GDC 073R124-000
Issue 1, November 1996

Installation and Operation

Universal Access System 701-T2

General DataComm

Warning

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

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

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Table of Contents

Antistatic Precautions

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

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

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

Safety Guidelines

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

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

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

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

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

FCC Part 68 Compliance

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

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

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

Canada DOC Notification

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

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

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

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

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

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

Deutschland

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

Preface

Scope

This manual describes how to install and configure a General DataComm Universal Access System (UAS) 701-T2 and explains how to monitor and manage network devices. 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* introduces important concepts and features of the UAS 701-T2.
- *Chapter 2 - Installation* tells you how to install the UAS 701-T2. Only typical or fundamental applications are given because of the variety of specific customer system choices.
- *Chapter 3 - Operation* describes the front panels of the UAS 701-T2.
- *Chapter 4 - Tests* describes external tests.

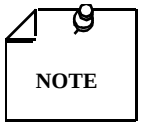
The *Index* contains the UAS 701-T2 subject and page number.

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.

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
- *Operating and Installation Instructions for Universal Access System, 3CM/HDSL Devices* GDC 058R699-V100

GDC publication numbers (e.g., *GDC 073R124-000*) are used to track and order technical manuals. Publication numbers use the following format:

GDC NNNRnnn-000 or GDC NNNRnnn-Vnnn

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

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

Glossary of Terms

2B1Q Code

HDSL line code

Address

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

BERT

Bit Error Rate Test, or tester.

A Binary Synchronous Communications protocol (BISYNC) that uses special characters to define the various fields of a message and for control functions. Typically used for transmission between a CPU and a CRT or batch-type processor. BISYNC accommodates a variety of transmission codes including ASCII, EBCDIC, and SBT (Six-Bit Transcode).

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

A binary digit, the representation of a signal, wave, or state, as either a binary zero or a one.

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; basic unit of measure for serial data transmission capacity; also kbps (kilobits) for thousands of bits per second; Mbps (megabits), for millions of bits per second; Gbps (gigabits) for billions of bits per second; Tbps (terabits) for trillions of bits per second.

CSU

Channel Service Unit.

Data

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

DDS

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

Diagnostics

Tests used to detect malfunctions in a system or component.

DSU

Data Service Unit.

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.

Modem

Modulator/demodulator; electronic device that enables digital data to be sent over (typically) analog transmission facilities.

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's output is connected to its receiver's 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.

1 System Description

Overview

The 701-T2 gives you local loop transmission for full and fractional T1 services, conforms to the HDSL standard, and operates on a two-wire metallic pair using High Bit-Rate Digital Subscriber Line (HDSL) technology. Using the 701-T2, a telephone company/carrier or an end user can transmit up to 1.544 Mbps on an unconditioned metallic cable. You can install the 701-T2 in the SpectraComm shelf (16 per shelf) for either the carrier central office or customer premises applications. There are three 701-T2 unit configurations:

- master connected to a remote 701-T2, 721-T2, or 731-D2
- unit connected to two single pair remotes, like 721-T2 or 731-D2 (point-to-multipoint)
- remote unit (NTU)

You can configure the 701-T2 as a single loop unit, so that the unit can operate with a 721-T2 or a 731-D2 NTU as point-to-point. Board dip-switches and/or jumpers let you configure and control the 701-T2; or you can control it from an optional ASCII terminal or from GDC's UAS Network Management System.

Specifications

This page presents you detailed technical aspects of the 701-T2.

Local Side	
Rate	1544 Kbps
Framing	SF or ESF per ATT Pub. 54016 or ESF per ANSI T1-403.
Interface	1544 Kbps DSX-1
Data Encoding	B8ZS or AMI
Transmission Line	
Rate	Dual duplex 392 Kbaud signaling rate, with 2B1Q line code (each loop)
Framing	HDSL framing per Bellcore TA-NWT-001210.
Transmit Power	13.5 dBm (+ - 0.5 dBm)
Meets performance specifications of Bellcore TA-NWT-001210.	
Test Features	
Local Loopback	Terminal screen selectable.
Remote Loop-back	Terminal screen selectable.
Self-Test	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, 4W max. +12 Vdc, 1W max. -12 Vdc, 1W max.
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

Applications

The Universal Access System (UAS) 701-T2 lets you connect to such equipment as:

Workstations	Data terminals
LAN bridges	Cluster controllers
Host mainframes	Mini-computers
Digital telephones	Telephone switches
Video terminals	Video conference stations
T1 multiplexers	Sub-rate multiplexers
VSAT terminals	Microwave equipment

GDC has designed the 701-T2 to handle typical functions for operating a LTU (Line Terminating Unit) or NTU (Network Terminating Unit). Using the 701-T2 you can connect any two devices like those listed above in a point-to-point link with inexpensive telephone wires. (*See Figures 1-1 through 1-5*).

Point-to-Point

Full T1

The 701-T2 can operate in one of several configurations. The first typical application is shown in *Figure 1-1*. You can connect the DSX-1 input/output of the units directly to a carrier central office, T1 cross-connect, a Digital Cross-Connect System, or into a higher order multiplexer for inter-office transport. For full T1 service-provisioning applications, connect the master 701-T2 to a slave 701-T2 or 721-T2. Also, you can use the 701-T2 transport to extend 1.544 Mbps service within your place of business.

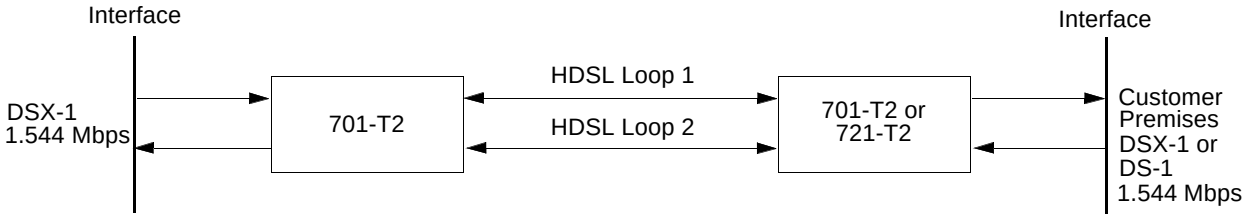


Figure 1-1 Full T1

Full T1 to Remote V.35

You can use a 701-T2 in conjunction with a 731-D2 to provide 1.536 Mbps in a V.35 interface at the customer's premises. *See Figure 1-2 below.*

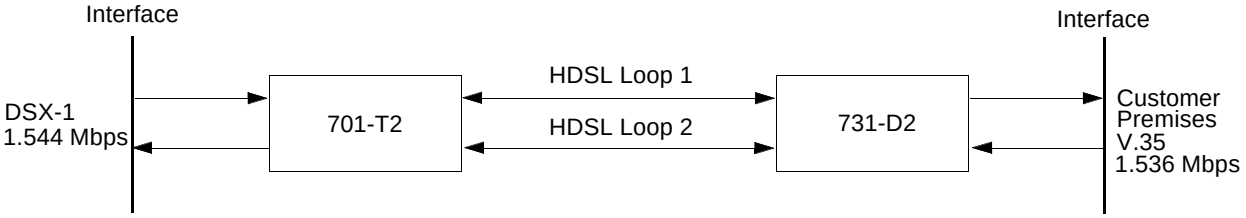


Figure 1-2 Full T1 to Slave V.35

T1 to Nx64K V.35

You can use the 701-T2 to provide Nx64 Kbps data service to a customer's site from a central office location. When you use the 731-D2 remote unit in a single loop provisioning configuration, a V.35 Nx64 Kbps signal is available (up to 12x64 Kbps). When you use the 731-D2 remote unit in a two-loop configuration, a V.35 Nx64 Kbps signal is available at the customer's site (configurable up to 24x64 Kbps). *See Figure 1-3.*

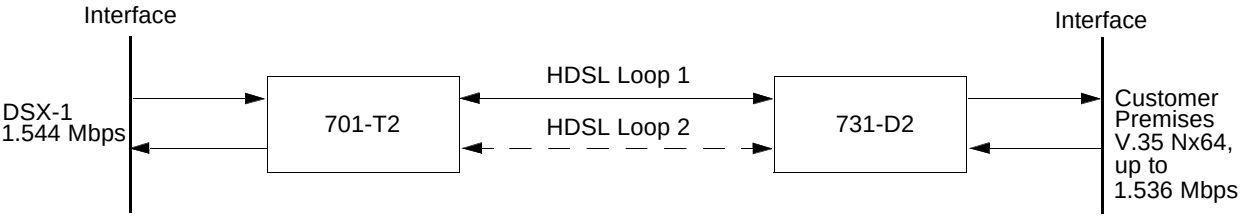


Figure 1-3 T1 to Nx64K V.35

Point-to-Multipoint

HDSL Units at Two Locations

You can connect the 701-T2 to HDSL units at two different locations using the point-to-multipoint configuration. This is useful for combining customer's data into a single DSX-1 interface, which then can be sent to the network for proper routing. *See Figure 1-4.*

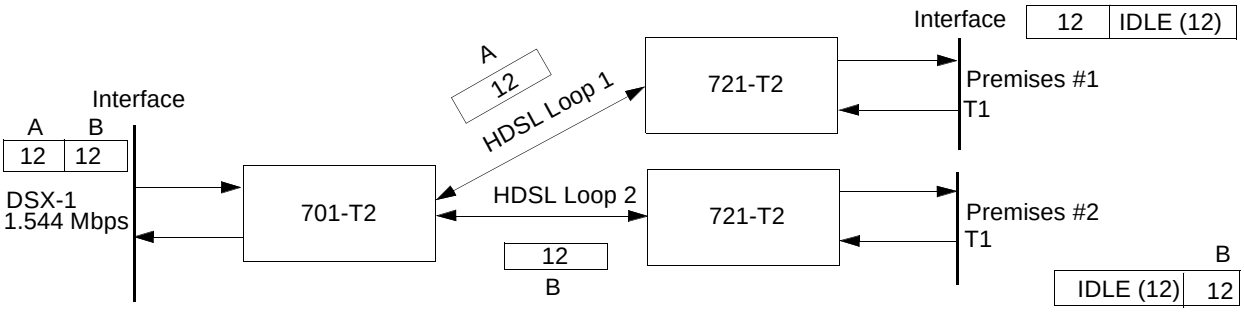


Figure 1-4 Point-to-T1 Multipoint

The 701-T2 maps the DS0s or V.35 Nx64 Kbps from the individual customer sites into proper alignment in its DSX-1 frame. When you use 721-T2 units at the remote sites, up to 12 T1 time slots are available at each remote site.

When you use 731-D2 units at the remote sites, a V.35 Nx64 Kbps signal is available at each remote location (up to 12x64 Kbps). *Chapter 3 — Operation* describes in detail these time slot mapping functions. *See Figure 1-5.*

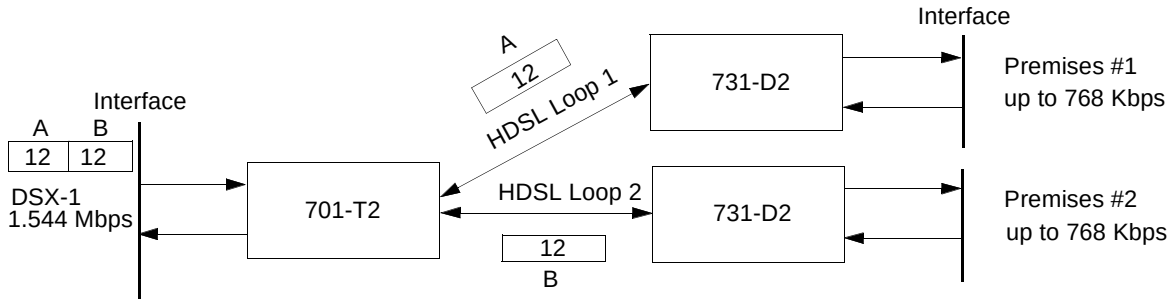
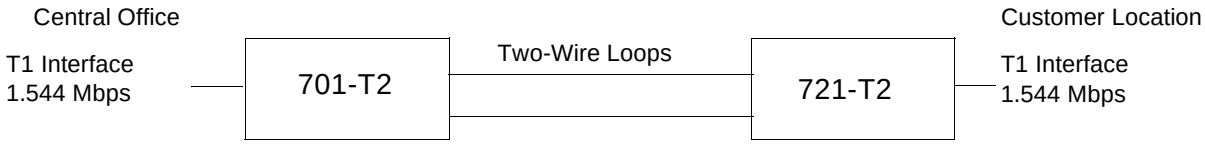


Figure 1-5 Point-to-V.35 Multipoint

Configurations

Figures 1-6 through *1-9* show typical system configurations.

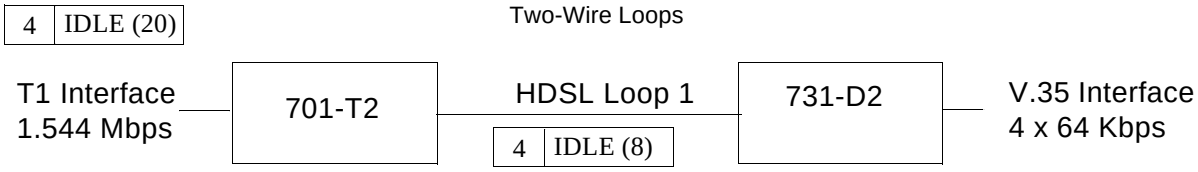


Unit Type:	LTU	NTU
Enabled Loops:	2	2
Front Panel Enable:	N/A	Enabled
T1 Interface:	N/A	DSX-1
Line Code:	B8ZS	B8ZS
Frame Mode:	ESF/ANSI	ESF/ANSI
Line PreEqualization:	0-133*	0-133*
Loopback Type:	Line	Line
AIS Loopdown:	Inhibit	Inhibit

Network Configuration	LTU	NTU
Application:	P2P	P2P
Loop 1 Start DS0:	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

*Set line pre-equalization according to the T1 transmit line length of the application.

Figure 1-6 Point-to-Point Application

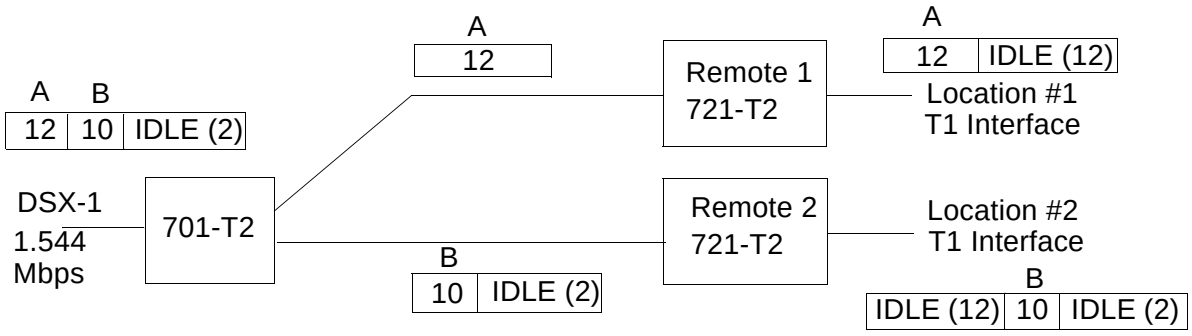


Unit Type:	LTU	NTU
Enabled Loops:	1	1
Application:		P2P
Front panel Enable:		Enabled
Tx Clock Mode		Looped
CTS Mode		On
Data Rate:		4 x 64 Kbps
V54 Rx Mode		Enabled
FP RL Mode:		V54
Line Code:	B8ZS	
Frame Mode:	ESF/ANSI	
Line PreEqualization:	0-133*	
Loopback Type:	Line	
AIS Loopdown:	Inhibit	

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

*Set line pre-equalization according to the T1 transmit line length of the application.

