Installation and Operation

UAS 700A-G2

General DataComm

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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.

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Manual Revision History

Shown below is a chronological listing of revisions to this manual. The issue number, date, and synopsis of revised materials are included to provide the reader with a comprehensive manual history.

> *Note*   *In keeping with the policy of continuing development carried out by General Data-Comm Inc., the information in this manual is subject to revision without notice.*

Issue	Date	Description
1	Mar 98	First issue.

Errata Sheet
for

Installation and Operation
UAS 700A-G2
Publication 073R116-000-01, Issue 1

Overview

This publication reflects changes to the Installation and Operation manual for the UAS 700A-G2.
Please make a note on the corresponding pages.

Page 4-12, Second paragraph.
Replace with the following paragraph:

"You may load the standby version with new firmware by way of the TEAM management software. Downloading a new standby version does not disrupt data transfer".

December 1998

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Chapter 3 Operation

Chapter 4 Tests

Preface

Scope

This manual describes how to install and operate the Universal Access System (UAS). This documentation is written for operators and installers, and assumes a working knowledge of data communications equipment.

Organization

This manual has four chapters. The information is arranged as follows:

- *Chapter 1 - System Description* provides an overview to the UAS 700A-G2. It includes a general description, equipment, assembly, and cabling information for the UAS 700A-G2.

- *Chapter 2 - Installation* tells you how to install the UAS 700A-G2. Only typical or fundamental applications are given because of the variety of specific customer system choices.

- *Chapter 3 - Operation* describes the configuration and operation of the UAS 700A-G2.

- *Chapter 4 - Tests* describes front panel and external tests of the UAS 700A-G2.

The *Index* contains topics on the UAS 700A-G2 with 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.
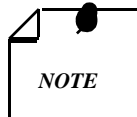
Notes present special instructions, helpful hints or general rules.

NOTE

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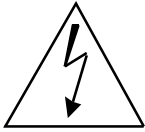
Warning statements identify conditions or practices that can result in personal injury or loss of life.

Related Publications

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

*   *Operating and Installation Instructions for
    SpectraComm Manager Card   GDC 048R303-000*

*   *Operating and Installation Instructions for
    SpectraComm Shelf   GDC 010R302-000*

*   *Installation and Operating Instructions for
    TEAM 700 for Unix   GDC 058R707-V300-01*

GDC publication numbers (e.g., *GDC XXXXXXX-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.

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Hands-on training courses are provided by GDC Educational Services. Courses range from basic data communications, modems and multiplexers, to complex network and ATM systems and are

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Glossary of Terms

2B1Q Code

Line code for basic rate ISDN at the U reference point.

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.

Analog

Transmission employing variable and continuous wave forms to represent information values.

BERT

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

Bipolar

The predominant signaling method used for digital transmission services, such as DDS and T1, in which the signal carrying the binary value successively alternates between positive and negative polarities. Zero and one values are represented by the signal amplitude at either polarity, while no-value spaces are at zero amplitude; also, polar transmission.

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, facsimile, and video.

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 will echo back a received test message, after first decoding and then re-encoding it, the results of which are compared with the original message.

DSU

Data Service Unit.

E1

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

Ground

An electrical connection or common conductor that, at some point, connects to the earth.

HDSL

High-Bit Rate Digital Subscriber Line.

Interface

A shared boundary; a physical point of demarcation between two devices, where the electrical signals, connectors, timing, and handshaking are defined; the procedure, codes, and protocols that enable two entities to interact for the meaningful exchange of information.

Local Area Network

A type of high-speed data communications arrangement wherein all segments of the transmission medium (typically, coaxial cable, twisted-pair wire, or optical fiber) are under the control of the network operator.

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.

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

A point where one or more functional units interconnect transmission lines (ISO); a physical device that allows for the transmission of data within a network; an end-point of a link or a junction common to two or more links in a network (IBM SNA); typically includes host processors, communications controllers, cluster controllers, and terminals.

Self-Test

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

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.

Chapter 1 System Description

Overview

The UAS 700A-G2 provides local loop transmission for Full and Fractional E1 (FE1) services. This unit conforms to the ETSI HDSL standard and operates on a 2-wire metallic pair using High Bit-Rate Digital Subscriber Line (HDSL) technology. Using the 700A-G2, a telephone company/carrier or an end user can transmit up to 2.048 Mbps on an unconditioned metallic cable, up to 4.5 Km on 0.5mm cable, or 3.2 Km on 0.4mm cable.

The 700A-G2 can be installed in the SpectraComm shelf (16 per shelf) for either carrier central office or customer premises applications. It can operate in one of two configurations: as a master unit connected to a slave 700A-G2, 702-G2, 720-G2, or 730-D2 (point-to-point operation); or as a master unit connected to two single-pair slave units (e.g., 720-G1 or 730-D1, point-to-multipoint operation). Additionally, the 700A-G2 can operate as an NTU in a point-to-point network configuration.

The 700A-G2 can also be configured to operate as single loop units, enabling it to operate with 720-G1 and 730-D1 NTUs in a point-to-point configuration. It may be configured and controlled by dip-switches and/or jumpers on the board, either from an optional ASCII terminal or from GDC's UAS Network Management System.

Applications

The UAS 700A-G2 can provide connectivity between equipment such as the following:

• Workstations	Data terminals
• LAN bridges	Cluster controllers
• Host mainframes	Mini-computers
• Digital telephones	Telephone switches
• Video terminals	Video conference stations
• E1 Multiplexers	Sub-rate multiplexers
• VSAT terminals	Microwave equipment

The 700A-G2 is designed to operate as an LTU (Line Terminating Unit) or NTU (Network Terminating Unit). The 700A-G2 lets you connect any two devices such as those listed above in a point-to-point link with inexpensive telephone wires (See *Figure 1-1* and *Figure 1-2*).

It may also be used in a point-to-multipoint network configuration where the remote units (NTUs) may be 720-G1 or 730-D1 type units (See *Figure 1-1* and *Figure 1-2*). You can also use the 700A-G2 to add new links to networks or to replace older expensive links. For example, you could replace coaxial cable with inexpensive telephone wire.

Features

Full E1 Service Provisioning (Point-to-Point)

The 700A-G2 can operate in one of several configurations. Three are shown in *Figure 1-1* and *Figure 1-2*. The input/output of the G.703/G.704 unit can be connected directly to a carrier central-office, E1 cross-connect, a digital cross-connect system, or to a higher order multiplexer for inter-office transport.

For full E1-service-provisioning applications, the master 700A-G2 is connected to a slave 700A-G2, 702-G2, 720-G2, or 730-D2 to provide the end-user with the G.703/G.704 or V.35 interface. The 700A-G2 transport can also be used to extend 2.048 Mbps applications within a customer-owned facility.

Fractional E1 (FE1) Service Provisioning (Point-to-Point)

The 700A-G2 can be used to provide fractional E1 data service to customer sites from a central office location. When 720-G1 or 730-D1 remote units are used in a single loop provisioning configuration, up to 17 G.704 E1 timeslots are available at the customer site in the 720-G1 case; and a V.35 nx64kbps signal is available in the 730-D1 case (up to 18x64kbps). When the 720-G2 or 730-D2 remote units are used in a two-loop configuration, up to 31 G.704 E1 timeslots are available at the customer's site in the 720-G2 case, and a V.35 nx64kbps signal is available in the 730-D2 case (configurable up to 31x64kbps).

Fractional E1 (FE1) Service Provisioning (Point-to-Multipoint)

When connected to two different customer premises HDSL units, the 700A-G2 can be used to combine the customers' data into a single G.704 interface. This signal can be sent into the network for proper routing. The 700A-G2 maps the DS0s or V.35 nx64kbps from each customer site into proper alignment in its G.704 frame. When 720-G1 units are used at the remote sites, up to 17 G.704 E1 timeslots are available at each remote site, with the exception that the total number of provisioned timeslots for both remotes must be less than or equal to 31 timeslots. When 730-D1 units are used at the remote sites, a V.35 nx64kbps signal is available at each remote (up to 18x64kbps), with the exception that the aggregate data rate of both remote sites must be less than or equal to 31x64kbps. *Chapter 3 - Operation* describes in detail these functions of timeslot mappings.

Point-to-Point

Point-to-Multipoint Data-Grooming   * 31 timeslots total

Fractional G.704 Service
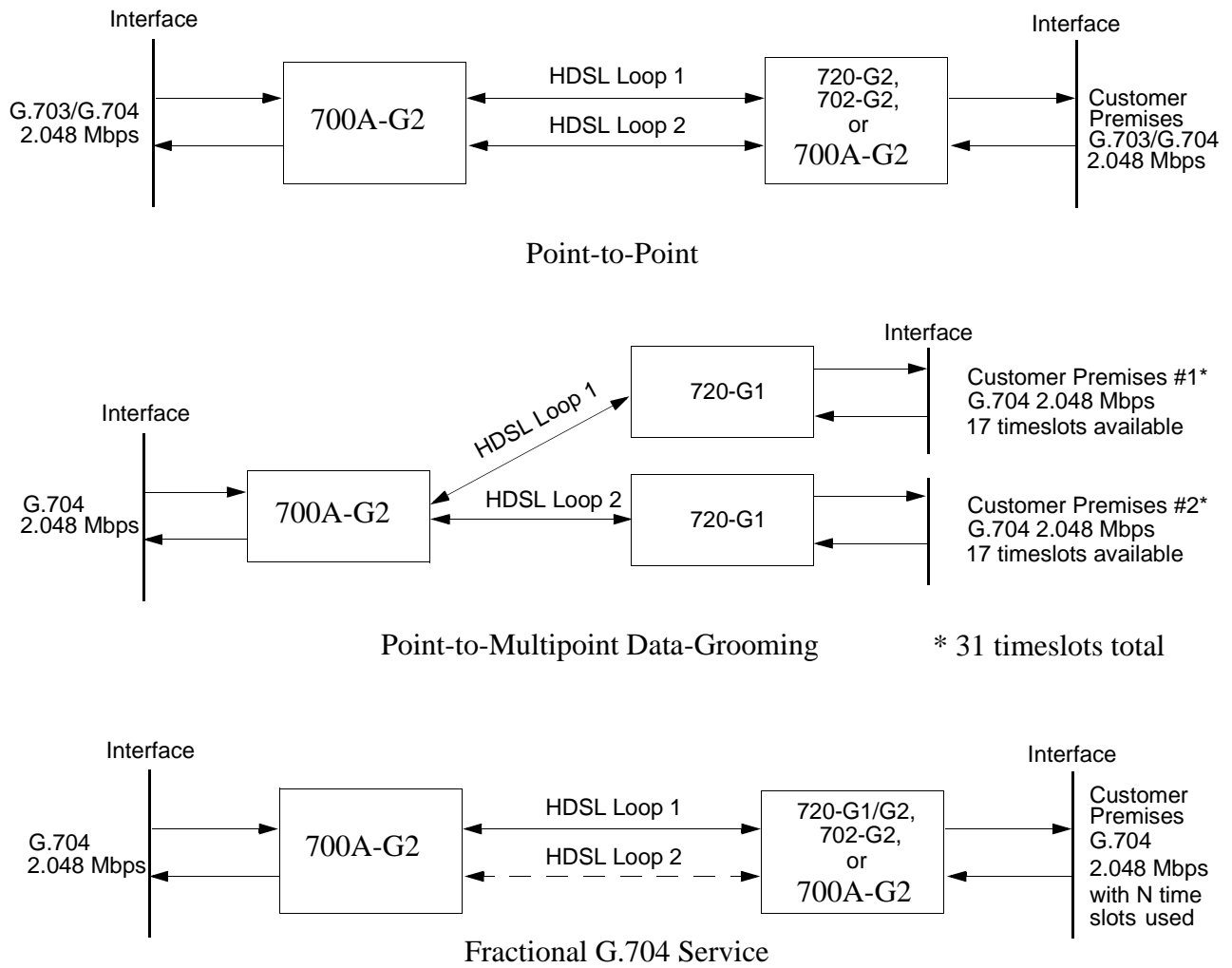
Figure 1-1   Typical UAS 700A-G2 Applications
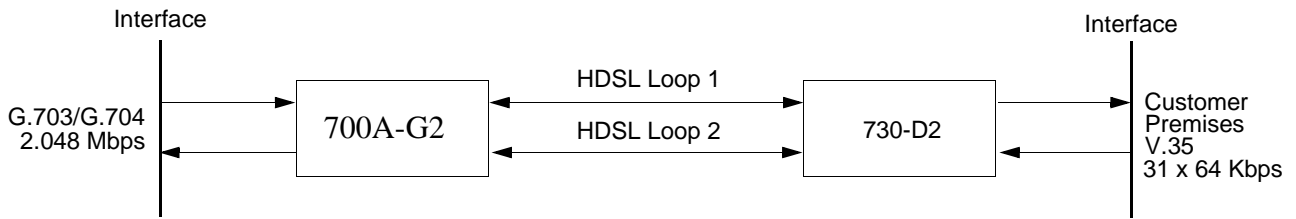
Point-to-Point
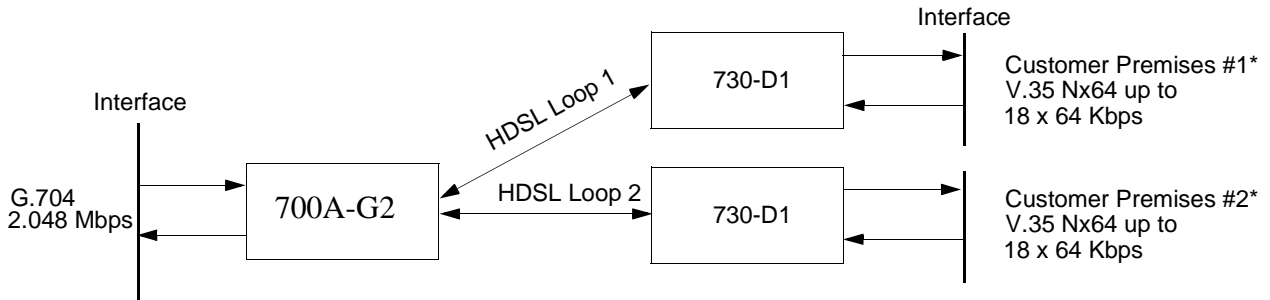
Point-to-Multipoint Data-Grooming   *31 x 64 Kbps total aggregate
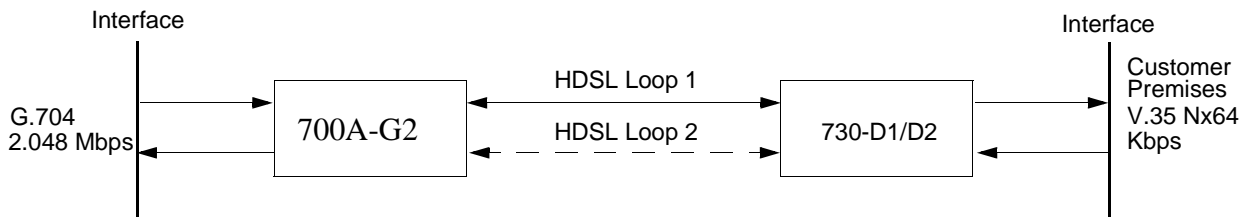
Fractional G.704 Service

Figure 1-2   Typical UAS 700A-G2 Applications

Typical Applications--Examples

This section includes timing notes and typical applications to assist you in configuring your system. The next six figures show you a few more examples of applications and option settings for configuring your system.

