

**SATURN<sup>®</sup> IIE EPABX**  
**INSTALLATION TEST PROCEDURES**

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## SECTION 1.00 INTRODUCTION

1.01 Purpose. The equipment comprising the SATURN IIE (SATURN II-Expanded) System is completely tested at the factory prior to shipment. The inspections and tests covered in this practice verify that the EPABX equipment has been properly installed; ensure that no damage was incurred during transit; and confirm that the system is completely operational. Table 1.00 defines the mnemonics used throughout this practice.

### CAUTION

**Installation test procedures on the SATURN IIE EPABX must be performed only by Siemens certified personnel.**

1.02 Scope. This practice is divided into the following sections which are presented in the sequential order of performance after initial installation of a SATURN IIE System. When additional equipment is installed to an existing and active SATURN IIE System, it is the responsibility of craft personnel to determine the sequential order of the test procedures contained in these sections.

- a. Section 1.00 - Introduction
- b. Section 2.00 - Preparatory Activity
- c. Section 3.00 - Ground Tests
- d. Section 4.00 - Power-Up Tests
- e. Section 5.00 - Operating Program Loading
- f. Section 6.00 - On-Line Diagnostic Tests
- g. Section 7.00 - Installation Test Procedures Checklist

7.03 Siemens SATURN IIE Practices. The practices, issue numbers and dates for the SATURN IIE EPABX are listed in the Practices Documentation Index A30808-X5130-A190- \* -E987. Always refer to the latest issue of the application index to obtain the latest issue number of a practice.

1.04 Siemens Customer Support Services. Siemens maintains a nationwide network of field service offices. Contact the Siemens regional office for any engineering assistance that may be required.

Table 1.00 Mnemonics Used in This Practice

MNEMONIC	DEFINITION
ACD	Automatic Call Distribution
ALM	Alarm
ASCII	American Standard Code for Information Interchange
CICP	Controller/Input-Output Processor
CMU	Customer Memory Update
CO	Central Office
CONF	Conference Module
COT	Central Office Trunk
DCI	Data Communication Interface
DID	Direct Inward Dialing
DIP	Dual Inline Package
DP	Dial Pulse
DTE	Data Terminal Equipment
DTMF	Dual Tone Multifrequency
EIA	Electronics Industries Association
EPABX	Electronic Private Automatic Branch Exchange
FDD	Floppy Disk Drive
IRAM	Input Random Access Memory
LTU	Line/Trunk Unit
LTUPS	Line/Trunk Unit Power Supply
LED	Light-Emitting Diode
MCA	Memory Control and Attenuation
MDF	Main Distribution Frame
MEM3	25Gkb Memory
MEM4	1Mb Memory
MOS	Metal Oxide Semiconductor
MRA	Material Return Authorization.
MSM	Memory Support Module
MTCE	Maintenance
OOS	Out-of-Service
ORAM	Output Random Access Memory
PABX	Private Automatic Branch Exchange
PCB	Printed Circuit Board
PEN	Port Equipment Number
PIMD	Premium Instrument Module Digital
PSC	Parallel/Serial Converter
PSU	Power Supply Unit

Table 1.00 Mnemonics Used in This Practice (Continued)

MNEMONIC	DEFINITION
R A U P	Remote Access Unit/Ports
RGEN	Ring Generator
SLA16	Subscriber Line Module Analog - 16 lines
SLMA	Subscriber Line Module Analog
SLMA-S	Subscriber Line Module Analog - Station
SLMD	Subscriber Line Module Digital
S M X T G	Signal Multiplexer/Tone Generator
SPC	Stored-Program-Controlled
S P G	Single Point Ground
TMBA-2	Two-Wire E&M Trunk
TMBA-4	Four-Wire E&M Trunk
TMBM	Central Office Trunk
TMIE	Direct Inward Dialing Trunk
TMS	Transmission Measuring Set
TSTAPP	Test - Apparatus
TSTDIAG	Test - Maintenance Diagnostic
TTY	Teletypewriter
UNA	Universal Night Answer
ZUNA	Zoned Universal Night Answer
-48PS	-48Vdc Power Supply

## SECTION 2.00 PREPARATORY ACTIVITY

2.01 General. This section describes the test equipment required to perform the installation test procedures, handling precautions for Printed Circuit Boards (PCBs) with Metal Oxide Semiconductor (MOS) integrated circuits, guidelines for removal and replacement of PCBs and power supplies, and initial visual inspection procedures.

2.02 Test Equipment Required. The following test equipment is required to perform the procedures contained in this practice:

- a. Digital Multimeter. A digital multimeter of good commercial quality with an accuracy of  $\pm 1.0\%$  or better. The digital multimeter is used to perform the ground tests and output voltage tests.
- b. Maintenance Test Phone. For both Dial Pulse (DP) and Dual Tone Multifrequency (DTMF) systems, a lineman's test set or a single line telephone. A modular jack (MTCE PHONE) is provided on the front panel of the PSU for connecting the maintenance test phone when equipped with a modular plug. When the maintenance test phone is not equipped with a modular plug, a station appearance can be used via the Main Distribution Frame (MDF). The maintenance test phone is used to perform the on-line diagnostic tests.
- c. Data Service Terminal. A Keyboard-Send-Receive (KSR) data terminal equipped with a standard ASCII keyboard and an EIA RS-232C interface (Silent 700 Series — Model 743 KSR — Texas Instruments, or equivalent). The data service terminal is used to input installation dependent data (i.e., system data base) into system memory when the standard data base format is supplied with the SATURN IIE System.
- d. -Transmission Measuring Set. A transmission measuring set (TMS) used to measure the transmission quality of a trunk or station (Hewlett Packard HP-3551A or equivalent). Refer to the manual On-Line Diagnostic Tests, Outgoing Trunk Test and Station Line Test.

**2.03 handling Precautions for PCBs with MOS Integrated Circuits.** It is important that craft personnel handling PCBs with MOS integrated circuits free themselves from electrostatic charge by touching a grounded cabinet frame before handling such PCBs, or by wearing grounded wrist straps. Failure to observe this practice may result in damage to MOS PCBs due to electrostatic discharge.

### WARNING

***Hazardous voltages exist within the equipment cabinets. Be extremely careful when performing testing/troubleshooting procedures with the equipment panel(s) removed.***

2.04 **PCB Removal and Replacement Guidelines.** In many instances during testing, the corrective action for a procedure in which the proper verification was not obtained requires that a PCB or a power supply be removed and replaced with a spare. Table 2.00 provides the guidelines that should be observed when removing and replacing PCBs and power supplies in an active system.

**2.05 Initial Visual Inspection Procedures.** The visual inspection procedures contained in Table 2.01 must be performed to ensure that the equipment comprising the SATURN IIE System has been properly installed and configured to meet the installation requirements. Before proceeding with the visual inspections, the front, rear and side panels of the cabinet should be removed to allow thorough inspection of the equipment.

Table 2.00 PC3 and Power Supply Removal Guidelines

MODULE OR UNIT	SERVICE STATE	SPECIAL INSTRUCTIONS
CIOP	NA	Notes 1 and 2
CONF	NA	Notes 1 and 2
DTMF	0 0 s	Note 3
FDD0, FDD1	NA	None
LTUC	NA	Note 4
LTUPS	NA	Note 5
MCA	NA	Notes 1 and 2
MEM3	NA	Notes 1 and 2
MEM4	NA	Notes 1 and 2
MSM	NA	Note 1
MSM Battery	NA	Note 6
PIMD	0 0 s	Note 3
PSC	NA	Notes 1 and 2
PSU	NA	Note 7
RAUP	NA	Notes 1 and 2
SLA16	OOS	Note 3
SLMA-0	0 0 s	Note 3
SLMA-S	OOS	Note 3
SLMD	0 0 s	Note 3
SMXTG	NA	Notes 1 and 2
TMBA-2	OOS	Note 3
TMBA-4	0 0 s	Note 3
TMBM	0 0 s	Note 3
TMIE	0 0 s	Note 3
-48PS0	NA	Note 3
-48PS1	NA	Note 3

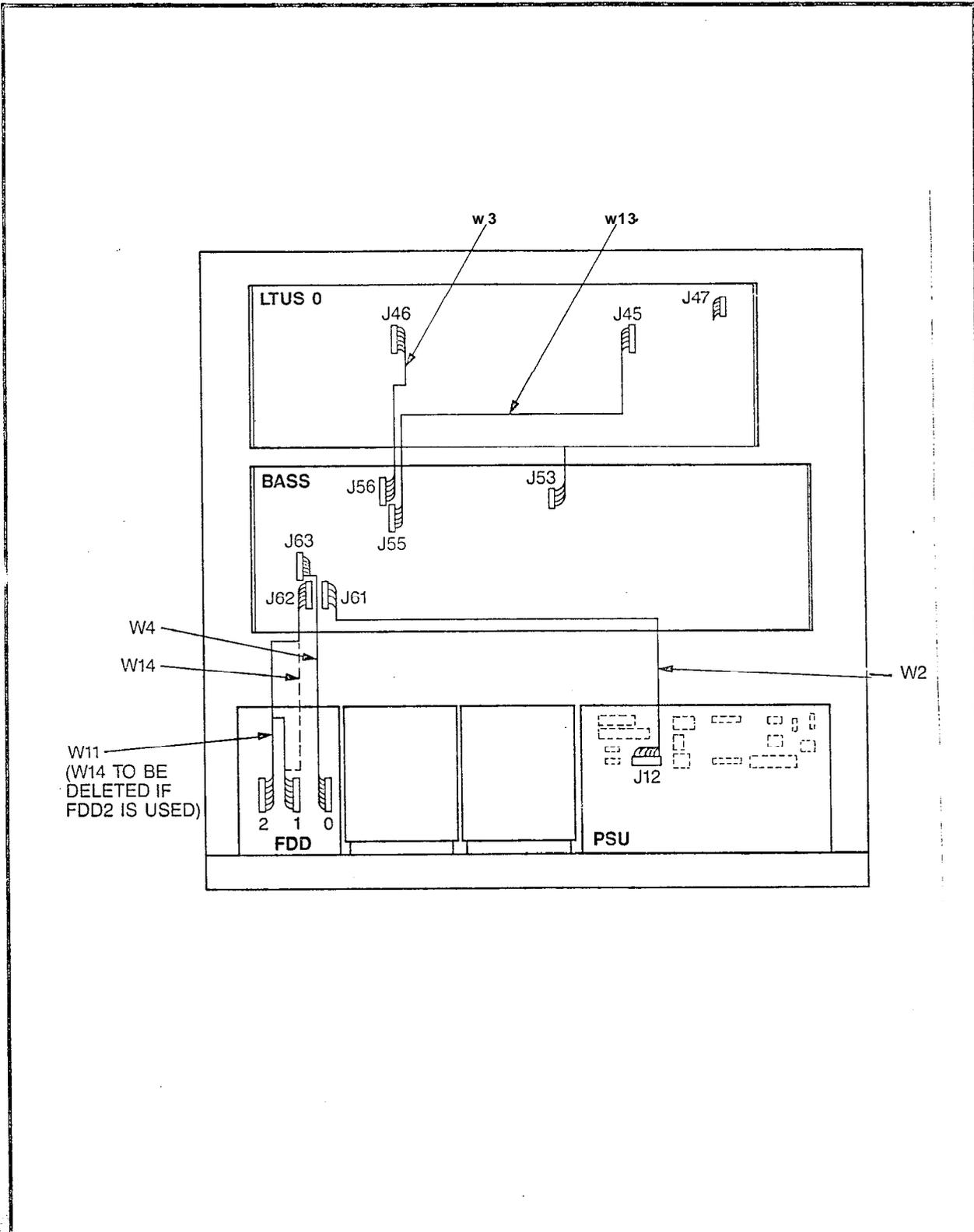
\* Optional depending upon customer/system requirements.  
NA = Not Applicable; OOS = Out-of-Service

Notes:

1. System outage (halts call processing). Set BASIC PS circuit breaker on PSU to off.
2. Open FDD and remove floppy disk before removing PCB. After new PCB is inserted, reinsert floppy disk, close FDD, set BASIC PS circuit breaker on PSU to on, and press reset switch on CIOP.
3. Wait for in-process calls to complete.
4. Removal places one-half of ports in shelf out-of-service.
5. Before removal, set related LTUPS circuit breaker on PSU to off. Removal places all ports in shelf out-of-service.
6. Battery may be replaced with power applied to system.
7. System outage (halts call processing). Before removal, set all circuit breakers to off, open FDDs and remove floppy disks. After replacement, reinsert floppy disks, close FDDs, set circuit breakers to on, and press reset switch on CIOP.
8. Set related circuit breaker on PSU to off. May halt call processing depending upon system configuration and traffic. If there are two -48Vdc power supplies (where system includes an Expansion Cabinet), the remaining supply may have sufficient capacity to support system operation.

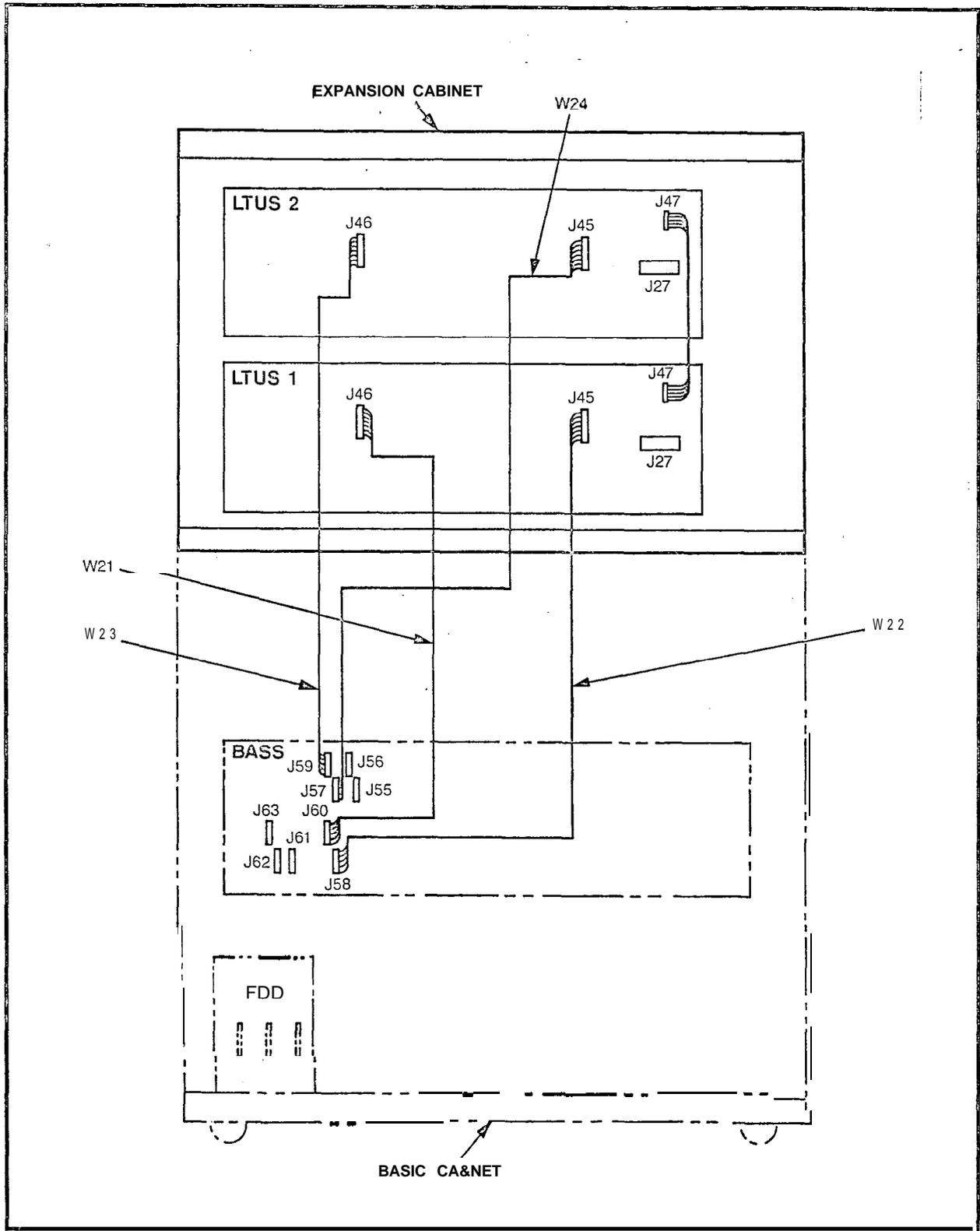
Table 2.01 Visual Inspection

STEP	VISUAL INSPECTION	REFERENCE
1	Check that the cabinet ac power cord is not connected to an electrical outlet.	
2	Check that the -48Vdc power supply is strapped for 110Vac or 220Vac.	SATURN IIE EPABX Installation Procedures Practice (Section 4.00)
3	Check that all circuit breakers on the Power System Unit (PSU) are in the OFF position and fuses inserted.	SATURN IIE EPABX Installation Procedures Practice (Section 4.00)
4	If the MSM is installed, check that the Battery Packk is not connected but inserted into corresponding position. Also check that the PSU is strapped for MSM operation.	SATURN IIE EPABX Installation Procedures Practice (Section 4.00)
5	Check that each PCB in the system is withdrawn from its backplane connector.	
6	Check that the DIP switch settings for the CIOP board are set to meet the operating characteristics of the particular data service terminal to be used to input the installation-dependent data(i.e.,data base) into system memory when the standard data base format is supplied with the SATURN IIE System.	SATURN IIE EPABX Installation Procedures Practice (Section 4.00)
7	Check that each trunk-type PCB (i.e., TMEM, TMIE, TMBA-2 and/or TMBA-4) is properly strapped according to the operating characteristics of the trunk facility of the Central Office (CO) or distant PABX.	SATURN IIE EPABX Installation Procedures Practice (Section 4.00)
8	Check that the intercabinet signal and power/ground cabling arrangements are complete and all connectors are firmly seated according to the referenced illustrations (Figures 2.00 through 2.03).	Figures 2.00 through 2.03
9	Check that Berg Clips are on pins 27 and 28 of unused signal cable connectors on basic shelf.	SATURN IIE EPABX Installation Procedures Practice (Section 4.00)



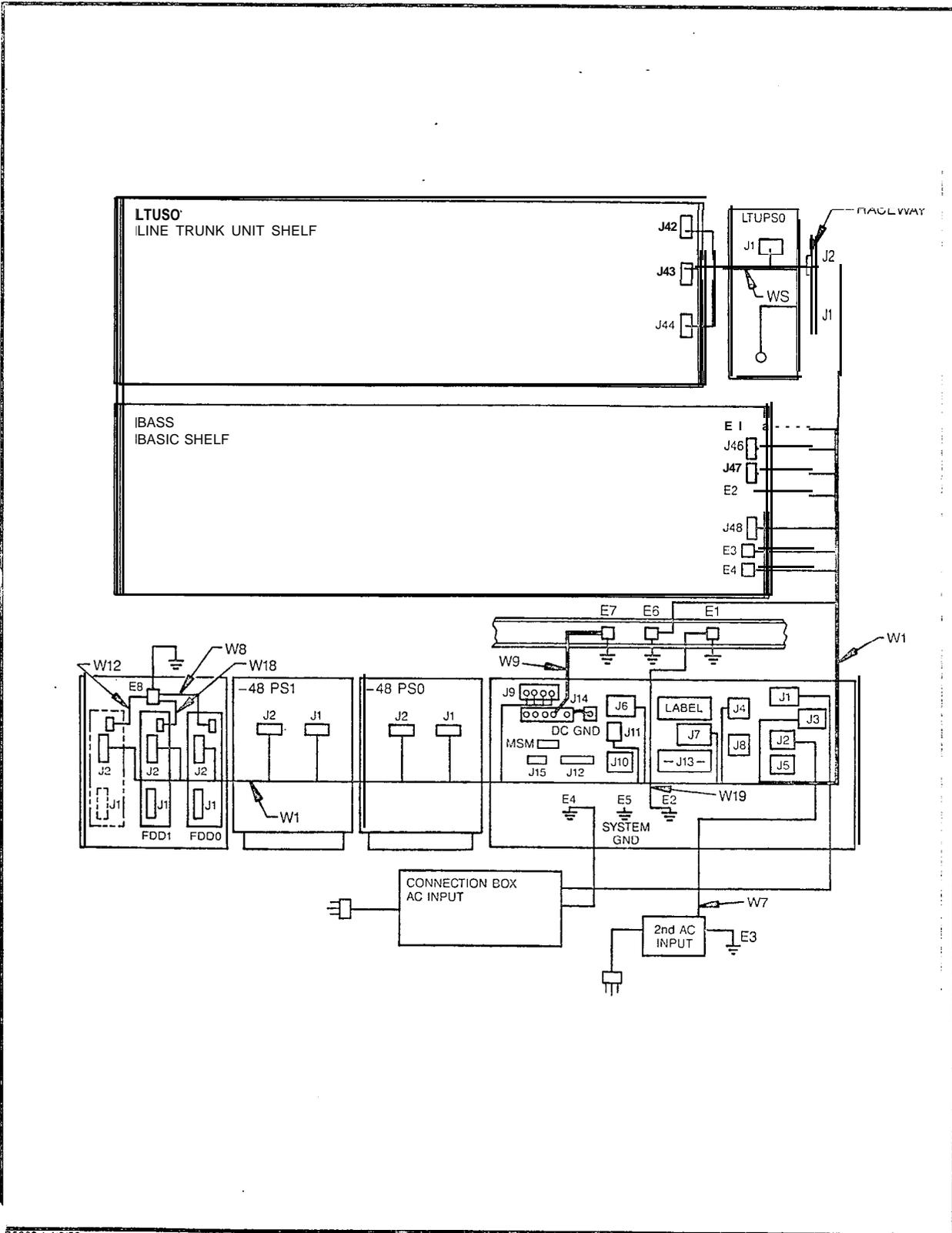
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Figure 2.00 Signal Cable Distribution for the SATURN IIE System (Basic Cabinet)



