Installation Engineering Handbook 281
Western Electric
Denver Works

Section 400
6-1-81
Replacing Section 400
Dated 3-15-78

DIMENSION ® 2000 and CUSTOM PBX
X-RAY TESTS

CONTENTS

1. GENERAL INFORMATION.

1.1 Description

1.11 This section describes the procedures to be followed to perform the X-Ray tests. The circuits tested by this section are shown in SD-1E480-01.

1.2 Sequence of Operations

1.21 Sections 300 through 319 in this handbook should be performed prior to this section.

2. RECORDS & DOCUMENTATION

2.1 Records

2.11 Form SD-97-1313 is required for recording the results of this test.

2.2 Documentation

2.21 Customer Order Document (COD)

2.22 CD & SD-1E480-01 CSS 201L System Ckt.

2.23 CD & SD-1E481-01 CSS 201L AC & DC Power Distribution

2.24 CD & SD-1E482-01 CSS 201L MAAP

2.25 CD & SD-1E449-01 CSS 201L SMDR

2.26 CD & SD-1E450-01 CSS 201L DCTS

2.27 CD & SD-97736-01 KS21447 Mini Recorder

3. REQUIREMENTS

3.1 The tests in this section are based on the performance requirements for the SD's listed in para. 2.2 of this section and are contained in PG-5E188-01.

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4.　　TEST EQUIPMENT

4.1　Test-Sets

QTY	ITE	DESCRIPTION
1	5783 issue 4	X-Ray Program, Dimension 2000 & Custom PBX
2	"	(Same as above) for duplicated processor machines
1		Touch Tone Station Set (2500 Type or Equivalent)

5.　　MAAP BUTTON OPERATIONS

5.1　The following paragraph describes the legal MAAP button operations for either test execution or MAAP display.

5.11　X-Ray - Test Starting & Stopping

EXECUTE, X, X, - Causes the execution of an X-ray test as defined by two digit code (X, X). Note: X = 0 through 7 (i.e. octal digits).

STOP - Causes a test to be stopped.

5.12　MAAP Tests

CHANGE FIELD, 1 - causes a changing character pattern to be displayed at the MAAP.

CHANGE FIELD, 2 - causes return to the clock display.

CHANGE FIELD, 3 - allows the MAAP button tests to be performed.

5.13　MAAP Displays

NOTE:　　There are two general types of display; those which display fault information and those which display system configuration information.

DISPLAY, 0 - Displays network configuration data, repeated operation of the NEXT DATA key displays further network configuration data in the following sequence.

BUTTON OPERATION	FORMAT*	DESCRIPTION
DISPLAY, 0	F 18	System Parameters
NEXT DATA	F 09	Line/Link Status
NEXT DATA	F 10	Trunk Status
NEXT DATA	F 20	ETC Parameters
NEXT DATA	F 20	Displays data for next ETC, if no other ETC's, display clears and resets

5.13 (Cont'd)

DISPLAY, 1 - Displays cabinet summary information for 4 cabinets at a time starting at cabinet 0. Repeated operation of the NEXT DATA key displays the next 4 cabinets until all cabinets have been displayed. This sequence is as follows:

BUTTON OPERATION	FORMAT*	DESCRIPTION
DISPLAY, 1	F 11	Cabinet summary (Cabinets 0 through 3)
NEXT DATA	F 11	Next four cabinets

Note: To display a specified cabinet without displaying previous cabinets proceed as follows.

BUTTON OPERATION	FORMAT*	DESCRIPTION
DISPLAY, 1	F 11	Cabinets 0 through 3
cabinet number	F 11	Desired cabinet number +3
NEXT DATA	F 11	Next four frames

DISPLAY,2 - Displays the last 10 faults starting at the most recent fault. Repeated operation of the "2" key displays the remaining faults in order inverse of occurrence until all faults have been displayed.

DISPLAY,5 - Displays detailed carrier information, starting at cabinet 0, carrier 0, repeated operation of the NEXT DATA key displays the next carrier information until all the carriers have been displayed. The sequence is as follows.