Central Office   Customer Location

G.704 Interface   ┌─────────────┐   Two-Wire Loops   ┌─────────────┐   G.704 Interface
2.048 Mbps   │   700A-G2   │   │   700A-G2   │   2.048 Mbps
                         │   │   │ or 702-G2 │
                         └─────────────┘   └─────────────┘
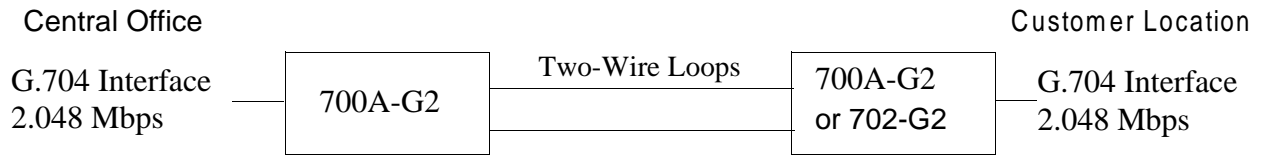
Unit Type:	**LTU**	**NTU**
Enabled Loops:	2	2
Front Panel Enable:	Enabled	Enabled
Line Unit:	ILU	ILU
Line Code:	HDB3	HDB3
Frame Mode:	Unframed	Unframed
TS16:	Data	Data

Network Configuration	**LTU**	**NTU**
Application:	P2P	P2P
Loop 1 Start DS0:	Not Applicable (N/A)	N/A
Loop 1 Consecutive DS0:	N/A	N/A
Loop 2 Start DS0:	N/A	N/A
Loop 2 Consecutive DS0:	N/A	N/A

Figure 1-3   Point-To-Point Application Unframed Data

Central Office   Customer Location

G.704   Interface | 700A-G2 | Single-Loop | 720-G1/G2, 702-G2, or 700A-G2 | G.704   Interface
2.048 Mbps   2.048   Mbps
                                                                                 10 time slots filled
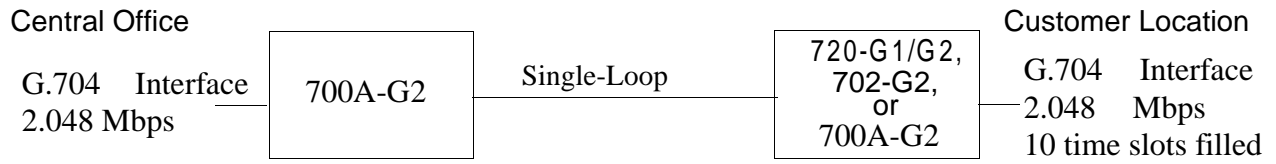
Unit Type:	LTU	NTU
Enabled Loops:	1	1
Front Panel Enable	Enabled	Enabled
Line Unit:	TLU	TLU
Line Code:	HDB3	HDB3
Frame Mode:	Framed	Framed
TS16:	Data	Data

Network Configuration	LTU	NTU
Application:	P2P	P2P
Loop 1 Start DS0:	1	1
Loop 1 Consecutive DS0:	10	10
Loop 2 Start DS0:	N/A	N/A
Loop 2 Consecutive DS0:	N/A	N/A

Figure 1-4   Point-to-Point Fractional G.704

G.704   Interface
2.048 Mbps

700A-G2	

Two-Wire Loops
HDSL Loop 1
HDSL Loop 2

730-D2	

V.35   Interface
24 X 64 Kbps
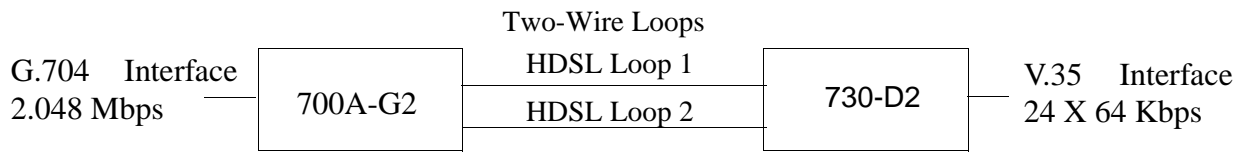
Unit Type:	**LTU**	**Unit Type:**	**NTU**
Enabled Loops:	2	Enabled Loops:	2
Front Panel Enable:	Enabled	Application:	P2P
Line Unit:	TLU	Front Panel Enable:	Enabled
Line Code:	HDB3	Tx Clock Mode:	Looped
Frame Mode:	Framed	CTS Mode:	On
TS16:	Data	Data Rate:	24 x 64 Kbps
		V54 Rx Mode:	Enabled
		FP RL Mode:	V54

Network Configuration	**LTU**
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 1-5   Fractional G.704 Service (2-Loop)

G.704 Interface	700A-G2	HDSL Loop 1	730-D2 or 730-D1	V.35 Interface
2.048 Mbps				4 x 64 K bps
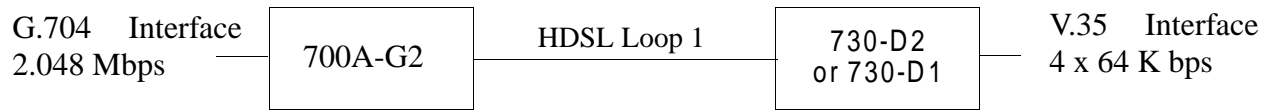
Unit Type:	**LTU**	**Unit Type:**	**NTU**
Enabled Loops:	1	Enabled Loops:	1
Front Panel Enable:	Enabled	Application:	P2P
Line Unit:	TLU	Front Panel Enable:	Enabled
Line Code:	HDB3	Tx Clock Mode:	Looped
Frame Mode:	Framed	CTS Mode:	On
TS16:	Data	Data Rate:	4 x 64 Kbps
		V54 Rx Mode:	Enabled
		FP RL Mode:	V54

Network Configuration	**LTU**
Application:	P2P
Loop 1 Start DS0:	1
Loop 1 Consecutive DS0:	4

Figure 1-6   Fractional G.704 Service (1-Loop)

| | G.704 Interface 2.048 Mbps | | 700A-G2 | | Remote 1 720-G1 | Customer Location #1 G.704 Interface 2.048 Mbps 17 time slots filled |
| | | | | | Remote 2 720-G1 | Customer Location #2 G.704 Interface 2.048 Mbps 10 time slots filled |
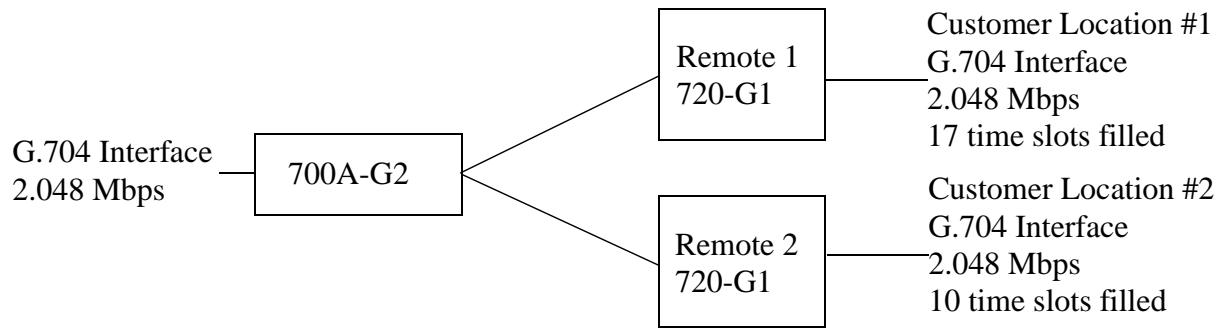
Unit Type:	**LTU**	**Remote 1**	**Remote 2**
		NTU	**NTU**
Enabled Loops:	2	1	1
Front Panel Enable	Enabled	Enabled	Enabled
Line Unit:	TLU	N/A	N/A
Frame Mode:	Framed	Framed	Framed
TS16:	Data	Data	Data

Network Configuration	**LTU**	**Remote 1**	**Remote 2**
Application:	P2MP	P2MP	P2MP
Loop 1 Start DS0:	1	1	18
Loop 1 Consecutive DS0:	17	17	10
Loop 2 Start DS0:	18	N/A	N/A
Loop 2 Consecutive DS0:	10	N/A	N/A

Figure 1-7   Point-to-MultiPoint

		Remote 1	**Remote 2**
Unit Type:	LTU	**Unit Type:**	**NTU**	**NTU**
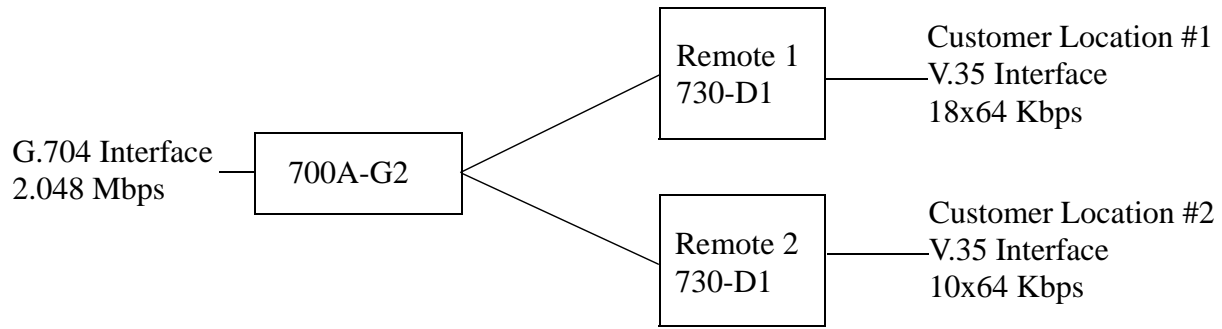
Unit Type:	LTU	**Unit Type:**	NTU	NTU
Enabled Loops:	2	Enabled Loops:	1	1
Front Panel Enable:	Enabled	Application:	P2MP	P2MP
Line Unit:	TLU	Front Panel Enable:	Enabled	Enabled
Line Code:	HDB3	Tx Clock Mode:	Looped	Looped
Frame Mode:	Framed	CTS Mode:	On	On
TS16:	Data	Data Rate:	18x64 Kbps	10 x 64 Kbps
		V54 Rx Mode:	Enabled	Enabled
		FP RL Mode:	V54	V54

Network Configuration	**LTU**
Application:	P2MP
Loop 1 Start DS0:	1
Loop 1 Consecutive DS0:	18
Loop 2 Start DS0:	19
Loop 2 Consecutive DS0:	10

Figure 1-8   Point-to-MultiPoint

Diagnostics/Network Management

A front panel terminal interface jack (CTRL) enables full access to the diagnostic and configuration controls via a terminal interface. The optional menu-driven interface provides loopback control, access to performance monitoring registers, and control of the configuration of the unit.

The 700A-G2 may also be used as a shelf unit as part of the Universal Access System (UAS). 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. Full network management capabilities are achieved using the SpectraComm Manager (SCM) and its interface to TEAM HDSL or a MIB browser SNMP Controller.

Table 1-1   Equipment List

Description	GDC Part No.
700A-G2 (NTU/LTU R/M - short-haul E1)	073P201-001
SPECTRACOMM Shelf Systems	
SpectraComm Shelf MS-2 Model 1 (100/120 V ac) Includes two 8-slot, dual RJ45 Zone 1 connector panels	010M054-001
SpectraComm Shelf MS-2 Model 2 (-48 Vdc) Includes two 8-slot, dual RJ45 Zone 1 connector panels	010M055-001
SpectraComm Shelf MS-2 Model 3 (220/240 V ac, international) Includes two 8-slot, dual RJ45 Zone 1 connector panels	010M056-001
SpectraComm Shelf MS-2 Model 10 (-48 Vdc, with redundant power supplies) Includes two 8-slot, dual RJ45 Zone 1 connector panels	010M070-001
SpectraComm 2000 Enclosure, single power supply	10B226-001
SpectraComm 2000 Enclosure, redundant power supply	10B226-002
Cables	
Interface cable, RJ48C plug to 9-pin female (HDSL Port to terminal connections)	027H250-010
Adapter RJ48C to Dual 75 ohm unbalanced E1 BNC connectors	209-044-001
Interface Cable 50-pin Amp Connector to six 8-position modular jacks. Each cable can support up to six cards.	024H608-002

Table 1-2   Technical Specifications

Local Side	
Rate	2048 kbps
Framing	E1 Framed G.704 and E1 Unframed data.
Interface	2048 kbps per G.703 and G.704 (-6 dB receiving sensitivity)
Data Encoding	AMI or HDB3
Remote Side	
Rate	Dual duplex 584 Kbaud signaling rate, with 2B1Q line code (each loop)
Framing	HDSL framing per ETSI ETR 152.
Interface	One or two non-loaded DLL-loops
Transmit Power	13.5 dBm (+ - 0.5 dB)
Transmission Line	

Two metallic twisted-pairs (loop #1 and loop#2), non-loaded DLL type, up to 3.2 Km at 0.4 mm or 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 specifications of ETSI ETR 152.

Table 1-2   Technical Specifications (Continued)

Test Features	
Local Loopback	Terminal screen selectable.
Remote Loopback	Terminal screen selectable.
Self-Test	Front panel switch or Terminal screen selectable.
Dimensions	
Dimensions	Height: 0.8 in. (27 mm)
	Width: 7.0 in. (178 mm)
	Depth: 9.5 in. (241 mm)
	Weight: 10 oz (0.28 kg)
	Shipping Weight: 1 LB 10 oz (0.74 kg)
Electrical	
Power	+5 Vdc, 900mA, Load Number = 0.8
Environmental	
Temperature Card Assembly Card Assembly Storage	Operation - 0 to 50 degrees Celsius Non-Operating -40 to +85 degrees Celsius
Humidity	5 to 95% non-condensing
Altitude	Operating - 0 to 10,000 feet Non-Operating - 0 to 40,000 feet

Chapter 2 Installation

Overview

This chapter guides you through the process of installing and using the SpectraComm 700A-G2 in your communications network. If this is your first experience using this unit, you may wish to review *Chapter 1 - System Description* to ensure that you understand the key features so that you can install and use the unit in your network.

Unpacking and Handling

Inspect the units 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

You may install the 700A-G2 basecard in the SpectraComm Shelf or in the SC2000 Enclosure. All electrical connections are made through backplane interfaces.

Place the unit in a ventilated area where the ambient temperature does not exceed 122^0F (50^0C).

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

Shelf Installation

To install the SpectraComm Shelf, refer to *Operating and Installation Instructions for SpectraComm Shelf, GDC Publication Number 010R302-000*.
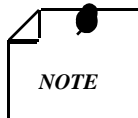
NOTE
Be sure to install shelves and power supplies as described in the SpectraComm Shelf manual. Failure to do so may result in overheating and subsequent power supply shutdown.

Module Installation

You can install the modules in any unused slot in the shelf that has the Zone 1 connectors required for the network. To install:

1. With the GDC logo on top, insert the module into its slot then slide it in until it makes contact.

2. Pull down the ejector tab and firmly push the module in until it seats in the rear connectors.

Setting Hard Options

Setting the hard options on the cards means adjusting configuration Switches S1 and S2 and jumpers to match your networks operation. *Table 2-1* explains the functions of the switches and jumpers, and *Figure 2-1* shows their location. The hard configuration option is selected by Switch S2-1.
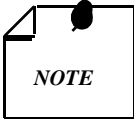
The microprocessor in the UAS 700A-G2 reads the switch settings only when you first power up. If you change the settings while the power is on, you must turn the power off and power up again for the new settings to take effect. Soft options that are changed while the power is on do not require a power cycle. Soft options are stored in non-volatile memory and do not need to be reset after a power interruption.

NOTE

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

Table 2-1   Option Selection

Switches	Description (Factory defaults are shown in **bold** type.)
S1-1 (SPARE)	Future use.
S1-2 (FP-EN/DIS)	**OFF:** **Front panel TST button is enabled.** ON: Front panel TST button is disabled.
S1-3 (DAT/SIG)	Data or Signalling mode: **OFF:** **Data - G.704 Channel Associated Signalling is disabled.** ON: Signalling - G.704 Channel Associated Signalling is enabled.
S1-4 (P2P/P2MP)	Application: **OFF:** **Point-to-Point.** ON: Point-to-Multipoint.
S1-5 (SPARE)	Future Use.
S1-6 (SPARE)	Future Use.
S1-7 (SPARE)	Future Use.
S1-8 (SPARE)	For test purposes only and should always be **OFF**. When ON, the power-on self-tests are bypassed.
S2-1 (SFT/HRD)	Selects either soft or hard configuration mode. When soft mode is enabled, the option switch settings are ignored and configuration is determined by stored values and the optional terminal or network manager. **OFF:** **Soft configuration mode** ON: Hard mode configuration
S2-2 (HDB3/AMI)	Selects line coding. **OFF:** **HDB3** ON: AMI (Alternate Mark Inversion)
S2-3 (FR/UNFR)	Framed or unframed mode: **OFF:** **Framed - the unit expects a framed E1 signal and maps the E1 data stream accordingly**. ON: Unframed - the unit transfers the E1 signal on a bit by bit basis.

