REMOTE OFFICE TEST LINE SYSTEM TESTS

CONTENTS

---

1. GENERAL INFORMATION

1.1 This section provides testing methods to be used during the installation of the Remote Office Test Line (ROTL, SD-28067-01) for Crossbar No. 1 or Crossbar Tandem offices.

1.2 This section provides an overall test of ROTL signaling and operation. It performs transmission, operational, and balance tests on ROTL accessed trunks.

1.3 Table 1.1 through 1.6 are general information tables to be used throughout this section. They are located at the end of the section as attachments.

1.4 Tables 1.5 and 1.6 should be presented to the telephone company or to the CAROT center to be completed and returned prior to the system tests of this section. These tables specify the total number of trunks that require testing. Obtain this information before proceeding.

1.5 Reference is made in Tables 1.1, 1.5 and 1.6, and in instructions for various systems tests in this section, to the far end test line. The test line may be either located in an office remote from the office with the ROTL or when referred to as a home office test line, will be co-located in the office with the ROTL. Priming information for home office test lines will not require type of pulsing or far end test line numbers.

1.6 Using the data base information provided by the telephone company (Table 1.5) and the pulsing and supervision codes of Table 1.2, fill in the missing priming information of Table 1.1. This completed table will be used during system tests to prime the ROTL Systems Test Set (ITE-5462) for test calls.

1.7 Whenever the ROTL accesses an operational test line in a local office, one or two ringing cycles (2 seconds on, 4 seconds off) may be generated at the local office before test line connection. The ROTL frame detects these cycles and repeats them to the ROTL Systems Test Set as low tone. Therefore, during any test to a local

office, one or two low tone pulses will be heard at the ROTL Systems Test Set Speaker just before the test line connects. The possibility of these ringing cycles is mentioned at the appropriate time during each transmission, operational and balance test of this section, but they are not specifically included as part of the test.

1.8 Progress indicators (LED's) and a loudspeaker are provided to aid in trouble analysis and testing. The LED's provide 26 visual indications of the call status while the speaker allows audible monitoring of the TEST or BALANCE PORTS on an IN or OUT basis by speaker monitor switch selection.

2. TEST EQUIPMENT

2.1 One ITE-5462 or H-310-150 (Tel. Co. Maintenance) ROTL Systems Test Set.

2.2 Cords

Qty	ITE	Lgth	Cond	Terminals
1	9898	12'	2	(310 Plug) - (310 Plug)
1	9600	6'	3	(310 Plug) - (310 Plug)
1	9601	12'	3	(310 Plug) - (310 Plug)
1	9621	12'	3	(310 Plug) - (3 ITE-8507 Alligator Clips)

2.3 Accessories

Qty	Code	Description
1	322A	Make-Busy Plug
1	522A	Make-Busy Plug
1	ITE-4827	Test Receiver

3. TEST SET VERIFICATION

NOTE: The ROTL Systems Test Set is a completely solid state unit. The digital display and all lamps are light emitting diodes (LED's). If the test set is not working properly, the installer can only check the fuse, inspect for broken wires, and verify that all circuit packs are fully plugged in.

3.01 At the ROTL Systems Test Set, set the following switches to the designated positions:

SWITCH	POSITION
INT START	OFF
TEST PREPARATION	INT CHECK
TEST REQUEST	INT CHECK
MFO	MAN
SELECT	EXPANDED
ROS	HOLD
TST	ON HOOK

3.02 Operate each slide switch on the db insertion pads to its normal position (numbers not visible).

3.03 Connect the -48V INPUT jack on the test set to the -48V battery and ground jack on the ROTL frame using an ITE-9598 cord. At this time, tones or a series of MF pulses may be heard at the test set speaker, and numerals will appear at the test set digital readout display window. Clear the display to 000 by momentarily depressing the DATA RCV pushbutton.

3.04 Operate switch INT START to its ON position; then, depress the DATA RCV pushbutton once. Ignore the digital display or any lamp indications, but listen for a responder data tone (1200 Hz - 2200 Hz - 1200 Hz) at the speaker. This tone is used by the ATMS for data transmission and will be heard during the later transmission tests of this section.

3.05 Operate switch INT START back to its OFF position; then, depress the DATA RCV pushbutton to clear the digital readout display.

3.06 Perform the operations of Table 3.1 and verify the indicated responses. The table lists the responses in the relative order of occurrence. In many cases, the responses are difficult to verify and will have to be repeated. To repeat any tests, perform Paragraph 3.05 and start through the table again.

3.07 Rotate switch KP of the test set MF DIGITS thumbwheels to position KP (position 11 on the prototype test set). Rotate switch 24 to position ST (position 10 on the prototype test set). Rotate switch 23 to position OFF (position 11 on the prototype test set). Rotate the remaining switches to some digit position other than OFF (other than 11 on the prototype test set).

3.08 Momentarily operate pushbutton START MF and note that one 2/6 MF tone is heard. Continue to operate pushbutton START MF and verify that another 2/6 MF tone is heard for each digit and KP except that of digit switch 23 which is in the OFF position.

3.09 After the last digit (ST) is heard, momentarily operate switch RECYCLE. Note that a 1 second burst of 1300 Hz recycle tone is heard.

3.10 Operate switch MFO to position AUTO.

3.11 Depress pushbutton START MF again and verify that the test set outpulses the complete string of digits selected on the MF DIGITS thumbwheels

3.12 Momentarily depress pushbutton RSP RLS and verify that one 2/6 MF tone is heard (responder release signal).

3.13 Depress pushbutton DISC and verify that a 1300 Hz tone is heard as long as DISC is operated.

3.14 Momentarily operate switch RNG-FWD and verify that a short burst of 1300 Hz tone is heard.

TABLE 3.1

ROTL TEST SET INTERROGATOR SELF-CHECK					
SWITCH OPERATION		LAMP INDICATION		DATA READOUT DISPLAY	AUDIBLE INDICATION
		LIT	EXTINGUISHED		
		SCK NEW N-E/F-N CHK-2		000	
INT START TO ON		INT START ON SCK DATA RDY OLD F-E/N-F CHK-1 TEST FAULT 7*	NEW N-E/F-N CHK-2	-7_._	
DATA RCV	OP.		DATA RDY		
	REL.	NEW N-E/F-N CHK-2	OLD F-E/N-F TEST FAULT 7*	-000	Responder Data Tone
		DATA RDY OLD	NEW	+000	
INT START TO OFF		TEST FAULT 1		+001	
DATA RCV	OP.		DATA RDY		
	REL.	NEW	OLD ON TEST FAULT 1	000	

* Test Set L1, 2, 3 only.

4. ROTL ACCESS AND RELEASE

4.1 Operational Access

4.11 Obtain the telephone numbers for the three test ports from the telephone company and enter these numbers in Table 4.1.

TABLE 4.1

PORT	TELEPHONE NUMBER
Transmission and Operational Test Port #1	
Transmission and Operational Test Port #2	
Balance Test Port #3	

4.12 At the test set, set the following switches to the designated postions:

SWITCH	POSITION
MFO	AUTO*
SELECT	EXPANDED*
INT START	OFF
ROS	DIAL
TST	ON HOOK

* Switches will remain in the same positions throughout the system test.

4.13 Insert 6 db loss into the test set transmit and receive path by operating the 2 and 4 slide switches (numbers showing) on either of the db insertion pads. The remaining six slide switches should be normal (numbers not showing).

4.14 If the digital readout at the test set shows other than 000, momentarily depress the DATA RCV pushbutton.

4.15 Under telephone company supervision, connect an ITE-9621 cord from the test set TIP and RING jack to an unassigned subscriber's line or to a dedicated line to be used for ROTL access.

4.16 Operate the test set TST switch to position OFF HOOK and note that dial tone is heard (at the test set speaker).

4.17 Dial the telephone number of transmission and operational test port number one. Verify one second of 2225 Hz test progress tone indicating that the ROTL register is being attached to the access circuit. Continue on with 4.2.

4.18 If the 2225 Hz TPT is Not Heard - Depending on the test port accessed, verify that frame relay P1A (test port one), frame relay P2A (test port two), or frame relay P3A (test port three) is operated. An operated P1A relay operates relay TPTA, and operated P2A operates relay TPTB, and an operated P3A operates relay TPTD. The TPTA, TPTB, or TPTD relays extend the T and R leads to the test progress tone supply circuit.

