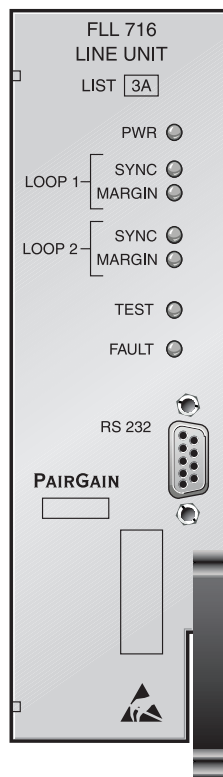# PG-FLEX 32 CHANNEL

CENTRAL OFFICE TERMINAL LINE UNIT

Model	List Number	Part Number
FLL-716	3A	150-1316-31

FLL 716
LINE UNIT
LIST 3A

PWR ○

LOOP 1 — SYNC ○
MARGIN ○

LOOP 2 — SYNC ○
MARGIN ○

TEST ○

FAULT ○

RS 232

PAIRGAIN

Revision History of This Practice
Revision 01—May 18, 1998
A) Initial Release

PAIRGAIN

USING THIS TECHNICAL PRACTICE

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

Notes contain information about special circumstances.

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

TABLE OF CONTENTS

PRODUCT OVERVIEW

This section provides a product description, and defines the features and specifications for a PairGain® PG-Flex™ FLL-716 List 3A Central Office Terminal (COT) Line Unit.

Description and Features

The FLL-716 List 3A COT line unit is the Central Office (CO) end of the PG-Flex subscriber carrier system, and resides in a PairGain COT 19 inch shelf. The FLL-716 carries up to 32 subscriber channels between a COT and a Remote Terminal (RT). Each PG-Flex system in the COT shelf requires one FLL-716 List 3A which converts the CO battery to voltages necessary to operate the COT line units, channels units, and supplies power to the RT equipment. The FLL-716 Line Unit provides access through the RS-232 interface (Craft port) to provision the PG-Flex system using an ASCII terminal. However, installing an FPI-729 or FAU-728 List 2 unit in the shelf disables the Craft port on the FLL-716. The FPI-729 or FAU-728 List 2 unit then provides access through its Craft port to provision the PG-Flex system using an ASCII terminal.

The FLL-716 List 3A uses PairGain's High-bit-rate Digital Subscriber Line (HDSL) 2B1Q (2 binary 1 quaternary line code) technology to provide the equivalent of 2.048 Mbps digital transmission rates, plus signaling, over two copper pairs. The HDSL can include unterminated bridge taps, and is used:

- without using repeaters
- without loop conditioning
- without pair selection

The FLL-716 List 3A supports the use of PG-Flex doublers (FDU-452) to extend the range of a PG-Flex subscriber carrier system to 21.4 kft (6.6 km) with 24 AWG loops, or 16.2 kft (5.0 km) with 26 AWG loops. Two doublers can triple the range to 32.1 kft (9.9 km) with 24 AWG loops, or to 24.3 kft (7.5 km) with 26 AWG loops.

The FLL-716 List 3A supports:

- 32 subscriber channels
- PG-Flex doublers in systems transporting POTS and ISDN circuits
- 4Tel compatible Loop Test Systems
- Mechanical Loop Testing (MLT) and Pair Gain Test Controller (PGTC) when a FPI-729 List 1 PGTC interface is installed in the shelf
- ISDN channel units
- loop start and ground start channel units

Front Panel

Figure 1 shows the FLL-716 List 3A front panel. Table 1 on page iii lists the indicators and status for the front panel LEDs.
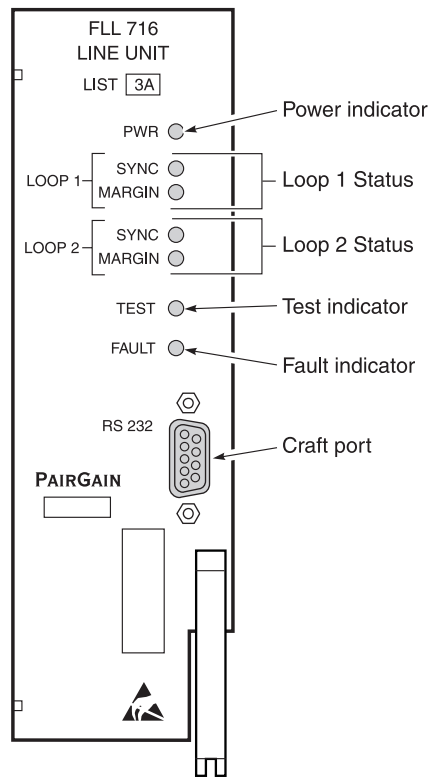
Figure 1. *FLL-716 List 3A Front Panel*

Table 1.   *FLL-716 List 3A Front Panel LEDs*

LED	LED States	Indicates
PWR	Solid Green	Power is applied and line feed is operating normally.
	Flashing Green	Power is applied to the RT and testing for overloads.
	OFF	Not receiving power. COT Line Unit fuse may be blown.
LOOP 1 SYNC	Solid Green	HDSL line 1 is in sync between the COT and RT.
	Flashing Green	HDSL line 1 is attempting to sync with RT.
	OFF	HDSL line 1 does not detect an active RT.
LOOP 1 MARGIN	Solid Yellow	HDSL line 1 is below present margin threshold.
	OFF	HDSL line 1 margin is above the preset margin threshold.
LOOP 2 SYNC	Solid Green	HDSL line 2 is in sync between the COT and RT.
	Flashing Green	HDSL line 2 is attempting to sync with RT.
	OFF	HDSL line 2 does not detect an active RT.
LOOP 2 MARGIN	Solid Yellow	HDSL line 2 is below present margin threshold.
	OFF	HDSL line 2 margin is above the margin threshold.
TEST	Flashing yellow	Metallic access in progress.
	OFF	No metallic access active in system.
FAULT	Solid Red	System alarm fault detected.
	OFF	No faults are detected in system.

Specifications

Electrical Characteristics

Input Voltage	–40 to –72 Vdc
Input Power	145 Watts (maximum)
Input Protection	Fuse (3A GMT)
Output Voltage	±130 Vdc (maximum) ground fault protected
Output Power	100 Watts (maximum)

Environmental

Operating Elevation	–200 ft to 13,000 ft (–60 m to 4000 m)
Operating Temperature & Humidity	–40° F to +150° F (–40° C to +65° C) 5% to 95% (non-condensing)

Physical

Dimensions

Height:	6.75 in. (17.2 cm)
Width:	2.00 in. (5.1 cm)
Depth:	10.50 in. (26.7 cm)
Weight	2.0 lb. (0.9 kg)

FUNCTIONAL DESCRIPTION

This section provides an overview of a PG-Flex system, how HDSL technology is used to provide 32 DS0 channels, and how a subscriber drop is connected to a metallic bypass pair.

Overview

PG-Flex is a small-capacity, universal subscriber carrier system supporting up to 32 DS0 channels including Plain Old Telephone Service (POTS), Loop Start or Ground Start, and Integrated Services Digital Network (ISDN) services.

A PG-Flex system is comprised of one line unit and one (or more) channel units at both the CO and the RT (see Figure 2). Line units and channel unit(s) can be hot-swapped without affecting other systems in the same shelf. The POTS channel units use a Pulse Coded Modulation (PCM) encoding scheme that allows high speed modem and group 3 facsimile operation on all channels.

The CO side of a PG-Flex system mounts into a COT shelf and supports up to two systems. An Alarm Unit or Pair Gain Test Controller (PGTC) Interface Unit (common to all systems installed in the shelf) provides an interface for maintenance alarm relays and metallic access to the remote subscriber lines.

The RT side of a PG-Flex system mounts into an FRE-765 RT enclosure and supports one system, which includes one line unit and up to four channel units. The RT line unit includes the HDSL transceivers and converts the line power from the COT into the voltages required by the remote terminal electronics. The channel units must be the same type of card as the channel units installed at the CO.

Power is supplied from the CO to the RT over the HDSL transmission lines. The maximum distance from the CO to the RT is 10.7 kft (3.3 km) using 24 AWG (0.5 mm) cable. (Refer to "HDSL Transmission" on page vi for more information.)
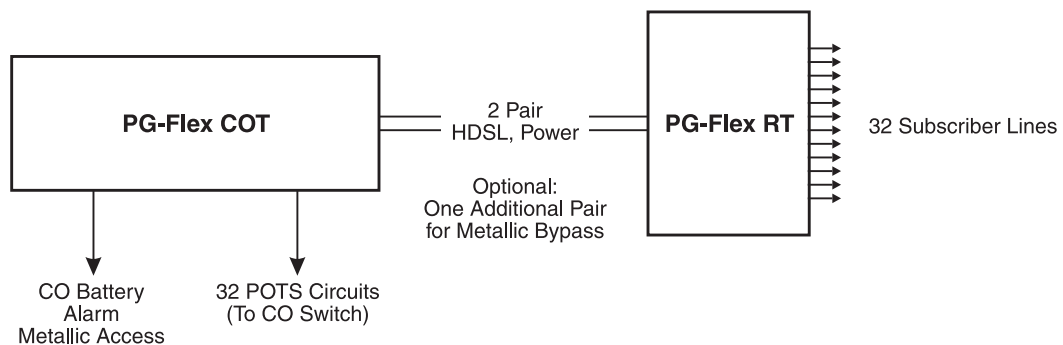

Figure 2.   *Typical PG-Flex Configuration*

HDSL Transmission

PG-Flex uses HDSL transmission technology between the COT and RT. This technology provides up to 32 DSOs, plus signaling, over two copper pairs without using repeaters, loop conditioning, or pair selection. Adaptive equalization, scrambling, and a four-level 2B1Q line coding increase range and minimize crosstalk. Because of HDSL transmission technology, the HDSL lines require no special conditioning and may include unterminated bridge taps, but cannot include load coils.