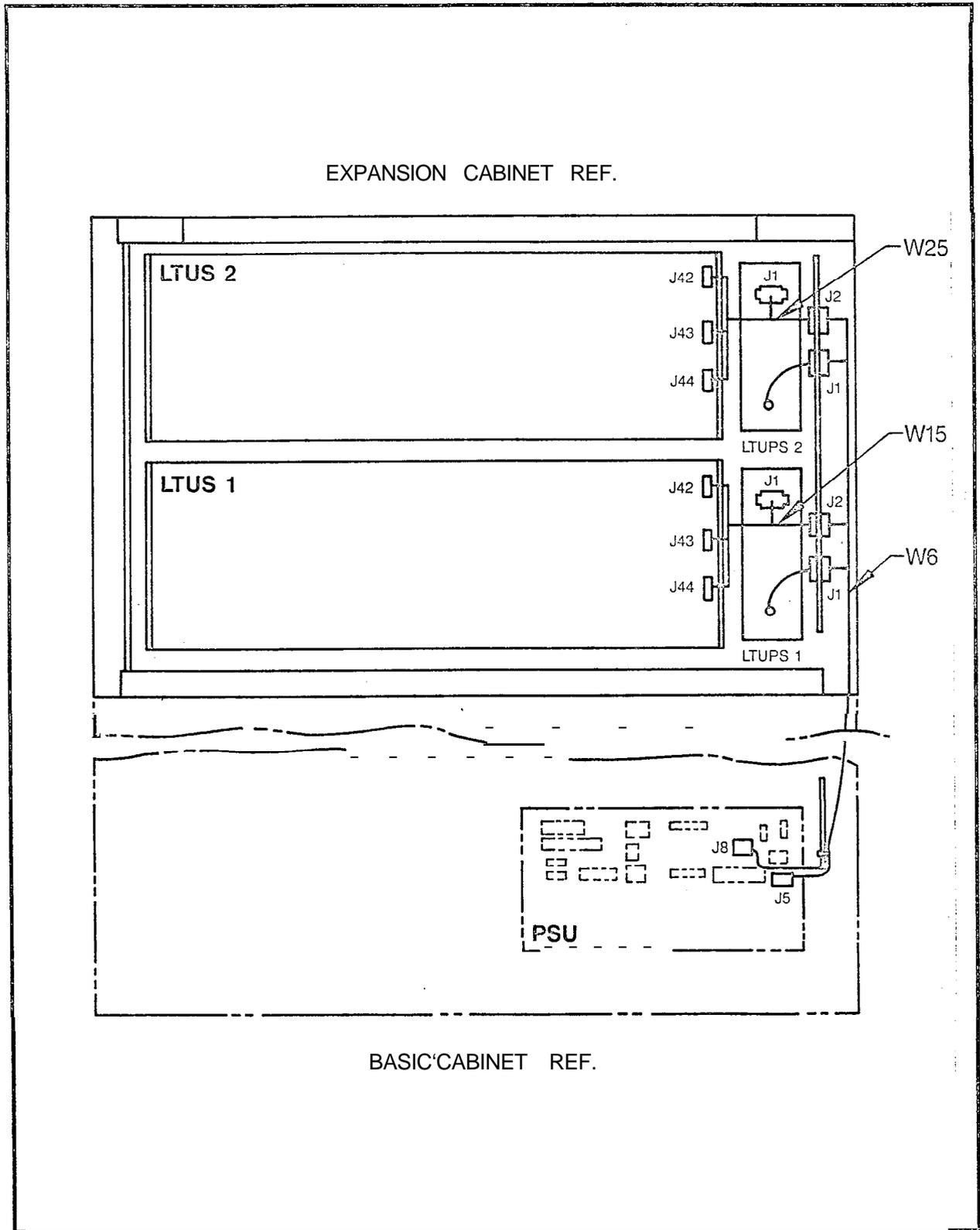
A5040-2:3/31/86

Figure 2.01 Signal Cable Distribution for the SATURN IIE System (Expansion Cabinet)



B5039-1-4/8/86

Figure 2.02 Power/Ground Distribution for the SATURN IIE System (Basic Cabinet)



A5038-1-4/3/85 Figure 2.03 Power/Ground Distribution for the SATURN IIE System (Expansion Cabinet)

## SECTION 3.00 GROUND TESTS

3.01 General. The SATURN IIE System must be connected to an earth ground (i.e., metallic cold water pipe or master ground busbar) in addition to the safety ground in the ac power cord. A 6-gauge (twisted copper wire) conductor should be connected between the grounding lug E5 located on the bottom of the cabinet frame and the selected earth ground (refer to Section 3.00 in the SATURN IIE EPABX Installation Procedures practice for details). The following tests must be performed to ensure that proper earth ground connections have been accomplished, and that ground connections within the cabinet assembly have not been damaged or loosened during shipment.

### WARNING

*Hazardous voltages exist within the equipment cabinet. Be*

*extremely careful when performing testing/troubleshooting procedures with the equipment panel(s) removed.*

3.02 System **Ground Test**. Before proceeding with the test procedures indicated in Table 3.00, check that the earth ground connections are secure and ground conductors are firmly positioned on grounding lug E5 at the bottom of the cabinet frame.

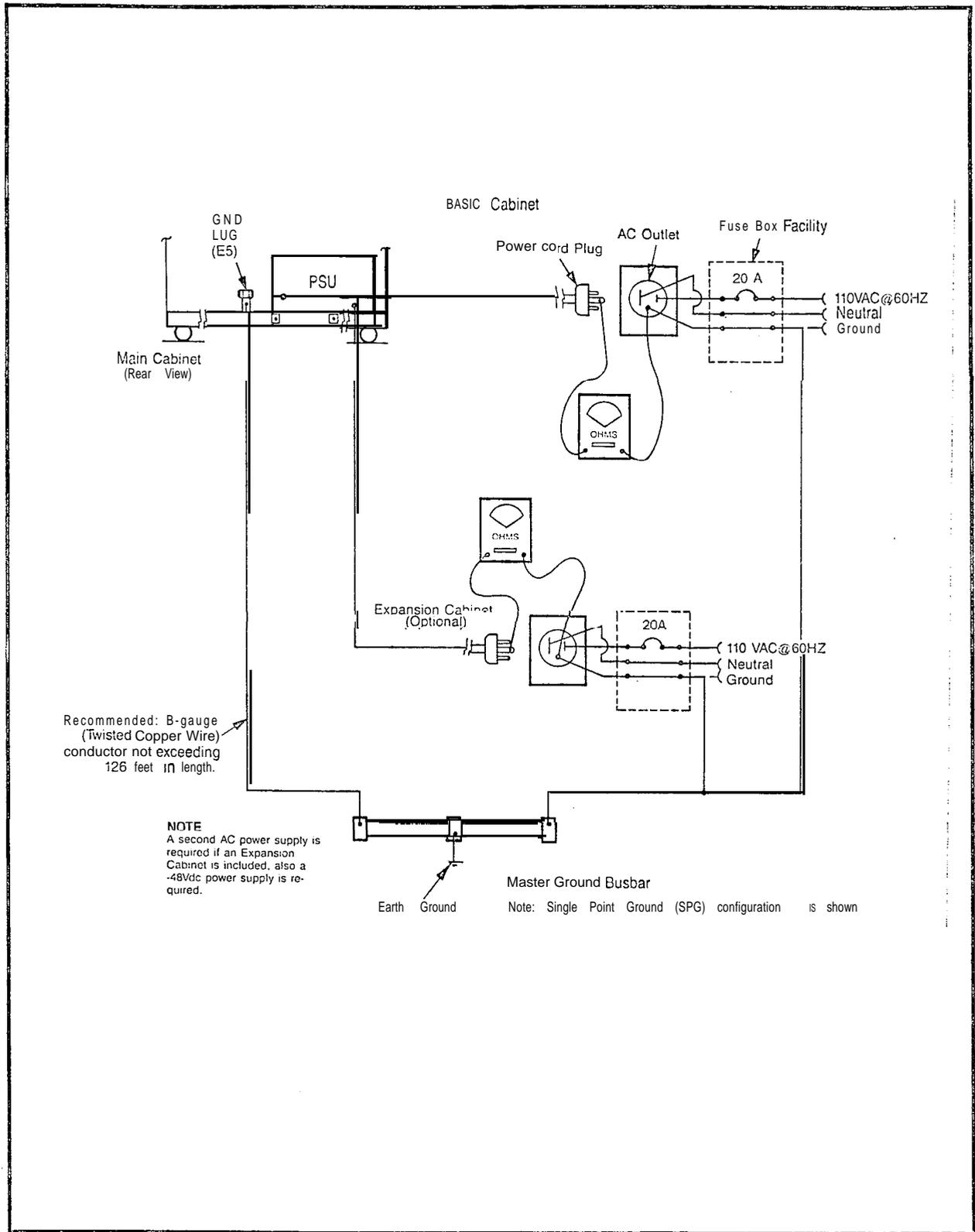
3.03 **Shelf Ground Continuity Test**. Each LTU shelf assembly within the cabinet assembly is grounded via two vertical busbars. Before proceeding with the test procedures indicated in Table 3.01, check that each shelf backplane is interconnected with the busbar flanges and adequately secured into position.

Table 3.00 System Ground Test

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
1	If connected, remove ac power cord from commercial power outlet.		
2	Short digital multimeter test leads together and note resistance of test leads.		
3	Set digital multimeter to lowest resistance range and connect its leads between the U-ground pin of the ac power cord and the U-ground socket in the commercial power outlet (refer to Figure 3.00 for details).	Resistance measured should be between 0 and 2 ohms greater than the measured test lead resistance.	If a reading greater than 2 ohms is obtained, the faulty ground connection must be isolated and corrected before continuing with the installation test procedures
4	Repeat procedure with second ac power cord if optional expansion cabinet is incorporated into system.	Same as step 3 above.	Same as step 3 above.

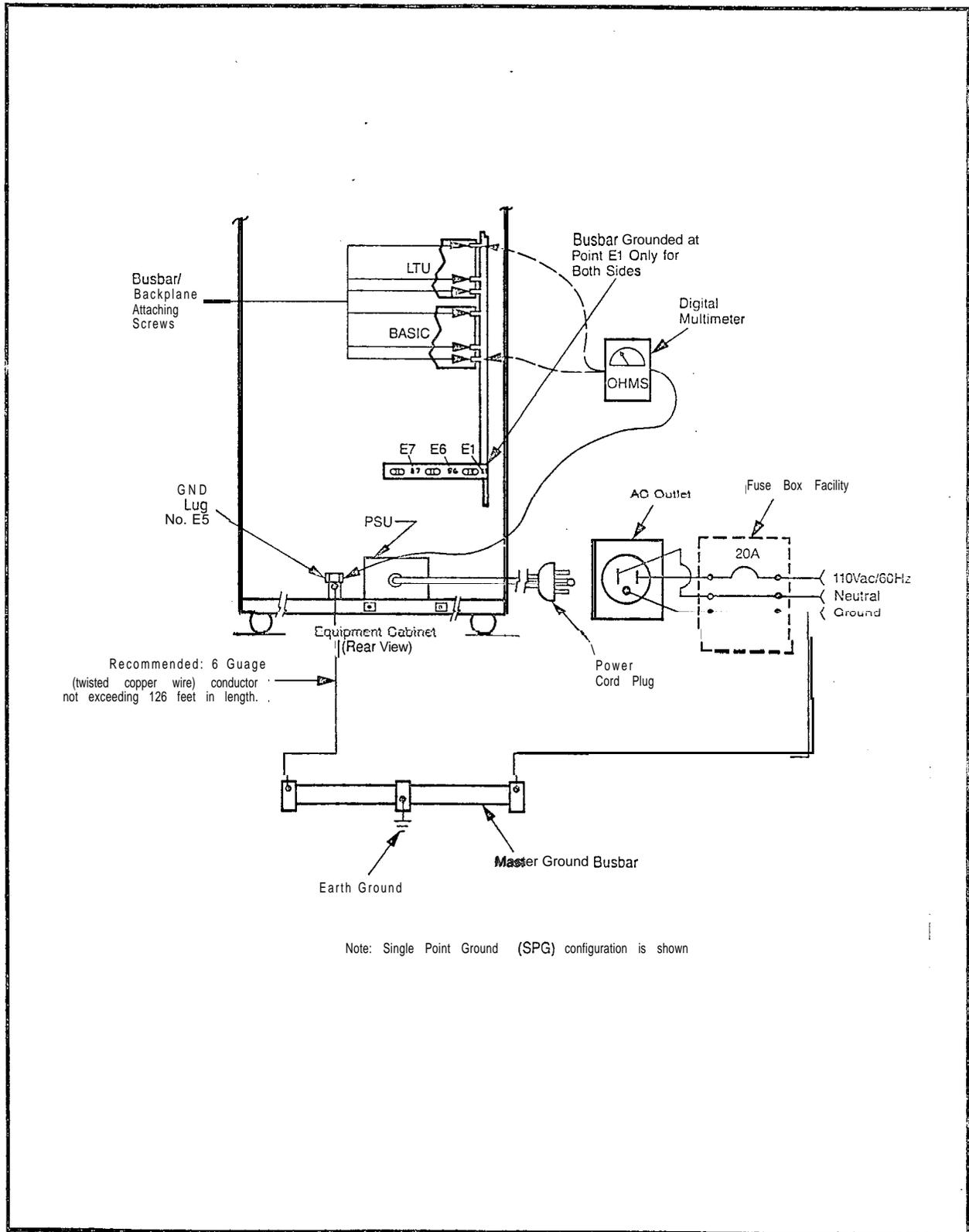
Table 3.01 Shelf Ground Continuity Test

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
1	If connected, remove ac power cord from commercial power outlet.		
2	Set digital multimeter to lowest resistance range and connect its leads between ground lug E5 located at the bottom of the cabinet frame, and one of the busbar/backplane attaching screws for each existing LTU shelf (refer to Figure 3.01)	Resistance measured should be between 0 and 1 ohm greater than the measured multimeter test lead resistance.	If a reading greater than 1 ohm is obtained, the faulty ground connection must be corrected before continuing the installation test procedures.



A5120-1-4/14/86

Figure 3.00 System Ground Test Connections



A5121-1-4/21/86

Figure 3.01 Shelf Ground Continuity Test Connections

## SECTION 4.00 POWER-UP TESTS

4.01 General. The SATURN IIE System makes use of distributed power in the equipment cabinet. Several power supplies are used in the system. These power supplies provide +5Vdc, -5Vdc, +12Vdc, -12Vdc, -48Vdc, 90Vac-20Hz ringing voltage and message waiting voltage, from a 110Vac 60Hz input power source. After satisfactorily performing the ground tests indicated in Section 3.00, the following tests must be performed to ensure that proper power cable connections have been accomplished and that the power supplies inside the cabinet assembly have not been damaged during shipment.

### WARNING

***Hazardous voltages exist within the equipment cabinet. Be extremely careful when performing testing/troubleshooting procedures with the equipment panel(s) removed.***

4.02 Power-Up/Output Voltage Tests. Before proceeding with the test procedures indicated in Table 4.00, check that all power cable assemblies are properly secured into their corresponding locations. Note that the test procedures in Table 4.00 include procedures for testing the optional MSM, when equipped in the system.

Table 4.60 Power-Up/Output Voltage Test

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
1	If not previously done, extract each PCB in the system from its respective backplane connector in basic and LTU shelves.		
2	Check that all circuit breakers on the PSU are in the off positions and that all fuses are inserted in their corresponding locations.		
3	Using the digital multimeter (or an AC polarity indicator), verify that the commercial ac power receptacle used for powering the system has the proper polarity.	Polarity indication must coincide with Figures 3.00 and 3.01.	if polarity indication does not coincide, correct before proceeding with the remainder of test in this table.
4	Connect the ac power cord(s) to the commercial ac power receptacle(s).		
5	Place the following circuit breakers on the PSU to the on (up) position: a) Basic PS b) -48PS0 c) -48PS1 (if equipped) d) LTUPSO (if equipped) e) LTUPS1 (if equipped) 9 LTUPS2 (if equipped)		
6	If the optional MSM module is equipped in the system, proceed as follows: a) If not previously done, connect and insert battery pack into the MSM assembly. b) Press the BATTERY TEST switch on the PSU and release after verification has been obtained.	The associated green LED should light steadily.	If the green LED remains extinguished, the battery pack is below acceptable voltage limits. Let MSM charge battery pack and retry test after 30 minutes have elapsed. If green LED remains extinguished, the battery pack is defective and requires replacement.

Table 4.00 Power-Up/Output Voltage Test (Continued)

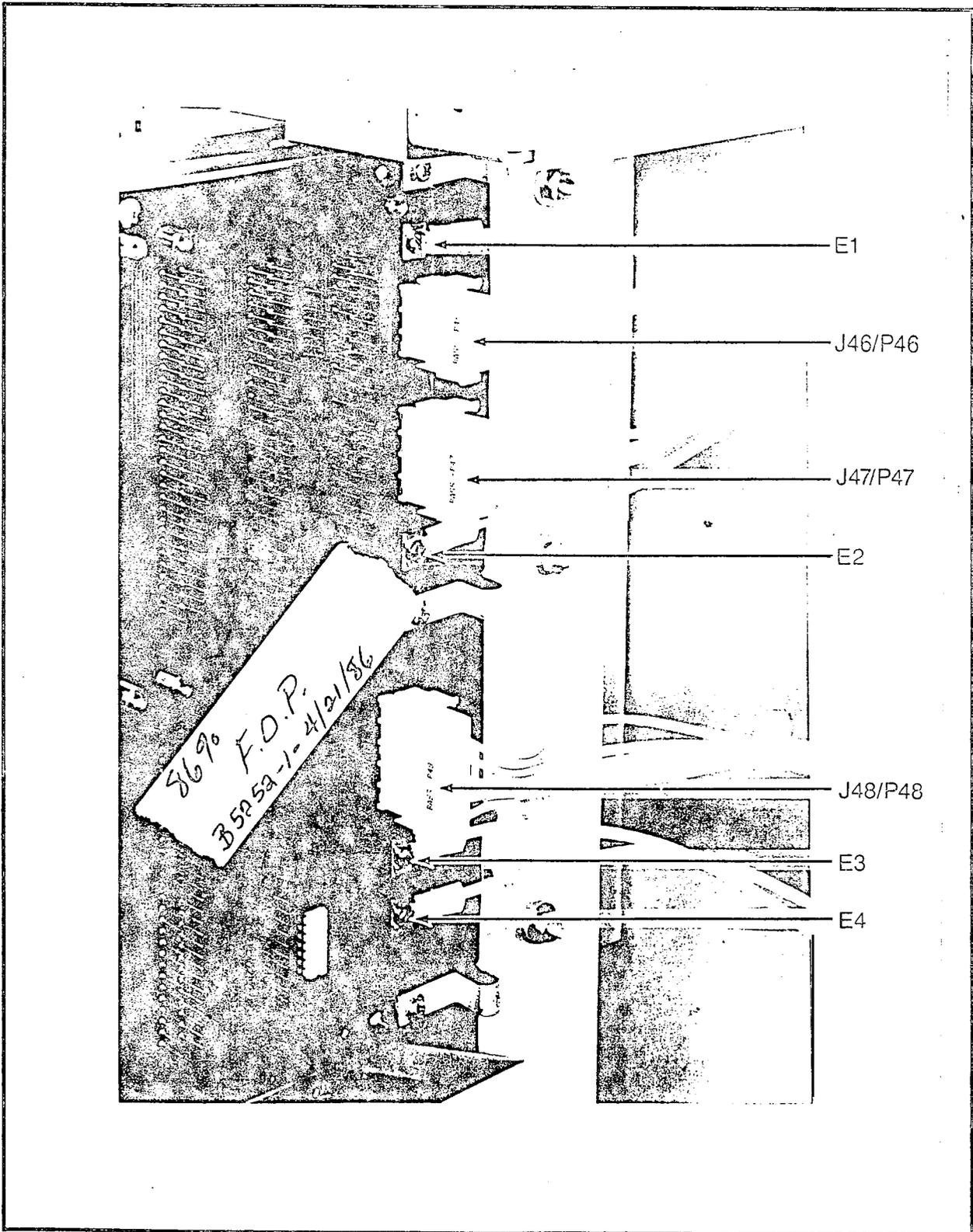
STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
7	<p>c) On the PSU, place the circuit breaker designated BASIC PS in the off (down) position.</p> <p>d) On the PSU, place the circuit breaker designated BASIC PS to the on (up) position.</p> <p>Set digital multimeter to appropriate dc voltage scale for the following tests.</p>	<p>The red LED designated BATTERY TEST should be steadily lit.</p> <p>The red BATTERY TEST LED should be extinguished.</p>	<p>If the red LED remains extinguished, replace the MSM.</p> <p>If the red LED remains steadily lit, either the cabinet ac power cord is not connected to the commercial ac power receptacle or a local ac power failure has occurred.</p> <p style="text-align: center;">NOTE</p> <p>If further troubleshooting information is required during these testing procedures, refer to SATURN IIE EPABX Maintenance and Troubleshooting Practice.</p>
8 A	<p>To measure the unloaded basic shelf input voltages, proceed as follows:</p> <p>a) On basic backplane shown in Figure 4.00, take reading between terminal E1, E2, E3 or E4 and ground.</p> <p>b) On basic backplane connector J46, shown in Figure 4.00, take readings between pins 2 and 3.</p> <p>c) Set digital multimeter to appropriate Vac scale and take reading between pins 1 and 2 of J46.</p> <p>d) Set digital multimeter to appropriate Vdc scale and take readings between the following pins on basic backplane connector J47 (shown in Figure 4.00):</p> <p>1) Pins 1 and 3.</p> <p>2) Pins 2 and 3.</p> <p>e) On basic backplane connector J48, shown in Figure 4.00, take readings between the following pins:</p> <p>1) Pins 1 and 4.</p> <p>2) Pin 2 or 3 and pin 4.</p> <p>3) Pins 4 and 5.</p>	<p>Voltage measured should read between +4.5 and +5.5 Vdc.</p> <p>Voltage measured should read between -43 and -53Vdc.</p> <p>Voltage measured should be between 75 and 100 Vac.</p> <p>Voltage measured should be between -4.9 and -5.2Vdc</p> <p>Voltage measured should be between -43 and -53Vdc</p> <p>Voltage measured should read between -11.3 and -12.7Vdc.</p> <p>Voltage measured should be between +11.3 and +12.7Vdc.</p> <p>Voltage measured should be between 4.85 and 5.15Vdc.</p>	<p>If reading is not within tolerance, adjust +5V ADJUST potentiometer on PSU. If still out-of-tolerance replace PSU.</p> <p>If reading is not within tolerance, check the -48P-BASIC fuse in PSU. If fuse is good, replace -48PSO.</p> <p>If the voltage is not present, check and replace RGEN fuse or RAC BASIC fuse on PSU. If fuses are good, replace RGEN PCB. If voltage still not present, replace PSU.</p> <p>If reading is not within tolerance, replace the PSU.</p> <p>If reading is not within tolerance, check the -488 BASIC fuse on PSU. If the fuse is good, replace -48PSO.</p> <p>If reading is not within tolerance, replace the PSU.</p> <p>If reading is not within tolerance, replace the PSU.</p> <p>If reading is not within tolerance, check that J16 on the rear panel of the PSU is strapped to the MSM terminal. If the strap is in place, replace the MSM.</p>

