

GEMINI User's Guide Version 2.03 Addendum

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Version 2.03 corrects the following problems:

- * Gemini would randomly report a GPIB E008 error condition during long term tests conducted using a TAS Series II and TASKIT software.
- * Gemini would incorrectly report the software cartridge version to the user when using TASKIT software to control the unit.
- * The internal clock generator outputs were not within the specified tolerances listed in the specifications.

Clock Generator

The internal clock generator outputs for Sync and Async modes have been improved for greater accuracy. The following specs should now be used as a reference.

Internal Clock (Sync)

Nominal Frequencies	75,110,134.5,150,300,600,1200, 1800,2000,2400,4800,7200,9600, 12000,14400,16000,16800, 19200,21600,24000,32000, 38400,48000,56000,57600, 64000,72000
Accuracy	+/- 0.01%
Offset	0 to +/- 10.0% in 0.1% Steps
Clock Accuracy with Offset	+/- 0.111%

Internal Clock (Async)

Nominal Frequencies	75,110,134.5,150,300,600,1200, 1800,2000,2400,4800,7200,9600, 12000,14400,16000,16800, 19200,21600,24000,32000, 38400,48000,56000,57600, 64000,72000
Accuracy	+/- 0.01% *
Offset	0 to +/- 10.0% in 0.1% Steps
Clock Accuracy with Offset	+/- 0.111%

* Actual nominal frequencies for 16000 is 15993.75 (-0.039%) and for 32000 is 31987.5 (-0.039%).

NOTE: Async clock frequencies are divided by 16 to obtain nominal levels. The current manuals specifications for Internal Clocks should be replaced with those specifications stated above.

TAS Gemini 1022 Dual Terminal Emulator User's Manual

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This manual applies to Gemini Software Cartridge version 2.02

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FEEDBACK...

We welcome any comments, suggestions, or questions you may have concerning this manual. In addition to the items listed below, please feel free to mention any other topic or area of concern that is of interest to you.

1. Did you find this manual useful and informative?
2. Was the manual easy to follow?
3. Did you require additional information that was not contained in this manual? If so, please tell us what information can be added to assist you.
4. Did you have difficulty locating the specific information you needed? If so, how can we restructure the manual so the pertinent information is easier to find?
5. Did you feel the information in this manual was correct from a technical standpoint? If not, what areas can be improved and/or adjusted?
6. Please indicate any other comments or suggestions.

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About This Manual...

This manual contains all the information you need to install and operate the TAS Gemini 1022 Dual Terminal Emulator. The manual is structured as follows:

The **Introduction** section provides an overview of Gemini features and functions, and details the Gemini installation procedure. Be sure to read this section before operating the unit.

The **Operation** section describes the Gemini front panel and menus in detail, and describes the procedures for setting up and executing call setup, bit error rate and throughput tests, and polling tests. This section also contains sample test procedures.

The **Menu Reference** section contains detailed information about each Gemini menu parameter. The organization of this section matches the Gemini menu structure to facilitate easy reference.

The **Remote Operation** section describes the Gemini GPIB and RS-232 remote control interfaces. This section provides an overview of the Gemini command set and command syntax, and contains sample remote control procedures. This section also documents the RS-232/GPIB Command Translator feature.

The **Remote Commands Reference** section contains a quick reference to the entire Gemini command set and a detailed reference for each command. This section documents the format of each command, and contains examples of command usage.

The **Status Codes** section documents the status codes that you may encounter while using the Gemini.

The **Specifications** section contains detailed specifications and connector pin assignments.

Purpose

This document lists the changes and additions made to the Gemini's Software Cartridge since version 2.01.

BERT Test

Previous Gemini versions computed throughput incorrectly if a test was started while the receiver was in the lost sync state. The BERT test results now report the correct value.

The BERT test results display has been reorganized slightly to allow room for more digits.

The Sync duration for A and B on the front panel were combined in previous versions. The settings for each are now independent.

Polls Test

The Polls test maximum effective transmit rate has been increased from 19.2 Kbps to 38.4 Kbps (Async) and 72 Kbps (Sync).

The Polls test always uses Rts-Cts flow control regardless of the Term menu selection.

When running the test in manual mode, the Rts-Cts time-out displayed would never exceed the programmed RTS-CTS time-out limit. The RTS-CTS time-out is now displayed correctly in manual mode.

The semiauto selection for the false poll limit, POLL:FPOL, now stops the test when the limit is reached. The limit was previously ignored.

Gemini previously inserted errors by modifying the last character of a poll message. Errors are now inserted randomly into any character of a message (except on the first sync character).

The accuracy of the interpoll delay time was improved from +/- 1.0 ms to +/- 0.05 ms.

Message Transfer Test

The command MSGX:GO no longer waits for the transmit string to be sent (or a 5-second maximum waiting time) before responding with /C/.

Remote Control

The GPIB terminator selection has been removed from front panel menu. Gemini Version 2.02 requires an EOI terminator when it is a GPIB talker or listener.

The semicolon ";" is no longer interpreted as end-of-string in GPIB messages.

The error codes associated with message time-out and device time-out have been separated. MTO = error 20 and DTO = error 21.

The Gemini TSND message response time-out is now programmable using GPIB:WTIM, and defaults to 100 seconds.

Miscellaneous Items

Two Gemini internal clock rates, 21.6K and 24 Kbps, were added.

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1 Introduction

The TAS Gemini 1022 Dual Terminal Emulator is a dual data analyzer that is especially suited for testing and evaluating modems and modem communication links. Gemini effectively tests and evaluates the performance of analog modems, limited-distance modems (LDMs), Digital Dataphone Service (DDS) sets, ISDN terminal adaptors, data multiplexers, and more. Gemini combines the features required for thorough testing into one compact unit. By combining these features, Gemini dramatically reduces the cost and complexity of data communications equipment test arrangements.

Gemini Features

Two Data Analyzers In One

Gemini contains two complete data communications analyzers in one compact package. This makes it easy to perform end-to-end tests on modems, DDS sets, limited distance modems, ISDN terminals, multiplexers, and other data communications equipment. Gemini's terminal emulation, data monitor, and performance testing features operate at rates from 0 to 72 kbps and up to 76.8 kbps with an external clock.

Advanced Performance Tests

Gemini provides built-in performance testing capabilities, including bit error rate tests, throughput tests, and polling tests.

Built-In Call Setup

Gemini can store and execute call setup instructions for virtually any modem. Call setup data formats include async, sync, and hdlc. Characters can be coded in ASCII or EBCDIC. Gemini can also monitor and display the data flow to and from each modem. Gemini provides complete testing capability, and eliminates the additional terminals, protocol analyzers, and switching equipment previously required for modem test setups.

Remote Control

RS-232 and IEEE-488 (GPIB) control are standard with Gemini. Remote control commands are simple and easy to use, and are the same regardless of the remote control method. This makes it easy to include Gemini in automatic modem test systems.

RS-232/GPIB Command Translator

Gemini can act as the GPIB controller in an automatic test system. The controller issues commands to Gemini via RS-232, and Gemini controls the rest of the test station via GPIB. This allows any standard PC to act as a GPIB controller without additional GPIB control hardware or software.

Software Cartridge

The feature set for Gemini resides on a plug-in software cartridge. You can easily add new test capabilities in the future as they become available.

Gemini Applications

Modem Testing

Figure 1-1 shows the TAS 100-GT Modem Test System. In this setup, the TAS 112 Telephone Network Simulator simulates telephone network conditions, and Gemini measures modem performance parameters such as bit error rate and throughput. Gemini also sends and monitors modem call setup commands. Since Gemini contains two data analyzers, it performs call setup at both modems without switching the data connections, and it measures modem performance simultaneously at both test interfaces. The PC executes the test control program (in this case, TASKIT/100). The PC controls Gemini directly, and controls the TAS 100 Series Telephone Network Simulator via Gemini's built-in RS-232/GPIB converter.

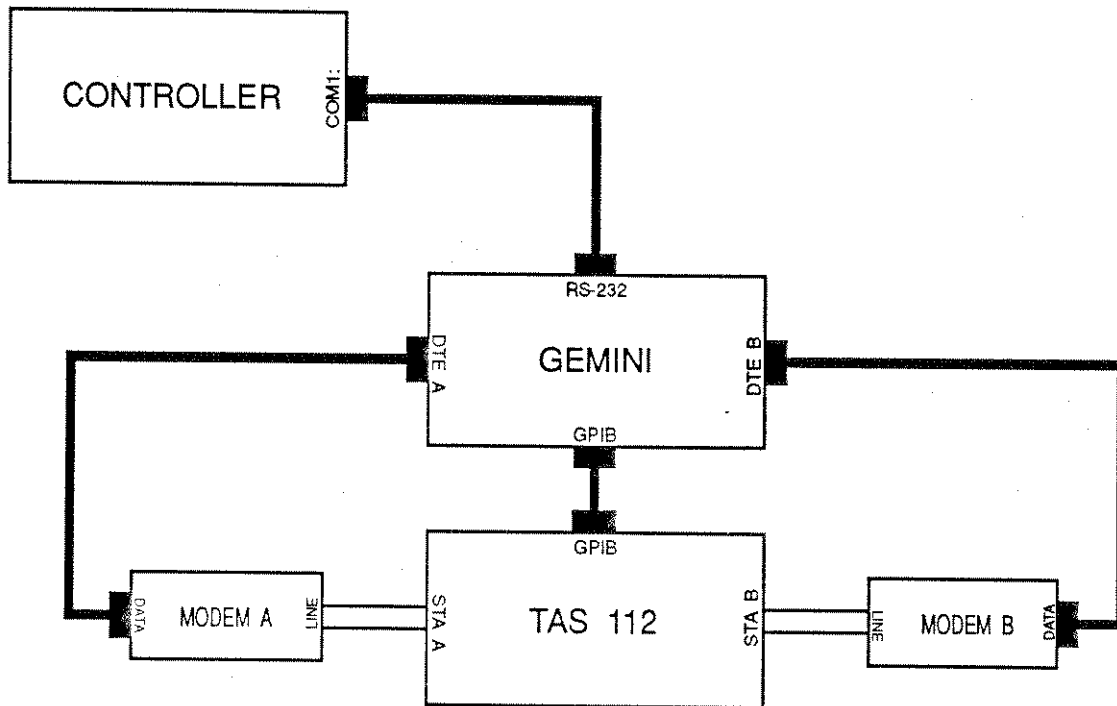


Figure 1-1. TAS 112-GT Modem Test System

Testing ISDN Transceivers, DDS Sets, or LDMs

Figure 1-2 shows a test setup for ISDN U-interface transceivers. In this setup, the TAS 2100 Loop Emulator simulates subscriber loop conditions, and Gemini measures transceiver performance parameters such as bit error rate. A similar setup can be used to test limited distance modems, DDS sets, and other wideband data transceivers.

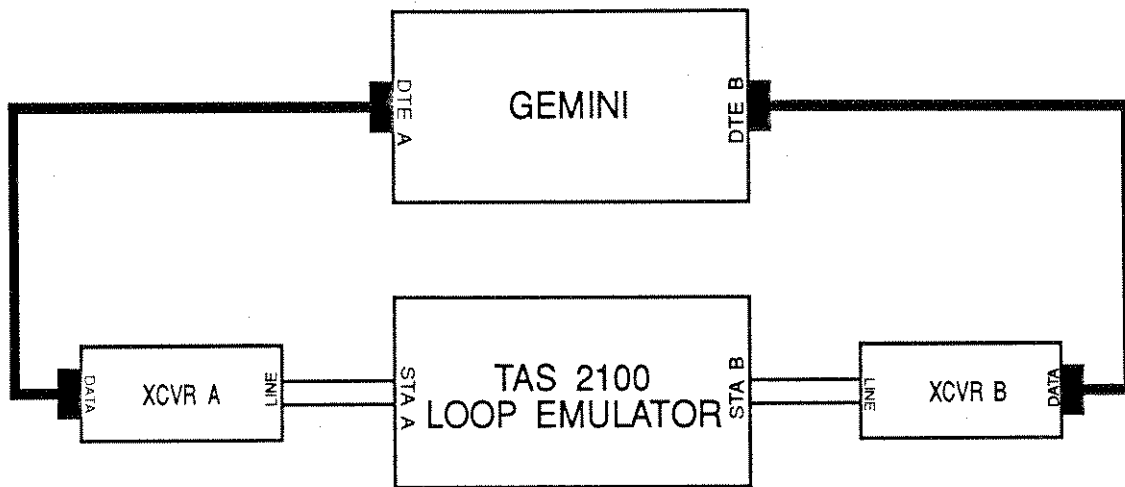


Figure 1-2. Testing ISDN U-Interface Transceivers

Communications Link Testing

Figure 1-3 shows Gemini testing an end-to-end data communications link. Gemini contains two independent data analyzers, so it can simultaneously test more than one port on a multiport modem or multiplexer. Since Gemini uses industry-standard data test patterns, it can work with a variety of other data analyzers.

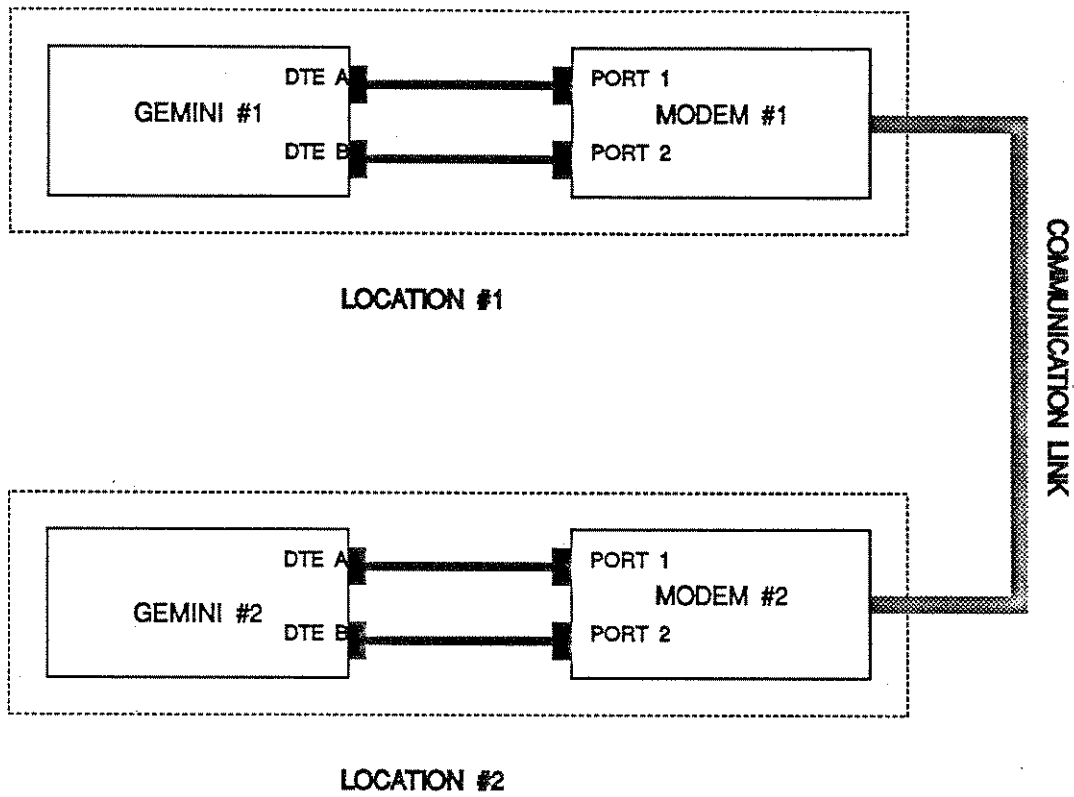


Figure 1-3. Communications Link Test Configuration

Guided Tour

The front panel keys and displays provide access to most of Gemini's features. Using the front panel, you can set up and execute tests, perform modem call setup, save and recall test configuration files.

Front Panel Description

Figure 1-4 shows the Gemini front panel. The following sections describe each front panel feature.

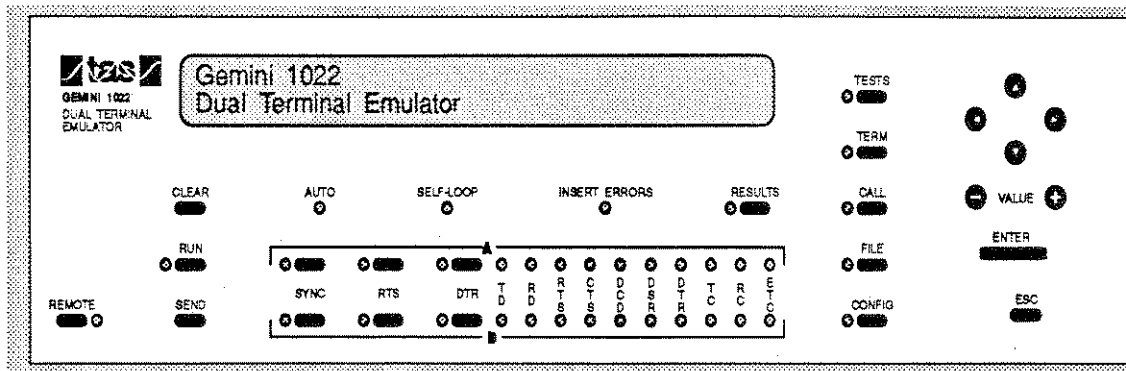


Figure 1-4. Gemini Front Panel

The MAIN DISPLAY shows all control menus and test results.

The A/B TEST INTERFACE contains the interface status monitors, and provides buttons for control of RTS and DTR functions.

The TESTS key selects the TESTS menu. This menu allows selection of the test mode and all parameters for performance tests such as BERT and POLLS.

The TERM key selects the Terminal Parameters menu. This menu permits selection of separate terminal parameters for call setup data and test data. Terminal parameters include protocol (sync, async, etc.), bit rate, flow control, etc. The TERM menu also lets you set and/or read the status of interface leads that do not appear on the interface status monitor.

The CALL key selects the Call Setup Menu. This menu allows you to enter, edit, and transmit call setup strings to autodial modems.

The FILE key selects the FILE Save/Recall menu.

The CONFIG key selects the Configuration Menu. This menu displays Gemini software version and status, and allows selection of Gemini operating modes and bus control modes.

The MENU NAVIGATION keys, located at the far right side of the panel, allow you to scroll between lines (up, down) or fields (left, right) of a menu.

The VALUE keys allow you to edit parameter values.

The ENTER key accesses a submenu. An ENTER symbol appears at the right side of each menu item that has a submenu.

The ESC key exits a submenu.

The RESULTS key displays test results in the LCD display when the RESULTS indicator is on, and displays menu information when the indicator is off.

When the INSERT ERRORS indicator is on, Gemini is inserting errors into the transmit data stream for both the A and B test interfaces.

When the SELF-LOOP indicator on, Gemini is looping transmit data to receive data at both the A and B test interfaces.

The AUTO indicator is reserved for future use.

The CLEAR key clears the test results display.

The RUN key starts or stops the analysis of test data. The RUN indicator is on when analysis is active.

In CALL SETUP mode, the SEND key transmits the currently active call setup string. In BERT or POLL test mode, you can insert one error in the transmit data stream each time you press the SEND key.

The REMOTE key enables/disables remote control operation. When remote operation is enabled, menu parameters cannot be changed from the front panel. However, the menu navigation keys can still be used to view parameter values.

Rear Panel Description

Figure 1-5 shows the rear panel of the Gemini. The following sections describe the rear panel features.

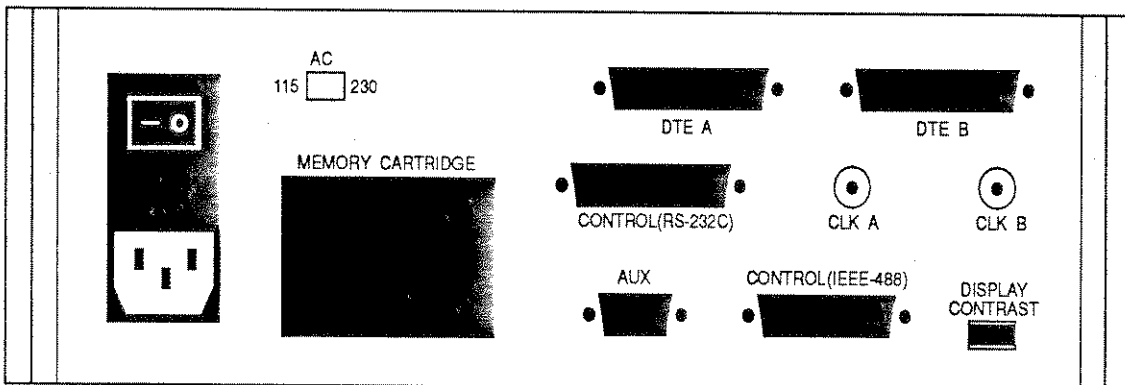


Figure 1-5. Gemini Rear Panel

The DTE A and DTE B ports each provide the interface to one of Gemini's two independent data analyzers.

The CLK A, CLK B connectors receive the External clock signals for station A and station B analyzers.

The DISPLAY CONTRAST potentiometer Controls the intensity of the front panel LCD display.

1-8 Introduction

The CONTROL (IEEE 488) port allows an external GPIB controller to control Gemini. Gemini's RS-232/GPIB Translator also uses this port to control other GPIB instruments.

The CONTROL (RS-232C) port allows an external computer to provide control of Gemini via RS-232 Carriage Return/Line Feed or RS-232 ACK/NAK protocol.

The AUX port is reserved for future use.

The MEMORY CARTRIDGE port accepts Gemini software cartridges. These cartridges contain the Gemini feature set.

The AC VOLTAGE SELECTION SWITCH permits selection of 90-125 VAC or 200-250 VAC operation. **Be certain that the setting of the switch agrees with your local power line.**

The AC SWITCH/RECEPTACLE ASSEMBLY contains the AC on/off switch and the AC power connector.

Installation

Before you install your Gemini, make sure that you have the following items:

- * Gemini unit.
- * AC power cord.
- * Gemini software cartridge.
- * Operations manual.
- * GPIB cable.
- * Two RS-232 test cables.

Perform the following steps to install Gemini.

Be sure that the power cord is detached from the Gemini, and that the power switch at the upper left side of the rear panel is in the off (O) position.

Check the AC voltage selection switch at the upper left side of the rear panel. Make sure that the setting of this switch is consistent with your AC power source. The **115** setting covers the 90 VAC to 130 VAC range, and the **230** setting covers the 190 VAC to 250 VAC range. **This switch must be set properly, or serious system damage may occur.**

Locate the Gemini software cartridge and insert it into the MEMORY CARTRIDGE slot in the rear panel.

Plug one end of the AC power cord into the Gemini, then plug the other end into the AC source.

Set the AC power switch to the on (-) position. Gemini now executes its power-up diagnostic sequence, and briefly displays the following message on the MAIN DISPLAY:

```
Gemini 1022  
Dual Terminal Emulator
```

If Gemini detects an error, it shows the appropriate status code on the MAIN DISPLAY. If Gemini loses the contents of its battery-backed memory, it displays the following message:

```
Gemini 1022  
Memory lost, restore from default.
```

Press the ESC key to clear the message and restore Gemini's default settings.

Consult Section 2, *Operation*, of the manual for further information. If you intend to use a computer or data terminal to control Gemini, also consult Section 4, *Remote Operation*.

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2 Operation

Gemini provides two control options: Local and Remote. For local control, you use Gemini's front panel keys and displays to set up and execute tests. For remote control, you must attach a computer or terminal to one of Gemini's control interfaces (RS-232 or GPIB), and use the computer or terminal to set up and execute tests. This section of the manual describes the Gemini local operations. Section 4, *Remote Operation*, describes the Gemini remote control protocols and commands.

For local operation, the REMOTE indicator must be off. This indicator and the REMOTE key are located at the lower left of the Gemini front panel. If the REMOTE indicator is on, press the REMOTE key to turn it off

Menus Overview

Gemini provides a convenient and easy-to-use menu structure that gives easy access to all of its functions. Figure 2-1 diagrams the Gemini menu structure. The keys at the right side of the Gemini front panel allow you to control the Gemini menus, and the MAIN DISPLAY shows the menu information. There are five main menus in the Gemini: **TESTS**, **TERM**, **CALL**, **FILE**, and **CONFIG**. Each of these menus is represented by a key on the Gemini panel. To access the associated menu, simply press the key and use the UP, DOWN, LEFT, and RIGHT menu navigation keys to traverse the selected menu. The + and - keys edit the value of menu items. The ENTER key accesses a submenu, and the ESC key exits a submenu. In summary, the rules for operating the Gemini menus are as follows:

- * Press the **TESTS**, **TERM**, **CALL**, **FILE**, or **CONFIG** key to select a menu.
- * Press the ENTER key to enter a submenu.
- * Press the ESC key to exit a submenu.
- * Press the UP or DOWN key to scroll up or down within a menu.
- * Press the LEFT or RIGHT key to position the cursor within a menu line.
- * Press the + or - key to change the value of the current menu parameter.
- * Gemini displays a carriage return symbol at the right side of a menu parameter to indicate that a submenu is present.
- * When you return to a menu, Gemini displays the same menu or submenu line that it displayed when you exited the menu.

2-2 Operation

- * If you press the menu key for the currently selected menu, Gemini positions the cursor at the top level and first line of the menu.

Tests Menu

The **TESTS** menu is where you select the test mode and enter the parameters for the selected test type. The **TESTS** menu also allows you to select the **SELF LOOP** and **INSERT ERRORS** options.

Test Modes

Since Gemini is a multifunction data analyzer, it has multiple modes of operation. The test mode must be explicitly selected by the user in the **TESTS** menu. Gemini always displays the selected test mode at the upper right side of the LCD display.

In Call Setup mode, Gemini can send the messages contained in the **CALL** menu to the devices under test. Gemini also monitors the transaction with each device. To send a message, select the message in the **CALL** menu and press **SEND**. To monitor the transaction, press **RESULTS**. For more information on call setup, see the Performing Call Setup paragraphs on page 2-9 in Section 2, *Operation*.

In BERT mode, Gemini can perform **simultaneous, bidirectional** bit error rate and throughput tests. BERT submenus allow you to set test parameters such as # blocks per test, block size, and pattern. Terminal parameters associated with the test, such as protocol and bit rate, are controlled in the **TERM** menu. For more information on BERT testing, see the Performing BER/Throughput (BERT) Tests paragraphs on page 2-10 in Section 2, *Operation*.

In POLLS mode, Gemini can perform **simultaneous, bidirectional** polling performance tests. This type of test is usually applied to multipoint modems. POLLS submenus allow you to set polling test parameters such as # polls per test, poll message, and poll delay. Terminal parameters associated with the test, such as transmission protocol and bit rate, are controlled in the **TERM** menu. For more information on polls testing, see the Performing POLLS Tests paragraphs on page 2-15 in Section 2, *Operation*.

Self-Loop and Insert Errors

If **SELF LOOP = yes**, Gemini internally connects transmit data to receive data at test interfaces A and B. If **INSERT ERRORS = yes**, Gemini inserts approximately one error per second in the transmit data stream of each test interface.

Terminal Parameters Menu

The **TERM** menu provides control of terminal configuration parameters for both of Gemini's data analyzers, and provides control and display of interface signal status. Terminal configuration parameters include transmission protocol, bit rate

and clock source, flow control options, and more. Gemini provides two independent sets of terminal parameters: one set for call setup mode, and another set for test modes. This allows you to perform, for example, asynchronous call setup followed by a synchronous BER test, without reconfiguring terminal parameters.

