High Density (80sa) Shelf Assembly Installation Manual



Document 250-1853-00 Version K2 September 2010

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QVP Card	Х	0	0	0	0	0
AAD Fan Tray	х	0	0	0	0	0
Shelf (80SA, 4SA)	Х	0	0	0	0	0
Cables & Accessories	Х	0	0	0	0	0
Note 注释:	O: If the r compo with "C 表示该 规定的 X: If the r compo with "C 表示该 11363-	estricted subst nent below the D' 语有毒有害物质 限量要求以 ⁻ estricted subst nent exceed th C' 语有毒有害物质 2006规定的图	ance concent e requiremen 页在该部件所 下. ance concent he requiremen 页至少在该部 灵量要求.	tration of all hor ts of standard SJ 所有均质材料中 tration of any ho nts of standard S 部件的某一均质	nogenous materi /T 11363-2006, 的含量均在SJ/ pmogenous mate J/T 11363-2006 材料中的含量却	als of the please mark F 11363-2006 rials of the , please mark 超出SJ/T

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Documentation Overview



September 2010

High Density (80sa) Shelf Assembly Installation Manual

Documents Ditech documentation is organized so that all users can understand the system components and perform tasks for Ditech's voice enhancement devices. Both paper documents and online help systems are provided.

Ditech's Documentation

Document Number	Document Title	
Quad Voice Processors		
250-0300-21	Quad T1 Voice Processor User Manual	
250-0300-20	Quad E1 Voice Processor User Manual	
Quad 2 T1 Echo Can	cellers	
250-0300-01	Quad 2 T1 Bidirectional Echo Canceller User Manual	
250-0300-03	Quad 2 T1 Echo Canceller User Manual	
250-0293-21	Quad 2 T1 Echo Canceller with CTM/TTY Adaptation User Manual	
Quad 2 E1 Echo Cancellers		
250-0300-00	Quad 2 E1 Bidirectional Echo Canceller User Manual	
250-0300-02	Quad 2 E1 Echo Canceller User Manual	
Shelf Assembly Options		
250-1853-00	High Density Shelf Assembly Installation Manual	
250-0272-00	4sa Shelf Assembly Installation Manual	
Element Management Software		
250-1252-50	NetConsul EMS Software Manual	
Communication Software		
250-0250-00	WinMAP Software Manual	
250-0252-00	WinMAP-4sa Software Manual	

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To order a document, contact Ditech Customer Service at: support@ditechnetworks.com or 1-800-770-0117.

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Document Revision History

The table below lists the revision history for this manual.

Document Revision History

Version	Date	Change Description
D.1	May 2001	Updated AAD fan assembly information, procedures, and illustrations. Updated cabling information and procedures. Updated BNC connector information. Updated power consumption information. Updated channels per shelf information. Updated MTBF information. Updated product part numbers.
E	July 2003	General reorganization and update of document. Updated contact and ERA information, and added ISO logos and document comment information. Updated AAD fan assembly information. Changed frame ground labeling.
F	January 2004	For QVP compatibility, changed recommended fuse panel or circuit breaker rating to 7.5 Amps, and Telco and Wire-Wrap backplane fuses were changed to 8 Amps. Changed backplane fuse type in images for the BNC connector panel. Updated AAD fan assembly information. BNC Rear Access support changed to 4 shelves per 7-foot rack. Typical Telco and Wire-Wrap support changed to 5 shelves per 7-foot rack. Removed BNC Front and SMB connector panel information.
G	June 2004	Updated AAD fan assembly information. Added regulatory compliance information. Updated card weights. Updated CCO form.
Н	June 2006	Updated specifications throughout manual and updated Support appendix. Removed discussion of gateway configurations. Added procedures for (optional) wire-wrap rear safety cover and AAD support bracket.
J	April 2007	Updated Appendix B with removal of BNC installation tool information.
к	October 2008	Added wiring diagrams to facilitate sending AAD fan tray alarms to NetConsul EMS.
K1	October 2009	Terminal server-to-AAD wiring information updated. Alarm contact information updated.
K2	September 2010	Alarm Contacts drawing has beeen replaced.

Document Conventions

The following symbols and terms are used in this document:

Document Conventions

Туре	Description
<u>_</u>	Warning. The caution sign indicates a warning.
	Go To . The hand shows you where to find more information about a particular topic.
	Note. The notepad emphasizes additional information that may be of interest.
∎ List	Bullets are used in a list of items when the sequence of the items is not important.
1. List	Numbered steps are used in a list of items when the sequence of the items is important.
Acronyms	Acronyms are defined when they first appear in the document. They are also defined in the Acronym List at the end of this manual.
bold	Directory names, project names, disk drive names, file names, file name extensions, and software utility names are shown in bold. Example: c: drive and .exe file.
Bold & Capitalized	Window titles, button names, and diskette names are shown in bold, with initial capital letters. Example: Save As window, Start button, and Install diskette.
Bold & Italicized	Manual titles are shown in bold italics with initial capital letters. Example: Network Operations Manual .
BOLD & ALL CAPS	Command names are shown in bold, uppercase. Example: the DATE and TIME commands.
Capitalized	Keyboard keys, user-editable application window fields, and menu names are shown with initial capital letters. Example: Delete key, Enter key, and the Options menu.
"Capitalized in Quotation Marks"	Subheadings within a manual section are enclosed in quotation marks. In manuals, titles of help topics are also shown in quotation marks.
courier	Anything that is typed exactly as it appears on screen is shown in Courier. Example: The system responds with: Changing Date Format from mm/dd/yyyy to mm/dd/yyyy
courier bold	In machine syntax, bold courier font may be used to distinguish a command from the command prompt or other variables. Example: 1-8>DATEF <cr></cr>
Italics Capitalized	Help Categories, chapter titles in manuals, application note names, checkbox options, and options in dialog boxes are shown in italics with initial capital letters. Example: Chapter 4, <i>Command Set</i> , in the Quad Voice Processor Manual .
<italics in<br="">brackets></italics>	Variables are enclosed in angle brackets (< >) and shown in italics. Example: < <i>filename</i> >.lod file.
Mouse Button 1	Left mouse button.
Mouse Button 2	Right button on a two-button mouse, or middle and right buttons on a three-button mouse.
Point To	Indicates that the mouse should be moved so that the pointer is over the specified item.
Press	Indicates that the mouse button or keyboard key should be held down.
Select	Indicates that text and/or objects, or an option must be highlighted with a key combination or the mouse. Selection does not start an action. Example: Select the file, then choose Delete from the Edit menu.
Trademarks	Ditech Networks trademarked products and services are marked with the trademark symbol (for example, $WinMAP^{TM}$) when they first appear in the chapter.

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1

Introduction

High Density (80sa) Shelf Assembly Installation Manual

The QVP T1, QVP E1, Quad 2 T1, Quad 2 E1, Quad-T1, and Quad-E1 provide superior voice processing and echo cancellation for today's communication provider. Ditech's high density (80sa) shelf assemblies offer support for up to 20 Quad cards for a maximum of 1,920 (QVP T1, Quad 2 T1, and Quad-T1) or 2,480 (QVP E1, Quad 2 E1, and Quad-E1) DS0 channels. Each shelf has a common communication serial bus, and each shelf can be interconnected, allowing easy in-service upgradability through an embedded software design.



Note For support of only one Quad card, see the **4sa Shelf Assembly Installation** *Manual* listed on page 5.

Both A and B battery, battery return, and chassis ground connections are made to a common terminal block on the rear of the shelf that provides a fused output to each Quad card. T1/E1 metallic bypass relays ensure signal integrity if a card is removed. Alarm cable connections are made on wire-wrap stake pins.

Any Quad card within the shelf can be accessed from a VT100 terminal emulator connected to one of the RJ-11 jacks (RS-232/V.24 ports) located on the shelf backplane or Quad card front panel. The DTE equipment can be a standard terminal, such as a VT100, or a PC running terminal emulation software, such as HyperTerminal.

Due to the individual needs and expectations of each customer, every deployment of the high density shelves and Quad cards is different. For technical assistance planning the deployment and installing the equipment, contact Ditech Customer Service at support@ditechnetworks.com or 1-800-770-0117.

To perform the installation, proceed step by step until all hardware is assembled, all software is uploaded and active, and all Quad cards are operational. Review the safety information before installation begins. Observe all safety measures and warnings.



ng Always read and follow the warnings and cautions before beginning work on any Ditech equipment. Safety information and guidelines must be followed for personal safety and for the correct handling and operation of the devices.

DITECH NETWORKS

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1.1 Shelf Ditech's high density shelf assemblies include a backplane, connector panel, and other components specific to the customer application. The shelf assemblies and Assemblies compatible card types are listed in Table 1-1.

Table 1-1 High Density Shelf Assemblies

Shelf Assembly	Description	Card Type
Wire-Wrap (80sa-ww)	Quad Wire-Wrap rear-access shelf assembly (960 wire-wrap pins)	T1 100 Ω balanced E1 120 Ω balanced
Telco (80sa-tc)	Quad Telco rear-access shelf assembly (16 Amphenol [Telco or RJ-21X] connectors)	T1 100 Ω balanced E1 120 Ω balanced
BNC Rear Access (80sar-bnc)	Quad BNC rear-access shelf assembly (320 coaxial connectors)	E1 75 Ω unbalanced

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Note The QVP T1, QVP E1, Quad 2 T1, Quad 2 E1, Quad-T1, and Quad-E1 cards can be mounted in the same shelf, provided that each card's type is compatible with the shelf assembly.

1.1.1 Rack Assemblies

Table 1-2 lists the number of shelves per rack for the standard rack assemblies.

Table 1-2	Maximum I	Number of	Shelves F	Per Rack A	Assembly

Rack Type	Wire-Wrap Shelves	Telco Shelves	BNC Shelves
19" ANSI/EIA (7 ft., 43 RU high)	5 (6 ¹)	5 (6 ¹)	4
23" ANSI/EIA (7 ft., 43 RU high)	5 (6 ¹)	5 (6 ¹)	4
600 mm ETSI (2,000 mm, 80 U high)	5	5	4

1. For Telco and Wire-Wrap, 5 shelves per 7-foot rack is standard, but a 6-shelf rack configura-tion is also available. See Section 1.5.3 on page 32 for more information.

Generally, each shelf must have an AAD fan assembly below it. Refer to Section 1.5.3 on page 32 for more information about rack assemblies and AAD usage with the high density shelf.

Fully populated racks operate at ambient temperatures of up to 40° Celsius in humidity up to 90% and can be stored at temperatures from -40 to 70° Celsius. Rack assembly space and environmental requirements are based on rack type, shelf assembly, fan assembly, and card population. The rack assembly's physical dimensions vary with the type of common rack. See Appendix A on page 91 for specifications and regulatory compliance information.



While each rack assembly meets all applicable regulatory requirements, there may be additional requirements associated with the operating conditions at a specific site. Review the appropriate site information and requirements before installation.

Table 1-3 displays the number of DS0s channels and DS-1s per rack assembly.

Number of Shelves	T1 DS0s/DS-1s	E1 ¹ DS0s/DS-1s
1	1,920/80	2,400 or 2,480/80
2	3,840/160	4,800 or 4,960/160
3	5,760/240	7,200 or 7,440/240
4	7,680/320	9,600 or 9,920/320
5	9,600/400	12,000 or 12,400/400
6	11,520/480	14,400 or 14,880/480

 Table 1-3
 Number of DS0 Channels and DS-1s per Rack Assembly

1. System configuration software allows the selection of 30 or 31 E1 DS0 channels per DS-1.

1.1.2 Wire-Wrap and Telco Shelf Assemblies with Rear Access

Figure 1-1 displays the high density shelf assemblies for Wire-Wrap and Telco systems (80sa-ww and 80sa-tc).



Figure 1-1 High Density Shelf Assembly – Wire-Wrap/Telco

1

Note For additional information about the Wire-Wrap systems, see Chapter 5 on page 67. For additional information about the Telco systems, see Chapter 6 on page 75.

1.1.3 BNC Shelf Assemblies with Rear Access

Figure 1-2 displays the high density shelf assembly for BNC systems with rear access (80sar-bnc).



Figure 1-2 High Density Shelf Assembly – BNC Rear Access

1

Note For additional information about the BNC Rear Access systems, see Chapter 7, *BNC Systems*, on page 85.

1.2 Network Orientation

Figure 1-3 and Figure 1-4 display the network orientation for the Quad cards in typical wireline and wireless systems.



Figure 1-3 Typical Wireline Network Orientation



Figure 1-4 Typical Wireless or VoIP Network Orientation

1.3 Installing the Shelf Assembly Procedure To perform the installation, proceed step by step until all hardware is assembled, all software is uploaded and active, and all Quad cards are operational. Review the safety information before installation begins. Observe all safety measures and warnings. For safety, a minimum of two people must work together to perform the installation.

Warning Always read and follow the warnings and cautions before beginning work on any Ditech equipment. Safety information and guidelines must be followed for personal safety and for the correct handling and operation of the devices.

