GDC 073R134-000
Issue 1, January 1997

Installation and Operation

DataComm 730-D2RP

General DataComm

Warning

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to CISPR-22 of FCC and international rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference. The user is cautioned that any changes or modifications not expressly approved by General DataComm void the user's authority to operate the equipment.

This digital apparatus does not exceed Class A limits for radio noise emissions from digital apparatus described in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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Antistatic Precautions

Electrostatic discharge (ESD) results from the buildup of static electricity and can cause computer components to fail. Electrostatic discharge occurs when a person whose body contains a static buildup touches a computer component.

The equipment may contain static-sensitive devices that are easily damaged and proper handling and grounding is essential. Use ESD precautionary measures when installing parts or cards and keep the parts and cards in antistatic packaging when not in use. If possible, use antistatic floorpads and workbench pads.

When handling components, or when setting switch options, always use an antistatic wrist strap connected to a grounded equipment frame or chassis. *If a wrist strap is not available, periodically touch an unpainted metal surface on the equipment.* Never use a conductive tool, like a screwdriver or a paper clip, to set switches.

Safety Guidelines

The following symbols are used when unsafe conditions exist or when potentially hazardous voltages are present:

Caution statements identify conditions or practices that can cause damage to the equipment or loss of data

Warning statements identify conditions or practices that can result in personal injury or loss of life.

Always use caution and common sense. *To reduce the risk of electrical shock, do not operate equipment with the cover removed.* Repairs must be performed by qualified service personnel only.

- Never install telephone jacks in a wet location unless the jack is designed for that location.
- Never touch uninsulated telephone wires or terminals unless the telephone line is disconnected at the network interface.
- Use caution when installing telephone lines and never install telephone wiring during an electrical storm.

FCC Part 68 Compliance

Connection of data communications equipment to the public telephone network is regulated by FCC Rules and Regulations. This equipment complies with Part 68 of these regulations which require all of the following.

All connections to the telephone network must be made using standard plugs and telephone company provided jacks or equivalent. Connection of this equipment to party lines and coin telephones is prohibited. A label on the back of the front panel of data communications equipment and on the underside or rear panel of other equipment provides the FCC Registration number and the Ringer Equivalence Number (REN) for the unit. If requested, give this information to the telephone company.

If the unit causes harm to the telephone network, the telephone company may discontinue your service temporarily and if possible, you will be notified in advance. If advance notice is not practical, you will be notified as soon as possible and will be advised of your right to file a complaint with the FCC. The telephone company may change its communication facilities, equipment, operations and procedures where reasonably required for operation. If so, the telephone company will notify you in writing. You must notify the telephone company before disconnecting equipment from 1.544 Mbps digital service. All repairs or modifications to the equipment must be performed by General DataComm. Any other repair or modification by a user voids the FCC registration and the warranty.

Canada DOC Notification

The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operation and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

NOTICE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

Deutschland

Installations Anweisungen: Installieren Sie die Telefonleitungen nicht während eines Gewitters. Installieren Sie die Telefonleitungen nicht in einem feuchten Raum, außer die Dose entspricht den Vorschriften für Feuchträume. Berühren Sie unisolierte Telefonleitungen oder Einrichtungen nicht, außer diese sind vom Telefonnetz getrennt. Vorsicht bei der Installierung oder Änderung von Telefonleitungen. *Achtung:* Es gibt keine durch den Benutzer zu wartende Teile im Gerät. Wartung darf nur durch qualifiziertes Personal erfolgen.

Preface

Scope

This manual describes how to install and configure a UAS (Universal Access System) 730-D2RP and explains how to monitor and manage this device. This documentation is written for operators and installers, and assumes a working knowledge of data communications equipment.

Organization

This manual has four chapters, an appendix, and the index. The information is arranged as follows:

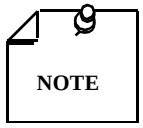
- *Chapter 1 - System Description* introduces important concepts and features of the SpectraComm 730-D2RP.
- *Chapter 2 - Installation* tells you how to install the UAS 730-D2RP. Only typical or fundamental applications are given because of the variety of specific customer system choices.
- *Chapter 3 - Operation* describes the front panels of the UAS 730-D2RP.
- *Chapter 4 - Tests* describes external tests for the 730-D2RP.
- *Appendix A - Business Equipment (DTE) Interface Signals* covers 730-D2RP pin interface signals.
- *Index* - Contains 730-D2RP topics and page numbers.

Document Conventions

Level 1 paragraph headers introduce major topics.

Level 2 paragraph headers introduce subsections of major topics.

Level 3 paragraph headers introduce subsections of secondary topics.



Notes present special instructions, helpful hints or general rules.

Caution statements identify conditions or practices that can result in damage to the equipment or in loss of data.

Related Publications

The following documents have additional information that may be helpful when using this product:

- *Operating and Installation Instructions for DataComm Shelf,* GDC 010R310-000
- *Operating and Installation Instructions for Universal Access System* GDC 010R380-000

GDC publication numbers (e.g., *GDC 073R134-000*) are used to track and order technical manuals. Publication numbers use the following format:

GDC NNNRnnn-000 or GDC NNNRnnn-Vnnn

NNN	identifies the product family (e.g. UAS)
R	denotes a technical publication
nnn	a number assigned by Technical Publications
000	identifies a hardware product and does not change
Vnnn	designates software version associated with a product, which may be updated periodically

The issue number on the title page changes only when a hardware manual is revised or when a manual is reprinted for some other reason; it does not automatically change when the software is updated. A new Software Version is always Issue 1. Other specialized publications such as Release Notes or Addenda may be available depending on the product.

Glossary of Terms

2B1Q

Line code for basic rate ISDN at the U reference point. 2B1Q (2 Binary 1 Quaternary) is a line encoding format that is supported on 2-wire interfaces.

Address

A sequence of bits, a character, or a group of characters that identifies a network station, user, or application; used mainly for routing purposes.

BERT

Bit Error Rate Test, or tester. (See Bit Error Rate.)

Bit Error Rate (BER)

The percentage of received bits that are in error, relative to a specific amount of bits received; usually expressed as a number referenced to a power of 10; e.g., 1 in 10^5.

BPS

Bits per Second

CSU

Channel Service Unit.

Data

Digitally represented information, which includes voice, text, facscimile, and video.

Data Set Ready (DSR)

Unit is ready to pass and accept data.

DDS

Dataphone digital service; private-line digital service offered intra-LATA by BOCs, inter-LATA by AT&T Communications, with data rates typically at 2.4, 4.8, 9.6, and 56 Kbps; now a part of the services listed by AT&T under the ACCunet family of offerings.

Diagnostics

Tests used to detect malfunctions in a system or component.

Digital Loopback (DL)

Technique for testing the digital processing circuitry of a communications device; may be initiated locally or remotely via a telecommunications circuit; device being tested echoes back a received test message, after first decoding and then reencoding it, the results of which are compared with the original message.

DTE

Data Termination Equipment

E1

European telecommunications standard defined by CCITT standards G.703, G.704, and G.732.

HDSL

High-Bit-Rate Digital Subscriber Line.

Loopback

Diagnostic procedure used for transmission devices; a test message is sent to a device being tested, which is then sent back to the originator and compared with the original transmission; loopback testing may be within a locally attached device or conducted remotely over a communications circuit.

LTU

Line Terminating Unit

Network

An interconnected group of nodes; a series of points, nodes, or stations connected by communications channels; the assembly of equipment through which connections are made between data stations.

Node

Any addressable location within a network capable of carrying a circuit.

NTU

Network Terminating Unit

Self-Test

A diagnostic test mode to check modem performance in which the modem is disconnected from the telephone facility and its transmitter's output is connected to its receiver's input, permitting the looping of test messages (originated by the modem test circuitry) through the modem.

Simple Network Management Protocol (SNMP)

A request-response type of protocol that gathers management information from network devices. A de facto standard protocol for network management.

SpectraComm Manager (SCM)

A printed circuit card that is an SNMP proxy agent for network elements colocated with it in a SpectraComm Shelf and for remote network elements that communicate with them.

Terminal

A point in a network at which data can either enter or leave; a device, usually equipped with a keyboard, often with a display, capable of sending and receiving data over a communications link (IBM).

Transmission

The dispatching of a signal, message, or other form of intelligence by wire, radio, telegraphy, telephony, facsimile, or other means (ISO); a series of characters, messages or blocks, including control information and user data; the signaling of data over communications channels.

1 System Description

Overview

The Remote Power 730-D2RP supports NX64 kbps customer digital data rates selectable from N=1 through N=32 transmitted over two HDSL loops. Having a maximum data rate of 2048 Kbps, the 730-D2RP has a standard interface, the ITU-T V.35, with optional piggyback cards for EIA-530 and X.21. This interfaces can provide the transmit timing for the user's DTE equipment, which is connected to the interface. The 730 D2RP is available in a standalone DataComm enclosure. Part numbers for standard and optional equipment for the 730-D2RP are found in *Table 1-1*, followed by *Technical Characteristics* at the end of this chapter.

Features

The DataComm 730-D2RP is a customer side interface of an HDSL system and has these attributes:

- Configurable as either a Line Terminating Unit (LTU) or Network Terminating Unit (NTU).
- Software configurable through an optional ASCII terminal or hardware configurable via on board jumpers and switches.
- May be used as a Network Managed Element within a GDC Network Management System.
- ITU-T V.35 customer interface or optional EIA 530 or X.21 interfaces.
- Internal BERT capability.
- Local Loopback and Remote Digital Loopback capabilities.
- Derives its power from the HDSL network loops using a 700 G2RP or 710 D2RP unit as a source.

Applications

Point-to-Point

The 730-D2RP can operate in one of several configurations; one is shown in *Figure 1-1*.

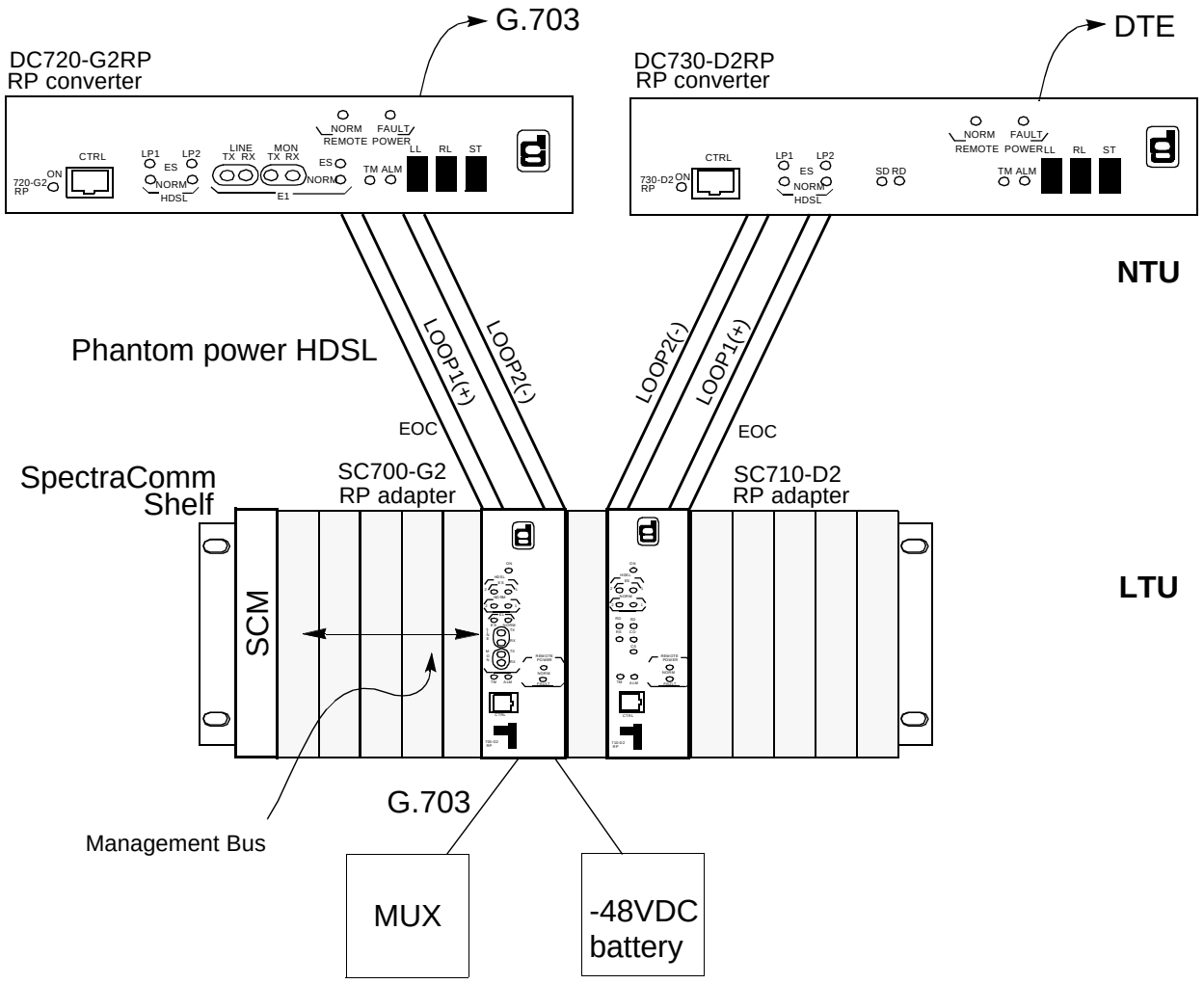


Figure 1-1 Typical DataComm 730-D2RP Application

This application provides bandwidth of Nx64 kbps for N=1 to N=32 for the 730-D2. You must configure both units in the HDSL system for the same data rate. If you want N=32, configure 700-G2RP in unframed mode.

High Channel Data Rate Application

The length of the cable connecting the customer equipment (the DTE) to the 730 is an important factor when using DCE timing in a high channel data rate application. With DCE timing, the 730 provides timing to the DTE. The DCE timing options in the 730 include Looped Timing and Internal Timing. The function of the cable is to induce a delay between the clock of the 730 and the data arriving from the DTE. When this delay is too great (because the cable is too long or the rate is too high), it can cause errors.

If errors occur with DCE timing, you can use External Timing for the 730 and loop timing for the DTE. This permits operation at any data rate, regardless of cable length. (Note that the ITU-T V.35 recommendation limits cable length to about 30 m.) See *Figure 1-2* below and refer to *Chapter 3, Operation,* for configuring timing options.

