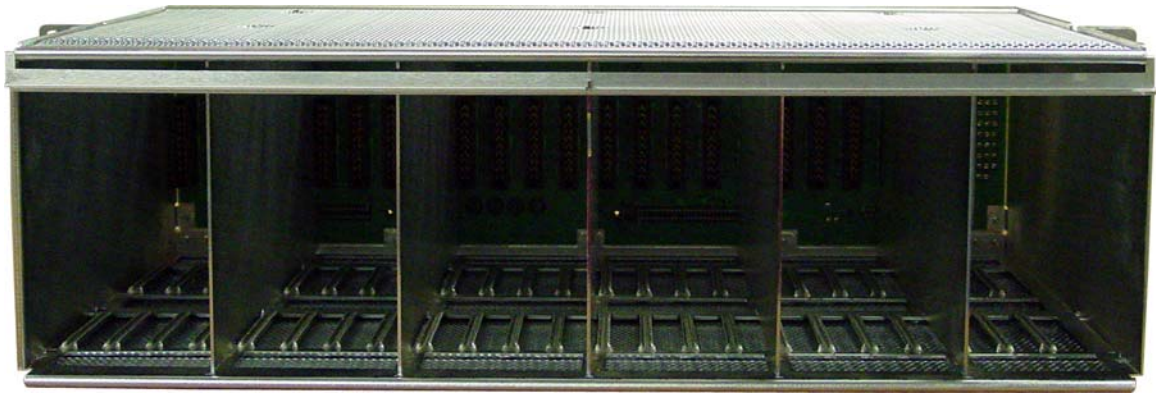
HiGain® Managed Shelf

19-inch, 3190 Mechanic, 22-Slot Managed CO Shelf (HMS-318 List 3)

User Manual



CLEI: T1MF2S04RA

Product Catalog: HMS-318 List 3

Document Number: LTPH-UM-1261-01

REVISION HISTORY

The Revision History provides a summary of any changes in this manual. Please make sure you are using the latest revision of this manual.

Revision	Release Date	Revisions Made
01	December 20, 2004	Initial Release

This manual is available online at ADC's website (www.adc.com/documentationlibrary/) or you can order copies of the manual by contacting your sales representative. Please ask for document LTPH-UM-1261-01.

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ABOUT THIS MANUAL

INTRODUCTION

This manual provides essential information about the HiGain® Management Shelf (HMS-318 List 3) along with step-by-step instructions on how to install the shelf into a Central Office (CO) or telco-style equipment rack.

AUDIENCE

This manual is written for people who install and plan the installation of ADC products in a Central Office environment. If you are an installer, technician, or a local craft person, this manual contains information you can use to install the HMS-318 List 3 shelf. It also provides information that can help you plan and make decisions about your installation.

This manual is also appropriate for managers and planners who are thinking about installing HMS-318 List 3 shelves into a CO or telco-style equipment rack, as well as people who are interested in the HMS-318 List 3 shelf in general.

This manual is written with the assumption that you are familiar with ADC equipment shelves or equivalent hardware and cabling, electronic circuitry, and wiring practices.

RELATED PUBLICATIONS

Listed below are related ADC publications and their document catalog numbers. These documents provide supplementary information for the *HMS-318 List 3 Shelf User Manual*. Copies of these manuals are available online at ADC's web site at www.adc.com/documentationlibrary/ or you can order copies of these documents by contacting your sales representative.

Note: The list of related publications is not all-inclusive. It is only a representative sampling of the instruction manuals that are available. Depending on your particular product model and List number, refer to that instruction manual for proper installation and provisioning information.

Catalog Number	Title
350-319-105	HLU-319 List 5 Quick Installation Guide
LTPH-UM-1182	H2TU-C-319 List 7 User Manual
LTPH-QI-1032	H4TU-C-319 List 1 Quick Installation Guide
LTPH-UM-1142	HMU-319 L7AV32 and L9V32 User Manual
SCP-LPS300-010	LoopStar LPS-300C L1 Power Module Technical Practice

ORGANIZATION

This manual includes the following chapters:

Chapter	Description
Chapter 1: Product Description	Summarizes the HMS-318 List 3 configuration, including details on power and alarm connections, connecting to HDSL, HDSL2, HDSL4 and xDSL circuits, and remote management via RS-232 and Ethernet interfaces.
Chapter 2: Installation	Provides installation instructions for mounting the shelf, connecting DSX/HDSL/xDSL connections, grounding the shelf , and installing the HMU-319, HLU-319, H2TU-C-319, H4TU-C-319, and LPS-300C power module, as necessary.

Chapter	Description
Appendix A: Signal and Pin Assignments	Lists Tip and Ring signal and pin assignments to the HMS-318 List 3 shelf, including: • P1-DSX-1 Receive or xDSL B IN, Tip and Ring • P2-DSX-1 Transmit or xDSL A IN, Tip and Ring • P3-HDSL Span 1 or xDSL A OUT, Tip and Ring • P4-HDSL Span 2 or xDSL B OUT, Tip and Ring
Appendix B: Standard PIC Color Code	Lists the standard PIC color codes with the Pair Number cross-referenced with the colors of the Tip and Ring wires used by the installer.
Appendix C: Circuit Card Preventive Measures	Describes the preventive measures that should be observed when using the shelf, including: • Handling and storing of circuit cards • Installing/replacing circuit cards sensitive to static electricity
Appendix D: Specifications	Provides power requirements, physical dimensions, recommended operational and storage environments, and accessories for the HMS-318 List 3 shelf.
Appendix E: Product Support	Provides information on how to contact the ADC Technical Support group.
Glossary	Defines abbreviations and acronyms used in this document and that relate to the HMS-318 List 3 shelf.

CONVENTIONS

The following style conventions and terminology are used throughout this guide.

Element	Meaning
Bold font	Text that you must input exactly as shown (e.g., type **1** for card 1), menu buttons (e.g., **ACCEPT SHELF OPTIONS**) or menu screen options (e.g., **ALARMS** screen) that you must select
Italic font	Variables that you must determine before inputting the correct value (e.g., *Password*)
Monospace font	References to screen prompts (e.g., Invalid Password...Try Again:.)

Reader Alert	Meaning
	Alerts you to supplementary information
	Alerts you to supplementary information that is essential to the completion of a task
	Alerts you to possible equipment damage from electrostatic discharge

Reader Alert	Meaning
CAUTION	Alerts you to possible data loss, service-affecting procedures, or other similar type problems
WARNING	Alerts you that failure to take or avoid a specific action might result in hardware damage or loss of service
DANGER	Alerts you that failure to take or avoid a specific action might result in personal harm

EU Compliance

The product complies with the requirements of the Low Voltage Directive 73/23/EEC, EMC Directive 89/336/EEC, and the R&TTE Directive 1999/5/EC Articles 3.1a and 3.1b.

Safety Guidelines

The following safety guidelines are presented to help you avoid injury to yourself and avoid damage to the equipment. These guidelines are recommended when working with any equipment that connects to electrical power or telco wiring.

- Locate the emergency power-off switch for the area in which you are working before beginning any procedures requiring access to the telco-style equipment rack. Then, if an electrical accident occurs, you can quickly shut off the power.
- Disconnect all power before doing the following:
  - Installing or removing the shelf
  - Working near power supplies
- Never work alone if potentially hazardous conditions exist.
- Never assume that power has been disconnected from a circuit; **always** check.
- Never perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Carefully examine your work area for possible hazards, such as moist floors, ungrounded power extension cables, and missing safety grounds.
- Keep the work area free of obstructions before, during, and after shelf installation.
- If an electrical accident occurs, proceed as follows:
  - Use caution; do not become a victim yourself.
  - Turn power off to the telco-style rack that the shelf is located in.
  - If possible, send another person to get medical aid. Otherwise, determine the condition of the victim and then call for help.
  - Determine if the victim needs rescue breathing or external cardiac compressions; then take appropriate action.
- Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g., use of power strips).
- The following precautions may appear in this manual in procedures that, if performed incorrectly, may harm you or your equipment.

DANGER

To prevent electrical shock, be careful when working near HDSL loops and telecommunications circuits. Coming in contact with high electrical potential will result in death or severe personal injury.

IMPORTANT

The shelf chassis must be properly grounded to ensure personal and equipment safety.

DANGER

To prevent electrical shock, never install telco equipment in a wet location or during a lightning storm. When installing or modifying telco lines, disconnect lines on the network side before working with uninsulated lines or terminals.

DANGER

To prevent electrical shock, be careful when working near power supplies. Telco equipment uses -48 Vdc office power.

ATTENTION

Electronic components can be damaged by electrostatic discharge (ESD). Before handling circuit cards, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place components in static-shielding protective bags when transporting or storing. When working on components, always place them on an approved antistatic mat that is electrically grounded.

INSPECTING YOUR SHIPMENT

Upon receipt of the equipment:

- Unpack each container and visually inspect the contents for signs of damage. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company and to ADC. Order replacement equipment, if necessary.
- Check the packing list to ensure complete and accurate shipment of each listed item. If the shipment is short or irregular, contact ADC as described in Appendix E: Product Support on page E-1. If you must store the equipment for a prolonged period, store the equipment in its original container.

Chapter 1

PRODUCT DESCRIPTION

The HMS-318 L3 is a 22-slot, 3190 mechanics shelf that is capable of being managed locally or remotely. It can be mounted in a 19-inch rack and is fully NEBS 3 and UL-60950 complaint.

The ADC HiGain® Management Shelf (HMS-318 List 3) weighs approximately 17 pounds (7.7 kg). It measures 17.3 in. wide x 5.22 in. high x 12 in. deep (43.9 cm x 13.3 cm x 30.5 cm). These dimensions do not include the mounting brackets that are factory-installed to the shelf.

The HMS-318 List 3 shelf can be mounted in three different types of rack mount configurations:

- A standard (EIA or WECO) 19-inch (48.3-cm) Central Office (CO) or telco-style equipment rack (using the mounting rack adapter brackets provided). These brackets can be positioned for either 2- or 5-inch recess.
- A standard (EIA or WECO) 23-inch (58.4-cm) Central Office (CO) or telco-style equipment rack (using the optional Extender Bracket: EB-52). These brackets can be positioned for either 2- or 5-inch recess.
- A European Telecommunications Standards Institute (ETSI) telco-style rack mounting (using ETSI mounting adapter brackets and hardware provided).

The HMS-318 List 3 shelf supports:

- 1.544 Mbps (T1) full-duplex transmission over two unconditioned, non-loaded copper loops
- DSX-1 interfaces at the CO and the remote end, with remote provisioning and performance monitoring
- CO power modules (LPS-300C) which provide xDSL span powering to ADC's LoopStar™ Wi-Fi® Access Point (AP) solution.

The HMS-318 List 3 shelf is shipped with:

- Adjustable mounting brackets (as described above) that allow the shelf to be positioned in the equipment rack to match the recess of the existing equipment (either 2- or 5-inch mounting).
- HMS-318 List 3 Shelf Rack Mounting Kit:
  - 3 x 5 inch label holder (1)
  - Label, HMS-318 (1)
  - BNC-T female connector (1) – used with 10 BASE-2 managed systems
  - 50-ohm BNC terminator (1) – used with 10BASE-2 managed systems
  - #12-24 x .5 inch mounting screws (4).
- ETSI mounting hardware:
  - #6-32 x 0.250 inch mounting Phillips head screws w/lock washer (8)
  - M6-1.0 x14 mm mounting panhead screws (4)
- Shelf grounding kit:
  - #10-32 x .5 inch mounting Hex screw w/washer (1)
  - Ring terminal stud, taped 12-10 AWG (1)
  - ground jumper, 2-position (1)
  - Cable ties (10)
- ETSI mounting brackets (2)
- This instruction manual, *HiGain Management Shelf (HMS-318 List 3) User Manual*, catalog number LTPH-UM-1261.