Test Port 1: P1A TPTA 2225 Hz
Test Port 2: P2A TPTB 2225 Hz
Test Port 3: P3A TPTD 2225 Hz

4.19 If the 2225 Hz TPT is Not Removed

(a) For access to test port one or two, verify that frame relay T1 is operated to release relay TPTC which removes the test progress tone.

(b) For access to test port three, verify that frame relay TBA is operated to release relay TPTD which remotes the test progress tone.

4.2 Release

4.21 Depress the test set DISC pushbutton for two to five seconds and verify a 1300 Hz tone while DISC is depressed. This is a release signal causing all previously seized ROTL equipment to release.

4.22 If the ROTL Frame Does Not Release - Verify that ROTL frame relay RLA for test port one, RLB for test port two or RLD for test port three operated from the tone detector DAT circuit to release the ROTL equipment.

4.23 Operate the test set TST switch to ON HOOK.

4.24 Repeat Paragraphs 4.16 through 4.23 for test ports two and three.

4.3 Test Access

4.31 Operate the test set TST switch to its OFF HOOK position.

4.32 Remove the ITE-9621 cord from the subscriber's line and the TIP and RING test set jack.

4.33 Connect the ROTL frame TEST jack to the frame TST1 jack using an ITE-9600 cord.

4.34 Connect the test set TIP and RING jack to the ROTL frame MCB jack using an ITE-9601 cord. Verify that a 2225 Hz test progress tone sounds for one second to indicate that the ROTL register is being attached to the access circuit. If the 2225 Hz TPT is not heard or removed, see Paragraph 4.18 or 4.19.

4.35 Remove the ITE-9601 cord from the frame MCB jack.

4.36 Remove the ITE-9600 cord from the frame TST1 jack. Reconnect it to frame jack TST2 (so that the cord is now connected between jacks TST2 and TEST). If lamp BY1 did not go out, manually release relay RU1. (If APP FIG 4 is provided.)

4.37 Repeat Paragraphs 4.34 and 4.35.

4.38 Remove the ITE-9600 cord from the frame TST2 jack. Reconnect it to frame jack BAL (so that the cord is now connected between jacks BAL and TEST). If lamp BY2 did not go out, manually release relay RU2. (If APP FIG 4 provided.)

4.39 Repeat Paragraph 4.34, noting that the "BALANCE PORT" LED lights when TPT is removed.

4.4 Preference Access

4.41 Block relay P3A in its operated position (it should be operated).

4.42 Remove the cord from frame jack BAL and reconnect it to jack TST1 (ignore any relay chatter while the cord is disconnected). Verify a continuous 2225 Hz tone.

4.43 Release relay P3A (and if lamp BY3 remains lighted, manually release relay RU3, APP FIG 4 provided) and verify that the 2225 Hz tone is removed and "A TRMSN TST PORT" LED lights.

4.44 Block relay P1A in its operated position.

4.45 Block relay P3A operated and note that lamp BY3 lights.

4.46 Remove the cord from jack TST1 and reconnect it to jack TST2 (again, ignore the relay chatter). Verify a continuous 2225 Hz tone.

4.47 Release relay P3A (and if lamp BY3 remains lighted, manually release relay RU3) and verify that the 2225 Hz tone is not removed.

4.48 Release relay P1A (and if lamp BY1 remains lighted, manually release relay RU1) and verify that the 2225 Hz tone is removed and "B TRMSN TST PORT" LED lights.

4.49 When access to all three ports has been verified, leave the ITE-9600 cord connected between frame jacks TST2 and TEST, and leave the ITE-9601 cord connected from the test set TIP and RING jack to frame jack MCB.

5. INVALID REGISTRATION

5.1 Set the first four test set MF DIGITS thumbwheel switches as follows:

KP	0	1	ST
KP	1	2	3

5.2 Momentarily depress the START MF pushbutton and verify 3 seconds of 120 IPM low tone indicating that a pulsing error has been detected by the ROTL register circuit. The "IMPLUSING ERROR" LED lights.

5.3 Recycle the ROTL frame by momentarily operating the test set RECYCLE pushbutton. The "RECYCLE TEST PORT" LED lights momentarily.

5.4 Set the first 18 test set MF DIGITS thumbwheel switches as follows:

KP	0	0	4	-	-	...	-	ST
KP	1	2	3	4	5		16	17

Digits 4-16 Set to Anything Except OFF or ST

5.5 Momentarily depress the START MF pushbutton and verify 3 seconds of 120 IPM low tone indicating that an invalid character has been detected by the ROTL register circuit. The "INVALID CODE" LED lights.

5.6 Recycle the ROTL frame by momentarily operating the test set RECYCLE pushbutton. The "RECYCLE TEST PORT" LED lights momentarily.

6. TRANSMISSION TEST - 100

NOTE: The far-end, or home office, test line accessed for this test must be a new 100-type. In other words, the test line must initially return 1000 Hz TPT for five seconds. Check Table 1.5 to verify that a new 100-type test line is available. If not, omit the tests of Paragraph 6.

6.01 From the data base information assembled in Table 1.1, set the test set MF DIGITS thumbwheels for a 100-type test line transmission test.

6.02 From the information provided by the telephone company in Table 1.5, determine the transmission level point (0 or -2 db) and the impedance of the trunk being accessed (600 or 900 ohms). Then, using Table 1.3, rotate the test set TEST PREPARATION switch to its appropriate position.

6.03 Set the following test set switches to the designated positions:

SWITCH	POSITION
TEST REQUEST	MEAS/ALL
ROS	HOLD
INT START	OFF

6.04 Recycle the ROTL frame by momentarily operating the test set RECYCLE pushbutton.

6.05 Momentarily depress the test set START MF pushbutton. Verify three, one-second bursts of 2225 Hz tone indicating that both the near-end and far-end circuits have been connected and are ready to test. The first TPT indicates that the trunk and near-end responder are available. The second TPT is an indication that test progress tone has been returned from the test line. And the third TPT indicates answer supervision from the far-end or home office. If the far-end of home office is a local office, one or two ringing cycles (low tone) could precede the second TPT.

6.06 If Three Seconds of 60 IPM Low Tone is Heard Initially - Indicates that the trunk being tested is busy. The "TRUNK BUSY" LED lights.

6.07 If Three Seconds of 120 IPM Low Tone Is Heard Initially - Indicates that invalid information was passed to the ROTL register circuit. Verify that ROTL frame A-, B-, C-, . . . Q- and R- relays operated on a 2/5 basis corresponding to test set MF DIGITS thumbwheel setttings.

6.08 If No Tone is Heard

(a) Momentarily depress the test set RECYCLE pushbutton and listen for one second of 1300 Hz tone followed by either three seconds of 120 IPM low tone (b) or one second of 2225 Hz TPT (c).

(b) The 120 IPM low tone indicates that the ITT connector is busy - check its status. The "CONN BUSY" LED lights.

(c) 1300 Hz followed by one second of TPT indicates a circuit problem. Momentarily depress the START MF pushbutton again and verify that the test frame relay S operates to cause the operation of relay TPTC which extends the T and R leads to the test progress tone supply.

6.09 If the First 2225 Hz Tone is Not Removed - Indicates that either the near-end responder is service busy (check its status) or a circuit problem exists. If the responder is idle, verify that test frame relay ("NEAR END TEST LINE" LED lit) RCT operated under control of the near-end 105 test line to operate relay SA (one second delay) which, in turn, releases relay TPTC.

6.10 If 60 or 120 IPM Low Tone is Heard After the First 2225 Hz TPT - Indicates that a test line circuit is busy or that no answer supervision was recieved ("NO ANS SUPV" LED lit).

6.11 If the Second 2225 Hz tone is Not Heard or Not Removed - This is an "echo" of the test progress tone from the distant test line. Verify that frame relay MW operates and releases under control of the MW tone detector circuit. The MW relay, in turn, causes relay TPTC to operate and release.

6.12 If the Third 2225 Hz tone is Not Heard - Verify that test frame relay CTA operated ("FAR END TEST LINE" LED lit) from the tone detector CT circuit to operate relay CTAT (.75 second delay) which, in turn, re-operates relay TPTC.

6.13 If the Third 2225 Hz Tone Is Not Removed - Verify that frame relay CT operated (as a result of answer supervision from the distant office) to release relay TPTC and the "RESPONDER CUT THRU" LED lights.

6.14 If the three 2225 Hz tones were not verified, repeat Paragraphs 6.04 through 6.14. Otherwise, continue with Paragraph 6.15.

