TPI Model 550B+
ISDN BRI Portable Test Set
User's Guide

Issue 4 - Firmware 4.*x*

September 2000

TTC

OPTIMIZING NETWORK PERFORMANCE

Notice

Every effort was made to ensure that the information in this document was accurate at the time of printing. However, information is subject to change without notice, and TTC reserves the right to provide an addendum to this document with information not available at the time that this document was created.

ISO Certification

This product was manufactured under a registered ISO 9001 quality system.

Ordering Information

This guide is a product of TTC's Technical Publications Department, issued as part of the TPI 550B+. The ordering number for this document is TPIP550BP.

Contents

Figures

Tables

Preface

About This Guide

Purpose and scope

The purpose of this guide is to help you successfully use the TPI 550B+ features and capabilities. This guide includes task-based instructions that describe how to install, configure, use, and troubleshoot the TPI 550B+. Additionally, this guide provides a complete description of TTC's warranty, services, and repair information, including terms and conditions of the licensing agreement. The following topics are discussed in this chapter:

Assumptions

This guide is intended for novice, intermediate, and experienced users who want to use the TPI 550B+ effectively and efficiently. We are assuming that you have basic computer and mouse/track ball experience and are familiar with basic telecommunication concepts and terminology.

Getting technical assistance

If you need assistance or have questions related to the use of this product, call or email TTC's Technical Assistance Center (TAC) for customer support.

Table 1 — *Technical assistance centers*

Region	Phone Number	Hours of Operation
Americas	1-800-638-2049	M-F, 8:00 a.m. to 8:00 p.m., EST
Europe, Africa, and Mid-East	+800 882 85822 (European Freephone) +44 (0) 118 975 9696 (TTC UK) +49 (0) 6172 59 11 00 (TTC Germany) +33 (0) 1 39 30 24 24 (TTC France)	M-F, 8:30 a.m. to 5:00 p.m., GMT
Asia and the Pacific	+852 2892 0990 (Hong Kong) +8610 6833 7477 (Bejing-China)	M-F, 9:00 a.m. to 5:30 p.m.

During off hours, you can leave a voice mail message; send an email to `tac@ttc.com` (in Europe, `eurotac@ttc.com`); or submit your question using our online Technical Assistance Request form at `www.ttc.com`.

Using this guide

The following table is a road map to using this guide efficiently; however, all chapters in this guide can be used for reference purposes.

Table 2 — *Locating information*

To	Refer to
Become familiar with TPI 550B+	Chapter 2 "Introduction"
Find menu structures	Chapter 3 "Menus"
Perform basic and general operations	Chapter 4 "Operation"
Learn about the warranty	Chapter 7 "TTC Customer Services"
Troubleshoot the unit	Appendix B "Quick Reference"
Identify Specifications	Appendix D "Specifications"

The remainder of this guide provides supplementary information. The Appendices provide reference information. The Glossary defines terms, abbreviations, and acronyms. To locate specific information, refer to the Index.

Conventions

This guide uses naming conventions and symbols, as described in the following tables:

Table 3 — *Typographical conventions*

Description	Example
Commands appear in this **typeface**.	On the Status bar, click **Start**.
Switches you press on a unit appear in this typeface.	Press the Aux switch.
Variables such as names or arguments appear in this *typeface*.	Enter new *hostname*.
Computer code and output messages appear in this `typeface`.	`All results okay`
Text you must enter exactly as shown appear in this `typeface`.	Type: `a:\set.exe` in the dialog box
Directories, websites, and filenames appear in this `typeface`.	`filename.txt`
Square brackets [] indicate an optional argument.	`login [`*platform name*`]`
A vertical bar | means "or": only one option can appear in a single command.	`platform [a|b|e]`
Slanted brackets < > are used to group required arguments.	*<Enter your name>*
Brackets { } indicate a set of choices from which you must choose one.	`{file1 file2 file3}`
A plus sign (+) indicates simultaneous keystrokes	Press Ctrl+s

Table 3 — *Typographical conventions (Continued)*

Description	Example
A comma indicates consecutive key strokes	Press Alt+f,s
A slanted bracket indicates choosing a submenu from menu	Click **Start>Program Files**

Usage of terms and symbols

Terms and symbols In manual

NOTE:

Indicates a point of interest or marks a statement that describes or identifies regulatory information concerning the use of the test set.

CAUTION:

Indicates a procedure that, if not followed, could result in loss of data, faulty test results or damage to the test set or other property.

WARNING x:

Marks a statement, which describes or identifies a situation or practice that could result in personal injury or loss of life.

Each warning will include the appropriate warning symbols.

The warnings are numbered (denoted as x above) for cross-referencing.

WARNING SYMBOL
Indicates a General Danger.

WARNING SYMBOL
Indicates Electric Shock/Electrocution Hazard.

WARNING SYMBOL
Indicates Burn Hazard.

WARNING SYMBOL
Indicates Fire Hazard.

WARNING SYMBOL
Indicates Explosion Hazard.

MANDATORY ACTION SYMBOL
Consult User's Guide.

Directs the reader to important information in the User's Guide. This information can include

CAUTIONS or ***WARNINGS***. In the convention used in this manual, and by markings on the equipment, the "Consult User's Guide" MANDATORY ACTION SYMBOL will be followed by a warning symbol and a reference to a particular warning number in the Safety chapter. This reference consists of the warning number, enclosed by parenthesis (). If the reference indicates more than one warning, the warning numbers will be separated by a comma (,).

For example:

(1, 2)

directs the reader to the TNV and Clip Leads ***WARNINGS*** found in the Safety chapter.

Preface

Chapter 1

Safety Information

This chapter provides a general description of the TPI 550B+. Topics discussed in this chapter include the following:

TPI 550B+ safety considerations

The TPI 550B+ is a professional instrument, designed and tested for connection to Integrated Services Digital Network (ISDN) lines that have the UL 1950/ EN 60 950 safety classifications of Safety Extra Low Voltage (SELV), Ref. clause 2.3 or Telecommunications Network Voltage (TNV), Ref. clause 6.2. The table below shows the safety classification and the normal, or working, voltage capability of each port.

Table 4 — *Voltage capabilities of various port designations*

PORT DESIGNATION	SAFETY CLASSIFICATION	WORKING VOLTAGE
LINE (2 wire)/U Interface	TNV	100 Vrms
Handset	SELV	± 5 VDC
12 VDC (power input)	SELV	12 VDC
DATA	SELV	± 15 VDC
S/T	SELV	50 VDC

WARNING 1: Telecommunications Network Voltage

Hazardous voltages caused by lightning strikes or accidental connection to power circuits may be present at times on lines that run outdoors. Such lines are classified as Telecommunications Network Voltage (TNV). Only trained Telecommunications Technicians, who can recognize when such hazards may be present and who practice proper procedures for dealing with them, should use this test set. Care must be taken to assure that TNV signals are not connected to SELV (Safety Extra Low Voltage) ports. DO NOT connect a line that has been routed outdoors to ANY PORT EXCEPT THE LINE PORT.

WARNING 2: Clip Leads

Connections to telecommunications circuits using clip leads such as TPI part number 834008, 834019, 834035, 836175, or 836335 will by their nature make it possible to come in direct contact with the hazards of lightning strike and accidental power circuit connection. Inspect the insulation of clip leads before each use to be sure the insulation, especially of the clips themselves, is not damaged or deteriorated. Use care when working around telephone circuits to be sure that you do not come in contact with exposed conductors.

Telecommunications providers employ all reasonable protective measures to limit electrical surges on lines. However, absolute protection from lightning, or from accidental connection to electrical power sources, is impossible.

Because an absolutely safe design is impossible, users must be responsible for their own safety and employ proper TNV safety procedures to minimize the risk of electrical shock. Comprehensive training in TNV safety procedures is beyond the scope of this

Operating Manual. Even so, the user should read and understand all Safety Information within before using the TPI 550B+ Test Set.

Other safety information

WARNING 3: Adapter/Charger

The AC Adapter/Charger is intended for use in dry, indoor locations only. Use outdoors or in wet or damp locations increases the risk of electrical shock and damage to the adapter.

Be sure the AC Adapter/Charger is connected to the correct mains voltage as indicated on its label.

Be sure to use only the AC Adapter/Charger supplied with the test set or offered by TPI as an option for the test set.

WARNING 4: Battery Replacement

This Test Unit uses a Nickel-Cadmium Battery. There is danger of extreme heat, fire, or explosion if the battery is incorrectly replaced or if it is tampered with.

Replace only with TPI part number 836593 or TPI recommended equivalent.

Always dispose of used batteries safely, in a way that will not harm the environment.

DO NOT place in a fire. The battery cells are sealed and the heat could cause them to explode, resulting in injury and the release of chemicals that are hazardous and harmful to the environment.