The following optional accessories are available:

- Extender Bracket Kit, 5.25 inches high for mounting a shelf into a 23-inch (58.4-cm) telco-style equipment rack

TYPICAL HMS-318 LIST 3 SHELF APPLICATIONS

Capable of using various components in different types of applications, the HMS-318 List 3 shelf is designed as a very adaptable shelf. It can be used in the following applications:

- Managed HDSLx configuration - HMU-319 (HiGain Management Unit) with HLU-319, H2TU-C-319, or H4TU-C-319 (HiGain Line Unit) configuration
- LoopStar™ (LPS-300C) Power Module configuration (for Wi-Fi)

The HMU-319 with HLU-319/H2TU-C-319/H4TU-C-319 use 23 slots in the HMS-318 List 3 shelf. The first 22 slots are for the HLU-319/H2TU-C-319/H4TU-C-319 and the 23rd slot is for the HMU-319 (for information about installation and provisioning, see “Installing the HMU-319 with HLU-319, H2TU-C-319, H4TU-C-319” on page 2-13 and refer to “Related Publications” on page ix).

The LPS-300C Power Module configuration is a double-width module that supports two Span Powered xDSL or ADSL pairs per module and is used as an integral part of the LoopStar Wi-Fi span powered Access Point (AP) solution. A total of 11 LPS-300C modules can be installed in the UL-60950 compliant HMS-318 List 3 power shelf for a total of 22 span powered pairs (for information about installation and provisioning, see “Installing LPS-300C Power Module” on page 2-13 and refer to “Related Publications” on page ix).

The following front and rear views show the HMS-318 List 3 shelf using the HMU-319 and HLU-319 configuration and the LPS-300C.

HMS-318 List 3 Front View

On the front panel, viewing from left to right, the HMS-318 List 3 shelf (see Figure 1-1) shows the orientation of the following components:

- HiGain Line Unit (HLU): first 22 (HLU1-HLU22) slots
- HiGain Management Unit (HMU): last or 23rd slot.

Communications between the HMU slot and the HLU card slots is routed through the rear panel.

- LPS-300C: the first 22 [odd numbered slots (1, 3, 5, 7, ... 21 connections)] slot

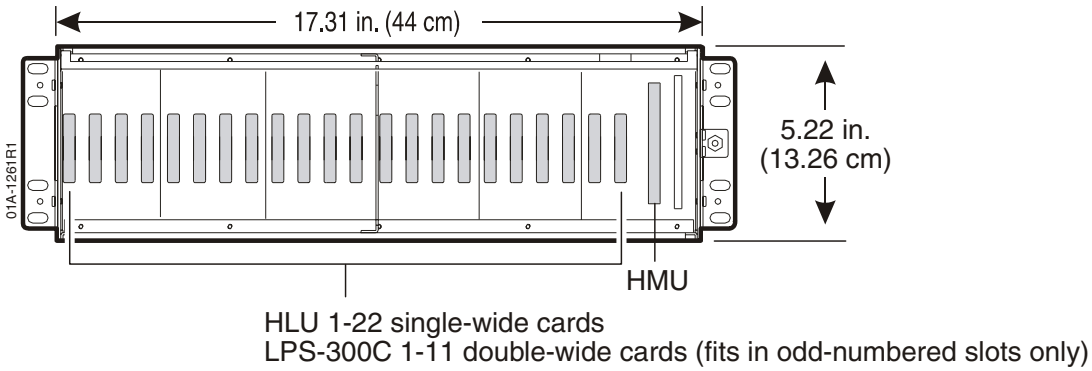


Figure 1-1. HMS-318 List 3 Shelf - Front View

HMS-318 List 3 Rear View

The HMS-318 List 3 shelf input power, 5-position terminal block (labeled TB1) and the alarms (labeled Alarms) wire-wrap connections are located on the rear panel (see Figure 1-2). The Bonding (Safety ground) is located on the upper right corner extension of the right panel. The label (BONDING WIRE MIN #10 AWG) is located on the right corner of the rear panel (see Grounding Lug and Hexhead Screw, Figure 1-2).

Managed HDSLx configuration

Also located on the rear panel, connectors P1 and P2 (labeled CO PAIR 1 and 2) are DSX-1 receive and transmit connections. Connectors P3 and P4 (labeled SPAN PAIR 1 and 2) are HDSL Spans (Loops 1 and 2) receive and transmit connections (see Figure 1-2). All of these plug-in connectors (P1, P2, P3, and P4) are 50-pin Amphenol-type male connectors and provide Tip and Ring for all the cards in the shelf. For information on the signal and pin assignments, see Appendix A: "Signal and Pin Assignments" on page A-1.

LoopStar™ (LPS-300C) Power Module configuration (for Wi-Fi)

Also located on the rear panel (for Visual & Audible Alarm Contact operation, install an HMU-319), connectors P1 and P2 (labeled CO PAIR 1 and 2) are xDSL B and A IN transmit and receive connections, respectively. Connectors P3 and P4 (labeled SPAN PAIR 1 and 2) are xDSL A and B OUT transmit and receive connections, respectively (see Figure 1-2). All of these plug-in connectors (P1, P2, P3, and P4) are 50-pin Amphenol-type male connectors and provide Tip and Ring for all the cards in the shelf. For information on the signal and pin assignments, see Appendix A: "Signal and Pin Assignments" on page A-1.

Table 1-1 on page 1-4 provides a description of each rear-panel component.

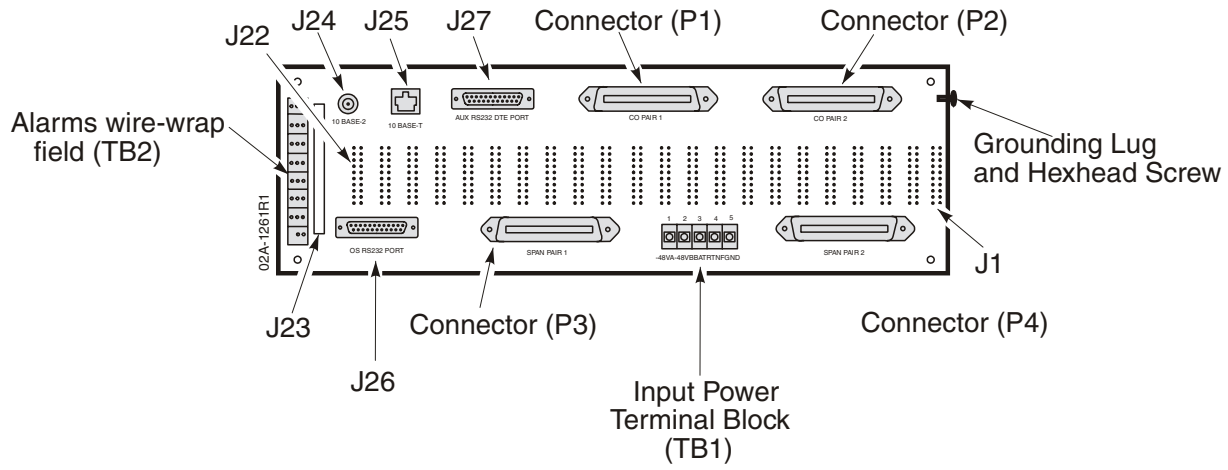


Figure 1-2. HMS-318 List 3 Shelf - Rear View

Table 1-1. HMS-318 List 3 Shelf Rear-Panel Connections (LPS-300C)

Connector/Terminal Block	Connector Type	Connectory Label	Description
J24	BNC-T (Female)	10 BASE-2	10BASE-2 Management Port
J25	RJ-45	10 BASE-T	10BASE-T Management Port
J26	RS-232 DB-25 (Female)	OS RS232 DTE PORT	RS-232/X.25 Management Port
J27	RS-232 DB-25 (Female)	AUX RS232 DTE PORT	Auxiliary RS-232 Management Port
P1	Amphenol 50-pin (Male)	CO PAIR 1	DS1/xDSL B IN Tip and Ring (non-powered xDSL signal to and from the DSLAM)
P2	Amphenol 50-pin (Male)	CO PAIR 2	DS1/xDSL A IN Tip and Ring (non-powered xDSL signal to and from the DSLAM)
P3	Amphenol 50-pin (Male)	SPAN PAIR 1	HDSL/xDSL A OUT Tip and Ring (bi-directional span powered xDSL signal to and from the Customer Premises)
P4	Amphenol 50-pin (Male)	SPAN PAIR 2	HDSL/xDSL B OUT Tip and Ring (bi-directional span powered xDSL signal to and from the Customer Premises)
J1 - J22	20-pin wire-wrap	J1 - J22	HLU connectors
J1 - J22	20-pin wire-wrap	J1 - J22 (odd-numbered slots only)	LPS-300C connectors
J23	DIN 96-pin (Female)	J23	HMU connector[a]
TB1	5-position terminal block	TB1	Input Power connector
TB2	26-pin wire-wrap field	Alarms	Alarm connector

a.Not used in LPS-300C Power Module configuration.

POWER AND ALARM CONNECTIONS

The HMS-318 List 3 shelf has a separate split input power (TB1) and an Alarms wire-wrap field (TB2). The following paragraphs provide information about TB1 and TB2.

Safety Precautions

Observe the following general precautions and recommendations in planning the source power requirements for the HMS-318 List 3 shelf (for additional safety information, please refer to the section describing the "Safety Guidelines" on page xi):

- Check the power at your site before shelf installation (and periodically after installation) to ensure clean power is being received.
- Always disconnect the power source and unplug all the power cables before working on the shelf.
- Install proper grounding for the site to avoid damage from lightning and power surges.

DANGER ***To avoid electrical shock, be careful when working near power supplies. Telco equipment uses -48 Vdc office power.***

Input Power Terminal Block

CAUTION ***Before making any power connections (CO primary power feeds A and B) to the HMS-318 List 3 shelf, ensure that the Main CO power breaker is off. Otherwise, severe injury to the installer or damage to the unit may result.***

The 5-position input power terminal block (TB1, see Figure 1-3) provides a central connection point for the CO primary power feeds (A and B).

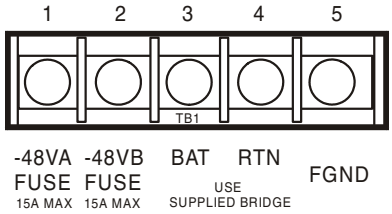


Figure 1-3. Input Power Terminal Block (TB1)

HMS-318 List 3 Shelf Input Power Connections

The input power terminal block supports split -48V battery power bussing. Slots 1 through 11 on the HMS-318 List 3 shelf are powered by the -48 Vdc A bus (labeled -48VA). Slots 12 through 22 are powered by the -48 Vdc B bus (labeled -48VB). The two GND terminals are tied together. In the HMU/HLU configuration, the HMU-319 is diode-OR'ed to both power busses, to guard against power failure in the event that one power supply is lost. This feature requires the two ground terminals to be tied together on the HMU card (for proper power and grounding of the HLU-319 and HMU-319, see "Related Publications" on page 1-ix and choose the most appropriate instruction manual for your product).

