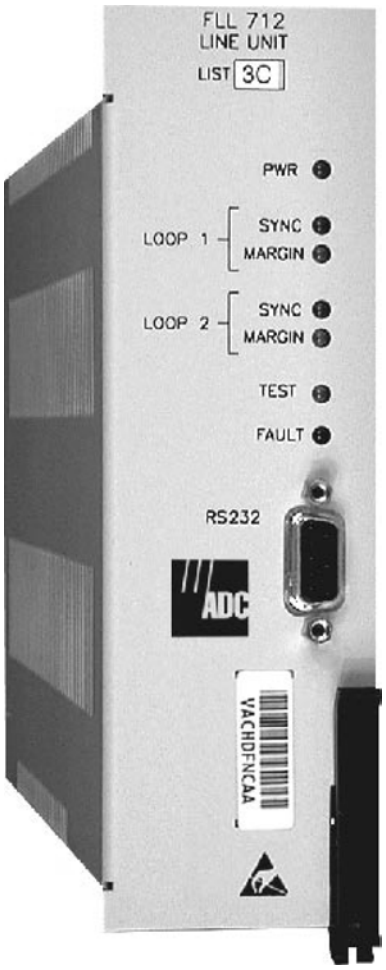
PG-FLEX

TECHNICAL PRACTICE



24 CHANNEL
CENTRAL OFFICE TERMINAL
LINE UNIT

Model	List	CLEI Code
FLL-712	3C	VACHDFNC~~

SECTION SCP-FLL712-033-02H

Revision History of This Practice

Revision	Release Date	Revisions Made
01	November 2, 2001	Initial release
02	February 4, 2003	Release to rebrand document to comply with ADC standards and updated Product Support Information

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 36. If you must store the equipment for a prolonged period, store the equipment in its original container.

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PRODUCT OVERVIEW

The ADC® PG-Flex® FLL-712 List 3C, Central Office Terminal (COT) Line Unit (LU) is located at the CO end of the PG-Flex subscriber carrier system, and transports up to 24 DS0 subscriber channels between a COT and a Remote Terminal (RT). The FLL-712 resides in a 19 or 23-inch COT shelf. Each system in the shelf requires one FLL-712. The FLL-712 provides access through its Craft port to provision a PG-Flex system using an ASCII terminal.

DESCRIPTION AND FEATURES

The FLL-712 uses High-bit-rate Digital Subscriber Line (HDSL) 2B1Q technology to provide the equivalent of 1.544 Mbps digital transmission rates plus signaling over two copper pairs (Figure 2). The HDSL line can include unterminated bridge taps. The technology is implemented without:

- using repeaters
- loop conditioning
- pair selection

The FLL-712 supports the use of PG-Flex doublers to extend the range of a PG-Flex subscriber carrier system to 24 kft (7.3 km) of 24 AWG or 18 kft (5.4 km) of 26 AWG loops. Two doublers can triple the range to 36 kft (10.9 km) of 24 AWG or to 27 kft (8.2 km) of 26 AWG loops.

In addition, the FLL-712 COT line unit is compatible with Mechanized Loop Testing (MLT) and the Pair Gain Test Controller (PGTC) when a PGTC Interface Unit is installed in the shelf. It also supports:

- 24 subscriber channels in the CO
- PG-Flex doublers in systems transporting Plain Old Telephone Service (POTS) and Integrated Services Digital Network (ISDN) circuits
- 4Tel and MLT/PGTC compatible Loop Test Systems
- ISDN channel units
- loop start/ground start channel units

Operational Capabilities

The FLL-712 provides the following functions for each 24-channel system in a single COT shelf:

- system power supply
- HDSL line transceivers and simplex RT power
- front-panel status indicators
- RS-232 Maintenance Interface (DCE)
- switched access to the metallic bypass pair
- MLT/PGTC loop test system compatibility
- 4Tel loop test system compatibility

Figure 1 shows a block diagram of the FLL-712. 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 voltages or other line faults that may 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.

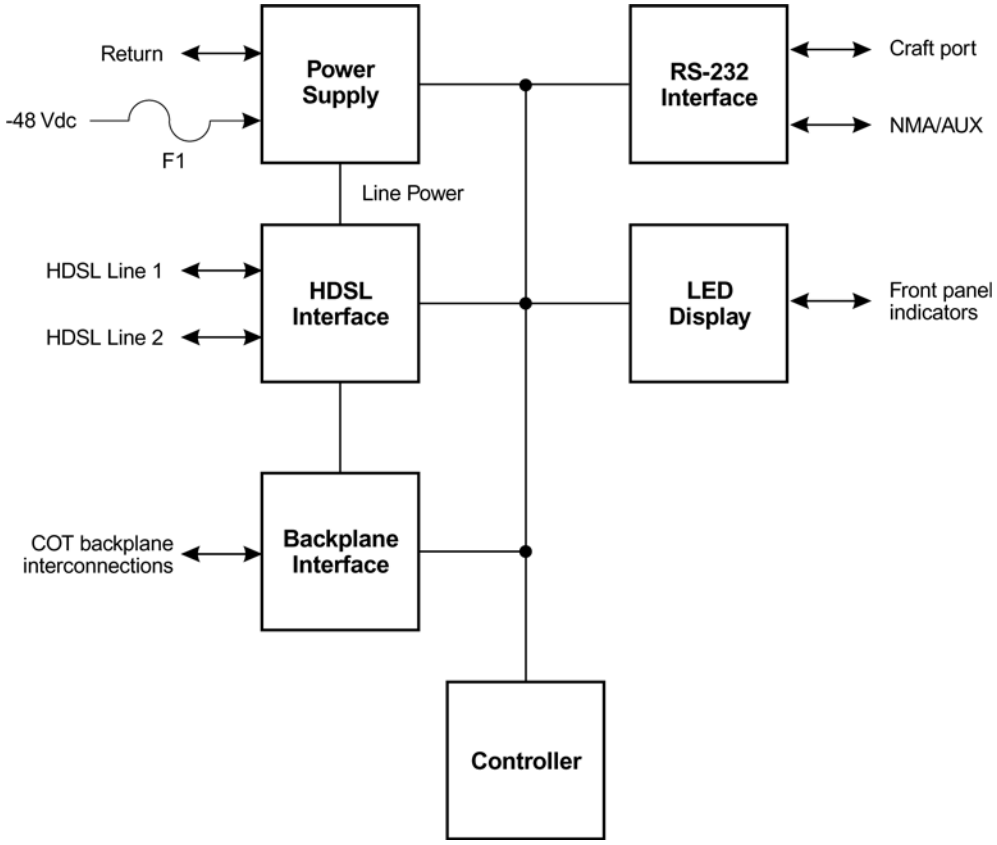


Figure 1. *FLL-712 Block Diagram*

HDSL Transmission

PG-Flex uses HDSL transmission technology between the COT and RT. This technology provides up to 24 DS0s, plus signalling, over two copper pairs without using repeaters, loop conditioning, or pair selection. Adaptive equalization, scrambling, and a four-level 2B1Q line coding scheme increase range and minimize crosstalk.

The line interface is a two-pair, 784-kbps full-duplex 2B1Q transmission format. The dual HDSL lines provide 24 channels at 64 kbps, with signalling and an operations channel for management control. The signal characteristics on the carrier pairs comply with TR-NWT-001210, Generic Requirements for HDSL Systems.