Figure 1-7 Single Loop Nx64K Service

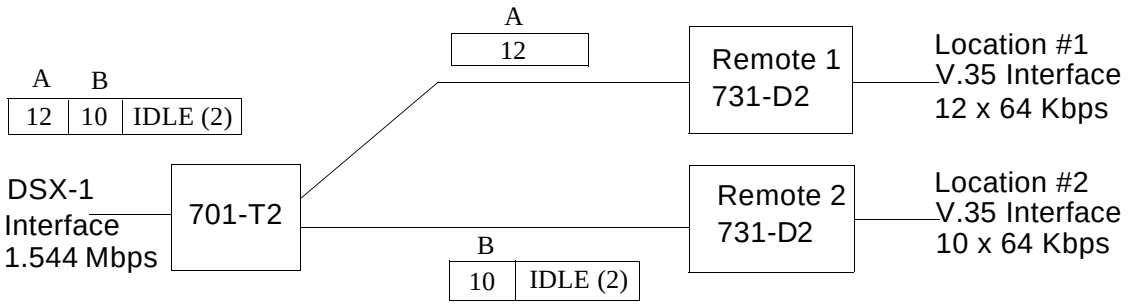


		Remote 1	Remote 2
Unit Type:	**LTU**	**NTU**	**NTU**
Enabled Loops:	2	1	1
Line Code:	B8ZS	B8ZS	B8ZS
Frame Mode:	ESF/ANSI	ESF/ANSI	ESF/ANSI
Line PreEqualization:	0-133*	0-133*	0-133*
Loopback Type:	Line	N/A	N/A
AIS Loopdown:	Inhibit	Inhibit	Inhibit

Network Configuration	**LTU**	**Remote 1**	**Remote 2**
Application:	P2MP	P2MP	P2MP
Loop 1 Start DS0:	1	1	13
Loop 1 Consecutive DS0:	12	12	10
Loop 2 Start DS0:	13	N/A	N/A
Loop 2 Consecutive DS0:	10	N/A	N/A

*Set line pre-equalization according to the T1 transmit line length of the application.

Figure 1-8 Point-to-Point MultiPoint - T1



		Remote 1	Remote 2
Unit Type:	**LTU**	**NTU**	**NTU**
Enabled Loops:	2	1	1
Application:	P2MP	P2MP	P2MP
Front Panel Enable:	N/A	Enabled	Enabled
Line Code:	B8ZS		
Tx Clock Mode		Looped	Looped
Frame Mode:	ESF/ANSI		
CTS Mode:		On	On
Data Rate		12 x 64 Kbps	10 x 64 Kbps
V54 Rx Mode:		Enabled	Enabled
FP RL Mode:		V54	V54
Line PreEqualization:	0-133*		
Loopback Type:	Line		
AIS Loopdown:	Inhibit		

Network Configuration	**LTU**
Application:	P2MP
Loop 1 Start DS0:	1
Loop 1 Consecutive DS0:	12
Loop 2 Start DS0:	13
Loop 2 Consecutive DS0:	10

*Set line pre-equalization according to the T1 transmit line length of the application.

Figure 1-9 Point-to-Point MultiPoint - V.35

Diagnostics/Network Management

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

You can also use the 701 as a shelf unit as part of the Universal Access System (UAS). The UAS is a family of network managed metallic looped, transmission products. A shelf-mounted UAS family member works with a standalone unit located at the far end of the access loop. You can get full network management capability if you use the SpectraComm Manager (SCM) and its interface into an SNMP controller.

Table 1-1 Equipment List

Description	GDC Part Number
UAS 701-T2	073P300-001
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 V dc) Includes two 8-slot, dual RJ45 Zone 1 connector panels	010M055-001
SpectraComm Shelf MS-2E 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 V dc, with redundant power supplies) Includes two 8-slot, dual RJ45 Zone 1 connector panels	010M070-001
SpectraComm Shelf MS-2 Model 7 (100/120 VAC) Includes 50-pin, mass-termination Zone 1 connector panel	010M073-001
SpectraComm Shelf MS-2E Model 8 (220/240 VAC) Includes 50-pin, mass-termination Zone 1 connector panel	010M074-001
SpectraComm Shelf MS-2E Model 9 (-48V, -60V dc) Includes 50-pin, mass-termination Zone 1 connector panel	010M075-001
SpectraComm Shelf MS-2E Model 12 (-48V, -60Vdc with redundant power supplies) Includes 50-pin, mass-termination Zone 1 connector panel	010M076-001
Universal Backplane frame grounding kit	010K071-001
Cables	
Interface cable, RJ48C plug to 9-pin female (HDSL port-to-terminal connections)	027H250-010
Interface cable 50-pin Amp connector to six 8-position modular jacks. Each cable can support up to six cards.	024H608-002
Interface cable, RJ48C plug-to-plug (CSU network port to the T1 line for any housing except a DataComm Shelf) (10 to 50-foot lengths; 10-foot length included with standa-lone enclosure models)	022H024-XXX
Interface cable, RJ48C plug-to-15-pin male (CSU network port to the T1 line: a. Any housing except a DataComm Shelf b. Canadian installation only; or optional cascade port to DTE) (10 to 50-foot lengths)	022H022-XXX
Interface cable, RJ48C plug to 15-pin female (CPE port to the T1 line, for Canadian in-stallation only) (10 to 125-foot lengths)	022H020-XXX
Interface cable, RJ48C plug-to-25-pin male (CPE port to multiplexer/DTE, any housing except a DataComm Shelf) (10 to 50-foot lengths)	027H218-XXX
Front panel access test jack patch cable (male-to-male) (24 and 60-inch lengths)	830-005-XXX
Front panel access test jack patch cable Bantam-to-WECO 310 (4 feet)	830-021-S001
Bantam-to-WECO 310 adapter plug	209-026-S001

2 Installation

Overview

This chapter guides you through installing and using the UAS 701-T2 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 and how to install and integrate the 701-T2 in your network.

Unpacking and Handling

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

Installation

1. You may install the 701-T2 in a standalone enclusre or in a SpectraComm Shelf. All electrical connections are made through the backplane interface.
2. Place the unit in a ventilated area where the ambient temperature does not exceed 122°F (50°C).
3. Do not install the unit directly above equipment that generates a large amount of heat (such as power supplies).

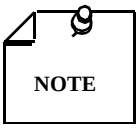
Shelf

To install the SpectraComm Shelf, refer to *Operating and Installation Instructions for SpectraComm/UAS Shelf, GDC Publication Number 010R302-000,* and to *Operating and Installation Instructions for SpectraComm Manager Card, GDC Publication Number 048R303-000*.

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.

Setting Hard Options

Setting the hard options on the cards means adjusting configuration Switches S34 and S35 and jumpers to match your network operation. *Table 2-1* explains the functions of the switches and jumpers, and *Figure 2-1* shows their locations. You can choose the hard configuration by Switch S34-1.



The microprocessor in the 701-T2 *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.*

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

Table 2-1 Option Selection

Switches	Description
S34-1 (SFT/HRD)	Selects either soft or hard configuration mode. **Open - Configuration is restored from non-volatile memory.** Closed - Configuration is obtained from basecard switches.
S34-2 (LTU/NTU)	Selects whether unit is configured as a line terminating unit (LTU) or network terminating unit (NTU). **Open - LTU** Closed - NTU
S34-3 (2LP/1LP)	Selects the number of enabled loops. **Open - Two loops enabled** Closed - One loop enabled
S34-4	Future use.
S34-5, S34-6 (TMG0, TMG1)	T1 Timing:Clock Source: **TMG0=Open, TMG1=Open:Looped - Clocked derived from T1 received signal.** TMG0=Open, TMG1=Closed:Internal - 701-T2 generates clock source TMG0=Closed, TMG1=Closed:External - Station clock from connector P2, Pins 11 and 24
S34-7 (SPARE)	Future use.
S34-8 (SPARE)	Future use.
S35-1, S35-2 (FRM0, FRM1)	T1 Framing **FRM0=Open,FRM1=Open: ESF/ANSI** FRM0=Open,FRM1=Closed: ESF/54016 FRM0=Closed,FRM1=Open: SF FRM0=Closed,FRM1=Closed: UNFRAMED
S35-3 (B8ZS/ AMI)	Selects T1 line coding. AMI (Alternate Mark Inversion) or B8ZS (Bit 8 zero suppression) **Open - B8ZS** Closed - AMI
S35-4 (RPEN/ DIS)	Future use for remote power enable.
S35-5, S35-6, S35-7 (TXLN0, TXLN1, TXLN2)	Selects T1 transmit line build-out. The switches are: S35-5 S35-6 S35-7 **Open Open Open 0-133 ft.** Closed Open Open 133-266 ft. Open Closed Open 266-399 ft. Closed Closed Open 399-533 ft. Open Open Closed 533-655 ft.
S35-8 (SPARE)	Future use.
Jumpers	**Description**
X11, X15	These must be shorted. Removal with remote power option installed enables sealing current remote power feeding.
X30 (JTAG)	For factory use. (Install jumper for normal operation.)
X31 (T1 Source)	Determines whether T1 signals are routed to/from Connector P1 or Connector P2. The four-position jumper bock should be connected, shorting Pins 1 and 2 for P1 connection (factory default); Pin 2 shorted to Pin 3 connects T1 through P2.
Factory defaults are shown in **bold** type.	

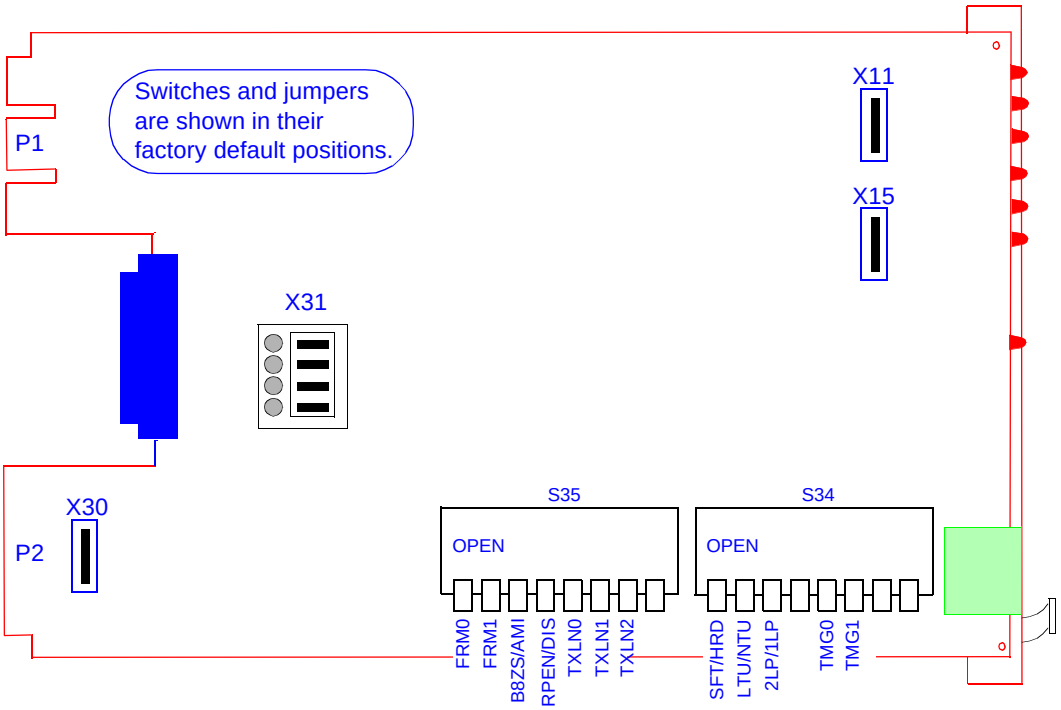


Figure 2-1 Option Switch and Jumper Locations

Electrical Connections

The following paragraphs describe the power and communications lines to the 701-T2

Power

The 701-T2 gets its power directly from the SpectraComm Shelf.

Signals

See *Figures 2-2 through 2-5* for instructions, which follow.

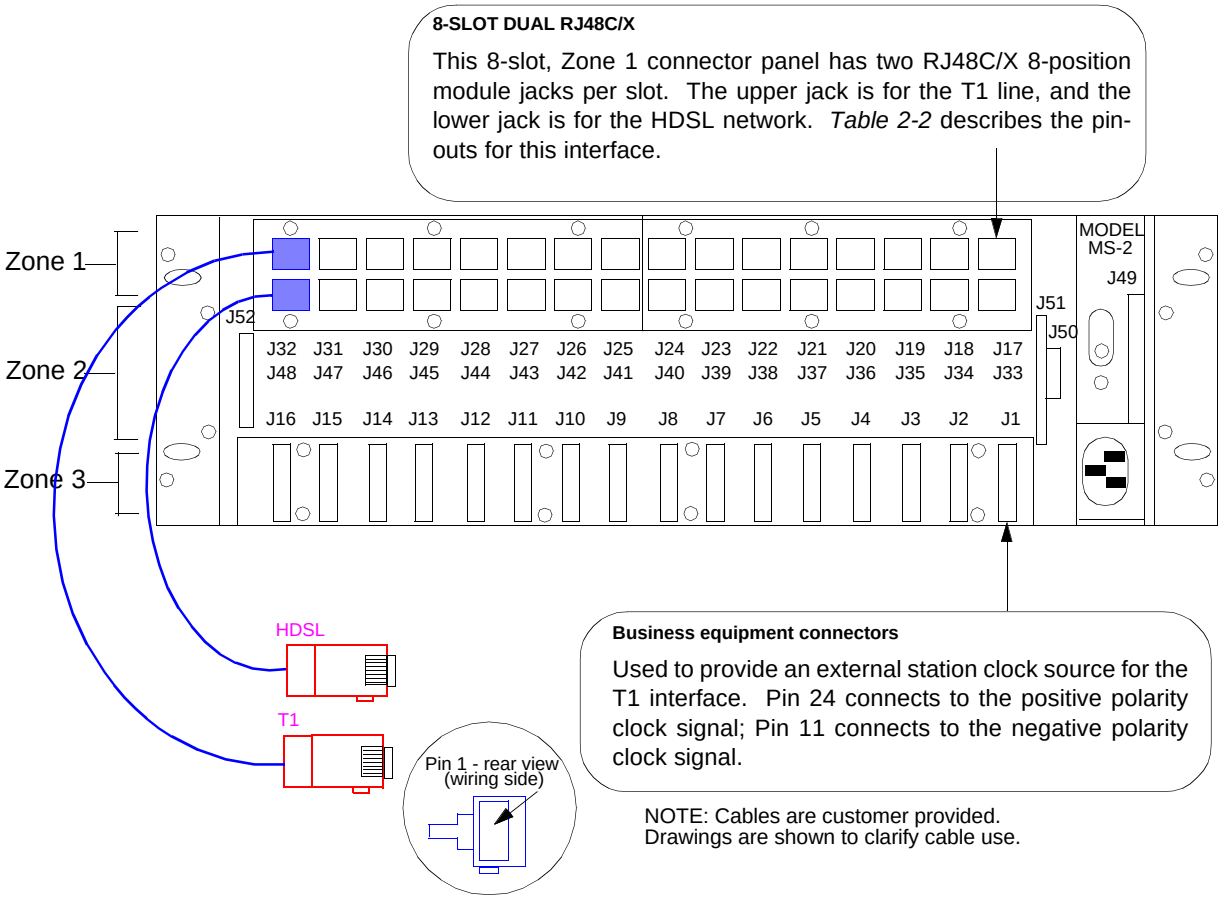


Figure 2-2 Rear Panel SpectraComm Shelf

Below is *Table 2-2*, showing you the RJ48C/X interface pin-outs for the rear panel SpectraComm shelf. Following this table is *Figure 2-3*, which illustrates the T1 Line and HDSL jacks.