Alarms Wire-Wrap Field

IMPORTANT ***Before making power connections (CO primary power feeds A and B) to the HMS-318 List 3 shelf, ensure that the Main CO power breaker is off. Otherwise, severe injury to the installer or damage to the unit may result.***

Terminate the alarm leads from the CO alarm system to the HMS-318 List 3 shelf. The Alarms wire-wrap field (TB2, see Figure 1-2) is a 26-pin wire-wrap connector and provides a central connection point to the Normally Closed (NC), Common (COM), and Normally Open (NO) relay contacts for installing optional alarm input connections (see Table 1-1 on page 1-4 for Alarm descriptions). When an alarm is not active, there is continuity between the NC and COM connections; when an alarm is active, there is continuity between the NO and COM connections.

Note: The NO and COM alarm relay connections can be daisy-chained between HMS-318 List 3 shelves for multi-shelf applications in the same equipment rack.

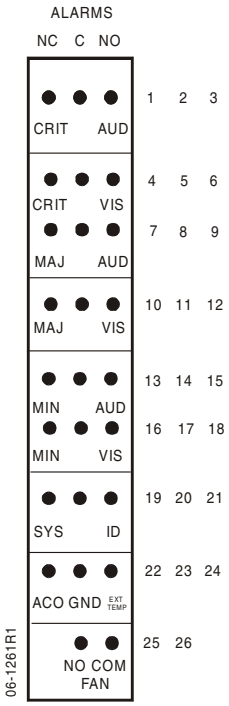


Figure 1-4. Alarms Wire-Wrap Field (TB2)

Alarm Cutoff (ACO)

The Alarm Cutoff (ACO) function silences active audible alarms. Alarm cutoff can be achieved by pressing the ACO button on the front panel of the Management Unit (for example, HMU-319) or by connecting the ACO pin 22 on the HMS-318 List 3 shelf Alarms wire-wrap field (see Figure 1-4 on this page and Table 1-2) to ground through an external NO push button switch. The ACO lead can be daisy-chained to other shelves for multi-shelf applications in the same equipment rack.

In the HMU/HLU configuration, for example, for detailed information about the different types of alarms, refer to the "Managing Alarms" section in the *HMU-319, H2TU-C-319, or H4TU-C-319 User Manuals*. Specifically, the manual describes the types of alarms the HMU-319 reports, when the alarm occurs, and how to respond to the alarm using the ACO.

Table 1-2. Alarms Wire-wrap Field Functional Description

Alarm	Alarm Description	Function
CRIT AUD	Critical Audible	There is a critical alarm active on the HMS-318 List 3 shelf. Connect this relay to the critical alarm audible indicator of the CO alarm system.
CRIT VIS	Critical Visible	There is a critical alarm active on the HMS-318 List 3 shelf. Connect this relay to the critical alarm visual indicator of the CO alarm system.
MAJ AUD	Major Audible	There is a major alarm active on the HMS-318 List 3 shelf. Connect this relay to the major alarm audible indicator of the CO alarm system.
MAJ VIS	Major Visible	There is a major alarm active on the HMS-318 List 3 shelf. Connect this relay to the major alarm visual indicator of the CO alarm system.
MIN AUD	Minor Audible	There is a minor alarm active on the HMS-318 List 3 shelf. Connect this relay to the minor alarm audible indicator of the CO alarm system.
MIN VIS	Minor Visible	There is a minor alarm active on the HMS-318 List 3 shelf. Connect this relay to the minor alarm visual indicator of the CO alarm system.
SYS ID	System ID	There is a critical, major, or minor alarm active on the HMS-318 List 3 shelf. Connect this relay to the equipment rack alarm indicator.
ACO	Alarm Cutoff	External Alarm Cutoff (ACO) function silences active audible alarms (see "Alarm Cutoff (ACO)" on page 1-6).
GND	Ground	External ground
EXT TEMP	External Temperature Thermostat	Thermal control (digital temperature sensor). Connect this pin to an external snap-action thermostat to activate the fan relay. This thermostat provides a switch closure to ground that is sensed by the HMU-319.
NO COM FAN	Fan Control	The Fan Control manually disables a Fan Assembly using the NO and COM fan control contacts.

CONNECTING TO HDSL, HDSL2, AND HDSL4 CIRCUITS

The following paragraphs provide information on making DSX-1 and HDSL, HDSL2, and HDSL4 connections to the HMS-318 List 3 shelf.

Plug-in Connections DSX-1 and HDSL, HDSL 2, or HDSL4

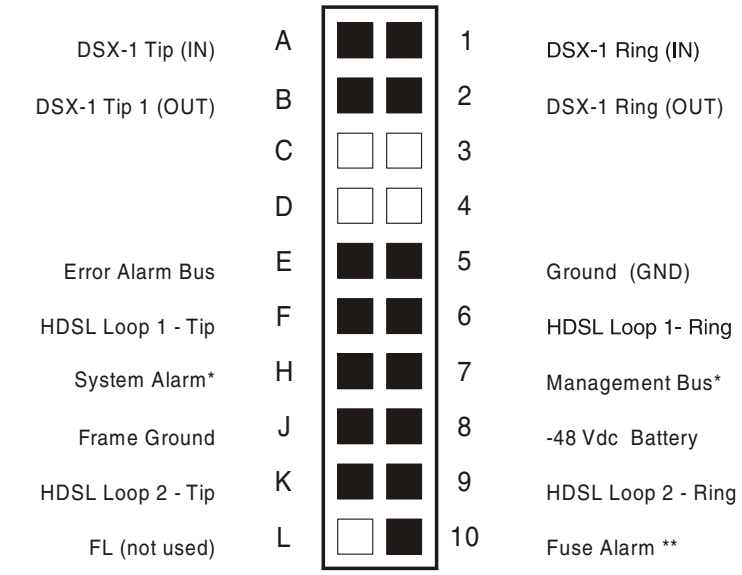
DSX-1 connections to the HMS-318 List 3 shelf can be made through the HMS-318 List 3 shelf's rear-panel 50-pin Amphenol-type male connectors P1, RCV to DSX (labeled CO PAIR 1) and P2, XMT from DSX (labeled CO PAIR 2). HDSL, HDSL2, or HDSL4 connections to the shelf can be made through rear-panel 50-pin Amphenol-type male connectors P3, HDSL Loop 1 (labeled SPAN PAIR 1) and P4, HDSL Loop 2 (labeled SPAN PAIR 2). All of these connectors (P1, P2, P3 and P4) are described in the section titled "HMS-318 List 3 Rear View" on page 1-3.

Wire-Wrap Connections DSX-1 and HDSL, HDSL2, or HDSL4

DSX-1 and HDSL, HDSL2, or HDSL4 connections can be made to the individual card connectors through the HMS-318 List 3 shelf's rear-panel wire-wrap pins (0.045-inch square/1.14 mm). Straps for cable dressings and a protective Lexan rear cover are provided with each shelf. Figure 1-5, Figure 1-6, and Figure 1-7 show the HLU card slot pinouts for HDSL, HDSL2, and HDSL4, respectively on the HMS-318 List 3 shelf rear panel.

Each circuit card is identified by name and list ID (for example, HLU-319 HiGain G.703 L1). The name and list ID are labeled on the upper portion of the front panel. All circuit cards are inserted straight into the slot, using guide pins to align each circuit card.

To ensure against damage to electronic components, ESD protection must be employed in the handling of all circuit cards. Therefore, antistatic discharge wrist-straps should be used whenever circuit cards are being removed or replaced. The antistatic discharge straps should be connected to frame ground. At all other times (shipping, storage, and so forth), these circuit cards should remain in static-shielding protective bags (for a description of card preventive measures, see Appendix C: "Circuit Card Preventive Measures" on page C-1).

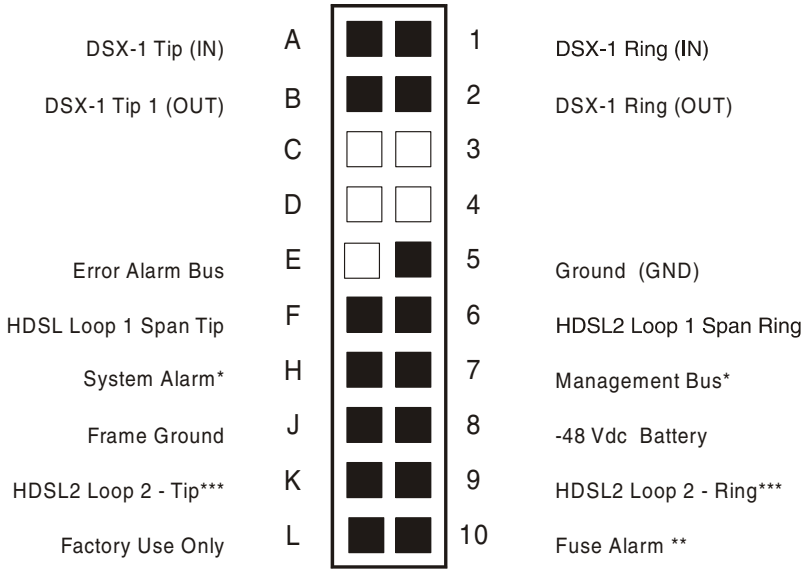


Notes:

* Minor alarm output is normally floating (0 to -60V maximum) and a ground (10 ma maximum, +5 Vdc for HLU-319 List 2D) when activated

** Fuse alarm is normally floating (0 to -80V maximum) and at -48V (10 ma maximum) when activated

Figure 1-5. HLU Slot Wire-wrap Pinouts for HDSL Circuits



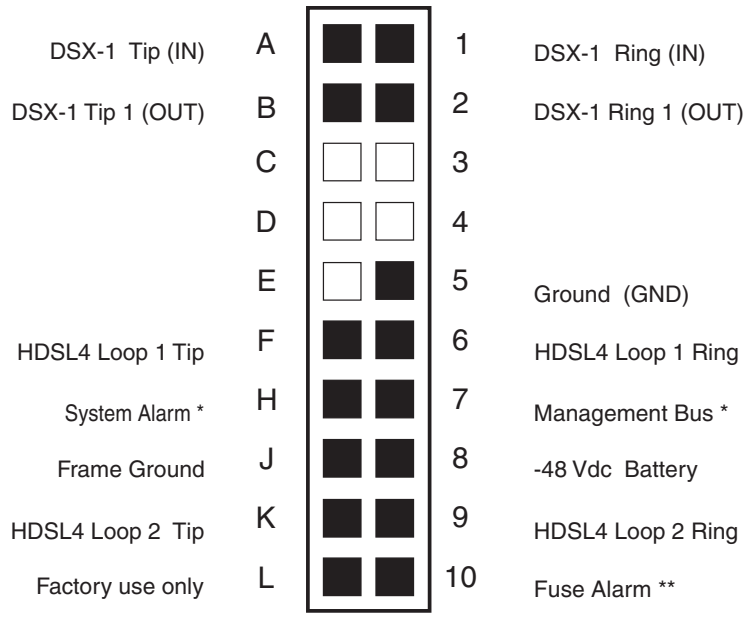
Notes:

* Minor alarm output is normally floating (0 to -60V maximum) and a ground (10 ma maximum, +5 Vdc for HLU-319 List 2D) when activated

** Fuse alarm is normally floating (0 to -80V maximum) and at -48V (10 ma maximum) when activated

*** Loop2 is used on H2TU-C-319-L7FX line of cards

Figure 1-6. HLU Slot Wire-wrap Pinouts for HDSL2 Circuits



Notes:

* System alarm and management bus reserved.