"Specifications" on page 4 shows the maximum distance between the COT and the RT for various gauge wire. Because of HDSL transmission technology, the HDSL lines require no special conditioning and may include unterminated bridge taps, but cannot include load coils.

Applications

PG-Flex is a small-capacity, universal subscriber carrier system supporting up to 24 DS0 channels including POTS and ISDN services. PG-Flex uses HDSL transmission technology over two unconditioned copper pairs. Power is supplied from the CO to the RT over the HDSL transmission lines. The maximum distance from the CO to the RT is 12.3 kft (3.7 km) using 24 AWG cable (0.5 mm).

A PG-Flex system is comprised of one line unit and one (or more) channel units at both the CO and the RT (Figure 2). Line units and channel units can be hot-swapped without affecting other systems in the same shelf. The POTS channel units use a Pulse Code Modulation (PCM) encoding scheme that supports 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 four 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 remote side of a PG-Flex systems mounts into an FRE-765 RT enclosure. The RT enclosure supports one system, which includes one LU and up to three channel units. The channel units must be the same type of card (that is, POTS or ISDN) as the channel units installed at the CO.

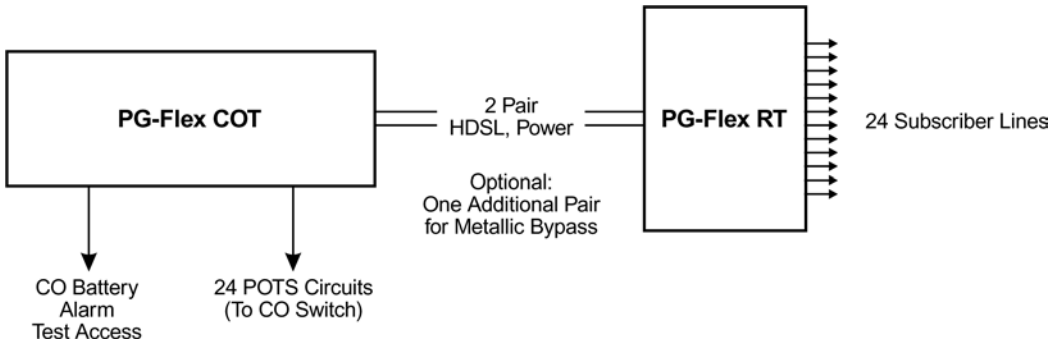


Figure 2. *Typical PG-Flex Configuration*

Subscriber Drop Testing

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

The CO loop test system can set up a metallic access connection to a subscriber circuit by momentarily placing +116 Vdc (from the CO) on the subscriber's Tip lead. (The Ring lead should be between GND and the tip value.) The selected subscriber drop is connected to the corresponding COT subscriber line (assuming there is a working metallic bypass pair between the CO and RT LUs).

The metallic connection drops when -116 Vdc is momentarily applied to the subscriber's COT Tip lead or by removing the PGTC LOCK signal (when an FPI unit is installed).

Metallic access may also be activated through an ASCII terminal connected to the RS-232 Craft port located on the front of the FLL-712 line unit or through the FAU-728 List 2 or FPI-729 units.

SPECIFICATIONS

Electrical Characteristics

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

24 Channel System Loop Length

26 AWG (0.4 mm)	9.0 kft (2.8 km) – 750 Ω Resistance
24 AWG (0.5 mm)	12.3 kft (3.8 km) – 638 Ω Resistance
22 AWG (0.6 mm)	16.1 kft (5.0 km) – 521 Ω Resistance
19 AWG (0.9 mm)	22.8 kft (7.0 km) – 367 Ω Resistance

Environmental Characteristics

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

Physical Dimensions

Height:	6.75 in. (17.1 cm.)
Width:	2.00 in. (5.1 cm.)
Depth:	10.50 in. (26.7 cm.)
Weight	2.0 lb. (0.91 kg.)

FRONT PANEL

Figure 3 shows the FLL-712 front panel. Table 1 on page 6 lists the indicators and status for the front panel LEDs.

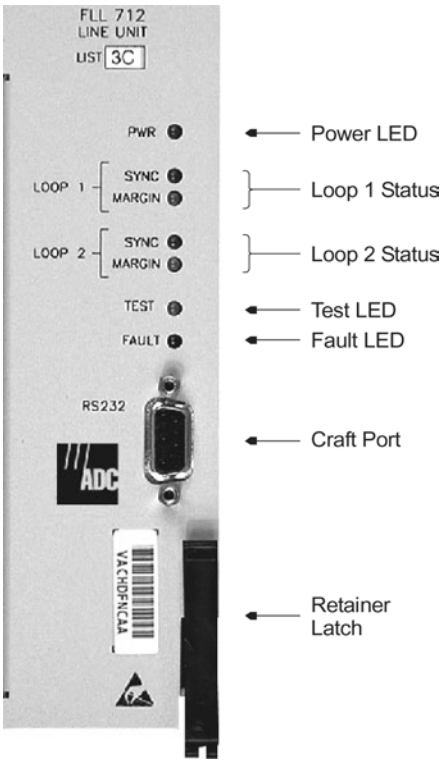


Figure 3. *FLL-712 Front Panel*

Table 1. *FLL-712 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 faults on the HDSL circuits
	OFF	Not receiving power. COT Line Unit or equipment bay 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	A fault has been detected in the FLL-712
	OFF	No faults detected in the FLL-712

INSTALLATION AND CONFIGURATION

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 ADC. Order replacement equipment if necessary.

2 Check the contents versus the packing list to ensure complete and accurate shipment. If the shipment is short or irregular, contact ADC as described in the Product Support section. When storing the equipment for a prolonged period, use 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.

An FPI-729 List 1 PGTC Interface Unit or an FAU-728 List 2 (or higher) Alarm Unit must be installed at all times when ISDN channel units are installed. These units provide the composite clock reference source for the ISDN channel units that is required for normal operation of the ISDN channel units. Removing the FPI-729 List 1 or FAU-728 List 2 Alarm Unit during an ISDN call for more than one minute may terminate the call.

Install a FLL-712 COT line unit and verify operation as follows.

1 Insert the FLL-712 COT line unit into the COT shelf and verify the following:

a All LEDs on the Line Card turn on for about one-half second, then turn off.

b PWR and FAULT LEDs turn on after ten seconds, the COT starts its power management routine, and the PWR LED flashes.

If line powering fails, the FLL-712 waits five minutes before attempting to repower the HDSL line. If line powering succeeds, HDSL communications begins 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.

- POWER 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 Measure the following voltages on the COT shelf backplane.

- -65 to -130 Vdc (±10%) between the HDSL_T1 pin and chassis ground
- +65 to +130 Vdc between the HDSL_T2 pin and chassis ground

TERMINAL MANAGEMENT

The terminal management function allows configuration of and access to the entire PG-Flex system using an ASCII terminal (or modem with a null modem cable) connected to the craft port.

Use this function to:

- display system status
- set configuration parameters
- set metallic access connection to the subscriber circuit
- monitor system performance
- obtain an inventory report

Connecting the FLL-712 to an ASCII Terminal or Modem

Figure 4 shows the pinouts for connecting the FLL-712 Craft port to an ASCII terminal.

