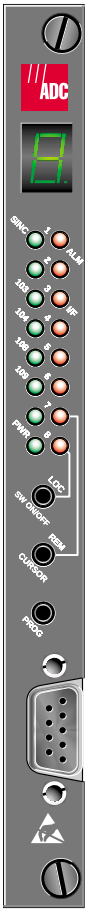
WorldDSL

USER GUIDE



Rate Selectable HDSL
Universal Termination Units

UTU-731 List 1
Part Number: 150-1425-31

UTU-732 List 1
Part Number: 150-1425-32

ADC

Revision History of This Practice

Issue	Release Date	Revisions Made
01	February 15, 2001	Initial release

CONVENTIONS USED

The following conventions are used in this manual:

- `Monospace type` indicates screen text, including text you type at a screen prompt.
- Keys you press are indicated by small icons such as ENTER. Key combinations to be pressed simultaneously are separated by a plus sign as follows: CTRL + ESC.
- Items you select are in **bold**.
- Three types of messages, identified by icons, appear in text.

Notes contain information about special circumstances.

Cautions indicate the possibility of personal injury or equipment damage.

The Electrostatic Discharge (ESD) susceptibility symbol indicates that a device or assembly is susceptible to damage from electrostatic discharge.

INSPECTING THE SHIPMENT

Upon receipt of the equipment:

- Unpack each container and 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 DSL Systems, Inc. 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 DSL Systems, Inc. as described in "Returns" on page 74. If you must store the equipment for a prolonged period, store the equipment in its original container.

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OVERVIEW

The ADC® WorldDSL™ Universal Termination Units (UTUs), models UTU-731 and UTU-732, are single-pair rate selectable High-bit-rate Digital Subscriber Line (HDSL) units produced in the Telebras form factor. The units install in 20-slot Telebras shelves or in single-slot Telebras enclosures. The units can be configured as Line Termination Units (LTUs) or Network Termination Units (NTUs). The default configuration is NTU.

LTUs are the Exchange Office side of a repeaterless E1 transmission system. They transport data to a remote NTU over the HDSL loop at rates of up to 2048 kbps (the standard E1 rate).

The UTU-731 and UTU-732 receive power from the Telebras shelf or enclosure in which they are installed.

APPLICATION INTERFACE

The UTU-731 has a G.703 E1 interface that can be configured for an impedance of 75 Ω unbalanced or 120 Ω balanced. Data is structured or unstructured according to the G.704 framing standard, and optionally CRC4 multiframed according to the G.706 standard. Structured mode is invoked automatically when 1 to 31 time slots are selected. Unstructured mode is invoked when 32 time slots are selected.

The UTU-732 has an Nx64k serial data port interface with user-selectable protocols that conform to the V.35, V.36, X.21, or RS-530 (RS-449) standards.

The only application mode is Single, indicating single pair.

The UTU-731 and UTU-732 have HDSL payload rates ranging from 64 kbps to 2048 kbps. The exchange office data terminal equipment (DTE) allocates the 2048 kbps payload to the G.703 and Nx64k ports in time-slot increments of 64 kbps each. The number of time slots allocated by the DTE is determined by the user-selected HDSL payload rate (the DTE and HDSL payloads must be set to the same rate).

The HDSL system is configured at the LTU, either through front-panel switch settings or through menu selections made at a maintenance terminal. When using a maintenence terminal to configure the system, the menu selections are applied to both the LTU and NTU. When using the front-panel switches to configure the system, the LTUs and NTUs must be individually configured (the switch settings are applied to the LTU and then repeated for the NTU).

SOFTWARE REQUIREMENTS

For compatibility and full use of available features, the units at each end of the circuit (LTU and NTU) must have the same version of the software installed.

When using Telebras form factor units with compatible non-Telebras form factor units, the non-Telebras units must be configured on-site through a maintenance terminal connected to the front-panel console port.

COMPATIBILITY

The UTU-731 and UTU-732 are compatible with the following ADC WorldDSL rate selectable units:

- UTU-701C Rate Selectable Universal Termination Unit, Part Number 150-1422-01C
- UTU-702C Rate Selectable Universal Termination Unit, Part Number 150-1422-02C
- ETU-751C Rate Selectable ETSI Termination Unit, Part Number 150-1432-01C
- ETU-752C Rate Selectable ETSI Termination Unit, Part Number 150-1432-02C

FRONT PANELS

The components on the UTU-731 and UTU-732 front panels are shown in Figure 1 on page 3.

The LEDs and pushbuttons on the UTU front panels can be used to program system operating parameters. Their functions in the program mode and normal mode are described in Table 1 on page 4. The indications made by the seven segment front-panel display are described in Table 2 on page 5. The LED status functions are described in Table 3 on page 6. For more information, see "Front-Panel Configuration Settings" on page 12.

You can also configure the unit through a maintenance terminal connected to the UTU console port. For more information, see "Console Port Configuration Settings" on page 17.

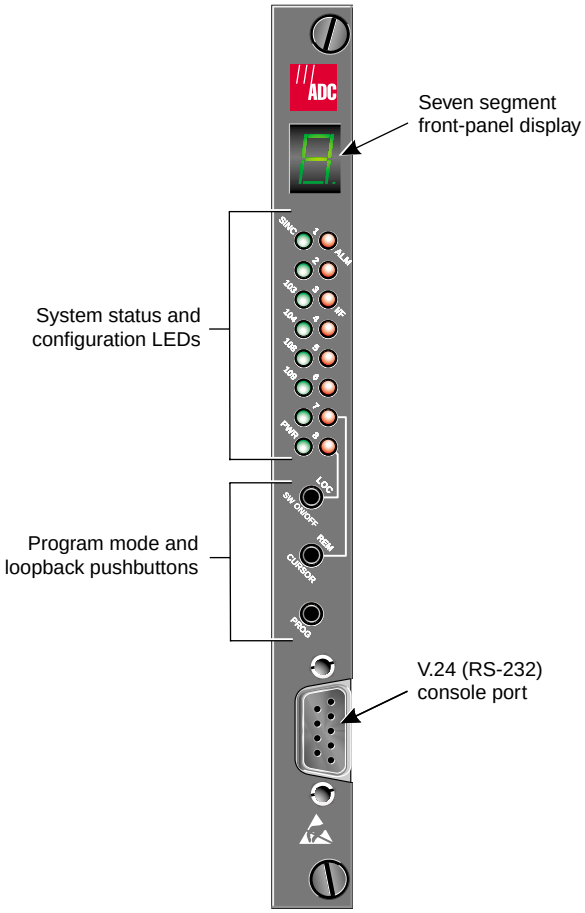

Figure 1. *UTU-731 and UTU-732 Front Panel*

Table 1. *UTU-731 and UTU-732 Front-Panel Components*

Item	Normal Mode Function	Program Mode Function
PROG pushbutton	Enables front-panel "program" mode. See "Front-Panel Configuration Settings" on page 12.	Selects virtual DIP switches 1 through 6 or 7 (the front-panel display indicates "P" for program mode and then 1, 2, 3, and so on).
REM CURSOR pushbutton	Activates and terminates the remote interface loopback. Remote loopbacks are indicated by the red LED at virtual DIP switch position 7.	Selects virtual DIP switch positions 1 through 8. Pressing the REM CURSOR button for 4 seconds stores configuration settings and exits program mode.
LOC – SW ON/OFF pushbutton	Activates and terminates the local HDSL analog loopback. Local loopbacks are Indicated by the red LED at virtual DIP switch position 8.	Changes state of the virtual DIP switch position selected by the REM - CURSOR button (that is, alternately turns the green and red LEDs at each position on and off).
SINC LED and ALM LED (green and red LED pair #1)	SINC LED displays synchronization state for the HDSL Loop. ALM LED displays alarm state for the HDSL Loop (see Table 3 on page 6).	SINC and ALM LEDs indicate on/off state for virtual DIP switch position 1.
Green and red LED pair #2	No function in normal mode.	Green and red LED pair #2 indicate on/off state for virtual DIP switch position 2.
103 LED and I/F LED (green and red LED pair #3)	103 LED indicates that data is coming from the DTE. I/F LED displays the interface (I/F) alarm state for the G.703 or Nx64k port (see Table 3 on page 6).	103 and I/F LEDs indicate on/off state for virtual DIP switch position 3.
104 LED and adjacent red LED (green and red LED pair #4)	104 LED indicates that data is being sent to the DTE. Adjacent red LED has no function in normal mode.	104 LED and adjacent red LED indicate on/off state for virtual DIP switch position 4.
106 LED and adjacent red LED (green and red LED pair #5)	Red LED indicates that data being received from shelf management card. Green LED indicates active CTS signal on UTU-732.	106 LED and adjacent red LED indicate the on/off state for virtual DIP switch position 5.

Table 1. *UTU-731 and UTU-732 Front-Panel Components (Cont.)*

Item	Normal Mode Function	Program Mode Function
109 LED and adjacent red LED (green and red LED pair #6)	Red LED indicates that data is being sent to shelf management card. Green LED indicates active RSLD signal on UTU-732.	109 LED and adjacent red LED indicate on/off state for virtual DIP switch position 6.
Green and red LED pair #7	Red LED indicates an active remote interface loopback.	Green and red LED pair #7 indicate on/off state for virtual DIP switch position 7.
PWR LED and adjacent red LED (green and red LED pair #8)	Green LED indicates that the UTU is receiving power. Adjacent red LED indicates an active local HDSL loopback.	PWR LED and adjacent red LED indicate on/off state for virtual DIP switch position 8.
V.24 (RS-232) console port	Permits connection of a maintenance terminal for system configuration and performance monitoring through the UTU console screens. See "Console Port Configuration Settings" on page 17.	No function in program mode.

Table 2. *Front-Panel Display Indications*

Indication	Definition	Description
b	Blocked	The HDSL loop is not available.
C	Complete	Configuration of the LTU or NTU is complete.
d	Data port	The UTU is a serial data port (Nx64k) unit.
E	Error	An error has occurred.
F	Factory defaults	All parameters are set to factory defaults.
G	G.703	The UTU is a G.703 unit.
L	Loopback	The UTU is in a loopback mode.
n	NTU	The UTU is configured as an NTU.
P	Program	The UTU is in the front-panel "program" mode.
t	Test	The UTU is in the power-up self-test mode.
	Transmit	Settings are being transmitted from LTU to NTU.
1 through 6, 1 through 7	Virtual DIP switch number	The number of the virtual DIP switch selected by the PROG button in the program mode.

Table 3. *Front-Panel LED Status Functions*

LED	Mode		Description
SINC LED	Steady green		HDSL loop is ready to transmit and receive data.
	Slow flashing		HDSL loop acquisition is in progress.
	Off		HDSL loop is not configured.
ALM LED	Steady red		Indicates: • Loss of sync word (LOSW). • Margin is below the set margin alarm threshold. • Errored Seconds (ES) count is above threshold on any span.
	Pulsing red		Pulses for every ES on any span.
	Off		Normal transmit or receive data is in progress.
IF LED	Steady red		Indicates: • Loss of G.703 signal (LOS) alarm. • Loss of Clock (LOC) alarm due to loss of TT clock (Nx64k timing). • Loss of external clock (LOC) alarm (when using EXT timing).
LOC and REM loopback LEDs [(a)]	LOC	REM	
	Off	Off	No loopbacks are active.
	Steady red	Off	Local HDSL analog loopback is active.
	Off	Steady red	Remote loopback is active.
	Blinking red	Off	Local interface loopback is active.
	Blinking red	Blinking red	A loopback away from the local equipment is active.

(a) The LOC and REM loopback LEDs are read in unison.

SAFETY AND EQUIPMENT REPAIR

SAFETY

To ensure your safety when servicing and installing this equipment, please take the following precautions:

Be careful when installing or modifying telephone lines. Dangerous voltages can be present. It is unsafe to install telephone wiring during a lightning storm.

Always disconnect all telephone lines and power connections before servicing or disassembling this equipment. For performance and safety reasons, only power supplies listed for use with telephone equipment by a locally recognized organization should be used with ADC equipment. All wiring external to the product should follow the local wiring codes.

EQUIPMENT REPAIR

To ensure that the equipment does not become damaged, carefully observe the following precaution:

If a problem has been isolated to this unit, do not attempt to repair it. The unit's components are not user serviceable. Return the unit to ADC for repairs. For more information, see "Returns" on page 74.

INSTALLATION

Wear an antistatic wrist band connected to earth ground when installing these units. Avoid unnecessary contact with board-mounted components.

LTU ADDRESS SETTINGS

One Exchange Office Management Unit (EMU) can manage up to 32 HDSL circuits, where each circuit consists of one LTU and one NTU. When one managed shelf is used, and the number of deployed LTUs exceeds the capacity of the 20-slot shelf, the excess LTUs can be installed in single-slot enclosures connected to the managed shelf. The excess LTUs must then be set for an "external address" that ranges from 21 to 32.

The location of the DIP switch used to set LTU addresses is shown in Figure 2. The LTU address DIP switch settings are listed in Table 4 on page 9.

LTUs installed in a managed shelf do not require address settings.

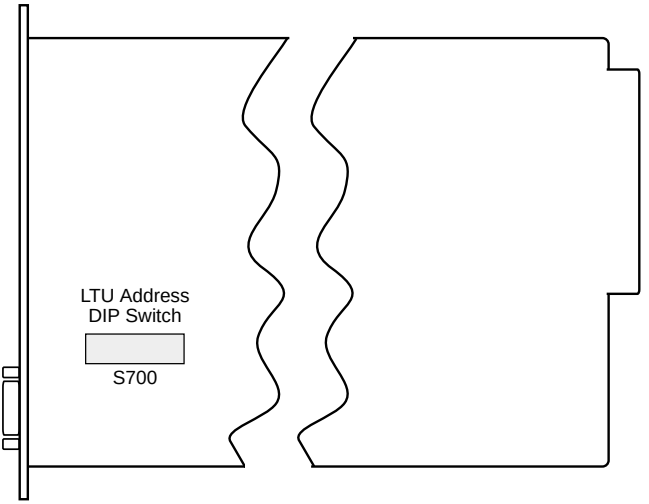

Figure 2. *Location of LTU Address DIP Switch S700*

The settings of DIP switch S700 are mapped to the next higher number. For example, a DIP switch setting of 20 equals LTU address 21. Refer to Table 4 when setting LTU addresses.

Table 4. *Address Settings for LTU DIP Switch S700*

LTU Address	DIP Switch Position (x = ON) [a] [b]				
	1	2	3	4	5
21			x		x
22	x		x		x
23		x	x		x
24	x	x	x		x
25				x	x
26	x			x	x
27		x		x	x
28	x	x		x	x
29			x	x	x
30	x		x	x	x
31		x	x	x	x
32	x	x	x	x	x

(a) DIP switch positions 6 and 8 are not used.
(b) Setting DIP switch position 7 to “ON” disables the front-panel program mode. Configuration settings become read-only and may be viewed by pressing the PROG button and then the CURSOR button to display each setting. The front-panel display will indicate “b” (blocked) when the SW ON/OFF button is pressed.

UTU-731 G.703 JUMPER SETTINGS

Jumpers P11 and P12 configure the UTU-731 for use with a 75 Ω or 120 Ω G.703 interface. The location of these jumpers is shown in Figure 3.

Place the four-position jumper block on one of the following:

- P11 for balanced 120 Ω circuits.
- P12 for unbalanced 75 Ω circuits (factory setting).

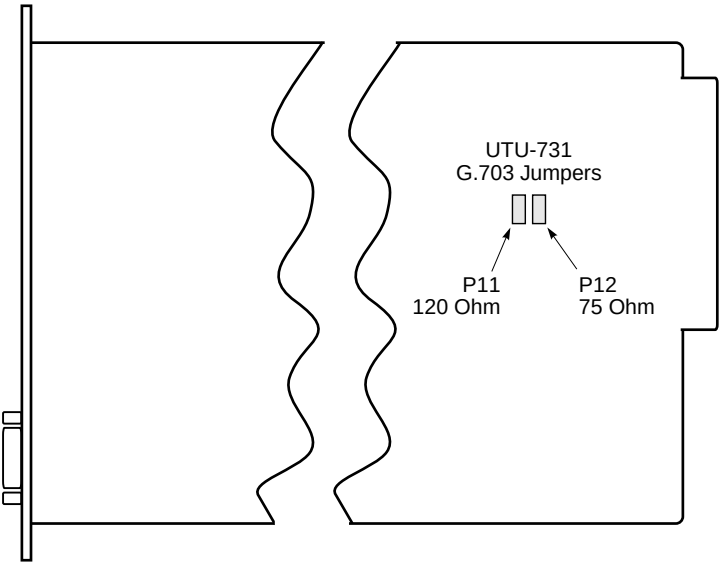

Figure 3. *Location of G.703 Jumpers P11 and P12 on UTU-731*

SHELF OR REMOTE ENCLOSURE INSTALLATION

1. Align the UTU with the card guides in the shelf or enclosure.
2. Slide the UTU into the guides, then push the unit inward until it seats firmly in the card-edge connector.
3. Tighten the two screws on the UTU front panel to secure the unit in place.
4. If using the UTU as an LTU, power up the shelf or enclosure and set the Local Unit Role option to LTU (see "Front-Panel Configuration Settings" on page 12 or "Console Port Configuration Settings" on page 17). The default setting for the UTU is NTU.
5. Set the TT clock at the DTE for the default HDSL payload rate of 128 kbps (2 time slots).