The **TESTS** submenu contains the terminal parameters for the BERT and POLL test modes. The **CALLS** submenu contains the terminal parameters for call setup mode. The **EIA** submenu allows you to control and/or display EIA interface leads that do not appear on the Gemini front panel.

For more information on setting terminal parameters, see the Performing Call Setup, Performing BER Tests, and Performing POLL Tests paragraphs, starting on page 2-9.

Call Menu

The **CALL** menu allows you to enter and send commands to autodial modems. Each line of the menu contains a modem command. Gemini sends commands that have an **A** suffix to test interface A, and sends commands that have a **B** suffix to test interface B. The following list describes each of the CALL menu command strings.

STRAP A, STRAP B: modem initialization commands

ORIG A, ORIG B: call origination commands

ANSW A, ANSW B: call answer commands

DROP A, DROP B: call disconnect commands

You can edit any of the modem command strings using Gemini's built-in command string editor. This editor is described in detail in Section 3, *Gemini Menu Reference*.

File Menu

The **FILE** menu allows you to save and recall Gemini test setups. Test setups can be user-defined or TAS-defined. User-defined test setups are saved in nonvolatile read/write memory (RAM). TAS-defined setups are stored in read-only memory (ROM). Gemini provides five user-defined files and six TAS-defined files.

Gemini ROM files contain predefined setups for testing several industry-standard modem types. When you recall a ROM file, Gemini sets the values for test parameters, terminal parameters, and call setup strings according to the settings contained in the ROM file. To perform a test, establish a connection between the two modems and activate the test. If you wish to modify the parameters contained in a ROM file, select the appropriate menus and change parameters. You can then save the modified test setup in a user (RAM) file.

2-4 Operation

Gemini allows you to create your own test definitions and save them to RAM files. You can also create and save a label along with each RAM file to help identify the file contents.

File Recall

You can recall TAS-defined and user-defined Gemini test configurations on the RECALL line of the **FILE** menu. To recall a file, simply select the file using the + or - key and press ENTER. Gemini prompts you to press ENTER again to recall the file, or press ESC to return to the menu.

File Save

You can save Gemini test configurations on the SAVE line (which is located below the RECALL line) of the **FILE** menu. To save a file, use the + or - key to select the target file (**file0** - **file4**). Next, select the LBL field and use the String Editor to enter a label for the file that you wish to save. Finally, press ENTER. Gemini then prompts you to press ENTER again to save the file, or press ESC to return to the menu.

Gemini Configuration Menu

The **CONFIG** menu allows you to check Gemini operating status and to set remote control protocol options.

Status, Model, Version

The first line of the **CONFIG** menu shows Gemini status, model number, and software cartridge version. These are read-only fields.

Remote Protocol

REMOTE PROTOCOL allows you to select one of three options for computer control of Gemini. These options are GPIB (IEEE-488), RS-232 ACK/NAK, and RS-232 CR/LF. Section 4, *Remote Operation*, fully details Gemini's remote control capabilities.

Protocol Response Mode

PROTOCOL RESPONSE MODE allows you to set Gemini for **verbose** or **terse** command responses. Verbose responses are more readable on the computer-Gemini control link. Terse responses contain fewer characters, simplify command decoding at the computer, and generally result in faster execution of test control programs.

```

TEST MODE: bert
[ENTER] [ESC]
CONFIGURATION: ta&b|ra&b
#BLOCKS: 100
BLOCK SIZE: 10E2
PATTERN: b1
    [ENTER] [ESC]
    B1: THE QUICK BROWN FOX
        [ENTER] [ESC]
        EDIT RANGE: A-Z

RESYNC ENABLE: yes
SYNC TIME-OUT: 5 sec
EXECUTION MODE: semiauto
    [ENTER] [ESC]
    BIT ERROR LIMIT:  A: 10000 B: 10000
    CHAR ERROR LIMIT: A:  200 B:  200
    BLOCK ERROR LIMIT: A:  50 B:  50
    SYNC LOSS LIMIT:  A:   2 B:   2

TEST MODE: polls
[ENTER] [ESC]
CONFIGURATION: ta|rb
#POLLS: 1000
POLL DELAY: 10 msec
POLL MESSAGE: p1
    [ENTER] [ESC]
    P1: USER MESSAGE #1
        [ENTER] [ESC]
        EDIT RANGE: A-Z

CARRIER MODE: XMT A: const RCV B: const
CARRIER MODE: XMT B: const RCV A: const
EXECUTION MODE: semiauto
    [ENTER] [ESC]
    SYNC ERROR LIMIT: A:  100 B:  100
    MESSAGE ERROR LIMIT: A:  100 B:  100
    FALSE POLL LIMIT:  A:   50 B:   50
    CTS TIME-OUT:      A:  500 B:  500
SELF-LOOP: no INSERT ERRORS: no

```

Figure 2-1a. Tests Menu

2-6 Operation

```
TESTS CALLS EIA
[ENTER] [ESC]
PROTOCOL: async
[ENTER] [ESC]
DATA: 7 PARITY: odd STOP: 1

CLK A: 9600 bps OFFSET: 0.0%
CLK B: 9600 bps OFFSET: 0.0%
FLOW A: none FLOW B: none

TESTS CALLS EIA
[ENTER] [ESC]
PROTOCOL: async
[ENTER] [ESC]
DATA: 7 PARITY: odd STOP: 1
INTERCHARACTER DELAY: 50 msec

PROTOCOL: sync
[ENTER] [ESC]
CHAR: 8BN #SYNC CHARS: 2
[ENTER] [ESC]
CODE: ascii
SYN1: 16 SYN2: 16

PROTOCOL: hdlc
[ENTER] [ESC]
CHAR: 8BN ADDR: FF CTRL: 13
[ENTER] [ESC]
CODE: ascii

CLK A: 2400 bps OFFSET: 0.0%
CLK B: 2400 bps OFFSET: 0.0%
FLOW A: none FLOW B: none

TESTS CALLS EIA
[ENTER] [ESC]
STD A: 0 SRTS A: 0
STD B: 0 SRTS B: 0
RI A: 0 SQD A: 0 DRS A: 0 PIN25 A: 0
SRD A: 1 SCTS A: 0 SDCD A: 0
RI B: 0 SQD B: 0 DRS B: 0 PIN25 B: 0
SRD B: 1 SCTS B: 0 SDCD B: 0
```

Figure 2-1b. TERM Menu

STRAP A: ATZ^M
[ENTER] [ESC]
EDIT RANGE: A-Z

STRAP B: ATZ^M
[ENTER] [ESC]
EDIT RANGE: A-Z

ORIG A: AT DT 2^M
[ENTER] [ESC]
EDIT RANGE: A-Z

ORIG B: AT DT1^M
[ENTER] [ESC]
EDIT RANGE: A-Z

ANSW A: AT S0=1^M
[ENTER] [ESC]
EDIT RANGE: A-Z

ANSW B: AT S0=1^M
[ENTER] [ESC]
EDIT RANGE: A-Z

DROP A: \P2 +++\P2 ATH^M
[ENTER] [ESC]
EDIT RANGE: A-Z

DROP B: \P2 +++\P2 ATH^M
[ENTER] [ESC]
EDIT RANGE: A-Z

Figure 2-1c. CALL Menu

2-8 Operation

RECALL: hayes24a 2400 ASYNC
[ENTER] [ESC]
Press <enter> to recall setup,
or <esc> to return to previous menu.

SAVE: file2 LBL:
[ENTER] [ESC] (SAVE field)
Press <enter> to save setup,
or <esc> to return to previous menu.
[ENTER] [ESC] (LBL field)
EDIT RANGE: A-Z

Figure 2-1d. FILE Menu

STATUS: Ok MODEL: 1022 VER: 2.00

REMOTE PROTOCOL: gpib
[ENTER] [ESC]
ADDRESS: 1 TERMINATOR: eoi

REMOTE PROTOCOL: crlf

Figure 2-1e. CONFIG Menu

Performing Call Setup

Gemini can send modem commands and monitor modem command responses. This capability can be used to perform call setup for virtually any autodial modem.

Call setup operations are performed in the CALL menu. This menu contains command strings for setting modem options (STRAP_A, STRAP_B), originating a call (ORIG_A, ORIG_B), and terminating a call (DROP_A, DROP_B). To place a call, scroll to the desired command string and press the SEND key. This sends the string to the modem and activates Gemini's data monitor feature. If you then press the RESULTS key, the transaction appears on the MAIN DISPLAY. The normal procedure for setting up a call on autodial modems is as follows:

- a. Send the STRAP_A and STRAP_B commands.
- b. Send the ANSW_B command (modem B answer command).
- c. Send the ORIG_A command (modem A originate command).
- d. To drop (terminate) the call, send the DROP_A and DROP_B commands.

To perform call setup functions, Gemini must be in its call setup mode. You select the call setup mode in the TESTS menu. When this mode is selected, the **call_setup** annunciator is visible at the top right of the MAIN DISPLAY. Terminal parameters (protocol, bit rate, flow control, etc.) for call setup are contained in the TERM menu, under the CALLS submenu. These parameters must be set properly to ensure successful call setup.

When you press the SEND key to transmit a modem command, Gemini automatically turns on its data monitor. Gemini turns on the RUN indicator to show that the data monitor is active. If you press the RESULTS key, Gemini displays the monitor results for the TxD and RxD lines. You can use the UP or DOWN key to scroll through the results display, so that you can monitor results at both test interfaces (A and B). Gemini monitors the data lines at A and B until its data buffer fills up. The buffer length is 2048 characters for each test interface. You cannot review data that has scrolled off the display while the data monitor is active. You must deactivate the data monitor to review the data.

Reviewing Modem Responses

To review all of the data sent and received at each test interface, you must stop the data monitor. To stop the monitor, press the RUN key while the data monitor is active. Gemini then turns the RUN indicator off and allows you to review the data. To review the data, simply scroll the display to the left or right. Gemini shows the hex equivalent for the left-most displayed character in the brackets at the left side of the display.

Performing BER/Throughput (BERT) Tests

The Gemini bit error rate/throughput (BERT) test simultaneously measures modem error rate and throughput parameters at speeds up to 72 kbps. Gemini performs error rate and throughput measurements independently at each of its two test interfaces.

The BERT test characterizes the steady-state data transmission performance of an end-to-end data communications link. Each Gemini test interface (A, B) contains a data transmitter and a data receiver. Each data transmitter sends a predetermined pattern. Each data receiver compares the received data with the predetermined pattern and reports errors. Each receiver also monitors the average rate at which data is received during the test and reports throughput results.

Each of the two Gemini data analyzers measures and displays the following BERT test results:

- * Number of bit errors.
- * Number of character errors (async tests only).
- * Number of block errors.
- * Bits/sec.
- * Characters/sec (async tests only).
- * Blocks/sec.
- * Transmit clock rate.
- * Receive clock rate.
- * Number of sync losses.
- * Duration of current in-sync period (sec).

Setting the Test Parameters

To enter the settings for a BERT test, enter the **TESTS** menu and select **TEST MODE: bert**. Next, press the **ENTER** key to see the BERT test parameters. BERT parameters include test configuration, # blocks per test, block size, pattern, and more. To set test parameters, scroll to the desired menu line and use the **+** and **-** keys to edit menu entries. For a full description of each BERT parameter, see Section 3, *Gemini Menu Reference*. Terminal parameters (protocol, bit rate, flow control, etc.) for BERT tests are contained in the **TERM** menu, under the **TESTS** submenu. These parameters must be properly set to ensure correct test operation.

BERT Test Control Keys

Several keys control the operation of the BERT test. These keys, and the functions they perform, are as follows:

RTS (A and B)

The RTS keys activate the RTS signal (pin 4) of the associated test interface. The LED next to the RTS button is lit when that station is selected as a transmitter. If the test interface is selected for data transmission by the TEST CONFIGURATION parameter (MODE=BERT or POLLS), then the RTS key also starts the flow of test data from the associated test interface.

SYNC (A and B)

The SYNC indicator at each test interface assumes one of three possible states. **off** represents a no sync condition. **blinking** represents a recovered sync condition. and **on** represents an in sync condition. "No sync" means that the data receiver at the associated test interface is not receiving the expected data pattern. Gemini indicates "no sync" if 1) it has received no data during the past 3 seconds or 2) the error rate exceeds 30 percent. "In sync" means that the data receiver at the associated test interface is receiving the expected data pattern, and that the error rate is less than 20 percent. "Recovered sync" means that the data receiver at the associated test interface experienced a no sync condition in the past, but is now in sync.

You can force a sync loss at either test interface by pressing the associated SYNC key while the sync indicator is on. If the SYNC indicator is blinking, pressing the SYNC key will reset the SYNC indicator to on. Pressing the SYNC key while the SYNC indicator is off has no effect.

RUN

When you press the RUN key, Gemini starts monitoring the test results at both test interfaces. Gemini continues to run until the test terminates, or until you press the RUN key again to stop the test. Note that the RUN key does not control the flow of data; this is controlled by the RTS keys. THE RUN key only enables the collection of test results.

CLEAR

The CLEAR key clears the test results registers.

SEND

If you press the SEND key while the BERT test is running, Gemini inserts one error in the transmit data at each test interface.

Running the BERT Test

To start the BERT test, use the RTS key(s) to start the flow of test data. Look for SYNC at the appropriate test interface and press the RUN key to start the data analysis.

Monitoring Test Results

Press the RESULTS key to view the test results. Use the UP and DOWN keys to scroll through the BER results, throughput results, clock frequency measurements, and # sync losses.

Example: Running a TAS-Defined BER/Throughput Test

In this example, you will recall and execute a TAS-defined BER/Throughput test for a Hayes-compatible 1,200 bps dial modem. The configuration for this test is shown in Figure 2-2. Please note that, for this example, the telephone number for the modem at DTE A is 1, and the telephone number for the modem at DTE B is 2.

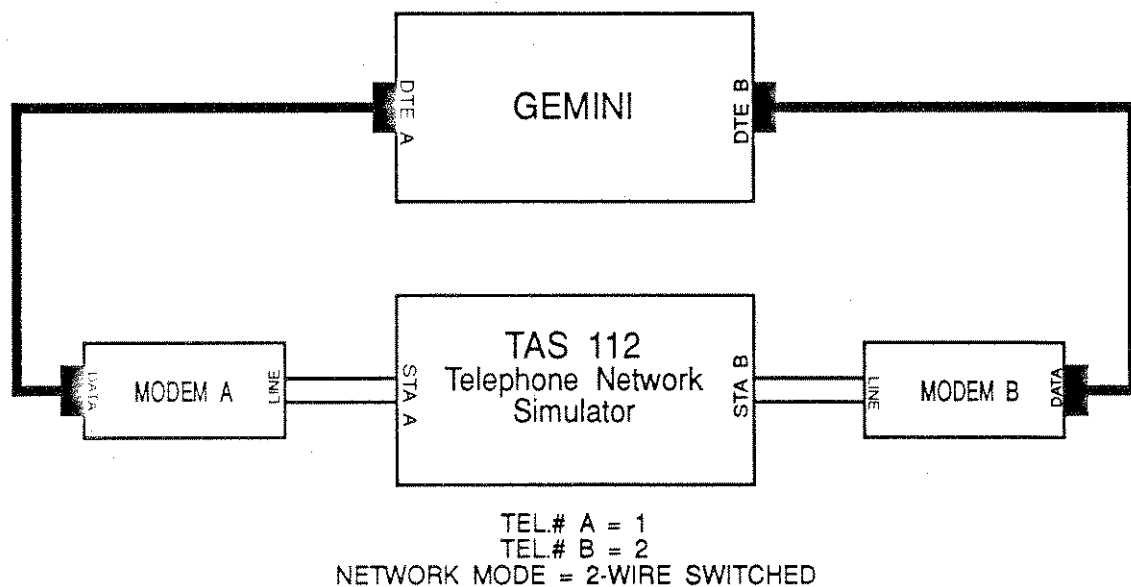


Figure 2-2. BERT Test Configuration

Recall the TAS-defined file for testing Hayes-compatible 1,200 bps dial modems.

- a. Press the FILE menu button.
- b. Use the UP or DOWN key to select the RECALL option.

- c. Use the + or - key to select the file to recall. For this example, select **hayes12a**.
- d. Press the ENTER key to recall the file.
- e. After you press the ENTER key, Gemini displays the following message:


```
Press <enter> to recall setup
or <esc> to return to previous menu.
```
- f. At this point, press ENTER to finish recalling **hayes12a**.

Establish a call between the two modems.

- a. Press the CALL menu button.
- b. Press the DTR buttons for stations A and B. These buttons are located in the middle of the front panel. Activating DTR ensures that the modems will respond to call setup commands.
- c. Use the UP key to select the menu line labeled STRAP A. Press the SEND key to send the modem initialization commands (straps) to modem A.
- d. Use the DOWN key to select the menu line labeled STRAP B. Press the SEND key to send the modem initialization commands (straps) to modem B.
- e. Use the DOWN key to select the menu line labeled ANSW B. Press the SEND key to send the call answer command to modem B.
- f. Use the UP key to select the menu line labeled ORIG A. Press the SEND key to send the call originate command to modem A.

Execute the BERT test.

- a. Press the TESTS key.
- b. Use the UP key to select the menu line labeled TEST MODE.
- c. Use the + or - key to select the TEST MODE: **bert**.

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- d. Press the **RTS A** key to begin the flow of test data from DTE A. Test data should now be flowing into modem A, through the telephone network simulator, into modem B, then into DTE B. The **SYNC** indicator for DTE B should now be on. This indicates that Gemini's data receiver at DTE B is now synchronized with the test pattern.
- e. Press the **RUN** key to begin the BER/Throughput test.
- f. Press the **RESULTS** key to monitor the test results. Use the **UP** or **DOWN** key to scroll through the BER and throughput results.

Creating a User-Defined BERT Test

To create a BERT test, set the terminal parameters in the **TERM** menu, then set BERT test parameters in the **TESTS** menu, **BERT** submenu. For example, the following steps create a bidirectional switched-carrier BERT test for a 19,200 bps private line modem. For this test, Gemini supplies the modem transmit clock.

- a. Enter the **TERM** menu, **TESTS** submenu, and set the following parameters:

PROTOCOL = sync
CLK A: 19200 OFFSET: 0.0%
CLK B: 19200 OFFSET: 0.0%
FLOW A: none FLOW B: none

- b. Enter the **TESTS** menu and set the **TEST MODE = bert**. Enter the **BERT** submenu and set the following parameters:

CONFIGURATION: ta&b|ra&b
#BLOCKS: 1000
BLOCK SIZE: 10E3
PATTERN: 511
RESYNC ENABLE: yes
SYNC TIME-OUT: 5 sec
EXECUTION MODE: manual

To execute this test, perform the following steps:

- a. Activate DTR A and DTR B.
- b. Activate RTS A and RTS B.
- c. Press RUN to begin the test.
- d. Press RESULTS to see the test results display.

Performing POLLS Tests

The Gemini POLLS test characterizes the message transfer performance of a data communications link. Figure 2-3 shows an example of a POLLS test configuration. Each test interface transmits a message repeatedly, separated by a POLL DELAY time. Each test interface also receives poll messages from the opposite end of the connection and analyzes the received messages for errors. For a complete description of the possible errors during a POLLS test, refer to the POLLS RESULTS display description beginning on page 3-20 in Section 3, *Menu Reference*. Each Gemini test interface (A,B) independently transmits poll messages, receives poll messages from the opposite end of the connection, and measures and displays results.

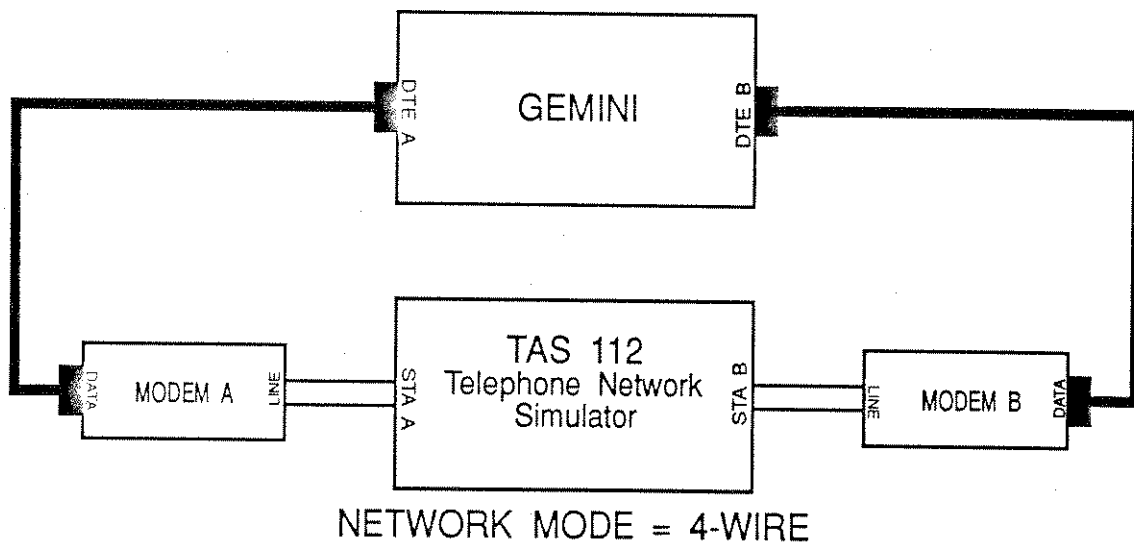


Figure 2-3. POLLS Test Configuration

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Each Gemini transmitter and each receiver can operate in one of two carrier modes: switched carrier or constant carrier. For switched carrier operation, a transmitter raises RTS before sending a message and lowers RTS after sending the message. The receiver at the opposite end of the connection starts reading the incoming poll message after the active transition of the DCD (data carrier detect) signal. For constant carrier operation, a transmitter does not switch RTS with each outgoing message and the receiver at the opposite end of the connection does not wait for an active DCD transition before it processes the incoming poll message.

Each of the two Gemini data analyzers measures and displays the following POLLS test results:

- * Number of poll messages analyzed.
- * Number of sync errors.
- * Number of message errors.
- * Number of false polls.
- * Transmit clock rate.
- * Receive clock rate.
- * RTS-CTS delay (msec: only measured when transmitter is in switched carrier mode).

Setting the Test Parameters

To enter the settings for a POLLS test, enter the **TESTS** menu and select **TEST MODE = polls**. Next, press the ENTER key to see the POLLS test parameters. POLLS parameters include test configuration, # polls per test, poll delay, transmit/receive carrier modes, poll message, and test mode. To set test parameters, scroll to the desired menu line and use the + or - key to edit menu entries. For a full description of each POLLS parameter, see Section 3, *Gemini Menu Reference*. Terminal parameters (protocol and bit rate) for POLLS tests are contained in the **TERM** menu, under the **TESTS** submenu. These parameters must be properly set to ensure correct test operation.

POLLS Test Control Keys

Several keys control the operation of the POLLS test. These keys and the functions they perform are as follows:

RTS (A and B)

The RTS keys activate the RTS signal (pin 4) of the associated test interface. The LED next to the RTS button is lit when that station is selected as a transmitter. If the test interface is selected for data transmission by the TEST

CONFIGURATION parameter (MODE=BERT or POLLS), then the RTS key also starts the flow of test data from the associated test interface.

SYNC (A and B)

The SYNC indicators and sync buttons have no function for the POLLS test.

RUN

When you press the RUN key, Gemini starts monitoring the test results at both test interfaces. Gemini will continue to run until the test terminates, or until you press the RUN key again to stop the test. Note that the RUN key does not control the flow of data: this is controlled by the RTS keys. RUN only enables the collection of test results.

CLEAR

The CLEAR key resets the test results registers.

SEND

If you press the SEND key while the POLLS test is running, Gemini inserts one error in the transmit data at each test interface.

Running the Test

To start the POLLS test, use the RTS key(s) to start the flow of test data and press the RUN key to start the data analysis.

Monitoring Test Results

Press the RESULTS key to view the test results. You can use the UP and DOWN keys to view the message errors, sync errors, false polls, transmit and receive clock frequencies, and RTS-CTS delay.

Example: Running a TAS-Defined POLLS Test

In this example, you will recall and execute a TAS defined POLLS test for a switched-carrier, 9,600 bps private-line modem. Note that the telephone network simulator is configured for 4-wire private line operation. Since these are private-line modems, no call setup is required.

Recall the TAS-defined file for testing high-speed (9600 bps) private-line modems.

- a. Press the FILE key.

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- b. Use the UP or DOWN arrow key to select the RECALL option.
- c. Use the + or - key to select the file to recall. For this example, select **hpl**.
- d. Press the ENTER key to recall the file.
- e. After you press the ENTER key, Gemini displays the following message:

```
Press <enter> to recall setup,  
or <esc> to return to previous menu.
```

- f. Press ENTER to finish recalling **hpl**.

Execute the POLLS test.

- a. Press the DTR buttons for stations A and B. These buttons are located in the middle of the front panel. Activating DTR indicates to the modems that Gemini is ready to transmit data.
- b. Press the TESTS key.
- c. Use the UP key to select the menu line labeled TEST MODE.
- d. Use the VALUE + or - key to select the **polls** test mode.
- e. Press the RTS A key to begin the flow of test data from DTE A. Poll messages should now be flowing from DTE A, into modem A, through the telephone network simulator, into modem B, and then into DTE B.
- f. Press the RUN key to begin the POLLS test.
- g. Press the RESULTS key to monitor the test results. Use the UP or DOWN key to scroll through the polls test results.

Creating a User-Defined POLLS Test

To create a POLLS test, set the terminal parameters in the **TERM** menu, then set POLLS test parameters in the **TESTS** menu, **POLLS** submenu. For example, the following steps create a bidirectional switched-carrier polls test for a 19,200 bps private line modem. For this test, Gemini supplies the modem transmit clock.

- a. Enter the **TERM** menu, **TESTS** submenu, and set the following parameters:

PROTOCOL = **sync**

CLK A: **19200** OFFSET: **0.0%**

CLK B: **19200** OFFSET: **0.0%**

FLOW A: **cts** FLOW B: **cts** (The FLOW control menu is not used during a polls test.)

- b. Enter the **TESTS** menu and set the **TEST MODE = polls**. Enter the **POLLS** submenu, and set the following parameters:

CONFIGURATION: **ta&b|ra&b**

#POLLS: **1000**

POLL DELAY: **10 msec**

POLL MESSAGE: **syn**

CARRIER MODE XMT A: **sw** RCV B: **sw**

CARRIER MODE XMT B: **sw** RCV A: **sw**

EXECUTION MODE: **manual**

To execute the above test, perform the following steps:

- a. Activate DTR A and DTR B.
- b. Activate RTS A and RTS B.
- c. Press **RUN** to begin the test.
- d. Press **RESULTS** to see the test results display.

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3 Gemini Menu Reference

Tests Menu

The **TESTS** menu allows you to select the Gemini test mode and set test parameters. The **TESTS** main menu contains just two lines. The first line allows you to select the test mode, and the second line allows you to set the SELF-LOOP and INSERT ERRORS options.