** Fuse alarm normally floating (0 to -80 Vdc maximum) and at -48Vdc (10 ma maximum) when activated.

Figure 1-7. HLU Slot Wire-wrap Pinouts for HDSL4 Circuits

CONNECTING SPAN POWERED XDSL CIRCUITS TO THE HMS-318 LIST 3 SHELF

The following paragraphs provide information on making Span Powered xDSL connections to the HMS-318 List 3 shelf.

Span Powered xDSL Plug-in Connections

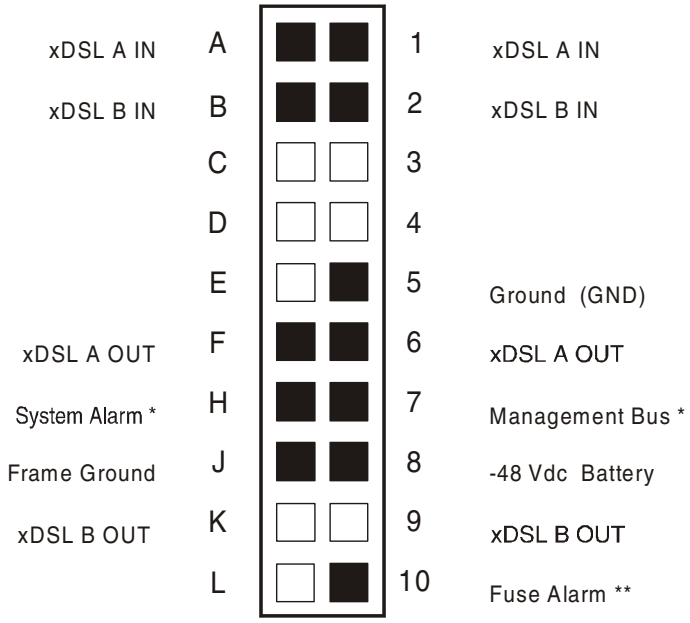
Span Powered xDSL (labeled xDSL B and A IN) connections to the HMS-318 List 3 shelf can be made through HMS-318 List 3 shelf's rear-panel 50-pin Amphenol-type male connectors P1 (labeled CO PAIR 1) and P2 (labeled CO PAIR 2), respectively. Span Powered xDSL (labeled xDSL A and B OUT) connections to the shelf can be made through rear-panel 50-pin Amphenol-type male connectors P3 (labeled SPAN PAIR 1) and P4 (labeled SPAN PAIR 2). All of these connectors (P1, P2, P3 and P4) are described in the section titled "HMS-318 List 3 Rear View" on page 1-3 (refer to the *LoopStar LPS-300C L1 Power Module Technical Practice*, catalog number SCP-LPS300-010 for installation, initialize and power up information).

ATTENTION

To ensure against damage to electronic components, ESD protection must be employed in the handling of all circuit cards. Therefore, antistatic discharge wrist-straps should be used whenever circuit cards are being removed or replaced. The antistatic discharge straps should be connected to frame ground. At all other times (shipping, storage, and so forth), these circuit cards should remain in static-shielding protective bags (for a description of card preventive measures, see Appendix C: "Circuit Card Preventive Measures" on page C-1).

Wire Wrap Connections – Span Powered xDSL

Figure 1-8 shows the LPS-300C slot pinouts on the HMS-318 List 3 shelf rear panel for xDSL circuits.



Notes:

* System alarm and management bus reserved.

** Fuse alarm normally floating (0 to -80 Vdc maximum) and at -48Vdc (10 ma maximum) when activated.

Figure 1-8. HLU Slot Wire-wrap Pinouts for Span Powered xDSL

RS-232/X.25 Remote Management Ports

Two EIA RS-232 communications ports, J26 (labeled OS RS232 PORT) and J27 (labeled AUX RS232 PORT), located on the HMS-318 List 3 shelf rear panel (see Figure 1-9 on page 12), provide optional OS and AUX management interfaces for connection to a HiGain system. Table 1-3 on page 1-12 lists the pin connections for the OS communications port connector, and Table 1-4 on page 1-13 lists the pin connections for the AUX communications port connector.

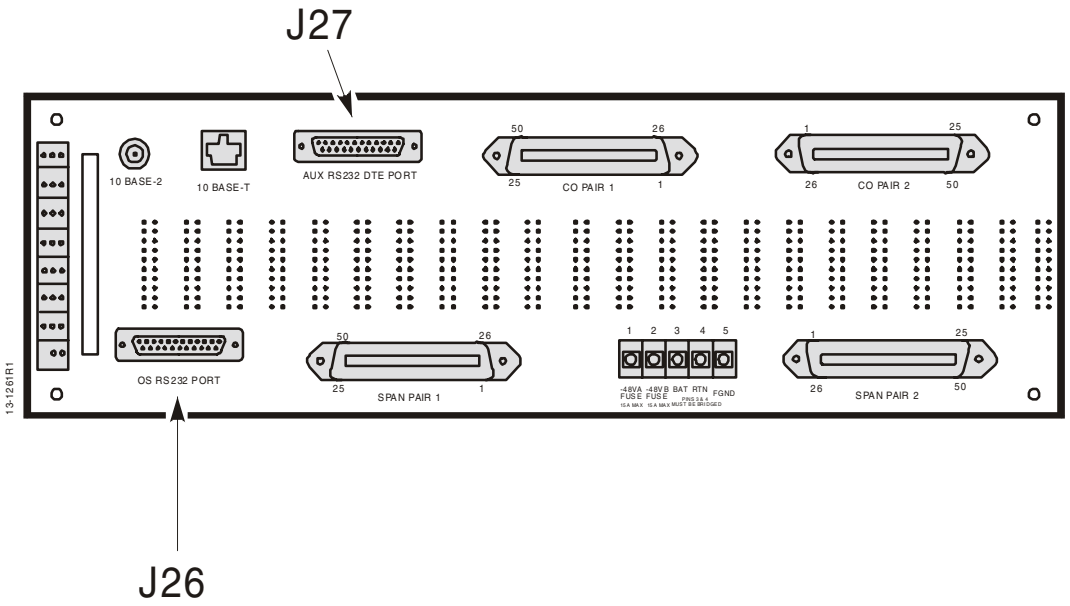


Figure 1-9. HMS-318 List 3 Shelf RS-232/X.25 Remote Management Ports

Note: The HMU-319 requires that Data Set Ready (DSR) be asserted by the connected Data Communications Equipment (DCE) in order to establish communications on this port. In the HMU/HLU configuration, the HMU-319 always asserts Data Terminal Ready (DTR) on this port.

Table 1-3. J26 – RS-232/X.25 Management Port (DTE)

Pin No.	Signal	Direction
1	Shield	—
2	Transmit Data (TD)	Out
3	Receive Data (RD)	In
4	Request to Send (RTS)	Out
5	Clear to Send (CTS)	In
6	Data Set Ready (DSR)	In
7	Ground (GND)	—
15	TCLK	In
17	RCLK	In
20	Data Terminal Ready (DTR)	Out
24	TCLK	In

Table 1-4. J27 – AUX RS-232 Management Port (DTE)

Pin No.	Signal	Direction
1	Shield	—
2	Transmit Data (TD)	Out
3	Receive Data (RD)	In
6	Data Set Ready (DSR)	In
7	Ground (GND)	—
20	Data Terminal Ready (DTR)	Out

ETHERNET REMOTE MANAGEMENT PORTS

The BNC connector J24 (labeled 10 BASE-2), see Figure 1-10, can be used to connect the management ports of up to 32 shelves into an integrated network through a 10 BASE-2 (Thinnet) Ethernet LAN (IEEE.802.3). The rear-panel RJ-45 connector J25 (labeled 10 BASE-T), see Figure 1-10, provides a 10 BASE-2 or a 10 BASE-T (Twisted-Pair) Ethernet LAN (both IEEE.802.3 compatible).

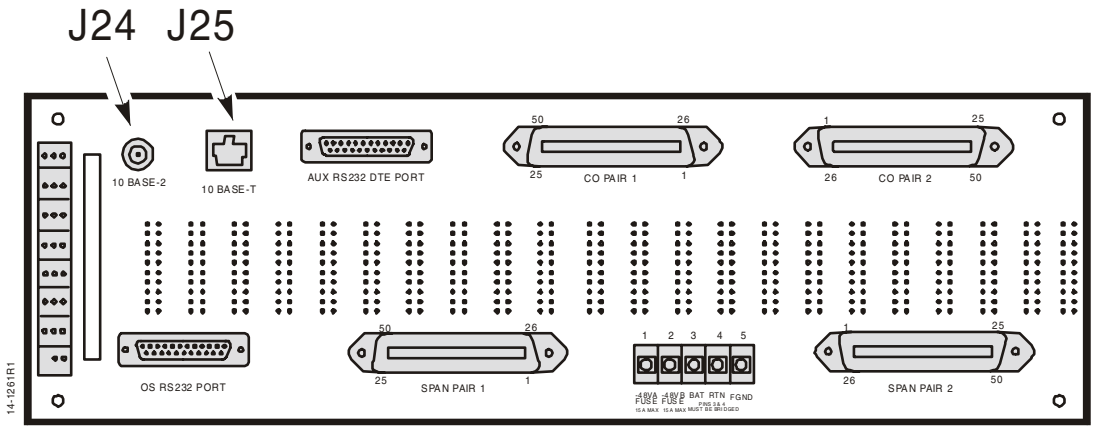


Figure 1-10. Multishelf Network Ports

Daisy-Chaining 10BASE-2 Connections

10BASE-2 management ports of up to *x* number of shelves can be hubbed together by daisy-chaining together using the included BNC-T connector. The last 10BASE-2 connection must be terminated with the included 50 ohm BNC terminator.

HEAT DISSIPATION FACTORS

The HMS-318 List 3 shelf is a 12-inch (30.48 cm) deep individual CO equipment shelf with open-faced mountings for natural convection cooling. The maximum heat dissipation for open-faced, natural convection-cooled mountings is limited to 134.7 Watts per square foot as defined in Section 4.1.4 of the NEBS standard for Physical Protection (GR-63-CORE) for all equipment placed in a CO environment.

The heat dissipation footprint of an HMS-318 List 3 shelf is approximately 5.9 square feet. Therefore, the maximum permissible heat dissipation per rack is 5.9 square feet x 134.7 Watts per square foot equals 790 Watts.

The maximum allowable heat dissipation for each telco-style equipment rack is:

- 790 watts for a 19-inch (48.3-cm) wide rack

Note: Refer to the respective ADC card user manuals to determine the maximum number of cards that can be installed in a shelf before exceeding the maximum heat dissipation density of the telco-style equipment rack configuration.

Figure 1-11 shows a typical example of a CO equipment rack layout using HMS-318 List 3 shelves. The figure shows a rack with a fuse panel, eight HMS-318 List 3 shelves, each separated by a two rack space baffle with the remaining shelf space open. As the figure illustrates, baffles should be placed between each shelf to reduce the chimney heating effect (see "Air Flow Guidelines" on page 1-15 for further information about cooling the HMS-318 List 3 shelf).

Outdoor cabinet applications require forced air to ensure proper cooling.