Table 2-2 RJ48C/X 8-Position Interface Pin-Outs

Connector Pin Assignments T1 Connectors		
Pin No.	**RJ48C/X**	**Color**
1	T1-RX-R	Blue
2	T1-RX-T	Orange
3		Black
4	T1-TX-R	Red
5	T1-TX-T	Green
6		Yellow
7		Brown
8		Slate
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

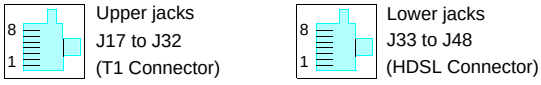


Figure 2-3 Jacks for the T1 Line and HDSL Network

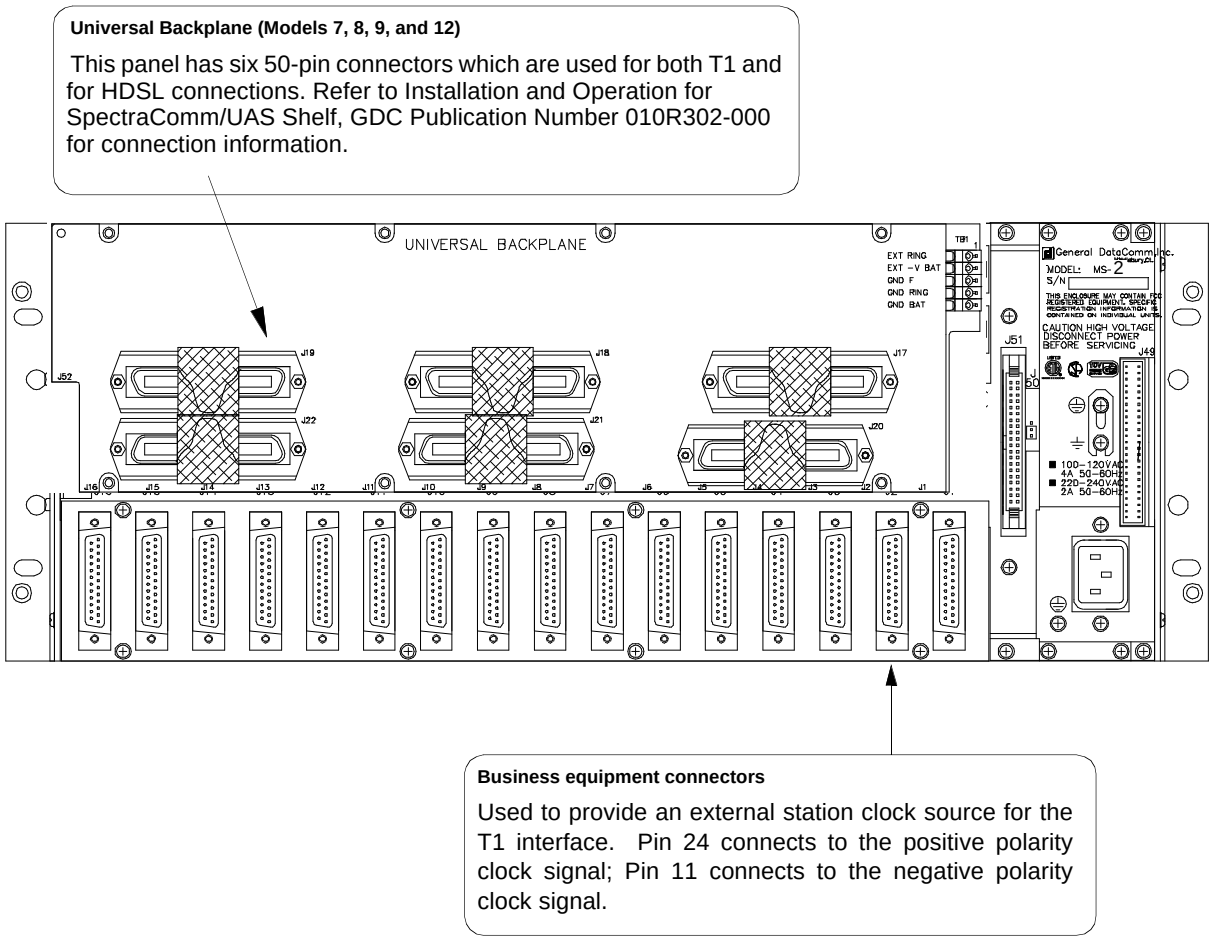


Figure 2-4 Rear Panel SpectraComm Shelf Mass-Termination

When 50-pin shielded cables are attached to the Universal Backplane connectors, be sure to use frame grounding kit (*GDC Part No. 010K071-001*) which includes three sets of screws and clips (Discard). See *Figure 2-5*, below.

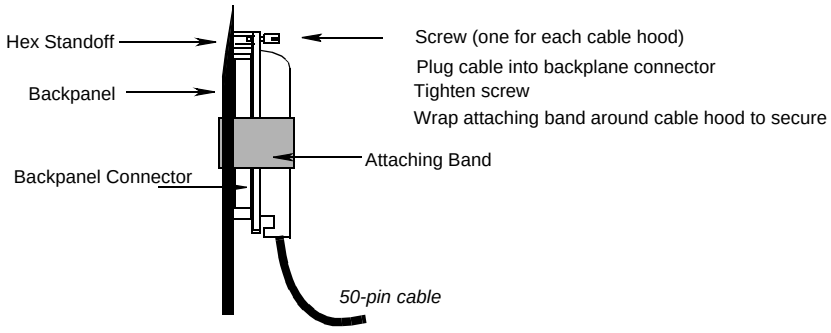


Figure 2-5 Shielded Cable, 50-Pin

Preoperational Configuration

Setup (Hard)

Configure the unit as follows:

1. Verify that Jumpers X11 and X15 are installed.
2. Verify that the card is configured as an LTU or NTU based upon *Table 2-1*.
3. Set the remaining switches and jumpers according to *Table 2-1* and *Figure 2-1*.

   If S34-1 is placed in the SOFT configuration position, all other switch settings are ignored, and the unit must be configured via the optional terminal screen. Refer to the following section: *Setup (Soft)*.
4. Connect the T1 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.

   The card automatically performs internal self-tests. If one of these tests fails, the front panel ALM LED blinks.
6. After going through the self-tests, the HDSL loops (LTU and NTU) initiate start-up and the green HDSL NORM LEDs blink.

   The start-up generally lasts less than 30 seconds, but may last up to 3 minutes. When complete, the HDSL NORM LEDs should be On and the HDSL ES LEDs are 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 T1 and HDSL status indicators clear.
7. T1 data transfer now occurs; the DSX-1 NORM LED is On and the ER LED is be Off. If this does not happen, refer to the troubleshooting procedure in C*hapter 4 Tests*.

Setup (Soft)

1. Verify that Jumpers X11 and X15 are installed.
2. Verify that Switch S34-1 is in the SOFT configuration position.
3. Connect the T1 line and HDSL loops to the network connectors on the rear panel.
4. Insert the card (NTU or LTU) into a previously powered-up SpectraComm Shelf.

   The card automatically performs internal self-tests. If one of these tests fails, the front panel ALM LED blinks.
5. When Switch S34-1 is in the SOFT position on power-up, configuration parameters are initially set to the last configuration settings present when the unit was last powered On (or factory defaults if unit is new). When S34-1 is in the HARD position, initial configuration settings are obtained from Switches S34-2 through S34-8, and Switches S35-1 through S35-8.
6. Connect an ASCII terminal to the CTRL connector on the front panel and proceed to *Chapter 3- Operation* for configuration and operation descriptions.
7. 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.)*
8. Verify the configuration of the T1 interface parameters (*Refer again to Setting Soft Options).*

9. After going through the self-tests, the HDSL loops (LTU and NTU) initiate start-up and the green HDSL NORM LEDs blink.

   The start-up generally lasts less than 30 seconds, but may last up to 3 minutes. When complete, the HDSL NORM LEDs should be On and the HDSL ES LEDs are 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 T1 and HDSL status indicators clear.

10. T1 data transfer now occurs; the DSX-1 NORM LED is On and the ER LED is be OFF. If this does not happen, refer to the troubleshooting procedure in C*hapter 4 Tests*.

3 Operation

Overview

Figure 3-1 presents the UAS 701-T2 front panel and explains each control and indicator. You may check the operation of the unit by monitoring the front panel indicators and using the test procedures found in *Chapter 4*.

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

Front Panel

You can monitor three data streams on the front panel, represented by these LED indicators:

HDSL loop 1 input	- ES (1) or NORM (1)
HDSL loop 2 input	- ES (2) or NORM (2)
Incoming T1 signal	- DSX-1 ER or DSX-1 NORM

Each LED indicator can be in one of three states: On, blinking, or Off. Blinking is at a 2-Hz rate. *Table 3-1* summarizes these indicators.

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.
T1 Indicators		
ER Indicator	**NORM Indicator**	**Indication**
Off	On	Normal operation
On	Off	LOS, OOF, or AIS
Blink	On	ER - Errored seconds
Other Indicators		
ON	Lit when +5V is applied to the card	
ALM	Indicates a major alarm. 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.	

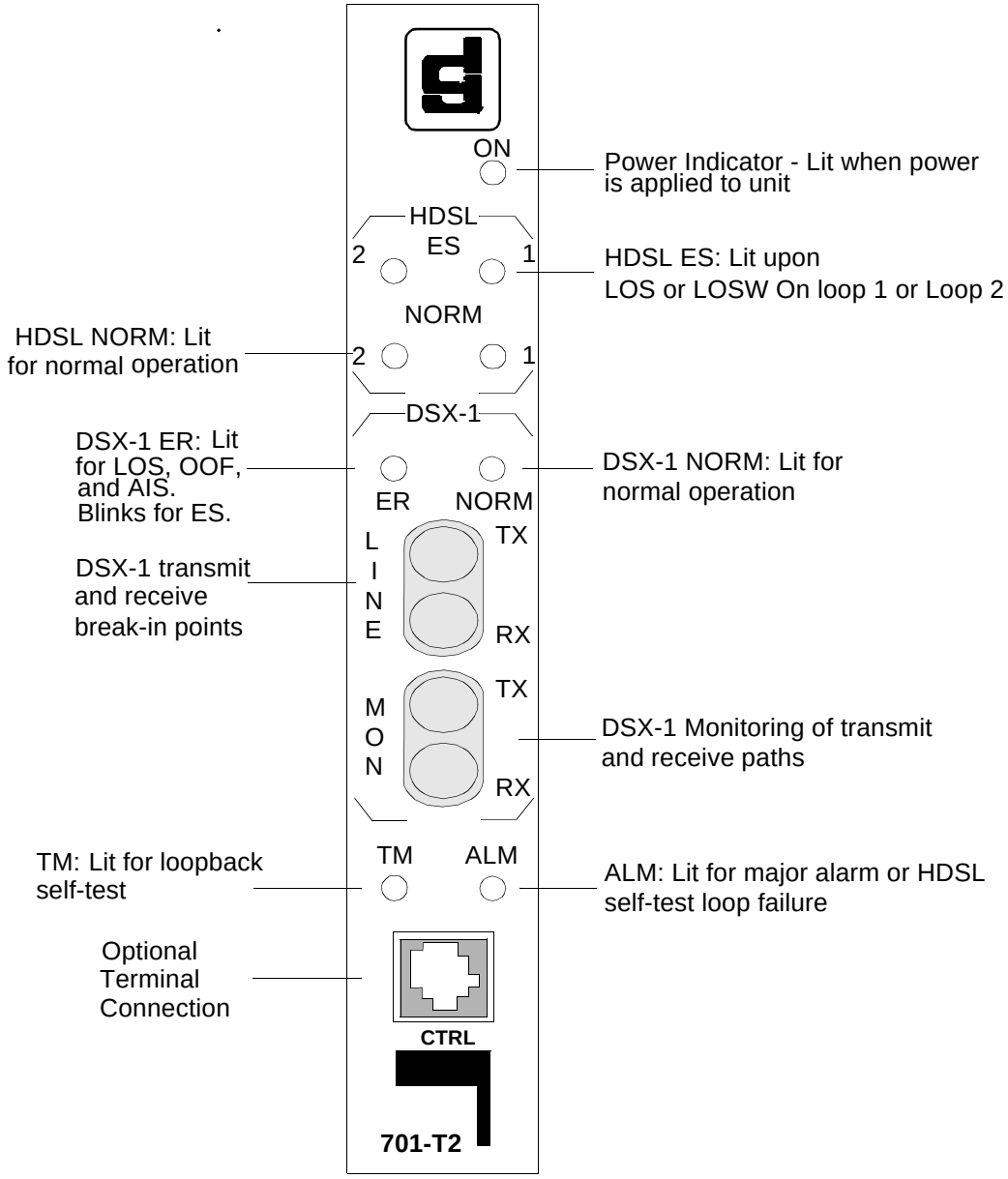


Figure 3-1 Front Panel of the 701-T2

Setting Soft Options

You can use an ASCII terminal equipped with an EIA/TIA-232-E communication interface to control the 701-T2. You connect the terminal to the control (CTRL) jack on the front panel. To end an ongoing management session, disconnect the terminal from the 701-T2.

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. 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 CTRL jack on the front panel 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 to run the supervision program is contained in the 701-T2.

Control Port Characteristics

The control port is terminated in an RJ45 connector, designated as CTRL on the front panel, and is wired as shown below:

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

Start-Up

As soon as you connect the terminal cable to the CTRL port of an operating 701-T2, you automatically start a management session. Upon power-up, the 701-T2 sends the opening screen, shown in *Figure 3-2*, followed by the main menu.

