PG-FLEX*PLUS*

TECHNICAL PRACTICE

MANAGEMENT UNIT

Model	List	CLEI Code
PMU-712	2	S9C3CCDA~~

SECTION SCP-PMU712-020-08H

Revision History of This Practice

Revision	Release Date	Revisions Made
01	July 11, 2001	Initial Release
02	July 31, 2001	Release to: **1** correct all custom defaults for Power A Missing and Power B Missing in Table 20, "Alarm Types," on page 61. **2** correct table captions for Table 21, "Service Loss Alarm Types," on page 62 and Table 22 on page 64. **3** correct custom default for Environmental Alarm *n* (where *n* = 1 to 4), List 3 in Table 24, "Environmental Alarm Types," on page 65.
03	August 17, 2001	Release to: **1** make corrections in "Specifications" on page 10. Height was changed to 5.50 in. (14.0 cm) and Length was changed to 10.25 in (26.0 cm). **2** correct Figure 6, "Front Panel Craft Port to Terminal Connections," on page 15 **3** delete second and third sentences in second paragraph after Figure 13 on page 20. **4** make corrections in "Logging On" on page 25 reference to the establishment of a password. The third bullet, third sentence was revised. **5** correct first line of second bullet on page 22. **6** correct second line of first paragraph in the Download Retry section on page 70. **7** correct other non-service affecting changes on pages 6, 7 and 52.
04	December 20, 2001	Release to rebrand document to comply with ADC standards
05	July 8, 2002	Eliminate references to the PMU-712 List 3
06	January 6, 2003	Updated Product Support Information
07	August 6, 2003	Updated external alarms
08	March 1, 2004	Updated DB-25 alarm information

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USING THIS PRACTICE

Three types of messages, identified by icons, appear in the text.

Notes indicate information about special circumstances.

Cautions indicate the possibility of equipment damage or the possibility of personal injury.

Electrostatic Discharge (ESD) susceptibility symbols indicate that a device or assembly is susceptible to damage from electrostatic discharge.You must wear an antistatic wrist strap connected to the appropriate ground connection prior to performing installation procedures. You must also observe normal ESD precautions when handling electronic equipment. Do not hold electronic plugs by their edges. Do not touch components or circuitry.

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 "Returns" on page 77. If you must store the equipment for a prolonged period, store the equipment in its original container.

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OVERVIEW

The PG-Flex*Plus*™ PMU-712 List 2 Management Units provide the user interface into the PG-Flex*Plus* Central Office Terminal (COT) Shelf. The PMU-712 allows you to provision, monitor, and test the Central Office (CO) Line Units and Multiplexers (MUXs) installed in the shelf.

DESCRIPTION AND FEATURES

The PMU-712 is interconnected through a serial bus to each CO line unit and PMX unit installed in the shelf. It provides the means for a user to provision, monitor, and test the units of the shelf (Figure 1).

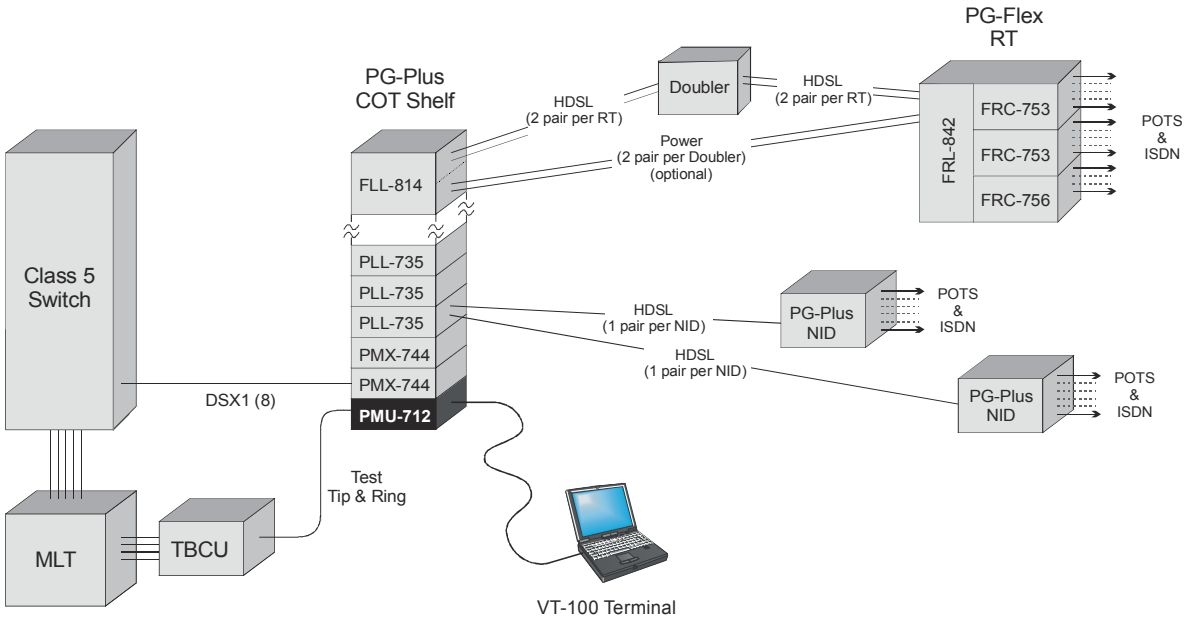

Figure 1. *Typical System Configuration*

The PMU-712 has two independently operating RS-232 serial ports, one on the front panel and another on the shelf's backplane. The PMU-712 has a 10Base-2 Ethernet port that connects PMUs of multiple shelves together. This allows all the cascaded shelves to be managed from a single interface point. Up to 24 shelves can be connected together through the 10Base-2 connector without an Ethernet repeater. The PMU provides two management user interfaces:

- a VT-100 screens based user interface
- a Telcordia compliant TL1 user interface

You can provision, monitor, and test the PG-Flex*Plus* through either interface.

The PMU-712 contains a nonvolatile database that stores provisioning data for all PG-Flex*Plus* systems and PMX units in the shelf. It monitors the status of other system units, and provides audible and visual alarms classified as major, minor, and critical.

The PMU-712 generates independent 64 K and 8 K system clock signals from a composite bipolar clock signal connected through the shelf's backplane. These clock signals are used by the Digital Data Service (DDS) cards and are distributed on the backplane. The clock signals are also terminated at the front panel as a 64 K bit and 8 K byte clock.

It provides Mechanized Loop Testing (MLT) and 4TEL by providing a subset of the TA-909 resistive signatures. The PMU provides a diode signature for the Integrated Digital Loop Carrier (IDLC) bypass pair test and a test jack for monitoring and testing a VF drop. The VF drop provides metallic access to any subscriber pair connected to the backplane or any integrated POTS channel by means of the PMX card.

Local Area Network Interface

The PMU-712 provides an Ethernet port for intershelf communication utilizing a 10Base-2 Ethernet connection in accordance with IEEE standard 802.3.

- System uses COAX interconnects terminated with BNC connectors on the backplanes of the shelf units.
- Shelves are cascaded in a daisy chain configuration.
- 10Base-2 must be terminated on both ends with 50Ω terminators.
- Allows the user to connect to the PG-Flex*Plus* by means of TELNET.

Voice Frequency Drop Line

The PMU-712 VF drop line meets the following criteria:

- It provides an audible and visual ringing signal, both in UDLC and IDLC configuration.
- The drop line can support up to a 100 ft. line length.
- It can decode the Line Current Feed (LCF) and Line Current Feed Open (LCFO) signal states.

Test Interface

The PG-Flex*Plus* system supports MLT, 4TEL, screen initiated drop tests, and integrated channel testing.

Screen initiated drop testing is supported through the RS-232 Craft Port. The test unit performs tests specified in section 11.4 of TA-909 for fiber in the loop systems. Test results as reported by the on board test unit located in the RT are presented as pass/fail on the Craft screen interface. Additionally, the test results are provided as DC resistive signatures as shown in Table 1 by the PMU to the Test Tip and Test Ring terminals on the backplane.

Table 1. *DC Resistive Signatures*

Test Results	T-R (kΩ)	T-G, R-G (kΩ)
Remote Terminal (RT) Equipment Failure	17.8	90.9
Foreign Voltage on Drop	27.8	90.9
All Tests OK	38.3	90.9
Drop Termination Test Failed (ISDN/POTS)	48.3	90.9
Resistive Fault on Drop	58.0	90.9
Receiver Off-Hook	68.0	90.9
Hazardous Potential on Drop	78.5	90.9
COTS - RT Facility Failure	≥ 1000	90.9

The signatures on the List 2 are biased to -14 Vdc.

In support of MLT testing on the Universal PG-Flex*Plus* system, the PMU will supply 1kΩ from Tip to Ground in lieu of allowing the PGTC to be activated. For either MLT or 4TEL test systems, subscriber drop test results are provided as TA-909 DC resistive signatures as shown in Table 1, "DC Resistive Signatures," on page 2 by the PMU to the Test Tip and Test Ring terminals on the backplane. When the test environment includes IMLT on a Class 5ESS switch, use of a PCU-796 conditioner unit is required for proper PGTC test results reporting.

In support of MLT testing on the Integrated PG-Flex*Plus* system, the PMU provides the diode/410Ω bypass integrity test signature as required by TR-08. Additionally, subscriber drop test results are provided as TA-909 DC resistive signatures as shown in Table 1, "DC Resistive Signatures," on page 2 by the PMU to the Test Tip and Test Ring terminals on the backplane.

Serial Management Interfaces

An RS-232 serial interface is provided on the front of the PMU-712 and meets the following specifications:

- compliant with EIA-RS-232
- full duplex, serial, asynchronous format
- supports baud rates 1200, 2400, 4800, 9600, 14400, 28800, 38400, and 57600
- configured as DCE, supporting TX, RX, DTR and DSR signals
- connector is a 9-pin DB type

An RS-232 serial interface is provided on the shelf's backplane and meets the following specifications:

- compliant with EIA-RS-232
- full duplex, serial, and asynchronous format
- supports baud rates 1200, 2400, 4800, 9600, 14400, 28800, 38400, and 57600
- configured as DTE, supporting TX, RX, DTR, and CD signals
- connector is a 25-pin DB type

Composite Clock

The PMU-712 derives certain system timing from a selected Composite Clock (CCLK) source. This derived CCLK is used for bit synchronization for the optional external digital functionality (for example, DDS) offered by the PG-Flex*Plus*. The CCLK circuitry provides the necessary clocks to the shelf backplane. The CCLK is sent to two drivers, one of which drives the first eight CO line units, and the other the last eight CO line units. Figure 2 shows the CCLK in relation to bit position, and the 64 kHz and 8 kHz clocks.

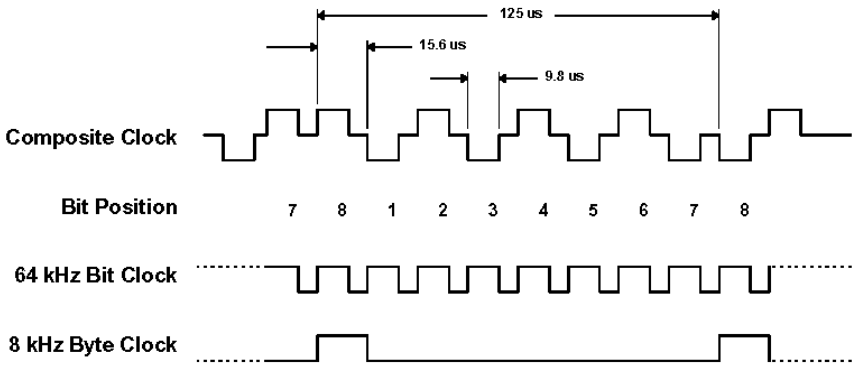

Figure 2. *Composite Clock Relationship*

The PMU-712 activates a front panel Light Emitting Diode (LED) when clock synchronization is obtained. This LED is used for both CCLKs terminated on the PMU-712. If the LED is on then both CCLKs are functional. In the event that one CCLK is lost, the LED flashes. When both CCLKs are lost, the LED is off.

ALARMS

The PMU-712 communicates with each PMX and CO line unit in the shelf to provide a summary of active shelf-level alarms (Figure 3). The CO line unit and PMX units inform the PMU-712 of alarms becoming active and inactive. A summary of alarms for each unit is maintained on the PMU. Active shelf alarms are displayed by the front panel LEDs and through audible and visual relay contacts. These are also obtainable through the Craft interface. An ACO is provided to silence audible alarms. A shelf ID relay is provided to allow shelf fault isolation when more than one PG-Flex^{Plus} shelf is located in one bay. The shelf ID relay is activated when any visual alarm is active in the shelf.

The PMU-712 can also accept external environmental alarms via the backplane DB-25 connector; however, the functionality of the DB-25 must be changed to ENV-ALARMS setting rather than the default setting of CRAFT-PORT (refer to Shelf Options Screen). The DB-25 connector can function as a craft access port or operate as an external alarm input source.

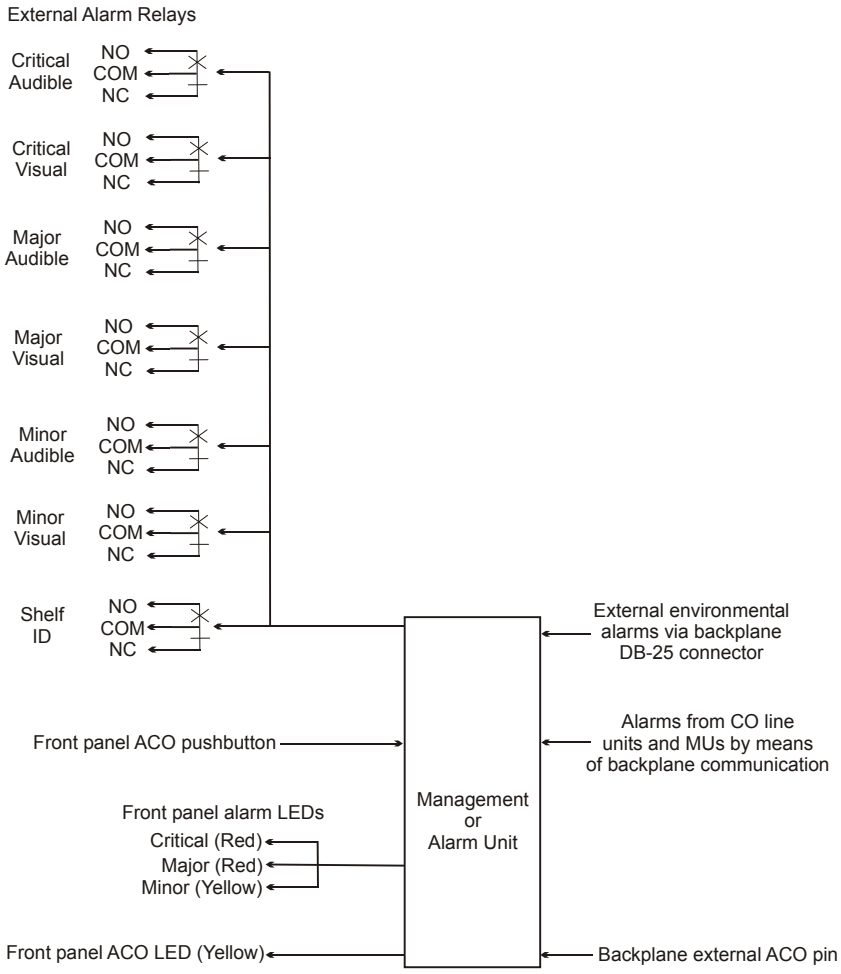

Figure 3. *Alarm Processing*

ALARM TYPES

Any alarm may be set to the following severities:

- Critical - CR
- Major - MJ
- Minor - MN
- Not Alarmed - NA
- Not Reported - NR

An alarm type set to NA will accumulate history counts and send an SNMP trap message, but will not activate an alarm LED or alarm relay. However, *Current* Status will show ACTIVE. An alarm set to NR will not be reported by the PMU-712.

EXTERNAL ENVIRONMENTAL ALARM CONTACT ALARM INPUTS/OUTPUTS

The PMU-712 allows the rear DB-25 connector to be provisioned as either a craft port (RS-232) or environmental alarm input (Figure 4). When the rear DB-25 is provisioned for environmental alarm inputs, the conductors operate as dry input contacts. An alarm is considered active when certain pins are pulled to +8 volts. There are a total of four Environmental Alarms: ENV1, ENV2, ENV3, and ENV4 (Table 2 on page 8). In addition to the Environmental Alarms being reported through screens, they are also reported through the Derived Data Link (DDL) of the TR-08 Shelf A DS1. There are three shelf alarm relay settings: Standard, Telemetry and Environmental. The system activates different relays depending on Shelf Option configuration (Table 3 on page 8). Refer to Figure 4 on page 7 and Table 4 on page 8 for proper wiring of customer supported DB-25 alarm cable.

When the PMU-712 is used in the Field Shelf, the rear craft port interface is not used for alarm inputs. Rather, the prewired Alarm cable will contain the Alarm inputs and outputs and will operate as dry contacts.

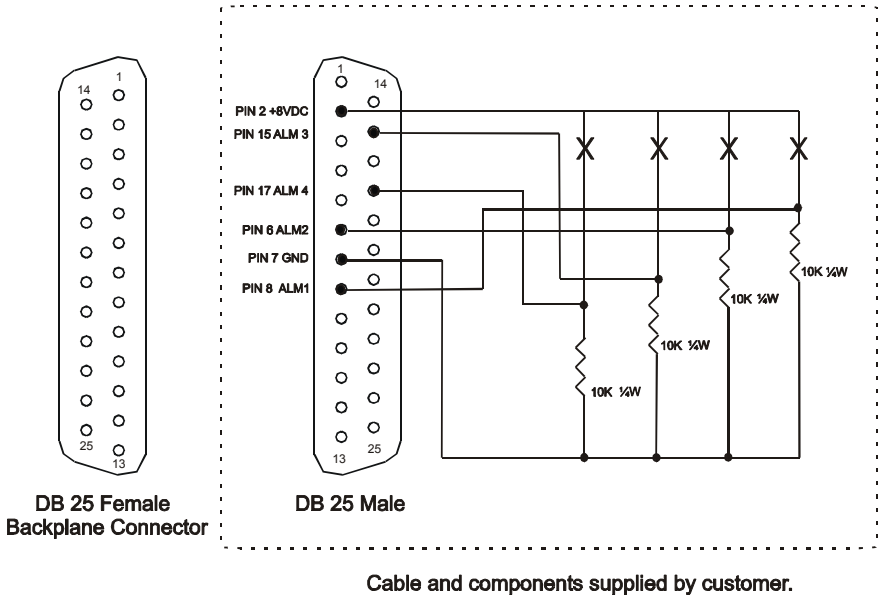

Figure 4. *ENV Alarm Input Pinouts*

Connections other than those shown in Figure 4 will damage the PMU-712 and will not be covered under the warranty.

Table 2. *Environmental Alarm Input Definitions*

Alarm Input Type	AMU-912 in CO Shelf (TR-08 Alarm Defaults)	AMU-912 in Field Shelf (TR-08 Alarm Defaults)
ENV1	ENV1 (SYS1-PWRMISC)	AC Power Fail (SYS1-PWRMISC)
ENV2	ENV2 (SYS2-PWRMISC)	Door Alarm (COM MN)
ENV3	ENV3 (COM MN)	Fan Alarm (COM MN)
ENV4	ENV4 (COM MJ)	MISC (COM MJ)

Table 3. *Alarm Relay Definitions*

Standard	Telemetry	Environmental
System ID	Shelf ID	System ID
Critical - Visual	System - Major	Critical - Visual
Critical - Audible	System - Minor	Major - Visual
Major - Visual	Major - Visual	Minor - Visual
Major - Audible	Major - Audible	Environmental #1
Minor - Visual	Minor - Visual	Environmental #2
Minor - Audible	Minor - Audible	Environmental #3

Table 4. *DB-25 Alarm Cable Pinouts*

Environmental Alarm	Common	Normally Open
Alarm 1	2	8
Alarm 2	2	6
Alarm 3	2	15
Alarm 4	2	17

SERVICE LOSS ALARM REPORTING VIA THE TR-08 DERIVED DATA LINK

The PMU-712 provides a method for Service Loss Alarms to be reported to the Central Office switch or SLC-96 COT via the TR-08 Derived Data Link. The Service Loss Alarms occur when six or more POTS lines lose service. These alarms can be triggered by removal of line units, Loss of Signal (LOS) or Loss of Frame (LOF) of the High-bit-rate Digital Subscriber Line (HDSL)/Symmetric High-bit-rate Digital Subscriber Line (SHDSL), etc. When a Service Loss Alarm is detected, the PMU-712 will report a TR-08 Shelf A, B, C, or D Major or Minor alarm to the TR-08 shelf or switch. The type of alarm is determined by the CO Line Unit type that has the "Active" Service Loss Alarm (e.g., Shelf A, B, C, or D alarms are only reported against the FLL-814.) The severity and CO Line Unit location of the Service Loss Alarm will determine what TR-08 alarm is reported. Refer to Table 5 and Table 6.

