

# ***GT 128 Network Terminating Unit***

**Installation and Operation**

## Safety Guidelines

Always use the following guidelines when unsafe conditions exist or when potentially hazardous voltages are present:

- 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.

## 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.

## 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.

## Public Telecommunications Networks



The presence of this symbol indicates that this equipment is not intended to be connected to a public telecommunications network. The connection of such equipment to a public telecommunications network in a European Community Member State will be in violation of the national law implementing Directive 91/263/EEC on the approximation of the laws of the Member States concerning telecommunication terminal equipment, including the mutual recognition of their conformity

## EC Declaration of Conformity

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On behalf of: General DataComm Inc.  
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The products to which this declaration relates are in conformity with the following relevant harmonized standards, the reference numbers of which have been published in the Official Journal of the European Communities;

### Electromagnetic Compatibility

EN55022: 1994

Specification for limits and methods of measurement of radio interference characteristics of information technology equipment.

EN 50082-1: 1992

Generic immunity standard Part 1 Residential, Commercial, and Light Industry.

### Safety

EN 60950: 1995 A1 through A3

Low Voltage Directive relating to electrical equipment designed for use within certain voltage limits.

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# Manual Revision History

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

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

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Issue	Date	Description
-01		First issue.



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# Preface

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## Scope

This manual describes how to install and operate the GT 128 network terminating unit.

The information contained in this manual has been carefully checked and is believed to be entirely reliable. However, as General DataComm improves the reliability, function, and design of their products, the possibility exists that information may not be current.

If you require updated, or any other General DataComm product information, contact:

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## Organization

This manual is divided into five primary chapters:

- Technical Overview (Chapter 1),
- Installation (Chapter 2),
- Operation (Chapter 3),
- Tests (Chapter 4), and
- Specifications (Chapter 5).

## 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.

This typewriter font shows output that is displayed on the screen or input entered by you.

**This bold font is used when referring to window names and menu selections.**



## Safety Information

The DANGERS, WARNINGS and CAUTIONS that appear throughout this manual are not only preventative measures designed to uphold the safety of both the service engineer and operator, but also enhance equipment reliability.

The definitions and symbols for DANGER, WARNING and CAUTION comply with ANSI Z535.2, American National Standard for Environmental and Facility Safety Signs, and ANSI Z535.4, Product Safety Signs and Labels, issued by the American National Standards Institute.

The following examples show the symbols and definitions of DANGER, WARNING, CAUTION, *Note* and *Important* as they are used in this manual.

---

**Note** *Indicates a note. It is something you should be particularly aware of; something not readily apparent. A note is typically used as a suggestion.*

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**Important** *Indicates an emphasized note. It is something you should be particularly aware of; something not readily apparent. Important is typically used to prevent equipment damage.*

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**CAUTION** *Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury. It may also be used to alert against unsafe practices.*

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**WARNING** *Warning indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury.*

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**DANGER** *Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.*

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# Chapter 1: Introduction

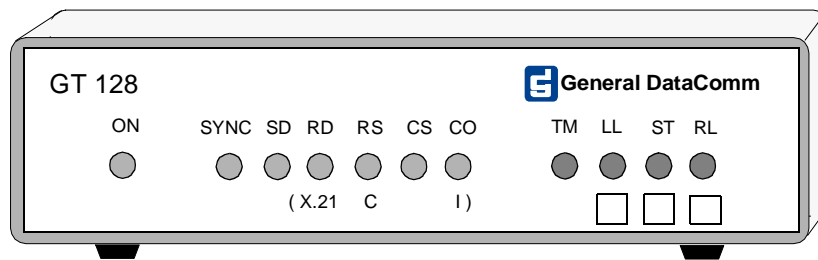
## GT 128

The GT 128 network terminating unit (NTU) is a two-wire transmission product that uses 2B1Q signalling (defined in ANSI T1.601-1992) for its line coding scheme. It supports one channel of user data at 64 kbps or 128 kbps, and has an operating range of up to 18,000 feet over a two-wire, 26 gauge line. Its DTE interface is configurable by a Berg jumper to be either V.35 (default) or X.21.

You can use a GDC Network Management System to option the GT 128 NTU remotely when it operates in conjunction with a managed UAS system. It responds to messages sent over the Embedded Operations Channel (EOC) from either a Network Manager or the network.

The GT 128 NTU is an improved version of the earlier DC 610 NTU, featuring a more compact enclosure, a universal power supply, lower cost, and easier installation.

[Table 1-1](#) lists part numbers for GT 128 standard and optional equipment.