DO NOT puncture or otherwise damage the sealed battery cells. Nickel-Cadmium cells contain chemicals that are hazardous and harmful to the environment.

DO NOT cause, or allow, the battery to short circuit. The heat generated could cause the cells to rupture or explode, resulting in injury and the release of chemicals that are hazardous and harmful to the environment.

DO NOT discard batteries in a trash receptacle whose contents are likely to end up in a landfill. Nickel-Cadmium cells contain chemicals that are hazardous and harmful to the environment.

DO dispose of the battery according to local codes or regulations.

DO deliver the battery to a service facility that will recycle it or otherwise be sure that battery chemicals are not allowed to contaminate the environment. If a local facility is not available, ship the battery to TTC - TPI Division who will forward it to a recovery/recycle service.

General telecommunications safety

Do not work on telephone equipment if you have not been trained to do so. Serious injury could result if you do not understand the hazards of Telecommunications Network Voltages (TNV), especially the hazards of lightning strikes and accidental connection to power circuits.

Do not work on telephone equipment if there is a threat of lightning.

Do not touch or otherwise come in contact with telephone conductors that could be exposed to lightning or accidental connection to power circuits without first isolating them from the telephone network.

Do not install telephone equipment or termination (jacks) in wet locations unless the equipment or termination are specifically designed for wet locations.

Do not cause or allow telephone circuits to come in contact with power circuits (Mains).

Do not use telephone equipment in the vicinity of a gas leak or in any place where there might be an explosive atmosphere. This test set and most other telephone equipment could in normal operation generate a spark strong enough to ignite a fire or explosion.

Avoid the use of telephone equipment (other than cordless) during a lightning storm. There is a remote possibility of a nearby lightning strike which, because of its closeness, could exceed the capacity of the telephone network's protective devices and harm you.

Do not use the AC Adapter/Charger outdoors or in wet or damp locations.

Be sure the AC Adapter/Charger is connected to the correct mains voltage as indicated on its label.

Be sure to use only the AC Adapter/Charger supplied with the test set.

Chapter 2

Introduction

This chapter provides a basic introduction to the TPI 550B+ unit. Topics discussed in this chapter include the following:

General information

The TPI 550B+ ISDN BRI Test Set, illustrated below, is a compact, battery operated device used to conduct testing of ISDN circuits at the customer premise, the input and output of the ISDN repeater housing, or at the main distribution frame. The TPI 550B+ is designed both for rugged durability and ease of use, with menu driven screens.

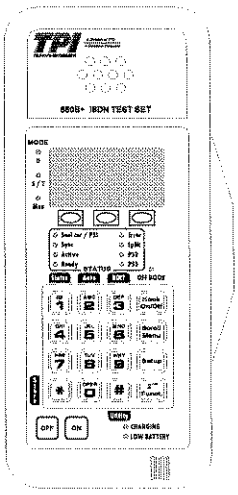


Figure 1 — *TPI 550B+ ISDN BRI Test Set*

The TPI 550B+'s operating modes allow it to function as an NT1 (Network Termination), as TE (Terminal Equipment), as both (NT1/TE), as LT (Line Termination), or in a Monitor mode (for monitoring D channel info). It may be connected to either the DSL (Digital Subscriber Loop) U Interface or the S/T interface. It is compatible with the 2B1Q DSL interface, EBS (P-Phone) interface, and POTS Line Interface. The TPI 550B+ allows placement of additional loss on the circuit, either at the LINE U

Interface or the S/T interface for margin analysis testing.

The TPI 550B+ ISDN BRI Test Set allows selection of loopbacks for each of the B channels, or for the full bandwidth (2B+D). The TPI 550B+ also responds to network controlled loopbacks at the NT1.

ISDN testing and measurements made by the TPI 550B+ include:

- FEBE (Far End Block Errors) and FEBE Errored Seconds in all ISDN U interface modes.
- Cyclic Redundancy Check (CRC) Errors and CRC Errored Seconds with 2B1Q Interface selected.
- S/T FRAME Errors and Errored Seconds, and Bipolar Violations (BPV's) and Errored Seconds on the S/T Interface in NT1 and TE modes.
- Bearer Service selections.
  - Circuit-Switched Voice, 3.1kHz Audio
  - Circuit-Switched Data
  - B- or D-Packet
- Intelligent Testing (IT) features.
  - Auto Bearer Service tests, Local and Distant
  - Auto SPID/Guess SPID
  - Video Test (Channel Delay and Dual BERT)
  - Test Macro (dial test number and run test for each Bearer service)
- Dual Call Testing.
- Bit Error Testing, with G.821 Results.
- B channel Delay.
- D channel message analysis.
- Cause Messages.
- Layer 1, 2, 3 States.
- BRIV Support.

- Pre-Qualification of Loop.
  - LT Emulation, generating Layer 1 2B1Q signal
  - Generation of 40 kHz Test Tone
  - Intercom mode
- Optional U interface Monitor.
- Parameter Download.
- Optional Service Testing.
  - EBS (P-Phone) and POTS
  - IDSL
  - SDSL
  - Total Reach ISDN/DDS

Basic rate ISDN

Introduction

ISDN today is a Digital Network which promises a wide range of enhanced services, including Voice, Data, and Image. While ISDN customers may subscribe to either the Primary Rate Interface (PRI) service, or the Basic Rate Interface (BRI) service, BRI has the most immediate application since it is designed to connect individual Terminal Equipment to the Integrated Services Digital Network (ISDN). Centrex services can be configured to provide voice and data service over the same 2-wire single subscriber loop. Telecommuting can be economically supported with the 2B+D format in the home. Business-to-business data communications applications can use 64 kb/s speeds, or even 128 kb/s using two B channels.

ISDN basic rate interface

ISDN divides a standard 2-wire non-loaded telephone line into three Digital Channels capable of simultaneous Voice, Data, and low speed Video transmission. The three Channels are comprised of two Bearer (B) channels, which carry Voice, Circuit-

Switched, or Packet-Switched Data up to 64 kb/s, and a 16 kb/s Data (D) channel for Packet-Switched Data and Signaling information. When combined, the two B channels and one D channel make up the Basic Rate (2B+D) Access. Maintenance and framing information are added within a 16 kb/s overhead to bring the total transmission rate to 160 kb/s at the U Interface. See Figure 2 below.:

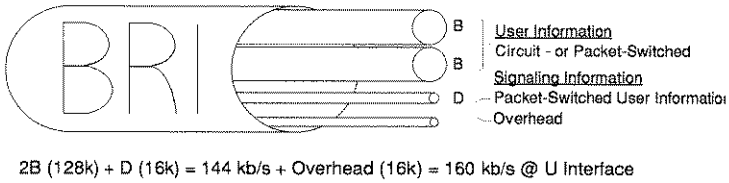


Figure 2 — *ISDN basic rate interface*

A typical configuration for ISDN Basic Rate Access is shown below:

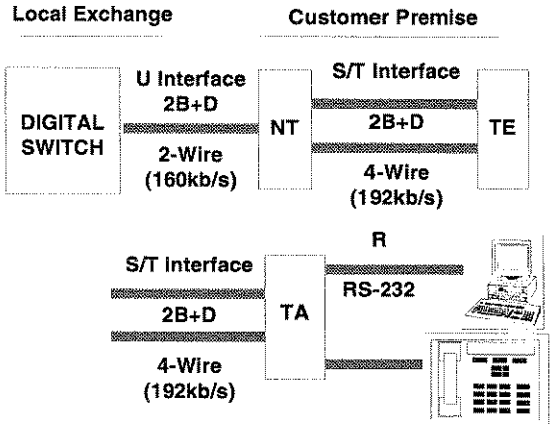


Figure 3 — *ISDN basic rate access*

LINE/U interface The U Interface refers to the physical interface on the Network side of an NT1. It is a 2-wire interface that uses an echo cancelling technique to transmit and receive information over the same pair of wires. A total data rate of 160 kb/s is used with a 144 kb/s payload.

Network termination (NT) Network Termination (NT1) is the Customer Premises termination equipment that converts the 2-wire U Interface signal to a 4-wire S/T Interface signal. The NT1 also provides some simplified looping capabilities for testing of the facilities.

The term NT2 refers to a device that terminates a PRI ISDN 4-wire interface circuit.

S/T interface The S/T Interface is the standard ISDN Interface used by ISDN Terminals and is the physical interface on the Terminal side of an NT1. It is a 4-wire transmission interface, with one pair used to transmit and one pair used to receive, at a total rate of 192 kb/s with a payload of 144 kb/s.

Terminal equipment (TE) Terminal Equipment is a Customer ISDN Terminal that operates when connected to an ISDN Basic Rate Access Interface, either a U or an S/T. Examples are Digital Telephones, Data Terminals, and Integrated Work Stations.

Other kinds of Customer Terminals, which operate from a non-ISDN Interface (RS-232), would need a Terminal Adapter (TA) to convert from the non-ISDN Interface to the S/T ISDN Interface.