Note *FIVE SHELVES OR FEWER*: When installing 5 or fewer shelves in a rack, standard AAD and shelf installation is followed. See Table 1-4.

SIX SHELVES IN A RACK: For 6-shelf rack assemblies, a different AAD is installed at the bottom of the rack. See Table 1-5.

Step	Procedure	Comment	
1	Determine the required hardware and software for the planned installation, and obtain the hardware and software.	For installation planning assistance, contact Ditech Customer Service (see "Contacting Ditech Networks" on page 4).	
		See Section 1.5 on page 27 for the rack configurations.	
2	Determine the required environmental conditions.	Refer to Appendix A on page 91 for the environmental conditions.	
3	Determine the required space conditions.	 Refer to appropriate system chapter for the space requirements for the different shelves: For Wire-Wrap systems, refer to Chapter 5 on page 67. For Telco systems, refer to Chapter 6 on page 75. For BNC systems, refer to Chapter 7 on page 85. 	
4	Install the WinMAP TM or NetConsul TM software application as needed.	See the <i>WinMAP Software Manual</i> and <i>NetConsul EMS Software Manual</i> listed on page 5.	
5	Review the hardware requirements, and follow the procedure to build each rack assembly containing shelves, AADs with air filters, and a fuse panel.		
6	Set up the 7-foot common rack in accordance with the instructions provided by the rack's manufacturer.		
7	Verify the common rack's inner width to ensure that the shelves, AADs, and fuse panel can fit in the common rack.	See Figure 1-6 on page 30 and Figure 1-8 on page 31 for illustrations of the different rack widths.	
8	Identify the required shelves, AADs, and fuse panel. Verify their measurements and their placement in the common rack.		
	Components are installed in the order of placement from the bottom up.		
	Shelves are installed with just the chassis in place. No cards are present.		

Table 1-4 Five or Fewer Shelves – Installation Procedure

Step	Procedure	Comment	
9	Attach the ear mounts and extenders (if required) to the appropriate components.	See Section 1.5.2 on page 29 for details about ear mounts.	
10	The first AAD is placed at the bottom of the rack assembly. The AAD should have its ear mounts attached. Lift the AAD to the appropriate position in the common rack. Align the screw hole on each ear mount with the screw holes in the common rack. Note: A 6-shelf rack assembly is configured differently. See Table 1-6 on page 29. While one installer holds the AAD in place, anoth for balance.	See Section 1.5.3 on page 32. The common rack's base should provide the required clearance between the bottom shelf and the floor. For fan assembly information, see Section 1.5.4 on page 36. Each AAD contains an air filter when shipped. For air filter maintenance after the first 90 days of operation, see Section 1.5.4 on page 36. ther inserts one screw on each side of the AAD	
	Then the installers insert the remaining screws. Use a total of 4 screws to attach the AAD to the	common rack.	
12	The shelf should have its ear mounts attached. T AAD in the common rack. AADs are positioned b	wo installers lift and place the shelf above the petween shelves.	
13	Align the screw hole on each ear mount with the mounting holes in the rack.	For example, Figure 1-6 on page 30 shows the alignment of ear mounts and screws in the installation of a shelf in a common rack.	
14	While one installer holds the shelf in place, the other installer inserts one screw on each side of the shelf for balance. Then the installers insert the remaining screws.		
15	Mount the remaining AADs and shelves by repeating the instructions in Steps 10-14.		
16	The fuse panel should have its ear mounts attached. Lift the fuse panel to the appropriate position near the top of the common rack. Align the screw hole on each ear mount with the screw holes in the common rack.		
17	While one installer holds the fuse panel in place, fuse panel for balance. Then the installers insert the remaining screws. Use a total of 4 screws to attach a fuse panel to Review power safety, use proper ESD grounding, and follow the procedure to hook up and test power to each shelf. FAor safety, the ESD connector (banana jack) is located on the AAD.	another inserts one screw on each side of the a common rack. See Chapter 2 on page 47.	
19	Connect the office alarms.	See "Office Alarm Connection" on page 48.	
20	Optional fan tray alarms can be connected.	See "Wiring the AAD Alarms" on page 40.	
21	Power up the rack assembly.	See "Shelf Powerup" on page 49.	
22	Set the shelf address for each shelf.	See "Shelf Addressing" on page 53.	
23	Physically install the cards in each shelf. Cover any unused slots with blank covers.	See "Quad Card Installation" on page 54.	
24	Connect the signal cables.	See "Signal Cable Routing" on page 50 and the appropriate system chapter.	

 Table 1-4
 Five or Fewer Shelves – Installation Procedure (Continued)

Step	Procedure	Comment
25	Make the RS-232 (V.24) communications connections.	See "Local and Remote Access" on page 59.
26	Review the card LEDs after installation to verify that each card is error-free (if signal is present).	See "Quad Card Powerup Test" on page 55.
27	Log on and set up each card.	See "Front Panel Connection" on page 62.

 Table 1-4
 Five or Fewer Shelves – Installation Procedure (Continued)

Table 1-5 provides the procedure for building a 6-shelf rack assembly and installing the shelf assemblies.

For safety, a minimum of two people must work together to perform the installation.

 Table 1-5
 Shelf Assembly Installation Procedure—6-Shelf Configuration

Step	Procedure	Comment	
1	Determine the required hardware and software for the planned installation, and obtain the hardware and software.	For installation planning assistance, contact Ditech Customer Service (see "Documents" on page 5).	
		See Section 1.5 on page 27 for the rack configurations.	
2	Determine the required environmental conditions.	Refer to Appendix A on page 91 for the environmental conditions.	
3	Determine the required space conditions.	Refer to appropriate system chapter for the space requirements for the different rack and shelves:	
		 For Wire-Wrap systems, refer to Chapter 5, Wire-Wrap Systems, on page 67. 	
		 For Telco systems, refer to Chapter 6, <i>Telco Systems, on page 75.</i> For BNC systems, refer to Chapter 7 on page 85. 	
4	Install the WinMAP TM or NetConsul TM software application as needed.	See the WinMAP Software Manual and NetConsul EMS Software Manual listed on page 5.	
5	Review the hardware requirements, and follow the procedure to build each rack assembly containing shelves, AADs, the high density filter assembly, and a fuse panel.		
6	Set up the 7-foot common rack in accordance wi rack's manufacturer.	th the instructions provided by the common	
7	Verify the common rack's inner width to ensure that the shelves, AADs, and fuse panel can fit in the common rack. See Figure 1-6 on page 30 and Figure 1 page 31 for illustrations of the different widths.		
8	Identify the required shelves, AADs, the high density filter assembly, and fuse panel. Verify their measurements and their placement in the common rack.		
	Components are installed in the order of placement from the bottom up.		
	The high density filter assembly fits at the bottom of the rack assembly.		
	An 8-fan AAD is placed between the two lowest	shelves.	
	Shelves are installed with just the chassis in place	ce. No cards are present.	
9	Attach the ear mounts and extenders (if required) to the appropriate components.	See Section 1.5.2 on page 29 for details about ear mounts.	

Step	Procedure	Comment			
10	The lowest shelf should have its ear mounts attached.				
	Two installers lift and place the shelf in the common rack.				
	The common rack's base should provide the required clearance between the bottom shelf and the floor.				
11	Align the screw hole on each ear mount with the mounting holes in the rack.	For example, Figure 1-6 on page 30 shows the alignment of ear mounts and screws in the installation of a shelf in a common rack.			
12	While one installer holds the shelf in place, the other installer inserts one screw on each the shelf for balance.				
	Then the installers insert the remaining screws.				
	Use a total of 8 screws to attach a shelf to a com	nmon rack.			
13	Adjust the high density filter assembly brackets a directly below the shelf.	as necessary so they can support the filter			
	Attach the brackets to the rack below either side	of the shelf.			
	Insert the filter for the high density filter assembly	у.			
	Use a total of two screws (one per side) to attach the high density filter assembly brackets t common rack.				
14	The first AAD contains eight fans and no internal exhaust deflector. It is placed between the two lowest 2 shelves in the rack assembly.	For fan assembly information, see Section 1.5.4 on page 36. Each AAD contains an air filter when shipped. For air			
	The AAD should have its ear mounts attached.	filter maintenance after the first 90 days of operation see Section 1.5.10 on page 44			
	Lift the AAD to the appropriate position in the common rack.				
	Align the screw hole on each ear mount with the screw holes in the common rack.				
15	The remaining AADs each have 4 fans and an internal exhaust deflector. AADs are positioned between the rest of the shelves.	See Section 1.5.3 on page 32. For fan assembly information, see			
	The AAD should have its ear mounts attached.	Section 1.5.4 on page 36.			
	Lift the AAD to the appropriate position in the common rack.	For air filter maintenance after the first 90			
	Align the screw hole on each ear mount with the screw holes in the common rack.	page 36.			
16	While one installer holds the AAD in place, anoth for balance.	her inserts one screw on each side of the AAD			
	Then the installers insert the remaining screws.				
	Use a total of 4 screws to attach the AAD to the	common rack.			
17	The shelf should have its ear mounts attached. Two installers lift and place the shelf above the AAD in the common rack. AADs are positioned between shelves.				
18	Align the screw hole on each ear mount with the mounting holes in the rack.	For example, Figure 1-6 on page 30 shows the alignment of ear mounts and screws in the installation of a shelf in a common rack.			
19	While one installer holds the shelf in place, the ot the shelf for balance.	her installer inserts one screw on each side of			
	Then the installers insert the remaining screws.				
	Use a total of 8 screws to attach a shelf to a common rack.				
20	Continue mounting the remaining shelves and AADs by repeating Steps 15-20.				

 Table 1-5
 Shelf Assembly Installation Procedure—6-Shelf Configuration

Step	Procedure	Comment
21	The fuse panel should have its ear mounts attached. Lift the fuse panel to the appropriate position near the top of the common rack. Align the screw hole on each ear mount with the screw holes in the common rack.	The 6-shelf configuration requires a fuse panel with 12 fuses.
22	While one installer holds the fuse panel in place, another inserts one screw on each side of the fuse panel for balance. Then the installers insert the remaining screws.	Use a total of 4 screws to attach a fuse panel to a common rack.
23	Review power safety, use proper ESD grounding, and follow the procedure to hook up and test power to each shelf.	See Chapter 2 on page 47. The ESD connector (banana jack) is located on the AAD.
24	Connect the office alarms.	See "Office Alarm Connection" on page 48.
25	Optional fan tray alarms can be connected.	See "Wiring the AAD Alarms" on page 40.
26	Power up the rack assembly.	See "Shelf Powerup" on page 49.
27	Set the shelf address for each shelf.	See "Shelf Addressing" on page 53.
28	Physically install the cards in each shelf. Cover any unused slots with blank covers.	See "Quad Card Installation" on page 54.
29	Connect the signal cables.	See "Signal Cable Routing" on page 50 and the appropriate system chapter.
30	Make the RS-232 (V.24) communications connections.	See "Local and Remote Access" on page 59.
31	Review the card LEDs after installation to verify that each card is error-free (if signal is present).	See "Quad Card Powerup Test" on page 55.
32	Log on and set up each card.	See "Front Panel Connection" on page 62.

 Table 1-5
 Shelf Assembly Installation Procedure—6-Shelf Configuration

1.4 Installation Guidelines Install all equipment in restricted access locations. In North America, the location restriction must be in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA No. 70. In the context of these requirements, a restricted access location is defined as a location where:

- Access is restricted to trained personnel only.
- Unsupervised members of the general public are not admitted.

Do not install the shelf assembly near RF-noisy equipment or locations. Examples of such equipment and locations are:

- DC and AC power supply equipment
- 48- to 120-VDC inverters
- Any devices that generate and/or emit high RF energy, including cellular telephones and two-way pagers
- Any 20/30-cycle ringing plants or ringing distribution wiring
- General alarm panels and frames containing open relay contacts
- Any product that contains coiled inductors (coils of wire)

The equipment frame must have a solid frame ground (FGND) connection directly traceable to the office's principle ground bus. Do not make physical connections through painted steel – scrape away paint and/or coatings. All physical connections must be coated with a non-oxide compound. The wire gauge for FGND must be oversized – 14-gauge or better.

1

Note

Measure resistance between frame ground and facility ground for each shelf to confirm a 0 Ω connection.

1.5 Rack Configurations Place the rack 655 feet (200m) or less from the T1/E1 cross-connect point or digital terminal (or 300 ft. maximum for 24-gauge wire when used instead of 22-gauge wire). At the extreme end of the length limitation, waveform continuity testing may be required. Install the shelf from the front of the 19" ANSI rack. For an ETSI rack or 23" ANSI rack, use the shelf extenders (see Figure 1-7 on page 30). Secure the shelf to the rack with #12-24 × 7/16" screws or equivalent (four per shelf, Ditech-supplied).

1.5.1 Common Rack

A rack assembly is housed in a common rack: a grounded frame supporting the shelves and fan assemblies. Three common rack types are used most often:

- ANSI/EIA, 7-foot (43 RU), 19" wide
- ANSI/EIA, 7-foot (43 RU), 23" wide
- ETSI, 2,000mm (80 U), 600mm wide



As an example, Figure 1-5 displays a common rack containing no shelves.