Table 2-1   Option Selection (Continued)

Switches	Description
S2-4 (TLU/ILU)	Configures the Framed 700A-G2 for either a 2048 kbps Terminating Line Unit (TLU) or Intermediate Line Unit (ILU). **OFF:** **TLU**, the 700A-G2 regenerates the G.704 frame structure, and recalculates the CRC-4 error checking of the G.704 frame structure. ON: ILU, the E1 data is passed transparently without frame regeneration.
S2-5 (LTU/NTU)	Selects whether unit is configured as a line terminating unit (LTU) or network terminating unit (NTU). **OFF:** **LTU** ON: NTU Note: For the UAS 700A-G2, the position of this switch always determines LTU/NTU status, even when the unit is configured through SOFT mode or by a network management system.
S2-6 (SPARE)	Future use.
S2-7, S2-8 (N LOOPS)	Selects the number of enabled loops: For the 700A-G2, this may be 1 or 2. S2-7 S2-8 **OFF** **OFF** **Maximum number of loops enabled** (two loops) OFF ON one loop enabled ON OFF two loops enabled ON ON two loops enabled An invalid selection causes the maximum number of loops to be enabled.
Jumpers	**Description**
X3, X5 (75/120 ohm)	Fix the termination of the E1 interface: 75-ohm unbalanced, 120-ohm balanced.
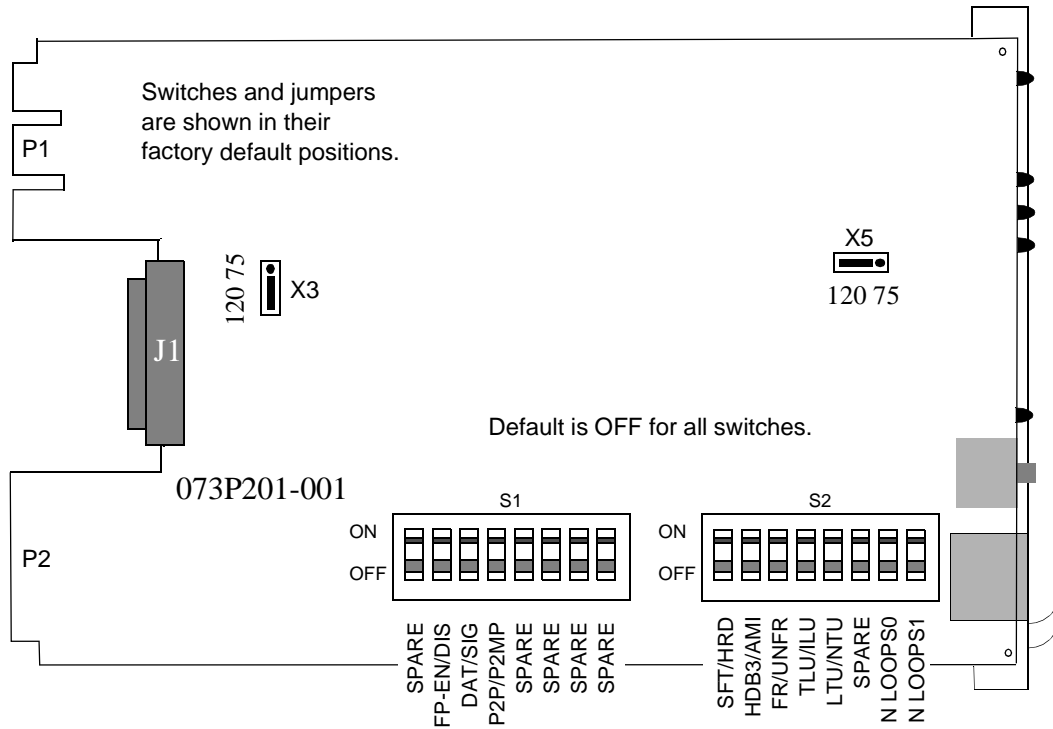
Figure 2-1   Option Switch and Jumper Locations

Electrical Connections

The following paragraphs describe the power line and communications line connections to the UAS 700A-G2.
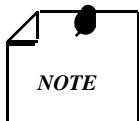
> *Before applying power to the unit, check that the edge connectors on the rear panel of the card are inserted firmly in their receptacles, which are mounted on the rear panel of the SpectraComm Shelf, shown in Figure 2-2 below.*
>
> *NOTE*

Power Line

The 700A-G2 obtains power directly from the SpectraComm or SC2000 Shelf.

Communications Line

See *Figure 2-2* for instructions. The universal back plane for the SpectraComm shelf (Zone 1) is shown in *Figure 2-3* and the SpectraComm 2000 Enclosure back panel is shown in *Figure 2-4*.

8-SLOT DUAL RJ48C/X Connector Panel

This 8-slot, Zone 1 connector panel has two RJ48C/X 8-position module jacks per slot. The upper jack is for the E1 line, and the lower jack is for the HDSL network. *Table 2-2* describes the pin-outs for this interface.
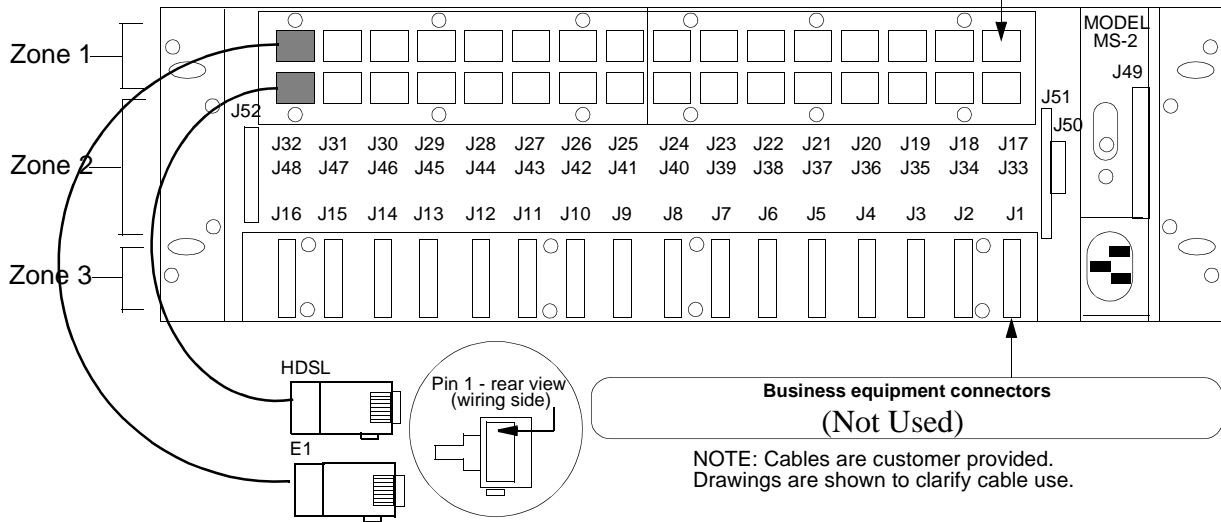
Figure 2-2 Rear Panel SpectraComm Shelf

Table 2-2 E1 Connector Pin Assignments

Pin No.	RJ48C/X	Color
1	E1-RX-R	Blue
2	E1-RX-T	Orange
3		Black
4	E1-TX-R	Red
5	E1-TX-T	Green
6		Yellow
7		Brown
8		Slate

Table 2-2   E1 Connector Pin Assignments (Continued)

HDSL Connector		
1	HDSL2-R	Blue
2	HDSL2-T	Orange
3		Black
4	HDSL1-R	Red
5	HDSL1-T	Green
6		Yellow
7		Brown
8		Slate

8 ⬚ 1 Upper jacks J17 to J32 (E1 Connector)	8 ⬚ 1 Lower jacks J33 to J48 (HDSL Connector)
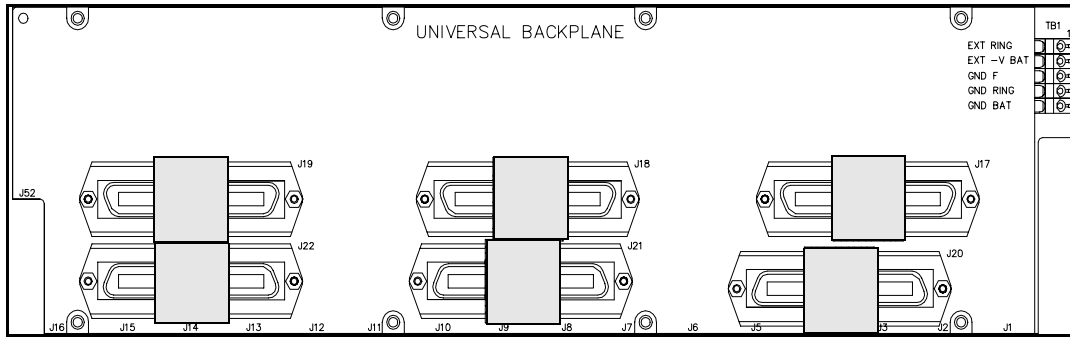
Figure 2-3   Universal Back PLane for SpectraComm Shelf, Zone 1
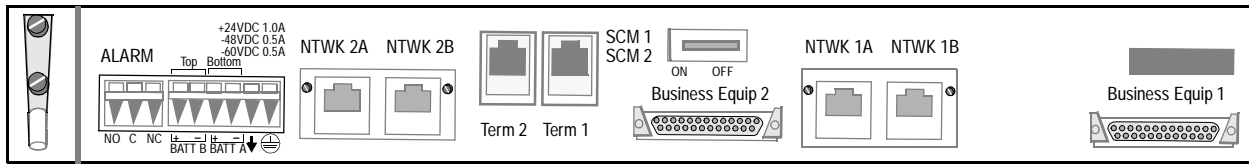
For each card slot (Slot 1 and 2) these are the following connectors:

Business Equip n   Not used for 700A-G2

NTWK *n*A   RJ48C jack for E1 interface connection

NTWK *n*B   RJ48C jack for HDSL interface connection

Term *n*   Not used for 700A-G2

Figure 2-4   SpectraComm 2000 Enclosure Back Panel

Pre-Operational Configuration

Setup (Hard)

Configure the unit as follows:

1. Fix the E1 receiver termination to the proper impedance setting (X3 and X5): 75-ohm unbalanced, 120-ohm balanced.

2. Verify that the card is configured as an LTU or NTU.
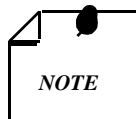
> *NOTE*
>
> *For the UAS 700A-G2, LTU/NTU status is determined solely by the on-board configuration switch. When configured as an LTU, the UAS 700A-G2 responds to commands from a network manager connected to an SCM only in the installed shelf; when configured as an NTU, it acts as a remote unit and only responds to network management commands which are forwarded by the HDSL unit at the far end (LTU).*

3. Set the remaining switches and jumpers according to *Table 2-1* and *Figure 2-1*.

    If S2-1 is placed in the SOFT configuration position, all other switch settings, except S2-5, are ignored and the unit must be configured via the optional terminal screen. Refer to the following section: *Setup (Soft)*.

4. Connect the E1 line and HDSL loops to the network connectors on the rear panel.

5. Insert the card (NTU or LTU) into a previously powered-up SpectraComm Shelf.

6. The card automatically performs internal self-tests. If one of these tests fails, the front panel ALM LED blinks.

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

Setup (Soft)

1. Follow *Steps 1* through *3*, and Steps *5* through *7* in *Setup (Hard)* above.

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 option on the terminal. (Refer to *Setting Soft Options* in *Chapter 3 - Operation).*

4.   Verify the configuration of the E1 interface parameters (Refer again to *Setting Soft Options).* These should be set as follows:

   •   AMI/HDB3

   •   FRAMED/UNFRAMED

   •   ILU/TLU

   These settings should match those on the switches and jumpers in *Table 2-1* if in Hard configuration mode (Switch S2-1).

5.   After performing the self-tests, the HDSL loops (LTU and NTU) initiate start-up, and the HDSL NORM LEDs blink.

   The start-up should last less than 3 minutes. When complete, the HDSL NORM LEDs should be 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. During this time the ALM light blinks until all E1 and HDSL Status Indicators clear.

6.   E1 data transfer now occurs; the E1 NORM LED should be ON, and the ES LED should be OFF. If not, refer to the troubleshooting procedure in C*hapter 4- Tests*.

Chapter 3 Operation

Overview

Figure 3-1 illustrates the UAS 700A-G2 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*.

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

Front Panel Description

The front panel enables you to visually monitor three data streams, represented by the following LED indicators:

HDSL Loop 1 input	- ES LP1 or NORM LP1
HDSL Loop 2 input	- ES LP2 or NORM LP2
Incoming E1 signal	- E1 ES or E1 NORM

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

Table 3-1   Front Panel Indicators

HDSL Indicators		
ES Indicators	**NORM Indicators**	**Indication**
Off	On	Normal operation
On	Off	LOS/LOSW
On (for 0.5 sec.)	On	ES - Errored second
On	Blink	Start-up in progress. No response received from mating unit.
Off	Blink	Start-up in progress. Signal from mating unit has been received.
E1 Indicators		
ES Indicator	**NORM Indicator**	**Indication**
Off	On	Normal operation
On	Off	LOS or LOFA
On (for 0.5 sec.)	On	ES - Errored second
On	Blink	AIS received

<div align="center">

Table 3-1   Front Panel Indicators (Continued)

</div>

Other Indicators	
ON	Lit when +5V is applied to the card.
ALM	Indicates 'Major Alarm' is present.
	If a failure is detected during self-test, this LED blinks. It also blinks upon the detection of LOS, LOSW, or UAS on any HDSL loop.
TM	This LED is on during one of the following conditions:
	• Loopback is activated at the local unit.
	• Loopback is activated at the remote unit.
	• The BER meter has been activated.
	This LED blinks when a BER test is in progress and bit errors are present.

The front panel also provides the TST push button. Pushing the TST button activates the internal unit's BER test. Refer to *Chapter 4* for more information on the operation of this test. Lamp-test is also activated when power is applied to the card.

When stored firmware is being loaded into active memory, the indicators flash in a particular sequence. Refer to *Downline Loading on Page 11,* in *Chapter 4* for more details.
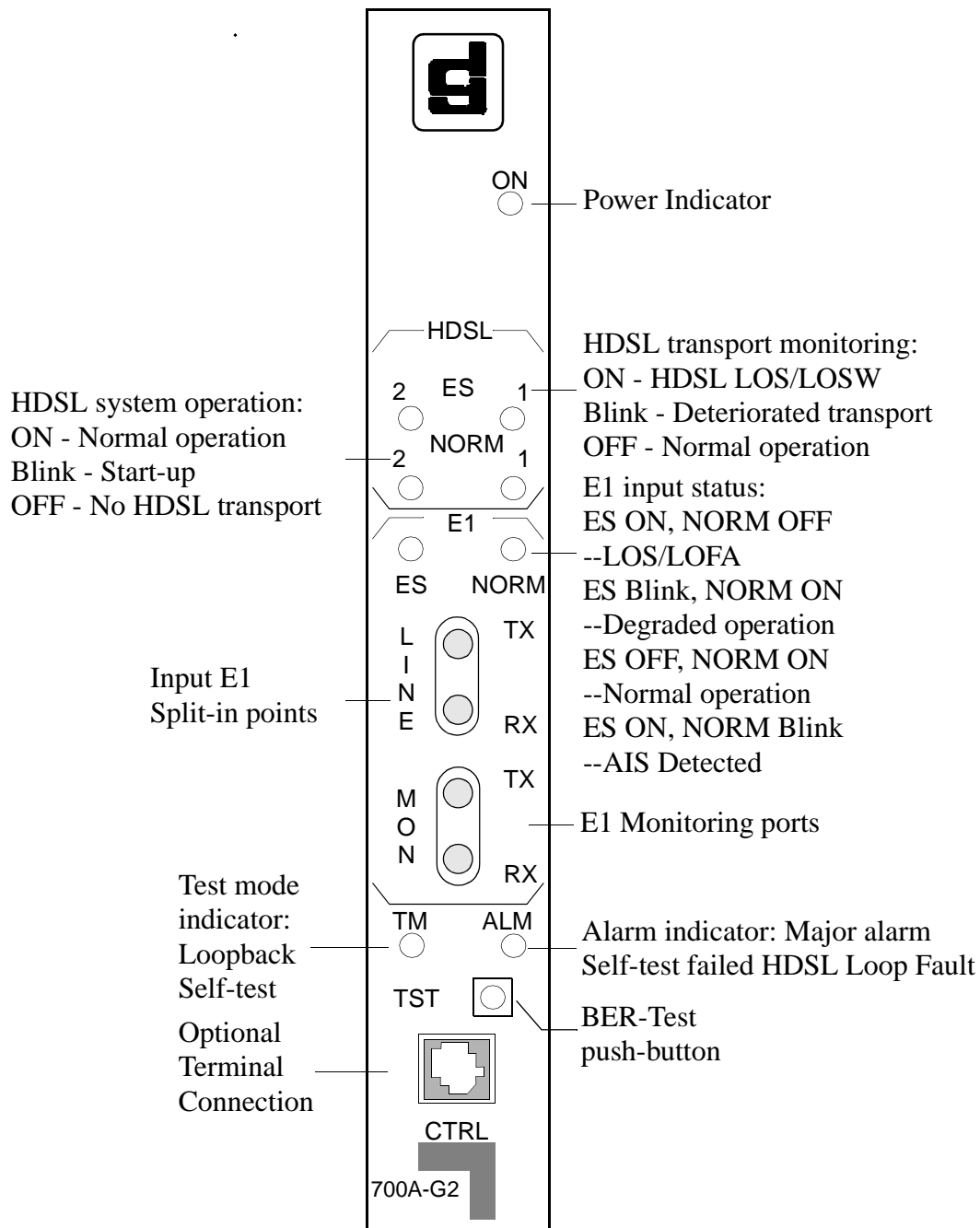
Figure 3-1 Front Panels 700A-G2

Setting Soft Options

You can use an ASCII terminal equipped with an EIA/TIA-232-E communication interface to control the 700A-G2. You connect the terminal to the control (CTRL) jack on the front panel. To end an ongoing management session, disconnect the terminal from the 700A-G2.

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 to control unit operation. The screens depicted in the remaining sections of this chapter were derived by plugging the COMM port of a PC (using a terminal emulator program) into the front panel CTRL jack of the unit.