Table 4.00 Power-Up/Output Voltage Test (Continued)

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
8B	<p>f) Connect positive lead of digital multimeter to pin 5 of connector J48 and negative lead to terminal EI on basic backplane. (Refer to Figure 4.00.)</p> <p>After satisfactorily completing step 8A, proceed as follows to measure the loaded basic shelf input voltages.</p> <p>a) On the PSU, place the circuit breaker designated BASIC PS in the off (down) position.</p> <p>b) Plug all previously extracted PCBs on the basic shelf into their respective backplane connectors.</p> <p>c) On the PSU, place the circuit breaker designated BASIC PS in the on (up) position.</p> <p>d) Repeat measuring procedures on basic backplane connectors J46, J47, J48 and terminals EI-E4 as indicated in step 8A.</p>	<p>Voltage measured should read + 0.05Vdc.</p> <p>The MSM red LED designated BATTERY TEST should be steadily lit.</p> <p>The MSM red LED designated BATTERY TEST should be extinguished.</p> <p>Same verification as in steps 8A a) through e), except that +5Vdc at terminal EI should read between 4.85 and 5.15Vdc under load.</p>	<p>If reading is not 0.05 Vdc, adjust +5V ADJUST potentiometer on PSU. If adjustment is not effective, replace PSU.</p>
9A	<p>To measure the unloaded LTU shelf input voltages (if applicable), proceed as follows:</p> <p>a) On the LTU backplane connector J42, shown in Figure 4.01, take a reading between the following pins:</p> <p>1) Pins 1 and 3.</p> <p>2) Pins 3 and 5.</p> <p>3) Pins 3 and 4.</p> <p>4) Set digital multimeter to read Vac and connect between pins 2 and 3.</p> <p>b) Set digital multimeter to appropriate Vdc scale.</p> <p>c) On LTU backplane connector J43, shown in Figure 4.01, take a reading between the following pins:</p>	<p>Voltage measured should be between +4.5 and +5.5Vdc.</p> <p>Voltages measured should be between -4.9 and -5.2Vdc.</p> <p>Voltage measured should be between -43 and -53Vdc.</p> <p>Voltage measured should be between 75 and 100Vac.</p>	<p>If reading is not within tolerance, adjust +5V ADJUST potentiometer on LTUPS. If the adjustment does not bring voltage into tolerance, replace LTUPS.</p> <p>If reading is not within tolerance, replace appropriate LTUPS.</p> <p>If reading does not coincide with verification reading, check the -48P LTU fuse on PSU. If fuse is good, replace -48PS0.</p> <p>If voltage is not present, check/replace RGEN fuse or RAC LTUO fuse on PSU. If fuses are good, replace PSU.</p>

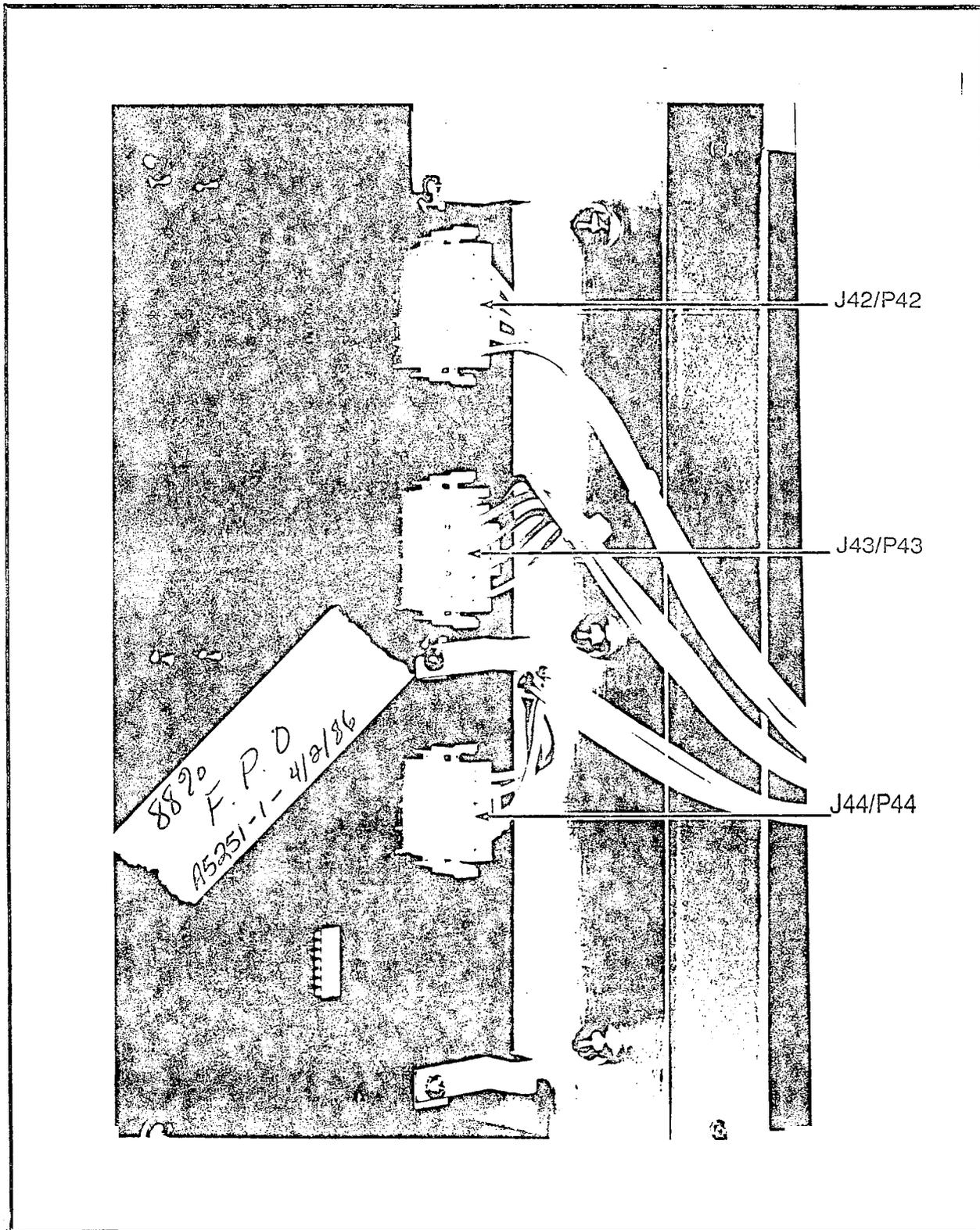
Table 4.00 Power-Up/Output Voltage Test (Continued)

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
	<p>1) Pins 1 and 3.</p> <p>2) Pins 1 and 2.</p> <p>3) Pins 1 and 4.</p> <p>4) Pins 1 and 5.</p> <p>d) On LTU backplane connector J44 shown in Figure 4.01, take a reading between pins 1 and 2 or pins 1 and 3.</p>	<p>Voltage measured should read between +4.5 and +5.5Vdc.</p> <p>Voltage measured should read between -43 and -53Vdc.</p> <p>Voltage measured should read between +11.3 and +12.7Vdc.</p> <p>Voltage measured should read between -11.3 and -12.7Vdc.</p> <p>Voltage measured should read between +4.5 and +5.5Vdc.</p>	<p>If reading is not within tolerance, adjust +5V ADJUST potentiometer on LTUPSO. If adjustment does not bring the voltage into tolerance, replace LTUPSO.</p> <p>If reading is not within tolerance, replace -48PS0. If voltage not present, check -48B LTUO fuse on PSU. If fuse is good, replace 48PS0.</p> <p>If reading is not within tolerance, replace LTUPSO.</p> <p>If reading is not within tolerance, replace LTUPSO.</p> <p>If reading is not within tolerance, check +5V cabling between between basic shelf and LTU</p>
9B	<p>Repeat steps 9A a) through d) for expansion cabinet LTU shelf voltages (if applicable) substituting -48PS1 for 48Vdc power supply and appropriate LTUPS.</p>		
9C	<p>After satisfactorily completing steps 9A and 9B, proceed as follows to measure the loaded LTU shelf input voltages:</p> <p>a) On the PSU, place the circuit breakers designated LTUPS0,LTUPS1,and LTUPS2 in the off (down) positions.</p> <p>b) Plug all previously extracted PCBs on the LTU shelves into their respective backplane connectors.</p> <p>c) On the PSU, place the circuit breakers designated LTUPSO, LTUPS1, and LTUPS2 in the on (up) positions.</p> <p>d) Repeat measurements on LTU backplane connectors J42, J43, and J44 per step 9A.</p>	<p>Voltages measured should be within same tolerances except +5Vdc supply should read between 4.85 and 5.15 Vdc.</p>	



09252-1-2/21/86

Figure 4.00 Location of Input Voltage Connectors on Basic Backplane



A5251-1-4/2/86

Figure 4.01 Location of Input Voltage Connectors on LTU Backplane

## SECTION 5.00 OPERATING PROGRAM LOADING

5.01 General. The SATURN IIE EPABX is a Stored-Program-Controlled (SPC) system. The system is shipped with two identical floppy disks that contain the basic operating and the installation-dependent data. The operating program uses the installation-dependent data, commonly referred to as the system data base, to complete and process calls as required by the customer. This information includes such items as the number of station lines and trunks in the system, as well as their operating characteristics.

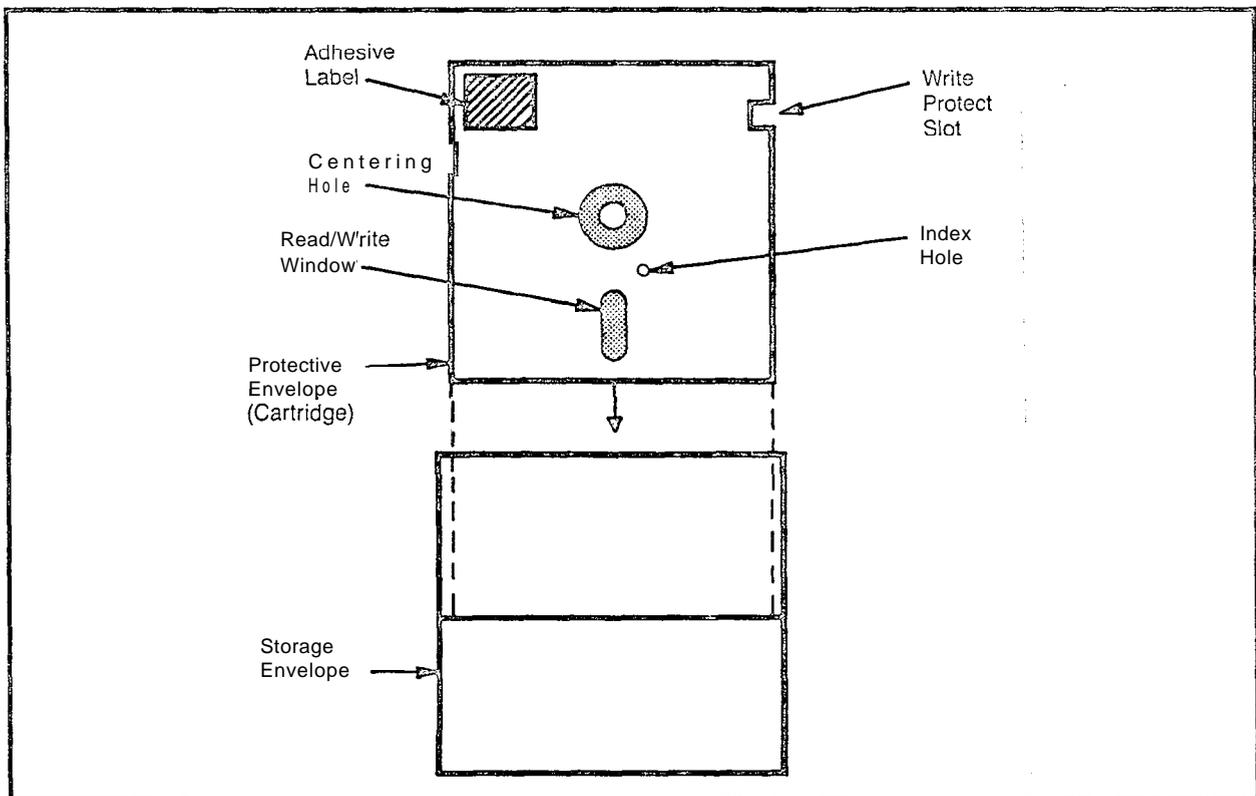
The exact equipment configuration of the SATURN IIE System must be defined in the data base in order for the system to operate properly. Depending on how the system is ordered, the data base is supplied in a standard format or, on request, can be supplied completely defined and prepared by Siemens. When the standard data base format is supplied, via the SATURN EPABX Data Base Preparation practice, the equipment configuration of the particular installation-site must be evaluated to determine if additional information must be added to the floppy disks. The floppy disks are updated via a service terminal. The procedures for defining the data base and inputting the data to memory are described in the SATURN EPABX Data Base Preparation practice and SATURN EPABX Customer Memory Update (CMU) Procedures practice.

5.02 Loading Operating Disks. After satisfactorily completing the Power-Up/Output Voltage Tests in Section 4.00, the

system's operating program, contained on the floppy disks, is loaded into the FDD modules for the initial processor initialization. Both floppy disks are loaded, with either disk placed in either drive (FDD0 or FDD1). Before proceeding with the loading procedures indicated in Table 5.00, the following precautions must be observed when handling the floppy disks. Figure 5.00 illustrates the floppy disk and storage envelope.

- a. Prior to using a floppy disk, leave disk in the same environment as the FDD module for at least 5 minutes.
- b. Do not place heavy objects on floppy disk.
- c. Do not write on floppy disk.
- d. Do not touch floppy disk surface while handling. Damage to FDD head may occur due to skin oil picking up dirt.
- e. Always return floppy disk to storage envelope when it is not in use.

5.03 Inputting CMU Data to Floppy Disk. After satisfactorily loading the operating disks as indicated in Table 5.00, refer to the SATURN EPABX Data Base Preparation practice which defines the particular system's data base, and SATURN EPABX Customer Memory Update (CMU) Procedures practice to input the installation-dependent data to memory



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Figure 5.00 Floppy Disk and Storage Envelope

**WARNING**

*Hazardous voltages exist within the equipment cabinet. Be extremely careful when performing testing/troubleshooting procedures with the equipment panel(s) removed.*

**Table 5.00 Loading Procedures for Operating Disk**

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
<p>1</p> <p>2</p> <p>3</p> <p>4</p>	<p>On the PSU, shown in Figure 5.01, place the FAILURE TRANSFER switch in the AUTO position,</p> <p>Insert a floppy disk into slot opening of each FDD until it stops (Figure 5.02).</p> <p>NOTE: Either system disk may be placed in either FDD.</p> <p>Close FDD latch to secure floppy disk in place.</p> <p>Perform the following operations on the CIOP PCB (Figure 5.03).</p> <p>a) Connect service terminal to TTY connector on CIOP PCB (Figure 5.03).</p> <p>b) Depress the reset switch located under the CIOP TTY connector. Use pencil or other nonmetallic object to depress the switch.</p>	<p>Set CIOP DIP switches (Figure 5.03) for service terminal in use per Table 5.01.</p> <p>The following three messages should appear on the service terminal:</p> <p>1) THE SIB SIDE IS READY FOR USE</p> <p>2) READY TO START BOOT LOADER</p> <p>3)*** BOOT LOADER COMPLETE"</p> <p>After the last message, the red STO-ST3 LEDs perform a cycling sequence and the green ACTV LED remains lit.</p> <p>When the loading process is complete, the red LEDs stop cycling and one LED remains lit for a few seconds, then cycling starts again. The green LED (ACTV) remains lit.</p> <p>If no failures occur during processor initialization, the four red LEDs display a code indicating that processor initialization has been completed and the processor is on-line. Concurrently, the service terminal displays software version, date base version, patch level of disk software, site information and the prompt ENTER PASSWORD. If it is desired to perform CMU procedures or clear the alarm stack, enter the appropriate password. If the proper password is entered, a date-and-time prompt is displayed. If an incorrect password is entered, INVALID PASSWORD ENTERED is displayed.</p>	<p>If a failure occurs during initialization, the LEDs flash a binary value to indicate loading error as described in Table 5.02.</p> <p>Should any of the failures described in Table 5.02 occur during processor initialization, remove the floppy disks from FDDs and insert the spare floppy disks into the FDDs. If no failures occur, the floppy disks previously removed are defective. If the same failure occurs, refer to ACTION column in Table 5.02</p>

Table 5.00 Loading Procedures for Operating Disk (Continued)

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
5	If the operating disks that were loaded did not contain a Siemens-. prepared data base, refer to SATURN EPABX Data Base Preparation practice to define the particular system data base, and the SATURN EPABX Customer Memory Update Procedures practice to input the installation-dependent data to the system memory.		

Table 5.01 CIOP DIP Switch Settings

CAUTION:

***Before removing CIOP PCB to set switches, place BASIC PS circuit breaker on the PSU to the off (down) position. After replacement of CIOP PCB, place circuit breaker back to the on (up) position.***

SWITCH NUMBER	SWITCH ON (CLOSED)	SWITCH OFF (OPEN)
1	Maintenance/ Test	Normal
2	Not Used	Not Used
3&4	Baud Rate (see note)	Baud Rate (see note)
5	One Stop Bit	Two Stop Bits
6	Odd Parity	Even Parity
7	Parity Disabled	Parity Enabled
8	Seven Bits	Eight Bits

NOTE: The following are the baud rate combinations for switches 3 and 4.

SW3	SW4	BAUD RATE
OFF	OFF	300
ON	OFF	1200
OFF	ON	2400
ON	ON	9600

Table 5.02 LED Display Values for Loading Errors

ST0 LED	ST1 LED	ST2 LED	ST3 LED	HEX CCDE	ERRCR DETECTED	ACTION
OFF	OFF	OFF	OFF	0	Start of self test not halted	-----
OFF	OFF	OFF	ON	1	Main processor error	Note 1
OFF	OFF	ON	OFF	2	EPROM checksum error	Note 1
OFF	OFF	ON	ON	3	MEM slot 0 low 64k test error	Notes 1 and 3
OFF	ON	OFF	OFF	4	8k by 8 static RAM test error	Note 1
OFF	ON	OFF	ON	5	IRAM memory test error	Note 1
OFF	ON	ON	OFF	6	ORAM memory test error	Note 1
OFF	ON	ON	ON	7	SIB side error	Note 1
ON	ON	OFF	OFF	C	Global memory error	Notes 1 and 3
ON	ON	OFF	ON	D	Watchdog timer error	Note 1
ON	ON	ON	OFF	E	SIB serial loopback test error	Note 1
ON	ON	ON	ON	F	SIB counter timing test error	Note 1
ON	OFF	OFF	OFF	8	Start boot process (self test done)	-----
ON	OFF	OFF	ON	9	Disk controller error	Note 1
ON	OFF	ON	OFF	A	Drive not ready error	Note 2
ON	OFF	ON	ON	B	CRC retry errors exceed 8	Note 2

Notes:

1. Upon failure, retry loading procedure. If failure persists, replace CIOP PC3.
2. Upon failure, retry loading procedure using another set of floppy disks. If failure persists, check/replace disk drives and then CIOP PCB, if necessary.
3. If reload and CIOP PCB replacement (Note 1) is not effective, replace memory PCBs starting from slot 0 until failure is no longer present.