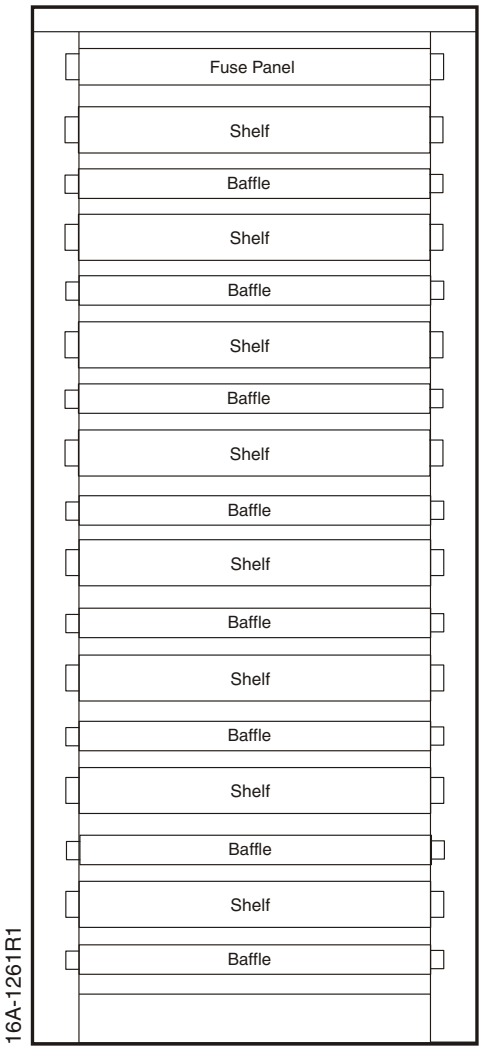


Figure 1-11. Central Office Equipment Rack Configuration

AIR FLOW GUIDELINES

To ensure adequate air flow through the telco-style equipment rack, it is recommended that you maintain a clearance of at least 6 inches (15.2 cm) in the front and the back of the rack at all times.

If airflow through the telco-style equipment rack and the shelves that occupy it is blocked or restricted, or if the ambient air being drawn into the rack is too warm, an over temperature condition within the rack and the shelves that occupy it can occur.

The site should also be as dust-free as possible. Dust tends to clog the shelves, reducing the flow of cooling air through the telco-style equipment rack and the shelves that occupy it and increasing the risk of an over temperature condition.

Additional rack-mounting guidelines are:

- Install the shelf in an enclosed rack only if the rack has adequate air flow (see Chapter 2: “Installation” on page 2-1); install the shelf in an open rack whenever possible.
- The proper use of heat (air) baffles inside an enclosed rack can help ensure adequate shelf cooling.

Chapter 2

INSTALLATION

This section provides specific information about preparing your site for installation. Included are specific preparatory information, safety guidelines, specific rack-mounting guidelines, adapter bracket mounting, rack mounting, DSX and HDSL or Span Powered xDSL connections, and power and alarm connections. Once you have completed the basic installation and verified that your shelf is functioning properly, you can refer to the instruction manuals for the individual modules (HLU, HMU, or LPS-300C). These instruction manuals provide comprehensive configuration and technical information that will help you further define the parameters to meet your particular requirements (see "Related Publications" on page ix).

BEFORE YOU BEGIN

Before installing the HMS-318 List 3 shelf, it is important to prepare for installation by:

- Preparing the site (site preparations) or reviewing the installation plans by establishing a Method of Procedure (MOP)
- Unpacking and inspecting the shelf shipment
- Gathering the tools and test equipment required to properly install the shelf.

Site Preparations

Typically, you should have prepared the installation site beforehand. As part of your preparation, obtain a floor plan of the site and the Central Office (CO) or telco-style equipment rack (either EIA with 1.75 in. mounting spaces or WECO with 2 in. mounting spaces) where the HMS-318 List 3 shelf will be housed. Determine the location of any existing shelves and their interconnections, including communications and power. The -48VA and -48VB busses provide the -48V shelf battery feed. Each bus should be fused at 15 Amperes. All personnel involved in the installation of the shelf, including installers, engineers, and supervisors, should participate in the preparation of a MoP for approval by the customer.

Method of Procedure

An example of a Method of Procedure (pre-installation checklist of tasks and considerations that needs to be addressed and agreed upon before proceeding with the installation) is given below:

- Assign personnel.
- Determine protection requirements for personnel, equipment, and tools.
- Evaluate potential hazards that may affect service.
- Schedule time for installation.
- Determine any space requirements.
- Determine any power requirements.
- Identify any required procedures or tests.
- On an equipment plan, make a preliminary decision that locates each of the HMS-318 List 3 shelves that you plan to install.
- Read this manual.
- Modify the preliminary plan, if necessary.
- Verify the list of replaceable parts for the installation (screws, bolts, washers, and so on) so that the parts are identified (see Table 2-1 on page 2-2).
- Check the required tools list to make sure the necessary tools and test equipment are available (see Chapter 2: "Required Tools" on page 2-3).
- Purchase necessary parts.
- Perform the installation (see Chapter 2: "Safety Guidelines" on page 2-4).

Unpacking and Checking the Contents of your Shipment

The shipping package for the HMS-318 List 3 is designed to reduce the possibility of product damage associated with routine material handling experienced during shipment. To reduce the potential damage to the product, transport the shelf in its ADC-specified packaging. Failure to do so may result in damage to the shelf. Also do not remove the shelf from its shipping container until you are ready to install it. Refer to "Inspecting Your Shipment" on page xii for unpacking instructions.

Note: Do not discard the packaging materials used in shipping your HMS-318 List 3 shelf. You will need the packaging materials in the future if you move or ship your HMS-318 List 3 shelf.

Table 2-1 lists the items included in the HMS-318 List 3 shipment. After inspecting each item, check and initial that it has been received. A "Notes" section has been provided on the next page to record damaged or missing parts.

Table 2-1. HMS-318 List 3 Shelf Parts List

Check ✓	Item	Quantity	Catalog/Part No.	Installer Initial ✍
❒	HiGain Management Shelf (HMS-318 List 3)	1	HMS-318 List 3	
❒	Adjustable Mounting Brackets, two (either 2-inch recess or 5-inch recess) installed at factory	1 set	N/A	
❒	HMS-318 List 3 Shelf Installation Kit includes mounting hardware (four #12-24 x 0.5 inch panhead screws), label holder, label, 50-ohm BNC terminator, and BNC-T female connector	1 bag	130-1028-01	
❒	ETSI Mounting parts kit includes mounting hardware (eight #6-32 x .250 inch Phillips head screws w/lock washer, four M6-1.0 x 14 mm panhead screws), and two ETSI Mounting Brackets, one	1 bag	N/A	
❒	Shelf Grounding kit includes one cabletie, one #12-24 x 0.5 inch Hexhead screw w/washer, one #12 Ring Terminal, 12-10 AWG (used to connect the grounding cables to the grounding stud), and one ground jumper	1 bag	N/A	
❒	HiGain Management Shelf (HMS-318 List 3) User Manual	1	LTPS-UM-1261	
❒	(Optional) Extender Bracket for mounting into 23-inch (58.4 cm) rack includes two brackets and all the appropriate mounting hardware.	1	EB-52	

Notes:

Required Tools

The following tools are required to install the shelf:

- Grounding or ESD-preventive wrist strap
- #2 Phillips-head screwdriver
- #1 Phillips-head screwdriver
- Straight-slot-head screwdriver
- Cable preparation tools
- A $^{5}/_{16}$-inch open-end wrench
- Tape measure
- Wire strippers
- An Amphenol crimping tool for making up connectors (if necessary).

Note: All other tools are normally carried in a craftsman's tool set.

SAFETY GUIDELINES

The safety guidelines (see Chapter 1: “Safety Guidelines” on page 1-iv) are provided to help ensure your safety and to protect your equipment. The list on page iv may not identify all potentially hazardous situations in your working environment, so be alert and exercise good judgment at all times.

MOUNTING THE HMS-318 LIST 3 SHELF

Each HMS-318 List 3 shelf has a hardware kit. The rack adapter brackets are attached to the HMS-318 List 3 shelf at the factory. They are supplied with the shelf to allow mounting on 19-inch (48.3-cm) telco-style EIA or WECO equipment racks. Select the appropriate position for the brackets (2 or 5 inches) and mount the shelf to the bracket as described in the Chapter 2: “Adapter Bracket Mounting Procedure (19-inch Telco-style Equipment Rack)” on page 2-5 and the Chapter 2: “Adapter Bracket Mounting Procedure (23-inch Telco-style Equipment Rack)” on page 2-5. When installed in an EIA rack, a total of three 1.75-inch (4.4-cm) mounting spaces [5.25 inches (13.3 cm) of vertical rack space] are required for mounting an HMS-318 List 3 shelf. When installed in a WECO rack, a total of three 2.0-inch (5.08-cm) mounting spaces [6 inches (15.2 cm) of vertical rack space] are required for mounting.

ETSI adapter brackets are included for installation of the HMS-318 List 3 shelf in an ETSI-style equipment rack (see Chapter 2: “Adapter Bracket Mounting Procedure (ETSI-style Equipment Rack)” on page 2-6).

IMPORTANT

Clearance above and below the shelf must be allowed for cooling air to be drawn in the front and circulated through the shelf and out. A heat (air) baffle must be used between shelves to ensure that heated air is dissipated appropriately (see “Air Flow Guidelines” on page 21 for detailed information about air flow guidelines).

Special Rack-Mounting Precautions

Special rack-mounting precautions must be followed to ensure safety. They are:

- Never wear loose clothing, jewelry (such as rings, bracelets, or chains), or other items that could get caught in the shelf housing during handling and use.
- When mounting the shelf to a telco-style rack, ensure that the rack is bolted to the floor.
- Since you will probably be installing more than one shelf into the rack, ensure that the weight of all the shelves installed does not make the rack unstable.

IMPORTANT

Some telco-style racks are also secured to ceiling brackets, if necessary, due to the weight of the equipment in the rack. Make sure that the rack you are using to install the shelves is secured to the building structure.

- As mentioned in “Air Flow Guidelines” on page 1-15, maintain a clearance of 6 inches (15.2 cm) at the front and back of the shelf to ensure adequate air intake and exhaust.
- Avoid installing the shelves in an overly congested rack (see “Heat Dissipation Factors” on page 1-13). Air flowing to or from other shelves in the rack might interfere with the normal flow of cooling air through the shelves, increasing the potential for over temperature conditions within the shelves.
- Allow at least 19 inches (48.7 cm) of clearance at the front and back of the rack for shelf maintenance.
- Follow your local practices for cable management. Ensure that cables to and from the shelves do not impair access to perform equipment maintenance or upgrades.

Adapter Bracket Mounting Procedure (19-inch Telco-style Equipment Rack)

Adapter bracket placement depends on the type of telco-style rack you plan to use to install the HMS-318 List 3 shelf. First, check the mounting adapter brackets on the shelf to determine whether the factory-installed configuration is correct for the planned telco-style equipment rack installation. The following procedure describes how to install the adapter brackets. Threaded holes on the HMS-318 List 3 shelf are strategically located to position and mount the adapter brackets.

Note: As mentioned in Chapter 1: “Product Description” on page 1-1 and “Mounting the HMS-318 List 3 Shelf” on page 2-4, the adapter brackets are normally attached to the HMS-318 List 3 shelf at the factory for a 19-inch telco-style equipment rack. When changing the position of the brackets from a 2- or 5-inch recess mounting or vice versa, ensure that you place the appropriate hardware (screws, washers, and so on) you remove in a convenient location for re-assembly.

Perform the following procedure to mount the HMS-318 List 3 shelf to the adapter brackets for a 19-inch telco-style equipment rack.

Note: When mounting a 19-inch HMS-318 List 3 shelf into a 23-inch telco-style equipment rack (see Adapter Bracket Mounting Procedure (23-inch Telco-style Equipment Rack)on this page, use extender brackets (including mounting hardware: EB-52).