NOTE

Select the appropriate timing option for the DTE: The DTE must loop timing from the Chnl Rcv Clk lead to the Chnl Ext Clk lead.

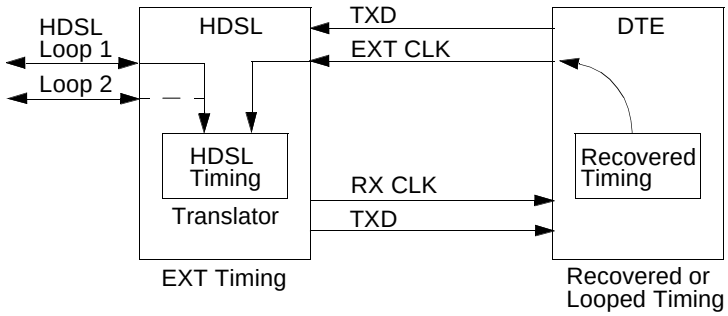
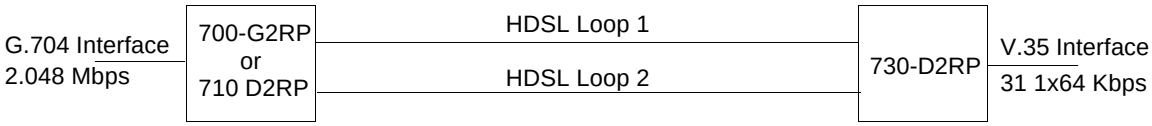


Figure 1-2 High Channel Data Rate Application

Fractional G.704 Service (2-Loop)

The Fractional G.704 Service (2-Loop) is another example *(Figure 1-3, below)* of applying the 730-D2RP to the needs of your installation.



Unit Type:	LTU	Unit Type:	NTU
Enabled Loops:	2	Enabled Loops:	2
FP Enable	Enable	Application:	P2P
Line Unit:	TLU	FP Enable:	Enabled
Line Code:	HDB3	Tx Clock Mode:	Looped
Frame Mode:	Framed	CTS Mode:	ON
TS16	Data	Data Rate:	31 1x64Kbps max rate
		V.54 Rx Mode:	Enabled
		FP RL Mode:	V.54

Network Configuration	
Application:	P2P
Loop 1 Start DS0:	Not Applicable
Loop 1 Consecutive DS0:	Not Applicable
Loop 2 Start DS0:	Not Applicable
Loop 2 Consecutive DS0:	Not Applicable

Figure 1-3 Fractional G.704 Service (2 Loop) Application

Diagnostics/Network Management

Operation and parameters are controlled by switches and jumpers mounted on the printed circuit card. A front panel terminal interface jack labeled CTRL is also furnished on the 730. This terminal interface lets you access the full set of menu-driven diagnostic and configuration controls via a standard terminal interface. This includes loopback and test pattern control, access to performance monitoring, and configuration control. Instructions for using this terminal feature are in *Chapter 2, Installation.*

The 730 may also be used as a standalone unit as part of the Universal Access System (UAS), where the UAS is a family of network managed metallic loop transmission products. A shelf mounted UAS family member interworks with a standalone unit located at the far end of the access loop. You can achieve full network management capabilities, using the SpectraComm Manager (SCM) and its interface to MEGAVIEW (a UNIX workstation), or a PC based SNMP controller.

Table 1-1 Equipment List

Description	GDC Part No.
DataComm 730-D2RP	073M310-011
DataComm 730-D2RP X.21	073A310-013
DataComm 730-D2RP 530	073M310-012
DataComm 730-D2RP (standalone)	073A310-011
DataComm 730-D2RP (standalone) X.21	073A310-013
DataComm 730-D2RP (standalone) 530	073A310-012
Cables	
Interface cable RJ48C plug to 9-pin female (HDSL CTRL port to terminal connection)	027H250-010
Cable assembly V.35 straight-through M/M	027H516-xxx
Adapter cable 37-pin female to 25-pin male (use with customer provided cable for RS-449 equipped. with DC 730 equipped with EIA-530 Channel Interface Card	023H501-xxx
Cable assembly DB-25M to DB-15F X.21 Adapter	027H436-001
Cable assembly DB-25M to V.35M Adapter	070H002-001
Adapter Cable 37-pin male to 25-pin male (use with customer provided cable for RS449 equipment with DataComm 730 equipped with EIA 530 Channel Interface Card.	023H603-xxx
Enclosure/Shelves	
DE Cover Dual	010D500-004
Base Assembly	010B211-001
V.35 Modular Connector	208-033-001

Technical Characteristics

DTE Interface	
Rate	N x 64 N = 1 to 32
Interface	V.35 [optional X.21 or V.11 (530)]
HDSL Interface	
Rate	Dual duplex 584 Kbaud signaling rate, with 2B1Q line code (each loop)
Framing	HDSL framing per ETSI DTR/TM 3017, including performance monitoring via HDSL CRC indication
Transmit Power	13.5 dBm (± 0.5 dB)
Transmission Line	
Two non-loaded metallic twisted-pairs (loop # 1 and loop # 2), up to 3.2 Km at 0.4 mm or up to 4.5 Km at 0.5 mm under the following conditions: No loading coils, no additional shielding. When Bridged-Taps (BTs) are present, the following rules apply: Maximum number of bridged-taps = 2 Maximum tap length = 1000 meters No loop impairments Meets performance specification of ETSI DTR/TM 3017	
Test Features	
Local Loopback	Front panel switch or terminal screen selectable.
Remote Loopback	Front panel switch or terminal screen selectable.
BER Testing	Front panel switch or terminal screen selectable.
Dimensions	
Standalone	
Height	99 mm (3.9 in.)
Width	277 mm (10.9 in.)
Depth	318 mm (12.5 in.)
Weight	3.2 kg (7.1 lbs.)
Shipping Weight	3.6 kg (8.1 lbs.)
Temperature	0° to 50°C (32° to 122°F) operating and –40° to 70°C (–40° to 158°F) non-operating
Electrical	
Power	7 watts per card at card edge.
Environmental	
Temperature Card Assembly Operation Card Assembly Storage/Non-Operating	 0 to 50 degrees Celsius -40 to +85 degrees Celsius
Humidity	5 to 95% non-condensing
Altitude Operating Non-Operating	 0 to 10,000 feet 0 to 40,000 feet

2 Installation

Overview

This chapter guides you through the process of installing and using the 730-D2RP in your communications network. If this is your first experience using these units you may wish to review *Chapter 1* to ensure that you understand the key features and the process of installing and using the unit in your network.

Unpacking and Handling

Inspect the unit for damage; if any is observed, notify the shipper immediately. Save the box and packing material; you can use it to reship the unit, if necessary.

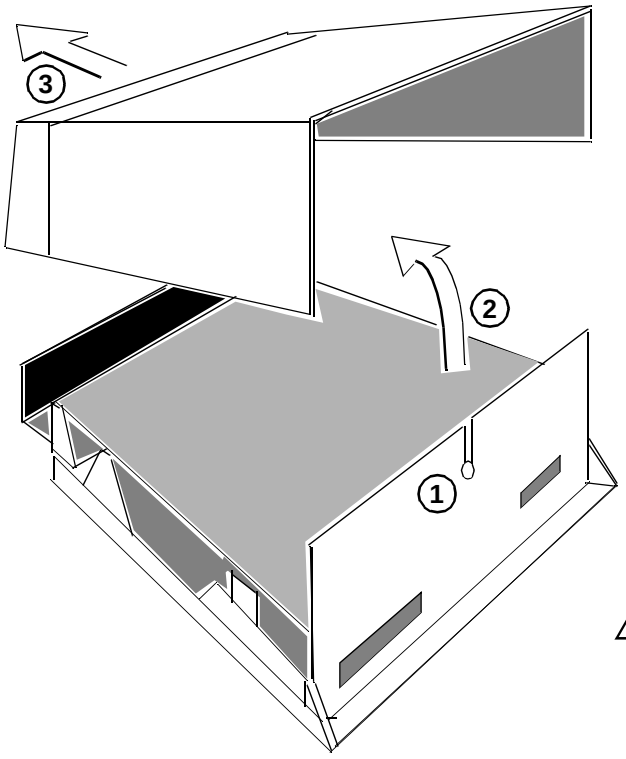
Installation Requirements

Place the unit directly in a ventilated area where the ambient temperature does not exceed 122°F(50°C).

Do not install the unit directly above equipment that generates a large amount of heat (such as power supplies).

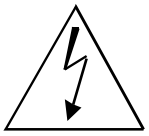
Standalone Installation

If you need to remove the component cards from the standalone base, disconnect the green chassis ground wire from connector TB2 mounted at the rear center of the base card and from the connector on the adapter card. When you reinstall the component cards to the base, reinstall green chassis wires. See *Figure 2-1*.



1. With front of unit facing left, turn screw to release cover.
2. Lift right end of cover upward.
3. Slide cover left with an upward motion.

When reinstalling cover, top edge of rear panel must sit between the two ridges on underside of cover.

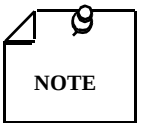


HDSL Remote Power utilizes harmful voltages on the phone lines. Disconnect HDSL loop wires from the power sources located at the 700 G2RP or 710 D2RP before handling wires on TB1.

Figure 2-1 Standalone Cover Removal Procedure

Setting Hard Options

Setting the hard options on the DataComm 730 basecard means adjusting configuration switches and jumpers to match your networks operation. *Table 2-1* explains the functions of the switches and jumpers and *Figure 2-2* shows their locations. The hard configuration option is selected by Switch S34-1.



The microprocessor in the DataComm 730 reads the switch settings only when you first power up. If you change the settings while the power is on, you must turn the power off and power up again for the new settings to take effect. Soft options that are changed while power is on, do not require a power cycle. Soft options are stored in non-volatile memory and do not need to be reset after power interruption.

You need to make these adjustments only once, when first installing the unit. You don't have to repeat the procedure, unless you change your network or connect a different device to a data channel.

Table 2-1 Switch Option Selection

Switches	Description			
S34-1 (**SFT**/HRD)	OFF = Soft - Allows 730-D2RP configuration control through the terminal or a GDC SNMP managed Universal Access System. ON = Hard - Allows 730-D2RP configuration through dip-switch settings.			
S34-2 (**NTU**/LTU)	OFF = NTU - The 730-D2RP operates as a network termination unit, located on the user's side. ON = LTU - The 730-D2RP operates as a line termination unit located on the central office side. In this mode the 730-D2RP serves as the master unit with respect to timing and supervision of the NTU.			
S34-3 (**2LP**/1LP)	Allows a 730-D2RP to operate over one or two HDSL loops. ON = HDSL Loop 1 Enabled (not available) OFF = HDSL Loops 1 and 2 Enabled This must always be two loops for remote power.			
S34-4 (**FPEN**/DIS)	OFF = Disables front panel Switches RL, LL and ST. ON = Enables front panel Switches RL, LL and ST.			
S34-5 (TMG0) S34-6 (TMG1)	TMG-1 S34-6	TMG-0 S34-5	Selects Timing	The DCE transmit clock is locked to the DCE receive clock and is developed from the incoming remote end timing.
	OFF	**don't car**e	**Loope**d	
	ON	OFF	Internal	The DCE transmit clock is derived from the internal clock oscillator of the 730-D2RP.
	ON	ON	External	The DCE uses an external transmit clock provided by the customer's DTE.
S34-7 (**10MN EN**/DIS)	EN - Allows a 10-minute timeout of V.54 RL DIS - Disables the 10-minute timer.			
S34-8 (**P2P**/P2MP)	Not used.			
S35-1 (**V.54 EN**/DIS)	Enabled - Unit acknowledges V.54 inband loopback code. Disabled - Unit does not acknowledge V.54 loopback code.			
S35-2 (**RL-EOC**)	Front panel RL button sends V.54 code. FP-RL-EOC - Front panel RL button sends EOC loopback.			
S35-3 (CTS-ON)	OFF CTS line ON if HDSL is operating normally. ON CTS line tracks RTS line			
S35-4 through S35-8 (SPARE)	Future use.			
S36-1 though S36-6 (CHSEL 1 through 6)	Refer to *Table 2-2* on next page.			
S36-7/S36-8 (SPARE)	Future use.			
Jumpers	**Description**			
X2	Select `0` for common signal and chassis grounds. Select `100` for grounds isolated by 100 ohm resistor.			
X4	Must be installed.			
X25	Must be installed for V.35 operation and removed for X.21 or 530 piggyback operation when option is installed.			
X9, X10	Must be installed for normal operation.			
Remote Converter Card				
X1 (on piggyback)	Install jumper over Pins 2 and 3.			
Defaults are in bold print.				

Table 2-2 Switches, On and OFF

Data Rate (X64 kbps)	S36-6	S36-5	S36-4	S36-3	S36-2	S36-1
32	Off	On	On	On	On	On
31	On	Off	Off	Off	Off	Off
30	On	Off	Off	Off	Off	On
29	On	Off	Off	Off	On	Off
28	On	Off	Off	Off	On	On
27	On	Off	Off	On	Off	Off
26	On	Off	Off	On	Off	On
25	On	Off	Off	On	On	Off
24	On	Off	Off	On	On	On
23	On	Off	On	Off	Off	Off
22	On	Off	On	Off	Off	On
21	On	Off	On	Off	On	Off
20	On	Off	On	Off	On	On
19	On	Off	On	On	Off	Off
18	On	Off	On	On	Off	On
17	On	Off	On	On	On	Off
16	On	Off	On	On	On	On
15	On	On	Off	Off	Off	Off
14	On	On	Off	Off	Off	On
13	On	On	Off	Off	On	Off
12	On	On	Off	Off	On	On
11	On	On	Off	On	Off	Off
10	On	On	Off	On	Off	On
9	On	On	Off	On	On	Off
8	On	On	Off	On	On	On
7	On	On	On	Off	Off	Off
6	On	On	On	Off	Off	On
5	On	On	On	Off	On	Off
4	On	On	On	Off	On	On
3	On	On	On	On	Off	Off
2	On	On	On	On	Off	On
1	On	On	On	On	On	Off

EIA-530 or X.21 Interface Card

The optional EIA-530 or X.21 Interface Card provides these interfaces for the DTE. They are available factory installed or as a field upgrade kit. They plug into the base card illustrated in *Figure 2-2*. (You can also remove the card(s) and place jumpers on XA1P2 and XA1P3 to make the base card interface active. Make sure X25 is in the V.35 position.) When you install the optional X.21 Interface Card in the active position, DTE control of Remote Terminal Test and Local Loopback are not supported. *Appendix A* describes the signals exchanged through the business equipment interfaces. Optional transmit signal timing, X.21 Interface Card jumper position BT (Byte Timing), is not supported.

