

**Audio Information Exchange
(AUDIX) Voice Mail System
Release 1 Version 7
Maintenance for Tier III**

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Contents

About This Document	xv
INTENDED AUDIENCES	xv
PREREQUISITE SKILLS OR KNOWLEDGE	xv
HOW THIS DOCUMENT IS ORGANIZED	xv
Chapters 1 and 2: Introduction and Orientation	xv
Chapters 3 through 5: Basic Troubleshooting	xvi
Chapter 6: Disk Drives	xvi
Chapter 7: Power and Environment	xvi
Chapter 8: Terminal Setup and Use	xvi
Chapter 9: Adding New Hardware	xvi
Chapter 10: File Redundancy Alarms	xvi
Chapter 11: Control Mode	xvii
Chapter 12: Initialization Debugging	xvii
Chapter 13: Buses and Backplane	xvii
Chapter 14: Software Troubleshooting	xvii
Chapter 15: Filesystem Restoration	xvii
Chapter 16: Feature Troubleshooting	xvii
Appendices A, B, and C: Reference	xvii
TRADEMARKS AND SERVICE MARKS	xviii
CHANGES IN THIS ISSUE	xix
RELATED RESOURCES	xix
HOW TO MAKE COMMENTS ABOUT THIS DOCUMENT	xx
 1. Introduction	 1-1
GENERAL RULES	1-1
TOOLS AND AIDS	1-2
RELATED DOCUMENTS	1-3

2. Orientation	2-1
PHYSICAL DESCRIPTION	2-1
AUDIX Large (or AUDIX-L)	2-1
One-Cabinet AUDIX (formerly AUDIX-S)	2-2
Two-Cabinet AUDIX	2-2
Administration and Maintenance Forms	2-2
AUDIX Hardware	2-3
ROUTINE MAINTENANCE	2-14
Air Filter	2-14
Battery Reserve	2-14
Cartridge-Handling Procedures	2-14
Environment	2-15
Fans	2-15
Check for Current Filesystem Backups	2-16
FAULT DIAGNOSIS	2-17
Visual Inspection	2-17
Check Alarm, Error, Administrator, and Activity Logs	2-18
Block Service	2-19
Shut Down Software	2-19
Power Down and Replace Hardware	2-20
Initialize the System	2-20
Equipping Devices	2-21
BEFORE LEAVING THE SITE	2-22
 3. Start Troubleshooting	 3-1
TROUBLESHOOTING SUMMARY	3-1
CONTROL MODE/VISUAL INSPECTION CHECKLIST	3-3
INITIAL DIAGNOSIS	3-5
Is AUDIX Taking Calls?	3-5
Is AUDIX Software Running?	3-6
Are There Active Alarms?	3-6
Are There Customer Complaints?	3-7
SOLVING ACTIVE ALARMS	3-8

Active Alarm Resolution	3-8
Alarmable Units and Resolution Procedures	3-10
SOLVING CUSTOMER COMPLAINTS	3-13
Ringback But No Answer on a Voice Mailbox Call	3-14
Ringback But No Answer on a Call Answer Call	3-15
AUDIX Answers After Long Ringing	3-16
Bad or Noisy Connection	3-16
No, Wrong, or Garbled AUDIX Announcements	3-17
Garbled or Missing Unified Messages	3-18
Message-Waiting Lamp Problems	3-18
Subscribers Hear “No Message to Play Back”	3-19
Subscribers Hear “No Room in Your Mailbox”	3-19
Subscribers Hear Reorder Tone	3-20
Subscribers Get Faint or Silent Messages	3-20
Administrator is Unable to Add Subscribers	3-20
Network Messages Are Not Being Sent	3-21
An Integrated AUDIX Answers in Standalone Mode	3-21
Slow Response Time on Terminal	3-21
An Upgraded AUDIX Does not Transfer Calls	3-21
SOLVING UNALARMED PROBLEMS	3-23
No Alarms – System Not Running	3-23
No Alarms and Software Running	3-23
VERIFY GOOD SERVICE	3-28
4. Circuit Pack Faults	4-1
CIRCUIT PACK OVERVIEW	4-2
Resolving Alarms	4-4
Replacing Circuit Packs	4-5
TN366(B): ACC	4-6
Procedure A: General Replacement Steps	4-7
Procedure B: Resolving Connection Failures	4-8
Procedure C: Check Translations and Switch Facilities	4-8
Procedure D: Remote Update Failure	4-9

TN472C: DBP-CPU	4-10
Procedure A: General Replacement Steps	4-10
TN475(B): SADI	4-11
Procedure A: General Replacement Steps	4-11
SADI Diagnostic Tests	4-11
TN477 (TDBI-8) OR TN500 (TDBI)	4-12
Procedure A: General Replacement Steps	4-14
Procedure B: TDBI External HDLC (Loop-Around) Test	4-14
Procedure C: Complete TDBI Channel Test	4-15
Procedure D: TD-Bus Control Channel Test	4-15
Procedure E: Complete TD-Bus Test	4-15
TN501B: VPC	4-16
Procedure A: General Replacement Steps	4-28
Procedure B: VPC Short Test	4-29
Procedure C: Complete VPC Test	4-29
Procedure D: TD-Bus Control Channel Test	4-29
Procedure E: Complete TD-Bus Test	4-29
TN506B: BC	4-30
Procedure A: General Replacement Steps	4-30
TN511: MI	4-31
Procedure A: General Replacement Steps	4-31
TN520: VB	4-32
Procedure A: General Replacement Steps	4-33
Procedure B: VPC/TDBI Check	4-33
TN523 (OR TN591), TN716B, TN734 (OR TN761): PE	4-34
Procedure A: General Replacement Steps	4-35
TN716B: Bus Interface (PE-BI)	4-35
TN734 or TN761: Random Access Memory (FP-RAM or PE- RAM)	4-36
PE Software Load Threshold Alarms	4-37
Procedure A: Reduce Load and Report	4-37
TN532 OR TN540: DBP-RAM	4-38
Procedure A: General Replacement Steps	4-38
TN533: SCPI	4-39

Procedure A: General Replacement Steps	4-40
Procedure B: FSW Test	4-40
Procedure C: Restart System	4-41
Procedure D: Restart and FSW Test	4-41
TN539(B): ACCE	4-42
Procedure A: General Replacement Steps	4-42
Procedure B: Check Translations	4-42
TN547(B): MPSI	4-45
Procedure A: General Replacement Steps	4-45
Procedure B: Check System Configuration	4-45
TN714: TC	4-46
Procedure A: General Replacement Steps	4-46
Procedure B: TC Short Test	4-47
Procedure C: Complete TC Test	4-47
Procedure D: TD-Bus Control Channel Test	4-47
Procedure E: Complete TD-Bus Test	4-47
TN727: NC	4-48
Procedure A: General Replacement Steps	4-49
Procedure B: NC Short Test	4-49
Procedure C: NC Long Test	4-49
Procedure D: TD-Bus Reset	4-50
Procedure E: TD Bus Failed Clock	4-50
Procedure F: System Clock Reset	4-50
Procedure G: Boot Time File Problem	4-50
TN747B: VPT	4-51
Procedure A: General Replacement Steps	4-54
Procedure B: VPT Short Test	4-55
Procedure C: Complete VPT Test	4-55
Procedure D: TD-Bus Control Channel Test	4-56
Procedure E: Complete TD-Bus Test	4-56
UN160B: DBPI	4-57
Procedure A: Replace the DBPI	4-57
Procedure B: Check the M-Bus (PE) RAM	4-57
UN162: VSFI	4-58

Procedure A: General Replacement Steps	4-58
5. Data Link or Switch Problems	5-1
DATA LINK ALARMS	5-2
Procedure A: Data Link Tests	5-3
Procedure B: Interface Equipment Tests	5-5
Procedure C: Check the Link Translations	5-7
Procedure D: Check System Configuration	5-8
Procedure E: General Replacement Steps	5-8
SOFTWARE TRANSLATION ALARMS	5-9
Procedure A: Check Specific Port and Extension Translations	5-10
Procedure B: Check for Call Forwarding	5-11
Procedure C: Check for Translation Consistency	5-11
Procedure D: Check Switch Clock	5-12
DATA LINK HARDWARE	5-13
Check the IDI	5-13
Check the DSU	5-15
Check the LADS	5-16
Check the MPDM	5-17
Check the SCA	5-19
Check the 202T Modem	5-20
Check the Cabling to an ACP	5-23
SWITCH ADMINISTRATION	5-24
Switch Port Reliability	5-24
DCS Network Administration	5-25
6. Disk Drives	6-1
DISK DRIVE ALARM RESOLUTION	6-1
Procedure A: General Replacement Steps	6-2
Procedure B: Increase the Size of a Filesystem	6-4
Equip the New Disk or Cartridge	6-4

UNALARMED DISK DRIVE TROUBLESHOOTING	6-5
Check TN475B SADI LEDS	6-5
Check the Disk Drive LEDS	6-6
Check for Disk Crash	6-7
Check the Data and Power Cables	6-7
Check Drives Through Software	6-9
REPLACING AND INSTALLING DISK DRIVES	6-11
Replacing a Faulty Drive	6-12
Installing a Replacement Drive	6-15
Installing a New Disk Drive	6-16
JUMPER SETTINGS	6-18
RICOH Model RH5261 and RH5500 Drives	6-19
CDC Model 94161-155 Drive	6-20
CDC Model 94171-344 Drive	6-21
CDC Model 94191-766 (ST-4766N) Drive	6-23
HP Model 97536SX and Model 97548SX Drives	6-24
Hitachi Model DK515C Drive	6-25
MICROPOLIS Model 1375 Drive	6-25
MICROPOLIS Model 1578-15 Drive	6-27
MICROPOLIS Model 1588 Drive	6-28
MAXTOR Model 7120S	6-28
MAXTOR Model 4380S and Model XT-8760S Drives	6-30
NEC Model D5862 Drive	6-32
PRIAM Model 738 Drive	6-33
Seagate Model ST3283N Drive	6-34
Seagate Model ST1480N Drive	6-36
 7. Power and Environment	 7-1
ENVIRONMENTAL ALARM RESOLUTION	7-2
Procedure A: Fan or Over-Temperature Faults	7-2
Procedure B: Check the Batteries	7-3
Procedure C: Check the 5V Fuse	7-4
Procedure D: Battery Reserve Alarms	7-5

Procedure E: Batteries Charging	7-5
Procedure F: Check the Power Supply Voltages	7-6
Check or Replace the Air Filter	7-7
Replace a Fan or Fan Assembly	7-8
CONTROL MODE MENU ALARMS	7-10
FANALM: Temperature Differential	7-10
OPTALM: Over-Temperature	7-11
UNALARMED PROBLEMS	7-12
One Nonworking Fan	7-12
No Power	7-13
Check the CDR1B Alarm Board	7-13
Replace the AC Power Supply	7-17
Check AC Power Supply Strapping Options	7-22
ITT Power Supply	7-26
Replace the DC Power Supply	7-27
8. Terminal Setup and Use	8-1
DISPLAY TERMINAL TROUBLESHOOTING	8-1
Check the Power	8-1
Check the Terminal	8-1
Check the MI Connection	8-2
PRINTER TROUBLESHOOTING	8-3
DISPLAY TERMINAL AND PRINTER SETUP	8-3
LMT and RMT Cabling	8-3
OPTION SETTINGS	8-5
Display Terminal Option Settings	8-5
Modem Option Settings	8-7
Other Data Setups	8-9
Printer Option Settings	8-10
TERMINAL COMMANDS AND USE	8-11
Logging On and Off	8-11
Using the Printer	8-12
Displaying Screen Forms	8-13

Accessing and Using Forms	8-17
Programming Function Keys	8-19
9. Adding New Hardware	9-1
SWITCH PREREQUISITES	9-1
ADDING TN501B CIRCUIT PACKS ONLY	9-2
ADDING TN501B, TN747B, AND TN500 CIRCUIT PACKS	9-4
ADDING AN AUDIX EXPANSION CABINET	9-8
Required Tools	9-8
Inventory of Parts	9-8
Two-Cabinet Conversion Procedures	9-11
Assemble the System	9-12
Intercabinet Cabling	9-14
Complete the Assembly	9-20
Boot the System	9-21
Floor Mounting	9-23
Front Cabinet Plate Mounting	9-27
Two-Cabinet Conversion Troubleshooting	9-28
ADDING DC POWER	9-29
UPGRADE THE RICOH RH5261 TO A RICOH RH5500	9-42
10. Filesystem Problems	10-1
SOLVING FILE REDUNDANCY ALARMS	10-1
Procedure A: Master Filesystem Alarm Resolution	10-2
Procedure B: Slave Filesystem Alarm Resolution	10-2
RESTORING FILE REDUNDANCY FOR MULTIPLE FILESYSTEMS	10-3
DISTRIBUTING FILESYSTEMS	10-4

11. Control Mode	11-1
QUICK-REFERENCE PROCEDURE	11-2
CONTROL MODE/VISUAL INSPECTION CHECKLIST	11-3
Step 1: Verify You Are in Control Mode	11-5
Step 2: Record System Status (Option 1)	11-6
Step 3: Record Alarms (Option 2)	11-6
Step 4: Record Initialization History (Option 3)	11-7
Step 5: Visually Inspect Power Equipment	11-8
Step 6: Check Disk Drives	11-8
Step 7: Visually Inspect Circuit Pack LEDs	11-9
Control Mode Checklist Diagnosis	11-10
CONTROL MODE MENU OPTIONS	11-12
Option 1: System Status	11-12
Option 2: Active Alarms	11-15
Option 3: Initialization History	11-15
Option 4: Restart	11-15
Option 5: Reboot	11-15
Option 6: FP Restart and DBP Reboot	11-15
12. Initialization Debugging	12-1
Initialization Troubleshooting	12-1
Troubleshooting a Nonworking System	12-1
FP Reset	12-4
AUDIX Initialization in Progress	12-5
Standard Initialization? (y or n)	12-6
FP Self Tests Passed	12-6
VSP Self Tests Passed (Two-Cabinet Systems Only)	12-8
Interprocessor Communication Tests Passed	12-9
FP Configuration Results Display	12-10
S-Bus Access Test Passed	12-12
VSFI Access Test Passed	12-13
DBPI Initialization Passed	12-14
FP RAM Passed	12-15

VSP RAM Passed	12-16
DBP RAM Passed	12-17
DBP Initialization Results Display	12-18
DBP Initialization Passed	12-21
Attempting DBP Filesystem Boot	12-22
DBP Boot File Loaded	12-22
AUDIX Loader File Opened	12-23
AUDIX Loader File Loaded	12-24
Maintenance Interface Entering Normal Mode	12-25
Start Service	12-26
Initialization Overview	12-27
Terminal Commands	12-27
Start an Initialization	12-27
Stop an Initialization	12-28
Select Initialization Options	12-28
Monitor Hardware Initialization	12-31
Monitor LED Patterns	12-31
Monitor Software Initialization	12-32
 13. Buses And Backplane	 13-1
Bus Overview	13-2
DBP (VME) Bus Diagnosis	13-5
DBP-Bus Alarms	13-5
DBP-Bus Diagnosis	13-7
S-Bus Diagnosis	13-8
TD-Bus Diagnosis	13-9
TD-Bus Alarms	13-9
TD-Bus Board Back-Out Procedure	13-10
AUDIX Backplane	13-14
Backplane Layouts	13-14
Replacing Backplane Boards	13-20
Replacing the Backplane	13-21
Replacing Backplane Pins	13-21

14. Software	14-1
SDAT, ADAT, AND NDAT FILESYSTEM ALARMS	14-1
Procedure A: sdats Backup Alarm Resolution	14-2
Procedure B: Names Backup Alarm Resolution	14-3
Procedure C: Announcement Filesystem Alarm Resolution	14-4
Procedure D: Names Filesystem Alarm Resolution	14-5
SOFTWARE TROUBLESHOOTING	14-6
Solving Unalarmed Initialization Problems	14-9
SOLVING DISK SPACE PROBLEMS	14-16
Managing Disk Space	14-16
Locating Space Problems	14-17
Solving Threshold Violations	14-17
Increasing Filesystem Size	14-18
Using the system : limits Form	14-18
CREATING AND COPYING FILESYSTEMS	14-20
Using the filesystem : detail Form	14-20
Naming Conventions	14-21
Backing Up (Copying) Filesystems	14-23
Using the filesystem : copy Form	14-24
Using the filesystem : update configuration Form	14-25
Copying Files	14-25
Mounting Filesystems	14-27
 15. Restoring Filesystems	 15-1
RESTORING A DISK	15-2
Restoring Disk00	15-3
Recommended Filesystem Distribution	15-4
RESTORING A FILESYSTEM	15-7
Restoring the adat Filesystem	15-7
Restoring the boot Filesystem	15-8
Restoring the ndat Filesystem	15-9
Restoring the sdats Filesystem	15-10
Restoring the sst Filesystem	15-12

Restoring the vdat Filesystem	15-13
Restoring vtext Filesystems	15-14
Wrong Number of Active vtext Filesystems	15-15
RUNNING AUDITS	15-16
Audits Description	15-16
General Audit Procedure	15-18
 16. Feature Troubleshooting	 16-1
AUTOMATED ATTENDANT	16-2
OUTCALLING	16-4
ADMINISTRATIVE LOG ENTRIES	16-5
STANDALONE MAINTENANCE	16-6
Blocking/Restoring Service in a Standalone System	16-6
Making Test Calls in a Standalone System	16-6
Busying Out Ports	16-6
Other Standalone Considerations	16-7
NETWORK AND CALL DETAIL RECORDING FAULTS	16-9
AUDIX NETWORK TROUBLESHOOTING	16-10
Administrator Log	16-10
Local Connection Test	16-10
Remote Connection Test	16-14
Test the Local Modem Pool	16-14
Modem Pool Option Settings and Configurations	16-15
TESTING THE AMIS ANALOG NETWORK	16-21
 A. Basic Procedures	 A-1
BLOCK/RESTORE SERVICE	A-1
Block Service (Busy-Out or Shutdown)	A-1
Restore Service (Release or Reboot)	A-4
MI TOGGLE SWITCH (MODES AND USE)	A-5
Using the MI Toggle Switch	A-5
MI Toggle Switch Equivalents	A-6

MI Toggle Switch and LEDs	A-6
MI Board Alarm Panel	A-7
MI Board and System Modes	A-9
MI Board Terminal Connectors	A-9
RCD CARTRIDGE HANDLING	A-10
Cartridge-Handling Procedures	A-10
RCD Faceplate Design	A-11
RCD Spin-Up/Spin-Down Behavior	A-12
Changing RCD Cartridges	A-13
REMOVE COVER PLATES	A-15
Removing the Front Cover	A-15
Removing the Lower Front Cover Plate	A-16
Removing the Rear Cover Plates	A-17
RESTART OR REBOOT THE SYSTEM	A-20
Restarts	A-20
Reboots	A-20
SHUT DOWN THE SOFTWARE	A-21
Shutdown Using a Form (Remote and Local)	A-21
Shutdown Using The MI Toggle Switch (Local Only)	A-23
VISUAL INSPECTION	A-23
Circuit Pack LEDs	A-23
SADI Diagnostic Tests	A-28
Cable Connections	A-28
Lower Front Panel	A-30
ALARM AND ERROR LOGS (DISPLAY AND USE)	A-31
Alarm Log	A-31
Error Log	A-32
VPT (VOICE PORT) TEST CALLS	A-34
 B. Error And Alarm Tables	 B-1
S-BUS PROCESSOR FSW	B-1
ERROR CODE DESCRIPTIONS	B-3
ADMINISTRATION LOG	B-23

AUDIX SOFTWARE TABLES	B-25
Software Modules	B-25
Software Sessions	B-26
 C. Equipment and References	C-1
CIRCUIT PACKS	C-1
COMPONENT ORDERING TABLES	C-4
REFERENCES	C-14
AUDIX Documentation	C-14
AUDIX Technical Documentation	C-14
Switch Documentation	C-15
 D. Remote Access to the DBP Utilities	D-1
PHYSICAL CONNECTIONS	D-1
DBP ACCESS	D-2
Remote Maintenance Terminal	D-2
DBP Monitor	D-3
THE DBPUTIL UTILITY	D-4
Disk Manipulation Commands	D-4
Filesystem Manipulation Commands	D-5
File Manipulation Commands	D-5
THE SCSITEST UTILITY	D-6
General DBP Command Set	D-6
Disk Drive Commands	D-7
INSTRUCTION CODES AND RETURN CODES	D-8
DBP Instruction Codes	D-8
DBP Return Codes	D-12

E. Remote Access to the SADI Monitor	E-1
REMOTE SADI MONITOR INSTALLATION	E-2
SADI OVERVIEW	E-3
SADI LED Indicators	E-3
SADI Diagnostics Performed After a Reset	E-3
SADI ERROR INTERPRETATION	E-4
DBP Errors	E-4
SADI Errors	E-4
SADI MONITOR CONVENTIONS	E-5
SADI MONITOR COMMANDS	E-6
ddev	E-7
derrlog	E-8
deverr	E-9
inquiry	E-10
pdms	E-11
rddev	E-12
rdmem	E-13
reset	E-14
scsi	E-15
trace	E-16
wtdev	E-18
wtmem	E-19
SADI MONITOR Device Error Log	E-20
 F. Remote Access to ACCE Trace Information	 F-1
FEATURE OVERVIEW	F-1
CAPTURING AND DISPLAYING TRACE INFORMATION	F-1
FP Memory Retention	F-1
ACCE Trace Forms Interface	F-2

G. Enhanced Activity Trace and Activity Log	G-1
BACKGROUND	G-1
ACTIVITY LOG	G-2
Overview	G-2
Find the Activity Log Entries (Maximum)	G-2
Increase the Size of the “ss” Filesystem	G-3
Activate the Activity Log	G-3
Activity Log Messages	G-3
Example Activities	G-7
system : activity log : specification	G-8
system : activity log : display	G-9
ENHANCED ACTIVITY TRACE	G-10
Allocate Disk Space	G-10
Error Filtering Array	G-11
Activate the Trace	G-12
Displaying the Data	G-12
Review Disk Space Allocation	G-16
Error Descriptions	G-16
Enhancements to the Activity Log	G-20
 H. INADS-Only Screens	 H-1
ADMINISTRATION FORMS	H-1
system : cdr	H-1
system : feature control	H-1
MAINTENANCE FORMS	H-1
maintenance : acce trace : display	H-1
maintenance : acce trace : specification	H-2
maintenance : dbp : equip	H-3
maintenance : link log : display	H-3
maintenance : link log : specification	H-3

Abbreviations		AB-1
Glossary		GL-1
Index		IN-1

LIST OF FIGURES

Figure 2-1. AUDIX Connector Panel (Rear View)	2-4
Figure 2-2. AUDIX Cable Connectors (Expansion Cabinet)	2-6
Figure 2-3. One-Cabinet AUDIX System (Front View)	2-10
Figure 2-4. Two-Cabinet AUDIX System (Front View)	2-11
Figure 2-5. Early Two-Cabinet AUDIX System (Rear View)	2-12
Figure 2-6. Current Two-Cabinet AUDIX System (Rear View)	2-13
Figure 3-1. Troubleshooting Flowchart	3-9
Figure 4-1. One-Cabinet AUDIX Carriers and Circuit Packs	4-2
Figure 4-2. Two-Cabinet AUDIX Carriers and Circuit Packs	4-3
Figure 5-1. IDI Data Link to a System 75/XE, Generic 1, or Generic 3i/s	5-13
Figure 5-2. IDI Data Link to a Generic 3r	5-14
Figure 5-3. IDI Data Link to a System 85, Generic 2, or DIMENSION PBX	5-14
Figure 5-4. DSU Data Link to a System 75, Generic 1, or Generic 3i/s	5-15
Figure 5-5. DSU Data Link to a Generic 3r	5-16
Figure 5-6. DSU Data Link to a System 85, Generic 2, or DIMENSION PBX	5-16
Figure 5-7. LADS Data Link to a System 85, Generic 2, or DIMENSION PBX	5-17
Figure 5-8. MPDM Data Link to a System 75, Generic 1, or Generic 3i/s	5-18
Figure 5-9. MPDM Data Link to a Generic 3r	5-19
Figure 5-10. AUDIX to 5ESS Switch Data Link Using the SCA	5-20
Figure 5-11. SCA Option Settings	5-21
Figure 5-12. AUDIX Data Link to a 1A ESS Switch	5-22
Figure 5-13. AUDIX Data Link to a 5ESS Switch ACP	5-22
Figure 5-14. AUDIX Data Link to a 5ESS Switch Local ACP	5-23
Figure 6-1. Order of Disk Drives in AUDIX Cabinets	6-2
Figure 6-2. Disk Drive Power Cabling	6-9
Figure 6-3. 5.25-inch Disk Drive Replacement Procedure	6-13
Figure 6-4. 3.5-inch Disk Drive Replacement Procedure	6-14
Figure 6-5. RICOH Drive Jumper Settings	6-19
Figure 6-6. CDC Model 94161-155 Drive Jumper Settings (J4)	6-20

Figure 6-7. CDC Model 94171-344 Drive Jumper Locations (Rear View)	6-22
Figure 6-8. CDC Model 94191-766 (ST-4766N) Drive Jumper Locations (Rear View)	6-23
Figure 6-9. HP Drive Jumper Settings	6-24
Figure 6-10. MICROPOLIS Model 1375 Drive Jumper Settings	6-26
Figure 6-11. MICROPOLIS Model 1578-15 Drive Jumper Settings	6-27
Figure 6-12. MAXTOR Model 7120S Drive Jumper Settings	6-29
Figure 6-13. MAXTOR Model 4380S and Model XT-8760S Drive Jumper Locations	6-31
Figure 6-14. NEC Model D5862 Drive Dip Switch Settings	6-32
Figure 6-15. PRIAM Model 738 Drive Jumper Settings	6-33
Figure 6-16. Seagate Model ST3283N Drive Jumper Settings	6-35
Figure 6-17. Seagate Model ST1480N Drive Jumper Settings	6-37
Figure 7-1. Replacing a Fan or Fan Assembly	7-9
Figure 7-2. CDR1B Alarm Board and Cable Connections	7-16
Figure 7-3. Power Supply Replacement (Early Hardware)	7-19
Figure 7-4. Power Supply Replacement (Newer Hardware)	7-20
Figure 7-5. jETA Power Supply	7-23
Figure 7-6. Computer Products (Unipower) Power Supply	7-24
Figure 7-7. LH Research Power Supply Strapped for 115V Input	7-25
Figure 7-8. ITT Power Supply Wiring (Original AUDIX Harness)	7-26
Figure 7-9. ITT Power Supply Wiring (Second-Design AUDIX Harness)	7-27
Figure 8-1. Local Maintenance Terminal Setup	8-4
Figure 8-2. Remote Maintenance Cabling	8-5
Figure 8-3. The list : volume names Form	8-13
Figure 9-1. Expansion Cabinet Alarm Cabling	9-15
Figure 9-2. Expansion Cabinet S-Bus Cabling	9-17
Figure 9-3. Expansion Cabinet TD-Bus Cabling	9-18
Figure 9-4. Intercabinet Cabling (List 2 or List 4 Backplanes)	9-19
Figure 9-5. Earthquake Mounting Floor Template	9-24
Figure 9-6. Anchor Hole Locations	9-26
Figure 9-7. CDR1B Board Connectors	9-32
Figure 9-8. Local DC Cable	9-34
Figure 9-9. Installation of New Fuse Holder (Side View)	9-36

Figure 9-10. Connections at the DC Power Supply	9-37
Figure 9-11. AUDIX DC Power and Ground Connections	9-39
Figure 9-12. Gutter Tap	9-40
Figure 10-1. The filesystem : detail Form With Sample Data	10-3
Figure 11-1. Control Mode Menu Screen Display	11-6
Figure 11-2. Control Mode Menu System Status Display	11-6
Figure 11-3. Control Mode Menu Alarms Display	11-7
Figure 11-4. Control Mode Menu Initialization History	11-7
Figure 12-1. S-Bus Processors	12-6
Figure 13-1. One-Cabinet AUDIX System Architecture	13-3
Figure 13-2. Two-Cabinet AUDIX System Architecture	13-4
Figure 13-3. One-Cabinet AUDIX List 1 Backplane Circuit Packs and Layout	13-15
Figure 13-4. One-Cabinet AUDIX List 2 Backplane Boards and Layout	13-16
Figure 13-5. Two-Cabinet AUDIX Backplane Boards and Layout	13-19
Figure 14-1. The filesystem : list Form with Sample Data	14-13
Figure 14-2. The system : filesystems Form with Sample Data	14-14
Figure 14-3. The system : announcement : filesystem Form	14-15
Figure 14-4. The system : limits Form	14-19
Figure 16-1. AUDIX Standalone Configuration	16-8
Figure 16-2. 2224G Option Switch Locations	16-17
Figure A-1. MI Circuit Pack Faceplate	A-8
Figure A-2. RICOH 20-Mbyte RCD Faceplate	A-11
Figure A-3. RICOH 50-Mbyte RCD Faceplate	A-12
Figure A-4. Inserting a 50-Mbyte Cartridge	A-15
Figure A-5. Removing the Front Cover and Lower Cover Plate	A-17
Figure A-6. Removing the Rear Cover Plates	A-19
Figure A-7. The maintenance : active alarm : display Form	A-32
Figure A-8. The maintenance : error : display Form	A-34
Figure D-1. Remote DBP Connections	D-2
Figure E-1. Remote SADI Monitor Installation	E-2

LIST OF TABLES

Table 2-1. AUDIX Connectors	2-5
Table 2-2. AUDIX Expansion Connectors (Expansion Cabinet)	2-6
Table 2-3. One-Cabinet AUDIX Circuit Packs	2-7
Table 2-4. Two-Cabinet AUDIX Circuit Packs (<i>Part 1 of 2</i>)	2-8
Table 3-1. Alarm Resolution Procedures (<i>Part 1 of 2</i>)	3-11
Table 3-2. Common Error Codes (<i>Part 1 of 2</i>)	3-25
Table 4-1. ACC [TN366(B)] Alarm Resolution	4-6
Table 4-2. DBP-CPU (TN472C) Alarm Resolution	4-10
Table 4-3. SADI (TN475B) Alarm Resolution	4-11
Table 4-4. TDBI-8 (TN477) or TDBI (TN500) Alarm Resolution (<i>Part 1 of 2</i>)	4-12
Table 4-5. VPC (TN501B) Alarm Resolution (<i>Part 1 of 13</i>)	4-16
Table 4-6. BC (TN506B) Alarm Resolution	4-30
Table 4-7. MI (TN511) Alarm Resolution	4-31
Table 4-8. VB (TN520) Alarm Resolution	4-32
Table 4-9. PE Alarm Resolution	4-34
Table 4-10. System Software Alarm Resolution	4-37
Table 4-11. DBP-RAM (TN532 or TN540) Alarm Resolution	4-38
Table 4-12. SCPI (TN533) Alarm Resolution	4-39
Table 4-13. ACCE [TN539(B)] Alarm Resolution	4-42
Table 4-14. MPSI [TN547(B)] Alarm Resolution	4-45
Table 4-15. TC (TN714) Alarm Resolution	4-46
Table 4-16. NC (TN727) Alarm Resolution	4-48
Table 4-17. VPT (TN747B) Alarm Resolution (<i>Part 1 of 4</i>)	4-51
Table 4-18. DBPI (UN160B) Alarm Resolution	4-57
Table 4-19. VSFI (UN162) Alarm Resolution	4-58
Table 5-1. Data Link Alarm Resolution	5-2
Table 5-2. Software Translation Alarm Resolution (<i>Part 1 of 2</i>)	5-9
Table 6-1. Disk Drive Alarm Resolution	6-1
Table 6-2. TN475B SADI LEDs and Disk Drive Position	6-6

Table 7-1. Environmental Alarm Resolution	7-2
Table 7-2. Control Mode Menu Alarm Resolution	7-10
Table 7-3. AUDIX Power Supply Input and Output Voltages	7-22
Table 8-1. Terminal Commands	8-16
Table 8-2. USER PF Key Setup	8-20
Table 9-1. Backplane Boards	9-10
Table 9-2. Intercabinet Cables	9-11
Table 10-1. Filesystem Mirroring Alarms	10-1
Table 10-2. Recommended Filesystem Distribution	10-5
Table 10-3. Recommended Filesystem Distribution with File Redundancy	10-6
Table 11-1. Hexadecimal-to-Binary Conversion	11-14
Table 12-1. Last “Good” Message Sections	12-2
Table 12-2. DBP-CPU Status	12-19
Table 12-3. VME Configuration	12-20
Table 12-4. Disk Controller	12-20
Table 13-1. DBP (VME) Bus Alarm Resolution	13-6
Table 13-2. TD Bus Alarm Resolution	13-10
Table 13-3. One-Cabinet AUDIX Backplane Circuit Packs	13-14
Table 13-4. Two-Cabinet AUDIX Backplane Boards	13-17
Table 13-5. Intercabinet Cables	13-18
Table 14-1. Filesystem Alarm Resolution	14-2
Table 14-2. System Initialization Faults	14-6
Table 14-3. Filesystem Names, Types, and Mount Points	14-22
Table 15-1. Recommended Filesystem Distribution (No File Redundancy)	15-5
Table 15-2. Recommended Filesystem Distribution (Full File Redundancy)	15-6
Table 15-3. Filesystem Audits	15-19
Table 16-1. Call Detail Recording Alarms	16-9
Table 16-2. ACC Status Field Displays (<i>Part 1 of 3</i>)	16-11
Table 16-3. MTDM Option Settings for 2400 Baud Networking	16-16
Table 16-4. MTDM Option Settings for 9600 Baud Networking	16-19
Table 16-5. 2296A Option Switch Settings for 9600 Baud Networking	16-20
Table A-1. Toggle Switch Movement and Effects	A-5
Table A-2. SADI Diagnostic Tests	A-28
Table B-1. S-Bus Processor FSW Bit Relationship to the Error Log	B-1

Table B-2. Error Code Descriptions (<i>Part 1 of 19</i>)	B-4
Table B-3. Administration Log Entries and Types	B-23
Table B-4. AUDIX Software Modules	B-25
Table B-5. AUDIX Software Sessions	B-26
Table C-1. AUDIX System Parts List (<i>Part 1 of 6</i>)	C-4
Table C-2. AUDIX Circuit Pack Codes (<i>Part 1 of 2</i>)	C-10
Table C-3. AUDIX Cable Codes and Descriptions (<i>Part 1 of 2</i>)	C-12
Table D-1. DBP Instruction Codes (<i>part 1 of 3</i>)	D-8
Table D-2. Physical Filesystem Error Codes	D-12
Table D-3. Logical Filesystem Error Codes	D-13
Table D-4. Table and Field Error Codes	D-13
Table E-1. DBP Command Completion Status Codes	E-22
Table E-2. SADI Error Numbers (<i>part 1 of 4</i>)	E-23
Table E-3. SADI Errors Status (<i>part 1 of 6</i>)	E-27
Table E-4. SADI Diagnostic Tests	E-33
Table E-5. SADI Diagnostic Test LED Numbers	E-35
Table E-6. SCSI completion codes	E-36
Table E-7. Sense Key	E-37
Table E-8. Extended Sense codes	E-38
Table F-1. ACCE Trace Settings	F-5
Table F-2. Form And Field Help	F-6

About This Document

This manual covers routine maintenance and troubleshooting procedures for an AUDIX™ Voice Messaging System (Release 1 Version 7).

Normally, remote service technicians try to isolate and repair problems *first*. If the problem needs local attention, they will dispatch a technician to resolve the problem on-site (such as hardware replacement).

There are several places in Chapters 1 through 10 asking the Tier I technician to escalate the problem to a Tier III technician. In most cases, an escalated problem can be solved using Chapters 11 through 16 and Appendices D through H.

INTENDED AUDIENCES

This manual is intended for Tier III personnel at the Technical Support Center (TSC) in Denver, Colorado.

PREREQUISITE SKILLS OR KNOWLEDGE

Previous training and/or experience in troubleshooting AUDIX systems are presumed.

HOW THIS DOCUMENT IS ORGANIZED

This document is organized as follows. Unless otherwise noted, the *AUDIX Maintenance for Tier I* manual, 585-305-106, contains the same chapters.

Chapters 1 and 2: Introduction and Orientation

This material introduces the new or infrequent AUDIX technician to the manual and the AUDIX machine. Chapter 1 provides the general rules of AUDIX maintenance, tools and aids, and a list of related documentation that could be helpful. Chapter 2 includes routine maintenance procedures, the physical layout of the AUDIX machine, and fault diagnosis.

Chapters 3 through 5: Basic Troubleshooting

These chapters attempt to isolate and resolve problems with the AUDIX system. Topics include:

- Determining the state of the system (Is it in service and is the software running?)
- Resolving alarmed problems when the software is running
- Resolving unalarmed problems when the software is running

Chapter 6: Disk Drives

Solving alarmed and unalarmed problems, replacing disk drives, and disk drive option settings.

Chapter 7: Power and Environment

Solving alarmed and unalarmed problems. There are procedures for when the software is running and when it is not.

Chapter 8: Terminal Setup and Use

This chapter covers problems with terminals, modems, and printers. Proper settings for each are included along with troubleshooting steps when any of this equipment is not working.

Chapter 9: Adding New Hardware

This chapter covers the addition of voice ports (i.e., TN747B and TN501B circuit packs), the addition of the AUDIX expansion cabinet, and the upgrade from a 20M-byte RCD to a 50M-byte RCD. To add or replace other disks, see Chapter 9. To replace faulty circuit packs, including the TN747B and TN501B, see the appropriate section in Chapter 4.

Chapter 10: File Redundancy Alarms

Replacing filesystems through the use of mirroring.

Chapter 11: Control Mode

Tier I personnel do not have this chapter.

Chapter 12: Initialization Debugging

Tier I personnel do not have this chapter.

Chapter 13: Buses and Backplane

Tier I personnel do not have this chapter.

Chapter 14: Software Troubleshooting

Tier I personnel do not have this chapter.

Chapter 15: Filesystem Restoration

Tier I personnel do not have this chapter.

Chapter 16: Feature Troubleshooting

Tier I personnel do not have this chapter.

Appendices A, B, and C: Reference

Reference material includes:

- Appendix A: Basic procedures such as blocking service, handling removable cartridges, shutting down the system, and making a visual inspection
- Appendix B: Error and fault code descriptions, administration log, software tables
- Appendix C: Reference material including component ordering tables, references to other documentation, acronyms and abbreviations, and a glossary

- Appendix D: Remote Access to the DBP Utilities
Tier I personnel do not have this section.
- Appendix E: Remote Access to the SADI Monitor
Tier I personnel do not have this section.
- Appendix F: Remote Access to the ACCE Trace
Tier I personnel do not have this section.
- Appendix G: Enhanced Activity Trace and Activity Log
Tier I personnel do not have this section.
- Appendix H: INADS-Only Forms
Tier I personnel do not have this section.

TRADEMARKS AND SERVICE MARKS

The following trademarked products are mentioned in this document:

- 5ESS® Switch is a registered trademark of AT&T
- Aspen Scientific® is a registered trademark of Aspen Scientific Corporation
- AUDIX™ Voice Messaging is a registered trademark of AT&T.
- CDC™ is a trademark of Control Data Corporation
- DATAPHONE® is a registered trademark and service mark of AT&T
- DEFINITY® Communications System is a registered trademark of AT&T
- DIMENSION® PBX is a registered trademark of AT&T
- ESS™ Switch is a trademark of AT&T
- Franklin® is a registered trademark of Franklin Telecommunications Corporation
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- TELETYPE® is a registered trademark of AT&T
- UNIX® System is a registered trademark of AT&T
- WREN III™ and WREN IV™ are trademarks of Magnetic Peripherals, Inc., a Control Data Company

CHANGES IN THIS ISSUE

Besides the reorganization of the Tier III chapters, the following changes are included:

- Added Fault 601 (FFSCHINIT) to Table B-2 and Proc. Q to Chapter 11.
- Added Fault 602 (FVSCCHINIT) to Table B-2 and Proc. Q to Chapter 11.
- Added Fault 603 (FRTCFail) to Table B-2 and to Chapter 4 - TN727 (was fault 252).
- Added Fault 604 (FBOOTTIME) to Table B-2 and to Chapter 4 - TN727 (was fault 252).
- Added Error 38 (LSID) to Table B-2.
- Added Error 315 (LMWIBLK) to Table B-2.
- Changed Error 893 (LVPCDIAL) to 1051 (number change only).
- Added Errors 1000-1035 (subscriber activity) to Table B-2.
- Added Error 1585 (LDSREAD) to Table B-2.
- Added Error 1586 (LDWRITE) to Table B-2.
- Added an appendix on remote access to the DBP utilities.
- Added an appendix on remote access to the SADI monitor.
- Added an appendix on remote access to the ACCE trace.
- Added an appendix on the Enhanced Activity Trace and the Activity Log.
- Added an appendix on INADS-only administration.
- Removed mirroring section from Chapter 14 because mirroring can be found in Chapter 10 (from the Tier I book).
- Updated the “Recommended Fielsystem Distribution” tables (Chapter 15). Now there is one for non-mirrored systems and one for mirrored systems.

RELATED RESOURCES

This document is designed to supplement, *not replace*, other volumes in the AUDIX document library. Always refer to the appropriate document for specific information on installing, administering, or maintaining an AUDIX system. Documents related to AUDIX systems are listed in the following table.

Refer to the *Business Communications Systems Publication Catalog* (555-000-010) for a more complete list of documents related to switching systems and peripheral equipment that can be integrated with AUDIX systems.

Title	Document Number
AUDIX Administration	585-305-501
AUDIX Administration and Data Acquisition Package	585-302-502
AUDIX Call Detail Recording Package	585-305-506
AUDIX Documentation Guide	585-300-010
AUDIX Feature Descriptions	585-305-203
AUDIX Installation	585-305-105
AUDIX Maintenance for Tier I	585-305-106
AUDIX Networking	585-300-903
AUDIX Release 1 Version 7 Forms Reference	585-305-208
AUDIX Upgrade Instructions	585-302-108
BCSystems Products Security Handbook	555-025-600
Portable Guide to AUDIX Voice Messaging	585-305-709
AUDIX Voice Messaging Quick Reference	585-305-710
AUDIX Voice Messaging Wallet Card	585-305-712
Switch Administration Guide for AUDIX Voice Messaging	585-305-505

HOW TO MAKE COMMENTS ABOUT THIS DOCUMENT

A reader comment card is behind the title page of this document. While we have tried to make this document fit your needs, we are interested in your suggestions for improving it and urge you to fill one out. If the reader comment card is missing, please send your comments and suggestions to:

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Room 22-2C11
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Denver, Colorado 80234

1. Introduction

This chapter presents the general rules for servicing an AUDIX system. It also contains tools, aids, and related documents that may be helpful.

GENERAL RULES

When servicing an AUDIX system, always:

1. Follow the troubleshooting procedures, which start in Chapter 3.
If you are unfamiliar with the AUDIX system, see Chapter 2, *Orientation*.
2. Notify the customer (or AUDIX system administrator) *before* shutting down the AUDIX system.
3. *A software shutdown must be performed before powering down the AUDIX system or doing filesystem maintenance.*
4. Shut down and power down the AUDIX system before changing any circuit pack, internal cable, or other piece of hardware.
5. Verify that normal service has been restored after a repair is completed (see *Before Leaving The Site* in Chapter 2).
6. Follow your local escalation procedures when a problem cannot be corrected within a reasonable amount of time.

TOOLS AND AIDS

For efficient service, the following equipment, tools, and information should be available *before* servicing an AUDIX system:

- *Customer Complaint(s)*: Have the trouble ticket(s) describing the problem, time of occurrence, and customer contact(s).
- *Documentation*: Installation, maintenance, administration, forms, and user's manuals. A shelf for holding service manuals is located at the top front of each cabinet. Try to keep a complete set of manuals with the machine at all times.
- *New Parts*: Replacement units as diagnosed by preliminary service should be on-site (if available).
- *Terminal*: Local Maintenance Terminal (LMT) or Remote Maintenance Terminal (RMT) and touch-tone telephone(s) next to the AUDIX system
- *Test Equipment*: Digital voltmeter and EMC wrist strap
- *Local Contact*: Name and number of the AUDIX system administrator
- *Configuration*: AUDIX type, AUDIX software, switch type, and switch software for that site
- *AUDIX-to-Switch Translations*: AUDIX adjunct (machine) number, data link translations, voice port extension numbers, and call-distribution or hunt group numbers
- *AUDIX Access Information*: AUDIX extension number, voice mailbox number(s) for testing, maintenance-terminal login number, and passwords

RELATED DOCUMENTS

The following AUDIX documents can be good resources when specialized information is needed on one of the specific topics listed. These documents should all be shipped with the AUDIX system.

Try to keep a complete library on-hand to ensure all the necessary information is readily available to you. Appendix C, *Equipment and References*, lists additional related AUDIX and switch manuals.

- *AUDIX System Description* (585-305-201) includes:
 - Individual circuit pack and hardware component descriptions
 - Overview of configuration, switch, and hardware considerations
 - System architecture and detailed internal functions
 - Non-AT&T switch configurations
- *AUDIX Feature Descriptions* (585-305-203) includes a detailed description of AUDIX software features and interactions.
- *AUDIX Installation* (585-305-105) includes:
 - Cabling from AUDIX to the switch including data link variations
 - Preinstallation requirements including power, environment, and switch information
 - Maintenance and administration terminal installation
- *Switch Administration Guide for AUDIX Voice Messaging* (585-305-505) includes the administration of the System 75, System 75 XE, System 85, DEFINITY Communications Systems, and DIMENSION PBX systems for interfacing with AUDIX.
- *AUDIX Release 1 Version 7 Forms Reference* (585-305-208) includes:
 - Details on the use of all AUDIX forms, including the purpose of each form, procedural tasks, display line messages, and an illustration
 - Procedures for setting up the terminals used to display the forms
- *AUDIX Administration* (585-305-501) includes:
 - Filesystem creation, deletion, addition, changes, and backups
 - Subscriber issues, requests, and procedures
- *A Portable Guide to AUDIX Voice Messaging* (585-305-702) includes:
 - AUDIX access procedures
 - AUDIX activities, functions, and commands
- If you are working on an AUDIX Large system, you will need *AUDIX-L Enhanced III Maintenance* (585-304-102) in addition to *AUDIX Maintenance for Tier I* (585-305-106).

2. Orientation

This chapter presents an overview of the AUDIX system and provides the concepts and procedures for servicing an AUDIX system. It is organized as follows:

- Physical Description
- Routine Maintenance
- Fault Diagnosis
- Before Leaving The Site

PHYSICAL DESCRIPTION

This section covers the AUDIX cabinet, connectors, and circuit packs. You may wish to review this section for differences in AUDIX systems if you work on more than one type of AUDIX system.

AUDIX Large (or AUDIX-L)

This is a two-cabinet, 2- to 32-port system. It has many configurable elements such as one or two disk controllers (0 and 1), one Removable Storage Drive (RSD), and one to seven Fixed Storage Drives (FSD). AUDIX-L may run AUDIX R1V1 through R1V5 software.

NOTE

Use *AUDIX-L Enhanced III Maintenance* (585-304-102) to troubleshoot AUDIX-L hardware. Use *AUDIX Maintenance for Tier I* (585-305-106) to troubleshoot AUDIX-L software.

One-Cabinet AUDIX (formerly AUDIX-S)

This is a half-height cabinet, 2- to 16-port system. It supports one disk controller (0), one Removable Cartridge Drive (RCD), and one to three Hard Disk Drives (HDDs). It may run AUDIX R1V2 or later AUDIX software.

Two-Cabinet AUDIX

The AUDIX two-cabinet system is a one-cabinet system with an expansion cabinet stacked on top. The additional cabinet provides up to sixteen additional ports. This system uses the same disk controller and provides up to three additional HDDs. This system may run AUDIX R1V3 or later AUDIX software.

Administration and Maintenance Forms

Forms are summarized in *AUDIX Release 1 Version 7 Forms Reference* (585-305-208). For software changes, see *AUDIX Feature Descriptions* (585-305-203).

The AUDIX one- and two-cabinet and AUDIX-L systems share the same maintenance software. Some differences among AUDIX models include:

- A one-cabinet system does not have a Voice Session Processor (VSP). This processor and associated subsystem are present in a two-cabinet system (when an expansion cabinet is added) and in the AUDIX-L.
- Forms may list more than one disk controller (0 and 1). Only AUDIX-L uses controller 1.
- AUDIX-L hardware terms (such as GPP, SI, and IPC/DIM) are listed as aliases in various tables or forms in the text.

AUDIX Hardware

Figure 2-1, *AUDIX Connector Panel (Rear View)*, shows a close-up of the lower (base) cabinet cable connector panel. Original versions of AUDIX use the early version of the cable connector; newer shipments use a connector panel with additional monitor connectors used in troubleshooting. Both types are shown in the figure. Table 2-1, *AUDIX Connectors*, provides a description of each connector.

Figure 2-2, *AUDIX Connectors (Expansion Cabinet)*, shows a close-up of the top (expansion) cabinet cable connector. There is only one version of this connector panel. Table 2-2, *AUDIX Connectors (Expansion Cabinet)*, provides a description of these connectors.

AUDIX hardware includes:

- **Carriers:** The basic AUDIX system uses a single circuit-pack carrier built into the half-height cabinet. The system can also have an expansion cabinet stacked on top of the original system. The expansion cabinet has the same carrier layout as the basic system, but only certain circuit packs are installed in the top cabinet. AUDIX circuit packs are listed in Table 2-3, *One-Cabinet AUDIX Circuit Packs*, and Table 2-4, *Two-Cabinet AUDIX Circuit Packs*.
- **Environment Control:** Fans, an air filter, thermal sensors, and air diverters (plenums) regulate each cabinet's temperature.
- **Hard Disk Drive (HDD):** Up to six HDDs provide space for system and customer data. These may be 120-Mbyte, 170-Mbyte, 380-Mbyte, and/or 760-Mbyte drives. Early AUDIX systems contain only 5.25-inch drives. Later AUDIX systems may contain 3.5-inch drives that are equivalent in storage capacity to the 5.25-inch 170-Mbyte and 380-Mbyte drives; new disks are sized by hours instead of megabytes.
- **Power Distribution:** AUDIX has two power options. One of the following options is required:
 - AUDIX may have an AC power supply and a DC battery reserve. During normal operation, AUDIX is supplied with 120 V AC from a standard wall outlet. During brief power outages, the battery reserve supplies 48 V DC power to the vital circuits within the AUDIX cabinet. A battery charger is included with the power supply.
 - AUDIX may receive DC power directly from the building battery plant.
- **Removable Cartridge Drive (RCD):** One 50-Mbyte cartridge-type drive with removable media is used for routine backups of system data and updating system software if needed. On two-cabinet systems, the RCD is located in the bottom cabinet. (Early systems have a 20-Mbyte RCD; see Appendix A for cartridge-handling procedures.)

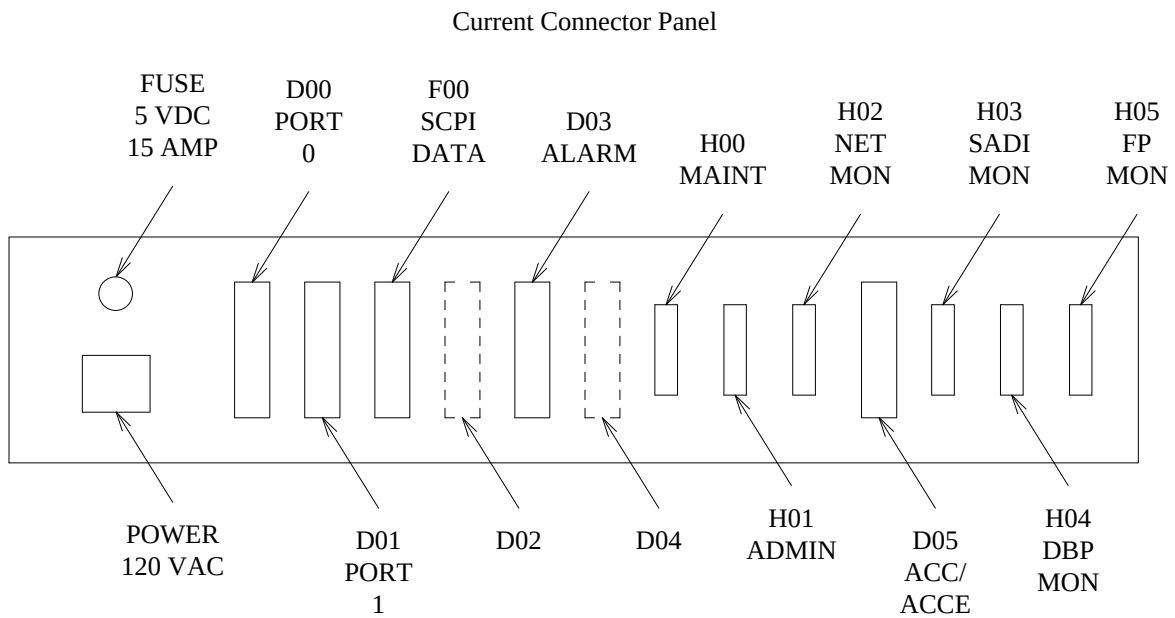
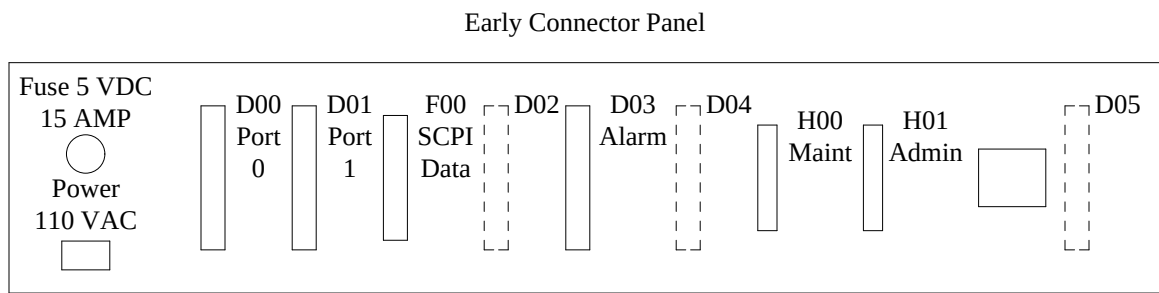


Figure 2-1. AUDIX Connector Panel (Rear View)

Table 2-1. AUDIX Connectors

Early Connector Panel			
Function	Description	Labels	
Voice Ports	Female 25-pair amphenol (8 ports)	PORT 0	D00
	Female 25-pair amphenol (8 ports)	PORT 1	D01
Alarms *	Female 25-pair amphenol (1 pair)	ALARM	D03
Data Link	Male 37-pin RS-449 connector	SCPI DATA	F00
Maintenance *	Female 25-pin RS-232C	MAINT	H00
Administration	Female 25-pin RS-232C	ADMIN	H01
(Reserved for future use)	Female 25-pair amphenol	<i>none</i>	D02
	Female 25-pair amphenol	<i>none</i>	D04
	Female 25-pair amphenol	<i>none</i>	D05
Current Connector Panel			
Voice Ports	Female 25-pair amphenol (2 to 8 ports)	PORT 0	D00
	Female 25-pair amphenol (10 to 16 ports)	PORT 1	D01
Data Link	Male 37-pin RS-449 connector	SCPI DATA	F00
(Reserved for SL-1 use) †	Female 25-pair amphenol	<i>none</i>	D02
Remote Alarms Link *	Female 25-pair amphenol (1 pair)	ALARM	D03
(Reserved for future use)	Female 25-pair amphenol	<i>none</i>	D04
Maintenance Terminal *	Female 25-pin RS-232C	MAINT	H00
Administration Terminal	Female 25-pin RS-232C	ADMIN	H01
ACC(E) Monitor *	Female 25-pin RS-232C	NET MON	H02
SADI Monitor *	Female 25-pin RS-232C	SADI MON	H03
DBP Monitor *	Female 25-pin RS-232C	DBP MON	H04
FP Monitor *	Female 25-pin RS-232C	FP MON	H05
Networking Link	Female 25-pair amphenol (2 links)	ACC/ACCE	D05

* For Services or Development use only.

† Used for VPT 5 on an SL-1 switch; see *AUDIX Integration Package for the SL-1 Switch* (585-304-203).

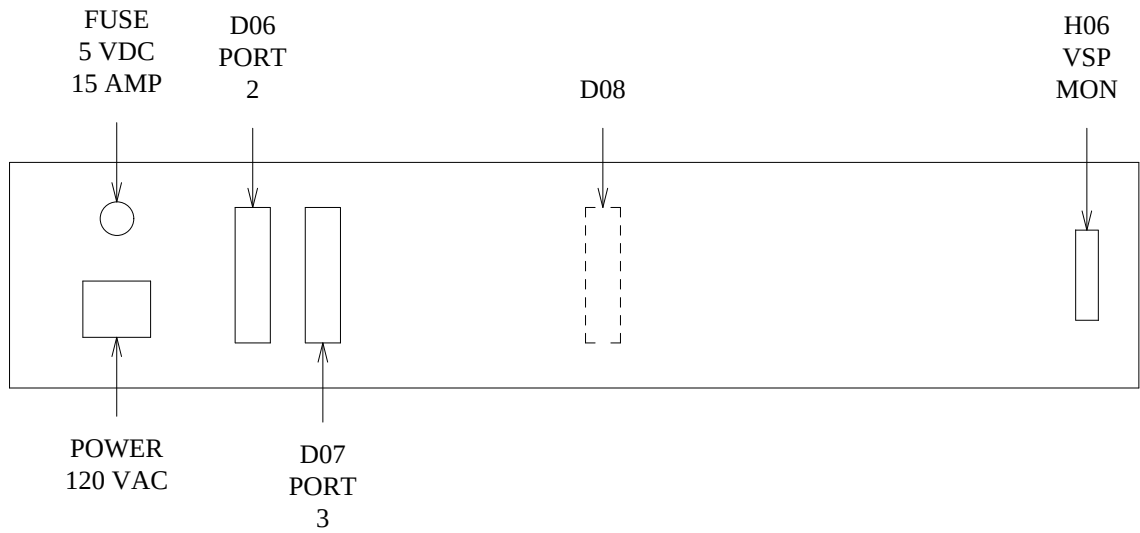


Figure 2-2. AUDIX Cable Connectors (Expansion Cabinet)

Table 2-2. AUDIX Expansion Connectors (Expansion Cabinet)

Function	Description	Labels	
Voice Port:	Female 25-pair amphenol (8 ports)	PORT 2	D06
	Female 25-pair amphenol (8 ports)	PORT 3	D07
VSP Monitor *	Female 25-pin RS-232C	VSP MON	H06
(Reserved for future use)	Female 25-pair amphenol	none	D08

* For Services or Development use only.

Table 2-3. One-Cabinet AUDIX Circuit Packs

Slot	Circuit Pack	Description and Names	Installed?
00	TN506B	Bus Controller (BC)	Standard
01	TN475B	SCSI-to-AUDIX Disk Interface (SADI)	Standard
02	TN532 or TN540	Data Base Processor Random Access Memory (DBP-RAM, DBP-MEM, or DVRAM)	Standard
03	TN366(B) or TN539(B)	AUDIX Communications Controller (ACC) or ACC Enhanced (ACCE)	Networking Networking
04	TN472C	DBP Central Processing Unit (DBP-CPU or DFC)	Standard
05	UN162	Voice Store and Forward Interface (VSFI)	Standard
06	UN160B	Data Base Processor Interface (DBPI)	Standard
07	TN511	Maintenance Interface (MI)	Standard
08	TN535	Processor Monitor (FP-MON or MON)	Testing
09	TN591 or TN523	Feature Processor Central Processing Unit (FP-CPU, FP-PE, or PE 0) CPU in early systems with < 24 ports; requires TN734 RAM boards	Standard
10	TN761 or TN734	FP Random Access Memory board 1 (FP-RAM 0) (One TN761 replaces two TN734s)	Standard
11	TN734	FP Random Access Memory board 2 (FP-RAM 1) (Empty if slot 10 has a TN761 installed)	Standard
12	–	Spare	–
13	TN716B	FP Bus Interface (FP-BI or Interface 1)	Standard
14	TN727	Network Control (NC or NETCON)	Standard
15	TN533 or TN547B	Switch Communications Processor Interface (SCPI), or Multiprotocol Switch Interface (MPSI)	Standard
16	TN500 or TN477	Time Division Bus Interface – 16 ports (TDBI), or (TDBI-8 in early systems with ≤ 8 ports)	Standard
17	TN520	Voice Buffer (VB)	Standard
18	TN714	Tone and Clock (TC)	Standard
19	TN747B	Voice Port 1 (VPT)	Standard *
20	TN501B	Voice Processor 1 (VPC)	Standard
21	TN501B	Voice Processor 2 (VPC)	Optional †
22 to 23	TN501B	Voice Processors 3 and 4 (VPC)	Optional
24	TN747B	Voice Port 2 (VPT)	Optional *
25 to 28	TN501B	Voice Processors 5 to 8 (VPC)	Optional

* For SL-1 applications, this may be a TN762B.

† For SL-1 applications, this may be a TN747B or TN762B (VPT 3).

Table 2-4. Two-Cabinet AUDIX Circuit Packs *(Part 1 of 2)*

Upper (Expansion) Cabinet			
Slot	Circuit Pack Code	Acronym	Quantity
00 - 07	—	Spare	
08	TN535	FP-MON or MON	Testing
09	TN591 or TN523	VSP-CPU	1
10	TN761 or TN734	VSP-RAM	1
11, 12	—	Spare	
13	TN716B	VSP-BI	1
14	TN727	NC	1
15	—	Spare	
16	TN500	TDBI 2	1
17	TN520	VB 2	1
18	—	Spare	
19	TN747B	VPT 3	1 * †
20	TN501B	VPC 9	1 *
21	TN501B	VPC 10	1 *
22	TN501B	VPC 11	1 *
23	TN501B	VPC 12	1 *
24	TN747B	VPT 4	1 * †
25	TN501B	VPC 13	1 *
26	TN501B	VPC 14	1 *
27	TN501B	VPC 15	1 *
28	TN501B	VPC 16	1 *

* Optional port boards. One VPT board handles up to four VPC boards.

† For SL-1 applications, this may be a TN762B.

(Continued)

TABLE 2-4. Two-Cabinet AUDIX Circuit Packs *(Part 2 of 2)*

Lower (Base) Cabinet			
Slot	Circuit Pack Code	Acronym	Quantity
00	TN506B	BC	1
01	TN475B	SADI	1
02	TN540	DBP-RAM	1
03	TN366(B) or TN539(B)	ACC or ACCE	1 #
04	TN472C	DBP-CPU	1
05	UN162	VSFI	1
06	UN160B	DBPI	1
07	TN511	MI	1
08	TN535	FP-MON or MON	Testing
09	TN591 or TN523	FP-CPU	1
10	TN761 or TN734	FP-RAM	2
11	TN734	FP-RAM	2 \$
12	—	Spare	
13	TN716B	FP-BI	1
14	—	Spare	
15	TN533 or TN547B	SCPI or MPSI	1
16	TN500	TDBI 1	1
17	TN520	VB 1	1
18	TN714	T/C	1
19	TN747B	VPT 1	1 †
20	TN501B	VPC 1	1 *
21	TN501B	VPC 2	1 * ‡
22	TN501B	VPC 3	1 *
23	TN501B	VPC 4	1 *
24	TN747B	VPT 2	1 * †
25	TN501B	VPC 5	1 *
26	TN501B	VPC 6	1 *
27	TN501B	VPC 7	1 *
28	TN501B	VPC 8	1 *

* Optional port boards. One VPT board handles up to four VPC boards.

Used only for AUDIX Networking.

\$ Only installed if another TN734 is installed in slot 10, otherwise empty.

† For SL-1 applications, this may be a TN762B.

‡ For SL-1 applications, this may be a TN747B or TN762B (VPT 5).

The following figures illustrate AUDIX system hardware.

- Figure 2-3, *One-Cabinet AUDIX System (Front View)*, shows a single-cabinet system with the newer equipment: the 50-Mbyte RCD, finger guard over the power switch, and 3.5-inch Hard Disk Drives (HDDs).
- Figure 2-4, *Two-Cabinet AUDIX System (Front View)*, shows the base cabinet and expansion cabinet in a two-cabinet AUDIX configuration. One-cabinet AUDIX systems will only have the base cabinet (the lower cabinet in the figure). Figure 2-4 shows the 20-Mbyte RCD and 5.25-inch drives used in earlier AUDIX systems.
- Figure 2-5, *Early Two-Cabinet AUDIX System (Rear View)*, and Figure 2-6, *Current Two-Cabinet AUDIX System (Rear View)*, show the variations in the hardware that may be found in early or newer AUDIX systems. One-cabinet AUDIX systems have only the base cabinet (the lower cabinet shown in each figure).

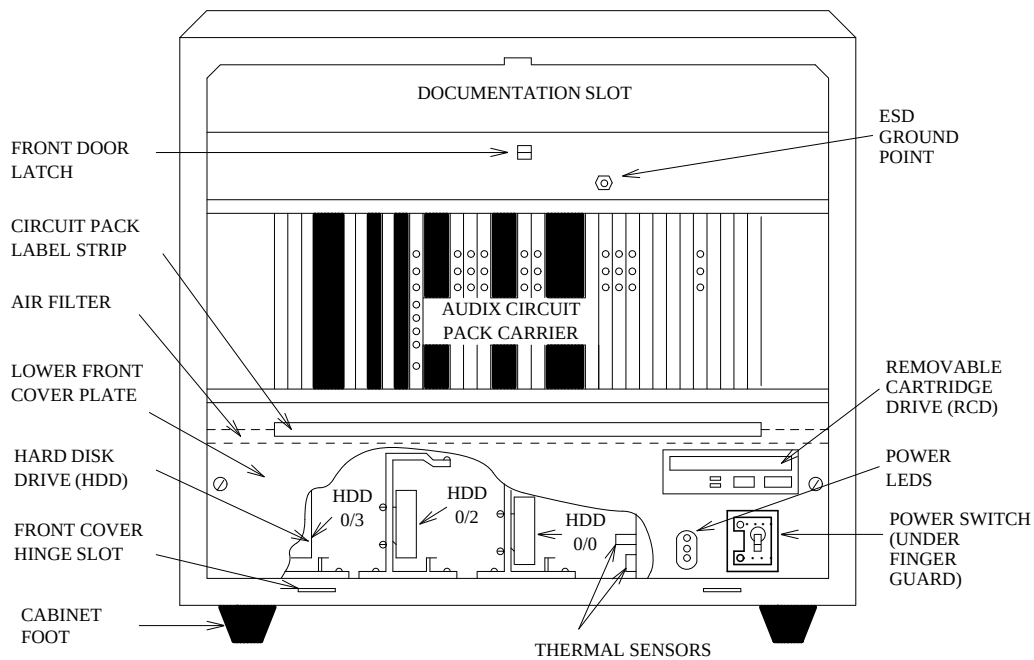


Figure 2-3. One-Cabinet AUDIX System (Front View)

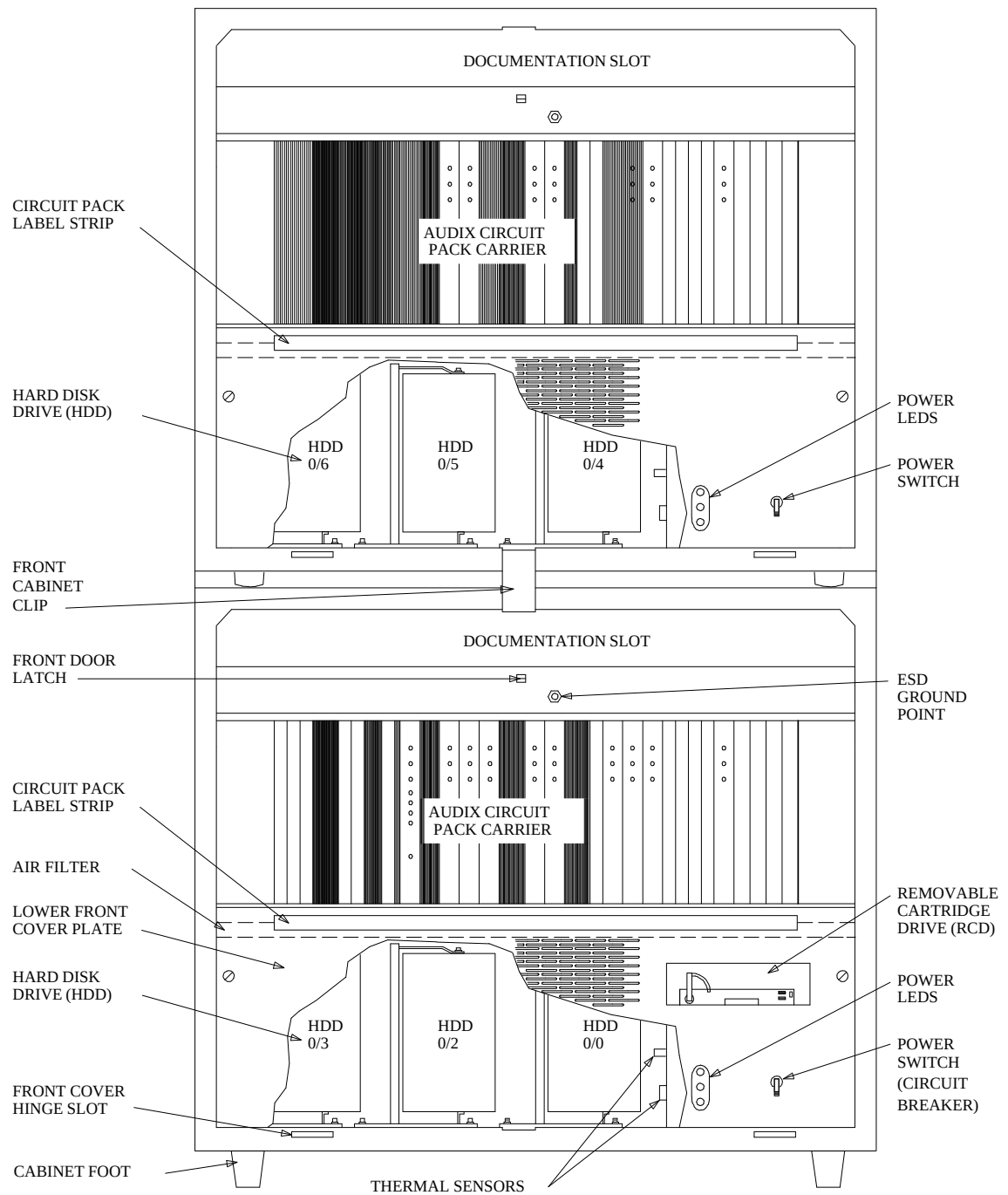


Figure 2-4. Two-Cabinet AUDIX System (Front View)

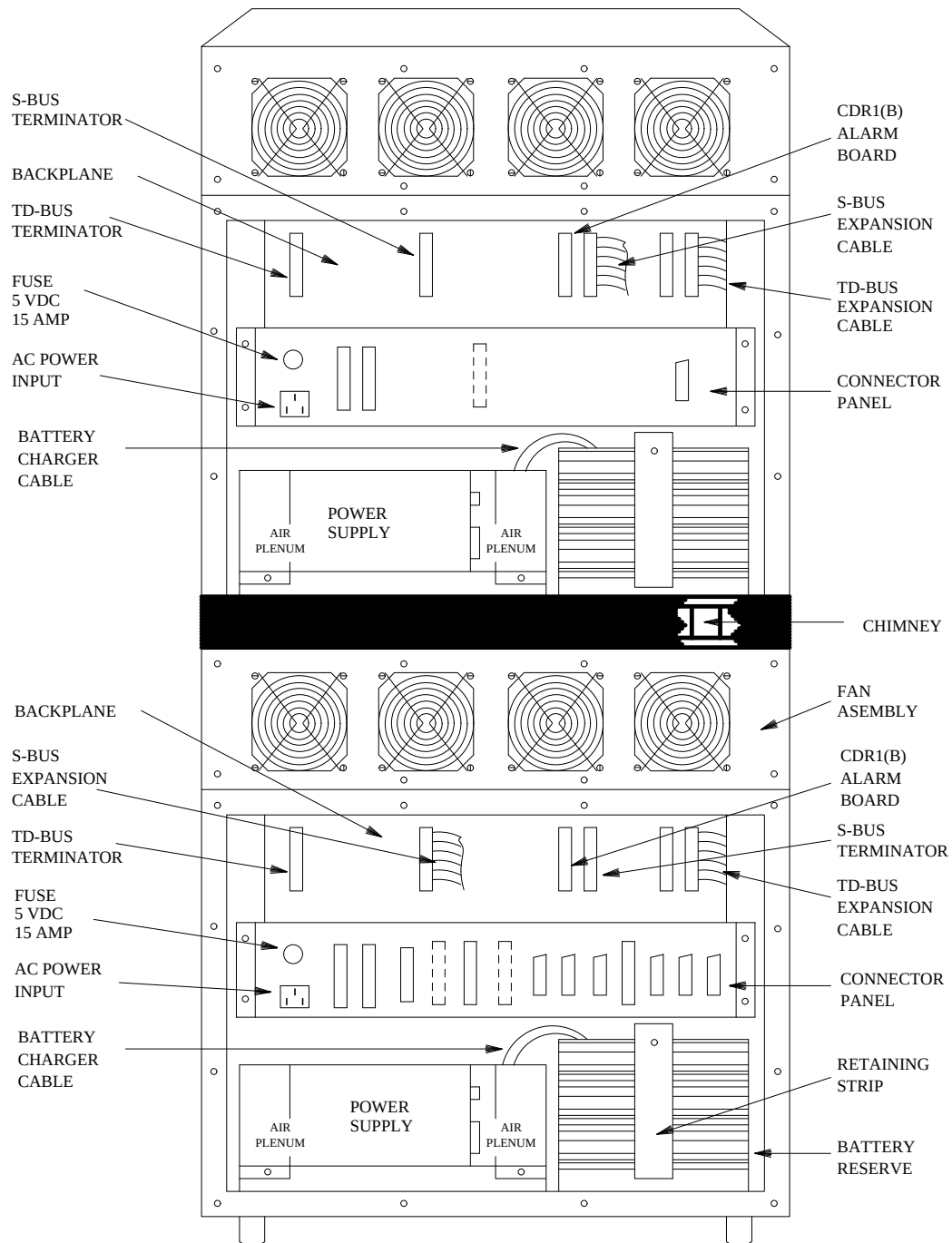


Figure 2-5. Early Two-Cabinet AUDIX System (Rear View)

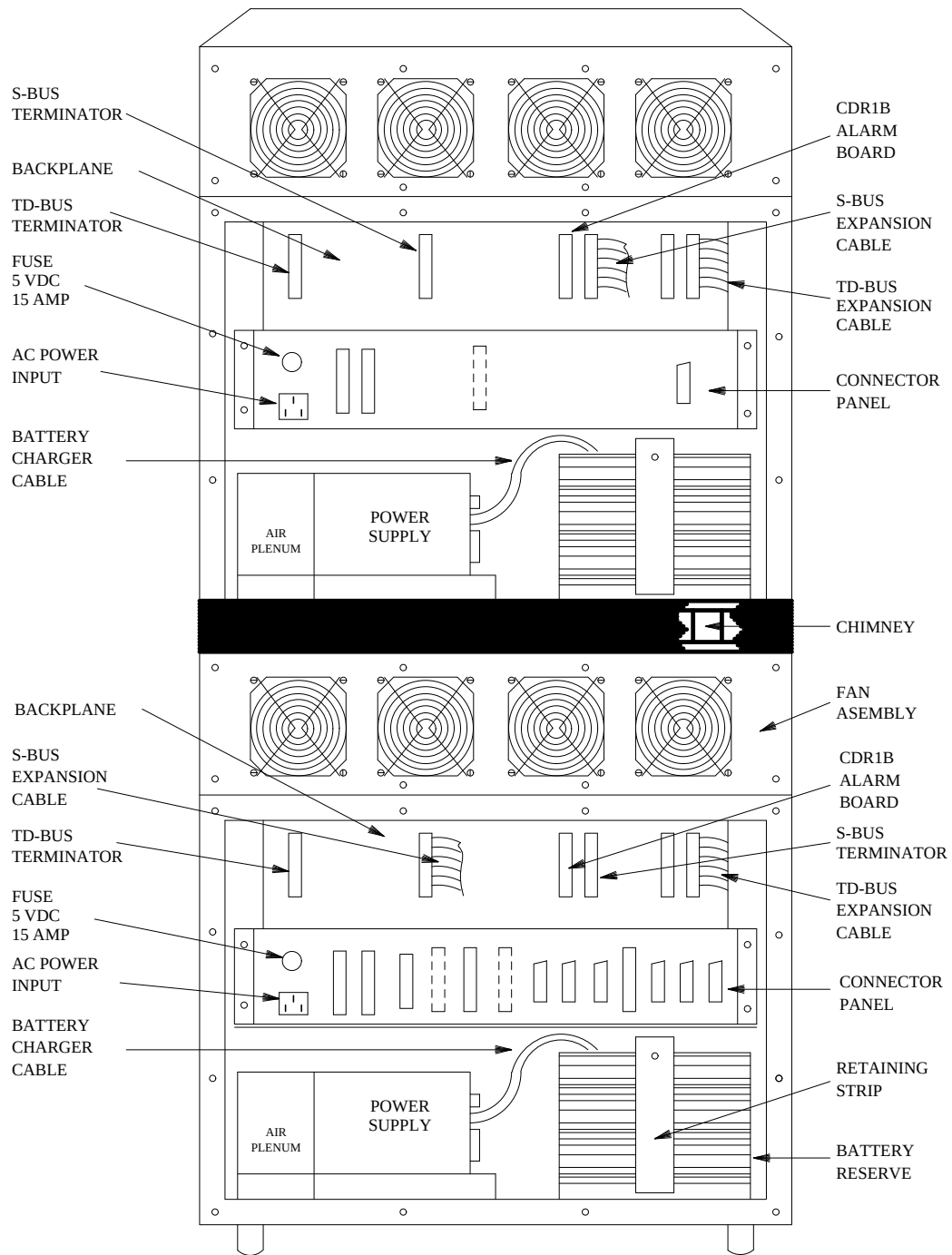


Figure 2-6. Current Two-Cabinet AUDIX System (Rear View)

ROUTINE MAINTENANCE

Routine preventive maintenance should be performed as part of a service call when the technician responds to a customer complaint or system alarm.

NOTE

Keep a log for each site so you know when a routine check or replacement is due.

Air Filter

The air filter below the circuit pack carrier of each cabinet should be checked. See Chapter 7, *Power and Environment* for replacement procedures.

Battery Reserve

For systems using AC power with battery backup, check battery voltage(s). The battery reserve supplies emergency DC power during a power failure, giving the system time to shut down software to protect valuable system and subscriber data. See Chapter 7, *Power and Environment* for battery checking and replacement procedures.

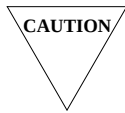
Cartridge-Handling Procedures

The Removable Cartridge Drive (RCD) cartridges must be handled carefully to prevent damage to the media or drive. See *RCD Cartridge Handling* in Appendix A for complete cartridge-handling precautions and removal procedures. In two-cabinet systems, the RCD is always in the bottom cabinet.

Environment

AUDIX requires a clean, regulated environment in order to work properly.

- The air should be clean, free of dust and particles (such as those produced by copy machines), smoke, and corrosive gases.



Smoke, dust, or dirty conditions can severely damage removable cartridges. Keep the environment as clean as possible.

- Air conditioning should handle up to 2337 BTUs/hour (685 watts) for a one-cabinet system. For two-cabinet systems, the air conditioning should handle 3757 BTUs/hour (673 watts for the base cabinet and 428 watts for the expansion cabinet). The air should not blow directly at the cabinet or it may interfere with internal cooling patterns.
- The room should be well ventilated with a relative humidity of 10 to 80 percent (noncondensing). Maximum wet-bulb temperature should be 79°F (26°C).
- Optimum temperature should range from 65 to 85°F (18 to 29°C). However, AUDIX can operate at temperatures from 50 to 95°F (10 to 35°C), the same maximum ambient temperature needed for the switch.
- If RCD cartridges are exposed to extreme temperatures – those greater than 100°F (38°C) or lower than 39°F (4°C) – allow them to acclimate at least 1 hour before using them. Let the RCD warm up (run) about 40 minutes before reading from or writing to the cartridge.

NOTE

AUDIX can operate at temperatures between 32 and 122°F (0 and 50°C) and at 5 to 10 or 80 to 95 percent relative humidity for no more than 72 continuous hours or a total of 15 days in 1 year.

Fans

Check that *all four* fans at the back of *each* cabinet are running. (Three fans run on high if one fan is not working.) If any fan is not running, see Chapter 7, *Power and Environment* for replacement procedures.

Check for Current Filesystem Backups

Routine filesystem backups (copies) should be made on a separate disk or cartridge. In the event of a hardware or operational error, the backup copy may be the only way to restore valuable customer data. Work closely with the AUDIX system administrator to implement a backup strategy. Check for current backups of critical filesystems as follows:

1. Check the RCD cartridge for current sdat filesystem backups (use the `filesystem : list` form). The backup filesystems are created automatically through nightly audits and are named by date (for example, the backup from October 7, 1992 is named “sd921007”).
2. Check that the names filesystem is being backed up on a weekly basis. Use the `system : announcement : filesystems` form.
3. If the system uses custom announcements (announcements voiced-in by the customer), check that there is a backup announcement filesystem for these custom announcements. If the customer uses the standard announcement set, this backup is not necessary.
4. Check that the vtext filesystems are balanced (similar in size) and are spread out over more than one disk if possible (use the `filesystem : list` form).
5. Make sure the system administrator is updating the backup boot filesystem any time the system configuration is changed. This includes the addition of voice ports and disks or whenever translations are changed. Also check that a copy of the generic-program cartridge is stored in an acceptable storage location.

FAULT DIAGNOSIS

AUDIX is designed for modular hardware replacement in the field. Comcodes for AUDIX circuit packs and other equipment are listed in Appendix C, *Equipment and References*. A general summary of on-site troubleshooting procedures is included in this section.

Faults are reported in two ways. One way is through alarms generated internally by AUDIX diagnostics. The alarms appear on the AUDIX system, on the maintenance terminal, and if equipped to do so, at the switch and at a remote maintenance location. The second method of reporting faults is through service complaints. (Look for areas in this manual that address “unalarmed” problems.)

Generally, remote maintenance personnel try to diagnose any problem, alarmed or unalarmed, from information gathered from the trouble ticket and from the maintenance port. Internal AUDIX diagnostics try to narrow the problem down to a faulty circuit pack or component (called a *replaceable unit*). If possible, the system takes a faulty device out of service through automatic system reconfiguration so the system can continue to provide service, although possibly at a reduced capacity.

Use the following procedures to aid in the diagnosis.

Visual Inspection

The first part of an on-site service visit is to inspect the system visually for obvious problems. See *Visual Inspection* in Appendix A for detailed steps.

- **TN511 MI Alarm Panel:** The TN511 Maintenance Interface (MI) contains extra red and yellow LEDs to display system alarms, warnings, or shutdown status. If you already plugged in the Local Maintenance Terminal (LMT), the IN USE LED should be lit.
- **TN475B SADI LEDs:** The TN475B SADI circuit pack lights yellow LEDs 10 to 16 for each disk drive installed in the system (RCD 0/1 and HDD 0/0 to HDD 0/6). See Chapter 6, *Disk Drives*, for more information on disk drives.
- **Other Circuit Pack LEDs:** Any steadily lit red (alarm) LED may mean a circuit pack is faulty. Check for yellow (warning) LEDs, or yellow LEDs marking normal in-use activity. A green LED indicates a test (if steady) or heartbeat (if pulsing). *Visual Inspection* in Appendix A lists LEDs which should be lit.
- **Front Panel LEDs:** The three LEDs next to the POWER switch on each cabinet indicate the system power source (AC or DC holdover) and battery-reserve faults. Only the green LED should be lit.
- **Cable Connections:** Each cabinet’s POWER switch should be ON and the 120 V AC power cord or DC power feeders at the rear of each unit must connected to building power. The connectors on the rear panels are summarized in Table 2-1 and Table 2-2 along with *Visual Inspection* in Appendix A. Connect the LMT to H00 on the back of the cabinet in place of the remote maintenance modem during an on-site visit.

Check Alarm, Error, Administrator, and Activity Logs

If software is running and forms can be used, check the alarm log and the error log for the cause of a problem. See *Alarm and Error Log (Display and Use)* in Appendix A for details on the alarm and error logs. Chapter 3, *Start Troubleshooting* covers steps for using the logs to troubleshoot or solve problems.

- *Alarm Log:* Alarms (faults) are recorded on the `maintenance : active alarm : display` form in the order in which they should be resolved (most severe fault first). Each alarm shows a fault, unit, and device number used to identify the problem.

Use the `maintenance : active alarm : specification` form *before* going to the `maintenance : active alarm : display` form if you are looking for a specific alarm log entry. Select a specific date, time, type of alarm, etc.).

- *Resolved Alarm Log:* Faults that have been corrected appear on the `maintenance : resolved alarm : display` form. Check this log to be sure alarms are cleared after maintenance. Faults that resolve themselves and then re-occur are called *intermittent* faults.
- *Error Log:* Errors are listed on the `maintenance : error : display` form. You may use error reports when the alarm log is not sufficient. Because 10,000 or more errors may be listed, use the `maintenance : error : specification` form *first* to specify what set of errors to view. Use the error log as directed in Chapter 3, *Start Troubleshooting*.

The `maintenance : error : specification` form also allows you to activate an *enhanced activity trace* for a set of error codes (1000-1099) that track detailed system events. If you choose to activate the *enhanced activity trace* feature, you *cannot* also activate the activity log (described below).

- *Activity Log:* The AUDIX system records certain mailbox-related activities in a disk file known as the activity log. This provides the system administrator or technician with a tool for investigating user-reported troubles (for example, delayed deliveries). The technician may display the activities for any local subscriber.

In order to record errors, the activity log must first be activated using the `system : activity log : specification` form. Subsequent mailbox activities can then be displayed on the `system : activity log : display` form.

- *Administration Log:* Certain errors which should be handled by the system administrator appear on the `system : log : display` form. **Do not** display this form without first informing the system administrator or having him or her present. Once displayed, the entries are cleared unless a date and time are specified on the `system : log : specification` form.

Although these errors are the responsibility of the administrator, this log may point to potential problems with system operation. This log can be very useful in troubleshooting unalarmed problems in an AUDIX network. Look for errors in message delivery or machine connection failures that may indicate a problem with AUDIX networking, if used.

Block Service

Service may be interrupted (blocked) on an AUDIX system to keep subscribers from using faulty equipment, and to allow the technician to do repairs, tests, or filesystem audits (update programs) without interference. On a blocked system, users who try to access the system hear reorder tone (fast-busy) or ringing with no answer.

Always notify the customer before blocking service. Try to block service only during light or no-traffic conditions if possible. On integrated (data link) systems, you may use the `maintenance : datalink : busyout` form to block all new calls to the system (this is the normal method). You could also use the `maintenance : vsp : busyout` form to remove any or all TDBI, VB, VPC, or VPT ports or channels from service (if not in use). Be sure to release the data link and/or voice ports once you have finished the repair action. See *Block/Restore Service* in Appendix A for details.

Shut Down Software

A system shutdown protects software and customer data. A software shutdown is *always* required prior to powering down the system, and may be required for many filesystem procedures. If the Control Mode Menu is on the screen, the system software is already shut down (firmware is in control). See *Shut Down Software* in Appendix A for details. *Notify the customer and schedule a time*, then shut down system software as follows:

- **Shutdown Using a Form (Remote and Local):** When the system is in normal (in-service) mode, you may use the `shutdown` form to close software files and bring down the system. Select the type of shutdown you need based on urgency and function:
 - A *camp-on* shutdown (c) prevents new calls and gradually blocks service as calls in progress end. A *forced* shutdown (f) drops all calls and should be used only when there is no traffic on the system or if maintenance is urgent.
 - An *administrative* shutdown (a) closes all files except the active boot and adat, but remounts the filesystems so administration or maintenance can be done. A *maintenance* shutdown (m) should be used just before powering down the system to close and unmount all filesystems except the active boot.

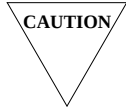
NOTE

A maintenance shutdown automatically spins down the RCD (wait for the green LED to go out). An administrative shutdown leaves the cartridge active.

- **Shutdown Using the MI Toggle Switch (Local Only):** You may *cycle* the MI toggle switch to shut the system down (pull the toggle switch out and set it from the center to the off-center position). This action is equivalent to a forced maintenance shutdown and should be done only in urgent or no-traffic situations. See *MI Toggle Switch* in Appendix A for details.

Power Down and Replace Hardware

To replace any unit, first shut down the software using the maintenance (m) option (see the previous section). If software is not running, use the MI toggle switch. Wait for the RCD to spin down (the green LED goes out) and for the red COMPL LED on the MI to light. When shutdown is complete, turn the POWER switch OFF. Replace the unit as described in this manual.



When replacing circuit packs, always plug the jack on your antistatic EMC wrist strap into the Electro-Static Discharge (ESD) ground point on the front of the cabinet [see Figure 2-4, *Two-Cabinet AUDIX System (Front View)*].

When you turn power back ON, the system should initialize automatically. Block service to run verification test(s) on the new unit. If you had an alarm, check the alarm logs to make sure it is resolved. See *Remove Cover Plates* in Appendix A for details.

Initialize the System

Return the system to full service as follows:

1. *Start Initialization:* Reinitialize by powering the system up, moving the MI toggle from off-center to center, running the `startup` form, or using Control Mode Menu options. You may do a *restart* (partial initialization from FP memory), or a *reboot* (automatically loads programs from disk after a power up or failed restart).
2. *Select Initialization Options:* Standard initialization may take 10 to 45 minutes, depending on the system configuration. You may manually select other options to run additional tests or select alternative devices or filesystems to test them.
3. *Watch Initialization:* Hardware initialization and self-tests take from 6 to 20 minutes, depending on the options selected. When the system displays “MAINTENANCE INTERFACE ENTERING NORMAL MODE,” it starts software initialization (a restart starts here). This step takes from 5 to 45 minutes, depending on the size of the data base and if the system was shut down properly.
4. *Start Service:* After software is loaded, the terminal screen displays the message “start service” and gives a login prompt (both MI connectors are now active). After about 1 minute, the data link to the switch is initialized (on integrated systems) and full service is available.

A “service not started” message normally means that a filesystem is missing. The system will not accept calls until the problem is corrected and the system restarted.

Equipping Devices

Equipping a device means to make the software aware of its presence.

1. *VSP Devices:* To equip or unequip a VB/TDBI pair, VPT, or VPC (called VSP devices), use the `maintenance : vsp : equipage` form. Existing devices must be busied out using the `maintenance : vsp : busyout` form before they can be unequipped.
2. *DBP Devices:* The only devices in the Data Base Processor (DBP) subsystem that can currently be equipped or unequipped on AUDIX are the disks (the RCD cartridge or HDDs). To equip or unequip these devices, use the `maintenance : dbp : equip` and `maintenance : dbp : unequip` forms.

NOTE

An unequip command on disk01 automatically spins down the RCD (wait for the green LED to go out). An equip command spins up the drive (wait for a steady green LED). The start/stop button is disabled while the green LED is blinking. See *RCD Cartridge Handling* in Appendix A for details.

BEFORE LEAVING THE SITE

After the problem is resolved, do the following:

1. *Restore Service:* If you blocked service, use the appropriate AUDIX form or switch procedure to free the blocked ports for use. See *Block/Restore Service* in Appendix A for details.
2. *Make a Test Call:* Call the AUDIX number to verify that full service is available.
3. *Check Trouble Tickets:* Verify that the original problem or customer complaint is solved and that related features are working correctly.
4. *Check Alarm Logs:* Check the active, administration, and resolved alarm logs for new faults and for the correct resolved entries. See *Alarm and Error Logs (Display and Use)* in Appendix A for details.
5. *Check the Terminal:* Check the maintenance terminal STATUS line to make sure all faults or threshold violations are resolved. See Chapter 8, *Terminal Setup and Use* for details.
6. *Check LEDs:* Check the circuit packs and front panel for lit red (alarm) or yellow (in use or warning) LEDs. Also verify that the fans and disk drives are running. See *Visual Inspection* in Appendix A for details.
7. *Routine Maintenance:* Do any routine (preventive) maintenance needed for that site (see *Routine Maintenance* in Chapter 2).
8. *Restore Original Setup:* Place the MI toggle switch in the center position. Disconnect the LMT cable from the MAINT port (H00) on the back of the cabinet and reconnect the cable for the remote maintenance site's modem. Turn off the LMT.

3. Start Troubleshooting

This chapter is the starting point for diagnosing any problem on AUDIX. It contains:

- **Troubleshooting Summary:** A quick guide for experienced service personnel
- **Control Mode Menu:** A list of options active when the AUDIX firmware has taken control over a troubled system
- **Initial Diagnosis:** Basic diagnostic procedures to determine the state of the AUDIX system and locate active alarms (if present)
- **Solving Active Alarms:** Procedures to resolve alarms
- **Solving Customer Complaints:** A list of typical complaints and their solutions
- **Solving Unalarmed Problems:** A procedure to diagnose the system when no alarm is present
- **Verify Good Service:** Steps to verify good service after the system is repaired

NOTE

If you are not experienced with AUDIX or have not worked on an AUDIX system for some time, you should first review Chapter 2, *Orientation*, Chapter 8, *Terminal Setup and Use*, and Appendix A, *Basic Procedures*.

AUDIX problems fall into two categories: those that cause alarms (faults), and those that do not. For problems that cause alarms to appear in the alarm log, look up the alarm unit number in Table 3-1, *Alarm Resolution Procedures*, for directions on how to resolve them. Resolve the alarms in the order in which they appear in the alarm log.

Problems that do not raise alarms are those usually reported by users of the AUDIX system. First verify that there is a problem. Try to reproduce it from the explanation given by the user. If you cannot fix the problem using *Solving Customer Complaints* and/or *Solving Unalarmed Problems*, escalate it per local procedures.

TROUBLESHOOTING SUMMARY

If you are familiar with AUDIX systems, use the following quick list as a guide for diagnosing AUDIX problems. This summary is a memory jogger for experienced services personnel. If the problem is complex or if you need more information, go on to *Initial Diagnosis*.

1. Log in to the AUDIX system. If the Control Mode Menu appears, use the procedures of *Control Mode Menu* to get the software running and return here to step 2. If the path line and screen layout appear, go directly to step 2.

2. Check the STATUS line for alarms. If there is an active alarm, do the following. If there is no active alarm, go to step 3.
 - a. If there is an active “M, m, or w” alarm, display the `maintenance : active alarm : display` form. Each entry has a unit number associated with it. Look the unit number up in Table 3-1 and go to the indicated chapter for problem resolution.
 - b. Use the `maintenance : resolved alarm : display` form or the `maintenance : error : display` form to track down intermittent faults. Look up suspected units in Table 3-1 and go to the indicated chapter.

NOTE

Errors 1000 to 1099 are used only to track system or subscriber activity. They should not be interpreted as a problem. In the event a subscriber reports a problem, these errors can be used to trace that subscriber’s sequence of button pushes.

- c. For an active “A” alarm, inform the system administrator. This is an *administrative* alarm that might indicate possible break-in attempts, subscriber problems, or other issues that require system administrator attention.
3. Check the STATUS line for filesystem threshold violations. If any are reported:
 - a. Use the `system : thresholds` form to locate filesystems that are exceeding space limitations. Use the `system : limits` form to compute new sizes for ndat, sdat, sst, or vdat. For vtext filesystems, create a new filesystem of the same size as the existing ones (if fewer than 10 vtext filesystems are assigned).
 - b. You can shut the system down and either increase the filesystem sizes if possible using the `filesystem : detail` form (all vtext filesystems *must* be the same size), or move the filesystem to a disk that has more available space (use the `filesystem : list` and `filesystem : copy` forms).
4. If the STATUS line shows no problems, check that all hardware devices are equipped and enabled (ready for use).
 - a. Use the `maintenance : dbp : status` and `maintenance : vsp : equipage` forms to check hardware status.
 - b. Activate any devices if needed using the `maintenance : dbp : equip` or `maintenance : vsp : busyout` and `maintenance : vsp : equipage` forms.
5. If the hardware looks correct, check that all required filesystems are mounted and active:
 - a. Use the `system : filesystems` form to verify that an sd, vd, ss, boot, and one or more vm filesystems are shown as active.

Use the `system : announcement : filesystems` form to verify that an active announcement filesystem and a names filesystem are shown. There may be an admin filesystem also shown, but not required. It is highly recommended that a weekly names backup filesystem be shown.
 - b. Activate any required filesystems using these forms. If a filesystem cannot be activated, check the `filesystem : list` form to verify that the filesystem has a mount point. If not, use the `filesystem : mount` form to mount the filesystem and then go back and try to activate it.

6. If the software looks correct, place a test call through any suspected ports or channels using the `maintenance : system : test call` form.
7. If the problem is still not detected, *notify the customer about an interruption in service*, then restart the system at an agreed-upon time. See if the problem is cleared.
8. If the problem persists, *arrange for another service interruption with the customer*, then reboot the system. (A reboot may run automatically if the restart in the previous step fails.)
9. If the problem is still not isolated, go to *Solving Unalarmed Problems* (if software is running). If the software is not running (Control Mode Menu is displayed), go to *Control Mode Menu*.
10. After repair procedures, go to *Verify Good Service*.
11. Make sure the customer complaint or original problem is solved.

CONTROL MODE/VISUAL INSPECTION CHECKLIST

NOTE

DO NOT cycle power, restart, or reboot the system without recording the information in the checklist *first*. Otherwise, this data will be lost and a valuable clue to repairing the system will be erased.

Whenever AUDIX software is not running, take 5 minutes to record the Control Mode Menu and visual inspection information before doing any service procedures. This quick check is vital to help you isolate a simple problem. It also ensures you have a record of the initial system state so you can bring other people up to date (for example, if remote maintenance is called).

This section gives a step-by-step checklist for checking control mode and visual information on a nonworking system. A service technician must be on-site in order to do the visual inspection steps. Remote service technicians may do steps 1 to 4 (Control Mode Menu display and analysis) to assist with problem diagnosis if desired.

CONTROL MODE/VISUAL INSPECTION CHECKLIST			
Step:		Normal:	Abnormal:
1	– Access and Display Control Mode Menu	_____	_____
2	– Record System Status (Display Option 1)	_____	_____
3	– Record Alarms (Display Option 2)	_____	_____
4	– Record Initialization History (Display Option 3)	_____	_____
5A	– Check Power Status (AC/Battery Reserve or DC)	_____	_____
5B	– Check Fans and Fuse	_____	_____
6	– Check Disk Drives	_____	_____
7	– Check Circuit Pack LEDs	_____	_____

CONTROL MODE WORKSHEET

(Copy this page or use a separate sheet of paper)

Step 1: Control Mode Menu appears: YES___ (continue) NO___ (go to *Verify Good Service*)

Step 2: Record all nonzero fields and asterisks (Menu Option 1):

DBPI___ SCPI___ VB1___ VB2___ FP___ DBP___ MI___

Step 3: Check off all currently active alarms (Menu Option 2):

CHG_RATE___ CNVDSK___ FANALM___ FUSALM___
LOW_BAT___ ON_RESV___ OPTALM___ RESV_FLT___

Step 4: Record the last two or three initialization messages (Menu Option 3):

Step 5A: Record any abnormal battery reserve or power states in both cabinets (if installed):

Lower Cabinet Upper Cabinet

Red LED: ON___ OFF___ ON___ OFF___ (Should be OFF)
Yellow LED: ON___ OFF___ ON___ OFF___ (Should be OFF)
Green LED: ON___ OFF___ ON___ OFF___ (Should be ON)
Power Switch: ON___ OFF___ ON___ OFF___ (Should be ON when AC cord plugged in)

Step 5B: Check off any stopped fan(s) or blown fuse:

Fuse blown (lower)___ (upper)___ All fans stopped (lower)___ (upper)___
One fan stopped (lower): Left___ Left-middle___ Right-middle___ Right___
One fan stopped (upper): Left___ Left-middle___ Right-middle___ Right___

Step 6: Check if drives are running and have lit yellow LEDs on TN475B SADI:

disk00 (LED 10):___ RCD (LED 11):___ disk02 (LED 12):___ disk03 (LED 13):___
disk04 (LED 14):___ disk05 (LED 15):___ disk06 (LED 16):___

Step 7: Record any circuit packs with red LEDs, and record the status shown on the MI alarm panel (alarms, shutdown state):

INITIAL DIAGNOSIS

This section helps to identify the type of problem AUDIX is having, and directs you to the appropriate section for problem resolution. Figure 3-1, *Troubleshooting Flowchart*, outlines the basic troubleshooting procedure.

Is AUDIX Taking Calls?

Before doing any service procedure, first see if AUDIX is answering calls. If so, AUDIX is providing service. Whenever AUDIX is running and allowing subscribers to log in, do *not* shut down the system without customer consent.

To see if AUDIX is taking calls:

1. Place a Voice Mailbox call to see if AUDIX answers (dial the AUDIX-associated extension).
2. If AUDIX answers, see if it will accept your login (i.e., your extension number and the # sign followed by your password and the # sign).

If the AUDIX answers in Stand-Alone mode (AUDIX requests that you redial your extension number), the data link is not working. Check the SCPI (or MPSI) in slot 15 for a yellow LED.

3. If AUDIX answers, it is providing service. Do *not* interrupt service without customer consent.
4. If AUDIX does *not* answer, it is *not* providing service. Do the steps needed to restore service freely.

If you cannot log in to AUDIX yourself (for example, if no voice terminal is available):

1. Ask the system administrator or customer if AUDIX is taking calls.
2. Check for red LEDs on the TN523, TN533, or UN160B circuit packs. This indicates a core hardware fault that has put the system out-of-service. Note any lit red LEDs.
3. Check the VPC boards for yellow LEDs indicating that calls are in progress. This may not be accurate because calls can hang (terminate incorrectly), leaving connections up.

Are There Customer Complaints?

Customer-generated complaints are often related to some unalarmed software problem that impacts system performance. For example, a filesystem may be damaged so it can no longer be used. For customer complaints:

1. Use the complaint as a guide for your troubleshooting. If you have any active alarms, solve these *first* and see if they fix the reported problem.
2. If you have no active alarms to go by, check the list of problems in *Solving Customer Complaints* and follow any suggested procedures that pertain to the complaint.
 - a. Recheck the customer complaint form. Should this complaint have been fixed as a result of the troubleshooting procedures you just did?
 - b. Try to reproduce the error. If fixed, you should not be able to duplicate the complaint.
 - c. If you can reproduce the error, the problem may be another unalarmed problem or an operator (subscriber) error. Go to *Solving Unalarmed Problems*.
3. If you cannot find a similar problem in the customer complaints section, run through the list of steps in *Solving Unalarmed Problems*. Repeat the verification steps in the list above to see if the problem is fixed.
4. As an option, you can also check the error log (maintenance : error : display) for a clue (see Appendixes A and B).

SOLVING ACTIVE ALARMS

Most AUDIX problems cause an entry in the active alarm log. The alarm log is the primary means of diagnosing and repairing a system when software is in control.

Active Alarm Resolution

Resolve active alarms as follows:

1. Log in and check for active alarms on the terminal STATUS line and in the alarm log using the `maintenance : active alarm : display` form (see *Control Mode/Visual Inspection Checklist* if needed).
2. Faults are displayed by order of severity and should be resolved in this order. Record the first four alarm codes listed (fault, unit, and device numbers called *triplets*).
3. Use Table 3-1, *Alarm Resolution Procedures*, to find the unit associated with the first alarm. Go to the indicated chapter to resolve the alarm.
 - a. If the first-choice procedure does not solve the alarm, use the second- or (if needed) third-choice procedures.
 - b. If you can't solve the first alarm, try to solve the next alarm in the list by returning to Table 3-1 and repeating these steps.
4. To check if the problem is resolved, use the `maintenance : active alarm : display` form. The fault code should no longer appear in this log.

NOTE

Some faults require the system to be rebooted before they are cleared from the log. If the alarm still appears, reboot the system (if you have not already done so) and see if the fault disappears.

5. To check if other problems still exist, use the `maintenance : active alarm : display` form. Record any fault(s) in the log and repeat steps 3 and 4 to resolve it.
6. When all problems are resolved, the active alarm log should show no entries and the previously active alarm codes should be listed under the `maintenance : resolved alarm : display` log with a recent time.
7. After repair procedures, verify good service by making test calls using the `maintenance : system : test call` form. See Appendix A, *Basic Procedures*, for test call procedures.
8. If you feel you are not making progress or cannot resolve the faults, escalate the problem using your local procedures.

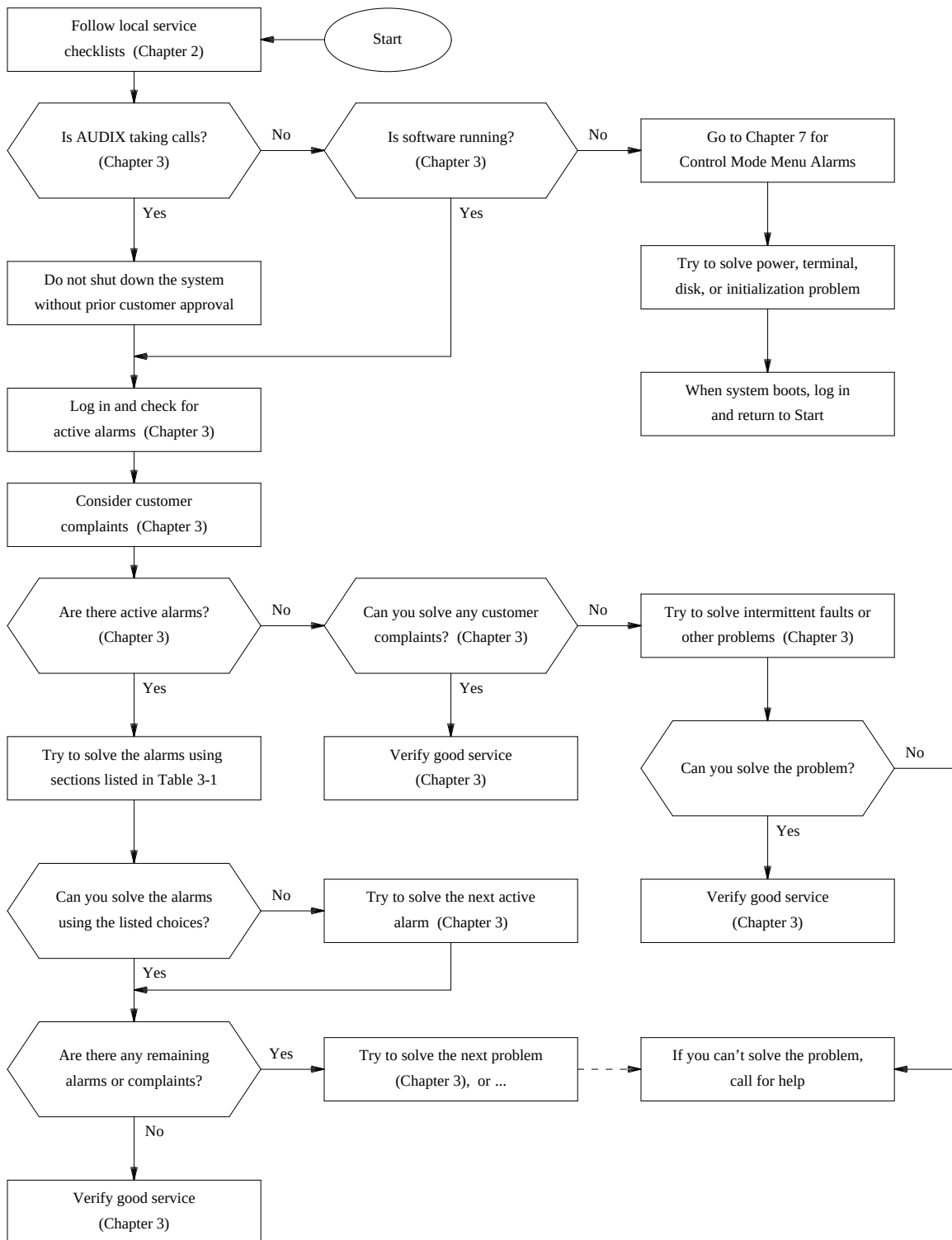


Figure 3-1. Troubleshooting Flowchart

Alarmable Units and Resolution Procedures

Table 3-1 shows the physical device or software problem associated with each unit number in the alarm log. To use it:

1. Look up the unit causing the alarm. Go to the indicated chapter to resolve the alarm.
2. Look up the fault and unit/device pair numbers in the alarm-resolution table in the referenced chapter and follow the listed procedure. If you can't find the unit number in the table, escalate the problem to the TSC (the Technical Service Center, formerly the NCSC).

The TSC may be contacted at 1-800-248-1234.

Table 3-1. Alarm Resolution Procedures *(Part 1 of 2)*

Unit	Name	Description	Alias	See Page:
1	TN472C	DBP-CPU board	DCPU	4-10
2	TN532/TN540	DBP-RAM board	DUMER, DEXPR	4-38
3	TN506B	BC board	BUS CTRL, DBCTRL	4-30
4	Terminal	DBP monitor	DTERM	Escalate
5	UN162	VSFI board	DVSFI	4-58
6	Disk controller	TN475B SADI	DISK CTRL, DCTL	4-11
7	TN475(B)	SADI board	IPC, DIPC	4-11
8	TN475(B)	SADI board	DIM, DDIM	4-11
9	RCD, HDD	Disk drive	RSD, FSD, DDISK	6-1
11	DBP bus	DBP subsystem	VME bus	Escalate
12	UN160B	DBPI board		4-57
13	UN160B	DBPI channel	DBPCH	4-57
14	UN162	VSFI or DBP bus	DVSFI, VME bus	4-58
15	S Bus	S Bus	SBUS	Escalate
16	TDM Bus	TDM Bus	TDMBUS	Escalate
17	TN511	MI board	MI	4-31
18	TN716B	Bus Interface	BI	4-34
21	Filesystem	Voice Message	vm1	Escalate
22	Filesystem	Voice Message	vm2	Escalate
23	Filesystem	Voice Message	vm3	Escalate
24	Filesystem	Voice Message	vm4	Escalate
25	Filesystem	Voice Message	vm5	Escalate
26	Filesystem	Voice Message	vm6	Escalate
27	Filesystem	Voice Message	vm7	Escalate
30	TN547(B) or	MPSI	SWITCH_LINK	4-45
	DCIU, PI, SCI	Data link	SWITCH_LINK	5-2
32	Translation fault	Switch/AUDIX software	SW_VMS_TDATA	5-9
33	TN591/TN523, TN716B, and TN761/TN734	FP Processor Element (PE)	PE 0, FP-PE, FP-CPU, FP-BI, FP-RAM/MEM	4-34
34	TN591/TN523, TN716B, and TN761/TN734	VSP Processor Element (PE)	PE 1, VSP-PE, VSP-CPU, VSP-BI, VSP-RAM/MEM	4-34
35	TN747B	VPT port	VPT_COMMON, CO Trunk	4-51
36	TN501B	VPC channel	VPC_COMMON	4-16
37	TN477/TN500	TDBI channel	TDBI_COMMON	4-12
38	TN714	TC (tone-clock) board	TC_COMMON	4-46

(Continued)

TABLE 3-1. Alarm Resolution Procedures *(Part 2 of 2)*

Unit	Name	Description	Alias	See Page:
41	TN520	Voice Buffer	VB	4-32
42	TD-bus time slot	Time-division bus	T_SLOT	Escalate
43	TN533	SCPI board	SCP, SAI	4-39
49	Filesystem	Primary Announcement	UNANPFS_MT	Escalate
50	Filesystem	Secondary Announcement	UNANSFS_MT	Escalate
51	Filesystem	System Status	UNSSFS_MT	Escalate
52	Filesystem	System Data	UNSDFS_MT	Escalate
53	Filesystem	Voice Data	UNVDFS_MT	Escalate
54	Filesystem	Voice Message	UNVM0FS_MT	Escalate
55	TN747B	VPT board	VPT_COMMON, CO Trunk	4-51
56	TN501B	VPC board	VPC_COMMON	4-16
57	TN477/TN500	TDBI board	TDBI_COMMON	4-12
58	TN714	TC TD-bus circuit	TC_COMMON	4-46
59	Switch port	Data link	GPP_COMMON	—
61	TN520	VB board	VB_COMMON	4-32
62	Filesystem	Voice Message	vm8	Escalate
63	Filesystem	Voice Message	vm9	Escalate
91	Adat filesystem	Missing filesystem		Escalate
93	Sst filesystem	Missing filesystem		Escalate
94	Sdat filesystem	Backup problem	FSDBACKUP	Escalate
116	Environmental component	Environmental or power equipment	CTRL CABINET, CONT_CAB, C_PWRU	7-2
117	Power	Power, env. component	CC_CCAR	7-2
120	TN727	NC (NETCON) board	SI, SI_COMMON	4-48
121	PE software fault	System load threshold	SYS_SW	4-37
140	TN727	NC TD-bus circuit	SI, SI_COMMON	4-48
141	TN366(B)/TN539(B)	ACC(E) board	ACC	4-42
142	TN366(B)/TN539(B)	ACC(E) port	ACC_P	4-42
143	Filesystem	Module init failure	MODINIT	Escalate
144	TN366(B)/TN539(B)	AUDIX Networking	NET_CON	4-42
150	Filesystem	Names	UNNMFS_MT	Escalate
151	Filesystem	Names backup	UNNMFS_SY	Escalate

SOLVING CUSTOMER COMPLAINTS

Customers (subscribers) may report problems to the AUDIX system administrator or the remote maintenance site (trouble reports). Customer-generated complaints often reflect problems that do not cause alarms, such as damaged (corrupted) filesystems or other software problems. For many problems, the technician may need to call the listed customer contact for more information.

If you have a customer complaint, see if it matches one of the following customer-reported problems. If so, go to the chapter listed and try to reproduce the problem. If you cannot duplicate or resolve the problem, go to *Solving Unalarmed Problems* in this chapter or escalate the problem.

Some troubleshooting guidelines include:

- Some troubleshooting steps test the switch-to-AUDIX data link. Standalone systems do not have this link. If you are working an AUDIX Standalone system, skip any steps which require you to test the data link.
- Many of the following tests use the `maintenance : system : test call` form to test voice ports. When the AUDIX is connected to a 1A ESS Switch or 5ESS Switch, you cannot test individual ports using this form. If the system you are working on is connected to a 1A ESS Switch or 5ESS Switch, skip any steps which have you use the test call form.
- When investigating a subscriber-reported problem, go to the activity log (the `system : activity log : display` form) and display subscriber activity for the user in question (if possible). As an alternative, you can activate enhanced activity tracking on the `maintenance : error : specification` form (see Table B-2 in Appendix B for a list of these error codes).

Both the activity log and error log must be activated *before* they can collect any data on system activity. Refer to the *AUDIX Release 1 Version 7 Forms Reference* (585-305-208) for details on activating and using these features. Both the activity log and enhanced activity tracking can *not* be active at the same time; normally only the activity log is active.

This section is organized as follows:

- Ringback But No Answer on a Voice Mailbox Call
- Ringback But No Answer on a Call Answer Call
- AUDIX Answers After Long Ringing
- Bad or Noisy Connection
- No, Wrong, or Garbled AUDIX Announcements
- Garbled or Missing Unified Messages
- Message-Waiting Lamp Problems
- Subscribers Hear “No Message to Play Back”
- Subscribers Hear “No Room in Your Mailbox”
- Subscribers Hear Reorder Tone
- Subscribers Get Faint or Silent Messages

- Administrator is Unable to Add Subscribers
- Network Messages Are Not Being Sent
- An Integrated AUDIX Answers in Standalone Mode
- Slow Response Time on Terminal
- An Upgraded AUDIX Does not Transfer Calls

Ringback But No Answer on a Voice Mailbox Call

After dialing the AUDIX extension (for a voice mailbox call), a subscriber hears ringback tone but the AUDIX system never answers. Check the following:

1. *On Standalone systems:* AUDIX will not answer calls if the system clock is not set. Display the `system : clock` form and check the time:
 - a. If the time is correct, go to the next step.
 - b. If the time is not correct, go to *TN727: NC* in Chapter 4 to set and test the system clock.
2. If the problem occurs *rarely* on some ports (once every several thousand calls), it is possibly due to a lost data link message. Report this problem to the TSC.
3. If the problem occurs *always* on all ports, AUDIX might have lost a boot, sdat, sst, or vdat filesystem or had a disk crash involving one of these filesystems. Go to *No Alarms and Software Running* (step 3) in *Solving Unalarmed Problems*.
4. If the problem occurs *frequently*, it is probably either in the switch-to-AUDIX analog connection, or in the AUDIX voice port (VPT) or voice processor (VPC) boards. Make a VPT test call to each port to check each switch-to-AUDIX voice path using the `maintenance : system : test call` form. Instructions for the test call can be found in Appendix A, *Basic Procedures*.
 - a. If a repeatable problem is *not* found on one VPT port, make VPC test calls to test all the AUDIX voice processors. If this does not lead you to the problem, there is probably an intermittent fault in the system. Go to *Solving Unalarmed Problems*.
 - b. If a repeatable problem is found on one port, continue.
5. Test the switch port by placing a test phone at the switch cross-connect field. Call the switch extension related to the failing AUDIX port to check for ringing.
 - a. If you receive ringing, go on-hook and connect the test phone to the circuit you just dialed. Go off-hook and verify that dial tone is received, then break dial tone to verify that the switch port listens. If these tests pass, the switch port is functioning correctly.
 - b. If these tests fail, inspect the cabling and the connectors associated with the circuit. Repair or replace any faulty equipment and retry the VPT test call. If the test still fails, replace the switch port board. Retry the VPT test call.
6. If these tests pass and the problem remains, replace the AUDIX VPT that may be faulty and verify that the problem is fixed by making VPT test calls (test all the ports). Use the `maintenance : system : test call` form.

7. If the problem continues, the system may have an intermittent fault. Go to *Solving Unalarmed Problems*.

Ringback But No Answer on a Call Answer Call

After dialing the system for a call answer call, a subscriber receives ringback tone, but the AUDIX system never answers. This problem is probably *not* caused by the AUDIX-to-switch hardware. Check the following:

1. *On Standalone systems:* AUDIX will not answer calls if the system clock is not set. Display the `system : clock` form and check the time:
 - a. If the time is correct, go to the next step.
 - b. If the time is not correct, go to *TN727: NC* in Chapter 4 to set and test the system clock.
2. The subscriber's mailbox may be full. Since AUDIX could not record a message, it did not answer. The system administrator should tell the subscriber to delete unneeded messages in the mailbox (especially the old and file cabinet areas), or increase the subscriber's mailbox size. (Subscribers should hear a warning message when they log in for this problem.)

In AUDIX R1V5 and later software, the full-mailbox feature allows AUDIX to answer and inform the caller that there is no room in the called mailbox. If the complainant states that the call was not answered, you can disregard a full mailbox as a possible problem on R1V5 and later systems.

3. The subscriber may not be set up with call answer permission on the `subscriber : local` form. The system administrator should check this field.
4. Filesystem thresholds may be exceeded or the system may be out of voice message (vtext) space. Check the STATUS line or `system : thresholds` form for threshold violation messages. If found, escalate the problem.
5. The AUDIX call-coverage translation on the switch (ACD, Call Forwarding, etc.) or related equipment translations may be incorrect. Use *Switch Administration Guide for AUDIX Voice Messaging* (585-305-505) to check for this problem.
6. The switch-to-AUDIX data link (DCIU, PGATE, PI, or SCI) could have been out of service temporarily. (Calls never reach AUDIX if the link is down; they will not follow the coverage path to AUDIX.) To determine if this is the problem, look for data link restart errors (159, 871, 878, 902, and 903) and software restart errors (907 and 908) in the `maintenance : error : display` log.
 - a. If these errors are found but occur less than twice a day, ignore the problem. If errors are *not* found, go to the next step.
 - b. If the problem occurs frequently, run data link tests from both the switch and AUDIX ends (see Chapter 5).
7. The system may have lost one or more filesystems. Do the following:
 - a. Check if all filesystems are active and present.
 - b. If filesystems appear good, check the disks (see Chapter 6).
8. If none of these fix the problem, go to *Solving Unalarmed Problems* in this chapter to check the switch.

AUDIX Answers After Long Ringing

After dialing the system, AUDIX answers but only after many rings. Check the following:

1. This is normal during heavy traffic conditions. It only means that all available switch-to-AUDIX voice ports were busy and the user was placed in a waiting queue. Verify heavy traffic by looking at the maximum traffic peg on the `traffic : load : day/hour` form.
2. If this problem occurs frequently during medium or light traffic conditions, it is possible that some of the voice ports are not in service or have incorrect translations. Check traffic activity on each port by using the `traffic : load : day/hour` forms. *If a port has not been used for some time:*
 - a. Verify that all installed VPT, VPC, TDBI, and VB ports are equipped and enabled using the `maintenance : vsp : equipage` form.
 - b. Verify that the AUDIX voice port translations are correct using the `system : translation : voice port` form and *Switch Administration Guide for AUDIX Voice Messaging* (585-305-505).
3. If these are correct or do not solve the problem, go to *Solving Unalarmed Problems*.

Bad or Noisy Connection

After dialing the AUDIX system, subscribers hear static and abnormal noise. Check the following:

1. *Listen to a sample message:* For all “bad message” problems on AUDIX, encourage the customer to save a copy of the bad or noisy message. Have the subscriber or the system administrator mail the bad message to a test mailbox (something the technician can access) so services personnel can hear it. This greatly facilitates problem diagnosis.
2. *Garbled or noisy message:* For garbled or noisy messages (versus AUDIX system announcements):
 - a. Check whether the caller created the AUDIX message using one of the following devices:
 - Speakerphone
 - Mobile or cordless phone
 - Pay phoneOccasionally one of these devices will cause a garbled or noisy message to be left on AUDIX. This is a result of the device used, *not* the AUDIX system.
 - b. Check the switch facilities. Many times a noisy message can be traced to the telephone set, the cross-connect field, or other switch facilities.
3. *Background hum:* If subscribers dial AUDIX and hear a hum in the background, the noise is probably coming from a TN753 DID trunk port on the switch, or from some other switch facility. You should hear this hum a moment before AUDIX answers if this is the problem. A technician can help trace the problem, or the customer can ask their local telephone company to check their facilities.

4. *Static or tone in messages:* Most static noises or background tones in AUDIX messages are a problem in one of the AUDIX TN747B VPT or TN501B VPC boards. To diagnose this problem:
 - a. Check the error log and resolved alarm log to try to determine which pack is faulty. If you suspect problems with a pack, replace it.
 - b. If you can't find a suspect board using the software, try to isolate the problem by making test calls using the `maintenance : system : test call` form (see Appendix A, *Basic Procedures*, for test call procedures).
 - c. If you can't isolate the faulty pack through the test calls, arrange with the customer for a time to take the system down. Then, try popping the TN501B VPC packs one by one, making test calls each time you pull an additional VPC free from the backplane. Often one pack can create a tone on the whole system. If the tone goes away, replace the last pack you pulled from the backplane.
5. *Static in greetings or system prompts:* The static in personal greetings or system announcements is almost always a problem in the AUDIX TN500 TDBI or TN520 VB. If you have a two-cabinet system, make test calls using the `maintenance : system : test call` form to isolate which TN500/TN520 pair is causing the problem (see Appendix A, *Basic Procedures*, for test call procedures).
6. *Squeal:* If subscribers hear an AC hum or squeal on messages, headers, and system announcements whenever they access AUDIX, the problem is almost always the AUDIX power supply. You can also check the switch analog port packs (TN742 or TN746B) for an alternative cause of the problem.
7. If you can't solve the problem using these guidelines, follow the procedures in *Solving Unalarmed Problems*, or escalate the problem to the TSC.

NOTE

If pocket-dialer, international, or some long distance calls are constantly having bad connections, the customer may want to install a Voice Gain Amplifier as described in *AUDIX Installation* (585-305-105).

No, Wrong, or Garbled AUDIX Announcements

After making a voice mail or call answer call, the subscriber is connected to AUDIX but receives no system announcements, wrong announcements, garbled announcements, or announcements out of order. Check the following:

1. If static, noise, or a squeal occurs on all messages, use the troubleshooting steps in the previous section, *Bad or Noisy Connection*.
2. If bad announcements occur *rarely*, the user may be accessing a faulty AUDIX port. Follow the repair procedures in *Solving Unalarmed Problems*.
3. If garbled announcements occur *sometimes*, one or more AUDIX VPC boards may be faulty. Make a VPC test call to check each AUDIX voice processor using the `maintenance : system : test call` form.

4. If bad announcements occur *frequently or always*, the system may not be able to access the announcement data (adat) filesystem. Do the following:
 - a. Display the `system : announcement : filesystems` form and check the `active announcements` field. If this field is empty, escalate the problem.
 - b. If filesystems appear good, check the disks (see Chapter 6).
 - c. If the disks appear good, the adat filesystem may be corrupt even though it is mounted. Escalate the problem.
5. If the announcement filesystems are good and the problem remains, go to *Solving Unalarmed Problems*.

Garbled or Missing Unified Messages

One of the following messages may be garbled or is not announced:

- “Leave Word Calling message” (from switch)
- “Electronic Text message” (from AP)
- “Message Center message” (from AP)

Check the subscriber’s phone and the switch-to-AUDIX path for correct translations. For example, if the message should be coming from an AP, check translations for the AP, switch, and AUDIX voice ports. See the *Switch Administration Guide for AUDIX Voice Messaging* (585-305-505) for all AUDIX/switch translations.

NOTE

These messages are available only on an integrated AUDIX setup with an AT&T PBX.

Message-Waiting Lamp Problems

The MESSAGE lamp may not light or extinguish properly. A few causes are listed below. For the correct switch translations, see *Switch Administration Guide for AUDIX Voice Messaging* (585-305-505).

- *Lamp Does Not Light:* After sending a message, you found out that the receiving person’s message-waiting lamp did not light. Check the following:
 - Check the switch voice-port hardware for problems.
 - Check the message-waiting lamp translations on the switch for the subscriber’s phone.
 - Check the subscriber’s telephone set for a faulty switchhook.
 - If the AUDIX system is in a DCS network, verify that the switch number on the AUDIX `subscriber : local` form is correct.

- *Lamp Does Not Extinguish:* After all new messages in the incoming mailbox have been played and either deleted or saved, the message-waiting lamp does not extinguish. Check the following:
 - Check the message-waiting translations on the switch for the subscriber's phone.
 - Check if the subscriber has LWC on the switch (or another Unified Messaging service). The message-waiting lamp might be lit because the subscriber has a new message waiting on some other messaging service.
- *System 75 Lamp Not Correct:* Occasionally on System 75, the message-waiting lamp may be inconsistent with the state of the AUDIX mailbox (it may light when there are no new messages, or fail to extinguish when all new messages have been accessed). This is an audit problem with some older releases of System 75 software. However, the AUDIX login statement informing you of new (or no new) messages is correct.

Subscribers Hear “No Message to Play Back”

AUDIX callers may hear AUDIX announce “there is no message to play back” during a Voice Mailbox call when scanning messages. On a call answer call, this announcement may be followed by a standard system greeting instead of a personal greeting. Check the following:

1. Check if all vtext filesystems are active and present.
2. If filesystems appear good, check the disks (see Chapter 6).
3. If the problem is still present, go to *Solving Unalarmed Problems*.

NOTE

If a vtext was corrupt and had to be replaced, the “No Message to Play Back” announcement is expected.

Subscribers Hear “No Room in Your Mailbox”

During a Voice Mailbox call, the caller may hear the message “there is no room in your mailbox” when trying to create a message. Check the following:

1. The subscriber's mailbox may be full. The system administrator should tell the subscriber to delete unneeded messages in the mailbox (especially the old and file cabinet areas), or increase the subscriber's mailbox size. (Subscribers should hear a warning message when they log in if their mailboxes are getting full.)
2. If the mailbox is *not* full, the AUDIX system administrator should check the subscriber's maximum message lengths on the `subscriber : local` form to make sure they are set to the standard size (they may need to be increased).
3. If the subscriber's mailbox has adequate space and they hear this message, the vdat or one or more vtext filesystems may be missing. Escalate the problem.

Subscribers Hear Reorder Tone

After dialing the system, a subscriber receives reorder tone (fast-busy). Check the following:

1. This is a normal occurrence if you were working on AUDIX and busied out the data link (from either the AUDIX or the switch side) or *all* the voice ports. If you were *not* doing service at the time of the complaint, continue.
2. The switch-to-AUDIX data link may have been out-of-service due to a restart or data link crash. Check for intermittent problems as follows:
 - a. Check the switch and AUDIX resolved alarm log history for data link problems.
 - b. Check the AUDIX `maintenance : error : display` log for data link restart errors (159, 871, 878, 902, and 903) and software restart errors (907 or 908).
 - c. If these problems have occurred more than once a day, run the data link tests (affects service) from both the switch and AUDIX ends (see Chapter 5).
3. If the problem is not resolved, go to *Solving Unalarmed Problems*.

Subscribers Get Faint or Silent Messages

Subscribers may occasionally complain that they are receiving AUDIX messages that have very faint recordings or are simply silent. Possible causes might be:

- Certain loads of switch software.
- A possible problem with the DCIU boards on a System 85 or Generic 2 (the DCIU can set up a one-way communications path to AUDIX). If this problem goes uncorrected, AUDIX may eventually fail to respond to touch-tone commands.

If you suspect this problem exists on your system, escalate it using your local procedures.

Administrator is Unable to Add Subscribers

If the AUDIX system administrator cannot add new subscribers, check the following:

1. Use the `system : limits` form to see if the maximum allowable number of subscribers has been reached. If so, increase the number on this form.
2. The subscriber's name may be a touch-tone equivalent of another subscriber (names must be unique). The administrator should get a "subscriber already exists" error message if this is the problem. Try modifying the name.
3. The sdat filesystem may be full. Refer to *AUDIX Administration* (585-305-501).

Network Messages Are Not Being Sent

If the system is part of an AUDIX network, and messages are not being transmitted between machines, check the administration log for connect failures using the `system : log : display` form. If there is a problem between the local AUDIX and machines in the network, go to *TN366(B): ACC* in Chapter 4 to solve the problem.

Also check the transmission schedule on the `system : translation : machine : audix/amis/call delivery` form. Network messages may only be sent once a day, or the transmission schedule may have been cleared and therefore messages would only be sent when the networking queue was full. See *AUDIX Networking* (585-300-903) for details on networking operation and administration.

An Integrated AUDIX Answers in Standalone Mode

If an AUDIX system is connected to a 1A ESS Switch or 5ESS Switch through a data link, but is answering in the standalone mode (i.e., the system prompts call answer callers to enter the extension of the number they dialed), the data link may be down. If this occurs on all calls, go to Chapter 5 to run data link tests. If this occurs rarely, the system is not getting a connect message from the switch in time and will answer the call in standalone mode rather than not at all.

Slow Response Time on Terminal

This usually happens to the administration terminal, although the maintenance terminal might be affected if the administration terminal uses a modem.

Occasionally the modem connected to the maintenance port experiences problems or is optioned incorrectly; this causes extremely poor response time on the terminal connected to the other port (usually the ADMIN port). To solve this problem:

1. Cycle power on the modem connected to the other port (usually the MAINT port).
2. Check the option switches for the modem using Chapter 8 as a guide.
3. If you still suspect the modem is incorrectly optioned, escalate the problem.

An Upgraded AUDIX Does not Transfer Calls

If an AUDIX system was just upgraded to run R1V7 software, the Call Transfer Out of AUDIX feature was turned off. This is standard procedure for *all* R1V7 upgrades.

To allow call transfer following an upgrade, instruct the customer or system administrator to activate Call Transfer Out of AUDIX using the steps described in the *AUDIX Release 1 Version 7 Forms Reference* manual (585-305-208).

NOTE

Customers must activate the Call Transfer Out of AUDIX feature themselves so they will see the warning message about possible toll fraud. Under no circumstances are you to activate the Call Transfer Out of AUDIX feature for a customer.

If the customer or system administrator has turned call transfer *on* following an upgrade and call transfer still does not work:

1. Display the `system : appearance` form.
2. Check the `call transfer out of AUDIX feature (y/n)?` field.
 - If the field is displaying an **n**, the customer has *not* activated the Call Transfer Out of AUDIX feature. The customer needs to change this field to a **y**.
 - If the field is displaying a **y**, go to the next step.
3. Check whether the `enhanced call transfer (y/n)?` field is displaying a **y** or an **n**.
 - If the field is displaying a **y**, the customer must have a System 75 R1V3 Issue 1.4 (or later), System 85 R2V4 (or later), or a DEFINITY Communications System Generic 1, 2, or 3 for enhanced call transfer to work.

If the customer does not have one of these switches, he or she must reset the field to **n** for call transfer to work. **Do not set this field to n for the customer!**
 - If the field is displaying an **n**, call transfer should work. Check for other reasons for call transfer to fail (such as switch translations).

SOLVING UNALARMED PROBLEMS

If you have no active alarms, you need to check for other possible problems or intermittent faults as outlined in this section.

NOTE

If the Control Mode Menu appears on the terminal screen, go to *Control Mode/Visual Inspection Checklist*.

No Alarms – System Not Running

A local (on-site) service technician may find that AUDIX is not running at all (no fans are on and no LEDs are lit). Take the following steps:

1. Check that the AUDIX AC power cord is plugged in to a working 120 V AC, 60-Hz outlet.
2. Check that the POWER switch on the lower front panel is ON.
3. Make sure AC power is available from the outlet (no general power outage is currently taking place). Plug something else such as a lamp into the outlet and see if it works.
4. If AUDIX still won't run and AC power should be available, go to *Unalarmed Problems* in Chapter 7 to check the power supply and internal wiring.

No Alarms and Software Running

This section covers problems that do not result in an alarm in the active alarm log, although there may be intermittent alarms (faults which repeatedly recur and resolve themselves). AUDIX may or may not answer calls, or it may be providing only limited service. Use the trouble ticket as a guide for all customer-reported problems. **You must be able to log in and access forms** in order to use this section. If you cannot log in, go to *Control Mode/Visual Inspection Checklist*.

CAUTION

If AUDIX answers calls and allows people to log in, *do not* shut down the system without prior customer consent.

Step 1: Check for Intermittent Alarms

Unalarmed service problems may be due to an error or alarm that is resolving itself and then becoming active again (an *intermittent* fault). Check for these as follows:

1. Using the LMT, log in to AUDIX (see Chapter 8 for terminal procedures if needed).
2. If no alarms appear in the active alarm log, check the resolved alarm log using the `maintenance : resolved alarm : display` form. Record the last several resolved alarms reported. Record the unit and device numbers for the fault(s).
3. Use the `maintenance : error : specification` form to select errors by recent date or the time of the problem.
4. Display these errors using the `maintenance : error : display` form. Check if any of the errors match those with resolution procedures in Table 3-2. Record the unit and device numbers for the error(s).

Step 2: Check Hardware Configuration

Check the hardware configuration to verify that AUDIX software has the correct information:

1. Count the number of optional VPC boards installed in slots 20 to 23 and slots 25 to 28.
2. Record any circuit packs that have red (fault) LEDs lit.
3. Use the `maintenance : vsp : equipage` and `maintenance : vsp : busyout` forms to verify all installed VPT, VPC, TDBI, and VB boards and channels in the system are equipped and released (not busy). Record those which are not.
4. Use the `maintenance : td-bus : status` form to see if all installed VPT, VPC, TDBI, and TC boards are in service (IS) or out of service (OOS). Record any that are not in service.
5. Use the `maintenance : dbp : status` form to check that the disks are equipped and enabled (EQ/EN). Note any that are installed but unequipped or disabled.
6. Check the `switch : translation : switch connection` form to verify that the information shown is correct (i.e., switch number, AUDIX number, data link translations). These translations must match the translations at the switch. Correct any problems.
7. Check the `system : translation : voice port` form to verify that the voice port extensions are correctly translated. Note any problems.
8. Check traffic activity on each port by using the `traffic : load : day` and `traffic : load : hour` forms. *If a VPT port has not been used recently*, check its switch translations. Use the *Switch Administration Guide for AUDIX Voice Messaging* (585-305-505).
9. Check the S-bus boards using the `maintenance : system : hardware status` form.
 - a. Write down each unit that has no status (“can’t determine”) or bad status (1). Good status is shown by zeros (0).
 - b. See if the unit(s) with a bad (or no) hardware status match the unit(s) with resolved alarms or errors (from step 1). Match unit numbers to devices using Table 3-1.

Step 3: Check Software Configuration

1. Display the **system : filesystems** form and check for active vtext filesystems (up to ten), other active filesystem types (sdat, sst, and vdat), and the active boot filesystem (usually disk00.boot_f).
2. Display the **filesystem : list** form for each volume. Look for corrupt filesystems. These often have unusual sizes. Verify that all filesystem types are mounted and present.
3. Display the **system : announcement : filesystems** form and check for active announcement filesystems (adat and ndat). If the system uses custom announcements, check also for a backup version of the adat filesystem.

Table 3-2. Common Error Codes *(Part 1 of 2)*

Errors	Cause	Go to:
<i>Data link:</i>		
159, 871, 878 902, 903	Data-link errors.	Chapter 5
198	AUDIX time was resync'd with switch (DEVICE field shows the number of minutes adjusted; normal after 908 error).	Chapter 5
325-328	Switch-to-AUDIX protocol errors (if > 10 per week).	Chapter 5
<i>Disk or Files:</i>		
32, 115	Disk play/record errors (usually, a user or software audit could not find message after a listen (0 or *L) command.	Chapter 6
181, 897, 900	Disk error followed by a recovery.	Chapter 6
704	Disk play/record errors.	Chapter 6
<i>Filesystem:</i>		Escalate
42, 1533	Administration error if at 22:00 (no backup cartridge).	
50-64 69-70	Problem initializing filesystems. Check filesystem (ckfs) program found errors.	
194	No name recorded for subscriber (extension number as above).	
224	DBP error buffer to AUDIX overflowed (log may be full)	
823, 127, 167	Possible corrupt filesystem, if occurring in this order	

(Continued)

TABLE 3-2. Common Error Codes (*Part 2 of 2*)

Errors	Cause	Go to:
<i>Intermittent:</i>		
308	Normal software time-out. If > 4 per day, indicates a problem.	<i>Solving Unalarmed Problems</i>
907-908	Normal initialization. If these occur and you did <i>not</i> restart/reboot the system, you have an unexplained restart.	
1576	MI toggle switch moved <i>if</i> UNIT=17 (1=offc, 0=cntr).	Chapter 4
<i>Routine:</i>		
	Always ignore (up to 12 per day are normal).	<i>Ignore up to 12 per day</i>
14, 24	Subscriber file updated or mailbox message-waiting lamp out-of-synchronization. Not a user problem.	
29, 153	Normal error after deleting subscribers or sending 2-body messages (after an audit or user scans the outgoing mailbox).	
65	DBPA audit resync'd internal free space with the DBP processor (DEVICE field shows number of blocks adjusted).	
127, 167	Messages that often appear with errors 32 and 115. If they appear with error 823, escalate.	
706, 712, 753, 756, 822 (710)	Always ignore (up to 12 per day are normal). (May frequently appear on pre-R1V6 systems; ignore)	
710	Normal if subscribers or CA callers hang up at certain times or if no activity (silence) for 20 seconds while recording. These errors can number into the hundreds.	
725	New firmware using unknown suffix for board code report.	
736	Late angel scan (big bursts of 20 to 50 may cause alarm).	
821	Hardware time-out; normal if CA caller hangs up at certain times.	
–	Some errors against UNIT 35 (VPT), 36 (VPC), 37 (TDBI) are normal if occur on different devices. If many occur on <i>one</i> device, indicates a bad port on that board. If so –	... go to Chapter 4

Step 4: Restart/Reboot the System

Many problems are resolved simply by restarting or rebooting the system. If the system is providing service, *clear this action with the customer first*.

1. Restart the system using the **startup** form.
 - a. If the restart fails, the system automatically attempts a reboot. If the reboot fails (the system does not initialize), go to *Control Mode/Visual Inspection Checklist*.
 - b. If the restart passes (the system enters normal mode and gives you a “start service, login:” prompt), log in and see if the problem is corrected (refer to the list of problems you recorded in the previous steps).
 - c. If the restart gives you the message “service not started”, go to step 4.
 - d. If the restart has no affect on the problem(s), go to the next step.
2. If the system did not already do a reboot, try one now. Use the **shutdown** form to shut down the system software, using the camp-on option (c) if there is traffic. Otherwise, use options (f) and (m) on the form, or cycle the MI toggle switch.
3. After shutdown, press **CTRL** and **c** simultaneously or cycle the MI toggle switch to show the Control Mode Menu. Use Option 5 to reboot the system software, selecting the same boot filesystem that the system was running from in step 3 when you checked the configuration (normally disk00.boot_f).
 - a. If the reboot fails, go to *Control Mode/Visual Inspection Checklist*.
 - b. If the reboot is successful and “start service” appears, go to the next section (step 5).
4. If the reboot is successful, but “service not started” displays, a filesystem is missing or corrupt.
 - a. Check the alarm log to find out which filesystem is missing or what software manager is indicating a problem.
 - b. Escalate the problem.

Step 5: Check if the Problem is Fixed

If the reboot is successful and “start service” appears, check for intermittent problems as follows:

1. Wait 1 or 2 minutes for the switch data link to come up, then display the active alarm log.
 - a. If any active alarms appear, go back to *Solving Active Alarms*.
 - b. If no alarms appear, try to reproduce the original problem (you shouldn’t be able to).
2. Recheck the hardware status from step 2 (hardware configuration).
 - a. If any devices were unequipped, busy, or out of service, see if they are now correctly placed in service. If not, continue.
 - b. Check that any translation problems are now corrected.
 - c. Check if any recorded bad (or nonexistent) hardware status has now cleared, and if packs that had red LEDs are now normal. If not, continue.

3. Begin to replace circuit packs, one at a time, that presently have red LEDs, did not equip correctly during initialization, or have no or bad status (follow the replacement rules for each circuit pack as listed in Chapter 4). If there are none, continue.
4. Begin to replace circuit packs that *previously* had red LEDs or other hardware status problems before the reboot (recorded in step 2).
5. After each hardware replacement, power up the system (it will initialize itself).
 - a. If the initialization succeeds, go back to the beginning of this step to check for alarms and see if the problem is fixed.
 - b. If the initialization fails, go to *Control Mode/Visual Inspection Checklist*.
6. If the problem seems to be fixed, verify good service by making test calls.
7. If the problem is still not resolved, escalate the problem.

VERIFY GOOD SERVICE

After solving any AUDIX service problem, make sure full service is restored as follows:

1. If you blocked service, restore full service as follows:
 - a. Use the `maintenance : vsp : busyout` form if you busied-out individual ports.
 - b. Use the `maintenance : datalink : release` form if you blocked the data link. See *Block/Restore Service* in Appendix A for details if needed.
 - c. Release the AUDIX voice ports at the switch (for a 1A ESS Switch, a 5ESS Switch, or a standalone AUDIX system).
2. Using a telephone, call the AUDIX number to check for good response and verify that full service is available.
3. Double-check your trouble ticket(s) to make sure the customer complaint(s) is solved and related features are working correctly.
4. Check the active and resolved alarm logs for new faults and for the correct resolved entries. See “Alarm Logs (Display and Use)” in Appendix A for details if needed.
5. Check the STATUS line of the terminal screen for any unresolved alarms or threshold (disk space) problems. See Chapter 8, *Terminal Setup and Use*, for details on terminal setup and use if needed.

Local Technicians Do the Following Before Leaving

1. Check the circuit packs and front panel lights for red (alarm) LEDs or warning conditions, and verify that the fans and disk drives are running. See *Visual Inspection* in Appendix A for details if needed.
2. Do any routine maintenance needed for that site (see *Routine Maintenance* in Chapter 2).
3. Place the MI toggle switch in the center position (if not already there).
4. Disconnect the LMT cable from the MAINT port (H00) on the back of the bottom cabinet and reconnect the cable for the Remote Maintenance Terminal (RMT) modem.
5. Turn off the LMT.

4. Circuit Pack Faults

This chapter covers procedures for resolving circuit pack alarms and replacing faulty boards. Only the circuit packs in the AUDIX carrier(s) are covered in this section. For help with backplane boards and buses, contact the TSC.

Circuit packs are covered in the order shown in the following table.

Circuit Pack	Page
TN366 or TN366B: ACC	4-6
TN472 or TN472C: DBP-CPU	4-10
TN475 or TN475B: SADI	4-11
TN477 (TDBI-8) or TN500 (TDBI)	4-12
TN501B: VPC	4-16
TN506B: BC	4-30
TN511: MI	4-31
TN520: VB	4-32
TN523 (or TN591), TN716B, TN734 (or TN761): PE	4-34
TN532 and TN540: DBP-RAM	4-38
TN533: SCPI	4-39
TN539 or TN539B: ACCE	4-42
TN547 or TN547B: MPSI	4-45
TN714: TC	4-46
TN727: NC	4-48
TN747B: VPT	4-51
UN160B: DBPI	4-57
UN162: VSFI	4-58

CIRCUIT PACK OVERVIEW

The AUDIX circuit packs, terminology, and general procedures for handling and replacing circuit packs are covered in this section.

Figure 4-1, *One-Cabinet AUDIX Carrier and Circuit Packs*, shows the required and optional one-cabinet AUDIX circuit packs and their slot locations. The circuit packs in slots 03 and 21 through 28 are optional.

AUDIX Carrier																												
00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
TN506B	TN475B	TN532*	TN539B†	TN472C	TN5162	TN5160B	TN5111		TN591‡	TN761&			TN716B	TN727	TN533\$	TN530#	TN520	TN714	TN747B	TN501B	TN501B	TN501B	TN501B	TN747B	TN501B	TN501B	TN501B	TN501B
◀ --- Optional --- ▶																												

* A TN540 may be in this slot (a TN540 is required for two-cabinet systems).

† The TN539 or TN539B ACCE replaces the TN366 or TN366B ACC in new networked systems.

‡ The TN591 CPU replaces the TN523 CPU in new systems.

& One TN761 RAM board replaces two TN734 RAM boards in slots 10 and 11 in systems using a TN591 CPU.

\$ The TN547 or TN547B MPSI replaces the TN533 SCPI for 1A ESS, 5ESS, or some non-AT&T switch applications.

The TN477 TDBI-8 is used in some early systems with ≤ 8 ports instead of the TN500 TDBI.

Figure 4-1. One-Cabinet AUDIX Carriers and Circuit Packs

Figure 4-2, *Two-Cabinet AUDIX Carriers and Circuit Packs*, shows the required and optional two-cabinet AUDIX circuit packs and their slot locations. Empty slots are reserved for future use.