6.15 Read the notes of Table 6.1 carefully and read through the switch operations and responses. Then, repeat Paragraphs 6.04 and 6.05. This time, operate switch INT START to its ON position within three seconds after the third 2225 Hz TPT. Verify the responses of Table 6.1, Step 1, and continue as indicated in Steps 2 through 4.

NOTE: Since some of the responses are of short duration, Paragraph 6.15 can be repeated as many times as needed. The test line must be reaccessed so 6.15 will have to be repeated in its entirety.

6.16 Normally, the trunk transmission loss will be between -1 and -8 db. Compare this measurement with office records for the trunk, verifying that it is within ±1 db f the TELCo EML. If ROTL and EML data do not agree, request TELCo verify trunk data by manual measurements to determine where the problem lies. With a manual measurement, the two readings should be within ±06 db. Normally trunk noise measurements will be between +15 and +30 dBrnc.

NOTE: Due to a pad in the 52A reponder readings for the 400 Hz, 1 KHz and 2.8 KLHz gainslope measurements (See Table 8.1, Steps 5, 7, and 9) will indicate 16 db more loss than actual trunk loss. The 0 dbm reading is the actual trunk loss.

6.17 Repeat the tests of Paragraph 6 for any additional trunks to 100-type test lines as specified in Table 1.1. When completed, recycle the ROTL frame by operating the test set RECYCLE pushbutton.

7. TRANSMISSION TEST - 102

7.01 From the data base information assembled in Table 1.1, set the test set MF DIGITS thumbwheels for a 102-type test line transmission test.

7.02 From the information provided by the telephone company in Table 1.5, determine the transmission level point (0 or -2 db) and the impedance of the trunk being accessed (600 or 900 ohms). Then, using Table 1.3, rotate the test set TEST PREPARATION switch to its appropriate position.

TABLE 6.1

TEST SET OPERATIONS - 100-TYPE TEST LINE MEASUREMENTS

STEP	SWITCH OPERATION		LAMP INDICATION LIT	LAMP INDICATION EXTINGUISHED	DATA READOUT DISPLAY	AUDIBLE INDICATION
			MEAS NEW N-E/F-N CHK-2		000	
1	Operate INT START To Position ON		INT START ON ODBM	CHK-2	-00.0	2/6 MF Command (Loss MEAS) 1 Burst F-N Loss Data Tone
			DATA RDY		LOSS READING SEE PARA. 6.16	
2	DATA RCV	OP. REL.	F-E/N-F	DATA RDY N-E/F-N		
3	DATA RCV	OP. REL.	F-E/F-N NOISE	F-E/N-F ODBM	+000	2/6 MF Command (N-E Noise MEAS); 1 Burst N-E Noise Data Tone
			DATA RDY		NOISE READING	
4	DATA RCV	OP. REL.	CHK-2	DATA RDY ON NOISE	SEE PARA. 6.16 000	

NOTES:

(1) Once the INT START switch is operated, new MF commands must be sent to the responders at less than 15-second intervals. This is necessary to keep the responders from timing out between commands. These time-out intervals are indicated by the horizontal, double-lined dividers in the table. All the steps between each set of dividers must be performed within 15 seconds to insure responder connections.

(2) The DATA RDY lamp lights as an indication that the digital readout at the display window is measurement data. Only then can the readout be considered as data.

(a) When lamp N-E/F-N is lit, the data is from the near-end ROTL responder and is a far-end to near-end measurement.

(b) When lamp F-E/N-F is lit, the data is from the far-end responder and is a near-end to far-end measurement.

(3) If an error is detected by the test set, a TEST FAULT lamp will light. When this happens, refer to Table 1.4 for the fault. Note the FAULT 2 is not an error indication but rather an indication that the data received was underrange (i.e., trunk loss was too small to measure).

7.03 Set the following test set switches to the designated positions:

SWITCH	POSITION
TEST REQUEST	MEAS/ALL
ROS	HOLD
INT START	OFF

7.04 Recycle the ROTL frame by momentarily operating the test set RECYCLE pushbutton.

TABLE 7.1

TEST SET OPERATIONS - 102-TYPE TEST LINE MEASUREMENTS

STEP	SWITCH OPERATION	LAMP INDICATION LIT	LAMP INDICATION EXTINGUISHED	DATA READOUT DISPLAY	AUDIBLE INDICATION
		MEAS NEW N-E/F-N CHK-2		000	
1	Operate INT START To Position ON	INT START ON ODBM	CHK-2	-00.0	2/6 MF Command (Loss MEAS) 1 Burst F-N Loss Data Tone
		DATA RDY		LOSS READING SEE PARA. 6.16	
2	DATA OP.		DATA RDY		
	RCV REL.	CHK-2	ON ODBM	000	

NOTE: If an eror is detected by the test set, a TEST FAULT lamp will light. When this happens, refer to Table 1.4 for the fault. Note that FAULT 2 is not an error indication but rather an indication that the data received was underrange (i.e., trunk loss was too small to measure).

7.05 Momentarily depress the test set START MF pushbutton and verify three one-second bursts of 2225 Hz tone indicating that both the near-end and far-end circuits have been connected and are ready to test. The first TPT indicates that the trunk is available. The second TPT indicates that the test line is connected. The third TPT indicates that the near-end responder is attached. If the far-end or home office is a local office, one or two ringing cycles (low tone) could precede the second TPT.

7.06 If Three Seconds of 60 IPM Low Tone is Heard Initially - Indicates that the trunk being tested is busy . The "TRUNK BUSY" LED lights.

7.07 If Three Seconds of 120 IPM Low Tone is Heard Initially - Indicates that invalid information was passed to the ROTL register circuit. Verify that ROTL frame A-, B-, C-, ..., Q- and R- relays operated on a 2/5 basis corresponding to test set MF DIGITS thumbwheel settings.

7.08 If No Tone is Heard

(a) Momentarily depress the test set RECYCLE pushbutton and listed for one second of 1300 Hz tone followed by either three seconds of 120 IPM low tone (b) or one second of TPT (c).

(b) The 120 IPM low tone indicates that the ITT connector is busy - check its status. The "CONN BUSY" LED lights.

(c) 1300 Hz followed by TPT indicates a circuit problem. Momentarily depress the START MF pushbutton again and verify that the test frame relay S operates to cause the operation of relay TPTC which extends the T and R leads to the test progress tone supply.

7.09 If the First 2225 Hz Tone is Not Removed - Verify that test frame relay SA operated to release relay TPTC.

7.10 If 60 or 120 IPM Low Tone is Heard After the First 2225 Hz Tone - Indicates that test line circuit is busy, that no answer supervision was received ("NO ANS SUPV" LED lights), or that the near-end responder is plugged busy.

7.11 If the Second 2225 Hz Tone is Not Heard or Not Removed - This is an "echo" of the test progress tone from the distant test line. Verify that frame relay MW operates and releases under control of the MW tone detector circuit. The MW relay, in turn, causes relay TPTC to operate and release.

7.12 If the Third 2225 Hz Tone is Not Heard - Indicates that a circuit trouble exists. If the responder is idle, verify that test frame relay RCT operated ("NEAR END TEST LINE" LED lit), and that relay CTA operated ("FAR END TEST LINE" LED lit), from the tone detector CT circuit to oeprate relay CTAT (.75 second delay). The CTAT relay causes the TPTC relay to operate.

7.13 If the Third 2225 Hz Tone is Not Removed - Verify that frame relay CT operated (as a result of answer supervision from the distant office) to release relay TPTC and the "RESPONDER CUT THRU" LED lights.

7.14 If the three 2225 Hz tones were not verified, repeat Paragraphs 7.04 through 7.14. Otherwise, continue with Paragraph 7.15.

7.15 Review the switch operations and responses of Table 7.1. Then, repeat Paragraphs 7.04 and 7.05. This time, operate switch INT START to its ON position wthin seven seconds after the third 2225 Hz TPT. Verify the responses of Table 7.1.

NOTE: Paragraph 7.15 can be repeated as many times as need for verification, but it must be repeated in its entirety.

7.16 Repeat the tests of Paragraph 7 for any additional trunks to 102-type test lines as specified in Table 1.1. When completed, recycle the ROTL frame by operating the test set RECYCLE pushbutton.

8. TRANSMISSION TEST - 105

8.01 From the data base information assembled in Table 1.1, set the test set MF DIGITS thumbwheels for a 105-type test line transmission test.