Set the terminal communications parameters as follows:

• Data Rate = 9600 bps

• Character Format = 1 start bit / 8 data bits / no parity / 1 stop bit

The software necessary to run the supervision program is contained in the 700A-G2 unit.

Control Port Characteristics

The control port is terminated in an RJ45 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	Connected internally

Start-up Procedure

A management session is automatically started as soon as you connect the terminal cable to the CTRL port of an operating 700A-G2. Upon power-up, the 700A-G2 momentarily displays the opening screen (*Figure 3-2)* followed by the main menu.

NOTE
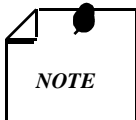
If a terminal cable is plugged into a unit that has already been powered-up, the user must refresh the screen with <Ctrl R>.

```
GDC - General DataComm Inc.        700A-G2              LTU
┌──────── E1 ──────────┐ ┌───── Loop 1 ─────┐ ┌───── Loop 2 ─────┐
LOS RAI AIS UAS R-LOS LOFA LOS UAS LOSW MAJ MIN LOS UAS LOSW MAJ MIN




                                       ××××
                                       ××××
                             ××××××××××××××××××
                             ××××××××××××××××××
                             ××××            ××××
                             ××××
                             ××××            ××××
                             ××××××××××××××××××
                               ××××××××××××××××
                                           ××××
                             ××××            ××××
                             ××××××××××××××××××  (R) General DataComm
                               ××××××××××××××××
```

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; displays the:
	• manufacturer name and equipment model
	• current operating mode (LTU or NTU)
Status Line	Located below the header; includes two main fields displaying the status of the various 700-G2 alarms. An active alarm indicator is displayed in reverse video.
E1 alarms field	Includes the following indications:
	LOS - Loss of input signal on the E1 trunk.
	RAI - Reception of remote alarm indication via the E1 trunk.
	AIS - Reception of alarm indication signal on the E1 trunk.
	UAS - Unavailable seconds threshold for the E1 trunk is being exceeded.
	R-LOS - Reception of remote loss-of-E1 signal report via the HDSL trunk. This field is disabled when the unit is configured for P2MP.
	LOFA - Local loss of frame alignment on the E1 trunk.
Loop alarms Field	Divided into sub-fields, one for each loop; 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 - Incoming bit error rate exceeds selected major alarm threshold.
	MIN - Incoming bit error rate exceeds selected minor alarm threshold.
Work Area	Displays the menu and dialog boxes.
Active Keys Area	Constantly updated to show keys and combinations available on the current screen.

Operating Procedures

The following procedures apply to all operations carried out on the control terminal.

Menu Selection

You can select a Menu item in one of two ways:

1.   Move the selected block to the desired item by using the arrow keys ⬆ or ⬇ , then press the
      Enter .

2.   Or, type in the digit appearing to the side of the menu item.

Either way, you can open the sub-menu or dialog box for doing operations.

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, then press `Enter` to select the new value and close the option menu.

Restoring Default Values

When the 700A-G2 stores default values for parameters displayed in a screen field, you can replace the current values with the default values by pressing `Ctrl` and D (that is, hold down the control key and press D).

Saving Values

To save new parameter values entered in dialog boxes, press `Ctrl` and W. These parameters are stored in non-volatile memory for the next unit power-up in SOFT Config mode (S2-1 switch is set to SOFT).

Quitting Without Saving

To quit without saving the new parameter values entered in a field, press `Esc`. You can also press `Esc` as necessary to close any open sub-menus and to return to the main menu.

Refresh

You may refresh the screen at any time by pressing `Ctrl` and R.

Main Menu

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

```
GDC - General DataComm Inc.          700A-G2              LTU
┌────────── E1 ──────────┐ ┌────── Loop 1 ──────┐ ┌────── Loop 2 ──────┐
LOS RAI AIS UAS R-LOS LOFA LOS UAS LOSW MAJ MIN LOS UAS LOSW MAJ MIN

                        ┌─────── Main Menu ───────┐
                        │                         │
                        │  1. Diagnostics        ▐│
                        │  2. Configuration       │
                        │  3. Maintenance         │
                        │                         │
                        └─────────────────────────┘




















Arrows Movement ENTER Submenus

```
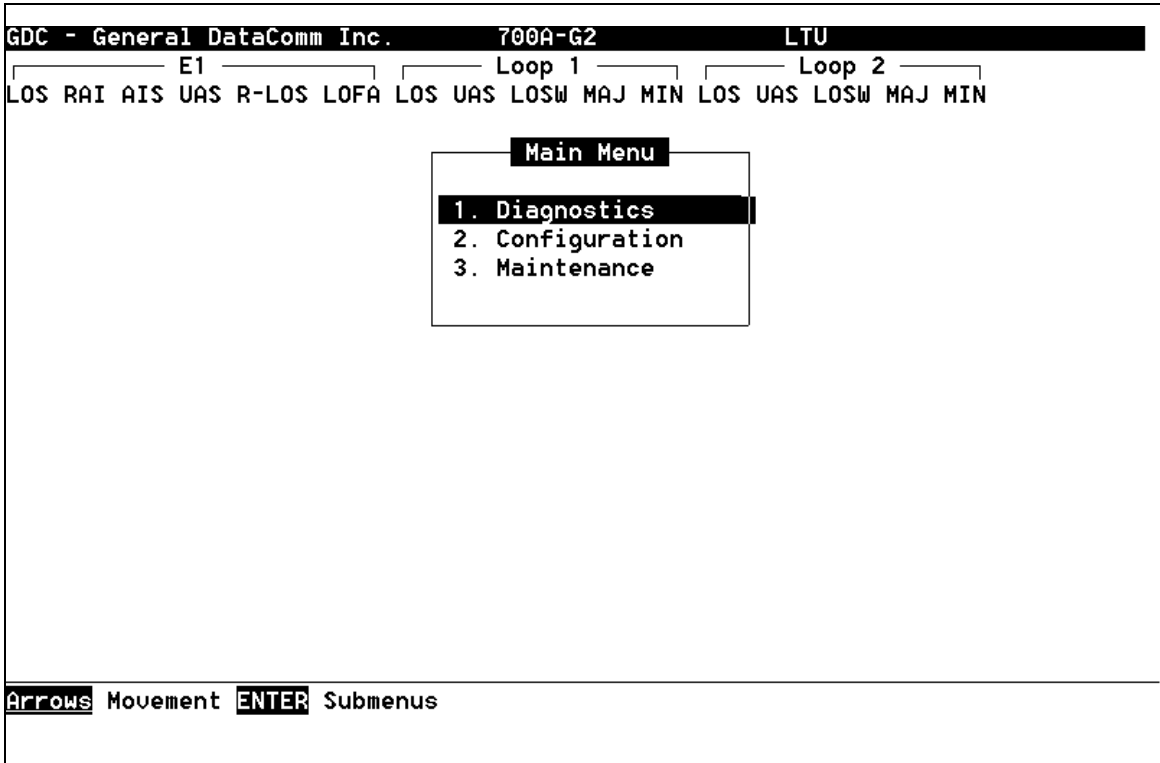
Figure 3-3   Main Menu

Diagnostics Option

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

- Display performance statistics collected on the E1 trunk and on each of the HDSL loops.

- Display HDSL loop status information, technical data on loop performance, HDSL loop noise margins, optional gain settings, etc.

- Cancel the start-up process.

Configuration Option

Use this option to configure the E1 and HDSL loop parameters, as follows:

- Modify the HDSL loop operating mode.

- Display and modify the E1 operating mode of the 700A-G2, the E1 line code, and the E1 framing mode.

- Set/modify the network circuit configuration and E1 timeslot routing over the HDSL loops.

- Display system hardware and software data and 700A-G2 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 700A-G2 BER meter.

- Reset the 700A-G2 statistics counters.

- Initiate manually the start-up process.

- Enable/Disable Downline Loading.

- Reset the 700A-G2. (Simulate a power-up.)

Refer to *Chapter 4 - Tests*.

Diagnostic Menu

Selecting the Diagnostics option from the Main Menu displays the *Diagnostics* menu, shown in *Figure 3-4*. This menu displays diagnostic information and activates diagnostic functions.

```
GDC - General DataComm Inc.        700A-G2              LTU
┌──────── E1 ────────┐ ┌──────── Loop 1 ──────┐ ┌──────── Loop 2 ──────┐
LOS RAI AIS UAS R-LOS LOFA LOS UAS LOSW MAJ MIN LOS UAS LOSW MAJ MIN

                            ┌───── Main Menu ─────┐
                            │  ┌───Diagnostics───┐
                            │  │ 1. E1 Monitoring │
                            │  │ 2. HDSL Monitoring │
                            │  │ 3. HDSL Status   │
                            └──│ 4. Cancel Startup │
                               └──────────────────┘




Arrows Movement ENTER Submenus ESC Cancel
```

Figure 3-4   Diagnostics Menu

The functions available from the diagnostics menu are:

•   E1 Monitoring

•   HDSL Monitoring

•   HDSL Status

•   Cancel Startup

E1 Monitoring

This menu item displays the 24-hour performance statistic data collected on the E1 trunk.
Figure 3-5 depicts a typical E1 Monitoring screen.

```
GDC - General DataComm Inc.        700A-G2           LTU
┌─────────── E1 ───────────┐ ┌──── Loop 1 ────┐ ┌──── Loop 2 ────┐
LOS RAI AIS UAS R-LOS LOFA LOS UAS LOSW MAJ MIN LOS UAS LOSW MAJ MIN


                      ┌──── Main Menu ────┐


                        ┌─ Diagnostics ─┐


                            ┌── E1 Monitoring ──┐

                        Valid Intervals: 73
                        Interval Time  : 240

                        ES  : 0      Last 24 Hr. ES  : 5
                        UAS : 0      Last 24 Hr. UAS : 0
                        SES : 0      Last 24 Hr. SES : 1
                        DM  : 0      Last 24 Hr. DM  : 0




Any key Next Screen R Reset E1 Stat. ESC Cancel
```

Figure 3-5   E1 Monitoring Screen

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

Table 3-3   E1 Monitoring Screen Fields

Fields	Display and Description
Valid Intervals	Number of 15-minute intervals (96 total) within the last twenty-four hours since power-up. *Figure 3-5* shows that data or statistics collected for the first interval of 15 minutes has already taken place.
Interval Time	Elapsed time in seconds from the beginning of the current 15-minute interval. The range is 0 to 900.
Displays number of:	
ES	Errored seconds in the current 15-minute interval.
Last 24 Hr ES	Errored seconds in the last 24-hour interval.
UAS	Unavailable seconds in the current 15-minute interval. Here is an example:
Last 24 Hr UAS	Unavailable seconds in the last 24-hour interval.
SES	Severely errored seconds in the current 15-minute interval. Here is an example:
Last 24 Hr SES	Errored seconds in the last 24-hour interval.
DM	Degraded minutes in the current 15-minute interval.
Last 24 Hr DM	Degraded minutes in the last 24-hour interval.

Operation

The `E1 Monitoring` screen displays data for the current 15-minute interval. After viewing the data for the current 15-minute interval, you can display the other 95 intervals in the current 24-hour interval by pressing any key, except the R (r) and the `Esc` keys.

You can continue to scroll through the remaining intervals by continually to press any key, except the R (r) and the `Esc` keys. The display is cyclic, that is, the current interval is displayed again after the 95th interval. E1 statistics are computed based on G.821 thresholds and criteria.

To reset the counters for the E1 statistics, type R (r) and a message appears, `Reset E1 Statistics?` Pressing `Enter` when `No` (the default) is highlighted allows the counter to continue. Otherwise, when you use the ⭡ or the ⭣ to highlight `Yes` and then press `Enter`, all the displayed values are reset to 0 (◄ and ► do not work in reset mode). To exit and return to the `Diagnostics` menu, press `Esc`.

HDSL Monitoring

The `HDSL Monitoring` screen displays 24-hour performance statistics on the HDSL loops. A typical screen is shown in *Figure 3-6*.

```
GDC - General DataComm Inc.        700A-G2              LTU
┌──────── E1 ────────┐ ┌─────── Loop 1 ──────┐ ┌─────── Loop 2 ──────┐
LOS RAI AIS UAS R-LOS LOFA LOS UAS LOSW MAJ MIN LOS UAS LOSW MAJ MIN

                            ┌──── Main Menu ────┐

                            ┌── Diagnostics ──┐

                                    ┌── HDSL Monitoring ──┐
                                    Loop1
                                    Valid Intervals: 74
                                    Interval Time  : 126

                                    ES  : 0     Last 24 Hr. ES  : 0
                                    UAS : 0     Last 24 Hr. UAS : 17
                                    SES : 0     Last 24 Hr. SES : 0
                                    FEBE: 0     Last 24 Hr. FEBE: 0



1/2    Loop Any key Next Screen R Reset HDSL Stat. ESC Cancel
```

Figure 3-6   HDSL Monitoring Screen

The `HDSL Monitoring` screen is similar to the `E1 Monitoring` screen, except that there is a loop field that identifies the HDSL loop and a `FEBE` field. *Table 3-4* describes these two fields.

Table 3-4 HDSL Monitoring Screen Fields

Fields	Display and Description
Loop	Identifies the loop applicable to the displayed diagnostic information.
FEBE	Number of far-end block errors reported by the remote HDSL unit in the current 15-minute interval.
Last 24 Hr. FEBE	Number of far-end block errors in the last 24-hour interval.

Operation

To display the HDSL Monitoring screen, select Item 2 on the Diagnostics menu. The sample screen above shows (displayed in the upper left-hand corner) Loop1, which is the default loop number, for the current 15-minute interval. To select the second loop (Loop2), just type 2. Typing 1 gets you back to the first loop.

To display the other 95 intervals within the current 24-hour period, press any key except 1, 2, R (r), and Esc. When you are viewing the statistics in this mode, you can toggle between the two loops by typing either 1 or 2.

To reset the counters for the HDSL statistics, type R (r) and a message appears, Reset HDSL Statistics? Pressing Enter when No (the default) is highlighted allows the counter to continue. Otherwise, when you use the ⬆ or the ⬇ to highlight Yes and then press Enter, all the displayed values are reset to 0 (⬅ and ➡ do not work in reset mode). To exit and return to the Diagnostics menu, press Esc. The display is cyclic, that is, the current interval is displayed again after the 95th interval.

HDSL Status

This 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 3-7*.
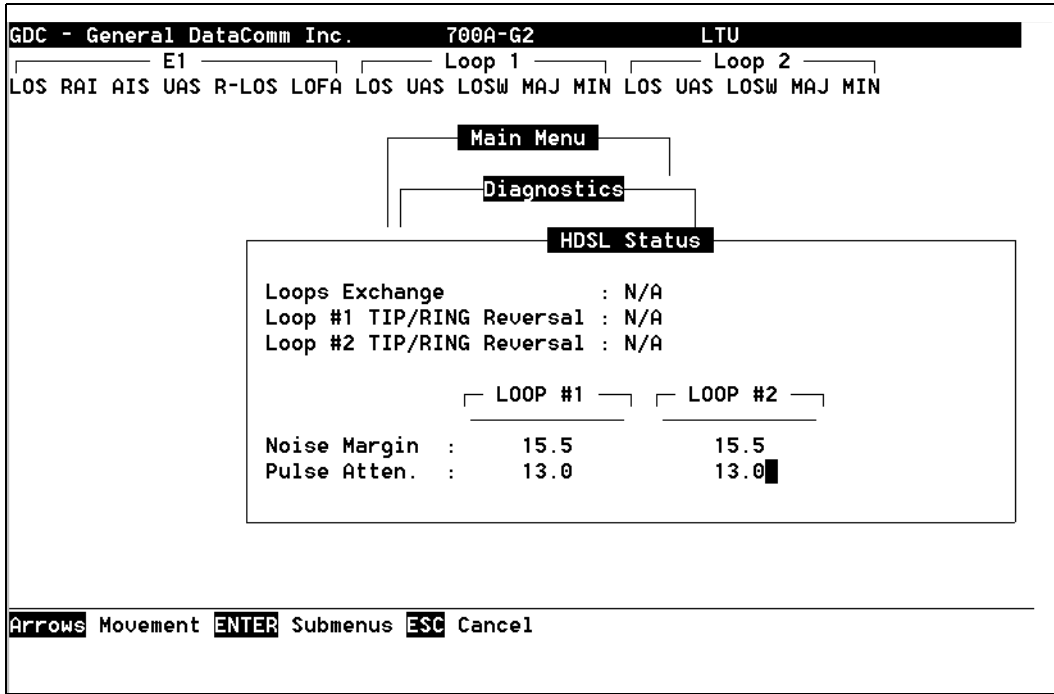
```
GDC - General DataComm Inc.        700A-G2              LTU
┌──────────── E1 ────────────┐ ┌────── Loop 1 ──────┐ ┌────── Loop 2 ──────┐
LOS RAI AIS UAS R-LOS LOFA LOS UAS LOSW MAJ MIN LOS UAS LOSW MAJ MIN

                          ┌──── Main Menu ────┐
                          │                   │
                          └─ Diagnostics ─┐   │
                          │               │   │
                          │        ┌ HDSL Status ┐
                    ┌─────┴────────┴─────────────┴──────────┐
                    │ Loops Exchange           : N/A        │
                    │ Loop #1 TIP/RING Reversal : N/A        │
                    │ Loop #2 TIP/RING Reversal : N/A        │
                    │                                        │
                    │                ┌─ LOOP #1 ─┐ ┌─ LOOP #2 ─┐
                    │                ─────────────  ───────────── │
                    │ Noise Margin  :     15.5         15.5   │
                    │ Pulse Atten.  :     13.0         13.0█  │
                    │                                        │
                    └────────────────────────────────────────┘


───────────────────────────────────────────────────────────────
 Arrows Movement ENTER Submenus ESC Cancel
```

Figure 3-7   HDSL Status Screen

Table 3-5 describes the fields on the HDSL Status screen.

