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DEFINITY® Communications System
DEFINITY High Speed Link

User's Guide

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Contents

Preface: About This Guide

The purpose of this document is to provide information for installing, operating, and testing the DEFINITY® High Speed Link.

Note: The DEFINITY High Speed Link will be referred to as the ''HSL'' throughout this guide.

AUDIENCE

This guide is written for technical people with a knowledge of data communications hardware used in synchronous data transfers. The reader should have an understanding of the V.35, RS-366, and
EIA-232-D* interfaces.

CONVENTIONS

Several type styles are used in this guide to represent information presented on the front panel of the HSL. The following table shows examples of the type styles used in this guide.

TABLE 1
Conventions

Example	Usage Description
NEXT/NO or *DCD*	Slanted, block-style characters in all capital letters are used for labels printed on the front panel of the HSL. These labels are associated with the push buttons, light emitting diodes (LEDs), and specific character positions of the LCD message display.

`SELF TESTING`
`SELF-TEST PASSED`
`REL 1.0, VER 1.0`
	Typewriter-style characters in all capital letters are used for messages presented on the 16-character LCD message display of the HSL. The system displays multiple line messages one line at a time.

* Formerly RS-232-C.

ORGANIZATION OF THIS GUIDE

The information in this guide is presented in seven chapters and five appendices, with an index at the rear. The chapters and appendices of this guide are organized as follows:

Chapter 1: Introduction. Provides an overview of the operating interfaces that make the HSL suitable for a variety of data communications tasks and describes the external features that assist you in configuring the HSL for your application.

Chapter 2: Installation. Outlines procedures for preparing and installing the HSL for operation in single and multiple installations.

Chapter 3: Using the Front Panel. Discusses how to configure, store telephone numbers, and test the HSL using the pushbuttons and display on the front panel.

Chapter 4: Options. Discusses each option of the HSL's Set Options Menu.

Chapter 5: Call Control Operation. Provides information on dialing a call, answering a call, and ending a call.

Chapter 6: Test Descriptions. Provides information on how tests are initiated and terminated.

Chapter 7: Technical Description. Provides information about the physical dimensions, external power supply, and environmental requirements of the HSL.

Appendix A: RS-232 Interface. Contains the circuits provided on the 25-pin interface for RS-232 call set-up.

Appendix B: RS-366 Interface. Contains the circuits provided on the 25-pin interface for RS-366 automatic calling operation.

Appendix C: V.35 Synchronous Interface. Contains the circuits supported and connector pin assignments for V.35 synchronous data operation.

Appendix D: Applications and Switch Administration. Provides information on switch configuration and administration for switched and permanent applications.

Appendix E: Troubleshooting. Provides troubleshooting guidelines specific to operational problems that may be encountered when using the HSL.

RELATED PUBLICATIONS

The following is a list of other manuals that may provide helpful information while installing and using the HSL. Since each user may have different equipment, only generic titles are given for the manuals.

Application notes are available for administering AT&T PBX systems to recognize the HSL:

- AT&T DEFINITY® Communications System Generic 1 and System 75
- AT&T DEFINITY® Communications System Generic 2 and System 85
- AT&T DEFINITY® Communications System Generic 3

The documents listed below can be used as references for implementing data applications:

- *AT&T Network and Data Connectivity Reference Manual*, 555-025-201
- *AT&T DEFINITY® Communications System Generic 1.1 Implementation Manual*, 555-204-654
- *AT&T DEFINITY® Communications System Generic 1.2 Implementation Manual*, 555-204-655
- *AT&T DEFINITY® Communications System Generic 2 Administration Procedures*, 555-104-506
- *AT&T DEFINITY® Communications System Generic 2 Administration Quick Reference*, 555-230-661
- *AT&T DEFINITY® Communications System Generic 3 Implementation Manual*, 555-230-651

Chapter 1: Introduction

OVERVIEW

This chapter provides an overview of the operating interfaces that make the DEFINITY High Speed Link suitable for a variety of data communications tasks and describes the physical features that assist you in configuring the HSL for your application.

The HSL is a data service unit that allows data equipment to access the data services of System 75/85 and DEFINITY® switches. It is used where the integration of voice and data is not required. The HSL supports synchronous data transmission at speeds of 56 and 64 Kbps, and provides a link to high speed data networks.

Compatible AT&T PBX Systems

The following AT&T PBX systems can be administered to operate with the HSL:

- DEFINITY® Communications System Generic 1
- DEFINITY® Communications System Generic 2
- DEFINITY® Communications System Generic 3
- AT&T System 75
- AT&T System 85

ABOUT THE HSL

This section discusses the basic operational features of the HSL, and describes the external indicators and connectors.

Features

The HSL provides the following features:

- Super-twist Liquid Crystal Display (LCD) and three push-button switches for displaying status, setting options, controlling tests, storing telephone numbers, originating and answering calls.
- Two LEDs for power, incoming calls, data mode, test mode and fault indications.
- V.35 internally timed, synchronous data interface for 56 Kbps half duplex operation, 56 Kbps full duplex operation, and 64 Kbps full duplex operation.
- RS-366 Automatic Calling Unit (ACU) interface for originating data calls.
- RS-232 AT command interface for originating and disconnecting data calls.
- Test features for easy system fault isolation.
- Non-volatile memory for option and telephone number storage.
- Reset options feature for easy loading of default options.
- Automatic or manual answer option.
- Data inversion option for compatibility with older 64 Kbps Digital Communications Protocol (DCP) data modules.
- A DTR lead IGNORE option and DSR lead ON option for operation with terminals that normally interface with private line DCE equipment.
- An optional DTR lead activated dial feature for stored number dialing.
- An optional DTR HOTLINE dial feature.
- A permanent connection option for operation in private line applications.
- Memory cartridge interface for firmware upgrades to support new features.

Physical Description

This section describes the physical features of the HSL which include the front panel (LED indicators, LCD display, and push-button switches) and the rear panel connectors.

Front Panel

The HSL provides a front panel user interface which consists of two light emitting diodes (LEDs), one red and one green; a single line,
16-character super-twist liquid crystal display (LCD); and three non-locking push-button switches. Figure 1-1 illustrates the front panel.

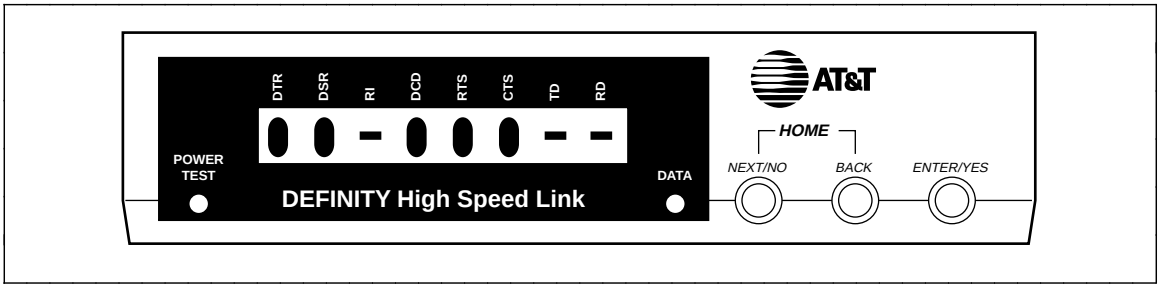

FIGURE 1-1
Front Panel LED Indicators, LCD Display and Push-Button Switches

Refer to Chapter 3, ‘‘Using the Front Panel,’’ for a full description of the HSL’s front panel.

Rear Panel Connectors

Figure 1-2 illustrates the connectors on the rear panel of the HSL. Table 1-1 describes the purpose of each connector.

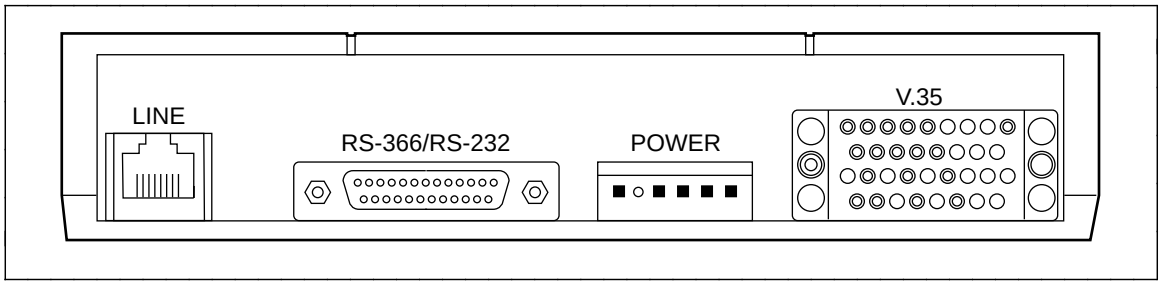

FIGURE 1-2
Rear Panel Connectors

TABLE 1-1
Rear Panel Connector Descriptions

Connector	Description
LINE	This connector accepts one end of the D8W telephone cord that connects between the HSL and the PBX wall jack.
POWER	This connector accepts the output cable of the external power supply unit used with the HSL.
RS-366/RS-232	This connector accepts a plug from the RS-366/RS-232 cable that connects between the HSL and associated dialing equipment.
V.35	This connector accepts a plug from the V.35 cable that connects between the HSL and associated data terminal equipment.

Power Supply Unit

An external power supply unit is required with the HSL. The power supply unit connects between a grounded AC outlet and the *POWER* connector at the rear of the unit. This power supply unit provides the necessary operating voltages for the HSL. For information on power requirements, refer to Chapter 7, ‘‘Technical Description.’’

CAUTION: The AC outlet to which you connect the power supply must **not** be controlled by a light dimmer. It is also highly recommended that the AC outlet **not** be controlled by a wall switch.

Instructions for connecting the power supply unit are provided in Chapter 2, ‘‘Installation.’’

HSL APPLICATIONS

The HSL provides access to various switched and dedicated (private) data networks. The following sections provide a brief overview of the four major applications. Refer to Appendix D, ‘‘Applications and Switch Administration,’’ for information regarding the configuration and implementation of these applications.

Group 4 Fax

Group 4 Fax applications include electronic mail and messaging and electronic storage of printed documents and graphics. Group 4 Fax is a digital facsimile transmission that typically occurs at 56 or 64 Kbps. A Group 4 Fax typically has a keypad for dialing, and uses an RS-366 Automatic Calling Unit interface to pass the dialing information to the switch.

Video Teleconferencing

Video teleconferencing allows image and sound to be transmitted over relatively low speed facilities. It provides *instant meeting* services to a nearby city or to a foreign country. A typical conference call involves two 56 or 64 Kbps connections between locations to carry video and audio traffic. Video teleconferencing units use a keypad and an associated RS-366 interface for dialing.

LAN Interconnect

High speed dedicated circuits are often used to interconnect Local Area Networks (LAN) in Wide Area Network configurations. To accommodate transient changes in LAN traffic, the HSL can connect to bridges/routers that provide flexible connectivity and on-demand bandwidth for interconnecting LANs. Dial-up LAN bridges use an
RS-232 interface for dialing calls. Hayes AT commands provide the call control.

Cluster Controller/Front-End Processor Connection

Dedicated connections between a Cluster Controller and a Front-End Processor typically use ACCUNET Spectrum of Digital Services or Dedicated Digital Services to provide data connectivity. The HSL can function as a Data Service Unit behind the switch. It supports communications with other Data Service Units as well as the private network maintenance loopbacks.

Chapter 2: Installation

INSTALLATION SAFETY INSTRUCTIONS

IMPORTANT INSTALLATION SAFETY INSTRUCTIONS

WARNING

When this product is located in a separate building from the telephone communications system, a line current protector MUST be installed at the entry/exit points of ALL buildings through which the line passes.

The following are the ONLY acceptable devices for use in this application:

- AT&T 4-type protectors
- ITW LINX™ LP-type protectors

Never install telephone wiring during a lightning storm.

Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.

Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.

Use caution when installing or modifying telephone lines.

WARNING

RISK OF ELECTRIC SHOCK
EQUIPMENT MUST BE PROPERLY GROUNDED

Your AT&T equipment requires a properly grounded 3-prong AC power receptacle for safe operation. Do not cut or remove the third (ground) prong from the AT&T power cord. Do not use 2 wire extension cords or adapters to defeat the safety features of your equipment. If you have a 2-prong receptacle, it is very important to have it replaced with a 3-prong receptacle, installed by a qualified electrician.

Before equipment installation, a qualified technician should use an outlet tester or voltmeter to check the AC receptacle for the presence of ground as shown in Figure 2-1.

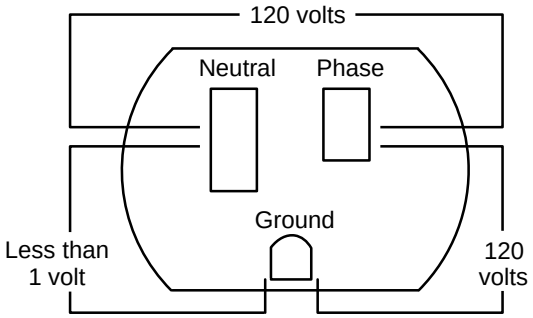

FIGURE 2-1
AC Power Receptacle

1. The voltage measured from Phase to Neutral should be 110 to 125 VAC.
2. The voltage measured from Phase to Ground should be 110 to 125 VAC.
3. The voltage measured from Neutral to Ground should be less than 1 VAC.

If the receptacle is not a properly grounded 3-prong type, stop the installation. Installation can only be completed after a qualified electrician corrects the problem.

SINGLE HSL INSTALLATION

The parts required for installing a single DEFINITY High Speed Link are listed below and are shown in Figure 2-2:

- The HSL
- AC power converter
- D8W telephone line cord
- V.35 cable
- RS-366 / RS-232 cable (optional)

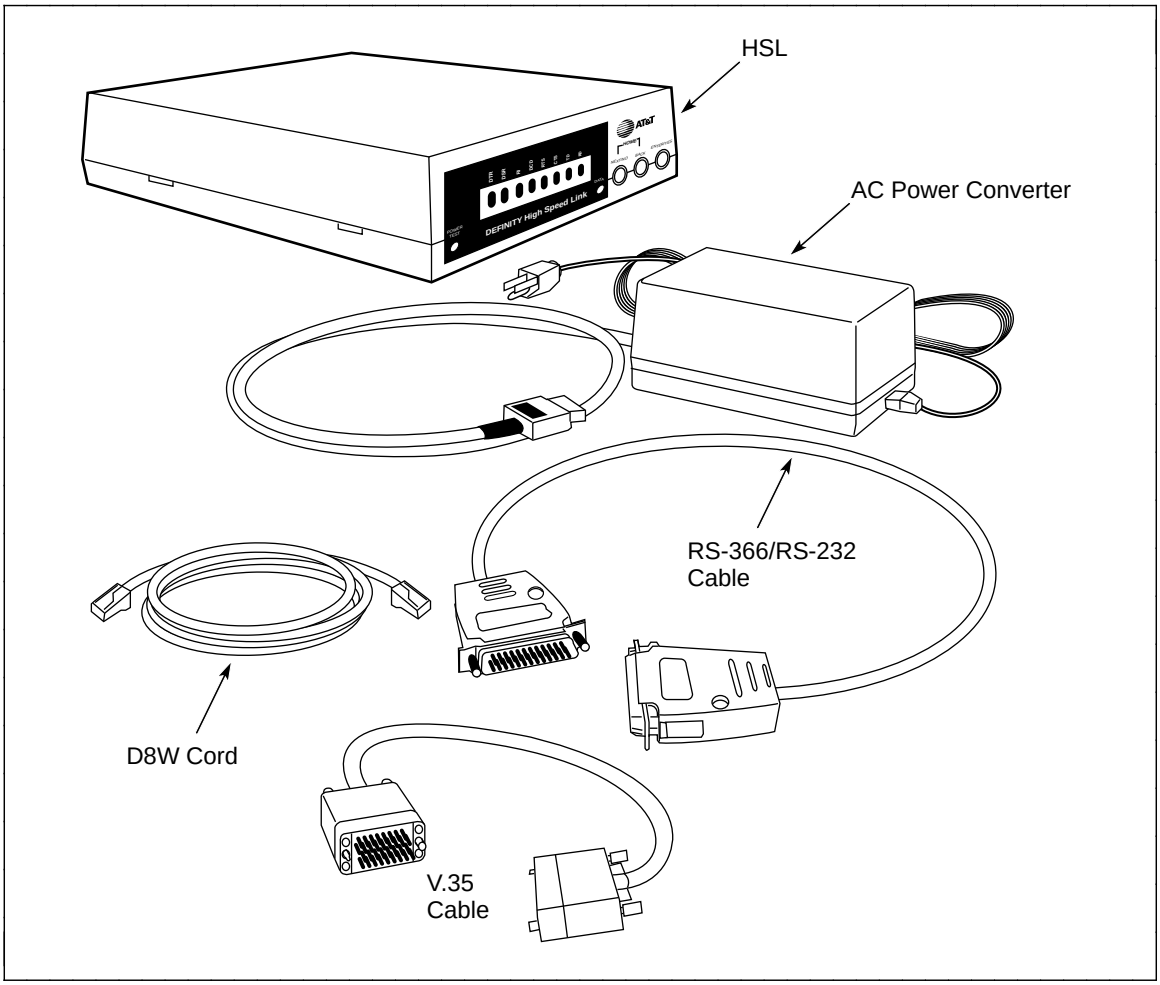

FIGURE 2-2
Installation Materials — Single HSL

Procedure: Installing a Single HSL

Use the following procedure to install a single unit:

1. Plug the D8W telephone line cord into the connector labeled *LINE*.
2. Plug the free end of the telephone line cord into the telephone wall jack assigned to your HSL.
3. Plug the V.35 cable from the synchronous terminal equipment into the connector labeled *V.35* on the HSL.
4. If the RS-366/RS-232 interface is used, connect the RS-366/RS-232 interface cable and the associated dialing equipment.
5. Plug the power supply cord into the connector labeled *POWER*.
6. Plug the other end of the power supply cord into an AC power outlet.

   The unit powers on as soon as the AC cord of the power supply is connected to a live AC power outlet. As the HSL performs its startup self-test, the system displays the following messages on the front panel.

   ```
   SELF TESTING
   SELF-TEST PASSED
   REL 1.0, VER 1.0
   IDLE
   ```

   Note: The HSL displays multiple line messages one line at a time.

   If everything is normal, the HSL dispays the `IDLE` message. Should the HSL fail self-test, the system displays different messages than what is shown above. If this happens, refer to the Self-Test section in Chapter 3, ‘‘Using the Front Panel.’’

For administration information on switched and permanent applications, refer to Appendix D, ‘‘Applications and Switch Administration.’’

MULTIPLE HSL INSTALLATION

This section describes how to mount one or more units in a new or existing Z77A Data Mounting. The data mounting rack is provided with a built-in power supply and cables for distributing power for up to 8 units.

Installing the Z77A Data Mounting

The following procedure is required only in new installations or when adding a new Z77A data mounting to an existing installation.

Note: The data mounting has brackets (item 1 in Figure 2-3) that can be positioned for installing the unit in either a 19-inch or a 23-inch rack mounting.

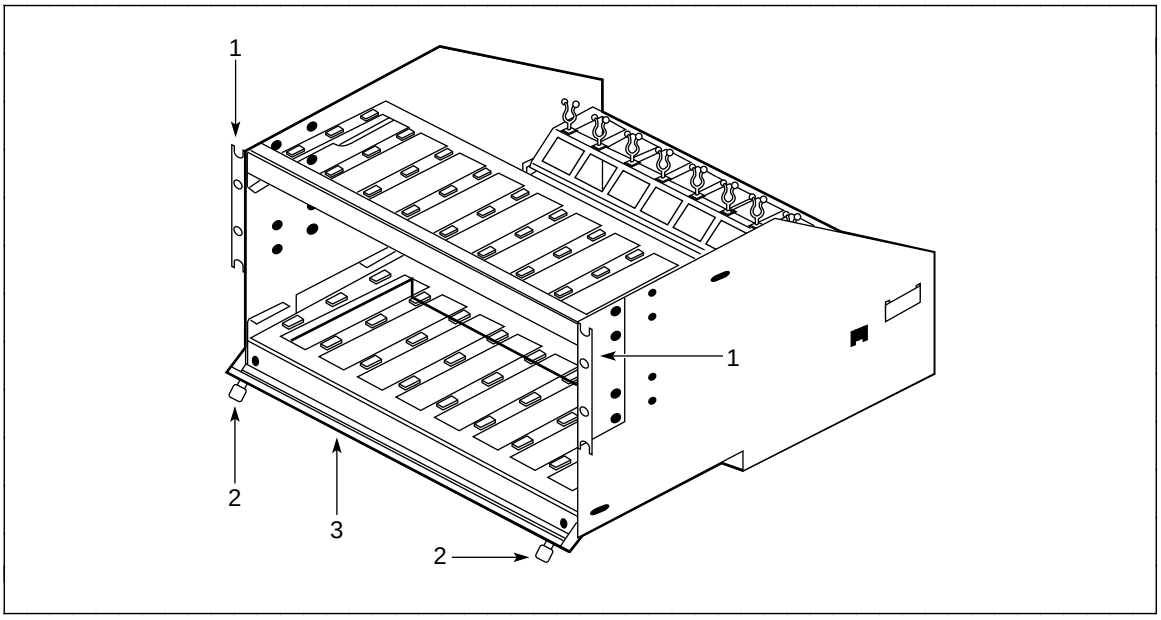

FIGURE 2-3
Z77A Data Mounting

Procedure: Placing the HSL in the Data Mounting

Install the new units into the data mounting as follows:

1 From the front of the data mounting, pull out the left and right plungers (items labeled 2 in Figure 2-3) that hold the horizontal retaining bar (item 3 in Figure 2-3) against the rack.