Figure 1-5 Empty Common Rack

To set up a common rack, refer to the rack's outer measurements in Figure 1-5 above. The rack's inner width of 19", ETSI, or 23" matches the space required to install high density shelves, AAD fan assemblies, the fuse panel, and other components.

Follow the directions provided by the common rack's manufacturer to set up the grounded frame.



Note

 Many common racks provide side cable mounts. For more information, see "Signal Cable Routing" on page 50. Table 1-6 lists the preferred racks.

Table 1-6 Preferred Racks

Туре	Size	ANSI Rack Units (1 RU = 1.75")
Channel rack – alum.	7' × 19"	43
Channel rack – alum.	7' × 23"	43
Channel rack – steel		42
Channel rack – steel		42
Unequal flange – front guard box – steel – top angle		43
Unequal flange – front guard box – steel – top angle		43
Unequal flange – front guard box – zone 4 ¹ – steel – top angle	7' × 19"	43
Unequal flange – front guard box – zone 4 – steel – top angle – WF	7' × 23"	43
Unequal flange – rear guard box – zone 4 – steel – top angle – WF	7' × 23"	43

1. Zone 4 means earthquake application per Telcordia GR-63.

1

Note For assistance concerning other rack types, contact Ditech Customer Service at support@ditechnetworks.com or 1-800-770-0117.

1.5.2 Shelves and Ear Mounts

Use ear mounts to attach each shelf and fan assembly onto the frame of the 7-foot common rack. In a 19" common rack, only ear mounts are needed. An ETSI or 23" common rack requires extenders.

Secure the shelf or fan assembly into place using Phillips pan head screws (type 12 thread-cutting, 24x7/16", zinc plated, hardened steel). A high density shelf in a 19" common rack requires a total of eight screws (four per side), while a high density shelf in an ETSI or 23" common rack requires extenders and a total of 16 screws (eight per side). An AAD fan assembly in a 19" common rack requires four screws (two per side), while an AAD fan assembly in an ETSI or 23" common rack requires eight screws (four per side) (Figure 1-6 on page 30). The high density filter assembly requires two screws (one per side).



Figure 1-6 Ear Mount and Extender Positioning onto Rack







Figure 1-7 Ear Mounts and Extenders for Various Rack Widths



Figure 1-8 displays how the standard ear mounts adjust.

Figure 1-8 Adjusting Standard Ear Mounts

1.5.3 Racks and Active Air Deflector (AAD) Cooling

Air flows from the bottom to the top of each shelf for cooling. Maximum ambient temperature is 40° Celsius. The rack assemblies can operate in humidity up to 90% and can be stored at temperatures from -40 to 70° Celsius.

Table 1-7Rack Assembly Types

Rack Assembly	Shelf Assembly	Components
5-Shelf Telco	Telco (80sa-tc)	Five shelvesFive 4-fan AADsFuse panel
5-Shelf Wire-Wrap	Wire-Wrap (80sa-ww)	Five shelvesFive 4-fan AADsFuse panel
6-Shelf Telco	Telco (80sa-tc)	 Six shelves, Four 4-fan AADs One 8-fan high density fan assembly/high density filter assembly Fuse panel
6-Shelf Wire-Wrap	Wire-Wrap (80sa-ww)	 Six shelves Four 4-fan AADs One 8-fan high density fan assembly/high density filter assembly Fuse panel
BNC Rear Access	BNC Rear Access (80sar-bnc)	Four shelvesFour 4-fan AADsFuse panel
Custom (partially populated)	Wire-Wrap (80sa-ww), Telco (80sa-tc), or BNC Rear Access (80sar-bnc)	Each shelf must have a 4-fan AAD mounted below it and 1 RU of space above the uppermost Ditech shelf

Fan trays alarms can be sent should a fan tray overheat or fail. See Section 1.5.7.5 on page 40.

1.5.3.1 5-Shelf Wire-Wrap or Telco Rack Assembly

A typical 5-shelf rack assembly contains 5 Wire-Wrap or Telco shelves with cards, five 4-fan AADs, and the fuse panel.



Figure 1-9 Typical 5-Shelf Rack Assemblies

The components in a typical 5-shelf rack assembly are listed below.

Table 1-8Components in the Typical 5-Shelf Rack Assembly

Component	Comment ¹
Fuse Panel	The 1.75" H x 17.0" W x 11.75" D fuse panel resides at the top of the rack assembly. There is 1 RU of space between the fuse panel and the top shelf for cooling.
Shelf	Each 9.84" H x 17.34" W x 12.30" D shelf contains 20 cards. Card types vary. Below the bottom shelf, there is 1 RU of space for cooling.
AAD	A 2.32" H x 17.25" W x 12.38" D AAD fan assembly below each shelf is required for regulatory compliance. The 4-fan AAD contains an air filter.

1. The width specifications do not include ear mounts for 19" and 23" common racks.



g While each rack assembly meets all applicable regulatory requirements, there may be additional requirements associated with the operating conditions at a specific site. Review the appropriate site information and requirements before installation.

1.5.3.2 BNC Rack Assembly

A typical 4-shelf rack assembly contains four BNC Rear Access shelves with cards, four 4-fan AADs, and the fuse panel.



Figure 1-10 Typical BNC Rack Assembly

The components in a typical BNC rack assembly are listed below.

Table 1-9 Components in the Typica	BNC Rack Assembly
------------------------------------	-------------------

Component	Comment ¹
Fuse Panel	The 1.75" H x 17.0" W x 11.75" (44 x 432 x 298mm) D fuse panel resides at the top of the rack assembly. There is 1 RU of space between the fuse panel and the top shelf for cooling.
Shelf	Each 14.76" H x 17.34" W x 13.30" (375 x 440 x 340mm) D shelf contains 20 cards. Card types vary. Below the bottom shelf, there is 1 RU of space for cooling.
AAD	A 2.32" H x 17.25" W x 12.38" (59 x 440 x 310mm) D AAD fan assembly below each shelf is required for regulatory compliance. The 4-fan AAD contains an air filter.

1. The width specifications do not include ear mounts for 19" and 23" common racks.

Marning

While each rack assembly meets all applicable regulatory requirements, there may be additional requirements associated with the operating conditions at a specific site. Review the appropriate site information and requirements before installation.

1.5.3.3 6-Shelf Wire-Wrap or Telco Rack Assembly

A typical 6-shelf rack assembly contains six Wire-Wrap or Telco shelves with cards, four 4-fan AADs, an 8-fan high density fan assembly, a high density filter assembly, and the fuse panel.



Figure 1-11 Typical 6-Shelf Rack Assemblies

The components in a typical 6-shelf rack assembly are listed below.

Table 1-10	Components in t	he Typical 6-Shelf	Rack Assembly
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Component	Comment ¹
Fuse Panel	The 1.75" H x 17.0" W x 11.75" D fuse panel resides at the top of the rack assembly. There is 1 RU of space between the fuse panel and the top shelf for cooling.
Shelf	Each 9.84" H x 17.34" W x 12.30" D shelf contains 20 cards. Card types vary. Below the bottom shelf, there is 1 RU of space for cooling.
AAD and High Density Fan Assemblies	A 2.32" H x 17.25" W x 12.38" D AAD fan assembly between shelves is required for regulatory compliance. Two types of fan assemblies are used. The 4 AADs contain 4 fans and an internal exhaust deflector. A high density fan assembly with 8 fans and no internal exhaust deflector is placed between the two bottom shelves. All fan assemblies ship with air filters inserted. For details, see "Air Filter Maintenance" on page 44.
High Density Filter Assembly	The rack filter consists of two metal guides mounted below the bottom shelf. An air filter slides into the guides.

1. The width specifications do not include ear mounts for 19" and 23" common racks.

1.5.3.4 Custom Rack Assembly

For a custom rack assembly with up to four shelves, an AAD must be mounted under each shelf. Shelves do not require additional spacing other than the 4-fan AAD with internal exhaust deflector.

As in all rack assemblies, there must be 1 RU of space below the bottom shelf in the rack for cooling. There must be 1 RU of space above any shelf that is placed underneath non-Ditech equipment because it does not use the Ditech AAD.



Warning

While each rack assembly meets all applicable regulatory requirements, there may be additional requirements associated with the operating conditions at a specific site. Review the appropriate site information and requirements before installation.

1.5.4 Fan Assembly

The fan assembly is installed between shelves for cooling. The fan assembly forces air through the shelf. Fans provide an estimated maximum temperature through the chassis at 15° Celsius above ambient. Fan speed is fixed, regardless of input voltage. Refer to section 1.5.3, "Racks and Active Air Deflector (AAD) Cooling," on page 32 for guidelines on AAD placement within the rack.

1.5.5 4-Fan AAD with Internal Exhaust Deflector

The 4-fan AAD is placed below each shelf in a 5-shelf, 4-shelf, or custom (partially populated) rack assembly. In a 6-shelf rack assembly, the 4-fan AAD is placed below each of the top four shelves, while an 8-fan high-density fan is placed below the fifth shelf. The high-density fan is discussed in Section 1.5.6 on page 37.

The AAD provides an inlet grille, metal guides for an air filter, an internal exhaust deflector, an exhaust grille, a warning LED, an ESD connector (banana jack), front access fuses, and a control board to support the electronics. The 4-fan AAD contains an air filter when shipped.



Figure 1-12 4-Fan AAD with Internal Exhaust Deflector



When working with an AAD fan assembly, always use protection from electrostatic discharge, such as an ESD wrist or foot strap plugged into the ESD connector (banana jack) on the front panel.
1.5.6 High Density Cooling for 6-Shelf Rack Assemblies

An 8-fan high density fan assembly is placed between the two bottom shelves in the 6-shelf rack assembly. This fan assembly provides an inlet grille, a warning LED, an ESD connector (banana jack), front access fuses, and a control board to support the electronics, but it has no internal exhaust deflector or exhaust grille. The fan assembly is used with the high density filter assembly, which provides metal guides for an air filter and is mounted below the bottom shelf in the 6-shelf rack assembly (see Figure 1-16 on page 39).



Figure 1-13 8-Fan High Density Fan Assembly

1.5.7 AAD Support Bracket Installation

Warning If shelves and fan assemblies have been installed with ear mounts positioned on the front of the rack, brackets are required to support the lowest 4-fan AAD that is mounted directly beneath a shelf. This applies to all Wire-Wrap, Telco, and BNC systems.

Warning

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ng Electronic modules can be damaged by static electrical discharge. When working with Ditech equipment, always use an ESD grounding device, such as a wrist strap, plugged into the ESD connector on the front panel.

Table 1-11 on page 38 provides steps for installing the AAD support brackets.

 Table 1-11
 AAD Support Bracket Installation Procedure

Step	Procedure	Comment		
1	Remove the two existing screws from each side of the shelf (four screws total) located directly above the two holes on each side of the AAD.	See Figure 1-14 on page 38 for location of shelf screws and AAD holes. These screws will be replaced with new screws (P/N 172-0012-00) in Step 3.		
2	Vertically align the screw holes on each support bracket with the holes on each side of the shelf and AAD.	See Figure 1-14 on page 38 for bracket alignment.		
3	Install the support bracket on each side of the shelf with new screws as shown in Figure 1-14 on page 38.	Use two screws (P/N 172-0012-00) on each side of shelf.		
4	If needed, also install the support bracket to each side of the AAD with screws as shown in Figure 1-14 on page 38.	Use two screws (P/N 171-0011-00) on each side of AAD.		
5	Ensure the bottom ridge of the bracket supports the bottom of the AAD.	See Figure 1-15 on page 39.		



Figure 1-14 Support Bracket Alignment to Shelf and AAD



Figure 1-15 Support Bracket Installed on Shelf and AAD

1.5.7.1 Grounding

Each fan assembly must be connected to the frame ground on the common rack. Connect each fan assembly to the adjacent frame steel using a 14-gauge or better ground wire. Do not make physical connections through painted steel. Measure resistance between the frame ground and the facility ground directly (should be 0Ω).

1.5.7.2 Power

For power, the fan assembly connects to the fuse panel, which is typically placed at the top in the rack assembly. Most fuse panels also provide fuse alarm LEDs for each connection. The redundant A and B power connectors are located at the back of the fan assembly, as shown below. The 4-fan AAD draws 0.5A of current at 36V (18W), while the 8-fan high density fan assembly draws 1.0A of current at 36V (36W).



Figure 1-16 Fan Assembly Connectors

Each fan assembly also has front access fuses. The required fuse is 125V/1.5A.

1.5.7.3 Warning LED

The fan assembly provides a warning LED on the front panel. A red light indicates that the fan assembly is not operating properly. A green light indicates that the fan assembly is operational, while no light indicates that it is not powered.

1.5.7.4 AAD Alarms

Wire-wrap dry contacts for normally open (NO), normally closed (NC), and common (COM) alarms are provided on the back of the fan assembly. When the fan tray is operating normally, the COM and NC contacts are closed. When the fan tray is alarmed, the COM and NO contacts are closed.