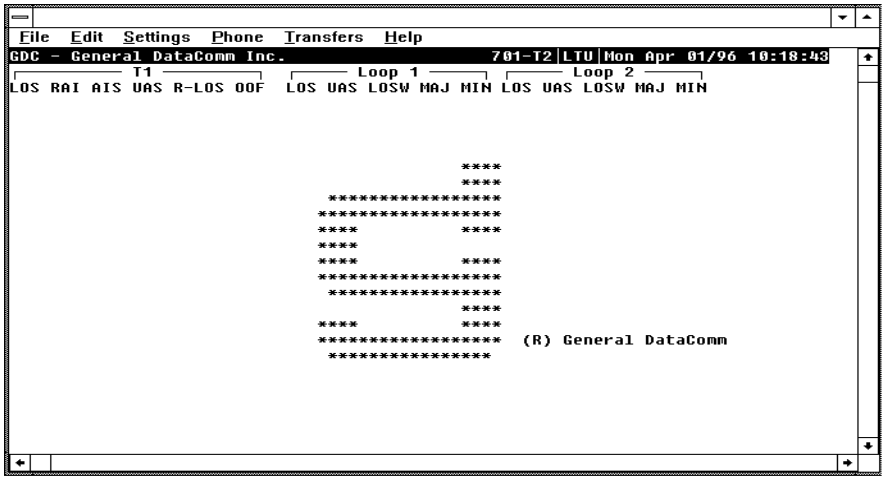


Figure 3-2 Opening Screen

Screen Organization

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

Terminal Screen Organization

Header	Located at the top of the screen; displays the: • GDC abbreviation and full manufacturing name • unit type • current operating mode (LTU or NTU) • data and time sent by the 701-T2.
Status Line	Located below the header; includes two main fields displaying the status of the various 701-T2 alarms. An active alarm indicator is displayed in reverse video.
T1 alarms field	Includes the following indications: LOS - Loss of input signal on the T1 interface. RAI - Reception of unframed all 1s via the T1 interface. AIS - Reception of alarm indication signal on the T1 interface. UAS - Unavailable seconds recorded by the T1 interface. R-LOS - Reception of remote loss-of-T1 signal report via the HDSL interface. OOF - Out of frame on the T1 interface.
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 HDSL bit error rate exceeds selected major alarm threshold. MIN - Incoming HDSL 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 the operations that you do on the ASCII terminal.

Menu Selection

You can select a Menu item in two ways:

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

Either action opens the submenu or dialog box used to carry out the selected operation.

Field Navigation

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

Field Editing

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

1. Bring the cursor to the desired field, 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.
3. For free-text fields, bring the cursor to the desired field, then type in the desired value.

   You can use the `Backspace` and `Delete` keys to make changes or correct errors. When done, press `Enter`.

Restoring Default Values

You can replace the current screen values with the 701-T2 default values by pressing `Ctrl-D` (`Ctrl-D` means hold down the control key and press `D`).

Saving Values

To save new parameter values entered in dialog boxes, press `Ctrl-W`. These parameters are stored in non-volatile memory for use upon the next unit power-up in `SFT Config` mode (S34-1 switch is set to `SFT`).

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 submenus and to return to the main menu.

Refresh

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

Main Menu

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

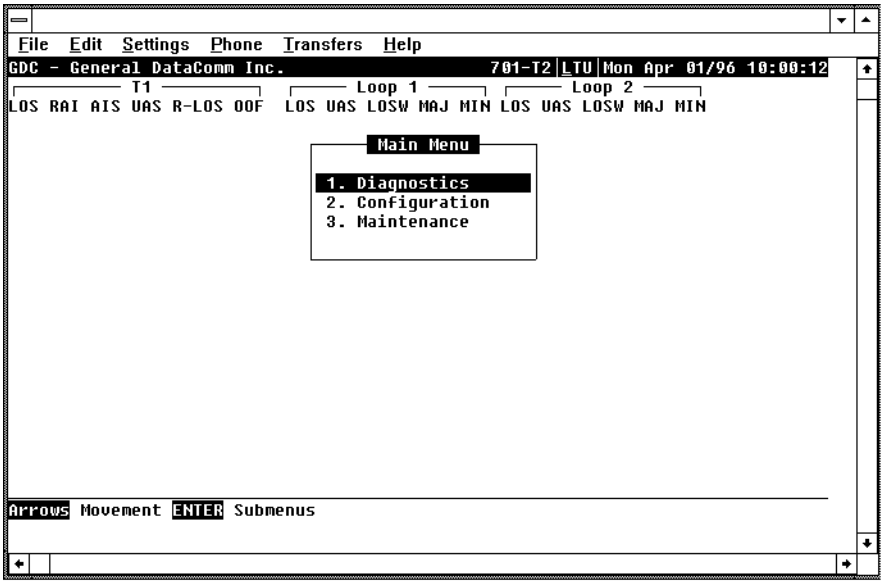


Figure 3-3 Main Menu Screen

Diagnostics

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

- Display performance statistics collected on the T1 interface and on each of the HDSL loops.
- Display HDSL loop status information, technical data on loop performance, HDSL loop noise margins, optional gain settings, and loop characteristics.
- Cancel the start-up process.

You can activate loopbacks through the Maintenance option of the Main Menu.

Configuration

Apply this option to configure the T1 and HDSL interface parameters, as follows:

- Modify the HDSL loop operating mode.
- Display and modify the T1 line code, T1 framing mode, line build-out, inband loopback parameters, and timing source.
- Set/modify the network circuit configuration and time slot routing over the HDSL loops.
- Display system hardware and software data and 701-T2 self-test results.

Maintenance

Apply this option to do maintenance activities:

- Enable both local and remote system loopbacks.
- Test system performance using the internal 701-T2 BER meter.
- Set the real-time clock of the 701-T2.

- Reset the 701-T2 statistics counters.
- Manually initiate the start-up process.
- Reset the 701-T2. (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*. Use this menu to display diagnostic information and to activate diagnostic functions.

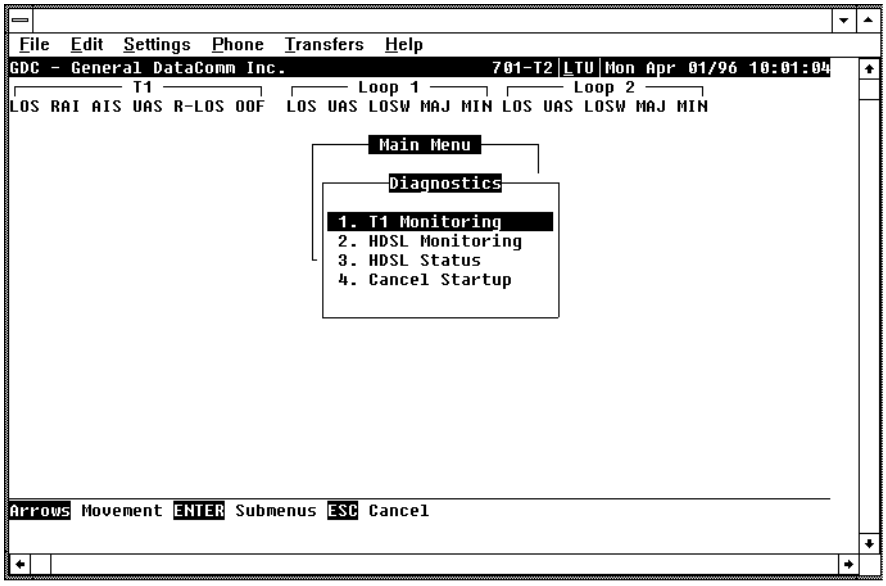


Figure 3-4 Diagnostics Menu Screen

The functions available from the diagnostics menu are as follows:

- `T1 Monitoring`
- `HDSL Monitoring`
- `HDSL Status`
- `Cancel Startup`

T1 Monitoring

This menu item displays the 24-hour performance statistic data collected on the T1 trunk. *Figure 3-5* depicts a typical T1 monitoring screen.

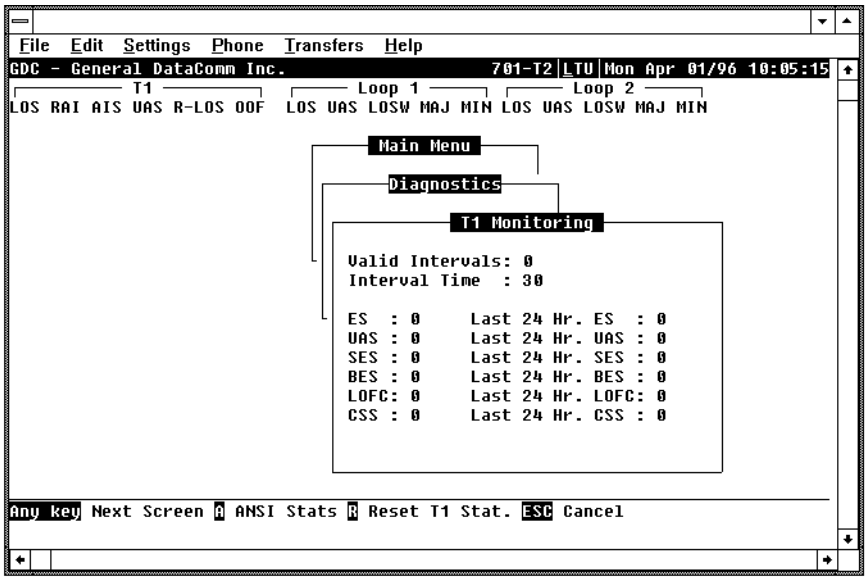


Figure 3-5 T1 Monitoring Screen

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

T1 Monitoring Screen Fields

Valid Intervals	Displays the number of valid 15-minute intervals within the current 24-hour interval. The range is 0 to 96.
Interval Time	Displays the elapsed time in seconds from the beginning of the current 15-minute interval. The range is 0 to 900.
ES	Displays the number of errored seconds in the current 15-minute interval.
Last 24 Hr. ES	Displays the number of errored seconds in the last 24-hour interval.
UAS	Displays the number of unavailable seconds in the current 15-minute interval.
Last 24 Hr. UAS	Displays the number of unavailable seconds in the last 24-hour interval.
SES	Displays the number of severely errored seconds in the current 15-minute interval.
Last 24 Hr. SES	Displays the number of severely errored seconds in the last 24-hour interval.
BES	Displays the number of burst errored seconds in the current 15-minute interval.
Last 24 Hr. BES	Displays the number of burst errored seconds the last 24-hour interval.
LOFC	Displays the number of frame loss events in the current 15-minute interval.
Last 24 Hr. LOFC	Displays the number of frame loss events in the last 24-hour interval.
CSS	Displays the number of controlled frame slip seconds in the current 15-minute interval.
Last 24 Hr. CSS	Displays the number of controlled frame slip seconds in the last 24-hour interval.

T1 Monitoring Operation

The T1 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, A, and the Esc keys. The display is cyclic, that is, the current interval is displayed again after the 95th interval.

To reset the T1 statistics counters, type R. All the displayed values are reset to 0. To exit and return to the Diagnostics menu, press Esc.

If the 701-T2 is configured for ESF/ANSI framing mode, then T1 ANSI statistics are available for display. To display ANSI statistics (*as shown in Figure 3-6*), type A while in the T1 monitoring screen. This screen includes the fields described in *Table 3-4*.

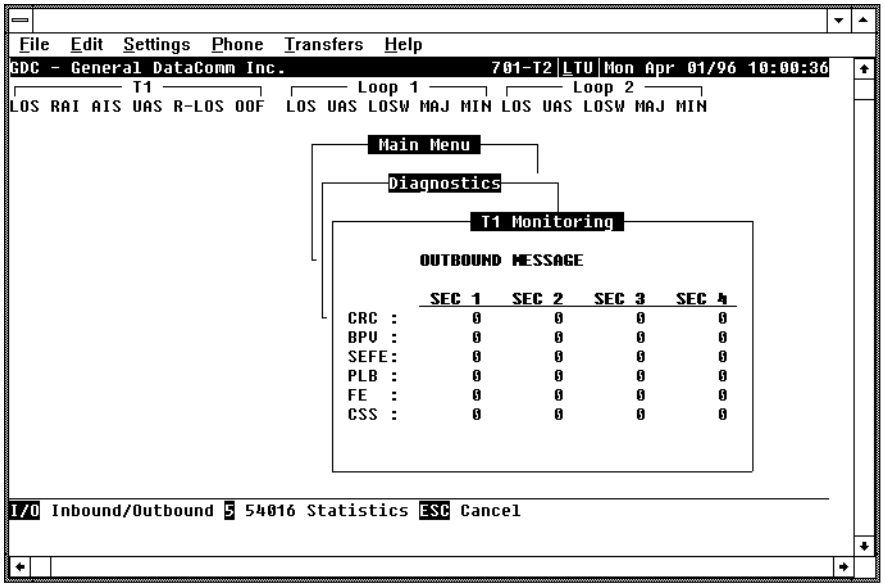


Figure 3-6 T1 ANSI Monitoring Screen

T1 ANSI Monitor Fields

CRC	Displays the number of CRC errors in the one-second interval.
BPV	Displays Yes if any bipolar violations occurred in the one-second interval.
SEFE	Displays Yes if any severely errored framing events occurred in the one-second interval.
PLB	Displays Yes if any payload loopback events occurred in the one-second interval.
FE	Displays Yes if any frame errors occurred in the one-second interval.
CSS	Displays Yes if any controlled frame slips occurred in the one-second interval.

ANSI Statistics Operation

To display ANSI statistics for inbound data, type I. You may again view ANSI statistics for outbound data by typing O.

To return to the original 54016 T1 monitor display, type 5.

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 3-7*.

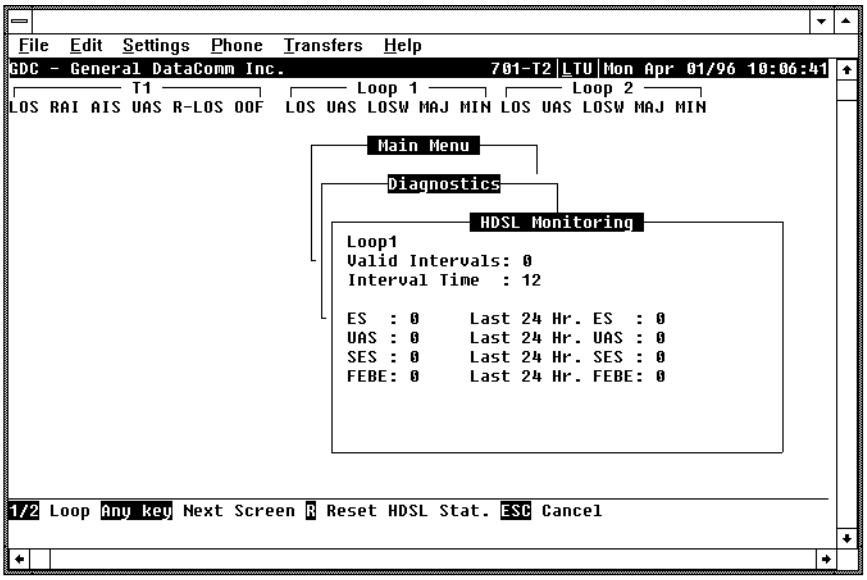


Figure 3-7 HDSL Monitoring Screen

The HDSL Monitoring screen is similar to the T1 Monitoring screen. The main difference is the addition of a loop field that identifies the HDSL loop described by the screen, and the inclusion of a FEBE field. *Table 3-5* describes the fields on the HDSL Monitoring screen.