2 Pull the retaining bar out and down to allow insertion of units into the data mounting.

3 Insert one or more units into successive slots of the data mounting, positioning each HSL with its display window upward as shown in Figure 2-4.

Note: From the front of the Z77A Data Mounting, start with
slot 1 or the lowest numbered empty slot on the left and fill each slot in order.

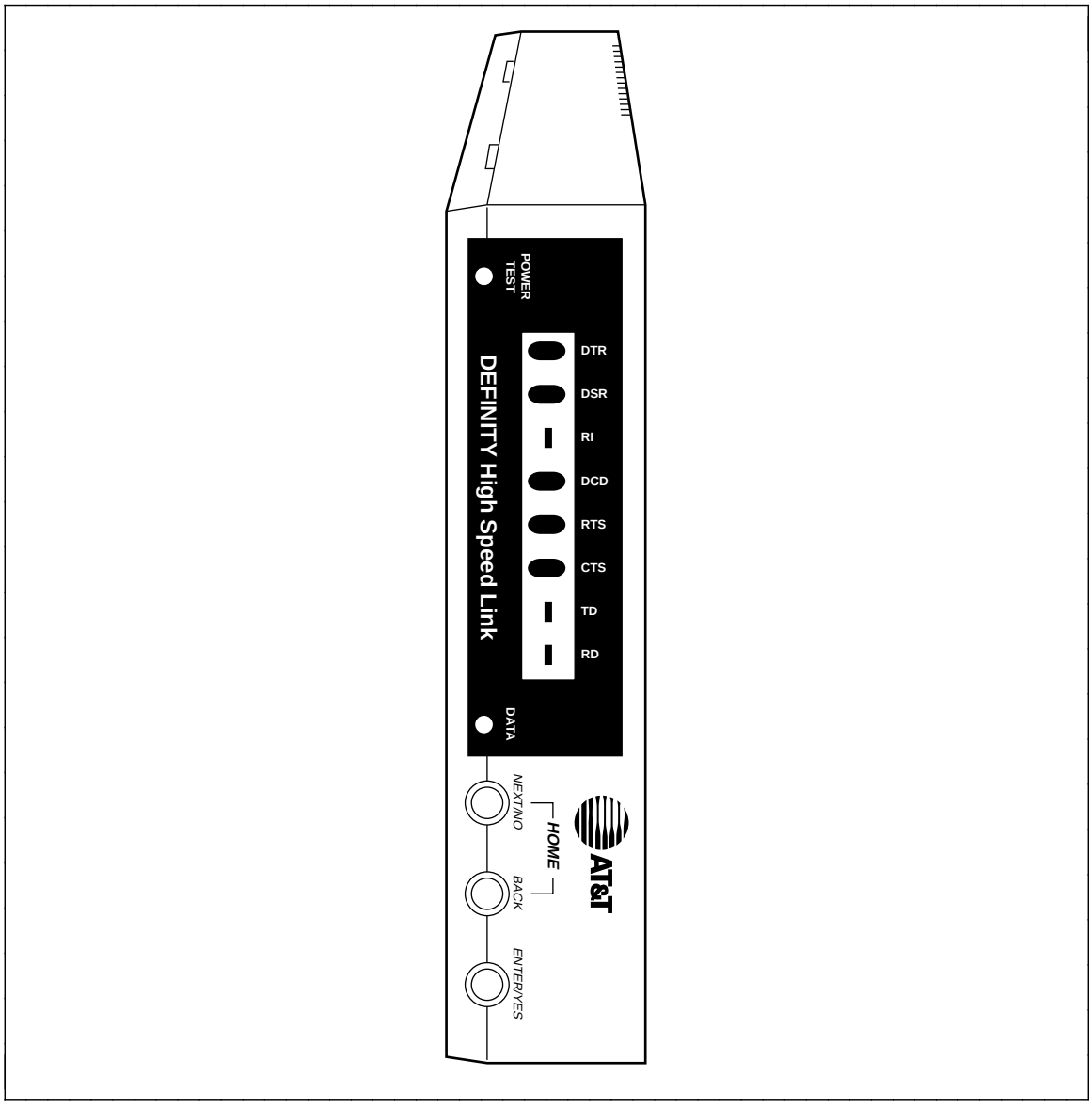

FIGURE 2-4
Position of HSL for Multiple Installation

4 Move the retaining bar into its locking position and push in the left and right plungers to secure the units in the data mounting.

Connecting the New HSL to the Switch

The HSL can be connected to the switch in several ways, depending on the configuration of the HSL and its associated equipment. Installation components supplied will differ according to how the installation kit was specified at the time it was ordered. The following procedures cover each of several installation configurations.

New Installation: Ordered as Attribute 1 or 6

The following items, specific to this installation, are required:

- WP90780L2 adapter harness (referred to as L2 in this procedure), supplied with the installation kit (attribute 1)

  or

- individual D8W telephone cords, one supplied with each HSL (attribute 6)

Procedure: Connecting the New HSL to the Switch

Use the following procedure for connecting new units to the switch with the items supplied in installation kit having attribute 1 or 6.

1 If you are using the L2 adapter harness (attribute 1):

a Attach the 50-pin connector to the B25-type cable from the switch as shown in Figure 2-5.

Note: Refer to Table 2-1 at the end of this chapter for standard wiring information to the switch.

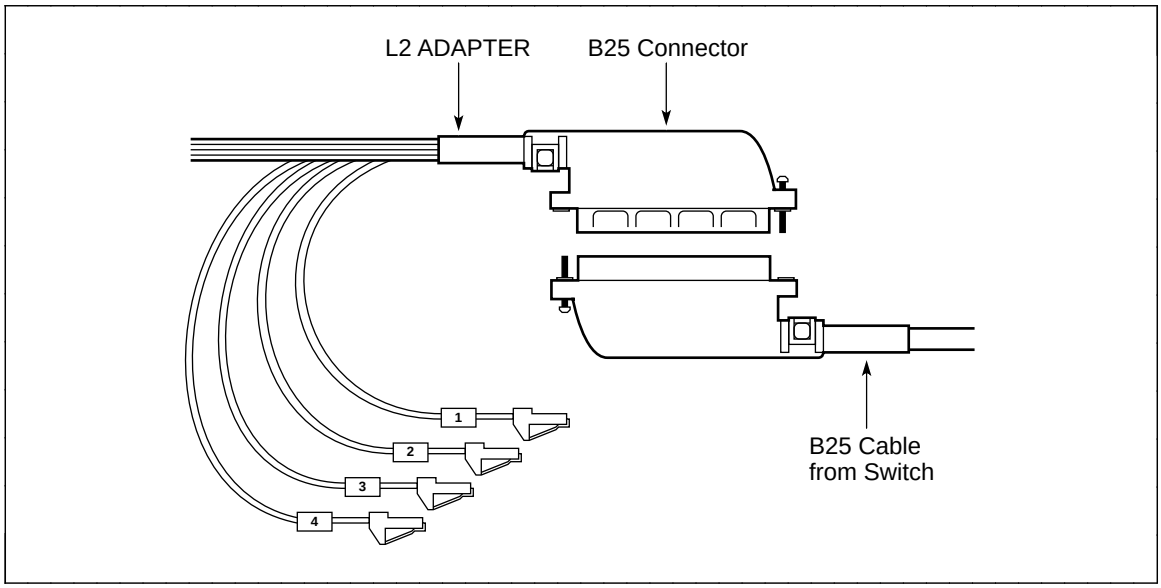

FIGURE 2-5
Connecting the L2 Adapter Harness to the B25 Cable

b Plug a D8W connector from the L2 adapter harness into the connector on the rear of each new HSL labeled *LINE,* and then skip to the section, Installing DC and AC Power Cords, later in this chapter.

Note: Numbers labeling the D8W connectors should correspond to slot numbers on the Z77A Data Mounting.

2 If you are using individual D8W cords (attribute 6):

a Plug one end of a D8W cord into the connector on the rear of the HSL labeled *LINE.*

b Plug the free end of the D8W cord into the assigned wall jack.

c Use the same procedure for connecting each new unit to the switch, and then skip to the section, Installing DC and AC Power Cords, later in this chapter.

Existing Installation

The following procedure is for connecting additional units in an existing data mounting to the switch.

Procedure: Connecting Additional Units to the Switch

1 If your installation uses the L2 adapter harness, plug a D8W connector from the L2 adapter harness into the connector on the rear of each new HSL labeled *LINE*, and then skip to the section, Installing DC and AC Power Cords later in this chapter.

Note: Numbers labeling the D8W connectors should correspond to slot numbers on the Z77A Data Mounting.

2 If your installation uses individual D8W cords:

a Plug one end of a D8W cord into the connector on the rear of the HSL labeled *LINE*.

b Plug the free end of the D8W cord into the assigned wall jack.

c Use the same procedure for connecting each new HSL to the switch, and then proceed to the section, Installing DC and AC Power Cords, later in this chapter.

Installing DC and AC Power Cords

The following procedure is for attaching DC power cords to units in new or existing installations, and for connecting the AC power cord to a newly installed Z77A Data Mounting.

CAUTION: Do **NOT** disconnect the AC power of a Z77A data mounting if you are installing additional units to an existing data mount. Disconnecting the AC power will interrupt data connections on the other units in the rack.

Procedure: Attaching Power Cords

1 (All installations) Insert one of the loose DC power cords from the data mounting power supply into the connector labeled *POWER* on the rear of each unit being installed.

2 (New or disconnected data mounting) Install the AC power cord as follows:

a Plug one end of the AC power cord into the AC connector at the rear of the data mounting power supply (Figure 2-6).

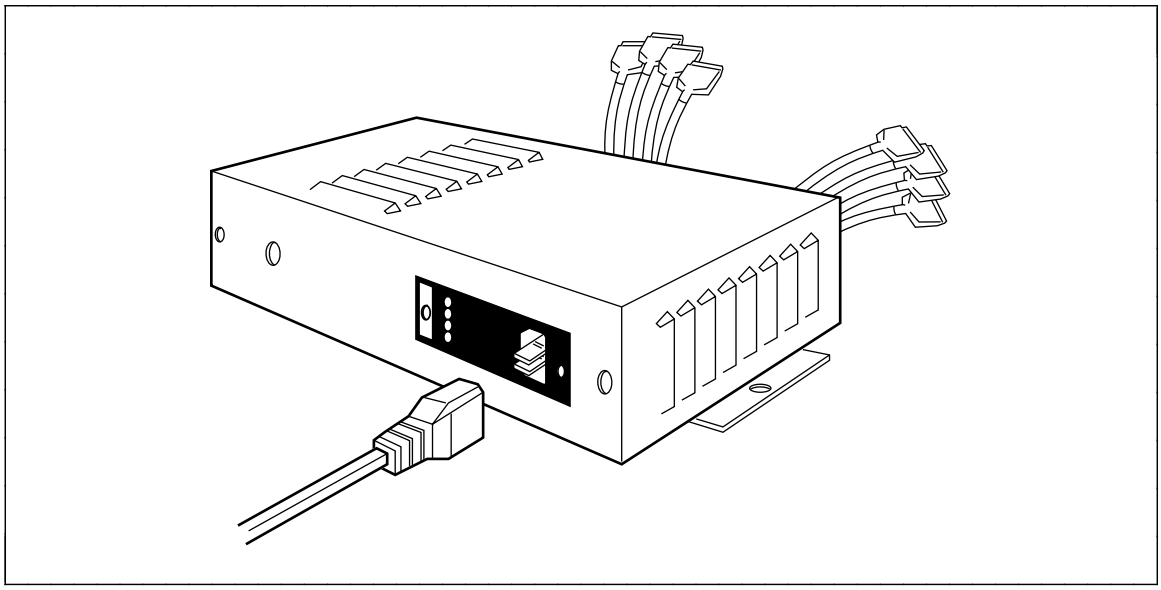

FIGURE 2-6
Inserting the AC Power Connector

b Plug the other end of the AC power cord into an unswitched AC outlet inside the equipment rack.

The HSL powers on as soon as the AC cord of the power supply is connected to a live AC power outlet. The HSL displays the following messages on the front panel as it performs its startup self-test.

```
SELF TESTING
SELF-TEST PASSED
REL 1.0, VER 1.0
IDLE
```

If everything is normal, the HSL dispays the `IDLE` message. Should the HSL fail self-test, the system displays different messages than what is shown above. If this happens, refer to the Self-Test section in Chapter 3, ‘‘Using the Front Panel.’’

Procedure: Connecting the Cables

Use the following procedure for connecting cables between the new units and their associated terminals or ports on the terminal equipment.

1. Connect one end of a V.35 cable to the connector on the rear of the HSL labeled *V.35*, and tighten the connector retaining screws.
2. If RS-366/RS-232 dialing is to be used, connect one end of the RS-366/RS-232 cable to the connector marked *RS-366/RS-232*, and tighten the retaining screws.
3. Dress the cable(s) toward the rear of the cabinet, through the associated plastic twist lock at the rear of the Z77A Data Mounting, and twist the top ends of the lock to secure the cable
(see Figure 2-7).

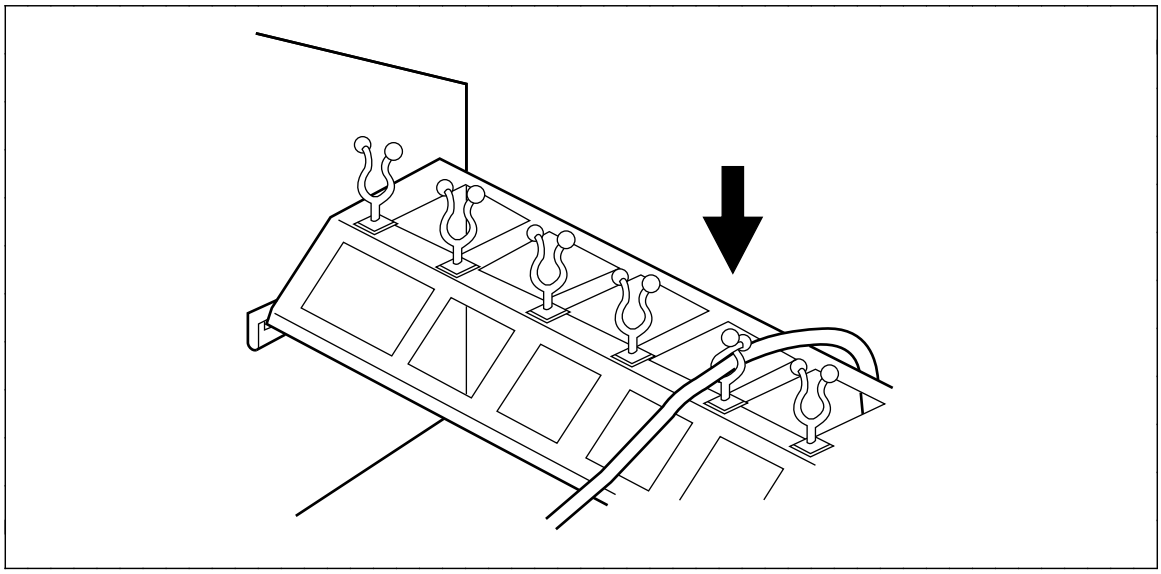

FIGURE 2-7
Securing the Cables

4 Connect the other end of the cable(s) to the port(s) on the associated terminal device and tighten the connector retaining screws.

5 Follow this same procedure to connect the interface cable(s) for each new HSL.

For administration information on switched and permanent applications, refer to Appendix D, ‘‘Applications and Switch Administration.’’

TABLE 2-1
L2 Adapter Cable Pin Assignments*

Z77A Data Mounting Position	Modular Plug Pin Numbering	Signal Direction**	B25 Connector Pin Numbering
1	1 2 3 6 4 5	S ← M S ← M S → M S → M TDG D1	27 2 28 3 4 29
2	1 2 3 6 4 5	S ← M S ← M S → M S → M TDG D1	30 5 31 6 7 32
3	1 2 3 6 4 5	S ← M S ← M S → M S → M TDG D1	33 8 34 9 10 35
4	1 2 3 6 4 5	S ← M S ← M S → M S → M TDG D1	36 11 37 12 13 38

(Continued)

* Refer to Figure 2-5.

** S=Switch, M=Data Module, (TDG and D1=Modem Control not used with HSL)

L2 Adapter Cable Pin Assignments*
(Continued)

Z77A Data Mounting Position	Modular Plug Pin Numbering	Signal Direction**	B25 Connector Pin Numbering
5	1	S ← M	39
	2	S ← M	14
	3	S → M	40
	6	S → M	15
	4	TDG	16
	5	D1	41
6	1	S ← M	42
	2	S ← M	17
	3	S → M	43
	6	S → M	18
	4	TDG	19
	5	D1	44
7	1	S ← M	45
	2	S ← M	20
	3	S → M	46
	6	S → M	21
	4	TDG	22
	5	D1	47
8	1	S ← M	48
	2	S ← M	23
	3	S → M	49
	6	S → M	24
	4	TDG	25
	5	D1	50

* Refer to Figure 2-5.

** S=Switch, M=Data Module, (TDG and D1=Modem Control not used with HSL)

Chapter 3: Using the Front Panel

This chapter illustrates and discusses the front panel of the DEFINITY High Speed Link, and how to use the panel's push buttons and front display to configure the unit. Also provided in this chapter is an explanation of the HSL's main menu as well as its options and suboptions for operation.

THE FRONT PANEL

The front panel of the HSL is shown in Figure 3-1. The panel is comprised of:

- two light emitting diodes (LEDs), one red and one green
- a single line, 16-character, super-twist liquid crystal display (LCD)
- three non-locking push-button switches.

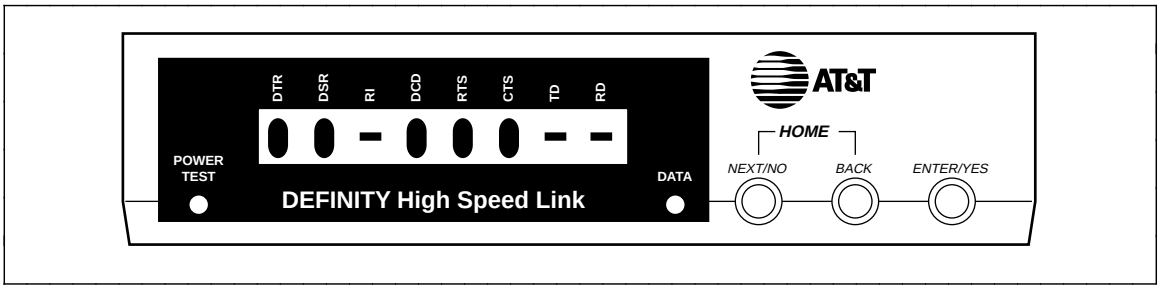

FIGURE 3-1
Front Panel

The red LED — Labeled *POWER/TEST*, this LED lights steadily when there is power to the HSL, and winks during all test modes. Used in conjunction with the green LED, this LED flashes to indicate that the HSL is not communicating with the switch.

The green LED — Labeled *DATA*, this LED lights steadily indicating a data call is in progress and flashes when receiving an incoming data call. This LED is off for approximately one second, then winks asynchronously with the red LED during self-test mode. This LED winks off during a combined remote loopback/self-test to indicate that a data error is detected. Used in conjunction with the red LED, this LED flashes to indicate that the HSL is not communicating with the switch.

The LCD display — This display first shows a start-up sequence consisting of self-test results, software release, and version. Following start-up, the HSL

displays the HOME screen. (Full details on the HOME screen and the main menu are provided in following sections.)

Three push buttons

- *NEXT/NO* is used to step forward through the menu. By keeping this button depressed, you are able to quickly step through menu items.

- *BACK* is used to step backward through the menu. By keeping this button depressed, you are able to quickly step back through menu items.

- *NEXT/NO* and *BACK* pressed simultaneously returns you automatically to the HOME screen from most menus. However, do not press these two keys simultaneously while changing option values. If this is done, rather than returning you to the HOME screen, the HSL queries if you want to save the changes you have made.

- *ENTER/YES* is used to set an option or execute the function displayed.

LCD MENU SYSTEM

The 16-character LCD displays the following information:

- start-up sequence of screens
- HOME screen for operating mode
- V.35 lead status
- `VIEW OPTIONS?` for viewing options
- `SET DATA OPTS?` for setting data options
- `SET DIAL METHOD?` for setting dial method
- `TEST - RESET?` for controlling tests and loading default options
- `CALL CONTROL?` for call control and storing telephone numbers

The LCD Menu System has several levels. By pressing *NEXT/NO*, you are able to step through the entire first level.

After stepping to the desired main menu item and selecting it by pressing *ENTER/YES*, you are now one level deeper within the menu; a subitem choice is presented to you.

Pressing *NEXT/NO* and *BACK* simultaneously will return you to the HOME screen most of the time.

HOME Screen

The HOME screen is the the first item shown on the display. This screen is used to display HSL's status information. The display automatically updates depending on what state the HSL is in. Table 3-1 below illustrates the messages the HSL displays on the HOME screen and an explanation of each.