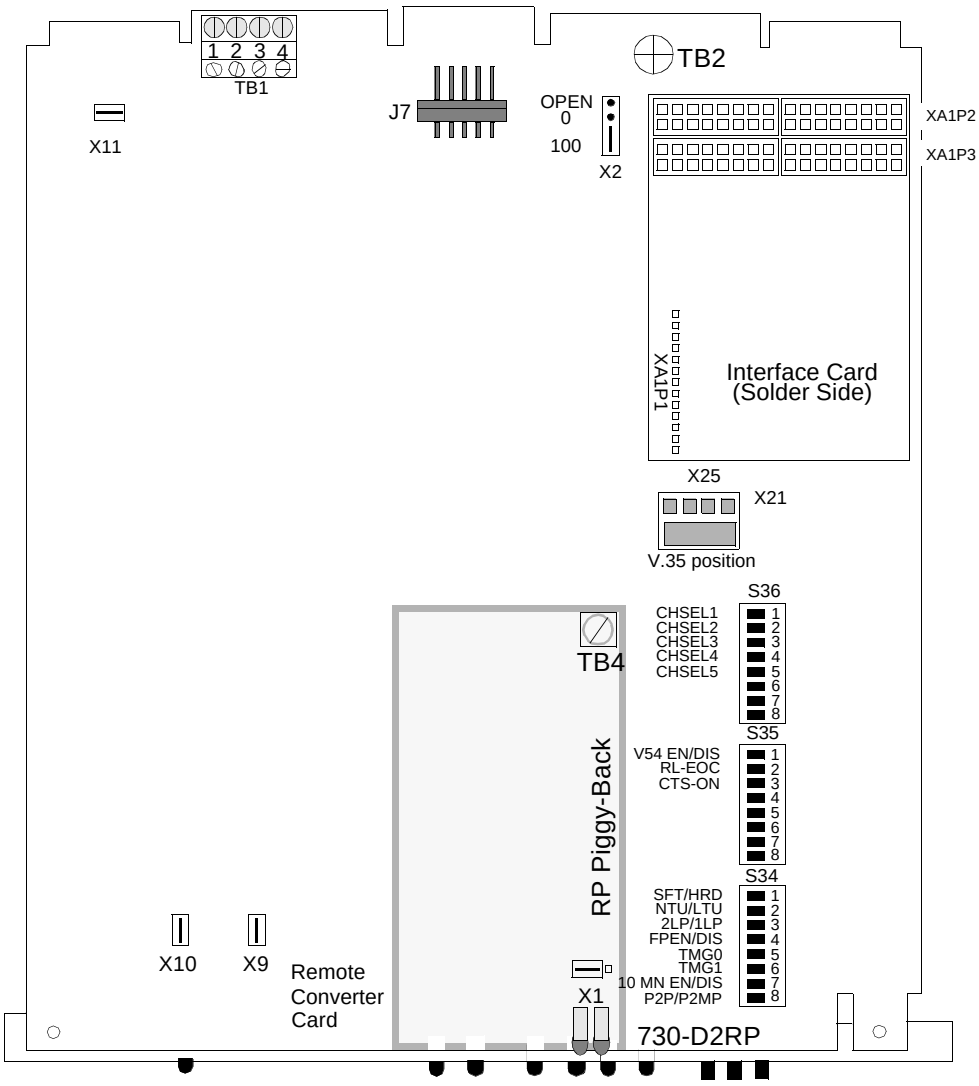


Figure 2-2 Option Switch and Jumper Locations, Basecard

Electrical Connections

The following paragraphs describe the power and line connections to the DataComm 730.

NOTE

Before you power the unit up, refer to the Preoperational Hard/Soft paragraphs that follow the Electrical Connections information.

HDSL Remote Power utilizes harmful voltages on the phone lines. Disconnect HDSL loop wires from the power sources located at the 700 G2RP or 710 D2RP before handling wires on TB1 or TB2.

Power - Standalone

The power for the standalone unit is derived from HDSL line connections.

1. Attach an appropriate earth ground wire to the rear panel standoff.

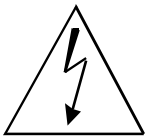
   The unit should connect to the same earth ground source as the equipment that interfaces with the unit. This prevents large circulating currents caused by differences in ground potential.

2. If you cannot determine whether the equipment is connected to the same earth ground source, verify that the potential difference is less than 0.25 V rms between grounding circuits of each unit.

Business Equipment Connections

You may make the Business Equipment connections to the 720-G2RP and 730-D2RP standalone enclosures using a variety of connectors depending on the base assembly that was ordered. See *Figure 2-3.*

HDSL Line Connections



HDSL Remote Power utilizes harmful voltages on the phone lines. Disconnect HDSL loop wires from the power sources located at the 700 G2RP or 710 D2RP before handling wires on TB1.

You may make HDSL line connections to the 730-D2RP standalone using TB1, which is located on the basecard. See *Figure 2-2.*

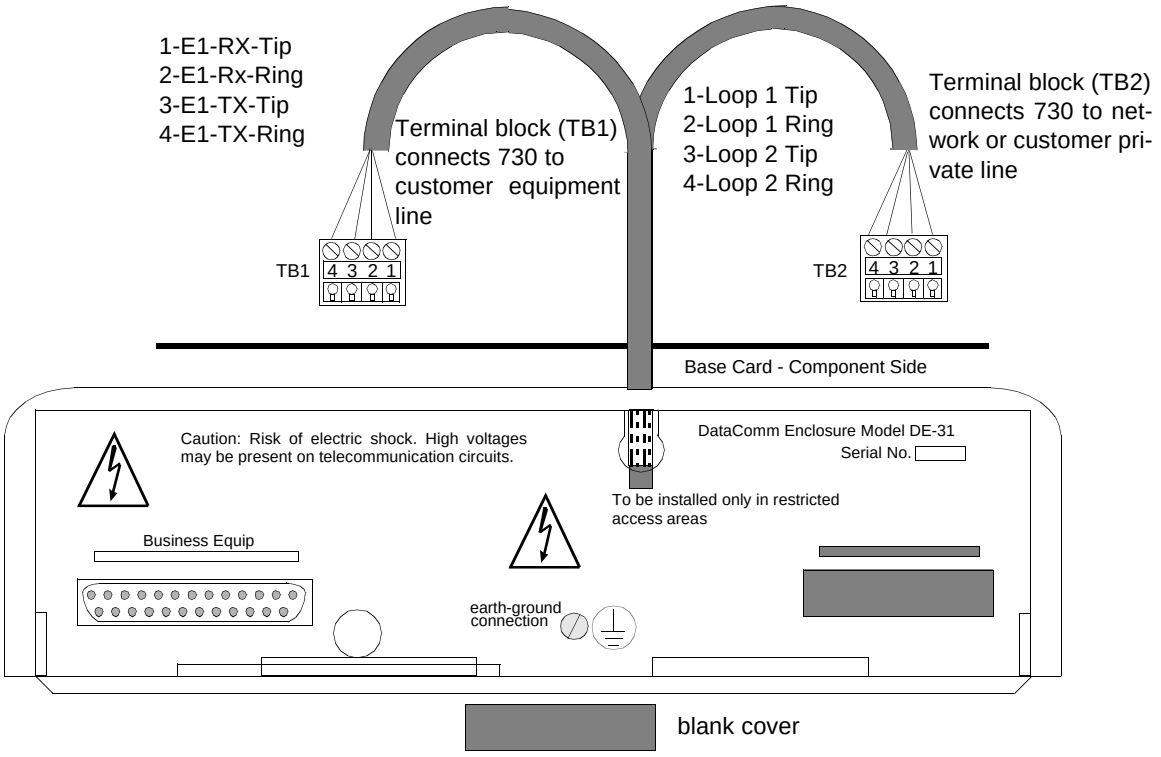


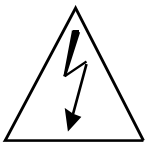
Figure 2-3 DE-31 Standalone Enclosure Rear Panel

Preoperational Configuration Setup

Hard Setup

The base card derives its power from the 700 G2RP or the 710 D2RP at the source end of the network. Be careful when you handle the HDSL loop pairs since the wires have high voltages. You have to remove power from the source 700 G2RP or 710 D2RP so that there is no power on the HDSL loop pairs during installation. Configure the unit as follows:

1. On the basecard, verify that the card is configured as an LTU or NTU based upon *Table 2-1*.
2. Set the remaining switches and jumpers according to *Table 2-1* and *Figure 2-2*. If Switch S34-1 is placed in the SOFT (SFT) configuration position, all other switch settings are ignored, and you must configure the unit via the optional terminal screen. Refer to *Setup (Soft).*



HDSL Remote Power utilizes harmful voltages on the phone lines. Disconnect HDSL loop wires from the power sources located at the 700 G2RP or 710 D2RP before handling wires on TB1 or TB2.

3. Connect the DTE interface and HDSL loops to the network connectors on the rear panel (See *Figure 2-3*).
4. Place the cover back on the unit.

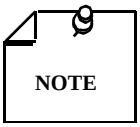
   At this time power may be connected at the source 700 G2RP or 710 D2RP. The Remote Power NORM LED lights on the 730 D2RP unit. At power up, the unit automatically does its internal self-tests. If one of these tests fails, the ALRM blinks, or if the red FAULT LED on the

remote power section lights, refer to the troubleshooting steps in *Chapter 4*. If the remote power FAULT LED is on or flashing, the source unit makes 10 attempts to apply power to the loops, then ceases applying power for 30 seconds. The unit continues this routine until the fault is cleared or the unit is disabled.

5. Follow Step 4 under *Setup (Soft).*

Soft Setup

1. Follow Steps 1 through 4 above.



Chassis and signal ground are connected on the 730 D2RP.

2. Connect a terminal to the CTRL connector on the front panel.
3. To view the test results on the terminal, go to the View H/S Config Screen on the terminal. Refer to *Chapter 3, Paragraph Setting Soft Options*.
4. After performing the self-tests, the HDSL loops (LTU and NTU) initiate start-up, and the HDSL green LEDs should blink.

   The start-up lasts less than 3 minutes. When start-up is complete, the HDSL NORM LEDs are on and the HDSL ES LEDs should be off. If not, the start-up failed. The two cards automatically initiate a new start-up procedure. At this point, the ALM LED blinks until all HDSL and E1 status indicators clear.
5. Check that Data transfer occurs, DTE indicators RD and SD are on, NORM LED is on, and the ES LED are off. Otherwise, refer to the troubleshooting procedure in *Chapter 4*.

3 Operation

Overview

Figure 3-1 illustrates the DataComm 730-D2RP front panel and explains the function of each control and indicator. You may check the operation of the unit by monitoring the front panel indicators and using the test procedures provided in *Chapter 4.* You can find some unit configurations for typical applications in *Chapter 1.*

Once the options are set and the communication line properly connected, the units need no additional operator commands. The units are transparent to your network and communicate automatically with each other and with your connected network devices.

Front Panel Description

The front-panel red and green indicators (LEDs) are described below:

The red LED indicates critical or major failure or error. The green LED indicates satisfactory operation or completion of a process.

Data Path Indicators - Three data streams are visually monitored:

1. HDSL Loop 1 input
2. HDSL Loop 2 input
3. DTE Interface

HDSL LEDs

Two indicators are used for each data stream: (1) The green LED is designated as NORM indicates the status of the system. (2) The red LED is referred to as ES and indicates the data transport status.

Each LED can be in one of three states: ON, blinking, or OFF (Blinking is at a 2 Hz rate). *Table 3-1* summarizes these conditions.

Table 3-1 Front Panel Indicators

HDSL Indicators		
ES	**NORM**	**Indication**
Off	On	Normal operation
On	Off	LOS/LOSW
On (for 0.5 sec.)	On	ES - Errored second
On	Blink	Start-up tests - No response from mating unit
Off	Blink	Start-up in progress

DTE LEDs

Two additional LEDs are available and indicate transmit and receive data at the customer DTE interface.

Remote Power

NORM - On when loop voltage is present and proper.

FAULT - On when loop voltage is not enough to meet requirements for proper operation.

Three Other LEDs

Three additional indicators are used on the front panel:

ON - Lit when +5V is applied to the card.

ALM - Indicates if a there is a Major Alarm. A detected failure during self-test causes this LED to blink. It also blinks if the unit finds LOS, LOSW, or UAS on any HDSL loop.

TM - This LED is on during one of the following situations:

Loopback is activated at the local unit.

Loopback is activated by the remote unit.

The BER meter has been activated, or any self-test is in progress.

The TM LED blinks when a BER test is in progress and there are bit errors.

Three Push Buttons

ST push button - Pushing the ST button activates a 2^{15} pseudo-random test pattern while enabling the simultaneous detection of an incoming 2^{15} pattern.

LL push button - Pushing this button initiates the same loopback as the Local Line Loopback described in *Chapter 4*. The unit must be configured for external timing for this loopback to be functional.

RL push button - Pushing this button initiates the same loopback as the Remote Line Loopback described in *Chapter 4*. The RL push button functions when the unit is configured as a LTU, or whenever V.54 inband signaling is enabled.