AUDIX Expansion Carrier																							
00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
									TN591	TN761			TN716B	TN727		TN500	TN520		TN747B	TN501B	TN501B	TN501B	TN747B
									†	&													
◀----- Optional -----▶																							
AUDIX Base Carrier																							
00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TN506B	TN475B	TN540	TN539B*	TN472C	TN162	TN160B	TN511		TN591	TN761			TN716B		TN533	TN500	TN520		TN747B	TN501B	TN501B	TN501B	TN747B
			*	C		B			†	&					\$								
◀----- Optional -----▶																							

* The TN539 or TN539B ACCE replaces the TN366 or TN366B ACC in new networked systems.

† The TN591 CPU replaces the TN523 CPU in new systems.

& One TN761 RAM board replaces one or two TN734 RAM boards in slots 10 and 11 in systems using a TN591 CPU.

\$ The TN547 or TN547B MPSI replaces the TN533 SCPI for 1A ESS, 5ESS, or some non-AT&T switch applications.

Figure 4-2. Two-Cabinet AUDIX Carriers and Circuit Packs

Resolving Alarms

Each circuit pack has an Alarm Resolution table. The first two columns in each table contain the fault, unit, and device numbers that appear in the alarm log. The tables also have a “1st” and sometimes a “2nd” or “3rd” choice for resolving an alarm. To resolve an alarm, do the following:

1. Start in Chapter 3, *Start Troubleshooting* and record the unit, device, and fault numbers of the first several entries in the alarm log (shown on the **maintenance : active alarm : display** form).
2. Use Table 3-1 to find the unit number of the first entry in the alarm log, then go to the section indicated.
3. Find the alarm (the fault, unit, *and* device number) you want to resolve in the table in this section. Follow the 1st-choice procedure to resolve this alarm.

NOTE

For systems with an expansion cabinet, circuit pack slot numbers are the same for each cabinet. The alarm resolution tables have an L next to alarmed circuit packs in the lower cabinet and a U next to alarmed circuit packs in the upper cabinet.

When an expansion cabinet is added, the TN727 Network Control (NC) is moved from the lower to the upper cabinet. The slot remains empty on the bottom cabinet.

4. Use the **maintenance : active alarm : display** form to verify that all alarms are resolved. When you are finished, no alarms should appear.
 - a. If the 1st-choice procedure fails to resolve the alarm and you replaced the 1st-choice circuit pack, insert the *original* circuit pack back into its slot and proceed.

CAUTION

See the circuit pack handling procedures on the following page before inserting any circuit packs. You need to check the backplane for possible damage or you may damage the replacement pack.

- b. Replace the 2nd-choice unit, if provided, using that unit’s general replacement procedure.
 - c. If the second choice fails to resolve the alarm, replace the 3rd-choice unit, if provided. Otherwise, try to resolve the next alarm in the log.
 - d. If the third choice fails to resolve the alarm, or if you feel you are not making progress, escalate the problem using your local procedures.
5. After the original 1st-choice fault is resolved, check the **maintenance : active alarm : display** form for additional faults that may have occurred. Repeat the steps in this list if needed to resolve any remaining active alarms.
 6. When the faults in this section are solved, return to *Verify Good Service* in Chapter 3.

Replacing Circuit Packs

Shut down and power down the system before removing boards unless specifically instructed to do otherwise. *Always* shut down and power down before inserting boards.

NOTE

The Voice Port Controller (VPC) and Voice Port Trunk (VPT) circuit packs in slots 21 to 28 of each cabinet are optional. While these boards are designed to be replaced without powering down the system, the AUDIX backplane does not support this [the Time Division (TD) bus may hang, or other problems may occur]. All AUDIX packs should be replaced *only* after shutting down software and powering down the system.

CAUTION

Always wear an antistatic EMC wrist strap before handling any circuit pack. Plug the jack into the Electro-Static Discharge (ESD) ground point near the front cover latch on the cabinet. See Figure 2-3 in Chapter 2.

Before inserting or swapping circuit packs:

1. After removing a circuit pack, look into the empty slot (you may need a flashlight). Look for bent pins on the backplane; a bent or broken pin may have damaged the circuit pack.
2. Examine the connector on the removed circuit pack. Look for broken pins that may have pulled out of the backplane and stuck to the connector. Also look for a burn mark on the connector that may indicate a short on the backplane.
3. If you find bent or broken pins or burn marks indicating a backplane problem, escalate the problem to the TSC.

Circuit-pack handling terms include:

1. Unseat or *pop* the circuit pack by opening the faceplate lever of the pack, “popping” it out of its backplane connector.
2. Install or *push* in a new or equivalent circuit pack. Carefully insert the pack into the backplane connector. Once the circuit pack is close enough to hook the bottom of the faceplate to the carrier, push the faceplate at the top with your thumb, then latch and push the faceplate lever into position at the bottom.

CAUTION

Never force circuit packs into a slot or you can damage the backplane. If the backplane is damaged, check with the TSC for procedures to replace a broken backplane pin.

3. Exchange or *swap* circuit packs by replacing a pack with a spare, or by changing the positions of duplicate packs within the system.

TN366(B): ACC

The AUDIX Communications Controller (ACC) allows an AUDIX system to network with other AUDIX adjuncts. The TN366 or TN366B circuit pack has two Digital Communications Protocol (DCP) links that provide dial access to and from other AUDIX systems.

A networked system must have a TN366 Vintage 5 (or later) or TN366B ACC, or a TN539 or TN539B ACCE; see *TN539(B): ACCE* later in this chapter. If the AUDIX networking ports connect to a Generic 2 Universal Module or to a MERLIN II, the TN366B or a TN539(B) *must* be used. The AUDIX system must also have a TN472C Vintage 2 or later circuit pack and a UN160B Vintage 2 (or later) circuit pack.

Table 4-1. ACC [TN366(B)] Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (ckt,slot,proc.)	2nd (ckt,slot)	3rd
249	141 : 0	ACC Board was Reset	TN366B, 3, A	—	—
253	141 : 0	ACC Address Error Fault	TN366B, 3, A	—	—
254	141 : 0	ACC Bus Error Fault	TN366B, 3, A	—	—
255	141 : 0	ACC Zero Divide	TN366B, 3, A	—	—
256	141 : 0	ACC Exception on CHK Instruction	TN366B, 3, A	—	—
257	141 : 0	ACC Privilege Violation	TN366B, 3, A	—	—
258	141 : 0	ACC Program Logic Error	TN366B, 3, A	—	—
259	141 : 0	ACC Spurious or Unknown Interrupt	TN366B, 3, A	—	—
260	141 : 0	ACC NMI	TN366B, 3, A	—	—
261	141 : 0	ACC I/O (DMA) Fault	TN366B, 3, A	—	—
262	141 : 0	ACC I/O (HDLC) Fault	TN366B, 3, A	—	—
263	141 : 0	ACC I/O (USART) Fault	TN366B, 3, A	—	—
264	141 : 0	ACC Sanity Timeout	TN366B, 3, A	—	—
265	141 : 0	ACC Link Reset	TN366B, 3, A	—	—
266	141 : 0	ACC System Queue/Buffer Corruption	TN366B, 3, A	—	—
267	141 : 0	ACC Unknown Mailbox Interrupt	TN366B, 3, A	—	—
268	141 : 0	ACC RAM Failed Background Test	TN366B, 3, A	—	—
269	141 : 0	ACC EPROM Failed Background Test	TN366B, 3, A	—	—
270	141 : 0	ACC Firmware: Mailbox or Queue Audit Error	TN366B, 3, A	—	—
271	141 : 0	ACC Firmware: Bad Channel	TN366B, 3, A	—	—
271	141 : 1	ACC Firmware: Bad Channel	TN366B, 3, A	—	—
272	141 : 0	ACC Firmware: Channel okay	—	—	—
272	141 : 2	ACC Firmware: Bad Channel	TN366B, 3, A	—	—
501-600	144:1-100	Continuing connection failure (device = node)	TN366B, 3, B	—	—
701-800	144:1-100	Remote Update failure (device = node)	TN366B, 3, D	—	—

Procedure A: General Replacement Steps

Do the following steps to resolve the alarm:

1. Display the `maintenance : network` form. Check the status of the channels. This should indicate which ones are assigned.
 - a. If the RS-232 channels are NOT AVAILABLE, the system is using a TN366(B). If the RS-232 channels are NOT EQUIPPED, a TN539(B) is being used, but these channels are unequipped on the `system : translation : network port` form.
 - b. If any DCP channels are shown as NOT EQUIPPED, check your switch configuration:
 - A System 75, Generic 1, or Generic 3 switch can use only two of the DCP channels: 2 and 4.
 - A MERLIN switch can use only two of the DCP channels: 1 and 3.
 - c. If any channels which display the message NOT EQUIPPED should be equipped, go to step 2. Otherwise, skip to step 3.
2. Display the `system : translation : network port` form.
 - a. Try equipping the channels that should be equipped. Refer to the *AUDIX Networking* manual (585-300-903) for complete information on using this form.
 - b. If you have a switch that only supports two DCP channels, make sure the correct channels are equipped (see the previous step).
 - c. After re-equipping or re-assigning the ports, go to the next step.
3. Perform test number 2 for each assigned channel. When the test is complete, check the “test result” field.
 - a. If the test passes for all channels, go to step 8.
 - b. If you get FAIL: NO ANSWER, the remote AUDIX can probably be reached, but does not respond (does not answer). Retry the test.
 - c. If you get FAIL: BUSY, it usually indicates the local switch facilities are suspect. Check the switch facilities (modem pooling) and translations.
 - d. If you get TEST FAILED, check the *channel status* fields for the cause of the failure.
 - e. If the alarm remains, select test number 5, board reset, and press CHANGE. Repeat the tests and see if the alarm is resolved. If not, go to the next step.
4. Do a maintenance shutdown and power down.
5. Replace the TN366(B) in slot 3.
6. Power up and initialize the system.
7. Display the `maintenance : network` form.
 - a. The board status should now show “NORMAL”. Each channel status should show “IDLE”, “IN USE”, or “NOT EQUIPPED”. If this is the current status of the board and channels, go to *Verify Good Service* in Chapter 3.

- b. If any status is bad or the alarm becomes active again, go to the next step.
8. Check the active alarm log.
 - a. If the alarm is still active, check for other alarms. If there are other active alarms, try resolving them and see if this helps resolve the current alarm.
 - b. If there are no additional active alarms and you cannot resolve this alarm, it may go away by itself or you may have to restart the system. Check with the customer for a convenient time.
 - c. If the restart clears the alarm, go to *Verify Good Service* in Chapter 3.

NOTE

For complete information on AUDIX networking connections, administration, and testing, see the *AUDIX Networking* manual (585-300-903).

Procedure B: Resolving Connection Failures

Do the following steps to resolve this alarm:

1. The device field of the fault code points to a specific AUDIX machine. Look up this number on the `list : machine` form.
2. Go to the `maintenance : network` form and try to connect to this machine (test 1). You must enter the remote AUDIX's machine name. If the connect test succeeds, the fault should be cleared.
3. If the connect test fails, go to Procedure A. After completing Procedure A, retry the connect test. If there is still a fault, go to Procedure C.

Procedure C: Check Translations and Switch Facilities

When logged in to the local AUDIX:

1. Check the local AUDIX translations on the `system : translation : machine : audix/amis/call delivery` form. (*local/remote = l*)

NOTE

AUDIX networking administration, forms, and field descriptions are covered in the *AUDIX Networking* manual (585-300-903).

2. Check the remote AUDIX translations (*local/remote = r*).
3. Translations for the remote AUDIX machine(s) should correspond to translations for the host (local) AUDIX. Check the *machine names*, the *network data phone numbers*, and the *network data speeds*. Then retry the connect test.

NOTE

This form has changed in R1V5 and later software. The Network Data Phone Number and Network Data Speed have changed to *network connection type* (dcp, rs232a, or rs323s), *data rate* (if type is rs232s and data rate is 56K or 64K, you may have a distance limitation and dialing restrictions), *channel* (only used for RS-232 dedicated connections), and *dial string* (characters to be send to the remote AUDIX to establish a connection). There is also a new field: *default community* (used to restrict one AUDIX from calling another that is outside of its community).

4. The *dial string* may contain special characters that, when enclosed in double quotes act as control characters for the ACCE. The AUDIX must have the TN539(B) to use these characters.
5. If there is still an alarm, check the switch translations and facilities. Commom problems include the installation and administration of modem pooling, option settings on the data sets, etc. Retry the connect test (Procedure B) once everything is checked.
6. If the problem cannot be located, try tracing the problem from the remote AUDIX to the local AUDIX.
7. Some of the AUDIX ports may be unequipped. Refer to steps 1 and 2 in Procedure A to try re-equipping the channels using the `system : translation : network port` form.

Procedure D: Remote Update Failure

This fault is raised whenever three consecutive remote update attempts to the same remote adjunct fail. The fault will resolve itself when a remote update to the remote adjunct is successful. This could be an automatic update or an update performed manually using the `system : translation : remote updates` form.

If the Remote Updates feature is turned off at the local adjunct for updates to/from the remote adjunct, the fault will eventually disappear.

TN472C: DBP-CPU

The TN472C Data Base Processor (DBP) Central Processing Unit (CPU) performs filesystem data-base management and handles initialization and maintenance for the DBP subsystem.

If the AUDIX is networked, the TN472C must be a Vintage 2 or later circuit pack.

Table 4-2. DBP-CPU (TN472C) Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (ckt,slot,proc.)	2nd Choice	3rd Choice
897	1 : 0	DBP-CPU diagnostic result (116F)	TN472C, 04, A	—	—
Note: Fault code 116 is not currently alarmed.					

Procedure A: General Replacement Steps

To replace the DBP-CPU circuit pack:

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the DBP-CPU. Power up the system. The system should initialize.
3. Verify that the alarm is resolved using the `maintenance : active alarm : display` form.

TN475(B): SADI

The TN475 or TN475B Small Computer Systems Interface (SCSI)-to-AUDIX Disk Interface (SADI) board is the disk controller for AUDIX. The SADI has LEDs to show which disk drives are connected and accessible. It communicates with the TN472C DBP-CPU and the disk drives over the DBP (VME) bus.

Table 4-3. SADI (TN475B) Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (ckt,slot,proc.)	2nd Choice (see section)	3rd Choice
322	6 : 0	Controller did not respond before timeout (file redundancy error)	TN475B, 01, A	DBP/VME bus	
332	6 : 0	Error detected in disk controller test	TN475B, 01, A	DBP/VME bus	
334	6 : 0	Communication error with DBP disk driver	TN475B, 01, A	DBP/VME bus	
897	6 : 0	Controller DBP diagnostic result (102F)	TN475B, 01, A	DBP/VME bus	
897	7 : 0	Disk controller diagnostic result (104F)	TN475B, 01, A	DBP/VME bus	
897	8 : 0	Disk controller diagnostic result (106F)	TN475B, 01, A	DBP/VME bus	
Note: Fault codes 102 to 106 are not currently alarmed.					

Procedure A: General Replacement Steps

To replace the SADI circuit pack:

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the TN475(B). Power up the system. The system should initialize.
3. Verify that the alarm is resolved using `maintenance : active alarm : display`.
4. If the alarm returns, have the TSC check the DBP/VME bus.

SADI Diagnostic Tests

The SADI runs diagnostic tests during a DBP subsystem reboot (as in step 2 in Procedure A). If the red LED remains lit, a SADI test failed. LEDs 10 to 13 show a binary code for the diagnostic test. All but one of these codes indicate a problem with the SADI board. The exception is when yellow LEDs 10, 11, and 13 are lit (see Table A-2 in Appendix A for test 11, VME bus-access failure). In this case, the problem is probably some other board on the DBP (VME) bus. For other LED patterns, if the TN475(B) SADI has a lit red LED, the SADI is probably faulty and should be replaced.

TN477 (TDBI-8) OR TN500 (TDBI)

The Time Division Bus Interface (TDBI) circuit pack is the data-exchange interface between the TN520 VB and TN501B VPC boards. The TN477 has eight channels. The TN500 has sixteen. The TN477 was only installed in early one-cabinet systems containing four or fewer TN501Bs. The TN500 is installed in most cabinets.

The following table shows fault and device codes for solving either TN477 TDBI-8 or TN500 TDBI problems. Even though the table always points to the TN500 for repair action, repair action can apply to either the TN500 or the TN477.

Table 4-4. TDBI-8 (TN477) or TDBI (TN500) Alarm Resolution *(Part 1 of 2)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
684	37 : 1-8	Slave processor ROM failure	TN500, 16L, A	—	—
685	37 : 9-16	Slave processor ROM failure	TN500, 16L, A	—	—
686	37 : 17-24	Slave processor ROM failure	TN500, 16U, A	—	—
687	37 : 25-32	Slave processor ROM failure	TN500, 16U, A	—	—
688	37 : 1-8	Slave processor insane	TN500, 16L, A	—	—
689	37 : 9-16	Slave processor insane	TN500, 16L, A	—	—
690	37 : 17-24	Slave processor insane	TN500, 16U, A	—	—
691	37 : 25-32	Slave processor insane	TN500, 16U, A	—	—
692	37 : 1-8	Late voice buffer scan	TN500, 16L, A	TN520, 17L	—
693	37 : 9-16	Late voice buffer scan	TN500, 16L, A	TN520, 17L	—
694	37 : 17-24	Late voice buffer scan	TN500, 16U, A	TN520, 17U	—
695	37 : 25-32	Late voice buffer scan	TN500, 16U, A	TN520, 17U	—
696	37 : 1-8	Slave processor RAM failure	TN500, 16L, A	—	—
697	37 : 9-16	Slave processor RAM failure	TN500, 16L, A	—	—
698	37 : 17-24	Slave processor RAM failure	TN500, 16U, A	—	—
699	37 : 25-32	Slave processor RAM failure	TN500, 16U, A	—	—
700	37 : 1-8	TDBI VB/DPR error	TN500, 16L, A	TN520, 17L	any TN501B
701	37 : 9-16	TDBI VB/DPR error	TN500, 16L, A	TN520, 17L	any TN501B
702	37 : 17-24	TDBI VB/DPR error	TN500, 16U, A	TN520, 17U	any TN501B
703	37 : 25-32	TDBI VB/DPR error	TN500, 16U, A	TN520, 17U	any TN501B
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

(Continued)

TABLE 4-4. TDBI-8 (TN477) or TDBI (TN500) Alarm Resolution *(Part 2 of 2)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
704	37 : 1-8	Slave processor serial link error	TN500, 16L, A	—	—
705	37 : 9-16	Slave processor serial link error	TN500, 16L, A	—	—
706	37 : 17-24	Slave processor serial link error	TN500, 16U, A	—	—
707	37 : 25-32	Slave processor serial link error	TN500, 16U, A	—	—
716-723	37 : 1-8	Hardware time-out	TN500, 16L, A	—	—
724-731	37 : 9-16	Hardware time-out	TN500, 16L, A	—	—
732-747	37 : 17-32	Hardware time-out	TN500, 16U, A	—	—
748-755	37 : 1-8	Protocol chip test error	TN500, 16L, A	—	—
756-763	37 : 9-16	Protocol chip test error	TN500, 16L, A	—	—
764-779	37 : 17-32	Protocol chip test error	TN500, 16U, A	—	—
780-787	37 : 1-8	Slave processor HDLC/PC link error	TN500, 16L, B	any TN501B	—
788-795	37 : 9-16	Slave processor HDLC/PC link error	TN500, 16L, B	any TN501B	—
796-811	37 : 17-32	Slave processor HDLC/PC link error	TN500, 16U, B	any TN501B	—
812-819	37 : 1-8	TDBI external loop-around test	TN500, 16L, B	any TN501B	—
820-827	37 : 9-16	TDBI external loop-around test	TN500, 16L, B	any TN501B	—
828-843	37 : 17-32	TDBI external loop-around test	TN500, 16U, B	any TN501B	—
844-851	37 : 1-8	TDBI crosstalk	TN500, 16L, C	TD bus	—
852-859	37 : 9-16	TDBI crosstalk	TN500, 16L, C	TD bus	—
860-875	37 : 17-32	TDBI crosstalk	TN500, 16U, C	TD bus	—
1145	57 : 1	TD-bus sanity	TN500, 16L, E	TD bus	—
1146	57 : 2	TD-bus sanity	TN500, 16U, E	TD bus	—
1171	57 : 1	TD-bus control channel	TN500, 16L, D	TD bus	—
1172	57 : 2	TD-bus control channel	TN500, 16U, D	TD bus	—
1197	57 : 1	Angel ROM or RAM error	TN500, 16L, E	TD bus	—
1198	57 : 2	Angel ROM or RAM error	TN500, 16U, E	TD bus	—
1223	57 : 1	Angel program logic inconsistency	TN500, 16L, E	TD bus	—
1224	57 : 2	Angel program logic inconsistency	TN500, 16U, E	TD bus	—
1249	57 : 1	Translation error	TN500, 16L, E	TD bus	—
1250	57 : 2	Translation error	TN500, 16U, E	TD bus	—
1256	57 : 1	VB initialization failed	TN500, 16L, A	TN520, 17L	—
1257	57 : 2	VB initialization failed	TN500, 16U, A	TN520, 17U	—
1533	37 : 1	Angel serial link error	TN500, 16L, A	—	—
1534	37 : 2	Angel serial link error	TN500, 16U, A	—	—

Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.

Procedure A: General Replacement Steps

To replace the TN500 TDBI or TN477 TDBI-8 circuit pack (TDBI or TD-bus tests can be performed on either the TDBI or TDBI-8):

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the alarmed circuit pack.
3. Power up the system. After the system initializes, block service using the appropriate form or switch procedure. See Appendix A for details.
4. Run the complete TD-bus test on the replaced unit using the `maintenance : td-bus : test` form. Select 5 repetitions and option ‘y’ for the long test.
5. Run the TDBI external HDLC (loop-around) test on each channel controlled by the replaced unit using the `maintenance : tdbi : test` form. Select 5 repetitions and the ‘n’ option to run the short test.
6. Verify that the alarm did not become active again using the `maintenance : active alarm : display` form.
 - a. If the alarm is *not* active, go to the next step and verify that the alarm is resolved if traffic allows. If you cannot keep the system down, enable service using the appropriate form or switch procedure and continue with step 7 when traffic allows.
 - b. If the alarm is still active, go to the next step.
7. To ensure complete TDBI operation, display the `maintenance : system : test call` form. Make eight TDBI test calls (on a TN477) or 16 test calls (on a TN500) to test all the channels on the replaced TDBI. See Appendix A for test call procedures.
8. Verify that the alarm is resolved using the `maintenance : active alarm : display` form.
9. If you have not already restored service, use the `maintenance : datalink : release` form.
10. If the alarm returns, replace the 2nd-choice board or have the TSC check the TD bus.

Procedure B: TDBI External HDLC (Loop-Around) Test

This test can be performed on either the TDBI or TDBI-8.

Run the TDBI external HDLC (loop-around) test on the alarmed channel (repetitions = 5). Use the `maintenance : tdbi : test` form and the ‘n’ option to run the short test.

If the test fails, follow Procedure A with the addition that the external HDLC (loop-around) test must run five times successfully to resolve the alarm (repetitions = 5).

Procedure C: Complete TDBI Channel Test

This test can be performed on either the TDBI or TDBI-8.

Run the TDBI NPE crosstalk test on the alarmed channel (repetitions = 5). Use the `maintenance : tdbi : test` form and the ‘y’ option to run the long test.

If the test fails, follow Procedure A with the addition that the NPE crosstalk test must run five times successfully to resolve the alarm (repetitions = 5).

Procedure D: TD-Bus Control Channel Test

This test can be performed on either the TDBI or TDBI-8.

Run the TD-Bus control channel test on the alarmed TDBI unit (repetitions = 5). Use the `maintenance : td-bus : test` form and the ‘n’ option to run the short test.

If the test fails, follow Procedure A with the addition that the TD-Bus control channel test must be run five times successfully to resolve the alarm (repetitions = 5).

Procedure E: Complete TD-Bus Test

This test can be performed on either the TDBI or TDBI-8.

Run the complete TD-bus test on the alarmed TDBI board (repetitions = 5). Use the `maintenance : td-bus : test` form and the ‘y’ option to run the long test.

If the test fails, follow Procedure A to resolve the alarm.

TN501B: VPC

Each Voice Port Controller (VPC) board has two ports that connect to the TD bus. Each port has two channels: one to the TN747B VPT board, and the other to the disk drives through the TN472C DBP-CPU. The VPC circuit pack encodes and compresses messages to reduce disk storage requirements. It also controls speed and volume control, speech compression and expansion, and touch-tone signal detection and generation.

If the alarmed unit is 36, only one channel on the board is failing. The board can still provide service on its other channel.

Table 4-5. VPC (TN501B) Alarm Resolution *(Part 1 of 13)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
300-301	36 : 1-2	Hardware time-out	TN501B, 20L, A	TN727, 14	—
302-303	36 : 3-4	Hardware time-out	TN501B, 21L, A	TN727, 14	—
304-305	36 : 5-6	Hardware time-out	TN501B, 22L, A	TN727, 14	—
306-307	36 : 7-8	Hardware time-out	TN501B, 23L, A	TN727, 14	—
308-309	36 : 9-10	Hardware time-out	TN501B, 25L, A	TN727, 14	—
310-311	36 : 11-12	Hardware time-out	TN501B, 26L, A	TN727, 14	—
312-313	36 : 13-14	Hardware time-out	TN501B, 27L, A	TN727, 14	—
314-315	36 : 15-16	Hardware time-out	TN501B, 28L, A	TN727, 14	—
316-317	36 : 17-18	Hardware time-out	TN501B, 20U, A	TN727, 14U	—
318-319	36 : 19-20	Hardware time-out	TN501B, 21U, A	TN727, 14U	—
320-321	36 : 21-22	Hardware time-out	TN501B, 22U, A	TN727, 14U	—
322-323	36 : 23-24	Hardware time-out	TN501B, 23U, A	TN727, 14U	—
324-325	36 : 25-26	Hardware time-out	TN501B, 25U, A	TN727, 14U	—
326-327	36 : 27-28	Hardware time-out	TN501B, 26U, A	TN727, 14U	—
328-329	36 : 29-30	Hardware time-out	TN501B, 27U, A	TN727, 14U	—
330-331	36 : 31-32	Hardware time-out	TN501B, 28U, A	TN727, 14U	—
332-333	36 : 1-2	VPC DSP #1, 2, 3 ROM or	TN501B, 20L, A	—	—
334-335	36 : 3-4	RAM error	TN501B, 21L, A	—	—
336-337	36 : 5-6	(same)	TN501B, 22L, A	—	—
338-339	36 : 7-8	(same)	TN501B, 23L, A	—	—
340-341	36 : 9-10	(same)	TN501B, 25L, A	—	—
342-343	36 : 11-12	(same)	TN501B, 26L, A	—	—
344-345	36 : 13-14	(same)	TN501B, 27L, A	—	—
346-347	36 : 15-16	(same)	TN501B, 28L, A	—	—
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

(Continued)

TABLE 4-5. VPC (TN501B) Alarm Resolution *(Part 2 of 13)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
348-349	36 : 17-18	VPC DSP #1, 2, 3 ROM or	TN501B, 20U, A	—	—
350-351	36 : 19-20	RAM error	TN501B, 21U, A	—	—
352-353	36 : 21-22	(same)	TN501B, 22U, A	—	—
354-355	36 : 23-24	(same)	TN501B, 23U, A	—	—
356-357	36 : 25-26	(same)	TN501B, 25U, A	—	—
358-359	36 : 27-28	(same)	TN501B, 26U, A	—	—
360-361	36 : 29-30	(same)	TN501B, 27U, A	—	—
362-363	36 : 31-32	(same)	TN501B, 28U, A	—	—
364-365	36 : 1-2	VPC HDLC/PC init error	TN501B, 20L, A	—	—
366-367	36 : 3-4	VPC HDLC/PC init error	TN501B, 21L, A	—	—
368-369	36 : 5-6	VPC HDLC/PC init error	TN501B, 22L, A	—	—
370-371	36 : 7-8	VPC HDLC/PC init error	TN501B, 23L, A	—	—
372-373	36 : 9-10	VPC HDLC/PC init error	TN501B, 25L, A	—	—
374-375	36 : 11-12	VPC HDLC/PC init error	TN501B, 26L, A	—	—
376-377	36 : 13-14	VPC HDLC/PC init error	TN501B, 27L, A	—	—
378-379	36 : 15-16	VPC HDLC/PC init error	TN501B, 28L, A	—	—
380-381	36 : 17-18	VPC HDLC/PC init error	TN501B, 20U, A	—	—
382-383	36 : 19-20	VPC HDLC/PC init error	TN501B, 21U, A	—	—
384-385	36 : 21-22	VPC HDLC/PC init error	TN501B, 22U, A	—	—
386-387	36 : 23-24	VPC HDLC/PC init error	TN501B, 23U, A	—	—
388-389	36 : 25-26	VPC HDLC/PC init error	TN501B, 25U, A	—	—
390-391	36 : 27-28	VPC HDLC/PC init error	TN501B, 26U, A	—	—
392-393	36 : 29-30	VPC HDLC/PC init error	TN501B, 27U, A	—	—
394-395	36 : 31-32	VPC HDLC/PC init error	TN501B, 28U, A	—	—
396-397	36 : 1-2	VPC CAB/DSP error	TN501B, 20L, A	—	—
398-399	36 : 3-4	VPC CAB/DSP error	TN501B, 21L, A	—	—
400-401	36 : 5-6	VPC CAB/DSP error	TN501B, 22L, A	—	—
402-403	36 : 7-8	VPC CAB/DSP error	TN501B, 23L, A	—	—
404-405	36 : 9-10	VPC CAB/DSP error	TN501B, 25L, A	—	—
406-407	36 : 11-12	VPC CAB/DSP error	TN501B, 26L, A	—	—
408-409	36 : 13-14	VPC CAB/DSP error	TN501B, 27L, A	—	—
410-411	36 : 15-16	VPC CAB/DSP error	TN501B, 28L, A	—	—
412-413	36 : 17-18	VPC CAB/DSP error	TN501B, 20U, A	—	—
414-415	36 : 19-20	VPC CAB/DSP error	TN501B, 21U, A	—	—
416-417	36 : 21-22	VPC CAB/DSP error	TN501B, 22U, A	—	—
418-419	36 : 23-24	VPC CAB/DSP error	TN501B, 23U, A	—	—
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

(Continued)

TABLE 4-5. VPC (TN501B) Alarm Resolution *(Part 3 of 13)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
420-421	36 : 25-26	VPC CAB/DSP error	TN501B, 25U, A	—	—
422-423	36 : 27-28	VPC CAB/DSP error	TN501B, 26U, A	—	—
424-425	36 : 29-30	VPC CAB/DSP error	TN501B, 27U, A	—	—
426-427	36 : 31-32	VPC CAB/DSP error	TN501B, 28U, A	—	—
428-429	36 : 1-2	Angel serial link error	TN501B, 20L, A	—	—
430-431	36 : 3-4	Angel serial link error	TN501B, 21L, A	—	—
432-433	36 : 5-6	Angel serial link error	TN501B, 22L, A	—	—
434-435	36 : 7-8	Angel serial link error	TN501B, 23L, A	—	—
436-437	36 : 9-10	Angel serial link error	TN501B, 25L, A	—	—
438-439	36 : 11-12	Angel serial link error	TN501B, 26L, A	—	—
440-441	36 : 13-14	Angel serial link error	TN501B, 27L, A	—	—
442-443	36 : 15-16	Angel serial link error	TN501B, 28L, A	—	—
444-445	36 : 17-18	Angel serial link error	TN501B, 20U, A	—	—
446-447	36 : 19-20	Angel serial link error	TN501B, 21U, A	—	—
448-449	36 : 21-22	Angel serial link error	TN501B, 22U, A	—	—
450-451	36 : 23-24	Angel serial link error	TN501B, 23U, A	—	—
452-453	36 : 25-26	Angel serial link error	TN501B, 25U, A	—	—
454-455	36 : 27-28	Angel serial link error	TN501B, 26U, A	—	—
456-457	36 : 29-30	Angel serial link error	TN501B, 27U, A	—	—
458-459	36 : 31-32	Angel serial link error	TN501B, 28U, A	—	—
460-461	36 : 1-2	Slave proc. ROM, RAM,	TN501B, 20L, A	—	—
462-463	36 : 3-4	insane, mode err	TN501B, 21L, A	—	—
464-465	36 : 5-6	(same)	TN501B, 22L, A	—	—
466-467	36 : 7-8	(same)	TN501B, 23L, A	—	—
468-469	36 : 9-10	(same)	TN501B, 25L, A	—	—
470-471	36 : 11-12	(same)	TN501B, 26L, A	—	—
472-473	36 : 13-14	(same)	TN501B, 27L, A	—	—
474-475	36 : 15-16	(same)	TN501B, 28L, A	—	—
476-477	36 : 17-18	(same)	TN501B, 20U, A	—	—
478-479	36 : 19-20	(same)	TN501B, 21U, A	—	—
480-481	36 : 21-22	(same)	TN501B, 22U, A	—	—
482-483	36 : 23-24	(same)	TN501B, 23U, A	—	—
484-485	36 : 25-26	(same)	TN501B, 25U, A	—	—
486-487	36 : 27-28	(same)	TN501B, 26U, A	—	—
488-489	36 : 29-30	(same)	TN501B, 27U, A	—	—
490-491	36 : 31-32	(same)	TN501B, 28U, A	—	—
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

(Continued)

TABLE 4-5. VPC (TN501B) Alarm Resolution *(Part 4 of 13)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
492-493	36 : 1-2	VPC slave processor reset	TN501B, 20L, A	—	—
494-495	36 : 3-4	VPC slave processor reset	TN501B, 21L, A	—	—
496-497	36 : 5-6	VPC slave processor reset	TN501B, 22L, A	—	—
498-499	36 : 7-8	VPC slave processor reset	TN501B, 23L, A	—	—
500-501	36 : 9-10	VPC slave processor reset	TN501B, 25L, A	—	—
502-503	36 : 11-12	VPC slave processor reset	TN501B, 26L, A	—	—
504-505	36 : 13-14	VPC slave processor reset	TN501B, 27L, A	—	—
506-507	36 : 15-16	VPC slave processor reset	TN501B, 28L, A	—	—
508-509	36 : 17-18	VPC slave processor reset	TN501B, 20U, A	—	—
510-511	36 : 19-20	VPC slave processor reset	TN501B, 21U, A	—	—
512-513	36 : 21-22	VPC slave processor reset	TN501B, 22U, A	—	—
514-515	36 : 23-24	VPC slave processor reset	TN501B, 23U, A	—	—
516-517	36 : 25-26	VPC slave processor reset	TN501B, 25U, A	—	—
518-519	36 : 27-28	VPC slave processor reset	TN501B, 26U, A	—	—
520-521	36 : 29-30	VPC slave processor reset	TN501B, 27U, A	—	—
522-523	36 : 31-32	VPC slave processor reset	TN501B, 28U, A	—	—
524-525	36 : 1-2	VPC NPE crosstalk	TN501B, 20L, C	TD-bus	—
526-527	36 : 3-4	VPC NPE crosstalk	TN501B, 21L, C	TD-bus	—
528-529	36 : 5-6	VPC NPE crosstalk	TN501B, 22L, C	TD-bus	—
530-531	36 : 7-8	VPC NPE crosstalk	TN501B, 23L, C	TD-bus	—
532-533	36 : 9-10	VPC NPE crosstalk	TN501B, 25L, C	TD-bus	—
534-535	36 : 11-12	VPC NPE crosstalk	TN501B, 26L, C	TD-bus	—
536-537	36 : 13-14	VPC NPE crosstalk	TN501B, 27L, C	TD-bus	—
538-539	36 : 15-16	VPC NPE crosstalk	TN501B, 28L, C	TD-bus	—
540-541	36 : 17-18	VPC NPE crosstalk	TN501B, 20U, C	TD-bus	—
542-543	36 : 19-20	VPC NPE crosstalk	TN501B, 21U, C	TD-bus	—
544-545	36 : 21-22	VPC NPE crosstalk	TN501B, 22U, C	TD-bus	—
546-547	36 : 23-24	VPC NPE crosstalk	TN501B, 23U, C	TD-bus	—
548-549	36 : 25-26	VPC NPE crosstalk	TN501B, 25U, C	TD-bus	—
550-551	36 : 27-28	VPC NPE crosstalk	TN501B, 26U, C	TD-bus	—
552-553	36 : 29-30	VPC NPE crosstalk	TN501B, 27U, C	TD-bus	—
554-555	36 : 31-32	VPC NPE crosstalk	TN501B, 28U, C	TD-bus	—
556-557	36 : 1-2	Protocol chip test error	TN501B, 20L, A	—	—
558-559	36 : 3-4	Protocol chip test error	TN501B, 21L, A	—	—
560-561	36 : 5-6	Protocol chip test error	TN501B, 22L, A	—	—
562-563	36 : 7-8	Protocol chip test error	TN501B, 23L, A	—	—
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

(Continued)

TABLE 4-5. VPC (TN501B) Alarm Resolution *(Part 5 of 13)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
564-565	36 : 9-10	Protocol chip test error	TN501B, 25L, A	—	—
566-567	36 : 11-12	Protocol chip test error	TN501B, 26L, A	—	—
568-569	36 : 13-14	Protocol chip test error	TN501B, 27L, A	—	—
570-571	36 : 15-16	Protocol chip test error	TN501B, 28L, A	—	—
572-573	36 : 17-18	Protocol chip test error	TN501B, 20U, A	—	—
574-575	36 : 19-20	Protocol chip test error	TN501B, 21U, A	—	—
576-577	36 : 21-22	Protocol chip test error	TN501B, 22U, A	—	—
578-579	36 : 23-24	Protocol chip test error	TN501B, 23U, A	—	—
580-581	36 : 25-26	Protocol chip test error	TN501B, 25U, A	—	—
582-583	36 : 27-28	Protocol chip test error	TN501B, 26U, A	—	—
584-585	36 : 29-30	Protocol chip test error	TN501B, 27U, A	—	—
586-587	36 : 31-32	Protocol chip test error	TN501B, 28U, A	—	—
588-589	36 : 1-2	VPC tone level test	TN501B, 20L, B	TN714, 18	—
590-591	36 : 3-4	VPC tone level test	TN501B, 21L, B	TN714, 18	—
592-593	36 : 5-6	VPC tone level test	TN501B, 22L, B	TN714, 18	—
594-595	36 : 7-8	VPC tone level test	TN501B, 23L, B	TN714, 18	—
596-597	36 : 9-10	VPC tone level test	TN501B, 25L, B	TN714, 18	—
598-599	36 : 11-12	VPC tone level test	TN501B, 26L, B	TN714, 18	—
600-601	36 : 13-14	VPC tone level test	TN501B, 27L, B	TN714, 18	—
602-603	36 : 15-16	VPC tone level test	TN501B, 28L, B	TN714, 18	—
604-605	36 : 17-18	VPC tone level test	TN501B, 20U, B	TN714, 18	—
606-607	36 : 19-20	VPC tone level test	TN501B, 21U, B	TN714, 18	—
608-609	36 : 21-22	VPC tone level test	TN501B, 22U, B	TN714, 18	—
610-611	36 : 23-24	VPC tone level test	TN501B, 23U, B	TN714, 18	—
612-613	36 : 25-26	VPC tone level test	TN501B, 25U, B	TN714, 18	—
614-615	36 : 27-28	VPC tone level test	TN501B, 26U, B	TN714, 18	—
616-617	36 : 29-30	VPC tone level test	TN501B, 27U, B	TN714, 18	—
618-619	36 : 31-32	VPC tone level test	TN501B, 28U, B	TN714, 18	—
620-621	36 : 1-2	VPC data count	TN501B, 20L, B	TN714, 18	—
622-623	36 : 3-4	VPC data count	TN501B, 21L, B	TN714, 18	—
624-625	36 : 5-6	VPC data count	TN501B, 22L, B	TN714, 18	—
626-627	36 : 7-8	VPC data count	TN501B, 23L, B	TN714, 18	—
628-629	36 : 9-10	VPC data count	TN501B, 25L, B	TN714, 18	—
630-631	36 : 11-12	VPC data count	TN501B, 26L, B	TN714, 18	—
632-633	36 : 13-14	VPC data count	TN501B, 27L, B	TN714, 18	—
634-635	36 : 15-16	VPC data count	TN501B, 28L, B	TN714, 18	—
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

(Continued)

TABLE 4-5. VPC (TN501B) Alarm Resolution *(Part 6 of 13)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
636-637	36 : 17-18	VPC data count	TN501B, 20U, B	TN714, 18	—
638-639	36 : 19-20	VPC data count	TN501B, 21U, B	TN714, 18	—
640-641	36 : 21-22	VPC data count	TN501B, 22U, B	TN714, 18	—
642-643	36 : 23-24	VPC data count	TN501B, 23U, B	TN714, 18	—
644-645	36 : 25-26	VPC data count	TN501B, 25U, B	TN714, 18	—
646-647	36 : 27-28	VPC data count	TN501B, 26U, B	TN714, 18	—
648-649	36 : 29-30	VPC data count	TN501B, 27U, B	TN714, 18	—
650-651	36 : 31-32	VPC data count	TN501B, 28U, B	TN714, 18	—
652-653	36 : 1-2	VPC CAB chip test error	TN501B, 20L, A	—	—
654-655	36 : 3-4	VPC CAB chip test error	TN501B, 21L, A	—	—
656-657	36 : 5-6	VPC CAB chip test error	TN501B, 22L, A	—	—
658-659	36 : 7-8	VPC CAB chip test error	TN501B, 23L, A	—	—
660-661	36 : 9-10	VPC CAB chip test error	TN501B, 25L, A	—	—
662-663	36 : 11-12	VPC CAB chip test error	TN501B, 26L, A	—	—
664-665	36 : 13-14	VPC CAB chip test error	TN501B, 27L, A	—	—
666-667	36 : 15-16	VPC CAB chip test error	TN501B, 28L, A	—	—
668-669	36 : 17-18	VPC CAB chip test error	TN501B, 20U, A	—	—
670-671	36 : 19-20	VPC CAB chip test error	TN501B, 21U, A	—	—
672-673	36 : 21-22	VPC CAB chip test error	TN501B, 22U, A	—	—
674-675	36 : 23-24	VPC CAB chip test error	TN501B, 23U, A	—	—
676-677	36 : 25-26	VPC CAB chip test error	TN501B, 25U, A	—	—
678-679	36 : 27-28	VPC CAB chip test error	TN501B, 26U, A	—	—
680-681	36 : 29-30	VPC CAB chip test error	TN501B, 27U, A	—	—
682-683	36 : 31-32	VPC CAB chip test error	TN501B, 28U, A	—	—
876-877	36 : 1-2	VPC encoder test failure	TN501B, 20L, A	—	—
878-879	36 : 3-4	VPC encoder test failure	TN501B, 21L, A	—	—
880-881	36 : 5-6	VPC encoder test failure	TN501B, 22L, A	—	—
882-883	36 : 7-8	VPC encoder test failure	TN501B, 23L, A	—	—
884-885	36 : 9-10	VPC encoder test failure	TN501B, 25L, A	—	—
886-887	36 : 11-12	VPC encoder test failure	TN501B, 26L, A	—	—
888-889	36 : 13-14	VPC encoder test failure	TN501B, 27L, A	—	—
890-891	36 : 15-16	VPC encoder test failure	TN501B, 28L, A	—	—
892-893	36 : 17-18	VPC encoder test failure	TN501B, 20U, A	—	—
894-895	36 : 19-20	VPC encoder test failure	TN501B, 21U, A	—	—
896-897	36 : 21-22	VPC encoder test failure	TN501B, 22U, A	—	—
898-899	36 : 23-24	VPC encoder test failure	TN501B, 23U, A	—	—
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

(Continued)

TABLE 4-5. VPC (TN501B) Alarm Resolution *(Part 7 of 13)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
900-901	36 : 25-26	VPC encoder test failure	TN501B, 25U, A	—	—
902-903	36 : 27-28	VPC encoder test failure	TN501B, 26U, A	—	—
904-905	36 : 29-30	VPC encoder test failure	TN501B, 27U, A	—	—
906-907	36 : 31-32	VPC encoder test failure	TN501B, 28U, A	—	—
908-909	36 : 1-2	VPC decoder test failure	TN501B, 20L, A	—	—
910-911	36 : 3-4	VPC decoder test failure	TN501B, 21L, A	—	—
912-913	36 : 5-6	VPC decoder test failure	TN501B, 22L, A	—	—
914-915	36 : 7-8	VPC decoder test failure	TN501B, 23L, A	—	—
916-917	36 : 9-10	VPC decoder test failure	TN501B, 25L, A	—	—
918-919	36 : 11-12	VPC decoder test failure	TN501B, 26L, A	—	—
920-921	36 : 13-14	VPC decoder test failure	TN501B, 27L, A	—	—
922-923	36 : 15-16	VPC decoder test failure	TN501B, 28L, A	—	—
924-925	36 : 17-18	VPC decoder test failure	TN501B, 20U, A	—	—
926-927	36 : 19-20	VPC decoder test failure	TN501B, 21U, A	—	—
928-229	36 : 21-22	VPC decoder test failure	TN501B, 22U, A	—	—
930-931	36 : 23-24	VPC decoder test failure	TN501B, 23U, A	—	—
932-933	36 : 25-26	VPC decoder test failure	TN501B, 25U, A	—	—
934-935	36 : 27-28	VPC decoder test failure	TN501B, 26U, A	—	—
936-937	36 : 29-30	VPC decoder test failure	TN501B, 27U, A	—	—
938-939	36 : 31-32	VPC decoder test failure	TN501B, 28U, A	—	—
940-941	36 : 1-2	VPC touch tone detector test	TN501B, 20L, A	—	—
942-943	36 : 3-4	VPC touch tone detector test	TN501B, 21L, A	—	—
944-945	36 : 5-6	VPC touch tone detector test	TN501B, 22L, A	—	—
946-947	36 : 7-8	VPC touch tone detector test	TN501B, 23L, A	—	—
948-949	36 : 9-10	VPC touch tone detector test	TN501B, 25L, A	—	—
950-951	36 : 11-12	VPC touch tone detector test	TN501B, 26L, A	—	—
952-953	36 : 13-14	VPC touch tone detector test	TN501B, 27L, A	—	—
954-955	36 : 15-16	VPC touch tone detector test	TN501B, 28L, A	—	—
956-957	36 : 17-18	VPC touch tone detector test	TN501B, 20U, A	—	—
958-959	36 : 19-20	VPC touch tone detector test	TN501B, 21U, A	—	—
960-961	36 : 21-22	VPC touch tone detector test	TN501B, 22U, A	—	—
962-963	36 : 23-24	VPC touch tone detector test	TN501B, 23U, A	—	—
964-965	36 : 25-26	VPC touch tone detector test	TN501B, 25U, A	—	—
966-967	36 : 27-28	VPC touch tone detector test	TN501B, 26U, A	—	—
968-969	36 : 29-30	VPC touch tone detector test	TN501B, 27U, A	—	—
970-971	36 : 31-32	VPC touch tone detector test	TN501B, 28U, A	—	—
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

(Continued)

TABLE 4-5. VPC (TN501B) Alarm Resolution *(Part 8 of 13)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
972-973	36 : 1-2	VPC idle time slot test	TN501B, 20L, B	TD-bus	—
974-975	36 : 3-4	VPC idle time slot test	TN501B, 21L, B	TD-bus	—
976-977	36 : 5-6	VPC idle time slot test	TN501B, 22L, B	TD-bus	—
978-979	36 : 7-8	VPC idle time slot test	TN501B, 23L, B	TD-bus	—
980-981	36 : 9-10	VPC idle time slot test	TN501B, 25L, B	TD-bus	—
982-983	36 : 11-12	VPC idle time slot test	TN501B, 26L, B	TD-bus	—
984-985	36 : 13-14	VPC idle time slot test	TN501B, 27L, B	TD-bus	—
986-987	36 : 15-16	VPC idle time slot test	TN501B, 28L, B	TD-bus	—
988-989	36 : 17-18	VPC idle time slot test	TN501B, 20U, B	TD-bus	—
990-991	36 : 19-20	VPC idle time slot test	TN501B, 21U, B	TD-bus	—
992-993	36 : 21-22	VPC idle time slot test	TN501B, 22U, B	TD-bus	—
994-995	36 : 23-24	VPC idle time slot test	TN501B, 23U, B	TD-bus	—
996-997	36 : 25-26	VPC idle time slot test	TN501B, 25U, B	TD-bus	—
998-999	36 : 27-28	VPC idle time slot test	TN501B, 26U, B	TD-bus	—
1000-1001	36 : 29-30	VPC idle time slot test	TN501B, 27U, B	TD-bus	—
1002-1003	36 : 31-32	VPC idle time slot test	TN501B, 28U, B	TD-bus	—
1004-1005	36 : 1-2	VPC dial tone detection error	TN501B, 20L, B	TN714, 18	—
1006-1007	36 : 3-4	VPC dial tone detection error	TN501B, 21L, B	TN714, 18	—
1008-1009	36 : 5-6	VPC dial tone detection error	TN501B, 22L, B	TN714, 18	—
1010-1011	36 : 7-8	VPC dial tone detection error	TN501B, 23L, B	TN714, 18	—
1012-1013	36 : 9-10	VPC dial tone detection error	TN501B, 25L, B	TN714, 18	—
1014-1015	36 : 11-12	VPC dial tone detection error	TN501B, 26L, B	TN714, 18	—
1016-1017	36 : 13-14	VPC dial tone detection error	TN501B, 27L, B	TN714, 18	—
1018-1019	36 : 15-16	VPC dial tone detection error	TN501B, 28L, B	TN714, 18	—
1020-1021	36 : 17-18	VPC dial tone detection error	TN501B, 20U, B	TN714, 18	—
1022-1023	36 : 19-20	VPC dial tone detection error	TN501B, 21U, B	TN714, 18	—
1024-1025	36 : 21-22	VPC dial tone detection error	TN501B, 22U, B	TN714, 18	—
1026-1027	36 : 23-24	VPC dial tone detection error	TN501B, 23U, B	TN714, 18	—
1028-1029	36 : 25-26	VPC dial tone detection error	TN501B, 25U, B	TN714, 18	—
1030-1031	36 : 27-28	VPC dial tone detection error	TN501B, 26U, B	TN714, 18	—
1032-1033	36 : 29-30	VPC dial tone detection error	TN501B, 27U, B	TN714, 18	—
1034-1035	36 : 31-32	VPC dial tone detection error	TN501B, 28U, B	TN714, 18	—
1036-1037	36 : 1-2	VPC HDLC external test	TN501B, 20L, B	TN500, 16L	—
1038-1039	36 : 3-4	VPC HDLC external test	TN501B, 21L, B	TN477/500, 16L	—
1040-1041	36 : 5-6	VPC HDLC external test	TN501B, 22L, B	TN500, 16L	—
1042-1043	36 : 7-8	VPC HDLC external test	TN501B, 23L, B	TN500, 16L	—
1044-1045	36 : 9-10	VPC HDLC external test	TN501B, 25L, B	TN500, 16L	—

(Continued)

TABLE 4-5. VPC (TN501B) Alarm Resolution *(Part 9 of 13)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
1046-1047	36 : 11-12	VPC HDLC external test	TN501B, 26L, B	TN500, 16L	—
1048-1049	36 : 13-14	VPC HDLC external test	TN501B, 27L, B	TN500, 16L	—
1050-1051	36 : 15-16	VPC HDLC external test	TN501B, 28L, B	TN500, 16L	—
1052-1053	36 : 17-18	VPC HDLC external test	TN501B, 20U, B	TN500, 16U	—
1054-1055	36 : 19-20	VPC HDLC external test	TN501B, 21U, B	TN500, 16U	—
1056-1057	36 : 21-22	VPC HDLC external test	TN501B, 22U, B	TN500, 16U	—
1058-1059	36 : 23-24	VPC HDLC external test	TN501B, 23U, B	TN500, 16U	—
1060-1061	36 : 25-26	VPC HDLC external test	TN501B, 25U, B	TN500, 16U	—
1062-1063	36 : 27-28	VPC HDLC external test	TN501B, 26U, B	TN500, 16U	—
1064-1065	36 : 29-30	VPC HDLC external test	TN501B, 27U, B	TN500, 16U	—
1066-1067	36 : 31-32	VPC HDLC external test	TN501B, 28U, B	TN500, 16U	—
1129	56 : 1	TD-bus sanity	TN501B, 20L, E	TN714, 18	—
1130	56 : 2	TD-bus sanity	TN501B, 21L, E	TN714, 18	—
1131	56 : 3	TD-bus sanity	TN501B, 22L, E	TN714, 18	—
1132	56 : 4	TD-bus sanity	TN501B, 23L, E	TN714, 18	—
1133	56 : 5	TD-bus sanity	TN501B, 25L, E	TN714, 18	—
1134	56 : 6	TD-bus sanity	TN501B, 26L, E	TN714, 18	—
1135	56 : 7	TD-bus sanity	TN501B, 27L, E	TN714, 18	—
1136	56 : 8	TD-bus sanity	TN501B, 28L, E	TN714, 18	—
1137	56 : 9	TD-bus sanity	TN501B, 20U, E	TN714, 18	—
1138	56 : 10	TD-bus sanity	TN501B, 21U, E	TN714, 18	—
1139	56 : 11	TD-bus sanity	TN501B, 22U, E	TN714, 18	—
1140	56 : 12	TD-bus sanity	TN501B, 23U, E	TN714, 18	—
1141	56 : 13	TD-bus sanity	TN501B, 25U, E	TN714, 18	—
1142	56 : 14	TD-bus sanity	TN501B, 26U, E	TN714, 18	—
1143	56 : 15	TD-bus sanity	TN501B, 27U, E	TN714, 18	—
1144	56 : 16	TD-bus sanity	TN501B, 28U, E	TN714, 18	—
1155	56 : 1	TD-bus control channel	TN501B, 20L, D	TN714, 18	—
1156	56 : 2	TD-bus control channel	TN501B, 21L, D	TN714, 18	—
1157	56 : 3	TD-bus control channel	TN501B, 22L, D	TN714, 18	—
1158	56 : 4	TD-bus control channel	TN501B, 23L, D	TN714, 18	—
1159	56 : 5	TD-bus control channel	TN501B, 25L, D	TN714, 18	—
1160	56 : 6	TD-bus control channel	TN501B, 26L, D	TN714, 18	—
1161	56 : 7	TD-bus control channel	TN501B, 27L, D	TN714, 18	—
1162	56 : 8	TD-bus control channel	TN501B, 28L, D	TN714, 18	—
1163	56 : 9	TD-bus control channel	TN501B, 20U, D	TN714, 18	—
1164	56 : 10	TD-bus control channel	TN501B, 21U, D	TN714, 18	—

(Continued)

TABLE 4-5. VPC (TN501B) Alarm Resolution *(Part 10 of 13)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
1165	56 : 11	TD-bus control channel	TN501B, 22U, D	TN714, 18	—
1166	56 : 12	TD-bus control channel	TN501B, 23U, D	TN714, 18	—
1167	56 : 13	TD-bus control channel	TN501B, 25U, D	TN714, 18	—
1168	56 : 14	TD-bus control channel	TN501B, 26U, D	TN714, 18	—
1169	56 : 15	TD-bus control channel	TN501B, 27U, D	TN714, 18	—
1170	56 : 16	TD-bus control channel	TN501B, 28U, D	TN714, 18	—
1181	56 : 1	Angel ROM or RAM error	TN501B, 20L, E	—	—
1182	56 : 2	Angel ROM or RAM error	TN501B, 21L, E	—	—
1183	56 : 3	Angel ROM or RAM error	TN501B, 22L, E	—	—
1184	56 : 4	Angel ROM or RAM error	TN501B, 23L, E	—	—
1185	56 : 5	Angel ROM or RAM error	TN501B, 25L, E	—	—
1186	56 : 6	Angel ROM or RAM error	TN501B, 26L, E	—	—
1187	56 : 7	Angel ROM or RAM error	TN501B, 27L, E	—	—
1188	56 : 8	Angel ROM or RAM error	TN501B, 28L, E	—	—
1189	56 : 9	Angel ROM or RAM error	TN501B, 20U, E	—	—
1190	56 : 10	Angel ROM or RAM error	TN501B, 21U, E	—	—
1191	56 : 11	Angel ROM or RAM error	TN501B, 22U, E	—	—
1192	56 : 12	Angel ROM or RAM error	TN501B, 23U, E	—	—
1193	56 : 13	Angel ROM or RAM error	TN501B, 25U, E	—	—
1194	56 : 14	Angel ROM or RAM error	TN501B, 26U, E	—	—
1195	56 : 15	Angel ROM or RAM error	TN501B, 27U, E	—	—
1196	56 : 16	Angel ROM or RAM error	TN501B, 28U, E	—	—
1207	56 : 1	Angel program logic inconsistency	TN501B, 20L, E	—	—
1208	56 : 2	Angel program logic inconsistency	TN501B, 21L, E	—	—
1209	56 : 3	Angel program logic inconsistency	TN501B, 22L, E	—	—
1210	56 : 4	Angel program logic inconsistency	TN501B, 23L, E	—	—
1211	56 : 5	Angel program logic inconsistency	TN501B, 25L, E	—	—
1212	56 : 6	Angel program logic inconsistency	TN501B, 26L, E	—	—
1213	56 : 7	Angel program logic inconsistency	TN501B, 27L, E	—	—
1214	56 : 8	Angel program logic inconsistency	TN501B, 28L, E	—	—
1215	56 : 9	Angel program logic inconsistency	TN501B, 20U, E	—	—
1216	56 : 10	Angel program logic inconsistency	TN501B, 21U, E	—	—
1217	56 : 11	Angel program logic inconsistency	TN501B, 22U, E	—	—
1218	56 : 12	Angel program logic inconsistency	TN501B, 23U, E	—	—
1219	56 : 13	Angel program logic inconsistency	TN501B, 25U, E	—	—
1220	56 : 14	Angel program logic inconsistency	TN501B, 26U, E	—	—
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

(Continued)

TABLE 4-5. VPC (TN501B) Alarm Resolution *(Part 11 of 13)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
1221	56 : 15	Angel program logic inconsistency	TN501B, 27U, E	—	—
1222	56 : 16	Angel program logic inconsistency	TN501B, 28U, E	—	—
1233	56 : 1	Translation error	TN501B, 20L, E	—	—
1234	56 : 2	Translation error	TN501B, 21L, E	—	—
1235	56 : 3	Translation error	TN501B, 22L, E	—	—
1236	56 : 4	Translation error	TN501B, 23L, E	—	—
1237	56 : 5	Translation error	TN501B, 25L, E	—	—
1238	56 : 6	Translation error	TN501B, 26L, E	—	—
1239	56 : 7	Translation error	TN501B, 27L, E	—	—
1240	56 : 8	Translation error	TN501B, 28L, E	—	—
1241	56 : 9	Translation error	TN501B, 20U, E	—	—
1242	56 : 10	Translation error	TN501B, 21U, E	—	—
1243	56 : 11	Translation error	TN501B, 22U, E	—	—
1244	56 : 12	Translation error	TN501B, 23U, E	—	—
1245	56 : 13	Translation error	TN501B, 25U, E	—	—
1246	56 : 14	Translation error	TN501B, 26U, E	—	—
1247	56 : 15	Translation error	TN501B, 27U, E	—	—
1248	56 : 16	Translation error	TN501B, 28U, E	—	—
1314	56 : 1	Angel vintage inconsistency	TN501B, 20L, E	—	—
1315	56 : 2	Angel vintage inconsistency	TN501B, 21L, E	—	—
1316	56 : 3	Angel vintage inconsistency	TN501B, 22L, E	—	—
1317	56 : 4	Angel vintage inconsistency	TN501B, 23L, E	—	—
1318	56 : 5	Angel vintage inconsistency	TN501B, 25L, E	—	—
1319	56 : 6	Angel vintage inconsistency	TN501B, 26L, E	—	—
1320	56 : 7	Angel vintage inconsistency	TN501B, 27L, E	—	—
1321	56 : 8	Angel vintage inconsistency	TN501B, 28L, E	—	—
1322	56 : 9	Angel vintage inconsistency	TN501B, 20U, E	—	—
1323	56 : 10	Angel vintage inconsistency	TN501B, 21U, E	—	—
1324	56 : 11	Angel vintage inconsistency	TN501B, 22U, E	—	—
1325	56 : 12	Angel vintage inconsistency	TN501B, 23U, E	—	—
1326	56 : 13	Angel vintage inconsistency	TN501B, 25U, E	—	—
1327	56 : 14	Angel vintage inconsistency	TN501B, 26U, E	—	—
1328	56 : 15	Angel vintage inconsistency	TN501B, 27U, E	—	—
1329	56 : 16	Angel vintage inconsistency	TN501B, 28U, E	—	—
1333-1334	36 : 1-2	VPC error during play or record	TN501B, 20L, E	—	—
1335-1336	36 : 3-4	VPC error during play or record	TN501B, 21L, E	—	—
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

(Continued)

TABLE 4-5. VPC (TN501B) Alarm Resolution *(Part 12 of 13)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
1337-1338	36 : 5-6	VPC error during play or record	TN501B, 22L, E	—	—
1339-1340	36 : 7-8	VPC error during play or record	TN501B, 23L, E	—	—
1341-1342	36 : 9-10	VPC error during play or record	TN501B, 25L, E	—	—
1343-1344	36 : 11-12	VPC error during play or record	TN501B, 26L, E	—	—
1345-1346	36 : 13-14	VPC error during play or record	TN501B, 27L, E	—	—
1347-1348	36 : 15-16	VPC error during play or record	TN501B, 28L, E	—	—
1349-1350	36 : 17-18	VPC error during play or record	TN501B, 20U, E	—	—
1351-1352	36 : 19-20	VPC error during play or record	TN501B, 21U, E	—	—
1353-1354	36 : 21-22	VPC error during play or record	TN501B, 22U, E	—	—
1355-1356	36 : 23-24	VPC error during play or record	TN501B, 23U, E	—	—
1357-1358	36 : 25-26	VPC error during play or record	TN501B, 25U, E	—	—
1359-1360	36 : 27-28	VPC error during play or record	TN501B, 26U, E	—	—
1361-1362	36 : 29-30	VPC error during play or record	TN501B, 27U, E	—	—
1363-1364	36 : 31-32	VPC error during play or record	TN501B, 28U, E	—	—
1434-1435	36 : 1-2	VPC DSP ROM error	TN501B, 20L, E	—	—
1436-1437	36 : 3-4	VPC DSP ROM error	TN501B, 21L, E	—	—
1438-1439	36 : 5-6	VPC DSP ROM error	TN501B, 22L, E	—	—
1440-1441	36 : 7-8	VPC DSP ROM error	TN501B, 23L, E	—	—
1442-1443	36 : 9-10	VPC DSP ROM error	TN501B, 25L, E	—	—
1444-1445	36 : 11-12	VPC DSP ROM error	TN501B, 26L, E	—	—
1446-1447	36 : 13-14	VPC DSP ROM error	TN501B, 27L, E	—	—
1448-1449	36 : 15-16	VPC DSP ROM error	TN501B, 28L, E	—	—
1450-1451	36 : 17-18	VPC DSP ROM error	TN501B, 20U, E	—	—
1452-1453	36 : 19-20	VPC DSP ROM error	TN501B, 21U, E	—	—
1454-1455	36 : 21-22	VPC DSP ROM error	TN501B, 22U, E	—	—
1456-1457	36 : 23-24	VPC DSP ROM error	TN501B, 23U, E	—	—
1458-1459	36 : 25-26	VPC DSP ROM error	TN501B, 25U, E	—	—
1460-1461	36 : 27-28	VPC DSP ROM error	TN501B, 26U, E	—	—
1462-1463	36 : 29-30	VPC DSP ROM error	TN501B, 27U, E	—	—
1464-1465	36 : 31-32	VPC DSP ROM error	TN501B, 28U, E	—	—
1466-1467	36 : 1-2	VPC DSP ROM error	TN501B, 20L, E	—	—
1468-1469	36 : 3-4	VPC DSP ROM error	TN501B, 21L, E	—	—
1470-1471	36 : 5-6	VPC DSP ROM error	TN501B, 22L, E	—	—
1472-1473	36 : 7-8	VPC DSP ROM error	TN501B, 23L, E	—	—
1474-1475	36 : 9-10	VPC DSP ROM error	TN501B, 25L, E	—	—
1476-1477	36 : 11-12	VPC DSP ROM error	TN501B, 26L, E	—	—
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

(Continued)

TABLE 4-5. VPC (TN501B) Alarm Resolution *(Part 13 of 13)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice
1478-1479	36 : 13-14	VPC DSP ROM error	TN501B, 27L, E	—	—
1480-1481	36 : 15-16	VPC DSP ROM error	TN501B, 28L, E	—	—
1482-1483	36 : 17-18	VPC DSP ROM error	TN501B, 20U, E	—	—
1484-1485	36 : 19-20	VPC DSP ROM error	TN501B, 21U, E	—	—
1486-1487	36 : 21-22	VPC DSP ROM error	TN501B, 22U, E	—	—
1488-1489	36 : 23-24	VPC DSP ROM error	TN501B, 23U, E	—	—
1490-1491	36 : 25-26	VPC DSP ROM error	TN501B, 25U, E	—	—
1492-1493	36 : 27-28	VPC DSP ROM error	TN501B, 26U, E	—	—
1494-1495	36 : 29-30	VPC DSP ROM error	TN501B, 27U, E	—	—
1496-1497	36 : 31-32	VPC DSP ROM error	TN501B, 28U, E	—	—
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

Procedure A: General Replacement Steps

To replace a VPC circuit pack:

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Using the table, find the correct board related to the alarm (it should have a lit red LED).
3. Replace the indicated VPC board. Power up the system. The system should initialize.
4. Make a test call on both channels of the replaced VPC board by calling the AUDIX number (use the `maintenance : system : test call` form). See Appendix A, *Basic Procedures* for test call procedures.
5. To ensure complete VPC operation, you may run the following additional tests. These tests will also run later in the background, but slowly.
 - a. Run the complete TD-bus test on the replaced unit (repetitions = 5). Use the `maintenance : td-bus : test` form and the “y” option to run the long test.
 - b. Run the short version of the VPC test on each channel controlled by the replaced unit (repetitions = 5). Use the `maintenance : vpc : test` form and the “n” option.
6. Use the `maintenance : active alarm : display` form to verify that the alarm has not returned. If the alarm is still not resolved, do a restart.
7. If the alarm continues to return, replace the 2nd-choice circuit pack or have the TSC check the TD bus.

Procedure B: VPC Short Test

Run the short version of the VPC test on the alarmed channel (repetitions = 5). Use the `maintenance : vpc : test` form and the “n” option to run the short test.

If the test fails, follow Procedure A with the addition that the short version of the VPC test must run five times successfully to resolve the alarm (repetitions = 5).

Procedure C: Complete VPC Test

Run the complete VPC test on the alarmed channel (repetitions = 5). Use the `maintenance : vpc : test` form and the “y” option to run the long test.

If the test fails, follow Procedure A with the addition that the complete VPC test must run five times successfully to resolve the alarm (repetitions = 5).

Procedure D: TD-Bus Control Channel Test

Run the TD-Bus control channel test on the alarmed VPC unit (repetitions = 5). Use the `maintenance : td-bus : test` form and the “n” option to run the short test.

If the test fails, follow Procedure A with the addition that the TD-Bus control channel test must be run five times successfully to resolve the alarm (repetitions = 5).

Procedure E: Complete TD-Bus Test

Run the complete TD-bus test on the alarmed VPC board (repetitions = 5). Use the `maintenance : td-bus : test` form and the “y” option to run the long test.

If the test fails, follow Procedure A to resolve the alarm.

TN506B: BC

AUDIX has a single TN506B Bus Controller (BC) board in slot 0. This board combines the function of bus controller and bus terminator. The BC also does DBP (VME) bus master-bus clocks, reset signals, and data flow control.

The terminator board for the DBP bus is the AHF102 board on the backplane. The AHF102 is used only for DBP bus impedance termination and never generates an alarm. However, it might be an alternate replacement circuit pack as a last choice.

Table 4-6. BC (TN506B) Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (ckt,slot,proc.)	2nd Choice	3rd Choice
897	3 : 0	DBP Diagnostic Result (126F)	TN506B, 00, A	—	—
Note: Fault code 126 is not currently alarmed.					

Procedure A: General Replacement Steps

To replace the BC circuit pack:

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the TN506B. Power up the system. The system should initialize.
3. Verify that the alarm is resolved using the `maintenance : active alarm : display` form.

TN511: MI

The Maintenance Interface (MI) circuit pack handles major and minor alarms passed to it from the CDR1 or CDR1B alarm board. The MI is connected to the FP-PE through the M bus. It can reset (reboot), restart, or shut down the FP through software, firmware thresholds, or its toggle switch. The MI handles administration and maintenance terminal access (RS-232C compatible ADMIN and MAINT connectors) and monitors environment and power. The system can run without an MI if the FP is in control. However, if the MI is bad, faulty alarms (or no alarms) may be generated.

Table 4-7. MI (TN511) Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (ckt,slot,proc.)	2nd Choice	3rd Choice
899	17 : 0	Bad MI dual-ported RAM (86F)	TN511, 07, A	–	–

Procedure A: General Replacement Steps

To replace the TN511 MI board:

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the TN511. Power up the system. The system should initialize.
3. Verify that the alarm is resolved using the `maintenance : active alarm : display` form. Make sure it does not return by waiting one minute past initialization and rechecking for alarms.

TN520: VB

The TN520 Voice Buffer (VB) circuit pack handles voice data flow to and from the Data Base Processor (DBP) subsystem over the System (S) bus and UN160B. The TN520 VB can handle up to 16 active voice ports simultaneously and supports two channels per port (32 channels per board).

Table 4-8. VB (TN520) Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice (cause)
168	61 : 1	DBPI fails to VB 1, not to PEs, VB 2	TN520, 17L, A	UN160B, 06	S bus
169	61 : 2	DBPI fails to VB 2; not to PEs, VB 1	TN520, 17U, A	UN160B, 06	S bus
171	61 : 1	Only VB S-bus test passes	TN520, 17L, A	S bus	—
172	61 : 1	Only VB S-bus test fails	TN520, 17L, A	—	—
177	61 : 2	Only VB 2 S-bus test passes	TN520, 17U, A	S bus	—
178	61 : 2	Only VB 2 S-bus test fails	TN520, 17U, A	S bus	—
182	61 : 2	DBPI cannot access VB 2 and VB 2 down	TN520, 17U, A	UN160B, 06	—
176	61 : 1	DBPI cannot access VB 1 and VB 1 down	TN520, 17L, A	UN160B, 06	—
186	61 : 1	PE 0 fails to VB 1; not to PE 1, VB 2	TN520, 17L, A	TN523, 09L	S bus
187	61 : 2	PE 1 fails to VB 2; not to PE 0, VB 1	TN520, 17U, A	TN523, 09U	S bus
1254	61 : 1	VB channels not in sync with software	TN520, 17L, A	Software	—
1255	61 : 2	VB channels not in sync with software	TN520, 17U, A	Software	—
1258	61 : 1	VB initialization failed	TN520, 17L, A	TN500, 16L	—
1259	61 : 2	VB initialization failed	TN520, 17U, A	TN500, 16U	—
1260	61 : 1	VB CPU failure	TN520, 17L, A	TN500, 16L	—
1261	61 : 2	VB CPU failure	TN520, 17U, A	TN500, 16U	—
1262	61 : 1	VB RAM memory error	TN520, 17L, A	TN500, 16L	—
1263	61 : 2	VB RAM memory error	TN520, 17U, A	TN500, 16U	—
1264	61 : 1	VB EPROM memory error	TN520, 17L, A	TN500, 16L	—
1265	61 : 2	VB EPROM memory error	TN520, 17U, A	TN500, 16U	—
1266	61 : 1	VB invalid mailbox	TN520, 17L, A	S bus	—
1267	61 : 2	VB invalid mailbox	TN520, 17U, A	S bus	—
1268	61 : 1	TDBI/VPC error detected by VB	TN520, 17L, B	TN500, 16L	any TN501B
1269	61 : 2	TDBI/VPC error detected by VB	TN520, 17U, B	TN500, 16U	any TN501B
1270	61 : 1	VB firmware audit failure	TN520, 17L, A	—	—
1271	61 : 2	VB firmware audit failure	TN520, 17U, A	—	—
1272	61 : 1	TDBI DPR failure	TN520, 17L, A	TN500, 16L	—
1273	61 : 2	TDBI DPR failure	TN520, 17U, A	TN500, 16U	—
1274	61 : 1	VB had shut down	TN520, 17L, A	TN500, 16L	S bus
1275	61 : 2	VB had shut down	TN520, 17U, A	TN500, 16U	S bus

Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.

Procedure A: General Replacement Steps

To replace the VB circuit pack:

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the TN520. Power up the system. The system should initialize.
3. To ensure complete VB operation, display the `maintenance : system : test call` form. Make 8 VB test calls (to a TN477 TDBI-8 board) or 16 test calls (to a TN500 TDBI board) to test all the channels on the replaced VB.
4. Verify that the alarm is resolved using the `maintenance : active alarm : display` form.
5. If the alarm returns, replace the 2nd-choice board or have the TSC check the S bus.

Procedure B: VPC/TDBI Check

If any TDBI or VPC board is also alarmed, replace it *first*. Otherwise, use Procedure A.

TN523 (OR TN591), TN716B, TN734 (OR TN761): PE

A Processing Element (PE) consists of a TN523 or TN591 Central Processing Unit (CPU), one or two TN734 (or one TN761) Random Access Memory (RAM) boards, and a TN716B Bus Interface (BI) board. These packs are connected by a Memory (M) bus. A one-cabinet AUDIX has a single PE, the Feature Processor (FP). When an expansion cabinet is added, an additional PE, the Voice Session Processor (VSP) is added. The term PE 0 refers to the FP-CPU, FP-RAM, and FP-BI, and the term PE 1 refers to the VSP-CPU, VSP-RAM, and VSP-BI.

The only circuit board alarmed in either PE is the CPU (TN523 or TN591). However, the fault could actually be on the associated BI (TN716B) or one of the RAM (TN734 or TN761) circuit packs. The alarm resolution procedures for these 2nd-choice boards appear later in this section. The best test for any PE circuit pack is a successful system initialization.

The CPU is responsible for overall operation of both PE 0 and PE 1. Firmware runs low-level functions, while software loaded into the RAM boards runs the primary AUDIX programs.

Table 4-9. PE Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice * (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice (ckt,slot)
80	33 : 0	FP-CPU, RAM, or ROM errors	TN523, 09L, A	TN734, 10 or 11L	TN716B, 13L
81	34 : 0	VSP-CPU, RAM, or ROM errors	TN523, 09U, A	TN734, 10U	TN716B, 13U
140	33 : 0	FP S bus error	TN523, 09L, A	TN716B, 13L	S bus
142	34 : 0	VSP S bus error	TN523, 09U, A	TN734, 10U	TN716B, 13U
162	34 : 0	SCP fails to PE 1; not to PE 0	TN523, 09U, A	TN716B, 13U	TN533, 15
163	33 : 0	SCPI fails to PE 0	TN523, 09L, A	TN716B, 13L	TN533, 15
166	33 : 0	DBPI fails to PE 0, not to VB	TN523, 09L, A	TN716B, 13L	UN160B, 06
167	34 : 0	DBPI fails to PE 1; not to PE 0 or VBs	TN523, 09U, A	TN716B, 13U	UN160B, 06
173	33 : 0	VB 1 fails to PE 0, not to PE 1, DBPI	TN523, 09L, A	TN716B, 13L	TN500, 16L
174	34 : 0	VB 1 fails to PE 1; not to PE 0, DBPI	TN523, 09U, A	TN716B, 13U	TN500, 16U
179	33 : 0	VB 2 fails to PE 0; not to PE 1, DBPI	TN523, 09L, A	TN716B, 13L	TN500, 16L
180	34 : 0	VB 2 fails to PE 1; not to PE 0, DBPI	TN523, 09U, A	TN716B, 13U	TN500, 16U
183	34 : 0	S bus test fails for PE 1 only	TN523, 09U, A	TN716B, 13U	—
184	34 : 0	SCP, DBPI, VBs and PE 0 fail to PE 1	TN523, 09U, A	TN716B, 13U	—
188	34 : 0	SCP, DBPI and VBs fail to PE 1	TN523, 09U, A	TN716B, 13U	—
189	33 : 0	Only PE 0 S-bus test passes	TN523, 09L, A	TN716B, 13L	—
190	34 : 0	PE 0 fails to PE 1; not DBPI or SCP	TN523, 09U, A	TN716B, 13U	TN523, 09L
193	33 : 0	SCPI DBPI and VB fail to PE 0	TN523, 09L, A	TN716B, 13L	—
* The CPU may be a TN523 or a TN591. The RAM may be a TN734 or a TN761. A TN523 CPU requires TN734 RAM boards, while a TN591 may use either TN734 or TN761 boards. Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

Procedure A: General Replacement Steps

Before replacing the CPU:

1. Verify that the correct RAM boards are installed:
 - A TN523 CPU requires that TN734 RAM boards be installed (two in the base cabinet and one in the expansion cabinet, if installed).
 - A TN591 CPU may use either TN734 or TN761 RAM boards.
2. If the CPU and RAM boards are incompatible, update the CPU with a TN591, or replace the RAM boards with TN734 packs.

To replace the PE:

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the alarmed TN523 or TN591. Power up the system. The system should initialize.
3. Verify that the alarm is resolved using the `maintenance : active alarm : display` form. Wait one minute past initialization and recheck to see if the alarm returns.
4. If the alarm is *not* resolved or returns, replace the 2nd- or 3rd-choice packs as needed.

TN716B: Bus Interface (PE-BI)

The BI circuit pack provides a bidirectional path for data transfer between the Memory (M) bus and the System (S) bus. The BI also provides interrupt and clock functions for control of and communication with processor components on the S bus. The BI is not alarmed by software but can be a 2nd-choice replacement for the PE. The best test of a BI is a successful system initialization.

To replace the BI circuit pack:

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the TN716B indicated in the previous table. Power up the system. The system should initialize.
3. Initialization completes if the PE-BI board is functional.
 - a. If the initialization is successful, verify that the alarm is resolved using the `maintenance : active alarm : display` form.
 - b. If the initialization is *not* successful, go to *Control Mode/Visual Inspection Checklist* in Chapter 3.

TN734 or TN761: Random Access Memory (FP-RAM or PE-RAM)

AUDIX uses two different RAM boards:

- Early systems use the TN734 circuit pack containing 2 Mbytes of Random Access Memory (RAM). The TN734 board can be used with either the TN523 or TN591 CPU board.
- Later systems use the TN761 board containing 4 Mbytes of RAM. The TN761 board can *only* be used in systems that have a TN591 CPU board.

The FP requires 4 Mbytes of RAM, so either two TN734 packs or one TN761 pack may be installed in the base cabinet. The VSP in two-cabinet systems requires only 2 Mbytes of RAM, so either a single TN734 or TN761 board may be installed in the upper cabinet.

The RAM board provides dynamic memory control and error detection/correction functions for each CPU. Background RAM tests on the board run slowly but continuously.

The PE-RAM is not alarmed by software but may be a 2nd-choice replacement for the PE, or it may halt initialization and cause the red LED to light on the failing RAM board. The best test for a PE-RAM board is a successful initialization using the extended RAM test.

To replace the PE-RAM board(s):

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the board with the lighted red LED. If the FP is alarmed, and neither pack in slot 10 or 11 is alarmed, replace first one, then the other. If the VSP is alarmed, replace the board in slot 10 of the top cabinet.
3. Power up the system. Start a nonstandard initialization (press **CTRL-C** on the terminal).
4. Run the extended memory (RAM) test (select option “y”). This adds about 15 to 30 minutes to the initialization. Initialization completes if the RAM boards are functional.
5. If the initialization is successful, verify the alarm is resolved using the **maintenance : active alarm : display** form.

If initialization does *not* complete, replace the associated BI or CPU. If this does not fix the problem, go to *Control Mode/Visual Inspection Checklist* in Chapter 3.

PE Software Load Threshold Alarms

This software alarm occurs when the AUDIX system load is greater than the expected engineered load. Unlike the other PE procedures, there are no packs to replace. However, you *must escalate* the problem to the TSC so load re-engineering can be done if needed.

Table 4-10. System Software Alarm Resolution

Alarm		Description	Repair
Fault	Unit:Dev		Procedure
1501	121 : 33	PE 0 software path record low watermark (90F)	A
1501	121 : 34	PE 1 software path record low watermark (90F)	A
1502	121 : 33	PE 0 software path record high watermark (87F)	A
1502	121 : 34	PE 1 software path record high watermark (87F)	A
1504	121 : 33	PE 0 software message buffer low watermark (91F)	A
1504	121 : 34	PE 1 software message buffer low watermark (91F)	A
1505	121 : 33	PE 0 software message buffer high watermark (88F)	A
1505	121 : 34	PE 1 software message buffer high watermark (88F)	A
1507	121 : 33	PE 0 software S-bus queue low watermark (92F)	A
1507	121 : 34	PE 1 software S-bus queue low watermark (92F)	A
1508	121 : 33	PE 0 software S-bus queue high watermark (89F)	A
1508	121 : 34	PE 1 software S-bus queue high watermark (89F)	A

Procedure A: Reduce Load and Report

1. Reduce the system load by busying out one or two VPT ports using the `maintenance : vsp : busyout` form. In a Standalone system, these ports must be busied out at the switch also.
2. Check to see if the alarm is resolved. Even if the alarm resolves itself, *the problem must be reported*.
3. Record the alarm and description and call the TSC at 1-800-248-1234.

TN532 OR TN540: DBP-RAM

The TN532 Data Base Processor (DBP) Random Access Memory (RAM) circuit pack contains 2 Megabytes (Mbytes) of memory using 256K RAM chips. This board is used only in one-cabinet systems. The TN540 DBP-RAM board contains 4 Mbytes of memory using 1M RAM chips. It is used in two-cabinet systems. The DBP-RAM circuit pack buffers voice data channels between the TN520 VB and the disk drives over the DBP (VME) bus.

Table 4-11. DBP-RAM (TN532 or TN540) Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (ckt,slot,proc.)	2nd Choice	3rd Choice
410	2 : 0	DBP-RAM correctable fault	TN532/TN540, 01, A	TN472C, 04, A	—
897	2 : 0	DBP-RAM Diagnostic Result (118F)	TN532/TN540, 02, A	—	—
Note: Fault code 118 is not currently alarmed.					

Procedure A: General Replacement Steps

To replace a DBP-RAM circuit pack:

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the DBP-RAM board in slot 02. Power up the system. The system should initialize.
3. Verify that the alarm is resolved using the `maintenance : active alarm : display` form.

TN533: SCPI

The TN533 Switch Communications Processor Interface (SCPI) board supports the AUDIX data link to an AT&T PBX. This may be:

- The DCIU on System 85, Generic 2, and DIMENSION PBX
- The PGATE on Generic 3r
- The PI on System 75, System 75 XE, Generic 1, Generic 3i, and Generic 3s
- The SCI on System 75

The SCPI has an RS-449 synchronous BX.25-compatible data link that runs at 9600 bps. The data devices in the switch link provide electrical isolation for signals. They also act as null-modems in directly cabled applications since both data link boards are DTE devices. The SCPI connects to the S bus and transmits data to and from FP memory over the data link.

Table 4-12. SCPI (TN533) Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (ckt,slot,proc.)	2nd Choice (cause)	3rd Choice
18	43 : 0	VIP-SCPI loopback failure	TN533, 15, A	Data link	
25	43 : 0	SCPI CPU error	TN533, 15, B	Data link	—
26	43 : 0	SCPI RAM error	TN533, 15, B	Data link	—
27	43 : 0	SCPI ROM error	TN533, 15, B	Data link	—
28	43 : 0	SCPI S-bus access	TN533, 15, B	S bus	—
29	43 : 0	SCPI mailbox failure	TN533, 15, B	S bus	—
31	43 : 0	SCPI firmware audit	TN533, 15, B	—	—
82	43 : 0	SCPI PE 0 memory access	TN533, 15, B	TN523, 09L	—
84	43 : 0	SCPI write buffer checksum	TN533, 15, B	—	—
160	43 : 0	Only SCPI S-bus test fails	TN533, 15, C	—	—
161	43 : 0	Only SCPI S-bus test passes	TN533, 15, C	—	—
191	43 : 0	PE 0 fails to SCPI, not to DBPI	TN533, 15, C	TN523, 09L	—
215	43 : 0	Maint removed SCPI from S bus	TN533, 15, D	Data link	—

NOTE

The TN533 is present in a Standalone system, but is not used. However, the board can still be alarmed. If you have a Standalone system and this board is alarmed, system operation should not be affected. Try steps 2, 3, and 4 of Procedure A if the customer is worried about the alarm.

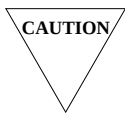
Procedure A: General Replacement Steps

You should do the following *before* replacing the SCPI to make sure the correct alarm was entered in the alarm log (the fault code may change). If you have intermittent (or no) alarms, run this test once or twice and check the active alarm log to see if a fault occurred.

1. If an alarm for the SCPI just occurred, wait 15 minutes for the background test to run to see if it resolves the alarm.
2. If alarm remains active, run the data link test using the `maintenance : datalink : test` form. This will reset the data link to the host and all nonhost switches in a Distributed Communications System (DCS) network.

After running the test:

- a. If the SCP test passes, verify that the alarm is resolved.
- b. If the test fails, run the test once more. If it still fails, use the following steps to replace the SCPI.



This test causes all DCS access to AUDIX to be busied out. It may also take longer to run on a network, depending on its size.

3. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
4. Replace the TN533. Power up the system. The system should initialize.
5. Verify that the alarm is resolved using the `maintenance : active alarm : display` form. Wait 15 minutes and recheck the form to make sure the fault does not return.
6. If the fault returns, run the data link test again using the `maintenance : datalink : test` form. Wait 15 more minutes.
7. If the alarm returns, replace the 2nd-choice board, check the S bus (contact the TSC), or check the data link (see Chapter 5, *Data Link Or Switch Problems*).

Procedure B: FSW Test

Follow Procedure A up to step 3, then display the `maintenance : scpi : fsw` form and press ENTER (F8) *before* the data link test to resolve the original alarm.

Procedure C: Restart System

Do a restart, wait 5 minutes after the “start service” message, and check to see if the alarm is resolved. If not, do Procedure A.

Procedure D: Restart and FSW Test

Do a restart, wait 5 minutes after the “start service” message, then display the maintenance : scpi : fsw form and press  (F8). Check to see if the alarm is resolved. If not, do Procedure A and run the maintenance : scpi : fsw form again.

TN539(B): ACCE

The AUDIX Communications Controller — Enhanced (ACCE) circuit pack allows an AUDIX system to network with other AUDIX adjuncts.

The TN539 or TN539B ACCE provides the same two DCP links as the TN366 or TN366B ACC (for a total of four network channels). It also provides two Electronic Industries Association (EIA) RS-232 links for two additional networking channels. In addition, its firmware allows new connection options; refer to the *AUDIX Networking* manual (585-300-903) for details on capabilities.

The following faults indicate a problem with the RS-232 ports. The faults listed under *TN366(B): ACC* may also be present, indicating a problem with another part of the TN539(B) or with the network.

Table 4-13. ACCE [TN539(B)] Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (ckt,slot,proc.)	2nd Choice	3rd Choice
420	141 : 4	RS-232 failure (ACCE port 5)	TN539B, 03, A	Translations, B	–
421	141 : 5	RS-232 failure (ACCE port 6)	TN539B, 03, A	Translations, B	–

Procedure A: General Replacement Steps

See the procedures given under *TN366(B): ACC*. Replace any defective TN539 with a TN539B.

NOTE

For complete information on AUDIX networking connections, administration, and testing, see the *AUDIX Networking* manual (585-300-903).

Procedure B: Check Translations

When logged in to the local AUDIX:

1. Check the local AUDIX translations on the system : translation : machine :
audix/amis/call delivery form. (*local/remote = l*)
2. Check the remote AUDIX translations (*local/remote = r*).

NOTE

AUDIX networking administration, forms, and field descriptions are covered in the *AUDIX Networking* manual (585-300-903).

3. Translations for the remote AUDIX machine(s) should correspond to translations for the host (local) AUDIX. Check the *machine name*, the *dial string*, (characters to be sent to the remote AUDIX to establish a connection), *network connection type*, *data rate* (if type is rs232s and data rate is 56K or 64K, you may have a distance limitation and dialing restrictions), and *channel* (only used for RS-232 dedicated connections). Then retry the connect test.
4. The *dial string* may contain special characters that, when enclosed in double quotes act as control characters for the ACCE. The AUDIX must have a TN539(B) to use these characters.
5. If there is still an alarm, check the switch translations and facilities. Common problems include the installation and administration of modem pooling, option settings on the data sets, etc. Retry the connect test once everything is checked.
6. If the problem cannot be located, try tracing the problem from the remote AUDIX to the local AUDIX.
7. Check the `system : translation : network port` form.
 - a. Check the data rate assigned on AUDIX that will be used on incoming DCP Mode 2 calls; the switch will ask the ACCE what speed to use. The ACCE will respond with the speed administered on the `system : translation : network port` form. Each DCP channel is assigned a speed. The default is 9600 bps, while a zero (0) indicates the port is not equipped.
 - b. The RS-232 ports should be assigned the following attributes:
 - equipped or unequipped
 - asynchronous or synchronous
 - Up to three data rates
 - Switched or dedicated facility
 - A string that is sent to initialize the modem

If the RS-232 ports are assigned, press the key (F8) to obtain the status of the ports (PASS or FAIL).

NOTE

The RS-232 ports are for direct connections (i.e., not to a modem-pool). The modems must support Hayes-compatible dialing. The RS-232 ports are hard-set at parity - none, data bits - 8, stop bits - 1 (if asynchronous), and can support up to three different data rates. The modems must match these attributes and be compatible with the assigned rate(s).

8. When testing the ACCE ports, use the `maintenance : network` form. Test 6 (modem loop-around) allows you to test the RS-232 ports, if used.

9. If the tests don't pass, reset the board (test 5) and try the other tests again. If the tests continue to fail, try the procedures associated with the TN366(B). In addition, note the following:
 - The use of *network connection type* - **rs232s** and *data rate* - **56000** or **64000** imposes distance limitations and dialing restrictions on the network connections.
 - Running DCP Mode 2 at 19,200 bps on several ports may reduce their throughput.
 - The *dial string* on the `system : translation : machine : audix/amis/call delivery` form may have special characters entered that are treated as control characters by the ACCE. These characters must be enclosed in double quotes on the *dial string* line.

TN547(B): MPSI

The TN547 or TN547B Multiprotocol Switch Interface (MPSI) circuit pack provides the data link between AUDIX and a 1A ESS Switch, 5ESS Switch, or other vendor switches.

Table 4-14. MPSI [TN547(B)] Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (ckt,slot,proc.)	2nd Choice	3rd Choice
344	30 : 0	MPSI configured for DCIU-SCI switch	TN547B, 15, B	Data link	–
346	30 : 0	Corrupt MPSI	TN547B, 15, A	Data link	–

Procedure A: General Replacement Steps

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the TN547(B) board. Power up the system. The system should initialize.
3. Verify that the alarm is resolved using the `maintenance : active alarm : display` form. If the alarm has not been resolved, check the data link (Chapter 5).

Procedure B: Check System Configuration

This alarm indicates the system has a TN547(B) installed, but the `system : translation : switch connection` form has the system set for a DCIU/SCI data link. Check the following:

1. If the system is using a DCIU, PGATE, PI, or SCI data link (AUDIX is connected to a System 75, System 85, DEFINITY Communications System, or DIMENSION PBX), you must have a TN533 SCPI installed in slot 15. Order the TN533 and replace the TN547(B) when it arrives.
2. If the system is connected to a 1A ESS Switch, 5ESS Switch, or other vendor switch, you must change the `system : translation : switch connection` form to indicate the correct type of data link. See *AUDIX Installation* (585-305-105) for the correct translations of this form.
3. If the alarm has not been resolved, go to Chapter 5, *Data Link Or Switch Problems*.

TN714: TC

The TN714 Tone and Clock (TC) board provides the master reference clock for the TD bus and performs digital generation of the standard call-progress tones.

Table 4-15. TC (TN714) Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev (Note)		1st Choice (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice (cause)
1068	38 : 1	Hardware has gone insane	TN714, 18, B	TN727, 14	TD bus
1070	38 : 1	TC did not initialize	TN714, 18, A	TD bus	—
1071	38 : 1	TC dial tone detection test	TN714, 18, C	TD bus	—
1072	38 : 1	TC data count	TN714, 18, B	TD bus	—
1073	38 : 1	TC tone level test	TN714, 18, B	TD bus	—
1074	38 : 1	TC NPE crosstalk test	TN714, 18, C	TD bus	—
1147	58 : 1	TD-bus sanity	TN714, 18, E	TN727, 14	TD bus
1173	58 : 1	TD-bus control channel	TN714, 18, D	TN727, 14	TD bus
1199	58 : 1	ROM or RAM error	TN714, 18, E	—	—
1225	58 : 1	Program logic inconsistency	TN714, 18, E	—	—
1251	58 : 1	Translation error	TN714, 18, E	—	—
1397	58 : 1	Hardware time-out	TN714, 18, E	—	—

Procedure A: General Replacement Steps

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the TN714 board. Power up the system. The system should initialize.
3. Run the complete TD-bus test on the replaced pack. Use the `maintenance : td-bus : test` form. Select the TC board, 5 repetitions, and the “y” option to run the long test.
4. Run the complete TC test using the `maintenance : tc : test` form. Select 1 repetition and the “y” option to run the long test.
5. Verify that the alarm is resolved using the `maintenance : active alarm : display` form. Wait one minute past initialization and recheck to see if the alarm returns.
6. If the alarm returns, replace the 2nd-choice board or have the TSC check the TD bus.

Procedure B: TC Short Test

Run the short version of the TC test using the `maintenance : tc : test` form. Select 5 repetitions and the “n” option for the short test.

If the test fails, follow Procedure A with the addition that the short version of the TC test must run five times successfully to resolve the alarm (repetitions = 5).

Procedure C: Complete TC Test

Run the complete TC test on the TC board (repetitions = 5). Use the `maintenance : tc : test` form and the “y” option for the long test.

If the test fails, follow Procedure A with the addition that the complete TC test must run five times successfully to resolve the alarm (repetitions = 5).

Procedure D: TD-Bus Control Channel Test

First, shut down system software and power down. Next, power the system back up. The system should initialize.

1. Log in and run the short version of the TD-Bus control channel test on the alarmed TC pack (repetitions = 5). Use the `maintenance : td-bus : test` form and the “n” option.
2. *If the test fails*, follow Procedure A with the addition that the TD-Bus control channel test must run five times successfully to resolve the alarm (repetitions = 5).

Procedure E: Complete TD-Bus Test

First, shut down system software and power down. Next, power the system back up. The system should initialize.

1. Log in and run the complete TD-bus test on the TC board (repetitions = 5). Use the `maintenance : td-bus : test` form and the “y” option to run the long test.
2. *If the test fails*, follow Procedure A to resolve the alarm.

TN727: NC

The TN727 Network Control (NC) board is also known as the Switch Interface (SI) board. The NC circuit pack is a bidirectional path for transferring status and control information between the FP-PE on the M bus and devices on the TD bus. The NC continuously scans the TD bus for messages and hardware problems. The AUDIX real-time clock is included on this circuit pack.

This board must be working correctly for any of the TD-bus tests to run. See the `maintenance : nc : test` form, the `maintenance : system : test` call form, the `maintenance : tdbi : test` form, the `maintenance : tc : test` form, the `maintenance : vpc : test`, and the `maintenance : vpt : test` form.

Table 4-16. NC (TN727) Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev (Note)		1st Choice (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice (cause)
1	120 : 1	NC archangel reset test	TN727, 14, B	TN714, 18	TD bus
2	120 : 1	NC control channel	TN727, 14, C	TD bus	—
3	120 : 1	NC DPR failure	TN727, 14, B	—	—
4	120 : 1	NC error	TN727, 14, A	—	—
5	120 : 1	TD-bus clock failed	TN714, 18, E	TN727, 14	—
7	120 : 1	Hardware insane, LSIOP3, etc.	TN727, 14, B	TN714, 18	—
9	120 : 1	LSIOP14	TN727, 14, B	TN714, 18	—
10	120 : 1	LSIOP1, LSIOP2, LSIOP4, etc.	TN727, 14, C	TN714, 18	—
11	120 : 1	LSIOP11, LSIOP12, LSIOP2	TN727, 14, C	—	—
252	120 : 1	System clock failure	TN727, 14, F	—	—
603	120 : 1	Real-time clock failure	TN727, 14, A	—	—
604	120 : 1	Boot time file cannot be accessed	—, —, G	—	—
1124	140 : 1	TD-bus sanity	TN727, 14, D	TN714, 18	TD bus
1150	140 : 1	TD-bus control channel	TN727, 14, D	TN714, 18	TD bus
1176	140 : 1	ROM or RAM error	TN727, 14, D	—	—
1202	140 : 1	Program logic inconsistency	TN727, 14, D	TN714, 18	—
1228	140 : 1	Translation error	TN727, 14, D	—	—
1398	140 : 1	Hardware time-out	TN727, 14, A	TN714, 18	—
Note: For systems with an expansion cabinet, the TN727 is in slot 14 of the <i>top</i> cabinet.					

Procedure A: General Replacement Steps

To replace the NC circuit pack:

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the TN727 board. For systems with an expansion cabinet, the TN727 is slot 14 of the top cabinet.
3. Power up the system. After the system initializes, block service using the appropriate form or switch procedure. See Appendix A, *Basic Procedures* for details.
4. Run the complete NC test twice using the `maintenance : nc : test` form. Select repetitions = 2 and the “y” option for the long test.
5. Verify that the alarm is resolved using the `maintenance : active alarm : display` form. Wait one minute past initialization and recheck to see if the alarm returns.
6. Enable service using the appropriate form or switch procedure.
7. If the alarm returns, replace the 2nd-choice board or have the TSC check the TD bus.

Procedure B: NC Short Test

Run the short group of NC tests (repetitions = 3) using the `maintenance : nc : test` form and the “n” option for the short test.

If the test fails, follow Procedure A with the addition that the group of short tests must run three times successfully to resolve the alarm (repetitions = 3).

Procedure C: NC Long Test

Run the complete group of NC tests twice (repetitions = 2) using the `maintenance : nc : test` form and the “y” option for the long test.

If the test fails, follow Procedure A to resolve the alarm.

Procedure D: TD-Bus Reset

This alarm affects only the bus interface part of the board. No test currently exists to resolve this alarm. If you wish, you may leave the alarm active unless you notice other negative affects on service. If you do:

1. Run the `maintenance : td-bus : reset` form to try to clear the processors on the TD bus.
2. If the alarm remains active, clear it by doing a software shutdown and power down. Next, power the system back up.
3. After the system initializes, check if the alarm is resolved. If the alarm returns, replace the board (see Procedure A).

Procedure E: TD Bus Failed Clock

This alarm often indicates that a clock from the TN714 TC has failed. In this case, replacing the NC will not resolve the problem. If there are no other active alarms against unit 120 or 140, replace the TC first. Otherwise, use Procedure A to replace the NC.

Procedure F: System Clock Reset

If, at initialization, the system cannot find the necessary filesystem for setting the system clock, this alarm will be raised. Use the following steps to reset the system clock and resolve the alarm:

1. Display the `system : clock` form.
2. Enter an “x” in the “set system clock” field.
3. Fill in the date, time, and day of week in the appropriate fields. Press .
4. Tab to the “test system clock” field and enter an “x”. Press .

Procedure G: Boot Time File Problem

This alarm indicates the system cannot access or correct the time file in the filesystem you booted from. This alarm can indicate many problems in the DBP subsystem and often appears with other errors. Check for the following additional problems to isolate the cause:

- Corruption of disk drive media
- Disk drive controller problem (TN475B SADI)
- A system crash that caused the clock to be invalid (the system may have lost the year). In this case, reset the clock using the `system : clock` form (see Procedure F).

TN747B: VPT

Each Voice Port Trunk (VPT) board has eight voice-port circuits for analog connections to a call-distribution group on the switch. It performs signaling and analog/digital conversions for each port. One VPT board provides analog interfaces for up to four VPC boards (two channels each) over the TD bus. Some circuit packs in the field may be TN747 vintage boards.

Table 4-17. VPT (TN747B) Alarm Resolution *(Part 1 of 4)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (cause)	3rd Choice (cause)
12-19	35 : 1-8	Single polarity ring current	TN747B, 19L, B	Switch port brd	Cables
20-27	35 : 9-16	Single polarity ring current	TN747B, 24L, B	Switch port brd	Cables
28-35	35 : 17-24	Single polarity ring current	TN747B, 19U, B	Switch port brd	Cables
36-43	35 : 25-32	Single polarity ring current	TN747B, 24U, B	Switch port brd	Cables
44-51	35 : 1-8	Ringing without ground	TN747B, 19L, B	—	—
52-59	35 : 9-16	Ringing without ground	TN747B, 24L, B	—	—
60-67	35 : 17-24	Ringing without ground	TN747B, 19U, B	—	—
68-75	35 : 25-32	Ringing without ground	TN747B, 24U, B	—	—
76-83	35 : 1-8	No PBX release on disconnect	TN747B, 19L, A	Switch port brd	Cables
84-91	35 : 9-16	No PBX release on disconnect	TN747B, 24L, A	Switch port brd	Cables
92-99	35 : 17-24	No PBX release on disconnect	TN747B, 19U, A	Switch port brd	Cables
100-107	35 : 25-32	No PBX release on disconnect	TN747B, 24U, A	Switch port brd	Cables
108-115	35 : 1-8	Ground detector stuck active	TN747B, 19L, A	Switch port brd	Cables
116-123	35 : 9-16	Ground detector stuck active	TN747B, 24L, A	Switch port brd	Cables
124-131	35 : 17-24	Ground detector stuck active	TN747B, 19U, A	Switch port brd	Cables
132-139	35 : 25-32	Ground detector stuck active	TN747B, 24U, A	Switch port brd	Cables
140-147	35 : 1-8	VPT trunk diagnostic test	TN747B, 19L, B	Switch port brd	Cables
148-155	35 : 9-16	VPT trunk diagnostic test	TN747B, 24L, B	Switch port brd	Cables
156-163	35 : 17-24	VPT trunk diagnostic test	TN747B, 19U, B	Switch port brd	Cables
164-171	35 : 25-32	VPT trunk diagnostic test	TN747B, 24U, B	Switch port brd	Cables
172-179	35 : 1-8	VPT port diagnostic test	TN747B, 19L, B	Switch port brd	Cables
180-187	35 : 9-16	VPT port diagnostic test	TN747B, 24L, B	Switch port brd	Cables
188-195	35 : 17-24	VPT port diagnostic test	TN747B, 19U, B	Switch port brd	Cables
196-203	35 : 25-32	VPT port diagnostic test	TN747B, 24U, B	Switch port brd	Cables
204-211	35 : 1-8	VPT dial tone seizure test	TN747B, 19L, B	Switch port brd	Cables
212-219	35 : 9-16	VPT dial tone seizure test	TN747B, 24L, B	Switch port brd	Cables
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

(Continued)

TABLE 4-17. VPT (TN747B) Alarm Resolution *(Part 2 of 4)*

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note)	2nd Choice	3rd Choice
220-227	35 : 17-24	VPT dial tone seizure test	TN747B, 19U, B	—	—
228-235	35 : 25-32	VPT dial tone seizure test	TN747B, 24U, B	—	—
236-243	35 : 1-8	VPT hybrid circuit test	TN747B, 19L, B	TN714, 18	—
244-251	35 : 9-16	VPT hybrid circuit test	TN747B, 24L, B	TN714, 18	—
252-259	35 : 17-24	VPT hybrid ckt test	TN747B, 19U, B	TN714, 18	—
260-267	35 : 25-32	VPT hybrid ckt test	TN747B, 24U, B	TN714, 18	—
268-275	35 : 1-8	VPT NPE crosstalk	TN747B, 19L, C	TD bus	—
276-283	35 : 9-16	VPT NPE crosstalk	TN747B, 24L, C	TD bus	—
284-291	35 : 17-24	VPT NPE crosstalk	TN747B, 19U, C	TD bus	—
292-299	35 : 25-32	VPT NPE crosstalk	TN747B, 24U, C	TD bus	—
1125	55 : 1	TD-bus sanity	TN747B, 19L, E	TD bus	—
1126	55 : 2	TD-bus sanity	TN747B, 24L, E	TD bus	—
1127	55 : 3	TD-bus sanity	TN747B, 19U, E	TD bus	—
1128	55 : 4	TD-bus sanity	TN747B, 24U, E	TD bus	—
1151	55 : 1	TD-bus control channel	TN747B, 19L, D	TD bus	—
1152	55 : 2	TD-bus control channel	TN747B, 24L, D	TD bus	—
1153	55 : 3	TD-bus control channel	TN747B, 19U, D	TD bus	—
1154	55 : 4	TD-bus control channel	TN747B, 24U, D	TD bus	—
1177	55 : 1	Angel ROM or RAM error	TN747B, 19L, E	TD bus	—
1178	55 : 2	Angel ROM or RAM error	TN747B, 24L, E	TD bus	—
1179	55 : 3	Angel ROM or RAM error	TN747B, 19U, E	TD bus	—
1180	55 : 4	Angel ROM or RAM error	TN747B, 24U, E	TD bus	—
1203	55 : 1	Angel program logic inconsistency	TN747B, 19L, E	TD bus	—
1204	55 : 2	Angel program logic inconsistency	TN747B, 24L, E	TD bus	—
1205	55 : 3	Angel program logic inconsistency	TN747B, 19U, E	TD bus	—
1206	55 : 4	Angel program logic inconsistency	TN747B, 24U, E	TD bus	—
1229	55 : 1	Translation error	TN747B, 19L, E	TD bus	—
1230	55 : 2	Translation error	TN747B, 24L, E	TD bus	—
1231	55 : 3	Translation error	TN747B, 19U, E	TD bus	—
1232	55 : 4	Translation error	TN747B, 24U, E	TD bus	—
1310	55 : 1	Angel vintage inconsistency	TN747B, 19L, E	TD bus	—
1311	55 : 2	Angel vintage inconsistency	TN747B, 24L, E	TD bus	—
1312	55 : 3	Angel vintage inconsistency	TN747B, 19U, E	TD bus	—
1313	55 : 4	Angel vintage inconsistency	TN747B, 24U, E	TD bus	—

Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.

(Continued)

TABLE 4-17. VPT (TN747B) Alarm Resolution (*Part 3 of 4*)

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (cause)	3rd Choice (cause)
1278-1285	35 : 1-8	Belated PBX release	TN747B, 19L, A	Switch port brd	Cables
1286-1293	35 : 9-16	Belated PBX release	TN747B, 24L, A	Switch port brd	Cables
1294-1301	35 : 17-24	Belated PBX release	TN747B, 19U, A	Switch port brd	Cables
1302-1309	35 : 25-32	Belated PBX release	TN747B, 24U, A	Switch port brd	Cables
1365-1372	35 : 1-8	Hardware time-out	TN747B, 19L, A	—	—
1373-1380	35 : 9-16	Hardware time-out	TN747B, 24L, A	—	—
1381-1388	35 : 17-24	Hardware time-out	TN747B, 19U, A	—	—
1389-1396	35 : 25-32	Hardware time-out	TN747B, 24U, A	—	—
1402-1409	35 : 1-8	No loop-current detected	TN747B, 19L, B	Switch port brd	Cables
1410-1417	35 : 9-16	No loop-current detected	TN747B, 24L, B	Switch port brd	Cables
1418-1425	35 : 17-24	No loop-current detected	TN747B, 19U, B	Switch port brd	Cables
1426-1433	35 : 25-32	No loop-current detected	TN747B, 24U, B	Switch port brd	Cables
1498	35 : 1	VPT touch tone test (flash transfer)	TN747B, 19L, B	Switch port brd	Cables
1499	35 : 2	VPT touch tone test (flash transfer)	TN747B, 19L, B	Switch port brd	Cables
1500	35 : 3	VPT touch tone test (flash transfer)	TN747B, 19L, B	Switch port brd	Cables
1501	35 : 4	VPT touch tone test (flash transfer)	TN747B, 19L, B	Switch port brd	Cables
1502	35 : 5	VPT touch tone test (flash transfer)	TN747B, 19L, B	Switch port brd	Cables
1503	35 : 6	VPT touch tone test (flash transfer)	TN747B, 19L, B	Switch port brd	Cables
1504	35 : 7	VPT touch tone test (flash transfer)	TN747B, 19L, B	Switch port brd	Cables
1505	35 : 8	VPT touch tone test (flash transfer)	TN747B, 19L, B	Switch port brd	Cables
1506	35 : 9	VPT touch tone test (flash transfer)	TN747B, 24L, B	Switch port brd	Cables
1507	35 : 10	VPT touch tone test (flash transfer)	TN747B, 24L, B	Switch port brd	Cables
1508	35 : 11	VPT touch tone test (flash transfer)	TN747B, 24L, B	Switch port brd	Cables
1509	35 : 12	VPT touch tone test (flash transfer)	TN747B, 24L, B	Switch port brd	Cables
1510	35 : 13	VPT touch tone test (flash transfer)	TN747B, 24L, B	Switch port brd	Cables
1511	35 : 14	VPT touch tone test (flash transfer)	TN747B, 24L, B	Switch port brd	Cables
1512	35 : 15	VPT touch tone test (flash transfer)	TN747B, 24L, B	Switch port brd	Cables
1513	35 : 16	VPT touch tone test (flash transfer)	TN747B, 24L, B	Switch port brd	Cables
1514	35 : 17	VPT touch tone test (flash transfer)	TN747B, 19U, B	Switch port brd	Cables
1515	35 : 18	VPT touch tone test (flash transfer)	TN747B, 19U, B	Switch port brd	Cables
1516	35 : 19	VPT touch tone test (flash transfer)	TN747B, 19U, B	Switch port brd	Cables
1517	35 : 20	VPT touch tone test (flash transfer)	TN747B, 19U, B	Switch port brd	Cables
1518	35 : 21	VPT touch tone test (flash transfer)	TN747B, 19U, B	Switch port brd	Cables

Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.

(Continued)

TABLE 4-17. VPT (TN747B) Alarm Resolution (*Part 4 of 4*)

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (Note) (ckt,slot,proc.)	2nd Choice (cause)	3rd Choice (cause)
1519	35 : 22	VPT touch tone test (flash transfer)	TN747B, 19U, B	Switch port brd	Cables
1520	35 : 23	VPT touch tone test (flash transfer)	TN747B, 19U, B	Switch port brd	Cables
1521	35 : 24	VPT touch tone test (flash transfer)	TN747B, 19U, B	Switch port brd	Cables
1522	35 : 25	VPT touch tone test (flash transfer)	TN747B, 24U, B	Switch port brd	Cables
1523	35 : 26	VPT touch tone test (flash transfer)	TN747B, 24U, B	Switch port brd	Cables
1524	35 : 27	VPT touch tone test (flash transfer)	TN747B, 24U, B	Switch port brd	Cables
1525	35 : 28	VPT touch tone test (flash transfer)	TN747B, 24U, B	Switch port brd	Cables
1526	35 : 29	VPT touch tone test (flash transfer)	TN747B, 24U, B	Switch port brd	Cables
1527	35 : 30	VPT touch tone test (flash transfer)	TN747B, 24U, B	Switch port brd	Cables
1528	35 : 31	VPT touch tone test (flash transfer)	TN747B, 24U, B	Switch port brd	Cables
1529	35 : 32	VPT touch tone test (flash transfer)	TN747B, 24U, B	Switch port brd	Cables
Note: For systems with an expansion cabinet, the lower cabinet board is shown with an L next to the slot number and the upper cabinet board is shown with a U next to the slot number.					

Procedure A: General Replacement Steps

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. If this AUDIX machine has more than one VPT board, you can swap (exchange) the alarmed VPT with the other one and reboot. If the fault moves to follow the originally alarmed board, that VPT is faulty. Shut down and power down again.
3. *On Standalone systems:* If there are specific ports alarmed on the VPT, busy out the corresponding circuits at the switch until a replacement VPT arrives. Display the `system : translation : voice port` form and record the extension associated with the each alarmed port. Then busy out each extension at the switch. *Remember to release the ports at the switch when the replacement VPT arrives.*
4. Replace the VPT. Power up the system. The system should initialize.
5. Make a VPT test call on all ports of the replaced VPT board using the `maintenance : system : test call` form.
6. To ensure complete VPT operation, you may run additional tests. These tests will also run later in the background, but slowly.
 - a. Run the complete TD-bus test on the replaced board. Use the `maintenance : td-bus : test` form. Select repetitions = 5 and long version = y.
 - b. Run the short version of the VPT test on each channel controlled by the replaced unit. Use the `maintenance : vpt : test` form and select long version = n.

7. Verify that the alarm has not returned using the `maintenance : active alarm : display` form. If the alarm is still not resolved, do a restart.
8. If the alarm continues to return, replace the 2nd-choice board, check the switch boards and cables (see Chapter 5), or have the TSC check the TD bus.

Procedure B: VPT Short Test

Many VPT alarms are caused by switch problems. Check for these as follows:

1. Verify that the call-distribution group in the switch has no restriction for call origination:
 - For System 85, Generic 2, and DIMENSION PBX, this is in switch PROC 010, Word 3, Field 18.
 - For System 75, System 75 XE, Generic 1, and Generic 3, this is the “cor” form.

See the *Switch Administration Guide for AUDIX Voice Messaging* (585-305-505) or the appropriate switch documents for details on all switch translations.
2. For other faults (or if the switch translations are good), check the physical connection (wiring) to the switch to make sure it is sending dial tone to AUDIX.
 - a. Disconnect the AUDIX port and install a test phone on the line, then ring the phone and go off-hook to dial. Make sure the test phone has touch-tone dialing when trying to break dial tone.
 - b. If you cannot get dial tone from the switch, check the wall field connections. If the physical connections look good, test or replace the associated switch port board.
3. If the switch side looks good, run the short version of the VPT test on the alarmed channel (repetitions = 5). Use the `maintenance : vpt : test` form and long version = n. *If the test fails*, follow Procedure A.

Procedure C: Complete VPT Test

Run the complete version of the VPT test twice on the alarmed channel (repetitions = 2). Use the `maintenance : vpt : test` form and long version = y.

If the test fails, follow Procedure A with the addition that the complete VPT test must run successfully twice to resolve the alarm (repetitions = 2).

Procedure D: TD-Bus Control Channel Test

Run the TD-Bus control channel test on the alarmed VPT unit (repetitions = 5). Use the `maintenance : td-bus : test` form and long version = n.

If the test fails, follow Procedure A with the addition that the TD-Bus control channel test must be run five times successfully to resolve the alarm (repetitions = 5).

Procedure E: Complete TD-Bus Test

Run the complete TD-bus test on the alarmed VPT board (repetitions = 5). Use the `maintenance : td-bus : test` form and long version = y.

If the test fails, follow Procedure A to resolve the alarm.

UN160B: DBPI

The UN160B Data Base Processor Interface (DBPI) board connects the FP subsystem with the DBP subsystem over the S bus. It works with the UN162 VSFI to allow AUDIX system communication with the DBP subsystem and disk storage.

If the AUDIX is networked with other AUDIX adjuncts, the UN160B must be Vintage 2 (or later).

Table 4-18. DBPI (UN160B) Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (ckt,slot,proc.)	2nd Choice (ckt,slot,proc.)	3rd Choice (ckt,slot)
164	12 : 0	Only DBPI S-bus test fails	UN160B, 06, A	M-bus RAM, B	—
165	12 : 0	Only DBPI S-bus test passes	UN160B, 06, A	—	—
170	12 : 0	VB and PE 0 fail to DBPI	UN160B, 06, A	UN162, 05	—
175	12 : 0	VB fails to DBPI, not PE 0	UN160B, 06, A	TN520, 17	UN162, 05
192	12 : 0	PE 0 fails to DBPI, not SCPI	UN160B, 06, A	TN523, 09L	UN162, 05
201	12 : 0	DBPI RAM failure	UN160B, 06, A	—	—
202	12 : 0	DBPI ROM failure	UN160B, 06, A	—	—
203	12 : 0	DBPI CPU failure	UN160B, 06, A	—	—
204	12 : 0	DBPI mailbox failure	UN160B, 06, A	S bus	—
205	12 : 0	Maint removed DBPI from S bus	UN160B, 06, A	S bus	—
212	12 : 0	General IOK error	UN160B, 06, A	UN162, 05	—

Procedure A: Replace the DBPI

1. Shut down system software (if running) and spin down the RCD (if not done automatically).
2. Power down the system, replace the UN160B, power up the system, and log in.
3. Verify that the alarm is resolved using the `maintenance : active alarm : display` form. Wait one minute past initialization and recheck to see if the alarm returns.
4. If the alarm continues, replace the 2nd-choice board or have the TSC check the S bus.

Procedure B: Check the M-Bus (PE) RAM

1. Reboot the system and select a nonstandard initialization.
2. Run the extended memory (RAM) test (select option “y”). This will add about 15 to 30 minutes to the initialization.
3. *If the test fails*, replace the FP-RAM boards one at a time as directed in *TN523 (or TN591)*, *TN716B*, *TN734 (or TN761)*: PE.

UN162: VSFI

The UN162 Voice Store and Forward Interface (VSFI) links all DBP subsystem interactions with the FP subsystem. The UN162 VSFI connects to the S bus through the UN160B DBPI board and enables voice data transfer between the TN532/540 DBP-RAM on the DBP (VME) bus and the TN520 VB voice buffer on the S bus. The UN162 VSFI is initialized by the UN160B DBPI.

Table 4-19. VSFI (UN162) Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice (cause)
159	13 : 0	DBP/VME-bus interface fault	UN162, 05, A	TN472C, 04	DBP/VME bus
197	14 : 0	DBP memory access and VME-bus fault	UN162, 05, A	UN160B, 06	DBP/VME bus
206	5 : 0	VSFI dual-ported RAM failure	UN162, 05, A	UN160B, 06	DBP/VME bus
897	5 : 0	DBP diagnostic result (127F)	UN162, 05, A	UN160B, 06	DBP/VME bus
Note: Fault code 127 is not currently alarmed.					

Procedure A: General Replacement Steps

To replace the VSFI:

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the UN162. Power up the system. The system should initialize.
3. When the initialization completes:
 - a. If the initialization is successful, verify the alarm is resolved by waiting one minute past initialization and rechecking for alarms.
 - b. If initialization stops before the “start service” message, go to *Control Mode/Visual Inspection Checklist* in Chapter 3.
4. If the alarm returns, replace the 2nd-choice board or have the TSC check the DBP bus.

5. Data Link or Switch Problems

The AUDIX data link passes call connect, disconnect, and message-waiting lamp data as well as other call-related information to a fully integrated switch. The term used for the data link depends on the type of switch to which AUDIX is connected. It can be any of the following:

- The Data Communications Interface Unit (DCIU) on System 85, DEFINITY Generic 2, or DIMENSION PBX
- The PGATE board for a DEFINITY Generic 3r
- The Processor Interface (PI) board (or PIB) on System 75, System 75 XE, DEFINITY Generic 1, Generic 3i, or Generic 3s
- The Switch Communications Interface (SCI) or the AP/CMS/DCS interface on System 75
- The Simplified Message Service Interface (SMSI) on the 1A ESS Switch and certain configurations of the 5ESS Switch
- The Basic Rate Interface–Applications Processor Interface (BRI-API) on the 5ESS Switch

This chapter covers alarmed and unalarmed problems with the AUDIX-to-switch data link, including:

- Data Link Alarms (Unit 30)
- Software Translation Alarms (Unit 32)
- Data Link Hardware
- Switch Administration

NOTE

If you are troubleshooting the data link for an AUDIX system connected to a non-AT&T switch, refer to the appropriate document for troubleshooting procedures:

- *AUDIX Integration Package for the DMS-100 Switch* (585-304-204)
- *AUDIX Integration Package for the SL-1 Switch* (585-304-203)

DATA LINK ALARMS

Data link failures (Unit 30) indicate that there is a problem either with the TN547(B) (if used) or with the link to the switch. This link may include other links to the nodes of a DCS. If the AUDIX uses a TN533 and not the TN547(B), Unit 30 alarms usually point to the link. A TN533 failure there would result in a Unit 43 alarm.

Some failures might be that the switch data link board might fail, the connecting hardware or cabling could be faulty, the data link translations may have been changed at the switch, or (in a DCS network) one or more of the nonhost switches could have a data link problem. See the *Switch Administration Guide for AUDIX Voice Messaging* (585-305-505) for details on DCS networks.

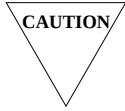
If you are working on an AUDIX Standalone system (i.e., one without a data link) and one of these alarms is active, escalate per your local procedures.

Table 5-1. Data Link Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (cause,proc.)	2nd Choice (cause,proc.)	3rd Choice (cause,proc.)
22	30 : 0	Corrupt DCIU/PGATE/PI/SCI channel	AUDIX, A	Data link, B	Switch, C
157	30 : 0	VIP L4 is out of data transfer	AUDIX, A	Data link, B	Switch, C
158	30 : 0	DLC/MPDM handshake problem	AUDIX, A	Data link, B	Data, C
218	30 : 1	VIP L4 out of data transfer to host switch	AUDIX, A	Data link, B	Switch, C
219 – 237	30 : 2-20	VIP L4 is out of data transfer to remote switch 2 to 20 (in DCS networks only)	AUDIX, A	Data link, B	Switch, C
344	30 : 0	MPSI configured for DCIU/SCI	Translations, D	–	–
345	30 : 0	SCPI configured for SMSI/API	Translations, D	–	–
346	30 : 0	MPSI corrupt	TN547B, 15, E	–	–
347	30 : 35	End to end data transfer problems	AUDIX, A	Data link, B	Switch, C
348	30 : 42	SCA layer 1 failure	AUDIX, A	Data link, B	Switch, C
349	30 : 39	1A ESS Retry Later	Switch, A	Data link, B	–
350	30 : 41	No response from SCA	SCA, A	Data link, B	Switch, C
351	30 : 36	No SMSI/API end-to-end message, timeout	AUDIX, A	Data link, B	Switch, C
352	30 : 43	SCA layer 2 failure or failure to assign Network Termination Endpoint ID	SCA, A	Data link, B	Switch, C
353	30 : 44	SCA failed beyond ISDN	SCA, A	Data link, B	Switch, C
354	30 : 45	LCEN failure	SCA, A	Data link, B	Switch, C

Procedure A: Data Link Tests

This test is designed to narrow the problem down to AUDIX hardware, switch hardware or software, or the data link connecting equipment. The information returned by AUDIX after running the switch connect test will determine the additional steps needed to restore the data link.



The data link test will temporarily affect service (2 to 20 minutes) and should be run during a low- or no-traffic period. It will also bring down the AUDIX link to the host switch and busy-out access to all DCS switches configured. When the data link is alarmed, AUDIX will not accept calls so the test can be run immediately.

Use the following steps to restore the data link:

1. Display the `maintenance : datalink : test` form.
2. Select loopback point 1 and press `CHANGE`.
3. When the test is finished, check the *test result* field and look up the appropriate set of instructions.

Failure at SCPI

The TN533 SCPI or TN547(B) MPSI internal test failed. The type of board you have depends on what type of switch you are connected to, but in either case the board in slot 15 is probably bad. When you get the proper replacement board, do the following:

1. Do a maintenance shutdown and power down the system.
2. Replace the board in slot 15.
3. Power up and initialize the system.
4. Check the `maintenance : active alarm : display` form to see if the original alarm returns. If so, escalate the problem immediately.
5. The system may take up to 5 minutes to completely initialize the data link. When the link is up (the yellow LED on the board in slot 15 is lit), make test calls to ensure proper operation.

Failure at Host Switch

The test failed somewhere outside the AUDIX cabinet. You will need to run additional tests to isolate the problem. Go to Procedure B to test the interface equipment.

Pass

The system was able to send a message to the switch and get an acknowledgement back. Do the following:

1. Check the `maintenance : active alarm : display` form to see if the alarm is now resolved. If so, release the data link and make test calls to ensure normal service.

2. If AUDIX still won't accept calls (you receive fast busy when you call AUDIX), restart the system using the **startup** form.
3. If the system doesn't accept calls or the alarm remains active after the restart, escalate per local procedures.

For systems connected to a 5ESS Switch, the following additional messages may be displayed.

Failure at SCA

The Switch Communications Adapter (SCA) did not respond to AUDIX. Cycle power on the SCA (turn the SCA off and then back on) and rerun the switch connect test on the **maintenance : datalink : test** form.

1. If the system test now passes, check that the alarm is resolved and the system will now answer calls.
2. If the test still fails, go to *Data Link Hardware* to test the SCA and associated cabling and hardware.

SCA Failed Layer 1 Protocol

The SCA passed internal tests and can communicate with AUDIX, but can't complete the physical link to the switch.

1. Check the connection between the SCA and Network Termination 1 (NT1) if an NT1 is required. If you do not have access to this connection, escalate per local procedures.
2. If the two are connected, try replacing the modular cord between the SCA and NT1.
3. If all of the hardware on site is good, the 5ESS Switch translations will have to be checked. Escalate per local procedures.

SCA Failed Layer 2 Protocol

The SCA was able to establish a physical link with the 5ESS Switch, but could not establish communication. Someone will have to check the translations at the 5ESS Switch and make sure they are consistent with those in AUDIX and the SCA. Make sure the Terminal Endpoint Identifier is assigned correctly.

SCA Failed Beyond ISDN Software

The SCA was able to establish communications with the Integrated Services Digital Network (ISDN) software at the switch, but cannot complete the communication path. Someone will have to check the translations at the 5ESS Switch and make sure they are consistent with those in AUDIX and the SCA.

Line Card Equipment Number Improperly Assigned

The Line Card Equipment Number (LCEN) is set using dip switches inside the SCA. You will need to find out the correct number and then set the switches inside the SCA box. See Figure 5-11, *SCA Option Settings*, for dip switch locations.

Procedure B: Interface Equipment Tests

The following test can further isolate an unresolved data link problem. If you run a loop-around test on a device you do not have, the test will always fail. The `maintenance : datalink : test` form shows test 3 as “LADS or MPDM”, but will also test the link with a DSU or 202T modem as well as a LADS or MPDM (formerly called “PDM”).

The equipment to be tested depends on the type of switch to which AUDIX is connected. It can be any of the following:

- **Data Service Unit (DSU):** Used on System 75, System 75 XE, System 85, DIMENSION PBX, or DEFINITY Communications Systems for distances over 400 feet (122 meters). Needs to be set in loop-back mode. The DSU replaces the LADS. See *AUDIX System Description* (585-305-201) for details on the various DSUs available for use with AUDIX.
- **Isolating Data Interface (IDI):** Used on System 75, System 75 XE, System 85, DIMENSION PBX, or DEFINITY Communications Systems for distances of 400 feet or less. Requires a manual loop-back plug (ED-1E422-10, Group 6) to be physically inserted in the data link.
- **Local Area Data Set (LADS):** Used on the System 75, System 75 XE, System 85, or DIMENSION PBX for distances over 400 feet. Needs to be set in loop-back mode. *The LADS has been replaced by the DSU, but is still used at some sites.*
- **Modular Processor Data Module (MPDM):** Sometimes used in a System 75, System 75 XE, System 85, or DEFINITY Communications Systems data link. Needs to be set in loop-back mode. The MPDM has been discontinued but may still be used at certain sites.
- **Direct Cabling:** Used to connect the AUDIX to a 5ESS Switch through an Advanced Communications Package (ACP), which runs on an Applications Processor (AP) and provides an SMSI data link.
- **202T Modem:** Used to connect the AUDIX to a 1A ESS Switch or to a 5ESS Switch using an SMSI data link.
- **Switch Communications Adapter (SCA):** The SCA is a protocol converter made specifically for AUDIX to connect to a 5ESS Switch with a BRI-API data link.

Use the following steps to test the data link interface equipment:

1. First, verify that the MPDM, LADS, DSU, or 202T modem option settings are set correctly (see *Data Link Hardware*). The IDI has no option settings.
2. Run the MPDM, DSU, or LADS self-tests to see if they are causing the alarm (see *Data Link Hardware* for details). The IDI and the 202T modem do not have a self-test mechanism. If the self-tests fail, replace the unit. If they pass, continue.
3. Busy-out the data link using the `maintenance : datalink : busyout` form.

4. Remove the cable connected to the SCPI DATA port (F00) on the AUDIX cabinet.
5. Place a loop-back plug on the back of the cabinet.
6. Run the `maintenance : datalink : test` form using loopback point 4. If the test passes, re-connect the cable to F00 and go to the next step. If the test fails, replace the TN533 or TN547(B) in slot 15 of the AUDIX carrier and rerun the test. If this test passes, restore service. If this test fails, there is a problem with the connection between the AUDIX backplane and the connector panel. Escalate the problem immediately.
7. Set up for a local loop-back test. This will test the MPDM, the local LADS, the local DSU, the local 202T modem (the unit nearest AUDIX), or the cabling to an IDI or 5ESS Switch AP.
 - a. Place the MPDM, LADS, or DSU in local loop-back mode (modem check).
 - b. For 202T modems, press the AL (Analog Loop) button on the front of the modem.
 - c. For an IDI, disconnect the Group 174 cable at the IDI and place a loop-back plug on the end of the cable.
 - d. For direct cabling to an AP, replace the Group 110 cable and/or the H600-258 cable and go to step 10.
8. Run the `maintenance : datalink : test` form using loopback point 3. This tests the near-end connection to AUDIX.
 - a. If the test passes, consider the unit and/or cabling good. Take the unit out of loopback mode or remove the loopback plug and reconnect the cabling. Go to the next step.
 - b. If the test fails, either replace the cable or replace the bad unit (see *Data Link Hardware*). If a LADS is bad, you may have to replace it with a DSU, which may require replacing both LADS in the link with DSUs. Go back to steps 1, 2, and 7.
9. Test the other half of the link:
 - a. For a LADS or DSU, set up for a remote loop-back test. Set the unit nearest the switch in far-end (remote) loop-back mode. Run the `maintenance : datalink : test` form using loopback point 3.
 - If the test passes, consider that unit good. Take the unit out of loop-back mode.
 - If the test fails, run data link tests from the switch if possible (see Procedure C). If these tests fail, replace the failed unit (see *Data Link Hardware*). If both the AUDIX and switch tests pass, it is unlikely that the IDI, MPDM, LADS, DSU, or 202T is faulty. Escalate the problem using local procedures.
 - b. For an IDI, check the Group 304 cable by replacing it with a known good cable. Go to step 10 to test the new cable. If that test fails, replace the IDI and return to step 10.
10. If a bad unit was replaced, rerun the `maintenance : datalink : test` form at AUDIX using loopback point 1. If the test passes, go to the next step. If the test fails, go to Procedure C.
11. After the tests are finished, use the `maintenance : datalink : release` form to enable the link for service.
12. Run the `maintenance : datalink : test` form again using loop-back point 1. If the test passes:
 - a. Use the `maintenance : active alarm : display` form to verify the fault is resolved.

- b. Wait 15 minutes past initialization and verify the fault does not return.
13. If the fault is still not resolved or returns, use Procedure C.

Procedure C: Check the Link Translations

If the AUDIX SCPI or MPSI board and its connecting equipment appear good, the next step is to double-check the switch translations and port board as follows:

1. Check that the AUDIX `system : translation : switch connection` and `system : translation : voice port` forms are administered correctly. See Procedure D. If not, correct the problem.
2. Wait 15 minutes from when the alarm was activated to see if the background data link test resolves the alarm. Check if the alarm now is resolved using the `maintenance : active alarm : display` form.
3. Check the translations on the host switch to see if the alarm is in the switch administration or switch data link board. See the *Switch Administration Guide for AUDIX Voice Messaging* (585-305-505) for complete administration procedures.
 - a. On System 75 with an MPDM: If the switch seems okay and if AUDIX is on interface link 1, try moving it to another link (2 through 4). This may require readministering another adjunct, such as an AP or CMS link.
 - b. On System 85, Generic 2, and DIMENSION PBX: Check with the switch administrator in case PROC 027, test 3 has made the data link to AUDIX inactive. Have the switch administrator use PROC 650 to check the switch for alarms. PROC 650, test 3, can run an external loop-around test to an MPDM or pair of DSUs/LADS in the link.
 - c. On the 1A ESS Switch or the 5ESS Switch: Have the switch translations checked for errors.
4. If a fault is found at the host switch, have the switch administrator correct the problem. If the repair requires the AUDIX data link to the host switch to be shut down:
 - a. Inform the customer of a service interruption. At the scheduled time, do an administrative shutdown using the `shutdown` form.
 - b. After the switch repair is complete, restart AUDIX using the `startup` form.
5. *In a DCS Network:* If the alarm is not resolved, inform the switch administrator that there could be a hardware or administration problem with a data link to a nonhost switch data link. Check the nonhost node number(s) on the `system : translation : switch connection` form while the switch administrator checks the switch.
6. After a switch repair procedure, use the `system : translation : alarm resolution` form to immediately clear the problem on AUDIX. If you changed any translations on the host switch, you need to restart AUDIX using the `startup` form.
7. Check if the AUDIX alarm is resolved using the `maintenance : active alarm : display` form. Check for alarms again after 15 minutes to make sure the problem is fixed.

Procedure D: Check System Configuration

These alarms indicate there is a problem with translations on the `system : translation : switch connection` form. Check the following:

- *For fault 344:* The system has a TN547(B) MPSI installed in slot 15, but the `system : translation : switch connection` form is translated for a DCIU-SCI type of data link.
 - If the system uses an SMSI or API data link (it is connected to either a 1A ESS Switch or 5ESS Switch) or it is integrated with some other vendor switch, change the `system : translation : switch connection` form to indicate the correct type of data link.
 - If the system is connected to an AT&T PBX, order a TN533 SCPI and replace the TN547(B) MPSI when the new board arrives.
- *For fault 345:* The system has a TN533 SCPI installed in slot 15, but the `system : translation : switch connection` form is translated for either an SMSI or API data link.
 - If the system uses a DCIU, PGATE, PI, or SCI (it is connected to a System 75, System 75 XE, System 85, DEFINITY Communications System, or DIMENSION PBX), change the `system : translation : switch connection` form so that the correct translations are shown.
 - If the system uses an SMSI or API link, order a TN547(B) MPSI and replace the TN533 SCPI when the new board arrives.

Procedure E: General Replacement Steps

Use the following procedure to replace the TN547(B) MPSI:

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Replace the TN547(B) board. Restore power to the system. The system should initialize.
3. Verify the alarm is resolved using the `maintenance : active alarm : display` form.

SOFTWARE TRANSLATION ALARMS

Software translation alarms generally refer to administrative errors. For example, if the call-distribution group (ACD/EUCD/UCD) member extension administered on the switch is inconsistent with AUDIX administration, calls cannot be connected on the AUDIX port. Either AUDIX or the switch translation needs to be corrected.

Most of these faults apply only to AT&T PBX data links (DCIU, PGATE, PI, or SCI). Fault 67 and Fault 68 can occur on a DCIU-SCI, BRI-API, or SMSI link.

Table 5-2. Software Translation Alarm Resolution (*Part 1 of 2*)

Alarm		Description (see Note)	Repair Procedure
Fault	Unit:Dev		
36	32 : 0	Port 1 C-D member extension translation inconsistent	A
37	32 : 0	Port 2 C-D member extension translation inconsistent	A
38	32 : 0	Port 3 C-D member extension translation inconsistent	A
39	32 : 0	Port 4 C-D member extension translation inconsistent	A
40	32 : 0	Port 5 C-D member extension translation inconsistent	A
41	32 : 0	Port 6 C-D member extension translation inconsistent	A
42	32 : 0	Port 7 C-D member extension translation inconsistent	A
43	32 : 0	Port 8 C-D member extension translation inconsistent	A
44	32 : 0	Port 9 C-D member extension translation inconsistent	A
45	32 : 0	Port 10 C-D member extension translation inconsistent	A
46	32 : 0	Port 11 C-D member extension translation inconsistent	A
47	32 : 0	Port 12 C-D member extension translation inconsistent	A
48	32 : 0	Port 13 C-D member extension translation inconsistent	A
49	32 : 0	Port 14 C-D member extension translation inconsistent	A
50	32 : 0	Port 15 C-D member extension translation inconsistent	A
51	32 : 0	Port 16 C-D member extension translation inconsistent	A
52	32 : 0	Port 17 C-D member extension translation inconsistent	A
53	32 : 0	Port 18 C-D member extension translation inconsistent	A
54	32 : 0	Port 19 C-D member extension translation inconsistent	A
55	32 : 0	Port 20 C-D member extension translation inconsistent	A
56	32 : 0	Port 21 C-D member extension translation inconsistent	A
57	32 : 0	Port 22 C-D member extension translation inconsistent	A
58	32 : 0	Port 23 C-D member extension translation inconsistent	A
59	32 : 0	Port 24 C-D member extension translation inconsistent	A
Note: “C-D” refers to a call-distribution group (ACD/EUCD/UCD).			

(Continued)

TABLE 5-2. Software Translation Alarm Resolution (*Part 2 of 2*)

Alarm		Description (see Note)	Repair Procedure
Fault	Unit:Dev		
60	32 : 0	Port 25 C-D member extension translation inconsistent	A
61	32 : 0	Port 26 C-D member extension translation inconsistent	A
62	32 : 0	Port 27 C-D member extension translation inconsistent	A
63	32 : 0	Port 28 C-D member extension translation inconsistent	A
64	32 : 0	Port 29 C-D member extension translation inconsistent	A
65	32 : 0	Port 30 C-D member extension translation inconsistent	A
66	32 : 0	Port 31 C-D member extension translation inconsistent	A
67	32 : 0	Port 32 C-D member extension translation inconsistent	B
		or no port assigned to C-D member extension(s)	
67	32 : 32	AUDIX has no voice port translations	B
68	32 : 0	Data link translations inconsistent between host and AUDIX	C
250	32 : 0	AUDIX rejected switch clock time	D
Note: “C-D” refers to a call-distribution group (ACD/EUCD/UCD).			

Procedure A: Check Specific Port and Extension Translations

Whenever AUDIX sends the switch a call-distribution group (ACD/EUCD/UCD) member extension and receives an error message, check the switch and AUDIX translations:

1. Using the AUDIX system : translation : voice port form, find the call-distribution member extension corresponding to the alarmed port number.

NOTE

Only the first bad translation is alarmed, so check all translations using the detailed steps in the *Switch Administration Guide for AUDIX Voice Messaging* (585-305-505).

2. Verify that this extension is consistent with the switch administration as follows:
 - a. On System 75, System 75 XE, Generic 1, and Generic 3: Check the “analog-stations” and “hunt-group” forms for AUDIX.
 - b. On System 85, Generic 2, and DIMENSION PBX: Check Procedure 026.
3. This alarm often involves other port translation problems. Therefore, verify all other extensions starting with the last call-distribution member extension assigned.
4. Next, try to resolve the alarm using the system : translation : alarm resolution form.
5. If you changed the extension length, run the Service Dispatcher audit on the maintenance : audits : fp form. (A system restart also does this; do one only if there is no traffic.)
6. Verify the alarm is resolved using the maintenance : active alarm : display form. Monitor system traffic to ensure that the problem does not occur again.

Procedure B: Check for Call Forwarding

Whenever AUDIX receives a call-distribution group member extension in a message for which there is no port number assigned, you should first check if the AUDIX associated number has been call forwarded at the switch. If it has, calls to AUDIX normally ring with no answer; see if you have a customer complaint about this.

1. Check for Call Forwarding at the switch. If it is on, remove it. Then restart the AUDIX.
2. If this is not the problem or does not resolve the alarm, go to Procedure A.

Procedure C: Check for Translation Consistency

This procedure checks the data link between the switch and AUDIX. If you are working on a Standalone system, there is no data link. Escalate per your local procedures.

This alarm shows that the BX.25 data link translations are inconsistent between AUDIX and the host switch, or that the data link is down for another reason. Check for consistent translations as follows:

1. Check all switch and AUDIX fields and numbers on the `system : translation : switch connection` form. These fields are described in detail in *AUDIX Release 1 Version 7 Forms Reference* (585-305-208). Generally, data link administration includes:
 - a. The “communication-interface processor-channels” form on System 75, System 75 XE, Generic 1, and Generic 3.
 - b. PROC 257 on System 85 and Generic 2 or PROC 256 on DIMENSION PBX.
2. Make sure all switch and AUDIX fields and numbers on the `system : translation : voice port` form are consistent with the data link translations. Go to Procedure A, step 2, to continue checking translations and run the repair procedures.

Procedure D: Check Switch Clock

AUDIX relies on the time set through the switch to send messages at the correct time, delete voice messages after a certain number of days, and make traffic and error reports. Because AUDIX has no way to keep its own time internally on systems running R1V2 software, the correct time must come from the switch. If the switch is set to the wrong day or time, the time-dependent operations in AUDIX do not work as expected because AUDIX was given the wrong information.

If you have a time-related fault or warning, a user complaint about unexpected deletions or scheduling, or see many time-dependent errors, check the switch clock time as follows:

1. First, go to the `system : clock` form and synchronize the AUDIX clock with the switch clock. This should resolve any alarm associated with the clock.
2. Check the switch clock for accuracy. If the switch clock is incorrect, consult local maintenance personnel to have it reset. **Do not reset the clock without prior consultation.** Altering the clock could have adverse affects on traffic studies. After resetting the clock, repeat step 1.
 - On System 75, System 75 XE, Generic 1, and Generic 3, use the “set time” command.
 - On System 85, Generic 2, and DIMENSION PBX, use PROC 284 (system clock).

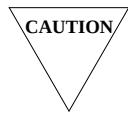
DATA LINK HARDWARE

This section covers problems related to the data link between the switch and AUDIX. A Standalone system does not have this link. If you are working on a Standalone system, and you believe you have switch problems, escalate to the Technical Service Center (TSC).

Steps for ordering, installing, testing, and checking option switch settings for data link hardware can be found in Table C-1, *AUDIX System Parts List*, of Appendix C.

Check the IDI

The Isolating Data Interface (IDI) is a passive device and has no self-test capabilities. The only way to check the IDI is to exchange it and/or the cables with known-good components.



IDI cables may be up to 400 feet long, depending on the group ordered. Do *not* leave excess cable in a coil.

System 75/XE, Generic 1, and Generic 3i/s

The IDI connection can be checked by inserting a manual loop-back plug (ED-1E422-10, Group 6) in the link (see the *Data Link Alarms* section).

- If this test indicates a near-end problem, try exchanging the 4.5-foot ED-1E434-11, Group 174 cable and IDI connected to the AUDIX SCPI DATA port.
- If the test fails near the switch end, try replacing the 10- to 400-foot H600-210 cable with known-good components.

See Figure 5-1, *IDI Data Link to a System 75/XE, Generic 1, or Generic 3i/s* and Figure 5-2, *IDI Data Link to a Generic 3r* for correct cabling setups.

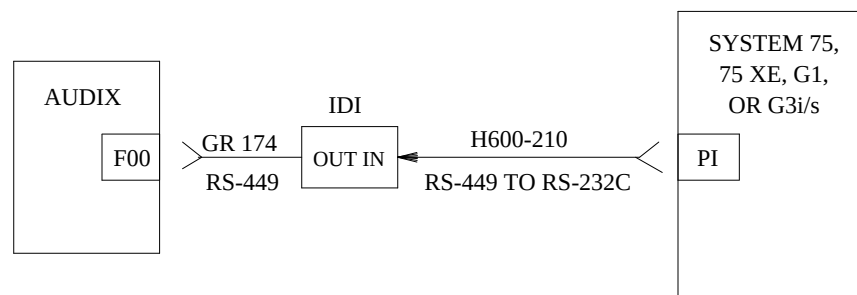


Figure 5-1. IDI Data Link to a System 75/XE, Generic 1, or Generic 3i/s

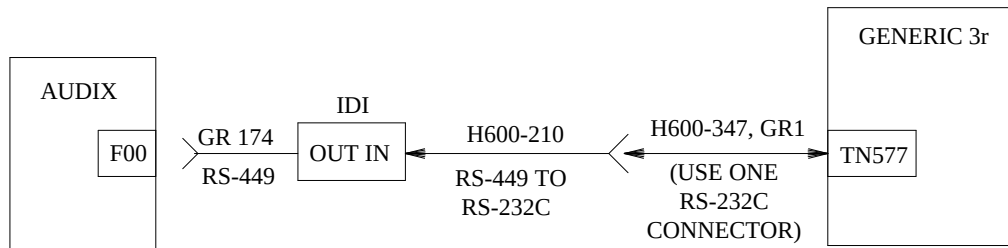


Figure 5-2. IDI Data Link to a Generic 3r

System 85, Generic 2, and DIMENSION PBX

See Figure 5-3, *IDI Data Link to a System 85, Generic 2, or DIMENSION PBX* for the correct IDI setup. The IDI connection can be checked by inserting a manual loop-back plug (ED-1E422-10, Group 6) in the link (see the *Data Link Alarms* section).

- If this test indicates a near-end problem, try exchanging the 4.5-foot ED-1E434-11, Group 174 cable and IDI connected to the AUDIX SCPI DATA port.
- If the test fails near the switch end, try replacing the 25- to 400-foot Group 304 cable or the Group 342 “Y” cable (for duplicated common control) with known-good components.

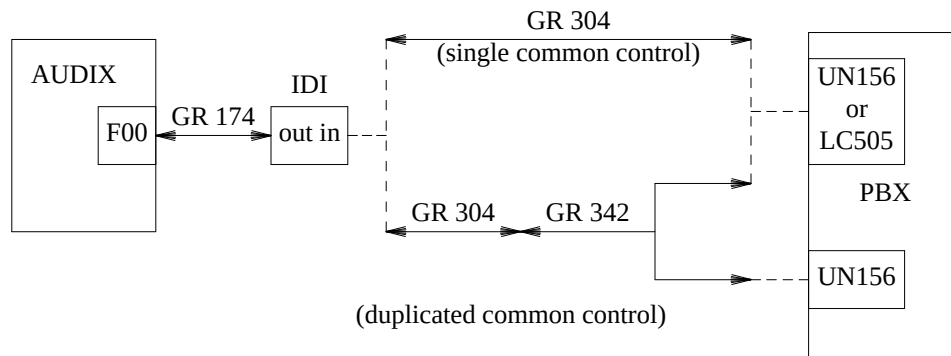


Figure 5-3. IDI Data Link to a System 85, Generic 2, or DIMENSION PBX

Check the DSU

A pair of DATAPHONE II Data Service Units (DSUs) (2500, 2600, or 2700 series) may be used in place of the IDI to extend the AUDIX data link. These units replace the LADS.

Use the following procedure to run self-tests on the DSUs. See the DSU user's manual for details.