HDSL SELF TEST AND LINK UP

The LTU-configured UTU holds the configuration settings for both itself and the remote NTU-configured UTU. As the two units synchronize, the LTU determines if the NTU is the same type (the same model number). If the NTU is the same type, it is configured with the LTU settings. If the NTU is a different type, it is configured with factory default settings.

1. Power up the UTU.
2. Confirm the following:
   - The red ALM LED is on and the green SINC LED flashes once per second as the units self-configure and establish synchronization.
   - After approximately 60 seconds the red ALM LED is off and the SINC LED is a steady green. The unit is now ready for configuration through the front-panel virtual DIP switches and/or the console screen menus viewed from a maintenance terminal.

SYSTEM CONFIGURATION

After establishing communication with the remote unit, the HDSL system can be configured at the LTU, either through front-panel switch settings or through a maintenance terminal connected to the LTU console port. If the HDSL link is down, the only parameters that can be configured are those on the LTU.

The system can also be configured through use of the EES-897 Graphical User Interface (GUI). See your sales representative for details.

FRONT-PANEL CONFIGURATION SETTINGS

The LEDs on the UTU-731 and UTU-732 front panels can be used both to display system status and to configure system operating parameters. The front panel PROG button activates an optional program mode, where each pair of LEDs, numbered 1 though 8, serves as one position of a virtual DIP switch. Seven virtual DIP switches are used to configure the UTU-731 and six are used to configure the UTU-732.

The PROG button selects virtual DIP switches 1 through 6 or 1 through 7, depending on UTU model. The DIP switch number is indicated by the front-panel display. The CURSOR button selects the DIP switch position (LED pairs 1 though 8). The SW ON/OFF button changes the state of the selected position (turns the LEDs on or off to obtain the desired parameter setting).

The UTU-731 virtual DIP switch parameter settings are shown in Figure 4 on page 13. The UTU-732 parameter settings are shown in Figure 5 on page 14. The procedure for selecting and setting these parameters is provided in “Virtual DIP Switch Configuration Settings” on page 15.

Not all parameters can be configured by front panel switch settings. The Terminal Settings, Date and Time, Password, and Circuit ID parameters can only be configured from console screen menus. For more information, see “Config Menu Options” on page 22.

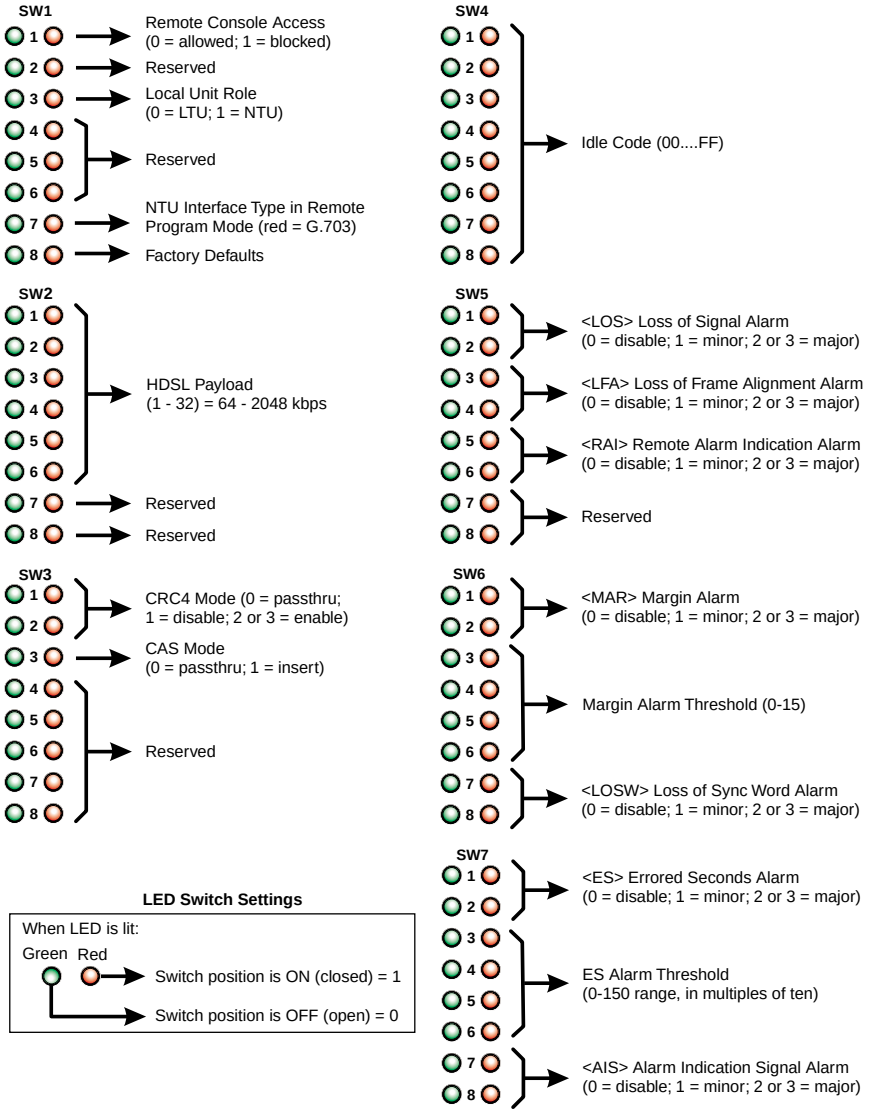

Figure 4. *UTU-731 Virtual DIP Switch Parameter Settings (G.703)*

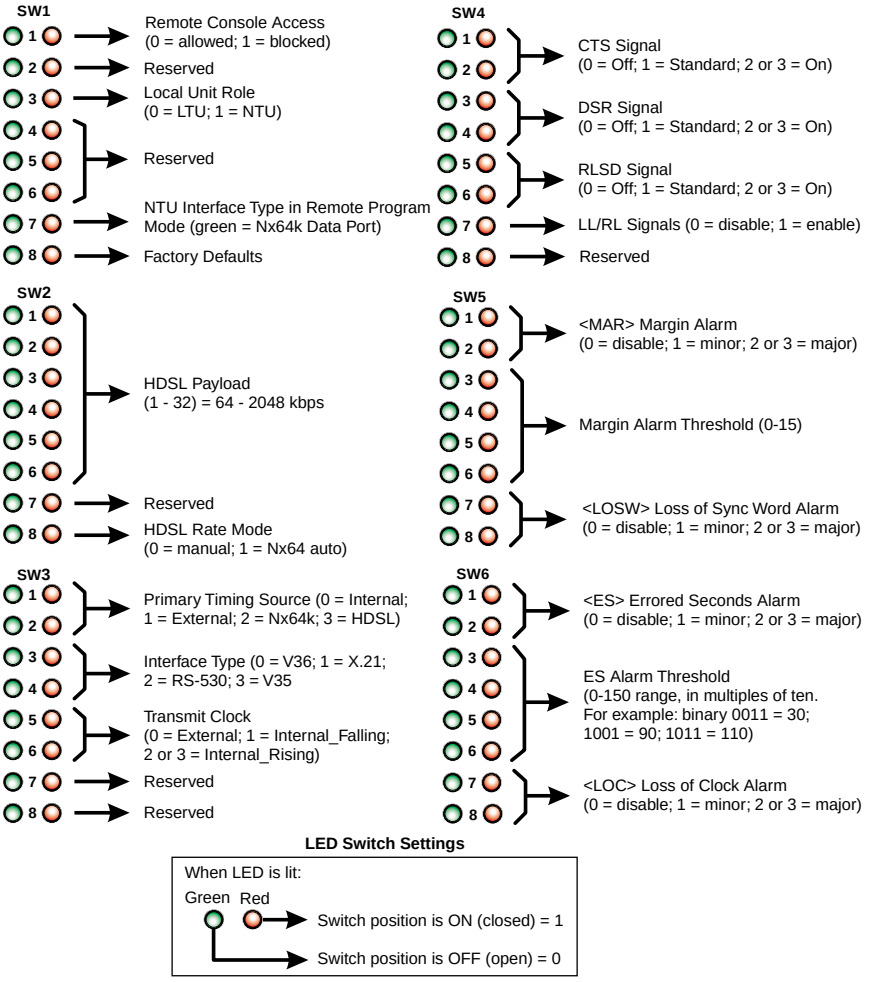

Figure 5. *UTU-732 Virtual DIP Switch Parameter Settings (Nx64k Data Port)*

Virtual DIP Switch Configuration Settings

The HDSL system is configured in two parts when using the front-panel switches. First, the LTU is configured, and then the NTU is configured.

To configure the local LTU and remote NTU:

1 Press and release the PROG button on the LTU front panel. The front-panel display indicates "P" and then "1," indicating that virtual DIP switch 1 (SW1) is ready for configuration.

2 Press the CURSOR button to select the desired DIP switch position. The LED at the selected position (either green or red, depending on current state) will blink. (Select position 3 to configure the UTU as an LTU.)

3 Press the SW ON/OFF button to light the LEDs at the position selected. Lighting the green LED opens the switch position. Lighting the red LED closes the switch position (see "LED Switch Settings" in Figure 4 on page 13 or Figure 5 on page 14). (Light the green LED at position 3 to configure the UTU as an LTU.)

The settings "1-32," "2 or 3," and "0-15" in Figure 4 on page 13 and Figure 5 on page 14 are binary values expressed as decimal numbers. For example, lighting red LEDs 1 through 4 of SW2 equals binary 1111 or decimal 15. Lighting red LEDs 1, 3, and 5 equals binary 10101 or decimal 21. The lowest number LED is the least significant bit (LSB).

The setting "2 or 3" means that either the most significant (higher number) red LED can be lit for a value of 2, or both the most and least significat (lower number) red LED can be lit for a value of 3. Either setting will enable the mode selected.

The G.703 idle code settings (SW4 in Figure 4) are binary values expressed as hexadecimal numbers. For example, lighting green LEDs 1 through 8 equals binary 0000 0000 or hexadecimal 00. Lighting red LEDs 1 through 8 equals binary 1111 1111 or hexadecimal FF.

For more information, see "Appendix A - Binary and Hexadecimal Numbers" on page 70.

4 Press the PROG button to select the next virtual DIP switch and repeat steps 2 and 3.

5 When the LTU is configured, press the CURSOR button for 4 seconds. The LTU stores the configuration settings and exits the program mode. The front-panel display indicates “C” when LTU configuration is complete.

6 To configure the NTU, press the PROG button for 4 seconds. The LTU front-panel display blinks rapidly, indicates “P,” and then “1.”

The lit LED at position 7 indicates the remote NTU interface type: red = G.703, green = Nx64k data port.

The front panel display will indicate “b” if the HDSL line is blocked and not available for remote NTU configuration.

7 Repeat steps 2 through 5 for the NTU.

8 To prevent unauthorized configuration changes, remove the HDSL card from the shelf and set position 7 of DIP switch S700 to “ON.” See Figure 2 on page 8 for the location of DIP switch S700. See also footnote (b) of Table 4 on page 9.

Loading Factory Defaults

To load the LTU and NTU with their factory default settings:

1 Press the PROG button on the LTU front panel. The front-panel display indicates “P” and then “1,” indicating that virtual DIP switch 1 (SW1) is ready for configuration.

2 Press the CURSOR button to select the position 8 of DIP switch 1 (SW1). The LED at the selected position (either green or red, depending on current state) will blink.

3 Press the SW ON/OFF button to light the red LED at position 8 — keep the SW ON/OFF button pressed for 4 seconds. The red LED blinks and the factory default settings are loaded. The front-panel display indicates “F” and the UTU exits the program mode.

4 To load the NTU with its default settings, press the PROG button for 4 seconds. The LTU front-panel display blinks rapidly, indicates “P,” and then “1.”

5 Repeat steps 2 and 3.

CONSOLE PORT CONFIGURATION SETTINGS

Maintenance Terminal Connection

To connect a maintenance terminal:

1 Connect a standard serial cable from the maintenance terminal COM port to the UTU's front panel console port. The pinouts for the console port and maintenance terminal connectors are shown in Figure 6.

2 Configure the maintenance terminal as follows:

- VT100 Emulation or ANSI (if VT100 is not available)
- Clear the modem initialization string if supported by the terminal
- Bits per second: 9600 (default) or 19200 bps (recommended)
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow Control: None

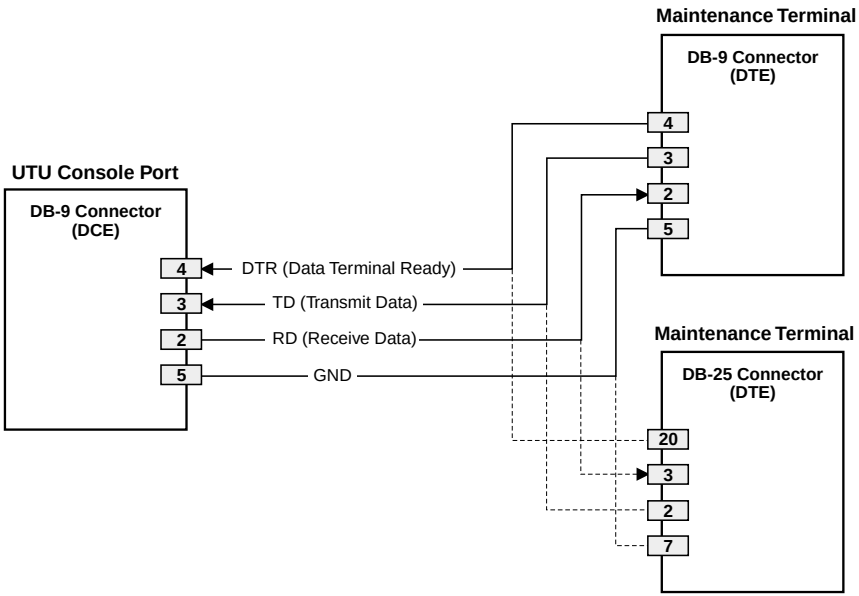

Figure 6. *Pinouts for Console Port and Maintenance Terminal Connectors*

Logging On

To log on to the maintenance terminal console screen:

1 Press the **SPACEBAR** several times to activate the autobaud feature and to display the Logon Password screen (Figure 7 below).

The ENTER key is the factory default password. If you establish a different password, you must type the new password (single word, no spaces, up to eight characters) on each subsequent logon. If the system does not respond, verify that the Hardware Flow Control of the maintenance terminal is set to NONE.

2 Type the password at the prompt or press **ENTER**. The console screen menu bar displays (Figure 8 on page 19).

The console screen menus are not available when the UTUs are under the control of a shelf management unit.

The LTU-configured unit has a lockout feature that prevents configuration changes from being made at the remote unit. When this feature is enabled, the console screen menus viewed at the NTU are read-only.

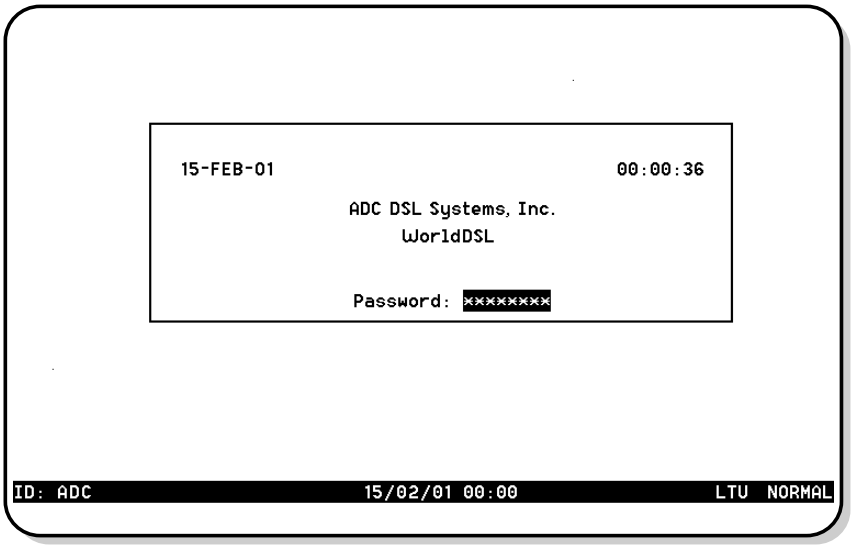

Figure 7. *Logon Password Screen*

Reading and Navigating Menus

The menu and status bars appear on all console screens. The information on the rest of the screen varies depending on the function of the menu or screen.

The menu bar displays the name of each menu. Choosing Monitor, History, or Config from the menu bar drops down a menu of available options. When selected, all options on the Monitor drop-down menu and the Alarm option on the Config drop-down menu, display drop-down submenus.

The status bar at the bottom of the screen displays the circuit ID, the current date and time, unit type, and current system information. Select Config from the console screen menu bar to enter or change the circuit ID and the current date and time. The numbered items in Figure 8 below correspond to the items described in Table 5 on page 20.