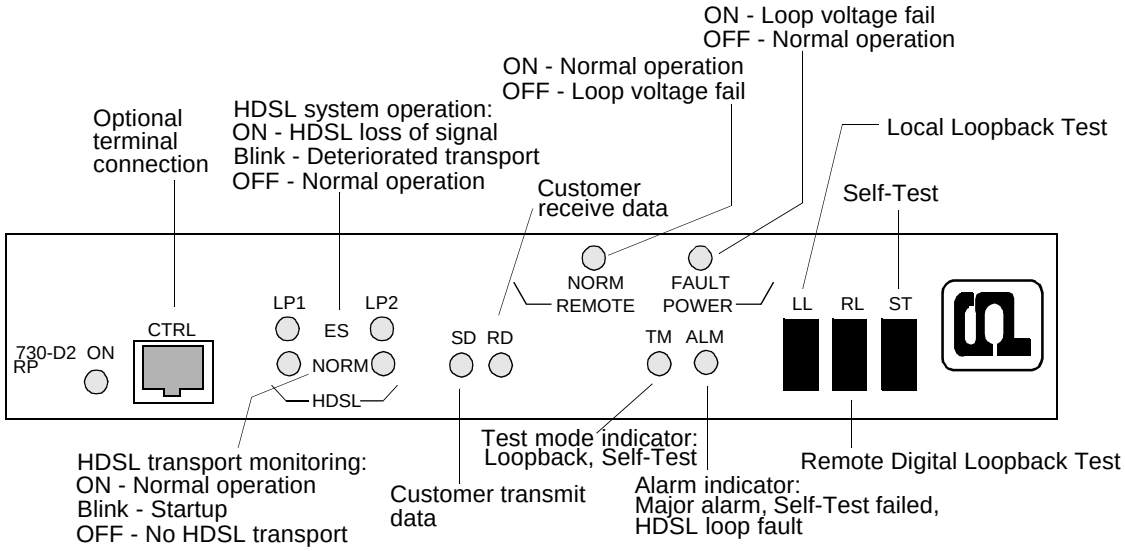
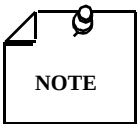


Figure 3-1 Front Panel for the 730-D2RP

Soft Option Selection

You can use an optional terminal (a standard ASCII terminal equipped with an EIA/TIA-232-E communication interface) connected to the Control (CTRL) jack on the front panel for configuration and control of the 730.



Chassis ground and signal ground are connected on the 730 D2RP.

Terminal Requirements

You can use any standard ASCII terminal (VT100 or ANSI terminal or personal computer emulating an ASCII terminal) equipped with an EIA/TIA-232-E communication interface can be used to control the 730 operation. Screens shown below were derived by plugging the COMM port of a PC (using Microsoft Windows™ terminal emulator program) into the 730 front panel CTRL jack. Set the terminal communications parameters as follows:

- Data Rate = 9600 bps, Character Format = 1 start bit, 8 data bits, no parity, stop bit
- The software necessary to run the 730 supervision program is contained in the 730 itself.

Control Port Characteristics

The control port has an EIA/TIA-232-E asynchronous DCE interface, terminated in an RJ-45 connector designated CTRL on the front panel. The connector is wired as shown below:

Pin	Function
1, 2, 3	Not connected
4	Ground
5	Transmit output (RXD of terminal)
6	Receive input (TXD of terminal)
7, 8	Shorted internally

Startup Procedure

A management session is automatically started as soon as the terminal cable is connected to the CTRL port of an operating 730. To end an ongoing management session, disconnect the terminal from the 730. Upon power-up, the 730 sends the opening screen, showed in *Figure 3-2*, followed by the main menu.

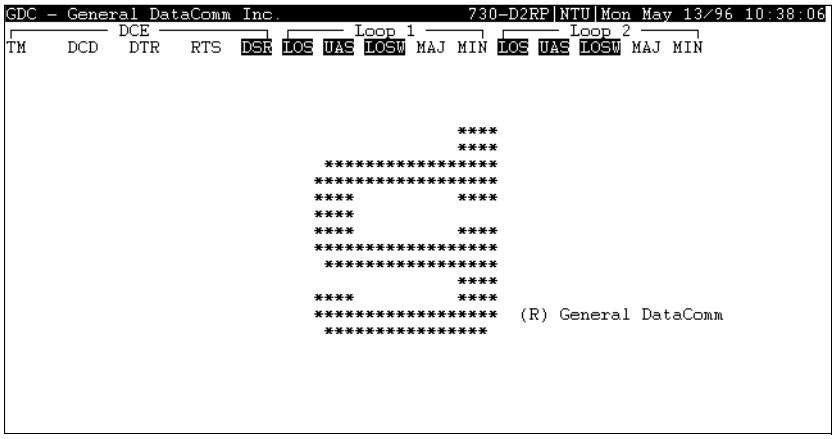


Figure 3-2 Opening Screen

Screen Organization

The screen includes the areas described in *Table 3-2.*

Table 3-2 Terminal Screen Organization

Header	Located at the top of the screen, the header displays GDC name and equipment model, followed by the current operating mode (LTU or NTU), and the date and time sent by the 730.
Status Line	Located below the header, the status line includes two main fields, which display the status of the various 730 alarms and status signals. An active alarm and status indicators are displayed in reverse video.
DTE Field	Includes the following indications: TM, DCD, DTR, RTS
Loop Alarms Field	Loop alarms field is divided into several sub fields, one for each loop and includes the following indications: LOS - Loss of input signal on the corresponding loop. UAS - Unavailable seconds threshold for the corresponding loop is being exceeded. LOSW - Loss of synchronization word on the corresponding loop. MAJ - Indicates that user definable threshold has been exceeded. MIN - Indicates that user definable threshold has been exceeded.
Work Area	Displays the menu and dialog boxes.
Active Keys Area	The active keys are constantly updated to show the keys and key combinations you can use on the current screen.

Operating Procedures

The following procedures apply to all the operations done on the optional terminal:

Menu Selection

You can select a Menu item in two ways:

1. Move the selected block to the desired item by means of the arrows, then press the `Enter` key.
2. Type the number appearing to the side of the menu item.

Either action opens the sub menu or dialog box used to perform the selected operation.

Field Navigation

To move forward among the fields of a dialog box, press the Down arrow key. To move backward, press the Up arrow key.

Field Editing

You can modify the values displayed in the screen fields as follows:

1. Bring the cursor to the desired field, and then press Enter to display an option menu with the available values.
2. Highlight the desired value using the arrow keys, then press Enter.

Restoring Default Values

When the 730 stores default values for parameters displayed in a dialog box, you can replace the current values with the default values by pressing Ctrl D (Ctrl D means hold down the Ctrl (control) key and press D).

Saving Values

To save new parameter values entered in dialog boxes, press Ctrl W. These new board configurations are stored in non-volatile memory, regardless of the Switch S34-1 setting. If Switch 34-1 is set to HARD (HRD), the next power cycle uses the switch settings of S34, S35, and S36 to configure the board and, at the same time, to store the configuration in non-volatile memory. If S34-1 is set to SOFT (SFT), the next power cycle uses the non-volatile memory to configure the board.

Quitting Without Saving

To quit without saving the new parameter values entered in a dialog box, press Esc. You can also press Esc as necessary to close any open submenus and to return to the main menu.

Refresh

You may refresh the screen at any time by typing Ctrl R.

Main Menu

The Main Menu is displayed in *Figure 3-3*. The menu includes four options, described in the following paragraphs.

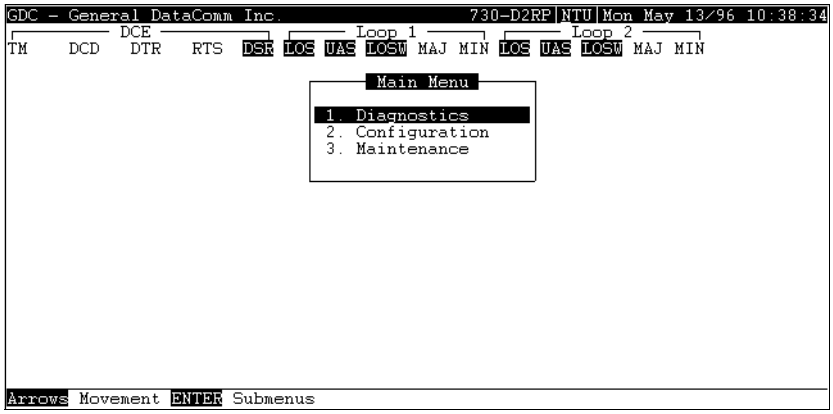


Figure 3-3 Main Menu Screen

Diagnostics Option

Use this option to display diagnostic information and to activate or control diagnostic functions, as follows:

- Display performance statistics collected on each of the HDSL loops.
- Display HDSL loop status information, technical data on loop performance, HDSL loop noise margins, etc.
- Cancel the start-up process.

Configuration Option

Use this option to configure the data interface and HDSL loop parameters, as given:

- Modify the HDSL loop operating mode.
- Display and modify the interface configuration, TX Clock mode, CTS mode, V.54 and RL pushbutton options, and Data Rate.
- Display system hardware and software data and 730 self-test results.

Maintenance Option

Use this option to perform maintenance activities, as follows:

- Enable both local and remote system loopbacks.
- Test system performance using the internal 730 BER meter.
- Set the real-time clock.
- Reset the statistics counters.
- Initiate manually the start-up process.
- Reset the 730 (Simulate a power-up).

These screens are discussed in *Chapter 4* under *Maintenance Menu.*

Diagnostic Menu

You can use the diagnostic menu to display diagnostic information, and to activate diagnostic functions. See *Figure 3-4*. To open the diagnostics menu, select Item `1` on the main menu.

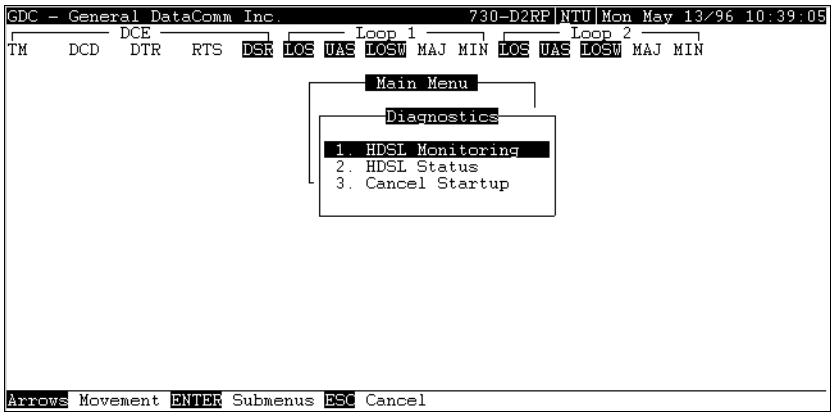


Figure 3-4 Diagnostic Menu Screen

The functions available from the diagnostic menu are as follows:

- `HDSL Monitoring`
- `HDSL View`
- `Cancel Startup`

HDSL Monitoring

The HDSL Monitoring screen, *Figure 3-5*, displays 24-hour performance statistics on the HDSL loops. To display the HDSL monitoring screen, select Item 2 on the diagnostic menu.

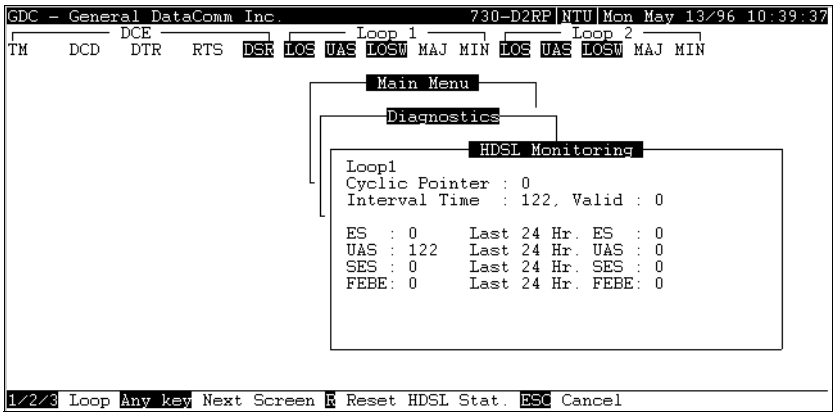


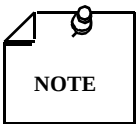
Figure 3-5 HDSL Monitoring Screen

The screen includes the fields described in *Table 3-3*.

Table 3-3 HDSL Monitoring Menu

`Cyclic Pointer`	Displays the number sequence of the current 15-minute interval within the current 24-hour interval. The range is 0 to 95. HDSL error statistics ES, UAS, and SES are reported consistent with ITU G.821.
`Interval Time`	Displays the elapsed time in seconds from the beginning of the current 15-minute interval. The range is 0 to 900.
`ES`	Displays the number of errored seconds in the current 15-minute interval.
`Last 24 Hr ES`	Displays the number of errored seconds in the last 24-hour interval.
`UAS -`	Displays the number of unavailable seconds in the current 15-minute interval.
`Last 24 Hr UAS`	Displays the number of unavailable seconds in the last 24-hour interval.
`SES`	Displays the number of severely errored seconds in the current 15-minute interval.
`Last 24 Hr SES`	Displays the number of severely errored seconds in the last 24-hour interval.
`FEBE`	Displays the number of Far-End-Block-Errors reported by the remote equipment in the current 15-minute interval.
`Last 24 Hr FEBE`	Displays the number of Far-End-Block-Errors reported in the last 24-hour interval.

To select another loop, type its number: `1` or `2`.



Powering up the 730-D2RP resets the 24-hour performance statistics on the HDSL loops.

After viewing the data collected for the selected loop in the current 15-minute interval, you can display the other 95 intervals within the current 24-hour interval by pressing any key, except `1`, `2`, `3`, `R`, and `Esc` keys. The display is cyclic, that is, the current interval appears again after the 95th interval.

To reset the HDSL statistics counters, type `R.` All the displayed values are reset to `0`.

To exit and return to the `Diagnostics` menu, press the `Esc`.

HDSL Status

The option displays the HDSL Status screen, which shows you diagnostic information and technical data on HDSL loop performance. A typical screen is shown in *Figure 3-6.*

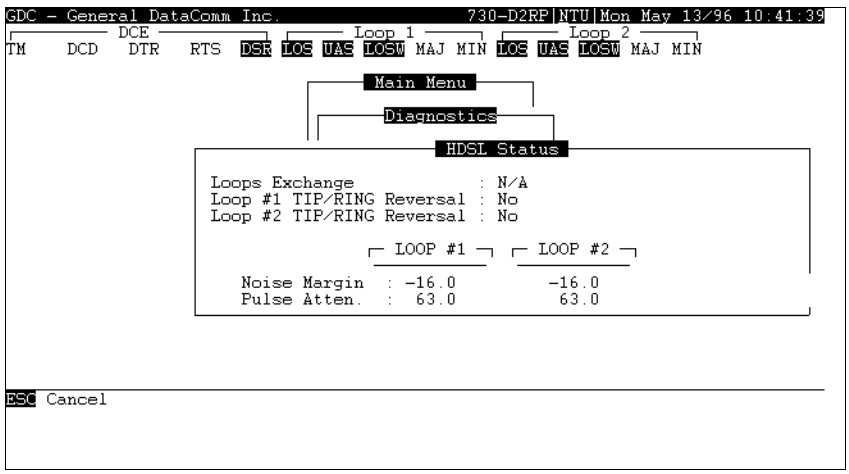


Figure 3-6 HDSL View Screen

Table 3-4 describes the fields on the HDSL Status screen.