2B1Q line code The ANSI U Interface specification incorporates a 2B1Q Line Code, which is the electrical representation of digital signaling, and represents the

pattern of pulses carried across the wire that forms the 1s and 0s transmitted. 2B1Q adds adaptive digital signal processing to this pattern of pulses, which can smooth out interference on a line to create the capability of using ordinary non-loaded twisted pair for distances of up to 18,000 feet using 26 ga. cable (-42dB).

The major Switch vendors initially used their own proprietary Line Codes, e.g., AT&T AMI (Alternate Mark Inversion) and NTI AMI, but are now bringing 2B1Q to their products.LT Emulate mode with an external clock reference has been added for IDSL/ISDN 2B1Q testing through a Subscriber Line Carrier (SLC) system.

The 2B1Q (two Binary, one Quaternary) Line Coding is a four level, or quaternary code. Each level is determined from a single combination of two bits. Thus, 160 kb/s (binary) equates to 40 kHz. The lower frequency is desirable for extending the distance over which transmission is possible.

Physical description

The TPI 550B+ ISDN BRI Test Set consists of circuit boards and a battery pack, housed in a plastic case. It weighs 3 pounds and has external dimensions of 9 $^1/_2$" high, 4" wide x 2 $^1/_2$" deep for the basic unit.

(3)

The internal battery pack is a custom NiCad rechargeable flat pack that can be externally charged via the TPI 550B+(4) Battery Charger/AC Adapter. A fully charged battery will typically last for eight hours of 2B1Q Interface operation. When the Low Battery LED illuminates, there are approximately 10 minutes of operating time left before complete shutdown. At that time, the internal battery needs to be recharged. The recommended recharge time is 12 to 14 hours (overnight).

A plastic, hinged cover is attached to the unit to protect the control panel when the unit is being transported. The cover is secured by a sliding latch.

D-rings are attached to sides of the unit for convenience to allow attachment of the portable set to a line-up rack, or for a carry strap. (A clip hook is provided in the soft pack carry case or the soft pack carry case strap can be used.)

The hinged cover houses a lid Test Summary Label that outlines unit operation.

Controls and indicators

Power The power switch is used to turn the ISDN Portable Test Set ON and OFF. If there is no activity (DSL sync, S/T sync, or keystroke) for 5 minutes, the ISDN Portable Test Set will turn itself off to conserve battery life. If in POTS or EBS modes, the unit will turn itself off after 10 minutes.

NOTE:

The Automatic Power Down feature can be disabled via the Utility/CONFIG menus.

Charging LED The charging LED indicates that the AC Adapter is providing power to the unit.

Low battery LED When the Low Battery LED lights, there is approximately 10 minutes of operating time left before complete shutdown. However, if needed, the unit may still be used with the AC Adapter. This will give power to the unit and recharge the batteries, but at a slower rate than when the unit is not in operation.

CAUTION:

The 10 minute low battery warning is only approximate, and will depend on several factors. To insure proper operation throughout the testing procedures, we recommend that you recharge the battery as soon as the warning LED lights (recommended recharge time is 12 to 14 hours).

Due to battery shelf life, leaving the unit on a shelf for months at a time can drain the battery, and, over an extended length of time, may damage the battery. For proper battery maintenance, TPI recommends that the battery be recharged at least once every two (2) months.

Speaker In the hands-free mode, the integral speaker produces an amplified version of received voice.

The lower end of the case houses a microphone grid for hands-free operation.

Display and keypad

The Liquid Crystal Display (LCD), keypad, and soft keys are used to perform many functions, ranging from setting up voice and data calls, to setting up and viewing test results.

Screen actions are initiated via the following keys:

Soft keys These three keys, located under the LCD, perform different functions as described by the words above them in the LCD display.

1/Status This key is used to display information of the status of the interface the test set is connected to. The **STATES** sub-menu provides information on the state of layers 1, 2, and 3. It also displays the status of loopbacks that have been received from the network and voltage present on the interface connected to. The **CAUSE** sub-menu displays diagnostic information received from the network (e.g., cause messages, USID, TID, TEI, B channel in use, Caller ID data, and NTI Protocol information). The **RESULT** sub-menu displays layer 1 errors for the interface that the unit is connected to as well as Inter B channel delay testing results.

2/Auto This key is used to perform automatic testing on the line under test. The available functions are:

SPID Items

Bearer Tests

IT Macro

Parameter Download

Video Mode

Auto CACH detect

Auto call control

3/BERT This key allows the TPI 550B+ to conduct Bit Error Testing on B1, B2, or both B channels, using one of six available patterns.

B Channel operation is now more independent. A voice call can be placed on one B channel while the test set is running a BER test over a Data call on the other B channel.

****/Store*** This key is used to store up to ten numbers for repeat use.

#/Utility This key is used to configure the various test set utilities. The **MODES** sub-menu provides the capability to change the testing modes of the test set (e.g., POTS dialing mode, Dual Call mode, select B channel). The **CONFIG** sub-menu provides the capability to change the configuration of the test set (e.g., battery status, volume level, LCD contrast). The **DATA** sub-menu allows access to optional Data Capability functions (e.g., Bearer Capability, D-packet options, D channel monitor).

Hook On/Off This key is used to set up/release a call, redial, speed dial, or enter the SPID.

Scroll Menu This key is used to scroll through sub menu selections of the selected menu.

Setup This key allows the user to review the current setup configuration and accept it, or respond to menu prompts to change the setup.

2nd Func. This key is used to give other keys a 2nd function.

Mode and status LED's

These LED's indicate the active Line Interface.

NOTE:

If an interface has not been installed in your Test Set, the LED for that interface will not light and that interface will not activate.

Off Hook This LED, when illuminated, indicates that the TPI 550B+ is in a call state.

Seal Cur/PS1 LED The **Seal Cur/PS1** LED (Sealing Current/Power Source 1) serves two functions. In TE mode, it operates as a **PS1** LED and will light *green* when power source 1 has at least 30 Volts, but will light *red* if the polarity has been reversed. In NT1TE mode, this LED will operate as a Sealing Current (**Seal Cur**) indicator and will light *green* when at least 2 mA of sealing current is detected in either polarity.

Sync. LED The **Sync.** LED will light Green when the test set has gained synchronization with the received BRI carrier signal.

Active LED The **Active** LED will light Green when Layer 1 communication has been established.

Ready LED The **Ready** LED will light Green when the Layer 2 initialization process has been completed and indicates a call may be attempted from the test set.

Error LED The **Error** LED will light Red when a layer 1 error has been detected. When lit (steady or pulsing), accessing the STATUS RESULTS menu will display what layer 1 errors are occurring.

LpBk LED The **LpBk** LED will light amber when the unit is in a looped state, i.e., the unit has responded to a loop command from the network or the user has initiated a loopback.

PS2 and PS3 LED's The **PS2** and **PS3** LED's show the status of Power Sources 2 & 3 (Refer to the Power Feeding diagram on the next page). These LED's will light green when their corresponding power sources have at least 30 Volts. They will light red if the polarity has been reversed on their corresponding power source.

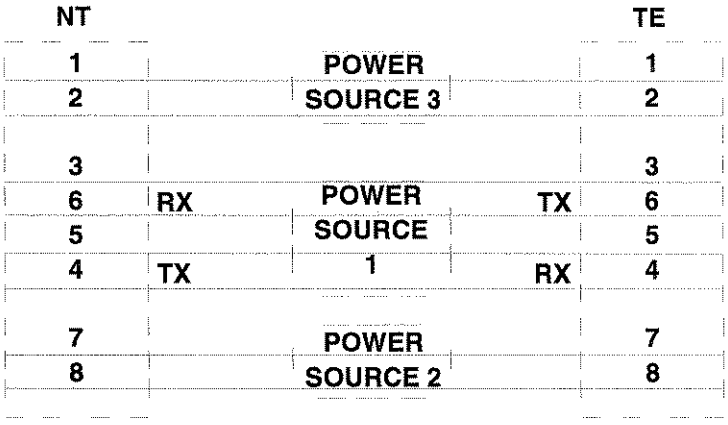


Figure 4 — *Configuration for power feeding*

NOTE:

Access lead designations 1 through 8 correspond to contact assignments of the 8-pin network interface connector. Access lead pairs 4-5 and 3-6 are for bi-directional transmission of the Digital signal and may provide a phantom circuit for power transfer to a TE (Power Source 1). Access lead pair 7-8 may be used for additional power transfer to a TE (Power Source 2). Access lead pair 1-2 may also be used for additional power transfer to a TE (Power Source 3).

Power Source 1, the Sealing Current power, derives its power locally (commercial power and/or batteries). The source may be an integral part of the NT.

Power Source 2, the Stand Alone Power Pair, also derives its power locally (commercial power and/or batteries). The source may be located or associated with the NT or it may be located separately; eg, in a remote wiring closet.