TABLE 3-1
HOME Screen Messages and Explanations

Message	Explanation
SWITCH LINK DOWN	The HSL is not communicating with the switch. There is a line problem.
TEST MODE ACTIVE	The HSL is in a test mode (other than self-test) and the line is OK.
IDLE	The HSL is idle.
INCOMING CALL	There is an incoming call.
ORIGINATING CALL	The HSL is originating a data call.
DATA CALL ACTIVE	The HSL is in the data mode and the Permanent Connection option is NO.
PERM CALL ACTIVE	The HSL is in the data mode and the Permanent Connection option is YES.
DISCONNECTING	The HSL is going through its call disconnect sequence at the end of a normal data call.
BUSY	The HSL disconnects the call because the number you called was busy.
TRY AGAIN	The HSL disconnects the call because the switch can not place the call at that time.
CHECK NUMBER	The HSL disconnects the call because the switch could not place the call as dialed.

V.35 Lead Status Screen

The V.35 Lead Status Screen is used to display the status of the HSL's V.35 interface leads as shown in Figure 3-2 below.

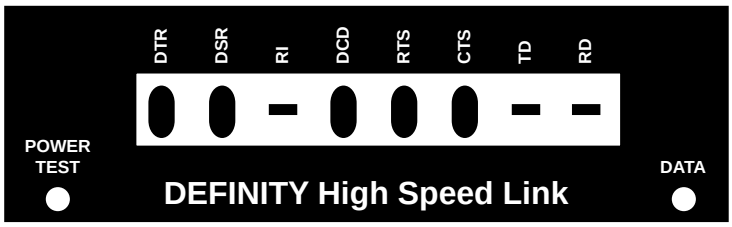

FIGURE 3-2
Lead Status screen

A solid oval indicates the control lead is **ON** or data is present, while a dash indicates the lead is **OFF** or there is no data. The abbreviations above the display translate as shown in Table 3-2 below.

TABLE 3-2
Label Descriptions

Label	Description	V.35
DTR	Data Terminal Ready	DTR
DSR	Data Set Ready	DSR
RI	Ring Indicator	RI
DCD	Data Carrier Detect	RLSD
RTS	Request to Send	RTS
CTS	Clear to Send	RFS
TD	Transmitted Data (display shows an oval when data is being transmitted)	TD
RD	Received Data (display shows an oval when data is being received)	RD

This screen displays the true state of the DSR, RI, DCD, and CTS output control leads.

The HSL displays the state of the DTR input lead when the DTR LEAD option is set to NORMAL. The oval is displayed, independent of the state of the DTR input lead, when the option is set to IGNORE.

The state of the RTS input lead is displayed when the DUPLEX option is set to HALF. The oval is displayed, independent of the state of the RTS input lead, when the option is set to FULL, or speed is set to 64 Kbps.

Menus

The following sections provide information and procedures for using the menus.

View Options

The purpose of the View Options screen is for viewing the current settings of the dial method and all options. Table 3-3 below illustrates the possible settings for the options. The factory default settings are in bold print. Refer to Chapter 4, ‘‘Options’’ for more information on these options.

TABLE 3-3
View Option Values

Option Displays	Possible Values
DIAL	**RS-366**, RS-232, DTR, HOTLINE, MANUAL
SPEED	**56KBPS**, 64KBPS
DUPLEX	**FULL**, HALF
DATA INVERT	ON, **OFF**
ANS	**AUTO**, MANUAL
PERM CONN	YES, **NO**
LOOPBACK	**AT&T**, V.54
DSR	**NORMAL**, ON
DTR	**NORMAL**, IGNORE

Procedure: Viewing Options

Perform the following steps to view the current option settings:

1. From the HOME screen, press *NEXT/NO* or *BACK* until the HSL displays `VIEW OPTIONS?`
2. To view the options, press *ENTER/YES*.
3. Scroll forward and backward using the *NEXT/NO* and *BACK* keys, respectively.
4. Once you are finished viewing the options, you can return to the HOME screen by pressing
   - *NEXT/NO* until the HSL displays the `DONE?` query, and then *ENTER/YES* or
   - *NEXT/NO* and *BACK* simultaneously.

Set Data Options

The operation of the front panel interface for setting the data options and saving changes is explained in this section. The screens for the `SET DATA OPTS?` menu are listed below.

- `SET SPEED?`
- `SET DUPLEX?` or `SET DATA INVERT?` (See note below.)
- `SET ANSWER?`
- `SET PERM CONN?`
- `SET LOOPBACK?`
- `SET DSR LEAD?`
- `SET DTR LEAD?`
- `DONE?`

Note: When the SPEED option is set to `56KBPS`, the HSL displays `SET DUPLEX?` When the SPEED option is set to `64KBPS`, the HSL displays `SET DATA INVERT?` Refer to the Data Inversion section in Chapter 4, ‘‘Options.’’

Procedure: Setting Data Options

Perform the following steps to SET DATA OPTS?

1. From the HOME screen, press *NEXT/NO* or *BACK* until the HSL displays SET DATA OPTS?
2. To set options, press *ENTER/YES*. The HSL displays SET SPEED?
3. Press *ENTER/YES*. The HSL displays the current setting, for example, SPEED = 56KBPS?

   If you want to keep the setting,

   - Press *ENTER/YES*. The HSL displays CONTINUE?
   - Press *ENTER/YES*.

   If you want to change the setting,

   - Press *NEXT/NO*. The HSL displays SPEED -> 64KBPS?
   - Press *ENTER/YES* to change the speed to 64KBPS. The HSL displays CONTINUE?
   - Press *ENTER/YES*.

   Note: An equal sign (=) indicates the current setting for the data option. A right arrow (->) separates an alternate choice for the data option. A question mark (?) follows both cases.
4. Continue this procedure to set the other data options. When you are finished, press *NEXT/NO* until the HSL displays DONE?
5. Press *ENTER/YES*. The HSL displays SAVE CHANGES?
6. Press *ENTER/YES* to save the changes. The HSL briefly displays CHANGES SAVED and returns you to the HOME screen.

The option name and setting screens are shown in Table 3-4.

TABLE 3-4
Options and Settings

SPEED = 56KBPS?	or	SPEED = 64KBPS?
DUPLEX = FULL?	or	DUPLEX = HALF?
DATA INVERT = ON?	or	DATA INVERT = OFF?
ANS = AUTO?	or	ANS = MANUAL?
PERM CONN = YES?	or	PERM CONN = NO?
LOOPBACK = AT&T?	or	LOOPBACK = V.54?
DSR = NORMAL?	or	DSR = ON?
DTR = NORMAL?	or	DTR = IGNORE?
DONE?		

Set Dial Method

This section explains the operation of the front panel interface for selecting a dial method. The screens for the SET DIAL METHOD? menu are listed below.

- DIAL = RS-366?
- DIAL = RS-232?
- DIAL = DTR?
- DIAL = HOTLINE?
- DIAL = MANUAL?
- EXIT?

Procedure: Setting Dial Method

Perform the following steps to set the dial method.

1. From the HOME screen, press *NEXT/NO* or *BACK* until the HSL displays SET DIAL METHOD?
2. Press *ENTER/YES*. The HSL displays, for example, DIAL = RS-366?

   Note: An equal sign (=) indicates the current dialing method. A right arrow (->) indicates alternate dialing methods. A question mark (?) follows both cases.

   If you want to keep the setting,

   - Press *ENTER/YES*. The HSL displays RS-366 SAVED, and then returns to the HOME screen.

     OR

   - Press *NEXT/NO* or *BACK* until the HSL displays EXIT? Press *ENTER/YES*. The HSL displays SET DIAL METHOD?

   If you want to change the setting,

   - Press *NEXT/NO* or *BACK* to step forward or backward to the desired dial method, for example, DIAL -> RS-232?
   - Press *ENTER/YES* to enable the dial method displayed.
   - The HSL displays a confirmation message, for example RS-232 SAVED, and then returns to the HOME screen.

Test-Reset

The Test-Reset menu allows you to control the unit's test features and to reset the options to the default settings.

The Test-Reset screens are listed below.

TABLE 3-5
Test-Reset Screens

DATA LOOPBACK?	or	END DATA LOOP?
SELF-TEST?		
LOCAL LOOPBACK?	or	END LOCAL LOOP?
REMOTE LOOPBACK?	or	END REMOTE LOOP?
REMOTE LOOP/ST?	or	END REM LOOP/ST?
RESET OPTIONS?		
EXIT->TESTS?		

Procedure: Selecting a Test

Use the procedure below to select a test:

1. From the HOME screen, press *NEXT/NO* or *BACK* until the HSL displays TEST-RESET? Once displayed, press *ENTER/YES*.
2. Press *NEXT/NO* or *BACK* to step through the available tests.

Note: Except for self-test, only one test may be activated at a time, and a test must end before another can be activated.

Procedures for running each test follow. For additional information refer to Chapter 6, ''Test Descriptions.''

Data Loopback Test

The data loopback test can be initiated by the front panel interface, a command from the switch, a remote data endpoint, or a network test center.

You should initiate this test when data errors are detected and remote testing of the HSL and network is desired. You must be on a data call to run a data loopback test.

The following procedure contains step-by-step instructions for initiating a data loopback test from the front panel interface. Refer to the Data Loopback Test section in Chapter 6, ''Test Descriptions'' for details of this test.

Procedure: Running a Data Loopback Test

1 Press *NEXT/NO* or *BACK* until the HSL displays `DATA LOOPBACK?`

2 Press *ENTER/YES* to begin the data loopback test. The HSL briefly displays

```
TEST STARTED
END DATA LOOP?
```

The *POWER/TEST* lamp winks during the test and stops winking when the test is completed.

Notes: If you attempt to start a data loopback test when not on a data call, the HSL displays

```
DENIED
NOT IN DATA MODE
DATA LOOPBACK?
```

If you attempt to start a data loopback test when a switch test is in progress, the HSL displays

```
DENIED:  SWITCH
TEST IN PROGRESS
DATA LOOPBACK?
```

If you attempt to start a data loopback test when a test (other than a switch activated test) is in progress, the HSL displays

```
DENIED:  ANOTHER
TEST IN PROGRESS
DATA LOOPBACK?
```

3 To end the data loopback test, press *ENTER/YES* while the HSL displays `END DATA LOOP?` The HSL displays

```
TEST ENDED
DATA LOOPBACK?
```

Note: If you attempt to end a data loopback test started by the switch, the HSL displays

```
DENIED:  SWITCH
ACTIVATED TEST
END DATA LOOP?
```

4 Press *ENTER/YES* to repeat the test or *NEXT/NO* to display the next test.

Note: Press *NEXT/NO* and *BACK* simultaneously to return to the HOME screen.

Self-Test

The self-test is an internal check of the unit. It is a disruptive test that resets the HSL, checks and initializes its internal circuits, and displays the results on the LCD during the start-up sequence.

The self-test should be the first test conducted when any problem is encountered. It is the only test that you can activate while another test is in progress.

> **CAUTION**: Running the self-test causes a reset; a call in progress will be disconnected.

The following procedure contains step-by-step instructions for initiating a self-test from the front panel interface. Refer to the Self-Test section in Chapter 6, ‘‘Test Descriptions’’ for details of this test.

Procedure: Running a Self-Test

1 Press *NEXT/NO* or *BACK* until the HSL displays `SELF-TEST?`

2 Press *ENTER/YES* to begin the self-test. The HSL displays the following:

```
SELF TESTING
```

The red *POWER/TEST* LED winks for the duration of the test. The green *DATA* LED is off for one second, and then winks asynchronously with the red LED for the duration of the test.

Passing the Self-Test

When the test is complete, the unit enters the start-up sequence and displays the following:

```
SELF-TEST PASSED
REL 1.0, VER 1.0
```

The HSL automatically displays the HOME screen when the start-up sequence completes.

When the self-test completes, and a non-volatile memory error is detected during the start-up sequence, the HSL displays the following:

```
SELF-TEST PASSED
MEMORY ERROR
DEFAULT OPTIONS
LOADED
REL 1.0, VER 1.0
```

The HSL automatically displays the HOME screen when the start-up sequence completes.

Failing the Self-Test

If the self-test fails, the following messages are displayed for 4 seconds each, and the self-test repeats.

```
SELF-TEST FAILED
CONTINUE?
```

You can stop the test by pressing any button while the HSL displays these messages. The HSL will end the self-test and display the following message during the start-up sequence.

```
REL 1.0, VER 1.0
```

The HSL automatically displays the HOME screen when the start-up sequence completes.

If the self-test fails, and a non-volatile memory error is detected during the start-up sequence, the HSL displays the following:

```
MEMORY ERROR
DEFAULT OPTIONS
LOADED
REL 1.0, VER 1.0
```

The HSL automatically displays the HOME screen when the start-up sequence completes.

Local Loopback Test

The local loopback test can be initiated by the front panel interface, the V.35 Local Loopback (LL) interface lead, or a command from the switch. Data terminal equipment is required for this test.

The HSL, while in the local loopback test mode, accepts synchronous data on its V.35 input data lead and retransmits the data synchronously on its V.35 output data lead.

The following procedure contains step-by-step instructions for initiating a local loopback test from the front panel interface. Refer to Local Loopback Test section in Chapter 6, ‘‘Test Descriptions’’ for details of this test.

Procedure: Performing a Local Loopback Test

1. Press *NEXT/NO* or *BACK* until the HSL displays `LOCAL LOOPBACK?`
2. Press *ENTER/YES* to begin local loopback test.
   - If the HSL is idle or a Permanent Call is active, the HSL displays

     ```
     TEST STARTED
     END LOCAL LOOP?
     ```

   - Otherwise, the call is disconnected and the HSL displays

     ```
     DISCONNECTED
     TEST STARTED
     END LOCAL LOOP?
     ```

The *POWER/TEST* lamp winks during the test and stops winking when the test is completed.

Notes: If you attempt to start a local loopback test when a switch test is in progress, the HSL displays

```
DENIED:  SWITCH
TEST IN PROGRESS
LOCAL LOOPBACK?
```

If you attempt to start a local loopback test when another test (other than a switch activated test) is in progress, the HSL displays

```
DENIED:  ANOTHER
TEST IN PROGRESS
LOCAL LOOPBACK?
```

3 To end the local loopback test, press *ENTER/YES* while the HSL displays `END LOCAL LOOP?` The HSL displays

```
TEST ENDED
LOCAL LOOPBACK?
```

Note: If you attempt to end a local loopback test started by the switch, the HSL displays

```
DENIED:  SWITCH
ACTIVATED TEST
END LOCAL LOOP?
```

If you end a local loopback test from the front panel when the V.35 Local Loopback input lead is ON, the test automatically restarts and the HSL displays

```
TEST ENDED
END LOCAL LOOP?
```

4 Press *ENTER/YES* to repeat the test, or *NEXT/NO* to display the next test.

Note: Press *NEXT/NO* and *BACK* simultaneously to return to the HOME screen.

Remote Loopback Test

The remote loopback test can be initiated by the front panel interface or the Remote Loopback (RL) lead on the V.35 interface. This test is used to send data to a remote endpoint and check the returned data for errors.

You must be on a data call to run a remote loopback test.

The following procedure contains step-by-step instructions for initiating a remote loopback test from the front panel interface. Refer to Remote Loopback Test section in Chapter 6, ''Test Descriptions'' for details of this test.

Procedure: Performing a Remote Loopback Test

1 Press *NEXT/NO* or *BACK* until the HSL displays `REMOTE LOOPBACK?`

2 Press *ENTER/YES* to begin the remote loopback test. The HSL displays

```
REQUESTING TEST
TEST STARTED
END REMOTE LOOP?
```

(The HSL displays `END REMOTE LOOP?` while the test is active.)

The *POWER/TEST* lamp winks during the test and stops winking when the test is completed.

Notes: If the HSL is optioned for V.54 loopback and the remote data endpoint fails to respond to the request, the test aborts and the HSL displays

```
REQUESTING TEST
NO RESPONSE
REMOTE LOOPBACK?
```

If you attempt to start a remote loopback test when the HSL is not in the data mode, the HSL displays

```
DENIED
NOT IN DATA MODE
REMOTE LOOPBACK?
```

If you attempt to start a remote loopback test when a switch test is in progress, the HSL displays

```
DENIED: SWITCH
TEST IN PROGRESS
REMOTE LOOPBACK?
```

If you attempt to start a remote loopback test when another test (other than a switch activated test) is in progress, the HSL displays

```
DENIED: ANOTHER
TEST IN PROGRESS
REMOTE LOOPBACK?
```

3 To end the remote loopback test, press *ENTER/YES* while the HSL displays `END REMOTE LOOP?` The HSL displays

```
TEST ENDED
REMOTE LOOPBACK?
```

Note: If you end the test while the RL input lead is ON, the test automatically restarts and the HSL displays

```
TEST ENDED
REMOTE LOOPBACK?
END REMOTE LOOP?
```

If the HSL is optioned for V.54 loopback, `REMOTE LOOPBACK?` is not displayed.

4 Press *ENTER/YES* to repeat the test, or *NEXT/NO* to display the next test.

Note: Press *NEXT/NO* and *BACK* simultaneously to return to the HOME screen.

Remote Loopback with Self-Test

The remote loopback with self-test can only be initiated from the front panel interface. This test uses an internal test data generator and error detector to send data to the remote station and to check the return data for errors. The green *DATA* LED flashes off to indicate errors are detected. You must be on a data call to run a remote loopback with self-test.

You should conduct this test when the local DTE can neither send nor check the returned data for errors. You cannot send or receive data during this test.

The following procedure contains step-by-step instructions for initiating a remote loopback with self-test from the front panel interface. Refer to the Remote Loopback with Self-Test section of Chapter 6, ‘‘Test Descriptions’’ for details of this test.

Procedure: Running the Remote Loopback with Self-Test

1 Press *NEXT/NO* or *BACK* until the HSL displays `REMOTE LOOP/ST?`

2 Press *ENTER/YES* to begin the remote loopback with self-test. The HSL displays

```
REQUESTING TEST
TEST STARTED
END REM LOOP/ST?
```

(The HSL displays `END REM LOOP/ST?` while the test is active.)

The *POWER/TEST* lamp winks during the test and stops winking when the test is completed.

Notes: If the HSL is optioned for V.54 loopback and the remote data endpoint fails to respond to the request, the test aborts and the HSL displays

```
REQUESTING TEST
NO RESPONSE
REMOTE LOOP/ST?
```

If you attempt to start a remote loopback with self-test when not on a call, the HSL displays

```
DENIED
NOT IN DATA MODE
REMOTE LOOP/ST?
```

If you attempt to start remote loopback with self-test when a switch test is in progress, the HSL displays

```
DENIED: SWITCH
TEST IN PROGRESS
REMOTE LOOP/ST?
```

If you attempt to start remote loopback with self-test when a test (other than a switch activated test) is in progress, the HSL displays

```
DENIED: ANOTHER
TEST IN PROGRESS
REMOTE LOOP/ST?
```

3 To end the remote loopback with self-test, press *ENTER/YES* while the HSL displays `END REM LOOP/ST?` The HSL displays

```
TEST ENDED 000
REMOTE LOOP/ST?
```

`TEST ENDED 000` shows that there were no errors, `003` shows that there were three errors, and `255` shows that more than 254 errors were detected.

Note: The green *DATA* LED winks off to indicate errors are detected.

If the remote endpoint did not loopback the test data, the HSL displays the following when the test is stopped:

```
NO DATA RETURNED
REMOTE LOOP/ST?
```

4 Press *ENTER/YES* to repeat the test, or press *NEXT/NO* to display the next test.

Note: Press *NEXT/NO* and *BACK* simultaneously to return to the HOME screen.

Reset Options

Reset Options is used to set the values of all options including the Dialing Method to their factory default settings. All stored telephone numbers are erased.

Procedure: Resetting Options

1. Press *NEXT/NO* or *BACK* until the HSL displays `RESET OPTIONS?`
2. Press *ENTER/YES* to reset options.
   - The HSL **erases** all stored telephone numbers, and loads and saves the factory default options in non-volatile memory. The `DIAL METHOD` is reset to the factory default setting.
   - The HSL then briefly displays `OPTIONS RESET` and returns to the HOME screen automatically.

Call Control

The Call Control menu provides you with a means to dial a stored number, answer a call, disconnect a call, and store up to four telephone numbers. When you select `CALL CONTROL?`, the HSL displays messages which are determined by the HSL's operating mode. Refer to Chapter 5, ''Call Control Operation'' for procedures on operating the HSL.

1. From the HOME screen, press *NEXT/NO* or *BACK* until the HSL displays `CALL CONTROL?`
2. Press *ENTER/YES* while `CALL CONTROL?` is displayed to enter the call control mode.
   - If the HSL is idle, the HSL displays `DIAL?`
   - If there is an incoming call, the HSL displays `ANSWER CALL?`
   - If there is a call in progress, the HSL displays `END CALL?`
3. Once you are in the call control mode, you can
   - press *ENTER/YES* to execute the displayed call control function, or
   - press *NEXT/NO* or *BACK* to step through the menu for the following alternate choices:
     - `STORE NUMBER?`
     - `EXIT -> CALL CON?`

Dial a Call

To dial a stored number, the HSL must be idle and the data terminal equipment must be ready (V.35 DTR interface lead ON) or the DTR LEAD option must be set to IGNORE.

Procedure: Dialing a Call

1. From the HOME screen, press *NEXT/NO* or *BACK* until the HSL displays `CALL CONTROL?`
2. Press *ENTER/YES* to enter the call control mode. If idle, the HSL displays `DIAL?`
3. Press *ENTER/YES* to view the stored numbers.
   - If a number stored in the memory location is 9 digits or less, the HSL displays `DIAL:` and the number, for example `DIAL:5551414?`
   - If the number stored in the memory location is more than 9 digits, the HSL displays only the number, for example `19085551414?`
   - If the memory location is empty, the HSL displays `DIAL:?`
4. Press *NEXT/NO* or *BACK* to step through the four stored numbers.
5. Press *ENTER/YES* when the desired number is displayed. The HSL dials the number displayed, and then returns to the HOME screen.