Table 3-4 HDSL Status Screen Fields

Loops Exchange	Indicates whether the HDSL loops carrying the data traffic are correctly connected or have been interchanged by error. This information is available only when the unit connected in a link can exchange information with the remote unit. Not applicable if unit is configured as an LTU.
Loop 1 TIP/RING Reversal	Indicates whether the two conductors of HDSL loop 1 are correctly connected or have been interchanged by error. This information is available only when the unit (loop exchange must be connected for data to pass correctly) connected in a link can exchange information with the remote unit. Not applicable if unit is configured as an LTU. If TIP/RING reversal indicates YES, the unit automatically detects and recovers from this condition.
Loop 2 TIP/RING Reversal	Indicates whether the two conductors of HDSL loop 2 are correctly connected or have been interchanged by error. This information is available only when the unit connected in a link can exchange information with the remote unit. Not applicable if unit is configured as an LTU. If TIP/RING reversal indicates YES, the unit automatically detects and recovers from this condition.
Noise Margin	Displays amount of additional noise in dB which can be tolerated before exceeding $5X10^{-8}$ bit error ratio. Separate values are provided for each HDSL loop.
Pulse Attenuation	Displays the pulse attenuation, in dB, measured by the signal processing circuits of the 730. Separate values are provided for each HDSL loop for the local unit.

Operation

To display the HDSL Status screen, select Item 2 on the Diagnostics menu. After viewing the data, press Esc to exit and return to the Diagnostic menu.

Cancel Start

The Cancel Startup option is used to cancel the start-up process performed by the 730 upon link initialization and when the synchronization between two GDC HDSL units connected in a link is lost. This function enables partial operation under fault conditions.

Operation

To instruct the 730 to stop performing the start-up process, select Item 3 from the Diagnostics menu.

Configuration Menu

Use the Configuration menu to configure the data interface and the HDSL loop parameters.

To open the Configuration menu, select Item 2 on the Main Menu. *Figure 3-7* depicts the Configuration menu.

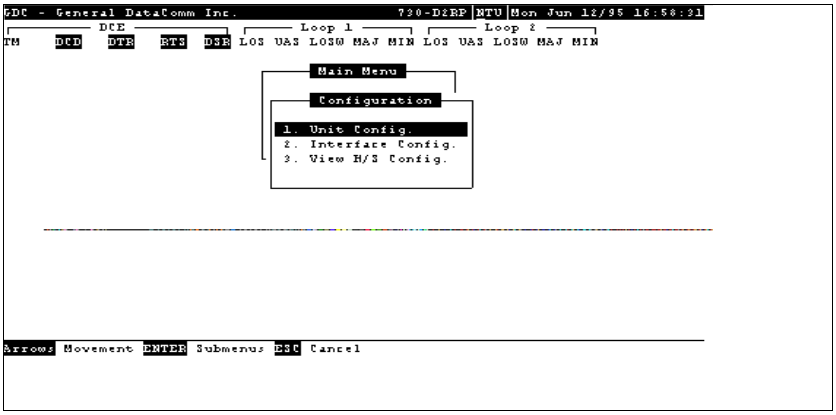


Figure 3-7 Configuration Menu Screen

The functions available from the `Configuration` menu are as follows:

- `Unit Config.`
- `Interface Config.`
- `View H/S Config.`

Unit Configuration Screen

The Unit Configuration option displays the Unit Configuration screen, showing the HDSL configuration parameters of the 730. A typical screen is shown in *Figure 3-8.*

l

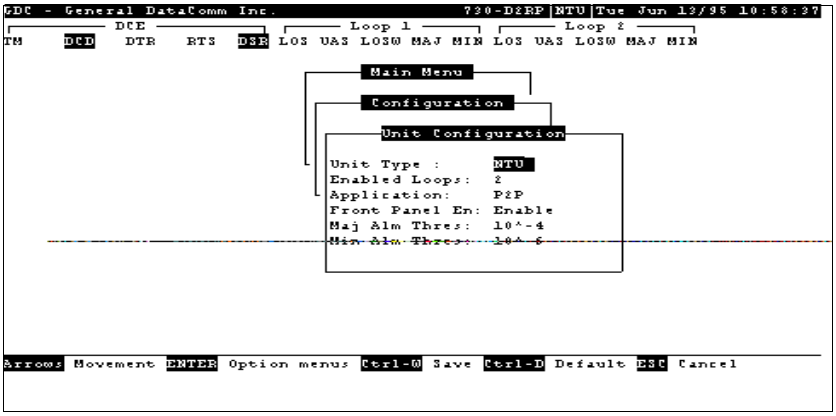


Figure 3-8 Unit Configuration Screen

The screen includes six fields, which are used to select the operating mode of the 730 on the HDSL loops side and the network application:

- `Unit Type`
- `Enabled Loops`
- `Application`

- Front Panel Enable
- MAJ ALARM threshold
- MIN ALARM threshold

Operation

1. To display the Unit Configuration screen, select Item 1 on the Configuration menu.
2. To change the current value of Unit Type parameter, press Enter. This displays an option menu with the available options:
   - LTU
   - NTU
3. Highlight the desired option and press Enter. The option menu closes and the new selection appears in the screen.
4. The Enabled Loops Field is always 2 for 730-D2RP.
5. The Application field determines whether the unit is in Point-to-Point (P2P) or in a Point-to-MultiPoint (P2MP) network configuration; for the 730-D2RP, however, it is always Point-to-Point (P2P). The 730-D2RP is intended to be used as a NTU in a P2P configuration, but may be used as a LTU in a P2P configuration, where the remote NTU is 710-D2RP.
6. The Front Panel Enable field determines whether the front panel switches are enabled or disabled.
7. Highlight the desired option and press Enter. The option menu closes and the new selection appears on the screen.
8. After making the desired change, press Ctrl W to save the change in the 730. To quit and cancel changes made in this screen, press the Esc key without pressing Ctrl W.
9. To exit and return to the configuration menu, press the Esc.

Point-to-Point Options

When the 730-D2RP is used in a P2P configuration, any of the three DTE timing options (EXTERNAL, INTERNAL, LOOPED) found in the Interface Config. Screen under TX Clock Mode are available. Usually, when the 730-D2RP is configured as a NTU, either the EXTERNAL or LOOPED configuration is used. In this case, the LTU is typically a 700G2RP with its E1 Interface Conf. Frame Mode set up for FRAMED. The E1 DS0s of the LTUs are recombined into a user-selectable, aggregate data rate (V.35, EIA-530, X.21) by the 730-D2RP. For increasing 730-D2RP aggregate rates, the 730-D2RP data is sourced from the E1 DS0s in an increasing order, i.e., 1x64 kbps is sourced from E1 DS0 1, 2x64 kbps from E1 DS0s 1 and 2, 3x64 kbps from E1 DS0s 1, 2, and 3, and so forth. Time slot routing over the HDSL loops follows that shown in *Table 3A*. A maximum aggregate rate of 31x64 kbps is available from the 730-D2RP NTU in this case.

Table 3-A E1 P2P Timeslot Routing

Routed E1 timeslots over HDSL loops with 700-G2 Interface Config. TS16 set for DATA

Loop 1	0	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31
Loop 2	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	f

f = all ones filled

Routed E1 timeslots over HDSL loops with 700-G2 Interface Config. TS16 set for SIGNALING

Loop 1	0	1	3	5	7	9	11	13	15	16	18	20	22	24	26	28	30
Loop 2	0	2	4	6	8	10	12	14	16	17	19	21	23	25	27	29	31

f = all ones filled

With two loops enabled in P2P mode and a 700-G2RP LTU with its E1 Interface Config. Frame Mode set for UNFRAMED, an aggregate signal of 2048 kbps may be provisioned. Here, the 730-D2RP remote (V.35, EIA-530, or X.21) has its Tx Clock Mode set for EXTERNAL or LOOPED timing. Also, with 730-D2RP unit as NTU and 710-DRP as LTU, an aggregate nx64 kbps signal up to 2048 kbps may be provisioned. In this case, the Tx Clock Mode for the 710-D2RP LTU is set for INTERNAL timing while the one for the 730-D2RP NTU is set for EXTERNAL or LOOPED timing.

Interface Configuration Screen

The Interface Configuration option displays the DCE Interface Configuration parameters of the 730. A typical screen is shown in *Figure 3-9.*

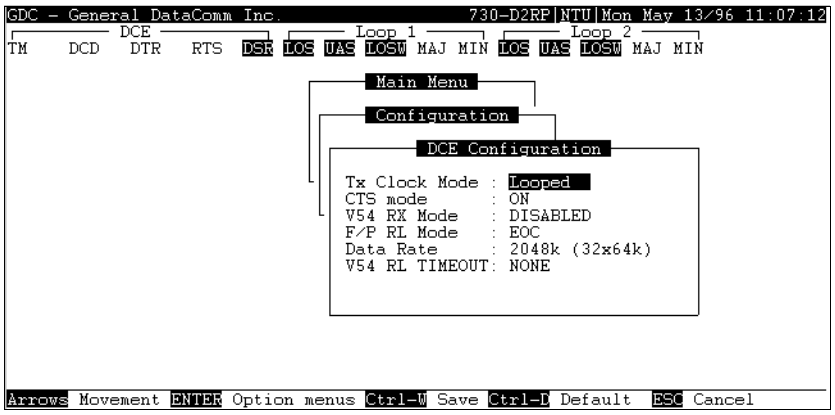


Figure 3-9 Interface Configuration Screen

The screen includes the following fields described in *Table 3-5.*

Table 3-5 Interface Configuration Menu

`TX Clock Mode`	Displays the DCE interface transmit timing selection: Looped - The transmit clock is locked to the receive clock and is developed from the incoming remote end timing. External - The DCE interface uses an external clock provided by the customer's DTE. Internal - The transmit clock is derived from the internal clock oscillator of the HDSL module.
`CTS Mode`	ON: CTS is on as long as the HDSL module is powered and operating normally. ON with RTS: The CTS line tracks the state of the RTS line.
`V54 Rx Mode`	Enabled: The 730 detects and responds to inband V54 protocol. Disabled: The 730 does not respond to inband V54 protocol.
`FP RL Mode`	V54: Pressing the front panel RL button initiates the V54 protocol toward the HDSL side of the 730. EOC: Pressing the front panel RL button causes the 730 to send a loopback command to the remote HDSL unit.
`Data Rate`	Press the space bar to increment the data rate, press the minus key to decrement the data rate. Select from N=1 to N=18 for the 730-D1 or N=1 to N=32 for the 730-D2RP.
`V54 RL Timeout`	10 minutes - Selects a 10-minute timer that turns off V54 RL after 10 minutes. None - Disables the 10-minute timer.

Operation

To display the interface configuration screen, select Item 2 on the configuration menu.

To change the current value of a parameter, use the following procedure:

1. Move the selection block to the desired line and press `Enter`

An option menu appears with the available options.

2. Highlight the desired option, and press `Enter`. The option menu closes, and the new selection appears in the corresponding line.
3. To reset the selected parameters to the default values, press `Ctrl D`.
4. To save changes, press `Ctrl W`.
5. To quit and cancel the changes made in this screen, press `Esc`.
6. To exit and return to the Configuration menu, press the `Esc`.

View H/S Configuration

The View H/S Configuration option displays the Configuration and Selftest Results screen, showing hardware and software configuration data and the results of the last power-up self-test. The information displayed on this screen is intended for maintenance and technical support groups. A typical screen is shown in *Figure 3-10.*

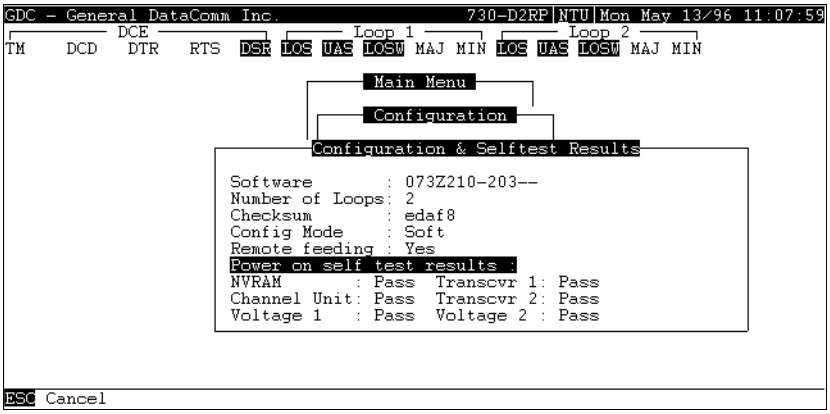


Figure 3-10 View H/S Configuration Screen

The upper area of the screen presents configuration data. The lower area presents the results of the last power-on self-test. *Table 3-6* describes the fields in the screen.

Table 3-6 Configuration and Self-Test Results Screen Fields

`Software Version`	Displays the software version of the 730.
`Number of Loops`	Displays the number of HDSL loops of the 730.
`Checksum`	Firmware checksum.
`Config Mode`	Displays the current configuration mode of the 730: Soft - The 730 is configured under software control. Hard - The 730 is configured by means of the internal dip switches and jumpers.
`Remote Feeding`	Indicates whether the 730 is fed power from the remote unit via the interconnecting lines.

The last power-on self-test results area lists each 730 subsystem tested during the self-test, and the self-test result: `Pass` or `Fail`.

Maintenance Menu

You may refer to *Chapter 4* to perform maintenance and troubleshooting.

Network Management

The DataComm 730-D2RP can be used as Network Managed elements when used within a GDC Network Management System. The DataComm 730-D2RP management software conforms to the MIB (Management Information Base) II standards set out for SNMP Version 1.0. Refer to the related SCM Manager Card publication listed in the *Preface.*

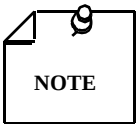
MIB Tables

This section consists of tables that list and describe the MIB objects by which an SNMP network manager can configure, control, and monitor the DataComm 730-D2RP. Each table is arranged in five columns:

- MIB Object- name
- Syntax- MIB variable type

- Access- read-write, read-only, or write-only
- Enumeration- interpretation of specific possible values, or range of possible values
- Description - function of the MIB object

The way MIB objects appear on the screen and how they are manipulated varies, depending on the network manager or MIB browser being used. Information in these tables is therefore intended to be used with operating instructions for manager or browser.



Many SNMP network managers and MIB browsers automatically perform a Get operation immediately following a Set to an object that permits read-write access. In that way the success of the write operation is confirmed. If your manager or browser does not perform this function automatically, we strongly recommend that you command a Get for each object you Set.