NOTE:

Power Source 3 is an optional power source that may be used in some cases.

Interface panel

(1)

The interface panel of the TPI 550B+ is located behind the drop down panel on the top of the unit. Users can make connections through this panel for a U (2 wire) jack, a handset jack, an S/T (4 wire) monitor jack, an S/T Term switch, a DATA connector, and a Power jack.

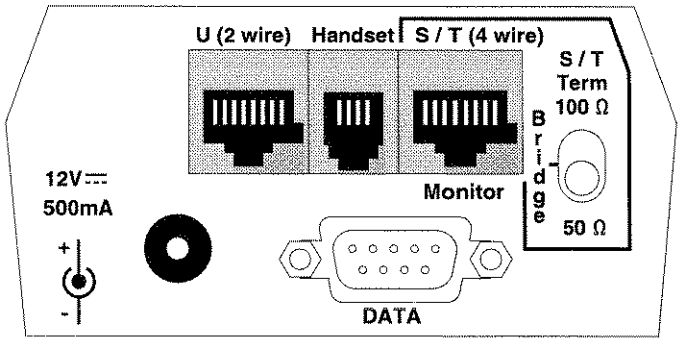


Figure 5 — *TPI 550B+ interface panel*

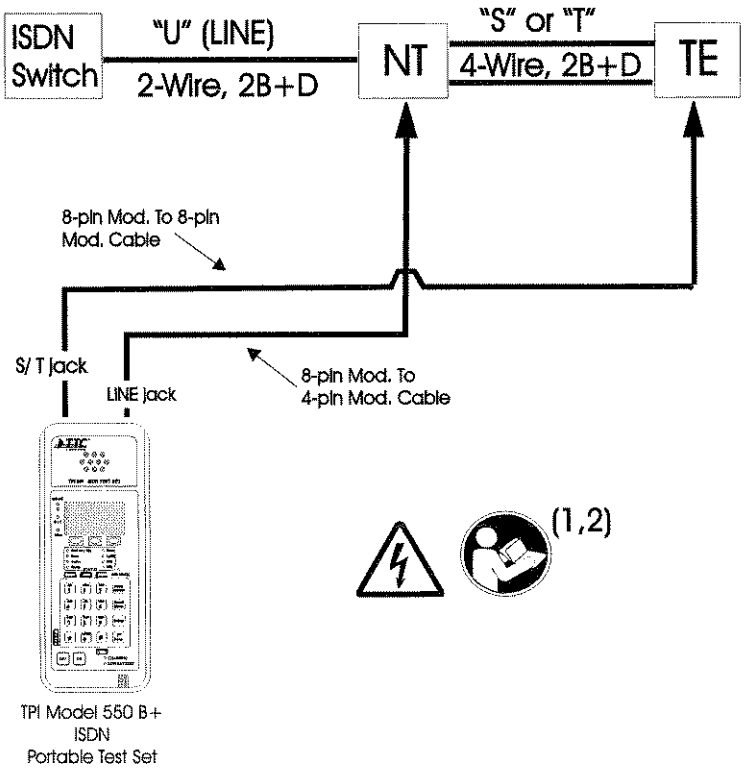


Figure 6 — *Connecting the 550B+ to the line under test*

U (2 wire) jack An 8-pin modular connector used to make connection to the 2-wire U Interface (Line Interface) when the ISDN BRI Test Set is in the NT1 or NT1/TE mode. When in U monitor mode, this jack is used to connect to the network side of the line.

Handset jack A 4-pin modular jack provided for connection of an optional handset, TPI 550B-8, to access either B channel when in a noisy environment.

S/T (4 wire) monitor jack An 8-pin modular connector used to make connection to the 4 wire S or T Interface when the TPI 550B+ is in the TE or NT1 mode. This jack also is used when in U monitor mode to connect to the CPE side of the line.

S/T term switch The **Term** switch may be used to place either a 100Ω or a 50Ω termination on the S/T line, or in the **Bridge** position, there would be no termination.

DATA connector A DB9/RS-232 connector is available for printing results or monitoring D channel signaling. The displayed information will be formatted in English for easy analysis, and raw HEX data is also shown. This connector will only be enabled when the option is purchased.

Power jack Bantam jack for AC Adapter (TPI 550B-4).

Chapter 3

Menus

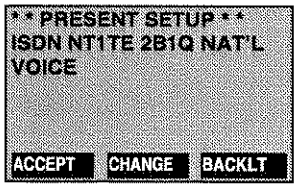
This chapter provides a basic introduction to the TPI 550B+ unit menus. Topics discussed in this chapter include the following:

Setup

When the unit is first turned on, it will conduct the Power On Self Test, and the following message will be momentarily displayed:

Upon successful completion of the Power On Self Test another message will be momentarily displayed, stating that the test has been passed.

The unit will then proceed to display the following configuration menu:



NOTE:

The second line of this display (just below Present Setup) will show your previous selection, and may not be as shown in this illustration.

Press the appropriate soft key to either **ACCEPT** the setup shown, or enter a new setup (**CHANGE**).

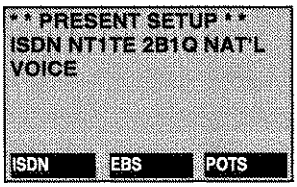
The **BACKLT** soft key is used to toggle the LCD backlight on or off.

NOTE:

Battery life will be enhanced if the LCD backlight is turned off when not needed (i.e., when there is sufficient ambient light).

The TPI550B+ Test Set has a variety of option boards that may be purchased to allow additional testing. The following section is for the standard ISDN Test Set or the EBS/POTS option only. Please see Chapter 5 for information about the SDSL and U-Mon options.

With the EBS/POTS option board installed, selecting **CHANGE** will display the following menu:



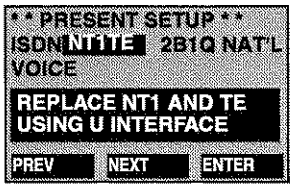
NOTE:

This menu is for selection of a service mode. This menu will only be displayed if the POTS/EBS option is installed. If this option is not installed, the first screen will be the mode of operation screen.

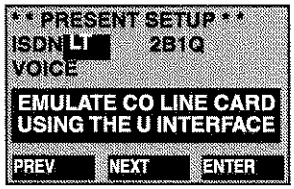
If **POTS** is selected, setup is complete.

If **EBS** is selected, other setup menus will follow (display size, primary set/add on unit, station address).

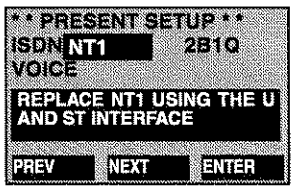
If the EBS/POTS option board is not installed, selecting **CHANGE**, or pressing the **Scroll Menu** keypad button, will display the following menu:



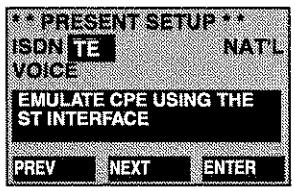
Use the **PREV** and **NEXT** soft keys to move between the different modes. Selecting **NEXT** will result in the following menu:



Selecting **NEXT** will result in the following menu:



Selecting **NEXT** will result in the following menu:



Mode Of Operation:

If you wish to use this unit connected in place of the NT1, press the **Scroll Menu** key until the screen

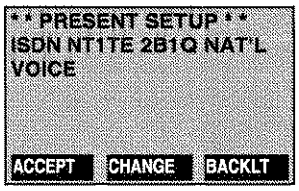
shows **NT1** and setup will be complete for your application.

If you wish to use this unit connected in place of the TE, press the **Scroll Menu** key until the screen shows **TE**.

If you wish to use this unit connected in place of both the NT1 and the TE, press the **Scroll Menu** key until the screen shows **NT1TE**.

If you wish to use this unit connected in place of the LT, press the **Scroll Menu** key until the screen shows **LT**.

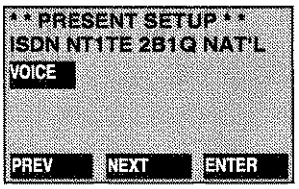
Once the appropriate selection is highlighted, select the **ENTER** soft key. If **LT**, **U-MON**, **IDSL**, or **NT1** was chosen, selecting the **ENTER** soft key will display the following screen:



NOTE:

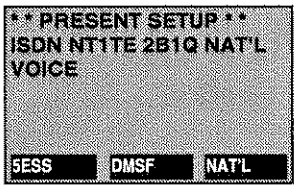
The second line of this screen is mode specific. Therefore, it may not look exactly as above.

If **NT1TE** or **TE** was chosen, the following screen will be displayed:



From this menu, select the desired bearer capability. The current selection will be highlighted on the screen and the soft key selections will be **PREV**, **NEXT**, and **ENTER**. Select **NEXT** to scroll through the selections: Voice, 3.1K Audio, Data 56K, Data 64K, then **ENTER** to select.