The FLL-712 does not automatically log off when a terminal is unplugged from the Craft port unless the DTR signal is connected between the terminal and the Craft port. Technicians must manually log off the line unit before unplugging from the port. Otherwise, the line unit remains logged in and the terminal session continues.

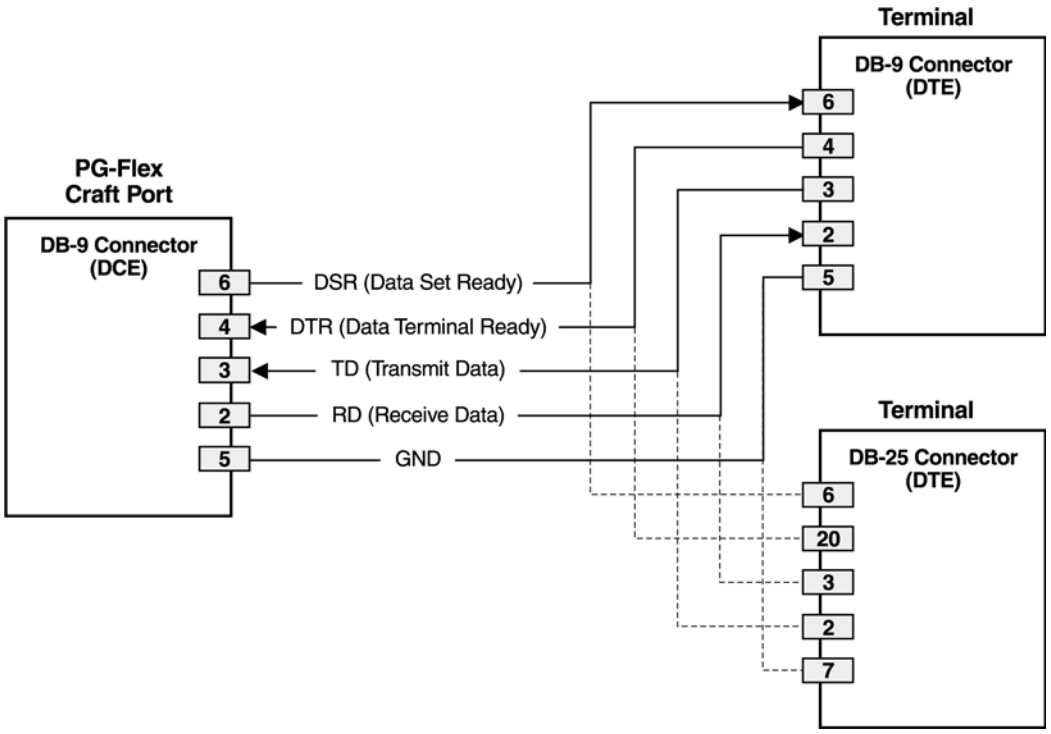


Figure 4. *Connecting the FLL-712 to an ASCII Terminal*

Figure 5 shows the pinouts for connecting the FLL-712 to a modem using a null-modem cable. Using Data Carrier Detect from the modem ensures that the FLL-712 logs off if the carrier signal disappears.

When configuring a modem, ensure that either the DIP switches or the software configuration is setOff 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-712 connection functions correctly but does not log out when disconnected.

Therefore, set Data Terminal Ready (DTR) override to Off so a modem terminates correctly when the FLL-712 drops DSR (which is null-modemed to DTR input on the modem).

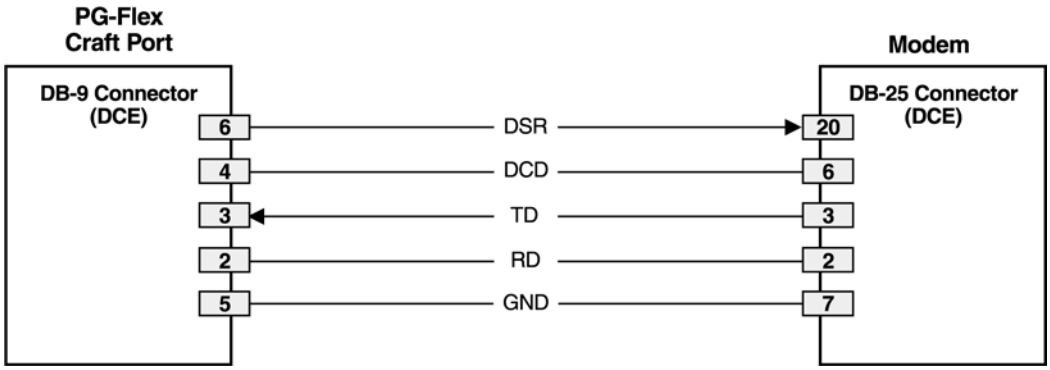


Figure 5. *Connecting the FLL-712 to a Modem*

The connection is set up as follows:

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

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

Connecting the ASCII Terminal to the FPI Card

To test the system, the ASCII terminal can be connected to either the FPI card (if present) or the FLL-712 line unit.

Power-up and connection through the FPI card

If the FPI card is present, plug the cable into the FPI Craft port and observe the indicator lights to ensure the card is working properly.

1 At the blank ASCII screen, press **ENTER** and the power-up and connection screen appears:

2 Press **ENTER** again and the Login screen appears:

3 Enter the password, which the screen echoes as a series of asterisks, and press **ENTER**. The Main Menu for the FPI card appears:

```
ADC TECHNOLOGIES INC., PG-FLEX TERMINAL
                       Shelf ID:

    CURRENT ALARMS: NONE

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

     1) Connect to COT 1   Active
     2) Connect to COT 2   Inactive
     3) Connect to COT 3   Inactive
     4) Connect to COT 4   Inactive


     5) Configuration

     Q) Quit




    [FPI] ENTER COMMAND>
```

4 Choose one of the COTs by typing the number at the prompt. Press **ENTER** to call the [COT] power-up and connection screen. Proceed as described in the following section.

Power-up and connection through the FLL-712 line unit

1 If the FPI card is not installed, plug the cable into the Craft port of the FLL-712 line unit. The power-up and connection screen displays:

```
    [COT] Ready
```

2 Press **ENTER** to start the autobaud feature and display the login screen:

```
17-OCT-98 ADC TECHNOLOGIES INC., PG-FLEX TERMINAL 03:55:54
         SYSTEM ID: List 3C - Tech Pubs                          SYSTEM: 2









[COT] LOGIN PASSWORD>
```