Table 5. *Service Loss Alarm Reporting*

Service Loss Alarm Severity	TR-08 DDL Alarm
CR	MJ Shelf A, B, C, or D
MJ	MJ Shelf A, B, C, or D
MN	MN Shelf Alarm
NR	No alarm reported via DDL
NA	No alarm reported via DDL

Table 6. *Alarms Reported for each Different COLU Service Loss Alarm*

COLU Service Loss Alarm	TR-08 DDL Alarm
LU 1 & LU 2	System 1 Shelf A Alarm
LU 3 & LU 4	System 1 Shelf B Alarm
LU 5 & LU 6	System 1 Shelf C Alarm
LU 7 & LU 8	System 1 Shelf D Alarm
LU 9 & LU 10	System 2 Shelf A Alarm
LU 11 & LU 12	System 2 Shelf B Alarm
LU 13 & LU 14	System 2 Shelf C Alarm
LU 15 & LU 16	System 2 Shelf D Alarm

SPECIFICATIONS

Alarm Relays

Critical	Audible, Visual
Major	Audible, Visual
Minor	Audible, Visual
Shelf ID	Visual

Alarm Relay Contact Rating

0.3A @ 125 Vac

0.3A @ 110 Vdc

1.0 A @ 30 Vdc

Alarm Cutoff

ACO pushbutton

ACO LED

Remote ACO capabilities

Test Connector

RJ-11

RS-232 Connectors

DB-9 (female) – PMU-712 front panel

DB-25 (female) – Shelf backplane

Test Sync Connector

RJ-11

Test System Interface

Wire wrap pins on the PG-Plus shelf backplane

Input Power

-42.5 to -56.5 Vdc

8 Watts (maximum), cooled by natural convection

0.50 Amp Fuse

Environment

Operating Temperature	-40°F to 150°F/(-40°C to 65°C)
Operating Humidity	5% to 95% (non-condensing)
Operating Elevation	-200 ft to 13,000 ft/(-60 m to 4,000 m)

Dimensions

Height	5.50 in. (14.0 cm.)
Length	10.25 in. (26.0 cm.)
Width	1.10 in. (2.8 cm.)
Weight	0.7 lb. (0.3 kg.)

FRONT PANEL

Figure 5 shows the PMU-712 front panel. The Status LEDs indicate different system states as described in Table 7, "LED Indicators," on page 12. Table 8, "LED Modes," on page 12 describes the LED modes.

The features of the front panel are:

- Alarm Cut-off (ACO) reset switch
- Test clock connector (bit/byte)
- VF drop output connector
- LED indicators
- DB-9 pin serial port (craft interface)

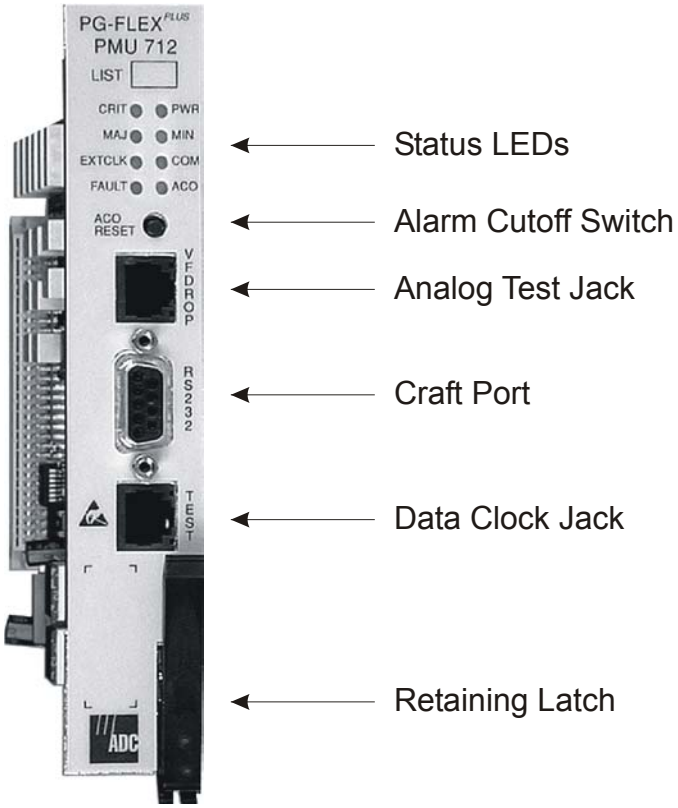

Figure 5. *PMU-712 Front Panel*

Table 7. *LED Indicators*

LED	Color	State	Description
CRIT	Red	On	One or more Critical Alarms active in shelf.
		Off	No Critical alarms active.
PWR	Green	On	The PMU-712 is powered.
		Flashing at 1 Hz	One of the two battery feeds is not present.
		Off	The PMU-712 is not receiving power.
		Flashing at 10 Hz	Burn-in.
MAJ	Red	On	One or more Major Alarms active in shelf.
		Off	No Major alarm active.
MN	Yellow	On	One or more Minor Alarms active in shelf.
		Off	No Minor alarms active.
EXTCLK		On	Both composite clocks present.
		Flashing at 1 Hz	One composite clock present.
		Off	No composite clock signal.
COM	Green	On	Multishelf management through Ethernet connection is active.
		Off	Remote management is not active.
FAULT	Red	On	Board failure. Return board to ADC.
		Off	Board has not failed.
ACO	Yellow	On	ACO was operated.
		Off	ACO button has not been operated.

Table 8. *LED Modes*

LED	State	Others	Mode
PWR	On	All other LEDs flashing at 1 Hz	Running in Boot Mode due to invalid Application Program.
PWR	On	All other LEDs running downward at 1 Hz	Active software download of the PMU-712.
FAULT	On	All other LEDs are Off	PMU-712 hardware failure.

INSTALLATION AND TEST

INSTALLING THE PMU

To install the PMU-712 card:

1 Open the retaining latch at the front bottom of the card.

2 Slide the PMU-712 into the card guides for the slot marked COMMON.

3 Push the card back until it touches the backplane card-edge connector.

4 Engage the retaining latch on the front edge of the shelf.

INITIALIZATION SEQUENCE

After power-up has occurred, all LEDs should cycle upwards in pairs and then go off. The PWR LED should remain on.

The Critical, Major, or Minor Alarm LEDs may turn on if any unit in the shelf is in an alarm condition. If alarm LEDs turn on, you can view detailed information through the Shelf Summary screen and the Alarm screen (see "Provisioning, Performance Monitoring and Testing" on page 24).

The PMU-712 and PG-Plus systems operate without provisioning. ADC recommends that, as a minimum, you change the password and set the date and time for the shelf. For instructions on this process, see the "Shelf Options Screen" on page 54.

ACO PUSHBUTTON

The ACO can be wired for remote operation by connecting the backplane External ACO input wirewrap pin to Ground through a momentary contact, normally open pushbutton.

The ACO Reset pushbutton is used to invoke a front panel LED test. To perform an LED test, press and hold the ACO pushbutton for 5 seconds, any active audible alarm relays are deactivated. This causes all LEDs to go to on for 1 second, and then return to their previous state. Pressing the ACO has no effect on the visual alarm indicators or relays. If a new alarmed event is detected, the new alarm causes the audible relay for that alarm type to be reactivated. When all alarm conditions are cleared for the alarm types that have been silenced, the ACO LED goes off.

ADMINISTRATION

To provision the PMU or other cards installed in the shelf using the craft interface, connect a VT-100 compatible terminal or a personal computer with VT-100 terminal emulation software to the RS-232 interface of the PG-Flex*Plus* Management Unit (PMU) or shelf backplane. The VT-100 interface allows "real time" updating of information displayed on the screen, rather than requiring technician interaction to refresh the screen. Through the craft interface screens, system administration functions such as alarm checking and clearing, configuration changes and performance monitoring and testing can be performed.

FRONT PANEL CRAFT PORT TO TERMINAL CONNECTIONS

Connections between the RS232 craft port of the PMU and the craft terminal are shown in Figure 6.

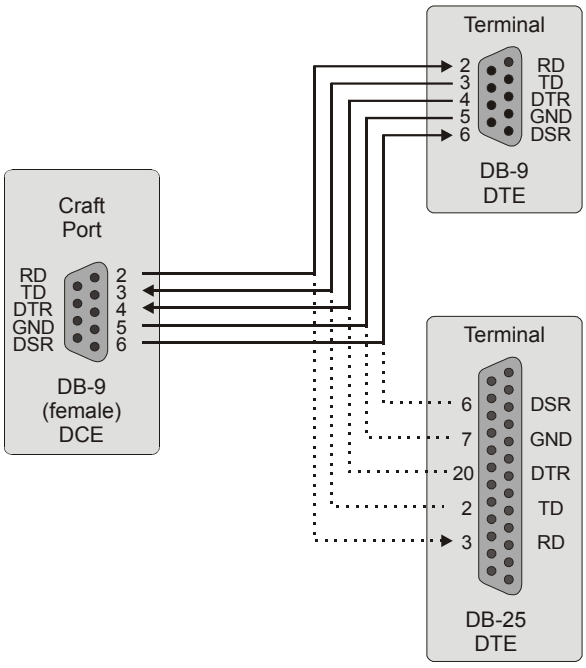

Figure 6. *Front Panel Craft Port to Terminal Connections*

FRONT PANEL CRAFT PORT TO MODEM CONNECTIONS

Using a cable that connects the Data Terminal Ready (DTR) signal will ensure automatic log off when the terminal is unplugged. When connecting the RS-232 port to a modem, a null modem cable should be used. Ensure that the modem's Carrier Detect (CD) and DTR functions are enabled. This will allow the modem connection to terminate properly when the PMU drops Data Set Ready (DSR) and the unit will log off when the modem drops CD. The following connections are required to make the modem work correctly (see Figure 7).

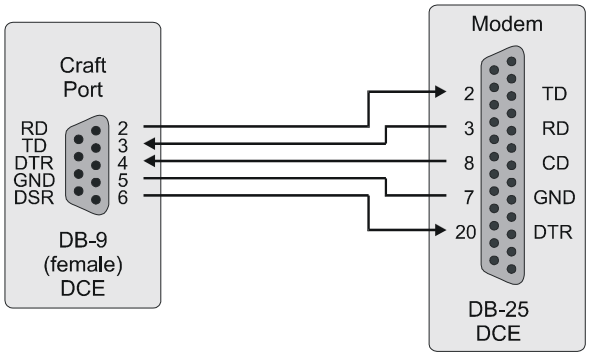

Figure 7. *Front Panel Craft Port to Modem Connections*

BACKPLANE CRAFT PORT TO TERMINAL CONNECTIONS

Use a null modem cable to connect to a DTE device from the backplane connector. Figure 8 shows the wiring for the required null modem cable to a DB-9 and a DB-25 connector.

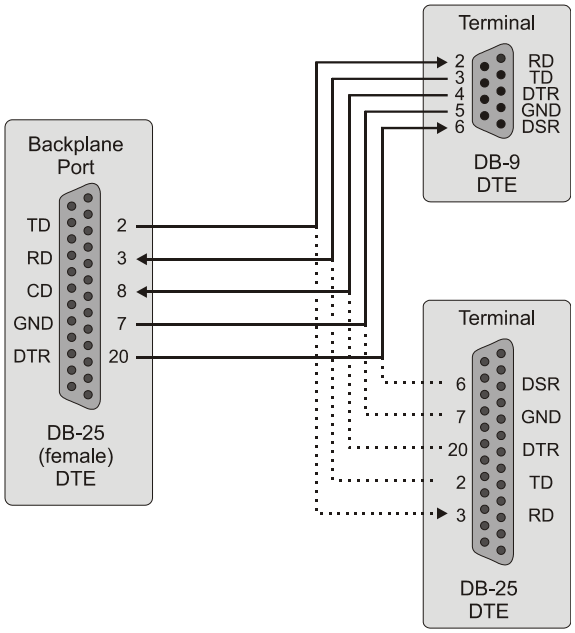

Figure 8. *Backplane Craft Port to Terminal Connections*

BACKPLANE CRAFT PORT TO MODEM CONNECTIONS

The backplane DB-25 is a female connector wired as a Data Terminal Equipment (DTE) interface. Figure 9 shows the cable connections between the backplane connector and a DCE DB-25 connector.

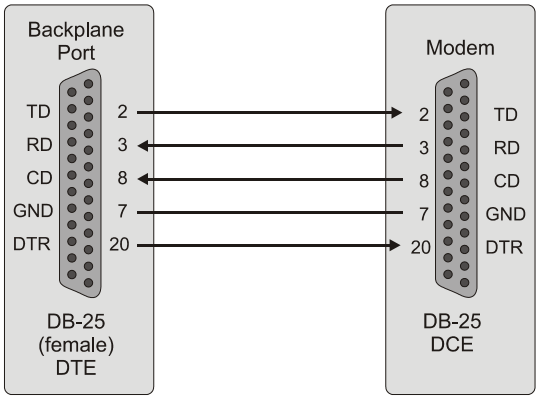

Figure 9. *Backplane Craft Port to Modem Connections*

Refer to Table 9 to set up the VT-100 craft port connections.

Table 9. *Craft Port Configuration*

Control	Setting	Supported	Default
Software Flow Control	XON/XOFF	Enabled	Enabled
Baud Rate		PMU: 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600	Autobaud
Asynchronous Communication Parameters	Data Bits	8	8 bits
	Parity	No	No
	Start/Stop Bits	1	1 Stop Bit

CONNECTING OVER TELNET

The PMU supports up to three simultaneous TELNET connections. You can use either the TL1 Interface or the Screens Interface to manage the PMU. The logical connection over TELNET provides the same functionality and interface as a locally connected craft port. However, only TELNET clients fully supporting the VT-100 emulation can adequately provide access to the Screens Interface.

There exists a number of possible physical configurations to access one or more PMU-712s, and each is described in detail in the section “Physical Connection” on page 18.

Software Connection

The PMU-712 supports all TELNET client application software complying with the (RFC854)-"The Telnet Protocol" standard to access the TL1 interface. Additionally, TELNET client applications providing full support for the VT-100 standard may be used to remotely access the Screens and Screens MultiShelf interfaces. Known VT-100 compliant TELNET client applications are:

- ProComm Plus 3.x, 4.x
- Reflection X 7.x

Packages that do not provide the full VT-100 emulation have unpredictable display results.

The PMU-712 TELNET Server supports the TELNET negotiation options:

- Suppress Go Ahead
- Will Echo

Physical Connection

Accessibility of the Multishelf Local Area Network (MSLAN) is dependent upon its physical connection. A MSLAN consists of one, or more, shelf connected by means of 10Base-2 cabling and connectors on their respective backplanes. Each end of the daisy-chained LAN must be terminated using 50-ohm BNC terminators.

A MSLAN can support from one to a maximum of twenty-four PMUs on a single segment.

To remotely connect with the MSLAN, at least one PMU on the segment must have a correctly configured IP Address and Subnet Mask. You can access these values from the CONFIG submenu IP INFO (see “IP Information Screen” on page 58). Both of these values must be correctly assigned for IP connectivity.

Four distinct topographies, described in the following sections, can be created to allow or restrict remote access to a MSLAN.

Isolated LAN

The simplest topography of a MSLAN consists of n PMUs (where 1<= n <= 24), terminated on both ends of the 10Base-2 physical connection (see Figure 10). The ability to TELNET to any PMU on this segment requires that the host be connected online between the two terminators. Therefore, the physical distance between a host and any single PMU can be no greater than the maximum 10Base-2 LAN distance of 200 meters. An example of how this connection is configured is shown in Table 10, “Example of Isolated LAN Connection,” on page 19.

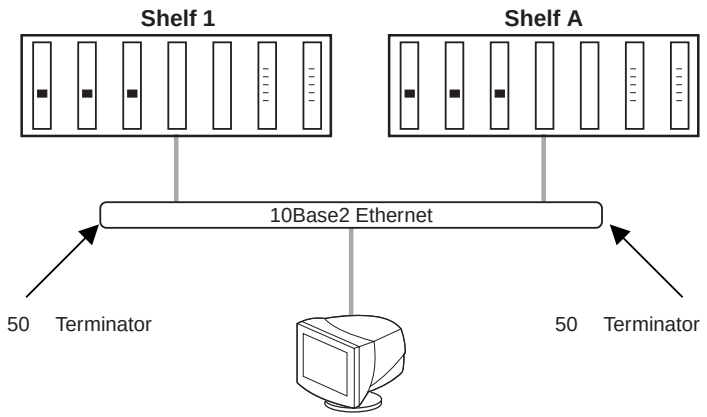

Figure 10. *Isolated LAN Model*

Table 10. *Example of Isolated LAN Connection*

Entity	IP Address	Subnet Mask	Gateway IP Address	Default Route	Default Route Mask	Results
PMU A	172.17.0.3	255.255.0.0	0.0.0.0	0.0.0.0	0.0.0.0	
Defines that the PMU exists on the 172.17.xxx.xxx network and responds only to requests originating from this network.Thus, the following hosts may or may not communicate with the target PMU						
Host 1	172.17.20.9	255.255.0.0				Able to communicate with target PMU A
Host 2	172.10.20.9	255.255.0.0				Unable to communicate with target PMU A
Host 3	172.17. 0.12	255.0.0.0				Able to communicate with target PMU A

MSLAN Connection to Router/Bridge/Switch - Same Segment

By connecting the MSLAN to a router/bridge/switch, accessibility to the MSLAN expands to the virtual distance of the connected LAN, MAN or WAN (see Table 11 and Figure 11). In this topography, clients attempting to connect by means of the TELNET protocol must have a configured IP Address and Subnet Mask matching that network defined by the target PMU.

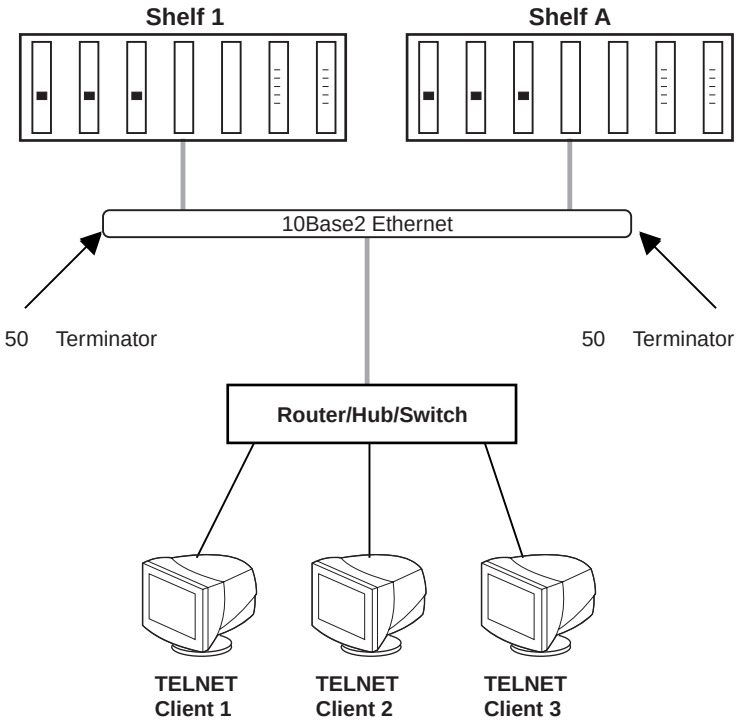

Figure 11. *MSLAN Connection to Router/Bridge/Switch*

Table 11. *Example of Connection to Router/Bridge/Switch - Same Segment*

Entity	IP Address	Subnet Mask	Gateway IP Address	Default Route	Default Route Mask	Results
PMU A	172.17.0.3	255.255.0.0	0.0.0.0	0.0.0.0	0.0.0.0	
Defines that the PMU exists on the 172.17.xxx.xxx network and responds only to requests originating from this network.Thus, the following hosts may or may not communicate with the target PMU						
Host 1	172.17.20.9	255.255.0.0				Able to communicate with target PMU A
Host 2	172.10.20.9	255.255.0.0				Unable to communicate with target PMU A
Host 3	172.17. 0.12	255.0.0.0				Able to communicate with target PMU A

MSLAN Connection to Router/Bridge/Switch - Different Segment, Unrestricted Route

In the set-up illustrated in Figure 12, clients attempting to connect through the TELNET protocol must configure the PMU to respond to packets not originating on the local segment (see Table 12, "Example of Connection to Router/Bridge/Switch - Different Segment, Unrestricted Route," on page 22). This is accomplished by configuring a gateway router/bridge/switch to which the PMU can direct its reply packets. You can access these values from the CONFIG submenu IP INFO (see "IP Information Screen" on page 58). The gateway IP address must be accessible from the MSLAN, and the Default Route and Default Route Mask fields must have the value of 000.000.000.000.