8.02 From the information provided by the telephone company in Table 1.5, determine the transmission level point (0 or -2 db) and the impedance of the trunk being accessed (600 or 900 ohms). Then, using Table 1.3, rotate the test set TEST PREPARATION switch to its appropriate position.

8.03 Set the following test set switches to the designated positions:

SWITCH	POSITION
TEST REQUEST	SCK/ALL
ROS	HOLD
INT START	OFF

8.04 Recycle the ROTL frame by momentarily operating the test set RECYCLE pushbutton.

8.05 Momentarily depress the test set START MF pushbutton and verify three one-second bursts of 2225 Hz tone indicating that both the near-end and far-end circuits have been connected and are ready to test. The first TPT indicates that the trunk is available. The second TPT indicates that the test line and responder are connected. The third TPT indicates that the near-end responder is connected. If the far-end or home office is a local office, one or two ringing pulses (low tone) could precede the second TPT.

8.06 If Three Seconds of 60 IPM Low Tone is Heard Initially - Indicates that the trunk being tested is busy. The "TRUNK BUSY" LED lights.

8.07 If Three Seconds of 120 IPM Low Tone is Heard Initially - Indicates that invalid information was passed to the ROTL register circuit. Verify that ROTL frame A-, B-, C-, ..., Q- and R- relays operated on a 2/5 basis corresponding to test set MF DIGITS thumbwheel settings.

8.08 If No Tone Is Heard

(a) Momentarily depress the test set RECYCLE pushbutton and listen for one second of 1300 Hz tone followed by either three seconds of 120 IPM low tone (b) or one second of TPT (c).

(b) The 120 IPM low tone indicates that the ITT connector is busy - check its status. The "CONN BUSY" LED lights.

(c) 1300 Hz followed by TPT indicates a circuit problem. Momentarily depress the START MF pushbutton again and verify that the test frame relay S operates to cause the operation of relay TPTC which extends the T and R leads to the test progress tone supply.

8.09 If the First 2225 Hz Tone is Not Removed - Verify that test frame relay SA operated to release relay TPTC.

8.10 If 60 or 120 IPM Low Tone Is Heard After the First 2225 Hz Tone - Indicates that a test line circuit is busy or that no answer supervision was received ("NO ANS SUPV" LED lit).

TABLE 8.1

TEST SET OPERATIONS - RESPONDER SELF-CHECK (SCK)

STEP	SWITCH OPERATION		LAMP INDICATION LIT	LAMP INDICATION EXTINGUISHED	DATA DISPLAY (±0.1)	AUDIBLE INDICATION
			SCK NEW N-E/F-N CHK-2		000	
1	Operate INT START To Position ON		INT START ON ODBM	CHK-2	-000	2/6 MF Command (Loss SCK); 1 Burst F-N Loss Data Tone
			DATA RDY		+00.0	1 Burst N-F Loss Data Tone
			OLD (See Note 4)	NEW (See Note 4)	+00.0	
2	DATA RCV	OP.		DATA RDY	+00.0	
		REL.	F-E/N-F DATA RDY	N-E/F-N	+00.0	
3	DATA RCV	OP.		DATA RDY	+00.0	
		REL.	N-E/F-N NOISE	F-E/N-F ODBM	-000	2/6 MF Command (N-E Noise SCK); 1 Burst N-E Noise Data Tone
			DATA RDY		+000	
4	DATA RCV	OP.		DATA RDY	+000	
		REL.	F-E/N-F	N-E/F-N	-000	2/6 MF Command (F-E Noise SCK); 1 Burst F-E Noise Data Tone
			DATA RDY		+000	
Proceed to STEP 13 if far-end responder is OLD type (See Note 4).						
5	DATA RCV	OP.		DATA RDY	+000	
		REL.	N-E/F-N 400 Hz	F-E/N-F NOISE	-00.0	2/6 MF Command (Gainslope SCK); 1 Burst N-F Loss Data Tone
			DATA RDY		+00.0	1 Burst F-N Loss Data Tone
6	DATA RCV	OP.		DATA RDY	+00.0	
		REL.	F-E/N-F DATA RDY	N-E/F-N	+00.0	
7	DATA RCV	OP.		DATA RDY	+00.0	
		REL.	N-E/F-N 1KHZ	F-E/N-F 400 Hz	-00.0	2/6 MF Command (Gainslope SCK); 1 Burst N-F Loss Data Tone
			DATA RDY		+00.0	1 Burst F-N Loss Data Tone

TABLE 8.1 (Cont'd)

TEST SET OPERATIONS - RESPONDER SELF-CHECK (SCK)						
STEP	SWITCH OPERATION		LAMP INDICATION LIT	LAMP INDICATION EXTINGUISHED	DATA DISPLAY (±0.1)	AUDIBLE INDICATION
8	DATA RCV	OP.		DATA RDY	+00.0	
		REL.	F-E/N-F DATA RDY	N-E/F-N	+00.0	
9	DATA RCV	OP.		DATA RDY	+00.0	
		REL.	N-E/F-N 2.8 KHZ	F-E/N-F 1KHZ	-00.0	2/6 MF Command (Gainslope SCK); 1 Burst N-F Loss Data Tone
			DATA RDY		-00.0	1 Burst F-N Loss Data Tone
10	DATA RCV	OP.		DATA RDY	-00.0	
		REL.	F-E/N-F DATA RDY	N-E/F-N	+00.0	
11	DATA RCV	OP.		DATA RDY	+00.0	
		REL.	N-E/F-N NOISE TONE	F-E/N-F 2.8 KHZ	-000	2/6 MF Command (Noise Tone SCK); 1 Burst N-F Noise Data Tone
			DATA RDY		+000	1 Burst F-N Noise Data Tone
12	DATA RCV	OP.		DATA RDY	+000	
		REL.	F-E/N-F	N-E/F-N	+000	
			DATA RDY		+000	
13	DATA RCV	OP.		DATA RDY	+000	
		REL.	NEW N-E/F-N CHK-2	OLD (See Note 4) F-E/N-F ON	000	

NOTES FOR TABLE 8.1

(1) Once the INT START switch is operated, new MF commands must be sent to the responder at less than 15 second intervals. This is necessary to keep the responder from timing out between commands. These time-out intervals are indicated by the horizontal, double-lined dividers in the table. All the steps between each set of dividers must be performed within 15 seconds to insure responder connections.

(2) The DATA RDY lamp lights as an indication that the digital readout at the display window is measurement data. Only then can the readout be considered as data.

(a) When lamp N-E/F-N is lit, the data is from the near-end ROTL responder and is a far-end to near-end measurement.

(b) When lamp F-E/N-F is lit, the data is from the far-end responder and is a near-end to far-end measurement.

(3) If an error is detected by the test set, a TEST FAULT lamp will light. When this happens, refer to Table 1.4 for the fault. Note that FAULT 2 is not an error indication but rather an indication that the data received was underrange (i.e., trunk loss was too small to measure).

(4) If the far-end responder is a 51B-type, the OLD lamp will light at the end of STEP 1. In that case, the test set will sequence from STEP 4 directly to STEP 13 (STEPS 5 through 12 will be omitted). If the far-end responder is a 52A type, lamp NEW will remain lighted and all steps will be completed.