**Figure 1-1** GT 128 Network Terminating Unit

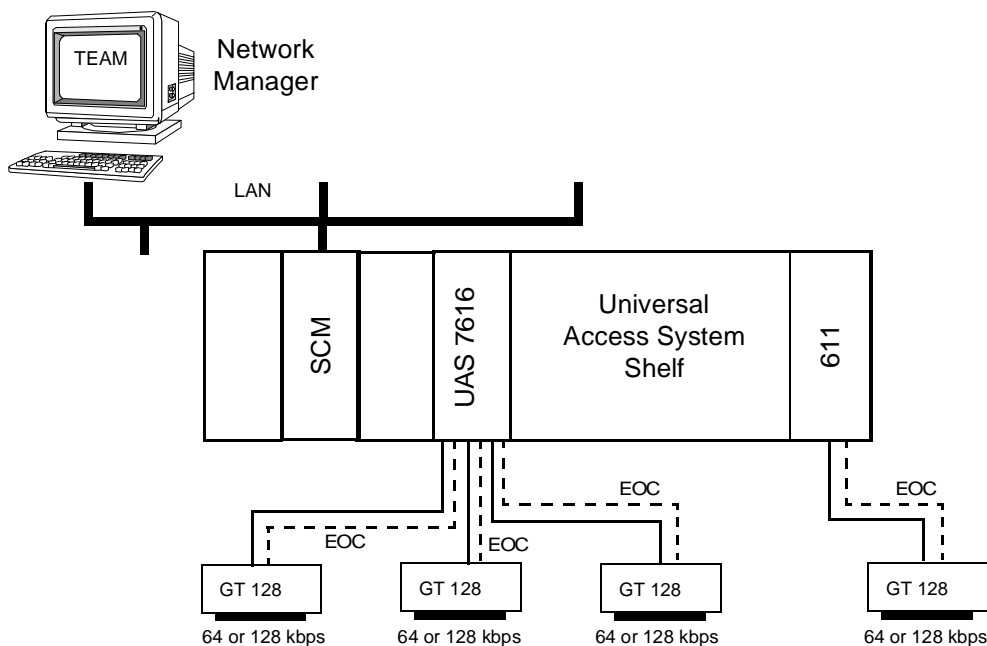
## Features

- Supports a single channel (64 kbps or 128 kbps) of customer data on a two-wire 2B1Q loop circuit.
- Acts as a Managed Network Element when connected to a unit under the control of a GDC Network Management System.
- Supports the Embedded Operations Channel (EOC) for network management communications.
- Provides selectable V.35 or X.21 interface.
- Responds to ANSI 2B+D, B1, and B2 loopback commands from a network test center.
- Supports both V.54 and PN127 remote loopback codes.
- Able to terminate sealing current.
- End-to-end compatible with GT 128, DC 610, and DC 612 NTUs.

- Compatible as a remote to UAS 611, UAS 613, UAS 7616, UAS 7624, or UAS 76726.
- Occupies a compact Mini Standalone Enclosure that measures approximately 9" x 7" x 3" (23 cm x 18 cm x 7.6 cm).
- Operates from a Universal AC power supply.

## Applications

**Tail Circuit (UAS Shelf)** - [Figure 1-2](#) shows GT 128 NTUs being used to support tail circuits of a UAS Shelf. The network manager, running the SNMP protocol, has soft control for configuration and monitoring functions in this application. The SCM (SpectraComm Manager) acts as the SNMP agent for the components installed in the shelf and, through them, for the NTUs connected to the tail circuits.



**Figure 1-2** Tail Circuit Application (UAS Shelf)

## Diagnostics

The GT 128 NTU incorporates built-in diagnostic circuits to allow quick and thorough performance tests. Diagnostic testing capabilities include power-up self test, bi-lateral Line Loopback (LL), V.54 and PN127 compliant Remote Loopback (RL), Self Test, and ANSI B1, B2 and 2B+D loopbacks.

The unit performs its power-up self test each time it is connected to ac power. During the test all LED indicators except ON illuminate briefly, then go off. If the test detects a failure, it indicates that result by flashing the LEDs five times.

The built-in RL capability supports transmission and recognition of selectable V.54 and PN127 loopback codes. By transmitting the loopback code when its front panel RL switch is activated, the unit can command the corresponding remote unit, at the far end of the network, to loop data back onto the network. The remote unit can be either another GT 128 NTU or an SC 616 NTU. Front panel-activated loopback codes are transmitted in-band, along with user data. The unit can also be commanded to perform loopbacks by means of network manager commands sent over the EOC.

The Self-Test feature reduces the need for external test equipment by providing a built-in test pattern generator and receiver.

## Equipment List

[Table 1-1](#) contains the equipment list for the GT 128 NTU.

**Table 1-1** Equipment List

Description	Part No.
GT 128 NTU Standalone, 100 to 240 V AC, 50/60 Hz	048A090-001
<b>Interface Cables</b>	
DB-25 Male to V.35 Male (ISO 2593) adapter cable	027H579-005 -015 -025 -050
DB-25 Male to V.35 Female (ISO 2593) adapter cable	027H572-001
DB-25 Male to DB-15 Male (ISO 4903) adapter cable for X.21	027H448-005 -010 -025
Line cable	022H024-001 -002 -005 -010 -015 -025 -050
The three digits following the dash in cable part numbers represent cable length in feet.	
<b>Power Cords (IEC320)</b>	
Domestic	830-024-003
Europe	830-061-002
Italy	830-002-008
Japan	830-002-009
Australia	830-002-010
Taiwan	830-002-011
U.K.	830-060-102
Switzerland	830-061-003



# Chapter 2: Installation

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## Installation Procedures

Place the GT 128 NTU in a ventilated area where the ambient temperature does not exceed 122°F (50°C). Do not install the unit directly above equipment that generates a large amount of heat (such as power supplies).

## Option Selection

The only option on the GT 128 NTU is the XP1 jumper that selects the DTE interface for either V.35 or X.21 operation. The unit's default setting when delivered from the factory is V.35.

During the unit's power-up self test, its front panel LEDs indicate how the XP1 jumper is set. The unit performs the test each time it is connected to ac power, and during the test all LED indicators except ON illuminate briefly, then go off. If XP1 is set to V.35 (default), all the LEDs go off at the same time. If XP1 is set to X.21, the RD indicator (located above the X.21 designation) remains on longer than the other LEDs.

If your application requires an X.21 DTE interface, use the following procedure to change the option setting.

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**Important** *Observe ESD precautions during the procedure. Most especially, be sure to wear a properly grounded antistatic wrist strap.*

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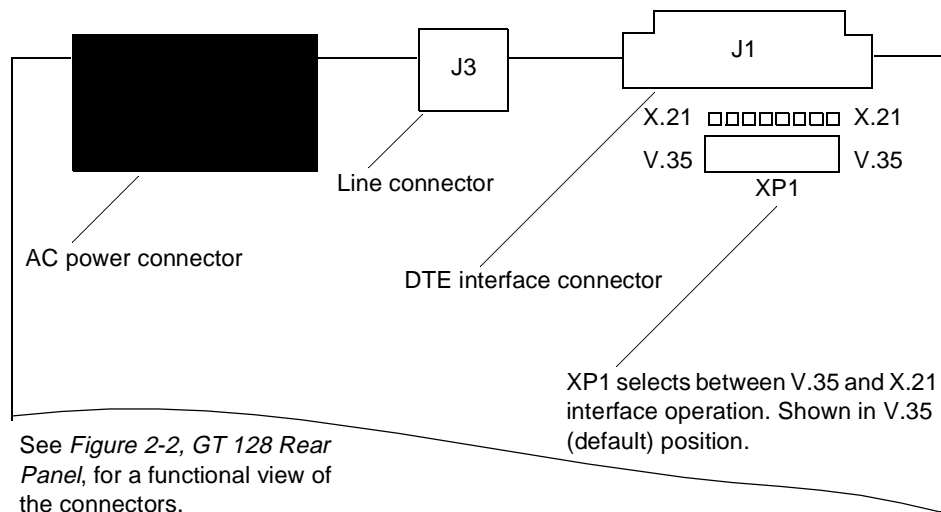
1. Make sure that the unit's power cord is disconnected.
2. Remove the two screws from the bottom of the unit.
3. Place the unit right side up on a flat surface and carefully remove the top cover.