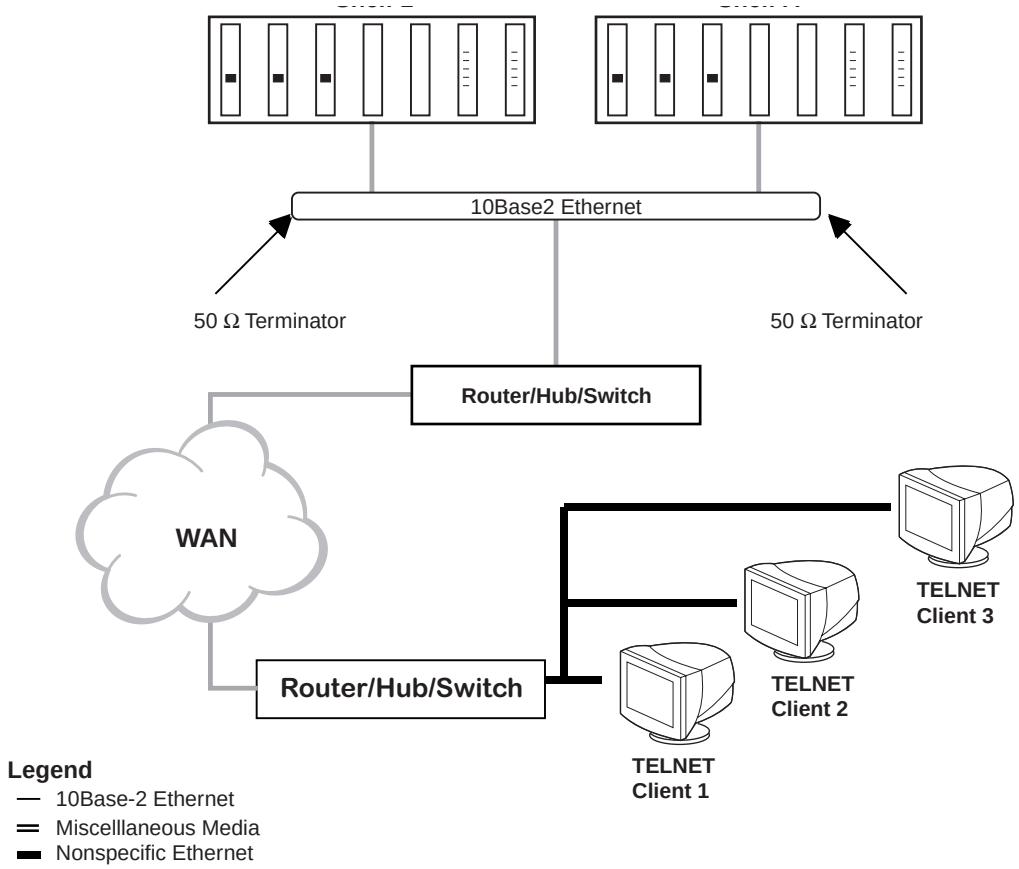

Figure 12. *MSLAN Connection with Different Segment, Restricted Route Model*

Table 12. *Example of Connection to Router/Bridge/Switch - Different Segment, Unrestricted Route*

Entity	IP Address	Subnet Mask	Gateway IP Address	Default Route	Default Route Mask	Results
PMU A	172.17.0.3	255.255.0.0	0.0.0.0	0.0.0.0	0.0.0.0	
Defines that the PMU exists on the 172.17.xxx.xxx network and responds only to requests originating from this network.Thus, the following gateways may or may not be accessible by the target PMU						
Case 1	172.17.20.9	255.255.0.0	172.17.0.1			Gateway IP Network of 172.17.xxx.xxx matches PMU's Network of 172.17.xxx.xxx and is accessible.
Case 2	172.16.0.1	255.255.0.0	172.16.0.1			Address does not match, and is inaccessible.
Given a correctly administered gateway (such as Case 1), the following hosts can communicate with the target PMU						
Host 1	172.17.20.9	255.255.0.0	172.17.0.1			Able to communicate with target PMU A.
Host 2	172.10.20.9	255.255.0.0	172.16.0.1			Able to communicate with target PMU A (provided that 172.10.xxx.xxx is accessible by the gateway device).
Host 3	172.17. 0.12	255.0.0.0				Able to communicate with target PMU A
Host 4	128.33.20.9	255.255.0.0				Able to communicate with target PMU A (provided that 128.33.xxx.xxx is accessible by the gateway device)

MSLAN Connection to Router/Bridge/Switch - Different Segment, Restricted Route

In the set-up shown in Table 13, clients attempting to connect by means of the TELNET protocol must configure the PMU to respond to packets not originating on the local segment but confine the accessibility of the MSLAN to a particular network (see “IP Information Screen” on page 58).

1 Configure a gateway router/bridge/switch to which the PMU can direct its reply packets. The gateway IP address must be accessible from the MSLAN.

2 Configure the Default Route and Default Route Mask fields to the values of the external Network to which accessibility is granted

Table 13. *Example of Connection to Router/Bridge/Switch - Different Segment, Restricted Route*

Entity	IP Address	Subnet Mask	Gateway IP Address	Default Route	Default Route Mask	Results
PMU A	172.17.0.3	255.255.0.0	172.17.0.1	172.2.0.0	255.255.0.0	
Defines that the PMU exists on the 172.17.xxx.xxx network and responds to requests originating either from this network or from networks accessible through the gateway.The addition of a specified Default Route and Default Route Mask limits the accessibility of remote connections as follows						
Host 1	172.17.0.1	255.255.0.0	172.17.0.1			The host IP network of 172.17.xxx.xxx matches the PMU's network of 172.17.xxx.xxx and is accessible
Host 2	172.2.0.1	255.255.0.0	172.16.0.1			The host IP network of 172.2.xxx.xxx does NOT match the PMU's network of 172.17.xxx.xxx but does match the Default Route. The PMU is accessible.
Host 3	172.5.0.1	255.255.0.0				The host IP network of 172.2.xxx.xxx does NOT match the PMU's network of 172.17.xxx.xxx but does match the Default Route. The PMU is accessible.

PROVISIONING, PERFORMANCE MONITORING AND TESTING

All configurable options are provisioned with factory defaults to minimize field provisioning. PG-Flex^{Plus} systems do not require any provisioning for normal operation. Use the Craft terminal to verify system performance and to customize the units to your requirements.

SUPPLEMENTAL DOCUMENTATION

You can use the screen interface to configure and monitor the system, or you can use the TL1 commands. If you desire to use TL1 commands, rather than the system screens, you will require the applicable TL1 command reference practice for the PMU, available in a PDF format for viewing, downloading, and printing at the ADC Technical Manuals web page at *www.adc.com*.

TERMINAL MODES

The terminal mode dictates the user interface to be used to perform all provisioning, performance monitoring, and testing for the entire shelf. The following terminal modes are supported:

- **TL1** All provisioning, performance monitoring, and testing must be done using the TL1 protocol.
- **Screens** All provisioning, performance monitoring, and testing must be done using the proprietary VT-100 user interface screens.
- **Both** Provisioning, performance monitoring, and testing can be done using either the TL1 protocol or the VT-100 user interface screens (factory default setting).

LOGGING ON

1 Press **SPACEBAR** several times to activate the Autobaud feature. If the Login screen displays, go directly to step 3, or follow these procedures to change from the TL1 user interface to the screens user interface. A TL1 prompt displays:

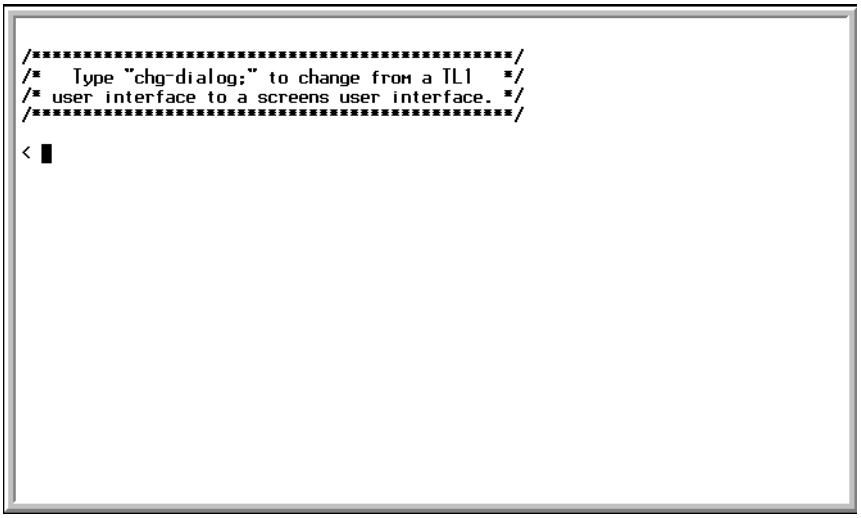

Figure 13. *TL1 Prompt Screen*

The Factory Default mode is in both TL1 and Screen Mode; all shelf open with the TL1 prompt as shown above when you first establish a connection. If you select to manage the shelf through the TL1 terminal mode, refer to the applicable TL1 command reference practice for this information.

You can download this document from the ADC Technical Manuals web page at www.adc.com.

Entering the TL1 prompt `chg-mode::screens` will permanently change the interface to screens mode, while entering `chg-dialog` is for the current session only.

2 When the terminal mode is both, you can start a screens session by entering the following TL1 command:

```
chg-dialog;
```

The TL1 parser returns with the following TL1 command response:

Figure 14. *TL1 Command Response Screen*

When the password screen displays, type the password, and press **ENTER**.

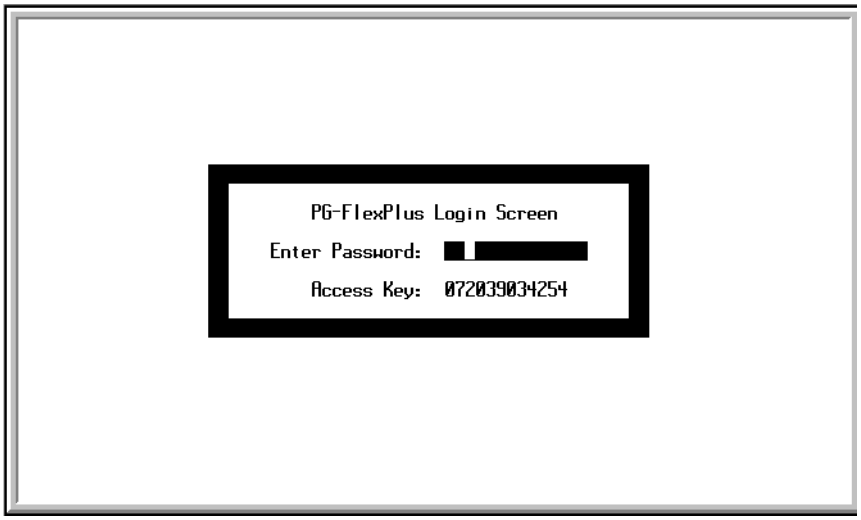

Figure 15. *Login Password Screen*

- **The factory-default password is** password#1**. After a new password has been established, type the new password at a subsequent logon.**
- **Passwords are not case sensitive. The password must use at least 6 and no more than 10 characters, and the new password must contain at least 1 alpha, 1 numeric, and 1 special character.**
- **If the password has been changed and the new password is not known, contact ADC Technical Support while at the terminal (see "Technical Support" on page 77). They will provide a temporary password based on the Access Key number displayed on the Logon screen. The Access Key changes when the temporary password in the PMU is used. When using the temporary password, the password previously stored in the PMU is set to the factory default of** password#1 **and the temporary password will no longer be valid.**

3 The banner momentarily appears, and then the main menu bar of the PMU displays.

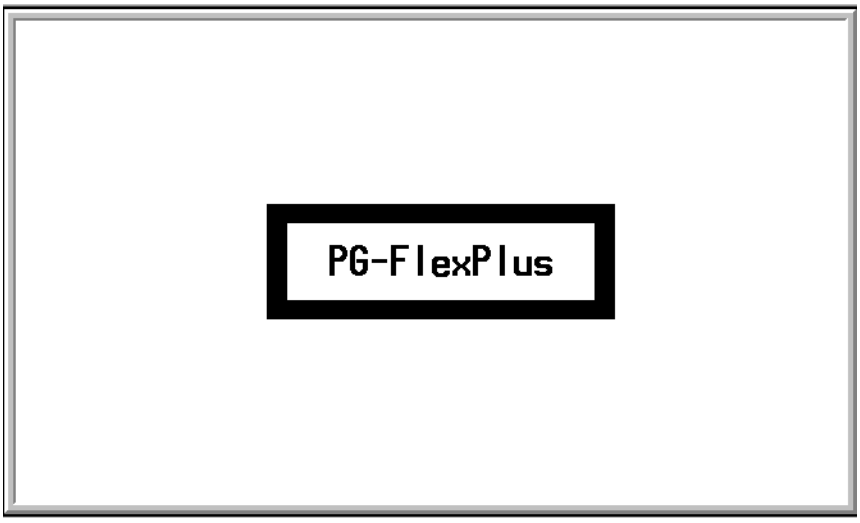

Figure 16. *Banner Screen*

Changing Modes

When the terminal mode has been set to only TL1 mode, to change back to screens mode:

1 type `chg-mode::both;` at the TL1 prompt.

2 type `chg-dialog;` as shown in Figure 17, then follow step 3 as previously shown in "Logging On" on page 25.

When the terminal mode has been set only to screens mode, to change to a TL1 mode session see the section, "Start TL1 Session" on page 37.

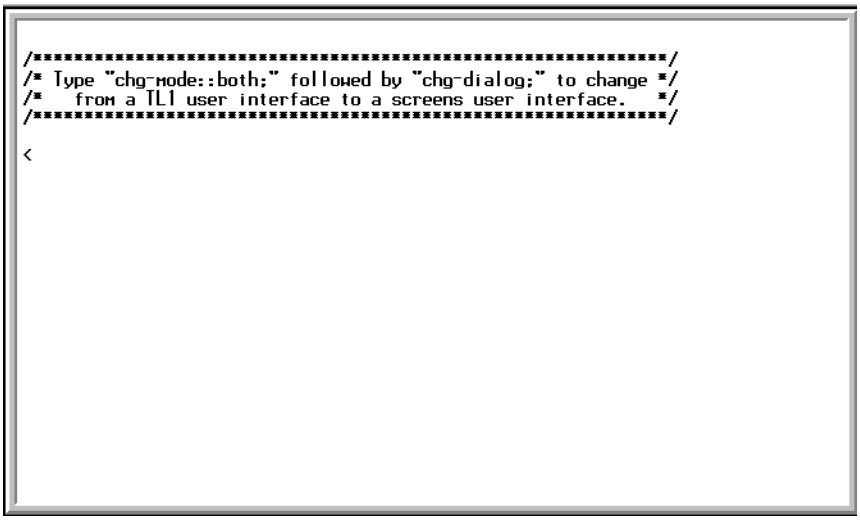

Figure 17. *Changing from TL1 mode to Screens Mode*

PMU MAIN MENU

The screens are identified at the top. The provisionable shelf ID string displays at the bottom center, the date displays at the lower left of the screen, and the time in 24 hour format displays at the lower right of the screen. Go to "Date and Time Screen" on page 66 to set the values to your local time and date. See Table 14, "Navigational Methods," on page 29 for navigational methods within a screen, and Figure 19,"Menu Bar Summary," on page 30 for a options available from the menu tree.

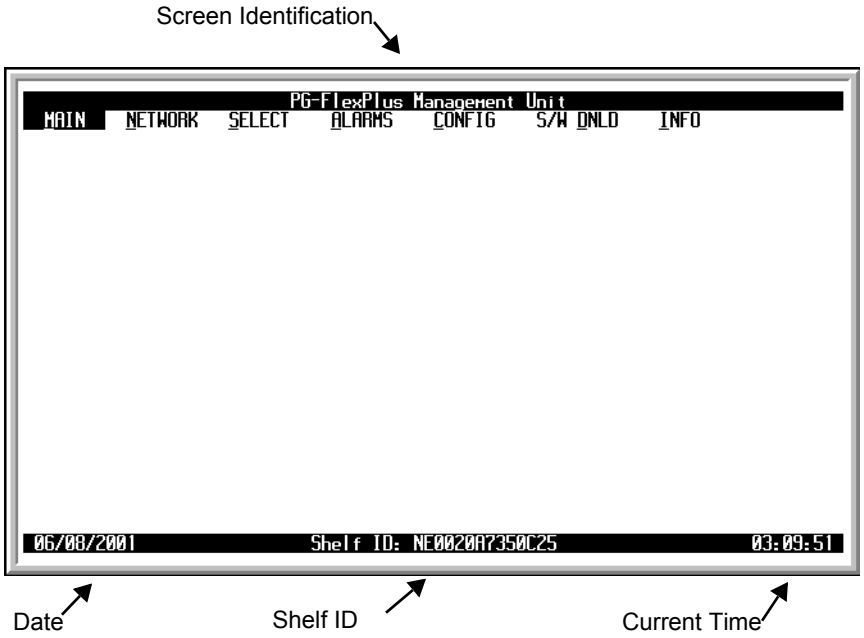

Figure 18. *PMU Main Menu*

Submenu	To...
MAIN	view shelf status and alarms.
SELECT	select COLUs or MUXs installed in shelf.
ALARMS	view alarm status and history.
CONFIG	provision PMU or PAU options.
S/W DNLD	download new software to unit(s) in shelf.
INFO	view inventory information or on-line help.

Press the underlined key to go directly to the selected submenu.

Table 14. *Navigational Methods*

Keypress	Effect on Menu	Effect on Screen
ENTER	Moves to submenu or screen selected.	Invokes selected response to prompt.
← or CTRL-F	Moves left across Main menu.	Moves the cursor to the left.
→ or CTRL-G	Moves right across Main menu.	Moves the cursor to the right.
↑ or CTRL-T	Moves up the submenu selection.	Moves the cursor up.
↓ or CTRL-V	Moves down the submenu selection.	Moves the cursor down.
TAB	No effect.	Moves to the next field on all other submenu screens.
SPACE	No effect.	Cycle through the field options.
ESC	Moves up a menu level. From the Main menu, the Logout screen is displayed.	Returns to Main menu without accepting changes.
CTRL-R	Returns to the PMU main screen. The PG-Flex*Plus* banner briefly appears and then the password screen displays.	Returns to the PMU main menu without accepting changes.
A - Z keys	Selects an underlined or highlighted menu item.	A screen entry is made.