   Note: If the HSL is not idle or the data terminal equipment is not ready when *ENTER/YES* is pressed, the HSL displays the message `DENIED`, followed by the HOME screen.

Answer a Call

The HSL allows you to answer a call from the front panel.

1. From the HOME screen, press *NEXT/NO* or *BACK* until the HSL displays `CALL CONTROL?`
2. Press *ENTER/YES* to select `CALL CONTROL?` when there is an incoming call. The HSL displays `ANSWER CALL?`
3. Press *ENTER/YES* while the HSL displays `ANSWER CALL?` The HSL answers the call and displays the HOME screen.

   Note: There must be an incoming call and either the DTR lead on the V.35 interface must be ON or the DTR LEAD option must be set to IGNORE. Otherwise, the HSL displays the `DENIED` message, and then returns to the HOME screen.

Disconnect a Call

The HSL allows you to disconnect a call from the front panel.

1. From the HOME screen, press *NEXT/NO* or *BACK* until the HSL displays `CALL CONTROL?`
2. Press *ENTER/YES* to select `CALL CONTROL?` while the HSL is on a call. The HSL displays `END CALL?`
3. Press *ENTER/YES* while the HSL displays `END CALL?`

   The HSL disconnects the call and displays the HOME screen.

The call will not be disconnected if a switch activated test is in progress.

Note: The Permanent Connection option must be set to NO and the HSL must not be in a test mode activated by the switch. Otherwise, the HSL displays the HOME screen, and does not disconnect the call.

Store a Number

If you press *NEXT/NO* while the HSL displays `DIAL?`, `ANSWER CALL?`, or `END CALL?` the HSL displays `STORE NUMBER?` Following are the screens for `STORE NUMBER?`

- M0:?
- M1:?
- M2:?
- M3:?
- EXIT -> STORE?

The HSL allows you to store four numbers. Each number can be 15 digits or less.

Note: 0 through `9`, `#`, `*`, and `,` may be part of a stored number.

To store a number, do the following:

1. From the HOME screen, press *NEXT/NO* or *BACK* until the HSL displays `CALL CONTROL?`
2. Press *ENTER/YES* to select `CALL CONTROL?` The HSL will display either `DIAL?`, `ANSWER CALL?`, or `END CALL?`
3. Press *NEXT/NO*. The HSL displays `STORE NUMBER?`
4. Press *ENTER/YES*. The HSL displays `M0:?` if there is no number stored.
5. Press *ENTER/YES*. The HSL displays `M0:_` (The cursor marks the first digit for storing the number.)

6 Press *NEXT/NO* or *BACK* until the HSL displays the first digit of the number you are storing.

7 Press *ENTER/YES* to select the first digit. The cursor moves to the right.

8 Press *NEXT/NO* or *BACK* until the HSL displays the second digit of the number you are storing.

9 Continue this procedure until the number you are storing is complete.

Note: To back up the cursor while entering a number, do the following:

1 Press *ENTER/YES* when the cursor is under a *blank*. The cursor will move to the first digit of the number.

2 Press *NEXT/NO* or *BACK* to step through the digits until a *blank* is displayed, or press *ENTER/YES* to move the cursor right until the cursor is under a *blank*.

10 Press *ENTER/YES* to move the cursor to the right, and *NEXT/NO* or *BACK* until the HSL displays the letter `E`.

11 Press *ENTER/YES* to store the number in memory location `M0`. The HSL returns to the HOME screen after the number is stored.

Change a Stored Number

To change a stored a number, do the following:

1 From the HOME screen, press *NEXT/NO* or *BACK* until the HSL displays `CALL CONTROL?`

2 Press *ENTER/YES* to select `CALL CONTROL?` The HSL will display either `DIAL?`, `ANSWER CALL?`, or `END CALL?`

3 Press *NEXT/NO*. The HSL displays `STORE NUMBER?`

4 Press *ENTER/YES*. The HSL displays the number stored in memory location `M0`. Press *NEXT/NO* or *BACK* until the HSL displays the number to be changed.

5 Press *ENTER/YES* to select the number you would like to change. The HSL displays the stored number with the cursor under the first digit of the number.

6 Press *ENTER/YES* to move the cursor to the first digit to be changed.

7 Press *NEXT/NO* or *BACK* to change the digit.

8 Press *ENTER/YES* to move the cursor to the next digit to be changed.

9 Press *NEXT/NO* or *BACK* to change the next digit.

10 Continue this procedure until the number you are changing is complete.

11 Press *ENTER/YES* to move the cursor to the right, and *NEXT/NO* or *BACK* until the HSL displays the letter E.

12 Press *ENTER/YES* to store the changed number in the memory location. The HSL stores the number and returns to the HOME screen.

To exit without making a change, do the following:

1 Press *NEXT/NO* and *BACK* simultaneously. The HSL returns you to the HOME screen.

To erase a stored number, do the following:

1 Press *ENTER/YES* when the cursor is under a *blank*. The cursor will move to the first digit of the number.

2 Press *NEXT/NO* or *BACK* until the HSL displays an E.

3 Press *ENTER/YES* to erase the number. The HSL returns you to the HOME screen.

Chapter 4: Options

The SET DATA OPTS? menu allows you to set and save a complete set of options, using the front panel interface. The DEFINITY High Speed Link stores these options (configuration information) which tell it how to operate. The options, listed in the Table 4-1, are explained in this chapter. The factory default settings are in bold print.

TABLE 4-1
Option Settings

Option	Settings
SPEED	**56KBPS**, 64KBPS
DUPLEX	**FULL**, HALF
DATA INVERSION	ON, **OFF**
ANSWER	**AUTO**, MANUAL
LOOPBACK	**AT&T**, V.54
DTR LEAD	**NORMAL**, IGNORE
DSR LEAD	**NORMAL**, ON
PERMANENT CONNECTION	YES, **NO**

OPTION DESCRIPTIONS

These options are explained in the following sections. For information on setting the options, refer to Chapter 3, ‘‘Using the Front Panel.’’

Speed

- Settings: **56KBPS**, 64KBPS

The speed option allows you to set the data rate for the V.35 interface. The speed must match the speed of the local V.35 terminal equipment.

Set the SPEED option to 56KBPS if you want the HSL to transmit and receive data across the V.35 interface at 56 Kbps.

Set the SPEED option to 64KBPS if you want the HSL to transmit and receive data across the V.35 interface at 64 Kbps.

Duplex

- Settings: **FULL**, HALF

The duplex option is used only when the HSL is operating at 56 Kbps.

If you set the DUPLEX option to FULL, the HSL ignores the Request to Send input lead and holds the Clear to Send output lead ON while in the data mode.

If you set the DUPLEX option to HALF, the HSL monitors the Request to Send input lead and does not turn on the Clear to Send output lead until it is in the data mode and the Request to Send input lead is ON.

Data Inversion

- Settings: ON, **OFF**

The data inversion option is used only when the HSL is operating at 64 Kbps, and transmitting data over restricted facilities using HDLC-based protocols.

Set DATA INVERSION to ON for compatibility with the ACCUNET MPDMs.

Set DATA INVERSION to OFF when data inversion is not needed (for example, compatibility with ISDN and DSU endpoints).

Answer

- Settings: **AUTO**, MANUAL

The answer option controls the automatic answer feature.

Set the ANSWER option to MANUAL, if you want to disable the automatic answer feature, and manually answer incoming calls from the front panel.

Set the ANSWER option to AUTO, if you want to enable the automatic answer feature, and automatically answer an incoming call.

Note: You can answer a call manually from the front panel or automatically only if

- the HSL is not in the local loopback test mode, and
- either the DTR input lead on the V.35 interface is ON or the DTR LEAD option is set to IGNORE.

Loopback

- Settings: **AT&T**, V.54

This option determines the data signaling protocol to be used by the HSL for remote loopback test mode control. The option must be set to match the protocol used by the remote data endpoint.

AT&T is a proprietary loopback control protocol used by the HSL and AT&T DSU products. Set the LOOPBACK option to AT&T when the remote data endpoint uses the AT&T loopback signaling protocol for the remote loopback test mode control.

Set the LOOPBACK option to V.54 when the remote data endpoint uses CCITT V.54 Standard loopback signaling protocol for remote loopback test mode control.

DTR Lead

- Settings: **NORMAL**, IGNORE

This option allows you to specify how the HSL should respond to the DTR input lead.

When you set the DTR LEAD option to NORMAL, the DTR input lead functions as required for switched network applications.

Set the DTR LEAD option to NORMAL when the local terminal equipment uses the V.35 DTR lead to disconnect calls.

When you set the DTR LEAD option to IGNORE, the HSL ignores the DTR input lead and operates as if the lead is always ON as required by private line applications. The DTR and HOTLINE dial methods are disabled when this option is set to IGNORE.

DSR Lead

- Settings: **NORMAL**, ON

This option controls the operation of the DSR output lead.

When you set the DSR LEAD option to NORMAL, the DSR output lead functions as required for switched network applications.

When you set the DSR LEAD option to ON, the DSR output lead is ON, except during a self-test, as required by private line applications at all times.

Permanent Connection

- Settings: YES, **NO**

The permanent connection option allows you to option the HSL for compatibility with the PBX for dedicated (private line) or dialed (switched) type data service.

Set the PERMANENT CONNECTION option to YES when the HSL is used in private line applications.

Set the PERMANENT CONNECTION option to NO when the HSL is used in switched network applications.

Note: When you set permanent connection to YES, you must set the answer option to AUTO. You should also set the DTR LEAD option to IGNORE, and dial method to MANUAL.

Refer to Appendix D, ‘‘Applications and Switch Administration’’ for further details.

Chapter 5: Call Control Operation

This chapter discusses the guidelines and procedures for operating the DEFINITY High Speed Link from the front panel, RS-366 interface, RS-232 interface, DTR dialing, and HOTLINE.

DIALING A DATA CALL

When you dial a call, you must provide the HSL with the number of the called endpoint. You can select one of the following methods for dialing a data call depending on your equipment:

- RS-366 interface (number supplied by data equipment)
- RS-232 interface (number supplied by data equipment)
- DTR dialing (number stored by user in the HSL memory)
- HOTLINE (number supplied by the switch)
- MANUAL (dialing from the front panel only).

Notes: When using the RS-366/RS-232 interface, the DTR input lead on the V.35 interface must be ON or the DTR LEAD option must be set to IGNORE before you can dial a call. The DTR lead option must be set to NORMAL for DTR and HOTLINE dialing.

Calls may be dialed manually using the front panel when either the RS-366 or RS-232 dial method is selected, but not for DTR or HOTLINE.

MANUAL (Front Panel)

Procedure: Dialing a call through the front panel

1. Press *ENTER/YES* when the HSL displays `Call Control?` The HSL displays `DIAL?` if the HSL is idle.
2. Press *ENTER/YES* while `DIAL?` is displayed. The HSL displays `DIAL: nnn...?`, where `nnn...` is the number stored in memory location `M0`.

   Note: If the stored number is more than 9 digits, `DIAL` is omitted and only the number is displayed.
3. Press *NEXT/NO* to step through the four memory locations to select the desired stored number.
4. Press *ENTER/YES* when the desired number is displayed, and the HSL dials the number.

RS-366 Interface

Procedure: Dialing with the RS-366 interface

RS-366 is a machine interface. The procedure depends on the customer's equipment.

When you set the dial method to RS-366, the Automatic Calling Equipment (ACU) dials the call using the RS-366 protocol. The HSL must be idle. DTR must be ON or the DTR lead must be set to IGNORE.

For information on the circuits provided on the 25-pin interface for RS-366 ACU operation, refer to Appendix B, ''RS-366 Interface.''

RS-232 Interface

Procedure: Dialing with the RS-232 interface

When you set the dial method to RS-232, the Data Terminal Equipment (DTE) connected to the RS-232 interface can use the ATDmn and ATH commands for call control.

The HSL will automatically adjust its speed (300, 1200, 2400, 4800, 9600, 19200 bps) to match the terminal speed when a command is entered.

The HSL must be idle and the V.35 DTR lead must be ON to dial a call. The user enters ATD and the number followed by (RETURN) to dial a call.

Note: The HSL does not return result codes to indicate it is ready, it is connected, or the call was disconnected.

For more information on the circuits provided on the 25-pin interface for RS-232 call operation, refer to Appendix A, ''RS-232 Interface.''

DTR Dialing

When you set the DIAL method to DTR and the HSL is idle, the HSL dials the number stored in memory location `M0` when the DTR V.35 lead turns ON and hangs up when the DTR turns OFF.

HOTLINE

When you set the DIAL method to HOTLINE, and the DTR V.35 lead turns ON, the HSL signals the switch to dial the call automatically based on a number stored via switch administration. Turning the DTR lead OFF will disconnect the call.

ANSWERING A CALL

When the HSL indicates the presence of an incoming call (HOME screen displays `INCOMING CALL` and the green *DATA* LED flashes), the call can be answered manually from the front panel or automatically, depending on the configuration of the answer option.

Notes: The DTR lead on the V.35 interface must be ON or the DTR LEAD option must be set to IGNORE before you can answer a call.
Calls cannot be answered while the HSL is in local loopback test mode.

Front Panel

When you set the ANSWER option to MANUAL, the automatic answering feature is disabled, and all incoming calls must be manually answered via the front panel.

Procedure: Answering a call from the front panel

1. From the HOME screen, press *NEXT/NO* until the HSL displays `CALL CONTROL?`
2. Press *ENTER/YES*. If there is an incoming call, the HSL displays `ANSWER CALL?`
3. Press *ENTER/YES*. The HSL answers the call and displays the HOME screen.

Auto Answer

When you set the ANSWER option to AUTO (default setting), the automatic answering feature is enabled and the HSL automatically answers an incoming call.

ENDING A CALL

Calls can be disconnected using the front panel, the V.35 interface, or the RS-232 interface. A call cannot be disconnected when the Permanent Connection option is set to YES or when the HSL is in a test mode activated by the switch.

Front Panel

Procedure: Ending a call from the front panel

1. Press *NEXT/NO* until the HSL displays `CALL CONTROL?`
2. Press *ENTER/YES*. If there is a call in progress, the HSL displays `END CALL?`
3. Press *ENTER/YES* when the HSL displays `END CALL?`

The HSL disconnects the call and displays the HOME screen.

V.35 DTR Lead

With the DTR lead option set to NORMAL, the data equipment turns OFF the V.35 DTR lead.

RS-232

The user sends an ATH command to end the call.

Chapter 6: Test Descriptions

This chapter describes how the tests supported by the DEFINITY High Speed Link are used to isolate data communications problems. The tests can be controlled by the front panel interface, the terminal, the remote endpoint, a Digital Data System test center, or the switch.

SELF-TEST

Self-test has priority over all other tests. It can be activated from the front panel at any time, and is activated automatically when AC power is applied.

The self-test is a disruptive test that

- resets the HSL
- checks and initializes its internal circuits
- displays the results on the LCD during the start-up sequence.

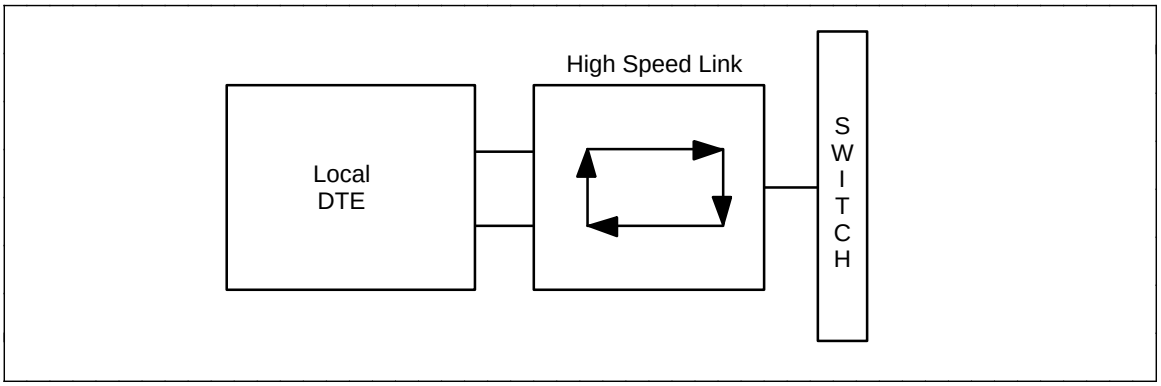

FIGURE 6-1
Self-Test

This test should be the first test conducted when any problem is encountered. Passing this test indicates that the internal circuits are working properly. The self-test does not check the data interface to the local DTE or the line interface to the switch. These interfaces are tested by the other tests.

LOCAL LOOPBACK TEST

The local loopback test can be initiated by the front panel interface, the V.35 local loopback interface lead, or a command from the switch.

The HSL provides a local loopback test that accepts synchronous data on its input data lead and retransmits the data synchronously on its output data lead. If this test is activated during a normal call, the call will be disconnected. The call will not be disconnected if the permanent connection option is set to YES.

In the local loopback test, data is sent from the local data terminal equipment on a loop through the HSL on the local side of the switch; the switch and remote endpoint are excluded from this test.

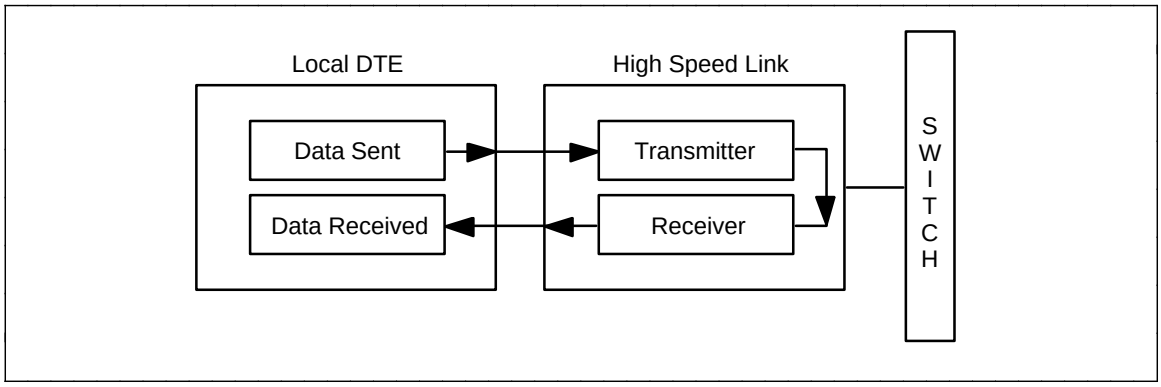

FIGURE 6-2
Local Loopback Test

This test should be conducted when the received data contains errors. Passing this test indicates that the local DTE, the interface cable, and the HSL data circuits are working properly.

DATA LOOPBACK TEST

The data loopback test is initiated by the front panel interface, a command from the switch, a remote data endpoint using the AT&T or V.54 protocol, or a network test center. You must be on a data call to run a data loopback test. Note, when the data loopback test is initiated by a remote data endpoint, the protocol used must be the same as the protocol used by the remote endpoint. In addition, the REQUEST TO SEND input lead on the V.35 interface must be ON if your HSL is optioned for 56KBPS, HALF DUPLEX operation, and the DATA INVERT option must be set to OFF if your HSL is optioned for 64KBPS operation.

The data loopback test is a test that aids the remote user. It excludes the local V.35 interface and local data terminal equipment. The remote equipment sends a test message that is received at the local HSL and is looped back to the remote endpoint for verification that the data endpoints and telephone line are operating properly. (See also the Remote Loopback Test section later in this chapter.)

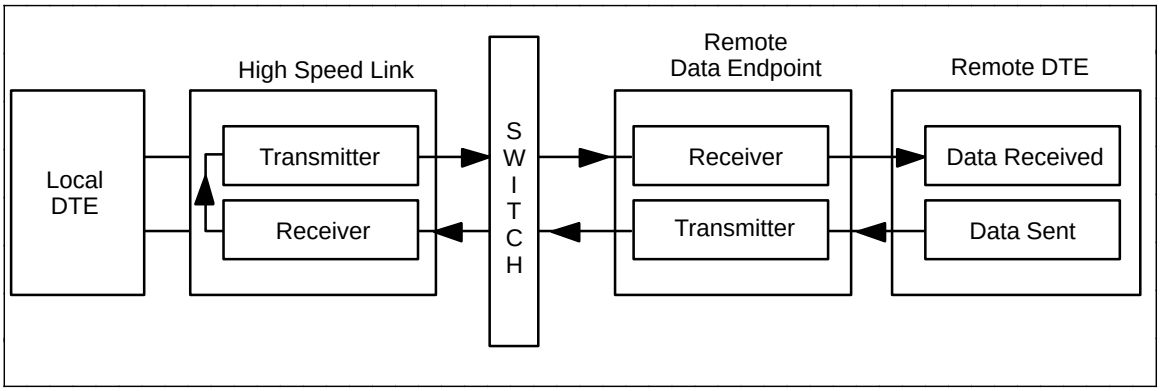

FIGURE 6-3
Data Loopback Test

This test should be conducted when data errors are detected and when remote testing of the HSL and network is desired. Passing the test indicates that the problem is most likely in the local DTE or the interface to the local DTE.

REMOTE LOOPBACK TEST

This test can be initiated by the front panel interface or the RL lead on the V.35 interface.

The remote loopback test is used to send data to a remote endpoint and check the returned data for errors. You must be on a data call to run a remote loopback test.