HDSL Monitoring Screen Fields

ES	Displays the number of errored seconds reported by the remote HDSL unit in the current 15-minute interval.
Last 24 Hr. ES	Displays the number of far-end block errors in the last 24-hour interval.
UAS	Displays the number of unavailable seconds reported by the remote HDSL unit in the current 15-minute interval.
Last 24 Hr. UAS	Displays the number of far-end block errors in the last 24-hour interval.
SES	Displays the number of severely errored seconds reported by the remote HDSL unit in the current 15-minute interval.
Last 24 Hr. SES	Displays the number of far-end block errors in the last 24-hour interval.
FEBE	Displays the number of far-end block errors reported by the remote HDSL unit in the current 15-minute interval.
Last 24 Hr. FEBE	Displays the number of far-end block errors in the last 24-hour interval.

HDSL Monitoring Screen Operation

To display the HDSL monitoring screen, select Item 2 on the Diagnostics menu. The screen displays the data collected for Loop 1 in the current 15-minute interval.

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

To display the other 95 intervals within the current 24-hour period, press any key except `1`, `2`, `3`, `R`, and `Esc`. The display is cyclic; that is, the current interval is displayed again after the 95th interval.

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

To exit and return to the diagnostics menu, press Esc.

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 3-8*.

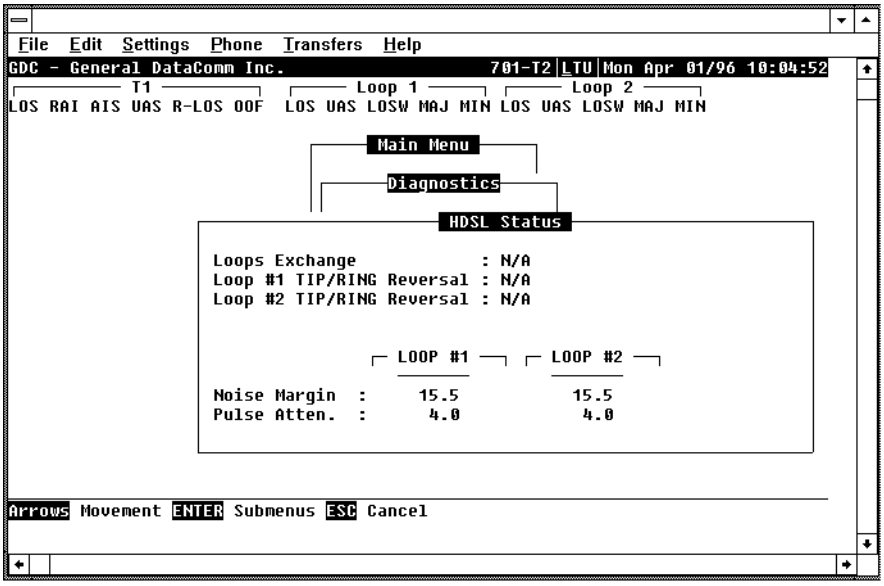


Figure 3-8 HDSL Status Screen

Table 3-6 describes the fields on the HDSL Status screen.

HDSL Status Screen Fields

Loops Exchange	Indicates whether the HDSL loops carrying the T1 traffic are correctly connected or have been interchanged by error. This information is available only when the two 701-T2 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 701-T2 series will automatically detect and recover 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 701-T2 series will automatically detect and recover from this condition.
Noise Margin	Displays the noise margin, in dB, measured by the signal processing circuits of the 701-T2. Separate values are provided for each HDSL loop.
Pulse Attenuation	Displays the pulse attenuation, in dB, measured by the signal processing circuits of the 701-T2. Separate values are provided for each HDSL loop.

HDSL Status Screen Operation

To display the HDSL Status screen, select Item 3 on the Diagnostics menu. After viewing the data, press Esc to exit and return to the Diagnostics menu.

Cancel Start-up

The Cancel Startup option is used to cancel the start-up process which is carried out by the 701-T2 upon link initialization and whenever the synchronization between the two 701-T2 units connected in a link is lost. To instruct the 701-T2 to stop performing the start-up process, select Item 4 from the Diagnostics menu.

Configuration Menu

Use the Configuration menu to configure the T1 and the HDSL loop parameters.

To open the Configuration menu, select Item 2 on the Main Menu. *Figure 3-9* depicts the Configuration menu.

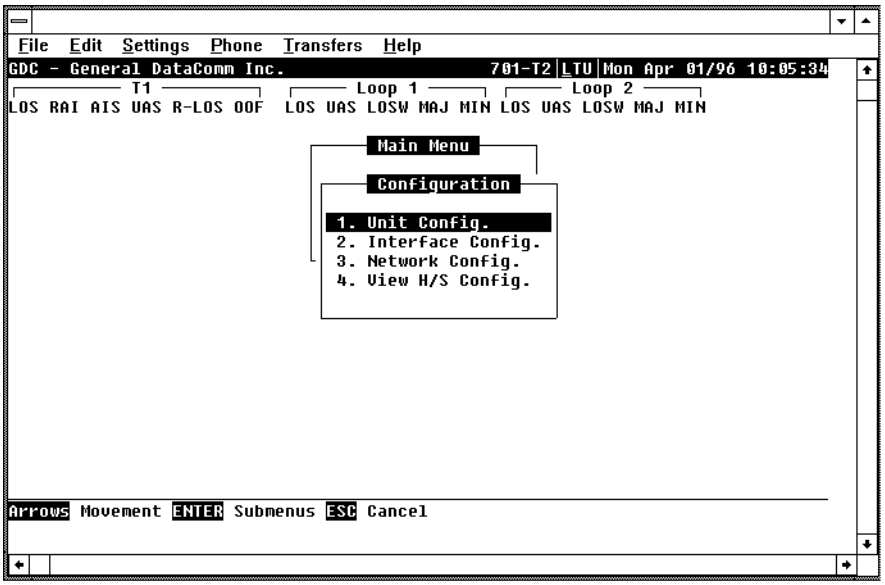


Figure 3-9 Configuration Menu Screen

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 701-T2. A typical screen is shown in *Figure 3-10.*

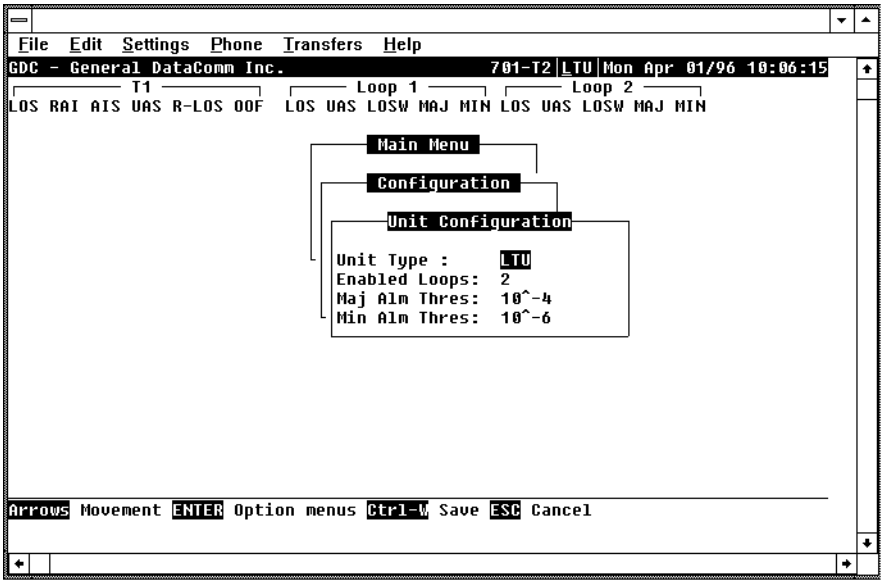


Figure 3-10 Unit Configuration Screen

The screen includes four fields that you use to select the operating mode of the 701-T2 on the HDSL loops side and alarm thresholds (*Also refer to Table 3-7*):

- `Unit Type`
- `Enabled Loops`
- `Major Alarm Threshold`
- `Minor Alarm Threshold`

Unit Configuration Screen Fields

Unit Type	**LTU** - Line Terminating Unit NTU - Network Terminating Unit
Enabled Loops	1 or **2** loops available with the SC701.
Maj Alm Thres	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.
Min Alm Thres	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 disturbances. **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. 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-D`.
4. To save changes, press `Ctrl-W`.
5. To quit and cancel the changes made in this screen, press `Esc`.
6. To exit and return to the Configuration menu, press `Esc`.

Interface Configuration

The Interface Configuration option displays the Interface Configuration screen, showing the T1 configuration parameters of the 701-T2. A typical screen is shown in *Figure 3-11*.

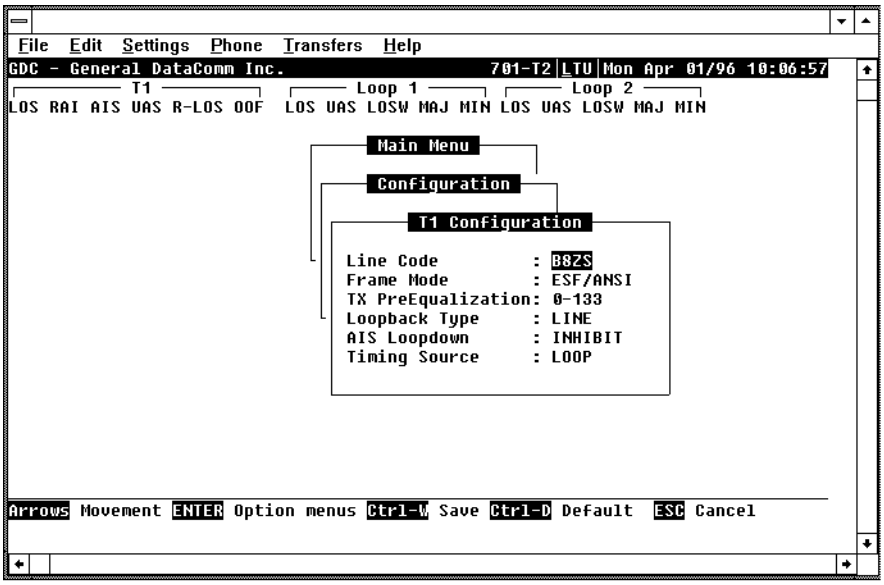


Figure 3-11 Interface Configuration Screen

The screen includes the fields described in *Table 3-8.*

Interface Configuration Screen Fields

Line Code	Displays the current T1 line code used by the 701-T2: AMI - The T1 line coding is Alternate Mark Inversion. **B8ZS** - The T1 line coding is Bit 8 Zero suppression.
Frame Mode	Displays the current framing mode of the 701-T2 with respect to the T1 trunk: **ESF/ANSI** - The 701-T2 uses ESF framing with facility data link according to ANSI T1.403. ESF/54016 - The 701-T2 uses ESF framing with facility data link according to ATT Pub. 54016. SF - 701-T2 uses SF framing. UNFRAMED - 701-T2 utilizes an unframed 1.544 Mbps data stream.
TX PreEqualization	Displays the current transmit signal conditioning tailored for the transmit line length. Choose from **0-133**, 133-266, 266-399, 399-533, or 533-655 ft.
Loopback Type	Displays the current type of loopback (line, **payload**, or inhibit) which is activated when the 701-T2 receives an inband loopback request at the T1 interface.
AIS Loopdown	Displays the time requirement of consecutive ones received on the T1 interface which causes an inband loopback to terminate. This feature can be **inhibited**.
Timing Source	Displays the current source of timing clock for T1 transmit data. Choose from **Loop** (timing recovered from T1 signal), External (from station clock), or Internal (701-T2 generates timing).
Defalult values are shown in **bold** type.	

Interface Configuration 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-D`.

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

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

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

Network Configuration

The Network Configuration option displays the Network Configuration screen, showing the network topology and time slot routing options of the 701-T2. A typical screen is shown in *Figure 3-12*.

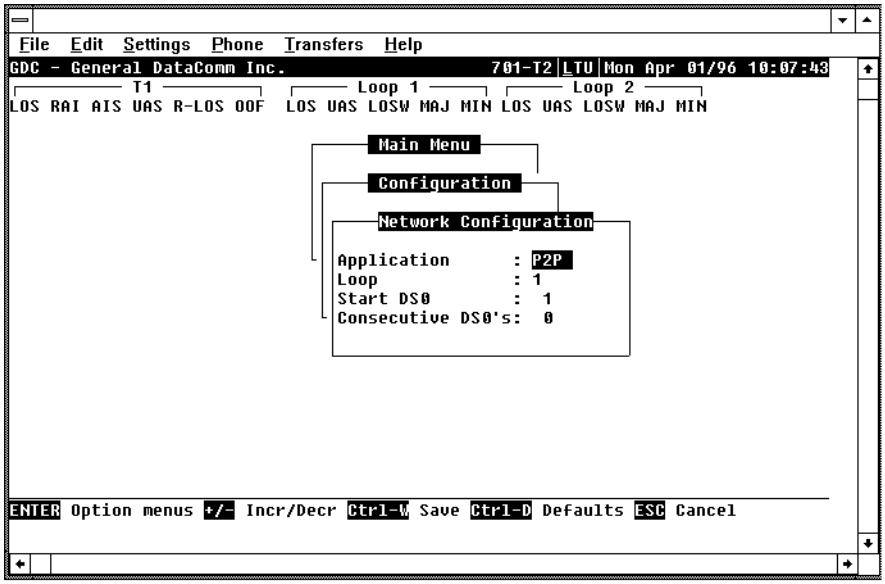


Figure 3-12 Network Configuration Screen

Operation

1. To display the Network configuration screen, select Item 3 on the configuration menu.

This screen includes the following fields:

Application	Determines whether the unit is being used in Point-to-Point (P2P) or in a Point-to-Multi-Point (P2MP) network configuration. P2P is the default value.
Loop	Selects the HDSL loop that the Start DS0 and Consecutive DS0 options are being configured for. Not used for P2P mode.
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.
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.

2. To change the current value of application, highlight the desired option and press `Enter`. This displays and option menu with the available options `P2P` and `P2MP`.

3. Highlight the desired option and press `Enter` . The option menu closes and the new selection appears on the screen.

4. To change the current value of the loop, highlight the desired option and press the (+) key or the space bar to increment, or the (-) key to decrement the loop number to the desired loop. This is available for P2MP mode only, and in P2P mode, this option should be left at `1`. The loop number increments to the maximum number specified by `Enabled Loops` in the `Unit Config` screen.

