay, verify that relay CWB relay does not operate steadily while battery is applied. (CWB relay may operate intermittently while battery is applied if regular calls are in progress).

10.68 In the connector under test, change state of W and Z relays from blocked nonoperated to blocked operated.

10.69 At the master traffic control circuit, momentarily apply battery to lower winding of CWB relay. Verify that CWB relay operates steadily while battery is applied. Apply battery to lower winding of CWA relay, verify that relay CWA does not operate steadily while battery is applied. (CWA relay may operate intermittently while battery is applied if regular calls are in progress.)

10.70 At connector under test remove blocks from W and Z relays.

F. WCWA and WCWB Leads (Wideband)

10.71 In connector under test, block operated SPLP relay.

10.72 Repeat 10.67 to 10.70 with WCWA and WCWB relays referred to instead of CWA and CWB relays.

G. IM Lead

10.73 In the master traffic control circuit, block operated the IM relay. In the connector under test verify that IM relay operates. Manually operate and release, in turn, TC and TC1 relays. Verify that IM relay does not release. Simultaneously operate and release TC and TC1 relays, check that IM relay releases when both relays are operated.

10.74 In the master traffic control circuit unblock the IM relay and release it momentarily. In the connector under test, verify that IM relay releases when the IM relay of the traffic control circuit is momentarily released.

H. BWM Lead (Wideband)

10.75 In connector under test, operate SPLP relay. Verify that IM relay operates. In traffic control circuit operate BWM relay.

10.76 In connector under test, verify that IM relay releases. Release SPLP relay. In traffic control circuit release BWM relay.

I. Restore Circuits to Normal

10.77 In connector under test, unblock TM and TM1 relays.

10.78 At jack, lamp, and key circuit, restore CMTCA and CMTCB keys. Verify that CMTCA and CMTCB lamps are extinguished.

CALL THROUGH CONNECTOR

10.79 At connector under test, block CB_ relays operated for all markers but the first.

10.80 At master test frame, operate the OA, IR_, IRG_, TCL_, MAX L, and SRS_ if equipped, to select an incoming register assigned to the connector under test.

10.81 Set up a basic test call to the selected register as follows.

If Automatic Monitor is Provided

10.82 Operate IC_, A-D, MAC and STT keys, also operate 24 MAX key if DP register, and BL key if by-link operation is required.

If Test Set Testing

10.83 Patch IRT jack of test set into IRT jack of test box.

10.84 ***DP register***—Set L switch to 8 and operate STT key and dial A-D digits using 20PPS dial.

10.85 ***MF register***—Set L switch to OFF and operate the STT key. Sequentially depress the KP, A-D, and ST buttons.

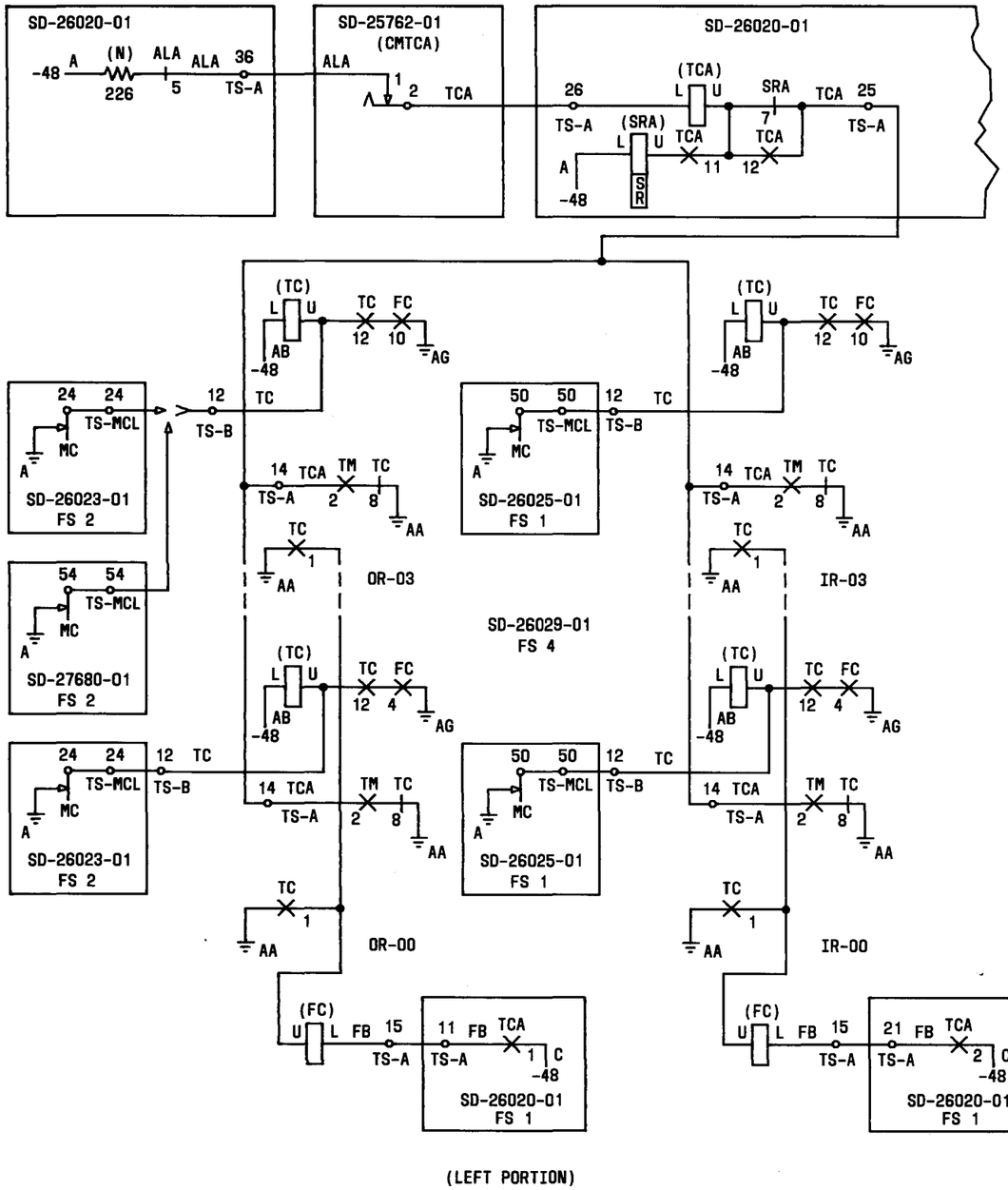
10.86 ***RP Operation***—Operate the RP key. Also operate the STT key and dial digits 4-XXXX.

10.87 At connector under test observe that the M_ relays for the only available marker operate during the test call and the M_ relays for unavailable markers do not.

10.88 Repeat above tests for each of the remaining markers in the connector under test, by manipulating the blocked CB_ relays to allow each marker to be the only one available on at least one test call.

10.89 Remove blocks from CB_ relays.

10.90 At jack, lamp, and key circuit, release all incoming registers assigned to the connector under test by removing MB plugs inserted in 10.26.



(LEFT PORTION)

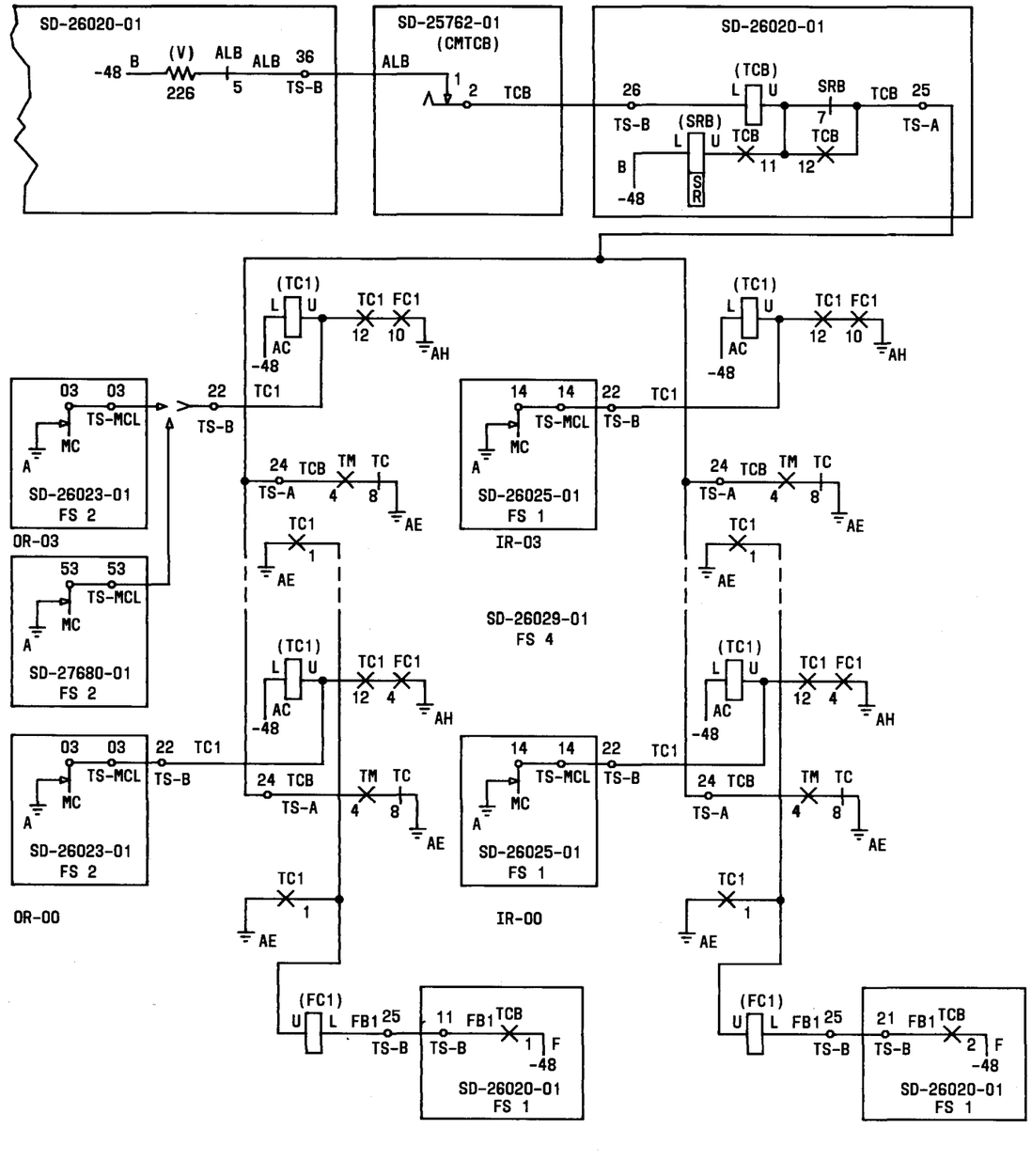


Fig. 11—Traffic Control for Originating Incoming and Transfer Register Marker Connectors

11. OUTGOING SENDER

11.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
PF	—48V	Frame	Frame FA—Aisle MJ

11.02 With the use of a volt-ohmmeter and appropriate test cords, verify the potential at the 130V and 48V test battery.

11.03 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle or MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on test cord will start and release the call respectively from the RC jack.

(d) ***Make-Busy jack*** - Insert a 322A make-busy plug in the sender MB jack at the master test center (jack, key, and lamp circuit or recorder bay), for sender under test.

Verify relay MB operates in the associated sender.

Remove 322A make-busy plug.

(e) ***Sender Test Jack*** - In any convenient manner, verify continuity of each lead between SDT1 and SDT2 jack appearances to another appearance in an existing sender frame.

TIMING TESTS

11.04 Timing tests should be applied as listed in Timing Requirement Tables of SDs, using timing test J24753A.

CANCEL TIMED RELEASE

11.05 When stuck sender tracing is provided, the ACT key at the jack, lamp and key circuit should be normal for this test. This test shall be made only when the "Cancel Timed Release" feature per Fig. 38 of SD-25762-01 is provided.

11.06 At the master test frame, jack, key, and lamp panel, set all CTR keys associated with sender in the OFF position (push-in). At the outgoing sender under test, temporarily connect ground to lead "AB" at terminal 37, terminal strip B, of the sender controller unit.

11.07 Lead AB for other circuits is located as follows:

SD-27624-01 FSP Sdr TS B11

SD-27629-01 OS DP LLP TS G14

SD-27882-01 OS-AIS TS B46

11.08 At a revertive pulse sender only, block OF3 relay nonoperated.

11.09 Manually operate ON relay (then AB and CT relays in that order with ON held operated for an intermarker group sender); ON relay should lock operated, following the operation of LR relay (or LR1 relay in a revertive pulse sender). After a delay of approximately 20 to 35 seconds (or approximately 15 to 24 seconds for a multifrequency sender only) the sender should time-out, operating TM, TRL, and RO relays to release ON, etc, relays and restore the circuit to normal.

11.10 Operate (pull-out) the associated CTR key at the master test frame.

11.11 Again manually operate ON relay which should lock as before and start the timing circuit of tube TM. When the sender times out, however, as indicated by the operation of TM and TRL relays, ON and ON1 relays should remain operated. Operate CTR key to the OFF position (push-in) at the master test frame, ON, ON1, etc, relays should release and restore the circuit to normal.

PLANT REGISTERS

A. MF, DP, PCI and LLP-DP Senders

11.12 Record reading of SS plant register associated with senders to be tested.

11.13 In sender being tested, block operated CT and MB relays. Manually operate and release TRL relay of this sender several times. The assigned plant register SS should score only once each time TRL relay is operated and released.

11.14 Release CT and MB relay.

B. RP Sender SD-26052-01

11.15 Record reading of SS plant register associated with senders to be tested.

11.16 Manually operate and release ON1 and TR1 relays, of the sender under test, several times. The assigned plant register SS should score only once each time TRL relay is operated and released.

C. Coin Zone Sender (MF Sender) SD-26051-01

11.17 Record reading of CZSR plant register associated with senders to be tested. Block operated ON relay and momentarily operate CTV1, RO, TM, and TRL relays in the MF sender. They lock operated.

11.18 Momentarily operate CTM relay. Observe that associated CZSR plant register operates.

11.19 Remove the blocking tool from ON relay.

D. CAMA Sender SD-26056-01

11.20 Record reading of plant register NPA.

11.21 Block operated TM1 and AV relays. Momentarily operate TMB relay and verify register scores.

11.22 Release TM1 and AV relays.

E. FSP Sender SD-27624-01

11.23 Record readings of SS, S1TF, and S2TF plant registers associated with senders to be tested.

11.24 In sender being tested, block operated CT relay.

11.25 Manually operate and release TRL relay several times. The assigned SS plant register should score only once each time TRL relay is operated and released. Release CT relay.

11.26 In sender being tested, block operated TRL relay. Manually operate and release E2T relay. The assigned S2TF register should score only once each time E2T relay is operated and released. Release TRL relay.

11.27 Manually operate and release SP1 relay. The assigned register is operated and released.

TRAFFIC REGISTERS

A. Intersender Timing Traffic Register (PC STR)

11.28 Record reading of PC-STR registers associated with senders under test.

11.29 At sender under test, block operated relays as follows:

SENDERS	SCHEMATIC	RELAY
DP	26050-01	CT, ATM & ATC1
MF	26051-01	CT, ATM & ATC
RP	26052-01	ON1, ATM & ATC
PCI	26053-01	ON, TM, TG1 & PC
LLP-DP	27629-01	CT, ATM & ATC
FSP	27624-01	CT, ATM & ATC

11.30 Momentarily operate RO relay in the sender under test.

11.31 At the traffic register cabinet, check that one unit has been scored on the associated PC-STR register.

11.32 Release blocked operated relays.

B. CAMA Sender SD-26056-01

11.33 Record reading of traffic register NPA.

11.34 Block operated TM1 and AV relays. Momentarily operate TMB relay and verify register scores.

11.35 Release TM1 and AV relays.

C. AIS Sender SD-27882-01

11.36 Record reading of SB, ASB, and ALB traffic registers associated with the AIS senders to be tested.

11.37 Manually operate and release several times MCB relay in the AIS sender connector associated with the sender to be tested. The assigned traffic register SB should score only once each time MCB relay is operated and released. Traffic registers ASB and ALB should not score.

11.38 Block TST1 relay operated in the sender connector. Manually operate and release MCB relay several times and verify that traffic register SB does not score.

11.39 Release TST1 relay and block MCB relay operated. Manually operate and release ASB relay in the sender connector several times and verify that traffic register SB does not score, and that traffic register ASB scores only once each time ASB relay is operated and released.

11.40 Manually operate and release ABL relay in the sender connector several times. Verify that traffic register ALB scores only once, each time ALB relay is operated and released. Unblock TST1 and MCB relays.

TROUBLE LOCATING METHODS

11.41 Table AE provides the traffic register operating lead and its associated frame, terminal strip, terminal, and relay contacts. A continuity test to the traffic register circuits should locate most troubles.

TUR ASSIGNMENTS

11.42 Check assignment of SB and SBM leads to TUR per 526 Wiring List Assignment Chart or 430 Drawing.

TABLE AE

SCHEMATIC	TRAFFIC REGISTER	DESCRIPTION	REGISTER OPERATING PATH					
			LEAD	FRAME	TS	TERM.	RELAY	CONTACT
26050-01	PC-STR	Intersender Time-Out	STR	SDR	MA	41-44	RO	2
26051-01	PC-STR	Intersender Time-Out	STR	SDR	MA	41-44	ATC	2
26052-01	PC-STR	Intersender Time-Out	STR	SDR	MA	41-44	ATC	8
26053-01	PC-STR	Intersender Time-Out	STR	SDR	MA	41-44	RO	2
27629-01	PC-STR	Intersender Time-Out	STR	SDR	MA	41-44	RO	2
27624-01	PC-STR	Intersender Time-Out	STR	SDR	MA	31-33	ATC	8
26056-01	PC-NPA	No Position Available	NPA	SDR	ME	35	TM1	10
26816-01	SIO Traffic Reg. Ckt.	SDR Required	SIO	SDR	K(Unit)	9/13	SB	5T

REGULAR CALL

11.43 Select a line location on the highest number line link frame and highest vertical group assigned on that frame. Select office code and class of service as required to select trunk group having access to sender under test. Operate remaining D to L digits OS_, OSS, SDT1, NTC, MT, REC, SGA/SGB, RA_ as required.

If test set testing is provided

11.44 Operate SDT key. Patch SDT1 and SDT2 jacks of test set into the SDT1 and SDT2 jacks on relay rack bay of sender under test.

If automatic monitor is provided

11.45 Operate SDR, MAC, STT, SG-SEL switch.

11.46 Operate ST key. Trouble card taken. Verify OSG_, SSA/SSB, OS_ punches. Restore REC key.

If test set testing

11.47 Sender pulses into test circuit.

If automatic monitor is used

11.48 OK lamps lights.

OSL CHECK

11.49 Operate the following keys:

ORIG, MT_, line location and class of service.

11.50 Operate office code and numerical digits, as required, to select sender under test. Select a trunk on the first OSL switch that this sender appears.

11.51 Operate ST key.

11.52 ORIG, DISI, LK2 and MRL lamps light, no trouble record taken.

11.53 Repeat with each completing marker.

11.54 Repeat for each switch in OSL where the sender appears.

FR, CN, AND S LEADS FROM OUTGOING SENDER CONNECTOR

11.55 Make one marker busy by placing a make-busy plug in associated MMB jack at master test frame jack, key, and lamp panel.

11.56 Place make-busy plug in SCMB_ jack, at master test frame jack, key, and lamp panel for sender connector in which sender to be tested appears.

11.57 In the outsender connector which was made busy, block operated MA relay in U&Y-type connectors, or MA2 and MB1 in WS connectors associated with the made-busy marker.

11.58 Set up OGT class of call. Block OST1 relay in marker nonoperated. Operate ST key. Trouble record taken. Verify FR_, CN_, SO-14.

11.59 In this outsender connector, also block operated SA relay for U&Y-type connectors, or SA2 for WS connectors for sender tested. Momentarily operate any X-relay in marker. A trouble record card should be delivered. Check that following punches are correct for sender tested.

FR (0-4) OSC Frame No.

CN (0-3) OSC Conn. No.

S (0-14) OSC Sender No.

11.60 All other punches may be disregarded for this test.

11.61 Release SA or SA2, MA or MA2, and MB1 relays.

11.62 Remove make-busy plug from marker MMB jack, and SCMB.

FR, CN, AND S LEADS FROM M RELAY (AUTOMATIC MONITOR ONLY)

11.63 Block operated M relay of sender to be tested.

11.64 Block operated MCA relay in AUTO MON.

11.65 Momentarily operate TRR1 relay in AUTO MON until trouble record is taken.

11.66 Check that following punches are correct for sender tested.

FR (0-4) OSC Frame No.

CN (0-3) OSC Conn. No.

S (0-14) OSC Sender No.

11.67 All other punches may be disregarded for this test.

11.68 Unblock M relay in sender and MCA relay in AUTO MON.

CHECK SIA/SIB LEADS

11.69 Make marker busy and in marker block TMS nonoperated.

11.70 Operate OSG_ in marker associated with sender under test. Verify that SIA/B operate in marker.

11.71 At jack, lamp, and key circuit, make busy all senders in subgroup A or B associated with sender(s) under test.

11.72 Alternately restore to service and then busy-out each sender in subgroup, and verify that SIA operates then releases.

11.73 Restore all senders to service.

11.74 Repeat 11.71 to 11.73 for other subgroups as required.

11.75 Release OSG_ in marker.

11.76 Repeat 11.70 to 11.75 for all other sender groups as required.

11.77 Restore marker to service and unblock TMS.

11.78 Repeat 11.69 to 11.77 for all markers.

SENDER IDENTIFICATION VIA TRANSVERTER CONNECTOR (Check 241 Drawing)

11.79 This test is intended to check the FR, CN, and RG leads to the trouble recorder via the transverter connector.

11.80 At the AMA sender, hold operated AMA and STT relays until the trouble recorder delivers a card.

11.81 The card punches should indicate the correct connector frame, connector, and sender number as follows:

TVC, CTVC FR (0-4)

ATVC

Connector No. CN (0-3)

Sender No. S (0-14)

11.82 Check also for punches TI, TV and DR (0-9). All other punches may be disregarded for this test.

TRANSVERTER CONNECTOR TEST

11.83 Operate keys as follows:

OSS, SGA/SGB, and OS - as required to select sender under test. Class of service and office code as required to select AMA trunk associated with sender under test, TTL, RA_, OGT, MT_, and TLK.

11.84 Make all transverters busy except one, by inserting MB plug into TVC MB jack associated with sender under test.

11.85 Operate ST key. AS, IE, RN_, T_, and U_ lamps light.

11.86 Verify that the TM relay operates in the connector when call is established.

11.87 No trouble record taken.

11.88 Repeat tests so that each of the remaining transverters is the only one made available on a particular test call.

INTERSENDER TIMING

11.89 Select a line location on the highest numbered line link frame and the highest vertical group assigned on that frame. Select office code and class of service as required to select trunk group having access to sender under test. Operate remaining D to L digits, OS_, OSS, SDT1,

NTC, MT, REC, SGA/SGB, RA_ as required. In sender under test block SP relay nonoperated. At associated OSG release circuit, SD-26055-01, block operated R_ relay.

If test set testing is provided

11.90 Operate SDT key. Patch SDT1 and SDT2 jacks of test set into the SDT1 and SDT2 jacks of the MTF.

If automatic monitor is provided

11.91 Operate SDR, MAC, STT, SG_ SEL switch, TMT, and MOTL.

11.92 Operate ST key, start timing. TMT lamp lights; in 4 to 8 seconds, OK lamp lights.

11.93 Verify that within 4 to 8 seconds overflow tone is heard in test receiver.

11.94 In sender under test, remove block from SP relay. At associated OSG release circuit, remove block from R_ relay.

SENDER GROUP BUSY

11.95 At jack, key, and lamp circuit operate SDA key.

11.96 Insert MB plugs into SMB - jacks for senders in the sender group associated with sender being tested.

11.97 Verify that minor alarm sounds and SGB_ lamp lights for sender group made busy. Remove MB plug for sender under test. Momentarily operate TRAR key. Verify that the minor alarm is silenced, SGB lamp is extinguished. Remove all MB plugs.

REGULAR CALL CHECK USING MTF OSS TEST

11.98 At master test frame, operate OSS, A or B keys and S button to select new sender. Put up code for OSG_ that new sender is in and 9972. Operate MT_ for marker and MISC to complete to called office.

11.99 Verify that call completes to 9972.

11.100 Repeat from each marker with each new sender. ***Make at least 2*** calls using each marker. Make sure call completes and no stuck sender is received.

12. OUTGOING SENDER LINK

12.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
PF	−48V	Frame	

12.02 Verify that all fuses appear in the Fuse Record Book.

12.03 With the use of a volt-ohmmeter and appropriate test cords, verify the potential at the 48V test battery.

12.04 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle of MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on test cord will start and release the call respectively from the RC jack.

SC_ ASSIGNMENTS

12.05 At RD terminal strip, strap punching (SC for switch 0) to ground. Verify that ground is not present on terminal punchings 60 thru 69, terminal strip B section M (SLK leads). At OSL switch 0, verify that ground is present on contact 2 of each select magnet associated with switch 0. Remove ground from SC for switch 0 and place ground on SC for switch 1. Again verify that ground is not present on terminal strip punchings

60 thru 69, terminal strip B, section M. At OSL switch 1, verify that ground is present on contact 2 of each select magnet associated with switch 1. Remove ground from punching SC for switch 1. Repeat test for each outsender link switch 2 thru 9, using terminals for SC switch 2-9 respectively.

SSO - 9 AND SLK LEADS

12.06 Consult office records to determine which trunk link frames are associated with the switches on the OSL under test. At the trunk link connector associated with switch 0 of OSL under test, momentarily place test battery on punching 30 of ML terminal strip. At OSL, verify that select magnet 0 operates for only those switches associated with the trunk link used for test. Repeat test using punching 31 thru 34 and 40 thru 44 of the trunk link connector ML terminal strip and verify the operation of select magnets 1 thru 9, respectively on the switches associated with the trunk link. At the trunk link connector associated with switch 0 of OSL under test, place test battery on punching 24 of ML terminal strip. At OSL, with test receiver verify that battery is present on those punchings, 30 thru 39, of the RB terminal strip SLK portion associated with those OSL switches 0 thru 9, which are associated with the trunk link connector used on the test. Also verify that battery is not present on those terminals, 30 thru 39, not associated with the trunk link used for test. At the OSL switches associated with the trunk link connector used for test, verify that battery is present on contact 1 of each select magnet on the switch. Remove test battery from trunk link connector. Repeat test for each trunk link connector associated with outsender link under test.

TRUNK CROSS-CONNECTIONS

12.07 Using XRLs, verify visually that only those appearances assigned are cross-connected and that the wire colors are uniform.

SENDER LEAD CROSSES

12.08 Using test receivers verify that adjacent levels on each OSL switch are free of crosses. Check between levels 0 and 1, 1 and 2, 2 and 3, etc, for each banjo wire.

13. OUTGOING SENDER CONNECTOR

13.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
PF	—48V	Frame	Frame FA—Aisle MJ
	—48V	Frame	Frame FA—Aisle MJ

13.02 With the use of a volt-ohmmeter and appropriate test cords, verify the potential at the 130V and 48V test battery.

13.03 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle or MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on test cord will start and release the call respectively from the RC jack.

(d) ***Make-Busy Jack*** - Insert make-busy plug into each SCMB_ jack at jack, lamp, and key circuit for completing marker and verify that the respective SCB_ in completing marker operates as each plug is inserted. Remove MB plugs. Repeat test for remaining completed markers.

13.04 Timing tests should be applied as listed in Timing Requirement Tables of SDs.

PLANT AND TRAFFIC REGISTERS

13.05 There are no registers associated with the outgoing sender connector.

13.06 At outgoing sender connector under test, verify that the TR key is normal (MP relay chain in control).

13.07 At master test frame, operate keys and switches as required to set up an ORIG test call using an office code to select a sender associated with the outgoing sender connector under test. Operate ST key. Verify that call completes satisfactorily.

13.08 Repeat test using each equipped completing marker.

13.09 At outgoing sender connector under test, operate the TR key. Verify that TR_ relay operates (E relay chain in control). Repeat 13.07 and 13.08.

13.10 At connector control circuit associated with connector under test, momentarily insulate 8 break-contact of each equipped E_ relay.

13.11 As each contact is insulated verify that the CH relay operates momentarily, the TR relay operates, the TR_ relay releases, the CH lamp lights, and the minor alarm sounds.

13.12 Momentarily operate the AR key and verify that the TR relay releases, the TR_ relays reoperate, the CH lamp is extinguished, and the minor alarm is silenced. Repeat test, this time insulating contact 12 break instead of 8 break of each equipped E_ relay.

13.13 Release the operated TR key and repeat 13.10 to 13.12. This time insulate contacts 8 and 12 break of MP_ relays instead of the E_ relays. For this test TR_ relays will operate instead of release. All other verifications will remain the same.

MP RELAY CHAIN

13.14 With TR key normal (MP relay chain in control), insulate contact 12 of each MP_ relay in connector control unit associated with the connector under test. Using two test receivers apply and remove battery at unit terminal strip punchings associated with MP_ relays in outgoing sender connector control unit under test, in the ascending sequence shown in Table AF. Verify that the MP relays operate and release in given order.

13.15 Apply and remove battery at unit terminal strip punching associated with MP_ relays in the descending sequence shown in Table AG. Verify that MP_ relays operate and release in order indicated.

13.16 Remove insulation from contact 12 make of each MP_ relay.

E RELAY CHAIN

13.17 With TR key operated (E_ relay chain in control), insulate break-contact 12 of each E_ relay in connector control unit associated with the connector under test.

13.18 Using two test receivers apply and remove battery at unit terminal strip punchings associated with E_ relays in outgoing sender connector control unit under test in ascending sequence shown in Table AF. Verify that the E_ relays operate and release in the order given.

13.19 Apply and remove battery at unit terminal strip associated with E_ relays in the descending sequence shown in Table AG. Verify that MP_ relays operate and release in order indicated.

13.20 Remove insulation from contact 12 of each E_ relay. Restore TR key.

SENDER GROUP AND CONNECTOR RELAY ASSIGNMENT

13.21 From job traffic schematic and OSC frame wiring list, determine what outgoing sender groups have been assigned to the OSGA_ and OSGB_ relays in the sender subgroup relay unit, of the connector under test, as established by straps on terminal strip B of sender subgroup relay unit on the OSC frame. Also determine how the OSGA_ and OSGB_ relays of the connector under test have been assigned to the connector MA1 and MA2 relays as established by straps on terminal strip A of sender group relay unit. (See Fig. 12.) Insert a make-busy plug into the MMB jack of first marker.