The HSL supports two optional protocols for putting a remote endpoint in the data loopback test mode —AT&T and V.54 protocol. The protocol used must be the same as the protocol used by the remote endpoint. In addition to matching protocols, the REQUEST TO SEND input lead on the V.35 interface must be ON if your HSL is optioned for 56KBPS, HALF DUPLEX operation, and the DATA INVERT option must be set to OFF if your HSL is optioned for 64KBPS operation.

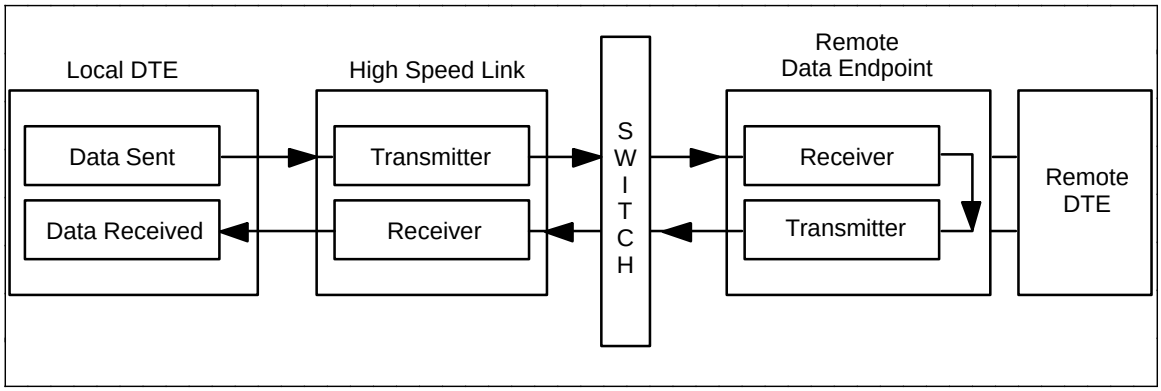

FIGURE 6-4
Remote Loopback Test

This test should be conducted when data errors are detected. Passing this test indicates that the problem is most likely in the remote DTE. Since network problems can cause errors, the remote loopback test should be run while on the call where errors were detected.

REMOTE LOOPBACK WITH SELF-TEST

This test can only be initiated from the front panel interface. You cannot send or receive data during this test.

The remote loopback with self-test determines the quality of the data transmission channel and the proper operation of the HSL at the local endpoint.

The HSL supports two optional protocols for putting a remote endpoint in the data loopback mode—AT&T and V.54 protocol. The protocol selected must be the same as the protocol used at the remote endpoint. In addition to matching protocols, the REQUEST TO SEND input lead on the V.35 interface must be ON if your HSL is optioned for 56KBPS, HALF DUPLEX operation, and the DATA INVERT option must be set to OFF if your HSL is optioned for 64KBPS operation.

Once a call has been established and you initiate the test, the HSL generates a test message and transmits it to the remote endpoint where it is looped back to the HSL. The HSL then compares the received message with the transmitted message for errors.

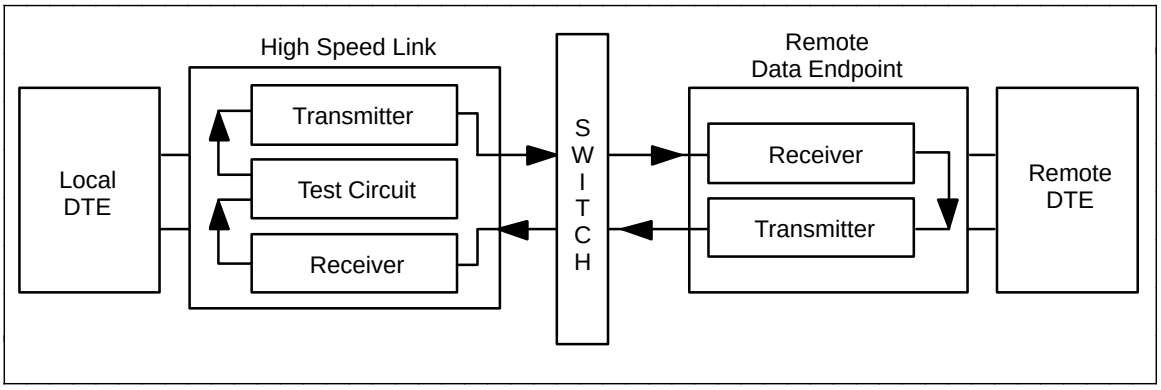

FIGURE 6-5
Remote Loopback with Self-Test

This test should be conducted when data errors are detected and the local DTE cannot send and check the returned data for errors. Passing this test indicates that the problem is most likely in the DTE equipment or the interface to the DTE equipment. Since the network problems can cause errors, this test should be run while on the call where errors were detected.

DCP LOOPAROUND TEST A mode of operation in which the DEFINITY High Speed Link retransmits the received digital line signal back to the switch. Only the switch can activate the DCP Looparound test.

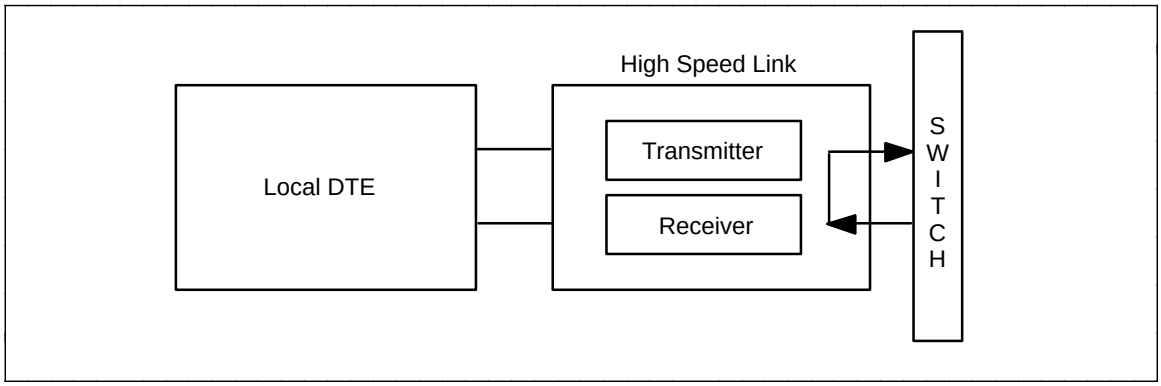

FIGURE 6-6
DCP Looparound Test

This test is conducted by switch maintenance personnel when line problems are encountered. Passing this test indicates that the digital line and the line interface circuits in the HSL are operating properly.

Chapter 7: Technical Description

PHYSICAL DIMENSIONS AND WEIGHT

The HSL measures

- Height 1.8 inches
- Width 7.1 inches
- Depth 9.2 inches
- Weight 1 pound 5 ounces

FEATURES

Line Type

- DEFINITY® Generic 1, Generic 2, and Generic 3
- System 75 and 85
- Digital Communications Protocol

Line Length (from HSL to switch)

- Up to 5000 feet, 24 gauge

Data Interface

- 34-Pin
- V.35
- Synchronous
- Internal Timing

Data Rates

- 64 Kbps, Full Duplex
- 56 Kbps, Full or Half Duplex

Auxiliary Interfaces

- 25-Pin, RS-366, Automatic Calling Equipment
- 25-Pin, RS-232, Asynchronous
  - 300, 1200, 2400, 4800, 9600, 19200 bps
  - 7 data bits
  - even, odd, zero, or one parity
  - one or more stop bits

Dialing Methods

- Manual stored number
- DTR stored number
- Hotline
- RS-366 / RS-232

Memory

- Non-volatile memory for storing options and four telephone numbers

AC POWER

AC Voltage

- 104 to 129 volts

Frequency

- 57 to 63 Hz

Power Consumption

- 9 watts

DC POWER

The HSL is powered by an external power supply. Connection to the power supply uses a six position male connector with one pin removed for polarization. The power supply must provide +5.0 vdc, and ±12.0 vdc relative to the signal ground lead. The 5 volt supply must provide at least 1.50 amp with a voltage tolerance of ±5 percent. The 12 volt circuits must provide at least 0.10 amp each with a voltage tolerance of ±10 percent. The power supply also provides a separate green wire ground connection. The green wire ground lead is permanently connected to the signal ground inside the HSL.

ENVIRONMENTAL REQUIREMENTS

Operating Temperature

- 40 to 120 degrees F (5 to 49 degrees C)

Relative humidity

- 5 to 95 percent below 84 degrees F, less than 168 grains of water vapor per pound of dry air above 84 degrees F

REGISTRATION

FCC: Part 15, sub-part B approved

Appendix A: RS-232 Interface

This appendix contains the circuits provided on the 25-pin interface for RS-232 asynchronous call set up and disconnect. When optioned for RS-232 dialing, this interface supports the ATD dial and ATH disconnect commands for call control.

TABLE A-1
RS-232 interface, pin assignments

Pin No.	Circuit	Description	Termination
2	BA (TD)	Transmitted Data	Receiver
3	BB (RD)	Received Data	Driver
4	CA (RTS)	Request to Send	Receiver
5	CB (CTS)	Clear to Send	Driver
6	CC (DSR)	Data Set Ready	Driver
7	AB (SG)	Signal Ground	Common
8	CF (RLSD)	Received Line Signal Detector	Driver
12		Not used (output always OFF)	Driver
13		Not used (output always OFF)	Driver
14		Not used (input ignored)	Receiver
15		Not used (input ignored)	Receiver
16		Not used (input ignored)	Receiver
17		Not used (input ignored)	Receiver
20	CD (DTR)	Data Terminal Ready	Receiver
22	CE (RI)	Ring Indicator	Driver

Note: The HSL ignores the RTS and DTR input leads, holds CTS, RLSD, and DSR outputs ON, and the RI output OFF. Output data lead is not used and is always set to MARK.

Appendix B: RS-366 Interface

This appendix contains the circuits provided on the 25-pin interface for RS-366 automatic calling operation. The operation of this interface is in agreement with the Electronics Industries Association (EIA) Standard RS-366 ‘‘Interface Between Data Terminal Equipment and Automatic Calling Equipment for Data Communication.’’

TABLE B-1
RS-366 Pin Assignments

Pin No.	Circuit	Description	Termination
2	DPR	Digit Present	Receiver
3	ACR	Abandon Call and Retry	Driver
4	CRQ	Call Request	Receiver
5	PND	Present Next Digit	Driver
6	PWI	Power Indication	Driver
7	SG	Signal Ground	Common
8		Not used (output always OFF)	Driver
12		Not used (output always OFF)	Driver
13	COS	Call Origination Status	Driver
14	NB1	Digit Signal Circuit (Low Order Bit)	Receiver
15	NB2	Digit Signal Circuit (Second Order Bit)	Receiver
16	NB4	Digit Signal Circuit (Third Order Bit)	Receiver
17	NB8	Digit Signal Circuit (High Order Bit)	Receiver
20		Not used (input ignored)	Receiver
22	DLO	Data Line Occupied)	Driver

Appendix C: V.35 Synchronous Interface

The DEFINITY High Speed Link provides V.35 switched network type interface circuits for high speed synchronous data transmission. This appendix contains the circuits supported and connector pin assignments for V.35 synchronous data operation.

TABLE C-1
V.35 Synchronous Data Interface

Pin No.	Circuit	Description	Termination
A		No Connection	
B		Signal Ground	Common
C	RTS	Request to Send	Receiver
D	RFS	Ready for Sending	Driver
E	DSR	Data Set Ready	Driver
F	RLSD	Received Line Signal Detector	Driver
H	DTR	Data Terminal Ready	Receiver
J	RI	Ring Indicator	Driver
K		No Connection	
L	LL	Local Loopback	Receiver
M		No Connection	
N	RL	Remote Loopback	Receiver
R	RD	Received Data A-wire	Driver
T	RD	Received Data B-wire	Driver
V	RT	Receive Signal Element Timing A-wire	Driver
X	RT	Receive Signal Element Timing B-wire	Driver
Y	TT	Transmitter Signal Element Timing A-wire	Driver
AA	TT	Transmitter Signal Element Timing B-wire	Driver
P	TD	Transmitted Data A-wire	Receiver
S	TD	Transmitted Data B-wire	Receiver
U		No Connection	
Z		No Connection	
W		No Connection	
BB		No Connection	
CC		No Connection	
DD		No Connection	
EE		No Connection	
FF		No Connection	
HH		No Connection	
JJ		No Connection	
KK		No Connection	
LL		No Connection	
MM		No Connection	
NN	TM	Test Mode	Driver

Appendix D: Applications and Switch Administration

PREFACE

The purpose of this Appendix is to provide information for designing, implementing, and administering applications which involve the DEFINITY High Speed Link in conjunction with the DEFINITY Communications Systems or System 75/85 and is written for people with a thorough understanding of switch administration procedures for switched and permanent data connections.

OVERVIEW

This Appendix describes several examples regarding the configurations and implementation of data networking applications involving the DEFINITY High Speed Link (HSL) and the DEFINITY Communications Systems or System 75/85. The use of the HSL, however, is not limited to these applications. Through the examples, it is the intent of these notes to give readers a basic understanding of the different HSL configurations and implementations so that they can develop customized HSL solutions that meet their own needs and applications. It is recommended that the appropriate switch implementation and administration manuals be used in conjunction with this Appendix.

The HSL is used to provide connectivity between a data endpoint (such as video codec or LAN bridge) and the DEFINITY Communications System or System 75/85. The endpoint communicates with the HSL through a V.35 interface while the HSL communicates with the switch over a DCP interface. The switch is then used to establish and maintain a switched or permanent connection through the public or private network. An example of this configuration is shown in Figure D-1.

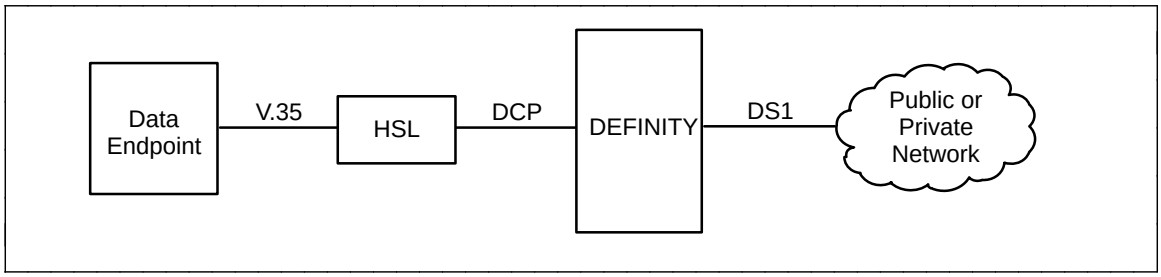

FIGURE D-1
Overview

The remainder of this Appendix will cover the details necessary to support HSL applications on the switch. For both switched and permanent applications, the following implementation information is provided:

- Data endpoint requirements
- Switch requirements
- Network service requirements
- Network access requirements
- Configuration and administration examples

The last section, Configuration and Administration Example, will include descriptions of switched and private line applications to provide an overview of how these applications are configured and implemented.

SWITCHED APPLICATIONS

A switched application is one in which a connection must be set up every time there is a need to transmit data. Once the transmission is completed, the connection is cleared.

Typical switched applications include: videoconferencing, dial-up Local Area Network (LAN) bridging, batch processing, and dialed back-up. Switched calls can be routed over the public network using ACCUNET Switched Digital Service (SDS) or Software Defined Data Network (SDDN). Or, they can be switched through a private network made up of switches interconnected with private T1s. In either the public or private switched configuration, the data endpoint can initiate a call through the HSL and send the data over the V.35 interface. An example of switched videoconferencing is shown in Figure D-2.

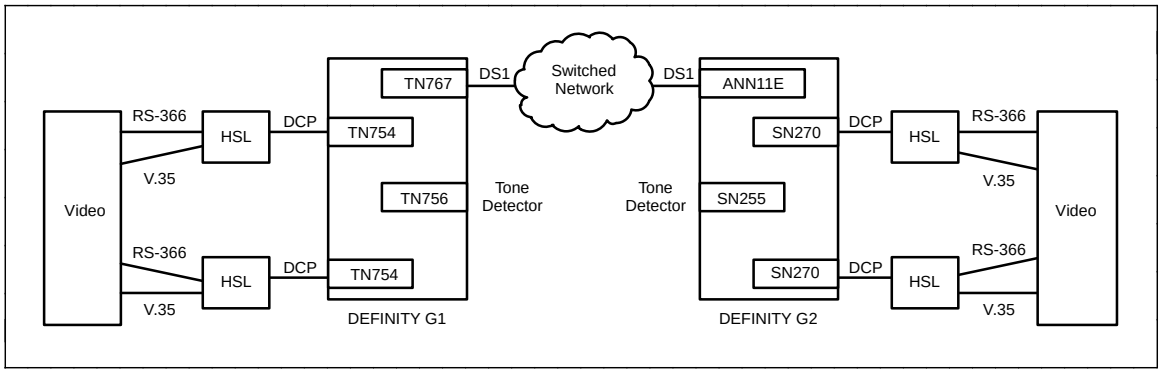

FIGURE D-2
Switched Applications

Data Endpoint Requirements

For proper switched operation the data endpoint must support the Data Terminal Ready (DTR) lead on its V.35 interface. The DTR lead provides the signal to the HSL that it is ready to receive or originate a call. Before the HSL can originate (dial) or answer a call, the DTR lead must be asserted (high) by the endpoint. The endpoint can also drop the call by turning off the DTR lead.

Switch Requirements

Switched applications are supported on the following switches:

- System 75 R1V2 or later,
- System 85 R2V3 or later, and
- DEFINITY Communications System Generics 1, 2, and 3.

It should be noted, that the level of functionality varies from switch to switch and from release to release. The major difference involves the type of network access arrangement that is supported. For more details, consult the section on Network Access Requirements in this Appendix.

Switch Hardware

HSL applications require a DCP port to interface with the switch. Each Digital Line circuit pack (TN754 - S75, Generic 1, Generic 2 Universal Module; SN270B - S85, Generic 2 Traditional Module) has eight DCP ports which can be used for both HSL and non-HSL applications. If the application requires connectivity to another switch or across a public network, a DS1 circuit pack (TN767 - Generic 1, ANN11E - Generic 2) is also required.

Tone detectors are required to receive touch-tone signals and detect call progress tones, modem answer-back tones, transmission test tones, and noise. In switched applications, tone detectors are used to indicate to the originating switch when the HSL should be cut-through. On
System 85/Generic 2, the SN255B tone detector is available on the Traditional Module and the TN748C is used on the Universal Module. On System 75/Generic 1, the TN748C is used with the exception of the System 75 XE and the Generic 1 Single Carrier System where the TN756 and the TN768 are used, respectively.

Note: At peak traffic, the capacity of the tone detectors can be exceeded resulting in intermittent call set-up failures. To remedy this, additional tone detectors should be installed.

Switch Software

To allow the switch to properly route calls over a private network, Automatic Alternate Routing (AAR) software is required. Similarly, Automatic Route Selection (ARS) software is required for public network routing.

Network Service Requirements

To provide switched data networking through the DEFINITY Communications System or System 75/85, access to one of the following switched public or private data networks is required.

- **Private T1** — Private facilities can be used to place switched 56/64 Kbps calls through a company's private network. These calls are switched through a series of tandem switches connected by private T1 facilities.
- **ACCUNET Switched Digital Services (SDS)** — SDS offers switched 56/64 Kbps digital transmission between any two locations, intra- and intercompany. SDS is also connected to Switched Digital International (SDI) Service for switched 56/64 Kbps digital transmission to international locations.

  Before placing international 56 Kbps calls, verify that the data rate of the destination data endpoint is 56 Kbps. This is required since
  64 Kbps is the dominant data rate outside the U.S. Furthermore, international 64 Kbps calls must be established as a clear-channel or unrestricted calls.
- **Software Defined Data Network (SDDN)** — SDDN is an option for AT&T's Software Defined Network (SDN) customers wishing to incorporate switched 56/64 Kbps service into their existing numbering and pricing plans.

Network Access Requirements

Access to SDS and SDDN is via DS0 channels on a DS1 facility. There are three types of access available:

- **Static Access** — Static access from DEFINITY or a System 75/85 to the public network requires a separate dedicated trunk group for each service. With static access, a particular trunk group can only be used for data calls to the specified service — it cannot be used for voice calls or to access other services. The System 75/85 and DEFINITY Communications System support a static access arrangement on both robbed-bit and ISDN PRI facilities.
- **Dynamic Access** — Dynamic access provides the ability to use the same trunk group for voice and data to access SDN/SDDN. This capability is often referred to as Alternate Voice/Data (AVD). Dynamic access to SDN/SDDN can be accomplished on a DS1 robbed-bit or ISDN PRI facility. Note that dynamic access to SDS does not apply since SDS can only carry data calls.
- **ISDN PRI Call by Call Service Selection** — Call-By-Call Service Selection is an enhancement to dynamic trunk access that enables a single ISDN PRI facility to provide access to an assortment of AT&T network services including SDS and SDN/SDDN, regardless of whether the call is voice or data.

For each call, the switch determines which service is required to handle it based on the number dialed and its administration tables. The switch will then request a particular service from the network through an ISDN message. Call-By-Call Service Selection provides the greatest amount of efficiency in the engineering of access facilities.

Table D-1 summarizes the access arrangements supported by the different switch releases.

Network Requirements for Incoming Call Routing

In order to properly route calls from a public network, such as SDN/SDDN, the switch requires information regarding the called number. The Dial Number Identification Service (DNIS) provides this functionality on both robbed-bit and ISDN PRI facilities. Note that digits sent from the network must match the dial plan of the switch in order for the switch to properly route the call. Therefore, when provisioning a network service the requirements for digit delivery must be specified.