Table 3-7 Version Group

MIB Object	Syntax	Access	Enumeration	Description
System MIB Version	Display String	Read-only		Identifies the version of the MIB. The format of the version is x = yzT, where x identifies the major revision number, y identifies the typographical revision, and T identifies the test revision (not on formal release). Acceptable values for the individual revision components are: x: 1 - 9 y: 0 - 9 z: 0 - 9 T: A - Z
Version Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop, and sub-identifier. The table describes the maintenance objects for the unit and references the unit interface.
Firmware Level	Display String	Read-only		The version number of the firmware. This allows the products to know which revision is installed. The released version number is sequenced from, A_,...AA,...ZZ. Test versions are numerical from 01 to 99.
Model Number	Display String	Read-only		This variable is used to determine the type of card family installed.

Table 3-8 Maintenance

MIB Object	Syntax	Access	Enumeration	Description
Maintenance Line Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop, and subidentifier. The table describes the maintenance objects for the unit and references the unit interface.
Soft Reset	SC instance	Read-write	Reset (1) Norm (2)	Supports the action of soft resetting the unit. When this object is set to reset, the unit performs a soft reset to the managed unit. Norm cannot be set by management.
Config Mode	Integer	Read-only	Software (1) Hardware (2)	The hardware configuration mode of the unit. A unit may be hardware or software configured.
System Up Time	Time Ticks	Read-only		This variable is used to report the elapsed system tick time.
Unit Type	Integer	Read-write	LTU (1) NTU (2)	This variable is used to define HDSL type. LTU selects line terminating unit, NTU selects network terminating unit. For 700-G2/G3, this variable can only be a LTU.
Default Initiate	Integer	Read-write	Default (1) Normal(2)	Used to allow the non volatile configuration to be set to a factory default reset. Normal cannot be set by management.
Data Type	Integer	Read-write	Data (2) Voice (1)	Defines the HDSL data type, either data or voice.
Loop Provision	Integer	Read-write	Point-to-point (1) Point-to-MultiPoint (2)	This variable is used to define the HDSL loop provision. When P-P is selected, the unit is connected to another HDSL unit. When P-MP is selected, the unit is connected to more than one HDSL units or data grooming.
Number of Loops Enabled	Integer	Read-write	One Loop (1) Two Loops (2)	Used to define the HDSL loop configuration. It can be set for one to two loops.
Front Panel	Integer	Read-write	Inhibit (1) Enable (2)	Enables or inhibits the front panel operation.
Private Storage 1	Display String	Read-write	(Size (16))	This variable is used for general purpose storage.
Private Storage 2	Display String	Read-write	(Size (16))	This variable is used for general purpose storage.
Private Storage 3	Display String	Read-write	(Size (16))	This variable is used for general purpose storage.
Data Type	Integer	Read-write	Data (2) Voice (1)	Defines the HDSL data type, either data or voice.
Loop Provision	Integer	Read-write	Point-to-point (1) Point-to-MultiPoint (2)	This variable is used to define the HDSL loop provision. When P-P is selected, the unit is connected to another HDSL unit. When P-MP is selected, the unit is connected to more than one HDSL units or data grooming.
Number of Loops Enabled	Integer	Read-write	One Loop (1) Two Loops (2)	Used to define the HDSL loop configuration. It can be set for one to two loops.
Front Panel	Integer	Read-write	Inhibit (1) Enable (2)	Enables or inhibits the front panel operation.

Table 3-8 Maintenance (Cont.)

Private Storage 1	Display String	Read-write	(Size (16))	This variable is used for general purpose storage.
Private Storage 2	Display String	Read-write	(Size (16))	This variable is used for general purpose storage.
Private Storage 3	Display String	Read-write	(Size (16))	This variable is used for general purpose storage.
LED Status	Display String	Read-only	Octet 1 Bit 7 - not used Bit 6 - not used Bit 5 - not used Bit 4 - not used Bit 3 - NORM E1 Bit 2 - ES E1 Bit 1 - AL Bit 0 - TM Octet 2 Bit 7 - not used Bit 6 - not used Bit 5 - NORM L3 Bit 4 - ES L3 Bit 3 - NORM L2 Bit 2 - ES L2 Bit 1 - NORM L1 Bit 0 - ES L1	Returns a bit wise snapshot of the front panel LED status.
Frac Execution	Integer	Read-write		For Set, only execute is allowed.
Alarm Status	Octet String	Read-only	(Size1..255))	The current alarms of the unit without the alarm masks.
V54Config	Integer	Read-write	Inhibit (1) Enabled (2)	This object selects the ability of the unit to recognize V.54 pattern. Only applicable to DC730 units.
FPRDLConfig	Integer	Read-write	EOC (1) V54 (2)	This object selects the pattern to be transmitted when RDL test is selected via the front panel RDL switch. Only applicable to DC730 units.
LED Status 1	Display String	Read-only	Octet 1 Bit 7 - not used Bit 6 - not used Bit 5 - not used Bit 4 - not used Bit 3 - NORM E1 Bit 2 - ES E1 Bit 1 - AL Bit 0 - TM Octet 2 Bit 7 - not used Bit 6 - not used Bit 5 - NORM L3 Bit 4 - ES L3 Bit 3 - NORM L2 Bit 2 - ES L2 Bit 1 - NORM L1 Bit 0 - ES L1	Returns a bit wise snapshot of the front panel LED status. This MIB object is used only for the new HDSL elements.

Table 3-8 Maintenance (Cont.)

			Octet 3 Bit 7 - not used Bit 6 - not used Bit 5 - not used Bit 4 - not used Bit 3 - not used Bit 2 - not used Bit 1 - RPF FAULT Bit 0 - RDF NORM	

Table 3-9 DTE Configuration

MIB Object	Syntax	Access	Enumeration	Description
DTE Config Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop.
DTE CTS Mode	Integer	Read-write	Forced ON (1) ON With RTS (2)	Controls the function of CTS.
DTE Data Rate	Integer	Read-write	(1..32)	This variable represents the DTE data rate in 64 K increments.
DTE TX Clock Source	Integer	Read-write	External Timing (1) Internal Timing (2) Loop Timing (3)	External timing indicates that recovered receive clock from another interface is used as the transmit clock. Internal indicates that a local clock source is used. Loop Timing indicates that the recovered receive clock is used as the transmit clock.

Table 3-10 HDSL Diagnostic

MIB Object	Syntax	Access	Enumeration	Description
Diagnostic Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop. and sub-identifier, which is in this case, a network interface.
Loopback	Integer	Read-write	No Loopback (1) Line Loop (2) Local Loop (3) Line and Local HDSL Local (4)	Supports the action of a diagnostic loop at the point indicated.
BER Test	Integer	Read-write	Inhibit (1) Enable (2) Reset (3)	Supports the action of bit error rate test. When set to inhibit, no BERT test is in progress. When set to enable, BERT is in progress.

Table 3-11 HDSL Diagnostic Results

MIB Object	Syntax	Access	Enumeration	Description
Diagnostic Results Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop. and sub-identifier, which is in this case, a network interface.
Test Execution Status	Integer	Read-only	In Sync (1) Not In Sync (2)	The current execution status of the diagnostic test. When set to In Sync, BERT test is in sync and BER rate is valid. When set in NOT IN Sync, BERT test is not in sync, and BER rate is not valid.
	Integer	Read-only	(0..65535)	The results of the last diagnostic test. This can be the current test running or the last completed test. Note that the interpretation of these test results may be affected by the value of the Test Execution Status object.
Diagnostic Result Interval	Integer	Read-only	(0..65535)	This variable represents the BER test intervals. A time interval is defined as the time required for transmission of a block of bits.

Table 3-12 HDSL Performance

Current Performance				
MIB Object	**Syntax**	**Access**	**Enumeration**	**Description**
HDSL Current Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop. and interface, which is in this case, can be an E1 or loop interface.
HDSL Current ESs	Gauge	Read-only		The number of errored seconds encountered by an E1 or loop interface in the current 15 interval.
HDSL Current SESs	Gauge	Read-only		The number of severely errored seconds encountered by a loop or E1 interface in the current 15 minute interval.
HDSL Current UASs	Gauge	Read-only		The number of degraded seconds encountered by a loop or E1 interface in the current 15 minute interval.
HDSL Current DMs	Gauge	Read-only		The number of degraded minutes encountered by a E1 interface in the current 15 minute interval.
HDSL Current FEBEs	Gauge	Read-only		The number of Far End Block Errors encountered by a loop interface in the current 15 minute interval.
Internal Performance				
HDSL Interval Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop. and interface, which is in this case, can be an E1 or loop interface.
HDSL Interval Number	Integer	Read-only	(1..96)	A number between 1 and 96, where 1 is the most recently completed 15 minutes interval and 96 is the least recently completed 15 minutes interval (assuming that all 96 intervals are valid).
HDSL Interval LESs	Gauge	Read-only		The number of erred seconds encountered by a loop or E1 interface in one of the previous 97 individual 15 minute intervals.

Table 3-12 HDSL Performance (Cont.)

HDSL Interval SESs	Gauge	Read-only		The number of severely errored seconds encountered by a loop or E1 interface in one of the previous 96 individual 15 minute intervals.
HDSL Interval UASs	Gauge	Read-only		The number of unavailable seconds encountered by a E1 interface in one of the previous 96 individual 15 minute intervals.
HDSL Interval DMs	Gauge	Read-only		The number of degraded minutes encountered by a loop or E1 interface in one of the previous 96 individual 15 minute intervals.
HDSL Interval FEBEs	Gauge	Read-only		This variable represents the HDSL loops Far End Block Errors.

Total Performance				
MIB Object	**Syntax**	**Access**	**Enumeration**	**Description**
HDSL Total Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop. and interface, which is in this case, can be an E1 or loop interface.
HDSL Total ESs	Gauge	Read-only		The number of errored seconds encountered by an E1 or loop interface in the previous 24 hour interval.
HDSL Total SESs	Gauge	Read-only		The number of severely errored seconds encountered by a loop or E1 interface in the previous 24 hour interval.
HDSL Total UASs	Gauge	Read-only		The number of unavailable seconds encountered by a loop or E1 interface in the previous 24 hour interval.
HDSL Total DMs	Gauge	Read-only		The number of degraded minutes encountered by a E1 interface in the previous 24 hour interval.
HDSL Total FEBEs	Gauge	Read-only		The number of Far End Block Errors encountered by a loop interface in the current 15 minute interval.

Table 3-13 Loop/E1 Performance Interval Maintenance

MIB Object	**Syntax**	**Access**	**Enumeration**	**Description**
HDSL Interval Maintenance Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop. and interface, which is in this case, can be an E1 or loop interface.
HDSL Reset Intervals	Integer	Read-write	Normal (1) Reset (2)	This variable is used to reset loop/E1 performance intervals. When it is set to reset, the loop/E1 performance tables are set to zero.
HDSL Number of Valid Intervals	Integer	Read-only	(1..96)	This variable is used to read the number of intervals collected. Each interval is an increment of 15 minutes.

Table 3-14 HDSL Status

MIB Object	Syntax	Access	Enumeration	Description
HDSL Loop Status Line Index	SC instance	Read-only		This object identifies status parameters associated with the managed object.
HDSL Loop Start-up	Integer	Read-write	Normal (1) Start (2) Cancel (3)	Supports the action of initializing HDSL loop startup sequence. When set to start, HDSL unit reinitialize the startup sequence. Set to cancel, the unit aborts the startup sequence. Normal, the unit operates normally.
HDSL Loop Tip and Ring Reversal Mode	Integer	Read-only	Normal (1) Reversed (2)	Signals the loop Tip and Ring status. When normal, the loop operates normally. When reversed, loop Tip and Ring have been reversed.
HDSL Loop Signal to Noise Margin	Integer	Read-only	(0..127)	Represents the loop signal to noise margin in dB units.
HDSL Loop SN Frac	Integer	Read-only	(0..5)	Used with the HDSL loops signal to noise margin variable in the following manner: 1. Only the values 0 and 5 are allowed. 2. The value of zero means HDSL loops signal to noise margin is a whole number. 3. The value of five means HDSL loop signal to noise margin is a real number and that 0.5 must be added to it.
HDSL Loop SN Atten Sense	Integer	Read-only	Positive (1) Negative (2)	Identifies the sense of the HDSL loop signal to noise margin variable.
HDSL Loop Pulse Atten	Integer	Read-only	(0..100)	Represents twice the HDSL loop pulse attenuation level in dB units.
HDSL Loop Pulse Atten Frac	Integer	Read-only	(0..5)	This variable is used with the HDSL loop pulse attenuation variable under the following conditions: 1. Only the values 0 and 5 are allowed. 2. The value of zero means HDSL loop pulse atten is a whole number. 3. The value of five means HDSL loop pulse atten is a real number and that 0.5 must be added to it.
HDSL Loop Gain	Integer	Read-only	Low (1) High (2) OK (3)	Represents the HDSL loop gain setting.
HDSL Loop Exchange	Integer	Read-only	Normal (1) Exchange (2)	This variable is used to represent the HDSL loop status. When set to normal, HDSL loops are correctly connected. Set to exchange, the HDSL loop has been interchanged.

Table 3-15 DTE Status (DTE Interface Only)

MIB Object	Syntax	Access	Enumeration	Description
DTE Status Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop.
DTE DTR Status	Integer	Read-only	Off (1), On (2)	DTR EIA status indicator.
DTE DCD Status	Integer	Read-only	Off (1), On (2)	DCD EIA status indicator.
DTE RTS Status	Integer	Read-only	Off (1), On (2)	RTS EIA indicator.

Table 3-16 HDSL Alarm Object Identifier Definitions

Alarm Name	Maskable?	Applies To
HDSL No Response Alarm	No	Unit
HDSL Diagnostic Rx Error Alarm	No	Unit
HDSL Power Up Alarm	No	Unit
HDSL Unit Failure	No	Unit
HDSL Check Sum Corrupt	No	Unit
HDSL Loss of Signal	Yes	L1, L2
HDSL Unavailable Second	Yes	L1, L2
HDSL Errored Second	Yes	L1, L2
HDSL Loss of Sync Word	Yes	L1, L2
MAJ Alarm	Yes	L1, L2
MIN Alarm	Yes	L1, L2

4 Tests

Overview

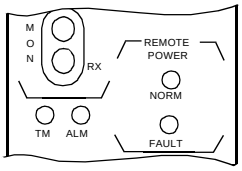
This chapter is divided into the following main paragraphs: Loopback testing hard and soft, troubleshooting procedures, and the Maintenance Menu screens and descriptions.