Step	Action
1	Locate the mounting holes of the HMS-318 List 3 shelf for the desired rack width 19 inches (48.3 cm) and position (2- or 5-inch recess mounting).
2	Align each adapter bracket with the HMS-318 List 3 shelf and attach to the desired rack width 19 inches (48.3 cm) and position (2- or 5-inch recess mounting) with the #6-32 x .25 inch screws (provided).
3	Insert the screws (4 places) and tighten using a #2 Phillips screwdriver.
4	Repeat for the other adapter bracket.
5	You are now ready to install the HMS-318 List 3 shelf into the telco-style rack (see “Rack Mounting Procedure” on page 2-7).

Adapter Bracket Mounting Procedure (23-inch Telco-style Equipment Rack)

To mount the adapter brackets for a 23-inch Telco-style Equipment Rack, select the appropriate position (2- or 5-inch recess) and mount the HMS-318 List 3 shelf to the adapter brackets as described in this procedure.

Note: As mentioned in Chapter 1: “Product Description” on page 1-1 and “Mounting the HMS-318 List 3 Shelf” on page 2-4, the adapter brackets are attached to the HMS-318 List 3 shelf at the factory for a 19-inch telco-style equipment rack. When changing the position of the brackets from a 2- or 5-inch recess mounting or vice versa, ensure that you place the appropriate hardware (screws, washers, and so on) you remove in a convenient location for re-assembly.

Perform the following procedure to mount the HMS-318 List 3 shelf to the adapter brackets for a 23-inch telco-style equipment rack.

Note: When mounting a 19-inch HMS-318 List 3 shelf into a 23-inch equipment rack, use extender brackets (including mounting hardware: EB-52).

Step	Action
1	Locate the mounting holes of the HMS-318 List 3 shelf for the desired rack width 23 inches (58.4 cm) and position (2- or 5-inch recess mounting).
2	Align each adapter bracket with the HMS-318 List 3 shelf and attach to the desired rack width 23 inches (58.4 cm) and position (2- or 5-inch recess mounting) with the #6-32 x .25 inch screws (provided).
3	Insert the screws (4 places) and tighten using a #2 Phillips screwdriver.
4	Repeat for the other adapter bracket.
5	You are now ready to install the HMS-318 List 3 shelf into the telco-style rack (see “Rack Mounting Procedure” on page 2-7).

Adapter Bracket Mounting Procedure (ETSI-style Equipment Rack)

To mount the adapter brackets for a 600-mm ETSI-style Equipment Rack, mount the HMS-318 List 3 shelf to the adapter brackets as described in this procedure.

Note: As mentioned in Chapter 1: “Product Description” on page 1-1 and “Mounting the HMS-318 List 3 Shelf” on page 2-4, the adapter brackets are attached to the HMS-318 List 3 shelf at the factory for a 19-inch telco-style equipment rack. When disassembling the brackets from the shelf, ensure that you place the appropriate hardware (screws, washers, and so on) you remove in a convenient sealed package for possible re-assembly later.

Perform the following procedure to mount the HMS-318 List 3 shelf to the adapter brackets for a 600-mm ETSI-style equipment rack.

Note: When mounting a 19-inch (48.3-cm) HMS-318 List 3 shelf into a 600-mm ETSI-style equipment rack, use the adapter brackets provided (see “Product Description” on page 1-1 and Table 2-1 on page 2-2).

Step	Action
1	Locate the mounting holes of the HMS-318 List 3 shelf for the desired rack width 23 inches (58.4 cm) and position (2- or 5-inch recess mounting).
2	Align each adapter bracket with the HMS-318 List 3 shelf and attach to the desired rack width 23 inches (58.4 cm) and position (2- or 5-inch recess mounting) with the #6-32 x .25 inch screws (provided).
3	Insert the screws (4 places) and tighten using a #2 Phillips screwdriver.
4	Repeat for the other adapter bracket.
5	You are now ready to install the HMS-318 List 3 shelf into the ETSI-style rack (see “Rack Mounting Procedure” on page 2-7).

Rack Mounting Procedure

To secure the HMS-318 List 3 shelf to the telco-style rack, you must use the mounting screws provided or follow your local practices for installing the shelves into your telco-style equipment rack. Ensure that the adapter brackets have been securely fastened [see "Adapter Bracket Mounting Procedure (19-inch Telco-style Equipment Rack)" on page 2-5, "Adapter Bracket Mounting Procedure (23-inch Telco-style Equipment Rack)" on page 2-5, or "Adapter Bracket Mounting Procedure (ETSI-style Equipment Rack)" on page 2-6 for more information].

Perform the following procedure to mount the HMS-318 List 3 shelf into a telco-style equipment rack.

IMPORTANT

To prevent injury, review the "Safety Guidelines" on page xi and the "Special Rack-Mounting Precautions" on page 2-4 before installing the HMS-318 List 3 shelf in the telco-style equipment rack.

Step	Action
1	Locate the telco-style equipment rack position you plan to install the HMS-318 List 3 shelf into.
2	Verify that there are no obstructions and ensure that the telco-style equipment rack is stabilized.
3	Position the shelf in the telco-style equipment rack lining up the bracket holes on the shelf with the holes on the rack and secure with the four #12-24 x .375 inch mounting screws (see Table 2-1 on page 2-2). **Note:** The vertical spacing for EIA racks is 1.75 inches (4.44 cm), with mounting holes spaced 1.5 inches (3.81 cm) apart. Vertical spacing for WECO racks is 2.0 inches (5.08 cm), with mounting holes spaced 1.0 inch (2.54) apart.
4	Tighten the screws using a 1/4-inch flat-blade screwdriver.
5	You are now ready to begin interconnecting the communications cables that apply to your application (see "DSX-1 and HDSLx Connections" on page 2-7 or "Span Powered xDSL Connections" on page 2-8).

DSX-1 AND HDSLX CONNECTIONS

Perform the following procedure to connect the DSX-1 and HDSLx interface cables to connectors P1, P2, P3 and P4 (see Figure 1-2 on page 1-3 for connector location and "Connecting to HDSL, HDSL2, and HDSL4 Circuits" on page 1-8, for connector descriptions).

DANGER

Before making both DSX-1 and HDSLx connections to the HMS-318 List 3 shelf, ensure that the Main CO power breaker is off. Otherwise, severe injury to the installer or damage to the unit may result.

DSX and HDSL Connector Procedure

Step	Action
1	Complete one of the following steps to make the DSX-1 and HDSLx connections to the shelf using one of the following methods: Plug the DSX-1 interface cables into P1 and P2 and the HDSLx interface cables into P3 and P4. Wire-wrap the DSX-1 and HDSLx inputs to the appropriate individual card slots. Pin assignments are listed in Appendix A: "Signal and Pin Assignments" on page A-1. **Note:** See Figure 1-2 on page 1-3 for the location of the HDSLx Span connectors. HDSLx Span pin assignments are listed in Appendix A: "Signal and Pin Assignments" on page A-1. Standard PIC cable color codes are listed in Appendix B: "Standard PIC Color Code" on page B-1.
2	Continue to "Bonding (Safety) Ground, Power and Frame Ground, Alarm, and Optional Fan Inputs" on page 2-9.

SPAN POWERED XDSL CONNECTIONS

Perform the following procedure to connect the Span Powered xDSL interface cables to connectors P1, P2, P3 and P4 (see Figure 1-2 on page 1-3 for connector location and "Connecting Span Powered xDSL Circuits to the HMS-318 List 3 Shelf" on page 1-10 for connector descriptions).

DANGER

Before making any Span Powered xDSL connections to the HMS-318 List 3 shelf, ensure that the Main CO power breaker is off. Otherwise, severe injury to the installer or damage to the unit may result.

Span Powered xDSL Connector Procedure

Step	Action
1	Complete one of the following steps to make the Span Powered xDSL connections to the shelf using one of the following methods: • Plug the Span Powered xDSL interface cables into P1, P2, P3 and P4. • Wire-wrap the Span Powered xDSL inputs to the appropriate individual card slots. Pin assignments are listed in Appendix A: "Signal and Pin Assignments" on page A-1. **Note:** See Figure 1-2 on page 1-3 for the location of the HDSL Span connectors. HDSL Span pin assignments are listed in Appendix A: "Signal and Pin Assignments" on page A-1. Standard PIC cable color codes are listed in Appendix B: "Standard PIC Color Code" on page B-1.
2	Continue to "Bonding (Safety) Ground, Power and Frame Ground, Alarm, and Optional Fan Inputs" on page 2-9.

BONDING (SAFETY) GROUND, POWER AND FRAME GROUND, ALARM, AND OPTIONAL FAN INPUTS

IMPORTANT

Before making connections to the HMS-318 List 3 shelf, ensure that the Main CO power breaker is off. Otherwise, severe injury to the installer or damage to the unit may result.

Bonding (safety) ground, power and frame ground, and alarm connections and cabling are marked for ease of installation [see ground lug location (labeled BONDING WIRE MIN #10 AWG)], TB1, and TB2 on the rear panel of the HMS-318 List 3 Shelf, and the following procedures for proper safety ground, power, alarm, and optional fan (alarms) connections (see Figure 1-2 on page 1-3).

Bonding (Safety) Ground Procedure

To connect the Bonding (Safety) ground to the HMS-318 List 3 Shelf, complete the following steps:

Note: The ground wire exiting the HMS-318 List 3 Shelf is terminated with a ground lug. The lug can be either a one-hole or two-hole lug. The surface of the lug that connects to the HMS-318 List 3 Shelf should be cleaned with an antioxidant. The same should also be applied to the surface of the telco-style rack where the connection is to be made. The #12 Hexhead screw (supplied) is used to connect the grounding lug to the HMS-318 List 3 Shelf.

Step	Action
1	Looking at the HMS-318 List 3 rear panel, find the ground lug location (labeled BONDING WIRE MIN #10 AWG) on the upper right corner extension of the right panel (see Figure 2-1).
2	Measure between the telco-style rack and the HMS-318 List 3 Shelf the correct length of a #10 AWG (minimum) ground wire so that it reaches the ground lug location on the HMS-318 List 3 Shelf, and cut. Leave enough excess to allow for tying to the rack.
3	Using wire strippers, strip about 5/8 inches of insulation from the ground wire that you will fasten to the ground lug.
4	Next, using a crimping tool, insert the stripped end of the ground wire into the ground lug, and crimp.
5	Attach the ground lug to the HMS-318 List 3 Shelf by placing the ground lug against the ground lug location, aligning the hole. Insert the ground-lug screw (#12 Hexhead) through the locking washer and then through the hole in the ground lug and the ground lug location on the HMS-318 List 3 Shelf. Ensure that the ground lug and attached ground wire does not interfere with the HMS-318 List Shelf or the telco-style rack.
6	Tighten the screws to secure the locking washer and the ground lug to the ground lug location on the HMS-318 List 3 Shelf.
7	Using wire strippers, strip about 5/8 inches of insulation from the other end of the ground wire. Using locally approved practices and fasten the stripped end of the ground wire to the telco-style rack.
8	Use the tie-wraps (supplied) and secure the ground wire to the rack to prevent rotation.