Available test modes are BERT, POLLS, and CALL SETUP. The BERT and POLLS test modes each provide extensive submenus for setting the test parameters. Figure 3-1a and Figure 3-1b show the **TESTS** menu layout.

```
TEST MODE: bert
[ENTER] [ESC ]
CONFIGURATION: ta&b|ra&b
#BLOCKS: 100
BLOCK SIZE: 10E2
PATTERN: b1
[ENTER] [ESC ]
B1: THE QUICK BROWN FOX
[ENTER] [ESC ]
EDIT RANGE: A-Z

RESYNC ENABLE: yes
SYNC TIME-OUT: 5 sec
EXECUTION MODE: semiauto
[ENTER] [ESC ]
BIT ERROR LIMIT: A: 10000 B: 10000
CHAR ERROR LIMIT: A: 200 B: 200
BLOCK ERROR LIMIT: A: 50 B: 50
SYNC LOSS LIMIT: A: 2 B: 2
```

Figure 3-1a. Tests Menu, Part 1

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```
TEST MODE: polls
      [ENTER] [ESC]
CONFIGURATION: ta|rb
#POLLS: 1000
POLL DELAY: 10 msec
POLL MESSAGE: p1
      [ENTER] [ESC]
      P1: USER MESSAGE #1
            [ENTER] [ESC]
            EDIT RANGE: A-Z
CARRIER MODE: XMT A: const RCV B: const
CARRIER MODE: XMT B: const RCV A: const
EXECUTION MODE: semiauto
      [ENTER] [ESC]
      SYNC ERROR LIMIT: A: 100 B: 100
      MESSAGE ERROR LIMIT: A: 100 B: 100
      FALSE POLL LIMIT: A: 50 B: 50
      CTS TIME-OUT: A: 500 B: 500
SELF-LOOP: no INSERT ERRORS: no
```

Figure 3-1b. Tests Menu, Part 2

Test Mode

The TEST MODE parameter determines the type of test operations that Gemini performs. For example, to execute a BERT test, you must select the BERT mode. To perform call setup operations, you must select the CALL SETUP mode.

BERT Test Parameters

TEST MODE: **bert** selects the Bit Error Rate and Throughput test. The submenu associated with this selection allows you to set the parameters for the BERT test.

CONFIGURATION

The CONFIGURATION parameter determines data transmit (**t**) and data receive (**r**) configurations for DTE A and DTE B. For example, if you select **ta|rb**, Gemini transmits the BERT data pattern at DTE A, and receives the pattern and analyzes results at DTE B. If you select **ta&b|ra&b**, Gemini transmits the BERT data pattern on both DTE A and DTE B, and receives the pattern and analyzes results at both DTE A and DTE B. Gemini does not transmit or receive data at a test interface if that test interface is not selected in the CONFIGURATION parameter. For example, if you select **ta|rb**, the transmitter at DTE B and the receiver at DTE A are idle.

#BLOCKS

#BLOCKS determines the duration of the BERT test. Gemini automatically terminates the test when the data receiver(s) designated by the CONFIGURATION parameter has analyzed the specified number of blocks. If #BLOCKS = 0, the test runs continuously.

BLOCK SIZE

This parameter determines the block size that Gemini uses to compute block errors. If the test protocol (selected in the TERM menu) is **async**, then the block size is in characters/block. If the test protocol is **sync**, then the block size is in bits/block.

You can choose modulo 2 (2E5 to 2E28) or modulo 10 (10E2 to 10E8) block sizes.

PATTERN

PATTERN determines the BERT data pattern. Gemini provides built-in patterns and user-definable patterns. The built-in patterns are **63**, **511**, **2047**, **mark**, **space**, and **alt**. The user patterns are **b1** and **b2**. Each of the user pattern selections contains a submenu. To set the user pattern, enter the submenu and use the Gemini String Editor to enter or modify the pattern. Each of the user pattern strings can contain up to 255 characters. When you select a pattern, ensure that the pattern is sufficiently random to allow the BERT receiver to properly synchronize on it.

RESYNC ENABLE

The RESYNC ENABLE parameter enables (**yes**) or prevents (**no**) the BERT receivers from attempting to regain synchronization after a sync loss. If you wish to disable resync, set the parameter to **yes**, then to **no** before the test begins. This allows Gemini to synchronize on the data at the start of the test, but does not allow Gemini to resync in the event of a sync loss. For normal testing, set this parameter to **yes**.

SYNC TIME-OUT

Gemini automatically terminates a BERT test if data pattern synchronization is not achieved within a specified time interval after RUN is pressed. This interval is specified by the SYNC TIME-OUT parameter. This time-out applies to one or both test interfaces, depending on the setting of the CONFIGURATION parameter.

EXECUTION MODE

If you select **semiautomatic** test execution, Gemini can automatically terminate a BERT test based on error counts or sync loss counts. Gemini can terminate a

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losses recorded at DTE A or at DTE B. You program the error limit values on the submenu that is associated with the semiautomatic choice. You can disable termination of the test based on any individual error count by setting the limit for the error count to zero. This, in effect, sets the limit to infinity.

POLLS Test Parameters

TEST MODE: **polls** selects the POLLS test. The submenu associated with this selection allows you to set the parameters for the POLLS test.

CONFIGURATION

The CONFIGURATION parameter determines data transmit (t) and data receive (r) configurations for DTE A and DTE B. For example, if you select **ta|rb**, Gemini transmits the poll messages at DTE A, and receives the messages and analyzes results at DTE B. If you select **ta&b|ra&b**, Gemini transmits the poll messages on both DTE A and DTE B, and receives the messages and analyzes results at both DTE A and DTE B. Gemini does not transmit or receive data at a test interface if that test interface is not selected in the CONFIGURATION parameter. For example, if you select **ta|rb**, the transmitter at DTE B and the receiver at DTE A are idle.

#POLLS

#POLLS determines the duration of the POLLS test. Gemini automatically terminates the test when the data receiver(s) designated by the CONFIGURATION parameter has analyzed the specified number of poll messages. If #POLLS = 0, the test runs continuously.

POLL DELAY

The POLL DELAY parameter determines the time from the end of one poll message transmission to the beginning of the next. For switched carrier modems, this is equivalent to the CTS OFF to RTS ON delay.

POLL MESSAGE

The POLL MESSAGE parameter determines the poll message. Gemini provides built-in poll messages and user-definable poll messages. The built-in messages are **syn** (SYN SYN EOT), and **fox** (THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK). The user patterns are **p1** and **p2**. Each of the user pattern selections contains a submenu. To set the user pattern, enter the submenu and use the Gemini String Editor to enter or modify the pattern. Each of the user pattern strings can contain up to 255 characters.

CARRIER MODE

The CARRIER MODE parameters set the carrier mode for the transmitter and receiver at each test interface. The choices are switched (**sw**), mixed (**sw2**), and constant (**const**). Typically, each transmitter/receiver pair should be set to the same carrier mode, however mixed carrier mode is the case where they are not set the same. It is applicable when you want to conduct Polls testing with the transmitting modem in switched carrier mode and the receiving modem set to constant carrier mode. For instance, the mode for XMT A would be switched and the mode for RCV B is constant or vice versa (B to A). The receiver must be constant carrier when the transmitter is set for mixed carrier (**sw2**).

EXECUTION MODE

If you select **semiautomatic** test execution, Gemini automatically terminates a POLLS test based on test results. Gemini terminates a test if the total number of sync errors, message errors, or false polls exceeds programmed limits. Gemini also terminates the test if the measured RTS-CTS delay exceeds the programmed limit. Program the error limit values on the submenu that is associated with the semiautomatic choice. You can disable an error limit by setting its value to zero. This, in effect, sets the limit to infinity.

Self-Loop

If SELF LOOP = **yes**, Gemini internally connects transmit data to receive data at each test interface. This allows you to verify Gemini transmitter and receiver operation. SELF LOOP can be used to verify BERT tests only, and only under the following conditions:

- * The test protocol is **async**.
- * The test flow control options are set to **none**.

Insert Errors

If INSERT ERRORS = **yes**, Gemini inserts one error per second in the transmit data stream at each test interface.

TERM Menu

The **TERM** menu controls the data format and protocol for each of Gemini's two test interfaces. The **TERM** menu also allows you to set and/or read interface control signals that do not appear on the front panel.

The **TERM** menu contains three main submenus. The **TESTS** submenu controls the data format and protocol for test data transmission. The **TESTS** parameters apply when Gemini is in its BERT or POLLS test mode. The **CALLS** submenu

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controls the data format and protocol for call setup. The **CALLS** parameters apply when Gemini is operating in its call setup mode. The **EIA** submenu allows you to view and set test interface output signals, and allows you to view interface input signals. Figure 3-2 shows the **TERM** menu organization.

```
TESTS  CALLS  EIA
[ENTER] [ESC ]
PROTOCOL: async
      [ENTER] [ESC ]
      DATA: 7 PARITY: odd  STOP: 1

CLK A: 9600 bps  OFFSET: 0.0%
CLK B: 9600 bps  OFFSET: 0.0%
FLOW A: none    FLOW B: none
```

```
TESTS  CALLS  EIA
[ENTER] [ESC ]
PROTOCOL: async
      [ENTER] [ESC ]
      DATA: 7 PARITY: odd  STOP: 1
      INTERCHARACTER DELAY: 50 msec

PROTOCOL: sync
      [ENTER] [ESC ]
      CHAR: 8BN #SYNC CHARS: 2
      [ENTER] [ESC ]
      CODE: ascii
      SYN1: 16  SYN2: 16

PROTOCOL: hdlc
      [ENTER] [ESC ]
      CHAR: 8BN ADDR: FF CTRL: 13
      [ENTER] [ESC ]
      CODE: ascii

CLK A: 2400 bps  OFFSET: 0.0%
CLK B: 2400 bps  OFFSET: 0.0%
FLOW A: none    FLOW B: none
```

```
TESTS  CALLS  EIA
[ENTER] [ESC ]
STD A: 0  SRTS A: 0
STD B: 0  SRTS B: 0
RI A: 0  SQD A: 0  DRS A: 0  PIN25 A: 0
SRD A: 1  SCTS A: 0  SDCD A: 0
RI B: 0  SQD B: 0  DRS B: 0  PIN25 B: 0
SRD B: 1  SCTS B: 0  SDCD B: 0
```

Figure 3-2. TERM Menu

TESTS Submenu

The **TESTS** submenu controls the data format and protocol for test data transmission. The **TESTS** submenu determines parameters such as protocol, clock rates, and flow control options.

PROTOCOL

The PROTOCOL parameter determines the format for test data transmission. Options are **sync** and **async**. A submenu associated with the **async** option allows you to set DATA, PARITY, and STOP parameters.

PROTOCOL: **async** selects the asynchronous format for test data. The submenu associated with the **async** allows you to set the DATA, PARITY, and STOP parameters for the **async** option. The DATA parameter sets the character size (5, 6, 7, or 8 bits), the PARITY parameter sets the parity option (even, odd, or none), and the STOP option sets the number of stop bits (1, 1.5, or 2).

CLK A, OFFSET

The CLK A parameter determines the data rate and clock source for DTE A. The OFFSET parameter specifies an offset from the nominal clock rate, and applies only when Gemini generates the transmit clock. ***The offset parameter must be set to 0.0 percent if the clock source is modem or ext.***

The choices for CLK A include bit rates from 75 bps to 72,000 bps, plus **modem** and **ext**. If you select CLK A = **modem**, then Gemini extracts the transmit clock from the TRANSMIT CLOCK pin of the test interface. If you select CLK A = **ext**, then Gemini accepts a TTL transmit clock from the CLK A BNC connector on the rear panel. The external clock rate should be equal to the data rate for synchronous operation, and should be 16 times the data rate for asynchronous operation.

Gemini does not operate with internal clocks and async data at rates above 38,400 bps. For async operation, select a value for CLK A that is less than or equal to 38,400 bps, or EXT and a supply clock 16 times the desired baud rate. The maximum desired baud rate is 76.8 Kbps.

CLK B, OFFSET

The CLK B parameter determines the data rate and clock source for DTE B. The OFFSET parameter specifies an offset from the nominal clock rate, and applies only when Gemini generates the transmit clock. ***The offset parameter must be set to 0.0 percent if the clock source is modem or ext.***

The choices for CLK B include bit rates from 75 bps to 72,000 bps, plus **modem** and **ext**. If you select CLK B = **modem**, then Gemini extracts the transmit clock from the TRANSMIT CLOCK pin of the test interface. If you select CLK B = **ext**, then Gemini accepts a TTL transmit clock from the CLK B BNC connector on the rear panel. The external clock rate should be equal to the data rate for

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synchronous operation, and should be 16 times the data rate for asynchronous operation.

Gemini does not operate with async data at rates above 38,400 bps. For async operation, you should select a value for CLK B that is less than or equal to 38,400 bps, or EXT and a supply clock 16 times the desired baud rate. The maximum desired baud rate is 76.8 Kbps.

FLOW A, FLOW B

These parameters determine the method for data flow control for DTE A and DTE B. If FLOWj = **none**, Gemini does not employ flow control. If FLOWj = **cts**, then Gemini employs RTS/CTS (hardware) flow control. If FLOWj = **xoff**, then Gemini employs XOFF (software) flow control. Note that the XOFF characters may appear in the BERT pseudorandom patterns. For this reason, only employ hardware flow control with user BERT patterns.

These parameters do not apply to the POLLS test. *The POLLS test always uses CTS flow control.*

CALLS Submenu

The **CALLS** submenu controls data format and protocol for call setup data transmission. The **CALLS** submenu determines parameters such as protocol, clock rates, and flow control options. These parameters apply when Gemini is operating in CALL SETUP mode.

PROTOCOL

The PROTOCOL parameter determines the format for call setup data transmission. Options are **async**, **async-v.25**, **sync**, **sync-v.25**, **hdlc**, and **hdlc-v.25**. The **async**, **sync**, and **hdlc** options each provide a submenu for setting data format parameters. The V.25 protocol options have the data format parameters preset to the values specified by the CCITT V.25 specification.

PROTOCOL: **async**

PROTOCOL: **async** selects the asynchronous format for call setup data. The associated submenu contains the DATA, PARITY, STOP, and INTERCHARACTER DELAY data format options. The async format options apply only when you have selected an **async** protocol.

The DATA, PARITY, and STOP parameters determine the async data format. The DATA parameter sets the character size (5, 6, 7, or 8 bits), the PARITY parameter sets the parity option (even, odd, or none), and the STOP option sets the number of stop bits (1, 1.5, or 2).

The INTERCHARACTER DELAY parameter determines the amount of delay that Gemini inserts between each transmitted character. This same parameter also applies if you select the **async-v.25** protocol.

PROTOCOL: sync

PROTOCOL: sync selects the monosync or bisync format for call setup data. The associated submenu contains the data format options. The format options apply only when you have selected the **sync** protocol.

Gemini uses 8-bit data characters in synchronous mode. The CHAR parameter determines the format of these characters. The following table (Table 3-1) shows the CHAR values and the character format they specify:

<u>CHAR</u>	<u>Data</u>	<u>Parity</u>
8BN	8	NONE
7BO	7	ODD
7BE	7	EVEN
7BM	7	MARK
7BS	7	SPACE

Table 3-1. CHAR Parameter Definition

Synchronous protocol characters can be coded in ASCII or EBCDIC. To select the code, set the character format (CHAR) to 8BN, then select the desired value for CODE.

The #SYNC CHARS parameter sets the number of sync characters. Choices are 1 and 2.

SYN1 determines the value of the first sync character. The sync character can have values from 0 to 0FFH (hexadecimal). The typical value for SYN1 is 016H (ASCII SYN). If #SYNC CHARS is 1, then SYN1 contains the value of the single sync character.

SYN2 determines the value of the second sync character if #SYNC CHARS is 2. The second sync character can have values from 0 to 0FFH (hexadecimal). The typical value for SYN2 is 016H (ASCII SYN).

PROTOCOL: hdlc

PROTOCOL: hdlc selects the HDLC format for call setup data. The associated submenu contains the data format options. The format options apply only when you have selected the **hdlc** protocol.

Gemini uses 8-bit data characters in HDLC mode. The CHAR parameter determines the format of these characters. The following table (Table 3-2) shows the CHAR values and the character format they specify:

<u>CHAR</u>	<u>Data</u>	<u>Parity</u>
8BN	8	NONE
7BO	7	ODD
7BE	7	EVEN
7BM	7	MARK
7BS	7	SPACE

Table 3-2. CHAR Parameter Definition

HDLC protocol characters can be coded in ASCII or EBCDIC. To select the code, set the character format (CHAR) to 8BN, then select the desired value for CODE.

The ADDRESS parameter contains the HDLC address field. The value range for this parameter is 0 to FF hex.

The CTRL parameter contains value for the HDLC control field. The value range for this parameter is 0 to FF hex.

PROTOCOL: async-v.25

The **async-v.25** option selects the ASYNC data format and sets character size, parity, and # stop bits to values determined by the CCITT V.25 specification: DATA = 7, PARITY = **even**, # STOP BITS = 1.

PROTOCOL: sync-v.25

The **sync-v.25** option selects the BISYNC data format and sets values for CHARACTER, CODE, #SYNC CHARS, SYN1, and SYN2 to values determined by the CCITT V.25 specification: CHARACTER = **7BO**, #SYNC CHARS = 2, SYN1 = 16 (hex), SYN2 = 16 (hex).

The **hdlc-v.25** option selects the HDLC data format and sets values for CHARACTER, CODE, ADDR, and CTRL to values determined by the CCITT V.25 specification: CHAR = **7BO**, ADDRESS = **255**, CTRL = **13** (hex).

CLK A, OFFSET

The CLK A parameter determines the data rate and clock source for DTE A. The OFFSET parameter specifies an offset from the nominal clock rate, and applies only when Gemini generates the transmit clock. **The offset parameter must be set to 0.0 percent if the clock source is modem or ext.**

The choices for CLK A include bit rates from 75 bps to 72,000 bps, plus **modem** and **ext**. If you select CLK A = **modem**, Gemini extracts the transmit clock from the TRANSMIT CLOCK signal (pin 15) of the test interface. If you select CLK A = **ext**, Gemini accepts a TTL transmit clock from the CLK A BNC connector on the rear panel. The external clock rate should be equal to the data rate for

synchronous operation, and should be 16 times the data rate for asynchronous operation.

Gemini does not operate with async data at rates above 38,400 bps. For async operation, you should select a value for CLK A that is less than or equal to 38,400 bps.

CLK B, OFFSET

The CLK B parameter determines the data rate and clock source for DTE B. The OFFSET parameter specifies an offset from the nominal clock rate, and applies only when Gemini generates the transmit clock. **The offset parameter must be set to 0.0 percent if the clock source is modem or ext.**

The choices for CLK B include bit rates from 75 bps to 72,000 bps, plus **modem** and **ext**. If you select CLK B = **modem**, then Gemini extracts the transmit clock from the TRANSMIT CLOCK signal (pin 15) of the test interface. If you select CLK B = **ext**, then Gemini accepts a TTL transmit clock from the CLK B BNC connector on the rear panel. The external clock rate should be equal to the data rate for synchronous operation, and should be 16 times the data rate for asynchronous operation.

Gemini does not operate with async data at rates above 38,400 bps. For async operation, select a value for CLK B that is less than or equal to 38,400 bps.

FLOW A, FLOW B

These parameters determine the method for data flow control for DTE A and DTE B. If FLOWJ = **none**, Gemini does not employ flow control. If FLOWj = **cts**, Gemini employs RTS/CTS (hardware) flow control. If FLOWj = **xoff**, then Gemini employs XON/XOFF (software) flow control.

EIA Submenu

The **EIA** submenu allows you to control and view test interface signals that do not appear on the front panel DTE A/B displays.

The **EIA** submenu allows you to view and set test interface output signals, and to view interface input signals. The **EIA** submenu allows you to control and view the following test interface output signals:

STD A, STD B: secondary transmit data
SRTS A, SRTS B: secondary request to send

The **EIA** submenu also allows you to view the status of the following test interface input signals:

RI A, RI B: ring indicator
SQD A, SQD B: signal quality detect
DRS A, DRS B: data rate select
PIN25 A, PIN25 B: interface pin #25

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SRD A, SRD B: secondary receive data
SCTS A, SCTS B: secondary clear to send
SDCD A, SD CD B: secondary data carrier detect

CALL Menu

The CALL menu facilitates call setup for autodial modems. To perform call setup, set the TEST MODE parameter to **call_setup** in the **TESTS** menu. Gemini can perform call setup using one of several data formats and protocols. Set the desired data format and protocol parameters in the **TERM** menu, **CALLS** submenu.

Each line of the **CALL** menu contains a character string that can be transmitted to one of the test interfaces. Each command string can be up to 80 characters in length. Gemini transmits string names that have an A suffix from DTE A. Gemini transmits string names that have a B suffix from DTE B. For example, Gemini transmits the STRAP A string from DTE A. Other than the A or B suffix, the string names are for reference only, i.e., a character string can contain any modem command. Figure 3-3 shows the **CALL** menu.

STRAP A: ATZ^M
[ENTER] [ESC]
EDIT RANGE: A-Z

STRAP B: ATZ^M
[ENTER] [ESC]
EDIT RANGE: A-Z

ORIG A: AT DT 2^M
[ENTER] [ESC]
EDIT RANGE: A-Z

ORIG B: AT DT 1^M
[ENTER] [ESC]
EDIT RANGE: A-Z

ANSW A: AT S0=1^M
[ENTER] [ESC]
EDIT RANGE: A-Z

ANSW B: AT S0=1^M
[ENTER] [ESC]
EDIT RANGE: A-Z

DROP A: \P2 +++\P2 ATH^M
[ENTER] [ESC]
EDIT RANGE: A-Z

DROP B: \P2 +++\P2 ATH^M
[ENTER] [ESC]
EDIT RANGE: A-Z

Figure 3-3. CALL Menu

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After you select a character string, press SEND to transmit the string to the designated test interface. If you press the RESULTS key before or after you press SEND, you can view the transaction on Gemini's built-in data monitor.

Gemini provides two methods for entering and editing modem command strings. You can use the Gemini String Editor to edit the contents of any command string (see the Gemini String Editor paragraphs on page 3-22), or you can enter command strings via an attached terminal or PC (see Section 4, *Remote Operation*).

STRAP A

The STRAP A parameter contains the initialization command string for the modem connected to DTE A.

STRAP B

The STRAP B parameter contains the initialization command string for the modem connected to DTE B.

ORIG A

The ORIG A parameter contains the call initialization command string for the modem connected to DTE A.

ORIG B

The ORIG B parameter contains the call initialization command string for the modem connected to DTE B.

ANSW A

The ANSW A parameter contains the call answer command string for the modem connected to DTE A.

ANSW B

The ANSW B parameter contains the call answer command string for the modem connected to DTE B.

DROP A

The DROP A parameter contains the call disconnect command string for the modem connected to DTE A.

DROP B

The DROP B parameter contains the call disconnect command string for the modem connected to DTE B.

FILE Menu

The file menu allows you to quickly save or recall Gemini test configuration files. These files contain the settings each of the parameters contained in the **TESTS**, **TERM**, and **CALL** menus.

The SAVE function stores the current test configuration to a read/write memory file. Gemini saves read/write memory file contents in battery-backed random access memory (RAM).

The RECALL function loads a set of test parameters from read/write memory or from read-only memory (ROM). TAS supplies predefined test configurations for popular modem types in the ROM test configuration files.

Figure 3-4 shows the FILE menu.

```

RECALL: hayes24a      2400 ASYNC
      [ENTER] [ESC]
      Press <enter> to recall setup
      or <esc> to return to previous menu.

SAVE: file2      LBL:
      [ENTER] [ESC] (SAVE field)
      Press <enter> to save setup
      or <esc> to return to previous menu.
      [ENTER] [ESC] (LBL field)
      EDIT RANGE: A-Z
  
```

Figure 3-4. FILE Menu

File Recall

The RECALL function loads a read/write file (**file0** to **file4**) or a ROM file. The ROM files have a descriptive name and a label for easy identification. For example, the predefined test configuration file for a Hayes 1,200 bps dial modem is **hayes12a**, and the file label is **1200 ASYNC**.

To recall a test configuration, select the target file in the RECALL field and press the ENTER key. Gemini will present the following prompt:

```

      Press <enter> to recall setup,
      or <esc> to return to previous menu.
  
```

If you wish to recall the file, press the ENTER key in response to the prompt. If you do not wish to complete the recall operation, press the ESC key.

Predefined Test Configuration Files

Hayes 1,200 bps Async (**hayes12a**)

hayes12a contains test settings for a 1,200 bps asynchronous modem with Hayes command set. This test configuration was verified on a pair of Hayes Smartmodem 1200 modems.

Hayes 2,400 bps Async (**hayes24a**)

hayes24a contains test settings for a 2,400 bps asynchronous modem with Hayes command set. This test configuration was verified on a pair of Hayes Smartmodem 2400 modems.

Hayes 2,400 bps Sync (**hayes24s**)

hayes24s contains test settings for a 2,400 bps synchronous modem with Hayes command set. This file configures the modem for asynchronous call setup and synchronous test data transmission. This test configuration was verified on a pair of Hayes Smartmodem 2400 modems.

CCITT V.32 Async (**v.32a**)

v.32a contains the test settings for a 9,600 bps V.32 modem. This file configures the modem for asynchronous call setup and asynchronous test data transmission. This test configuration was verified on a pair of UDS V.3225 modems. Both modems were configured with factory option set 2.

CCITT V.32 Sync (**v.32s**)

v.32s contains the test settings for a 9,600 bps V.32 modem. This file configures the modem for asynchronous call setup and synchronous test data transmission. This test configuration was verified on a pair of UDS V.3225 modems. Both modems were configured with factory option set 2.

9600 bps Leased-Line (**hpl**)

hpl contains the test settings for a high-speed (9,600 bps) private-line modem. Since this is a leased-line modem, no call setup is required. This file configures the modem for synchronous test data transmission. This test configuration was verified on a pair of UDS 9600FP modems.

File Save

The SAVE function stores the current test configuration in one of the five read/write memory files (**file0** to **file4**). The LBL field accepts a descriptive label for the file contents. Use the Gemini String Editor to enter the contents of the LBL field.

To save the current test configuration, select the target file in the SAVE field, and enter the file label in the LBL field. Next, position the cursor at the SAVE field and press ENTER. Gemini presents the following prompt:

```
Press <enter> to save setup,
or <esc> to return to previous menu.
```

If you wish to save the test configuration, press the ENTER key in response to the prompt. If you do not wish to complete the save operation, press the ESC key.

The following items are not saved in test configuration files:

CONFIG menu contents

FILE menu contents

TERM\EIA menu contents

BERT user patterns b1 and b2

POLL user patterns p1 and p2

CONFIG Menu

The **CONFIG** menu has two functions. First, it allows you to read the current Gemini operating status, model number, and software version number. Second, the **CONFIG** menu allows you to set the Gemini for GPIB or RS-232 remote control.

Figure 3-5 shows the CONFIG menu layout.