BUTTON OPERATION	FORMAT*	DESCRIPTION
DISPLAY, 5	F 12	Carrier Summary (Cabinet 0 , carrier 0)
NEX DATA	F 12	Next carrier

Note: To display a specified carrier without displaying previous carriers, proceed as follows:

5.13   (Cont'd)

BUTTON
OPERATION   FORMAT*   DESCRIPTION

DISPLAY, 5   F 12   Carrier Summary
                                         (Cabinet 0, carrier 0)

Cabinet number   F 12   Desired cabinet number, carrier 0

NEXT DATA   F 12   Next carrier

RESET - causes MAAP display to be reset to the normal displays. The RESET
key may be used in any MAAP display sequence. If a test is not running (BUSY-
OUT lamp flashing) and the RESET key is operated the MAAP will display
blanks with the last test number displayed at the rightmost 2 digits (X-Ray
TEST NO. field)

*Format info is contained in Section 400.81T.

5.14   X-Ray - Repeat Mode

RLS BUSY-OUT, X, X, causes a particular test to be executed in the repeat
mode, (X, X = test number (0-7).

6.   TEST PROCEDURES

6.1   Preliminary

6.11   Prior to performing any X-ray tests, certain prerequisite tests should be
        met. These prerequisite tests are as follows.

        a)   Pre-Power Inspections - See Sections 300 series.

        b)   Fuse Alarm & Alarm Panel Checks - See Section 350.

6.12   Minimum Circuit Pack Requirements - Subsection 5 of section 400.01 lists the
        circuit packs required to load the X-ray tests. A listing of the minimum
        circuit pack requirements for each individual test is contained in each test
        section.

        Note: These are the minimum requirements. The system should not be stripped
        back to this configuration unless there is no other way to get the test started.
        The test should first be tried using the fully equipped (as received per COD)
        system.

6.13   MAAP Connection - The MAAP initially should be connected to the "ON
        LINE" connector at the common control cabinet. If dual processors are
        provided, this connector will access the on-line processor.

6.14   Since X-Ray is a test program, it has no call processing capability. Therefore,
        the system cannot handle traffic when the X-Ray tape is loaded. When X-Ray
        is loaded, all existing connections are knocked down. X-Ray also clears the data
        from the message register memory. Any billing information in an in-service hotel/
        motel system is lost when X-Ray is loaded (or when microdiagnostic test 8 is run).

6.14 (Cont'd)

Therefore, all hotel/motel billing, etc. should be recorded before X-Ray or microdiagnostic 8 is run.

6.2   X-Ray Test Pass and Fail Indications

6.21   Pass Indication - Each X-Ray test "pass" indication is indicated by the green Alarm Panel PASS lamp lighting or extinguishing while the red software controlled Alarm Panel lamps continue cycling. Refer to Section 400.01, Figure 1 for a description of how the red software controlled lamps should cycle. The SEE NOTE, MAAP Lamp lighting, also indicates that an X-Ray test has passed; however, once this lamp is lit, it will stay lit until a new test is started or until a fault occurs.

6.22   Fail Indication - When an X-Ray test "fails" the red Alarm Panel software controlled lamps will stop cycling, if the MAAP is plugged in the BUSY OUT lamp will flash.

6.3   X-Ray Test Procedures

6.31   Load the X-Ray tape (see Section 400.01 for tape loading procedures) and perform each of the tests listed below in sequence.

Note: Detailed test information for each of the tests listed below is provided in the corresponding 400 sub section. (i.e. to find more information about X-Ray test 02 refer to Section 400.02).

TEST NUMBER	DESCRIPTION
01	Basic (Tape Load)

MAAP TESTS - (Refer to Section 400.01)

46	Serial Data Channel
03	Scanner/distributor
04	Time Division Network
05	Time Division Network - including tones
13*	Console and 102 type Display Unit Tests (Refer to Section 400.01)
45*	LC105 Self Test
21*	TOUCH TONE® Register
23*	ANI
07*	DCTS Controller
10*	DCTS Station Test
15*	SMDR
35*	RMAT
06*	Emergency transfer
02	All automatic tests
20	Park Tape

*Perform if feature is provided.