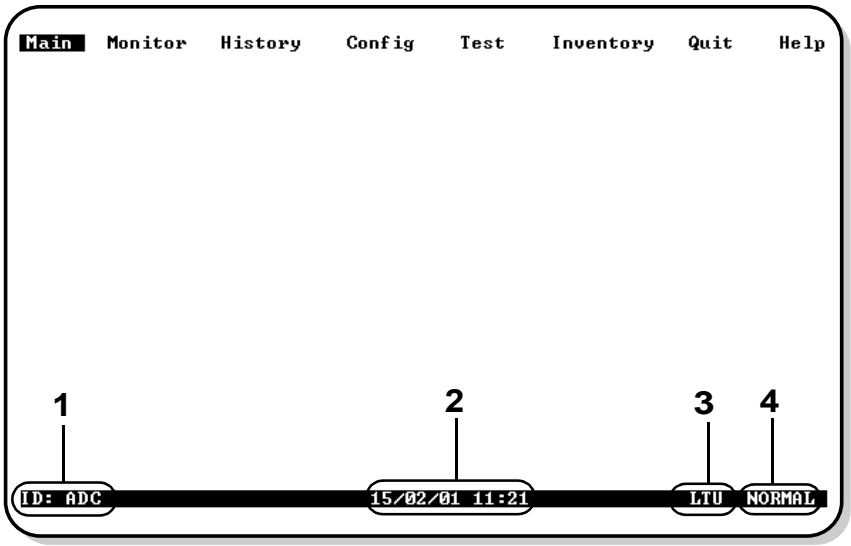

Figure 8. *Console Screen Menu and Status Bars*

Table 5. *Console Screen Status Bar Displays*

Item	Field	Description
1	Circuit ID	Shows the user-selected name for the circuit (such as customer name).
2	Date and time	Today's date in dd/mm/yy format. Today's time in 24-hour format.
3	Local unit role	Either LTU or NTU.
4	System information	Displays the current system status. The system information field shows one of the following: • Loop down - At least one configured HDSL channel is down, either due to restart, or startup not completing. • Alarm - A major alarm condition is currently active in the system. In the case of a loopback bringing the loop down, LOSW alarms will be ignored. • Loopback - The system is in a diagnostic loopback configuration. • Update - Circuit-wide provisioning is in progress. • Normal - All configured HDSL channels are up in the circuit, no alarms are present, and provisioning is complete.

Navigation Keys

Use the keys described in Table 6 to navigate the console screen and its menus.

Table 6. *Console Screen Navigation Keys*

These Keys	Perform this Function
Alphanumeric keys	Press the underlined or highlighted letter to select and execute a menu item. For example, on the Console screen menu bar, press C to access the Config drop-down menu. Also use these keys to enter values in text fields. For example, on the Config Date and Time menu, enter the date in a DD/MM/YY format.
↑ and ↓ keys	Press the ↓ key to access a Console screen drop-down menu. For example, press the ↓ key on Config to access the Config drop-down menu. Or press the ↑ and ↓ keys to highlight a submenu item, then press ENTER to select the item. For example, press the ↓ key to highlight Config Alarms, then press ENTER to view the submenu.
TAB key	Provides same function as the ↓ key.
← and → keys	Moves horizontally across the Menu bar, except in a text entry field.
CTRL + E	CTRL + E moves up one line in the History screens.
CTRL + X	CTRL + X moves down one line in the History screens.
CTRL + C	CTRL + C performs the page-down function in the History screens.
CTRL + R	CTRL + R performs the page-up function in the History screens.
SPACEBAR	Selects options displayed for current menu item. For example, to select a Local Unit Role of LTU or NTU from the Config System Settings menu: • press the ↓ key to highlight the Local Unit Role option, then • press the SPACEBAR until the desired option (LTU or NTU) is highlighted.
ESC	Exits the current screen and returns to the previous screen. Selection changes made on the current screen are discarded. Press ESC while in a text field to cancel the text entry and restore the old value.
ENTER	Applies all selections on the current screen. For example, to select an HDSL payload rate from the Config System Settings menu: • press the ↓ key to highlight the HDSL Payload Rate option, then • type the desired number of time slots (1 to 32) and press ENTER to display the selected HDSL payload rate.

Config Menu Options

Press C at the console screen to display the Config menu (Figure 9). Table 7 below lists the Config menu options and the suggested order of system configuration.

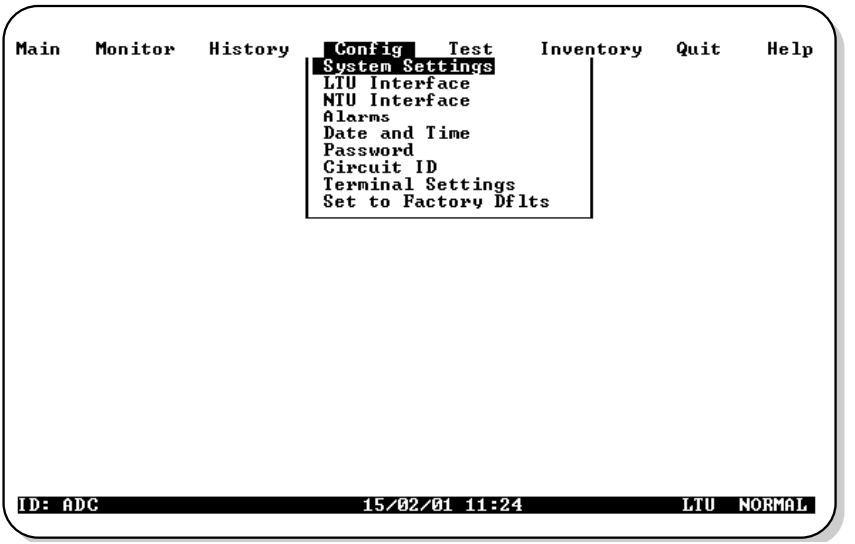

Figure 9. *Console Screen Config Menu*

Table 7. *Config Menu Options and Order of System Configuration*

Use this Option	To:	See page:
Terminal Settings	Select the best viewing mode for the console screen.	23
Date and Time	Set the system date and time.	24
Password	Set or change the system password.	25
Circuit ID	Assign a circuit ID.	26
System Settings	Select and configure system-wide operating parameters.	27
LTU and NTU Interface	Select and configure LTU/NTU-specific operating parameters.	29
Alarms	Enable or disable alarms and select alarm severity.	33
Set to Factory Dflts	Reset all operating parameters to factory settings.	38

Observe the following when configuring a system:

- Configure settings in the order specified in Table 7. The System Settings must be configured before the LTU and NTU Interface settings. Changing System Settings can clear values configured in LTU and NTU Interface settings.
- When using a UTU as an LTU, change the Local Unit Role for the unit using the Config System Settings menu. Note that changing the Local Unit Role of a UTU causes the unit to reset and the LEDs to cycle.
- When the HDSL cards are reset or cycle power, the date field is preserved, but the time field is not preserved. Set the time using the Config Date and Time display. When the HDSL cards are turned off and left off for a longer period of time (more than 24 hours, for example), set both the date and time using the Config Date and Time display since neither value was preserved.

Configure Terminal Settings

1 Press T at the Config drop-down menu to display the Config Terminal Settings menu (Figure 10).

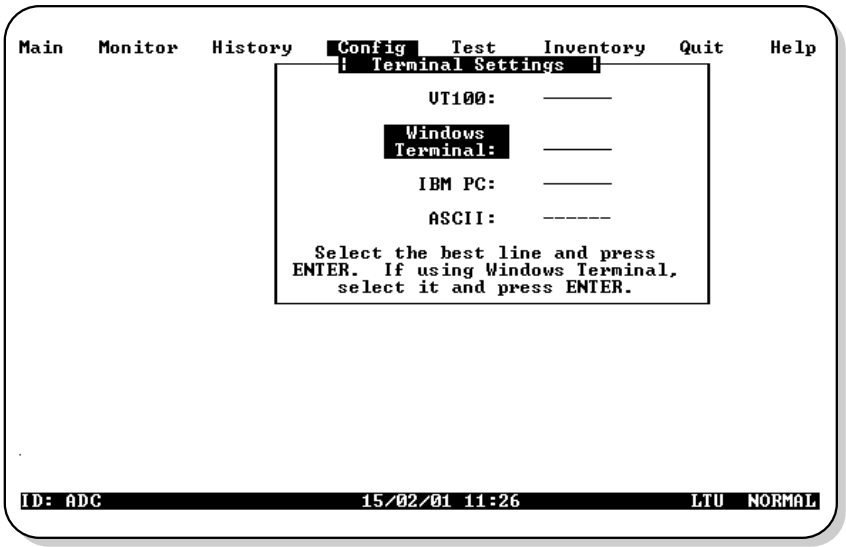

Figure 10. *Config Terminal Settings Menu*

2 Press the ↑ or ↓ key to highlight the selection that matches the terminal configuration (which should also be the selection most clearly displayed on the monitor). The choices are:

- VT100
- Windows Terminal
- IBM PC
- ASCII

3 Press ENTER to confirm the selection.

Configure Date and Time

1 Press D at the Config drop-down menu to display the Config Date and Time menu (Figure 11).

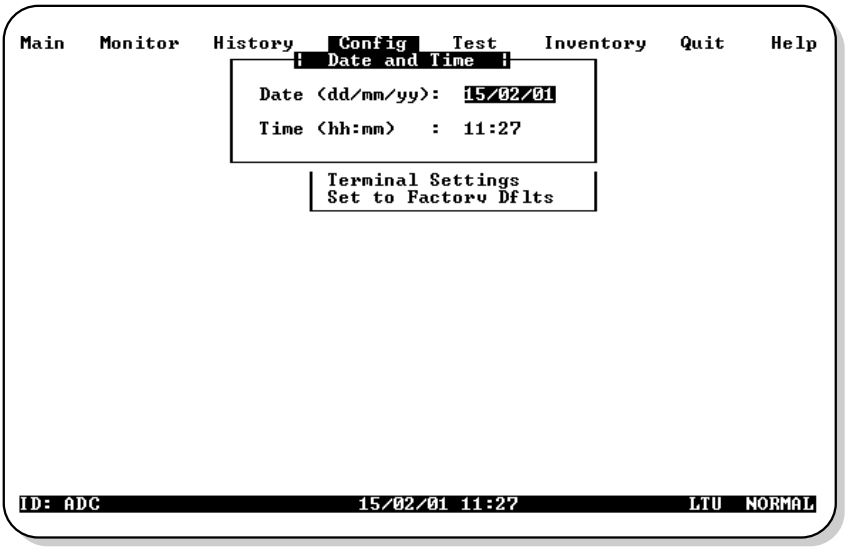

Figure 11. *Config Date and Time Menu*

2 Type the date in DD/MM/YY format, then press ENTER.

3 Type the time in HH : MM format (24-hour clock), then press ENTER.

Change Password

1 Press **P** at the Config drop-down menu to display the Config Change Password menu (Figure 12).

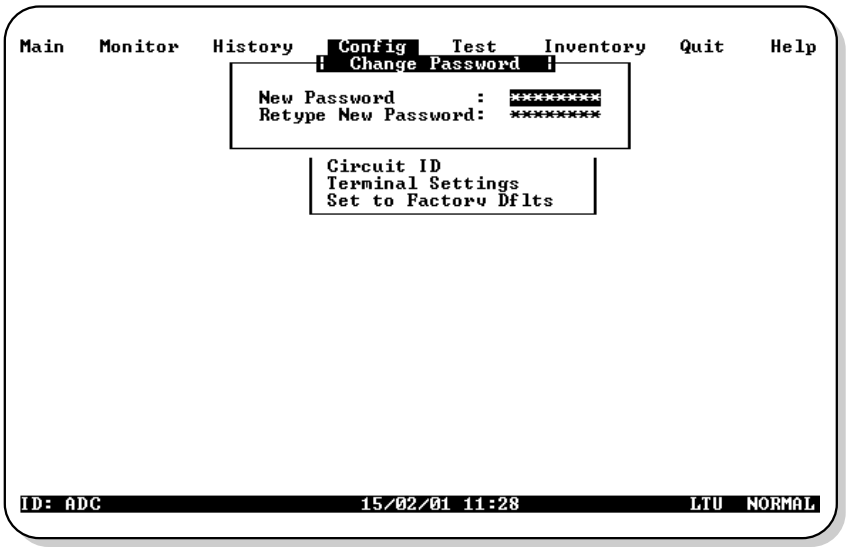

Figure 12. *Config Change Password Menu*

2 Enter a new password (up to eight characters) to change the current system password.

3 Retype the new password (up to eight characters) to confirm its accuracy.

When changing the default password (ENTER), save the new password in a secure place. A password cannot be recovered if it is forgotten. Contact an ADC Regional Sales Office if assistance is needed (see page 73).

Configure Circuit ID

The circuit ID appears on the status line of each console screen. Choose a unique circuit ID for each HDSL card.

1 Press **C** at the Config drop-down menu to display the Config Circuit ID menu (Figure 13).

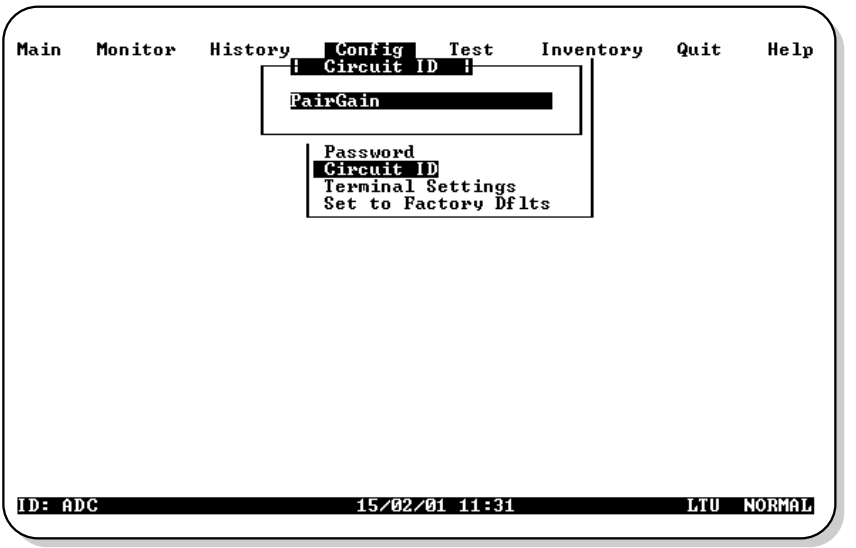

Figure 13. *Config Circuit ID Menu*

2 Type a new circuit ID (up to 23 characters), then press **ENTER**.

Configure System Settings

Use the System Settings menu to select and configure system-wide operating parameters. Configure the system settings as follows:

1 Press **S** at the Config drop-down menu to display the Config System Settings menu. Figure 14 shows the Config System Settings menu for the UTU-731 and UTU-732.

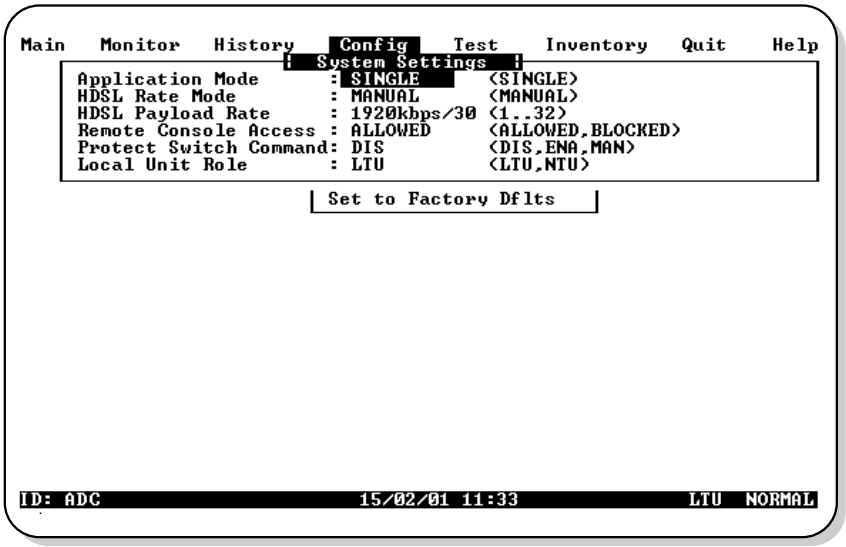

Figure 14. *Config System Settings Menu*

2 Do the following for each system option setting to be changed. Table 8 on page 28 describes the fields and options displayed in the Config System Settings menu. The settings in boldface type are factory default settings.

- Use the ↑ or the ↓ key to select the submenu item to be changed.
- Use the **SPACEBAR** to toggle to the appropriate option or type in the correct information, then press **ENTER** to select the option.

When using a UTU as an LTU, configure the Local Unit Role option first.

Table 8. *Fields and Options Displayed in Config System Settings Menu*

Field and Options	Description
Application Mode [a]	
SINGLE	System uses a single-pair of twisted copper wire to transport data. .
HDSL Rate Mode [b]	Selects the mode with which the HDSL payload rate will be determined.
MANUAL	HDSL payload rate is set by number of time slots entered for the HDSL Payload Rate option.[c] Each time slot is 64 kbps.
Nx64K AUTO (UTU-732 only)	HDSL payload rate of UTU-732 is set by TT clock input at Nx64K data port.
HDSL Payload Rate [d]	Selects the rate at which data will be transported.
128kbps/2	Typing a time slot value of 1 through 32 and pressing ENTER sets and displays the HDSL payload rate. [e] [f]
Remote Console Access	Selects whether a maintenance terminal connected to an NTU can be used to configure the system or is read-only. This field may be set only at the LTU.
ALLOWED	NTU console screens can be used to configure the system.
BLOCKED	NTU console screens are read-only. The LOC and REM pushbuttons on the NTU are also disabled. System changes can only be made from the LTU.
Local Unit Role	Configures UTU as LTU (master) or NTU (slave). The default configuration is NTU (slave). Note that changing the Local Unit Role of a UTU causes the unit to reset and the LEDs to cycle.
LTU	Configures UTU as LTU (master). The LTU-configured rate selectable UTU does not provide line power to other HDSL cards.
NTU	Configures UTU as NTU (slave). The NTU-configured rate selectable UTU does not provide line power to other HDSL cards.