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**Note** *The component card and rear panel are fixed to the bottom. The front panel, however, is floating.*

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4. Move the XP1 jumper to the X.21 position. [Figure 2-1](#) illustrates the location of the XP1 jumper and indicates the V.35 and X.21 option positions.
5. Replace the top cover, positioning it with the grille at the rear, and carefully align the front panel so that it fits into the grooves in the top and bottom covers.
6. Replace the two screws in the bottom of the unit.



**Figure 2-1** V.35/X.21 Option Jumper and Base Card Connectors

## Electrical Connections

The following paragraphs describe the power line, business equipment, and line connections to the GT 128 NTU.

### Power

Attach the appropriate power cord to the rear panel IEC 320 connector and to the wall receptacle. The front panel ON LED lights to indicate the presence of power to the unit.

The ac outlet that powers the NTU should not be under switch control. If possible, it should part of the same ac circuit that powers the DTE that is connected to the GT 128 NTU. Having the NTU and the DTE on the same ac circuit prevents large circulating currents caused by differences in ground potential. If you cannot determine whether both devices are connected to the same circuit, verify that the potential difference between the grounding circuits of the respective power outlets is no more than 0.25 V rms.

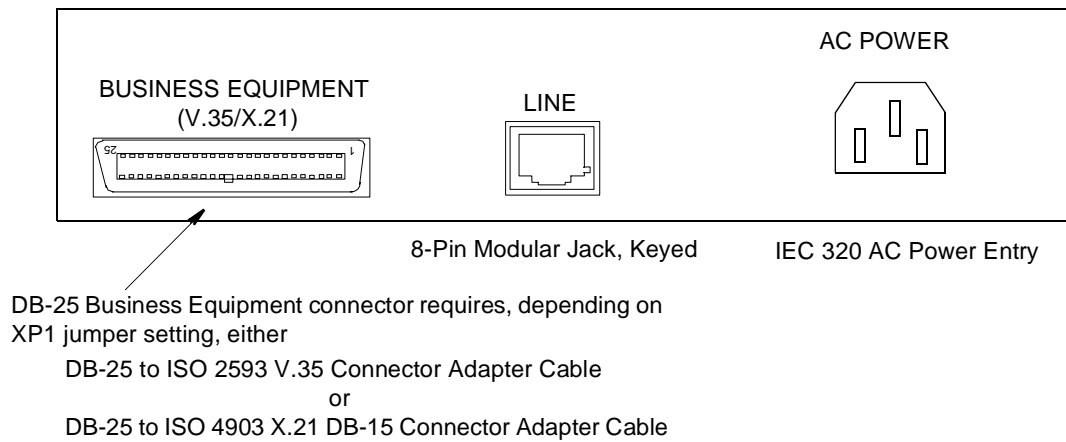
### Business Equipment Connection

The rear panel universal DTE DB-25 connector, labeled Business Equipment (see [Figure 2-2](#)), supports either X.21 or V.35 interface connection as selected by the XP1 jumper. The connector pinouts for the two applications are detailed in *Appendix A, Technical Characteristics*.

### Line Connection

The rear panel 8-position modular jack, labeled Line (see [Figure 2-2](#)), supports network connection. The jack conforms to the ISO 8877 standard. Its connector pinouts are detailed in *Appendix A, Technical Characteristics*.





**Figure 2-2** GT 128 Rear Panel



# Chapter 3: Operation

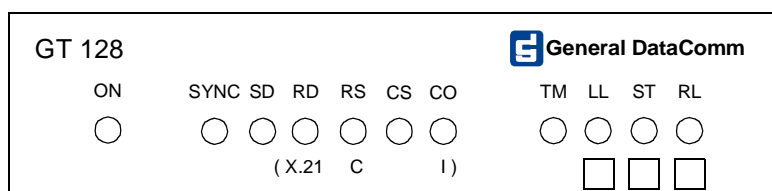
## Overview

When you install the GT 128 properly, control is automatic. It has no operating instructions (except for test procedures given in *Chapter 4, Tests*). This chapter describes the controls and indicators of the unit that you may use to check the operation of the GT 128.

This chapter also lists options that can be set by means of a GDC Network Manager. When the GT 128 is used in an unmanaged system those options remain at their default settings.

## Indicators and Controls

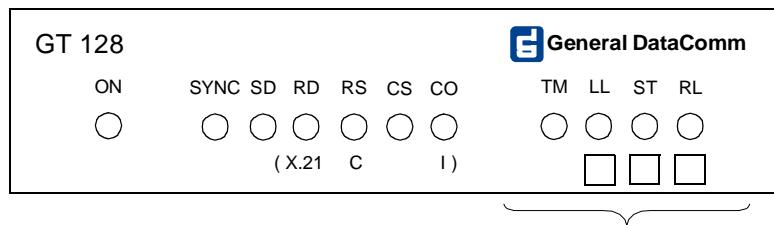
[Figure 3-1](#) and [Figure 3-2](#) illustrate the GT 128 front panel and explain the function of each indicator and control. You can find illustrations of the rear panel in *Chapter 2*.



The operation indicators are all green LEDs.

- ON - Lit while the on-board power supply is functioning and providing +5 Vdc.
- SYNC - Lit while the 2B1Q link is established and in sync.
- SD - Send Data. Blinks on each time a 0 is sent to the network in the transmit data stream.
- RD - Received Data. Blinks on each time a 0 is detected in the receive data stream from the network.
- RS - Request to Send. Lit while RS to the NTU is active (either received from the DTE or forced on by option selection).
- CS - Clear to Send. Lit while CS to the DTE is on.
- CO - Carrier On. Lit while the NTU is in sync. Off during self test.