Selecting the bearer capability, or pressing the **Scroll Menu** key, will result in the following menu:



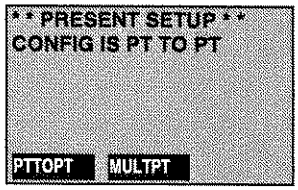
Call Control: This menu selects the current call control. The choices are: 5ESS, DMS-Functional, and National (Includes NI-1, NI-2, and NI-3 support).

NOTE:

The seldom used Northern Stimulus call control may be selected from the CALL CONTROL menu under Utility/MODES.

Other menus will then proceed to ask for information relevant to your particular setup. The information needed to complete the setup will depend on what menu selections you have made up to this point. This may include the SPID, DN (Directory Number), and whether the circuit is point-to-point or multi-point.

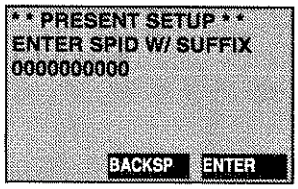
For example, pressing **5ESS** will display:



5ESS Configuration: This menu selects the configuration of the 5ESS line: Point to Point or Multipoint.

Selecting **PTTOPT** completes setup for this application. The ACCEPT/CHANGE screen will be displayed.

Selection of **MULTPT** will display:



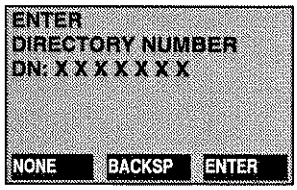
SPID: If 5ESS Multipoint, W/SUFFIX will not be displayed (5ESS doesn't require a TID). (No SPID is required in a PT to PT circuit configuration for 5ESS custom.)

Enter the new SPID (Service Profile Identifier) using the keypad. The TID (Terminal ID), if required for a national line, should be entered at the end of the SPID.

NOTE:

If the Dual Call feature is ON, two SPID's must be entered. If the setup is 5ESS, Pt-to-Pt, and Data call, only one SPID is required.

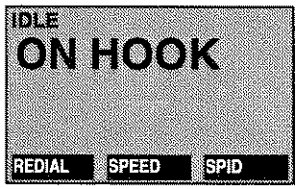
Pressing **ENTER** will enter the new SPID and display the ENTER DIRECTORY NUMBER screen:



Directory number: A directory number is required for non-CACH translations. The DN is normally seven digits and is automatically populated from the SPID, but may be changed via this menu. This menu will be displayed if National or DMS-Functional Call Control has been selected; in 5ESS Multipoint, the Directory Number is not required.

When you have entered all of the necessary information, the ACCEPT/CHANGE screen will again be shown.

After accepting the new setup, you will proceed to the **HOOK** screen, which is the default screen:



From this screen, you can also access Last Number Redialing, Speed Dialing, and entry of the SPID.

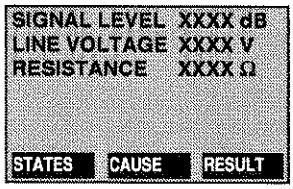
NOTE:

If the Dual Call feature is ON, the HOOK screen will show CALL1 *or* CALL2 *in the upper right-hand corner. Pressing the Scroll Menu key moves the display back and forth between the two calls.* ***SPID*** *soft key will change to SPID1/SPID2.*

If, at any time, you wish to changë the unit's setup, press the **Setup** key. You will then return to the above set of menus.

1/STATUS menu

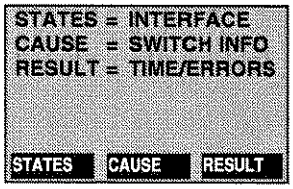
Selecting **1/STATUS** in EBS mode will display the following menu:



This screen reports EBS line measurements. Selecting the **STATES** soft key displays the S/T Signal Level. It is shown in volts and dBm. The signal level displayed is the actual measured loss of the cable plant as if the 8 kHz signal were sent at 0 dBm (similar to a TIMS box). The line voltage and resistance are measured at the test interface.

A new measurement is taken each time the **TEST** soft key is selected.

Selecting **1/STATUS** on the keypad in ISDN or POTS mode will result in the following screen:



The first three lines represent the menu. The fourth line represents the corresponding soft key selections available. In POTS mode, **CAUSE** is the only sub-menu available.

Choosing one of the three sub-menus is accomplished by selecting the soft key corresponding to the choices of **STATES**, **CAUSE** or **RESULT**.

STATES submenu

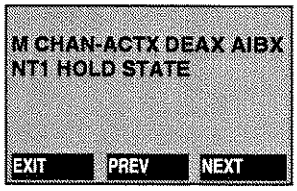
Selecting the **STATES** soft key from the **Status** menu provides several screens to show the status of:

- M Channel Activity
- Layer 1
- Layer 2
- Layer 3
- Received Loopbacks on B1, B2, and 2B+D
- EOC RX Message Buffer
- PS Voltage
- U Line Voltage
- S/T Receive Level

NOTE:

Moving from screen to screen is accomplished by either pressing the Scroll Menu key or selecting the soft key corresponding to EXIT, PREV or NEXT. Menus may vary depending on the mode of operation.

Selection of **STATES** from the **Status** menu will result in the following screen (NT1 or NT1TE mode):



This menu provides Maintenance Channel information relative to the Activate Bit (ACT), the Deactivate Bit (DEA), the Alarm Indicator Bit (AIB),

and the actual EOC messages received. (This menu will only display values if synced.)

ACT=1 is normal—(0 indicates not transparent to network)

DEA=1 is normal—(0 indicates the network is going to deactivate)

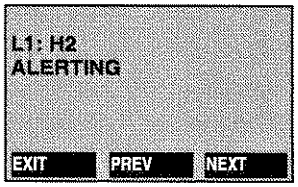
AIB=1 is normal—(0 indicates a problem)

The second line displays EOC messages (with the address) from the network. The Actual EOC message received may be one of the following:

Table 5 — *Possible EOC messages*

2B+D LOOPBACK
B1 LOOPBACK
B2 LOOPBACK
REQ CRPT CRC
NOTIFY CRPT CRC
RETURN NORMAL
HOLD STATE

Selecting the **NEXT** soft key or pressing the **Scroll Menu** keypad button shows one of the following screens:

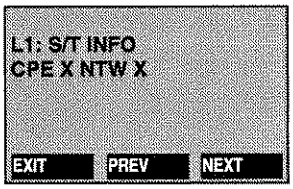


This menu provides layer 1 diagnostic messages relative to the state of the U (Line) Interface.

Table 6 — *Layer 1 diagnostic messages*

MESSAGES	MEANINGS
H1 FULL RESET	Interface is being reset
H2 ALERTING	Interface is trying to alert network
H6 ISW SYNC	Sync has been found on inverted sync word
H8 ACTIVE	Interface is active
H10 TEAR DOWN	Interface in process of being torn down

For the TE Mode, the following information will be shown on the display:



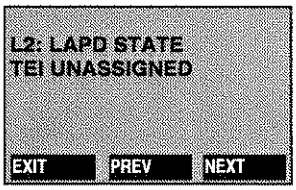
This menu provides layer 1 diagnostic messages relative to the state of the S/T Interface. The second line will display the info states. This will be the first menu when in the TE mode.

The following information will be shown on the display for TE and NT1 modes.

Table 7 — *Display readings—TE and NT1*

COMBINATIONS CPE	NETWORK	MEANING
Info 0	Info 0	Just powered up (less than 1 second) or not working.
Info 1	Info 0	Terminal is waiting for framing from network. Network is down or there is a wiring problem. Line to switch is not operational.
Info 1	Info 2	Network initiating communication with TE.
Info 3	Info 4	Link to network is operational. Terminal should work. If not, there are potential translation problems.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button at this time results in the following screen (TE or NT1TE mode):



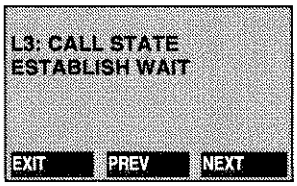
This menu provides layer 2 information for link access protocol for the D channel. The second line will display the message.

The complete messages and their meanings are indicated below:

Table 8 — *Layer 2 information messages*

MESSAGES	MEANINGS
TEI UNASSIGNED	Requesting TEI state
ASSIGN AWAITING TEI	Requesting TEI state
ESTABLISH AWAITING TEI	Requesting TEI state
TEI ASSIGNED	TEI has been assigned
AWAITING ESTABLISHMENT	Not yet in multiple frame state
AWAITING RELEASE	Release request from multiple frame state
MULT FRAME EST	Completed SABME/UA (This is the state the 550B+ should be in when ready to place a call.)
TIMER RECOVERY	Error State

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button at this time results in the following screen (TE or NT1TE mode):



This menu provides layer 3 information for the state of actual calls (the X.25 call state will be displayed for D-packet calls). The second line will display the information.