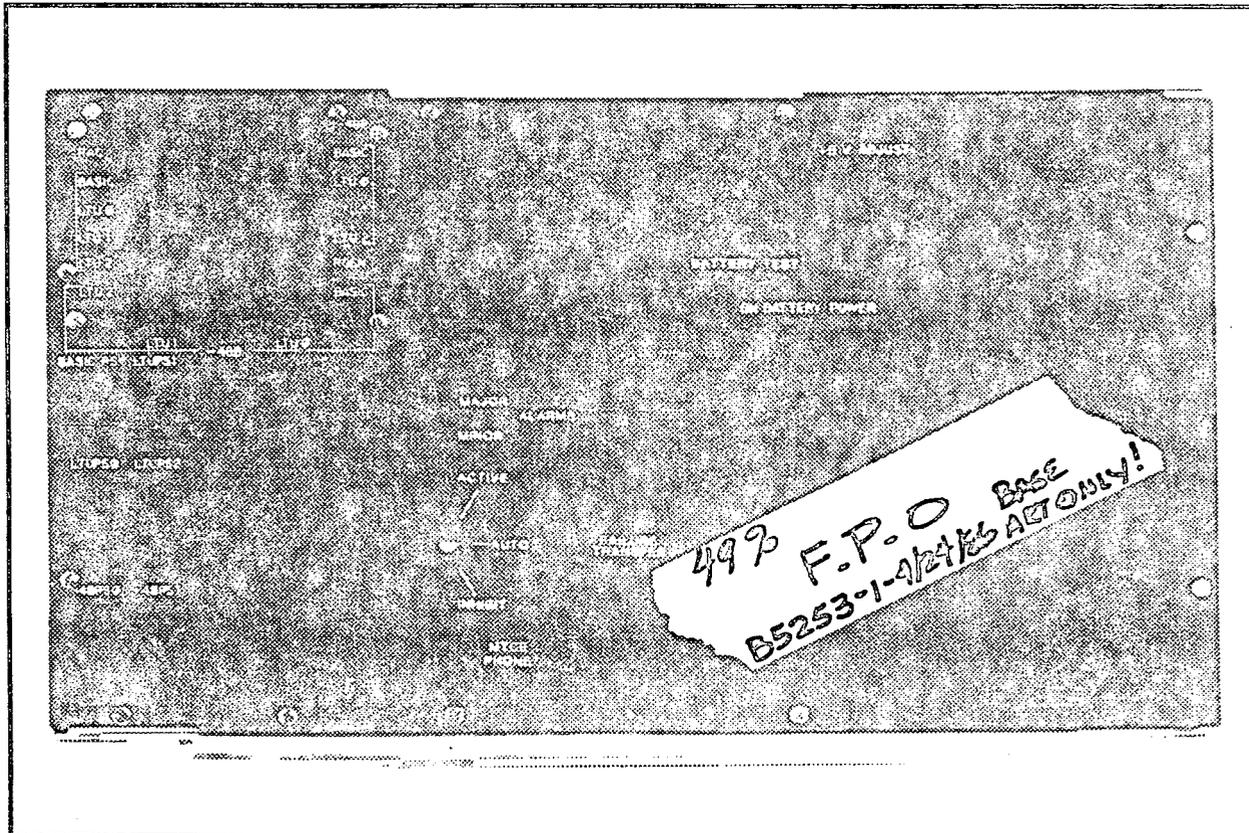
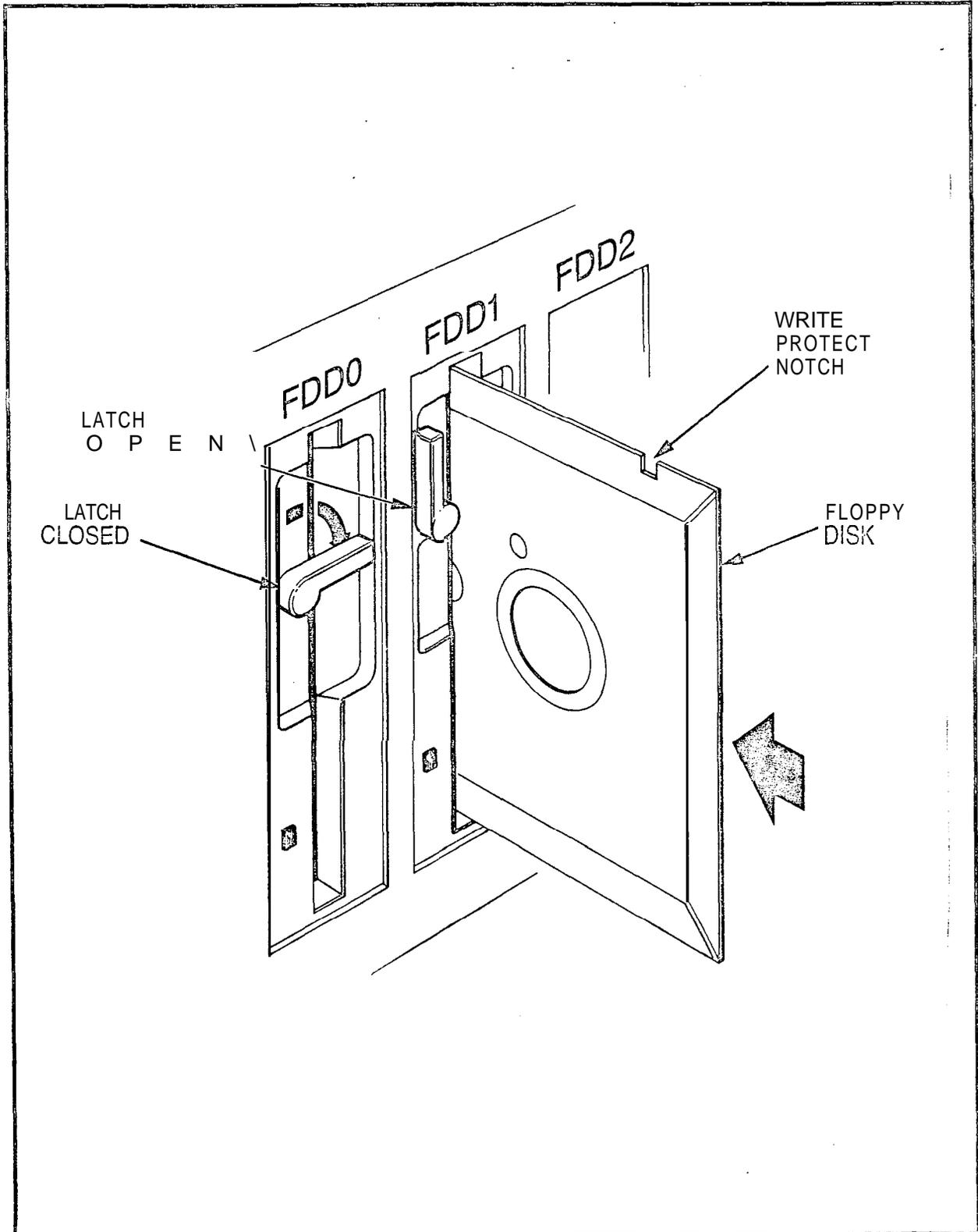
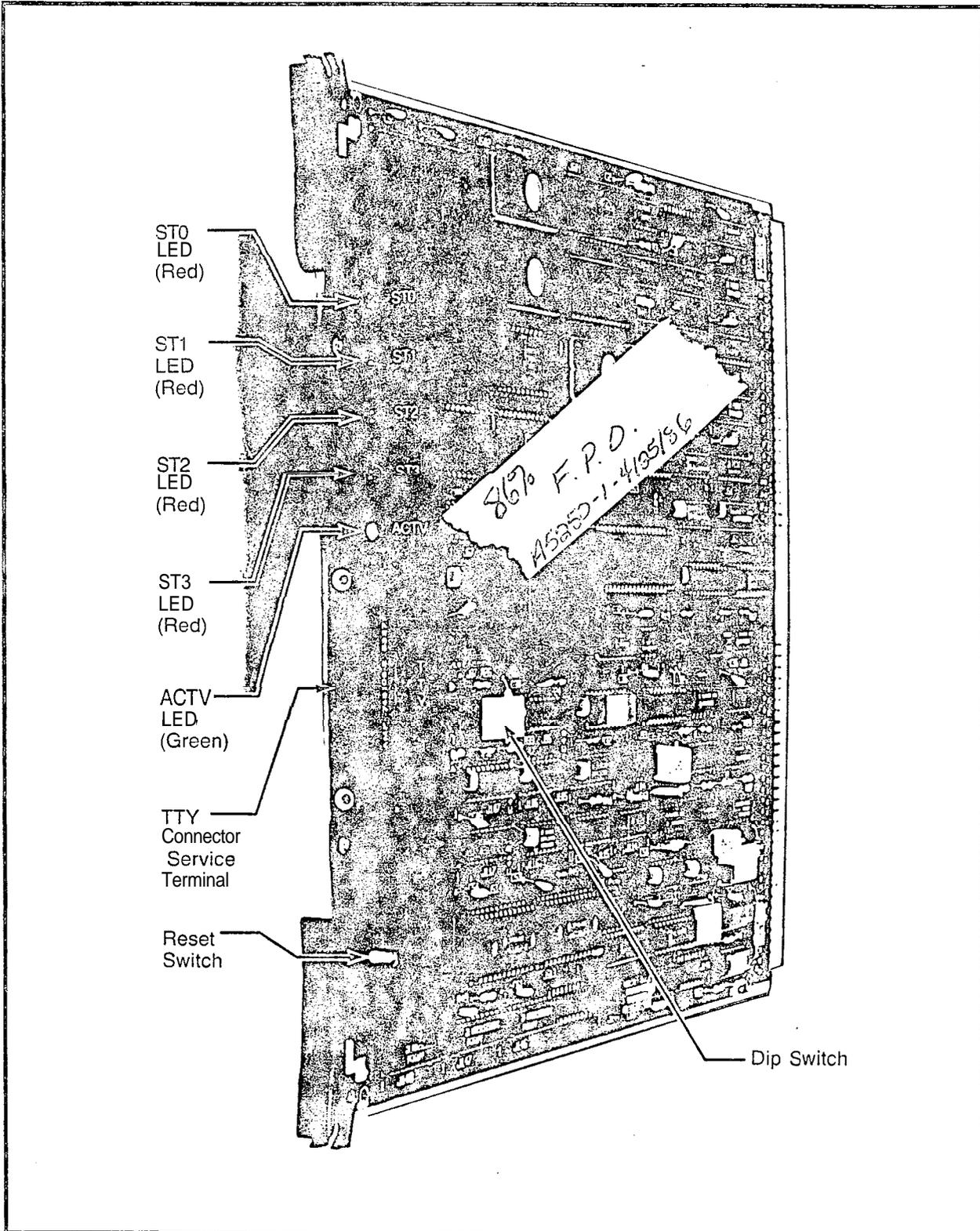


Figure 5.01 Power System Unit (Front View)



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Figure 5.02 Floppy Dish Loading Procedures



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Figure 5.03 CIOP Printed Circuit Board

## SECTION 6.00 ON-LINE DIAGNOSTIC TESTS

6.01 **General.** After satisfactorily loading the operating disk and inputting CMU data to system memory via a service terminal, the operational capability of the system must be verified after the necessary MDF cross-connections are performed. The SATURN IIE System software contains a group of system and apparatus (ancillary equipment) diagnostic test routines which are accessed via the maintenance phone. Resulting visual and/or audible responses from these on-line diagnostic tests make it possible to verify correct operation or detect and isolate system and apparatus malfunctions. If in doubt about a SATURN PCB or apparatus malfunctioning, craft personnel should refer to the SATURN IIE EPABX Maintenance and Troubleshooting practice for further details. If a SATURN PCB or apparatus is proven to be defective, craft personnel should proceed according to the instructions contained in the MRA kit.

**6.02 Connection of Maintenance Phone and Modem.** Figures 6.00 and 6.01 provide the details for the maintenance phone and modem initial MDF cross-connections. Figure 6.00 also identifies the leads used when interfacing other maintenance related equipment such as a power failure transfer subsystem and dry contact closures for remote minor and major alarm indications. Note that such equipment is customer-provided and craft personnel should follow the manufacturer's instructions when installing them. To connect the maintenance phone and modem, the initial MDF cross-connections are as follows:

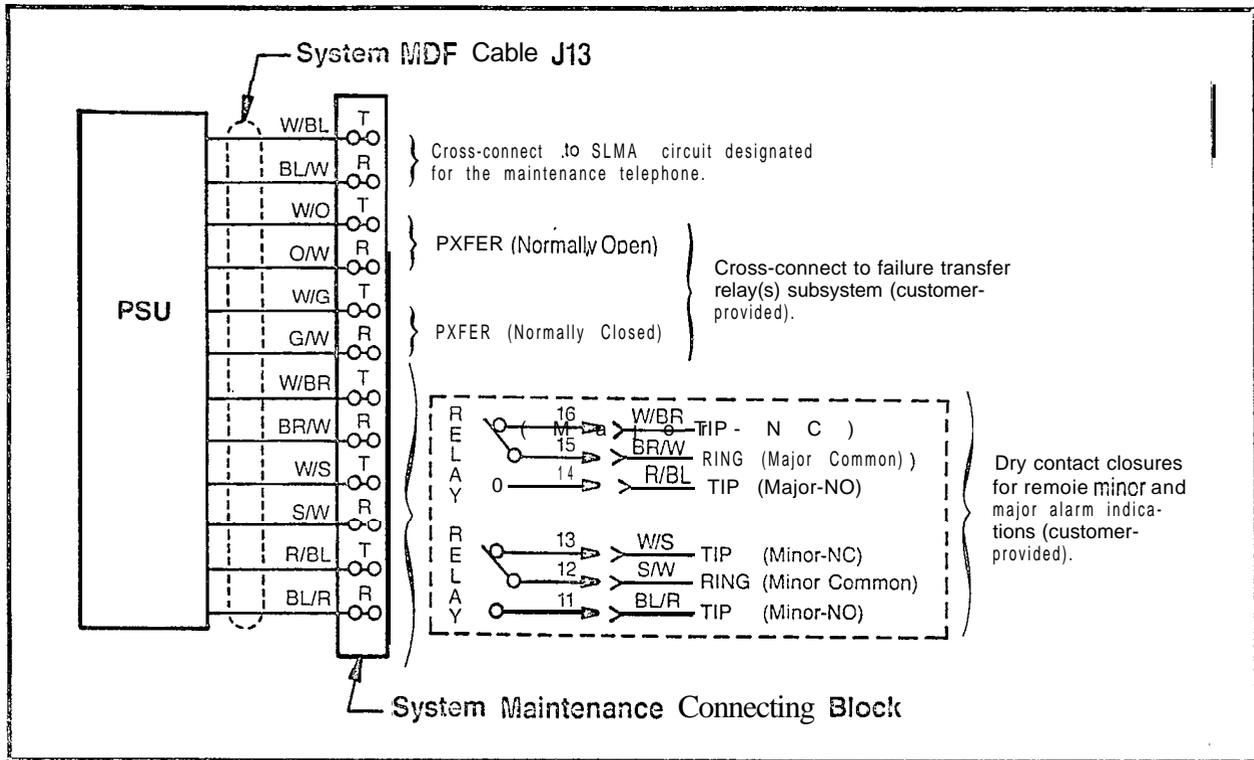
- a. Maintenance Phone. At the MDF connecting block on which PSU cable J13 is terminated, cross-connect the T&R leads of pair number 1 (W/BL-BL/W) to the T&R leads of the subscriber line circuit assigned for maintenance purposes (refer to Figure 6.00 for details). Note that this subscriber line circuit must be classmarked with the Maintenance Diagnostic Test (TESTDIAG) and Apparatus Test (TSTAPP) features.
- b. Modem. From the system T&R connecting block that allocates system MDF cable J44 from the basic shelf, cross-connect the T&R of pair number 24 (V/BR-BR/V) to the T&R leads of the subscriber line circuit to be used for modem application (refer to Figure 6.01 for details). The subscriber line circuit to be used for modem application must be assigned to a class of service in which the Data Line Security (DATASEC) classmark has been enabled.

After the above initial MDF cross-connections have been performed, the DTMF telephone set to be used as the maintenance phone can be connected to the modular jack designated MTCE PHONE on the PSU if equipped with a standard modular plug, or connected at the MDF to the T&R leads of the associated subscriber line circuit. Note that if a permanent maintenance phone is

desired in the equipment, it may be installed near the front of the cabinet, and cross-connected per Figure 6.02.

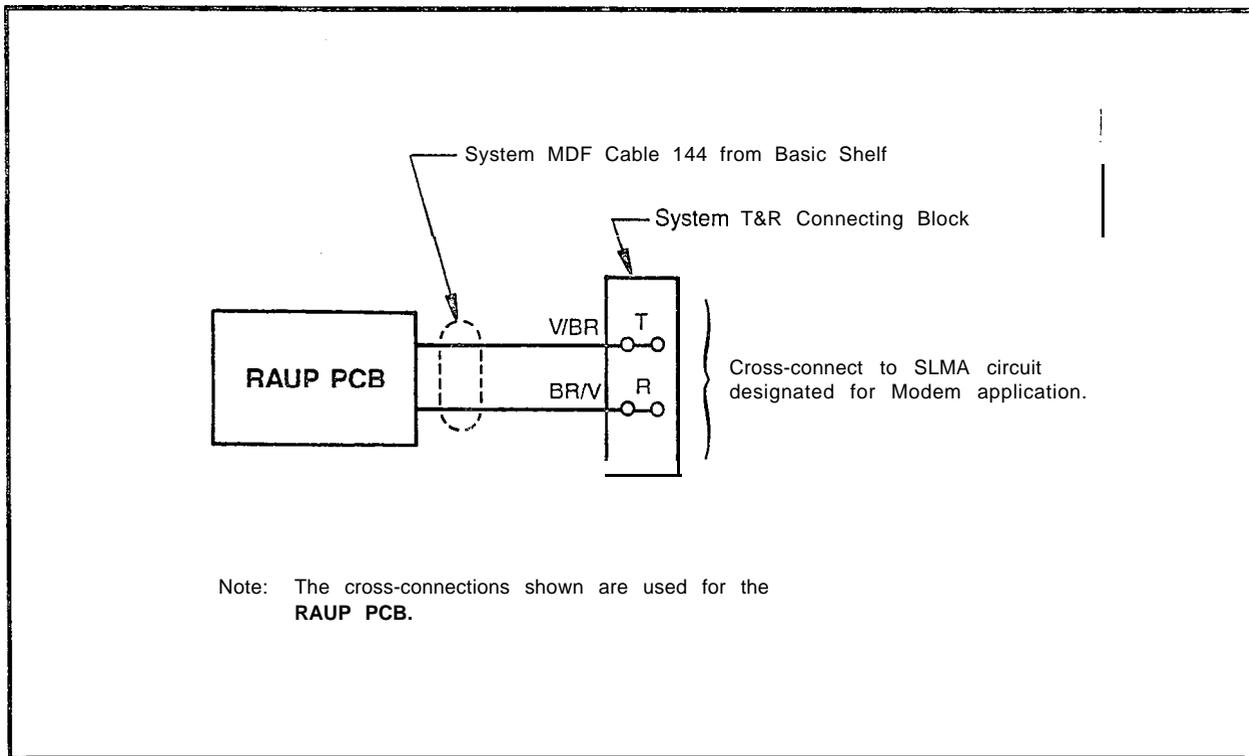
**6.03 MDF Cross-Connecting Procedures.** After the maintenance phone and modem connections have been completed, perform the necessary MDF cross-connections according to the equipment configuration plan. The following illustrations are provided to assist craft personnel in the MDF cross connections of peripheral interfacing devices:

- a. Figures 6.02 and 6.03 - Cross-Connections for rotary or pushbutton Single Line Telephone Instruments interfacing with SLMA-S and SLA16 PCBs, respectively.
- b. Figure 6.04 - Cross-Connections for Siemens Digital Telephone Interfacing with SLMD PCB.
- c. Figure 6.05 - Cross-Connections for SATURN Attendant Console.
- d. Figure 6.06 - Cross-Connections for Central Office (CO) and Direct Inward Dialing (DID) Trunks.
- e. Figure 6.07 - Cross-Connections for Two-Wire (Type I) E&M Tie Trunks.
- f. Figure 6.08 - Cross-Connections for Four-Wire (Type I) E&M Tie Trunks.
- g. Figure 6.09 - Cross-Connections for Two-Wire (Type II) E&M Tie Trunks.
- h. Figure 6.10 - Cross-Connections for Four Wire (Type II) E&M Tie Trunks.
- i. Figure 6.11 - Cross-Connections for Recorded Announcement Equipment (DID and Tie Trunk Vacant Number Intercept, and ACD Announcement Service).
- j. Figure 6.12 - Cross-Connections for Coda Calling Equipment with or without Answerback Capability.
- k. Figure 6.13 - Cross-Connections for DTMF Dial Dictation Equipment.
- l. Figures 6.14 and 6.15 - Cross-Connections for Music-on-Hold Feature via a Music Source, interfacing with a TMBA4 and an SLMA/SLA16 PCB, respectively.
- m. Figure 6.16 - Cross-Connections for Zoned Paging Equipment With Answerback Capability.
- n. Figure 6.17 - Cross-Connections for Zoned Paging Equipment Without Answerback Capability.
- o. Figure 6.18 - Cross-Connections for Zoned Universal Night Answer (ZUNA or UNA) Signaling Equipment,



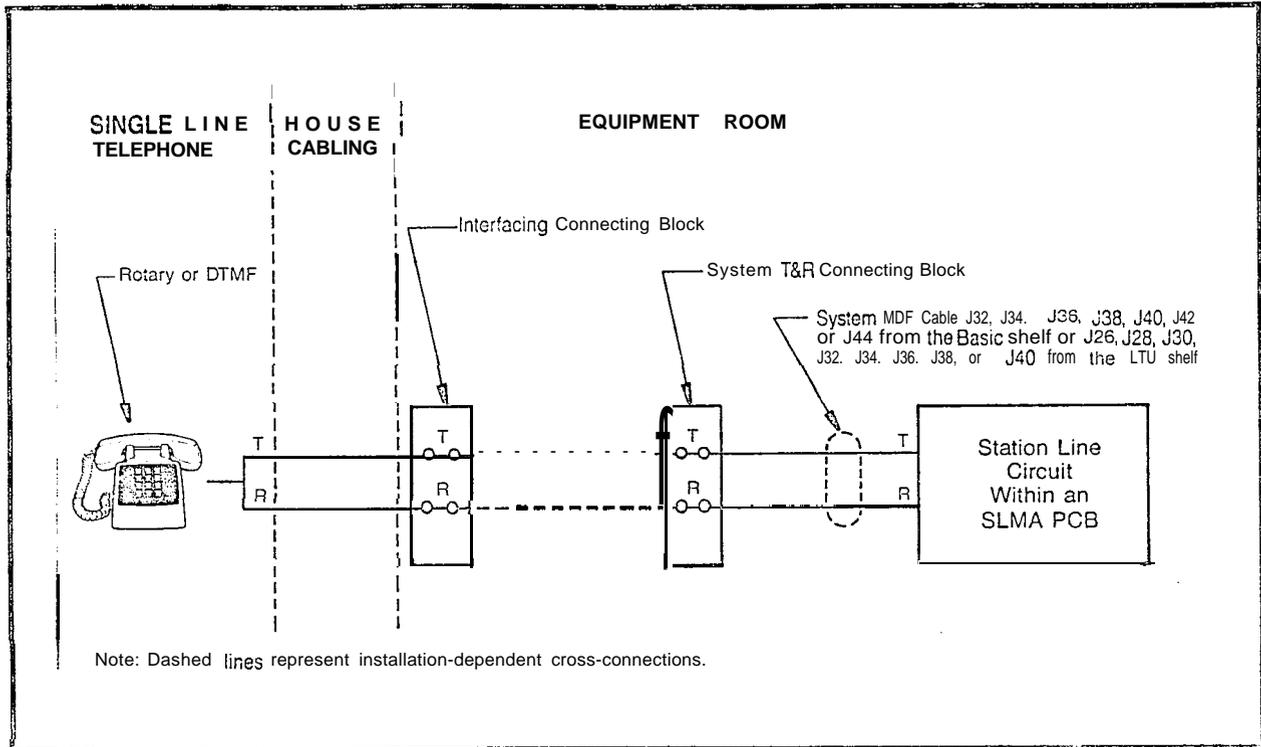
A5100-1-4/9/86

Figure 6.00 Maintenance Phone and Maintenance-Related Cross-Connections



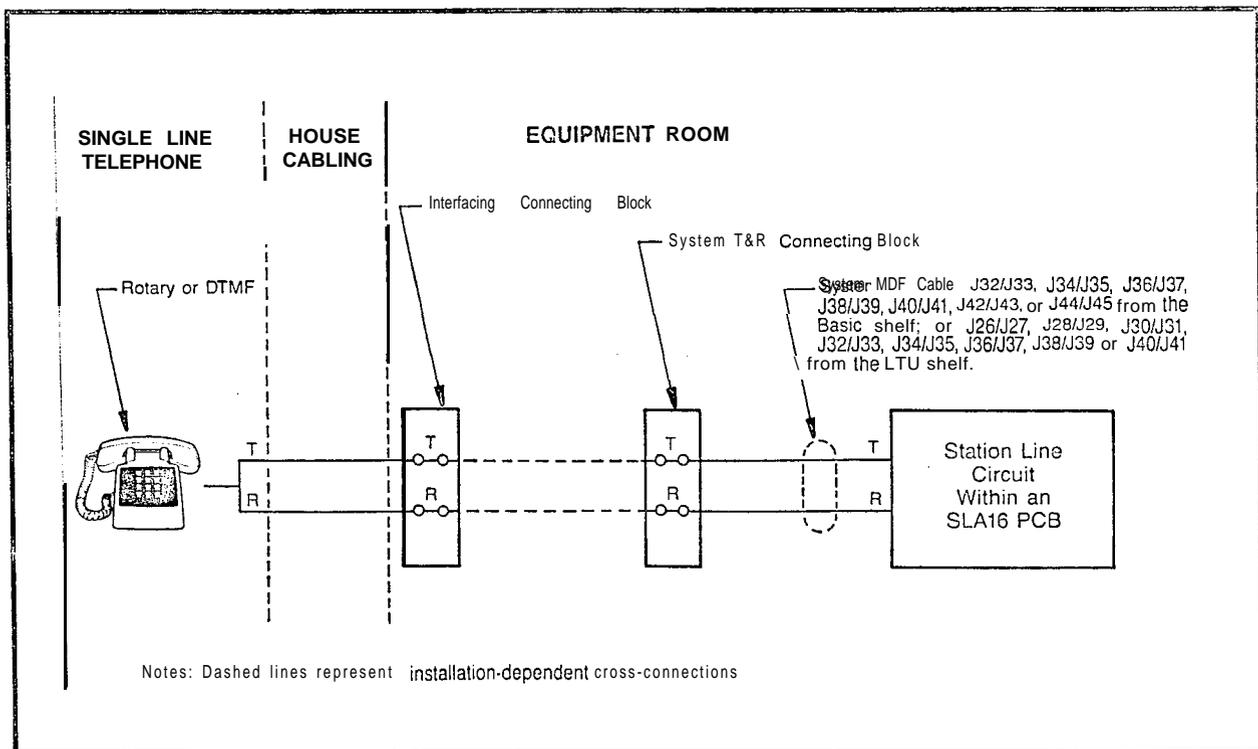
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Figure 6.01 Modem Cross-Connections