TABLE 8.2

TEST SET OPERATIONS - RESPONDER MEASUREMENTS (MEAS)						
STEP	SWITCH OPERATION		LAMP INDICATION LIT	LAMP INDICATION EXTINGUISHED	DATA READOUT DISPLAY	AUDIBLE INDICATION
			MEAS, NEW N-E/F-N, CHK-2		000	
1	Operate INT START To Position On		INT START ON, ODBM	CHK-2	-00.0	2/6 MF Command (Loss MEAS); 1 Burst F-N Loss Data Tone
			DATA RDY		LOSS READING See Par 6.16	1 Burst N-F Loss Data Tone
			OLD (See Note 4)	NEW (See Note 4)		
2	DATA RCV	OP.		DATA RDY		
		REL.	F-E/N-F DATA RDY	N-E/F-N	LOSS READING See Par 6.16	
3	DATA RCV	OP.		DATA RDY		
		REL.	N-E/F-N NOISE	F-E/N-F ODBM	+000	2/6 MF Command (N-E Noise MEAS) 1 Burst N-E Noise Data Tone
			DATA RDY		NOISE READING See Par 6.16	
4	DATA RCV	OP.		DATA RDY		
		REL.	F-E/N-F	N-E/F-N	+000	2/6 FM Command (F-E Noise MEAS) 1 Burst F-E Noise Data Tone
			DATA RDY		NOISE READING See Par 6.16	
Proceed to STEP 13 if far-end responder is OLD type (See Note 4).						
5	DATA RCV	OP.		DATA RDY		
		REL.	N-F/F-N 400 Hz	F-E/N-F NOISE	-00.0	2/6 MF Command (Gainslope MEAS) 1 Burst N-F Loss Data Tone
			DATA RDY		LOSS READING See Par 6.16	1 Burst F-N Loss Data Tone
6	DATA RCV	OP.		DATA RDY		
		REL.	F-E/N-F DATA RDY	N-E/F-N	LOSS READING See Par 6.16	
7	DATA RCV	OP.		DATA RDY		
		REL.	N-E/F-N 1HKZ	F-E/N-F 400 HZ	-00.0	2/6 MF Command (Gainslope MEAS) 1 Burst N-F Loss Data Tone
			DATA RDY		LOSS READING See Par 6.16	
8	DATA RCV	OP.		DATA RDY		
		REL.	F-E/N-F	N-E/F-N	LOSS READING See Par 6.16	
9	DATA RCV	OP.		DATA RDY		
		REL.	N-E/F-N 2.8 KHZ	F-E/N-F 1KHZ	-00.0	2/6 MF Command (Gainslope MEAS) 1 Burst N-F Loss Data Tone
			DATA RDY		LOSS READING See Par 6.16	1 Burst F-N Loss Data Tone
10	DATA RCV	OP.		DATA RDY		
		REL.	F-E/N-F DATA RDY	N-E/F-N	LOSS READING See Par 6.16	

TABLE 8.2 (Continued)

TEST SET OPERATIONS - RESPONDER MEASUREMENTS (MEAS)						
STEP	SWITCH OPERATION		LAMP INDICATION		DATA READOUT DISPLAY	AUDIBLE INDICATION
			LIT	EXTINGUISHED		
11	DATA RCV	OP.		DATA RDY		
		REL.	N-E/F-N NOISE TONE	F-E/N-F 2.8 KHZ	+000	2/6 MF Command (Noise Tone MEAS) 1 Burst N-F Noise Data Tone
			DATA RDY		NOISE READING	1 Burst F-N Noise Data Tone
12	DATA RCV	OP.		DATA RDY	See Par 6.16	
		REL.	F-E/N-F	N-E/F-N	+000	
			DATA RDY		NOISE READING	
13	DATA RCV	OP.		DATA RDY	See Par 6.16	
		REL.	NEW N-E/F-N CHK-2	OLD (See Note 4) F-E/N-F ON	000	

NOTES: See Table 8.1 notes on Page 10.

8.11 If the Second 2225 Hz Tone is Not Heard or Not Removed - This tone is an "echo" of the test progress tone from the distant test line. Verify that relay TPTC operates and releases under control of the TPT tone detector circuit.

8.12 If 60 IPM Low Tone is Heard After the Second 2225 Hz Tone - Indicates that the near-end responder is plugged busy.

8.13 If the Third 2225 Hz Tone is Not Heard - Indicates that a circuit problem exists. If the responder is idle, verify that test frame relay RCT operated ("BEAR END TEST LINE" LED lit) and that relay CTA operated ("FAR END TEST LINE" LED lit) from the tone detector CT circuit to operate relay CTAT (.75 second delay). The CTAT relay causes the TPTC relay to operate.

8.14 If the Third 2225 Hz Tone is Not Removed - Verify that frame relay CT operated (as a result of answer supervision from the distant office) to release relay TPTC and the "RESPONDER CUT THRU" LED lights.

8.15 If the three 2225 Hz tones were not verified, repeat Paragraph 8.04 through 8.15. Otherwise, continue with Paragraph 8.16.

8.16 Read the notes of Table 8.1 carefully and read through the switch operations and responses. Then, repeat Paragraphs 8.04 and 8.05. This time, operate switch INT START to its ON position within 12 seconds after the third 2225 Hz TPT. Verify the responses of Table 8.1, Step 1 and continue as indicated in Steps 2 through 13. Keep in mind the time-out intervals and table variations mentioned in the notes.

NOTE: Since some responses are short, test sequences can be repeated by operating INT START to OFF, depressing DATA RCV to clear the display, and starting again with INT START. Remember that start commands must be sent to the responder(s) within the 15-second time-out period.

8.17 Operate the test set INT START switch to position OFF and if the digital readout reads other than 000, depress pushbutton DATA RCV.

8.18 Operate the test set TEST REQUEST switch to position MEAS/ALL.

8.19 Review the notes of Table 8.1 (which apply to Table 8.2 also) and read through the switch operations and responses of Table 8.2. Then, repeat Paragraphs 8.04 and 8.05. Again, operate switch INT START to position ON within 12 seconds after third 2225 Hz TPT. Verify the responses of Table 8.2, Step 1, and continue as indicated in Steps 2 through 13. Keep the notes in mind.

NOTE: Again, since some responses are short, test sequence can be repeated according to the note of Paragraph 8.16.

8.20 Repeat the test of Para. 8 for any additional trunks to 105-type test lines as specified in Table 1.1. When completed, recycle the ROTL FRAME by operating the test set RECYCLE pushbutton.

9. OPERATIONAL TEST - 103

9.01 From the data base information assembled in Table 1.1, set the test set MF DIGITS thumbwheels for a 103-type test line operational test.

9.02 Set the test set ROS switch to position HOLD.

9.03 Recyle the ROTL frame by momentarily operating the test set RECYCLE pushbutton.

9.04 Momentarily depress the START MF pushbutton and verify the following responses:

	RESPONSE	DURATION	INDICATION
1.	2225 Hz TPT	1 Second	Prepared for OP. Test
2.	Quiet	.75 Seconds	Trunk Seized
3.	2225 Hz TPT	1 Second	
4.	Quiet	2-3 Seconds (Approx.)	
5.	2225 Hz TPT	Continuous	Waiting for Rering

9.05 If Three Seconds of 60 IPM Low Tone is Heard Initially - Indicates that the trunk being tested is busy. The "TRUNK BUSY" LED lights.

9.06 If Three Seconds of 120 IPM Low Tone is Heard Initially - Indicates that invalid information was passed to the ROTL register circuit. Verify that ROTL frame A-, B-, C- ..., Q- and R- relays operated on a 2/5 basis corresponding to test set MF DIGITS thumbwheel settings.

9.07 If No Tone is Heard

(a) Momentarily depress the test set RECYLE pushbutton and listen for one second of 1300 Hz tone followed by either three seconds of 120 IPM low tone (b) or one second of TPT (c).

(b) The 120 IPM low tone indicates that the connector is busy - check its status. The "CONN BUSY" LED lights..

(c) 1300 Hz followed by TPT indicates a circuit problem. Momentarily depress the START MF pushbutton again and verify that the test frame relays OT and RCK2 operate the cause relay TPTC to operate. The operated TPTC relay extends the T and R leads to the test progress tone supply.

9.08 If the First 2225 Hz Tone is Not Removed - Verify that frame relay OTA operated to release relay TPTC.

9.09 If the Second 2225 Hz Tone is Not Heard - Verify that frame relays OTB and S operated to reoperate relay TPTC.

9.10 If the Second 2225 Hz Tone is Not Removed - Verify that frame relay SA operates to release relay TPTC.

9.11 If the Third 2225 Hz Tone is Not Heard - Verify that frame relays D1T, CS1 ("OFF HOOK SUPV TST" LED) and OCT ("FAR END TEST LINE" LED) operated to operate relay TPTC.

9.12 If the sequence of 2225 Hz tones given in Paragraph 9.04 was not verified, repeat Paragraphs 9.03 through 9.12. Otherwise, continue with Paragraph 9.13.

9.13 Momentarily depress the test set RNG-FWD pushbutton to initiate a burst (.1 second) of 1300 Hz tone. This causes the ROTL frame to send a ring forward signal to the trunk. Verify that the 2225 Hz tone is removed.

9.14 If the 2225 Hz Tone is Not Removed - Verify that frame relay CS1 released (due to the operation and release of relay RR under control of the tone detector RRING circuit) to release relay TPTC.

9.15 When the 2225 Hz tone has been removed, momentarily depress the test set RNG-FWD pushbutton again. Verify the short 1300 Hz burst followed by a 2225 Hz tone interrupted at 120 IPM.