1. Press the **(LL)** test switch. This begins the internal local loop around test. WAIT should be displayed on the front of the unit.
2. Press the **(TP)** test switch. The TP box indicator should appear and the SD and RD indicators should flash.
3. After 30 seconds, the WAIT indicator should disappear and a result should display:
 - a. If PASS is displayed, the unit is good. Check for a damaged cable. If a cable is causing the problem, replace it and verify the problem is solved. If not, continue.
 - b. If FAIL is displayed, continue.
4. Replace the DSU. Set the new DSU's options as shown:

speed = 9600
 timing = internal
5. Power up the new DSU. Run installation tests as directed by the user's guide.
6. Restart the system using the **startup** form. Wait a few minutes after getting the "start service" message, then execute the **maintenance : datalink : test** form.
7. Verify that the alarm is resolved using the **maintenance : active alarm : display** form.

Correct cabling configurations are shown in Figure 5-4, *DSU Data Link to a System 75, Generic 1, or Generic 3i/s*, Figure 5-5, *DSU Data Link to a Generic 3r*, and Figure 5-6, *DSU Data Link to a System 85, Generic 2, or DIMENSION PBX*.

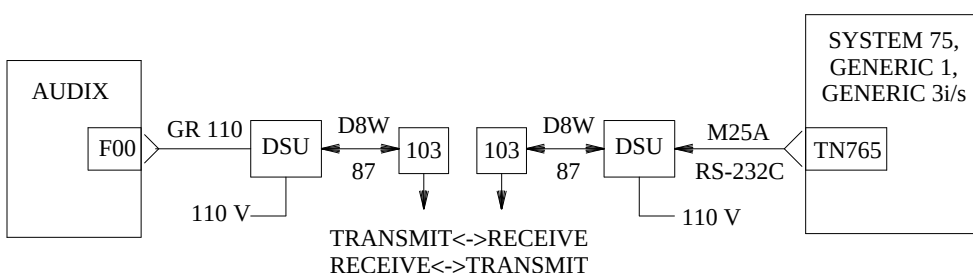


Figure 5-4. DSU Data Link to a System 75, Generic 1, or Generic 3i/s

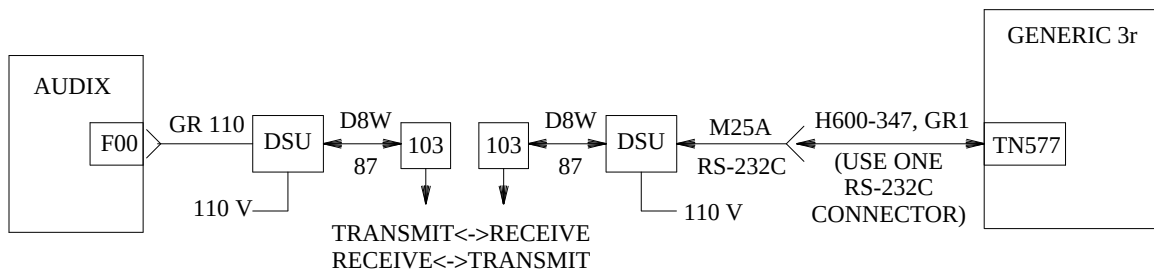


Figure 5-5. DSU Data Link to a Generic 3r

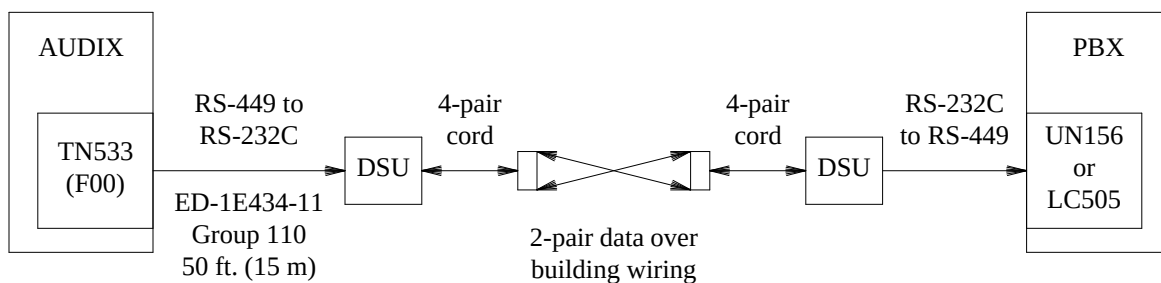


Figure 5-6. DSU Data Link to a System 85, Generic 2, or DIMENSION PBX

Check the LADS

A pair of Local Area Data Sets (LADS) can be used to extend the distance of the data link beyond the 400-foot limitation of the IDI. LADS are typically used only at existing System 85, Generic 2, or DIMENSION PBX installations.

The following paragraphs provide cabling and option settings appropriate for AUDIX. For complete information and self-test procedures, see the *LADS User's Guide* (999-100-166 AB).

Cabling: Two LADS may be connected back-to-back over building wiring. See Figure 5-7, *Data Link Using LADS*. Because the LADS can run self-tests (see the user's manual), they can usually detect their own faults. Before replacing a LADS, therefore, you should swap their connecting cables to see if this fixes the problem. In addition to the loop-around tests run from AUDIX or the switch (see *Data Link Alarms*), you may also try crossing over the transmit and receive wire pairs at the cross-connect field to double-check transmission and reception capability.

Either ED-1E434-11, Group 110 (50-foot) cables attach each LADS to the AUDIX or to the switch. A 25-pair cable (up to 200 feet long) or building wiring (up to 15,000 feet long) connects the two LADS. When connecting the LADS, make sure the transmit pair of one LADS connects to the receive pair of the other, and vice versa.

NOTE

If a Group 342 cable “Y” cable is required at the switch for duplicated common control, connect it between the Group 110 cable and the UN156 connector. See Figure 5-3 for a similar connection.

Option Settings: When installing or replacing a pair of LADS, or when troubleshooting problems with this data link, check the following option settings. Open the LADS chassis to access the circuit card. Also, remove the ground strap for the power supply if in place.

2/4 WIRE = FOUR	RCV CLK = NORM (XZ5)
CA/CB DELAY = 0 (XZ5)	RCV HOLD = MARK (XZ3)
CARR CONT = ON (XZ2)	RCV IMPD = 150 ohms
DATA RATE = 9.6 (XZ3)	XMT CLK = NORM (XZ5)
DX MODE = FULL (XZ2)	XMT IMPD = 150 ohms
OUTPUT LEVEL = -16 (XZ1)	XMIT TMG = INT (XZ2)

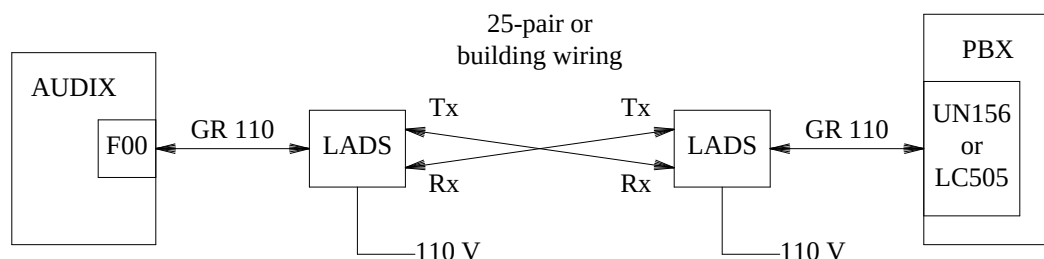


Figure 5-7. LADS Data Link to a System 85, Generic 2, or DIMENSION PBX

Check the MPDM

A Modular Processor Data Module (MPDM) is used for AUDIX data links to a System 75 that uses a Switch Communications Interface (SCI) for its data link. The AUDIX connects to a TN754 Digital Line board in order to reach the SCI. An MPDM data link may also be used to connect to a TN754 board on DEFINITY Generic 1 or Generic 3.

To check the MPDM:

1. At a customer-approved time, shut down system software using the `shutdown` form.
2. Run the MPDM self-test. See the *MPDM User's Guide* (999-700-300 IS) for details:
 - a. Place the SELF TEST switch in the SELF TEST position to test internal circuitry. During the test, the TEST IN PROGRESS lamp lights.
 - b. If the test passes, the TEST RSLT lamp is steadily on. If it *fails*, the lamp flashes.
 - c. If the MPDM passes the internal circuit test, a known bit sequence is looped through the internal data path for an error check.

- d. Any bit error causes the TEST RSLT lamp to flutter momentarily. If no bit errors occur, the TEST RSLT lamp is steadily on.
 - e. At the end of the test, place the SELF TEST switch in the off position. The TEST IN PROGRESS and TEST RSLT lamps are turned off.
 - If the TEST RSLT lamp flashed or fluttered in the test, continue.
 - If the MPDM passed the self-test, check the cabling for damage. Turn off the MPDM and replace the cabling (see the following figures). Verify the alarm is resolved. If not, continue.
3. Power down and replace the MPDM. Set the new MPDM's options as shown:
- | | |
|--------|-----|
| 9600 | ON |
| SYNC | ON |
| INT | ON |
| AANS | ON |
| others | OFF |
4. Power up the new MPDM. Run its installation tests as directed by the user's guide. When ready for normal operation, all LEDs should be ON *except* the TEST IN PROGRESS and CHECK OPTIONS lamps.
 5. Restart AUDIX using the `startup` form. Wait 2 minutes, then execute the `maintenance : datalink : test` form.

NOTE

If the data link has been down for 15 minutes or more, System 75 will only try to reset the link at previously specified times. You may need to busy out and then release-busy the link on the switch side in order to restore service.

6. Verify the alarm is resolved using the `maintenance : active alarm : display` form. Wait 15 minutes longer, then recheck for active alarms to see if the alarm returns.

See Figure 5-8, *MPDM Data Link to a System 75, Generic 1, or Generic 3i/s* or Figure 5-9, *MPDM Data Link to a Generic 3r* for correct cabling configurations.

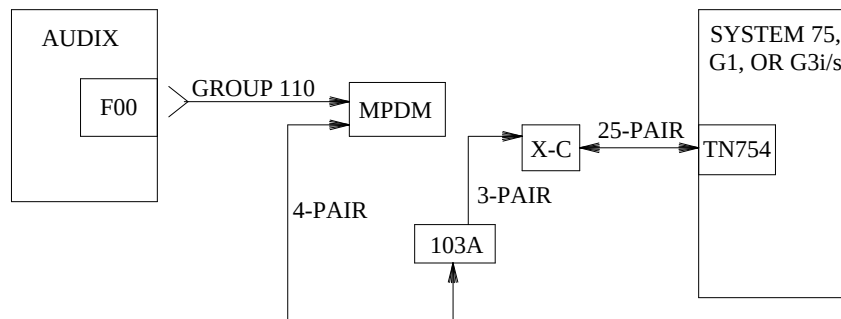


Figure 5-8. MPDM Data Link to a System 75, Generic 1, or Generic 3i/s



If the AUDIX is connected to a 5ESS Switch with a BRI-API data link, the system needs the SCA protocol converter to communicate with the switch. Figure 5-10, *AUDIX to 5ESS Switch Data Link Using the SCA*, shows the data link connection between AUDIX and the 5ESS Switch. Check the SCA as follows:

1. Check the LEDs on the front of the box.
 - a. The “Power” LED should always be lit when the box is on. If this LED is not lit, check the on/off switch and the power connector.
 - b. The “In Use” LED should be lit if the SCA can communicate with the ISDN side of the connection. If this LED is lit, the problem is probably between AUDIX and the SCA.
 - c. If the red “Fault” LED is lit, there is a problem with the SCA or beyond. This LED is lit if AUDIX can determine a problem and the SCA can understand the message from AUDIX to light the LED. Check the SCA option settings, 5ESS Switch translations, and cabling.
 - d. The “P1” port LED is lit when AUDIX has a physical connection to the SCA. If this LED is lit, the cabling between the AUDIX and the SCA is good; however, there may be errors in the AUDIX translations.
 - e. If all of the LEDs on the front of the box are lit correctly, continue.
2. There is a 7-segment LCD inside the SCA box which should be lighting segment by segment in a square around the display when the SCA is working correctly. You can see this display by looking through the window in the front or removing the top cover.

3. If this display is working correctly, the problem is either outside of the box or with incorrect dip switch settings inside the SCA. Check the option switches inside the box. See Figure 5-11, *SCA Option Settings*. If there is an incorrect dip setting, make the necessary corrections and rerun the switch connection test. The AUDIX installation manual has the correct option settings. If the dips are all correct, escalate per local procedures.
4. If the display shows a value (such as 1, 2, 3, etc.), the SCA has a problem. Replace the box and rerun the switch connection test.

If you still cannot get the AUDIX to communicate with the switch, escalate per your local procedures.

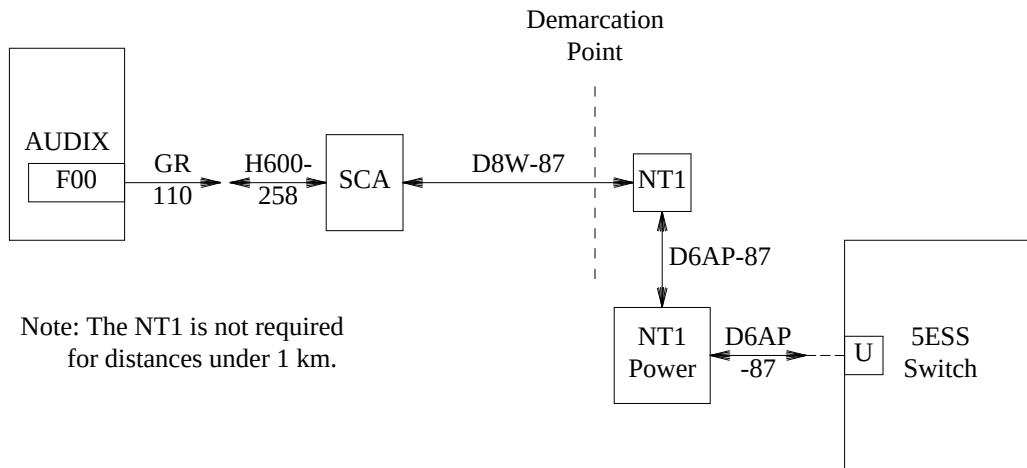
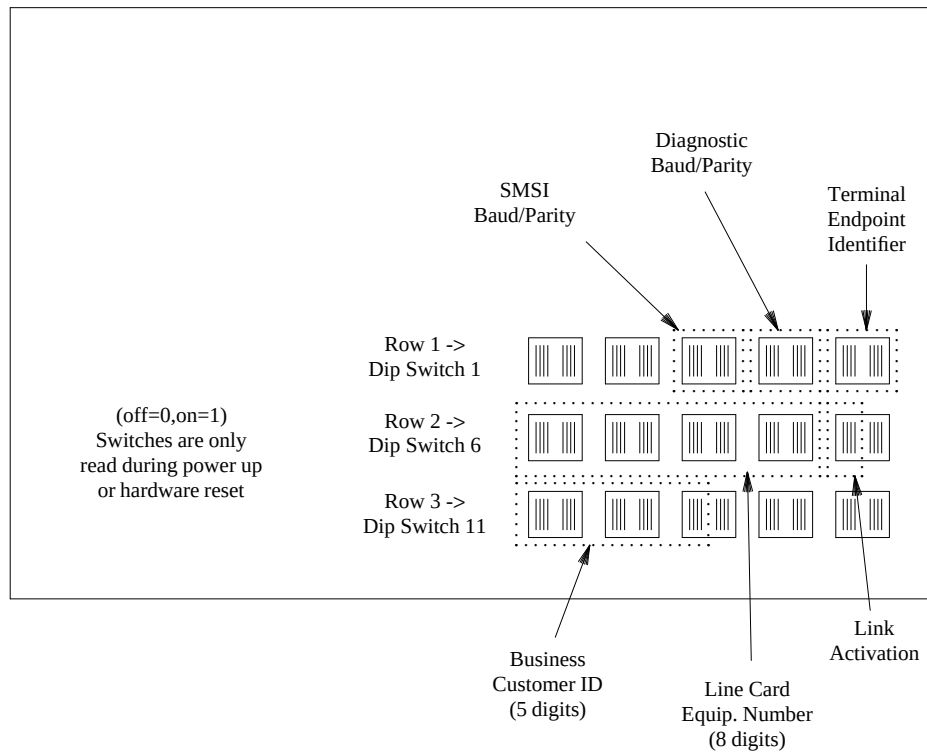


Figure 5-10. AUDIX to 5ESS Switch Data Link Using the SCA

Check the 202T Modem

When a system is connected to any 1A ESS Switch, or to a 5ESS Switch through an Advanced Communications Package (ACP) running on an Applications Processor (AP), a 202T modem is used in the data link. See Figure 5-12, *AUDIX Data Link to a 1A ESS Switch*, and Figure 5-13, *AUDIX Data Link to a 5ESS Switch ACP*. Check the 202T as follows:

1. Put the modem in analog loop-back.
2. Display the `maintenance : datalink : test` form.
3. Enter “loopback point” 3. Press **CHANGE**.
4. When the test completes, the system will return a test result:
 - a. If the test fails, the problem is either the modem or the cabling between the AUDIX and the 202T. Replace one or the other and rerun the test.
 - b. If the test passes, the problem in the data link is somewhere beyond the connection between the AUDIX and the 202T.

**Figure 5-11.** SCA Option Settings

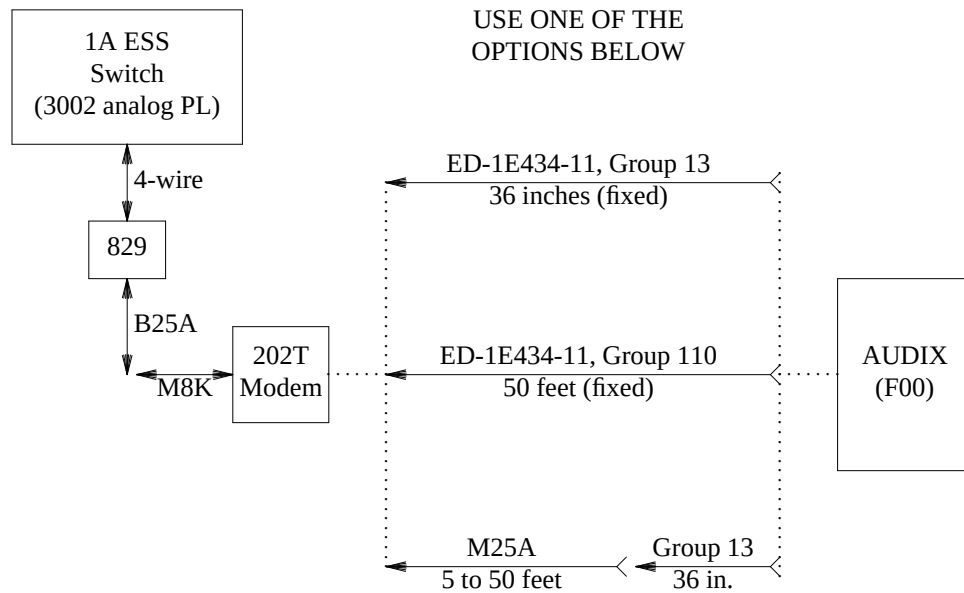


Figure 5-12. AUDIX Data Link to a 1A ESS Switch

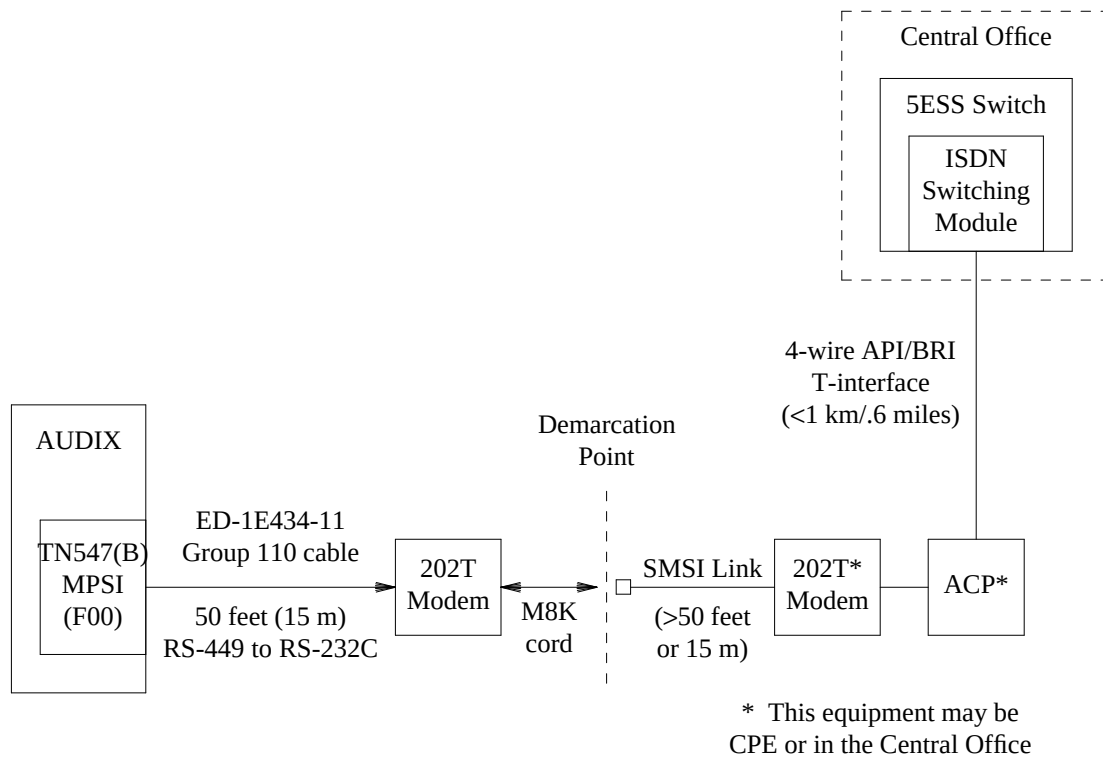


Figure 5-13. AUDIX Data Link to a 5ESS Switch ACP

Check the Cabling to an ACP

On the 5ESS Switch, the AUDIX may be cabled directly to a local ACP as shown in Figure 5-14, *AUDIX Data Link to a 5ESS Switch Local ACP*. If problems occur, try swapping the cables with known-good cables to try to isolate the problem.

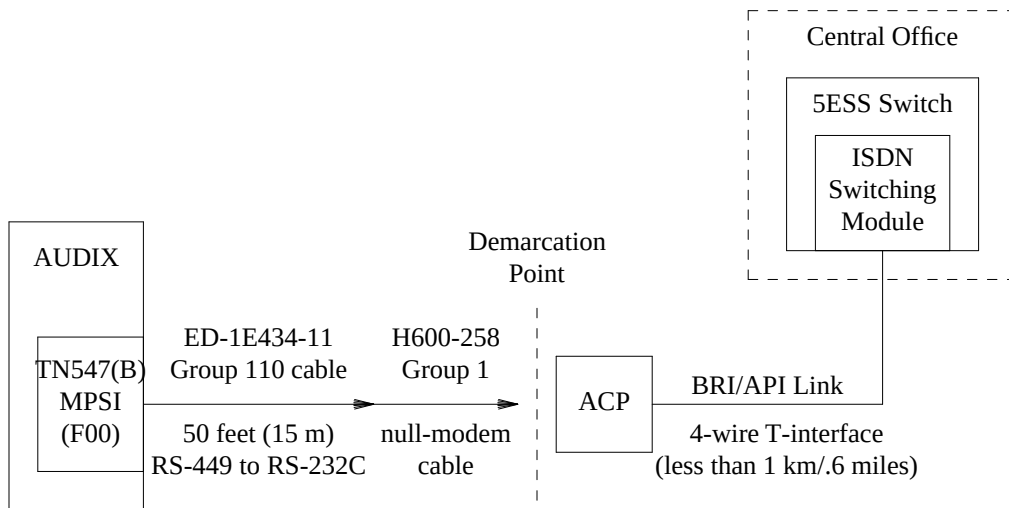


Figure 5-14. AUDIX Data Link to a 5ESS Switch Local ACP

SWITCH ADMINISTRATION

Switch administration involves setting up the logical links between the AUDIX adjunct and the switch so the two systems operate smoothly together. Translations must be consistent for the data link and voice ports on both AUDIX and the switch (see *Data Link Alarms* and *Data Link Hardware*). For complete switch administration procedures, see the *Switch Administration Guide for AUDIX Voice Messaging* (585-305-505).

This section covers additional switch administration concerns for maintenance, including reliability factors and DCS network administration.

Switch Port Reliability

The call-distribution group (ACD/EUCD/UCD) for AUDIX should be set up so that service interruptions are minimized. A good strategy is to spread out the switch ports in the group over as many port boards or carriers as possible. This distributes ring blocking over a larger area and reduces the size of failure groups when they occur. For example:

- DEFINITY Generic 2 traditional modules, DIMENSION PBX, and System 85 ring four ports per 1/4 carrier. By spreading port boards over more carriers or parts of carriers, more than 4 ports can ring at one time.
- System 75, System 75 XE, Generic 1, and Generic 3 can ring 4 ports per board on an 8-port TN742. The 16-port TN746B board can ring 4 ports out of each set of 8 (4 ports can simultaneously ring on ports 1 through 8 and 4 ports can simultaneously ring on ports 9 through 16). AUDIX ports should be distributed among different boards to minimize ring blocking.

DCS Network Administration

The Distributed Communications System (DCS) connects two or more switches or *nodes* together with logical (channel) and physical links. Each node uses one link on a DCIU or SCI. Tie trunks provide voice links between switches.

AUDIX is directly connected only to the *host* (local) switch. Full feature transparency is always available between AUDIX and its host switch. The *remote* switches on other nodes of the network can only access AUDIX through the local switch. The degree of feature transparency between AUDIX and a remote switch varies according to the type of switch and software. See *AUDIX Feature Descriptions*, 585-305-203 for details on feature operation in a DCS network.

DCS messages passed among switches include those listed below. Most messages travel through the data link. If you have problems with any of the following, you may wish to test the data link from your local AUDIX to the local host. You *cannot* test the other links in the network from your site (they must be tested individually by switch administrators at other sites).

- Connect/disconnect messages
- Extension availability
- Integrated Message Notification (IMN)
- LWC activation (except on DIMENSION PBX)
- Message waiting lamp status
- Time synchronization

DCS Administration

A DCS network uses the same forms and procedures as those used for administering the local AUDIX switch link. The major difference is that the additional channels, ports, and switch numbers must be consistent across the network or errors will occur. AUDIX administration considerations include:

- The AUDIX voice ports and data link are physically connected only to the host switch. Remote switches are connected to AUDIX with logical “hop” channels through the host switch for data transmission. DCS trunks are used for voice transmission.
- Each switch has a unique node number. AUDIX currently supports switch numbers 1 to 20. Some switch software releases support numbers greater than 20, but AUDIX cannot serve a switch with a number greater than 20.
- The AUDIX logical channel may be numbered 1 to 64 (but only 20 switches are currently supported in a DCS network).
- The switch ports and logical channels may be numbered 1 to 64 except with DIMENSION PBX, which allows numbering 1 to 20. AUDIX does not support any number greater than 64.

AUDIX Forms for DCS Administration

This information must be consistent with the rest of the network. Forms which contain DCS information are listed below. See *AUDIX Release 1 Version 7 Forms Reference* (585-305-208) for details and field descriptions of these forms.

- **subscriber : local** – Includes the switch number the AUDIX subscriber is on (1 to 20) and can be changed at any time. Filled in by subscriber data audit.

NOTE

Do not use the **subscriber : remote** form. It is only used when two or more AUDIX systems are networked.

- **switch time zone** – Includes daylight savings time and a time zone for each switch in the DCS network (usually done during installation).
- **system : translation : switch connection** – Identifies an AUDIX port (1 to 20), a switch port (1 to 64), a logical channel (1 to 64), and the AUDIX data link (always 1) for each switch in the network (see *Switch Administration Guide for AUDIX Voice Messaging*, 585-305-505).
- **system : translation : voice port** – Identifies the switch call-distribution extensions for AUDIX voice ports. Extensions may be 4 or 5 digits long in this case (see *Switch Administration Guide for AUDIX Voice Messaging*, 585-305-505).

DCS Subscriber Selection

To solve some customer-reported problems, you may need to know how subscribers were selected. Usually one of the following two methods is used, or a combination of both.

1. One AUDIX in the DCS network: All AUDIX subscribers are selected using the **subscriber : local** form. Other AUDIX's may be tied to switches in the network, but are not part of the DCS network.
2. Multiple AUDIX machines in the DCS network using different numbering plans: DCS allows 5-digit extension numbering for easy grouping of numbering plans. A DCS network may have two or three numbering plans in order to distribute the hardware facilities among the network users. For example, if the DCS network has 20,000 users, the DCS planners may divide these users into 5 numbering plans to allow 5 AUDIX machines to serve this group. Each AUDIX serves the users in its numbering plan and is directly connected only to its local (host) switch, even though the numbering plan may stretch across a number of switches.

Some DCS users may have to use two pound (#) signs to access AUDIX when entering the AUDIX-associated extension and their number. System 85 software load R2V3 1.0 has this problem, but load 1.1 does not.

6. Disk Drives

This chapter covers alarmed and unalarmed problems with AUDIX disk drives. Topics include:

- Disk Drive Alarm Resolution (when software is running)
- Unalarmed Disk Drive Troubleshooting
- Replacing and Installing Disk Drives
- Disk Drive Jumper Settings

DISK DRIVE ALARM RESOLUTION

If you have a disk drive alarm, use Table 6-1, *Disk Drive Alarm Resolution*, to find the alarmed drive, then follow the diagnostic procedures. Disk drive numbering is shown in Figure 6-1, *Order of Disk Drives in AUDIX Cabinets*. Afterwards, verify that the fault is resolved using the alarm logs.

Table 6-1. Disk Drive Alarm Resolution

Alarm Log		Description	Repair Action	
Fault	Unit:Dev		1st Choice (controller/disk,proc.)	2nd Choice
290-296	9 : 0-6	DBP disk drive seek failure	Disk00-Disk06, A	—
298-304	9 : 0-6	DBP disk drive read failure	Disk00-Disk06, A	—
306-312	9 : 0-6	DBP disk drive write failure	Disk00-Disk06, A	—
314-320	9 : 0-6	DBP disk drive returned bad data	Disk00-Disk06, A	—
324-330	9 : 0-6	Disk defect map couldn't be read at equip	Disk06-Disk06, A	—
336-342	9 : 0-6	A filesystem has run out of space	Disk00-Disk06, B	—
411-417	9 : 0-6	Disk device status error	Disk00-Disk06, A	—
897	9 : 0-6	DBP disk drive diagnostic result	Disk00-Disk06, A	—
Note: Fault codes 108 to 111 are not currently alarmed.				

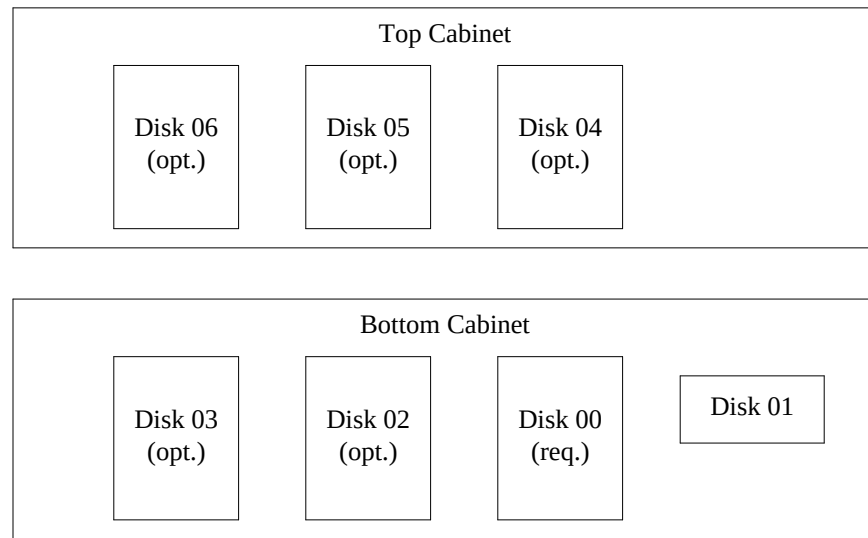


Figure 6-1. Order of Disk Drives in AUDIX Cabinets

Procedure A: General Replacement Steps

To check or replace a faulty drive:

1. Go to the `maintenance : dbp : status` form and check the status of the alarmed drive.
 - a. If the status is `UEQ/D`, go to step 2.
 - b. If the status is `EQ/D`, go to *Replacing and Installing Disk Drives*.

NOTE

As an option, you may continue with Procedure A if you see a status of `EQ/D`, but be aware that an attempt to re-equip the drive may cause the system to crash. To avoid any possibility of a crash, go directly to *Replacing and Installing Disk Drives*.

2. Verify that the alarmed disk is actually faulty by re-equipping it as follows:
 - a. Unequip the alarmed disk using the `maintenance : dbp : unequip` form. This removes it from the system configuration and spins down the disk.
 - b. Reactivate the drive using the `maintenance : dbp : equip` form (do *not* reinitialize or erase it!). This runs verification tests.
 - c. If you get an error message on the RCD, go to step 3. Otherwise, go to step 4.

3. *If an RCD fails to equip* (you receive an error message):
 - a. Make sure a cartridge is installed (press the eject button).
 - If the RCD did not spin down automatically (the light is still on or flashing), shut the system down using the `shutdown` form.
 - Press the button on the TN506B BC and wait five minutes. If the RCD has not spun down, spin it down by pressing the start/stop button.
 - b. Insert or reseal the cartridge, then restart the system using the `startup` form.
 - c. Try to re-equip the cartridge using the `maintenance : dbp : equip` form.
 - d. If the cartridge was inserted correctly and the RCD still fails to equip, replace the cartridge. Initialize a new cartridge using the steps under *Equip the New Disk or Cartridge* after Procedure B. See if this solves the problem.
 - e. *If you replace the cartridge and the fault returns*, the RCD is probably faulty. Go to the next step.
4. If the disk drive equips, go to the next step. If a Hard Disk Drive (HDD) or an RCD with a *good* cartridge fails to equip, the drive is probably bad. Do the following:
 - a. Go to *Unalarmed Disk Drive Troubleshooting* and follow the checklist to make sure the disk is the problem.
 - b. If you verify the disk is bad, replace it using the steps in *Replacing and Installing Disk Drives*. When the new disk is installed and the TN475B SADI lights the correct LEDs, return to this procedure and go to step 5.
5. If the drive equips, check the error log for 181 errors using the `maintenance : error : specification` and `display` forms.
 - a. If *no* 181 errors are found, the disk drive is good. To clear the alarm, wait until there is no traffic on the system, then restart the system using the `startup` form. Verify that the alarm is resolved using the `maintenance : active alarm : display` form.
 - b. If 181 errors *are* found, the disk drive probably has a media defect. Escalate the problem.
 - c. If the media damage is severe or remote maintenance personnel recommend it, you should replace the faulty drive (go to *Replacing and Installing Disk Drives*). When the new disk is installed and the TN475B SADI lights the correct LEDs, return to step 6 in this section.

NOTE

When replacing a drive, *make sure* the new drive's jumper settings match the logical number of the drive you are replacing. See *Disk Drive Jumper Settings* or the enclosed disk drive information for a description of these settings.

6. After the drive is replaced, equip and test the new disk as described in *Equip the New Disk or Cartridge*.
7. When software is running, verify the alarm is resolved using the `maintenance : active alarm : display` form.
8. Restore any lost filesystems as needed.

Procedure B: Increase the Size of a Filesystem

1. Check the threshold violations (on the AUDIX STATUS line and on the `system : thresholds` form. This could indicate what filesystem is out of space. Or else go to the `system : filesystems` form. It will be one of these filesystems.
2. Go to the `filesystem : detail` and display each suspected filesystem. Filesystems out of space will have “0” free space.
3. Shut down the software using the `shutdown` form. (Active filesystems cannot be increased while the software is running.)
4. Go back to the `filesystem : detail` form and set **size** to a larger number (e.g., increase size by 30%). Press **CHANGE**.
5. If the disk is out of space, try decreasing the size of any largely unused filesystem(s) on the same disk. If that isn’t possible, the filesystem/disk usage scheme will have to be reworked.

See the *AUDIX Release 1 Version 7 Forms Reference* (585-305-208) for more information on copying filesystems.

Equip the New Disk or Cartridge

The new disk or removable cartridge must be equipped (identified to system software and activated) before it can be used. Afterwards, the disk contents must be recreated or copied (restored) from recent backups to bring the new disk into full service.

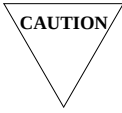
If disk00 (HDD 0/0) is being replaced, escalate to the Technical Service Center (TSC). To equip a new disk02 to disk06 or a replacement cartridge for the RCD, follow these steps:

1. Initialize the system after replacing the disk drive and powering up. *If the RCD or its cartridge crashed*, insert a new cartridge in the drive (see Appendix A for steps if needed).
2. When software is running, log in and display the `maintenance : dbp : equip` form. Specify `circuit pack code = SCSI` and `disk device number = 1` to 6.

NOTE

The `circuit pack code` in early systems was SD160 (for an HDD) and SD20 (for the RCD). This code still works, but is no longer needed. AUDIX software automatically reads the size and type of each disk.

3. Next to `volume label`, give the new drive a meaningful name that is 1 to 7 characters long:
 - a. For HDDs 0/2 to 0/6, use “disk02”, “disk03”, etc.
 - b. For the RCD, use “back01” or whatever name was previously used for the backup cartridge that was lost when the drive crashed.
4. In the `erase` (or `initialization`) field, type “y” and press **CHANGE**.



Starting in R1V7 software, hard disks can only be initialized by remote services personnel; if you attempt a hard disk initialization, you will get an **Access denied** message. Contact the AUCC or the TSC (1-800-248-1234) to initialize a new hard disk.

Removable cartridges may be initialized from any valid login. If you initialize a drive or cartridge that already contains data, *all* data on the device is erased.

5. When the disk finishes initializing, the new drive is verified and identified to the system.
6. Restore or create new filesystems on the disk.

UNALARMED DISK DRIVE TROUBLESHOOTING

Isolate or diagnose suspected disk drive faults as outlined in this section. Steps include:

- a. Check LEDs on the SADI and disk drives
- b. Check for a disk crash
- c. Check the disk drive data and power cables
- d. Check drives through software if possible
- e. If these steps fail to solve the problem or the only candidate left is a faulty drive, replace the drive.

Check TN475B SADI LEDS

The TN475B SADI is the best indicator of an actual disk failure. The LEDs on the SADI circuit pack's faceplate show the number of drives installed and whether or not they are working. One yellow LED should be lit on the TN475B for each installed disk drive as shown in Table 6-2, *TN475B SADI LEDs and Disk Drive Position*.

Table 6-2. TN475B SADI LEDs and Disk Drive Position

SADI LED	Disk Drive and Position	Label	Required	Cabinet
10	HDD 0/0	disk00	Yes	Bottom
11	RCD 0/1	Varies *	Yes	Bottom
12	HDD 0/2	disk02	Optional	Bottom
13	HDD 0/3	disk03	Optional	Bottom
14	HDD 0/4	disk04	Optional	Top
15	HDD 0/5	disk05	Optional	Top
16	HDD 0/6	disk06	Optional	Top
* Cartridges are named by the system administrator according to contents (for example, “backup” or “back01”).				

Check the LEDs for the following problems:

1. If *one* LED is *not* lit, the missing LED indicates a faulty drive. Go to *Check the Disk Drive LEDs* and *Check for Disk Crash*.
2. If *no* drive LEDs are lit, there is a common problem such as a faulty data or power cable. Go to *Check Data and Power Cables*.
3. If *extra* drive LEDs are lit, the option settings on a new or replaced disk are probably wrong. Go to *Disk Drive Jumper Settings* to check them.
4. If you just replaced a drive and now the SADI is alarmed (its red LED is lit), the data cable is probably upside down. Return to *Replacing and Installing Disk Drives* to fix the problem.

Check the Disk Drive LEDs

The disk drive LEDs can sometimes indicate problems as follows:

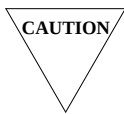
1. If the system is running, check for normal operation:
 - a. For the RCD, the green LED should be steadily lit when the drive is up to speed and ready for use. If this LED is blinking or dark, continue.
 - b. For most drives, the LED on the front of the drive indicates it is reading from or writing to the disk (it is *not* a fault indicator). Check for disk activity.
2. If you suspect a drive, shut down the system software, spin down the RCD (if it didn't spin down automatically), and power down the system.
3. Restore power and watch the LEDs.
 - a. The RCD's green LED should start blinking as the drive spins up. If the green LED blinks, then shuts off, check that a cartridge is installed. If the green LED does *not* light or continues to blink for more than 2 minutes, the drive is faulty.

- b. The LED on the front of all drives should light as disk drive diagnostics are run. If the LED does *not* light during initialization (or if it stays lit), the drive is probably faulty.

Check for Disk Crash

In a disk drive crash, the read/write heads (which normally coast above the disk surface) hit the media, often damaging it or breaking the drive heads. This usually damages the drive (and any data on it) beyond repair. A crashed disk should be alarmed through software (check the alarm log) and replaced (see *Replacing and Installing Disk Drives*). Some checks for a disk crash are:

1. You bumped or dropped a drive, and now it fails to work.
2. You notice broken heads, pieces of media, or other damage when you remove or try to insert a cartridge in the RCD.
3. You dropped a cartridge from a height greater than about 4 feet. (A short drop probably won't hurt the cartridge, but you may want to replace it anyway to be safe.)



Do not use damaged cartridges or cartridges that were in use when an RCD crashed. They can break the new drive. Throw them away or (if requested by remote maintenance) return them to the factory for analysis.

4. You hear a loud screeching sound while the drive is running.
 - The MICROPOLIS hard disk may buzz loudly if its ground screw is vibrating. The drive should still be good (you find no disk problems). To stop the noise, remove or tape down the metal tab in the center of the drive's circuit pack.
 - The 380-Mbyte NEC drive will make a sound when the drive is accessed. If the drive is making noise and the system is not accessing the drive, it may be bad.

Check the Data and Power Cables

If the TN475B SADI shows *no* lit disk drive LEDs when the system is running, a disk drive data or power cable may be faulty. Use the following procedure to check the cables. If the system is a two-cabinet AUDIX, be sure to check both cabinets.

To check if one or more cables are bad:

1. Shut down software using the MI toggle switch or `shutdown` form with the maintenance (m) option. Wait for the RCD to spin down, then power down the system.
2. Unplug the AC power cord at the rear of the cabinet.

3. Remove the lower front cover and gently pull the disk drives out of the cabinet (remove the two hex nuts that attach each bracket to the cabinet floor).

For the RCD, note that the mounting bracket on early models of the RCD hooked **over** the retaining bar. Push the bracket backwards slightly to unhook it from the retaining bar, then lift the entire assembly out of the cabinet.

4. Check the 50-pin data cable (ED-1E434-11 Group 183 or 186 SCSI-bus cable).
 - a. For each drive, make sure the data cable is seated correctly (it is keyed to fit). *If a cable is loose*, press it into place. Go to step 6 to see if the problem is fixed.
 - b. If the cables are seated correctly, carefully check the ribbon cable for breaks or other physical damage. Unplug each connector and visually check for damage.
 - c. If you suspect the data cable, use an ohmmeter to check the leads for continuity. The cable terminates on the AHF104 disk interface board. Bring the RCD connector around to the back of the cabinet to check the leads against those at the end of the cable.
 - d. *If you find a problem*, repair or replace the data cable. To reattach it to the drives, turn the cable red-stripe down.
5. If the data cable appears good, check the disk drive power cable.
 - a. Plug in the AC power cord.
 - b. Unplug the 4-pin power connector from each drive. Restore power to the system.
 - c. Using a voltmeter, check for the following voltages starting with the connector leading to the CDR1B board and ending with the plug for the RCD (see Figure 6-2, *Disk Drive Power Cabling*).

Pin:	Voltage:

1	+12 VDC
2	12 return
3	5 return
4	+5 VDC

- d. If the voltages are correct, the cable is good. Go to the next step.
 - e. If you get a break in the voltage, the cable is damaged. Power down the system and repair the cable if possible. *If you cannot fix the cable*, you need to return the entire AUDIX cabinet to the factory for rewiring.
6. To reattach the cables to the drives, spin down the RCD and power down the system. Unplug the AC power cord. Carefully plug the keyed cables back into the correct connectors, checking for good seating. Plug in the AC power cord.
7. Restore power. Watch the disk drive LEDs to make sure they are getting power during initialization (see *Check the Disk Drive LEDs*).
8. When the system is up, see if the problem is corrected. If not, replace the SADI board or call for further instructions.

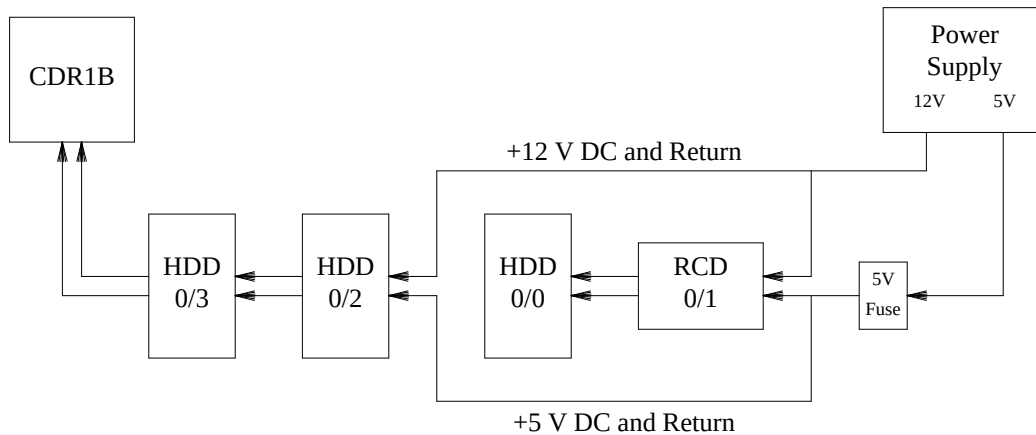


Figure 6-2. Disk Drive Power Cabling

Check Drives Through Software

These procedures assume the system is initialized and running from software on a good disk drive. These steps may be used to test a newly installed disk drive or to isolate a faulty drive except disk00. If disk00 (HDD 0/0) is bad, you need to replace the drive and boot filesystems (go to *Replacing and Installing Disk Drives*).

1. Check the status of the DBP equipment by displaying the `maintenance : dbp : status` form.
 - a. All installed drives should show EQ/EN (equipped/enabled) status. If so, go to step 2.
 - b. If the status is UEQ/D (unequipped/disabled), the drive is unequipped (software does not know it exists). Equip (activate) it using the `maintenance : dbp : equip` form. This will run verification tests on the drive. Afterwards, check the `maintenance : dbp : status` form and see if the drive is now enabled.
 - c. If the status is EQ/D (equipped/disabled), the DBP took it out of service. Normally this indicates a problem with the drive. Go to *Replacing and Installing Disk Drives*.

NOTE

As an option, you may attempt to re-equip a drive with a status of EQ/D, but be aware that this may cause the system to crash. To avoid any possibility of a crash, go directly to *Replacing and Installing Disk Drives*.

2. Check the alarm log for active alarms. Disk drive alarms (fault 897, unit 9) always indicate a hardware problem on AUDIX.
3. Check the error log for the following errors: 42, 69, 70, 181, 704. If any of these appear, a drive may be faulty or a filesystem may be missing.

4. Use the `filesystem : list` form to read from each equipped disk drive (disk00 to disk06).
 - a. If the form returns filesystem names and information, the volume (disk) is working correctly. *If a drive was just installed, the form will show no data.*
 - b. If the form gives the message “unavailable at this time” or “invalid data”, the disk has a problem. Continue.
5. If you noticed any problems, do a restart using the `startup` form. *Clear this action with the customer first if the system is providing service.*
 - a. If a “start service” message appears, the problem is corrected. Verify good service.
 - b. If a “service not started” message appears, a filesystem is missing. Check the TN475B SADI LEDs to make sure an LED is lit for each drive (see Table 6-2). If these look good, restore the missing filesystem(s).
 - c. If the restart fails, a reboot runs automatically. If this fails, go to Chapter 3, *Start Troubleshooting* and check the control mode menu options.
6. Remote services can also run tests on SCSI devices (disk drives) remotely. Contact the TSC if you feel a disk drive test is warranted.

REPLACING AND INSTALLING DISK DRIVES

This section covers procedures for replacing a faulty disk drive, or for adding an optional hard disk. Comcodes are in Table C-1 of Appendix C.

NOTE

AUDIX currently uses two kinds of hard disk drives: 3.5-inch drives in newer systems and 5.25-inch drives in older systems. A 3.5-inch drive could potentially replace a 5.25-inch drive in the field, although a 5.25-inch drive can *not* be used as a replacement for a 3.5-inch drive. Technicians should therefore replace each drive (either 3.5-inch or 5.25-inch) with the same type of drive.

If and when 5.25-inch drives are no longer available in maintenance stock, 3.5-inch drives could be used as replacements in the field for 5.25-inch drives. However, AUDIX systems shipped prior to December 1991 will need a new disk bracket in order to mount the 3.5-inch drive (compare Figures 6-3 and 6-4). Refer to the *AUDIX System Parts List* table in Appendix C for ordering codes for AUDIX equipment.

If drives or cartridges were exposed to extreme temperatures during shipment [greater than 100°F (38°C) or lower than 39°F (4°C)], allow them to acclimate at least 1 hour before powering them up. The RCD should always warm up about 40 minutes before booting off it.

CAUTION

Handle all drives carefully! Do not shake or drop them.

Never reuse cartridges that were in use when an RCD failed. If you use this cartridge in the replacement RCD, it could break the new drive. Equip and initialize a new cartridge for this drive as directed.

Replacing a Faulty Drive

If you have not already done so, verify the drive is faulty using the procedures in *Disk Drive Alarm Resolution* and *Unalarmed Disk Drive Troubleshooting*. Figures 6-3 and 6-4 show the disk drive replacement procedure for 3.5-inch and 5.25-inch drives.

Before replacing a faulty drive, call the TSC to see if you can save any information from the disk.

To replace a faulty drive:

1. *If you are replacing the RCD*, unequip and remove the cartridge currently in the drive (see “RCD Cartridge Handling” in Appendix A if needed).
2. Shut down system software using the MI toggle switch or the `shutdown` form with the maintenance (m) option.
3. Wait for the RCD to spin down (the green LED should go out), then power down the system.
4. *If you are replacing the RCD*, unplug the AC power cord at the rear of the cabinet.
5. Remove the lower front cover plate (loosen the two quarter-turn screws).
6. Locate the faulty drive (see Figure 6-1 if needed). Remove the two hex nuts and washers that attach the drive’s mounting bracket to the floor of the cabinet. Slide the bracket and disk drive *gently* forward and out of the cabinet.

If you are replacing the RCD, note that the mounting bracket on early models of the RCD hooked **over** the retaining bar. Push the bracket backwards slightly to unhook it from the retaining bar, then lift the entire assembly out of the cabinet.

7. Unplug the 4-pin power cord and the 50-pin data cable from the faulty drive.
8. Remove the four screws that attach the mounting bracket to the faulty drive. Refer to Figure 6-3 or Figure 6-4 for the different mounting methods between 3.5-inch and 5.25-inch drives.
9. The bad drive is now ready to ship back to the factory.

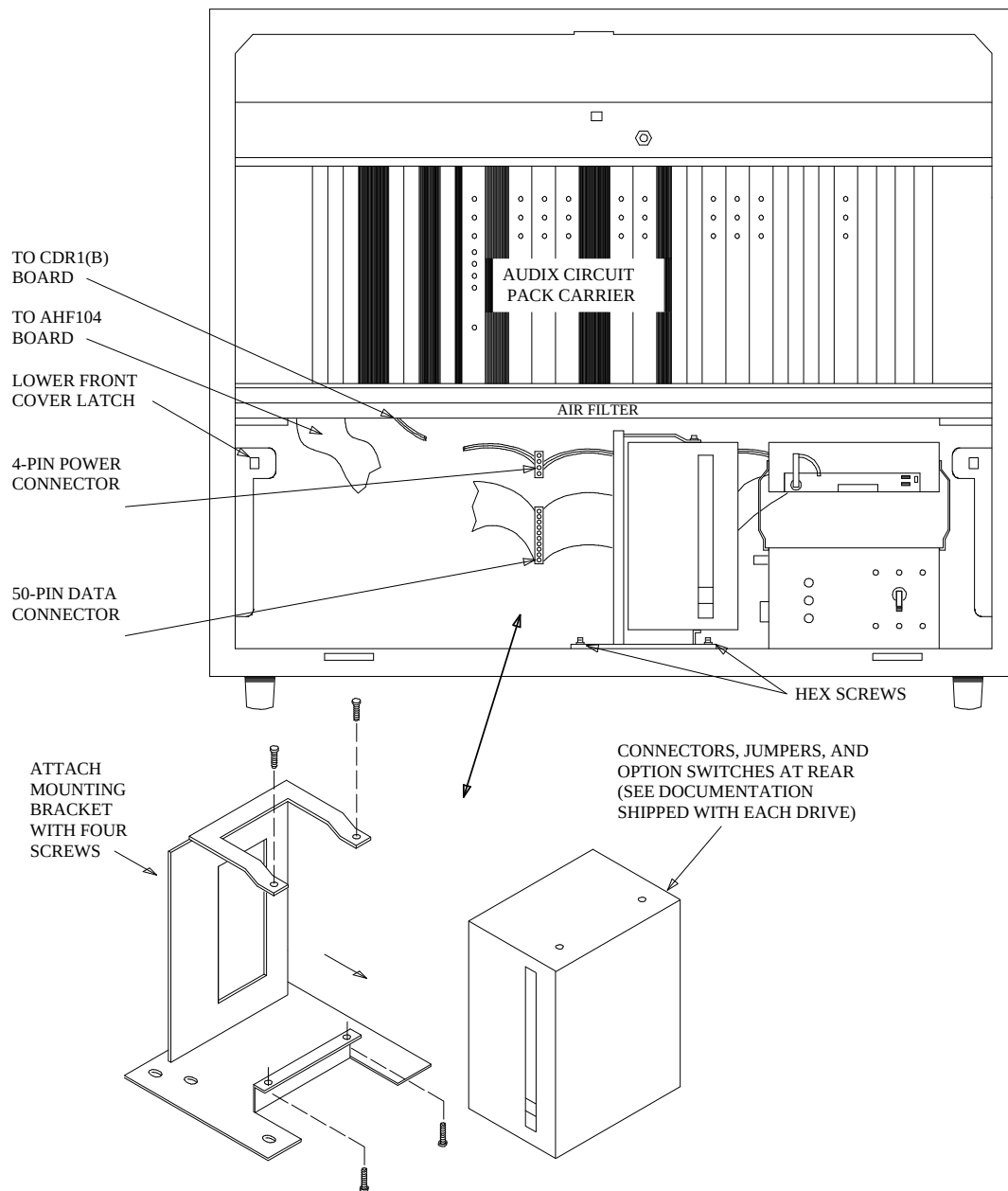


Figure 6-3. 5.25-inch Disk Drive Replacement Procedure

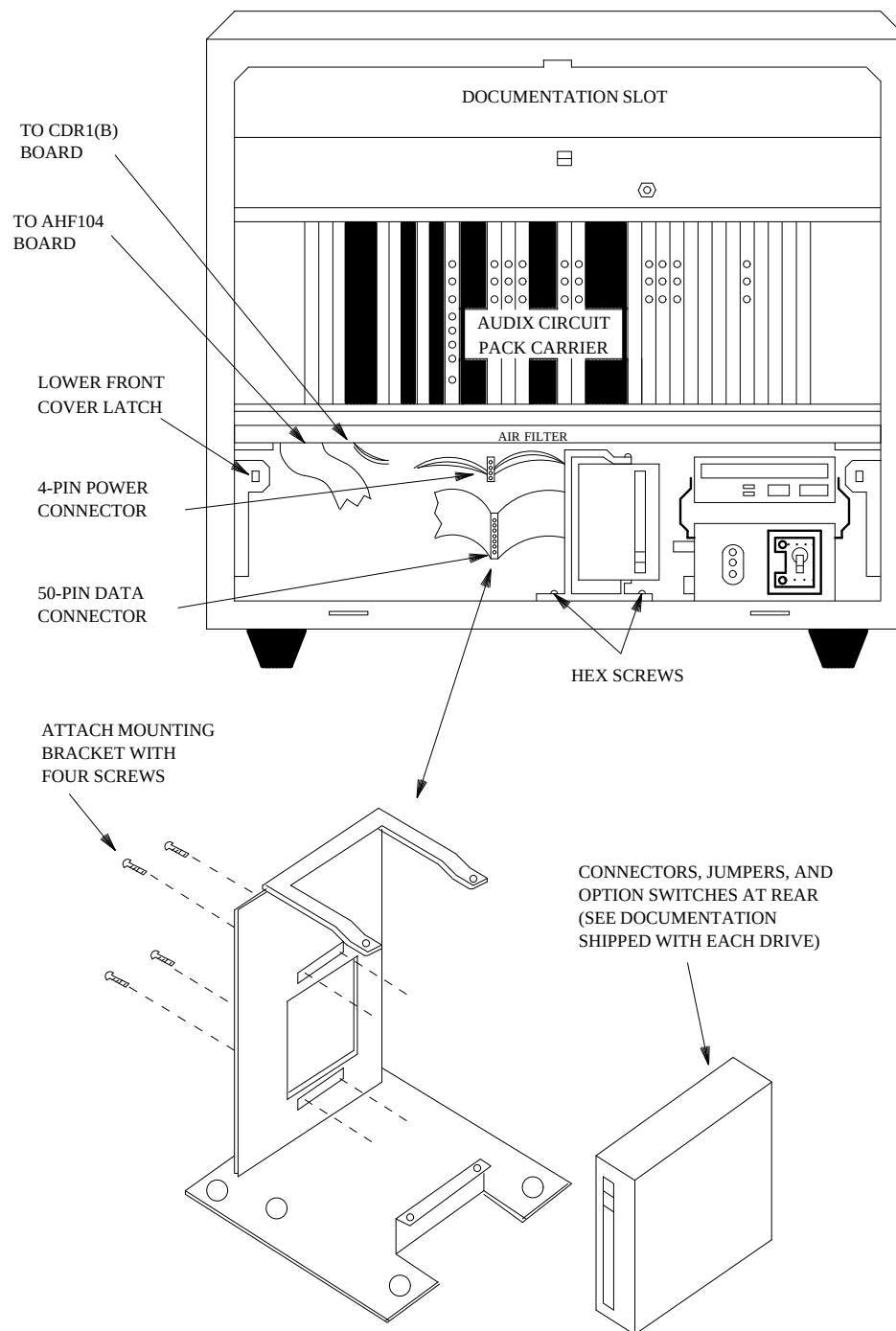


Figure 6-4. 3.5-inch Disk Drive Replacement Procedure

Installing a Replacement Drive

To insert and activate the replacement drive:

1. Inspect the new drive. Because AUDIX uses more than one type of drive, it may look different from the drive you're replacing.
2. Check the shock-watch indicator on the drive. If activated, the disk may have been damaged during shipment. *Do not use it.*
3. *Read* the documentation shipped with the drive. Set the jumpers as indicated in *Disk Drive Jumper Settings*.
4. Attach the old disk's mounting bracket to the new drive. (Make sure the two holes at the base of the bracket are at the *front* of the new drive.)
5. Place the disk in front of the empty slot. Reattach the data and power cables.
6. Lift the drive back into the cabinet. Slide the back of the mounting bracket under the disk drive's retaining bar. *For early models of RCD*, hook the mounting assembly over the back of the retaining bar and slide the unit forward.
7. Reattach the two hex nuts and washers to secure the drive's mounting bracket to the cabinet.
8. Check for continuous grounding between the drive and cabinet by placing probes on the bracket and an unpainted surface on the cabinet (such as the front latch). You should get a near 0-ohms reading. If not, make sure the two hex nuts are tight.
9. *If you unplugged the AC power cord*, reattach it to the back of the cabinet.
10. Restore power. Watch for the drive's LED to light.
11. Press **CTRL-C** on the LMT or set the MI toggle switch off-center to halt the initialization (this is essential when replacing HDD 0/0). Wait for the green LED on the RCD to light steadily, then press the reset button on the TN506B BC board (in LED slot 13).

NOTE

A new RCD should always be shipped with a dummy cartridge in place. If no cartridge is inserted, the green LED will turn off after the drive tries to spin up, and the TN475B SADI will not light LED 11.

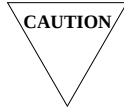
12. After you reset the DBP bus, wait for the TN475B SADI to complete its diagnostics, then check that the correct yellow LED is lit for each drive (see Table 6-2).
 - a. If the correct LED *does not* light, or if the wrong number of LEDs light, you probably incorrectly set the jumpers that identify the drive's logical position (0, or 2 to 6) to software. If this happens, spin down the RCD, turn power off, remove the drive, and recheck the settings (see *Disk Drive Jumper Settings*). Reinstall the drive and repeat steps 10 to 12.
 - b. If the TN475B SADI *alarms itself* (the red LED stays lit), you probably connected the data cable to the disk drive upside down. Spin down the RCD and turn power off. Remove the drive and recheck the cable connections and seating. Reinstall the drive and repeat steps 10 to 12 to verify the LEDs are correct.
13. Reattach the lower front cover plate.
14. *For the RCD, or HDD 0/2 to HDD 0/6,:* Initialize the system and equip the new disk using the steps in *Equip the New Disk or Cartridge*. *For HDD 0/0:* Escalate to the TSC.

Installing a New Disk Drive

Use the following steps to add a new HDD (see Figures 6-3 and 6-4 for an illustration). If you are servicing a two-cabinet AUDIX system with space for additional drives in either cabinet, try to keep a balance of equipment between them.

1. Shut down system software using the MI toggle switch or the `shutdown` form with the maintenance (m) option.
2. Wait for the RCD to spin down, then power down the system. Remove the lower front cover plate (loosen the two quarter-turn screws).
3. Inspect the new drive and check the shock-watch indicator.
4. *Read* the documentation shipped with the drive. Set the jumper settings as indicated in *Disk Drive Jumper Settings*.
5. Attach the mounting bracket to the drive with 4 screws (these are shipped separately). Make sure the two holes at the base of the bracket are at the *front* of the new drive.
6. Position the new drive in front of the correct position (see Figure 6-1 if needed). Connect the corresponding data and power cables in the harness (cables are keyed to fit).
7. Lift the drive into the cabinet, sliding the back of the mounting bracket under the lower retaining bar. Connect the bracket to the cabinet floor with the two hex nuts and washers.
8. Check for continuous grounding between the drive and cabinet by placing probes on the bracket and an unpainted surface on the cabinet (such as the front latch). You should get a near 0-ohms reading. If not, make sure the two hex nuts are tight.
9. *If you have added a new drive (HDD):*
 - a. Unplug the AC power cord from the back of the cabinet.
 - b. Pull the RCD from the cabinet. (Note that the mounting bracket on early models of the RCD hooked **over** the retaining bar. Push the bracket backwards slightly to unhook it from the retaining bar, then lift the entire assembly out of the cabinet.)
 - c. Check the jumpers on the back of the RCD (see Figure 6-5). The only jumpers that should be installed are:
 - *On the 20-Mbyte RH5261 drive:* Jumper JP3
 - *On the 50-Mbyte RH5500 drive:* The left-most jumper of JP2
 - d. If extra jumpers are installed, **remove** them or errors will be logged against the new disk and AUDIX will crash.
 - e. Return the RCD to the cabinet and reattach the AC power cord.
10. Restore power. Watch for the drive's LED to light.
11. Wait for the TN475B SADI to complete its diagnostics, then check for LED 12 or higher to light yellow (see Table 6-2). *If all LEDs do not light correctly*, go to step 10 of the previous procedure.
12. When all LEDs light correctly, reattach the lower front cover plate.

13. Equip the new disk (identify it to the system) using the `maintenance : dbp : equip` form. Use the following options:
 - a. Specify *circuit pack code* = SCSI
 - b. Specify *disk device number* = 2, 3, 4, 5, or 6.
 - c. Give the new drive a 1- to 7-character name (*volume label*), usually disk02, disk03, etc. In the *erase* (or initialization) field, type “y” and press CHANGE.



Starting in R1V7 software, hard disks can only be initialized by remote services personnel; if you attempt a hard disk initialization, you will get an **ACCESS denied** message. Contact the AUCC or the TSC (1-800-248-1234) to initialize a new hard disk. Removable cartridges may be initialized from any valid login.

14. Update the backup boot filesystem using `filesystem : update configuration`.
15. You are now ready to add filesystems to the new disk.

JUMPER SETTINGS

Before installing a disk drive, make sure it has the correct settings. Documentation showing drive settings should be shipped with every new drive. Every drive used by AUDIX except the NEC drive uses jumper wires (the NEC drive uses rocker switches). Settings required by AUDIX are shown in the following order:

- The RICOH Model RH5261 and Model RH5500 Removable Cartridge Drives (RCDs)
- The CDC* Model 94161-155 Hard Disk Drive (HDD)
- The CDC* Model 94171-344 HDD
- The CDC* Model 94191-766 (ST-4766N) HDD
- The HP Model 97536SX and Model 97548SX HDDs
- The Hitachi DK515C HDD
- The MICROPOLIS Model 1375 HDD
- The MICROPOLIS Model 1578-15 HDD
- The MICROPOLIS Model 1588 HDD
- The MAXTOR Model 7120S HDD
- The MAXTOR Model 4380S and Model XT-8760S HDDs
- The NEC Model D5862 HDD
- The PRIAM Model 738 HDD
- Seagate Model ST3283N HDD
- Seagate Model ST1480N HDD

After installing the drive, check the following:

1. If software is running, display the `maintenance : dbp : status` form and check that the right number of disk drives are equipped and enabled (EQ/EN) in the system.
2. Make sure the TN475B SADI has the correct LEDs lit for each drive (see Table 6-2 in *Unalarmed Disk Drive Troubleshooting*). If the wrong LED(s), too few, or too many LEDs are lit, the drive is incorrectly identified to software.

NOTE

If the system is using 380- or 760-Mbyte disk drives, it must be equipped with the TN475B to communicate with the drives. Systems using only 170-Mbyte drives may use either the TN475 or TN475B.

* CDC disk drives will have one of three labels; CDC, Imprimis, or Seagate. Seagate Technology Incorporated has purchased Imprimis Technology Incorporated, a subsidiary of CDC which makes the WREN III Model 94161-155 disk drive and the WREN IV Model 94171-344 disk drive.

RICOH Model RH5261 and RH5500 Drives

The RICOH Small Computer System Interface (SCSI) drive is currently used as the AUDIX Removable Cartridge Drive (RCD). The RICOH is a 5.25-inch cartridge drive. Two models are currently in use:

- The RH5261 is a 20-Mbyte drive which was shipped in early AUDIX systems. This drive is identified by its flip-down faceplate.
- The RH5500 is a 50-Mbyte drive. This is the drive which is currently shipped.

Figure 6-5 shows the option settings for the 20-Mbyte RH5261 and the 50-Mbyte RH5500. Correct settings include:

- *Drive Identification:* The RICOH RCD is always drive 01 (disk01). On the RH5261, place a jumper on JP3 only (JP1 and JP2 must be removed). On the RH5500, the left-most segment of JP2 (five segments side-by-side) should be installed.
- *Auto Spin-up, Data Buffer, etc.:* On the RH5500, all JP1 segments (three segments end-to-end) should be installed.
- *Missing Jumpers:* On the RH5261, jumpers JP1, JP2, JP4, JP5, JP6, and JP7 should *not* be installed. On the RH5500, only the left-most segment of JP2 should be installed. The other segments should *not* be installed.
- *Terminators:* On the RH5261, interface terminators AR1, AR2, and AR3 *must* be installed. On the RH5500, all three terminators *must* be installed.

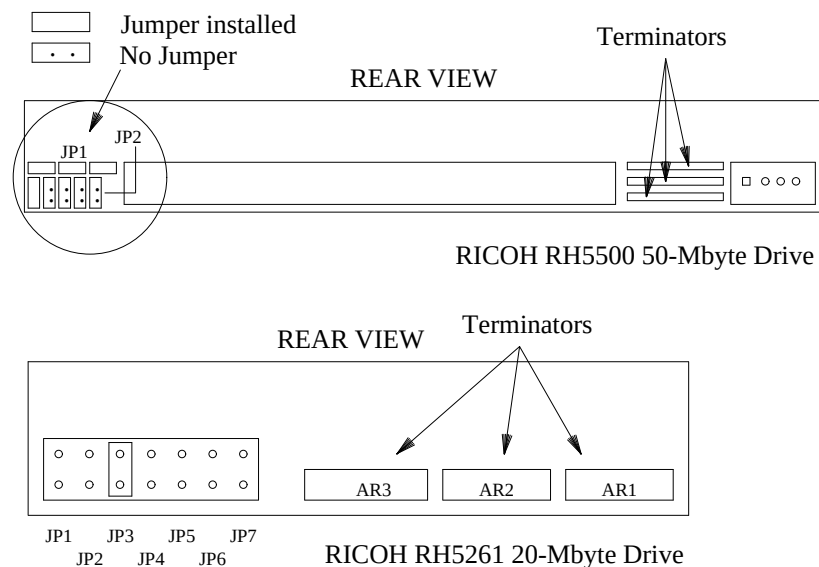


Figure 6-5. RICOH Drive Jumper Settings

CDC Model 94161-155 Drive

The CDC WREN III SCSI Model 94161-155 drive is a 5.25-inch HDD that can hold about 170-Mbytes of data. Figure 6-6, *CDC Model 94161-155 Drive Jumper Settings (J4)*, shows the Connector J4 (at the left rear of the drive). The jumper field at the top of the figure represents J4 in early versions of this drive. The jumper field at the bottom shows the later version. Jumper settings should be:

- *Drive Identification:* Use jumpers ID0, ID1, and ID2 to identify the drive using binary coding. Assign the disk drive position as follows:

HDD	Jumpers	HDD	Jumpers
0/0	None	0/4	ID2
0/2	ID1	0/5	ID0, ID2
0/3	ID0, ID1	0/6	ID1, ID2

- *Motor-Start Jumper:* The motor-start jumper M should be installed.
- *Parity-Check Jumper:* The parity checking jumper P should be installed.
- *Missing Jumpers:* The TP jumper should *not* be installed.
- *Terminators:* Interface terminators U20, U32, and U41 (located behind the data connector at the back of the drive) must *not* be installed.

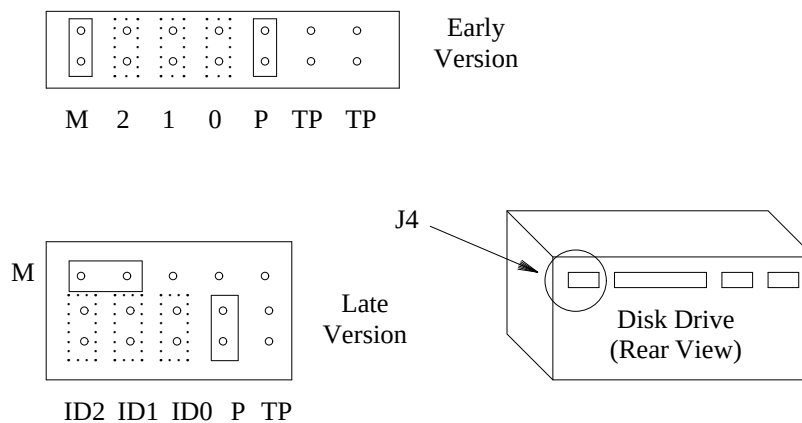


Figure 6-6. CDC Model 94161-155 Drive Jumper Settings (J4)

CDC Model 94171-344 Drive

The CDC WREN IV SCSI Model 94171-344 drive is a 5.25-inch HDD that can hold 380-Mbytes of data. Figure 6-7, *CDC Model 94171-344 Drive Jumper Locations (Rear View)*, shows the location of the jumpers.

NOTE

The system must be equipped with a TN475B SADI board in order to use 380-Mbyte drives.

Jumper settings should be:

- **Drive Identification:** The jumper field contains jumpers 0, 1, and 2 to identify the drive using binary coding. Assign the disk drive position as follows:

HDD	Jumpers	HDD	Jumpers
0/0	None	0/4	2
0/2	1	0/5	0, 2
0/3	0, 1	0/6	1, 2

- **Motor-Start Jumper:** The motor-start jumper M should be installed for delayed start on command.

NOTE

This option is *required* for all Model 94171-344 drives.

- **Parity-Check Jumper:** The P jumper on the leftmost pins on the jumper field should be installed to enable parity checking.
- **Ground Select Jumper:** The GS1 ground select jumper across pins 3 and 4 of the ground select field should be installed to select chassis ground.
- **Missing Jumpers:** The GS2 ground select jumpers for the two rightmost pins on the ground select field and the TP (terminal power) jumpers should *not* be installed.
- **Terminators:** Interface terminators U53 and U54 must *not* be installed. Verify that these terminators are absent. See Figure 6-7 for terminator socket locations.

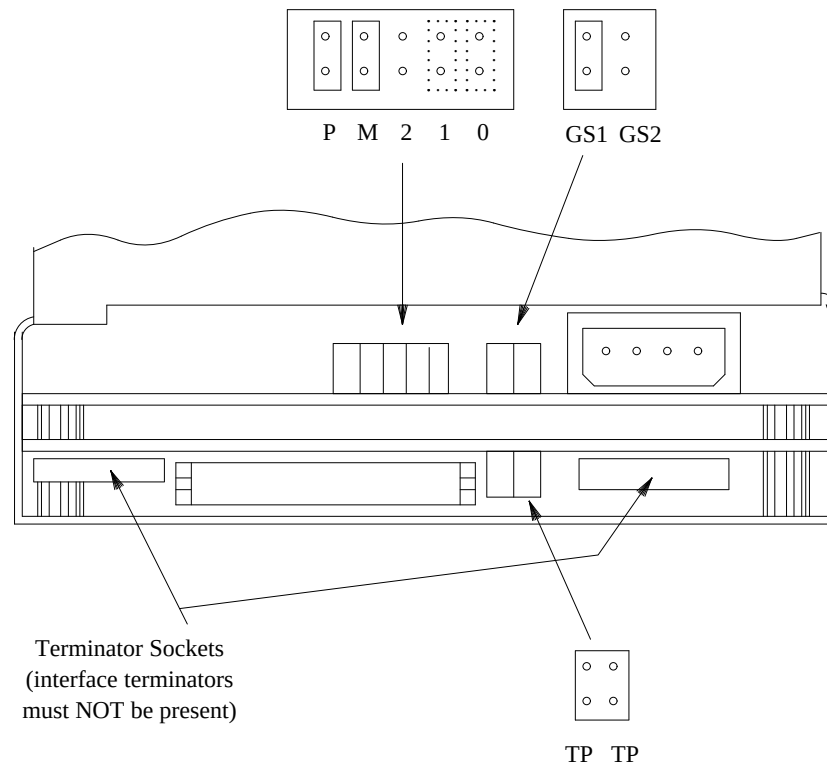


Figure 6-7. CDC Model 94171-344 Drive Jumper Locations (Rear View)

CDC Model 94191-766 (ST-4766N) Drive

The CDC WREN VI SCSI Model 94191-766 (ST-4766N) drive is a type of 5.25-inch HDD that holds 760-Mbytes of data. Figure 6-8, *CDC Model 94191-766 Drive Jumper Locations (Rear View)*, shows a view of the J4 connector where the jumpers are located. The J4 connector is located next to the data connector (J3).

NOTE

The system must be equipped with a TN475B SADI board in order to use 760-Mbyte drives.

Jumper settings should be:

- **Drive Identification:** The jumper field contains three jumpers (jumpers 4, 2, and 1 in the figure) to identify the drive using binary coding. Assign the disk drive position as follows:

HDD	Jumpers	HDD	Jumpers
0/0	None	0/4	4
0/2	2	0/5	4, 1
0/3	2, 1	0/6	4, 2

- **Motor-Start Jumper:** The motor-start jumper M should be installed for delayed start on command. This option is *required* for all Model 94191-766 drives.
- **Parity-Check Jumper:** The parity jumper P should be installed to enable parity checking.
- **Missing Jumpers:** No other jumpers should be present on this jumper field.
- **Terminators:** Interface terminators (located behind J3) must *not* be installed. Verify that these terminators are absent.

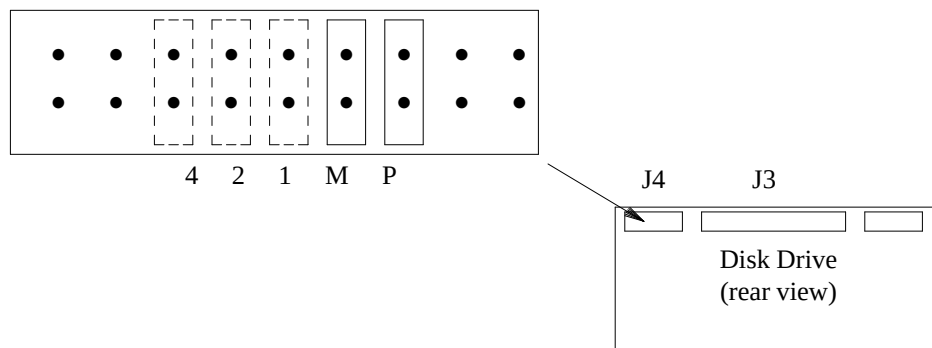


Figure 6-8. CDC Model 94191-766 (ST-4766N) Drive Jumper Locations (Rear View)

HP Model 97536SX and Model 97548SX Drives

The HP Model 97536SX 380-Mbyte drive and the HP Model 97548SX 760-Mbyte drive are types of SCSI, 5.25-inch AUDIX HDDs. The jumper settings for each drive are similar. Figure 6-9, *HP Drive Jumper Settings*, shows Connector J4 (located at the lower left rear of either drive). There are seven jumper settings and they should be installed as follows:

- *Drive Identification:* Jumpers 5, 6, and 7 identify the drive to the system. Assign the disk drive position as follows:

HDD	Jumpers	HDD	Jumpers
0/0	None	0/4	5
0/2	6	0/5	5, 7
0/3	6, 7	0/6	5, 6

- *Bus-Parity Jumper:* Jumper 3 should be installed to enable parity. Check that this jumper is in place.
- *Motor-Start Jumper:* Jumper 4 should *not* be installed so that the drive will wait for a start command before spinning up. Make sure this jumper is not installed. This option is required for all drives.
- *Terminators:* The HP has three terminator slots located directly below the SCSI interface cable connector (J1). These terminators should *not* be installed. If you can see terminator packs in these slots, remove them.

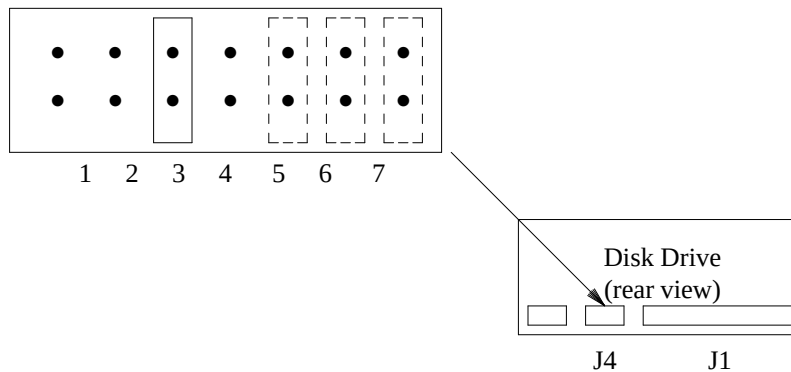


Figure 6-9. HP Drive Jumper Settings

Hitachi Model DK515C Drive

The Hitachi Model DK515C drive is 5.25-inch, 760-Mbyte SCSI HDD.

There should be **no** SCSI interface termination resistors installed. Option settings should be:

- Drive ID set at 0, 2, 3, 4, 5, 6, or 7
- Motor sequencing enabled
- Parity checking enabled
- Power terminators removed

MICROPOLIS Model 1375 Drive

The MICROPOLIS Model 1375 is a SCSI, 5.25-inch AUDIX HDD. The Model 1375 drive can hold about 170 Mbytes of data. Figure 6-10, *MICROPOLIS Model 1375 Drive Jumper Settings*, shows Connector J2 (located at the lower left rear of the drive). Jumper settings should be:

- *Drive Identification:* Jumpers ID0, ID1, and ID2 on the rightmost side of the connector identify the drive to the system. Assign the disk drive position as follows:

HDD	Jumpers	HDD	Jumpers
0/0	None	0/4	ID2
0/2	ID1	0/5	ID0, ID2
0/3	ID0, ID1	0/6	ID1, ID2

- *Bus-Parity Jumper:* The W9 jumper between pins 9 and 10 on connector J2 should *not* be present to enable parity checking. If it is installed, remove it.
- *Motor-Start Jumper:* The motor-start jumper W3 between pins 7 and 8 on J2 should be installed for delayed start on command.
- *Missing Jumpers:* All jumpers from pin 9 to 28 should *not* be installed.
- *Terminators:* Interface terminators RN1, RN7, and RN8 (located behind the data connector at the back of the drive) must *not* be installed. To verify that these terminators are absent, look into the slit on the drive housing above the data connector for three flat bars sticking up (you should not see anything). If you can see them, they need to be removed.

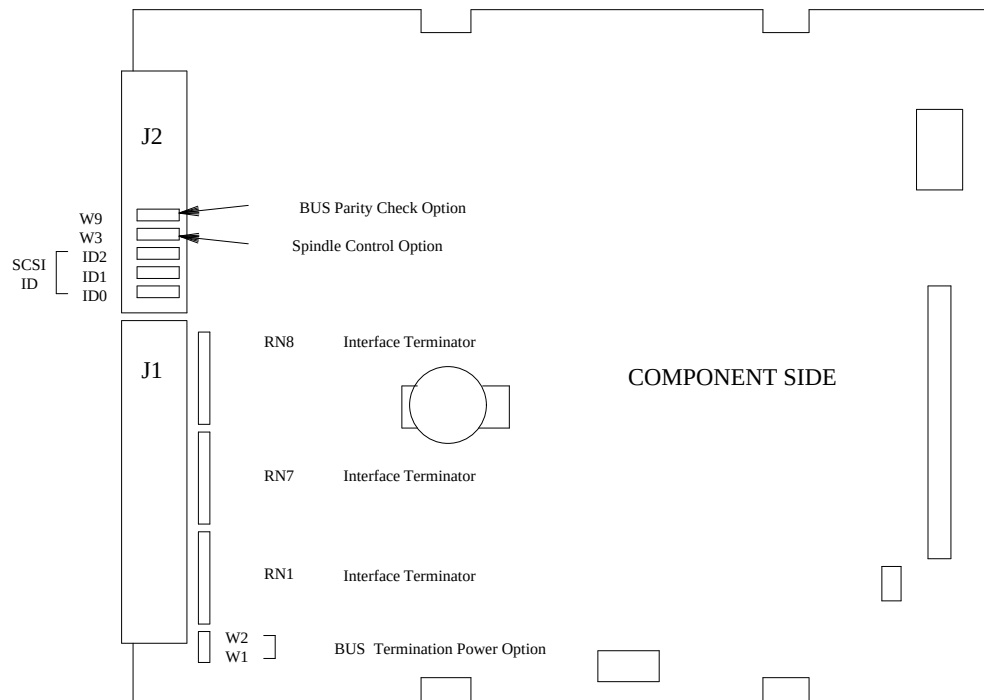


Figure 6-10. MICROPOLIS Model 1375 Drive Jumper Settings

MICROPOLIS Model 1578-15 Drive

The MICROPOLIS Model 1578-15 drive is a 5.25-inch, 380-Mbyte SCSI HDD. Figure 6-11, *MICROPOLIS Model 1578-15 Drive Jumper Settings*, shows the jumpers which are located on top of the mother board, behind Connector J3. Jumper settings should be:

- *Drive Identification:* Jumpers ID0, ID1, and ID2 identify the drive to the system. Assign the disk drive position as follows:

HDD	Jumpers	HDD	Jumpers
0/0	None	0/4	ID2
0/2	ID1	0/5	ID0, ID2
0/3	ID0, ID1	0/6	ID1, ID2

- *Bus-Parity Jumper:* The W4 jumper between pins 3 and 4 should *not* be present to enable parity checking. If it is installed, remove it.
- *Motor-Start Jumper:* The motor-start jumper W5 between pins 5 and 6 should be installed for delayed start on command.

NOTE

This option is *required* for all Model 1578-15 drives.

- *Missing Jumpers:* There should be *no* jumpers installed across pins 1 to 4.
- *Terminators:* Interface terminators RN1, RN7, and RN8 (located behind the data connector at the back of the drive) must *not* be installed. To verify that these terminators are absent, look into the slit on the drive housing above the data connector for three flat bars sticking up (you should not see anything). If you can see them, they need to be removed.

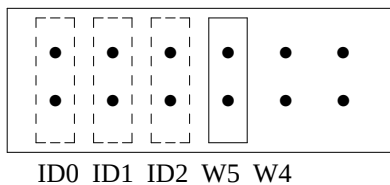


Figure 6-11. MICROPOLIS Model 1578-15 Drive Jumper Settings

MICROPOLIS Model 1588 Drive

The MICROPOLIS Model 1588 is a 5.25-inch, 760-Mbyte, SCSI HDD. Jumper settings are similar to the Model 1578-15 drive.

MAXTOR Model 7120S

The MAXTOR Model 7120S 125-Mbyte drive is an SCSI, 5.25-inch AUDIX Hard Disk Drive. Figure 6-12, *MAXTOR Model 7120S Drive Jumper Settings*, shows the printed circuit board on which the jumpers are located.

- *Drive Position Jumpers:* Jumpers J602 (5-6), J602 (7-8), and J602 (9-10) tell the AUDIX software the drive's position inside the cabinet(s).

HDD	Jumpers	HDD	Jumpers
0	None	4	J602 (5-6)
2	J602 (7-8)	5	J602 (5-6), J602 (9-10)
3	J602 (7-8), J602 (9-10)	6	J602 (5-6), J602 (7-8)

- *Bus-Parity Jumper:* The J601 (5-6) jumper disables parity. It should *not* be installed.
- *Motor-Start Jumper:* The J602 (1-2) jumper determines the start up sequence. This jumper should *not* be installed so the drive will wait for a start command.
- *Terminator Power:* Jumper J601 (1-2) should be installed.
- *Bus Terminators:* Terminators RP601 and RP602 should *not* be installed.

Other jumpers should *not* be used.

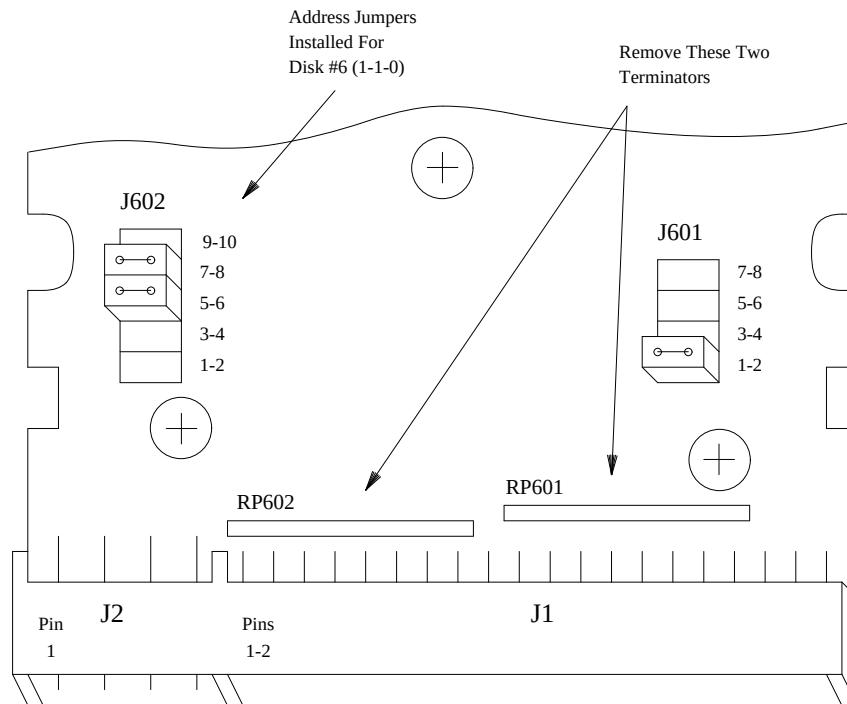


Figure 6-12. MAXTOR Model 7120S Drive Jumper Settings

MAXTOR Model 4380S and Model XT-8760S Drives

The MAXTOR Model 4380S 380-Mbyte drive and the MAXTOR Model 8760S 760-Mbyte drive are both SCSI, 5.25-inch AUDIX Hard Disk Drives. Figure 6-13, *MAXTOR Model 4380S and Model XT-8760S Drive Jumper Settings*, shows the side of a MAXTOR drive where the drive settings are located. The Model 4380S and Model XT-8760S drives are similar, however, the settings are slightly different.

- *Drive Position Jumpers:* Jumpers JP35, JP36, and JP37 tell the AUDIX software the drive's position inside the cabinet(s).

HDD	Jumpers	HDD	Jumpers
0	None	4	JP37
2	JP36	5	JP35, JP37
3	JP35, JP36	6	JP36, JP37

- *Disk Size Jumper* The JP39 jumper should be installed on Model XT-8760S drives. The Model 4380S drive does *not* use this jumper.
- *Bus-Parity Jumper:* The JP40 jumper sets parity and should be installed.
- *Motor-Start Jumper:* Two jumpers, JP14 and JP38, determine the start up sequence. Jumper JP38 should be installed and jumper JP14 should *not* be installed so the drive will wait for a start command. Check that these jumpers are correctly set.
- *Terminators:* There should be no interface terminators installed on the board. Check that all terminators are removed.

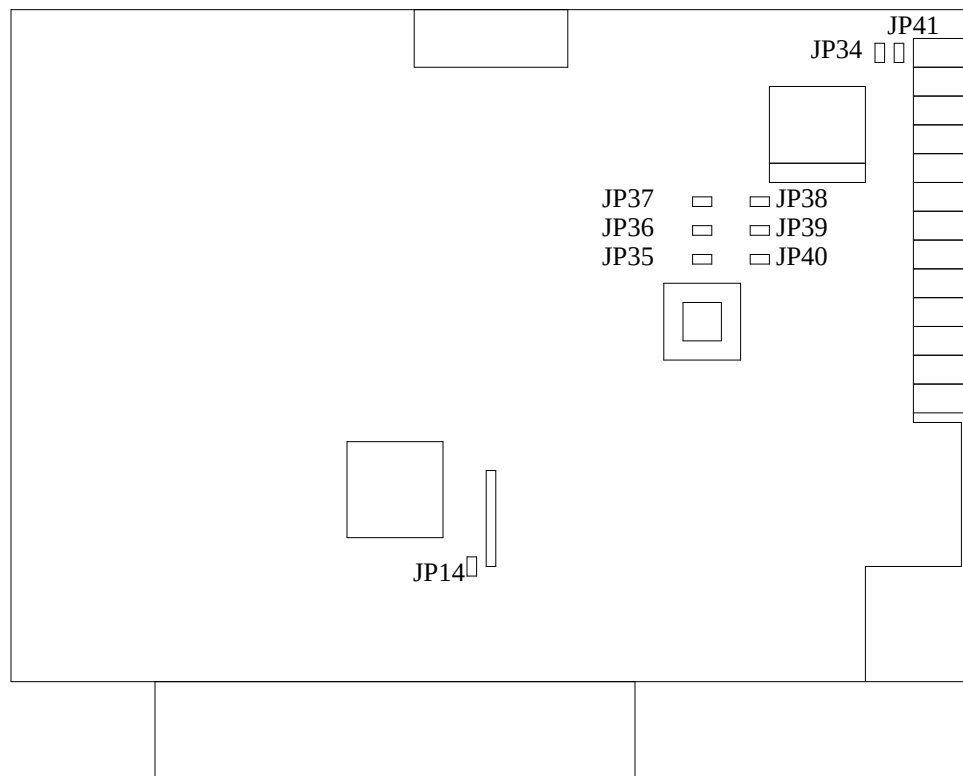


Figure 6-13. MAXTOR Model 4380S and Model XT-8760S Drive Jumper Locations

NEC Model D5862 Drive

The NEC Model D5862 drive is a 5.25-inch, 380-Mbyte SCSI HDD. The NEC drive uses three 8-segment dip switches to set the delay start, parity, drive identification, and drive termination options. These dip switches are located on the bottom of the drive and should be set as follows:

- *Drive Identification:* Segments 1, 2, and 3 of the bottom dip switch sets the drive ID. See Figure 6-14, *NEC Model D5862 Drive DIP Switch Settings*. Assign the drive ID as follows (set the indicated segments to a 1):

HDD	Segments	HDD	Segments
0/0	None	0/4	1
0/2	2	0/5	1, 3
0/3	2, 3	0/6	1, 2

- *Motor-Start Segment:* Segment 4 of the bottom dip switch is used to set the delayed start on command option. This segment should be set to a 1.
- *Terminators:* The rest of the bottom dip switch (segments 5 through 8) and the other two dip switches *must* have all segments set to 0.

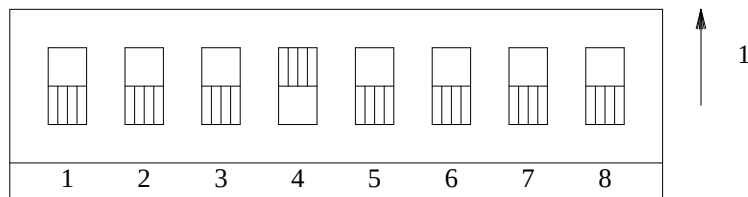


Figure 6-14. NEC Model D5862 Drive Dip Switch Settings

PRIAM Model 738 Drive

The PRIAM Model 738 drive is a 5.25-inch, 380-Mbyte SCSI HDD. Figure 6-15, *PRIAM Model 738 Drive Jumper Settings*, shows Connector J11 (lower right rear of the drive). Jumper settings should be:

- *Drive Identification:* Jumpers ID1, ID2, and ID4 on the rightmost side of the connector identify the drive to the system. Assign the disk drive position as follows:

HDD	Jumpers	HDD	Jumpers
0/0	None	0/4	ID4
0/2	ID2	0/5	ID1, ID4
0/3	ID1, ID2	0/6	ID2, ID4

- *Bus-Parity Jumper:* The parity jumper between pins 9 and 10 (Jumper P in the figure) should be present to enable parity checking.
- *Motor-Start Jumper:* The motor-start jumper across pins 7 and 8 (Jumper MS in the figure) should *not* be installed; this allows the delayed start on command to be used. In addition, jumper W5 should be removed (located at the center of the component side of the disk).

NOTE

This option is *required* for all Model 738 drives.

- *Missing Jumpers:* Jumpers across pins 7 and 8 as well as all jumpers from pin 11 to 20 should *not* be installed.
- *Terminator:* The terminator slot, J2, is located above the 50-pin connector on the drive. The terminator pack should *not* be present. If it is, remove it now.

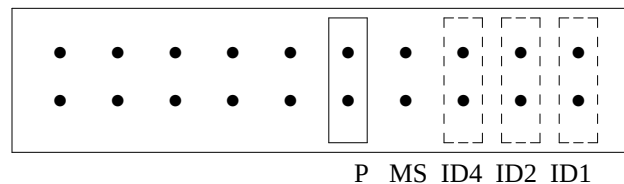


Figure 6-15. PRIAM Model 738 Drive Jumper Settings

Seagate Model ST3283N Drive

The Seagate Model ST3283N drive is 3.5-inch, SCSI HDD that may be used in place of any of the 170-Mbyte 5.25-inch drives that were shipped in early AUDIX systems.

Figure 6-16, *Seagate Model ST3283N Drive Jumper Settings*, shows the location of the jumpers and terminating resistors. Jumper settings should be:

- *Parity/Remote Start Jumper Block:*
 - *Bus Parity:* When a jumper is installed on pins 1-2 of this jumper block, the drive will check the SCSI bus parity. Although the drive will operate with or without this jumper, it is recommended that this jumper be installed.
 - *Spindle Control (Remote Motor Start):* When a jumper is installed on pins 3-4 of this jumper block, the drive spindle motor will not start on power-up until it has received a motor start command. This feature is used to sequence drive spin-up to reduce maximum current requirements. Therefore a jumper should be installed on this position.
- *SCSI ID Address Jumper Block:* Pins 1-2, 3-4, and 5-6 are used to control the identification of the disk drives in AUDIX using binary coding. Set the jumpers to correctly identify the position of the disk drive as follows:
 - Disk00 should *not* have any of the three jumpers installed.
 - Disk01 should only have the 5-6 jumper installed.
 - Disk02 should only have the 3-4 jumper installed.
 - Disk03 should only have the 3-4 and 5-6 jumpers installed.
 - Disk04 should only have the 1-2 jumper installed.
 - Disk05 should only have the 1-2 and 5-6 jumpers installed.
 - Disk06 should only have the 1-2 and 3-4 jumpers installed.
- *Terminators:* Interface terminator packs should *not* be installed. Verify that they are not present.
- *Other Jumpers:* Any other jumpers on this disk drive should be left alone. Do *not* remove or change any jumpers not previously specified.

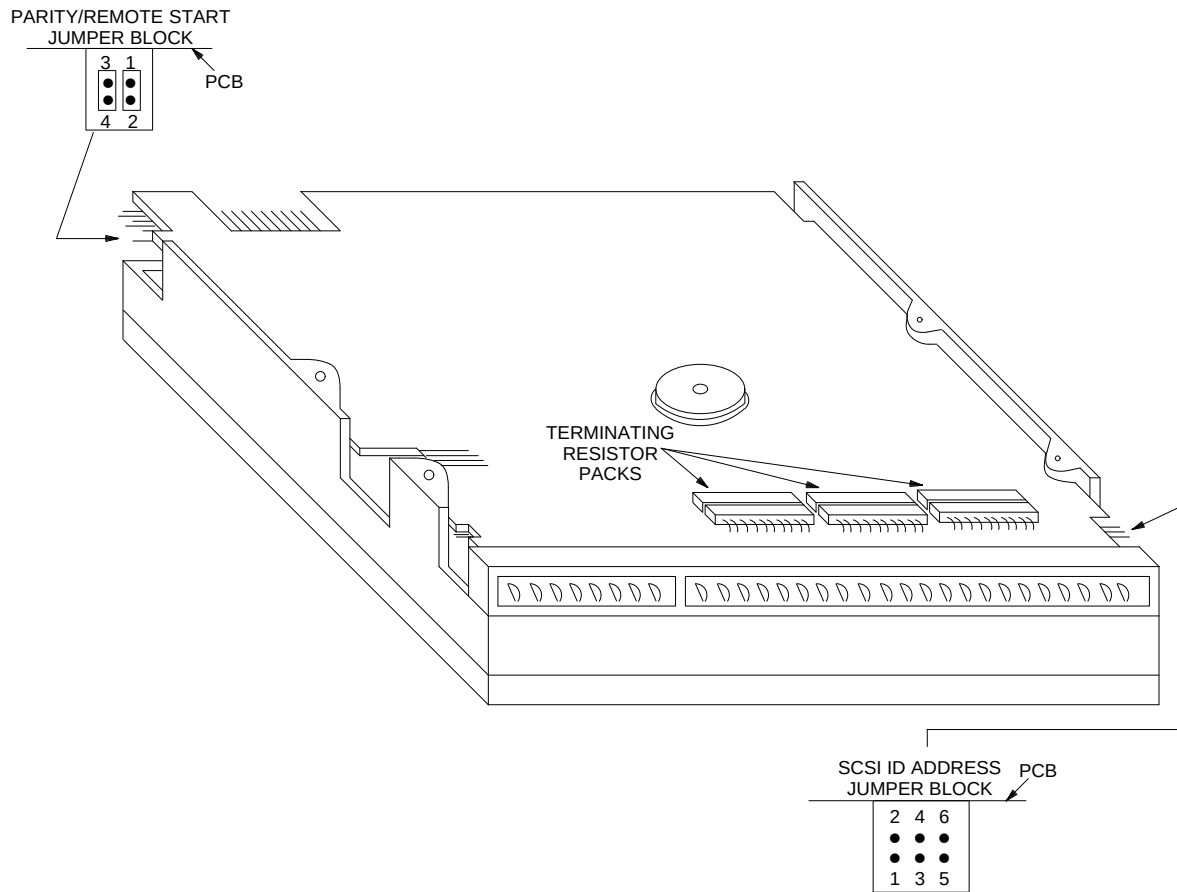


Figure 6-16. Seagate Model ST3283N Drive Jumper Settings

Seagate Model ST1480N Drive

The Seagate Model ST1480N drive is 3.5-inch, SCSI HDD that may be used in place of any of the 380-Mbyte 5.25-inch drives that were shipped in early AUDIX systems.

Figure 6-17, *Seagate Model ST1480N Drive Jumper Settings*, shows the location of the jumpers and terminating resistors. Jumper settings should be:

- *Bus Parity:* When a jumper is installed on J6 position 5, the drive will check the SCSI bus parity. Although the drive will operate with or without this jumper, it is recommended that this jumper be installed.
- *Spindle Control (Remote Motor Start):* When a jumper is installed on J6 position 2, the drive spindle motor will not start on power-up until it has received a motor start command. This feature is used to sequence drive spin-up to reduce maximum current requirements. Therefore a jumper should be installed on this position.
- *Drive Identification:* Jumpers J5-1, J5-2, and J5-3 are used to control the identification of the disk drives in AUDIX using binary coding. Set the jumpers to correctly identify the position of the disk drive as follows:
 - Disk00 should *not* have any of the three jumpers installed.
 - Disk01 should only have the J5-3 jumper installed.
 - Disk02 should only have the J5-2 jumper installed.
 - Disk03 should only have the J5-2 and J5-3 jumpers installed.
 - Disk04 should only have the J5-1 jumper installed.
 - Disk05 should only have the J5-1 and J5-3 jumpers installed.
 - Disk06 should only have the J5-1 and J5-2 jumpers installed.
- *Terminators:* Interface terminator packs should *not* be installed. Verify that they are not present.
- *Other Jumpers:* Any other jumpers on this disk drive should be left alone. Do *not* remove or change any jumpers not previously specified.

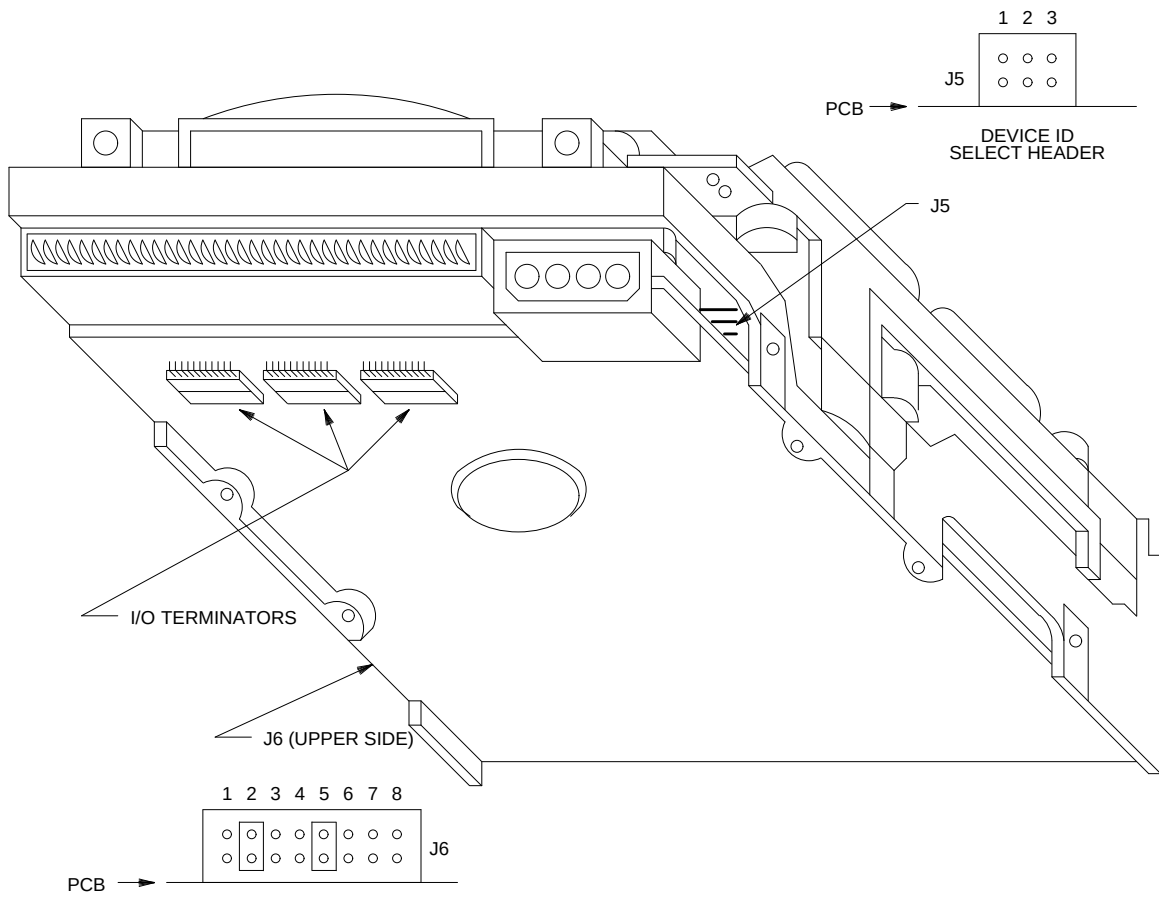


Figure 6-17. Seagate Model ST1480N Drive Jumper Settings

7. Power and Environment

Environmental and power component problems fall into two categories: those that raise alarms and those that do not. This chapter covers both cases:

- Environmental Alarm Resolution (when software is running)
- Control Mode Menu Alarm (when software is *not* running)
- Unalarmed Problems

Although this chapter addresses AUDIX systems installed with AC power, the procedures can be used to isolate problems on systems with DC power also. Once a problem is isolated down to the power supply itself, see *Unalarmed Problems* for replacement.

ENVIRONMENTAL ALARM RESOLUTION

If you were referred here to resolve an alarm, use Table 7-1, *Environmental Alarm Resolution*, to locate the diagnostic procedure you should follow. After doing the steps in the indicated section, verify that the fault is resolved using the alarm logs (if software is running) or Control Mode Menu Option 2 (if the system is *not* running). Comcodes for AUDIX parts and cables are in Table C-1 of Appendix C.

Table 7-1. Environmental Alarm Resolution

Alarm Log		Description (see Note)	Repair Action		
Fault	Unit:Dev		1st Choice	2nd Choice	3rd Choice
16	116 : 0	Battery charging at high rate (CHG_RATE)	Batteries, E	Power supply	–
70	116 : 0	Cabinet over temperature (OPTALM)	External, A	Fans	CDR1B
71	116 : 0	Cabinet differential too great (FANALM)	Filter, A	Fans	CDR1B
75	116 : 0	Battery power below 48 VDC (LOW_BAT)	Batteries, B	Batt. cable	Power sup.
77	116 : 0	Cabinet fuse failure (FUSALM)	Fuse, C	Fuse cable	CDR1B
78	116 : 0	On battery reserve, no AC power (ON_RES)	Power, D	Power supply	Cables
155	116 : 1	Battery charger fault or open battery string (RESV_FLT)	Batteries, B	Batt. cable	Power sup.
74	117 : 0	System lost +5, –5, 12, or 48 VDC from power supply (CNVDSK)	Voltage, F	Short ckt	Fuse
156	117 : 0	DC voltage not in tolerance	Voltage, F	Short ckt	Fuse
Note: Control Mode Menu alarm equivalents (Option 2) appear in parentheses. For two-cabinet systems, the same alarms will appear for each cabinet. The troubleshooting steps explain how to tell which cabinet is alarmed.					

Procedure A: Fan or Over-Temperature Faults

AUDIX detects many environmental problems indirectly by monitoring temperature. For over-temperature conditions, check the following:

1. Check if the room temperature is excessively high (greater than 95°F or 35°C). If so, wait until the external problem at the site is corrected and check if the alarm is resolved.
2. Look for air obstructions to the fans [such as things stacked against the back of the cabinet, or the system being too close to the wall (less than 38 inches)]. Correct the problem if present and see if the alarm is resolved.
3. If there is no external obstruction, check the air filter below the circuit pack carrier of each cabinet (see *Check or Replace Air Filter* after Procedure F). If a filter is dirty, clean or replace it. See if this resolves the problem.

4. If the air filter is clean, check the fans.
 - a. If *one* fan is not running, go to *Replace a Fan or Fan Assembly* in this section to replace it. Return to this list to see if the problem is resolved.
 - b. If *all* fans in a cabinet are not running, go to *Replace a Fan or Fan Assembly* to check the fan assembly. Follow the steps in that section to determine when the fault is resolved.
5. If these procedures do not resolve the fault, check the cabling to the CDR1B board(s) (see *Unalarmed Problems*).

Procedure B: Check the Batteries

The batteries should be checked in response to most power alarms, including CHG_RATE, LOW_BAT, and RESV_FLT. The batteries should also be replaced periodically as part of routine system maintenance. There are no visual checks to tell which cabinet's batteries are bad in a stack cabinet system. You will have to do this check for each cabinet. To check the batteries:

1. Shut down system software (if running), spin down the RCD (if not done automatically), power down the system, and unplug the AC power cord(s) in that order.
2. Remove the lower panel from the back of the cabinet. (Loosen the 4 bottom screws, then remove the other 9 screws. Slide the panel up to remove it and set it aside.)
3. The battery reserve is on the right side of the cabinet. First check the cabling:
 - a. Make sure the red and black battery cable is securely attached to the power supply.
 - b. Make sure the 10-pin power-supply alarm cable is securely attached to the bottom connector (J7) of the CDR1B board. This connector is located above the air plenum on the right of the power supply.
4. To see if the batteries are good, disconnect the red and black battery-charger cable from the right side of the power supply.
5. Using a voltmeter, check the voltage leading to the battery reserve (place a probe on each of the two metal pins inside the connector). The voltage should read:

49 VDC to 56 VDC

6. If the voltage is low, power up the system and check the output voltage of the battery charger. It should also be 49–56 VDC. If the output is okay, reconnect the battery-charger cable to the batteries and allow them to recharge for at least 16 hours. Afterwards, recheck the voltage.

If the output of the charger is not okay, replace the power supply (the charger is integrated with the supply). See *Unalarmed Problems*.

7. If the voltage is still low after recharging, replace the batteries. (Remove the screw in the retaining strip, unplug the battery cables, slide out the old pack, and insert a new 48V, 24-cell battery module.)

Procedure C: Check the 5V Fuse

A 5 VDC fuse is located on the connector panel of each cabinet (10-amp fuses should be replaced with 15-amp fuses per QPPCN 363DR).

For two-cabinet systems, check each cabinet's fuse to determine where the problem is. When you have found which cabinet is having the problem, follow the recovery steps for that cabinet.

The fuse at the back of the AUDIX cabinet may be blown if:

1. The disk drives *all* fail to work (or any other indication of a short on the 5 VDC bus).
2. A FUSALM fault has been reported (either in the Control Mode Menu or alarm log).

To Check or Replace the Fuse:

1. Locate the 5 VDC fuse on the back of the AUDIX cabinet. Press in the fuse and turn it counterclockwise. The fuse will pop out.
2. Using an ohmmeter, place a probe on the metal tip of the fuse and place a second probe on the metal ring below the cap.
 - a. *If you get an open-circuit reading* (for example, OL or overload), the fuse is blown. Replace the fuse with a standard 125V, 15-amp BUSS fuse.
 - b. *If you get a 0 ohms reading* (a beep on some ohmmeters), the fuse is good.

NOTE

If the existing fuse is *not* a 15-amp fuse (early models use a 10-amp fuse), order Quality Protection Plan Change Notice (QPPCN) 363DR. This change will make the system more reliable.

3. After you have replaced the fuse or determined it is good, go on with your troubleshooting or verification procedures.
4. *If the fuse blows again*, isolate the cause as follows:
 - a. Disconnect all disk drive power cables and the 4-pin disk drive power connector (J2) at the upper right of the CDR1B board. See Chapter 6, *Disk Drives* for disk drive removal procedures.
 - b. Recheck the fuse. If it blows, the cable is damaged. Check for pinches or nicks. If found, repair the cable if possible. *If you cannot fix the cable*, you need to exchange the entire internal wiring harness (LCJ58886U-1) through the factory.
 - c. If the cable is good, plug the power connectors back into the disk drives one by one, rechecking the fuse after each new connection. *If the fuse blows*, the last disk drive you plugged in is bad and should be replaced. See Chapter 6, *Disk Drives* for disk drive replacement procedures.
 - d. If the disk drives are good, plug the power connector back into the J2 connector on the CDR1B board and recheck the fuse. *If the fuse blows*, the CDR1B board is bad and should be replaced (see *Unalarmed Problems*).

Procedure D: Battery Reserve Alarms

The ON_RES alarm is a normal condition if AC power has been lost and AUDIX is running on DC (battery) power. To resolve it:

1. Check the LEDs at the lower right front of the AUDIX cabinet(s).
 - a. The yellow LED (ON RESERVE) should be the only LED lit, indicating the battery reserve is supplying power. Go to step 2.
 - b. *If the red LED (RESERVE FAULT) is also lit*, go back to Procedure B to check the batteries.
 - c. *If the green LED (AC) is also lit*, the power supply is sending a bad signal. Check cabling to the CDR1B board (see *Unalarmed Problems*). If good, suspect the power supply.
2. Check for AC power to the AUDIX cabinet (see *Unalarmed Problems*).
 - a. If the AC power has been interrupted to the site, wait for the external problem to be resolved. Check to see if the alarm is resolved.
 - b. Make sure the AC power cord(s) is plugged in correctly. If not, plug it in and see if this corrects the problem.
 - c. If you *do* have AC power and this alarm is raised, check cabling to the CDR1B alarm board (see *Unalarmed Problems*). If good, suspect the power supply.

Procedure E: Batteries Charging

The CHG_RATE fault is a warning condition that the batteries are charging. This alarm normally follows an AC power outage where AUDIX had to temporarily use DC (battery) power.

1. If the CHG_RATE (fault 16) alarm is accompanied by a LOW_BAT low voltage (fault 75) alarm, allow the batteries to fully recharge (up to 16 hours).

NOTE

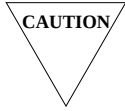
If the batteries are low, the red ENV LED on the TN511 MI may flicker. The yellow WRN LED should be lit.

2. When the batteries are (or should be) completely recharged, check if the alarm is resolved. If not, check the battery voltage (go back to Procedure B).
 - a. If the voltage is *not* correct and cabling is not the problem, replace the batteries.
 - b. If the voltage is correct or the batteries are good, check cabling to the CDR1B board (see *Unalarmed Problems*). If good, suspect the power supply.

If the charging condition continues over 30 hours, the MI automatically escalates this to a RESV_FLT alarm (go back to Procedure B).

Procedure F: Check the Power Supply Voltages

On two-cabinet systems, the alarmed cabinet will *not* have its green LED lit. Do the following steps on the alarmed cabinet.



Always power down both cabinets when you are instructed to turn the power off. See Appendix A, *Basic Procedures*, for details on how to power down a system.

The CNVDSK alarm (fault 117) means that the power supply has found one of its four voltages incorrect (+5, –5, +12, or –48 VDC). To isolate which channel is causing this problem:

1. Shut the system software down using the MI toggle switch or the **shutdown** form with the maintenance (m) option.
2. Wait for the RCD to spin down, power down the system, then unplug the AC power cord(s).
3. Remove the lower panel from the back of the cabinet. (Loosen the four bottom screws, then remove the other screws on the sides and top. Slide the panel up to remove it.)
4. If needed, you may remove the battery module in order to get room to work on the power supply:
 - a. Disconnect the red and black battery-charger cable from the battery reserve.
 - b. Remove the two nuts and washers that hold down the battery housing on the right of the cabinet, then remove the battery module.

NOTE

Removing the battery module is optional in later models because the right air plenum has been removed. However, you can remove the battery module if you need more room.

5. *If the right air plenum is installed (see Figure 7-3):* Remove the screw(s) that attach the air plenum to the right side of the power supply, then remove the air plenum. (Early models have three screws, newer models have one at the bottom in front. The latest models have no right air plenum to remove).
6. On the right side of the power supply are four terminals that carry the four voltages. Plug in the AC cord(s) and restore power. Using a voltmeter, check the voltage of each channel.
 - a. If *all* channels are incorrect, the power supply or harness is faulty and should be replaced (see Table 7-3 if needed).
 - b. If the +5 or –5 VDC channels are incorrect, check for a faulty circuit board by turning power off, unseating all boards except the MI, and turning power back on. Push the boards in one at a time, checking after each one for the fault to return. If it does, replace the last board pushed in.
 - c. If the +12 VDC channel is incorrect, check the disk drives and their cabling to the CDR1B board (see *Unalarmed Problems* if needed).
 - d. If the –48 VDC channel is incorrect, check the – 48V fuse (see the next section).

To Check the –48V Fuse:

The CNVDSK fault may indicate that the –48 VDC fuse *in the power supply* is blown. To resolve this problem:

1. Remove the back panel and plenum to the power supply as described in the previous section (if not already off).
2. Locate the –48 VDC fuse (on some supplies, it is on the right side at the upper left corner). Insert a screwdriver into the fuse cap and turn it counterclockwise. The fuse will pop out.
3. Visually check for a blown fuse. (If you need to use an ohmmeter, go back to Procedure C.)
4. If the fuse is blown, replace it with a standard 250 V, 1-amp slow-blow (1 ASB) fuse (a 3AG-type fuse). Restore power to the system.
5. *If the fuse blows again*, (or if it was good and not replaced), one of the –48 V circuit boards may be bad. Isolate the cause as follows:
 - a. Spin down the RCD and power down the system.
 - b. Slide the TN511 MI and the TN747B VPT boards out of their slots. Restore power. *If the fuse blows*, the problem is with the power supply or wiring. Replace the appropriate unit.
 - c. If the fuse remains good, push in the MI and VPT boards *one at a time*, checking the fuse (or the –48 VDC terminals on the power supply) after each board. *If the fuse blows*, the last board you pushed in is the problem. Replace the faulty board.
 - d. If the fuse blows *after* the boards are replaced, check the backplane for damage or bent pins. If the backplane requires work or replacement, call the Technical Service Center (TSC).

Check or Replace the Air Filter

The filter under the AUDIX carrier may be dirty or blocked if software reports a FANALM fault. The filter should also be cleaned or changed when necessary as part of routine system maintenance. On two-cabinet systems, do the following for both cabinets. To remove the filter:

1. Turn the two quarter-turn screws on the lower front panel. Lift the panel out of the bottom groove and set it aside.
2. Reach into the cabinet above the disk drives and slide the filter straight out of the cabinet.
3. Replace the filter if dirty or old.
4. If you *cannot* replace the filter, you may clean it as follows:
 - a. Agitate the filter in a solution of water and mild detergent.
 - b. Rinse the filter thoroughly with clean running water and allow it to dry *completely* before reinserting it.
5. Slide the new (good) filter back into place.
6. If you changed the filter in response to an alarm, check that the problem is resolved. If not, go on to the next problem choice (go back to Procedure A).

Replace a Fan or Fan Assembly

On two-cabinet systems, use the following steps for the cabinet that is having problems.

If you observe a single fan not working or have diagnosed a fan or temperature fault (FANALM or OPTALM), take the following steps (see Figure 7-1, *Replacing a Fan or Fan Assembly*):

1. Shut the system software down using the MI toggle switch or the `shutdown` form with the maintenance (m) option.
2. Wait for the RCD to spin down, power down the system, then unplug the AC power cord(s) in that order.
3. *If you are replacing a single fan:*
 - a. Remove the eight screws that fasten the fan assembly to the back of the AUDIX cabinet. (You will need to hold up the fan assembly.)
 - b. Remove the four screws that hold the fan in place. Unplug the power cord to the fan.
 - c. Insert a good fan into the fan assembly. Reinsert the screws and plug it back in. Go to step 5.
4. *If you are replacing the entire fan assembly:*
 - a. Remove the middle panel to disconnect the fan assembly's power cord from the CDR1B board. (Loosen the seven screws along the bottom of the panel, then remove the four screws along the top. Slide the panel upwards to remove it.)
 - b. *Before replacing the fan assembly:* Check the cabling to the CDR1B (alarm) board. The fan assembly uses the 6-pin connector (J3) at the top left of the board. If this (or any other cables) on the CDR1B are loose, reseal them firmly and recheck the fan assembly (go to step 5). If the cables are *not* loose, continue here.
 - c. Unplug the fan assembly's 12 VDC power cord from the CDR1B board's J3 connector.
 - d. Remove the 8 screws that fasten the fan assembly to the back of the cabinet.
 - e. Pull the fan assembly away from the unit (the power cord will pull upwards through a hole into the fan section). Set the old fan assembly aside.
 - f. Push the power cord from a new fan assembly through the hole in the fan section down to the CDR1B board.
 - g. Plug the new power cord back into the CDR1B J3 connector.
5. Before reattaching the fan assembly, verify that the replaced fan (or assembly) works. Power up the system.
6. *For a single-fan replacement:* Check if the replaced fan is working. If the fan is *not* working, replace the entire fan assembly (go back to step 4).
7. If the fan (or fan assembly) *fails to work*, check the cables from the CDR1B board to the power supply (see *Unalarmed Problems*).
8. If the fan (or fan assembly) appears to be good, reattach the fan assembly to the back of the AUDIX cabinet and replace the middle panel.
9. If you are responding to an alarm, reinitialize the system and verify that the fault is resolved.

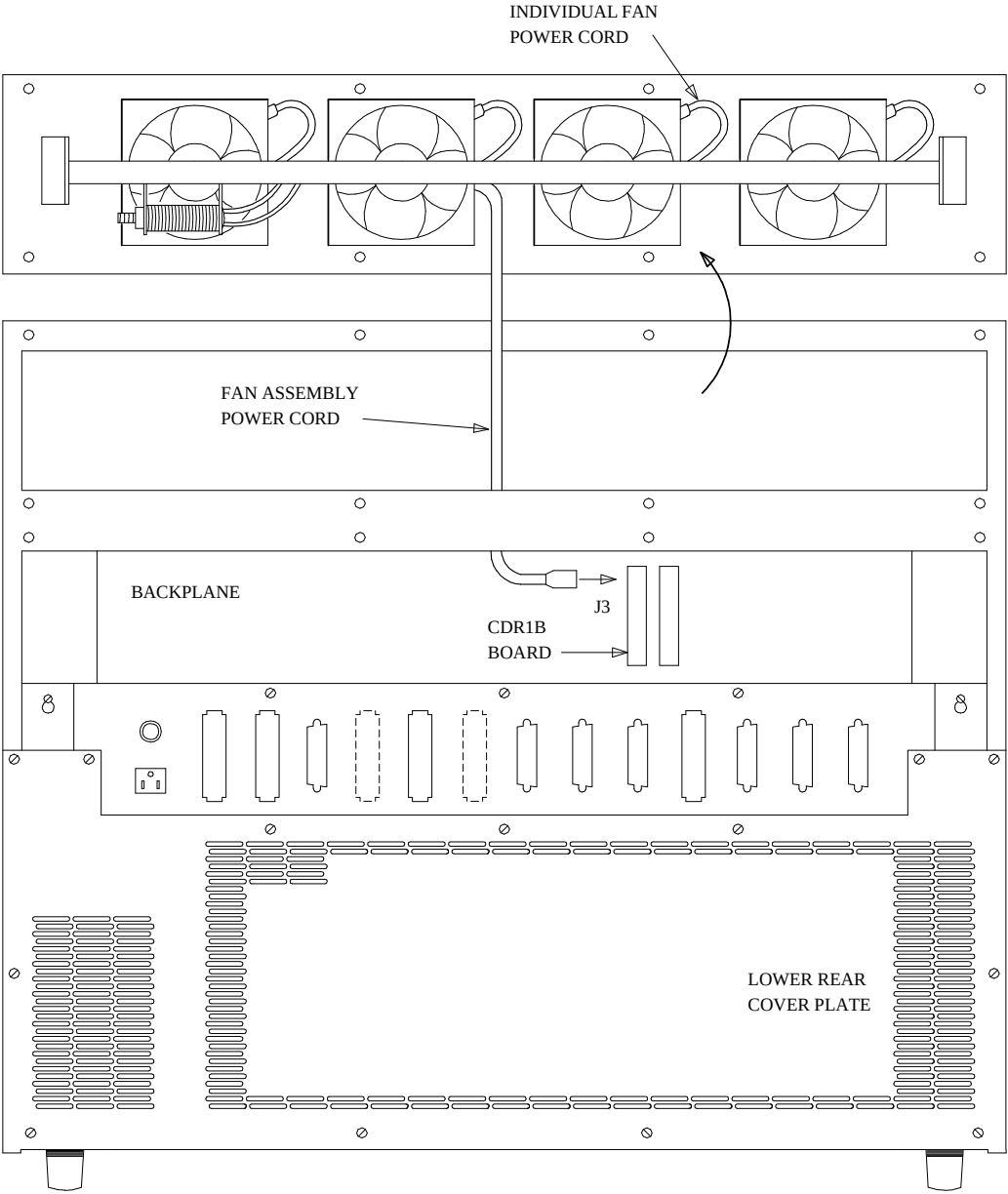


Figure 7-1. Replacing a Fan or Fan Assembly

CONTROL MODE MENU ALARMS

Option 2 on the Control Mode Menu shows environmental or power alarms that relate to the resolution procedures in the previous section (see Table 7-2, *Control Mode Menu Alarm Resolution*). You can therefore solve environmental alarms even when the system software is not running. On two-cabinet AUDIX systems, the same alarms appear for either cabinet. Each section indicates how to tell which cabinet is having problems and any additional steps required to resolve alarms. Ambiguous major alarms are explained briefly below.

Table 7-2. Control Mode Menu Alarm Resolution

Control Mode Menu Alarm		Fault	Use Procedure*
CHG_RATE	(warning)	16	E
CNVDSK	(major)	74	F
FANALM	(major)	71	A
FUSALM	(major)	77	C
LOW_BAT	(major)	75	B
ON_RES	(major)	78	D
OPTALM	(major)	70	A
RESV_FLT	(major)	155	B

* Procedures are in the *Environmental Alarm Resolution* section.

FANALM: Temperature Differential

The FANALM fault is sent when the two cabinet thermistors register a difference of temperature between them greater than 30°F (16.6°C). A thermistor is located on the back of the fan assembly (to monitor heat output) and at the left of the RCD bracket (to monitor incoming air temperature). The FANALM fault is retired when the temperature difference falls below 29.5°F (16°C).

Because external or mechanical factors can cause this alarm, the fault cannot precisely identify the source of trouble. Use Procedure A to isolate the probable cause, which could include:

1. A blocked air filter
2. Blocked or stopped fans
3. Loose cabling to the CDR1B board affecting the fan assembly.

OPTALM: Over-Temperature

The OPTALM fault is sent when one of the cabinet's thermal switches detects an exit-air temperature greater than 150°F (65.5°C). Two thermal switches (thermostats) are located on each side of the fan assembly, and another at the bottom left of the RCD bracket. The OPTALM fault can indicate any of the following problems:

1. A breakdown of the facility's normal air conditioning (environmental fault, not AUDIX). Check with the customer for possible site problems.
2. Blocked or stopped fans. Use Procedure A in *Environmental Alarm Resolution*.

UNALARMED PROBLEMS

Not all environmental problems cause alarms. If you suspect an environmental or power problem, check the following list and go to the indicated section to resolve it.

NOTE

For two-cabinet systems, do each step for both cabinets, if applicable.

- *A single nonworking fan.* This problem is compensated for by the other fans and must be checked visually (see “One Nonworking Fan” in this section).
- *External or cabinet component.* The air filter or external problems cannot be reported directly. Use Procedure A in *Environmental Alarm Resolution* to diagnose these problems. If these steps fail, check the CDR1B board cabling (see *Check the CDR1B Alarm Board*).
- *Front panel not working.* If the three LEDs and the POWER switch on the front panel do not work, check the CDR1B board cabling and related wiring (see *Check the CDR1B Alarm Board*).
- *No power.* AUDIX cannot report problems when it cannot run (see *No Power* in this section).
- *No switch alarms or terminal response.* If one of the alarm, maintenance, or administration connectors on the rear connector panel fails to send signals or respond, check the external cabling and the CDR1B board cabling (see *Check the CDR1B Alarm Board*).
- *Fans on high.* If the ambient temperature at the site is over 95°F (35°C), the fans switch to high speed, but no alarm is issued. Solve the external problem if possible.

One Nonworking Fan

The fans are set on high if the thermostats detect an exit-air temperature greater than 95°F (35°C). This action can compensate for a single failed fan. Therefore, check for one-fan failures as a routine part of on-site service:

1. Check if the fans are running on high speed (normally the fans run on low speed).
2. If fans are on high, visually check for one fan that is not turning. If you locate a nonworking fan, replace it as described in *Environmental Alarm Resolution*.

No Power

If AUDIX is not running at all, the on-site service technician should take the following steps:

1. Check that the AUDIX AC power cord(s) is plugged in to a working 120 VAC, 60-Hz outlet. Plug something else such as a lamp into the outlet and see if it works.
2. Check that the circuit breaker on the lower front panel is ON. Check both cabinets if this is a Two-Cabinet AUDIX system. If off, try powering up the system. If for some reason the circuit breaker tripped, it may or may not happen again. Even if it does, it could take hours or days before the same sequence of events cause it to trip. **It is highly unlikely that the breaker itself is faulty.**
3. Do a visual inspection of the AUDIX system. If the circuit breaker(s) is ON and *no* LEDs are lit, check the cabling to the CDR1B board (see the next section).

Check the CDR1B Alarm Board

The CDR1B alarm board transmits signals to and from the MI board to most of the major components and connectors in the system. While the CDR1B board itself is rarely faulty, loose cables to this board could raise false alarms.

NOTE

Early one- or two-cabinet systems may have a CDR1 vintage board. However, the CDR1B vintage board is always required for DC-powered systems.

Diagnose CDR1B Cabling Problem

Because the CDR1B board is not alarmed directly, check the following list to see if a loose cable could be causing the problem. See Figure 7-2, *CDR1B Alarm Board and Cable Connections*, for an illustration of CDR1B connectors.

1. Check the connectors for specific problems as follows:
 - **J1: Backplane.** If the MI does not register alarms correctly, make sure the CDR1B is fastened securely to the backplane.
 - **J2: Disk Power.** This 4-pin connector carries 5 and 12 VDC and GRD from the disk drives to the fan assembly. Check it if you have a nonworking fan assembly.
 - **J3: Fan Assembly.** If the fan assembly fails to work, make sure this 6-pin connector is seated correctly.
 - **J4: Front Panel.** If the three LEDs, POWER switch(es), and temperature alarms do not work, check that the 10-pin J4 connector is attached.
 - **J5:** The topmost connector is used to connect the two CDR1B boards in a two-cabinet cabinet system. Make sure this cable is properly connected if it is present.

- *J6: Switch Alarms.* If AUDIX reports alarms locally but fails to send them to the remote site, make sure that this 6-pin connector is well-seated on the CDR1B and the ALARM (D03) connector on the rear panel.
 - *J7: Power Supply.* All power and battery alarms go through this 10-pin connector. Check that it is well-seated whenever you check the batteries or power supply.
 - *J8: RS-232C Connectors.* If the local maintenance *and* administration terminals do not respond, or if the remote maintenance terminal cannot dial-in to AUDIX, check that this 16-pin connector is firmly attached to the CDR1B board and to each of the EIA connectors on the rear panel (MAINT H00 and ADMIN H01).
2. If you have one or more of these problems and the cables are securely attached, check the suspected cable(s) for damage.
 3. If the cable(s) appear good, replace the CDR1B board (see the next section) *except* for power problems.
 4. *For power problems:* Replace the power supply before the CDR1B. See *Replace the AC Power Supply* or *Replace the DC Power Supply*, whichever is applicable.
 - a. If the replacement supply does not work, replace the CDR1B board.
 - b. In the unlikely event that neither of these actions solves the power problem, you may try replacing the circuit breaker (see *To Replace the Circuit Breaker*), or call for help.

To Replace the CDR1B Board:

1. Shut the system software down using the MI toggle switch or the `shutdown` form with the maintenance (m) option.
2. Wait for the RCD to spin down, power down the system, and unplug the AC power cord(s) in that order.
3. Remove the middle panel to access the CDR1B board. (Loosen the seven screws along the bottom of the panel, then remove the four screws along the top. Slide the panel upwards to remove it.)
4. Remove all the cables as listed in the previous section (see Figure 7-2).
5. Pull the CDR1B off the backplane (rear of slot 7), noting where it is connected.
6. Insert a new CDR1B on the correct pins (marked AB3) of the backplane. Reattach all cables securely.
7. Before reattaching the back panel, check that the new board is operational. Tests include:
 - a. Checking that the LMT and LAT can *both* log in.
 - b. Shutting down power and seeing if the MI and switch both report the correct alarms.
 - c. Making sure the fans, disk drives, and LEDs are working.
8. If the new board solves the problem, reattach the middle panel. If the problem persists, call for help.

To Replace the Circuit Breaker:

If you replace the CDR1B board and/or the power supply and you still cannot get AC power, the only thing left to suspect is the POWER switch (circuit breaker). To replace the circuit breaker:

1. Make sure the system's power is off and the AC power cord(s) is unplugged before you begin.
2. Remove the two nuts and washers that attach the RCD bracket to the cabinet as described in Chapter 6, *Disk Drives*. Pull the entire bracket assembly out of the cabinet.
3. Remove the old circuit breaker from the back of the bracket, and insert a good breaker.
4. To test the new breaker, plug the AC power cord(s) back in and power up the system.
5. If the system powers up and the green LED (AC) lights, the breaker is good. If the new breaker does *not* work, call for help.

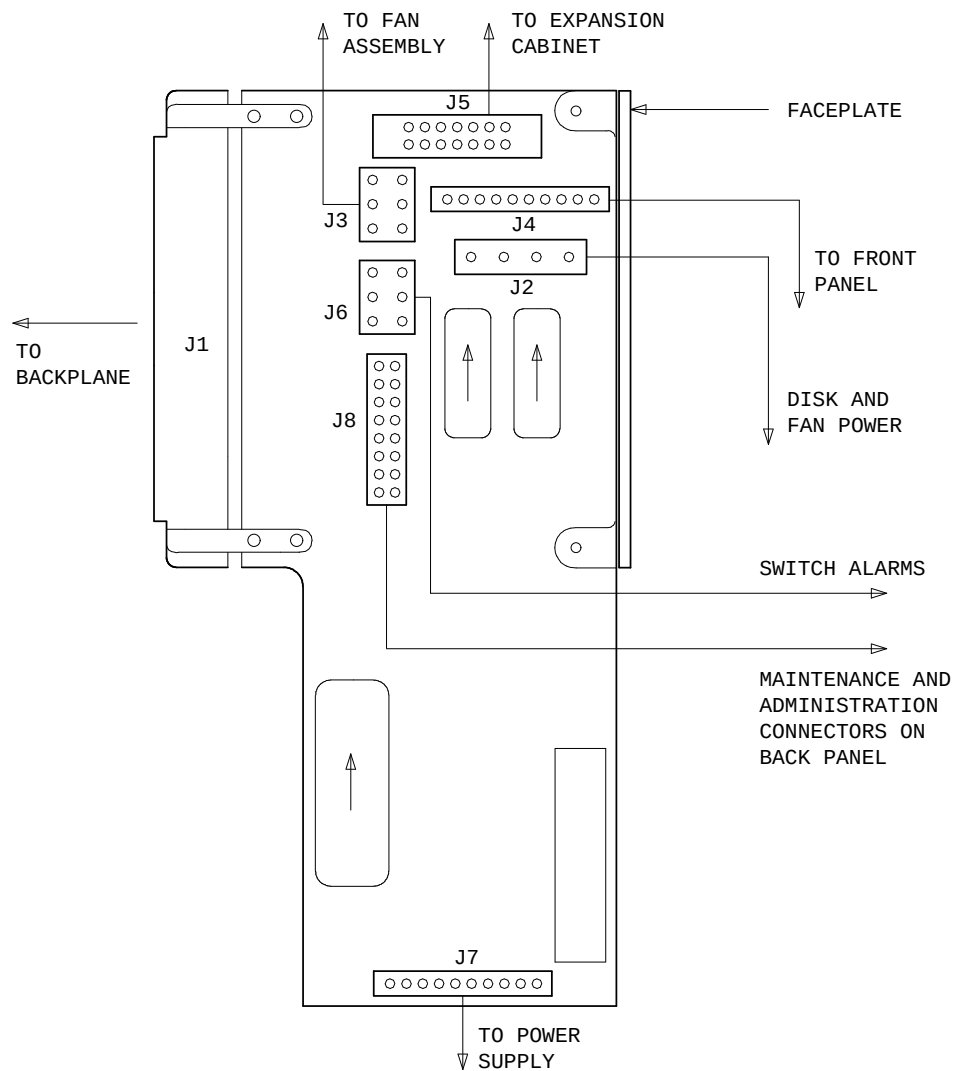


Figure 7-2. CDR1B Alarm Board and Cable Connections

Replace the AC Power Supply

The power supply is a last-choice replacement after checking cables. See Figures 7-3 and 7-4, *Power Supply Replacement (Early Hardware)* and *Power Supply Replacement (Newer Hardware)* for an illustration of this procedure. Comcodes for replacement parts are in Table C-1 of Appendix C.

NOTE

AUDIX can use more than one type of power supply, so the replacement module may not look exactly like the supply you just removed. However, the cable harness (LCJ58886U-1) is identical for each power supply and will connect in a similar manner.

If the customer wants to replace the AC power supply with DC power, obtain Kit no. D-182236 (comcode 845 367 522). Instructions are included with the kit.

Remove the Existing AC Power Supply

1. Shut the system software down using the MI toggle switch or the shutdown form with the maintenance (m) option.
2. Wait for the RCD to spin down, power down the system, and unplug the AC power cord(s) in that order.
3. Remove the lower panel from the back of the cabinet. (Loosen the four bottom screws, then remove the other screws on the sides and top. Slide the panel up to remove it.)
4. If needed, you may remove the battery module in order to get room to work on the power supply:
 - a. Disconnect the red and black battery-charger cable from the battery reserve.
 - b. Remove the two nuts and washers that hold down the battery housing on the right of the cabinet, then remove the battery module.

NOTE

Removing the battery module is optional in later models because the right air plenum has been removed. However, you can remove the battery module if you need more room.

5. *If the right air plenum is installed (see Figure 7-3):* Remove the screw(s) that attach the air plenum to the right side of the power supply, then remove the air plenum. (Early models have three screws, newer models have one at the bottom in front. The latest models have no right air plenum to remove).
6. *If the left air plenum is attached with a single screw (in later models):* Remove the single screw to the left air plenum, then lift and pull out the left air plenum. (In early models, leave the left air plenum attached to the power supply base.)
7. Remove the nuts and washers that attach the power supply's base to the cabinet. Early models have four, later models have two.

8. Lift the power supply and base above the lower rim of the cabinet and slide the right side partially out of the cabinet to better access the screws and cables on the side. *If it does not lift freely*, you may need to loosen or remove one or more of the lower, outer screws (see Figure 7-3).
9. Starting at the innermost side of the power supply, remove all plugs and cables:
 - a. Unplug the red and black battery-charger cable.
 - b. Pop off the 9-pin molex connector (you may need to use a screwdriver).
 - c. Remove the two nuts and washers from the 5 VDC 5/16 stud terminals. *Label* the cables if they are unlabeled (one large and two small 5V return cables, and one large and one small +5V cable). Slip the cables off the stud terminals.
 - d. Loosen all six screws over the screw terminals. Pull the terminals down as a set (some screws hold down two terminals each). *Label* these wires as you remove them to ensure you can replace them in the same position.
 - e. Loosen the screw terminals to remove the two AC connectors. *Label* the cables if they are unlabeled. On some supplies, you need to remove the AC guard plate (see the discussions on power supplies later in this section).
 - f. Loosen the nut and remove the green-wire ground (GWG).
10. Lift out the power supply and base. Remove the four screws on the bottom of the base to free the power supply.
11. Replace the hardware you removed (nuts, washers, AC guard plate). The power supply should be shipped back to the factory.

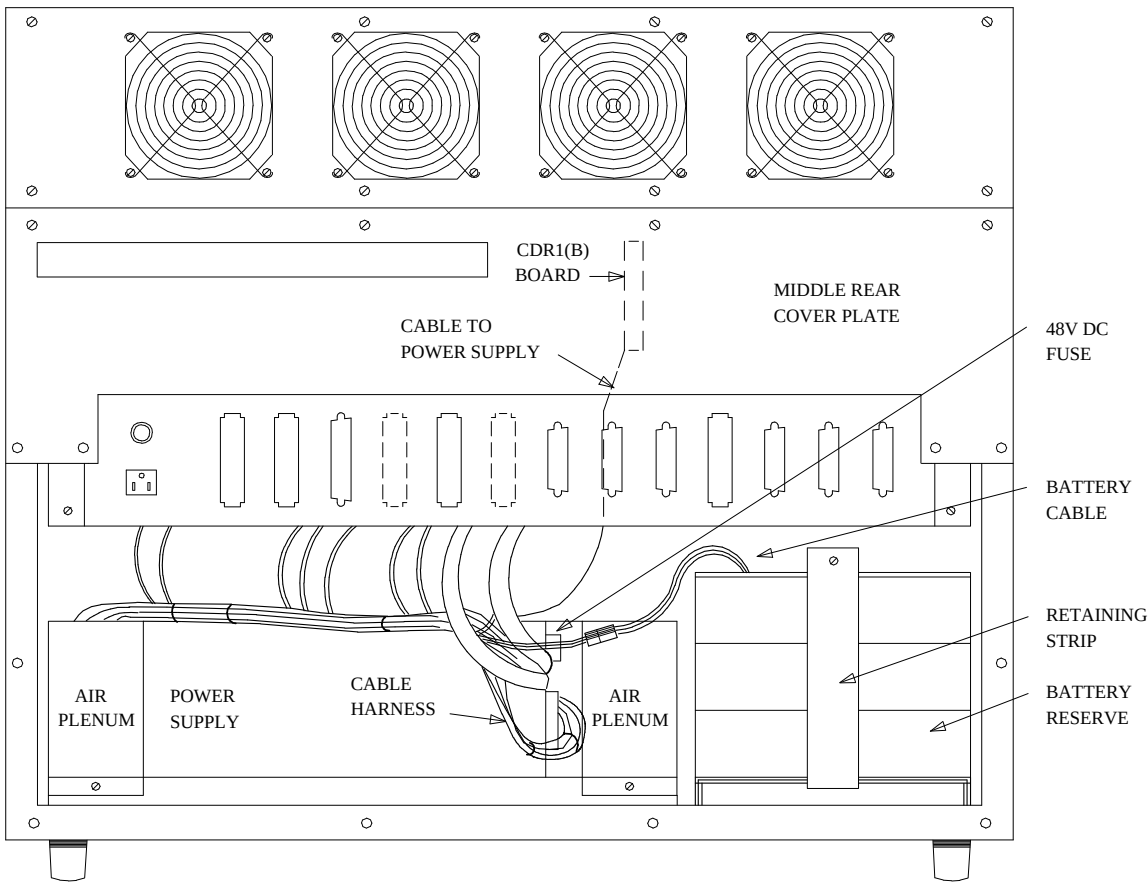


Figure 7-3. Power Supply Replacement (Early Hardware)

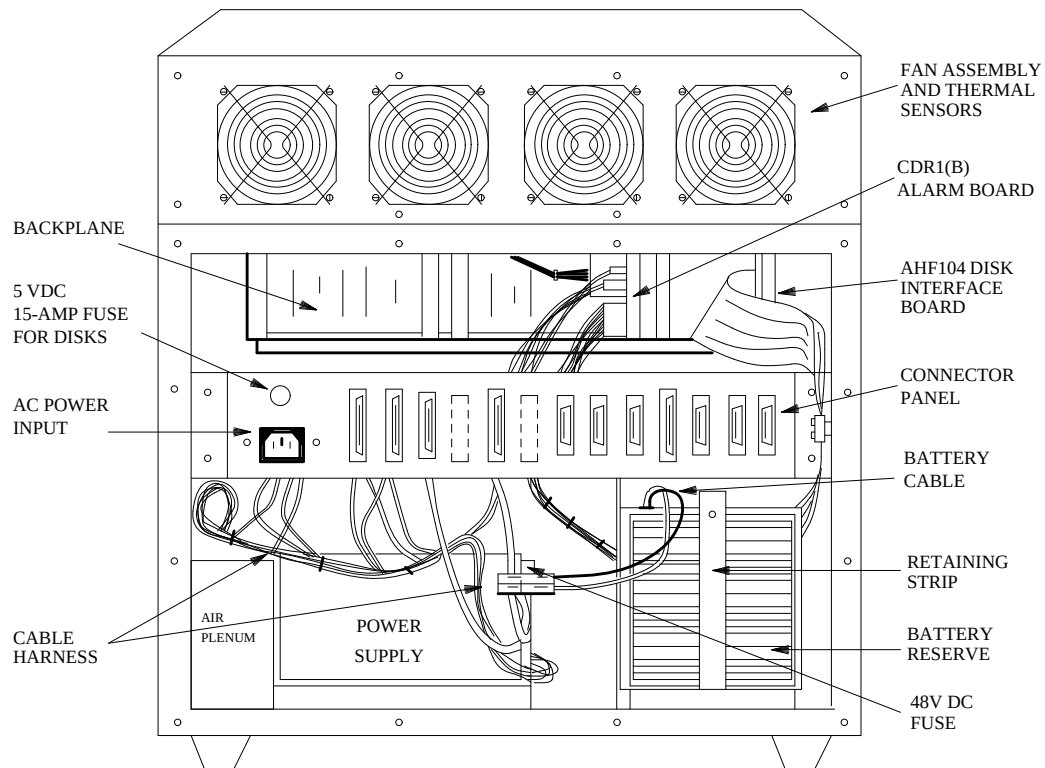


Figure 7-4. Power Supply Replacement (Newer Hardware)

Install the Replacement Module

1. Check the option straps for the correct (115 VAC) voltage (see the next section).
2. Align the holes on the bottom of the replacement module with those in the base you removed. (If you have an early-model AUDIX, the air plenum should be on the opposite side from the terminals.) Reinsert the four screws.

NOTE

Because AUDIX can use more than one type of power supply, the placement of the screws at the bottom of the base and the exact location of the connectors for the cable harness may differ slightly.