The activation of any loopback disrupts the flow of user's traffic.

The 730 displays the status of these tests through the indicators on the front panel. You may also use the optional terminal connected to the control port (CTRL) on the front panel which gives a comprehensive set of features for testing operation and identifying trouble areas. This chapter tells you how to manage the 730 system with this terminal and how to enable and disable various loopbacks.

Troubleshooting Procedures

All Remote power diagnostics are available from the VT-100 control terminal or from the SpectraComm Management system. Front panel LEDs are used to indicate the presence of a FAULT condition or an ALARM state of the basecard. The details of these faults are found by examining the control terminal screens or the Management system.



Front panel ALARM
and FAULT indicators.

Unit Plugged in Shelf, No Power-Up

If the unit is plugged into a shelf, but does not power up, then:

- Verify that the shelf power supply is ON.
- Verify the fuse on the rear of the shelf is good.
- Verify that the unit is seated properly in the shelf.

Fault LED, No Power-Up

If the DataComm unit has a FAULT LED indicator, but does not power up, then:

- This LED indicates that the voltage applied to this unit is not within the required limits and therefore will not power the unit. Also, it may be that the loop length exceeds the limitations for Remote Power.

Power-Up, But No Handshake

Refer to *Table 4-1* below for fault LEDs during power-up.

Table 4-1 Panel Indicator Faults, Symptoms, and Possible Reasons

Front Panel Indicator	Symptom	Possible Reasons
FAULT LED	Continuously ON	This is most likely a -48V input battery problem. Confirm this by observing the VT-100 screen. Verify that the battery cable is connected properly and is connected to the correct Zone3 DB25 connector.
FAULT LED	Continuously ON	VT-100 screen indicates a GND FLT. This means that the remote power ground fault detector has detected a foreign voltage on the loop. The unit does not attempt to power the line under these conditions. Verify that the connections to the HDSL loops are correct and have not been connected to another live circuit.
FAULT LED	Cycles 10 times, then stays ON for 25 seconds. The NORM LED tries to turn on but then goes off.	VT-100 screen indicates GND-FLT. This means no foreign voltages were detected and the unit attempted to turn on, but encountered a ground fault on one of the loops. In the case of large current draw, protection circuitry inside the unit requires 25 seconds before attempting to turn on. The unit makes ten attempts before it shuts down; after 25 seconds, the unit automatically starts the cycle again.
FAULT LED	Cycles 10 times, then stays ON for 25 seconds. The NORM LED tries to turn on but then goes off	VT-100 screen indicates OVR CUR. This means the unit attempted to turn on, but encountered excessive current draw on the loops. In the case of large current draw, protection circuitry inside the unit requires 25 seconds before attempting to turn on. The unit makes ten attempts before it shuts down; after 25 seconds, the unit automatically starts the cycle again.
FAULT LED	Continually cycles while the NORM LED tries to turn on.	VT-100 screen displays UNDR CUR. This means that not enough current is being drawn, most likely because of an open circuit. The unit continues to test the line to see if the fault has been cleared--this accounts for the NORM LED periodically turning on.

No Handshake and No Remote Power Fault

If the unit does not handshake and there is no Remote Power FAULT, then:

- It is possible that one wire of a loop is connected (TIP) and the other (RING) is open. If the loop length is short enough so that it does not exceed the maximum current draw, one wire of a loop can complete the phantom circuit and supply sufficient power to the remote unit.
- If units are connected on loops exceeding the maximum reach of the HDSL transmitter, it is possible that the voltage from the Remote Power source module can power the remote unit.
- It is possible the basecard may have a defective component Verify the VIEW H/S Config screen does not report a component failure.
- Both units could be configured as LTU (or NTU). Verify that one unit is LTU and its Remote is an NTU.

Over-Current Problem at Power-Up and Handshake

If units appears to power up, but during handshake there is an over-current fault OVR CUR and the unit shut down, then:

Loop exceeds maximum reach of Remote Power supplies or one of the wires of a loop is not connected. If one wire is not connected and a long loop is used, the Power source unit on the shelf tries to supply maximum current. When power is supplied to the loop, the remote unit performs self-test power-up and does not demand maximum current. As soon as it has satisfied the self test power up routine, the unit begins the handshake routine; this requires more current and trips the over-current fault circuitry at the source card.

Maintenance Menu

The Maintenance Menu is used to perform maintenance and troubleshooting activities. To open the maintenance menu, select Item 3 on the main menu. *Figure 4-1* illustrates the Maintenance Menu.

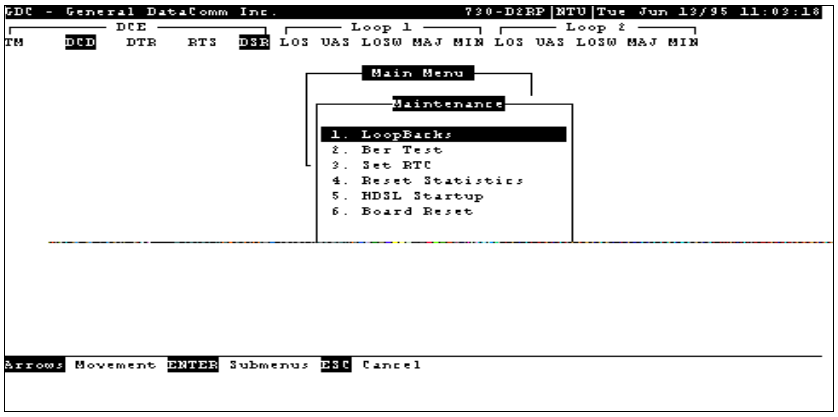


Figure 4-1 Maintenance Menu Screen

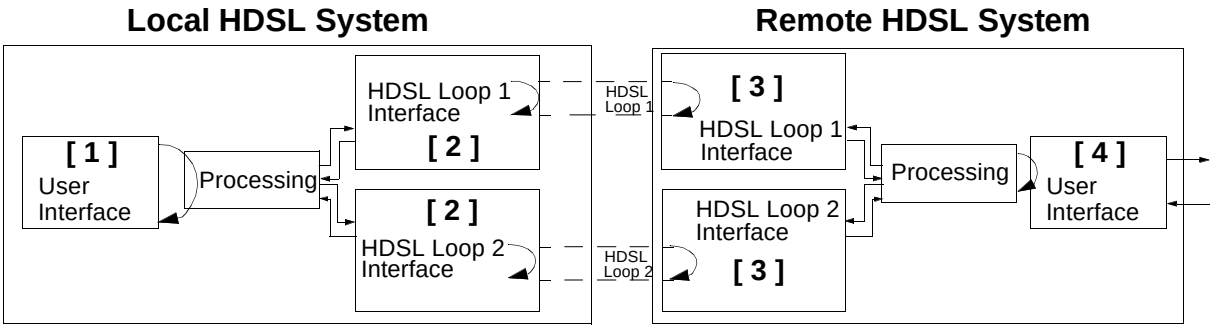
The functions available from the maintenance menu are as follows:

- Loopbacks
- BER Test
- Set RTC
- Reset Statistics
- HDSL Startup
- Board Reset

Loopback Testing

The activation of any loopback disrupts the flow of user's traffic.

This function is used to enable/disable loopbacks on the user's equipment interface and on the HDSL loops for maintenance purposes. The HDSL systems offered by GDC provide three types of test loopbacks. *Figure 4-2* shows the simplified signal paths when the loopbacks are connected.



Local line loopback	**[1]**
Local HDSL loopback	**[2]**
Remote HDSL local loopback	**[3]** not available
Remote local loopback	**[4]**
V54 Remote local	**[5]**

Figure 4-2 Loopbacks Signal Paths

Figure 4-3 shows a typical loopback setting screen for a HDSL system using a DTE interface.

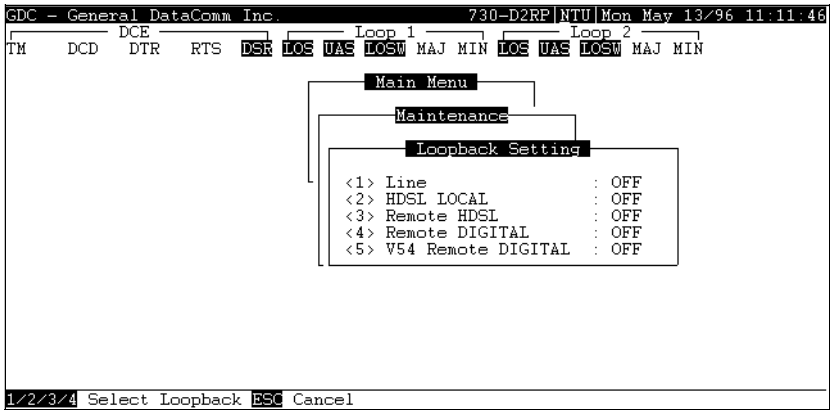


Figure 4-3 Loopback Screen

Operation

To access the Loopbacks function, select Item 1 on the Maintenance Menu.

To change the state of a loopback, use the following procedure:

1. Type the number of the line of the desired loopback. This toggles the selected loopback `ON` and `OFF`.
2. To exit and return to the Maintenance Menu, press the `Esc`.

Loopback Testing (Hard)

The 730 supports two types of loopbacks at the front panel:

LL - Local Loopback loops the data back towards the user's equipment interface. The unit must be configured for external timing for this loopback to be functional.

RL - Remote Loopback signals the remote unit to loopback the data to the user's equipment interface. There are two types of remote loopbacks depending on the front panel RL configuration (See *Configuration screen*). One is EOC remote loopback which sends loopback information over the EOC channel. The other is V.54 remote loopback which sends an inband V.54 loopback code signaling the remote circuit into loopback. If the EOC option is selected the RL switch is functional only if the 730 is configured as a LTU.

The forward signal for both of these loopbacks is transparent.

Loopback Testing (Soft)

You may also use the optional terminal connected to the Control Port (CTRL) on the front panel which provides a comprehensive set of features for testing operation and identifying trouble areas. You may use loopbacks to enable/disable loopbacks on the user's equipment interface and on the HDSL loops for doing maintenance.

The HDSL systems offered by GDC provide three types of test loopbacks available from the optional terminal. *Figure 4-2* shows the simplified signal paths when the loopbacks are connected.

Line Loopback

The local line loopback is generally used to test the connections between the local user's equipment and the HDSL system module.

When the local line loopback is connected (ON) (Loopback **[1]**), the data signal received from the local user via the transmit line of the user's equipment interface is returned by the HDSL system module on the receive line of that interface. Therefore, during normal operation the local user's equipment receives it own signal without errors.

The local user transmit signal is transparent and thus is sent to the remote HDSL system; however, the signal received from the remote HDSL system is lost.

HDSL Line Loopback

The local HDSL loopback is generally used to test the proper operation of the local HDSL system, and therefore should be used after normal operation is obtained.

When the local HDSL loopback is connected (ON) (Loopback **[2]**), the transmit signal of each HDSL loop is returned by the HDSL loop interface(s) of this HDSL system module on the receive path of the same loop. So, during normal operation the local user's equipment receives its own signal without errors.

The local user transmit signal is transparent and therefore sent to the remote HDSL system; however, the signal received from the remote HDSL system is lost.

Remote HDSL Local Loopback - Not Available.

Remote Local Loopback

The remote local loopback is generally used to test end-to-end the proper operation of the HDSL link and therefore, it should be initiated by the LTU only and used when you have normal operation.

When the EOC remote line loopback is connected (ON) (Loopback **[3]**), the data received by the remote module from the local user is returned by the HDSL system module on the receive path, within the remote user's equipment interface. Therefore, during normal operation the local user's equipment receives its own signal without errors.

The local user transmit signal is also passed to the remote user's equipment connected to the HDSL system; however the signal transmitted by the remote user is lost.

V.54 Remote Loopback

The V.54 remote loopback is generally used to test the proper operation of one remote to another. You should use it when you have normal operation. When the V.54 loopback is selected (Loopback 5), the initiating unit sends V.54 inband code to the other remote unit. After receiving an acknowledgment, the initiating unit turns its TM LED ON, meaning the far-end unit is in the loopback mode. When the loopback is engaged, you see error-free data returning. The other remote units data is blocked. If the other unit doesn't acknowledge the V.54 inband loopback code, or error to transmit the acknowledgment, the initiating unit continues sending V.54 inband code and blocks data until it is appropriately acknowledged or the loopback command is terminated.

Considerations in the Use of Test Loopbacks

The test loopbacks are designed to allow systematic testing of the signal paths along the link, starting from one end of the link (the local HDSL module). In most situations, we recommend that you initiate the loopbacks from the side serving as the LTU, since this allows you to follow the signal path; that means, starting from the office and continuing toward the end-user, while maintaining system timing. All of the test loopbacks are transparent. Here is the test activate sequence we recommend:

1. Line loopback.
2. HDSL line loopback.
3. Remote local loopback
4. V54 remote local loopback.

This is also the order in which the loopbacks are listed on the loopbacks screen.

BER Test

This screen is used to perform bit error measurements on an HDSL system module.

Testing Method

BER testing is performed by repeatedly transmitting a pseudo-test sequence having a length of 2^{15}-1 bits and comparing with an error detector the received sequence. Any difference is assumed to be an error and is counted. To do a meaningful comparison, error counting is inhibited until the error detector becomes synchronized with the incoming sequence. During this synchronization, it is possible to see a burst of 255 errors.

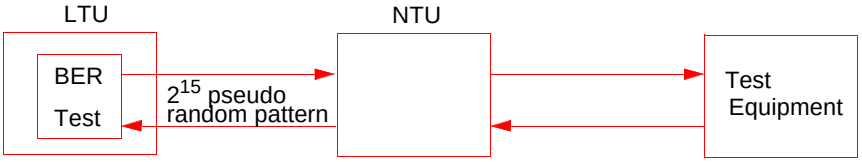
During this testing, your traffic is disconnected. BER tests may be performed in an end-to-end mode, requiring both LTU and NTU BER testers to be on. If testing is initiated at one end, a loopback along the signal path needs to be connected. The loopback can be a physical connection made somewhere along the signal path or a test loopback activated at the desired location as described in the *Loopbacks* paragraphs of this manual. Alternatively, an external BERT may be connected to the remote unit to facilitate testing.