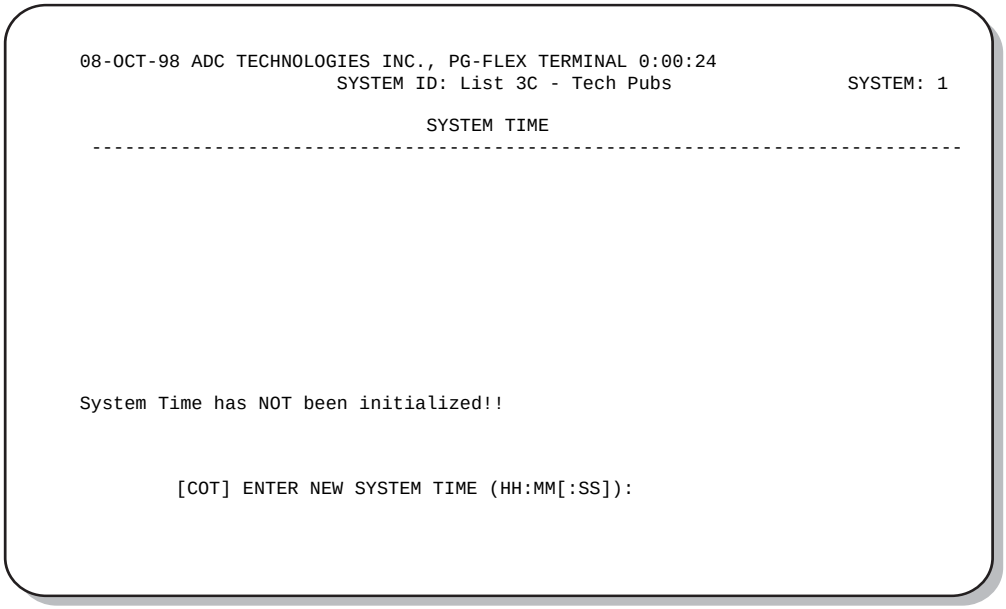
The autobaud feature supports transmission rates of 1200, 2400, 4800 and 9600 bps only.

3 Enter the password. For security reasons, the system echoes the password with "*".

To obtain a login password, contact the Customer Service Engineering group (see "Technical Support" on page 36) for access using a master password.

System Time Screen

The System Time screen appears the first time you log on or after the power has been removed from the COT shelf. Enter the new system time in hours (HH), minutes (:MM), and seconds (:SS).



This screen does not appear the next time you log on unless the power has been removed. Press **ENTER** to display the Main Menu.

CONFIGURATION, MAINTENANCE, AND TESTING

The following sections describe how to navigate the ASCII screens to configure, check the status of, and maintain the FLL-712 system.

Menus and Display Structure

Figure 6 shows the menu structure of the terminal management system.

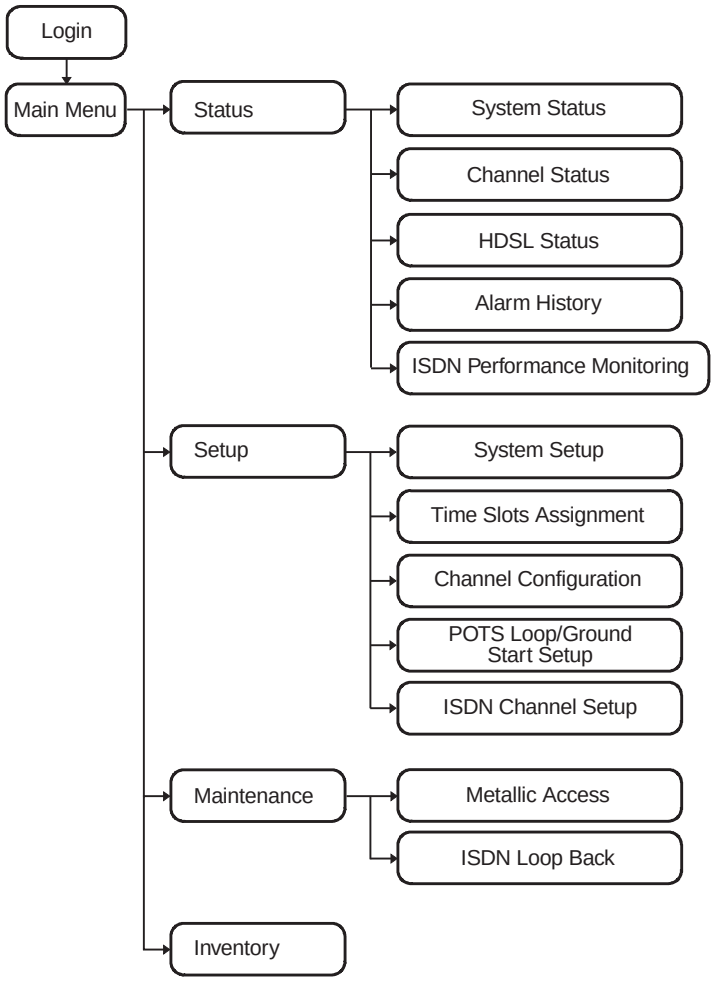


Figure 6. *Terminal Menu and Display Structure*

Main Menu

The Main Menu provides access to other menus to configure the PG-Flex system, initiate or display metallic access connections, and display status information.

```
17-OCT-98 ADC TECHNOLOGIES INC., PG-FLEX TERMINAL 03:55:54
                     SYSTEM ID: List 3C - Tech Pubs              SYSTEM: 2

    CURRENT STATUS: OK  LOGGED IN: COT
    ALARMING TERMINAL: NONE


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

                                A) STATUS

                                B) SETUP

                                C) MAINTENANCE

                                D) INVENTORY

                                    Q)uit


      [COT] ENTER COMMAND>
```

Table 2 describes the Main Menu options.

Table 2. *Main Menu Options*

Main Menu Option	Function
A) Status	• System Status shows the equipment installed in the system and the current status (in alarm or not) of the equipment. • Channel Status shows the current status of all channels in the system. Each channel has a status condition. 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 Vdc test request SERR: PCM bus frame sync error FIDL: forced idle TDSB: time slots disabled RBAT: reverse battery ****: unknown • HDSL Status shows the status of the HDSL span, listing either a 24-hour or 7-day performance history. • Alarm History displays the status history of COT, RT, and span alarms. • ISDN Performance Monitoring Menu displays PM error count and PM threshold for a specific ISDN card and channel.
B) Setup	Display the current setup or 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	Set up a metallic access connection to a subscriber circuit or perform 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. ISDN loopback testing includes the ability to switch between COT and RT loopback and change the loopback mode for each card and channel.
D) Inventory	Display manufacturing information and version information for all the units in the system (except the FAU/FPI unit). At the CO line unit terminal or the RT line unit terminal, the command displays all units in the system.
Q) Quit	Logs the user off.

Configure System Settings

To perform system setup:

1 On the Main Menu, type **B** then press **ENTER** to display the Setup Menu.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL 3:59:46
                       SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 2

    CURRENT STATUS: OK LOGGED IN: COT
    ALARMING TERMINAL: NONE



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

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


                           CTRL-X) Main Menu    e(X)it



      [COT] ENTER COMMAND>
```

2 Type **A** then press **ENTER** to display the System Settings menu.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         03:59:52
                       SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 2
                                 SYSTEM SETTINGS
 ------------------------------------------------------------------------------
    A) SYSTEM DATE: .   .   .   .   .   17-OCT-98
    B) SYSTEM TIME: .   .   .   .   .   03:59:52
    C) SYSTEM ID:   .   .   .   .   .   List 3C - Tech Pubs
    D) SET PASSWORD .   .   .   .   .
    E) AUTO LOGOUT TIME (min.): .   .   DISABLED    (DISABLED,5,30,60)
    F) METERED TONE FREQUENCY (kHz):    DISABLED    (DISABLED,12,16)
    G) RING FREQUENCY (Hz): .   .   .   20          (20,25,30)
    H) HDSL ES ALARM THRESHOLD: .   .   DISABLED    (DISABLED,17,170)
    I) HDSL MARGIN THRESHOLD:   .   .   11          (0-15,0=DISABLED)
    J) ALARM ON HDSL THRESHOLD: .   .   DISABLED    (DISABLED,ENABLED)
    K) LOCAL LOOP LENGTH:   .   .   .   LONG        (SHORT,LONG)
    L) ALARM ON CONFIGURATION:  .   .   MINOR       (DISABLED,MINOR,MAJOR)
    M) ALARM ON INSUFFICIENT TIMESLOT:  DISABLED    (DISABLED,ENABLED)
    N) ALARM ON ISDN PM THRESHOLD:  .   DISABLED    (DISABLED,ENABLED)


                           CTRL-X) Main Menu    e(X)it


      [COT] ENTER CHOICE>
```

3 Type a letter (**A** through **N**) then press **ENTER** to select a parameter to change. Refer to Table 3 on page 18 for System Settings menu options.