3. Slide the replacement module into the cabinet and turn the right side partially outward.
4. Reattach all terminals and connectors in the reverse order that you disconnected them (see step 8 in the previous section).
5. *Before reattaching* the base of the new module to the cabinet, test the new power supply:
 - a. Connect the AC power plug to the rear of the cabinet. Restore power.
 - b. The LEDs on the circuit packs at the front of the cabinet should light and the fans should come on. Consider the power supply good (go to the next step).
 - c. If nothing happens, spin down the RCD, power down, and recheck your connections. Try restoring power. If the power supply still fails to work, call for help.
6. If the power supply seems good when you power it up, you may verify the voltage at the backplane as follows:
 - a. Loosen the screws along the bottom of the middle rear cover panel, then remove the four screws along the top of the panel. Slide the cover upwards to remove it.
 - b. Place probes from a voltmeter across the +5 and GRDD points on the backplane (where the big cables from the power supply connect). Voltage should range from 5.0 to 5.05 VDC.
 - c. If the voltage is off, use a tweak tool to adjust the +5 VDC potentiometers on the power supply. When the voltage is correct, replace the middle rear cover panel.
7. When the power supply works correctly, spin down the RCD, power down the system, and disconnect the AC power cord(s) again.
8. *If you removed the right air plenum*, reattach it (early models have three screws, newer models have one at the bottom in front).
9. Slide the power supply into the cabinet and bolt it down with its (two or four) nuts and washers.
10. *If you removed the left air plenum*, position it beside the power supply and reattach it with its single screw.
11. *If you removed the battery module*, reinstall the battery reserve and reconnect the red and black battery cable.
12. Reattach the back panel and plug in the AC power cord. Restore power.
13. Return to Chapter 3, *Start Troubleshooting* for service verification steps.

Check AC Power Supply Strapping Options

The power supply (ED-1E524-70) is located at the lower left side of the AUDIX cabinet. AUDIX uses more than one vendor for its system-wide power supply. All qualified power supplies must meet the regulated input and output voltages listed in Table 7-3, *AUDIX Power Supply Input and Output Voltages*. They also must meet the following specifications:

- **Alarms:** Report power or battery problems to the system through the CDR1B board.
- **Input:** Accept 120 VAC (nominal), 60-Hz, single-phase from a standard wall outlet. (The 220 VAC option is reserved for future use.)
- **Physical design:** Fit the cabinet dimensions (up to 5 by 8 by 13.5 inches), connect to the internal wiring harness (LCJ58886U-1), and contain an internal DC fan and 48 VDC fuse.
- **Safety:** Meet Underwriter Laboratories (UL) approval.

Table 7-3. AUDIX Power Supply Input and Output Voltages

Input Voltage:	for:	
90 to 132 VAC	Nominal 120 VAC	
180 to 264 VAC	Nominal 220 VAC	
47 to 63 Hz	Frequency variation	
Output Voltage:	Range:	Amperes:
+ 5 VDC	+ 4.85 to + 5.15	100 A
– 5 VDC	– 4.85 to – 5.15	2 A
+ 12 VDC	+ 11 to + 13	15 A
– 48 VDC	– 44 to – 52.5	0.5 A

Check Option Straps

For all power supplies, the factory should set the power to 120 (115) VAC using an option strap before shipping the cabinet. Before inserting a replacement power supply, you should check the new supply to make sure the strap is set for 115 VAC power. On all qualified power supplies, the voltage option straps are metal tabs inserted under screw terminals. Check the straps for the appropriate vendor as described in the following sections.

Computer Products (Unipower) and jETA Option Straps

Both the Computer Products (now Unipower) and jETA power supplies have the same markings and option straps. To check the straps:

1. Remove the black plastic AC guard plate on the power supply.
2. Check that the metal strap links the correct terminals over the barrier strip for 115 VAC power [see Figure 7-5, *jETA Power Supply*, and Figure 7-6, *Computer Products (Unipower) Power Supply*]. If the strap is set up for 230 VAC power, loosen the screw terminals and move the strap to match Figure 7-5.
3. The other two screw terminals are ACN (ac neutral) and ACH (ac hot). These are connected to the local LCJ58886U-1 cable during installation.

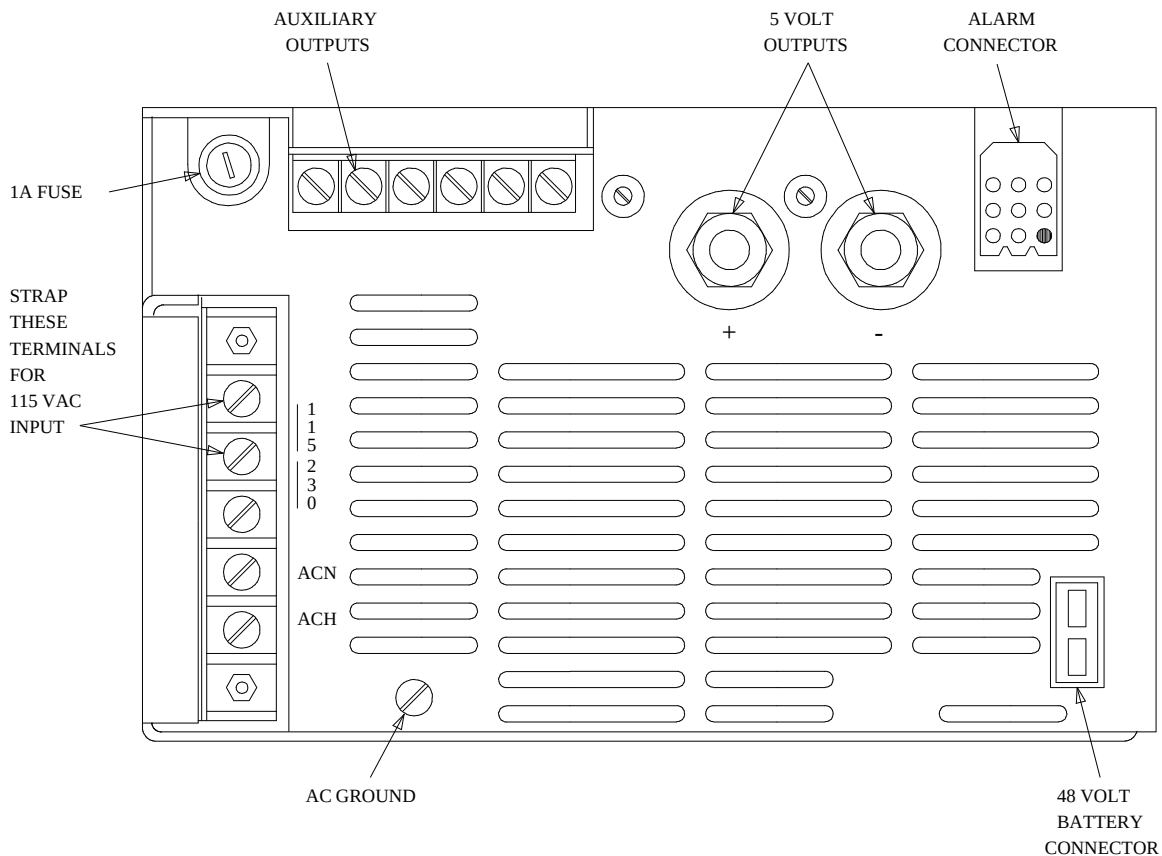


Figure 7-5. jETA Power Supply

Auxiliary outputs are paired from left to right: -48/RTN, -5/RTN, and +12/RTN.

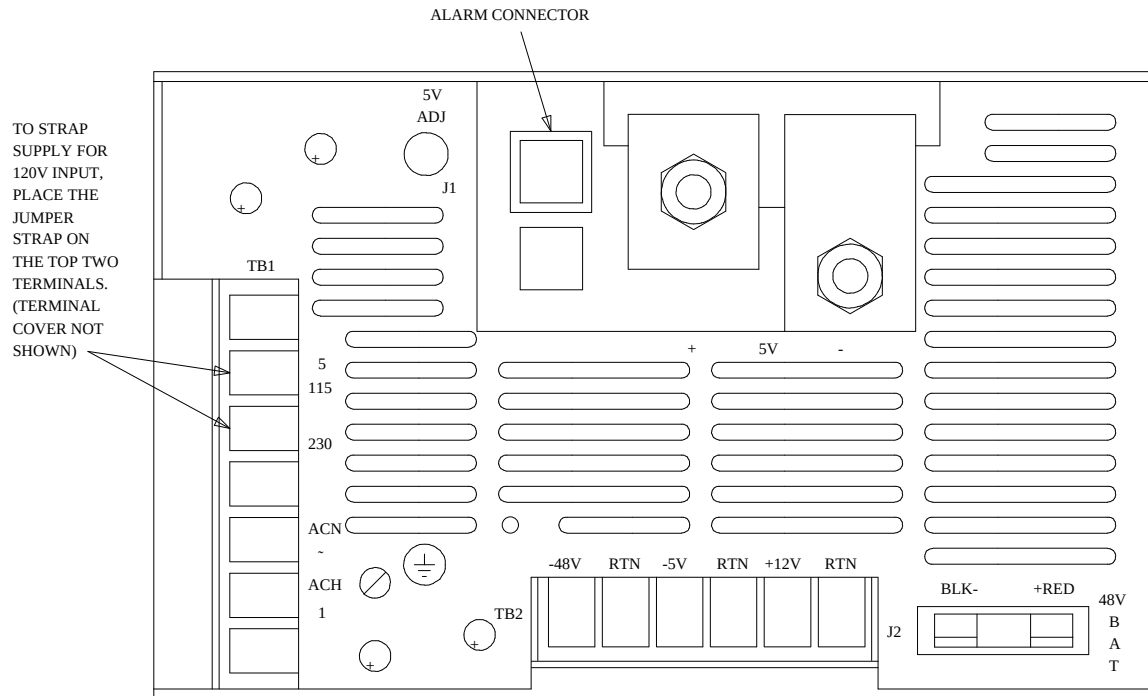


Figure 7-6. Computer Products (Unipower) Power Supply

LH Research Power Supply Option Straps

The LH Research power supply has a different physical setup and markings. To check the straps:

1. Look through the clear AC guard plate. Two metal straps are needed for 115 VAC power (see Figure 7-7, *LH Research Power Supply Strapped for 115V Input*). One strap should link the two leftmost terminals and the other should link the two rightmost terminals around the barrier strips.
2. If the straps are set up for 230 VAC power, remove the AC guard plate, then loosen the 230 VAC screw terminals (both metal straps under the 230 VAC power strap). Connect the straps to the 115 VAC terminals.
3. Two other screw terminals in a different location are AC (N) (AC common or neutral) and AC (L) (AC line or hot). These connect to the local LCJ58886U-1 cable during installation.

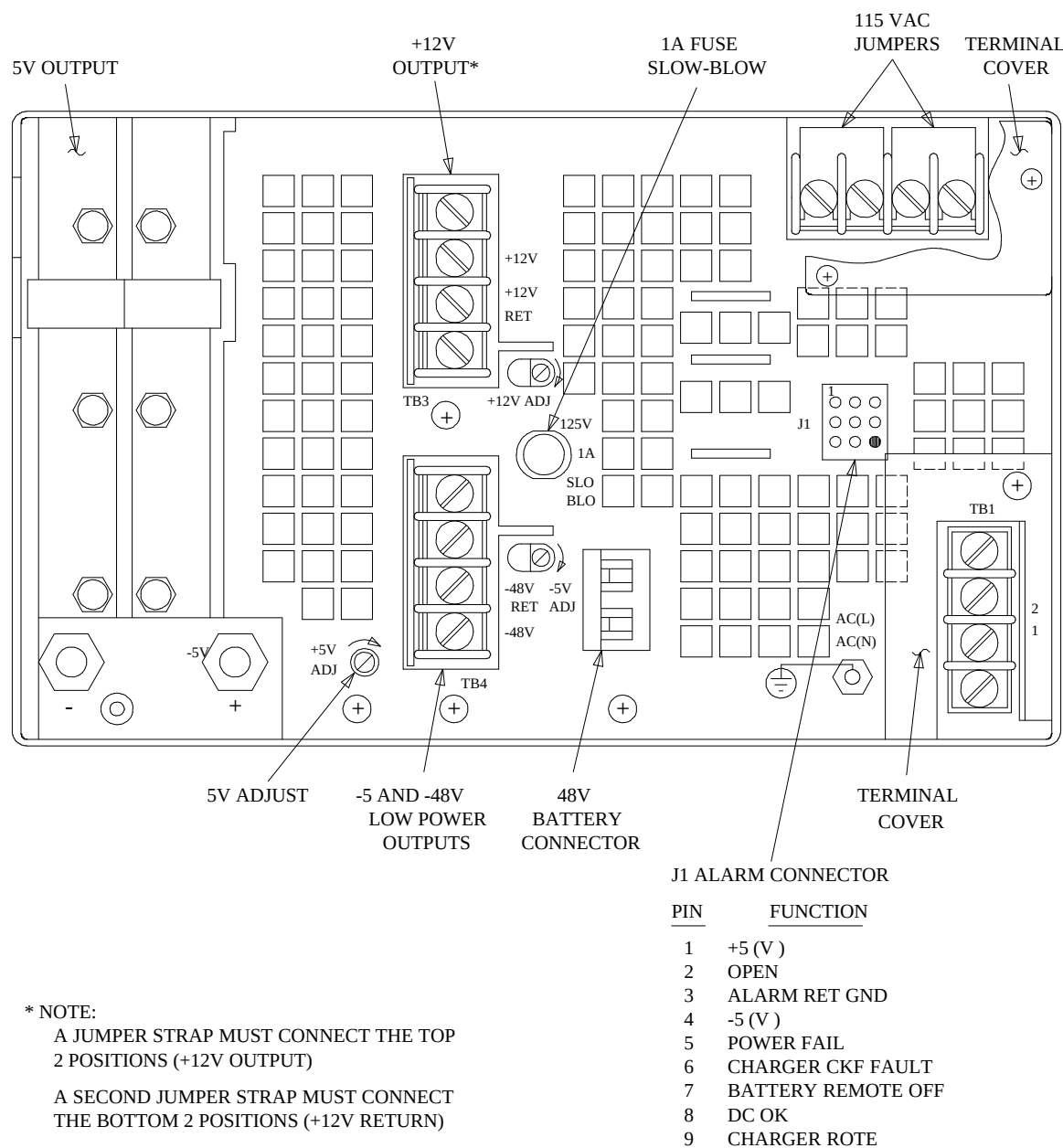
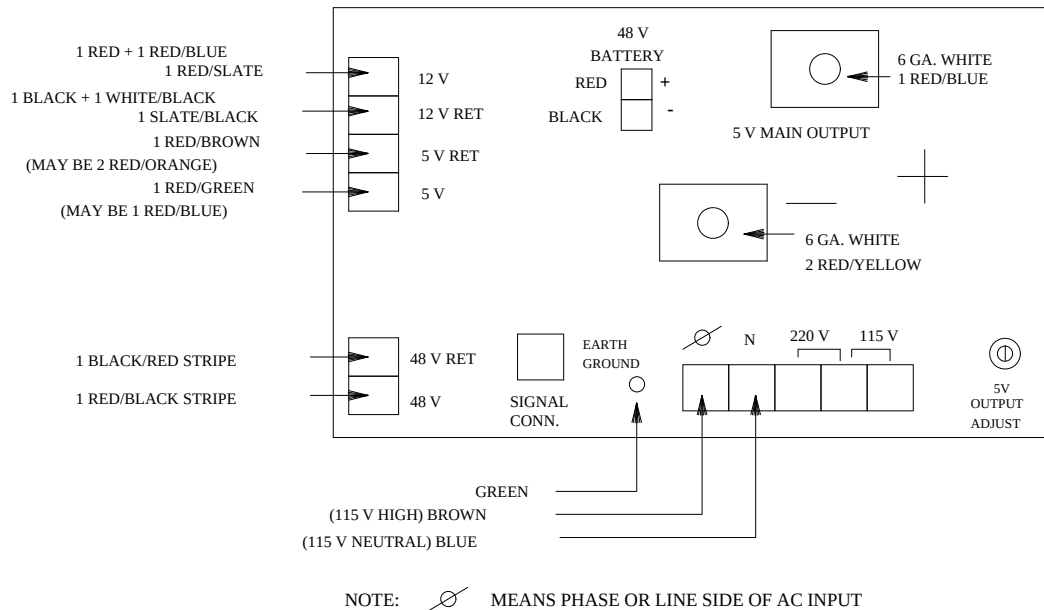


Figure 7-7. LH Research Power Supply Strapped for 115V Input

ITT Power Supply

Figure 7-8, *ITT Power Supply Wiring (Original AUDIX Harness)*, and Figure 7-9, *ITT Power Supply Wiring (Second-Design AUDIX Harness)*, show two different wiring configurations used with an ITT power supply when installed in the AUDIX cabinet. The wire colors shown in Figure 7-8 represent the original AUDIX wiring harness. For AUDIX cabinets with wire colors other than that shown here, refer to Figure 7-9.



JPWR

○	○	○
1	2	3
○	○	○
4	5	6
○	○	○
7	8	9
○	○	○
10	11	12

CONNECTOR JPWR IS WIRED AS FOLLOWS:

PIN 1 = RED PIN 2 = RED/BLUE PIN 3 = RED/SLATE

PIN 4 = BLACK PIN 5 = WHITE/BLACK PIN 6 = SLATE/BLACK

PIN 7 = RED/BROWN PIN 8 = EMPTY PIN 9 = RED/BLACK

PIN 10 = RED/GREEN PIN 11 = EMPTY PIN 12 = BLACK/RED

Figure 7-8. ITT Power Supply Wiring (Original AUDIX Harness)

The wire colors shown in Figure 7-9 represent the second-design AUDIX wiring harness. For AUDIX cabinets with wire colors other than that shown here, refer to Figure 7-8.

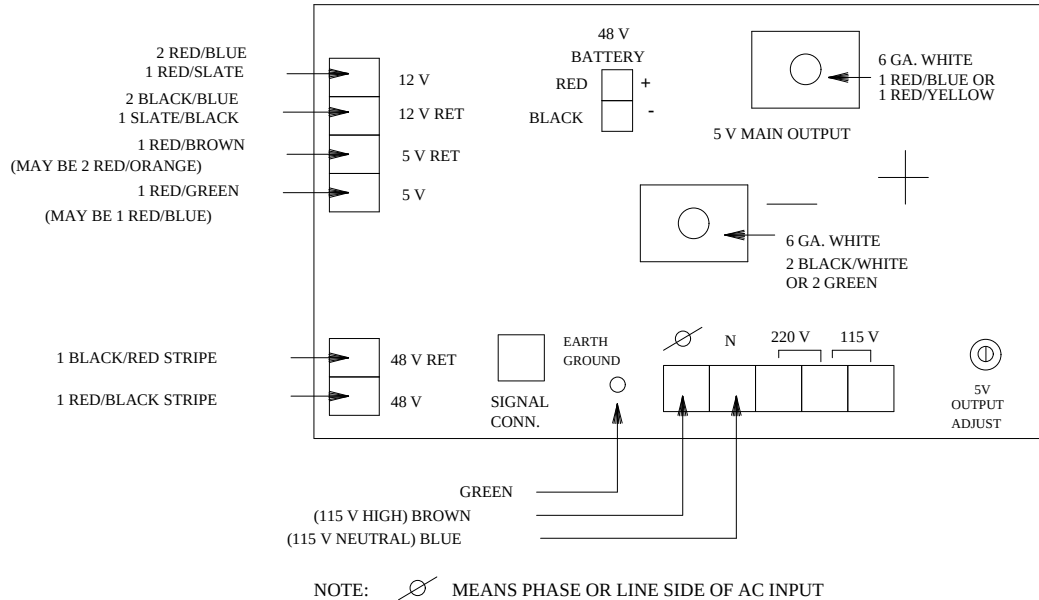


Figure 7-9. ITT Power Supply Wiring (Second-Design AUDIX Harness)

Replace the DC Power Supply

The power supply is a last-choice replacement after checking cables. Comcodes for replacement parts are in Appendix C. Instructions for installing DC power components are in Kit no. D-182236 and repeated in Chapter 9, *Adding New Hardware* for your convenience. Steps 26 through 34 describe the connections to the power supply. *Make sure the system is shut down and powered off at the system and at the DC power plant before servicing the DC power supply.*

8. Terminal Setup and Use

Both local and remote service personnel use a display terminal to access the AUDIX system. There is only one maintenance port on the back of the AUDIX system, so this port must be shared. Before starting any troubleshooting, first make sure that the terminal is connected to this port.

This chapter contains the following information:

- Display Terminal Troubleshooting
- Printer Troubleshooting
- Display Terminal and Printer Setup
- Option Settings
- Terminal Commands and Use

DISPLAY TERMINAL TROUBLESHOOTING

These procedures should isolate the problem to the terminal, the connecting equipment, or the AUDIX MI board (TN511).

Check the Power

1. If the display terminal is not powered up, first plug it into an approved outlet. Most local terminals require a 60-Hz, 120 V AC outlet fed from the same AC load center as AUDIX.
2. Place the terminal's power switch in the ON position. If the AUDIX system and the maintenance terminal are operational, this causes a `login:` prompt to appear.
3. If nothing happens, plug a working appliance (such as a lamp) into the terminal's AC outlet to see if it is working. If the outlet is okay, go to the next section.

Check the Terminal

1. Check the brightness setting. If turned all the way down, the screen appears blank.
2. Make sure the option settings and modes are correct (see *Option Settings*).
3. Press BREAK slowly several times to try to get a response. This should cause the `login:` prompt to appear.

4. If there is still no response, run the terminal self-tests if possible (see *Option Settings* or the appropriate user's manual). If the terminal passes, go to the next section.

Check the MI Connection

1. If you still do not get a prompt and the terminal seems okay, check for a good MI connection by pressing **CTRL-e** on the terminal. (This empties the MI buffer.)
2. If characters appear or a bell sounds, the MI is communicating with the terminal. The missing prompt is probably an AUDIX system problem. Do the following:
 - a. Reinitialize the system (reboot or use the **startup** form).
 - b. Press **BREAK** again. If a **login:** prompt appears, the problem is fixed.
3. If there is no response to the **CTRL-e**, the MI is *not* communicating with the terminal. This is probably a connection problem. Check the physical connections (either to the remote maintenance modem or to the MAINT connector on the AUDIX cabinet) as follows:
 - a. Make sure all necessary cables are present and seated correctly (see *Display Terminal and Printer Setup*).
 - b. For the RMT, check the modem and option settings (see *Display Terminal and Printer Setup* and *Option Settings*).
 - c. Swap any damaged or suspected cables with known good cables.
4. Recheck for a good MI connection by pressing **CTRL-e** again. If characters appear or the bell sounds, the problem is fixed.
5. If there is still no response, the TN511 MI circuit pack may be faulty. A local technician should replace the MI board as described in Chapter 4, *Circuit Pack Faults* then do the following:
 - a. Recheck the MI connection by pressing **CTRL-e** on the LMT. If characters appear or the bell sounds, the problem is fixed.
 - b. If you get no response and cannot solve the problem, escalate the problem using your local procedures.

If *both* local terminals fail to respond, check the CDR1B alarm board's internal cable connections to the rear connector panel. See Chapter 7, *Power and Environment*.

PRINTER TROUBLESHOOTING

1. Check that the printer is correctly set up (see *Display Terminal and Printer Setup* and *Option Settings*).

NOTE

A printer connected to a 610 BCT or 615 MT must be optioned for the same speed as the 610/615.

2. Turn the printer off and back on. Try to print again. If the printer still fails to work, check that all cables are seated in the connectors and that the terminal is correctly set up.
3. If these steps do not fix the printer, refer to the printer's user manual.

DISPLAY TERMINAL AND PRINTER SETUP

The AUDIX MAINT connector (H00) is used to connect both the Local Maintenance Terminal (LMT) and the Remote Maintenance Terminal (RMT). One of these connections must always be in place as described in this section.

LMT and RMT Cabling

The local and remote maintenance terminals are required for every AUDIX system. Both terminals share the MAINT connector, so only one maintenance connection can be active at a time. The connection may run at 1200 bps (remotely) or 4800 bps (locally).

AUDIX works with any of the 513-family terminals, including the 715 Business Communications System (BCS), the 615 Multi-tasking Terminal (MT), or the 610 Business Communications Terminal (BCT). Other equivalent terminals include the TELETYPE 5420 terminal or the AT&T 4415, 4425, or a 6300-type Personal Computer such as the PC 6300 (+) using a 513 emulator software package.

Cabling for the LMT, RMT, and printer are covered in this section. For details on the possible different configurations, see the AUDIX installation manual or AUDIX system description manual.

NOTE

Each terminal has its own configuration and installation requirements. Always obtain and read the correct documentation for the type of terminal you are using. Option settings for several different models are provided here.

LMT Cabling

The Local Maintenance Terminal (LMT) should be installed in the equipment room within sight of the AUDIX front panels. The LMT is cabled directly (hard-wired) to the AUDIX maintenance port (MAINT H00); this connection should run at 4800 bps. A local terminal installation requires an ED-1E434-11 Group 311 (RS-232C compatible) and an H600-258 Group 1 (AUDIX null modem) cable, shipped with the basic AUDIX system.

Figure 8-1, *Local Maintenance Terminal Setup*, shows the standard LMT connection. If you use another setup for this terminal connection, see *Option Settings*.

NOTE	The AUDIX null-modem (H600-258 Group 1) cable is a special crossover cable (more than just the transmit and receive leads are crossed). You <i>cannot</i> use this cable in place of any other standard null-modem cable.

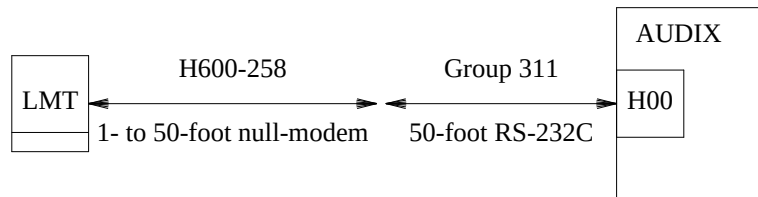


Figure 8-1. Local Maintenance Terminal Setup

Local Printer Cabling

A parallel or serial printer (6417, 475/572, or equivalent) may be attached to the Local Administration Terminal (LAT) so the AUDIX system administrator can print out traffic reports, subscriber data, and system configuration information. If possible, connect the LAT to the H00 connector for use as an LMT.

RMT Cabling

The Remote Maintenance Terminal (RMT) connection should always be in place except when the LMT is being used. It connects AUDIX to a remote maintenance site. Normally, an analog modem (data set) transmits signals to the AUDIX maintenance port at 1200 bps. Analog signals require only 1-pair wiring and can be used with any switch. Because a modem uses an RS-232C interface, it should be located within the recommended limit of 50 cable feet from the AUDIX port.

A 2212, 212AR, 4000, or equivalent modem and an RS-232C compatible cable connect the terminal to AUDIX locally (this cable is shipped with the basic AUDIX system). The modem must be plugged into a 120 V AC power outlet and attached to the switch with a D8W-87 modular wall cord plugged into a 104A wall jack.

For example, if a 2212 modem is used, a 4-pair wall cord plugs into the modem's modular LINE connector to attach it to the building wiring or cross-connect field. Another modem and the RMT are at the far end of the connection. Figure 8-2, *Remote Maintenance Cabling*, shows the local cabling for the RMT connection.

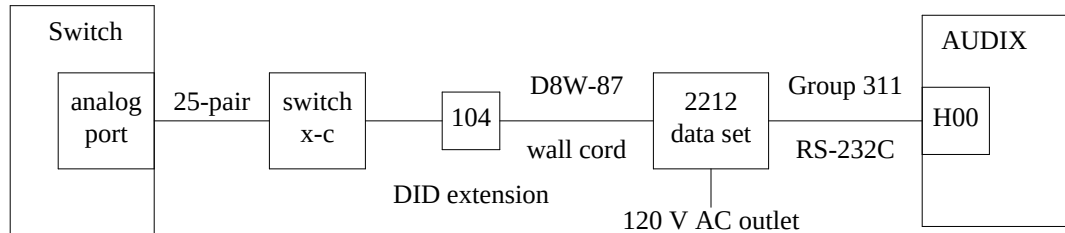


Figure 8-2. Remote Maintenance Cabling

OPTION SETTINGS

This section contains option settings for terminals, printers, and modems. It also contains alternative modem arrangements.

Display Terminal Option Settings

AUDIX software can automatically load the correct option settings and program the soft (screen-labeled) keys for TELETYPE 5420 and 513 BCT-type displays, such as the 715 BCS, 615 MT, or 610 BCT. If desired, other compatible terminals may be substituted, but they often require more complicated keyboard commands, additional option settings, or other customization.

The following option settings apply to the 715 BCS, 615 MT, 610 BCT, 513 or 515 BCT, TELETYPE 5420, AT&T 4425, or other compatible terminals.

1. Access the terminal's options menu as described by the user's manual for that terminal.
 - a. On a 715 BCS, 615 MT, or 610 BCT, press **CTRL** **Set-Up**.
 - b. On a 513-type BCT, press **SHIFT** **LCL MENU**, then press the **terminal setup** screen-labeled key (f1).
 - c. On a TELETYPE or AT&T terminal, press **SHIFT** **SET-UP**.

Make sure the following options are set.

On all terminals:	On some terminals:	On a 610/615 BCT:
Speed = 4800	Duplex = full	Autowrap = on
Send Parity = even	Clock = asynch	(other personal functions)
Check Parity = no	Transmission = char	
Return Key = CR		
Newline on LF = no		

"Enter" Key = ec[2a where "ec" is **ESCAPE**. The ENTER key is programmed automatically for the terminals listed in *Terminal Commands and Use*.

2. Save the option settings. On most AT&T terminals, press **SAVE ALL** (f6) to exit the menu. On a 610/615 BCT, press **SAVE**, then **CTRL** **Set-Up** again. On a 715 BCS, return to the Setup Menu and press **SAVE**.

NOTE

You cannot do the next two steps on all terminals (such as the 610/615 BCT). Check your user's manual for appropriate tests.

3. Run terminal tests. See the appropriate user's manual if the tests fail.
 - a. On most terminals, press **SHIFT** **LCL MENU**. On a 513-type BCT, also press **tests** (f6).
 - b. Next, press the **TERMINAL TEST** screen-labeled key. A beep means it passes.
 - c. Finally, press **KEYBOARD TEST**. A beep means it passes.

NOTE

For the 715 BCS, see the *715 BCS User's Guide and Service Manual* (999-300-765) for terminal and keyboard tests.

4. Check terminal and transmission modes.
 - a. On most terminals, press **SHIFT** **MODES**.
 - b. Next, press each relevant function key to set the following modes. An asterisk (*) in the field means the mode is *on*:

Character Mode = ON (CHAR MODE *)
 Remote Mode = ON (LOCAL MODE) or (REMOTE MODE *)
 Others = OFF (no *'s required).

NOTE

You may set certain options such as XON/XOFF (DC1DC3 *) or timing without hurting AUDIX operation.

5. To return to the original screen-labeled keys on most terminals, press **SHIFT** **SYS PF** or **SHIFT** **USER PF**. On a 610/615 BCT, press **CTRL** **Sys Fkey** or **CTRL** **User Fkey**. On a 715 BCS, press **CTRL** **Sysm** or **CTRL** **User**.

NOTE

If you are missing some AUDIX function keys on your compatible terminal (such as ENTER on a 6300-type AT&T PC), you should also recode your Programmed Function (PF) keys with the appropriate AUDIX function if possible (see Table 8-2, *USER PF Key Setup*).

Modem Option Settings

A modem (data set) is the most common type of remote connection used for the RMT. An AT&T 2212, 212AR, 4000, or equivalent modem such as the Paradyne DM224 modem is recommended for the remote maintenance link. Always obtain the correct document for the type of data device you are using for complete information. For modem installation or for remote troubleshooting, check the following option settings:

1200 bps = ON	internal timing = ON
asynchronous transmission = ON	local echo = ON
automatic answer = ON	loss-of-carrier or space disconnect = ON
data transparency = ON	10-bit character length = ON

See Figure 8-2, *Remote Maintenance Cabling*, for details on installation (including cable connections) and an illustration.

2212 and 2212C Modems

The 2212 modem needs to have one soft option adjusted before it can be attached to AUDIX. A display terminal must be connected to the modem:

1. At the terminal, press **CTRL** **f1** simultaneously. Set baud rate to 1200. Set parity to even. Set RETURN key to CR/LF. Press **SAVE ALL**. Press **CTRL** **f1** to clear the screen.
2. Disconnect the modem from the AC outlet. Then temporarily disconnect the 2212 from the H00 port and connect the Group 311 cable to the terminal.
3. Press **RETURN** a couple times or until **dialer waiting** is displayed.
4. Press **o** (or **O**) and **RETURN**.
5. Enter **data transparency=y** and press **RETURN**.

6. Reconnect the modem to the AUDIX H00 port. Reconnect the modem to the AC outlet. Reconnect and reoption the terminal as it was.

If you are using a 2212C modem, use the same procedure as mentioned above to set the soft options. Then before you reconnect power to the modem, set the four dip switches inside the unit (component side) to dip1 - closed (rocker pressed down towards the number), dip2 - open, dip3 - open, and dip4 - closed.

Paradyne DM224 Option Settings

- Step 1: Connect a 1200 bps terminal to the back of the modem.
- Step 2: Type **at** and press . You should get an OK response.
- Step 3: Type **at s0=1 \n3 q1 &w** and press . You should get an OK response.
- Step 4: Set dip switch number 1 to ON (up).
- Step 5: Disconnect the terminal and connect the modem to the RMT cabling.

2224G Option Settings

Set the options for the 2224 modem as follows:

- Step 1: Locate the switches on the modem faceplate. Set Switches 1 and 6 to the UP position (1200 baud).
- Step 2: Connect an RS-232 cable to the modem and to the INPUT connector on the back of a display terminal.
- Step 3: Set the terminal to 1200 bps, even parity and Return Key to "CR".
The 2224's PASS lamp should be on after power up. Press a few times until **dialer waiting** is displayed.
- Step 4: Press and . Options S1 through S4 and options 1 through 11 should be displayed. Parity should be set to even. Press again. Options 12 through 26 should be displayed.
- Step 5: If necessary, enter **set parity=even** (for even parity).
Enter **o34=3**.
Enter **o36=1**.
- Step 6: Disconnect the terminal from the 2224 modem and return the terminal options to their original values. Connect the RS-232 cable to H00 (MAINT) on the back of the AUDIX.

Other Data Setups

Some installations may have other data devices connecting their terminals to AUDIX. Some possible setups are discussed in this section.

Asynchronous Data Unit (ADU)

The Asynchronous Data Unit (ADU) is used to extend the distance between RS-232C devices or between a device and the switch. The ADU always requires an external AC power transformer when it is attached to one of the AUDIX 25-pin ports (H00 or H01). The transformer may be located in an equipment closet or plugged into an outlet near the AUDIX cabinet. ADU setups include:

- *Hard-Wired:* Two ADUs may be used back-to-back to extend the distance to the terminal. A D8AM-87 crossover cord must be between them. No option settings are needed.
- *Switched Access:* If ADUs are connected through an AT&T digital PBX, the switch port boards must be set up for AUDIX and terminal operation. See *SN238 EIA Port Application Notes*, 555-103-522 for System 85 and Generic 2 option settings. On System 75, Generic 1, or Generic 3, options may be set on the TN726 Data Line board or through a user options menu accessed by pressing `BACKSPACE` or `CTRL-h` after getting a `DIAL :` prompt on the screen.

See the AUDIX system description manual for details on ADU setups with AUDIX. The AUDIX installation manual shows cabling connections. See *Asynchronous Data Unit (Z3A) User Manual*, 555-401-701 for complete information on ADUs.

Other Data Devices

Other devices for connecting terminals include a pair of modems (analog switched access), LADS (hard-wired access), or MPDMs (digital switched access). See the AUDIX installation manual for option settings, cable connections, and switch requirements.

- *Analog modems* may be used on any switch (see the previous section).
- *LADS* may be used for extended local applications.
- *MPDMs* may be used for digital switched access on System 75, System 85, or DEFINITY Communications Systems.

Printer Option Settings

A printer should be attached to the Local Administration Terminal (LAT) for record keeping. A variety of printers may be used as long as they are compatible with the display terminal. See *AUDIX Installation* (585-305-105) or the documentation shipped with the printer to set the printer options.

The 6417 25-pin dot-matrix parallel printer is shipped with many new AUDIX systems. To check the option settings:

1. On a 715 BCS terminal, press **CTRL** **Setup** to access the Setup Menu, then access the User Preferences submenu and enable the printer port.
2. Access the Printer Options submenu and change the Print Terminator to FF (Form Feed after print file is complete) and set the Printer Type to BCS.

Many AUDIX systems use a 475 or 572 dot-matrix printer that has an RS-232C serial interface and prints 120 characters per second (cps). On most compatible terminals, set the following options for a 475/572 or equivalent printer:

1. Access the terminal's options menu as described by the user's manual for that terminal.
 - On a 513-type BCT, press **SHIFT** **LCL MENU**, then press **terminal setup**.
 - On a compatible TELETYPE or AT&T terminal, press **SHIFT** **SET-UP**.
 - On a 715 BCS, press **CTRL** **Setup** to access the Setup Menu, then select the Printer Options submenu.

Make sure the following options are set:

Speed = 1200

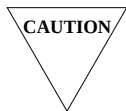
Printer Model = 470 (for a 475 or 572 printer also)

For a 715: Set the Printer Type/Driver field to 475 or 572/573

Flow Control = DC1DC3 (XON/XOFF)

Alarm = pin 20 (or none).

2. Save the option settings.
 - On most terminals, press the **SAVE ALL** screen-labeled key to exit the menu.
 - On a 715 BCS, return to the Setup Menu and press **SAVE**.



To set printer options on a 610/615 BCT, you need to manually set the printer's option switches to 1200 bps. See the appropriate user's manual. Common reference manuals are listed in Appendix C, *Equipment and References*.

TERMINAL COMMANDS AND USE

This section covers terminal operation procedures including logging on and off, using the printer, accessing and using forms, using keyboard keys and commands, and programming function keys.

Logging On and Off

Once the terminal is correctly set up as described in the previous sections, remote or local maintenance personnel access the AUDIX screen forms as described in this section.

Logging On

Use the following procedure to log on to AUDIX:

1. The terminal should be powered on and connected to the AUDIX MAINT connector as described in *Display Terminal and Printer Setup*.
2. If this is the first time you are using this terminal to access AUDIX, verify that the option settings are correct (see *Option Settings*).
3. *For Remote Personnel:* Dial the number of the AUDIX site using a modem as follows:
 - a. Make sure the modem is set up correctly.
 - b. Press **BREAK** to select 1200 bps. A **login:** prompt should appear.
 - c. Dial the number of the remote AUDIX site and press return.
4. *For Local Personnel:* Press **BREAK** to change the baud rate between 4800 bps and 1200 bps as needed.

NOTE

On a PC 6300, **CTRL** can also be used to toggle the baud rate.

5. If AUDIX software is running, the terminal screen should display a **login:** prompt.

If the prompt does not appear, press **BREAK** slowly a couple of times. If you can't get a response, go back to *Display Terminal Troubleshooting*.

Type in your login code and press **RETURN** (not ENTER). The four default system logins are *craft*, *cust*, *inads*, and *ap*. Service personnel should use *craft*.

NOTE

If you make a typing error, use **BACKSPACE** or **CTRL-h**.

6. After you press **RETURN**, the system should display a **password:** prompt.

Type in your password (usually **craft**) and press **RETURN**. The system automatically blacks out the password so it cannot be read off the screen.

NOTE

Call your local Field Support Organization (FSO) for the latest craft password to log in to AUDIX.

7. After you press **RETURN**, the system should display a **terminal type:** prompt.

Type in terminal type **513** (for any 715 BCS, 615 MT, 610 BCT, or 513 BCT or equivalent) or **5420** (for any TELETYPE or AT&T equivalent terminal) and press **RETURN**.

8. The AUDIX STATUS and PATH lines should appear at the top of the display screen. You can now access any administration or maintenance form.

NOTE

If the login information is not correct, the AUDIX screen-labeled keys will not appear. Log off (press **CTRL-d**) and try the login procedure again.

Logging Off

From any form on any type of terminal, press **CTRL-d** to log off. The system responds:

logged off. good-bye.

You may also turn the terminal off to drop a connection. AUDIX software has a built-in time-out for idle sessions. If you do not enter any characters for 1 hour, the session is automatically logged off. To extend the session, press any key.

Using the Printer

To use an attached printer, see the printer's user manual. For any 513-type BCT (such as the 610 BCT or 615 MT with the 513 emulation cartridge) or equivalent terminal:

1. When the data you wish to print is on the terminal screen:
 - a. On a 715, 615, or 610, press **CTRL** **Print**.
 - b. On a 513-type BCT, press **SHIFT** **LCL PRT**.
 - c. On a TELETYPE or AT&T terminal, press **SHIFT** **PRINT**.
2. Press the appropriate screen-labeled key such as **PRINT SCREEN**, **PRINT LINE**, or **STOP PRINT**. Do *not* use **LOG TEXT** on BCTs.

3. To return to the original screen-labeled keys, press **SHIFT** **SYS PF** or **SHIFT** **USER PF**. On a 610 or 615, press **CTRL** **Sys Fkey** or **CTRL** **User Fkey**. On a 715 BCS, press **CTRL** **Sysm** or **CTRL** **User**.

Displaying Screen Forms

Screen forms are only available when the system is in the normal (in-service) mode. Certain forms may be used in the administrative shutdown mode, a subset of normal mode [see the AUDIX forms reference manual for details]. Some forms simply display information (read-only) while others allow you to add or change information. For the latter, use the screen-labeled function keys (shown at the bottom of the form) to do the desired action. Figure 8-3, *The list : volume names Form*, shows a sample screen form (list : volume names) and the regular AUDIX screen-labeled function keys.

Forms are displayed by supplying the correct name on the PATH line. Path names are divided into *segments* (subdirectories) which identify the form and its location to software. This software arrangement is called a *parse tree*, where the different segments are *branches* of the tree.

AUDIX STATUS: alarms: none, logins: 1, thresholds: none

PATH: list : volume names

controller	device	name	free space/size (blocks)
0	0	disk00	3054/8651
0	1	backup	172/1020
0	2	disk02	1132/8651

Error and confirmation messages appear here.

CHANGE or RUN	ADD	DELETE	HELP	FIELD HELP	CLEAR FORM	EXIT	ENTER

Figure 8-3. The list : volume names Form

The STATUS Line

When the MI and software are working, a STATUS line appears at the top of the display terminal screen. The STATUS line shows alarms (warning, minor, major, administrative, or none), logins (two terminals may be logged in at one time), and threshold violations (if any) as follows:

- **alarms:** This field shows *none* for no alarms or *w* (warning), *m* (minor), *M* (major), or *A* (administration) according to the severity of the alarm. Go to Chapter 3, *Start Troubleshooting* if any alarms are reported.
- **logins:** This field shows the number of display terminals logged on to the system. Up to two logins are possible at any given time. If you notice another login in progress, always contact that person (usually the system administrator) to make sure your actions do not conflict (two people cannot access the same form simultaneously).
- **thresholds:** This field shows filesystem disk space violations. For any status other than *none*, call the Technical Service Center (TSC) for software troubleshooting.

The PATH Line

The PATH line appears below the STATUS line on the display screen. This line is the input field that allows you to select the maintenance or administration form you wish to display. You may use either **ENTER** or **RETURN** after typing in each segment of the form you wish to access. If you press **HELP**, a list of choices for the next segment appears. See Table 8-1, *Terminal Commands*, for additional commands and information.

The Message Line

The blank line just above the AUDIX screen-labeled function keys is the error/confirmation message display line. When you access or try to run an AUDIX form, a message appears here informing you of problems, progress, or success. These messages are listed and explained in *AUDIX Release 1 Version 7 Forms Reference* (585-305-208).

Screen-Labeled Keys

The eight reverse-video boxes at the bottom of the screen are the AUDIX function keys. They are called *screen-labeled* keys because the AUDIX software programs these keys when you log in to AUDIX. In some cases you need to set up these keys yourself (see *Programming Function Keys* at the end of this section). AUDIX function keys include:

1. **CHANGE or RUN:** This key executes a form or processes new data after you have made changes or requested a test to run.
2. **ADD:** This key adds a subscriber, filesystem, or other entity to the system.
3. **DELETE:** This key removes a subscriber, filesystem, or other entity from the system.

4. **HELP:** This key displays on-line information about the form currently on the screen, including its display-only fields. If you are on the PATH line, it shows you the next possible entries from your current position. It is equivalent to the HELP key on the keyboard (if present) or the CTRL-key commands listed in Table 8-1.
5. **FIELD HELP:** This key displays on-line information about a specific data-entry (modifiable) field on a currently displayed form. The cursor marks the field to be described.
6. **CLEAR FORM:** This key is used to blank all fields without leaving the form.
7. **EXIT:** This key is used to leave a form or back up on the PATH line. It is equivalent to EXIT on the keyboard (if present) or the CTRL-x command.
8. **ENTER:** This key is used to display information on a form. It is equivalent to on the keyboard (if present) or the CTRL-key commands listed in Table 8-1.

On-Line Help

The on-line help facility gives a terminal user a summary of commands, forms, or field options at the touch of a key. All AUDIX administration and maintenance forms offer three levels of on-line help to supplement written documentation:

<i>PATH Line Help</i>	Whenever your cursor is on the PATH (command) line of the terminal screen, you can use the help feature to find out the next possible segments (parts) of a form name. You can activate the help feature by pressing HELP or by using a CTRL-key sequence (see Table 8-1). The help feature lists all legal command options available to you at that point in the path. After typing a valid segment (or its unique abbreviation) and pressing ENTER , you can again request help for the next segment.
<i>Form Help</i>	Whenever a form is displayed on the screen, use HELP (or equivalent) to show a summary of the form's purpose, valid commands (such as CHANGE or ENTER), and other pertinent information. The display-only fields for that form (if any) are also listed in the form help summary.
<i>Field Help</i>	Whenever the cursor is on a data-entry (modifiable) field in a form, use FIELD HELP to show a brief description of that field and list valid options you may enter. Because the cursor cannot rest on a display-only field, these fields are described under the form help.

PATH Line and Terminal Commands

Table 8-1 shows commands which may be used on the PATH line or in an AUDIX form. These commands may be given through the programmable function (screen-labeled) keys discussed previously, or by using the following *keyboard-labeled* keys that are physically present on the keyboard. The CTRL (control) characters are often used on non-BCT terminals. Hold down the CTRL key, then press the other key linked with a hyphen (“?”, “d”, etc.) to do the function.

Table 8-1. Terminal Commands

Function	610/615 or 513 BCT Family	54xx- or 44xx- Type Terminal	PC 6300 or 715 BCS
Back up cursor over the last character typed	BACKSPACE	CTRL-h	Backspace
End entry of one segment (part) of a form name or its unique abbreviation	ENTER *	ENTER * †	ENTER * (on PC) RETURN (on 715)
Show the next possible segment entries for your current position	HELP *	CTRL-?	CTRL- <u> </u>
Move cursor to the next enterable data field	NEXT or TAB	TAB	TAB
Move cursor to the last previous enterable data field	PREV or SHIFT-TAB	SHIFT-TAB	SHIFT-TAB
Exit the form or back up one (more) segment in the command path	EXIT * or CTRL-x	CTRL-x	CTRL-x
Exit the form and clear the entire PATH line	SHIFT-EXIT or CTRL-z	CTRL-z	CTRL-z
Log off from any point in a form or on the PATH line	CTRL-d	CTRL-d	CTRL-d
Note 1. The PC 6300 (or equivalent) must be running a 513 emulation package. * These keys also appear on the screen-labeled function keys. † For some terminals, you may need to use the codes in Table 8-2.			

Accessing and Using Forms

This section discusses how to move into and out of forms, move within a screen form, and run (execute) a form. Key sequences that may be programmed on User PF keys are shown in Table 8-2, *USER PF Key Setup*.

Accessing a Form

To show a form, enter each segment individually on the PATH line as follows:

1. Type each segment name (or a unique abbreviation) individually (press the space bar or **RETURN** between segments). Colons (:) are automatically inserted by software. For example, the maintenance : dbp : equip form can be entered as:

m SPACE *db* SPACE *e* RETURN

NOTE

RETURN works the same as **ENTER** on the PATH line, but *not* in the form.

If you choose an abbreviation that is not unique, the system displays an error message.

2. To display the menu of segment(s), press **HELP**, **CTRL-?**, or **CTRL-_**.

Moving in a Form

To move around the different fields in a form, use the following keys:

1. **NEXT** or **TAB**: Moves the cursor to the next data field that you are allowed to change (you cannot type on display-only fields)
2. **PREV** or **SHIFT** + **TAB**: Moves the cursor to the previous enterable data field
3. **→**: Moves the cursor right one field or down one line
4. **←**: Moves the cursor left one field or up one line

Changing Data Fields

For fields that allow data input, type in the desired characters using the appropriate keys on your terminal. For example:

1. To erase any information already in the field, you may use the space bar, **CLEAR LINE**, **DEL LINE**, **DEL CHAR**, or **DEL WORD** if available.
2. To add new information, you may need to use **INS CHAR** or **INS LINE** if available. The **←** and **→** keys may also be used.

3. To clear all information from the form and place the cursor at the top of the form, press `CLEAR FORM`.
4. To find out what to type for a specific field, move your cursor to the field and press `FIELD HELP`.

Using the Form

The use of a form depends on its function. Some forms or fields are read-only (you can only display information). Others allow you to type in new data or run an operation.

1. To execute a form, use `CHANGE or RUN`, `ADD`, or `DELETE`. The correct key to press for your operation should be noted on the screen. See AUDIX forms reference manual for details on running forms.
2. To display information on a form, use `ENTER`. For example, you may need to type a volume or filesystem name, then press `ENTER` to see additional information about it.
3. To display information on a read-only form, simply type the form's path name. After a pause, the form and its information appear.

Exiting the Form or Path

You may back up the PATH line out of the form partially or all at once.

1. To back up one segment, press `EXIT` or `CTRL-x`. The screen shows the PATH line with one less segment.
2. To clear the entire PATH line and exit the form, press `SHIFT` `EXIT` or `CTRL-z`. The PATH line will be blank.

Logging Off

To log off of AUDIX, press `CTRL-d` at any point (in a form or on the PATH line).

Programming Function Keys

The BCT-family of terminals including the 513, 610, and 615 MT have **EXIT**, **HELP**, and **ENTER** on their keyboards. On a 715 BCS, TELETYPE 5420 terminal, AT&T 4425-type terminal, or 6300-type PC, you must press two keys simultaneously as shown in Table 8-1.

To use a single button for these 2-key functions, you may code these functions on the User Programmable Function (USER PF or User Fkey) keys as shown in Table 8-2. Once programmed, the corresponding screen-labeled key acts like the appropriate keyboard-labeled (physical) key on a BCT terminal. To access the User PF keys, press **SHIFT** **SET-UP** twice on most terminals. On a 610 BCT or 615 MT, press **CTRL** **Set-Up**, then **NEXT SET-UP**. On a 715 BCS, press **CTRL** **User**. To program the keys, access the User Function Key Setup submenu under the Setup Menu (**CTRL** **Setup**).

AUDIX software automatically programs the System Programmable Function (SYS PF or Sys Fkey) keys for many compatible terminals with the screen-labeled AUDIX function keys described in this section. See the sample form in Figure 8-3. These terminals include:

- TELETYPE 5420 and 5410 terminals
- AT&T 4415, 4420, and 4425 terminals
- 513-type terminals including the 515 BCT, 715 BCS, and the 610 BCT or 615 MT with a 513 emulation cartridge

As an option, you may recode some (or all) of these AUDIX functions on your User PF key menu. You can then run all your chosen screen-labeled key options with one button push, without switching between the User PF and System PF menus. For example, if you already have **EXIT** on your keyboard, you may wish to recode the EXIT screen-labeled function key with another function you *do not* have. However, it is recommended that you use the first five entries in this table (F1 to F5) to match the normal AUDIX system screen-labeled keys.

Table 8-2. USER PF Key Setup

Function Key	Key Label	R1V2 to R1V4 Coding Sequence *	R1V5 and Later Coding Sequence *
F1	CHANGE or RUN	EcOc	EcOc
F2	ADD	EcOd	EcOd
F3	DELETE	EcOe	EcOe
F4	HELP	EcOf	EcOf
F5	FIELD HELP	EcOb	EcOg
F6 (V2)	CLEAR PATH	CTRL-z or Ec[P (DEL CHAR) †	EcOh
F6 (V3)	CLEAR FORM	CTRL-g	
F7	EXIT	CTRL-f or CTRL-x ‡	EcOi
F8	ENTER	CTRL-b or Ec[2a ‡	EcOj
* Ec = ESC (escape) key. † AUDIX downloads this as a blank key (CTRL-a) in R1V2, but you can make it whatever function you wish. Two examples are shown (the delete character function is recommended for a PC 6300). ‡ The two coding options shown for F7 and F8 act the same.			

9. Adding New Hardware

This chapter covers adding voice port boards, swapping a new TN500 Time Division Bus Interface (TDBI) for the early TN477 TDBI-8, and converting a one-cabinet AUDIX system into a two-cabinet AUDIX system. Also, be sure to follow any specific instructions that come with the hardware device.

NOTE

If you plan to add hardware to an existing AUDIX system, or if you need to convert a one-cabinet AUDIX system into a two-cabinet system, contact the AUDIX Upgrade Control Center (AUCC) at 1-800-248-1234.

This chapter is organized as follows:

- Switch Prerequisites
- Adding TN501B Circuit Packs Only
- Adding TN501B, TN747B, and TN500 Circuit Packs
- Adding An AUDIX Expansion Cabinet
- Adding DC Power

NOTE

To add new disk drives, see Chapter 6, *Disk Drives*. To add circuit packs other than the ones mentioned, see Chapter 4, *Circuit Pack Faults*.

SWITCH PREREQUISITES

Before installing any new TN501B circuit packs, the switch must have spare analog port circuits. These circuits must be patched through to the AUDIX cross-connect field, and switch administration must be in place.

Contact the switch administrator to have these additions made as required. Switch requirements and cabling from AUDIX to the switch are described in *AUDIX Installation* (585-305-105). Switch translations are described in the *Switch Administration Guide for AUDIX Voice Messaging* (585-305-505).

It is recommended that all the switch translations be entered and in place with the exception of the addition of the AUDIX extensions in the AUDIX UCD/ACD hunt group; these will be added later.

NOTE

When a new TN747B is required at AUDIX, a new 25-pair cable must be installed from the corresponding AUDIX D0x connector to the AUDIX cross-connect.

ADDING TN501B CIRCUIT PACKS ONLY

These steps are for adding new TN501B circuit packs in the slots associated with an existing TN747B. If the existing TN747B has no empty TN501B slots, a new TN747B is required and you must follow the steps in *Adding TN501B, TN747B, and TN500 Circuit Packs*.

NOTE

You do *not* have to shut down and power down the AUDIX system for the following steps.

1. Insert the TN501B(s) in the next available VPC slot(s). The slot has a corresponding VPC board number (e.g., VPC-1). This board number is used in step 7.

Note the red LED on the TN501B's faceplate. It should be lit momentarily and then go dark. If it does not go dark, the pack is bad. Remove it and get a replacement. If the LED goes dark, continue with step 2.

2. At the Local Maintenance Terminal (LMT), log in using the craft login and password. Enter the terminal type.
3. At the path line, enter **m vsp eq** and press **ENTER** (F8).

Tab to the VPC fields that correspond to the TN501B(s) that was inserted in step 1. Press **DELETE CHAR**. This changes the UEQ to EQ. You could also type over the UEQ by entering **eq** (followed by the space bar). When all new VPCs are equipped, press **CHANGE or RUN** (F1).

When **operation confirmed** appears on the message line, press **EXIT** (F7) three times to exit this form (or press **CTRL-z** once).

4. At the path line, enter **sy tr v** and press **ENTER** (F8).

Tab to the first unassigned field (should correspond to the new TN501B). Enter the switch extension assigned to this AUDIX voice port. Check the cross-connect field and the switch translations, if necessary. If this is not done correctly, the new ports won't work.

Repeat for each new AUDIX voice port. Once the extensions are entered in the correct fields, press **CHANGE or RUN** (F1).

When **operation confirmed** appears, press **EXIT** (F7) three times to exit.

5. You need a telephone close to the LMT for this step. At the path line, enter **m sy test** and press **ENTER** (F8).

Tab to **port number** and enter the port number for the first new port added. Then tab to **type** and enter **c**. Before you press the F1 key, go to the phone and dial the extension assigned to this port.

When you hear ringing, then press **CHANGE or RUN** (F1) at the LMT. Wait for **operation confirmed**. The message **allocated** should appear under **status** on the LMT. At the phone you should hear AUDIX answer. If AUDIX does not answer, proceed to step 6. (*Do not hang up the phone.*)

If AUDIX answers, press ***** **H** on the phone's keypad and verify that the voiced messages can be heard clearly.

Hang up the phone. At the LMT, set **type** to **d** and press **CHANGE or RUN** (F1). When **operation confirmed** appears, press **CLEAR FORM** (F6) to clear the form. Repeat this process for each newly added port and extension. When finished, press **EXIT** (F7) two times. See step 7.

6. If you hear ringing and no answer on the phone, note the state of the amber light on the TN747B associated with new VPC. Is it lit or dark? You can now hang up the phone. At the LMT, set **type** to **d** and press **CHANGE or RUN** (F1) to disconnect. If the light was lit, go to item (b). If the amber light was dark, go to item (a).

- a. Press **EXIT** (F7) two times. At the end of the path line, enter **vsp busy** and press **ENTER** (F8). Tab to **type** and enter **vpt**. Press **CHANGE or RUN** (F1). If **b** is displayed in the field(s) corresponding to the ports just added, then a restart of AUDIX is required to release these ports. Press **EXIT** (F7) three times to clear the path line.

Inform the customer that you need to take the AUDIX out of service for a short period of time.

At the path line, enter **startup**. Press **ENTER** (F8). Then press

CHANGE or RUN (F1) as instructed on the form. Shortly initialization messages start scrolling on the screen, indicating that the AUDIX is restarting. Wait for several **login:** prompts to appear. Wait for **start service** to appear. Then log in at the next login prompt. Go back to step 5 to retest the port(s).

- b. The cross-connections are suspect at this point. Recheck and verify that these are correct. Once verified, go back to step 5.

7. At the path line, enter **vpc test**. Press **ENTER** (F8).

Tab to **board** and enter the VPC number associated with the new TN501B.

Tab to **repetitions** and enter **3**. Tab to **long version** and enter **n**. Tab to **start** and enter **x**. Press **CHANGE or RUN** (F1).

When **operation confirmed** appears, check the status of the test by clearing the **start** field (press the space bar), tab to **status**, enter **x**, and press **CHANGE or RUN** (F1). All fields should pass.

NOTE

The NPE crosstalk result is displayed only when **long version = y**.

If the test takes longer than a few seconds, you can monitor the progress of the test by repeatedly pressing **CHANGE or RUN** (F1). When all three repetitions have passed, press **CLEAR FORM** (F6) to clear the form. Repeat this test for each VPC added.

When finished, press **EXIT** (F7) three times.

8. The extensions assigned to the new AUDIX voice ports can now be added to the UCD/ACD hunt group. Have the system administrator perform this step.
9. After the extensions are added to the hunt group, enter **m au fp** on the LMT path line. Press **ENTER** (F8).

Tab to **Service Dispatcher** and enter **x**. Tab to **start** and enter **x**. Press **CHANGE or RUN** (F1). This audit generally takes only a few seconds.

When **operation confirmed** appears on the message line, tab to **start**, press space bar, tab to **status**, enter **x**, and press **CHANGE or RUN** (F1).

The demand status field should display **completed**. This test should result in the AUDIX ports being staffed in and ready to take calls.

Press **EXIT** (F7) three times to exit this form.

10. At the path line, enter **fi up** and press **ENTER** (F8). At the **update boot filesystem to:** field, enter the name of the backup boot filesystem (this is generally disk00.boot_e or disk02.boot_e). Press **CHANGE or RUN** (F1). When **operation confirmed** appears on the message line, exit the form by pressing **EXIT** (F7) twice. Then press **CTRL-d** to log off.

ADDING TN501B, TN747B, AND TN500 CIRCUIT PACKS

Once the switch has been cabled and translated as described in *Adding TN501B Circuit Packs Only*, the following instructions should be followed. *Inform the customer that you need to take the AUDIX out of service for a short period of time.*

1. Log in to the LMT with your craft login. At the path line, enter **sy fi** and press **ENTER** (F8). Record the location and name of the active boot filesystem (e.g., disk00.boot_f). Press **EXIT** (F7) twice.

If slot 16 of the AUDIX cabinet is already equipped with a TN500, then go to step 2. If a TN477 is in this slot, its ports must be busied, the board must be unequipped, and the board must be replaced with the TN500. Start with item (a).

- a. At the path line, enter **m vsp bu** and press **ENTER** (F8). Set type to **tdbi**. Press **CHANGE or RUN** (F1).

All ports associated with this TDBI should have a status of **r**. Tab to each of these fields and overwrite each **r** with a **b**. Press **CHANGE or RUN** (F1). The message **operation confirmed** should be displayed.

Press **EXIT** (F7) once to exit this form.

- b. At the end of the path line, enter **eq** and press **ENTER** (F8). Tab to **vb/tdbi**, overwrite the EQ with UEQ (first field is for the main cabinet, second field is for the expansion cabinet), and press **CHANGE or RUN** (F1).

When **operation confirmed** appears on the message line, press **EXIT** (F7) three times to exit the form and proceed to step 2.

2. At the path line, enter **st** and press **ENTER** (F8). Press **CHANGE or RUN** (F1).

When FP RESET appears on the screen, press **CTRL-c**. The Control Mode menu appears on the screen.

3. Follow the instructions on the AUDIX cabinet to power down the system.

4. Once the power has been turned off, remove the TN477 (if there) and insert the TN500.

Insert the additional VPT and VPC(s) in their assigned slots.

Install the new 25-pair cable and patch it to the newly assigned analog ports at the switch.

5. Power up the system.
6. At the LMT, respond to the initialization questions as follows:

Standard Initialization? n <CR>
 Perform extended test of RAM? n <CR>
 Standard boot filesystem? n <CR>

(The next responses depend on where the boot filesystem is located. This was recorded in step 1. Here we are using *disk02.boot_f* as an example.)

Boot Disk Controller number? 0 <CR>
 Boot disk number? 2 <CR>
 Boot filesystem boot_? f <CR>
 Initialization stop point desired? n <CR>

Several messages, including several login prompts, scroll across the screen. Wait for the login preceded by **start service**.

7. Log in with your craft login.
8. Check the new boards for any lit red LEDs. If there are none, go to step 9. If there is one or more lit, the board(s) must be busied and/or unequipped and replaced:

- a. If the TN500 is bad, busy out its ports and unequipped the board as outlined in step 1. Then unequip the new TN747B and TN501B boards.

If the TN500 is good, but the TN747B and/or TN501B is bad, just unequip the bad board(s).

- b. Shut down the AUDIX system and power down as outlined in steps 2, 3, and 4. Then remove all the unequipped boards. If the TN500 is bad, reinstall the TN477.
- c. Power up the system as in steps 4 and 5. When **start service** is displayed, log in with your craft login. Re-equip the TN477 and make sure its ports are released.

Make a call to the AUDIX main number to verify service. Once new packs have been received, start over with step 1.

9. Wait a few minutes. Then at the path line enter **m vsp eq** and press **ENTER** (F8). Tab to each field corresponding to the board(s) that you have added and press **DELETE CHAR** (or enter **eq** followed by the space bar).

Press **CHANGE or RUN** (F1). Wait for **operation confirmed**. Press **EXIT** (F7) three times to exit.

10. At the path line, enter **sy tr v** and press **ENTER** (F8).

Tab to the first unassigned field (should correspond to the new TN501B). Enter the switch extension assigned to this AUDIX voice port. Check the cross-connect field and the switch translations, if necessary. If this is not done correctly, the new ports won't work.

Repeat for each new AUDIX voice port. Once the extensions are entered in the correct fields, press **CHANGE or RUN** (F1).

When **operation confirmed** appears, press **EXIT** (F7) three times to exit.

11. You need a phone close to the LMT for this step. At the path line, enter **m sy test** and press **ENTER** (F8).

Tab to **port number** and enter the port number for the first new port added. Then tab to **type** and enter **c**. Before you press the F1 key, go to the phone and dial the extension assigned to this port. When you hear ringing, press **CHANGE or RUN** (F1) at the LMT. Wait for **operation confirmed**. The message **allocated** should appear under **status** on the LMT. At the phone you should hear AUDIX answer. If AUDIX does not answer, proceed to step 12. (**Do not hang up the phone.**)

If AUDIX answers, press ***** **H** on the phone's keypad and verify that the voiced messages can be heard clearly.

Hang up the phone. At the LMT, set **type** to **d** and press **CHANGE or RUN** (F1). When **operation confirmed** appears, press **CLEAR FORM** (F6) to clear the form. Repeat this process for each newly added port and extension. When finished, press **EXIT** (F7) two times. Go to step 13.

12. If you hear ringing and no answer on the phone, note the state of the amber light on the TN747B associated with new VPC. Is it lit or dark? You can now hang up the phone. At the LMT, set **type** to **d** and press **CHANGE or RUN** (F1) to disconnect. If the light was lit, go to item (b). If the amber light was dark, go to item (a).
 - a. Press **EXIT** (F7) two times. At the end of the path line, enter **vsp busy** and press **ENTER** (F8). Tab to **type** and enter **vpt**. Press **CHANGE or RUN** (F1). If **b** is displayed in the field(s) corresponding to the ports just added, then a restart of AUDIX is required to release these ports. Press **EXIT** (F7) three times to clear the path line.

At the path line, enter **startup**. Press **ENTER** (F8). Then press **CHANGE or RUN** (F1) as instructed on the form. Shortly initialization messages start scrolling on the screen, indicating that AUDIX is restarting. Wait for several **login:** prompts to appear. Wait for **start service** to appear. Then log in at the next login prompt. Go back to step 11 to retest the port(s).
 - b. The cross-connections are suspect at this point. Recheck and verify that these are correct. Once verified, go back to step 11.

13. At the path line, enter **vpc test**. Press **ENTER** (F8).

Tab to **board** and enter the VPC number associated with the new TN501B.

Set **repetitions** to **3**. Set **long version** to **n**. Set **start** to **x**. Press **CHANGE or RUN** (F1).

When **operation confirmed** appears, tab to **start**, press the space bar, tab to **status**, enter **x**, and press **CHANGE or RUN** (F1). All fields should pass. The NPE crosstalk result is displayed only when **long version = y**.

If the test takes longer than a few seconds, you can monitor the progress of the test by repeatedly pressing **CHANGE or RUN** (F1). When all three repetitions have passed, press **CLEAR FORM** (F6) to clear the form. Repeat this test for each VPC added. When finished, press **EXIT** (F7) two times.

14. At the path line, enter **m vpt test** and press **ENTER** (F8).

At the **board** field, enter the VPT number associated with the new TN747B. Tab to **repetitions** and enter **3**. Tab to **long version** and enter **n**. Tab to **start** and enter **x**. Press **CHANGE or RUN** (F1).

When **operation confirmed** appears on the message line, check the status of the test (see step 13 above). The dial tone test only tests those ports that have extensions assigned in the **system : translation : voice port** form. Repeat this test for each VPT added. When finished, press **EXIT** (F7) three times. Continue with step 15.

15. If you changed a TN477 with a TN500, you need to test this board. If not, proceed to step 16.

At the path line, enter **m tdbi test** and press **ENTER** (F8). At the **board** field, enter the TDBI number associated with the new TN500. Tab to **repetitions** and enter **3**. Tab to **long version** and enter **n**. Tab to **start** and enter **x**. Press **CHANGE or RUN** (F1).

When **operation confirmed** appears on the message line, check the status of the test (see step 13 above). After successfully testing the TDBI, press **EXIT** (F7) three times. Continue with step 16.

16. The extensions assigned to the new AUDIX voice ports can now be added to the UCD/ACD hunt group. Have the system administrator perform this step.

17. After the extensions are added to the hunt group, enter **m au fp** on the LMT path line. Press **ENTER** (F8).

Tab to **Service Dispatcher** and enter **x**. Tab to **start** and enter **x**. Press **CHANGE or RUN** (F1). This audit generally takes only a few seconds.

When **operation confirmed** appears on the message line, check the status.

The demand status field should display **completed**. This test should result in the AUDIX ports being staffed in and ready to take calls.

Press **EXIT** (F7) three times to exit this form.

18. At the path line, enter **fi up** and press **ENTER** (F8). At the **update boot filesystem to:** field, enter the name of the backup boot filesystem (this is generally **disk00.boot_e** or **disk02.boot_e**).

Press **CHANGE or RUN** (F1). When **operation confirmed** appears on the message line, exit the form by pressing **EXIT** (F7) twice. Then press **CTRL-d** to log off.

ADDING AN AUDIX EXPANSION CABINET

This section describes the steps required to add an expansion cabinet to a one-cabinet AUDIX system.

NOTE

Call the Technical Service Center (TSC) prior to beginning the addition of the expansion cabinet. They will schedule a time to have someone on hand to guide you through the installation process and through any troubleshooting that may be required. The TSC may be contacted at 1-800-248-1234.

Required Tools

The following is a list of tools you will need add an expansion cabinet to a one-cabinet AUDIX system:

- Two 5/16-inch box wrenches or a 5/16-inch socket, used to loosen the bottom cabinet bus bar ground lug
- A hammer, used to remove the bottom cabinet knockout
- A chisel or large screwdriver, also used to remove the knockout
- A flashlight, needed to install backplane circuit boards
- One or two screwdrivers, used to remove and install the various screws on the cabinet

NOTE

If you need to install the floor anchors and front cabinet plate (required for earthquake zones), see *Floor Mounting* in this section for required tools and equipment needed to install the additional hardware.

Inventory of Parts

Before interrupting service of the currently active system, make sure you have addressed the following:

1. *The switch.* The switch must be upgraded with additional analog ports and extension numbers for assignment to the new AUDIX voice ports.
2. *The expansion cabinet.* This cabinet should have the following hardware:
 - a. All circuit packs shown in Table 2-4 for the upper cabinet *except* the TN727 NC. This board will be moved from the bottom cabinet to the expansion cabinet during this procedure.
 - b. The TN540 in slot 02. This board will be moved to the bottom cabinet before the system is powered up.

- c. The backplane boards shown in Table 9-1, *Backplane Boards*, for the expansion (upper) cabinet. You have to remove the rear covers to check for these boards.
 - d. The expansion cabinet power cord. This should be shipped in the slot above the circuit packs at the front of the machine.
3. *The bottom cabinet.* This cabinet should have the following:
- The backplane circuit boards for the bottom cabinet (these ship in a separate package from the expansion cabinet):
 - The AHF107 S-Bus expansion board
 - The AHF108 S-Bus terminator board
 - The AHF109 TD-Bus expansion board.
 - New power down instructions (yellow label) for the front of the cabinet
 - New carrier label
 - If the existing AUDIX system does not have the following circuit packs, they should have been shipped for the two-cabinet conversion:
 - A TN475B in slot 01 (comcode 105 474 118) (Vintage 5 or greater)
 - A TN472C in slot 04 (comcode 105 474 126)
 - A UN160B in slot 06 (comcode 105 319 818)
 - A TN716B in slot 13 (comcode 105 442 412)
 - A TN500 in slot 16 (comcode 103 281 085).
4. The intercabinet cables used to connect the two cabinets (see Table 9-2, *Intercabinet Cables*). These ship either with the expansion cabinet or in a separate package.
5. Additional hardware (shipped in a package separate from the expansion cabinet):
- The rectangular chimney (ductwork) needed to route the intercabinet cables from the expansion cabinet to the base cabinet (comcode 845 952 902)
 - The cabinet connector clip that goes between the two cabinets, connecting them in front (comcode 845 798 123)

NOTE

If this AUDIX is located in an earthquake zone, a front cabinet plate may replace the connector clip. Four bolts will also be included for mounting to the floor. This equipment may require that you do some drilling in the bottom cabinet and the floor. If this is the case, *Floor Mounting* shows where to drill holes in the AUDIX system.

- The rear bracket that physically connects the two cabinets (comcode 846 242 840)
- One or two ED-1E434-11, Group 300 voice port cables

Table 9-1. Backplane Boards

Upper (Expansion) Cabinet				
Circuit Board	Acronym	Slot L1/L2, L4*	Field Designation L1/L2, L4*	Quantity
AHF109	TDBUS-EXP	00	AB5	1
AHF104	SADI-I/O	01	AB0	1
AHF107	SBUS-EXP	06	AB2	1
CDR1B	ALARM-BD	07	AB3	1
AHF108	SBUS-TERM	17	AB4	1
AHF1†	TDBUS-TERM	28	AB6	1
Lower (Base) Cabinet				
AHF109	TDBUS-EXP	28/00	AB6/AB5	1
AHF104	SADI-I/O	01	AB0	1
AHF102	VME-TERM	05	AB1	1
AHF108	SBUS-TERM	06	AB2	1
CDR1B	ALARM-BD	07	AB3	1
AHF107	SBUS-EXP	17	AB4	1
AHF1†	TDBUS-TERM	18/28	AB5/AB6	1

* The bottom (base) cabinet may be a PWJ58886U1, L1 or a PWJ58886U1, L2 or L4.
The list (L1 versus L2 or L4) determines the location of the AHF109 and the AHF1.

† The AHF1 may be replaced by a WP91602, List 1.

Table 9-2. Intercabinet Cables

Cable	Conductors	Connects	Quantity
SADI-I/O (1E434-11 Grp. 186)	50	AHF104 in base cabinet to all disks in the system (daisy chain).	1
CDR1B/Alarms (1E434-11 Grp. 185)	14	Upper and base cabinet CDR1B alarm boards.	1
TD-Bus Expansion (1E434-11 Grp. 187)	40	AHF109 to AHF109, extending the TD-Bus to the expansion cabinet.	1
S-Bus Expansion (1E434-11 Grp. 329)	60 each cable	AHF107 to AHF107, extending the S-Bus to the expansion cabinet.	2
S-Bus Signal Ground (H600-140 Grp.403)	Stranded #10 wire	AHF107 to AHF107 ground lugs of the two cabinets. A 5-foot black cable.	1
S-Bus Ground (H600-140 Grp. 404)	Stranded #10 wire	Bottom cabinet AHF107 board ground to the ground on the bus bar. An 8-inch green cable.	1

Two-Cabinet Conversion Procedures

If you are converting a one-cabinet AUDIX system to a two-cabinet system and you are *not* upgrading the software (for example, if you are converting a one-cabinet R1V7 system to a two-cabinet R1V7 system), do the steps in this section.

NOTE

If you are converting a one-cabinet AUDIX system to a two-cabinet system and you are also upgrading the software (for example, if you are upgrading an R1V2 or later system to R1V7 software), skip this section. You will upgrade the software following the hardware conversion using the steps in the *AUDIX Upgrade Instructions* (585-302-108).

Before doing the hardware conversion, you must first copy the backup boot filesystem from the generic program cartridge shipped with the expansion cabinet and delete the existing backup filesystem as follows:

1. Unequip the RCD using the `maintenance : dbp : unequip` form.
2. Remove the RCD cartridge currently in the drive and replace it with the 50-Mbyte generic program cartridge (or cartridge 1 of 2 for a system with a 20-Mbyte RCD) that was shipped with the expansion cabinet.
3. Re-equip the drive using the `maintenance : dbp : equip` form.
4. Verify the location of the current one-cabinet backup (boot_e) filesystem using the `filesystem : list` form.

5. Display the `filesystem : detail` form. Enter the `boot_e` filesystem in `volume.filesystem` format (for example, **disk02.boot_e**). Enter **boot** in the type field. Press `(ENTER)`.
6. The system should fill in the rest of the fields on the form. When all of the data is displayed, press `(DELETE)`. This removes the old one-cabinet `boot_e` filesystem.
7. Display the `list : volume names` form and make a note of the volume name of the RCD cartridge.
8. Display the `filesystem : copy` form. Copy the `boot_e` filesystem from the generic cartridge to `disk00` (the destination filesystem should be **disk00.boot_e**).
9. Display the `system : filesystems` form. Record or print the contents of the form.
10. Finally, display the `filesystem : update configuration` form and update `disk00.boot_e`. This copies the current system configuration information to the new backup boot filesystem.

Assemble the System

This section includes steps for preparing the bottom cabinet, stacking the expansion cabinet, inserting the intercabinet chimney, and preparing the two backplanes.

NOTE

Before removing the AUDIX from service, make sure that you have all required cabling and hardware to do the conversion. If any part is missing, order it now and wait for it to arrive before continuing.

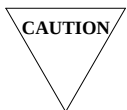
1. Shut down the AUDIX system and turn the power OFF. Remove the AC power cord from the connector panel.
2. If floor mounting hardware is shipped with the system for earthquake mounting, go to *Floor Mounting* for installation instructions. Once you have prepared the cabinet for the earthquake mounting, return here to continue the assembly.
3. Remove the front cover of each cabinet.
4. *If a TN532 DBP-RAM board is installed*, remove it from slot 02 of the base cabinet and replace it with the TN540 DBP-RAM board shipped in slot 02 of the expansion cabinet. Return the TN532 to your local MLO or MMS, per your local procedures.
5. Remove the TN727 NC from slot 14 of the bottom cabinet and place it in slot 14 of the expansion cabinet.
6. Remove the two rear panels of each cabinet. One panel is the slotted screen covering the power supply/battery area. The other is the solid panel directly above the connector panel.
7. On the bottom cabinet, remove the knockout at the top rear of the cabinet. You need a hammer and chisel or screwdriver to remove the knockout. There is a second knockout, located on the bottom of the fan assembly directly below the first, that must also be removed.



Be sure to wear eye protection when removing the knockouts. Metal chips could fly off during removal.

8. Position the bottom cabinet *exactly* where the system should stand when the expansion cabinet is added. The two-cabinet system cannot be moved once the two cabinets are stacked.
9. Stack the expansion cabinet on the existing cabinet. Two people are required to stack the cabinets. Center the cabinets. Do not try to line up the knockouts. The chimney is angled slightly to compensate for this.
10. Remove the battery pack assembly from the expansion cabinet. See Chapter 7, *Power and Environment* for details.
11. The chimney should angle toward the back of the cabinet when inserted. Squeeze the chimney together and slide it through the holes in the two cabinets. It expands to fit tightly when completely inserted. You may have to adjust the expansion cabinet slightly to make the chimney fit.
12. Exchange the following backplane boards in the bottom cabinet (all of the new backplane boards are shipped in a package separate from the expansion cabinet):
 - a. *For List 1 backplanes:* Remove the AHF1 TD-Bus terminator board on slot 28, field AB6. Place the AHF109, TD-Bus expansion board on this slot.
 - b. *For List 2 or List 4 backplanes:* Remove the AHF1 TD-Bus terminator board on slot 00, field AB5. Replace it with the AHF109, TD-Bus expansion board.
 - c. Remove the ZAHF8 S-Bus terminator board on slot 17, field AB4. Put the AHF107, S-Bus expansion board in this slot.
 - d. Remove the ZAHF8 S-Bus terminator board on slot 06, field AB2. Replace it with the AHF108, S-Bus terminator board.
13. Connect the green H600-140 Group 404 S-Bus ground cable to the bus bar. Use the two 5/16 inch box wrenches (or a 5/16 inch socket) to remove the bolt on the ground bar. If you use a crescent wrench it may slip and bend backplane pins.

When the cable is connected to the bus bar, connect the other end to the inside ground lug on the AHF107 board on slot 17. It may be easier to remove the AHF107 before attaching the cable. But be sure to identify the board's location so that it is reinstalled correctly.



While the bus bar bolt needs to be tight once the cable is on, applying too much pressure can break off the terminal. Be careful!

Intercabinet Cabling

This section gives detailed steps on how to route and connect the intercabinet cables required to extend the system buses. Follow the instructions and use the diagram given for each cable in the order they appear. Figure 9-4, *Intercabinet Cabling (List 2 or List 4 Backplanes)*, (at the end of this section) shows the backplane boards and cables for a system with a List 2 or List 4 backplane in the bottom cabinet.

Wait until all the cables are installed before dressing them down. Leave enough slack so that the battery pack(s) can be reinstalled easily.

Routing Cables Through the Chimney

Group the following cable ends so that they can be routed down through the chimney:

- Two ends of the ED-1E434-11 Group 186, disk drive (SADI) cable (usually blue). If this cable is not already attached to the expansion cabinet's disk drives, attach it now.
- One end of the ED-1E434-11 Group 185, alarm cable (gray w/ red stripe)
- One end of each ED-1E434-11 Group 329, S-Bus signaling cable (two cables, rainbow color)
- One end of the ED-1E434-11 Group 403, S-Bus ground cable (black)
- One end of the ED-1E434-11 Group 187, TD-Bus signaling cable (gray w/ black stripe)

Route them down through the chimney so that they can be accessed from either side of the chimney. Continue with the following steps.

SADI Cables

The SADI cable (ED-1E434-11 Group 186) is connected as follows:

NOTE

It may be easier to remove the AHF104 board from the backplane before installing the following cable. However, this increases the chance of damaging backplane pins or reinstalling the board incorrectly.

1. In the expansion cabinet, make sure the daisy-chained portion of this cable is connected to the disk drives. The other two ends should be routed down through the chimney.
2. In the bottom cabinet:
 - a. Unplug the 50-position female connector currently attached to the AHF104 board in slot 01. Attach this female connector to the male connector on the Group 186 cable.
 - b. Attach the Group 186 cable's female connector to the now-vacant connector of the AHF104. The cable's connector should be red on one end with a key on one side. The red end goes at the top and the key should face the inside of the cabinet.

The expansion cabinet AHF104 does not have a cable connected to it.

Alarm Signal Cable

The alarm cable (ED-1E434-11 Group 185) is connected as follows, allowing the expansion cabinet to report alarms to the FP:

NOTE

It may be easier to remove the CDR1B boards from the backplanes before installing the following cable. However, this increases the chance of damaging backplane pins or reinstalling the boards incorrectly.

1. In the expansion cabinet, route one end of the Group 185 cable over the top of the CDR1B board (see Figure 9-1, *Expansion Cabinet Alarm Cabling*). Connect the cable to the J5 connector on the board. The cable and/or the J5 connector may not be keyed. If not, there should be a red stripe down one side of the cable. Connect the cable so the stripe is toward the outside of the cabinet.
2. In the bottom cabinet, connect the other end of the Group 185 cable to the J5 connector on the bottom cabinet CDR1B board. As you did with the expansion cabinet, route the cable over the top of CDR1B with the red stripe to the outside of the cabinet.

NOTE

If the cable is installed incorrectly, both battery and fan alarms become active when the system is powered up. If you get these alarms, check to see if the cable is correctly installed.

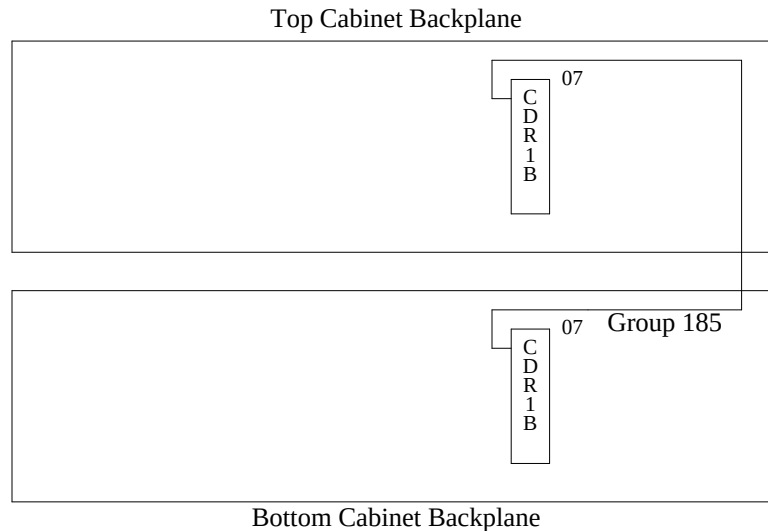


Figure 9-1. Expansion Cabinet Alarm Cabling

S-Bus Expansion Cables

The ED-1E434-11 Group 329, S-Bus signaling cables and the ED-1E434-11 Group 403, S-Bus ground cable are connected as follows (see Figure 9-2, *Expansion Cabinet S-Bus Cabling*):

NOTE

It may be easier to remove the AHF107 boards from the backplanes before installing the following cables. However, this increases the chance of damaging backplane pins or reinstalling the boards incorrectly.

1. In the expansion cabinet, connect one of the Group 329 cables to the inside connector (closest to the backplane) of the AHF107 board in slot 06. *Make sure the notch on the cable connector matches the slot on the connector of the board.*
2. In the bottom cabinet, connect the other end of the same Group 329 cable to the inside connector of the AHF107 board in slot 17. Again, be sure the notch on the cable connector and slot on the board connector match.

NOTE

A lot of cable is left hanging once it is connected. Leave the cable hanging until you have connected all of the intercabinet cables, then dress all of the cables across the back of the cabinet at once.

3. In the expansion cabinet, connect the second Group 329 cable to the outside connector of the AHF107 board in slot 06.
4. In the bottom cabinet, connect the other end of the second Group 329 cable to the outside connector of the AHF107 board in slot 17.
5. In the expansion cabinet, connect one end of the black Group 403 cable to the remaining ground lug on the AHF107 board in slot 06.
6. In the bottom cabinet, connect the other end of the Group 403 cable to the AHF107 board in slot 17.

NOTE

If the expansion and base cabinet connectors are reversed, the system will not boot.

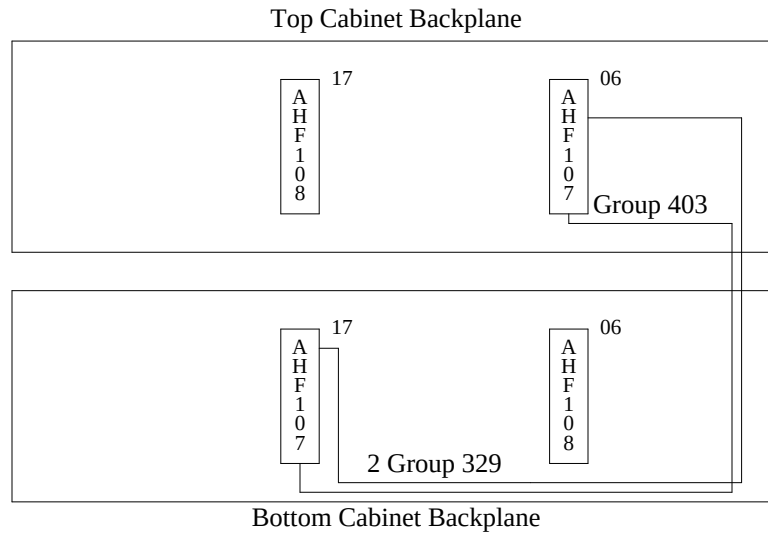


Figure 9-2. Expansion Cabinet S-Bus Cabling

TD-Bus Cable

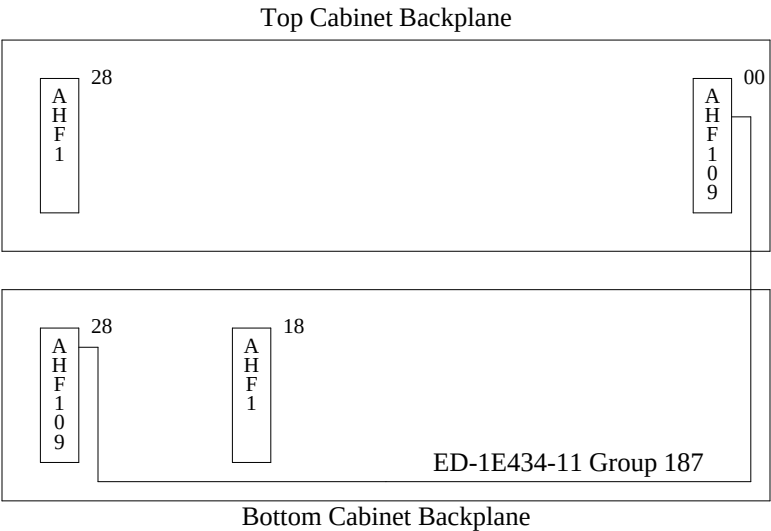
The ED-1E434-11 Group 187, TD-Bus cable is connected as follows (see Figure 9-3, *Expansion Cabinet TD-Bus Cabling*):

NOTE

It may be easier to remove the AHF109 boards from the backplanes before installing the following cable. However, this increases the chance of damaging backplane pins or reinstalling the boards incorrectly.

1. In the expansion cabinet, connect one end of the Group 187 cable to the AHF109 board. This cable may or may not be keyed. If it isn't keyed, look for a black stripe which runs down one side of the cable. Connect the cable so the stripe is at the bottom and facing you. If the cable is keyed, follow the keying.
2. In the bottom cabinet:
 - a. A plastic cable clamp may be on the side of the cabinet to hold this cable in place. If there is one, put the cable in it.
 - b. Connect the other end of the Group 187 cable to the AHF109 in the bottom cabinet (slot 00 in List 2 or List 4 backplanes, slot 28 in List 1). Make sure the black stripe is at the bottom of the connector, facing the inside of the cabinet.

List 1 Backplanes



List 2 or List 4 Backplanes

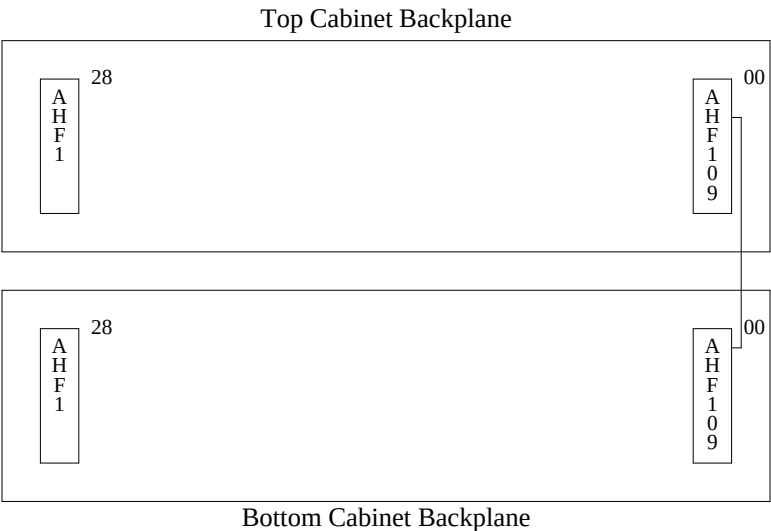


Figure 9-3. Expansion Cabinet TD-Bus Cabling

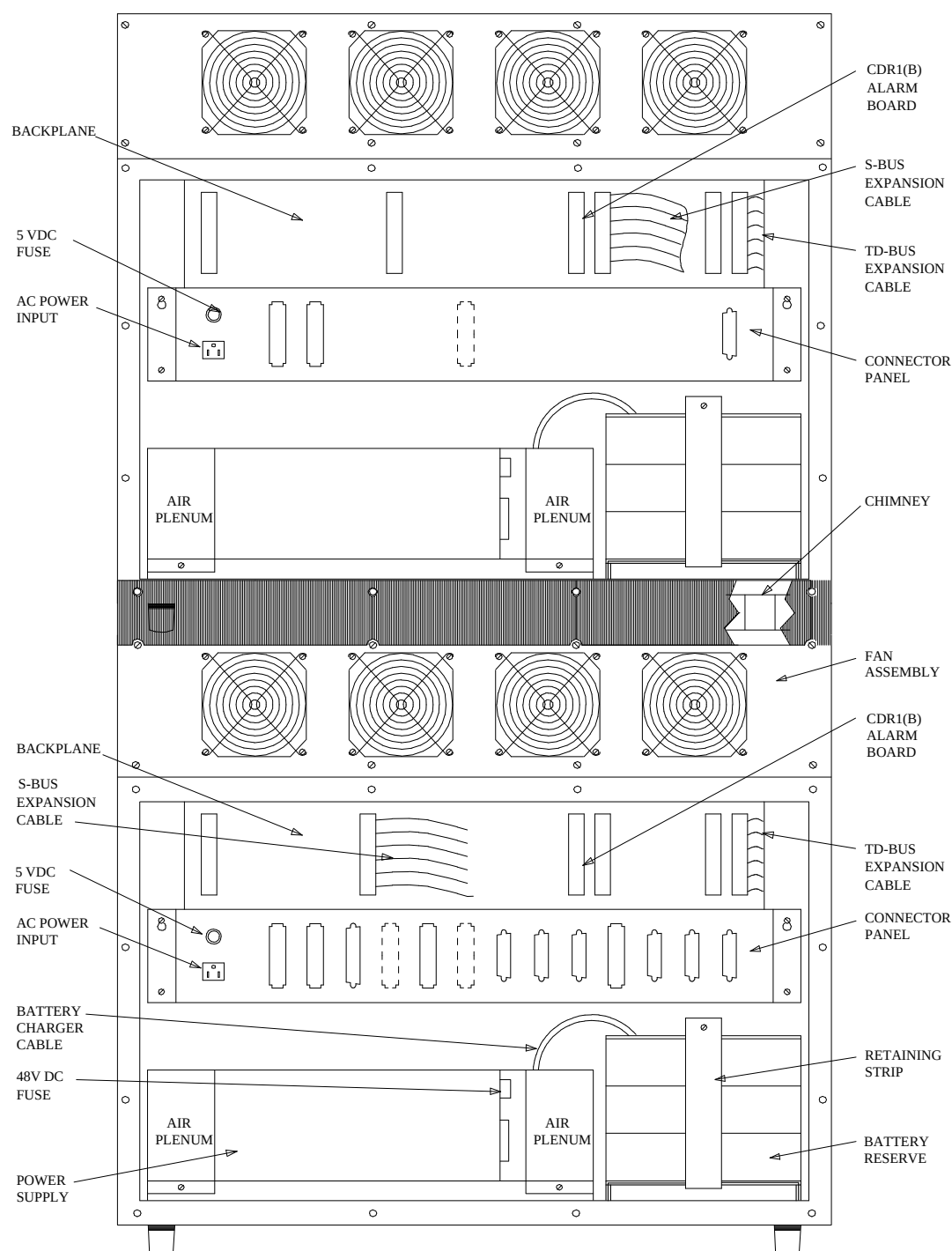


Figure 9-4. Intercabinet Cabling (List 2 or List 4 Backplanes)

Complete the Assembly

This section describes how to finish assembling the system. Do the following:

1. When you are sure the cables are correctly connected, carefully replace the battery in the expansion cabinet. Remove the battery from its housing (remove the retaining bar in front of the battery pack), place the housing in position, and then put battery back in the housing. Make sure no cables are pinched or caught under the battery housing.

NOTE

A thin piece of cardboard placed against the cables makes it easier to slide the battery pack assembly back in. This also protects the cables from getting pinched in the future.

2. Most of the cables are longer than necessary and hang out of the back of the cabinet. Run the excess cable across the back of the system. Be careful not to bend any backplane pins when you dress the cables.
3. Reattach the four rear panels. Leave the four screws on the bottom edge of the expansion cabinet off. The rest of the screws can be completely tightened.
4. Remove the four screws across the fan bracket at the top edge of the base cabinet. Attach the rear cabinet bracket that fastens the two cabinets together on both cabinets. Tighten all screws completely.
5. At the front of the cabinet, place the cabinet clip between the two cabinets by pressing it into the slots at the center of each cabinet. The slots are about 1 inch wide; the clip is 1 inch by 1.75 inches. If you are installing the front cabinet plate, go to *Front Cabinet Plate Mounting* (later in this section) to drill the bottom cabinet if necessary. Then return here.
6. Mount the new bottom cabinet labels.
 - a. Place the yellow power-down instruction label on the front of the machine over the old instructions.
 - b. Place the new circuit pack carrier label over the old label.
7. Run the Group 300 cable(s) from the expansion cabinet to the wall field. At the expansion cabinet, connect the cable(s) to D06 and D07. Patch the voice port wire pairs to the analog switch ports.
8. Plug in the AC power cords of each cabinet if so equipped. The cabinets should be powered either by two separate AC outlets, each with its own 15-amp fuse or one outlet with a 20-amp fuse. If the system uses DC power, the expansion cabinet needs to be wired to the building DC Power Plant. Instructions for DC power are provided in *Adding DC Power*.
9. If the maintenance terminal is not currently connected, attach it to the maintenance port on the back of the bottom cabinet.
10. Check the following during power up in step 10:
 - a. If the red LEDs on the expansion cabinet TN500, TN747Bs, and TN501Bs stay lit for more than 10 seconds, the TD-Bus expansion cable is installed incorrectly. Put the system in control mode (toggle the MI switch), spin down the RCD (press the button on the front of the drive), power down both cabinets, and flip *one* of the AHF109 cable connectors around.

- b. If all the of the LEDs on the TN523 (or TN591), TN734 (or TN761), and TN716B in both cabinets stay lit after a few seconds, the S-Bus expansion cables are installed backwards. Power down the system and swap the inside and outside cable connectors on the bottom cabinet AHF107.
 - c. If the red LEDs on the TN523 (or TN591) and TN716B in both cabinets stay red after a few seconds, the expansion cable connected to the outside connector of the AHF107 in the bottom cabinet is installed upside down. Power down the system and flip the cable connector around.
 - d. If all of the LEDs on the TN523 (or TN591) and TN734s (or TN761s) in both cabinets stay lit after a few seconds, the expansion cable connected to the inside connector of the bottom cabinet's AHF107 is installed upside down. Power down the system and flip the cable connector around.
 - e. If all of the LEDs on the expansion cabinet TN523 (or TN591) and TN734 (or TN761) stay lit, the cable connected to the inside connector of one of the AHF107s is not properly seated. Power down and check the cabling on each board.
11. Power up the machine using the circuit breakers (power switches) at the front of each cabinet. Power up the expansion cabinet first, followed by the bottom cabinet. The red LEDs on all of the circuit packs should flash on and then most turn off. If there are no problems as outlined in the previous step, go to the next section where a non-standard initialization will be performed.

NOTE

If you cannot start a non-standard initialization within a few minutes from now, press **CTRL-C** to bring up the Control Mode menu. This halts the otherwise automatic standard initialization that occurs on timeout when at the **Standard initialization** prompt.

Boot the System

You are now ready to boot the two-cabinet system. If you did a hardware conversion only (installed an expansion cabinet *without* needing to upgrade the software), follow the steps in this section.

NOTE

If you are doing a software upgrade (for example, if you are upgrading an R1V2 or later system to R1V7 software), return to the *AUDIX Upgrade Instructions* (585-302-108) document and continue the upgrade instructions from the point you left off.

1. Boot the system using a non-standard initialization from the disk00.boot_e filesystem you created in the *Two-Cabinet Conversion Procedures* section (contact the AUCC or TSC at 1-800-248-1234 for assistance if needed).
2. Display the **filesystem : detail** form. Enter the boot_f filesystem in **volume.filesystem** format (for example, **disk00.boot_f**). Enter **boot** in the type field. Press **ENTER**.
3. The system should fill in the rest of the fields on the form. When all of the data is displayed, press **DELETE**. This removes the previously active one-cabinet boot_f filesystem.
4. Display the **filesystem : copy** form. Copy the boot_f filesystem from the generic cartridge to disk00 (the destination filesystem should be **disk00.boot_f**).

5. Display the `maintenance : vsp : equipage` form. Equip any additional VPT, VPC, and VB/TDBI boards in the expansion cabinet that are physically present but are currently unequipped (type **EQ** in the appropriate fields and press `CHANGE or RUN`).
6. If any additional disk drives are installed in the expansion cabinet, equip them using the `maintenance : dbp : equip` form. The disks must also be initialized before they can be used.

NOTE

Starting in R1V7 software, hard disks can only be initialized by remote services personnel; if you attempt a hard disk initialization, you will get an **Access denied** message. Contact the AUCC or TSC (1-800-248-1234) to initialize new hard disk(s).

7. Display the `filesystem : update configuration` form and update `disk00.boot_f`. This copies the current system configuration information from `boot_e` to the new `boot_f` filesystem.
8. Shut down the system using the `shutdown` form.
9. Do a standard initialization from the `boot_f` filesystem by executing the `startup` form.
10. The two-cabinet system is now ready for regular use. Log in and check the **STATUS** line for alarms or other problems (for example, you will have to reset the system clock using the `system clock` form). Use the *AUDIX System Administration* chapter in *AUDIX Installation* (585-305-105) as a guide.

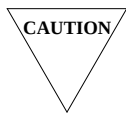
Floor Mounting

Some areas require special floor mounting for the AUDIX system in case of an earthquake. If you are in one of these areas, you should have been shipped the following:

- Four anchors for the floor
- Four bolts and eight washers used to anchor the base cabinet to the floor (the base cabinet may already be anchored in the front)
- A front cover plate (the same plate that is used for the back; you should have two).
- Self tapping screws for the front plate.

If you have all of this equipment, you need the following tools to install the earthquake hardware:

- A hammer drill, used to drill and place the floor anchors
- A power drill with a number 26 (.147 inch) drill bit, a 9/32 inch bit, and a 9/16 inch bit.
- A 9/16 inch chassis punch, used to punch the holes in the back of the base cabinet, if available. Otherwise, a normal drill can be used to drill the bottom cabinet.



All of the following steps must be done with power to both cabinets off. If AC power is used, unplug the AC power cord(s). If DC power is used, trip the AUDIX circuit breaker(s) at the DC power plant.

When you have all of the required tools and hardware, do the following to install the floor mounting:

1. If necessary, remove the two bolts that fasten the front of the AUDIX system to the floor. Move the AUDIX system to the side. This may require two people.
2. *Earthquake Mounting:* The following procedures are designed to enable a two-cabinet AUDIX to withstand earthquakes in Zones 1 through 4. Local construction codes always apply.

To anchor the AUDIX base cabinet to a floor, holes must be drilled in concrete.

- a. Draw a diagram like that shown in Figure 9-5, *Earthquake Mounting Floor Template*, on the floor where the AUDIX base cabinet will go.
- b. Using one of the anchor bits supplied with ED-1E496-70 and a hammer drill, drill a hole at one of the four anchor hole marks indicated in the following figure. Stop drilling when the mark on the bit reaches floor level (see the next figure). Pull the bit from the floor and insert one of the four plugs that come with ED-1E496-70. Drill the anchor back into the hole until the mark again reaches floor level. Pull on the drill to make sure the anchor is firmly in place. Using the drill as a lever, snap off the top of the anchor. Repeat this step with the other three anchors.
- c. Using the cap screws (or rods and nuts), flat washers, and nylon washers supplied with ED-1E496-70, fasten the AUDIX base cabinet to the floor. Insert the nylon washers between the flat washers and the cabinet.

If the base cabinet does *not* have holes in the rear, continue with the following steps.

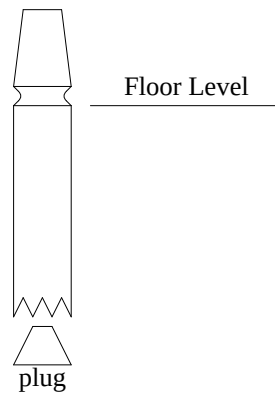
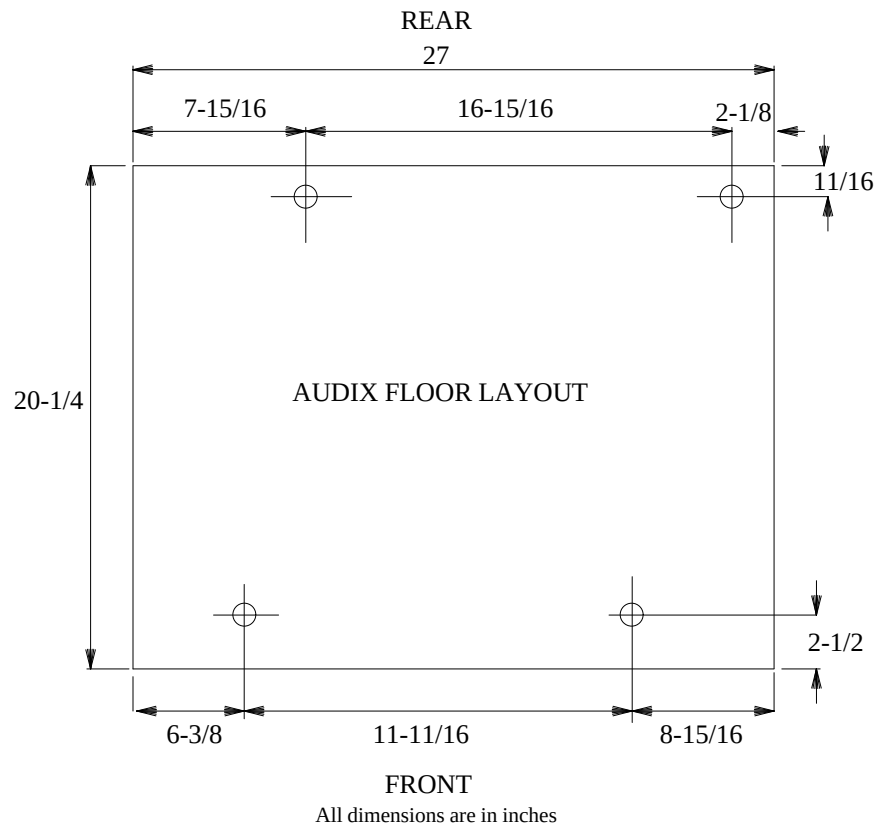
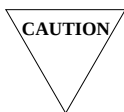


Figure 9-5. Earthquake Mounting Floor Template

3. At the front of the base cabinet, unscrew the nuts holding disk00 in place. Slide the drive out as far as it will go, and pull the SADI and power cabling as far toward the front of the cabinet as they will go. This helps protect the cables when you move the power supply in the following steps.
4. At the back of the base cabinet, unscrew the four nuts holding the power supply in place.
5. Lift the supply up and out until it is no longer held by the retaining bar at the center of the cabinet. Then slide it toward the front of the cabinet. *Be careful not to pinch the SADI or power cables you moved in the previous step.*
6. Check the base cabinet for holes drilled in the positions shown at the rear of the cabinet in Figure 9-6, *Anchor Hole Locations*.
 - a. If the holes are there, they will have plugs in them. Remove the plugs and go to step 11.
 - b. If the holes are not there, you have to drill them. *The base cabinet must be moved from the equipment room before drilling. If it isn't, warranties on other computer equipment could be voided.* Moving the base cabinet requires at least two people. Go to the next step to drill the holes.
7. Measure and mark the position of the holes as shown in Figure 9-6. Be sure to measure from the inside of the cabinet. There is a 0.06 inch difference between the outside and inside wall of the cabinet that could affect the floor mounting.
8. Drill two 9/32 inch pilot holes at the marked positions.
9. If you have a 9/16 inch chassis punch, use it to make the holes the required size. Otherwise, drill the holes using the 9/16 inch drill bit. File the edges so that no sharp edges are left.
10. If a front cabinet plate is used to attach the two cabinets, holes may have to be drilled across the top of the base cabinet. If so, drill these holes also (see *Front Cabinet Plate Mounting*). Then return here.
11. When the holes have been completed, clean up all of the metal shavings created while making the holes. You can use tape or a *small* magnet to clean them up. Remember, magnets can erase or damage disk drives.



If any shavings are left in the cabinet, they can ruin disk drives and circuit packs. Be sure you have them all cleaned up.

12. Move the base cabinet back into the equipment room.
13. Install the front and rear anchor bolts (total of four).
14. When the floor mounting is complete, replace the power supply and disk00. If this is an expansion cabinet conversion, leave the battery pack out until the cabling is completed. Otherwise, replace the battery pack also.
15. Return to the two-cabinet conversion steps to finish the hardware procedures.

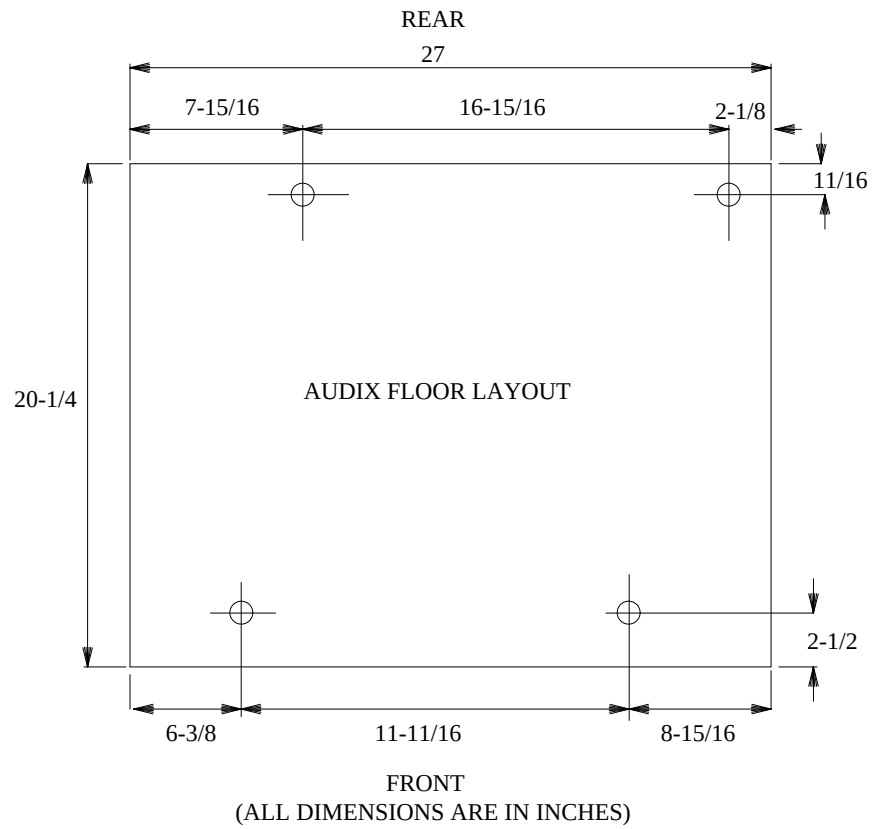


Figure 9-6. Anchor Hole Locations

Front Cabinet Plate Mounting

Most two-cabinet systems use a front connector clip to connect the two cabinets. Some, however, require a front cabinet plate to be installed instead of the clip for additional stability (such as systems installed in earthquake zones). If the expansion cabinet was shipped with a connector plate (versus a clip) for the front of the cabinet (in addition to the one required for the back of the cabinet), do the following steps to install the plate on the front of the system.

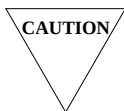
First, check to see whether the bottom cabinet needs to be drilled. Early versions of the cabinets do not have the required holes across the top of the cabinet. Newer systems and all two-cabinet installations should have the new cabinet. Check to see if there are four holes along the top of the cabinet. If there are, you do not need to do any drilling. Otherwise, you have to drill these holes yourself.

If you have to drill the holes, you need the following:

- A large piece of plastic to cover the circuit pack carrier. If you do not use this plastic, metal chips could ruin the circuit packs and disk drives. The plastic should be large enough to spread across the front of the cabinet and reach to the floor.
- A drill
- A number 26 (.147 inch) drill bit
- A center punch
- Tape strong enough to hold up the piece of plastic

When you have all of the required materials, do the following:

1. *Move the base cabinet from the equipment room. Drilling the base cabinet inside the equipment room may void the warranty of other computer equipment.* Moving the base cabinet requires at least two people.
2. Tape the plastic across the inside top of the cabinet an inch or so deep.
3. When the plastic is in place, connect the front cover plate to the expansion cabinet. Mark the position of the holes on the bottom cabinet.
4. Remove the front cabinet plate from the expansion cabinet.
5. Center punch the holes at the marked positions.
6. Drill the holes using the number 26 (.147 inch) drill bit.



Make sure all metal shavings are caught by the plastic or land on the floor. Any shavings in the cabinet can ruin disk drives or circuit packs.

7. Remove the plastic from the front of the cabinet.
8. Move the base cabinet back into the equipment room.

Two-Cabinet Conversion Troubleshooting

Use this section to return the system to a one-cabinet configuration. You do not have to remove all of the expansion hardware. You only need to make a few minor hardware changes and then boot up the original one-cabinet boot filesystem.

Hardware Changes

Make the following changes to the hardware to return the system to a one-cabinet configuration.

1. Shut down and power down the system.
2. *If you replaced the TN532 DBP-RAM board*, remove the TN540 from slot 02 of the bottom cabinet and replace it with the TN532 you removed earlier in the procedure.
3. Remove the TN727 NC in slot 14 of the expansion cabinet and put it in slot 14 of the base cabinet.
4. Pop the TN523 (or TN591), TN734 (or TN761), TN716B, TN500, and TN520 circuit packs in the expansion cabinet. Pull them out far enough so that they don't touch the backplane. You do not have to remove them completely.

Boot the System

You now have to boot from the one-cabinet active boot filesystem. If you already erased both one-cabinet boot filesystems, you have to boot from the one-cabinet generic cartridge.

1. Power up the system (*expansion cabinet first*).
2. Choose a non-standard initialization and enter the one-cabinet boot filesystem.
3. When the system has booted, it should work as it did before. If there are still problems, escalate per local procedures.

NOTE

If you used the generic cartridge, you have to reconfigure (translate) the hardware, data link, voice ports, time zone, etc. See *AUDIX Installation* (585-305-105) if necessary.

ADDING DC POWER

The following instructions are for installing the AUDIX DC power option (Kit no. D-182236) in the field. You need to remove the battery, power supply assembly, local wiring harness, AC receptacle, and the circuit breaker on the RCD (Removable Cartridge Drive). You then install a new circuit breaker, a new local DC cable, a new DC power supply, a cover (in place of the AC receptacle), a DC terminal strip assembly, a new lower rear cover, and a CDR1B alarm board (if not already installed). These instructions do not apply to the installation of an AUDIX system that is shipped to the customer with the DC option *already* installed.

If the AUDIX already contains the DC hardware, only two basic procedures are necessary:

- Run the feeder lines between the DC power source and the DC terminal strip assembly in the AUDIX cabinet (proceed to step 26).
- Install the gutter tap ground wire (see step 27).

The installation requires the following tools:

Quantity	Description
1	screwdriver — straight, small-blade "tweezer"
1	screwdriver — straight, long-blade
1	1/4" nut driver
1	1/2" socket
1	open-ended wrench (9/16" or crescent)
1	drill motor with #34 (or .111") bit
1	voltmeter
1	magic marker
1	large wire cutters
1	needle-nose pliers
3	tie-wraps 6"

Before starting the installation, visually inspect the DC power option kit to make sure that all items are present according to the following list. Report damaged, stolen, or missing equipment to the account team, installation supervisor, services organization, or the carrier or shipper as appropriate.

Quantity	Description	Product Identifier
1	CDR1B	105711238
1	Cover, lower rear	846303824
1	Local cable	LCJ58886U-1A, G3
1	Power supply, DC	405951781
1	Mounting assembly, DC terminal strip	846360014
2	Screw #8	901090308
1	AC receptacle outlet cover	846306843
2	Screw #4	901125294
1	Screw 1/4-20x1/2	841059843
1	Washer	804236362
2	Nut	802207563
1	Kit, D-181895 Gutter tap ground	105434559
1	Circuit breaker	405951757
1	Wire assembly, power supply	H600-232
1	Wire assembly, fuse holder	846511681
4	Wire assembly, disk (1 required per disk)	H600-261
1	Wire assembly, ground	H600-275
2	Screw	840058267
2	Nut	802108282
2	Washer	804236313
2	Screw, flathead, 6-32x1/4	901082313
2	Nut, 6-32	801259524
2	Washer, external tooth	804236321
1	Instruction sheet	846367522

This procedure can be used for either an AUDIX main cabinet or AUDIX expansion cabinet.

1. Open the front of the AUDIX cabinet. Shut down the software and power off the system according to the instructions given on the cabinet label. If no label is provided, power-down instructions are given in Appendix A, *Basic Procedures*.
2. Unplug the AC power cord.
3. Disconnect the cables from the back of the connector panel. Make sure cables are properly labeled for reconnection.
4. At the back of the cabinet, remove the middle cover (the cover above the connector panel). Also remove the cover below the connector panel.
5. At each end of the connector panel are four screws that hold the panel in place. Loosen (do not remove) these four screws.

NOTE

In the next step, be careful not to damage the flat SCSI (Small Computer System Interface) ribbon cable when removing the battery assembly.

6. At the lower righthand side of the cabinet is the battery. Disconnect the battery's black and red connector from the local wire harness. Remove the two nuts that hold the battery assembly to the cabinet. Remove the battery assembly.

7. Remove the air duct (plenum) located at the righthand side of the power supply held in place by three screws.
8. Remove the four nuts that fasten the power supply assembly to the cabinet. Carefully slide the power supply assembly partway out of the cabinet far enough to allow access to the wiring on the power supply.
9. Disconnect all wires from the power supply, then remove the power supply assembly from the cabinet.
10. Remove the power supply from its base. *The base of the assembly will be used to mount the DC power unit.*
11. Disconnect the power cables from the disk drives. Leave the flat (ribbon) cables attached.
12. Check slot 07 at the AUDIX backplane to see which alarm board is installed. The board is either a CDR1 or a CDR1B.
 - a. If a CDR1 is installed, remove all connectors from the board (connector locations are shown in Figure 9-7, *CDR1B Board Connectors*), remove the board from the backplane, and install in its place a CDR1B board (105711238). When installing this board, be careful not to bend the backplane pins.

Referring to Figure 9-7 for locations, reconnect P3, P6, and P8 to J3, J6, and J8 respectively on the CDR1B board. The remaining connections come from the DC harness when it is installed.

NOTE

Connector J5 and its cable are used only in two-cabinet systems. Reconnect this cable if you are working on a two-cabinet system. If the system is a one-cabinet, the cable is not present and the connection is unused. Note that J5 is not keyed. For correct installation, make sure that the red stripe on the J5 cable is toward the backplane on both cabinets.

- b. If a CDR1B is installed, remove the following connectors from the locations shown in Figure 9-7: J2, J4, and J7 (connections from the AC harness). These connections will be replaced with connections from the new DC harness when it is installed.

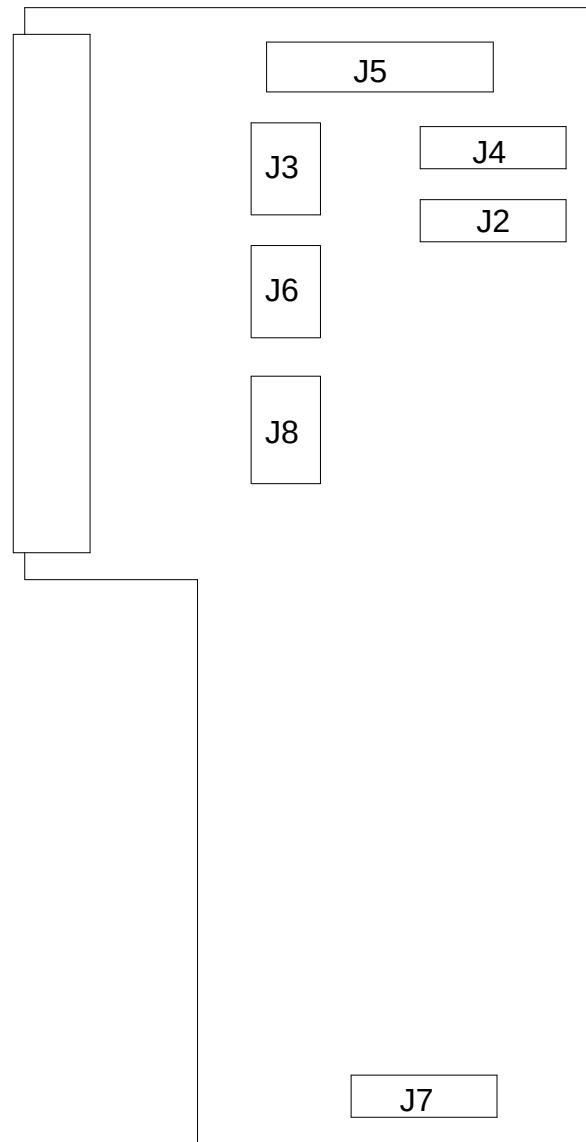
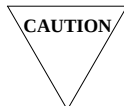


Figure 9-7. CDR1B Board Connectors



Be careful when working around the backplane. The protruding pins can scratch or puncture the skin, and are easily bent.

- c. *Carefully* remove the Faston connectors from the bottom of the backplane. The connectors are pressed into place but not soldered. Use a screwdriver to hold the male end of the connector (tab) against the backplane while removing the female end of the connector (Faston) with needle-nose pliers.
 - Disconnect the black wire from PL00.
 - Disconnect the red wire from PL01.
 - Disconnect the pink terminals from PL02 and PL03.
 - Disconnect the blue terminals from PL04 and PL05.
 - Disconnect the pink terminals from PL06 and PL07.
- d. At the front of the cabinet, unbolt and remove the tape drive/circuit breaker assembly located at the far right side of the cabinet. Remove the circuit breaker (ON/OFF switch) from the faceplate of this assembly. Disconnect the mate-and-lock connector from the local power harness.
- e. Go to the rear of the cabinet. At the connector panel, remove the AC power cord receptacle. If rivets are used to fasten the AC receptacle, they have to be drilled out with a .111 diameter (#34) drill. *It may be necessary to unmount the connector panel to access the back of the AC receptacle.*
- f. Disconnect the green wires from the ground stud near the AC receptacle. Return the washer and both nuts to the ground stud after removing the wires. You will use these later to connect the DC harness grounds.
- g. Disconnect the wires from the fuse assembly. Cut the fasteners that hold the local wiring harness to the connector panel and remove the harness from the cabinet.

This completes the removal of the AC power hardware.

Install the DC hardware as follows:

1. Lay the local DC power cable (LC158886U-1A, G3) in the bottom of the cabinet, with the taped portion of the cable going to the location vacated by the tape drive/circuit breaker assembly and the long thin part of the cable going to the disk drives.
2. Connect the wires from the DC cable to the new circuit breaker (405 951 757) as follows:
 - R-W wire to the top right terminal (the top portion of the circuit breaker has the word "line" printed on it)
 - R wire to the bottom right terminal (the bottom portion of the circuit breaker has the word "load" printed on it)
 - BK-W wire to the top left terminal
 - BK wire to the bottom left terminal.

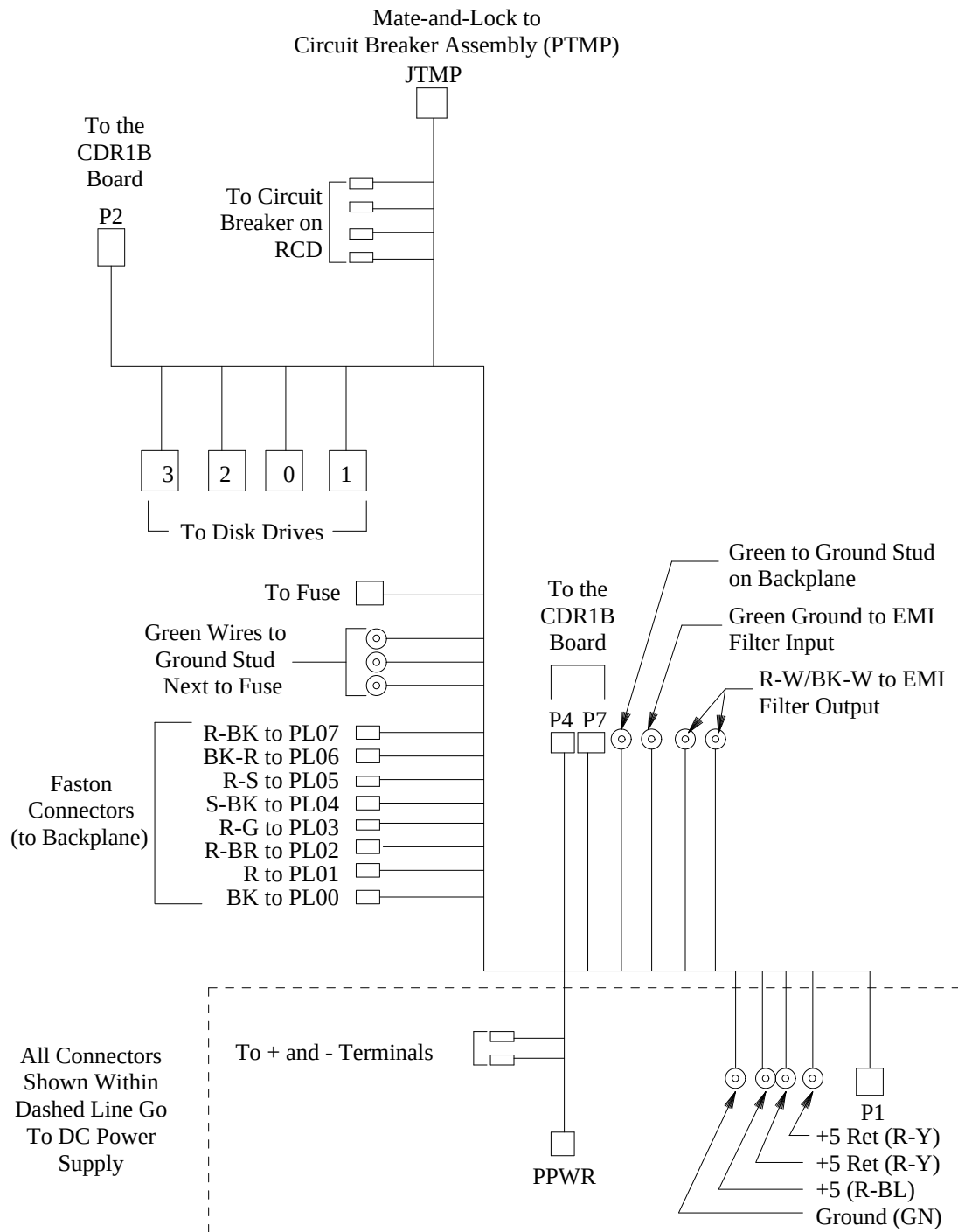


Figure 9-8. Local DC Cable

3. Install the new circuit breaker in the tape drive/circuit breaker assembly.

NOTE

The new circuit breaker is attached with four screws instead of six. Use the four holes on the righthand side of the faceplate. If a finger guard was present, use screws (901 082 313), nuts (801 259 524), and washers (804 236 321) to attach the finger guard to the lefthand holes.

4. Connect the mate-and-lock connectors on the DC cable (JTMP) and the circuit breaker (PTMP).
5. Connect one disk wire assembly (H600-261) to *each* disk drive and to the disk drive connectors on the DC power cable (see Figure 9-8).
6. On the DC cable, locate the point where the three short green ground wires break out of the cable near the fuse connector J FUSE. Position this point approximately 2 to 3 inches to the right of the hole vacated by the receptacle cover. When position is correct, use tie-wraps to secure the DC power cable to the connector panel.
7. If you did not have to drill out the AC power cord receptacle, use the two #4 screws from the kit to attach the AC receptacle cover (846 306 843) over the hole left by the removal of the AC power cord receptacle.

If you had to drill out the AC receptacle, use screws (840 058 267), nuts (802 108 282), and washers (804 236 313) from the kit to mount the receptacle cover. Attach the cover using the holes drilled out during the removal of the AC receptacle.

— In one of the holes in the receptacle cover, insert screw (841 059 843), and attach with washer (804 236 362) and nut (802 207 563). The head of the screw should be on the outside of the cover and the washer and nut on the inside (toward the backplane).

— Leave the other hole in the AC receptacle cover empty. It will be used when you install the gutter tap grounding wire from the battery plant (step 28).

8. Locate the green ground wire (H600-275) in the kit. Remove both nuts from the ground stud near the AC receptacle cover. Attach the ground wire (H600-275) to this stud, using only one of the nuts. Tighten the nut down on the wire, making sure this connection is secure. *Loosely* replace the second nut on the ground stud. You will use this later to connect additional ground wires. Attach the other end of the ground wire (H600-275) to the AC receptacle cover below the nut you installed in step 19. Be sure this connection is secure.
9. Near the AC receptacle cover, locate the three short green wires on the DC harness. Attach these wires to the ground stud under the top (loose) nut. Tighten the nut, making sure that all the ground wires attached to the stud are securely fastened and fanned out around the stud to ensure solid connections.
10. Remove the fuse holder from the connector panel. Remove the fuse for installation in the new fuse holder. Install the new fuse holder/wire assembly (846 511 681) and fuse in place of the old fuse holder.

NOTE

The new fuse holder is installed from *inside* the cabinet with the washer attached from the *outside* of the cabinet [see Figure 9-9, *Installation of New Fuse Holder (Side View)*].

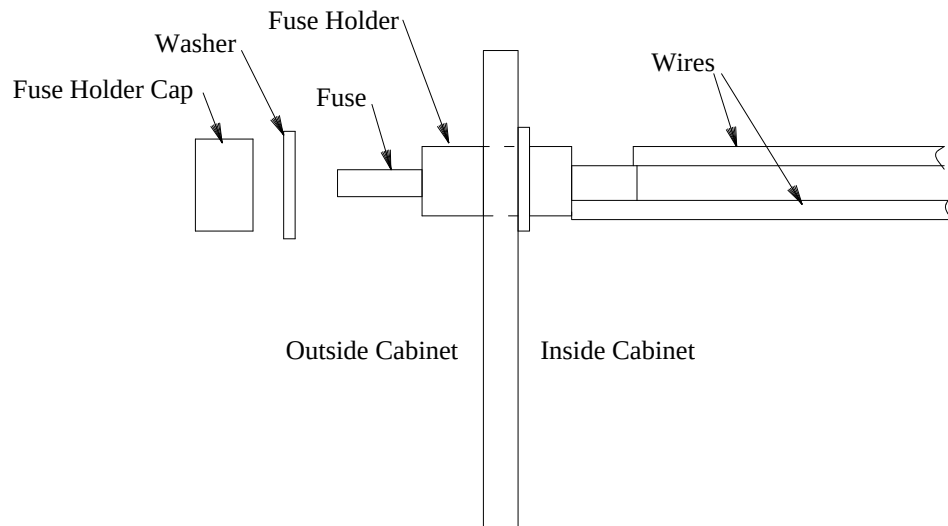
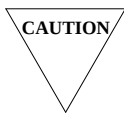


Figure 9-9. Installation of New Fuse Holder (Side View)

Connect the wires from the fuse holder to the fuse connector on the DC harness (P FUSE Connector into J FUSE Connector).



Be careful when working around the backplane. The protruding pins can scratch or puncture the skin, and are easily bent.

11. Using needle-nose pliers, connect the center group of wires on the DC cable (see Figure 9-8, *Local DC Cable*) to the bottom of the backplane. Make sure the female portion of the Faston connector is secure on the male end.
 - R-BK to PL07
 - BK-R to PL06
 - R-S to PL05
 - S-BK to PL04
 - R-G to PL03
 - R-BR to PL02
 - R to PL01
 - BK to PL00
12. Locate Connectors P2, P4, and P7 on the wire harness. Referring to Figure 9-7, attach these connectors to J2, J4, and J7 respectively, on the CDR1B board at the backplane.
13. Mount the DC power supply to the base power supply assembly that you removed from the AUDIX cabinet earlier. Do not reinstall the righthand plenum yet.

14. Locate the H600-232 wire assembly in the kit. Refer to Figure 9-10, *Connections at the DC Power Supply*, and connect the terminals on the H600-232 wire assembly to the main terminal block on the power supply as follows:

NOTE

You may encounter a power supply that is different from the one shown in Figure 9-10. The terminal block and other connectors are the same, but they may be in different locations.

- Attach the R-BL and R wire pair to the +12 V terminal.
- Attach the R-SL wire to the +12 V terminal.
- Attach the W-BK and BK wire pair to the +12 V return terminal.
- Attach the SL-BK wire to +12 V return terminal.
- Attach the R-G wire to the -5 V terminal.
- Attach the R-BR wire to the -5 V return terminal. (If you have trouble distinguishing R-BK from R-BR, R-BK has a thinner stripe.)
- Attach the R-BK wire to the -48 V terminal.
- Attach the BK-R wire to the -48 V return terminal.

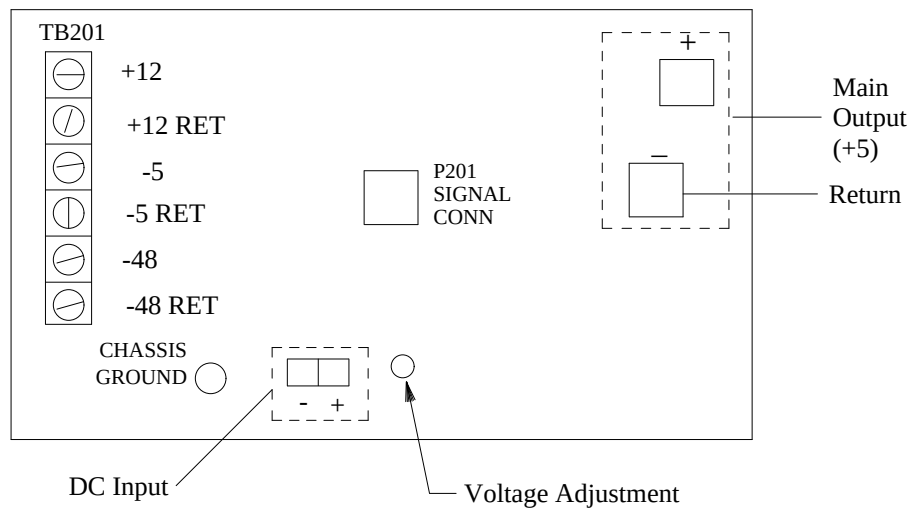


Figure 9-10. Connections at the DC Power Supply

15. Slide the DC power supply partway into the AUDIX cabinet so that you can connect the remaining wires on the DC cable to the power supply.
16. Plug Connector P1 on the DC harness into the Molex connector (P201 in Figure 9-10) on the power supply.

17. At the power supply, plug the red powerlock connector on the DC cable into the “+” connector and plug the black powerlock connector into the “-” (negative) connector. See Figure 9-10.
18. Attach the two 6-gauge white wires from the bus bar (+5 V DC and GRDD) to the main output (+ and RETURN, respectively) on the DC power supply. Be sure that the polarity is correct (see Figure 9-10).
19. Connect the two 14-gauge wires (R-Y) to the +5 RETURN terminal on the main output of the power supply. This terminal has the 6-gauge +5 return cable (GRDD) connected to it as well as the two 14-gauge wires.
20. Connect the 10-gauge wire (R-BL) to the +5 terminal on the main output of the power supply (+5). This terminal has the 6-gauge +5 cable connected to it as well as the one 10-gauge wire.
21. Connect the PPWR connector on the DC cable to the H600-232 (Connector JPWR) wire assembly attached to the power supply.
22. Toward the power supply end of the harness, locate the three green ground wires still unconnected. Locate the green wire with the smallest hole in the ring terminal. Connect this wire to chassis ground on the power supply.
23. The EMI filter is located on the terminal strip assembly (846 360 014). The input side of the filter has three terminals designated 48 RTN (left) and -48 (right). The middle terminal (ground) is not labeled.

At the output end of the EMI filter (the end with two studs) on the terminal strip assembly, connect the R-W wire to RETURN; connect the BK-W wire to -48 V.

NOTE

Terminals at the output side of the EMI filter may not be labeled. If not, remember that the polarity goes straight through from the input side.

24. On the DC harness, locate the two green ground wires with the larger ring terminals.
 - a. Connect the green wire with the larger ring terminal to the ground terminal (GRDD) on the bus bar. The 6-gauge +5 return wire is also connected to this terminal.

NOTE

In the case of a two-cabinet configuration, this wire should only be connected in the lower cabinet. In the upper cabinet, fold the wire out of the way and wrap electrical tape around the ring terminal to prevent accidental shorting.

In the upper cabinet, a green wire should have been factory installed. This wire connects the ground terminal (GRDD) on the bus bar and the AHF 107 backplane board. Check to make sure its connections are secure.

- b. Connect the green wire with the smaller ring terminal to the middle terminal on the input end (the end with three studs) of the EMI filter. It may be necessary to remove the terminal strip to connect this ground wire. Be sure the terminal strip is securely fastened when reconnected to the terminal strip base.
25. Mount the DC Terminal Strip in the spot vacated by the battery.
26. Make sure that the circuit breaker located on the DC power plant is off and that the circuit breaker on the AUDIX is off. Install the 6-gauge feeders from the DC Power Plant to the terminal strip.

NOTE

Depending on local code, feeders from the DC power source may have to be installed by an electrician.

Leads are identified as 48 RTN (left) and -48 (right). A one-cabinet AUDIX uses one set of DC cables (DC power and return). An expansion cabinet requires an additional set for a total of four cables. A separate dedicated 30-amp breaker is required for each cabinet (see Figure 9-11, *AUDIX DC Power and Ground Connections*).

NOTE

The feeders from the battery plant supply a *negative* voltage. Be sure that the negative conductor (-48V) is connected to -48V, and the positive conductor (48 RTN or 0V) is connected to 48 RTN.

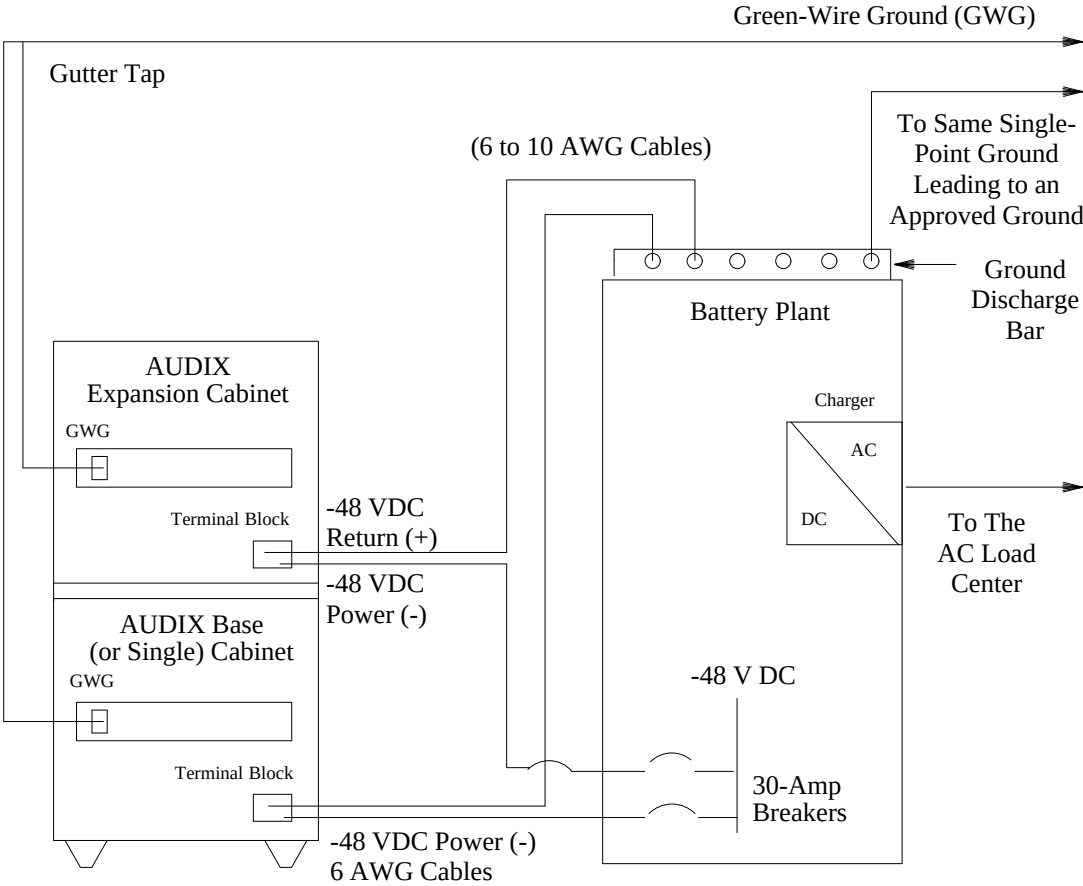


Figure 9-11. AUDIX DC Power and Ground Connections

27. Inspect gutter tap kit D-181895. Make sure the following items are present:

Quantity	Description	Product Identifier
1	Tap, gutter, ILSCO	405 265 315
4	Lug, Thomas & Betts	403 210 479
4	Screw, SPHM 1/4-20x1/2 289A finish	841 059 843
4	Washer, external tooth, lock 1/4, 289A finish	804 236 362
4	nut, 1/4-20, 289A finish	802 207 563

28. Install the gutter tap as follows:

- At an appropriate location on the 2-gauge wire, remove insulation to accommodate the gutter tap (see Figure 9-12, *Gutter Tap*).
- Attach the gutter tap to the 2-gauge wire.
- Using screw (841 059 843), washer (804 236 362), and nut (802 207 563), attach lug (405 265 315) to the remaining hole in the AC receptacle cover.
- Cut a piece of 6-gauge wire long enough to reach from the gutter tap on the 2-gauge wire to the lug on the AC receptacle cover. Strip insulation from each end of the 6-gauge wire. Attach the 6-gauge wire to the gutter tap and to the lug on the AC receptacle cover. Make sure that the 6-gauge wire and the green ground wire (H600-275) to the ground stud (inside the cabinet) are on *separate* screws at the AC receptacle cover. See “A” in Figure 9-12.

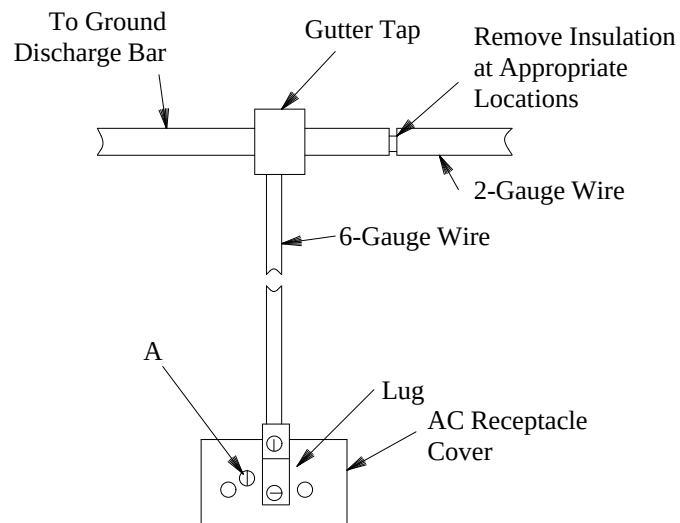


Figure 9-12. Gutter Tap

NOTE

If this is a two-cabinet system, run a separate gutter tap to each cabinet.

29. At the DC power plant, turn on the breaker controlling the 6-gauge feeder cables to the AUDIX system. Before turning the AUDIX on, use a voltmeter to verify the polarity of the battery plant feeder wires at the terminal block inside the AUDIX cabinet. The measurement can be taken at the screw heads at the terminal block. With the voltmeter ground probe on the 48RTN screw and the positive probe on the -48V screw, the measurement should be approximately -52 VDC. If the voltage is positive (+52 VDC), TURN OFF THE CIRCUIT BREAKER AT THE BATTERY PLANT, reverse the feeder wires at the AUDIX terminal block, and repeat the measurement. When correct polarity is verified, power up the AUDIX according to standard procedures.

CAUTION

In the next step, be careful not to cause a short against the backplane pins.

At the bus bar in the AUDIX cabinet, check the voltage across the +5 VDC and ground (the two large leads). Voltage should be between 5 VDC and 5.05 VDC. If necessary, *slowly* adjust the voltage at the power supply, monitoring the voltage at the backplane at the same time until the proper voltage level is achieved. See Figure 9-10 for location of the voltage adjustment potentiometer.

30. Remount the righthand plenum to the base of the power supply. The harness wires dress to the outer side of the power supply (toward the rear of the cabinet). Be careful not to crimp any of the wires between the plenum and the power supply base.
31. Attach the power supply assembly to the AUDIX cabinet.
32. Tighten the four screws used to mount the connector panel. Reconnect the cables that you disconnected in step 3.
33. Install the new lower cover (846 303 824). Use the old screws plus the two #8 screws to mount the new cover. Remount the middle cover.
34. At the back of the AUDIX cabinet (in about the middle), locate the label that reads "120V AC, 11.5 AMPS, 60 HZ". Use a marker to cross out this label. Locate the yellow CAUTION labels at the front and back of the AUDIX cabinet. Use a marker to cross out these labels.

This completes the installation.

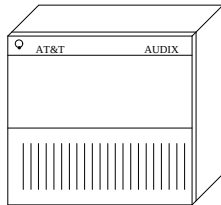
UPGRADE THE RICOH RH5261 TO A RICOH RH5500

The following parts, provided in Kit no. D-182482, are required to replace the 20-Mbyte removable cartridge drive (RCD) with the 50-Mbyte RCD:

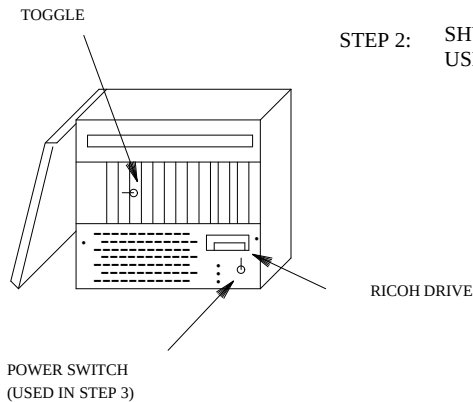
- 1 - Ricoh Removable Cartridge Drive
- 1 - adapter bracket (846 675 882)
- 4 - flat-head screws (802 260 711). These may already be installed.

The AUDIX system must be shut down and powered down in the following steps.

- One-cabinet AUDIX systems look similar to the cabinet shown below. Two-cabinet AUDIX systems have two of these cabinets stacked on top of each other. You will work on the bottom (base) cabinet of a two-cabinet system.

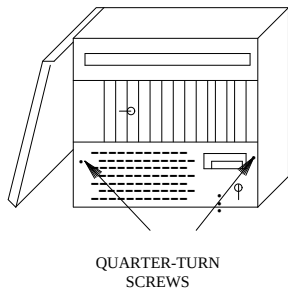


STEP 1: REMOVE THE FRONT COVER



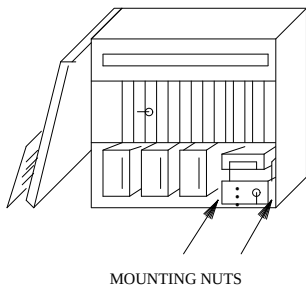
STEP 2: SHUT DOWN THE SOFTWARE
USING THE MI TOGGLE SWITCH

- The red COMPL lamp on the TN511 should light within four minutes. Once it does, check the RICOH drive. Its green lamp should be OFF. If so, proceed with step 3.
- If the green lamp is not off, press the small white button on the TN506B. After five minutes, press the small black button on the RICOH drive. The RICOH drive should now spin down and its green lamp should go OFF. Proceed with step 3.