X-RAY TEST NUMBER	HDBK. SECT. 400.	DESCRIPTION	APPROX. TIME
01	.01	BASIC (Tape Load)	4 min.
MAAP	.01	MAAP Tests	---
46	.46	Serial Data Channel	1 sec.
03	.03	Scanner/Distributor	1 sec.
04	.04	Time Division Network	2-30 sec.
05	.05	Time Division Network plus Tones	68 sec.
45*	.45	LC 105 Self Test	1 sec.
13	.13	Console and 102 Type Display Units	---
21	.21	TOUCH TONE Receiver	---
23*	.23	ANI (Automatic Number Identification)	
07*	.07	DCTS Controller	1 min/ETC
10*	.10	DCTS Station Tests	30 sec/ETC
15*	.15	SMDR	
35*	.35	RMAT	1-10 sec.
06*	.06	Emergency Transfer	15 sec.
02	.02	Performs all Automatic Tests	2 min.
20	.20	Park Tape	0-2 min.

6.32   Figure 1 of this section provides a complete listing of all the X-Ray tests available for your reference.

Figure 1 – X-Ray Tests, Identification and Description

TEST NO.	TEST NAME	FUNCTIONAL AREA (PROGRAM)	ITEMS TESTED
00	Alarm Panel Test	Alarm Panel (ALARMS)	LC147, Alarm Panel
		Main Store Instructions Fetch (INIT - B)	LC455 or (LC142 & LC143)
		Register Memory (MEMXRY)	LC455 or (LC143)
		Data Set Initiate (T1SUBR)	LC455 or (LC143)
01	Processor Test	Real Time Clock (PI10MS)	LC455 or (LC143)
		Error Recovery (ERRTST)	LC455 or (LC142 & 143), LC133B or (LC133)
		Instruction Set (INSTRC)	LC455 or (LC143)
		Register Memory (MEMXRY)	LC455 or (LC143)
		RAM Memory (MEM TST)	LC346 or (LC28C, LC128B), LC136 LC135C or (LC135B), LC454 or (LC137 & LC138)
		Serial Data Link (DLX RAY)	LC366 or (LC34B), LC130, LC131, LC132
		Attendant Console (ATTXRY)	LC366 or (LC34B), LC133B or (LC133), Consoles
		MAAP (MPTST)	LC366 or (LC34B), MAAP
		Alarm Panel (AP-LED)	LC147, Alarm Panel
		Data Link Init (DLINIT)	LC131, LC123, LC124
		Tape Interface (TAPXRY)	LC29B, LC30B, Tape Drive
		Time of Day Clock (TODC TST)	LC144
		Peripheral Interface Circuit (PIC TST)	LC366 or (LC34B), PIC
		PMS (PIC TST)	PIC
		Auto. No. Ident. (ANITST)	LC31, LC32
		Loop Signaling Interface Trunk Board (LC361 TST)	LC361
		LC361 Ring Cycle Test (RING- 361)	LC361
		Hotel/Motel Display Test Force Administration Data System (FADS) 102F & Calling Number Display Unit (CNDU) 102D (INSTRC)	LC361
02	System Test	All Test 01 areas plus the following:	
		Scanner/Distributor (SCNXRY)	LC46, LC121, LC49C
		Time Division Network (NETWRK)	LC01, LC03, LC08B, LC09B, LC10C, LC11B, LC13, LC04, LC05B, LC49C, LC121, LC122 LC06, LC285
		Tone Boards (PAMXRY)	LC04, LC05B
		ANI Test (ANITST)	LC31, LC32
		RMATS	LC171B
		AMP Test (PAMTST)	LC100, LC101, LC102, LC103, LC104, LC105

Figure 1 - X-Ray Tests, Identification and Description (Cont'd)