Table 3-5 HDSL Status Screen Fields

`Loops Exchange`	Indicates whether the HDSL loops are correctly connected or have been interchanged by error.
	This information is available only when the two HDSL units connected in a link can exchange information, and is not applicable if unit is configured as an LTU. If the Loops Exchange indicates `Yes`, then the swapped wires must be corrected.
`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 two HDSL units connected in a link can exchange information, and is not applicable if unit is configured as an LTU. If Tip/Ring Reversal indicates `Yes`, the 700 series 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 two HDSL units connected in a link can exchange information, and is not applicable if unit is configured as an LTU. If Tip/Ring Reversal indicates `Yes`, the 700 series automatically detects and recovers from this condition.
`Noise Margin*`	Displays the noise margin, in decibels (dB), measured by the signal processing circuits of the 700A-G2. Separate values are provided for each HDSL loop.
`Pulse Attenuation*`	Displays the pulse attenuation, in dB, measured by the signal processing circuits of the 700A-G2. Separate values are provided for each HDSL loop.
*Note: Noise margin and pulse attenuation are valid only when the loop has completed its handshake with the opposite end.	

Operation

To display the `HDSL Status` screen, select Item 3 on the `Diagnostics` menu. The HDSL status screen has no sub-screens. After viewing the data on this screen, press any key to exit from this screen and return to the `Diagnostics` menu.

Cancel Startup

The `Cancel Startup` lets you cancel the 700A-G2 startup process at link initialization and when the synchronization between the two 700A-G2 units connected in a link is lost.

Operation

To instruct the 700A-G2 to stop performing the startup process, select Item 4 from the `Diagnostics` menu. Then, arrow down for `Yes` and press `Enter`. The default is `No`.

Configuration Menu

Use the `Configuration` menu to configure the E1 and the HDSL loop parameters.

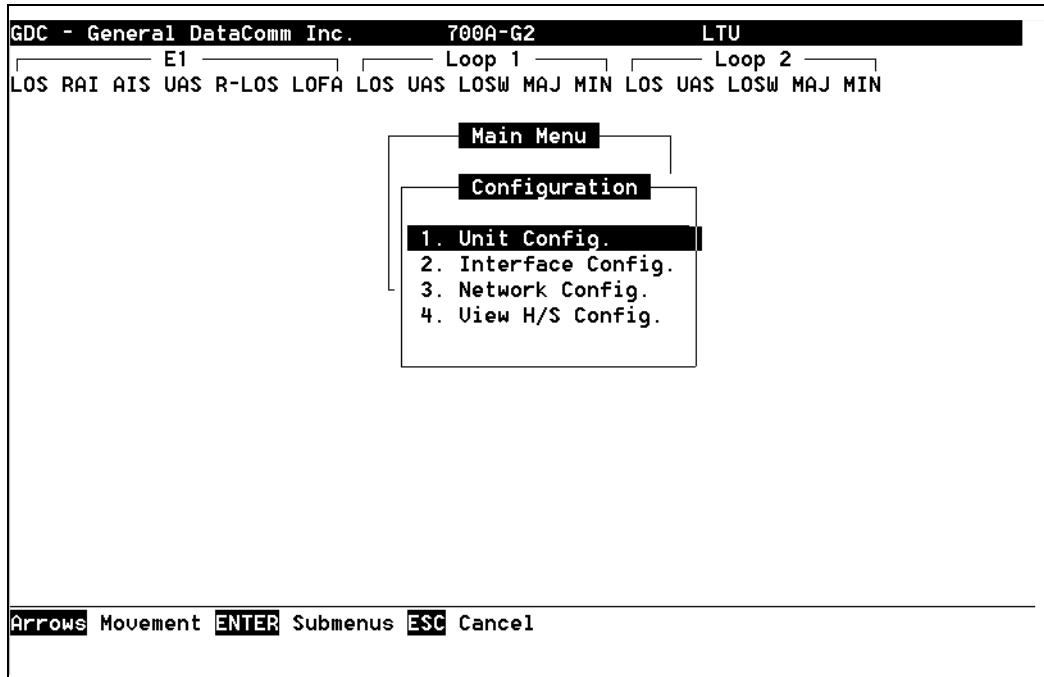To open the `Configuration` menu, select Item 2 on the `Main Menu`. *Figure 3-8* depicts the `Configuration` menu.

```
GDC - General DataComm Inc.        700A-G2              LTU
┌──────── E1 ────────┐ ┌──────── Loop 1 ────────┐ ┌──────── Loop 2 ────────┐
LOS RAI AIS UAS R-LOS LOFA LOS UAS LOSW MAJ MIN LOS UAS LOSW MAJ MIN


                           ┌──── Main Menu ────┐

                           ┌──── Configuration ────┐

                        ┌ 1. Unit Config.
                        │ 2. Interface Config.
                        └ 3. Network Config.
                          4. View H/S Config.




Arrows Movement ENTER Submenus ESC Cancel
```

Figure 3-8   Configuration Menu

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

- `Unit Configuration`

- `Interface Configuration`

- `Network Configuration`

- `View H/S Configuration`

Unit Configuration

The `Unit Configuration` option displays the `Unit Configuration` screen, showing the HDSL configuration parameters of the 700A-G2. A typical screen is shown in *Figure 3-9*.

```
GDC - General DataComm Inc.        700A-G2              LTU
┌─────────── E1 ───────────┐ ┌─────── Loop 1 ───────┐ ┌─────── Loop 2 ───────┐
LOS RAI AIS UAS R-LOS LOFA LOS UAS LOSW MAJ MIN LOS UAS LOSW MAJ MIN

                            ┌──────── Main Menu ────────┐
                            │                           │
                            └──── Configuration ────┐
                                │                   │
                            ┌───── Unit Configuration ─────┐
                            │                              │
                            │ Unit Type :        LTU       │
                            │ Enabled Loops:     2         │
                            │ Front Panel En:    Enable    │
                            │ Maj Alm Thres:     10^-4     │
                            │ Min Alm Thres:     10^-6     │
                            │                              │
                            └──────────────────────────────┘




─────────────────────────────────────────────────────────────────
Arrows Movement ENTER Option menus Ctrl-W Save Ctrl-D Defaults ESC Cancel
```
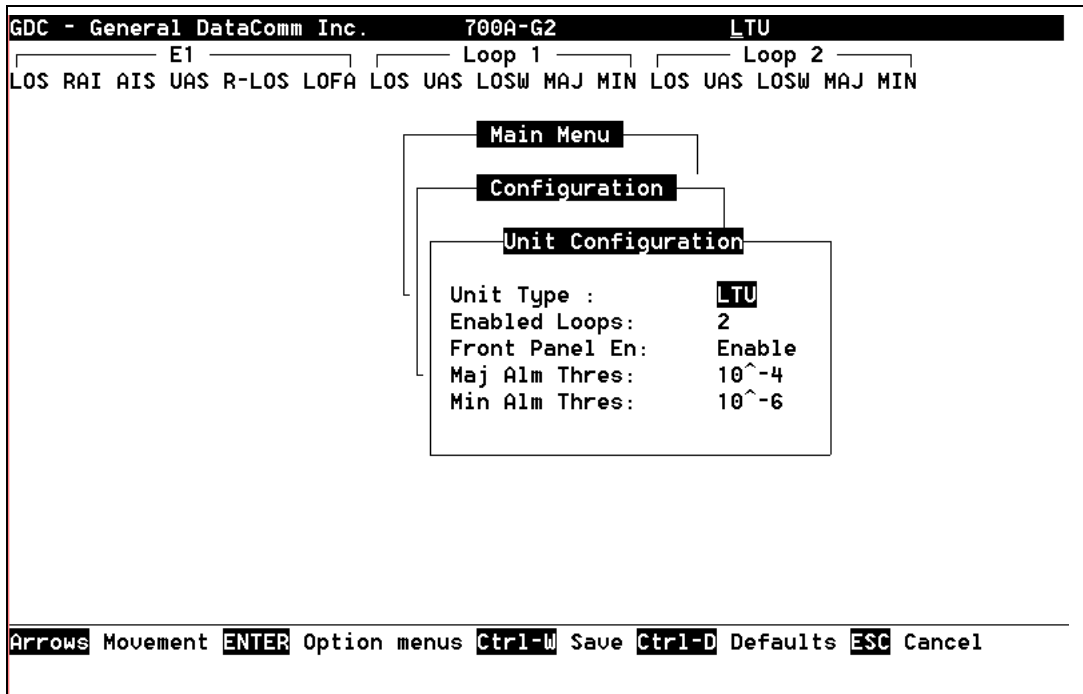
Figure 3-9   Unit Configuration Screen

The screen includes five fields that you use to select the unit configuration of the 700A-G2 on the HDSL loops side:

-     Unit Type

-     Enabled Loops

-     Front Panel Enable

-     Major Alarm Threshold

-     Minor Alarm Threshold

The screen includes the fields described in *Table 3-6*.

Table 3-6   Unit Configuration Screen Fields

Unit Type	Read-Only LTU - Line Terminating Unit NTU - Network Terminating Unit
Enabled Loops	1 or **2** loops
Front Panel En	**Enabled**: allows self-test diagnostics from the front panel. Disabled: prohibits self-test diagnostics from the front panel.
MAJ Alarm Threshold	Programmable threshold from 10^{-4} to 10^{-8} for determining incoming line bit error rate. Set to a higher threshold than MIN ALM THRES to indicate conditions of major line problems. $\mathbf{10^{-4}}$ is the default value
MIN Alarm Threshold	Programmable threshold from 10^{-4} to 10^{-8} for determining incoming line bit error rate. Set to a lower threshold than MAJ ALM THRES to indicate conditions of minor line problems. $\mathbf{10^{-6}}$ is the default value.
Default values are shown in **bold** type.	

Operation

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

1.   By using the up or down arrow keys, move the selection block to highlight the desired field and then press `Enter` or `Ctrl` and M.

2.   When the menu appears with the available options, use the arrow keys to select option and press `Enter`.

The option menu closes, and the new selection appears in the corresponding field.

3.   To reset the selected fields to the default values, press `Ctrl` and D.

4.   To save changes, press `Ctrl` and W.

5.   To quit and cancel the changes made in this screen, or to exit and return to the Configuration menu, press `Esc`.

Interface Configuration

The Interface Configuration option displays the Interface Configuration screen, showing the E1 configuration parameters of the 700A-G2. A typical screen is shown in *Figure 3-10.*
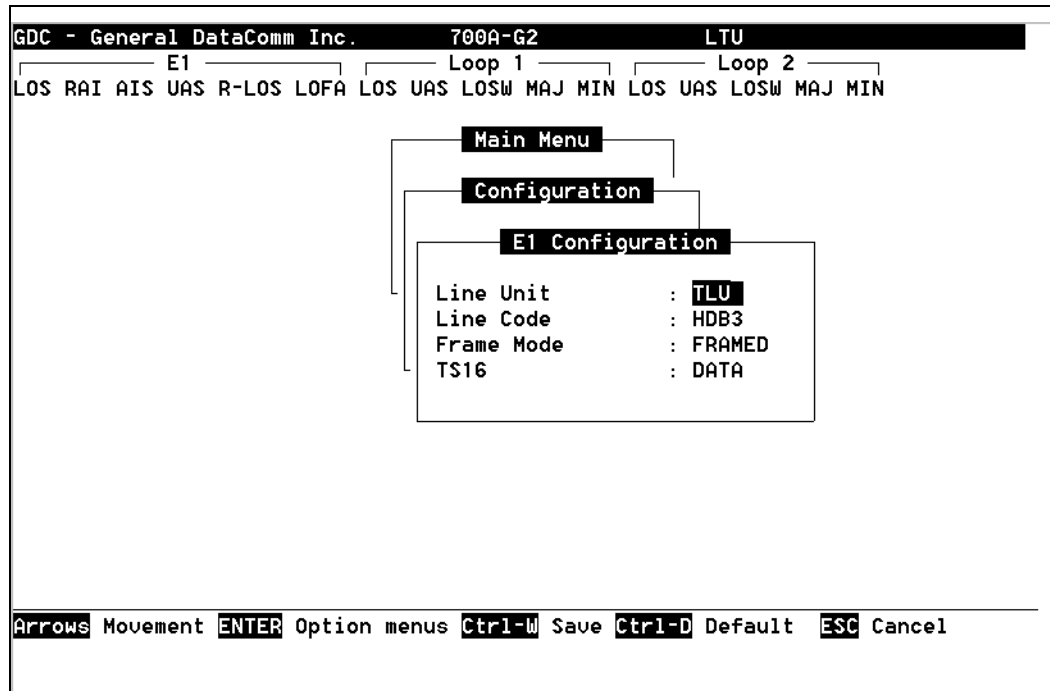
```
GDC - General DataComm Inc.        700A-G2           LTU
┌─────── E1 ───────┐  ┌─── Loop 1 ───┐  ┌─── Loop 2 ───┐
LOS RAI AIS UAS R-LOS LOFA LOS UAS LOSW MAJ MIN LOS UAS LOSW MAJ MIN


                    ┌─ Main Menu ─┐

                      ┌─ Configuration ─┐

                        ┌─ E1 Configuration ─┐

                        Line Unit      : TLU
                        Line Code      : HDB3
                        Frame Mode     : FRAMED
                        TS16           : DATA




Arrows Movement ENTER Option menus Ctrl-W Save Ctrl-D Default ESC Cancel
```

Figure 3-10   Interface Configuration Screen

The screen includes the fields described in *Table 3-7*.

Table 3-7   Interface Configuration Screen Fields

|	
Line Unit	Displays the current operating mode of the 700A-G2 with respect to the E1 trunk: ILU - 700A-G2 operates as an intermediate line unit and transparently transfers the E1 frames. **TLU** - 700A-G2 operates as a termination line unit and regenerates the E1 frames including the CRC.
Line Code	Displays the current E1 line code used by the 700A-G2: AMI - 700A-G2 uses the AMI line code. **HDB3** - 700A-G2 uses the HDB3 line code.
Frame Mode	Displays the current framing mode of the 700A-G2 with respect to the E1 trunk: **FRAMED** - 700A-G2 expects a framed E1 signal and maps the E1 data stream accordingly. UNFRAMED - 700A-G2 transfers the E1 signal on a bit-by-bit basis.
TS16	Displays the current E1 timeslot routing option: DATA - E1 Timeslot 16 is routed as a normal data channel to remotes. This option is required for operation with 730-D1/D2 remotes. **SIGNALING** - E1 Timeslot 16 carries signaling information and is routed to all remotes in a PTMP configuration, or on all loops in a PTP configuration. The default hard mode (switch) setting is for DATA timeslot routing; the soft mode default is SIGNALING.
Bold indicates default values.	

Operation

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

1.   Move the selection block to the desired field 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 field.

3.   To reset the selected fields to the default values, press `Ctrl` and D.

4.   To save changes, press `Ctrl` and W.

5.   To quit and cancel the changes made in this screen, press `Esc`.

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

Network Configuration

The Network Configuration option displays the Network Configuration screen, showing the network topology and timeslot routing options of the 700A-G2. A typical screen is shown in *Figure 3-11*.

Figure 3-11   Network Configuration Screen

Table 3-8 Network Configuration Screen Fields

`Application`	Determines whether the unit is being used in Point-To-Point (P2P) or in a Point-To-Multi-Point (P2MP) network configuration. The 700A-G2 is intended to be used in a P2P configuration, but may be used in a two-loop P2MP configuration.
`Loop`	Selects the HDSL loop that the Start `DS0` and `Consecutive DS0` options are being configured for. Not used for P2P mode. This is available for P2MP mode only; in P2P mode, this option should be left at `1`.
`Start DS0`	For P2MP mode, selects the starting DS0 of the contiguous block of DS0s being provisioned for a particular `Loop`. Not used for P2P, mode, except in a single loop P2P network configuration. In P2P mode, this option should be left at `1`.
`Consecutive DS0s`	For P2MP mode, selects the number of DS0s in the contiguous block of DS0s being provisioned for a particular `Loop`. Not used for P2P mode, except in a single loop P2P network configuration. In P2P mode, with two loops enabled, this option should be left at `0`.

Operation

1. To display the network configuration screen, select Item 3 on the configuration menu. This screen includes the fields as shown in *Table 3-8*.