13.22 At the made-busy marker, block the OSC and SKA relays operated.

13.23 Manually operate and release OSG_ relays in marker assigned to the connector under test. Verify that the correct OSGA_ relay associated

TABLE AF

MP AND E RELAY WORK CHAINS				
*TEST STEP	Ø AT CONTROL UNIT TS AND PUNCHINGS		Ø AT OSCC MP OR E RELAYS	
	CONN. BAT.	REMOVE BAT.	OPER.	RELEASE
1	A-13		0	—
2	A-14		1	—
3		A-13	—	0
4	A-23		2	—
5		A-14	—	1
6	A-24		3	—
7		A-23	—	2
8	A-33		4	—
9		A-24	—	3
10	A-34		5	—
11		A-33	—	4
12	A-43		6	—
13		A-34	—	5
14	A-44		7	—
15		A-43	—	6
16	A-53		8	—
17		A-44	—	7
18	A-54		9	—
19		A-53	—	8
20	A-63		10	—
21		A-54	—	9
22	A-64		11	—
23		A-63	—	10
24	B-52		14	—
25		A-64	—	11
26	B-62		15	—
27		B-52	—	14
28	B-72		16	—
29		B-62	—	15
30	B-82		17	—
31		B-72	—	16
32		B-82	—	17

* Perform test to highest equipped MP- or E relay.

Ø Reference to MP- or E relays 11-14 and B TS are associated with combined OS and NG connector control circuits.

TABLE AG

MP- AND E OPERATING CHAINS				
*TEST STEP	Ø AT CONTROL UNIT TS AND PUNCHINGS		Ø AT OSC MP OR E RELAY	
	CONN BAT.	REMOVE BAT.	OPER.	RELEASE
1	B-82		17	—
2	B-72		—	—
3		B-82	16	17
4	B-62		—	—
5		B-72	15	16
6	B-52		—	—
7		B-62	14	15
8	A-64		—	—
9		B-52	11	14
10	A-63		—	—
11		A-64	10	11
12	A-54		—	—
13		A-63	9	10
14	A-53		—	—
15		A-54	8	9
16	A-44		—	—
17		A-53	7	8
18	A-43		—	—
19		A-44	6	7
20	A-34		—	—
21		A-43	5	6
22	A-33		—	—
23		A-34	4	5
24	A-24		—	—
25		A-33	3	4
26	A-23		—	—
27		A-24	2	3
28	A-14		—	—
29		A-23	1	2
30	A-13		—	—
31		A-14	0	1
32		A-13	—	0

* Start test at highest equipped MP- or E- relay.

Ø MP or E relays 14-17 and reference to B TS are associated with combined OS and NG connectors.

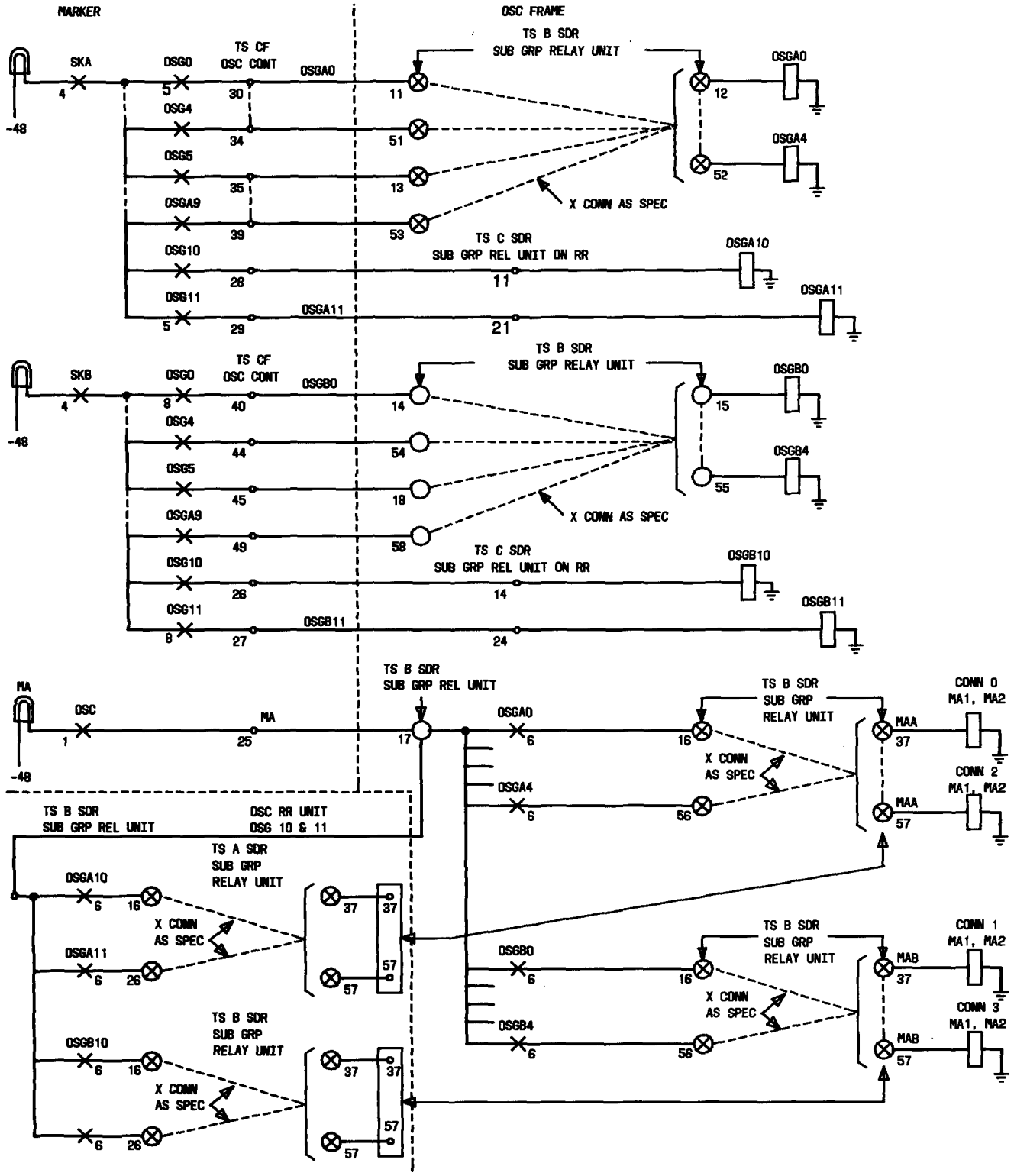


Fig. 12—Sender Group and Connector Relay Assignment Test Setup

with the marker in sender subgroup relay unit operates as the OSG_ relay operated, and that relays MA1 and MA2, associated with the marker in outgoing sender connector 0 or to which the sender has been assigned, also operate.

13.24 In made-busy marker unblock SKA relay and block SKB relay operated. Manually operate and release each OSGB_ relay in marker assigned to connector under test. Verify that the correct OSGB_ relay associated with the marker in sender subgroup relay unit operates as OSG_ relay is manually operated in the marker, and that relays MA1 and MA2, associated with the marker in outgoing sender connector 1 or 3 to which the sender subgroup has been assigned, also operate. In made-busy marker, unblock OSC and SKB relays. Repeat tests for each of the remaining completing markers.

GBA AND GBB LEADS

13.25 At jack, lamp, and key circuit, make busy first marker associated with the connector under test by inserting a make-busy plug into the respective MMB jack. At made-busy marker, block TMS relay nonoperated and block operated OSG_ relay assigned to the connector under test. If made-busy marker is an even marker, short circuit contact 01 fixed to 01 make of the associated MA2 relay at the outgoing sender connector frame under test, or if it is an odd marker, short circuit contact 12 fixed to 12 make of the associated MA1 relay at the outgoing sender connector frame under test. Verify that the GBA relay operates.

13.26 Repeat 13.25 for subgroup B. Verify that GBB relay operates instead of GBA relay. At marker under test, remove block from OSG_ relay.

13.27 Repeat 13.25 and 13.26 for other OSG_ relays in made-busy marker assigned to connector under test. Remove block from TMS relay. At jack, lamp, and key circuit, remove make-busy plug from MMB jack.

13.28 Repeat 13.25 to 13.27 for each completing marker.

TEST CALL

13.29 At master test frame, operate keys and switches as required to set up an ORIG-type test call. Use office code as required to select a sender associated with the outgoing sender connector under test.

13.30 Insert a make-busy plug into the MMB jack associated with the first completing marker. Select the made-busy marker and the first sender in the A subgroup associated with the connector under test. Operate ST key and verify that the call completes without a trouble record.

13.31 At the made-busy marker verify that SKA relay operates on the test call.

13.32 Repeat 13.29 to 13.31 for remaining senders associated with subgroup A and each sender in subgroup B. When selecting senders in subgroup B, verify that the SKB relay operates instead of the SKA relay.

13.33 Restore marker to service.

13.34 Repeat 13.29 to 13.33 for each completing marker.

14. COMPLETING MARKER

14.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM	AUDIBLE ALARM
MB	−48V	PRTD	Frame FA—Aisle MJ	Major
TBS	+130V	PRTD	Frame FA—Aisle MJ	Major
E	+130V	PRTD	Frame FA—Aisle MJ	Major
TBS	−48V	PRTD	Frame FA—Aisle MJ	Major
Ring Grd.	Ring Grd.	PRTD		
+ Aud or ac-dc				
Aud dc				
64-88 Volts		PRTD		

14.02 Verify that all fuses appear in the fuse record book.

14.03 With the use of a volt-ohmmeter and appropriate test cords, verify the potential at the +130V and 48V test battery.

14.04 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle or MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on test cord will start and release the call respectively from the RC jack.

ALARMS AND TIMING

14.05 At the master test frame, make busy the trouble recorder to the marker under test by inserting a 322A plug into associated TRMB M_ jack. Also make marker busy by inserting 322A plug into associated M-C-MB jack. Block marker relays as indicated in Table AH. Observe the indicated relays operate within the specified time interval and the DL_ lamp at the master test frame and the TA lamp at the marker lights.

14.06 Momentarily operate TRR-AR key to retire the alarm and extinguish DL_ lamp.

14.07 After verifying the DL_ lamp lights on one test for each marker, observation that DL relay operates in the marker will suffice. To release the alarm, manually release DL relay.

14.08 For overall timing, the TA lamp lights on the marker frame instead of DL_ lamp on the master test frame.

14.09 On the marker frame, release the TA and TRT lamps by operating AR key.

14.10 Unblock marker relays immediately after results are obtained to prevent further timing.

14.11 Remove make-busy plugs from TRMB M and M-C-MB jacks on the completion of tests.

TRAFFIC REGISTER ASSIGNMENT

14.12 At MTF, plug marker to be tested busy. With the use of the traffic register assignment list, associate each register or group of registers with the corresponding item on Fig. 13 to 18. The designation of traffic registers vary depending on operating conditions and wiring list options furnished. Before starting test, obtain assigned registers from dial administrator. Test all assigned registers by verifying actual register operation. Unassigned registers shall be tested to their respective terminals. Station an observer at the traffic register cabinet during operation tests to verify only the proper register scores. Interference from other calls in progress causing the operation of traffic registers must be considered. (Out of hour testing is recommended.) Figures 13-18 provide the traffic register operating lead and its associated originating frame, terminal strip, terminal, and relay contacts. A continuity test to the traffic register circuit should locate most troubles.

TABLE AH

MARKER TIMEOUT FEATURES

TIMER	BLOCK RELAYS TO START TIMING	RESULTS	
		TIME INTERVAL	RELAYS OPERATE
Work Timer	1. SP, SNK 2. SP, TM	Apprx. .45 to .60 Sec. Apprx. .45 to .60 Sec.	WT, TRT, TRL, DL ST, TRT, TRL, DL DL Lamp Lights
Short Delay Timer	1. TGT 2. NTT (SPL MKR), CKG2 3. FAST (FAT CONN) NOTE 1	2.6 to 4.25 Sec. 2.6 to 4.25 Sec. 2.6 to 4.25 Sec.	SDT, TRT, TRL, DL SDT, TRT, TRL, DL SDT, TRT, TRL, DL
Long Delay Timer	1. RON, TST, CKG2 2. RON, TLC2, TER1 SP (N.O.)	4.6 to 7.5 Sec. 4.6 to 7.5 Sec.	LDT, TRT, TRL, DL LDT, TRT, TRL, DL
Over-All Timer	1. SP, OAT	9.6 to 15.4 Sec. TA Lamp Lights on Marker, DL Lamp Does Not Light and Major Alarm Sounds	MRL, TAL
High Traffic Timer	HTR (NOTE 2)	1.0 to 1.5 Sec.	HTT (Operates) HTR (Releases)
Trunk Busy Timer	TBC MT17, TBC	27 to 30 MIL SEC 80 to 100 MIL SEC	TBT TBT
Trouble Recorder Timer Release	TR1 TRTR	Approx. 2.5 Sec.	TA Lamp TRT Lamp Major Alarm Sounds

Note 1: If Foreign Area Translator is furnished.

Note 2: Momentarily operate relay HTR. Relay HTR locks operated unitl relay HTT operates (1 - 1.5 Sec.).

14.13 Apply test of each assigned register by blocking relays as shown in Fig. 13 thru 18 per options furnished.

CAUTION: Block nonoperated SP and block operated MT2 while performing these tests.

14.14 Remove MMB plug at MTF when tests are completed.

TUR LEAD ASSIGNMENT

14.15 Check the assignment of the leads to TUR per 526 Wiring List Assignment Chart.

COMPLETING MARKER PLANT REGISTERS

A. Marker Trouble Record (TR)

14.16 At MTF insert MMB plug into marker under test.

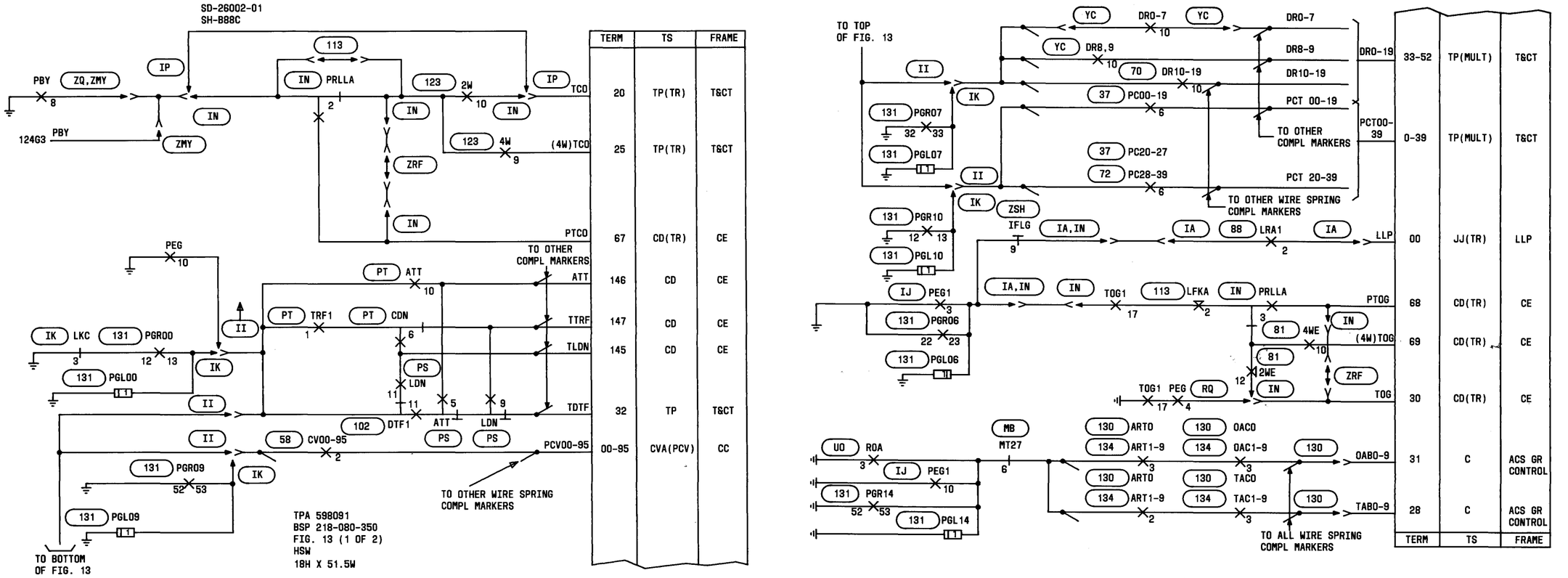
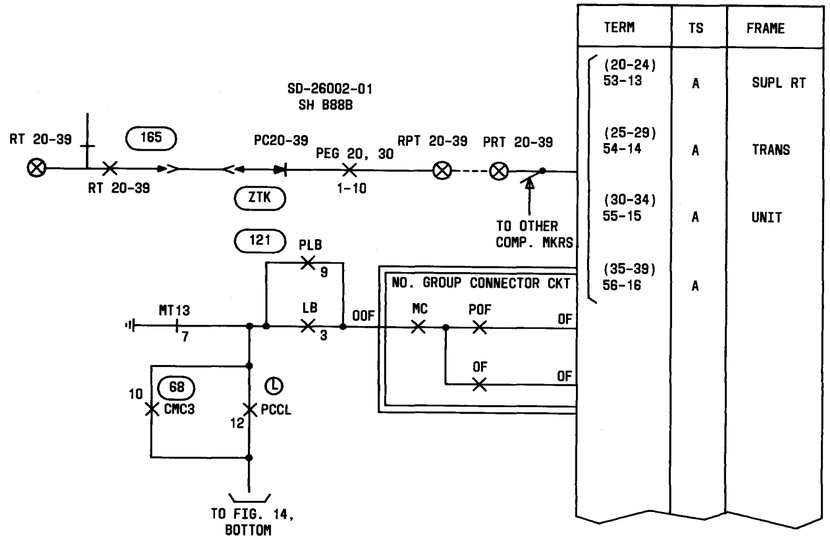


Fig. 13—Traffic Register Leads



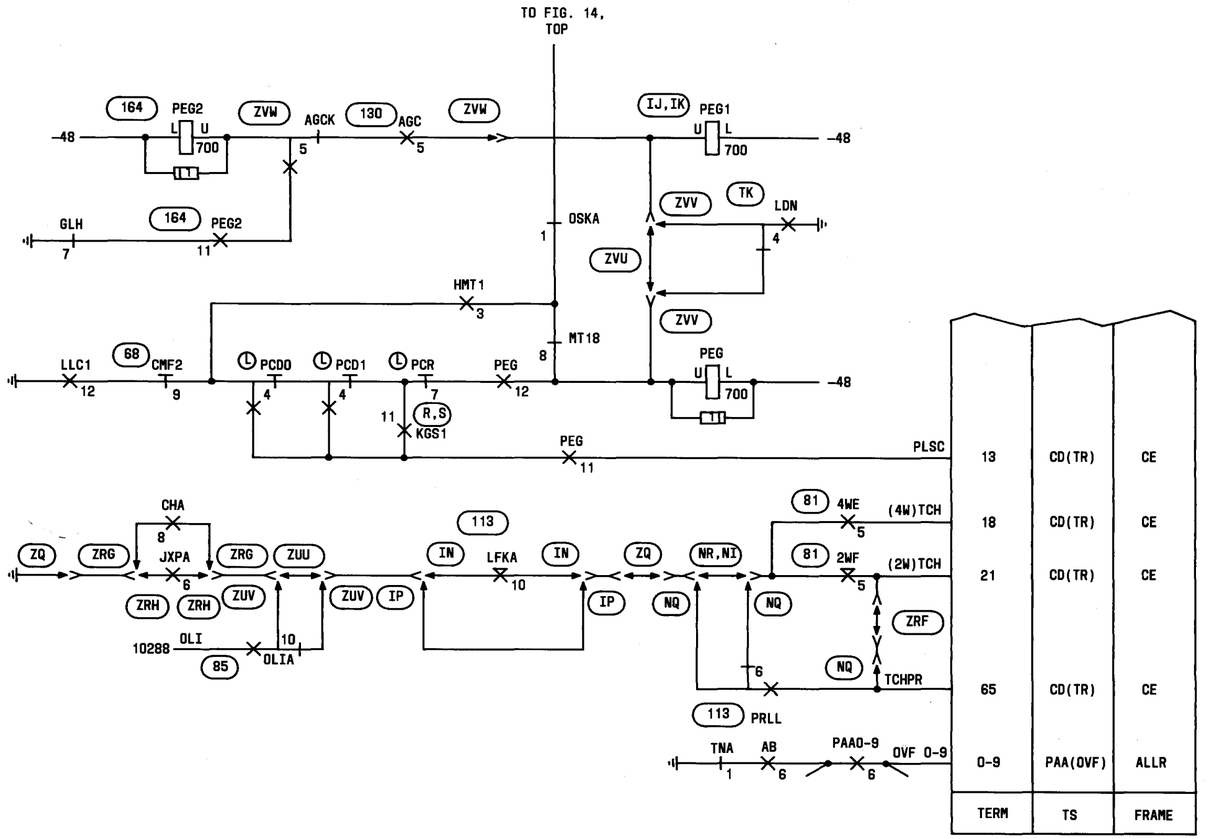


Fig. 14—Traffic Register Leads

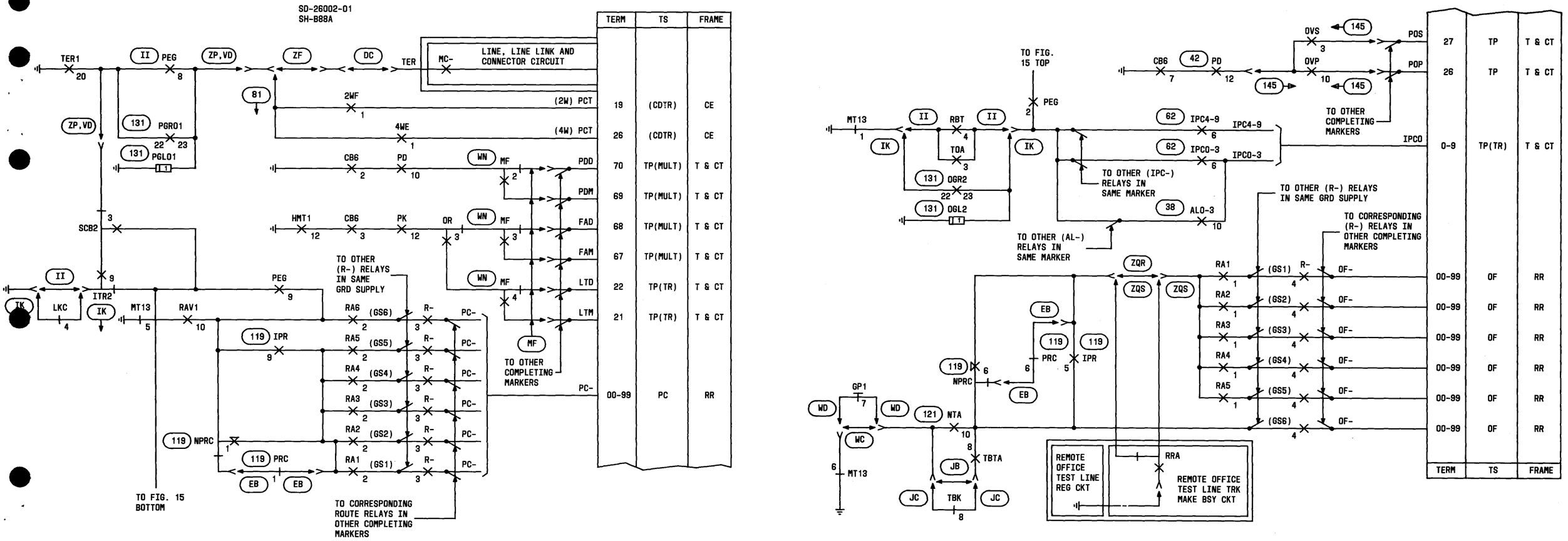
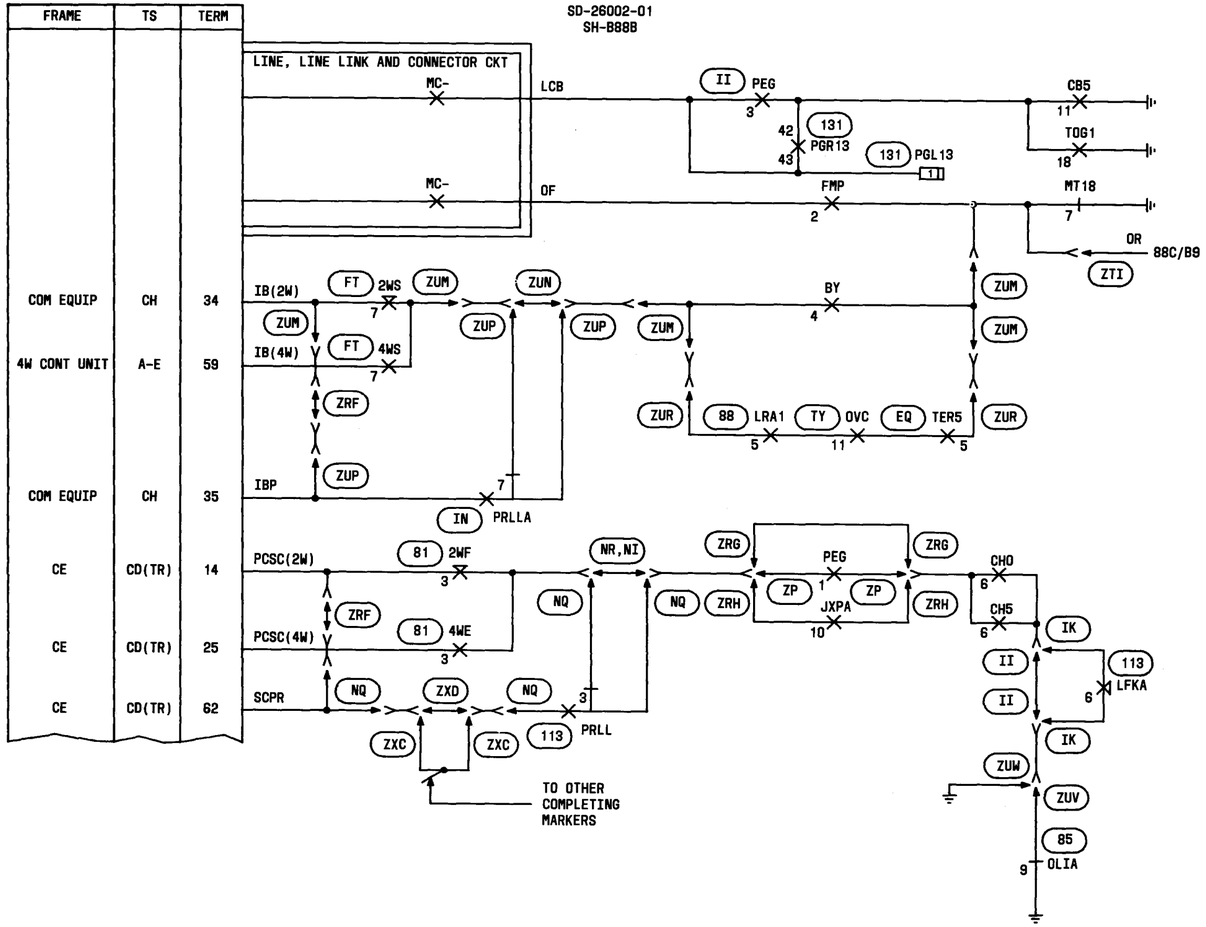


Fig. 15—Traffic Register Leads



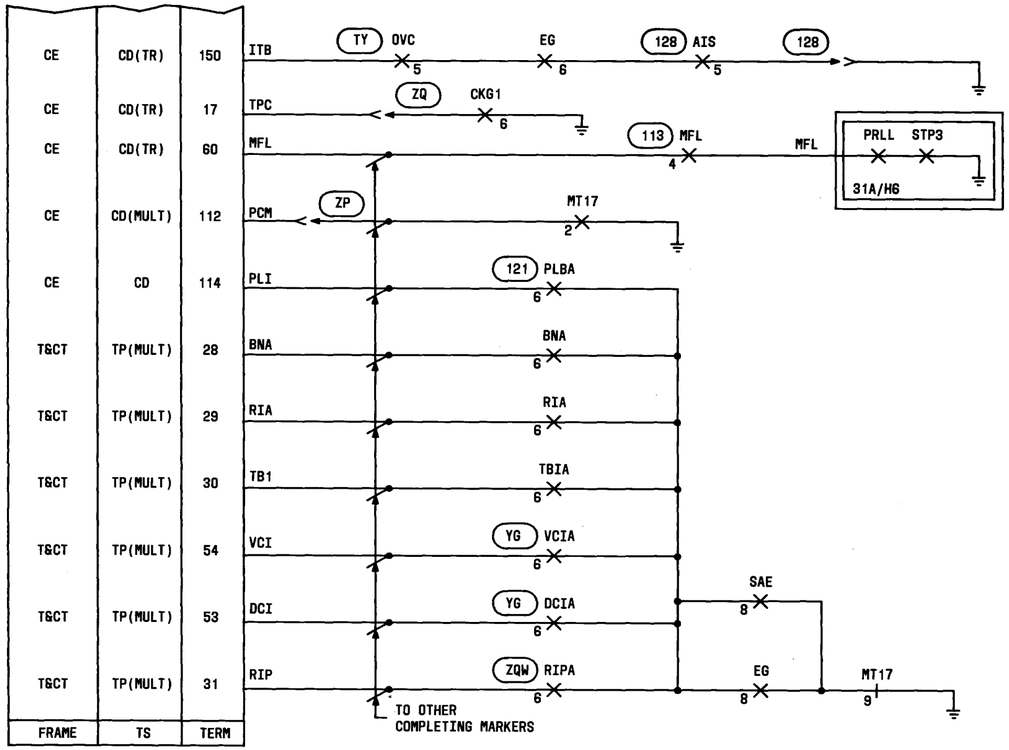
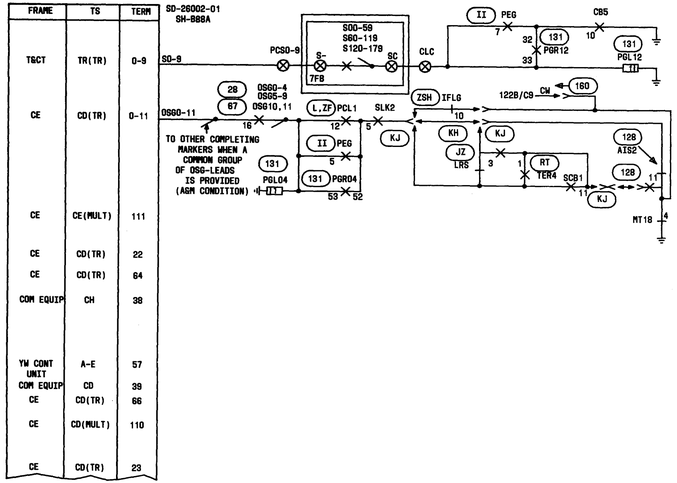
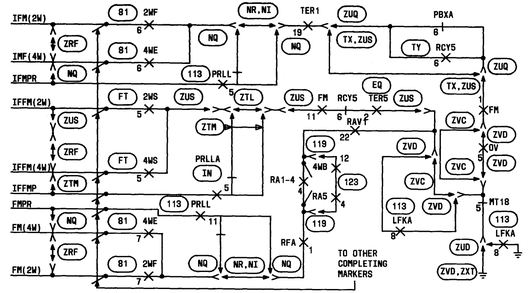