TABLE D-1
Available Data Rates for Various Network Access Arrangements

DEFINITY PBX	SDS or SDDN Static Trunk Group		SDN/SDDN Dynamic Trunk Group		SDS/SDN/SDDN ISDN Call-by-Call
	Robbed-Bit	ISDN PRI	Robbed-Bit	ISDN PRI	Service Selection
System 75 R1V2	56	N/A	N/A	N/A	N/A
System 75 R1V3	56	N/A	N/A	N/A	N/A
System 85 R2V3	56	N/A	N/A	N/A	N/A
System 85 R2V4	56	56/64	N/A	56/64	56/64
DEFINITY G1	56	56/64	56	56/64	56/64
DEFINITY G2	56	56/64	56	56/64	56/64
DEFINITY G3	56	56/64	56	56/64	56/64

56 = 56 Kbps, 64 = 64 Kbps, N/A = Not available

Network Requirements for Outgoing Call Routing

When establishing a call over a dynamic access facility, the switch must inform the network of the type of service requested and the destination of the call so that it can be properly handled. On robbed-bit facilities, the dialed digits provide this information. For example:

- SDS domestic calls are identified by "700" numbers. More specifically, the numbering format for 56 Kbps SDS calls is 700-56X-XXXX while ISDN 56 or 64 Kbps calls are in the format 700-737-XXXX.
- International SDS calls are prefixed with a "173." To place international SDS calls, the user must dial 173+CC+NN, where 173 is the service identifier, CC is the country code (for example, 44 is used for the U.K.), and NN is the destination number in a format that complies with the destination country's numbering plan.
- SDDN calls are prefixed with "115" to identify to the SDN that the call is a 56 Kbps data call. To place SDDN calls, the user must dial 115-NNN-NNNN, where the last 7 digits are the SDN destination number. For 64 Kbps data calls, an ISDN PRI message is used to convey this information to the network.

The insertion of these service identifiers can be done automatically by the AAR/ARS software in the switch such that it is transparent to the user. Note that if ISDN PRI access is used, the "115" and "173" identifiers are not required for SDDN and international SDS calls since the service identification information will be conveyed in an ISDN message.

For static access, where only one service is supported by an access facility, a service identifier is not required.

Configuration and Administration Example

In this section, an example of a switched application will be presented to describe a typical HSL configuration and the steps needed to administer this application. The application and configuration presented here is not the only one available to the HSL. Instead, the intent is to give the reader a basic understanding of HSL switched applications.

Application Description

In this application the customer has a DEFINITY Generic 1 that is connected to a DEFINITY Generic 2.1 via SDN. In addition to the voice traffic that is carried by the SDN, the customer wants to have the capability of making 112 Kbps video calls from both sites over SDDN.

Implementation

To implement this application, a videoconferencing system at each site is connected to two HSLs, each operating at 56 Kbps for a collective data rate of 112 Kbps. On each HSL, the RS-366 interface is used for dialing and the V.35 interface for 56 Kbps data transmission. The Generic 1 and 2 are part of a SDN/SDDN with robbed-bit dynamic access over DS1 trunks (trunk groups 10 and 60). In addition, the prefix "115" is inserted to inform the network that these video calls must be routed over SDDN. Digit insertion along with the call routing can be done using the Private Network Access (PNA) feature, also known as AAR, on the Generic 1 and 2. A 7 digit dialing plan, which is sometimes referred to as Private Network Interface, is used in this SDN. The configuration of this network is shown in Figure D-3.

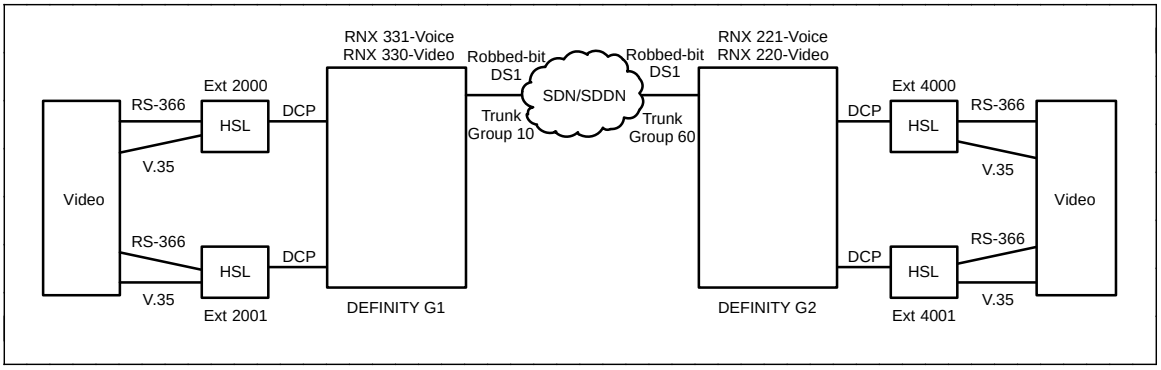

FIGURE D-3
Switched Videoconferencing

Administration

The following section describes the HSL settings as well as the administration of the DEFINITY Generics 1 and 2 needed to implement switched videoconferencing. The description of Generic 1 and 2 administration is presented in the following order:

- Station Administration
- Trunk Group Administration
- Routing Administration

Although the information presented here pertains to the DEFINITY Generic 1, this information can also be applied to a System 75 or a DEFINITY Generic 3. Likewise, the DEFINITY Generic 2 information can be applied to System 85. To assist in describing the administration procedures, selected administration screens are provided as reference.

Note: This section should not be used as a step-by-step administration guide nor is it intended to replace the information provided in the switch administration manuals. Only those procedures and entries that are essential to this application will be covered. It is recommended that the proper administration manuals be consulted before any steps are taken. Furthermore, certain fields in various administration screens and procedures have been left blank or their default values have been used because the proper entry for those fields will vary from switch to switch. It is left to the discretion of the network administrator to properly populate these fields.

HSL Options

For switched video applications, the HSLs on both the Generic 1 and Generic 2 are all optioned as follows:

```
DIAL = RS-366     PERM CONN = NO
SPEED = 56KBPS    LOOPBACK = AT&T
DUPLEX = FULL     DSR = NORMAL
ANSWER = AUTO     DTR = NORMAL
```

Data Invert should be set to ON if a 64 Kbps call is established with a data module that performs bit inversion at 64 Kbps, such as the MPDM.

These settings are described in Chapter 4, ‘‘Options.’’

Generic 1 Administration

Station Administration

In this application, the two HSLs (extensions 2000 and 2001) are administered identically on the Generic 1 and are done using the Data Module form (Screen D-1). The administration of this form is identical to that of an MPDM:

- **Type**: *PDM*. For administrative purposes, the HSL is aliased as a "PDM".
- **Connected to**: *DTE*. To indicate that the HSL is connected to a data terminal equipment (DTE).
- **Remote Loop-Around Test**: *Y*. To indicate that the module responds to loop-back commands from the switch.

If Data Privacy is required, the Class of Service (COS) should be assigned to a class in which the Data Privacy feature is active. In this example, COS 1 has Data Privacy and is therefore assigned to this extension. The Class of Restriction (COR) should be set so that each extension can access an SDN/SDDN trunk. In this example, COR 1 has been established to access an SDN/SDDN trunk.

```
                                          Page 1 of 1

                          DATA MODULE

     Data Extension:  2000        Type:  pdm         Port:  __
             Name:  Video1         COS:  1            COR:  1
  Connected to:  DTE                 Remote Loop-Around Test:  Y

ABBREVIATED DIALING
     List1:  _________

HOT LINE DESTINATION
    Abbreviated Dialing Dial Code (from above list):  __

ASSIGNED MEMBERS
    (Stations with a data extension button for this data module

         Ext       Name               Ext       Name

        1:                           3:

        2:                           4:
```

SCREEN D-1
Generic 1 HSL Station Administration

Trunk Group Administration

To administer the trunk group for the videoconference call, the Trunk Group form is used (Screen D-2) and is populated in the following manner:

- **Group Number**: *10*. This is the trunk group that accesses SDN/SDDN.
- **Group Type**: *tie*. The access trunk group is a tie trunk.
- **Direction**: *two-way*. This trunk group will be used for both incoming and outgoing calls.
- **Comm Type**: *rbavd*. Robbed-bit alternate voice/data should be used for dynamic access. This field can also be set to "data" for static access.
- **Trunk Type**: *wink/wink*. Digits will be supplied to and from SDN/SDDN. Make sure that the trunk type is coordinated with the network provider since the switch administration must match how the network provides signaling.

The group members of this trunk group must be assigned on pages 3 to 9 of the Trunk Group form. For 112 Kbps video applications, at least two channels (DS0s) must be defined for the trunk group. Also note that the **Bit Rate**, **Synchronization**, and **Duplex** fields at the bottom of this form refer to modem pool applications and do not affect this application.

```
                                        Page 1 of 9
                          Trunk Group

Group Number:  10             Group Type:  tie   SMDR Reports?  Y
  Group Name:  SDN DYNAMIC           COR:  1              TAC:
   Direction:  two-way  Outgoing Display?  n

 Dial Access:  y          Busy Threshold:  99   Night Service:  ___
Queue Length:  0                        Incoming Destination:  __
   Comm Type:  rbavd           Auth Code?  n


TRUNK PARAMETERS
  Trunk Type (in/out):  wink/wink  Incoming Rotary Timeout (sec):  5
   Outgoing Dial Type:  tone                 Incoming Dial Type:  tone
                                     Disconnect Timing (msec):  500
      Digit Treatment:  ________                         Digits:  ____
    Connected to Toll:  y    STT Loss:  normal   DTT to DCO Loss:  normal
   Incoming Dial Tone:  y
             Bit Rate:         Synchronization:           Duplex:
Answer Supervision Timeout?  10
```

SCREEN D-2
Generic 1 Trunk Group Administration

Routing Administration

The AAR software on the Generic 1 allows the switch to route the video call over the appropriate trunk group and insert the "115" prefix indicating to the SDN that it is a data call. For the switch to determine when the prefix "115" should be inserted, it must recognize when a video endpoint is being called. To do this, a pseudo PBX location code (RNX) must be established for video.

Note: The World Class Routing feature in the DEFINITY Generic 3 allows for much greater flexibility in treatment of data and voice calls. Refer to the Generic 3 Feature Reference Manual for more information.

In this example, the Generic 2 has an RNX of 221 for voice and a pseudo RNX of 220 for video. As seen in the RNX Translation Table (Screen D-3), RNX 220 and 221 are assigned to different routing patterns (30 and 29, respectively) which allow the digits to be manipulated differently. All the other RNXs have not been assigned. In this configuration, voice calls will be dialed as 8-221-XXXX and data calls as 8-220-XXXX. The "8" is the AAR feature access code (FAC).

```
                                                    Page 1 of 1
                              RNX TABLE:  2
                        Partitioned Group Number:  1

R20:  30 R30: 254 R40: 254 R50: 254 R60: 254 R70: 254 R80: 254 R90: 254
R21:  29 R31: 254 R41: 254 R51: 254 R61: 254 R71: 254 R81: 254 R91: 254
R22: 254 R32: 254 R42: 254 R52: 254 R62: 254 R72: 254 R82: 254 R92: 254
R23: 254 R33: 254 R43: 254 R53: 254 R63: 254 R73: 254 R83: 254 R93: 254
R24: 254 R34: 254 R44: 254 R54: 254 R64: 254 R74: 254 R84: 254 R94: 254
R25: 254 R35: 254 R45: 254 R55: 254 R65: 254 R75: 254 R85: 254 R95: 254
R26: 254 R36: 254 R46: 254 R56: 254 R66: 254 R76: 254 R86: 254 R96: 254
R27: 254 R37: 254 R47: 254 R57: 254 R67: 254 R77: 254 R87: 254 R97: 254
R28: 254 R38: 254 R48: 254 R58: 254 R68: 254 R78: 254 R88: 254 R98: 254
R29: 254 R39: 254 R49: 254 R59: 254 R69: 254 R79: 254 R89: 254 R99: 254
```

SCREEN D-3
Generic 1 Routing Administration - RNX Translation Table

To route the call over Trunk Group 10 and through the SDN, the "115" prefix must be inserted and the pseudo RNX 220 must be replaced by the RNX that the SDN understands, 221. To do this, the Routing Pattern form (Screen D-4) is administered in the following manner:

- **Grp No.** - *10*. This is the trunk group over which the video calls are to be routed over. Note that it is possible to use the same trunk group to route both voice and video calls.
- **No. Del Digits** - *3*. This deletes the 220 pseudo RNX.
- **Inserted Digits** - *115221*. The "115" prefix is inserted along with the proper RNX (221).

```
                                                    Page 1 of 1
                          Pattern Number:  30

    Pattern Assignments (Enter Up to 6)

     Grp.    FRL   NPA   Prefix   Toll  No. Del   Inserted          IXC
     No.                 Mark     List  Digits    Digits
1.   10      __    ___    __       __    3        115221            ___
2.   __      __    ___    __       __    __       ________________  ___
3.   __      __    ___    __       __    __       ________________  ___
4.   __      __    ___    __       __    __       ________________  ___
5.   __      __    ___    __       __    __       ________________  ___
6.   __      __    ___    __       __    __       ________________  ___

     BCC Value           Service/Feature
    0  1  2  3  4
1.  _  _  _  _  _        ________________  Band:  ____
2.  _  _  _  _  _        ________________  Band:  ____
3.  _  _  _  _  _        ________________  Band:  ____
4.  _  _  _  _  _        ________________  Band:  ____
5.  _  _  _  _  _        ________________  Band:  ____
6.  _  _  _  _  _        ________________  Band:  ____
```

SCREEN D-4
Generic 1 Routing Administration - Routing Pattern Form

With the completion of this screen, the administration for switched videoconferencing over SDDN on the Generic 1 is complete. Two HSLs have been administered such that when the user dials the two numbers (each in the form of 8-220-XXXX) for the videoconference call, the switch will select Trunk Group 10 and outpulse 115221XXXX to SDN / SDDN.

ISDN Administration

If this application is implemented using ISDN PRI access facilities, additional administration must be done. One of the parameters that must be entered is the Bearer Capability Class (BCC) which defines the nature of a call (for example, 56 Kbps data). When administering an ISDN PRI facility, a new field will appear called the BCC and for this application, that field should be populated with a *1* to indicate 56 Kbps data transmission. Similarly, on the Routing Pattern form (Screen D-4), a *Y* should be entered under **BCC Value**, columns 0 and 1, to allow the switch to properly handle the call.

International (Unrestricted) Calls

A 64 Kbps international call must be classified as unrestricted. To do this on the DEFINITY Generic 1, the destination must be recognized as an international number (typically with a 011 prefix). Note that the Generic 1 can only set up a call as unrestricted if the call is an international 64 Kbps data call and routed over ISDN PRI facilities.

The Generic 3 has the added capability to set up a domestic or international call as unrestricted. This is done by adding the Information Transfer Capability (ITC) and Bearer Capability Information Element (BCIE) fields to several administration forms. Depending on how these fields are administered, the switch can decide if the call is to be routed over restricted or unrestricted facilities. The default settings for these fields is for restricted (domestic) calls. However, if both restricted and unrestricted (international) endpoints are to be called, the routing patterns must be changed. Specifically, a routing pattern should be created so that the trunk group to Switched Digital International accepts a restricted endpoint and sets up the call as unrestricted. This is accomplished by setting the **ITC** field to *both* (unrestricted and restricted) and the **BCIE** field to *unr* (unrestricted) in the Routing Pattern forms (these fields only appear on systems administered with ISDN PRI).

System Related Parameters

Data calls that traverse through international networks or over multiple tandem switches may experience long call set-up intervals. This may cause the switch to drop the call before the call can be completed. To remedy this situation, the "Off-Premises Tone Detect Timeout Interval" can be increased to a maximum of 25 seconds. This field can be found on the "Feature Related Systems Parameters" screen.

Generic 2 Administration

The next step in implementing this application is to administer the Generic 2.1 to handle switched data calls over SDDN.

Station Administration

Assuming the Dialing Plans and Class of Services (COS) have been defined, the HSL extensions (4000 and 4001) are administered using the following procedures for each extension:

- **PROC 000 Word 1** is used to create the HSL extensions (4000 and 4001) and associate a Class of Service (COS) for these extensions. The COS should have at least touch-tone dialing, conference / transfer, and data protection assigned.
- **PROC 000 Word 3** is used to assign a Bearer Capability Class of Service (BCCOS) to these extensions. BCCOS 3 can be used as long as it has not been altered from the default. If BCCOS 3 has been altered, another BCCOS must be created with the same attributes as the default BCCOS 3. This procedure should be performed only if the call is going to be routed over ISDN PRI facilities.

```
              ENHANCED MODE - PROCEDURE:  051, WORD:1

       MULTIAPPEARANCE TERMINAL AND DATA MODULE TRANSLATION

TERMINAL EQUIPMENT LOCATION
   1.    Module: [--]           12.  Lock/Unlock Available: [-]
   2.   Cabinet: [-]            13.       Keyboard Dialing: [1]
   3.   Carrier: [-]            14.   LWC Global Retrieval: [-]
   4.      Slot: [--]           15.      Terminal Alarming: [-]
   5.   Circuit: [--]           16.                BRI TEI: [---]
                                17.         ISDN Advantage: [-]
TERMINAL OR DATA MODULE TYPE
   6.   Terminal Type: [1]
   7.          Option: [0]
PHYSICAL TYPE
   8.      Data: [2]
   9.   Display: [-]
PREFERENCE
  10.  Origination: [2]
  11.  Termination: [0]
```

SCREEN D-5
Generic 2 HSL Station Administration

- **PROC 051 Word 1** (Screen D-5) is used to define a data module. The fields must be populated in the following manner:
  - **Field 6 (Terminal Type)**: *1*. To indicate a PDM (the HSL is aliased as a PDM).
  - **Field 7 (Option)**: *0*. To indicate data.
  - **Field 8 (Data)**: 2. Because the PDM is not an available choice, the 7400 should be entered.
  - **Field 10 (Origination)**: *2*. To originate on prime line.
  - **Field 11 (Termination)**: *0*. To indicate no preference on termination assignment.
  - **Field 13 (Keybd Dialing)**: *1*. To allow the HSL to dial / originate calls. In this example this is done through the RS-366 interface.
- **PROC 052 Word 1** is used to define the line appearance and match the HSL extensions to the equipment location. The fields must be populated in the following manner:
  - **Field 8 (Extension number):** *4000, 4001*. This should be populated with the HSL extension as defined in PROC 000.
  - **Field 9 (Line Appearance):** *1*. There is only one line appearance with the HSL.
  - **Field 10 (Line Type):** *1*. To indicate prime line answering.

► **Field 11 (Ringing Type):** *1*. This will allow the switch to ring the HSL for incoming calls.

Trunk Group Administration

To administer Trunk Group 60 to carry SDN / SDDN traffic the following procedures must be performed:

- **PROC 260 Word 1** is used to administer the DS1 circuits with signaling. This is only required if the DS1 in which the trunk group is to be administered on has not yet been administered.
- **PROC 100 Word 1** (Screen D-6) is used to administer the trunk group translations. To implement this application, the following fields must be populated.
  - ► **Field 1 (Trunk Group):** *60*. This is the trunk group number for this application.
  - ► **Fields 2-5 (Dial Access Codes):** *160*. 160 is used in this application.
  - ► **Field 6 (Trunk Type):** *41*. Although a trunk type of 41 indicates a TIE ETN 2-way dial repeating trunk group, it can also be used to indicate dynamic access.
- **PROC 100 Word 2** is used to define the BCCOS of the trunk group. To allow voice and 56 Kbps (Mode 1) data calls on the same trunk group, Field 2 (BCCOS) should be set to "3," the default BCCOS for administering alternate voice / data trunk groups. This procedure should be performed only if the call is going to be routed over ISDN PRI facilities.
- **PROC 101 Word 1** is used to administer trunk group characteristics. To enable touch-tone signaling for incoming and outgoing trunks, Fields 6 and 7 should be set with a "1" for trunk group 60.

```
              ENHANCED MODE - PROCEDURE:  100, WORD:1

                    TRUNK GROUP TRANSLATION

   1.    Trunk Group: [60]
DIAL ACCESS CODE/TRUNK ID CODE
   2.  Digit 1: [1]
   3.  Digit 2: [6]
   4.  Digit 3: [0]
   5.  Digit 4: [-]

 6. Trunk Type: [41]
 7.      Dial Access Restriction: [-]
 8.  Personal CO Line Appearance: [-]
 9. Public Network Access/Egress: [-]
DISPLAY ONLY
  10.  Signaling Type: [---]
```

SCREEN D-6
Generic 2 Trunk Group Administration

- **PROC 103 Word 1** (Screen D-7) is used to define the network functionality of Trunk Group 60 and should be populated as follows:
  - ► **Field 1 (Trunk Group):** *60.*
  - ► **Fields 3 and 4 (Network Trunk Usage):** *1,0.* This indicates a network to main trunk usage.
  - ► **Field 5 (AAR Trunk Access):** *1.* This allows incoming SDN/SDDN calls to have access to AAR in the switch.
  - ► **Field 9 (AAR dialing prefix):** *8.* The AAR Feature Access Code (FAC) is 8 and will be the access code for SDN/SDDN calls.