9.16 If the 2225 Hz Tones are Not Heard or Removed - Verify that the TPTC relay operates and releases under direct control of the CS1 relay.

9.17 Momentarily operate the test set RECYCLE pushbutton and verify that the 120 IPM 2225 Hz tone is removed.

9.18 Repeat Paragraphs 9.01 through 9.17 for any additional trunks to 103-type test lines as specified in Table 1.1.

10. OPERATIONAL TEST - SYNCHRONOUS

10.01 From the data base information assembled in Table 1.1, set the test set MF DIGITS thumbwheels for a synchronous test line operational test.

10.02 Set the test set ROS switch to position HOLD.

10.03 Recycle the ROTL frame by momentarily operating the test set RECYCLE pushbutton.

10.04 Momentarily depress the test set START MF pushbutton and verify the following response:

	RESPONSE	DURATION	INDICATION
1.	2225 Hz TPT	1 Second	Prepared for OP. Test
2.	Quiet	.75 Seconds	
3.	2225 Hz TPT	1 Second	Trunk Seized
4.	Quiet*	4 Seconds (Approx.)	
5.	6 Flashes of 2225 Hz TPT (1 Long, 2 Short, 1 Long, 2 Short)	4.25 seconds	Sync. Test

*If the far-end or home office is a local office, one or two ringing cycles (low tone) will precede the six TPT flashes.

10.05 If Three Seconds of 60 IPM Low Tone is Heard Initially - See Paragraph 9.05.

10.06 If Three Seconds of 120 IPM Low Tone is Heard Initially - See Paragraph 9.06.

10.07 If No Tone is Heard - See Paragraph 9.07.

10.08 If the First 2225 Hz Tone is Not Removed - See Paragraph 9.08.

10.09 If the Second 2225 Hz Tone is Not Heard - See Paragraph 9.09.

10.10 If the Second 2225 Hz Tone is Not Removed - See Paragraph 9.10.

10.11 If the Test Flashes are Not Heard - Verify that test frame relay OCT ("FAR END TEST LINE" LED) operates (under control of CT tone detector circuit or by the first operation of relay CS1). The operated OCT relay enables the CS1 relay to control the TPTC relay. Relay CS1 ("OFF HOOK SUPV TST" LED) in turn monitors the flashes returned for the test line.

10.12 Recycle the ROTL frame by momentarily operating the test set RECYCLE pushbutton.

10.13 Repeat Paragraph 10 for any additional trunks to synchronous test lines as specified in Table 1.1.

11. OPERATIONAL TEST - NONSYNCHRONOUS

11.1 From the data base information assembled in Table 1.1, set the test set MF DIGITS thumbwheels for a nonsynchronous test line operational test.

11.2 Set the test set ROS switch to position HOLD.

11.3 Recycle the ROTL frame by momentarily operating the test set RECYLE pushbutton.

11.4 Momentarily depress the test set START MF pushbutton and verify the following reponse:

	RESPONSE	DURATION	INDICATION
1.	2225 Hz TPT	1 Second	Prepared for OP. Test
2.	Quiet	.75 Seconds	
3.	2225 Hz TPT	1 Second	Trunk Seized
4.	Quiet*	4 Seconds (Approx.)	
5.	Interrupted TPT	Continuous	Nonsync. Test

*If the far-end or home office is a local office, one or two ringing cycles will precede the 120 IPM TPT.

11.5 If problems occur in verifying the above responses, see Paragraphs 10.05 through 10.11.

11.6 Recycle the ROTL frame by momentarily operating the test set RECYCLE pushbutton.

11.7 Repeat Paragraph 11 for any additional trunks to nonsynchronous test lines as specified in Table 1.1.

12. TERMINAL BALANCE TEST

NOTE: If it is not possible to terminate at a new 100-type test line (5.5 seconds of 1000Hz followed by quiet termination) for this test, access an old 100-type test line (quiet termination only) and manually apply a 1000Hz, M- Watt signal across terminals 81 and 91 of TS (AA-B) on the ROTL frame (test receiver connections) for 2 or 3 seconds during RESPONSE 3 of Paragraph 12.06.

12.01 From the data base information assembled in Table 1.1, set the test set MF DIGITS thumbwheels for a balance test. Note that a new 100-type test line must be accessed.

12.02 Remove the cord connected to frame jack TST2 and reconnect it to jack BAL (ignore any relay chattering while the cord is disconnected). If continuous TPT is returned, manually release relay RU1 (if App. Fig. 4 is provided).

12.03 Set the test set ROS switch to position HOLD.

12.04 Set the MON AMP switch to the BAL PORT OUT position to hear return test tones from the ROTL to the terminal balance test line.

12.05 Recycle the ROTL frame by momentarily operating the test set RECYCLE pushbutton.

12.06 Momentarily depress the test set START MF pushbutton and verify the following responses:

	RESPONSE	DURATION	INDICATION
1.	2225 Hz TPT	1 Second	Trunk Seized
2.	Quiet*	4 Seconds (Approx.)	
3.	1000 Hz TPT (ROTL Speaker)	1 Second	Test Line Connected
4.	1000 Hz 1MW (ROTL Speaker)	10 Seconds	Ready For Balance Test
5.	Quiet	Continuous	Balance Test

*If the far-end or home office is a local office, one or two ringing cycles will precede the 1000 Hz tones.

12.07 If Three Seconds of 60 IPM Low Tone is Heard Initially - Indicates that the trunk being tested is busy. The "TRUNK BUSY" LED lights.

12.08 If Three Seconds of 120 IPM Low Tone is Heard Initially - Indicates that invalid information was passed to the ROTL frame A-, B-, C-, ..., Q- and R- relays operated on a 2/5 basis corresponding to test set MF DIGITS thumbwheel settings.

12.09 If No Tone is Heard

(a) Momentarily depress the test set RECYCLE pushbutton and listen for one second of 1300 Hz tone followed by either three seconds of 120 IPM low tone (b) or one second of TPT (c).

(b) The 120 IPM low tone indicates that the connector is busy - check its status. The "CONN BUSY" LED lights.

(c) 1300 Hz followed by TPT indicates a circuit problem. Momentarily depress the START MF pushbutton again and verify that test frame relay SB operates to inturn operate relay TPTD which extends the T and R leads through to the test progress tone supply.

12.10 If the 2225 Hz TPT is Not Removed - Verify that frame relay SAB operated to release relay TPTD.

12.11 If One Second of 1000 Hz is Not Heard (At ROTL Speaker) - This signal is TPT from the far-end test line. If the rest of the sequence progresses, the signal was too low to be heard. Otherwise, a problem exists at the far-end.

12.12 If Ten Seconds of 1000 Hz, 1 MW Tone is Not Heard (At ROTL Speaker) - Verify that frame relay CTB operated to connect the milliwatt distributing circuit to the T1 and R1 leads of the incoming trunk test circuit and the "OFF HOOK SUPV BAL" LED lights.

12.13 If 1000 Hz, 1 MW Tone is Not Removed (At ROTL Speaker) - Verify that frame relay CTTC operated at the end of the ten-second timing period to disconnect the milliwatt distributing circuit from the T1 and R1 leads and replace it with a load resistor and capacitor for quiet termination. ("CUT THRU" LED lights).

12.14 Disconnect the test connection by momentarily operating the test set RECYCLE pushbutton.

13. TRUNK BUSY AND MAKE-BUSY OVERRIDE TEST

13.01 Using the data base information assembled in Table 1.1, locate any one-way trunk of the listed trunks, and with telephone company supervision, insert a 322A plug into the make-busy jack of that trunk.

NOTE: Verify that this trunk is accessible from an ITT connector switch that has been modified for ROTL.

13.02 From the data base information of Table 1.1, set the MF DIGITS thumbwheels on the test set for a TRUNK STATUS INTERROGATION of the trunk plugged busy.

13.03 Remove the cord connected to frame jack BAL and reconnect it to frame jack TST1 (ignore any relay chattering while the cord is disconnected). If continuous TPT is returned, manually release relay RU3 (if App. Fig. 4 is provided).

13.04 Set the test set ROS switch to position HOLD.

13.05 Momentarily depress the test set START MF pushbutton. Verify the selected MF digit outpulsing; then, one second of 2225 Hz test progress tone indicating that the trunk is made busy.