The line interface is a two-pair, 1110-kbps full-duplex 2B1Q transmission format. The dual HDSL lines provide 32 channels at 64-kbps, with signaling and an operations channel for management control. The signal characteristics on the carrier pairs comply with TR-NWT-001210, *Generic Requirements for High-bit-rate Digital Subscriber Line (HDSL) Systems*.

The distance limitation for HDSL transmission is based on a maximum signal attenuation of 35 dB. Since signal attenuation decreases as cable size increases, the larger the gauge (19 AWG vs. 26 AWG), the greater the distance between the FLL-716 List 3A COT shelf and the RT enclosure. Table 2 identifies these distances (at a cable temperature of 68°F):

Table 2.   *16 and 32 Channel HDSL Transmission Distances**

Gauge	Loop Length	Resistance
19 AWG 0.9 mm	19.4 kft 5.9 km	322 Ω
22 AWG 0.6 mm	13.7 kft 4.2 km	457 Ω
24 AWG 0.5 mm	10.7 kft 3.3 km	569 Ω
26 AWG 0.4 mm	8.1 kft 2.5 km	686 Ω

*   Loops over 570 Ω will not provide full loop current and ring voltage with all 32 channels off-hook simultaneously.

Subscriber Drop Testing

For subscriber drop testing from the Central Office, PG-Flex is able to select and connect any subscriber drop to a metallic bypass pair at the RT. A PG-Flex system extends this connection back to the COT where it switches it to the test jack on the FAU-728 or FPI-729 units or to the corresponding subscriber line on the COT channel card.

Metallic access is performed by momentary placement and removal of +116 Vdc (from the CO) on the subscriber's Tip lead. (The Ring lead should be between GND and the Tip value.) With POTS, Ground Start/Loop Start, and ISDN channel cards, the selected subscriber drop (assuming a working metallic bypass pair) connects to the corresponding COT subscriber line. The metallic connection drops when –116 Vdc is momentarily placed then removed from the subscriber's COT Tip lead.

Metallic access can also be activated through an ASCII terminal connected to the Craft port located on the front of the FLL-716 List 3A line unit or through the FAU-728 or FPI-729 units. (Refer to "Metallic Access" on page xxxv for metallic access test procedures.)

Operational Capabilities

Figure 3 shows a block diagram of the FLL-716 List 3A. The power supply converts CO battery into voltages necessary to power the PG-Flex electronics including ±130 Vdc. During power-up, the system checks the HDSL lines for hazardous conditions or other line faults which might effect the system. If a fault condition is detected, the system stops the power-up sequence and the LED indicators on the front panel indicate a line fault problem.

The FLL-716 List 3A provides the following functions for each 32 channel system in a single COT shelf:

- system power supply
- HDSL line transceivers and duplex RT power
- front-panel status indicators
- RS-232 Craft Maintenance Port Interface (DCE)
- switched access to the metallic bypass pair
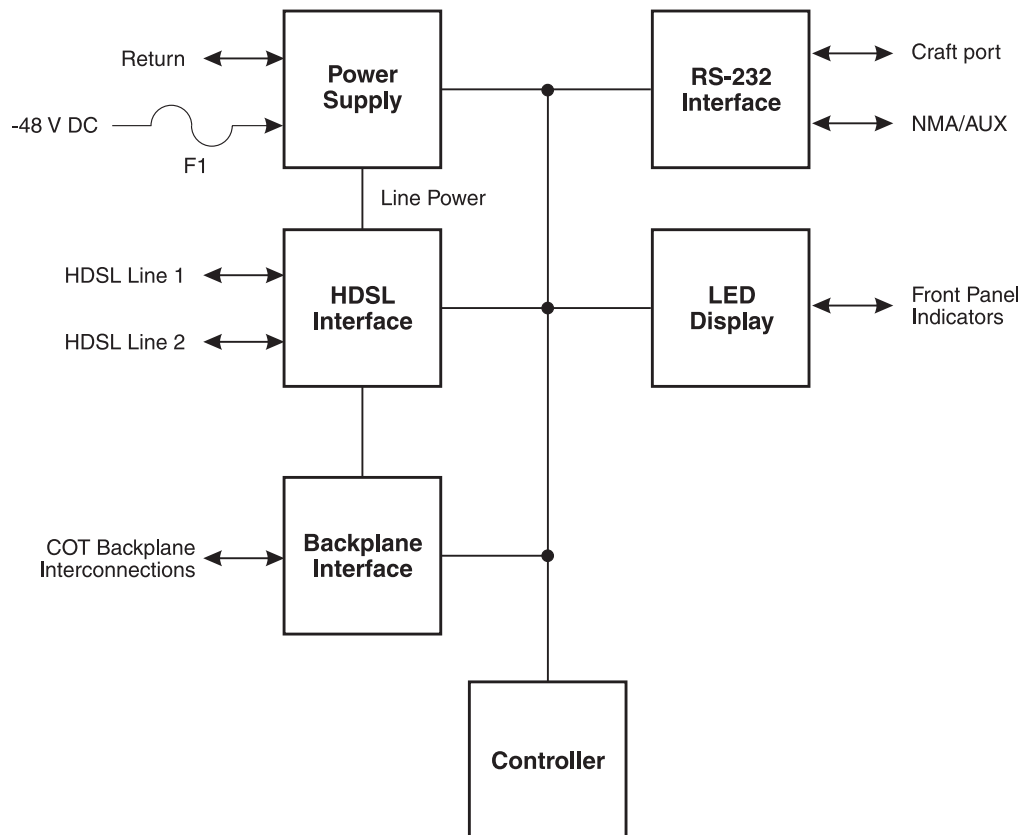
Figure 3. *FLL-716 List 3A Block Diagram*

Terminal Management

The terminal management function at the CO allows the technician to manage the entire PG-Flex system using an ASCII terminal (or modem with a null modem cable) connected to the Craft port. With this function, the technician can access a series of menus, to do the following:

- view system status

- set configuration parameters

- set up metallic access connections

- monitor performance

- obtain an inventory report

Cable Connections

The DB-9 connector on the front panel of the line unit allows you to connect your system to an ASCII terminal or a PC running terminal emulation software with a standard RS-232 cable. Figure 4 shows the cable connections between the front panel connector and a DTE DB-9 or DB-25 connector.
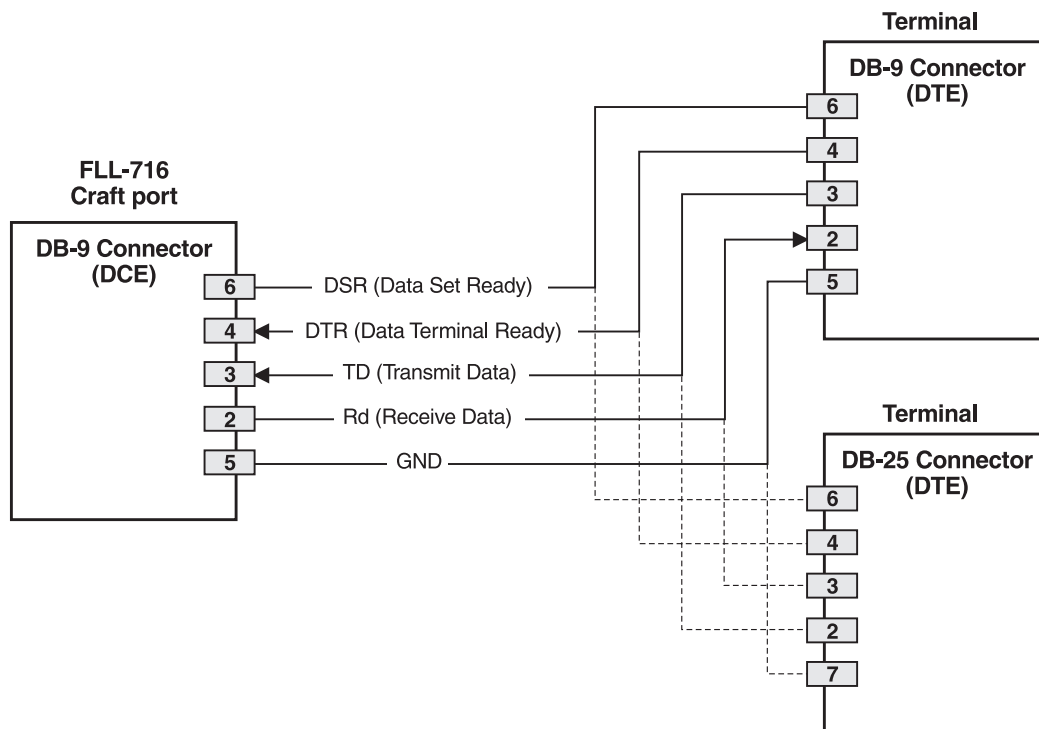
Figure 4. *Connecting an ASCII Terminal to the FLL-716 List 3A*

Table 3.   DB-9 Connector Pinouts

DB-9 Pin	Signal
2	Receive Data
3	Transmit Data
4	Data Terminal Ready
5	Signal Common (GND)
6	Data Set Ready

Connecting to a Terminal

1   Connect a standard RS-232 cable between the PG-Flex FLL-716 List 3A line unit and your ASCII terminal:

   •   Connect the RS-232 cable to the appropriate system line unit (Figure 5)

2   Configure your terminal to the following communications settings:

   •   Baud Rate: 1200 to 9600 baud (9600 baud recommended)