The following is a list of these messages and their meanings:

Table 9 — *Layer 3 information messages*

MESSAGES	MEANINGS
ESTABLISH WAIT	Layer 3 is not active
NULL STATE	No call exists
CALL INIT	(Call Initiated) The state exists for an outgoing call.
OVERLAP SENDING	Call establishment request acknowledgment has been received permitting additional call information to be sent in the overlap mode.
OUT CALL PROC	Outgoing call proceeding

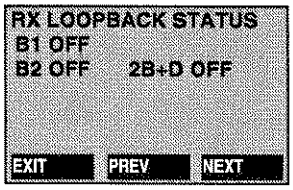
Table 9 — *Layer 3 information messages*

CALL DELIVERED	Remote user alerting has been initiated.
CALL PRESENT	State exists for an incoming call.
CALL RECEIVED	Incoming call not yet answered.
CONNECT REQUEST	Incoming call answered, waiting to be awarded.
IN CALL PROC	Incoming call proceeding
CALL ACTIVE	Incoming call or outgoing call state.
DISCONNECT REQ	(Disconnect request Request for network to clear the end-to-end connection.
DISCONNECT IND	(Disconnect Indication) Receipt of indication to disconnect.
SUSPEND REQUEST	Request for network to suspend the call.
RESUME REQUEST	Request for network to resume a previously suspended call.
RELEASE REQUEST	Request for network to release a call.
OVERLAP RECEIVE	(Overlap Receiving) Network is prepared to receive additional call information (if any) in overlap mode.

Table 9 — *Layer 3 information messages*

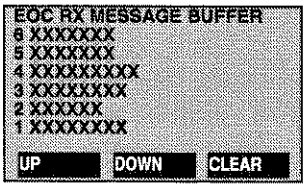
IDLE STATE	(IDLE CALL STATE) On Hook. No calls in progress.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button at this time results in the following screen:



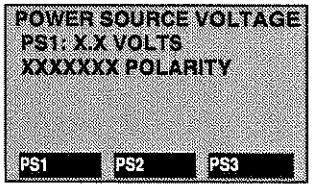
This menu provides status information for loopback commands that have been received from the network. When the test set is in NT1 or NT1TE mode, it will respond to loopback commands addressed to NT1 or Broadcast. If any of the indicated loopbacks are activated, the **LpBk** LED will light.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button at this time results in the following screen



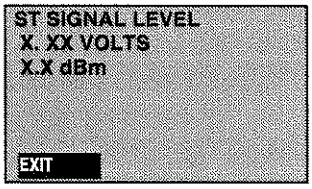
This screen lists the current stored messages. Other messages can be displayed with the **UP** and **DOWN** soft keys.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button at this time results in the following screen (NT1 or TE mode):



This menu reports the power source voltage and polarity (normal or reverse). Selecting the appropriate soft key will report the status of power source 1, 2, or 3.

Pressing the **Scroll Menu** keypad button next will result in the following screen:

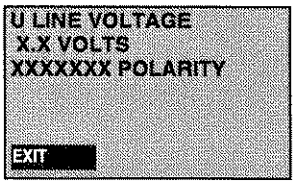


This menu is used to measure the signal voltage on the S/T bus. It is shown in volts and dBm.

NOTE:

The above capability requires processor rev 3 or higher.

Pressing the **Scroll Menu** keypad button at this time results in the following screen (NT1 or NT1TE mode):



This menu reports the line voltage and polarity (normal or reverse) on the U interface. The volt range displayed will be approximately 10 to 15 volts. Although a volt meter could measure an open line (a line with nothing attached to it) at 48 volts, the TPI 550B+ terminates the voltage down to 10 to 15 volts. In 2B1Q, either polarity will work.

To exit the **1/Status** menu, select the **EXIT** soft key.

CAUSE submenu

NOTE:
The CAUSE sub menu is available in TE and NT1TE modes.

These sub-menus provide diagnostic information such as:

Cause Information (CAUSE INFO)

User Service Identifier (USID)

Terminal Identifier (TID)

Parameter Download

Service Profile Management (SPM)

Terminal Endpoint Identifier (TEI)

B Channel Usage

Automatic Number Identification (ANI) [CLID]

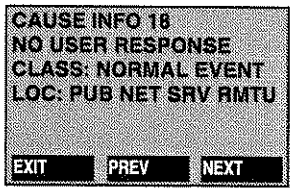
NTI Protocol Revision and Issue Number (if supported by the switch)

CACH Test

NOTE:

Moving from screen to screen is accomplished by either pressing the Scroll Menu key or selecting the soft key corresponding to PREV or NEXT.

Selecting **CAUSE** from the **Status** menu will result in the following screen:



This screen will display the cause message, which, if in Voice or Data mode, may be one of the following:

Table 10 — *Cause messages*

NONE=No Cause Message received	
1	UNASSIGNED NUM
2	NO ROUTE TO NET
3	NO ROUTE TO DEST
6	CHN UNACCEPTABLE
7	CALL AWARDED

Table 10 — *Cause messages*

16	NORMAL CLEARING
17	USER BUSY
18	NO USER RESPONSE
19	ALERTING NO ANS
21	CALL REJECTED
22	NUMBER CHANGED
26	NON SELECTED CLR
27	DEST OUT ORDER
28	INVALID NUM FMT
29	REQ FACILITY REJ
30	RSP TO STAT ENQ
31	NORM UNSPEC
34	NO CHAN AVAIL
35	QUEUED
38	NET OUT ORDER
41	TEMP FAILURE
42	NETWORK CONGEST
43	INFO DISCARDED
44	CHN NOT AVAIL
47	RESOURCE UNAVAIL
49	QUAL SVC UNAVAIL
50	FAC NO SUBSCRIB
52	OUT CALLS BARRED
54	IN CALLS BARRED
57	BEARCAP NOT AUTH
58	BEARCAP NOT AVAI
63	SERVC NOT AVAIL
65	BEARSVC NOT IMPL
66	CHN TYPE NOT IMPL

Table 10 — *Cause messages*

69	REQ FAC NOT IMPL
70	RES DIGITAL ONLY
79	SVC NOT IMPLEMNT
81	INVAL CALL REF
82	CHN NOT EXIST
83	NO CALL ID
84	CALL ID IN USE
85	NO CALL SUSPEND
86	CALL CLEARED
88	INCOMPAT DEST
91	NET NOT EXIST
95	INVALID MSG
96	INFOELEMENT MISS
97	MSG TYPE NONEXST
98	MSG NOT COMPAT
99	ELEMENT NONEXIST
100	INVAL INFO
102	RECOV ON TMR EXP
111	PROTOCOL ERROR
127	INTERWORKING

However, in D channel Packet mode, the cause messages come in 3 types: CLEAR, RESET, or RESTART indication packet. The message displayed will be one of the following:

Table 11 — *RESET indicator packet messages*

01	OUT OF ORDER
03	REMOTE PROCEDURE ERROR

Table 11 — *RESET indicator packet messages*

05	LOCAL PROCEDURE ERROR
07	NETWORK CONGESTION
09	REMOTE DTE OPERATIONAL
15	NETWORK OPERATIONAL
17	INCOMPATIBLE DESTINATION
29	NETWORK OUT OF ORDER

Table 12 — *RESTART indicator packet messages*

01	LOCAL PROCEDURE ERRROR
03	NETWORK CONGESTION
07	NETWORK OPERATIONAL
127	REGISTRATION/CANCEL CONFIRMED

Check with your technical support organization for further explanation of each cause message.

CLASS and LOCATION will have one of the following messages:

Table 13 — *CLASS indicator packet messages*

01	NORMAL EVENT
02	RESOURCE UNAVALIABLE
03	SERVICE OR OPTION NOT AVAILABLE
04	SERVICE OR OPTION NOT IMPLEMENTED

Table 13 — *CLASS indicator packet messages*

05	INVALID MESSAGE
06	PROTOCOL ERROR (e.g., parameter out of range
07	INTERWORKING (e.g., unknown message)

Table 14 — *LOCATION indicator packet messages*

01	PRIVATE NETWORK SERVING THE LOCAL USER
02	PUBLIC NETWORK SERVING THE LOCAL USER
03	TRANSIT NETWORK
04	PUBLIC NETWORK SERVING THE REMOTE USER
05	PRIVATE NETWORK SERVING THE REMOTE USER
07	INTERNATIONAL NETWORK
12	NETWORK BEYOND INTERWORKING POINT

Table 15 — *CLEAR indicator packet messages*

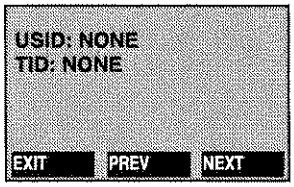
01	NUMBER BUSY
03	INVALID FACILITY REQUEST
05	NETWORK CONGESTION

Table 15 — *CLEAR indicator packet messages*

09	OUT OF ORDER
11	ACCESS BARRED
13	NOT OBTAINABLE
17	REMOTE PROCEDURE ERROR
19	LOCAL PROCEDURE ERROR
21	RPOA OUT OF ORDER
25	REVERSE CHARGE NOT SUBSCRIBED
33	INCOMPATIBLE DESTINATION
41	FAST SELECT ACCEPTANCE NOT SUBSCRIBED