TEST NO.	TEST NAME	FUNCTIONAL AREA (PROGRAM)	ITEMS TESTED
02 (Cont'd)			
	System Test	Line and Trunks (LINRAY)	LC49C, LC02, LC03, LC09B, LC10C, LC11B, LC13, LC06, LC08B, LC190
		SMDR	SMDR
		Transmission Test	LC145
		Universal Loop-Start Trunk Circuit Test	LC285
		TOUCH TONE Receiver-Register-Automatic Test (LC12TST)	LC54B, LC10C, LC12
		Peripheral Interface Circuit (PIC-TST)	PIC
		Hotel/Motel Display Test (INSTRC)	FADS, CNDU
		PMS (PIC TST)	PIC
03	Scanner/Distributor Test	SCNXRY	LC46, LC49C
04	Time Division Network Test	NETWRK	LC46, LC49C, LC02, LC03, LC08B, LC09B LC10C, LC11B, LC13, LC04, LC05B LC06, LC121, LC122, LC285
05	Tones Test	PAMXRY	LC04, LC05B
06	Emergency Transfer	EMXFER	LC147
07	ETC Test	PWR-DIU	LC366 or (LC34B), LC55, LC56, LC57, LC58, LC59, LC60, Key Telephone Set
10	ETC Stations Test	PWR-DIU	LC55, Key Telephone Set
12	Tape Interface Test	TAPXRY	LC29B, LC30B, Tape Drive
13	Attendant Console Test	ATTXRY	LC366 or (LC34B), LC133B or (LC133) Consoles
14	RAM Memory Test	MEMTST	LC346 or (LC28C, LC128B), LC39, LC40, LC135C or (LC135B) LC136, LC454 or (LC137 & LC138)
15	SMDR Test	SMDRXR	LC38, LC39, LC62-LC67
17	Lines Test	LINRAY	LC02, LC03, LC04, LC05B, LC190
		Transmission Test (LC145TST)	LC145

Figure 1 - X-Ray Tests, Identification and Description (Cont'd)

TEST NO.	TEST NAME	FUNCTIONAL AREA (PROGRAM)	ITEMS TESTED
20	Park Tape	SYSCLR	LC29B, LC30B, Tape Drive
21	"Touch-Tone" Reg-Rec Test (Manual)	TTRECREG	LC10C, LC54
23	ANI Test	ANITST	LC31, LC32
24	LC15 Display Interface Test		LC15
25	Hotel/Motel Display Units Test	(INSTRC)	FADS, CNDU
27	Tape Interface Test	TAPXRY	LC29B, LC30B, Tape Drive
30	System Signature		
31	Instruction Set	INSTRC	LC455 or (LC142 & LC143)
32	Processor Error Detection Test	ERRTST	LC133B or (LC133), LC455 or (LC142 & LC143)
33	Contact Interface Test	LC14TST	LC14
34	Message Register Test	LC16TST	LC16
35	RMATS Test	RMATS	LC171B, LC172B
37	Transmission Test CP Test		LC145
40	Touch-Tone Receiver Register (Automatic)	LC12TST	LC54B, LC10C, LC12
41	MAAP Controlled I/O		
42	Trunk Ckt Tests	LINRAY LC361TST RING-361	LC285, LC07, LC10C LC06, LC08, LC09, LC11, LC13, LC361
45	Common Amplifiers, Link Loopback, LC105 Test	PAMTST	LC100-LC105
46	Serial Data Channel Test	DLXRY	LC366 or (LC34B), LC123, LC130, LC131, LC132

Figure 1 - X-Ray Tests, Identification and Description (Cont'd)

TEST NO.	TEST NAME	FUNCTIONAL AREA (PROGRAM)	ITEMS TESTED
47	System Test	(Same as Test 02, Except Scann/Distributor Test Eliminated)	
50	Link Cabling Test	PAMTST	Intermodule Link Cabling, LC100-LC105
52	Special FP9 Tests	TODC TST	LC03, LC190, LC49C Memory; LC144

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