```
STATUS: Ok  MODEL: 1022  VER: 2.00
```

```
REMOTE PROTOCOL: gpib
  [ENTER] [ESC]
  ADDRESS: 1  TERMINATOR: eoi
REMOTE PROTOCOL: crlf
```

Figure 3-5. CONFIG Menu

Status, Model, and Version

The STATUS field shows the current Gemini operating status. If the status is **ok**, Gemini has not detected any problems with its circuitry or software. If Gemini detects a system error, it displays the error code in this field.

The MODEL field shows the Gemini model number, **1022**.

The VER field shows the Gemini software cartridge version.

Control Link Protocol

The PROTOCOL parameter determines the command link control protocol. The choices are **crlf** (carriage return/line feed), **acknak**, and **gpib**.

PROTOCOL: **crlf**

crlf selects the carriage return/line feed protocol. **crlf** uses the RS-232 serial control port and does not provide error control. For more information on this protocol, see Section 4, *Remote Operation*.

The **crlf** selection contains a submenu that allows you to set BAUD RATE, DATA (# data bits), PARITY, and STOP (# stop bits) options.

PROTOCOL: **acknak**

acknak selects the acknak protocol. **acknak** uses the RS-232 serial control port and provides error control. For more information on this protocol, see Section 4, *Remote Operation*.

The **acknak** selection contains a submenu that allows you to set BAUD RATE, ADDRESS, DATA (# data bits), PARITY, and STOP (# stop bits) options.

PROTOCOL: **gpib**

gpib selects the General Purpose Instrumentation Bus (IEEE-488) protocol. **gpib** uses the GPIB parallel control port. For more information on this protocol, see Section 4, *Remote Operation*.

The **gpib** selection contains a submenu that allows you to set the ADDRESS options.

PROTOCOL RESPONSE MODE

This parameter directs Gemini to provide either **verbose** or **terse** responses to remote port commands. Verbose responses include the command name and subcommand name. Terse responses include only the response value. For more information on verbose and terse responses, see Section 4, *Remote Operation*.

Test Results Displays

Gemini shows test results on its main display. To access the test results, press the RESULTS key. When the results display is active, the indicator next to the results display is on. To return to the menu display, press the RESULTS key again. When the menu display is active, the indicator next to the RESULTS key is off.

Each results display contains multiple lines of information. To scroll through the lines of the results display, use the UP and DOWN keys.

The contents of the results display depend upon the test mode. If the test mode is **bert**, the results display contains the BERT test results. If the test mode is **polls**, the results display contains the POLLS test results. If the test mode is **call_setup**, the results display shows the transmit data and receive data (Td and Rd) for DTE A and DTE B.

BERT Results Display

\BERT\A Blocks, Ber, Cer, Bler

This display line shows total blocks analyzed, total bit errors, total character errors, and total block errors detected at DTE A. If the test data format is **sync**, Gemini does not count character errors, and the character error display indicates **0**.

\BERT\B Blocks, Ber, Cer, Bler

This display line shows total blocks analyzed, total bit errors, total character errors, and total block errors detected at DTE B. If the test data format is **sync**, Gemini does not count character errors, and the character error display indicates **0**.

\BERT\A Blocks, Bps, Cps, Blps

This display line shows total blocks analyzed, average received bits/sec., average received characters/sec., and average received blocks/sec. at DTE A.

\BERT\B Blocks, Bps, Cps, Blps

This display line shows total blocks analyzed, average received bits/sec., average received characters/sec., and average received blocks/sec. at DTE B.

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\BERTA Txclk, Rxclk

This display line shows the transmit clock frequency and the receive clock frequency for DTE A. Table 3-3 shows the source of the transmit and receive clocks.

<u>Protocol</u>	<u>Clk Source</u>	<u>Txclk</u>	<u>Rxclk</u>
async	Gemini	Internal	Gemini
async	ext	Rear Panel BNC	Rear Panel BNC
sync	Gemini	Internal	DTE pin 17
sync	modem	DTE pin 15	DTE pin 17
sync	ext	Rear Panel BNC	DTE pin 17

Table 3-3. Source for Txclk and Rxclk Measurements

\BERTB Txclk, Rxclk

This display line shows the transmit clock frequency and the receive clock frequency for DTE B. Table 3-3 shows the source of the transmit and receive clocks.

\BERTA Sync loss, Duration

This display line shows the number of sync losses that have occurred at DTE A, and the duration (in seconds) of the current in-sync period.

\BERTB Sync loss, Duration

This display line shows the number of sync losses that have occurred at DTE B, and the duration (in seconds) of the current in-sync period.

POLLS Results Display

\POLLVA Rcvd, R-CTS, Ser, Mer, Fpo

This display line shows the total number of polls analyzed at DTE A (Rcvd), the RTS-CTS delay (in msec) measured at DTE A (R-CTS), and the total number of sync errors (Ser), message errors (Mer), and false polls (Fpo) detected at DTE A. False polls are only counted in switched carrier mode.

In sync mode, a false poll error is counted if character synchronization is not achieved while DCD is asserted. A sync error is counted if the first character read after achieving character synchronization (the second sync character) is in error, or if the receiver achieves sync with the poll message anywhere after the first two characters.

In async mode, a false poll error is counted if the first character is not read while DCD is asserted and a sync error is counted if the second character of the message is in error.

In switched carrier mode (sync or async), a sync error is counted if DCD is dropped after the first two characters are read.

A message error is counted if any character after the first two characters is in error.

\POLL\B Rcvd, R-CTS, Ser, Mer, Fpo

This display line shows the total number of polls analyzed at DTE B (Rcvd), the RTS-CTS delay (in msec) measured at DTE B (R-CTS), and the total number of sync errors (Ser), message errors (Mer), and false polls (Fpo) detected at DTE B. False polls are only counted in switched carrier mode.

In sync mode, a false poll error is counted if character synchronization is not achieved while DCD is asserted. A sync error is counted if the first character read after achieving character synchronization (the second sync character) is in error, or if the receiver achieves sync with the poll message anywhere after the first two characters.

In async mode, a false poll error is counted if the first character is not read while DCD is asserted and a sync error is counted if the second character of the message is in error.

In switched carrier mode (sync or async), a sync error is counted if DCD is dropped after the first two characters are read.

A message error is counted if any character after the first two characters is in error.

\POLL\A Txclk, Rxclk

This display line shows the transmit clock frequency and the receive clock frequency for DTE A. Table 3-3 shows the source of the transmit and receive clocks.

\POLL\B Txclk, Rxclk

This display line shows the transmit clock frequency and the receive clock frequency for DTE B. Table 3-3 shows the source of the transmit and receive clocks.

Call Setup Results

When Gemini is in call setup mode, it activates a data monitor that captures the transmit data and receive data at both DTE A and DTE B. Gemini displays this data when you select the call setup results display.

Tda, Rda

This display line shows the data transmitted from DTE A to the DCE (Tda), and shows the data received at DTE A from the DCE device (Rda).

Tdb, Rdb

This display line shows the data transmitted from DTE A to the DCE (Tda), and shows the data received at DTE A from the DCE device (Rda). Gemini places gaps between characters to represent the relative time relationships between the characters..

Gemini String Editor

Several Gemini menu items require you to enter or modify text strings. The Gemini String Editor allows you to create and modify text strings. Examples of menu items that require string input or modification are listed below:

- * Modem command strings (**CALL**).
- * BERT user patterns **b1** and **b2** (**TESTS**).
- * POLL user patterns **p1** and **p2** (**TESTS**).
- * File labels (**FILE**).

The String Editor allows you to set a character to any 8-bit binary value. This feature allows you to enter ASCII printable characters, ASCII nonprintable (control) characters, and non-ASCII 8-bit quantities. You can enter an ASCII printable character directly, or you can enter the hexadecimal value of the character. You can enter an ASCII control character (0 to 1F hex) as a control character sequence (^+character), or you can enter the hexadecimal equivalent. You must enter characters in the range 7F to FF hex as hexadecimal values. For example, the character sequence ABC<RETURN> can be represented by any of the following strings:

- * ABC^M
- * ABC<0D>
- * <41><42><43><0D> or <4142430D>

Gemini interprets the sequences contained in each character string, and stores each string as a sequence of 8-bit values.

Entering a String

To enter a string, use the LEFT and RIGHT keys to position the cursor and use the + or - key to select the character value. As you press the + or - key, the String Editor scrolls through the list of characters in the current edit range. Gemini shows the current edit range on the top line of the display, in the Edit field. Continue to scroll through the list until you reach the desired character.

Changing the Edit Range

To change the edit range, press the ENTER key. Gemini will display the following Edit Range menu:

```
Select editing mode...
EDIT RANGE:
```

Use the + or - key to select the edit range, then press the ESC key to return to the character string. Table 3-4 defines each of the edit range choices:

<u>Identifier</u>	<u>Range</u>
A-Z	upper case alphabetic
a-z	lower case alphabetic
0-9	decimal digits
^\...	^ _ { } ~ ! " # \$ % & ' () * + , - . / : ; < = > ? @ [\] and SPACE
ins/del	insert and delete
all	all printable ASCII characters

Table 3-4. String Edit Ranges

Inserting and Deleting Characters

To insert characters in a string, perform the following steps:

- a. Select the **ins/del** edit range.
- b. Position the cursor at the point in the string where you wish to insert characters.

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- c. Press the + key to insert a space at the cursor position.

To delete characters from a string, perform the following steps:

- a. Select the **ins/del** edit range.
- b. Position the cursor at the point in the string where you wish to delete characters.
- c. Press the - key to delete the character at the cursor position.

Entering Printable ASCII Characters

To enter a printable ASCII character, select the edit range that contains the character. Next, press the + or - key until you locate the character.

Entering ASCII Control Characters

The String Editor provides two options for entering ASCII control characters. You can enter a control character as a **^+character** sequence, or you can enter the hexadecimal value of the control character. To enter the control character as a **^+character** sequence, perform the following steps:

- a. Select the **^\...** edit range.
- b. Enter the ^ character.
- c. Select the appropriate edit range.
- d. Enter the desired character.

For example, to enter the control character <CARRIAGE RETURN>, you must enter the sequence **^M**. Gemini interprets this sequence as <CONTROL>**+M**.

To enter a control character as a hexadecimal value, perform the following steps:

- a. Select the **^...** edit range.
- b. Enter the **<** character.
- c. Select the **A-Z** or **0-9** edit range.
- d. Enter the hex value for the character.
- e. Enter the **>** character.

For example, to enter the control character **<CARRIAGE RETURN>**, you must enter the sequence **<0D>**.

If you wish to enter the hex values for several characters in sequence, you can enclose the sequence with a single pair of brackets. For example, to enter the sequence **<CARRIAGE RETURN><LINE FEED>** you can enter **<0D 0A>**.

Table 3-5 lists each ASCII control character and its String Editor implementation.

<u>Char</u>	<u>Hex</u>	<u>Name</u>	
^@	00	NUL	
^A	01	SOH	
^B	02	STX	
^C	03	ETX	
^D	04	EOT	
^E	05	ENQ	
^F	06	ACK	
^G	07	BEL	
^H	08	BS	
^I	09	HT	
^J	0A	LF	
^K	0B	VT	
^L	0C	FF	
^M	0D	CR	
^N	0E	SO	
^O	0F	SI	
^P	10	DLE	
^Q	11	DC1	(XON)
^R	12	DC2	(sometimes XON)
^S	13	DC3	(XOFF)
^T	14	DC4	(sometimes XOFF)
^U	15	NAK	
^V	16	SYN	
^W	17	ETB	
^X	18	CAN	
^Y	19	EM	
^Z	1A	SUB	
^[1B	ESC	
^\ ^]	1C	FS	
^^	1D	GS	
^^	1E	RS	
^^	1F	US	

Table 3-5. ASCII Control Character Codes

Entering Non-ASCII Characters

Non-ASCII characters have 8-bit hex values from 80 to FF hex. You must enter these characters as hexadecimal values. The procedure for entering these characters is the same as the procedure for entering the hex values for ASCII control characters.

4 Remote Operation

A computer or terminal can control Gemini by issuing commands to Gemini's GPIB or RS-232 remote control port. Gemini supports three control link protocols:

- * RS-232 CR/LF.
- * RS-232 ACK/NAK.
- * GPIB.

CR/LF (carriage return/line feed) is a simple command-line protocol, and allows you to control Gemini from a dumb terminal or a computer. In addition to being easiest to implement, the CR/LF protocol provides a convenient way to practice using the Gemini command set.

ACK/NAK is a more sophisticated serial control protocol that includes error-checking and command retransmission.

GPIB (General Purpose Instrumentation Bus) is the industry-standard parallel-bus instrument control protocol.

You can use Gemini's remote control features to design computer-controlled automatic test procedures for data communications equipment, or to access and control a Gemini unit at a remote location via modem link.

Figure 4-1 shows Gemini being used in an automatic modem test system. In this configuration, a computer controls the Gemini, a TAS Telephone Network Simulator, a TAS Modem Test Switch, and other test equipment via the GPIB. The control bus originates at the computer and is connected to each piece of test equipment. This type of configuration is simple to set up and operate, provided that the computer has GPIB controller capability.

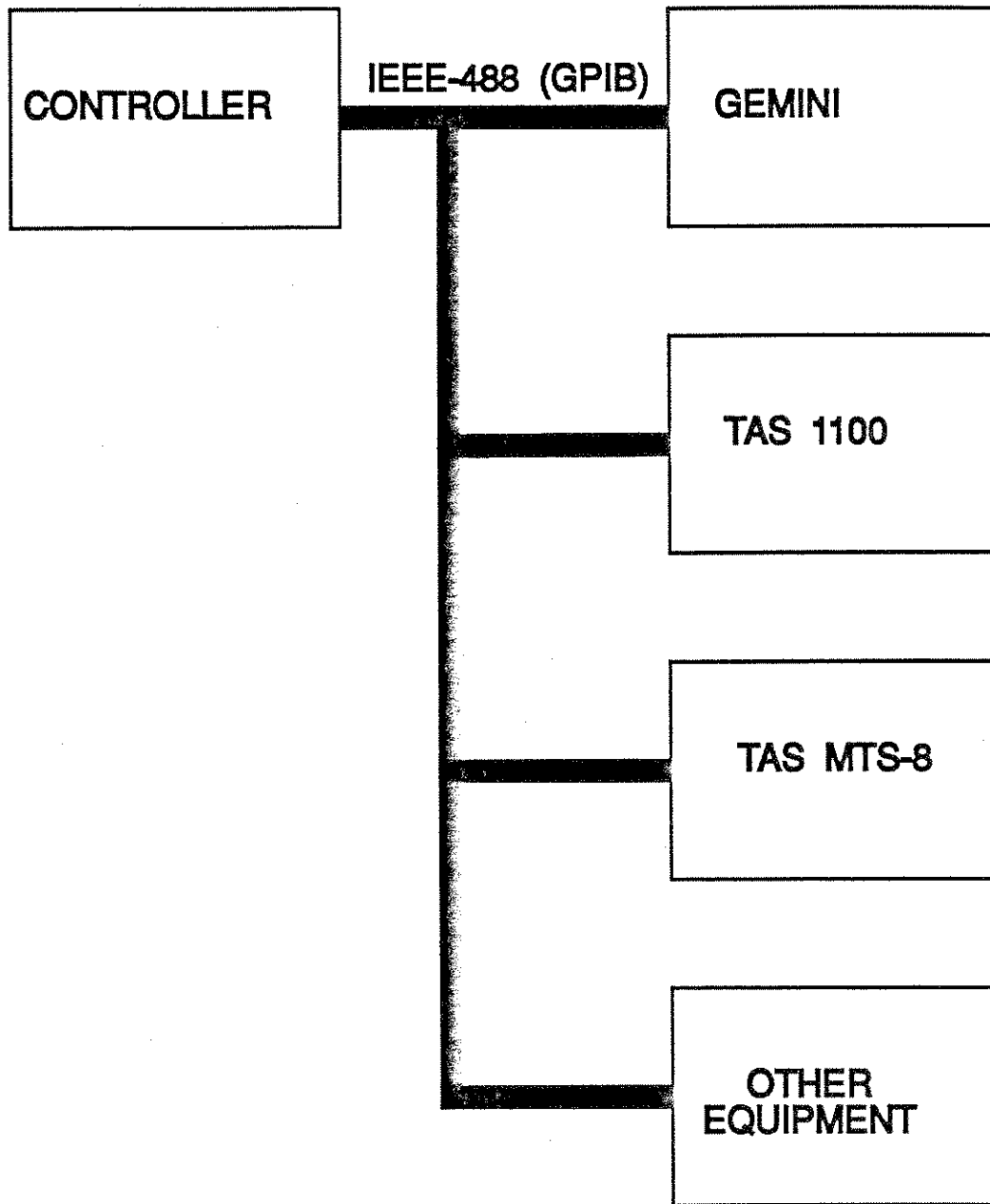


Figure 4-1. GPIB Automatic Modem Test System

Figure 4-2 shows a typical RS-232 control application. This type of setup might be used when Gemini is the only instrument to be controlled, or when a GPIB control computer is not available.

Gemini can also be controlled via modem link. In Figure 4-3, a computer at a central site directs a Gemini at each end of a communications link to perform a series of tests. The computer sends commands to each Gemini via a modem link.

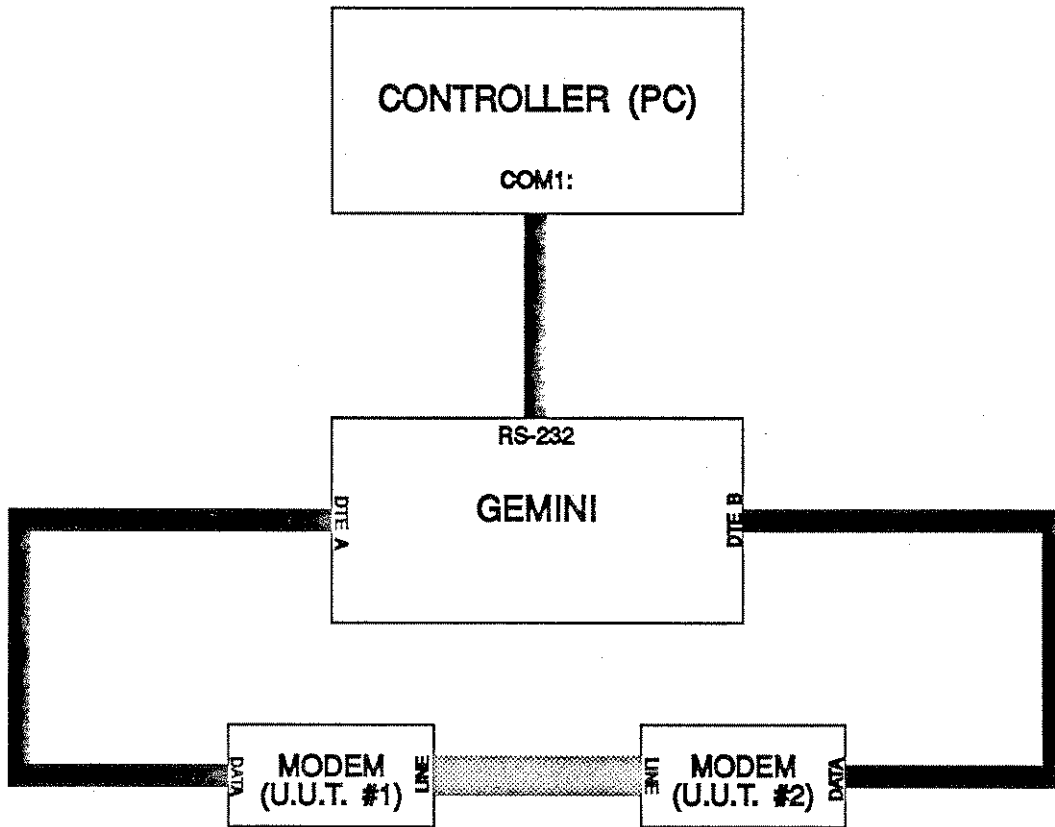


Figure 4-2. RS-232 Control of Gemini

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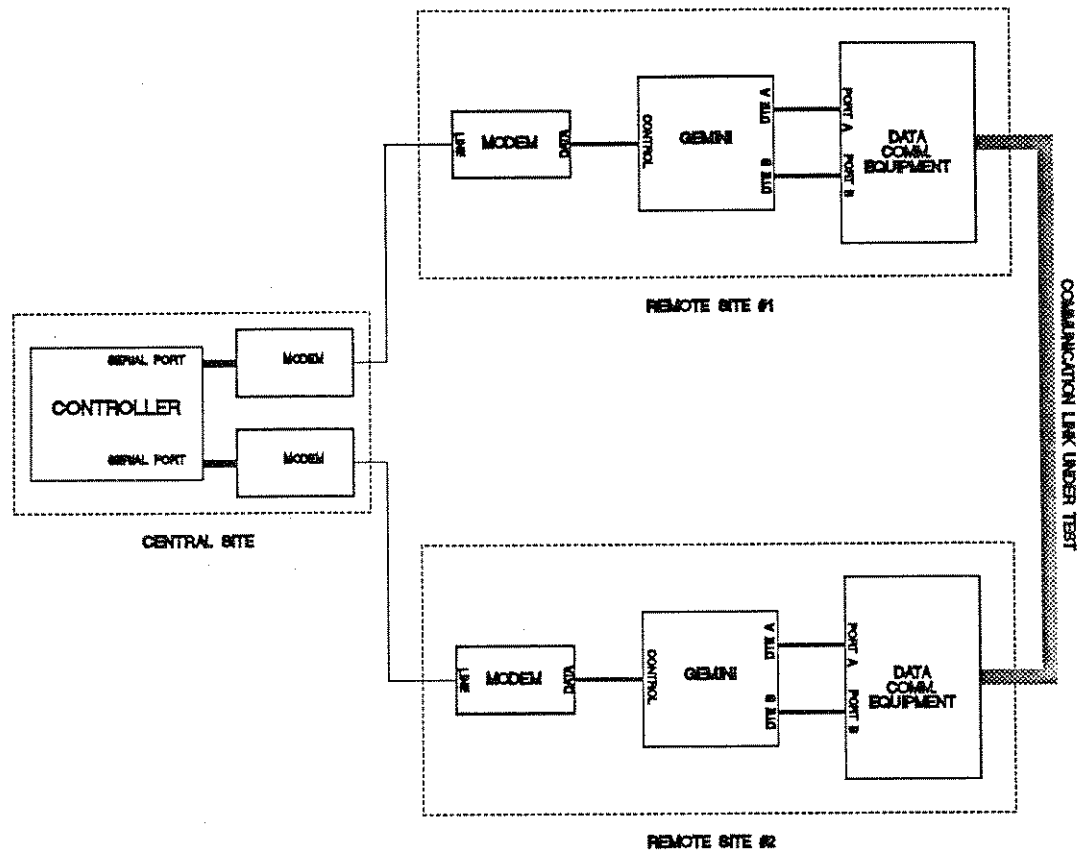


Figure 4-3. Gemini Control via Modem Link

Gemini includes a built-in RS-232/GPIB protocol converter. This means that a computer can control instruments attached to Gemini's GPIB port by sending commands to Gemini's RS-232 port. The advantage of this configuration is that a computer does not have to be a GPIB controller to control GPIB instruments. Since Gemini performs the bus conversion, a computer can control Gemini and several GPIB instruments from a single serial port.

TAS uses the Gemini protocol converter feature in its TASKIT automatic modem test software. In one of the standard TASKIT modem test configurations, a computer controls Gemini via RS-232, and controls the telephone network simulator indirectly via Gemini's GPIB port. Figure 4-4 shows this configuration.

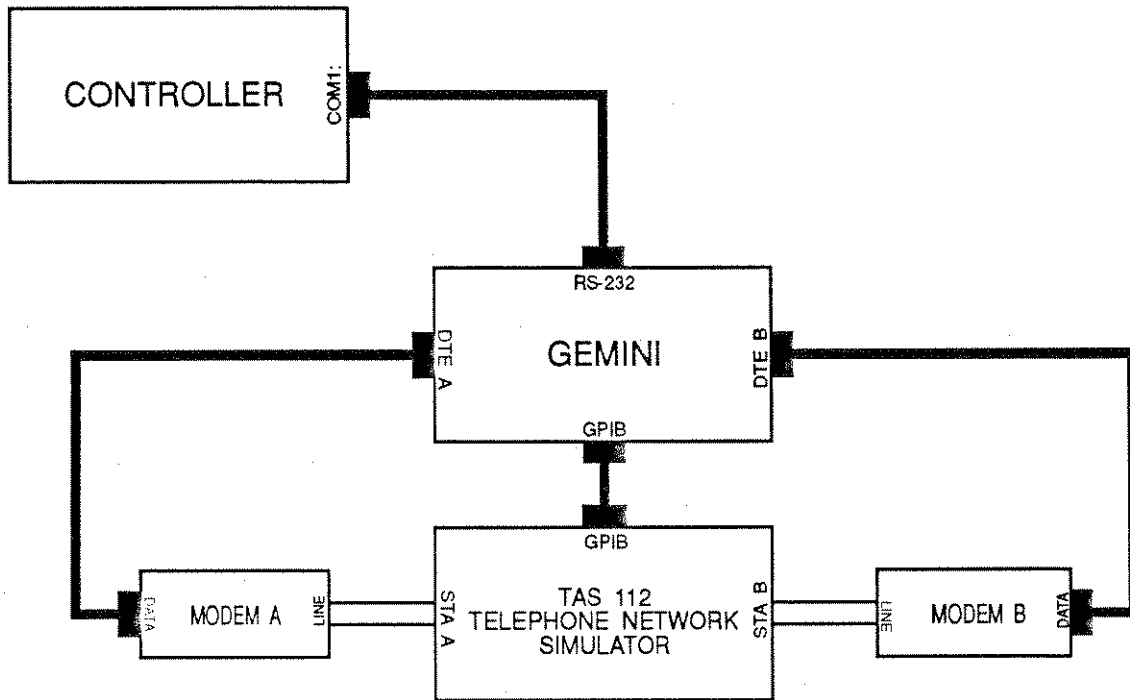


Figure 4-4. TASKIT Modem Test Configuration

Overview of Gemini Commands

Gemini commands are arranged in functional groups. As an example, the following operations might be required to perform an automatic BERT or POLL test on an autodial modem. The command group(s) associated with each test operation are listed in parentheses.

- a. Check Gemini status, model #, and software version (CNFG).
- b. Set terminal parameters for call setup (CPCL, ACLL, SCLL, HCLL).
- c. Set terminal parameters for test data transmission (TPCL, ATST).

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- d. Set test parameters (BERT or POLL).
- e. Set up call (CALL or MSGX, INTF).
- f. Execute the test (TEST, BERT or POLL, INTF).

The following brief descriptions outline the function of each Gemini command group. For a complete description, refer to Section 5, *Gemini Remote Commands Reference*.

ACLL: determines the data format for asynchronous call setup, including character size, parity, number of stop bits, and intercharacter delay.

ATST: determines the data format for asynchronous BERT tests and POLLS tests, including character size, parity, and number of stop bits.

BERT: determines BERT test execution parameters and reports BERT test results.

CALL: determines modem call connect/disconnect command strings, and sends the strings.

CNFG: reports Gemini status, model #, and software cartridge version. Also determines command response format.

CPCL: determines the call setup protocol, clock rate, clock offset, and flow control options.

FILE: saves, recalls, and names Gemini test configuration files.

GPIB: determines GPIB options and RS-232/GPIB translator options.

HCLL: determines the data format for HDLC call setup.

INTF: controls and/or reports the status of DTE A and DTE B interface control signals.

MSGX: controls Gemini's built-in dual data analyzer. This command group allows you to send commands from DTE A or DTE B, and to monitor and buffer the command responses.

POLL: determines POLLS test execution parameters and reports POLLS test results.

SCLL: determines the data format for sync call setup.

TEST: determines Gemini's test mode. Starts and stops test execution. Controls SELF-LOOP function and INSERT ERRORS function.

TPCL: determines the test data transmission protocol, clock rate, clock offset, and flow control options.

Configuring Gemini for Remote Control

Before you can control Gemini from a remote terminal or computer, you must first set the remote control configuration. The remote configuration can be set only via the Gemini front panel. To set the remote control configuration, you must perform the following steps:

- a. Select the **CONFIG** menu.
- b. Use the DOWN or UP key to scroll to the REMOTE PROTOCOL menu line.
- c. Select the desired protocol (**gpib**, **crLf**, or **acknak**).
- d. Press the ENTER key and set the options for the remote control program that you selected.

For example, to configure Gemini for RS-232 CR/LF control, select REMOTE PROTOCOL: **crLf**, and press ENTER to select the **crLf** submenu. Next, set the BAUD RATE, DATA, PARITY, and STOP options for the CR/LF protocol.

For more information on the Gemini **CONFIG** menu, see Section 3, *Menu Reference*. For detailed information on each of the Gemini link control protocols, see the *Remote Control Protocols* section on page 3-17.

Sending Commands to Gemini

Command Types

Gemini supports three distinct types of commands. These command types are SET commands, REPORT commands, and EXECUTE commands.

SET commands simply assign a value to a Gemini configuration parameter. For example, the command that sets the BERT pattern to **511** is a SET command. If Gemini receives a SET command without a parameter value, it returns the current setting of the parameter.

REPORT commands return a value. For example, the command that returns the bit error count for the BERT test is a REPORT command.

EXECUTE commands instruct Gemini to perform an operation. For example, the command that instructs Gemini to start running the BERT test is an EXECUTE command. EXECUTE commands do not return a value.

Command Sequence

To execute a Gemini command, a controller must execute a simple three-step sequence:

- a. Check for any pending command response. Gemini does not execute a new command if the result from a previous command has not been read.
- b. Send the command to the Gemini.
- c. Read the command response from the Gemini.

Command Messages

A Gemini command message consists of one or more command frames. A command frame consists of a command group name and one or more commands. A backslash precedes and follows each command frame. A colon follows the command group name, and a comma follows each command name except the last command. Gemini ignores white space within the command frame. The command frame has the following syntax:

```
/command group: command1, command2, ..., commandn/
```

All of the commands within a command frame must belong to the same command group. An example of a command group is BERT:

```
/BERT: CNFG=ta|rb, BSIZ=10E3, NBLK=1000, MODE=0/
```

The above command performs the following BERT test operations:

- * SET test configuration = transmit A receive B.
- * SET block size = 1000.
- * SET # blocks per test = 1000.
- * SET test mode = 0 (manual termination).

Note that all of the commands in the previous example are SET commands. An example of a REPORT command is:

```
/BERT: BERa/
```

This command instructs Gemini to report the number of bit errors measured at DTE A.

If Gemini receives a SET command without a parameter value, it returns the current value of the parameter. For example, the following message tells Gemini to return the value of the BSIZ parameter:

```
/BERT: BSIZ/
```

Note that a similar command was used to SET the BSIZ parameter:

```
/BERT: BSIZ=10E3/
```

An example of an EXECUTE command is:

```
/TEST: RUN/
```

This command tells Gemini to EXECUTE the current test.

A command message can contain more than one command frame. For example, the following command message tells Gemini to SET the test mode to BERT, EXECUTE the BERT test, and REPORT the bit error count at DTE B:

```
/TEST: MODE=BERT, RUN/BERT: BERb/
```

A single backslash separates the TEST command group from the BERT command group.

Response Messages

Gemini provides an explicit response to each command message that it receives. A command message can be one of three types:

- a. a command completion message.
- b. a value message.
- c. an error message.

Gemini returns a command completion message in response to a SET command or EXECUTE command. The command completion message is:

```
/C/
```

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Gemini returns a value message in response to a REPORT command. The form of the value message is:

```
/command group: command=value/
```

For example, if the controller sends the message

```
/BERT: BERb/
```

Gemini might respond with

```
/BERT: BERb=17/
```

This response indicates that Gemini detected 17 bit errors at DTE B.

Gemini returns an error message when it detects a problem with command syntax, or when it detects an internal processing error. The form of the error message is:

```
/command group: Exxx/
```

where xxx is the error number.

For example, if the controller sends the message:

```
/BERT: BARb/
```

Gemini responds with:

```
/BERT: E006/
```

This response indicates that Gemini has detected a command error. Specifically, BARb is an illegal command.

Response to a Multiple-Command Message

Gemini returns only one response for each command message that it receives. If the command message contains multiple commands, Gemini responds to the last command in the message. For example, if the controller sends the command:

```
/TEST: MODE=BERT, RUN/BERT: BERb/
```

Gemini responds with the message:

```
/BERT: BERb=nnnnnnn/
```

where *nnnnnnn* is the number of bit errors detected at DTE B. Note that Gemini did not return completion messages for the *MODE=bert* or *RUN* commands, since they preceded the *BERb* command. A REPORT command should always be the last command in a command message, since Gemini supplies a response for only the last command. In addition, a command message should contain only one REPORT command.

If one of the commands in a multiple command message results in an error, Gemini ceases processing the command message and reports the error. For example, if the controller sends the message:

```
/TEST: MODE=BART, RUN/BERT: BERb/
```

Gemini responds with:

```
/TEST: E001/
```

Gemini responds with an error message because the MODE command resulted in a value error. In the example, Gemini did not execute the RUN command or the BERb command, since these commands follow the command that contained the error.

Terse Responses

If the PROTOCOL RESPONSE MODE is **terse**, Gemini does not include the slashes, command group name, or parameter name in the response. The following command transactions illustrate the format of terse responses.

```
Command:    /BERT: BSIZ=10E3/
```

```
Response:   C
```

```
Command:    /BERT: BSIZ/
```

```
Response:   10E3
```

```
Command:    /BERT: BERb/
```

```
Response:   17
```

```
Command:    /BERT: BARb/
```

```
Response:   E006
```

BER Test for a 2400 bps Dial Modem

The following example shows you how to construct a test procedure for a 2,400 bps dial modem. The procedure consists of several test operations. Each operation, in turn, results in one or more Gemini command messages. The description of the test procedure includes a description of each test operation, a

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brief description of each command message, and a brief description of each command.

Figure 4-5 shows the equipment configuration. Gemini DTE A is connected to Modem A, and Gemini DTE B is connected to Modem B. The line side of each modem is connected to a TAS 112 Telephone Network Simulator. The telephone number for Station A is 1, and the telephone number for Station B is 2.

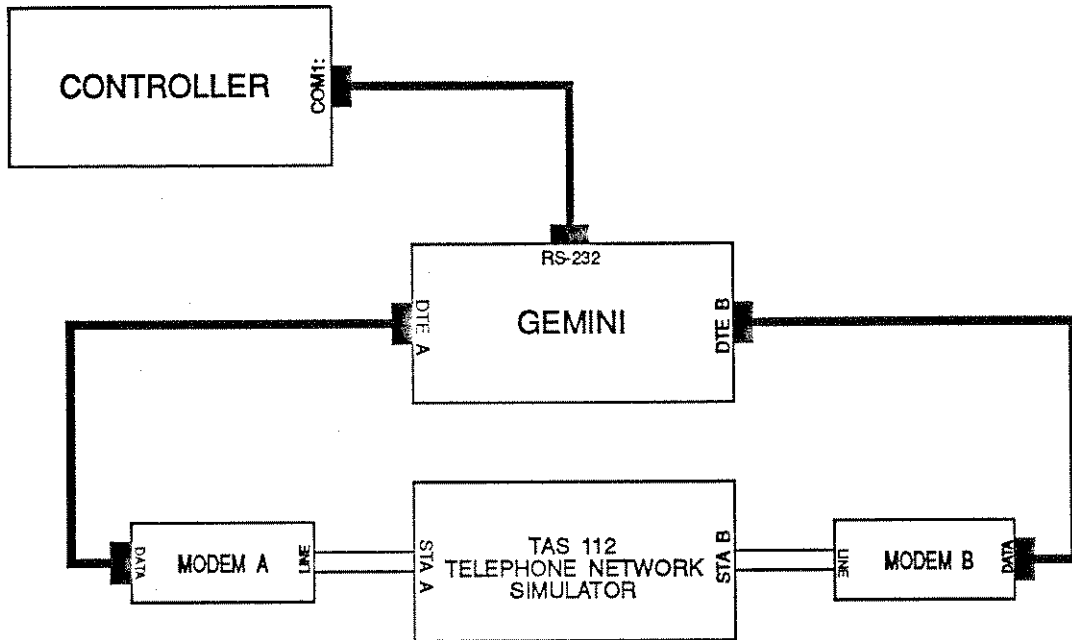


Figure 4-5. BERT Test Configuration for 2400 bps Dial Modem

Test Operation #1: Verify Gemini Configuration and Status

Verify the Gemini model number.

```
/CNFG: MODL/
```

Verify the version of the Gemini software cartridge.

```
/CNFG: VERS/
```

Read the result of the power-up diagnostics.

```
/CNFG: STAT/
```


Set VERBOSE response option.

```
/CNFG: RESP=VERBOSE/
```

Test Operation #2: Set the Terminal Parameters for Call Setup

Set the call setup protocol parameters.

```
/CPCL: PCL=ASYNC, CLKa=2400, CLKb=2400, OFSa=0, OFSb=0,
      FLOWa=NONE, FLOWb=NONE/
```

- a. Set the call setup protocol to **async**.
- b. Set DTE A clock to **2,400** bps.
- c. Set DTE B clock to **2,400** bps.
- d. Set DTE A clock offset to **0**.
- e. Set DTE B clock offset to **0**.
- f. Set DTE A flow control to **none**.
- g. Set DTE B flow control to **none**.

Set the data format options for call setup.

```
/ACLL: DATA=8, PARI=NONE, STOP=1, CHRd=50/
```

- a. Set # data bits to **8**.
- b. Set parity to **none**.
- c. Set # stop bits to **1**.
- d. Set the intercharacter delay to **50** msec.

Test Operation #3: Set the Terminal Parameters for Tests

Set the test data protocol parameters.

```
/TPCL: PCL=ASYNC, CLKa=2400, CLKb=2400, OFSa=0, OFSb=0,
      FLOWa=NONE, FLOWb=NONE/
```

- a. Set the protocol to **async**.
- b. Set DTE A clock to **2,400** bps.
- c. Set DTE B clock to **2,400** bps.
- d. Set DTE A clock offset to **0**.

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- e. Set DTE B clock offset to **0**.
- f. Set DTE A flow control to **none**.
- g. Set DTE B flow control to **none**.

Set the data format options for ASYNC test data transmission.

```
/ATST: DATA=8, PARI=NONE, STOP=1/
```

- a. Set # data bits to **8**.
- b. Set parity to **none**.
- c. Set # stop bits to **1**.

Test Operation #4: Set the BERT Test Options

Set the BERT parameters.

```
/BERT: CNFG=TA&B|RA&B, BSIZ=10E2, NBLK=100, PATT=SPACE,  
RTSD=30, RSEN=Y, MODE=0/
```

- a. Set the Gemini to transmit on DTE A&B and receive and analyze results on DTE A&B.
- b. Set block size to **100** characters/block.
- c. Set number of blocks/test to **100**.
- d. Set the pattern to **space**.
- e. Set the RTS-SYNC delay to **30** seconds.
- f. Set RESYNC ENABLE to **yes**.
- g. Set the BERT test execution mode to **manual**.

Test Operation #5: Set Up the Call

Set the test mode to CALL SETUP.

```
/TEST: MODE=CALL_SETUP/
```

Set DTR active at both terminals.

```
/INTF: DTRa=1, DTRb=1/
```

Send the call setup message to the modem at DTE B.

```
/MSGX: CNFG=tb|rb, CLRb, TSTR="AT S0=1^M", RESP="OK",
      TLIM=5, CLIM=20, GO/
```

- a. Set Gemini to transmit the call setup message on DTE B and check the response at DTE B.
- b. Clear the DTE B message buffer.
- c. Set the transmit string to **AT S0=1^M** (answer on one ring).
- d. Set the expected response to **OK**.
- e. Set the response time limit to **5** seconds.
- f. Set the response # characters limit to **20**.

Execute the message transfer.

Check message transfer status until the transfer has terminated.

```
/MSGX: STAT/
```

Send the call setup message to the modem at DTE A.

```
/MSGX: CNFG=ta|ra, CLRa, TSTR="AT DT2^M", RESP="CONNECT
      2400", TLIM=10, CLIM=30, GO/
```

- a. Set Gemini to transmit at DTE A and check the response at DTE A.
- b. Clear the DTE A message buffer.
- c. Set the transmit string to **AT DT2^M** (dial the telephone number 2).
- d. Set the expected response to **CONNECT 2400**.
- e. Set the response time limit to **10** seconds.
- f. Set the response # characters limit to **30**.

Execute the message transfer.

Check message transfer status until the transfer has terminated.

```
/MSGX: STAT/
```

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Test Operation #6: Execute the BERT Test

Set the BERT test mode, then activate RTS at both test interfaces to start the flow of test data.

```
/TEST: MODE=BERT, IERR=N, LOOP=N/INTF: RTSa=1, RTSb=1/
```

- a. Select the BERT test mode.
- b. Disable error insertion.
- c. Disable self-loop.
- d. Turn on RTS A to start data flow from DTE A.
- e. Turn on RTS B to start data flow from DTE B).

Until data pattern sync is achieved, check for data pattern sync at both test interfaces.

Check for pattern sync at DTE A.

```
/BERT: SYNCa/
```

Check for pattern sync at DTE B.

```
/BERT: SYNCb/
```

After data pattern sync is achieved, run the BERT test.

```
/TEST: RUN/
```

Test Operation #7: Check Test Status and Read Results

While the BERT test is executing, you can check the test status and read the interim results.

Check the DTE A BERT status.

```
/BERT: STATa/
```

Check the DTE B BERT status.

```
/BERT: STATb/
```

Get the DTE A BERT results.

```
/BERT: RPTa/
```

Get the DTE B BERT results.

```
/BERT: RPTb/
```

Remote Control Protocols

Gemini provides three remote control protocol options: RS-232 CR/LF, RS-232 ACK/NAK, and GPIB. The command syntax remains the same, regardless of the remote protocol. The remote control protocol determines only the method by which Gemini receives commands and provides responses.

To control Gemini from a computer or terminal, you must first set the remote protocol options. These options reside in the **CONFIG** menu, under **REMOTE PROTOCOL**. Use the **REMOTE PROTOCOL** option to select the protocol, then access a submenu to set the options for the protocol you select. See Section 3, *Menu Reference*, for further information.

RS-232C CR/LF Protocol

The Gemini RS-232 CR/LF is the simplest and quickest remote control protocol. You can use this protocol to control Gemini from a data terminal or a computer. The RS-232 CR/LF protocol does not perform error checking, so you should not use this protocol unless the control terminal or computer is collocated with the Gemini.

Gemini provides a > prompt when it is ready to receive a command. To enter a command, simply type the command, then press CARRIAGE RETURN. Gemini executes the command and provides a response. After Gemini provides the response, it sends another > prompt to indicate that it is again ready to receive a command.

ACK/NAK Protocol

The Gemini ACK/NAK protocol supports RS-232 multipoint communication between a controller and one or more TAS devices. ACK/NAK also detects command transmission errors, and provides for retransmission of corrupted commands. ACK/NAK is well suited for applications in which the Gemini is not collocated with the controller, such as when Gemini is controlled remotely via a modem link.

The controller initiates all ACK/NAK protocol transactions. To effect a command transaction with Gemini, the controller must perform the following operations:

- a. Poll the Gemini for a pending response.
- b. Send the command to Gemini.
- c. Poll Gemini for the command response.

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ACK/NAK Command Transaction Example

The following example illustrates a command transaction between a controller and Gemini.

First, the controller polls for any pending response. This ensures that the Gemini response buffer is empty so that Gemini can process the next command.

```
[addr]p<ENQ>
```

The Gemini response buffer is empty, so it responds:

```
[addr] <EOT>
```

Next, the controller sends the command to Gemini:

```
[addr]s<ENQ><SOH><STX>/BERT: PATT=511/<ETX> [checksum]
```

Gemini receives the command, does not detect any errors, and responds:

```
[addr] <ACK>
```

Next, the controller polls for the response to the command:

```
[addr]p<ENQ>
```

Gemini has finished executing the command, so it responds:

```
[addr] <SOH><STX>/C/<ETX> [checksum]
```

NOTE:

[addr] is the device address. The address can be any decimal number from 0 to 99. If the address is less than 10, the controller must left-pad the address with a space.

[checksum] is the message checksum. The message checksum is a three-digit decimal number. [checksum] is the two's complement of the modulo 256 sum of all characters from the first address character through the <ETX> character. For example, if the checksum is 201, then the block checksum should be 055 (256-201).

<ENQ> is the ASCII ENQUIRE control character.

<EOT> is the ASCII END OF TRANSMISSION control character.

<SOH> is the ASCII START OF HEADER control character.

<STX> is the ASCII START OF TEXT control character.

<ETX> is the ASCII END OF TEXT control character.

Polling for a Response

When Gemini receives a command from the controller, it executes the command and prepares a response. The controller must poll Gemini to receive this response. The poll sequence is:

```
[addr]p<ENQ>
```

The poll message results in one of the following:

- * Gemini does not respond.
- * Gemini has no response waiting.

```
[addr]<EOT>
```

- * Gemini provides a response.

```
[addr]<SOH><STX>[response]<ETX>[checksum]
```

Gemini does not respond to a poll if one of the following conditions exists:

- * The Gemini configuration is not proper. For example, Gemini does not respond if its ACK/NAK address does not match the address contained in the poll message.
- * Gemini is currently processing a command.
- * The poll message has been corrupted by an error.
- * Gemini AC power is off.

If the controller does not receive a response from Gemini, it should poll again. Gemini responds with [addr]<EOT> if it has no response pending.

Sending Commands to Gemini

To send a command to Gemini, the controller must assemble and send a SELECT message. The format of the SELECT message is shown below.

```
[addr]s<ENQ><SOH><STX>[command]<ETX>[checksum]
```

The select message yields one of three possible results:

- * Gemini does not respond to the message.
- * Gemini detects an error in the message:

```
[addr]<NAK>
```

- * Gemini receives the message and does not detect any errors:

```
[addr]<ACK>
```

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Gemini does not respond to the SELECT message if one of the following conditions exists:

- * The Gemini address does not match the address contained in the SELECT message.
- * Gemini AC power is off.

Gemini responds with a negative acknowledgement (NAK) if it detects a transmission error in the SELECT message (bad checksum), or if the message is too long (greater than 512 characters). If Gemini detects a transmission error in the message, the controller should send the message again.

Receiving Responses from Gemini

Gemini provides a command response when it is polled by the controller. If the controller detects a transmission error in the Gemini response, it should perform the following steps:

- a. Poll Gemini until Gemini responds with [addr]<EOT>.
- b. Send the message again.
- c. Poll Gemini again for the response.

GPIB Protocol

The Gemini GPIB protocol supports a parallel bus control architecture in which Gemini is one of the devices being controlled. The controller must meet all GPIB electrical and mechanical specifications.

The controller initiates all GPIB protocol transactions. In order to communicate with Gemini, a GPIB controller must perform the following operations:

- a. Poll Gemini for a pending response.
- b. Send the message to Gemini.
- c. Poll Gemini for the command response.

Gemini provides a GPIB status byte to indicate its current state. Possible states include:

- * IDLE - 02H.
- * BUSY - 01H.
- * READY TO RESPOND (RTR) - 04H or 44H.

IDLE indicates that Gemini does not have a message to send and is ready to accept a command.

BUSY indicates that Gemini is currently processing a command. Gemini does not accept a new command until it has finished processing the current command and has provided the response to the controller.

READY TO RESPOND (RTR) indicates that Gemini currently has a message to send to the controller. Gemini is always Ready to Respond when it finishes processing a command.

When Gemini is ready to respond, it activates the service request line (SRQ), and sets the RTR status to 44 hex. After the controller conducts the serial poll, SRQ goes inactive, and Gemini sets the RTR status to 04 hex. Figure 4-6 shows a flowchart for a typical bus controller sequence.

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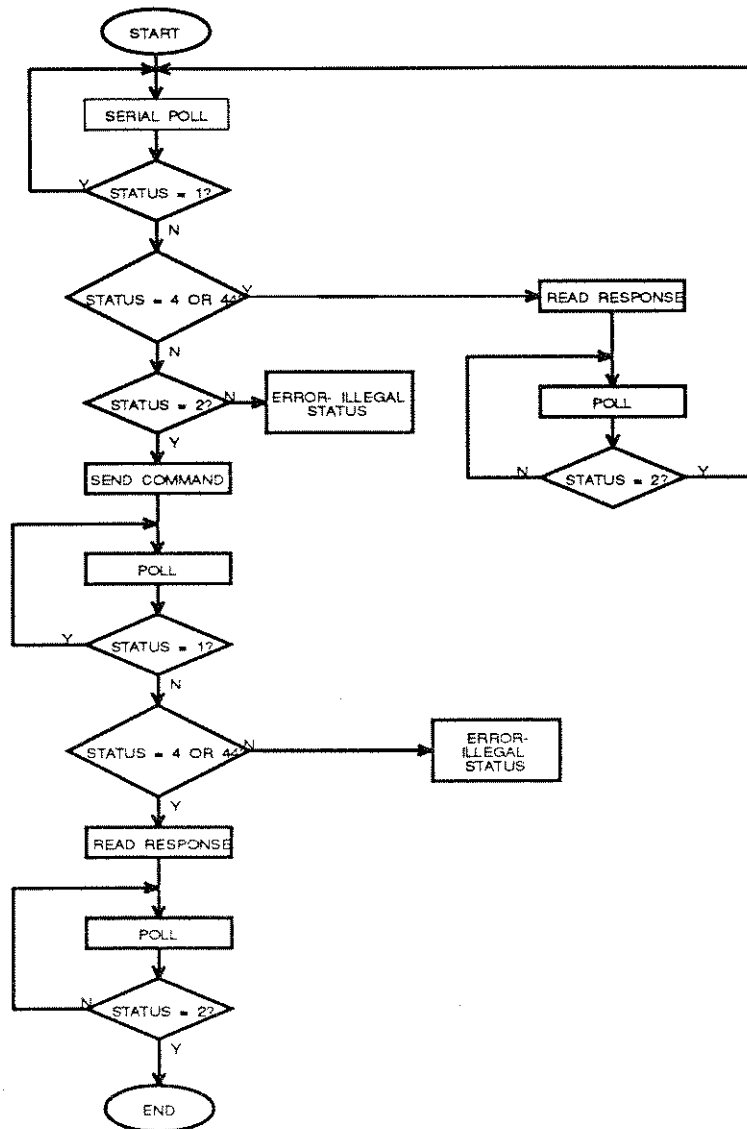


Figure 4-6. GPIB Controller Sequence

Polling for a Response

The controller must conduct a serial poll to receive a command response from Gemini. The following example show the typical GPIB sequence required to achieve a serial poll of Gemini. Your actual bus sequence may be different:

- a. ATN active.
- b. UNT - (UNTalk).

- c. UNL - (UNListen).
- d. SPE - (Serial Poll Enable).
- e. MTA - (Gemini My Talk Address).
- f. Controller programmed to listen.
- g. ATN inactive.
- h. Gemini sends status.
- i. ATN active.
- j. SPD - (Serial Poll Disable).
- k. UNT - (UNTalk).

Always conduct a serial poll before sending a command to Gemini. If Gemini has a pending message to send, it does not accept a new command.

Sending Commands to Gemini

The following example shows the typical GPIB sequence required to send a command to Gemini. Your actual bus sequence may be different.

- a. ATN active.
- b. UNT - (UNTalk).
- c. UNL - (UNListen).
- d. MLA - (Gemini My Listen Address).
- e. Controller programmed to talk.
- f. ATN inactive.

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- g. Controller sends command to Gemini and asserts EOI with last command character.
- h. ATN active.
- i. UNL - (UNListen).

Command strings must not be terminated with CARRIAGE RETURN or CARRIAGE RETURN+LINE FEED. The controller must signal the end of a command message by asserting EOI (end of interrupt) while it sends the last character of the message.

Some commands require several seconds of Gemini processing time. While Gemini completes most commands in less than 100 msec., some commands may require up to 3 seconds. The controller should conduct serial polls until the Gemini status is RTR.

Receiving Responses from Gemini

The following example shows the typical GPIB sequence required to receive a command from Gemini. Your actual bus sequence may be different.

- a. ATN active.
- b. UNT - (UNTalk).
- c. UNL - (UNListen).
- d. MTA - (Gemini My Talk Address).
- e. Controller programmed to listen.
- f. ATN inactive.
- g. Gemini sends data to controller.
- h. Controller reasserts control when EOI goes active.
- i. ATN active.
- j. UNT - (UNTalk).

Gemini does not terminate its response message with a CARRIAGE RETURN or CARRIAGE RETURN+LINE FEED. Gemini signals the end of a response message by raising EOI while it sends the last character of the response.

Using the RS-232/GPIB Translator Feature

Gemini's RS-232/GPIB Translator allows you to control GPIB instruments from an RS-232 control port. Figure 4-7 shows an application example. In the example, a TAS 112 Telephone Network Simulator is attached to the GPIB port of the Gemini. The controller encloses each TAS 112 command within a Gemini GPIB command and sends the command to Gemini. Gemini receives the GPIB command, extracts the TAS 112 command portion, and issues the command from its GPIB port. Gemini then encloses the TAS 112 command response within a GPIB command response, and provides the response to the controller.

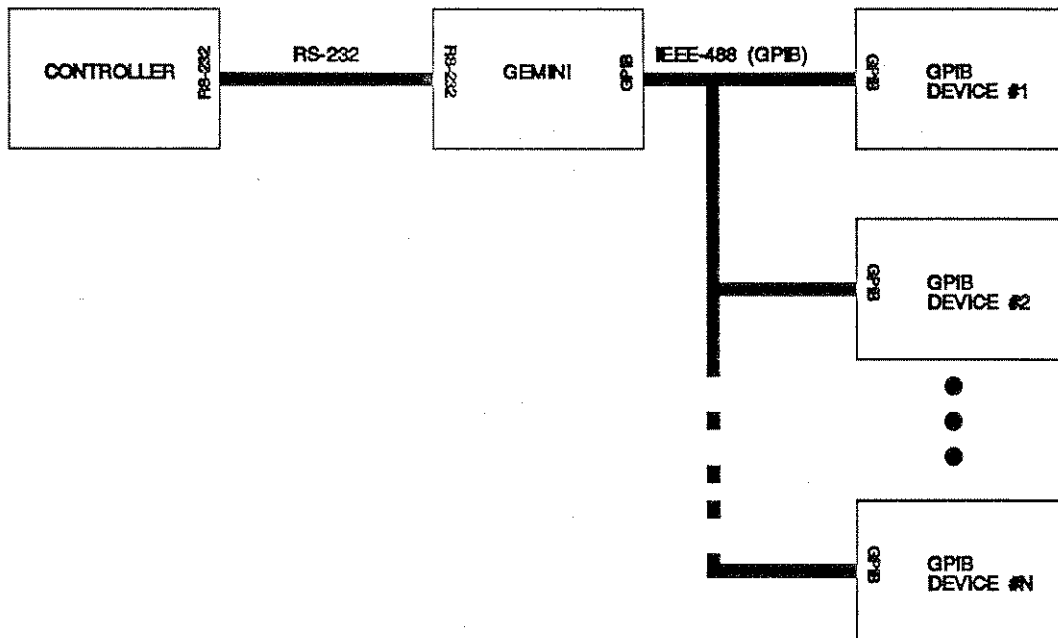


Figure 4-7. Gemini RS-232/GPIB Translator Configuration

The RS-232/GPIB Translator supports both TAS instruments and instruments from other manufacturers. As with any GPIB application, several instruments may coexist on the bus.

The GPIB command group controls the operation of the RS-232/GPIB Translator. The Translator commands are available whenever Gemini is controlled via its RS-232 control port. The Translator commands are not available when Gemini is

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controlled via its GPIB port. For specific information on the GPIB command group, see Section 5, *Gemini Remote Commands Reference*.

When the RS-232/GPIB Translator is active, Gemini acts as a GPIB controller to control the devices attached to the GPIB bus. Gemini supports the following GPIB controller functions:

- * Controller initialization.
- * Device addressing.
- * Device status check.
- * Data transfer.
- * Auxiliary functions, such as Go To Local and Local Lockout.

To effect a data transaction with a GPIB device, the controller must perform the following operations:

- a. Initialize the GPIB.
- b. Set the device address.
- c. Initialize the device.
- d. Poll the device (if applicable).
- e. Send the command.
- f. Get the response (if applicable).
- g. Restore the device (if applicable).

Initializing the Gemini GPIB Controller

The PON command initializes the Gemini GPIB controller to its power-on condition. This command is useful for establishing the state of the controller if it is hung up by an anomalous bus condition. For example, if the GPIB cable falls off of a device in the middle of a transaction, you can use the PON command to reinitialize the Gemini GPIB controller.

Command: /GPIB: PON/

Response: /C/

Setting GPIB Addresses

Every device on the GPIB must have a unique primary (talker/listener) address. The MADDR command sets the address of the Gemini GPIB controller, and the ADDR command selects a GPIB device for a bus transaction. Gemini supports all GPIB primary addresses (0 to 30). Gemini does not support secondary addressing.

Setting the Controller Address

The MADDR command sets the Gemini GPIB controller address.

Command: /GPIB: MADDR=0/

Response: /C/

Setting the Device Address

The ADDR command selects a GPIB device for bus transactions. Gemini performs transactions with only one GPIB device at a time, so you must set a new device address for each different device. If you wish to perform transactions with only one device, you do not need to set the device prior to each transaction.

Command: /GPIB: ADDR=4/

Response: /C/

Clearing the GPIB

The controller clears the GPIB by issuing the INTERFACE CLEAR (IFC) command to Gemini. When Gemini receives the IFC command, it issues the IFC command on the GPIB. The interface clear command signals all devices to abort bus transactions and place their bus drivers in a passive state. The controller should issue the INTERFACE CLEAR before any GPIB transactions occur, or after a device time-out occurs.

Command: /GPIB: IFC/

Response: /C/

Setting the Input Termination Condition

The input terminator marks the end of a message from a GPIB device to the Gemini GPIB controller. Gemini supports four input termination conditions: the carriage return character, the line feed character, the carriage return/line feed character sequence, and the GPIB end-of-interrupt (EOI) signal. The INPUT TERMINATION CONDITION (ITC) command tells Gemini which terminator to use.

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Input terminators may differ from device to device. The controller must select the appropriate input terminator before starting a transaction with a device. The Gemini GPIB controller strips the input terminator from any GPIB message that it receives.

Command: /GPIB: ITC=eoi/

Response: /C/

Setting the Device Time-out

If a GPIB device does not respond to a command within a specified time period, Gemini returns a DEVICE TIME-OUT error message to the controller. The DEVICE TIME-OUT (DTO) command determines the time-out length. The default time-out length is 10 seconds.

Command: /GPIB: DTO=10/

Response: /C/

Initializing a GPIB Device

Enabling the Device

The controller issues a REMOTE ENABLE command to Gemini to force a GPIB device to accept remote commands. When Gemini receives the command, it asserts the REMOTE ENABLE lead on the GPIB and places the device's address (as determined by the ADDR command) on the bus. The REMOTE ENABLE command overrides the device's front panel local/remote switch setting.

Command: /GPIB: REN=1/

Response: /C/

Selective Device Clear

The implementation of the SELECTIVE DEVICE CLEAR command is left to the manufacturer of the GPIB device. Some GPIB devices do not respond to this command.

Command: /GPIB: CLR/

Response: /C/

Execute Trigger

The implementation of DEVICE TRIGGER is left to the GPIB device manufacturer. Some GPIB devices do not respond to this command.

Command: /GPIB: TRIG/

Response: /C/

Locking Out the Device's Front Panel

The controller can issue a LOCAL LOCKOUT command to Gemini to disable the front panel of a GPIB device. For most GPIB devices, the local lockout command must follow a remote enable command. The ADDR command determines the target of the LOCAL LOCKOUT command.

Command: /GPIB: LLO/

Response: /C/

Polling a GPIB Device

The controller can conduct a serial poll of a GPIB device to determine the device's status. The controller conducts the serial poll by issuing a SERIAL POLL (SPOLL) command to Gemini. Gemini then issues a SERIAL POLL command on the GPIB and returns the serial poll status byte to the controller. The ADDR command determines the target device for the serial poll.

Seven out of the eight bits in the status byte (B0-B5 and B7) are determined by the GPIB device manufacturer. Bit B6 indicates the state of the GPIB Service Request (SRQ) line.

Command: /GPIB: SPOLL/

Response: /GPIB: SPOLL=XX/

(XX is the hex-coded value of device's status byte)

Performing Command Transactions

Gemini provides two ways to perform a command transaction with a GPIB device. The OUT and IN commands can be used to control GPIB devices from virtually any manufacturer. The TAS SEND (TSND) command is designed to perform transfers with TAS devices. The OUT command transfers messages to a GPIB device, and the IN command transfers messages from a GPIB device. The TSND command transfers a message to the GPIB device, retrieves the response from the device, and returns the response to the controller.

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Setting the Message

The MESSAGE (MSG) command specifies the message to be sent to a GPIB device.

Command: /GPIB: MSG="/RN, L500/"//

Response: /C/

Sending the Message

The OUT command causes Gemini to transfer the contents of the message buffer to the selected device. The ADDR command selects the device. Gemini applies the selected command terminator to the end of the message. The ITC command specifies the command terminator.

Command: /GPIB: OUT/

Response: /C/

Receiving Messages from a Device

The IN command directs Gemini to receive a message from the selected GPIB device and to provide the message to the controller. Gemini collects the entire message, up to the input terminator. If Gemini does not receive the entire message before the device time-out interval expires, Gemini sends a Device Time-out status code to the controller.

Command: /GPIB: IN/

Response: /GPIB: IN=/C//

Performing OUT/IN Transfers Using TAS SEND (TSND)

The TSND command can be used in lieu of separate OUT and IN commands, and is designed to be used to control TAS Telephone Network Simulators and Loop Emulators. The TSND command directs Gemini to send a message to a GPIB device, collect the response, and forward the response to the controller. The ADDR command selects the device. The MSG command specifies the message to be sent to the device. Before executing the TSND command, the controller must poll the device to ensure that it is idle (SPOLL=02).

Command: /GPIB: TSND/

Response: /GPIB: TSND=/C//

Encoding GPIB Messages

The controller must encode all GPIB messages (MSG contents) according to Gemini String Coding Conventions. These conventions are summarized as follows:

- * All GPIB messages must be enclosed within quotes.
- * Each printable ASCII character (0x20 to 0x7E) may be entered directly, or may be represented by its hexadecimal value. For example, the character "A" may be represented as A or as <41>.
- * An ASCII control character (0x00 to 0x1F) may be represented by its hex value, or by a forward slash followed by the control character. For example, the CARRIAGE RETURN control character may be represented as <0D> or as ^M.
- * Each 8-bit value from 0x7F to 0xFF must be represented by its hexadecimal value. For example, the 8-bit value 0x7F must be represented as <7F>.

Gemini uses each of the following five characters to interpret message strings:

< > \ " ^

If any of these characters is used in a message string, it must be preceded by a forward slash (\).

String Encoding Example

GPIB MSG strings must be encoded according to the Gemini String Coding Conventions before they are transmitted to the Gemini. The MSG string