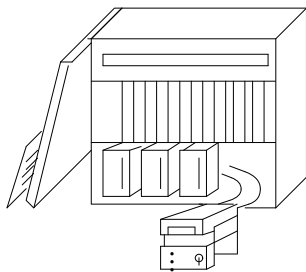


STEP 3: FOLLOW STANDARD PROCEDURES FOR POWERING DOWN THE SYSTEM

STEP 4: REMOVE THE LOWER SCREEN USING THE QUARTER-TURN SCREWS

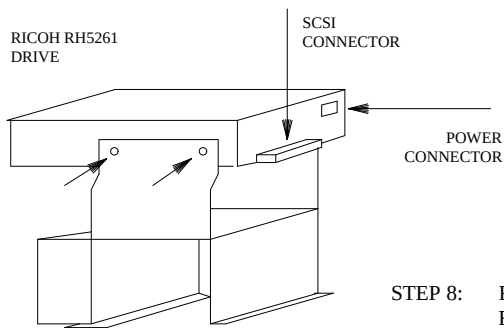


STEP 5: REMOVE THE TWO NUTS THAT HOLD THE REMOVABLE DISK ASSEMBLY IN PLACE

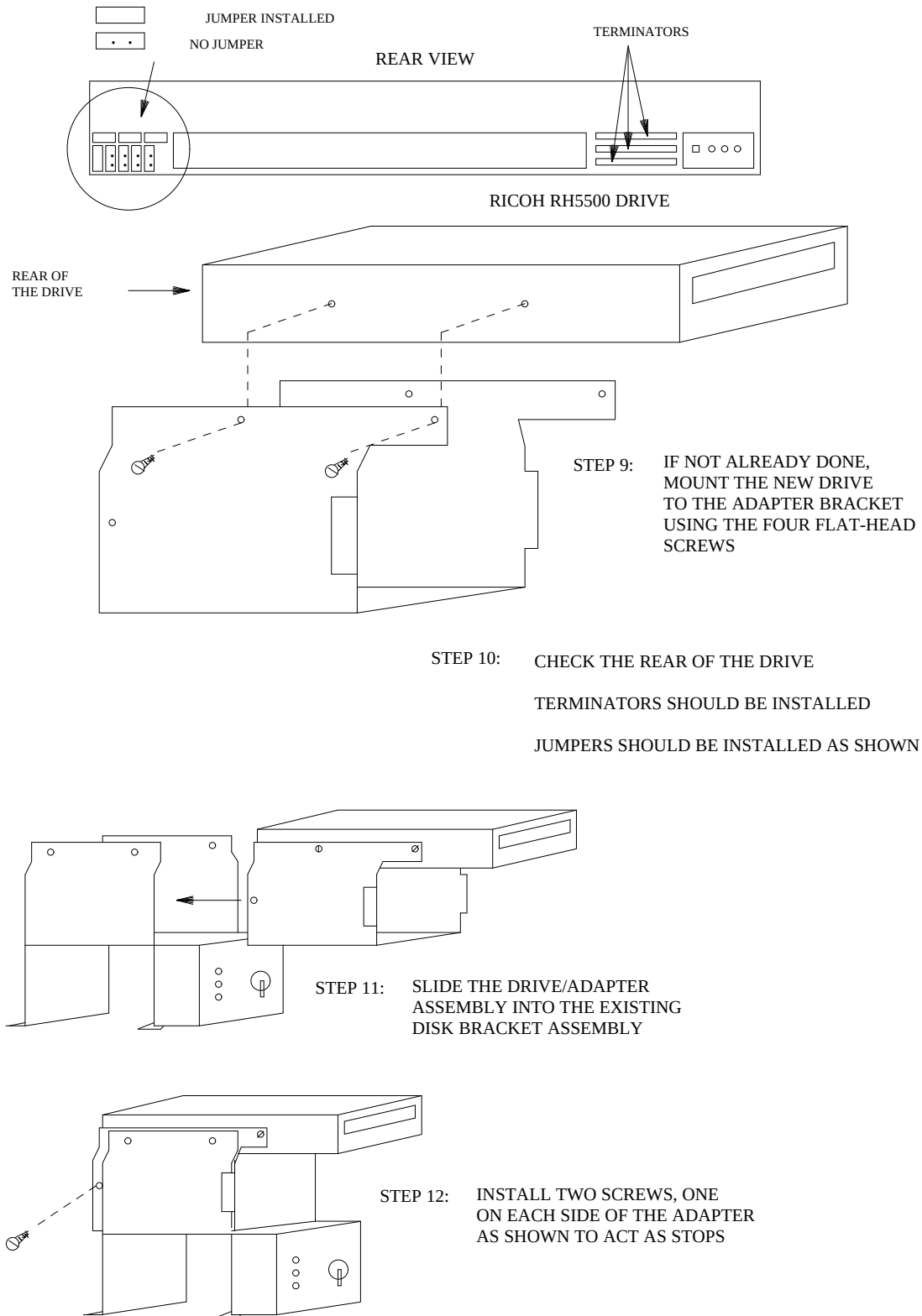


STEP 6: PULL THE ASSEMBLY FORWARD ONLY ENOUGH TO ACCESS THE CONNECTORS AT THE BACK OF THE RICOH DRIVE

STEP 7: DISCONNECT THE POWER CABLE AND THE SCSI RIBBON CABLE



STEP 8: REMOVE THE FOUR SCREWS THAT FASTEN THE DRIVE TO THE BRACKET
SAVE TWO OF THE SCREWS



- Connect the SCSI ribbon cable and the power cable to the back of the new drive.
- Carefully slide the assembly into the cabinet. Do not pinch any wires.
- Install the nuts that fasten the assembly to the cabinet.
- Reinstall the lower panel. Power up the system. It should initialize by itself.
- Once the system has initialized, reinstall the cabinet cover.

10. Filesystem Problems

This chapter covers file redundancy and filesystem distribution problems on an AUDIX system.

SOLVING FILE REDUNDANCY ALARMS

Starting in R1V4 software, AUDIX has the capability to duplicate (*mirror*) filesystems; this is called the File Redundancy feature. When a filesystem is mirrored, the system automatically keeps an updated, backup copy on another disk drive. The primary filesystem is called the *master* and is shown as mounted on the `filesystem : list` form. The backup filesystem is called the *slave* and is not mounted under normal conditions. If the master filesystem becomes corrupt or lost, the system automatically mounts the slave filesystem, uses it as the active filesystem, and alarms the master. If the slave filesystem becomes corrupt or lost, the system simply alarms the bad filesystem and will not use it, even if there are problems with the master.

If either a master or slave filesystem is alarmed, use Table 10-1 to find the appropriate troubleshooting procedure. If both the master and slave filesystems are alarmed, call the Technical Service Center (TSC) to restore the corrupt filesystem(s).

Table 10-1. Filesystem Mirroring Alarms

Alarm Log		Description	Repair Procedure
Fault	Unit:Device *		
360	49 : 0, 1	Master/slave active announcement filesystem	A or B
361	50 : 0, 1	Master/slave admin announcement filesystem	A or B
362	51 : 0, 1	Master/slave sst filesystem	A or B
363	52 : 0, 1	Master/slave sdat filesystem	A or B
364	53 : 0, 1	Master/slave vdat filesystem	A or B
365	150 : 0, 1	Master/slave names filesystem	A or B
366	54 : 0, 1	Master/slave vm0 filesystem	A or B
367	21 : 0, 1	Master/slave vm1 filesystem	A or B
368	22 : 0, 1	Master/slave vm2 filesystem	A or B
369	23 : 0, 1	Master/slave vm3 filesystem	A or B
370	24 : 0, 1	Master/slave vm4 filesystem	A or B
371	25 : 0, 1	Master/slave vm5 filesystem	A or B
372	26 : 0, 1	Master/slave vm6 filesystem	A or B
373	27 : 0, 1	Master/slave vm7 filesystem	A or B
374	62 : 0, 1	Master/slave vm8 filesystem	A or B
375	63 : 0, 1	Master/slave vm9 filesystem	A or B
* For an alarmed master filesystem (device 0), see Procedure A. For an alarmed slave filesystem (device 1), see Procedure B.			
Note: Error 349 points to Alarms 360 to 375. Error 350 points to Alarms 376 to 391.			

Procedure A: Master Filesystem Alarm Resolution

To resolve an alarm for a *master* filesystem:

1. First, find which disk the alarmed filesystem is on. Display the `filesystem : list` form for each disk to find the alarmed filesystem. It should be unmounted (not have a mount point).
2. Check the alarm and error logs to be sure the disk drive the master filesystem was on is not bad. See Table 3-2 for errors that may point to potential disk failures. If the disk looks bad, go to Chapter 6 to investigate possible disk problems.
3. When you have found the bad filesystem, display the `filesystem : detail` form (see Figure 10-1, *The filesystem : detail Form*, for an example).
4. Enter the name of the currently active filesystem (the former slave filesystem) and press `ENTER`.
5. Turn mirroring off (change the `redundant` field to `n`) and press `CHANGE`.
6. Now press `CLEAR FORM` and enter the name and type of the alarmed filesystem (the former master filesystem) and press `ENTER`.
7. When the filesystem data is displayed, press `DELETE` to remove this filesystem.
8. Enter the name of the currently active filesystem again and press `ENTER`. When the filesystem data is displayed, change the `redundant` field back to `y`.
9. When the system prompts you for the slave filesystem name, enter the name of the former master filesystem (the filesystem you just deleted). Press `CHANGE`.

Procedure B: Slave Filesystem Alarm Resolution

When a slave filesystem is alarmed, the alarm can be resolved without shutting the system down. Do the following:

1. Check the alarm and error logs to be sure the disk drive the master filesystem was on is not bad. See Table 3-2 for errors that may point to potential disk failures. If the disk looks bad, replace it using Chapter 6 and restore service.
2. When you have found the bad filesystem, display the `filesystem : detail` form. Enter the name and type of the *master* filesystem. Press `ENTER`.
3. When the system displays the filesystem information, tab to the `redundant` field and enter `n`. Press `CHANGE`. The alarm should now be resolved.
4. Now press `CLEAR FORM` and enter the name and type of the former *slave* filesystem. Press `ENTER`. When the filesystem information is displayed, press `DELETE`.
5. Finally, re-enter the name and type of the *master* filesystem. Press `ENTER`. When the filesystem information is displayed, tab to the `redundant` field and enter `y`. Tab to the *slave* field and enter the name of the slave filesystem. Press `CHANGE`.

```

AUDIX STATUS:  alarms: none,  logins: 1,  thresholds: none
PATH:  filesystem : detail

filesystem: disk00.sd          type: sdas
(PRESS ENTER TO DISPLAY FILESYSTEM DATA)

      size: 1000          free: 275

      redundant (y/n/d)? y  status: complete

      master filesystem: disk00.sd

      slave filesystem : disk02.sd

```

Error and confirmation messages appear here.

CHANGE or RUN	ADD	DELETE	HELP	FIELD HELP	CLEAR FORM	EXIT	ENTER

Figure 10-1. The `filesystem : detail` Form With Sample Data

NOTE

On R1V4 systems, the `redundant` field may be labeled `mirrored` and the `d` and `all` options may not be available.

RESTORING FILE REDUNDANCY FOR MULTIPLE FILESYSTEMS

A system error or disk crash may cause you to lose one or more of your duplicated filesystems (you may have received a `bad slave` or equivalent message). When the system problem is fixed, you can restore all missing duplicate filesystems in one step as follows:

1. Display the `filesystem : detail` form.
2. Move the cursor to the `filesystem` field and type **all**.
3. Move the cursor to the `redundant` field and type **y** for yes.
4. Press **F1** (CHANGE or RUN).

The system will begin making copies of all filesystems that are no longer mirrored as a result of the disk problem. It may take up to 30 minutes for the system to duplicate each filesystem.

DISTRIBUTING FILESYSTEMS

Customers who have more than one hard (or fixed) disk in their AUDIX systems can improve their response time by placing the busiest filesystems on separate hard disks.

Activity of Filesystems

The most frequently accessed AUDIX filesystems are:

- sdat
- sst (especially if the Activity Log is turned on)
- vdat

The next most active filesystems are:

- adat
- ndat

System response time will improve to the extent that these filesystems can be separated. General guidelines include:

1. The three busiest filesystems (sdat, sst, and vdat) should be placed on separate disks whenever possible.
2. The next busiest filesystems (adat and ndat) should be separated from sdat, sst, and vdat if possible.
3. The vtext filesystems should be spread as evenly as possible among disks.

Table 10-2, *Recommended Filesystem Distribution*, shows how filesystems should be distributed, based on the number of disks in the system, to result in optimum performance.

File Redundancy

Table 10-3, *Recommended Filesystem Distribution with File Redundancy*, shows the recommended filesystem distribution if full mirroring is used (all filesystems are duplicated and continuously updated). Customers who are using the File Redundancy feature to duplicate only some of their filesystems should combine the recommendations from Tables 10-2 and 10-3 as appropriate.

Table 10-2. Recommended Filesystem Distribution

Number of Hard Drives	disk00	disk02	disk03	disk04	disk05	disk06
1 HDD	boot_f boot_e sd vdat sst adat ndat all vtext					
2 HDDs	boot_f sd vdat 50% vtext	boot_e sst adat ndat 50% vtext				
3 HDDs	boot_f sd ndat 30% vtext	boot_e vdat adat 30% vtext	sst 40% vtext			
4 HDDs	boot_f sd 25% vtext	boot_e vdat 25% vtext	sst 25% vtext	adat ndat 25% vtext		
5 HDDs	boot_f sd 20% vtext	boot_e vdat 20% vtext	sst 20% vtext	adat 20% vtext	ndat 20% vtext	
6 HDDs	boot_f sd 15% vtext	boot_e vdat 15% vtext	sst 15% vtext	adat 15% vtext	ndat 15% vtext	25% vtext

In the following table, duplicated (*mirrored*) filesystems are indicated with an **m** prefix.

Table 10-3. Recommended Filesystem Distribution with File Redundancy

# of Drives	disk00	disk02	disk03	disk04	disk05	disk06
2 HDDs	boot_f sd vdat 50% vtext msst madat mndat 50% mvtext	boot_e sst adat ndat 50% vtext msdat mvdat 50% mvtext				
3 HDDs	boot_f sd ndat 33% vtext mvdat 33% mvtext	boot_e vdat adat 33% vtext msst 33% mvtext	sst 34% vtext msdat madat mndat 34% mvtext			
4 HDDs	boot_f sd 25% vtext mvdat 25% mvtext	boot_e vdat 25% vtext msdat 25% mvtext	sst 25% vtext madat mndat 25% mvtext	adat ndat 25% vtext msst 25% mvtext		
5 HDDs	boot_f sd 20% vtext mvdat 20% mvtext	boot_e vdat 20% vtext mndat 20% mvtext	sst 20% vtext madat 20% mvtext	adat 20% vtext msst 20% mvtext	ndat 20% vtext msdat 20% mvtext	
6 HDDs	boot_f sd 16% vtext 16% mvtext	boot_e vdat 16% vtext 16% mvtext	sst 16% vtext 16% mvtext	adat 16% vtext mvdat 16% mvtext	ndat 16% vtext msdat 16% mvtext	20% vtext msst madat mndat 20% mvtext

11. Control Mode

This chapter covers system diagnostic procedures for a nonworking AUDIX system. Many steps can only be done by an on-site service technician. Contents include:

- Quick-Reference Procedure
- Control Mode/Visual Inspection Checklists (includes nonworking system diagnosis)
- Control Mode Menu Options.

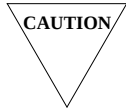
QUICK-REFERENCE PROCEDURE

- Step 1: Ask the *local technicians* to visually inspect the AUDIX system. *Record* any obvious problems and the slot numbers of any circuit packs with lit red (alarm) LEDs.
- If there are obvious disk drive problems, go to Chapter 6.
 - If there are obvious power or environmental problems, go to Chapter 7.
- Step 2: Display the Control Mode Menu and select Option 1. *Record* any entries with nonzero codes or *no asterisks* (*).
- Step 3: Select Option 2 on the menu. If it lists alarms, go to Chapter 3.
- Step 4: Select Option 3 on the menu and *record* the last two or three entries (if any).
- Step 5: Select Option 4 on the Control Mode Menu (restart). The system will try to start up.
- If the restart succeeds and the message “start service” appears, log in and go to Chapter 3 to verify good service.
 - If the restart succeeds, but the message “service not started” appears, log in and go to Chapter 12 to find the missing filesystem.
 - If the restart fails, the system attempts a reboot automatically (answer the initialization prompts). See step 6.
- Step 6: If the restart does not succeed or hangs, force a reboot by using Option 5 on the menu or (locally) by cycling the MI toggle switch.
- If the reboot succeeds and you get the “start service” message, log in and go to Chapter 3 to verify good service.
 - If the reboot succeeds, but the message “service not started” appears, log in and go to Chapter 12 to find the missing filesystem.
 - If the reboot fails, do another visual inspection and compare the current status to the status prior to the reboot (note any new or continuing red LEDs).
- Step 7: Display Options 1, 2, and 3 on the Control Mode Menu and compare the current status to the previous status.
- If Option 2 now shows alarms, go to Table 3-1.
 - Decode Option 1 nonzero codes using *Control Mode Menu Options*. See if the status bits indicate faulty packs that match the red LEDs on possibly alarmed circuit packs.
 - Decode Option 3 initialization history messages using Chapter 7. This should further pinpoint faulty circuit packs which should be replaced.
 - Resolve initialization failure problems using Chapter 7. Replacement procedures for individual circuit packs are in Chapter 4.
- Step 8: After replacing the faulty unit and doing a successful reboot, go to Chapter 3 to verify good service (if “start service” appears), or go to Chapter 11 to find a missing filesystem (if “service not started” appears).
- Step 9: If you cannot decode the problem, escalate the problem using your local procedures.

CONTROL MODE/VISUAL INSPECTION CHECKLIST

Whenever AUDIX software is not running, take 5 minutes to record the Control Mode Menu and visual inspection information before doing any service procedures. This quick check is vital to help you isolate a simple problem. It also ensures you have a record of the initial system state so you can bring other people up to date (for example, if the problem is escalated further).

A service technician must be on-site in order to do the visual inspection steps.



DO NOT cycle power, restart, or reboot the system without recording the information in the checklist *first*. Otherwise, this data will be lost and a valuable clue to repairing the system will be erased.

CONTROL MODE/VISUAL INSPECTION CHECKLIST			
Step:		Normal:	Abnormal:
1	– Access and Display Control Mode Menu	_____	_____
2	– Record System Status (Display Option 1)	_____	_____
3	– Record Alarms (Display Option 2)	_____	_____
4	– Record Initialization History (Display Option 3)	_____	_____
5A	– Check Power Status (AC/Battery Reserve or DC)	_____	_____
5B	– Check Fans and Fuse	_____	_____
6	– Check Disk Drives	_____	_____
7	– Check Circuit Pack LEDs	_____	_____

CONTROL MODE WORKSHEET

(Copy this page or use a separate sheet of paper)

Step 1: Control Mode Menu appears: YES___ (continue) NO___ (go to Chapter 10)

Step 2: Record all nonzero fields and asterisks (Menu Option 1):

DBPI___ SCPI___ VB1___ VB2___ FP___ DBP___ MI___

Step 3: Check off all currently active alarms (Menu Option 2):

CHG_RATE___ CNVDSK___ FANALM___ FUSALM___
LOW_BAT___ ON_RESV___ OPTALM___ RESV_FLT___

Step 4: Record the last two or three initialization messages (Menu Option 3):

Step 5A: Record any abnormal battery reserve or power states in both cabinets (if installed):

Lower Cabinet Upper Cabinet

Red LED: ON___ OFF___ ON___ OFF___ (Should be OFF)
Yellow LED: ON___ OFF___ ON___ OFF___ (Should be OFF)
Green LED: ON___ OFF___ ON___ OFF___ (Should be ON)
Power Switch: ON___ OFF___ ON___ OFF___ (Should be ON when ac power cord plugged in)

Step 5B: Check off any stopped fan(s) or blown fuse:

Fuse blown (lower)___ (upper)___ All fans stopped (lower)___ (upper)___
One fan stopped (lower): Left___ Left-middle___ Right-middle___ Right___
One fan stopped (upper): Left___ Left-middle___ Right-middle___ Right___

Step 6: Check if drives are running and have lit yellow LEDs on TN475B SADI:

disk00 (LED 10):___ RCD (LED 11):___ disk02 (LED 12):___ disk03 (LED 13):___
disk04 (LED 14):___ disk05 (LED 15):___ disk06 (LED 16):___

Step 7: Record any circuit packs with red LEDs, and record the status shown on the MI alarm panel (alarms, shutdown state):

Step 1: Verify You Are in Control Mode

This step checks if the system is in control mode and if the MI, terminal, and cables are working.

Local (On-Site) Procedure

1. If the LMT (Local Maintenance Terminal) is already attached, check the display for messages or the Control Mode Menu shown in Figure 11-1, *Control Mode Menu Screen Displays*.
2. If you just connected the LMT, press **BREAK** (or **BREAK** and **RETURN**) to try to get a response.
 - a. If the “login:” message appears, software is running. Go back to Chapter 3.
 - b. If no prompt appears, press **CTRL** + **C**. The Control Mode Menu should appear if software is *not* running.
 - c. If the terminal does not respond at all, go to Chapter 15 for troubleshooting. Only the LMT can respond; the administration terminal port does not work in control mode and will show no messages.
3. Press **CTRL** + **C** again. The menu should again appear on the terminal screen.
4. Record the terminal response using the Control Mode Menu Worksheet. If you wish, you can copy the Control Mode Worksheet and fill in Step 1.

Remote (Off-Site) Procedure

1. From the RMT (Remote Maintenance Terminal), dial the number of the remote site. The AUDIX-site modem should answer.
2. Press **BREAK** (or **BREAK** and **RETURN**) a few times to try to get a response. *If the “login:” message appears, software is running. Go back to Chapter 3.*
3. If the “login:” message *does not* appear, press **CTRL** + **C**. The Control Mode Menu should appear if software is not running.
4. Press **CTRL** + **C** to verify the system is responding to the terminal. *If you get no response, the MI may be faulty or the terminal may not be set up correctly.*
5. List any display options (1 to 3) or run any corrective procedures (4 to 6) you feel appropriate to diagnose or possibly repair the system.

MAINTENANCE INTERFACE IN CONTROL – FEATURE PROCESSOR PUT TO SLEEP

Control mode menu:

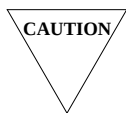
1 = system status	4 = AUDIX restart
2 = environmental alarm status	5 = AUDIX reboot
3 = initialization history	6 = AUDIX restart and DBP reboot

C>

Figure 11-1. Control Mode Menu Screen Display

Step 2: Record System Status (Option 1)

This step checks the system status at the time the MI circuit pack entered control mode.



All Control Mode Menu information is lost whenever the system is powered down. To preserve the initial system state, record it now.

1. Type “1” and press **RETURN** on the terminal. The screen should show a list of S-bus processor circuit pack status similar to the one shown in Figure 11-2, *Control Mode Menu System Status Display*. Codes are in hexadecimal.
2. Record any nonzero fields. This indicates possible problems for any processor *except* the MI, which is usually nonzero in control mode.
3. Record any processors that *do not* have an asterisk (*) next to them. Jot this information down in your notebook or use Step 2 on the worksheet.

Control Mode MI System Status Display:

DBPI	SCP	VB1	VB2	FP	DBP	MI
0000*	0000*	0000*	0000*	0000*	00000000*	00xy*

Figure 11-2. Control Mode Menu System Status Display

Step 3: Record Alarms (Option 2)

This procedure records any *currently active* alarms. This display may be updated after the system is powered down. To preserve any initial entries, record them now.

1. Type **2** and press **RETURN**. The terminal screen should show one of the active alarm messages shown in Figure 11-3, *Control Mode Menu Alarms Display*.
2. Record any active alarms (see Step 3 on the worksheet).

```
active alarms:    CHG_RATE  CNVDSK  FANALM  FUSALM
                  LOW_BAT   ON_RES  OPTALM  RESV_FLT

or

no active alarms
```

Figure 11-3. Control Mode Menu Alarms Display

Step 4: Record Initialization History (Option 3)

This step shows where initialization failed when the MI entered control mode. If you try to reinitialize, the new information is recorded here. This data is lost whenever the system is powered down. To preserve this information, record it now.

NOTE

You will frequently display this option when trying to diagnose a nonworking system that cannot fully initialize (as in Chapter 3). This option records each last initialization attempt so you can study messages that may have scrolled off your screen.

1. Type **3** and press **RETURN**. The terminal screen should show initialization reports like the examples shown in Figure 11-4, *Control Mode Menu Initialization History*.
2. Record the last two or three initialization messages (see Step 4 on the worksheet).

```
initialization history:

    FP has completed its self tests and is operational
    S-bus tests failed

or

no initialization history available
```

Figure 11-4. Control Mode Menu Initialization History

Step 5: Visually Inspect Power Equipment

This data can change after the system is powered down. Record it now before doing any service procedures (see Steps 5A and 5B on the worksheet).

NOTE

For two-cabinet systems, do the following checks for each cabinet. If any of the power equipment is bad, be sure to record the cabinet with the problem.

1. If AC power is used, check to see that the power cord at the rear of the AUDIX cabinet is plugged in to a working 110 V AC, 60-Hz, 15-amp outlet, and that the cabinet's POWER switch is ON. The base cabinet and the expansion cabinet must use separate 15- or 20-amp breakers.
2. If DC power is used, verify that the feeders from the DC power plant are connected properly. Both the one- and two-cabinet AUDIX systems require two –48 V, 30-amp, single-pole dedicated circuits. More details can be found in the AUDIX installation manual.
3. Record the power LED status on the lower front panel. Only the green LED should be lit.
4. Check if *all four* fans are running, or if three fans are on high and *one* fan is not running.
5. Check if the fuse is blown.

Step 6: Check Disk Drives

Check to see if the drives are running (watch for LED activity). The LEDs vary on different drives:

- The RCD should have a steady green (ready) LED.
- On most disk drives (including the red LED on the RCD), a lit red or green LED on the front of the drive means the disk heads are accessing the drive (red is *not* a fault). Check for flickering LEDs on the hard disks by looking through the lower front screen.

Check that the LEDs on the TN475B SADI (slot 01) are lit for each installed drive:

- LED 10 = HDD 0/0 (disk00) (*required*)
- LED 11 = RCD 0/1 (backup) (*required*)
- LED 12 = HDD 0/2 (disk02) (*optional*)
- LED 13 = HDD 0/3 (disk03) (*optional*)
- LED 14 = HDD 0/4 (disk04) (*optional, top cabinet*)
- LED 15 = HDD 0/5 (disk05) (*optional, top cabinet*)
- LED 16 = HDD 0/6 (disk06) (*optional, top cabinet*).

Step 7: Visually Inspect Circuit Pack LEDs

Red LEDs indicate a faulty circuit pack or failed self-test.

Check the TN511 MI

1. Record if the MI has alarmed itself (red FAULT LED at top of circuit pack is lit).

NOTE

Normally only the yellow IN USE LED should be lit when the LMT is connected. If the MI is alarmed, the maintenance terminal may not work correctly or may not be able to show the Control Mode Menu.

2. Check the MI's alarm panel for system-wide alarms or warnings (under the ALARMS label). Record any indicated problems or faults.
3. Check the LEDs above and below the MI toggle switch. Record if the software is running (the green ACT LED is lit) or is shut down (the red COMPL LED is lit).
4. Check for a lit red LED on the TN523 or TN591 (bottom cabinet, next to the MI) to confirm the system is not running and is shut down.

Check the Remaining Circuit Packs

1. Record each circuit pack that has a lit red LED. (This does not necessarily mean the circuit pack is faulty; the red LEDs may go out after a successful reboot or if another problem is fixed.)
2. Not all circuit packs have red LEDs. Record packs that do not have any LEDs lit at all, or should have a pulsing green LED as a heartbeat and do not. Use the “Visual Inspection” checklist in Appendix A to find the correct LED states for AUDIX circuit packs.

Control Mode Checklist Diagnosis

Along with the Control Mode Menu options and visual information you recorded on the worksheet, use the following to diagnose the most likely problem with the system. Some steps apply to both cabinets in a two-cabinet system. When applicable, check both cabinets.

NOTE

Before going to any other section, you may first try to reboot the system to see if the problem clears. *DO NOT* cycle power or reboot the system without recording visual or Control Mode Menu information *first* or this data will be lost.

1. *Is the Maintenance Terminal Working?*
 - a. If the Control Mode Menu appeared and the terminal responded, go to the next step.
 - b. If the terminal could not display the Control Mode Menu or its options, go to Chapter 8 to troubleshoot the terminal connection to the MI.
2. *Is There a Power or Environmental Problem?*
 - a. If Control Mode Menu Option 2 showed no active alarms (Step 3 of the worksheet is normal), go to the next step.
 - b. If you recorded any active alarms, go to Chapter 3.
3. *Is There a Power Problem?*
 - a. If you found no visual power problems (Step 5 of the worksheet is normal), go to the next step.
 - b. If you recorded any problems or if the system is not running at all (no fans or LEDs work when the POWER switch is ON), go to Chapter 7.
4. *Is There a Disk Drive Problem?*
 - a. If you found no visual disk drive problems (Step 6 of the worksheet is normal), go to the next step.
 - b. If the TN475B SADI or the drives did not have the correct LEDs lit, go to Chapter 6.
5. *Is There a Possible Circuit Pack, Disk, or Software Problem?*
 - a. If Control Mode Menu Option 1 showed only zeroes (0) or asterisks (*) for all S-bus processors (Step 2 of the worksheet is normal), go to the next step.
 - b. If any nonzero hexadecimal codes appeared for any processor *except* the MI, keep a note of it. (You may look up MI codes using *Control Mode Menu Options* if you wish.)

- c. Note the disk drives that did not seem to work correctly (Step 6 of the worksheet).
- d. Note the circuit packs that had red LEDs lit (Step 7 of the worksheet), or that did *not* have a yellow or green LED lit when they should.

6. *Restart the System*

- a. Select Option 4 on the Control Mode Menu (restart). The system will try to start up.
- b. If the restart succeeds and the message “start service” appears, log in and go to Chapter 3 to verify good service.
- c. If the restart succeeds, but the message “service not started” appears, log in and go to Chapter 12 to find the missing filesystem.
- d. If the restart fails, the system attempts a reboot automatically. You must answer the initialization prompts (see Chapter 12).

7. *Reboot the System*

- a. If the restart does not succeed or hangs, force a reboot by using Option 5 on the menu or (locally) by cycling the MI toggle switch.
- b. If the reboot succeeds (the system initializes), log in and go to the appropriate section in Chapter 3 or Chapter 12 based on the start service message.
- c. If a reboot fails, do another visual inspection and compare the current status to the status prior to the reboot (note any new or continuing red LEDs).

8. *Compare Previous Status*

- a. Display Options 1, 2, and 3 on the Control Mode Menu again and compare the current status to the previous status.
 - a. If Option 2 now shows alarms, go to Chapter 7.
 - b. If the reboot fails, display Option 1 again and compare the faulty (nonzero) codes to the first display (recorded in Step 2). If the same circuit pack(s) failed both times, you may have isolated the faulty pack(s). If desired, you may go to *Control Mode Menu Options* to decode the status codes.
 - c. See if the same circuit packs with lit red LEDs are alarmed again. Check if these possibly faulty packs match the nonzero processors listed by Option 1.
 - d. Display Option 3 on the menu again and compare the initialization messages you recorded with the new history. If the reboot failed in the same place, you may have isolated the problem.
 - e. Go to Chapter 12 for initialization troubleshooting. Circuit pack replacement procedures are in Chapter 4.
- b. After replacing the faulty unit and doing a successful reboot, go to Chapter 3 to verify good service (if “start service” appears), or go to Chapter 12 to find a missing filesystem (if “service not started” appears).
- c. If you cannot decode the problem, escalate the problem using your local procedures.

CONTROL MODE MENU OPTIONS

This section describes the operation of Control Mode Menu functions. Options 1, 2, and 3 (system status, alarm status, and initialization history) are used in the previous section as part of nonworking system diagnosis. Options 4, 5, and 6 are used to try to return a nonworking system to service.

NOTE

The information in Options 1, 2, and 3 is erased if the system is rebooted or if power is cycled. Record this information *first* before you bring the system down.

Option 1: System Status

This option records the system status at the time the MI circuit pack entered control mode. This information is updated once a minute by the FP-CPU when the system is running in normal mode. The VIP software in the FP tells the MI which processors were communicating before the system entered control mode; these are marked with asterisks (*).

Control Mode MI System Status Display:

DBPI	SCP	VB1	VB2	FP	DBP	MI
0000*	0000*	0000*	0000*	0000*	00000000*	00xy*

- Any nonzero fields indicate a possible problem with the processor (except for the MI).
- An asterisk (*) means the FP-CPU (PE 0) could communicate with the indicated subsystem at the time the last update was received. This means the indicated processor is probably working.
- “SCP” is the SCPI or the MPSI on AUDIX. One-cabinet systems do not have a “VB2.”
- The MI’s two hexadecimal nibbles (xy) give the reason why the MI entered control mode or reset the FP. See the end of this section for MI code definitions.

This display shows a 2-byte status word (SYS_STAT opcode) for each processor (the DBP has 4 status bytes) in hexadecimal code. These hexadecimal values may be converted to binary (0’s and 1’s) if you wish to know the exact meaning of a code. Binary status words are read from right to left (bit 0 is on the right and bit 15 is on the left). Any “1” bit indicates a possible problem with that circuit pack. If a circuit pack shows all zeroes (0), it is either healthy or is not installed.

Usually you are not interested in specific bit meanings. If the processor does *not* have an asterisk, or if a nonzero code appears for the status word (meaning the hexadecimal-to-binary conversion would result in one or more “1” bits, the processor circuit pack may be faulty and is a possible candidate for replacement. *Before* replacing any packs, record this display status, then try a system reboot and see if the problem is corrected.

If you wish to convert a hexadecimal value to binary, use Table 11-1. For example, the code “a107” would be “1010 0001 0000 0111,” where “0111” is the low-order nibble “7” (2 nibbles make a byte, and

2 bytes make a word). The meaning of each bit in the status word appears in the “maintenance : system : hardware status” form description in Appendix B. The exception is the MI, whose bits are described following Table 11-1.

Table 11-1. Hexadecimal-to-Binary Conversion

Hexadecimal	Decimal	Binary Value
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	1001
A	10	1010
B	11	1011
C	12	1100
D	13	1101
E	14	1110
F	15	1111

MI Status:

The MI shows status in the form “00xy,” where “x” is the high nibble and “y” is the low nibble.

Low Nybble (y) – Reason MI Entered Control Mode

- 0 Craft request (for reason other than those given below).
- 1 Shutdown switch was thrown off-center during normal mode operation.
- 2 Maintenance software request via Control Opcode #2.
- 3 MI did not receive the SYS_STAT opcode for 4 minutes and a monitor was not installed.
- 4 FP firmware instructed the MI to enter control mode via byte 510 of the dual-port RAM.
- 5 FP sanity time-outs exceeded a leaky bucket threshold.
- 6 FP firmware reset response failures have exceeded a threshold.
- 7 Time-outs on an FP transfer to O/P have exceeded a threshold.
- 8 MIIOP failures to set the FPOK bit have exceeded a threshold.
- 9 FP firmware reboot requests have exceeded a leaky bucket threshold.

High Nybble (x) – Reason MI Reset the FP

- 0 Power-up reset.
- 1 Shutdown switch was thrown off-center during normal mode operation (same as bit 1 above).
- 2 VIP software manager requested restart or reboot.
- 3 The MI did not receive the SYS_STAT opcode for 4 minutes, and the FP monitor was not installed (same as bit 3 above).
- 4 FP firmware requested a restart or reboot.
- 5 FP sanity time-outs exceeded a leaky bucket threshold (same as bit 5 above).
- 6 FP failed to respond to a reset after 1 minute.
- 7 MI timed out on impending transfer to Oryx/Pecos after 20 minutes.
- 8 MI timed out on MIIOP software driver setting FP_OK bit.

- 9 MI init state variables in error.
 - a AC power returned after LOW_BAT went active.
 - b AC power returned before DIE opcode (disconnect battery) was sent from VIP software manager.

Option 2: Active Alarms

This display shows currently active power or environmental alarms. These alarms appear in the Control Mode Menu so you can display them when the system is not running. If software is running, they are also recorded in the active alarm log. Go to Chapter 7 to find the resolution procedure for the listed alarm. In two-cabinet systems, a power or environmental alarm displayed using this option could apply to either cabinet.

Option 3: Initialization History

This option records the initialization messages from the last reboot up to the point where the initialization failed. This allows you to review the messages of the last failure when you are trying to solve initialization problems. Usually the last two or three messages pinpoint the problem. See Chapter 12 for complete initialization troubleshooting procedures.

Option 4: Restart

This option attempts to return the system to normal mode using the programs in FP memory to do a partial (software) initialization. A checksum compares memory to disk; if the contents differ, the system automatically does a full reboot (you are given initialization prompts). Restarts are normally done to clear software problems. You must log in following a restart.

Option 5: Reboot

This option does a complete initialization by loading programs into memory from disk. A reboot is often done to clear system problems (such as corrupt program memory) when a restart is insufficient. A power-up (usually after hardware replacement) automatically does a reboot. You must answer initialization prompts and log in for a reboot (see Chapter 12 for details).

Option 6: FP Restart and DBP Reboot

This option is designed to save time while diagnosing DBP subsystem problems by doing only a partial hardware initialization. The programs in FP memory are restarted, then the DBP subsystem is completely reinitialized. This procedure cuts down the total initialization time to about 5 minutes. Normally, a

complete reboot takes 10 minutes or more, depending on system configuration.

12. Initialization Debugging

OVERVIEW: If, during an AUDIX initialization, the Control Mode Menu appears on the display terminal, the hardware failed to initialize. This chapter can help troubleshoot this situation. If, on the other hand, the hardware succeeded in initializing, but the message “service not started” appears, go to Chapter 14 to troubleshoot the software.

- Initialization troubleshooting procedures
- Basic initialization information including selecting initialization options.

Initialization Troubleshooting

Use the last *good* (normal or expected) message on your terminal as the troubleshooting starting point. Please review each of the following steps before debugging the system.

Troubleshooting a Nonworking System

1. Run through the Control Mode Menu checklist in Chapter 11. This quick check on a nonworking system may lead you to another area. (For example, disk problems are handled in Chapter 6.)
2. If this is the second, third, etc. attempt at initializing the system, display Option 3 on the Control Mode Menu. This lists the messages (if any) from the last initialization attempt.
3. Table 12-1, *Last “Good” Message Sections*, shows each good message of a successful initialization in the order that they appear. Each message has a corresponding section in this chapter. Turn to your last “good” message section for troubleshooting procedures.
4. Repair steps usually involve checking or replacing hardware unit(s). **Always spin down the RCD and power down the system first.**
 - a. After the RCD is spun down and power has been turned off, you may pop (unseat), push (reseat), or swap (exchange) circuit packs. Verification tests for each pack are in Chapter 4.
 - b. Certain types of circuit packs are used in more than one slot in the system. You can swap a suspected circuit pack with a duplicate as part of problem isolation to see if the fault follows the original circuit pack.
 - c. You may need to check or replace other hardware as directed. Complete diagnostic and replacement procedures for buses or the backplane are in Chapter 13. To service disk drive, power, and environmental components, see Chapters 6 and 7.

5. After each repair procedure, power up and reinitialize the system. Watch the LED patterns (see *Initialization Overview* later in this chapter) on the circuit packs and see if the initialization passes the point where it failed before.
6. *If the initialization fails again*, repeat Steps 2 through 5.

The hardware problem is fixed when the last system message is either:

- a. “start service” (log in and go to Chapter 3 to verify good service), or
- b. “service not started” (log in and go to Chapter 14 to find and restore a missing filesystem).

NOTE

Alarms that occur while the system is down are not recorded in the alarm logs because software is not running.

Table 12-1. Last “Good” Message Sections

Normal Time Until Message	Normal Initialization Messages
1-40 seconds	FP reset
1-40 seconds	AUDIX INITIALIZATION IN PROGRESS
1 second	Standard initialization? (y or n)
1 second to 2 min. (time-out)	Standard initialization invoked. * (or nonstandard initialization options are listed)
1 second	FP self tests passed.
1 second	VSP self tests passed. (Two-cabinet systems only.)
1 second	Interprocessor communication test passed. (Two-cabinet systems only.)
30 seconds	(FP configuration results display)
1 second	S-Bus access test passed.
1 second	VSFI access test passed.
5 seconds	DBPI initialization passed.
2-3 minutes or 15-30 minutes	FP RAM passed.
1 second	VSP RAM passed. (Two-cabinet systems only.)
1 second	DBP RAM passed.
1 second	(DBP initialization results display)
1 second	DBP initialization passed.
20 seconds	Attempting DBP file system boot (controller,disk,filesystem): 0,0,f

* See *Initialization Overview* at the end of this chapter.

(Continued)

TABLE 12-1. Last “Good” Message Sections (*Continued*)

Normal Time Until Message	Normal Initialization Messages
1-20 seconds	<i>Attempting DBP file system boot (controller,disk,filesystem): 0,0,f</i> *
1 second	DBP boot file loaded.
1 second	AUDIX loader file opened.
1 second	AUDIX loader file loaded.
30 seconds	Impending transfer to AUDIX loader.
1 second	FP AUDIX loaded.
5 seconds	VSP AUDIX loaded. (Two-cabinet systems only.)
5 seconds	Impending transfer to AUDIX.
20 seconds	MAINTENANCE INTERFACE ENTERING NORMAL MODE
20 seconds	<i>login:</i> †
5 seconds to	<i>fp mtce on</i>
45 minutes	(depends on size of database)
1 second	<i>login:</i>
5 seconds	<i>dbp available</i>
1 second	<i>login:</i>
5 seconds	<i>fpi/vspi link</i> (Two-cabinet systems only.)
1 second	<i>login:</i>
5 seconds	<i>vsp mtce on</i>
1 second	<i>login:</i>
25 seconds	<i>vb/td bus up</i>
1 second	<i>login:</i>
20 seconds	<i>admin on</i>
1 second	<i>login:</i>
5 seconds	start service
1 second	<i>login:</i>

* Additional messages appear only when the system could not access a boot filesystem on the first try. It will try each possible filesystem name in turn. See *Initialization Overview* at the end of this chapter.

† These italicized messages show software modules logging in; some messages may appear twice.

FP Reset

You should see “FP reset” for any of the following:

- For a restart — marks the beginning of a software initialization
- For a reboot — marks the beginning of a hardware initialization
- When the system cannot initialize, it automatically tries the reboot again. The system may retry a failing initialization three times before giving up and showing the Control Mode Menu.
- When the system experiences too many problems to handle gracefully.

If this message appears while software is running, it may take a couple of minutes for the reinitialization to start because software filesystems must be closed first.

NOTE

If the “FP Reset” message does *not* appear when an initialization should start, the MI is not sending messages to the FP. One of these two circuit packs is most likely bad.

LED States:

Check for the following good LED pattern:

FP-CPU = red (reset)

FP-RAM (circuit pack 0) and DBPI = red (reset)

Minimum Configuration

for Next Normal Message: FP-CPU, FP-BI, FP-RAM, and the MI (for messages).

Next Normal Message: “AUDIX INITIALIZATION IN PROGRESS.”

Next Bad Message: “FP reset” or no message at all.

Time Till This Message: 40 seconds or no response.

Likely Failures: FP-CPU or first FP-RAM circuit pack.

Troubleshooting: If you can’t get past this message, probably the FP-CPU is faulty. If you get no message or no screen display, probably the MI is faulty.

1. If the MI’s red FAULT LED is lit, power off, replace the MI circuit pack, and power back up. If the problem remains, continue.
2. If the red LED is *not* lit, pop (unseat) the MI and reboot. If the FP-RAM green LED lights within 15 seconds, the FP is doing its RAM tests as normal. Replace the MI and verify the problem is fixed. If not, continue.
3. Power down and replace the FP.
4. If a new FP doesn’t solve the problem, the FP-RAM could be bad. If TN734 circuit packs are being used, swap the circuit pack next to the FP-CPU with the second FP-RAM circuit pack. If this solves the problem, the first FP-RAM circuit pack is probably faulty. Have it replaced.

If a TN761 circuit pack is being used, replace it to see if that fixes the problem.

5. If the problem remains, escalate it using your local procedures.

AUDIX Initialization in Progress

At this point, the FP is reset and begins self-testing. The FP and the MI continue to communicate. If the initialization stops at this point, do the following:

LED States:	Check for the following good LED pattern: MI = green and yellow (if terminal is connected) all through boot FP-CPU = yellow, green heartbeat FP-BI = yellow
Minimum Configuration for Next Normal Message:	FP-CPU, FP-BI, FP-RAM, and the MI (for messages).
Next Normal Message:	“Standard initialization? (y or n).”
Next Bad Message:	“FP reset” or no message at all.
Time Till This Message:	40 seconds or no response.
Likely Failures:	FP-CPU or MI. Possibly, FP-BI, RAM, or M-bus backplane problem.
Troubleshooting:	Do the following if no initialization history exists (Option 3 on the Control Mode Menu), or if “FP reset” or no message appears.
1. Follow Steps 1 to 5 in the previous section to find out if the problem is in the MI, the FP-CPU, or FP-RAM 0. If the problem remains, continue.
 2. If not solved, pop the FP-PE circuit packs (FP-CPU, RAM 0 and 1, and BI) and reinsert them one at a time, powering up and down between each circuit pack. For the RAM circuit packs, insert RAM 1 instead of RAM 0 to test the second circuit pack. The red LED on the RAM circuit pack should go on and then turn off. If one of the circuit packs does not follow this pattern, replace it and verify the problem is solved.
 3. If the problem is not solved, remove all the FP-PE circuit packs and the MI. Check the backplane for damage (see Chapter 13 for complete steps).
 4. If you still can't find the problem, call for help.

Standard Initialization? (y or n)

If no messages follow this point or an FP failure message appears after options are selected, do the following:

LED States:	Check for the following good LED pattern: MI = green and yellow (if terminal is connected) all through boot FP-CPU = yellow, green heartbeat FP-BI = yellow DBPI = red (reset)
Minimum Configuration for Next Normal Message:	FP-CPU, FP-BI, FP-RAM, and the MI (for messages).
Next Normal Message:	“Standard initialization invoked” (for the default initialization), or a list of nonstandard initialization options.
Next Bad Message:	“FP reset,” “FP self test failed,” or no message at all.
Time Till This Message:	3 minutes or no response.
Likely Failures:	FP-CPU or MI. Possibly, FP-BI, RAM, or M-bus backplane problem.
Troubleshooting:	Check your answers to the prompts, then check the circuit packs.
1. Check that your initialization options are correctly selected (see <i>Initialization Overview</i>). If the prompts were answered correctly, continue. 2. Diagnose the MI, FP-PE, or M-bus problem using the steps in “AUDIX initialization in progress”.	

FP Self Tests Passed

At this point the FP successfully completed its self-tests. It now tries to set up a path to the other S-bus processors (see Figure 12-1, *S-Bus Processors*). If you get no other message, do the following:

NOTE

If you are working on an AUDIX Standalone system, the SCPI or MPSI should not affect the initialization, but include it in the troubleshooting steps anyway.

TN533 SCPI
T01N533H,
and TN533H
TN547 MPSI

Figure 12-1. S-Bus Processors

LED States:	Check for the following good LED pattern: MI = green and yellow (if terminal is connected) all through boot FP-CPU = yellow, green heartbeat FP-BI = yellow
Minimum Configuration for Next Normal Message:	FP-CPU, FP-BI, FP-RAM, the MI (for messages), and the NC.

Next Normal Message:	FP configuration results display or “VSP self tests passed.”
Next Bad Message:	“Unable to determine system configuration,” no FP configuration appears, or “VSP self tests fails.”
Time Till This Message:	Up to 30 seconds.
Likely Failures:	FP-CPU, FP-BI, FP-RAM, or hung S bus. Also (possibly) M-bus failures, MI hanging the M bus, or a bad NC. <i>For two-cabinet systems</i> , the VSP-CPU, VSP-BI, VSP-RAM, S-bus extender cabling, or S-bus expansion circuit packs on the backplane.
Troubleshooting:	Check for a problem with the FP-PE, its buses, or other processors.

1. If the “Unable to determine system configuration” appears, the NC may be bad. Try replacing the NC if you get this message. If the NC is not the problem, continue.
2. Replace the FP-BI. If this doesn’t fix the problem, replace the FP-CPU.
3. *For two-cabinet systems, do the following:*
 - a. Replace the VSP-BI. If the problem remains, continue.
 - b. Swap the FP- and VSP-CPU. If the FP self tests now fail, the CPU now in the bottom cabinet is bad. Replace that circuit pack. If the original problem remains, continue.
 - c. Check the S-Bus expansion cables. Make sure they are correctly connected (see Chapter 13). If the cables are correctly connected, continue.
 - d. Check that the S bus expansion circuit packs are intact, and in the correct slot. If everything is correct, continue.
4. If the problem remains, power down, remove the circuit packs along the M bus, and check the backplane for damage or loose paddle circuit packs (see Chapter 13).
5. If the backplane seems okay, check the S bus for damage. Remove the S-bus processor circuit packs and check the backplane.
6. If the backplane and rear circuit packs seem okay, power down and push (reseat) the circuit packs. Pop the SCPI/MPSI, DBPI, and VB and power up. If the problem is resolved, the FP-CPU was bad. Replace it and verify that the problem is solved.
7. If the problem remains, power down. Push the S-bus processor circuit packs in one at a time, rebooting between each one. If the reboot fails, the last circuit pack pushed in was faulty. Replace it and verify that the problem is solved.
8. If you can’t find the problem, call for help.

VSP Self Tests Passed (Two-Cabinet Systems Only)

At this point, the FP has accessed the VSP and determined that the VSP has passed self tests. The FP now tries to set up a path to the other S-bus processors (see Figure 12-1, *S-Bus Processors*). If this is the last message you get, do the following:

LED States:	Check for the following good LED pattern: MI = green and yellow (if terminal is connected) all through boot FP-CPU = yellow, green heartbeat FP-BI = yellow VSP-CPU = yellow, green heartbeat VSP-BI = yellow
Minimum Configuration for Next Normal Message:	FP-CPU, FP-BI, FP-RAM, the MI (for messages), VSP-CPU, VSP-BI, VSP-RAM, and the NC.
Next Normal Message:	“Interprocessor communication test passed”
Next Bad Message:	“Interprocessor communication test failed” or no message at all.
Time Till This Message:	1 second.
Likely Failures:	VSP-CPU, VSP-BI, VSP-RAM, FP-CPU, FP-BI, FP-RAM, or hung S bus. Also (possibly) M-bus failures, or a bad NC.
Troubleshooting:	Check for a problem with the VSP-PE, the FP-PE, buses, or other processors. 1. Swap the VSP- and FP-CPU circuit packs, if the problem follows the circuit pack (FP self tests now fail) replace the CPU in the bottom cabinet. If the VSP-CPU is not the problem, continue. 2. Replace the VSP-BI. If this doesn’t fix the problem, replace the FP-BI followed by the FP-CPU. If the problem still remains, continue. 3. Replace the NC. If this does not fix the problem, continue. 4. If the problem remains, power down, remove the circuit packs along the M bus, and check the backplane for damage or loose paddle circuit packs (see Chapter 13). 5. If the backplane seems okay, check the S bus for damage. Remove the S-bus processor circuit packs and check the backplane. 6. If the backplane and rear circuit packs seem okay, power down and push (resseat) the circuit packs. Pop the SCPI/MPSI, DBPI, and VB and power up. If the problem is resolved, the FP-CPU was bad. Replace it and verify the problem is solved. 7. If the problem remains, power down. Push the S-bus processor circuit packs in one at a time, rebooting between each one. If the reboot fails, the last circuit pack pushed in was faulty. Replace it and verify the problem is solved. 8. If you can’t find the problem, call for help.

Interprocessor Communication Tests Passed

This is for Two-Cabinet AUDIX systems only. At this point, the FP and VSP have both completed their self-tests. The S-bus processors have set up communication path with the FP. The FP now tries to determine the state of the other S-bus processors. If this is the last message, do the following:

LED States:	Check for the following good LED pattern: MI = green and yellow (if terminal is connected) all through boot FP-CPU = yellow, green heartbeat FP-BI = yellow VSP-CPU = yellow, green heartbeat VSP-BI = yellow
Minimum Configuration for Next Normal Message:	In addition to the packs listed in “VSP Self Tests Passed”, the DBPI, SCPI/MPSI, VB1, VB2, TDBI 1, and TDBI 2.
Next Normal Message:	FP configuration results display.
Next Bad Message:	“Unable to determine system configuration” or no configuration appears.
Time Till This Message:	Up to 30 seconds.
Likely Failures:	DBPI, SCPI/MPSI, VB1, VB2, FP-BI, or (possibly) hung S-bus.
Troubleshooting:	Use the FP Configuration Results for the following procedure. If those results are not displayed, go to Step 5.

	DBPI	SCP	VB1	VB2	
Present	Y	Y	Y	Y	Y
Accessible	Y	Y	Y	Y	Y

Note: The “SCP” column refers to the SCPI or the MPSI. See Figure 12-1, *S-Bus Processors*, for a diagram of the S-bus processors.

1. Check the status of any processor that has present = Y and accessible = N.
2. If any processor has present = N, make sure a circuit pack is physically in that slot. If a correct circuit pack is installed in that slot, replace the FP-BI. If this doesn't fix the problem, replace the FP-CPU.
3. If the problem remains, power down, remove the circuit packs along the S bus, and check the backplane for damage or loose paddle circuit packs (see Chapter 13).
4. If the backplane seems okay, power down. Push the S-bus processor circuit packs in one at a time, rebooting between each one (see Figure 12-1). If the reboot fails, the last circuit pack pushed in was faulty. Replace it and verify the problem is solved.
5. If “Unable to determine system configuration” was displayed, replace the NC.
6. If you can't find the problem, try the M-bus diagnostic steps in “FP Self Tests Passed”.

FP Configuration Results Display

At this point the FP checks the S-bus processors for good communication with the FP. It shows its results in the following display. If it can't communicate with these processors over the S bus, it shows an error message or stops. If so, do the following:

NOTE

On AUDIX, the “SCP” column refers to the SCPI or the MPSI. See Figure 12-1, *S-Bus Processors*, for a diagram of the S-bus processors.

	DBPI	SCP	VB1	VB2
Present	Y	Y	Y	N
Accessible	Y	Y	Y	N

Note: VB2 should be present on two-cabinet systems

LED States: Check for the following good LED pattern:

Same as previous section plus:
DBPI = green

Minimum Configuration

for Next Normal Message: FP-CPU, FP-BI, FP-RAM, and the MI (for messages), plus all S-bus processors (DBPI, SCPI/MPSI, and VB).

Next Normal Message: “S-Bus access test passed.”

Next Bad Message: “S-Bus access test failed” or no message at all. The S-bus processor display appears even if the test fails.

Time Till This Message: Up to 30 seconds or no response.

Likely Failures: DBPI, SCPI/MPSI, VB, FP-BI, or hung S bus. Also, possibly, an M-bus problem or the MI hanging the M bus.

Troubleshooting: Check the status of any processor that has present = Y and accessible = N. This usually indicates a problem with that circuit pack.

1. If any processor has present = N, make sure a circuit pack is physically in that slot. If a circuit pack with an “N” entry is installed, replace the FP-BI.
2. If any processor has present = Y and accessible = N, replace it and see if this solves the problem.
3. If the configuration seems correct but this step fails, replace the FP-BI. If this doesn’t fix the problem, replace the FP-CPU.
4. If the problem remains, power down, remove the circuit packs along the S bus, and check the backplane for damage or loose paddle circuit packs (see Chapter 13).
5. If the backplane seems okay, power down. Push the S-bus processor circuit packs in one at a time, rebooting between each one (see Figure 12-1, *S-Bus Processors*). If the reboot fails, the last circuit pack pushed in was faulty. Replace it and verify the problem is solved.
6. If you can’t find the problem, try the M-bus diagnostic steps in “FP Self Tests Passed” or call for help.

S-Bus Access Test Passed

The FP has determined the S-bus status and now accesses the VSFI through the DBPI. This is the first time the FP communicates with hardware in another subsystem. The DBPI tests the integrity of the VSFI and its accessibility to the DBP (VME) bus. If you get no other message, do the following:

LED States: Check for the following good LED pattern:

Same as previous section plus:

VSFI = green

Minimum Configuration

for Next Normal Message: FP-CPU, FP-BI, FP-RAM, and the MI (for messages), plus all S-bus processors (DBPI, SCPI/MPSI, and VB) and VSFI.

Next Normal Message: “VSFI access test passed.”

Next Bad Message: “VSFI access test failed.”

Time Till This Message: Up to 30 seconds or no response.

Likely Failures: DBPI, VSFI, or other S-bus circuit pack has hung the bus.

Troubleshooting: Check the DBP subsystem interface first.

1. Replace VSFI. If the problem is resolved, the VSFI was bad. Verify the problem is solved. If not, continue.
2. Replace DBPI. If the problem is resolved, the DBPI was bad. Verify the problem is solved. If not, call for help.

VSFI Access Test Passed

The FP has successfully accessed the VSFI. It now sends an “initialization” command to the DBPI so the FP can access the DBP. If this is the last message you get, do the following:

LED States:	Check for the following good LED pattern: Same as previous section plus: DBP circuit packs reset from right to left DBP-CPU = red, green (reset and self-test)
Minimum Configuration for Next Normal Message:	All S-bus processors plus VSFI and DBPI.
Next Normal Message:	“DBPI initialization passed.”
Next Bad Message:	“DBPI initialization failed” or “DBPI mailbox initialization failed.”
Time Till This Message:	Up to 20 seconds.
Likely Failures:	DBPI, VSFI, FP-BI, FP-CPU, or other S-bus circuit pack hung bus. Possibly, DBP (VME) bus, M bus, or S bus failures.
Troubleshooting:	For each step, power down, then observe LED patterns on power up. 1. Power down the system. If the VSFI is red, replace it. If it isn't, replace the DBPI. Then power up and reboot the system. Verify that the problem is solved. If not, continue. 2. Power down and replace the VSFI or DBPI, whichever has not been replaced. Then power up and reboot. Verify that the problem is solved. If not, continue. 3. To see if the problem is in the S-bus, turn the power off, pop all but one of the S-bus circuit packs (see Figure 12-1, <i>S-Bus Processors</i>), power up, and reinitialize. Reseat the processors one by one until the problem is found. Replace the last circuit pack pushed in and verify that the problem is solved. 4. If the problem remains, check the backplane for damage (see Chapter 13). If you can't find the problem, call for help.

DBPI Initialization Passed

The FP-RAM tests run while other tests are being run. The results are now displayed. Use this section if the FP-RAM tests fail.

LED States: Check for the following good LED pattern:
Same as previous section plus:
FP-RAM = green, then yellow
DBP circuit pack tests continue from right to left
SADI = under test (LEDs show diagnostics)

Minimum Configuration
for Next Normal Message: All S-bus processors plus VSFI and DBPI.

Next Normal Message: "FP RAM passed."

Next Bad Message: "FP RAM failed."

Time Till This Message: 2 or 3 minutes (or 15 to 30 minutes if extended tests were chosen).

Likely Failures: FP-RAM, or other FP, S-bus, or M-bus circuit pack.

Troubleshooting: A RAM test failure almost certainly means that a RAM circuit pack is bad.

1. Check the FP-RAM LED. If red, the RAM test failed. Swap the faulty FP-RAM with another RAM circuit pack, if possible. If the problem follows the circuit pack, that circuit pack is definitely faulty. Replace the faulty FP-RAM circuit pack. If the problem remains, continue.
2. Replace the FP-CPU. If the problem is resolved, the FP-CPU was bad. If not, continue.
3. Replace the FP-BI. If the problem is resolved, the FP-BI was bad. If not, continue.
4. Power off and pop the DBPI, SCPI/MPSI, and VB. Push circuit packs in one at a time and power up in this order: DBPI, SCPI/MPSI, and VB. If the problem returns, the last circuit pack pushed in is the problem. Replace it. Verify the problem is solved, or call for help.

FP RAM Passed

When the FP completes its RAM test, the DBP-RAM test runs (One-Cabinet systems) or the VSP-RAM test runs (Two-Cabinet systems). The results should now display. If the DBP-RAM or VSP-RAM test fails, do the following:

LED States: Check for the following good LED pattern:

Same as previous section plus:

DBP-RAM = yellow

VSP-RAM = yellow – two-cabinet systems

Minimum Configuration

for Next Normal Message: All S-bus processors plus VSFI, DBPI, DBP-CPU, and DBP-RAM. *For two-cabinet systems, VSP-RAM.*

Next Normal Message: DBP initialization results display, or “VSP RAM passed”.

Next Bad Message: “DBP RAM failed” or “VSP RAM failed.”

Time Till This Message: 2 to 3 minutes.

Likely Failures: DBP-RAM. *On two-cabinet systems, the VSP-RAM.* Possibly, DBPI, VSFI, BC, or other S-bus circuit pack has hung the bus, or another DBP/VME-bus circuit pack has hung the bus.

Troubleshooting: The DBP-RAM (or VSP-RAM) should be red if it fails.

For one-cabinet systems:

1. Replace the DBP-RAM. If the red LED is lit, the circuit pack is probably bad. Replace it in any case. If it is not the problem, try replacing the following circuit packs.
2. Pop the DBP-CPU, SADI, and BC one at a time, then reseal one by one. If the problem is not isolated, continue.
3. Replace the VSFI. If the problem is solved, the VSFI was bad. If not, continue.
4. Replace the DBPI. If the problem is solved, the DBPI was bad. If not, continue.
5. Replace the BC. If the problem is solved, the BC was bad. If not, call for help.

For two-cabinet systems:

1. Replace the VSP-RAM. If red LED is lit, the circuit pack is probably bad. Replace it in any case. If it is not the problem, try replacing the following circuit packs.
2. Pop the VSP-CPU, VSP-BI, and BC one at a time, then replace one by one. If the problem is not isolated, continue.
3. Replace the VSFI. If the problem is solved, the VSFI was bad. If not, continue.
4. Replace the DBPI. If the problem is solved, the DBPI was bad. If not, continue.
5. Replace BC. If the problem is solved, the BC was bad. If not, call for help.

VSP RAM Passed

This is for Two-Cabinet AUDIX systems only. When the VSP RAM test passes, the DBP-RAM test runs. The results should now display. If the DBP-RAM test fails, do the following:

LED States: Check for the following good LED pattern:

Same plus:
DBP-RAM = yellow

Minimum Configuration
for Next Normal Message: All S-bus processors plus VSFI, DBPI, DBP-CPU, and DBP-RAM.

Next Normal Message: DBP initialization results display.

Next Bad Message: “DBP RAM failed.”

Time Till This Message: 2 to 3 minutes.

Likely Failures: DBP-RAM. Possibly, DBPI, VSFI, BC, or other S-bus circuit pack has hung the bus, or another DBP/VME-bus circuit pack has hung the bus.

Troubleshooting: The DBP-RAM’s red LED should be lit if it fails.

1. Replace the DBP-RAM. If the red LED is lit, the circuit pack is probably bad. Replace it in any case. If it is not the problem, try replacing the following circuit packs.
2. Pop the DBP-CPU, SADI, and BC one at a time, then replace one by one. If the problem is not isolated, continue.
3. Replace the VSFI. If the problem is solved, the VSFI was bad. If not, continue.
4. Replace the DBPI. If the problem is solved, the DBPI was bad. If not, continue.
5. Replace BC. If the problem is solved, the BC was bad. If not, call for help.

DBP RAM Passed

When the DBPI successfully initialized itself, it set up a communication path to the DBP subsystem through the VSFI. The VSFI has a mailbox where the FP and DBP CPUs leave messages for each other. When the FP completes its diagnostics, it checks the VSFI mailbox for DBP status (which has been processing in the background) or for a flag asking for more time. The system then checks the DBP-CPU, RAM, disk controller, and disks. If it cannot display the results, use this section.

LED States: Check for the following good LED pattern:

Same as previous section plus:

DBPI and VSFI = dark

DBP-CPU = yellow, green heartbeat

DBP-RAM and BC = yellow

SADI = yellow, green heartbeat, and yellow for each installed drive.

Minimum Configuration

for Next Normal Message: All S-bus processors plus DBPI, VSFI, and DBP subsystem (DBP-CPU, DBP-RAM, SADI, BC, disk drives).

Next Normal Message: DBP configuration results display.

Next Bad Message: “DBP initialization failed” or nothing.

Time Till This Message: Less than 15 seconds.

Likely Failures: DBP-CPU, DBP-RAM, SADI, disk drives and cables, VSFI, BC.

Troubleshooting: Check the DBP subsystem.

1. Replace the DBP-CPU and see if the problem is fixed. If not, continue.
2. Check the remaining DBP subsystem circuit packs as directed in Chapter 13.
3. If the circuit packs seem good, check the disk drives and cables using Chapter 6. If you cannot solve the problem, call for help.

DBP Initialization Results Display

When the DBPI successfully initialized itself, it set up a communication path to the DBP. The FP then sent an echo, reset, and initialization command to the DBP, which began its own self-tests. Meanwhile, the system displays the results of its DBP subsystem check as shown. Use this section if the DBP seems faulty.

	31	24	23	16	15	8	7	0
DBP CPU status:	00000000		00010000		00000000		00001000	
VME configuration:	00000000		00001000		00000000		00001100	
Disk controller 1:	00000000		00000000		00000000		00001000	

LED States: Same as the last good LED pattern.

Minimum Configuration

for Next Normal Message: All S-bus processors plus DBPI, VSFI, and DBP subsystem (DBP-CPU, DBP-RAM, SADI, BC, disk drives).

Next Normal Message: “DBP initialization passed.”

Next Bad Message: “DBP init does not respond” or “DBP initialization failed”

Time Till This Message: Up to 2 minutes.

Likely Failures: DBP-CPU, DBP-RAM, SADI, disk drives and cables, VSFI, BC.

Troubleshooting: Check the DBP subsystem.

1. Use the following tables as a guide for finding the problem with the DBP subsystem. Do the repair procedure if applicable. If nothing applies, return here and go to the next step.
 - a. Generally, zero (0) bits indicate that the hardware is installed and present (or that the bit is not used), while one (1) bits indicate devices that are *not* installed or present. In the VME configuration line, a 1 bit is “true,” meaning the hardware is present.
 - b. If you find a 1 bit, look up its meaning in the following tables. If the description applies to a device that *should be present* on your system, follow the troubleshooting steps in the table.
2. Replace the DBP-CPU and see if the problem is fixed. If not, continue.
3. Check the remaining DBP subsystem circuit packs as directed in Chapter 13.
4. If the circuit packs seem good, check the disk drives and cables using Chapter 6. If you cannot solve the problem, call for help.

Table 12-2. DBP-CPU Status

Bit	Bit Meaning	If a 1 Bit Appears:
0	Unused	Ignore
1	Error in MMU	Replace DBP-CPU
2	Error in ROM checksum	Replace DBP-CPU
3	No expansion memory found on RAM 0	Ignore
4	On-circuit pack memory data error	Replace DBP-CPU
5	On-circuit pack memory parity error	Replace DBP-CPU
6	Expansion memory data error	Replace DBP-RAM 0
7	Expansion memory parity error	Replace DBP-RAM 0
8-9	VME circuit pack 0 or 1 data or parity error	Replace DBP-RAM 0
10-19	Unused	Ignore
20	512K of on circuit pack memory on this DBP-CPU	Replace DBP-CPU
21-27	Unused	Ignore
28	Data error in first 4K of on-board memory	Replace DBP-CPU
29	Parity error in first 4K of on-board memory	Replace DBP-CPU
30	Unused	Ignore
31	Fatal error encountered	Replace DBP-CPU

Table 12-3. VME Configuration

Bit	Bit Meaning	Bit 1 = true
0	Unused	Ignore
1	RAM type: TN540 (4 Mbytes)	
2	RAM type: TN532 (2 Mbytes)	
3	VME circuit pack at 1.5 Mbytes present	
4	DBP-RAM 2 present	If status is ‘‘1’’: Ignore * Ignore Ignore Ignore
5	DBP-RAM 1 absent	
6	DBP-RAM 5 present	
7	DBP-RAM 6 present	
8	DBP-RAM 7 present	
9-18	Unused	Ignore
19	DBP-RAM 1 memory test passed	If status is ‘‘0’’: * Ignore Ignore Ignore Ignore Ignore
20	DBP-RAM 2 memory test passed	
21	DBP-RAM 3 memory test passed	
22	DBP-RAM 5 memory test passed	
23	DBP-RAM 6 memory test passed	
24	DBP-RAM 7 memory test passed	
25-31	Unused	Ignore

* 1. Replace the RAM. 2. Replace the DBP-CPU. 3. Check the backplane.

Table 12-4. Disk Controller

Bit	Bit Meaning	If a 1 Bit Appears:
0	Drive unit 0 not present or ready	If an installed disk shows bad status (1), use the disk drive troubleshooting steps in Chapter 6
1	Drive unit 1 not present or ready	
2	Drive unit 2 not present or ready	
3	Drive unit 3 not present or ready	
4-7	Drive unit 0-3 failed read/write test (used only during a dbpinit)	Ignore
8-12	Unused	Ignore
13	Controller not present or ready	Check the controller Replace the SADI Ignore
14	Controller self-test failed	
15	Reserved	
16-31	Unused	Ignore

DBP Initialization Passed

At this point, the system tries to read a boot filesystem from disk. In a standard initialization, it first tries disk00.boot_f. If it can't find or read this filesystem, it tries other combinations according to a preset pattern (see *Initialization Overview*). The boot filesystem and DBP boot file within must be good for this step to pass. If the DBP can't read a boot filesystem, use this section.

LED States: Check for the following good LED pattern:

Same as previous section plus:

The DBPI, VSFI, and SADI blink yellow as data is transferred.

Minimum Configuration

for Next Normal Message: All S-bus processors plus DBPI, VSFI, and DBP subsystem (DBP-CPU, DBP-RAM, SADI, BC, disk drives).

Next Normal Message: "Attempting DBP file system boot ..."

Next Bad Message: "No boot filesystem," "Disk I/O error," "No disk or controller," "Unable to load DBP boot file," or no message.

Time Till This Message: Up to 20 seconds.

Likely Failures: Software, SADI, disk drives, DBP-CPU, DBP-RAM, BC, disk cables.

Troubleshooting: Check software first, then hardware.

1. If the "No boot filesystem" message appears, the disk is installed but the software is missing. Try to boot from another disk. Use the generic-program cartridge if you have only one disk.
2. Check the DBP subsystem, using the tables in the previous section as a guide. Do the repair procedure if applicable. If nothing applies, return here.
3. Check the disk drives and cables using Chapter 6. If a disk may be faulty, try to boot from the generic-program cartridge. If the boot succeeds, the disk may be bad. Return to Chapter 6 to repair or replace it.
4. If the disk(s) seem good, replace the DBP-CPU and see if the problem is fixed.
5. If the problem remains, check the remaining DBP subsystem circuit packs as directed in Chapter 13. If you cannot solve the problem, call for help.

Attempting DBP Filesystem Boot

If more than one of these messages appear, the DBP cannot find or load a boot filesystem.

- If the “Attempting DBP file system boot” messages appear quickly one after another, the FP thinks the DBP-CPU is faulty.

The FP may reset the DBP-CPU up to three times to try to get it to respond. The “Unable to load DBP boot file” message may be followed with “DBPI initialization passed” as the DBP-CPU is retested. Return to the previous section.

- If the messages take longer to appear (about 20 seconds), the DBP-CPU is working and searching for a boot filesystem to load.

If it cannot find a boot_f or boot_e filesystem on any disk, the initialization halts.

DBP Boot File Loaded

The DBP has located, loaded, and transferred control to a DBP boot file program stored in its memory at this point. The FP now sends a command to the DBP to open an AUDIX loader file. Use this section if this step fails.

LED States: The basic good LED pattern should remain the same. Watch for the DBPI, VSFI, and SADI to blink yellow as data is transferred.

Minimum Configuration
for Next Normal Message: Same as last step.

Next Normal Message: “AUDIX loader file opened.”

Next Bad Message: “Unable to load AUDIX loader file” or no message.

Time Till This Message: Up to 20 seconds.

Likely Failures: Software, SADI, disk drive.

Troubleshooting: Check software first, then hardware.

1. Try booting from another boot filesystem on a different disk or a known-good RCD cartridge. If this solves the problem, the disk may be faulty.
2. Check the disk drives and cables using Chapter 6. If a disk may be faulty, try to boot from the generic-program cartridge. If the boot succeeds, the disk may be bad. Return to Chapter 6 to repair or replace it.
3. Check the DBP subsystem circuit packs as directed in the previous section. If you can’t solve the problem, call for help.

AUDIX Loader File Opened

A loader file was opened, and now the FP copies the loader program into its memory from the DBP. If the FP can't read it, use this section.

LED States: Same as the last good LED pattern.

Minimum Configuration

for Next Normal Message: All S-bus processors plus DBPI, VSFI, and DBP subsystem (DBP-CPU, DBP-RAM, SADI, BC, disk drives).

Next Normal Message: "AUDIX loader file loaded."

Next Bad Message: "Unable to load AUDIX loader file."

Time Till This Message: Up to 30 seconds.

Likely Failures: Software, DBP subsystem, or S-bus problem.

Troubleshooting: Check the major subsystems again.

1. To check for a software problem, try booting from another boot filesystem.
 - a. Try another filesystem on the disk. If this fails, boot from a known-good filesystem (such as on the generic-program cartridge).
 - b. If the system boots from another disk, go to Chapter 6 to try to find a disk problem.
2. If the software seems good, do a nonstandard initialization and run the extended RAM tests. This will add 15 to 30 minutes to the initialization time.
3. If the tests pass, check for another S-bus circuit pack hanging the S bus (go back to "S-Bus Access Test Passed").
4. If the S-bus seems okay, check the DBP subsystem again (go back to "DBP RAM Passed").

AUDIX Loader File Loaded

The FP has copied the loader program into its memory successfully. Now the FP tries to transfer control to the loader program, which copies the main AUDIX program into FP memory from the DBP, which reads it in from the boot filesystem on disk.

NOTE

The FP may reset at any time if the initialization fails. For example, the “Unable to load FP AUDIX” message may be followed with “FP reset” and another complete initialization.

Due to the integration of hardware and software from this point on until normal mode (total software control), use the troubleshooting steps in the last section for any of the following messages:

- Impending Transfer to AUDIX Loader
- FP AUDIX Loaded (this message comes from the boot filesystem software)
- VSP AUDIX Loaded (this message only appears on two-cabinet systems)
- Impending Transfer to AUDIX.

LED States: Same as the last good LED pattern, plus:
NC = yellow
SCPI/MPSI = red
VB = red (reset), then green
TC = reset, then slow yellow heartbeat.

Minimum Configuration
for Next Normal Message: Same plus NC and TC. The NC is never reset.

Maintenance Interface Entering Normal Mode

When the FP thinks the main AUDIX programs are good, the MI displays the normal mode message. The transfer of control to software is complete. All further messages are sent by the software programs controlling the system. The software now goes through its own initialization and outputs messages as various programs begin and set up communication with each other. Use this section if bad or unusual messages appear instead of the normal software login sequence that is shown in Table 12-1, *Last “Good” Message Sections*.

NOTE

Occasionally messages appear twice; this does *not* indicate a problem.

If a bad or unexpected message does appear, such as “initialization timed out” or “terminal initialization failed,” do the following:

1. Try another reboot. This runs the check filesystem (ckfs) program again on all disk files.
 - a. The ckfs program runs at the “fp mtce on” message step and may take from less than 1 minute up to 45 minutes to run, depending on the size of your database.
 - b. The program may delete data it suspects is damaged (for example, remove some subscriber messages). It may also cause some filesystems to be unmounted (deactivated) which causes a “service not started” message. If this message is displayed, you must fix the problem and restart the machine to get the “start service” message. If you do not get the “start service” message, the system will not accept calls.
2. If the initialization does not complete again, you may spin-down the RCD, remove the standard backup cartridge, and insert the generic-program cartridge. Spin the drive up and try a nonstandard initialization from this cartridge (options 0, 1, f).
3. If the system now boots, you may have one or more corrupt filesystems on the regular hard disk (such as a faulty dbpa file in the boot filesystem). Go to Chapter 14 to find this software problem and restore full service.

NOTE

The entire right side of the carrier blinks red and is reset at the “vsp mtce on” step. The VB and other port circuit packs then go through their self-tests. They flash yellow at the “vb/td bus up” message, then go dark until calls are made or data is transferred.

LED States:

Same as the last good LED pattern, plus:

TDBI = red (reset), then dark

VB = red (reset), then green, then dark

VPT(s) and VPCs = red (reset), then yellow, then dark

Minimum Configuration

for Next Normal Message: Same plus all TD-bus circuit packs (TDBI, VPT(s), and at least one VPC).

Start Service

Software initialization is complete, and now the data link-to-switch initialization begins. In about 1 or 2 minutes, full service should be available.

LED States: The basic good LED pattern should remain the same. On systems with a data link, the SCPI or MPSI remains red up to 2 minutes until the switch data link is initialized. On Standalone systems, all LEDs on the SCPI/MPSI should now go dark. See *Initialization Overview* for final patterns.

Minimum Configuration
for Next Normal Message: All core (required) hardware.

Next Normal Message: “start service”

Next Bad Message: “service not started”

Time Till This Message: 2 to 45 minutes, depending on size of database.

Likely Failures: Hardware or software.

Troubleshooting:

- If “service not started” appears, go to Chapter 14 to locate the filesystems that were not found during software initialization.
- If “start service” appears, yet the system reverts back to a reboot or restart, the Processor Element (PE 0 or PE 1) may be having difficulty communicating with the DBP Subsystem. Check the VSFI, the DBPI, and all RAM circuit packs.
- If the system does not reboot or restart, normal service should be available. In any case, check for any active alarms and verify good service using Chapter 3.

Initialization Overview

During an initialization, the software is not running. So no faults are recorded in the alarm log and no errors are recorded in the error log. The only way to check for alarms is by visually inspecting the circuit pack LEDs or by selecting Option 2 of the Control Mode Menu to display any power and environmental alarms.

This section covers the following general initialization steps:

- Start an initialization (manually or automatically). For a manual initialization, you may select options to run a nonstandard reboot, and stop or restart initializations in progress.
- Monitor hardware initialization (up to the “MAINTENANCE INTERFACE ENTERING NORMAL MODE” message) and watch the LED patterns.
- Monitor software initialization (following the normal mode message). Log in if possible and verify full service, or continue troubleshooting if needed.

Terminal Commands

The following commands are available during initialization. To execute them, hold down the CTRL key on the terminal and press the other key. See Chapter 8 for complete terminal operation procedures.

- **CTRL** + **c** – Can be used any time during a hardware initialization to halt the initialization and display the Control Mode Menu.
- **CTRL** + **d** – Can be used to restart the initialization option questions before the last prompt is answered (for example, if you made a typing error).
- **CTRL** + **e** – Used to empty MI buffer. A beep means the MI is talking to the terminal.

Start an Initialization

You may need to reinitialize (reboot) the system several times while troubleshooting a nonworking system when trying to isolate the problem. To start an initialization, you may:

- Cycle the MI toggle switch from off-center to center (reboot). The MI tracks toggle switch movement as described in Table A-1 in Appendix A.
- Select Option 4 on the Control Mode Menu (restart) *before* initialization completes.
- Select Option 5 on the Control Mode Menu (complete reboot) or Option 6 (FP restart and DBP reboot).
- Run the “startup” form (only if software is running). This form normally does a restart. However, it may be interrupted by pressing **CTRL** + **c** if you wish to do a reboot. See *Restart or Reboot the System* in Appendix A for details.

An initialization will also start automatically after a power up, after certain system faults, or if a restart fails.

Stop an Initialization

To stop or interrupt an initialization, you may:

- Press **CTRL** + **C** on the terminal before the “ENTERING NORMAL MODE” message. This stops initialization and shows the Control Mode Menu.
- Set an initialization stop point (see *Initialization Overview*).
- Cycle the MI toggle switch from center, off-center, back to center (to start the initialization over), or move it from center to off-center (to stop).

Select Initialization Options

You may choose initialization options to run extended memory tests, boot from a nonstandard boot filesystem, or cause the initialization to halt at a specified point. Each prompt is discussed below.

Standard Initialization? (y or n)

If you press **y** for yes, the initialization:

- skips the extended RAM tests (saves 15 to 30 minutes)
- tries to load boot filesystem disk00.boot_f
- selects *no* initialization stop point.

“Standard initialization invoked” appears and the initialization immediately begins.

If you want to change any of these options, press **n** for no. The other prompts in this section will then appear. If you make a mistake in choosing the options, press **CTRL** + **d** to start the initialization option questions over.

Perform extended RAM tests? (y or n)

To run the complete memory tests on FP and DBP RAM, press **y**. This will add 15 to 30 minutes to the total initialization time. To skip over this prompt, press **n**.

Standard boot file system? (y or n)

If you choose a standard boot (press **y**), the system will search first for disk00.boot_f. If it fails, it tries other disk and filesystem combinations as follows:

0, 0, f (for disk00.boot_f)
0, 1, f (for disk01.boot_f)

0, 2, f (for disk02.boot_f)
0, 3, f (for disk03.boot_f)
0, 0, e (for disk00.boot_e)
0, 1, e (for disk01.boot_e)
0, 2, e (for disk02.boot_e)
0, 3, e (for disk03.boot_e)

If it cannot find a boot_f or boot_e filesystem on any disk it expects to be installed (0 to 3), the system may retry the sequence or halt the initialization.

Choose a nonstandard boot filesystem if you are having problems loading the standard boot. This is marked with many “Attempting to load DBP boot file” messages. Answer “n” to the standard boot filesystem prompt, then answer the following additional prompts:

- Boot disk controller number? (0 or 1) – Always choose “0” on a One- or Two-Cabinet AUDIX (only AUDIX-L has controller 1).
- Boot disk number? (0, 1, 2, or 3) – Enter the device number of the disk drive to boot from. Usually the backup boot filesystem is on disk02 (position 0/2) if installed.
- Boot file system boot_ (any single letter or number) – Press any single alphabetic number to select the boot filesystem you want to load. This is usually “e” to select a backup boot, or “f” if you want to boot from the generic-program cartridge.

Generally, when selecting a boot filesystem:

- When in doubt, select a standard boot filesystem (0, 0, f).
- The error message “Unable to load DBP boot file” indicates a problem with the selected boot filesystem. For example, if disk00.boot_f is corrupt, you may select options 0, 2, e to try the backup boot filesystem disk02.boot_e.
- If you suspect the disk drive has failed, try to boot from another disk. Then go to Chapter 6 to fix or replace the suspected disk.

Initialization stop point desired? (y or n)

You may wish to set a stop point if you know the initialization is failing at a certain point and you want to study the LED patterns just before that point. You may also halt the initialization if you have to be away from the system and don't want the system to start up by itself.

Press **(n)** to **not** select stop points and let the initialization try to complete normally. If you press **(y)** to select a stop point, the following list appears:

Stop boot process after:

- a = FP self tests
- b = S-Bus access tests
- c = VSFI access tests
- d = DBPI initialized
- e = FP RAM test
- f = DBP initialized
- g = DBP boot file loaded
- h = AUDIX loader file opened
- i = AUDIX loader file loaded

Select the point at which you wish the initialization to stop. Since this is the last message, the initialization will then begin. When it reaches the stop point you requested, it reports:

Initialization halted. Set new stop points (s) or continue (c)?

Press **(s)** to redisplay the options list and set a new stop point. If you press **(c)**, the initialization will try to complete normally.

Monitor Hardware Initialization

Once the initialization options (if any) are selected, step-by-step hardware initialization and self-tests begin. While the hardware initializes, the system displays messages reporting progress of the initialization and self-tests. Hardware initialization normally completes in about 6 to 20 minutes depending on the options selected (extended RAM tests add 15 to 30 minutes).

The hardware initialization can fail up to three times before the system gives up and redisplay the Control Mode Menu. Watch for these failure messages to try to find the cause of the problem. One of your best tools for monitoring the initialization is to watch the LED patterns (see the next section). The system ends a successful hardware initialization with the “MAINTENANCE INTERFACE ENTERING NORMAL MODE” message.

Monitor LED Patterns

Reading and understanding the circuit pack LED patterns is the most important diagnostic tool available for troubleshooting a nonworking system. Generally, LEDs indicate:

r = red (fault)	g = green (test)
y = yellow (in use)	hb = heartbeat (working)

Most circuit packs have the red, green, and yellow LEDs (exceptions are noted in the LED checklist). LEDs which pulse (have a heartbeat) indicate that a pack is working. Often a quick (1- or 2-second) pulse indicates firmware is in control. A slower (2- to 4-second) pulse indicates software control or much load on the system.

During initialization, the core (central required) hardware LEDs go through regular patterns first, followed by the DBP subsystem. These patterns are outlined in the following list. For a complete list of *good* LED patterns on AUDIX, use the “Visual Inspection” list (Appendix A).

- *Core LEDs.* During initialization, the main circuit packs go through a regular LED pattern:
 - Reset or Power Up – Most circuit packs in the carrier flash red for 1 to 2 seconds.
 - MI – Remains green during initialization. A yellow LED indicates a local terminal is connected or a remote terminal is logged in. Other alarms may be red until initialization completes.
 - FP-PE – FP-CPU does a self-test, then lights its green heartbeat. The first FP-RAM circuit pack then lights a green LED for about 2 minutes, followed by a lit yellow LED. The second FP-RAM circuit pack then does its self-test. The FP-BI is tested last.

- S-Bus Access – The S-bus circuit pack LEDs wink red when reset by the FP. The SCPI or MPSI stays red until the data link is up (about 2 minutes after initialization completes).
- DBP Interface Initialization – The FP “INIT” command causes the DBPI and VSFI to light their green LEDs for 1 to 2 seconds.
- *DBP Subsystem LEDs.* The regular DBP subsystem LED patterns are:
 - Reset Self-Tests – All or most packs flash red LEDs on reset.
 - DBP-CPU – The DBP-CPU self-tests first (red and green LEDs light), then its green LED goes into heartbeat and its yellow LED lights. Next, the DBP-RAM to the left of the DBP-CPU lights its red and green LEDs during self-test, then its yellow LED.
 - Disk Subsystem – The SADI does its self-test and diagnostics (red and yellow LEDs light). It then lights a green heartbeat and yellow LED for each disk installed.
 - BC – Lights yellow at the end of the DBP subsystem tests.
 - Final State – The working state of the DBP subsystem is: BC=y, SADI=y with g=hb and all installed drives=y, DBP-RAM=y, DBP-CPU=y with g=hb, DBPI and VSFI=y when passing data.
- *Port Circuit Pack LEDs.* These circuit packs flash red on reset (during the “vsp mtce on” step of software initialization). During normal operation, yellow LEDs are lit on the VPT and VPC circuit packs only when calls are active. Otherwise, the LEDs are dark except for a slow yellow heartbeat on the TC circuit pack.

Monitor Software Initialization

After the hardware has tested itself and loaded the software programs, the software programs in the FP take control and load other programs, filesystems, and data from disk to the subsystem memory (DBP-RAM and FP-RAM). A restart shows the same messages as those that follow a hardware initialization, except it loads programs from DBP-RAM, not the disk.

The software initialization normally takes about 4 to 5 minutes. However, if you have a very large database and many subscribers, it can take up to 45 minutes to run. A check filesystem (ckfs) program runs at the “fp mtce on” message step to check disk filesystems for good data. When software initialization completes, the system prompts you to log in. Either the message “start service” or “service not started” is on the screen. You can log in after either message.

After you enter the correct login ID and password, the system shows its status through screen forms and the STATUS line on the terminal. The data link to the switch initializes in about 1 or 2 minutes. If the “start service” message appeared, full service should be available. Check for any remaining problems using Chapter 3. If a “service not started” message appeared, a filesystem is missing or damaged. Go to Chapter 11 to diagnose this problem. When you fix the problem you must restart the system and get the “start service” message in order for AUDIX to work properly.

13. Buses And Backplane

This chapter covers diagnostic procedures for the main system buses and the backplane. Unlike the front-loaded circuit packs, many bus problems and paddle circuit packs on the backplane cannot be alarmed directly. Therefore, problem isolation is usually required. This chapter includes:

- Bus Overview
- DBP (VME) Bus diagnostics and alarms
- S (System) Bus diagnostics and alarms
- TD (Time-Division) Bus diagnostics and alarms
- AUDIX Backplane.

Bus Overview

Buses are usually diagnosed as a last resort (after other unit replacements or tests fail). Because the buses connect many circuit packs and subsystems, they may be difficult to diagnose. Follow these general steps for troubleshooting buses:

1. Study initialization messages or LED patterns to find a bus problem (see Chapter 12).
2. Pull out circuit packs one by one to bring the bus to a minimum configuration, retesting or rebooting after each pack reduction.
3. Check the backplane for damage if replacing circuit packs does not solve the problem.

Figures 13-1 and 13-2 show block diagrams of AUDIX system architecture. Figure 13-1 shows the one-cabinet system architecture while Figure 13-2 shows the two-cabinet system architecture. These figures may help you to understand bus diagnostic procedures. The main AUDIX buses include:

- *DBP (VME) Bus:* The Data Base Processor (DBP) bus controls the data flow to and from the disk drives.
- *Memory (M) Bus:* Each Processing Element (PE) uses an M bus to access programs and data in its RAM circuit pack(s) and to communicate with the TN511 MI.
 - *On one-cabinet systems:* There is one PE, the Feature Processor (FP). The FP uses the M bus to communicate with other buses. It accesses the S-bus through the TN716B FP-BI, and the TD-bus through the TN727 NC.
 - *On two-cabinet systems:* There is an additional PE, the Voice Session Processor (VSP). The FP and VSP each use an internal M bus (M0 for the FP, M1 for the VSP) to send signals to the S-bus through their own TN716B BI circuit pack. The VSP uses the M1 bus to communicate with the TD-bus through the TN727 NC; the FP does not communicate directly with the TD-bus.

In either configuration, the M bus is normally serviced as part of the PE (the TN523, TN716B, and TN734). See Chapter 4.

- *System (S) Bus:* The S-bus is the primary bus of the AUDIX system, connecting all major subsystems to the FP and the switch.
- *Time-Division (TD) Bus:* The TD-bus connects the TN501B VPC and TN747B VPT circuit packs to the rest of the system.

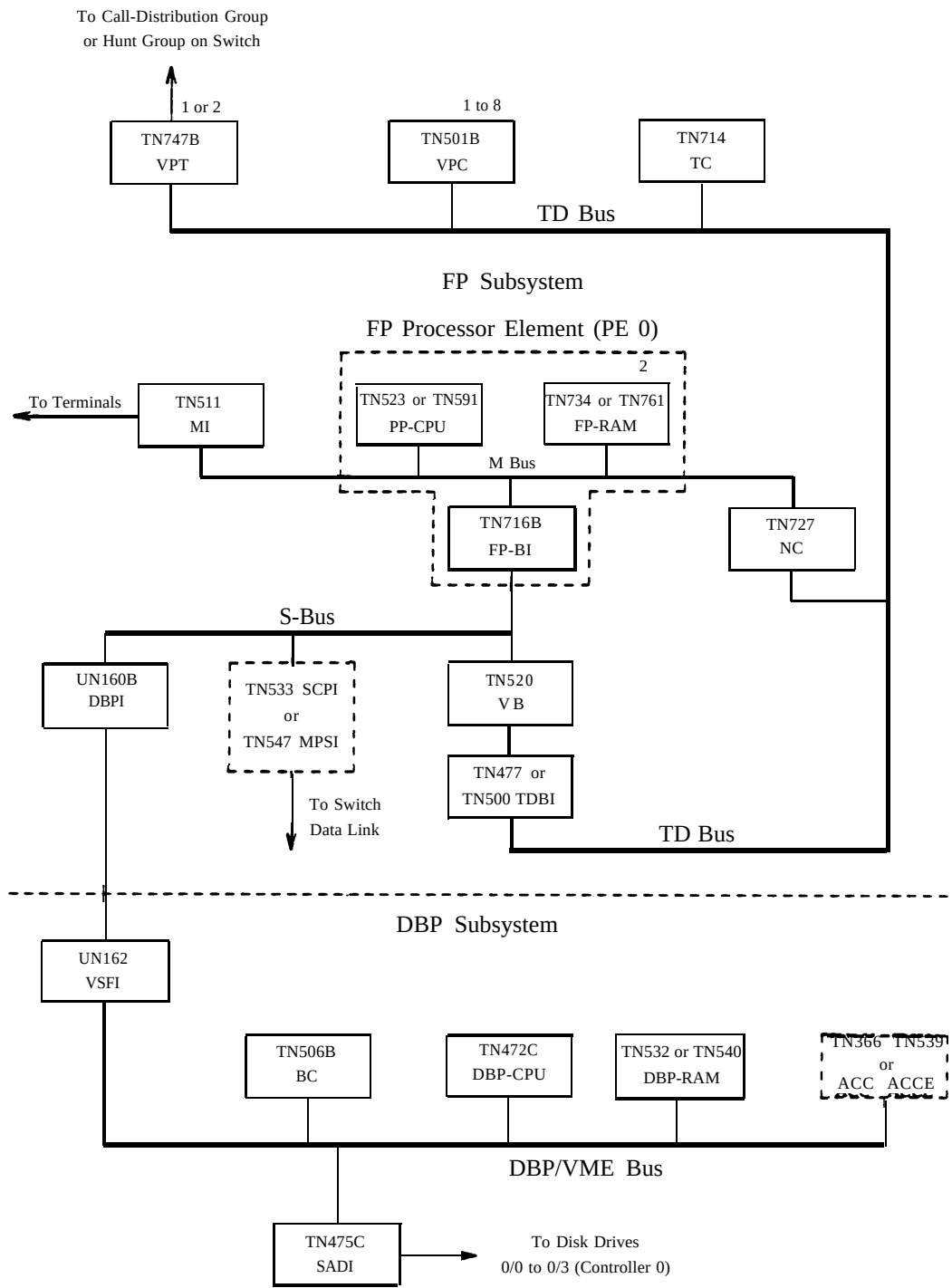


Figure 13-1. One-Cabinet AUDIX System Architecture

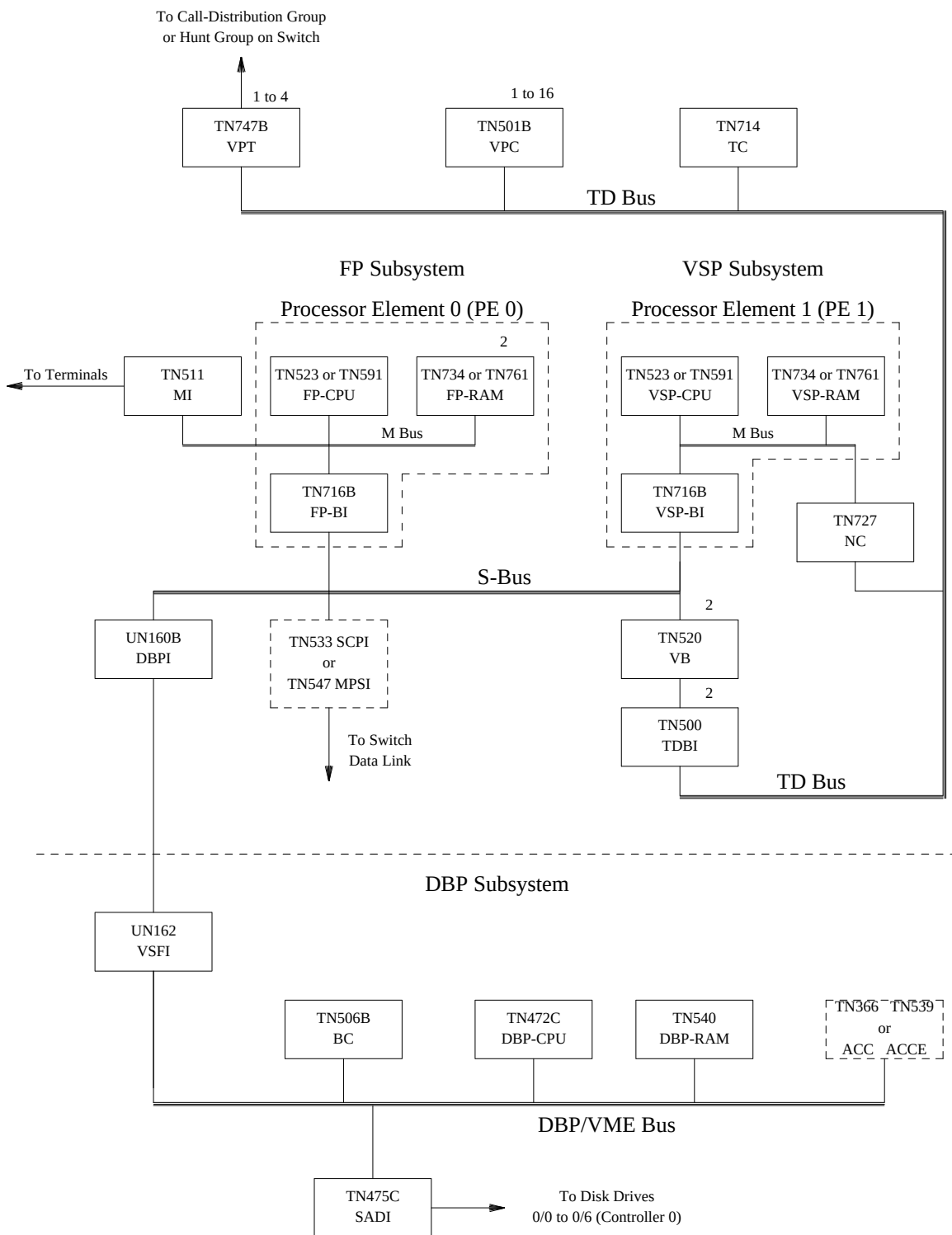


Figure 13-2. Two-Cabinet AUDIX System Architecture

DBP (VME) Bus Diagnosis

The Data Base Processor (DBP) bus, or Versa-Module European (VME) bus, runs from the TN506B BC (slot 00) to the AHF102 on the backplane. The DBP bus connects to the S-bus through the UN162 VSFI (slot 05) and the UN160B DBPI (slot 06). The DBP bus also connects to the disk drives through the TN475C SADI (slot 01).

This section covers faults from the alarm log and the general DBP-bus isolation procedure. If you were referred to this page as a second or third choice from another section, go to *DBP-Bus Diagnosis*.

DBP-Bus Alarms

Many DBP/VME-bus alarms are nonisolated DBP alarms which cannot be linked to a specific circuit pack in the DBP subsystem. The following table gives a general replacement procedure for DBP circuit packs or disks that are probably faulty.

Table 13-1. DBP (VME) Bus Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice (ckt,slot,proc.)	2nd Choice (ckt,slot)	3rd Choice (ckt,slot)
1	11 : 1	DBP CPU failure	TN472C, 04, A	—	—
2	11 : 1	Disk failure	Disk drive, B	—	—
3	11 : 1	DBP RAM failure	TN532/TN540, 02, A	—	—
6	11 : 0	Maintenance boots DBP	—	—	—
7	11 : 0	Controller failure	TN475C, 01, A	—	—
8	11 : 1	Bus timeout	Disk drive, B	—	—
17	11 : 0	DBP memory access failure	TN532/TN540, 02, A	TN472C, 04, A	—
181	11 : 1	Disk failure	Disk drive, B	—	—
183	11 : 11	DBP ROM failure (4F, 100F)	TN472C, 04, A	—	—
184	11 : 1	DBP on-board RAM failure (1F, 5F)	TN472C, 04, A	—	—
185	11 : 1	DBP slave CPU failure (79F, 101F)	TN472C, 04, A	—	—
206	11 : 11	Bus time-out (8F, 97F)	UN162, 05, A	—	—
207	11 : 1	Memory management error (1F, 5F)	TN472C, 04, A	—	—
208	11 : 2	Parity error (3F, 98F)	TN532/540, 02, A	—	—
209	11 : 1	DBP CPU failure (1F, 5F)	TN472C, 04, A	—	—
210	11 : 1	DBP CPU failure (1F, 5F)	TN472C, 04, A	—	—
211	11 : 11	Maint removed DBP from S-bus	TN472C, 04, A	TN532/540, 02	TN475C, 01
212	11 : 1	Divide by zero (1F, 5F)	TN472C, 04, A	—	—
213	11 : 1	Miscellaneous error (1F, 5F)	TN472C, 04, A	—	—
216	11 : 11	Controller (IPC or SADI) reset	TN475C, 01, A	TN472C, 04	DBP Bus
273	11 : 0	ACC Timed Out on DBP	TN366, 03, A	DBP Bus	—
1322	11 : 1	Invalid channel	TN366, 03, A	DBP Bus	—

Procedure A: General Replacement Steps

To replace the faulty circuit pack:

1. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
2. Using the table, replace the indicated circuit pack using the steps in Chapter 4 (circuit packs are covered alphabetically). Use Table 3-1 in the same manual to find the section by unit code if needed.
3. Power up the system. The system should start to initialize.
4. Watch the LEDs during reinitialization for clues to a DBP-bus problem (see *DBP-Bus Diagnosis* for major patterns). *If the initialization fails, go to DBP-Bus Diagnosis.*

5. If the initialization is successful, verify that the alarm is resolved using the maintenance : active alarm : display form.
6. If the problem continues, try solving the problem using the next circuit pack or procedure (if listed in Table 13-1).

Procedure B: Check the Disk Drives

Go to Chapter 6 to isolate disk drive problems.

DBP-Bus Diagnosis

If the DBP bus is corrupted, the system will usually be unable to boot and forms are inaccessible. To isolate a DBP-bus problem, follow these steps:

1. Shut down system software (if running) using the MI toggle switch, then reboot the system.
2. If the initialization fails, look for DBP-bus problems as follows:
 - a. If the TN472C DBP-CPU has a green heartbeat, but no TN532/540 DBP-RAM LEDs are lit, the CPU could not access the bus. This is the best indicator of a DBP-bus problem.
 - b. If the TN475C SADI has a lit red LED, check for yellow LEDs 10, 11, and 13. This indicates a failed DBP-bus access diagnostic.
 - c. If any non-DBP bus circuit pack is alarmed, go to Chapter 11.
3. To isolate a DBP-bus problem, spin down the RCD and power down the system. Unseat the UN162 VSFI (pull it out about 2 inches) and restore power. You do not need to wait for the reinitialization to complete.
4. Interrupt the initialization by pressing the reset button on the TN506B BC (located in LED slot 13). Watch the LEDs for the patterns listed in Step 2.
 - a. If the reset works (the DBP-CPU accesses its RAM), the UN162 VSFI is probably faulty. Replace it and reboot the system. If the initialization is now successful, log in and verify that the problem is resolved. If not, continue.
 - b. If the reset *does not* work (the DBP-RAM LEDs never light), go to Step 5.
5. Pull out the TN475C SADI and press the reset button on the TN506B BC again.
 - a. If the reset works, the TN475C SADI is probably faulty. Replace it and reboot. If the initialization completes, log in and verify that the problem is solved. If not, continue.
 - b. If the reset *does not* work (the DBP-RAM LEDs never light), go to Step 6.
6. If you cannot isolate the problem using the reset button, spin down the RCD and power down the system. Replace the TN506B BC and power up.

- a. If the initialization is successful, log in and verify that the problem is solved.
 - b. If initialization fails or the problem is still present, continue.
7. Repeat the previous step replacing, in order, the TN472C DBP-CPU, the TN532/540 DBP-RAM, and the TN475C SADI.
8. If all circuit packs on the DBP bus have been replaced and the problem remains, spin down the RCD and power down the system. Remove all DBP circuit packs and examine the backplane for damage or bent pins. If the backplane seems okay and the problem remains, call for help.

S-Bus Diagnosis

The S (System) bus is the primary bus of the AUDIX system. It runs between the two ZAHF8s located on the backplane. The S-bus does three things:

- Connects the Processing Element(s) to the DBP bus through the UN160B DBPI (slot 06) and the UN162 VFSI (slot 05).
- Connects the Processing Element(s) to the TD-bus through the TN520 VB (slot 17) and the TN500 TDBI or TN477 TDBI-8 (slot 16).
- Connects the AUDIX system to the switch through the TN533 SCPI or TN547 MPSI (slot 15). Standalone systems do not have this link.

The S-bus is never alarmed directly. Because it links all subsystems and most processors on the system, diagnosis may be difficult. Use Figures 13-1 and 13-2 as a guide. To check the S-bus:

1. Block service using the appropriate form or switch procedure.
2. Do a system restart.
 - a. If the restart fails, do a reboot. *If the reboot fails*, go to Chapter 11.
 - b. If the restart (or reboot) passes, wait 5 minutes. Verify that the alarm or problem is solved using the `maintenance : active alarm : display` form.
 - c. If the alarm or problem is *not* resolved after about 6 minutes, continue.
3. Use the `maintenance : system : hardware status` form to check the status of S-bus circuit packs.
 - a. If the status displays all zeroes (0), there are no errors. Verify that the alarm or problem is resolved. If not, go to Step 4.
 - b. If the status displays many circuit packs with bad status, the S-bus is corrupted. Replace the S-bus circuit packs one at a time until the faulty circuit pack is found (see Step 4).
 - c. If one or two circuit packs have errors, determine which circuit packs are bad using Table B-1 in Appendix B. Replace the S-bus circuit pack(s) with bad status (see Step 4).

4. To replace a possibly faulty S-bus circuit pack:
 - a. Shut down system software (if running), spin down the RCD (if not done automatically), and power down the system.
 - b. Replace the probable circuit pack(s) from the previous step. S-bus circuit packs include: TN520 VB, TN533 SCPI, UN160B DBPI, and TN716B FP-BI (last choice).
 - c. Restore power. System should initialize. Block service using the appropriate form or switch procedure. (If initialization *fails*, go to Chapter 11.)
 - d. If the initialization is successful, verify that the alarm or problem is resolved using the `maintenance : active alarm : display` form. If resolved, wait 1 minute and recheck the log to verify that the alarm does not return.
 - e. If the alarm is *not* resolved, replace the next S-bus circuit pack until all have been replaced. If all circuit packs have been replaced, continue.
5. If replacing the S-bus circuit pack(s) fails to resolve the alarm, shut down system software, spin down the RCD, and power down the system. Remove all S-bus circuit packs and check the backplane for damage or bent pins.
6. If the backplane seems okay and the problem remains, go to Chapter 11 or escalate the problem using your local procedures.

TD-Bus Diagnosis

The Time-Division (TD) bus processes call information from the switch. It runs between the two AHF1s located on the backplane. It connects to the S-bus through the TN520 VB (slot 17) and the TN500 TDBI or TN477 TDBI-8 (slot 16). It also connects the voice ports (TN747B VPTs and TN501B VPCs) to the rest of the system.

The major circuit packs are the TN714 TC and the TN727 NC. Without these circuit packs, the TD-bus cannot function.

This section covers faults from the alarm log and the general TD-bus isolation procedure. If you were referred to this page as a second or third choice from another section, go to *TD-Bus Board Backout Procedure*.

TD-Bus Alarms

TD-bus problems include TD-bus time slots and circuit packs connected to the TD-bus (see Figure 13-1).

Table 13-2. TD Bus Alarm Resolution

Alarm Log		Description	Repair Action		
Fault	Unit:Dev		1st Choice	2nd Choice	3rd Choice
1123 Multiple	42 : 1	TD-bus time slot See symptoms	Procedure A Procedure B	Procedure B –	– –

Procedure A: General Replacement Steps

One circuit pack could corrupt the whole bus. To find the faulty circuit pack, do the following:

1. Run the long version of all TD-bus circuit pack tests. The different tests are described in Chapter 11:
 - a. TN477 TDBI-8 or TN500 TDBI
 - b. TN501B VPC
 - c. TN714 TC
 - d. TN727 NC
 - e. TN747B VPT
2. Replace any circuit packs that fail. Follow the general replacement procedure for that circuit pack in the section listed above.
3. Verify that the alarm(s) are resolved using the `maintenance : active alarm : display` form.
4. If the alarm is *not* resolved, make a logical choice of a circuit pack to replace, or go to Procedure B. If you make a logical choice, follow the general replacement procedure for that circuit pack (see sections above) and verify that the alarm(s) are resolved.
5. If the fault is resolved, wait 1 minute past initialization. Check that the alarm is still resolved. If it returns, go to Procedure B.

Procedure B: TD-Bus Board Back-Out

If TD-bus alarms return or cannot be isolated, follow the steps in the next section.

TD-Bus Board Back-Out Procedure

Use this procedure to isolate a circuit pack that is corrupting (confusing communication on) the TD-bus. Before using this procedure, you should have tried to resolve any alarms in the alarm log. If you cannot isolate or solve the alarms, the bus may be corrupt. Check for the following symptoms:

- Service may be poor or nonexistent.
- Many alarms are active on one or more TD-bus circuit packs.
- There are active alarms for TD-bus circuit packs in the alarm log, but no red LEDs on the packs, or there are red LEDs on the circuit packs but no alarms. (This almost always means the bus is corrupted.)
- The TN714 TC or TN727 NC was alarmed, replaced, and became alarmed again.
- All or many of the following circuit packs have TD-bus control channel alarms (1150-1175): TN477 TDBI-8, TN500 TDBI, TN501B VPC, TN747B VPT, TN714 TC, or TN727 NC.

NOTE

The circuit pack back-out procedure should be used *only* after other procedures have failed to isolate the problem and if service is poor or nonexistent.

Before using this procedure, you may wish to locate or reserve spare TN714 TC and TN727 NC circuit packs. You may also run through the back-out procedure while waiting for replacement circuit pack(s). The idea of this procedure is to remove all circuit packs on the TD bus one at a time, and test the remaining circuit packs. If all tests pass, the last backed-out circuit pack is faulty and should be replaced.

1. Block service (if needed) using the appropriate form or switch procedure.
2. Back out the first TN747B VPT circuit pack.
 - a. *On systems with a data link*, busy it out using the `maintenance : vsp : busyout` form and unequip it using the `maintenance : vsp : equipage` form. Unlatch the circuit pack and pull it out about 2 inches.
 - b. *On Standalone systems*, busy out each port on the appropriate circuit pack at the switch and unequip it using the `maintenance : vsp : equipage` form. Unlatch the circuit pack and pull it out 2 inches.

3. Run 1 repetition of the NC long test using the `maintenance : nc : test` form, 1 repetition of the TC long test using the `maintenance : tc : test` form, and 1 repetition of the VPT long test using the `maintenance : vpt : test` form.
 - a. If all tests pass, shut down system software, spin down the RCD (if not done automatically), and power down the system. Replace the VPT circuit pack. Next, push in and latch all circuit packs, restore power, and verify that the corrupt symptom disappears.
 - b. If any test fails or if the symptom is still present, go to the next step.
4. Back out the second TN747B VPT circuit pack (if installed). For this circuit pack, instead of running the VPT long test, run the TDBI long test on the `maintenance : tdbi : test` form.
 - a. If all tests pass, shut down system software, spin down the RCD (if needed), and power down the system. Replace the VPT circuit pack. Next, push in and latch all circuit packs, power up, and verify that the corrupt symptom disappears.
 - b. If any test fails or if the symptom is still present, continue.
5. Back out one of the TN501B VPC circuit packs (busy it out and unlatch it as described in Step 2).
6. Run 1 repetition of the NC long test using the `maintenance : nc : test` form, 1 repetition of the TC long test using the `maintenance : tc : test` form, and 1 repetition of the VPC long test using the `maintenance : vpc : test` form.
 - a. If all tests pass, shut down system software, spin down the RCD (if needed), and power down the system. Replace the VPC circuit pack. Next, push in and latch all circuit packs, power up, and verify that the corrupt symptom disappears.
 - b. If test fails or if the symptom is still present, continue.
7. Redo Steps 5 and 6 until all VPCs are tested. For the last VPC, instead of running the VPC long test, run the TDBI long test on the `maintenance : tdbi : test` form.
8. Back-out the TN477 TDBI-8 or TN500 TDBI, depending on which circuit pack is installed in slot 16 (busy it out and unlatch it as described in Step 2).
9. Run 1 repetition of the NC long test using the `maintenance : nc : test` form, 1 repetition of the TC long test using the `maintenance : tc : test` form, and 1 repetition of the TD-bus short test (select “TC” for the device) using the `maintenance : td-bus : test` form. The only tests which should pass are:
 - a. The NC short and long tests on the `maintenance : nc : test` form.
 - b. The “DSP sanity” test for the TC short test.
 - c. The “channel control loop around” test on the TD-bus short test.

If all tests pass, shut down system software, spin down the RCD (if needed), and power down the system. Replace the TDBI circuit pack. Next, push in and latch all circuit packs, power up, and verify that the corrupt symptom disappears.

If any of the tests failed or if the symptom is still present, go to Step 10.

10. At this point, only the TN714 TC and TN727 NC remain on the bus. Do the following:
 - a. Shut down system software, spin down the RCD (if needed), and power down the system.
 - b. Replace either the TC or NC (if not already replaced).

-
- c. Power up and initialize without reinserting any of the circuit packs which have been removed. Go to Step 11.
 11. When the system is up, run the NC long test using the `maintenance : nc : test` form and the TC short test using the `maintenance : tc : test` form (only “DSP sanity” should pass).
 - a. If all tests pass, the last circuit pack replaced was the problem. Shut down system software, spin down the RCD (if not done automatically), and power down the system. Push in and latch all circuit packs that have been backed out. Next, power-up, initialize, and verify that the corrupt symptom disappears. If the symptom is still present, you may have just reinserted a (different) faulty circuit pack. Return to Step 1.
 - b. If any of the tests fail, go back to Step 9 and replace any circuit pack (NC or TC) that has not already been replaced. If all circuit packs were replaced and any tests continue to fail, go to Step 12.
 12. All circuit packs on the TD-bus should have now been eliminated from the list of possible problems. Do the following:
 - a. Shut down system software, spin down the RCD (if not done automatically), and power down the system.
 - b. Remove all TD-bus circuit packs from the carrier.
 - c. Inspect the backplane for bent or broken pins, especially where the NC and TC were located (see Chapter 11). Also check the backplane for damage and the AHF1 paddle circuit packs for good connections (see Figure 13-2).
 - d. If a problem with the backplane is found, fix it if possible. Restore power and initialize. Verify the symptom has disappeared.
 13. If the symptom(s) still remains, escalate the problem using your local procedures.

AUDIX Backplane

The backplane is a multi-layer circuit pack with many contact pins that connect the circuit packs to major and minor buses (etched printed paths on the backplane) and to each other. Paddle circuit packs, cabling, loose connections, broken pins, or other backplane problems cannot be alarmed directly by AUDIX software. Follow the problem isolation procedures as directed elsewhere in this manual before coming to this section. Paddle-circuit pack and backplane replacement are last-choice procedures.

Backplane Layouts

Table 13-3 shows the circuit packs and cables that attach to the AUDIX backplane in one-cabinet systems. Figure 13-3 shows the List 1 backplane layout, Figure 13-4 shows the List 2 backplane. Tables 13-3 and 13-4 show the circuit packs. Table 13-5 shows the cables that attach to the backplane and extend the buses in a two-cabinet system as shown in Figure 13-5.

One-Cabinet Backplane Paddle Boards

If you have an unresolved bus problem, look up the paddle circuit pack related to the corrupted bus (or intermittent fault). You may wish to check or replace it as a last-choice option.

Table 13-3. One-Cabinet AUDIX Backplane Circuit Packs

Backplane Code	Circuit Pack Code	Comcode	Carrier Position	Description
AB0	AHF104	105 190 839	01	Disk interface
AB1	AHF102	105 167 233	05	DBP/VME-bus terminator
AB2	ZAHF8	103 963 336	06	S-bus terminator
AB3	CDR1B	105 711 238	07	Alarms
AB4	ZAHF8	103 963 336	17	S-bus terminator
AB5	AHF1	103 810 586	18/00*	TD-bus terminator
AB6	AHF1	103 810 586	28	TD-bus terminator
–	PWJ58886U-1	105 442 941, L2	all (rear)	Backplane circuit pack
* On List 1 backplanes this circuit pack is in slot 18, on List 2 backplanes the circuit pack is on slot 00.				

One-Cabinet Backplane Circuit Pack Cabling

Only two of these circuit packs have any cables attached:

- **AHF104:** This circuit pack has a 50-pin data cable connector for the disk drives. The 60-pin connector is for lab use only.
- **CDR1 or CDR1B:** This alarm circuit pack links many devices in the system. See Chapter 6 for a description of these connectors and an illustration.

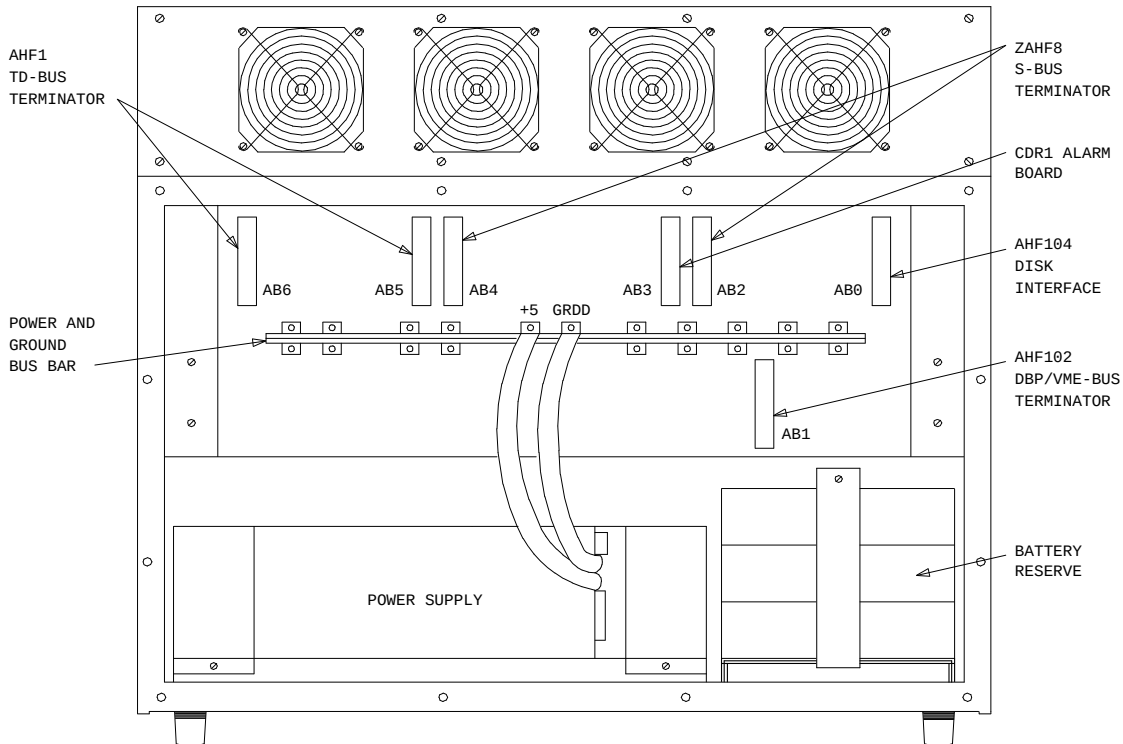


Figure 13-3. One-Cabinet AUDIX List 1 Backplane Circuit Packs and Layout

The AHF1 TD-Bus terminator has been replaced by the WP91602, List 1 TD-Bus terminator.

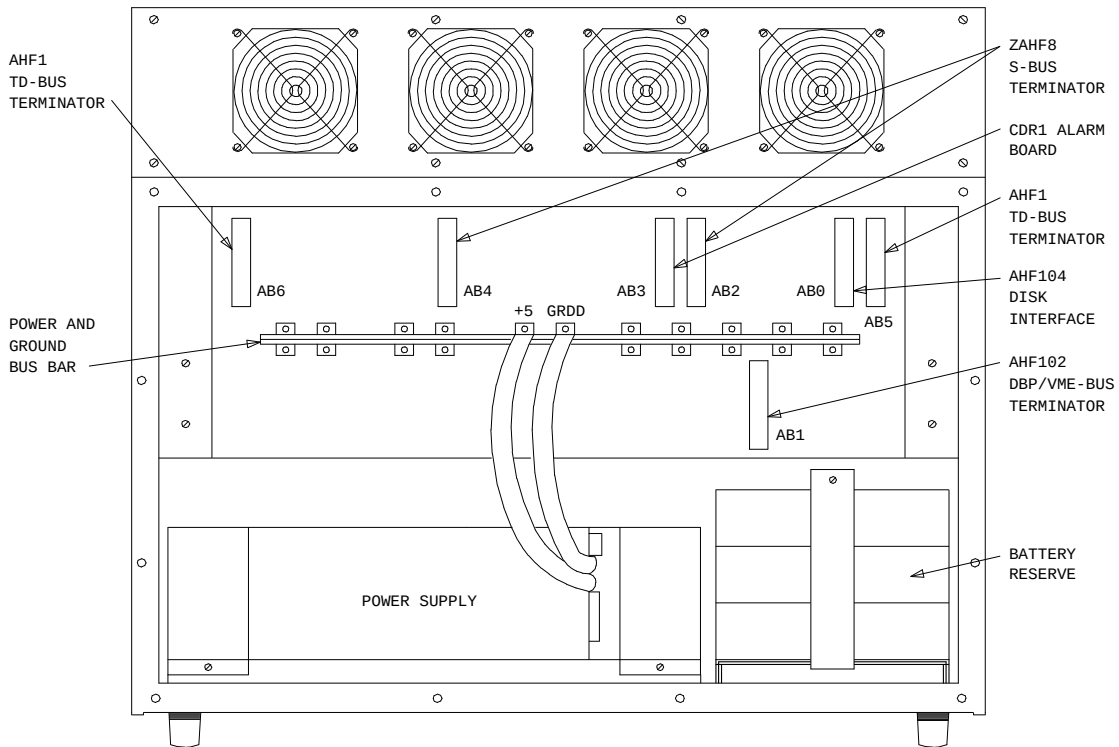


Figure 13-4. One-Cabinet AUDIX List 2 Backplane Boards and Layout

The AHF1 TD-Bus terminator has been replaced by the WP91602, List 1 TD-Bus terminator.

Two-Cabinet Backplane Paddle Boards

Table 13-4 shows the required backplane circuit packs for a two-cabinet system. The position of the circuit packs will depend on whether the bottom cabinet has a List 1 or List 2 backplane.

The easiest way to determine the list number of the backplane is to check the connector panel. If there are RS-232C connectors for the DBP, FP, and VSP on the right side of the connector panel, the system has a List 2 backplane. If these connectors are not in place, the system has a List 1 backplane (see Chapter 2 for figures of each connector panel).

You may also find the list number pressed into the backplane circuit pack. The list number will be PWJ58886U1, L1 for the List 1 backplane or PWJ58886U1, L2 for the List 2 backplane. This number is at the top, center of the backplane.

If the bottom cabinet has a List 1 backplane, the AHF109 TD-Bus expansion circuit pack will be on slot 28 and the TD-Bus terminator (AHF1 or WP91602, L1) will be on slot 18. If the bottom cabinet has a List 2 backplane, the AHF109 will be on slot 00 and the TD-Bus terminator will be on slot 28. See Table 13-4.

Table 13-4. Two-Cabinet AUDIX Backplane Boards

Lower (Base) Cabinet				
Circuit Pack	Acronym	Slot	Field Designation	Quantity
AHF109	TDBUS-EXP	28/00	AB6/AB5	1
AHF104	SADI-I/O	01	AB0	1
AHF102	VME-TERM	05	AB1	1
AHF108	SBUS-TERM	06	AB2	1
CDR1B	ALARM-BD	07	AB3	1
AHF107	SBUS-EXP	17	AB4	1
AHF1*	TDBUS-TERM	18/28	AB5/AB6	1
Upper (Expansion) Cabinet				
AHF109	TDBUS-EXP	00	AB5	1
AHF104	SADI-I/O	01	AB0	1
AHF107	SBUS-EXP	06	AB2	1
CDR1B	ALARM-BD	07	AB3	1
AHF108	SBUS-TERM	17	AB4	1
AHF1*	TDBUS-TERM	28	AB6	1

* Or the WP91602, L1.

Intercabinet Cables

Table 13-5 lists the intercabinet cables required to connect the two cabinets together. Check that all the cables are connected correctly. See Table 13-4 for the slots the cables should be connected to. The bottom cabinet backplane list number will determine where the cables go.

The cables are not keyed. The S-bus expansion cables have a notch on the connector which should match the slot on the header (connector) of the AHF107 circuit packs. The other cables *should* have a stripe down one side so you can be sure the connectors match on the top and bottom cabinet backplane circuit packs.

Table 13-5. Intercabinet Cables

Cable	Conductors	Connects	Quantity
SADI-I/O (1E434-11 Grp. 186)	50	AHF104 in lower cabinet to all disks in the system (daisy chain).	1
CDR1B/Alarms (1E434-11 Grp. 185)	14	Upper and lower cabinet CDR1B alarm circuit packs.	1
TD-Bus Expansion (1E434-11 Grp. 187)	40	AHF109 to AHF109, extending the TD-Bus to the top cabinet.	1
S-Bus Expansion (1E434-11 Grp. 329)	60 each cable	AHF107 to AHF107, extending the S-Bus to the top cabinet.	2
S-Bus Signal Ground (H600-140 Grp.403)	Single #10 wire	AHF107 to AHF107 ground lugs of the two cabinets. A 5 foot black cable.	1

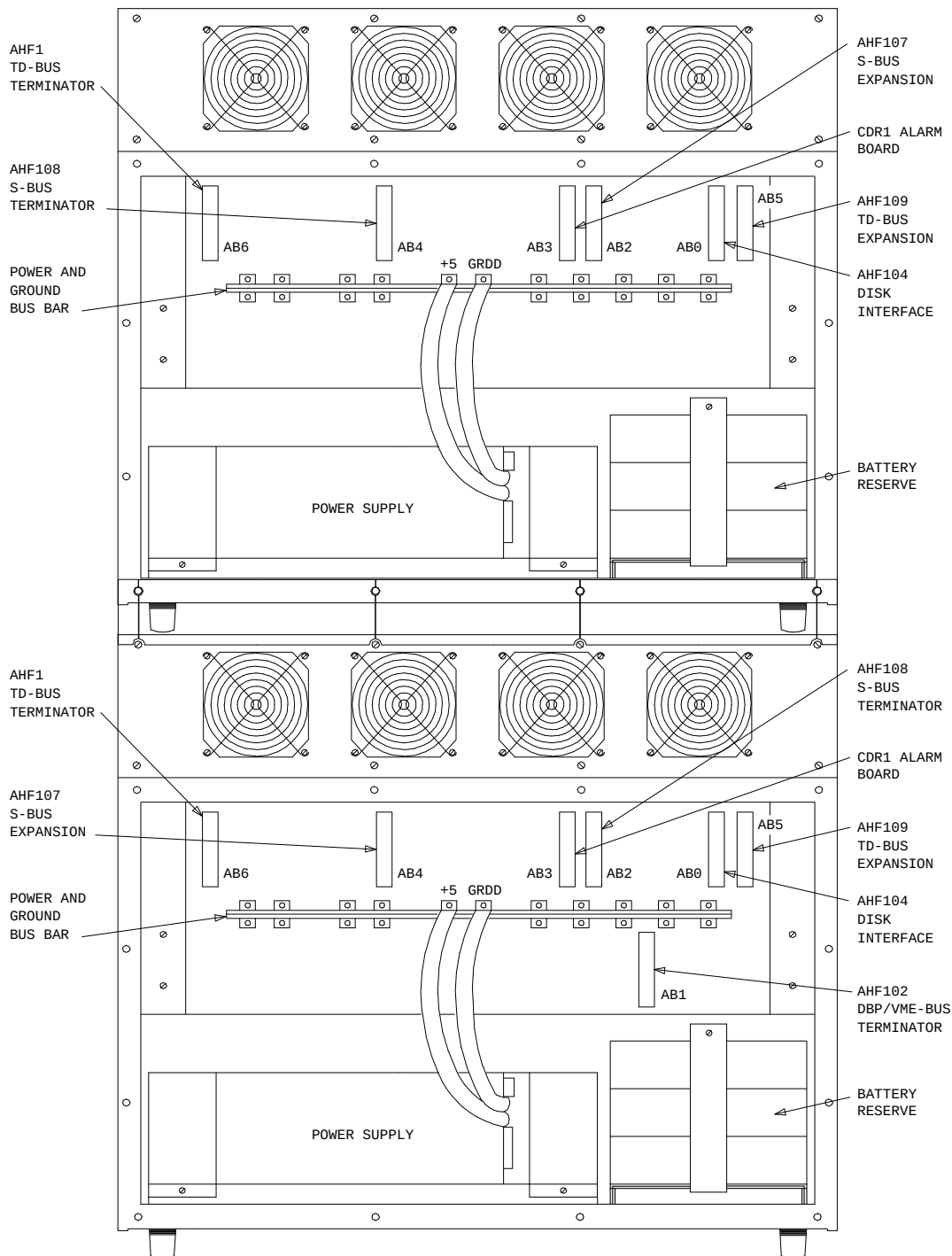


Figure 13-5. Two-Cabinet AUDIX Backplane Boards and Layout

Replacing Backplane Boards

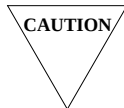
If you are working on a two-cabinet system, do all of the following steps for both cabinets.

Check the backplane circuit pack(s) if:

- All other likely causes of a problem have been eliminated (for example, all other circuit packs on the bus test out as good and the bus is still locked up).
- The circuit pack appears damaged during a visual inspection (the surface is scratched or backplane pins have contacted the circuitry).

To replace a faulty backplane circuit pack:

1. Shut down the system software (if running) using either the `shutdown` form with the maintenance (m) option or the MI toggle switch (see Appendix A if needed). This should spin down the RCD automatically (wait for the green LED to go out).
2. Power down the system. Then unplug the AC power cord(s).
3. Remove the middle panel to access the backplane. (Loosen the 7 screws along the bottom, then remove the 4 screws along the top. Slide the panel upwards to remove it.)
4. *Check for problems:*
 - a. Check the seating of cables to the paddle circuit packs and connector panel. If any cables are loose, reseat them firmly, but *do not* use excessive force.
 - b. Check that the circuit packs are well seated. Paddle circuit packs should be about 1/3-inch away from the backplane for all pins to be properly engaged. If the circuit packs are too far out, the pins may not engage the gold portion of the pin socket, causing a poor connection. Push in loose connections (*do not* use excessive force).



If you can see the tops of the pins through the connector holes on the circuit pack, stop pushing. If the connectors are pushed too far in, the backplane pins may contact the circuitry in the circuit packs and damage them.

- c. Replace any circuit packs suspected of being faulty.
 - d. Check for bent or broken pins (see “Replacing Backplane Pins”).
5. If you notice any problems, fix them or replace the circuit pack.
 - a. *For the CDR1 or CDR1B circuit pack(s)*, see Chapter 7 and Figure 7-2.
 - b. *For any other backplane circuit packs*, make sure any cables you remove to replace the circuit pack are properly reinserted.
 6. To check the repair, power up the system. The system should initialize.
 7. For faults, verify that the alarm is resolved using the `maintenance : active alarm : display` form.
 8. For intermittent or other faults, wait a few minutes and check again to see if the alarm returns. If it does not, consider the problem fixed.

9. Verify that good service is restored by making test calls using the `maintenance : system : test call` form. After checking for good operation, reattach the middle panel.

Replacing the Backplane

The AUDIX carrier is built-in to the cabinet and cannot be removed. If the slots or card guides are damaged, the entire cabinet must be replaced. However, the backplane at the rear of the carrier may be replaced as a last-choice procedure. If you have eliminated all other causes for a backplane problem, it is possible that the backplane itself may be faulty. Check the backplane if:

1. Bus-isolation procedures indicate a backplane problem, and the paddle circuit packs or broken pins do not seem to be the problem.
2. After removing all paddle circuit packs and power-supply connections, you measure a short on the backplane (0 ohms).

In either of these cases, you may try to replace the backplane (PWJ58886U-1, comcode 105 263 909) as a last-choice option. Do this only as directed by remote maintenance personnel.

Replacing Backplane Pins

While seating a circuit pack or troubleshooting the backplane, you may have damaged a pin. A broken pin could cause intermittent faults, but is usually one of the last possible causes checked.

Pin Replacement Procedure

To replace a backplane pin:

1. Shut down the system software (if running) using either the `shutdown` form with the maintenance (m) option or the MI toggle switch (see Appendix A if needed). This should spin down the RCD automatically (wait for the green LED to go out).
2. Power down the system. Then unplug the AC power cord(s).
3. The damaged pin must be accessible from the front and back:
 - a. Remove the circuit pack that caused the damaged pin plus one or two adjacent circuit packs from each side.
 - b. At the rear of the cabinet, remove the middle panel. (Loosen the 7 screws along the bottom of the panel, then remove the 4 screws along the top. Slide the panel upwards to remove it.)
4. From the rear, use the appropriate tool (such as Head No. 3, 4, or 5) to remove the broken pin. (See the next section for tool-kit information.)
5. Match the removed pin to one like it in the kit.
6. From the front, use Head No. 1 or 2 to insert new pin. *Do not* scratch any surface on the backplane.

7. *Before replacing the middle panel:*

- a. Check the cabling to the paddle circuit packs and connector panel. If any cables are loose, reseal them firmly (*do not* use excessive force).
 - b. Check that the circuit packs are well seated. Push in loose connections (*do not* use excessive force).
 - c. If the connectors are pushed too far in, the backplane pins may contact the circuitry in the circuit packs and damage them. Replace any circuit packs suspected of being faulty (see Table 13-3 for comcodes).
8. To check the repair, power up the system. The system should initialize.
 9. For faults, verify the alarm is resolved using the `maintenance : active alarm : display` form.
 10. For intermittent or other faults, wait a few minutes and check again to see if the alarm returns. If it does not, consider the problem fixed.
 11. After checking for good operation, reattach the middle panel. Verify that good service is restored by making test calls using the `maintenance : system : test call` form.

Backplane Tool Kit

AUDIX uses a FASTECH type of backplane and 1-type contact pins. These contact pins come in various lengths for electrical sequencing. The pins are press-to-fit into backplane printed-wiring circuit packs without soldering. Only 1B-3, 1B-4, 1B-14, 1C-1, or 1D-1 contacts are used with the connectorized contacts in AUDIX.

Pins are removed from the back and inserted from the front. Use a 940A Tool Kit (comcode 403 425 705). The kit includes:

- Handle assembly (automatic center punch with a 4-inch long handle)
- 12 types of connector pins
- 10-inch extension rod (can increase tool length to 18 inches)
- Head No. 1 – used to insert pins in spacer-aligner areas
- Head No. 2 – used to insert pins in areas without spacer-aligners
- Head No. 3 – used to remove pins from the wiring side (rear)
- Head No. 4 – used to remove stubs or broken pins from the wiring side
- Head No. 5 – used to remove pins from the circuit pack side.

14. Software

This chapter is used to isolate software problems in AUDIX. Many problems are identified by alarms and can be diagnosed relatively easily. If there is no alarm, but none the less there is a suspected filesystem problem, use the step-by-step check in *Service Not Started* to pinpoint it.

Use the tables and procedures in the following sections:

- Filesystem Alarms — sdat, adat, and ndat filesystem alarm resolution (Units 91, 94, and 151)
- Software Troubleshooting — Service Not Started Alarms and Step-by-Step Check
- Solving Disk Space Problems — includes threshold violations and increasing filesystem size
- Creating and Copying Filesystems

SDAT, ADAT, AND NDAT FILESYSTEM ALARMS

The sdat filesystem contains crucial information for rebuilding the system. For this reason, the sdat filesystem is backed up automatically each night to the RCD cartridge. If this backup fails, an alarm is recorded (See Table 14-1).

The adat filesystem contains all of the announcements used by the system to prompt callers. If the system cannot find an active version of this filesystem during initialization, it generates an alarm (See Table 14-1).

The ndat filesystem contains the voiced-in subscriber names. This filesystem can be alarmed in two ways. First, if the system cannot find the names filesystem during initialization, an alarm is raised. Second, the names filesystem can and should be scheduled for a weekly backup. If this backup fails, an alarm is generated (see Table 14-1).

Table 14-1. Filesystem Alarm Resolution

Alarm Log		Description	
Fault	Unit:Dev		
239	94 : 0	sdat filesystem backup failed	
1530	151 : 0	Names filesystem backup failed	
1531	91 : 0	No announcement filesystem	
1532	151 : 0	No names filesystem	

Procedure A: sdat Backup Alarm Resolution

Do the following checks to try to find out why the backup failed:

1. Make sure the RCD is powered up and the green LED is lit. If not, try to spin the drive up (push the start button).

NOTE

Remote personnel can use the `maintenance : dbp : equip` form to spin up the RCD.

2. Check that the RCD is EQ/EN using the `maintenance : dbp : status` form. See if the DBP took the RCD out of service (EQ/D).
3. If the RCD is unequipped, equip it now using the `maintenance : dbp : equip` form. See *RCD Cartridge Handling* in Appendix A for details.
4. *If the RCD fails to equip*, check the following:
 - a. Make sure a cartridge is installed. Spin down the RCD (if it didn't spin down automatically) and insert or reseat the cartridge, then re-equip it.
 - b. If the cartridge is correctly inserted, replace it with a new (blank) cartridge. Initialize the new cartridge and see if this solves the problem.
 - c. *If you replace the cartridge and the disk still fails to equip*, the RCD is probably faulty. Go to Chapter 6, *Disk Drives*, to check and replace the drive.
 - d. *If you replace the drive*, create new backup filesystems on a new cartridge using the steps in *Creating and Copying Filesystems*.
5. If the drive equips, check that the RCD has enough room for backups using the `filesystem : list` form. Software should automatically erase enough old backup copies to make room for the new one. However, it should never delete the previous day's backup, so two current copies are always available.
 - a. If all old backups except the previous day's have been deleted and there is *not* enough room on the disk for the new backup, check if other data is being stored on that disk (such as adat copies). If so, order and initialize a new backup cartridge with a unique name to hold this extra data (such as adat or sst backups).

- b. If software does not seem to be making backups or deleting old copies as it should and the disk is *not* full, restart the system using the **startup** form. Make a new manual sdat backup as directed by *Creating and Copying Filesystems*.

The alarm will *not* be resolved until the next automatic nightly audit.

6. *If a restart does not solve the problem*, replace the current backup cartridge. Initialize a new (blank) sdat backup cartridge, manually make a new sdat backup as directed by *Creating and Copying Filesystems*, and wait for a successful automatic backup to be made that night. (You may have to order a new cartridge if you don't have a spare.)
7. If the RCD seems to be okay but the problem continues, check for other problems with the DBP subsystem (red LEDs, errors, or intermittent faults).
8. When the problem is fixed, this alarm should be resolved the next time an automatic nightly backup is made. Check the **maintenance : active : display** form the next day to verify this.
9. If the alarm is still active, check the RCD for problems using Chapter 6.

Procedure B: Names Backup Alarm Resolution

Use the following steps to back up the names filesystem and resolve the alarm.

1. Display the **system : announcement : filesystem** form. Note the names backup-filesystem name (such as disk02.nmback).
2. Display the **filesystem : list** form. Enter the disk or cartridge that the names backup filesystem is on.
3. Check the number of free blocks on the disk or cartridge.
 - a. If there is enough space to do the backup, go to the next step.
 - b. If there is not enough free space to back up the filesystem, put the backup on another disk. Go to the next step.

NOTE

If the system does not have enough disks to place the backup on a different disk than that of the active filesystem, you will have to delete some files on the backup disk. Escalate per local procedures.

4. Do a manual backup of the filesystem.
 - a. Display the **system : announcement : filesystem** form.
 - b. Enter **x** in front of the *backup names to:* field.
 - c. Enter the name of the backup filesystem after *backup names to:*. Press **CHANGE**.

Procedure C: Announcement Filesystem Alarm Resolution

This alarm indicates that the active announcement filesystem was either missing or corrupt at initialization. Before recovering this filesystem, you must first determine where the backup version is. Do the following:

1. Display the `system : announcement : filesystem` form.
2. Check the *admin announcements:* field
 - a. If there is a filesystem name listed in this field, tab to the *swap active and admin* field, enter **x**, and press **CHANGE**. Restart the system and go to *Creating and Copying Filesystems* to back up the announcement filesystem.
 - b. If nothing is displayed in this field, go to Step 3.
3. Display the `filesystem : list` form. Check each disk drive in the system for an announcement filesystem (for example, name = ana, type = adat).
 - a. If this filesystem is on an HDD, record which drive the filesystem is on and go to *Recovering From an HDD*.
 - b. If this filesystem is on the RCD, go to *Recovering From a Cartridge*.
 - c. If you can't find an adat filesystem anywhere on the system, you will have to copy this filesystem from either the generic-program cartridge (standard announcements) or a backup cartridge (custom announcements). Get the required cartridge and go to *Recovering From a Cartridge* section.

Recovering From an HDD

1. Display the `system : announcement : filesystem` form.
2. Tab to the *active announcements:* field and enter the name of the announcement filesystem in the "volume.filesystem" format (such as disk00.ana). Press **CHANGE**.
3. Restart the system using the `startup` form.
4. Go to *Creating and Copying Filesystems* to back up the active version of the announcement filesystem.

Recovering From a Cartridge

1. Do an administrative shutdown using the `shutdown` form.
2. *If the cartridge in the drive does not have the announcement filesystem on it:* Unequip the RCD, using the `maintenance : dbp : unequip` form, replace the cartridge currently in the drive with the required cartridge, and equip the RCD using the `maintenance : dbp : equip` form.
3. Display the `filesystem : list` form to confirm that the required filesystem is on the cartridge.

4. Display the **filesystem : copy** form. Copy the announcement filesystem from the cartridge to one of the HDDs using an appropriate filesystem name (such as disk00.ana) and set *physical copy* to **y**.
5. Display the **system : announcement : filesystem** form. Tab to the *active announcements:* field and enter the name of the announcement filesystem you copied on the HDD (such as disk00.ana). Press **CHANGE**.
6. If you used a different cartridge than was originally in the RCD, unequip the RCD using the **maintenance : dbp : unequip** form, remove the cartridge in the drive and replace it with the sdatt backup cartridge. Equip the RCD using the **maintenance : dbp : equip** form.
7. Restart the system.

Procedure D: Names Filesystem Alarm Resolution

This alarm indicates that the names filesystem was either missing or corrupt at initialization. Do the following:

1. Display the **system : announcement : filesystem** form.
2. Record the name of the *weekly names backup* filesystem.
3. *If the backup filesystem is on a cartridge:* Do a filesystem list on the RCD.
 - a. If the backup is not on the cartridge currently in the drive, get the backup cartridge, unequip the RCD using the **maintenance : dbp : unequip** form, and replace the cartridge currently in the drive with the required cartridge. Equip the RCD using the **maintenance : dbp : equip** form. Go to Step 5.
 - b. If the backup is on the cartridge currently in the drive, go to Step 5.
4. Display the **filesystem : copy** form. Copy the names filesystem from the cartridge to one of the HDDs using an appropriate filesystem name (such as disk00.nm) and set *physical copy* to **y**.
5. Display the **system : announcement : filesystem** form. Tab to the *names:* field and enter the name of the names filesystem you copied on the HDD (such as disk00.nm). Press **CHANGE**.
6. *If you used a different cartridge than was originally in the RCD:* Unequip the RCD using the **maintenance : dbp : unequip** form, remove the cartridge in the drive and replace it with the sdatt backup cartridge. Equip the RCD using the **maintenance : dbp : equip** form.
7. Restart the system using the **startup** form.

SOFTWARE TROUBLESHOOTING

When a system initialization ends with the “service not started” message, log in and check the alarm log for the following alarms. If none of these alarms are active, go to *Solving Unalarmed Initialization Problems*.

Table 14-2. System Initialization Faults

Alarm Log		Description	
Fault	Unit:Device		
392	143 : 2	Am manager failed to initialize	
393	143 : 1	Alrm manager failed to initialize	
394	143 : 4	Dbpa manager failed to initialize	
395	143 : 5	Dm manager failed to initialize	
396	143 : 7	Er manager failed to initialize	
397	143 : 9	Ffd manager failed to initialize	
398	143 : 14	Mbox manager failed to initialize	
399	143 : 15	Mm manager failed to initialize	
400	143 : 16	Mmi manager failed to initialize	
401	143 : 33	Net manager failed to initialize	
402	143 : 20	Sd manager failed to initialize	
403	143 : 21	Sdm manager failed to initialize	
404	143 : 22	Sm manager failed to initialize	
405	143 : 24	Vfd manager failed to initialize	
406	143 : 26	Vm manager failed to initialize	
407	143 : 25	Vip manager failed to initialize	
601	143 : 1	Can't open FSCH file in the ss filesystem	
602	143 : 1	Can't open VSCH file in the ss filesystem	

The only way to clear these alarms is through a successful system initialization. However, service can still be provided in many cases.

Procedure A: Announcement Manager

Check for the `/sd/sav`, `/nm/sat`, `/anp1/sat`, and `/anp1/sam` files. One of these is probably missing. See *Creating and Copying Filesystems* to copy a file from the backup `sd`, `adat`, or `ndat` filesystem. If that doesn't help, you may have to use the generic filesystem *which may cause customer data to be lost*. Reinitialize the system after file restoration.

Procedure B: Alarm Manager

The cause of this alarm will not degrade service. Before continuing, check to see if the voice ports are busied. If so, release them so that AUDIX will begin taking calls.

Check for the `/ss/ala` and `/ss/alr` files. These files contain the active and resolved alarm logs, respectively. If they aren't present, copy them from the backup or generic ss filesystem.

Procedure C: Dbpa Manager

This alarm indicates that one or more of the filesystems in the `/boot/dbpa` file could not be mounted. If the filesystem is mirrored and its slave did get mounted, the system should be providing service. Fix the master filesystem using *File Redundancy (Mirroring) Alarms*.

If a vtext filesystem failed to mount, check to see if there are any vtext filesystems that did get mounted. If so, the system is still capable of providing partial service. Release the voice ports. Once that is done, try to recover the missing vtext.

Procedure D: Delivery Manager

Check for the `/vd/dr` (delivery request) file and the `/vd/xmq` (network transmission queue) file. If they are missing, copy them from a backup or generic filesystem. Reinitialize the system.

Procedure E: Er Manager

Check for the `/ss/el` and `/ss/al` files. These files are not required for service to be provided. If the voice ports are busied, release them. Then restore these files.

Procedure F: Ffd Manager

This alarm indicates that PE 0 could not initialize its cyclic timer. This will not degrade service, so if the voice ports are busied, release them.

Procedure G: Mbox Manager

This manager attempts to open the `/vd/mb` file. If this file cannot be opened, an alarm is raised. An alarm is also raised if the file can be opened but access to the records within the file is denied. Restore this file from the backup or generic vdat filesystem.