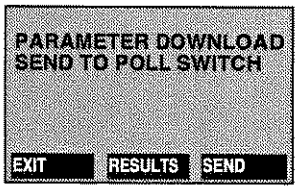
Check with your technical support organization for further explanation of each cause message.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button at this time results in the following screen:

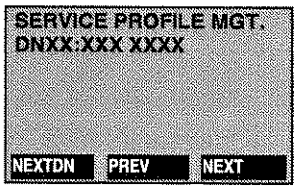


This menu will display the User Service Identifier (USID) and Terminal Identifier (TID) codes assigned, if any (TID required for NI-1), after access has been gained. If Dual Call is ON and has been sent, both USIDs and both TIDs will be displayed.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button at this time results in the following screen:

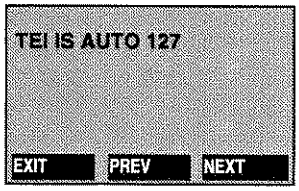


Parameter download capability is the ability to download some of the translations, e.g., features/button numbers, from the switch for your particular SPID.



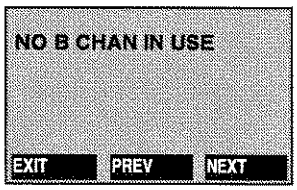
This menu is only valid for NTI-Functional call control. The above information (DN's assigned to each button number) will be displayed if the switch has SPM (Service Profile Management) information available. The second line `DNXX:XXX XXXX` translates to key no.:DN This menu can store up to 20 SPM messages. Selecting the **NEXTDN** soft key will review other key assignments.

Selecting the **NEXT** soft key or pressing the **Scroll Menu** keypad button at this time results in the following screen:



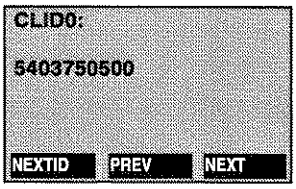
This menu will display the current mode (Auto or Fixed) and current assigned Terminal Endpoint Identifier (TEI) number.This menu will report both TEIs if Dual Call is ON.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button at this time results in the following screen:



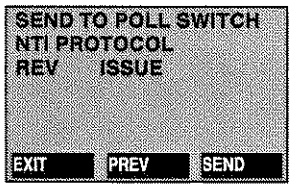
This menu reports which B Channel is in use, if any.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button at this time results in the following screen:



When an incoming call is received, this menu will display the calling party number, if the data received contains the calling party number. This menu can store up to 10 CLID messages. Selecting **NEXTID** will scroll through the messages.

Selecting the **NEXT** soft key or pressing the **Scroll Menu** keypad button at this time results in the following screen:



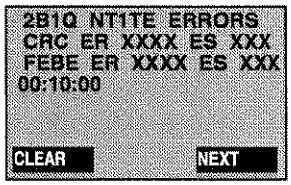
When turning up an NTI Functional Call Control circuit, you may wish to verify the correct protocol versions. This screen will only be displayed if DMS-F or NAT'L call control is used. Select **SEND** to download the NTI protocol from the switch.

The revision and issue numbers of the protocol software for your particular U Interface DMS-100 translation will be displayed, if the switch supports this feature (otherwise they will remain blank).

To exit the **1/Status** menu, select the **EXIT** soft key.

RESULT submenu

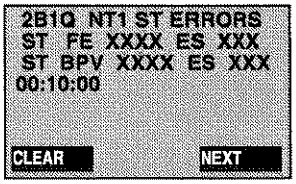
Selecting **RESULT** from the **Status** menu will result in the following screen (NT1 or NT1TE mode):



The display above indicates the NT1TE mode. If in NT1 mode, the top line would display 2B1Q NT1 U ERRORS.

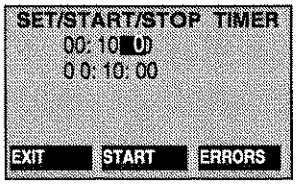
This screen displays the errors on the U interface. The **CLEAR** soft key can be selected to reset the timer and the error counters for the U interface.

If in NT1 mode, selecting the **NEXT** soft key or pressing the **Scroll Menu** keypad button results in the following screen:



This screen displays the errors on the S/T interface. If operating in TE mode, the top line would display TE ERRORS. If operating in TE mode, this will be the first screen. The **CLEAR** soft key can be selected to reset the timer and the error counters for the S/T interface.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button at this time results in the following screen:



The first line is the time selected. The second line is the descending counter.

Enter the time desired by pressing the number keys on the keypad with the format of HH:MM. When ready to begin timed testing, select the **START** soft key.

To display errors occurring and time left in the test, select the **ERRORS** soft key.

Movement between the SET/START/STOP TIMER and ERRORS screens can be accomplished by

pressing **Scroll Menu** on the keypad or by using the **ERRORS** and **NEXT** soft key selections.

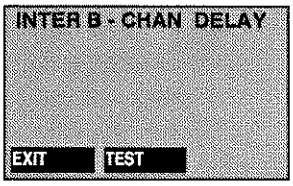
NOTE:

Timed tests will freeze the error counters after the time has expired. This timer is for the RESULTS screen only and is not valid for ing.

Test Results available for the various setups are:

- CRC ERR & CRC ES (Cyclic Redundancy Check Errors & CRC Errored Seconds) - indicates the unit has received corrupted data.
- FEBE ERR & FEBE ES (Far End Block Errors & FEBE Errored Seconds) - indicates that the far end has received a block error.
- S/T FE & S/T FE ES (Frame Errors & FE Errored Seconds) - indicates an error in the framing pattern has been received.
- S/T BPV & S/T BPV ES (Bipolar Violations & BPV Errored Seconds) - indicates that two consecutive 1 bits of the same polarity have been detected.

Pressing the **Scroll Menu** keypad button will display the following results screen:



After placing dual calls to a loopback, selecting this menu reports the difference in channel delay (in microseconds or milliseconds) between B1 and B2.

Many BRI users desire more bandwidth than is available over a single 64kb/s channel for services

such as video conferencing. With BRI service, both B channels may be used simultaneously by placing two separate calls to equipment at the far end. However, since these are 2 distinct calls, the routing through the public network can be along different paths. The time required for the data to reach the far end will vary with each call. The equipment using the extended bandwidth must compensate for this time delay. If the difference in delay between the 2 B channels is too great, the equipment may not compensate for the delay, thus preventing the user from accessing the desired service.

This differential delay measurement is made after 2 calls are established on the TPI 550B+. A far end loopback is placed on each B channel. This can be accomplished by calling another TPI 550B+ or by calling a 108 test line at the far end.

Since each call placed is routed according to resources available at the time of the call, the differential delay can vary each time a call is made.

Selecting the **TEST** soft key will measure the delay. At the completion of the test, the following menu will appear:

The delay reported is the one-way differential delay between the two B channels. This delay can be

compared to the maximum allowable delay for the particular CPE.

NOTE:

If running BERT, the delay cannot be measured. `BERT RUNNING` *will be displayed when the TEST soft key is selected.*

If a problem involving a delay is suspected, this routine (placing two calls and performing this test) should be repeated several times to ensure the delays maintain an acceptable range. Typically CPE can accommodate up to 300 msec, some up to 500 msec of differential delay. Results are accurate to 125 microseconds.

NOTE:

In conjunction with the dual channel BERT feature of the TPI 550B+, the differential delay measurement feature provides strong support for video service applications.

To exit the **Results** menu, press any keypad selection, or select the **EXIT** soft key.

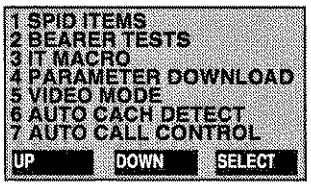
2/AUTO menu

The **2/AUTO** key displays the Auto Modes screen, allowing the following Intelligent Tests (IT) to be performed:

- Auto SPID—Auto SPID or Guess SPID
- Auto Bearer Service Test—Test for bearer services on local exchange or to a remote device
- IT Macro—Place calls to a test number and run the test for a user-specified amount of time

- Parameter Download—Download translations from the switch for a particular SPID
- Video—Answer and Loop both B channels
- Auto CACH Detect
- Auto Call Control

Pressing **2nd Func.** then **2/Auto**, will result in the following screen being displayed:

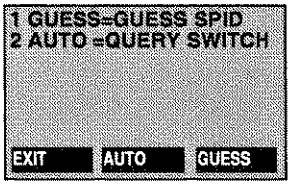


The first seven lines represent the menu. The eighth line represents the corresponding soft key selections available.