**Figure 3-1** Front Panel Operation Indicators



The LL, ST, and RL switches are momentary action pushbuttons. Pressing a switch initially activates the designated function and causes the corresponding red LED to light. Pressing the switch a second time turns off the function and the LED.

The red TM (Test Mode) LED is lit while any test function is active.

- LL - Local Loop. Loops the channel's received data back toward the network; loops the channel's transmit data back toward the DTE.
- ST - Self Test. When this function is active the NTU generates and checks a 2047 test pattern. The NTU indicates detected errors by causing the TM LED to blink off.
- RL - Remote Loop. Causes the NTU to send a loopback code to its remote, commanding the remote to loop received data back to the NTU. The loopback code is selectable by means of a network manager to be either PN127 (default) or V.54.

**Figure 3-2** Front Panel Diagnostic Controls and Indicators

## Options

[Table 3-1](#) lists the GT 128 options that can be set by means of an SNMP network manager such as GDC's TEAM 600. The default settings shown in the table are in effect when the unit is installed and operated without network management. *Operation TEAM 600 for UNIX* (GDC Part No. 058R731-V300) contains instructions for using the TEAM 600 network manager.

**Table 3-1** Options Selectable from the TEAM 600 Network Manager

Options	Default	Description
<b>Configuration</b>		
64 or 128 kbps Data Rate	64 kbps	When 128 kbps is selected, 128 kbps data rate is configured for the channel. When 64 kbps is selected, the channel data rate is 64 kbps.
RTS Normal or Forced	Normal	When Forced, the RTS signal is forced On. When Normal, the RTS/CTS delay is determined by the RTS/CTS Delay option.
RTS-CTS Delay	0 RTS Delay	Selects RTS to CTS delay in 5 ms increments, from 0 to 75 ms.
RL Enable	RL Enabled	Enables or disables Remote Loopback test. Inhibits V.54/PN127 RL send and receive.
RL Timeout	No RL Timeout	Selects 10 minute RL timeout. Timeout ends loopback initiated in response to received V.54 or PN127 code.
V.54 or PN127 Loopback Code	PN127	Selects the in-band code the unit can transmit to initiate a remote loopback. The selection also determines which code the unit recognises as the command to go into loopback itself.
511 or 2047 Test Pattern	2047	When 2047 is selected, a 2047 test pattern is used for network manager initiated self-test pattern generation and checking. When 511 is selected, a 511 test pattern is used. The 2047 test pattern is always used for front panel initiated self-test pattern generation and checking.
<b>Diagnostics (from Network Test Center)</b>		
Operate 2B+D Loopback		This function directs the GT 128 to loopback the user-data (2B+D) bit stream toward the network.
Operate B1 or B2 Channel Loopback		This function directs the GT 128 to loopback an individual B-channel toward the network.
<b>Diagnostics (from TEAM 600 Network Manager)</b>		
B1 or B2 Channel Loopback		This function directs the GT 128 to loop back an individual B-channel toward the DTE interface.
B1 or B2 Digital Loopback		This function directs the GT 128 to loop back an individual B-channel toward the network.
B1 or B2 Remote Bi-lateral Loopback		This function directs the GT 128 to perform simultaneous Channel and Digital Loopbacks.
B1 or B2 Channel Self-Test		The channel has the ability to generate and check either a 2047 or a 511 test pattern. Errors are reported to the network manager and by flashing the front panel TM LED.



# Chapter 4: Tests

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## Overview

This chapter describes tests you can perform from the front panel. (See [Figure 4-1](#) through [Figure 4-5](#)). You can use the tests described in this section to isolate problems in the data communications system.

## Point-to-Point Testing

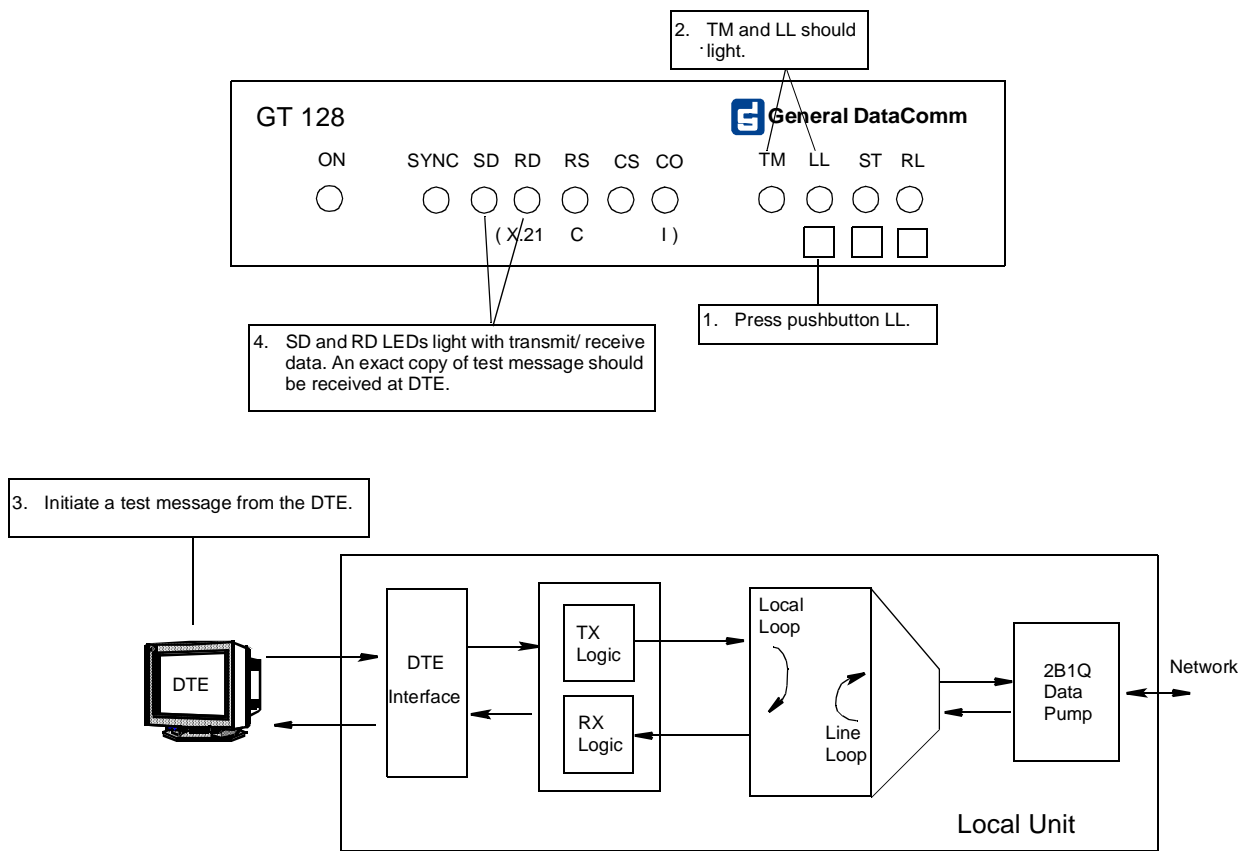
The following paragraphs present test information for point-to-point installations.