Procedure H: Mm Manager

Check for the `/sd/mh` file. The Mm manager could not open this file or could not initialize the message header cache. Restore this file and reinitialize the system.

Procedure I: Mmi Manager

The Mmi manager opens or creates all traffic files. If unable to do so, an entry is made in the admin log. Voice ports are not busied out in this case. If the customer is using ADAP, these files should be restored as soon as possible.

Procedure J: Network Manager

This manager opens among others the `/vd/net_tmp` file, `/sd/upddlta` file, the `/sd/rmail` file, and the `/sd/vnq` file. If the `/sd/upddlta` file is missing, no delta or diff activity can take place. If the `/sd/rmail` file is missing, message status may be affected. If the `/sd/vnq` file is missing, no names voiceback updates will occur.

In a non-networked system, these problems will only cause an error in the error log and the voice ports will come up released. If the system is networked, restore these files from the backup sd and vd filesystems.

Procedure K: Service Dispatcher Manager

This manager opens the `/sd/svd_trans` and the `/sd/svd_amw` files. These files contain the switch translation, outcalling, and message waiting data. If these files cannot be opened, the system attempts to recreate them. If recreated, switch translation or outcalling data will be lost. Message waiting status will be restored at the next update.

An alarm is raised only if these files fail to open and cannot be recreated. Restore the files from the backup sd filesystem and reinitialize the system.

Procedure L: Sdm Manager

This manager opens the `/sd/usrd`, `/sd/extr`, `/sd/ttnm`, `/sd/nmtr`, `/sd/nettr` (all subscriber data files), `/sd/netprof`, `/sd/ranges`, `/sd/netname` (all network machine translation files), and the `/sd/syp` (system data) files.

Except for the `/sd/syp` file which is created with default values, an alarm is raised when one of these files cannot be opened. Restore the file from the backup sd filesystem and reinitialize the system.

Procedure M: Sm Manager

This manager opens the `/sd/subtr`, `/sd/sup`, `/sd/sdl`, `/sd/cls`, `/sd/attend`, and `/sd/attend_ext` files. The `/sd/subtr` file contains traffic data and will not cause an alarm if not opened. The others will cause an alarm. Restore the missing files from the backup sd and reinitialize the system.

Procedure N: Vfd Manager

This manager is much like the Ffd manager, except that it applies to the second processor element in a Two-Cabinet AUDIX system (PE 1).

Procedure O: Vm Manager

This manager opens the `/sd/vhconfig` file, which contains equipage status for the system. If unable to open, the system comes up with all devices unequipped. Equip the necessary devices and release the voice ports. Check the sd filesystem for other problems. At a convenient time, reinitialize the system. If this alarm is not resolved, you should replace the sd filesystem.

Procedure P: Vip Manager

If the Vip cannot access *timefile* (in the boot filesystem used to bring up the system) to initialize the system clock, an alarm is raised.

Vip also opens the `/sd/viptr` file (data link translations). If it cannot be opened, one is created containing a default set of translations. No Vip alarm is raised in this case. But the default translations may not match the translations at the switch and that will raise a Unit 32 alarm.

Procedure Q: Scheduler File Restoration

The initialization procedure failed to open the `/ss/fsch` or `/ss/vsch` file. Restore this file or the entire ss filesystem from the generic disk. Restoring the entire ss filesystem will wipe out the alarm and error logs.

Solving Unalarmed Initialization Problems

If the “service not started” message is not accompanied by an alarm, check the following to diagnose the problem. The “service not started” message always means there is a missing filesystem, either an inactive filesystem or one that is *corrupt* or damaged. Filesystem problems may be caused by operator (administrator or technician) error or by system errors, including:

- Deleting or deactivating the wrong filesystem (results in a missing filesystem at initialization and the “service not started” message)
- Overwriting a filesystem unintentionally with other data (results in a corrupt filesystem).

Hardware problems such as a power system failure, disk crash, or controller problem should have been eliminated in Chapters 3 and 7. This section lists basic software troubleshooting procedures you can use to locate and solve unalarmed filesystem problems. See Chapter 8 for a complete description of using screen forms, function keys, and terminal commands. The *AUDIX R1V7 Forms Reference*, 585-305-208 covers forms in detail, including their fields and functions.

Basic Troubleshooting Procedures

Check the software configuration as follows:

1. For a customer-reported problem, call into the system and log in. Check for the complaints below, and try to duplicate the problem to see if it still exists. If so, use the steps in Chapter 3 *first*, then return here if a filesystem problem is likely.

User Complaint:	Possible Disk Data Lost:
AUDIX answers with no or bad voice prompts	– The active adat filesystem
AUDIX doesn't play subscriber names	– The active ndat filesystem
Voice Mailbox calls ring with no answer	– The sdats, vdat, or boot filesystem
Some Call Answer calls ring with no answer	– Permissions or vtext filesystem(s)
Subscribers hear "No message to play back" or lose their personal greeting	– One or more vtext filesystems
Subscribers hear "No room in your mailbox"	– vdat or vtext filesystem(s)

2. Do a `filesystem : list` on each installed disk drive.
 - a. If the form returns filesystem data for all disks, the disks should be working correctly. Go to the next step.
 - b. If a form shows the message "invalid data" and no filesystems display, this disk may have a problem. Go to Chapter 6, *Disk Drives*, to investigate disk problems.
3. Use the `filesystem : list` form on each drive to look for bad filesystems (see Figure 14-2):
 - a. Check for unusual size. A corrupt filesystem may be missing data (smaller than normal), may be unusually large, may have too much or too little free space, or may have been internally rearranged so data cannot be read (may have a negative size).
 - b. Compare sizes with like filesystem types where possible. For example, the backup boot_e filesystem should be the same size as the active boot_f, and the active and administrative adat filesystems should be similar. (However, expect the sdats backups on the cartridge to be smaller than those on disk.)
 - c. Make a note of any filesystem(s) that appear questionable.
4. Display the `system : filesystems` form (see Figure 14-3):
 - a. Count the number of voice text (vtext) filesystems that have been administered (up to 10). These should have names like disk00.vm0 or disk02.vm4.
 - b. If a volume name is missing from a group of filesystems, the disk may have crashed. For example, disk02.vm4 may appear as just "vm4." Note any bad names.
 - c. Make sure all filesystem types listed on this form are active: boot, sdats, sst, vdat, and vtext. Note any that are missing.
 - d. Write down the active boot filesystem (typically, it is disk00.boot_f). Note if this is different (such as disk02.boot_e).
5. Display the `system : announcement : filesystem` form (see Figure 14-4):

-
- a. Check the *active announcements:* field for an active version of the announcement filesystem (such as disk02.anp). Note if it is missing.
 - b. If the system uses custom announcements, look for an admin version of the announcement filesystem (such as disk00.ans). Note if anything is displayed in the *admin announcements:* field.
 - c. Check the *names* field for an active names filesystem (such as disk00.names). These are the voiced-in subscriber names for the system. Note if this filesystem is missing.
 6. Check for disk or filesystem errors in the error log (see Table 3-2). Disk errors should be solved *first* (go to Chapter 9).
 7. Arrange a time with the customer where service can be interrupted. At the specified time, do a restart using the **startup** form to try to clear the problem:
 - a. If the restart is successful (the “start service” message appears), check if the original problem is solved (compare your notes from Steps 1 to 7).
 - b. If the restart fails, go to Step 8.
 - c. If you get the message “service not started,” go to Step 9.
 8. If the restart fails, an initialization (reboot) should run automatically. A reboot does a check filesystem (ckfs) program that tests filesystems for bad data or structure. It may erase questionable data or cause the filesystem to come up unmounted (inactive).
 - a. If the system boots from a nonstandard boot filesystem (such as the boot_e backup), the regular boot filesystem may need to be restored. Make a note of this.
 - b. If the reboot succeeds and you get a “start service” message, check if the original problem is solved. If you get the message “service not started,” go to the next step.
 - c. If the reboot fails (the system cannot initialize), go to Chapter 6.
 9. If the reinitialization ends with the “service not started” message, log in and compare the system status you recorded prior to the restart or reboot with the current status.
 - a. If filesystems that should be active are still not active (from Step 4), they are probably too damaged to be mounted. Go to Chapter 12 to delete and restore them.
 - b. If a volume name was missing from a filesystem name(s), the filesystem(s) may have disappeared completely from the form (for example, “vm4” may no longer be listed). Go to Chapter 9 to diagnose this probable disk drive problem.
 - c. If adat filesystems are inactive or corrupt (from Step 5), go to Chapter 12 to delete and restore them.
 - d. If any other filesystems are missing or appear damaged (from Steps 3 through 5), go to Chapter 12 to delete and restore them.
 10. *Optional Maintenance.* If you found any filesystems that were *not* damaged but were on the wrong disk according to the recommended filesystem distribution (see Table 15-1), go to *Creating and Copying Filesystems* to copy them to the recommended volume. Delete the old versions.
 11. If you cannot find the problem, check the errors listed in Table 3-2 for a clue to the problem. Go to the indicated section for resolution procedures.
 12. After filesystem restoration procedures, do another restart to make sure the system is working correctly. Check for good status using Steps 1 to 6 and verify the original problem is solved. If not,

call for help using regular escalation procedures.

Using the `filesystem : list` Form

Before you create a filesystem, you need to know what size to make it and where to put it. The easiest way of finding this information is through the `filesystem : list` form.

1. If you are unsure what all your *volume labels* are (the disk or cartridge device names), use the `list : volume names` form.
2. Next, display the `filesystem : list` form (see Figure 14-2). In the *volume:* field, type one of the disk or cartridge labels and press `ENTER`.
3. Filesystem type, status, and mount points should appear if the disk and DBP subsystem are working correctly. See Figure 14-2. Use this information to:
 - a. Determine the status of filesystems. Active filesystems always have mount points (only the first 8 characters display). Other filesystems may also be mounted for other reasons (such as making copies), but are inactive (not used to run the system).
 - b. Check for an active filesystem of each type (boot, adat, ndat, sdat, sst, vdat, and vtext). All active filesystems have a mount point (see Table 14-3). If you have more than one disk, these types should be spread out over the disks as recommended in Table 15-1. Print or copy each screen.
 - c. The leading slash (/) and first seven characters of each mounted filesystem are displayed. Usually only active filesystems are mounted.
 - d. Disk00 always has two filesystems with no type: a .unitctl filesystem which has disk mapping information, and a util filesystem for experienced service personnel.
4. Check filesystem and volume size, given in blocks. Each block is equivalent to 8 seconds of speech in a vtext filesystem.
 - a. The *free space (blocks)*: field shows the number of 16-Kbyte blocks of space still available on the volume. Use this number to see if you have enough space for copying a filesystem to this volume or increasing its size.
 - b. The *size (blocks)*: field shows the space allocated to that filesystem when it was created. You can use this number to figure out what size to make a new filesystem of the same type. See *Solving Disk Space Problems* for complete steps.
 - c. The *free (blocks)*: field shows the space that is not currently being used in the filesystem. If this number is very small, you may need to increase the size of the filesystem(s), or add another vtext if appropriate using the `filesystem : detail` form.
5. Change the *volume:* field to the next label and press `ENTER`. The filesystems on the next disk should appear. Repeat Steps 3 and 4 for each disk.

AUDIX STATUS: alarms: none, logins: 1, thresholds: none

PATH: filesystem : list

volume: disk00__ (PRESS ENTER TO DISPLAY VOLUME DATA)

free space (blocks): 5143

name	type	mount point	size (blocks)	free (blocks)	redundant?
.unitctl			10	9	
boot_f	boot	/boot	280	7	n
sd	sd	/sd	500	432	y
ss	sst	/ss	75	69	y
vd	vdat	/vd	50	47	y
vm0	vtext	/vm0	3500	1578	n
vm1	vtext	/vm1	3500	1432	n
ans	adat	/anp2	1750	1672	n

END OF LOG _

Error and confirmation messages appear here.

CHANGE
or RUN

ADD

DELETE

HELP

FIELD
HELP

CLEAR
FORM

EXIT

ENTER

Figure 14-1. The filesystem : list Form with Sample Data

Using the system : filesystems Form

Use this form to activate or deactivate most active filesystems (see Figure 14-3). *If a volume name is missing* from a group of filesystems (for example, disk02.vm2 to disk02.vm4 appear simply as “vm2” to “vm4”), go to Chapter 9 to diagnose this probable disk drive problem.

To activate a filesystem:

1. At a customer-approved time, do a software shutdown using the shutdown form (use options “c” and “a”).
2. On the system : filesystems form, tab to the appropriate field and type in the name of the filesystem. (This must be an existing filesystem. See *Creating and Copying Filesystems* to create a filesystem if necessary.) Make sure you use the “volume.filesystem” format.

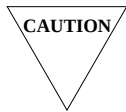
To deactivate one filesystem and activate another, simply type over the active filesystem’s name with the new filesystem name.

3. Press CHANGE. The active filesystem status is now changed.
4. Use the filesystem : update configuration form to update the secondary boot filesystem with this new status.
5. Restore service by running the startup form.

To add a vtext filesystem:

1. Use the filesystem : detail form to create a new vtext filesystem of the correct size (usually about 2,000 blocks) on the target disk. See Figure 14-1 for an example.

2. Display the **system : filesystems** form and tab to the appropriate empty line beneath the *voice text (messages)* field. Type the name of the new voice text filesystem.
3. Press **CHANGE**. The new filesystem is now available for use.
4. Use the **filesystem : update configuration** form to copy the new active-filesystem information to the secondary boot filesystem (usually boot_e).



Sometimes the “service not started” message appears because a formerly active vtext filesystem was deleted. You can never decrease the total number of active vtext filesystems (for example, from six to five). See Chapter 12 for details.

AUDIX STATUS: alarms: none, logins: 1, thresholds: none

PATH: system : filesystems

FILESYSTEMS IN ACTIVE USE:

system data /sd: disk00.sd_____ voice data /vd: disk00.vd_____

system status /ss: disk00.ss_____ boot /boot: disk00.boot_f_____

voice text (messages):

/vm0 disk00.vm0_____	/vm1 disk00.vm1_____
/vm2 disk02.vm2_____	/vm3 disk02.vm3_____
/vm4 disk02.vm4_____	/vm5 _____
/vm6 _____	/vm7 _____
/vm8 _____	/vm9 _____

Error and confirmation messages appear here.

CHANGE or RUN	ADD	DELETE	HELP	FIELD HELP	CLEAR FORM	EXIT	ENTER

Figure 14-2. The **system : filesystems** Form with Sample Data

Using the **system : announcement : filesystem** Form

Use this form to change the active announcement data (adat) filesystem or activate the names data (ndat) filesystem (see Figure 14-4).

The active adat filesystem should only be changed when system announcement fragments have been added or changed. The active ndat filesystem should only be changed if it is corrupt. Any time the system administrator adds new subscriber names, this filesystem is automatically updated.

Common procedures appear in this section. For complete step-by-step instructions for using this or other forms, see *AUDIX R1V7 Forms Reference*, 585-305-208.

To activate the names filesystem, tab to the *names* field and enter the names filesystem name in the volume.name format (such as disk00.nm). Press CHANGE. Restart the system when the operation is complete.

If you have made changes to the admin version of the announcement filesystem, swap the active and admin versions and then copy the new active to admin, then swap them back. When all operations are complete, restart the system.

AUDIX STATUS: alarms: none, logins: 1, thresholds: none

PATH: system : announcement : filesystem

active announcements: disk02.ana_____

admin announcements : _____

names : disk03.names_____

weekly names backup : disk02.nmback_____ status:

(TO COPY, SWAP, OR BACKUP, ENTER AN X THEN PRESS CHANGE)

_ copy active to admin

_ swap active and admin

_ backup names to: _____ status:

Error and confirmation messages appear here.

CHANGE
or RUN

ADD

DELETE

HELP

FIELD
HELP

CLEAR
FORM

EXIT

ENTER

Figure 14-3. The system : announcement : filesystem Form

SOLVING DISK SPACE PROBLEMS

AUDIX filesystems grow as subscribers and AUDIX programs use the system. This section discusses how to locate and correct disk (filesystem) space problems. This is normally the responsibility of the AUDIX system administrator; you may never have to increase a filesystem's size yourself.

Managing Disk Space

Disk space should be monitored and used carefully to prevent future problems. Before increasing filesystem size or adding new filesystems, follow these guidelines:

- Spread filesystems over your available disks (see Table 15-1). This puts fewer filesystems at risk in case of a device failure.
- Make several smaller vtext filesystems (about 2,000 blocks each) rather than one or two very large filesystems. In case of a media defect or other accident, only the messages in one or two filesystems are lost instead of *all* subscriber messages.
- Some filesystems grow automatically through normal use. You must periodically increase the size of these filesystems as they become full, or new data may be lost and system operation might suffer. Filesystems which grow are:
 - *Names Data (ndat)*: Grows as new subscriber names are added. Normally four subscribers fit into a block.
 - *System Data (sdat)*: Grows as new subscriber profiles, mailing lists, and message headers are added. This may stabilize after several months.
 - *Voice Data (vdat)*: Grows as subscribers create voice mail and deliver messages.
 - *Voice Text (vtext)*: Grows as the number of subscribers and their messages grow.
- Allocating too much space for a filesystem wastes disk space that may be needed for other purposes. Make filesystems a reasonable size for efficient disk use.
 - If a disk is completely filled, you cannot later increase individual filesystems if needed (you must copy them to another disk and delete the old versions). Try to leave a few hundred extra blocks on a disk when creating filesystems.
 - If you allocate space too conservatively, you may have to later increase filesystem sizes. Use the `system : limits` form as a guide when possible (see Figure 14-5).

Locating Space Problems

Filesystems may be running low on space if:

1. You have customer complaints about subscribers being unable to deliver or create messages.
 - a. Go to *Software Troubleshooting* (if you have not done so already) to isolate the problem. Make sure all filesystems are present and active.
 - b. If all required filesystems are active, check the number of vtext filesystems. If you don't have 10, you may add one using the `filesystem : detail` and `system : filesystems` forms (see *Software Troubleshooting*) or increase the size of existing ones.
 - c. If you already have 10 vtext filesystems or if you have run out of space on any other type of filesystem, increase the size of that filesystem.
2. The *thresholds* field on the terminal STATUS line shows a space violation (anything other than "none"). To solve threshold (disk space) problems, go to *Increasing Filesystem Size*.
3. The `filesystem : list` form shows that a filesystem is out (or nearly out) of space. Go to *Increasing Filesystem Size*.
4. You looked up the error codes in Table 3-2 and found a space problem. Use the `filesystem : list` form to find the filesystem low on space. Then increase its size.

Solving Threshold Violations

Thresholds are boundaries or checkpoints for monitoring the space remaining in a filesystem. If a filesystem runs low on available space, a warning message appears in the "thresholds" field on the AUDIX terminal STATUS line. This means an ndat, sdat, sst, vdat, or vtext filesystem is filling up some preset percentage of its total allotted size. This message is updated every 30 minutes. Normally this field should display the word "none" for no filesystem disk space problems. However, the "thresholds" field may display one or both of the following messages:

1. *Lower, Middle, or Upper*: This means a message-space threshold has been exceeded within a voice text (vtext) filesystem. If any of these three thresholds has been exceeded, increase the size of the current vtext filesystem(s), or create and activate a new vtext filesystem using the `filesystem : detail` and `system : filesystems` forms.

If an upper threshold is exceeded, the system should be shutdown before a service disruption occurs. Once the system is shutdown, the vtext capacity should be increased. Then the system can be restarted.

In any case, the vtext should be increased to a point where free vtext space equals *100% - lower threshold + 10%*.

2. *Filesystem*: A threshold has been passed in the ndat, sdat, sst, or vdat filesystem. To solve this:
 - a. Display the `system : thresholds` form to find out which filesystem needs space.
 - b. To correct the space violation, recalculate the filesystem size using the `system : limits` form (see Figure 14-5).

- c. Increase the size using the `filesystem : detail` form.

Increasing Filesystem Size

You may need to increase a filesystem's size in response to a threshold violation, or because one of the filesystems that grows is filling up. To do this:

1. Calculate recommended filesystem sizes as follows:
 - a. *For a boot or adat:* Check the size of a comparable type of filesystem using the `filesystem : list` form. Make sure the filesystem is not completely full.
 - b. *For ndat, sdat, sst, or vdat:* Use the `system : limits` form (see the next section). For the sdat filesystem, add about 350 blocks.
 - c. *For a vtext:* Use about 2,000 blocks for size, or check the `filesystem : list` form for the normal size used at that site. Create several smaller vtext filesystems rather than one or two very large filesystems to minimize the impact of a lost filesystem.
2. Also on the `filesystem : list` form, check for sufficient free space on the volume:
 - a. Check and record the number of blocks available in the *free space* field. A filesystem cannot be increased by more than the remaining blocks of free space. Try to leave a couple of hundred free blocks for filesystems to grow.
 - b. If space is insufficient for an increase, you need to move the filesystem to another volume (see *Creating and Copying Filesystems*).
3. To increase the size of any filesystem on the `system : filesystems` form, first do a forced, administrative shutdown using the `shutdown` form.
4. Display the `filesystem : detail` form. Type the name of the filesystem you wish to increase using a "volume.filesystem" format.
5. Tab to the *type* field and enter the filesystem type (adat, boot, ndat, sdat, sst, vdat, or vtext). Press . The field containing the current size of the filesystem will be filled in.
6. Tab to the *size* field and type the new size over the number currently in the field. Press . The size is now increased.
7. Restart the system using the `startup` form.

Using the `system : limits` Form

The `system : limits` form may be used to calculate new sizes for the ndat, sdat, sst, or vdat filesystems (see Figure 14-5). It may also be used to increase the number of default entries in the error and administration logs. To use this form:

1. Display the `system : limits` form.
2. Tab to the appropriate field, type the new value, and press . For example:

- a. If more subscribers are added, tab to the *subscribers-maximum number* field and increase the value by the number of subscribers added.
 - b. If you are increasing the length of the error log (maintenance : error : display form), type in the new value. The recommended value for this field is 10,000.
 - c. If you are increasing the length of the administrator log (system : log : display form), type in the new value. The recommended value for this field is 10,000.
3. When you make all the desired changes and press **CHANGE**, the system will update the filesystem sizes at the bottom of the form. Write these numbers down or print this screen. You need to use these numbers later when you actually increase filesystem sizes.

NOTE

Because some values are not considered on this form, increase the displayed size of the sdat filesystem 300 to 400 percent. This makes it up to 350 blocks greater than the size shown.

For example, if you increase the error or administration log length to 20,000, the sst filesystem size may grow from 75 to 92 blocks.

```

AUDIX STATUS:  alarms: none, logins: 1, thresholds: none
PATH: system : limits

message lengths, maximum (seconds): ____ minimum (tenths of seconds): ____
subscribers, local: ____ administered remote: ____
lists - total entries: ____ lists/subscriber: ____ recipients/list: ____
error log entries (maximum): ____ admin log entries (maximum): ____
messages, total in all mailboxes: ____ awaiting delivery: ____

RECOMMENDED FILESYSTEM SIZES (IN BLOCKS), BASED ON LIMITS:

system data:          system status:
voice data:           names:

Error and confirmation information appears on this line.

CHANGE  ADD  DELETE  HELP  FIELD  CLEAR  EXIT  ENTER
or RUN

```

Figure 14-4. The system : limits Form

CREATING AND COPYING FILESYSTEMS

Many filesystem procedures require you to first create an empty filesystem of the correct size on the correct volume (disk or cartridge device). Often you follow this procedure by copying information from one filesystem to another. This section covers steps for creating and copying filesystems.

Using the `filesystem : detail` Form

Use the form shown in Figure 14-1 to add a new (empty) filesystem, delete an existing filesystem, or increase filesystem size. Complete steps for increasing filesystem size are in *Solving Disk Space Problems*.

To add a new filesystem:

1. Use the steps in *Solving Disk Space Problems* to figure out the size you want the new filesystem to be.
2. Do a forced, administrative shutdown using the `shutdown` form.
3. Display the `filesystem : detail` form. Type the name of the filesystem you wish to create using a “volume.filesystem” format. Naming conventions are described early in this section.
4. Tab to the *type* field and enter the filesystem type (adat, boot, ndat, sdat, sst, vdat, or vtext).
5. Tab to the *size* field and type the filesystem size you previously figured. Press `ADD`.
6. To activate this new filesystem (for example, if you added a new vtext filesystem), go to *Software Troubleshooting*.

To delete a filesystem:

1. Type the name of the filesystem you wish to remove using a “volume.filesystem” format.
2. Tab to the *type* field and enter the filesystem type (adat, boot, ndat, sdat, sst, vdat, or vtext).
3. Press `ENTER`. This displays the current data for that filesystem. Check that the displayed filesystem is the one you really wish to erase.
4. Press `DELETE`. This removes the filesystem from the volume and creates free space the size of the filesystem on the volume.

Increase filesystem size:

Follow the steps in *Solving Disk Space Problems*.

Naming Conventions

Each filesystem name has two parts: the device or *volume* name, and the filesystem name. Some conventions for these names are discussed below; standard names are shown in Table 14-3.

Disk Names: Disk devices are assigned 1 to 7 alphanumeric-character volume names or *labels* based on the drive's position in the cabinet (0 to 6) and its controller. For example, the second hard disk run by controller 0 (device 0/2 or HDD 0/2) would be called disk02.

Cartridge Names: Removable cartridge volumes follow different naming conventions than hard disks. Program cartridges shipped from the factory are marked with volume names that indicate the software issue. For example, the first program cartridge shipped with your system could be named 1:2 for Issue 1.2. *Don't change* program-cartridge labels.

Backup cartridges, on the other hand, should be given names that clearly reflect their contents. These names are assigned by the AUDIX system administrator or service personnel. For example, the nightly backup cartridge might have the volume name back01 or backup. If the AUDIX system administrator keeps other records, the cartridge could be named adback1 or backup2. The only restriction is that the name be 1- to 7-alphanumeric characters long.

Filesystem Names: The 1- to 14-character filesystem name should indicate the type of files contained in that filesystem. Although you may use names other than the standard filesystem names shown in Table 14-3, you should follow the naming conventions where possible for consistency with other AUDIX systems, published AUDIX documentation, and normal software operation. For example, AUDIX software always looks for the boot filesystem disk00.boot_f on disk00.

Table 14-3. Filesystem Names, Types, and Mount Points

Filesystem Name (Note 1)	Mount Point	Type (Note 2)	Description
disk02.anp	/anp1	adat	Active announcement data (adat) version
disk00.ans	/ans	adat	Administrative (working) announcement version Note: These filesystems are activated using the <code>system : announcement : filesystem</code> form
disk00.boot_f	/boot	boot	Boot (startup) filesystem *
disk00.nm	/nm	ndat	Names data filesystem
disk00.sd	/sd	sdatt	System data filesystem
disk00.ss	/ss	sst	System status filesystem
disk00.vd	/vd	vdat	Voice data filesystem
disk00.vm0	/vm0	vtext	First voice text filesystem
disk00.vm1	/vm1	vtext	Second voice text filesystem
.			
.			
disk06.vm9	/vm9	vtext	Tenth voice text filesystem Note: These filesystems are activated using the <code>system : filesystems</code> form
Note 1. These filesystem names are conventions, not absolutes. Although you may change them, using the names above ensures consistency with published documentation. Note 2. Unlike filesystem names, the type must be specified exactly as shown. It cannot be abbreviated or changed. * AUDIX software always attempts to boot from the disk00.boot_f filesystem at system startup, so you should always use this name for your main boot filesystem. If disk00.boot_f does not exist, software looks for another boot filesystem. A boot_e backup should be on another disk (if possible).			

Backing Up (Copying) Filesystems

Filesystem backups, or duplicate copies, prevent the catastrophic loss of data and minimize the repair time and impact on customer data. The service technician should work with and encourage the customer and AUDIX system administrator to maintain complete and current backups.

Normally, the AUDIX system administrator is responsible for copying (backing up) filesystems to either a removable cartridge or a different disk drive than the original. Each system should have at least two backup cartridges, which should be used as follows:

1. *Generic-Program Cartridge*: This backup cartridge must be ordered with every system. It contains a copy of the system software in case filesystems or disks are lost. It must always be filed in a cool, dry, safe place.

NOTE

See the *RCD Cartridge Handling* section in Appendix A for details on handling, equipping, and protecting cartridges.

2. *sdat – Required Backup Cartridge*: Make sure the required backup cartridge is equipped so the sdat can be copied automatically each night through audits. Software names the sdat backups by date (for example, the copy made on March 9, 1988, is called sd880309).
3. *adat – Disk or Cartridge*: A backup version of the adat filesystem is necessary if the system uses custom announcements. If the system uses the standard announcement set, the adat filesystem can be recovered from the generic-program cartridge.
4. *ndat – Disk or Cartridge*: Subscriber names are recorded in this filesystem. The system administrator should update the backup filesystem whenever additional subscribers are added. The system will do a weekly backup of this filesystem each Sunday if a filesystem is entered on the `system : announcement : filesystem` form. Make sure a backup filesystem is entered on this form. If the system has only one HDD, you may put the names backup on the sdat backup cartridge because each week the backup ndat filesystem is overwritten if there are any changes.
5. *sst – Disk or Cartridge*: The sst filesystem may be backed up to preserve traffic records. See the previous adat filesystem description for information about keeping this copy on another hard disk or on an additional cartridge (with the adat backup copy).

The vtext filesystems are rarely copied because of their size. The vdat filesystems are normally rebuilt from a generic version and need not be backed up.

CAUTION

Avoid making a filesystem backup copy on the same disk as the original if possible. If the device fails, you would lose both the filesystem and its backup.

Using the `filesystem : copy` Form

All filesystems *except* the active boot filesystem can be copied manually using the `filesystem : copy` form. Use this form to back up or move a filesystem to another volume, or to restore a filesystem from a backup or the generic-program cartridge. The *active* boot filesystem must be backed up with the `filesystem : update configuration` form (see the next section). To copy (back up, move, or restore) a filesystem:

1. Check the size of the source filesystem using the `filesystem : list` form.
2. Use the `list : volume names` form to check for sufficient free space on the destination volume to accommodate the new filesystem.

NOTE

If you are restoring a filesystem from a generic version, you may need to increase its size later using *Increasing Filesystem Size*. Make sure you have room.

3. Before copying an active filesystem, first deactivate it as follows:
 - a. If the filesystem is listed on the `system : filesystems` form (such as `sst`), do a camp-on administrative shutdown using the `shutdown` form.
 - b. For additional `vtext` filesystems, you may try to copy them first using Step 4. If they are in use, return to Step 3 and shut down the system.
4. Display the `filesystem : copy` form. In the *from filesystem* field, type the name of the filesystem to be copied using a “volume.filesystem” format.
5. Tab to the *type* field and enter the filesystem type (`adat`, `boot`, `ndat`, `sdat`, `sst`, `vdat`, or `vtext`).
6. Tab to the *to filesystem* field and type the name of a *new* unique filesystem using a “volume.filesystem” format. See *Naming Conventions* if necessary.

CAUTION

A filesystem with the new name **cannot** already exist for the copy option to work. If you are restoring a filesystem, the corrupt version should have already been deleted using the `filesystem : detail` form.

7. Set *physical copy* to **y** for a physical (exact) copy. (The logical copy *n* option is used only in special cases.) You *must* use the physical copy option for `adat` or `boot` filesystems.
8. Press CHANGE. The filesystem will be copied to the specified device.
9. If you are moving a filesystem to a new volume, delete the old (source) filesystem using the `filesystem : detail` form (see the beginning of *Creating and Copying Filesystems*).
10. When you are finished, restart the system (if shut down) using the `startup` form.

Using the filesystem : update configuration Form

Use the `filesystem : update configuration` form to copy custom information about the system from the currently active boot filesystem to a new or backup boot filesystem (usually `disk02.boot_e`). Do this whenever you make a change to the `system : filesystems` form, the `maintenance : dbp : status` form, or receive a new software release from the factory. To update the boot filesystem:

1. Display the `filesystem : update configuration` form. Type the name of the new or backup boot filesystem in a “volume.filesystem” format. Press `CHANGE`.
2. Custom information is copied from the active boot to the boot copy you named.

Copying Files

Occasionally you may copy individual files within or between filesystems, usually as directed by remote service personnel. A faulty file may also be copied to a removable cartridge and returned for analysis. Use logical, unique file names and mount points and record them (you cannot display individual file names on any AUDIX forms). Copy a file with these five steps:

1. Use the `filesystem : detail` form to create a new (unique) filesystem, usually on a spare cartridge you have equipped.
2. If you are copying a file *to* an active filesystem, do a camp-on administrative shutdown using the `shutdown` form. You can always copy a file *from* an active or inactive filesystem, or *to* an inactive filesystem.
3. Mount (open) the new filesystem using the `filesystem : mount` form (see *Creating and Copying Filesystems*). Use a unique mount point and *record* it.

NOTE

Mount points may be 1 to 15 characters long and file names may be 1 to 10 characters (such as “/sd/sup” where /sd is the mount point and sup is the file name). Because the `filesystem : list` form shows only the first 8 characters of a mount point, *record* long mount points or keep them short.

4. Use the `filesystem : file copy` form to copy the file(s) to a new mount point:
 - a. Type the source file name in the *from file* field in a /mountpoint/filename format.
 - b. Type in the destination file name in the *to file* field using the same format. *Record any names you make up.* Press `CHANGE`.

NOTE

For large files (such as /vd/mb), the form may time out and show a “program error encountered” message. This has been known to happen when copying a file to the same disk on which the original resides, when copying a file to/from a 20-Mbyte RCD, or when copying files on a Two-Cabinet AUDIX system. There may be other cases as well. Retry the copy operation.

5. For a cartridge, unmount the filesystem using the `filesystem : unmount` form. Unequip the cartridge and remove it from the RCD. For a service request, ship the cartridge to the factory. Always re-equip the standard backup cartridge when done.

Mounting Filesystems

AUDIX software accesses filesystems through nicknames called *mount points*. A mount point is a software abbreviation of a filesystem name. It is a logical means of identifying a filesystem independent of its physical location. Mount points allow you to move a filesystem from volume to volume as needed, and still enable software to locate the files it needs. Table 14-4 shows the standard mount points used by AUDIX software and the filesystems with which they are associated.

Any *mounted* filesystem (one assigned a mount point) is accessible by software. All active filesystems are mounted, but other filesystems may be mounted to do copy procedures. These *inactive* mounted filesystems are listed on the `filesystem : list` form for each volume (see *Software Troubleshooting*). You may wish to mount a filesystem after a shutdown, after using the `filesystem : unmount` form, or in order to copy an inactive filesystem using the `filesystem : copy` form.

To mount filesystems:

1. Use the `filesystem : mount` form and enter the filesystem name (in a “volume.filesystem” format) and its type.
2. Make up a unique *mount point* (software name) up to 15 characters long with a leading slash (/) such as /temp or /restore. *Record* the mount point if it is over 7 characters long.
3. Press the CHANGE key to allow the system to access this filesystem.

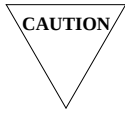
To change the mount point of a filesystem, you must unmount the filesystem first.

To unmount filesystems:

You can remove a filesystem’s mount point (*unmount* it) to make it inaccessible. An unmounted filesystem is always inactive (out of service) because software cannot locate it. In general, you *must* unmount an active filesystem before you copy it, do a filesystem check, or unequip that disk.

1. To unmount a single, inactive filesystem, use the `filesystem : unmount` form. Type in the mount point and press CHANGE (see Table 14-4 for common mount points).
 - a. If you forget a mount point, you can display the leading slash (/) and first 7 characters on the `filesystem : list` form (see Figure 14-2).
 - b. The mount point for unmounting filesystems must be identical to the one used on the `filesystem : mount` form.
2. To unmount (deactivate) *some* active filesystems, blank out the appropriate field(s) on the `system : filesystems` form or the `system : announcement : filesystem` form. See Figures 14-3 and 14-4.

3. To unmount *all* filesystems (active or not), do a camp-on, administrative shutdown using the `shutdown` form. Only the active boot filesystem remains mounted.



An inactive or unmounted filesystem continues to take up disk space until it is deleted with the `filesystem : detail` form.

15. Restoring Filesystems

This chapter contains procedures for recovering filesystems. This is required after a disk crash, after a system crash, or after a failed system initialization. This chapter includes:

- Restoring a Disk (includes recommended filesystem distribution)
- Restoring a Filesystem
- Running Audits

If the system is using File Redundancy (i.e., mirroring), see Chapter 10, *File Redundancy*, to restore a corrupt master or corrupt slave filesystem.

All of the procedures included in this chapter are meant to be used by experienced AUDIX service personnel. You will probably need the following materials:

- Generic-program cartridge
- Latest sdat backup cartridge
- Blank, new spare cartridge
- Hard-copy of the `system : filesystems` form. This will show what, if any, active filesystems were located on the damaged disk.

RESTORING A DISK

Whether the system is running or not, do the following:

- Step 1: If another disk has available space to restore the lost filesystem(s), create the new filesystem(s) from a suitable backup. Look in *Restoring a Filesystem* under the type of filesystem lost for its suitable backup.

You may be able to delete certain filesystems from the usable disks in order to create space. This depends on the availability of a backup for the filesystem(s) to be deleted and/or urgency of the situation.

If you cannot find any space (for example, disk00 on a single hard-disk system crashed), go to Restoring Disk00.

- Step 2: If you were able to find space and restored the lost filesystem(s), next you need to run audits on these filesystem(s). Go to *Running Audits* at the end of this chapter.

NOTE

If the system is up, check with the customer before running the audits. The audits can be run while the system is up, but they take longer to run and cause reduced service if the system is operating near capacity. Audits run much quicker if the data link is busied out first.

- Step 3: After the audits have completed, restart the system (use a backup or the generic boot filesystem and a non-standard initialization if necessary). If you get a “start service” message, verify that the system is providing normal service.

If you get a “service not started” message, log in and check the system according to *Running Audits*.

- Step 4: Next you want to fix the disk. Go to Chapter 6.

- Step 5: After the disk is repaired or replaced, power up and initialize the system. Equip and initialize the repaired disk. If the generic boot was used to initialize the system, you will have to do a standard installation process (that is, equip all devices, translate the data link, etc.). Copy the lost filesystem(s) back to this disk. (See Table 15-1 and Table 15-2 to make sure the disks are being used properly.)

NOTE

If it was disk00 on a single hard-disk system that was lost, go to the next section (Restoring Disk00).

Restoring Disk00

Do the following for a single hard-disk system to get disk00 restored and the system running again:

1. With power on, remove the backup cartridge (if software is running, do a maintenance shutdown using the `shutdown` form), then insert the factory generic-program cartridge. See *RCD Cartridge Handling* in Appendix A for complete steps if needed.
2. Cycle the MI toggle switch. The Control Mode Menu should appear.
3. Do a reboot (Option 5), then select a nonstandard initialization from `boot_f` on the removable cartridge (disk 0/1) using options 0, 1, f. When the reboot completes, the system may display “service not started,” but should allow you to log in. If the reboot fails, go to Chapter 11.
4. When software is running, log in and display the `maintenance : dbp : equip` form. Set the following options for the new drive:
 - a. Set *circuit pack code* to **SCSI**
 - b. Set *disk device number* to **0**
 - c. Set *volume label* to **disk00**
 - d. Set *erase* to **y**. Press .
5. When the disk finishes initializing, the new drive is verified and identified to the system.

Restore lost filesystems

At the minimum, you should have backup `sdat` and `ndat` filesystems. Other filesystems may also be backed up on other hard drives in the system or on spare disk cartridges. If you use the generic versions, you lose all voiced-in subscriber names as well as alarm, error, and traffic data.

Restoring a Filesystem explains how to restore each type of filesystem. Take special care when restoring the `sdat` and `ndat` filesystems. If the system was having disk problems before the last `sdat` or `ndat` backup, the most recent backups may be corrupt. *Restoring a Filesystem* shows how to find the most recent good backup.

After restoring the filesystems, return here to run audits.

Run Audits

After copying all of the necessary filesystems to disk00, you will have to run audits so that AUDIX can provide proper service. Do the following:

1. Block service using the `maintenance : datalink : busyout` form. This will ensure that subscribers do not get confusing messages, and AUDIX doesn't log multiple errors.
2. Go to the `maintenance : audits : fp` form and run the *Voice Data Rebuild* audit. This audit can take up to eight hours.
3. When you are finished, restart the system using the `startup` form, or do a complete reboot to further clean up the system. Watch for a good "start service" message. If you get the "service not started" message, use Chapter 14 to troubleshoot the software problem. You must get the "start service" message before AUDIX will work properly.

Recommended Filesystem Distribution

Table 15-1 and Table 15-2 show the recommended filesystem distribution based on the number of disks in the system. The probable location of current backup copies for each disk is also listed. The AUDIX system administrator is responsible for backing up and distributing filesystems, and may have additional backup cartridges or records.

NOTE

Always keep a current printout (hard-copy list) of the `system : filesystems` form so you know where the active filesystems *were* located in case of disk problems. Update this list whenever a filesystem is added or moved.

Table 15-1. Recommended Filesystem Distribution (No File Redundancy)

Number of Hard Disks	disk00	disk02	disk03	disk04	disk05	disk06
One disk	boot_f boot_e sdatsdat sst, adatsdat ndatsdat all vtext					
Two disks	boot_f sdatsdat vdat vtext (50%)	boot_e sst, adatsdat ndatsdat vtext (50%)				
Three disks	boot_f sdatsdat, ndatsdat vtext (30%)	boot_e vdat, adatsdat vtext (30%)	sst vtext (40%)			
Four disks	boot_f sdatsdat vtext (25%)	boot_e vdat vtext (25%)	sst vtext (25%)	adatsdat ndatsdat vtext (25%)		
Five disks	boot_f sdatsdat vtext (20%)	boot_e vdat vtext (20%)	sst vtext (20%)	adatsdat vtext (20%)	ndatsdat vtext (20%)	
Six disks	boot_f sdatsdat vtext (15%)	boot_e vdat vtext (15%)	sst vtext (15%)	adatsdat vtext (15%)	ndatsdat vtext (15%)	vtext (25%)

Table 15-2. Recommended Filesystem Distribution (Full File Redundancy)

Number of Hard Disks	disk00	disk02	disk03	disk04	disk05	disk06
Two disks	boot_f sdat, vdat vtext (50%) msst, madat mndat mvtext (50%)	boot_e sst, adat ndat vtext (50%) msdat mvdat mvtext (50%)				
Three disks	boot_f sdat, ndat vtext (33%) mvdat mvtext (33%)	boot_e vdat, adat vtext (33%) msst mvtext (33%)	sst vtext (34%) msdat, madat msdat, madat mndat mvtext (34%)			
Four disks	boot_f sdat vtext (25%) mvdat mvtext (25%)	boot_e vdat vtext (25%) msdat mvtext (25%)	sst vtext (25%) madat, mndat mvtext (25%)	adat ndat vtext (25%) msst mvtext (25%)		
Five disks	boot_f sdat vtext (20%) mvdat mvtext (20%)	boot_e vdat vtext (20%) mndat mvtext (20%)	sst vtext (20%) madat mvtext (20%)	adat vtext (20%) msst mvtext (20%)	ndat vtext (20%) msdat mvtext (20%)	
Six disks	boot_f sdat vtext (16%) mvtext (16%)	boot_e vdat vtext (16%) mvtext (16%)	sst vtext (16%) mvtext (16%)	adat vtext (16%) mvdat mvtext (16%)	ndat vtext (16%) msdat mvtext (16%)	vtext (20%) msst, madat mndat mvtext (20%)

RESTORING A FILESYSTEM

Use this section for details on restoring *particular* filesystems that you suspect are damaged or missing. Often the only notification you get (if any) of missing filesystems is a “service not started” message following initialization.

Use Table 15-1 and Table 15-2 as a guide to restoring and distributing the filesystems. Be sure to run any audits specified in Table 15-3 after restoring the filesystem(s).

Restoring the adat Filesystem

The adat filesystem contains all of the system announcements. If the customer uses the standard announcement set, you can copy the adat filesystem from the generic software cartridge. If the customer is using a custom set of announcements, there should be a backup set.

Use the following steps to restore the adat filesystem when the standard set of announcements are used and when they are not mirrored, or both master and slave filesystems are alarmed. If there is a backup announcement filesystem, make it the active version and create a new backup after the corrupt announcement filesystem is deleted.

1. If software is not running (system is in control mode), reboot the system before continuing (Option 5 on the Control Mode Menu). The system should return “service not started” and the vdat filesystem should be unmounted. When the system is up, go to the next step.
2. If the backup sdat is on the installed cartridge, go to the next step. If the backup sdat is on a different cartridge, do the following:
 - a. Unequip the RCD using the `maintenance : dbp : unequip` form. The disk device number is **1**.
 - b. Remove the cartridge currently in the RCD and replace it with the generic software cartridge (cartridge 1 of 2 if the generic software comes on a set of cartridges).
 - c. Re-equip the RCD using the `maintenance : dbp : equip` form. The circuit pack code is **SCSI**, the device number is **1**, and the erase field should be **n**. When the drive equips it displays the volume label you will need in the following steps.
3. Do a forced administrative shutdown using the `shutdown` form.
4. Delete the bad adat filesystem using the `filesystem : detail` form. Display the form and enter the following:
 - a. The filesystem name is normally **disk00.ana**. If the active adat was on another disk, you may need to use the `filesystem : list` form on each drive in the system to identify where the corrupt adat is.
 - b. The type is **adat**. Press ENTER to display the filesystem information.
 - c. When system displays the information, press DELETE. This will delete the bad filesystem.

5. Copy the generic adat filesystem using the `filesystem : copy` form as follows:
 - a. Set *from filesystem:* to **4:1.ana** (or whatever was displayed in *volume label* when you equipped the RCD earlier)
 - b. Set *type:* to **adat**
 - c. Set *to filesystem:* to **disk00.ana** (or whichever disk drive the adat filesystem was on before)
 - d. Set *physical copy (y/n)?* to **y**
 - e. When all of the fields are entered, press CHANGE.
6. When the system completes the copy, replace the generic software cartridge with the sdat backup cartridge using the steps above.
7. Restart the system using the `startup` form.
8. You should now get the “start service” message when the restart is complete. See Table 15-5 to run audits.

Restoring the boot Filesystem

Use the following steps to restore the active boot filesystem when it is not mirrored, or both master and slave filesystems are alarmed:

1. If software is running, see which boot filesystem is active. If it is **not** the backup boot (should be **disk02.boot_e**), do a forced maintenance shutdown using the `shutdown` form and go to Step 2. If the backup boot is active, go to Step 3.
2. When software is not running (system is in control mode), reboot the system from the backup boot filesystem (should be **disk02.boot_e**).
3. If the backup sdat is on the installed cartridge, go to the next step. If the backup sdat is on a different cartridge, do the following:
 - a. Unequip the RCD using the `maintenance : dbp : unequip` form. The disk device number is **1**.
 - b. Remove the cartridge currently in the RCD and replace it with the generic software cartridge (cartridge 1 of 2 if the generic software comes on a set of cartridges).
 - c. Re-equip the RCD using the `maintenance : dbp : equip` form. The circuit pack code is **SCSI**, the device number is **1**, and the erase field should be **n**. When the drive equips it displays the volume label you will need in the following steps.
4. Do a forced administrative shutdown using the `shutdown` form.
5. Delete the bad boot_f filesystem using the `filesystem : detail` form.
6. Do a physical copy of the generic boot_f filesystem to disk00.boot_f using the `filesystem : copy` form.

7. When the system completes the copy, replace the generic software cartridge with the sdat backup cartridge using the steps above.
8. Update the new boot_f using the `filesystem : update configuration` form.
9. Restart the system using the `startup` form. When the system displays “FP Reset”, press CTRL c. The control mode menu should be displayed.
10. Finally, choose Option 5 and do a standard initialization.
11. You should now get the “start service” message when the restart is complete. You do not have to run any audits for the boot filesystem.

Restoring the ndat Filesystem

Use the following steps to restore the ndat filesystem when it is not mirrored, or both master and slave filesystems are alarmed:

1. If software is not running (system is in control mode), reboot the system before continuing (Option 5 on the Control Mode Menu). The system should return “service not started” and the ndat filesystem should be unmounted. When the system is up, go to the next step.
2. Locate the backup ndat filesystem. It is normally on disk00, but may be on another hard disk or on a disk cartridge. If there is no backup, go ahead and restart the system to provide service. The subscriber names will have to be voiced-in again.
3. If the backup ndat is on the installed cartridge, go to the following step. If the ndat backup is on a different cartridge, do the following:
 - a. Unequip the RCD using the `maintenance : dbp : unequip` form. The disk device number is **1**.
 - b. Remove the cartridge currently in the RCD and replace it with the ndat backup cartridge.
 - c. Re-equip the RCD using the `maintenance : dbp : equip` form. The circuit pack code is **SCSI**, the device number is **1**, and the erase field should be **n**. When the drive equips, it displays the volume label you will need in the following steps.
4. Do a forced administrative shutdown using the `shutdown` form.
5. Delete the bad ndat filesystem using the `filesystem : detail` form.
6. Copy the backup ndat filesystem using the `filesystem : copy` form. Use the name of the bad ndat filesystem as the name of the *copy to*: filesystem.
7. *If you changed cartridges in the RCD:* When the system completes the copy, replace the cartridge in the RCD with the sdat backup cartridge.
8. Restart the system using the `startup` form.

9. You should get the “start service” message when the restart is complete, but you should have a system threshold violation on the ndat filesystem. You will have to increase the size of the ndat as follows:
 - a. Display the `system : limits` form and record the recommended size of the ndat filesystem.
 - b. Do a forced administrative shutdown using the `shutdown` form.
 - c. Display the `filesystem : detail` form. Enter the name of the new ndat filesystem. The type is **ndat**. Press `ENTER`.
 - d. When the form displays the current filesystem information, tab to the *size* field and enter the size you recorded earlier. Press `CHANGE`.
 - e. Restart the system using the `startup` form.
10. After the system initializes, see Table 15-3 to run audits.

Restoring the sdat Filesystem

Use the following steps to restore the sdat filesystem when it is not mirrored, or both master and slave filesystems are alarmed. You must restore the sdat **and** vdat filesystems when the sdat is bad.

1. If the software is not running (system is in control mode), reboot the system before continuing (Option 5 on the Control Mode Menu). The system should return “service not started” and the sdat filesystem should be unmounted. When the system is up, or if it was already running, go to the next step.
2. If the backup sdat is on the installed cartridge, go to the next step. If the sdat backup is on a different cartridge, do the following:
 - a. Unequip the RCD using the `maintenance : dbp : unequip` form. The disk device number is **1**.
 - b. Remove the cartridge currently in the RCD and replace it with the sdat backup cartridge.
 - c. Re-equip the RCD using the `maintenance : dbp : equip` form. The circuit pack code is **SCSI**, the device number is **1**, and the erase field should be **n**. When the drive equips, it displays the volume label you need in the following steps.
3. Do a forced administrative shutdown using the `shutdown` form.
4. Use `filesystem : unmount` to unmount the bad sdat filesystem and unmount the active vdat filesystem.
5. Delete the bad sdat filesystem using the `filesystem : detail` form. Note its size. Create a new sdat filesystem of the same name and size as the old one.
6. Delete the previously active vdat filesystem using the `filesystem : detail` form. Note its size. Create a new vdat filesystem of the same name and size as the old one.
7. Next, you will copy the most recent good sdat backup. See *Finding a Good Backup When the Disks Have Problems* for more information.

8. When you have found the most recent good backup, do a logical copy of that filesystem using the `filesystem : copy` form. Set *to filesystem:* to the name of the new sdat filesystem.

Next you will have to copy the vdat filesystem from the generic system software. Do the following:

1. Unequip the RCD using the `maintenance : dbp : unequip` form. The disk device number is **1**.
2. Remove the sdat backup cartridge currently in the RCD and replace it with the generic software cartridge (cartridge 1 of 2 if the generic software comes on a set of cartridges).
3. Re-equip the RCD using the `maintenance : dbp : equip` form. The circuit pack code is **SCSI**, the device number is **1**, and the erase field should be **n**. When the drive equips, it displays the volume label you will need in the following steps.
4. Do a logical copy of the generic vdat filesystem. Set *to filesystem:* to the name of the new vdat.
5. When the system completes the copy, replace the generic software cartridge with the sdat backup cartridge.
6. Restart the system using the `startup` form.
7. You should now get the “start service” message when the restart is complete. See Table 15-3 to run audits.

Finding a Good Backup When the Disks Have Problems

The sdat filesystem is backed up on the disk cartridge automatically each night at 10:00 pm. This filesystem is the key to recovering data lost due to disk problems. Ideally, you should use the latest sdat backup. However, if it is disk00 that has the problem, and errors started before the latest backup, the latest backup may be corrupt. In this case, the last good sdat backup copy must be located as follows:

1. On the `maintenance : error : specification` form, specify 181 or 897 errors.
2. Go to the `maintenance : error : display` form to show these errors. If any of these errors began occurring before the sdat backup is made, the latest sdat backup may be corrupt and should **not** be used.
3. Check the previous dates in the error log until you find a night when a backup was made **without** disk errors prior to the backup.

NOTE

Another way to find the last good sdat backup filesystem is to check the free space available on the backup filesystems. If the free space changed dramatically at some date and remained constant right up to the current date, all of these backup filesystems are probably corrupt like the active filesystem.

4. Insert and equip the sdat backup cartridge (if not already in place). Backups are named by date (such as sd921103); locate the good sdat backup you should use.
5. Resume sdat recovery steps as discussed previously.

Restoring the sst Filesystem

Use the following steps to restore the sst filesystem when it is not mirrored, or both master and slave filesystems are alarmed:

1. If the software is not running (system is in control mode), reboot the system before continuing (Option 5 on the Control Mode Menu). The system should return “service not started” and the vdat filesystem should be unmounted. When the system is up, go to the next step.
2. If the backup sdat is on the installed cartridge, go to the next step. If the backup sdat is on a different cartridge, do the following:
 - a. Unequip the RCD using the `maintenance : dbp : unequip` form. The disk device number is **1**.
 - b. Remove the cartridge currently in the RCD and replace it with the generic software cartridge (cartridge 1 of 2 if the generic software comes on a set of cartridges).
 - c. Re-equip the RCD using the `maintenance : dbp : equip` form. The circuit pack code is **SCSI**, the device number is **1**, and the erase field should be **n**. When the drive equips, it displays the volume label you will need in the following steps.
3. Do a forced administrative shutdown using the `shutdown` form.
4. Use the `filesystem : unmount` to unmount the bad sst filesystem.
5. Delete the bad sst filesystem using the `filesystem : detail` form.

Make a note of the size of this sst filesystem.

6. Create a new sst filesystem of the same name and size as the old one.
7. Do a logical copy of the generic sst filesystem using the `filesystem : copy` form. Set the *to filesystem:* field to the name of the new sst filesystem.
8. When the system completes the copy, replace the generic software cartridge with the sdat backup cartridge.
9. Restart the system using the `startup` form.
10. You should now get the “start service” message when the restart is complete. See Table 15-3 to run audits.

Restoring the vdat Filesystem

Use the following steps to restore the vdat filesystem when it is not mirrored, or both master and slave filesystems are alarmed:

1. If software is not running (system is in control mode), reboot the system before continuing (Option 5 on the Control Mode Menu). The system should return “service not started” and the vdat filesystem should be unmounted. When the system is up, go to the next step.
2. If the backup sdat is on the installed cartridge, go to the next step. If the backup sdat is on a different cartridge, do the following:
 - a. Unequip the RCD using the `maintenance : dbp : unequip` form. The disk device number is **1**.
 - b. Remove the cartridge currently in the RCD and replace it with the generic software cartridge (cartridge 1 of 2 if the generic software comes on a set of cartridges).
 - c. Re-equip the RCD using the `maintenance : dbp : equip` form. The circuit pack code is **SCSI**, the device number is **1**, and the erase field should be **n**. When the drive equips, it displays the volume label you will need in the following steps.
3. Do a forced administrative shutdown using the `shutdown` form.
4. Use `filesystem : unmount` to unmount the bad vdat filesystem.
5. Delete the bad vdat filesystem using the `filesystem : detail` form.
Make a note of the size of this filesystem.
6. Create a new vdat filesystem of the same name and size as the old one.
7. Do a logical copy of the generic vdat filesystem using the `filesystem : copy` form. Set the *to filesystem:* field to the name of the new vdat filesystem.
8. When the system completes the copy, replace the generic software cartridge with the sdat backup cartridge.
9. Restart the system using the `startup` form.
10. You should now get the “start service” message when the restart is complete. See Table 15-3 to run audits.

Restoring vtext Filesystems

When a vtext filesystem is lost or corrupt, and the filesystem is not mirrored, the only thing you can do is remove the bad filesystem and create a new one. Use the following steps to restore a vtext when the filesystem is not mirrored, or both master and slave filesystems are alarmed:

1. If software is not running (system is in control mode), reboot the system before continuing (Option 5 on the Control Mode Menu). The system should return “service not started” and the corrupt vtext filesystem should be unmounted. When the system is up, go to the next step.
2. Do a forced administrative shutdown using the `shutdown` form.
3. Delete the bad vtext filesystem using the `filesystem : detail` form.
4. Recreate the lost vtext using the `filesystem : detail` form:
 - a. The filesystem should be **disk0X.vm***, where X is the disk drive the filesystem was on and * is the number of the corrupt vtext filesystem.
 - b. The type is **vtext**, and the size should be around 2000 blocks for 120-Mbyte or 170-Mbyte disk drives, and 3500 blocks for 380-Mbyte or larger drives.
 - c. When all of the fields are correctly entered, press .
5. Repeat Step 3 and Step 4 for each vtext that was lost.
6. Activate the new vtext filesystem(s) using the `system : filesystems` form.
7. Restart the system using the `startup` form. You may do a full reboot if desired to further clean up the system.
8. When all of the vtext filesystems have been re-created, run the audits specified in Table 15-3.

Wrong Number of Active vtext Filesystems

Sometimes the “service not started” message appears because a formerly active vtext filesystem was lost or deleted. You can **never decrease** the total number of active vtext filesystems. For example, if you have six vtext filesystems and delete (or lose) one so you have only five, a “service not started” message appears. To restore missing vtext filesystems:

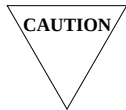
1. Use the software troubleshooting procedures in Chapter 14 (if you have not already done so) to make sure there is no other obvious system problem.
2. If you suspect a vtext filesystem is missing, check the `filesystem : list` form for each volume to make sure all the vtext filesystems currently created are mounted.
3. Go to the `system : filesystems` form and make sure all the vtext filesystems you noted appear on this form. If so, go to the next step. *If not*, add the correct name(s) and press `CHANGE`. Restart the system using the `startup` form and go to Step 5.
4. *If all vtext filesystems appear active* and there are less than ten on the form, try adding a new vtext filesystem and restarting the system:
 - a. Use the `filesystem : detail` form to create a new vtext filesystem with the appropriate name. Use an 8-block size until the problem is solved (you can increase the size later).
 - b. Go to the `system : filesystems` form to activate the new filesystem. Use the `startup` form to restart the system.
5. *If the message “start service” appears*, the problem is solved.
 - a. Use the `filesystem : update configuration` form to copy the new system information to the backup boot filesystem.
 - b. Increase the vtext filesystem(s) you added to 2000 blocks (170 M-byte disk) or 3500 blocks (380 M-byte or larger disks).
6. *If the message “service not started” appears*, repeat Step 4 until you get the “start service” message.

If you activate *all ten* vtext filesystems and the problem remains, some other problem is causing the “service not started” message. However, you *cannot* now deactivate (delete) the extra vtext filesystems you just created. Leave them at the small 8-block size and only increase them when you need to add another vtext. AUDIX will not put a message in a filesystem unless 10 blocks are free, so the extra filesystem(s), though active, will never be used.

RUNNING AUDITS

After restoring filesystems, look up any audits that should be run using Table 15-3 (see the “Run After Recovery” column).

You may choose **not** to run an immediate audit if you finished restoring filesystems shortly before the nightly audits regularly run. The default time is 10:00 p.m. for most audits. Some audits run only once a week (see Table 15-3 and the audits descriptions).



If a manual audit is running when the nightly audits are scheduled to begin, the automatic nightly audits do **not** run. *If your manual audits do run passed the nightly interval, run the other nightly audits manually also.*

Audits Description

Audits are special software programs designed to recognize and resolve problems within filesystems to ensure their integrity. Most audits run automatically each night to update the filesystems internally and synchronize them with each other. For example, nightly audits can remove references to a deleted subscriber from other subscribers’ mailing lists. Audits may be run:

- Manually using the maintenance terminal
- Automatically each night (including the sdat backup)
- Automatically each week (for long audits)
- Automatically when faults are logged and alarmed by software.

Feature Processor (FP) Audits

The Feature Processor (FP) audits on the `maintenance : audits : fp` form affect various filesystems as listed in Table 15-3. Most of these audits run automatically as listed below. However, notes on when to run these audits manually are also given.

- *Alarm Log* – Automatic (runs nightly). This audit compares the disk and memory versions of the active alarm log for consistency. If they contain different records, both versions are updated against each other. For minor variations, memory is updated from disk. You may run this audit manually after restoring the sst filesystem from a recent backup.
- *Announcement Structure* – Automatic (runs nightly). This audit verifies that each announcement contains at least one fragment and no invalid fragments.
- *DBP Administrator* – Parts of it run automatically. Parts of it run only manually. Every 30 seconds this audit will synchronize internal tables with volume labels, directory locations or mount points, and filesystem names, and to report the amount of free space in vtext filesystems to the DBP (with load on the system, this space count may be slightly off).

If run manually, this audit checks for a /boot/dbpa file (which contains the system's configuration) and creates an empty one if it does not already exist. Run this audit manually after a manual Voice Files audit, after deleting a vtext filesystem, or if you have threshold warnings on the STATUS line while there still appears to be free space in a filesystem.

- *Mailing List and Personal Directory* – Automatic (runs nightly). This audit validates the members in all delivery lists and all personal directories. If deleted subscribers are found, they are removed.
- *Message Data* – Automatic (runs nightly). This audit verifies that a message body exists for each message header. If not, it causes the message “there is no message to play back” to be played. If a body does not exist for personal greetings, file cabinet messages, or working messages, this audit deletes the message header. Run this audit manually whenever you add or delete a vtext filesystem.
- *Message Waiting Lamp* – Manual only. This audit compares the message-waiting lamp status in memory against that on disk. If they differ, the disk status is updated.
- *Network Data* – Automatic (runs nightly). This audit checks the transmission queues and remote machine translations.
- *Service Dispatcher* – Automatic (runs nightly). This audit compares the data on the `system : translation : switch connection` form and on the `system : translation : voice port` form in memory against that on disk. If they differ, the disk data is updated. Run this audit manually if you change any data (such as the AUDIX machine number).
- *Subscriber Data* – Automatic (runs each Friday). This audit verifies the information on the `subscriber : local` form (such as name, extension, class of service, and list entries) is complete and correct. If not, it enters the correct data in that field.
- *Subscriber Mailbox* – Automatic (runs nightly). This audit ensures that files within the sdat and vdat filesystems are synchronized and that each subscriber has a mailbox with valid contents. It ensures that each subscriber's new-mail status is correct. It also deletes messages and headers that have been saved beyond their allocated time limits, and corrects the count of the amount of space a subscriber is using. If you run the audit manually, it also adds missing mailboxes.
- *Subscriber Name Data* – Automatic (runs nightly). This audit verifies that each subscriber has a readable name fragment and valid subscriber id. If no name fragment exists, a message is entered in the administrator log. If both do not exist, this audit deletes the fragment and the subscriber's name will not be voiced by AUDIX.
- *Voice Data Rebuild* – Automatic (runs each Friday). This audit runs the Mailing List, Message Data, and Subscriber Mailbox audits, as well as restoring message headers to mailboxes, to rebuild the vdat filesystem. It solves problems with mismatched message bodies and headers, adds missing mailboxes, and deletes messages and headers that have been saved beyond their allocated time limits.

Run this audit manually overnight or at another low-service time after restoring an sdat or vdat filesystem. The audit takes up to 1 hour to run for every 300 subscribers.

- *Voice Files* – Automatic (runs each Saturday). This audit verifies that every message body has a corresponding header. If not, the body is deleted. Run this audit manually after restoring or deleting a vtext filesystem to free up space, or after restoring an sdat filesystem. Also run this audit before returning vtext filesystems to service if a disk problem caused a disk to be unequipped for a period of time while the system was still providing service on other disks to free up space.

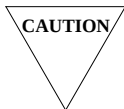
Voice Session Processor (VSP) Audits

The Voice Session Processor (VSP) audits on the `maintenance : audits : vsp` form check software tables against the play and record hardware.

- *Control Channel Manager Internal Data* – Automatic (runs nightly). This audit verifies communication between software and hardware devices on the TD bus.
- *Hardware Configuration File* – Automatic (runs nightly). This audit verifies that hardware data used for message transmission is stored both in memory and on disk (in the `sd`at filesystem). If the versions differ, it updates memory to match the copy on disk.
- *Resource Allocation Status* – Automatic (runs nightly). This audit verifies that the logical connections between a VB and DBP (used for play and record) are released when subscribers have finished using AUDIX.
- *VM-VB-DBP Voice Channel* – Automatic (runs nightly). This audit compares the VB channel status against that maintained by the voice manager. If the status differs, the VB is updated according to the voice manager. This audit also compares the status of the play, record, and announcement channels between the DBP and the voice manager. Any invalid connections are dropped.

General Audit Procedure

1. List each filesystem that has been restored.
2. Look up the audit(s) to run for each filesystem using Table 15-3. If an audit is listed for more than one filesystem, you only have to run it once. Some audits (such as those for the `sd`at filesystem) must be run before others. Make sure you run audits in the right order.



Check the time needed to run an audit. While many audits take less than 2 minutes, others take several hours and may affect normal service.

3. **Before running the Voice Data Rebuild audit**, block service using the appropriate form or switch procedure.
4. Display the appropriate audit form, either the `maintenance : audits : fp` form or the `maintenance : audits : vsp` form. See *AUDIX Release 1 Version 7 Forms Reference*, 585-305-208, for details on these forms.
5. After starting an audit, you can leave the form and return later to display the status. You can also stop an audit if you believe it is slowing down system response.
6. The message “program error encountered” after several minutes means the form reached its time-out value (about 20 minutes). This simply means you have terminal control (you do not have to wait for a long audit to finish).
7. **If you blocked service**, restore it using the appropriate form or switch procedure.

Table 15-3. Filesystem Audits

Filesystem and Type	Associated Audits	Audit Form	Runs Automatically	Run After Recovery
System Data (sdat) *	Mailing List/Personal Dir.	fp	yes	no
	Message Data	fp	yes	no
	Message-Waiting Lamp	fp	no	no
	Service Dispatcher	fp	yes	no
	Subscriber Data	fp	yes	no
	Subscriber Mailbox	fp	yes	no
	Voice Data Rebuild	fp	yes ‡	yes (run 1st)
	Voice Files	fp	yes ‡	yes (run 2nd)
	DBP Administrator	fp	no	yes (run 3rd)
	Network Data	fp	yes	yes (run 4th)
	Hardware Configuration File	vsp	yes	no
	Resource Allocation Status	vsp	yes	no
Announcement Data (adat)	Announcement Structure	fp	yes	yes
Boot (boot)	DBP Administrator	fp	no	no
Names Data (ndat)	Subscriber Name Data	fp	yes	yes
System Status (sst)	Alarm Log	fp	yes	yes †
Voice Data (vdat)	Subscriber Mailbox	fp	yes	no
	Voice Data Rebuild	fp	yes ‡	yes
Voice Text (vtext)	Message Data	fp	yes	yes (run 1st)
	Voice Files	fp	yes ‡	yes † (run 2nd)
	DBP Administrator	fp	no	yes (run 3rd)
*	Run sdat filesystem audits <i>first</i> (before other filesystem audits) as shown. Run each audit only once even when restoring more than one filesystem.			
†	Run this audit only if the filesystem was restored from an older copy.			
‡	This audit runs weekly, or partially each night on Networking systems.			

16. Feature Troubleshooting

This chapter contains information specific to certain features provided by the AUDIX system.

- Automated Attendant
- Outcalling
- The Administrator Log
- Standalone System Considerations
- Networking and Call Detail Recording.

AUTOMATED ATTENDANT

If possible, get a copy of the *AUDIX Applications Notes*, 585-300-902. This document provides details on how to assign this feature for a pre-R1V5 AUDIX system. Some of that information is repeated here. If you are working on an R1V5 or later system, stay with this manual. Automated Attendant has been significantly enhanced in R1V5 to address many of the issues mentioned in 585-300-902.

1. First, check the administrator log. Correct any problems that indicate an attendant error. Remember that once an error has been displayed, it no longer appears on the form.
2. Active attendants can be displayed using the `list : attendant` form. Record each Automated Attendant listed on the form.
3. Go to the `subscriber : local` form. Each attendant extension must be assigned here. The *permissions, type (a/c/p/n)* field must be set to **a**.
4. Go to the `system : attendant` form. Each attendant extension must be assigned here also. Each button assignment (an extension or the letter “e”) can now be assigned a type of treatment. This treatment applies whether a button (menu selection) is pressed or the extension is dialed explicitly:

ca - call answer (call goes directly into the dialed extension’s mailbox — this may be a normal subscriber, another attendant, or a bulletin board)

These calls are treated according to the Multiple Personal Greetings assignment. See the assignment of the greeting below.

t - transfer (call is transferred out of AUDIX to the dialed extension)

g - guest greeting (call goes directly into the dialed extension’s mailbox and receives the guest password greeting — password is not required).

The *timeout* extension has been added to the button column to allow the same treatment as described above to be assigned to it.

Make sure that the *length of time-out on initial entry* field allows subscribers sufficient time to press a digit (at least 5 seconds). If most of the incoming calls are being transferred to the timeout extension, try increasing this time.

5. Make sure an attendant greeting(s) has been recorded. Dial into AUDIX, enter the attendant extension and password, press 3 to administer the greeting, and press 0 to listen to the Automated Attendant message. If a greeting is not recorded, the system should reply with “no message to play back.”

NOTE

If a disk fails and voice messages are lost, it is likely that an Automated Attendant greeting will be lost.

Check the Multiple Personal Greetings assignment. Calls are treated according to type (internal or external), reason for redirection (not available or busy), and time of day (in-hours or out-of-hours). Time of day is based on the prime-time assignment of the AUDIX system.

6. Check the switch translations for the Automated Attendant extension and make sure the class of service and class of restrictions are not too restrictive. See the *Switch Administration Guide for AUDIX*, 585-305-505.
7. Since Automated Attendant and Call Transfer Out of AUDIX are so inter-related (i.e., they both use the switch's call transfer function to direct callers), check to see if you aren't also having problems with Transfer Out of AUDIX. It could be that the *enhanced call transfer (y/n)?* field on the **system : appearance** form is set incorrectly. For some switches, this field must be set to "n". For other switches, it can be set either way depending on how the customer wants the transfers to take place. *On Standalone systems*, this field must always be set to "n".
8. You may want to check the **traffic : attendant : hour** and **traffic : attendant : day** forms which may indicate a problem.

OUTCALLING

If the customer is reporting problems with the Outcalling feature, check the following:

1. Go to the `system : outcalling` form. Make sure that outcalling has been turned on for the entire system (*outcalling active = y*).
2. Check that the *maximum number digits* allows enough digits to be outpulsed for the desired destination number. Extra digits may be needed for pauses so that external systems or pagers can interpret the number dialed.
3. Changes to Outcalling parameters are only incorporated after a restart or after running the Service Dispatcher audit.
4. In R1V5, the Priority Outcalling was created in conjunction with Priority Messaging. Users, while logged in to assign Outcalling from the activity menu, can specify Outcalling to be active for all new messages or for just new priority messages.

Traffic Reports

The system administrator should monitor Outcalling through the `traffic : special features : day` and `traffic : special features : hour` forms to check the Outcalling feature's use of AUDIX system resources. Check the following:

- If the maximum number of simultaneous calls allowed on the `system : outcalling` form is often reached, the system administrator may wish to raise or lower the limit for the number of outcalls allowed.
- If many outcalls are not being completed, the administrator may wish to increase the interval between calls.
- If many outcalls are rescheduled, check that sufficient system resources (such as voice ports) are available.

A high number of rescheduled outcalls may also reflect a downward adjustment of the number of digits allowed for outcalls. For example, if the system administrator changed a 25-digit number down to a 10-digit number, all subscribers who have specified Outcalling numbers greater than 10 digits will have their outcalls repeatedly rescheduled since these calls can no longer be made. The system administrator may wish to notify subscribers when the number of digits allowed is changed.

ADMINISTRATIVE LOG ENTRIES

The administration log (displayed using the `system : log : display` form) is used to record errors which require the attention of the system administrator but do not directly affect the overall operation of AUDIX (for example, full mailboxes, break-in attempts to subscriber's mailboxes, or extensions without names recorded). While most entries in the administration log will be handled by the system administrator, some errors may point to potential service-affecting problems. See Appendix A and the AUDIX administration manual for details on most administration log entries.

One of the primary components of the administration log is the data related to AUDIX networking. If the customer is reporting problems with their AUDIX network, check the log for connect failures or other signs that machines in the system are having problems communicating. If this is the case, go to *Network and Call Detail Recording Faults* later in this chapter to troubleshoot the problem.

STANDALONE MAINTENANCE

This section describes any effects a Standalone AUDIX has on system maintenance. Figure 16-1 shows a typical Standalone configuration.

Blocking/Restoring Service in a Standalone System

Normally, the `maintenance : datalink : busyout` form is used to block service to AUDIX. In a Standalone system, there is no data link, so this form serves no purpose. In order to block service, you must busy out each AUDIX port *on the switch side*.

When you have finished the required tests on AUDIX and wish to restore service, you must release each AUDIX port that you previously busied out using the regular switch procedure.

Making Test Calls in a Standalone System

There are no changes to the actual test call procedure, but the way AUDIX handles the test call has changed, and could affect the test call in certain situations.

Normally, when the `maintenance : system : test call` form is used, the switch will busy out the port AUDIX is testing using information that is passed across the data link. Since a Standalone system does not have this link, the switch can't reserve the port for the test call; a race condition exists. If a user seizes the port before you make the test call, you will get a busy tone when you make the call. Continue trying the port until the user hangs up, or dial another port.

Busying Out Ports

The way the system busies out port circuit packs changes for an AUDIX Standalone as follows:

- `maintenance : vpt : test` form: This form seizes one VPT port or circuit pack for service testing. For a very brief time after requesting this test, it is possible for a subscriber's incoming call to access the port before the service technician can. If this occurs, the technician must wait for the call to complete, or test another port.
- `maintenance : vsp : busyout` form: The busy-out option on this form does not work in Standalone. Instead, it causes a VB, TDBI, VPC, or VPT port to be deactivated until it is manually reactivated. The switch, however, cannot tell an active AUDIX port from an inactive one and will continue to send calls to the inactive port. Callers will hear ringing with no answer. To prevent this, the switch ports must be busied out *on the switch*.

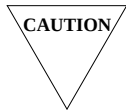
Other Standalone Considerations

AUDIX Standalone has other effects on the system that do not directly affect system maintenance, but still need to be considered when working on a system.

Voice Port Disconnect

The `system : standalone` form provides a field to set the voice port disconnect recognition timing to any value between 0 and 9999 milliseconds. The system software default value is 400 milliseconds. This default value should work with any switch; however, if it does not work, do the following:

- If calls are being incorrectly disconnected, increase the time by 50 millisecond intervals until the problem goes away. Do not increase this value over 1000 milliseconds.
- If the system doesn't recognize disconnect signals from the switch, decrease the timing interval to no less than 200 milliseconds. If this does not fix the problem, change the value back to 400 milliseconds.



Values under 200 milliseconds and over 1000 milliseconds usually cause problems, and should not be used.

Data Link Alarms

Although no data link is connected, the SCPI data-link circuit pack is installed and run in a quiescent state. Software still checks the circuit pack for alarms as part of initialization and maintenance.

System Shutdown and Startup

The `shutdown` and `startup` forms deactivate the ports instead of sending the normal switch message (agent available or unavailable). When AUDIX is initializing after a restart, the ports remain active until the restart is complete. Incoming calls can therefore access faulty ports or hear ringing with no answer during the interval between port initialization and its full completion (about 5 to 10 minutes).

Unused Data Link Forms

The following forms have fields which are not used with AUDIX Standalone:

- `maintenance : scp : fsw`
- `maintenance : scp : init`
- `maintenance : system : hardware status.`

The following forms are not used with a Standalone system:

- `maintenance : datalink : busyout`

- maintenance : datalink : fsw
- maintenance : datalink : release
- maintenance : datalink : test.

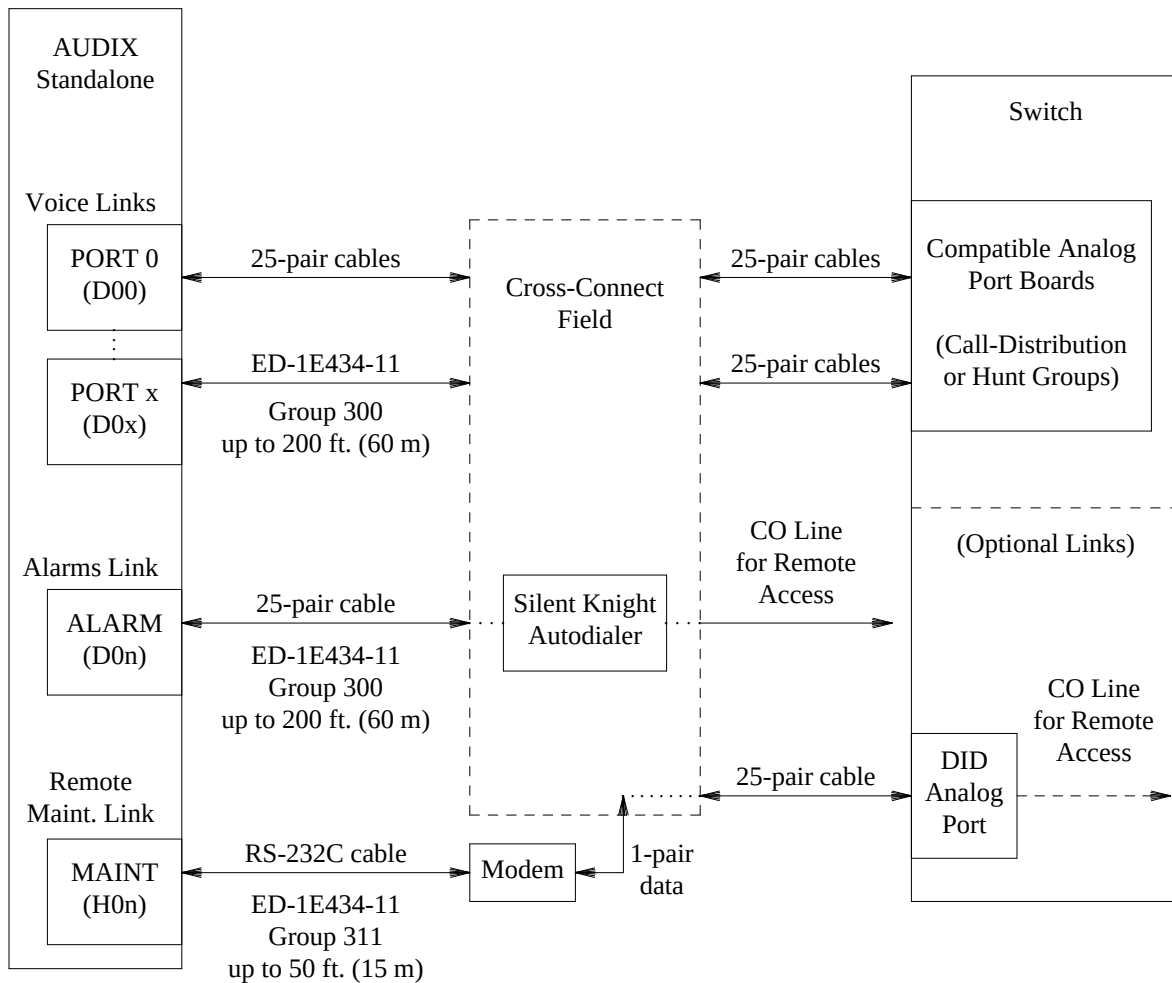


Figure 16-1. AUDIX Standalone Configuration

NETWORK AND CALL DETAIL RECORDING FAULTS

The following faults and errors indicate a problem with either Networking or Call Detail Recording. Networking faults listed below indicate a problem with an AUDIX-to-AUDIX adjunct network. See *AMIS Analog Networking* at the end of this chapter for problems with an AUDIX-to-other vendor adjunct network.

Table 16-1. Call Detail Recording Alarms

Alarm Log		Description	Repair Procedure
Fault	Unit : Device		
408-507	144 : 1-100	Networking connection failure	A
422	93 : 0	CDR data corruption	B
423	93 : 0	CDR data corruption cleared	none required

Procedure A: Connection Failure Alarm Resolution

The fault triplet's device field indicates which remote AUDIX machine could not be reached. Find the name of this AUDIX on the `list : machine` form. Then go to the `maintenance : network` form and run a connection test to this machine. If the test succeeds, the alarm will be resolved. See *AUDIX Network Troubleshooting* after Procedure B.

Procedure B: Data Corruption Alarm Resolution

This alarm will be cleared if the CDR feature is temporarily turned off (see `system : cdr`) or after a system reboot.

AUDIX NETWORK TROUBLESHOOTING

If possible, get a copy of the *AUDIX Networking Implementation Guide*, 585-300-903. Troubleshooting procedures can be found in this guide. If you cannot get a copy of this guide, use the following to troubleshoot the network.

Administrator Log

First, check the administrator log for errors associated with networking. If this log is of no help, try a local connection test.

Local Connection Test

This will test the link between the TN366B (or TN539) and the host switch. Perform this test at each machine that may be associated with the problem. If you cannot access all machines, they may be tested from another machine with a remote connection test.

1. Go to the `system : translation : machine : audix` form. Press to display the translations for the local machine.
2. The *data port group number* field must be set to the internal DID extension for the ACC circuit pack.
3. Go to the `maintenance : network` form.
4. Select test 1 (connection test) and enter the name of the local AUDIX in the *machine name* field. Press .

NOTE

In order for the ACC to make a connection to itself, it must have two channels available. If three or more of the channels are unavailable (i.e., DOWN, BUSY, or IN USE), the test result will either be “failed” or “hardware resource not available”.

Currently, System 75, System 75 XE, Generic 1, and MERLIN II are capable of supporting only two channels. Both must be available in order to run local tests.

- a. If the test passes, the system was able to complete a loop from one outgoing channel on the ACC to the digital port of the host switch and back in on one incoming channel on the ACC circuit pack. Go to the next section and perform a remote connection test.
- b. If the test fails, check the status of the circuit pack and Table 16-2. If the form does not indicate a problem, check the local AUDIX system translations using the `system : translation : machine : audix` form. If the translations look correct, reset the ACC (run test 5).
 - If the reset passes, check the switch translations using *Switch Administration Guide for AUDIX*, 585-305-505.

- If the translations look correct, or the reset fails, go to the 585-300-903 document to run further tests on the ACC.

The best indication of the local ACC circuit pack status (slot 03) is the **maintenance : network** form. The form shows the status of the circuit pack as well as each individual channel. Use Table 16-2 to determine the status of the ACC and what recovery actions to take, if needed.

Table 16-2. ACC Status Field Displays (*Part 1 of 3*)

Display Field	Result	Actions
Board Status	NORMAL	The ACC is operational. No action is necessary.
	SHUTDOWN	The ACC is down. Run test 5 (board reset). If the test passes, the circuit pack should have NORMAL status. If the test fails, replace the ACC.
	<i>all blanks</i>	The ACC is not present or does not respond. Do the following: 1. Check slot 3 and make sure the circuit pack is present (the ACC is <i>not</i> required for normal AUDIX service). If the circuit pack is present, continue. 2. Check the switch and AUDIX translations using <i>Switch Translation Guide for AUDIX</i>, 585-305-505, and <i>AUDIX Installation</i>, 585-305-105. 3. Run test 5 (board reset). If the form now displays a status, check this table for any required action. If the form still shows no status, continue. 4. If the circuit pack still doesn't respond, replace the circuit pack or escalate the problem.

(Continued)

TABLE 16-2. ACC Status Field Displays (*Part 2 of 3*)

Display Field	Result	Actions
Channel Status	IDLE	Channel is not in use. No action is necessary.
	DOWN	Channel is bad. Run the channel internal looparound test (test 2) on the down channel. — If it passes, the channel status should change to either BUSIED or IDLE. Check the status and verify that the system can now send network messages. — If the test fails, busy out the bad channel, order a new TN366 and follow the circuit pack replacement procedures in Chapter 4 when the new circuit pack arrives.
	IN USE	The channel is currently being used. No action is necessary.
	BUSIED	The channel is busied out. Use test 4 to activate the busied channel.
	SWITCH LOOP	The switch is testing the circuitry that the channel uses to connect to the switch. When the status changes, check to see if any action is required.
	AUDIX LOOP	AUDIX is testing the internal circuitry of the channel. When the status changes, check to see if any action is required.
	BOTH LOOPS	Both AUDIX and the switch are testing the internal circuitry used by the channel to provide the switch-to-AUDIX connection.
	UNKNOWN	The hardware and software state of the channel is questionable. Run the connection test to the local machine. Two channels must be available for use in order to run a connection test. If two channels are not available, the test returns either “test failed” or “hardware resource not available”. — If the status is still unknown, the machine translations at the switch are probably incorrect. Check the AUDIX translations using the <code>system : translation : machine : audix</code> form, and check the switch translations using the AUDIX installation manual. — If a new status is now displayed, check this table to see if recovery actions are required.
	<i>all blanks</i>	The ACC is not present or does not respond. See the “Board Status” for recovery steps.

(Continued)

TABLE 16-2. ACC Status Field Displays (*Part 3 of 3*)

Display Field	Result	Actions
Listen Pending	Y	A listen command is pending or currently active. AUDIX is either waiting for incoming calls or currently handling incoming calls from another machine in the AUDIX network.
	N	No listen command is pending. AUDIX will not accept incoming network messages from other AUDIX machines. — If the “drop listen” field shows a “y”, the FP has requested that the ACC ignore incoming calls. There is no problem with the ACC. — If the “drop listen” field is an “n”, the ACC should be accepting network calls. Wait 5 to 10 minutes and then check the status again (the ACC may have been too busy to accept incoming calls previously). If the status remains the same for an extended period of time (more than 20 minutes), go to Chapter 4 and follow the recovery steps for the ACC.
	<i>blank</i>	The ACC is not responding. See “Board Status” for recovery steps.
Drop Listen	Y	The FP software has requested that incoming calls be ignored. The FP is too busy with local AUDIX traffic to handle network messages.
	N	The FP software has <i>not</i> requested that incoming calls be ignored. The ACC should be accepting network calls. If the system is not accepting calls, try resetting the ACC (test 5). If the problem remains, replace the ACC.
	<i>blank</i>	The ACC is not responding. See “Board Status” for recovery steps.

Remote Connection Test

This section includes steps for checking the connection between the local AUDIX and the other machines in the network. Run the following tests for each remote machine in the AUDIX network that is having problems.

1. Display the `maintenance : network` form.
2. Select test 1 (connection test), and enter the name of a remote machine in the “machine name” field. Press `CHANGE`.
3. Check the “test result” field:
 - a. If the form returns “Test Passed”, the local AUDIX was able to make a complete connection to the remote machine. Try sending some network messages and see if the problem is fixed. If so, verify good service (Chapter 3). If not, escalate per your local procedures.
 - b. If the form returns “Test Failed”, check the following:
 - Translations for the remote machine using the `system : translation : machine : audix` form.
 - If the translations are correct, perform a local connection test and a remote connection test from the remote machine.
 - If the remote machine passes all its local testing but cannot connect to other systems in the network, escalate per local procedures.
 - c. If the form returns “Rejected,” the remote machine’s password is probably wrong. Contact the system administrator and check the remote password on the `system : translation : machine : audix` form. If the password is correct, try the test again.

Test the Local Modem Pool

Use these steps to test the complete local connection when the system is using modem pooling to connect to remote machines in the AUDIX network. To test the local modem pool:

1. Display the `system : translation : machine : audix` form. Enter the name of the local AUDIX (either “local” or an actual name such as “Toyko”).
2. Tab to the “data port phone number” field and enter the external DID number for the ACC circuit pack (for example 9=5551111). Press `CHANGE`.
3. Display the `maintenance : network` form. Select test 1 and enter the name of the local machine in the “machine name” field. Press `CHANGE`.
 - a. If the test passed, the network is operational from the local AUDIX to the network facilities.
 - b. If the system still can’t communicate with another AUDIX in the network, run these *AUDIX NETWORKING TROUBLESHOOTING* tests on the remote AUDIX that is having problems.
4. If the local modem pool tests fail, go to the next section to check the options settings on the MTDMs and modems.

Modem Pool Option Settings and Configurations

This section describes the required option settings for 2400- and 9600-baud modem pool setups. This includes option settings for the MTDMs (TDMs can also be used) and modems. Also included is general information which may prove helpful in troubleshooting the network.

2400 Baud Modem Pooling

This section describes the required option settings for the MTDMs and 2224G modems to implement 2400 baud modem-pooling.

MTDM Settings

Table 16-3 shows the MTDM option settings for 2400 baud networking. There are three switches on the MTDM that need to be set, two on the front and one on the RS-232C interface card. There is a 10-segment switch on the front that sets the speed. Below that is a 12-segment switch that sets signaling information. The RS-232C interface card has an 8-segment switch that also sets signaling information.

NOTE

Older MTDMs (TRIK 3) need to be upgraded to TRIK 4 in order to work correctly. Check the EPROMs on the RS-232C interface card to tell what TRIK you currently have. The EPROMs should have an EJ number on top; the TRIK 3 MTDMs a DF. If you do not have the correct firmware, order and install the 18470 D-kit (comcode 105 033 211).

Table 16-3. MTDM Option Settings for 2400 Baud Networking

10 Segment (Front)		
1	L	Low
2	L	300
3	L	1200
4	R	2400
5	L	4800
6	L	9600
7	L	19.2K
8	L	56K
9	L	64K
10	L	TRBK
12 Segment (Front)		
1	L	FDX
2	L	ASYN
3	L	INT
4	R	DISC
5	R	KYBD
6	L	PRTY
7	L	ENV
8	L	Spare
9	L	Spare
10	R	SW
11	R	SIGLS
12	L	Spare

(Continued)

TABLE 16-3. MTDM Option Settings for 2400 Baud Networking *(Continued)*

8 Segment (RS-232C Card)	
1	On
2	Off
3	On
4	Off
5	On
6	On
7	On
8	Off

Modem Settings

The 2224G modems have 6 switches (S1-S5 and S7) that must be set. Their positions are shown in Figure 16-2. Switches S1-S5 are all eight-segment switches; S7 is a two-segment switch. Each switch should indicate an “on” position.

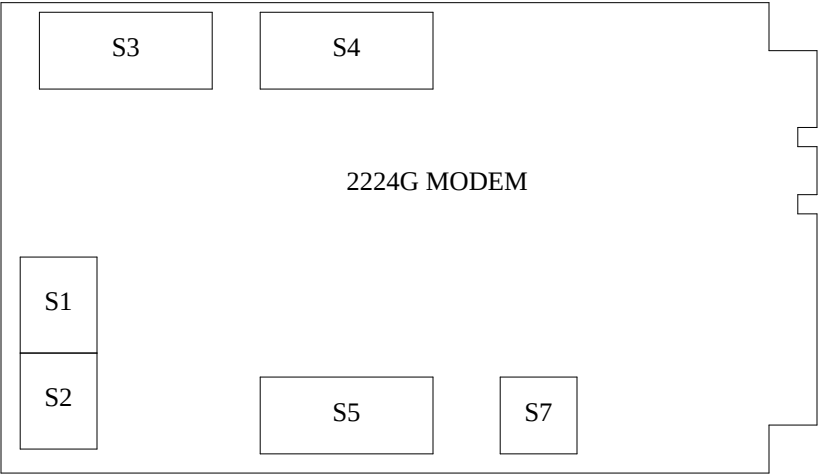


Figure 16-2. 2224G Option Switch Locations

Switch S1								
Segment	1	2	3	4	5	6	7	8
Position	Off	Off	On	Off	On	Off	Off	On

Switch S2								
Segment	1	2	3	4	5	6	7	8
Position	On	Off	On	Off	On	On	Off	On

Switch S3								
Segment	1	2	3	4	5	6	7	8
Position	On	On	On	On	On	On	On	On

Switch S4								
Segment	1	2	3	4	5	6	7	8
Position	On	On	On	On	On	On	On	On

Switch S5								
Segment	1	2	3	4	5	6	7	8
Position	Off	On	On	Off	On	On	On	Off

Switch S7		
Segment	1	2
Position	Off	Off

If all option settings are correctly set, check the cabling between the modem pool carrier and the switch [see *AUDIX Installation*, 585-305-105, for proper cabling]. Also, make sure the MB/SL switch on the carrier above each MTDM/modem pair is in the center. If this is set to either MB (Make Busy) or SL (Select) that pair cannot be used by AUDIX.

9600 Baud Modem Pooling

This section describes the required option settings for the MTDMs and 2296 modems to implement 9600 baud modem-pooling.

MTDM Settings

Table 16-4 shows the speed option settings for the MTDM for 9600 baud modem pooling. The 10-Segment switch on the front of the MTDM sets the speed. The other required option settings are shown in Table 16-3 (those settings are the same no matter what the baud rate).

NOTE

Older MTDMs (TRIK 3) need to be upgraded to TRIK 4 in order to work correctly. Check the EPROMs on the RS-232C interface card to tell what TRIK you currently have. The EPROMs should have an EJ number on top; the TRIK 3 MTDMs have a DF. If you do not have the correct firmware, order and install the 18470 D-kit (comcode 105 033 211).

Table 16-4. MTDM Option Settings for 9600 Baud Networking

10 Segment (Front)		
1	L	Low
2	L	300
3	L	1200
4	L	2400
5	L	4800
6	R	9600
7	L	19.2K
8	L	56K
9	L	64K
10	L	TRBK

Modem Settings

The 2296A has two switches on the front panel covered by sliding plastic strip. The top switch, S1, is a single segment switch that should be open (to the right). The bottom switch, S2, is an eight-segment switch that should have the settings shown in Table 16-5.

Table 16-5. 2296A Option Switch Settings for 9600 Baud Networking

1	closed
2	closed
3	open
4	closed
5	closed
6	open
7	closed
8	closed

NOTE

The open position is to the right.

In addition to these switches, two other options must be set on the LCD (Liquid Crystal Display). Option 50 must be set to ‘y’. When this option is set, the word ‘ASYNC’ should also be displayed in the lower left corner of the display. Option 56 must also be set to a ‘y’. See the *DATAPHONE II 2296A Modem User’s Manual* (999-100-287) for details on how to set these options. The 2296A may also have an autodialer installed. If so, this option should be turned off.

The 2296A also requires the 140C1 memory module in order to provide AUDIX Networking. If you do not have this module installed, you may order it by calling the National Parts Service at 1-800-222-PART (comcode 105 304 935).

Required Switch Hardware

Each switch requires certain hardware to be installed in order to provide AUDIX Networking. The System 85 requires an SN255B tone detector circuit pack and an SN261B or SN261C ADFTC in order to provide any remote networking. The System 75 needs a TN748C tone detector circuit pack to provide 9600 baud networking.

TESTING THE AMIS ANALOG NETWORK

Starting in R1V6 software, AUDIX has the capability to network with other-vendor voice-mail systems. This is accomplished using an industry agreed-upon standard called the Audio Messaging Interchange Specification (AMIS). This specification requires that the transfer of messages between voice mail systems uses analog signaling.

In AMIS analog networking, messages addressed to other-vendor voice mail systems are sent by AUDIX to that system using the AUDIX voice ports, *not* the ACC or ACCE network ports used by other AUDIX adjuncts. See *AUDIX Administration* (585-305-501) for more information on AMIS analog networking.

NOTE

An AUDIX system can still use digital messaging when communicating with another AUDIX system through the AUDIX networking feature.

To test an AMIS analog network:

1. If you have an INADS login, check the `system : feature control` form to make sure the AMIS networking feature is turned on.

NOTE

Because the AUDIX ACC(E) networking ports are not used, the `maintenance : network` form can *not* be used to perform connection tests to an other-vendor system. Instead, a special mailbox has been created which can be used to send test messages from AUDIX to the other-vendor system.

2. Check the analog network administration required on the `system : translation : analog network` form. This is where the test mailbox extension can be found. This form is also used for:
 - *callback number*: This should be the number assigned to the local AUDIX voice port hunt group.
 - *AMIS analog networking incoming allowed (y/n)?*: Set to **y** if other-vendor systems are allowed to send voice mail to the local AUDIX. If the **y** is not accepted, it means the AMIS feature is turned off on the `system : feature control` form.
 - *AMIS analog networking outgoing allowed (y/n)?*: Set to **y** if the local AUDIX needs to send voice mail to other-vendor systems. If the **y** is not accepted, it means the AMIS feature is turned off on the `system : feature control` form.

- *AMIS prefix*: 1 to 5 digits dialed in front of a subscriber's address to identify the address as an AMIS address. This prefix is optional. It is required when AUDIX ACC(E) networking ports and AMIS networking are used on the same AUDIX. It is *not* required if only AMIS networking is used.
 - *AMIS protocol - use 8 minutes for incoming msg length 0 (y/n)?*: This field determines how AUDIX will handle an incoming message of length zero (that is, unknown length). If **y**, the recipient machine will see the message as an 8-minute message (when in fact it may only be 2 minutes). If the recipient machine does not have space for an 8-minute message, the message will be rejected until space becomes available. If **n**, the recipient machine will attempt to record the message in any case.
 - *AMIS loopback test mailbox extension*: A message sent to this mailbox will cause an automatic reply to the sending machine, thereby creating a loopback test. This extension must be assigned on the `subscriber : local` form *before* it is entered here.
3. Check the `system : translation : machine : audix/amis/call delivery` form. The *connection type* should be `amisac` or `amisap`.

A. Basic Procedures

This appendix covers basic tasks of remote and local AUDIX service technicians. It is intended as an introductory guide for service personnel who are unfamiliar with AUDIX maintenance procedures, and as a quick-reference for experienced technicians who simply need a reminder of the basic AUDIX support tasks.

Basic procedures include the following:

- Block/Restore Service (includes busy-ing-out and releasing VSP devices and the data link)
- MI Toggle Switch (Modes and Use)
- RCD Cartridge Handling
- Remove Cover Plates
- Restart or Reboot the System
- Shut Down the Software
- Visual Inspection
- Alarm and Error Logs (Display and Use)
- VPT (Voice Port) Test Calls

BLOCK/RESTORE SERVICE

Normally service is blocked (interrupted) to keep subscribers from using faulty equipment until you can repair and test it, or run audits on a restored filesystem. If service is *not* blocked, callers could get confusing responses after dialing AUDIX, or tests might give misleading results.

When the AUDIX system is taken out of service, subscribers who try to access their mailboxes hear reorder tone (fast-busy). This tone is used whenever the switch cannot access AUDIX (either the data link is down, or no voice ports are attached or in service). People who would normally reach AUDIX through the Call Answer feature are not forwarded to AUDIX (they hear ringing and no answer at the number they called).

Block Service (Busy-Out or Shutdown)

Service may be blocked completely or partially, depending on the method you choose. You normally block service by *busy-ing-out* an AUDIX device, which means temporarily removing it from service. You *release* the device to return it to service.

You may busy-out either the data link or the Voice Session Processor (VSP) devices on the TD bus (the VB, TDBI, VPT, or VPC boards). You may also force all calls to be dropped, or allow service to be blocked gradually as calls end (called *camp-on* busy-out).

Block All Service

To block all calls to AUDIX, use one of these methods:

- *Data Link Busy-Out:* Use the `maintenance : datalink : busyout` form to drop all calls in progress and to block all new calls coming from the switch. This is the recommended busy-out procedure for systems with a data link unless attached to a 1A ESS Switch or 5ESS switch (see *Standalone Busy-out*).
- *Standalone Busy-Out:* In a Standalone system, there is no data link. In order to block service, you must busy out each AUDIX port *on the switch side*. To restore service, release each AUDIX port at the switch. This method is also used when the switch is a 1A ESS or 5ESS switch. (If you busy out the data link, the AUDIX starts to answer calls in stand-alone mode.)
- *System Shutdown:* You may shut the system down to prevent callers from accessing it by:
 - Using the `shutdown` form to do an administrative (a) or maintenance (m) shutdown, with a forced (f) or camp-on (c) option.
 - Using the MI toggle switch to force off all active calls and shut down the system (same as a forced, maintenance shutdown).

NOTE

Whenever you restart or reboot the system, devices you have manually busied out are automatically returned to service.

Partially Block Service

You can busy-out individual VSP-board ports or channels so AUDIX can continue to provide service over good ports. VSP devices include the VPT, VPC, TDBI, and VB boards. These boards (or some of their ports or channels) are routinely busied-out and released so you can make test calls (force a call through a desired device). You may also need to keep traffic from using a possibly faulty device, port, or channel until you test or repair it. After you busy-out service, an incoming call can be answered by any idle port or channel.

To busy-out a VSP device:

1. Use the `maintenance : vsp : busyout` form to remove traffic from one or all VPT or VPC ports, or from one or more VB or TDBI channels.

NOTE

On a Standalone system, busy-out the desired ports *on the switch side*.

- a. To *partially* block service, busy-out only the ports or channels you need to work on. This allows service to continue over the ports and channels still in service. You can then unequip or test the selected VSP device without interference.
 - b. To block *all* service, remove all ports or channels from service. Users receive reorder tone or hear ringing with no answer.
2. Select the forced (f) option to drop all calls immediately (used during off-peak hours or for urgent repairs), or camp-on (c) option to block service gradually as ports become idle. *If all calls are not dropped within 2 minutes*, AUDIX software may cancel the camp-on busy-out request.
 3. When tests or repairs are complete, use the `maintenance : vsp : busyout` form to release the busied-out port(s) or channel(s) and restore normal service.

Force Off Traffic

You may force traffic off the system to do urgent repairs or tests. Normally, service should be done during nonpeak hours when little or no traffic is on the system. You may force off traffic by:

- Using the `maintenance : datalink : busyout` form.
- Using the MI toggle switch (always a forced shutdown) or running the `shutdown` form with the forced (f) option.
- Using the `maintenance : vsp : busyout` form with the forced (f) option.

CAUTION

A forced busy-out or shutdown should be used only if no traffic is on the system or if maintenance is urgent and must be done immediately. Always notify the customer *before* blocking service if AUDIX is providing service.

Restore Service (Release or Reboot)

After repairing or testing the system, return it to service as follows:

1. *If the system was shut down*, restart or reboot it. This automatically releases any devices you manually busied-out.
2. If you busied-out the data link to block all service, use the `maintenance : datalink : release` form to bring up the switch link.
3. If you busied-out some VSP devices to partially block service, use the `maintenance : vsp : busyout` form to release them.

NOTE

If the VSP device to be released is on an unequipped VSP board, it must be equipped using the `maintenance : vsp : equipage` form first.

4. Verify that full service is restored by making a test call using the `maintenance : system : test call` form.

MI TOGGLE SWITCH (MODES AND USE)

The toggle switch on the Maintenance Interface (MI) circuit pack faceplate may be used to shut down or reboot the system depending on the system mode and switch movement. The switch's position does *not* affect normal power-up or initialization. Equivalent actions on the terminal, MI and FP LEDs, system modes, and general MI board description are discussed in this section.

Using the MI Toggle Switch

The MI toggle switch must be pulled out before it can move to either side. The switch movement causes the actions shown in Table A-1 depending on its mode. The *center* movement means moving the switch from off-center (offc) to center (cntr). Moving the toggle from off-center to the center (cntr) position (if not already there), then off-center (offc), is called *cycling* the toggle switch.

Table A-1. Toggle Switch Movement and Effects

System Mode	Switch Movement	Time (Note)	Effect
Control	cntr to offc offc to cntr	– immed.	None; system shows Control Mode Menu System does a full initialization (reboot) from disk
Initialization (hardware)	cntr to offc offc to cntr	immed. –	System shows Control Mode Menu; FP is reset None; system continues hardware initialization
Normal (software running)	cntr to offc	1-4 min.	Starts forced system shutdown; when the red COMPL LED lights, the FP is reset (its red LED lights), and the Control Mode Menu appears
	cntr to offc, back to cntr	1-4 min.	Starts forced system shutdown as above, then immediately starts a full initialization (reboot)
	offc to cntr	–	None; software stays up and all screen forms are accessible
Normal (software shutdown)	cntr to offc	4 min.	Starts forced system shutdown (see above)
	cntr to offc, back to cntr	4 min.	Starts forced system shutdown as above, then immediately starts a full initialization (reboot)
	offc to cntr	–	None; filesystems are closed so administrative or maintenance tasks can be done
Note: Shutdown normally takes about 30 seconds depending on load. If software is insane or was already shut down, the MI does a shutdown after a 4-minute time-out.			

MI Toggle Switch Equivalents

AUDIX is designed so that all actions done using the MI toggle switch can be done from the terminal. The toggle switch is simply a short-cut that may be used locally, or another means of controlling the system in case the terminal is not working or is unavailable. Actions include:

- *Display the Control Mode Menu:*
 - In hardware initialization mode (before the “ENTERING NORMAL MODE” message), press **CTRL-c** on the terminal to stop initialization and show the menu.
 - In normal mode (after the “ENTERING NORMAL MODE” message and when forms are accessible), run the **startup** form and press **CTRL-c** immediately after the “FP reset” message. The Control Mode Menu appears.
- *Initialize (restart or reboot):*
 - In control mode, use the Control Mode Menu Options 4 (restart), 5 (reboot), or 6 (FP restart with DBP reboot). Only Option 5 (reboot) resets the FP.
 - In normal mode (after the “ENTERING NORMAL MODE” message and when forms are accessible), run the **startup** form (to restart), or press **CTRL-c** after the “FP reset” message and go to the Control Mode Menu (to reboot).
- *Shut down system software:*
 - In control mode, software is already shut down.
 - In initialization mode (before the “ENTERING NORMAL MODE” message), press **CTRL-c** on the terminal to stop initialization and show the Control Mode Menu.
 - In normal mode (after the “ENTERING NORMAL MODE” message and when forms are accessible), run the **shutdown** form. The toggle switch does a forced maintenance shutdown (options m and f). However, the form also allows you to select administrative (a) or camp-on (c) options.

MI Toggle Switch and LEDs

After the toggle switch is moved (or an equivalent action is done), the MI and FP-CPU circuit pack LEDs indicate system modes as follows:

- a. MI LEDs:
 - TEST (green) – Initialization is in progress.
 - ACT (green) – Software shutdown from normal mode is in progress.
 - COMPL (red) – Software is shut down.
- b. FP-CPU LEDs:
 - Red – FP is reset. When the TN523 or TN591 is red, software is always shut down.
 - Green heartbeat – FP has finished initialization tests.

MI Board Alarm Panel

An alarm panel on the front of the MI circuit pack shows MI board and AUDIX system status (see Figure A-1, *MI Circuit Pack Faceplate*). These LEDs are described in this section.

MI Board Status

Three LEDs show MI circuit pack status:

- **FAULT – Red:** Steadily lit when the MI board detects a failed self-test. This LED also lights briefly when the system is powered on (most LEDs flash on power-up).
- **TEST – Green:** Lights when the FP tests the board or during initialization
- **IN USE – Yellow:** Lights when a Local Maintenance Terminal (LMT) is connected to the MAINT H00 port, or when an RMT modem is attached *and* a call is in progress.

AUDIX System Status

Four LEDs under the ALARMS label show AUDIX system status. The MI reports major and minor alarms to the remote maintenance site through the CDR1B alarm board and the alarm link (D03) using the existing alarm-reporting facilities in place for the switch. The MI also displays alarms on the terminal STATUS line (if a display terminal is logged on). The ALARMS LEDs are:

- **MAJ – Red:** Lights when the system has detected a major alarm or is in control mode. A major alarm can potentially affect over 25 percent of the system.
- **MIN – Red:** Lights when the system has a minor alarm (may be lit when the MAJ alarm LED is lit). A minor alarm can potentially affect up to 25 percent of the system.
- **WRN – Yellow:** Lights when the system has a warning alarm (may be lit when either the MAJ or MIN alarms LEDs are lit). A warning alarm is a problem that needs attention but has (as yet) a limited impact on service.
- **ENV – Red:** Lights when the system has an environmental alarm (sent from the CDR1B alarm board to the MI). Environmental alarms include power or temperature equipment.

System Shutdown Status

Two LEDs located above and below the MI toggle switch show system shutdown status. The system may be shut down with the MI toggle switch or the **shutdown** form.

- **ACT – Green:** Lights when system shutdown is activated when the system is in normal mode (software is running).
- **COMPL – Red:** Lights when shutdown is complete (from 30 seconds to 4 minutes, depending on the size of the system). This indicates the filesystems on disk have been closed. You may now safely power down the system without losing data. Sometimes this red LED does not light after 4 minutes. However, the TN523 or TN591 FP-CPU will light red, indicating the system is shut down.

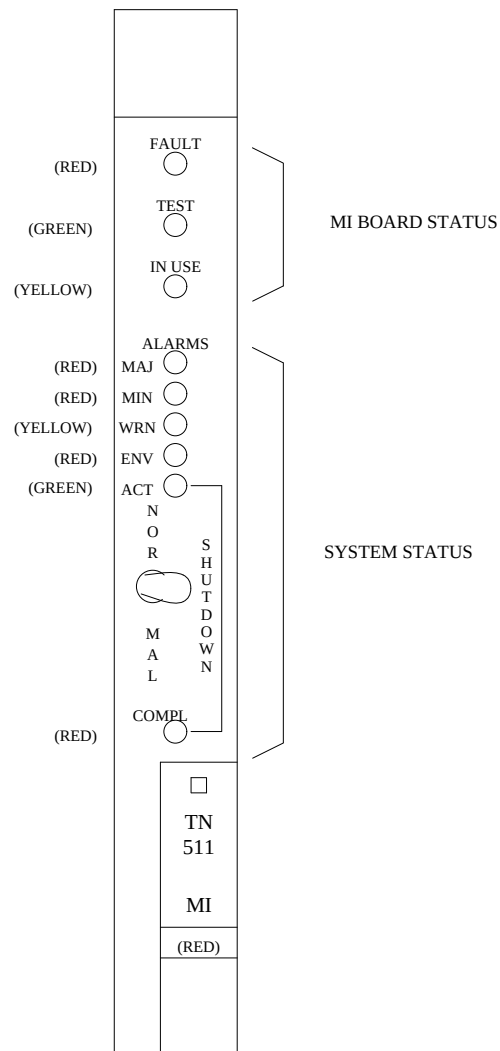


Figure A-1. MI Circuit Pack Faceplate

MI Board and System Modes

The MI displays the mode or state in which AUDIX operates. Some modes are transitional states; others remain in effect until a specific action is taken. AUDIX modes include:

1. *Control Mode:* The MI firmware is in control, the FP is not active (the red LED on the TN523 or TN591 CPU is lit), and screen forms cannot be accessed. Only the MI's maintenance connector (MAINT H00) is active, so the maintenance terminal must be attached to it to do any commands. If the system is held in control mode, a Control Mode Menu appears on the terminal screen, and the FP-CPU TN523 or TN591 CPU is always red.
2. *Initialization Mode:* If the MI switch is moved (see Table A-1, *Toggle Switch Movement and Effects*) or if AUDIX is powered down and then up, the system passes through this mode to test its hardware and load software. A complete initialization from disk is called a *reboot*; a partial initialization from FP memory is called a *restart*.
3. *Normal Mode:* Software is in control. The system enters normal mode during software initialization, marked by the "MAINTENANCE INTERFACE ENTERING NORMAL MODE" message. Normal mode is the usual, in-service state of AUDIX operation. The administration or maintenance forms can be accessed and displayed on terminals connected to either MI RS-232C port (H00 or H01).
4. *Shutdown Mode:* The system closes files and saves data. If an administrative shutdown was done using a form, some forms are still accessible (for example, software may be restarted using a form). Administrative commands may be done because the system remains in a subset of normal mode. If the MI toggle switch was used, the system returns to control mode and forms are not available.

MI Board Terminal Connectors

The MI board controls the two 25-pin RS-232C compatible connectors for attaching administration and maintenance display terminals: MAINT (H00) and ADMIN (H01). The MI sets the baud rates the terminals can use at 1200 bits per second (bps) or 4800 bps (default). To toggle the baud rate, press **BREAK** on an attached terminal.

When the system is initializing or held in control mode, only the maintenance connector is active, so the maintenance terminal must be attached to the MAINT H00 connector to do any commands. In normal mode (software is running), both connectors are active. See Chapter 8, *Terminal Setup and Use* for information on terminals.

RCD CARTRIDGE HANDLING

This section covers Removable Cartridge Drive (RCD) cartridge handling, automatic spin up or spin down of the cartridge, faceplate design, and cartridge-changing procedures. Two types of RCDs are in current use:

- Early AUDIX systems use a 20-Mbyte RICOH drive. This drive is identified by its flip-down lid and lid latch. Any references to the physical nature of the RCD or its cartridges in this section correspond to the 20-Mbyte drive.
- Newer systems use a 50-Mbyte RICOH drive. This drive has a button to push for simpler cartridge handling.

The LED patterns and spin-up/spin-down behavior of the RCD are the same for 50-Mbyte and 20-Mbyte drives.

Cartridge-Handling Procedures

Handle RCD cartridges carefully to prevent damage to the media or drive. Precautions include:

1. RCD cartridges are designed to handle falls from heights of about 3 to 4 feet without breaking (a short drop probably won't hurt the cartridge). However, *do not use* cartridges that fell from a higher height or seem damaged. They may break the drive.
2. *Never use* cartridges that were in an RCD that crashed. They can break the new drive.
3. Keep cartridges away from motors or other magnetic devices.
4. Store cartridges in a cool, dry, protected area. Keep all cartridges out of direct sunlight. Always store cartridges in their protective holders to keep them clean.
5. Keep the environment clean to protect the media; no smoking.
6. If cartridges are exposed to extreme temperatures – those greater than 100°F (38°C) or lower than 39°F (4°C) – allow them to acclimate at least 1 hour before using them.
7. Never leave the RCD empty without a cartridge inserted or the heads may become contaminated. Insert the null (dummy) cartridge that was shipped with the drive if needed so the drive is never left empty.
8. *Never force* the 20-Mbyte drive's front latch to move (such as when power is off). This will break the latch.
9. Close the RCD door securely after inserting or removing a cartridge.
10. *Never open* the drive door while the drive is spinning, when the heads are accessing the disk, or when power is off.

RCD Faceplate Design

The 20-Mbyte and 50-Mbyte RICOH drives have the following LEDs and switches. See Figure A-2, *RICOH 20-Mbyte RCD Faceplate*, and Figure A-3, *RICOH 50-Mbyte RCD Faceplate*, for an illustration.

- The *red* LED flashes when one of the drive heads is writing to disk. This light is on only when the disk is running correctly.
- The *green* LED is steady whenever the drive is ready for use. A *flashing green* light means the drive motor is in the process of spinning up or down. A 50-Mbyte drive takes about 20 seconds to spin up and 4 seconds to spin down. The 20-Mbyte drive takes about 30 seconds to spin up and 10 seconds to spin down.
- The *start/stop button* to the right of the LEDs starts the spin down/spin up process and retracts the drive heads (if exposed). If the start/stop button has *not* been pressed and the green LED is blinking, this indicates a drive fault.
- *For a 20-Mbyte drive:* The front *latch* holds the upper lid in place. The drive *must have power on* for the front latch to operate, but the drive *must* be spun down (both LEDs must be dark). The latch keeps the top cover from being flipped back during normal drive operation.

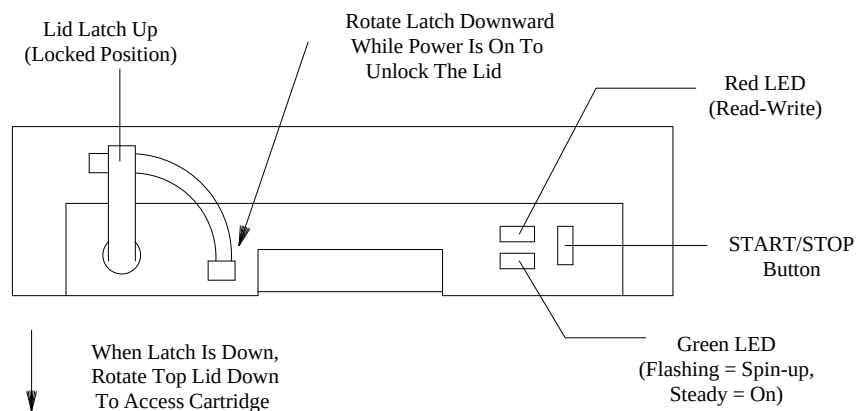


Figure A-2. RICOH 20-Mbyte RCD Faceplate

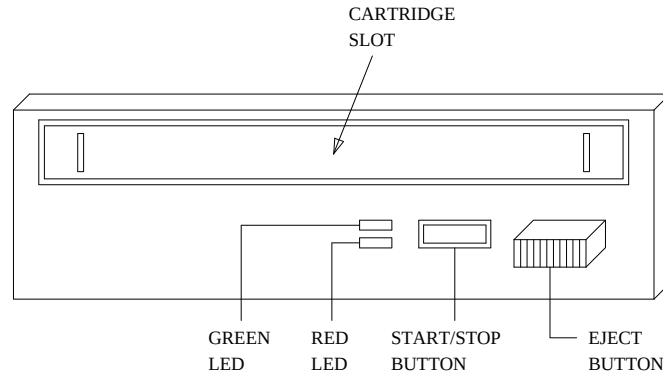


Figure A-3. RICOH 50-Mbyte RCD Faceplate

RCD Spin-Up/Spin-Down Behavior

AUDIX software automatically spins up or down the RCD in certain cases. The green LED flashes for 4 to 30 seconds until spin-up (steady green LED) or spin-down (LEDs dark) is complete.

NOTE

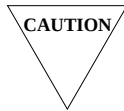
The start/stop button is disabled during a software request to spin the drive up or down. This prevents you from accidentally interrupting or reversing an automatic spin-up/spin-down cycle.

1. Software automatically spins *down* the RCD when:
 - a. The `maintenance : dbp : unequip` form for the RCD (disk01) is used.
 - b. The `shutdown` form with the `maintenance (m)` option is used.
 - c. The MI toggle switch is used to shut down the system (see Table A-1).
2. Software automatically spins *up* the RCD when:
 - a. The `maintenance : dbp : equip` form for the RCD is used (where *disk device number* = 1 for disk01).
 - b. The `startup` form is used. (This form does a maintenance shutdown first, which spins down the RCD, then a restart which spins up the RCD.)
 - c. A system initialization (reboot) or power on procedure is done. (A DBP subsystem initialization always spins up the RCD.)

Changing RCD Cartridges

The RCD cartridge is normally changed using these procedures. It may also be changed any time the system is shut down before a reboot (*not* a restart) if power is on.

1. Make sure the power is on and software is running.
2. Use the `maintenance : dbp : unequip` form to unequip the RCD (take it out of service). Specify `disk device number = 1` and press **CHANGE**. This form should cause the RCD to spin down (the green LED will flash as the drive motor spins down).
3. Remove the AUDIX cabinet front cover if needed (turn the top-center screw a quarter-turn and lift the cover out of the bottom hinge slots).
4. *For a 50-Mbyte drive:*
 - a. If the green LED is lit, press the start/stop button (the left-hand button) to spin down the drive.
 - b. Once the green LED goes out, press the eject button (the right-hand button) to eject the cartridge. Go to step 6.
5. *For a 20-Mbyte drive:*
 - a. When the green LED goes out (all RCD LEDs are off), move the lever on the left of the faceplate down 90 degrees to unlatch the door.

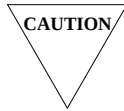


DO NOT move the latch if the green LED is on or flashing, or if power to the system is OFF. This will damage the drive.

- b. Grasp the front of the RCD and pull the drive forward out of the lower cover housing. The drive will click when it is about 6 inches out.
 - c. When the drive clicks into place, rotate the front lid (the top of the faceplate) forward and down. The cartridge should pop up. Go to the next step.
6. Remove the cartridge. *Before setting it down*, make sure the cartridge is clearly labeled with the volume name and contents. Place the cartridge in its protective cover.
7. *For a 50-Mbyte drive:*
 - a. Check the cartridge you are going to insert and verify that the red tab on the underside of the cartridge is set to the W/R position (for write/read).
 - b. Position the cartridge so that the arrow is on top and pointing toward the slot. (See Figure A-4, *Inserting a 50-Mbyte Cartridge*.)
 - c. Slide in the cartridge.
 - d. Press the start/stop button to spin it up. The green LED will blink and then stay on. (This takes about 20 seconds). Go to step 9.

8. For a 20-Mbyte drive:

- a. Position the new cartridge so the label faces forward and the write-enable tab is at the bottom right (this covers the write-protect notch). The head-access panel at the rear of the cartridge should be shut.

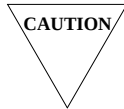


You cannot write to a write-protected disk or RCD, so you cannot initialize a system without a write-enable tab over the notch.

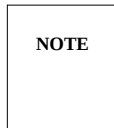
- b. Insert the cartridge and push down firmly on the housing so it snaps into place.
 - c. Lift the front lid back into place, and return the front lever to the latched (upright) position. Push the RCD drive back into place (the drive will not slide back in unless the latch is up). Go to the next step.
9. Use the maintenance : dbp : equip form to equip the RCD (identify it to software). Use the following options:

- a. Specify *circuit pack code* = SCSI and *disk device number* = 1. Press .

If this cartridge has already been used, the volume name appears when you press .

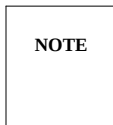


If *initialization* or *erase* = n, you will erase all the cartridge contents.



The *circuit pack code* in early systems was SD20. This code still works, but is no longer needed. AUDIX software automatically reads the size and type of each disk.

- b. For a new cartridge *ONLY*, assign it a meaningful volume name (label) that is 1 to 7 characters long. In the *erase* (or *initialization*) field, enter y and press .
10. This form should cause the RCD to spin up (the green LED should start to flash). If the green LED does not blink, push on the front of the RCD to make sure it is back in place, then press the start/stop button to spin up the drive manually.
11. When the green LED remains steady, the cartridge is ready for use. File the cartridge you removed in a cool, dry, safe place.



If the green LED blinks more than 2 to 3 minutes, open the RCD again starting with step 4 or 5. Make sure the cartridge is correctly inserted and seated.

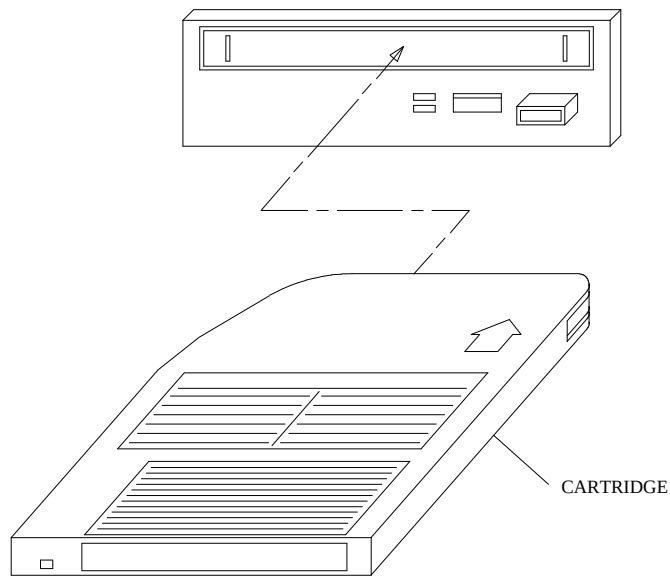


Figure A-4. Inserting a 50-Mbyte Cartridge

REMOVE COVER PLATES

Many procedures require the front or back cover plates to be removed from one of the AUDIX cabinet. This section details procedures for removing:

- Front cover and lower front cover plate
- Middle rear cover plate (above the connector panel)
- Lower rear cover plate (below the connector panel)

Removing the Front Cover

Remove the AUDIX front cover to access:

- The circuit-pack carrier
- The Electro-Static Discharge (ESD) ground point for the EMC wrist strap
- The RCD (bottom cabinet only)
- The documentation slot

See Figure A-5, *Removing the Front Cover and Lower Cover Plates*, and the following steps to remove the front cover:

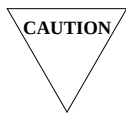
1. Turn the quarter-turn screw in the top center of the cover.
2. Tip the cover forward, then lift it out of the bottom hinge slots and set it aside.

Removing the Lower Front Cover Plate

Remove the lower front cover plate to access:

- The air filter (below the carrier)
- The disk drives (HDDs, RCD bracket, or their cables)
- The LED/circuit-breaker module.

See Figure A-5 and the following steps to remove the lower front cover plate:



Before removing the front cover plate, shut down the software and power down the system. It is too easy to trip the cabinet power switch when removing the plate.

1. Remove the front cover (see previous procedure).
2. Turn the 2 quarter-turn screws on the lower front cover plate.
3. Lift the plate out of the bottom hinge slots and set it aside.

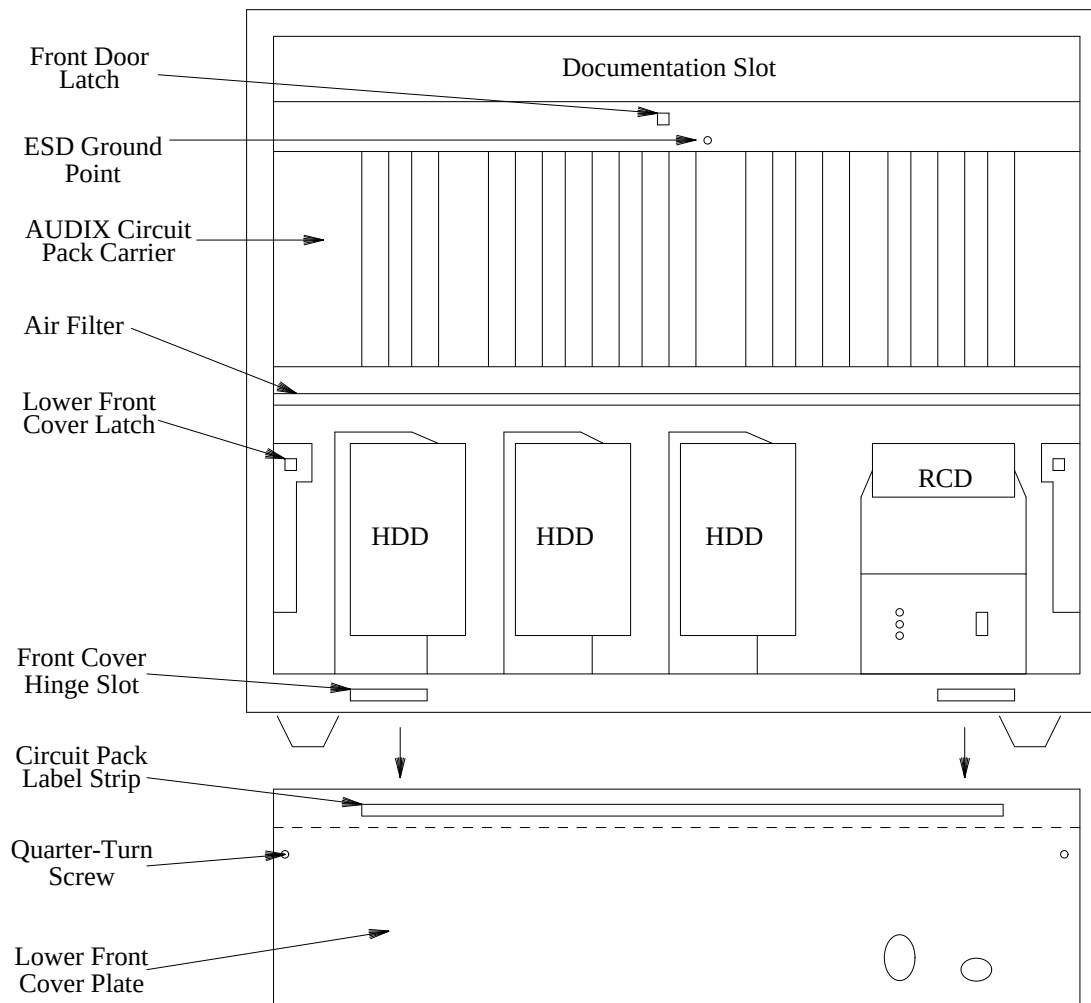


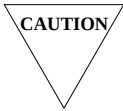
Figure A-5. Removing the Front Cover and Lower Cover Plate

Removing the Rear Cover Plates

You may need to remove one or more of the rear cover plates to access components inside the back of the AUDIX cabinet. See Figure A-6, *Removing the Rear Cover Plates*, and do the following:

- Remove the *top* panel only to access the fans in the fan assembly (see Chapter 7, *Power and Environment*).
- Remove the *middle* cover plate to access:
 - The backplane and paddle boards

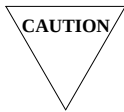
- Internal cables including those for the fan assembly, CDR1B alarm board, and the connectors inside the rear connector panel
- *On two-cabinet systems:* The intercabinet cabling that connects the two cabinets
- Remove the *lower* cover plate to access:
 - The power supply
 - The battery-charger cable and battery pack



The software must be shut down and the power turned OFF before you remove any cover plate on the back of the cabinet.

Step 1: Shut Down and Power Down

1. If software is running, shut the system down using the MI toggle switch or the shutdown form with the maintenance (m) option.
2. Wait for the RCD to spin down (green LED goes dark), then power down the system.



Turn the power off **before** unplugging the cord. Otherwise, AUDIX will run on its battery power even if you turn the power switch(es) off afterwards.

3. If AC power is used, unplug the power cord(s) from the 120 V AC 3-prong connector at the rear of the cabinet(s).



The POWER switch should be OFF **and** the power cord should be unplugged to prevent you from accidentally contacting electrical current in the backplane.

Step 2: Remove the Cover Plate(s)

The AUDIX middle and lower cover plates (located above and below the connector panel) are notched to slide out for easier removal and reassembly. To replace either cover, reverse the steps.

To remove the *middle* cover plate:

1. Loosen (do *not* remove) the 7 screws along the bottom of the middle cover plate. (The 4 screws on the sides also attach the bottom cover plate.)
2. Remove the 4 screws along the *top* of the middle cover plate and set them aside.
3. Slide the middle cover plate upwards to remove it from the back of the AUDIX cabinet.

To remove the *lower* cover plate:

1. Loosen (do *not* remove) the 4 screws along the bottom of the lower cover plate.
2. Remove the 9 screws along the top and sides of the lower cover plate and set them aside.
3. Slide the lower cover plate upwards to remove it from the back of the AUDIX cabinet.

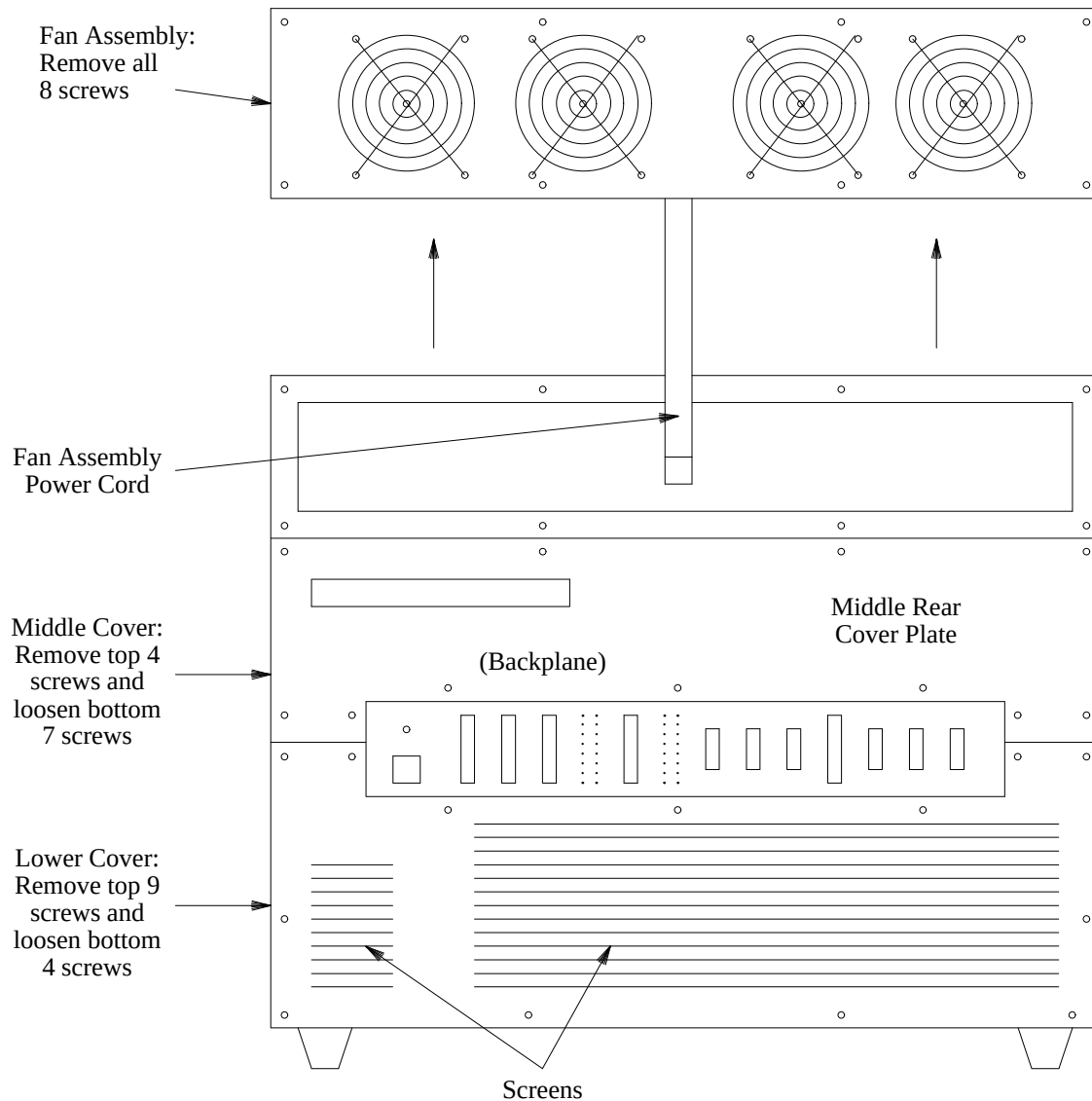


Figure A-6. Removing the Rear Cover Plates

RESTART OR REBOOT THE SYSTEM

A system restart is a partial initialization started from FP memory. A reboot is a full initialization started by loading programs into FP memory from disk. Both options are intended to return AUDIX to service following a problem resolution or hardware replacement. They both reset the FP and attempt to bring a system out of control mode and back into normal (in-service) mode.

Restarts

A system *restart* brings the system software back into full service, usually after an administrative shutdown. This is often done to try to clear software problems. To restart the system, do one of the following:

1. If software is running, use the **start up** form.
2. If software is *not* running, access the Control Mode Menu by using the MI toggle switch (if local) or pressing **CTRL-c** at log in (if remote). Select Option 4 (restart) on the menu.
3. During an initialization, press **CTRL-c** any time *before* the software boots and *after* the “MAINTENANCE INTERFACE ENTERING NORMAL MODE” message appears. When the Control Mode Menu appears, select Option 4.
4. The message “FP reset” should appear on the screen, followed by a software initialization. You need to log in after a restart.

A system restart resets the FP, tests the FP-RAM, then starts loading software programs from DBP-RAM to FP-RAM. Part of the process checks the FP memory against disk memory. If a checksum differs, the system will reboot instead of restarting (you will see a list of initialization options). This may happen if you have not restarted the system for a long time.

Reboots

A system *reboot* is done to clear major system problems (such as corrupt program memory). It also runs automatically whenever the system is powered up. To reboot the system, do one of the following:

1. Power the system down, then up.
2. Move the MI toggle switch from off-center to center. After 2 minutes, an initialization starts automatically.
3. Move the MI toggle switch from center to off-center. When the Control Mode Menu appears, select Option 5 (for a complete reboot) or Option 6 (to restart the FP and reboot only the DBP subsystem).
4. Some internal software problems may cause the FP to reset automatically.

A manual reboot resets the FP, then prompts you to select initialization options. If you don't type anything, a standard initialization begins after 2 minutes. The system first does a hardware initialization from disk, which loads software into FP memory. A check filesystem (ckfs) program tests all filesystems for bad data or structure, and may delete files or unmount filesystems depending on errors it finds. After testing the hardware, a software initialization from disk is run, normally ending with the "start service" message.

SHUT DOWN THE SOFTWARE

A shutdown procedure protects system software and customer data. A software shutdown is *always* required before powering down the system. It may also be required for certain maintenance and administration procedures. You may use a software form or the MI toggle switch (local only).

NOTE

If the Control Mode Menu is on the screen and the TN523 or TN591 FP-CPU has a red LED lit, software is already shut down.

CAUTION

You **must** shut down the system software before a power down, or valuable customer and system data will be lost.

Shutdown Using a Form (Remote and Local)

Whenever the system is in normal (in-service) mode, you may use the shutdown form to close software files and bring down the system.

Gradual or Immediate Shutdown

Select the type of shutdown you need based on urgency as follows:

- The *camp-on* shutdown (c) should be used whenever the system is running and calls are in progress. This option prevents new calls from being made and gradually blocks service as calls in progress are dropped and ports become idle. *If current calls are not ended within 2 minutes*, this option times out and must be restarted.
- The *forced* shutdown (f) should be used when there is no traffic on the system or if maintenance is urgent. If any calls are in progress, they are immediately disconnected.

Maintenance Shutdown

Do a *maintenance* shutdown before replacing hardware and powering down the system. This shutdown closes all files and unmounts all filesystems except the boot filesystem running the system. Most forms are not accessible. To do this type of shutdown:

1. Display the **shutdown** form and choose the maintenance shutdown option.

NOTE

A maintenance shutdown automatically spins down the RCD (wait for the green LED to go out). An administrative shutdown leaves the cartridge active.

2. Select the forced (f) or camp-on (c) option (you normally enter “f”).
3. Press **CHANGE** and wait for “operation complete” to appear (this normally takes about 30 seconds to 1 minute). The red COMPL (complete) LED will light on the MI faceplate. (If this LED never lights, see if the TN523 or TN591 has a red LED lit.)

NOTE

Verify that the RCD has spun down (its green light is OFF). If so, continue. If not, press the button on the TN506B. After a few minutes, press the button on the RCD. It should now spin down and its light should go off. If it doesn’t, you can still go to the next step.

4. You may now power down the system to replace hardware. You could also restart the system without a power down to return to normal mode when ready.

Administrative Shutdown

Use an *administrative* shutdown to close all files, and then remount the filesystems so filesystem administration or maintenance may be done. The only filesystem that is left open is the announcement (adat) filesystem; this allows AUDIX to play system prompts or announcements. However, no other filesystems may be accessed. Screen forms are accessible and most filesystem maintenance is done in this mode.

This type of shutdown is normally followed with a system restart to return to normal mode. To do an administrative shutdown:

1. Display the **shutdown** form and choose the administrative shutdown option (enter “a”).
2. Select the forced (f) or camp-on (c) option (you normally enter “c”).
3. Do the required disk or filesystem operation using screen forms. When complete, do a restart to return the system to service.

Shutdown Using The MI Toggle Switch (Local Only)

You may *cycle* the MI toggle switch (set it from center to off-center position) to shut the system down. This action is equivalent to a forced maintenance shutdown and should be performed only if immediate maintenance is needed or if no traffic is on the system.

Cycling the toggle switch resets the FP, then the system displays the Control Mode Menu. All files are closed, all active calls are dropped, and all filesystems are unmounted except the boot filesystem running the system. After cycling the toggle switch:

1. The green ACT (active) LED lights, indicating a shutdown request is active.
2. The red COMPL (complete) LED lights after 15 seconds to 4 minutes, depending on the size of the system. This indicates that the software filesystems on disk have been closed.
3. You may then power down the system. If you wish, you may immediately reboot the system by returning the toggle switch to the center position.

VISUAL INSPECTION

Visually inspect the AUDIX system for obvious problems as listed in this section. Any questions about or deviations from these standard connections should be resolved using *AUDIX Installation* (585-305-105).

Circuit Pack LEDs

The LEDs on the circuit pack faceplates can indicate possible problems. Normal LED patterns are listed in this section. Record any deviation from this pattern as part of system diagnosis. The inspection includes both one- and two-cabinet configuration checks.

NOTE

Yellow (in-use) LEDs that are steadily lit during normal operation are marked “ON” in capital letters. Any steadily lit red LED indicates a possible fault.

Base Cabinet Circuit Packs

This is for a one-cabinet AUDIX system or the base cabinet of a two-cabinet AUDIX system. Check for the following normal LED patterns:

1. Slot 0 – TN506B BC: LED 18 (yellow) = ON
(There is no red LED on the BC; faults must be located through the alarm log or circuit pack isolation.)
2. Slot 1 – TN475B SADI should be lit as follows:
 - LED 9: yellow = ON when passing data from SADI memory to DBP (VME) bus
 - LED 10: yellow = ON when disk00 (HDD 0/0) is installed and operational
 - LED 11: yellow = ON when disk01 (RCD 0/1) is installed and operational
 - LED 12: yellow = ON when disk02 (optional HDD 0/2) is installed and operational
 - LED 13: yellow = ON when disk03 (optional HDD 0/3) is installed and operational
 - LED 14: yellow = ON when disk04 (optional HDD 0/4) is installed and operational
 - LED 15: yellow = ON when disk05 (optional HDD 0/5) is installed and operational
 - LED 16: yellow = ON when disk06 (optional HDD 0/6) is installed and operational
 - LED 17: yellow = ON when passing data between SADI and SCSI (disk) bus
 - LED 18: red = OFF (ON if pack is alarmed or during initialization)
 - LED 19: green = quick (1-second) heartbeat. Under heavy disk load, this heartbeat slows down (LEDs 9 and 17 should be flickering)

NOTE

The SADI lights show diagnostic tests during a reboot. See the next section.

3. Slot 2 – TN532 or TN540 RAM: LED 9 (yellow) = ON
LED 18 (red) = OFF (if ON, pack is alarmed)
LED 19 (green) = only under test
4. Slot 3 – TN366(B) ACC or TN539(B) ACCE: LED 9 (yellow) = ON (when Networking is active)
LED 18 (red) = OFF (if ON, pack is alarmed)
LED 19 (green) = quick (1-second) heartbeat
5. Slot 4 – TN472C DBP-CPU: LED 9 (yellow) = ON
LED 15 (green) = quick (1-second) heartbeat
LEDs 18 (red) and 19 (green) = same as TN532/540
6. Slot 5 – UN162 VSFI: LED 9 (yellow) = ON when passing data
LEDs 18 (red) and 19 (green) = same as TN532
7. Slot 6 – UN160B DBPI: Same as UN162

-
8. Slot 7 – TN511 MI: Yellow (IN USE) LED = ON when LMT connected or RMT logged in
Green (TEST) LED = ON during self-test or initialization
Red (FAULT) LED = off (if ON, pack is alarmed)
All other alarm panel LEDs = off (If ON, see the MI section in this appendix.)
 9. Slot 8 (spare)
 10. Slot 9 – TN523 or TN591 FP-CPU: Yellow LED = ON
Green LED = 2-second heartbeat
Red LED = OFF (if ON, pack is alarmed)
 11. Slot 10 – TN734 or TN761 FP-RAM: Yellow LED = ON
Green LED = ON only during test
Red LED = OFF (if ON, pack is alarmed)
 12. Slot 11 – TN734 FP-RAM: Yellow LED = ON (empty if Slot 10 contains TN761)
Green LED = ON only during test
Red LED = OFF (if ON, pack is alarmed)
 13. Slot 12 (spare)
 14. Slot 13 – TN716B FP-BI: Same as TN734 or TN761
 15. Slot 14 – TN727 NC: Same as TN734 or TN761 (in top cabinet of two-cabinet systems)
 16. Slot 15 – TN533 SCPI or TN547(B) MPSI: LED 9 (yellow) = ON (Integrated system)
= OFF (Standalone system)
LED 18 (red) = OFF (if ON, pack is alarmed or switch data link is not up)
LED 19 (green) = ON when under test
 17. Slot 16 – TN477 or TN500 TDBI: Yellow LED = ON when passing data from the TD bus
Green LED = ON only during test
Red LED = OFF (if ON, pack is alarmed)
 18. Slot 17 – TN520 VB: Yellow LED = ON when traffic is on system
Green and red LEDs = same as TN477/500
 19. Slot 18 – TN714 TC: Yellow LED = slow (4-second) heartbeat
Green and red LEDs = same as TN477
 20. Slot 19 – TN747B VPT: LED 8 (yellow) = ON when port(s) in use
LED 4 (red) = OFF (if ON, pack is alarmed)
LED 6 (green) = ON when under test
 21. Slots 20 to 23 – TN501B VPC: LED 9 (yellow) = ON when port(s) in use
LED 18 (red) = OFF (if ON, pack is alarmed)
LED 19 (green) = ON when under test
 22. Slot 24 – TN747B VPT (Optional): Same as slot 19
 23. Slots 25 to 28 – TN501B VPC (Optional): Same as slots 20 to 23

NOTE

If the AUDIX system is integrated with an SL-1, slots 19, 21, and 24 may contain TN747Bs or TN762Bs. Refer to the *AUDIX Integration Package for the SL-1 Switch* (585-304-203) for complete information.

Expansion (Top) Cabinet Circuit Packs

This is for the expansion cabinet of a two-cabinet AUDIX system. Check for the following normal LED patterns.

1. Slots 0 to 8 – Spare
2. Slot 9 – TN523 or TN591 VSP-CPU: Yellow LED = ON
Green LED = 2-second heartbeat
Red LED = OFF (if ON, pack is alarmed)
3. Slot 10 – TN734 or TN761 VSP-RAM: Yellow LED = ON
Green LED = ON only during test
Red LED = OFF (if ON, pack is alarmed)
Slots 11 and 12 – Spare
4. Slot 13 – TN716B FP-BI: Same as TN734 or TN761
5. Slot 14 – TN727 NC: Same as TN734 or TN761
6. Slot 15 – Spare
7. Slot 16 – TN500 TDBI: Yellow LED = ON when passing data from the TD bus
Green LED = ON only during test
Red LED = OFF (if ON, pack is alarmed)
8. Slot 17 – TN520 VB: Yellow LED = ON when traffic is on system
Green and red LEDs = same as TN500
9. Slot 18 – Spare
10. Slot 19 – TN747B VPT: LED 8 (yellow) = ON when port(s) in use
LED 4 (red) = OFF (if ON, pack is alarmed)
LED 6 (green) = only under test
11. Slots 20 to 23 – TN501B VPC: LED 9 (yellow) = ON when port(s) in use
LED 18 (red) = OFF (if ON, pack is alarmed)
LED 19 (green) = ON when under test
12. Slot 24 – TN747B VPT (Optional): Same as slot 19
13. Slots 25 to 28 – TN501B VPC (Optional): Same as slots 20 to 23

NOTE

If the AUDIX system is integrated with an SL-1, slots 19 and 24 may contain TN747Bs or TN762Bs. Refer to the *AUDIX Integration Package for the SL-1 Switch* (585-304-203) for complete information.