2. To change the current value (`P2P` or `P2MP`) of the `Application`, highlight the current value and press `Enter`. Then, with the either the up or down arrow key, highlight either `P2P` or `P2MP`.

3. Press `Enter` again. This closes the two-option menu and sets the `Application` value.

NOTE
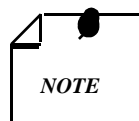
The following steps apply only if `PM2P` *is the* `Application` *value.*

4. To change the current value of the `Loop` to either `1` or `2`, toggle down by using the up or down arrow key. Then, use the either the space bar, `Shift` with `+` (plus), or `−` (minus) to change the digit.

5. To change the number of DSOs, toggle down to `Start DS0` by using the up or down arrow key, then press the `Shift` with `+` (plus) or the space bar to increase the DSOs (`1` through `32`); or use the `−` (minus) to decrease the DSOs to the desired number.

6. To change the number of consecutive DSOs, toggle down to `Consecutive DS0s` by using the up or down arrow key, then press the `Shift` with `+` (plus) or the space bar to increase the consecutive DSOs (`0` through `18`); or use the `−` (minus) to decrease the consecutive DSOs to the desired number.

7. To save the changes made in this screen press `Ctrl` and `W`, or to quit and cancel the changes made in this screen, press `Esc`.

8.   To return to the `Configuration` menu without saving, press `Esc`.

Point-To-Point Options

When the 700A-G2 is used in a P2P configuration, with the Interface Config. Frame Mode set for `FRAMED`, E1 payload is distributed along the HDSL loops with alternating DS0s on each HDSL loop, as shown in *Table 3-9*.

Table 3-9   E1 P2P Timeslot Routing

Routed E1 timeslots w/Interface Configuration 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	
Routed E1 timeslots w/Interface Configuration 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

In this configuration with a 700A-G2, 702-G2, or 720-G2 remote, the E1 payload is recombined at the remote end such that the full E1 frame is exactly reconstructed. When the Interface Config. Line Unit option is set for and `TLU`, Timeslot 0 of the E1 frame is regenerated; while in `ILU` mode, Timeslot 0 is passed transparently. Note that when the Interface Config. TS16 option is set for `DATA`, Timeslot 16 is only routed on Loop 1 to the remote. When the Interface Config. TS16 option is set for `SIGNALING`, it is assumed that time slot 16 of the E1 frame contains signaling information (such as that necessary for voice applications), and Timeslot 16 is routed on Loops 1 and 2. The reason for routing Timeslot 16 on both loops in this case is to insure that if one loop were to experience a fault condition, the Timeslot 16 data and a fractional number of payload timeslots would still be available at the remote, regardless of which loop is faulty.

In P2P mode, with Interface Config. Frame Mode set for `FRAMED`, a 730-D2 remote, and two loops enabled, the E1 DS0s are recombined into a user selectable aggregate data rate (V.35, EIA-530, X.21). For increasing 730-D2 aggregate rates, the 730-D2 data is sourced from the E1 DS0s in an increasing order, i.e, 1x64kbps are sourced from E1 DS0 1, 2x64kbps are sourced from E1 DS0s 1 and 2, 3x64kbps are sourced from E1 DS0s 1, 2, and 3, etc. Timeslot routing over the HDSL loops follows that shown in *Table 3-9*.

With two loops enabled in P2P mode and the Interface Config. Frame Mode set for `UNFRAMED`, an aggregate signal of 2048kbps must be provisioned using 700A-G2 (G.703), 702-G2 (G.703), 720-G2 (G.703), or 730-D2 (V.35, EIA-530, or X.21) remotes.

If only one loop is enabled in P2P mode and the Interface Config. Frame Mode is set for `FRAMED`, then a fractional E1 service is provided to the remote site, with a timeslot allocation following the consecutive DS0 pattern shown in *Table 3-10*. The Start DS0 and Consecutive options of the DS0 must be set as described below in P2MP Options for this case. Up to 17 G.704 DS0s may be provisioned for a 700A-G2, 702-G2, or 720-G1/G2 remote, and an aggregate nx64kbps signal up to 18x64kbps may be provisioned for a 730-D1/D2.

Point-To-MultiPoint Options

When the 700A-G2 is used in a P2MP configuration, with 720-G1 units as remotes, E1 payload is distributed along the HDSL loops in contiguous blocks of DS0s, with the remote E1 payload reconstructed such that the remote (NTU) DS0s are mapped into the same position in the E1 frame as they were at the local (LTU) side. A typical mapping example is shown in *Table 3-10*.

Table 3-10   Typical E1 P2MP Timeslot Routing (Data Mode)

If Network Configuration Options are set for:			
		remote 1	**remote 2**
Application	:	P2MP	
Loop	:	1	2
Start DS0	:	1	11
Consecutive DS0s	:	10	9
and the Network Configuration Options at each 720-G1 (NTU) are set for:			
		remote 1	**remote 2**
Application	:	P2MP	P2MP
Loop	:	1	1
Start DS0	:	1	11
Consecutive DS0s	:	10	9
Then the resulting timeslot allocation at remote 720-G1 E1 interface is:			

Remote 1:											
0	1	2	3	4	5	6	7	8	9	10	<ts 11 - 31 filled with 1s>

Remote 2:											
0	<ts 1 - 10 filled with 1's>	11	12	13	14	15	16	17	18	19	<ts 20 - 31 filled with 1s>

The 720-G1 units automatically configure themselves based on the setting of their Application, Start DS0, and Consecutive DS0s configuration options. In the P2MP configuration, Timeslot 0 of the LTUs recombined E1 frame and of the remote E1 frames are completely regenerated. Using E1 Timeslot 16 as a signaling channel is presently not supported in this configuration, and therefore, the TS16 option under the Interface Config. screen must be set for DATA. Finally, it should be noted that the contiguous blocks of DS0s routed to each remote are treated as an aggregate data stream, and therefore, byte alignment is not presently maintained between individual DS0s at the LTU as well as the corresponding DS0s in the reconstructed E1 frames at the remote units.

When used in a P2MP configuration with 730-D1 units as remotes, E1 payload is again distributed along the HDSL loops in contiguous blocks of DS0s, but here, the payload is reconstructed at the remote V.35 interface at a data rate corresponding to the number of DS0s selected to be routed along a particular loop (nx64kbps). The 730-D1 units automatically configure themselves based on the setting of their Application and Data Rate configuration option.

When 720-G1 units are used at the remote sites, up to 17 G.704 E1 timeslots are available at each remote site, with the exception that the total number of provisioned timeslots for all three remotes must be less than or equal to 31 timeslots. When 730-D1 units are used at the remote sites, a V.35 nx64kbps signal is available at each remote (up to 18x64kbps)--again except hat the total data rate of all three remote sites must be less than or equal to 31x64kbps.

NOTE
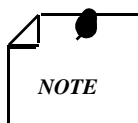
A short burst of errors occurs on a loop which is in normal operation when one of the other HDSL loops transition in or out of normal operation.

720G1/G2s and 730-D1/D2 remotes cannot simultaneously be connected to a 700A-G2 LTU.

View H/S Configuration

The View H/S Configuration option displays the Configuration & 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 personnel and is read-only. A typical screen is shown in *Figure 3-12*.
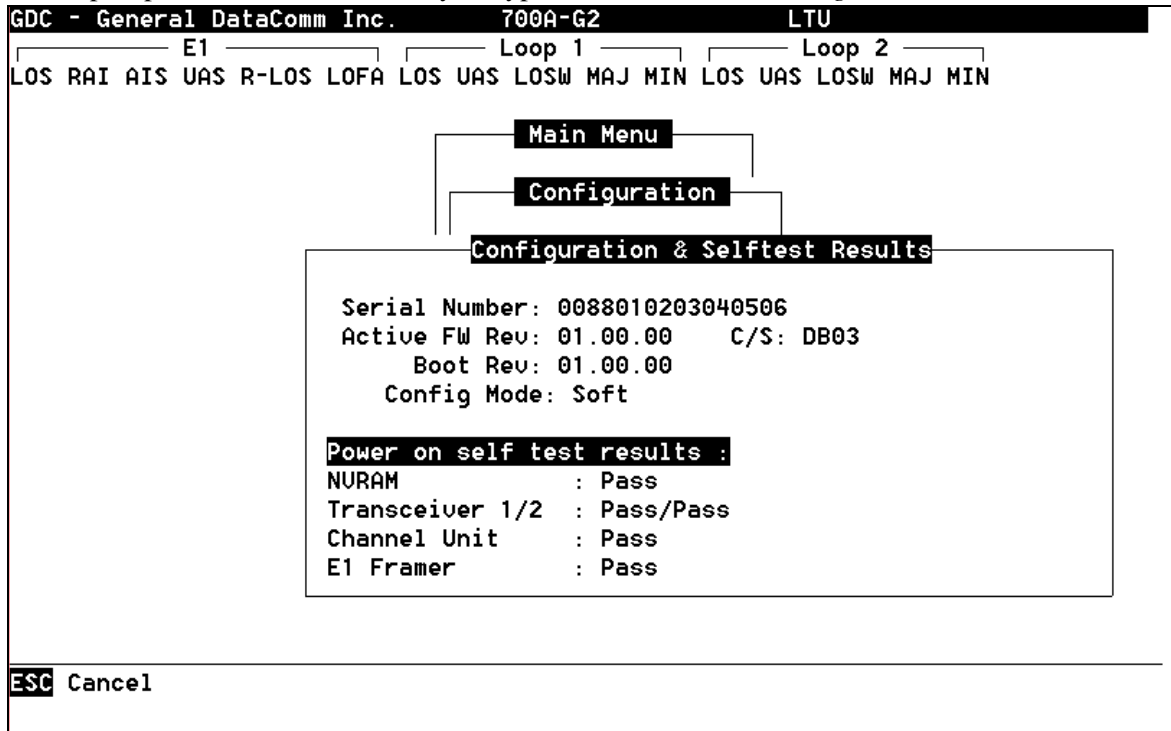
```
GDC - General DataComm Inc.       700A-G2           LTU
┌───── E1 ─────┐ ┌───── Loop 1 ─────┐ ┌───── Loop 2 ─────┐
LOS RAI AIS UAS R-LOS LOFA LOS UAS LOSW MAJ MIN LOS UAS LOSW MAJ MIN


                        ┌─────── Main Menu ───────┐


                         ┌─────── Configuration ───────┐


                          ┌─Configuration & Selftest Results─┐

                            Serial Number: 0088010203040506
                            Active FW Rev: 01.00.00   C/S: DB03
                                  Boot Rev: 01.00.00
                              Config Mode: Soft


                            ┌Power on self test results :┐
                            NVRAM              : Pass
                            Transceiver 1/2    : Pass/Pass
                            Channel Unit       : Pass
                            E1 Framer          : Pass


ESC Cancel
```

Figure 3-12   Configuration & Selftest Results Screen

The upper area presents configuration data. The lower area presents the results of the last power-on self-test. *Table 3-11* describes the fields in the screen.

Table 3-11   Configuration & Selftest Results Screen Fields

Serial Number	Displays the serial number of the unit.
Active FW Rev	Displays the version of the application firmware which is currently active. Version changes with new download.
C/S	Checksum Active of firmware application.
Boot Rev	Permanent revision number.
Config Mode	Displays the current configuration mode of the unit: Soft - The unit is configured under software control. Hard - The unit is configured by means of the internal switches.
Power on self test results:	
NVRAM, Transceiver 1/2, Channel Unit, and E1 Framer	Performance of devices or components on PC board are tested and designated as either passing or failing to operate.
The last power-on self-test results area lists several important subsystems of the unit tested during the self-test, and the self-test result, Pass or Fail.	

Maintenance Menu

You may refer to *Chapter 4 - Tests* to perform tests from the optional terminal.

Network Management

The UAS 700A-G2 can be used as a Network Managed element within a GDC Network Management System. The UAS 700A-G2 management software conforms to the MIB II (Management Information Base) standards set out for SNMP Version 1.0. Refer to the *Operating and Installation Instructions for SpectraComm Manager Card, Publication GDC 048R303-000.*
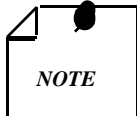
> *NOTE*
>
> *For the UAS 700A-G2, its LTU/NTU configuration determines how a Network manager can access the unit. When configured as an LTU (master unit), the 700A-G2 accepts commands from a Network Manager only by way of a SpectraComm Manager Card installed in the same shelf as the 700A-G2. When configured as an NTU (remote unit), the 700A-G2 accepts commands which have been forwarded by the HDSL far end master unit only.*

MIB Tables

This section consists of tables that list and describe the MIB objects by which you can configure, control, and monitor the UAS 700A-G2 using an SNMP network manager. 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

As how MIB objects appear on the screen and how they are manipulated varies with the network manager or MIB browser that you are using. The information in these tables is therefore intended to be used with the operating instructions for the manager or browser.
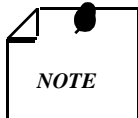
> *NOTE*
>
> *Many SNMP network managers and MIB browsers automatically perform a* Get *operation immediately following a* Set *to an object which permits read-write access. In that way, the success of the write operation is confirmed. If your manager or browser does not perform this function automatically, we recommend that you command a* Get *for each object you* Set*.*

Table 3-12   Version Group Table

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		Identifies the interface where 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		Version number of the firmware. This identifies the installed revision. The released version number is sequenced from A,...AA,...ZZ. Test versions are numerical from 01 to 99.
Model Number	Display String	Read-only		Determines the type of card family installed.

Table 3-13   Maintenance Table

MIB Object	Syntax	Access	Enumeration	Description
Maintenance Line Index	SC instance	Read-only		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.
Soft Reset	SC instance	Read-write	Reset (1) Norm (2)	Supports soft resetting of 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)	Hardware configuration mode of the unit. A unit may be hardware or software configured.
System Up Time	Time Ticks	Read-only		Reports the elapsed system tick time.
Unit Type	Integer	Read-only	LTU (1) NTU (2)	Defines HDSL type.
				LTU selects line terminating unit, NTU selects network terminating unit.
Default Initiate	Integer	Read-write	Default (1) Normal(2)	Allows the non volatile configuration to be reset to a factory default. Normal cannot be set by management.
Data Type	Integer	Read-write	Data (2) Voice (1)	Defines the HDSL data type, either data or voice.

Table 3-13 Maintenance Table (Continued)

Loop Provision	Integer	Read-write	Point-to-Point (1) Point-to-Multi-point (2)	Defines the HDSL loop provision. When P2P is selected, the unit is connected to another HDSL unit. When P2MP is selected, the unit is connected to more than one HDSL units or data grooming.
Number of Loops	Integer	Read-write	One Loop (1) Two Loops (2)	Defines the HDSL loop configuration. It can be set for one or 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))	General purpose storage.
Private Storage 2	Display String	Read-write	(Size (16))	General purpose storage.
Private Storage 3	Display String	Read-write	(Size (16))	General purpose storage.
LED Status	Octet 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.

Table 3-14 E1 Configuration Table

MIB Object	Syntax	Access	Enumeration	Description
E1 Config Index	SC instance	Read-only		Identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop, sub-identifier, and the E1 interface.
E1 Framing Mode	Integer	Read-write	Framed (1) Unframed (2)	Used to determine the E1 framing mode.
E1 Line Unit	Integer	Read-write	TLU (1) ILU (2)	Determines the operating mode of the HDSL system with respect to the E1 trunk. When TLU is selected, the system operates as a termination line unit, ILU the system operates as an intermediate line unit.

Table 3-14   E1 Configuration Table (Continued)

E1 Line Coding	Integer	Read-write	AMI (1) HDB3 (2)	Describes the variety of Zero Code Suppression used on the link, which in turn affects a number of it's characteristics. For E1 links with or without CRC use HDB3 or AMI.

Table 3-15   HDSL Diagnostic Table

MIB Object	Syntax	Access	Enumeration	Description
Diagnostic Index	SC instance	Read-only		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 Loop (4)	Supports the action of a diagnostic loop at the point indicated.
BER Test	Integer	Read-write	Inhibit (1) Enable (2)	Supports the action of bit error rate test. Set to inhibit, no BERT test in progress. Set to enable, BERT is in progress.

Table 3-16   HDSL Diagnostic Results Table

Object	Syntax	Access	Enumeration	Description
Diagnostic Results Index	SC instance	Read-only		Identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop, and sub-identifier, in this case, a network interface.
Test Execution Status	Integer	Read-only	In Sync (1) Not In Sync (2)	Current execution status of the diagnostic test. When set to In Sync, BERT test is in sync and BER rate is valid. When set to Not-In Sync, BERT test is not in sync, and BER rate is not valid.
Diagnostic Result Error Counts	Integer	Read-only	(0..65535)	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)	BER test intervals, defined as the time required for transmission of a block of bits.

Table 3-17   E1/HDSL Performance Tables

Current Performance Table				
MIB Object	Syntax	Access	Enumeration	Description
Current Index	SC instance	Read-only		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.
Current ESs	Gauge	Read-only		Number of errored seconds encountered by an E1 or loop interface in the current 15-minute interval.