   •   Data Bits: 8

   •   Stop Bits: 1

   •   Parity: None

   •   Flow Control: None
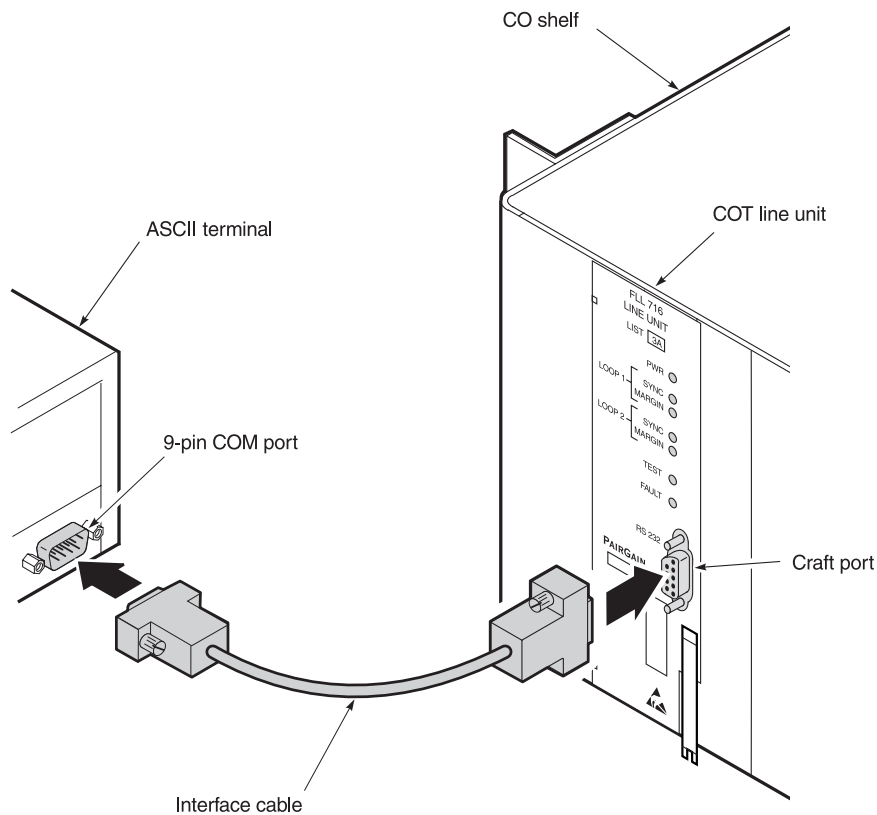
Figure 5. Connecting an ASCII Terminal to an FLL-716 List 3A Line Unit

Connecting to a Modem

Figure 6 shows the pinouts for connecting the FLL-716 List 3A to a modem using a null-modem cable. Using Data Carrier Detect (DCD) from the modem ensures that the FLL-716 List 3A logs off if the carrier signal disappears.

When configuring a modem, ensure that the DIP switches or the software configuration is set OFF for Carrier Detect (CD) override. This causes the modem to send a CD signal when it connects with another modem and to drop CD when it disconnects. Otherwise, if set ON, the FLL-716 connection will function properly but will not log out properly when disconnected.

It is recommended that Data Terminal Ready (DTR) override be OFF. This allows a modem call to terminate properly when the FLL-716 List 3A drops Data Set Ready (DSR); which is null-modemed to a DTR input on the modem.
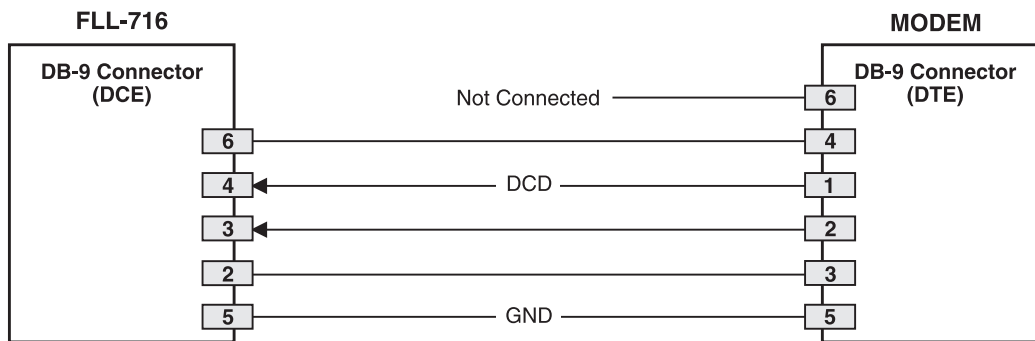
Figure 6. *Connecting the FLL-716 to a Modem*

The Modem connection is set up as:

- 1200 to 9600 baud (9600 baud recommended)
- DCE with 8 data bits
- 1 stop bit
- no parity

The protocol requires DTR active from the terminal to prevent automatic log off.

Menus and Display Structure

Figure 7 shows the menu structure which is accessed through the Craft port of an FLL-716 List 3A line unit.
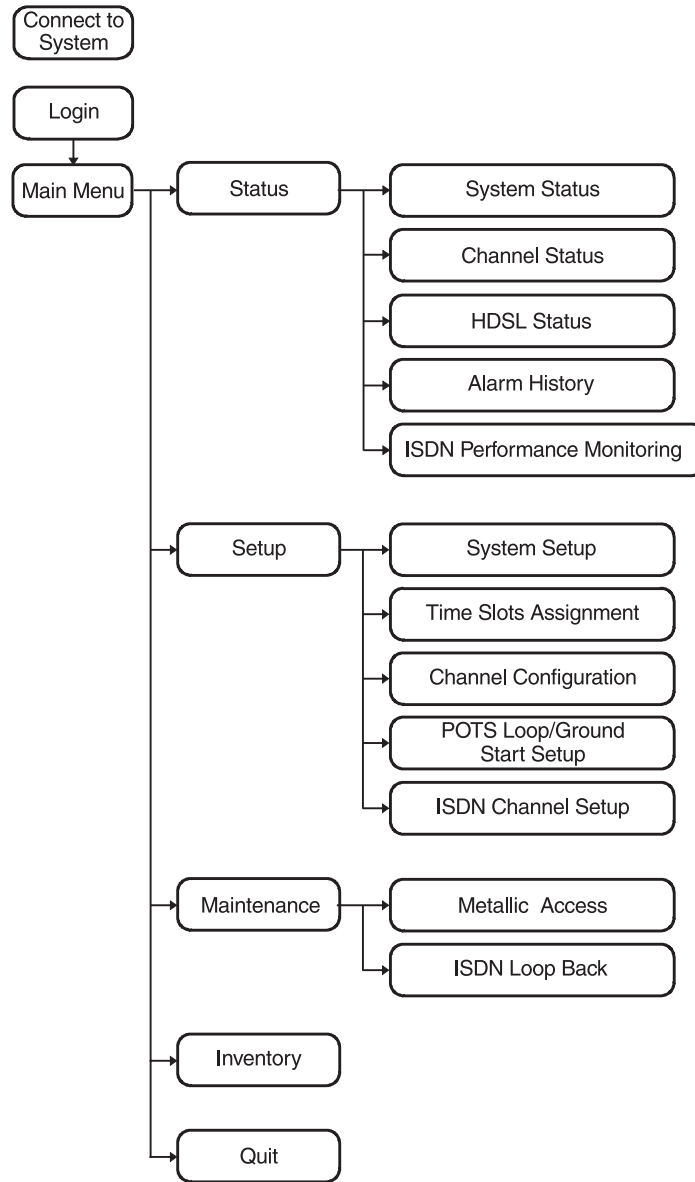
Figure 7. *Terminal Menu and Display Structure*

Navigating Through the Menus

Access the menus by typing the letter (A through D) from the Main Menu then pressing `ENTER`. The menu structure requires that you press enter each time you select an option or setting to continue. Table 4 describes keys you can use from the ASCII terminal keyboard to navigate through the menus.

Table 4. *Key Functions*

Key	Function
`Q`	Log out from the Main Menu
`ENTER`	Executes commands or selects a menu
`ESC`	Returns to the previous menu
`CTRL` + `X`	Returns to the Main Menu

Selecting an Option

From the ASCII terminal select an options as follows:

1   Type the letter of your selection, then press `ENTER`. The screen prompts you for specific information.

2   Type the information, following the instructions on the screen, then press `ENTER`.

3   Type `CTRL` + `X` to return to the Main Menu.

INSTALLATION AND TEST

The section provides procedures for unpacking, installing, and provisioning a FLL-716 List 3A line unit.

Unpacking

Upon receipt of the equipment, proceed as follows:

1   Unpack each container and visually inspect it for signs of damage. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company and to PairGain. Order replacement equipment if necessary.

2   Check the contents against the packing list to ensure complete and accurate shipment. If the shipment is short or irregular, contact PairGain as described in "Product Support" on page xli. If you must store the equipment for a prolonged period, store the equipment in its original container.

Installation

> **Observe normal electrostatic discharge precautions when handling electronic equipment. Do not hold electronic plugs by their edge. Do not touch components or circuitry.**

Install FLL-716 List 3A line unit and verify operation as follows:

1   Insert the FLL-716 List 3A line unit into the COT shelf and verify:

- all LEDs turn on for about one second
- PWR and FAULT LEDs turn on
- after four seconds, the power management routine starts, and the PWR LED on the FLL-716 List 3A flashes

> **If line powering fails, the COT will wait one minute before attempting to power up again. If line powering succeeds, HDSL communications begin synchronization and LOOP 1 SYNC and LOOP 2 SYNC flash.**

2   Verify the following front panel indications after the system powers up and establishes HDSL synchronized communications, and when no calls are in progress:

- PWR is on
- LOOP 1 SYNC is on
- LOOP 1 MARGIN is off
- LOOP 2 SYNC is on
- LOOP 2 MARGIN is off
- TEST is off
- FAULT is off

3   Using a voltmeter, measure the following voltages on the COT shelf backplane:

- –105 Vdc (±10%) for a short loop, and –130 Vdc (±10%) for a long loop or with doublers; measured between the HDSL_T1 pin and chassis ground.
- +105 Vdc (±10%) for a short loop, and +130 Vdc (±10%) for a long loop or with doublers; measured between the HDSL_T2 pin and chassis ground.