5. To change the current value of `Start DS0` , highlight the desired option and press the (+) key or the space bar to increment, or the (-) key to decrement the starting location of the first time slot allocated for the selected loop. This is available for P2MP mode only, and in P2P mode, this option should be left at `1`.

6. To change the current value of consecutive DS0s, highlight the desired option and press the (+) key or the space bar to increment, or the (-) key to decrement the number of consecutive time slots allocated for the selected loop. This is available for P2MP mode only, and in P2P mode, this option should be left at `1`.

7. To save the changes made in this screen press `CTRL-W` .

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

9. To return to the configuration menu without saving, press `Esc` .

Point-to-Point Data Routing

The T1 payload is distributed along the HDSL loops with consecutive DS0s placed in ascending order in the HDSL loops as shown in *Table 3-9*. When a 701-T2 or 721-T2 unit is remote, the T1 payload is recombined at the remote end such that the full T1 frame is exactly reconstructed.

When the 701-T2 is used with a 731-D2 remote unit, and two loops enabled, the T1 DS0s are recombined into a user selectable aggregate data rate (V.35, EIA-530, X.21). For increasing 731-D2 aggregate rates, the 731-D2 data is sourced from the T1 DS0s in increasing order, i.e., there is data rate accumulation when DS0s are combined: the T1 DS0 1 issues 1x64 Kbps, T1 DS0s 1 and 2 issue 2x64 Kbps, T1 DS0s 1, 2, and 3, issue 3x64 Kbps, and so forth up to a maximum of 24x64 Kbps. Time slot routing over the HDSL loops follows that shown in *Table 3-9*.

If only one loop is enabled, then a fractional T1 service is provided to the remote site, with a time slot allocation following the consecutive DS0 pattern shown in *Table 3-9*. Up to 12 DS0s may be allotted for the remote device. The maximum aggregate of Nx64 Kbps signals is 12x64 Kbps for a 731-D2 for single loop operation.

Point-to-Multipoint Data Routing

When the 701-T2 is used in a P2MP configuration, with remote 721-T2 units, T1 payload is distributed along the HDSL loops in contiguous blocks of DSOs, with the remote T1 payload reconstructed such that the remote (NTU) DS0s are mapped into the same position in the T1 frame as they were at the local (LTU) side. A typical mapping example is shown in *Table 3-10*. The 721-T2 units automatically configure themselves based on the setting of their application, `Start DS0` , and `Consecutive DS0` s configuration options. Finally, note 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 and the corresponding DS0s in the reconstructed T1 frames at the remote units.

When used in a P2MP configuration with remote 731-D2 units, T1 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 that corresponds to the number of DS0s selected to be routed

along a particular loop (Nx64 Kbps). The 731-D2 units automatically configure themselves based on the setting of their `Application` and `Data Rate` configurations option.

When 721-T2 units are used at the remote sites, up to 12 time slots are available at each remote site. When 731-D2 units are used at the remote sites, a V.35 Nx64 Kbps signal is available at each remote site (up to 12x64 Kbps).

NOTE

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

721-T2 and 731-D2 remote units cannot simultaneously be connected to a 701-T2 LTU.

T1 Time Slot Routing

Routed T1 Time Slots												
Loop 1	1	2	3	4	5	6	7	8	9	10	11	12
Loop 2	13	14	15	16	17	18	19	20	21	22	23	24

Typical T1 P2MP Time Slot 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 721-T2 (NTU) are set for:		
	Remote 1	**Remote 2**
Application:	P2MP	P2MP
Loop:	1	1
Start DS0:	1	11
Consecutive DS0:	10	9
Then the resulting time slot allocation at remote 721-T2 T1 interface is:		
Remote 1:		
1 2 3 4 5 6 7 8 9 10 <ts 11 - 24 filled with 1s>		
Remote 2:		
<ts 1 - 10 filled with 1s> 11 12 13 14 15 16 17 18 19 <ts 20 - 24 filled with 1s>		

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 groups. A typical screen is shown in *Figure 3-13.*

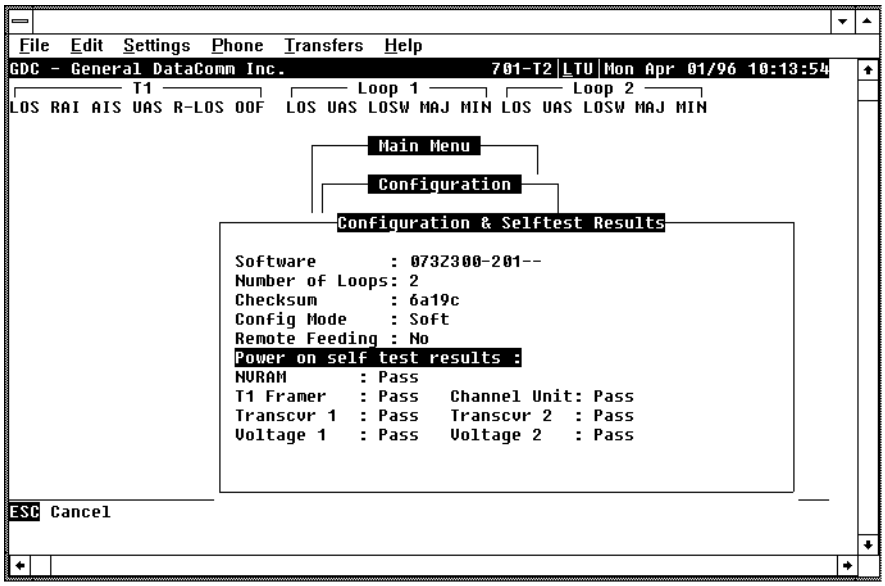


Figure 3-13 Configuration and Self-Test Results Screen

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.

Configuration and Self Test Results Screen Fields

Software Version	Displays the software version of the 701-T2.
Number of Loops	Displays the number of HDSL loops available.
Checksum	Firmware checksum.
Config Mode	Displays the current configuration mode of the 701-T2: Soft - The 701-T2 is configured under software control. Hard - The 701-T2 is configured by means of the basecard switches.
Remote Feeding	Indicates whether the 701-T2 is power feeding the remote unit, via the interconnecting lines.
The last power-on self-test results area lists each 701-T2 subsystem tested during the self-test, and the self-test result, Pass or Fail. Tested subsystems are non-volatile RAM, T1 Framer, HDSL Channel Unit, HDSL Loop 1 and Loop 2 transceivers; and +12V (Voltage 1) and -12V (Voltage 2) power supplies.	

Maintenance Menu

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

Network Management

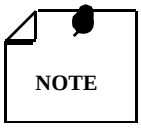
The UAS 701-T2 can be used as a Network Managed element when used within a GDC Network Management System. The UAS 701-T2 management software conforms to the MIB (Management Information Base) II standards set out for SNMP Version 1.0. Refer to the *Operating and Installation Instructions for SpectraComm Manager Card, Publication GDC 048R303-000.*

MIB Tables

This section consists of tables that list and describe the MIB objects by which a SNMP network manager can configure, control, and monitor the UAS 701-T2. 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

How MIB ojects appear on the screen and are manipulated varies with the network manager or MIB browser being used. Purpose of information in these tables is for supplementing the operating instructions for the manager or browser.



Many SNMP network managers and MIB browers automatically perform a Get operaton immediately following a Set to an object that permits read-write access. In that way the success of the write operaiton is confirmed. If your manager or brower does not perform this function automatically, it is highly advisable that you command a Get for each object you Set.

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 to which this entry is applicable. SC instance defines the slot, line, drop, and sub-identifier. The table describes the maintenance objects for the unit and references the unit interface.
Firmware Level	Display String	Read-only		The version number of the firmware. This identifies the installed revison. The released version number is sequenced from A,...AA,...ZZ. Test versions are numerical from 01 to 99.
Model Number	Display String	Read-only		This variable is used to determine the type of card family installed.

Maintenance

MIB Object	Syntax	Access	Enumeration	Description
Maintenance Line Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop, and 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 the action of soft resetting the unit. When this object is set to reset, the unit performs a soft reset to the managed unit. Norm cannot be set by management.
Config Mode	Integer	Read-only	Software (1) Hardware (2)	The configuration mode of the unit. A unit may be hardware or software configured.
System Up Time	Time Ticks	Read-only		This variable is used to report the elapsed system time since power on.
Unit Type	Integer	Read-write	LTU (1) NTU (2)	This variable is used to define HDSL type. LTU selects line terminating unit, NTU selects network terminating unit.
Default Initiate	Integer	Read-write	Default (1) Normal (2)	Used to allow the non-volatile configuration to be set to a factory default reset. Normal cannot be set by management.
Loop Provision	Integer	Read-write	Point-to-point (1) Point-to-MultiPoint (2)	This variable is used to define the HDSL loop provision. When P-P is selected, the unit is connected to the other HDSL unit. When P-MP 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 number of active HDSL loops. Can be set for one or two loops.
Private Storage 1	Display String	Read-write	(Size (16))	This variable is used for general purpose storage.

Private Storage 2	Display String	Read-write	(Size (16))	This variable is used for general purpose storage.
Private Storage 3	Display String	Read-write	(Size (16))	This variable is used for general purpose storage.
LED Status	Display String	Read-only	Octet 1 Bit 7 - not used Bit 6 - not used Bit 5 - not used Bit 4 - not used Bit 3 - T1 NORM Bit 2 - T1 ER Bit 1 - ALM Bit 0 - TM Octet 2 Bit 7 - not used Bit 6 - not used Bit 5 - not used Bit 4 - not used 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.

T1 Configuration

MIB Object	Syntax	Access	Enumeration	Description
T1 Configuration Index	SC instance	Read-only		Identifies the interface where this entry is applicable. SC instance defines the slot, line, drop, and interface, which in this case, can be a T1 interface.
T1 Framing Mode	Integer	Read-write	ESF/ANSI (1) ESF/54016 (2) SF (3) Unframed (4)	Used to determine T1 framing mode.
T1 TX Pre-equalization	Integer	Read-write	0-133 ft. (1) 133-266 ft. (2) 266-399 ft. (3) 399-533 ft. (4) 533-655 ft. (5)	Used to set T1 transmit pre-equalization.
T1 Inband Loopback Type	Integer	Read-write	Inhibit (1) Line Loopback (2) Payload Loopback (3)	Used to determine the loopback type when a T1 inband Loopback command is received.
FDL Mode	Integer	Read-only	Enable (1) Disable (2)	Returns the state of FDL channel utilization based on framing mode selected.
AIS Loopdown Time	Integer	Read-write	Inhibit (1) 5 sec (2) 10 sec (3) 20 sec (4) 40 sec (5) 60 sec (6)	Determines the period of unframed all 1’s on the T1 interface, which triggers the disabling of an inband-initiated loopback.
T1 Line Coding	Integer	Read-write	AMI (1) B8ZS (2)	Determines the line coding on the T1 interface.
Trasmit Clock Source	Integer	Read-write	External Timing (1) Internal Timing (2) Loop Timing (3)	Determines the source of the transmit clock. External timing indicates timing sourced from a station clock. Internal timing indicates that an on-board clock source is used. Loop timing indicates that timing is recovered from the receive data stream.

HDSL Diagnostics

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) Not Used (3) Not Used (4) Payload Loop (5)	Supports the action of a diagnostic loop at the point indicated.
BER Test	Integer	Read-write	Inhibit (1) Enable (2) Reset (3)	Supports the action of bit error rate test. When set to inhibit, no BERT test is in progress. When set to enable, BERT is in progress. When set to reset, diagnostic result error counts and intervals are set to zero.

HDSL Diagnostic Results

MIB 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, which is in this case, a network interface.
Test Execution Status	Integer	Read-only	In Sync (1) Not In Sync (2)	The current execution status of the diagnostic test. When set to In Sync, BERT test is in sync and BER rate is valid. When set in NOT IN Sync, BERT test is not in sync, and BER rate is not valid.
Dagnostic Result Error Counts	Integer	Read-only	(0..65535)	The results of the last diagnostic test. This can be the current test running or the last completed test. Note that the interpretation of these test results may be affected by the value of the Test Execution Status object.
Diagnostic Result Interval	Integer	Read-only	(0..65535)	This variable represents the BER test intervals. A time interval is defined as the time required for transmission of a block of bits.

HDSL Performance

Current Performance				
MIB Object	**Syntax**	**Access**	**Enumeration**	**Description**
HDSL 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 in this case, can be a loop interface.
HDSL Current ESs	Gauge	Read-only		The number of errored seconds encountered by a loop interface in the current 15-minute interval.
HDSL Current SESs	Gauge	Read-only		The number of severely errored seconds encountered by a loop interface in the current 15-minute interval.
HDSL Current UASs	Gauge	Read-only		The number of unavailable seconds encountered by a loop interface in the current 15-minute interval.
HDSL Current FEBEs	Gauge	Read-only		The number of far end block errors encountered by a loop interface in the current 15-minute interval.

Interval Performance				
HDSL Interval Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop. and interface, which is in this case, a loop interface.
HDSL Interval Number	Integer	Read-only	(1..96)	A number between 1 and 96, where 1 is the most recently completed 15 minutes interval and 96 is the least recently completed 15 minutes interval (assuming that all 96 intervals are valid).
HDSL Interval ESs	Gauge	Read-only		The number of errored seconds encountered by a loop interface for the 15-minute interval.
HDSL Interval SESs	Gauge	Read-only		The number of severely errored seconds encountered by a loop interface for the 15-minute interval.
HDSL Interval UASs	Gauge	Read-only		The number of unavailable seconds encountered by a loop interface for the 15-minute interval.
HDSL Interval FEBEs	Gauge	Read-only		This variable represents the HDSL loops far end block errors for the 15-minute interval.

Total Performance				
MIB Object	**Syntax**	**Access**	**Enumeration**	**Description**
HDSL Total Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop, and interface, which in this case, can be a loop interface.
HDSL Total ESs	Gauge	Read-only		The number of errored seconds encountered by a loop interface in the previous 24-hour interval.
HDSL Total SESs	Gauge	Read-only		The number of severely errored seconds encountered by a loop interface in the previous 24-hour interval.
HDSL Total UASs	Gauge	Read-only		The number of unavailable seconds encountered by a loop interface in the previous 24-hour interval.
HDSL Total FEBEs	Gauge	Read-only		The number of far end block errors encountered by a loop interface in the previous 24-hour interval.

Loop Performance Interval Maintenance

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

T1 Performance Tables

Current Performance				
MIB Object	**Syntax**	**Access**	**Enumeration**	**Description**
T1 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 in this case, can be a T1 interface.
T1 Current Stats	Octet String	Read-only	Octet 1 Bits 7-2: not used Bits 1-0: ES bits 15, 14 Octet 2 Bit 7: not used Bits 6-0: ES bits 13-7 Octet 3 Bit 7: not used Bits 6-0: ES bits 6-0 Octet 4 Bits 7-2: not used Bits 1,0: SES bits 15, 14 Octet 5 Bit 7: not used Bits 6-0: SES bits 13-7 Octet 6 Bit 7: not used Bits 6-0: SES bits 6-0 Octet 7 Bits 7-2: not used Bits 1, 0: UAS bits 15, 14 Octet 8 Bit 7: not used Bits 6-0: UAS bits 13-7 Octet 9 Bits 7: not used Bits 6-0: UAS bits 6-0	Returns the number of current ES, SES, UAS, BES, LOFC, and CSS encountered by the T1 interface in the current 15-minute interval.