Figure 1-17 Alarm Contacts

An alarm triggers if a fan stops, while the other fans continue operating. In the event of a fan failure, the entire fan assembly needs to be removed and replaced. Replace the fan assembly within one hour on a functioning shelf.

Warning

ng The high density shelves should never be operated without a fan assembly for more than an hour without an external cooling fan.

Replacement fan assemblies should be kept on hand. To order fan assemblies, see the information on page 99.

1.5.7.5 Wiring the AAD Alarms

Wiring for fan alarms involves connecting the fan alarm dry contacts to a terminal server. The fan alarm dry contacts on the AAD shelf are shown in Figure 1-17 on page 40.

Alarm input contacts are rated at 56.5 VDC with a maximum current of 100ma.



Warning

J Do not attach the alarm input contacts to any device that exceeds the alarm input contact ratings.

Ditech recommends that 22AWG be used when wiring AAD shelves to the terminal server.

Users of NetConsul EMS can arrange to have fan alarms sent to NetConsul. QVP shelves are typically connected to a terminal server. The terminal server communicates with NetConsul EMS. The AAD shelves can be connected to the terminal server to report fan alarms to NetConsul EMS.

An 8-port or a 16-port terminal server is typically installed in a rack with multiple QVP and AAD shelves. If there are not sufficient free ports on the terminal server to connect each AAD shelf to a separate port, refer to Figure 1-18 to see how shelves may be daisy-chained to one port on the terminal server. Alarms for the daisychained AAD shelves will be reported to NetConsul as occurring at the single IP address of this port of the terminal server. When an administrator looks at the rack or daisy-chained shelves, a fan alarm LED will indicate which AAD shelf sent the alarm.

If there are sufficient free ports on the terminal server to connect each AAD shelf to a separate port, refer to Figure 1-19. Alarms will be reported to NetConsul for individual AAD shelves with an IP address for each terminal server port equating to an AAD shelf in the rack.

Fans, NetConsul's term for AAD shelves, must be "added" to the NetConsul EMS Network Tree so that NetConsul learns the IP addresses associated with them.

5

Go To AAD shelf fan alarms passed to NetConsul EMS will be displayed as an alarm of critical severity on NetConsul's alarms list. Refer to **NetConsul EMS Software Manual**, P/N 250-1252-50 for information about configuring the fans in NetConsul EMS and viewing alarms.

1.5.7.5.1 Daisy-chaining AAD Shelves to the Terminal Server

If an 8-port terminal server is installed and there are not enough free ports to connect each ADD shelf to its own terminal server port, the AAD shelves can be daisychained to each other and connected to a terminal server port, as shown in Figure 1-18.



Figure 1-18 Daisy-chaining the Rack's Alarm Contacts to a Terminal Server

Regardless of the number of shelves installed in the rack, connect the terminal server to to Pins 3 and 4 of the RJ-11 port on the top AAD shelf. Connect the Normally Closed contact of the top shelf to the Closed contact of the shelf below it. Continue connecting each Normally Closed contact to the Closed contact of the shelf below it. On the last (bottom) shelf, connect the Normally Closed contact to the Alarm contact on the first (top) shelf.

To have NetConsul report alarms, configure the terminal server port IP address as a "fan" in NetConsul EMS. Refer to **NetConsul EMS Software Manual**, P/N 250-1252-50 for information about configuring the fans in NetConsul EMS and viewing alarms.

1.5.7.5.2 Connecting AAD Shelves to Individual Ports on the Terminal Server

If a 16-port terminal server is installed, each shelf can be connected to a separate terminal server port, as shown in Figure 1-19.



Figure 1-19 Wiring Each Shelf to the Terminal Server

Connect each shelf's Normally Closed dry contact to the Alarm contact on the same shelf. Connect each terminal server to Pins 3 and 4 of the RJ-11 port on its designated AAD shelf. Repeat the process for each shelf, connecting each shelf to a separate terminal server port.

To have NetConsul report alarms, configure each terminal server port IP address as a separate "fan" in NetConsul EMS. Refer to **NetConsul EMS Software Manual**, P/N 250-1252-50 for information about configuring the fans in NetConsul EMS and viewing alarms.

1.5.8 Fan Assembly Replacement

The table below provides the procedure for replacing a fan. For safety, at least two people must work together to perform the replacement.

Table 1-12 Fan Assembly Replacement Procedure

Ste	Procedure	Comment
1	Using proper ESD protection, such as a wrist strap plugged into an ESD connector (banana jack), turn off the fan assembly, and then disconnect the power and office alarms. If AAD	Do not use the ESD connector on the fan assembly to be removed. Use an ESD connector on another fan assembly in the same rack assembly.
	fan alarms to NetConsul are in use, disconnect the wires to the terminal server. While one installer holds the fan assembly steady, another uses a Phillips head screwdriver to remove one screw on each side of the fan assembly for balance. Then the installers remove the remaining screws.	The 4-fan AAD fits under each high density shelf in most rack assemblies. The 8-fan high density fan assembly fits between two bottom shelves in the 6-shelf rack assembly. The high density filter assembly, providing metal guides for an air filter, mounts below the bottom shelf.
		Each fan assembly contains an air filter when shipped. For air filter maintenance after the first 90 days of operation, see "Air Filter Maintenance" on page 44.
2	The replacement fan assembly should have its ear mounts attached. Align the screw hole on each ear mount with the screw holes in the common rack.	See "Fan Assembly" on page 36 and "Shelves and Ear Mounts" on page 29.
3	While one installer holds the fan assembly in place, another inserts one screw on each side of the fan assembly for balance. Then the installers insert the remaining screws.	Use a total of four screws to attach a fan assembly to a common rack.
4	Using proper ESD protection connect the frame ground and power.	See "Grounding" below and "Power" on page 39.
5	If AAD fan alarms to NetConsul are in use, re- connect the wires to the terminal server.	See section 1.5.7.5, "Wiring the AAD Alarms," on page 40.

1.5.9 High Density Filter Assembly Replacement for 6-Shelf Rack Assemblies

In a 6-shelf rack assembly, a high density filter assembly may need replacement or realignment of the metal guides for the air filter. Each guide mounts independently and must be aligned evenly with the other guide in the common rack. Use ear mounts in a 19" common rack along with Phillips pan head screws (type 12 thread-cutting, 24x7/16", zinc plated, hardened steel). A 23" common rack also requires extenders.

Observe all power and safety requirements when working on the rack assembly.

1.5.10 Air Filter Maintenance

1.5.10.1 4-Fan AAD and 8-Fan High Density Fan Assemblies

A reusable foam air filter rests in the metal guides in each 4-fan AAD and 8-fan high density fan assembly, as shown below.



Figure 1-20 Air Filter

The air filter removes particles in circulated air that may harm electronic devices. In order to maintain the proper airflow across the cards, the air filter must be cleaned on a regular basis. At a minimum, the air filter should be inspected and cleaned once every 90 days. The removal and cleaning of the air filter does not affect live traffic.

Follow the procedure described in Table 1-13 below to remove, clean, and replace the air filter.

Table 1-13	Air Filter Maintenance	Procedure
------------	------------------------	-----------

Step	Description
1	Turn off the fan assembly.
2	Remove the front panel screws, the front panel, and then the air filter from the fan assembly.
3	Inspect the air filter. What is its condition? Clean and undamaged: The air filter can continue in service. Proceed to Step 5. Dirty but undamaged: The air filter must be cleaned so it can continue in service. Go to Step 4. Extremely dirty and/or damaged: The air filter must be replaced. Obtain a clean, undamaged air filter and proceed to Step 5.
4	Use a small component vacuum to remove dust from both sides of the air filter.
5	Gently insert the clean, undamaged air filter.
6	Replace the front panel and start the fan assembly. Do not operate a fan assembly without an air filter for more than one hour.

In 6-shelf rack assemblies, a high density air filter is inserted in the high density filter assembly below the bottom shelf. Simply slide the air filter gently to remove it, clean it as directed above in Steps 3 through 5, and replace it.

Replacement air filters should be kept on hand. To order air filters, see the information on page 99.

1.5.10.2 8-Fan High Density Filter Assembly for 6-Shelf Rack Assemblies

A reusable air filter rests in the metal guides in high density filter assembly, as shown below.



Figure 1-21 8-Fan High Density Filter Assembly with Air Filter

The air filter removes particles in circulated air that may harm electronic devices. In order to maintain the proper airflow across the cards, the air filter must be cleaned on a regular basis. At a minimum, the air filter should be inspected and cleaned once every 90 days. The removal and cleaning of the air filter does not affect live traffic.

Follow the procedure below to remove, clean, and replace the air filter.

Table 1-14 Filter Assembly Air Filter Maintenance Procedure

Step	Description
1	The high density filter assembly is located at the bottom of the 6-shelf rack assembly. Reach gently under the edge of the bottom shelf to find the air filter.
2	Gently slide the air filter from the metal guides.
3	Inspect the air filter. What is its condition? Clean and undamaged: The air filter can continue in service. Proceed to Step 5. Dirty but undamaged: The air filter must be cleaned so it can continue in service. Go to Step 4. Extremely dirty and/or damaged: The air filter must be replaced. Obtain a clean, undamaged air filter and proceed to Step 5.
4	Use a small-component vacuum to remove dust from the air filter.
5	Gently insert the clean, undamaged air filter.
6	Replace the front panel and start the fan assembly. Do not operate a fan assembly without an air filter for more than one hour.

Replacement air filters should be kept on hand. To order air filters, see the information on page 99.



Chapter 2: Power and Cabling

High Density (80sa) Shelf Assembly Installation Manual

Power connections for A and B battery, battery return, and chassis frame grounds are made to a common terminal block that provides fused output to each card in the shelf.

圖 Note

Signal cabling varies with the high density shelf assembly model. See Chapter 5 through Chapter 7 for information about the model being installed.

Warning

When working with Ditech equipment, always use an ESD grounding device, such as a wrist strap, plugged into an ESD connector, or use other safety equipment.

- 2.1 Fuse Panel The fuse panel, typically placed at the top in the rack assembly, provides power connections for the high density shelves and AAD fan assemblies. Most fuse panels also provide fuse alarm LEDs for each connection.
- 2.2 Ground and Each shelf chassis has two frame grounds on the side of the shelf. The frame grounds are heavy duty dual hole lugs that fit over 0.25" (6.4mm) diameter threaded **Power Cabling** studs at 0.625" (15.8mm).

Separate FGND connections must be provided from each EC shelf to the adjacent steel frame. These connections cannot be through paint. Scrape away paint and/or coatings. It is recommended to use a 14-gauge or better ground wire. Measure resistance between the frame ground and the facility ground directly (should be 0Ω).

Unshielded power cables can be a major source of EMI/EMC. All unterminated leads and unshielded lines can act as antennas under the presence of RF emitting devices. Under some circumstances, powerful RF flux densities may have an adverse influence on system performance if allowed an entry path through these antennae.

Ditech requires shielded signal cables and recommends the use of shielded power cables to protect against EMI/EMC interference. Ditech recommends grounding the shield at the card end. Do not ground both ends of the cable.

1

Note Do not install the Quad cards near RF-noisy equipment.

 Table 2-1 describes the power and ground cabling procedure.

 Table 2-1
 Power and Ground Cabling Procedure

Step	Description	Comments
1	Route cables down from the fuse panel along left- rear side of the rack.	
2	Connect the backplane connectors at TB1: Main power feed to -48VA Backup (battery) power feed to -48VB If installing the BNC model, use terminals TB1 and TB2.	Use 16 AWG insulated cable for the 48 VDC battery source.
3	Tie the shelf chassis to earth ground using the frame FGND position on TB1. If installing the BNC model, use FGND positions on panel connectors TB1 and TB2.	Use insulated, 14 AWG for the FGND wiring. Connect it to the relay rack at the point that provides a common access for the earth ground.
4	Connect the isolated battery returns using the return 48VR positions on TB1. If installing the BNC model, use 48VR positions on TB1 and TB2.	Use 16 AWG for the 48VR wiring. Connect it to the relay rack component that provides access for the battery return.
5	Connect digital ground DGND on TB1 to DGND on the adjacent shelves. For the BNC model, DGND positions are on terminals TB1 and TB2.	Use 12 to 14 AWG.

2.3 Office Alarm Connection For office alarm connections, the high density shelf provides wire-wrap stake pins at the backplane for the MAJ (major/local/urgent), MIN (minor/remote/deferred), and SVC (service/equipment) alarms. The dry contacts for Normally Open (NO), Common (COM), and Normally Closed (NC) are rated 1 Amp at -48 VDC. Pin designations are listed in Table 2-2 through Table 2-4 below.

For the AAD, wire-wrap dry contacts are provided at the back. When the fan tray is operating normally, the COM and NC contacts are closed. When the fan tray is alarmed, the COM and NO contacts are closed.