A separate screen appears for the parameter selected. Input the change at the prompt.

Table 3. *System Settings Menu Options*

Parameter	Default Value	Description
A) System Date	01-JAN-00	Enter date. (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	Enter military time (hh:mm:ss). The System Time must be set individually for each PG-Flex system. The time setting is lost whenever the system shelf loses power or the COLU or RTLU module is removed and reinserted.
	**All the parameters discussed in the remainder of this table are stored in the CO line unit card NVRAM, and therefore normally do not change when power is cycled or cards are removed and reinserted.**	
C) System ID	(all spaces)	Indicate the physical location of the PG-Flex system (CO or RT terminal) using any combination of up to 24 alphanumeric characters (including upper case, lower case, numerals, and punctuation marks). Each PG-Flex system should be assigned a unique, System ID. The default for System ID is "blank" (all spaces). If the CO line unit is replaced, re-enter the appropriate system ID.
D) Set Password	(all spaces)	Enter the password. The password can be up to 10 characters (including spaces), or any combination 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 does not change when power is cycled or cards are removed and reinserted. The password default is **ENTER**.
E) Auto Logout Time	DISABLED	The system automatically logs off after a time determined by this parameter: • DISABLED: The user is never automatically logged off. • 5: 5 minutes. • 30: 30 minutes. • 60: 60 minutes.
	**If the user leaves the system without logging off, and if Auto Logout Time is "DISABLED," the next person who accesses the system can do so without logging on and does not need a password.**	
F) Meter Tone Frequency	12	Meter 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. • 12: 12 kHz. • 16: 16 kHz.
G) Ring Frequency	20	Determines the frequency of the ringing voltage on all subscriber lines: • 20: 20 Hz. • 25: 25 Hz. • 30: 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. • 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.

Table 3. *System Settings Menu Options*

Parameter	Default Value	Description
I) HDSL Margin Threshold	4	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 (determined by the Alarm setting on HDSL Threshold parameter). A default setting of 4 indicates that a minor alarm occurs when the HDSL margin is 4 dB. The HDSL Margin Threshold can be set between 1 dB and 15 dB.
J) Alarm on HDSL Threshold	DISABLED	Controls whether a minor alarm is generated if the HDSL ES Alarm Threshold or HDSL Margin Threshold is exceeded. • DISABLED: A minor alarm does not occur when the HDSL ES Alarm Threshold and/or HDSL Margin Threshold is exceeded. • ENABLED: A minor alarm occurs when the HDSL ES Alarm Threshold and/or HDSL Margin Threshold is exceeded.
K) Local Loop Length	Long	Determines the length of subscriber loop supported by PG-Flex and affects all subscriber loops within a single PG-Flex system. The loop length affects the total power required by the PG-Flex system: the shorter the loop, the less the power required. • 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. For most applications, the power saved by the SHORT setting is relatively insignificant; therefore, select the default value (LONG) in most cases.
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. If a mismatch condition exists between the CO and RT, replace the corresponding channel unit with a matching channel unit. • 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.
M) Alarm on Insufficient Time Slot	DISABLED	The system can generate a minor alarm if more circuits are 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.) • 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. • 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.

Configure an ISDN Channel Unit

1 Type **E** then press **ENTER** to display the ISDN Channel Setup selection screen.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         04:00:14
                       SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 2

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

                     Press ESCAPE to return to previous menu

    Enter Card and Channel To Setup (CARD, CHANNEL):
```

If no ISDN cards are installed in the PG-Flex system, the display indicates and prevents access to the ISDN Channel Setup menu.

2 Type the card number followed by a comma. Then type the channel number for the ISDN circuit being configured, then press **ENTER** (for example, "1,2") to display the ISDN Channel Setup menu.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         22:50:08
                       SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 2

                                ISDN CHANNEL SETUP
------------------------------------------------------------------------------
   CARD:1    CHANNEL:2
------------------------------------------------------------------------------
   A) PM Mode: .   .   .   .   .   .   Interim Path(Int. Path, Int. Segmented)
   B) eoc Mode:    .   .   .   .   .   Normal      (Normal, Transparent)
   C) B1 <-> B2 Swap:  .   .   .   .   Normal      (Normal, Swap)
   D) Sealing Current: .   .   .   .   On          (Off, On)
   E) Zero Byte Substitution:  .   .   Off         (Off, Enabled)

                         S)ELECT NEW CARD AND CHANNEL

                         CTRL-X) Main Menu    e(X)it

      [COT] ENTER CHOICE>
```

When finished with the System Setting Menu Options, type **X** to return to the Setup Menu.

3 On the ISDN Channel Setup menu, type a letter (A through E) then press ENTER to choose a setup parameter. Select one of the two options available for each parameter (Table 4).

Table 4. *ISDN Channel Unit Configuration Options*

Parameter	Default Value	Description
A) PM Mode	Interim	Method of performance monitoring. • Interim Performance: Considers the channel as one path and collects the end-to-end error rate for the entire transport path. • Segmented Performance: Considers the channel as separate sections and individually collects error rates for each DSL loop.
B) eoc mode	Normal	How ISDN eoc (embedded operations channel) messages are handled by the PG-Flex system. • Normal: eoc messages are decoded and retransmitted within the PG-Flex system. • Transparent: eoc messages are not decoded and are passed through the PG-Flex system transparently.
C) B1<-> B2 Swap	Normal	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: channels "B1" and "B2" at the CO ISDN "U" interface are routed to channels "B1" and "B2" at the RT ISDN "U" interface. • Swap: channels "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	On	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 flows in the ISDN subscriber loop at all times.
E) Zero Byte Substitution	Off	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 uses a ZBS code to prevent long string of zeros in the data.

4 To choose a new ISDN channel unit and channel to configure, type S then press ENTER. Repeat steps 2 and 3.

5 When finished, type X then press ENTER to return to the Setup Menu.

Channel Configuration

24 time slots are available, with channels enabled by default. Disable channels only when the time slots are required by another channel unit.