(a) SINGLE is the only application mode.
(b) MANUAL is the only HDSL rate mode for the UTU-731.
(c) UTU-731 and UTU-732 have 32 time slots available for HDSL payload rates of 64 kbps to 2048 kbps.
(d) An HDSL Payload Rate of 64 kbps (1 time slot) is transmitted at 128 kbps.
(e) Payload rates are displayed in the Config LTU and Config NTU Interface menus as Data Rate/# of TSs (data rate/number of time slots).
(f) Changing the HDSL Payload Rate or Local Unit Role causes the unit to reset and the LEDs to cycle. Log on again by pressing the SPACEBAR several times.

Configure LTU and NTU Interfaces

Select and configure the LTU- and NTU-related operating parameters as follows:

1 Press one of the following keys at the Config drop-down menu to display the Config LTU or NTU Interface menu:

- L for the Config LTU Interface menu (UTU-731 in Figure 15 below or UTU-732 in Figure 16 on page 30).
- N for the UTU-731 or UTU-732 Config NTU Interface menu (the fields and options displayed in the Config NTU Interface menu are identical to those displayed in the Config LTU Interface menu).

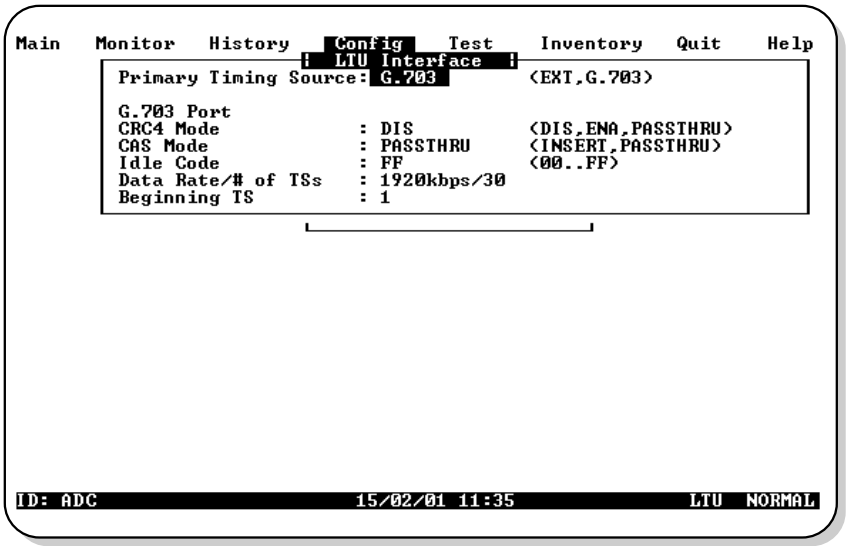

Figure 15. *UTU-731 Config LTU Interface Menu*

The Data Rate/# of TSs and Beginning TS parameters in the Config LTU and NTU Interface menus are read-only displays. The Data Rate/# of TSs value is set in the Config System Settings menu as the "HDSL Payload Rate" (see Figure 14 on page 27). The Beginning TS value is automatically set to 0 when 32 time slots are selected (unstructured mode) and set to 1 when less than 32 time slots are selected (structured mode).

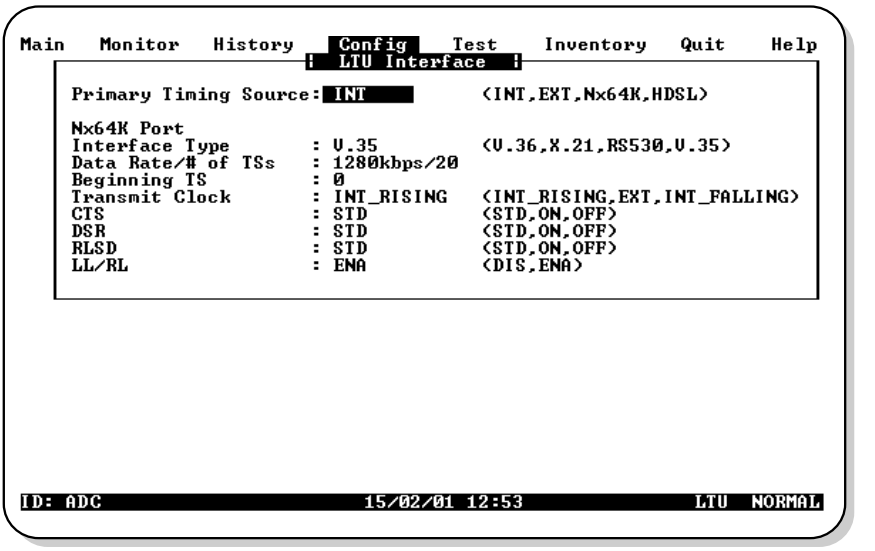

Figure 16. *UTU-732 Config LTU Interface Menu*

2 Do the following for each interface option to be changed.

- Use the ↑ or the ↓ key to select the submenu item to be changed.
- Use the **SPACEBAR** to toggle to the appropriate option or type in the correct information, then press **ENTER** to select the option.

Table 9 on page 31 describes the fields and options displayed in the UTU-731 Config Interface menus. Table 10 on page 32 describes the fields and options displayed in the UTU-732 Config Interface menus.

The settings in boldface type in Table 9 on page 31 and Table 10 on page 32 are factory default settings.

Table 9. *Fields and Options Displayed in UTU-731 Config Interface Menus*

Field and Options	Description
Primary Timing Source	Selects the clock source for the HDSL transmit direction.
EXT	External 2.048 MHz clock (UTU-701 only)
G.703	Input E1 clock
	G.703 Port
CRC-4 Mode	Cyclic Redundancy Check (CRC) to detect errors in transmitted data. Available only when less than 32 time slots are selected (places unit in structured application mode).
DIS	CRC-4 mode is disabled. CRC-4 mode is not available (N/A) when 32 time slots are selected (places unit in unstructured application mode).
ENA	The input G.703 signal is monitored for CRC-4 multiframe errors. A new CRC-4 code is output for use at the remote unit. Detected errors are displayed in the Monitor LTU and NTU Interface screens.
PASSTHRU	All time slot 0 bits are passed unchanged to the remote unit. Useful when detection of CRC-4 errors is performed by customer equipment.
Idle Code	User inputs the idle pattern (from 00 to FF) transmitted in unused time slots from LTU or NTU G.703 port. Factory default setting is **FF**.
Data Rate/# of TSs	Read-only display of indicated HDSL data rate and corresponding number of time slots (TSs) as set with HDSL Payload Rate option in the Config System Settings menu. Default setting is **128kbps/2**.
Beginning TS	Read-only display of beginning time slot. This setting is 0 (zero) in the structured mode and one (1) in the unstructured mode.

Table 10. *Fields and Options Displayed in UTU-732 Config Interface Menus*

Field and Options	Description
Primary Timing Source [a]	Selects the clock source for the HDSL transmit direction.
INT	Internal Oscillator
EXT	External 2.048 MHz clock (UTU-712 only)
Nx64k	Nx64k Serial Data port receive clock (TT)
HDSL	Recovered clock from received HDSL data
	Nx64k Port
Interface Type	Select the interface standard for serial data port. Choices are: V.35, **V.36**, X.21, and RS-530.
Data Rate/# of TSs	Read-only display of HDSL data rate and corresponding number of time slots (TSs) as set automatically by TT clock (Nx64K AUTO mode) or by HDSL Payload Rate option in Config System Settings menu (MANUAL mode). Default setting is **128kbps/2**.
Beginning TS	Read-only display of beginning time slot. For UTU-732 the Beginning TS is always 0 (zero).
Transmit Clock	Selects the transmit data (SD) clock as External (EXT), Internal Rising Edge (**INT_RISING**), or Internal Falling Edge (INT_FALLING). Transmit clock is always EXT if the Timing Source is Nx64k.
CTS DSR RLSD	Specifies one of three methods the LTU/NTU uses to generate the Clear to Send (CTS), Data Set Ready (DSR), and Received Line Signal Detect (RLSD) control signals for the V.35/V36 port. The V.35/V.36 port is hardware-configured as DCE. Set each of these parameters to match the requirements of the application.
STD (standard)	The output control signal follows the ITU standards
ON (force ON)	Control signal is always ON
OFF (force OFF)	Control signal is always OFF
LL/RL	Selects whether the LTU/NTU responds to (enabled) or ignores (disabled) the Local Loopback (LL) and Remote Loopback (RL) input control signals. The enabled (**ENA**) status appears on the display.

(a) Primary Timing Source is automatically set to Nx64k in Nx64K AUTO mode.

Configure Alarms

Use the Config Alarms menu to configure LTU and NTU Interface alarm parameters and the HDSL span alarm parameters. When setting alarm parameters for LTUs and NTUs, keep the following rules in mind:

- Minor alarms cause LED indications and are stored in history. Console screen menu alarm history reports are generated.
- Major alarms cause LED indications, actuate the line unit alarm relay, and are stored in history. Console screen menu alarm history reports are generated.
- The LTU alarm relay activates in response to a major alarm at the LTU only.
- The NTU alarm relay activates in response to a major alarm at the NTU only.

Press **A** at the *Config* drop-down menu to display the UTU-731 or UTU-732 Config Alarms menu (Figure 17).

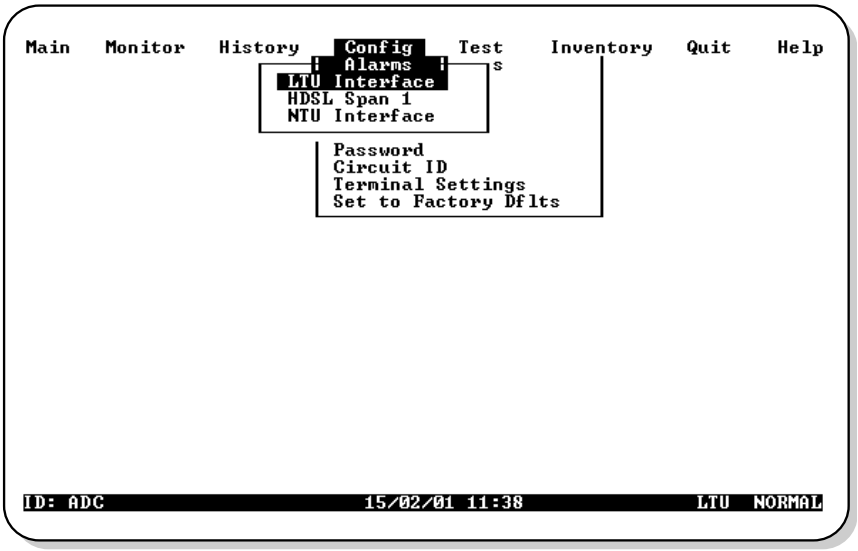

Figure 17. *Config Alarms Menu*

Alarms for LTU and NTU Interface

1 Press one of the following keys at the Config Alarms drop-down menu to display the Config Alarms LTU or NTU Interface menu:

- L for the Config Alarms LTU Interface menu (UTU-731 in Figure 18 below or UTU-732 in Figure 19 on page 35).
- N for the UTU-731 or UTU-732 Config Alarms NTU Interface menu (the fields and options displayed in the Config Alarms NTU Interface menu are identical to those displayed in the Config Alarms LTU Interface menu).

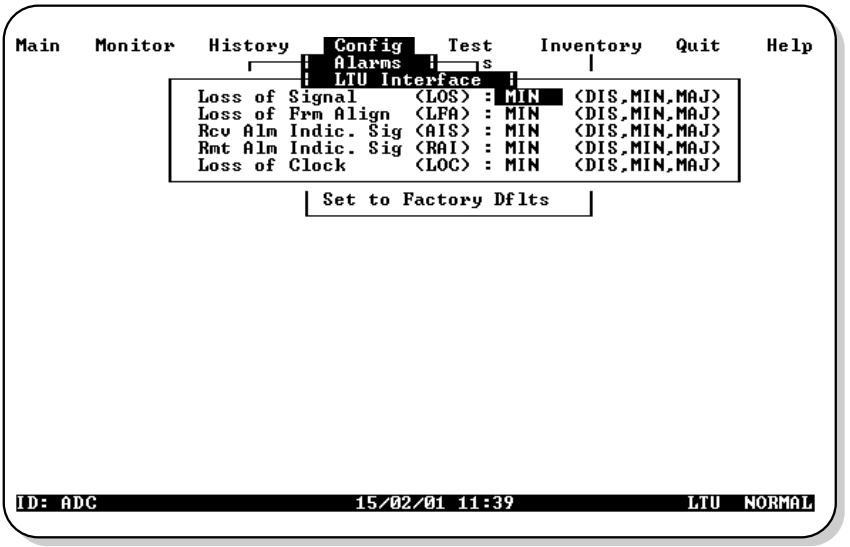

Figure 18. *UTU-731 Config Alarms LTU Interface Menu*

2 Do the following for each interface option to be changed. The fields displayed in the Config Alarms LTU and Config Alarms NTU Interface menus are described in Table 11 on page 35.

- Use the ↑ or ↓ key to select the submenu item to be changed.
- Use the SPACEBAR to toggle to the appropriate option or type in the correct information, then press ENTER to select the option.

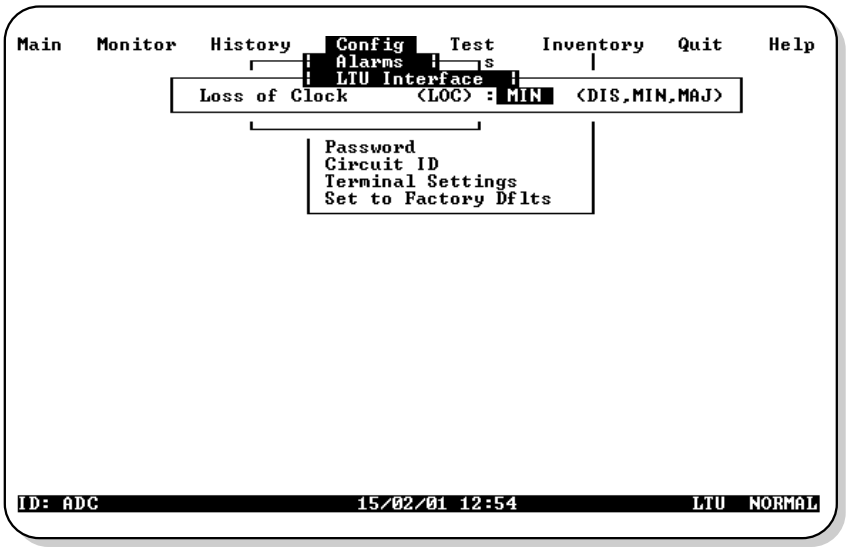

Figure 19. *UTU-732 Config Alarms LTU Interface Menu*

Table 11. *Fields in Config Alarms LTU and NTU Interface Menus*

Field	Description
	UTU-731 Alarms
Loss of Signal (LOS)	Loss of signal at the G.703 input.
Loss of Frame Alignment (LFA)	Loss of frame alignment at the G.703 input.
Receive Alarm Indication Signal (AIS)	Alarm indication signal (unframed all ones) received at the G.703 input.
Remote Alarm Indication Signal (RAI)	Remote alarm indication signal received at the G.703 input
Loss of External Clock (LOC)	Loss of external clock when EXT timing is used. The external clock was lost for the previous second. This alarm is reset when the clock is active again.
	UTU-732 Alarms
Loss of External Clock (LOC)	Loss of external clock when EXT timing is used. The external clock was lost for the previous second. This alarm is reset when the clock is active again.
Loss of Incoming Clock (LOC)	Loss of incoming clock (TT) at the serial data port (only enabled if the primary timing source is Nx64k or if the transmit clock mode is set to EXT).

HDSL Span 1 Alarms

1 Press 1 at the Config Alarms drop-down menu to display the Config Alarms HDSL Span 1 menu (Figure 20 below).

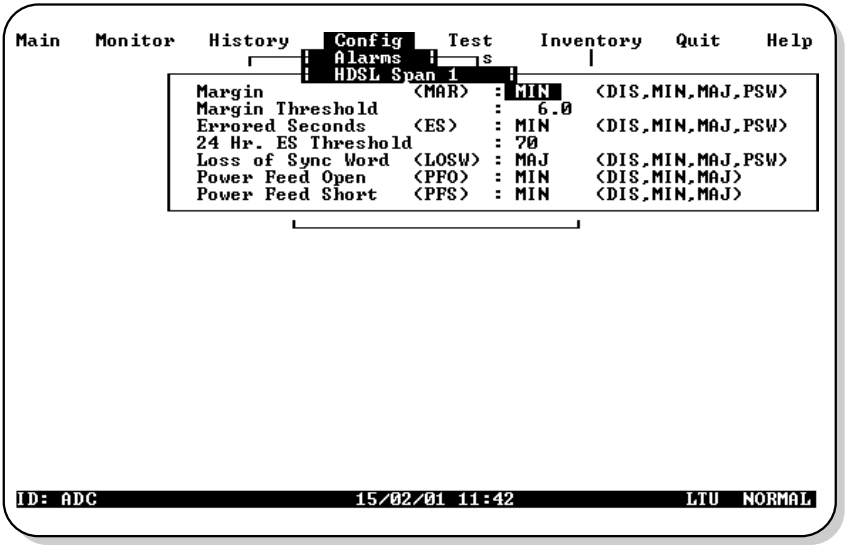

Figure 20. *Config Alarms HDSL Span 1 Menu*

2 Do the following for each option to be changed. The fields displayed in the Config Alarms HDSL Span 1 menu are described in Table 12.