Fig. 16—Traffic Register Leads





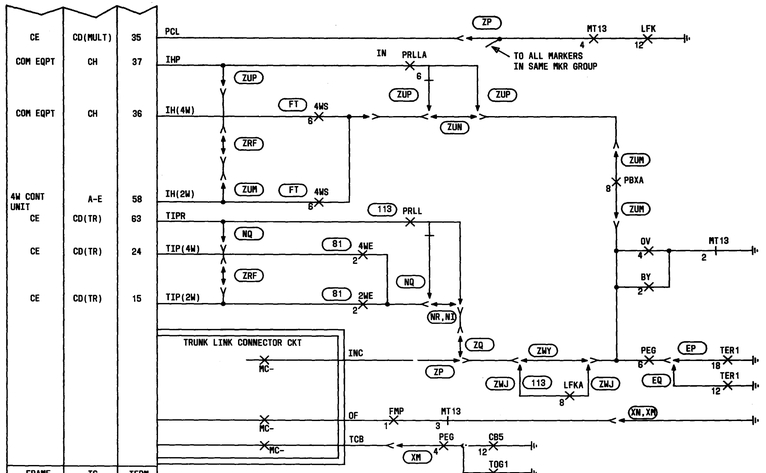


Fig. 17—Traffic Register Leads

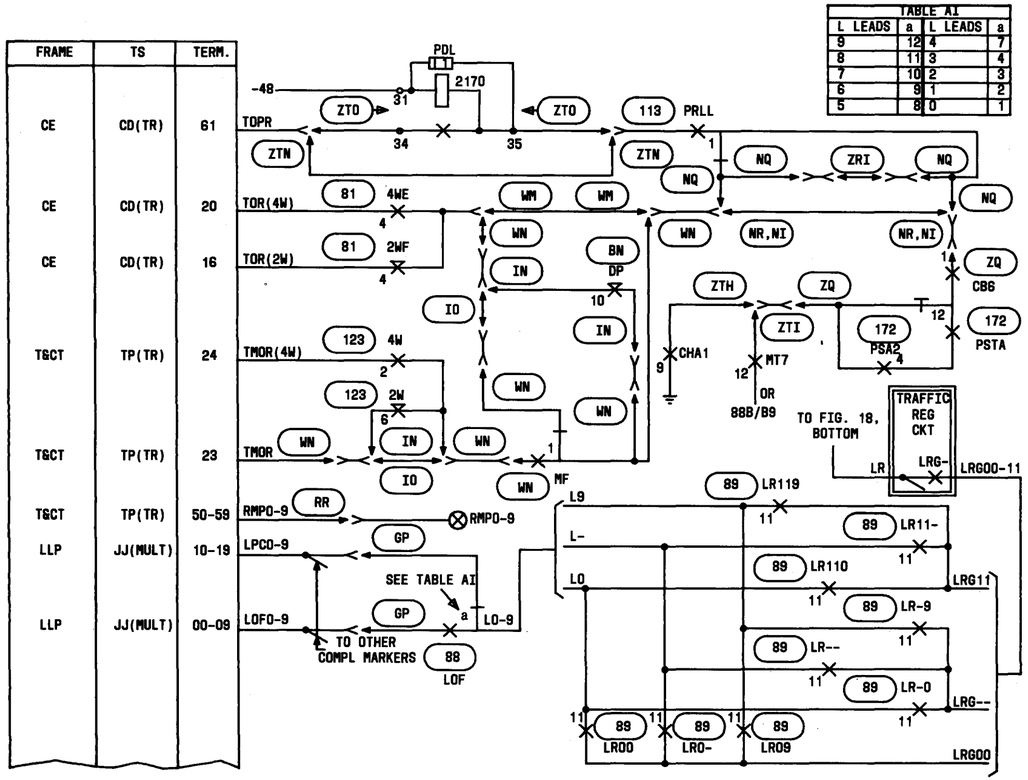


TABLE AI			
L LEADS	a	L LEADS	a
9	12	4	7
8	11	3	4
7	10	2	3
6	9	1	2
5	8	0	1

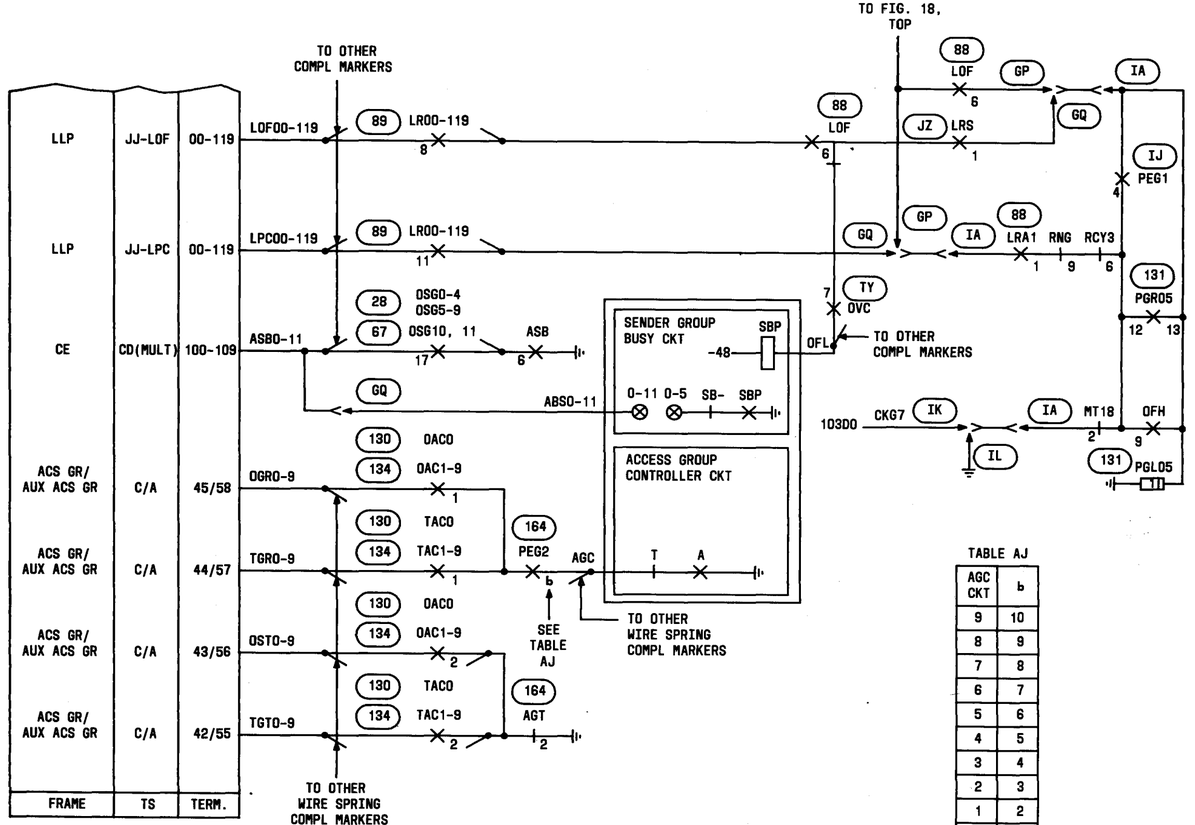


TABLE AJ	
AGC CKT	b
9	10
8	9
7	8
6	7
5	6
4	5
3	4
2	3
1	2
0	1

Fig. 18—Traffic Register Leads

Note: If WH option is provided in the marker, short contacts 7F and 7B of relay MB.

14.17 Momentarily operate TRR relay in the marker under test. Verify plant register MTR_, associated with the marker under test, scores once and that plant register CMST does not score.

14.18 Repeat 14.17, momentarily operating TR1 relay instead of TRR relay.

14.19 Block operated GLH1 and CON1 relays in the marker.

14.20 Momentarily operate TR1 and TRR relays in turn and verify plant register MTR_ scores once for each relay operation. Release GLH1 and CON1 relays.

14.21 ***WH Option Provided:*** Remove short from 7F and 7B of MB relay. Momentarily operate TR1 and TRR relays in turn and verify plant register MTR_ does not score.

14.22 ***Originating Line Identifier, Apparatus 85 Provided:*** Block operated OLIA relay in marker and verify plant register DTPC scores. Momentarily operate TR1 and TRR relays in turn and verify plant register DMTR scores once for each relay operation and that plant register MTR does not score. Release OLIA relay.

B. Marker Second Trial Failure (MST)

14.23 If WH option is provided, strap 7F and 7B of MB relay. Block operated TR2B, GLH1, and CON1 relays.

14.24 Momentarily operate TR1 and TRR relays in turn. Verify plant register CMST_ scores once for each relay operation and that plant register MTR does not score.

14.25 Release GLH1 and CON1 relays. Momentarily operate TR1 and TRR relays in turn, and verify plant register CMST_ scores once for each relay operation.

14.26 ***WH Option Provided:*** Remove strap from 7F and 7B of MB RE1. Momentarily operate TR1 and TRR relays in turn, and verify plant register CMST_ does not score. Release TR2B and at MTF, remove MBB plug.

14.27 ***Originating Line Identifier, Apparatus 85 Provided:*** Block operated OLIA relay in the marker and verify plant register DTPC scores. Momentarily operate TR1 and TRR relays in turn, and verify plant register DMST scores once for each relay operation and that plant register CMST does not score. Release OLIA and TR2B relays.

C. Ground Test Failure (GTF)

14.28 Momentarily operate GT5 relay and verify plant register GTF scores. Block operated MT13 relay and repeat test. Verify plant register GTF does not score. Release MT13 relay.

D. Link Release Failure (LRF)

14.29 Block operated LR relay.

14.30 Momentarily operate TR1 and TRR relays in turn, and verify plant register LR scores once for each relay operation.

14.31 ***WH Option Provided:*** Block operated MB relay. Momentarily operate TRR and TR1 relays in turn, and verify plant register LR does not score.

14.32 Release LR and MB relays.

14.33 ***Centrex Apparatus 112, 114 Provided:*** Block operated LR1 relay. Momentarily operate TR1 and TRR relays in turn, and verify plant register LR with CZ option, or register TLR with BA option scores for each relay operation. Release LRI relay.

E. Transfer Peg Count (TPC)

14.34 Momentarily operate CKG7 relay and verify plant register TPC_ scores.

F. Outgoing SDR Group PC (OSG_ LM Option)

14.35 Block operated SLK2 and PEG1 relays.

14.36 Momentarily operate OSG_ relays, verifying the associated OSG_ plant register scores once for each relay operation.

14.37 Release PEG1 relay and block operated PCL1 relay (when equipped). Repeat and verify same. Release SLK2 and PCL1 relays.

G. Stuck Sender (SS_ LM Option)

14.38 Block operated SDT and TGT relays.

14.39 Momentarily operate OSG_ relays, verifying the associated SS_ plant register scores once for each relay operation. Release SDT and TGT relays.

H. Record of Selected Traffic Condition (EXR)

14.40 At MTF, plug marker to be tested busy.

14.41 Verify that ground is present on cross-connection punching GRD of terminal strip CF at common equipment bay of first completing marker under test.

14.42 Cross-connect punching BAT to BWD and GWD to contact 15 of relay CKG2. Block operated CKG2 relay and observe that CKG6 and BG relays operated.

14.43 Operate EXR key at MTF jack, lamp, and key circuit, and observe that EXA relay operates and grounds punching EXG and causes resistance battery (TRT relay winding) to be cut through to punching EXA. Trouble recorder delivers record with EX punched.

14.44 Remove cross-connection between GWD and contact 15 of CKG2 relay.

14.45 Release EXR key and observe that plant register EXR scores (register energized when EX or EXA with BG were operated).

14.46 Remove block from CKG2 relay and observe that it releases and causes CKG6, BG, and EXA relays to release.

14.47 With AT option provided operate MDK relay and verify that punching EX is grounded. Release MDK relay and apply battery to punching EXB. Manually operate TRR relay momentarily and observe that trouble record is delivered with EX punched.

14.48 Remove cross-connection between BAT and BWD punchings. Remove battery from punching EXB and release marker.

I. Glare Detection (GRA, GR0)

14.49 Momentarily operate GLC relay and verify plant register GRA scores. Block operated GL and GLB relays. Verify plant register GR0 does not score.

14.50 Momentarily operate AVK1 relay and verify plant register GR0 scores.

14.51 Release relays GL and GLB.

J. Incoming Reorder Requests (RO)

14.52 Momentarily operate relay RO and verify plant register RO scores. (AX and AZ option.)

K. Wideband Registers

14.53 Block operated marker TR1 and WBA1 relays.

14.54 Momentarily operate WB0 relay. Verify that plant register WTR0 and WTPC0 score once.

14.55 Momentarily operate WB1 relay. Verify that plant registers WTR1 and WTPC1 scores once.

14.56 Momentarily operate WB2 relay. Verify that plant registers WTR2 and WTPC2 score once.

14.57 Block operated TR2F relay.

14.58 Momentarily operate WB0 relay. Verify that plant registers WMST0 and WTPC0 score once.

14.59 Momentarily operate WB1 relay. Verify that plant registers WMST1 and WTPC1 score once.

14.60 Momentarily operate WB2 relay. Verify that plant registers WMST2 and WTPC2 score once.

14.61 Release TR1, WBA1 and TR2F relays.

L. Call Waiting Feature Registers

14.62 Record reading of CWP, CW1F, and CW2F plant registers.

14.63 Block operated PEG1 relay. Momentarily operate CWK relay and verify register CWP scores as a call waiting usage indication. Release PEG1 relay.

14.64 Block operated TRT relay. Momentarily operate CWS relay and verify register CW1F scores as a call waiting first trial failure indication.

14.65 Block operated TR2E relay. Momentarily operate CWS relay and verify register CW2F scores as a call waiting second trial failure indication.

14.66 Release TRT and TR2E relays.

COMPLETING MARKER TESTS USING MASTER TEST FRAME

A. IAO Calls (Table AK)

14.67 Determine from class-of-service assignment list, what classes of service are assigned in the office. Operate CST, CSU, CRU, CGB, CSGA, or CSGB keys or switches as required for individual flat rate subscriber class of service. Select an intraoffice code and an assigned individual subscriber line number and operate corresponding code and digits keys or switches A to G. Select a trunk link frame and an intraoffice trunk assigned for individual selected class of service and operate corresponding FS and TS keys or switches. If intraoffice trunk group is subdivided into two groups, select one in subgroup A and operate GPA key in addition to other lever keys or switches. At all line link connector frames, verify that TR is normal (MP chain is in preference). Change setting of FT, FU, VG, HG, and VF keys or switches, on successive calls so as to use each key or switch at least once. Change FT and FU so that all line link frames are used at least once. In offices equipped for centrex service also change setting of CST and CSU keys or switches and operate CRU and CSGA or CSGB keys so as to include each assigned customer group class. For each class setting, test to a terminating line number in each assigned customer group and to an individual line number. Set up the office code and line number as required for 4, 5, or 7 digit intraoffice call in accordance with marker cross-connection assignments. For 4 or 5 digit calls that use the X11 translator, operate key X11 or switch TRNA (X11). Check by lamp indications that calls complete satisfactorily, and that trouble recorder card positions FT, FU, VG, HG, VF, CT, CU, CRU, CGA, CGB, and A to G are perforated in accordance with line location, class of service, intraoffice code, and line number keys or switches operated. At all line link connector frames, operate TR key to change MP to E chain. Repeat basic call to each line link frame.

14.68 At the master test control bay pull out LP_ key associated with marker under test.

> ***Note:*** When a marker group expands beyond 12 markers, LP_ key is replaced by LPT key (lamp progress tens) and LP_ switch (for units) of marker under test.

14.69 Repeat one of the preceding tests and check at MTF JK bay that only connector LLC_ and TLC_ lamps light, corresponding to the line link and trunk link frame selected.

B. OGT Calls (Table AL)

14.70 Using marker cross-connection list, select an outgoing route (flat rate, non-AMA) requiring the use of a sender. Operate keys or switches as follows:

- Any line location.
- Class of service with access to the route. (2 Wire)
- CGB, CSGA or CSGB keys or switches will be operated along with CST, CSU and CRU keys or switches, as required, to give class of service having access to route selected.
- A, B, C code of the selected route (flat rate, non-AMA).

14.71 Check by lamp indications, that call completes satisfactorily and that trouble recorder card perforations OSG_, SSA or SSB, and OS_ are in accordance with sender group associated with outgoing code. Also check that A_ to G_ perforations agree with operated keys or switches.

14.72 At outsender connector frame, verify that the new TR key is normal (MP relay chain is in preference). Repeat one test call to each outsender connector. At outsender connector frame, operate TR key to change from MP to E. Repeat test call to each outsender connector.

14.73 Repeat test operations to each group of outgoing senders and each sender in a group changing class and code keys or switches as required.

C. INC Call (Table AM)

14.74 Set up incoming class, thousands, hundreds, tens, and units for an assigned directory number on IC, A, B, C, and D keys or switches. Operate an FS_ key or switch for any selected trunk link frame. Operate ITC(NP) key or switch, if a physical number is used, ITC(NT) if a theoretical number is used, ITC(NE) if extra theoretical number is used, or ITC(NA) for all or nondiscriminating number. Operate remaining keys or switches as indicated. Check by lamp indications that test call completes satisfactorily. Ringing combination lamps lighted depend on RC assignment of called number. Also check that trouble recorder card positions INC, OA, OB, A, B, C, D, FTT, FUT, VGT, HGT, VFT, RCT, RS, PTK, are perforated in accordance with keys or switches operated and number group assignments for called number. At all NG connectors, verify that TR key is normal and MP chain is in preference. Repeat test to direct calls to all equipped number group frames. At all NG connectors, operate TR key to transfer MP to E chain and repeat test to direct calls to all equipped number group frames. Change A, B, C, and D selection so that every FTT, FUT, VGT, HGT, VFT, and RCT indication is selected at least once in one NG.

14.75 Operate IC(AB) key or TRNB(FVD) or ICL(INC) switch, set up office code, thousands, hundreds, tens, and units for directory number on A, B, C, D, and E keys or switches respectively. Operate an FS_ key for selected trunk link frame. Operate ITC key or switch and lever keys or switches as indicated.

14.76 Check by lamp indications that test call completes satisfactorily and that trouble recorder card positions A to E, FTT, FUT, VGT, HGT, RCT, and RS are perforated in accordance with keys or switches operated and number group assignments for called number.

14.77 Operate IC(AB) key or TRNB(FVD), ICL(INC) switches, set up thousands, hundreds, tens, and units digits of an assigned physical line number on A, B, C, and D keys or switches, operate an FS_ key for selected trunk link frame, and operate ITC, switches and keys as indicated for physical line test.

14.78 Check by lamp indications that test call completes satisfactorily and that trouble recorder card position PHC is perforated.

14.79 Repeat test using an assigned theoretical line number. Observe same results and that trouble recorder card position THC is perforated instead of PHC.

> ***Note:*** If 4-wire operation tests are required, apply 14.74 with 4w key operated.

D. Tandem & Toll Incoming (Table AN)

14.80 Set up single directory digit and an assigned line number on A, B, C, D, and E keys or switches. Operate remaining keys or switches as indicated. Check by lamp indications that test call completes satisfactorily and that trouble recorder card positions FVD, A to E, RN2 and TAN are perforated in accordance with operated keys or switches, and that line location and ringing combination perforations agree with number group assignments of selected line number.

14.81 Set up single directory digit outgoing tandem office code and any line number A, B, C, D, and E keys or switches.

14.82 Set up any assigned trunk number on THT0/THT1 or THT2/THT3, HT, TT, and UT keys or switches as indicated.

14.83 Check by lamp indications that test call completes satisfactorily and that trouble recorder card positions FVD, TAN, TRN, and ECN are perforated. Also check that FTT, FUT, VGT, HGT, VFT, and RCT perforations agree with line location assignments for selected trunk number; that TB and TG perforations are for correct outgoing trunk group; and that A to F, THT0, 1, 2 or 3, HT, TT, and UT perforations are in accordance with operated keys or switches.

TABLE AK

COMPLETING MARKERS - IAO CLASS

CLASS INTRA-OFFICE		KEYS OR SWITCHES			SWITCH AND LEVER KEYS	LAMPS	MARKER
		LINE LOCATION AND CLASS	CODE AND DIGITS	MISC.			
TEST		F F V H V S S S R T U G G F T U U	A B C D E F G	F T 4 S S W	To Start Test Operate Keys RL and ST	O D R L I M I K S R G 2 1 L	0 2 4 6 8 10 12 14 16 / / / / / / / / / 1 3 5 7 9 11 13 15 17
LINE LOCATION		0 0 0 0 0 X X X / / / / / 5 9 13 9 4	X X X X X X X	X X X	ORIG OR TSTA (ORIG), RA0 OR RAUO, FS, TS, FG, REC, CD-OR BPU/CDU, CDT1	X X X X	

TABLE AL

COMPLETING MARKERS - OGT CLASS

CLASS OUTGOING	KEYS OR SWITCHES		SWITCH AND LEVER KEYS	LAMPS	MARKER
	LINE LOCATION AND CLASS	CODE AND DIGITS	To Start Test Operate Keys RL and ST	O D	
TEST	F F V H V S S R C C C T U G G F T U U A B C D E F G			R L I M I K S R G 2 1 L	0 2 4 6 8 10 12 14 16 / / / / / / / / / 1 3 5 7 9 11 13 15 17
OUTGOING CALL USING SENDERS	X X X X X X X X	X X X 0 3 7 9	ORIG OR TSTA (ORIG), MT, OR MTU-, MTTL, RA0 OR RAU0, 4W, REC, CD- OR BPU/CDU, CDT1	X X X X	

TABLE AM

COMPLETING MARKER - INC CLASS

CLASS REGULAR INCOMING CALLS	KEYS OR SWITCHES		SWITCH AND LEVER KEYS	LAMPS	MARKER
	CODE & DIGIT	MISC		D	
TEST	I C A B C D	! F T E S C	To Start Test Operate Keys RL & ST After Keys & Switches Listed Below	I L I M N K S R C 2 1 L C	0 2 4 6 8 10 12 14 16 / / / / / / / / / 1 3 5 7 9 11 13 15 17
4 DIGIT INC CALL	OA X X X X OB	X X	INC OR TSTA (INC), MT- OR MTU-, MTT1, FG, CON,	X X X X X	
5 DIGIT INC CALL	AB X X X X	X X 3	REC	X X X X X	/ / / / / / / / /
PHYSICAL (REVERTIVE) THEORETICAL	AB X X X X	X 9	INC OR TSTA (INC), MT- OR MTU-, MTT1, FG, PHC, CON, REC	X X X X X	
	AB X X X X	X 6	INC OR TSTA (INC), MT-, OR MTU-, MTT1, FG, THC, CON, REC	X X X X X	
4 DIGIT INC CALL 4 WIRE	OA X X X X OB	X X	INC OR TSTA (INC), MT-, MTU, MTT1, FG, CONA, REC, 4W	X X X X X	

14.84 Set up local completing code and any assigned line number on A, B, C, D, E, F, G keys or switches. Operate remaining keys or switches as indicated. Check by lamp indications that test call completes satisfactorily without a trouble record.

14.85 Set up outgoing office code and any line number A, B, C, D, E, F, and G keys or switches.

14.86 Set up an assigned trunk number on THT0/THT1 or THT2/THT3, HT, TT, and UT keys or switches and operate remaining keys or switches as indicated. Check by lamp indications that test call completes satisfactorily and that trouble recorder card positions TAN and ECN are perforated. Also check that line location and ringing combination perforations agree with number group assignments for selected trunk number, that TB and TG perforations are for correct outgoing trunk group, and that A to G, THT0, 1, 2, or 3, HT, TT, and UT perforations are in accordance with operated keys or switches.

14.87 Set up directing digit of 11X code on key or switch A. Set up any office code and number on keys or switches B to H.

14.88 Set up an assigned trunk number on THT0/THT1 or THT2/THT3, HT, TT, and UT keys or switches and operate remaining keys or switches as indicated. Check by lamp indications that test call completes satisfactorily and that trouble recorder card positions 11, TAN, and ECN are perforated. Also check that line location and ringing combination perforations agree with number group assignments for selected trunk number, that TB and TG perforations are for correct outgoing trunk group, and that A to H, THT0, 1, 2, or 3, HT, TT, and UT perforations are in accordance with operated keys or switches.

14.90 Set up foreign area (XOX) code on A, B, and C keys or switches. Set up any office code and number on keys or switches D to K.

14.91 Set up assigned trunk number on THT0/THT1 or THT2/THT3, HT, TT, and UT keys or switches and operate remaining keys or switches as indicated. Check by lamp indications that test call completes satisfactorily and that trouble recorder card positions TAN, TRN, and ECN are perforated. Also check that line location and ringing combination perforations agree with number group assignments for selected trunk number, that TB and TG perforations are for correct outgoing trunk group, and that A to K perforations are in accordance with operated keys or switches.

14.92 Set up local completing code and any assigned line number on A, B, C, D, E, F, and G keys or switches. Operate remaining keys or switches as indicated. Check by lamp indications that test call completes satisfactorily without a trouble record.

14.93 Set up outgoing office code and any line number on A, B, C, D, E, F, and G keys or switches.

14.94 Set up an assigned trunk number on THT0/THT1 or THT2/THT3, HT, TT, and UT keys or switches and operate remaining keys or switches as indicated. Check by lamp indications that test call completes satisfactorily and that trouble recorder card positions TOL, TRN and ECN are perforated. Also check that line location and ringing combination perforations agree with number group assignments for selected trunk number, that TB and TG perforations are for correct outgoing trunk group, and that A to G, THT0, 1, 2, or 3, HT, TT, and UT perforations are in accordance with operated keys or switches.

14.95 Set up foreign area toll code on A, B, and C keys or switches. Set up any office code and number on keys or switches D to K.

14.96 Set up an assigned trunk number on THT0/THT2 or THT2/THT3, HT, TT, and UT keys or switches and operate remaining keys or switches as indicated. Check by lamp indications that test call completes satisfactorily and that trouble recorder card positions TOL, TRN, and ECN are perforated. Also check that line location and ringing combination perforations agree with number group assignments for selected trunk number, that TB and TG perforations are for correct outgoing trunk group, and that A to K, THT0, 1, 2, or 3, HT, TT, and UT perforations are in accordance with operated keys or switches.

E. 4W Toll Incoming (Table AN)

14.97 Paragraph 14.80 applies for this test with key TTI or switch TRNTA(TT), key 4W, and switch CD_ or BPU/CDU operated for 4-wire operation.

14.98 Set up outgoing office code and any line number on A, B, C, D, E, F, and G keys or switches.

14.99 Set up an assigned trunk number on THT0/THT1 or THT2/THT3, HT, TT, UT keys or switches as indicated in table. Check by lamp indications that test call completes satisfactorily and that trouble recorder card position TOL, TRN, ECN, and 4W are perforated. Also check that line location and ringing combination perforations agree with number group assignments for selected trunk number, that TB and TG perforations are for correct outgoing trunk group, and that A to H, THT0, 1, 2, or 3, HT, TT, and UT perforations are in accordance with operated keys or switches.

14.100 Momentarily insert MB plugs into each ORMC or IRMC MB jack associated with the completing marker under test. Verify that the respective BG relay operates and releases as each MB plug is momentarily inserted. (BG relays are located above jack field of jack, lamp, and key circuit).

14.101 Verify that the associated CM AMB relay operates in CM under test while the respective BG relay is operated.

14.02 With all completing marker AMB relays operated simultaneously, verify that the B1 relay operates in the "all completing markers busy circuit".

14.103 Verify that an AMB relay released in each completing marker causes the release of the B1 relay in the "all completing markers busy circuit" .

14.104 Verify all CB relays associated with the marker under test operate and release under control of the connector make-busy jack at the master test jack, lamp, and key circuit.

- ORMC (Comp. Mkr.)
- IRMC (Comp. Mkr.)
- TRMC (Comp. Mkr.)

14.105 Insert MB plug into marker MB jack associated with the completing marker under test. Verify that all of the respective CB relays in the ORMC, IRMC, and TRMC operate. Also verify marker's AMB relay operates.

14.106 Using office wiring list for completing markers T-5870, verify that MAK, MCK, and MSK chain circuits are cross-connected correctly.

TRUNK LINK FRAME AND TRUNK SELECTION

A. OGT or IAO Trunk Selection

14.107 From office records select an office code and directory number of an available trunk on trunk link frame 00; BT00. Set up A_ through G_, CST_, CSU_, CRU_, CGA, CSGA, or CSGB keys as required for selected route. Operate FG0 and FS00 keys corresponding to trunk link frame 00. Operate TS00 key corresponding to BT00. Operate RA_ key as required for the selected route.

14.108 Set up any working line location on FT, FU, VG, HG, and VF keys. Operate FS and TS lever keys. Operate ORIG class of call. Select marker under test and operate REC key.

14.109 Originate test call and verify ORIG, LK2, DIS1, and MRL lamps light. Check that trouble card positions FS_ and TS_ are perforated in accordance with operated FS_ and TS_ keys. Also check the following perforations SF, PR, or TTF, depending on office size, and RF, EF, or SEF, depending on line link frame location used in 14.108.

14.110 Repeat 14.107 through 14.109, changing setting of FG_, FS_, and TS_ keys on successive calls so that an outgoing or intraoffice trunk in each assigned BT_ (TS_) position is used on one trunk link frame and one BT_ (TS_) is used on all trunk link frames.

B. Busy Trunk Selection

14.111 Make busy all the trunks on a trunk link frame of the selected group and repeat 14.107 and 14.108. Verify RA_ lamp lights and requested record card indicates marker route advanced. Operate NTFS and NTTS keys. Repeat 14.107 and 14.108. Repeat above. Verify ORIG, LK2, DIS1, and MRL lamps light. Also verify record card indicates call completed to selected trunk and FG_ and TF_ perforations indicate trunk link frame selected. Repeat for each equipped trunk link frame. Release made-busy trunks.

TABLE AN

TABLE E COMPLETING MARKERS – TAN, TOLL CLASS

NO. 5 CROSSBAR MARKER TEST CALL CHART

CLASS	TANDEM AND TOLL INCOMING — TEST	TEST SEC.	PUSH BUTTON KEYS OR SWITCHES — CODE AND DIGITS (CST, IC, A B C D E F G H J K)	MISC. FS	MISC. ITC	TRK. NO. * HT	TRK. NO. * TT	TRK. NO. * UT	SWITCH & LEVER KEYS — To Start Test Operate Keys RL and ST After INC or TSTA (INC), MT- or MTU-, MTT1, FG and Keys Listed Below	INC	TAN	TOL	LK2	DIS1	MRL	#RC
5 DIGIT TAN	LOCAL COMP CODES	D	FVD X X X X X (NOTE 1)	X	2				REC	X	X		X	X	X	X
5 DIGIT TAN	CODES COMP TO OGT	D	FVD X X X X X	X	2	X	X	X	REC	X	X		X	X	X	
TAN INC	LOCAL COMP CODES	D	TAN X X X X X X X (NOTE 2)	X	2					X	X		X	X	X	X
TAN INC	LOCAL AREA CODES	D	TAN X X X X X X X (NOTE 2)	X	2	X	X	X	REC	X	X		X	X	X	
TAN INC	FOREIGN AREA 11X CODES	D	(NOTE 3) TAN X X X X X X X X	X	2	X	X	X	REC, 11 ¢	X	X		X	X	X	
TAN INC	FOREIGN AREA XOX CODES	D	(NOTE 3) TAN X O X X X X X X X X	X	2	X	X	X	REC, ¢	X	X		X	X	X	
TOLL INC	LOCAL COMP CODES	D	(NOTE 3) TOL X X X X X X X	X	2					X		X	X	X	X	X
TOLL INC	LOCAL AREA CODES	D	(NOTE 3) TOL X X X X X X X	X	2	X	X	X	REC	X		X	X	X	X	
TOLL INC	FOREIGN AREA CODES	D	TOL X X X X X X X X X X	X	2	X	X	X	REC ¢	X		X	X	X	X	
TOLL INC 4 WIRE	LOCAL COMP CODES	E	TOL X X X X X X X	X					CD-, OR BPU/CDU, CDT1, TTI OR TRNA (TT)	X		X	X	X	X	X
TOLL INC 4 WIRE	CODES TO OGT	E	TOL X X X X X X X	X		X	X	X	REC, CD-, OR BPU/CDU, CDT1, 4W	X		X	X	X	X	

Note 1: Heavy vertical lines in code and digits columns indicate division between local office code and number or between foreign area code, office code and number.