1 On the Setup Menu, type **C** then press **ENTER** to access the Channel Configuration menu.

```
17-OCT-01 ADC TECHNOLOGIES INC., PG-FLEX TERMINAL 04:00:02
                      SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 2

                             CHANNEL CONFIGURATION
 ------------------------------------------------------------------------------
                    CU1        CU2        CU3
    Channel COT   (ISDN4)    (POTG8)    (---)
              RT  (ISDN4)    (POTG8)    (---)      (---)
 ------------------------------------------------------------------------------
          1          ON         ON         -
          2          ON         ON         -
          3          ON         ON         -
          4          ON         ON         -
          5          -          ON         -
          6          -          ON         -
          7          -          ON         -
          8          -          ON         -

                             4 Time slots Available

                        D)isable Channel   E)nable Channel
                           CTRL-X) Main Menu    e(X)it

      [COT] ENTER COMMAND>
```

See Table 5 for channel configuration options.

Table 5. *Channel Configuration Options*

Parameter	Default Value	Function
Channel configuration	Enabled	Each channel is individually enabled or disabled through the COLU. This configuration is stored in both the COLU and the COCU. If any one card (COLU, RTLU, COCU, or RTCU) is removed, replaced, or reinserted, the Channel Configuration is automatically reserved. The values can be set to one of the following parameters: The display indicates when a channel is enabled but no slots are available. DISABLED (OFF): The selected channel is disabled (no time slot). ENABLED (ON): The selected channel is enabled (with time slot).

2 Each channel is individually enabled or disabled through the COLU. Type **D** to disable a channel or type **E** to enable a channel then press **ENTER**.

3 Enter the card number, a comma, then the channel number (for example, type “1,1” for card 1 on channel 1). Press **ENTER**.

4 When finished, type **X** then press **ENTER** to return to the Setup Menu.

View Time Slot Assignments

1 On the Setup Menu**,** type **B** then press **ENTER** to display the Time Slots Assignment screen.

```
17-OCT-01 ADC TECHNOLOGIES INC., PG-FLEX TERMINAL 03:59:56
                    SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 2
                          TIME SLOTS ASSIGNMENT
--------------------------------------------------------------------------------
 TIME    CHANNEL     TIME    CHANNEL     TIME    CHANNEL     TIME    CHANNEL
 SLOT  ASSIGNMENT    SLOT  ASSIGNMENT    SLOT  ASSIGNMENT    SLOT  ASSIGNMENT
--------------------------------------------------------------------------------
   1:   CU2  CH1       7:   CU2  CH7      13:   CU1  CH2      19:   CU1  CH4
   2:   CU2  CH2       8:   CU2  CH8      14:   CU1  CH2      20:   CU1  CH4
   3:   CU2  CH3       9:   CU1  CH1      15:   CU1  CH3      21:    ----
   4:   CU2  CH4      10:   CU1  CH1      16:   CU1  CH3      22:    ----
   5:   CU2  CH5      11:   CU1  CH1      17:   CU1  CH3      23:    ----
   6:   CU2  CH6      12:   CU1  CH2      18:   CU1  CH4      24:    ----
--------------------------------------------------------------------------------

                        CTRL-X) Main Menu    e(X)it




     [COT] ENTER COMMAND>
```

The system automatically generates these values. However, cycling power to the system or hot plugging a new channel unit can change these values.

2 On the Time Slots Assignment screen, type **X** then press **ENTER** to return to the Setup Menu.

Configure Loop Start/Ground Start Channel Units

Some screens differ when channel units are installed in a 19-inch instead of a 23-inch shelf. The example screens (where appropriate) show only a 23-inch shelf with three channel units.

1 On the Setup Menu, type **D** then press **ENTER** to display the POTS Ground/Loop Start Configuration menu.

```
17-OCT-98 ADC TECHNOLOGIES INC., PG-FLEX TERMINAL 04:00:08
                      SYSTEM ID: List 3C - Tech Pubs        SYSTEM: 2

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

                         L) Change to Loop Start
                         G) Change to Ground Start
                       CTRL-X) Main Menu    e(X)it


    [COT] ENTER COMMAND>
```

2 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. Enter the card and channel numbers.

3 When finished, type **X** then press **ENTER** to return to the Setup Menu.

Test the Loop Start and Ground Start Channels

1 Verify that front panel ACTIVE and FAULT LEDs on the Channel Unit are off.

2 Test circuits for loop start.

3 Test circuits for ground start.

Configure the CU Channels

1 Start at the Setup Menu (Table 5 on page 22). Type **C** then press **ENTER** to display the Channel Configuration menu.

24 time slots are available, with channels enabled by default. Disable channels only when the time slots are required by another channel unit.

```
17-OCT-01 TECHNOLOGIES INC., PG-FLEX TERMINAL 04:00:02
                      SYSTEM ID: List 3C - Tech Pubs        SYSTEM: 2

                             CHANNEL CONFIGURATION
--------------------------------------------------------------------------------
                  CU1        CU2        CU3
   Channel COT  (ISDN4)    (POTG8)     (---)
             RT  (ISDN4)    (POTG8)     (---)      (---)
--------------------------------------------------------------------------------
         1          ON         ON         -
         2          ON         ON         -
         3          ON         ON         -
         4          ON         ON         -
         5          -          ON         -
         6          -          ON         -
         7          -          ON         -
         8          -          ON         -

                             4 Time slots Available

                        D)isable Channel   E)nable Channel
                           CTRL-X) Main Menu    e(X)it

     [COT] ENTER COMMAND>
```

2 Repeat process as described for setting and viewing ISDN Channel Configuration.

The system automatically generates the channel assignment values. However, cycling power to the system or hot plugging a new CU can change these values.

View Doubler Status

Display the status for the doubler unit(s) through the HDSL Status screen.

1 On the Main Menu, type **A** then press **ENTER** to display the Status menu.

2 Type **C** then press **ENTER** to display the HDSL Status screen.

```
17-OCT-01 TECHNOLOGIES INC., PG-FLEX TERMINAL 03:56:42
                      SYSTEM ID: 123ABC.....              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):       20/21/22     20/21/22     20/21/23     19/21/23
     PULSE ATTN (db):          0            0            1            1
     PPM OFFSET (ppm):         0            0           -1           -1
     24 HOUR ES:               0            1            2            2
     24 HOUR UAS:             45           38            6            0
--------------------------------------------------------------------------------
          LAST CLEARED: NONE
--------------------------------------------------------------------------------

                        A) 24-HOUR PERFORMANCE HISTORY
                        B) 7-DAY PERFORMANCE HISTORY


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

     [COT] ENTER COMMAND>
```

3 Type an option (Table 6) and, where appropriate, press **ENTER** to bring about one of the following.

Table 6. *HDSL Status Screen Options*

Option	Response
A	Shows the 24-hour performance history.
B	Shows the 7-day performance history.
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. Type **Y** to confirm the reset, or type **N** to cancel the reset.
X	Exits this screen and returns to Status Menu.

4 Type **X** then press **ENTER** to return to the Status Menu.

Select "Reset" when initially powering up or plugging in the board.