## Local Loopback Test

Local Loopback (LL) checks the performance of the GT 128 NTU and its associated DTE . The test disconnects the GT 128 NTU transmitter output and receiver input from the communications line and connects them together. The resulting circuit, which is similar to an analog loopback, loops signals from the transmitter back through the receiver. The test signal you send through the Local Loopback can be supplied from the DTE or from test equipment connected to the DTE interface.

When a Local Loopback is initiated, the NTU also connects its receiver and transmitter communications lines to create a Line Loopback circuit. The Line Loopback directs received signals back over the communications line to the originating station for where they can be checked for errors. This test checks the performance of the remote site's LTU and the communications line. To perform this test, arrange with the remote site personnel before initiating the Local Loopback test.

[Figure 4-1](#) illustrates LL using the front panel LL push-button.



**Figure 4-1** Local Loopback (LL) Test



## Remote Loopback

Remote Loopback (RL) checks the performance of the local and remote units, the local DTE, and the communications path through the network. When you initiate this test, the local unit transmits a loopback code that causes the remote unit to go into a Digital Loopback (DL) condition.

In Digital Loopback the remote unit's transmitter and receiver are disconnected from the DTE interface and connected together. The resulting circuit loops the receiver's digital output signals to the transmitter's input so that signals are returned to their source at the local unit where they can be checked for errors.

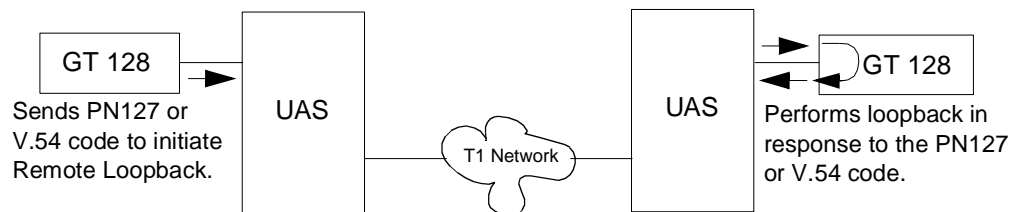
The test signal you send through the Remote Loopback can be supplied from the local DTE or from test equipment connected to the DTE interface of the local unit.

The GT 128 NTU can be configured to send either a PN127 or a V.54 Remote Loopback code.

[Figure 4-2](#) illustrates RL.

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**Important** *Keep in mind when performing GT 128 Remote Loopback tests that the code is interpreted, and the loopback is performed, by the GT 128 NTU at the far end of the network. The line interface and drop-side interface units at each site pass the loopback code through without taking action in response to it.*