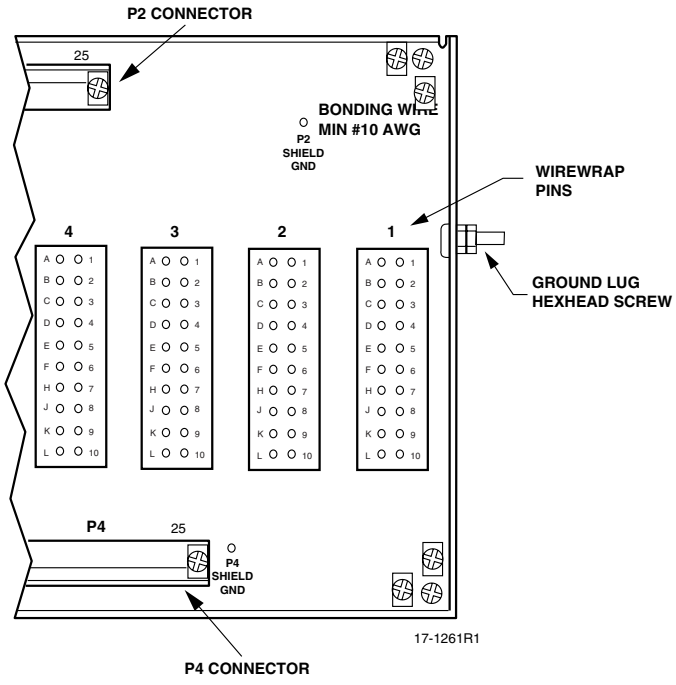


Figure 2-1. Grounding Lug

Power and Frame Ground Procedure

IMPORTANT ***To avoid voltage differences from building up between the shelf ground (GND) bus and the ground pins of the management terminal that connects to the RS-232 ports, connect the shelf ground pins and the terminal ground bus to the TB1 FGND (frame ground) pin.***

Step	Action
1	Use locally approved practices to connect #12 AWG (minimum) power wiring from -48Vdc Office Battery to -48VA and -48VB terminals on TB1-1 and TB1-2 (see <Cross-Ref>Figure 2).
2	Connect #12 AWG (minimum) power wiring from the Battery Returns to BAT RTN terminals on TB1-3 and TB1-4 (see <Cross-Ref>Figure 2).

Note: Slots 1 through 11 on the HMS-318 List 3 shelf are powered by the -48VA bus. Slots 12 through 22 are powered by the -48VB bus.
In the HMU/HLU configuration, the HMU-319 is diode-OR'ed to both power busses to guard against power failure in the event that one power supply is lost. This feature requires the two ground (GND) terminals to be connected on the HMU card.

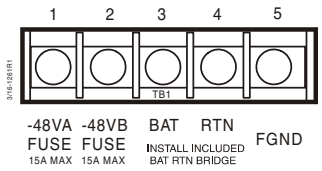


Figure 2-2. Input Power Terminal Block (TB1)

Alarms Procedure

Note: As described in "Power and Alarm Connections" on page 7, the HMS-318 List 3 shelf provides alarm outputs in the form of an Alarms wire-wrap field. This field consists of a three-pin wire-wrap header for alarm management. Before connecting the alarm inputs, you must first determine whether the external alarm equipment requires either an NO or an NC circuit to pass an alarm.

Step	Action
1	Use locally approved practices to connect the alarm inputs to the Alarms wire-wrap field (see Figure 2-3 on page 2-12).

Note: The HMU-319 is required for NO and NC alarm operation.

Optional Fan Alarm Procedure

Note: The FAN terminals wire-wrap field provides access to the Normally Open (NO), Form A fan relay contact located on the HMU-319 management unit. A temperature monitor activates this fan relay when the shelf temperature exceeds 45°C (±1°C) and deactivates the relay when the temperature drops below 35°C (±1°C). If the temperature exceeds 77°C (±1°C) a critical alarm is also generated. The critical alarm resets when the temperature drops below 40°C (±1°C).

Step	Action
1	Connect the optional fan inputs to the Alarms wire-wrap field pins 25 and 26 (see Figure 2-3).

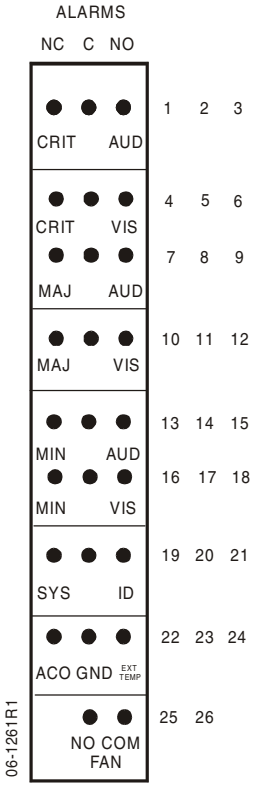


Figure 2-3. Alarms Wire-wrap Field (TB2)

INSTALLING THE HMU-319 WITH HLU-319, H2TU-C-319, H4TU-C-319

Install the line units (HLUs) into slots 1 through 22 and the HMU-319 management unit into slot 23 of the HMS-318 List 3 shelf (see "HMS-318 List 3 Shelf - Front View" on page 1-2 for slot location).

Install HMU and HLU Procedure

Use anti-static wrist-straps connected to the ESD Jack (located on the right adapter bracket, see Figure 1 on page 3) when inserting a circuit card. Avoid touching components on the circuit card.

Step	Action
1	Hold the HLU and HMU vertically with the front of the circuit card toward you. Align the top and bottom edges of the HLU and HMU with the HMS-318 List 3 shelf slot guides.
2	Slide the HLU and HMU into their respective slots.
3	Press the HLU and HMU firmly into the connector until it is seated into the edge-connector on the shelf backplane.

Note: The HLU and HMU will power up with various status LEDs and displays indicating power up status (refer to the *HLU-319, H2TU-C-319, or H4TU-C-319 Technical Practice* and *HMU-319L7V32 and L9V32 User Manual*, catalog number LTPH-UM-1142 in the "Related Publications" on page ix for the proper power-up descriptions).

INSTALLING LPS-300C POWER MODULE

Install the LoopStar (LPS-300C) Power Modules into slots 1 through 22 [odd numbered slots (1, 3, 5, 7, ... 21)] of the HMS-318 List 3 shelf (see Figure 1-2 on page 1-3 for slot location, "Connecting Span Powered xDSL Circuits to the HMS-318 List 3 Shelf" on page 1-10 for Span Powered xDSL Circuit connection, and Appendix A: "Signal and Pin Assignments" on page A-1 for pin assignments).

For visual and audible alarm contact operation, install an HMU-319. Refer to *HMU-319 L7AV32 and L9V32 User Manual (LTPH-UM-1142)*.

Install LPS-300C Procedure

Use anti-static wrist-straps connected to the ESD Jack (located on the right adapter bracket, see Figure 1-1 on page 1-2) when inserting a circuit card. Avoid touching components on the circuit card.

Step	Action
1	Hold the LPS-300C Power Module vertically with the front of the circuit card toward you. Align the top and bottom edges of the LPS-300C with the HMS-318 List 3 shelf slot guides.
2	Slide the LPS-300C Power Module into its respective slot.
3	Press the LPS-300C Power Module firmly into the connector until it is seated into the edge-connector on the shelf backplane.

Note: The LPS-300C will power up with various status LEDs indicating power up status (refer to the LoopStar LPS-300C L1 Power Module Technical Practice, catalog number SCP-LPS300-010 in the “Related Publications” on page iii for the proper power up descriptions).

Appendix A

SIGNAL AND PIN ASSIGNMENTS

The Tip and Ring signal and pin assignments to the HMS-318 List 3 shelf are:

- P1-DSX-1 Receive or xDSL B IN, Tip and Ring (see Table A-1)
- P2-DSX-1 Transmit or xDSL A IN, Tip and Ring (see Table A-2 on page A-2)
- P3-HDSL Span 1 or xDSL A OUT, Tip and Ring (see Table A-3 on page A-4)
- P4-HDSL Span 2 or xDSL B OUT, Tip and Ring (see Table A-4 on page A-5)

Connector P1 - DSX-1 Receive or Span Powered xDSL (xDSL B IN)

Table A-1 provides signal and pin assignment information for making DSX-1 receive or Span Powered (xDSL B IN) circuit connections to the HMS-318 List 3 shelf.

Table A-1. P1-DSX-1 Receive or Span Powered xDSL B IN, Tip and Ring

Cable Pin Number	Slot	Card Slot Pin Number
26	1	Tip
1		Ring
27	2	Tip
2		Ring
28	3	Tip
3		Ring
29	4	Tip
4		Ring
30	5	Tip
5		Ring
31	6	Tip
6		Ring
32	7	Tip
7		Ring
33	8	Tip
8		Ring
34	9	Tip
9		Ring
35	10	Tip
10		Ring
36	11	Tip
11		Ring
37	12	Tip
12		Ring
38	13	Tip
13		Ring
39	14	Tip

Cable Pin Number	Slot	Card Slot Pin Number
14		Ring
40	15	Tip
15		Ring
41	16	Tip
16		Ring
42	17	Tip
17		Ring
43	18	Tip
18		Ring
44	19	Tip
19		Ring
45	20	Tip
20		Ring
46	21	Tip
21		Ring
47	22	Tip
22		Ring

Connector P2 - DSX-1 Transmit or Span Powered xDSL (xDSL A IN)

Table A-2 provides signal and pin assignment information for making DSX-1 transmit or Span Powered xDSL (xDSL A IN) circuit connections to the HMS-318 List 3 shelf.

Table A-2. P2-DSX-1 Transmit or Span Powered xDSL A IN, Tip and Ring

Cable Pin Number	Slot	Card Slot Pin Number
26	1	Tip
1		Ring
27	2	Tip
2		Ring
28	3	Tip
3		Ring
29	4	Tip
4		Ring
30	5	Tip
5		Ring
31	6	Tip
6		Ring
32	7	Tip
7		Ring
33	8	Tip

Cable Pin Number	Slot	Card Slot Pin Number
8		Ring
34	9	Tip
9		Ring
35	10	Tip
10		Ring
36	11	Tip
11		Ring
37	12	Tip
12		Ring
38	13	Tip
13		Ring
39	14	Tip
14		Ring
40	15	Tip
15		Ring
41	16	Tip
16		Ring
42	17	Tip
17		Ring
43	18	Tip
18		Ring
44	19	Tip
19		Ring
45	20	Tip
20		Ring
46	21	Tip
21		Ring
47	22	Tip
22		Ring

Connector P3 - HDSL Span 1 (HDSL, HDSL2, or HDSL4) or Span Powered xDSL (xDSL A OUT)

Table A-3 provides connector P3 signal and pin assignment information for making HDSL Span 1 (HDSL, HDSL2, or HDSL4) or Span Powered xDSL (xDSL A OUT) connections to the HMS-318 List 3 shelf.

Table A-3. P3-HDSL Span 1 or Span Powered xDSL A OUT, Tip and Ring

Cable Pin Number	Slot	Card Slot Pin Number
26	1	Tip
1		Ring
27	2	Tip
2		Ring
28	3	Tip
3		Ring
29	4	Tip
4		Ring
30	5	Tip
5		Ring
31	6	Tip
6		Ring
32	7	Tip
7		Ring
33	8	Tip
8		Ring
34	9	Tip
9		Ring
35	10	Tip
10		Ring
36	11	Tip
11		Ring
37	12	Tip
12		Ring
38	13	Tip
13		Ring
39	14	Tip
14		Ring
40	15	Tip
15		Ring
41	16	Tip
16		Ring
42	17	Tip
17		Ring
43	18	Tip

Cable Pin Number	Slot	Card Slot Pin Number
18		Ring
44	19	Tip
19		Ring
45	20	Tip
20		Ring
46	21	Tip
21		Ring
47	22	Tip
22		Ring

Connector P4 - HDSL Span 2 (HDSL, HDSL2, or HDSL4) or Span Powered xDSL B OUT

Table A-4 provides signal and pin assignment information for making HDSL Span 2 (HDSL, HDSL2, or HDSL4) or Span Powered xDSL (xDSL B OUT) connections to the HMS-318 List 3 shelf.