Note 2: For 2 digit translation of BX codes, operate key 2DT or switch TRNA (2DT) instead of TAN button on IC key or ICL (TAN) switch. Set BX code on A + B keys or switches followed by numerical digits.

Note 3: Operate keys or switches required for TAN and TOL classes as follows:

INC CLASS			KEYS OR SWITCHES OPERATED (SEE NOTE 4)
TAN0	VF0*	CST0**	TAN (IC), or ICL (-), TRNA (-), CL (TCA or TCB)
TAN1-4	VF1-4	CST1-4	TAN (IC), 2DT or FVD, or TRNA (2DT) or (FVD)
TOL0	VF0	CST0	TOL (IC), or ICL (-)
TOL1-4	TCB	CST1-4	TOL (IC), 2DTT or FVDT, or ICL (-), TRNA (-), CL (TCA or TCB)

* VF and TCB keys are for option "RE"
** CST keys are for option "RD"

Note 4: When option "NQ" is furnished on SD-25800-01, the settings for switches ICL, TRNA, and CL are flexible and determined by local office cross connections and assignments.

Combination of ringing lamps lighted, depends on number group RC assignment of called numbe

¢ Lamp FAT - should light on foreign area codes requiring foreign area translation.

* THT1 key is normal for under 1000 trunk numbers and operated for over 1000 trunk numbers. THT2 key operated for trunk numbers and THT3 key operated for 3000 trunk numbers.

C. Random Trunk Selection

14.112 Select a trunk group which has idle trunks on every trunk link frame. At trunk link connector frames, verify TR key is normal (MP chain is preference). Restore FG_, FS, and TS lever keys to normal. Repeat 14.107 and 14.109 as many times as the number of trunk link frames are accessible from marker under test. Verify from trouble records that the marker selects trunk link frames in steps of twos—0, 2, 4, 6, —, 1, 3, 5, etc. At all trunk link connector frames, operate the TR key to transfer MP to E chain. Repeat this procedure.

D. Channel Selection

14.113 Repeat 14.107 and 14.108. Operate CH0 key. Originate test call and verify at trunk link frame 00 that channel 0 is used on call. Also verify that CH0 is perforated on trouble record card. Change setting of CH_ keys on successive tests to include all CH0-9 indications. Restore CH_ keys to normal.

FRAME BUSY

14.114 During light traffic insert a 349A make-busy plug in TL-MB jack on trunk link frame 0. Block operated relay BC00 in marker under test. Verify the FB0 relay operates in marker under test. Restore trunk link made busy. Verify FB0 relay releases. Repeat above test for each equipped trunk link frame. Verify that the corresponding FB_ relay operates for the numbered trunk link made busy. Operate BC00 relay for trunk links 0-9; BC10 relay for trunk links 10-19; BC20 relay for trunk links 20-29.

JUNCTOR SEQUENCE

14.115 At MTF, insert make-busy plug into MMB jack of completing marker under test.

14.116 At marker frame, with test receiver, alternately operate and release LLC2 relay and observe JSQ_ relays until JSQ0 remains operated with LLC2 relay nonoperated. Check that JL0 is operated.

14.117 With this made as a starting point, alternately operate and release LLC2 and observe that the JSQ0_ 5, JLE, JL0, JSE, and JS0 relays follow the sequence shown below.

ACTION	RELAYS OPERATED	RELAYS RELEASED
	JSQ0, JL0	
OPR. LLC2	JS0	
REL. LLC2	JSQ1, JLE	JSQ0, JL0, JS0
OPR. LLC2	JSE	
REL. LLC2	JSQ2, JL0	JSQ1, JLE, JSE
OPR. LLC2	JS0	
REL. LLC2	JSQ3, JLE	JSQ2, JL0, JS0
OPR. LLC2	JSE	
REL. LLC2	JSQ4, JL0	JSQ3, JLE, JSE
OPR. LLC2	JS0	
REL. LLC2	JSQ5, JLE	JSQ4, JL0, JS0
OPR. LLC2	JSE	
REL. LLC2	JSQ0, JL0	JSQ5, JLE, JSE

14.118 Restore marker to service.

DCT TEST

14.119 At MTF, insert make-busy plug into MMB jack of completing marker under test.

14.120 At marker under test, strap GND to 11M of LXP1 relay, strap 11F of LXP1 to 2 fix of LXP1.

14.121 At MTF, momentarily remove make-busy plug from MMB jack of marker under test.

Allow one call to be processed by that marker (observe usage lamp for marker). Call should fail and take a trouble record. Verify that all punches are correct up to and including DCT. (DCT should not be punched.)

14.122 Remove straps from LXP1 relay, and restore marker to service.

CONTINUITY TEST

14.123 At MTF, insert make-busy plug into MMB jack of completing marker under test. Verify CCT key is not operated.

14.124 Set up a basic MISC class of trunk test to any outgoing trunk with outsender, requiring loop supervision through the switches; such as: tone trunk, permanent signal, zero operator, etc.

14.125 At MTF control circuit, insulate 2/3T and 5/6T of the NTC1 relay. (Right control bay plate 41.)

14.126 Operate ST key. Trouble record should be taken with the correct progress punches perforated up to but not including the CON perforation.

14.127 Operate TR2 key then operate ST key. Verify no trouble record taken and the trunk test circuits AS lamp momentarily lights.

14.128 Restore TR2 key.

14.129 At jack bay operate CCT key. Operate ST key, verify no trouble record taken, and the trunk test circuits AS lamp momentarily lights. Restore marker under test to service and release CCT key.

LINE LOCATION TO SENDER FOR CHARGING

14.130 From office records determine which outgoing senders are arranged for AMA. (To be arranged for AMA, the senders must be equipped with line link storage relays.) Also determine on which outgoing sender connectors and subgroups within a connector these senders are located.

14.131 At MTF, set up an ORIG class and select marker under test.

14.132 Operate REC key and the OSS, SGA, or SGB and OS0 through OS4, as required, to select a sender on the first outsender connector frame, subgroup A. Make the sender selected busy to service. Select an office code and class of service corresponding to a trunk group having access to the selected sender. Operate line link location keys as follows: FT0, FU0, VG0, HG0, VF0.

14.133 Operate the ST key. Verify call completes and ORIG, LK2, DIS1, and MRL lamps light. At sender selected, verify the correct line link storage relays momentarily operate corresponding to the FT, FU, VG, HG, and VF keys operated at the test frame. (For reed packages, a reed reader can be used.) Verify punches on trouble record agree with test call setup and correct sender is used.

14.134 Repeat above test to the same sender, changing FT, FU, VG, HG, and VF keys as required to verify each storing relay in the sender and each corresponding punch on the card. Release to service selected sender.

14.135 Repeat above test to one sender in each outgoing sender connector and subgroup.

LL0-9 LEAD CHECK - IDLE AND BUSY

Note: Perform this test during light traffic.

14.136 At MTF insert make-busy plug into MMB jack.

14.137 Set up an ORIG class of marker test. Select marker under test. Operate class of service and select office code as required to select any outgoing trunk without sender.

14.138 Select any line link location.

14.139 At marker under test block LL4 and LL7 relays operated. At selected line link frame place make-busy plug into JS0 jack. At test frame operate CH0 key.

14.140 Operate ST key. Verify LK2, DIS1, and MRL lamps light. Also verify that no trouble record is taken.

14.141 Remove blocks from LL4 and LL7 relays.

14.142 Repeat test. Verify call does not complete and RBT1 and BTOF lamps light.

14.143 Remove MB plug from JS0 jack.

14.144 Repeat test for each channel of selected line link frame as follows:

LL RELAYS BLOCKED	JS- MAKE-BUSY CH- KEY	AT TST FRAME OPERATE CH- KEY
0, 1	1	1
0, 2	2	2
1, 2	3	3
0, 4	4	4
1, 4	5	5
2, 4	6	6
0, 7	7	7
1, 7	8	8
2, 7	9	9

14.145 Restore marker under test to service.

LB0-9 LEAD CHECK - IDLE AND BUSY

Note: Perform this test during light traffic.

14.146 At MTF_ insert make-busy plug into MMB jack.

14.147 Set up an ORIG class of marker test. Select marker under test. Operate class of service and select office code as required to select any outgoing trunk without sender. Select any line link frame location but select HG-0.

14.148 At line link frame selected, manually operate select magnet 0 on junctor switch 0. Using a 351-type make-busy shoe, operate any idle vertical on junctor switch 0. Release select magnet 0. Crosspoints should be closed and hold magnet should remain operated.

14.149 Operate CH0 key at test frame. Operate REC and ST keys. Verify BTOF lamp lights. Card should indicate HMS1 failure.

14.150 Remove make-busy shoe from line link junctor switch. Operate ST key. Verify call completes satisfactorily and no trouble record. LK2, DIS1, and MRL lamps light.

14.151 Repeat test changing only junctor switch and channel (CH_) keys as required for channel test leads 1 through 9.

14.152 Restore marker under test to service.

J0-9 LEAD CHECK - IDLE AND BUSY

14.153 Perform this test during light traffic.

14.154 At MTF insert make-busy plug into MMB jack.

14.155 Set up ORIG class of marker test. Select marker under test. Operate class of service and select office code as required to select any outgoing trunk without sender appearing on trunk link frame 0. Operate FS0 key and FS lever key. Select any line link location.

14.156 At trunk link frame 0, place a make-busy plug into JS0 jack. Operate CH0 key.

14.157 Operate ST key. Verify BT-OF lamp lights. Remove make-busy plug from JS0 jack. Operate ST key. Verify LK2, DIS1, and MRL lamps light.

14.158 Repeat above test changing CH_ key and JS_ make-busy for channels 1 through 9.

14.159 Restore marker to service.

LH0-9 LEAD CHECK - IDLE AND BUSY

14.160 Perform this test during light traffic.

14.161 At MTF, insert make-busy plug into MMB jack.

14.162 Set up ORIG class of marker test. Select marker under test. Operate class of service and office code as required to select an outgoing trunk without sender appearing on trunk link frame 0. Operate FS0 key and FS lever key. Operate TS lever key and TS_ key corresponding to the selected trunk. Select a line location on line link frame 0.

14.163 At trunk link frame 0, insert a 351-type make-busy shoe into the left trunk vertical 0 of the trunk junctor switch selected. Operate CH0 key.

14.164 Operate ST key. Verify BT-OF lamp lights. Remove make-busy from trunk switch vertical 0. Operate ST key. Verify LK2, DIS1, and MRL lamps light.

14.165 Repeat test changing CH_ key, and make-busy left half of trunk switch as required to select channels 1 through 9.

14.166 Restore marker to service.

MARKER SELECTION THROUGH MARKER CONNECTORS

14.167 At master test frame jack bay, make busy all markers to a connector but the marker under test. Allow two service calls through the idle marker. Verify call completes and the associated connector lamp lights. Also verify connectors TC, TC1, MK, W, and Z relays operate. Repeat test through each equipped marker connector, all ORMC, IRMC, and TRMC.

MARKER - SENDER LEADS

14.168 At jack, lamp, and key circuit, verify that make-busy plugs in SCMB - jacks operate SCBA/B_ relays in marker under test. Remove make-busy plugs.

14.169 At MTF, insert make-busy plug into MMB jack of marker under test. In marker under test, block TMS nonoperated.

14.170 Operate OSG0 in marker. Verify S1A and S1B operate in marker.

14.171 At jack, lamp, and key circuit, make-busy all senders in outsender group 0, subgroup A. Verify that S1A releases.

14.172 Alternately restore to service and then busy out each sender in subgroup and verify that SIA operates then releases.

14.173 Restore all senders to service.

14.174 Repeat 14.171 thru 14.173 for subgroup B.

14.175 Unblock OSG0 in marker.

14.176 Repeat 14.170 thru 14.175 for all other sender groups.

14.177 At marker, block OSG0 relay operated.

14.178 At sender connector associated with outsender group 0 subgroup A:

If connectors are wire spring

- If marker under test is an even numbered marker, momentarily short contacts 01 fixed to 01 make of MA2 relay associated with marker under test
- If marker under test is an odd numbered marker, momentarily short contacts 12 fixed to 12 make of MA1 relay associated with marker under test.

If connectors are U and Y

- If marker under test is an even numbered marker, momentarily short contacts 08 of MA relay associated with marker under test
- If marker under test is odd numbered marker, momentarily short contacts 09 of MA relay associated with marker under test.

14.179 Verify that GBA relay operates.

14.180 Repeat 14.178 and 14.179 for subgroup B (GBB relay should operate.)

14.181 Release OSG0 relay in marker.

14.182 Repeat 14.178 thru 14.181 for all other outsender groups.

14.183 Remove block from TMS RE1. Restore marker under test to service.

FTC LEAD CHECK

14.184 Perform this test during light traffic.

14.185 At MTF, insert make-busy plug into the MMB jack associated with marker under test.

14.186 At marker under test, block WT relay nonoperated.

14.187 Momentarily operate each assigned R_ (route relay) and FC_ (route relay). From office records determine which trunk link frame FTC_ relays should operate, FTC0-19 (for operated R_) and FTC 20-29 (for operated FC_). Verify that only the FTC_ operate where there are assigned trunks on the corresponding trunk link frames associated with the operated route relays. Remove block from WT relay and restore marker to service.

MARKER HOLDING TIME

14.188 This test provides verification that a marker serves a call within an accepted time frame, and when operating on heavy traffic and special conditions, the holding time of the marker is shortened. Details of actual setup will vary depending on the type of test equipment used, however general guidelines are included to insure that all markers are measured from the same "start timing" and "stop timing" points.

(a) ***Start Timing:*** Start timing point should be upon the release of the MAK, MCK and MSK relays. 8(MCK) is a spare break-make contact which can be used to give a start indication to the timing instrument.

(b) ***Stop Timing:*** Stop timing point should be at the release of the BX relay. 6(BX) has ground on 6 fixed, secondary winding of XJS1 on 6 make and nothing on 6 break. Six break can be used to give a stop indication of the timing instrument.

Note: When applicable, the MAK, MCK, or MSK relays alone could be used, measuring from the release to operate of any one of the three.

A. Times

14.189 The overall holding times for a completing marker are shown in Tables AO, AP, and AQ. Each type of call is indicated for light and heavy traffic as well as special features which may add to the overall timing.

B. Procedure

14.190 Make marker under test busy to all connectors at jack, lamp, and key circuit connector make-busy jacks. Open marker to one connector of a particular type such as ORMC. Allow marker to handle calls from the idle connector. As each call is handled allow timer to function. While call is being timed, verify the operation of key relays in the marker, such as; IAO, TER, SOG, etc. These relays will aid in determining the type of call being timed. Repeat test for each connector type until all equipped types of calls have been verified. When timing light traffic calls, block nonoperated HTR relay. For heavy traffic, block operated HTR relay. After test remove block and release marker made busy.

CODE POINT CHECK

14.191 Make an ORIG class of test call using any assigned class of service and line link location. Select office code on A, B, C digits. Operate REC key. Determine from office records the routing of each office code for the selected class of service. Operate ST key. Verify from trouble record card that the proper route relay operates. Check TB_, TG_, OS_, CL_, CP_, CR_, DL_ perforations for operated route. Repeat test for each code point.

SC CROSS-CONNECTION CHECK

14.192 Make an ORIG class of test as required to direct call to each SC_ cross-connection point assigned in the marker. Select office code as required which uses the SC_ point under test. Select class of service and line link location and trunk link frame as required to direct call to SC point under test. Operate REC key. Operate ST key. Verify from trouble record card that the proper route relay operates. Check TB_, TG_, OS_, CL_, CP_, CR_, DL_ perforations for operated route. Repeat test for each assigned SC point.

TABLE AO

WORK TIME FOR BASIC CALLS

TYPE OF CALL TYPE OF CALL	OVERALL TIME (HTR) OVERALL TIME (HTR)	TIME MEAS. FROM OP OF MS– TO RELEASE OF CB– IN–
IAO*	523MS	ORMC
SOG*	341MS	ORMC
INC*#	293MS	IRMC
TDM*#	347MS	IRMC
PCR	326MS	IRMC
Inc. CAMA, 1st. usage	429MS	IRMC
CAMA Junctor, 1st. usage	354MS	ORMC
CAMA Completing	456MS	IRMC
CNTX. LDN. (IAO) 1st. usage *#	586MS	ORMC
CNTX. LDN. TRF Portion	380MS	IRMC
Sta. Dial TRF. (Ph. II)	289MS	TRMC
LLP, 1 N.G. usage (IAO) *#	647MS	ORMC
LLP, 1 N.G. usage (INC) *#	437MS	IRMC
LLP, 2 N.G. usage (IAO) *#	692MS	ORMC
LLP, 2 N.G. usage (INC) *#	490MS	IRMC
Ph. II CNTX, IAO (DT)	581MS	ORMC
Ph. II CNTX, DAT	374MS	IRMC
Ph. III CNTX, DTI	269MS	TRMC
Ph. III CNTX, DTF	317MS	TRMC

* If 4W in 2W office add 21MS (if using LT trans.).

If equipped with PBX Allotter add 20MS.

ROUTE RELAY CHECK

14.193 Make an ORIG class of test as required to direct call to each assigned route relay. Select office code as required to direct call to route relay under test. Select class of service and line link location and trunk link frame as required to direct call to route relay under test. Operate REC key. Operate ST key. Verify from trouble record card that the proper route relay operates. Check TB_, TG_, OS_, CL_, CP_, CR_, DL_ perforations for route relay under test. Repeat test for each assigned route relay. Operate RA1 key and repeat test call to each assigned route relay.

AUTOMATIC MONITORING

A. Originating Register Monitoring

14.194 At MTF, operate STM and MAC key of the automatic monitor. During light traffic, allow only originating traffic into marker under test. At MTF connector make-busy jacks, busy

TABLE AP

ADDITIVE TIMES

FEATURE	ADDITIONAL TIME	TIME MEASURED BETWEEN
Line Busy (IAO)	11MS	OP of MS- and release of CB- in ORMC
Line Busy (INC)	95MS	OP of MS- and release of CB- in IRMC
Term. hunt, 1st. TB	100MS	Bat on NGS-ST PCHG & GND on U (RNG)
Term. hunt, each add. TB	78MS	Bat. on NGS-ST PCHG & GND on U (RNG)
Route Advance	72MS	OP of TBTA until OP of RR of OVFL TRK
AMA on IAO calls	19MS	OP of MS- and release of CB- in ORMC
Mess. Reg. on Orig. Line (IAO)	19MS	OP of MS- and release of CB- in ORMC
Mess. Reg. on Term. Line (IAO)	24MS	OP of MS- and release of CB- in ORMC
F. A. T. Switched Route	141MS	OP of MS- and release of CB- in ORMC
F. A. T. Direct Route	90MS	OP of MS- and release of CB- in ORMC

out all markers except marker under test to all originating marker connectors, and busy out marker under test to all incoming marker connectors. At automatic monitor, operate MOR key. The calls being monitored should be only the service originating registers associated with marker under test. At marker under test, verify the MON relay operates as each call is being monitored.

B. Outgoing Sender Monitoring

14.195 Restore MOR key and operate MOS key. The calls being monitored should be only the service outgoing senders which the marker under test has access to. At marker under test, verify the MON relay operates as each sender call is being monitored.

C. Incoming Register Monitoring

14.196 During light traffic, allow only terminating traffic into the marker under test. At MTF connector make-busy jacks, busy out all markers except marker under test to all incoming marker connectors, and busy out marker under test to all originating marker connectors. At automatic monitor, restore MOS key and operate MIR key. The calls being monitored should be only the service incoming registers associated with marker under test. At marker under test verify the MON relay operates as each call is being monitored.

14.197 Restore all keys and switches and make-busy plugs.

TABLE AQ

LIGHT TRAFFIC TIMES

TYPE OF CALL	TIME	ADDITIONAL TIME DUE TO TGT	TOTAL TIME
IAO	651MS	—	651MS
INC	383MS	—	383MS
SOG Call (1W Local TRK) (DF SDR)	341MS	669MS	1.01sec
SOG Call (2W Intertoll TRK) (DP SDR)	340MS	345MS	685MS
SOG Call (1W Local TRK) (MF SDR)	339MS	496MS	835MS
SOG Call (2W Intertoll TRK) (MF SDR)	339MS	76MS	415MS
TOG Call (1W Local TRK) (DP SDR)	365MS	645MS	1.01sec
TOG Call (2W Intertoll TRK) (DF SDR)	365MS	288MS	653MS
TOG Call (1W Local TRK) (MF SDR)	370MS	456MS	826MS
TOG Call (2W Intertoll TRK) (MF SDR)	370MS	75MS	445MS
SOG Call (2W Intertoll TRK) (RP SDR)	342MS	121MS	463MS
TOG Call (2W Intertoll TRK) (RP SDR)	382MS	97MS	479MS
Ph. II CNTX, IAO (Dial TRF)	788MS	—	788MS
Ph. II CNTX, (Don't Answ TRF)	454MS	—	454MS
Ph. III CNTX, (Dial TRF Identification)	356MS	—	356MS
Ph. III CNTX, (Dial Transfer)	428MS	—	428MS

15. DIAL TONE MARKER

15.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM	AUDIBLE ALARM
MB	—48V	PRTD	Frame FA—Aisle MJ	Major
*M	130V	PRTD	Frame FA—Aisle MJ	Major
E	130V	PRTD	Frame FA—Aisle MJ	Major
*TBS	—48V	PRTD	Frame FA—Aisle MJ	Major
Ring Grd	Ring Grd	PRTD		
Aud or AC DC Aud		PRTD		
DC 64-88 Volts				
*Misc Ckt				

15.02 Verify that all fuses appear in the fuse record book.

15.03 With the use of a volt-ohmmeter and appropriate test cords, verify the potential at the 130V and 48V test battery.

15.04 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle or MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on the test cord will start and release the call respectively from the RC jack.

ALARMS AND TIMING

15.05 At the master test frame, make busy the trouble recorder to the marker under test by inserting a 322A plug into associated TRMB M-jack. Also make marker busy by inserting 322A plug into associated M-MB jack. Block marker relays as indicated in Table AR. Observe the indicated relays operate within the specified time interval and the DL-lamp at the master test frame and the TA lamp at the marker lights.

15.06 Momentarily operate TRR-AR key to retire the alarm and extinguish DL_ lamp.

15.07 After verifying the DL_ lamp lights on one test for each marker, observation that relay DL operates in the marker will suffice. To release the alarm, manually release DL relay.

15.08 For overall timing the TA lamp lights on the marker frame instead of DL_ lamp on master test frame.

15.09 On the marker frame, release the TA and TRT lamps by operating AR key.

15.10 Unblock marker relays immediately after results are obtained to prevent further timing.

15.11 Remove make-busy plugs from TRMB M-jacks on the completion of tests.

TRAFFIC REGISTER ASSIGNMENT

15.12 With the use of the traffic register assignment list, associate each register or group of registers with the corresponding item on Table AS. The designation of traffic registers vary depending on operating conditions, therefore, the description of the register is furnished to facilitate the correct association.

15.13 Station an observer at the traffic register cabinet during operation tests to verify only the proper register scores. Interference from other tests in progress, causing the operation of traffic registers, must be considered.

15.14 Momentarily operate the relay or relays listed for each in Table AS to provide the operating path for traffic register. Verify when the last relay of a series is operated, the associated register scores.

15.15 Table AS also provides the traffic register operating lead and its associated originating frame, terminal strip, terminal, and relay contact.

PLANT REGISTERS

A. Marker Trouble Record (TR)

15.16 Manually operate and release TRR relay in the marker to be tested. Check that plant register MTR_ associated with the marker under test, scores once, and that plant register DMST does not score.

15.17 Manually operate and release TR1 relay and check for the same results.

15.18 Block GLH1 and CON1 relay operated in the marker.

15.19 Manually operate and release TRR and TR1 relays in turn and check that plant register MTR_ scores once for each relay function.

15.20 ***ZN Option*** - Block operated MB relay. Manually operate and release TRR and TR1 relays in turn. Check that plant register MTR_ does not score. Unblock MB relay.

TABLE AR

MARKER TIMEOUT FEATURES

TIMER	BLOCK RELAYS TO START TIMING	RESULTS	
		TIME INTERVAL	RELAYS OPERATE
Work Timer	1. SP, SNK 2. SP, TM	Apprx .24 to .45 Sec Apprx .24 to .45 Sec	WT, TRT, TRL, DL WT, TRT, TRL, DL DL Lamp Lights
Short Delay Timer	1. MAK1, LLC1, SP (N. O.) 2 FTCK, TLC, SP (N. O.) MXT (N. O.)	2.6 to 4.25 Sec 2.6 to 4.25 Sec	SDT, TRT, TRL, DL SDT, TRT, TRL, DL
Long Delay Timer	1. MAK1, RON, LLC1 SP (N. O.)	4.6 to 7.5 Sec	LDT, TRT, TRL, DL
Overall Timer	1 SP, OAT	9.6 to 15.4 Sec	MRL, TAL TA Lamp Lights on Marker Frame instead of DL Lamp and Major Alarm Sounds.
Heavy Traffic Timer	HTR (Note 1)	1.0 to 1.5 Sec	HTR (Operates) HTR (Releases)
Trunk Busy Timer	TBT	120 to 185 Mil-Sec	TBTA, FM, RAV1
Trouble Recorder Timer Release	TRT	Apprx 2.5 Sec	TA Lamp, and Major Alarm Sounds

Note 1: Momentarily operate relay HTR. Relay HTR locks operated until relay HTT operates (1—1.5 Sec).

B. Marker Second Trial Failure (MST)

15.21 Block operated TR2A relay.

15.22 Manually operate and release TR1 and TRR relays in turn and check that plant register DMST_ on the trouble recorder bay scores once for each relay function and that plant register MTR does not score.

15.23 Unblock GLH1 and CON1 relays.

15.24 Manually operate and release TR1 and TRR in turn and check that plant register DMST_ scores once for each relay function.

15.25 ***ZN Option*** - Block operated MB relay. Manually operate and release TRR and TR1 relays in turn. Check that plant register DMST_ does not score. Unblock TR2A and MB relays.

C. Dial Tone Peg Count (DTPC)

15.26 Manually operate and release CKG1 relay. Verify plant register (DTPC) scores once for each relay operation.

TABLE AS

TRAFFIC REGISTER OPERATION TESTS

TRAFFIC REGISTER DESIG.	DESCRIPTION OF REGISTER	OPERATE RELAYS TO SCORE REGISTERS	LEAD	REGISTER OPERATING PATH				
				FRAME	T. S.	TERM	RELAY	CONTACT
PCD	ORIG. REG. PEG COUNT (DP)	CHA, D	PCD	D-MKR	C (TR)	03	D	10
PCMF	ORIG. REG. PEG COUNT (MF)	CHA, MF	PCMF	D-MKR	C (TR)	02	MF	10
BD	BUSY ORIG. REG. (DP)	TBTA, D	BD	D-MKR	C (TR)	01	D	18
BMF	BUSY ORIG. REG. (MF)	TBTA, MF	BMF	D-MKR	C (TR)	00	MF	18
DT-TPC	DT MKR PEG COUNT	CKG1 (NOTE 1)	TPC	D-MKR	C (TR)	04	CKG 1	12
PCA	OVERLOAD ANN. TRK.	CHA, ANN	PCA	RR	A-TR	9	ANN	12M
PCR	ORIG. REG. GROUP	RO-3, CHA	PCR-	RR	A-TR	0-3	R-	10
BA	BUSY OVERLOAD ANN. TRK.	ANN, TBTA	BA	RR	A-TR	8	ANN	11M
BR 0-3	BUSY ORIG. REG. GROUP	RO-3, TBTA	BR 0-3	RR	A-TR	4-7	R-	3
TPC (TRF)	TOTAL PEG COUNT PHASE III CENTREX	DTA, CKG1	TPC-TRF	D-MKR	C (TR)	06	DTA	4M

Note 1: Operate relay 2W and/or 4W as required.

TUR ASSIGNMENT

15.27 Check the assignment of the dial tone marker MB and MBM leads to TUR per Wiring List Assignment Chart.

COMPLETE DIAL TONE MARKER TESTS USING MASTER TEST FRAME

A. Test Call Table

15.28 It is recommended that a table similar to Table AV be prepared for the job.

15.29 Table AV lists the various test calls to be made and indicates the key or switch operations required at the master test control bay for each test. Lamp indications for satisfactory tests and associated test paragraphs are also shown.

15.30 On Table AV an X in key or switch column indicates that a key or switch in this row must be operated. Its selection, however, is optional depending on what frame or circuit is available or is selected for the test.

15.31 Numerals such as 0/19 in switch or key columns indicate that a series of tests are to be made, in which each key or switch position must be used at least once, in accordance with equipment installed or as explained in associated test paragraph.

15.32 When more than ten trunk link frames are provided, FG_ key should be in position FG0 for frames 0 to 9, position FG1 for frames 10 to 19, and position FG2 for frames 20 to 29, in addition to FS key.

15.33 Do not use combination of Vertical Group 2 (VG2) and Vertical File 0 (VF0) keys for tests in this section as this is the no test vertical.

B. Test Operations

15.34 If applying this section on an addition, make marker to be tested busy by inserting a 322A make-busy plug into the associated M-D-MB jack on the master test frame jack, lamp, and key bay to avoid seizure or interference from service equipment during these tests.

15.35 Operate pushbutton and lever-type keys and switches as indicated in Table AV and associated test paragraph for test to be made. All other keys or switches should be in their nonoperated position.

15.36 Operate RL key momentarily to restore test circuit to normal and then operate ST key to start test. Check that master test control lamps light as indicated in Table AV and associated test paragraph. Also check that trouble record perforations agree with line location used and other pushbutton keys or switches indicated in Table AV.

15.37 A test failure will be indicated by a failure of one or more lamps listed in the lamp indication column to light or by TRL, TRL1 or BT/OF lamps lighting when test does not specify them to be lit.

15.38 TRL lamp will light when trouble encountered requires a trouble release with a trouble record.

15.39 TRL1 lamp will light when trouble encountered requires a trouble release without a trouble record.

15.40 BT/OF lamp will light to indicate a trouble release when circuit is unable to make second trial.

15.41 To control the start and release of tests of a particular marker, while observing that marker, the associated line link or trunk link frames, insert a remote control (RC) jack of the associated frame. Momentarily operate the test cord red button to release the master test control circuit. Momentarily operate the test cord white button to start the master test control circuit.