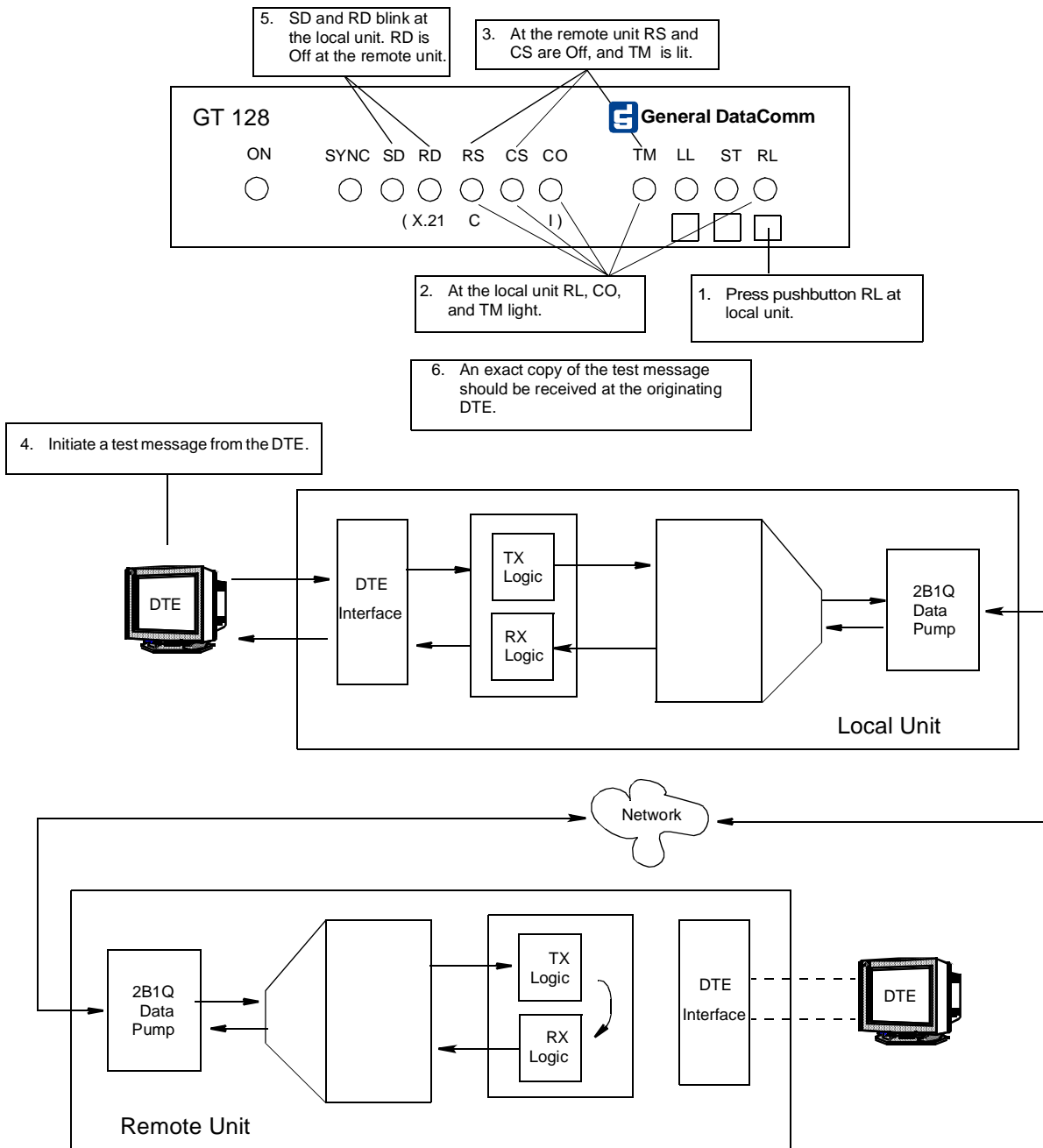
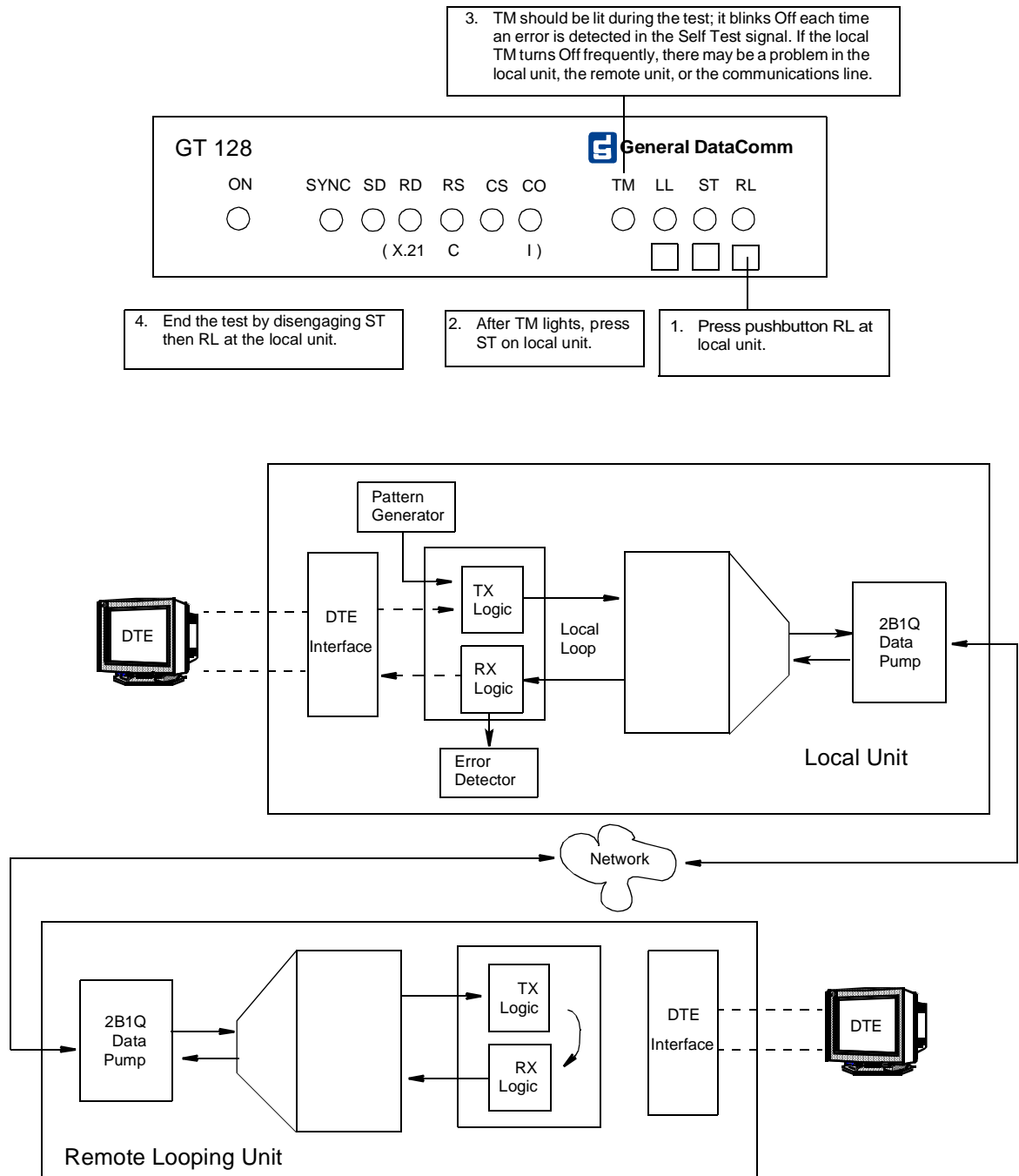


Figure 4-2 Remote Loopback Test

## Remote Loopback Self Test

In a Remote Loopback Self Test the test signal directed through the remote digital loopback is generated and checked by the GT 128 NTU rather than by an external device. [Figure 4-3](#) illustrates the Remote Loopback Self Test.



**Figure 4-3** Remote Loopback Self Test

## End-to-end Self Test

In addition to using the Self-Test function in conjunction with other test features, Self-Test may be used independently. In this test, the local and remote unit's exchange Self-Test patterns between their respective test circuits to check the performance of the communications line and the local and remote unit's (not including the DTE interfaces). To perform End-To-End Self-Test, proceed as shown in [Figure 4-4](#).