Table 2-2 describes the office alarm connections for the Wire-Wrap shelf assemblies (80sa-ww).

Designation	Description	Major (MAJ) Alarm Pinout	Minor (MIN) Alarm Pinout	Service (SVC) Alarm Pinout	
NO	Normally Open	JP41-1	JP41-4	JP41-7	
COM	Common	JP41-2	JP41-5	JP41-8	
NC	Normally Closed	JP41-3	JP41-6	JP41-9	

 Table 2-2
 Wire-Wrap Office Alarm Connections

Table 2-3 describes the office alarm connections for the Telco shelf assemblies (80sa-tc).

Designation	Description	Major (MAJ) Alarm Pinout	Minor (MIN) Alarm Pinout	Service (SVC) Alarm Pinout	
NO	Normally Open	JP1-1	JP1-4	JP1-7	
СОМ	Common	JP1-2	JP1-5	JP1-8	
NC	Normally Closed	JP1-3	JP1-6	JP1-9	

Table 2-3 Telco Office Alarm Connections

Table 2-4 describes the office alarm connections for the BNC Rear Access shelf assemblies (80sar-bnc).

Table 2-4 BNC Office Alarm Connections

Designation	Description	Major (MAJ) Alarm Pinout	Minor (MIN) Alarm Pinout	Service (SVC) Alarm Pinout	
NO	Normally Open	JP2-1	JP2-4	JP2-7	
СОМ	Common	JP2-2	JP2-5	J21-8	
NC	Normally Closed	JP2-3	JP2-6	JP2-9	

2.3.1 Sending Alarms to NetConsul EMS

To send fan alarms regarding problems with the AAD shelves to NetConsul EMS, refer to "Wiring the AAD Alarms" on page 40. Fan failure alarms will be conveyed to NetConsul EMS and displayed as a critical alarm in the alarms list.

2.4 Shelf Powerup Follow local office procedures and apply power to the fuse distribution panel that supplies power to the Ditech high density shelves. A rack assembly housing 6 shelves requires a current-carrying capacity of 50 Amps. Ensure that the fuses or circuit breakers are rated to handle this load.

To power up the rack assembly, follow the procedure in Table 2-5.

 Table 2-5
 High Density Shelf Powerup Procedure

Step	Procedure	Description		
1	With power supplied to the shelves, insert a 7.5 Amp fuse in the fuse holders of each shelf output on the fuse distribution panel.	There are two fuse holders per shelf output: Fuse 1 – Power 'A' Fuse 2 – Power 'B'		
2	With a voltmeter, measure the TB1 voltages between terminals 48VA and 48VR, and between 48VB and 48VR. For a BNC connector panel, these voltages are available on TB1 and TB2.	Both voltages must be from -39 to -60 VDC (-48 VDC nominal).		
3	Insert an open GMT type fuse of any rating into fuse holder, F1. Repeat for F2.	The red fuse alarm LED lights.		
4	Check for –48 VDC on the MAJOR and MINOR ALARM wire-wrap pins.	This step verifies the backplane fuse alarm circuitry.		
5	Proceed to the next section.	Procedures for pre-service verification testing and front panel operations.		

2.5 Signal Cable Routing Refer to Figure 2-1 and Figure 2-2 on page 51 for the proper way to route cables to and from the high density shelf assembly connector panel.

Also see, as appropriate for your installation, the following topics:

- Chapter 5, *Wire-Wrap Systems*, on page 67
- Chapter 6, *Telco Systems*, on page 75
- Chapter 7, *BNC Systems*, on page 85



Figure 2-1 Signal Cable Routing—Up



Figure 2-2 Signal Cable Routing—Down

2.6 DSX Panel Configuration Figure 2-3 and Figure 2-4 show examples of how the shelf is wired to a DSX panel. Generally, the OUT on DSX is wired to OUT on Ditech equipment, and IN on DSX is wired to IN on Ditech equipment. OUT of the DSX is then an output of the Ditech equipment. For these figures:

- MON = MON, OUT = RCV OUT (separate cable), IN = SEND IN (separate cable)
- 84 jacks available per DSX panel (the last four jacks are not used)
- 80 T1/E1s per high density shelf
- 160 DSX jacks (80 drop and 80 line) required per high density shelf
- One-half of high density shelf (80 drop or 80 line) per DSX panel







Figure 2-4 Shelf-to-DSX Panel Wiring—2 DSX Jack Panel Card Slots

Chapter 3: Quad Card Installation



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High Density (80sa) Shelf Assembly Installation Manual

3.1 Shelf Addressing

The Quad cards read their shelf ID from shelf identification switch (S1) (Figure 3-1) when they are powered up, so setting this switch is done before inserting and powering the cards.



Figure 3-1 Shelf Address Switch

The switch is located on the far left side of the backplane (when viewed from the front). The S1 switch has 256 possible address settings, of which 99 can be used. Set each shelf address according to the selections shown in Table 3-1.

Table 3-1	Shelf Address	Selection	Using	Switch S1

DinemeValue	S1 Positions							
Binary value	1	2	4	8	16	32	64	128
Address	1	2	3	4	5	6	7	8
01	OFF	ON	ON	ON	ON	ON	ON	ON
02	ON	OFF	ON	ON	ON	ON	ON	ON
03	OFF	OFF	ON	ON	ON	ON	ON	ON
04	ON	ON	OFF	ON	ON	ON	ON	ON
05	OFF	ON	OFF	ON	ON	ON	ON	ON
06	ON	OFF	OFF	ON	ON	ON	ON	ON
•								
٠								
•								
99	OFF	OFF	ON	ON	ON	OFF	OFF	ON

3.2 Quad Card To Installation

To install the Quad cards in the shelf assembly, follow the procedure in Table 3-2.

 Table 3-2
 Quad Card Installation Procedure

Step	Procedure
1	Observe all guidelines for protection from electrostatic discharge. Wear an ESD wrist strap or other protection.
2	Carefully inspect each card. Ensure that no pins or connectors are bent.
3	Carefully align the top and bottom edges of the card with the correct card slot in the shelf.
4	Slowly slide the card straight into the card slot. Do not bend, twist, or force the card.
5	When the card is properly inserted, push firmly to make the connection with the backplane.
6	Carefully insert the Quad cards in the shelf assembly slots. Secure each Quad card in the shelf by closing the front panel thumb screws. Do not cross thread thumb screws. Observe the card's initial self-test as its LEDs flash for about one minute. Verify that there are no alarms indicated.
	For information about the card front panel LEDs and diagnostics, refer to the appropriate Quad card manual listed on page 5.
7	Then insert the Quad cards in the remaining slots, repeating steps 1 through 6.

Up to 20 Quad cards can reside in a high density shelf, each sliding into the slots numbered 1 to 20 (Figure 3-2).



Figure 3-2 Card Insertion

3.3 Quad Card After a Quad card is inserted into the shelf assembly and securely connected to the backplane, observe the card to verify that power is applied correctly to the unit.

The Quad cards receive power when plugged into the shelf's backplane if power is applied to the shelf. For approximately 30 seconds, various LEDs turn on and off, indicating different steps of the card self-initialization and self-testing. If the LEDs do not come on in this manner, there may not be power to the shelf, or the card may not be inserted properly.

To verify that the front panel LEDs work, press the ACO button. This momentarily lights all front panel LEDs. Replace the card if any fail to light.



Note

• For information about provisioning the Quad cards in the shelf assembly, refer to the appropriate Quad card manual listed on page 5.

The following four figures, Figure 3-3 to Figure 3-6 on page 58, display the Quad card front panels.



Figure 3-3 QVP T1 and Quad 2 T1 Front Panels



Figure 3-4 QVP E1 and Quad 2 E1 Front Panels



Figure 3-5 Quad-T1 Front Panel



Figure 3-6 Quad-E1 Front Panel



Chapter 4: Local and Remote Access

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High Density (80sa) Shelf Assembly Installation Manual

4.1 Daisy-Chaining Multiple Shelves

Terminal or PC access to multiple shelf assemblies is achieved by interconnecting the shelf Control or Maintenance serial ports using a daisy-chain cable. A pair of RJ-11 jacks (J3 and J4 on Wire-Wrap and Telco shelves, and J326 and J325 on BNC shelves) provide the daisy-chaining Maintenance ports. Another pair of RJ-11 jacks (J1 and J2 on Wire-Wrap and Telco shelves, and J324 and J323 on BNC shelves) provide the daisy-chaining Control ports.

Description	Where Used
Intershelf data cable: RJ-11 to RJ-11, 24" long	Shelf to shelf
Data cable: RJ-11 to RJ-11, 14' long	Shelf to terminal or PC
Adapter: RJ-11 to DB-25	Shelf to terminal or PC
Adapter: RJ-11 to DB-9	Shelf to terminal or PC
Kit: RJ-11 to DB-9 for high density shelves (with 14', RJ-11 to RJ-11 cable and RJ-11 to DB-9 adapter)	Shelf to terminal or PC
Kit: RJ-11 to DB-9 for high density shelves (with 14', RJ-11 to RJ-11 cable and RJ-11 to DB-25 adapter)	Shelf to terminal or PC



These items cannot be ordered separately from Ditech.

Table 4-2 displays the RJ-11 data cable options and connector panel switch setting cross reference for Control and Maintenance ports.

Table 4-2	RJ-11 Data	Cables and	Connector	Panel	Switch	Settings

Port	Port Setting	Cable for connection to terminal or PC	
Telco or Wire-Wrap shelf connector panel	S1 and S2 set to DTE	RJ-11 4-wire cross-pinning (telephone station cable) (see Figure B-4 on page 96).	
Telco or Wire-Wrap shelf connector panel	S1 and S2 set to DCE	RJ-11 4-wire straight-pinning (see Figure B-4 on page 96)	
BNC shelf connector panel	DCE only	RJ-11 4-wire straight-pinning (see Figure B-4 on page 96).	
Quad card front panel access	DCE	RJ-11 4-wire straight-pinning (see Figure B-4 on page 96).	



Figure 4-1 Shelf Interconnect Cabling for Wire-Wrap Shelf Assemblies

4.2 Serial Ports The Quad card has three serial port communication interfaces: one on the front panel, providing maintenance access to the card, and two through the backplane, supporting the maintenance and control communications to all cards in the node. The backplane connections through the maintenance and control ports of the shelf assembly provide user access to the command set as well as a path for software upgrades during normal operation.

Each serial port requires a RJ-11 interface cable. The interface is configured as Data Communications Equipment (DCE), allowing direct connection to any standard Data Terminal Equipment (DTE). The DTE equipment can be a standard terminal, such as a VT100, or a PC running terminal emulation software, such as HyperTerminal.

The DTE configuration is shown below (Figure 4-2).



Figure 4-2 DTE Serial Port Connection

4.2.1 Data Terminal Equipment

The required configuration for the data terminal equipment is listed below (Table 4-3).

Table 4-3 Required DTE Settings

Setting	Values		
Speed	19200, [9600], 4800, 2400, 1200, 600, or 300 baud		
Data Bits	8 with no parity, [7 with even parity]		
Stop Bits	1		
Parity	None, [Even]		
Flow Control	[None]		
Duplex	Full		

4.2.2 ANSI Compatibility for 1-Screen Mode

Commands can be issued to a Quad card using a ANSI-compatible VT100 terminal emulator such as HyperTerminal or Procomm. 1-Screen™ mode provides a realtime overview of the status of all channels, as well as the capability to modify channel provisioning.

4.2.3 Communications Software

For provisioning using a graphical user interface, Ditech provides the WinMAPTM or NetConsulTM EMS software application.

Go To use WinMAP, see the WinMAP Software Manual. To use NetConsul EMS, refer to the *NetConsul EMS Software Manual*. For more information, see page 5.

4.2.4 Front Panel Connection

An ANSI-compatible VT100 terminal emulator such as HyperTerminal or Procomm can be used to check each T1/E1's status and configuration.

4.2.4.1 Logon

To access the card, plug in the connector at the card's front panel serial port and press <Enter>. If the user is plugged into the first card in the first shelf, the Quad card responds with the system prompt:

1-1,1-1>

The system prompt appears after any character is entered. Line 1 and channel 1 appear by default at logon. The syntax of the system prompt is as follows:

```
<Shelf>-<Slot>,<Line>-<Channel>
Shelf = 1 to 99,
Slot = 1 to 20,
Line = 1 to 4,
Channel = 1 to 24 on a T1, or 1 to 31 on an E1
```

When a user is logged on to a Quad card, the **EQPT** (QVP T1, QVP E1, Quad 2 T1, and Quad 2 E1) or **PWR** (Quad-T1 and Quad-E1) LED on the front panel flashes green. At the prompt, the user can choose a line and channel by entering a command such as **SELECT**, **LINE**, or **CHAN**. To use these commands, refer to the appropriate Quad card manual listed on page 5.

4.2.4.2 Logoff

To terminate the connection to the front panel serial port, type:

```
LOGOFF < Enter >
```

or

@0<Enter>

The **@0** command also cancels all silent logon connections.