Provisioning Your PG-Flex System

Provisioning your PG-Flex system is accomplished through an ASCII terminal or computer, using emulation software, connected to the Craft port of your FLL-716 List 3A line unit. (Refer to "Terminal Management" on page viii for connection procedures.)

Power-up and Connection Screen

The Power-Up and Connection screen displays once an ASCII terminal is connected to the FLL-716 Craft port:
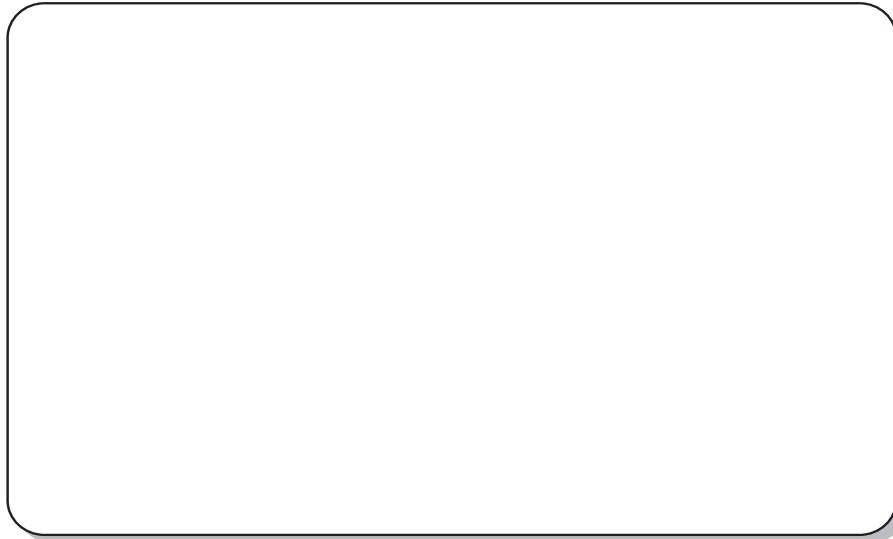
Log On Screen

The FLL-716 List 3A displays a log on screen when it detects user input from the Craft port (while idle).

1 Press the `SPACEBAR` rapidly several times to start the autobaud feature. The log on screen displays:

```
12-MAY-98   PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL          00:01:06
                 SYSTEM ID: PG-Flex 32 Channel System             SYSTEM: 2
```

2 Type your password. The password input is echoed back to the terminal screen with "*" characters.

3 Press `ENTER` .

> **If you do not have your log on password, contact the PairGain Customer Service Engineering group (see "Product Support" on page xli) for access using a Master Password.**

Set System Time

The System Time menu displays the first time you log on, or after power has been turned off. Enter the new system time in hours (HH), minutes (:MM), and seconds (:SS); seconds are optional and are not required to set the system time. You may press **ENTER** to bypass the system time, which sets the time to zero.

```
12-MAY-98         PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                    SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


                                   SYSTEM TIME
     ------------------------------------------------------------------------
```

> **This screen will not appear the next time you log on unless the PG-Flex system has lost power or was turned off.**

Main Menu

From the Main Menu, access other menus to configure a PG-Flex system, initiate or view metallic access connections, and view status information. The Main Menu appears after a successful log on:

```
12-MAY-98         PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                       SYSTEM ID: 32 Channel PG-Flex System           SYSTEM: 2


   CURRENT STATUS: OK                                       LOGGED IN: COT
   ALARMING TERMINAL: NONE
                                             CHREV: SPAN 1



                              MAIN MENU
   --------------------------------------------------------------------------------

                          A) STATUS

                          B) SETUP

                          C) MAINTENANCE
```

Type a letter (A through D) then press ENTER to access the desired Main Menu option (see for a description of the Main Menu functions).

Type Q then ENTER to log out.

Table 5 describes the functions associated with the four Main Menu options (A through D).

Table 5. *Main Menu Options*

Type Letter	Parameter	Function
A	Status	Select the Status option from the Main Menu to display: • System Status to show the equipment installed in the system and the current status (in alarm or not) of the equipment. • Channel Status to show the current status of all channels in the system. Status conditions vary for the different types of channel cards. Examples of status are: IDLE: channel is not off-hook or ringing RING: channel is ringing BUSY: channel is off-hook OPEN: no connection to CO switch TEST: in test mode TREQ: 116 volts test request SERR: PCM bus frame sync error FIDL: forced idle TDSB: time slots disabled RBAT: reverse battery ****: unknown NSYN: ISDN line is not synchronized with the CO switch SYN: ISDN line is synchronized with the CO switch • HDSL Status to show the status of the HDSL span. You can view either the 24-hour or 7-day performance history. • Alarm History to show the status of system alarm conditions. Examples of alarm conditions are: COT Shelf Alarm History RT Shelf Alarm History Span Alarm History • ISDN Performance Monitoring to show the following conditions: PM Error Count PM Threshold/Alert Info
B	Setup	Select the Setup option from the Main Menu to view the current setup and to set or change the following configurable items: • System Setup • Time Slots Assignment (view only) • Channel Configuration • POTS Loop/Ground Start Setup • ISDN Channel Setup
C	Maintenance	Select the Maintenance option (C) from the Main Menu for setting up a metallic access connection to a subscriber circuit or performing an ISDN loop back test for a PG-Flex system. Metallic Access includes: COT bridging, COT looking in, COT looking out, RT looking out, RT looking in, RT bridging, and subscriber bypass.
D	Inventory	Select the Inventory option from the Main Menu to view manufacturing information and version information for all the units in the system (except the FAU or FPI units). At the CO Line Unit terminal or the RT Line Unit terminal, the command displays all units in the system.

Configuring System Settings

The PG-Flex system parameters are set from the System Settings menu, and should be set before configuring the rest of the PG-Flex system.

1 At the Main Menu, type **B** then press **ENTER** . The Setup Menu displays:

```
12-MAY-98        PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                     SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


   CURRENT STATUS: OK                                      LOGGED IN: COT
   ALARMING TERMINAL: NONE
                                               CHREV: SPAN 1



                            SETUP MENU
     ----------------------------------------------------------------------

                      A) SYSTEM SETUP
                      B) TIME SLOTS ASSIGNMENT
                      C) CHANNEL CONFIGURATION
                      D) POTS LOOP/GROUND START SETUP
                      E) ISDN CHANNEL SETUP
```

2 Type a letter (**A** through **E**) then press **ENTER** to access the desired Setup Menu option (see Table 5 on page xvii for a description of the Setup Menu functions).

3 Type **CTRL** + **X** to return to the Main Menu, or type **X** to go back to the previous menu.

System Settings. System parameters are accessed from the System Settings menu, where you can view the current setup or change a system configurable item.

1　At the Setup Menu, type `A` and press `ENTER`. The System Settings menu displays:

```
 12-MAY-98          PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                          SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


                                  SYSTEM SETTINGS
       ---------------------------------------------------------------------------
         A) SYSTEM DATE: .   .   .   .   .   24-MAR-98
         B) SYSTEM TIME: .   .   .   .   .   01:07:36
         C) SYSTEM ID:   .   .   .   .   .   32 Channel PG-Flex System
         D) SET PASSWORD .   .   .   .   .
         E) AUTO LOGOUT TIME (min.): .   .   30          (DISABLED,5,30,60)
         F) METERED TONE FREQUENCY (kHz):    12          (DISABLED,12,16)
         G) RING FREQUENCY (Hz): .   .   .   30          (20,25,30)
         H) HDSL ES ALARM THRESHOLD: .   .   DISABLED    (DISABLED,17,170)
         I) HDSL MARGIN THRESHOLD:   .   .   4           (0-15,0=DISABLED)
         J) ALARM ON HDSL THRESHOLD: .   .   DISABLED    (DISABLED,ENABLED)
         K) LOCAL LOOP LENGTH:   .   .   .   SHORT       (SHORT,LONG)
```
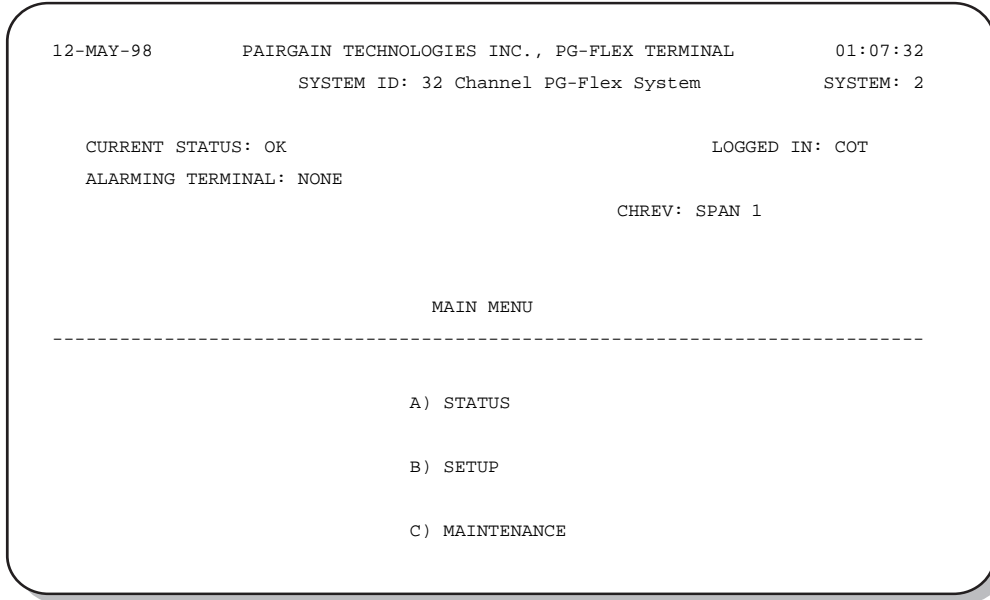
2　Type a letter (`A` through `N`) then press `ENTER` to select a parameter to change (see Table 6 on page xx for system settings menu options).