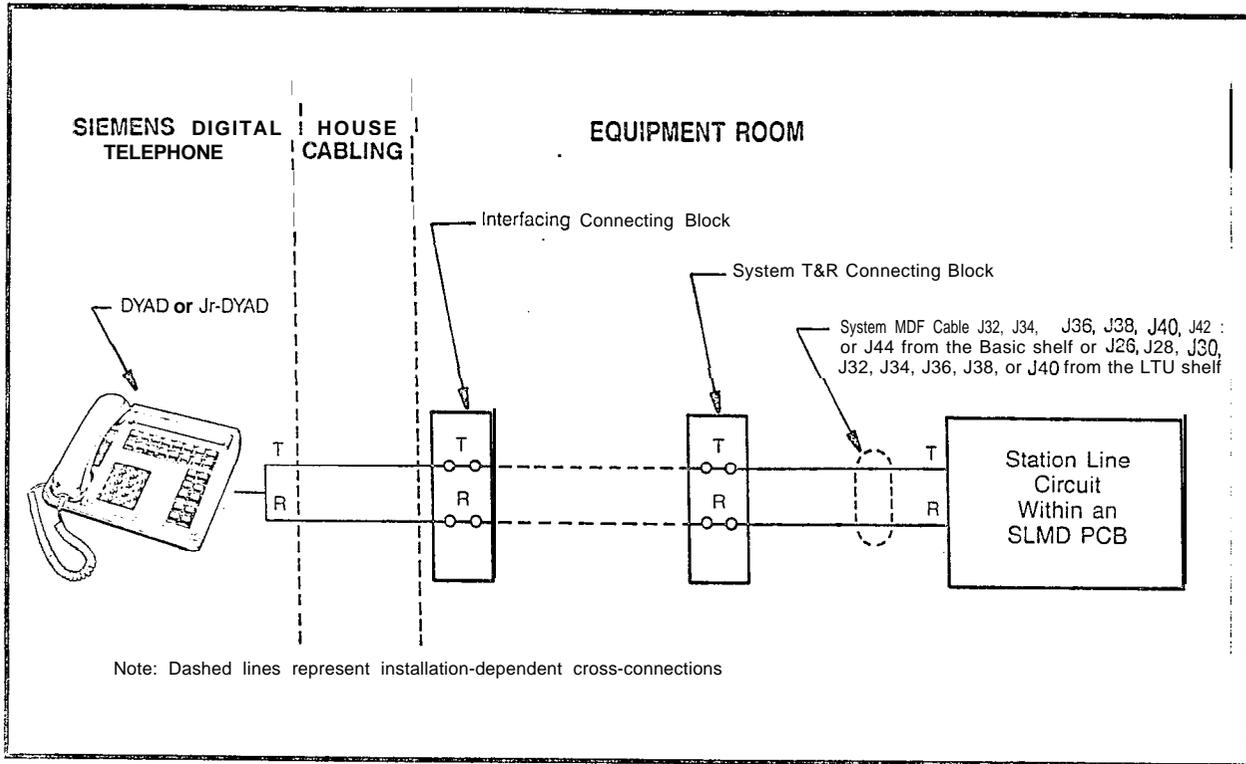
A5124-1-4/14/86

Figure 6.02 Single Line Telephone Cross-Connections Using SLMA PCB



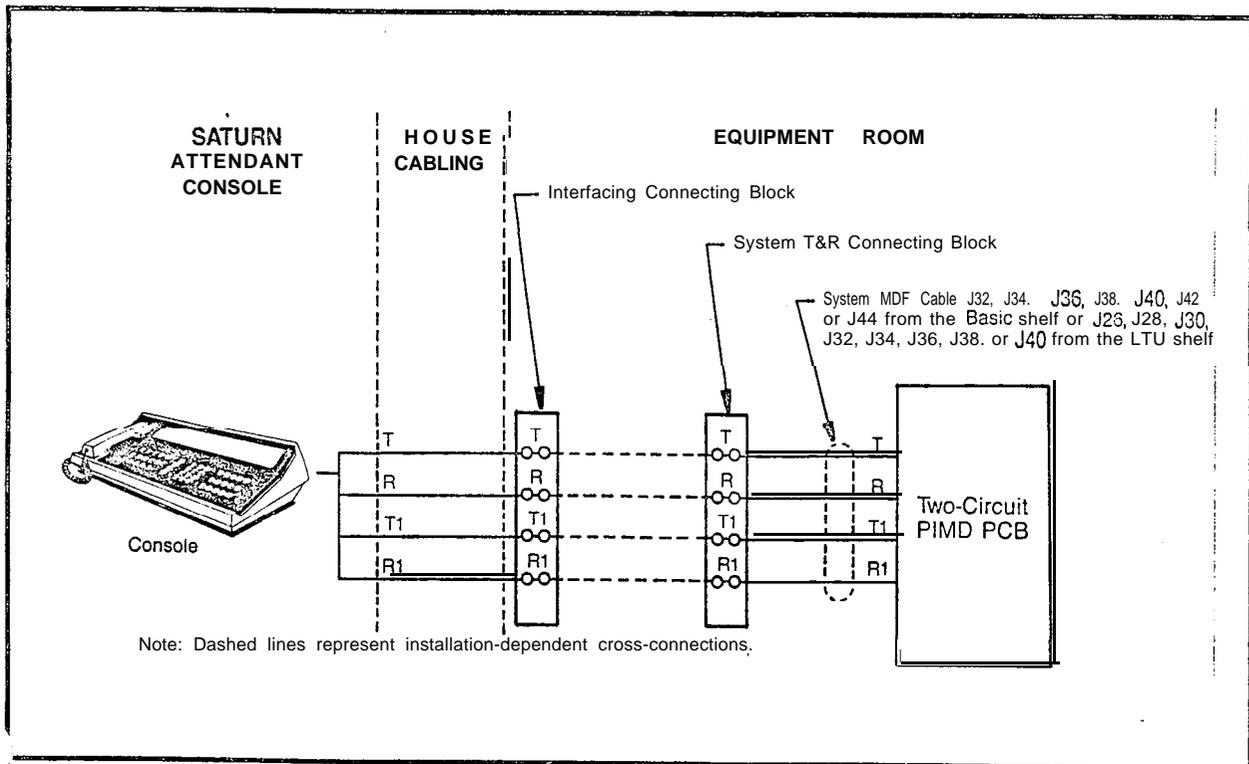
A5122-1-4/14/86

Figure 6.03 Single Line Telephone Cross-Connections Using SLA16 PCB



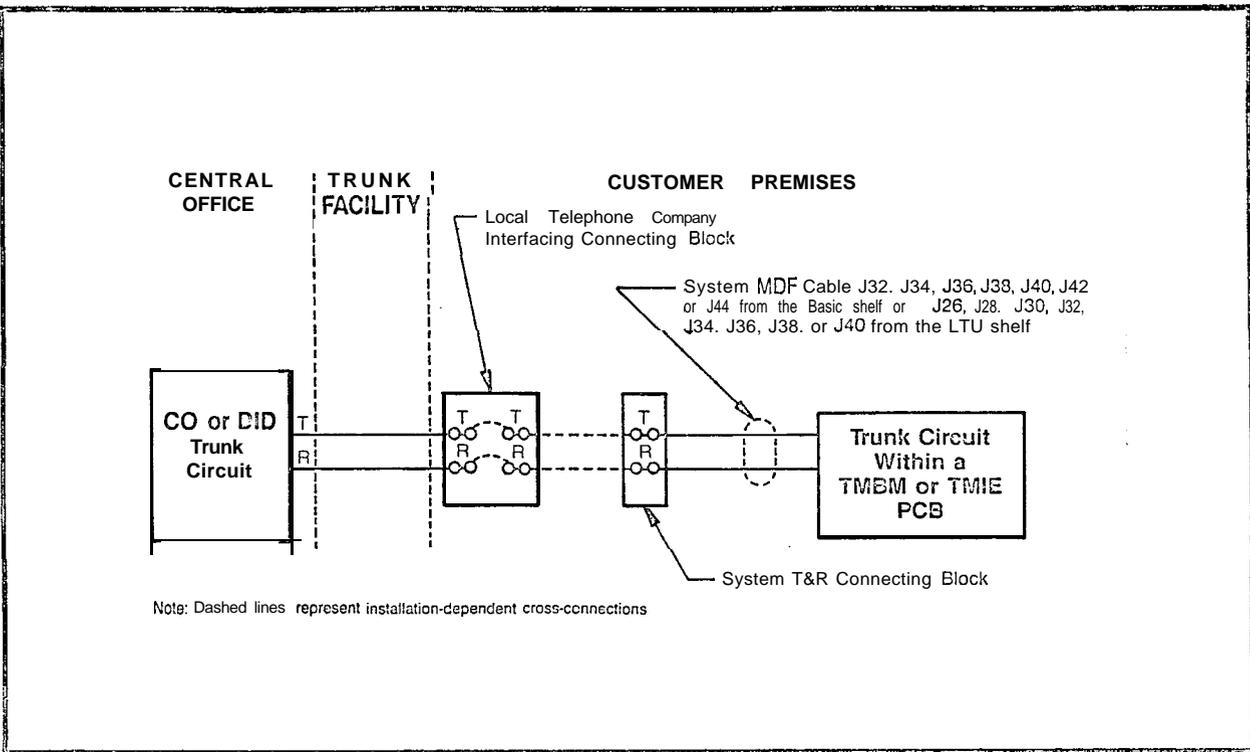
A5153-1-4/14/86

Figure 6.04 Siemens Digital Telephone Cross-Connections Using SLMD PCB



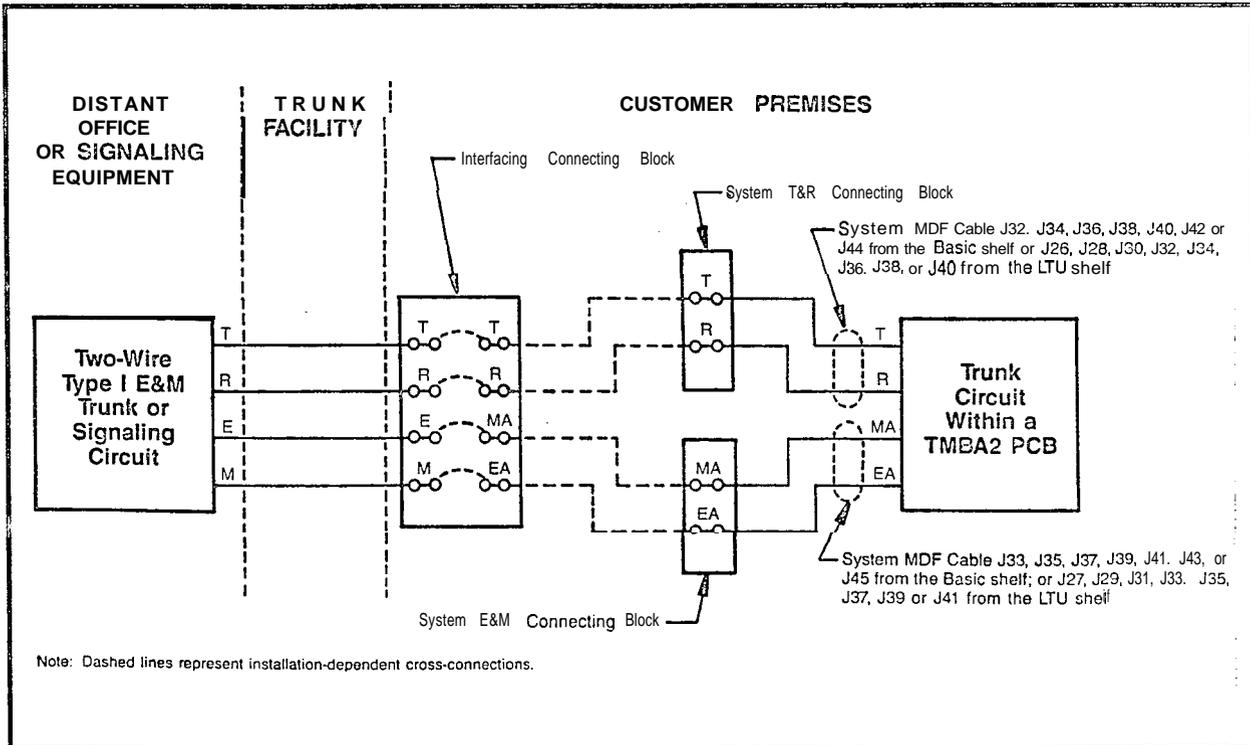
A5136-1-4/14/86

Figure 6.05 SATURN Attendant Console Cross-Connections



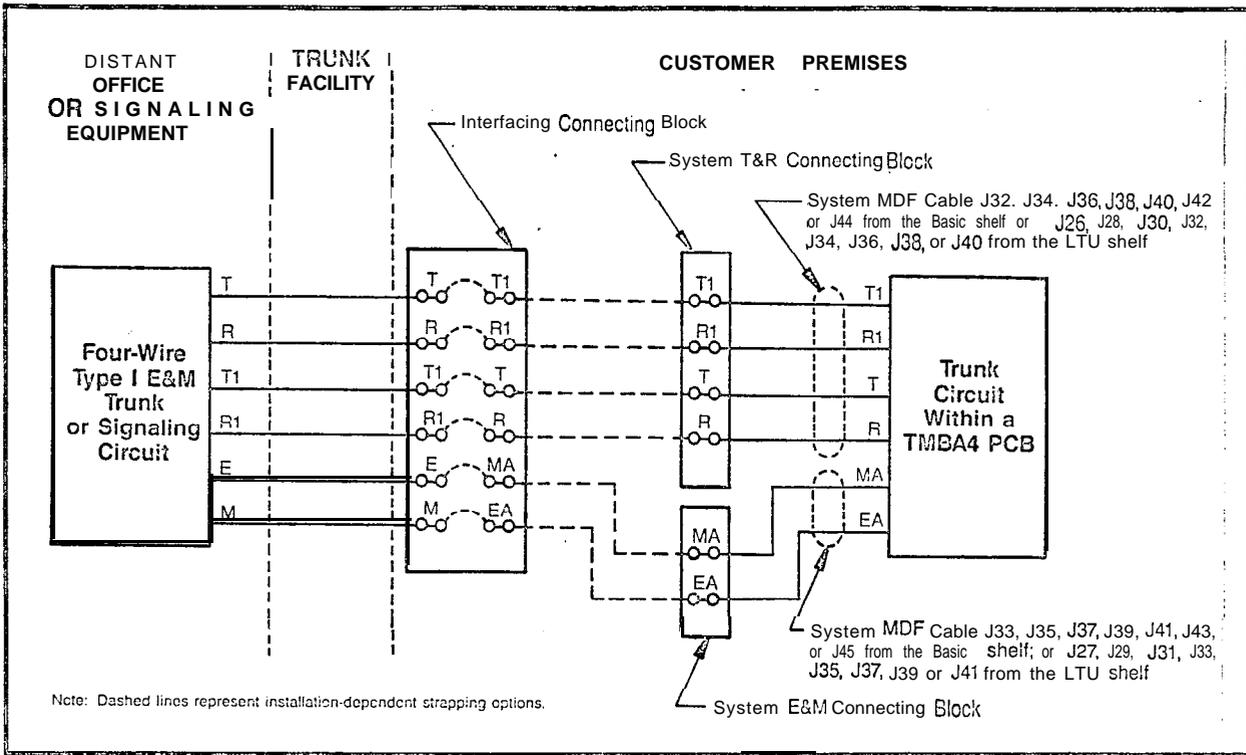
A5134-1-4/9/86

Figure 6.06 CO and DID Trunk Cross-Connections



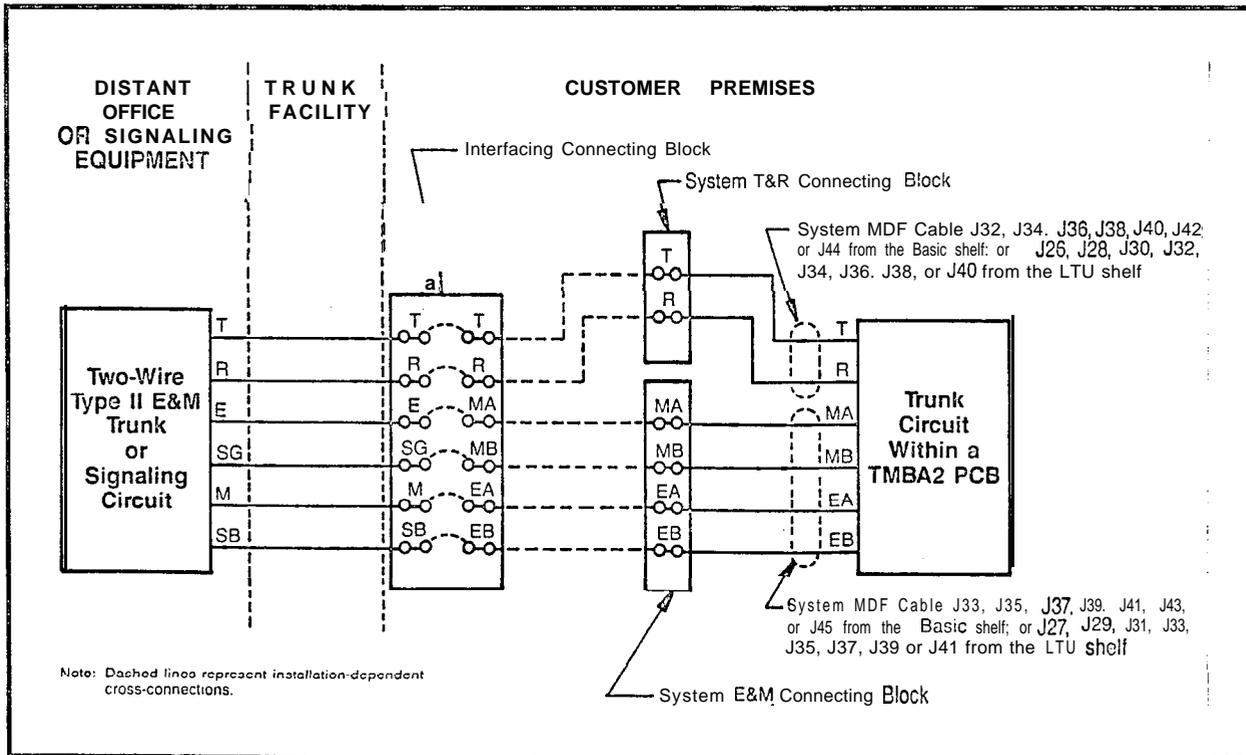
A5129-1-4/9/86

Figure 6.07 Two-Wire (Type I) E&M Trunk Cross-Connections



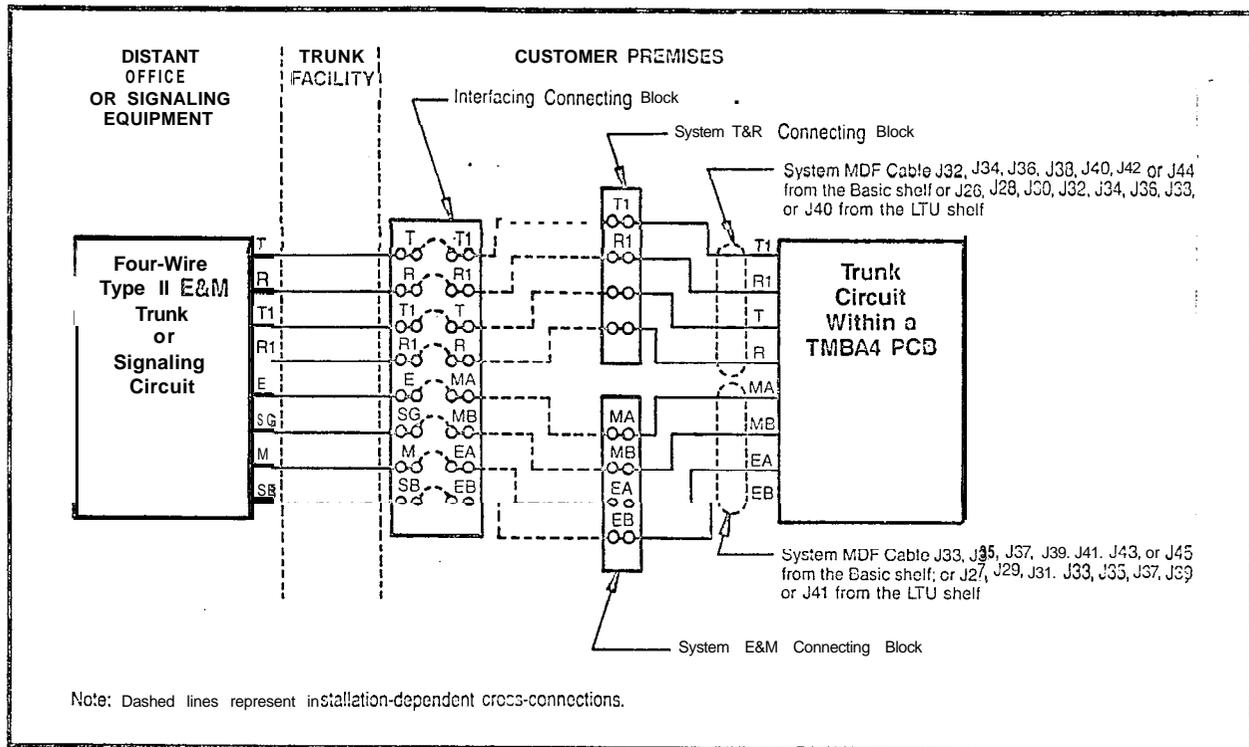