When logoff is complete, the **EQPT/PWR** LED shows steady green, and the system prompt does not print. After logoff, unplug the cable from the front panel.

Warning

It is important to log off properly and unplug from the front panel interface because a front panel connection disables access to the card through the shelf backplane maintenance port. This maintenance port access can remain disabled as long as the cable is plugged into the front panel, even after issuing a **LOGOFF** command.

4.2.5 Backplane Connection

To access all cards in the node, use the backplane communications port.

4.2.5.1 Logon

When using the backplane serial port to connect through a high density or broadband shelf, the user sends the @ command to log on:

@<Shelf #>-<Slot #><Enter>
<Shelf #> = 1 to 99, <Slot #> = 1 to 20

For example, to log on to the card in shelf 1, slot 4, type:

@1-4<Enter>

Characters do not echo until logon is complete and the **EQPT** (QVP T1, QVP E1, Quad 2 T1, and Quad 2 E1) or **PWR** (Quad-T1 and Quad-E1) LED on the front panel flashes green. Once logon to the card is complete, the system prompt appears, supplying the line and channel that were accessed from the previous logon.

If the most recent connection in the card was to line 3, channel 8, the prompt shows this:

1-4,3-8>

At the prompt, the user can choose a line and channel by entering a command such as **SELECT**, **LINE**, or **CHAN**. To use these commands, refer to the appropriate Quad card manual listed on page 5.

4.2.5.2 Logging On to a Different Quad

The Logon command can be used to access a different Quad. To log on to a different card, enter its shelf and slot numbers at the system prompt. For example, to log on to the card in shelf 1, slot 2, type the new logon at the prompt.

```
1-4,3-8>@1-2
```

The command is not echoed. After the @ character is typed, the current Quad's **EQPT/PWR** LED stops flashing and shows steady green. Once the command executes, the **EQPT/PWR** LED on the new card starts flashing green, and the new system prompt appears. The new prompt reflects the new shelf and card number along with the channel selection retained from a previous logon.

1-2,3-8>

Automatic logoff from the card occurs when the user logs on to a different Quad.

4.2.5.3 Logging Off

To terminate the connection to the front panel or backplane serial port, type:

@0<Enter>

or

LOGOFF<Enter>

The **@0** command is preferred because it also cancels all silent logon connections.

After logoff is complete, the **EQPT/PWR** LED shows steady green, and the system prompt does not print.

Go To For information about provisioning the cards, refer to the appropriate Quad card manual listed on page 5.

4.3 Modem Configuration A standard off-the-shelf modem can be used for remote access. The highest recommended baud rate is 9600 bps. Connect the modem to a serial port of the PC, as shown in Figure 4-3. Once communication between the modem and PC is established, configure the modem as follows:

- Answer after first ring
- No display of result codes
- Ignore DTR (Data Terminal Ready) and RTS (Request To Send)



Figure 4-3 Connecting the Modem to a Serial Port

Different modems require different actions to set provisioning. For best operation, Ditech recommends that the modem is AT command set-compatible. In some cases, different modems use a unique subset of AT commands. Table 4-4 displays common AT commands.

Table 4-4 Common AT Commands

Command	Description	
ATSO=1	Answer after the first ring.	
AT&KO	Disable the local flow control.	
AT&D0	DTR Override.	
AT&R1	CTS is always active (may be factory default).	
AT&Y1	On powerup, profile 1 will be loaded.	
ATQ1	Quiet mode, no result codes.	
AT&W1	Save the current configuration in the non-volatile memory, profile 1.	



Note Sequence of commands is important. AT&W1 must be the last entered command; after receiving ATQ1, the modem stops responding (silent mode), so there is no response to any command, except AT&V.

After modem configuration is complete, connect the modem to the Ditech equipment, as shown in Figure 4-4.

Each shelf should be equipped with a DCE/DTE switch. This switch simply flips the TRANSMIT DATA and RECEIVE DATA signals. Its position is normally set complimentary to the type of device to which the Ditech shelf is connected (DTE for a modem or DCE for a terminal).



Figure 4-4 Connecting the Modem to Ditech Equipment





September 2010

Ditech

Networks

High Density (80sa) Shelf Assembly Installation Manual

This chapter discusses the Wire-Wrap shelf assembly (80sa-ww) installation. Up to six Wire-Wrap Shelf Assemblies can be mounted in a typical 7-foot rack.



Figure 5-1 Wire-Wrap Shelf Assemblies in 19" and 23" ANSI/EIA Racks (5-Shelf Configuration)



Figure 5-2 displays Wire-Wrap shelf assemblies with the 6-shelf rack configuration.

Figure 5-2 Wire-Wrap Shelf Assemblies in 19" and 23" ANSI/EIA Racks (6-Shelf Configuration)

5.2 Wire-Wrap Backplane and Connector Panel

Figure 5-3 displays the 80sa-ww shelf rear access backplane and connector panel.



Figure 5-3 Wire-Wrap Shelf Assembly Backplane and Connector Panel

5.2.1 T1/E1 Cables

T1/E1 Send and Receive cables terminate on wire-wrap connectors JP1 through JP40 on the connector panel. Table 5-1 lists the signal designations and pin termination points.



See Section 1.2 on page 21 for the Quad card network orientation.

Terminate the cable shields at any of the four ground pins, labeled SHIELD, on each connector. Shield wiring must conform to local practices. Do not terminate the cable shield at both ends of the cable.

To minimize electrical interference, separate the Send and Receive cable pairs. Do not run both pairs within the same commonly shielded cable.

T1/E1	Lead	Designation		Connector Panel Pinout
Return from	Т	SEND IN (SI) TIP	1	ECHO CANCELLER 1
tall end (drop)	S	SEND IN (SI) SHIELD	2	ECHO CANCELLER 2
	R	SEND IN (SI) RING	3	
Transmit toward	Т	RCV OUT (RO) TIP	4	
tall end (drop)	S	RCV OUT (RO) SHIELD	5	
	R	RCV OUT (RO) RING	6	SO SO R
Return from	Т	RCV IN (RI) TIP	7	
long haui (line)	S	RCV IN (RI) SHIELD	8	
	R	RCV IN (RI) RING	9	
Transmit toward	Т	SEND OUT (SO) TIP	10	
iong naui (line)	S	SEND OUT (SO) SHIELD	11	ECHO CANCELLER 4 —
	R	SEND OUT (SO) RING	12	ECHO CANCELLER 3

 Table 5-1
 T1/E1 Send and Receive Wire-Wrap Termination

5.2.2 Example Wire-Wrap Connector Panels

The following figures illustrate the Wire-Wrap connector panels.



WIRE-WRAP CONNECTOR PANEL



5.3 Optional Rear This section provides instructions for installing the optional wire-wrap shelf rear safety Cover (assembly P/N 000-0253-15) on the 80sa shelf.

5.3.1 Components

The following components are provided for the safety cover installation:

- 80sa wire-wrap shelf safety cover, P/N 051-0200-00
- 12 nylon snap-lock rivets (0.118" diameter x 0.260" long, for hole diameter 0.122" – 0.126"), P/N 201-0016-01

5.3.2 Tools and Materials

No special tools are required.

Warning

Electronic modules can be damaged by static electrical discharge. When working with Ditech equipment, always use an ESD grounding device, such as a wrist strap, plugged into an ESD connector or use other safety equipment.

5.3.3 Installation Procedure

Follow the steps below to install the rear safety cover on the wire-wrap shelf:

- **Note** These instructions assume the backplane connector panel of the shelf has already been properly cabled.
- **Step 1** Align the top hole on each side of the safety cover with the top hole on each side of the wire-wrap shelf backplane. The top surface of the safety cover should be level with the shelf top.
- **Step 2** Install the safety cover on the wire-wrap shelf with 0.118" x 0.260" snap-lock rivets (see Figure 5-5 and Figure 5-6 on page 73).
 - a. Secure a rivet to the top hole on each side of the safety cover and shelf.
 - b. Secure the remaining rivets on each side of the safety cover and shelf. Ditech recommends using three rivets on each side of the safety cover (six rivets total).


Figure 5-5 shows the hole alignment for the rear safety cover and the shelf.

Figure 5-5 Rear Safety Cover Alignment to Wire-Wrap Shelf



Figure 5-6 shows the rear safety cover installed on the wire-wrap shelf.

Figure 5-6 Rear Safety Cover Installed



High Density (80sa) Shelf Assembly Installation Manual

This chapter discusses the Telco shelf assembly (80sa-tc) installation. Up to six Telco shelves can be mounted in a typical 7-foot rack.

Figure 6-1 displays a typical configuration of Telco shelf assemblies in ANSI/EIA

Configurations for racks. **Telco Shelf** 19" Rack Assembly 23" Rack Assembly 24.3" (Channel Rack) 25.9" (Unequal Flange) 20.3" (Channel Rack) Assemblies 21.9" (Unequal Flange) 0 FUSE PANEL FUSE PANEL 7' (2.15m) 43RU EXTENDERS

Figure 6-1 Telco Shelf Assemblies in 19" and 23" ANSI/EIA Racks (5-Shelf Configuration)

6

Telco Systems



6.1 Rack



Figure 6-2 displays Telco shelf assemblies with the 6-shelf rack configuration.

Figure 6-2 Telco Shelf Assemblies in 19" and 23" ANSI/EIA Racks (6-Shelf Configuration)



Figure 6-3 Telco Backplane and Connector Panel

Figure 6-4 displays an HD shelf with connector cable and AAD fan assembly.



Figure 6-4 Telco Shelf Assembly and Connector Cable

6

6.2.1 T1/E1 Cables

T1/E1 Send and Receive cables terminate on the Telco connectors JT1 through JT16. A single Telco connector supports five Quad cards. Telco connectors provide for Send In, Send Out, Receive In, and Receive Out.



6.2.2 Telco Connector Pinout

Figure 6-5 displays the Telco (Amphenol or RJ-21X) connector.



Figure 6-5 Pin Numbering for 25-Pair Telco Connector

Table 6-1 displays the color code for the 25-pair cable.

Table 6-1 Pinout for Standard 25-Pair Telco Cabl
--

	Ring		Тір				
Pin #	Standard Co	lor	Pin #	Standard Co	lor		
1	Blue-white	BL-W	26	White-blue	W-BL		
2	Orange-white	OR-W	27	White-orange	W-OR		
3	Green-white GR-W		28	White-green	W-GR		
4	Brown-white BR-W		29	White-brown	W-BR		
5	Slate-white SL-W		30	White-slate	W-SL		
6	Blue-red BL-R		31	Red-blue	R-BL		
7	Orange-red OR-R		32	Red-orange	R-OR		
8	Green-red	GR-R	33	Red-green	R-GR		
9	Brown-red	BR-R	34	Red-brown	R-BR		
10	Slate-red	SL-R	35	Red-slate	R-SL		
11	Blue-black	BL-BK	36	Black-blue	BK-BL		
12	Orange-black	OR-BK	37	Black-orange	BK-OR		
13	Green-black	GR-BK	38	Black-green	BK-GR		
14	Brown-black	BR-BK	39	Black-brown	BK-BR		
15	Slate-black	SL-BK	40	Black-slate	BK-SL		
16	Blue-yellow	BL-Y	41	Yellow-blue	Y-BL		
17	Orange-yellow	OR-Y	42	Yellow-orange	Y-OR		

	Ring		Тір				
Pin #	Standard Co	lor	Pin #	Standard Color			
18	Green-yellow GR-Y		43	Yellow-green	Y-GR		
19	Brown-yellow	BR-Y	44	Yellow-brown	Y-BR		
20	Slate-yellow SL-Y		45	Yellow-slate	Y-SL		
21	Blue-violet	BL-V	46	Violet-blue	V-BL		
22	Orange-violet	OR-V	47	Violet-orange	V-OR		
23	Green-violet GR-V		48	Violet-green	V-GR		
24	Brown-violet GR-V		49	Violet-brown	V-BR		
25	Slate-violet	SL-V	50	Violet-slate	V-SL		

Table 6-1	Pinout for	Standard 25-Pair	Telco	Cable	(Continued)
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6.2.3 Cards/Slots to Telco Connectors

A cable channel is provided for securing the signal cables to the shelf and routing them to their panel connectors. A removable rear cover panel provides access to the panel. T1/E1 bypass relays ensure signal integrity if a card is removed.

T1/E1 Send and Receive cables terminate on the shelf's Telco connectors JT1 through JT16. A high density shelf uses a total of 16 Telco connectors (model number 80sa-tc). Figure 6-6 displays the 80sa-tc backplane.

	SNO 1	JT14 RCY OUT	JT 2 SEND SEND SUT		ITS SEND SEND OUT		JT4		

Figure 6-6 Telco Connector Panel Ports

6

Table 6-2 and Table 6-3 display how the cards and slots in an 80sa-tc connect to the Telco connectors.