13.06 If No Tone Is Heard

(a) Momentarily (less than one second) depress the test set RECYCLE pushbutton and listen for one second of 1300 Hz tone followed by either three seconds of 120 IPM low tone (b) or one second of 2225 Hz TPT (c).

(b) The 120 IPM low tone indicates that the ITT connector is busy - check its status. The "CONN BUSY" LED lights.

(c) 1300 Hz followed by TPT indicates a circuit problem. In this case, momentarily depress the START MF pushbutton again and verify that test frame relays TPD and TPW operate to cause operation of relay TPTC which connects the T and R leads through to the test progress tone supply.

13.07 If Other Than the 2225 Hz TPT is Heard - Verify that the digits set on the MF DIGITS thumbwheels are valid for the trunk being tested.

13.08 If the 2225 Hz TPT is Not Removed - Verify that frame relay TPW releases (under control of the TPU interrupter) to release relay TPTC.

13.09 Recycle the ROTL frame by momentarily operating the test set RECYCLE pushbutton.

13.10 At the trunk plugged busy in Paragraph 13.01, replace (with telephone company supervision) the 322A make-busy plug with a 522A plug. This allows the override make-busy feature to function.

13.11 Momentarily depress the test set START MF pushbutton. Verify three seconds of 60 IPM low tone indicating that ROTL circuit override make-busy feature functioned.

13.12 If No Tone Is Heard

(a) Momentarily depress the test set RECYCLE pushbutton and listen for one second of 1300 Hz tone followed by either three seconds of 120 IPM low tone (b) or one second of 2225 Hz TPT (c).

(b) The 120 IPM low tone indicates that the ITT connector is busy - check its status. The "CONN BUSY" LED lights.

(c) 1300 Hz followed by TPT indicates a circuit problem. In this case, momentarily depress the START MF pushbutton again and verify that test frame relays TPU and TM2 operate causing relay LTC to operate which connects the T and R leads through to the tone supply circuit.

13.13 If Other Than 60 IPM Low Tone is Heard - Verify that the digits set on the MF DIGITS thumbwheels are valid for the trunk being tested.

13.14 If the override make-busy function was not verified, recycle the ROTL frame by momentarily operating the test set RECYCLE pushbutton; then, repeat Paragraph 13.11 through 13.14.

13.15 To verify that a maintenace busy condition can actually be overridden, set the test set MF DIGITS thumbwheels for a test line test over the trunk plugged maintenance busy in Paragraph 13.10 (use the data base information of Table 1.1 for an override make-busy test); then, momentarily operate the START MF pushbutton and check that the far-end test line is reached.

NOTE: Presently, a maintenance busy cannot be overridden on trunks having trunk relay equipment at the near-end (such as two way trunks and signaling converters). A maintenance busy can be overridden when the trunk group busy feature is provided, if Option ZO is specified for the ROTL..

13.16 Recycle the ROTL frame by momentarily operating the test set RECYCLE pushbutton.

13.17 Remove the 522A plug from the trunk under test.

13.18 If connection appraised is to be performed in a XB1 office, continue testing per Paragraph 14. Otherwise, proceed to the final tests of Paragraph 15.

14. CONNECTION APPRAISAL

NOTE: This is an optional feature per Circuit Note 109 of SD-28067-01.

14.1 Using the data base information assembled in Table 1.1, set the test set thumbwheels for a connection appraisal test to any of the test lines given.

14.2 Recyle the ROTL frame by momentarily operating the test set RECYCLE pushbutton.

14.3 Momentarily depress the test set START MF pushbutton and verify the appropriate signaling (TPT's) for connection to the test line chosen - if necessary, refer to the transmission paragraph dealing with tests to the appropriate test line.

14.4 Disconnect the test connection by momentarily operating the test set RECYCLE pushbutton.

15. CONNECTOR ACCESS

15.1 With telephone company supervision, start automatic trunk testing at the ITT frame - access trunks on connector switch 0. Then, using the ROTL System Test Set and the priming information provided in Table 1.6, try to access a trunk with an appearance on connector switch 0. Verify that after outpulsing, no tones are heard at the test set, and the "CONN BUSY" LED lights. When the test set is recycled, 120 IPM low tone is returned for three seconds. Stop automatic testing at ITT frame.

15.2 Recycle the ROTL frame again; then, operate the START MF pushbutton to outpulse priming digits.

15.3 Note that the ROTL immediately accesses the ITT connector (lamp RPT lights at the ITT). Verify that the test set completes the appropriate signaling for the far-end test line.

15.4 While the ROTL still has access to the ITT connector, start automatic testing on connector switch 0 at the ITT again. Verify that the ITT does not start testing - it should enter a waiting period for the ROTL to release. Lamp CBY lights.

15.5 Recycle the ROTL frame and verify that the ITT immediately begins testing.

15.6 Disconnect any test connection by momentarily operating the test set recycle pushbutton. If the ROTL does not recycle, verify that ROTL frame relay RCYC can operate and release through relay RL in the 105 test line.

15.7 Repeat Paragraphs 15.1 through 15.6 for trunks on each connector switch in the office.

15.8 Remove all cords from the test set and the ROTL frame.

16. BUSY LINE VERIFICATION TRUNK TEST (Opt ZS)

16.1 Set up the ROTL test set as follows:

(a) Connect an ITE-9598 cord from the test set -48V INPUT jack to the ROTL frame -48V Batt. and Grd. jack.

(b) Connect an ITE-9600 cord between frame jacks TEST and TST1.

(c) Connect an ITE-9601 cord between frame jack MCB and test set TIP and RING jack.

16.2 Set test set switches as follows:

SWITCH	POSITION
INT START	OFF
SELECT	EXPANDED
MFO	AUTO
TEST	ON HOOK
ROS	HOLD

16.3 From the data base information assembled in Table 1.1, set the MF DIGITS thumbwheels to an operational test (103, synchronous or non-synchronous type test line) for a Busy Line Verification Trunk SD-28127-01.

16.31 Use pulsing code digits 90-99 as required.

16.4 Recycle the ROTL frame by momentarily operating the test set recycle pushbutton.

16.5 Momentarily depress the START MF pushbutton and verify the required responses occur (see Para. 9, 10, or 11 depending upon type of test line used). The "BLV TST" progress lamp lights.

16.6 Disconnect the test connection by momentarily operating the test set RECYCLE pushbutton.

16.7 Repeat test Para. 16.1 to 16.6 using a trunk type other than SD-28127-01 but continuing to pulse code digits 90-99 as required.

16.71 The "FAIL BLV TEST" progress lamp lights indicating a non-busy line verification trunk is attached.

16.8 Disconnect the test connection by recycling the test set.

17. DC TEST FROM SCC (Opt ZK)

17.1 Set up the ROTL test set as indicated in Para. 16.1 and 16.2.

17.2 From the data base information assembled is Table 1.1, set the MF DIGITS thumbwheels to a DC TEST FROM AN SCC.

17.3 Recycle the ROTL frame by momentarily operating the test set recycle pushbutton.

17.4 Momentarily depress the test set MF START pushbutton and verify the required 2225 Hz TPT is heard indicating the trunk has been cut through to the ROTL.

17.41 The "PRIMING IMPULSE COMP" progress lamp will be lit.

17.42 Three seconds of 60 IPM low tone and a "TRUNK BUSY" progress lamp indicates the trunk being tested is busy.

17.43 Three seconds of 120 IPM low tone indicates invalid information was passed to the ROTL register circuit.

17.5 Using a test receiver verify trunk circuit polarity at ROTL frame T.S.(AA-C) terminal 7 (Tip) and 8 (Ring).

17.6 Disconnect the test connection by recylcing the test set.

No changes are indicated due to extensive revision.

ATTACHMENTS
Tables 1.1 thru 1.6 on Pages 20 thru 25.

Manager, Product Engineering
Control Center

Reason for Reissue
1) To add Busy Line Verification Trunk Test.
2) To add DC Test From an SCC.
3) In Table 1.2, pulsing information for BLV Test added.