- Use the ↑ or ↓ key to select the submenu item to be changed.
- Use the SPACEBAR to toggle to the appropriate option or type in the correct information, then press ENTER to select the option.

Table 12. *Fields Displayed in Config Alarms HDSL Span 1 Menu*

Field	Description
Margin (MAR)	Selects whether the alarm is disabled (DIS), or enabled and reported as a Minor (MIN) or Major (MAJ) Alarm when the margin falls below the threshold. This indicates a potential degradation of line quality. If an alarm is configured as a protection switch (PSW), it will behave as a Major (MAJ) Alarm, and cause protection switching to engage.
Margin Threshold	Selects the margin alarm threshold (from 0 dB to 15 dB) for all four margin measurements of the span.
Errored Seconds (ES)	Selects whether the alarm is disabled (DIS), or enabled and reported as a Minor (MIN) or Major (MAJ) Alarm when 24-hour ES count exceeds the threshold.
24 HR ES Threshold	Selects the errored seconds threshold (0 to 255) for all four errored seconds measurements of the span measured over a 24-hour period.
Loss of Sync Word (LOSW)	Selects whether the alarm is disabled (DIS), or enabled and reported as a Minor (MIN) or Major (MAJ) Alarm when the LOSW condition (HDSL loop down) occurs.
Power Feed Open	Not supported. These units do not supply power to other units.
Power Feed Short	Not supported. These units do not supply power to other units.

Set to Factory Defaults

Set to Factory Dflts is the screen from which all operating options can be reset to the ADC factory defaults.

1 Press **F** at the Config drop-down menu to display the Set to Factory Dflts screen (Figure 21 below).

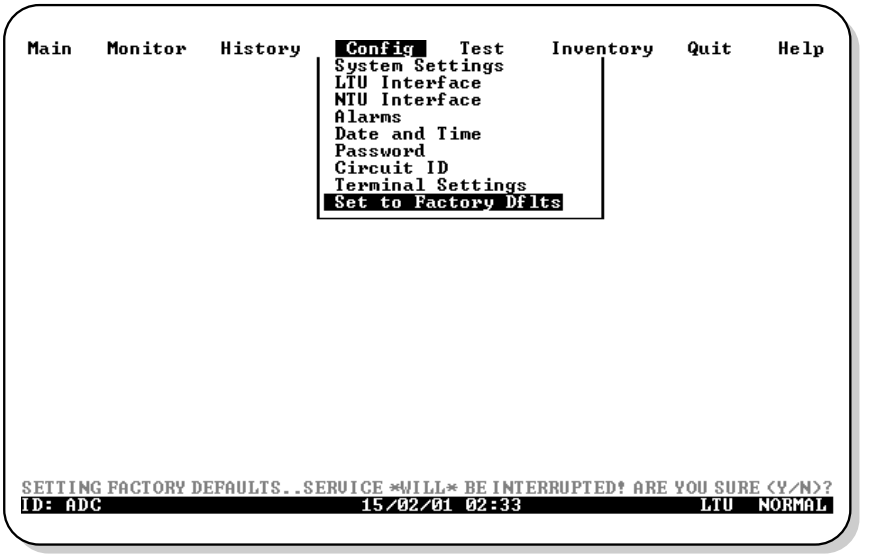

Figure 21. *Set to Factory Dflts Screen*

2 Press **ENTER** to reset the UTU configuration to factory defaults. A confirmation message appears at the bottom of the display:

SETTING FACTORY DEFAULTS … SERVICE *WILL* BE INTERRUPTED! ARE YOU SURE(Y/N)?

3 Do one of the following:

- Press **N** to keep the current settings.
- Press **Y** to reset values to factory defaults. The system resets and both LTU and NTU units go through their respective synchronization processes. If loops are down or in update mode while Set to Factory Dflts is enabled, only the local unit will restart. If the loops are up, both the LTU and NTU will restart.

The factory default system settings for the UTU-731 are listed in Table 13 below. The settings for the UTU-732 are listed in Table 14 on page 40.

Table 13. *UTU-731 Factory Default System Settings*

Parameter	Default Setting
System Settings	
Application Mode	SINGLE
HDSL Rate Mode	MANUAL
HDSL Payload Rate	128kbps/2
Remote Console Access	ALLOWED
Local Unit Role	NTU
LTU/NTU Interface	
G,703 port	
Interface Type	G.703
Data Rate/# of TSs	256 / 4
Beginning TS	0 (structured mode) 1 (unstructured mode)
Alarms	
Alarms LTU/NTU Interface	
Loss of Clock (LOC)	MIN (Minor)
Alarms HDSL Spans	
Margin (MAR)	MIN (Minor)
Margin Threshold	6
Errored Seconds (ES)	MIN (Minor)
24 Hour ES Threshold	70
Loss of Sync Word (LOSW)	MAJ (Major)
Power Feed Open (PFO)	Not supported on these units.
Power Feed Short (PFS)	Not supported on these units.

Table 14. *UTU-732 Factory Default System Settings*

Parameter	Default Setting
System Settings	
Application Mode	SINGLE
HDSL Rate Mode	MANUAL
HDSL Payload Rate	256kbps/4
Remote Console Access	ALLOWED
Protect Switch Command	Not supported on these units.
Local Unit Role	NTU
LTU/NTU Interface	
Nx64k port	
Interface Type	V.36
Data Rate/# of TSs	0
Beginning TS	0
Transmit Clock	INT-RISING (Internal Rising)
CTS	STD (Standard)
DSR	STD (Standard)
RLSD	STD (Standard)
LL/RR	ENA (Enabled)
Alarms	
Alarms LTU/NTU Interface	
Loss of Clock (LOC)	MIN (Minor)
Alarms HDSL Spans	
Margin (MAR)	MIN (Minor)
Margin Threshold	6
Errored Seconds (ES)	MIN (Minor)
24 Hour ES Threshold	70
Loss of Sync Word (LOSW)	MAJ (Major)
Power Feed Open (PFO)	Not supported on these units.
Power Feed Short (PFS)	Not supported on these units.

VIEWING SYSTEM STATUS

View status using a maintenance terminal or PC running a terminal emulation program connected to the UTU front-panel console port.

MAIN CONSOLE SCREEN

The Main console screen displays a summary of LTU and NTU circuit configuration, as well as performance statistics and alarm status for each interface.

Press M to display the Main console screen for the UTU-731 (Figure 22 below) or UTU-732 (Figure 23 on page 42). The screen shown is the LTU and NTU in the single-pair application. The numbered fields in Figure 22 and Figure 23 are described in Table 15 on page 42.

Each field displayed in the Main console screen is described in Table 16 on page 43 (UTU-731) and Table 18 on page 48 (UTU-732).

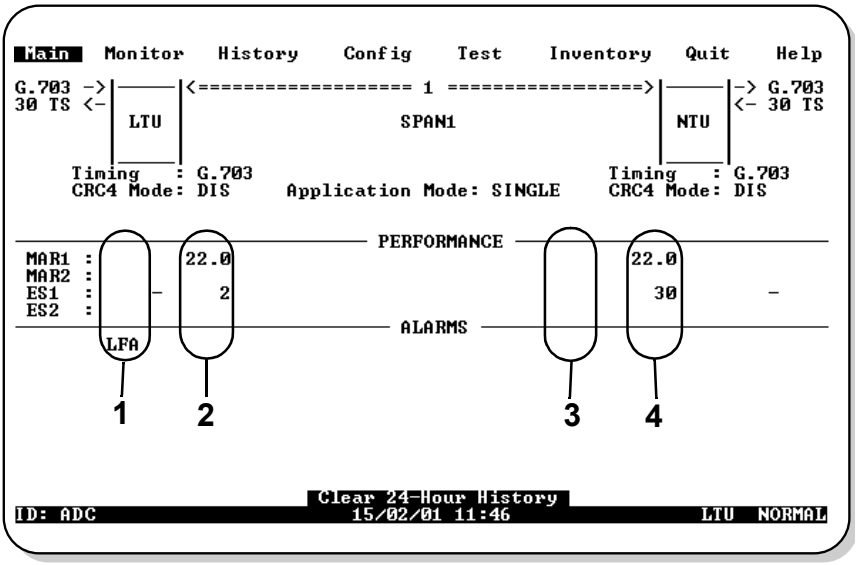

Figure 22. *UTU-731 Main Console Screen*

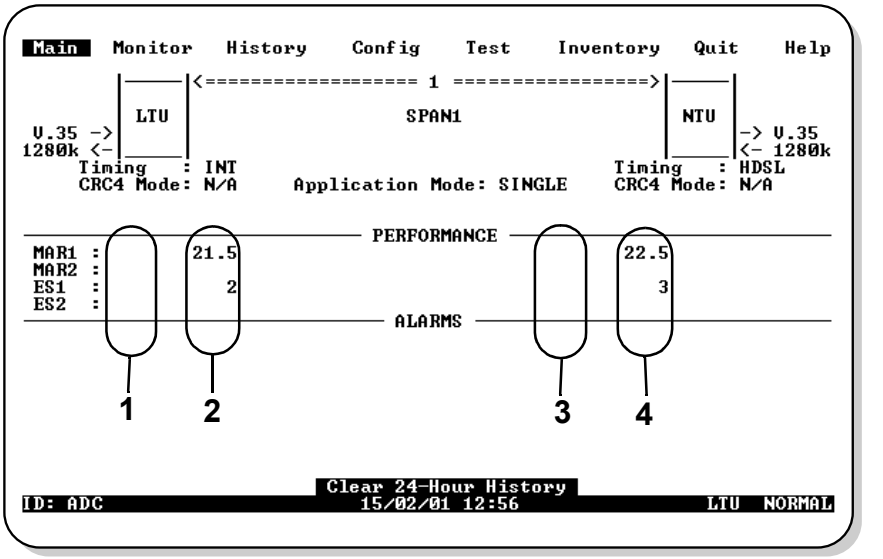

Figure 23. *UTU-732 Main Console Screen*

Table 15. *Reading the Main Console Screen*

Field	Description
1	Shows performance and alarms for the LTU network interface.
2	Shows performance and alarms for the LTU HDSL interface.
3	Shows performance and alarms for the NTU HDSL interface.
4	Shows performance and alarms for the NTU customer interface.

Table 16. *Fields Displayed in UTU-731 Main Console Screen*

Field	Description
	Circuit Configuration
G.703	Indicates the interface standard for G.703 data port.
n TS	Indicates the number of time slots (*n*) mapped to the G.703 interface.
Timing	Indicates the primary source the unit uses for clock synchronization:
EXT	External 2.048 MHz clock.
G.703	G.703 port receive clock.
Application mode	Indicates that the Single Pair (SINGLE) application mode is in effect.
	Performance
MAR1	Displays the Margin value for each HDSL interface or displays link status (SIG, ACQ, etc.) if the link is not up.
MAR2	Reserved
ES1	Displays the Errored Seconds (ES) counts for each HDSL interface. The counts are for the latest 24-hour period, calculated as the sum of the counts in the previous 95 15-minute intervals, plus the count in the current 15-minute interval.
ES2	Reserved
	Alarms
The Alarms field displays a list of all active alarms at each LTU/NTU and HDSL interface.	
	Possible LTU/NTU Interface Alarms
Loss of Signal (LOS)	Loss of signal at the G.703 input.
Loss of Frame Alignment (LFA)	Loss of frame alignment at the G.703 input.
Receive Alarm Indication Signal (AIS)	Alarm indication signal (unframed all ones) received at the G.703 input.
Remote Alarm Indication Signal (RAI)	Remote alarm indication signal received at the G.703 input (through A-bit).
Loss of Clock (LOC)	Applies to loss of external clock when EXT timing is used. The external clock was lost for the previous second. This alarm is reset when the clock is active again.

Continued

Table 16. *Fields Displayed in UTU-731 Main Console Screen (Cont.)*

Field	Description
	Possible HDSL alarms
Margin (MAR)	Margin has fallen below threshold set for the HDSL interface.
Errored Seconds (ES)	Errored seconds count has exceeded threshold set for the HDSL interface.
Loss of Sync Word (LOSW)	Loss of sync word at the HDSL interface. Remains active during restart, but not a cold start.

Table 17. *Fields Displayed in UTU-732 Main Console Screen*

Field	Description
	Circuit Configuration
V.35/V.36/X.21/RS-530	Indicates the interface standard for Nx64k serial data port.
n k	Indicates the data rate (*n*) mapped to the Nx64k interface.
Timing	Indicates the primary source the LTU/NTU uses for clock synchronization:
INT	Internal oscillator.
EXT	External 2.048 MHz.
Nx64k	Serial data port receive clock.
HDSL	Recovered clock from received HDSL data.
Application mode	Indicates that the Single Pair (SINGLE) application mode is in effect.
	Performance
MAR1	Displays the Margin value for each HDSL interface or displays link status (SIG, ACQ, etc.) if the link is not up.
MAR2	Reserved
ES1	Displays the errored second counts for each HDSL interfaces. The counts are for the latest 24-hour period, calculated as the sum of the counts in the previous 95 15-minute intervals, plus the count in the current 15-minute interval.
ES2	Reserved

Table 17. *Fields Displayed in UTU-732 Main Console Screen (Cont.)*

Field	Description
Alarms	
The Alarms field displays a list of all active alarms at each LTU/NTU and HDSL interface.	
Possible Nx64k port alarms	
LOC	Loss of incoming clock (TT) at the serial data port (only enabled if the primary timing source is Nx64k).
Possible External Clock Alarms	
LOC	Applies to loss of external clock when EXT timing is used. The external clock was lost for the previous second. This alarm is reset when the clock is active again.
Possible HDSL alarms	
MAR1	Margin threshold has fallen below alarm threshold for the HDSL interface.
ES1	Errored second count has exceeded alarm threshold for the HDSL interface.
LOSW1	Loss of sync word for the HDSL interface. Remains active during restart, but not a cold start.

MONITOR MENU

The Monitor menu contains the following options:

- LTU and NTU Interface screens that display the 24-hour and cumulative count of errors at the UTU-731 G.703 port or the UTU-732 serial data port.
- HDSL Span 1 screen that displays the circuit performance and 24-hour error counts at the HDSL span 1 interface.

Press 0 at the console screen to display the Monitor menu (Figure 24 below).

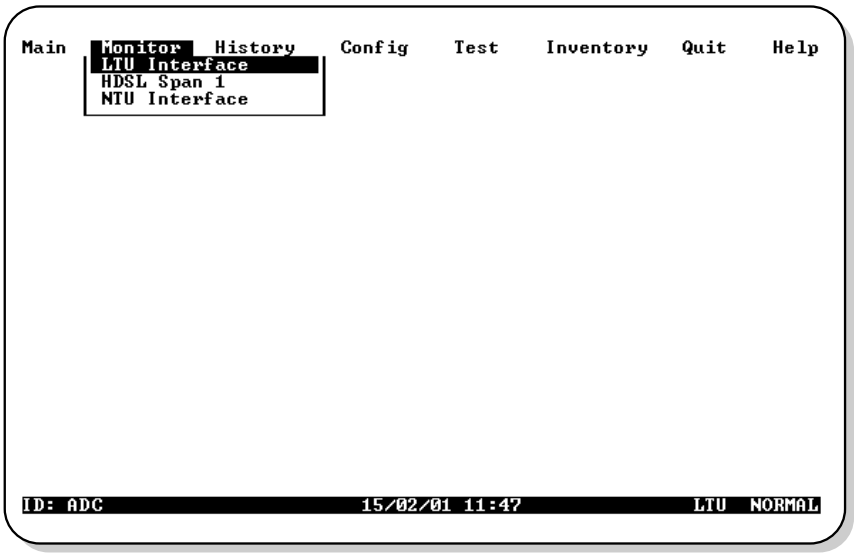

Figure 24. *Monitor Menu*

Monitor LTU and NTU Interface Screens

At the Monitor menu (Figure 24 on page 46), press L to display the Monitor LTU Interface screen for the UTU-731 (Figure 25 below) or the UTU-732 (Figure 26 on page 48).

The fields displayed in the Monitor NTU Interface screen are identical to those displayed in the Monitor LTU Interface screen.

Table 18 on page 48 (UTU-731) and Table 19 on page 49 (UTU-732) describe the fields displayed in the Monitor Interface screens.