A5133-1-4/9/86

Figure 6.08 Four-Wire (Type I) E&M Trunk Cross-Connections



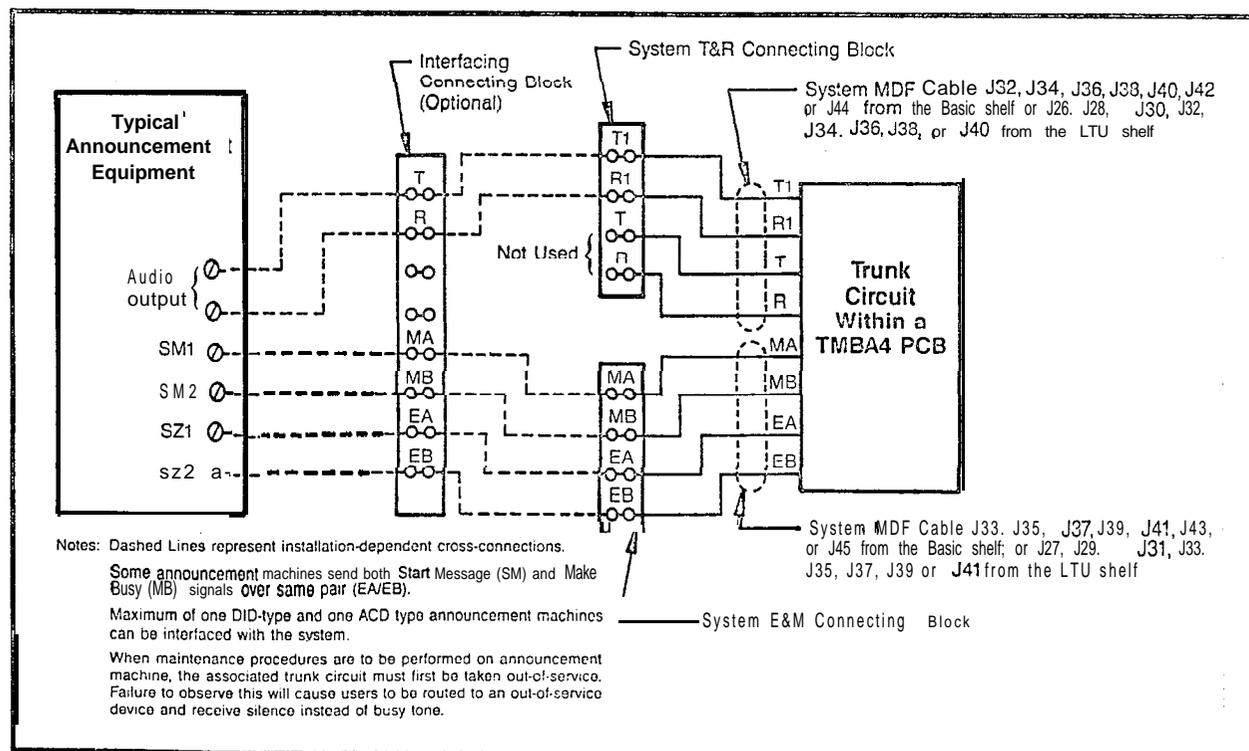
A5133-1-4/9/86

Figure 6.09 Two-Wire (Type II) E&M Trunk Cross-Connections



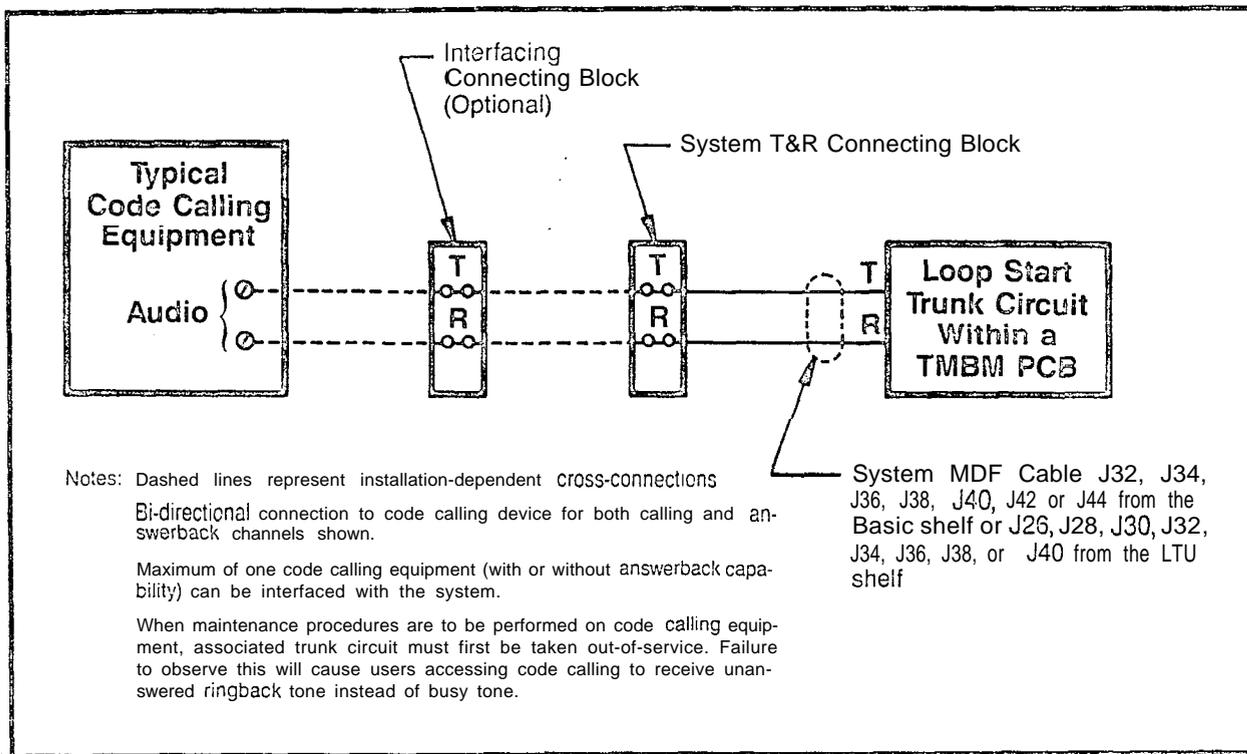
A5127-1-4/8/86

Figure 6.10 Four-Wire (Type II) E&M Trunk Cross-Connections



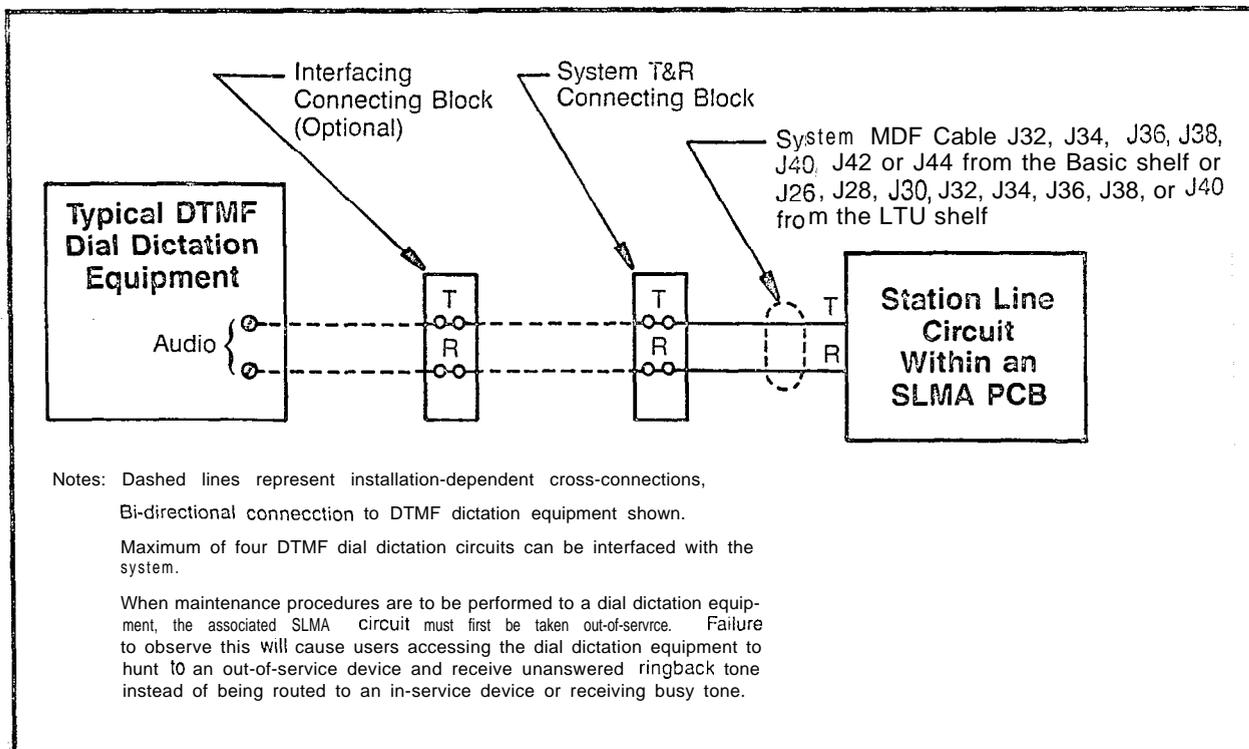
A5126-1-4/8/86

Figure 6.11 Recorded Announcement (DID and Tie Trunk Vacant Number intercept, and ACD Announcement Service) Cross-Connections



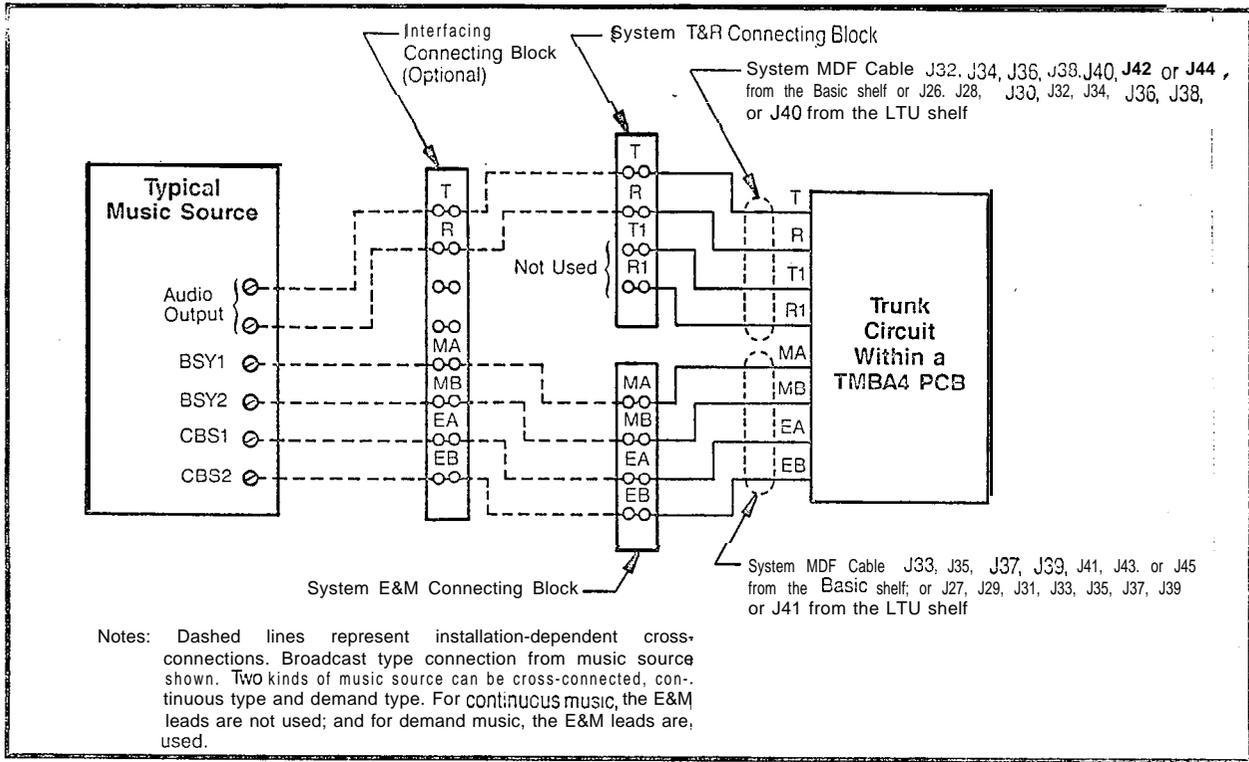
119-1-4/0/85

Figure 6.12 Code Calling (With or Without Answerback) Cross-Connections



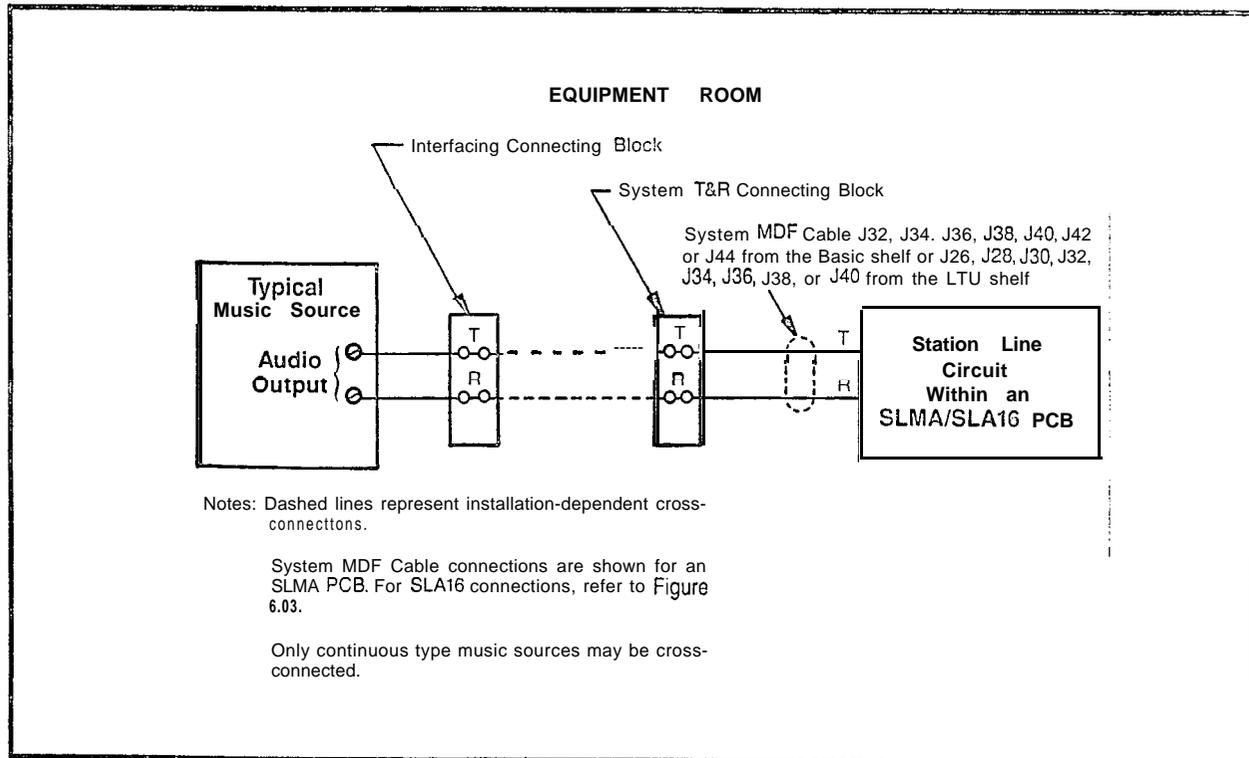
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Figure 6.13 Dial Dictation (DTMF) Cross-Connections