Display Alarm History

1 On the Status Menu, select **D** then press **ENTER** to display the System Alarm History menu.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         03:57:32
                      SYSTEM ID: List 3C - Tech Pubs                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









     [COT] ENTER COMMAND>
```

Upon initially powering up, select Reset to clear out the alarm history.

2 Type **C** then press **ENTER** to display the Span Alarm history.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         22:57:30
                      SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 2
                             SPAN-1 ALARM HISTORY
--------------------------------------------------------------------------------
 Type            First           Last            Status     Current   Count
 ------         --------------  --------------  ----------  -------    -----
 HDSL1 UAS       OCT 17, 00:00   OCT 17, 00:00    Enabled     NONE       1
 HDSL2 UAS       OCT 17, 00:00   OCT 17, 00:00    Enabled     NONE       1
```

```
     CTRL-X) Main Menu   e(X)it > (S)pan >
```

3 Type **S** then press **ENTER** to get the additional screens for the doubler spans.

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

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         22:57:30
                      SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 2
                              SPAN-2 ALARM HISTORY
--------------------------------------------------------------------------------
 Type            First           Last             Status     Current   Count
 ------        --------------  --------------  ----------  -------    -----
HDSL2 UAS      OCT 17, 00:00   OCT 17, 00:00    Enabled     NONE       1









     CTRL-X) Main Menu   e(X)it > (S)pan >
```

Display ISDN Performance Monitoring

1 On the Status Menu, type **A** then press **ENTER** to display the ISDN Performance Monitoring Menu.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         03:57:44
                      SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 2

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

                   Press ESCAPE to return to previous menu









   Enter Card and Channel (CARD,CHANNEL):
```

If no ISDN cards are installed in the PG-Flex system, the display so indicates, and does not continue to the ISDN Channel Setup menu.

2 Type the card number followed by a comma. Then type the channel number for the ISDN module being configured, then press **ENTER** (for example, "1,2") to display the ISDN Channel Setup menu.

3 Enter the channel unit number and the channel for the new ISDN channel unit.

```
08-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         12:45:18
                      SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 1

                       ISDN PERFORMANCE MONITORING MENU
--------------------------------------------------------------------------------
    INTERIM PATH ENABLED   CARD:1   CHANNEL:2
--------------------------------------------------------------------------------

                        A) SELECT NEW CARD AND CHANNEL

                        B) PM ERROR COUNT

                        C) PM THRESHOLD/ALERT INFO


                         CTRL-X) Main Menu    e(X)it









     [COT] ENTER COMMAND>
```

4 Type **B** then press **ENTER** to display the 8-Hour PM Error Count History screen.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         00:07:08
                      SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 1
                          8-HOUR PM ES COUNT HISTORY
--------------------------------------------------------------------------------
    INTERIM PATH ENABLED   CARD:2   CHANNEL:1
--------------------------------------------------------------------------------
                                 CUSTOMER/NETWORK
HOUR                    COT      <<Hourly ES>>      RT
--------------------------------------------------------------------------------
16:00                   0/    0                     0/    0
17:00                   0/    0                     0/    0
18:00                   0/    0                     0/    0
19:00                   0/    0                     0/    0
20:00                   0/    0                     0/    0
21:00                   0/    0                     0/    0
22:00                   0/    0                     0/    0
23:00                   0/    0                     0/    0

                        A) SELECT NEW CARD AND CHANNEL


                         CTRL-X) Main Menu    e(X)it

[COT] ENTER COMMAND>
```

5 Type **X** then press **ENTER** to return to the ISDN Performance Monitoring Menu. Type **C** then press **ENTER** to display the PM Threshold/Alert Info screen.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         00:07:38
                      SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 1
                           PM THRESHOLD/ALERT INFO
--------------------------------------------------------------------------------
    INTERIM PATH ENABLED   CARD:2   CHANNEL:1
--------------------------------------------------------------------------------
COT                          CUSTOMER/NETWORK
                          Hourly ES    Hourly SES   Daily ES     Daily SES
Threshold Count              40           10           100          25
Threshold Exceeded        no/no        no/no        no/no        no/no
Threshold Cross Alarm     dis/dis      dis/dis      dis/dis      dis/dis

RT                           CUSTOMER/NETWORK
                          Hourly ES    Hourly SES   Daily ES     Daily SES
Threshold Count              40           10           100          25
Threshold Exceeded        no/no        no/no        no/no        no/no
Threshold Cross Alarm     dis/dis      dis/dis      dis/dis      dis/dis

                  A) SELECT NEW CARD AND CHANNEL
                  B) CHANGE PM THRESHOLD COUNT
                  C) ENABLE/DISABLE THRESHOLD CROSSING ALARM

                        CTRL-X) Main Menu    e(X)it
[COT] ENTER COMMAND>
```

6 To select another card and channel: type **X** then press **ENTER** to return to the ISDN Performance Monitoring Menu. Otherwise, type **CTRL** + **X** to return to the Main Menu.

Maintenance

On the Main Menu, press **C** then press **ENTER** to access the Maintenance Menu.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         04:01:22
                      SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 2

   CURRENT STATUS: OK                                      LOGGED IN: COT
   ALARMING TERMINAL: NONE


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

                             A) METALLIC ACCESS

                             B) ISDN LOOPBACK


                           CTRL-X) Main Menu    e(X)it




     [COT] ENTER COMMAND>
```

Metallic Access

A metallic access connection to a subscriber circuit can be setup using the metallic access options.

1 On the Maintenance Menu, type **A** then press **ENTER** to display the Metallic Access Menu.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         04:01:10
                      SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 2

   CURRENT STATUS: OK                                        LOGGED IN: COT
   ALARMING TERMINAL: NONE


                              METALLIC ACCESS MENU
------------------------------------------------------------------------------
                           A) COT - BRIDGING
                           B) COT - LOOKING IN
                           C) COT - LOOKING OUT
                           D) RT  - LOOKING OUT
                           E) RT  - LOOKING IN
                           F) RT  - BRIDGING
                           G) SUBSCRIBER BYPASS

                           R)emove access

                           CTRL-X) Main Menu    e(X)it


      [COT] ENTER COMMAND>
```

Table 7 defines the functions of the metallic access menu parameter selections.

Table 7. *Metallic Access Menu Options*

Option	Parameter	Function
A	COT - Bridging	Monitors a subscriber circuit connection between the switch and the specified CO channel unit Tip/Ring pair.
B	COT - Looking In	The subscriber connection between the switch and the specified channel unit Tip/Ring pair can be tested. The channel under test is disconnected from the switch for this function. The technician will be able to verify connectivity between the channel under test and the CO switch.
C	COT - Looking Out	The subscriber connection through the CO channel unit toward the subscriber can be tested. The switch is disconnected from PG-Flex for this function.
D	RT - Looking In	Provides a connection to the subscriber circuit at the RT channel unit Tip/Ring pair with the subscriber terminal equipment disconnected. (Metallic bypass pair required.)
E	RT - Looking Out	Provides a connection to the subscriber drop with the RT channel unit disconnected. (Metallic bypass pair required.)
F	RT - Bridging	Monitors the connection between the RT channel unit and the subscriber terminal equipment. (Metallic bypass pair required.)
G	Subscriber Bypass	Provides a metallic connection from the switch to the subscriber's terminal equipment for the selected channel, bypassing the PG-Flex carrier transport. This is the only access connection that can be maintained after the technician logs off the craft port. (Metallic bypass pair required.)