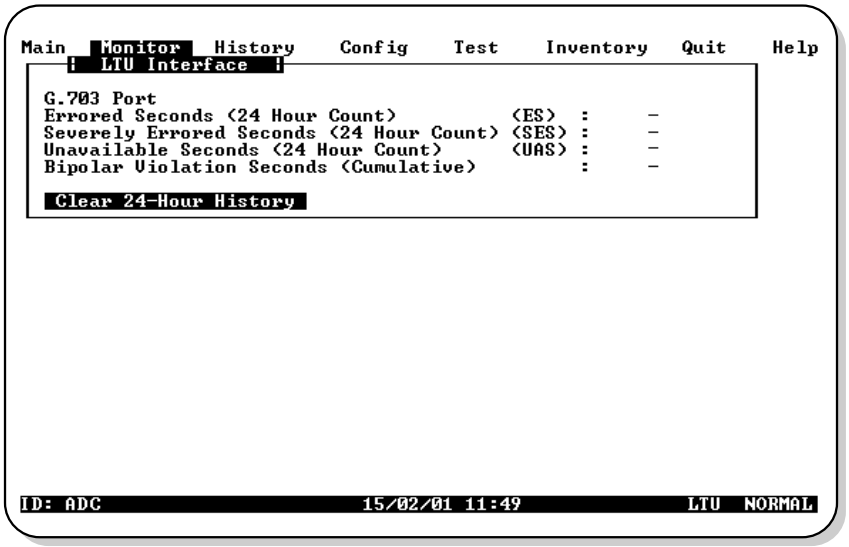

Figure 25. *UTU-731 Monitor LTU Interface Screen*

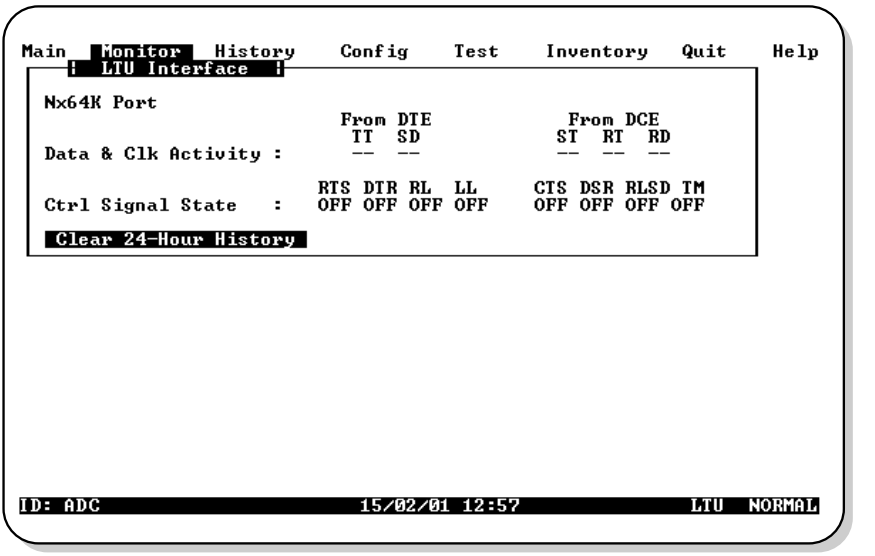

Figure 26. *UTU-732 Monitor LTU Interface Screen*

Table 18. *Fields Displayed in UTU-731 Monitor Interface Screens*

Field	Description
	G.703 Port
Errored Seconds (ES) 24-Hour Count	The number of one-second intervals in which at least one bipolar violation (BPV) or one CRC-4 error was detected at the G.703 input port during the last 24 hours.
Severely Errored Seconds (SES) 24-Hour Count	The number of one-second intervals during which a Loss of Signal (LOS), an Alarm Indication Signal (AIS), or a Loss of Frame (or CRC-4 Multiframe) Alignment (LFA) occurred at the incoming port.
Unavailable Seconds (UAS) 24-Hour Count	The number of seconds that G.703 input signals were unavailable during the last 24 hours. After ten consecutive SESs, the system is deemed unavailable, and the current UAS counter begins counting from ten. After ten consecutive non-SESs, the system returns to availability, and the ten counts representing the non-SESs are removed from the UAS counter.

Table 18. *Fields Displayed in UTU-731 Monitor Interface Screens (Cont.)*

Field	Description
CRC-4 Errored Seconds (Cumulative)	The number of CRC-4 errors that were detected at the G.703 port since error counters were last cleared. Turning CRC-4 mode on and off clears the CRC-4 error counter.
Bipolar Violation Seconds (Cumulative)	The number of seconds in which bipolar violations were detected at the G.703 port since error counters were last cleared.
Clear 24-Hour History	The date and time that the 24-hour histories were last cleared are displayed here. Enable this function by pressing **L** or **ENTER** to clear all 24-hour history counters (including HDSL). This action must be confirmed by pressing **Y**.

Table 19. *Fields Displayed in UTU-732 Monitor Interface Screens*

Field	Description
	Nx64k Port
Data & Clk Activity	Displays the status of the data and clock signals at the Nx64k port at one-second intervals. Asterisks (**) indicate an active line. Dashes (- -) indicate an inactive line. Displayed fields are: From DTE: TT SD - - - - From DCE: ST RT RD ** ** - -
Ctrl Signal State	Displays the status of the control signals at the Nx64k port at one-second intervals. ON indicates an active line. OFF indicates an inactive line. Displayed fields are: From DTE: RTS DTR RL LL OFF OFF OFF OFF From DCE: CTS DSR RLSD TM OFF OFF ON OFF
Clear 24-Hour History	The date and time that the 24-hour histories were last cleared are displayed here. Enable this function by pressing **L** or **ENTER** to clear all 24-hour history counters (including HDSL). This action must be confirmed by pressing **Y**.

Monitor HDSL Span 1 Screen

The Monitor HDSL Span 1 screen (Figure 27 below) displays the circuit performance and 24-hour error counts at the HDSL span 1 interface. The values under the LTU-1 column represent HDSL Span 1 as measured by the LTU. The values under the NTU-1 column represent HDSL Span 1 as measured by the NTU.

At the Monitor menu (Figure 24 on page 46), press 1 to select the Monitor HDSL Span 1 screen. The fields displayed in the Monitor HDSL Span 1 screen are described in Table 20 on page 51.

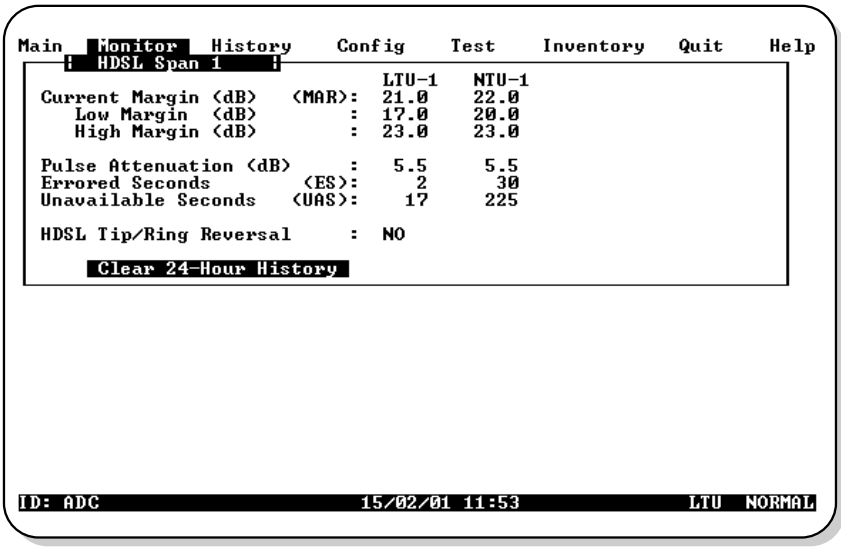

Figure 27. *Monitor HDSL Span 1 Screen*

Table 20. *Fields Displayed in Monitor HDSL Span 1 Screen*

Field	Description
Current Margin (dB) (MAR)	Indicates the excess signal-to-noise ratio relative to a 10^{-7} bit error rate. The normal range of a typical margin is from 6 to 22 dB, with a value of 6 dB corresponding to a predicted BER of 10^{-10}.
Low Margin (dB)	Indicates the lowest margin since startup or the last 24-hour history clear.
High Margin (dB)	Indicates the highest margin since startup or the last 24-hour history clear.
Pulse Attenuation (dB)	Indicates the attenuation of the 2B1Q pulse from the distant end. This value is related to the cable pair's loss at 292 KHz. The normal range of pulse attenuation is from 1 to 32 dB.
Errored Seconds (ES)	The number of one-second intervals in which at least one HDSL CRC-6 error or loss of Sync Word (LOSW) was detected on the HDSL span during the last 24 hours.
Unavailable Seconds (UAS)	The number of seconds that the HDSL span was down during the last 24 hours.
Pair Exchange	Indicates whether the HDSL pairs carrying the traffic are correctly connected or have been interchanged. The system automatically compensates for an interchange of pairs.
Loop1 Tip/Ring Reversal	Indicates whether the two conductors of HDSL Loop1 are correctly connected or have been interchanged. The system automatically compensates for an interchange of wire leads.
Loop2 Tip/Ring Reversal	Indicates whether the two conductors of HDSL Loop2 are correctly connected or have been interchanged by error. The system automatically compensates for an interchange of wire leads.
Clear 24-Hour History	Clears all 24-hour history counters (including G.703 values) and displays the date and time the error counters were last cleared.

HISTORY MENU

The History menu contains the following status screens:

- Screens that display the alarm history for the LTU and NTU interface.
- Screens that display the 24-hour, 7-day, and alarm history for the HDSL span.

The History menu also provides the option to clear the 24-hour, 7-day, and alarm history screens. This option is described on page 60.

Type H to select the History menu (Figure 28 below).

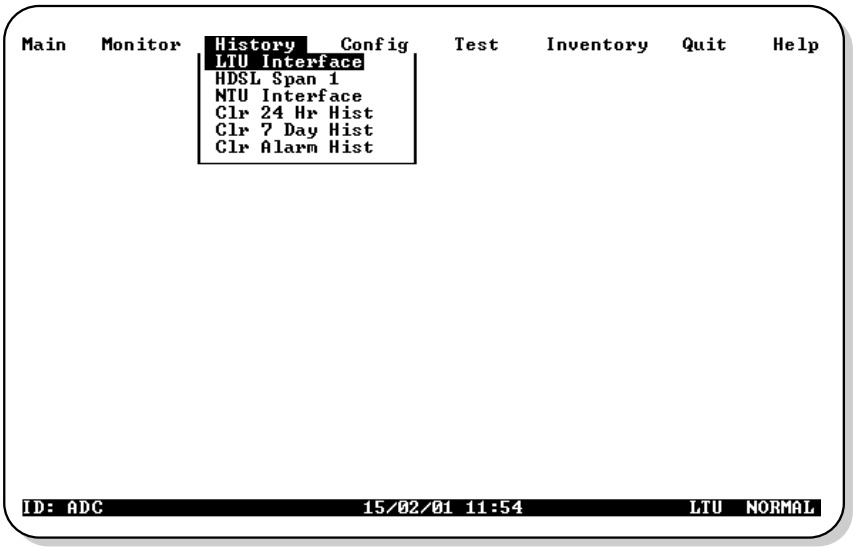

Figure 28. *History Menu*

History LTU and NTU Interface Menus

At the History menu (Figure 28 on page 52), press L to select the History LTU Interface menu (Figure 29 below) or N to select the History NTU Interface menu (the History LTU and NTU Interface menus are identical).

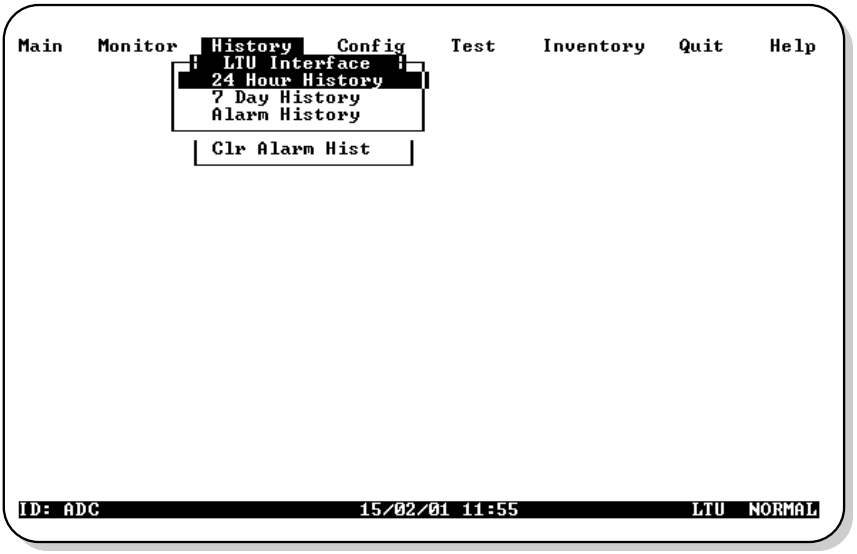

Figure 29. *History LTU Interface Menu*

Only the Alarm History screen is available for the LTU and NTU interfaces. The 24-Hour and 7-Day History screens, as well as the Alarm History screen, are available for HDSL Span 1.

LTU and NTU Interface Alarm History Screens

At the History LTU or History NTU Interface menu, press **A** to select the Alarm History screen. The LTU Interface Alarm History screen is shown in Figure 30 below (UTU-731) and in Figure 31 on page 55 (UTU-732).

Table 21 below (UTU-731) and Table 22 on page 55 (UTU-732) describe the four columns data contained in the LTU Interface and NTU Interface Alarm History screens. If no alarm has occurred since the last alarms were cleared, the message "No alarms reported" displays on the appropriate line for each alarm.

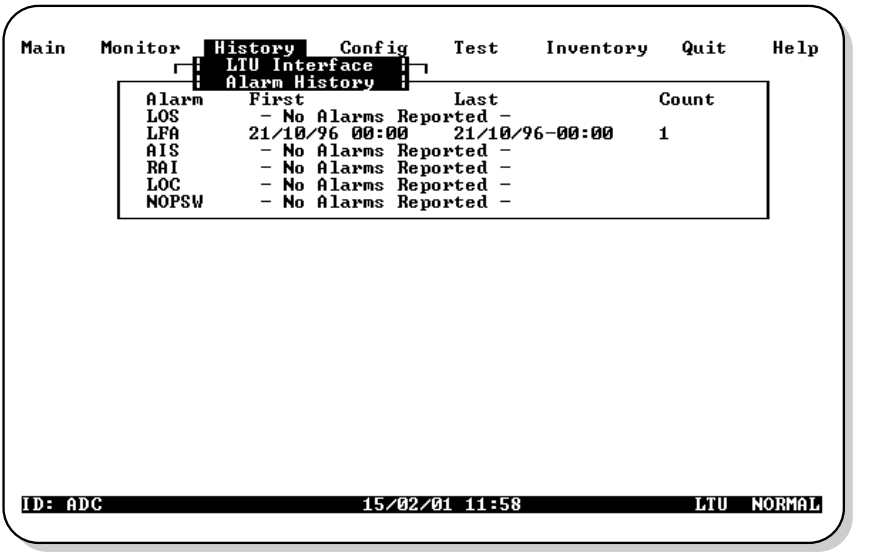

Figure 30. *LTU Interface Alarm History Status Screen, UTU-731*

Table 21. *Data in LTU and NTU Interface Alarm History Screens, UTU-731*

Column	Description
Alarm	Type of alarm: LOS, LFA, AIS, RAI, and LOC
First	Date and time the alarm first occurred
Last	Date and time the alarm last occurred
Count	Number of times the alarm has occurred since the alarms were last cleared

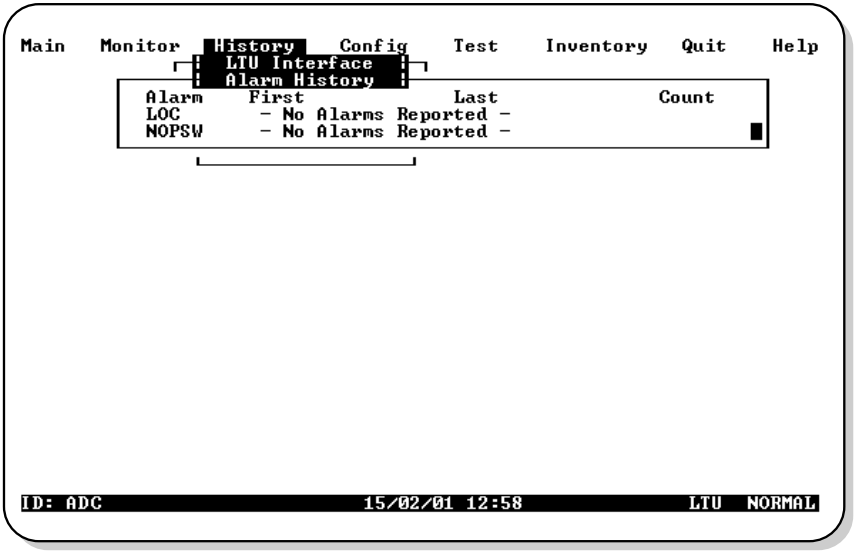

Figure 31. *LTU Interface Alarm History Status Screen, UTU-732*

Table 22. *Data in LTU and NTU Interface Alarm History Screens, UTU-732*

Column	Description
Alarm	Type of alarm: LOC (Loss of Clock), NOPSW [a] (No Protection Switch)
First	Date and time the alarm first occurred.
Last	Date and time the alarm last occurred.
Count	Number of times the alarm has occurred since the alarms were last cleared.

(a) Not available on Nx64k serial data port units.

HDSL Span Performance History Screens

At the History menu (Figure 28 on page 52), press 1 to select the History HDSL Span 1 menu (Figure 32 below).