TEST CALLS

A. Line Location and Line Link Frame Selection

15.42 Operate keys or switches as shown on Table AV. Successive test calls should be made with the keys or switches changed to cover the following:

- All line link frames equipped - use one setting on the VG_, HG_, and VF_ keys or switches, and change the FT_ and FU_ keys or switches as required.

Note: If both wire-spring and flat-spring connectors are furnished, change settings for VG_, HG_, and VF_ to cover all vertical group, horizontal group, and vertical file leads in a frame served by each connector multiple.

- Check trouble record positions FT_, FU_, VGT_, HGT_ and VFT_ to verify that punches are in accordance with keys or switches operated.

- Operate HTR key. Observe that the same results are obtained except that trouble recorder card position HTR is perforated also.

B. Class of Service

15.43 Set up any equipped line location on FT, FU, VG, HG, and VF keys or switches. Include each assigned combination of CS0 to CS29 and CA or CB. Where rate treatment applies or class of service is on a tens and units basis, this information will be CST_, CSU_, CRU_, and CSGA or CSGB.

15.44 Check that the CS0 to CS9, CS10 to CS19, CS20 to CS29, and CGA or CGB perforations are correct for the class of service assignments of the line locations selected for test.

15.45 Also check by the CT_, CU_, CRU_ and CSGA/B perforations that the marker correctly translates the three CS_ assignments into the correct class tens, class units, and customer group service indication, respectively, on a two out of five basis.

15.46 When selected line location is manual (MAN), two party (2P), coin (CN), noncoin (NC), four digit PBX (PBX), five digit PBX (5DG), four digit PBX with private line network (4DG), PICTUREPHONE (PK1), or digit eight access (AC8) class of service, check that the indication in parentheses above is perforated.

C. Trunk Link Frame and Originating Register Selection

15.47 Set up any line location on FT, FU, VG, HB, and VF keys or switches and operate lever keys or switches as indicated in Table AV.

15.48 Change setting of FS and TS keys or switches on successive calls so that an originating register in each assigned TS position is used on one trunk link frame and one TS is used on all trunk link frames.

15.49 Check that trouble recorder card positions FS and TS are perforated in accordance with operated FS and TS keys or switches. Also check the following perforations, SF, PR, or TTF depending on office size and RF, EF, or SEF depending on trunk link frame selected.

D. Busy Trunk Link Frame and Originating Register Selection

15.50 Apply the following paragraphs during light traffic periods only.

15.51 At the MTF, set up any line location on FT, FU, VG, HG, and VF keys or FS and TS switches to select the first trunk link frame and originating register which are to be made busy for test. (Use NTTS and NTFS keys.)

15.52 Make busy all originating registers appearing on this frame by inserting a 322A make-busy plug into their associated ORMB jacks at the MTF jack, key, and lamp bay.

15.53 Operate START key.

15.54 Remove the make-busy plugs from the ORMB jacks.

15.55 At the MTF, verify correct lamp indications per Table AV. Check that trouble recorder card positions TF, FG, and TS_ are perforated in accordance with operated keys or switches. If inaccuracies are found, the cause shall be corrected and the test paragraph repeated.

15.56 Momentarily operate RL key to release the test frame.

15.57 Repeat the test to each trunk link frame.

E. Random Trunk Link Selection

15.58 Set up any location on FT, FU, VG, HG, and VF keys or switches as indicated in Table AV. Check by lamp indications that test call completes satisfactorily and that no trouble record call is received.

15.59 Repeat test as many times as the number of trunk link frames installed. Check by observing that the operated FM_ and FMG_ (45) and (46) relays after each test call correspond to the trunk link frame number selected and that the trunk link frame number is selected in steps of twos 0, 2, 4, 1, 3, 5, etc. The FM_ and FMG_ relays associated with each trunk link frame are as follows:

FM- RELAY OPERATED	FMG- RELAY OPERATED					
	0	5	10	15	20	25
0	0	5	10	15	20	25
1	1	6	11	16	21	26
2	2	7	12	17	22	27
3	3	8	13	18	23	28
4	4	9	14	19	24	29

TRUNK LINK FRAME NUMBERS

F. All Registers Busy

15.60 Set up any line location on FT, FU, VG, HG, and VF keys or switches and operated lever keys or switches as indicated in Table AV. Check by lamp indications that test call completes satisfactorily. No trouble record card should be received.

G. Channel Selection

15.61 Set up any line location on FT, FU, VG, HG, and VF keys or switches and operate lever keys or switches as indicated in Table AV.

15.62 Change setting of CH keys or switch on successive tests to include all CH0-9 indications.

15.63 Check that trouble recorder card positions CH_ and LL_ are perforated in accordance with CH_ indications used. Number of CH_ perforation should agree with number of CH_ key or switch, while LL_ perforation should be additive on a two out of five basis.

H. Junctor Sequence and Subgroup Selection

15.64 Set up any line location on FT, FU, VG, HG, and VF keys or switches as indicated in Table AV.

15.65 Change setting of JSQ_ keys or switch on successive test calls to include JSQ0 to 5.

15.66 Check that trouble recorder card positions STP1 and JG_ are perforated in accordance with Table AX.

15.67 Repeat test with STP2 key and check that trouble recorder card positions STP2 and JG_ are perforated in accordance with Table AX.

I. Failure to Match

15.68 To test this feature a channel is made busy at the trunk link frame and the DT marker is directed to it by the MTF. In single, paired, and triple TLF offices, the junctor pattern is such that the marker test of ten channels is done in one step. On other junctor patterns, marker goes to Step 2 after finding channel busy on Step 1. Apply the following paragraphs during light traffic periods.

15.69 Set marker under test to select trunk link frame 0 on its next call by manually operating its highest numbered FM_ and FMG_ relays which should lock operated.

15.70 At the MTF, set up any line location on FT, FU, VG, HG, and VF keys or switches. Operate keys and switches as indicated in Table AV.

15.71 At trunk link frame 0, insert the plug of remote control cord into the RC jack and a 349A make-busy plug into JS_ jack which corresponds to the channel selected in Table AV.

15.72 Using remote control cord, momentarily operate RED and then WHITE button, remove the make-busy plug from the JS0 jack, and the remote control cord from R0 jack.

15.73 Marker should select an originating register on trunk link frame 0 but find no channel available. It should then recycle, select a register on trunk link frame 2, and complete the call satisfactorily as shown by lamp indications. Check that trouble recorder card position FS2 is perforated. If incorrect lamps are found, the cause shall be corrected and the test paragraph repeated. Momentarily operate RL key to release the test frame.

15.74 Insert make-busy plugs into JS0 jacks at trunk link frame 0 and 2. Release REC key and repeat test.

15.75 Marker should select an originating register on trunk link frame 0, fail to find a channel, recycle, select a register on trunk link frame 2, again fail to find a channel, route advance, and disconnect. DT, TC1, D1S1, MRL, and RA1 lamps should light. No trouble record card should be received.

15.76 Remove make-busy plugs from JS0 jacks on trunk link frames 0 and 2. Momentarily operate RL key to release the test frame.

J. Second Trial - GOA Lead

15.77 Set up any line location on FT, FU, VG, HG, and VF keys or switches and operate lever keys or switches as indicated in Table AV. Check that trouble recorder card positions 2TR, or TR2, CH5, or higher channel and JG0 are perforated.

15.78 Release TR2 key and repeat test. Check that trouble recorder card CH0 or higher, ITR or TRK is perforated and TR2, or 2TR is not.

K. Transfer Start

15.79 Set up any line location on FT, FU, VG, HG, and VF keys or switches and operate lever keys or switches as indicated in Table AV. Do not operate REC key. Check that trouble recorder card position TRS is perforated.

L. No Test Connector

15.80 Set up any line location FT, FU, VG, HG, and VF keys or switches and operate lever keys or switches as indicated in Table AV. Check by lamp indications that test call completes satisfactorily and that no trouble record card is received.

15.81 At the no-test connector switch, make busy the no-test vertical serving line location set up on the FT, FU, and HG keys or switches, by temporarily grounding the NT lead at vertical No. 3 spring. Hold magnet should operate.

15.82 Repeat test. Check that NTB and TRL lamps light and a trouble recorder card is received without position LXP1 perforated.

15.83 Remove ground from NT lead at the no test vertical.

M. Loop Continuity Test

15.84 Set up any line location on FT, FU, VG, HG, and VF keys or switches and operate lever keys or switches as indicated in Table AV. Check by lamp indications that test call completes satisfactorily and that no trouble record card is received.

15.85 Operate CONA key for 4-wire office. Omit CON key.

15.86 Operate NTC key and repeat test M. Observe same results.

N. Reverse Continuity Test

15.87 Set up any line location on FT, FU, VG, HG, and VF keys or switches and operate lever keys or switches as indicated in Table AV. Check by lamp indications that test call completes satisfactorily and that no trouble record card is received.

15.88 Operate NTC key and repeat test M. Observe same results.

O. False Ground On Line Sleeve

15.89 Set up any line location on FT, FU, VG, HG, and VF keys or switches and operate lever keys or switches as indicated in Table AV. Check by lamp indications that test call completes satisfactorily and that a trouble record card is received without position HMS1 perforated.

P. Crossed Line Hold Magnet

Note: Disregard LLJ, LHMT, and TLH lamps in tests P and Q when message register operation is provided.

15.90 Set up any line location on FT, FU, VG, HG, and VF keys or switches and operate lever keys or switches as indicated in Table AV. Check that trouble recorder card is received with position XLH perforated.

15.91 Operate HTR key in the MTF and repeat test P. Check that DT, TC1, DIS1, LK2, MRL, LLJ, LHMT, and TLH lamps light and no trouble record card is received.

15.92 Release key HTR.

Q. False Cross and Ground Test

15.93 Set up any line location on FT, FU, VG, HG, and VF keys or switches and operate lever keys or switches as indicated in Table AV. Check by lamp indications that test call completes satisfactorily and trouble recorder card with position FCG is perforated.

15.94 Operate FCGA key for 4-wire operation. Omit FCG key.

15.95 Operate TR2 key and repeat test Q. Check that BT/OF lamp lights instead of TRL and that trouble record card positions 2TR or TR2 and FCG are perforated.

15.96 Release TR2 key, block operated HTR(24) relay in marker and repeat test Q. Check that DT, TC1, DIS1, MRL, LLJ, LHMT, and TLH lamps light and no trouble record card is received.

15.97 Unblock relay HTR.

R. Monitoring Originating Register

15.98 Operate MAC key and wait at least one minute for automatic monitor to warm up and then operate MPOR and STM keys in sequence.

15.99 Set up any line location on FT, FU, VG, HG, and VF keys or switches, operate an FS_ and TS_ key or switch to select an originating register for test, and operate lever keys or switches as indicated in Table AV. Check by lamp indications that test is completed satisfactorily and no trouble record card is received.

15.100 Momentarily operate RL key to release test frame, check that M relay of originating register used for test is locked operated.

15.101 Release STM key. M relay in originating register should release.

S. Service Observing (AMA Only)

15.102 Set up any line location FT, FU, VG, HG, and VF keys or switches and operate lever keys or switches as indicated in Table AV. Check by lamp indications that test is completed satisfactorily and that a trouble record card with positions OBS1 and OBS2 is perforated.

T. Paired Line Link

Note: This test checks marker operation when the DCT circuit is modified to operate with paired line link frames.

15.103 Make busy marker under test at master test frame. Operate FT, FU, VG, HG, and VF keys or switches for originating test line on a paired line link frame. Operate MT and DT keys or switches to select marker under test and dial tone class of test.

15.104 Momentarily operate ST key and observe DT, TC1, and MRL lamps light.

15.105 Momentarily operate RL key and observe all lamps are extinguished.

15.106 If office is equipped with nonpaired line links, also repeat test using an originating test line location on a nonpaired line link frame.

U. Overload Announcement (Optional)

15.107 Set up a line location of a line in a vertical group denied access to announcement trunks as indicated in Table AV. AN key should be set in TST position.

15.108 Momentarily operate ST key and observe that test call completes satisfactorily. Trouble record card should indicate marker has route advanced.

15.109 Change setup to a line in a vertical group having access to announcement trunks.

15.110 Momentarily operate ST key and observe that test call completes satisfactorily and trouble record card indicates marker recycle to announcement trunk.

15.111 Release RA1 key or RAU1 switch and operate CH0 key or switch. Repeat tests

with JS0 jack at line link frame of line location used plugged busy. Results should be the same.

15.112 Restore all keys and switches.

V. Range Extension (Unigauge) (Optional)

15.113 Set up any line location on FT, FU, VG, HG, and VF keys or switches as indicated in Table AV. Operate ST key and check that LOLL punch is perforated on the trouble record card. (If a failure occurs it may be due to the marker not receiving the check ground from the operated LOLP relay in the register to hold operated the LOLP relay in the marker).

15.114 Release LOLL and REC keys, operate NOLL key. Repeat test and observe that test call completes satisfactorily.

15.115 Operate LOLL key, repeat test. Marker should fail on channel test and indicates an XCS punch on the trouble record card.

15.116 Release NOLL and LOLL keys. Operate NLL key and repeat test. Marker fails to set channel because it did not receive LOLL or NOLL indication from the line link.

15.117 Operate RL key.

W. Light Traffic Test (Option VR)

15.118 Set up any line location on keys or switches FT, FU, VF, HG, and VF. Set switches or operate lever keys as indicated in Table AV.

15.119 Momentarily operate ST key. Check by lamp indications that test call completes satisfactorily.

15.120 Momentarily operate RL key. All lamps extinguished.

15.121 At marker under test, remove timer tube HTT(11) and insert plug of 32A test set (remote control cord) into the RC jack. Manually operate HTR(24) relay. HTR relay should lock up.

15.122 Momentarily depress white button on RC cord. HTR relay should release immediately.

15.123 Momentarily depress red button on RC cord to release marker. Replace tube HTT.

15.124 Momentarily insert MB plugs into each LLMC MB jack associated with DT marker under test. Verify that respective BG relay operates and releases as each MB plug is inserted. (BG relays are located above jack field of jack, lamp, and key circuit.)

15.125 Verify that the associated DT marker AMB relay operates while the BG relay is operated.

15.126 With all DT marker AMB relays operated simultaneously, verify that the B1 relay operates in the "all DT markers-busy circuit."

15.127 Verify that an AMB relay released in any DT marker causes the release of the B1 relay in the "all DT markers-busy circuit." Where five DT markers are provided, both graded marker AMB relays must be released together to cause release of the B1 relay.

15.128 Where short cycle gate is provided verify during a light traffic period that if all DT markers are made busy simultaneously the AMB relay in the LLMC traffic control circuit operates.

15.129 Where the AMB relay does operate verify that the momentary release of each DT marker make-busy plug or both graded marker MB plugs, where provided, causes the release of the AMB relay in the LLMC traffic control circuit.

15.130 Verify all CB relays associated with marker under test operate and release under control of the connector make-busy jack at the master test jack, lamp, and key circuit.

LLMC (DT MKR)

TLLMC (Centrex) (DT MKR)

15.131 Verify that the dial tone marker can select each idle orginating register. This can be checked using the master test frame with FS and FS0-9; FG0-2; TS/ and TS0-9 keys operated.

15.132 Using office wiring list for dial tone markers T-5874 verify that the MAK,

MCK, and MSK chain circuit are cross-connected correctly.

15.133 Arrange dial tone markers to perform CON test at all times, by insulating respective contact of CCT relay at jack, lamp, and key circuit, SD Fig. 21. (Any CON failures generated by dial tone markers are linkage problems.)

15.134 ***Make-Busy*** Insert a 349A make-busy plug in TL-MB jack on trunk link.

15.135 Verify TMB lamp lights on frame upright and TLMB_ lamp lights in master test frame jack bay.

15.136 Block operated BC_ relay (per Table AT) in each marker in marker group. Verify FB_ relay (per Table AR) operates for trunk link under test.

15.137 Remove make-busy plug. Verify TMB and TLMB lamps are extinguished and FB relay releases in marker. Remove blocking tool from BC_ relay in each marker.

SPECIAL TEST FOR DIAL TONE MARKER ACCEPTANCE TESTS - MKR HOLDING TIME

15.138 This test provides verification that a marker serves a call within an accepted time frame, and that when operating on heavy traffic the holding time of the marker is shortened. Details of actual setup will vary depending on the type of test equipment used, however general guidelines are included to insure that all markers are measured from the same "start timing" and "stop timing" points.

15.139 ***Start timing:*** Start timing point should be upon the release of the MSK, MCK, MAK relays. Ten(MAK) is a spare break, make-contact which can be used to give a start indication to the timing instrument.

15.140 ***Stop timing:*** Stop timing point should be at the release of the BX relay. Eight(BX) is a spare break, make-contact which can be used to give a stop indication to the timing instrument.

Note: When applicable, the MAK, MCK or MSK alone could be used, measuring from the release to operate, of any one of those three relays.

TABLE AT

UNIT 0			UNIT 1			UNIT 2		
TL FRAME	TL TENS	TL UNITS	TL FRAME	TL TENS	TL UNITS	TL FRAME	TL TENS	TL UNITS
0		FB0	10		FB10	20		FB20
1		FB1	11		FB11	21		FB21
2	BC-0	FB2	12	BC-10	FB12	22	BC-20	FB22
3		FB3	13		FB13	23		FB23
4		FB4	14		FB14	24		FB24
5		FB5	15		FB15	25		FB25
6		FB6	16		FB16	26		FB26
7		FB7	17		FB17	27		FB27
8		FB8	18		FB18	28		FB28
9		FB9	19		FB19	29		FB29

15.141 ***Times:*** The overall holding time, light traffic, for a dial tone marker serving a flat rate line with no frame seizure delays, should be 305 ms ±25 ms. The overall holding time, heavy traffic, for a dial tone marker serving a flat rate line with no frame seizure delays, should be 225 ms ±25 ms.

15.142 ***Procedure:*** Make MKR busy while attaching timing instrument. Block nonoperated MB relay and allow MKR to handle a call. Observe that 2PMR relay does not operate. (This cancels dual voltage operation and lengthens holding time.)

SPECIAL TEST FOR DIAL TONE MARKER ACCEPTANCE TEST - JUNCTOR SEQUENCE

15.143 At MTF, insert a make-busy plug into MMB or M-D-MB jack of marker being tested.

15.144 At MKR frame, with test receiver, alternately operate and release LLC2 relay and observe JSQ_relays until JSQ0 remains operated with LLC2 nonoperated. Check that JG0 is operated.

15.145 With this mode as a starting point, alternately operate and release LLC2 and observe that the JSQ-0-5, JLE, JL0 and JSE, JS0 relays follow the sequence shown in Table AU.

SPECIAL TEST FOR DIAL TONE MARKER ACCEPTANCE TESTS - DCT TEST

15.146 At MTF, insert make-busy plug into MMB or M-D-MB jack of marker being tested.

15.147 At marker being tested, clip a ground to 10M (LXP1), clip from 10F (LXP1) to 23 (LLC1).

15.148 At MTF, remove make-busy plug from marker under test until one call is processed by that marker. (Observe usage lamp for marker.) Call should fail and take a TBL record, observe that all punches up to DCT punch are perforated.

15.149 At MTF, reinsert make-busy plug into make-busy jack and remove clip leads from LXP1 relay in marker.

15.150 At MTF, remove make-busy plug from MMB or M-D-MB jack.

SPECIAL TEST FOR DIAL TONE MARKER ACCEPTANCE TESTS - CONTINUITY TEST

15.151 At MTF, insert make-busy plug into MMB or M-D-MB jack of marker being tested.

15.152 Set up an originating register test (OR key operated). Do not operate TLK key.

15.153 Operate ST key. TBL record should be taken with all progress punches perforated up to CON punch.

15.154 Remove make-busy plug from MMB or M-D-MB jack.

SPECIAL TEST FOR DIAL TONE MARKER ACCEPTANCE TESTS - FALSE CROSS AND GROUND TEST

15.155 At MTF, set up a dial tone class of test. (DT key operated.) Select channel 9 and any line location by setting FT, FU, VC, HG, and VF keys or switches.

15.156 Insert make-busy plug into MMB or M-D-MB jack of marker being tested.

15.157 At marker frame, block operated RCTA relay.

15.158 At line link frame, clip ground to tip lead of line link channel 9 associated with horizontal group of line location selected.

15.159 At MTF, operate ST key. Verify trouble record taken with FCG perforated. Operate REL key.

15.160 If HTR key is provided, operate HTR key. If HTR key not provided, block nonoperated HTT. Block operated HTR in marker under test.

15.161 Operate ST key, verify no trouble record taken.

15.162 Operate REL key momentarily and restore HTR key, or remove blocking tools from HTT and HTR relays.

15.163 At line link frame, remove ground from tip lead of channel 9.

TABLE AU

START		OPERATED JSQ0, JLO	NON OPERATED
	Oper.	JSO	
	Non Oper.	JSQ1, JLE	JSQO, JLO, JSO
	Oper.	JSE	
	Non Oper.	JSQ2, JLO	JSQ1, JLE, JSE
	Oper.	JSO	
LLC2	Non Oper.	JSQ3, JLE	JSQ2, JLO, JSO
	Oper.	JSE	
	Non Oper.	JSQ4, JLO	JSQ3, JLE, JSE
	Oper.	JSO	
	Non Oper.	JSQ5, JLE	JSQ4, JLO, JSO
	Oper.	JSE	
	Non Oper.	JSQO, JLO	JSQ5, JLE, JSE

15.164 At marker frame, remove blocking tool from RCTA relay.

15.165 At MTF frame, remove make-busy plug from MMB or M-D-MB jack of marker under test.

TABLE AV

DIAL TONE MARKER TEST CALL CHART

CLASS DIAL TONE TEST	TEST SEC.	KEYS OR SWITCHES									LEVER KEYS OR SWITCHES	LAMP INDICATIONS											MARKERS			
		LINE LOCATION CLASS					NOTE A OTHER				SEE NOTE B TO START TEST OPERATE KEYS RL & ST AFTER KEYS & SWITCHES LISTED BELOW															
		FT	FU	VG	HG	VF	FS	TS	CH	JSQ		DT	TC1	DIS1	LK2	MRL	TRL	TSK	RA1	CK	AN	RCY	0	1	2	3
Line Location and Line Link Frame Selection	A	0/5	0/9	0/11	0/9	0/4	X				DT, MT-, FS, TS, FG-, REC	X	X	X	X	X										
Class of Service	B			(See Text)			X	X			DT, MT-, FS, TS, FG-, REC	X	X	X	X	X										
Trunk Link Frame and Originating Register Selection	C	X	X	X	X	X	0/9	0/19			DT, MT-, FS, TS, FG-, REC	X	X	X	X	X										
Busy TL Frame and Reg Selection	D	X	X	X	X	X	0/9	X			DT, MT-, NTFS, NTTS, FG-, REC	X	X	X	X	X		X								
Random Trunk Link Selection	E	X	X	X	X	X					DT, MT-	X	X	X	X	X										
All Registers Busy	F	X	X	X	X	X					DT, MT-, RA	X	X	X		X				X						
Channel Selection	G	X	X	X	X	X			0/9		DT, MT-, REC	X	X	X	X	X										
Junctor Sequence and Subgroup Selection	H	X	X	X	X	X				0/5	DT, MT-STP1, REC	X	X	X	X	X										
Failure to Match	I	X	X	X	X	X			0	0	DT, MT-, REC (See Text)	X	X	X	X	X										
Second Trial - GOA Lead	J	X	X	X	X	X				0	DT, MT, TR2, REC (See Text)	X	X	X	X	X										
Transfer Start	K	X	X	X	X	X					DT, MT, TRS	X	X		X	X										
No Test Connector	L	X	X	X	X	X					DT, MT, NTC (See Text)	X	X	X	X	X										
Loop Continuity	M	X	X	X	X	X					DT, MT, CON (See Text)	X	X	X	X	X										
Reverse Continuity	N	X	X	X	X	X					DT, MT, RV (See Text)	X	X	X	X	X										
False Grd Line Sleeve	O	X	X	X	X	X					DT, MT, LB	X	X				X									
Crossed Line Hold Mag	P	X	X	X	X	X					DT, MT-, XLH (See Text)	X	X			X										
False Cross and Ground Test	Q	X	X	X	X	X					DT, MT-, FCG	X	X				X									
Monitor on Orig Reg	R	X	X	X	X	X	X	X			DT, MT-, FS, TS (See Text)	X	X	X	X	X										
Service Observing (AMA)	S	X	X	X	X	X					DT, MT, OBS, REC	X	X	X	X	X				X						
Paired Line Links	T	X	X	X	X	X					DT, MT	X	X			X										
Overload Ann	U	X	X	X	X	X					DT, MT-, AN, RA1, REC	X	X	X		X			X		X	X				
Range Extension	V	X	X	X	X	X	0/9	0/19			FS-TS, FG-, LOLL, REC	X	X	X	X	X										
(Unigauge)																										
Light Traffic Test	W	X	X	X	X	X	0/9	0/19			FS, TS, FG-	X	X	X	X	X										

Note A - When line link frame serves only multifrequency originating registers operate key MF/MLF to MF position. If the line link frame serves both multifrequency and dial pulse originating registers operate key MF/MLF to MLF position. MF/MLF key normal simulates a call on a dial pulse register.

Note B - When switch type MTF is provided set switches MTU—, TSU—, RAU—, and TSTA (DT).

TABLE AW

Note A - For a Particular Originating Register Group (Max. 6 groups).

TYPE OF REGISTER GROUP	VERTICAL GROUP PATTERN	OPERATE KEY	OR	SET SWITCH RG
DP	—	—		DP
MF	—	MF		MF
R0	—	RT0		RT0
R1	—	RT1		RT1
R2	—	RT2		RT2
R3	—	RT3		RT3
MLF	—	MLF		MLF
MLF	0	MLF, RT0		VP0
MLF	1	MLF, RT1		VP1
MLF	2	MLF, RT2		VP2

TABLE AX

JUNCTOR SEQUENCE AND SUBGROUP SELECTION

NUMBER OF TRUNK LINK FRAMES			JUNCTOR SUBGROUP SELECTED JG–										
			STP1 KEY AND JSQ–KEY OPERATED							STP2 KEY AND JSQ–KEY OPERATED			
SINGLE	PAIRED	TRIPLE	0 1	2	3 4	5	0	1		2	3	4	5
2	4	6	0 1	2	0 1	2	3	4		3	4	3	4
2-3	4-6	6-9	0 1	2	0 1	2	1	2		0	1	2	0
3	6	9	0 1	2	0 1	2	3	3		3	3	3	3
4	8	12	0 1	0	1 0	1	2	2		2	2	2	2
5	10	15	0 1	0	1 0	1	1	0		1	0	1	0
6	12	18	0 0	0 or 1*	0 0	0 or 1*	1	1 or 2 ¢		0 or 1 ¢	1 or 2 ¢	1	0 or 2 ¢
7	14	21	0 0	0	0 0	0 or 1*	1	1 or 2 ¢		1	1 or 2 ¢	1	0 or 2 ¢
8	16	24	0 0	0	0 0	0	1	1		1	1	1	1
9	18	27	0 0	0	0 0	0	1	1		1	1	1	1
10	20	30	0 0	0	0 0	0	—	—		—	—	—	—

* JG0 operates if 3 Junctor Subgroups exist between the LL and TL. JG1 operates if 2 Junctor Subgroups exist between the LL and TL.

¢ The higher numbered JG relay operates if 3 Junctor Subgroups exist between the LL and TL. The lower numbered JG relay operates if 2 Junctor Subgroups exist between the LL and TL.

16. NUMBER GROUP, CONNECTOR AND CONNECTOR CONTROL

16.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
TBS	—48V	NGC	Frame FA—Aisle MJ (NGC Aisle)
PF	—48V	Frame	

16.02 With the use of a volt-ohmmeter and appropriate test cords, verify -48V test battery.

16.03 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle or MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on test cord will start and release the call respectively from the RC jack.

(d) ***Make-Busy Jack*** - Insert 349A make-busy plug into NMB jack on frame upright.

- Verify NMB (RED) lamps on frame upright and aisle MJ (RED) light and major alarm sounds.
- Verify MB relay in number group connector control, preference control, and make-busy circuit, SD-26039-01, associated with the number group under test is operated.
- Set basic incoming class of marker test to number group under test. Verify that marker is routed to overflow. Repeat this test using each marker.
- Remove 349A make-busy plug and verify NMB and MJ lamps are extinguished, major alarm is silenced and MB relay in NGCC is released.

TRAFFIC REGISTERS

16.04 With the use of the traffic register assignment list, apply the following test to each number group under test.

16.05 Table AY provides the traffic register operating lead and its associated frame, terminal strip, and terminal, and relay contacts.

TUR ASSIGNMENTS

16.06 No TUR leads are associated with this circuit.

NUMBER GROUP IDENTIFICATION LAMPS

16.07 At the master test frame jack, lamp, and key bay, operate BAT key to position ON. If alarm sending is provided, SB-NTR-DB key should be in NTR position. Manually operate MCC or MCE relay in the nonwire-spring or wire-spring number group connector associated with the added number group. Verify the NGC lamp associated with the added number group lights.

16.08 Release MCC or MCE relay. NGC lamp is extinguished.

NS_ LEADS

16.09 At number group under test block operated each equipped SC relay. At the MDF place ground on terminal NS000 for SC00 of number group under test. Verify at MDF that every NS (0) of all equipped SC relays has ground present and ground is not present on any other terminals NS (1-9). Place an additional ground on terminal NS001 of SC00. Verify that every NS (1) of all equipped SC relays has ground present and ground is not present on any other NS (2-9) terminals. Repeat above procedures in increasing order for the remaining NS (2-9) terminals. At the number group frame under test, remove the block from the highest equipped SC relay. At MDF, verify the ground is not present on any of the NS (0-9) terminals associated with the released SC relay. At number group under test, remove block from the second highest SC relay. At MDF, verify ground is not present on any of the NS (0-9) terminals associated with second highest SC relay. Repeat above tests for each equipped SC relay in decending order. Remove grounds from terminals associated with the SC00 relay.

TABLE AY

TRAFFIC REGISTER		DESCRIPTION OF REGISTER	LEAD	REGISTER PATH				
TYPE	DESIG.			FROM	TS	TERM	RELAY	CONTACT
OF	OF0-1	Subs Line Overflow	OF	NG	A (E)	06-07	OF	4M
OF	1OF0-1	PBX Line Overflow	POF	NG	A (C)	06-07	POF	6M

TB RELAY CHECK

16.10 Perform test prior to adding any line cross-connections. At number group under test, block operated all TB relays. Strap ground to punching 11 of the MC portion of HA terminal strip. Verify that ground is not present on 2M of U0 relay. Block U0 relay operated. Verify that ground is present on 2M of U0 relay, and not present on 2M of U1-9 relays, and not present on 4M and 6M of U0-9 relays. Block U1 relay operated. Verify that ground is present on 2M of U1 relay, and not present on 2M of U2-9 relays, and not present on 4M and 6M of U0-9 relays. Repeat this sequence until all U relays have been operated. With all U relays operated, verify that ground is present on the F cross-connection field for punching 000 through 999, and not present on the G and L cross-connection fields for punchings 000 through 999.