Table A-4. P3-HDSL Span 1 or Span Powered xDSL A OUT, Tip and Ring

Cable Pin Number	Slot	Card Slot Pin Number
26	1	Tip
1		Ring
27	2	Tip
2		Ring
28	3	Tip
3		Ring
29	4	Tip
4		Ring
30	5	Tip
5		Ring
31	6	Tip
6		Ring
32	7	Tip
7		Ring
33	8	Tip
8		Ring
34	9	Tip
9		Ring
35	10	Tip
10		Ring
36	11	Tip
11		Ring
37	12	Tip

Cable Pin Number	Slot	Card Slot Pin Number
12		Ring
38	13	Tip
13		Ring
39	14	Tip
14		Ring
40	15	Tip
15		Ring
41	16	Tip
16		Ring
42	17	Tip
17		Ring
43	18	Tip
18		Ring
44	19	Tip
19		Ring
45	20	Tip
20		Ring
46	21	Tip
21		Ring
47	22	Tip
22		Ring

Appendix B

STANDARD PIC COLOR CODE

This appendix lists the standard PIC color codes in tabular format with the Pair Number cross-referenced with the colors of the Tip and Ring wires used by the installer.

Table B-1. Standard PIC Color Code

Pair Number	Tip	Ring
1	White	Blue
2	White	Orange
3	White	Green
4	White	Brown
5	White	Slate
6	Red	Blue
7	Red	Orange
8	Red	Green
9	Red	Brown
10	Red	Slate
11	Black	Blue
12	Black	Orange
13	Black	Green
14	Black	Brown
15	Black	Slate
16	Yellow	Blue
17	Yellow	Orange
18	Yellow	Green
19	Yellow	Brown
20	Yellow	Slate
21	Violet	Blue
22	Violet	Orange
23	Violet	Green
24	Violet	Brown
25	Violet	Slate
26	White	Blue
27	White	Orange
28	White	Green

Appendix C

CIRCUIT CARD PREVENTIVE MEASURES

This appendix describes the preventive measures that should be observed for the following:

- Handling and storing of circuit cards.
- Installing/replacing circuit cards sensitive to static electricity.

HANDLING CIRCUIT CARDS

Damage to circuit cards, particularly those that are sensitive to static electricity, may occur at any time. Follow these safeguards when handling circuit cards.

- Avoid dropping a circuit card.
- Hold circuit card by ejector tabs or card edges; avoid handling components or the connector pins.
- Avoid unnecessary removal and insertion of circuit cards. Contact life is reduced by repeated removals and insertions.
- Avoid touching circuit card contacts. Handling leaves dirt and grease, causing unit failure and reduced contact life.
- Wear a properly grounded antistatic discharge strap when handling circuit cards that are sensitive to static electricity. This strap consists of an expandable wrist strap and grounding cord; its function is to rapidly dissipate charges to ground.
- Periodically check the resistance value of the antistatic discharge wrist strap. The resistance measurement should be between 1 and 10 Mohms.

Note: Alternate grounding methods can be used; for example, conductive carpet, conductive shoes, or heel grounders.

STORING CIRCUIT CARDS

Spare circuit cards must be left in the original shipping container until required. To prevent damage to circuit cards while they are in storage, the following necessary precautions must be observed:

- Store circuit card in a dust-free environment. Dust particles will scratch the circuit card contacts when inserted in a connector.
- Store circuit card in a dry environment at room temperature. Excessive heat will cause the circuit card to warp.
- Place circuit card in shipping container (if available) after removal. Otherwise, carefully place circuit card in a static-shielding protective bag.

INSTALLATION/REPLACEMENT

To prevent electrostatic damage, the following conditions apply during the installation/replacement of circuit cards that are sensitive to static electricity:

- All circuit cards must be enclosed in static-shielding protective bags for transportation to and from the location.
- Upon installation/replacement, installers must wear a properly grounded antistatic discharge wrist strap.

Note: Whenever possible use the original static-shielding bag, padding, and box in which the circuit card was received. If the original material was lost, use suitable packing.

Circuit Card Ejector Tab or Built-in Thumb Hold

Most circuit cards have an ejector tab that is used to assist the installer in inserting and removing each circuit card. These ejector tabs are typically located at either the top or bottom of the circuit card. Other types of circuit cards have a built-in thumb hold for gripping the card. Follow the procedure given to remove and insert a circuit card.

Removing Circuit Card

DANGER ***Contacting circuit card components or traces can result in an electrical shock even after removal from the shelf.***

ATTENTION ***Wear properly grounded anti-static wrist-straps when removing a circuit card. At all other times (shipping, storage, and so on) keep the circuit cards in their protective bags.***

Step	Action
1	Remove any front-panel cables from the circuit card. **Note:** Note the positions of all cables and slots each circuit card resides in for later replacement.
2	Grasp the circuit card at the top or bottom ejector tab or the built-in thumb hold and pull forward to release it from its connection. A slight amount of force may be required to unseat the circuit card.

Inserting Circuit Card

ATTENTION ***Wear properly grounded anti-static wrist-straps when inserting a circuit card. At all other times (shipping, storage, and so on) keep the circuit cards in their protective bags.***

Step	Action
1	Holding the circuit card by its ejector tab or built-in thumb hold, insert into the shelf housing. Ensure that the circuit card connection is firmly seated.
2	Attach any front-panel cables to the circuit card.

Note: To prevent confusion, it is sometimes important for the installer to note in which slot each circuit card resides and in which connector each cable resides.

Appendix D

SPECIFICATIONS

Power Requirements	
CO Battery	Voltage -48 Vdc nominal (-42.5 Vdc to -56.5 Vdc)
Fuse	Maximum 15 A[a]
Compliance	
NEBS	GR-63-CORE, Issue 2
	GR-1089-CORE, Issue 3
	SR-3580, Level 3
Safety	UL/cUL 60950-1
	UL/cUL 60950-21
	EN 60950-1:2001
	EN 60950-21:2003
EMC	EN 300 386-2 V1.1.3:December 1997
Physical	
Dimensions (HxWxD)	5.22 in. x 19 in. x 12 in. (13.3 cm x 48.3 cm x 30.5 cm), without mounting brackets
Weight	17 lb. (7.7 kg)
Capacity	1 HMU Management Module and 22 HLU Modules
	or
	22 ELU Modules
	or
	11 LPS-300C Power Modules
Mounting	3190-type mechanics
Operational Environment	
Temperature	-40°F to +149°F (-40°C to +65°C)
Humidity	5% to 95% (non-condensing)
Altitude	200 ft below sea level to 13,000 ft above sea level (-60 m below seal level to 4,000 m above see level)
Storage Environment	
Temperature	-40°F to +185°F (-40°C to +85°C)
Humidity	5% to 95% (non-condensing)

Accessories Supplied	
	Brackets (attached at factory) for mounting in either 19-inch (48.3 cm) or 23-inch (58.4 cm) bays
	Brackets for mounting in ETSI rack
Accessories Available	
	Extender Bracket Kit: available in three colors: EB-52, gray; EB-52B, black; EB-52P, putty).

a.If fuse size and wire gauge requirements are not specific, follow local practices for determining your fuse and wire gauge size.

Appendix E

PRODUCT SUPPORT

ADC Customer Service Group provides expert pre-sales support and training for all of its products. Technical support is available 24 hours a day, 7 days a week by contacting the ADC Technical Assistance Center.

Sales Assistance: 800.366.3891	Quotation Proposals, Ordering and Delivery General, and Product Information
Systems Integration: 800.366.3891	Complete Solutions (from concept to installation), Network Design and Integration Testing, System Turn-Up and Testing, Network Monitoring (upstream or downstream), Power Monitoring and Remote Surveillance, Service/Maintenance Agreements, and Systems Operation
ADC Technical Assistance Center: 800.366.3891 **Email: wsd.support@adc.com**	Technical Information, System/Network Configuration, Product Specification and Application, Training (product-specific), Installation and Operation Assistance, and Troubleshooting and Repair/Field Assistance
Online Technical Support:	www.adc.com/Knowledge_Base/index.jsp
Online Technical Publications:	www.adc.com/documentationlibrary/technicalpublications/
Product Return Department: 800.366.3891 **Email: repair.return@adc.com**	ADC Return Material Authorization (RMA) number and instructions must be obtained before returning products.

GLOSSARY

A

ACO – Alarm Cutoff

AUD – Audible (alarm)

AUX – Auxiliary port

AWG – American Wire Gauge

C

CLEI – Common Language Equipment Interface

CO – Central Office

COM – Common

CRIT – Critical (alarm)

D

DSL – Digital Subscriber Loop

DSX-1 – DS-1 Cross-connect frame

E

E1 – 2.048 Mbps data rate (European T-1)

EIA – Electronic Industries Alliance

ELU – E1 HiGain Line Unit

ESD – Electrostatic Discharge

ETSI – European Telecommunications Standard Institute

F

FCC – Federal Communications Commission

FGND – Frame Ground

G

G.SHDSL – Single-pair High-speed Digital Subscriber Line

G.703 – ITU-T Recommendation for physical/electrical characteristics of hierarchical digital interfaces.

H

HCDS – High Capacity Digital Service

HCP – HiGain Connector Panel

HDSL – High-bit-rate Digital Subscriber Line

HLU – HiGain Line Unit

HMS – HiGain Management Shelf

HMU – HiGain Management Unit

M

MAJ – Major (alarm)

MIN – Minor (alarm)

MOP – Method of Procedure

N

NC – Normally Closed

NEBS – Network Equipment Building System

NO – Normally Open

O

OS port – Operator Services port

P

PIC – Plastic Insulated Conductor

R

RCV – Receive

RMA – Return Material Authorization

RX – Receive

S

SYS ID – System Identifier (alarm)

T

T1 – 1.544 Mbps data rate (North American)

V

VIS – Visible (alarm)

W

WECO – Western Electric Company (now AT&T Telecommunications)

X

XMT – Transmit

Certification and Warranty

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Limited Warranty

Product warranty is determined by your service agreement. Refer to the *ADC Warranty/Software Handbook* for additional information, or contact your sales representative or Customer Service for details.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by ADC voids the user's warranty.

All wiring external to the products should follow the provisions of the current edition of the National Electrical Code.

Safety Standards Compliance

This equipment has been tested and verified to comply with the applicable sections of the following safety standards:

- GR 63-CORE - Network Equipment-Building System (NEBS) Requirements
- GR 1089-CORE - Electromagnetic Compatibility and Electrical Safety
- Binational Standard, UL-60950 3rd Edition/CSA1459 C22.2 No. 60950-00: Safety of Information Technology Equipment

For technical assistance, refer to "Appendix E: Product Support" on page E-1.

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ADC Telecommunications, Inc.
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Minneapolis, MN 55440-1101 USA

For Technical Assistance
Tel: 800.366.3891

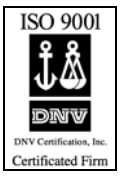
HiGain® Managed Shelf

19-inch, 3190 Mechanic, 22-Slot Managed CO Shelf (HMS-318 List 3) User Manual

CLEI: T1MF2S04RA

Product Catalog: HMS-318 List 3

Document Number: LTPH-UM-1261-01



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