			Octet 10 Bits 7-2: not used Bits 1, 0: BES bits 15, 14 Octet 11 Bit 7: not used Bits 6-0: BES bits 13-7 Octet 12 Bit 7: not used Bits 6-0: BES bits 6-0 Octet 13 Bits 7-1: not used Bit 0: LOFC bit 7 Octet 14 Bit 7: not used Bits 6-0: LOFC bits 6-0 Octet 15 Bits 7-1: not used Bit 0: CSS bit 7 Octet 16 Bit 7: not used Bits 6-0: CSS bits 6-0	
Interval Performance				
T1 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 in this case, can be a T1 interface.
T1 Interval Number	Integer	Read-only	(1..96)	A number between 1 and 96, where 1 is the most recently completed 15 minutes interval and 96 is the least recently completed 15 minutes interval (assuming that all 96 intervals are valid).
T1 Interval Stats	Octet String	Read-only	Octet 1 Bits 7-2: not used Bits 1-0: ES bits 15, 14 Octet 2 Bit 7: not used Bits 6-0: ES bits 13-7 Octet 3 Bit 7: not used Bits 6-0: ES bits 6-0 Octet 4 Bits 7-2: not used Bits 1,0: SES bits 15, 14	Returns the number of ES, SES, UAS, BES, LOFC, and CSS encountered by the T1 interface in the 15-minute interval indicated by T1 interval number.

			Octet 5 Bit 7: not used Bits 6-0: SES bits 13-7 Octet 6 Bit 7: not used Bits 6-0: SES bits 6-0 Octet 7 Bits 7-2: not used Bits 1, 0: UAS bits 15, 14 Octet 8 Bit 7: not used Bits 6-0: UAS bits 13-7 Octet 9 Bits 7: not used Bits 6-0: UAS bits 6-0 Octet 10 Bits 7-2: not used Bits 1, 0: BES bits 15, 14 Octet 11 Bit 7: not used Bits 6-0: BES bits 13-7 Octet 12 Bit 7: not used Bits 6-0: BES bits 6-0 Octet 13 Bits 7-1: not used Bit 0: LOFC bit 7 Octet 14 Bit 7: not used Bits 6-0: LOFC bits 6-0 Octet 15 Bits 7-1: not used Bit 0: CSS bit 7 Octet 16 Bit 7: not used Bits 6-0: CSS bits 6-0	

T1 Total Performance				
MIB Object	**Syntax**	**Access**	**Enumeration**	**Description**
T1 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 in this case, can be a T1 interface.
T1 Total Stats	Octet String	Read-only	Octet 1 Bits 7-2: not used Bits 1-0: ES bits 15, 14 Octet 2 Bit 7: not used Bits 6-0: ES bits 13-7	Returns the number of ES, SES, UAS, BES, LOFC, and CSS encountered by the T1 interface in the last 24-hour interval.

			Octet 3 Bit 7: not used Bits 6-0: ES bits 6-0 Octet 4 Bits 7-2: not used Bits 1,0: SES bits 15, 14 Octet 5 Bit 7: not used Bits 6-0: SES bits 13-7 Octet 6 Bit 7: not used Bits 6-0: SES bits 6-0 Octet 7 Bits 7-2: not used Bits 1, 0: UAS bits 15, 14 Octet 8 Bit 7: not used Bits 6-0: UAS bits 13-7 Octet 9 Bits 7: not used Bits 6-0: UAS bits 6-0 Octet 10 Bits 7-2: not used Bits 1, 0: BES bits 15, 14 Octet 11 Bit 7: not used Bits 6-0: BES bits 13-7 Octet 12 Bit 7: not used Bits 6-0: BES bits 6-0 Octet 13 Bits 7-1: not used Bit 0: LOFC bit 7 Octet 14 Bit 7: not used Bits 6-0: LOFC bits 6-0 Octet 15 Bits 7-1: not used Bit 0: CSS bit 7 Octet 16 Bit 7: not used Bits 6-0: CSS bits 6-0	

HDSL Status

MIB Object	Syntax	Access	Enumeration	Description
HDSL Loop Status Line Index	SC instance	Read-only		This object identifies status parameters associated with the managed object.
HDSL Loop 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 reinitialize the startup sequence. Set to cancel, the unit aborts the startup sequence. Normal, the unit operates normally.

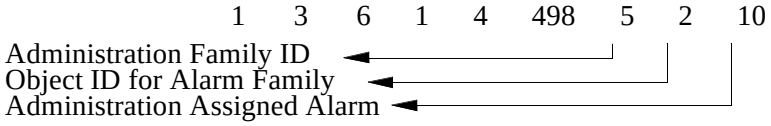
HDSL Loop Tip and Ring Reversal Mode	Integer	Read-only	Normal (1) Reversed (2)	Signals the loop Tip and Ring status. When normal, the loop operates normally. When reversed, loop Tip and Ring have been reversed.
HDSL Loop Signal to Noise Margin	Integer	Read-only	(0..127)	Represents the loop signal to noise margin in dB units.
HDSL Loop SN Frac	Integer	Read-only	(0..5)	Used with the HDSL loops signal to noise margin variable in the following manner: 1. Only the values 0 and 5 are allowed. 2. The value of zero means HDSL loops signal to noise margin is a whole number. 3. The value of five means HDSL loop signal to noise margin is a real number and that 0.5 must be added to it.
HDSL Loop SN Atten Sense	Integer	Read-only	Positive (1) Negative (2)	Identifies the sense of the HDSL loop signal to noise margin variable.
HDSL Loop Pulse Atten	Integer	Read-only	(0..100)	Represents twice the HDSL loop pulse attenuation level in dB units.
HDSL Loop Pulse Atten Frac	Integer	Read-only	(0..5)	This variable is used with the HDSL loop pulse attenuation variable under the following conditions: 1. Only the values 0 and 5 are allowed. 2. The value of zero means HDSL loop pulse atten is a whole number. 3. The value of five means HDSL loop pulse atten is a real number and that 0.5 must be added to it.
HDSL Loop Gain	Integer	Read-only	Low (1) High (2) OK (3)	Represents the HDSL loop gain setting.
HDSL Loop Exchange	Integer	Read-only	Normal (1) Exchange (2)	This variable is used to represent the HDSL loop status. When set to normal, HDSL loops are correctly connected. Set to exchange, the HDSL loop has been interchanged.

HDSL Fractionalization

MIB Object	Syntax	Access	Enumeration	Description
Frac Index	SC instance	Read-only		Identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop, and interface, which in this case, can be a loop interface.
Channel Mapping	Integer	Read-write	Byte 1 Starting time slot Byte 2 Number of consecutive time slots	Defines the T1 time slot allocation for a loop. Loop 1 must have starting time slot = 1. Loop 2 must have starting time slot equal to Loop 1 starting time slot, plus number of consecutive time slots for Loop 1. Number of consecutive time slots must be in the range of 1-12.

Alarm Treshold Configuration

MIB Object	Syntax	Access	Enumeration	Description
Alarm Configuration Index	SC instance	Read-only		The index value that uniquely identifies the interface to which this entry is applicable. SC instance defines the slot, line, drop, and sub-identifier, which is in this case, a network interface, including Loop 1 and Loop 2.
Alarm Configuration Identifier	Object Identifier	Read-only		The unique alarm identifier assigned to this alarm type. The format of this identifier is an Object Identifier that has the following format: {iso (1) org (3) dod (6) internet (1) private (4) enterprises (1) gdc (498) xxx (x) alarm (z) yyy (y) where xxx (x) is the administratively assigned family object identifier, (z) is the object identifier for alarms in the family defined MIB, and yyy (y) is the administratively assigned alarm type identifier for this alarm. See example below.



Alarm Threshold	Integer	Read-write	thres1E04 (1) thres1E05 (2) thres1E06 (3) thres1E07 (4) thres1E08 (5)	Sets the Major or Minor alarm threshold criteria.

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	T1, L1, L2
HDSL Unavailable Second	Yes	T1, L1, L2
HDSL Errored Second	Yes	T1, L1, L2
HDSL Loss of Sync Word	Yes	L1, L2
HDSL loss of Frame Align	Yes	T1
HDSL All Ones	Yes	T1
HDSL Remote Loss of Signal	Yes	T1
HDSL Remote Alarm Indicator	Yes	T1

4 Tests

Overview

This chapter provides instructions for managing the 701 system with the optional terminal and tells you how to enable and disable various loopbacks. The UAS 701-T2 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 701-T2 displays the status of these tests through the TM indicator on the front panel. Internal functions are checked when you first turn on power and during operation.

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

Troubleshooting

- LEDs are Off:
  1. If all the LEDs are Off, verify that the fuse on the rear panel is good and that the unit is properly seated in the shelf.
  2. If the terminal is working, check the status of the ± 12V supplies (Voltage 1, Voltage 2) on the terminal using the `View H/S Config` option. If there is a problem with one of the supplies, 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 701-T2 provides front panel bantam jacks for customer use in testing the HDSL and T1 lines and the unit circuitry. *Figure 4-1* illustrates the break-in points of these jacks.

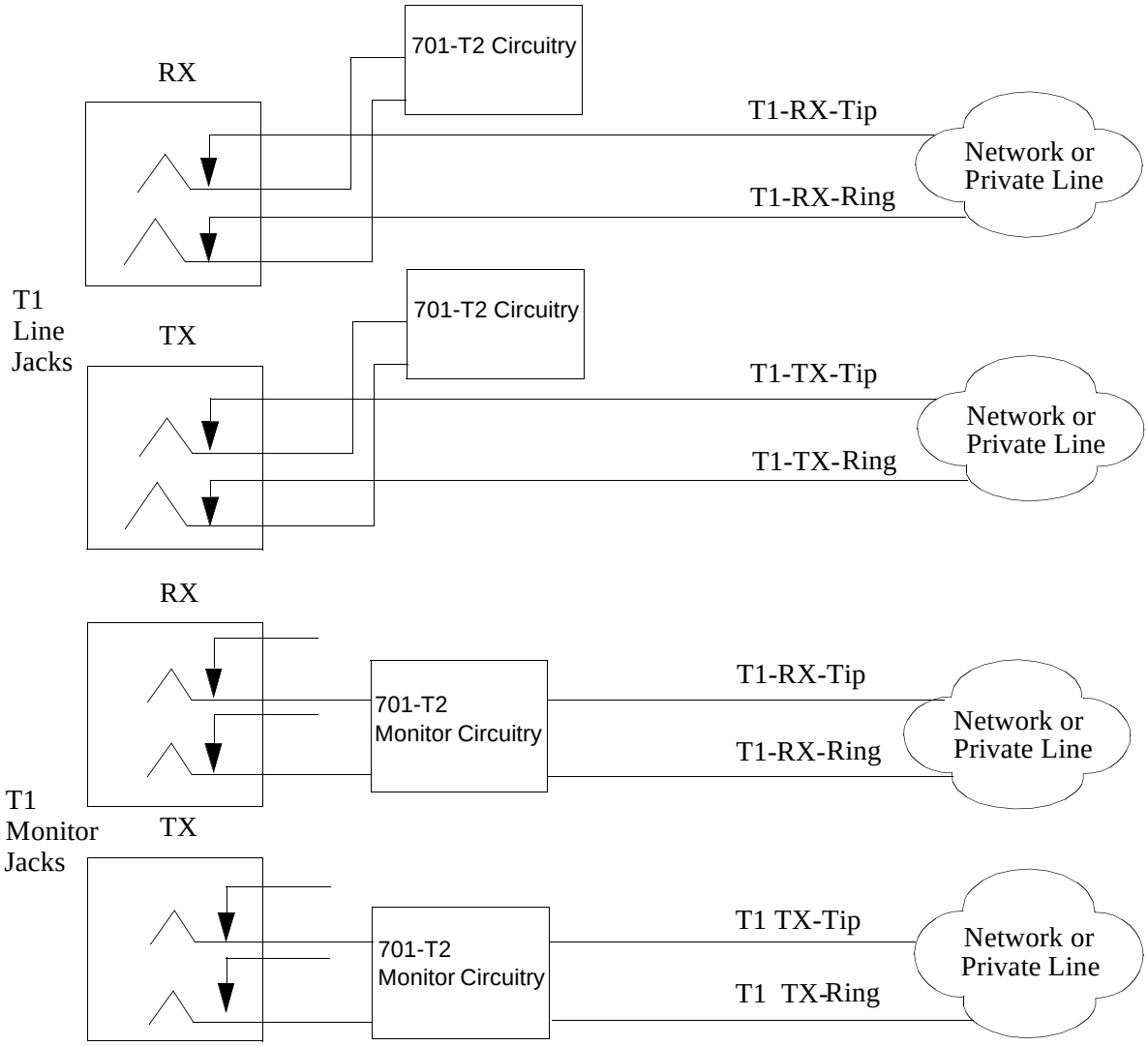


Figure 4-1 Metallic Access Jacks

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.

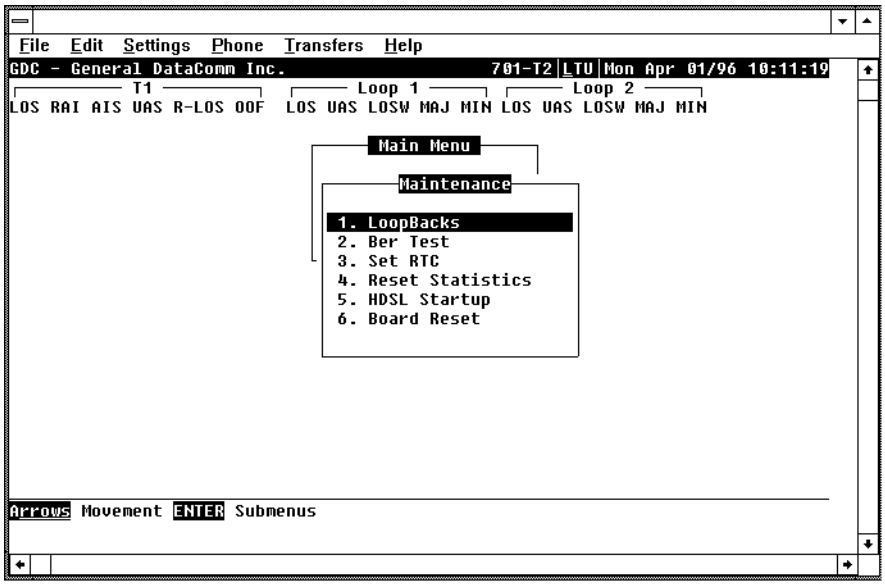


Figure 4-2 Maintenance Menu Screen

The functions available from the maintenance menu are as follows:

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

NOTE

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

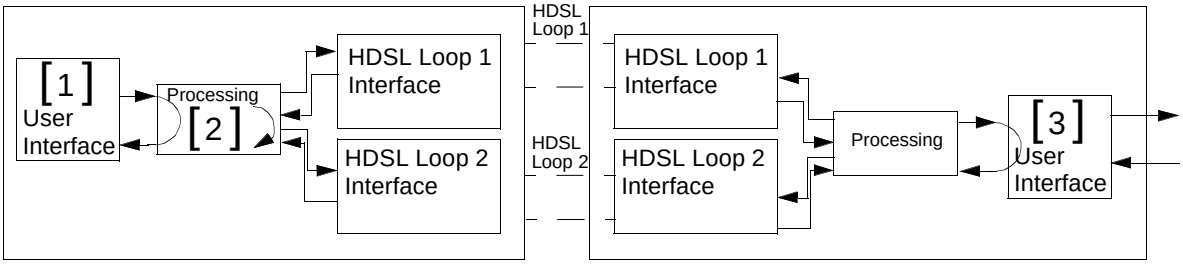
Loopbacks

NOTE

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

This function is used to enable/disable loopbacks on the user equipment interface (T1) and on the HDSL loops for doing maintenance.