3　After selecting a parameter to change, do one of the following:

   a　Type the desired information for the select parameter.

   b　Toggle among the options, using the spacebar.

4　Press `ENTER`.

5　Repeat steps 3 and 4 until all changes are made.

6　Type `CTRL` + `X` to return to the Main Menu, or type `X` to go back to the previous menu.

Table 6.   *System Settings Menu Options*

Type Letter	Parameter	Default Value	Function
A	System Date	01-JAN-00	The System Date is set for each PG-Flex system individually and displays as dd-mmm-yy. It increments automatically each midnight, as long as the COLU and RTLU are installed in the shelf and CO battery is connected to the COLU. If the COLU or the RTLU is removed from a powered shelf, then reinserted, the date will be the same as it was when the COLU or RTLU was pulled out of the shelf or when its power was removed. It then continues to increment to successive dates each midnight, as indicated by the System Time. All years which are evenly divisible by 4 (including the default year "00") are considered leap years. In such years, the date increments from 28-FEB-yy to 29-FEB-yy (where "yy" represents the last two digits of the year, such as 00, 04, 08, etc.).
			This product meets or exceeds the current technical quality requirements for Year 2000 compliance and properly processes dates up to, and beyond, December 31, 1999.
B	System Time	00:00:00 at power on	The System Time must be set for each PG-Flex system individually and displays as hh:mm:ss. System Time is lost (default back to 00:00:00) whenever power is removed from the system shelf or the COLU or RTLU module is removed and reinserted.
C	System ID	(all spaces)	The System ID is supplied to indicate the physical location of the PG-Flex system (CO or RT terminal). Each PG-Flex system should have a unique System ID. The default for System ID is "blank" (all spaces). This can be left blank or set to any desired name of 24 or fewer characters (including spaces). This name can be any mixture of alphanumeric characters (including upper case, lower case, numerals, punctuation, etc.). If System ID is set to "shelf 25 system A", this ID appears at the top of each screen when accessing this system. This parameter is stored in the CO line unit NVRAM and therefore does not change when power is cycled or cards are removed and reinserted. If the CO line unit is replaced, it is necessary to reenter the appropriate system ID.
D	Password	(all spaces)	If there is an FPI card present in the system, you will be connected to the system through the connector on the FPI card front panel and will be prompted for a password only on initial log on to the FPI card, before accessing a specific system in the shelf. You will not be asked for an additional password when accessing a system. However if there is no FPI card, you will connect to each system individually through its front panel connector and will be prompted for the individual system Password. The Password default is <ENTER>. The password can be 10 or fewer characters (including spaces), or any mixture of alphanumeric characters (including upper case, lower case, numerals, and punctuation marks). This parameter is stored in the CO line unit card NVRAM and therefore will not change when power is cycled or cards are removed and reinserted.
			All of the parameters discussed in the remainder of this table are stored in the CO line unit card NVRAM and therefore will not normally change when power is cycled or cards are removed and reinserted.
E	Auto Logout Time	DISABLED	After logging on to a system, you are automatically logged out after a time determined by the Auto Logout Time parameter: • DISABLED: The user is never automatically logged out. • 5: The user is automatically logged out after 5 minutes. • 30: The user is automatically logged out after 30 minutes. • 60: The user is automatically logged out after 60 minutes.
F	Metered Tone Frequency	DISABLED	Metered tones are used for out-of-band signaling with coin telephones, typically in international markets. A special channel card is required to support this function. • DISABLED: No tones are recognized. • 12: Recognizes 12 kHz as the signal frequency. • 16: Recognizes 16 kHz as the signal frequency.

Table 6.   *System Settings Menu Options (Cont.)*

Type Letter	Parameter	Default Value	Function
G	Ring Frequency	20	Determines the frequency of the ringing voltage on the subscriber line. The values can be set to one of the following parameters: • 20: The ring generator is set to 20 Hz. • 25: The ring generator is set to 25 Hz. • 30: The ring generator is set to 30 Hz.
H	HDSL ES Alarm Threshold	DISABLED	Sets the number of Error Seconds required before a minor alarm is generated (dependent on the setting of the Alarm on HDSL Threshold parameter). The count of Error Seconds is reset to zero when the reset function is used on the HDSL Performance History status screen. The values can be set to one of the following parameters: • DISABLED: No minor alarm is generated, regardless of the number of error seconds. • 17: A minor alarm is generated after 17 error seconds. • 170: A minor alarm is generated after 170 error seconds.
I	HDSL Margin Threshold	4	This parameter sets the HDSL margin threshold. If the HDSL margin attains a value equal to or less than the setting for this parameter, a minor alarm is generated (dependent on the setting of the *Alarm on HDSL Threshold* parameter). A default setting of 4 indicates that a minor alarm occurs when the HDSL margin is $\leq$ 4 dB. The HDSL Margin Threshold can be set between 0 dB and 15 dB (0 dB = Disabled).
J	Alarm on HDSL Threshold	DISABLED	This parameter controls whether a minor alarm is generated if the HDSL ES Alarm Threshold or HDSL Margin Threshold is exceeded. The values can be set to one of the following parameters: • DISABLED: A minor alarm does not occur when the HDSL ES Alarm Threshold and HDSL Margin Threshold is exceeded. • ENABLED: A minor alarm occurs when the HDSL ES Alarm Threshold and HDSL Margin Threshold is exceeded.
K	Local Loop Length	Long	The length of subscriber loop supported by PG-Flex is determined by this parameter and affects all subscriber loops within a single PG-Flex system. The length of the loop affects the total power required by the PG-Flex system; the shorter the loop, the less the power required. For the majority of applications, the power saved is relatively insignificant and the default value ("LONG") should be selected. The values can be set to one of the following parameters: • LONG: The PG-Flex system can support subscriber loops with a line resistance of 530 Ω or less. • SHORT: The PG-Flex system can support subscriber loops with a line resistance of 400 Ω or less.
L	Alarm on Configuration	DISABLED	Each channel card in a PG-Flex system must have a corresponding channel card type at the opposite node. A mismatch condition results when a card does not have the correct corresponding card at the other end due to channel unit removal, type mixing, or failure. Note if a mismatch condition exists, between the CO and RT, replace the corresponding channel with a matching channel unit. The values can be set to one of the following parameters: • DISABLED: A minor alarm does not occur if there is a mismatch of channel units. • ENABLED: A minor alarm occurs if there is a mismatch of channel units.

Table 6. *System Settings Menu Options (Cont.)*

Type Letter	Parameter	Default Value	Function
M	Alarm on Insufficient Time Slot	DISABLED	This parameter determines whether a minor alarm is generated if more circuits have been enabled than there are time slots available. This could occur when enabling ISDN circuits without first disabling a sufficient number of POTS circuits to ensure that there are enough time slots available to support the ISDN circuits. The values can be set to one of the following parameters: • DISABLED: A minor alarm does not occur if more circuits have been enabled than there are available time slots. • ENABLED: A minor alarm occurs if more circuits have been enabled than there are available time slots.
N	Alarm on ISDN PM Threshold	DISABLED	This parameter determines whether a minor alarm occurs if any of the PM thresholds are exceeded. The values can be set to the following parameters: • DISABLED: A minor alarm does not occur if any of the ISDN PM thresholds are exceeded. • ENABLED: A minor alarm occurs if any of the ISDN PM thresholds are exceeded.

ISDN Channel Unit Setup

1   At the Setup Menu, type `E` then press `ENTER`. The ISDN Channel Setup menu displays:

```
12-MAY-98         PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL       01:07:32
                      SYSTEM ID: 32 Channel PG-Flex System         SYSTEM: 2


                            ISDN CHANNEL SETUP
--------------------------------------------------------------------------------



                    Press ESCAPE to return to previous menu
```

> 📝 **When there are no ISDN cards present in the PG-Flex system, the display indicates this, and will not allow you to continue to the ISDN Channel Setup menu.**

2   From the ISDN Channel Setup selection menu, type the card number followed by a comma, then type the channel number and press `ENTER` to access the ISDN module you want to configure. The ISDN Channel Setup menu displays:

```
12-MAY-98         PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL       01:07:32
                      SYSTEM ID: 32 Channel PG-Flex System         SYSTEM: 2


                            ISDN CHANNEL SETUP
--------------------------------------------------------------------------------
    CARD:2    CHANNEL:3

--------------------------------------------------------------------------------
   A) PM Mode: .   .   .   .   .   .    Interim Path(Interim Path, Segmented)
   B) eoc Mode:    .   .   .   .   .   Normal      (Normal, Transparent)
   C) B1 <-> B2 Swap:  .   .   .   .   Normal      (Normal, Swap)
   D) Sealing Current: .   .   .   .   Off         (Off, On)
   E) Zero Byte Substitution:  .   .   Off         (Off, Enabled)


                      S)ELECT NEW CARD AND CHANNEL


                      CTRL-X) Main Menu    e(X)it
```

Changing ISDN Parameters.

1 From the ISDN Channel Setup menu type a letter (`A` through `E`) and press `ENTER` to choose a setup parameter. (Refer to Table 7 for descriptions of the ISDN channel unit configuration option.)