2 On the Metallic Access Menu, type a letter (**A** through **G**) then press **ENTER** to display the Metallic Access menu and select the subscriber circuit to be accessed.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         22:58:46
                      SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 2

   CURRENT STATUS: OK                                          LOGGED IN: COT
   ALARMING TERMINAL: NONE



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

                    Press ESCAPE to return to previous menu









   Enter Card and Channel (CARD,CHANNEL):
```

To select a subscriber circuit:

1 Type the card number followed by a comma. Then type the channel number for the ISDN circuit being configured, then press **ENTER** (for example, “1,2”) to select a subscriber circuit. Metallic access to the selected circuit is provided at the test jack on the FPI-729 or FAU-728 front panel. The Metallic Access Menu indicates the current metallic access configuration.

2 Use a volt/ohm meter or other test equipment to test the subscriber circuit.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         04:01:10
                       SYSTEM ID: List 3C - Tech Pubs                SYSTEM: 2

    CURRENT STATUS: OK                                          LOGGED IN: COT
    ALARMING TERMINAL: NONE


                               METALLIC ACCESS MENU
------------------------------------------------------------------------------
                          A) COT - BRIDGING
                          B) COT - LOOKING IN
                          C) COT - LOOKING OUT
                          D) RT  - LOOKING OUT
                          E) RT  - LOOKING IN
                          F) RT  - BRIDGING
                          G) SUBSCRIBER BYPASS

                          R)emove access

                          CTRL-X) Main Menu    e(X)it


      [COT] ENTER COMMAND>
```

To release a subscriber drop, select **R** then press **ENTER**.

ISDN Loopback Menu

On the Maintenance Menu, type **B** then press **ENTER** to display the ISDN Loopback Menu.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         04:01:16
                      SYSTEM ID: List 3C - Tech Pubs                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

                      P)revious Card  or  N)ext Card
                      S)witch between COT or RT Loopback
                      C)hange Loopback Mode

                          CTRL-X) Main Menu  e(X)it


     [COT] ENTER COMMAND>
```

To initiate a loop back on an ISDN line:

1. On the ISDN Loopback menu, type **C** and press **ENTER**.
2. Type the card number followed by a comma. Then type the channel number for the ISDN circuit being configured, then press **ENTER** (for example, “1,2”).
3. 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 Loopback on an ISDN line:

1. On the ISDN Loopback menu, type **C** and press **ENTER**.
2. Type the card number followed by a comma. Then type the channel number for the ISDN circuit being configured, then press **ENTER** (for example, “1,2”).
3. Select Set Normal from the loopback mode menu.
4. Type **CTRL** + **X** to return to the Main Menu.

Display System Inventory

This option allows displaying of manufacturing and version information for all the units in the system (except the FAU/FPI unit).

On the Main Menu, type **D** then press **ENTER** to display the system Inventory screen.

```
17-OCT-98        ADC TECHNOLOGIES INC., PG-FLEX TERMINAL         11:20:02
                       SYSTEM ID: List 3C - Tech Pubs SYSTEM: 1

INVENTORY
 ------------------------------------------------------------------------------
  LOC  SLOT    MODEL   LIST  ISSUE     TYPE      S/W     P1 TAG     CLEI CODE
 ------------------------------------------------------------------------------
  COT  LU1    FLL-712   3C     1     32-CH E1*   4.7   2658001749
  COT  CU1    FLC-703    4     1       POTG8     1.3   2057000141   VACHCHGCAA
  COT  CU2    FLC-703    3     1       POTS8     1.3   0217001889   VACHCDGCAA
  COT  CU3    FLC-703    3     1       POTS8     1.3   0217001722   VACHCDGCAA
  COT  CU4    FLC-706    1     1       ISDN4     1.4   0148002670   VACHEGJCAA
  RT   LU     FRL-746   3C     1     32-CH E1*   4.7   3108001710
  RT   CU1    FRC-753    4     1       POTG8     1.5   0838004040   VARHCKGCAA
  RT   CU2    FRC-753    2     1       POTS8     1.4   2067001665   VARHCGGCAA
  RT   CU3    FRC-753    2     1       POTS8     1.4   3486001316   VARHCKGCAA
  RT   CU4    FRC-756    1     1       ISDN4     1.3   1747001417   VARHEJJCAA

                          CTRL-X) Main Menu    e(X)it



      [COT] ENTER COMMAND>
```

Table 8. *Inventory Menu Definitions*

Parameter	Definition
LOC	Card location (the COT shelf or the RT enclosure)
SLOT	Slot location
MODEL	Card model
LIST	Card list number
ISSUE	Issue number
TYPE	Type (E1, T1, POTS, ISDN)
S/W	The software version of the installed card
P1 TAG	An ASCII character string up to 10 characters representing the manufacturing serial number
CLEI CODE	Card CLEI code

Type **CTRL** + **X** to return to the Main Menu.

TROUBLESHOOTING

Table 9 provides troubleshooting procedures based on indications displayed by the front panel indicators of FLL-712.

Table 9. *FLL-712 COT Line Unit Troubleshooting*

LED	State	Problem	Action
POWER	Off	• The COT Shelf is not receiving CO battery.	**1** Verify that the shelf fuse on the equipment bay is good. **2** Verify wiring between the COT shelf and the CO fuse panel, and from the panel to the CO battery.
		• The CO line unit fuse F1 has blown.	**1** Replace the fuse in the CO line unit with a 3A GMT type.
LOOP 1 (2) SYNC	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).	**1** Verify the HDSL circuits are terminated properly and with the correct orientation. **2** 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 16.
		• The COLU and RTLU are incompatible. That is, one is a T1 version and the other is an E1 version	**1** Replace the incompatible line unit.
LOOP 1 (2) MARGIN	On	• The HDSL line margin level is below the preset level.	**1** Check the preset Margin Alarm level in the Setup Menu. **2** 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 16.
FAULT	On	• Faulty FLL-712 CO line unit	**1** Check that none of the HDSL pairs are shorted to ground. **2** Check for continuity from COT to RT on all HDSL lines. **3** Replace the COT line unit, if the RT line unit is confirmed good. Otherwise, replace the RT line unit.

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 and return to:

ADC DSL Systems, Inc.
14352 Franklin Ave.
Tustin, CA 92780-7013

Attention: **RMA (Number)**

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

CO	Central Office
COT	Central Office Terminal
CRC	Cyclic Redundancy Check
DC	Delayed Call
DCE	Data Communications Equipment
DIP	Dual In-Line Package
DSL	Digital Subscriber Line
DTR	Data Terminal Ready
ES	Errored Seconds
ESD	Electrostatic Discharge
HDSL	High-bit-rate Digital Subscriber Line
ISDN	Integrated Services Digital Network
LED	Light Emitting Diode
LU	Line Unit
MLT	Mechanized Loop Testing
NVRAM	Non Volatile Random Access Memory
PBX	Private Branch Exchange
PCM	Pulse Code Modulation
PM	Performance Monitoring
POTS	Plain Old Telephone Service
REN	Ringer Equivalency Number
RMA	Return Material Authorization
RT	Remote Terminal

GLOSSARY

Margin 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 The attenuation of the 2B1Q pulse from the distant end. This value is related to the cable pair's 196-kHz loss. The pulse attenuation is a more direct indication of the loop attenuation to the 2B1Q signal than the 196-kHz loss. The normal range of pulse attenuation is from 1 to 32 dB.

PPM 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 (unavailable) seconds the HDSL loop was out of synchronization.

World Headquarters:
ADC Telecommunications, Inc.
12501 Whitewater Drive
Minnetonka, Minnesota USA 55343

For Technical Assistance:
800.366.3891

ISO 9001
DNV
DNV Certification, Inc.
Certificated Firm

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