The measurement is carried out over discrete intervals (an interval corresponds to the time need to transmit a block of 2^{24} bits). Errors count in each interval can be as high as 255. If the actual number of errors in a given interval is higher, this maximum count is considered in the calculation of the BER. At the end of each interval, the calculated BER is updated.

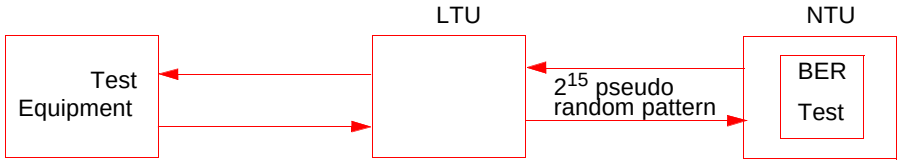
The bit error rate test can be accomplished over individual HDSL loops or over the entire HDSL bandwidth. But only one BERT test can be active at a time. For point-to-point, the BER test can be done only when all loops are taken together. For point-to-multipoint, you can apply the BERT test on individual loops.

You can handle BER testing through the GDC UAS Controller, supervisory terminal port or front panel switch. The front panel LED TM is on when the BER test is initiated. When the error detection is in sync and detects no errors, the TM LED is on steadily without blinking; otherwise, when the error detector is not in sync or detects some errors, the TM blinks.

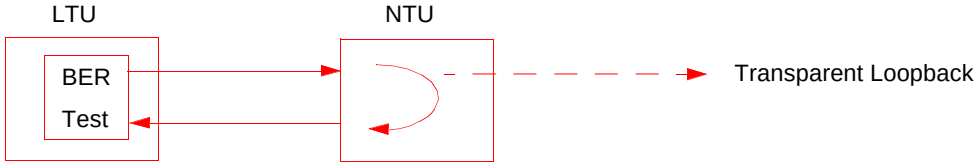
Test Configuration Notes



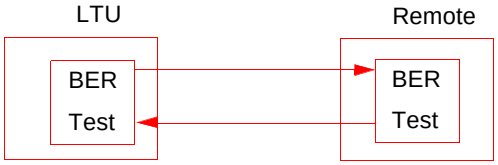
LTU Self-Test:
Enable the Master BER test. Be sure you have an external loopback or test equipment at the remote unit to facilitate this test.



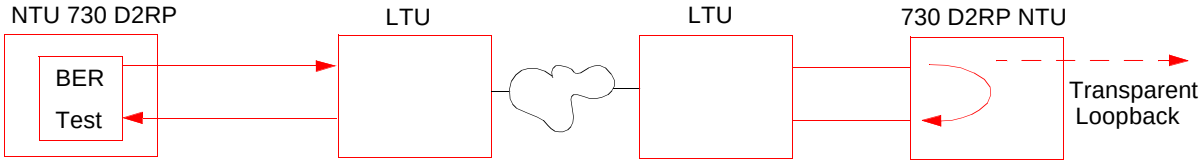
Remote Self-Test:
Enable BER test on remote unit. Be sure you have an external loopback or test equipment at the master unit to facilitate this test.



Self-Test with Remote Loopback:
From Master unit, assert Remote Loopback (RL) and enable BER test.



Master to Remote Self-Test:
Enable BER test on both Master and Remote unit.



Remote Self-Test with V.54 RDL:
Place far-end remote into Remote Loopback by sending V.54 code and turn on the self-test on that remote. This test can be initiated only from the front panel or supervisory terminal. Both remote units must be 730 units.

BER Screen Description

A typical screen for BER testing is shown in *Figure 4-4*.

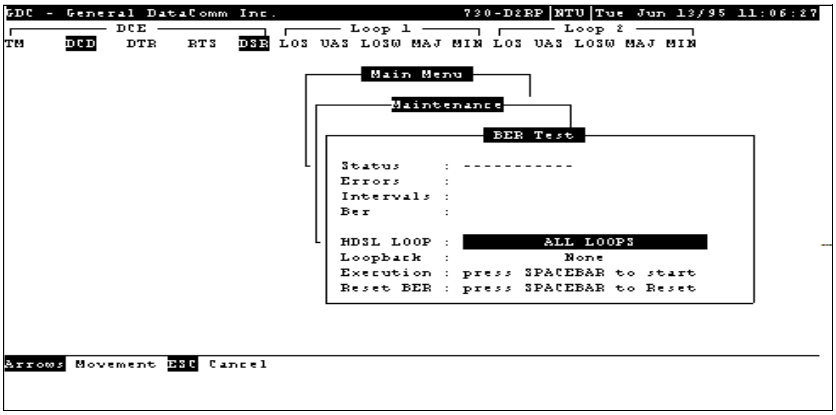


Figure 4-4 BER Test Screen

The dialog box used to control BER testing has two areas:

- The top area is used to display BER results.
- The bottom area is used to select the desired HDSL loop you want to perform the test on, and to start/stop BER measurement.

The fields of the BER Test dialog box are described in *Table 4-2*.

Table 4-2 BER Test Screen Fields

`Status`	Displays the current status of the error detector: Sync - error detector is synchronized, and the BER measurement is possible. Out-of-Sync - error detector is not synchronized, and BER measurement is inhibited.
`Intervals`	Displays the number of measurement intervals up to this point.
`BER`	Displays the BER calculated up to this point.
`Loopback`	Displays the current state of the loopback activated for the purpose of the BER test: No loopback has been activated. In this case, an external loopback, e.g., a physical loopback connection, must be connected before starting the BER test. Remote Local - Remote line loopback is activated for the BER test.
`Execution`	Displays the next state of BER measurement: Press spacebar to start - BER measurement disabled. Press spacebar to stop - BER measurement enabled.
`Reset BER`	Resets the errors and intervals counter. Use the arrow key to move down and press the spacebar to reset.

Operation

1. To display the BER TEST screen, select Item `2` on the Maintenance Menu.
2. Select desired HDSL loop you want to perform test on, by moving the selection block to HDSL loop field. Press the spacebar to select the desired HDSL loop.
3. Make sure a loopback is activated. If the Loopback field displays `None` and no external loopback is currently connected, change the state of the loopback used for BER measurement. Move the selection block to the Loopback line and press the spacebar.

To enable/disable BER testing:

1. To start the BER measurement, move the selection block to the Execution field and press the space bar. The Execution field now shows `Stop`.

2. To stop the BER measurement, move the selection block to the Execution line and press the space bar. The Execution field now shows `Press Spacebar` to start.

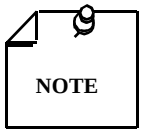
To exit and return to the maintenance menu, make sure that BER testing has been disabled, and press the `Esc` key.

To Reset BER:

1. To start the BER measurement, move the selection block to the Execution field and press the space bar. The Execution field now shows `Stop`.

2. To stop the BER measurement, move the selection block to the Execution line and press the space bar. The Execution field now shows `Press Spacebar` to start.

To exit and return to the maintenance menu, make sure that BER testing has been disabled, and press the `Esc` key.



You cannot exit the BER TEST screen while a BER test is running. When you start or stop the BER test on one of the HDSL loops, the other loop(s) see bursted errors on its data. The BER test detector synchronizes and show error-free for all 1s and all 0s pattern.

Set RTC

The Set RTC option enables you to set the real-time clock of the 730. A typical screen is shown in *Figure 4-5.*

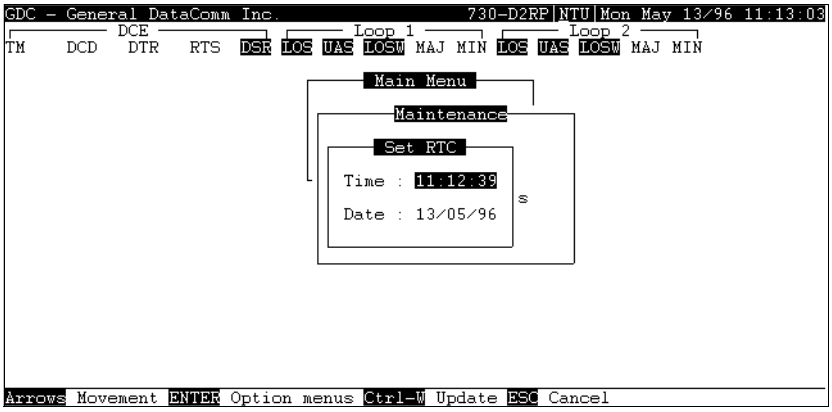


Figure 4-5 Set RTC Screen

The screen includes two fields described in *Table 4-3.*

Table 4-3 Set RTC Screen Fields

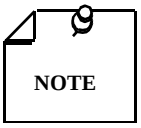
`Time`	Displays the time in 24-hr military format showing hours:minutes:seconds retrieved from the 730 at the time the screen is opened.
`Date`	Displays the date (day/month/year) retrieved from the 730 at the time the screen is opened.

Operation

To change the current time or date, use the following procedure:

1. Move the selection block to the desired line and press `Enter`.

2. Type the new time or date in the format seen on the screen, then press `Enter`. The option menu closes, and the new time and/or date appears in the corresponding line.
3. To save changes, press `Ctrl W`.
4. To quit and cancel the changes made in this screen, press `Esc` without pressing `Ctrl W`.
5. To exit and return to the maintenance menu, press the `Esc`.



The 730 internal time is updated at the instant you press `CTRL W`.

Reset Statistic

The Reset Statistics option resets all the performance statistics entries of the 730.

Operation

To instruct the 730 to reset all the performance statistics counters:

1. Select Item `4` on the Maintenance Menu. You observe a dialog box with two options: `Yes` and `No`.
2. To reset the statistics, move the selection block to `Yes,` and press `Enter`.
3. To exit without resetting press `Esc`, or move the selection block to `No`, and press `Enter`.

HDSL Start-Up

This option is used to initiate manually the 730 HDSL loops start-up process. Normally this process is automatically performed upon link initialization and whenever the synchronization between two linked 730 units is lost.

The activation of this function disrupts the transfer of data through the link for a short time.

To instruct the 730 to perform the start-up process, select Item `5` on the Maintenance Menu.

Board Reset

This option is used to reset the 730.

To reset the 730, select Item `6` on the Maintenance Menu. After a few seconds, the opening screen appears. The unit performs the start-up process, and displays the Main Menu screen.

The activation of this function disrupts the transfer of data through the link for a short time.

A Business Equipment (DTE) Interface Signals

EIA/TIA-232-E and ITU-T					
P1 Pin	**V.35 Pin**	**ITU-T (See Note)**	**EIA**	**Signal**	**Description**
1	A	101	AA	Protective ground	This circuit is connected to the equipment frame. Normally, it is separated from signal ground (Pin B) by 100 ohms, but it may be connected to signal ground by means of an option strap.
7	B	102	AB	Signal ground	Establishes a common ground reference for all interface circuits except protective ground, Pin A.
4	C	105	CA	Request-to-send	Indicates to 730 that DTE is prepared to transmit.
5	D	106	CB	Clear-to-send	Indicates to DTE that 730 is prepared to transmit.
6	E	107	CC	Data-set-ready	Indicates to DTE that 730 is operational.
8	F	109	CF	Received line signal detector	Indicates to DTE that 730 is receiving data (not idle or OOS codes).
25	K	142	NN	Test mode	Indicates to DTE that 730 in a test mode.
18	L	141	LL	Line loopback enable	Transfers signal from DTE to control Line Loopback test mode.
2 14	P S	103 103	BA(A) BA(B)	Transmitted data	Transfers data signals from DTE for modulation and transmission over communications line.
3 16	R T	104 104	BB(A) BB(B)	Received data	Transfers data signals received over communication line and demodulated by 730 to DTE.
12 24	U W	113 113	DA(A) DA(B)	Transmitter timing (DTE source)	Transfers transmitter signal timing information from DTE to 730.
13 17	V X	115 115	DD(A) DD(B)	Receiver timing	Transfers receiver signal timing information from 730 to DTE.
19 15	Y AA	114 114	DB(A) DB(B)	Transmitter timing	Transfers transmitter signal timing information from 730 to DTE.
21	BB/b	140	RL	Remote Digital Loopback test enable	Transfers transmitter signal timing information from 730 to DTE.
20	H	108/2	CD	Data Terminal Ready	Indicates to 730 that DTE is prepared for data communication.
9				+12V	Provided to interface.
10				-12V	Provided to interface.
NOTE: ITU-T designations are shown for reference only. M, N, CC, FF, HH, JJ, KK, LL, MM, NN, Z, and Pins 23 and 26 are not used.					

EIA-530			
Pin	**Circuit**	**Direction**	**Description**
1			Frame Ground
2	BA	To 730	Send Data (A)
14	BA	To 730	Send Data (B)
3	BB	From 730	RCV Data (A)
16	BB	From 730	RCV Data (B)
4	CA	To 730	RTS (A)
19	CA	To 730	RTS (B)
5	CB	From 730	CTS (A)
13	CB	From 730	CTS (B)
6	CC	From 730	DSR (A)
22	CC	From 730	DSR (B)
7	AB		Signal Ground
8	CF	From 730	DCD (A)
10	CF	From 730	DCD (B)
17	DD	From 730	RCV CLK (A)
9	DD	From 730	RCV CLK (B)
24	DA	To 730	EXT CLK (A)
11	DA	To 730	EXT CLK (B)
15	DB	From 730	TX CLK (A)
12	DB	From 730	TX CLK (B)
20	CD	To 730	DTR (A)
23	CD	To 730	DTR (B)
21	RL	To 730	Remote Digital Loopback Enable
18	LL	To 730	Line Loopback Enable
25	TM	From 730	Test Mode

X.21				
P1/P2 Pin	*** 15-Pin X.21 Connector**	**ITU-T Circuit**	**Signal**	**Description**
2 14	2 9	T(A) T(B)	Transmitted Data	Data from DTE.
3 16	4 11	R(A) R(B)	Received Data	Data to DTE.
4 19	3 10	C(A) C(B)	Control	Indicates to 730 that DTE is prepared to transmit.
8 10	5 12	I(A) I(B)	Indication	Indicates to DTE that 730 is receiving data.
17 9	6 13	S(A) S(B)	Signal Element Timing	Transmit and receive signal timing information from 730 to DTE.
24 12	7 14	X(A) X(B)	* DTE Signal Element Timing (X)	Optional transmit signal timing information from DTE to 730 if X.21 adapter module is configured for XT.
7	8	G	Signal Ground	Common ground reference.
* Optional transmit signal timing, X.21 Interface Card jumper position BT, (Byte Timing) is not supported.				

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