16.11 Release U0-9 relays and strap an additional ground to punching 12 of the MC portion of HA terminal strip. Verify that ground is not present on 4M of U0 relay. Block U0 relay operated. Verify that ground is present on 4M of U0 relay, and not present on 4M of U1-9 relays, and not present on 6M of U0-9 relays. Block U1 relay operated. Verify that ground is present on 4M of U1 relay, and not present on 4M of U2-9 relays, and not present on 6M of U0-9 relays. Repeat this sequence until all U relays have been operated. With all U relays operated, verify that ground is present on the G cross-connection field for punchings 000 through 999, and not present on the L cross-connection field for punchings 000 through 999.

16.12 Release U0-9 relays and strap an additional ground to punching 13 of the MC portion of HA terminal strip. Verify that ground is not present on 6M of U0 relay. Block U0 relay operated. Verify that ground is present on 6M of U0 relay, and not present on 6M of U1-9 relays. Block U1 relay operated. Verify that ground is present on 6M of U1 relay and not present on 6M of U2-9 relays. Repeat sequence until all U relays have been operated. With all U relays operated, verify that ground is present on the L cross-connection field for punching 000 through 999. Release all TB_ and U0-0 relays, remove ground straps from punchings 11, 12, and 13 of MC portion of HA terminal strip.

NUMBER GROUP TRANSLATION

16.13 Temporarily cross-connect the number group under test as indicated in Table AZ. At MTF, set up an incoming class of marker test. Operate IC_, ITC_, and A_ keys as required to direct call to number group under test. Set up B, C, and D keys corresponding to H, T, and U digits of directory number shown in Table AZ for test No. 1. Select marker for test. At marker selected, make marker busy and block the RNG relay nonoperated. Operate ST key. Trouble record taken. Verify correct information is returned for number translation shown in Table AZ. Also verify the correct number group identification is shown. If tens block screening is provided, verify correct TBS0-3 for number selected. Verify the correct physical and theoretical perforation. XSC may be perforated but should not be considered as a trouble.

16.14 Repeat above test for each test number in Table AZ for selected marker. Remove block from RNG relay and restore marker to service. Repeat test using each completing marker.

MP AND E CHAIN

16.15 Set up master test frame to direct an incoming class of call to the number group under test as indicated in Table AZ, test number 1. At number group connector control, verify TR key is normal and MP relay chain is in control. At test frame, repeat test number 1 of Table AZ for each equipped marker.

16.16 Verify call completes satisfactorily.

16.17 At number group connector control, operate TR key allowing E chain to be in control. At test frame, repeat test number 1 of Table AZ for each equipped marker. Verify call completes satisfactorily.

16.18 At number group connector control circuit associated with number group under test, momentarily insulate 8 and 12 break-contacts of each equipped marker E relay and verify as each contact is insulated the CH relay momentarily operates, the TR relay operates, and the TR_ relays release. Also verify the minor alarm sounds and the CH lamp lights. Prior to insulating the next contact, momentarily operate the AR key and verify that the TR relay releases, the TR_ relays

TABLE AZ

TEST NO.	DIRECT. NO. H.	T.	U.	NUMBER TRANSLATION FT	FU	VG	HG	VF	RC	PT– TO
1	9	8	7	0	1	0	2	4	01	9-PN
2	8	7	6	1*	2	1	3	3	06*	8-TN
3	7	6	5	2*	3	2	4	2	07*	7-EN
4	6	5	4	3*	4*	3	5	1	08*	6-PTN
5	5	4	3	4*	5*	4*	6	0	09*	5-PN
6	4	3	2	5*	6*	5*	7	4	11*	4-TN
7	3	2	1	0	7*	6*	8	3	16*	3-PN
8	2	1	0	0	8*	7*	9	2	17*	2-PN
9	1	0	9	0	9*	8*	0	1	18*	1-PN
10	0	9	8	0	0	9*	1	0	19*	0-PN

* If frame tens, frame units, vertical groups and ringing combinations are not equipped make assignments as required to insure that each equipped translation is used.

reoperate, the alarm is silenced, and the CH lamp goes out.

16.19 Release the operated TR key. Repeat 16.18. Where TR— relays are supposed to release, for this test they will operate. Also, instead of insulating at the E relay contacts, the MP relay contacts should be insulated and the same results obtained.

16.20 Verify the electrical operation of all equipped SC, A and TBA relays by applying battery and/or ground per Table BA.

TABLE BA

RELAY	APPLY GND.	APPLY BATT.
SC	XC	SC-
A	—	AD-
TBA	—	TBA-

TENS BLOCK SCREENING

16.21 Wire first number of 2LN to its assigned VF, using the RC punching associated with the units digit of the second number (see Note 405.1 SD-26034-01-D7).

16.22 Wire second number of 2LN 1SG to assigned VF using RC-01 at all times. ***Note:*** Using a spare LL location on HMDF, wire all twenty numbers in accordance with Table BB.

Match Line Verification Test

16.23 Operate following keys at MTF: Digits A-D, MLV, MT_, line location, CST, CSU, RC01, TERT - 2LN, TBS-2, (S_ Units digit of second line), KCS (CT-INC), (TRNB-OA) and LTC_.

16.24 Operate ST key; first line should match without a TRBL record. Lamps 2LN RP, 1, (ES - centrex only), CK DISI, LK2, MLVM and MRL wil light. Restore TERT_ SW to (POTS) and release (S) button.

TABLE BB

VF	0		1		2		3		4	
Line	X400	RC 03	X371	RC 04	X242	RC 05	X123	RC 09	X084	RC 12
#	X401	RC 01	S372	RC 01	X243	RC 01	X124	RC 01	X085	RC 01
Line	X995	RC 14	X566	RC RFTN	X716	RC 15	X657	RC 13	X838	RC 02
#	X997	RC 01	X569	RC 01	X718	RC 01	X656	RC 01	X830	RC 01

16.25 Operate digits A-D, line location, CST and CSU for second number. Line should match without a TRBL record being taken.

Hunt Feature

16.26 Operate the following keys at MTF: digits A-D for first number of 2LN ISG under test, INC, REC, FS, FS_, LTC_, TERT-2LN, TBS-2, MT_, and LBL (first line busy).

16.27 Operate ST key; lamps RP, 1, (ES_ centrex only), LHMT, TLH, LLJ, DISI, LK2, MRL, and INC will light. A TRBL record will be taken having line location of second number, 2LN, RC01, and TBS_ punches.

16.28 Repeat test for each tens block wired in the number group under test.

LVM TRAP

16.29 Wire the number appearance to F1 punching in ringing field of number group under test. Wire RF1 punching to VF and RNG comb appearance of number group under test.

16.30 Wire second number to F2 and RF2 punchings in the same manner.

16.31 Operate ENA, ENB, and ENC keys at MTF jack, lamp, and key circuit.

16.32 Operate keys at MTF; digits A-E of number under test, MT_, line location, CST, CSU, RC01, KCS, (CT-INC), TRNB_, A, ITC-9 physical, 6 theoretical, INC, FS, and REC. TBL card should have punches LVM, TL appearance, 1st, 2nd trial cards on LTR, 1st trial on HTR, DCT2 punch. Call will terminate, ringing into open will be heard since numbers do not terminate.

16.33 Lamps on MTF are RP, 1, (ES - centrex) LHMT, TLH, DISI, LK2, MRL, INC.

16.34 CLI lamp lighted, major alarm sounds; extinguish alarm and lamp by operating TRR-AR key. Operate RL key, test all markers to all numbers under test. Restore EN_ keys.

17. PRETRANSLATOR

17.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
PF	−48V	Frame	Frame FA—Aisle MJ
Test 48V (note 1)	−48V	PRTD	Frame FA—Aisle MJ
Test 130V (Note 2)	130V	PRTD	Frame FA—Aisle MJ
PB	−48	PRTD	Frame FA—Aisle MJ
TBS	−48	Frame	Frame FA—Aisle MJ
F0/F1	130V	PRTD	Frame FA—Aisle MJ
PRT CKT 0/1/2	130V	Frame	Frame FA—Aisle MJ

Note 1: Verify for battery on tip and ground on sleeve of test battery jack.

Note 2: Verify for 130 volts on tip of 130V jack.

17.02 Verify that all fuses associated with the pretranslator under test and assigned to the PRTD frame are listed in the fuse record book and are in agreement with the 569 Specification Equipment and Assembly Drawing.

17.03 Verify that an operated 48V or 130V fuse will cause the operation of FA1 (FA2 130V only), and MB relays in the pretranslator under test and associated CB_ relays in the connector.

17.04 Replace operated fuse and verify that FA and 130V FA2 relays release, but FA1 and MB relays remain operated, and fuse guard lamp (FG) on frame upright and the fuse guard lamp at the master test frame are lighted.

17.05 Operate AR key on frame upright. Verify FG lamp extinguished and FA1, MB relays in pretranslator and CB_ relay in connectors release.

17.06 With the use of a volt-ohmmeter verify the potential of the 130V and -48V test battery.

17.07 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and the absence of crosses to first frame in aisle or to MDF.

(b) ***Frame Line Telephone Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call of any type set up on the master test frame, verify that the white and red buttons on the test cord will start and release the call respectively from the RC jack.

MAKE-BUSY

A. PRT Make-Busy

17.08 Insert a make-busy plug into the PRT-MB jack, at the jack, lamp, and key circuit. Verify that the respective CB_ relays operate in all pretranslator connector circuits. Remove make-busy plug; verify that the CB_ relays release.

B. PRTC Make-Busy

17.09 At jack, lamp, and key circuit, insert a make-busy plug into the associated PRTC-MB0 jack for connector 0. Verify that CB_ relay operates in PRTC-0.

17.10 Remove make-busy plug and verify that CB_ relay releases.

17.11 Repeat 17.09 and 17.10 for each MB jack in each connector and verify that the associated CB_ relay operates in each connector.

C. Trouble Recorder Make-Busy

17.12 At master test center, insert make-busy plug into TRMB_ jack associated with the pretranslator under test.

17.13 At pretranslator under test, momentarily operate TR relay. Verify that the associated DL lamp lights. Momentarily operate the TRR-AR key. Verify that the DL_ lamp releases.

TIMING TESTS

17.14 Apply timing tests as listed in Timing Requirement Tables of SD_ Drawing.

PLANT REGISTERS

17.15 At pretranslator under test, block TRB1 relay operated and momentarily operate TR2 relay. Verify that registers PST and PTR_ each score once. On portion of master test frame connector located on pretranslator frame, short contacts 11 and 12 of relay PTT, contact 1 in W/S connector. Verify that PTP relay in master test frame connector operates.

17.16 Remove block from TRB1 relay and short on PTT relay.

17.17 Using master test frame, apply tests of Table BC to pretranslator under test. Verify that lamp indications and recorder card perforations are as indicated in Table BC.

17.18 Using office pretranslator cross-connection assignment records, perform a basic pretranslator test call for each code requiring pretranslation. Verify by lamp indications of Table BD that each code in the pretranslator is wired properly.

GS AND GC RELAY CHAINS

17.19 At jack, lamp, and key circuit, make all originating registers associated with the first pretranslator connector busy. (Use T-5790.)

17.20 At associated connector circuit, block TM, GA0, GB0, GA1, GB1, GA2, GB2, and associated PS_ relays nonoperated.

17.21 In one originating register in each of the associated subgroups of the connector, block operated the PST relay starting with an originating register in subgroup 0 followed by one in subgroup 1, and then one in subgroup 2.

17.22 Verify that GS0 and GC0 relays operate but GS1 and GS2 relays do not. Block GS0 relay nonoperated, verify that GS1 and GC1 relays operate and GC0 relay releases. Unblock the GS0 relay, verify that it reoperates, but the GC0 relay does not. Block the GS1 relay nonoperated. Verify that the GC1 relay releases and the GC0 relay operates. Block the GS0 relay nonoperated. Verify that relays GS2 and GC2 operate, and the GC0 relay releases.

17.23 Remove blocks from PST relays in each subgroup. Verify that GS2 and GC2 relays release.

17.24 Remove blocks from GS0 and GS1 relays, verify that GS0 and GS1 relays do not operate. Remove blocks from connector TM, GA0, GB0, GA1, GB1, GA2, and GB2 relays. At jack, lamp, and key circuit, remove make-busy plugs from originating registers associated with the first connector.

17.25 Repeat above test for each of the remaining pretranslator connectors.

PS-RELAY CHAINS

17.26 At pretranslator connector circuit, block nonoperated CB_ relays associated with the pretranslator under test.

17.27 At pretranslator under test block operated PC and PS relays.

17.28 In each connector position associated with the pretranslator under test, insulate contacts in accordance with Table BE. Verifications should be as indicated in Table BE.

17.29 Verify that the opposite potential is not present on the respective relay contacts in tests associated with Table BE.

17.30 At pretranslator circuit, remove blocks from PC and PS relays.

PS PREFERENCE

17.31 From traffic schematic, determine preferred and alterate preferred pretranslators for each pretranslator connector. Table BF provides standard arrangement for 2 connectors, and all the possible standard variations for 3 connectors.

17.32 At jack, lamp, and key circuit, make busy all originating registers associated with the first pretranslator connector.

17.33 At each connector associated with the pretranslator under test, momentarily apply

TABLE BC

TEST NO.	TEST	CODE	KEYS OR SWITCHES OPERATED	FINAL LAMP INDICATIONS	RECORDER CARD PERFORATIONS MTPT AND
1	Basic Test	Vac Code	PTT, MTU-	PTT, PRL, CMC	No Card
2	Transfer Start	any 7 Digit Code	PTT, MTU, TRS-	PTT, PRL, GR	TRS, PRT, DR-LT 1TR/2TR, PCK, PRL RLK Digits
3	Directing Code (11X)	any (11X)	PTT, MTU-TRS-	PTT, PRL, GR SD	TRS, PRT, DR-LT 1TR/2TR, PCK, PCK, RLK Digits
4	PRL Lead Open	Vac Code	PTT, MTU-PRL	PTT, PTR, HD G1	PRT, DR-LT, 1TR/ 2TR, CMC PCK Digits
5	RLK Open	Vac Code	PTT, MTU-RLK	PTT PRL, CM3 GR	PRT-DR-LT 1TR/ 2TR, CMC, PCK PRL Digits
6	Locking ground Failure on Translation Leads	Vac Code	PTT, MTU, LK	PTT, PRL, GR	PRT, DR-LT 1TR/ 2TR, PCK PRL, Digits
7	Open Translation Leads	Vac Code	PTT, MTU-OT	PTT, HD, PTR G1	PRT, DR-LT, 1TR/ 2TR, CMC PCK Digits
8	Second Trial	Vac Code	PTT, MTU-OT TR2	PTT, PRL, GR	PRT, DR, LT 1TR/ 2TR, CMC PCK Digits
9a	Open PTR Lead	Vac Code	PTT, MTU-PTR PRL	PTT, PRL, GR (TRT-Pretrans frame.)	PRT, DR-LT 1TR/ 2TR, CMC PCK Digits
9b	Open PTR Lead	Vac Code	PTT, MTU, RLK PTR	PTT, PRL, GR (TRT-Pretrans frame.)	PRT, DR, LT 1TR/ 2TR, CMC PCK Digits
10	Cross Detecting	*326	PTT, MTU	PTT, HD, PTR G1	DR-LT, TRK SD (X C Digit)
11	Second Trial	*326	PTT, MTU-TR2	PTT, PRL, GR SD	DR-LT, TR2 SD, (X C Digit)

* Mutilate C digit by depressing both the 5 and 6 buttons. If switches are provided apply ground to terminal 10 of MTC B4 T. S.

TABLE BD

S–CONN PUNCHING	LAMP
BSS	None
BSP	SD
CMS3	CM3
CMP3	CM3, SD
CMSA	CMA
CMPA	CMA, SD
CMSB	CMB
CMPB	CMB, SD
CMSC	CMC
CMPC	CMC, SD

battery through a test receiver to 5B of the TRS relay (STA lead). Verify that the proper PS_, PA_, PB_, and PC_ relays operate while battery is applied. Momentarily apply battery in the same manner to 5T of the TRS relay (STB lead), again verify that the proper PS_, PA_, PB_, and PC_ relays operate while battery is applied.

W AND Z RELAY OPERATION

17.34 Apply tests of 17.31 to 17.33. This time verify that the W and Z relays operate or release as each test is performed.

TRANSFER START

17.35 At pretranslator connector circuit, block TM relay operated. Verify that after a timed interval TRS relay operates. As soon as the TRS relay operates, release TM relay. (Note the time required for the TRS relay will vary depending on traffic conditions.)

TABLE BE

INSULATE CONTACTS	TEST AT CONTACTS	*Potential found on PS– relay contact in connector position under test only when contacts are insulated in*		
		CONN POSITION UNDER TEST	* PRECEDING CONN POSITION	Ø SUCCEEDING CONN POSITION
PS-	1T PS-	–48	–48	–48
2 and 3 T	2T PS-	GRD	–48	GRD
	3T PS-	–48	–48	GRD
PS-	1B PS-	GRD	GRD	–48
1 and 3B	2B PS-	GRD	GRD	GRD
	3B PS-	–48	GRD	–48

* Preceding connector position will be that connector position having its PCG- punching connected to the PCK- punching of the succeeding connector. Connector position having its PCK- punching connected to the PCG punching of the Pretranslator are not preceded.

Ø Succeeding connector positions will be that connector having its PCK- punching connected to the PCG- of the preceeding connector position. Connectors position having its PCG- punching connected to the PCK punching of the Pretranslator are not succeeded.

TABLE BF

NUMBER OF CONN IN OFFICE	CONN NO.	PREFERRED PRETRANS. (STA LEAD)	ALTERNATE PREFERRED PRETRANS. (STB LEAD)
2	0	0	1
	1	1	0
3	0	0	1
	1	1	2
	2	2	0
3	0	1	2
	1	2	0
	2	0	1
3	0	2	0
	1	0	1
	2	1	2

17.36 Repeat test for each pretranslator connector circuit.

17.37 At the first pretranslator connector, block operated the CB_ relay associated with the PS_ relay of the alternate preferred pretranslator. Momentarily apply battery to 5B of the TRS relay.

17.38 If two pretranslators are provided, verify that the PS_, PA_, PB_, and PC_ relays of the alternate preferred pretranslator operate while the battery is applied.

17.39 If three pretranslators are provided, verify that the PS_, PA_, PB_, and PC_ relays of the next highest pretranslator in numerical sequence operate, or if the alternate preferred pretranslator is the highest numerical sequence (2) that the PS_, PA_, PB_, and PC_ relays for pretranslator 0 operate. Block operated the CB_ relay of the next highest numerical pretranslator or the CB_ relay for pretranslator 0 as required. Momentarily apply battery to 5B of the TRS relay and verify that the PS_, PA_, PB_, and PC_ relays for the preferred pretranslator operate while battery is applied.

17.40 Remove blocks from CB_ relays, and at jack, lamp, and key circuit, restore all originating registers associated with the first pretranslator connector to service. Repeat the above test with each pretranslator connector.

LCB LEAD GROUNDS

17.41 At connector circuit, apply ground to 3B of any CB_ relay. This will provide a CB relay locking ground on the LCB lead for all CB_ relays in the same pretranslator connector. Apply ground to 1B of each CB_ relay in the same connector.

17.42 Verify that each relay operates without buzzing and locks. Also verify that when the last CB_ relay in the connector operates, all other CB_ relays release. Repeat above test enough times so that CB_ relays for each pretranslator will be the last one operated.

17.43 Remove ground from 3B of the CB_ relay. Repeat above test for each connector serving the pretranslator under test.

18. RECORDER, RECORDER CONNECTOR AND CALL IDENTITY INDEXER, PERFORATOR

18.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
PF	−48V	Frame	
1 of PA-PF	24V	Perforator (For added perforator)	
1-1/3	24V	Perforator	FA

18.02 Verify that all fuses appear in the fuse record book.

18.03 With the use of a volt-ohmmeter and appropriate test cords, verify the potential at the 48V test battery.

18.04 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle or MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on test cord will start and release the call respectively from the RC jack.

(d) ***Recorder Test Remote Control Jack (R JK)*** - Check continuity from all added R jacks to master timer frame.

(e) ***Make-Busy Jack*** - Insert 322A plug into TRMB R-0 jack. Relay TTIB operates in the recorder. Momentarily operate TB relay to operate DL relay. (TRR-AR key must be normal.) DL relay locks. DL-RO lamp lights. Operate TRR-AR key.

TIMING TESTS

18.05 Timing tests should be applied as listed in Timing Requirement Tables of SDs.

PLANT AND TRAFFIC REGISTERS

A. Plant Registers

18.06 Record the reading of the RTR_ and PC_ registers.

18.07 Momentarily operate TE relay in the recorder circuit, SD-25872-01. Observe plant register RTR_ associated with the recorder under test operates. Momentarily operate ON relay in the recorder circuit, SD-25872-01. Observe plant register PC associated with the recorder under test operates.

18.08 If AMA recorder total usage (RECPCT0-1) is furnished, apply the following paragraphs.

18.09 Momentarily apply ground to punching 2-11 for recorder under test on cabinet plate 13 until register RECPC_ reads 99.

18.10 Momentarily apply ground one more time and verify register RECPC_ steps to 00 and register RECPCT-0 scores once. If recorders 10-19 are added, use punchings 2-11 on plate 14 and check RECPCT-1 scores.

B. Traffic Registers

18.11 Momentarily operate ON3 relay and verify PC traffic register scores per telephone company traffic register assignment list.

18.12 Check the assignment of all leads to TUR per 526 Wiring List Assignment Chart.

CII AND RECORDER IDENTIFICATION

18.13 Make busy all trunks in the recorder under test. At CII associated with recorder under test, manually, simultaneously operate T0 and U1 relays. Trouble record taken. Release manually operated relays. Verify that trouble record card indicates TI, REC, DR(0-9) positions associated with AMA recorder under test, also verify that T4, T7, U0, and UI are perforated corresponding to the T0 and U1 operated relays. Repeat test operating T1 through T9 along with U2 through U9 and U0. Verify that the corresponding T and U 2-out-of-5 are perforated.

CII CHAINS

18.14 At CII associated with recorder under test, momentarily operate T0 relay. Verify that TA0, TB0, and TL0 relays momentarily operate and release. Also, verify that no trouble record is taken. Repeat test for T1 through T9 relays.

18.15 At recorder under test, block nonoperated IP and TA relays. Momentarily operate T0 and U0 relays. Verify that T0 and U0 lock operated and that TA0, TB0, TL0, and UA0 relays operate and lock. Momentarily operate T1 relay. Verify that T1 relay locks operated. Also verify that TA0, TB0, and TL0 relays release and TA1, TB1, and TL1 relays operate and lock. In sequence momentarily operate T2 through T9 relays. Verify

that as each relay is operated it locks. Also, verify that the preceding TA_, TB_, and TL_ relays release and the corresponding TA_, TB_, and TL_ relays, to the last operated T_ relay, operate and lock. After T9 relay has been operated, momentarily release U0 relay. Verify that all operated relays release. Momentarily operate U1 and T0 relays and repeat sequence of tests verifying the same results except that the UA1 relay will be operated. Repeat tests using U2 through U9 relays. Momentarily operate T0 and U0 relays. Verify that they lock operated. Momentarily operate U1 through U9 relays in sequence. Verify as each relay is operated it locks and the preceding U_ relay releases. When U9 relay has been operated, manually release U9. Verify that all relays release. Remove blocks from TA and IP relays in the recorder under test. Verify that no trouble record is taken.

CII CROSS DETECTION

18.16 Momentarily short contacts 3 and 4 top of T0 and T1 relays. Verify trouble record taken with IPA, XTL, and XTC positions perforated. Repeat tests, shorting 3 and 4 top of T2 and T3; T4 and T5; T6 and T7; T8 and T9. Verify the same results. Momentarily place ground on 2 top of UA0 relay. Verify trouble record taken with XTC position perforated. Repeat the above test for relays UA1 through UA9. Verify the same results.

18.17 Momentarily insulate 2 and 3 bottom of U9 relay. Verify trouble record taken with XU1 position perforated. Also, verify that the XRB lamp on the recorder upright is lit and major alarm is brought in. Momentarily operate the AR key. Verify alarm is silenced and XRB lamp is extinguished. Momentarily insulate 1 and 3 top of the U0 relay. Verify the same results. Momentarily insulate 1 and 2 bottom of the T0 relay. Verify the same results except instead of the XU1, the XT1 position is perforated. Momentarily insulate the 1 and 2 top of the T9 relay. Verify the same results except instead of the XU1, the XT1 position is perforated.

RECORDER TESTS MISC

18.18 Block TA, TB, TC, TD, and TE relays nonoperated. Insulate 2 and 3 top of TT1B relay. Short contacts 11 and 12 top, and 1 and 2 bottom of ON relay. Verify TF relay is operated. Remove block from TB relay and then from TA relay. Verify TA relay operates. In about 0.6 seconds TB relay operates and minor alarm sounds. Remove the block from TE, TD relay, and then from TC relay. Verify TC relay operates. TD relay operates for about 0.6 seconds. About 0.6 seconds later TE and RD relays operate. With a test receiver, verify that a ground is present on terminal 23 of the ID terminal strip. Remove the shorts on contacts of the ON relay and the insulator from 2 and 3 top of the TT1B relay. At the master test frame, momentarily operate the TRR-AR key. Verify that the minor alarm is silenced. Momentarily insulate 1 and 3 bottom of MTP relay. Verify XRB lamp lights on frame upright and major alarm sounds. Also verify that trouble record is taken.

18.19 Momentarily operate AR key. Verify XRB lamp is extinguished and alarm is silenced. Also, verify XP1 is perforated on trouble record card.

18.20 Momentarily operate A0 relay. Verify trouble record card is perforated with A0, IPA, TBL, and PTS positions.

PREFERENCE CHAIN

18.21 Block nonoperated OT0, IPA, and XP1 relays. Insulate 6 break of RTL relay. Block operated IP relay. Verify that ground is present on 6B of ON1 relay. With a metal object, verify that IPA relay is energized. Also, verify that XP relay does not operate.

18.22 Momentarily operate and release, one at a time, HP, TP_ (last), TP_ (all intermediate relays), TP0 and MTP relays. Verify that ground is not present on 6B of ON1 relay as each relay is operated. Verify that IPA relay is not energized while each relay is operated.

18.23 Also, verify the XP relay does not operate.

18.24 Block operated RIP relay. Verify that ground is present on 6B of ON1 relay. OTK relay operates and IPA relay is not energized. Remove insulator from 6-break of RTL relay. Verify IPA is energized. Release RIP relay. Verify OTK relay releases. Release IP relay. Momentarily open contacts 2T, 3T, 5T, and 6T of MTP relay. Verify XP relay operates while contacts are opened. Verify ground is removed from 6B of ON1 relay and IPA relay is not energized. Momentarily open contacts 2T and 3T of MTP relay. Verify XP relay

does not operate while contacts are opened. Insulate 2-break of RIP relay. Verify XP relay operates. Momentarily open contact 4 of RIP relay. Verify XP relay momentarily releases. Remove insulator from 2-break of RIP relay. Verify XP relay releases.

18.25 Insulate contacts 5T and 6T, and 2T and 3T of HP relay. Verify XP relay operates. Momentarily make contact 8 of RIP relay. Verify that XP relay momentarily releases. Remove insulators from HP relay. Verify XP relay releases. Remove blocking tools from OT0, XP1 and IPA relays. Remove insulator from 6-break of RTL.

SWITCH SYNCHRONISM

A. Preliminary Operation

Note: Telephone companies may not want transfer of timers. In that case do test on whichever timer is in service.

18.26 At the master timing frame, check that the TT (transfer timer) key is in the E (even) position and the ET lamp is lit, indicating that timing pulses are under control of the even timer.

18.27 Operate CMB0 key to horizontal position. CBM0 lamp lights. CMBE key is normal (vertical).

18.28 Operate CKL (check lamp) key for OS_ lamps associated with recorders.

B. Failure Alarm (Out of Sync)

18.29 Place the H, T, and U selectors of the added recorder in a position other than that occupied by the H, T, and U selectors of in-service recorders. Observe that within 1 minute, the major alarm sounds. Another way is to block UH operated for several seconds.

18.30 At MTMG key and lamp panel, check that SSF (switch synchronism failure) and the OS_ lamps corresponding to the recorder are lit. Momentarily operate AC0 key to silence the major alarm.

C. Switch Synchronization

18.31 This test also checks that a make-busy pattern (out of sync) is applied on the recorder tape by an even timer.

18.32 At the MTF JK bay, insert a make-busy plug (322A) in R_ MB jack of added recorder and observe that the associated R_ lamp lights and a make-busy pattern (out of sync) is applied on the recorder tape (see Table BG).

18.33 At the associated CII, check that a ground is absent from the terminals of CH terminal strip.

18.34 At each transverter, check that a ground is present on 1 bottom of corresponding RST_ relay (28,29) as an indication that the recorder tests busy to the transverter.

18.35 At the MTMG key and lamp panel, momentarily operate the S key. Observe that while the selectors in the recorder are synchronized, SE lamp lights. Within 30 seconds, SE or SO lamps and corresponding OS_ lamp are extinguished indicating that the recorder selectors are synchronized with those of the even timer.

18.36 At MTF JK bay, remove the make-busy plug from the R_ MB jack of added recorder. Observe that the associated R_ lamp remains lighted until completion of make-busy pattern.

18.37 Operate AR key to extinguish SSF lamp.

18.38 Release CMB0 key and operate TT key to the add (horizontal) position. Operate CMBE key, CMBE lamp lights. CMB0 lamp was extinguished with release of CMB0 key. Repeat tests per 18.29 through 18.36 on each added recorder. At end of tests, release CMBE and CLK key and operate TT key in that order.

PATTERNS

Note: In the following tests, AMA tape is perforated according to specific patterns. These perforations are checked with an ITE-4419 hand reader, either immediately after each pattern is applied or after all patterns on added recorders are applied.

TABLE BG

END OF TAPE ENTRY

MTMG RELAY	POSITION PERFORATED						REMARKS
	A	B	C	D	E	F	
P3	2	8	2	1	DT	DU	
P4	2	8	1	1	HT	HU	6 Sec. Tmg., Op. WY (MTMG)
P4	2	8	1	2	HT	HU	1 Sec. Tmg., Op WZ (MTMG)
P5	2	8	5	6	0	0	Out of Sync.
P6	2	8	0	5	RNT	RNU	*
P7	2	8	3	DU	MOT	MOU	6 Sec. Tmg., Op. WY (MTMG)
P7	2	8	3	MT	MOT	MOU	1 Sec. Tmg., Op. WZ (MTMG)
P8	2	8	4	DT	MGT	MGU	Op. ZY (MTMG)
P8	2	8	4	RGH	RGT	RGT	Op. ZY, WL/WM (MTMG)
P8	2	8	9	DT	RGT	RGU	Op. ZZ, CAMA. (MTMG)
P8	2	8	9	RGH	RGT	RGU	Op. ZZ, WL/WM (MTMG)
P1	0	8	1	0	1	0	Splice
Approx. 35 Lines of Splice							
P1	0	8	1	0	1	0	Splice
P3	2	8	2	1	DT	DU	
P4	2	8	1	1	HT	HU	6 Sec. Tmg., Op. WY (MTMG)
P4	2	8	1	2	HT	HU	1 Sec. Tmg., Op. WZ (MTMG)
P5	2	8	5	6	0	0	Out of Sync.
P6	2	8	0	5	RNT	RNU	*
P7	2	8	3	DU	MOT	MOU	6 Sec. Tmg., Op. WY (MTMG)
P7	2	8	3	MT	MOT	MOU	1 Sec. Tmg., Op. WZ (MTMG)
P8	2	8	4	DT	MGT	MGU	Op. ZY, (MTMG)
P8	2	8	4	RGH	RGT	RGU	Op. ZY, WL/WM (MTMG)
P8	2	8	9	DT	RGT	RGU	Op. ZZ, CAMA (MTMG)
P8	2	8	9	RGH	RGT	RGU	Op. ZZ, WL/WM (MTMG)
	A	B	C	C	E	F	

DT — Day Tens
DU — Day Units
HT — Hour Tens
HU — Hour Units
MT — Minute Tens
MU — Minute Units
MGT — Mkr. Grp. Tens
MGU — Mkr. Grp. Units

MOT — Month Tens
MOU — Month Units
RGH — Recorder Grp. Hds.
RGT — Recorder Grp. Tens
RGU — Recorder Grp. Units
RNT — Recorder No. Tens
RNU — Recorder No. Units
(MTMG) — Master Tim

* 2 - 8 - 0 - 6 - 4 - 0 For Energency Tapes.