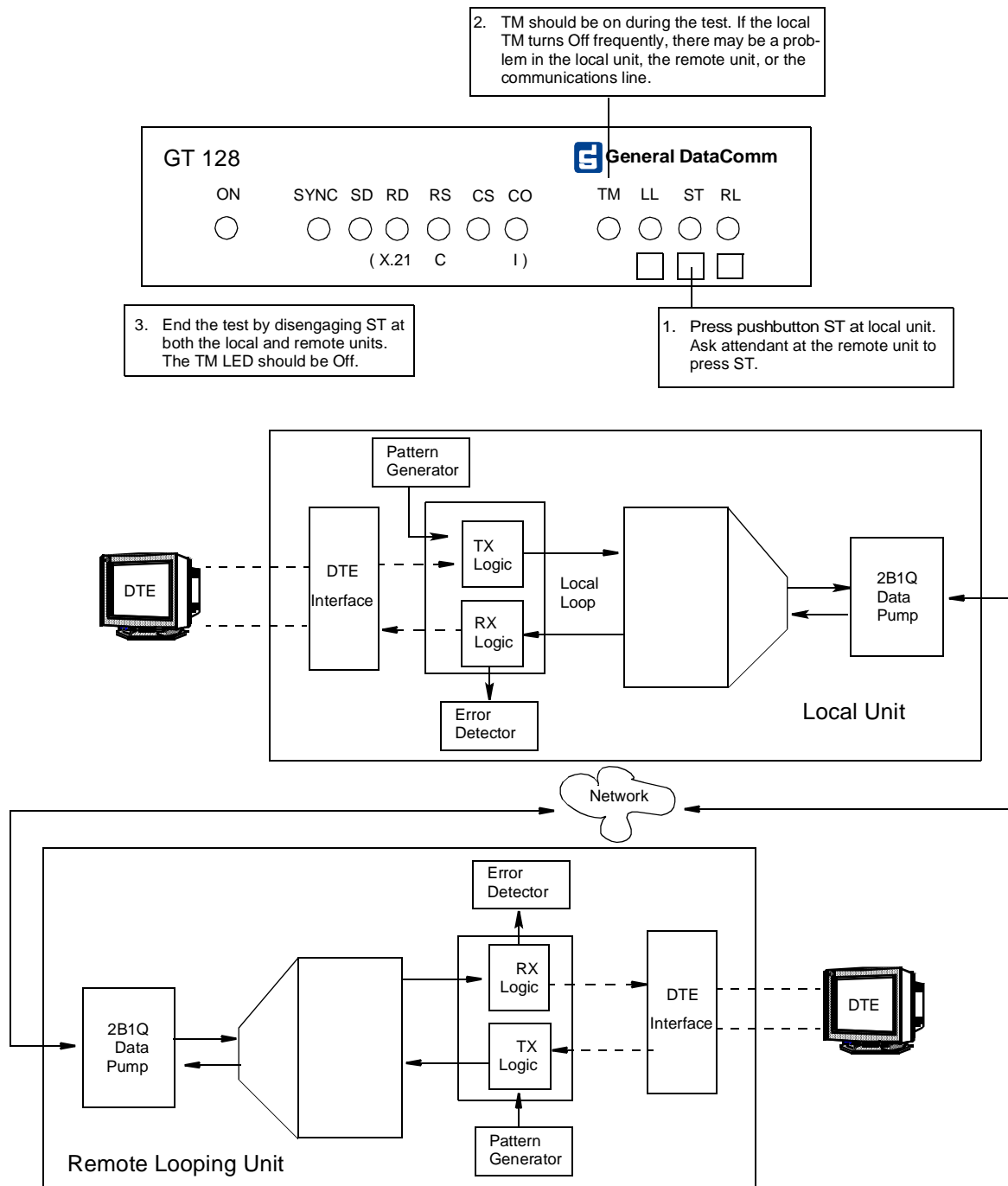


Figure 4-4 End-to-End Self Test

## Network Loopback Tests (EOC Controlled)

The GT 128 NTU responds to the standard network loopback codes that are defined in the ANSI T1.601-1992 standard. A network test center or test equipment connected to the network can send the loopback codes in the Embedded Operation Channel (EOC) of the 2B1Q line signal.

The GT 128 NTU supports three loopback codes: B1, B2, and 2B+D. When the unit detects one of those codes it goes into loopback by disconnecting its transmitter input and receiver output from the DTE and connecting them together. The result is a circuit that loops received signals back over the communications line to the originating station. [Figure 4-5](#) illustrates the EOC controlled Network Loopback tests.

When the DTE interface is set to 64 kbps the B1 channel is used and the B2 channel is unused. When the DTE interface is set to 128 kbps both the B1 and the B2 channels are used. The 16 kbps D channel is not used by the GT 128 NTU, but it is looped back properly when required.

When it is necessary to isolate a problem, contact the remote test center operator and ask them to initiate a network test.