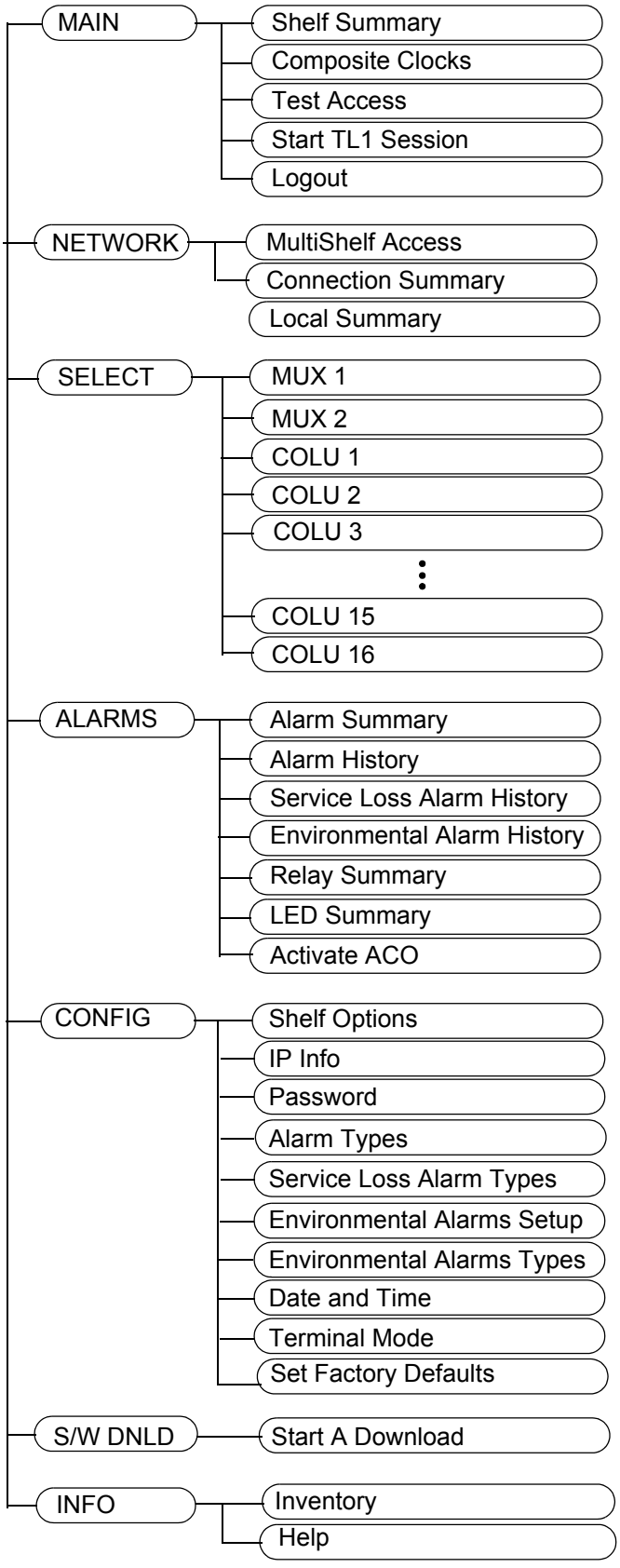

Figure 19. *Menu Bar Summary*

MAIN SUBMENU

This screen provides access to information about the Shelf Summary, Composite Clocks and Test Access screens. You can also have the options to start a TL1 session, or log off the PMU screen session from this submenu.

1 At the PMU main screen, select the *MAIN* option and press **ENTER** to view the submenu.

2 Select the desired option and press **ENTER** to view the screen.

Figure 20. *MAIN Submenu*

Submenu	To...
Shelf Summary	view shelf status and alarms.
Composite Clocks	view CC information.
Test Access	perform test access on channels.
Start TL1 Session	begin a TL1 session.
Logout	log off the screens session.

3 Press **ESC** to return to the PMU main menu.

Shelf Summary Screen

This screen details the types and positions of cards installed and displays existing alarms in the shelf.

1 At the *MAIN* submenu, select the *Shelf Summary* option and press **ENTER** to view the screen.

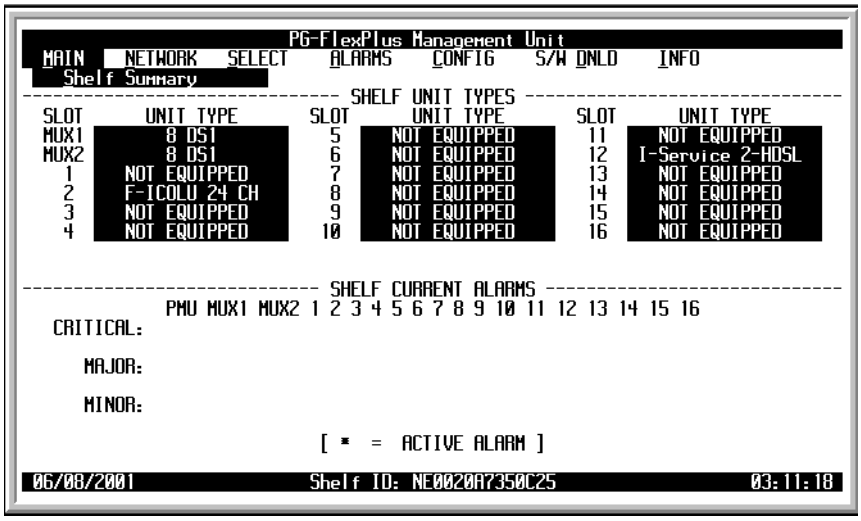

Figure 21. *Shelf Summary Screen*

The Shelf Unit Types columns identify the types of cards installed in the shelf.

Asterisks in the Shelf Current Alarms columns indicate the presence of an alarm and its severity.

Table 15. *Shelf Summary*

Status	Description
Shelf Unit Types	
SLOT	The slot identifier name or number
UNIT TYPE	An identifier for card type or not equipped note.
Alarm Status	
CRITICAL	A summary of Critical alarms for each shelf slot.
MAJOR	A summary of Major alarms for each shelf slot.
MINOR	A summary of Minor alarms for each shelf slot.

2 Press **ESC** to return to the PMU main menu.

Composite Clocks Screen

The Composite Clocks screen displays the current status and conditions of the Composite Clocks.

1 At the *MAIN* submenu, select the *Composite Clocks* option and press **ENTER** to view the screen.

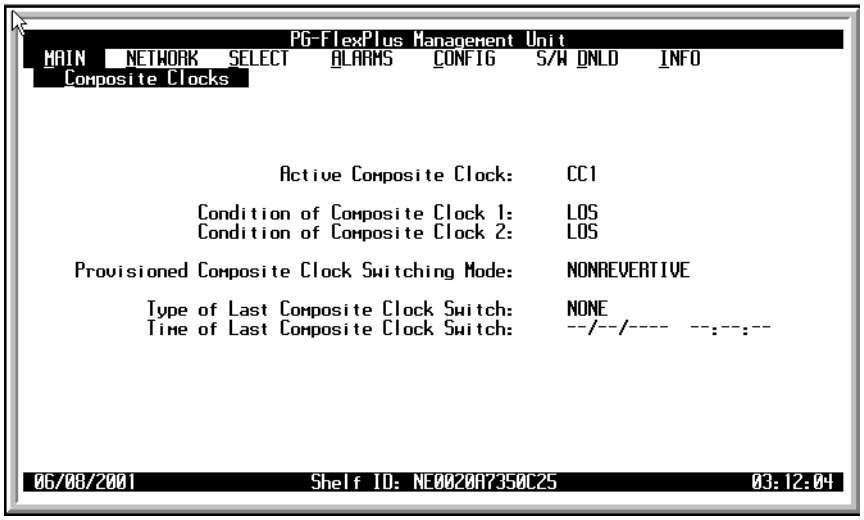

Figure 22. *Composite Clocks Screen*

The time of the last switch is displayed at the bottom right of the screen.

2 Press **ESC** to return to the PMU main menu.

Table 16. *Composite Clocks*

Field	Values	Description
Active CC	CC1	The clock selected by the PMU to be used by the shelf.
	CC2	
Condition of CC 1	Normal	Composite Clock is considered valid.
	LOS	An active Loss of Signal alarm exists.
Condition of CC 2	Normal	Composite Clock is considered valid.
	LOS	An active Loss of Signal alarm exists.
Provisioned CC Switching Mode	Nonrevertive	At power-up, active CC defaults to CC1. Switching occurs any time active CC becomes invalid and the inactive CC is valid. (This is the default switching mode).
	Revertive - CC1	If CC1 is valid, it is the active CC. CC2 is active only if CC2 is valid and CC1 is invalid.
	Revertive - CC2	If CC2 is valid, it is the active CC. CC1 is active only if CC1 is valid and CC2 is invalid.
	Force CC1	CC1 is always the active CC regardless of it's validity.
	Force CC2	CC2 is always the active CC regardless of it's validity.
Type of Last CC Switch	Automatic	PMU performed the switch automatically.
	Manual	User requested the PMU to perform a manual switch.
Time of Last CC Switch	Time and date	Time and date of the last CC switch.

Test Access Screen

This screen allows you to perform test access on channels for the units installed in the shelf.

1 At the *MAIN* submenu, select the *Test Access* option and press **ENTER** to view the submenu.

2 **TAB** to the desired slot and press **ENTER**.

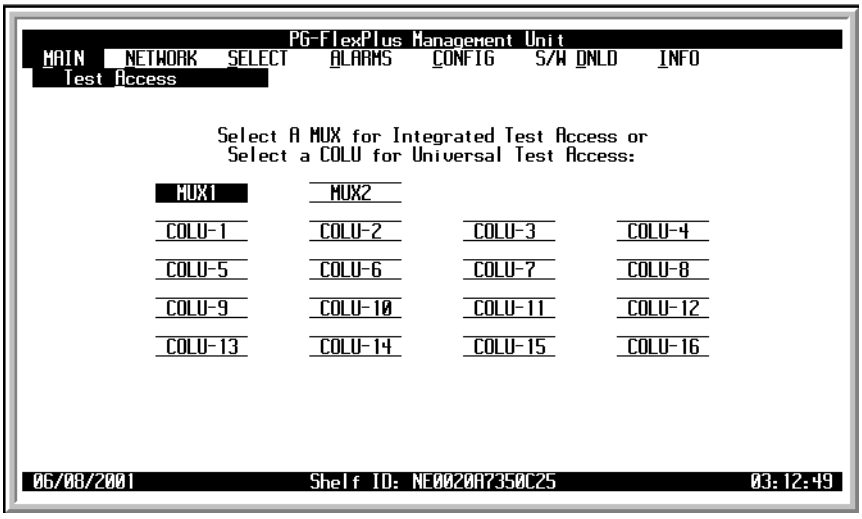

Figure 23. *Test Access Selection Screen*

3 As an example, the MUX1 was selected. This test scenario selects one DS0 from one of the DS1s and makes it accessible as a Voice Frequency (VF) drop on the front panel of the PMU:

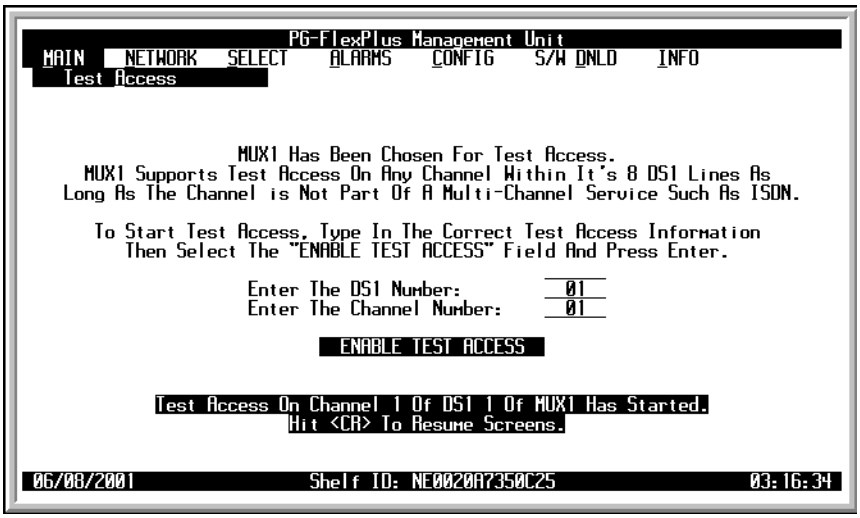

Figure 24. *MUX1 Test Access Screen*

4 Select the ENABLE TEST ACCESS button and press **ENTER**. A message will flash that the Test Access has started as shown in Figure 24. To resume screens press **ENTER**.

5 If you select a card that is not equipped, the following error message will display:

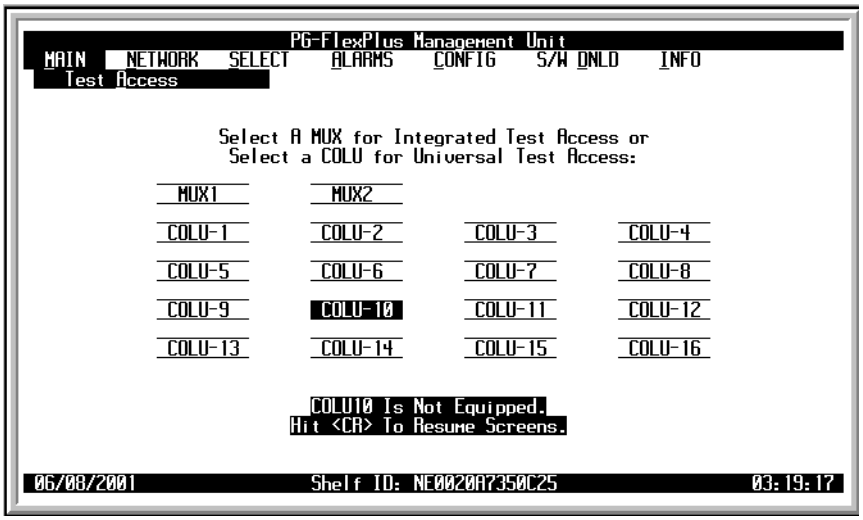

Figure 25. *Test Access Start Warning Screen*

6 Press **ESC** to return to the PMU main menu.

Start TL1 Session

This screen allows you to exit the screens and return to the TL1 command line.

1 At the *MAIN* submenu, select the *Start TL1 Session* option and press **ENTER** to view the screen.

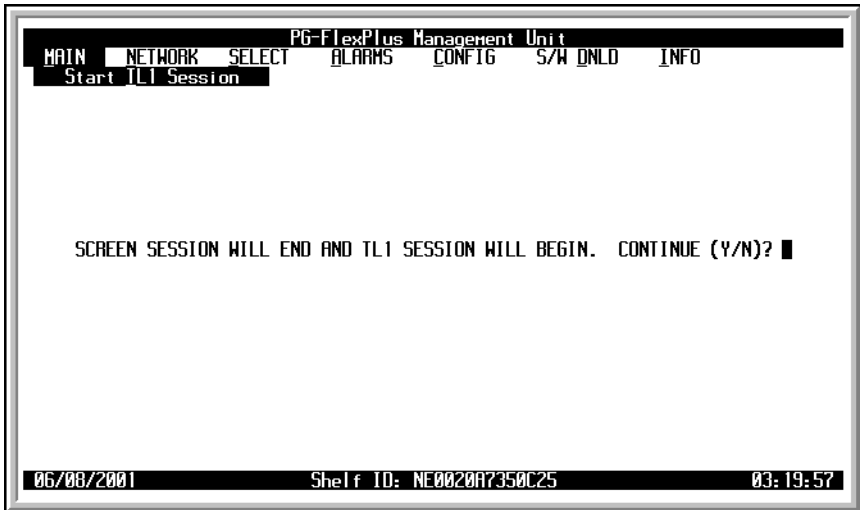

Figure 26. *Start TL1 Session Screen*

2 At the `SCREEN SESSION WILL END AND TL1 SESSION WILL BEGIN. CONTINUE (Y/N)?` prompt, type **Y** to exit the screens and return to the TL1 session.

3 If you do not have TL1 access, the following screen displays:

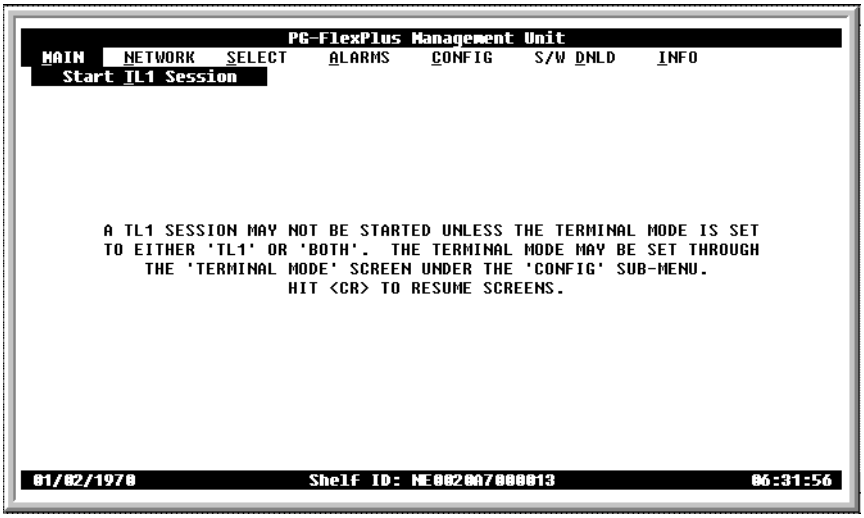

Figure 27. *No TL1 Access Error Screen*

4 Press **ENTER** to return to the PMU main menu.

Logout Screen

If you must leave your VT-100 terminal unattended, it is a good practice to log out until you are ready to resume work. This prevents unauthorized persons from inadvertently changing any of the system operating parameters.

1 At the *MAIN* submenu, select the *Logout* option and press **ENTER** to view the screen.

2 At the `Current Session will be logged out. Continue (Y/N)?` prompt you can:

a Type **Y** at the prompt to log out of the screen session.

b Type **N** at the prompt to continue with the current session.

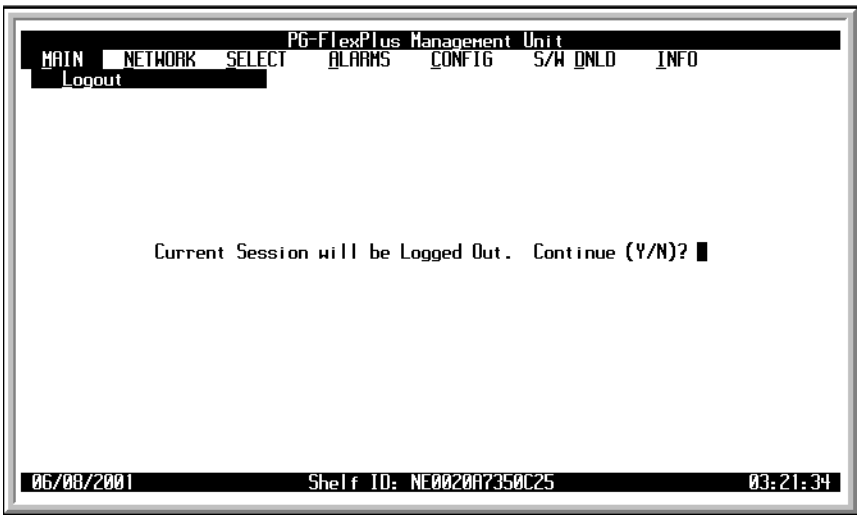

Figure 28. *Logout Screen*

3 Press **ESC** to return to the PMU main menu.

NETWORK SUBMENU

This submenu allows you to view all available and connected PMUs existing on the 10Base-2 LAN.

1 At the PMU main screen, select the *NETWORK* option and press **ENTER** to view the submenu.

2 Select the desired option and press **ENTER** to view the screen.

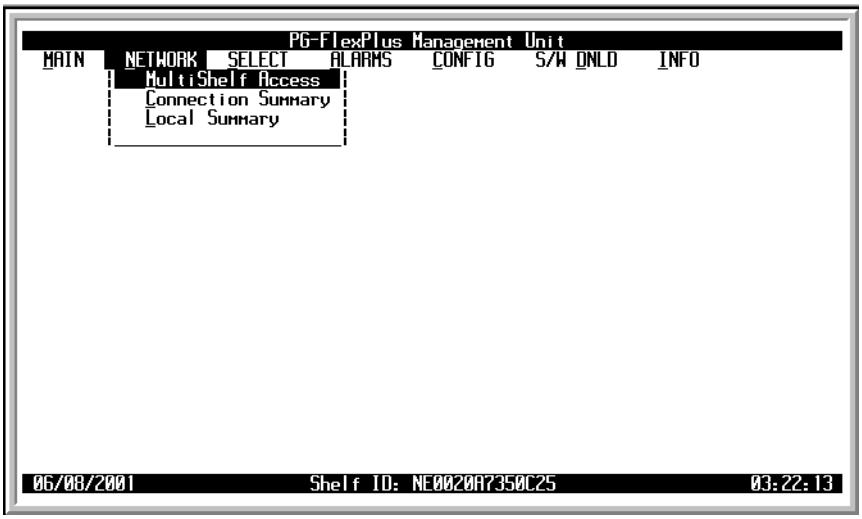

Figure 29. *Network Submenu Screen*

Table 17. *Network Submenu*

Submenu	To...
MultiShelf Access	view all connected PMUs on the LAN.
Connection Summary	view a summary of connections.
Local Summary	view a summary of card details

3 Press **ESC** to return to the PMU main menu.

MultiShelf Access Screen

This screen allows you to view the multishelf access. This screen displays a list of all accessible PMUs existing on the 10Base-2 LAN.