Table 7. *ISDN Channel Unit Configuration Options*

Type Letter	Parameter	Default Value	Options
A	PM Mode	Interim	Performance monitoring of the ISDN channels is done considering the channel as one path (Interim Path) or several separate sections (Segmented).
			Interim: Performance monitoring is done considering the channel as one path and collects the end-to-end error rate for the entire transport path.
			Segmented: Performance monitoring is done considering the channel as separate sections, and collects error rates for each DSL loop individually
B	eoc mode	Normal	This parameter determines how ISDN eoc messages are handled by the PG-Flex system.
			Normal: ISDN eoc messages are decoded and retransmitted within the PG-Flex system.
			Transparent: ISDN eoc messages are not decoded and are passed through the PG-Flex system transparently.
C	B1<->B2 Swap	Normal	This parameter determines whether the B channels are swapped between the PG-Flex CO ISDN "U" interface and the RT ISDN "U" interface. The "D" signaling channel is unaffected by this parameter.
			Normal: ISDN channel "B1" and "B2" at the CO ISDN "U" interface are routed to channels "B1" and "B2" at the RT ISDN "U" interface.
			Swap: ISDN channel "B1" and "B2" at the CO ISDN "U" interface are routed to channels "B2" and "B1" at the RT ISDN "U" interface.
D	Sealing Current	Off	This parameter determines whether sealing current is applied to the ISDN subscriber loop.
			Off: No sealing current is applied to the ISDN subscriber loop.
			On: A constant current of approximately 5 ma. flowing in the ISDN subscriber loop at all times.
E	Zero Byte Substitution	Off	This parameter determines how ISDN eoc messages are handled by the PG-Flex system.
			Off: The PG-Flex system passes all data through without any special encoding.
			On: The PG-Flex system will use a ZBS code to prevent long string of zeros in the data.

* Options shown in bold are factory default settings.

2 To select one of the two options available for each parameter, do one of the following:

a Type the desired information for the select parameter.

b Toggle among the options, using the spacebar.

3 Press `ENTER` .

4 Repeat steps 3 and 4 until all changes are made.

5 From the ISDN Channel Setup menu, type `S` and press `ENTER` to select a new ISDN channel unit and channel to configure.

Type the channel unit number followed by a comma, then type the channel for the new ISDN channel unit. That is, type "2, 3" for ISDN card number 2 on channel 3.

6 Type `CTRL` + `X` to return to the Main Menu or type `X` to go back to the previous menu.

Configure ISDN Channels. From the Channel Configuration menu, you can enable or disable each ISDN circuit installed in a PG-Flex system.

> **There are 32 time slots available. Enable is the default for the channels. Disable channels only when the time slots are required by another channel unit.**
>
> **For channel configuration, ON means the channel is enabled with a time slot, OFF means the channel is enabled but does not have a time slot assigned.**

1 Type `C` then press `ENTER`. The Channel Configuration menu displays:

```
  12-MAY-98         PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                         SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


                             CHANNEL CONFIGURATION
 -------------------------------------------------------------------------------
            CU1CU2CU3  CU4
     ChannelCOT(POTS8)(POTS8)(POTS8)(ISDN4)
          RT  (POTS8)(POTS8)(POTS8)(ISDN4)
 -------------------------------------------------------------------------------
      1      ONON ON    ON
      2      ONON ON    OFF
      3      ONON DISABLEDDISABLED
      4      ONON DISABLEDDISABLED
      5      ONON DISABLED-
      6      ONON DISABLED-
      7      ONON DISABLED-
```

2 Type `D` to disable a channel or type `E` to enable a channel, and then press `ENTER`. (Refer to Table 8 for channel configuration functions.)

You get a prompt to enter the card and channel number.

3 At the prompt for the system to be configured, do the following:

- Enter the card number followed by a comma

- Enter the channel number then press `ENTER`, (that is, type "1,1" for card 1 on channel 1)

Table 8.   Channel Configuration Options

Parameter	Default Value	Function
Channel Configuration	Enabled	Each channel is individually enabled or disabled. This configuration is stored in both the COLU and the CO channel card. If any one card (COLU, RTLU, COCU or RTCU) is removed and replaced or reinserted, the Channel Configuration is automatically preserved. Can be set to the following parameters: • DISABLED: The selected channel is disabled. • ENABLED: The selected channel is enabled.

ISDN Alarms. Enable alarms, if required by local practice. To Enable/disable the Alarm On ISDN PM Threshold Cross, do the following:

1 At the Setup Menu, type **A** then press **ENTER**. The System Settings menu displays.

2 At the System Settings menu, type **N** then press **ENTER**. The Alarm On ISDN PM Threshold Cross menu displays:

```
 12-MAY-98         PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                   SYSTEM ID: 32 Channel PG-Flex System              SYSTEM: 2


                      ALARM ON ISDN PM THRESHOLD CROSS
 ------------------------------------------------------------------------------



                         CURRENTLY: DISABLED
```
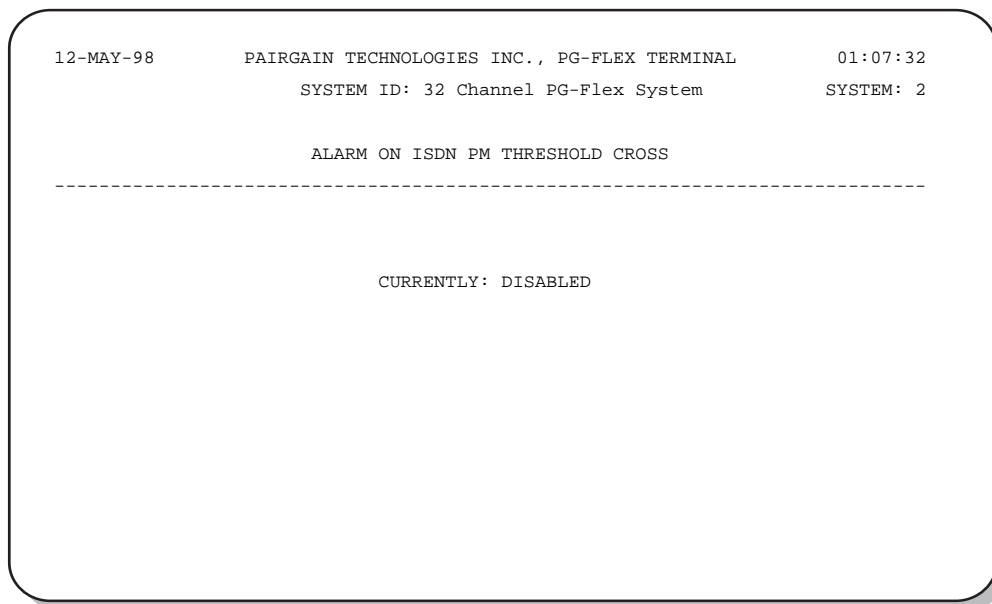
3 Type **Y** then press **ENTER** to enable the alarm, or type **N** then press **ENTER** to disable the alarm.

View Time Slots Assignment

View time slot assignments, starting at the Setup Menu**.** Type **B** then press **ENTER** . The Time Slots Assignment menu displays:

```
 12-MAY-98          PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL          01:07:32
                         SYSTEM ID: 32 Channel PG-Flex System           SYSTEM: 2


                            TIME SLOTS ASSIGNMENT
 --------------------------------------------------------------------------------
  TIME      CHANNEL      TIME      CHANNEL      TIME      CHANNEL      TIME      CHANNEL
  SLOT    ASSIGNMENT     SLOT    ASSIGNMENT     SLOT    ASSIGNMENT     SLOT    ASSIGNMENT

 --------------------------------------------------------------------------------
    1:    CU1   CH1       9:    CU2   CH1       17:    CU3   CH1       25:    CU4   CH1
    2:    CU1   CH2      10:    CU2   CH2       18:    CU3   CH2       26:    CU4   CH1
    3:    CU1   CH3      11:    CU2   CH3       19:    CU3   CH3       27:    CU4   CH1
    4:    CU1   CH4      12:    CU2   CH4       20:    CU3   CH4       28:    CU4   CH2
    5:    CU1   CH5      13:    CU2   CH5       21:    CU3   CH5       29:    CU4   CH2
    6:    CU1   CH6      14:    CU2   CH6       22:    CU3   CH6       30:    CU4   CH2
    7:    CU1   CH7      15:    CU2   CH7       23:    CU3   CH7       31:      ----
    8:    CU1   CH8      16:    CU2   CH8       24:    CU3   CH8       32:      ----
```

Timeslots are automatically generated. However, when you cycle power to the system or hot plug a new channel unit, these values may change.

Since PG-Flex is a universal carrier system, the specific time slot assigned to a channel is irrelevant—this screen is provided for diagnostic purposes only.

ISDN Performance Monitoring

Access ISDN Performance Monitoring Menu starting from the Status Menu.

1   At the Status Menu, type `E` then press `ENTER`. The ISDN Performance Monitoring Menu displays:

```
12-MAY-98         PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL          01:07:32
                    SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


                     ISDN PERFORMANCE MONITORING MENU
--------------------------------------------------------------------------------



                  Press ESCAPE to return to previous menu
```

2   Type the ISDN channel unit number and the channel number (2, 3) then press `ENTER`. The ISDN
        Performance Monitoring Menu for the selected card and channel displays:

```
12-MAY-98         PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL          01:07:32
                    SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


                     ISDN PERFORMANCE MONITORING MENU
--------------------------------------------------------------------------------
     INTERIM PATH ENABLED   CARD:2   CHANNEL:3
--------------------------------------------------------------------------------


                    A) SELECT NEW CARD AND CHANNEL


                    B) PM ERROR COUNT


                    C) PM THRESHOLD/ALERT INFO



                     CTRL-X) Main Menu    e(X)it
```

3   Type a letter (`B` or `C`) and press `ENTER` to view status for the channel unit and channel you selected.

4   Type `A` and press `ENTER` to select a new ISDN channel unit and channel.

Configure Loop Start/Ground Start Channel Units

To set up the channels for loop start or ground start, do the following:

1 At the Main Menu, type **B** then press **ENTER** . The Setup Menu displays.

2 At the Setup Menu, type **D** then press **ENTER** . The POTS Loop/Ground Start Configuration menu displays:

```
12-MAY-98        PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                      SYSTEM ID: 32 Channel PG-Flex System        SYSTEM: 2


                     POTS GROUND/LOOP START CONFIGURATION
--------------------------------------------------------------------------------
                CU1       CU2       CU3       CU4
    Channel COT (POTG8)   (POTG8)   (POTS8)   (ISDN4)
            RT  (POTG8)   (POTG8)   (POTS8)   (ISNN4)
--------------------------------------------------------------------------------
        1       GND       LOOP      LOOP      N/A
        2       LOOP      GND       LOOP      N/A
        3       LOOP      LOOP      LOOP      N/A
        4       LOOP      LOOP      LOOP      N/A
        5       LOOP      LOOP      LOOP
        6       LOOP      LOOP      LOOP
        7       LOOP      LOOP      LOOP
```

3 Type **L** then press **ENTER** to change the channel to loop start, or type **G** then press **ENTER** to change the channel to ground start. You get a prompt to enter the card and channel number.