Shelf	Telco Con	nector Panel	Shelf	Telco Connector Panel		
Slots/Cards	Port #	Termination	Slots/Cards	Port #	Termination	
1 - 5 1 - 5 1 - 5 1 - 5 1 - 5	JT1 JT2 JT3 JT4	SEND IN RCV OUT RCV IN SEND OUT	11 – 15 11 – 15 11 – 15 11 – 15 11 – 15	JT9 JT10 JT11 JT12	SEND IN RCV OUT RCV IN SEND OUT	
6 - 10 6 - 10 6 - 10 6 - 10 6 - 10	JT5 JT6 JT7 JT8	SEND IN RCV OUT RCV IN SEND OUT	$16 - 20 \\ 16 - 20 \\ 16 - 20 \\ 16 - 20 \\ 16 - 20$	JT13 JT14 JT15 JT16	SEND IN RCV OUT RCV IN SEND OUT	

Table 6-2 Quad Card Allocation to Telco Connector Ports

Table 6-3 T1/E1 Send and Receive Telco Termination

Chalf Clat/Cand	T4/E4	Pi	n #		T4/E4	Pi	n #
Shelf Slot/Card	11/E1	Тір	Ring	Shelf Slot/Card	11/E1	Тір	Ring
	1	26	1		1	26	1
1	2	27	2	44	2	27	2
	3	28	3		3	28	3
	4	29	4		4	29	4
	1	30	5		1	30	5
2	2	31	6	10	2	31	6
2	3	32	7	12	3	32	7
	4	33	8		4	33	8
	1	34	9		1	34	9
2	2	35	10	10	2	35	10
5	3	36	11	15	3	36	11
	4	37	12		4	37	12
	1	38	13		1	38	13
4	2	39	14	14	2	39	14
4	3	40	15	14	3	40	15
	4	41	16		4	41	16
	1	42	17		1	42	17
F	2	43	18	45	2	43	18
5	3	44	19	15	3	44	19
	4	45	20		4	45	20

Shalf Slat/Card	T4/E4	Pi	n #	Shalf Slat/Card	T4/E4	Pi	า #
Shelf Slot/Card	11/21	Тір	Ring	Shell Slot/Card	11/21	Тір	Ring
	1	26	1		1	26	1
6	2	27	2	40	2	27	2
0	3	28	3	10	3	28	3
	4	29	4		4	29	4
	1	30	5		1	30	5
7	2	31	6	17	2	31	6
Ĩ	3	32	7	17	3	32	7
	4	33	8		4	33	8
	1	34	9		1	34	9
0	2	35	10	19	2	35	10
0	3	36	11	10	3	36	11
	4	37	12		4	37	12
	1	38	13		1	38	13
0	2	39	14	10	2	39	14
9	3	40	15	19	3	40	15
	4	41	16		4	41	16
	1	42	17		1	42	17
10	2	43	18	20	2	43	18
10	3	44	19	20	3	44	19
	4	45	20		4	45	20

 Table 6-3
 T1/E1 Send and Receive Telco Termination (Continued)

6.2.4 Example Telco Connector Panels

The following figures illustrate the Telco connector panels.



Figure 6-7 Telco Connector Panel

6.3 Retrofitting In rare cases, Ditech may recommend that the backplane of the high density shelf be retrofitted. Table 6-4 presents the retrofitting procedure. Steps 1–3 apply only to those applications where either connector plugs or receptacles do not support tie wraps or the connector has lock hooks installed.

 Table 6-4
 Retrofit Procedure

Step	Description
1	Unplug Telco cable if plugged in.
2	Mount nylon tie-mount bracket (Panduit #TM1S4-C, supplied) using $4-40 \times 3/8$ "-long Phillips head screws (supplied) to the bottom hole of the backplane Telco connector.
3	Mount male/female standoff, $4-40 \times 1/4$ " (supplied) to the top hole of the backplane Telco connector. Remove latch lock clip from cable hood if it interferes with the standoff.
4	Remove existing screw from top of cable hood, and replace it with the shorter screw (supplied).
5	Plug in cable and secure bottom part of hood using cable tie (supplied) or lacing cord through nylon tie-mount.
6	Tighten top screw in cable hood to backplane Telco connector.
7	Mount cable lacing brace using two $12 \times 1/2$ " rack screws (supplied). The bottom of the brace should be even with the bottom of the shelf, but the position of the brace is optional.





Chapter 7: BNC Systems

September 2010

High Density (80sa) Shelf Assembly Installation Manual

This chapter discusses the BNC shelf assembly (80sar-bnc) installation. Up to four BNC rear access shelves can be mounted in a typical 7-foot rack.

Figure 7-1 displays a typical BNC rear access shelf assembly in a 482.6mm (19") 7.1 Rack rack (shelf extenders are used for an ETSI rack). Configurations for **BNC Shelf** 19" Rack Assembly 20.3" (Channel Rack) Assemblies 21.9" (Unequal Flange) 2 U 82 U FUSE PANEL 2 U 66 U 16 U 64 U 48 U 16 U 2.15 m HEIGHT (7') 32 U 16 U 16 U 16 U FRONT VIEW

Figure 7-1 BNC Rear Access Shelf Assemblies in a 482.6mm (19") Rack

1U = 25 mm

1RU = 1.75"

ETSI

ANSI

7.2 BNC Shelf Connector Panel Figure 7-2 displays a high density shelf and BNC rear access connector panel (model 80sar-bnc).



Figure 7-2 High Density Shelf and BNC Rear Access Connector Panel – Front and Side Views

Figure 7-3 displays a view of the BNC rear access connector panel, yellow stencil, with Lexan overlay.

Note On earlier models of the rear access BNC connector panel, the TB-1 DGND (digital ground) was incorrectly labeled FGND (frame ground). FGND at TB-2 should be connected to the office frame ground. DGND at TB-1 may be connected FGND at TB-2 with a jumper wire based on local installation practice.

7

BNC Systems



Figure 7-3 BNC Rear Access Connector Panel



Figure 7-4 BNC Rear Access (Early Release Models, No Lexan Overlay)

7.2.1 E1 Cables for BNC Shelf Assembly

The E1 Send and Receive cables terminate on the BNC shelf's connectors J1 through J320. These connectors provide for Send In, Send Out, Receive In, and Receive Out. The connector assignments are listed in Table 7-1, "E1 Send and Receive BNC Termination", on page 88. Tip is the center pin; Ring is the shield. Frame ground is available on TB2-FGND of each connector. Shield leads can be tied to local or remote connections in conformance with local practice.

1

Note On earlier models of the rear access BNC connector panel, the TB-1 DGND (digital ground) was incorrectly labeled FGND (frame ground). FGND at TB-2 should be connected to the office frame ground. DGND at TB-1 may be connected FGND at TB-2 with a jumper wire based on local installation practice.

	Slot	E1	SI	RO	RI	SO	Slot	E1	SI	RO	RI	SO
		1	J1	J2	J3	J4		1	J161	J162	J163	J164
	1	2	J5	J6	J7	J8	11	2	J165	J166	J167	J168
S	I	3	J9	J10	J11	J12	11	3	J169	J170	J171	J172
ŏ		4	J13	J14	J15	J16		4	J173	J174	J175	J176
		1	J17	J18	J19	J20		1	J177	J178	J179	J180
R	2	2	J21	J22	J23	J24	10	2	J181	J182	J183	J184
	2	3	J25	J26	J27	J28	12	3	J185	J186	J187	J188
R		4	J29	J30	J31	J32		4	J189	J190	J191	J192
0		1	J33	J34	J35	J36		1	J193	J194	J195	J196
0	2	2	J37	J38	J39	J40	12	2	J197	J198	J199	J200
5	5	3	J41	J42	J43	J44	15	3	J201	J202	J203	J204
		4	J45	J46	J47	J48		4	J205	J206	J207	J208
		1	J49	J50	J51	J52		1	J209	J210	J211	J212
	4	2	J53	J54	J55	J56	14	2	J213	J214	J215	J216
	4	3	J57	J58	J59	J60	14	3	J217	J218	J219	J220
		4	J61	J62	J63	J64		4	J221	J222	J223	J224
		1	J65	J66	J67	J68		1	J225	J226	J227	J228
	5	2	J69	J70	J71	J72	15	2	J229	J230	J231	J232
	5	3	J73	J74	J75	J76	15	3	J233	J234	J235	J236
		4	J77	J78	J79	J80		4	J237	J238	J239	J240
		1	J81	J82	J83	J84		1	J241	J242	J243	J244
	6	2	J85	J86	J87	J88	16	2	J245	J246	J247	J248
	0	3	J89	J90	J91	J92	10	3	J249	J250	J251	J252
		4	J93	J94	J95	J96		4	J253	J254	J255	J256
		1	J97	J98	J99	J100		1	J257	J258	J259	J260
	7	2	J101	J102	J103	J104	17	2	J261	J262	J263	J264
	7	3	J105	J106	J107	J108	17	3	J265	J266	J267	J268
		4	J109	J110	J111	J112		4	J269	J270	J271	J272

Table 7-1 E1 Send and Receive BNC Termination

Slot	E1	SI	RO	RI	SO	Slot	E1	SI	RO	RI	SO
	1	J113	J114	J115	J116		1	J273	J274	J275	J276
0	2	J117	J118	J119	J120	10	2	J277	J278	J279	J280
0	3	J121	J122	J123	J124	10	3	J281	J282	J283	J284
	4	J125	J126	J127	J128		4	J285	J286	J287	J288
	1	J129	J130	J131	J132		1	J289	J290	J291	J292
0	2	J133	J134	J135	J136	10	2	J293	J294	J295	J296
9	3	J137	J138	J139	J140	19	3	J297	J298	J299	J300
	4	J141	J142	J143	J144		4	J301	J302	J303	J304
	1	J145	J146	J147	J148		1	J305	J306	J307	J308
10	2	J149	J150	J151	J152	20	2	J309	J310	J311	J312
10	3	J153	J154	J155	J156	20	3	J313	J314	J315	J316
	4	J157	J158	J159	J160		4	J317	J318	J319	J320

 Table 7-1
 E1 Send and Receive BNC Termination



Appendix A: Specifications



High Density (80sa) Shelf Assembly Installation Manual

Note Refer to the appropriate Quad card manual listed on page 5 for card specifications.

Туре	Specification	Value			
Electrical	Input Voltage	QVP T1/E1: -36 to -60 VDC Quad 2 T1/E1: -36 to -60 VDC Quad-T1/E1: -36 to -60 VDC			
	Input Current per Card	QVP T1/E1 with 8 DSPs: <0.27A at -48 VDC QVP T1/E1 with 4 DSPs: <0.22A at -48 VDC Quad 2 T1/E1: <0.2A at -48 VDC Quad-T1/E1: <0.2A at -48 VDC			
	Power Consumption per Card	QVP T1/E1 with 8 DSPs: 13W maximum QVP T1/E1 with 4 DSPs: 11W maximum Quad 2 T1: 11W maximum Quad 2 E1: 11W maximum Quad-T1: 10W maximum Quad-E1: 9W maximum			
	Alarm Contacts	56.5 VDC 100ma max			
Physical	DS0 Channels per Shelf	T1: 1,920, E1: 2,400/2,480 (each T1/E1 channel individually provisionable)			
-	Shelf Dimensions 80sa-ww/tc $(h \times w \times d)$	9.84" × 17.34" × 12.3" (250mm × 440mm × 312mm)			
	Shelf Dimensions 80sar-bnc $(h \times w \times d)$	14.76" × 17.34" × 13.3" (375mm × 440mm × 340mm)			
	Quad card dimensions $(h \times w \times d)$	$9.46" \times 0.84" \times 9.03"$ (241mm × 21.4mm × 229mm)			
	Shelf Weight 80sa-ww/tc (empty)	19 lbs. (8.6 kg)			
	Shelf Weight 80sar-bnc (empty)	22 lbs. (10.0 kg)			
	Shelf Shipping Weight 80sa- ww/tc (empty)	23 lbs. (10.5 kg)			
	Card Weight:	QVP T1/E1 with 8 DSPs: 1.2 lbs (0.54 kg) QVP T1/E1 with 4 DSPs: 1.2 lbs (0.54 kg) Quad 2 T1/E1: 1.2 lbs (0.54 kg) Quad-T1/E1: 1.2 lbs (0.54 kg)			
	Shelf Weight (full, 20 cards)	Approximately 43 lbs. (19.5 kg)			
Environmental	Operating Temperature Limits	5°C to 40°C (long term) -5°C to 55°C (short term)			

Table A-1 High Density Shelf Assembly Specifications

A

Туре	Specification	Value
Regulatory Regulatory Information	UL 60950 / EN 60950	
		CAN/CSA-C22.2
		EN 300 386-1 and -2
		ETS 300 132-2 / EN 61000
	EN 55002 (CISPR 22) Class B	
	EN 55024	
		Telcordia GR-1089-CORE
		FCC part 15 Class A
		CE Mark
		NEBS Level 3 Compliant per Telcordia SR-3580
		Shipping containers certified to ISTA-2A

Table A-2 Shelf Fuse Specifications

Configuration	Fuse	Fuse Holder	Mount Location
80sa-ww	Littelfuse 216008 or Bussman GDB-8A	Bussman HBV-M (vertical)	Universal backplane
80sa-tc	Littelfuse 216008 or Bussman GDB-8A	Bussman HBV-M (vertical)	Universal backplane
80sar-bnc	Littelfuse R251010	Solderable fuse	Connector panel
80sar-bnc Old style	Littelfuse 216008 or Bussman GDB-8A	Bussman HBV-M (vertical)	Connector panel

Appendix B: Cables and Connectors

September 2010

Ditech

Networks

High Density (80sa) Shelf Assembly Installation Manual

B.1 Power and Ground Cables

Observe all safety measures and warnings. Figure B-1 shows recommended safety equipment for electrostatic discharge.