1 At the *NETWORK* submenu, select the *MultiShelf Access* option and press **ENTER** to view the screen. If the system does not have MultiShelf connections, an error message flashes at the bottom of the screen: `Network Table Empty.** Hit <CR> to Continue **`.

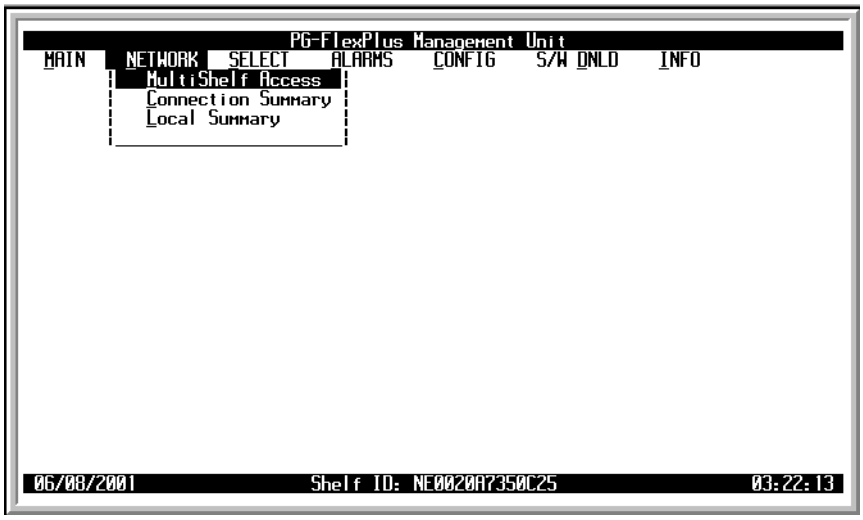

Figure 30. *MultiShelf Access Screen, No MultiShelf Connections*

2 If the system has MultiShelf connections, the summary screen displays:

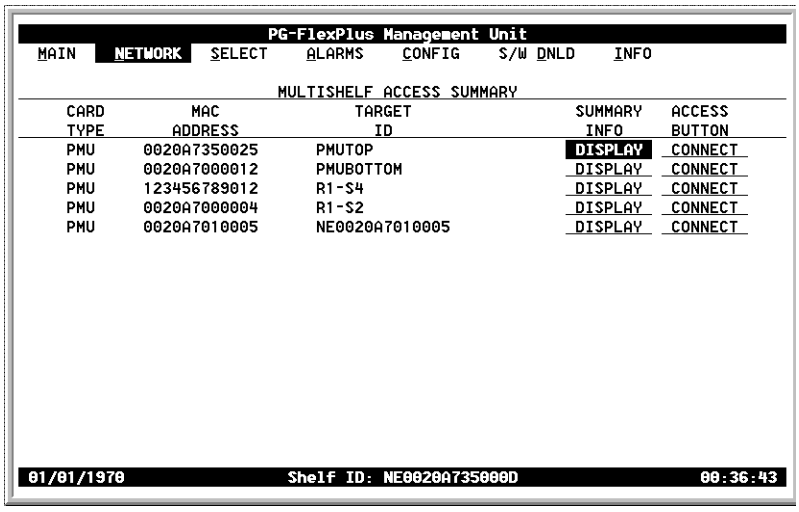

Figure 31. *MultiShelf Access Summary Screen with MultiShelf Connections*

3 Press **ESC** to return to the PMU main menu.

Connection Summary Screen

This screen allows you to view all incoming MultiShelf connections (maximum of three). MultiShelf screens supports a series of outbound connections with up to 24 remote PMUs while maintaining up to three simultaneous inbound connections.

1 At the *NETWORK* submenu, select the *Connection Summary* option and press **ENTER** to view the screen. If there is no information in the Connection Summary the following screen will display with a flashing message at the bottom of the screen: `Connection Table Empty. **Hit <CR> to Continue**`

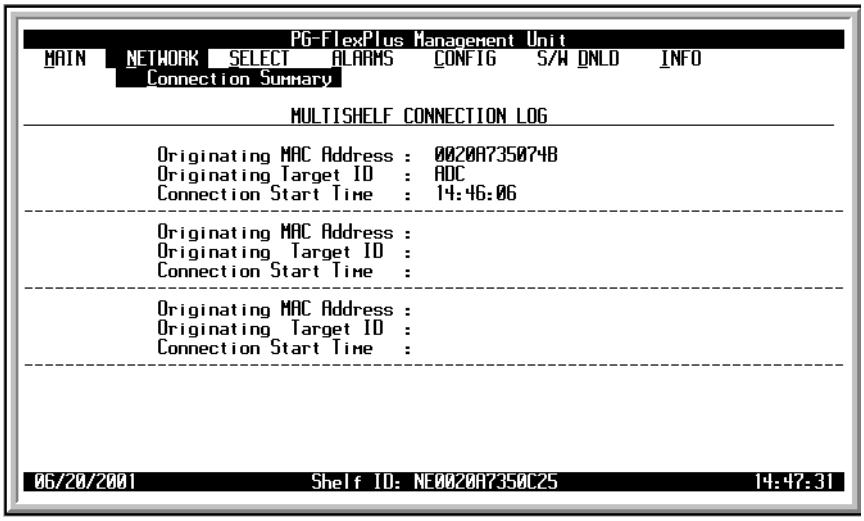

Figure 32. *Connection Summary Screen*

2 Press **ESC** to return to the MultiShelf main menu.

Local Summary Screen

This screen allows you to view the MultiShelf Local Card Summary for the PMU, including card identification information, port session locations and states, and alarm activity.

1 At the *NETWORK* submenu, select the *Local Summary* option and press **ENTER** to view the screen.

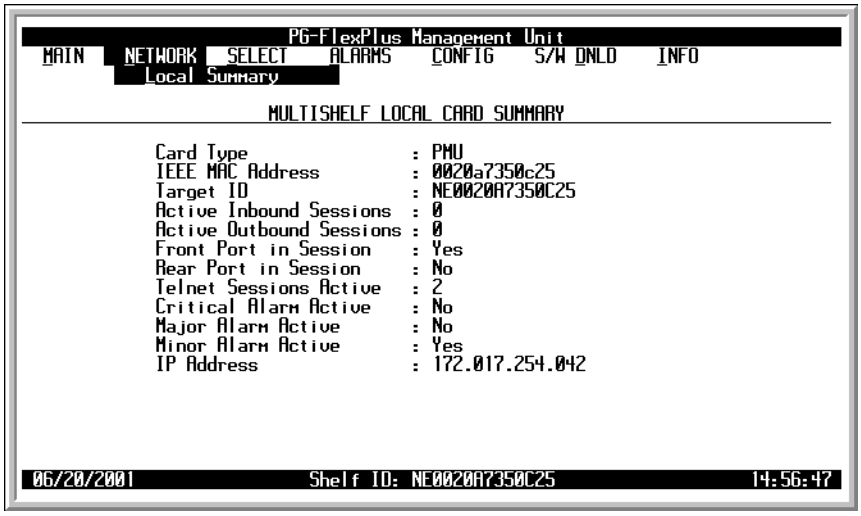

Figure 33. *Local Summary Screen*

2 Press **ESC** to return to the PMU main menu.

SELECT SUBMENU

This submenu allows you to select any of the cards installed in the COTS.

1 At the PMU main screen, choose the *SELECT* option and press **ENTER** to view the submenu.

2 Select the desired slot and press **ENTER** to access the card.

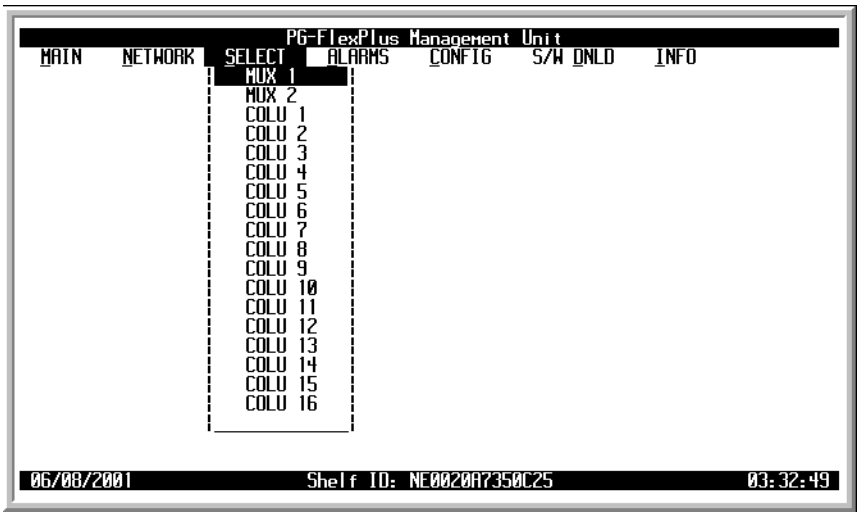

Figure 34. *SELECT Submenu*

If you select an unoccupied slot, an error message displays:

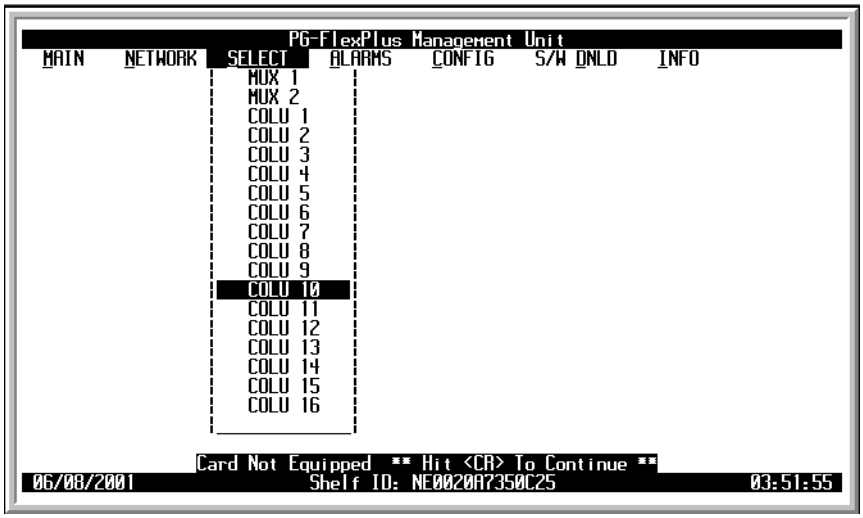

Figure 35. *SELECT Warning, no MUX or COLU in slot*

3 If you select an occupied slot, the main screen of the selected COLU or PMX displays:

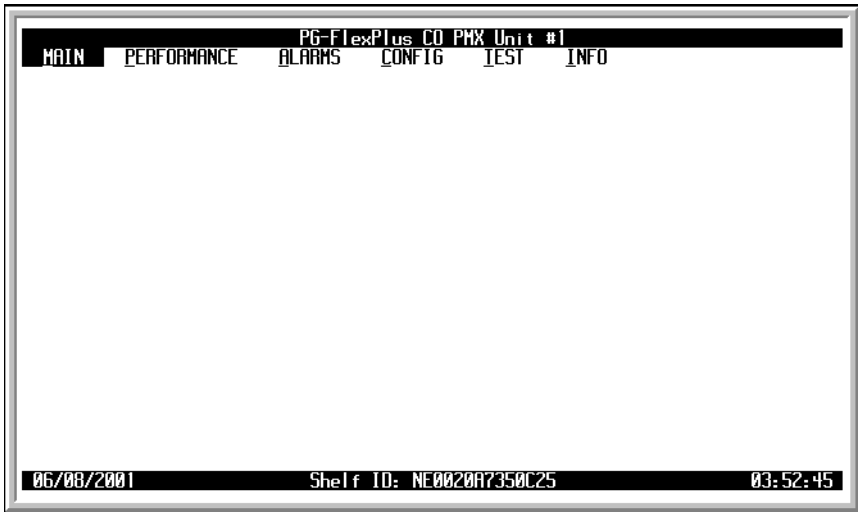

Figure 36. *PMX Unit #1 Main Screen*

4 At this screen you can view alarms, configure parameters, and perform tasks on the selected card. Refer to the documentation for the unit installed in the selected slot for additional information.

5 When you have finished, press **ESC** to return to the PMU main menu.

ALARMS SUBMENU

This submenu gives you access to the summary and history of the alarms and relays. You can also activate the ACO alarm from one of the screens.

1 At the PMU main screen, select the *ALARMS* option and press **ENTER** to view the submenu.

2 Select the desired option and press **ENTER** to view the screen.

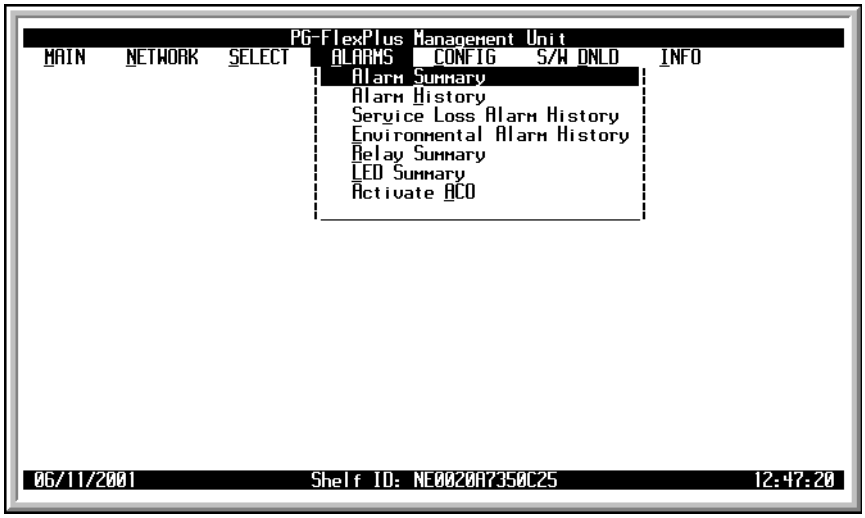

Figure 37. *Alarms Submenu Screen*

Submenu	To...
Alarm Summary	view a summary of alarms.
Alarm History	view a history of all alarm types.
Relay Summary	view the relay summary.
LED Summary	view a summary of LEDs.
Activate ACO	set ACO to active.

3 Press **ESC** to return to the PMU main menu.

Alarm Summary Screen

This screen displays the FDU-437 and FDU-439 alarmed events and the COTS alarm summary. The summary shows critical, major, or minor active alarms, and alarm history for each unit plugged into the COTS.

1 At the *ALARMS* submenu, select the *Alarm Summary* option and press **ENTER** to view the screen.

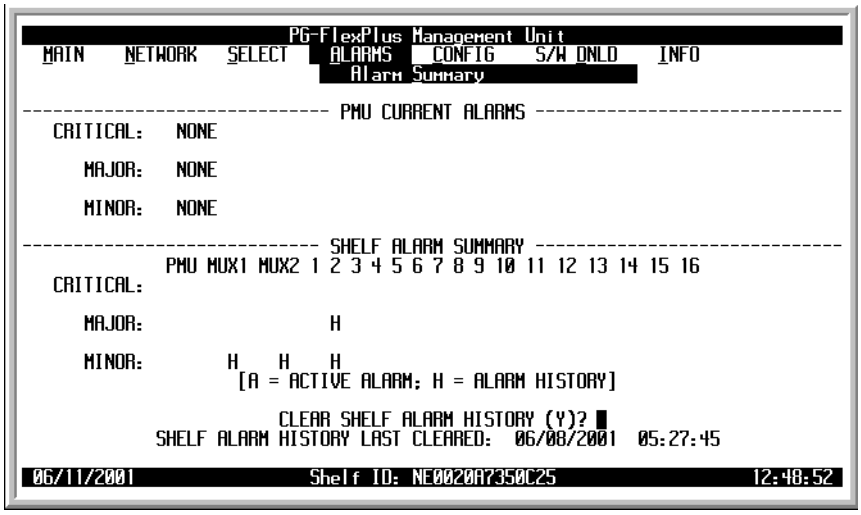

Figure 38. *Alarm Summary Screen*

An active alarm is represented by an A and a history alarm is represented by an H.

The line in which the Alarm appears indicates the level of the alarm and on which COTS slot the alarm exists.

A history alarm means that the alarm has been active and subsequently cleared since the last time the alarm history was cleared.

2 Enter a **Y** at the `CLEAR SHELF ALARM HISTORY (Y)?` prompt to clear the history file. The alarm summary history information remains latched until it is cleared. The time and date of the last alarm history clearing is listed at the bottom of the screen. An alarm is not cleared from the alarm history if it is currently active.

3 Press **ESC** to return to the PMU main menu.

Alarm History Screen

This screen displays the history of all FDU-437 and FDU-439 alarmed events.

1 At the *ALARMS* submenu, select the *Alarm History* option and press **ENTER** to view the screen.

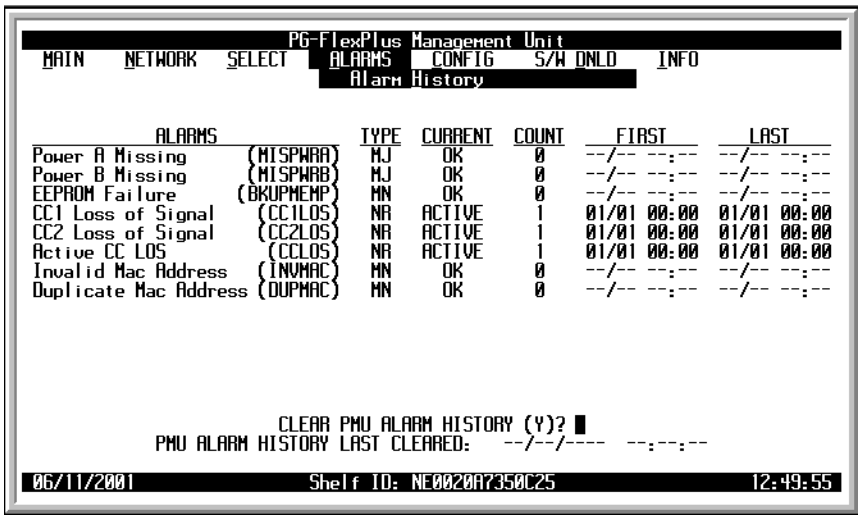

Figure 39. *Alarm History Screen*

Current values shown:

ACTIVE if an alarm exists

OK if there is no alarm condition.

The type of alarm is displayed in the TYPE column.

2 Enter a **Y** at the `CLEAR PMU ALARM HISTORY (Y)?` prompt to clear the history. The alarm history information remains latched until it is cleared.

The time and date of the last alarm history clearing is listed at the bottom of the screen.

An alarm is not cleared from the alarm history if it is currently active.

3 Press **ESC** to return to the PMU main menu.

Service Loss Alarm History Screen

This screen displays the Service Loss Alarm history for all COLUs in the COTS.

1 At the *ALARMS* submenu, select the *Service Loss Alarm History* option and press **ENTER** to view the screen.

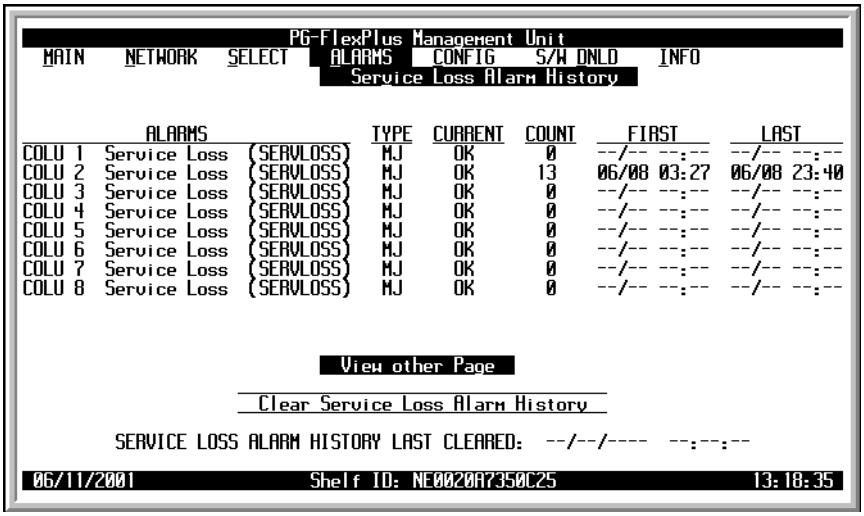

Figure 40. *Service Loss Alarm History Screen*

At this screen you have the following options:

- Select the View other Page button and press to page the screen forward or backward.
- Select the Clear Service Loss Alarm History button and press **ENTER**. At the `SERVICE LOSS ALARM HISTORY WILL BE CLEARED. CONTINUE (Y/N)?` prompt, press **Y** to set date and time registers of cleared alarms or press **N** to return to the *Service Loss Alarm History* main screen.