The HDSL systems offered by GDC provide three types of test loopbacks. *Figure 4-3* shows the simplified signal paths when the loopbacks are connected.



T1 Line Loopback	[1]	The status of these tests are displayed on the front panel indicators and on the terminal screen.
T1 Payload Loopback	[2]	
Remote Loopback	[3]	

Figure 4-3 Loopbacks Signal Paths

Figure 4-4 illustrates a typical Loopback Setting screen for an HDSL system module using the T1 interface.

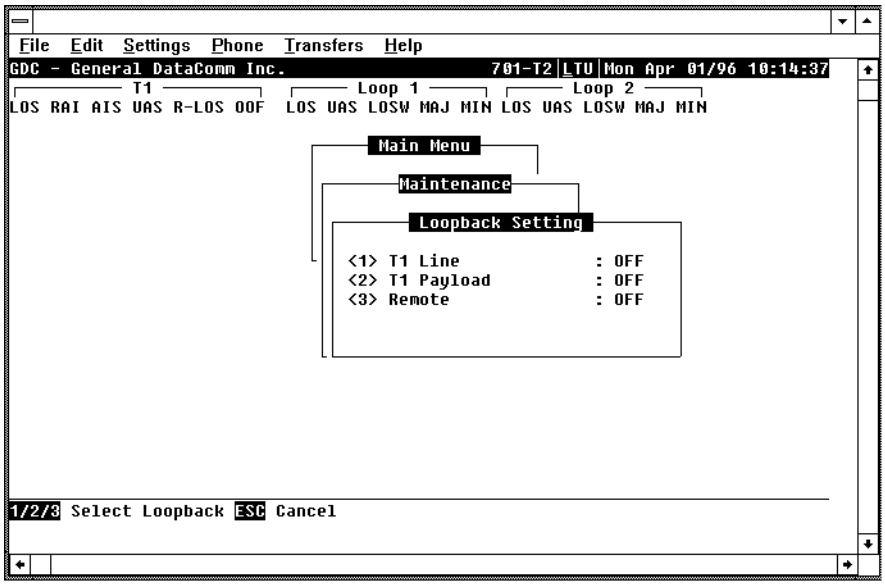


Figure 4-4 Loopbacks Screen

Operation

To access the loopbacks function, select Item 1 on the Maintenance Menu. To change the state of a loopback, use the following procedure:

1. Type the number of the line of the desired loopback — this toggles the selected loopback on and off.
2. Highlight the desired option, and press `Enter` to send the command to the HDSL system.

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

3. To exit and return to the Maintenance Menu, press Esc.

T1 Line Loopback

The line loopback is generally used to test the connection between your equipment and the HDSL system module. When the line loopback is activated (On) (Loopback **[1]**), the data signal received from the local user (via the transmit line of the user equipment interface) is returned on the receive line of that interface. Therefore, during normal operation the user equipment receives its own signal without errors.

The transmit signal from the local user equipment is transparent and thus is sent to the remote HDSL system, but the signal received from the remote HDSL system is blocked from the T1 interface. Note that when the 701-T2 is operating as a point-to-multipoint master unit, you have the option to activate the remote loopback on each individual loop or on all loops. When operating as a point-to-multipoint remote unit, remote loopback cannot be activated.

T1 Payload Loopback

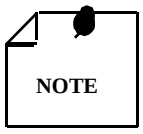
The payload loopback is generally used to test the connections between the local user equipment and the HDSL system module. When the payload loopback is activated (On) (Loopback **[2]**), the data portion of the T1 signal received from your installation (via the transmit line of the user's equipment interface) is returned to the data portion of the T1 receive interface. Only the data portion of the signal is returned -- all overhead bits are regenerated by the framing circuitry of the 701-T2. The user's transmit signal is transparent and therefore sent to the remote HDSL system, but the signal received from the remote HDSL system is blocked from the T1 interface.

Remote Loopback

The remote loopback is generally used to test end-to-end 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 loopback is activated (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 user's transmit signal is also passed to the remote user equipment that is connected to the HDSL system. But, the signal transmitted by the remote user is blocked from the HDSL receiver.



When the 701-T2 is operating as a point-to-multipoint master unit, you have the option to activate the remote loopback on each individual loop or on all loops. When operating as a point-to-multipoint remote unit, remote loopback cannot be activated.

Test Loopbacks - A Consideration

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 enables you to follow the signal path starting from the office and continuing toward the end user. We recommend this testing sequence:

1. Line loopback.

2. Payload loopback.

3. Remote loopback.

This is also the order in which the loopbacks are listed on the loopbacks screen. Activate only one loopback at a time.

BER Test

Method

Bit Error Rate (BER) testing is done by repeatedly transmitting a pseudo test sequence having a length of 2^{-15}-1 bits and comparing, by means of an error detector, the received sequence. Any difference is assumed to be an error and is counted. To perform 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.

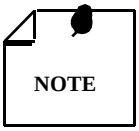
During this testing, user traffic is interrupted. You can do BER tests in an end-to-end mode that requires both LTU and NTU BER testers to be on. If testing is initiated at one end, a loopback along the signal path needs to be connected. The loopback can be a physical connection made somewhere along the signal path or a test loopback activated at the desired location as described in the *Loopbacks* section. Alternatively, an external BERT may be connected to the remote unit to make testing easier.

The measurement is 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 counted in each interval is up to 255. If the actual number of errors in a given interval is higher, only this maximum count is considered in the calculation of the BER. The calculated BER is updated at the end of each interval.

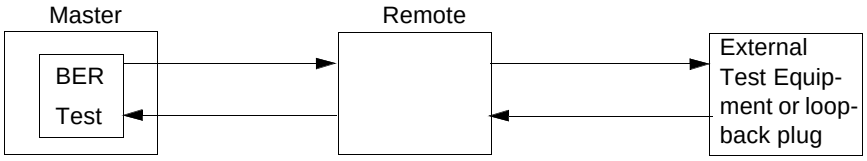
When configured as multi-point, you can use the BER tester on individual loops. When used in point-to-point operation both HDSL loops are used to transmit the 2^{-15} -1 bit pattern.

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

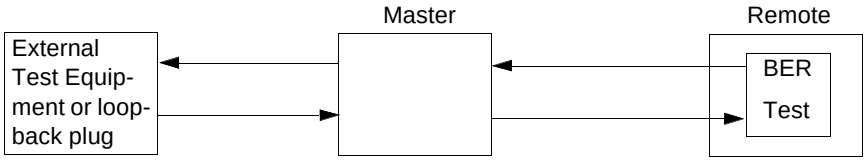
BER test can be invoked through a network management controller or supervisory terminal port. The front panel TM LED illuminates when the BER test is activated. When the error detector is in sync and detects no errors, the TM LED is constant, but when the error detector is not in sync or detects some errors, the TM LED blinks. The TM LED does not blink if the data detected is all 1s or all 0s.



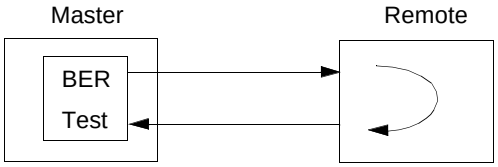
The internal BER test pattern generates data which is inverted relative to test equipment connected at the remote user equipment interface.



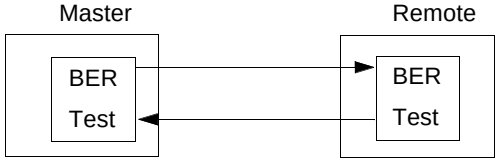
Master Self-Test:
(1) At the remote unit, attach external test equipment configured with test pattern 2^{15} and with data inverted. (A loopback plug may be used in place of test equipment.) (2) Enable Master BER test for all loops. (3) Proper operation is indicated by SYNC status and no errors.



Remote Self-Test:
(1) At the Master unit, attach external test equipment configured with test pattern 2^{15} and with data inverted. (A loopback plug may be used in place of test equipment.) (2) Enable Remote BER test for all loops. (3) Proper operation is indicated by SYNC status and no errors.



Self-Test with Remote Loopback:
(1) Enable Master BER test for all loops and with Remote Loopback. (2) Proper operation is indicated by SYNC status and no errors.



End-to-End Self-Test:
(1) Enable BER test for all loops on both Master and Remote units. (2) Proper operation is indicated by SYNC status and no errors.

Figure 4-5 Test Configuration

BER Screen Description

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

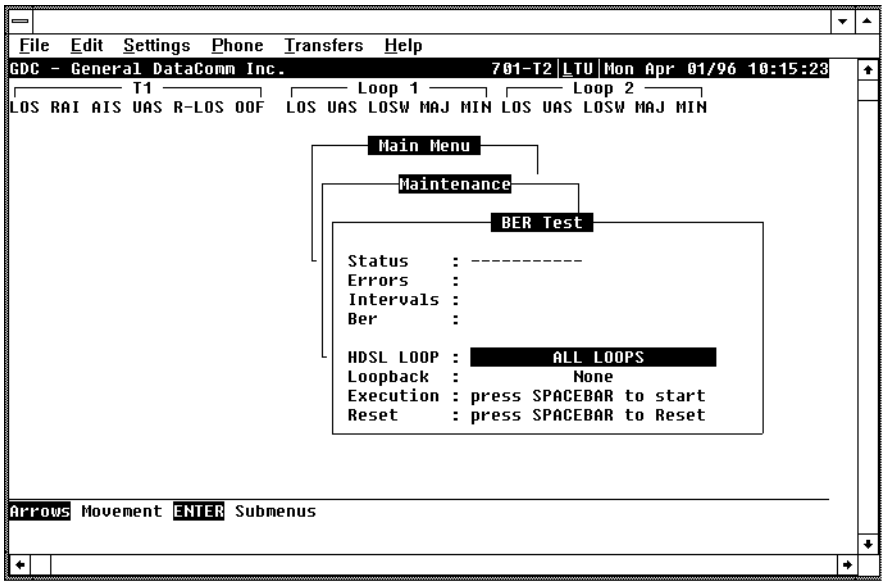


Figure 4-6 HDSL BER Test Screen

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

Status	Displays the status of the error detector: Sync - The error detector is synchronized, and the BER measurement is possible; Out-of-Sync - The error detector is not synchronized, and BER measurement is inhibited.
Errors	Displays the number of errors counted up to this point.
Intervals	Displays the number of measurement intervals up to this point.
BER	Displays the BER calculated up to this point.
HDSL Loop	Displays the HDSL loop to be tested. Each individual loop or all loops as an aggregate may be selected.
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	Displays the command to Reset Errors, Intervals, and BER.

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 HDSL loop field. Press space bar to select desired HDSL loop.

3. Make sure a loopback is activated. If the Loopback field displays None and no external loopback is currently connected, change the state of the loopback used for BER measurement. Move the selection block to the Loopback line and press the 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 `Stop`.
2. To stop the BER measurement, move the selection block to the Execution field and press the space bar. The `Execution` field now shows `Start`.
3. To exit and return to the Maintenance Menu, make sure that BER testing has been disabled, and press `Esc`.

To Reset Errors, Intervals, and BER, move the selection block to the Reset BER field and press the spacebar.

NOTE

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

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

BER test detector will synchronize and show extensively error free for 1s and 0s.

Set RTC

The `Set RTC` option permits you to set the real-time clock of the 701-T2. Choosing this option displays the `Set RTC` screen. A typical screen is shown in *Figure 4-7*.

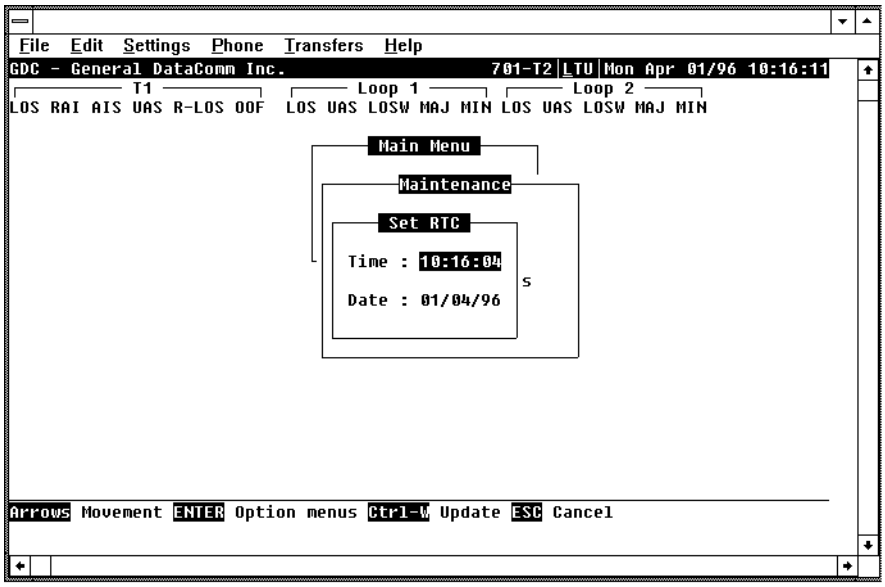


Figure 4-7 Set RTC Screen

The screen includes the two fields described in *Table 4-2*.

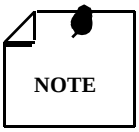
Table 4-2 Set RTC Screen Fields

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

Operation

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

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



The 701-T2 internal time is updated at the instant you press `CTRL-W`.

Reset Statistic

The Reset Statistics option resets all the performance statistics entries of the 701-T2.

Operation

To instruct the 701-T2 to reset all the performance statistics counters:

1. Select Item 4 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 701-T2 HDSL Loop start-up process. Normally this process is automatically performed at 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 701-T2 to perform the start-up process, select Item 5 on the Maintenance Menu.

Board Reset

This option is used to reset the 701-T2. To reset the 701-T2, select Item 6 on the Maintenance Menu. After a few seconds, the opening screen appears. The unit performs the start-up process and displays the Main Menu screen.

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

Index

General DataComm