```
"hello, world"<CR><LF>
```

could be encoded in any of the following ways:

```
\ "hello, world\"<0D><0A>
```

```
\ "hello, world\"^M^J
```

```
<22>hello, world<22><0D>< 0A>
```

Decoding GPIB Responses

When Gemini receives a message from a GPIB device, it encodes the message and transfers it to the controller. Gemini encodes messages according to the Gemini String Coding Conventions.

- * Gemini encloses the message within quotes.
- * Gemini passes printable ASCII characters (0x20 to 0x7E) to the controller without encoding.
- * Gemini represents ASCII control characters by their hexadecimal values. For example, the CARRIAGE RETURN character is represented by <OD>.
- * Gemini represents each 8-bit quantity in the range 0x7F to 0xFF by its hexadecimal value. For example, the quantity 0xA2 is represented by <A2>.
- * Gemini precedes each of the five characters (< > " \ >) with a forward slash (\).

Restoring Front Panel Control

The GO TO LOCAL (GTL) command returns the GPIB device to front panel control. Some devices also revert to front panel control in response to a REMOTE ENABLE (REN=0) command.

Command: /GPIB: GTL/

Response: /C/

Example #1: Performing a Transaction Using OUT and IN

The following example shows a complete command transaction with a GPIB device. In the example, the OUT command transfers data to the device, and the IN command transfers data from the device to the controller.

Initialize the Gemini GPIB Controller.

Command: /GPIB: PON, MADDR=0, IFC/

Response: /C/

Effect: Reset the Gemini GPIB controller to power-on defaults, set the Gemini GPIB controller address to **0**, and clear the GPIB.

Initialize the GPIB Device.

Command: /GPIB: ADDR=1, ITC=eoi, DTO=15, REN=1, LLO/

Response: /C/

Effect: Set the GPIB device address to **0**, set the input termination condition to **eoi**, set the DEVICE TIME-OUT to **15** seconds, enable the device for remote control, and lock out the device's front panel.

Poll the GPIB device to ensure that it is idle before sending the message.

Command: /GPIB: SPOLL/

Response: /GPIB: SPOLL=XX/

Effect: Perform a serial poll of the GPIB device at ADDR=**1**.

Place the message to be sent to the GPIB device into the message buffer, and send the message.

Command: /GPIB: MSG="CURRENT=100", OUT/

Response: /C/

Effect: Place the device command into the message buffer and send the command.

Perform serial polls of the device.

Command: /GPIB: SPOLL/

Response: /GPIB: SPOLL=XX/

Effect: Perform serial poll to get device status **XX**.

Get the response from the GPIB device.

Command: /GPIB: IN/

Response: /GPIB: IN=OKAY/

Effect: Get the response message "OKAY" from the GPIB device.

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Restore the device to front panel control.

Command: /GPIB: GTL, REN=0/

Response: /C/

Effect: Restore front panel control, disable remote control.

Example #2: Command Transaction Using TSND

The following example shows a command transaction that uses the TSND command. Note that TSND automatically polls the device for a response after transferring the command message. TSND also eliminates the need for the IN command. The TSND command is designed to work with TAS Telephone Network Simulators and Loop Emulators.

Initialize the Gemini GPIB Controller.

Command: /GPIB: PON, MADDR=0, IFC/

Response: /C/

Effect: Reset the Gemini GPIB controller to power-on defaults, set the Gemini GPIB controller address to **0**, and clear the GPIB.

Initialize the GPIB Device.

Command: /GPIB: ADDR=1, ITC=eoi, DTO=15/

Response: /C/

Effect: Set the GPIB device address to **0**, set the input termination condition to **eoi**, set the DEVICE TIME-OUT to **15** seconds.

Poll the GPIB device to ensure that it is idle before sending the message. Poll until the device status is **02**.

Command: /GPIB: SPOLL/

Response: /GPIB: SPOLL=XX/

Effect: Perform a serial poll of the GPIB device at ADDR=**1**. If the status is READY TO RESPOND (**04 or 44**), the controller must execute an IN command to clear the device response buffer.

Place the message to be sent to the GPIB device into the message buffer, and send the message.

Command: /GPIB: MSG="/IO, Z/", TSND/

Response: /GPIB: TSND=/C//

Effect: Place the device command into the message buffer and start the command transaction. The Gemini GPIB controller returns the response it received from the GPIB device; in this case the device is a TAS 1010 Channel Simulator.

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5 Gemini Remote Commands Reference

The *Gemini Remote Commands Reference* chapter describes the commands available for setting and reading parameter values, executing operations, and reading results from Gemini. This section consists of a Commands Quick Reference and Command pages. The Quick Reference section is designed to help those who are already familiar with the Gemini command set to easily find and use commands. The Command pages provide a complete description of each command group and all commands within each group.

You should be thoroughly familiar with Section 4, *Remote Operation*, of this manual before you attempt to use Gemini remote commands. The *Remote Operation* section provides the details of the Gemini command message format and syntax.

Since Gemini contains two complete data analyzers, many basic Gemini commands can apply to DTE A or to DTE B. For example, the command `/INTF: RTSa=1/` tells Gemini to turn on the RTS signal at DTE A, while the command `/INTF: RTSb=1/` tells Gemini to turn on RTS at DTE B. Rather than show two separate commands, the command reference puts a *j* suffix on the command as a place holder for the **A** or **B**. When you use the command, put an **A** or a **B** in place of the *j*.

Gemini commands are divided into three types: SET, REPORT, and EXECUTE. In the Commands Quick Reference, these three types are abbreviated S, R, and E.

Gemini Commands Quick Reference

<u>CMD</u>	<u>TYPE</u>	<u>VALUES</u>	<u>DESCRIPTION</u>
ACLL			Async Call Setup Data Format
DATA	S	5, 6, 7, 8	# data bits/char
PARI	S	even, odd, none	parity
STOP	S	1, 1.5, 2	# stop bits
CHRD	S	0 to 999 msec	intercharacter delay
ATST			Async Test Data Format
DATA	S	5, 6, 7, 8	# data bits
PARI	S	even, odd, none	parity
STOP	S	1, 1.5, 2	# stop bits
BERT			Bit Error Rate & Throughput
CNFG	S	ta ra, ta rb, tb ra, tb rb ta&b ra, ta&b rb, ta&b ra&b	test configuration
BSIZ	S	10E2 to 10E8, 2E5 to 2E28	block size
NBLK	S	0 to 1000000	number of blocks/test
PATT	S	63, 511, 2047, alt, mark, space b1, b2	data pattern
B1	S	<i>string</i>	user pattern #1
B2	S	<i>string</i>	user pattern #2
RTSD	S	1 to 1000	RTS-SYNC time-out
RSEN	S	Y, N	resync enable
MODE	S	0 (manual), 1 (semiautomatic)	test execution mode
BITLj	S	0 to 1000000	bit errors limit

<u>CMD</u>	<u>TYPE</u>	<u>VALUES</u>	<u>DESCRIPTION</u>
BERT			Bit Error Rate & Throughput (cont'd)
CHRLj	S	0 to 1000000	character errors limit
BLKLj	S	0 to 1000000	block errors limit
BRKLj	S	0 to 1000000	sync breaks limit
SBRKj	E		break sync
SRSTj	E		reset sync
BAj	R	0 to 1000000	report blocks analyzed
BERj	R	0 to 1000000	report bit errors
CERj	R	0 to 1000000	report character errors
BLERj	R	0 to 1000000	report block errors
BPSj	R	1.000E+0 to 1.000E+5	report bits/sec
CPSj	R	1.000E+0 to 1.000E+5 to	report characters/sec
BLPSj	R	1.000E+0 to 1.000E+5	report blocks/sec
SLOSSj	R	0 to 1000000	report # sync losses
RCLKj	R	1.000E+0 to 1.000E+5	report receive clock freq.
TCLKj	R	1.000E+0 to 1.000E+5	report transmit clock freq.
SYNCj	R	0, 1, 2	report sync status
STATj	R	0 to 9	report test execution status
RPTj	R	see note ¹	report all test results

note1 The BERT: RPTj command provides results in the following order: blocks analyzed, bit errors, character errors, block errors, sync losses, transmit clock frequency, receive clock frequency, bits/sec, characters/sec, blocks/sec, and sync status.

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<u>CMD</u>	<u>TYPE</u>	<u>VALUES</u>	<u>DESCRIPTION</u>
CALL			Call Setup
MSG	S	strpa, strpb, origa, origb, answa, answb, dropa, dropb	call setup message
SEND	E		send the message
STRPj	S	<i>string</i>	modem initialization command
ORIGj	S	<i>string</i>	call originate command
ANSWj	S	<i>string</i>	call answer command
DROPj	S	<i>string</i>	call disconnect command
CNFG			Gemini Configuration
MODL	R	1022	model #
OPT	R	<i>nnnnnnnn</i>	options
VERS	R	2.xx	version number
STAT	R	<i>nnn</i>	power-up status
RESP	S	verbose, terse	response mode
LOC	E		force to local
REM	E		force to remote
LOCK	E		disable REMOTE key
CPCL			Call Setup Protocol
PCL	S	async, async-v.25 sync, sync-v.25 hdlc, hdlc-v.25	protocol
CLKj	S	see note ²	transmit clock
OFSj	S	-100 to +100 (+/-10.0%)	clock offset

note2 Choices for Gemini clock are: 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 7200, 9600, 12000, 14400, 16000, 16800, 19200, 21600, 24000, 32000, 38400, 48000, 56000, 57600, 64000, 72000, modem, ext

<u>CMD</u>	<u>TYPE</u>	<u>VALUES</u>	<u>DESCRIPTION</u>
CPCL			Call Setup Protocol (cont'd)
FLOWj	S	none, cts, xoff	flow control
FILE			File Save and Recall
FNAM	S	see note ³	file name
FLBL	S	ssssssssssss	12-character file label
FSAV	E		save file
FRCL	E		recall file
GPIB			RS-232/GPIB Command Translator
ADDR	S	0 to 30	set device address
MADDR	S	0 to 30	set controller address
CLR	E		selective device clear
GTL	E		go to local
IFC	E		interface clear
LLO	E		local lockout
TRIG	E		device trigger
PON	E		controller power-on reset
IN	R	<i>string</i>	get input from device
OUT	E		transfer message to device
SPLL	R	<i>string</i>	serial poll
TSND	R	<i>string</i>	TAS-specific cmd transaction
DTO	S	0 to 100 sec	set device time-out
ITC	S	eoi, cr, lf, crlf	set input terminator
MSG	S	<i>string</i>	set output message

note3 FNAM options are the read/write files file0, file1, file2, file3, file4, and the read-only files hayes12a, hayes24a, hayes24s, v.32a, v.32s, and hpl.

<u>CMD</u>	<u>TYPE</u>	<u>VALUES</u>	<u>DESCRIPTION</u>
GPIB			RS-232/GPIB Translator (cont'd)
REN	S	0, 1	remote enable
WTIM	S	0-100	TSND response time-out
HCLL			HDLC Call Setup Data Format
CHAR	S	8BN, 7BO, 7BE, 7BM, 7BS	character format
CODE	S	ascii, ebcdic	character coding
ADDR	S	0x00 to 0xFF	hdlc address field
CTRL	S	0x00 to 0xFF	hdlc control field
INTF			Interface Lead Controls
RTSj	S	0, 1	set Request To Send
DTRj	S	0, 1	set Data Terminal Ready
SRTSj	S	0,1	set secondary RTS
STDj	S	0,1	set secondary TD
CTSj	R	0, 1	report Clear to Send
DSRj	R	0,1	report Data Set Ready
DCDj	R	0,1	report Data Carrier Detect
RIj	R	0,1	report Ring Indicator
SQDj	R	0,1	report Signal Quality Detect
DRSj	R	0,1	report Data Rate Select
PIN25j	R	0,1	report Pin 25
MSGX			Message Transfer
CNFG	S	ta ra, ta rb tb ra, tb rb	configuration
TSTR	S	<i>string</i>	transmit string
RESP	S	<i>string</i>	expected response string

<u>CMD</u>	<u>TYPE</u>	<u>VALUES</u>	<u>DESCRIPTION</u>
MSGX			Message Transfer (cont'd)
TLIM	S	0 to 99 sec	transfer time limit
CLIM	S	0 to 2048	transfer characters limit
GO	E		execute the transfer
STOP	E		halt the transfer
STAT	R	0 to 4	read transfer status
DUMPj	R	<i>string</i>	read transfer buffer contents
CLRj	E		clear the transfer buffer
DAVj	R	0 to 2048	read # characters in buffer
POLL			Polling Performance Test
CNFG	S	ta ra, ta rb, tb ra, tb rb ta&b ra, ta&b rb, ta&b ra&b	test configuration
NPOL	S	0 to 1000000	# polls/test
PDLY	S	0 to 2000 msec	poll delay
PMSG	S	syn, fox, p1, p2	poll message
P1	S	<i>string</i>	user poll message #1
P2	S	<i>string</i>	user poll message #2
RXCRj	S	sw, const	receive carrier mode
TXCRj	S	sw, sw2, const	transmit carrier mode
MODE	S	0 (manual), 1 (semiautomatic)	test execution mode
SYNLj	S	0 to 1000000	sync errors limit
MSGLj	S	0 to 1000000	message errors limit
FPOLj	S	0 to 1000000	false polls limit
CTOj	S	0 to 10000 msec	CTS time-out limit
RCVDj	R	0 to 1000000	report # polls received

<u>CMD</u>	<u>TYPE</u>	<u>VALUES</u>	<u>DESCRIPTION</u>
POLL			Polling Performance Test (cont'd)
SERRj	R	0 to 1000000	report # sync errors
MERRj	R	0 to 1000000	report # message errors
FPOj	R	0 to 1000000	report # false polls
CTSTj	R	0 to 10000 msec	report RTS-CTS delay
TCLKj	R	1.000E+0 to 1.000E+5	report transmit clock freq.
RCLKj	R	1.000E+0 to 1.000E+5	report receive clock freq.
STATj	R	0 to 9	report test execution status
RPTj	R	see note ⁴	report all test results
SCLL			Sync Call Setup Data Format
CHAR	S	8BN, 7BO, 7BE, 7BM, 7BS	character format
CODE	S	ascii, ebcdic	character coding
NSYN	S	1,2	# sync characters
SYN1	S	0x00 to 0xFF	sync character #1
SYN2	S	0x00 to 0xFF	sync character #2
TEST			Test Execution
MODE	S	bert, polls, call_setup, idle	test mode
RUN	E		execute the test
STOP	E		stop the test

note4 The POLL: RPTj command provides results in the following order: in the following order: number of polls analyzed, sync errors, message errors, false polls, RTS-CTS delay, transmit clock frequency, receive clock frequency, and *reserved number*.

<u>CMD</u>	<u>TYPE</u>	<u>VALUES</u>	<u>DESCRIPTION</u>
TEST			Test Execution (cont'd)
LOOP	S	y, n	self-loop
IERR	S	y, n	insert errors
TPCL			Test Protocol
PCL	S	async, sync	protocol
CLKj	S	see note ²	transmit clock
OFSj	S	-100 to +100 (-10.0% to +10.0%)	clock offset
FLOWj	S	none, cts, xoff	flow control

Asynchronous Call Setup Data Format (ACLL)

Command Group Format

/ACLL: command(s)/

Command Group Description

The ACLL command group sets the data format for asynchronous call setup or message transfer. The ACLL format options are in effect when the selected call setup protocol is ASYNC (see */CPCL: PCL=async/*).

Commands

DATA, PARI, STOP, CHRD

Commands Description

DATA sets the async character size. Options are 5, 6, 7, or 8 bits.

Command: */ACLL: DATA=7/*

Response: */C/*

PARI determines the character parity. Options are **odd**, **even**, and **none**.

Command: */ACLL: PARI=odd/*

Response: */C/*

STOP determines the number of stop bits. Options are 1, 1.5, and 2.

Command: */ACLL: STOP=1/*

Response: */C/*

CHRD determines the time interval between transmitted characters. The value range for CHRD is 0 to 999 (0 to 999 msec). The CHRD applies to both the **async** and **async-v.25** protocol options.

Command: */ACLL: CHRD=10/*

Response: */C/*

Asynchronous Test Data Format (ATST)

Command Group Format

/ATST: command(s)/

Command Group Description

The ATST command group sets the data format for asynchronous test data. The ACLL format options are in effect when the selected test data protocol is ASYNC (see */TPCL: PCL=async/*).

Commands

DATA, PARI, STOP

Commands Description

DATA sets the async character size. Options are **5**, **6**, **7**, or **8** bits.

Command: */ATST: DATA=7/*

Response: */C/*

PARI determines the character parity. Options are **odd**, **even**, and **none**.

Command: */ATST: PARI=odd/*

Response: */C/*

STOP determines the number of stop bits. Options are **1**, **1.5**, and **2**.

Command: */ATST: STOP=1/*

Response: */C/*

Bit Error Rate and Throughput Test (BERT)

Command Group Format

/BERT: command(s)/

Command Group Description

The BERT command group determines Bit Error Rate/Throughput test execution parameters and reports test results.

Commands

CNFG, BSIZ, NBLK, PATT, B1, B2, RTSD, RSEN, MODE, BITLj, CHRLj, BLKLj, BRKLj, SBRKj, SRSTj, BAj, BERj, CERj, BLERj, BPSj, CPSj, BLPSj, SLOSSj, RCLKj, TCLKj, SYNCj, STATj, RPTj

Commands Description

CNFG determines the test configuration. Each configuration option specifies a data transmit/receive combination. CNFG options are **ta|ra**, **ta|rb**, **tb|ra**, **tb|rb**, **ta&b|ra**, **ta&b|rb**, and **ta&b|ra&b**. **ta|ra** directs Gemini to transmit on DTE A and receive on DTE B. **ta&b|ra&b** directs Gemini to transmit on DTE A and DTE B, and receive on DTE A and DTE B.

Command: */BERT: CNFG=tb|ra/*

Response: */C/*

BSIZ determines the data analysis block size. If test data transmission is asynchronous (see */TPCL: PCL/*), the block size is in characters per block. If test data transmission is synchronous, the block size is in bits per block. BSIZ options are **2E5** to **2E28** (32 to 268,435,456) and **10E2** to **10E8** (100 to 100,000,000). Block sizes smaller than 100 are invalid at data rates above 19,200 bps.

Command: */BERT: BSIZ=10E3/*

Response: */C/*

NBLK determines the number of blocks analyzed per test. If NBLK=0, the test runs continuously. If NBLK=1 to 1000000, the test automatically stops after the specified number of blocks have been analyzed.

Command: /BERT: NBLK=1000/

Response: /C/

PATT sets the BERT test pattern. Test pattern options are 63, 511, 2047, mark, space, alt, b1, and b2. b1 and b2 are user-definable patterns (see /BERT: b1=pattern/).

Command: /BERT: PATT=511/

Response: /C/

b1 and b2 each set one of the user-definable BERT patterns. Each of these parameters accepts a coded ASCII string of up to 256 characters. The string must be enclosed in quotes. The pattern must be sufficiently random to allow the BERT receiver to achieve pattern synchronization.

Command: /BERT: B1="THE QUICK BROWN FOX"/

Response: /C/

RTSD sets the run-to-sync delay. If pattern synchronization is not achieved within the specified time period following the run command, Gemini automatically terminates the test. The range for RTSD is 1 to 1000 seconds.

Command: /BERT: RTSD=10/

Response: /C/

RSEN enables or disables pattern resynchronization after a sync loss. RSEN options are Y (yes) and N (no).

Command: /BERT: RSEN=Y/

Response: /C/

MODE sets the BERT test execution mode to manual (0) or semiautomatic (1).. If the MODE is semiautomatic, Gemini terminates the test if specified test limits are exceeded. Test limits are BIT ERROR LIMIT, CHAR ERROR LIMIT, BLOCK ERROR LIMIT, and SYNC LOSS LIMIT. If the MODE is manual, the test limits do not apply.

Command: /BERT: MODE=0/

Response: /C/

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BITLj sets the bit error limit. If the MODE is semiautomatic and the number of bit errors equals or exceeds the limit, Gemini terminates the test.. Values for BITLj are **0** (no limit) and **1** to **1000000**.

Command: /BERT: BITLa=0, BITLb=1000/

Response: /C/

CHRLj sets the character error limit for asynchronous tests. If the MODE is semiautomatic and the number of character errors equals or exceeds the limit, Gemini terminates the test. Values for CHRLj are **0** (no limit) and **1** to **1000000**.

Command: /BERT: CHRLa=200/

Response: /C/

BLKLj sets the block error limit. If the MODE is semiautomatic and the number of block errors equals or exceeds the limit, Gemini terminates the test. Values for BLKLj are **0** (no limit) and **1** to **1000000**.

Command: /BERT: BLKLb=50/

Response: /C/

BRKLj sets the sync break limit. If the MODE is semiautomatic and the number of sync breaks exceeds the limit, Gemini terminates the test. Values for BRKLj are **0** (no limit) and **1** to **1000000**.

Command: /BERT: BRKLa=1, BRKLb=2/

Response: /C/

SBRKj forces the specified test interface (A or B) to momentarily lose data pattern synchronization.

Command: /BERT: SBRKb/

Response: /C/

SRSTj forces Gemini to reset the status of the pattern sync indicator. If the sync status is **0** (no sync) or **1** (in sync), SRSTj has no effect. If the sync status is **2** (recovered sync), then the SRSTj command resets the sync status to **1**.

Command: /BERT: SRSTa, SRSTb/

Response: /C/

BAj directs Gemini to report the number of blocks analyzed. The range for BAj is **000000** to **1000000** (0 to 1,000,000).

Command: /BERT: BAb/

Response: /BERT: BAB=0000065/

BERj directs Gemini to report the number of bit errors. The range for BERj is **000000** to **1000000** (0 to 1,000,000).

Command: /BERT: BERa/

Response: /BERT: BERA=0000165/

CERj directs Gemini to report the number of character errors. The character error count is valid only for async tests. The range for CERj is **000000** to **1000000** (0 to 1,000,000).

Command: /BERT: CERb/

Response: /BERT: CERB=0000095/

BLERj directs Gemini to report the number of block errors. The range for BLERj is **000000** to **1000000** (0 to 1,000,000).

Command: /BERT: BLERb/

Response: /BERT: BLERB=0000043/

BPSj directs Gemini to report the received data throughput in bits/sec.

Command: /BERT: BPSb/

Response: /BERT: BPSB=9.600E+3/

CPSj directs Gemini to report the received data throughput for async tests in characters/sec.

Command: /BERT: CPSb/

Response: /BERT: CPSB=9.600E+2/

BLPSj directs Gemini to report the received data throughput in blocks/sec.

Command: /BERT: BLPSb/

Response: /BERT: BLPSB=9.600E+0/

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SLOSSj directs Gemini to report the number of sync losses.

Command: /BERT: SLOSSa/
Response: /BERT: SLOSSA=0000000/

RCLKj directs Gemini to report the frequency of the receive clock signal.

Command: /BERT: RCLKa/
Response: /BERT: RCLKA=9.601E+3/

TCLKj directs Gemini to report the frequency of the transmit clock signal.

Command: /BERT: TCLKa/
Response: /BERT: TCLKA=9.600E+3/

SYNCj directs Gemini to report the current pattern synchronization status. **0**=out of sync, **1**=in sync, and **2**=recovered sync.

Command: /BERT: SYNCb/
Command Response: /BERT: SYNCB=1/

STATj directs Gemini to report the BERT test status, as defined by the following table.

<u>STAT</u>	<u>Definition</u>
0	running, no errors detected
1	running, errors detected
2	stopped, no errors detected
3	stopped, errors detected
4	stopped, bit error limit
5	stopped, character error limit
6	stopped, block error limit
7	stopped, sync loss limit
8	stopped, max. count reached
9	stopped, run-to-sync time-out

Command: /BERT: STATb/

Response: /BERT: STATb=1/

RPTj directs Gemini to report all BERT results at once, in the following order: blocks analyzed, bit errors, character errors, block errors, sync losses, transmit clock frequency, receive clock frequency, bits/sec, characters/sec, blocks/sec, and sync.

Command: /BERT, RPTa/

Response: /BERT: RPTA=0000256, 0000213, 0000102,
0000023, 0000000, 9.600E+3, 9.600E+3,
9.600E+3, 9.600E+02, 9.600E+0, 0000001/

Call Setup (CALL)

Command Group Format

/CALL: *command(s)*/

Command Group Description

The CALL command group allows you to define and send modem call setup strings. The CALL commands provide a simple, basic call setup facility. For a more complete call setup and data monitoring capability, see the *Message Transfer* command group.

Commands

MSG, SEND, STRPj, ORIGj, ANSWj, DROPj

Commands Description

MSG selects the command string that is to be sent to the modem. MSG options are **strpa**, **strpb**, **origa**, **origb**, **answa**, **answb**, **dropa**, and **dropb**.

Command: /CALL: MSG=origa/

Response: /C/