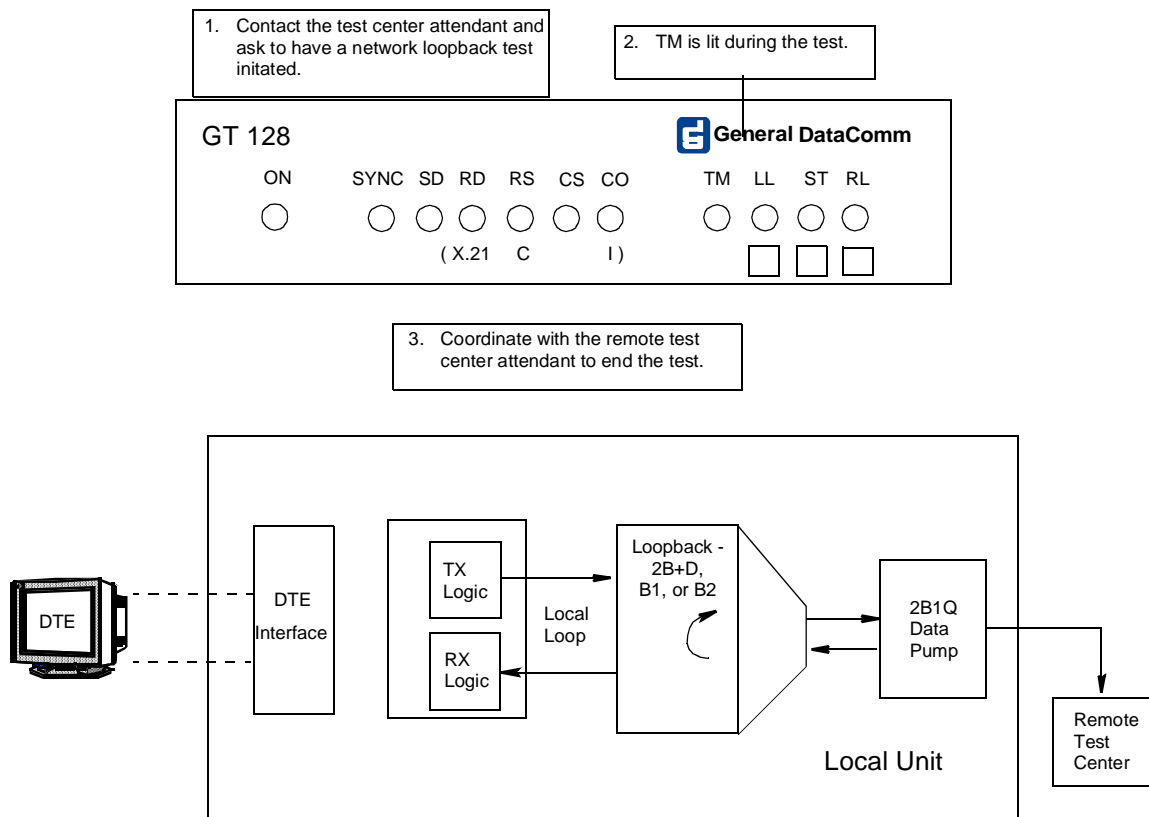


Figure 4-5 Network Loopback Test, EOC Controlled



# Chapter 5: Specifications

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## Technical Characteristics

Technical Characteristics for the GT 128 NTU are found in [Table 5-1](#), [Table 5-2](#) and [Table 5-3](#) describe the business equipment interface signals. [Table 5-4](#) lists the line interface signals.

**Table 5-1** Technical Characteristics

<b>Business Equipment Interface</b>	
Data Rates	64 kbps or 128 kbps.
Interface Types	ITU-T V.35 or X.21. Can be used as an LDM in Metropolitan Area Network (MAN) or campus networks
<b>Network Interface</b>	
Operating Mode	Full duplex with adaptive echo cancellation.
Data Rate	160 kbps total: 128 kbps user data, 16 Kbps internal control, 16 kbps for timing and synchronization.
Data Format	Synchronous, serial binary
Line Coding	2B1Q, compatible with ANSI T1.601-1992
Line Requirements	2-wire, non-loaded metallic circuit
Operating Range	5.5 to 7 km (18,000 to 22,967 ft) — varies with wire size and bridged taps
<b>Diagnostics</b>	
Front Panel Switch Controlled	2047 Self Test Remote Loop - PN 127 (default) and V.54 methods, network management selectable Remote Loop with Self Test Local Loopback
Network Manager (SNMP) Controlled	Channel Loopback Data Loopback Bi-lateral Loopback Self Test - selectable, 2047 or 511
Network Test Center Controlled	2B+D loopback B1 loopback B2 loopback
<b>Power Requirements</b>	
Voltage Range	100 – 240 V AC, nominal, 50/60 Hz
Input Power	3 W maximum
Fusing	F1, 0.5A, 250V SB
<b>Physical Characteristics</b>	
Enclosure	
Height	56 mm (2.2 in.)
Width	206 mm (8.1 in.)
Depth	163 mm (6.4 in.)
Weight	0.7 kg (1.5 lbs.)
Temperature	0° to 50°C (32° to 122°F) operating –40° to 70°C (–40° to 158°F) non-operating
Humidity	Up to 95% without condensation
Safety Protection	UL 1950 listed and CSA approved
EMC	EN55022 Class B
CE Mark	



**Table 5-2** Business Equipment (DTE) Interface Signals (ITU-T V.35)

J1 (DB-25) Pin (See Note 1)	V.35 (ISO 2593) Pin (See Note 2)	ITU-T (See Note 3)	NTU	Signal	Description
1	A	101		No Connection	
7	B	102		Signal ground	Establishes a common ground reference for all interface circuits.
4	C	105	RS	Request-to-send	Indicates to GT 128 that DTE is prepared to transmit.
5	D	106	CS	Clear-to-send	Indicates to DTE that GT 128 is prepared to transmit.
6	E	107	DM	Data Set Ready	Indicates to DTE that GT 128 is operational.
8	F	109	CO	Received line signal detector (Carrier On)	Indicates to DTE that GT 128 is receiving data (not idle or OOS codes).
25	NN	142	TM	Test mode	Indicates to DTE that GT 128 is in a test mode.
2 14	P S	103 103	SD-A SD-B	Transmitted data	Transfers data signals from DTE to GT 128 for transmission over communications line.
3 16	R T	104 104	RD-A RD-B	Received data	Transfers data signals received over communication line by GT 128 to DTE.
17 9	V X	115 115	RT-A RT-B	Receiver timing	Transfers receiver signal timing information from GT 128 to DTE.
15 12	Y AA/a	114 114	ST-A ST-B	Transmitter timing	Transfers transmitter signal timing information from GT 128 to DTE.
20	H	108/2	TR	Data Terminal Ready	Indicates to GT 128 that DTE is prepared for data communication.
Note 1: Unlisted DB-25 pins are not used Note 2: V.35 interface requires use of adapter cable 027H579 or 027H572 Note 3: ITU-T designations are shown for reference only.					

**Table 5-3** Business Equipment (DTE) Interface Signals (X.21)

J1 DB-25 Pin	15-Pin X.21 Connector*	ITU-T Circuit Designation	Signal	Description
2 14	2 9	T(A) T(B)	Transmitted data	Data from DTE.
3 16	4 11	R(A) R(B)	Received data	Data to DTE.
4 20	3 10	C(A) C(B)	Control	Indicates to DSU that DTE is prepared to transmit.
5 6	5 12	I(A) I(B)	Indication	Indicates to DTE that DSU is receiving data.
15 12	6 13	S(A) S(B)	Signal element timing	Transmit and receive signal timing information from DSU to DTE.
7	8	G	Ground	Common electrical reference

\* DB25 to DB15 adapter cable, part # 027H448-005, -010, or -025 needed for X.21 compatibility.

**Table 5-4** Line Interface Signals

8-Position Modular Jack Pin No.	Signal
1	Not Used
2	Not Used
3	Not Used
4	Tip or Ring
5	Ring or Tip
6	Not Used
7	Not Used
8	Not Used

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