4 At the prompt, type the card number followed by a comma, and then type the channel number for the channel unit and channel you want to disable/enable and press **ENTER** (that is, type "1,1" for card 1 on channel 1).

Enable or Disable Loop Start/Ground Start Channels. There are 32 time slots available for each
PG-Flex system. Enable is the default for the channels. Disable channels only when the time slots are required by
another channel unit.

1   At the Setup Menu, type `C` then press `ENTER`. The Channel Configuration menu displays:

```
  12-MAY-98        PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                      SYSTEM ID: 32 Channel PG-Flex System        SYSTEM: 2


                            CHANNEL CONFIGURATION
--------------------------------------------------------------------------------
            CU1CU2CU3 CU4
    ChannelCOT(POTS8)(POTS8)(POTS8)(ISDN4)
         RT  (POTS8)(POTS8)(POTS8)(ISDN4)
--------------------------------------------------------------------------------
      1      ONON ON    ON
      2      ONON ON    OFF
      3      ONON DISABLEDDISABLED
      4      ONON DISABLEDDISABLED
      5      ONON DISABLED-
      6      ONON DISABLED-
      7      ONON DISABLED-
```

2   Type `D` (disable) or `E` (enable) and press `ENTER`. You get a prompt to enter the card and channel number.

3   At the prompt, type the card number followed by a comma, and then type the channel number for the channel
unit and channel you want to disable/enable and press `ENTER` (that is, type "1,1" to disable/enable card 1 on
channel 1).

View Loop Start/Ground Start Time Slot Assignments. View time slot assignments, starting at the Setup Menu. Type `B` and press `ENTER`. The Time Slot Assignment menu displays:

```
12-MAY-98        PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                 SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


                       TIME SLOTS ASSIGNMENT
--------------------------------------------------------------------------------
  TIME      CHANNEL      TIME      CHANNEL      TIME      CHANNEL      TIME     CHANNEL
  SLOT    ASSIGNMENT     SLOT    ASSIGNMENT     SLOT    ASSIGNMENT     SLOT   ASSIGNMENT
--------------------------------------------------------------------------------
   1:     CU1   CH1       9:     CU2   CH1      17:     CU3   CH1      25:    CU4   CH1
   2:     CU1   CH2      10:     CU2   CH2      18:     CU3   CH2      26:    CU4   CH1
   3:     CU1   CH3      11:     CU2   CH3      19:     CU3   CH3      27:    CU4   CH1
   4:     CU1   CH4      12:     CU2   CH4      20:     CU3   CH4      28:    CU4   CH2
   5:     CU1   CH5      13:     CU2   CH5      21:     CU3   CH5      29:    CU4   CH2
   6:     CU1   CH6      14:     CU2   CH6      22:     CU3   CH6      30:    CU4   CH2
   7:     CU1   CH7      15:     CU2   CH7      23:     CU3   CH7      31:     ----
   8:     CU1   CH8      16:     CU2   CH8      24:     CU3   CH8      32:     ----
```

These assignments are automatically generated. However, when you cycle power to the system or hot plug a new channel unit, these assignments can change.

View Doubler Status

View status for the doubler unit(s) through the HDSL Status menu. At the Status Menu, type `C` then press `ENTER`. The HDSL Status menu displays:

```
  12-MAY-98        PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                       SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2
 HDSL STATUS

  ------------------------------------------------------------------------------
     ALARMS: NONE

  ------------------------------------------------------------------------------
                    COT HDSL-1   COT HDSL-2   RT HDSL-1   RT HDSL-2
                     mn/cr/mx     mn/cr/mx     mn/cr/mx    mn/cr/mx
       MARGIN (db):   21/22/23     21/22/23     21/22/24    21/22/23
       PULSE ATTN (db):   1            1            1           1
       PPM OFFSET (ppm):  0            0           27          27
       24 HOUR ES:        0            1            2           2
       24 HOUR UAS:      57           55            2           0
  ------------------------------------------------------------------------------
         LAST CLEARED: NONE
  ------------------------------------------------------------------------------
```

Type a letter at the prompt to accomplish one of the following:

Type this letter	To get this response
A	Shows a performance history for 24 hours.
B	Shows a performance history for seven days.
CTRL + X	Exits the current screen and returns to the Main Menu.
R	Resets minimum and maximum margins, 24-Hour ES, 24-Hour UAS, and 24-Hour Performance History. A prompt has you type Y to confirm the reset or type N to cancel the reset.
X	Exits this screen and returns to status menu.
S	Shows doubler spans not seen on the current screen. The first screen shows the span from the COT to the doubler and the second screen shows the span from the doubler to the RT. Another screen appears when using two doublers.

View Span Alarm History

View span alarm history for the doubler unit(s) through the System Alarm History menu by completing the following.

1   At the Setup Menu, type `D` then press `ENTER`. The System Alarm History menu displays:

```
 12-MAY-98          PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL          01:07:32
                        SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


                           SYSTEM ALARM HISTORY
--------------------------------------------------------------------------------
 LAST CLEARED:  ----

--------------------------------------------------------------------------------


                        A) COT SHELF ALARM HISTORY


                        B) RT  SHELF ALARM HISTORY


                        C) SPAN ALARM HISTORY



                   CTRL-X) Main Menu   R)eset    e(X)it
```

2   At the System Alarm History menu, type `C` then press `ENTER`. The Span-1 Alarm History displays:

```
 12-MAY-98          PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL          01:07:32
                        SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


                           SPAN-1 ALARM HISTORY
--------------------------------------------------------------------------------

    Type          First          Last          Status    Current   Count
    ------        -------------  -------------  --------- -------   -----


    HDSL1 UAS     DEC 24, 00:00  DEC 24, 00:00  ENABLED    NONE      1
    HDSL2 UAS     DEC 24, 00:00  DEC 24, 00:00  ENABLED    NONE      1
```

3   Type `S` then press `ENTER` to get the additional screens for the doubler spans present in the circuit.

The following Alarm History menu (Span-2) is only available when a doubler is present in the circuit.

```
 12-MAY-98        PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                    SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


                         SPAN-2 ALARM HISTORY
 -------------------------------------------------------------------------------


     Type          First           Last          Status     Current   Count
     ------      --------------  --------------  ----------  -------   -----
     HDSL2 UAS   DEC 24, 00:00   DEC 24, 00:00   ENABLED      NONE       1
```

Maintenance

From the Maintenance Menu you can set up a metallic access connection to a subscriber circuit or perform an ISDN loop back test for a PG-Flex system.

At the Main Menu, type `C` then press `ENTER` . The Maintenance Menu displays:

```
12-MAY-98          PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL          01:07:32
                        SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


   CURRENT STATUS: OK                                           LOGGED IN: COT
   ALARMING TERMINAL: NONE
                                                                CHREV: SPAN 1



                             MAINTENANCE MENU
-------------------------------------------------------------------------------

                        A) METALLIC ACCESS

                        B) ISDN LOOP BACK


```

Metallic Access

From the Maintenance Menu, type `A` then press `ENTER` . The Metallic Access Menu displays (refer to Table 9 on page xxxvi for the Metallic Access Menu options):

```
12-MAY-98          PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL          01:07:32
                        SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


   CURRENT STATUS: OK                                           LOGGED IN: COT
   ALARMING TERMINAL: NONE
                                                                CHREV: SPAN 1



                          METALLIC ACCESS MENU
-------------------------------------------------------------------------------

                          A) COT - BRIDGING
                          B) COT - LOOKING IN
                          C) COT - LOOKING OUT
                          D) RT  - LOOKING OUT
                          E) RT  - LOOKING IN

```

Table 9.   *Metallic Access Menu Options*

Type Letter	Parameter	Function
A	COT - Bridging	Provides the ability to monitor a subscriber circuit connection between the switch and the specified CO channel unit.
B	COT - Looking In	Provides the ability to verify the connection between the switch and the specified channel unit. The channel under test is disconnected from the switch for this function.
C	COT - Looking Out	Provides the ability to verify the subscriber connection through the CO channel unit. The switch is disconnected from PG-Flex for this function.
D	RT - Looking Out	Provides the ability to verify the subscriber circuit connection between the RT channel unit and the subscriber terminal equipment.
E	RT - Looking In	Provides the ability to connect a terminal equipment to the specified channel through the bypass pair. This provides the ability to verify the channel connection through PG-Flex but excludes the subscriber loop and subscriber's terminal equipment.
F	RT - Bridging	Provides the ability to monitor a subscriber circuit connection between the specified RT channel unit and the subscriber terminal equipment through the bypass pair.
G	Subscriber Bypass	Provides a metallic connection from the switch to the subscriber's terminal equipment utilizing the bypass pair. This connection bypasses the PG-Flex CO and RT channel units.