SEND transmits the selected command string to the modem. Gemini transmits commands strings that have an **a** suffix on DTE A, and transmits command strings that have a **b** suffix on DTE B.

Command: /CALL: SEND/

Response: /C/

STRPj sets the modem configuration strap command string. The command string must be enclosed in quotes.

Command: /CALL: STRPa="ATZ^M", STRPb="ATZ^M"/

Response: /C/

ORIGj sets the modem call originate command string. The command string must be enclosed in quotes.

Command: /CALL: ORIGa = "AT DT 555-0123^M" /

Response: /C/

ANSWj sets the modem call answer command string. The command string must be enclosed in quotes.

Command: /CALL: ANSWb="AT S0=1^M" /

Response: /C/

DROPj sets the modem call disconnect command string. The command string must be enclosed in quotes.

Command: /CALL: DROPa="\P2 +++\P2 ATH^M" /

Response: /C/

Gemini Configuration (CNFG)

Command Group Format

/CNFG: command(s)/

Command Group Description

Commands in the CNFG group report and/or set Gemini configuration options and status.

Commands

MODL, OPT, VERS, STAT, RESP, LOC, LOCK, REM

Commands Description

LOC (local) forces Gemini to accept front panel commands.

Command: */CNFG: LOC/*

Response: */C/*

LOCK disables the front panel REMOTE key. The LOCK command must follow a REM command, i.e., Gemini must already be in REMOTE control mode.

Command: */CNFG: LOCK/*

Response: */C/*

MODL reports the Gemini model number.

Command: */CNFG: MODL/*

Response: */CNFG: MODL=1022/*

OPT reports the Gemini options list.

Command: */CNFG: OPT/*

Response: */CNFG: OPT=00000000/*

REM forces Gemini to remote control mode.

Command: /CNFG: REM/

Response: /C/

RESP sets the Gemini response mode. Response options are VERBOSE and TERSE.

Command: /CNFG: RESP=VERBOSE/

Response: /C/

STAT reports the Gemini status. See Section 6, *Status Codes*, for status code definitions.

Command: /CNFG: STAT/

Response: /CNFG: STAT=000/

VERS reports the Gemini Software Cartridge version number.

Command: /CNFG: VERS/

Response: /CNFG: VERS=2.00/

Call Setup Protocol (CPCL)

Command Group Format

/CPCL: command(s)/

Command Group Description

The CPCL command group determines the terminal parameters for call setup and message transfer operations.

Commands

PCL, CLKj, OFSj, FLOWj

Commands Description

PCL determines the protocol used for call setup and message transfer. Protocol options are **async**, **sync**, **hdlc**, **async-v.25**, **sync-v.25**, and **hdlc-v.25**. The data format for the **async** protocol is determined by the ACLL command group. The data format for the **sync** protocol is determined by the SCLL command group. The data format for the **hdlc** protocol is determined by the HCLL command group. The data formats for the **async-v.25**, **sync-v.25**, and **hdlc-v.25** command groups are preset to the values required by the CCITT V.25 specification.

Command: */CPCL: PCL=async-v.25/*

Response: */C/*

CLKj determines the DTE data clock. CLKj options are **75**, **110**, **134.5**, **150**, **300**, **600**, **1200**, **1800**, **2000**, **2400**, **4800**, **7200**, **9600**, **12000**, **14400**, **16000**, **16800**, **19200**, **32000**, **38400**, **48000**, **56000**, **576000**, **64000**, **72000**, **modem**, and **ext**. If the CLKj value is numeric, Gemini uses its internal clock generator. If the CLKj value is **modem**, Gemini takes transmit clock from pin 15 (TxCLK) of the DTE connector. The **modem** option should not be used if you have selected the **async** or **async-v.25** protocol. If the CLKj value is **ext**, Gemini takes its transmit clock from the external clock connector on the Gemini rear panel. If you select an **async** protocol, the external clock must be 16 times the desired bit rate.

Command: */CPCL: CLKa=2400, CLKb=2400/*

Response: */C/*

OFS_j determines the amount of clock offset. This offset is relative to the nominal clock value determined by CLK_j. The offset value range is **-100** to **+100** (-10.0 percent to +10.0 percent). OFS_j **must** be **0** if the value of CLK_j is **modem** or **ext**.

Command: /CPCL: OFSa=25, OFSb=0/

Response: /C/

FLOW_j sets the flow control method. Flow control options are **none**, **cts** (RTS/CTS), and **xoff**. XOFF flow control may conflict with synchronous protocols, since the XOFF pattern may occur in the data.

Command: /CPCL: FLOWa=none, FLOWb=none/

Response: /C/

File Save/Recall (FILE)

Command Group Format

`/FILE: command(s)/`

Command Group Description

The FILE command group saves and recalls Gemini configuration files.

Commands

FNAM, FLBL, FSAV, FRCL

Commands Description

FNAM selects the file to be saved or recalled. FNAM options are the read/write files **file0**, **file1**, **file2**, **file3**, **file4**, and the read-only files **hayes12a**, **hayes24a**, **hayes24s**, **v.32a**, **v.32s**, and **hpl**.

Command: `/FILE: FNAM=file2, FLBL="test_a", FSAV/`

Response: `/C/`

FLBL sets the file label for a read/write file. FLBL is an ASCII string of up to 12 characters.

Command: `/FILE: FNAM=file2, FLBL="myfile", FSAV/`

Response: `/C/`

FSAV saves the current Gemini configuration to a read/write file. Use the FNAM command to select the target file.

Command: `/FILE: FNAM=file0, FLBL="myfile", FSAV/`

Response: `/C/`

FRCL recalls the Gemini configuration file specified by the FNAM command.

Command: `/FILE: FNAM=hayes24s, FRCL/`

Response: `/C/`

RS-232/GPIB Command Translator (GPIB)

Command Group Format

/GPIB: command(s)/

Command Group Description

The GPIB command group controls the operation of the Gemini RS-232/GPIB command translator. Before using the command translator, you should be familiar with GPIB operation and terminology.

Commands

ADDR, MADDR, CLR, GTL, IFC, LLO, TRIG, PON, IN, OUT, SPOLL, TSND, DTO, ITC, MSG, REN

Commands Description

ADDR sets the address of the GPIB device to be controlled by Gemini. Gemini controls one GPIB talker/listener device at a time. The range for ADDR is 0 to 30.

Command: */GPIB: ADDR=2/*

Response: */C/*

MADDR sets the GPIB address of the Gemini GPIB controller. This address should be different from the GPIB device addresses. The range for MADDR is 0 to 30.

Command: */GPIB: MADDR=0/*

Response: */C/*

CLR directs Gemini to issue a selective device clear to a GPIB instrument.

Command: */GPIB: ADDR=2, CLR/*

Response: */C/*

GTL directs Gemini to issue a Go To Local command to the selected device.

Command: */GPIB: GTL/*

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Response: /C/

IFC directs Gemini to issue an Interface Clear command. The Interface Clear command directs all GPIB devices to cease bus transactions and to place bus drivers in a passive state.

Command: /GPIB: IFC/

Response: /C/

LLO directs Gemini to issue a Local Lockout command to the selected device. The Local Lockout command tells the device to disable front panel control.

Command: /GPIB: LLO/

Response: /C/

TRIG directs Gemini to issue an Execute Trigger command to the selected device.

Command: /GPIB: TRIG/

Response: /C/

PON resets the Gemini GPIB controller to its power-on condition.

Command: /GPIB: PON/

Response: /C/

IN transfers data from the GPIB device to the RS-232 controller. To execute this command, Gemini issues a Input command to the GPIB device, and accepts input until it detects the input termination condition. Gemini then forwards the data to the RS-232 controller.

Command: /GPIB: IN/

Response: /GPIB: IN="12.0 VOLTS"/

OUT transfers data from the RS-232 controller to the selected GPIB device. Before executing the OUT command, use the MSG command to specify the data to be transferred.

Command: */GPIB: MSG="LEVEL=-10", OUT/

Response: /C/

SPOLL directs Gemini to execute a serial poll of the selected device and return the result. SPOLL returns either the (hex) value of the GPIB device's status byte, or returns a Gemini Device Time-out status code.

Command: /GPIB: ADDR=12, SPOLL/

Response: /GPIB: SPOLL=04/

TSND directs Gemini to execute a command/response transaction with a TAS GPIB device. Before executing TSND, use the SPOLL command to be sure that the TAS device is idle.

Command: /GPIB: MSG="/IO, L-230/", TSND/

Response: /GPIB: TSND="/C/" /

DTO sets the GPIB Device Time-out. If the Gemini GPIB controller does not receive a response from the device before the end of the device time-out interval, Gemini returns a Device Time-out status code. The range for DTO is 1 to 100 seconds.

Command: /GPIB: DTO=10/

Response: /C/

ITC specifies the interface termination condition that the Gemini GPIB controller applies to incoming data. ITC options are **eoI**, **cr**, **lf**, and **crlf**. Gemini strips input termination characters from the input.

Command: /GPIB: ITC=cr/

Response: /C/

MSG specifies the message to be used in the OUT or TSND command. MSG is an ASCII string of up to 256 characters.

Command: /GPIB: MSG="VOLTAGE=15"/

Response: /C/

REN controls the state of the Gemini GPIB controller Remote Enable signal. Gemini activates Remote Enable if REN=1, and deactivates Remote Enable if REN=0.

Command: /GPIB: REN=1/

Response: /C/

HDLC Call Setup Data Format

Command Group Format

/HCLL: command(s)/

Command Group Description

The HCLL command group sets the data format for HDLC call setup or message transfer. The HCLL format options are in effect when the selected call setup protocol is **hdlc** (see */CPCL: PCL=hdlc/*)

Commands

CHAR, CODE, ADDR, CTRL

Commands Description

CHAR determines the format of each HDLC data octet. Each CHAR option specifies a unique data/parity combination, as shown in the following table:

<u>CHAR</u>	<u>Data</u>	<u>Parity</u>
8BN	8	NONE
7BO	7	ODD
7BE	7	EVEN
7BM	7	MARK
7BS	7	SPACE

Command: */HCLL: CHAR=8BN/*

Response: */C/*

CODE determines if octets are coded as ASCII or EBCDIC. CODE is valid only if CHAR=8BN.

Command: */SCLL: CODE=ASCII/*

Response: */C/*

ADDR sets the HDLC address field. The value range for ADDR is **00** to **FF** hex.

Command: /HCLL: ADDR=C8/

Response: /C/

CTRL sets the value of the HDLC control field. The value range for CTRL is **0** to **FF** hex.

Command: /HCLL: CTRL=13/

Response: /C/

Interface Lead Controls (INTF)

Command Group Format

/INTF: command(s)/

Command Group Description

The INTF commands allow you to set and/or read DTE A and DTE B signals.

Commands

RTS_j, DTR_j, SRTS_j, STD_j, CTS_j, DSR_j, DCD_j, SCTS_j, SD_{CD}_j, RI_j, SQD_j, DRS_j, PIN25_j

Commands Description

RTS_j sets or reads the Request to Send signal. If the TEST MODE is BERT or POLL, RTS=1 sets the RTS signal and starts the flow of test data.

Command: */INTF: RTSa=1/*

Response: */C/*

Command: */INTF: RTSa/*

Response: */INTF: RTSa=1/*

DTR_j sets or reads the Data Terminal Ready signal.

Command Example (set): */INTF: DTRa=1, DTRb=0/*

Response: */C/*

CTS_j reads the Clear to Send signal.

Command: */INTF: CTSb/*

Response: */INTF: CTSb=0/*

SRTS_j sets or reads the Secondary Clear to Send signal.

STD_j sets or reads the Secondary Transmit Data signal.

SCTS_j reads the Secondary Clear to Send signal.

SDCD_j reads the Secondary Data Carrier Detect signal.

DSR_j reads the Data Set Ready signal.

DCD_j reads the Data Carrier Detect signal.

RI_j reads the Ring Indicator signal.

SQD_j reads the Signal Quality Detect signal.

DRS_j reads the Data Rate Select signal.

PIN25_j reads the signal on DTE PIN 25.

Message Transfer (MSGX)

Command Group Format

/MSGX: command(s)/

Command Group Description

The MSGX command group controls the Gemini Message Transfer feature. Message Transfer allows you to send and receive messages from either DTE. MSGX commands can check the received message for an expected response, a time-out interval, and a total character count.

Commands

CNFG, TSTR, RESP, TLIM, CLIM, GO, STOP, STAT, DUMPj, CLRj, DAVj

Commands Description

CNFG sets the message transfer configuration. For example, CNFG=**ta|ra** directs Gemini to transmit the message at DTE A and check the response at DTE A. CNFG options are **ta|ra**, **ta|rb**, **tb|ra**, and **tb|rb**.

Command: */MSGX: CNFG=ta|ra/*

Response: */C/*

TSTR sets the transmit message string. The transmit string must be enclosed in quotes.

Command: */MSGX: TSTR="AT DT 555-1212^M"/*

Response: */C/*

RESP sets the expected response string. During message transfer, Gemini continues to add received characters to the buffer until it recognizes the RESP string. The status is set according to when the expected response string is received(receiver not affected). If you do not wish to check for a response string, set RESP="". The RESP string can be up to 80 characters long, and must be enclosed in quotes.

Command: */MSGX: RESP="CONNECT 9600"/*

Response: */C/*

TLIM sets the time to allow for the response. The status is set according to when the set value is reached (receiver not affected). The choices are as follows:

<u>TLIM</u>	<u>Time Limit</u>
0	infinite (no limit)
1-99	1-99 seconds

Command: /MSGX: TLIM=10/

Response: /C/

CLIM sets the character limit for the response. It will terminate the receiver when the set value is reached. The status is set according to when the set value is reached (receiver stopped). The choices are as follows:

<u>CLIM</u>	<u>Character Limit</u>
0	2048 (maximum)
1-2048	1-2048 characters

Command: /MSGX: CLIM=40/

Response: /C/

GO starts the message transfer. The message transfer continues until Gemini reaches a termination condition or receives a STOP command. Termination conditions are listed below:

- * Expected response received.
- * Time limit exceeded.
- * Character limit exceeded.

Command: /MSGX: GO/

Response: /C/

STOP terminates the message transfer.

Command: /MSGX: STOP/

Response: /C/

5-34 Remote Commands Reference

STAT reports the status of the message transfer operation. Status codes are as follows:

<u>Code</u>	<u>Meaning</u>
0	Message transmission in progress.
1	Message transmission complete.
2	Expected response detected.
3	Character limit reached or receive buffer is full.
4	Time limit reached.

Command: /MSGX: STAT/

Response: /MSGX: STAT=2/

DUMPj returns the contents of the DTE A or DTE B buffer with up to 80 characters(encoded) being returned for each command issued. Each buffer contains up to 2,048 characters. The DAV command determines the number of characters in the buffer. When the buffer approaches full, the end of the message will be cut off.

Command: /MSGX: DUMPa/

Response: /MSGX: DUMPA="^M^JOK^M^JCONNECT 9600"/

CLRj clears the response buffer.

Command: /MSGX: CLRa/

Response: /C/

DAVj reports the number of characters available in the receive buffer.

Command: /MSGX: DAVb/

Response: /MSGX: DAVB=24/

Polling Test (POLL)

Command Group Format

/POLL: command(s)/

Command Group Description

The POLL command group determines polling test execution parameters and reports test results.

Commands

CNFG, NPOL, PDLY, PMSG, P1, P2, RXCRj, TXCRj, MODE, SYNLj, MSGLj, FPOLj, CTOj, RCVDj, SERRj, MERRj, FPOj, CTSTj, TCLKj, RCLKj, STATj, RPTj

Commands Description

CNFG determines the test configuration. Each configuration option specifies a data transmit/receive combination. CNFG options are **ta|ra**, **ta|rb**, **tb|ra**, **tb|rb**, **ta&b|ra**, **ta&b|rb**, and **ta&b|ra&b**. **ta|ra** directs Gemini to transmit on DTE A and receive on DTE B. **ta&b|ra&b** directs Gemini to transmit on DTE A and DTE B, and receive on DTE A and DTE B.

Command: */POLL: CNFG=ta|rb/*

Response: */C/*

NPOL determines the number of poll messages analyzed per test. If NPOL=0, the test runs continuously. If NPOL=1 to 1000000, the test automatically stops after the specified number of polls have been measured.

Command: */POLL: NPOL=1000/*

Response: */C/*

PDLY determines the interpoll delay. For switched carrier operation, the poll delay is the time interval from CTS off to RTS on. For constant carrier operation, the poll delay is the time interval between the last character of one poll message and the first character of the next poll message. The range for PDLY is 1 to 2000 msec.

Command: */POLL: PDLY=30/*

Response: */C/*

5-36 Remote Commands Reference

PMSG sets the poll message. Poll message options are **syn** (<SYNC><SYNC><EOT>), **fox** (THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK), **p1**, and **p2**. **p1** and **p2** are user-definable poll messages (see /POLL: p1=*pattern*/).

Command: /POLL: PMSG=fox/

Response: /C/

P1 and P2 each set one of the user-definable POLL patterns. Each of these parameters accepts a coded ASCII string of up to 256 characters. The string must be enclosed in quotes.

Command: /POLL: P1="ABCDEFGH"/

Response: /C/

RXCRj sets the receive carrier mode. RXCRj options are **sw** (switched) and **const** (constant). In switched carrier mode, an active transition on the Data Carrier Detect (DCD) signal defines the start of a poll. In constant carrier mode, an active transition on the Receive Data (RD) signal defines the start of a poll. The receiver and transmitter at opposite ends of a connection must have the same carrier mode (except for mixed carrier, see TXCRj below). For example, if DTE A transmits to DTE B, the receive carrier mode for DTE B must agree with the transmit carrier mode for DTE A.

Command: /POLL: TXCRa=sw, RXCRb=sw/

Response: /C/

TXCRj sets the transmit carrier mode. TXCRj options are **sw** (switched), **sw2** (mixed), and **const** (constant). In switched carrier mode, the transmitter raises RTS and waits for CTS before it transmits the poll message. In constant carrier mode, the transmitter does not control RTS. In mixed carrier mode, the transmitter expects the receiver to be in constant carrier mode, raises RTS, and waits for CTS before it transmits the poll message.

Command: /POLL: TXCRa=sw2, RXCRb=const/

Response: /C/

MODE sets the POLL test execution mode to **0** (manual) or **1** (semiautomatic). If the MODE=1, Gemini terminates the test if the specified test limits are exceeded. Gemini provides limits for sync errors, message errors, false polls, and RTS-CTS delay. If MODE=0, the test limits do not apply.

Command: /POLL: MODE=semiauto/

Response: /C/

SYNLj sets the sync errors limit. If the MODE is semiautomatic and the number of sync errors equals or exceeds the limit, Gemini terminates the test. Values for SYNLj are **0** (no limit) and **1** to **1000000**.

Command: /POLL: SYNLa=0, SYNLe=100/

Response: /C/

MSGLj sets the message errors limit. If the MODE is semiautomatic and the number of message errors equals or exceeds the limit, Gemini terminates the test. Values for MSGLj are **0** (no limit) and **1** to **1000000**.

Command: /POLL: MSGLa=20, MSGLb=20/

Response: /C/

FPOLj sets the false polls limit. If the MODE is semiautomatic and the number of false polls equals or exceeds the limit, Gemini terminates the test. Values for FPOLj are **0** (no limit) and **1** to **1000000**.

Command: /POLL: FPOLa=10, FPOLb=20/

Response: /C/

CTOj sets the RTS-CTS limit. CTOj applies only for switched carrier operation. If MODE=**semiauto** and the number of RTS-CTS delay equals or exceeds the limit, Gemini terminates the test. Values for CTOj are **0** (no limit) and **1** to **1000000** (1 msec to 1,000,000 msec).

Command: /POLL: CTOa=20, CTOb=20/

Response: /C/

RCVDj directs Gemini to report the number of polls analyzed. The range for RCVDj is **000000** to **1000000** (0 to 1,000,000).

Command: /POLL: RCVDb/

Response: /POLL: RCVDB=0000235/

SERRj directs Gemini to report the number of sync errors. The range for SERRj is **000000** to **1000000** (0 to 1,000,000).

Command: /POLL: SERRa/

Response: /POLL: SERRA=0000045/

5-38 Remote Commands Reference

MERRj directs Gemini to report the number of message errors. The range for MERRj is **000000** to **1000000** (0 to 1,000,000).

Command: /POLL: MERRa/

Response: /POLL: MERRA=0000123/

FPOj directs Gemini to report the number of false polls. The range for FPOj is **000000** to **1000000** (0 to 1,000,000).

Command: /POLL: FPOb/

Response: /POLL: FPOB=0000076/

CTSTj directs Gemini to report the RTS-CTS delay. The range for CTSTj is **000000** to **1000000** (0 to 1,000,000 msec).

Command: /POLL: CTSTa/

Response: /POLL: CTSTA=0000024/

TCLKj directs Gemini to report the frequency of the transmit clock signal.

Command: /POLL: TCLKa/

Response: /POLL: TCLKA=9.600E+3/

RCLKj directs Gemini to report the frequency of the receive clock signal.

Command: /POLL: RCLKa/

Response: /POLL: RCLKA=9.601E+3/

STATj directs Gemini to report the POLLS test status, as defined by the following table.

<u>STAT</u>	<u>Definition</u>
0	Running, no errors detected.
1	Running, errors detected.
2	Stopped, no errors detected.
3	Stopped, errors detected.
4	Stopped, sync error limit.
5	Stopped, message error limit.
6	Stopped, false poll limit.
7	Stopped, RTS-CTS delay limit.
8	Stopped, max count reached.

Command: /POLL: STATa/

Response: /POLL: STATa=1/

RPTj directs Gemini to report all POLLS results at once, in the following order: number of polls analyzed, sync errors, message errors, false polls, RTS-CTS delay, transmit clock frequency, receive clock frequency, and *reserved number*.

Command: /POLL, RPTa/

Response: /POLL: RPTA=0000755, 0000044, 0000092,
0000023, 0000027, 9.600E+3, 9.600E+3,
0000001/

Synchronous Call Setup Data Format (SCLL)

Command Group Format

/SCLL: *command(s)*/

Command Group Description

The SCLL command group sets the data format for synchronous call setup or message transfer. The SCLL format options are in effect when the selected call setup protocol is **sync** (see /CPCL: PCL=sync/).

Commands

CHAR, CODE, NSYN, SYN1, SYN2

Commands Description

CHAR determines the format of each synchronous data octet. Each CHAR option specifies a unique data/parity combination, as shown in the following table:

<u>CHAR</u>	<u>Data</u>	<u>Parity</u>
8BN	8	NONE
7BO	7	ODD
7BE	7	EVEN
7BM	7	MARK
7BS	7	SPACE

Command: /SCLL: CHAR=8BN/

Response: /C/

CODE determines if octets are coded as ASCII or EBCDIC. CODE is valid only if CHAR=8BN.

Command: /SCLL: CODE=ASCII/

Response: /C/

NSYN sets the number of sync characters to 1 or 2.

Command: /SCLL: NSYN=2/

Response: /C/

SYN1 and SYN2 set the value of sync character #1 and sync character #2, respectively. The value range for each sync character is **00** to **FF** hex.

Command: /SCLL: SYN1=16, SYN2=16/

Response: /C/

Test Execution (TEST)

Command Group Format

/TEST: command(s)/

Command Group Description

The TEST command group controls the test mode, test execution, and test diagnostics.

Commands

MODE, RUN, STOP, IERR, LOOP

Commands Description

MODE selects the test mode. Test mode options are **bert**, **polls**, **call_setup**, and **idle**. The **idle** option allows you to set Gemini parameters without affecting the execution of the current test. The new parameters take effect when the current test finishes execution.