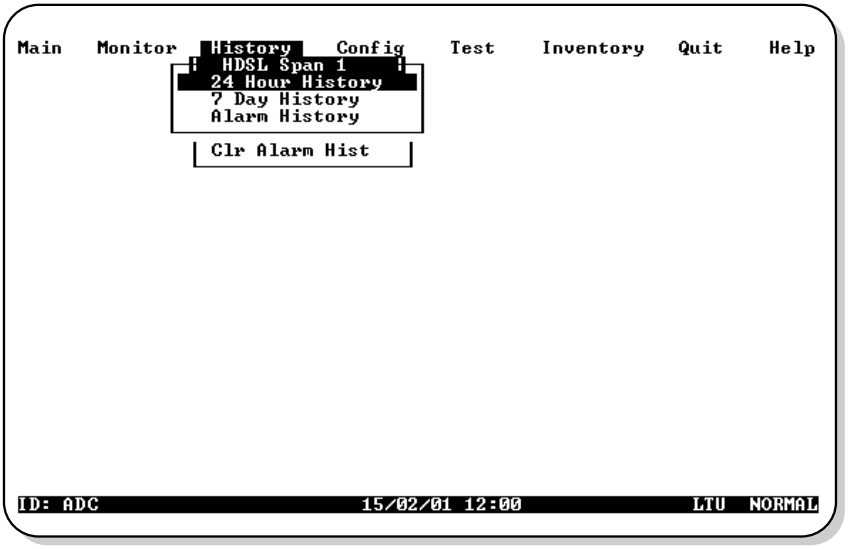

Figure 32. *History HDSL Span 1 Menu*

The History HDSL Span 1 menu contains three viewing options:

- 24-Hour History
- 7-Day History
- Alarm History

HDSL Span 1 24-Hour History Screen

At the History HDSL Span 1 menu (Figure 32 on page 56), press H to select the HDSL Span 1 24-Hour History screen (Figure 33 below).

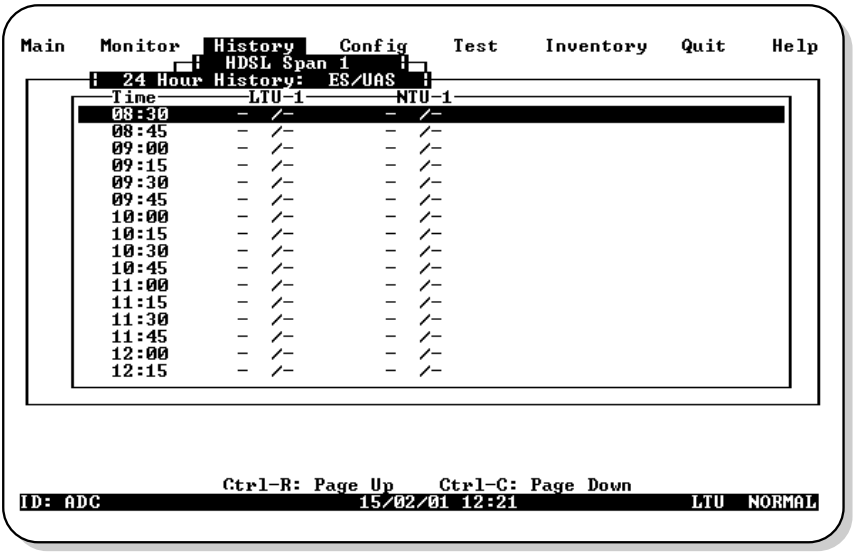

Figure 33. *HDSL Span 1 24-Hour History Screen*

The HDSL Span 1 24-Hour History screen contains three columns of data that show (from left to right) the:

- Starting time of each 15-minute interval.
- Number of ES/UAS at the LTU end of the HDSL span (LTU-1) for each interval. A dash (-) represents a count of zero.
- Number of ES/UAS at the NTU end of the HDSL span (NTU-1) for each interval. A dash (-) represents a count of zero.

The entire display consists of six screens, each showing sixteen 15-minute intervals (4 hours) of performance history.

Type CTRL+R or CTRL+C to display the previous or next screen in the sequence, respectively. Press the ↑ or ↓ key to scroll the screen up or down by one line, respectively.

HDSL Span 1 7-Day History Screens

At the History HDSL Span 1 menu (Figure 32 on page 56), press **D** to select the HDSL Span 1 7-Day History screen (Figure 34 below).

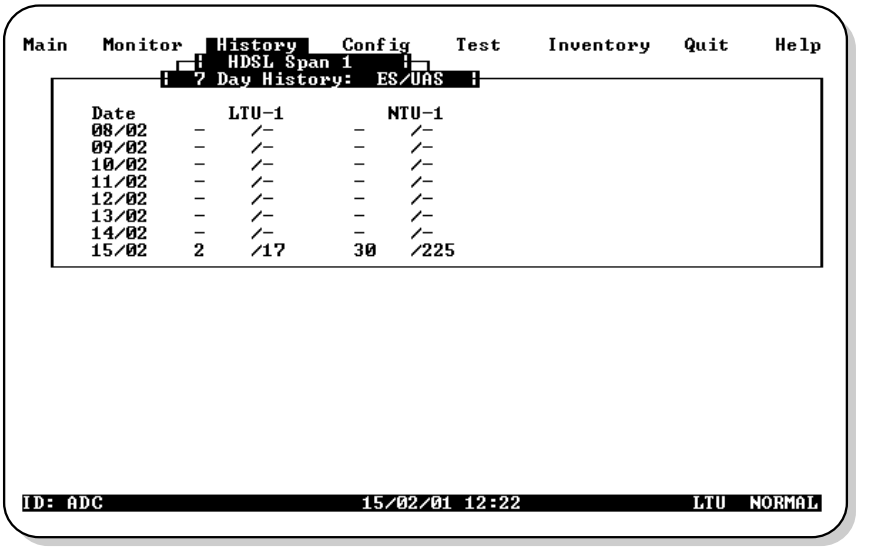

Figure 34. *HDSL Span 1 7-Day History Status Screen*

Each HDSL Span 1 7-Day History screen contains three columns of data showing (from left to right) the:

- date of each completed day within the 7-day interval
- number of ES/UAS at the LTU end of the HDSL span (LTU-1) for each interval. A dash (-) represents a count of zero
- number of ES/UAS at the NTU end of the HDSL span (NTU-1) for each interval. A dash (-) represents a count of zero

HDSL Span 1 Alarm History Screens

At the History HDSL Span 1 menu (Figure 32 on page 56), press **A** to select the HDSL Span 1 Alarm History screen (Figure 35 below). Table 23 below describes the four columns of data contained in each HDSL Span 1 Alarm History screen.

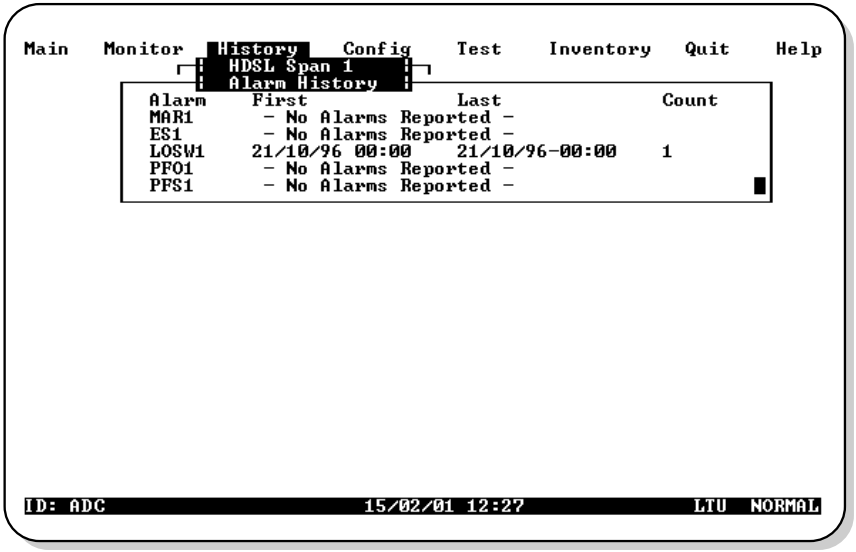

Figure 35. *HDSL Span 1 Alarm History Screen*

Table 23. *Data in HDSL Span 1 Alarm History Screen*

Column	Description
Alarm	Type of alarm: MAR1 (Margin Span 1), ES1 (Errored Seconds Span 1), LOSW1 (Loss of Sync Word Span 1), PFO1 [(a)] (Power Feed Open Span 1), PFS1 [(a)] (Power Feed Short Span 1)
First	Date and time the alarm first occurred
Last	Date and time the alarm last occurred
Count	Number of times the alarm has occurred since the alarms were last cleared

(a) Not supported. These units do not supply power to other units.

Clear History Screens

Use the following options to clear the 24-Hour, 7-Day, or Alarm History status screens:

- Clr 24 Hr Hist: clears all of the 24-hour history error counters
- Clr 7 Day Hist: clears all of the 7-day history error counters
- Clr Alarm Hist: clears all alarm history logs

To clear the status screens:

1 Select the alarm history option to be cleared with the ↑ and ↓ keys, then press ENTER. The following confirmation message appears:

```
ALL (24-HOUR, or 7 DAY, or ALARM) HISTORIES WILL
BE CLEARED. CONTINUE (Y/N)?
```

2 Do one of the following:

- Type N to cancel the operation.
- Type Y to clear the screen. Typing Y displays the following confirmation message:

```
24-HOUR HISTORIES CLEARED
```

INVENTORY SCREEN

Press I to display the Inventory screen for the UTU-731 (Figure 36 on page 61) or UTU-732 (Figure 37 on page 61).

The Inventory screen permits tracking of the system's inventory, service, and revision state. Table 24 on page 62 describes the data displayed in each Inventory screen.

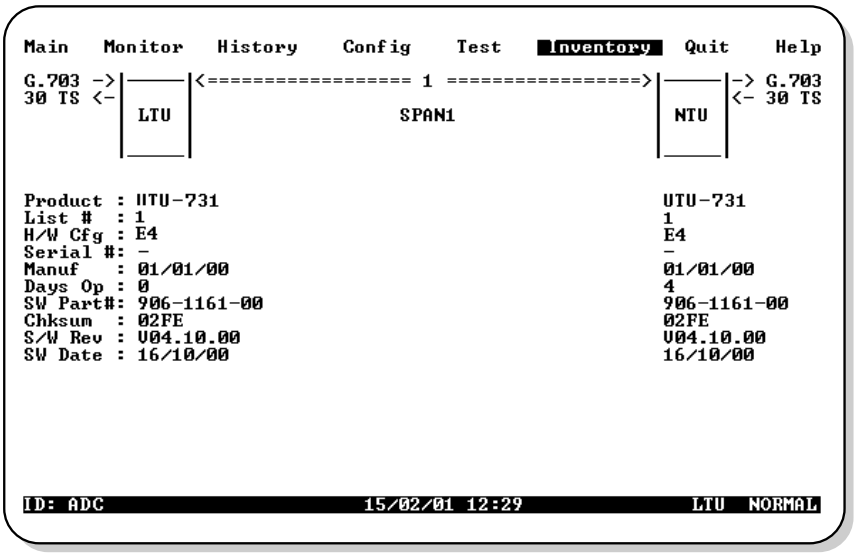

Figure 36. *UTU-731 Inventory Screen*

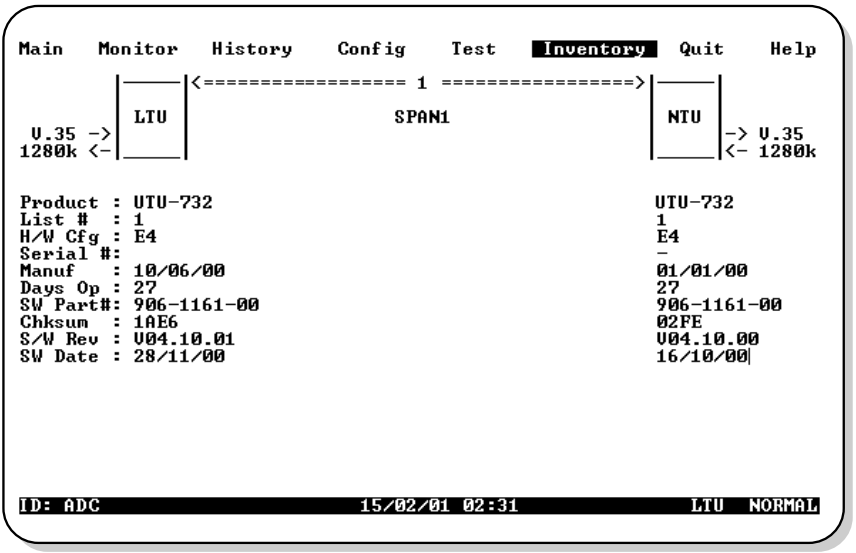

Figure 37. *UTU-732 Inventory Screen*

Table 24. *Inventory Screen Data*

Field	Description
Network Diagram	Displays the configuration of the LTU or NTU circuit.
Product	Displays the model numbers of the LTU, NTU, and any doubler units that comprise the channel.
List #	Displays the LTU, NTU, and doubler unit list numbers, which identify the particular unit versions.
H/W Cfg	Displays the LTU, NTU, and doubler unit hardware configuration level.
Serial #	Displays the unique serial number of the LTU, NTU and any doubler units for inventory and service tracking.
Manuf	Displays the date the LTU, NTU, and any doubler units were manufactured.
Days Op	Displays the number of days the LTU, NTU, and any doubler units have been in operation.
SW Part #	Displays the ADC part number of the firmware.
Chksum	Displays the checksum of the LTU, NTU, and doubler unit proms.
S/W Rev	Displays the currently installed firmware version level of the LTU, NTU and any doubler units.
SW Date	Displays the date that the firmware was released.

TESTING

From the main console screen (Figure 8 on page 19), press T to select the Test menu for the UTU-731 (Figure 38 below) or the UTU-732 (Figure 39 on page 64) from which you can set and run loopback and BER tests.

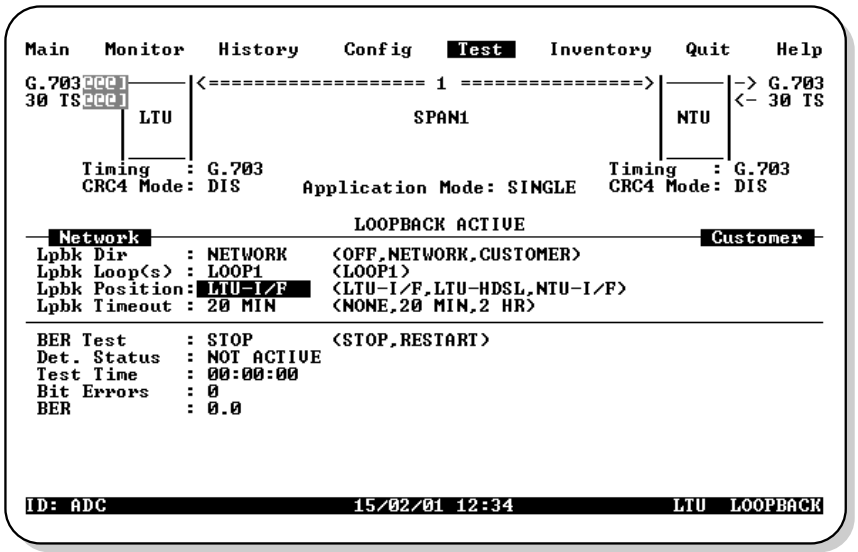

Figure 38. *UTU-731 Test Menu Screen*

Table 25 on page 64 lists the Test menu loopback options. Table 26 on page 65 lists the Test menu BER (Bit Error Rate) options.

Loopbacks remain active until the timeout elapses or the configuration changes. The loopback location and status are indicated on the network diagram portion of the test menu by " @@]" characters as follows:

- Flashing reverse video for active loopbacks
- Solid reverse video for disabled loopbacks

The front panel local (LOC) and remote (REM) loopback LEDs are described in Table 3 on page 6.

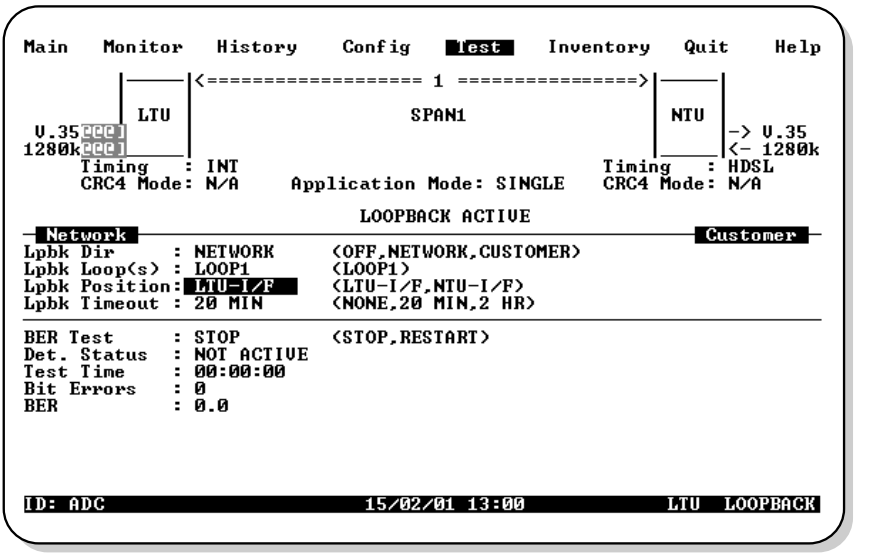

Figure 39. *UTU-732 Test Menu Screen*

Table 25. *Loopback Options in Test Menu*

Option	Default Setting
Network Diagram	Shows the loopback position and direction when the loopback is enabled and active.
Lpbk Dir	Selects one of three loopback direction modes:
OFF	No loopbacks are active.
NETWORK	The loopback selected in Loopback Position is directed toward the network equipment connected to the LTU.
CUSTOMER	The loopback selected in Loopback Position is directed toward the customer's equipment connected to the NTU.
Lpbk Loop(s)	Selects the loops used in the loopback test:
NONE	Option not available with single-pair HDSL card.
Lpbk Position	Selects the possible loopback positions:
NONE	Option not available with single-pair HDSL card.