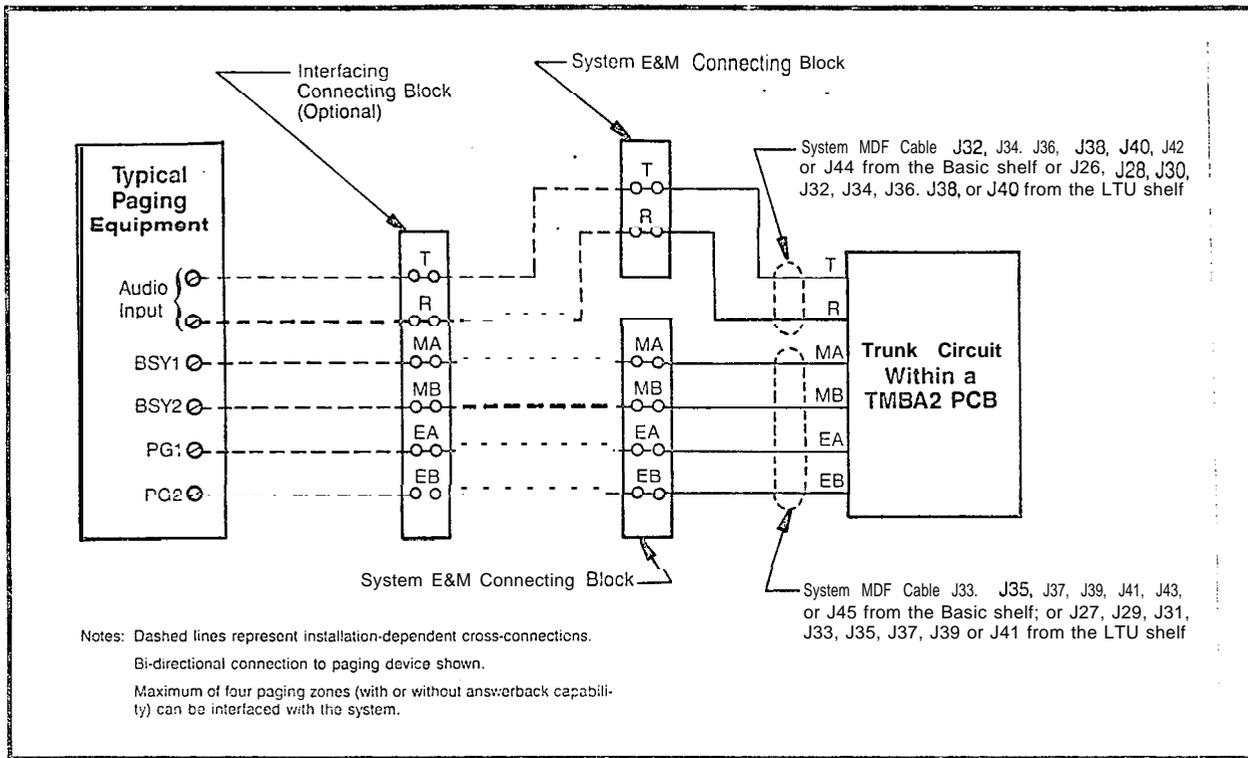
A5155-1-4/8/86

Figure 6.14 Music-on-Hold Cross-Connections Using TMBA4 PCB



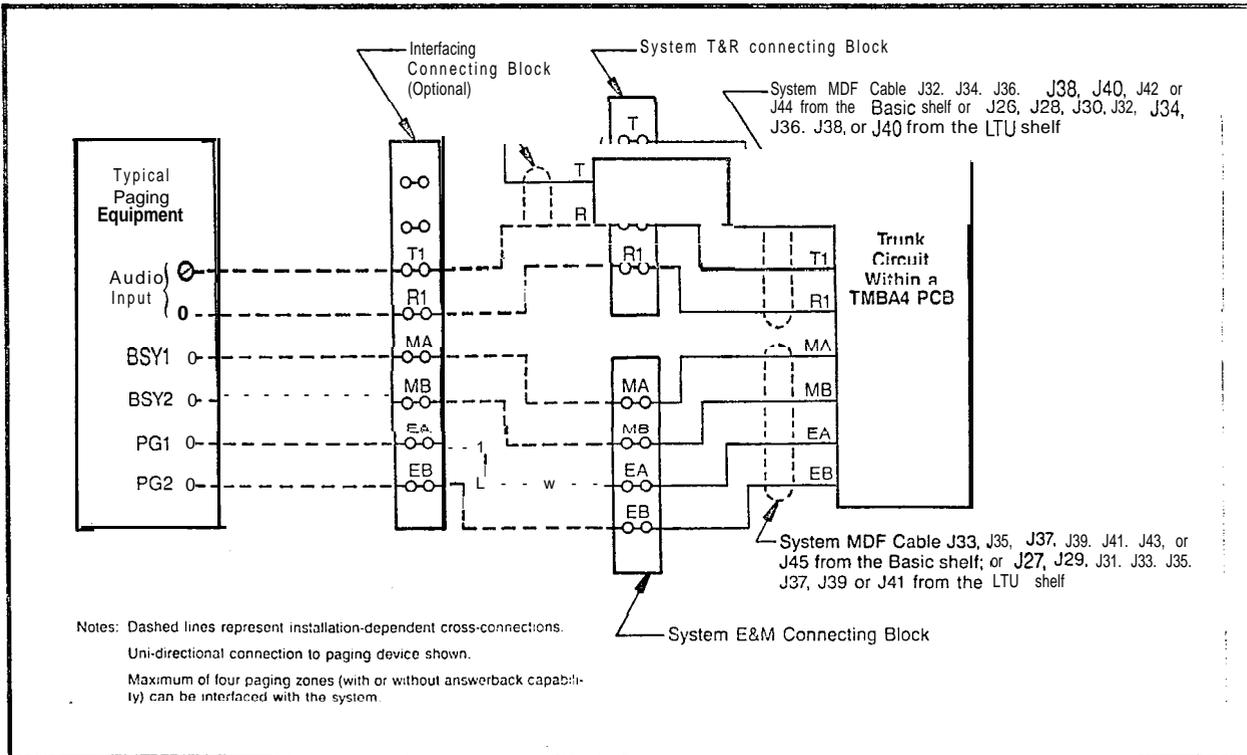
A5156-1-4/8/86

Figure 6.15 Music-on-Hold Cross-Connections Using SLMA/SLA16 PCB



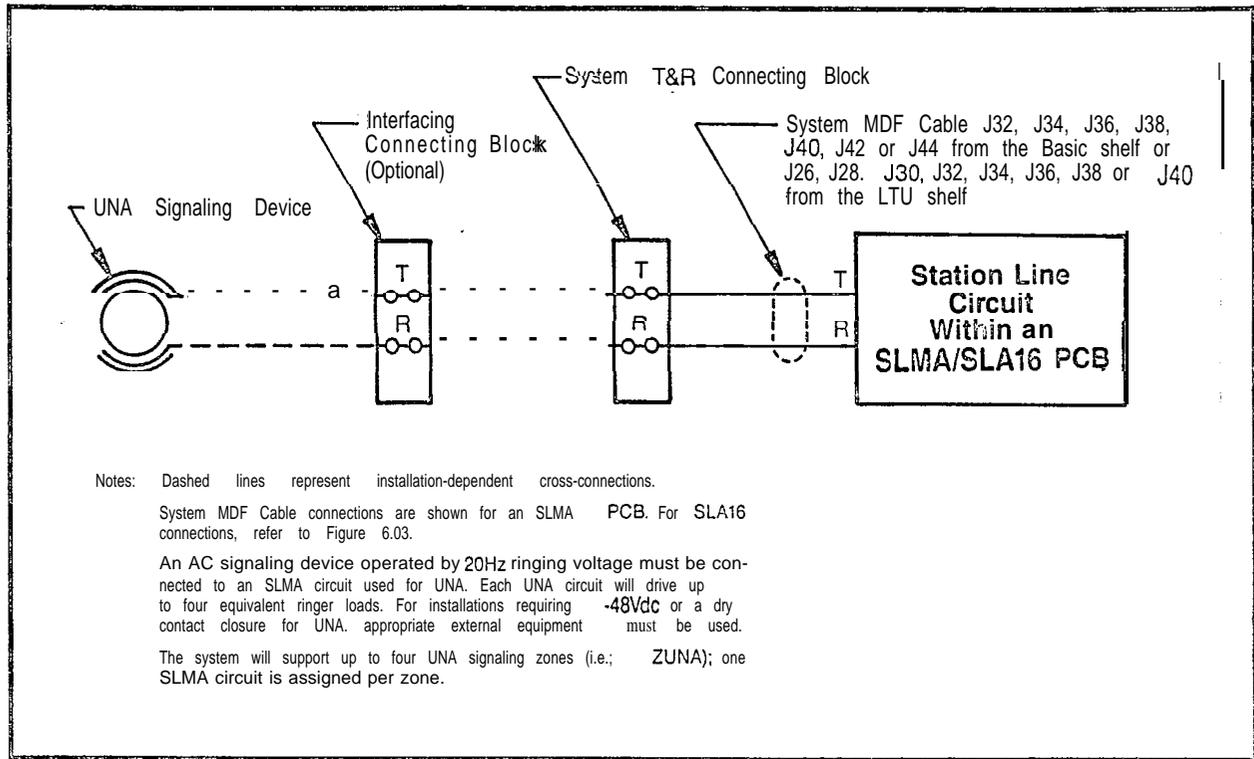
A5159-1-4/9/86

Figure 6.16 Paging With Answerback Cross-Connections



A5160-1-4/9/86

Figure 6.17 Paging Without Answerback Cross-Connections



A5157-1-4/9/86

Figure 6.18 Universal Night Answer (UNA) Cross-Connections

6.04 System Diagnostic Tests. After the necessary MDF cross-connections have been completed, the on-line diagnostic tests and procedures are performed to verify the operational capability of the system. Note that the subsequent on-line diagnostic tests and procedures are presented in the sequence in which they should be performed under normal installation conditions. It is the responsibility of craft personnel to determine the sequence in which such tests and procedures should be performed when unusual installation conditions exist. Unless otherwise indicated, these tests can be performed with SDTs and/or DTMF SLTs.

- a. Tone Generator Test. This system diagnostic test routine verifies that each tone provided by the SMXTG PCS is generated properly. In addition, the test also checks the connection path(s) through the Memory Time Switch (MTS). Refer to Table 6.00 for the necessary procedures to perform the tone generator test.
- b. DTMF Receiver Test. This system diagnostic test routine verifies that a DTMF receiver circuit in a particular DTMF PCB is operating properly. The test also checks the connection path(s) through the MTS. Refer to Table 6.02 for the necessary procedures to perform the applicable DTMF receiver circuit test(s). This test requires a Type 2500 DTMF Pushbutton Telephone Set.
- c. Station Line Test. This apparatus diagnostic test routine verifies that the supervisory and transmission capabilities between an SLMA, SLA16 or SLMD circuit and associated station or Siemens Digital Telephone instrument are operating properly. This test is performed from the station instrument under test and applies to both single line telephones (rotary or pushbutton) and Siemens Digital Telephones. Refer to Table 6.03 for the necessary procedures to perform the applicable station line test(s).
- d. DTMF Pad Test. This apparatus diagnostic test routine verifies that the DTMF keypad performance, including the transmission capabilities, of any DTMF pushbutton-type station instrument is operating properly. The test is performed from the station instrument under test and only applies to single line telephones equipped with a DTMF keypad. Note that a Siemens Digital Telephone cannot be used for this test since data, not tones, are transmitted from the SDTs pushbutton keypad. Refer to Table 6.04 for the necessary procedures to perform the applicable DTMF pad test(s).
- e. Console Test. This apparatus diagnostic test routine verifies that the data and speech highways to and from an attendant console are operating properly. The test also verifies that the console LED indicators, alphanumeric display unit and audible alerting device are oper-

ating properly. The test is performed from the console under test. Refer to Table 6.05 for the necessary procedures to perform the applicable console tests.

- f. Siemens Digital Telephone Button Tests. These apparatus diagnostic test routines verify that the signaling highways to and from Siemens DYAD and JR-DYAD telephones are operating properly. In addition, the tests also verify that the LEDs and the audible alerting devices of the telephones are operating properly. The tests are performed using the DYAD and JR-DYAD telephones. Refer to Tables 6.07 and 6.08 for the necessary procedures to perform the applicable Siemens digital telephone button tests.
- g. Siemens Digital Telephone Display Test. This apparatus diagnostic test routine verifies that the signaling highways to and from the Siemens DYAD telephones are operating properly. In addition, the tests also verify that the alphanumeric display unit and the audible alerting devices are operating properly. The tests are performed using the DYAD telephones under test. Refer to Table 6.09 for the necessary procedures to perform the Siemens digital telephone display tests.
- h. Trunk Test. This system diagnostic test verifies that the supervisory and transmission capabilities of an outgoing (or outgoing portion of a two-way) trunk are operating properly. In addition, the test also verifies the connection path(s) through the MTS. Refer to Table 6.11 for the necessary procedures to perform the applicable trunk tests.
- i. Placing Circuit(s) In-Service. This system procedure allows craft personnel to place an assigned circuit in service from an out-of-service state. This procedure works in parallel with the CMU procedure that changes a circuit's state. Refer to Table 6.12 for the necessary procedures to perform the applicable in-service placement of circuits.
- j. Placing Circuit(s) Out-of-Service. This system procedure allows craft personnel to place an assigned circuit out-of service from an in-service state. This procedure works in parallel with the CMU procedure that changes a circuit's state. Refer to Table 6.13 for the necessary procedures to perform the applicable out-of-service placement of circuits.

WARNING

*Hazardous voltages exist within the equipment cabinet. Be extremely careful when performing testing/troubleshooting procedures with the equipment panel(s) removed.*

Table 6.00 Tone Generator Test

TEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
1	Place maintenance test phone off-hook.	Dial tone returned.	
2	Dial the Diagnostic Test Access Code.	Recall dial tone returned.	
3	Dial 1 for tone generator test.	None.	
4 A	Dial 00 if all tones are to be tested and verify that all tones returned are undistorted.	All tones are returned in the sequence shown in Table 6.01 for two seconds each: test repeats until the maintenance test phone is placed on-hook or hook flashed.	If any tone(s) is returned distorted retry test two more times. If distortion continues, replace the SMXTG PCB. Note that the first 16 tones are hardware interrupted. If continuous tones are returned, replace the SMXTG PCB.
4B	Dial the individual test number shown in Table 6.01 if a particular tone is to be tested.	Chosen tone returned until maintenance test phone is placed on-hook or hook-flashed.	If chosen tone is returned distorted, retry test two more times. If distortion continues, replace the SMXTG PCB.
5 A	If additional tests or procedures are to be performed, hook-flash the maintenance test phone and dial the next code (Diagnostic Test Access Code is not redialed).	Recall dial tone is returned.	
5B	If no additional tests or procedures are to be performed, place the maintenance test phone on-hook.	None.	

Table 6.01 Tone Generator Test Numbers

TEST NUMBER	TONE
00	Circular Sequence
01	DTMF-1 (697Hz + 1209Hz)
02	DTMF-2 (697Hz + 1336Hz)
03	DTMF-3 (697Hz + 1477Hz)
04	DTMF-4 (770Hz + 1209Hz)
05	DTMF-5 (770Hz + 1336Hz)
06	DTMF-6 (770Hz + 1477Hz)
07	DTMF-7 (852Hz + 1209Hz)
08	DTMF-8 (852Hz + 1336Hz)
09	DTMF-9 (852Hz + 1477Hz)
10	DTMF-0 (941Hz + 1336Hz)
11	DTMF* (941Hz + 1209Hz)
12	DTMF# (941Hz + 1477Hz)
13	DTMF-A (697Hz + 1633Hz)
14	DTMF-B (770Hz + 1633Hz)
15	DTMF-C (852Hz + 1633Hz)
16	DTMF-D (941Hz + 1633Hz)
17	Dial Tone (350Hz + 440Hz)
18	Busy Tone (480Hz + 620 Hz)
19	Reorder Tone (Fast Busy Tone)
20	Test Tone (1004Hz @ -16dBm)
21	Low Tone (440Hz)
22	Audible Ring (440Hz + 480Hz - uninterrupted)
23	Intercept Tone (440Hz + 620Hz)
24	LDN Call Identification Tone (400 Hz + 480 Hz - interrupted)
25	Called Party Tone (2100 Hz - uninterrupted)
26	Remote Hold Recall Identification Tone (400 Hz)
27	Quiet Tone

Table 6.02 DTMF Receiver Test

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
1	Place maintenance test phone off-hook.	Dial tone is returned.	If busy tone is returned, the DTMF receiver circuit is busy. Retry later. If intercept tone is returned, the DTMF receiver circuit is not assigned (check data base assignment).  If intercept tone is returned at any time, either the DTMF receiver or the maintenance phone's key-pad is not operating properly, or the buttons were depressed in the wrong sequence. Retry test with another DTMF phone. If intercept tone is returned again, replace the DTMF receiver circuit.
2	Dial the Diagnostic Test Access Code.	Recall dial tone is returned.	
3	Dial # for DTMF receiver test.	None.	
4	Dial the four-digit PEN number of the DTMF receiver circuit to be tested.	Dial tone returned and the associated DTMF receiver circuit LED in the DTMF PCB is lit steadily.	
5	Depress the maintenance test phone keypad's buttons in the following sequence.  a) For 12-button phones: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, *and #.  b) For 16-button phones: A, B, C, D, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, *, and #.	Test tone (1004Hz at -16dBm) returned.	
6A	If additional tests or procedures are to be performed, hook-flash maintenance test phone and dial the next code (Diagnostic Test Access Code is not redialed).	Recall dial tone is returned and the associated DTMF receiver circuit LED in the DTMF PCB is extinguished.	
6B	If no additional tests or procedures are to be performed, place the maintenance test phone on-hook.	The associated DTMF receiver circuit LED in the DTMF PCB is extinguished.	

Table 6.03 Station Line Test

<p>NOTES: 1) If the system option flag TSTDIAG has been enabled in the data base or the station under test is classmarked with the TSTAPP feature, the maintenance test phone is not required to enable or disable the Apparatus Diagnostic Test routines; therefore, perform only steps 5 through 10.</p> <p>2) If the system option flag TSTDIAG has been disabled in the data base or the station under test is not classmarked with the TSTAPP feature, the maintenance test phone is required to enable or disable the Apparatus Diagnostic Test routines; therefore, perform the entire procedure (steps 1 through 11).</p>			
STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
1	Place maintenance test phone off-hook.	Dial tone is returned.	
2	Dial the Diagnostic Test Access Code.	Recall dial tone is returned.	
3	Dial 3 to enable the Apparatus tests.	Confirmation tone is returned.	
4	Place the maintenance test phone on-hook.	None.	
5	Place the station under test off-hook.	Dial tone is returned	
6	Dial the Test-Station Line Access Code.	Confirmation tone is returned.	

Table 6.03 Station Line Test (Continued)

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
7	Place station under test on-hook.	Ringing returned.	If ringing is not heard, switch the station instrument to determine if it is defective. If ringing is still not heard, replace the associated subscriber line PCB.
8	Pick up handset to answer test call.		
9	Verify that the test tone level is correct by using a TMS.	Test tone (1004Hz @ -1GdBm) is returned.	If the returned test tone level is weak, swap the instrument to determine if it is defective. If the test tone level increases considerably, replace the station instrument. If test tone level remains weak, replace the associated subscriber line PCB (SLMA, SLA16 or SLMD).
10	Place station under test on-hook.	None.	
11	If no additional Test routines are to be performed, proceed as follows:  Place maintenance test phone off-hook.	Dial tone is returned.	
	Dial the Diagnostic Test Access Code	Recall dial done is returned,	
	Dial 2 to disable test routine.	None.	
	Place maintenance phone on-hook.	None.	

Table 6.04 DTMF Fad Test

<p>NOTES: 1) If the system option flag TSTDIAG has been enabled in the data base or the station under test is classmarked with the TSTAPP feature, the maintenance test phone is not required to enable or disable the Apparatus Test routines; therefore, perform only steps 5 through 8.</p> <p>2) If the system option flag TSTDIAG has been disabled in the data base or the station under test is not classmarked with the TSTAPP feature, the maintenance test phone is required to enable or disable the Apparatus Test routines; therefore, perform the entire procedure (steps 1 through 9).</p>			
STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
1	Place maintenance test phone off-hook.	Dial tone is returned.	
2	Dial the Diagnostic Test Access Code.	Recall dial tone is returned.	
3	Dial 3 to enable the tests.	Confirmation tone returned.	
4	Place maintenance test phone on-hook.	None.	
5	Place DTMF station under test off-hook.	Dial tone returned.	
6	Dial the Test DTMF Pad Access Code.	Recall dial tone is returned.	

Table 6.04 DTMF Pad Test

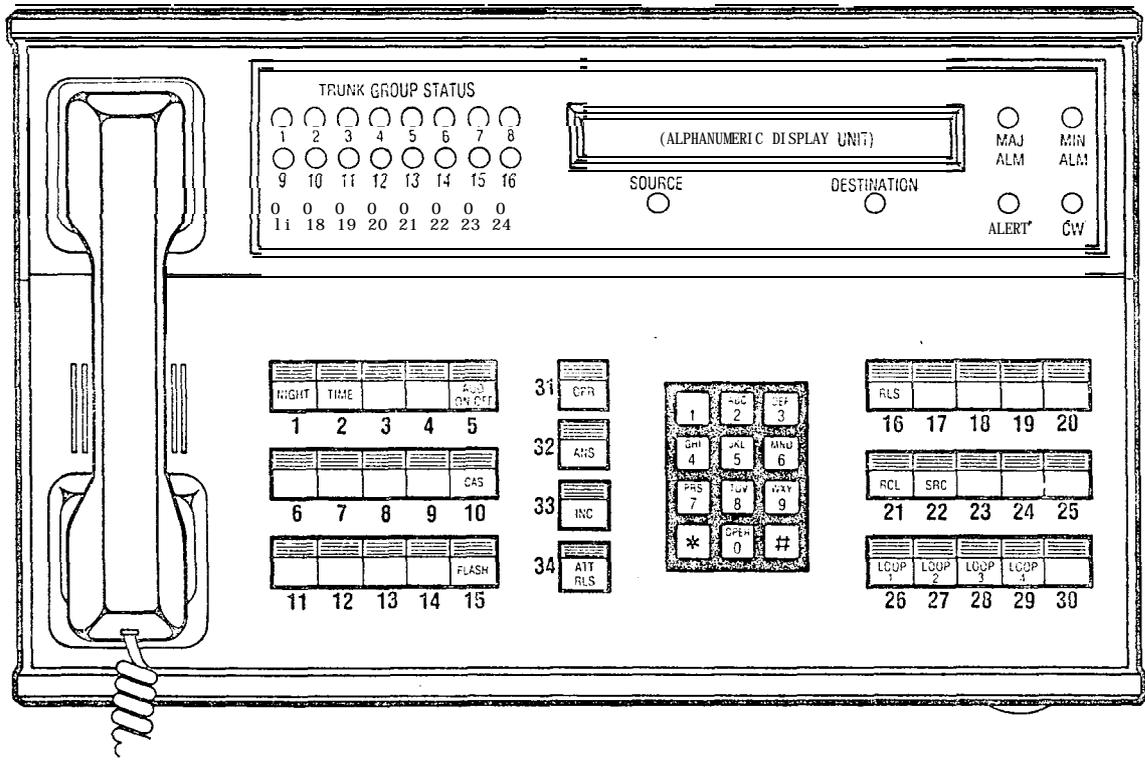
STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
7	Depress the DTMF keypad buttons in the following sequence:  For 12-button phones: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, * and #.  For 16-button phones: A, B, C, D, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, * and #.	Recall dial tone ceases. After all the DTMF keypad buttons are depressed in the sequence indicated, test tone (1004Hz @ -16dBm) is returned for one minute.	If busy tone is returned at any time, either the DTMF key pad buttons were depressed in the wrong sequence, the DTMF keypad of the station under test is defective or the subscriber line circuit is defective.  To locate failure, retry test to verify that the keypad buttons were not depressed out of sequence. If problem persists, swap the station instrument to determine if it is defective. If problem remains, replace the appropriate subscriber line PCB.
8	Verify the level of test tone by using a TMS.		If the measured test tone is correct but is weak, replace the station set. If the measured tone is low, replace the subscriber line PCB SLMA or SLA16).
9	Place DTMF station under test on-hook to terminate test.	None.	
10	If no additional apparatus tests are to be performed, proceed as follows:  Place maintenance test phone off-hook.  Dial the Diagnostic Test Access Code.  Dial 2 to disable the Apparatus Tests.  Place maintenance test phone on-hook.	Dial tone is returned.  Recall dial tone is returned.  None.  None.	

Table 6.05 Console Test

<p>NOTES: 1) If the system option flag TSTDIAG has been enabled in the data base, the maintenance test phone is not required to enable and disable the Apparatus Test routines; therefore, perform only steps 5 through 9.</p> <p>2) If the system option flag TSTDIAG has been disabled in the data base, the maintenance test phone is required to enable and disable the Apparatus Test routines; therefore, perform the entire procedure (steps 1 through 10).</p>			
STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
1	Place maintenance test phone off-hook.	Dial tone is returned.	
2	Dial the Diagnostic Test Access Code.	Recall dial tone is returned.	
3	Dial 3 to enable the Apparatus Tests.	Confirmation tone is returned.	
4	Place maintenance test phone on-hook.	None.	
5	At the Console under test dial the Attendant Console Test access code when the console is in an idle state.	Recall dial tone is returned. Also the access code is displayed momentarily, then the display changes to CONSOLE TEST and all button LEDs are extinguished.	If reorder tone is returned, the Attendant Console Test routine is in use, retry later.