Command: */TEST: MODE=bert/*

Response: */C/*

RUN begins execution of the current test.

Command: */TEST: RUN/*

Response: */C/*

STOP terminates execution of the current test.

Command: */TEST: STOP/*

Response: */C/*

IERR inserts approximately one error per second in the data stream of each enabled transmitter. Options are **Y** (yes) and **N** (no).

Command: */TEST: IERR=N/*

Response: */C/*

LOOP controls the Gemini self-loop function. LOOP options are **Y** (yes) and **N** (no). If LOOP=Y, Gemini internally connects transmit data to receive data at each test interface. This allows you to verify that Gemini hardware and software are working properly. Since Gemini loops only the TD/RD leads, the ASYNC BERT test is the only test that works in the self-loop configuration.

Command: /TEST: LOOP=Y/

Response: /C/

Test Protocol (TPCL)

Command Group Format

/TPCL: *command(s)*/

Command Group Description

The TPCL command group determines the terminal parameters for test data transmission. These parameters are in effect during BERT and POLLS tests.

Commands

PCL, CLKj, OFSj, FLOWj

Commands Description

PCL determines the protocol used during BERT and POLLS tests. Protocol options are **async** and **sync**. The data format the async protocol is determined by the ATST command group.

Command: /TPCL: PCL=sync/

Response: /C/

CLKj determines the DTE data clock. CLKj options are **75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 7200, 9600, 12000, 14400, 16000, 16800, 19200, 21600, 24000, 32000, 38400, 48000, 56000, 576000, 64000, 72000, modem, and ext**. If the CLKj value is numeric, Gemini uses its internal clock generator. If the CLKj value is **modem**, Gemini takes transmit clock from pin 15 (TxCLK) of the DTE connector. The **modem** option should not be used if you have selected the **async** or **async-v.25** protocol. If the CLKj value is **ext**, Gemini takes its transmit clock from the external clock connector on the Gemini rear panel. If you select an async protocol, the external clock must be 16 times the desired bit rate.

Command: /TPCL: CLKa=2400, CLKb=2400/

Response: /C/

OFSj determines the amount of clock offset. This offset is relative to the nominal clock value determined by CLKj. The offset value range is **-100** to **+100** (-10.0 percent to +10.0 percent). OFSj **must** be **0** if the value of CLKj is **modem** or **ext**.

Command: /TPCL: OFSa=25, OFSb=0/

Response: /C/

FLOWj sets the flow control method. Flow control options are **none**, **cts**, and **xoff**. FLOWj will not affect the switched carrier polls test. **CTS** flow control will always be employed during a switched-carrier POLLS tests. **xoff** flow control should generally not be used with pseudorandom BERT patterns, since the XOFF control characters occur in pseudorandom sequences. **xoff** flow control may also conflict with synchronous protocols, since the XOFF pattern may occur in the data.

Command: /TPCL: FLOWa=none, FLOWb=none/

Response: /C/

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6 Gemini Status Codes

Gemini provides status codes to indicate its current state of operation. Error conditions are reported on the front panel and the remote control (GPIB or RS-232) interfaces. For more information on reading status codes, see the CNFG command group in Section 5, *Remote Commands Reference*.

Status Code	Description
000	All is well with Gemini
001	Command value error
002	Command syntax error
003	Command group syntax error
004	Command failure
005	Undefined command group
006	Undefined command
007	Could not recall file
008	GPIB receive device time-out
009	GPIB in incorrect state during TSND
010	RS-232/GPIB translator cannot be used
011	Power-up failure
012	Power-up calibration failure
013	EPRAM checksum failure
014	Operating system error
015	Transceiver A RAM failure
016	Transceiver A didn't accept data
017	Transceiver B RAM failure
018	Transceiver B didn't accept data
019	Command not accepted in local mode
020	GPIB transmit device time-out
021	GPIB response (message) time-out

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7 Specifications

General

AC Power

Voltage	115/230 VAC (selectable),+10%/-13%
Frequency	48-63 Hertz
Dissipation	50 Watts Maximum

Operating Environment

Temperature:	0 to 50 degrees C (32 to 122 degrees F)
Humidity	10% to 90% non-condensing

Dimensions and Weight

Height	3.5 inches
Width	11.5 inches
Depth	14.5 inches
Weight	7 pounds (maximum)

Remote Control Interfaces

IEEE-488

Capabilities	talker/listener, controller
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7-2 Specifications

RS-232

Data Rates	300, 1200, 2400, 4800 bits per second
Character Size	7 or 8 bits
Parity	odd, even, none
Stop Bits	1, 1.5, or 2

Data Analyzers (A and B)

Test Interfaces (A & B)

Type	RS-232 (V.25 converters available)
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Terminal Parameters (Test Data)

Data Formats	sync, async
Clock Sources	internal, modem, external
Flow Control	cts, xoff, none

Sync Format Options

none

Async Format Options

Character Size	5, 6, 7, or 8 bits
Parity	EVEN, ODD, or NONE
Stop Bits	1, 1.5, or 2

Internal Clock

Frequencies	75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 7200, 9600, 12000, 14400, 16000, 16800, 19200, 21600, 24000, 32000, 38400, 48000, 56000, 57600, 64000, 72000
Accuracy	+/- 0.01%
Offset	0 to +/- 10% in 0.1% steps
Offset Accuracy	+/- 0.1%

External Clock

Frequency Range	0 to 72000 bits per second (SYNC) or 75 to 38400 (ASYNC)
-----------------	--

Modem Clock

Frequency Range	0 to 72000 bits per second (SYNC only)
-----------------	--

Terminal Parameters (Call Setup Data)

Protocols	async, sync, hdlc, async-v.25, sync-v.25, hdlc-v.25
Clock Sources	internal, modem, external
Flow Control	cts, xoff, none

Async Options

Character Size	5, 6, 7, 8 bits
Parity	even, odd, none
Stop Bits	1, 1.5, 2

Sync Options

Character Options	8 bits no parity, 7 bits odd parity, 7 bits even parity, 7 bits mark parity, 7 bits space parity
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7-4 Specifications

HDLC Options

Character Options	8 bits no parity, 7 bits odd parity, 7 bits even parity, 7 bits mark parity, 7 bits space parity
Data Code	ASCII, EBCDIC (character option must be 8 bits no parity for EBCDIC characters)
Address	0 to 0xFF (hex)

ASYNC-V.25 Options

preset to 7 bits, even parity, one stop bit

SYNC-V.25 Options

preset to 7 bits, odd parity, ASCII code

HDLC-V.25 Options

preset to 7 bits, odd parity, ASCII code,
address=0xFF, control field=0x13

Internal Clock

Frequencies	75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 7200, 9600, 12000, 14400, 16000, 16800, 19200, 21600, 24000, 32000, 38400, 48000, 56000, 57600, 64000, 72000
Offset	+/- 10% in 0.1% steps
Clock Accuracy	+/- 0.01%

External Clock

Frequency Range	0 to 72000 bits per second(sync) or 75 to 72000 bits per second (async) *(async external Clock Frequencies must be 16x the desired bit rate; max rate = 76.8k)
-----------------	---

Modem Clock

Frequency Range	0 to 76800 bits per second
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Performance Tests

Test Modes

BERT, POLLS, CALL_SETUP, IDLE

Self-Loop

Options on, off

Insert Errors

Options on, off, trigger

BER/Throughput Test

Configurations	ta ra, ta rb, tb ra, tb rb, ta&b ra, ta&b rb, ta&b ra&b
#Blocks per Test	1 to 1000000, or constant
Block Size	2E5 to 2E28 and 10E2 to 10E8
Pattern	63, 511, 2047, MARK, SPACE, ALT, user patterns B1 and B2
Execution Modes	manual, semiautomatic
Test Results	Blocks analyzed, total bit errors, total character errors (async only), total block errors, total sync losses, average bits per second, average characters per second, average blocks per second, transmit clock speed, receive clock speed.

7-6 Specifications

Polls Test

Configuration	ta ra, ta rb, tb ra, tb rb, ta&b ra, ta&b rb, ta&b ra&b
#Polls per Test	1 to 1000000, or constant
Poll Delay	1 to 2000 milliseconds
Poll Messages	SYN-SYN-EOT, THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS BACK^M^J, user patterns P1 and P2
Transmit Carrier	switched or continuous
Receive Carrier	switched or continuous
Execution Modes	manual, semiautomatic
Test Results	polls received, sync errors, message errors, false polls, RTS-CTS delay, transmit clock speed, receive clock speed.

RTS-CTS Delay Measurement

Measurement Range	0 to 9999 milliseconds
Resolution	1 millisecond
Accuracy	+/- 0.05 milliseconds

Call Setup/Message Transfer

Configuration	ta ra, ta rb, tb ra, tb rb, ta&b ra, ta&b rb
Max. Transmit Message	80 characters
Max. Receive Message	2,048 characters
Transfer Stop On	receive message match, receive # characters, receive message time-out, receive buffer full

Frequency Measurement

Range	20 Hz to 200 kHz
Resolution	100 PPM
Accuracy	+/- .01% +/- 1 digit

Interface DTE A and DTE B Pin Assignments

<u>PIN</u>	<u>SIGNAL</u>	<u>RS-232 CIRCUIT</u>	<u>SOURCE</u>	<u>V.24 CIRCUIT</u>
1	Protective Ground	AA	---	101
2	Transmit Data	BA	DTE	118
3	Receive Data	BB	DCE	104
4	Request to Send	CA	DTE	105
5	Clear to Send	CB	DCE	106
6	Data Set Ready	CC	DCE	107
7	Signal Ground	AB	---	102
8	Carrier Detect	CF	DCE	109
9	NC			
10	NC			
11	NC			
12	Secondary Carrier Det.	SCF	DCE	122
13	Secondary Clear to Send	SCB	DCE	121
14	Secondary Transmit Data	SBA	DTE	118
15	Modem Provided Transmit Clock	DB	DCE	114
16	Secondary Receive Data	SB	DCE	119
17	Receive Clock	DD	DCE	115
18	NC			
19	Secondary Req. Send	SCA	DTE	120
20	Data Terminal Ready	CD	DTE	108.2
21	Signal Quality Detector	CG	DCE	110
22	Ring Indicator	CE	DCE	125
23	Data Rate Selector	CH	DCE	111
24	Terminal Provided Transmit Clock	DA	DTE	113
25	Unassigned			DCE

RS-232 Control Port Pin Assignments

<u>PIN</u>	<u>SIGNAL</u>	<u>RS-232 CIRCUIT</u>	<u>SOURCE</u>	<u>V.24 CIRCUIT</u>
1	Protective Ground	AA	---	101
2	Transmit Data	BA	DTE	118
3	Receive Data	BB	DCE	104
4	Request to Send	CA	DTE	105
5	Clear to Send	CB	DCE	106
6	Data Set Ready	CC	DCE	107
7	Signal Ground	AB	---	102
20	Data Terminal Ready	CD	DTE	108.2

GPIB Control Port Pin Assignments

<u>PIN</u>	<u>FUNCTION</u>
1	DIO1
2	DIO2
3	DIO3
4	DIO4
5	EOI
6	DAV
7	NRFD
8	NDAC
9	IFC
10	SRQ
11	ATN
12	Frame Ground
13	DIO5
14	DIO6
15	DIO7
16	DIO8
17	REN
18	Signal Ground
19	Signal Ground
20	Signal Ground
21	Signal Ground
22	Signal Ground
23	Signal Ground
24	Signal Ground

AUX Port Pin Assignments

<u>PIN</u>	<u>FUNCTION</u>
1	Reserved
2	Reserved
3	Reserved
4	Reserved
5	Reserved
6	Reserved
7	Reserved
8	Reserved
9	Reserved

8 Application Notes

Setup

To verify that the TAS Gemini 1022 Dual Terminal Emulator is operating properly, you will need a null modem cable (Figure 8-1), an oscilloscope, and a frequency counter. You will be verifying the Gemini clock frequency; RS-232 signal levels; and the ability to send data, receive data, and insert errors.

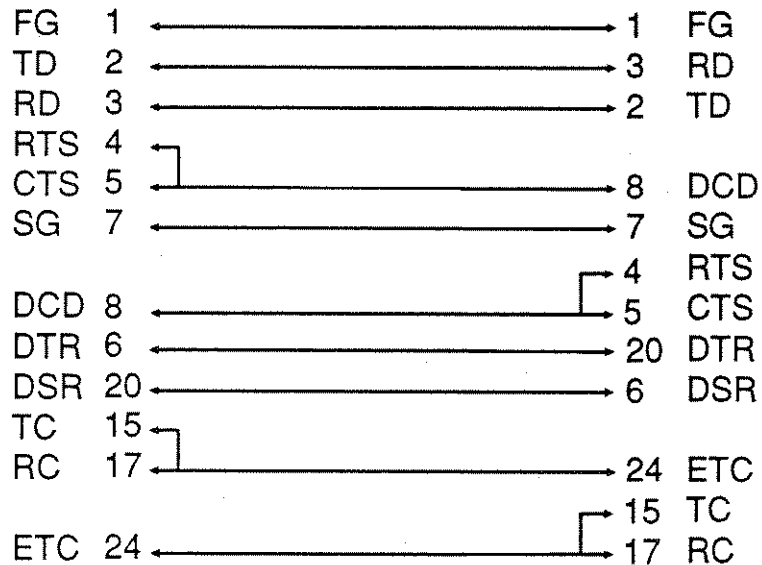


Figure 8-1. Null Modem Cable

Procedure

Power up the Gemini and set the test mode to BERT. To obtain this test mode, press the TESTS button twice and use the +/- keys to change the mode until it reads BERT. Press the ENTER key to select the BERT configuration TA|RB.

Select the Test protocol and frequency. Press the TERM key twice and select TESTS. Press the ENTER key to enter the tests protocol menu. Use the +/- key to set the protocol to SYNC.

Press the DOWN ARROW key to enter the test clock menu. Use the +/- keys to change the CLK A setting. Attach the frequency counter to Pin 7 (ground) and Pin 24 (terminal-provided transmit clock) on the RS-232 connector marked DTE A on the rear panel of Gemini. Change the clock rate with the +/- keys and check the setting on the frequency counter. The baud rate should agree with the

frequency read. For example, 1200 bps will be 1200 Hz (+/- 0.01 percent). This will verify the clock frequency.

Leave the configuration set as in the example provided above. Remove the frequency counter and attach a scope to Pin 7 (ground) and Pin 4 (RTS) on the RS-232 connector marked DTE A on the rear panel of Gemini. Toggle RTS on station A by pressing the RTS button on the front panel. Verify that the level is greater than +/- 3 volts for each setting (positive for a 1 and negative for a 0). By using this procedure, you can verify all Gemini outputs at stations A and B.

The last step is to verify that Gemini can transmit and receive data with and without errors. Use the null modem cable (refer to Figure 1-1 for the configuration) to attach the RS-232 connector labeled DTE A to DTE B on the rear panel. Raise RTS and DTR on stations A and B by pressing their respective buttons on the front panel. When the buttons are pressed, the LEDs will light up next to each button.

RTS will only be lit next to the button if that station is selected as a transmitter. Press the TERM key and set the TESTS submenu CLK A and CLK B to the same value. The UP/DOWN ARROW keys will toggle between them and the +/- key will change the clock rates. Verify that Gemini is still in the BERT mode by pressing the TESTS key. Press the ENTER key and use the DOWN ARROW key until you see #BLOCKS.

Use the +/- keys to change the #BLOCKS to 100. Press the UP ARROW key until the display reads CONFIGURATION. Use the +/- keys to change the configuration for the BERT test. Check that the TD and RD lights change as you alter the configuration from TA|RB to TB|RA to TA&B|RA&B. Press the RUN button to start the collection of data.

Press the RESULTS button to see if you are receiving error-free data at the appropriate station. The last thing to check is to determine if Gemini can correctly insert and count errors. Pressing the SEND key should insert one error each time the key is pressed. Press the RESULTS key to verify that the errors are being recorded.

THIS CONCLUDES THE TAS GEMINI 1022 VERIFICATION PROCEDURE. IF FURTHER ASSISTANCE IS REQUIRED, CONTACT THE TAS CUSTOMER SERVICE DEPARTMENT AT 908-544-8700.

Glossary of Telecommunications Industry Acronyms

This glossary contains many of the most commonly used acronyms in the telecommunications industry. It is designed to serve as a useful reference tool as you peruse this TAS document. No single TAS manual contains all the acronyms listed here. The acronyms are listed in alphabetical order.

ABM	Asynchronous Balanced Mode
ACA	Automatic Circuit Assurance
ACD	Automatic Call Distribution
ACF	Advanced Communications Function
ACK/NAK	Acknowledge Character/Negative Acknowledge Character
ACU	Automatic Calling Unit
A/D	Analog-to-Digital (conversion)
AIOD	Automatic Identification of Outward Dialing
AM	Amplitude Modulation
ANC	All-Number Calling
ANI	Automatic Number Identification
ANSI	American National Standards Institute
ARQ	Automatic Request for Repeat or Retransmission
ASCII	American Standard Code for Information Interchange
ASM	Algorithmic State Machine
ASR	Automatic Send/Receive
AVD	Alternate Voice/Data
AWG	American Wire Gauge
BALT	Balance and Long-Term (Tests)
BCC	Block Check Character
BCD	Binary-Coded Decimal
BER	Bit Error Rate

G-2 Glossary

BERT	Bit Error Rate Test or Throughput
BH	Busy Hour
BNC	British Naval Connector or Baby N Connector
BSC	Binary Synchronous Communications
CAD	Computer-Aided Design
CAE	Computer-Aided Engineering
CAI	Computer-Aided Instruction
CAM	Computer-Aided Manufacturing
CBX	Computerized Branch Exchange
CCETT	Centre Commun D'Etudes de Telediffusion et Telecommunications (research branch of the French postal and telecommunications service)
CCIS	Command Control Information System
CCITT	International Telegraph and Telephone Consultative Committee (from the French Comite Consultatif Internationale Telegraphique et Telephonique)
CCSA	Common Control Switching Arrangement
CCW	Channel Command Word
CDR	Call Data Reporting (port)
CFT	Combined Function Terminal
CICS	Customer Information Control System
CIM	Computer-Integrated Manufacturing
CO	Central Office (in telephony, the telephone company switching facility or center at which the subscriber's local loops terminate)
COMSAT	Communications Satellite Corporation
CONUS	Continental United States
CPE	Customer Premises Equipment
CRC	Cyclic Redundancy Check
CR/LF	Carriage Return/Line Feed

CRT	Cathode-Ray Tube
CSM	Configuration Switching Module
CSU	Channel Service Unit
CTS	Clear to Send
D/A	Digital-to-Analog (conversion)
DAA	Data Access Arrangement
DACS	Digital Access and Cross-Connect System
DBMS	Data Base Management System
DCD	Data Carrier Detect or Dynamic Computer Display
DCE	Data Communications Equipment
DCM	Digital Circuit Multiplication
DCU	Data Command Unit, Digital Control Unit, or Data Control Unit
DDCMP	Digital Data Communications Message Protocol
DDS	Digital Data Service
DFI	Dual Frequency Interference
DI	Data Input, Demand Indicator, or Digital Input
DIP	Dual In-Line Pin or Package
DLC	Data Link Control or Data Line Card
DLI	Data Line Interface
DMA	Direct Memory Access
DNA	Digital Network Architecture
DOMSAT	Domestic Communications Satellite
DOS	Disk Operating System
DOV	Data Over Voice
DP	Dial Pulse
DPC	Data Processing Center
DSA	Distributed Systems Architecture

G-4 Glossary

DSL	Digital Subscriber Loop
DSN	Distributed Systems Network
DSP	Digital Signal Processor or Display Systems Protocol
DSR	Data Set Ready
DSS	Direct Station Selection
DSU	Data Service Unit
DSX	Digital Signal Cross-Connect
DTE	Data Terminal Equipment
DTMF	Dual Tone Multifrequency
DTR	Data Terminal Ready
DTS	Digital Termination System
EAS	Extended Area Service
EBCDIC	Extended Binary-Coded Decimal Interchange
ECC	Error Correcting Code
EDC	Error Detecting Code
EDI	Electronic Data Interchange
EDP	Electronic Data Processing
EDT	Engineer Design Test or Energy Dissipation Test
EIA	Electronics Industries Association, Energy Information Administration, or Environmental Impact Appraisal
EOA	End of Address
EOB	End of Block
EOI	End of Interrupt
EOM	End of Message (indicator)
EOT	End of Transmission or Tape
EPROM	Erasable Programmable Read-Only Memory
ERL	Echo Return Loss

ESD	Electrostatic Discharge
ESS	Electronic Switching System
ETX	End of Text
EXT	External
FEP	Front-End Processor
FIR	Finite Impulse Response
FTP	File Transfer Protocol
FX	Foreign Exchange
FXO	Foreign Exchange Office
FXS	Foreign Exchange Station
GPIO	General Purpose Interface or Instrumentation Bus
HDX	Half Duplex
HDLC	High-Level Data Link Control
HF	High Frequency
HVDC	High Voltage Direct Current
IA	Integrated Analog
IC	Interconnect Carrier
IDDD	International Direct Distance Dialing
IDN	Integrated Digital Network
IEEE	Institute of Electrical and Electronics Engineers
IMD	Intermodulation Distortion
INT	Internal
I/O	Input/Output
IRQ	Interrupt Request
ISDN	Integrated Services Digital Network
IVDT	Integrated Voice/Data Terminal
IVDW	Integrated Voice/Data Workstation

2-6 Glossary

KP	Keypulse
KSR	Keyboard Send/Receive
KTS	Key Telephone System
LAN	Local Area Network
LAP	Link Access Procedure
LAPB	Link Access Procedure Balanced
LAPD	Link Access Procedure on D Channel
LATA	Local Access and Transport Area
LCD	Liquid Crystal Display
LDM	Limited Distance Modem
LEC	Local Exchange Carrier
LED	Light-Emitting Diode
LF	Low Frequency
LLC	Logical Link Control
LPC	Linear Predictive Coding
LRC	Longitudinal Redundancy Check
LSB	Least Significant Bit
LSD	Low Speed Data or Least Significant Digit
LSI	Large-Scale Integration
MAC	Media Access Control
MF	Medium Frequency (300 to 3 MHz)
MSB	Most Significant Bit
MSU	Modem Sharing Unit
MUX	Multiplexer
NCTE	Network Channel Terminating Equipment
NEMA	National Electrical Manufacturer's Association
NEXT	Near End Crosstalk

NSB	National Science Board or Nuclear Standards Board
NT	Network Termination
NTU	Network Terminating Unit
OH	Off-Hook
OHRC	Off-Hook Relay Control
OS	Operating System
OSI	Open Systems Interconnection
PAM	Pulse Amplitude Modulation
P/AR	Peak to Average Ratio
PBX	Private Branch Exchange
PC	Personal Computer
PCM	Pulse Code Modulation
PIC	Polyethylene Insulated Cable
PLI	Powerline Interference
PMC	Program Memory Cartridge
POI	Point of Interface
POR	Power-On Reset
PROM	Programmable Read-Only Memory
PSTN	Public Switched Telephone Network
PWM	Pulse Width Modulation
QOS	Quality of Service
RAM	Random Access Memory
RDT	Recall Dial Tone
RFI	Request for Information or Radio Frequency Interference
RI	Ring Indicator
RLC	Resistor Inductor Capacitor
RLSD	Received Line Signal Detector

G-8 Glossary

RMS	Root-Means-Squared
RO	Receive Only
ROM	Read-Only Memory
ROTL	Remote Office Test Line
RPG	Report Program Generator
RTR	Ready to Respond
RTS	Request to Send
RXA	Receive Analog
RXD	Receive Data
SAA	Systems Application Architecture
SABM	Set Asynchronous Balanced Mode
SABME	Set Asynchronous Balanced Mode Extended
SCA	Short Code Address
SCPC	Single Channel Per Carrier
SDA	Source Data Automation
SDLC	Synchronous Data Link Control
SDN	Software-Defined Network
SF	Single Frequency
SHF	Super High Frequency
SIP	Single In-Line Package
SNA	Systems Network Architecture
SNR	Signal-to-Noise Ratio
SOM	Start of Message
SOP	Standard Operating Procedure
SQ	Signal Quality
SRQ	Service Request Line
SSCP	System Services Control Point

SSN	Switched Service Network
STX	Start of Text (of message)
TA	Terminal Adaptor
TACS	Total Access Communications System
TAN	Trunk Appearance Number
TC	Transmit Clock
TCAM	Telecommunications Access Method
TCP	Transmission Control Protocol
TD	Transmitted Data
TDM	Time Division Multiplex
TE	Terminal Equipment
TEI	Terminal End Point Identifier
THL	Trans-Hybrid Loss
TIMS	Transmission Impairments Measurement Set
TLP	Transmission Level Point
TPT	Test Progress Tone
TSPS	Time Sharing Programming System
TTL	Transistor-Transistor Logic
TTS	Transmission Test Set
TTU	Terminal Time Unit
TXD	Transmitted Data or Telephone Exchange, Digital
TXE	Telephone Exchange, Electronic
TTY	Teletypewriter or Bell System Teletypewriter Service
UBC	Universal Buffer Controller
UC	Unit Call
UCD	Uniform Call Distribution
UCW	Unit Control Word

G-10 Glossary

UDB	Up Data Buffer
UDLC	Universal Data Link Control
UNCOL	Universal Computer-Oriented Language
UOC	Ultimate Operating Capability
UP	Utility Path
USE	Unit Support Equipment
UY	Unit Years
VAC	Volts Alternating Current
VAN	Value-Added Network
VBD	Voice Band Data
VCO	Voltage Control Oscillator
VFD	Vacuum Florescent Display
VHSIC	Very High Speed Integrated Circuit
VLF	Very Low Frequency
VLSI	Very Large-Scale Integration
VMX	Voice Message Exchange
WOM	Write Optional Memory
XT	Cross Talk
ZA	Zero Adjusted

The acronym definitions are excerpted from the IEEE Standard Dictionary of Electrical and Electronics Terms; Webster's New World Dictionary of Computer Terms; the Datapro Report on Telecommunications; and numerous TAS publications. This glossary was updated on June 20, 1990.