2 Press **ESC** to return to PMU main menu.

Environmental Alarm History Screen

This screen displays the history of environmental alarmed events for the PMU.

1 At the *ALARMS* submenu, select the *Environmental Alarm History* option and press ENTER to view the screen.

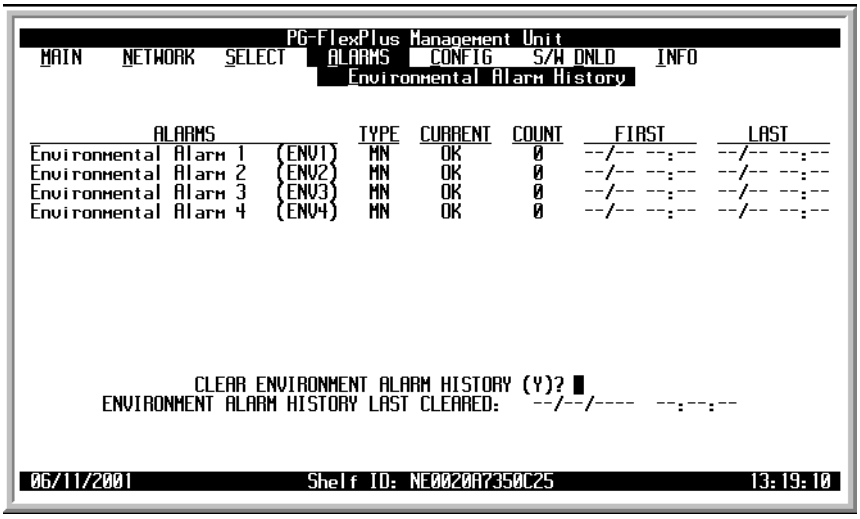

Figure 41. *Environmental Alarm History Screen*

At this screen you have the following options:

- Select the `CLEAR ENVIRONMENTAL ALARM HISTORY (Y)?` prompt and press Y to clear the Environmental Alarm History and to set the date and time that the Environmental Alarm History was last cleared.

2 Press ESC to return to PMU main menu.

Relay Summary Screen

This screen displays the relay summary information of the system.

1 At the *ALARMS* submenu, select the *Relay Summary* option and press **ENTER** to view the screen.

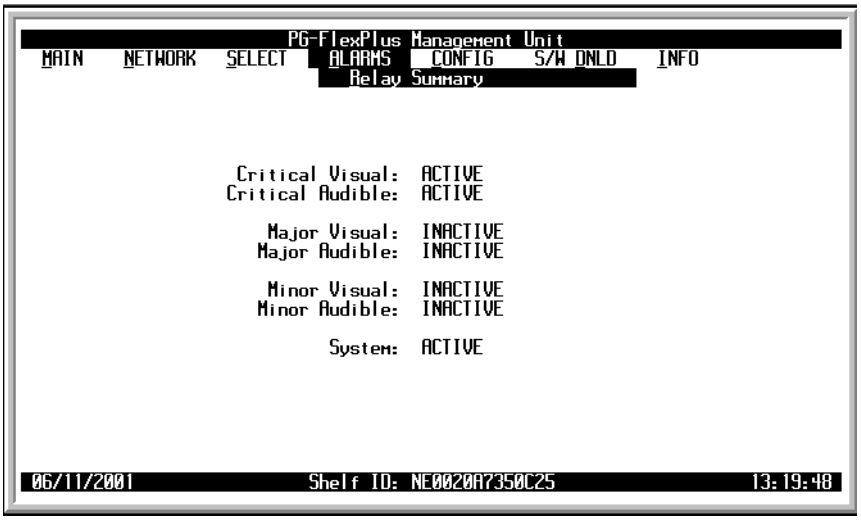

Figure 42. *Relay Summary Screen*

Current values shown:

- ACTIVE if the relay is activated
- INACTIVE if the relay is not activated.

2 Press **ESC** to return to the PMU main menu.

LED Summary Screen

This screen displays a summary of the LED activity.

1 At the *ALARMS* submenu, select the *LED Summary* option and press **ENTER** to view the screen.

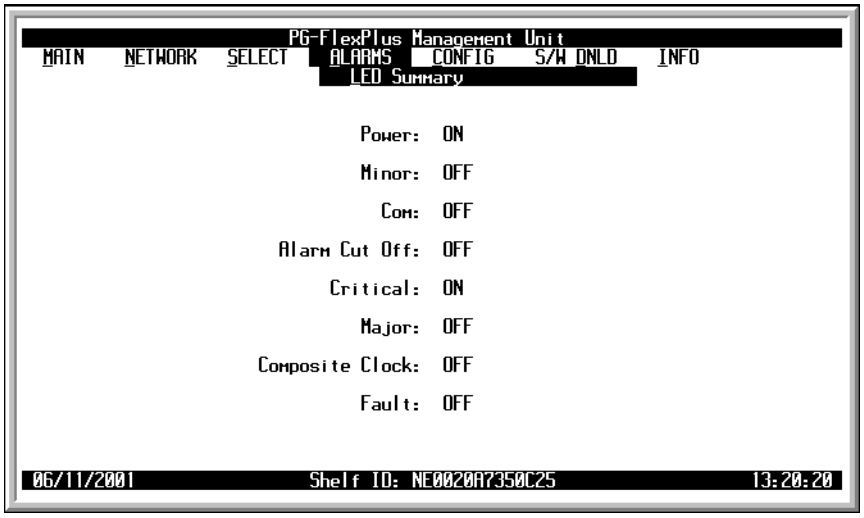

Figure 43. *LED Summary Screen*

Current values shown:

- ON if the LED is lighted
- OFF if the LED is not lighted.
- FLASHING if the LED is flashing.

2 Press **ESC** to return to the PMU main menu.

Activate ACO Screen

This screen allows you to activate the Alarm Cutoff feature of the PMU.

1 At the *ALARMS* submenu, select the *Activate ACO* option and press ENTER to view the screen.

Figure 44. *Activate ACO Screen*

2 At the `ACO WILL BE ACTIVATED. CONTINUE (Y/N)?` prompt, you can:

- Enter a Y to activate the ACO.
- Enter a N to escape without activating the ACO.

3 If you selected to activate the ACO, an acknowledgement screen displays.

Figure 45. *Activate ACO Acknowledgement Screen*

4 Press ENTER to return to the PMU main menu.

CONFIGURATION SUBMENU

Using the screens available in this submenu, you can custom configure the Model Number. The configurable data on the Model Number includes the password, IP address, alarm types, date and time, terminal mode, and the COTS ID.

1 At the PMU main screen, select the *CONFIG* option and press **ENTER** to view the submenu.

Figure 46. *CONFIG Submenu Screen*

Submenu	To...
Shelf Options	configure the optional features of the shelf.
IP Info	change the PMU's IP address.
Password	change the password.
Alarm Types	view alarm types and defaults and set alarm levels.
Service Loss Alarm Types	display Service Loss alarm types and defaults and set alarm levels.
Environmental Alarm Types	display Environmental Alarm types and defaults and set alarm levels.
Date and Time	set the shelf date and time.
Terminal Mode	set session to TL1 mode, Screen mode, or both.
Set Factory Defaults	set PMU to factory default values.

2 Press **ESC** to return to the PMU main menu.

Shelf Options Screen

The Shelf Options screen allows you to configure the optional features of the shelf to your preferences.

1 At the *CONFIG* submenu, select *Shelf Options* and press **ENTER** to view the screen.

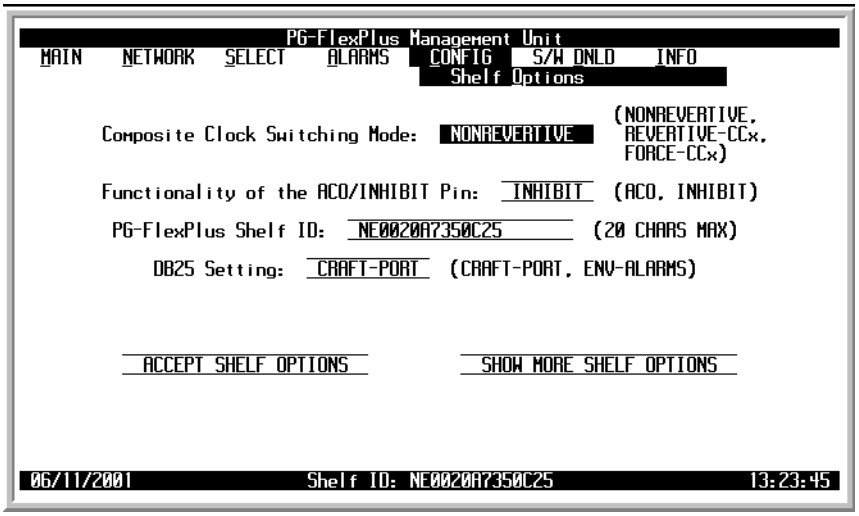

Figure 47. *Shelf Options Screen*

2 Press **TAB** to select the desired field, then press the **SPACEBAR** to toggle to the desired value for the switching mode.

3 You can perform these tasks:

- To change the Composite Clock Switching Mode value, press the **SPACEBAR** to toggle to the desired value, or press a directional key to move to next option. Refer to Table 18, "Shelf Options Configuration Fields," on page 56 for the default values.
- To change the Functionality of the ACO/INHIBIT PIN, press the **SPACEBAR** to toggle to the desired value, or press a directional key to move to next option. See Table 18, "Shelf Options Configuration Fields," on page 56 for the default values.
- To change the PG-Flex*Plus* System ID, type in a unique System ID name, or press a directional key to move to next option. See Table 18, "Shelf Options Configuration Fields," on page 56 for the default values.
- To change the DB25 Setting, press the **SPACEBAR** to toggle to the desired value, or press a directional key to move to next option. Refer to Table 18, "Shelf Options Configuration Fields," on page 56 for the default values.
- Select the SHOW MORE SHELF OPTIONS button and press **ENTER** to page to the next screen.

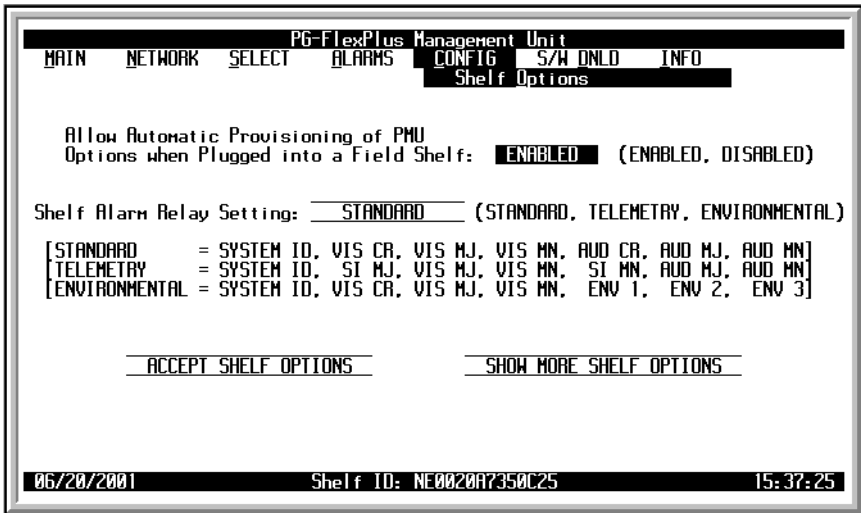

Figure 48. *Shelf Options Screen, Paged Forward*

- To enable or disable automatic provisioning of the PMU Options, press the press the **SPACEBAR** to toggle to the desired value, or press a directional key to move to next option. See Table 18, "Shelf Options Configuration Fields," on page 56 for the default values.
- To change the Shelf Alarm Relay Setting, press the **SPACEBAR** to toggle to the desired value, or press a directional key to move to next option. See Table 18, "Shelf Options Configuration Fields," on page 56 for the default values.

4 To save the shelf options, select the ACCEPT SYSTEM OPTION button and press **ENTER**. At the SHELF OPTIONS WILL BE CHANGED. CONTINUE (Y/N)? prompt:

- Press **Y** to save the shelf options. All values are saved.
- Press **N** to retain the existing shelf options and remain at the Shelf Options screen.

5 Press **ESC** to return to the PMU main menu.

Table 18. *Shelf Options Configuration Fields*

Options	Value	Description	List 2 Default
Composite Clock Switching Mode	Nonrevertive.	At power-up, the active CC defaults to CC1. Switching occurs any time the active CC becomes invalid and the inactive CC is valid. After switching, the CC will not automatically revert back to CC1 when it becomes valid.	NONREVERTIVE
	Revertive - CC1	If CC1 is valid, it is the active CC. CC2 is only active if CC2 is valid and CC1 is invalid.	
	Revertive - CC2	If CC2 is valid, it is the active CC. CC1 is only active if CC1 is valid and CC2 is invalid.	
	Force - CC1	CC1 is always the active CC regardless of validity.	
	Force CC2	CC2 is always the active CC regardless of validity.	
ACO/INHIBIT	ACO	Placing a ground on this pin on the COT shelf backplane will silence any audible alarms.	INHIBIT
	Inhibit	This pin on the COT shelf backplane will be grounded whenever a subscriber drop test is being performed.	
PG-Flex *Plus* Shelf ID		Configurable identification string for shelf can be up to 24 characters. The Shelf ID is always visible at the bottom of every screen. There are no special rules for changing the shelf ID. Any printable character, including space, is valid.	“NE” followed by the MAC address. For instance if a PMU has a MAC address of 0020A7350535, the Shelf ID will be NE0020A7350535”
DB25 Setting	CRAFT-PORT	The rear DB-25 RS-232 connector is setup to act as a craft port.	CRAFT-PORT
	ENV-ALARMS	The rear DB-25 RS-232 connector is setup to provide environmental alarm inputs.	NOTE: This setting is automatically changed to ENV-ALARMS when the PMU is plugged into a field shelf and the automatic field shelf provisioning option is set to ENABLED.

Table 18. *Shelf Options Configuration Fields*

Options	Value	Description	List 2 Default
Shelf Alarm Relay Setting	STANDARD	Alarm relay terminations on the COT shelf backplane support the following indications: System ID Critical - Visual Critical - Audible Major - Visual Major - Audible Minor - Visual Minor - Audible	STANDARD NOTE: This setting is automatically changed to ENVIRONMENTAL when the PMU is plugged into a field shelf and the automatic field shelf provisioning option is set to ENABLED.
	TELEMETRY	Alarm relay terminations on the COT shelf backplane support the following indication: Shelf ID System - Major System - Minor Major - Visual Major - Audible Minor - Visual Minor - Audible	
	ENVIRONMENTAL	Alarm relay terminations on the COT shelf backplane support the following indications: System ID Critical - Visual Major - Visual Minor - Visual Environmental #1 Environmental #2 Environmental #3	
Automatic field shelf provisioning	ENABLED	Allow automatic provisioning when the PMU is plugged into a field shelf. When this option is enabled, the setting for Environmental Alarm TR-08 Data Link Reporting Environmental Alarm 2 is set to COM-MN when the PMU is plugged into a field shelf. The setting will be set back to the normal default if the PMU is subsequently plugged back into a normal shelf.	ENABLED
	DISABLED	No automatic provisioning occurs when a PMU is plugged into a field shelf	

IP Information Screen

This screen allows you to change the PMU's IP address. To modify the configuration, see the following discussion.

1 At the *CONFIG* submenu, select the *IP Info* option and press **ENTER** to view the screen.

2 You can configure the IP settings following the rules outlined in Table 19.

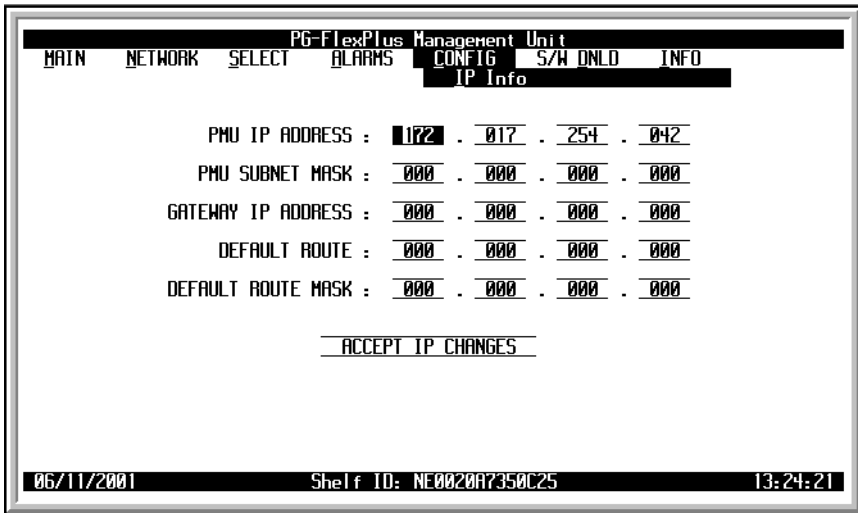

Figure 49. *IP Info Screen*

3 When you have completed the changes, you can:

- **1** Select the ACCEPT IP CHANGES button, and press **ENTER** to accept the changes.
- **2** Press **ESC** to escape without saving the changes.

4 Press **ESC** to return to the main menu.

Table 19. *IP Configuration Settings*

Address	Description
PMU IP Address	A unique 4-byte address, such as 128.33.10.3.
PMU's Subnet Mask	The subnet mask assigned to the LAN, such as 255.255.0.0.
Gateway IP Address (Optional)	The unique 4-byte address of the gateway/router/bridge, such as 128.30.0.1.
Default Route Network Address (Optional)	The network address assigned to the external LAN
Default Route Mask (Optional)	The assigned subnet mask of the external LAN.

Password Screen

This screen allows you to set or change the system password.

1 At the *CONFIG* submenu, select the *Password* option and press ENTER to view the screen.

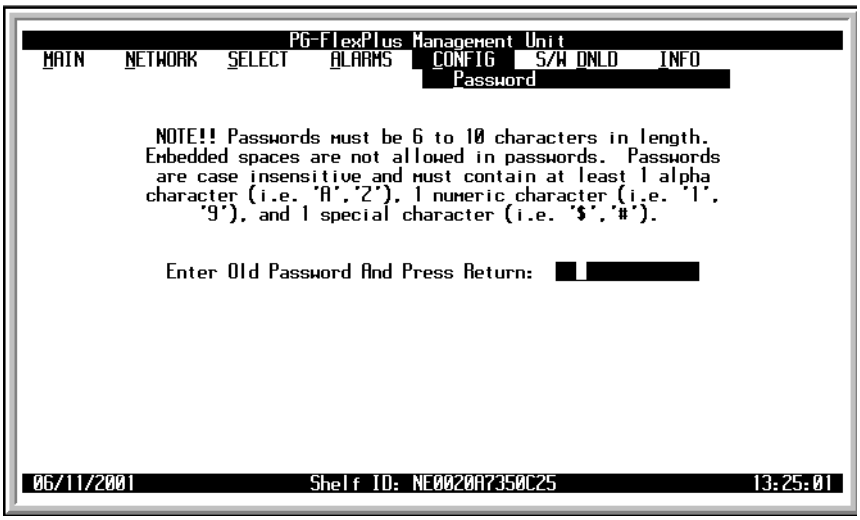

Figure 50. *Password Screen*

2 To change the password:

- **a** Enter the old password in the Enter Old Password And Press Return: field, and press ENTER to gain access to the change password field. If you do not know the old password, you cannot change the password.
- **b** At the prompt, type the new password, using the characters defined on the screen.
- **c** At the confirmation prompt, re-type the new password.

3 Press ESC to return to the PMU main menu.

Alarm Types Screen

The FDU-437 and FDU-439 detects and reports alarmed events specific to the FDU-437 and FDU-439, and alarms for all the units installed in the COTS. The notification type, such as Major, Minor, or Not Alarmed, is provisioned on the unit where the event is detected. The FDU-437 and FDU-439 specific alarmed events and the default notification types are shown in Table 19, "IP Configuration Settings," on page 58.