TABLE 1.1

ROTL PRIMING INFORMATION - TO BE FILLED OUT BY INSTALLER USING TABLES 1.2 & 1.5																			
TEST TO BE PERFORMED	TYPE OF TEST LINE			TRUNK(1) IDENTITY CODE						TYPE (2) OF PULSING		FAR END(3) TEST LINE NUMBER (1 TO 7 DIGITS)							
		PRIMING DIGITS (MF DIGITS THUMBWHEELS) (4)																	
		KP	1 A	2 B	3 C	4 D	5 E	6 F	7 G	8 H	9 J	10 K	11 L	12 M	13 N	14 P	15 Q	16 R	17
TRANSMISSION	100-TYPE	KP	0	0															ST
	102-TYPE	KP	0	2															ST
	105-TYPE	KP	0	5															ST
OVERRIDE MAKE BUSY	100-TYPE	KP	1	0															ST
	102-TYPE	KP	1	2															ST
	105-TYPE	KP	1	5															ST
OPERATIONAL	103-TYPE	KP	2	3															ST
	SYNCHRONOUS	KP	2	1															ST
	NON-SYNCHRONOUS	KP	2	0															ST
OVERRIDE MAKE BUSY	103-TYPE	KP	3	3															ST
	SYNCHRONOUS	KP	3	1															ST
	NON-SYNCHRONOUS	KP	3	0															ST
BALANCE	BALANCE(5)	KP	4	0															ST
OVERRIDE MAKE BUSY	BALANCE	KP	4	1															ST
INTERROGATE INDIVIDUAL TRUNK STATUS		KP	5	2						ST									
CONNECTION APPRAISAL(6) (OPTIONAL)	100-TYPE	KP	6	0												ST			
	102-TYPE	KP	6	2												ST			
	105-TYPE	KP	6	5												ST			
HOME OFFICE TEST LINE TRANSMISSION	100-TYPE	KP	7	0						ST									
	102-TYPE	KP	7	2						ST									
	105-TYPE	KP	7	5						ST									
HOME OFFICE TEST LINE OPERATIONAL	103-TYPE	KP	7	3						ST									
	SYNCHRONOUS	KP	7	1						ST									
	NON-SYNCHRONOUS	KP	7	4						ST									
DC TEST FROM AN SCC		KP	8	5						ST									

NOTE 1: TRUNK IDENTITY CODE - Transfer directly from Table 1.5.
NOTE 2: TYPE OF PULSING - Determine Code Digits from Table 1.2, using pulsing and supervision information from Table 1.5.
NOTE 3: FAR END TEST LINE NUMBER - Transfer directly from Table 1.5.
NOTE 4: PRIMING DIGITS - All unused MF Digits Thumbwheels should be set to OFF.
NOTE 5: BALANCE TEST - Trunk, Pulsing, and Test Line Number Digits identical to a new 100-Type Test Line.
NOTE 6: CONNECTION APPRAISAL - MF Digits set to Test Line Number (7, 8, 10 or 11 Digits) used for Transmission Test. See SD-28067-01-D2 Note 109.

TABLE 1.2

TYPE OF PULSING AND SUPERVISION			CODE DIGITS 8	9
MF		Wink Start	0	0
		Stop-Go Outpulsing	0	1
		Delay Dial	0	2
		Delay Dial (Two-Way)	0	3
DP Loop A		Wink Start	1	0
		Stop-Go Outpulsing	1	1
		Delay Dial	1	2
		Delay Dial (Two-Way)	1	9
DP Loop B		Wink Start	1	3
		Stop-Go Outpulsing	1	4
		Delay Dial	1	5
DP Battery and Ground		Wink Start	1	6
		Stop-Go Outplusing	1	7
		Delay Dial	1	8
RP		24V Panel Incoming	2	0
		48V Panel, XB, ESS	2	1
		Panel; Loop Compensating Resistance - 300	2	2
		XB; " " " - 300	2	3
		Panel; " " " - 600	2	4
		XB; " " " - 600	2	5
		Panel; " " " - 900	2	6
		XB; " " " - 900	2	7
		2-XB in Same Office (HI 5)	4	0
		2-XB; Loop Compensating Resistance - 300	4	1
		" ; " " " - 600	4	2
		" ; " " " - 900	4	3
PCI		PCI	3	0
		Loop Compensating Resistance - 300	3	1
		" " " - 600	3	2
		" " " - 900	3	3
R Opt	DP Loop A	Go-Start Outpulsing (Two-Way) - Opt. R	5	0
		Wink Start (Two-Way) - Opt. R	5	1
ZI Opt	PCI	PCI	6	0
		Loop Compensating Resistance - 300	6	1
		" " " - 600	6	2
		" " " - 900	6	3
	MF	Wink Start	6	4
ZS Opt	MF	Wink Start	9	0
	DP Loop A	Stop-Go Outpulsing	9	1
		Delay Dial	9	2
	DP Loop B	Wink Start	9	3
		Stop-Go Outpulsing	9	4
		Delay Dial	9	5
	DPBG	Stop-Go Outpulsing	9	7
	MF	Delay Dial	9	8
	DPLA	Wink Start	9	9

TABLE 1.3

TEST PREPARATION CONTROL SETTING	DESCRIPTION OF TEST PREPARATION CONTROL SETTING		
	TYPE OF FAR-END OR HOME OFFICE TEST LINE	TRANSMISSION LEVEL POINT AT TRUNK NEAR-END	TRUNK IMPEDANCE
100-0-600	100	0	600
100-0-900	100	0	900
100-2-600	100	-2	600
100-2-900	100	-2	900
102-0-600	102	0	600
102-0-900	102	0	900
102-2-600	102	-2	600
102-2-900	102	-2	900
105-0-600	105	0	600
105-0-900	105	0	900
105-2-600	105	-2	600
105-2-900	105	-2	900

TABLE 1.4

FAULT LAMP CODE	FAULT
1	Loss of priming during test
2	Data Underrange (Signal 3MS)
3	Both Faults 1 and 2
4	Responder Not Equipped to Make Test
5	Both Faults 1 and 4
6	Blank
7	No Data Received Within 2 Seconds

TABLE 1.5

PRIMING INFORMATION - TO BE FILLED OUT BY THE TELEPHONE COMPANY OR CAROT CENTER

Provide the following information necessary for ROTL System Test Set priming. Choose trunks to each listed test line such that every type of outpulsing is used (MF, DP Loop A or B, DP Battery and Ground, RP and PCI). If the ROTL does not have access to a new code 100-type test line (5.5 seconds of 1000 Hz followed by quiet termination), provide information for the old, manual 100-type.

TYPE OF TEST LINE		TRUNK IDENTITY CODE (5 DIGITS) 3 4 5 6 7	FAR-END TEST LINE NUMBER (2,3,4,5,6, OR 7 DIGITS) 10 11 12 13 14 15 16	TYPE OF PULSING	TYPE OF SUPERVISION	NEAR-END T.L.P. (0 OR -2)	TRUNK IMPEDANCE (600 OR 900)
New 100 Type (Code 00 or 10) or Manual 100 Type (Code 00 or 10)							
102 Type (Code 02 or 12)							
105 Type (Code 05 or 15)							
103 Type (Code 23 or 33)							
Synchronous (Code 21 or 31)							
Non-Synchronous (Code 20 or 30)							
HOME OFFICE TEST LINE	New 100 Type (Code 70) or Manual 100 Type (Code 70)		No Far End Test Line Number, Type of Pulsing or Type of Supervision Required				
	102 Type (Code 72)						
	105 Type (Code 75)						
	103 Type (Code 73)						
	Synchronous (Code 71)						
	Non-Synchronous (Code 74)						

TABLE 1.6

PRIMING INFORMATION - TO BE FILLED OUT BY THE TELEPHONE COMPANY OR CAROT CENTER

Provide priming information as in Table 1.5 for one trunk accessed by each ITT connector switch. Note that the number of trunks required will vary ;with each office up to a maximum of forty. In each case, choose any trunk on the switch to any type of test line.

ITC SWITCH	FAR-END TEST LINE	TRUNK IDENTITY CODE (5 DIGITS) 3 4 5 6 7	FAR-END TEST LINE NUMBER (2,3,4,5,6, OR 7 DIGITS) 10 11 12 13 14 15 16	TYPE OF PULSING	TYPE OF SUPERVISION	NEAR-END T.L.P. (0 OR -2)	TRUNK IMPEDANCE (600 OR 900)
00							
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							

TABLE 1.6 (Continued)

ITC SWITCH	FAR-END TEST LINE	TRUNK IDENTITY CODE (5 DIGITS) 3 4 5 6 7	FAR-END TEST LINE NUMBER (2,3,4,5,6, OR 7 DIGITS) 10 11 12 13 14 15 16	TYPE OF PULSING	TYPE OF SUPERVISION	NEAR-END T.L.P. (0 OR -2)	TRUNK IMPEDANCE (600 OR 900)
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							