A. Make-Busy

18.39 There shall be two end of tape patterns on each perforator tape. The first end of tape pattern should conform with Table BG. The second pattern is the same as the first except that the line associated with relay P5 (285600, out of sync) is omitted.

B. Transfer

18.40 At the MTF JK bay, insert an MB plug in the TN jack of added recorder. Observe that an end of type pattern is perforated on the regular and emergency recorder tape. This pattern is the same as shown in Table BG, except at a regular recorder, the number associated with relay P5 is 265500 if selectors are synchronized, or 285700 if not synchronized.

> ***Note:*** On installations with less than 100 trunks, no emergency recorder is furnished. The transfer pattern is the same as a make-busy pattern both when the recorder is taken out and placed back in service. If the selectors are not synchronized, a perforation of 285600 is associated with the P5 relay. If the selectors are synchronized, no perforation will occur in line P5.

18.41 At emergency recorder, recorder number on line associated with relay P6 agrees with that of transferred recorder.

18.42 At the MTF JK bay, remove the MB plug from TN jack and observe that a pattern is perforated on the emergency and regular recorder tape. This end of tape pattern need not be verified with ITE-4419 reader.

18.43 During the test when a regular recorder is transferred, verify that EW (emergency working) lamp at recorder frame upright is lit.

C. Test

18.44 At the MTF JK bay, insert a make-busy plug in the MB and TST jacks of added recorder.

> ***Caution: To avoid interference, an MB plug should not be in the TST jack during a 3AM entry.***

18.45 At the MTMG frame, insert the plug of a 32A test cord in the R jack (vertical upright) and momentarily depress the white key. Verify that RUT lamp lights during test perforations and 2R (2nd rotation) lamp lights during the second rotation of master timer TS selector. Observe also that a test pattern per Table BH is perforated on the perforator tape. Remove the plug of 32A test cord from the R jack.

18.46 Use the R jack appearance at the perforator cabinet and recorders (also check the RUT lamp at these locations). Observe that a test pattern per Table BH is applied on the corresponding perforator tape. At the MTF JK bay, remove the make-busy plugs from the recorder MB and TST jacks.

D. Window Spliced

18.47 At an added perforator, tear or cut an opening (window, approx. 1-1/2" × 3/4") in the center of that portion of tape which has not been perforated. Manually push the tape through the perforator until the window permits the perforator spring contact SP to make. Observe that an end of tape pattern per Table BG is perforated. The line associated with relay P5 is omitted if recorder and timer are in synchronism. Repeat test at each added perforator.

E. No Paper Alarm

18.48 At the perforator, cut and remove the tape. Observe that the perforator magnets operate similar to a window splice. After the magnets cease operation, check that an NP lamp associated with the recorder (vertical upright) is lit and the major alarm sounds.

18.49 At the MTF JK bay, insert a make-busy plug in the recorder make-busy jack.

18.50 At the perforator, install the tape. Allow the tape to clear the perforator drum. To provide traction for feeding a new piece of paper in the perforator, momentarily operate microswitch key AT (located at the front and on either side of perforator cabinet near perforator guide) several times. Observe that splice entry 010101 is perforated each time AT key is operated.

18.51 At the MTF JK bay, remove make-busy plug from recorder MB jack.

TABLE BH

TEST ENTRY

LINE	POSITION PERFORATED						REMARKS
	A	B	C	D	E	F	
1	0	0	1	0	1	0	
2	2	3	3	3	3	3	
3	0	3	0	3	0	3	
4	1	1	6	1	6	1	
5	2	6	6	6	6	6	
6	0	6	1	6	1	6	
7	1	0	3	0	3	0	
8	2	3	3	3	3	3	
9	0	3	0	3	0	3	
10	1	1	6	1	6	1	
11	2	6	6	6	6	6	
12	0	6	1	6	1	6	
13	1	0	3	0	3	0	
14	2	3	3	3	3	3	
15	0	3	0	3	0	3	Visual Diamond Shaped Pattern
16	1	1	6	1	6	1	
17	2	6	6	6	6	6	
18	0	6	1	6	1	6	
19	1	0	3	0	3	0	
20	2	3	3	3	3	3	
21	0	3	0	3	0	3	
22	1	1	6	1	6	1	
23	2	6	6	6	6	6	
24	0	6	1	6	1	6	
25	1	0	3	0	3	0	
26	2	3	3	3	3	3	
27	0	3	0	3	0	3	
28	1	1	6	1	6	1	
29	2	6	6	6	6	6	
30	0	6	1	6	1	6	
31	1	7	5	7	5	7	
32	0	5	2	5	2	5	Recorder Operation With Transverter
33	2	2	7	2	7	2	
34	0	4	4	4	4	4	
35	1	8	8	8	8	8	
36	2	5	9	5	9	5	
37	1	9	5	9	5	9	
38	1	MT	MU	T	1	1	Recdr. Ans. & Disconnect Entries
39	1	MT	MU	T	3	3	
40	$\overline{0, 1, 2}$	MT	MU	T	0	0	
41	$\overline{0, 1, 2}$	MT	MU	T	0	0	
42	1	MT	MU	T	7	0	Tbl. - Ans. or Disc. Cancel Entry
	2	8	7	1	0	0	
43							Pass by
44							Operate 2R Lamp

LINE	POSITION PERFORATED						REMARKS
	A	B	C	D	E	F	
45	0	$\overline{0}$	4	4	4	4	
46	0	$\overline{0}$	4	4	4	4	
47	1	$\overline{7}$	3	0	3	0	
48	1	$\overline{0, 1, 2}$	6	1	6	1	
49	2	$\overline{1, 2, 4}$	3	3	3	3	
50	1	$\overline{2, 4, 7}$	3	0	3	0	
51	0	4	$\overline{0}$	4	4	4	
52	0	3	$\overline{7}$	3	0	3	
53	0	6	$\overline{0, 1, 2}$	6	1	6	
54	2	3	$\overline{1, 2, 4}$	3	3	3	
55	0	3	$\overline{2, 4, 7}$	3	0	3	
56	0	4	4	$\overline{0}$	4	4	
57	1	0	3	$\overline{7}$	3	0	
58	1	1	6	$\overline{0, 1, 2}$	6	1	
59	2	3	3	$\overline{1, 2, 4}$	3	3	
60	1	0	3	$\overline{2, 4, 7}$	3	0	
61	0	4	4	4	$\overline{0}$	4	
62	0	3	0	3	$\overline{7}$	3	
63	0	6	1	6	$\overline{0, 1, 2}$	6	
64	2	3	3	3	$\overline{1, 2, 4}$	3	
65	0	3	0	3	$\overline{2, 4, 7}$	3	
66	0	4	4	4	4	$\overline{0}$	
67	1	0	3	0	3	$\overline{7}$	
68	1	1	6	1	6	$\overline{0, 1, 2}$	
69	2	3	3	3	3	$\overline{1, 2, 4}$	
70	1	0	3	0	3	$\overline{2, 4, 7}$	
71	$\overline{0, 1}$	4	4	4	4	4	
72	$\overline{0, 2}$	4	4	4	4	4	
73	$\overline{1, 2}$	8	8	8	8	8	
74	$\overline{0, 1, 2}$	8	8	8	8	8	
75	—	4	4	4	4	4	
76	0	4	4	4	4	4	Note 2
77	2	2	7	2	7	2	
78	0	4	4	4	4	4	
79	1	8	8	8	8	8	Tbl. Grd. "XTC"
80	2	5	9	5	9	5	Transverter
81	1	9	5	9	5	9	
82							Open OT Lead
83	2	8	5	4	0	0	Chg. Grd. Entry
84	0, 1, 2	MT	MU	T	6	6	Timed Disc. Entry
85	$\overline{0, 1, 2}$	MT	MU	T	0	0	
86	2	8	8	0	0	0	Tst. Grp. End of Cycle
87	2	8	8	0	0	0	
88							Pass by

Note 1: Any numbers with a line above them indicate the actual number of hole perforated.

Note 2: 0 and 2 will be perforated (for position A) if recorder under test has option "WN" applied.

MT — Minute Tens; MU — Minute Units; T — Tenths of minute.

F. Hour

Regular

18.52 A regular hour entry is automatically verified during normal operation of master timer. The case of timeouts or trouble recorder cards due to such entries should be investigated and cleared.

Irregular

18.53 At recorder and prior to an hour entry other than a 3AM entry, block relay HS in the nonoperated position. Observe that when an hour entry is perforated in other recorders, the HR lamp (on vertical upright) of recorder is lit and the major alarm sounds.

18.54 At recorder remove the block from HS relay and momentarily operate AR key (on vertical upright). Observe that the HR lamp is extinguished.

18.55 At the perforator verify that an irregular hour entry 281899 is perforated.

G. 3AM

18.56 After a 3AM (during normal service) entry has been applied, check that there are no recorder alarms. Also verify that the pattern perforated conforms with Table BG except for the number of splice entry (081010) lines. In this case, there exists approximately 6 feet of splice entry (081010) lines.

H. Routine End of Tape

Note: Perform this test during light traffic periods to avoid sticking outgoing senders.

18.57 If an odd recorder is added, at MTMG lamp and key panel, insert a make-busy plug in jack RET0.

18.58 At the odd added perforators check that an end of type pattern per Table BG is perforated.

18.59 At MTMG lamp and key panel, remove make-busy plug from RET0 jack. If an even recorder is added, at MTMG lamp and key panel, insert a make-busy plug in jack RETE.

18.60 At the even added perforators check that an end of tape pattern per Table BG is perforated.

18.61 At MTMG lamp and key panel, remove make-busy plug from RETE jack.

PAPER TAKE-UP ALARM

18.62 At the perforator associated with RCDR under test, place the motor drive unit trip arm in the hook provided for that purpose. Disengage the take-up reel from the motor drive unit in order to unreel and pull back through the tensioner, a sufficient quantity of tape to permit a full drop of the trip arm; reengage the take-up reel and unplug the power cord of the motor drive unit.

18.63 Permit the motor drive trip arm to drop. At the MTMG frame, PTU_ lamp for recorder under test should light and within 60 to 114 seconds the major alarm should be activated. At the perforator, plug in the motor drive unit power cord and observe that slack tape is properly reeled in. As the trip arm is raised the major alarm should be retired and PTU0 lamp should be extinguished.

RECORDER TEST WITH EACH TRANSVERTER

18.64 At master test frame, operate FT_, FU_, VG_, HG_, and VF_ keys corresponding to an assigned line link location. Operate A_ through K_ keys as required to select an office code and directory numbers. Operate ITC_, RN_, and AD/OD keys as required to select recorder under test. Operate CP_ keys as required. Select transverter. Operate TVT1, TVT, 4DG, MB9, and S2L keys. Operate ST key. Verify trouble record taken and TRL lamp lights. Trouble record card should indicate all the information set upon keys plus the prime punches corresponding to the second line. Repeat test changing the calling and called line locations to include each digit 0-9 as equipped.

18.65 Repeat test using each transverter.

18.66 At recorder under test, temporarily short 7 and 8B of the TEC relay, also insulate 2 and 3 top, and short 1 and 2 top of RT relay. Repeat one of the test calls using each equipped transverter. Verify that test call does not complete and transverter indicates recorder busy. Remove short from relay TEC.

RB AND EXT CHAIN CKTS FROM RECORDER TO TRANSVERTER FOR RECORDER BUSY

18.67 Remove first transverter from service.

18.68 Block operated TK and CK2 relays. (Disregard transverter time out alarm on this transverter.)

18.69 To test the RB chain, place a ground on contact 1B of RST_ relay for new recorder, and operate this relay. Verify that the RTR relay in the transverter operates, indicating a recorder is made busy.

18.70 To test the EXT chain, place a ground on contact 4B of RST_ relay for new recorder and operate RST_ relay. Verify that EXT relay in the transverter operates.

18.71 Remove blocks from TK and CK2 relays. Restore transverter to service. Repeat the procedure to remaining transverters in office, one at a time, making sure that the transverter being tested is made busy at the master test frame during test.

CONTINUITY TEST OF RECORDER ST_, BY_, EXT_, RB_, AND TCB_ LEADS

18.72 Buzz the following leads from the recorder under test to the corresponding RST_ relay contact in ***each*** transverter.

LEAD	RECORDER LOC	TRANSVERTER LOC
TCB-	Bottom Winding TC-A Relay (SD Fig. 25) or TC- (SD Fig. 4)	7B RST- Relay
RB-	2T MBJ Relay	1B RST- Relay
EXT-	2T RT Relay	4B RST- Relay
BY-	7T ON Relay	6T RST- Relay
ST-	7 Bottom Winding TP- Relay	1T RST- Relay

SINGLE TIME LINE REDUCTION FEATURE

18.73 ***Preparation:*** At recorder under test, block nonoperated the XP and ON relays. (***Note:*** Make-busy all trunks associated with the recorder.)

STEP	ACTION	VERIFICATION
1	At recorder unit SRD terminal strip— Momentarily apply ground to terminal 1.	RIP relay in recorder operates, T0 relay operates (CII).
2	Repeat using terminals 2 through 10.	RIP relay operates. T1 to T9 relays operate in order (CII).
3	Insulate 8 break of RTL relay. At recorder unit SRD terminal strip, momentarily ground terminal 1.	RIP relay does not operate. T0 relay operates (CII).
4	Remove insulation 8B of RTL relay. Momentarily ground the U winding terminal of RIP relay.	RIP relay operates. No T_ relay operates (CII).
5	Block TP0 relay operated.	RTL relay operates (TIA, HS, TC_ relays do not operate).
6	Insulate 6B of RIP relay.	RTL relay releases.

STEP	ACTION	VERIFICATION
7	Remove insulation 6B of RIP relay.	RTL relay operates.
8	Release TP0 relay.	RTL relay releases.
9	Momentarily operate the remaining TP_ relays, one at a time, observing that the RTL relay operates each time a TP_ relay is operated.	
10	Remove blocks from XP and ON relays.	
11	Block T1A relay nonoperated.	
12	Apply short circuit to contact 00 of T1 relay.	RTL relay operates.
13	Remove short circuits on contact 00 of T1 relay.	RTL relay releases.
14	Remove block from TIA relay.	
15	Block HS relay nonoperated.	
16	Apply ground to 9T of HS relay.	RTL relay operates.
17	Insulate 12 break of RIP relay.	RTL relay remains operated.
18	Remove ground from 9T of HS relay.	RTL relay releases.
19	Reapply ground to 9T of HS relay.	No action.
20	Remove ground from 9T of HS relay.	
21	Remove blocking from HS relay.	
22	Remove insulation 12 break from RIP relay.	
23	Apply ground to 7B of PTS relay. Momentarily manually operate RIP relay.	No action. RIP relay locks operated.
24	Remove ground 7B from PTS relay.	RIP relay releases.

TC LEAD CROSS TEST

18.74 Check TC leads at CII on trunk side of TL_ relays with ohmmeter connected to battery. 1000 ohm reading normal. 500 ohm reading or less indicates cross. (***Note:*** Check T-415 Drawing for trunk assignment if needed.) If SD-26085-01 is assigned to CII, check for ZK option. If provided S2 must be blocked operated to see 1000 Ω.

1A FAULT LOCATOR OF OT AND RC LEADS (WHISTLE TEST)

18.75 This test would identify OT to OT lead crosses, RC to RC lead crosses, and OT and RC lead crosses by change of frequency of tone. OT to TC and RC to TC crosses will kill tone due to the battery on the TC leads. These tests should be made on the trunk side of the TL_ relays in the CII. (Later issue trunks that have an S2 relay contact in the TC lead should have

the TC leads tested the same as the OT and RC leads.)

CROSS-DETECTION TEST

18.76 The following test checks for crossed contacts of T_ relays in the TA_, TB_ operating chain, crossed contacts of T_ relays in the TL_ operating chain, crossed contacts of T_ relays in the T_ relay operating path, crossed contacts of relays TA and TB_, and false battery or ground on DJ_ leads.

18.77 At OGT or relay rack, make trunks busy associated with CII to be tested.

STEP	ACTION	VERIFICATION
1	At Recorder Circuit— Insulate 5-6T of TN7 relay.	
2	Connect ground to 2B of UA9 relay.	
3	Manually operate U9 relay.	UA9 relay operates. U9 locks.
4	Block U8 relay operated. Momentarily open 1-2B of UA9 relay.	U9, UA9 relays release. U8 operates.
5	Remove block from U8 relay.	U8 remains operated.
6	Momentarily apply ground to 7TF of U9 relay.	U9 does not operate.
7	Block U7 relay operated.	
8	Momentarily open 1-2B of UA8 relay.	U8, UA8 relays release. UA7 operates.
9	Unblock U7 relay.	U7 remains operated.
10	Momentarily apply ground to 7F of U8 relay.	U8 does not operate.
11	Continue releasing higher numbered U_ and UA_ relays, observing that the next lower numbered U_ and UA_ relays operate and that you cannot reoperate the higher numbered U_ relay by applying ground to its 7TF winding terminal.	
12	Remove ground from 2B of UA9 relay.	
13	Remove insulation from TN7 relay.	
14	At the recorder associated with the CII under test— Block TL relay operated. Insulate 8-9T of TN7 relay.	
15	At CII Momentarily operate T9 to T0 relays in order.	T9 to T0 relays lock; TA9, TB9, TL9 relays operate.

STEP	ACTION	VERIFICATION
16	Momentarily open 6-7B of T9 relay.	T9, TA9, TB9, TL9 relays release; TA8, TB8, TL8 relays operate.
17	Momentarily apply ground to 9TF winding of T9 relay.	T9 relay does ***not*** operate.
18	Momentarily open 6-7B of T8 relay.	T8, TA8, TB8, TL8 relays release; TA7, TB7, TL7 relays operate.
19	Momentarily apply ground to 9TF winding of T8 relay.	T8 relay does ***not*** operate.
20	Continue releasing highest number T relay operated by momentarily opening 6-7B contacts, observing that its associated TA_, TB_, TL_ relays release, and that the next lower numbered TA_, TB_, TL_ relays operate, and that the T_ relay released cannot be reoperated by applying ground to its 9TF winding terminal.	
21	Remove block from TL relay and remove insulation 8-9T TN7 relay in the associated recorder.	
22	Restore trunks to service.	

19. TRANSLATOR

19.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
PF	—48V	Frame PRTD	Frame FA—Aisle MJ

19.02 Verify that all fuses appear in the fuse record book.

19.03 With the use of a volt-ohmmeter and appropriate test cords, verify the potential at the +130V and 48V test battery.

19.04 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle or MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that white and red buttons on test cord will start and release the call respectively from the RC jack.

(d) ***Make-Busy Features*** - Translator SD-26019-01—Insert a 322A make-busy plug into TRNSL-MB_jack. Verify TMB relay operates, AMAT_ lamp lights if option X provided in

translator. Remove make-busy plug, verify TMB relay releases.

TIMING AND ALARMS

19.05 ***Timing*** - Timing should be applied as listed in Timing Requirement Table of SD.

19.06 ***Alarms*** - Manually operate OTR relay. Verify OTR relay locks operated, CH (white) lamp on frame upright and MN (white) for aisle light and minor alarm sounds.

19.07 Operate AR key on frame upright. Verify OTR relay releases. CH and MN lamps are extinguished and minor alarm silenced.

19.08 Manually operate XTB relay. Verify XTB relay locks operated, XTB (red) lamp on frame upright and MN (white) for aisle light and minor alarm sounds.

19.09 Operate RXTB key on mounting plate, center of frame, right side. Verify XTB relay releases, XTB and MN lamps are extinguished, and minor alarm silenced.

PLANT AND TRAFFIC REGISTERS

19.10 There are no registers associated with the translator.

OPERATIONAL TEST

19.11 Using orange colored wire, run temporary cross-connection in translator under test, to include FT_ and FU_ for associated line link frames, each VG_ equipped and each HG_ and VF_ at least once (see Table BI). Cross-connections are run to include each of the TH_, HN_, T_, U_, and OFF_ rings on the translator frame.

19.12 Select the first test on Table BI and operate the following keys and switches. Operate TP for tip party translator, line location (FT, FU, VG, HG, and VF), originating office class OFF_ switch, OFT1 or OFT2 keys, and office designation and directory number (TH, H, T, and U). Switch positions should correspond to the line being verified. Operate MT_ for transverter TLV, TVT, RN3, CP3, MB3, and TR0 keys. Operate ANI or TVTC, ATLV, and 4DG keys if testing ANI translator cross-connections. Momentarily operate ST key and observe that the TLVM lamp is lit.

19.13 Operate REC key and draw a trouble card to verify for the proper TH, HB, T, U, GA/B, G/T, G/U, DR_, and TRL perforations.

19.14 Repeat test for each transverter.

19.15 Repeat test for each test in Table BI.

19.16 Repeat 19.12, standing in front of translator and verifying that W and Z relays in translator, if both operated or released, are in opposite positions after each test.

19.17 At translator frame under test, interconnect terminals HG0, VF0, to HG1, VF0. Repeat 19.12. Verify that trouble card indicates XET. Remove strap. Repeat for each transverter.

19.18 At translator operate TR key. Repeat 19.12 for each transverter.

19.19 Set translator on regular MP_ chain by restoring TR key to normal. Insulate contacts, 2, 8, and 12 break of all equipped TVP_ relays, one at a time. Verify that CH and aisle pilot lamps light and minor alarm sounds. When alarm sounds remove insulator and silence alarm. Operate TR key and repeat test using the same contacts of the E_ relay chain.

19.20 Momentarily ground terminal 20 of terminal strip A. XTB and aisle pilot lamps light, minor alarm sounds. Momentarily operate RXTB key to silence alarm and extinguish lamps.

19.21 Momentarily operate GAA0 through GAA19 and GBA0 through GBA19 relays. Verify GON relay in each case momentarily operated.

TABLE BI

TEST NO.	TEMP LINE LOCATION					TEMP BILLING NO.				
	FT	FU	VG	HG	VF	OFF	TH	HN	T	U
1	X	X	X	0	0	X	9	8	7	6
2	X	X	X	1	1	X	8	7	6	5
3	X	X	X	2	2	X	7	6	5	4
4	X	X	X	3	3	X	6	5	4	3
5	X	X	X	4	4	X	5	4	3	2
6	X	X	X	5	0	X	4	3	2	1
7	X	X	X	6	1	X	3	2	1	0
8	X	X	X	7	2	X	2	1	0	9
9	X	X	X	8	3	X	1	0	9	8
10	X	X	X	9	4	X	0	9	8	7

X = As required use all combinations that translator is equipped for.

20. TRANSVERTER CONNECTOR

20.01 Locate the following fuses and verify that the appropriate fuse alarms operate. (Apply on new frames only.)

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
Test 48V	−48V	PRTD	Frame FA—Aisle MJ
Test 130V	130	PRTD	Frame FA—Aisle MJ
PF	−48V	Frame	Frame FA—Aisle MJ

20.02 Verify that all fuses appear in the fuse record book. (Apply on new frames only.)

20.03 With the use of a volt-ohmmeter and appropriate test cords verify potential at the 48V test battery. (Apply on new frames only.)

20.04 Place an operational test on the following jacks (new frames only).

(a) ***Spare Jack*** - Verify the multiple for continuity and absence of crosses to first frame in aisle or MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on the test cord will start and release the call respectively from the RC jack.

(d) ***Make-Busy jack*** - At jack, lamp and key circuit, insert MB plug into the TVCMB_ jacks associated with the transverter connector under test.

- Verify that as each MB plug is inserted, the respective CB_ relay operates in the connector under test.

- Remove MB plugs. Verify that the CB_ relays release.

20.05 Timing tests should be applied as listed in Timing Requirement Tables of SD_ drawings.

SENDER PREFERENCE

20.06 From job traffic schematic (-240 Drawing) or equivalent, determine the senders assigned to the transverter connector under test and the position in the connector to which they have been assigned.

20.07 At jack, lamp, and key circuit, make senders assigned to the connector busy by inserting MB plugs into the associated SMB jacks. At the transverter connector under test, block the following relays normal.

(a) SS_ relays associated with the made-busy senders

(b) TM relay

(c) TS_ relays

(d) CB_ relays

20.08 In each sender associated with the connector under test, activate the ST and STA leads by blocking operated the STT and AMA or STT and LR in CAMA senders. At transverter connector remove the block from SS-0 relay.

20.09 Observe that equipped SS-0, SA-0, SB-0, etc, relays are operated.

20.10 Remove the block from the SS-1 relay and observe that it operates, but SA-1, SB-1, SC-1, etc, relays do not operate.

20.11 Remove block from STT relay in the first sender. Observe that SS-0, SA-0, SB-0, SC-0, relays release and SA-1, SB-1, SC-1, etc, relays operate. Remove block from SS-2, it operates, but SA-2, SB-2, SC-2, etc, relays do not operate.

20.12 Again block operated STT relay in the first sender, SS-0 relay does not operate. Remove blocks from STT relays and AMA or LR in the first sender. Continue the procedure until all SS_ relays in the connector under test have been tested.

20.13 Remove blocks from CB_ relays.

CB RELAY CHAIN

20.14 Verify that CB_ relays from unequipped transverters are blocked operated in a permanent manner in TVC under test. Block operated any relay SD_ (SD-26021-01) or SC_ (SD-26011-01 or SD-26162-01) associated with the connector control unit under test. This will provide a locking ground for all CB_ relays in the connector.

20.15 Apply ground through a test receiver in turn to U or 1U winding terminal of each CB_ relay in the preference control unit for the connector under test. Verify that each relay operates without buzzing and locks. (Reversed CB_ relay winding leads will cause it to buzz.) When the last CB_ relay is operated verify that all others release.

20.16 Repeat above test enough times so that CB_ relays for each transverter will be the last one operated.

20.17 Remove block from the SC_ or SD_ relay. Verify that each of the remaining SC_ or SD_ relays can provide locking ground for CB_ relays by checking that each operated SC_ or SD_ relay can lock each CB_ relay operated.

TRANSVERTER CONTROL AND PREFERENCE

20.18 At jack, lamp, and key circuit make the first transverter associated with the connector under test busy by inserting MB plug into the TVMB jack.

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20.19 At made-busy transverter, block the CH1 and CH2 relays operated. Block TRT1 and TM4 nonoperated.

20.20 At connector under test, change the condition of the TS_ relay associated with the made-busy transverter from blocked normal to blocked operated. Verify that the associated TVA relay does not operate, and check that the potentials

on contacts of the TS_ relay associated with the made-busy transverter are as indicated for the specified conditions in Table BJ. Also verify for the absence of the opposite potential in each of the above tests.

20.21 At made-busy transverter remove the blocks from the CH1, CH2, TRT1, and TM4 relays.

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20.22 At connector under test, check for the presence of ground and the absence of battery on contacts 1F, 6F, and 8M of each TS_ relay. At made-busy transverter, block CH1, CH2, CBR, and GC relays nonoperated. At preceding and succeeding connector to that under test, block relays TVA_ and TVB_ associated with the made-busy transverter, nonoperated. At preceding connector, block the TS_ relay associated with the made-busy transverter operated. Verify for the presence of battery and the absence of ground on contact 1F, and the presence of ground and the absence of battery on 8F of the TS_ relay associated with the made-busy transverter in the connector under test.

20.23 Remove block from TS relay in the preceding connector and block operated the TS_ relay in the succeeding connector associated with the made-busy transverter. Verify for the presence of battery and the absence of ground on 8F and presence of both battery and ground on 1F of the TS_ relay associated with the made-busy transverter in the connector under test. Remove blocks from TS_ relay and TVA_ and TVB_ relays in succeeding connector.

20.24 Remove blocks from TVA_ and TVB_ relays in preceding connector.

20.25 At made-busy transverter, remove blocks from relays CH1, CH2, CBR, and GC.

Second Trial Features (SD-26162-01)

20.26 At the connector under test, remove blocks from TS_ relays, observe that the CB_ relay is operated for the transverter made busy.

TABLE BJ

TS–RELAY CONTACT	*Potential Found on TS-Relay in Connector Under Test When TS-Relay is blocked operated in*		
	CONN UNDER TEST	* PRECEDING CONN	Ø SUCCEEDING CONN
9M	GND	GND	GND
9F	GND	BATT	GND
10F	GND	BATT	GND
10B	BATT	BATT	GND
2F	BATT	BATT	GND
2B	GND	BATT	GND
12B		BATT	
12F	BATT	BATT	

* The preceding connector will be that connector that has its D punching connected to the E punching of the connector under test. Connectors that have their E punching connected to the GD punching are not preceded.

Ø The succeeding connector will be that connector that has its E punching connected to the D terminal of the connector under test. Connectors that have their D punching connected to the DA punching are not succeeded.

At the transverter made busy, block nonoperated XRL, TM1, and TM2 relays.

20.27 At the connector, block operated the associated TVA_ relay. Observe that the previously operated CB_ relay releases. Unblock TM1 and TM2 relays until the transverter times out and operates an alarm, then reblock TM1 and TM2 nonoperated. Block operated the associated SC_ relay and observe that TR relay operates, and the released CB_ reoperates in the connector. Using a test receiver, check for presence of ground on fixed contact 10 of all other SC_ relays in the connector. Disconnect ground from SC relay, TR1 relay operates, then releases TVA_ relay. At the transverter frame, momentarily operate AR key. At the master test frame, momentarily operate TRR AR key to retire the alarm.

20.28 Connect battery to four fixed of TR1 relay. Observe that a TS_ relay operates for a different transverter (if provided) than the one made busy. Disconnect battery from TR1 relay and check that the TS relay releases. At the connector, block operated the SC_ relay for any sender. Remove blocking tool from TVC_ relay. Observe that TR1 remains operated. Check that ground is present at fixed contact 14 (2TR lead) of all TVA_ relays.

20.29 Release SC_ relay at the connector and remove blocks from XRL, TM1, and TM2 relays at the transverter made busy.

20.30 At jack, lamp, and key circuit, remove the MB plug associated with the first transverter of connector under test. Repeat tests for each of the remaining transverters appearing in connector under test.

20.31 At connector under test, reblock all TS_ relays nonoperated.

TS PREFERENCE

20.32 From traffic schematic determine preferred and alternate preferred transverter for connector under test.

20.33 At transverter connector under test, block TM and CA relays nonoperated. At any outgoing sender assigned to the connector under test, block operated STT and AMA or STT and LR relays in CAMA senders. Verify that the TS_ relay of preferred transverter in connector under test is energized.