1 At the *CONFIG* submenu, select the *Alarm Types* option and press **ENTER** to view the screen.

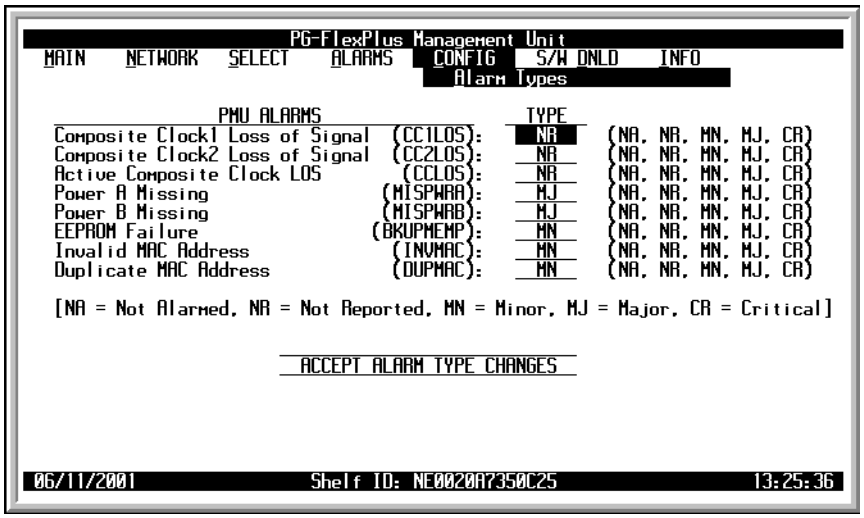

Figure 51. *Alarm Types Screen*

2 To change the Alarm Types:

- **a** Select the alarm type field, then press **SPACEBAR** to toggle to the value desired. See Table 20, "Alarm Types," on page 61 for explanations and default values of the alarms.
- **b** When you have completed changes, select ACCEPT ALARM TYPE CHANGES, then press **ENTER**.
- **c** To escape without saving the changes, press **ESC**.

3 Press **ESC** to return to the PMU main menu.

Table 20. *Alarm Types*

Alarms	Value	Description	List 2 Default
CC1 Loss of Signal	NA, NR, MN, MJ, CR	Composite clock 1 signal is missing	NR
CC2 Loss of Signal	NA, NR, MN, MJ, CR	Composite clock 2 signal is missing	NR
Active Composite clock LOS	NA, NR, MN, MJ, CR	A loss of signal has been detected on the active composite clock	NR
Power A Missing	NA, NR, MN, MJ, CR	PMU has detected missing “A” -48 V battery	MJ
Power B Missing	NA, NR, MN, MJ, CR	PMU has detected missing “B” -48 V battery	MJ
EEPROM Failure	NA, NR, MN, MJ, CR	PMU memory checksum is incorrect.	MN
Invalid MAC address	NA, NR, MN, MJ, CR	The PMU has an invalid MAC address.	MN
Duplicate MAC address	NA, NR, MN, MJ, CR	The PMU has the same MAC address as another PMU connected to the 10Base2 backplane network.	MN

Service Loss Alarm Types Screen

All service Alarm types can be provisioned at this screen.

1 At the *CONFIG* submenu, select the *Service Loss Alarm Types* option and press **ENTER** to view the screen.

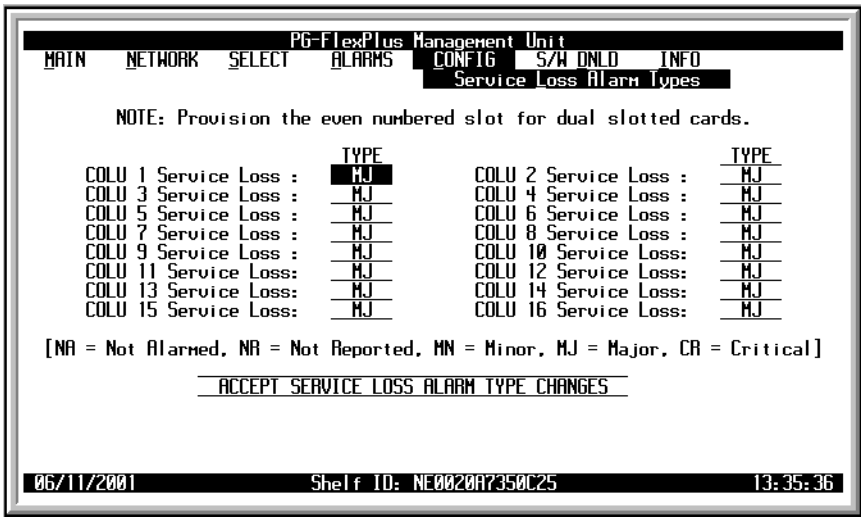

Figure 52. *Service Loss Alarm Types Screen*

2 To change the Service Loss Alarm Types:

a Select the alarm type field, then press **SPACEBAR** to toggle to the value desired. See Table 21 for explanations and default values of the alarms.

b When you have completed changes, select the ACCEPT SERVICE LOSS ALARM TYPE CHANGES button, then press **ENTER**.

c To escape without saving the changes, press **ESC**.

3 Press **ESC** to return to the PMU main menu.

Table 21. *Service Loss Alarm Types*

Alarm	Value	Description	List 2 Default
Service Loss COLU*n* (where *n* = 1 to 16)	NA, NR, MN, MJ, CR	Service to an RT serviced by COLU*n* (where *n* = 1 to 16) has been lost after service was previously active.	MJ

Environmental Alarms Setup Screen

The TR-08 data link alarm types can be provisioned at this screen for each environmental alarm.

1 At the *CONFIG* submenu, select the *Environmental Alarms Setup* screen option and press **ENTER** to view the screen.

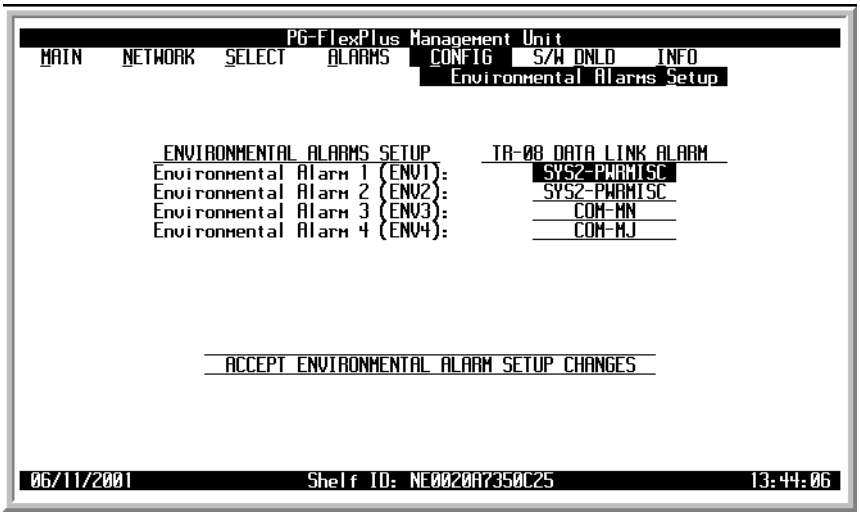

Figure 53. *Environmental Alarms Setup Screen*

2 To change the Environmental Alarms Setup:

a Select the TR-08 Data Link Alarm field for the desired Environmental Alarm, then press **SPACEBAR** to toggle to the value desired. See Table 22 for explanations and default values of the alarms.

b When you have completed changes, select the ACCEPT ENVIRONMENTAL ALARM SETUP CHANGES button, then press **ENTER**.

c To escape without saving the changes, press **ESC**.

d Press **ESC** to return to the PMU main menu.

Each environmental alarm can be sent via specific bit locations in the datalink. Refer to Table 22 for a list of possible alarm bit values. Refer to Table 23 for alarm defaults.

Table 22. *Environmental Alarm TR-08 Bit Positions*

Value	Description
NOT REPORTED	Not reported
SYS1-PWRMISC	Reported via the system 1 PWR/MISC bit
SYS1-MN	Reported via the system 1 MN bit
SYS1-MJ	Reported via the system 1 MJ bit
SYS2-PWRMISC*	Reported via the system 2 PWR/MISC bit
SYS2-MN*	Reported via the system 2 MN bit
SYS2-MJ*	Reported via the system 2 MJ bit
COM-PWRMISC*	Reported via the system 1 and system 2 PWR/MISC bit
COM-MN*	Reported via the system 1 and system 2 MN bit
COM-MJ*	Reported via the system 1 and system 2 MJ bit
* DS1 5 (system 2 SHELF A) must be up and operating in TR-08 mode for these alarms to work correctly.	

Table 23. *Environmental Alarm Defaults*

Alarms	Default
Environmental #1	SYS1-PWRMISC
Environmental #2	SYS2-PWRMISC*
Environmental #3	COM-MN
Environmental #4	COM-MJ
* Defaults to COM-MN in Field Shelf	

Environmental Alarm Types Screen

1 At the *CONFIG* submenu, select the *Environmental Alarm Types* option and press **ENTER** to view the screen.

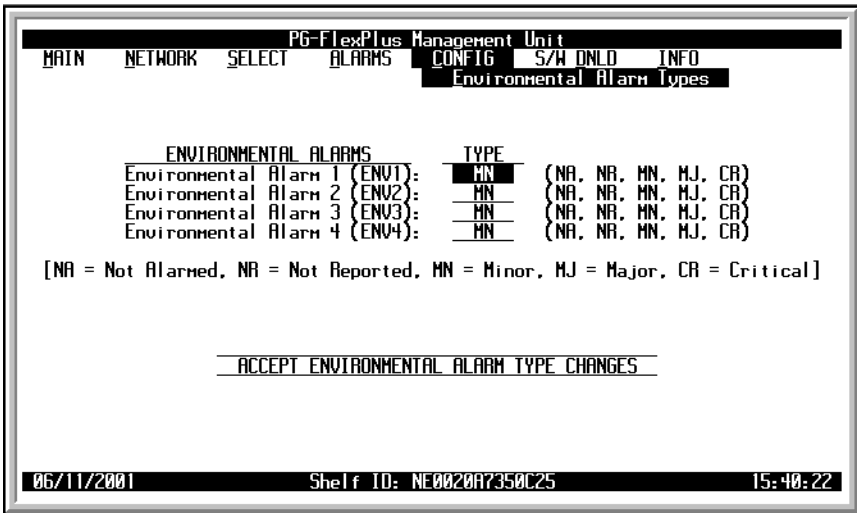

Figure 54. *Environmental Alarm Types Screen*

2 To change the Environmental Alarm Types:

- **a** Select the type field for the desired Environmental Alarm, then press **SPACEBAR** to toggle to the value desired. See Table 24 for explanations and default values of the alarms.
- **b** When you have completed changes, select the ACCEPT ENVIRONMENTAL ALARM TYPE CHANGES button, then press **ENTER**.
- **c** To escape without saving the changes, press **ESC**.

3 Press **ESC** to return to the PMU main menu.

Table 24. *Environmental Alarm Types*

Alarm	Value	Description	List 2 Default
Environmental Alarm *n* (where *n* = 1 to 4)	NA, NR, MN, MJ, CR	Severity of Environmental Alarm *n* (where *n* = 1 to 4) when alarm is active.	MN

Date and Time Screen

You can set the time zone and calendar date at this screen. All the screens show the default month, date, and year that comes with the system.

1 At the *CONFIG* submenu, select the *Date and Time* option and press **ENTER** to view the screen.

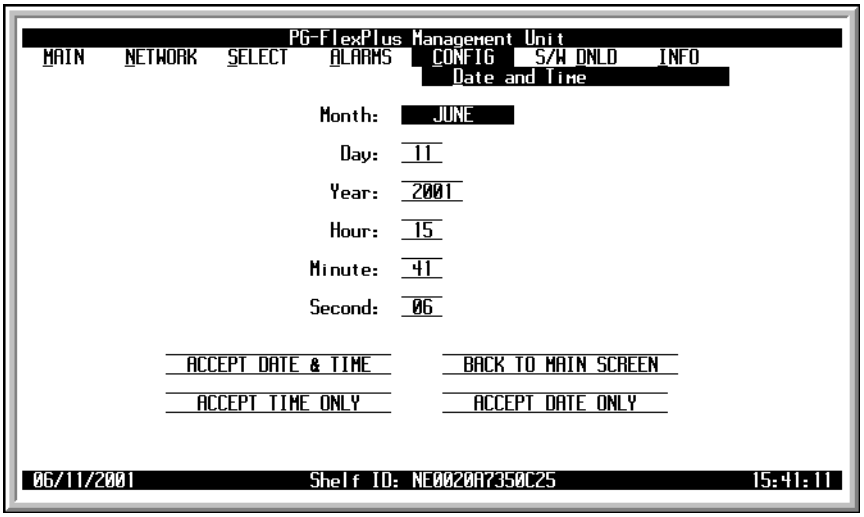

Figure 55. *Date and Time Screen*

2 You can perform these tasks:

a Select the Month field, then press **SPACEBAR** to toggle to the current month.

b Use the directional keys to move to the desired field, type the current values into the numeric entry fields. Valid values include:

- Day *Month and Year dependent*
- Year *1970 - 2035*
- Hour *0-23*
- Minute *0-59*
- Second *0-59*

c To save your changes, you have these options:

- Select the ACCEPT DATE AND TIME button and press **ENTER** to save all entries. If you accept the new settings, the PMU main menu displays and the new date and time is sent to all PG-Flex*Plus* units in the COTS.
- Select the ACCEPT DATE ONLY button and press **ENTER** to save only the date.
- Select the ACCEPT TIME ONLY button, to change only that value and press **ENTER** to save only the time.
- Select the BACK TO MAIN SCREEN button, to leave the screen without saving the changes and return to the PMU main menu.

3 Press **ESC** to return to the PMU main menu.

Terminal Mode Screen

The terminal mode allows the PMU terminals to act in a pure screen mode, a pure TL1 mode, or a hybrid of both modes.

- In SCREENS mode, the terminals supply only screen sessions; thus you can not change to a TL1 session while in screens mode.
- In the TL1 mode, the terminals support only the TL1 session; thus you can not change to a Screen session while in the TL1 mode.
- In the BOTH mode, you can switch between a Screen and TL1 session at any time.
  - At the *CONFIG* submenu, select the *Terminal Mode* option and press **ENTER** to view the screen.

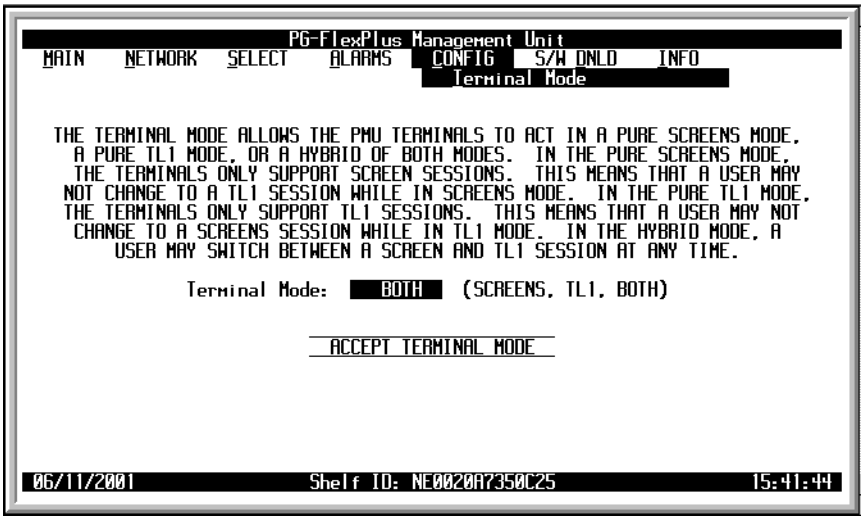

Figure 56. *Terminal Mode Screen*

Table 25. *Terminal Mode Screen*

Alarm	Value	Description	List 2 Default
Terminal Model	Screens	The PMU will only allow SCREENS user interface sessions.	Both
	TL1	The PMU will only allow TL1 user interface sessions.	
	Both	The PMU will allow both SCREENS and TL1 user interface sessions	

4 Select the Terminal Mode field, then press **SPACEBAR** to toggle to the value desired (Screens, TL1, or Both).

- To save you changes, select the ACCEPT TERMINAL MODE button, then press **ENTER**.
- To escape without saving the changes, press **ESC** to return to the PMU main screen.

5 Press **ESC** to return to the PMU main menu.

Set Factory Defaults Screen

At this screen you can reset the system to the factory default values.

1 At the *CONFIG* submenu, select the *Set Factory Defaults* option and press **ENTER** to view the screen.

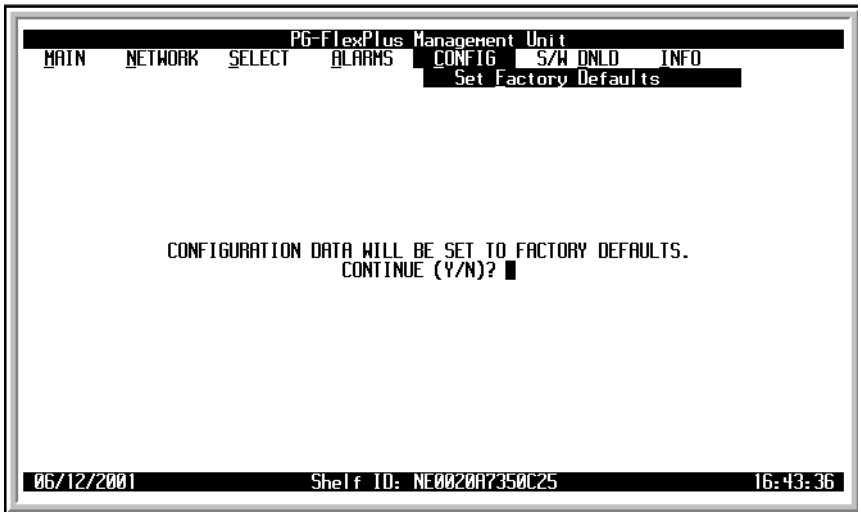

Figure 57. *Set Factory Defaults Screen*

2 To reset all PMU values to the factory defaults:

a Type **Y** at the `CONFIGURATION DATA WILL BE SET TO FACTORY DEFAULTS. CONTINUE (Y/N)?` prompt to reset the system values to the factory defaults. The date and time will reset to the default shown on the first screens.

b To save the changes you have made to the configuration data, including date and time, type **N**.

3 Press **ESC** to return to the PMU main menu.

SOFTWARE DOWNLOAD SUBMENU

1 At the PMU main screen, select the *CONFIG* option and press **ENTER** to view the submenu.

2 Select the desired option and press **ENTER** to view the screen.

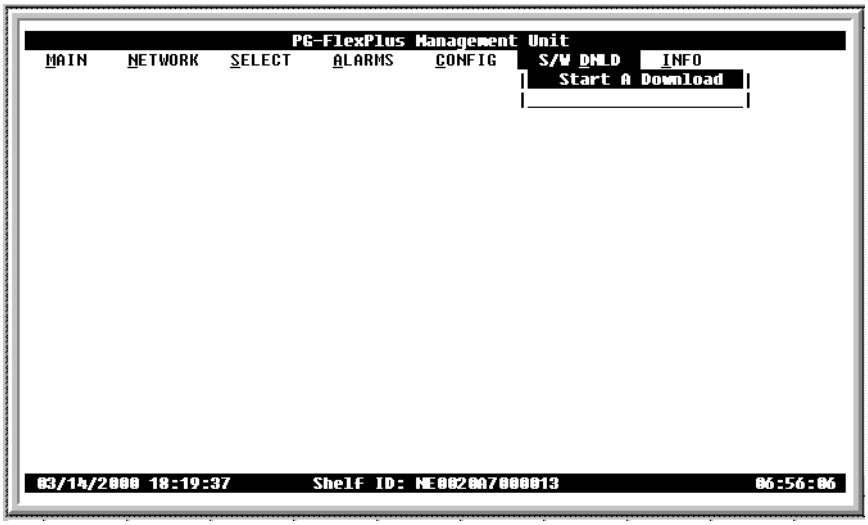

Figure 58. *Software Download Submenu*

3 Press **ESC** to return to the PMU main menu.

Start A Download Screen

1 At the *S/W DNLD* submenu, select the *Start A Download* option and press **ENTER** to view the screen.

The S/W DNLD menu has buttons representing the units that can be selected for software download. PG-Flex*Plus* microprocessor based units use flash memory to facilitate upgrading the stored software in the field.

2 Connect a PC running a terminal emulator program to the Model Number RS-232 Craft port. The terminal emulator program must emulate a VT-100 terminal, and support XMODEM program uploads. Downloading is performed using the same settings as the terminal, thus downloads can be done faster if the Model Number to PC link is operating at the highest baud rate supported by both devices. If the terminal emulator has the ability to support relaxed XMODEM protocol timing, also select this option.