Table 3-17   E1/HDSL Performance Tables (Continued)

Current SESs	Gauge	Read-only		Number of severely errored seconds encountered by a loop or E1 interface in the current 15-minute interval.
Current UASs	Gauge	Read-only		Number of degraded seconds encountered by a loop or E1 interface in the current 15-minute interval.
Current DMs	Gauge	Read-only		Number of degraded minutes encountered by the E1 interface in the current 15-minute interval.
Current FEBEs	Gauge	Read-only		Number of Far End Block Errors encountered by a loop interface in the current 15-minute interval.
Internal Performance Table				
Interval Index	SC instance	Read-only		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.
Interval Number	Integer	Read-only	(1..96)	Number between 1 and 96, where 1 is the most recently completed 15-minute interval and 96 is the least recently completed 15-minute interval (assuming that all 96 intervals are valid).
Interval ESs	Gauge	Read-only		Number of errored seconds encountered by a loop or E1 interface in one of the previous 97 individual 15-minute intervals.
Interval SESs	Gauge	Read-only		Number of severely errored seconds encountered by a loop or E1 interface in one of the previous 96 individual 15-minute intervals.
Interval UASs	Gauge	Read-only		Number of unavailable seconds encountered by a loop or E1 interface in one of the previous 96 individual 15-minute intervals.
Interval DMs	Gauge	Read-only		Number of degraded minutes encountered by the E1 interface in one of the previous 96 individual 15-minute intervals.
Interval FEBEs	Gauge	Read-only		HDSL loops Far End Block Errors.
Total Performance Table				
MIB Object	**Syntax**	**Access**	**Enumeration**	**Description**
Total Index	SC instance	Read-only		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.
Total ESs	Gauge	Read-only		Number of errored seconds encountered by an E1 or loop interface in the previous 24-hour interval.
Total SESs	Gauge	Read-only		Number of severely errored seconds encountered by a loop or E1 interface in the previous 24-hour interval.
Total UASs	Gauge	Read-only		Number of unavailable seconds encountered by a loop or E1 interface in the previous 24-hour interval.
Total DMs	Gauge	Read-only		Number of degraded minutes encountered by the E1 interface in the previous 24-hour interval.
Total FEBEs	Gauge	Read-only		Number of Far End Block Errors encountered by a loop interface in the previous 24-hour interval.

Table 3-18   Loop/E1 Performance Interval Maintenance Table

MIB Object	Syntax	Access	Enumeration	Description
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.
Reset Intervals	Integer	Read-write	Normal (1) Reset (2)	Resets loop/E1 performance intervals. When it is set to reset, the loop/E1 performance tables are set to zero.
Number of Valid Intervals	Integer	Read-only	(1..96)	Number of intervals collected. Each interval is an increment of 15 minutes.

Table 3-19   HDSL Status Table

Mib Object	Syntax	Access	Enumeration	Description
HDSL Loop Status Line Index	SC instance	Read-only		Status parameters associated with the managed object.
HDSL Loop Startup	Integer	Read-write	Normal (1) Start (2) Cancel (3)	Supports the action of initializing HDSL loop startup sequence. When set to start, HDSL unit re-initialize 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 Loop 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 Loop 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)	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 Attenuation is a whole number. 3. The value of five means HDSL Loop Pulse Attenuation is a real number and that 0.5 must be added to it.

Table 3-19 HDSL Status Table (Continued)

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)	Represents the HDSL Loop status. When set to normal, HDSL Loops are correctly connected. Set to exchange, the HDSL Loop has been inter-changed.

Table 3-20 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	E1, L1, L2
HDSL Unavailable Sec	Yes	E1, L1, L2
HDSL Errored Sec	Yes	E1, L1, L2
HDSL Loss of Sync Word	Yes	L1, L2
HDSL loss of Frame Align	Yes	E1
HDSL All Ones	Yes	E1
HDSL Remote Loss of Signal	Yes	E1
HDSL Remote Alarm Indicator	Yes	E1

Table 3-21   Download Table

MIB Object	Syntax	Access	Enumeration	Description
Download Index	SC Instance	Read-Only		The index value uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop, and interface.
Active Firmware Rev	Display String	Read-Only		Displays the version number of the firmware currently executing.
Stored Firmware Rev	Display String	Read-Only		Displays the version number of the firmware stored, but not currently executing.
Stored Firmware Status	Integer	Read-Only	Blank (1) DownLoading (2) OK (3) CheckSumBad (4) UnZipping (5) BadUnZip (6) DownloadAborted (7)	Represents the state of the stored firmware.
Switch Active Firmware	Integer	Read-Write	Norm (1) Read-Only Active (2) Write-Only	When set to Active, the unit resets and replaces the Active firmware with the stored firmware.
Downloading Mode	Integer	Read-Write	Disable (1) Enable and Write (2) Enable and Switch (3)	Enables/Disables Downloading and Switching to stored firmware.
Erase Flash	Integer	Read-Write	Normal (1) Read-Only Erase (2) Write-Only	When set to Erase, the unit erases memory for stored firmware. There should be a delay of two minutes before downloading data to unit.

Chapter 4 Tests

Overview

The UAS 700A-G2 provides a comprehensive set of features for testing operation and identifying trouble areas, using an optional terminal connected to the control port (CTRL) on the front panel.

> ⚠️ *The activation of any loopback disrupts the flow of user traffic.*

The UAS 700A-G2 displays the status of these tests through the TM indicator on the front panel.

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. This chapter provides instructions for managing the 700 system with the optional terminal and tells you how to enable and disable various E1 loopbacks.

Internal functions are checked when you first turn on power and during operation. The quality of the connecting communications line is also checked continuously during operation.

Troubleshooting Procedures

LEDs are OFF:

1. If all the LEDs are OFF, verify that the unit is properly seated in the shelf.

2. If the terminal is working, check the status of the unit using the View H/S Config option. If any of the test results show FAIL, return the unit for repair.

Start-up Continuously Fails:

1. If an HDSL red ES LED is continuously ON during start-up, the card is not receiving a signal from the far end of its channel. Check the loop connections between the two cards (LTU and NTU).

2. Verify that one card is configured as LTU and the other as NTU.

3. Check the status of the card using the View H/S Config option.

Metallic Access Testing

The UAS 700A-G2 provides front panel bantam jacks for customer use in testing the E1 lines and the unit circuitry. *Figure 4-1* illustrates the break-in points of these jacks.
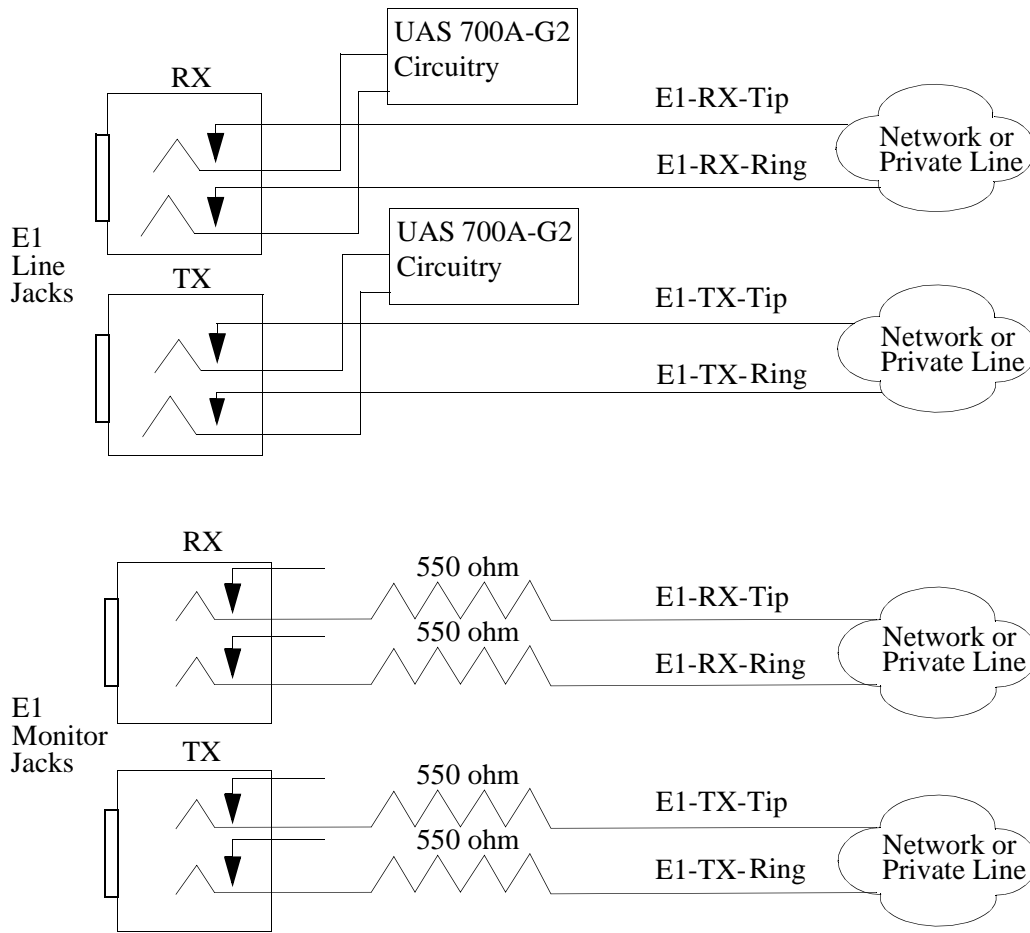
Figure 4-1   Metallic Access Jacks

Maintenance Menu

The Maintenance Menu, shown in *Figure 4-2*, is used to perform maintenance and troubleshooting activities. To open the maintenance menu, select Item 3 on the Main Menu and press Enter.
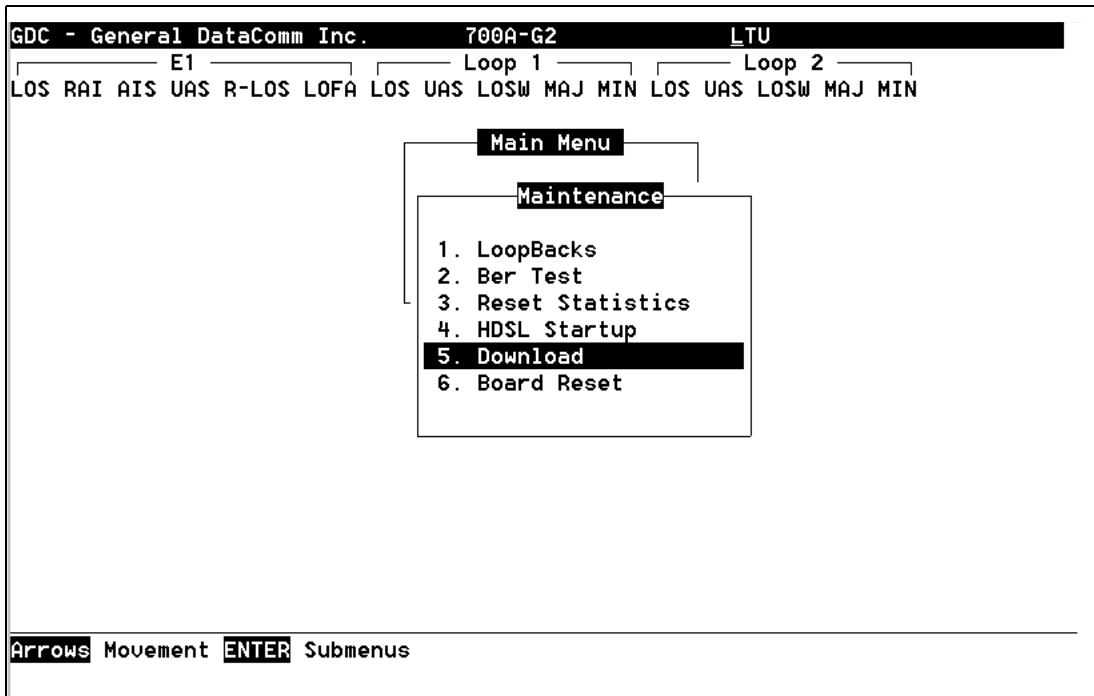
```
┌────────────────────────────────────────────────────────────────┐
│GDC - General DataComm Inc.      700A-G2           LTU           │
│┌────────── E1 ──────────┐ ┌────── Loop 1 ──────┐ ┌───── Loop 2 ─────┐│
│LOS RAI AIS UAS R-LOS LOFA LOS UAS LOSW MAJ MIN LOS UAS LOSW MAJ MIN│
│                                                                  │
│                              ┌──── Main Menu ────┐               │
│                              └──────────┐        └──┐            │
│                                   ┌──Maintenance─┐   │           │
│                            ┌──────┘              │   │           │
│                            │  1. LoopBacks       │   │           │
│                            │  2. Ber Test        │   │           │
│                            └──│  3. Reset Statistics│             │
│                               │  4. HDSL Startup    │             │
│                               │  5. Download        │             │
│                               │  6. Board Reset     │             │
│                               │                     │             │
│                               └─────────────────────┘             │
│                                                                  │
│                                                                  │
│                                                                  │
│─────────────────────────────────────────────────────────────────│
│Arrows Movement ENTER Submenus                                    │
└────────────────────────────────────────────────────────────────┘
```

Figure 4-2 Maintenance Menu

The functions available from the maintenance menu are as follows:

- Loopbacks

- BER Test

- Reset Statistics

- HDSL Startup

- Enable/Disable Downline Loading

- Board Reset

NOTE
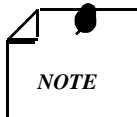
Performing loopbacks or BER *testing on any single loop causes a burst on the other loops which are in normal operation.*

Loopbacks

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

This function is used to initiate/terminate loopbacks on the user equipment interface (E1 or DCE) and on the HDSL loops, for maintenance purposes. The HDSL systems offered by GDC provide four types of test loopbacks. *Figure 4-3* shows the simplified signal paths when the loopbacks are connected.
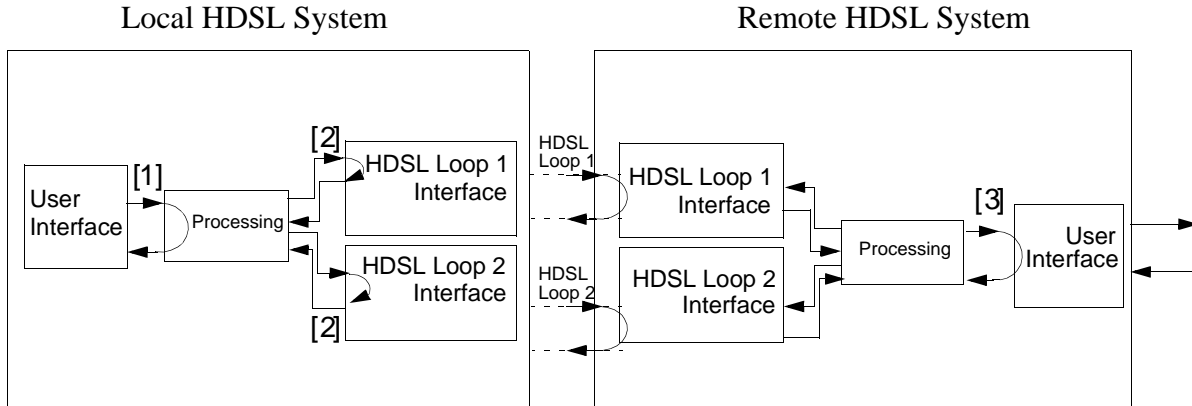
Line Loopback   [1]

HDSL Line Loopback   [2]   The status of these tests are displayed on the front panel

Remote Local Loopback   [3]

Figure 4-3   Loopbacks Signal Paths

Figure 4-4 illustrates a typical `Loopback Setting` screen for an HDSL system module using the E1 interface.
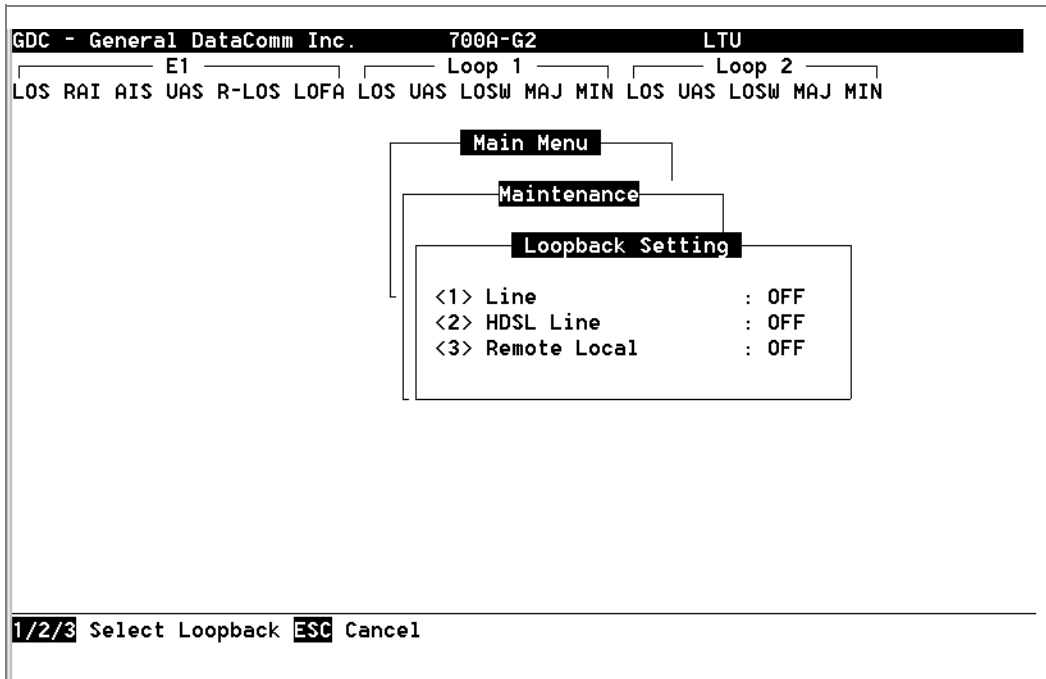
Figure 4-4   Loopbacks Screen

Operation

To select `LoopBacks` function, type 1 or press `Enter` if this function is already highlighted. Likewise, to choose any other line state, type 2, 3, 4, or 5; or use the arrow keys to toggle down or up, and then press `Enter`. To exit and return to the `Maintenance Menu`, press `Esc`.