Table 25. *Loopback Options in Test Menu (Cont.)*

Option	Default Setting
Lpbk Timeout	Selects one of three loopback timeouts:
NONE	Disables automatic timeout cancellation of all loopbacks.
20	Automatically cancels any loopback 20 minutes after initiation.
120	Automatically cancels any loopback 120 minutes after initiation.

Table 26. *BER Options in Test Menu*

Field	Description
BER Test	Selects the state of the BER test.
STOP	Terminates the current test and resumes normal transmission of user payload. Prior BER tests are maintained for reference on the screen. *STOP* must be selected to terminate the BER test prior to exiting the screen.
RESTART	Begins BER test. Disrupts user payload traffic and inserts a pseudo-random bit sequence (PRBS) at the LTU toward the NTU. The pattern used is a $2x10^{15}$ pattern as defined by reselecting this option (pressing the ENTER key) while the test is running. This entry reinitiates the BER values and restarts the test.
Det. Status	Displays the current status of the BER detector at the LTU.
NOT ACTIVE	Displays while the BER is not running.
SYNCING	Indicates that the BER qualification period is in progress (128 received bits are compared to the PRBS).
IN SYNC	Indicates that the BER test is in progress. The BER meter accumulates errors once per test interval (16 seconds). In a high bit error environment the test interval is shortened and the BER meter is updated every second.
Test Time	Displays the elapsed test time for the BER test.
Bit Errors	Displays the number of bits received that did not match the PRBS pattern. This field is updated every 30 seconds, with a maximum value of 255 per update.
BER	Displays the Bit Error Rate computer for the current test. This field is updated very 16 seconds, as is displayed in exponential form. The lowest positive displayable value is $1x10^{-11}$.

FIRMWARE DOWNLOAD UTILITY

The Firmware Download Utility is a separate program and is not available from the console screen menus.

This section describes the ETSI Firmware Download utility and how to use it to upgrade the HDSL card firmware. The utility is a program you can run on a PC to download new firmware to the LTU or NTU by connecting a standard RS-232 interface cable to the unit front panel V.24 console port. When using the ETSI Firmware Download utility, follow these rules:

- Make sure the destination unit where the new firmware is to be upgraded is correct before pressing the ENTER key.
- Do not disconnect the interface cable during the download process.
- Do not abort the download once it has started.

Figure 40 below shows the menu for the ETSI Firmware Download Utility. The upper area of the utility menu displays the configuration options, and the lower area displays messages during the download process.

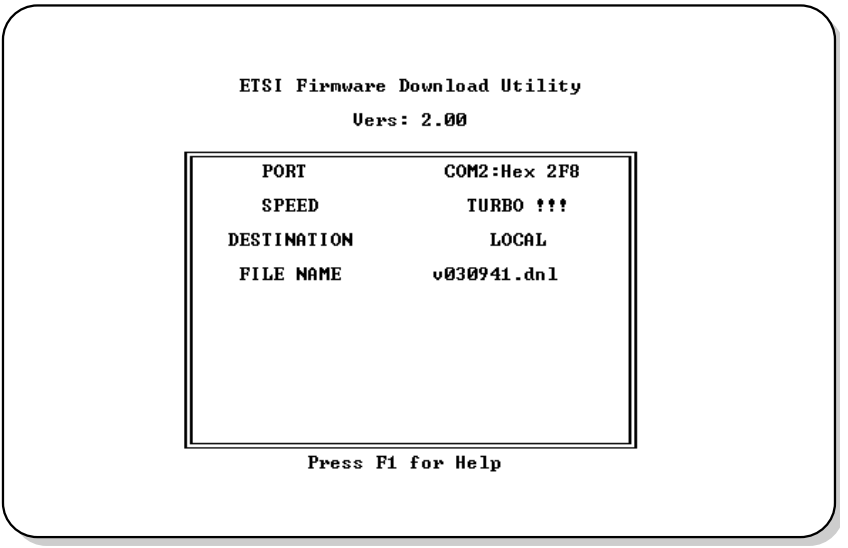

Figure 40. *ETSI Firmware Download Utility Menu*

INITIATE THE DOWNLOAD AND NAVIGATE THE MENUS

To initiate the download process, go to the DOS prompt and type: `dnl.` Table 27 describes user-selectable ETSI Firmware Download Menu Options.

Table 27. *ETSI Firmware Download Menu Options*

Option	Description
PORT	Provides support for two communication ports: COM1 at Hex 3F8 COM2 at HEX 2F8
SPEED	Supports *Standard* (9600 bit/s), *Medium* (19.2K kbps), *Fast* (38.4 kbps), *Faster* (57.6 kbps) and *TURBO* (115.2 kbps) speeds. The number of data bits is fixed at 8, with no parity and 1 stop bit.
DESTINATION	The destination can be set to one of the following: *LOCAL* (unit connected to the maintenance terminal) *LTU* (LTU unit) *NTU* (NTU unit) *NTU2* (NTU2 unit, in case of point-to-multipoint download) *REGENERATOR1* *REGENERATOR2*
FILE NAME[(a)]	Enter the firmware download file name.

(a) FILE NAME can be changed by pressing the **DEL** key, then typing the new file name. Once in the FILE NAME field, the download setup can be aborted only by typing **CTRL**+**C**. After typing the new file name, press the **ENTER** key to start the download sequence.

Table 28 on page 68 describes how to navigate within the ETSI Firmware Download menu.

Table 28. *Navigating the ETSI Firmware Download Menu*

Keystroke	Result
PAGE UP or PAGE DOWN	Change a setting, with the exception of the FILE NAME setting.
↑ and ↓	Move from field to field.
ESC	Abort setup and returns to the DOS prompt.
ENTER	Start the download process.

Download progress messages include:

- program size
- download time
- program checksum
- line-unit response
- time out message (posted if the line unit does not response within five seconds; when this occurs, the download operation is aborted).

While downloading, the HDSL card front-panel LEDs all light, then a binary count sequence indicates progress. When downloading is complete, the unit resets.

LOGGING OFF

If the maintenance terminal must be left unattended for any length of time, log off until work resumes. This prevents unauthorized persons from inadvertently changing the system operating parameters.

Log off by choosing **Quit** from the menu bar or by disconnecting the cable connecting the maintenance terminal to the line or desktop unit. Automatic log off occurs after 20 minutes of keyboard inactivity.

APPENDIX A - BINARY AND HEXADECIMAL NUMBERS

BINARY NUMBERS

The term *binary* refers to a numbering system in which there are only two possible digits: 0 or 1. The value of the 0 is always 0, and the value of the 1 depends upon its weight in a binary notation.

The weight of a binary number increases by powers of 2, rather than by powers of 10. In binary notation the digit furthest to the right has a weight of 1; the next digit to the left has a weight of 2; the next digit has a weight of 4, then 8, 16, 32 and so forth. The decimal equivalent of a binary number can be found by summing the weight of all digits. For example, the binary notation 10101 is equivalent to 16 + 0 + 4 + 0 + 1 or decimal 21.

The virtual DIP switches of the UTU-731 and UTU-732 use the binary numbering system to set system operating parameters. Figure 41 below illustrates the weight of each DIP switch position and the decimal equivalent of a typical DIP switch setting.

More examples of binary numbers and decimal equivalents are provided in Table 29 on page 71.

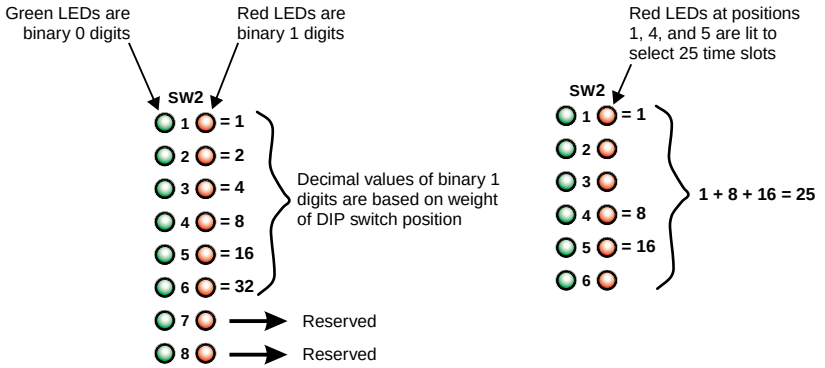

Figure 41. *Decimal Value of Virtual DIP Switch Positions and Typical Setting*

HEXADECIMAL NUMBERS

Hexadecimal is a base-16 numbering system that uses the numbers 0 through 9 and the letters A through F. The letter A is equivalent to decimal 10, and F is equivalent to decimal 15. On the other hand, the letters AA are equivalent to decimal 170, and FF is equivalent to decimal 255.

Hexadecimal is used to express binary values where four or more binary digits are present. For example, when expressing the binary value established by an eight-position DIP switch, the hexadecimal digit on the right expresses the value of switch positions 1 through 4, and the hexadecimal digit on the left expresses the value of switch positions 5 through 8.

Decimal, binary, and hexadecimal equivalents are shown in Table 29.

Table 29. *Decimal, Binary, and Hexadecimal Equivalents*

Decimal	8-Digit Binary	Hexadecimal
0	0000 0000	00
1	0000 0001	01
2	0000 0010	02
3	0000 0011	03
4	0000 0100	04
5	0000 0101	05
6	0000 0110	06
7	0000 0111	07
8	0000 1000	08
9	0000 1001	09
10	0000 1010	0A
11	0000 1011	0B
12	0000 1100	0C
13	0000 1101	0D
14	0000 1110	0E
15	0000 1111	0F
16	0001 0000	10
17	0001 0001	11

Continued

Table 29. *Decimal, Binary, and Hexadecimal Equivalents (Cont.)*

Decimal	8-Digit Binary	Hexadecimal
18	0001 0010	12
19	0001 0011	13
⋮	⋮	⋮
26	0001 1010	1A
27	0001 1011	1B
28	0001 1100	1C
29	0001 1101	1D
30	0001 1110	1E
31	0001 1111	1F
32	0010 0000	20
33	0010 0001	21
34	0010 0010	22
35	0010 0011	23
⋮	⋮	⋮
42	0010 1010	2A
43	0010 1011	2B
44	0010 1100	2C
45	0010 1101	2D
46	0010 1110	2E
47	0010 1111	2F
48	0011 0000	30
49	0011 0001	31
⋮	⋮	⋮
249	1111 1001	F9
250	1111 1010	FA
251	1111 1011	FB
252	1111 1100	FC
253	1111 1101	FD
254	1111 1110	FE
255	1111 1111	FF

APPENDIX B - REGIONAL SALES OFFICES

Customer assistance, sales, and product information is available at the regional sales offices. Contact the regional sales office at the location serving your area.

Table 30. *Regional Sales Offices*

Region	Location	Hours	Telephone Number	Fax Number
United States and Canada	Tustin, California USA	24-hours-a-day, 7-days-a-week	+714.832.9922	+714.832.9908
Latin America	Miami Beach, Florida USA	Monday - Friday, 9:00AM to 5:00PM	+305.957.8100	+305.949.5804
	Campinas, Brasil	Monday - Friday, 8:00AM to 5:00PM	+55.19.865.9205	+55.19.865.9202
Europe	Switzerland	Monday - Friday, 8:00AM to 5:30PM	+41.56.483.4400	+41.56.483.4401
	United Kingdom	Monday - Friday, 8:00AM to 5:00PM	+44.1256.698054	+44.1256.698254
Middle East and Africa	Dubai, U.A.E.	Sunday - Thursday, 9:00AM to 6:00PM	+971.4.343.4949	+971.4.343.0656
Asia Pacific and China	Hong Kong (N.E. Asia)	Monday - Friday 9:00AM to 5:00PM	+852.2802.2918	+852.2802.2789
	Beijing (N. China)	Monday - Friday 8:30AM to 5:00PM	+86.10.6847.6856	+86.10.6847.6857
	Guangzhou (S. China)	Monday - Friday 8:30AM to 5:00PM	+86.20.8752.0977	+86.20.8752.0047

ORDERING PROCEDURE

Orders may be placed through the regional sales offices by telephone, fax, or mail. A fax is preferred.

When placing an order, please provide the following information:

- Customer purchase order number
- Ship-to and bill-to addresses
- Part numbers and quantity required
- Requested delivery date
- Preferred method of shipment

After receiving your order, ADC will send an Order Acknowledgment to the bill-to and ship-to addresses (unless directed otherwise).

APPENDIX C - PRODUCT SUPPORT

ADC Customer Service Group provides expert pre-sales and post-sales support and training for all its products.

TECHNICAL SUPPORT

Technical support is available 24 hours a day, 7 days a week by contacting the ADC Wireline Systems Division Customer Service Engineering Group at the following telephone, fax, or email access:

Telephone:	800.638.0031 or 714.730.3222 The 800 telephone support line is toll-free in the U.S. and Canada.
Fax:	714.832.9924
Email:	wsd_support@adc.com

A Customer Service Engineer answers technical assistance calls Monday through Friday between 7:30 AM and 5:30 PM, Pacific Time, excluding holidays. At all other times, an on-duty Customer Service Engineer returns technical assistance calls within 30 minutes.

RETURNS

To return equipment to ADC Wireline Systems Division:

1 Locate the number of the purchase order under which the equipment was purchased. You will need to provide this number to ADC Wireline Systems Division Customer Service to obtain a return authorization.

2 Call or write ADC Wireline Systems Division Customer Service to ask for a Return Material Authorization (RMA) number and any additional instructions. Use the telephone number, fax number, or email address listed below:

- Telephone: 800.370.9670
- Fax: 714.832.9923
- Email: rma@adc.com

3 Include the following information, in writing, along with the equipment you are returning:

- Company name, address, and the name of a person Customer Service can contact regarding this equipment.
- The purchase order number provided to Customer Service when the RMA number was requested.
- A description of the equipment, as well as the number of units that you are returning. Be sure to include the model and part number of each unit.
- The shipping address to which Customer Service should return the repaired equipment.
- The reason for the return:
  - 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 the ADC Wireline Systems Division address and the RMA number you received from Customer Service clearly on the outside of the carton:

ADC Wireline Systems Division
14352 Franklin Ave.
Tustin, CA 92780-7013

Attention: **RMA (Number)**

Warranty information can be found on the inside back cover of this manual.

WARRANTY

LIMITED WARRANTY

ADC DSL Systems, Incorporated (“ADC”) warrants that, for a period of sixty (60) months from the date of shipment, the hardware portion of its products will be free of material defects and faulty workmanship under normal use. ADC's obligation, under this warranty, is limited to replacing or repairing, at ADC's option, any such hardware product which is returned during the 60-month warranty period per ADC's instructions and which product is confirmed by ADC not to comply with the foregoing warranty.

ADC warrants that, for a period of 90 days from the date of purchase, the software furnished with its products will operate substantially in accordance with the ADC published specifications and documentation for such software. ADC’s entire liability for software that does not comply with the foregoing warranty and is reported to ADC during the 90-day warranty period is, at ADC’s option, either (a) return of the price paid or (b) repair or replace of the software. ADC also warrants that, for a period of thirty (30) days from the date of purchase, the media on which software is stored will be free from material defects under normal use. ADC will replace defective media at no charge if it is returned to ADC during the 30-day warranty period along with proof of the date of shipment.

The transportation charges for shipment of returned products to ADC will be prepaid by the Buyer. ADC will pay transportation charges for shipment of replacement products to Buyer, unless no trouble is found (NTF), in which case the Buyer will pay transportation charges.

ADC may use reconditioned parts for such repair or replacement. This warranty ***does not*** apply to any product which has been repaired, worked upon, or altered by persons not authorized by ADC or in ADC's sole judgment has been subjected to misuse, accident, fire or other casualty, or operation beyond its design range.

Repaired products have a 90-day warranty, or until the end of the original warranty period—whichever period is greater.

ADC DISCLAIMS ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO ITS PRODUCTS AND ANY ACCOMPANYING WRITTEN MATERIALS. FURTHER, ADC DOES NOT WARRANT THAT SOFTWARE WILL BE FREE FROM BUGS OR THAT ITS USE WILL BE UNINTERRUPTED OR REGARDING THE USE, OR THE RESULTS OF THE USE, OF THE SOFTWARE IN TERMS OF CORRECTNESS, ACCURACY, RELIABILITY OR OTHERWISE.

MODIFICATIONS

Any changes or modifications made to these devices that are not expressly approved by ADC DSL Systems, Inc. voids the user's warranty.

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

ADC DSL Systems, Inc.
14402 Franklin Avenue
Tustin, CA 92780-7013
Tel: 714.832.9922
Fax: 714.832.9924

Technical Assistance

800.638.0031
714.730.3222

ISO 9001
DNV
DNV Certification, Inc.
Certificated Firm

DOCUMENT: LTPE-UG-1017-01
ISSUE 1
1145022