Before attempting a software download to a COLU or an RT, ensure that the COLU and the RT are synchronized, that is, the High-bit-rate Digital Subscriber Line (HDSL) status is Normal.

Performing a software download to a COLU or an RT interrupts service to all the lines served by the unit. Downloading new software to a FDU-437 and FDU-439 does not disrupt PG-Flex*Plus* systems (a COLU connected to a RT) managed by the FDU-437 and FDU-439. However, the FDU-437 and FDU-439 itself is out of service during its download and cannot process COTS alarms.

Verify the compatibility of the software before downloading. Release notes supplied with the diskette lists the compatible PG-Flex*Plus* units.

If you are downloading new software to both the COLU and RT, download the new software to the RT first. If you download software to the COLU first, you may not be able to communicate with the RT.

3 **TAB** to the desired unit for the software download and press **ENTER**.

A warning message remind you that the selected unit or system is out of service during the download.

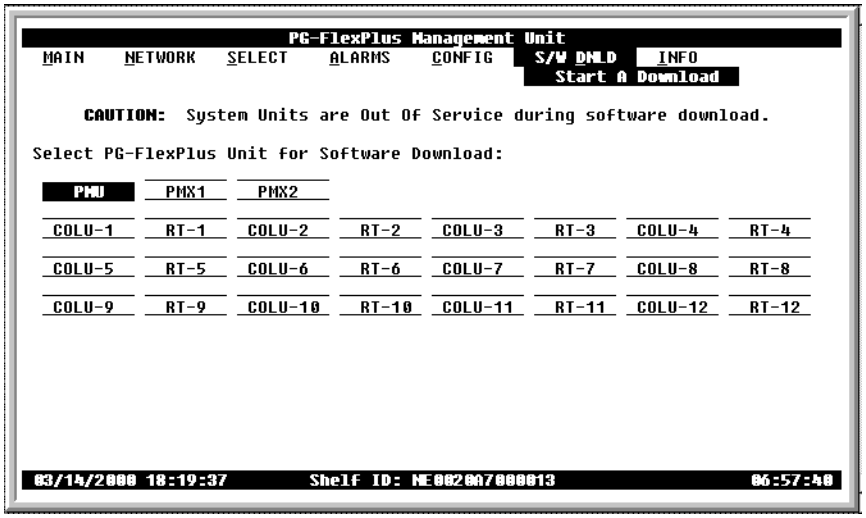

Figure 59. *Start A Download Screen*

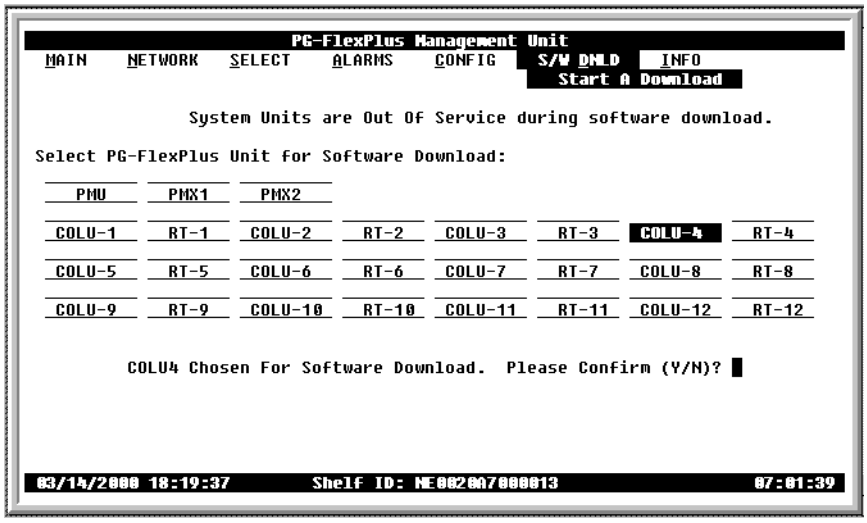

Figure 60. *Software Download Confirmation Screen*

4 Type **Y** at the `COLU4 Chosen for Software Download. Please Confirm (Y/N)?` prompt to continue. This screen shows that COLU-4 was selected for the target of the software download.

An RT download may take up to several minutes to prepare for a software download.

5 If the system was unable to prepare for the download, or if you chose an empty slot for the software download, an error message displays indicating a possible reason for the failure:

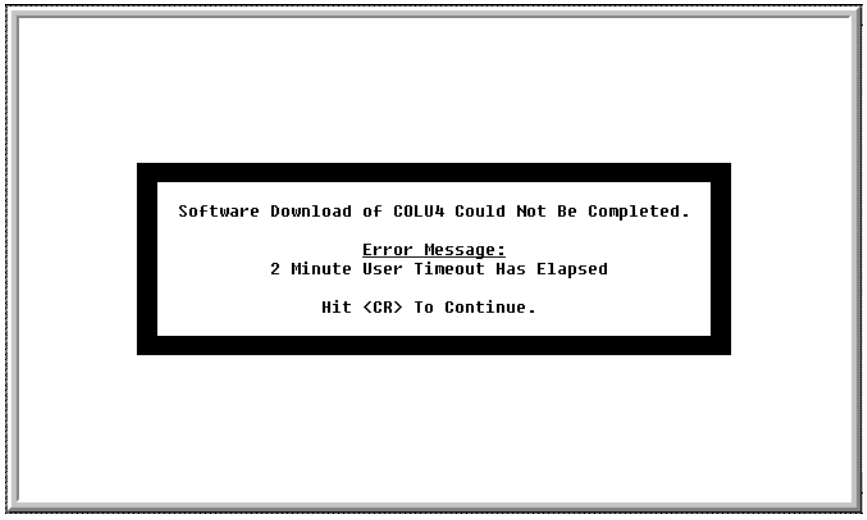

Figure 61. *Software Download Error Message Screen*

6 Press **ENTER** to return to the screens. The banner appears momentarily, and then the PMU main menu displays.

7 If the system was able to prepare for download, a message informs you that the system is ready, and the appropriate steps to take:

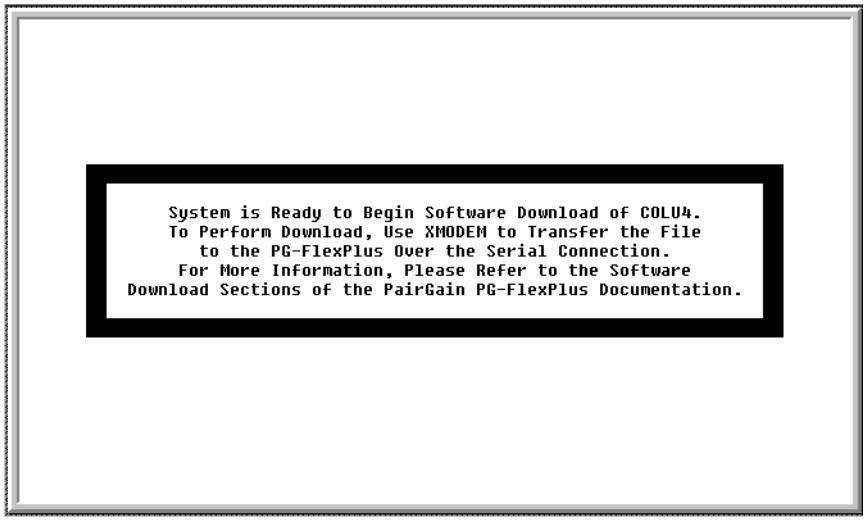

Figure 62. *Software Download System Ready Screen*

8 Instruct the terminal emulator to begin an XMODEM upload.

- The file to be uploaded has a .DWN extension, and a prefix that identifies the card to which it should be uploaded. For example, if a FDU-437 and FDU-439 was the target card, the file name would be similar to PMUAPPL.DWN, indicating that FDU-437 and FDU-439 Application Code is to be transferred.
- Most terminal emulators indicate the progress of the upload until completion. The FDU-437 and FDU-439 and COLU provide a visual indication of download activity by alternately blinking each of the front panel LEDs, except for the PWR LED. The COLU LEDs also give an indication of the RT download activity.

Do not interrupt the download process, unplug the PG-Plus units or the cable connecting the VT100 terminal to the PG-Flex*Plus* unit.

Upon completion, the Model Number displays a message of success or failure of the download. If the download failed, go to the next section for further instructions.

Download Retry

If a download failure occurs, the targeted download card may remain in boot code. The download target card indicates that it is in boot code by flashing all front panel LEDs with the exception of the PWR LED. When a COLU or RT is running in boot code, all lines serviced by that particular card remain out of service. The FDU-437 and FDU-439 in boot code is unable to process system alarms.

Another attempt to download to the card can be performed using the same procedure as above. An exception, if the targeted card was the FDU-437 and FDU-439 and the download fails, follow the instructions in the displayed message, and press **Y** to begin the download. Follow the download procedure as described above.

If a card fails to download, you can continue to retry until a successful download is achieved. If a failure occurs on a FDU-437 and FDU-439 or COLU and no response is received to subsequent download attempts, remove and then reinsert the FDU-437 and FDU-439 or COLU into the COTS and retry the download. If a RT fails and subsequent attempts to download achieve no response, remove and reinsert the appropriate COLU into the COTS, then retry the download.

Software Download with Modem

To perform software downloads of the software through a modem connection, you may need to reconfigure the modem. The settings on the modem connected to the unit are slightly different than the settings required on the modem connected to the PC used for the download. The following tables identify the functional characteristics required for each modem.

If you are using a modem that is not Hayes compatible, refer to the modem manufacturer's documentation for command codes required to implement the stated functional characteristics.

Modem Connected to PC

At the modem connected to the PC, use the settings in Table 26.

Table 26. *PC Modem*

Item	Functional Characteristic	Hayes Command String
1	Software Flow Control	AT&F2
2	Disable TX Flow Control	AT&H0
3	Disable RX Flow Control	AT&I0
4	Disable Data Compression	AT&K0
5	Normal Mode (Error Control Disabled)	AT&M0

Modem Connected to PG-Flex*Plus*

At the modem connected to the PG-Flex*Plus*, use the settings in Table 27.

Table 27. *PG-Plus Modem*

Item	Functional Characteristic	Hayes Command String
1	Software Flow Control	AT&F2
2	Disable TX Flow Control	AT&H0
3	Disable RX Flow Control	AT&I0
4	Disable Data Compression	AT&K0
5	Normal Mode (Error Control Disabled)	AT&M0
6	No Command Echo	ATE0
7	Quiet (No Result Codes)	ATQ1

Error Messages

Download error messages described below are shown in bold type, and are followed by a short description of the message.

Software Download Command Timed Out - The FDU-437 and FDU-439 sent a command to the card that was to be downloaded, and did not receive a response from the card.

Bad Response Received for Download Command - A command was sent from FDU-437 and FDU-439 to the card to be downloaded and an invalid response was returned.

Not Receiving ACK/NAK Responses - The FDU-437 and FDU-439 is not getting a response to a data packet that it has tried to transmit (several times) to the card being downloaded. If this failure occurs, the card that was being downloaded may be in a state that requires that it be power cycled prior to attempting the next download.

Software Download Data Timed Out - Displayed in situation where the terminal program began sending data, but for some reason the FDU-437 and FDU-439 has stopped receiving data. If possible, verify that the terminal emulator is functioning correctly.

XMODEM Protocol Violation - A number of things can cause this error to occur, such as pulled cables or cancellation by user of download by means of the terminal emulator. Basically a generic error indicating a failure to complete the download occurred somewhere between the FDU-437 and FDU-439 and the terminal emulator.

Invalid ACK/NAK Response Received - This failure indicates that the FDU-437 and FDU-439 has received an unexpected response to a packet in which an ACK or NAK response was expected.

Too Many Retransmission Requests - Somewhere in the link between the FDU-437 and FDU-439 and the card being downloaded there were errors. These errors cause retransmissions as an attempt to correct the errors. If too many retransmission attempts occur, the download is aborted.

Card Busy - An attempt to download was made while the card was servicing a call. Downloads can only be performed when a card is not servicing any calls.In case of the Integrated Services Digital Network (ISDN) boards, the ISDN channel status should be in an *Not Active* state.

2 Minute User Timeout Has Elapsed - The user did not instruct the terminal emulator to begin an upload within 2 minutes of the FDU-437 and FDU-439 indicating that it was ready for the download to begin.

Download File is Invalid - The file selected for download was the wrong file for the card selected. Can also occur if the file has been corrupted.

Abort Due to DTR Loss - The FDU-437 and FDU-439 detected a loss of Data Transmit Ready (DTR) signal during the download. Recheck the cable connection between the FDU-437 and FDU-439 and PC.

INFORMATION SUBMENU

The Information submenu provides technical information about the system and contact information for ADC.

1 At the PMU main screen, select the *INFO* option and press **ENTER** to view the submenu.

2 Select the desired option and press **ENTER** to view the screen.

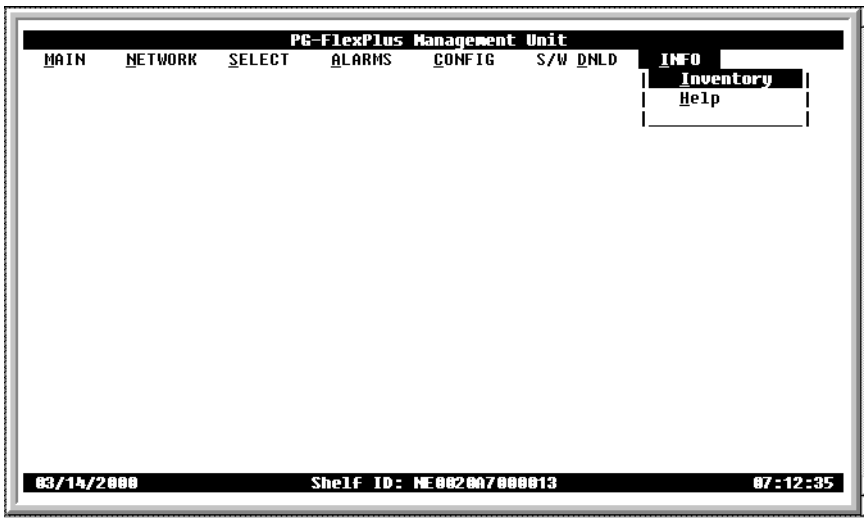

Figure 63. *Information Submenu*

3 From the Information submenu you can perform the following tasks:

Submenu	Allows you to....
Inventory	view the manufacturing data, software version and the hardware version for the PMU.
Help	view the on-line help.

4 Press **ESC** to return to the PMU main menu.

Inventory Screen

1 At the *INFO* submenu, select the *Inventory* option and press **ENTER** to view the screen.

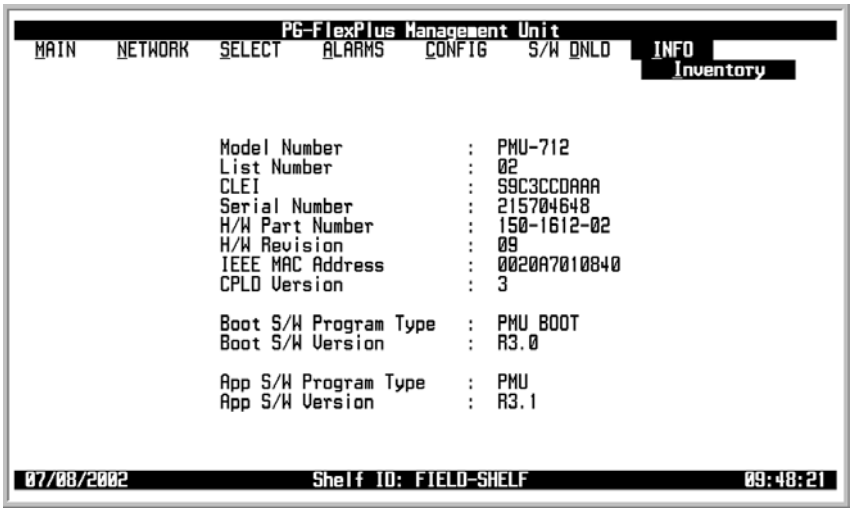

Figure 64. *Inventory Screen*

2 Press **ESC** to return to the PMU main menu.

Help Screen

The Help Screen provides information on using the FDU-437 and FDU-439 screens and menus and also lists the ADC Customer Support telephone number.

1 At the *INFO* submenu, select the *Help* option and press **ENTER** to view the screen.

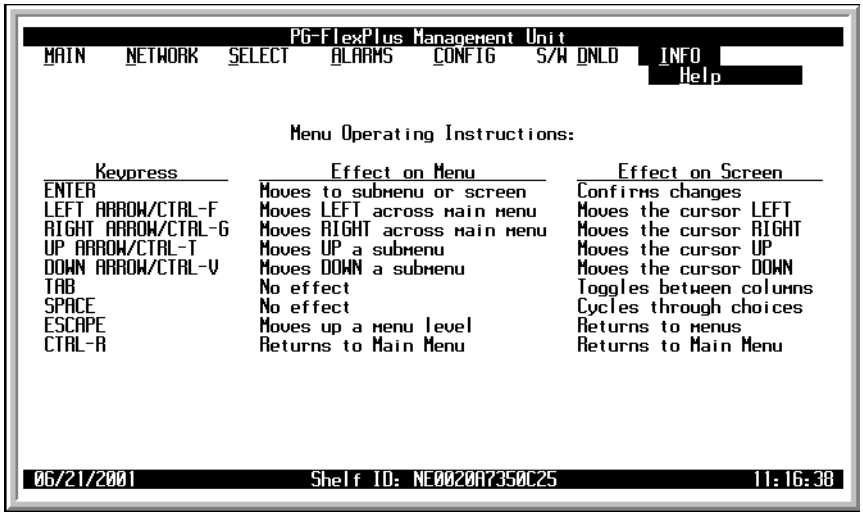

Figure 65. *Help Screen*

2 Press **ESC** to return to the PMU main menu.

PRODUCT SUPPORT

TECHNICAL SUPPORT

Technical Assistance is available 24 hours a day, 7 days a week by the contacting Customer Service Engineering group at:

Telephone:	800.366.3891 The 800 telephone support line is toll-free in the U.S. and Canada.
Email:	wsd_support@adc.com
Knowledge Base:	http://adc.com/Knowledge_Base/index.jsp
Web:	www.adc.com

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.

RETURNS

To return equipment to ADC:

1. Locate the number of the purchase order under which the equipment was purchased. To obtain a return authorization number, you need to provide the original purchase order number to ADC's Return Material Authorization (RMA) Department.
2. Call or write ADC's RMA Department to ask for an RMA number and any additional instructions. Use the telephone number, fax number or email address listed below:
   - Telephone: 800.366.3891
   - Email Address: rma@adc.com
3. Include the following information, in writing, along with the equipment you are returning:
   - Company name and address.
   - Contact name and telephone number.
   - The shipping address to which ADC should return the repaired equipment.
   - The original purchase order number.
   - A description of the equipment that includes the model and part number of each unit being returned, as well as the number of units that you are returning.
   - The reason for the return. For example:
     - The equipment needs an ECO/ECN upgrade.
     - The equipment is defective.

If the equipment is defective, please tell us what you observed just before the equipment malfunctioned. Be as detailed in your description as possible.

If there is another reason for returning the equipment, please let us know so we can determine how best to help you.

4 Pack the equipment in a shipping carton.

5 Write ADC's address and the RMA Number you received from the RMA Department clearly on the outside of the carton.

All shipments are to be returned prepaid. ADC will not accept any collect shipments.

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 use will be required to correct the interference at his own expense.

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 product(s) should follow the provisions of the current edition of the National Electrical Code.

ACRONYMS

ACO	Alarm Cut-Off
CCLK	Composite Clock
CO	Central Office
COLU	Central Office Line Unit
COTS	Central Office Terminal Shelf
CR	Critical
DDL	Derived Data Link
DDS	Digital Data Service
DSR	Data Set Ready
DTR	Data Terminal Ready
FCC	Federal Communications Commission
HDSL	High-bit-rate Digital Subscriber Line
IDLC	Integrated Digital Loop Carrier
ISDN	Integrated Services Digital Network
LAN	Local Access Network
LCF	Line Current Feed
LCFO	Line Current Feed Open
LED	Light Emitting Diode
mA	milli-Amps
MJ	Major
MLT	Mechanized Loop Testing
MN	Minor
NA	Not Alarmed
NR	Not Reported
RFC854	Request for Comment 854 Telnet Protocol Standard for TL1
RD	Receive Data
TD	Transmit Data

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For Technical Assistance:
800.366.3891

ISO 9001
DNV
DNV Certification, Inc.
Certificated Firm