20.34 Block operated the CB_ relay associated with preferred transverter. Verify that the TS_ relay of the alternate preferred transverter in connector under test is energized.

20.35 In connector under test, block operated CB_ relay associated with TS_ relay of alternate preferred transverter. Verify that succeeding TS_ relay is energized.

20.36 Continue in this manner until the TS_ relay of each equipped transverter in the connector has been energized in the connector control unit of connector under test. TS_ relays should operate in numerical sequence returning to the TS_ relay of transverter 0 after TS_ relay of highest equipped transverter has been tested. Unblock all CB_ relays on completion of test. Unblock STT and AMA or LR relays in outgoing sender.

TRANSFER START LEAD ON ALTERNATE CALLS

20.37 From traffic schematic (-240 Drawing or equivalent) determine first and second choice transverter assignments for connector under test. At the master test frame, check that none of the transverters are made busy and operate the TVTCA and TVTCB keys to disable the associated master traffic control circuit. In the preference control circuit under test, release W and Z relays if they are operated.

20.38 At first outgoing sender associated with connector under test, block operated STT and AMA or STT and LR relays in CAMA sender.

20.39 In the connector under test, with an iron object, check for magnetic pull on the TS_ relay of the first choice transverter and the absence of pull on the second choice TS_ relay. Also verify that the GT relay in the connector control circuit is operated.

20.40 Momentarily operate and release multicontact TVC relay in connector under test.

20.41 Check that W and Z relays operate and lock. Also check that magnetic pull has been transferred from first choice TS_ relay to second choice TS_ relay in preference control circuit.

20.42 Operate and release each remaining TVC_ relay in connector under test. Check that W and Z relays operate and release alternately with each operation of TVC_ relay.

20.43 Manually release W relay if it is operated at end of test.

GT RELAY OPERATE PATH (ANI AND CAMA TRANSVERTERS)

20.44 Block operated W relay. GT relay operates. Release W relay and observe that GT relay releases.

20.45 Repeat test for GT relay using Z, TR1, TRS, and any SC_ relay in the connector. Check that each operated relay provides an operating path for GT relay. Manually release W relay if operated at end of test.

TROUBLE RELEASE FEATURES

20.46 In preference control unit, verify that the TS_ relay of first choice transverter connector under test is energized. In control unit of connector under test, block operated TRL relay. Check that TR relay is operated and that first choice TS_ relay is no longer energized.

20.47 Unblock TRL relay. Check that TR1 relay operates and TR relay remains operated. Manually operate and release TVK relay. Check that TR and TR1 relays release. Block operated Z relay and check that TS_ relay of second choice transverter is energized.

20.48 Block operated Z relay and check that TS_ relay of second choice transverter is energized.

20.49 Block operated TRL relay. Check that TR relay is operated and that TS_ relay of second choice transverter is no longer energized.

20.50 Release and then operate and release TRL relay several times. Check that TR1 relay operates on first release of TRL relay and that thereafter TR and TR1 relays remain operated.

20.51 Operate and release TVK relay. Check that TR and TR1 relays release.

TRANSFER START FROM TRS RELAY

20.52 Release W and Z relays in connector control circuit if operated, and block operated TRS relay. Check that second choice TS_ is energized in preference control circuit under test.

20.53 Operate W and Z relays. Check that first choice TS_ relay is energized, and that TM relay is not energized. Then manually operate TM1 relay. Verify that TM1 relay locks.

20.54 Release TRS relay. Verify that TM1 relay releases and TM relay is energized.

OPERATING AND LOCKING PATHS—TC and TC1 RELAYS

20.55 Block normal W and Z relays. Manually operate and release, in turn, multicontact TVC relay of each transverter in connector. Check that TC and TC1 relays operate as each TVC relay is operated.

20.56 Block operated W relay, momentarily operate TC and TC1 relays. Verify that TC relay locks and TC1 releases.

20.57 Block W relay normal and Z relay operated; momentarily operate TC and TC1 relays. Verify that TC1 relay locks and TC relay releases.

20.58 Unblock W and Z relays. Verify TC1 relay releases.

TM AND RGB LEADS

20.59 Unblock STT and AMA or LR relays in first sender in connector under test. Check that TM relay is no longer energized and GT relay is released. Block STT and AMA or LR relays in second circuit in connector. Check that TM relay and first choice TS_ relay is energized. Also check that GT relay is operated.

20.60 Manually operate TR relay. Check that TR relay locks.

20.61 Unblock STT and AMA or LR relays. Verify that TR relay releases and TM and TS_ relays are no longer energized.

20.62 Apply tests to each outgoing sender in connector under test. Unblock TM, CA,

and TS_ relays in connector and preference control circuit.

TRAFFIC CONTROL TVC

A. Setup

20.63 The transverter master traffic control shall remain disabled, (20.63 to 20.77 [TVTCA and TVTCB keys operated at jack, lamp, and key circuit].)

B. TCA and TCB Relays (LAMA Connectors Only)

20.64 In the TVC under test block nonoperated TM1 and TC relays. Insulate contact 8B of TC1 relay. Block operated TM relay.

20.65 At the master traffic control circuit, apply battery for two seconds to the lower winding of TCA relay. Verify that TCA relay operates steadily while battery is applied. Apply battery for two seconds to the lower winding of TCB relay. Verify that the TCB relay does not operate steadily while the battery is applied. (TCB relay may operate intermittently while battery is applied if other TVCs are processing calls.) At the TVC under test, remove block from TC relay and the insulation from 8B of TC1 relay. Block TC1 relay nonoperated and insulate 8B of TC relay.

20.66 At the master traffic control circuit, apply battery for two seconds to the lower winding of TCB relay. Verify that TCB relay operates steadily while battery is applied. Apply battery for two seconds to the lower winding of TCA relay. Verify that TCA relay does not operate steadily while battery is applied. (TCA relay may operate intermittently while battery is applied if other TVCs are processing calls.) Remove block from TC1, TM1, and TM relays and insulation from TC relay.

MASTER TRAFFIC CONTROL LEADS

A. FB and FB1 Leads

20.67 At TVC under test block W, Z and TC relays operated. At master traffic control circuit manually operate the TCA (WS) or TCA2 (FS) for two seconds. (***Caution: do not keep TCA or TCA2 relay operated for more than two seconds.***) In the TVC under test, verify that FC relay operates steadily and FC1 relay does not operate at all while TCA or TCA2 relay is manually operated. Remove block from TC relay, change state of W and Z relays from blocked operated to blocked normal, and block TC1 relay operated. At the master traffic control circuit operate the TCB (WS) or TCB2 (FS) for two seconds. (***Caution, do not keep TCB or TCB2 relays operated for more than two seconds.***) In the TVC under test, verify that FC1 relay operates steadily and FC relay does not operate at all while TCB or TCB2 relay is manually operated. Remove block from W, Z and TC1 relays.

B. TC and TC1 Leads

20.68 In the following test procedure, do not keep FC or FC1 relays operated for more than three seconds.

20.69 In the connector under test, block operated FC relay. Manually operate TC and TC1 relays. Verify that TC relay locks and TC1 relay releases. Remove block from FC relay, verify that TC relay releases. Block FC1 relay operated. Manually operate TC and TC1 relays. Verify that TC1 relay locks and TC relay releases. Remove block from FC1 relay, verify that TC1 relay releases.

C. CWA and CWB Leads

20.70 In the connector under test block TM1, W, and Z relays nonoperated. Block TM relay operated. At the master traffic control circuit, momentarily apply battery to the lower winding of CWA relay. Verify that CWA relay operates steadily while battery is applied. Apply battery to lower winding of CWB relay, verify that CWB relay does not operate steadily while battery is applied, (CWB relay may operate intermittently while battery is applied if regular calls are in progress).

20.71 In the connector under test, change state of W and Z relays from blocked nonoperated to blocked operated.

20.72 At the master traffic control circuit, momentarily apply battery to lower winding of CWB relay. Verify that CWB relay operates steadily while battery is applied. Apply battery to lower winding of CWA relay, verify that CWA relay does not operate steadily while battery is applied (CWA relay may operate intermittently

while battery is applied if regular calls are in progres).

20.73 At connector under test, remove blocks from W and Z relays.

D. IM Lead (LAMA)

20.74 Block operated IM relay in the transverter master traffic control circuit. Verify that ITV relay in the connector control unit under test operates. Manually operate and release, in turn, TC and TC1 relays in connector control unit under test. Verify that ITV relay does not release. Simultaneously operate and release TC and TC1 relays in connector. Verify that ITV relay releases when both relays are operated.

20.75 Unblock and momentarily release IM relay in the traffic control circuit. Verify that ITV relay in the connector control releases when IM relay in the traffic control is released. Remove blocks from TM1 and TM relays. At jack, lamp, and key circuit, restore TVTCA and TVTCB keys.

E. ITV Lead (CAMA or ANI Transverters)

20.76 In a light traffic period block the CBR relay of all transverters except the first. In connector under test, verify that ITV relay operates each time the first transverter is idle. Remove block from CBR relay of first transverter. Repeat above test so that each of the remaining transverters are available for test. Remove blocks from TM1 and TM relays.

20.77 At jack, lamp and key circuit, restore TVTCA and TVTCB keys.

FALSE GROUND TEST FEATURE

SD-26011-01

20.78 At the master test frame, insert a make-busy plug into any TVMB_ jack. Then, at the connector under test, connect ground to solid contact 12 of the TVC_ relay associated with the transverter made busy. Observe that the major alarm sounds and aisle pilot lamp is lighted. Test for presence of ground.

SD-26021-01

20.79 At the master test frame, insert a make-busy plug into any TVMB_ jack. Then at the first connector, connect ground to solid contact 54 of the TVD_ relay associated with transverter made busy. Observe that the major alarm sounds and aisle pilot lamp is lighted. Test for presence of ground at fixed contacts 33 and 34 of all the remaining TVC_ relays in the connector. Check that TVC lamp lights at the master test frame.

20.80 Disconnect ground from contact 54 of TVD relay and momentarily operate TVC_ AR key. Observe that the alarm is silenced and all lamps are extinguished. At connector circuit, block operated TVK relay. Observe that GT relay operates. Then connect ground in succession to solid contacts of any 54 of TVD_ and 33, 34 of TVC in connector under test. Check that the major alarm is not sounded and that CA relay is not operated. Release TVK relay and observe that GT relay releases. After all tests are completed, remove make-busy plug from TVMB_ jack.

SD-26162-01

20.81 At punching 33 of the TVCR terminal strip of the connector under test, momentarily ground the OF lead. Observe that the CA relay operates and locks and a major alarm is sounded. Manually release CA relay and major alarm is silenced.

20.82 Momentarily ground the TR lead at punching 54 of the TVDR terminal strip. CA relay operates and locks and major alarm sounds. At the master test frame verify that TVC_ lamp associated with TVC under test lights.

20.83 At master test frame momentarily operate TVC-AR key. Major alarm is silenced and TVC_ lamp extinguished.

20.84 Momentarily ground the RL lead at punching 34 of the TVC terminal strip. The same results are obtained as for the test described for a grounded OF lead.

SPL RELAY OPERATION (ANI and LAMA Provided)

20.85 At sender circuit associated with the highest SS_ relay in the connector, block the CL3 relay operated and block operated the last equipped

SS_ relay and verify that SPL relay operates. Check that all CB_ relays operate except those associated with ANI transverters.

20.86 Momentarily operate the next lower numbered SS_ relay and verify that SPL relay releases while the next lowered SS_ relay is operated. Repeat tests until all SS_ relays have been operated momentarily. Unblock CL3 relay in sender associated with the highest SS_ relay.

CALL THROUGH CONNECTOR

20.87 At the connector under test, block CB_ relays operated for all transverters but the first. At master test frame, operate keys and switches as required to establish an OGT-type test call selecting one of the made-busy senders associated with the connector under test. Initiate the test call and verify that: (1) at the connector under test, the TVA_, TVB_, etc, relays for transverter associated with the only available transverter (unblocked CB_ relay) operate and TV_ relays for other transverters do not. (2) The test call completes satisfactorily. Repeat tests and verifications for each of the remaining transverters in the connector under test, manipulating the blocked CB_ relays to allow each transverter to be the only one available on at least one test call.

20.88 Remove blocks from CB_ relays.

20.89 At jack, lamp, and key circuit, release all outgoing senders associated with the connector under test by removing MB plugs inserted in 20.07.

21. COIN SUPERVISORY LINK

21.01 Locate the following fuses and verify that the appropriate fuse alarms operate.

FUSE DESIGNATION	POTENTIAL	FUSE AT	VISUAL ALARM
PF	—48V	Frame	Frame FA—Aisle MJ

21.02 Verify that all fuses appear in the fuse record book.

21.03 With the use of a volt-ohmmeter and appropriate test cords, verify the potential at the 130V and 48V test battery.

21.04 Place an operational test on the following jacks.

(a) ***Spare Jack*** - Verify the jack multiple for continuity and absence of crosses to first frame in aisle or MDF.

(b) ***Frame Line Jack*** - Using two operators telephone sets, test transmission between new frame and an existing frame.

(c) ***Remote Control Jack*** - With a simple test call set up on the master test frame, verify that the white and red buttons on the test cord will start and release the call respectively from the RC jack.

TP CHAIN

21.05 Block operated each SB relay associated with horizontal group under test.

21.06 At horizontal group 0 on CSL under test, place test pick ground on upper winding of TP00. Verify TP00 operates. Using a second test pick, place ground on upper winding of TP01. Verify TP01 does not operate. Remove test pick ground from TP00. Verify TP00 releases and TP01 operates. Replace test pick ground to upper winding of TP00. Verify TP00 operates and TP01 remains operated. Remove test pick ground from upper winding of TP00. Verify TP00 releases. Place test pick ground on upper winding of TP02. Verify TP02 does not operate. Remove test pick ground from TP01. Verify TP01 releases and TP02 operates. Replace test pick ground to upper winding of TP01. Verify TP01 operates and TP02 remains operated. Remove test pick ground from upper winding of TP01. Verify TP01 releases. Repeat sequence of tests for each TP02 thru TP09 or TP19 or TP39. Repeat test for each equipped horizontal group on CSL under test.

21.07 Place test pick ground on 10 fixed of the highest TP relay in horizontal group 0. Verify nothing happens. Manually operate TP00 in horizontal group 0. Verify nothing happens. Manually operate TP01. Verify TP00 releases and TP01 locks operated. Repeat this sequence of tests until the highest TP relay is locked operated. Remove ground from ten of highest TP relay. Highest TP relay releases. Repeat this test for each horizontal group of CSL under test.

21.08 Place ground straps on two and ten fixed of the highest TP relay in horizontal group 0. Verify that nothing happens. Manually, momentarily operate TP00. Verify that horizontal group 0 hold magnet 00 operates (note the corresponding TP relay will lock operated). Manually, momentarily operate TP01. Verify that hold magnet 00 releases and hold magnet 01 operates. Repeat this sequence of tests until the highest hold magnet is operated. Remove ground strap from two fixed of the highest TP relay. Verify that the highest hold magnet releases. Note highest TP relay remains operated. Manually release the highest TP relay. Place ground strap on four fixed of the highest TP relay and repeat the test verifying the same results. Remove ground straps. Repeat tests for each horizontal group of CSL under test.

21.09 Place ground strap on eight fixed of highest TP relay in horizontal group 0. Verify with test picks that ground is present on eight fixed of all TP relays in horizontal group 0 and not present on eight make of the same relays. Block operated TP00. Verify that ground is present on eight make of TP00. Block operated TP01. Verify ground is not present on eight-make of TP00 but is present on eight make of TP01. Remove block from TP00 and block operated TP02. Verify ground is not present on eight make of TP01 but is present on eight make of TP02. Repeat sequence until the highest TP relay is the only relay blocked operated. Remove block from the highest TP relay and remove ground strap. Repeat tests for each horizontal group of CSL under test.

SB OPERATING PATH

21.10 At the coin supervisory key and lamp panel, operate the MB key associated with the first supervisory circuit on the CSL under test. Verify the associated SB relays operate in the CSL under test. Momentarily move (wiggle) the resistors in the supervisory circuit corresponding to the operate path of the SB relays. Verify that the SB relays do not release. Momentarily short the twelve fixed and make-contacts at the SP relays associated with the operated SB relays. Verify that the SB relay releases associated with the shorted SP relay contacts. Release made-busy supervisory circuit. Repeat test for each equipped coin supervisory circuit assigned to the CSL under test.

COIN SUPERVISORY CSL CHAIN

21.11 At the coin supervisory key and lamp panel, operate the MB key associated with the first supervisory circuit assigned to the CSL under test. At the made-busy supervisory circuit block nonoperated RLK relay. From Fig. 19, 20 and 21 determine with what type of CSL arrangement the made-busy supervisory circuit is associated. At CS terminal strip of first CSL frame for made-busy circuit, strap punchings 21, 23, and 24 together. Using the table on the figure selected determine that the correct potential is present at the first appearance in the SP chain circuit for the following:

Lead LK - battery

Lead BL - ground

Lead B - battery

Lead SM - ground

Lead LO - ground

21.12 Insulate the corresponding contact for the lead under test of the first SP relay in the chain. Verify potential is removed from the succeeding SP relay contact in the chain. Remove insulator from first SP relay contact. Verify potential is present on the contact of succceeding SP relay in the chain. Repeat procedure sequentially for each SP relay in the chain. Repeat for each lead through the SP chain for register under test. Remove all straps and blocking tools and restore coin supervisory circuit to service. Repeat above for each equipped supervisory circuit assigned in the CSL under test.

SP CHAIN

21.13 Block nonoperated all of the SP relays corresponding to horizontal group 0 of CSL under test. Block operated the highest TP relay in the associated horizontal group. With a metal object, verify that only the preferred SP relay is energized as indicated in Table BK. Momentarily operate the SB relay associated with the energized SP relay. Verify that the SB relay locks operated and only the second preferred SP relay is energized. Momentarily operate the SB relay associated with the energized SP relay. Verify that the SB relay locks operated and only the third preferred SP relay is energized. Refer to Table BK for sequence of SP and SB relays. Repeat procedure until the last SB relay in the chain is operated. At the momentary operation of the last SB relay, verify that all preceding operated SB relays release and the SB relay in the chain locks operated. Remove blocks from TP and SP relays. Repeat test for each horizontal group on the CSL under test.

TRUNK ASSIGNMENTS

21.14 Using office records verify visually that each vertical is wired as indicated for the CSL under test.

CROSSBAR SWITCH CROSSES

21.15 Using test receivers verify that adjacent levels on the highest CSL horizontal group are free from crosses. Check between level 0&1, 1&2, 2&3, etc, for each banjo wire.

TABLE BK

COIN SUPERVISORY UNIT PREFERENCE OF EACH HORIZONTAL GROUP

HOR GRP NO.	SP & SB REL NO.	ORDER OF PREFERENCE									
		COIN SUPERVISORY UNIT NO.									
3	3	3	7	0	4	8	1	5	9	2	6
2	2	2	6	3	7	0	4	8	1	5	9
1	1	1	5	9	2	6	3	7	0	4	8
0	0	0	4	8	1	5	9	2	6	3	7

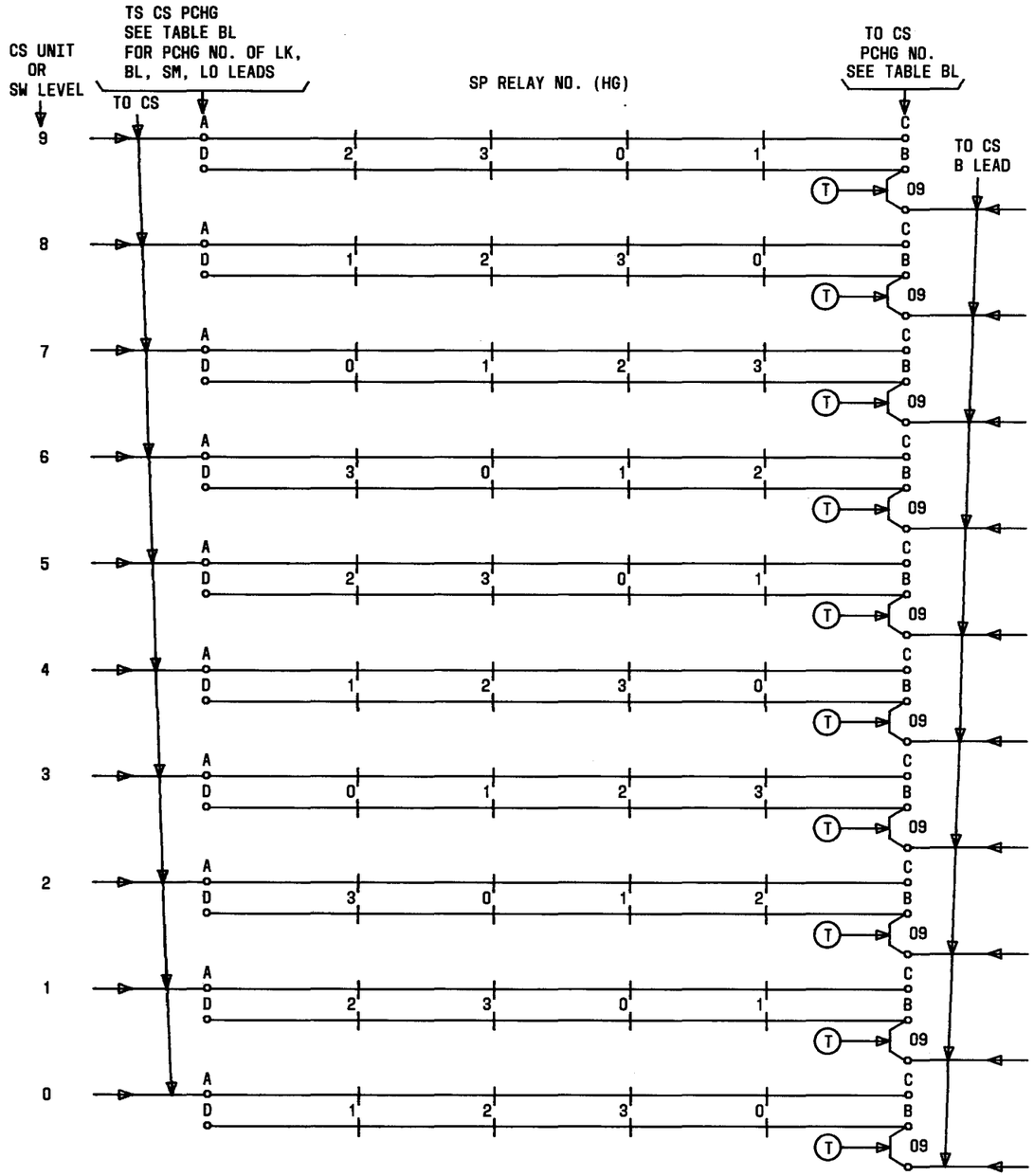

TABLE BL

LEAD	TS CS PCHG NO.				SP REL. CONTACT
	A	B	C	D	
LK	20		10		2
BL	21		11		4
B		12		22	6
SM	23		13		10
LO	24		14		12

DENOTES ORDER OF PREFERENCE

Fig. 19—SP Relay Chains, One CSL Frame

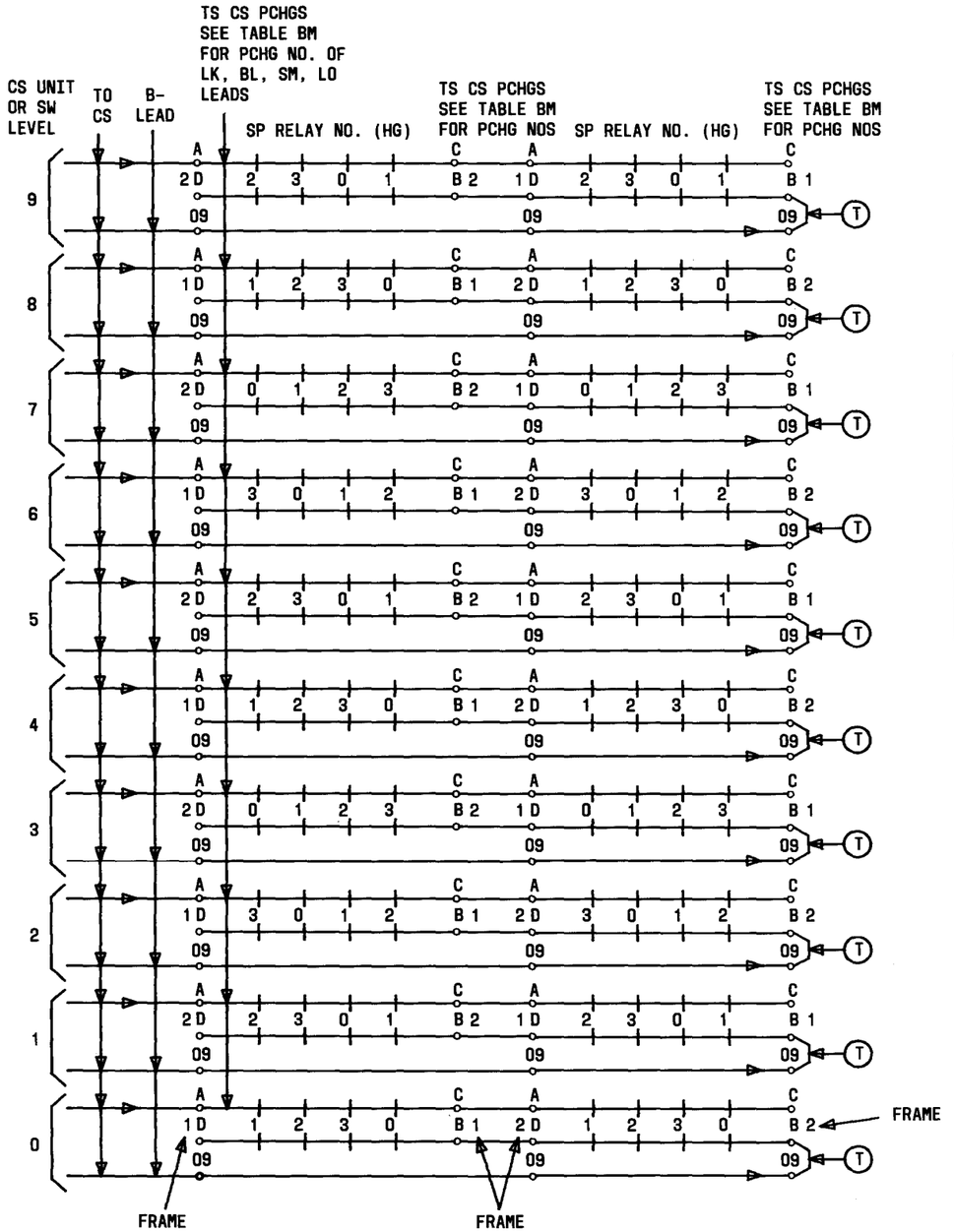

TABLE BM

LEAD	TS SC PCHG NO.				SP REL CONT
	A	B	C	D	
LK	20		10		2
BL	21		11		4
B		12		22	6
SM	23		13		10
LO	24		14		12
→ DENOTES ORDER OF PREFERENCE					

Fig. 20—SP Relay Chains, Two CSL Frames

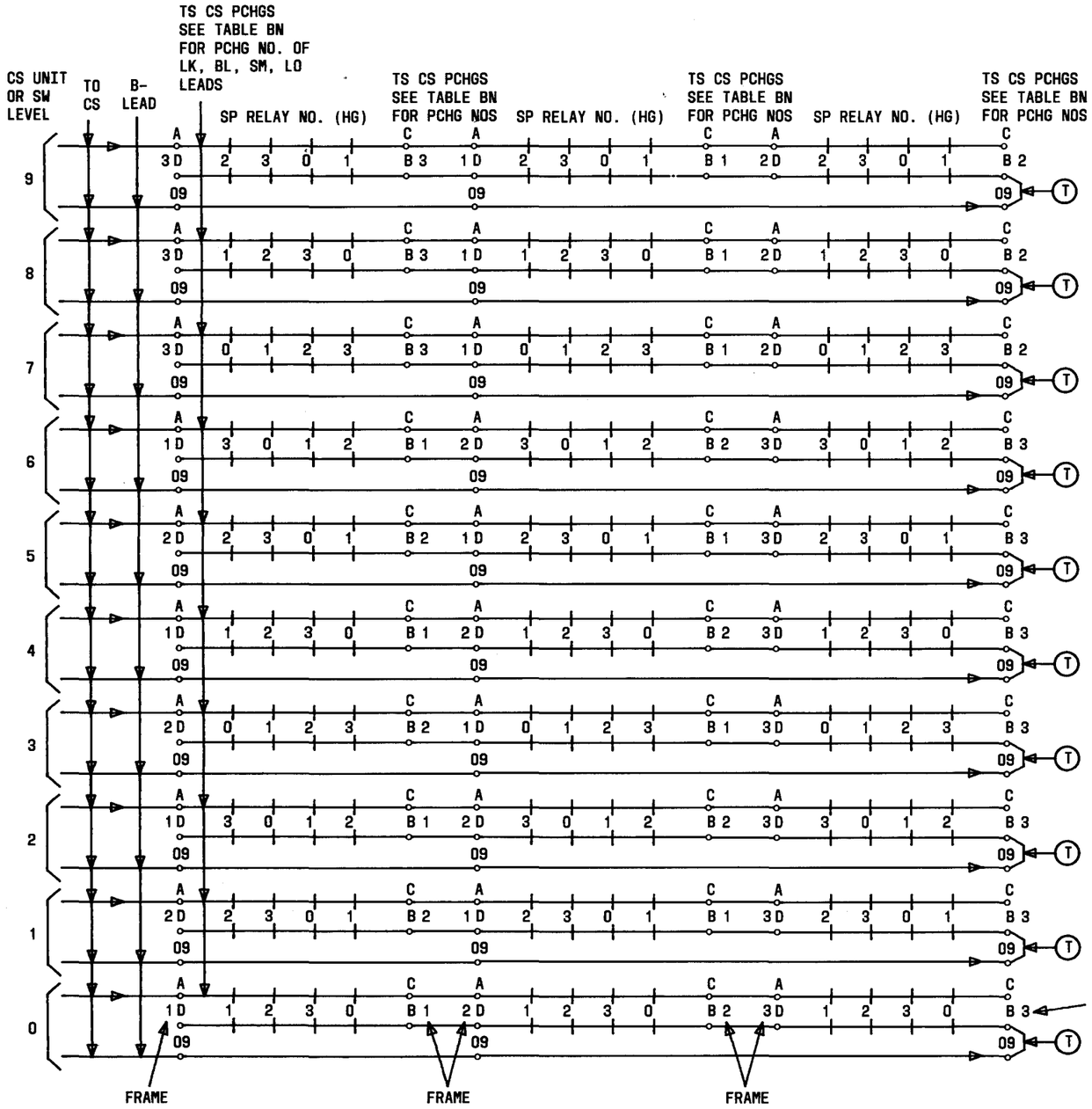

TABLE BN

LEAD	TS SC PCHG NO.				SP REL CONT
	A	B	C	D	
LK	20		10		2
BL	21		11		4
B		12		22	6
SM	23		13		10
LO	24		14		12

→ DENOTES ORDER OF PREFERENCE

Fig. 21—SP Relay Chains, Three CSL Frames