SADI Diagnostic Tests

During a DBP subsystem reboot, the SADI runs diagnostic tests. All but one of these indicates a problem with the SADI board if the test fails (the red LED remains lit). These tests use LEDs 10 to 13 as a binary code for the diagnostic test. LEDs 14 to 17 show the subtest that failed in binary (this component-level information is not needed in the field).

If the TN475B SADI has a lit red LED, the SADI is probably faulty. The exception is when yellow LEDs 10, 11, and 13 are lit (see test 11 in Table A-2, *SADI Diagnostic Tests*, VME bus-access failure). In this case, the problem is probably not the SADI, but some other board on the DBP (VME) bus. The low-order bit (LED 10) is on the right.

Table A-2. SADI Diagnostic Tests

SADI Test	LEDs 13–10	SADI Test	LEDs 13–10
1. CPU	0001	8. FIFO circuit	1000
2. EPROM	0010	9. DTB DMAC	1001
3. Control bus RAM	0011	10. VTB DMAC	1010
4. MFP chip	0100	11. VME bus access	1011
5. PIT chip	0101	12. SPC chip	1100
6. DRAM	0110	13. Extended DRAM	1101
7. VME bus RAM	0111		

Cable Connections

The cables connected depend on the backplane used.

Base Cabinet Backplane (List 1)

Check for the following connections:

- AC Power cord: should be plugged in to a working 120 V AC 60-Hz outlet, or
- DC Power feeders: should be wired to the building's DC Power Plant
- D00 (PORT 0): should be connected with a 25-pair cable to the switch analog call-distribution group (ACD/EUCD/UCD) for 2 to 8 ports
- D01 (PORT 1): should be connected with a 25-pair cable to the switch analog call-distribution group (ACD/EUCD/UCD) for 9 to 16 ports

- F00 (SCPI DATA): should be connected with an RS-449 cable to an IDI or LADS leading to the DCIU or SCI on the switch
- D03 (ALARM): should be connected with a 25-pair cable to the alarm-reporting facilities used by the switch
- H00 (MAINT) should be connected to either:
 - An RS-232C cable leading to the modem to the remote maintenance site
 - *Local only:* An AUDIX null-modem cable and an RS-232C cable to the LMT
- H01 (ADMIN): should be connected to the local administration terminal (LAT) with a null-modem cable and RS-232C cable, or to any data device as described in the installation manual

Base Cabinet Backplane (List 2 or List 4)

A system with a List 2 or List 4 backplane on the base cabinet should have all of the connections that a List 1 backplane has plus the following:

- D02 (PORT 2): may be connected with a 25-pair cable to an SL-1 switch for 1 to 3 ports
- H02 (NET MON): should only be used by system developers when high level troubleshooting is required
- D05 (ACC): should be connected with a 25-pair cable or an H600-330, Group 1 cable to the switch when the system is part of an AUDIX network
- H03 (SADI MON): should only be used by system developers when high level troubleshooting is required
- H04 (DBP MON): should only be used by system developers when high level troubleshooting is required
- H05 (FP MON): should only be used by system developers when high level troubleshooting is required

Expansion (Top) Cabinet

For two-cabinet AUDIX systems, the following cables should also be connected to the top cabinet connector panel:

- D06 (PORT 2): should be connected with a 25-pair cable to the switch analog call-distribution group (ACD/EUCD/UCD) for 17 to 24 ports
- D07 (PORT 3): should be connected with a 25-pair cable to the switch analog call-distribution group (ACD/EUCD/UCD) for 25 to 32 ports
- H06 (VSP MON): should only be used by system developers when high level troubleshooting is required

Lower Front Panel

The POWER switch/circuit breaker should be ON during normal power operation.

Three LEDs are located on the lower right (by the POWER switch). These should read as follows. (If the red or yellow LED is lit, see Chapter 7, *Power and Environment*.)

1. RESERVE FAULT: red LED should be off (if on, there is a battery problem)
2. ON RESERVE: yellow LED should be off (if on, the system is running on battery power)
3. AC: green LED should be ON (normal cabinet power, AC or DC). If this light is off, the cabinet is using its batteries for power.

ALARM AND ERROR LOGS (DISPLAY AND USE)

This section describes how to access the alarm and error logs and how to use them. For a list of alarm log and error log entries, see Appendix B.

Alarm Log

AUDIX software keeps two alarm logs on disk in the sst filesystem: the active alarm log, showing current faults, and the resolved alarm log, showing retired faults. You normally use the `maintenance : active alarm : display` log to find current problems with the system. Occasionally you may use the `maintenance : resolved alarm : display` log to track down intermittent faults.

Active Alarm Log

Figure A-7, *The maintenance : active alarm : display Form*, shows a sample entry from the active alarm log. The entries are listed by severity order, not date. Solve alarms from top to bottom as directed in Chapter 3, *Start Troubleshooting*. For example, solving fault 897 (the SADI) may solve subordinate fault 197 (the DBP bus). However, it may not solve an unrelated fault (such as 82, the SCPI).

Normally you do *not* use the `maintenance : active alarm : specification` form before displaying the active alarm log (you usually want all faults to display). The LEVEL column shows the alarm's severity; 0 level errors are reported to the remote maintenance site. Look up the UNIT number in Table 3-1 in Chapter 3, *Start Troubleshooting*. When you turn to the listed section, look up the *triplet* (fault, unit, and device) numbers in the table to find the correct resolution procedure.

Resolved Alarm Log

The resolved alarm log is used less frequently than the active alarm log, usually only to track down intermittent faults (those that recur and resolve themselves). Because the resolved alarm log shows retired faults in historical order (oldest first), and the log may contain hundreds of entries, you normally use the `maintenance : resolved alarm : specification` form before displaying the resolved alarm log. Select entries based on date, time, unit code, level, or fault code.

The entries in the log are interpreted the same as those in the active alarm log. Look up the UNIT number in Table 3-1 in Chapter 3, *Start Troubleshooting* to find the alarmed unit.

AUDIX STATUS: alarms: none, logins: 1, thresholds: none

PATH: maintenance : active alarm : display

DATE	TIME	FAULT	LEVEL	UNIT	DEVICE
01/15/88	01:24	897	0	7	0
01/15/88	13:10	82	0	43	0
01/15/88	01:27	197	0	14	0

END OF LOG _

Error and confirmation messages appear here.

CHANGE or RUN

ADD

DELETE

HELP

FIELD HELP

CLEAR FORM

EXIT

ENTER

Figure A-7. The maintenance : active alarm : display Form

Error Log

Use the error log to find a clue to a problem when other troubleshooting techniques fail. Some errors correspond to alarms, although many use different numbers than the associated faults. Other errors log normal software activity or nonalarm conditions (such as error 907, which is logged each time the system reinitializes). Common errors which indicate solvable problems are listed in Table 3-2 in Chapter 3, *Start Troubleshooting*.

Error Log Description

Errors are logged with the date and time that the error occurred, the number of times the error occurred that minute (count), an associated error code (to identify it), the class of severity, the session/unit, software module, and device numbers (see Figure A-8, *The maintenance : error : display Form*). The last three columns usually refer to software elements. If the error can be traced to an extension number (such as a subscriber call), that number appears in the **DEVICE** column. For 5-digit dialing, the first digit of the extension is in the **MODULE** column.

Errors are divided into classes of 0 to 2, where 0 is the most severe and usually triggers an alarm. Generally:

- CLASS = 0 is a switch-related or system-wide problem
- CLASS = 1 is a unit-related problem
- CLASS = 2 is a software session code

Error reports are buffered through FP-RAM and then stored in the error log on disk. The log is actually a file in the sst filesystem. You can increase the size of the log if needed using the `system : limits` form (for example, to track intermittent errors). Normally the default 10,000 entries is enough. The FP-RAM buffer can hold up to 1,000 error reports; these can be used for diagnosis in case the sst filesystem is lost or corrupted. If a disk is not accessible, the most current errors are saved and the oldest are erased.

Interpreting Error Log Data

Figure A-8 shows a sample end of the error log. Errors appear in historical order, with the oldest listed first. Unless you use the `maintenance : error : specification` form first, all errors will be listed (starting with any 1984 errors). Since the log usually contains up to 10,000 entries, you may choose to filter out older errors by using the *starting date* field on the specification form. Every system reinitialization resets the *starting date* to the default of 010184 (January 1, 1984).

NOTE

Starting in R1V5, the error log has been expanded to include a line of descriptive information in addition to the regular error code display. On the `maintenance : error : specification` form, set the *expanded display mode* field to **y** to display this extra information.

The following examples show how to use the error log.

1. The first error shown in Figure A-8, number 894, is probably a hardware error (CLASS=1). Looking up this error in Table B-1 shows that this error can activate Fault 1036 to 1067. The particular fault in this case depends on the device code. Here the device is 8 and points to Fault 1043.

Looking up Unit 36 in Table 3-1 shows the recommended resolution procedure to be in Chapter 4 (the TN501B VPC). For hardware faults, ignore MODULE (this is simply the module that reported the error).

2. The next two entries show software errors (CLASS=2). Table B-1 shows that error code 194 does not map to any fault code. Check Table 3-2. Error 194 maps to a subscriber problem (the system administrator needs to voice-in a name). The extension number for this subscriber is shown under DEVICE. (For 5-digit dialing, the first digit of this extension would be under MODULE.)
3. The final entry shows a normal software time-out error (308). This error code does not map to any fault. The session number indicates what was taking place when the listed module reported the error. The device field shows the decimal equivalent of the software opcode and its associated module. Table 3-2 shows that no action is normally required for this error.

AUDIX STATUS: alarms: none, logins: 1, thresholds: none

PATH: maintenance : error : display

DATE	TIME	COUNT	ERROR	CLASS	SESSION/UNIT	MODULE	DEVICE
01/09/88	01:16	1	894	1	36	28	8
01/09/88	01:25	1	194	2	52	0	3410
01/09/88	01:25	1	194	2	52	0	3413
01/09/88	01:42	1	308	2	14	22	5666

END OF LOG _

Error and confirmation messages appear here.

CHANGE or RUN	ADD	DELETE	HELP	FIELD HELP	CLEAR FORM	EXIT	ENTER

Figure A-8. The maintenance : error : display Form

VPT (VOICE PORT) TEST CALLS

Test each voice port found in the system : translation : voice port form.

- Step 1: On the maintenance : system : test call form, enter a port number and set *type* to **c**. Press **CHANGE**. The port's extension will be displayed.
- Step 2: At a voice terminal, dial the extension number associated with the port. Wait for ringing.
- Step 3: On the maintenance : system : test call form, press **CHANGE** to connect the call.
- Step 4: At the voice terminal, verify that AUDIX plays back the login prompt.
- Step 5: At the AUDIX, record the location of the yellow LEDs that light on the VPT, VPC, VB, and TDBI circuit packs.
- Step 6: On the maintenance : system : test call form, set *type*: to **d** and press **CHANGE**. Go on-hook at the voice terminal.
- Step 7: Repeat steps 1 through 5 for the other ports. On the maintenance : system : test call form, specify a different VPC and VB-TDBI channel for each call.

B. Error And Alarm Tables

This appendix contains the S-Bus processor Failure Status Word (FSW) bit relationship to the error log, error code descriptions, a description of the administration log, a description of the software modules (or managers), and a description of the software sessions.

S-BUS PROCESSOR FSW

Table B-1 shows the error triplet that is logged when a bit is set in one of the S-bus processor FSWs. These words appear in binary on the `maintenance : system : hardware status` form and in hexadecimal under Control Mode Menu option 1. Generally, technicians use the FSW only to determine which circuit pack to replace (all bits on the circuit pack are not “0”).

Table B-1. S-Bus Processor FSW Bit Relationship to the Error Log

S-Bus Processor		Error Log Triplet			Failure Status Word (FSW)
Circuit Pack	Bit	Error	Unit	Device	Bit Description
UN160B DBPI	0	221	12	0	CPU failure
UN160B DBPI	1	858	12	0	Local DBPI RAM failure
UN160B DBPI	2	172	12	0	Local DBPI EPROM failure
UN160B DBPI	3	858	5	0	VSFI dual port RAM failure
UN160B DBPI	4	720	12	0	S-bus processor interface failure
UN160B DBPI	5	722	12	0	FP memory access failure
UN160B DBPI	6	723	12	0	VSP memory access failure
UN160B DBPI	7	905	12	1	VB memory access failure
UN160B DBPI	9	175	14	0	DBP/VME-bus interface failure
UN160B DBPI	10	220	12	0	Mailbox failure
UN160B DBPI	11	904	12	0	Firmware audit failure
TN533 SCPI	0	871	30	0	Assigned data link interface failure
TN533 SCPI	1	-	-	-	Unassigned data link interface failure
TN533 SCPI	2	871	43	2	CPU failure
TN533 SCPI	3	871	43	3	Local SCPI RAM failure

(Continued)

TABLE B-1. S-Bus Processor FSW Bit Relationship to the Error Log (*Continued*)

S-Bus Processor		Error Log Triplet			Failure Status Word (FSW)
Circuit Pack	Bit	Error	Unit	Device	Bit Description
TN533 SCPI	4	871	43	4	Local SCPI EPROM failure
TN533 SCPI	5	871	43	5	S-bus access failure
TN533 SCPI	6	871	43	6	Mailbox failure
TN533 SCPI	7	871	40	7	SAI failure
TN533 SCPI	8	871	43	8	Firmware audit failure
TN533 SCPI	9	871	40	9	DPR failure
TN533 SCPI	11	871	43	11	FP memory access failure
TN533 SCPI	12	871	43	12	VSP memory access failure
TN533 SCPI	13	871	43	13	Write buffer checksum error
TN520 VB	0	631	61	1	8086 CPU failure
TN520 VB	1	634	61	1	Local VB RAM memory failure
TN520 VB	2	635	61	1	Local VB EPROM memory failure
TN520 VB	3	720	61	1	S-bus interface failure
TN520 VB	4	636	61	1	Mailbox failure
TN520 VB	5	715	61	1	TDBI/VPC failure
TN520 VB	6	714	61	1	Firmware audit failure
TN520 VB	7	642	61	1	TDBI DPR failure
TN520 VB	8	719	61	1	Timeout waiting for DBP response
TN520 VB	9	721	61	1	DBPI failure
TN520 VB	10	714	61	1	IVT audit failure
TN520 VB	11	722	61	1	FP memory access failure
TN520 VB	12	723	61	1	VSP memory access failure
TN523 FP	0	836	33	0	CPU error
TN523 FP	1	837	33	0	Single-bit memory error
TN523 FP	2	838	33	0	Multi-bit memory error
TN523 FP	3	723	33	0	M-bus interface error
TN523 FP	4	840	33	0	S-bus interface error
TN523 FP	5	841	33	0	ROM checksum errors
TN523 FP	6	842	33	0	RAM checksum errors
TN523 FP	7	843	33	0	IVT audit errors
TN523 FP	8	837	33	1	Memory board 1 single-bit error
TN523 FP	9	837	33	2	Memory board 2 single-bit error
TN523 FP	10	837	33	3	Memory board 3 single-bit error
TN523 FP	11	837	33	4	Memory board 4 single-bit error
TN523 FP	12	837	33	5	Memory board 5 single-bit error
TN523 FP	13	837	33	6	Memory board 6 single-bit error
TN523 FP	14	906	5	33	VSFI memory access test error

Bits which are not listed for a status word are not used.

ERROR CODE DESCRIPTIONS

If the system is reporting an alarm, check the alarm log (maintenance : active alarm : display) for the unit, device, and error code triplet. Look the error code up in Table B-2, *Error Code Descriptions*, which provides a description of the error. Then go to Table 3-1, *Alarm Resolution Procedures*, with the unit code to find the section of the manual that provides the resolution procedures.

If the customer is reporting problems but no alarms are active, check the error log (maintenance : error : display form) and Table 3-2, *Common Error Codes*, for possible causes of the problems. If the error does not appear in Table 3-2, use the error descriptions in Table B-2. Many errors can be traced to a fault and unit code. If shown, use the unit code and Table 3-1 to find the section of the manual that provides the resolution procedures. Errors without fault and unit codes will not cause alarms.

Table B-2. Error Code Descriptions (*Part 1 of 19*)

Err	Mnemonic	Description	Fault	Unit
2	LVMLISTERR	Error in VM allocator list	1401	49
3	LVMSTATERR	Error in VM task status table		
4	LVMCONFIGERR	Error in VM hardware configuration		
5	LVMRESERR	VM resource not deallocated by user		
6	LCCMLISTERR	Error in CCM event list		
7	LCCMSTATERR	Error in CCM task status table		
10	LINITLVL	Not all processes were created/connected	68 36-67	32
11	LCORVIP	Channel-port translation is corrupt		
12	LCORSD	Port-UCD extension translation is corrupt		
13	LCORSDM	System profile is corrupt		
14	LCORSM	Subscriber file is corrupt		
15	LCORMBOX	Mailbox is corrupt		
16	LCORMM	Message header file is corrupt		
17	LCORDM	Delivery list is corrupt		
18	LCORWB	Wastebasket is corrupt		
19	LCORAM	Announcement set is corrupt		
20	LCORNETP	Network machine profile is corrupt		
21	LCORMATX			
23	LCORDB1	DBP hardware configuration is corrupt		
24	LCORAMW	Message-waiting lamp status is corrupt		
25	LINC1	Subscriber file inconsistent with distribution list		
26	LINC2	Subscriber file inconsistent with sys profile		
27	LINC3	Mailbox inconsistent with subscriber file		
28	LINC4	Delivery list inconsistent with message header file		
29	LINC5	Mailbox inconsistent with message header file		
30	LINC6	Message header file inconsistent with subscriber file		
31	LINC7	Message header file inconsistent with distribution list		
32	LINC8	No voice body associated with message header		
33	LINC9	Missing data in delivery list		
34	LINC10	Number of new messages in Directory inconsistent with mbox		
35	LINC11	Unneeded voice bodies exist		
36	LINC12	Unneeded distribution list exist		
37	LINC13	Delivery list inconsistent with mailbox file		
38	LSID	Used up subscriber ID		
41	LDBPA1	Locking audit		
42	LDBPA2	DBP error: invalid error code or access failure		
43	LDBPA3	Internal error		

(Continued)

TABLE B-2. Error Code Descriptions (*Part 2 of 19*)

Error	Mnemonic	Description	Fault	Unit
44	LDBPA4	Bad slave filesystem		
45	LDBPA5	Mailbox audit		
46	LDBPA6	Audit fail on init		
47	LDBPA7	Stsdev fail on init		
48	LDBPA8	Open config fail on init		
49	LDBPA9	Bad slave config		
50	LDBPA10	Bad master filesystem		
51	LDBPA11	Record read fail on init		
52	LDBPA12	Volume not found on init		
53	LDBPA13	Ckfs fail primitives on init		
54	LDBPA14	Error in DBP/ckfs non-SUCCESS return code		
55	LDBPA15	Mount failed on init		
56	LDBPA16	Mirrorfs failed on init		
57	LDBPA17	Could not mount permanent filesystem because of errors, ckfs, no volume, etc.		
58	LDBPA18	Bad master		
59	LDBPA19	Bad slave		
60	LDBPA20	Check fs found error in master		
61	LDBPA21	Check fs found error in slave		
62	LDBPA22	Warning internal error trying to remove filesystem with outstanding find_space		
63	LDBPA23	Exceeded the number of filesystems defined		
64	LDBPA24	Duplicate labels on equipped disks		
65	LDBPA25	DBPA audit resync'd int. free space with DBP		
66	LDBPA26	Unused		
67	LDBPA27	Unused		
68	LDBPA28	Unused		
69	LDBPA29	Error reported in DBP/ckfs: error type		
70	LDBPA30	Error reported in DBP/ckfs: action taken		
71	LCORDB2	DBP logical resources are corrupt		
72	LBADTX	Bad message transmission		
73	LNOSPC	No more data space		
75	LCORTRAF	Traffic collection is corrupt		
76	LCORTIME	Timer services are corrupt		
77	LFAIDBP	DBP I/O failure		
78	LINTLOG	Internal logic check failure		
85	LFATAL	Initialization failed	392-407	143
86	LSEMIFATAL	Semifatal initialization	601,602	143

(Continued)

TABLE B-2. Error Code Descriptions (*Part 3 of 19*)

Error	Mnemonic	Description	Fault	Unit
105	LNFD	DBP file descriptor is invalid		
106	LNFILE	DBP file name is invalid		
111	LVBPAR	Invalid parameter to VB		
115	LVSCPAR	VSC called with a bad parameter		
119	LCCMEVENT	CCM event number overflow		
120	LPSWSM	Conflict with system guest password		
121	LNVPC	No VPCs exist for new call		
122	LNVB	No VB channels exist for new call		
123	LNTS	No time slots exist for new call		
124	LNVHFILE	Voice hardware configuration file missing		
125	LCORSIIOP	Corrupt SI (NC) driver		
126	LCORCCM	Corrupt CCM extent list or status table		
127	LCORVM	Voice resources are corrupt		
128	LCORVSH	Voice hardware status is corrupt		
129	LOPERR	Oryx/Pecos error		
130	LCORSCH	Scheduler has no valid time (/sd missing?)		
133	LTDMMSG	Corrupt uplink received		
134	LNUNIT	Invalid circuit pack type		
135	LVOPEN	Error during vopen		
136	LVCLOSE	Error during vclose		
137	LVSEEK	Error during vseek		
138	LMKANN	Error during mkann		
139	LATRUNC	Error during atrunc		
142	LSIKADM	ADM manager is insane		
144	LSIKAUD	AUD manager is insane		
146	LSIKDM	DM manager is insane		
147	LSIKER	ER manager is insane		
148	LSIKDBPA	DBPA manager is insane		
149	LSIKDIAG	DIAG manager is insane		
150	LSIKFC	FC manager is insane		
151	LSIKFPI	FPI manager is insane		
152	LSIKMBOX	MBOX manager is insane		
153	LSIKMM	MM manager is insane		
154	LSIKMTCE	MTCE manager is insane		

(Continued)

TABLE B-2. Error Code Descriptions (*Part 4 of 19*)

Error	Mnemonic	Description	Fault	Unit
155	LSIKSD	SD manager is insane		
156	LSIKSDM	SDM manager is insane		
157	LSIKSM	SM manager is insane		
159	LSIKVIP	VIP manager is insane		
160	LSIKNET	NET manager is insane		
162	LSIKVSPI	VSPI manager is insane		
163	LSIKWM	WM manager is insane		
164	LSIKDBP	DBPA manager is insane		
165	LSIKCCM	CCM manager is insane		
166	LSIKAM	AM manager is insane		
167	LSIKVSC	VSC manager is insane		
168	LSIKVM	VM manager is insane		
169	LSIKTM	TM manager is insane		
170	LVSFI_DPR	VSFI DPRAM failure		
171	LDI_RAM	DBPI RAM failure		
172	LDI_EPROM	DBPI EPROM failure	11,202	12
173	LVME_PWR	DBP/VME-bus power failure		
174	LDBPI_CPU	DBPI CPU failure		
175	LVME_INTRF	DBP/VME-bus interface failure	159 197	13 14
176	LDBP_ACC	DBP memory access failure	17 197	11 14
177	LDBI_MBOX	DBPI mailbox failure		
178	LDBP_CPU	DBP CPU failure		
181	L_DISK	Disk failure	99	11
182	L_RAM	DBP RAM failure	3,98	11
183	L_ROM	DBP ROM failure	4,100,183	11
184	L_OBRAM	DBP on-board RAM failure	1,5,184	11
185	L_SCPU	DBP slave CPU failure	79,185	11
190	LNOWBF	No waste basket file		
191	LCORFR	Fragment data corrupt		
192	LCORAN	Announcement data corrupt		
193	LCORSU	Subscriber data corrupt		
194	LINCSU	Subscriber with no name fragment		
195	LCORFI	File information corrupt		
197	LCORSWCLR	Switch real-time clock is down		
198	LCORVCLR	VMS real-time clock was off		

(Continued)

TABLE B-2. Error Code Descriptions (*Part 5 of 19*)

Error	Mnemonic	Description	Fault	Unit
199	LCLKOFF	AUDIX, switch clock off by more than 15 min.	250	32
200	LCLKSYNC	AUDIX, switch clock now within 15 min.	251	32
201	LCLKFAIL	System clock needs to be reset or replaced	603,604	120
206	LBUSTO	Bus time-out	8,97	11
207	LMMUER	Memory management error	1,5,207	11
208	LVRPAR	Parity error	4 3,208	2 11
209	LUEE	DBP CPU failure	1,5,209	11
210	LADDEX	DBP CPU failure	1,5,210	11
211	LIHIX	DBP CPU failure	1,5	11
212	LZDIV	Divide by zero	1,5	11
213	LMISC	Miscellaneous error	1,5	11
214	LDISK	Disk error		
215	LOBRAM	On-board RAM failure		
216	LSCPU	Slave CPU failure		
217	LCTL	Controller failure	419 7	6 11
218	LMEM_ACC	Memory access failure		
219	LBOOT	Maintenance boots DBP	6	11
220	LSMBOX	S-bus mailbox error	12,204	12
221	LCPU	CPU error	13,203	12
222	LBI	Bus interface error		
224	L_DOVFL	Device overflow		
225 -	LDSEC00 -	Bad sector/block number device 0 through device 15.		
240	LDSEC15	See note below to determine suspected track number.		

(Continued)

NOTE

Error codes 225 through 240 use the unit and device fields to identify the track where the error was found (these errors always follow other errors logged by the DBPA which indicate the type of error).

If UNIT = 0, DEVICE identifies in decimal format the track number.

If UNIT $\neq$ 0, convert both UNIT and DEVICE to hexadecimal (e.g., UNIT 123, DEVICE 47 equals 7B 2F). Add leading zeros to DEVICE to form a four character hexadecimal number (i.e., 7B 002F). Concatenate the two numbers (i.e., 7B002F). Convert this number to decimal to yield the bad track (i.e., 8060975).

TABLE B-2. Error Code Descriptions (*Part 6 of 19*)

Error	Mnemonic	Description	Fault	Unit
306	LINVAL	Invalid parameter (faulted circuit pack unequipped)		
308	LTMOUT	Time-out		
309	LCORALRM	Alarm data corrupt		
310	LCONFIG	Invalid data link configuration	344,345	30
311	LMPSI	MPSI is corrupt	346	30
312	LCORSCA	SCA is corrupt	350	30
313	LSMSI	SMSI link difficulties	348	30
314	LSCA	SCA (BRI/API link) difficulties (device 41 = SCA reset failed) (device 46 = SCA lost AUDIX message) (device 52 = SCA timeout, reestablish request confirmed) (device 53 = No ISDN heartbeat) (device 57 = ISDN connection confirmed)	348,352-354	30
315	LMWIBLK	Message waiting updates blocked by host (device = 0, blocked. device = 1, unblocked)		
318	LBADMP	Bad maintenance procedure		
325	LCNTRL SW	VMS-SW port control is in error		
326	LISSD	Invalid enhanced services message from SD		
327	LISSW	Invalid enhanced services message from SW		
328	LSLOWLINK	Slow data link or slow switch		
329	LDBPAMK	Make a hardware unit known to the system		
330	LDBPAINT	Run internal DBP voice/volume audits		
331	LDBPASHTDN	Shut the DBP down		
332	LDBPAPERM	Permanent filesystem audit		
333	LDBPACFG	Configuration file audit		
334	LDBPASTRT	DBPA startup		
335	LDBPALCK	Lock audits		
336	LDBPADBERR	Get DBP errors		
337	LDBPACLSE	Close the configuration file		
338	LDBPAFS	Create VMS filesystems		
339	LDBPAFLCR	Create VMS filesystems		
340	LDBPARMCFL	Remove the configuration file		
341	LSIKMTA1	MTA1 manager insane		
342	LSIKMTA2	MTA2 manager insane		
343	LSIKMTP1	MTP1 manager insane		
344	LSIKVMTP	VMTP manager insane		
345	LETIME	Nonfatal timer manager error		
346	LTDXLATERR	Angel port translation audit error		
347	LINBOX	Incoming mailbox error		
348	LOUTBOX	Outgoing mailbox error		

(Continued)

TABLE B-2. Error Code Descriptions (*Part 7 of 19*)

Err	Mnemonic	Description	Fault	Unit
349	L_MIRFAIL	Mirroring (redundancy) errors: Filesystem mirroring has failed	Table 10-1	
350	L_MIRCLR	Clear the FDMIRFn alarm	Table 10-1	
351	LDRETRY	I/O command succeeded with retries		
352	LDSEEK	Seek failed (all retries failed)	290-297	9
353	LDREAD	Read failed (all retries failed)	298-305	9
354	LDWRITE	Write failed (all retries failed)	306-313	9
355	LDCMP	Bkgnd write/read ok but returned bad data	314-321	9
356	LDTOUT	Controller didn't respond before timeout	322-323	9
357	LDBADDISK	Disk defect map couldn't be read at equip	324-331	9
358	LDCTRL	Error detected in disk controller test	332-333	6
359	LDDRV	Communication error between disk controller and DBP disk driver	334-335	6
360	LDCUS	Unsolicited status from controller		
361	LDALLOC	A filesystem has run out of space	336-343	9
362	LDINFO	Disk controller return code information		
631	LVBCPU	Hardware errors: VB CPU failure	1260-1261	61
634	LVBRAM	VB RAM memory error	1262-1263	61
635	LVBEPROM	VB EPROM memory error	1264-1265	61
636	LVBMINV	VB invalid mailbox	1266-1267	61
642	LVBTDBIDPR	TDBI DPR failure	1272-1273	61
643	LVPTIN	VPT port in-line error		
644	LVPTTRUNK	VPT trunk in-line error		
645	LVPTNOREL	VPT in-line error, no external release		
646	LVPTGD	VPT in-line error, ground detect stuck		
647	LVPTDIGT	VPT trunk diagnostic test failure	140-171	35
648	LVPTDIGP	VPT port diagnostic test failure	172-203	35
649	LVPTDTONE	VPT dial tone seizure test	204-235	35
650	LVPTHYBRID	VPT hybrid circuit test	236-267	35
651	LVPTXTALK	VPT NPE crosstalk	268-299	35
652	LGPPBSCAN	DLC (GPP) port in-line, bad scan		
653	LGPPXMIT	DLC (GPP) port in-line, xmit stuck		
654	LPIMAUDIT	PDM (PIM) audit failure		
655	LGPPLINK	DLC (GPP) link reset		
656	LGPPLP	DLC (GPP) local loop-around test		
657	LGPPXTALK	DLC (GPP) crosstalk test		
658	LVPTANSF	VPT no loop current detected after off-hook	1402-1433	35
659	LVPTTONE	VPT touch tone test (flash transfer) failed	1498-1529	35

(Continued)

TABLE B-2. Error Code Descriptions (*Part 8 of 19*)

Error	Mnemonic	Description	Fault	Unit
666	LVPCXTALK	VPC crosstalk	524-555	36
667	LVPCDTMF	VPC DTMF digit detection test		
668	LVPCTONE	VPC tone level test	588-619	36
669	LVPCCNT	VPC data count	620-651	36
670	LTCDSP	TC DSP sanity		
671	LTC DPR	TC DPR failure		
672	LTCXLN	TC bad port translation		
673	LTCDTMF	TC DTMF digit test	1071	38
674	LTCCNT	TC data count	1072	38
675	LTCTONE	TC tone level test	1073	38
676	LTCXTALK	TC crosstalk test	1074	38
677	LSIRESET	SI (NC) archangel reset test	1	120
678	LSICCHAN	SI (NC) control channel	2	120
679	LSIDPR	SI (NC) DPR failure	3	120
680	LSIMEM	SI (NC) 8051 memory		
681	LSIBCLK	SI (NC) bus clock failure		
682	LSIINSAN	SI (NC) archangel sanity		
683	LSIINLIN	SI (NC) in-line error		
684	LSIDTLCLK	SI (NC) DTL clock		
685	LDBPRVRY	DBP entering recover mode	216	11
686	LDBPNORM	DBP returning to normal mode	217	11
700	LREAD	Errors from VB return codes: Data link read operation failure		
701	LADDR	Invalid VB memory address is specified		
702	LCMLGTH	Invalid command length		
703	LCNTRNO	Counter out of range		
704	LDBPPR	DBP error during play or record		
705	LLMSLT	Length of message slot out of range		
706	LNCH	Invalid channel	1254-1255 1332	41 11
707	LNMSLT	Number of message slots out of range		
708	LNUMBYTE	DBP and VPC byte counts differ		
709	LOPCODE	Invalid command opcode		
710	LVPCPR	VPC or TDBI error during play or record	1333-1364	36
711	LSZMBX	Total size of mailbox is out of range		
712	LVBHALT	Voice activity halted by voice buffer		
713	LWRITE	Data link write operation failure		

(Continued)

TABLE B-2. Error Code Descriptions (*Part 9 of 19*)

Error	Mnemonic	Description	Fault	Unit
714	LVBFWADT	Errors from VB (FD counters on VSP): VB firmware audit failure	1270-1271	61
715	LTDERR	TDBI/VPC error detected by VB	1268-1269	61
716	LVBSHTDWN	VB has shutdown	1274-1275	61
717	LVBINIT	VB initialization failed	1256-1257 1258-1259	57 61
718	LRESET	VB/TDBI reset requested	1276-1277	57,61
719	LVBBDP	Errors from VB (FD counters on FP): DBP timed out to a VB		
720	LSBUSI	S-bus interface failure	134,164,165 144 145,149,171 172,177,178 161,191 184 189	12 43 61 61 43 34 33
721	LDBPI	DBPI failure detected by VB	148 170,175,181	61 12
722	LFPM	FP memory access failure detected by VB	135 143 146,150 161 166,173,179 185,193	12 34 61 43 33 33
723	LVSPM	VSP memory access failure detected by VB	136 147,151 167,174,188	12 61 34
724	LTDBITO	Errors from TDBI: S-bus processor status request time-out or TDBI time-out during maintenance	139,170,192 153,154,182 186,187	12 61 61
725	LCORUL	Errors from CCM: Corrupt uplink from TD-bus angel		
726	LCORTUL	Corrupt transparent uplink from TD-bus angel		

(Continued)

TABLE B-2. Error Code Descriptions (*Part 10 of 19*)

Error	Mnemonic	Description	Fault	Unit
728 729	LBATREV LNMSG	Errors from CCM: VPT: Battery reversal switch to port Message corruption error from TD-bus angel		
730	LHWPLINC	CCM TD-bus uplink message: firmware insane “firmware Program Logic inconsistent”	1202 1203-1206, and 1538 1207-1222 1223-1224 1225 1226 1227	140 55 56 57 58 59 60
731	LTCERR	Generic TC circuit pack error	1070	38
732	LSPROM	Slave processor ROM failure	460-491 684-687	36 37
733	LSPRAM	Slave processor RAM failure	460-491 696-699	36 37
734	LSPINSANE	Slave processor insane	460-491 688-691	36 37
735 736 737	LSPMODE LLSCAN LSPRESET	Slave processor mode audit error Late angel scan VPC slave processor reset	460-491 492-523	36 36
738	LPC	Protocol chip test error	556-587 748-779	36 37
739 740 741 742 743 744 745 746 747 748 749 750 751	LCAB LENCODER LDECODER LTTD LAGC LDSP1ROM LDSP2ROM LDSP3ROM LDSP1RAM LDSP2RAM LDSP3RAM LANGELPLI LANGELCMD	VPC CAB chip test error VPC encoder test error VPC decoder test error VPC touch-tone detector test error VPC AGC test error VPC DSP #1 ROM test error VPC DSP #2 ROM test error VPC DSP #3 ROM test error VPC DSP #1 RAM test error VPC DSP #2 RAM test error VPC DSP #3 RAM test error Angel program logic error Angel command error	652-683 876-907 908-939 940-971 332-363 332-363 332-363 332-363 332-363 332-363 332-363	36 36 36 36 36 36 36 36 36 36 36

(Continued)

TABLE B-2. Error Code Descriptions (*Part 11 of 19*)

Error	Mnemonic	Description	Alarm	Unit
752	LANGELLINK	Angel serial link error	428-459 1533-1534	36 37
753	LSPPLI	Slave processor program logic error		
754	LSPLINK	Slave processor serial link error	460-491 704-707	36 37
755	LSPHDLC	Slave processor HDLC/PC link error	780-811	37
756	LCAB_DSP	VPC CAB/DSP error	396-427	36
757	LLVBSCAN	Late voice buffer scan	692-695	37
758	LVB_DPR	TDBI VB/DPR error	700-703	37
759	LVPCLNK	VPC HDLC/PC init error	364-395	36
760	LRNGDENIAL	DLC (GPP): ring denial		
761	LLNKRES	TN762B circuit pack - link reset		
762	LLNKRESFAIL	TN762B circuit pack - link reset failed		
763	LEPFONNL	DLC (GPP): electronic power feed on no load		
764	LDLBUFOV	DLC (GPP): downlink buffer overflow		
765	LXMITSTUCK	DLC (GPP): transmit stuck		
766	LRNGVOLT	DLC (GPP): ringing voltage absent		
767	LZEROCUR	DLC (GPP): zero current absent		
768	LSWHKERR	DLC (GPP): switch-hook error		
769	LRNGTRIP	DLC (GPP): ring trip voltage absent		
770	LNSTATION	DLC (GPP): station set absent		
771	LRNGON	DLC (GPP): ringing function on		
772	LRNGOFF	DLC (GPP): ringing function off		
773	LMWAITON	DLC (GPP): message-waiting function on		
774	LMWAITOFF	DLC (GPP): message-waiting function off		
775	LMFATSCAN	DLC (GPP): bad MFT scan alarm		
776	LTSTPASS	TN762B circuit pack - test pass message		
777	LTSTFAIL	TN762B circuit pack - test fail message		
778	LGNDNR	VPT detected ground without ringing		
779	LSPRNG	Single polarity ring current	12-43	35
780	LRNGNGND	Ringing without ground	44-75	35
781	LGNDDET	Ground detect stuck active	108-139	35
782	LCOREL	Belated PBX release	1278-1309	35
783	LTIP	No tip ground on outgoing call		
784	LSIIOP1	NC DPR pointers out of range	10	120
785	LSIIOP2	NC ACK pointer corrupted	10	120
786	LSIIOP3	NC invalid ACK received	7	120

(Continued)

TABLE B-2. Error Code Descriptions (*Part 12 of 19*)

Error	Mnemonic	Description	Fault	Unit
787	LSIIOP4	NC message lost	10	120
788	LSIIOP5	NC downlink “in” pointer corrupt	10	120
789	LSIIOP6	NC downlink “out” pointer corrupt	10	120
790	LSIIOP7	NC archangel problem	7	120
791	LSIIOP8	NC uplink directory “in” pointer corrupt	7	120
792	LSIIOP9	NC uplink directory “out” pointer corrupt	10	120
793	LSIIOP10	NC uplink buffer out pointer corrupt	10	120
794	LSIIOP11	NC uplink from angel has bad checksum	11	120
795	LSIIOP12	NC uplink from angel has bad message length	11	120
796	LSIIOP13	Corrupt SIIOP	10	120
797	LSIIOP14	NC message but ACKed, no space for transmission	9	120
798	LSIIOP15	NC downlink message retransmission to TD-bus angel		
799	LSIIOP16	Not used		
801	LSIIOP17	Not used		
802	LSIIOP18	Corrupt SIIOP	10	120
803	LSIIOP19	NC out of sequence numbers		
804	LSIIOP20	NC linked list corruption	10	120
805	LSIIOP21	NC uplink with invalid angel address	11	120
806	LSIIOP22	NC	7	120
807	LSIIOP23	NC in overload	7	120
808	LSIIOP24	NC downlink directory full		
809	LSIIOP25	NC downlink buffer full	10	120
810	LSIIOP26	NC no SIIOP buffer space		
811	LSIIOP27	NC downlink directory “in” pointer corrupt		
812	LSIIOP28	NC downlink directory “out” pointer corrupt		
813	LSIIOP29	NC dead		
814	LSIIOP30	NC received too many uplinks from TD-bus angel		
821	LHWT0	Hardware time-out	300-331 716-747 1365-1396 1397 1398	36 37 35 38 140
822	LVBERR	VB error	137-138	12
823	LDBPERR	DBP error	9	
824	LVPCERR	VPC error		
825	LVPTERR	VPT error		

(Continued)

TABLE B-2. Error Code Descriptions (*Part 13 of 19*)

Error	Mnemonic	Description	Fault	Unit
826	LTDBIERR	TDBI error		
827	LNLPCUR	No loop current detected after off-hook		
828	LLPCUR	Loop current detected after on-hook		
835	LSIERR	SI (NC) error	4	120
836	LPECPU	PE CPU errors	80	33
			81	34
837	LPESBMEM	Single-bit memory errors		
838	LPSEMBMEM	Multi-bit memory errors	80	33
			81	34
839	LPSEMBUS	M-bus errors	80	33
			81	34
840	LPESBUS	S-bus errors	80,140,189	33
			81,142,183-184	34
			161	43
			165	12
			172,178	61
841	LPEROM	PE ROM checksum errors	80	33
			81	34
842	LPERAM	PE RAM checksum errors	80	33
			81	34
843	LPEIVT	IVT audit errors		
846	LFILELEN	File length and VM file length differ		
848	LHWINSANE	Hardware has gone insane	7	120
			1068	38
			1124	140
			1535	55
849	LHWNINSANE	Hardware has become sane	6	120
			1069	38
850	LUEXPTUL	CCM received response uplink when it wasn't looking for a response or unexpected transparent uplink received		
851	LUEXPUL	Unexpected uplink received		
852	LSIOVLD	SI (NC) entered overload mode		
853	LSINOVLD	SI (NC) left overload mode		
855	LTDCLKERR	TD-bus clock failed	5	120

(Continued)

TABLE B-2. Error Code Descriptions (*Part 14 of 19*)

Error	Mnemonic	Description	Fault	Unit
856	LTDCLKRST	TD-bus clock restored	5	120
857	LROMERR	ROM error	1176 1177-1180,1537 1181-1196 1197-1198 1199	140 55 56 57 58
858	LRAMERR	RAM error	10,201 15,206 1176 1177-1180,1537 1181-1196 1197-1198 1199	12 15 140 55 56 57 58
859 860	LINCDL LIAUDERR	Inconsistent downlink Board initialization audit error		
861	LNETUPDERR	Network update audit error	1228 1229-1232,1539 1233-1248 1249-1250 1251	140 55 56 57 58
862	LHOLDOVR	Battery fault or battery reserve failure (RESV_FLT) or on battery reserve – no ac power (ON_RES) (now says memory holdover failure)	78,155 156	116 117
863	LBREAKER	Circuit breaker tripped	863	46,117
864	L_LOW48	Battery holdover below 48 V dc (LOW_BAT) (now says DC power less than -48 volts)	75 76	116 46,117
865	L_NODCPW	Rectifier's DC breaker tripped or no DC disk power	70,865 73,238,865	116 117
866	LOVRTEMP	Cabinet over temperature (OPTALM)	70	116
867	L_FAN	Fan failure or cabinet differential too great (FANALM)	71 867	116 44,117
868	L_FUSE	Fuse failure (FUSALM)	77	116

(Continued)

TABLE B-2. Error Code Descriptions (*Part 15 of 19*)

Error	Mnemonic	Description	Fault	Unit
869	L_CNVR	Disk or port power failure – voltage loss (CNVDSK) (now says converter failure)	74 74	45,117 118,119
870	L_RCTFR	Rectifier failure	870	116,117
871	LCORSCP	Corrupt SCPI or MPSI (unit 30, device 48 = MPSI — no carrier)	24 25-29,31 82-84,160 162,184,188 163,189,193 165 172 178	30 43 43 34 33 12 61 61
872	LSCPLOOPBK	VIP-SCP loop-back failure	18	43
873	LADLLOOPBK	Assigned data link loop-back failure	19	40
874	LUDLLOOPBK	Unassigned data link loop-back failure	23	40
875	LGPPLOOPBK	DLC (GPP) loop-back failure	20	39
876	LPIMLOOPBK	PDM (PIM) loop-back failure	21	10
878	LCORBX25	Corrupt BX.25 channel	22	30
879	LMT_RES	Maintenance reset	14,201-204 206 33	12 12 43
880	LSIFC	SI (NC) DPR overflow		
881	LSIDRIVER	SI (NC) SHOP sick		
882	LSITDBUS	SI (NC) TD-bus failure		
883	LTDBIEXTLP	TDBI external loop-around test	812-843	37
884	LTDBIXTALK	TDBI crosstalk	844-875	37
885	LTDSAN	TD-bus sanity	1124 1125-1128, and 1535 1129-1144 1145-1146 1147	140 55 56 57 58
886	LTDCCHAN	TD-bus control channel	1150 1151-1154, and 1536 1155-1170 1171-1172 1173	140 55 56 57 58

(Continued)

TABLE B-2. Error Code Descriptions (*Part 16 of 19*)

Error	Mnemonic	Description	Fault	Unit
887	LTDANG	TD-bus angel background test		
888	LTDLOGIC	TD-bus logical inconsistency		
889	LTDXTALK	TD-bus crosstalk		
890	LTDTSLLOT	TD-bus time slot	1123	42
891	L_CHGRTE	Battery at high charge rate (CHG_RATE)	16	116
892	LVPCITS	VPC idle time slot test	972-1003	36
893	LVPCDIAL	Changed to Error Code 1051		
894	LVPCEXT	VPC HDLC external test	1036-1067	36
895	LNCOREL	No PBX release on VMS disconnect	76-107	35
896	LDREQ	DBP diagnostic request		
897	LDDIAG	DBP diagnostic result	116-117 118-125 127 102-103 104-105 106-107 108-115	1 2 5 6 7 8 9
898	LCKSUM	Checksum error		
899	LMIDPR	Bad MI dual ported RAM	86	17
900	LDBP_REQ	DBP test request		
901	LTDVIN	TD-bus common angel vintage inconsistent		
902	LDATAXFER	VIP L4 is out of data transfer	157,347 218-237 349,351	30 30 30
903	LHANDSHAKE	DLC/PDM handshake can't restart	158	30
904	LDI_FWADT	DBPI firmware audit failure		
905	LDI_VBERR	Errors added for I17: VB failure detected by DBPI	168,169 176,182	61 61
906	LPEVSFI	PE VSFI test failure		
907	LSTARTINIT	Errors that delimit initialization: Beginning of AUDIX initialization		
908	LENDINIT	End of AUDIX initialization		
909	LMEMCOR	Errors for DBP error logging: DBP memory correctable error		
910	LMEMNCOR	DBP memory noncorrectable error	408	2

(Continued)

TABLE B-2. Error Code Descriptions (*Part 17 of 19*)

Error	Mnemonic	Description	Fault	Unit
911	LMEMNRDY	DBP memory not ready error	409	2
912	LDSKSTAT	Disk device status error	410 411-418	2 9
913	LDBPSRV	DBP server hung		
1000-1035		Service codes to track subscriber activity (see Appendix G)		
1051	LVPCDIAL	VPC dial tone detection test	1004-1035	36
1501	LLPRECWM	Operating system errors: Path record low watermark	90	121
1502	LHPRECWM	Path record high watermark	87	121
1503	L0PRECWM	Path record goes below low watermark	93	33,34
1504	LLMBUFWM	Message buffer low watermark	91	121
1505	LHMBUFWM	Message buffer high watermark	88	121
1506	L0MBUFWM	Message buffer goes below low watermark	95	33,34
1507	LLSBQWM	S-bus queue low watermark	92	121
1508	LHSBQWM	S-bus queue high watermark	89	121
1509	L0SBQWM	S-bus queue goes below low watermark	94	33,34
1510	LSBPKT	S-bus packet watermark hit		
1511	LACCNMI	AC-low NMI	260	141
1512	LBEENMI	Bus error NMI		
1513	LBKYNMI	BREAK key NMI		
1514	LBTENMI	Bus time-out NMI		
1515	LHBKNMI	Hardware breakpoint NMI		
1516	LHLT NMI	Halt exception NMI		
1517	LIDENMI	Interrupt disable exception NMI		
1518	LIENMI	Illegal interrupt NMI		
1519	LMEENMI	Memory error NMI		
1520	LOBENMI	Out of bounds exception NMI		
1521	LPIONMI	Privileged I/O exception NMI		
1522	LPVENMI	Privileged exception NMI		
1523	LSDENMI	Stack/data error NMI		
1524	LSOENMI	Stack overflow NMI		
1525	LWPENMI	Write-protection exception NMI		
1526	LYZENMI	Yellow zone exception NMI		
1530	LORYX	Operating system additons done in I17: General Oryx error		
1531	LPECOS	General Pecos error		

(Continued)

TABLE B-2. Error Code Descriptions (Part 18 of 19)

Error	Mnemonic	Description	Fault	Unit
1532	LIOK	General IOK error	211 212,214 213 215	11 12 61 43
1533	LSDBACKUP	Filesystem problems: Sdat filesystem backup failed	239	94
1534	LNMBACKUP	Weekly name backup failed	1530	151
1535	LNOANNFS	No announcement filesystem	1531	91
1536	LNONMFS	ACC manager errors: No name filesystem	1532	151
1537	LACCERR	Miscellaneous error in the ACC	240 241-248	141 142
1538	LCORUPD	Remote subscriber audit		
1539	LCORNET	Corrupt net manager		
1540	LACCRES	ACC error	249	141
1541	LACCAE	ACC Address Error	253	141
1542	LACCB E	ACC Bus Exception Error	254	141
1543	LACCZERO	ACC Zero Divide Error	255	141
1544	LACCILL	ACC Illegal Instruction Error	258	141
1545	LACCCHK	ACC Check Instruction Error	256	141
1546	LACCTRAP	ACC Trap Instruction Error	258	141
1547	LACCPRIV	ACC Privileged Instruction Error	257	141
1548	LACCSINT	ACC Spurious Interrupt Error	259	141
1549	LACCUINT	ACC Unknown Interrupt Error		
1550	LACCPAR	ACC RAM parity error NMI		
1551	LACCSAN	ACC Sanity Timeout	264	141
1552	LACCDMAX	ACC DMA Transmit Error	261	141
1553	LACCDMAR	ACC DMA Receive Error	261	141
1554	LACCORN	ACC HDLC Receive Overrun Error	262	141
1555	LACCCRC	ACC HDLC Frame CRC Error	262	141
1556	LACCUSX	ACC USART Transmit Error	263	141
1557	LACCUSR	ACC USART Receive Error	263	141
1558	LACCTMRA	ACC Timer A Error	258	141
1559	LACCTMRB	ACC Timer B Error	258	141

(Continued)

TABLE B-2. Error Code Descriptions (*Part 19 of 19*)

Error	Mnemonic	Description	Fault	Unit
1560	LACCTMRC	ACC Timer C Error	258	141
1561	LACCTMRD	ACC Timer D Error	258	141
1562	LACCTSTK	ACC Task Stack Overflow	258	141
1563	LACCLRST	ACC Link Reset	265	141
1564	LACCSYSQ	ACC System Queue/Buffer Corruption	266	141
1565	LACCMBI	ACC Unknown Mailbox Interrupt	267	141
1566	LACCRAM	ACC RAM Failed Background Test	268	141
1567	LACCEPROM	ACC EPROM Failed Background Test	269	141
1568	LACCSAUD	ACC Firmware: System Queue Audit Error	270	141
1569	LACCMAUD	ACC Firmware: Mailbox Audit Error	270	141
1570	LACCHAUD	ACC Firmware: Bad Channel	271-272 420-421	141 141
1571	LACCCHOK	ACC Firmware: Channel OK		
1572	LACCLOG	ACC Error Log Overflow		
1573	LACCSPARE	ACC Spare Error Encode		
1574	LDBPTO	ACC Timed Out on DBP	273	141
1575	LNETTMP	/vd/net_tmp file is missing		
1576	LSHTDWN	MI Shutdown logged by Vip		
1577	LCORCDR	CDR data corruption	422	93
1578	LCLRCDR	CDR data corruption cleared	423	93
1579	LINVINIT	Invalid RS-232C initialization		
1580	LACCTRAF	Unanswered calls due to all ports active		
1582	LNCONF	Continuing connection failure to a remote machine	501-600	144
1583	LCORFSU	Field update software version incompatible	501-600	144
1584	LFUPDFAIL	Network remote update failed	701-800	144
1585	LDSREAD	Unable to read from alt. data seg.		
1586	LDWRITE	Unable to write from alt. data seg.		

ADMINISTRATION LOG

The administration (system) log is used to record errors which require the attention of the system administrator but do not directly affect the overall operation of the local AUDIX (for example, full mailboxes, break-in attempts to subscriber's mailboxes, or extensions without names recorded). Table B-3, *Administration Log Entries and Types*, lists the types of entries in the administration log. The path name used to display this log is `system : log : display`.

NOTE

Once this log is displayed and you exit the form, the errors are erased. So it is a good idea to have the system administrator on hand in case any errors require their attention.

The log is divided into two types of errors, those that apply to the local machine and those that apply to the network. You will probably not need to use the administration log if the system is not networked with other systems. In a network environment, this log may help to identify problems. The best indication of problems in a network are connect failures or other entries where two systems were unable to communicate due to some type of transmission error.

Table B-3. Administration Log Entries and Types

Type	Local Machine Entries
bsxt	Call answer for non-subscriber {owner's extension}
bsxt	Leave word calling for non-subscriber {owner's extension}
dxlt	UCD extension {extension} not in switch translations
lbpa	Break-in attempt into mailbox owned by {name}, {owner's extension} from {originating extension}
lcdl	Canceled Delivery: {originating extension} to {destination extension} at {machine name} created at {time and date}
lfmb	Full mailbox for {extension}
lsos	System out of space
lnnr	Name not recorded for {name} {extension}
sclk	Check AUDIX system clock
accb	No valid network modem speed found, defaulted to 9600 baud
furm	A full update has been requested by {machine name}

(Continued)

TABLE B-3. Administration Log Entries and Types (*Continued*)

Type	Network Entries
furm	Full update completed successfully to {machine name}
furm	Update discrepancies require full update to {machine name}
furm	Unable to perform requested full update to {machine name} updates temporarily disabled
furm	No permissions for requested full update to {machine name}
furm	Starting full update from {machine name}
furm	Remote update discrepancies require full update from {machine name}
furm	Full update completed successfully from {machine name}
furm	Full update denied due to permissions from {machine name}
furm	Update discrepancies require full update from {machine name}
furm	Full update aborted and transmissions temporarily disabled due to errors from {machine}
ndny	Remote subscriber update from {machine name} denied
ncol	Name changed at {extension} due to name conflict
ncfl	Connect failure to {machine name}
nrli	Machine {machine name} rejected login
nnrv	Remotely administered subscriber {name} {extension} does not have a voice name
nlrl	Rejected login for remote machine {machine name}
nrnf	Remote subscriber {name} {extension} not found on machine {machine name}
nsna	Subscriber {name} {extension} not addressable
n8ar	The 85% threshold for administered remote subscribers has been reached
nmar	The maximum number of administered remote subscribers has been reached
n8nr	The 85% threshold for non-administered remote subscribers has been reached
nmnr	The maximum number of non-administered remote subscribers has been reached
nmff	Message transmission threshold reached for machine {machine name}
nmtl	Message transmission limit reached for machine {machine name}

AUDIX SOFTWARE TABLES

AUDIX software can sometimes give a clue to a failing processor or filesystem when other troubleshooting methods fail. Generally, software errors are flagged in the error log with a “2” in the CLASS column (least severe type of error).

Software Modules

The software module that logs an error is listed in the MODULE field of the error log.

Table B-4. AUDIX Software Modules

Module	Mnemonic	Description
0	MOD_ADM	Administration
1	MOD_ALRM	Alarm Manager
2	MOD_AM	Announcement Manager
3	MOD_CCM	Control Channel Manager
4	MOD_DBPA	DBP Administrator
5	MOD_DM	Delivery Manager
6	MOD_EC	Error Collector
7	MOD_ER	Error Reporter
8	MOD_FC	Forms Control
9	MOD_FFD	FP Fault Detector
10	MOD_FMTC	FP Maintenance
11	MOD_FPI	FP System Initialization
12	MOD_FPM	FP-PE Maintenance Manager
13	MOD_FSCH	FP Maintenance Scheduler
14	MOD_MBOX	Mailbox Manager
15	MOD_MM	Message Manager
16	MOD_MMI	Maintenance Manager Interface
17	MOD_MTA1	Maintenance Activity
18	MOD_MTA2	Maintenance Activity
19	MOD_MTP1	FP Maintenance Procedure
20	MOD_SD	Service Dispatcher
21	MOD_SDM	System Data Manager
22	MOD_SM	Subscriber Manager
23	MOD_TM	Terminal Manager
24	MOD_VFD	VSP Fault Detector
25	MOD_VIP	VMS Interface Protocol Manager
26	MOD_VM	Voice Manager
27	MOD_VMTC	VSP Maintenance Manager

(Continued)

TABLE B-4. AUDIX Software Modules (*Continued*)

Module	Mnemonic	Description
28	MOD_VMTP	VSP Maintenance Procedure
29	MOD_VSC	Voice Session Controller
30	MOD_VSCH	VSP Maintenance Scheduler
31	MOD_VSPI	VSP System Initialization
32	MOD_VSPM	VSP-PE Maintenance Manager
33	MOD_NET	Networking Manager

Software Sessions

Errors that indicate a problem between software modules are usually logged with a number (1 to 52) in the SESSION/UNIT column of the error log. This number indicates the software session having the communication problem as listed below.

Table B-5. AUDIX Software Sessions

Session	Mnemonic	Description
1-32	P1_SESS	Assigned to Each Port
33	DM_SESS	Delivery Manager
34	LIB_SESS	General Library Session
35	SD_SESS	VIP / Service Dispatcher
36	ADM_SESS	Background Administration
37	FC1_SESS	Administration Terminal
38	FC2_SESS	Maintenance Terminal
39	INDS_SESS	INADS Request
40	AP_SESS	AP Request
41	FPI_SESS	FP System Initialization
42	VSPI_SESS	VSP System Initialization
43	SDM_SESS	System Data Manager
44	SM_SESS	Subscriber Manager
45	MBOX_SESS	Mailbox Manager
46	MM_SESS	Message Manager
47	TM_SESS	Terminal Manager
48	AM_SESS	Announcement Manager
49	VM_SESS	Voice Manager
50	DBPA_SESS	DBP Administrator
51	TD_SESS	TD-Bus Uplinks
52	MTCE_SESS	Maintenance

C. Equipment and References

This appendix contains circuit pack definitions, component ordering information, and references to other documents.

CIRCUIT PACKS

AHF1	TD-Bus Terminator Board
AHF3	TD-Bus Terminator Board
AHF102	DBP/VME-Bus Terminator
AHF104	Disk Interface
AHF107	S-Bus Expansion Board
AHF108	S-Bus Terminator Board
AHF109	TD-Bus Expansion Board
CDR1(B)	Alarm board
LC02	Line Circuit Board (4 ports)
LC03	Line Circuit Board (4 ports)
LC505	DCIU – Data Communications Interface Unit for DIMENSION PBX
PWJ58886U	AUDIX Backplane
SN222	Analog Line Port Board (8 ports)
SN228	Analog Line Port Board (8 ports)
SN229	Analog Line Port Board (8 ports)
SN238	EIA Port Board (4 ports)
SN270	GPP – General Purpose Port (4 ports)
TN366(B)	ACC – AUDIX Communications Controller (AUDIX networking)
TN472C	DBP-CPU
TN475(B)	SADI
TN477	TDBI-8 – Time Division Bus Interface (8 ports)
TN500	TDBI – Time Division Bus Interface (16 ports)
TN501B	VPC – Voice Processor
TN506B	BC – Bus Controller

TN507C	IPC – Intelligent Peripheral Controller (AUDIX-L)
TN508	DBP-RAM – Data Base Processor Random Access Memory (AUDIX-L)
TN509	DBP-CPU – Data Base Processor Central Processing Unit (AUDIX-L)
TN511	MI – Maintenance Interface
TN520	VB – Voice Buffer
TN521	SCP – Switch Communication Processor (AUDIX-L)
TN523	CPU – Central Processing Unit (FP or VSP)
TN531	MI – Maintenance Interface (AUDIX-L)
TN532	DBP-RAM – Data Base Processor Random Access Memory
TN533	SCPI – Switch Communication Processor Interface
TN547(B)	MPSI – Multi-Protocol Switch Interface
TN535	MON – Processor Monitor
TN539(B)	ACCE – AUDIX Communications Controller — Enhanced (AUDIX networking)
TN549	DBP-CPU – Data Base Processor Central Processing Unit
TN591	CPU – Central Processing Unit (FP or VSP)
TN714	TC – Tone and Clock
TN716(B)	BI – Bus Interface (FP or VSP)
TN719	SAI – Synchronous/Asynchronous Interface (AUDIX-L)
TN726	Data Line Board (8 ports)
TN727	NC – Network Controller (also SI – Switch Interface)
TN734	RAM – 2-Mbyte Random Access Memory (FP or VSP)
TN738	INT2 – Interface Board for System 75 SCI (4 links)
TN742	Analog Line Port Board (8 ports)
TN746B	Analog Line Port Board (16 ports)
TN747B	VPT – Voice Port Trunk (8 ports)
TN754	DLC – Digital Line Circuit (8 ports) ISDN Basic Rate Interface (BRI) Digital Line Circuit (Universal Module)
TN759	Processor Circuit Pack for System 75 XE
TN760B	Analog Trunk Board (4 ports)
TN761	RAM – 4-Mbyte Random Access Memory
TN762B	VPT – Voice Port Trunk (8 ports) used with SL-1 integration
TN765	Processor Interface (PI) (4 links plus EIA port)
TN767	Digital Service (DS1) Tie Trunk (Universal Module)

TN769	Analog Line Port Board (8 ports)
TN775	Maintenance Circuit Pack
TN777	Network Control Circuit Pack
UN156	DCIU – Data Communications Interface Unit (8 links)
UN160B	DBPI – Data Base Processor Interface
UN161B	DIM – Disk Interface Module (AUDIX-L)
UN162	VSFI – Voice Store and Forward Interface
WP91602, L1	New TD-Bus Terminator Board
ZAEH5B	Alarm Board (AUDIX-L)
ZAHF8	S-Bus Terminator Board (AUDIX-L)
ZAJU1	Disk Drive Cable Terminator Board (AUDIX-L)

COMPONENT ORDERING TABLES

The following tables list AUDIX components, circuit packs, and cables by comcode. See *AUDIX System Description* (585-305-201) for Price Element Codes (PECs) for AUDIX equipment.

Table C-1. AUDIX System Parts List (*Part 1 of 6*)

Item	Comcode	Notes
<i>Backplane Area:</i>	–	(Included in main J58886U-1 AUDIX drawing)
Backplane (List 1)	105 263 909	PWJ58886U-1, L1 board (mounts paddle boards)
Backplane (List 2)	105 442 941	PWJ58886U-1, L2 board (mounts paddle boards)
Backplane (List 3)	106 239 858	List 3 boards should be replaced with List 4
Backplane (List 4)	106 413 933	PWJ58886U-1, L4 board (mounts paddle boards)
Bus Bar	845 797 364	Assembly to supply power to backplane
Cable Clamp	901 086 173	Holds data cable for AHF104 disk interface board
Cable Ties (6)	400 891 735	Hold local LCJ58886U-1 wiring harness to connector panel
Connector Cables	–	H600-165 Group 4 and 5 cables attach alarm (D03) and RS-232C connectors (H00 and H01) to CDR1B board, respectively. Group 6 connects SCPI (F00) to backplane.
Connector Panels:		
Lower Cabinet	846 151 090	Marked panel for mounting rear connectors, fuse, ac cord
Upper Cabinet	845 953 124	Marked panel for mounting rear connectors, fuse, ac cord
Fuse Holder	405 362 617	Contains rear 5 VDC fuse (see Power section for fuse)
<i>Cabinet Equipment:</i>	–	J58886U-1 includes circuit packs, disks, internal wiring, labels, subassemblies, cabinet frame (List 1), HDD equipment (L2), cabinet feet (L3 and L4), 380-Mbyte disk drives (L5), AUDIX Networking hardware (L6), two-cabinet AUDIX base cabinet (L7), AUDIX expansion cabinet (L8), and AUDIX-S expansion cabinet hardware (L9)
Air Filter	405 302 159	Cabinet filter under circuit pack carrier

(Continued)

TABLE C-1. AUDIX System Parts List *(Part 2 of 6)*

Item	Comcode	Notes
<i>Cabinet Equipment:</i>	–	(continued)
Cabinet Feet:		Four needed per cabinet; need List 3 or 4
Short	405 289 547	J58886U-1 L4 7/8-inch foot for table or stack mount; used with 10-32 x 3/4 PH screw (comcode 840 059 885)
Tall	405 193 699	J58886U-1 L3 2-inch foot for floor mount; used with 10-32 x 1.5L PH screw (comcode 840 059 935)
Anchor Studs	–	If the welded studs that hold drives and power supply break off, knock out the PEM fasteners and replace them with a #8 screw (8-32x.5-inch)
Connector Clip	845 798 123	Used to connect upper and lower cabinets on expanded system.
Cover Plates:	–	(See also Backplane and Fan Assembly sections)
Lower Front Cover	845 799 063	Lower front cover plate over disk drives; includes quarter-turn screw fasteners
Lower Rear	845 799 097	Covers power supply and batteries
Middle Rear	845 799 105	Covers backplane
Screws	901 090 308	8-32 x 3/8 SHWH #8 screws attach rear covers
EMC Wrist Strap	900 792 888	Plugs into ESD ground point on cabinet front
Front Door	–	ED-1E521-70 front door assembly; includes latch
Grounding Plate	845 555 994	Connects back of upper and lower cabinets
Hex Nuts	802 065 185	The 8-32 size hex nuts connect disk drive brackets (2 nuts each), power supply (4 nuts), and battery housing (2 nuts) to the cabinet floor; used with #8 washers (comcode 801 831 470)
Labels:		(Rear labels part of J58886U-1)
Lower Cabinet		(Must be ordered when expansion cabinet added)
Carrier Label	845 799 170	Label strip identifying circuit packs
Shutdown Label	845 797 661	Label for software shutdown and power down
Upper Cabinet		(Differs from lower cabinet strip)
Carrier Label	845 953 157	Label strip identifying circuit packs
<i>Disk Drives:</i>	–	(Included in main J58886U-1 AUDIX drawing)
Cartridges	405 376 336	At least one J58889UB-1 L1 (blank) always needed for customer backups; one J58889UB-1 L3 (R1V2) or L4 (R1V3) program cartridge needed for software backup
HDD Bracket	845 799 048	Mounting bracket for 3.5- or 5.25-inch disk drives
Bracket Screws (4)	840 058 564	6-32 x 3/16 #6 screws attach each disk to bracket

(Continued)

TABLE C-1. AUDIX System Parts List *(Part 3 of 6)*

Item	Comcode	Notes
Hard Disk Drives:		
120 Mbyte	406 621 607	Qualified 120-Mbyte 5.25-inch HDD
170 Mbyte	405 391 889	Any qualified 170-Mbyte 5.25-inch HDD on WP91507-L1 spec
or	406 744 565	Equivalent qualified 3.5-inch HDD
380 Mbyte	405 684 978	Any qualified 380-Mbyte 5.25-inch HDD on WP91507-L2 spec
or	406 740 613	Equivalent qualified 3.5-inch HDD
760 Mbyte	406 071 746	Any qualified 760-Mbyte 5.25-inch HDD on WP91507-L3 spec
RCD Assembly:	–	ED-1E523-70 includes RCD, bracket, circuit breaker, LEDs, lower-front cabinet thermal equipment
Circuit Breaker	406 785 121	AC breaker for POWER switch on RCD bracket
– AC		(early AC breaker 405532290 should be replaced)
– DC	405 951 757	DC circuit breaker for DC-powered system
RCD Bracket		Mounting bracket for RCD and front panel
– early	845 949 932	equipment (slides under disk-drive retaining bar;
– current	846 653 327	current mounts 50-Mbyte drive)
– screws (4)	840 058 564	8-32 x 3/16 PH #6 screws attach the RCD to bracket
RCD (20-Mbyte)	405 356 981	Removable cartridge drive (20-Mbyte)
RCD (50-Mbyte)	406 411 306	Removable cartridge drive (50-Mbyte)
Thermal Assembly	845 797 711	Includes wiring, thermistor probe assembly (comcode 843 630 427), and two thermostats (comcode 403 216 781)
SCSI-Bus Cable	–	ED-1E434-11 Group 183 50-pin data cable for disk drives
Fan Assembly:	–	ED-1E522-70 includes fans, thermal assembly, rear plate
Cover Plate	845 798 958	Attaches fans to rear of cabinet
Fans	405 357 302	Four per assembly (early and current comcodes, resp.;
	406 421 677	the newer fan is more efficient)
	402 667 851	Four finger guards (one per fan);
	406 281 949	finger guards will work on either fan
	840 058 713	Sixteen 6-32 x 3/4 PHM screws (four per fan)

(Continued)

TABLE C-1. AUDIX System Parts List (*Part 4 of 6*)

Item	Comcode	Notes
Thermal Assembly	–	ED-1E430-70 Group 5 has thermal, mounting equipment, H600-140 Groups 387 and 388 wiring assemblies
Connector Assembly	845 797 729	Includes wiring, thermistor probe assembly (comcode 843 630 427), and two thermostats (comcode 402 825 756)
<i>Misc. Equipment:</i>		
FASTECH Backplane 940A Tool Kit	403 425 705	List 2, used to insert or remove 1-type pins from the backplane; see Tier III manual for more information
Isolating Data Interface (IDI)	103 981 742	For data link on System 85, DIMENSION PBX, System 75 XE, and DEFINITY Generic 1, 2, or 3. <i>System 85, Generic 2, and DIMENSION PBX:</i> also need 4.5-foot ED-1E434-11 Group 174 cable, Group 304 RS-449 extender cable (up to 400 feet), and (for duplicated common control) Group 342 “Y” cable. <i>System 75 XE, Generic 1, and Generic 3i/s:</i> also need 4.5-foot ED-1E434-11 Group 174 cable, and H600-210 Group 1 to 7 cable (group depends on length of cable: 1=10 ft., 2=25 ft., 3=50 ft., 4=100 ft., 5=200 ft., 6=300 ft., 7=400 ft.). <i>Generic 3r:</i> requires two preceding cables plus an H600-347 Group 1.
Local Area Data Set (LADS)	403 304 827 (disc.)	Two needed for extended local access or the System 85/Generic 2/DIMENSION PBX data link
SCA	405 766 460	For data link on 5ESS Switch. Also needed is an ED-1E434-11, Group 311 cable, an H600-258 cable, and a D8W-87 modular cord to the demarcation point.

(Continued)

TABLE C-1. AUDIX System Parts List *(Part 5 of 6)*

Item	Comcode	Notes
<i>Power Equipment:</i>	–	(Included in main J58886U-1 AUDIX drawing)
5 V Fuse	997 964 622	Standard 125 V DC, 15-amp BUSS fuse at rear of cabinet (early 10-amp fuses should be replaced with 15-amp fuses per QPPCN 363DR)
48 V Fuse	–	Standard 250 V DC, 1-amp slow-blow (1 ASB) fuse (commercially avail. 3AG-type fuse) in power supply
AC Power Cord	405 362 641	Supplies main power to AUDIX cabinet
Battery Housing	845 799 147	Metal container for battery module
Retaining Strip	845 799 113	Holds battery module in housing; uses 8-32 x 3/8 SHWH screw (comcode 901 090 308)
Battery Module	405 358 060	48 V, 24-cell battery pack
Internal Cables:	–	(Included in main J58886U-1 AUDIX drawing)
Port Cables	405 005 570	Two WP-90753, L2 cables to D00 and D01
Wiring Assemblies	–	H600-140 Groups 382 and 383 connect the power supply to +5 and GRDD on the backplane; Group 384 grounds the ac receptacle to the connector panel
Wiring Harness	–	LCJ58886U-1 internal (local cable) harness supplies most internal power, including disk drives
AC Power Assembly:	–	ED-1E524-70 assembly includes air plenums, base plate, and power supply
Air Plenums (early model)	845 799 014 845 799 006	Early left air plenum at rear of cabinet Right air plenum at cabinet rear; early plenums use three 6-32 x 3/8 SHWH #6 screws (comcode 900757253), later plenums use one screw. Grommet inside right air plenum is comcode 401780226
(current model)	846 821 833	New left air plenum does <i>not</i> mount to the new power supply base plate
Base Plate (early model)	845 798 990	Mounts power supply and early air plenums (later model does not mount air plenums); uses four 8-32 x 1/4 SHWH #8 screws (comcode 900 714 064)
(current model)	846 821 817	New base plate does <i>not</i> mount air plenum(s)

(Continued)

TABLE C-1. AUDIX System Parts List *(Part 6 of 6)*

Item	Comcode	Notes
<i>Power Equipment:</i>	-	(Continued)
Power Supplies:		
jETA Power Supply	405 356 809	Approved AUDIX main power supply
LH Research	-	Included in WP91569, use comcode 405 356 809
Computer Products	-	Included in WP91569, use comcode 405 356 809
DC Power Assembly:	105 733 547	D-kit #D-182236
Cover, lower rear	846 303 842	
Local cable	-	LCJ58886U-1A, G3
Power supply	405 951 781	
Mounting assembly	846 360 014	DC terminal strip
Screw #8	901 090 308	two provided
cover	846 306 843	AC receptacle outlet cover
Screw #4	901 125 294	two provided
Screw .25-20x1/2	841 059 843	one provided
Washer	804 236 362	one provided
Nut	802 207 563	two provided
Kit, D-181895	105 434 599	Gutter tap ground
Circuit breaker	405 951 757	
Wire assembly	-	H600-232, power supply
Wire assembly	-	H600-269, fuse
Wire assembly	-	H600-261, four provided (one for each disk)
Wire assembly	-	H600-275, ground
Screw	840 058 267	two provided
Nut	802 108 282	two provided
Washer	804 236 313	two provided
Fuse holder	406 018 903	one provided
Instruction sheet	846 367 522	
Note:	The fuse wire assembly (H600-269) is soldered to the fuse holder (406 018 903) at the factory.	

The following circuit packs are used in the AUDIX carrier and backplane. Some circuit packs can be ordered from compatible switch stock or swapped with AUDIX Large machines if needed.

Table C-2. AUDIX Circuit Pack Codes *(Part 1 of 2)*

Circuit Pack	Comcode	Number Used	Description	Also Used On
AHF1*	103 810 586	2	TD-Bus Terminator	A-L
AHF102	105 167 233	1	DBP/VME-Bus Terminator	—
AHF104	105 190 839	1	Disk Interface	—
AHF107	105 408 710	2	S-Bus Extender	—
AHF108	105 408 728	2	S-Bus Terminator	—
AHF109	105 465 603	2	TD-Bus Extender	—
CDR1	105 266 498	1	Early alarm board	—
CDR1B	105 711 238	1	Current alarm board	—
PWJ58886U (L1)	105 263 909	1	List 1 Backplane	—
PWJ58886U (L2)	105 442 941	1	List 2 Backplane	—
PWJ58886U (L4)	106 413 933	1	List 4 Backplane	—
TN366	103 279 840	1	ACC	A-L
TN366B	106 186 588	1	ACC	A-L
TN472C	105 474 126	1	DBP-CPU	—
TN475	103 280 830	1	SADI	—
TN475B	105 474 118	1	SADI	—
TN477	103 280 855	1	TDBI-8 (8 ports)	—
TN500	103 281 085	1 or 2	TDBI (16 ports)	A-L
TN501B	103 965 182	1 – 16	VPC (2 ports each)	A-L
TN506	103 281 143	1	BC	A-L
TN506B	105 222 301	1	BC	A-L
TN511	103 281 192	1	MI	—
TN520	103 281 283	1 or 2	VB	A-L
TN523	103 281 317	1 or 2	CPU (FP and VSP)	A-L
TN532	103 281 408	1	DBP-RAM (2 Mbyte)	—
TN533	103 281 416	1	SCPI	—
TN539	103 281 473	1	ACCE	A-L
TN539B	106 757 768	1	ACCE	A-L
TN540	103 281 481	1	DBP-RAM (4 Mbyte)	—
TN547	103 281 556	1	MPSI	A-L
TN547B	105 717 359	1	MPSI	A-L
TN591	103 281 994	1 or 2	CPU (FP and VSP)	—

* The AHF1 has been replaced by the WP91602, L1.

(Continued)

TABLE C-2. AUDIX Circuit Pack Codes *(Part 2 of 2)*

Circuit Pack	Comcode	Number Used	Description	Also Used On
TN714	103 556 676	1	TC	A-L, S75
TN716	103 556 692	1 or 2	BI	A-L, S75
TN716B	105 442 412	1 or 2	BI	A-L, S75
TN727	103 556 809	1	NC	A-L, S75
TN734	103 556 874	2 or 3	RAM (2 Mbyte)	A-L, S75
TN747B	105 167 266	1 – 4	VPT (8 ports each)	A-L, S75/G1/G3
TN761	103 557 146	1 or 2	RAM (4 Mbyte)	S75
TN762B	103 976 171	1 – 4	VPT for SL-1 setups	S75/G1/G3
UN160	103 666 038	1	DBPI	A-L
UN160B	105 319 818	1	DBPI	A-L
UN162	103 666 053	1	VSFI	A-L
ZAHF8	103 963 336	2	S-Bus Terminator	A-L

Table C-3. AUDIX Cable Codes and Descriptions *(Part 1 of 2)*

ED-1E434-11 Cable	Gender and Connectors (Note 1)	Associated PEC (Note 2)	Number Used	Description (Note 3)
Group 13	M RS-232C to F RS-449	65254A	1	36-inch for Aux. cabinet device (PEC includes Groups 304, 342)
Group 30	M-to-F RS-232C	65233	1	36-inch extender for cabinet-mount
Group 110	M RS-232C to F RS-449	65259	1	Straight-through cable from an RS- 232C device (such as LADS) to a DCIU; order length by comcode: 601 085 087 = 20 ft. 601 085 095 = 30 ft. 601 085 103 = 40 ft. 601 085 111 = 50 ft.
Group 174	F-to-M RS-449	65399 attr. CNN07	as needed	4.5-foot cable between the AUDIX and IDI (leads to switch DCIU)
Group 175	F RS-449 to M RS-232C	65399 attr. CNN06	as needed	4.5-foot cable between the AUDIX and LADS (leads to switch DCIU)
Group 183	Four F connectors	Basic	1	50-pin SCSI-bus disk-data cable
Group 185	2 F connectors	70310	1	10-pin CDR1B alarm signal extender
Group 186	4 F and 1 M	70310	1	50-pin SADI cable for top cabinet
Group 187	2 F connectors	70310	1	40-pin TD-bus extender cable
Group 300	M-to-M shielded Amphenol	65258/A LNG10 to 32	as needed	Extra 25-pair cable(s) to wall field; LNG10 = 35 ft. (601 000 904) LNG11 = 50 ft. (601 000 938) LNG12 = 75 ft. (601 000 979) LNG13 = 100 ft. (600 046 338) LNG14 = 125 ft. (601 004 625) LNG15 = 150 ft. (601 085 301) LNG16 = 175 ft. (601 085 319) LNG17 = 200 ft. (601 001 399) LNG20 = 15 ft. (601 000 854) LNG21 = 25 ft. (601 000 888) LNG25 = 20 ft. (601 000 862) LNG27 = 30 ft. (601 000 896) LNG28 = 40 ft. (601 000 912) LNG30 = 60 ft. (601 000 953) LNG32 = 80 ft. (601 000 987)

(Continued)

TABLE C-3. AUDIX Cable Codes and Descriptions *(Part 2 of 2)*

ED-1E434-11 Cable	Gender and Connectors (Note 1)	Associated PEC (Note 2)	Number Used	Description (Note 3)
Group 304	M-to-F RS-449	65399 attr. LNG10 to 49	as needed	Extender cable from IDI to DCIU; LNG21 = 25 ft. (601 089 535) LNG10 = 35 ft. (601 089 543) LNG11 = 50 ft. (601 003 585) LNG12 = 75 ft. (601 089 550) LNG13 = 100 ft. (601 085 426) LNG15 = 150 ft. (601 089 568) LNG16 = 175 ft. (601 089 576) LNG17 = 200 ft. (601 085 434) LNG47 = 250 ft. (601 089 584) LNG48 = 300 ft. (601 085 442) LNG49 = 400 ft. (601 089 592)
Group 309	M-to-F RS-232C		as needed	Extender cable, same as 50-foot M25A except for lengths (5, 12, 25, or 50 feet)
Group 311	M-to-M RS-232C	Basic	2	50-foot RS-232C extender cable 601087075 = 5 ft., 601087083 = 10 ft., 601087091 = 20 ft., 601087109 = 30 ft., 601087117 = 40 ft., 601001365 = 50 ft.
Group 329	2 F connectors	70310	2	60-pin S-bus expansion cable.
Group 342	M RS-449 to two F RS-449s	65259, 65399 attr. CCT02	as needed	“Y” cable for duplicated common control on switch DCIU
Group 350	M-to-F RS-232C	Basic attr. LNF05 to 28	2	Up to 50-foot AUDIX null-modem cable; order 601 088 008 = 1 ft., LNF05 = 5 ft. (601 089 733), LNF50 = 10 ft. (601 088 016), LNF25 = 20 ft. (601 089 741), LNF27 = 30 ft. (601 089 758), LNF28 = 40 ft. (601 089 766), LNF11 = 50 ft. (601 088 032)
Note 1. M = Male connector (plug). F = Female connector (receptacle). Note 2. Basic PEC is 7021-VM3 for AUDIX. Service technicians order by cable code and group number in column 1 for fixed-length cables only (order others by comcode). Note 3. DCIU is on System 85, Generic 2, or DIMENSION PBX only.				

REFERENCES

The following documents may help you maintain and service the AUDIX. Many of these documents should be available in the library received with your AUDIX or switch. They may also be obtained through your AT&T Account Executive.

AUDIX Documentation

See the *About this Document* section for a current list of AUDIX customer and services documentation. Some volumes are described in more detail in Chapter 1.

AUDIX Technical Documentation

One- and two-cabinet AUDIX technical documents include:

- AUDIX Cabinet Assembly (J58886U-1) — CD/SD-1E601-01 (List 1: Frame, circuit packs, disks, and internal wiring; List 2: HDD hardware; List 3 and 4: Cabinet feet; List 5: 380-Mbyte disk drives; List 6: AUDIX Networking hardware; List 7: Two-cabinet AUDIX base cabinet; List 8: AUDIX expansion cabinet; List 9: AUDIX expansion hardware)

AUDIX-L technical documents include:

- Control Carrier — J58888H (CD/SD-1E587-01)
- DBP Carrier — J58888K (CD/SD-1E589-01)
- DC Power Carrier — J58888L (CD/SD-1E590-01)
- Disk Drive Cabinet and Power Units — J58886M and J58886M-2 (CD/SD-1E577-01)
- Port Carrier — J58888J (CD/SD-1E588-01)

Engineering Drawing (ED) Documentation

AUDIX technical drawings include:

- ED-1E430-70 — Thermal assembly (Group 5)
- ED-1E434-11 — Custom cables
- ED-1E520-70 — Cabinet weldment
- ED-1E521-70 — Front door assembly
- ED-1E522-70 — Fan assembly
- ED-1E523-70 — RCD assembly
- ED-1E524-70 — Power supply assembly

AUDIX-L technical drawings include:

- ED-1E430-70 — Thermal sensor assembly
- ED-1E434-11 — Custom cables
- ED-1E435 — AUDIX-L cabinet power and ground bus bar
- ED-1E464-70 — AUDIX fascias
- ED-1E465-70 — Overhead ductwork
- ED-1E489-70 — Disk drive shelf assembly
- ED-1E496-70 — Cabinet floor anchors (Group 2 subfloor; Group 3 raised floor)

Switch Documentation

This section lists documents for compatible AT&T switches in the following order: general information; DEFINITY Generic 3, Generic 2, and Generic 1; System 75 and 75 XE; System 85, 1A ESS Switch; 5ESS Switch, and DIMENSION PBX. Documents for data devices and other peripheral equipment appear at the end of this section.

General Information Documents

555-015-201	Terminals and Adjuncts Reference
555-025-101	DS1/DMI/ISDN-PRI Reference
555-025-205	Trunk Signaling and Transmission Application Notes
555-400-010	Premises Distribution System Publications
555-025-201	Network and Data Services Reference

DEFINITY Communications System Generic 3 Documentation

555-230-020	Introduction to AT&T DEFINITY Communications System Generic 3
555-204-105	Generic 1 and Generic 3i Maintenance
555-230-105	Generic 3r Maintenance
555-204-106	Generic 1 and Generic 3i Upgrades and Additions
555-230-106	Generic 3r Upgrades and Additions
555-230-200	System Description
555-230-201	Feature Description
555-230-650	Generic 3i Implementation
555-230-651	Generic 3r Implementation

AT&T DEFINITY Communications System Generic 2 Documentation

AT&T DEFINITY Generic 2 corresponds to the newest release of System 85-based software (based on the System 85 R2V4 release).

555-104-120	Electrical Protection, Grounding, and Exposure Checklist
555-104-104	Installation
555-104-111	Upgrades
555-104-630	Wiring
555-104-020	An Introduction to DEFINITY Communications System Generic 2
555-104-506	Generic 2.1 Administration Procedures
555-104-507	Generic 2 Administration of Features and Hardware
555-104-730	Attendant Console User's Guide
555-104-603	Equipment Room Floor Plans and Specifications
555-105-301	Feature Descriptions
555-105-117	Maintenance Procedures
555-105-118	Maintenance Repair Strategies
555-104-505	Manager II MS-DOS Version Operation
555-104-401	New Capabilities
555-105-201	System Description
555-104-504	Traffic Theory
555-104-109	X-Ray and System Tests

AT&T DEFINITY Communications System Generic 1 Documentation

AT&T DEFINITY Generic 1 corresponds to the newest release of System 75-based software (based on the System 75 R1V3 release).

555-200-500	Administration and Measurement Reports
555-200-700	Console Operations
555-200-201	Feature Description
555-200-600	Planning/Configuration
555-200-111	Wiring Guide
555-204-499	Capabilities
555-204-652	Implementation
555-204-654	Implementation
555-204-104	Installation and Test

555-204-200	System Description
555-204-105	Maintenance
555-204-106	Upgrades and Additions

System 75 and System 75 XE Documentation (R1V3)

555-200-020	Introduction to AT&T System 75
555-209-003	Distributed Communications System
555-200-652	Implementation Release 1 Version 3
555-200-200	System 75 System Description
555-200-104	Installation and Test
555-200-105	Maintenance
555-201-104	Installation and Test
555-201-200	System 75 XE System Description
555-200-105	Maintenance
555-200-106	System Upgrades and Additions

System 85 Documentation (R2V2 to R2V4)

555-103-521	Data Communications Interface Unit (DCIU)
555-104-120	Electrical Protection, Grounding, and Exposure Checklist
555-102-107	Feature Translations (R2V3)
555-103-507	Administration of Features and Hardware (R2V4)
555-104-603	Equipment Room Floor Plans and Specifications
555-105-301	Feature Descriptions
555-104-104	Installation
555-102-108	Maintenance (R2V3)
555-105-201	System Description
555-103-109	System Tests (R2V4)
555-104-630	Wiring

1A ESS Switch Documents

231-099-029TD	1A ESS Switch Input/Output Asynchronous Protocol Specifications, Switching Systems
231-390-170	1A ESS Switch Message Service
231-390-176	1A ESS Switch Simplified Message Desk Service
Index 40	Central Office Equipment Engineering System (COEES) SMSI and MSS
Index 47	Central Office Equipment Engineering System (COEES)
231-302-305	Enhanced Input/Output Subsystem – Implementation Procedures for Customer Channels 24 through 95 (1AE9 and Later Generic Programs)
231-099-022TD	Message Service System Interface Specifications, Switching Systems
231-318-364	Recent Change Formats and Implementation – Description and Procedures – Message Desk Service (1AE9 Generic Program)
231-099-023TD	Simplex Voiceband Digital Interface Specification, Switching Systems
231-099-006TD	Simplified Message Desk Interface, Switching Systems
592-031-100	202T Modem Transmitter/Receiver Description and Operation
592-031-200	202T Modem Transmitter/Receiver Installation and Connections
592-031-500	202T Modem Transmitter/Receiver Test Procedures
592-031-501	202T Modem Transmitter/Receiver Maintenance

5ESS Switch Documents

533-605-206	3A SMSI Translator User's Guide
5D5-001-001	5ESS Switch Documentation Guide
5D5-600-304	5ESS Switch Equipment Communications Data (ECD/SG) Data Base 5E4 (3 Volumes)
-	5ESS Switch Growth Procedures
5D5-700-100	5ESS Switch Interface/Compatibility Guide
5D5-900-301	5ESS Switch ISDN Basic Rate Interface Specification 5E4
5D5-900-303	5ESS Switch ISDN Applications Processor Interface Specification 5E4/5E5 Generic Program
5D5-118-213	5ESS Switch Recent Change Procedures Menu Mode 5E4 (2 Volumes)
5D5-600-102	5ESS Switch Translation Data 5E4 (5 Volumes)
TG-5	5ESS Switch Translations Guide (5 Volumes)
IPH 555	5ESS Switching System Installation Procedures Handbook 555 and IPH 555A
533-604-100	Advanced Communications Package (ACP) Information Guide

IPH 565	Advanced Communications Package Installation Procedures Handbook Version 4.2
5D5-200-100	Business and Residence Custom Services (BRCS) Assignment Guide
592-031-100	202T Modem Transmitter/Receiver Description and Operation
592-031-200	202T Modem Transmitter/Receiver Installation and Connections
592-031-500	202T Modem Transmitter/Receiver Test Procedures
592-031-501	202T Modem Transmitter/Receiver Maintenance

DIMENSION System Documentation

554-010-406	DIMENSION PBX Electronic Custom Telephone Service (ECTS) and Automatic Call Distribution (ACD) for Use With DIMENSION 400E/600 600SN, 2000 and Custom PBX (includes AUDIX administration, installation, and testing)
554-105-322	DIMENSION 400E/600/600SN PBX — Feature Translations
554-105-320	DIMENSION 400E/600/600SN PBX — Installation
554-105-100	DIMENSION 400E/600/600SN PBX — System Description and Planning Information
554-105-324	DIMENSION 400E/600/600SN PBX — Trouble Analysis — Alarms
554-111-302	DIMENSION 2000 and Custom PBX — Feature Translations
554-111-300	DIMENSION 2000 and Custom PBX — Installation
554-111-100	DIMENSION 2000 and Custom PBX — System Description and Planning Information
554-111-304	DIMENSION 2000 and Custom PBX — Trouble Analysis — Alarms

Peripheral and Data Equipment Documentation

999-102-160	212AR Modem User's Manual
999-300-180	4410 Display Terminal
999-310-181	4425 Display Terminal
999-300-285	470/471, 475/476 Printers Users Guide
999-700-303	475 Printer Users Guide
999-700-493	513 BCT Technical Reference Manual
999-700-486	513 BCT User's Guide
999-801-202	513 Terminal Emulator User's Guide
999-700-483	515 BCT User's Guide
#609	5420 User's Guide (Teletype Corporation)

999-300-561	570/571 Printers Users Guide
999-300-562	572/573 Printers Users Guide
999-300-327	600 Terminal 513 BCT/System 75 User's Guide
999-300-270	610 Business Communications Terminal (BCT)
999-300-302	615 Multi-Tasking Terminal User's Guide
999-300-303	615 Multi-Tasking Terminal Pocket Reference Guide
ST-2112-09	6417 Users Guide (NCR order number)
999-300-765	715 BCS User's Guide and Service Manual
999-100-198	DATAPHONE II 2212C Modem User's Manual
999-100-199	DATAPHONE II 2212D Modem User's Manual
999-100-295	DATAPHONE II 2224G Modem User's Manual
999-100-287	DATAPHONE II 2296A Modem User's Manual (Stand-alone or Data-mounting Configuration)
999-100-188	DATAPHONE II 2500 Series Data Service Unit User's Manual
999-100-196	DATAPHONE II 2600 Series Data Service Unit User's Manual
999-100-197	DATAPHONE II 2700 Series Data Service Unit User's Manual
999-100-166	Local Area Data Set User's Guide
999-700-300	Modular Processor Data Module User's Guide
999-700-301	Modular Trunk Data Module User's Guide
555-401-702	Multiple Asynchronous Data Unit (MADU) User Manual
555-016-715	PC/PBX Connection documentation set (6 documents)
555-016-201	PC/PBX Connection Installation and Reference Manual
999-700-028	Processor Data Module User's Guide
555-016-711	Quick Guide to PC/PBX Connection
555-103-522	SN238 EIA Port Application Notes (for an ADU on System 85)
555-401-708	Z3A Asynchronous Data Unit Product Manual

D. Remote Access to the DBP Utilities

With the introduction of the AUDIX Release 1, Version 7 software, the Tier III technicians are provided with remote access to the following DBP functions:

- The “dbputil” utility — This utility provides the user with several disk, filesystem, and file operations. **A few of these operations are destructive to data on the disk drives.**

This utility is available from the AUDIX maintenance port (H00) or from the AUDIX DBP monitor port (H04). See *Physical Connections*.

- The “scsitest” utility — This utility allows the user to run diagnostic tests on the disk drives, to format and initialize the disk drives, and to inspect the software version of the SADI disk controller. **Some of the diagnostic tests are destructive to data on the disk drives.**

This utility is available from the AUDIX maintenance port (H00) or from the AUDIX DBP monitor port (H04). See *Physical Connections*.

- The DBP monitor — An on-line display of DBP activity. This display can be used to show what was happening with the DBP just before a DBP crash. **In the display mode, this function is not destructive to data on the disk drives.**

This monitor is only available through the DBP monitor port (H04). See *Physical Connections*.

PHYSICAL CONNECTIONS

A remote connection to the AUDIX maintenance port (H00) is the the standard AUDIX remote maintenance terminal connection. See Figure D-1, cabling option 2. To access “dbputil” or “scsitest”, see *DBP Access*.

A remote connection to the AUDIX DBP monitor port (H04) is also shown in Figure D-1 (option 1). Note that it is nearly the same connection as the RMT, only to a different port and with a null modem cable inserted. If a technician or customer representative is at the site, they can be instructed to remove the RMT cable from H00 and connect it to the null modem attached to H04.

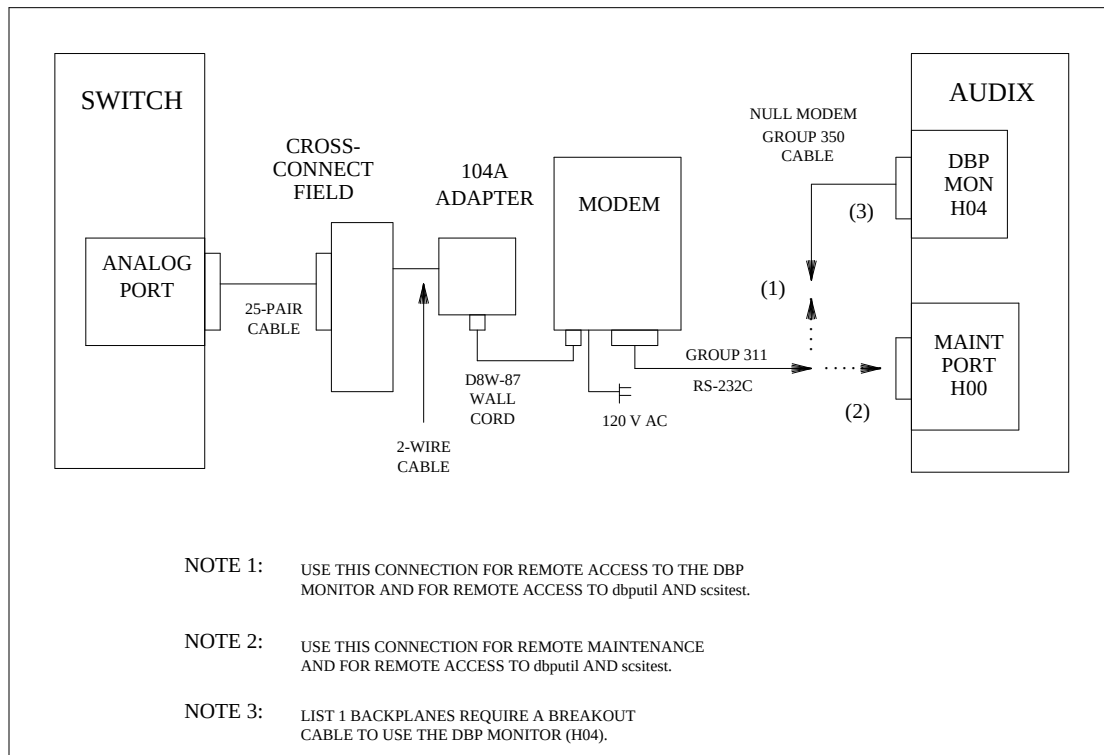


Figure D-1. Remote DBP Connections

DBP ACCESS

Once you have made the necessary hardware connection from your terminal to the AUDIX system, you must establish communication with the DBP. What you enter to establish this communication depends on the hardware connection used.

Remote Maintenance Terminal

To access “dbputil” or “scsitest” from the RMT, do the following:

- Step 1: Dial up the AUDIX system and log in as you normally would.
- Step 2: If the system is not shutdown, go to the **shutdown** form and do a forced, maintenance shutdown.
- Step 3: Using the **startup** form or option 4 (reboot) on the control mode menu, initiate a reboot.
Perform a nonstandard initialization from the controller and disk that contains “boot_i”. Boot from “boot_i”.

- Step 4: At the *Command:* prompt, enter **run**.
 You will have to enter the controller and disk again.
 At the *Utility:* prompt, enter **util**.
 At the **What util:** prompt, enter **dbp** or **scsi**.

To use either of these utilities, see the following sections.

DBP Monitor

To set up the DBP monitor or access “dbputil” or “scsitest” from the DBP monitor, do the following:

- Step 1: It is a good idea to have a printer set up on-line with the terminal you are using.
- Step 2: Log in to the DBP monitor. You should get a UNIX prompt. The terminal is then ready to display DBP activity.
- If nothing unusual happens within a five minute period, an “S” is output to the terminal to indicate the DBP has resynchronized itself.
- Step 3: When the DBP experiences problems, messages will be printed out on the monitor. An example is shown below:

```
RDB monitor (#) release 3.0 06/15/88
<RF1(0.2):0x1a9000,0x7025,29116>
** disk(0,2) sector[29116] READ retry[1]
```

In this example, the DBP receives a 7025 (see Appendix E) from the SADI relating to disk 02. Disk 02 caused an SCSI bus reset. The DBP was attempting to read block 29116 (256 bytes per sector) of disk 02 at the time of the reset, so the DBP retries the read command.

The DBP displays all errors (in decimal values) in terms of logical 256 bytes per sector. For the DBP block number to coincide with the SCSI block (512 bytes per block), it has to be divided by 2. For example:

$$29116 / 2 = 14558 \text{ (decimal SCSI block) or } 38DE \text{ (hexadecimal SCSI block)}$$

A DBP message will sometimes include an instruction code and a return code (for example, FP 272 RC 26). This means the DBP cannot execute the instruction requested, and thus informs the requesting processor of the situation.

NOTE

The list of instruction codes and return codes are provided at the end of this appendix.

- Step 4: The “dbputil” and “scsitest” utilities can be accessed from this point. But first, the AUDIX system must be shutdown and placed in control mode.
- (What is the best way to do this at this point?)**
- Step 5: Once the system is shutdown and in control mode, press CHANGE..Bx 6 P . This will get you to the “>>>” (chevron) prompt.

Step 6: Now enter **set n n**, where *n n* is the controller and device where the DBP utilities exist.

Step 7: Enter **run util**, where *util* is either “dbputil” or “scsitest”.

You will now have access to the utility. See the next section for the list of operations available.

THE DBPUTIL UTILITY

The DBP Stand-alone utility *dbputil* provides higher level DBP services. This utility can be used for inspecting and modifying files, filesystems, and disk units.

The functions can be summarized into the following categories.

Disk Manipulation Commands

These commands are used to inspect and modify the contents of a disk unit. For each of these commands, the controller number and the drive number have to be specified. **The “format” and “initdisk” commands are destructive commands; the data on the disk drive is lost.**

In order to do defect mapping for the disk drives the “reassign” command must be used.

- defect : create/modify/list disk defect map
 - l : list defective tracks
 - c : clear defect list
 - v : verify tracks, add bad tracks to defect list on disk
 - a : add new entry to defect list
 - d : delete an entry from defect list
- reassign : reassign SCSI blocks
- format : format a raw disk
- initdisk : initialize a disk unit
- sldisk : make a disk unit known to the system
- rmdisk : make a disk unit unknown to the system
- rwlabel : read/write a disk volume label
- lsdev : list filesystems of a given disk
- pkdisk : pack the space of a given disk
- voldup : volume to volume dupfs
- volckfs : verify/fix all filesystems on a disk
- volcmp : compare two disks physically

- `vollcmp` : compare two disks logically

Filesystem Manipulation Commands

These commands are used to inspect and modify the contents of a filesystem on a disk drive. The controller number, drive number and the name of the filesystem have to be specified.

- `mkfs` : make a new filesystem
- `rmfs` : remove an existing filesystem
- `ckfs` : verify/fix an existing filesystem

The “`ckfs`” command with the `fix` flag set may modify the data in the filesystem.

- `infs` : increase the size of an existing filesystem
- `dupfs` : make a physical copy of a filesystem
- `cpyfs` : make a logical copy of a filesystem
- `mergfs` : merge source filesystem into destination filesystem
- `cmpfs` : compare two filesystems
- `renamefs` : rename a filesystem
- `mount` : mount an existing filesystem
- `umount` : unmount a mounted filesystem
- `lmount` : list all mounted filesystems

File Manipulation Commands

These commands are used to inspect and modify contents of a file in a filesystem. The filesystem in which the file is located has to be mounted in order to use these commands (except for the ‘`fltx`’ commands, which mount the filesystem automatically).

- `mkdir` : make a directory
- `rm` : remove directories and/or files
- `creatfl` : create an indexed sequential or stream file
- `crann` : create an announcement file
- `rename` : rename a file
- `cpfl` : make a copy of a file
- `concat` : concatenate two stream files
- `fltx` : UNIX <-> DBP file transfer

- ui : upload an indexed sequential file
 - hui : upload an indexed sequential file (high speed)
 - di : download an indexed sequential file
 - hdi : download an indexed sequential file (high speed)
 - us : upload a stream file
 - hus : upload a stream file (high speed)
 - ds : download a stream file
 - hds : download a stream file (high speed)
- split : split a stream file into two stream files
- stat : query the status of a file
- ls : list files of a given directory

THE SCSITEST UTILITY

The “scsitest” utility can be used to run diagnostic tests on disk drives, to format and initialize disk drives, and inspect the software version of the SADI controller. Some of these tests are destructive tests; data on the disk drive is lost.

There are two sets of commands available in this utility: a set of general DBP commands and a set of disk testing commands. These are listed in the following sections.

General DBP Command Set

These commands are used to inspect and modify the contents of a disk unit. For each of these commands, the controller number and the drive number have to be specified. The 'dupfs' command also requires the source and destination filesystem names to be specified.

- dupfs : make a physical copy of a filesystem
- initdisk : initialize a disk unit

This is a destructive command; the data on the disk unit is lost.

- lsdev : list filesystems of a given disk unit
- reassign : reassign SCSI blocks

This command allows the user to map out bad blocks on the disk drive.

- rmdisk : make a disk unit unknown to the system
- sldisk : make a disk unit known to the system
- volcmp : compare two disk units

- voldup : volume to volume dupfs

Disk Drive Commands

These commands are used to perform tests on the disk drives and the SADI controller.

disktest

The “disktest” command has a set of tests that can be run on the disk drives.

- a (parallel alias blocks) : This test allows up to seven drives to be tested simultaneously. The test writes sequentially all the blocks beginning at the start block and ending at the end-block with the block address, and then it reads and verifies that the correct block numbers were written.
- b (butterfly verify blocks) : This test performs a verify while doing a butterfly seek. It writes and reads the last block, the first block, the last block minus the transfer size, the first block plus the transfer size and so on. Then the pattern written is compared with the pattern read.
- d (diagnose device) : This test sends a diagnostic command to the SADI controller/drive, and displays the results.
- f (format disk) : This command is used to format a disk drive.
- o (parallel operational test) : This test generates a series of random reads and writes (the operation as well as the access size is randomly selected) to up to seven drives in parallel.
- r (read blocks) : This test generates a series of reads from a start block to an end block at uniform increments. Up to seven drives can be tested in parallel.
- s (random block seek) : This test works on one disk at a time. It can perform verify while doing a random seek. There are four options to this test: only read, only write, write/read/verify and read/write/read/compare.
- v (verify blocks) : This test works on one disk at a time. It writes and reads a block(s) four times with four different patterns, and compares the pattern written with the pattern read.
- w (write blocks) : This test generates a series of writes from a start block to an end block at uniform increments. Up to seven drives can be tested in parallel.

saditest

The “saditest” command has a set of tests that can be run on the SADI host adapter.

- v : verify software version
- a : allow media removal
- p : prevent media removal
- i : get device id

- u : spin up disk
- d : spin down disk
- s : display device status

setdriver

The “setdriver” command provides the capability to set the disk driver retry and reset strategies. With this command the retry strategy and/or controller resets can be enabled or disabled.

INSTRUCTION CODES AND RETURN CODES

DBP Instruction Codes

The following is a list of the DBP instructions. The description will help to show what was requested. The return codes are given in the next section.

Table D-1. DBP Instruction Codes (*part 1 of 3*)

Hex	Decimal	Command	Description
0x0108	264	MKDIR	make a directory
0x0109	265	RM	delete a directory or a file
0x0110	272	CREATFL	create a file
0x0111	273	VCREATFL	create a voice file
0x0112	274	RENAME	change the file name
0x0113	275	CPFL	copy an existing file into a new file
0x0114	276	CONCAT	concatenate two existing files into a new file
0x0115	277	SPLIT	split an existing file into multiple new files
0x0116	278	STAT	acquire file status of an opened file
0x0117	279	FSTAT	acquire file status of an unopened file
0x0118	280	FLCNT	query/update the reference count of a file
0x0119	281	OPEN	open a file
0x011a	282	VOPEN	open a voice file
0x011b	283	CLOSE	close a file
0x011c	284	VCLOSE	close a voice file
0x0120	288	READ	read a record by key
0x0121	289	READL	read a record by reference key
0x0122	290	READEL	read a record by reference key
0x0123	291	INSERT	insert a record by key
0x0124	292	DELETE	delete a record by key

0x0125	293	REPLACE	replace a record by key
0x0128	296	FIRST	get the MIN primary key in an indexed sequential file

(Continued)

TABLE D-1. DBP Instruction Codes (*part 2 of 3*)

Hex	Decimal	Command	Description
0x0129	297	LAST	get the MAX primary key in an indexed sequential file
0x0130	304	CAPPEND	append a character stream to a non-voice file
0x0131	305	VAPPEND	append a voice segment to a voice file
0x0132	306	CREAD	read a character stream from a non-voice file
0x0133	307	VREAD	read a voice segment from a voice file
0x0134	308	CTRUNC	delete a character stream from a non-voice file
0x0135	309	VTRUNC	delete a voice segment from a voice file
0x0136	310	CSEEK	change the current position in a non-voice file
0x0137	311	VSEEK	change the current position in a voice file
0x0140	320	AOPEN	open an announcement
0x0141	321	MKANN	make an announcement (define an announcement)
0x0142	322	ACLOSE	close an announcement file
0x0143	323	ACACHE	cache announcement records
0x0144	324	AUNCACHE	uncache announcement records
0x0145	325	AINsert	insert an announcement record
0x0146	326	AREPLACE	replace an announcement record
0x0147	327	ADELETE	delete an announcement record
0x0148	328	AEXTRACT	extract an announcement record by key
0x0149	329	ATRUNC	abort an announcement
0x014a	330	ACOPY	copy an announcement record
0x014b	331	ACOPYCACHE	share cached fragments between two announcement files
0x014c	332	AFRAGINFO	get size and caching status of a fragment
0x0154	340	FMDEV	format a device unit
0x0155	341	LSDEV	list status of a device unit
0x0156	342	LABELIT	write a volume label on a device unit
0x0160	352	MKFS	make a filesystem
0x0161	353	RMFS	remove a filesystem
0x0162	354	INFS	increase the size of a filesystem
0x0163	355	CKFS	check the filesystem for error
0x0164	356	PKFS	pack and reorganize a filesystem
0x0165	357	DUPFS	make a physical copy of a filesystem
0x0166	358	MIRRORFS	activate “parallel updating” on two filesystems
0x0167	359	UNMIRRORFS*	deactivate “parallel updating” on two filesystems
0x0168	360	CMPFS	compare two filesystems
0x0169	361	CPYFS	make a logical copy of a filesystem
0x016a	362	DU	summarize disk usage
0x016b	363	DF	report number of free disk blocks
0x016c	364	MIRFIX	???
0x0170	368	LS	list status of files and directories

(Continued)

TABLE D-1. DBP Instruction Codes (*part 3 of 3*)

Hex	Decimal	Command	Description
0x0171	369	FIND	find files
0x0172	370	CPO	copy out
0x0173	371	CPI	copy in
0x0174	372	CRANN	create an announcement file
0x0177	375	MORE	retrieve more data blocks from the DBP
0x0180	384	DBPINIT	initialize the DBP
0x0181	385	DBPBOOT	boot the DBP
0x0182	386	SHUTDOWN	take the DBP out of normal service
0x0183	387	STARTUP	put the DBP back into normal service
0x0184	388	RESET	reset the DBP by simulating power-on reset
0x0190	400	DBPPERM	give DBP permission to run requested diagnostics
0x0191	401	DBPTEST	invoke internal DBP maintenance tests
0x0192	402	DBPXTEST	invoke external DBP maintenance tests
0x0193	403	DBPCTEST	invoke craft maintenance tests
0x0194	404	DBPLED	turn on/off DBP LEDs
0x0195	405	DBPMTCTRL	set the level of DBP testing and error reporting
0x0196	406	DBPERR	request for DBP errors
0x0197	407	EDEV	enable a DBP hardware unit for service
0x0198	408	DDEV	disable a DBP hardware unit for service
0x01a0	416	MOUNT	mount a filesystem
0x01a1	417	UNMOUNT	unmount a filesystem
0x01a8	424	KILL	kill outstanding utility requests
0x01a9	425	ECHO	echo a transmission to the DBP
0x01ab	427	DBPCLOCK	get/set the time of the DBP clock
0x01b0	432	GETPARAM	acquire the DBP system parameters
0x01b1	433	MAKE	make a type of hardware unit known to the DBP system
0x01b2	434	UNMAKE	make a known type of hardware unit unknown to the DBP
0x01b3	435	ADDEV	configure a DBP hardware unit to the DBP system
0x01b4	436	STSDEV	get the status of a DBP hardware unit
0x01b5	437	ATTDEV	acquire attributes of a DBP hardware unit
0x01b6	438	RMDEV	reconfigure a DBP hardware unit from the DBP system
0x01b7	439	RECONFIG	reconfigure the DBP system
0x01b8	440	T_MEASURE	start/stop collecting DBP traffic information
0x01b9	441	T_REPORT	report DBP traffic information
0x01ba	442	PARTITION	partition loads between the master and slave ???

DBP Return Codes

The following DBP return codes indicate why the instruction from the FP, VSP, or ACC(E) could not be executed.

Table D-2. Physical Filesystem Error Codes

Code	Mnemonic	Description
1	EPERM	permission denied - not owner
2	ENOENT	no such file or directory
3	ESRCH	no such process or task
4	EINTR	interrupted request
5	EIO	I/O error
6	ENXIO	no such device or address
7	E2BIG	argument too big
9	EBADF	bad file number - not open or write to read-only file
12	ENOMEM	not enough memory
13	EACCES	permission denied because access mode not correct
14	EFAULT	bad address
16	EBUSY	mount device busy
17	EEXIST	file exists
18	EXDEV	rename to cross device was attempted
19	ENODEV	no such device
20	ENOTDIR	not a directory
21	EISDIR	is a directory
22	EINVAL	invalid argument
23	ENFILE	file table overflow
24	EMFILE	too many open file
25	EMDEV	too many devices
26	ENOPART	out of partitions
27	EFBIG	file too large
28	ENOSPC	no space left on device
29	ESEEK	illegal seek
30	EMDEV	read-only filesystem
31	EMLINK	too many links to a file
32	EOPCODE	invalid command opcode
33	EBADM	bad master filesystem
34	EBADS	bad slave filesystem

Table D-3. Logical Filesystem Error Codes

Code	Mnemonic	Description
35	EKEXIST	key already exists or attempt to write on pristine file
36	EBADKEY	no record with desired key is found
37	EPLOCK	plock mode incompatible with existing plocks
38	ENXFILE	no more entries left in xfile
39	EXFS	fs or file differs from fs of xact
40	EPLXL	xlock not compatible with plock
41	EXLOCK	xlock not compatible with existing xlocks
42	EFORG	wrong file organization
43	EKEYLN	bad key length
44	EUNOC	unoccupied entry in btree table
45	EXPERM	file not xlocked right for this op
46	EXNFILE	xact can't lock so many files
47	EBADX	invalid transaction id
48	EBXMODE	illegal xact-lock
49	EBADFF	bad file format

Table D-4. Table and Field Error Codes

Code	Mnemonic	Description
50	ENTAB	no such table
51	ETABO	table not open
52	ENFIND	no such field index
55	EFNEMP	field not empty
56	ENFNAM	no such field name
57	EFNAML	field name too long
58	ENPRIM	wrong number of primary keys
59	ENSREC	not same record as in file
60	ETROOM	no room for another table
61	EIEOF	invalid end of file setting
62	ENPKEY	null primary key illegal
103	EDBPI	DBPI timeout on movefrom or moveto
134	EINIT	fatal error during DBP initialization
165	EBADCHK	bad DBP mailbox checksum
180	EBADSV	bad server or server hung
181	ESYNC	error during DBP shutdown, failed to close files and/or unmount filesystems
182	EASKU	controlling routine should ask user if he/she wants to continue
270	EPANIC	panic; DBP assertion failed

E. Remote Access to the SADI Monitor

This appendix describes how to access and use the SCSI AUDIX Disk Interface (SADI) monitor from a remote location. The SADI monitor can be used to display errors stored in the TN475 firmware. The SADI monitor can also be used to run tests (that is, commands that are stored in TN475 firmware) to debug any SCSI device.

The SADI monitor can be used in conjunction with the DBP monitor to test and debug the AUDIX DBP/disk subsystem.

This appendix includes the following:

- Remote SADI monitor installation
- SADI overview
- SADI error interpretation
- SADI monitor conventions
- SADI monitor device error log
- SADI monitor commands

REMOTE SADI MONITOR INSTALLATION

The remote maintenance terminal (RMT) can be used as a SADI monitor. Have someone at the customer site remove the RMT cable from H00 and connect it to the SADI MON connector as shown in Figure E-1. A null-modem cable is required.

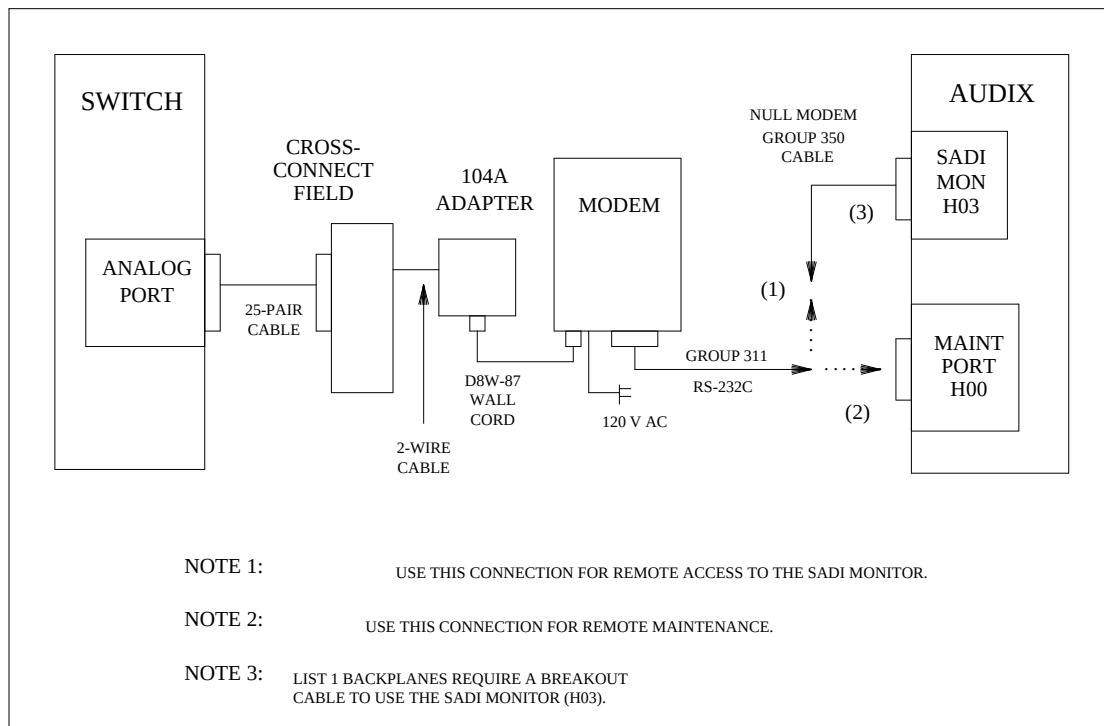


Figure E-1. Remote SADI Monitor Installation

SADI OVERVIEW

The SADI (TN475 circuit pack; the TN475C being the latest version) has LEDs on its faceplate which are used to indicate the status of the SADI and the SCSI devices. When the SADI or the AUDIX system is reset, the SADI performs diagnostic tests on the AUDIX disk subsystem.

SADI LED Indicators

The TN475 circuit pack has eleven (11) LEDs, which are numbered on the circuit pack's faceplate: nine yellow, one red, and one green.

- The yellow LEDs represent SCSI bus activity and the disks that are present on the bus
 - LEDs 10 (disk-0) through 16 (disk-6) represent the seven SCSI disks that can be connected to the bus.
 - LED 9 indicates bus activity between the SADI and DBP memory on the VME bus.
 - LED 17 indicates SCSI bus activity from the SADI.
- The green LED means that the SADI (TN475) is sane (it should be blinking).
- The red LED means the SADI is not operational.

The LEDs are also used during the SADI diagnostic tests to indicate which diagnostic test has passed.

SADI Diagnostics Performed After a Reset

After a SADI or system reset, the TN475 will perform its diagnostics. The red LED on the SADI will remain lit while the tests are being performed. The end of a successful SADI diagnostic is marked by the red LED going off and the green LED beginning to blink.

There are 13 main SADI diagnostic tests, and depending on the test there are many subtests. The TN475 LEDs (LED-10 through LED-13) will display a hexadecimal number corresponding to the test that is running or the test that has failed. If a test has failed, LED-14 through LED-17 will display the subtest that has failed (see appendix 7).

Following a successful diagnostic test, the SADI begins checking for disk drives present on the bus by issuing a series of commands. First, it will send the "start" command to any disk drive present on the bus. After sending this command to all the drives, the SADI will come back to the first disk drive and wait until it becomes ready.

The SADI will send various commands that will test each drive, find out what kind of drive it is, its size, and will write and read the maintenance blocks. The SADI firmware reserves the last 10 blocks of every disk drive for maintenance purposes. If a particular disk drive fails any of these commands (meaning the drive has a problem), the SADI will not turn on the LED corresponding to this disk drive. If the disk drive has no problems, the SADI will turn the drive's LED on.

SADI ERROR INTERPRETATION

Both the DBP and the SADI report errors caused by the AUDIX DBP/disk subsystem hardware or by the disk drives. These errors are reported on the DBP and SADI monitors, respectively.

DBP Errors

The SADI reports all its errors (when a test or load is running) to the DBP. This means that all the DBP errors should coincide with the SADI errors. When the DBP reports an error it is because the SADI has reported one to it. The following is an example of a DBP error, and how to determine its meaning.

```
RDB monitor (#) release 3.0 06/15/88
<RF1(0.2):0x1a9000,0x7025,29116>
** disk(0,2) sector[29116] READ retry[1]
```

In this example, the DBP receives a 7025 (see Table E-1) from the SADI, related to disk drive 2. This error means that this particular disk drive caused a SCSI bus reset. The DBP was doing a read to block 29116 (256 bytes per sector) of disk 2. Due to the read failure caused by the bus reset, the DBP retries the read command.

The DBP reports all errors (in decimal values) in terms of logical 256 bytes per sector. For the DBP block number to coincide with the SCSI (512 bytes per block) block it has to be divided by 2. For example:

$29116 / 2 = 14558$ (decimal SCSI block) or $38DE$ (hexadecimal SCSI block)

SADI Errors

These errors are caused by the disk drives, and by the host adapter hardware (TN475). The following are examples of SADI errors, and how to determine their meanings.

```
error:   error number = 0x52
         error status = 0x60405014
         device number = 0x2
         Sys_timer = 6836259
```

In this example, the SADI reports error number 52 (see Table E-2, *SADI Error Numbers*), with an error status of 60405014 (see Table E-3, *SADI Error Status*). This error means that disk 02 caused a SCSI protocol error, because it disconnected from the bus without applying the right protocol. According to the SCSI specification, this is to be considered a catastrophic error.

Test Unit Ready job returned with failed SCSI completion code: 0xd007

In this example, the SADI reports error code number 0xd007 (see Table E-6, *SCSI Completion Codes*). This error means that a SCSI bus reset was caused by this disk drive.

```
d_write SCSI check condition occurred for drive 0 on pre-read:
sense data is as follows:
Sense key = 0x3
Extended sense data block:
  0xf0 0x0 0x3 0x0 0xa 0x3 0xcd 0xa 0x0
  0x0 0x0 0x0 0x11 0x0 0x0 0x80 0x0 0x0
sys_timer = 20861
DBP block number = 1312666
```

These errors are the ones that best describe what is wrong with a specific disk drive.

In this example, the SADI reports a sense key of hexadecimal 3 and an extended sense error of hexadecimal 11 (see Table E-7, *Sense Key*, and Table E-8, *Extended Sensing Codes*). These errors mean that the SADI failed to read SCSI block a03cd (DBP block 1312666) on disk 00. The probable causes of this failure are a flaw in the medium or an error in the recorded data.

The SADI firmware keeps a log of device errors for each SCSI device. This log is stored in SADI VME bus RAM, and can be displayed in part or in full by using the SADI monitor "read memory" (*rdmem*) command.

The following sections describe how to use the SADI monitor, how to interpret the SCSI device error log, and the tests (commands) available.

SADI MONITOR CONVENTIONS

Keep in mind the following:

- Unless otherwise noted, UNIX shell conventions apply (that is, extra spaces and tabs are ignored, carriage returns are used to terminate input lines, etc.).
- All numerical values (both input and output) are interpreted as hexadecimal unless otherwise specified in the command manual page.
- The backspace character is the **CTRL** and **H** keys pressed simultaneously.
- The line-kill character is the ampersand sign "@".
- Output to the terminal may be stopped by pressing **CTRL** **S** and restarted by hitting any key.
- Command execution may be aborted with **BREAK** or **DELETE**.
- Typing ahead is not allowed. Once a carriage return is pressed, no additional input will be accepted (with the exception of control-S, control-Q, BREAK, and DELETE) until the next prompt appears.
- The monitor operates at 1200 baud.

- Entering a command without any arguments produces a synopsis of the command syntax.
- Entering "?", "help" (or any part of "help"), or a carriage return by itself on an input line produces a synopsis of syntax for all commands.
- Input lines may contain a maximum of 128 characters. For lines longer than 128 characters, the first 128 characters will be discarded.

Command synopsis:

- Arguments enclosed in brackets “[]” are optional.
- When two or more arguments, options, or commands enclosed in braces “{ }” or brackets “[]” and separated into choices by “|” (or), one and only one of those choices should be specified on the command line.

Monitor Data Buffers:

Two data buffers are set aside in the SADI DRAM for exclusive use by the monitor. These buffers are 32K-bytes apiece and start at address 0x80000 and 0x88000. The first buffer is the default for any commands using a monitor buffer. The second buffer may be specified if desired.

SADI MONITOR COMMANDS

The following is a list of commands available on the SADI monitor terminal. Along with each command is a description of its use (taken from its manual page).

ddev

Return information about a SCSI device.

Synopsis

ddev dev_id

Description

ddev allows the user to obtain information about the specified SCSI device. *dev_id* specifies a SCSI device number in the range 0-6.

The device information will be returned in the following format:

Device 0 status:

```
Device vendor: ABC
Device model: 12345
Device is fixed
Device is writeable
Device passes self-test
Device has 304600 logical blocks
Logical block size = 512 bytes
Logical unit structure address = 0x4480c
```

Examples

The following example returns information about SCSI device 1:

```
ddev 1
```

derrlog

Format and display the error log. **This command is only available with TN475B, or later, circuit packs.**

Synopsis

derrlog

Description

derrlog allows the user to display the error log in a format that is easier to read and interpret than dumping raw memory. Errors are displayed in the reverse order that they occurred (i. e., most recent error first). Information displayed includes the error number, error status, LU index (device id), and relative time the error occurred. The relative time is the time (x10 msec) that elapsed from the last SADI reset. Error numbers and associated status are found in Tables E-2 and E-3. The starting memory address where the error log is stored is also displayed.

Examples

The following example displays the error log:

```
derrlog
```


deverr

Return SCSI device error log information. **This command is only available with TN475C, or later, circuit packs.** If the AUDIX system is using a TN475 or TN475B, see *SADI MONITOR DEVICE ERROR LOG* towards the end of this appendix.

Synopsis

deverr dev_id

Description

deverr allows the user to obtain error log information about the specified SCSI device. *dev_id* specifies an SCSI device number in the range 0 through 6.

The device error log information will be returned in the following format:

Error log for device 1		
Recovered Errors	Unrecovered Errors	Other Errors
3	2	1

Sense Key	Extended Sense	SADI Block Number	DBP Block Number
0x2	0x14	0xao3cd	1312666
0x3	0x27	0xb043f	1443966
0x4	0x4	0x676c	52952
0x7	0x10	0x78929	987730
0x2	0x4	0xfffff	999999

Examples

The following example returns error log information about SCSI device 1:

```
deverr 1
```

inquiry

Send the SCSI inquiry command to a device.

Synopsis

inquiry dev_id

Description

The **inquiry** command sends a SCSI inquiry command to a SCSI device, and prints the returning data on the monitor. Data returned in the inquiry command includes the peripheral device type (disk, tape, printer, etc.), whether the media is removable, the vendor id, product id, and revision level. If the command fails, an explanatory message is printed.

Examples

The following example will send a SCSI inquiry command to device 2.

```
inquiry 2
```

pdms

Prepare data for mode select. **This command has development applications only.**

Synopsis

pdms dest_buf

Description

pdms is designed for a one specific purpose, that is, to be used in conjunction with the SCSI MODE SENSE and MODE SELECT commands (sent via the general-purpose *scsi* command). The sequence to use this command is as follows:

1. Read the current device parameters (using MODE SENSE) into monitor buffer 1.
2. Read the changeable parameters (again using MODE SENSE) into buffer 2.
3. Use the *pdms* command to operate on the data in buffer 1 and 2, storing the results in buffer 2.
4. Send the data in buffer 2 to the device using the MODE SELECT command.

NOTE

the buffer number used at each step is arbitrary, and may be reversed.

The *pdms* command performs the necessary operations to convert MODE SELECT data into a form usable for MODE SENSE. These operations include:

1. Zeroing out the first byte of the data (the sense data length).
2. Performing a bit-wise AND on the data, starting at the first byte of the first page, skipping over the 4-byte header and any block descriptors that may have been returned by the MODE SENSE. The AND is performed on 256 consecutive bytes.
3. Zeroes out the PS (Parameters Savable) bit of the first page. This is the most significant bit of the first byte of the page. If multiple pages are being sent with the MODE SELECT command, the PS bit of any subsequent pages must be zeroed manually (using the monitor *wmem* command).

Examples

The following example will use the mode sense data in monitor buffers 1 and 2 to prepare mode select data. The result will be stored in buffer 2.

```
pdms 2
```

rddev

Read data from a SCSI device.

Synopsis

rddev [-l length] [-b buffer] start_block dev_id

Description

rddev allows the user to read data from a SCSI device. The data read is copied to one of the monitor data buffers for later perusal (see the *rdmem* command). The starting logical disk block must be provided. The starting block number is taken to be decimal unless preceded by "0x", in which case it will be interpreted as hexadecimal. A SCSI logical device number between 0 and 6 must also be specified.

The following options are available:

- l length Length of read data in blocks. The length is taken to be decimal unless preceded by "0x", in which case it will be interpreted as hexadecimal. The total number of *bytes* read must not exceed 32768 (32KB). Since the number of bytes per block may be different for different devices, the maximum number of blocks that may be read will vary. An error message will be printed if the number of bytes (number of blocks x blocksize) requested is greater than 32KB. If no length is specified, 1 block is read.
- b buffer Monitor data buffer that data is to be read into. Data buffer 1 starts at 0x80000, and buffer 2 starts at 0x88000. Both buffers are 32KB in length. The default is data buffer 1.

Examples

The following example will read 1 block of data starting at block 100 (decimal) of SCSI device 1 into data buffer 1:

```
rddev 100 1
```

The following example will read 20 blocks of data starting at block 75 (hexadecimal) of SCSI device 3 into data buffer 2:

```
rddev -l20 -b2 0x75 3
```

rdmem

Read data from SADI memory.

Synopsis

rdmem [-w | -b] [-l length] address

Description

rdmem allows the user to read data from a SADI memory location. The starting memory address (in hexadecimal) must be specified.

The following options are available:

- b Printout in byte (2 hex digits) format. The default is byte format.
- w Printout in word (4 hex digits) format.
- l length Length of read data. The length is taken to be decimal unless preceded by "0x", in which case it will be interpreted as hexadecimal. The length is interpreted as bytes or words, depending on the display format requested (default byte). If no length is specified, 80 locations (bytes/words) are read and displayed.

Examples

The following example will read and display 50 bytes (decimal) of data starting at SADI memory location 0x5000.

```
rdmem -l 50 5000
```

The following example will read and display 1ff words (hexadecimal) of data starting at SADI memory location 0xfa4000.

```
rdmem -w -l 0x1ff fa4000
```

reset

Reset the SADI microprocessor.

Synopsis

reset

Description

reset allows the user put the gun to the head of the SADI and pull the trigger, for example, reset the SADI by forcing the SADI microprocessor to jump to the reset address. It goes without saying that this command blows away all operations in progress.

scsi

Send a SCSI command. **This command has development applications only.**

Synopsis

```
scsi [-b buffer] [-i | -o] [-t time] cmd_size dev_id
```

Description

scsi allows the user to send a SCSI command to the specified device. Before issuing the **scsi** command, the user must use the *wmem* command to type the command packet and output data (if any) into one of the monitor buffers, starting at the beginning of the buffer (address 0x80000 or 0x88000). The command line must also specify whether the command is a 6- or 10-byte (decimal) command, and the SCSI logical device number (0-6).

Input/output data for the command is written to or read from the specified monitor buffer starting at the address 16 bytes past the beginning of the buffer (address 0x80010 or 0x88010).

The following options are available:

- b *buffer* Monitor data buffer to be used. The default is data buffer 1.
- i, -o Data transfer direction. This specifies whether the data will be input (-i) or output (-o) from/to the SCSI bus. The default is input (-i). The amount of data to be transferred is automatically specified as 0xFF (decimal 256) bytes. However, the target may legally elect to transfer less, depending on the particular command.
- t *time* Maximum execution time for the command in decimal seconds. The default is one second, which is sufficient for most commands. If the command execution time exceeds the specified time, the command will be aborted and an error message will be printed.

Examples

The following example will send the SCSI 6-byte command stored in monitor buffer 1 to device 2, sending up to 256 (decimal) bytes of data in the buffer as output.

```
scsi -o 6 2
```

The following example will send the SCSI 10-byte command stored in monitor buffer 2 to device 3, reading up to 256 (decimal) bytes of data into the buffer. The command will have a maximum execution time of 30 seconds.

```
scsi -b2 -t30 -i 10 3
```

trace

Trace DBP accesses to the SCSI bus. **This command has development applications only.**

Synopsis

Description

The SADI provides the capability of storing a trace history of DBP read and write commands to the SADI. As yet, there is no actual monitor command to explicitly control this capability. This manual page describes how to control the trace using the *rdmem* and *wtmem* commands.

The trace history contains a record of DBP read and write accesses. Each access record contains the following information:

Byte 0, bit 7:	1 = write, 0 = read
Byte 0, bits 3-0:	device number (0-6)
Byte 1:	number of 256-byte blocks
Bytes 2-3:	relative time (x10 msec)
Bytes 4-7:	DBP block number

The trace history is stored in monitor buffer 2, starting at address 0x88000. The buffer is 32KB long, which allows up to 4K accesses to be stored (8 bytes per access).

There are two trace modes: continuous and single-pass. In continuous mode, when the trace buffer is full, the buffer pointer will wrap back to the beginning of the buffer, and tracing will continue until manually halted. In single-pass mode, tracing is automatically halted when the buffer becomes full.

The trace control word (global variable *trace*) is a 16-bit word that specifies the trace function. Tracing can be controlled by writing the trace control word via the monitor *wtmem* command. The layout of the trace control word is as follows:

Bit 15:	1 = trace on, 0 = trace off
Bit 14:	1 = continuous, 0 = single-pass
Bit 13-7:	unused
Bits 6-0:	1 = device traced, 0 = device not traced

The 32-bit global variable *trace_ptr* points to the address in the trace buffer where the next access will be stored. This variable can be read via the monitor *rdmem* command to determine where the last valid trace data was stored.

The addresses of the *trace* and *trace_ptr* variables can be obtained via the monitor *help* command.

Examples

The following example will start a single-pass trace to store DBP accesses to device 2 (assuming the *trace* variable is located at address 0x44458):

```
wtmem -w 44458 0x8004
```

The following example will start a continuous trace to store DBP access to all devices (0-6) (assuming the *trace* variable is located at address 0x44458):

```
wtmem -w 44458 0xC0FF
```

The following example will print the results of a single-pass trace, one access per line:

```
rdmem -l0x8000 88000
```

wtdev

Write data to a SCSI device.

Synopsis

wtdev [-l length] [-b buffer] start_block dev_id

Description

wtdev allows the user to write one or more blocks of data to a SCSI device. The data to be written will be taken from the specified monitor buffer. The starting device logical block must be provided. The starting block number is taken to be decimal unless preceded by "0x", in which case it will be interpreted as hexadecimal. A SCSI logical device number between 0 and 6 must also be specified.

The following options are available:

- l length Length of write data (in blocks). The length is taken to be decimal unless preceded by "0x", in which case it will be interpreted as hexadecimal. If no length is specified, one block is written.
- b buffer Monitor data buffer that data is to be read from. Data buffer 1 starts at 0x80000, and buffer 2 starts at 0x88000. The default is data buffer 1. The buffers are 32KB in length so the total number of bytes to be written must not exceed 32768 (32KB). Since the number of bytes per block may be different for different devices, the maximum number of blocks that may be written will vary. An error message will be printed if the number of bytes (number of blocks x blocksize) requested is greater than 32K-byte.

Examples

The following example will write 1 block of data to block 100 (decimal) of SCSI device 1:

```
wtdev 100 1
```

The following example will write 20 blocks of data from monitor data buffer 2 to block 75 (hexadecimal) of SCSI device 3:

```
wtdev -b2 -l20 0x75 3
```

wtmem

Write data to SADI memory. **This command has development applications only.**

Synopsis

wtmem [-w | -b] [-l length] address data

Description

wtmem allows the user to write data to SADI memory. The starting address and data pattern must be specified.

The data pattern is taken to be decimal unless preceded by “0x”, in which case it will be interpreted as hexadecimal. The specified data pattern will be repeated enough times to provide enough data to fill the specified length. The data pattern is right-justified, for example, 1 writes a pattern of 01 (if byte format) or 0001 (if word format).

If a memory location being written is non-equipped or non-writable (ROM), an error message will be printed and the command will terminate.

The following options are available:

- b Data format — bytes (8 bits). The default is bytes.
- w Data format — words (16 bits).
- l length Length of write data. The length is taken to be decimal unless preceded by "0x", in which case it will be interpreted as hexadecimal. The length is interpreted as bytes or words, depending on the data format requested (default byte). If no length is specified, one byte/word is written.

Examples

The following example will write 50 bytes (decimal) of data consisting of pattern 0x0a starting at SADI memory location 0x80000.

```
wtmem -l 50 80000 0xa
```

The following example will write 1ff words (hexadecimal) of data consisting of pattern 0x00a5 starting at SADI memory location 0xfa4000.

```
wtmem -w -l 0x1ff fa4000 0xa5
```

SADI MONITOR Device Error Log

(Use only with the TN475 or TN475B circuit pack.)

The SADI firmware keeps a log of device errors for each SCSI device. This log is stored in SADI VME bus RAM starting at address 0xfa5000 and can be displayed in part or in full by using the monitor “read memory” (*rdmem*) command. (The starting address is also displayed in the monitor “help” menu.) This section describes how to interpret the SCSI device error log.

The error log contains one section for each of the seven SCSI devices. Each section has cumulative error counters for recovered, non-recovered, and other errors, and space for a log of the last four errors, including the SCSI sense key, additional sense, and logical block number. The following table gives byte-by-byte detail of the information contained in each section:

Bytes (hex)	Contents
0	Device number (0-6)
1	Total soft (recovered) errors
2	Total hard (non-recovered) errors
3	Total other errors
4-7	Pointer to next free log entry
8	Error 1 — sense key
9	Error 1 — additional sense
A-B	Error 1 — fill (unused)
C-F	Error 1 — logical block number
10	Error 2 — sense key
11	Error 2 — additional sense
12-13	Error 2 — fill (unused)
14-17	Error 2 — logical block number
18	Error 3 — sense key
19	Error 3 — additional sense
1A-1B	Error 3 — fill (unused)
1C-1F	Error 3 — logical block number
20	Error 4 — sense key
21	Error 4 — additional sense
22-23	Error 4 — fill (unused)
24-27	Error 4 — logical block number

A typical device error log is shown below. A dump of these memory locations can be obtained by entering:

```
rdmem -l0x28 0xfa5050
```

This is the monitor “read memory” command to dump memory starting at address 0xfa5050 for a length of 28 bytes.*

```
0xfa5050 0x2 0x20 0x5 0x2 0x0 0xfa 0x50 0x58
0xfa5058 0x1 0x14 0x0 0x0 0x0 0x0 0x75 0x33
0xfa5060 0x1 0x14 0x0 0x0 0x0 0x0 0x75 0x33
0xfa5068 0x3 0x11 0x0 0x0 0x0 0x7 0xA1 0x2A
0xfa5070 0x1 0x14 0x0 0x0 0x0 0x0 0x75 0x33
```

The leftmost numbers in the lines above indicate the starting address of the memory locations displayed in the corresponding line.

The first byte of data indicates this is the error log for device number 2. The next three bytes indicate that 20 (hex) recovered errors, 5 non-recovered errors, and 2 other errors were reported by this device since the SADI was last powered up. Bytes 0xfa5054 through 0xfa5057 (the last four bytes on the first line) indicate that the next error will be logged at address 0xfa5058, and the last error that occurred is logged at address 0xfa5070 (since the error log is a circular buffer).

The next four lines show the detailed status of the last four errors that occurred. The line showing address 0xfa5058 shows a SCSI sense key of 1 (recovered error), with an additional sense key of 0x14 (no record found). This error occurred at SCSI logical block 0x7533. The lines showing addresses 0xfa5060 and 0xfa5070 indicate two other occurrences of the same error at the same block. The line showing address 0xfa5068 shows a SCSI sense key of 3 (non-recovered error), with an additional sense key of 0x11 (non-recovered read error). This error occurred at SCSI logical block 0x7A12A.

Tables E-7 and E-8 contain definitions for the SCSI sense keys and additional sense codes.

* If the AUDIX system has a TN475C, or later, circuit pack, use the “deverr” command to obtain this information.

Table E-1. DBP Command Completion Status Codes

Mnemonic	Code	Description
NOERROR	7000	No Errors
SEDCRC	7001	Data CRC Error
SEWPROT	7002	Disk Write Protected
SENRDY	7003	Disk Not Ready
SERDDL	7004	Read Deleted Data Mark (Floppy Only)
SEINVDNO	7005	Invalid Device Number
SEINVDADR	7006	Invalid Disk Address
SERST	7007	Restore Error
SENOREC	7008	Record not Found
SEAMCRC	7009	Address Mark CRC Error
SEDMACH	700A	DMA Channel Error
SECHKSUM	700B	Checksum Error
SEDBUSY	700C	Device Busy
SECHBUSY	700D	Channel Busy
SEINDET	700E	Indeterminate
SECNTL	700F	Controller Error
SEDEV	7010	Device Error
SESEEK	7011	Seek Error
SENODEV	7012	No Device Error
SEDEVCON	7013	Device Connect Conflict
SECMP	7014	Compare Error
SESECWPROT	7015	Sector Write Protected
SEBADSEC	7016	Bad Sector
SETIMOUT	7017	Timeout
SEINVCMD	7018	Invalid Command
SEDMABUS	7019	DMA Bus Error
SEDMAMAP	701A	DMA Mapping Error
SEDMACTL	701B	DMA Controller Error
SEVMEBERR	701D	VME bus error
SESPCDMAC	7020	SPC<->DRAM DMAC error
SEDRAMDMAC	7021	DRAM<->FIFO DMAC error
SEVTBDMAC	7022	FIFO<->VTB DMAC error
SEDRAM	7023	DRAM parity
SEFIFO	7024	FIFO error
SECRESET	7025	This controller caused SCSI bus reset
SERESSET	7026	Another controller caused SCSI bus reset
SECONTNTN	7062	Contention error

Table E-2. SADI Error Numbers (*part 1 of 4*)

Number	Description
0x00000001	bad state in init_dev_ble() stat reg: idev_state
0x00000002	bad sadi_state in init_dev_ble() stat reg: sadi_state
0x00000003	expect_int non-zero at base level stat reg: expect_int
0x00000004	buffer q job did not have need_buf = TRUE stat reg: job's command opcode
0x00000005	vtb_q job type not DBP_READ or DBP_WRITE stat reg: job_type field of invalid job
0x00000006	invalid job type stat reg: job_type field of invalid job
0x00000007	job has invalid command type stat reg: cmd_type field of invalid job
0x00000008	no buffers on free buffer queue stat reg: 0
0x00000009	invalid job type in job_disp() stat reg: job's job type
0x0000000A	job cannot be deq'd from free job Q stat reg: 0
0x0000000B	job on monjd_q not monitor cmd type stat reg: job->cmd_type
0x0000000C	job on intjd_q not internal cmd type stat reg: job->cmd_type
0x0000000D	job on dbpjd_q not dbp cmd type stat reg: job->cmd_type
0x00000010	no job on monjd_q stat reg: 0
0x00000011	no job on intjd_q stat reg: 0
0x00000012	no job on dbpjd_q stat reg: 0
0x00000013	job on intjd_q has invalid cmd opcode*/ stat reg: cmd->opcode
0x00000014	job on dbpjd_q has invalid cmd opcode*/ stat reg: cmd->opcode
0x00000015	job pointer does not point to valid job stat reg: invalid job pointer
0x00000016	buffer pointer does not point to valid buffer stat reg: invalid buffer pointer in job structure

(Continued)

TABLE E-2. SADI Error Numbers (*part 2 of 4*)

Number	Description
0x00000017	job_buf_bleve() did not find all jobs stat reg: jobs_present
0x00000018	job_buf_bleve() did not find all buffers stat reg: bufs_present
0x00000019	a job queue is full stat reg: address of queue struct
0x0000001A	free job queue is full stat reg: 0
0x0000001B	ROM checksum error — rom_bleve() stat reg: calculated checksum
0x0000001C	CB RAM error — cbam_bleve() stat reg: address of failure word
0x0000001D	DRAM error — dram_bleve() stat reg: address of failure word
0x00000020	int_cmds array is full stat reg: cmd opcode that overflowed
0x00000021	dbp status array is full stat reg: 0
0x00000022	no free timer structures left stat reg: 0
0x00000023	timer to be cleared is not in use stat reg: timer id
0x00000024	ck_timers(): timer's job did not point back to timer stat reg: timer's job->time_id
0x00000025	job_cleanup(): job's timer did not point back to job stat reg: job timer's job id
0x00000026	timer marked in use w/o valid job or function pointer stat reg: timer id
0x00000027	pull_job() did not find the job on the queue stat reg: pointer to job
0x00000028	monitor raw char queue full stat reg: 0
0x00000029	unknown monitor special character stat reg: special character
0x0000002A	invalid DBP channel cmd type stat reg: channel cmd type
0x0000002B	invalid DBP device cmd type stat reg: device cmd type
0x0000002C	DBP missed a cmd packet ack/nak interrupt stat reg: 0

(Continued)

TABLE E-2. SADI Error Numbers (*part 3 of 4*)

Number	Description
0x00000030	DBP missed a status packet interrupt stat reg: 0
0x00000031	We NAK'd a DBP cmd packet stat reg: 0
0x00000032	DBP cmd handler state variable invalid stat reg: command handler state variable
0x00000033	DMAC SW abort was not effective stat reg: DMAC channel address
0x00000034	DRAM DMAC error stat reg: DMAC channel err. reg
0x00000035	VTB DMAC error stat reg: DMAC channel err. reg
0x00000036	SPC_DMAL done but no active job stat reg: SPC DMAC channel err. reg
0x00000037	vtb job done but FIFO not empty stat reg: job->job_type
0x00000038	dma_setup received odd byte count for word xfer stat reg: 0
0x00000039	USART receiver overrun, parity, or frame error stat reg: USART receiver status register
0x0000003A	CPU interrupts not all enabled on entry to blev_disp() stat reg: CPU status register (interrupt level)
0x0000003B	MFP->imra not set properly on entry to blev_disp() stat reg: MFP->imra
0x0000003C	MFP->imrb not set properly on entry to blev_disp() stat reg: MFP->imrb
0x00000040	Bus exception error stat reg: program counter
0x00000041	Address exception error stat reg: program counter
0x00000042	Illegal instruction error stat reg: program counter
0x00000043	Divide by zero error stat reg: program counter
0x00000044	Privileged instruction error stat reg: program counter
0x00000045	sanity timer stat reg: program counter
0x00000046	Check instruction error stat reg: 0

(Continued)

TABLE E-2. SADI Error Numbers (*part 4 of 4*)

Number	Description
0x00000047	Trap instruction error stat reg: 0
0x00000048	Undefined error interrupt stat reg: 0
0x00000049	VME-disk FIFO U/O run stat reg: 0
0x0000004A	DRAM parity error stat reg: 0
0x0000004B	VME bus error stat reg: 0
0x0000004C	VME bus access timeout stat reg: 0
0x0000004D	MFP timer A interrupt stat reg: 0
0x0000004E	MFP timer B interrupt stat reg: 0
0x0000004F	invalid error number passed to error() stat reg: bad error number
0x00000050	No LU on bus free q (even though LU_ONBFQ flag was set) stat reg: 0
0x00000051	two immed. cmds to same LU stat reg: LU index
0x00000052	SCSI protocol error stat reg: unique code for each call with this error
0x00000053	invalid SCSI function request stat reg: invalid request (command opcode)
0x00000054	unexpected job return code stat reg: job->ret_code
0x00000055	"request sense" job returned "check condition" status stat reg: sc_comp_code
0x00000056	reselect with LU number stat reg: LU number
0x00000057	LU suspend bit cleared by init_devs_blew stat reg: 0
0x00000058	SPC DMAC error stat reg: DMAC channel err. reg
0x00000059	two DBP cmds at once to same device

Table E-3. SADI Errors Status (*part 1 of 6*)

Error	Description
60400001	The attempt to negotiate synchronous protocols failed. The secondary error status word indicates the reason for the failure. The relevant values are 1 indicating the bus connect timer timed out, 3 indicating an unrecovered parity error, and 4 indicating a SCSI protocol error.
60400002	The target controller rejected a message causing the host adapter to reset the bus. The secondary error status word contains the message that has been rejected. This is either an identify message or a NO-OP message.
60404001	The attempt to send the abort or reset message failed. The secondary error status word indicates the reason for the failure. The relevant values are 1 indicating the bus connect timer timed out, 3 indicating an unrecovered parity error, and 4 indicating a SCSI protocol error.
60404002	The target controller did not disconnect from the bus. Either no interrupt was detected or an interrupt other than DISCONNECT was set. The secondary error status word contains the contents of the SPC interrupt register. If this has a value of 0 then the connect timer expired. Any other value indicates which interrupt bit was set.
60405001	The bus connect timer expired before an interrupt was detected in the SPC. The secondary error status word is NULL.
60405002	The target requested a DATA_OUT phase when the scsi control block indicated a read job. The secondary error status word is NULL.
60405003	The target requested a DATA_IN phase when the scsi control block indicated a write job. The secondary error status word is NULL.
60405004	The bus connect timer expired while attempting to obtain the status byte from the target. The secondary error status word contains the value returned by the get_onebyte() function.