Note: With World Class Routing on the Generic 2.2, the appearance of these forms will alter slightly. Refer to the Generic 2.2 administration manual for the proper procedures.

```
              ENHANCED MODE - PROCEDURE:  103, WORD:1

                  NETWORK TRUNK GROUP TRANSLATION

 1.                     Trunk Group: [60]
 2.      Facility Restriction Level: [-]
 3.                   Network Trunk: [1]
 4.                     Main/Tandem: [0]
 5. Incoming Tie to AAR/ARS or APLT: [1]
 6.     Authorization Code Required: [-]
 7.               Bridge-On Allowed: [-]
 8.         Trunk Reservation Limit: [--]
 9.                   AAR/ARS Prefix: [8]
10.     Data Protection (Permanent): [-]
11.   Remote Access Echo Suppressor: [-]
12.         AAR Conditional Routing: [-]
13.                      Second TCM: [-]
14.                Digit Collection: [-]
```

SCREEN D-7
Generic 2 Trunk Group Administration

- **PROC 116 Word 1** is used to administer digital trunks to a trunk group and should be administered as follows:

  ► **Field 8 (Signaling assignment):** *0.* To indicate robbed-bit signaling.

Routing

For the Generic 2 to dynamically route video and voice calls over a dynamic trunk group, it needs to know if the destination is a video endpoint. This is done using pseudo PBX location codes (RNXs) as already described in the Generic 1 administration. In this example, the Generic 1 has an RNX of 331. A pseudo RNX of 330 will be created so that the Generic 2 will know when to insert the "115" and which trunk group to use. To do this the following steps should be taken:

- **PROC 321 Word 1** (Screen D-8) is used to administer AAR for routing and digit manipulation instructions and should be populated as follows:
  - **Field 1 (AAR Pattern Number):** *30*. This identifies the routing pattern to be used.
  - **Field 2 (Preference Number):** *1*. This should be first preference used for routing.
  - **Field 3 (Trunk Group):** *60*. Trunk Group 60 will be used to carry voice and video calls to SDN/SDDN.
  - **Field 7 (Digits Deleted):** *3*. Three digits will be deleted for these calls. In this case, it will be the pseudo RNX 330.

```
              ENHANCED MODE - PROCEDURE:  321, WORD:1

                          AAR - ROUTE TABLES

 1.                    Pattern Number: [30]
 2.                Preference Number: [1]
 3.                      Trunk Group: [60]
 4.       Facility Restriction Level: [-]
 5.                     Warning Tone: [-]
 6.                          Off Net: [-]
 7.         Number of Digits Deleted: [3]
 8. Digit Collect (DC) Signal Ignore: [-]
 9.                     Oxxx Allowed: [-]
10.      IXC ISDN Network Identifier: [---]
```

SCREEN D-8
Generic 2 Routing Administration - AAR Routing

- **PROC 321 Word 2** (Screen D-9) defines the digit group and dialing format for a trunk group in an AAR pattern and should be populated as follows:
  - **Field 1 (Pattern Number):** *30.*
  - **Field 2 (Preference):** *1.*
  - **Field 3 (Pause Length):** *2.* This is the pause length, in seconds, before the outpulsing of group one digits.
  - **Field 4 (Number of Digits):** *10.* Ten digits will be passed along to SDDN (115 + 7 digit SDDN number).
  - **Field 5 (Signaling):** *0.* "0" indicates touch-tone signaling for outpulsing.

  In this application, only one trunk group needs to be defined. All other groups will not be administered.

```
              ENHANCED MODE - PROCEDURE:  321, WORD: 2

                          AAR - SUBNET TRUNKING

 1.           Pattern Number: [30]
 2.        Preference Number: [1]
GROUP ONE
   3.            Pause Length: [2]
   4.       Number of Digits: [10]
   5.               Signaling: [0]
GROUP TWO
   6.            Pause Length: [--]
   7.       Number of Digits: [--]
   8.               Signaling: [-]
GROUP THREE
   9.            Pause Length: [--]
  10.       Number of Digits: [--]
  11.               Signaling: [-]
GROUP FOUR
  12.            Pause Length: [--]
  13.               Signaling: [-]
```

SCREEN D-9
Generic 2 Routing Administration - Subnet Trunking

- **PROC 321 Word 3** (Screen D-10) defines digits that will be inserted for calls handled by Routing Pattern 30 and should be populated as follows:
  - **Field 1 (Pattern Number):** *30.*
  - **Field 2 (Preference Number):** *1.*
  - **Field 3 (Digit Segment):** *1.* Only one digit group was defined in PROC 321 Word 2.
  - **Fields 4 - 9 (Inserted Digits):** *115331.* With pseudo RNX 330 already deleted (PROC 321 Word 1), the actual RNX (331) must be inserted along with the "115" data identifier for SDN.

```
              ENHANCED MODE - PROCEDURE:  321, WORD: 3

                          AAR - DIGITS INSERTED

 1.           Pattern Number: [30]
 2.        Preference Number: [1]
 3.            Digit Segment: [1]
DIGIT SEGMENTS ONE, TWO, AND THREE
   4.       Digit 1, 9, or 17: [1]
   5.      Digit 2, 10, or 18: [1]
   6.      Digit 3, 11, or 19: [5]
   7.      Digit 4, 12, or 20: [3]
   8.          Digit 5, or 13: [3]
   9.          Digit 6, or 14: [1]
  10.          Digit 7, or 15: [--]
  11.          Digit 8, or 16: [--]
```

SCREEN D-10
Generic 2 Routing Administration - AAR Digit Insertion

- **PROC 321 Word 4** (Screen D-11) is used to associate a RNX with an AAR pattern number. In this example, pseudo RNX 330 (Field 1) is associated with AAR pattern number 30 (Field 4) so that the proper digit manipulation and routing can be performed as defined in PROC 321 Words 1, 2, and 3.

```
              ENHANCED MODE - PROCEDURE:  321, WORD:  4

                          AAR - ROUTING

1.  Location Code (RNNX): [330]
2.           Mode Number: [---]
3.         Call Category: [---]
4.        Pattern Number: [30]
5.           First Digit: [-]
```

SCREEN D-11
Generic 2 Routing Administration - RNX and Pattern Number Association

Note: If there are any ISDN PRI trunks defined on the Generic 2, PROC 321 Word 5 (ISDN parameters for AAR preferences) must be administered even though these video calls are being routed over robbed-bit facilities. If this is the case, PROC 321 Word 5 must be administered such that the BCCOS (Field 5) of routing pattern 30 (Field 1) is *3*. This is assuming that the default BCCOS 3 has not been altered. If it has been altered, another BCCOS should be defined using the default BCCOS 3 attributes.

The administration to support switched videoconferencing is now complete. A user can now dial two numbers of the form 8-330-XXXX to establish a video call from the Generic 2 to the Generic 1. The 8 represents the feature access code for AAR. The 330 is used to indicate that the call is an SDDN call so that the switch can select trunk group 60 and replace the 330 prefix with 115331 in order to route the call to the proper location over SDDN.

International (Unrestricted) Calls

A 64 Kbps international call must be classified as unrestricted and as a result it must be routed over ISDN PRI facilities. The Generic 2 routes a data call as restricted / unrestricted based on the BCCOS. Since there are no pre-defined BCCOS for unrestricted calls, a new BCCOS must be created and assigned to an extension making international calls. In this example, a new BCCOS (250) will be created using the attributes of the pre-defined BCCOS 6, but with the following changes:

- **PROC 14 Word 1** (Screen D-12) is used to define a new BCCOS. The following fields must be populated as indicated:
  - ► **Field 1 (BCCOS):** *250*. This is the new BCCOS number.
  - ► **Field 3 (Information Type):** *1*. This is used to indicate an unrestricted channel.
  - ► **Field 15 (Default Information Type):** *1*. For facilities that do not have a BCCOS or an associated information element, this field assigns a default channel type that is unrestricted (1).
  - ► **Field 16 (Default Bearer Capability):** *4*. The default channel type is 64 Kbps Mode 0 data.

  If all calls, except Mode 0 (64 Kbps) calls are to be blocked, Fields 4 through 13 should be populated with a *2*, except for Field 6 which should be populated with a *1*.

```
              ENHANCED MODE - PROCEDURE:  014, WORD: 1

         BEARER CAPABILITY CLASS OF SERVICE - CALL OPTIONS

 1.  Bearer Capability COS: [250]
 2.         Transport Mode: [0]
 3.       Information Type: [1]
CALL TYPES AND ACTION TAKEN
   4.            Voice: [0]
   5. Voice Grade Data: [1]
   6.           Mode 0: [0]
   7.           Mode 1: [0]
   8.           Mode 2: [0]
   9.           Mode 3: [0]
  10.  Unknown Digital: [0]
  11.   Unknown Analog: [1]
  12.         Mode 3/2: [0]
  13.             X.25: [0]
DEFAULT CAPABILITIES
  14.   Transport Mode: [0]
  15. Information Type: [1]            16. Bearer Capability:[4]
```

SCREEN D-12
Generic 2 International Administration

Once BCCOS 250 has been defined, it can be used in other

procedures (PROC 000 Word 3 and PROC 321 Word 5) where a BCCOS entry is required.

Generic 2 System Administration

For data calls that originate on a Generic 2, the tone detector must be administered. This is done by creating a special trunk group. If this is the first data application on the switch, then this trunk group must be created using PROC 100, Word 1 (Screen D-13). In this case the trunk group is 100.

- **PROC 100 Word 1** (Screen D-13) is used to create a special trunk group. The following fields must be populated as indicated:
  - ► **Field 1 (Trunk Group):** *100*. This is the trunk group for the tone detectors.
  - ► **Field 6 (Trunk Type):** *100*. To indicate that this is a tone detector trunk group.

  Once this trunk group is created, no further administration for tone detectors is needed for additional stations.

```
              ENHANCED MODE - PROCEDURE:  100, WORD: 1


   1.    Trunk Group: [100]
DIAL ACCESS CODE/TRUNK ID CODE
   2.  Digit 1: [1]
   3.  Digit 2: [0]
   4.  Digit 3: [0]
   5.  Digit 4: [-]

 6. Trunk Type: [100]
 7.      Dial Access Restriction: [0]
 8.  Personal CO Line Appearance: [0]
 9. Public Network Access/Egress: [0]
DISPLAY ONLY
  10.  Signaling Type: [0]
```

SCREEN D-13
Generic 2 Tone Detector Administration

- **PROC 150** is required to install the tone detector circuits.

PERMANENT APPLICATIONS

In a permanent application, the switch establishes and maintains a permanent connection between endpoints over dedicated (nailed-up) DS0s on a private T1 or through a private line network service such as ACCUNET Spectrum of Digital Services (ASDS). Permanent applications include: Cluster Controllers (CC) to Front-End Processor (FEP) connections and LAN bridging. An example of a permanent application is shown in Figure D-4.

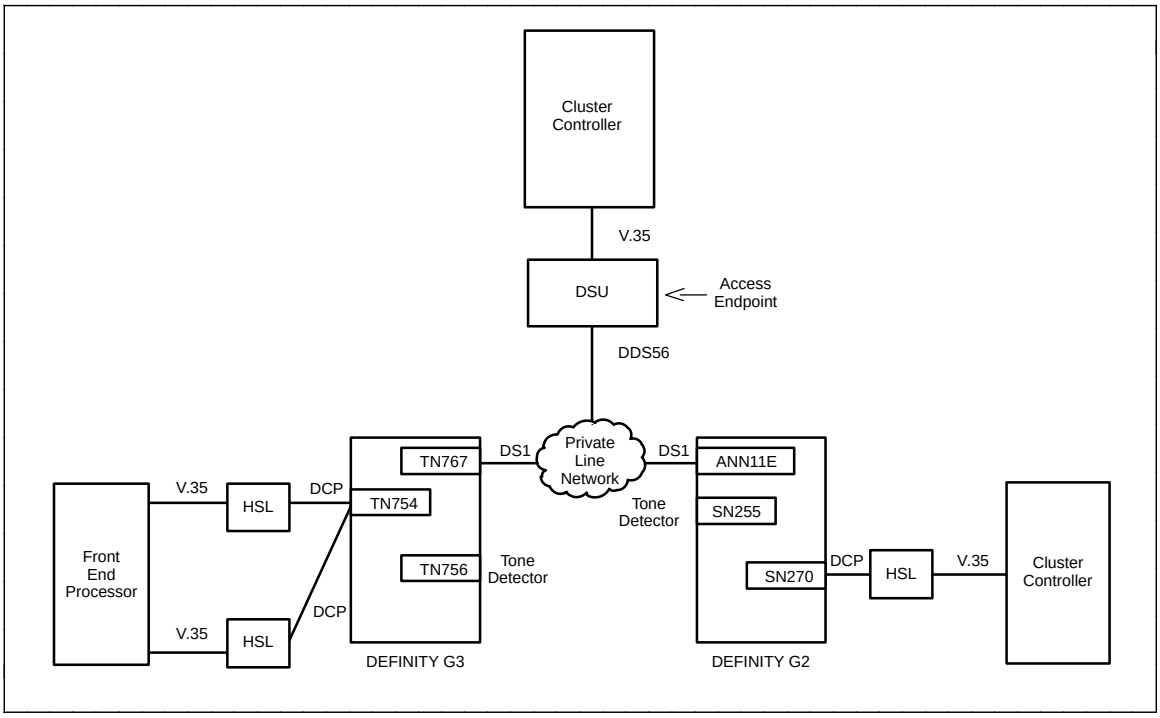

FIGURE D-4
Permanent (Private Line) Applications

There are two types of permanent connections:

- **PBX to PBX** — In this configuration, a permanent connection is established between two PBXs. The PBX may serve as a tandem node or as a terminating node with HSLs connected to each data endpoint. The PBX is also capable of monitoring the DS0 for on / off hook signaling information to determine if the connection has been dropped.

- **PBX to an access endpoint** — An access endpoint is one in which the data endpoint is connected directly to the public network via data service units (DSUs) or other similar private line devices. In this type of connection, the access endpoint is treated as if it were an extension on the switch. Furthermore, control information (for example, loopback commands) from the DSU and the public network would disrupt the connection. As a result, the signaling on the DS0 is disabled and the switch will not be able to monitor the channel for on/off hook signaling.

Data Endpoint Requirements

Most data endpoints involved in permanent connections support DTR operation. If the data endpoint does not support the DTR lead, the DTR option should be set to IGNORE on the HSL. This will allow the HSL to properly establish and terminate calls.

Switch Requirements

There are three options available to support permanent connections through DEFINITY or System 75/85. Each option, though essentially the same from an application viewpoint, varies slightly in functionality and operation.

- **Dedicated Switch Connection (DSC)** — DSCs are available on the System 85 R2V4 and DEFINITY Generic 2. With a DSC, a connection is established between any two ports (line or trunk, voice or data) on the same switch — the connection does not go beyond the switch. Therefore, to establish a permanent connection across a network of System 85/Generic 2s, a DSC must be established on each switch. When the switch detects a failure on a DSC, it will make an attempt to re-establish the connection and continue to do so until the connection is restored. DSCs can also be used to provide connections to access endpoints, such as DSUs.
- **Permanent Switched Call (PSC)** — PSCs are available on System 75 R1V2, R1V3 and DEFINITY Generic 1. PSCs are dialed data calls made automatically by the switch. The only difference between a PSC and a regular switched call is that PSCs remain connected for an indefinite amount of time. In a PSC, one endpoint resides on the switch originating the call while the other endpoint can reside on the same switch or through a network to another switch. PSCs can only be established between switches or intra-switch, they cannot be used to provide connections to access endpoints such as DSUs.

- **Administered Connection (AC)** — ACs are available on the DEFINITY Generic 3 and are similar to PSCs in that they are dialed data calls that remain connected for long periods of time. The AC, however, offers enhanced features over PSCs as well as DSCs such as scheduled connections, automatic call restoration, administrable alarming of failed calls, and administrable retry intervals. ACs can be used to establish connections across a network and connect to access endpoints such as DSUs.

In multiple switch configurations where the AC, PSC, and/or DSC features are available for establishing a permanent connection, ACs should be used since they provide the most functionality. If a switch with the AC feature is not available the next preference should be a PSC. Since a DSC can only be used to support connections between ports on a switch, a DSC should only be used when there is no other option (for example, when the connection involves multiple System 85s or Generic 2s).

For more information regarding each of these options, refer to the appropriate feature description manuals.

Switch Hardware

The switch hardware requirements for permanent connections are essentially the same as those for switched connections. Refer to Switch Hardware section in the Switched Applications portion of this Appendix for a description of this hardware.

Switch Software

Depending on how permanent connections are implemented on the switch, AAR software may be required.

Network Service Requirements

ACCUNET Spectrum of Digital Services (ASDS)

ASDS is AT&T's private line digital service that provides a permanent circuit from POP (Point-of-Presence) to POP. These connections are not dialed but are physically connected at all times.

When configuring a network with ASDS the following should be noted:

- In a PBX to PBX connection, robbed-bit signaling is used by the switch to monitor the status of the connection. To support this capability through the ASDS Network, ASDS should be ordered as a tie line with trunk conditioning. This will allow ASDS to maintain the integrity of the frames that pass through, allowing robbed-bit signaling to function properly. With this arrangement only full-duplex 56 Kbps data transmission is supported. Furthermore, since the switch monitors the

signaling, network initiated loopbacks can not be performed because the commands would be interpreted as an on-hook signal and the switch will drop the connection.

- In a PBX to an access endpoint connection, the ASDS connection should be ordered as a 56 or 64 Kbps digital circuit. This is a clear facility that passes the data transparently. Because the switch does not monitor the signaling, this allows the network to perform loopback tests on circuits and endpoints. Note that signaling can only be disabled using DSCs or ACs. A PSC can not be used since it does not support access endpoints.

Network Access Requirements

Access to ASDS can be accomplished using a dedicated DS0 or a DS1 facility. For endpoints connected directly to the network, individual DS0s are used and identified as an access endpoint. If a switch is involved in the connection, a DS1 facility must be used between the switch and the network. The entire DS1 facility, however, is not dedicated to ASDS. Other DS0 channels can be used to access other network services (for example, SDN, SDS). This ability to split the DS1 access for dedicated and switched services is known as M24 Office Function or Static Integrated Network Access (SINA). Currently, SINA is only supported on robbed-bit DS1 facilities. ISDN PRI facilities cannot have channels split-off to access ASDS.

Configuration and Administration Example

In this section, an example of a permanent application will be presented to describe a typical HSL configuration and the steps needed to administer this application. The application and configuration presented here is not the only one available to the HSL. The intent is to give the reader a basic understanding of HSL permanent applications.

Application Description

In this application a Front End Processor (FEP) is connected to two remote Cluster Controllers (CC) each communicating at 56 Kbps. One CC is co-located with a Generic 2 and the other is at a site where there is no switch. Rather than ordering a DDS 56 Kbps private line at each of the switch locations, the DS1 that is in place can be used. ASDS will be used to provide DS0 connectivity from the Generic 3 to the Generic 2 and to the other CC via a DSU.

Implementation

The configuration of this FEP / CC application is shown in Figure D-5. To implement this application, two HSLs (extensions 5000

and 5001) are required between the Generic 3 and the FEP with each HSL used for one FEP / CC connection. On the Generic 2, another HSL (extension 3000) will connect to the CC. The other CC is connected directly to the ASDS network via a DSU and will be administered as an access endpoint on the Generic 3 (extension 4000). Between the Generic 2 and Generic 3, a static trunk group consisting of a single DS0 is required for the connection. This trunk group is part of an overall DS1 facility.

Once the proper facilities are in place, a PBX to PBX AC will be initiated on the Generic 3 between one HSL on the Generic 3 and the HSL on the Generic 2. For the other FEP / CC connection, a PBX to an access endpoint AC must be created between the other Generic 3 HSL and the DSU. Once these connections have been established, the FEP will be able to communicate with both CCs.

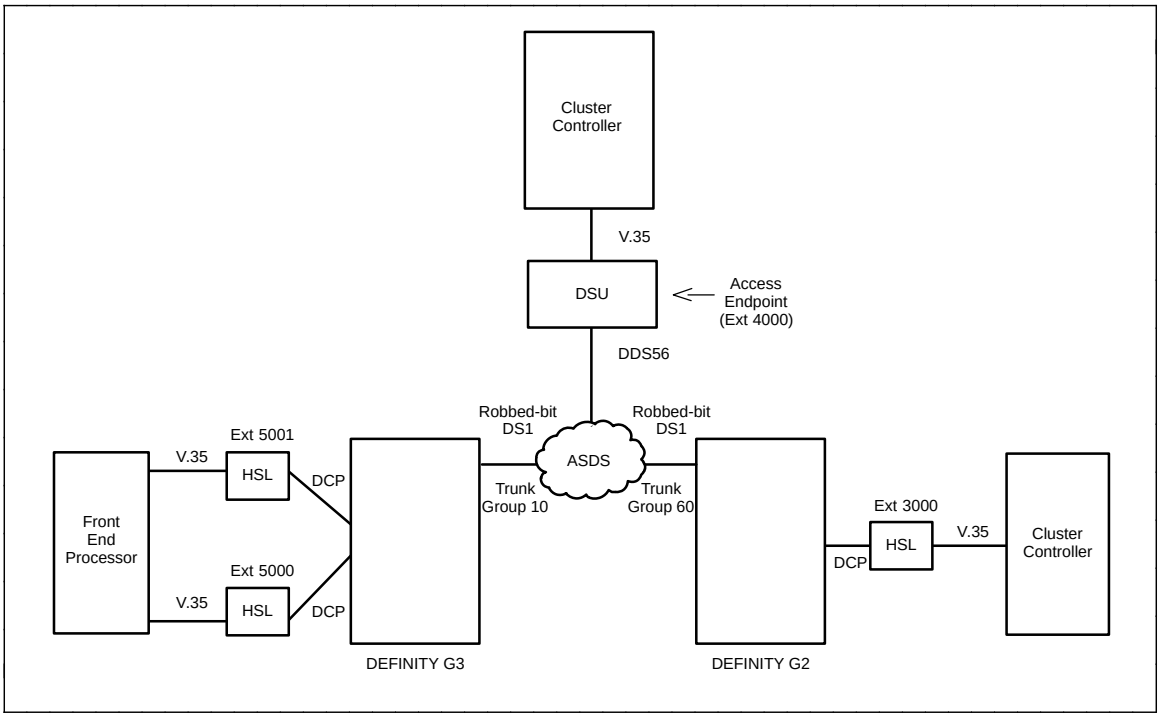

FIGURE D-5
FEP/CC Configuration

Administration

The following section describes the HSL options as well as the administration of the DEFINITY Generics 2 and 3 needed to implement this application. The explanation of Generic 2 and 3 administration will be done in the following order:

- Station Administration
- Trunk Group Administration
- Access Endpoint Administration
- Administered Connection Administration

To assist in describing the administration procedures, selected administration screens are provided as reference.