Table 6.05 Console Test (Continued)

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED ✓
6	Depress the console's keypad buttons in the following sequence: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, ★ and #.	All digits dialed are displayed (accumulate).	
7	Depress the console's feature buttons in the sequence shown in Figure 6.19.	Each button LED lights when depressed and extinguishes when the next key is depressed.	If proper verification is not obtained or busy tone is returned at any time, the keypad buttons or console buttons were depressed out of sequence, the console is defective, or PIMD circuit is defective. To isolate the failure, retry test to verify that the buttons were not depressed out of sequence.
a	After the last button in the sequence is depressed, depress any console button to initiate the display test. The display can be suspended by depressing any key on the console and resumed in the same manner.	<p>Groups of eight of each of the displayable characters are scrolled in the sequence shown in Table 6.06. After the last character is displayed (under score character), the display unit is cleared and the following LEDs momentarily light then extinguish in the following sequence:</p> <ul style="list-style-type: none"> <li>a) TRUNK GROUP STATUS 1 - 24</li> <li>b) SOURCE</li> <li>c) DESTINATION</li> <li>d) ALERT</li> <li>e) CW</li> <li>f) MAJ ALM</li> <li>g) MIN ALM</li> </ul> <p>After the above indications are completed the following indications occur:</p> <p>Ringback tone is returned.</p> <p>All LEDs on the display assembly flash..</p> <p>After the above indications are completed the following indications occur:</p> <p>Ringback tone is returned.</p> <p>All LEDs on the display assembly flash.</p> <p>The audible alerting device sounds at intervals.</p> <p>REMOVE HANDSET is displayed.</p>	If proper verification is not obtained or busy tone is returned again, replace associated PIMD PCB to verify whether the PIMD circuit or the console is defective. If proper verification is obtained, replace the associated PIMD PCB. If proper verification is not obtained or busy tone is returned again, replace the console.
9	Remove and reinsert handset assembly to terminate test, or wait 30 seconds for test timeout.	INSERT HANDSET is displayed while handset is removed. After handset is reinserted, console returns to normal operation.	
10	<p>If no additional apparatus tests are to be performed, proceed as follows:</p> <p>Place maintenance test phone off-hook.</p> <p>Dial the Diagnostic Test Access Code.</p> <p>Dial 2 to disable the Apparatus Tests.</p> <p>Place maintenance test phone on-hook.</p>	<p>Dial tone is returned.</p> <p>Recall dial tone is returned.</p> <p>None.</p> <p>None.</p>	



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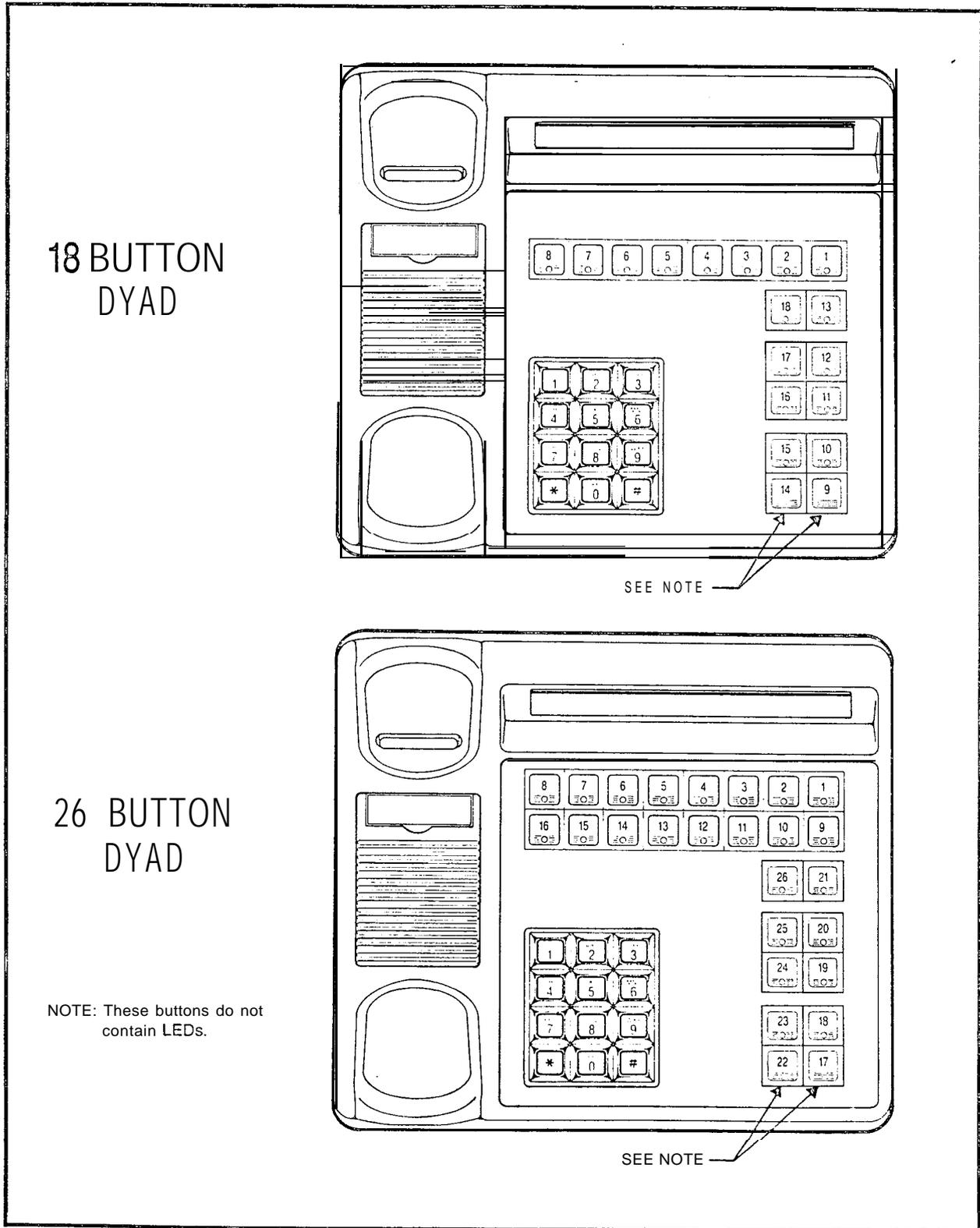
Figure 6.19 Attendant Console Keypad and Feature Button Depression Sequence

Table 6.06 Attendant Console Displayable Characters

ORDER	CHARACTER	ORDER	CHARACTER
1.	!	3	A
2.	"	34	B
3.	#	35.	c
4.	\$	36.	D
5.	%	37.	E
6.	&	38	F
7.		39	G
8.	)	40:	H
9.	)	41.	I
10.	⊖	42.	J
11.	+	43.	K
12.	,	44.	L
13.	-	45.	M
14.	.	46.	N
15.	/	47.	0
16.	0	48.	P
17.	1	49.	Q
18.	2	50.	R
19.	3	51.	s
21.	4	52.	T
22.	55555555 66666666	53.	v v v v v v v v u u u u u u u u
23:	7 7 7 7 7 7 7 7	55.	w w w w w w w w
24.	8 8 8 8 8 8 8 8	57.	x x x x x x x x
25.	9 9 9 9 9 9 9 9	58.	Y Y Y Y Y Y Y Y
26.	:	59:	Z Z Z Z Z Z Z Z
27.	;	60.	{ { { { { { { {
28.	<	61.	
29:	=	62.	A A A A A A A A
31.	>	63.	— — — — — — — —
32.	@ @ @ @ @ @ @ @		

Table 6.07 Siemens Digital Telephone - DVAD Button Test

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
<p>NOTES: 1) If the system option flag TSTDIAG has been enabled in the data base or the Siemens Digital Telephone under test is classmarked with TSTAPP feature, the maintenance test phone is not required to enable or disable the Apparatus Diagnostic routines; therefore, perform only steps 5 through 9.</p> <p>2) If the system option flag TSTDIAG has been disabled in the data base or the Siemens Digital Telephone under test is not classmarked with the TSTAPP feature, the maintenance test phone is required to enable or disable the Apparatus Diagnostic routine; therefore, perform the entire procedure (steps 1 through 10).</p>			
1	Place the maintenance test phone off-hook.	Dial tone is returned.	
2	Dial the Diagnostic Test Access Code.	Recall dial tone is returned.	
3	Dial 3 to enable the Apparatus Diagnostic Tests.	Confirmation tone is returned.	
4	Place maintenance test phone on-hook.	None.	
5	Place Siemens DVAD Telephone off-hook.	Dial tone is returned.	
6	Dial the Siemens Digital Telephone Test Access Code.	Recall dial tone is returned.  The access code is momentarily displayed, then the display unit and button LEDs are extinguished.	If reorder tone is returned, the Siemens DVAD Telephone Button Test is in use, try later.
7	Depress the Siemens DVAD Telephone keypad buttons as follows: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, *, #.		If proper verification is not obtained or busy tone is returned at any time, either the keypad buttons or feature buttons were depressed out of sequence, the DVAD Telephone is defective, or the SLMD circuit is defective.
8	Depress the DVAD feature buttons in the sequence shown in Figure 6.20 and according to the Siemens DVAD Telephone model.	Button LEDs light when depressed and extinguish when the next button is depressed.  After the last button is depressed, the following indications occur:  Ringback tone is returned.  All button LEDs flash.  The audible alerting device sounds at intervals.  TEST COMPLETE is displayed.	To isolate the failure, retry test to verify that the buttons were not depressed out of sequence.  If proper verification is not obtained or busy tone is returned again, replace the Siemens DVAD Telephone under test with a known good DVAD Telephone and retry test. If proper verification is not obtained or busy tone is returned again, replace the SLMD PCB.
9	Place Siemens DVAD Telephone under test on-hook to terminate test.	Siemens DVAD Telephone returns to normal operation.	
10	If no additional Apparatus Diagnostic Test routines are to be performed, proceed as follows:  Place maintenance test phone off-hook.  Dial the Diagnostic Test Access code.  Dial 2 to disable the Apparatus Diagnostic Test.  Place maintenance test phone on-hook. None.	Dial tone is returned.  Recall dial tone is returned.  None.  None.	

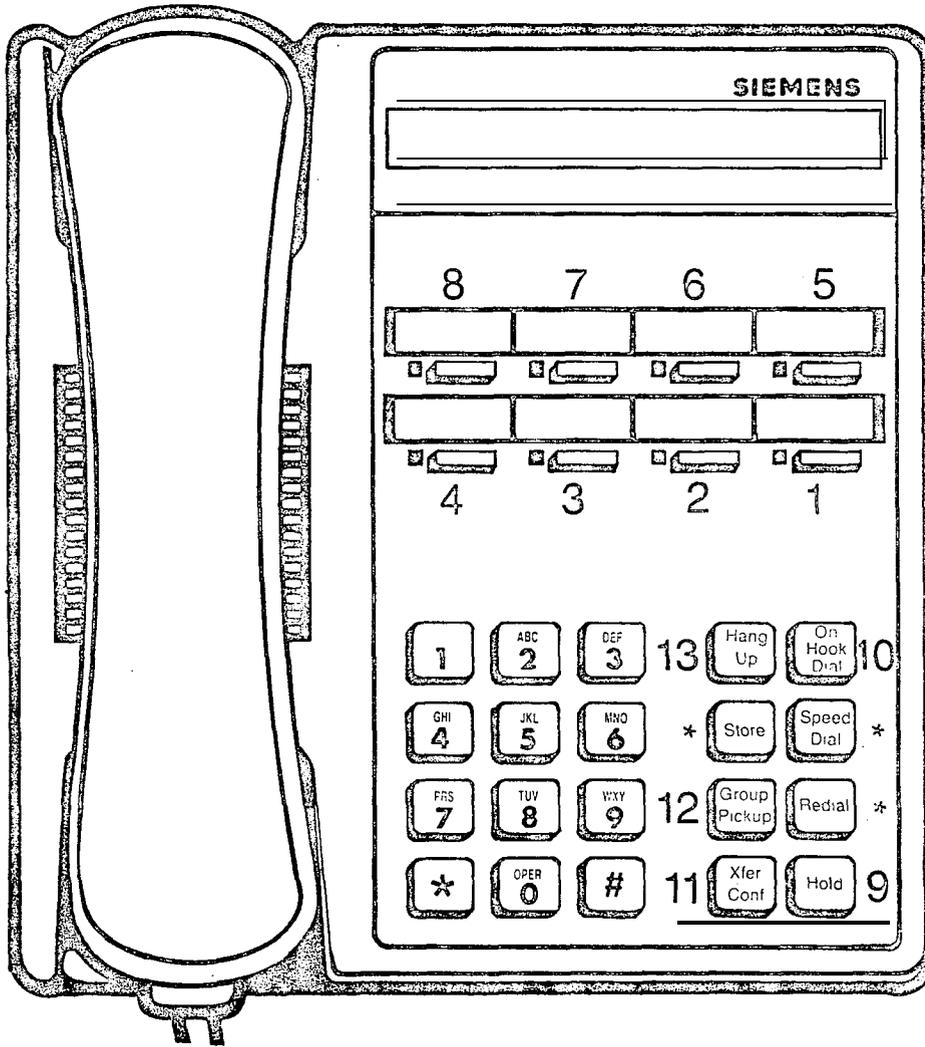


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Figure 6.20 Siemens DYAD Telephone Button Depression Sequence

**Table 6.06 Siemens Digital Telephone - JR-DYAD Button Test**

NOTES: 1) If the system option flag TSTDIAG has been enabled in the data base or the Siemens Digital Telephone under test is classmarked with TSTAPP feature, the maintenance test phone is not required to enable or disable the Apparatus Diagnostic routines; therefore, perform only steps 5 through 9.			
2) If the system option flag TSTDIAG has been disabled in the data base or the Siemens Digital Telephone under test is not classmarked with the TSTAPP feature, the maintenance test phone is required to enable or disable the Apparatus Diagnostic routines; therefore, perform the entire procedure (steps 1 through 10).			
STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
1	Place the maintenance test phone off-hook.	Dial tone is returned.	
2	Dial the Diagnostic Test Access Code.	Recall dial tone is returned.	
3	Dial 3 to enable the Apparatus Diagnostic Tests,	Confirmation tone is returned.	
4	Place maintenance test phone on-hook.	None.	
5	Place JR-DYAD Telephone off-hook.	Dial tone is rereported.	
6	Dial the Siemens Digital Telephone Test Access Code.	Recall dial tone is returned.	If reorder tone is returned, the Siemens JR-DYAD Telephone Button Test is in use, try later.
7	Depress the Siemens JR-DYAD Telephone keypad buttons as follows: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, *, #.		If proper verification is not obtained or busy tone is returned at any time, either the keypad buttons or feature buttons were depressed out of sequence, the JR-DYAD Telephone is defective, or the SLMD circuit is defective. To isolate the failure, retry test to verify that the buttons were not depressed out of sequence.
8	Depress the JR-DYAD feature buttons in the sequence shown in Figure 6.21.	Button LEDs light when depressed and extinguish when the next button is depressed.  After the last button is depressed, the following indications occur:  Ringback tone is returned.  All button LEDs flash.  The audible alerting device sounds at intervals.	If proper verification is not obtained or busy tone is returned again, replace the Siemens JR-DYAD Telephone under test with a known good JR-DYAD Telephone and retry test. If proper verification is not obtained or busy tone is returned again, the SLMD circuit is defective and the SLMD PCB requires replacement.
9	Place Siemens JR-DYAD Telephone under test on-hook to terminate test.	Siemens JR-DYAD Telephone returns to normal operation.	
10	If no additional Apparatus Diagnostic Test routines are to be performed, proceed as follows:  Place maintenance test phone off-hook.  Dial the Diagnostic Test Access code.  Dial 2 to disable the Apparatus Diagnostic Test.  Place maintenance test phone on-hook.	Dial tone is returned.  Recall dial tone is returned.  None.  None.	



NOTES:  
 \* These feature buttons are not testable.  
 Buttons 9 through 13 do not contain LEDs.

Figure 6.21 Siemens JR-DYAD Telephone Button Depression Sequence

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**Table 6.09 Siemens Digital Telephone -DYAD Display Test**

NOTES: 1) If the system option flag TSTDIAG has been enabled in the data base or the Siemens Digital Telephone under test is classmarked with TSTAPP feature, the maintenance test phone is not required to enable or disable the Apparatus Diagnostic routines; therefore, perform only steps 5 through 9.			
2) If the system option flag TSTDIAG has been disabled in the data base or the Siemens Digital Telephone under test is not classmarked with the TSTAPP feature, the maintenance test phone is required to enable or disable the Apparatus Diagnostic routines; therefore, perform the entire procedure (steps 1 through 10).			
STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
1	Place maintenance test phone Dial off-hook.	Dial tone is returned.	
2	Dial the Diagnostic Test Access Code.	Recall dial tone is returned.	
3	Dial 3 to enable the Apparatus Diagnostic test.	Confirmation tone is returned.	
4	Place maintenance test phone on-hook.	None.	
5	Place the Siemens Digital Telephone under test off-hook.	Dial tone returned.	
6	Dial the Siemens Digital Telephone test access code.	Recall dial tone is returned. The ACCESS code is momentarily displayed, then the display unit clears.	If reorder tone is returned, the Siemens Digital Telephone Display Test is being used, retry later.
7	Depress any button in the Siemens Digital Telephone under test to initiate test.  (Note: The display test can be suspended any time by depressing any button. The test can be resumed at any time in the same manner.)	Groups of 16 of each of the displayable characters are scrolled in the sequence shown in Table 6.09. After the last character (underscore) is displayed the following occurs:  Ringback tone is returned.  All button LEDs flash and the audible alerting device sounds at intervals.  TEST COMPLETE is displayed.	If verification is not obtained, either the Siemens Digital Telephone or the SLMD circuit is defective. Replace Siemens Digital Telephone with a good one and retry test. If verification is obtained, replace the Siemens Digital Telephone.  If verification is still not obtained, replace the SLMD PCS.
8	Place Siemens Digital Telephone on-hook to terminate test or wait 30 seconds for test timeout.		
9	If no additional Apparatus Diagnostic Tests are to be performed, proceed as follows:  Place maintenance test phone Dial off-hook.  Dial the Diagnostic Test Access Code. Recall dial tone returned.  Dial 2 to disable the Apparatus Diagnostic Test.  Place maintenance test phone on-hook.	Dial tone returned.  Recall dial tone is returned  None.  None.	



Table 6.11 Outgoing Trunk Test

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
1	Place maintenance test phone off-hook.	Dial tone is returned.	
2	Dial the Diagnostic Test Access Code.	Recall dial tone is returned.	
3	Dial 2 to enable trunk test.	None.	
4	Dial the two-digit trunk group number (00 through 31) containing the trunk circuit to be tested.	None.	
5	Dial the two-digit trunk number (00 - 99) of the trunk circuit to be tested.	CO or PABX dial tone is returned. Also, the associated trunk circuit LED on the trunk PCB is lit steadily to indicate the trunk has been seized outgoing.	<p>If reorder tone is returned, the selected trunk circuit is either an incoming-type, invalid, or not assigned (check data base assignments).</p> <p>If busy tone is returned, the selected trunk is in use, retry later.</p> <p>If CO or PABX dial tone is not returned, verify trunk MDF cross-connections and attempt to access CO/PABX trunk using a butt set. If the trunk is working properly replace the trunk PCB under test and retry test.</p>
6	For CO-type trunks (i.e., TMBM PCB), dial the test tone number provided by the local phone company.	Test tone (1004Hz) is returned	
7	Verify that the returned test tone level is correct, using a TMS.		<p>If the returned test tone level is weak, replace PCB with another having the same characteristics and retry test. If returned test tone level increases considerably, trunk PCB is defective and should be replaced. If the test tone level is still weak, contact CO repair service to verify trunk facility.</p>
8 A	If additional tests or procedures are to be performed, hook-flash the maintenance test phone and dial the next code (Diagnostic Test Access Code is not redialed).	Recall dial tone is returned.	
8 B	If no additional tests or procedures are to be performed, place the maintenance test phone on-hook.	None.	

Table 6.12 Placing Circuit(s) In-Service

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
1	Place maintenance test phone off-hook.	Dial tone is returned.	If reorder tone is returned, the selected circuit is invalid or unassigned. Check data base assignments.  If reorder tone is returned the selected PCB is invalid or unassigned. Check data base assignments.
2	Dial the Diagnostic Test Access Code.	Recall dial tone is returned.	
3	Dial 7 for placing a circuit in-service.	None.	
4A	If a single circuit is to be placed in-service, dial the four digit PEN number of the circuit.	Confirmation tone is returned.	
4B	If all the circuits in a PCB are to be placed in-service, dial the first three digits of the PEN number for the PCB followed by digit 8. For an SLA16, dial the first three digits of the PEN number associated with the first eight circuits followed by an 8, then dial the first three digits of the associated PEN number for the second eight circuits (W,X,Y+1) followed by an 8.	Confirmation tone is returned.	
5 A	If additional tests or procedures are to be performed, hook-flash the maintenance test phone and dial the next code (Diagnostic Test Access Code is not redialed).	Recall dial tone is returned.	
5B	If no additional tests or procedures are to be performed, place the maintenance test phone on-hook.	None.	

Table 6.73 Taking Circuit(s) Out-of-Service

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
1	Place maintenance test phone off-hook.	Dial tone is returned.	If reorder tone is returned, the selected circuit is invalid or unassigned. Check data base assignments.  If reorder tone is returned the selected PCB is invalid or unassigned. Check data base assignments.
2	Dial the Diagnostic Test Access Code.	Recall dial tone is returned.	
3	Dial 8 for placing a circuit out-of-service.	None.	
4 A	If a single circuit is to be placed out-of-service, dial the four digit PEN number of the circuit.	Confirmation tone is returned.	
4B	If all the circuits in a PCB are to be placed out-of-service dial the first three digits of the PEN number for the PCB followed by digit 8. For an SLA16, dial the first three digits of the PEN number associated with the first eight circuits followed by an 8, then dial the first three digits of the associated PEN number for the second eight circuits (W,X,Y+1) followed by an 8.	Confirmation tone is returned.	

**Table 6.13 Taking Circuit(s) Out-of-Service (Continued)**

STEP	PROCEDURE	VERIFICATION	IF VERIFICATION IS NOT OBTAINED
5A	If additional tests or procedures are to be performed, hook-flash the maintenance test phone and dial the next code (Diagnostic Test Access Code is not redialed).	Recall dial tone is returned.	
5B	If no additional tests or procedures are to be performed place the maintenance test phone on-hook.	None. زنا	

## SECTION 7.00 INSTALLATION TEST PROCEDURES CHECKLIST

7.01 General. After performing the installation test procedures contained in this practice, each installation test procedure performed should be recorded to ensure that all tests

have been completed satisfactorily. Use Table 7.00, Installation Test Procedures Checklist, for this purpose. This table can be used as a sign-off sheet, if required.

Table 7.00 Installation Test Procedures Checklist

NO.	TEST PROCEDURE	CHECK	REFERENCE
1	SYSTEM GROUND TEST		TABLE 3.00
2	SHELF GROUND CONTINUITY TEST		TABLE 3.01
3	POWER-UP/OUTPUT VOLTAGE TEST		TABLE 4.00
4	STONE GENERATOR TEST		TABLE 6.00
5	DTMF RECEIVER TEST		TABLE 6.02
6	STATION LINE TEST		TABLE 6.03
7	DTMF PAD TEST		TABLE 6.04
8	CONSOLE TEST		TABLE 6.05
9	SIEMENS DIGITAL TELEPHONE -DYAD BUTTON TEST		TABLE 6.07
9A	SIEMENS DIGITAL TELEPHONE - JR-DYAD BUTTON TEST		TABLE 6.08
10	SIEMENS DIGITAL TELEPHONE - DYAD DISPLAY TEST		TABLE 6.09
11	OUTGOING TRUNK TEST		TABLE 6.10
12	CUSTOMER SPECIFIC FEATURE TEST		(NOT APPLICABLE)