(Continued)

TABLE E-3. SADI Errors Status (*part 2 of 6*)

Error	Description
60405005	A parity error was detected while attempting to obtain the status byte from the target. The attempt to send an INITIATOR_DETECT_ERR message also failed. The secondary error status word contains the value returned by the send_msg() function.
60405006	The bus connect timer expired while attempting to send the command bytes to the target. The secondary error status word contains the value returned by the xfer() function.
60405007	A parity error was detected while attempting to send the command bytes to the target. The attempt to send an INITIATOR_DETECT_ERR message also failed. The secondary error status word contains the value returned by the send_msg() function.
60405008	The bus connect timer expired while attempting to obtain a message from the target. The secondary error status word contains the value returned by the get_msg() function.
60405009	A parity error was detected while attempting to obtain a message from the target. The attempt to send a MESSAGE_PARITY_ERR message also failed. The secondary error status word contains the value returned by the send_msg() function.
6040500A	An error occurred while attempting to reply to a target initiated synchronous protocol message exchange. The secondary error status word contains the value returned by the send_msg() function.
6040500B	An error occurred while trying to recover from a parity error that occurred while attempting to reply to a target requested synchronous protocol message exchange. This happened either during the sending of the INITIATOR_DETECT_ERR message or during the retransmission of the reply to the target's synchronous protocol message. The secondary error status word contains the value returned by the send_msg() function.
6040500C	An error occurred while attempting to send a MESSAGE_REJECT message after receiving an unrecognized extended message. The secondary error status word contains the value returned by the send_msg() function.

(Continued)

TABLE E-3. SADI Errors Status (*part 3 of 6*)

Error	Description
6040500D	1) An unrecognized extended message was received. 2) An attempt was made to send a MESSAGE_REJECT message. 3) The SPC detected a parity error while sending the MESSAGE_REJECT. 4) The attempt to send an INITIATOR_DETECT_ERR message encountered an error. The secondary error status word contains the value[returned by the send_msg() function.
6040500E	1) An unrecognized extended message was received. 2) An attempt was made to send a MESSAGE_REJECT message. 3) The SPC detected a parity error while sending the MESSAGE_REJECT. 4) An INITIATOR_DETECT_ERR message was sent. 5) An attempt was made to resend the MESSAGE_REJECT message and the retry encountered an error. The secondary error status word contains the value returned by the send_msg() function.
6040500F	An unrecognized message code was received from the target controller. This could be either an invalid message code or an identify message, neither of which are legal at this point.
60405010	The target requested a message out phase and an attempt to send a message was made. The secondary error status word contains the value returned by the send_msg() function.
60405011	The target requested a message out phase and an attempt to send a message was made. A parity error was detected and an attempt was made to send an initiator detected error message, and then resend the original message. An error occurred while sending one of these messages. The secondary error status word contains the value returned by the send_msg() function.
60405012	The target requested a message out phase but there was no message to be sent.
60405013	The target requested a transfer in an invalid bus phase.

(Continued)

TABLE E-3. SADI Errors Status (*part 4 of 6*)

Error	Description
60405014	The target disconnected from the bus without sending either a disconnect message or a command complete message. According to the SCSI specification this is to be considered a catastrophic error.
60405015	The SPC chip interrupt register had the SELECTED interrupt bit set while the SADI was already connected to a target controller.
60405016	The SPC chip interrupt register had the RESELECTED interrupt bit set while the SADI was already connected to a target controller.
60405017	The SPC chip interrupt register had the TIMEOUT bit set. This bit is used during the selection process when the target controller being selected does not respond. It should not become set while connected to a target controller.
60405018	The SPC chip interrupt register had the SPC_ERROR bit set. The secondary error status word contains the value of the SPC error status register.
60405019	A reset condition was detected on the SCSI bus.
6040E001	A reselected interrupt was received and a parity error occurred while attempting to obtain the identify message. An attempt to send a MESSAGE PARITY ERROR message and then to get the identify message again when another error was detected. The secondary error status word indicates the value returned from either the send_msg() or the get_onebyte() functions.
6040E002	An error occurred while trying to send a NO_OP message to get the identify message. This occurred after we attempted to select (setting ATN) and a target reselects us instead. The target responded to the ATN condition while in the middle of sending us its identify message.
6040E003	A reselected interrupt was received and an error (other than a parity error) occurred while attempting to obtain the identify message. The secondary error status word indicates the value returned by the get_onebyte() function while attempting to get the message.
6040E004	A RESELECTED interrupt was received but the message sent from the target for identification did not have the MSB set (it was not an identify message).

(Continued)

TABLE E-3. SADI Errors Status (*part 5 of 6*)

Error	Description
6040E005	A RESELECTED interrupt was received and the identify message that was received indicated a logical unit for which no job was in progress.
6040E006	A RESELECTED interrupt was received and a proper identify byte was obtained. The target subsequently requested a message from the host adapter and a NO_OPERATION message was sent. This message was rejected.
6040E007	A DISCONNECTED interrupt was received and the BUS FREE ENABLE bit in the SPC phase control register was not set. This implies that an active DMA job disconnected without any notice (such as a disconnect message or a command complete message) from the target.
6040E008	A DISCONNECTED interrupt was received and the BUS FREE ENABLE bit in the SPC phase control register was not set, but there was no active logical unit.
6040E009	A COMMAND COMPLETE interrupt was received indicating that a DMA job completed. While continuing to process the job the target requested a message from the host adapter and then rejected the message. If a parity error had been detected then the message would have been INITIATOR DETECTED ERROR, otherwise a NO_OPERATION message would have been sent.
6040E00A	A COMMAND COMPLETE interrupt was received indicating that a DMA job completed, but there was no active LU.
6040E00B	A SERVICE REQUIRED interrupt was received indicating that the target changed bus phases during a DMA job. The bsh() function was called to continue processing the targets requests. If the SPC chip had detected a parity error with the DMA transfer then the bsh() is instructed to send an INITIATOR DETECTED ERROR message. Otherwise no message is to be sent. The bsh() function returned indicating that a MESSAGE REJECT message was received.

(Continued)

TABLE E-3. SADI Errors Status (*part 6 of 6*)

Error	Description
6040E00C	The SPC TIMEOUT interrupt was detected. This bit is used during the selection process when the target controller being selected does not respond. It should not become set while a selection is not being attempted. The host adapter for the affected bus had a job in progress (doing DMA) at the time this interrupt occurred.
6040E00D	The SPC TIMEOUT interrupt was detected. This bit is used during the selection process when the target controller being selected does not respond. It should not become set while a selection is not being attempted. The host adapter for the affected bus did not have a job in progress at the time this interrupt occurred.
6040E00E	The SPC_ERROR interrupt was detected. The secondary error status word contains the value of the SPC error status register. The host adapter for the affected bus had a job in progress (doing DMA) at the time this interrupt occurred.
6040E00F	The SPC_ERROR interrupt was detected. The secondary error status word contains the value of the SPC error status register. The host adapter for the affected bus did not have a job in progress at the time this interrupt occurred.
6041C001	The time specified for the overall SCSI job timing expired and an ABORT message was successfully sent to the target working on the job. However the target did not disconnect from the bus as it should in response to an ABORT message. The secondary error status word contains the contents of the SPC interrupt register at the time the bus_reset() function was called.
6041C002	The time specified for the overall SCSI job timing expired and an attempt was made to send an ABORT message to the target controller. The target did not respond properly to the ABORT message. The secondary error status word contains the value returned by the send_msg() function.

Table E-4. SADI Diagnostic Tests

Number	Test	Subtests
1	CPU test	no sub-tests
2	EPROM test	no sub-tests
3	Control Bus RAM test	no sub-tests
4	MFP chip	1. Register test 2. Timer A test without interrupt 3. Timer A test with interrupt Note: This is also the first test of an external CPU interrupt. 4. Timer B test without interrupt 5. Timer B test with interrupt 6. Timer C test without interrupt 7. Timer C test with interrupt 8. USART functionality test 9. USART 300-baud rate test 10. USART 1200-baud rate test 11. USART 9600-baud rate test
5	PIT chip	1. Register test 2. Sanity timer test
6	DRAM	1. Parity test — low byte, parity bit = 1 2. Parity test — low byte, parity bit = 0 3. Parity test — high byte, parity bit = 1 4. Parity test — high byte, parity bit = 0 5. Pattern test — pattern 0xAEb9 6. Pattern test — pattern 0x5146 7. Address test 8. Address-complement test
7	VME bus RAM	1. Pattern test 2. Address test 3. Address-complement test
8	FIFO circuit	1. DTB to VTB — clear test 2. DTB to VTB — fill test 3. DTB to VTB — full test 4. DTB to VTB — overflow test 5. DTB to VTB — read test 6. DTB to VTB — empty test 7. DTB to VTB — underflow test

(Continued)

TABLE E-4. SADI Diagnostic Tests (*Continued*)

Number	Test	Subtests
8	FIFO circuit	8. VTB to DTB — clear test 9. VTB to DTB — fill test 10. VTB to DTB — full test 11. VTB to DTB — overflow test 12. VTB to DTB — read test 13. VTB to DTB — empty test 14. VTB to DTB — underflow test
9	DTB DMAC	1. Register test 2. DRAM->FIFO without interrupts 3. FIFO->DRAM with interrupts
10	VTB DMAC	1. Register test 2. VTB RAM->FIFO without interrupts 3. FIFO->VTB RAM with interrupts 4. DRAM->VTB RAM with interrupts 5. VTB RAM->DRAM with interrupts
11	VME bus access	no sub-tests
12	SPC chip	1. Register test 2. Select without attention 3. Select with attention 4. *Data out 5. Manual transfer (initiator) 6. Reset ATN, BSYI signal 7. Reselection 8. *Data in 9. *Message out 10. *Message in 11. *Command 12. *Status 13. Manual transfer (target) 14. Bus release 15. SPC interrupt to CPU * Also tests the SPC DMAC channel.
13	Extended DRAM	1. galpat — 1 thru field of 0s 2. galpat — 0 thru field of 1s 3. galpat — 11 thru field of 0s 4. galpat — 00 thru field of 1s 5. address-complement test

Table E-5. SADI Diagnostic Test LED Numbers

Diagnostic Test	LEDs 13-10
1. CPU	0001
2. EPROM	0010
3. Control bus RAM	0011
4. MFP chip	0100
5. PIT chip	0101
6. DRAM	0110
7. VME bus RAM	0111
8. FIFO circuit	1000
9. DTB DMAC	1001
10. VTB DMAC	1010
11. VME bus access	1011
12. SPC chip	1100
13. Extended DRAM	1101

Note: A “1” indicates the LED is on, a “0” indicates it is off.

Table E-6. SCSI completion codes

Mnemonic	Code	Description
JOB_OK	0x0001	job completed successfully
PROGRES	0x0013	Job in progress
UNUSED	0x0014	Job not in use
SUSPEND	0x1000	Processing has been suspended
MESS	0x2000	A message has been sent
RETRY	0x4000	Retry the job
ERROR	0x8000	An error was detected
NOTEQ	0x800A	Addressed device not present
SCBERR	0x800F	SCB error
ONEIC	0x8017	More than one immediate command
SFBERR	0x8019	SFB error
MEMERR	0xA00C	Memory fault
SBUSER	0xA00D	SCSI bus error
OOS	0xA010	Device is out of service
CRESET	0xD007	Reset was caused by this unit
TIME	0xD009	Job timed out
SHORT	0xD00C	unexpected short xfer
CKSTAT	0xD00E	Check the status byte
NOSELE	0xD011	The SCSI bus select failed
MISMAT	0xD012	parameter mismatch
QFLUSH	0xE004	Job was flushed
ABORT	0xF005	Command was aborted
RESET	0xF006	Reset was detected on the bus

Table E-7. Sense Key

Sense Key	Description
0h	NO SENSE. Indicates that there is no specific sense key information to be reported for the specific disk drive.
1h	RECOVERED ERROR. Indicates that the last command completed successfully with some recovery action performed by the specific disk drive.
2h	NOT READY. Indicates that the specific disk drive cannot be accessed.
3h	MEDIUM ERROR. Indicates that the command terminated with a nonrecovered error condition that was probably caused by a flaw in the medium or an error in the recorded data.
4h	HARDWARE ERROR. Indicates that the specific disk drive detected a nonrecoverable hardware failure while performing the command or during self test.
5h	ILLEGAL REQUEST. Indicates that there was an illegal parameter in the command descriptor block or in the additional parameters supplied as data for some commands.
6h	UNIT ATTENTION. Indicates that the removable medium may have been changed or the specific disk drive has been reset.
7h	DATA PROTECT. Indicates that an attempt was made to write on a specific disk drive that was write protected. The write operation is not performed.
8h	BLANK CHECK. Indicates that a sequential-access device encountered a blank block while reading.
9h	VENDOR UNIQUE. This sense key is available for reporting vendor unique conditions.
Ah	Copy aborted
Bh	Aborted command
Ch	Equal
Dh	VOLUME OVERFLOW. Indicates that a buffered peripheral device has reached the end-of-medium and data remains in

the buffer that has not been written to the medium.

Eh Miscompare

Fh Reserved

Table E-8. Extended Sense codes

Code	Description
0x00	No Additional Sense
0x01	No Index/Sector Signal
0x02	No Seek Complete
0x03	Write Fault
0x04	Drive Not Ready
0x05	Drive Not Selected
0x06	No Track Zero found
0x07	Multiple Drives Selected
0x10	ID CRC or ECC error
0x11	Unrecovered Read error
0x12	No Address Mark in ID
0x13	No Address Mark in Data
0x14	No record found
0x15	Seek error
0x16	Recovered Data Address Mark
0x17	Recovered Read with retry
0x18	Recovered Read with ECC
0x19	Defect List error
0x1A	Parameter Overrun
0x1B	Sync Transfer error
0x1C	Primary Defect List not found
0x1D	Compare error
0x1E	Recovered ID with ECC
0x20	Invalid Command Opcode
0x21	Illegal Block Address
0x22	Illegal Function
0x24	Illegal Field in CDB
0x25	Invalid LUN
0x26	Invalid Parameter List
0x27	Write Protected
0x28	Medium Changed
0x29	Power Up or Reset
0x2A	Mode Select Parameter changed
0x30	Incompatible Cartridge
0x31	Format Failed

TABLE E-8. Extended Sense codes (*Continued*)

Code	Description
0x32	No Defect Spares Available
0x40	RAM Failure
0x41	ECC Diagnostic Failure
0x42	Power On Failure
0x43	Message Reject Error
0x44	SCSI hw/fw Error
0x45	Select/Reselect Failed
0x46	Unsuccessful Soft Reset
0x47	Parity Error
0x48	Initiator Detected Error
0x49	Illegal Message
0x70	Self Test 0 Failed
0x71	Self Test 1 Failed
0x72	Self Test 2 Failed
0x73	Self Test 3 Failed
0x74	Self Test 4 Failed
0x75	Self Test 5 Failed
0x76	Self Test 6 Failed
0x77	Self Test 7 Failed
0x78	Self Test 8 Failed
0x79	Self Test 9 Failed
0x7A	Self Test A Failed
0x7B	Self Test B Failed
0x7C	Self Test C Failed
0x7D	Self Test D Failed
0x7E	Self Test E Failed
0x7F	Self Test F Failed
0x80	0 Bit Correctable ECC
0x81	1 Bit Correctable ECC
0x82	2 Bit Correctable ECC
0x83	3 Bit Correctable ECC
0x84	4 Bit Correctable ECC
0x85	5 Bit Correctable ECC
0x86	6 Bit Correctable ECC
0x87	7 Bit Correctable ECC
0x88	8 Bit Correctable ECC
0x89	9 Bit Correctable ECC
0x8A	A Bit Correctable ECC
0x8B	B Bit Correctable ECC
0x8C	C Bit Correctable ECC
0x8D	D Bit Correctable ECC
0x8E	E Bit Correctable ECC
0x8F	F Bit Correctable ECC

F. Remote Access to ACCE Trace Information

This appendix describes how to access the ACCE trace information from a remote location.

NOTE

You must have an INitialization and ADminstration System (INADS) login to access this information.

FEATURE OVERVIEW

Firmware on the ACCE circuit pack logs protocol messages sent to and received from other AUDIX systems in a digital network. In pre-R1V7 systems, this information is only accessible via an ACCE monitor at the site.

In R1V7 and with the new TN539B ACCE, this information is provided for remote locations using a maintenance form accessible via an INADS login. This form is also accessible by an on-site technician if they have an INADS login. The ACCE monitor is no longer required.

CAPTURING AND DISPLAYING TRACE INFORMATION

The technician can activate any chosen ACCE trace level*, capturing at least 100 lines of trace output and display it via the forms interface. The FP software picks up the trace information and stores it in memory.

FP Memory Retention

The trace information saved in FP memory will be lost when there is a system restart or reboot. Trace output is overwritten in FP memory each time the trace is activated.

When the FP buffer is full, the polling task instructs the ACCE to terminate the trace output and quits. At any time, either during or after polling, the FP memory buffer may be viewed. When the trace is re-activated, the FP memory buffer is cleared and new data is collected.

* L1, L2, L3 - DCP protocol levels: Physical, LAPD, X.25PLP respectively.

The collected data in the FP memory buffer will be retained until the next reboot/restart or until the next time the monitor trace is activated.

If the ACCE is reset, no trace settings are retained. The ACCE will revert back to the RS232 monitor (default configuration).

ACCE Trace Forms Interface

Use the following new maintenance forms to display the trace information:

- `maintenance : acce trace : specification` — the user specifies the trace level (the level of protocol information to be saved by the trace) and activates the trace.
- `maintenance : acce trace : display` — the user displays the trace information.

The Specification Form

Inputs for the *maintenance : acce trace : specification* form are described below:

- **start** : This field is used to turn the monitor trace on. Valid entries are "a-z,A-Z,0-9" to start the trace. CHANGE/RUN is used with this field.

NOTE

start may be used at any time when *stop* is not specified. If *start* is selected when the trace is already running, the trace data already collected will be flushed and new data collected. If a new trace level was also specified, the new level will be in effect.

Only forward scanning without search or filtering capabilities will be provided.

When the ACCE trace is activated, the output corresponding to all channels will be displayed. There is no provision to filter or specify individual channels for output.

- **stop** : This field is used to turn the monitor trace off. Valid entries are "a-z,A-Z,0-9" to stop the trace. CHANGE/RUN is used with this field.

NOTE

stop may be used at any time, although it has no effect when the trace is not active. When the trace is already running, the ACCE will be instructed to stop trace output and the data collected will be retained.

- **trace level** : This field is used to specify the type of trace (level) that is desired. Valid entries are specified in Table E-1. Multiple trace levels may be activated by 'and'ing the trace level numbers. For example, all S-channel traces may be activated by specifying level f0 (10 + 20 + 40 + 80). Note that leading zeros are not required. Valid entries are 0-ffffff. This field is used in conjunction with the *start* field.

NOTE

The trace level defaults to 0 (session level trace) when no level has been specified since boot/restart. The default or the previously specified trace level is automatically filled in each time the form is drawn. The last setting since reboot/restart will be retained.

Form messages are described below:

- "no response from hardware resource"
The ACCE is not present or did not respond.
- "trace not supported by ACC or ACCE, TN539B is required"
The ACCE responded with a return code indicating that the trace is not supported (command is not understood).
- "operation confirmed"
The requested operation completed successfully.
- "invalid input"
An invalid input has been entered on the form. The cursor will be placed on the field containing invalid data. Entering a character in both the start and stop fields simultaneously or an invalid trace level will result in "invalid input".

The suggested form and field help for this form is shown in Table E-2.

The Display Form

Inputs for the *maintenance : acce trace : display* form are described below:

- *starting page* : Page to begin output on. This may be specified by entering a page number between 1 and 999 and pressing **CHANGE/RUN**. The display begins on the specified page and subsequent pages are displayed when **ENTER** is pressed. Previous pages may also be specified, providing a backward scan capability. The default starting page is 1.
- *current page* : A display-only field showing the current page number.

The actual trace looks something like the following:

```
OUTGOING_C[191] - (I2,P1,SYS=STT01,PWD=STT01,PH#=67246990)
s_L3snd: S2 - Options INQ RESP(0xc4,0x19,0x0,0x42,0x19,0x2)
s_L3snd: S2 - OFFHOOK
s_L3rcv: S2 RINGER_OFF
s_L3rcv: S2 TONE_APPL<DIAL:>
s_L3snd: S2 - DIAL_ASCII[67246]...
s_L3snd: S2 - DIAL_ASCII[990CR]
s_L3rcv: S2 Transparent Text MSG ( )
s_L3rcv: S2 TONE_APPL<RINGING>
s_L3rcv: S2 TONE_APPL<ANSWERED>
lc_task: ANSWERED(port=1,ch=2)
Connection[51] - <I2,P1,OUT>
LL_HS_DONE[51] - <I2,P1,OUT>
BEGsession[51] - <I2,P1,M3,OUT,C51,SYS=STT01/(STT01),PH#=67246990>
```

```
lc_task: LNKDISC(port=1,ch=2)
ENDsession[51] - (I2,P1,SYS=STT01,RX=2,2;TX=2,2) (%RETX[1/118]=0)
```

The ACCE (TN539B) will support both the FP software collection of trace output and the current trace capabilities (output to the RS-232C ACCE monitor port). The ACCE does not support both simultaneously. Input to the RS-232C ACCE monitor will be ignored if the FP trace is activated from the maintenance terminal.

Table F-1. ACCE Trace Settings

Trace Level	Trace Output
00000000	Session Level Trace
00000001	Host/ACC Interface Traces
00000002	SC Task Traces
00000004	MTA Task Traces
00000008	DSR Task Traces
00000010	S Channel L2 Traces
00000020	S Channel L2 Traces
00000040	S Channel L3 Traces
00000080	S Channel L3 Traces
00000100	I Channel L3 Traces
00000200	I Channel L3 Traces
00000400	I Channel L2 Traces
00000800	I Channel L2 Traces
00001000	I Channel L1 Traces
00002000	I Channel L1 Traces
00004000	Link Control Traces
00008000	Detail Traces
00010000	Detail HSCI SC Tasks Traces
00020000	Detail MTA Tasks Traces
00040000	More Detailed MTA Tasks Traces
00080000	Detail DSR Task Traces
00100000	Detail DTC Task Traces
00200000	Queue Traces
00400000	Mailbox Message Dispenser Traces
00800000	Mailbox Interrupts Traces
01000000	Performance Traces (DBP)
02000000	Performance Traces (DBP-ACC)
04000000	Performance Traces (FP-ACC)
08000000	Performance Traces (TX Time)
10000000	Background Tests and Audits
20000000	Error Logging Traces
40000000	Unused
80000000	Unused

Trace levels may be or'd together (level 1 and level 2 active: trace level = 3)

Table F-2. Form And Field Help

Trace Level	Description	Trace Level	Description
0	Session Level Trace	10000	Detail HSCI SC Tasks Traces
1	Host/ACC Interface Traces	20000	Detail MTA Tasks Traces
2	SC Task Traces	40000	More Detailed MTA Tasks Traces
4	MTA Task Traces	80000	Detail DSR Task Traces
8	DSR Task Traces	100000	Detail DTC Task Traces
10	S Channel L2 Traces	200000	Queue Traces
20	S Channel L2 Traces	400000	Mailbox Message Dispenser Traces
40	S Channel L3 Traces	800000	Mailbox Interrupts Traces
80	S Channel L3 Traces	1000000	Performance Traces (DBP)
100	I Channel L3 Traces	2000000	Performance Traces (DBP-ACC)
200	I Channel L3 Traces	4000000	Performance Traces (FP-ACC)
400	I Channel L2 Traces	8000000	Performance Traces (TX Time)
800	I Channel L2 Traces	10000000	Background Tests and Audits
1000	I Channel L1 Traces	20000000	Error Logging Traces
2000	I Channel L1 Traces	40000000	Unused
4000	Link Control Traces	80000000	Unused
8000	Detail Traces		

G. Enhanced Activity Trace and Activity Log

The Activity Log and the Enhanced Activity Trace **cannot** be turned on at the same time. Thus, it is recommended that you turn on the Activity Log first. The Activity Log gives information about user and message activity, while the Enhanced Activity Trace gives information about system activities and any problems that the AUDIX may be detecting at low levels.

The Enhanced Activity Trace is recommended for use only after the Activity Log has been used to find some discrepancy and more information is needed.

BACKGROUND

Two new capabilities were added to the R1V4 4:4 and R1V5 5:4 software releases. The first was the Enhanced Activity Trace, an expansion to the error logging capabilities of the AUDIX system. The Enhanced Activity Trace was developed to aid in the investigation of delayed delivery reports. The trace was used successfully. However, it had several drawbacks. The most noticeable were the cryptic output and the necessity to use the AUDIX Data Acquisition Package (ADAP) to retrieve the data from AUDIX.

To overcome these problems, the second capability, the Activity Log, was introduced. The Activity Log is an entirely separate log that displays data related to user activity in a readable text form.

R1V6 and R1V7 changes to these features improve their usefulness. The biggest changes are more readable messages and a more efficient way to output the data to the terminal. (The Activity Log takes up approximately 50% less disk space and will not cause as much of a degradation in service as in the past.)

ACTIVITY LOG

The path specification for the Activity Log has changed:

- “system : log : a_spec” is now `system : activity log : specification`.
- “system : log : a_disp” is now `system : activity log : display`.

Overview

The Activity Log consists of five basic message types that are used to record user activity. The Activity Log records user-oriented events such as login, logoff, message delivery times, mailbox category counts, and whether a message is Voice Mail or Call Answer.

Any local or administered remote subscriber data can be viewed by specifying their extension number.

NOTE

Since the Activity Log does not give information regarding lamp updates, the Enhanced Activity Trace or Control Link Trace must be used where lamp problems are the primary trouble.

The Activity Log and Control Link Trace can be turned on at the same time in R1V5, or later, loads. The Activity Log and Enhanced Activity Trace **cannot** be turned on at the same time in most loads of software. Where they can, they should not be because this situation will likely cause the system to crash due to the “ss” filesystem running out of space.

Find the Activity Log Entries (Maximum)

The default number of entries allowed in the Activity Log (1000) is not sufficient to contain a useful amount of data. The limit of 99,999 would be nice. But the available space in the “ss” filesystem will probably allow some number in between:

1. On the `filesystem : detail` form, record the size of the “ss” filesystem and the number of free blocks in it.

NOTE

If the number of free blocks is greater than 600, you still need to find the new “ss” filesystem size recommendation.

2. On the `system : limits` form, enter **99999** in the *activity log entries (maximum)* field. Press **CHANGE**.

Record the new “ss” filesystem size recommendation from the bottom of the `system : limits` form.

- If the new recommended size is less than or equal to the current size, STOP. No further action is required here. Go to *Activate the Activity Log*.
 - If the new recommended size is greater than the current size, go to step 3.
3. Subtract the current “ss” filesystem size from the new recommended size. Add to that the current number of free blocks. Use the result in step 4. (If the sum is greater than 600, use 600.)
 4. Take the sum from step 3 and multiply by 150 (the number of Activity Log entries that can be stored in a single block).
 5. Enter the result of step 4 on the `system : limits` form in the *activity log entries (maximum)* field. If the result of step 4 is 100,000, leave the field set at 99,999. Press .
- The now updated “ss” filesystem recommended size should be equal to or slightly less than the previous recommendation.
6. The size of the “ss” filesystem must now be increased.

Increase the Size of the “ss” Filesystem

1. Perform a forced, administrative shutdown using the *shutdown* form.
2. Use the *filesystem : detail* form to increase the size of the “ss” filesystem. Press .
3. Restart the system using the *startup* form.
4. Once the Activity Log entry limit and the “ss” filesystem size have been increased, the Activity Log may be activated.

Activate the Activity Log

1. Go to the `system : activity log : specification` form.
2. Enter **y** in the *activity log (y/n)?* field.
3. Press .

As with the Enhanced Activity Trace, no restart is required. The first call and passage of the first minute will completely activate the feature.

Activity Log Messages

There are five different types of entries corresponding to a specific user action, with some variations on each type. Each reported action contains information about the status of the users’ mailbox. By associating each action with the mailbox status, a reasonably complete picture of the message flow and user activity for any user may be constructed.

The following sections provide examples of the types of messages that are displayed.

Login

The login message is generated each time a user enters their login id and the correct password. It contains the type of login (voice mail) and the category totals in the incoming mailbox. In R1V5, the incoming totals do not include broadcast messages.

```
mmddyy   hhmm   Voice mail login by xxxxxxxxxx. Category totals:
                        new xx, unopened xx, old xx.
```

Logout

The logout message is generated when a user logs out. This message will appear no matter how a user terminates their session. Hangup, timeout on input, **X, and *T will all cause this message to be entered in the Activity Log. The message contains the call type (call answer or voice mail) and the category totals. The totals given will reflect any changes made during the session.

```
mmddyy   hhmm   Voice mail logout by xxxxxxxxxx. Category totals:
                        new xx, unopened xx, old xx.
```

Message Delivery

Each time a message is delivered, two types of Activity Log entries are made:

- “message scheduled by” is made when the sender approves, addresses, and schedules a message to another local or remote subscriber. This message will be displayed when a search is made using the sender extension.
- “message delivered to” is displayed when the search is made using the recipient extension.

For each of the preceeding entries, there are several variations that can occur:

- The message type may be call answer or voice mail.
- When a message is sent to a list of subscribers, a single “message scheduled by” entry is made corresponding to the sender, while one “message delivered to” entries is made for each recipient.
To view all the entries related to message delivery using a list, the sender and all of the recipients’ data must be viewed individually.
- When a call answer message is left by an outside caller, both the “message delivered to” and “message scheduled by” entries will be displayed when searching on the recipient extension. The string “outside caller” is used instead of an extension.

```
mmddyy   hhmm   Voice mail message scheduled by xxxxxxxxxx to xxxxxxxxxx
```

mmddyy	hhmm	at mm/dd/yy hh:mm. Voice mail message delivered to xxxxxxxxxx from xxxxxxx. Category totals: new xx, unopened xx, old xx.
or		
mmddyy	hhmm	Voice mail message scheduled by xxxxxxxxxx to list containing 2 members at mm/dd/yy hh:mm.
mmddyy	hhmm	Voice mail message delivered to xxxxxxxxxx from xxxxxxx. Category totals: new xx, unopened xx, old xx.
mmddyy	hhmm	Voice mail message delivered to xxxxxxxxxx from xxxxxxx. Category totals: new xx, unopened xx, old xx.
or		
mmddyy	hhmm	Call answer message scheduled by xxxxxxxxxx to xxxxxxxxxx at mm/dd/yy hh:mm.
mmddyy	hhmm	Call answer message delivered to xxxxxxxxxx from xxxxxxx. Category totals: new xx, unopened xx, old xx.
or		
mmddyy	hhmm	Call answer message delivered to xxxxxxxxxx from an outside caller. Category totals: new xx, unopened xx, old xx.
mmddyy	hhmm	Call answer message scheduled by an outside caller to xxxxxxx at mm/dd/yy hh:mm.

Message Category Change

Any time a message changes from the *new* category to any other category, a message category change entry is made. The entry contains the recipient extension, the delivery date and time and the category that the message was moved to. The delivery date and time provides a means of tracking an individual message since it is almost always unique. When a message moves from unopened to old or from any category other than new to any other category, no entry is made. Only one message category change entry will be made for each message.

mmddyy hhmm Message to xxxxxxxxxx delivered at mm/dd/yy hh:mm moved to unopened.

or

mmddyy hhmm Message to xxxxxxxxxx delivered at mm/dd/yy hh:mm moved to old.

or

mmddyy hhmm Message to xxxxxxxxxx delivered at mm/dd/yy hh:mm deleted.

Message Delivery Canceled

When tracking a message delivery problem, it is necessary to know if the message got canceled before it was delivered. Therefore, an entry is made when delivery of a message has been canceled. The entry will contain the recipient and sender extensions and the delivery time. This entry is only displayed for sender extension and only one entry will be displayed when a list is involved.

mmddyy hhmm Message scheduled by xxxxxxxxxx to xxxxxxxxxx at mm/dd/yy hh:mm canceled.

or

mmddyy hhmm Message scheduled by xxxxxxxxxx to list containing xx members
at mm/dd/yy hh:mm canceled.

Example Activities

The following entries are examples of the entries that would be made in the log when the activity listed occurs. Note that two separate searches may be required to display the data shown, one for the sender and one for the recipient. They are shown together here for simplicity:

An internal call answer message left by x2345 for x3456:

091190	10:23	Call answer message scheduled by 2345 to 3456 at 09/11/90 10:23.
091190	10:23	Call answer message delivered to 3456 from 2345.
		Category totals: new 1, unopened 0, old 0.

An external call answer message is left for x6789:

091190	10:23	Call answer message delivered to 6789 from an outside caller.
		Category totals: new 1, unopened 0, old 0.
091190	10:23	Call answer message scheduled by an outside caller to 6789 at 09/11/90 10:23.

x3456 logs in and accesses the message without deleting it:

091190	11:00	Voice mail login by 3456. Category totals: new 1, unopened 0, old 0.
091190	11:02	Message to 3456 delivered at 09/11/90 10:23 moved to old.
091190	11:02	Voice mail logout by 3456. Category totals: new 0, unopened 0, old 1.

x2345 creates a voice mail message and sends it to x3456:

091190	12:00	Voice mail login by 2345. Category totals: new 0, unopened 0, old 0.
091190	12:03	Voice mail message scheduled by 2345 to 3456 at 09/11/90 12:03.
091190	12:03	Voice mail logout by 2345. Category totals: new 0, unopened 0, old 0.
091190	12:03	Voice mail message delivered to 3456 from 2345. Category totals: new 1, unopened 0, old 1.

x2345 calls the AUDIX extension, but does not log in:

No message will be logged.

system : activity log : specification

This form must be used first. Initially, it is used to activate the collection of subscriber activity. Later it is used to specify the search criteria. The starting date and time, ending date and time, and subscriber extension must be entered for each search.

NOTE

The Activity Log and the Enhanced Activity Trace may not be turned on at the same time.

AUDIX STATUS: alarms: none logins: 1 thresholds: none
PATH: system : activity log : specification

extension: _____ activity log (y/n): _
.sp
starting date (mmddy) _____ ending date (mmddy) _____
starting time (hhmm) ____ ending time (hhmm) ____

system : activity log : display

To use this form you must first successfully administer the `system : activity log : specification` form (feature turned on and search criteria entered) and both the first call and the first minute have passed.

The Activity Log has the capability to display new entries to the log (that is, new since you entered this form) by pressing `ENTER` after the end of the log has been viewed.

The following display form is an example of the output that would be viewed when data for subscriber 3456 has been requested:

AUDIX STATUS: alarms: none logins: 1 thresholds: none
PATH: system : activity log : display

DATE	TIME	ACTIVITY
09/11/90	10:23	Call answer message delivered to 3456 from 2345. Category Totals: new 1, unopened 0, old 0.
09/11/90	11:00	Voice mail login by 3456. Category totals: new 1, unopened 0, old 0.
09/11/90	11:00	Message to 3456 delivered at 09/11/90 10:23 moved to old.
09/11/90	11:02	Voice mail logout by 3456. Category totals: new 0, unopened 0, old 1.
09/11/90	12:15	Call answer message delivered to 3456 from 1122. Category Totals: new 1, unopened 0, old 1.
09/11/90	12:55	Call answer message delivered to 3456 from an outside caller. Category Totals: new 2, unopened 0, old 1.
09/11/90	13:32	Call answer message delivered to 3456 from 1122. caller. Category Totals: new 3, unopened 0, old 1.
09/11/90	15:39	Voice mail message delivered to 3456 from 4523. Category Totals: new 4, unopened 0, old 1.
09/11/90	17:59	Voice mail login by 3456. Category totals: new 4, unopened 0, old 1.

USE ENTER TO PAGE

ENHANCED ACTIVITY TRACE

The enhanced activity trace is a low level trace feature designed to help technicians and AUDIX development locate problems in user actions or in the software that are related to message movement in the AUDIX system. It may be used to determine what actions a user has taken during a particular session, what lamp status changes have been sent to the switch, when messages have been delivered to a mailbox and how many messages are in a given mailbox.

Error codes 1000 to 1099 have been reserved for use as special errors that show user and system activity. Each error code identifies a specific user action, system action or system error and contains other descriptive information in the associated fields (*Session/Unit, Device*, etc.). During every call, events such as password verification, message waiting lamp updates, message count announcements, message delivery and deletion all appear in the error log and are associated with the subscriber via the internal subscriber ID or their extension. Unusual system events also appear in the log, if any occur.

The Enhanced Activity Trace should only be used after the Activity Log has been used and more information is required.



In R1V4, both may be activated, but if both are turned on, the AUDIX system may crash!

Allocate Disk Space

1. Go to the **system : limits** form and check the *error log entries (maximum)* field. If the maximum is not set to 800 to allow the error log to store 99,999 errors (125 errors per block), go to step 2.
2. Add to the *error log entries (maximum)* field an incremental number of blocks. For example, if set at 450, add 100. Press **CHANGE**.

The “ss” filesystem size recommendation should change. If not, increment the *error log entries (maximum)* again. Do not exceed 800.

3. Perform a forced, administrative shutdown using the **shutdown** form.
4. On the **filesystem : detail** form, increase the size of the “ss” filesystem to the new recommendation. Wait for the “operation confirmed” message. Otherwise, there is no space left on the disk.
5. If the operation is successful, go back to step 2 and increment the *error log entries (maximum)* field again.



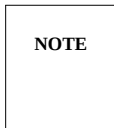
If the “ss” filesystem runs out of space, the system will crash! Always leave room to spare when sizing the “ss” filesystem.

6. When finished sizing the “ss” filesystem, restart the system using the `startup` form.

Error Filtering Array

Before activating the Enhanced Activity Trace, the error filtering array should be administered.

1. Go to the `maintenance : error : specification` form.
2. The error filtering array is a matrix of 1's and 0's. Enter a “0” where you do not wish the corresponding error to be logged. Enter a “1” where you do wish the error to be logged.



On a busy system, it is not generally practical to have 1030 errors (lamp updates) turned on when all other errors are turned on. This error could flood the error log in two or three days and thus will begin to overwrite any other errors you might be tracking. Therefore, save information related to lamp problems or save information related to other problems, but not both.

A screen similar to the following is displayed.

```
AUDIX STATUS: alarms: none  logins: 1  thresholds: none
PATH: maintenance : error : specification

Error display specification
time of occurrence
starting      date (mmddyy): _____
              time (hhmm)  : ____

search pattern
error number  : ____
session/unit  : ____
module code   : ____
device number : ____
search string : _____

expanded display mode :_
enhanced activity tracking on (y/n)? _

      0  1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6  7  8  9
1000  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
1020  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
1040  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
1060  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
1080  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
```

Activate the Trace

Once you have the disk space allocated, the error log entry limit set, and the error filtering array administered, the Enhanced Activity Trace can be activated.

1. Make sure the Activity Log is turned off (`system : activity log : specification`). If it is not already off, “invalid input” will appear in step 2.
2. Go to the `maintenance : error : specification` form and enter `y` in the *enhanced activity trace on (y/n)?* field. Press CHANGE.

No restart is required, however the feature is not fully activated until the first call is completed **and** the first minute has passed.

Displaying the Data

Enhanced Activity Trace data can be displayed using either the error log (`maintenance : error : specification` and `maintenance : error : display` forms) or the AUDIX Data Acquisition Package (ADAP).

NOTE

The error log is not capable of storing values (extension numbers) larger than 65535. Nor can the `maintenance : error : display` form be used to print out values larger than 65535. Therefore, it is not possible to search for or display extensions larger than this. See *Deciphering the Output* on how extensions larger than 65535 are handled.

Error Log

Use the *device* field to search for a subscriber extension in order to find out the internal subscriber id. Then search for additional information using the subscriber id in the *session/unit* field.

On a busy system, however, these searches through the log will timeout and come back unsuccessful (seen as “program error encountered”). The search routines were designed to search on error codes using a start and ending date and time. So other types of searches are not as efficient.

ADAP

To overcome the timeout problem associated with the error log, ADAP can be used to retrieve the data from the error log. Once on a PC, searches may be made using the tools installed on the PC.

Sample Display

The following example shows one complete voice mail call and part of another. See *Deciphering the Output* for an explanation of each error in this example.

A screen similar to the following is displayed.

```
AUDIX STATUS: alarms: none  logins: 1  thresholds: none
PATH: maintenance : error : display

  DATE      TIME  COUNT  ERROR  CLASS  SESSION/UNIT  MODULE  DEVICE
09/11/92   10:23   1      1031    2      4201          25     7530
09/11/92   10:23   1      1032    2       16          20     7530
09/11/92   10:23   1      1024   16      252          22     7530
09/11/92   10:23   1      1023   16      252          14      6
09/11/92   10:23   1      1000   16      252          14      6
09/11/92   10:23   1      1033   16      252          29      6
09/11/92   10:23   1      1035    2       16           2     396
09/11/92   10:26   1      1001   16      252          14      2
09/11/92   10:26   1      1031    2      4202          25     6644
09/11/92   10:26   1      1032    2       17          20     6644
09/11/92   10:26   1      1024   17      167          22     7890
09/11/92   10:26   1      1023   17      167          14      0
09/11/92   10:23   1      1000   17      167          14      0
09/11/92   10:23   1      1033   17      167          29      0

USE ENTER TO PAGE
```

Deciphering the Output

Enhanced Activity Trace output is in numeric codes. The following list attempts to explain the meaning of each code from the previous example. (A complete list of codes is provided at the end of this appendix.)

Be aware that the previous example shows two calls that came in to AUDIX in sequence. When calls are active simultaneously, a single call's entries into the trace will be mixed in with the other active calls' entries. Using the port number given usually in the *Class* field, you can follow the events of a particular call.

- 1031 A connect message was received from the switch and processed by Vip (module 25). The port translation on which the call was received is 4201, the calling party extension was 7530 (device field). The class field is always set to 2 (unused).
- 1032 A connect message was received from the switch and processed by Sd (module 20). The port number was 16, and the calling party extension is 7530. This message is from the same call as error 1, because the port translation (4201) matches the port number (16) on the `system : translation : voice port` form.
- 1024 Password verification has taken place on port 16 (class field). The subscriber ID is 252 (session/unit field), the error was logged by Mbox (module 14), and the subscriber logged in using extension 7530 (device field).

-
1023	As part of the login process, the system has successfully prepared internal data structures for activity by this subscriber. Class 16 (port 16) allows association with the preceding 1024. The subscriber ID is 252 (session/unit field), the error was logged by Mbox (module 14), and the new message count is in the device field (6).
1000	A subscriber has completed the login process on port 16. The port number is in the Class field, the subscriber ID is 252 (session/unit), the error was logged by Mbox (module 14), and the new message count is 6 (device field).
1033	The Vsc indicates that the new message count is 6. The port number is 16 (class field), the subscriber ID is 252 (session/unit field), the error was logged by Vsc (module 29) and the count is 6 (device field).
1035	The new message count announcement played out on port 16 is 396 (6 new messages. The class field is unused, the port number is 16 (session/unit field), the error was reported by Am (module 2), and the fragment id is 396 (device field).
1000	Subscriber 252 has logged off from port 16 and still has 2 new messages. The port is 16 (class field), the subscriber id is 252 (session/unit field), the error was logged by Mbox (module 14) and the new message count is 2 (device field).
1031	A connect message has been received from the switch on the port with extension 4202 and the calling party id is 6644.
1032	A connect message has been received from the switch on port 17 and the calling party id is 6644.
1024	Password verification has taken place for subscriber 167 who has extension 7890 on port 17. The calling party ID (6644) is not the same as the login used (7890) indicating that the subscriber has logged in from someone else's telephone.
1023	Subscriber 167 is logging in on port 17 and has no new messages.
1000	Subscriber 167 has completed the login procedure on port 17 and has no new messages.
1033	Vsc is preparing to play the new message count out on port 17 for subscriber 167.

Due to design limitations, extensions larger than 65535 cannot be represented on the error display form. They are printed as some number other than the actual extension. For example, 65536 will print out as 0. The extension may be determined using the bit pattern represented on the form in decimal. For 65535, the representation is ffff, the largest number that may be represented. The hex representation for 65536 is 1 0000 which prints out as 0. For 65537, the representation is 1 0001 which prints out as 1. The actual extension in such cases may be determined by adding 65536 to the extension displayed. As you might have guessed, when the device field displays a number like 34463, the actual extension could be 34463 or 99999.

Using Error Filtering

Even with a 99,999 entry limit in the error log, the log fills rather quickly (3 to 4 days) on a very busy system. In order to prevent the loss of error data before it may be collected and analyzed, some errors may be filtered out.

The only errors that may be filtered out are those between 1000 and 1099 that were added for the Enhanced Activity Trace feature. The default value for each field in the filtering array is "0" (that is, all errors 1000 to 1099 will be filtered out). You must go in and customize the array for each case. To make this job simpler, several configurations are suggested here along with the situation that they would be used in:

A lightly loaded system (average maximum ports in use 12 or less):

Set all array positions to 1 (write all errors to disk).

A system on which problems are reported, but it is unclear if the problem is related to lamps, user error or delayed messages (initial investigation, busy system):

	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
1000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1020	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1
1040	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1060	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1080	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

In this configuration, 1032 (connect message from switch) and 1033 (message count from Vsc) are turned off. These are essentially redundant errors and are used for internal cross-checking. They may be turned off without any loss of data for initial investigation.

A system that has primarily lamp problems:

	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
1000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1020	1	1	1	0	1	1	1	1	1	1	1	0	0	0	1	0	1	1	1	1
1040	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1060	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1080	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Here, 1031 (connect message), 1032 (connect message), 1033 (message count from Vsc), 1035 (message count from Am) are filtered out. These trace errors are not needed to investigate lamp problems. The 1030 error indicates lamp status changes sent to the switch, and the 1000, 1001, 1022, 1023 and 1024 errors give information about messages and mailbox status that may be cross-checked against the lamp updates.

A system on which users report delayed delivery (not lamp problems) or a system on which user errors are suspected (not lamp related):

	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
1000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1020	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1
1040	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1060	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1080	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

The 1030 (lamp updates) and 1032 (connect message) errors are not needed to investigate delayed deliveries and are turned off. Turning off 1030 errors will result in a substantial decrease in the number of errors logged over the course of a day.

Review Disk Space Allocation

Part of administering the Enhanced Activity Trace or the Activity Log is reviewing the maximum number of error log or activity log entries. As long as sufficient disk space is available, the number of entries should be set to 99,999.

The recommended filesystem size for the “ss” filesystem given on the `system : limits` form is a rough estimate of the disk space required and generally exceeds that actually needed. This provides a margin of safety when enough disk space is available. When this is not true, the system must be watched to be sure that the “ss” filesystem does not run out of space.

If it becomes apparent that the “ss” filesystem will run out of space, the number of entries in the activity log or error log must be decreased to prevent a system crash. Enter the new value and press **CHANGE**. If the new value is equal to the number of entries in the Enhanced Activity Trace or Activity Log file, the “ss” filesystem growth will halt. If it is less, the free space in the “ss” filesystem will increase slowly.

Unfortunately, there is no way to retrieve the number of records, so some guesswork is required.

Error Descriptions

1000	A subscriber has logged in. The <code>s_id</code> is in the Session/ Unit field, the port number is in the Class field and the new message count is in the Device field.
1001	A session has logged off. The current count of new messages is given in the Device field and the port number is in the Class field.
1002	A session logs off with another session using the same directory record. The <code>s_id</code> is in the Session/Unit field, the current count of new messages is in the Device field, and the port number is in the Class field.

1003	The directory record s_id does not match that of the subscriber logging in (inquire_mws). The subscriber sid is in the Session/ Unit field, the directory record s_id is in the Device field.
1004	The directory record s_id does not match the s_id of the subscriber logging in (mb_conn). The s_id of the subscriber is in the Session/ Unit field, the directory record s_id is in the Device field.
1005	The directory record s_id does not match the s_id of the subscriber logging off (mb_disc). The subscriber s_id is in the Session/Unit field, the directory record s_id is in the Device field.
1006	The directory record s_id does not match the s_id of the subscriber logged in (next_msg). The s_id of the subscriber is in the Session/ Unit field, the directory record s_id is in the Device field.
1007	The session descriptor s_id does not match the subscriber mailbox record s_id (next_cell). The session descriptor s_id is in the Session/Unit field, the mailbox record s_id is in the Device field.
1008	The directory record s_id does not match the s_id of the subscriber logged in (del_current). The s_id of the subscriber is in the Session/Unit field, the directory record s_id is in the Device field.
1009	The session descriptor s_id does not match the subscriber mailbox record s_id (del_cell). The session descriptor s_id is in the Session/Unit field, the mailbox record s_id is in the Device field.
1010	The message id of a message being deleted does not match the message id contained in the mailbox record. The mailbox s_id is in the Session/Unit field, the directory record s_id is in the Device field.
1011	The directory record s_id does not match the s_id of the subscriber logged in (upd_status). The s_id of the subscriber is in the Session/Unit field, the directory record s_id is in the Device field.
1012-1014	The session descriptor s_id does not match the subscriber mailbox record s_id (upd_cell). The session descriptor s_id is in the Session/Unit field, the mailbox record s_id is in the Device field.
1015	The directory record s_id does not match the s_id of the subscriber logged in (store_msg). The s_id of the subscriber is in the Session/ Unit field, the directory record s_id is in the Device field.
1016-1017	The session descriptor s_id does not match the subscriber mailbox record s_id (store_cell). The session descriptor s_id is in the Session/Unit field, the mailbox record s_id is in the Device field.
1018	The directory record s_id does not match the s_id of the subscriber logged in (prev_msg). The s_id of the subscriber is in the Session/ Unit field, the directory record s_id is in the Device field.
1019	The directory record s_id does not match the s_id of the subscriber mailbox being audited (audit_sub). The s_id of the subscriber is in the Session/Unit field, the directory record s_id is in the Device field.

1020	The directory record s_id does not match the s_id of the directory key (val_mbkey). The s_id of the directory key is in the Session/Unit field, the directory record s_id is in the Device field.
1021	The mailbox key s_id does not match the subscriber mailbox record s_id (mbox_reorg). The mailbox key s_id is in the Session/Unit field, the mailbox record s_id is in the Device field.
1022	A message has been stored in a subscribers' mailbox. The recipient s_id is in the Session/Unit field and the updated message count is in the Device field.
1023	A successful mb_conn has been performed. The s_id of the subscriber logging in is in the Session/Unit field, the port number is in the Class field and the current new message count is in the Device field.
1024	A subscriber has logged in using a valid extension and a matching password (verify_password). The s_id is in the Session/Unit field, the port number is in the Class field and the extension is in the Device field.
1025	A guest has logged in using a valid extension and matching password (verify_password). The s_id is in the Session/Unit field, the port number is in the Class field and the extension is in the Device field.
1026	The mb_conn call failed during logon. The s_id of the subscriber logging in is in the Session/Unit field, and the return code is in the Device field (unused in R1V5).
1027	A new Vsc session was started before the previous one had cleaned up (logon). The new s_id is in the Session/Unit field and the new extension is in the Device field (unused in R1V5).
1028	A new Vsc session was started before the previous one had cleaned up (new_call). The new s_id is in the Session/Unit field and the message type (dcui, outcall, mwi, port) is in the Device field (unused in R1V5).
1029	The Vsc global s_id does not agree with the local s_id during scanning of incoming mail. The local s_id is in the Session/Unit field and the global s_id is in the Device field (unused in R1V5).
1030	Message waiting status was sent to the switch. The lamp status is in the Session/Unit field (1=on, 0=off) and the extension is in the Device field.
1031	A connect message has been received by Vip. The ringing extension is in the Session/Unit field and the calling extension is in the Device field. Class is always set to 2. (1031 is used with DCIU, SMSI and BRI datalinks only).
1032	A connect message has been received by Sd. The port number is in the Session/Unit field and the calling extension is in the Device field. Class is always set to 2. (1032 is used with DCIU, SMSI and BRI datalinks only).
1033	The Vsc is playing out a name voiceback and new message status. The s_id is in the Session/Unit field, the port number is in the Class field and the new message count is in the Device field.
1034	The Vsc new message count disagrees with the service map provided by Sd (message waiting lamp). The Session is in the Session/Unit field and the new message count is in the Device field.

1035	A new message count is being played out by Am. The announcements "No new messages" and "N new voice mail messages" will cause this error to be logged. The Session/Unit field contains the Am Session (port number) and the Device field contains the fragment id. If there is no name voiceback, there will be one 1035 logged for each digit in the callers' extension. If there is a two digit message count, two 1035 errors will be logged. The most common fragment ids are 168 (0 new), 391 - 399 (1-9 new).
1036	The cat_index (search category order index) in the session descriptor is out of bounds. The Session is in the Session/Unit field, the cat_index is in the device field and Class is set to 2.
1037	The session descriptor contains invalid message types or the incoming or outgoing category count is incorrect. The message type is in the Session/Unit field, the category count is in the device field and Class is set to 2.
1038	A corrupt message category was found in the Session descriptor while scanning the incoming mailbox. The message type is in the Session/Unit field, the message category is in the Device field and the Class field is set to 2.
1039	The Session Descriptor points to a mailbox cell whose category does not correspond to the Session Descriptor type during scanning of the incoming mailbox. The Descriptor type is in the Session/Unit field, the category from the mailbox cell is in the device field and Class is set to 2.
1040	Mailbox 'used' count (number of cells in use) is less than 0. The Session is in the Session/Unit field, the used count is in the Device field and Class is set to 2.
1041	Mailbox 'used' count (number of cells in use) is greater than the maximum allowed. The Session is in the Session/Unit field, the used count is in the Device field and Class is set to 2.
1042	The current cell number in the Session Descriptor is greater than cell count in the mailbox. The cell number is in the Session/Unit field, the mailbox cell count is in the Device field and Class is set to 2.
1043	A message has changed from the new category to the unopened category. The sid of the recipient is in the session/unit field, the sid of the sender is in the device field and the port number is in the Class field.
1044	A message has changed from the new category to the old category. The sid of the recipient is in the session/unit field, the sid of the sender is in the device field and the port number is in the Class field.
1045	A message has been deleted. The sid of the recipient is in the session/unit field, the sid of the sender is in the device field and the port number is in the Class field.
1046	mb_conn detected an inconsistency in the new message count between the directory record and the number of cells containing messages with the category set to new.

Enhancements to the Activity Log

Several enhancements are made to the Activity Log in the R1V6 AUDIX software release. The Activity Log will support all the message types introduced in R1V5, namely Priority, Broadcast, Login Announcement, Undeliverable Notification, and AMIS messages.

The `system : limits` form can be used to remove the Activity Log files. Data corruption can be detected and is reported to the Administration Log.

Support of New Message Types

— Priority message.

Priority message scheduled by xxx to yyy at mm/dd/yy hh:mm is displayed for the sender.

Priority message delivered to yyy from xxx. Category totals: new 1, old 0, unopened 0 is displayed for the recipient.

These are the two instances when entries are marked priority.

— Broadcast message.

Broadcast message scheduled by xxx to yyy at mm/dd/yy hh:mm is displayed for the sender. yyy is the extension of the Broadcast mailbox.

Broadcast message delivered to yyy from xxx. Category totals: new 1, old 0, unopened 0 is displayed for the Broadcast mailbox extension.

No log entry is displayed for recipients of Broadcast messages. However, *Broadcast message delivered to yyy from xxx. Category totals: new 0, old 1, unopened 0* is displayed for the recipient when the broadcast message is saved.

— Login Announcement message.

Login Announcement message scheduled by xxx to yyy at mm/dd/yy hh:mm is displayed for the sender. yyy is the extension of the Broadcast mailbox.

Login Announcement message delivered to yyy from xxx. Category totals: new 1, old 0, unopened 0 is displayed for the Broadcast mailbox extension.

No log entry is displayed for recipients of Login Announcement message.

— Undeliverable Notification message.

Undeliverable Notification message delivered to xxx. Category totals: new 1, old 0, unopen 0 is displayed for the recipient.

This is the only log entry for Undeliverable Notification message.

— AMIS message.

- AMIS Casual.

Voice mail message scheduled by xxx to yyy at mm/dd/yy hh:mm is displayed for the sender. yyy is the extension of the receiving machine.

AMIS message delivered to xxx from yyy. Category totals: new 1, old 0, unopen 0 is displayed for the recipient. yyy is the sender's extension and is an **unknown extension** in most cases due to the temporary nature of a casual recipient.

- AMIS Pre-administered.

Voice mail message scheduled by xxx to yyy at mm/dd/yy hh:mm is displayed for the sender. yyy is the extension of the recipient.

AMIS message delivered to xxx from yyy. Category totals: new 1, old 0, unopen 0 is displayed for the recipient. yyy is the sender's extension.

— Call Delivery.

Voice mail message scheduled by xxx to yyy at mm/dd/yy hh:mm is displayed for the sender. yyy is the extension of the recipient.

There is no entry for the recipient.

— Loop Back Test Mailbox.

Voice mail message scheduled by xxx to yyy at mm/dd/yy hh:mm is displayed for the sender. yyy is the extension of the loop back mail box.

AMIS message delivered to xxx from yyy. Category totals: new 1, old 0, unopen 0 and **Message to xxx delivered at mm/dd/yy hh:mm deleted** are displayed for the recipient whenever a loop back test message is received.

Data Corruption Detection

The second enhancement is the detection of data corruption that would cause the Activity Log to throw away entries prematurely. When data corruption is detected, the message "Activity log corrupt, please remove" will be sent to the Administration Log. From this point on, the Activity log files are no longer functioning properly. It is recommended that the files be removed.

Activity Log Files Removal

The third enhancement is to allow the Administrator to remove the Activity Log files using the `system : limits` form. In order to activate the file removal process, a value of "0" needs to be entered in the *Activity log entries* field. When the recovery process is completed, the administrator will be notified via the Administration Log with the message "Activity log recreated". The Activity Log is ready to function by reentering in the *Activity Log entries* field a desirable value.

H. INADS-Only Screens

This appendix describes the AUDIX administration and maintenance forms, or fields within other forms, that are only accessible with the INitialization and ADminstration System (INADS) login.

ADMINISTRATION FORMS

system : cdr

This form is used to activate and deactivate the Call Detail Recording feature of AUDIX:

- To *activate* this feature, you must use the INADS login.
- To *deactivate* this feature, you can use any login.

system : feature control

This form is used to allow/disallow AMIS analog networking.

This form is not shown on the system and is inaccessible unless the INADS login is used.

MAINTENANCE FORMS

maintenance : acce trace : display

This form is used to remotely display the ACCE trace information.

This form is not shown on the system and is inaccessible unless the INADS login is used.

maintenance : acce trace : specification

This form is used to specify what ACCE data is to be displayed.

This form is not shown on the system and is inaccessible unless the INADS login is used.

maintenance : dbp : equip

This form is used to equip/initialize the disk drives.

With R1V7, customers can now purchase fixed disk drives “off the shelf”. To prevent them from installing disks that are not authorized, the INADS login must be used to initialize any fixed disk.

If *erase (y/n)?* = **y** and the INADS login was not used, the CHANGE operation will be denied.

maintenance : link log : display

This form is used to display information gathered by the Control Link Trace feature, which monitors the switch data link.

This form is not shown on the system and is inaccessible unless the INADS login is used.

maintenance : link log : specification

This form is used to activate the Control Link Trace and to specify what data is to be displayed.

This form is not shown on the system and is inaccessible unless the INADS login is used.

Abbreviations

AC	Alternating Current
ACC	AUDIX Communications Controller (for networking)
ACCE	AUDIX Communications Controller — Enhanced
ACD	Automatic Call Distribution
ACP	Advanced Communications Package
ADAP	AUDIX Data Acquisition Package
ADFTC	Analog/Digital Facilities Test Circuit (System 85 or Generic 2)
ADU	Asynchronous Data Unit (Z3A)
AE	Account Executive
AMIS	Audio Messaging Interchange Specification
AMLS	Automated Message Link Service
AMWI	Audible Message-Waiting Indicator
AMWL	Automatic Message-Waiting Lamp
AP	Applications Processor
API	Applications Processor Interface
AUDIX	Audio Information Exchange (one- or two-cabinet AUDIX)
AUDIX-L	Audio Information Exchange – Large
AUDIX-S	Audio Information Exchange – Small (renamed “one-cabinet AUDIX”)
AUX	Auxiliary
AVD	Alternate Voice/Data
AWG	American Wire Gauge
BC	Bus Controller (TN506B)
BCSDC	Business Communications Systems Design Center (formerly the NEC)
BCT	Business Communications Terminal
BI	Bus Interface (TN716)
bps	bits per second
BRI	Basic Rate Interface
BTU	British Thermal Unit

CCITT	International Consultive Committee for Telephony and Telegraphy
CMS	Call Management System
CO	Central Office
CPU	Central Processing Unit
CSM	Centralized System Management
DBP	Data Base Processor (Subsystem)
DBP-CPU	Data Base Processor Central Processing Unit
DBP Bus	Data Base Processor Bus (also VME Bus)
DBPI	Data Base Processor Interface
DBP-RAM	Data Base Processor Random Access Memory
DC	Direct Current
DCE	Data Communications Equipment
DCIU	Data Communications Interface Unit
DCP	Digital Communications Protocol
DCS	Distributed Communications System
DFC	Dedicated Function Computer (also DBP-CPU)
DID	Direct Inward Dialing
DIM	Disk Interface Module (UN161B on AUDIX-L)
DLC	Digital Line Circuit (TN754)
DMI	Digital Multiplexed Interface
DOSS	Delivery Operations Support System
DRAM	Dynamic Random Access Memory
DS1	Digital Service 1
DSI	Digital Service Interface
DSL	Digital Subscriber Line
DSO	Data Service Organization
DSU	Data Service Unit
DTE	Data Terminal Equipment
EDC	Electronic Document Communications
EDI	Engineering Drawing Information
EIA	Electronic Industries Association
EMC	Electro-Magnetic Compatibility
EMI	Electro-Magnetic Interference

EPROM	Erasable Programmable Read Only Memory
ES	Enhanced Services
ESS	Electronic Switching System
ETN	Electronic Tandem Network
EUCD	Enhanced Uniform Call Distribution
FAC	Feature Access Code
FP	Feature Processor (Subsystem)
FP-BI	FP Bus Interface (TN716)
FP-CPU	FP Central Processing Unit (TN523 or TN591)
FP-PE	FP Processor Element (includes BI, CPU, and RAM)
FP-RAM	FP Random Access Memory (TN734 or TN761)
FSD	Fixed Storage Drive (AUDIX-L)
FSW	Failure Status Word
GND	Ground
GPP	General Purpose Port (SN270)
HDD	Hard Disk Drive (AUDIX)
HDLC	High-Level Data Link Controller
ID	Identification
IDI	Isolating Data Interface
INADS	Initialization and Administration System
INT	Interface Board 1 to 3 for System 75 SCI
IPC	Intelligent Peripheral Controller (TN507C on AUDIX-L)
ISCN	Information Systems Change Notice
ISDN	Integrated Services Digital Network
ISLU-T	Integrated Services Line Unit — T Interface
K or Kbyte	Kilobyte (1024 bytes)
LADS	Local Area Data Set
LAT	Local Administration Terminal
LDN	Listed Directory Number
LEC	Local Exchange Carrier
LED	Light-Emitting Diode
LMT	Local Maintenance Terminal
LWC	Leave Word Calling

MAAP	Maintenance and Administration Panel
MADU	Multiple Asynchronous Data Unit
Mbyte	Megabyte ($\approx$ one million bytes)
M Bus	Memory Bus
MCS	Message Center Service
MDM	Modular Data Module
MEM	Memory (also RAM)
MFAT	Multifunction Analog Terminal
MFET	Multifunction Electronic Terminal
MHz	Megahertz
MI	Maintenance Interface (TN531 or TN511)
MLHG	Multiline Hunt Group
MMC	Material Management Center
MNP	Microcom Networking Protocol
MPSI	Multiprotocol Switch Interface
MON	Processor Monitor (TN535)
MPDM	Modular Processor Data Module
ms	Millisecond
MSC	Message Service Center
MSS	Message Service Center
MT	Multi-Tasking Terminal
MTBF	Mean Time Between Failures
MWI	Message-Waiting Indication
NC	Network Controller (TN727) (also NETCON)
NCSC	National Customer Support Center (now the TSC)
NEC	National Engineering Center (now the Business Communications Systems Engineering Center)
NT1	Network Termination 1 Unit
OLS	Off-Line Switcher
PBX	Private Branch Exchange
PC	Power Converter (AUDIX-L), or Personal Computer
PDM	Processor Data Module
PE	Processor Element

PEC	Price Element Code
PI	Processor Interface (System 75, System 75 XE, Generic 1, or Generic 3i/s)
PMX	Private Message Exchange
PRI	Primary Rate Interface
PROC	Procedure
PROFS	Professional Office System
PROM	Programmable Read Only Memory
RAM	Random Access Memory
RCD	Removable Cartridge Drive (AUDIX)
RMATS	Remote Maintenance, Administration, and Traffic System (now INADS)
RMT	Remote Maintenance Terminal
ROM	Read Only Memory
RSD	Removable Storage Drive (AUDIX-L)
SADI	SCSI-to-AUDIX Disk Interface (AUDIX)
SAI	Synchronous/Asynchronous Interface (TN719 on AUDIX-L)
SAT	System Administration Terminal
S Bus	System Bus
SC	System Consultant
SCA	Switch Communications Adapter
SCI	Switch Communication Interface
SCP	Switch Communications Processor (TN521)
SCPI	Switch Communications Processor Interface (TN533)
SCSI	Small Computer System Interface (AUDIX)
SDU	Synchronous Data Unit (Z3B1)
SI	Switch Interface (also TN727 NC)
SMDI	Simplified Message Desk Interface
SMSI	Simplified Message Service Interface
SMT	System Management Terminal
SNC	Service Node Controller
TC	Tone and Clock (TN714) (also Technical Consultant)
TCM	Terminal Change Management
TD	Time Division (also Transmit Data)
TDBI	Time Division Bus Interface (TN500)

TD Bus	Time Division Bus
TE	Terminal Equipment
TEI	Terminal Endpoint Identifier
TMC	Technical Marketing Center
TMS	Time Multiplexed Switch
TRACS	Translation Recovery, Additions and Conversion System
TSC	Technical Service Center (formerly the NCSC)
TSO	Technical Support Operations
UCD	Uniform Call Distribution
UDM	Universal Data Module
UL	Underwriters Laboratories
UM	Unified Messaging
UPS	Uninterruptible Power Supply
VB	Voice Buffer (TN520)
VDN	Vector Directory Number
VMAAP	Visual Maintenance and Administration Panel
VME Bus	Versa-Module European Bus (also DBP Bus)
VMWI	Visual Message-Waiting Indicator
VPC	Voice Processor Computer (TN501B)
VPT	Voice Port (TN747B)
VSFI	Voice Store and Forward Interface (UN162)
VSP	Voice Session Processor (Subsystem on AUDIX-L only)
VSP-BI	Voice Session Processor Bus Interface (TN716B)
VSP-CPU	Voice Session Processor Central Processing Unit (TN523 or TN591)
VSP-PE	VSP Processor Element (includes BI, CPU, and RAM)
VSP-RAM	Voice Session Processor Random Access Memory (TN734 or TN761)
WGS	Work Group System

Glossary

1A ESS Switch	An AT&T Central Office (CO) switch that supports integrated AUDIX applications in AUDIX R1V4 and later software.
5ESS Switch	An AT&T switch that supports ISDN protocol and integrated AUDIX applications in AUDIX R1V4 and later software. The 5ESS Switch is a CO that connects the Customer Premises Equipment (CPE) to an ISDN network over a U interface (2-wire outside plant wiring) through an NT1 unit, or directly from the switch through an ISLU-T (4-wire) interface.
Accessed Message	Voice mail that a recipient has received and scanned (either the entire message or just the header).
Active Filesystems	The filesystems used by AUDIX to provide service. These include types adat, boot, sdat, sst, vdat, vtext, and (beginning in R1V3) ndat. Most are activated by the <code>system : filesystem</code> form. The adat filesystem is activated using the <code>system : announcement : filesystem</code> form. (See also <i>Mount/Unmount</i>)
Activity	An option in the highest-level menu voiced to an AUDIX subscriber after first accessing the AUDIX system. Selecting an activity is the starting point for all user operations.
Activity Menu	The list of main options voiced to subscribers when they first access AUDIX. To hear the complete menu, press H . To interrupt an activity and return to the activity menu, press R .
Address	A memory location in disk or RAM. Also, subscriber identification indicating to whom AUDIX is to deliver a message.
Adjunct	A separate system that is closely integrated with a switch, such as an AUDIX or an AP.
Administration	The activity of setting up a system (such as the switch or AUDIX) so that it will function as desired. Options and defaults are set up (translated) by the AUDIX system administrator or service personnel.
Administrative Shutdown	An option on the <code>shutdown</code> form used to shut down the system software for administrative reasons, either gradually as calls are ended (camp-on) or immediately (forced). Filesystems are closed but left mounted.
Advanced Communications Package (ACP)	A 3B2 Applications Processor (AP) designed for the 5ESS Switch and compatible with AUDIX CO applications.
Alarm Board	The CDR1B, which monitors the system for alarms and passes warnings or faults to the MI board, which alerts remote service personnel over the alarm link leading to the switch.

Alarm Link	A 25-pair cable connection from the back of the AUDIX cabinet to alarm-reporting facilities on the switch. The link notifies remote service personnel about an AUDIX problem.
Alarm Log	A list of faults, including unit and device numbers, that is stored in a software file on disk. The <code>maintenance : active alarm : display</code> form shows alarm log faults in severity order. Use the <code>maintenance : active alarm : specification</code> form to select alarms by device, date, etc.
Alarms	Hardware, software, or environmental problems (detected by maintenance testing) that may affect system operation. Alarms (or faults) are classified as major, minor, or warning. They are reported to services personnel through the alarm link and logged in the alarm log on disk.
Alphanumeric	Alphabetic, numeric, or punctuation symbols.
Alternate Tracking	A disk drive procedure where bad tracks are mapped out on a defect map that lists bad tracks and alternate tracks to use. The DBP reads this information during system initialization or when equipping a disk drive (or new removable cartridge).
Analog	A continuous signal (versus digital, discrete signals).
Announcement Fragment	A numbered piece of spoken AUDIX information that makes up a system message or prompt.
Applications Processor (AP)	The AP 16 or 3B5 AP switch adjunct on a PBX that provides such services as Directory, EDC, Message Center, and Unified Messaging. The AP on a 5ESS Switch is called an ACP.
Applications Processor Interface (API)	Robust type of data link connection to an integrated 5ESS Switch in AUDIX R1V4 and later software.
Architecture	The composition and functional components of a system.
Asynchronous Data Unit (ADU)	A small device that can extend data transmissions far beyond recommended EIA limits over building wiring. AUDIX and terminals may connect to Z3A1, Z3A2, and Z3A4 ADUs.
Asynchronous Transmission	A form of serial communications where each transmitted character is bracketed with a start bit and one or two stop bits. The AUDIX display terminals use an asynchronous link to the MI.
Audio Information Exchange – Small (AUDIX)	A complete voice mail message system operated by a touch-tone telephone and integrated into a switch. Current models include the one- and two-cabinet AUDIX system and the earlier AUDIX-L.
AUDIX Data Acquisition Package (ADAP)	A software package compatible with AUDIX R1V2 and later software. ADAP allows the AUDIX administrator to transfer subscriber, maintenance, or traffic data from AUDIX to a compatible 62xx or 63xx Personal Computer (PC) or Work Group System (WGS).
AUDIX Basic (R1V1)	The basic AUDIX software. This version has been discontinued.

AUDIX Enhanced (R1V2)	An enhanced version of AUDIX software providing new user features. This version may run on early AUDIX-L and one-cabinet machines.
AUDIX Enhanced II (R1V3)	A version of AUDIX software that may run on any AUDIX one-cabinet, two-cabinet, or AUDIX-L machine. It includes all features from previous releases, plus the Automated Attendant, Networking, Outcalling, and Standalone features.
AUDIX Enhanced III (R1V4)	A version of AUDIX software that includes all features from previous releases, plus support of integrated 1A ESS Switch and 5ESS Switch interfaces, File Redundancy, Standalone Message Notification, Executive Features summary, administrable login ID length, and the Text Service Interface.
AUDIX Release 1 Version 5	A version of AUDIX software that includes all features from previous releases, plus Multiple Personal Greetings, Message Sending Restrictions, Priority Messaging, enhancements to Automated Attendant, and Call Detail Recording (off a PC interface).
AUDIX Release 1 Version 6	A version of AUDIX software that includes all features from previous releases, plus Call Delivery and the ability to network with other-vendor voice-mail systems using an AMIS analog network (see Audio Messaging Interchange Specification).
AUDIX Release 1 Version 7	A version of AUDIX software that includes all features from previous releases, plus network connection turnaround and loop-around testing, the Undelete Message feature, and administrable coverage for the Escape to Attendant feature.
AUDIX-L (Large)	AUDIX-L is the original AUDIX model; new machines are no longer available. Its equipment is arranged in two AT&T System 85-type equipment cabinets. AUDIX-L can run AUDIX R1V1 through R1V5 software.
AUDIX-S (Small)	The AUDIX-S model, now called the “one-cabinet AUDIX,” is physically the smallest member of the AUDIX family. All AUDIX-S hardware is housed in a single, half-height cabinet. AUDIX-S runs R1V2 or later software.
AUDIX Two-Cabinet Configuration	The newest AUDIX model consists of a one-cabinet (AUDIX-S) base cabinet with an expansion cabinet on top. The two-cabinet AUDIX offers 32 ports and greater disk storage than an AUDIX-L. It runs R1V3 or later software.
Audio Messaging Interchange Specification (AMIS)	A standard for interchange of voice messages between inter-vendor systems. Messages are sent in analog format. AUDIX uses its voice ports rather than its network links to transmit these messages. Messages between AUDIX adjuncts are still sent in digital form (that is, DCP or EIA RS-232) using the network links.
Audit	A software program that resolves filesystem incompatibilities and updates restored filesystems to a workable level of service. Audits are run nightly or after a failure.
Automated Attendant	An AUDIX R1V3 and later feature that allows the customer to set up a main number with a menu of options that route callers to an appropriate department at the touch of a button.
Automatic Call Distribution (ACD)	The System 85 or DEFINITY Generic 2 or 3 call-distribution group of analog ports that connect to AUDIX.

Background Testing	Testing that runs when the system is not busy performing other service tasks.
Backup	A duplicate copy of a filesystem saved on an RCD cartridge or on an HDD volume separate from the original. The backup filesystem may be copied back (restored) if the active version is damaged (corrupted) or lost.
Basic Call Transfer	A switchhook-flash method used on AUDIX Standalone and many switches to send the AUDIX transfer command over analog voice ports.
Basic Rate Interface (BRI)	(Also called Basic Rate Access) International standard protocol for connecting a station terminal to an ISDN switch. ISDN BRI supports two 64 kbps information bearer channels (B1 and B2), and one 16 kbps call status and control (D) channel (a 2B + D format).
Baud Rate	Transmission signaling speed (see bps).
Binary Digit (Bit)	Two-number notation that uses the digits 0 and 1. Low-order bits are on the right (for example, 0001=1, 0010=2, etc.). Four bits make a nybble; eight bits make a byte.
Blank Cartridge	One or more spare removable cartridges required to back up system information.
Block Service	Prevent use of a port, channel, or entire system through a fault or maintenance procedure.
Body	The part of AUDIX voice mail that contains the actual spoken message.
Boot (or Reboot)	An activity that brings up (initializes) a system by loading programs from disk to FP memory, activated by the Control Mode Menu (Function 5), a power up, or the MI toggle switch. Control Mode Menu (Function 6) does a partial reboot (the FP is restarted and the DBP initialized).
Boot Filesystem	The filesystem selected during system initialization, either automatically or manually, from which the system tries to load its initial programs. The filesystem names are usually “boot_f” for the active version and “boot_e” for the backup copy.
bps (bits per second)	The number of binary units of information (1s or 0s) that can be transmitted per second. Mbps refers to a million bits per second; kbps refers to a thousand bits per second.
Buffer	Memory used to compensate for time differences in transmission by temporarily storing data.
Bulletin Board	See Information Service.
Bus	The circuitry that links the various AUDIX subsystems together. The major AUDIX buses are the DBP (or VME), S (System), TD (Time Division), and M (Memory) bus.
Business Communications Terminal (BCT)	The currently recommended terminal for AUDIX maintenance or system administration.
Busy-Out/Release	To remove an AUDIX device from service (make it appear “busy” or in use), and later restore it to service (release it). The AUDIX data link, voice ports, or VB/TBDI channels may be busied out if faulty or while maintenance tests are run.
Byte	A binary element string operated on as a unit and equal to eight bits.

Call Answer	An AUDIX feature that allows AUDIX to answer a call and record a message when the subscriber is unavailable. Callers may be redirected to AUDIX through the call coverage or Call Forwarding switch features. Subscribers may record a personal greeting for these callers.
Call Coverage	A switch feature that defines a preselected path for calls to follow if the first (or second) coverage points are not answered. AUDIX may be placed at the end of a coverage path to handle redirected calls through call coverage, Send All Calls, Go To Cover, etc.
Call-Distribution Group	The set of analog port boards on the switch that connects subscribers and users to AUDIX by distributing new calls to idle ports. This group (or <i>split</i>) is called Automatic Call Distribution (ACD) on System 85, Enhanced Uniform Call Distribution (EUCD) on a DIMENSION PBX, and Uniform Call Distribution (UCD) on System 75.
Call Vectoring	A System 85 R2V4 and Generic 2 feature that uses a vector (switch program), allowing a switch administrator to customize the behavior of calls sent to an ACD group.
Camp-On	A shutdown option that waits for ports to become idle before blocking service to them, allowing subscribers to finish calls in progress. A data link busy-out uses camp-on blocking.
Central Office	A main telephone office where private customer lines are terminated and connected to the public network through common carriers.
Central Processing Unit (CPU)	The hardware that controls AUDIX subsystem operation (data transfer, I/O, and logical instructions) by executing instructions obtained from memory. The Feature Processor (FP) and Data Base Processor (DBP) CPUs form the major AUDIX subsystems on one-cabinet systems. The Voice Session Processor (VSP) CPU assists the FP-CPU on two-cabinet and AUDIX-L systems.
Circuit Pack Carrier	The physical box that contains circuit packs and connects them to a backplane.
Class of Service (COS)	The standard set of features given to subscribers when they are first administered (set up with an AUDIX Voice Mailbox).
Co-located	An AUDIX installed in the same physical location as the host switch (also called a local installation).
Closing Filesystems	Taking an active filesystem out of service, usually by doing an administrative or maintenance shutdown. Closed filesystems may still be mounted (operated on but not written to).
Colocated Adjunct	Two or more adjuncts that are serving the same switch (i.e., each has voice port connections to the switch) or that are serving different switches but can be networked through a direct RS-232 connection due to their proximity.
Commands	For AUDIX users, commands are one- or two-key touch tones that control a Voice Mailbox activity or function (such as 0 or *H). A <i>processor</i> command is an instruction to the system, usually sent from a display terminal (such as CTRL-c).
Configuration	The particular composition and hardware selected for a system, including external connections, internal options, and peripheral equipment.

Control Mode	A state of the AUDIX machine where firmware is in control and software is shut down. The maintenance terminal displays the Control Mode Menu and forms are not available.
Control Mode Menu	A list of Control Mode functions that may be done while software is shut down. The menu appears on the maintenance terminal and includes the options: (1) system status, (2) environmental alarm status, (3) initialization history, (4) restart, (5) reboot, (6) restart with DBP reboot.
Corrupt Filesystem	A damaged filesystem. It may have an usually small or large size, or a negative number on the <code>filesystem : list</code> form.
Create Message Activity	Activity 1 on the Activity Menu, used by AUDIX subscribers to record or edit a voice mail message.
Customer Premises Equipment (CPE)	Any ISDN data or Terminal Equipment (TE) that is installed at the customer site, not the CO. The NT1 unit is the normal boundary between CPE and CO (off-site) equipment.
Data Base	A collection of filesystems and files in disk memory that store the voice and nonvoice (program data) necessary for AUDIX system operation.
Data Base Processor (DBP)	One of the major AUDIX subsystems that interacts with the other subsystems to move voice and nonvoice data to and from disk.
Data Base Processor Interface (DBPI)	This processor (UN160B) talks to a Voice Buffer (TN520) over the S-bus, and to the DBP through the VSFI (UN162) pack and the DBP/VME Bus.
Data Communications Equipment (DCE)	Standard type of data interface normally used to connect to DTE-type devices. DCE devices include the DSU, IDI, and MPDM.
Data Communications Interface Unit (DCIU)	A switch device that allows nonvoice (data) communication between AUDIX and a System 85 or DIMENSION PBX. The DCIU is a high-speed synchronous data link that communicates with the Common Control switch processor over a Direct Memory Access (DMA) channel that reads data directly from FP memory.
Data Link	The connection from the AUDIX cabinet to the switch DCIU or SCI Interface boards that enables nonvoice (data) messages to pass between AUDIX and the switch, such as message-waiting lamp, time, and call-status information. The link varies according to the type of AUDIX and switch used. Each AUDIX adjunct needs one data link.
Data Service Unit (DSU)	DATAPHONE II 2500 DSUs are synchronous DCE devices used for extended-local AUDIX connections. The 2596A DSUs support 2400, 4800, and 9600 bps connections. The 2600 or 2700 series may also be used; these are more expensive DSU options and support diagnostic testing and the DATAPHONE II Service network system.
Data Terminal Equipment (DTE)	Standard type of data interface normally used for the endpoints in a connection. Normally AUDIX, most terminals, and the switch DCIU or SCI are DTE devices.

Data Set	(See also <i>Modem</i>) AT&T term for modem; a data set usually includes the telephone.
DBP Bus	The main bus in the DBP subsystem that interconnects the DBP-CPU, RAM, disk controller, and VSFI. The BC circuit pack is the primary bus controller.
Dedicated Line	A communications path that does not go through a switch. A dedicated (hard-wired) path may be formed with directly connected cables. LADS, ADUs, or other devices may also be used to extend the distance that signals can travel directly through the building wiring.
Default	A value that is automatically supplied if no other value is specified.
Defect Map	See “Alternate Tracking.”
Delivered Message	Voice mail that has been successfully transmitted to a recipient’s incoming mailbox.
Demand Testing	Testing performed on request (usually by service personnel using a form).
Device	A replaceable piece of hardware shown on the alarm and error log forms (part of a unit).
Dial-Ahead/Dial-Through	The act of interrupting or preceding AUDIX system announcements by typing (buffering) touch-tone commands in the order the system would normally prompt for them.
Digital	Discrete data or signals such as 0 and 1.
Digital Communications Protocol (DCP)	A 64 kbps digital data transmission code with a 160 kbps bipolar bit stream divided into two information (I) channels and one signaling (S) channel.
Digital Subscriber Line (DSL)	The ISDN Basic Rate Access (BRI) DSL is the 2B+D format used for the T 4-wire (2-pair) interface which connects CPE to ISDN.
Directory	An AUDIX feature allowing you to hear a subscriber’s name and extension after typing * * N at the activity menu. Also, a group of related files accessed by a common name in software, such as the <i>mount point</i> on disk where filesystems are located (for example, /ss, /sd, /vd).
Disk Controller	The SADI circuit packs that controls up to four disk drives in a one-cabinet system and seven disk drives in a two-cabinet system. Because there is only one controller, it is always number 0.
Disk Device	The drive number associated with a disk controller that indicates its physical position. Device numbers on AUDIX may be 0 to 6. The removable cartridge drive is always 1, the main hard disk is 0, and the other drives are hard disks numbered 2 to 6.
Display Terminal	A data terminal with a screen and keyboard used for displaying AUDIX forms and performing maintenance or administration activities.
Distributed Communications System (DCS)	The connection of two or more switches over logical and physical data links to provide full or partial feature transparency. Voice links are provided with tie trunks. The DCS configuration is set up using the <code>system : translation : switch connection</code> form.

Distribution List	See Mailing List.
Ductwork	The overhead structure used for holding cables and supplying power to an AUDIX-L system. Ductwork is optional for most switches, although it may be used to conform to an equipment room layout.
Duplex	See “Half-Duplex” or “Full-Duplex.”
Electronic Document Communications (EDC)	An AP program used for composing and sending text messages to other AP and switch users.
Enabled/Disabled	The state of a hardware (DBP) device that indicates whether or not the AUDIX system can use it. Devices must be equipped before they can be enabled (made active).
Enhanced Uniform Call Distribution (EUCD)	See “Call-Distribution Group.”
Environmental Alarm	Power, temperature, and airflow alarms that are monitored and reported to the MI through the alarm board, displayed by the Control Mode Menu (Function 2) or the alarm log.
Equipped/Unequipped	The state of a DBP or VSP device that indicates whether or not AUDIX software has recognized it. Devices must be equipped before they can be enabled (made active) using either the <code>maintenance : dbp : equip</code> or <code>maintenance : vsp : equip</code> form.
Error Log	A list of errors in a software file on disk. The <code>maintenance : error : display</code> form normally shows errors in historical order. The <code>maintenance : error : specification</code> form can be used first to select errors to display based on type, time, etc.
Errors	Problems detected by the system during maintenance self-tests and recorded in the error log. Errors can produce an alarm (fault) if they exceed a threshold.
Escape to Attendant	An AUDIX feature that allows an AUDIX subscriber with the Call Answer feature to have a personal attendant or operator administered to potentially pick up an unanswered call. A system-wide extension could also be used to send callers to a live agent.
Executive Features	A set of features introduced in R1V4 software that include Private Messaging (**P), Allow Forwarding (**F), Untouched Message (**H or Hold), and a Security Password Length, where a minimum-length password up to 15 characters long is administered to increase system security.
Exit Command	An AUDIX feature that allows callers to use the **X (Exit) command to have AUDIX disconnect a call <i>without</i> hanging up. This is especially useful during calls made from a toll phone or for ending Outcalling sessions from a remote location.
Expansion Cabinet	The upper cabinet of an AUDIX two-cabinet configuration, where the base cabinet is an AUDIX one-cabinet system.

Extended RAM Test	Initialization option selected during a nonstandard initialization that runs extended hardware tests on the FP processor memory (tests take about 10 to 15 minutes).
Failure Status Word (FSW)	Failure codes in bytes reported by a processor's firmware. Use the Control Mode Menu (Function 1) or the maintenance : system : hardware status form to show these bytes.
Faults	See "Alarms."
Feature Processor (FP)	The major AUDIX subsystem that controls feature operation, communicates with the switch through the data link, and supports the maintenance and administration interfaces.
Field	An area on a form, menu, or report where you can type or display information. For input fields, fill in the blanks or type over information already there. Read-only or output fields cannot be changed; you usually press ENTER to display information.
File	A collection of like records (data) stored under a single name on disk.
File Cabinet	A storage area for subscribers to keep copies of voice messages for future reference or action.
File Redundancy	An AUDIX R1V4 or later feature that allows data from crucial filesystems to be continuously copied to duplicate (mirror) filesystems while the system is running. If the system has some problem where an original "master" filesystem cannot be used, the backup "slave" filesystem is placed in service automatically.
Filesystem	A collection of related files (programs or data) stored on disk. Seven types of filesystems are required to initialize AUDIX and provide full service: adat, ndat (R1V3 and later), sdat, sst, vdat, vtext, and boot.
Fixed Storage Drive (FSD)	A permanently mounted disk drive on AUDIX-L. AUDIX uses an HDD.
Form	(Also called "Screen Form") A screenful of related data that can be shown on the display terminal. AUDIX software transfers screen forms out to the terminal where the user can display, add, or change information.
Format	To set up a disk with a predetermined arrangement of characters so the system can interpret meaningful information. If a disk is reformatted, all data is erased.
Full-Duplex	Simultaneous two-way, independent, asynchronous transmission in both directions.
Full Service	A fully functional AUDIX system with data and voice link communication with the switch that answers calls with good quality and no alarms.
Function	Individual steps or procedures within a Voice Mailbox activity.
Function Keys	See Programmed Function Keys.
Generic 1, 2, or 3	AT&T DEFINITY Communications System software releases. <i>Generic 1</i> and <i>Generic 3</i> correspond to releases based on System 75-type software. <i>Generic 2</i> is the newest release of System 85-based software.
Generic 4 or 5	Compatible 5ESS Switch software, used for integrated AUDIX applications.
Generic 7, 8, or 9	Compatible 1A ESS Switch software, used for integrated AUDIX applications. The different generics support different types of message-waiting indication capability.

Generic-Program Cartridge	A copy of the uncustomized software shipped with a new system or software upgrade.
Get Messages	See “Scan Incoming Mailbox Activity.”
Grade of Service (GOS)	The level of service subscribers receive based on the number of seconds they have to wait before AUDIX answers a call.
Guest Password	An AUDIX feature that allows people who are <i>not</i> AUDIX subscribers to leave messages on AUDIX by dialing a subscriber’s extension and entering a system-wide guest password.
Half-Duplex	Asynchronous transmission between devices in either direction, but not both directions at once.
Hard Disk Drive (HDD)	A permanently mounted, fixed disk drive on AUDIX.
Header	Information that AUDIX creates to identify a message. A message header includes the originator or recipient, type of message, creation time, and delivery time.
Help	A command run by pressing HELP or CTRL-? on a display terminal to show the options available at your current form position. In AUDIX, press * H on a touch-tone telephone to get a list of options.
Hexadecimal	Alphanumeric numbering scheme used in some error messages to represent the numbers 0 to 15. Hexadecimal digits include the numbers 0 to 9 and the characters A, B, C, D, E, and F.
Host Switch	The switch directly connected to AUDIX over the data link; also, the physical link connecting AUDIX to the rest of a DCS network. (See also <i>Distributed Communications System</i>).
Hunt Group	A group of analog ports on the switch, usually administered to search for available ports in a circular pattern. Used on AUDIX Standalone systems and some switches.
Information Service	(Also called <i>Bulletin Board</i>) An AUDIX feature that allows a message to be played to callers who dial the extension. Callers cannot leave a message (it is a listen-only service).
Inactive Filesystem	Any filesystem that is not administered as an active filesystem on the <code>system : filesystem</code> or <code>system : announcement : filesystems</code> forms.
Initialization	The process of bringing a device or system to a predetermined starting state. The full AUDIX start-up (boot) procedure tests hardware; loads the boot filesystem programs; locates, mounts, and opens other required filesystems; and starts normal service.
Initialization and Administration System (INADS)	A computer-aided maintenance system that offers AUDIX maintenance services at a centralized location. Major and minor alarms are sent over the AUDIX ALARM link using existing switch alarm-reporting facilities.
Initialization History	Function 3 on the Control Mode Menu that displays the last hardware initialization message.

Initialization Options	A series of initialization choices available by manually selecting a nonstandard initialization. The options include extended RAM tests, standard or nonstandard boot, and stop points.
Initialization Stop Points	An initialization option available through manual selection of initialization options, allowing the initialization to be halted at some point, then resumed, for diagnostic purposes.
Initializing a Disk	Erasing a disk directory, then reading its volume label (name) from the maintenance : dbp : equip form. Old disk contents are erased.
Integrated AUDIX	An AUDIX with a data link. Compatible switch software is required.
Integrated Message Notification (IMN)	A feature that allows several message services to alert users of new messages through a common service using descriptive announcements and the message-waiting lamp. (Unified Messaging)
Integrated Services Digital Network (ISDN)	A protocol being developed in response to a recommendation from an international standards body. It defines how equipment from different manufacturers should communicate with one another in end-to-end digital connections using standard interfaces.
Integrated Services Line Unit — T Interface (ISLU-T)	A 4-wire (2-pair) connection from CPE devices directly to the ISDN switch. This connection may be used instead of installing an NT1 to convert 4-wire signals to the 2-wire U interface.
Intelligent Unit	Any circuit pack or group of packs controlled by a single microprocessor or microcontroller that coordinates maintenance activities for that unit.
Interface	The device or software that forms the boundary between two devices or parts of a system, allowing them to work together.
Isolating Data Interface (IDI)	A synchronous, full duplex data device used for direct cable connections between an AUDIX with an SCPI and the switch DCIU.
Label	The name assigned to a disk device (either a removable cartridge or permanent drive) through software. Cartridge labels may have a generic name (such as 1:3) to indicate the software release, or a descriptive name if used for backup purposes (such as back1). Permanent disk drive labels usually indicate the position of the disk (such as disk00).
Leave Word Calling (LWC)	A switch feature that allows the calling party to leave a standard (nonvoice) message for the called party using a feature button or dial-access code.
Light-Emitting Diode (LED)	Indicator on a circuit pack faceplate or disk drive to show status of AUDIX operations and possible fault conditions.
Listen to Messages	See “Scan Incoming Mailbox Activity.”
Link	One of 20 data links shown on the system : translation : switch connection form that terminate on a switch port number.

Load	To read software from external storage (such as disk) and place a copy in system memory.
Local Administration Terminal (LAT)	The system administrator's display terminal used to set up AUDIX subscribers, check traffic and space, etc. for that site. Usually has a printer attached.
Local Adjunct	The adjunct to which the administration or maintenance terminal is connected. All other adjuncts, including colocated adjuncts, are considered remote to this adjunct.
Local Area Data Set (LADS)	A signal-extending data device used for connecting AUDIX to a switch DCIU for distances greater than 400 feet.
Local Installation	(see also <i>Co-located</i>) A switch, adjunct, or piece of peripheral equipment installed physically near the host switch or system.
Local Maintenance Terminal (LMT)	A display terminal located near the AUDIX cabinet (usually directly cabled) which is temporarily attached to the MAINT connector during an on-site service visit.
Login	(See also <i>Password</i>) A unique code used to gain approved access to the AUDIX system, either a subscriber's Voice Mailbox or a display terminal.
Mailbox	A portion of disk memory given to each subscriber for creating and storing outgoing and incoming messages. Space is usually allocated as needed.
Mailing List	A group of subscriber addresses assigned a list ID and public or private status. A mailing list may be used to simplify sending messages to several subscribers.
Maintenance	The process of identifying and correcting system problems and taking steps to prevent them.
Maintenance Interface (MI)	An intelligent circuit pack that has two RS-232C ports for maintenance and administration, a shutdown toggle switch, and system alarm LEDs. The MI controls system maintenance, modes, initialization, and alarm functions.
Maintenance Port (MAINT)	The RS-232C (H00) connector on the rear of the cabinet that connects the LMT (over cables) or the RMT (over a modem) to AUDIX.
Maintenance Shutdown	The process of closing all filesystems, leaving them unmounted and inaccessible (normally used before a system power down). This may be done with the MI toggle switch or shutdown form.
Major Alarm	An alarm detected by AUDIX software that affects at least one fourth of the AUDIX ports in service. Often a major alarm indicates that no AUDIX service is available.
Manager	A software module responsible for the operation of one part or function of the system.
Memory	A device which can store logic states such that data can be accessed and retrieved. Memory may be temporary (such as system RAM) or permanent (such as disk).
Message Categories	Groups of messages in subscribers' mailboxes. Categories include new, unopened, and old for the incoming mailbox, and delivered, accessed, undelivered, not deliverable, and file cabinet for the outgoing mailbox.
Message Center	An AP call-answering feature that allows an agent to enter a message for a busy or unanswered extension. Also called Message Center Service (MCS).

Message Line	The third line from the bottom of a terminal screen where help information and error messages are displayed.
Message-Waiting Lamp	An LED on a voice terminal (telephone) that alerts subscribers to new messages. Also called Automatic Message-Waiting (AMW) Lamp.
MI Toggle Switch	A switch on the MI (TN511) circuit pack used to shut down system software by moving it off-center (left or right), or reinitialize a system when returned to center position.
Microcom Networking Protocol	This provides on-line compressing data for increased throughput, provides error detection, correction, and retransmission, and provides data rate matching with the opposite endpoint.
Minor Alarm	An alarm detected by maintenance software that affects less than one fourth of the AUDIX ports in service, but has exceeded error thresholds or may impact service.
Mirroring	See File Redundancy.
Mode	An operating state in which the system can perform certain tasks. AUDIX modes include control mode, normal mode, administrative or maintenance shutdown mode, and initialization.
Modem	A modulator/demodulator device for transmitting analog (continuous) signals.
Modem Pool	A group of modems set up to accept incoming data calls from a remote device. The switch's modem-pooling feature inserts modems into the link automatically. The transmission rate could range from 1200 to 9600 bps depending on facilities.
Modular Processor Data Module (MPDM)	A data device that converts RS-232C or RS-449 protocol signals to Digital Communications Protocol (DCP) used by the System 75/85 switch. MPDMs may connect AUDIX to a switch DCIU or SCI link, or connect terminals to a switch port board.
Modular Trunk Data Module (MTDM)	A Data Terminal Equipment (DTE) device that converts RS-232C or RS-449 signals to Digital Communications Protocol (DCP) used by the System 75, System 85, or DEFINITY Communications Systems. MTDMs are often used in modem pools.
Mount Point	A software abbreviation for a filesystem that allows software to find it independent of its physical location. Similar to a "directory."
Mount	The process of identifying a filesystem to software and making it accessible.
Mounted	The state of a filesystem when it is identified to the software and accessible.
Network Termination 1 (NT1) Unit	A physical and electrical interface between the 2-wire U interface and the 4-wire T interface. The NT1 unit marks the boundary between Customer Premises Equipment (CPE) and the ISDN network.
Networking	An AUDIX R1V3 or later feature that allows the customer to link together up to 100 remote AUDIX machines for a total of up to 36,000 subscribers.
Nonstandard Boot	A manual initialization option run by typing "n" after the standard/nonstandard boot question. This must be followed with controller, device, and boot filesystem information.

Nonstandard Initialization	A manual initialization option run by typing “n” to the standard/nonstandard initialization question. Subsequent questions allow you to specify a type of initialization.
Normal Mode	The state of the AUDIX system after hardware initialization, where software is running and maintenance and administration forms are available.
Not Deliverable Message	A message that could not be delivered after a number of attempts specified by the system administrator (up to ten). This usually means the subscriber’s mailbox is full.
Null Modem	A device that rearranges (crosses over) the leads in a cable, allowing signals to be exchanged between two Data Terminal Equipment (DTE) devices. A null-modem cable is required to directly connect a display terminal to the AUDIX MI administration or maintenance connectors in a hard-wired local installation.
On-Line Help	An AUDIX feature allowing system administrators and maintenance personnel to obtain screen form information by pressing a key for the PATH line, field, or form.
One-Cabinet AUDIX	Current name for the 16-port AUDIX-S (Small) system. This half-height cabinet supports up to 2,000 subscribers (see AUDIX-S).
Operating System	The set of programs that runs the hardware and interprets software commands.
Opening a Filesystem	The process of making an inactive filesystem capable of providing service through a restart or a reboot.
Oryx/Pecos	The AUDIX operating system (application software shipped on the generic program cartridge from the factory), a set of programs that runs hardware and interprets software commands.
Outcalling	An AUDIX R1V3 or later feature that allows AUDIX to dial subscribers’ numbers to inform them they have new messages (often used with AUDIX Standalone or if the subscribers’ telephones do not have message-waiting lamps).
Password	A code assigned to every terminal user for security reasons. After dialing AUDIX, subscribers must correctly dial a personal password to log on to AUDIX.
Password and List Administration Activity	Activity 5 on the Activity Menu that allows subscribers to change their password, or to create, scan, or edit mailing lists.
Path	The form string (or location) typed on the second line of an AUDIX screen form that identifies the form to display. Parts of a path name are called segments. Each part must be typed with enough characters to uniquely name that segment, followed with an ENTER key.
Path Line	The second line from the top of a terminal display form used to identify the form you wish to display. Type segments individually followed by ENTER or a carriage return; you need to type only enough characters to name a unique form (such as m e d).
Peripherals	The voice terminals, printers, display terminals, and other devices external to the AUDIX cabinet, but necessary for full AUDIX operation and maintenance.

Personal Computer (PC)	An AT&T 62xx or 63xx desktop computing device, required for the AUDIX Data Acquisition Package (ADAP) and Text Service Interface.
Personal Greeting Administration Activity	Activity 3 on the Activity Menu that allows subscribers with the Call Answer feature to record a personal message. This greeting is played to callers who are redirected to AUDIX. The Information Service and Automated Attendant features also use this option for recorded messages or menus.
Port	A connection or link between two devices, allowing information to travel through it to a desired location. For example, a switch port connects to an AUDIX voice port to allow a subscriber on a voice terminal to leave a message on disk.
Power Down	The activity of turning off system power before changing hardware or reinitializing a faulty system. Always shut down the system software before turning power off, or data will be lost.
Power Up	The activity of turning power on to start system initialization and automatic self-tests; disks spin up.
Primary Rate Interface (PRI)	International standard protocol for connecting a switch or PBX to a computer, network, or another switch. PRI supports twenty-three 64 Kbps information channels and one 64 Kbps signaling channel (called 23B+D format or Extended DSL) over high-speed T1 facilities.
Private Mailing List	A list of addresses that only the owning subscriber can access.
Private Messaging	One of the Executive Features that allows a subscriber to send a voice mail message that can't be forwarded by the recipient.
Programmed Function (PF) Keys	User- or system-coded keys that allow information to be inserted or functions to be done by simply pressing the key.
Processor Element (PE)	The combination of CPU, RAM, and BI boards that together make up the FP or VSP. The CPU controls the other PE boards and is the heart of that subsystem.
Processor Interface (PI)	(Also known as Processor Interface Board or PIB). A System 75, System 75 XE, Generic 1, and Generic 3i or Generic 3s data link; AUDIX usually uses the EIA port connection (one of four links).
Processor Data Module (PDM)	See "Modular Processor Data Module (MPDM)."
Processor Element (PE)	The combination of CPU, RAM, and BI boards that together make up the FP (or AUDIX-L VSP). The CPU controls the other PE boards and is the heart of that subsystem.
Protocol	A set of conventions or rules governing the format and timing of message exchanges (signals) to control data movement and the detection and possible correction of errors.
Public Mailing List	A list of addresses that any subscriber can use if that subscriber knows the owner's list ID# and extension number. Only the owner can modify a public list.

R1Vx	The release and version of software. See AUDIX Basic (R1V1), AUDIX Enhanced (R1V2), and AUDIX Enhanced II (R1V3), AUDIX Enhanced III (R1V4), AUDIX Release 1 Version 5, AUDIX Release 1 Version 6, and AUDIX Release 1 Version 7 for details.
Real-Time Clock	The internal AUDIX clock which may or may not be synchronized with the clock in the switch.
Reboot	Any boot after the first system initialization. (See also <i>Boot</i>)
Reinitialization	The process of repeating an initialization completely or in part, either automatically or manually.
Remote Adjunct	Any adjunct other than the adjunct to which the administration or maintenance terminal is connected.
Remote Installation	A system, site, or piece of peripheral equipment that is installed in a different location from the host switch or system.
Remote Maintenance	The service personnel at a centralized maintenance site who can access the AUDIX through the remote MAINT connection to perform off-site troubleshooting or routine checks.
Remote Maintenance, Administration, and Traffic System (RMATS)	Early computer-aided maintenance system (replaced with INADS).
Remote Maintenance Terminal (RMT)	A display terminal at the remote maintenance site which dials-in to AUDIX over a modem connected to the MAINT port.
Removable Cartridge Drive (RCD)	A 20- or 50-Mbyte AUDIX disk drive with a removable magnetic-media cartridge.
Removable Storage Drive	An AUDIX-L disk drive that permits removal and replacement of the 80-Mbyte magnetic-media cartridge. One RSD is required per system for software updates and backup procedures.
Replaceable Unit	Any removable device that the system can identify as faulty. The unit may have more than one part (such as the FP-PE, which controls three circuit packs).
Reset	A low-level hardware function that causes various processors to interrupt, then begin to execute their RAM initialization.
Resolved Alarm Log	A list of the date and time at which alarms were activated and resolved (or <i>retired</i>), shown by the <code>maintenance : resolved alarm : display</code> form. The <code>maintenance : resolved alarm : specification</code> form can be used to select resolved alarms to display based on type or time.

Restart (AUDIX)	An AUDIX feature that allows subscribers who have reached AUDIX through the Call Answer feature to access their own mailboxes by typing the *R (Restart) command. This is especially useful for long-distance calls or for AUDIX Standalone users who wish to access AUDIX when all the Voice Mail ports are busy.
Restart (System)	A partial system initialization from FP memory using booted programs already in RAM. This can be done using the Control Mode Menu (Function 4) or the startup form. A restart resets the FP and opens and mounts all filesystems that need to be active for full service.
Retention Time	The amount of time messages are saved on disk before being automatically deleted from a subscriber's mailbox.
Return Call to Sender	An AUDIX feature that allows subscribers to place a call immediately to the originator of an incoming message if that person is in the switch's dial plan.
S Bus	The main bus of the AUDIX system which connects all other major processor subsystems (FP and DBP) as well as the minor processors (VB, SCPI, and DBPI).
Scan	To listen to a message body or header.
Scan Incoming Mailbox Activity	Activity 2 on the Activity Menu which allows subscribers to review, forward, or respond to messages they have received from other subscribers or through the Call Answer feature.
Scan Outgoing Mailbox Activity	Activity 4 on the Activity Menu which allows subscribers to review, edit, or redirect messages they have scheduled for delivery, or to check the status of messages that are already sent.
Scheduled Delivery Time	A time and/or date that a subscriber optionally assigns to a message that tells AUDIX when to deliver it. If a delivery time is omitted, AUDIX sends the message immediately.
Screen-Labeled Keys	The top row of eight keys on a display terminal whose functions are marked by reverse video blocks at the bottom of the screen. The keys' functions change when the screen labels change.
SCSI-to-AUDIX Disk Interface (SADI)	The SADI (TN475B) is the AUDIX disk controller. It uses the Small Computer System Interface (SCSI) protocol to communicate with the AUDIX disk drives. The SADI's LEDs show which drives are active. The 50-pin drive data cable is called the SCSI cable.
Simplified Message Service Interface (SMSI)	Type of data link connection to an integrated 1A ESS Switch or 5ESS Switch in AUDIX software.
Service Not Started	A message displayed at the end of unsuccessful initialization which indicates software problems, such as a missing or corrupt (bad) filesystem. Normally the system can still display forms, but cannot provide service (answer calls). You may log in after this message.
Shutdown	A procedure required to disable system operation and protect customer data stored on disk before a power down. Select the type of shutdown based on the tasks you need to perform and their urgency, using either the shutdown form or MI toggle switch.

Split	A group (or queue) of analog ports on the switch. See also “Call-Distribution Group.”
Standalone	An AUDIX R1V3 or later feature that allows AUDIX to connect to any switch without using a data link. This allows AUDIX to work with a switch built by a different vendor or one that runs an incompatible load of software.
Standard Initialization (Standard Boot)	The normal automatic (default) initialization of the AUDIX system, where firmware first scans for the program “boot_f” on disk 0/0. If not found, the firmware looks for another boot filesystem to load until all possible combinations have been examined.
Start Service	A message displayed at the end of a successful initialization, indicating that system software is active and display forms are available.
Start-up	See “Restart.”
Status Line	The top line of an administration or maintenance form displayed on a terminal, showing the active system alarms (if any), logins (up to two), and threshold (disk space) violations.
Subscriber	A person to whom the AUDIX administrator assigns the ability to access the Voice Mailbox feature. Subscribers may also be assigned the optional Call Answer feature on the <code>subscriber : local</code> or <code>cos</code> forms or given LWC permission through the switch.
Subsystem	A major functioning element of AUDIX software and hardware. Subsystems include the Feature Processor (FP), Data Base Processor (DBP), and Voice Session Processor (VSP) (the VSP is only used on AUDIX two-cabinet or AUDIX-L systems).
Switch	An analog, digital, or electronic system where data and voice transmissions are not confined to fixed communications paths, but are routed among available ports or channels.
Switch Communications Adapter (SCA)	Custom device used for making AUDIX connections to a 5ESS Switch.
Switch Communication Interface (SCI)	The System 75 data link device. An AUDIX adjunct connects to the SCI TN738 Interface-2 (INT2) board through an MPDM.
Switched Access	A connection made from one endpoint to another through switch port boards. This allows the endpoint (such as a terminal) to be used for several applications.
Synchronous Transmission	A type of transmission where the data characters and bits are exchanged at a fixed rate with the transmitter and receiver synchronized. This allows greater efficiency and supports more powerful protocols. The AUDIX-to-switch data link is synchronous.
System Administrator	Person usually at customer site who is responsible for AUDIX system administration and possibly Networking coordination.
System Administration Activity	Activity 9 on the Activity Menu which may be used only by an AUDIX system administrator who has announcement-control permission. This option allows the administrator to record, play, or edit subscriber names or system announcement fragments.

System Status	Function 1 on the Control Mode Menu that shows the Failed Status Words (FSW) last reported to the MI before shutdown. These bytes are updated every 30 seconds.
T Interface	The standard ISDN 4-wire (2-pair) interface used for terminal connection and data transmission on the customer premises. (Also called S interface.)
T1 Carrier	A short-haul digital transmission line that uses time-division multiplexing. A bipolar signal is transmitted at 1.544 Mbps along 16- to 20-gauge copper-conductor cables.
TD Bus	A main AUDIX bus that connects the VPT, VPC, and TDBI ports together during a call.
Terminal Line	The second line from the bottom of the display terminal screen that shows cursor line, column position, caps status, and current input mode.
Terminal Type	The last required entry before gaining access to the AUDIX display forms, giving the type of display terminal. All compatible terminals must use types "5420" or "513."
Text Service Interface	An AUDIX R1V4 or later feature that allows AUDIX headers to be sent to electronic mail services such as IBM PROFS using a PC/PBX 2780/3780 interface.
Threshold	A boundary used to indicate when available disk space is getting low. Both subscribers and filesystems are assigned thresholds.
Time Division Bus Interface (TDBI)	The TDBI (TN500) provides a 16-port interface between the VB and the VPCs (up to 4 boards) over the TD bus. Some early AUDIX one-cabinet systems may use the 8-port TN477 TDBI-8.
Tone Generator	A device acoustically coupled to a rotary phone, used to produce touch-tone sounds when subscribers cannot use a regular touch-tone generating voice terminal.
Traffic	The flow of attempts, calls, and messages across a telecommunications network.
Translations	Software assignments telling a system what to expect on a certain voice port or the data link, or how to handle incoming data. They customize AUDIX and switch features for users.
Triplet	An alarm or error code consisting of a unit, fault, and device number.
Type	The name entered on a screen form that identifies a kind of filesystem to software. The following types must be active for AUDIX to operate: boot, adat, ndat (beginning in R1V3), sdat, sst, vdat, and vtext.
U Interface	The standard ISDN 2-wire (1-pair) interface to the 5ESS Switch. It connects to the NT1 unit and carries signals off-premises to the CO.
Undelivered Message	A message that has not yet been sent to a subscriber's incoming mailbox. The message resides in the sender's outgoing message and may be modified or redirected by the sender.
Unequip	See "Equipped/Unequipped."
Unfinished Message	(Also called Working Message) A message that has been recorded but not approved or addressed, usually the result of an interrupted AUDIX session.

Unified Messaging	A switch software feature that allows various message-handling services to keep track of new messages from all internal, switch, and AP sources on the system, including Message Center, EDC, LWC, and electronic mail services such as AT&T Mail and UNIX System mail.
Uniform Call Distribution (UCD)	The System 75 or DEFINITY Generic 1 or 3 call-distribution group of analog port boards that connects users to AUDIX.
Unit	A piece of software, hardware, or a group of hardware devices. All AUDIX alarms are recorded against and ordered by a specific unit number.
Unmount	The process of making a filesystem inaccessible to the DBP. (See also <i>Mount</i>)
Untouched Message	One of the Executive Features that allows a subscriber to keep a message in its current category by using the **H (Hold) command. If the message is in the new category, message-waiting indication remains active (for example, the message-waiting lamp will remain lit).
User Population	A combination of light, medium, and heavy users on which AUDIX configuration guidelines are based.
Vector	A customized program in the switch for processing incoming calls.
VME Bus	The Versa Module European Bus. See “DBP Bus.”
Voice Buffer	The TN520 circuit pack that works with the TDBI circuit pack to support the AUDIX voice ports by moving blocks of voice information to and from the DBP.
Voice Link	The AUDIX VPT connection(s) to a call-distribution group (or hunt group) of analog ports on the switch.
Voice Mailbox	The standard AUDIX feature assigned to all subscribers giving them access to disk space on which to store, create, and send voice mail messages.
Voice Message	(Also called “Voice Mail”) Digitized voice information stored by AUDIX on disk memory.
Voice Port Trunk (VPT)	The TN747B circuit pack that provides the voice interface between the AUDIX voice ports and the analog ports on the switch used to connect subscribers’ voice terminals during a call.
Voice Processor (VPC)	The TN501B 2-port circuit pack that analyzes and compresses voice signals, detects touch-tones and silence, controls playback and recording volume, and controls playback speed.
Voice Session Processor (VSP)	A major AUDIX-L subsystem that processes the voice and data information that control the AUDIX call setup operation, including port hardware and buffers. On AUDIX, the FP controls these boards (TDBI, VB, VPC, and VPT packs).
Voice Store and Forward Interface (VSFI)	The UN162 circuit pack transfers voice information between the DBP bus and S bus.
Voice Terminal	A telephone used for spoken communications with AUDIX. A touch-tone telephone with a message-waiting lamp is recommended for all AUDIX subscribers.

Voicing	Either speaking a message into the AUDIX system during recording, or having the system playback a message or prompt to a subscriber.
Volume	A physical removable cartridge or disk drive device. Volume <i>labels</i> are disk software names.
Work Group System (WGS)	A 6312, 6286, 6386, or equivalent WGS is a PC-like device required for the AUDIX Data Acquisition Package (ADAP) and the Text Service Interface.

Index

2

2224 modem option settings 8-8
2224G Option Switch Locations 16-17
2296A Option Switch Settings 16-20

4

47x/57x options settings 8-10

6

64xx options settings 8-10

A

abbreviations *AB-1*
Accessing the Control Mode Menu 11-5
acronyms *AB-1*
Activate an Announcement Set Version 14-14
Activating/Deactivating Filesystems 14-13, 14-27
active alarms? 3-6
activity log *G-1*
activity trace *G-1*
Adding a New Filesystem 14-20
Adding a Vtext Filesystem 14-13, 15-15
Administration Log 16-5
administration log 2-18, *B-23*
Administrative Shutdown 14-13, 14-24
administrative shutdown 2-19, *A-22*
air filter replacement 2-14, 7-7
alarm and error log checks 2-18, 3-25
alarm logs *A-31*
alarmable units 2-17, 3-11
Alarms
alarms
 active alarm resolution 3-6, 3-8
 circuit packs 4-4
 Control Mode Menu 11-6, 11-15
 control mode menu 7-10
 data link 5-2
 DBP-Bus 13-5

alarms—*Contd*

 disk drives 6-1
 environmental alarms 7-2
 expansion cable 9-11
 Filesystems 14-1
 non-AT&T switch 5-1
 not reported to remote site 7-14
 power or environment 7-10
 software translation 5-9
 TD-Bus 13-9
AMIS analog network 16-21
Announcement Filesystem 15-19
answers after long ringing 3-16
Are There Active Alarms? 11-15
Are There Customer Complaints? 14-10
Asynchronous Data Unit setup 8-9
attempting DBP filesystem boot message 12-22
Audits
 Automatic 15-18, 15-19
 Description 15-16
 Filesystems 15-19
 FP Audits 15-16
 Immediate 15-18, 15-19
audits on filesystems 2-16
 Running Audits 15-16
 VSP Audits 15-18
AUDIX Hardware
 System Architecture Diagram 13-3
AUDIX Initialization in Progress Message 12-5
AUDIX Loader File Loaded Message 12-24
AUDIX Loader File Opened Message 12-23
AUDIX Networking Troubleshooting 16-10
AUDIX upgrade
 call transfer turned off 3-21
Automated Attendant 16-2

B

Backing Up Filesystems 14-23
backing up filesystems 2-16
Backplane
backplane

backplane—*Contd*

- affect on circuit pack replacement 4-5
- Backplane Diagnosis 13-14
- Cabling 13-20
- cabling 6-8
- list 1 vs. list 2 or 4 9-10
- One-Cabinet Cabling 13-15
- One-Cabinet List 1 Boards and Layout Diagram 13-15
- One-Cabinet List 2 Boards and Layout Diagram 13-16
- One-Cabinet Paddle Boards 13-15
- Paddle Boards 13-14, 13-20
- Pin Replacement 13-21, 13-22
- Replacement 13-21
- Two-Cabinet Boards and Layout Diagram 13-19
- bad or noisy connection 3-16
- basic maintenance procedures A-1
- battery charger check 7-3
- battery reserve replacement 2-14, 7-5
- Block Service 16-6
- block service 2-19, A-1
 - data link A-2
 - VSP boards A-2
- Boot Filesystem 15-19
- Boot Filesystem Search Pattern 12-28
- Bus Diagnosis
 - DBP/VME Bus 13-5, 13-7
 - S Bus 12-6
 - S-Bus 13-8
 - TD Bus 13-9, 13-10
- Bus Diagrams 12-6
- Buses 13-2
 - AUDIX Diagram 13-3
 - Two-Cabinet AUDIX Diagram 13-4
- busy-out, see block service A-1

C

- cabinet cover plates A-17
- cabinet equipment C-4
- cabinet (front view)
 - order of disk drives 6-1
- cable connectors, expansion cabinet 2-6
- cable order codes C-12
- cabling
 - cabinet connector genders 2-5, 2-6
 - cable genders and codes C-12

cabling—*Contd*

- data link equipment 5-13
- data setups 8-9
- internal 6-7, 7-4, 7-7, 7-13
- LADS 5-16
- LMT and RMT 8-3
- printer 8-4
- two-cabinet AUDIX 9-9, 9-11
- call transfer
 - does not work after upgrade 3-21
- camp-on busy-out 2-19, A-2
- camp-on shutdown 2-19, A-2
- carrier, front view 4-2, 4-3
- cartridge-handling procedures 2-14, A-10
- CDC 170-Mbyte drive 6-20
- CDC 380-Mbyte drive 6-21
- CDC 760-Mbyte drive 6-23
- CDR1B board
 - check for problems 7-13
 - expansion cable 9-11
 - terminals fail to respond 8-2
- Changing Filesystem Status 14-13, 14-27
- Changing the Current Adat Version 14-14
- Changing Volume Labels 15-3
- Check Hardware Configuration 11-8
- Check if the Problem is Fixed 11-11, 14-11
- Check Software Configuration 14-6
- circuit breaker, POWER switch 7-15
- circuit pack alarms 4-4
- circuit pack carrier, front view 4-2, 4-3
- Circuit Pack LEDs
- circuit pack LEDs
 - normal status 2-17, A-23
 - SADI diagnostic tests A-28
 - Troubleshooting 11-9, 12-31, 13-7
 - troubleshooting 6-5
- circuit pack overview 2-7, 2-8, 4-2
- circuit pack replacement
 - TN472C DBP-CPU 4-10
 - TN475(B) SADI 4-11
 - TN477 TDBI-8 4-12, 4-14
 - TN500 TDBI 4-12, 4-14
 - TN501B VPC 4-16, 4-28, 4-29
 - TN506B BC 4-30
 - TN511 MI 4-31
 - TN520 VB 4-32
 - TN523 FP-CPU 4-34
 - TN532 DBP-RAM 4-38
 - TN533 SCPI 4-39, 4-40

circuit pack replacement—*Contd*
 TN539(B) ACCE 4-42
 TN540 DBP-RAM 4-38
 TN547(B) MPSI 4-45
 TN714 TC 4-46, 4-47
 TN716B BI 4-35
 TN727 NC 4-48, 4-49
 TN734 FP-RAM 4-36
 TN747B VPT 4-51, 4-55
 UN160B DBPI 4-57
 UN162 VSFI 4-58

circuit pack troubleshooting 4-4

Circuit Packs

circuit packs
 acronyms defined C-1
 check backplane 4-5
 handling procedures 4-5
 MI faceplate A-8
 Ordering Codes 13-14
 ordering codes C-10
 replacement procedures 4-5
 Troubleshooting 11-10, 12-1, 13-7, 13-10

Comcodes 13-14, 13-22

comcodes C-4, C-10

Compare Previous Status 11-11, 14-11

component ordering tables C-4, C-10, C-12

Computer Products power supply option straps 7-23

connector panel, rear view 2-4

connectors, see cabling 2-5, 2-6

Control Mode Menu

control mode menu
 active alarms 7-10
 Checklist 11-3, 11-10
 Display Alarms 11-7
 FP Restart and DBP Reboot, Option 6 11-15, 12-27
 FP restart and DBP reboot, option 6 A-6, A-20
 Initialization History Display 11-7
 Initialization History, Option 3 11-7, 11-15, 12-1, 12-27
 Menu Screen Display 11-6
 Option 1, System Status 11-6, 11-12
 Option 2, Alarms 11-6, 11-15, 12-27
 option 2, alarms 7-2, 7-10
 Options 11-12, 11-15
 Reboot, Option 5 11-15, 12-27
 reboot, option 5 A-6, A-20
 Restart, Option 4 11-15, 12-27

control mode menu—*Contd*
 restart, option 4 A-6, A-20
 System Status Option Display 11-6, 11-12

Control Mode Procedure 11-2, 11-3

control mode procedure 3-3
 Checklist Diagnosis 11-10
 Worksheet 11-4
 worksheet 3-4

Conversion Tables
 Hexadecimal-to-Binary 11-14

Copying Files 14-25

Copying Filesystems 14-23

cover plate removal A-17, A-19

Creating Filesystems 14-20, 15-7

CTRL key commands 8-16

CTRL-Key Commands 12-27

Customer Complaints 14-10

customer complaints 3-7, 3-8

D

data equipment, see peripheral equipment C-19

data fields 8-17

data link
 202T modem 5-22
 5ESS Switch ACP 5-22, 5-23
 alarms 5-2
 busy-out A-2
 check connecting equipment 5-13
 check switch clock 5-12
 check the DSU 5-15
 check the IDI or LADS 5-6, 5-13
 check the link translations 5-7
 check the MPDM 5-17
 check the switch 5-11
 check translations 5-10, 5-11
 IDI 5-13
 non-AT&T switch 5-1
 SCA 5-20
 tests 5-3, 5-5, 5-7

DBP Boot File Loaded Message 12-22

DBP Initialization Passed Message 12-21

DBP Initialization Results 12-18

DBP instruction codes D-8

DBP monitor D-1

DBP RAM Passed Message 12-17

DBP return codes D-12

DBP Subsystem Diagnosis 12-17, 12-19, 13-7

DBP Subsystem Fault Tables 12-20

DBP-Bus Alarms 13-5
DBP-CPU Status Table 12-19
DBPI Initialization Passed Message 12-14
DCS networks 5-2, 5-7, 5-25
 administration 5-25
 AUDIX forms 5-26
 subscriber selection 5-26
Deleting Filesystems 14-20
Disk Controller Fault Table 12-20
Disk Drives
disk drives
 active alarms 6-1
 CDC 170-Mbyte drive 6-20
 CDC 380-Mbyte drive 6-21
 CDC 760-Mbyte drive 6-23
 check data and power cables 6-7
 check jumpers 6-15
 check LEDs 6-6
 crashed disk or cartridge 6-4, 6-7
 equipping a new disk or cartridge 6-4
 equipping a new drive or cartridge A-13
 Hitachi 760-Mbyte drive 6-25
 HP 380- and 760-Mbyte drives 6-24
 initialization 6-4, 6-17
 installing or replacing 6-11, 6-16
 jumper settings 6-18
 MAXTOR drives 6-28, 6-30
 MICROPOLIS 170-Mbyte drive 6-25
 MICROPOLIS 380-Mbyte drive 6-27
 MICROPOLIS 760-Mbyte drive 6-28
 Naming Conventions 14-21
 NEC 380-Mbyte drive 6-32
 order of drives in cabinets 6-2
 position table 6-6
 power cabling diagram 6-9
 PRIAM 380-Mbyte drive 6-33
 Recommended Filesystem Distribution 15-4
 recommended filesystem distribution 10-4,
 10-5, 10-6
 Recovery Steps 15-2
 replacement parts C-5
 replacement procedure 6-2, 6-12, 6-13, 6-14
 RICOH drives 6-19
 Seagate 170-Mbyte drive 6-34
 Seagate 380-Mbyte drive 6-36
 Space Management 14-16
 spin-up/spin-down behavior 2-20, 2-21, A-12
 Troubleshooting 11-8, 11-10
 troubleshooting 6-5, 6-9

disk drives—*Contd*
 unequip a disk or cartridge 6-2
 voltages 6-9
Disk Space Problems 14-17
 Filesystem Thresholds 14-17
 Space Management 14-16
Displaying Filesystem Information 14-12
Displaying Volume Labels 14-12
distributing filesystems 10-4
DMS-100 switch
 troubleshooting 5-1
documentation
 making comments xx
 peripheral equipment C-19
 related resources xix
DSU setup 5-15
dummy cartridge 6-15

E

EAT, enhanced activity trace G-1
environment 2-15, 6-11, 7-2, 7-10
environmental alarms 7-2
equipping devices 2-21, 6-4, A-13
error log
 common error codes 3-25
 description A-32
 display and use A-32, B-25
 software module table B-25
 software session table B-26
 table of error codes B-4
ESD ground point 2-20, 4-5, A-15
exiting the form or path 8-18
expansion cabinet addition 9-8
Extended RAM Test 12-14, 12-23, 12-28
extended RAM test 4-36, 4-57
extreme temperatures 6-11, A-10

F

fan or fan assembly
 replacement 2-15, 7-8
 replacement diagram 7-9
fan or over-temperature faults 7-2, 7-10
fault diagnosis order 2-17
FIELD HELP key, see using forms 8-13
fields
 INADS-only H-1

file redundancy 10-1
 description 10-4
 filesystem distribution 10-4, 10-6
 restoring file redundancy after a problem 10-3
 solving file redundancy alarms 10-1

filesystem
 filesystem : copy form 14-24
 filesystem : detail form 14-20
 filesystem : list form 14-12
 filesystem : update configuration form 14-25

Filesystem Alarm Resolution 14-2
 check backups 2-16
 file redundancy 10-4
 filesystem distribution 10-4
 most active 10-4
 problem resolution 10-1
 restoring file redundancy after a problem 10-3
 solving file redundancy alarms 10-1

Filesystems
 Activating/Deactivating Filesystems 14-13, 14-27
 Adding New Filesystems 14-13, 14-20
 Alarms 14-1
 Audits 15-18, 15-19
 Backups 14-23
 Changing the Current Adat Version 14-14
 Copying Files 14-25
 Deleting 14-20
 Increasing Filesystem Size 14-18
 Mount Points 14-22
 Mounting 14-25, 14-27
 Naming Conventions 14-21
 Recommended Distribution 15-4
 Recovery Steps 15-7
 Select Boot Filesystem 12-28
 Space Management 14-16
 Thresholds 14-17
 Types 14-22

force off traffic A-3, A-21
 forced busy-out 2-19, A-2, A-3
 forced shutdown 2-19, A-2, A-3

Forms
 forms 8-13, 8-17, 8-18
 access to 8-17
 DCS network forms 5-26
 filesystem : copy 14-24
 filesystem : detail 14-20
 filesystem : list 14-12
 filesystem : update configuration 14-25

forms—*Contd*
 HELP keys 8-13, 8-14, 8-15, 8-16, 8-17
 INADS-only *F-1, H-1*
 list : volume names 8-13
 maintenance : active alarm : display A-31, A-32
 maintenance : error : display A-33, A-34
 maintenance : network 16-10
 shutdown A-21
 system : announcement : filesystem 14-3
 system : filesystems 14-13
 system : limits 14-18

FP Configuration Results 12-10
 FP RAM Passed Message 12-15
 FP Reset Message 12-4
 FP Self Tests Passed Message 12-6
 FSO 8-12
 fuse replacement 7-4, 7-7

G

garbled or missing unified messages 3-18

H

Hardware
 hardware
 additions 6-16, 9-1
 Check Configuration 11-8
 check configuration 3-24
 Initialization 12-31
 replacement parts C-4

HELP keys, see using forms 8-13
 Hexadecimal-to-Binary Conversion Table 11-14
 Hitachi 760-Mbyte drive 6-25
 HP 380- and 760-Mbyte drives 6-24

I

IDI setup 5-13
 Immediate Audits, see Audits 15-18
 INADS-only forms and fields *F-1, H-1*
 Increasing Filesystem Size 14-18

Initialization
 Basic Procedures 12-27
 History, Option 3 11-15, 12-1
 Monitor Initialization 12-31, 12-32
 Select Initialization Options 12-28

Initialization—*Contd*

Starting/Stopping 12-27, 12-28

Initialization Stop Points 12-30

Troubleshooting 12-1, 12-2

Initialize the System 12-27

initialize the system 2-20

integrated AUDIX answers in standalone mode 3-21

intelligent units 2-17

intermittent faults 2-18, 3-2, 3-14, 3-15, 3-20, 3-23, 3-24, 3-25, 3-27

Interprocessor Communication Tests Passed Message 12-9

J

jETA power supply option straps 7-23

L

LADS setup 5-16

Last Good Message 12-1, 12-2

LEDs 6-6

LEDs, see circuit pack LEDs A-28

LH Research power supply option straps 7-24

list : volume names form 8-13

LMT cabling 8-4

Local Login Procedure 11-5

local login procedure 8-11

Local Service

local service

alarm and error log checks 2-18

fault diagnosis order 2-17

general rules 1-1

leaving the site checklist 2-22, 3-28

on-site tools and aids 1-2

verify good service 3-28

Visual Inspection 11-3

visual inspection 2-17, A-23

Locating Space Problems 14-17

logging off 8-12, 8-18

Logging On 11-5

logging on 3-5, 5-26, 8-11

M

M Bus 12-5, 12-6, 12-7, 12-11, 13-2

M bus 4-31, 4-57

maintenance : active alarm : display form A-31, A-32

maintenance : error : display form A-33, A-34

maintenance : system : test call form A-34

Maintenance Interface Entering Normal Mode Message 12-25

maintenance shutdown 2-19, A-22

maintenance terminal, see terminals 8-1

Manual Audits, see Audits (Immediate) 15-16

manual, intended audience -13

MAXTOR drive jumper settings 6-31

MAXTOR drives 6-28, 6-30

message line 8-14

message-waiting lamp problems 3-18

MI Board

MI board 4-31, A-5

alarm panel A-7

check the MI connection 8-2

circuit pack faceplate A-8

connectors A-9

LEDs 11-9

LEDs A-7

MI Status Words 11-14

MI toggle switch 2-19, A-5

equivalent actions A-6

LEDs A-6, A-7

modes and use A-5, A-23

position A-5

MICROPOLIS 170-Mbyte drive 6-25

MICROPOLIS 380-Mbyte drive 6-27

MICROPOLIS 760-Mbyte drive 6-28

mirroring, file redundancy 10-1

models

hardware changes 2-3

physical description 2-1

modem option settings 8-7

Modem Pooling 16-14

modules, see software modules B-25

Monitor LED Patterns 12-31

monitors

DBP D-1

SADI E-1

Mount Points 14-22, 14-25, 14-27

Mounting Filesystems 14-25, 14-27

moving in a form 8-17

MPDM setup 5-17

MTDM Option Settings

2400 Baud Networking 16-16

9600 Baud Networking 16-19

N

Names Data Filesystem 15-19
 Naming Conventions 14-21, 14-22
 NEC 170-Mbyte drive 6-32
 NEC 380-Mbyte drive 6-32
 network messages not being sent 3-21
 Networking
 networking
 2296A Option Switch Settings 16-20
 ACC Status 16-11
 Administration Log 16-5
 AMIS analog 16-21
 Modem Pool Testing 16-14
 MTDM Option Settings 16-16, 16-19
 Network Form Displays 16-11
 Remote Connection Test 16-14
 Troubleshooting 16-10
 No Alarms and Software Running 14-6
 no alarms and software running 3-23
 no alarms and system not running 3-23, 7-12
 no, wrong, or garbled AUDIX announcements 3-17
 non-AT&T switch
 circuit packs 4-2, 4-3
 troubleshooting 1-3, 5-1
 Nonstandard Initialization 12-28
 Normal Mode 12-25, 12-28, 12-31
 normal mode 2-21, A-6, A-9
 null, dummy, cartridge A-10

O

one-cabinet AUDIX
 circuit packs 4-2
 front view 2-10
 One-Cabinet AUDIX List 1 Backplane Boards and Layout 13-15
 One-Cabinet AUDIX List 2 Backplane Boards and Layout 13-16
 on-line help 8-15
 OPTALM fault 7-2, 7-11
 Option Settings
 option settings 8-5
 2224 modem 8-8
 LADS 5-17
 Modems 16-17, 16-20
 modems 8-7
 MPDM 5-18

option settings—*Contd*

 MTDM 16-16
 printers 8-10
 terminals 8-5

Outcalling 16-4

P

passwords 3-5, 8-11
 PATH line 8-14, 8-15, 8-16
 PE Troubleshooting 12-6
 PE troubleshooting 4-34, 4-37
 peripheral equipment
 documentation C-19
 physical description 2-1
 power down procedure 2-20, A-18
 power equipment replacement parts C-6
 Power Equipment Troubleshooting 11-8, 11-10
 power supply
 batteries 7-3
 check strapping options 7-22
 replacement 7-17
 replacement diagram 7-19, 7-20
 specifications and voltages 7-22
 troubleshooting 7-10, 7-12
 voltage 7-3, 7-6, 7-21
 voltages 7-22
 preventive maintenance, see routine maintenance 2-14
 PRIAM 380-Mbyte drive 6-33
 printer 8-4, 8-12
 option settings 8-10
 troubleshooting 8-3
 printers
 47x/57x option settings 8-10
 64xx option settings 8-10
 Processors
 FP 15-19
 VSP 15-19
 programming function keys 8-19

Q

QPPCN
 fuse replacement 7-4

R

RCD cartridge, see RICOH drive *A-10*
Reboot, see Restart/Reboot the System *11-15*
Recommended Filesystem Distribution *15-4*
recommended filesystem distribution *10-4, 10-5, 10-6*
Record Alarms, Option 2 *11-6*
Record Initialization History, Option 3 *11-7*
Record System Status, Option 1 *11-6*
Recovering Disks, see Restoring Disks *15-2*
Recovering Filesystems, see Restoring Filesystems *15-7*
reference material *1-3*

- basic procedures *A-1*
- engineering drawings, EDs *C-14*
- replacement part codes *C-4*
- software tables *B-25*

release, see restore service *A-1*
Remote Login Procedure *11-5*
remote login procedure *8-11*
remote maintenance terminal setup *8-5*
removing front covers *A-15, A-17*
removing rear covers *A-17, A-18, A-19*
replacement parts *C-4, C-10, C-12*
Replacing Hardware
replacing hardware *2-20*

- 48V fuse *7-7*
- 5V fuse *7-4*
- air filter *7-7*
- Backplane *13-20, 13-21*
- battery reserve *7-5*
- Buses *13-6, 13-7, 13-8, 13-10*
- CDR1B alarm board *7-14*
- circuit breaker, POWER switch *7-15*
- Circuit Packs *13-6, 13-8, 13-10*
- circuit packs *4-5*
- data link *5-13, 5-17*
- disk drives *6-2, 6-11*
- fan or fan assembly *7-8*
- power supply *7-17*
- removing cover plates *A-15*

Replacing the Backplane *13-21*
Restart/Reboot the System *11-11, 11-15, 12-27*
restart/reboot the system *3-27, A-6, A-20*
Restore Service *16-6*
restore service *A-1, A-4*
Restoring Disks *15-2*
Restoring Filesystems *15-7*

- Finding a Good Sdat Backup *15-11*

Restoring Filesystems—*Contd*

- General Recovery Steps *15-7*
- Sdat Filesystem *15-10, 15-11*
- Vtext Filesystem *15-15*

return codes *D-12*
RICOH drive *6-19**jumper settings*

- changing cartridges *A-13*
- faceplate *A-11*
- spin-up/spin-down behavior *A-12*

RICOH RH5261

- options *6-19*

RICOH RH5500

- installation *9-42*
- options *6-19*

ringback but no answer on a call answer call *3-15*
ringback but no answer on a voice mailbox call *3-14*
RMT cabling *8-4*
Routine Filesystem Backups *14-23*
routine maintenance *2-14*
Running Audits *15-16***S**

SADI diagnostic tests *4-11, A-28*
SADI expansion cable *9-11*
SADI monitor *E-1*
S-Bus Access Test Passed Message *12-12*
S-Bus expansion cable *9-11*
S-Bus Processor Diagram *12-6*
SCA

- line card equipment number *5-5*
- option settings *5-21*

screen-labeled keys *8-14*
Seagate 170-Mbyte drive *6-34*
Seagate 380-Mbyte drive *6-36*
Select Boot Filesystem *12-28, 12-29*
Select Extended RAM Test *12-28*
Select Initialization Options *12-28*
Select Initialization Stop Points *12-30*
Service Not Started Message *11-2, 11-11, 12-2, 12-26, 12-32, 14-6, 14-14, 15-3, 15-7, 15-15*
service not started message *2-21, 3-27, 6-10*
sessions, see software sessions *B-26*
shut down software *2-19, A-6, A-21*
SL-1 switch

- cabling *A-29*
- circuit packs *2-7, 2-8, 2-9, A-25, A-27*
- troubleshooting *5-1, A-25*

Software Alarms
 software alarms
 check disk drives 6-9
 Filesystems 14-1
 PE load threshold 4-37
 software translation 5-9
 solving active alarms 3-8
 software configuration 3-25
 Software Initialization 12-32
 software module table B-25
 software running? 3-6
 software session table B-26
 Software Troubleshooting
 Disk Space Problems 14-16
 General Procedure 14-6
 Solving Disk Space Problems 14-16
 Standalone 16-6
 Block Service 16-6
 Data Link Alarms 16-7
 Port Busy Out 16-6
 Restore Service 16-6
 Shutdown 16-7
 Startup 16-7
 Test Calls 16-6
 Unused Data Link Forms 16-7
 Voice Port Disconnect 16-7
 Standard Initialization Message 12-6, 12-28
 Start Service Message 11-2, 11-11, 12-2, 12-26,
 12-32, 14-11, 15-15
 start service message 2-21, 3-27, 6-10
 STATUS Line 14-17
 STATUS line 2-22, 3-1, 3-2, 3-6, 3-8, 3-15, 3-28,
 8-14
 Status Word Descriptions 11-13, 11-14
 subscribers get silent messages 3-20
 subscribers hear no message to play back 3-19
 subscribers hear no room in your mailbox 3-19
 subscribers hear reorder tone 3-20
 switch administration 3-15, 3-16, 3-18, 3-24, 4-55,
 5-7, 5-9, 5-11, 5-12, 5-24
 DCS networks 5-25
 switch port reliability 5-24
 switch documentation C-15
 switch fails to report alarms to remote site 7-14
 system : filesystems form 14-13
 system : limits form 14-18
 System Architecture
 Diagrams 13-3, 13-4
 System Data Filesystem 15-19

system modes A-7, A-9
 System Status Filesystem 15-19

T

taking calls? 3-5
 TD-Bus Alarms 13-9, 13-10
 TD-Bus Board Back-Out 13-10
 TD-Bus expansion cable 9-11
 temperatures 2-15
 Terminals
 terminals
 cable connections 8-3
 Commands 12-27
 commands 8-11, 8-16
 failure to respond 7-14, 8-2
 HELP keys 8-13, 8-14
 keyboard commands 8-16
 logging on and off 8-11
 message line 8-14
 on-line help 8-15
 operation 8-17
 option settings 8-5
 PF key setup 8-20
 screen forms 8-13
 screen-labeled keys 8-14
 setups 8-3, 8-9
 slow response time 3-21
 STATUS line 8-14
 Troubleshooting 11-10
 troubleshooting 7-14, 8-1
 test calls for the VPTs A-34
 Thresholds 14-16
 Filesystems 14-17
 Subscribers 14-16
 Vtext 14-16
 TN366(B) ACC 4-6
 TN472C DBP-CPU 4-10
 TN475B SADI
 LEDs 6-5, A-23
 replacement 4-11
 TN477 TDBI-8 4-12, 4-14
 TN500 TDBI 4-12, 4-14
 TN501B VPC 4-16, 4-28, 4-29
 TN506B BC 4-30
 TN511 MI 4-31
 TN520 VB 4-32
 TN523 FP-CPU 4-34
 TN532 DBP-RAM 4-38

TN533 SCPI 4-39, 4-40
TN539(B) ACCE 4-42
TN540 DBP-RAM 4-38
TN547(B) MPSI 4-45
TN714 TC 4-46, 4-47
TN716B BI 4-35
TN727 NC 4-48, 4-49
TN734 FP-RAM 4-36
TN747B VPT 4-51, 4-55
trace, activity G-1
trademarks and service marks xviii
Transfer Out of AUDIX 16-3
triplet 3-1, 3-8, A-31
trouble ticket 1-1, 2-17, 2-22, 3-23, 3-28
Troubleshooting
troubleshooting
 alarmable units 3-10
 Automated Attendant 16-2
 check for intermittent alarms 3-24
 Check Hardware Configuration 11-8
 check hardware configuration 3-24
 Check if the Problem is Fixed 11-11, 14-11
 check if the problem is fixed 3-27
 Check Software Configuration 14-6
 check software configuration 3-25
 checklists and rules 1-1
 Control Mode 11-2, 11-3, 11-5, 11-6, 11-7
 control mode menu 3-3
 disk drives 6-5
 flowchart 3-9
 Initial Diagnosis 11-10
 initial diagnosis 3-5
 Initialization 12-1, 12-2
 Networking 16-10
 Outcalling 16-4
 printer 8-3
 restart/reboot the system 3-27
 Software 14-6
 solving active alarms 3-8, 4-4
 solving customer complaints 3-13
 solving unalarmed problems 3-23
 Standalone 16-6
 Summary 11-2
 summary 3-1
 terminals 7-14, 8-1
 Transfer Out of AUDIX 16-3
Two-Cabinet AUDIX
two-cabinet AUDIX
 adding an expansion cabinet 9-8

two-cabinet AUDIX—*Contd*
 backplane boards 9-10
Two-Cabinet AUDIX Backplane Boards and
 Layout 13-19
 cables 9-9
 cabling 9-11
 circuit packs 4-3
 earthquake mounting 9-23
 front view 2-11
 inventory 9-8
 rear view 2-12, 2-13
 System Architecture 13-4

U

UN160B DBPI 4-57
UN162 VSFI 4-58
unable to add subscribers 3-20
Unalarmed Problems
unalarmed problems 3-23, 7-2, 7-12
 check the CDR1B alarm board 7-13
 no power 7-13
 one nonworking fan 7-12
 Software Troubleshooting 14-6
unequipping VSP devices 2-21, A-2
Unipower power supply option straps 7-23
unit codes 3-11, B-4
Unmount a Filesystem 14-27
upgraded AUDIX
 call transfer turned off 3-21
upgrades
 adding an AUDIX expansion cabinet 9-8
USER PF key table 8-20
Using Forms
 filesystem : copy 14-24
 filesystem : detail 14-20
 filesystem : list 14-12
 filesystem : update configuration 14-25
 system : announcement : filesystem 14-14
 system : filesystems 14-13
 system : limits 14-18

V

verify good service 3-28
Visual Inspection 11-3
visual inspection 2-17, 3-3, A-23
 cable connections A-28

visual inspection—*Contd*

- Circuit Pack LEDs 11-9, 12-31
- circuit pack LEDs A-23
- Disk Drives 11-8
- front panel LEDs A-30
- Power Equipment 11-8
- VME Bus, see DBP Bus 13-5
- VME Configuration Table 12-20
- Voice Data Filesystem 15-19
- Voice Message Filesystem 15-19
- voice port test
 - AUDIX Integrated A-34
- volume labels 6-4, 6-17
- VPT test calls A-34
- VSFI Access Test Passed Message 12-13
- VSP devices A-1
- VSP Problems 12-8
- VSP RAM Passed Message 12-16
- VSP Self Tests Passed Message 12-8

W

- Wrong Number of Vtext Filesystems 15-15