Figure B-1 ESD Wrist Strap

For the Telco rack assembly, power and ground cabling are connected to terminal block TB1 on the backplane. The -48 VDC power source must be rated to independently power a fully loaded shelf. A diode-steering circuit provides fail-safe protection for the A and B battery inputs should a loss occur at either source.

Ditech recommends using copper power cables 16-gauge or thicker. Using aluminum or copper-clad aluminum wire is not recommended. This complies with safety standard UL 60950 (EN 60950). Follow the EMI precautions when selecting cables (Table B-1).

Table B-1	Power and	Ground	Cable	Options
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Cable Type	Description
Power	Recommended: TFFN, 16 AWG, red, black, 600V.
Ground Strap	6", 14 AWG, green/yellow wire. The ground strap links the Connector panel to the rack to prevent ground loop currents.
Power	Unshielded, THHN, 16 AWG, stranded, red, black, blue, 600V.
Power	Unshielded, cotton braid cover, gray flame retardant, 16 AWG.
Power	Shielded (90-100%), two or three conductor, 16 AWG, tinned copper, polyester insulated, 600V.

B.2 Signal Cable and Connectors

Figure B-2 shows a Telco connector pinout.





Figure B-2 Telco Connector Pinout

The color codes in Table B-2 apply to most cables.

Ring			Тір		
1	Blue-White	BL-W	26	White-Blue	W-BL
2	Orange-White	OR-W	27	White-Orange	OR-W
3	Green-White	GR-W	28	White-Green	W-GR
4	Brown-White	BR-W	29	White-Brown	BR-W
5	Slate-white	SL-W	30	White-slate	W-SL
6	Blue-red	BL-R	31	Red-blue	R-BL
7	Orange-red	OR-R	32	Red-orange	R-OR
8	Green-red	GR-R	33	Red-green	R-GR
9	Brown-red	BR-R	34	Red-brown	R-BR
10	Slate-red	SL-R	35	Red-slate	R-SL
11	Blue-black	BL-BK	36	Black-blue	BK-BL
12	Orange-black	OR-BK	37	Black-orange	BK-OR
13	Green-black	GR-BK	38	Black-green	BK-GR
14	Brown-black	BR-BK	39	Black-brown	BK-BR
15	Slate-black	SL-BK	40	Black-slate	BK-SL
16	Blue-yellow	BL-Y	41	Yellow-blue	Y-BL
17	Orange-yellow	OR-Y	42	Yellow-orange	Y-OR
18	Green-yellow	GR-Y	43	Yellow-green	Y-GR
19	Brown-yellow	BR-Y	44	Yellow-brown	Y-BR
20	Slate-yellow	SL-Y	45	Yellow-slate	Y-SL
21	Blue-violet	BL-V	46	Violet-blue	B-BL
22	Orange-violet	OR-V	47	Violet-orange	V-OR
23	Green-violet	GR-V	48	Violet-green	V-GR
24	Brown-violet	GR-V	49	Violet-brown	V-BR
25	Slate-violet	SL-V	50	Violet-slate	V-SL

Table B-2 Standard Color Code for 25-Pair Cable

Figure B-3 shows other typical signal cables and connectors. For a list of compatible cables used with Telco connectors, BNC connectors, and wire-wrap office alarm connections, see Table B-3 on page 96.



Figure B-3 Coaxial Cables and BNC Connectors

Table B-3 lists compatible signal cables used with Telco connectors, BNC connectors, and wire-wrap office alarm connections.

Table B-3 Signal and Office Alarm (Wire-Wrap) Cable Options

Cable Type	Description
Signal Telco	100Ω balanced, shielded, 24 AWG solid, tinned copper, T1 rated, with connectors, 90° hood with short screw, ring lug #6, drain wire 18 AWG stranded green/yellow (ground wire 12" long), and heat shrink–1/8" clear. For use with Telco Connector panels.
Signal Telco	120 Ω balanced, shielded, 22 AWG, tinned copper. For use with wire-wrap panels.
Signal Telco	100Ω balanced, shielded, 24 AWG solid, tinned copper, T1 rated. For use with wire-wrap connectors (office alarms).
Signal Coaxial	75Ω , unbalanced coaxial cable, 95% shield. For use with BNC connectors.
Signal Coaxial	75Ω , unbalanced, multiple coaxial conductors in a single sheath, 90% shield. For use with BNC connectors.
Signal Coaxial	75Ω , unbalanced, multiple coaxial conductors in a single sheath, 95% shield with straight or 90 degree BNC at both ends.
Signal Coaxial	75Ω , unbalanced, BNC connectors at both ends, double-shielded (95%).

<u>_!</u>

Warning

B.3 Serial

Cables and

Connectors

Communications

For applications with cabling less than 300 feet (90 meters), 24-gauge wires are recommended. Lengths in excess of 300 feet must use 22-gauge or lower.

Figure B-4 shows the RJ-11 configurations.



Figure B-4 RJ-11 Connector Configurations



Figure B-5 shows the pinout for the RJ-11 to DB-9 adapter.







Figure B-6 RJ-11 to DB-25 Adapter Pinout

B

Cables and Connectors



Support



High Density (80sa) Shelf Assembly Installation Manual

Shelf Accessories To order shelf accessories such as spare cards, air filters, or AAD fan assemblies, contact your sales person, email a query to Ditech Networks Customer Support at orders@ditechnetworks.com, or phone one of the following numbers:

1-800-770-0117 Toll Free (USA and Canada) 1-650-864-1800 Direct

Customer Support If you have questions or need technical support, go to the Ditech Customer Support Site at:

https://support.ditechnetworks.com

This password-protected customer site contains the most current product information, including data sheet supplements, update sheets, and useful customer applications. To obtain a password, contact a Ditech Customer Service representative.

Customers may also telephone the following numbers:

1-800-770-0117 Toll Free (USA and Canada) 1-650-864-1800 Direct

Repair and
ReplacementThis section contains the information needed to report a defective Ditech product or
to return a Ditech product for repair or replacement in case of failure. Contact Ditech
Customer Service 24x7:

- support@ditechnetworks.com
- 1-650-864-1800 Direct
- 1-800-770-0117 Toll Free (USA and Canada)

Warranty Policy

Ditech's warranty policy covers defects in materials and workmanship for a limited period from the date of shipment. Liability under this warranty is limited to servicing, adjusting, repairing, or replacing, as necessary, any equipment returned to the factory for that purpose. Factory examination must disclose a manufacturing defect. Repaired or replaced items are returned to the purchaser surface freight prepaid within the continental USA.

This warranty does not extend to any equipment that has been subjected to misuse, neglect, accident, improper installation, or any other circumstances beyond the control of Ditech. Out of warranty repairs are billed to the purchaser at a fixed rate based on unit type. A purchase order for the repair must be received by Ditech before the repairs can be initiated. In such cases, an estimate is submitted for approval before repair is initiated. Repaired equipment is returned to the purchaser surface freight prepaid within the continental USA. For more information, see "Equipment Repair and Return" on page 100.

For detailed product warranty information, go to Ditech's corporate website at http://www.ditechnetworks.com. Copies are available on request.

To identify whether a product is currently covered by warranty services, contact Ditech Customer Service.

Warning The warranty is void if the product is not maintained properly, if it is misused, if the site is not prepared properly, or if the product is not installed properly. Further, the warranty is void if Ditech is not notified of a problem within the warranty period.

Equipment Repair and Return

Complete repair and return services are available from Ditech. If the Ditech product is considered defective, return it to Ditech without attempting repairs. The product warranty is void if the customer has made unauthorized attempts to repair the product. For more information about out of warranty repair services and advance replacements, see Ditech's corporate website at http://www.ditechnetworks.com.

To return one or more units, request the Equipment Return Authorization (ERA) number. Complete the ERA Request form on page 103. Leave the ERA number blank. Provide complete Ship To and Bill To addresses. Email the completed form to support@ditechnetworks.com, or fax it to the Ditech Networks Repair Center, Attn: ERA Request Form, at 1-650-564-9843.

Ditech Customer Service will respond within one business day, providing the ERA number authorizing the return, the Telecommunications Equipment number for shipping and customs, and additional information. Do not return the product to Ditech before receiving this information.

When returning the equipment, include the ERA Request form with the ERA number. For out of warranty repair services, include the product Purchase Order number.

Note on all shipping and customs declaration papers:

Telecommunications Equipment Number US GOODS RETURNING FOR REPAIR

Ditech's shipping address is:

Ditech Networks Attn: Repair Center ERA Number 825 East Middlefield Road Mountain View, CA 94043 USA **Shelf Packaging Instructions** Package the equipment in the original shipping container to prevent damage during transport. Use care when handling modules to prevent damage. Place each module in an anti-static bag, and pack each module with sufficient cushioning to prevent damage during shipping. If possible, replace modules in original packaging.

Package the shelf as instructed in the steps below.

Shelf Packaging Instructions

Step	Instructions
1	Wrap the shelf in the ESD plastic bag.
	See the figure, "Wrap shelf in the ESD plastic bag", on page 101.
2	Attach the foam end-caps to each side of the shelf.
	See the figure, "Attach foam end-caps to the shelf", on page 101.
3	Place the shelf (with foam end-caps attached) into the cardboard box.
	See the figure, "Place shelf into cardboard box", on page 102.
4	Seal or tape the cardboard shipping box.
	See the figure, "Seal the shipping box", on page 102.
5	Mark the box with the ERA number and return address.



Wrap shelf in the ESD plastic bag



Attach foam end-caps to the shelf

Support



Place shelf into cardboard box



Seal the shipping box

Email the completed ERA form to support@ditechnetworks.com, or fax it to 1-650-564-9843.

Equipment Return Authorization	(ERA) Request Form
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ERA #: (Provided by Ditech)		Date:	
Customer/Company:		Customer Ref #:	
Ship To Address:		Bill To Address:	
Contact Name:		Billing US\$: (Warranty/Non)	
Contact Phone:		Unit Type: (See unit label - for example, QT1###)	
Contact Fax:		Warranty Date:	
Contact Email:		Unit Serial Number: (###-####+##)	
Location in Office: (Rack/Shelf/System)		Part Number:	
Other:		Software Version:	
Reported Problem			
	Signature (Required for Adv	vance Replacements):	
By signing above, I agree for the purchase of the	ee to return the reported failed unit to Diten new product at the current company pricir	ch within 10 business day ng.	vs or, it not returned, I will be responsible
Notes:			



Acronyms



High Density (80sa) Shelf Assembly Installation Manual

Acronym definitions appear in the list below.

Acronym List

Acronym	Definition
A	Ampere
AAD	Active Air Deflectors
ANSI	American National Standards Institute
AWG	American Wire Gauge
BAT	Battery
BDFB	Battery Distribution and Fuse Bay
BNC	Connector Type
CLEI	Common Language Equipment Identifier
СОМ	Common
CPR	Continuous Property Record
DACS/DCS	Digital Cross-Connect System
DCE	Data Communications Equipment
DGND	Digital Ground
DS0	Digital Service Level Zero (64Kbps)
DS-1	Digital Service Level One (1.544Mbps)
DS-3	Digital Service Level 3 (45Mbps)
DSP	Digital Signal Processor
DSX/DS-1	Digital Cross Connect (1.544Mbps)
DTE	Data Terminal Equipment
E1	DS-1 Facility, European Standard (2.048Mbps)
EC	Echo Canceller
ECI	Equipment Code Identifier
EMC/EMI	Electromagnetic Interference
ESD	Electrostatic Discharge
ETSI	European Telecommunications Standards Institute
FGND or FRM GRD	Frame Ground
GMT	Fuse Type
GRD	Ground

Acronym Li	st (Continued)
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Acronym	Definition
LAN	Local Area Network
MML	Man Machine Language
MTBF	Mean Time Between Failures
NC	Normally Closed
NO	Normally Open
PDTC	Premises Distribution (telephone company)
PRI	Primary Rate Interface (ISDN)
RCV	Receive
RJ	Registered Jack
RTN	Return
RU	Rack Unit (ANSI/EIA standard)
S	Shield Lead
SEC	Secure
SONET	Synchronous Optical Network
Т1	DS-1 Facility; North American Standard (1.544Mbps)
ТВ	Terminal Block
TC/Telco	Telephone (company) Connectors
U	A Rack Unit for ETSI Rack
VDC	Voltage DC
WAN	Wide Area Network
ww	Wire-Wrap

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