Line

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

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

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

HDSL Line

The HDSL Line 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 HDSL Line 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. Therefore, during normal operation, the local user equipment should receive its own signal without errors.

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

Remote Local

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

When the remote local 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 equipment interface. Therefore, during normal operation, the local user equipment should receive its own signal without errors.

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

Considering Loopbacks Tests

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, you should initiate the loopbacks from the side serving as the LTU, because this lets you follow the signal path starting from the office and continuing toward the end user.

We recommend testing loopbacks in this order:

1. Line loopback.

2. HDSL line loopback.

3. Remote local loopback.

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

Only one loopback should be activated at any time.

⚠ *The activation of any loopback disrupts the flow of user traffic.*

BER Test

Testing Method

BER testing is performed by repeatedly transmitting a pseudo test sequence, having a length of 2^{-15}-1 bits, and then comparing it with the received sequence through an error detector. Any differences are assumed to be errors, which are then counted. To do a meaningful comparison, the 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, user 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 it can be a test loopback activated at the desired location as described in the LOOPBACKS section of this manual. Alternatively, an external BERT may be connected to the remote unit to facilitate testing.

Measurement are carried out over discrete intervals (an interval corresponds to the time required for the transmission of a block of 2^{21} bits). The number of errors that are counted in each interval can be as many as 255. If the actual number of errors for a given interval is higher, only this 255 maximum count is considered in the BER calculation. The calculated BER is updated at the end of each interval.

When configured as multi-point, the BER tester can be used on individual loops. If used in point-to-point operation, both HDSL loops are used to transmit the 2^{-15}-1 bit pattern.

The bit-error rate test can be done over an individual HDSL loop or over entire HDSL bandwidth. But only one BER test can be active at a time. For point-to-point operation, the BER test must be done over all loops simultaneously. For point-to-multipoint application, you can invoke the BER test on individual HDSL loops.

The BER test can be invoked through the GDC UAS controller, a supervisory terminal port, or a front panel switch.

Front panel TM LED illuminates when the BER test is activated. When the error detector is in sync and detects no errors, the TM led is constant. If, however, the error detector is not in sync or detects some errors, the TM LED blinks. See *Figure 4-5* which shows the self-tests.
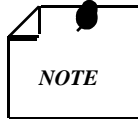
> *When the remote unit has an Nx64K DTE interface, such as V.35, then the BER test shows errors if the remote unit is not configured for full bandwidth (31x64Kbps for two loops and 18x64Kbps for one loop).*

NOTE

Front Panel BER Test

Front panel TST button is only applicable for point-to-point operation only; it does not function in point-to-multipoint. The TST button operates only if the front panel has been enabled by either the S1-2 switch, the soft option on the VT-100 unit configuration screen, or the UAS manager.
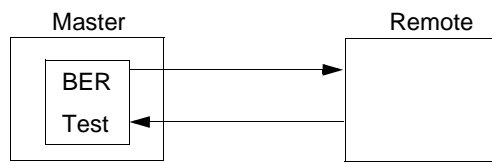
Master Self-Test:
Enable Master BER test. Be sure you have an external loopback
or test equipment at the remote unit to facilitate this test.
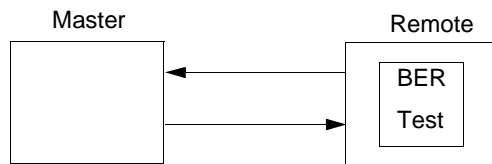
Remote Self-Test:
Enable Master BER test. Be sure you have an external loopback
or test equipment at the remote unit to facilitate this test.
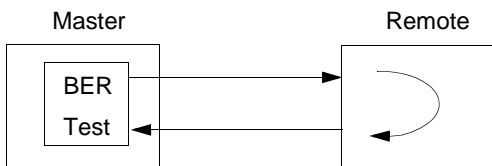
Self-Test with Remote Loopback:
From Master unit, assert Remote Loopback (RL) (activated via the
supervisory terminal or UAS manager) and enable BER test.

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

Figure 4-5   Test Configuration

BER Screen Description

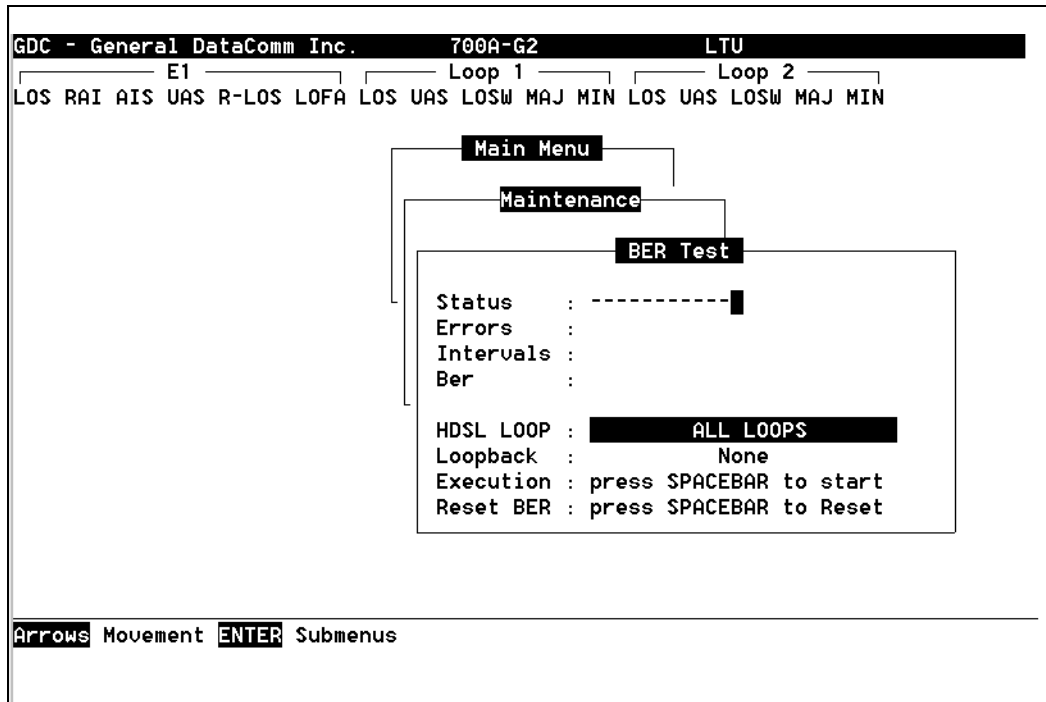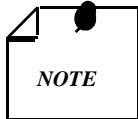A typical BER test screen for the HDSL system is shown in *Figure 4-6*.

```
GDC - General DataComm Inc.        700A-G2              LTU
┌────────── E1 ──────────┐ ┌───── Loop 1 ─────┐ ┌───── Loop 2 ─────┐
LOS RAI AIS UAS R-LOS LOFA LOS UAS LOSW MAJ MIN LOS UAS LOSW MAJ MIN

                          ┌────── Main Menu ──────┐
                              ┌── Maintenance ──┐
                                  ┌───── BER Test ─────┐
                          │  Status    : ----------█
                          │  Errors    :
                          │  Intervals :
                          │  Ber       :

                             HDSL LOOP :        ALL LOOPS
                             Loopback  :          None
                             Execution : press SPACEBAR to start
                             Reset BER : press SPACEBAR to Reset


Arrows Movement ENTER Submenus
```

Figure 4-6   HDSL 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 test loop and to start/stop BER measurement.

The fields of the BER Test screen are described in *Table 4-1*.

Table 4-1 BER Test Screen Fields

Field	Displays
Status	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.
Errors	Number of errors counted up to this point.
Intervals	Number of measurement intervals up to this point.
Ber	BER calculated up to this point.
HDSL LOOP	ALL LOOPS
Loopback	Displays the current state of the loopback activated for the BER test: None - 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 local loopback is activated for the BER test.
Execution	Displays the next state of BER measurement: Stop - BER measurement disabled; Start - BER measurement enabled.
Reset BER	Resets BER to zero.

Operation

1. To display the BER Test screen, select Item 2 on the Maintenance Menu.

2. Select desired HDSL test loop by moving the selection block to the HDSL loop field. Press space bar to select desired HDSL loop, None or Remote Local.

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.

4. Move the selection block to the Loopback line and press the space bar.

To enable or 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 press SPACEBAR to stop.

   Note that in press SPACEBAR to stop mode for Execution, no terminal keys function, except the up and down arrow keys for toggling between Execution and Reset BER.

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

3. To exit and return to the Maintenance Menu, make sure that BER testing has been disabled (Execution field would display press SPACEBAR to start), and press Esc.

To reset BER testing:

1. To reset the BER, move the selection block to the Reset BER field and press the space bar. The Reset BER field now resets the Status, Errors, Intervals, and Ber.

2. To exit and return to the Maintenance Menu, make sure that BER testing has been disabled, and press Esc.

You cannot exit the BER TEST screen while a BER test is running.

NOTE

When starting or stopping the BER TEST on one of the HDSL loop, other loop(s) see bursted errors on its data.

BER Test detector synchronizes and shows extensively error free for 1s and 0s.

You must exit the BER Test screen after running a BER test in order to release test mode and resume data transfer from the E1 interface.

If the remote unit is a 730-D2, then the 730-D2 must be configured for a data rate of 31x64K for proper BER operation.

Reset Statistic

The `Reset Statistics` option resets all the performance statistics entries of the 700A-G2.

Operation

To instruct the 700A-G2 to reset all the performance statistics counters:

1.   Select Item 3 on the `Maintenance Menu`. This displays 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 manually initiate the 700A-G2 HDSL Loop start-up process. Normally this process is automatically performed upon link initialization and whenever the synchronization between two linked HDSL units is lost.

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

To instruct the 700A-G2 to perform the HDSL start-up:

1.   Select Item 4 on the `Maintenance Menu`. This displays a dialog box with two options: `Yes` and `No`.

2.   To start up HDSL, move the selection block to `Yes`, and press `Enter`.

3.   To exit without starting up, press `Esc`, or move the selection block to `No` and press `Enter`.

Downline Loading

```
GDC - General DataComm Inc.        700A-G2              LTU
┌───────── E1 ─────────┐ ┌──────── Loop 1 ────────┐ ┌──────── Loop 2 ────────┐
LOS RAI AIS UAS R-LOS LOFA LOS UAS LOSW MAJ MIN LOS UAS LOSW MAJ MIN

                            ┌─────── Main Menu ───────┐

                              ┌──────── Maintenance ────────┐

                                ┌───── Download Mode ─────┐

                   Active FW Rev: 01.00.00
                   Standby FW Rev: -None-
                   Standby Status: INVALID - Unzip Failed

                   Download Mode: Disable Download


ENTER Change Mode Ctrl-W Save Ctrl-D Default  S  Switch Now  ESC Cancel
```
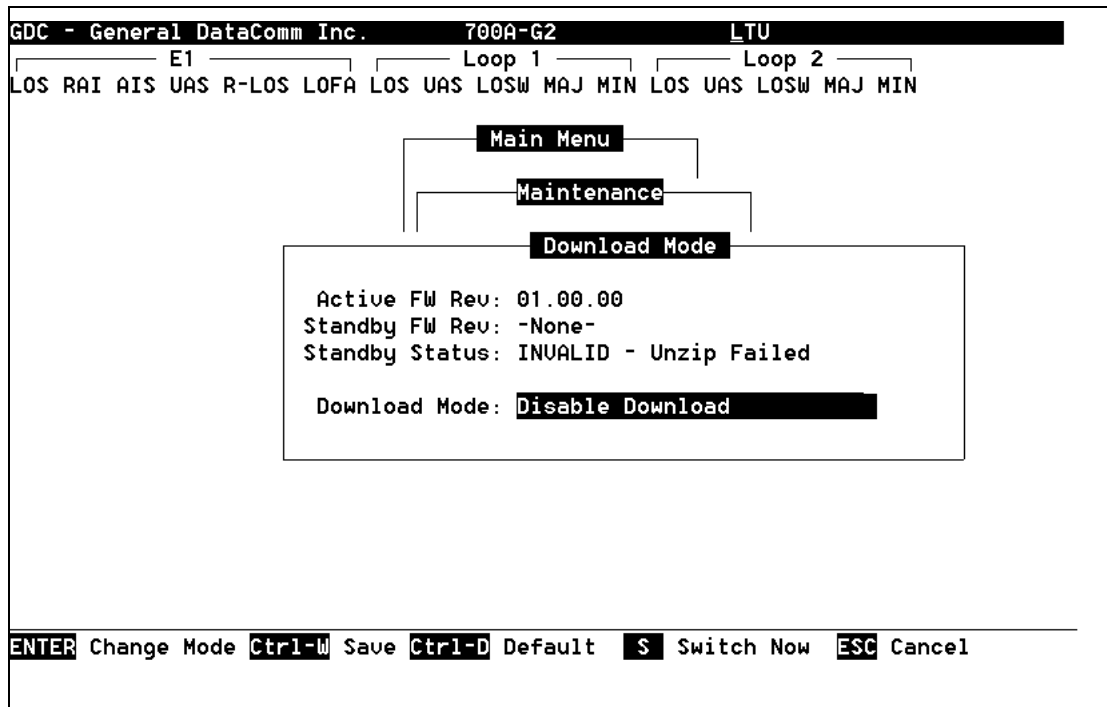
Figure 4-7   Download Screen

Table 4-2   Download Screen Fields

Field	Displays
Active FV Rev	Revision of the currently executing firmware.
Standby FW Rev	Revision of the stored firmware.
Standby Status	State of the stored firmware. When VALID, you may Switch the standby firmware to be the current executing firmware.
Download Mode	Current download mode: **Disable Download** - Disables downloading to unit. Enable Download, No Switch - Enables download, but does not switch active firmware. Enable Download and Switch - Enables download and automatic switching to download firmware when the download operation is complete.
Default values are shown in **bold** type.	

Operation

1.   To change the current value of Download Mode, press Enter. Then, with either the up key ⬆ or the down key ⬇, highlight your selection. Press Enter again.

2.   To switch to the standby firmware, press the S key.

3.   To save the changes, press Ctrl and W.
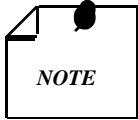
The TEAM management application changes Download Mode to the appropriate setting when download is initiated from TEAM. After the operation, Download Mode is returned to its original value.

NOTE

The 700A-G2 allows you to download new firmware to the unit without having to access or change any internal components. Refer to *Table 4-2*. The 700A-G2 can store two different compressed versions of its operating firmware. One version is always the currently operating firmware; the other is a standby version which can be switched to the active (currently operating) firmware (*Figure 4-7*).

You may load the standby version with new firmware either by way of the TEAM management software or by way of an SNMP TFTP session with the SpectraComm Manager Card (SCM). Downloading a new standby version does not disrupt data transfer.

To switch the active operating firmware to the standby version, you may use the TEAM management software, press S while in the Download Screen using the terminal interface, or you can carry out the following steps:

• To manually switch to the standby version, press the TST front panel button version immediately at power-up until all LEDs begin to flash.

You may release the TST button as soon as the LEDs begin flashing. While the unit is loading the standby version into active memory, the TM LED is on and the Loop 2 ES, Loop 2 NORM, and E1 ES LEDs flash in sequence. This process should last for a few minutes. Then, operation begins automatically from the newly activated version.

Board Reset

This option is used to reset the 700A-G2.

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

To instruct the 700A-G2 to perform the HDSL start-up:

1. Select Item 5 on the Maintenance Menu. This displays a dialog box with two options: Yes and No.

2. To reset the board, 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.

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