Selecting a Metallic Access Test. At the Metallic Access Menu, type a letter (`A` through `G`) then press `ENTER` . The Metallic Access selection menu displays:

```
12-MAY-98          PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                        SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


   CURRENT STATUS: OK                                       LOGGED IN: COT
   ALARMING TERMINAL: NONE
                                                            CHREV: SPAN 1



                                METALLIC ACCESS
   -----------------------------------------------------------------------------



                      Press ESCAPE to return to previous menu
```

4   At the prompt, enter the card number followed by a comma, then enter the channel number for the card and channel to be tested, then press `ENTER` (that is, type "2,1" to test channel unit 2 on channel 1). The following menu displays:

```
12-MAY-98          PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                        SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


   CURRENT STATUS: TEST                                     LOGGED IN: COT
   ALARMING TERMINAL: NONE
                                                            CHREV: SPAN 1

                              METALLIC ACCESS MENU
   -----------------------------------------------------------------------------


                  A) COT - BRIDGING    (ENABLED ON CU2/CH1)
                  B) COT - LOOKING IN
                  C) COT - LOOKING OUT
                  D) RT  - LOOKING OUT
                  E) RT  - LOOKING IN
                  F) RT  - BRIDGING
```

5   Type `R` to stop the test and return the circuit to service.

ISDN Loopback

ISDN loopbacks can be initiated as:

- inband loopback codes from the maintenance center upon the ISDN D-channel.

- or as a central office technician command via the ISDN Loopback Menu.

At the Maintenance Menu, type **B** then press **ENTER**. The ISDN Loopback Menu is displayed:

```
12-MAY-98        PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                      SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


                          ISDN LOOPBACK MENU
-------------------------------------------------------------------------------
COT LOOPBACK MAP    CARD:1
-------------------------------------------------------------------------------
LOOPBACK              CH1          CH2          CH3          CH4
-------------------------------------------------------------------------------
B1 DSL               normal       normal       normal       normal
B2 DSL               normal       normal       normal       normal
2B+D DSL             normal       normal       normal       normal
B1 DC                normal       normal       normal       normal
B2 DC                normal       normal       normal       normal
2B+D DC              normal       normal       normal       normal
```

To initiate an ISDN Loopback.

1   Select ISDN Loopback from the Maintenance Menu.

2   Select **C** from the ISDN Loopback Menu.

3   Select the card and channel to be tested.

4   Select the Loopback type desired. In most instances, a loopback of the B1 or B2 channels towards the office (DSL) or customer (DC) is sufficient to verify operation of the ISDN circuit.

To Release an ISDN Loopback.

1   Select "Change Loopback Mode" from the ISDN Loopback Menu.

2   Select the card and channel of the ISDN card to be released from the loopback test.

3   Select "Set Normal" from the loopback mode menu.

Inventory

The inventory menu displays manufacturing and version information for all units in a PG-Flex system, except for the FI unit. To access the inventory menu, do the following:

At the Main Menu, type `C` then press `ENTER` . The Inventory menu displays:

```
  12-MAY-98        PAIRGAIN TECHNOLOGIES INC., PG-FLEX TERMINAL        01:07:32
                     SYSTEM ID: 32 Channel PG-Flex System          SYSTEM: 2


                               INVENTORY
     ------------------------------------------------------------------------
     LOC   SLOT    MODEL   LIST  ISSUE     TYPE      S/W    P1 TAG     CLEI CODE

     ------------------------------------------------------------------------
     COT   LU1   FLL-716  ****  ****     32-CH E1   3.6   **********  **********
     COT   CU1   FLC-706    1     1        ISDN4    1.3   0123456789  @ABCDEFGHI
     COT   CU2   FLC-703    3     1        POTS8    1.3   3486001292
     COT   CU3   FLC-703    3     1        POTS8    1.3   abcdefghij  abcdefghij
     RT    LU    *****    ****  ****     *********  3.5   **********  **********
     RT    CU1   FRC-756    1     1        ISDN4    1.3   0123456789  @ABCDEFGHI
     RT    CU2   *****    ****  ****       POTS8    1.4   **********  **********
     RT    CU3   FRC-753    2     1        POTS8    1.4   0307000570  VARHCGGCAA
     RT    CU4   *****    ****  ****       POTS8    1.4   **********  **********
```

Table 10.   *Inventory Menu Definitions*

Parameter	Definition
LOC	Indicates whether the card is in the COT shelf or in the RT enclosure
SLOT	Indicates which slot the card is located
MODEL	Indicates the card model
LIST	Indicates the card list number
ISSUE	Indicates the card issue number
TYPE	Indicates the type of card (E1, T1, POTS, ISDN)
S/W	Indicates the software version of the installed card
P1 TAG	A character ASCII string up to 10 characters providing a manufacturing serial number
CLEI CODE	Indicates the card CLEI code

Troubleshooting

Table 11 provides troubleshooting procedures based on indications displayed by the front panel indicators of FLL-716 List 3A.

Table 11. *FLL-716 List 3A Troubleshooting*

Indication	Problem	Action
POWER LED off	The COT Shelf is no longer receiving CO battery.	Verify that the fuse on the CO fuse panel is good. Verify wiring between the COT shelf and the CO fuse panel, and from the panel to the CO battery.
	The COT Line Unit fuse F1 has blown.	Replace the fuse.
LOOP 1 (2) SYNC LED flashing or off	The HDSL line is attempting to synchronize with the remote terminal line unit or cannot detect the HDSL signal from the remote terminal line unit. This is usually an indication that there is a problem with the HDSL circuit between the COT and RT (assuming the FAULT LED is *off*). COLU and RTLU incompatible. That is, one is a T1 version and the other is an E1 version.	Verify the HDSL circuits are terminated properly and with the correct orientation. Measure the loop resistance of each HDSL circuit (shorting the pair at the far end). The loop resistance must be less than that shown in Table 2 on page vi.
LOOP 1 (2) MARGIN LED on	The HDSL line margin level is below a preset level.	See the previous discussion on the SYNC LED *flashing* or *off*.
FAULT LED on	Faulty FLL-716 List 3A.	Check that none of the HDSL pairs are shorted to ground. Check for continuity from COT to RT on all HDSL lines. Replace the COT Line Unit, if the RT line unit is confirmed good. Otherwise, replace the RT line unit.

PRODUCT SUPPORT

This section contains product support and warranty information.

Technical Support

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

Telephone:	(800) 638-0031 or (714) 832-9922
Fax:	(714) 832-9924

During normal business hours (8:00 AM to 5:00 PM, Pacific Time, Monday through Friday, excluding holidays), technical assistance calls are normally answered directly by a Customer Service Engineer. At other times, a request for technical assistance is handled by an on-duty Customer Service Engineer through a callback process. This process normally results in a callback within 30 minutes of initiating the request.

In addition, PairGain maintains a computer bulletin board system for obtaining current information on PairGain products, product troubleshooting tips and aids, accessing helpful utilities, and for posting requests or questions. This system is available 24 hours a day by calling (714) 730-2800. Transmission speeds up to 28.8 kbps are supported with a character format of 8-N-1.

Warranty

PairGain Technologies warrants this product to be free of defects and to be fully functional for a period of 60 months from the date of original shipment, given correct customer installation and regular maintenance. PairGain will repair or replace any unit without cost during this period if the unit is found to be defective for any reason other than abuse or incorrect use or installation.

Do not try to repair the unit. If it fails, replace it with another unit and return the faulty unit to PairGain for repair. Any modifications of the unit by anyone other than an authorized PairGain representative voids the warranty.

If a unit needs repair, call PairGain for a Return Material Authorization (RMA) number and return the defective unit, freight prepaid, along with a brief description of the problem, to:

PairGain Technologies, Inc.
14352 Franklin Avenue
Tustin, CA 92780
ATTN: Repair and Return Dept.
(800) 638-0031

PairGain continues to repair faulty modules beyond the warranty program at a nominal charge. Contact your PairGain sales representative for details and pricing.

FCC Compliance

This unit complies with the limits for Class A digital devices 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, can cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Refer to the installation section of the appropriate instruction manual for the unit you are installing to get information on:

- Cabling
- Correct connections
- Grounding

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by PairGain Technologies, Inc. may void the user's authority to operate the equipment.

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

ABBREVIATIONS

AWG	American Wire Gauge
CD	Carrier Detect
CO	Central Office
COT	Central Office Terminal
DCD	Data Carrier Detect
DIP	Dual In-Line Package
DS0	Digital Service, Level 0
DTR	Data Terminal Ready
HDSL	High-bit-rate Digital Subscriber Line
ISDN	Integrated Services Digital Network
LU	Line Unit
MLT	Mechanized Loop Testing
NVRAM	Non-Volatile Random Access Memory
PBX	Private Branch Exchange
PCM	Pulse Code Modulation
PGTC	PairGain Test Controller
POTS	Plain Old Telephone Service
RMA	Return Material Authorization
RT	Remote Terminal

GLOSSARY

Margins   Indicates the excess signal to noise ratio, at either the COT or RT, relative to a 10^{-7} Bit Error Rate. *cr* is the current margin, *mn* is the minimum margin since last cleared, *mx* is the maximum value since cleared, and N/A means Not Available. The normal range of a typical margin is from 22 to 6 dB.

Pulse Attenuation   Indicates the attenuation of the 2B1Q pulse from the distant end. This value is related to the cable pair's 272-kHz loss. The pulse attenuation is a more direct indication of the loop attenuation to the 2B1Q signal than the 272-kHz loss. The normal range of pulse attenuation is from 1 to 32 dB.

PPM   Indicates the relative offset of the crystal oscillator in the RT Line Unit from the COT Line Unit's crystal oscillator. Any value between –64 and +64 is adequate. Values outside this range indicate out of tolerance components or excessive temperature drift of critical components.

HDSL 24 Hour ES   The number of 1-second intervals that contained at least one CRC error. This value is a running total of errored seconds (ES) for the last 24 Hours.

HDSL 24 Hour UAS   The number of seconds (unavailable seconds) the HDSL loop was out of synchronization.

Corporate Office

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For Technical Assistance:

(800) 638-0031

ISO 9001

DNV

DNV Certification, Inc.
Certificated Firm

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