Note: This section should not be used as a step-by-step administration guide nor is it intended to replace the information provided in the switch administration manuals. Only those procedures and entries that are essential to this application will be covered. It is therefore recommended that the proper administration manuals be consulted before any steps are taken. Furthermore, certain fields in various administration screens and procedures have been left blank or their default values have been used because the proper entry for those fields will vary from switch to switch. It is left to the discretion of the network administrator to properly populate those fields.

HSL Options

Since the AC will establish all connections, the HSL will not be used for dialing and the Dialing Method can be set to MANUAL. In addition, the FEP and CC do not support a DTR lead on their V.35 interface and require DSR On from the HSL. As a result, the following options are set for this permanent application.

```
DIAL = MANUAL     PERM CONN = YES
SPEED = 56KBPS    LOOPBACK = AT&T
DUPLEX = FULL     DSR = ON
ANSWER = AUTO     DTR = IGNORE
```

The HSL Loopback option should be set to V.54 if the data module (for example, a DSU) at the other end supports V.54 loopback.

Data Invert should be set to ON if a 64 Kbps call is established with a data module that performs bit inversion at 64 Kbps, such as the MPDM.

These settings are described in Chapter 4, ‘‘Options.’’

Generic 3 Administration

Station Administration

The administration of the HSL extensions in this application is similar to that for the Generic 1 as described in the switched video application. In this case, the Data Module form is used to create extensions 5000 and 5001.

Trunk Group Administration

To support a PBX to PBX AC, a static trunk group consisting of a single DS0 is established. This allows signaling (on/off-hook) to be passed between the Generic 3 and Generic 2. To administer

this, the Trunk Group form (Screen D-14) is used and the entries for a static trunk group are similar to that described in Trunk Group Administration section for the Generic 1 in the switched videoconferencing example with the following exceptions:

- **Comm Type:** *data*. This indicates that only data is being transmitted. Since ASDS is being used, any echo cancelers or suppressors should be disabled in the trunk group. This is accomplished by making the path "data ready."
- **TAC:** *110*. To directly access the trunk group over which the permanent connection will be established, a Trunk Access Code (TAC) will be used. This is done by prefixing the TAC (110) onto the number of the destination. If a TAC is not used then the trunk must be accessed through the switch's routing software such as ARS. A benefit of using switch routing, however, is that it could be used to choose an alternate (switched) facility if the link through ASDS fails. For simplicity the TAC will be used in this example.

Note that the **Bit Rate**, **Synchronization**, and **Duplex** fields at the bottom of this form refer to modem pool applications and will not affect this application.

```
                                          Page 1 of 9
                        Trunk Group

Group Number:  10             Group Type:  tie   SMDR Reports?  Y
  Group Name:  ASDS FEP              COR:  1              TAC:  110
   Direction:  two-way  Outgoing Display?  n

 Dial Access:  y          Busy Threshold:  99   Night Service:  ___
Queue Length:  0                        Incoming Destination:  __
   Comm Type:  data            Auth Code?  n
                                                       BCC:  1

TRUNK PARAMETERS
  Trunk Type (in/out):  wink/wink  Incoming Rotary Timeout (sec):  5
   Outgoing Dial Type:  tone                  Incoming Dial Type:  tone
                                          Disconnect Timing (msec):  500
      Digit Treatment:  ________                          Digits:  ____
    Connected to Toll:  y    STT Loss:  normal   DTT to DCO Loss:  normal
   Incoming Dial Tone:  y
            Bit Rate:         Synchronization:           Duplex:
Answer Supervision Timeout?  10
```

SCREEN D-14
Generic 3 Trunk Group Administration

Access Endpoint Administration

To create a permanent connection between a Generic 3 HSL and the DSU, an access endpoint must be established. The access endpoint is a single member DS0 trunk group from the Generic 3 that the switch creates internally and is used to access ASDS and connect to the DSU. As a result, a trunk group does not need to be created when administering a DS0 access endpoint, but the DS0 access endpoint cannot be included in another trunk group.

Once the connection is established, the signaling for that DS0 is disabled which makes the switch transparent to any information sent from the ASDS network or the DSU. This allows the HSL to respond to all ASDS and DSU control commands without causing the switch to drop the call.

To administer the access endpoint, the Access Endpoint form should be used and populated in the following manner:

- **Extension** - *4000*. To create an AC with an access endpoint, the switch uses this extension. This extension should be compatible with the existing numbering plan.
- **Port** - This field should be entered with the DS0 port on the DS1 circuit pack that will be connected through ASDS to the DSU.
- **Communication Type** - *56K-data*. To indicate 56 Kbps data.

The access endpoint has now been administered and can be used in
an AC.

Administered Connection Administration

The administration of an AC defines the two endpoints of the connection. In this example two ACs are required.

In the PBX to PBX AC, the HSL extension (5000) on the Generic 3 is the originator and extension 3000 on the Generic 2 is the destination. To administer this, the Administered Connection form (Screen D-15) must be populated as follows:

- **Connection Number** - *1*. This defines which AC is being administered.
- **Originator** - *5000*. This is the originating extension on the Generic 3.
- **Destination** - *110,3000*. This is the destination on the Generic 2. 110 is the TAC as defined in the trunk group form on the Generic 3, the comma inserts a delay, and 3000 is the destination extension on the Generic 2.

The other fields in the Administered Connection form can be populated with information regarding scheduling and

miscellaneous parameters.

```
                                                          Page  1 of  1
                            ADMINISTERED CONNECTION

     Connection Number: 1                                 Enable? y
            Originator: 5000
           Destination: 110,3000
                  Name:

AUTHORIZED TIME OF DAY

            Continuous? n
                   Sun? n  Mon? n  Tue? n  Wed? n  Thu? n  Fri? n  Sat? n
            Start Time: 00:00
              Duration: 000:00


MISCELLANEOUS PARAMETERS

            Alarm Type: warning                 Alarm Threshold: 5
         Retry Interval: 2                     Auto Restoration? y
               Priority: 5
```

SCREEN D-15
Generic 3 Administered Connection Administration

The second AC between extension 5001 on the Generic 3 and the access endpoint (extension 4000) is administered using the same form in a similar manner:

- **Connection Number** - *2.*
- **Originator** - *5001*.
- **Destination** - *4000*. This is access endpoint extension.

The administration on the Generic 3 is now complete and once enabled, an AC can be established between the FEP and both CCs.

Feature Related Systems Parameters

If long call set-up times are experienced through a network (for example, international calls), the "Off-Premises Tone Detect Timeout Interval" field in the "Feature Related Systems Parameters" form should be set to the maximum of 25 seconds to allow for longer call set up times.

Generic 2 Administration

Since an AC on the Generic 3 will originate the call, administration on the Generic 2 only requires station and trunk group administration so that the Generic 2 will recognize the HSL extension and the trunk group over which the AC will be established. In this application, the Generic 2 will not be doing any call origination or routing.

Station Administration

The administration for the HSL on the Generic 2 for this application is identical to the administration for the HSL in the switched video application with the only difference being the HSL extension (3000). Refer to the earlier section in this Appendix on Generic 2 Station Administration for Switched Applications for more information.

Trunk Group Administration

The administration of trunk groups on the Generic 2 for this application is similar to the administration for trunk groups in the switched video application. The difference lies in the type of trunk group used to carry the call. In this case a static trunk group must be administered as opposed to a dynamic trunk group for the switched video application. In addition, PROC 103 does not need to be executed since incoming calls do not have to access AAR.

With the completion of the Generic 2 administration, the implementation of this application is complete. The Generic 3 will originate a call to both the access endpoint and the HSL extension on the Generic 2 allowing both CCs to communicate with the FEP. The call will be maintained until the connection is taken down.

PSC and DSC Administration

The example just presented only describes the administration of an AC on the Generic 3. There are two other types of permanent connections available: PSCs and DSCs. Using the same FEP / CC example, the following sections will summarize how PSCs and DSCs can be administered to implement a similar application.

PSC Administration

To describe how PSC administration is performed, consider the same example, except with the Generic 3 replaced by a Generic 1 or a
System 75. Note that the PSC feature does not support access endpoints, therefore only a permanent connection to the Generic 2 can be established. This section will describe how a PSC is administered for this application. The administration on the

Generic 2 in this new configuration is the same as previously described.

To establish a PSC between extension 5000 on the Generic 1 and extension 3000 on the Generic 2 requires station, trunk, and PSC administration. Station and trunk administration will be the same as described previously for the Generic 3. PSC administration is performed using the Permanent Switched Call form in the following manner:

- In the column under **Originator**, *5000* should be entered.
- In the column under **Destination**, *110,3000* should be entered. 110 is the TAC to the Generic 2, the comma inserts a delay, and 3000 is the destination extension on the Generic 2.
- In the column under **Enabled**, *y* should be entered to originate and maintain the call.

With this administration, the Generic 1 will originate the call from the FEP (extension 5000) to extension 3000 on the Generic 2 and maintain the connection until it is taken down.

DSC Administration

To describe how DSC administration is done, consider the same example, except with the Generic 3 replaced by a Generic 2 or a System 85. Unlike a PSC, a DSC can support a connection to an access endpoint and to another switch, but requires a DSC to be set up on both switches. This section will describe how a DSC is administered for this application.

In this example, a DSC is to be established on the Generic 2 with the FEP between extension 5000 and the DS0 channel that will be used to connect to the other Generic 2. Establishing this connection requires station, trunk, and DSC administration. Station and trunk administration will be the same as described previously for a Generic 2 permanent connection. DSC administration is accomplished in the following manner:

- **PROC 000 Word 3** administers a code for a "dedicated mode" message used with some data modules. Since the HSL does not support this message, Field 3 should be populated with a "0."
- **PROC 360 Word 1** administers a DSC between two line or trunk ports and the fields should be populated in the following manner:
  - ► **Field 1 (DSC Status)**. A "1" should be entered to indicate on, and a "0" to indicate off.
  - ► **Field 2 (DSC Number)**. This is the number used to identify this DSC (0-1023).

- **Fields 3 - 9**. These fields identify the port of one endpoint in the DSC.
- **Field 8 (I-Channel Assignment)**. If this port is connected to the HSL, a "0" should be entered to indicate that DCP I-channel 1 will be used to transmit the data. If this port is connected to the DS0, this field should be left blank.
- **Fields 10 - 14**. These fields identify the port of the other DSC endpoint.
- **Field 15 (I-Channel Assignment)**. See Field 8.

With this administration, the DSC on the Generic 2 with the FEP is established. Once the same procedures are performed on the other Generic 2, a permanent connection will be created allowing the CC behind the Generic to communicate with the FEP. To establish a DSC with the access endpoint, the same procedures can be used. However, in order for the HSL to communicate properly with the network and the DSU, the signaling must be disabled. This is done by entering a "0" in PROC 116 Word 1 Field 8. Once the signaling is disabled, the DSC can be established allowing the other CC to communicate with the FEP.

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User´s Guide

Appendix E: Troubleshooting

This chapter provides troubleshooting guidelines specific to operational problems that may be encountered when using the HSL. It also covers problems that may occur with switched and dedicated applications.

HOW TO USE THIS CHAPTER

Use the following guidelines to isolate and correct a problem:

1. Scan through the ‘‘Symptom’’ column in the chart on the following pages to find the description that best describes the problem situation you have encountered.
2. In the ‘‘Problem’’ column, one or more problem descriptions is offered. Select the one that best describes the observable condition, or try the solutions suggested in turn until the trouble has been corrected.

PROBLEMS AND SOLUTIONS

Symptom	Problem	Solution
The set does not function normally, unfamiliar front panel messages.	Set is in a FIELD TEST mode for use by trained service personnel only.	Press *NEXT/NO* and *BACK* simultaneously to exit the FIELD TEST mode. The set will perform a self-test and then display `IDLE` on the front panel interface. If the HSL does not display `IDLE`, clear the set by unplugging and reconnecting the power cord. Using the `VIEW OPTIONS?` menu, verify the options have not been changed.
Calls can not be dialed using the RS-232 interface.	The dial method selected is incorrect.	Set `DIAL METHOD` to `RS-232`, and try again.
	Set is not IDLE when the dial command is entered.	Return the set to the IDLE mode and try again.
	The dial command is entered incorrectly.	Verify that both the **A** and **T** characters were entered using either upper case or lower case, and the dial command ends with the CARRIAGE RETURN character.
	The dial command is sent at the wrong speed.	Verify that the terminal uses one of the following speeds: 300, 1200, 2400, 4800, 9600, or 19200 bps.
	The DTR input lead on the V.35 interface is OFF.	Configure the V.35 terminal equipment to turn ON the DTR lead and try again.

Symptom	Problem	Solution
Calls can not be dialed using the RS-366 interface.	The dial method selected is incorrect. Set is not IDLE when the call attempt is made. The DTR input lead on the V.35 interface is OFF.	Set DIAL METHOD to RS-366 and try again. Return the set to the IDLE mode and try again. Configure the V.35 terminal equipment to turn ON the DTR lead and try again.
Calls can not be dialed using the DTR method.	The dial method selected is incorrect. The DTR LEAD option selected is incorrect. The number is not stored. Set is not IDLE when the call attempt is made.	Set DIAL METHOD to DTR and try again. Set DTR LEAD OPTION to NORMAL and try again. Store the number. Return the set to the IDLE mode and try again.
Calls can not be dialed using the HOTLINE method.	The dial method selected is incorrect. The DTR LEAD option selected is incorrect. The set is not IDLE when the call attempt is made. The switch is not administered for HOTLINE dialing.	Set DIAL METHOD to HOTLINE and try again. Set DTR LEAD to NORMAL and try again. Return the set to the IDLE mode and try again. Request the switch administrator to provide the HOTLINE feature.

Symptom	Problem	Solution
Calls disconnect immediately after dialing. The HSL displays CHECK NUMBER while the call is being disconnected.	The telephone number dialed is incomplete or invalid.	Check the telephone number and try again.
Calls disconnect immediately after dialing. The HSL displays TRY AGAIN while the call is being disconnected.	Facilities / equipment necessary to complete the call are busy.	Try again later.
Calls disconnect immediately after dialing. The HSL displays BUSY while the call is being disconnected.	The number called is busy.	Try again later.
The set does not enter the data mode and display PERM CALL ACTIVE? when the permanent connection option is set to YES.	The incorrect ANSWER option or DTR LEAD option is selected.	Set ANS to AUTO and DTR LEAD to IGNORE.
	The switch is not administered to provide a permanent connection between the endpoints.	Have the line administered for a permanent connection to a remote endpoint.

Symptom	Problem	Solution
Data errors at both endpoints.	V.35 interface speed mismatch.	Change the local terminal equipment speed to match the remote terminal equipment speed or remote terminal equipment speed to match the local terminal equipment speed.
	Speed mismatch between local and remote stations.	Set SPEED to 56KBPS if the local terminal equipment operates at 56000 bps, or set SPEED to 64KBPS if the equipment operates at 64000 bps.
Data errors at 64KBPS.	The data invert option is set incorrectly at 64KBPS.	Change DATA INVERT? to the other choice and try again.
Local or remote endpoint fails to enter or stay in test mode when either a Remote Loopback or Remote Loopback / Self-Test is attempted.	Remote endpoint does not support the remote loopback tests.	Verify that remote endpoint supports either the AT&T or V.54 protocol for remote loopback control.
	Incompatible options selected.	Set LOOPBACK to AT&T or V.54 as needed to match remote endpoint. For 64KBPS, set DATA INVERT to OFF.
	RTS input lead on the V.35 interface is OFF.	For 56KBPS, HALF DUPLEX, configure the V.35 terminal equipment to turn ON the RTS lead.

Symptom	Problem	Solution
POWER/TEST and *DATA* indicators flash together.	HSL lost communication with the switch.	Verify that the line cord is connected to the HSL line jack. Also verify that the PBX is working and that the HSL is correctly administered or is not busied out of service.
POWER/TEST indicator is off.	Power is off.	Verify that the AC outlet is live and that the power unit is connected to the HSL.
DATA indicator flashes, but the HSL does not answer the call.	The answer option is not set to AUTO. The DTR input lead on the V.35 interface is OFF.	Set ANS to AUTO. Configure the V.35 terminal equipment to turn on the DTR LEAD.

Glossary

Answer mode. An operational mode where the 7400HS Link has gone offhook to answer an incoming call and is waiting for a command from the switch to enter the data mode or disconnect the call.

ANSI display protocol. A standard set of escape sequences, established by ANSI (the American National Standards Institute), used by many display terminal devices to transmit or receive display control functions, such as cursor movement and color or graphics configuration parameters.

ARTI. *See* Asynchronous Receiver Transmitter Interface.

AT command set. A de facto industry-standard set of commands used for configuration and operation of DCE devices or modems. The AT (ATtention) command set originated with Hayes Microcomputer Products, Inc.

Command files. Files created for or by PC communications software running on a PC that can be used to execute a sequence of commands to complete a task, such as performing an automatic log in to a specific remote device. Also called script files.

Command line. A string of one or more valid and compatible AT commands typed on one line with any applicable arguments. Most command lines begin with the *AT* prefix and end with a carriage return (issued by pressing (Enter)).

Communications parameters. *See* data options.

Counter. A byte or word in memory that is incremented or decremented to count events such as timing intervals or retransmissions of messages.

CRDLI circuit. *See* Cost Reduced Digital Line Interface circuit.

Data Communications Equipment (DCE). (Also known as Data Circuit-terminating Equipment.) The equipment that provides the functions required to establish, maintain and terminate a data communications connection. Additionally, the DCE provides any required signal conversion for communication between the DTE device (*see also* Data Terminal Equipment) and the telephone line or data circuit.

Data mode. An operational mode in which the 7400HS Link is offhook communicating with the remote end-point. Also called on-line mode.

Data set emulation mode. An operational mode used when both data endpoints have DCE interfaces. For this mode, the two data endpoints emulate a modem interface.

Data Terminal Equipment (DTE). A device that sends and / or receives data over a communication line via a DCE device (*see also* Data Communications Equipment). Examples of DTE devices are a data display terminal, a PC running appropriate data communications software, or a printer or plotter.

DCE. *See* Data Communications Equipment.

DCP. *See* Digital Communications Protocol.

DDS. *See* Dedicated Digital System.

Dedicated Digital System (DDS). Need Definition

Digital Communications Protocol (DCP). A proprietary digital protocol used by AT&T PBX equipment to communicate with AT&T voice terminals and data modules. DCP supports simultaneous voice and data services over the same line.

DTE. *See* Data Terminal Equipment.

D8W. A standard modular telephone cord used to connect DCP devices to a PBX wall jack.

Full duplex. A mode of data communications between data endpoints where data can be transmitted in both directions at the same time.

Handshake mode. An operational mode where a data module is offhook using I-channel mode 2 control frames to communicate with a remote end-point to determine compatibility before entering the data mode. The 7400HS Link does not support any handshake; it assumes compatibility and goes directly to the data mode.

Half duplex. A mode of data communications between data endpoints where data is transmitted in only one direction at a time. To send data, an endpoint turns on its RTS lead and waits for the CTS lead to turn on before transmitting. For true half duplex operation, the CTS lead will not turn on while data is being received for the remote endpoint. When the 7400HS Link is in the half duplex mode, the CTS lead will turn on and data can be transmitted while data is being received from the remote endpoint.

Hayes compatible. Of a DCE device, using the *AT command set* and performing in close compliance with the configuration and operating standards established by Hayes Microcomputer Products, Inc.
See also AT command set.

Idle mode. An operational mode in which the 7400HS Link is on-hook waiting for an incoming call or a call to be originated.

Non-volatile memory. A read / write memory device that retains data after power is removed.

Options. Parameters that are stored in memory and control the operation of the 7400HS Link, such as data speed.

Originate mode. An operational mode where the 7400HS Link is offhook sending Dial ASCII messages to set up a call.

Reset. A condition where the microprocessor, having received a reset signal, aborts its current operation, performs a self-test, initializes the 7400HS Link circuits, and then enters the idle mode.

Sanity timeout. A condition where the microprocessor receives a reset signal because it did not update a predefined register within the required time interval.

SCC. *See* Serial Communication Controller.

SDS. *See* Switched Digital System.

Serial Communication Controller (SCC). A HDLC controller for transferring S-channel data between the CRDLIs and the microprocessor.

Switched Digital System (SDS). Need Definition

Terminal mode. The mode of operation of the DCP port at a digital endpoint such as the 7400HS Link.

Timer. A counter that is either incremented or decremented on a periodic basis, or a device which changes its output at the end of a specified interval.

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