Selection of a sub-menu can be accomplished by using the **UP** and **DOWN** soft keys. Once the desired sub-menu is highlighted, choose the **SELECT** soft key.

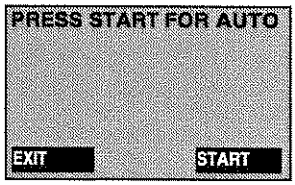
SPID submenu

Selecting the **Spid Items** sum-menu from the **Auto** menu will result in the following screen being displayed:



This menu allows two selections for obtaining the SPID–ask the switch or guess.

Auto SPID Selecting **SPID ITEMS** from the AUTO menu will display the following menu:

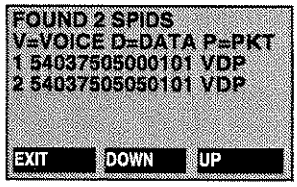


Selecting the **START** soft key will send out a SPID of 01010101010101, which asks the switch what SPIDs are valid on this line.

NOTE:

The switch must support the Auto SPID option and the option must be enabled for this feature to work. (Auto SPID is a cost option on the switch.) Most switches now support this feature, however Auto SPID is a feature of NAT'L (National) call control, so Custom call control may not support it.

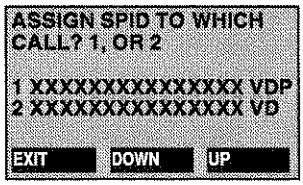
If AUTO SPID is supported by the switch, the following results screen will be displayed:



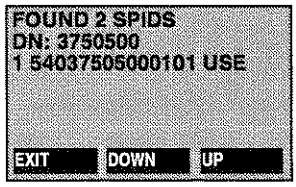
The first line of the results screen displays the number of SPIDs found. The second line indicates what bearer capability abbreviations are used for the SPIDs listed. The third line displays the sequence number (e.g., 1) associated with the SPID following it, the SPID returned from the switch (e.g., 54037505000101), and the bearer capabilities allowed for the SPID (e.g., VPD). If a SPID is currently in use, USE will be displayed after the SPID. If more SPIDs were

returned from the switch than can be displayed on the LCD, **DOWN** and **UP** soft keys are displayed to scroll through the SPIDs.

To select a SPID, enter the sequence number (e.g., 1) using the keypad.



Once the SPID has been selected, it is sent to the switch. The following screen is displayed:



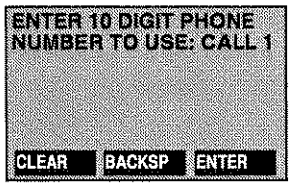
This screen displays the directory number associated with the selected SPID. To view the DN for a different SPID, select **DOWN** until the desired SPID is displayed then enter the sequence number using the keypad (e.g., **DOWN** to display SPID 2, **2** to select SPID 2).

If AUTO SPID is not supported on this line, `AUTO NOT SUPPORTED` will be displayed and a **GUESS** soft key will appear (to guess the SPID).

NOTE:

If not connected to a line, selecting START will display a `LAYER1 NO SYNC` *message.*

Guess SPID Selecting the **GUESS** soft key will display the following menu:



This screen is used to enter the 10-digit phone number for the line. The **CLEAR** soft key will erase the entire number, while **BACKSP** will move back (to the left) one digit at a time. After entering the 10-digit phone number, select the **ENTER** soft key to accept it. The TPI 550B+ uses a special algorithm to determine the correct SPID, based on the 10 digit number entered.

NOTE:

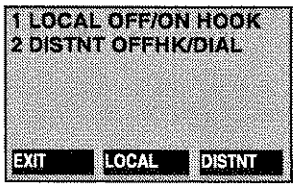
If not connected to a line, selecting ENTER will display a `LAYER1 NO SYNC` *message.*

If a SPID is determined, the following results screen will display:

Once the SPID has been found, it is sent to the switch.

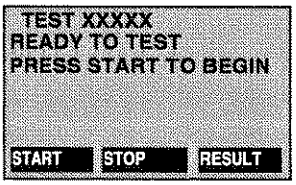
BEARER TEST submenu

Selecting **BEARER TESTS** from the **Auto** menu will result in the following screen being displayed:



Starting a bearer service test will cycle through Voice, 3.1K Audio, Data 56, and Data 64 bearer capabilities, attempting to draw dial tone for each. **LOCAL** tests the local exchange, **DISTNT** tests to a remote device.

Selecting **LOCAL** will display the following menu:



If **DISTNT** was selected, the screen will prompt for a `Number To Distant Test`. Once that number is entered, the screen above will be displayed.

Select **START** to initiate the test.

NOTE:

If not connected to an active line, selecting START will display a `LAYER1 NO SYNC` *message.*

For a Local test, the TPI 550B+ will go off hook and attempt to draw dial tone for each bearer capability being tested. If dial tone is received, the test of that bearer capability passes.

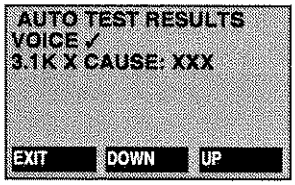
For a Distant test, the TPI 550B+ will go off hook and dial the distant number for each bearer capability being tested. If an Alerting message is received back from the distant end, the test of that bearer capability passes.

NOTE:

Although the equipment at the distant end may ring, it does not have to answer for the test to pass.

Selecting **STOP** will end the test.

At the conclusion of the test, a pass/fail report will be displayed. Select **RESULT** for more information on these results:



The check mark (✓) indicates the test of that bearer capability has passed. If the test of a bearer capability fails, an X will be displayed, along with a cause number. Select the **UP** or **DOWN** soft keys to scroll through the results. Results are reported for all bearer capabilities (transmission services) tested.

NOTE:

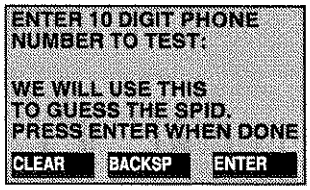
Some switch translations may not support the 3.1K Audio bearer capability, which will cause the 3.1K Audio test to fail.

If **STOP** is selected during the test, `TESTING CANCELED` will be displayed and the results screen will show `NO RESULTS`.

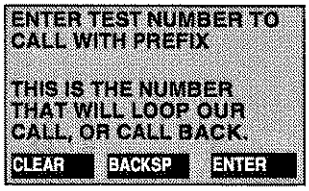
IT Macro submenu

IT Macro is a defined macro used to place calls to a test number and run a test for a user specified time. Selecting **IT Macro** will prompt for the 10 digit phone number to guess the SPID, prompt for the number to dial (e.g., 560B loopback device), and ask if the number returns the call. Select the **START** soft key to initiate the macro. For Voice mode, the 550B+ places a call and checks for Layer 1 errors for the amount of time specified in the **Utility/CONFIG** MACRO TIME menu. For the Data 56K or Data 64K mode, the 550B+ places a call and runs a BERT using the user selected pattern and test time selected in the **Utility/CONFIG** menu.

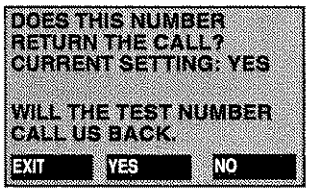
Selecting the **IT Macro** sub-menu from the **Auto** menu results in the following screen:



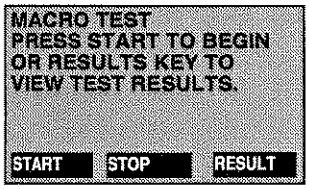
Selection of the **Enter** soft key at this time results in the following screen:



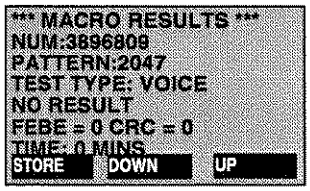
Selection of the **Enter** soft key at this time results in the following screen:



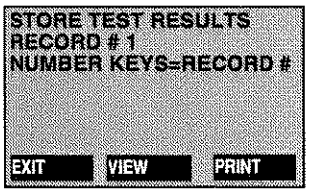
Selection of the **Yes** or **No** soft key at this time results in the following screen:



Selection of the **Result** soft key at this time results in the following screen:



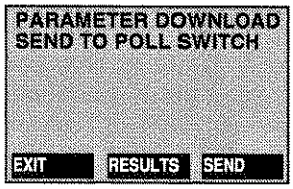
Selection of the **Store** soft key at this time results in the following screen:



Pressing **0** through **9** on the keypad followed by **View** or **Print** allows you to review or print one of ten stored records.

Parameter Download submenu

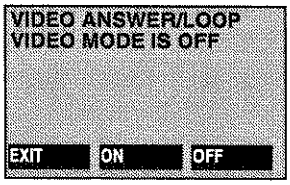
Selecting the **Parameter Download** sub-menu from the **Auto** menu results in the following screen:



Parameter download capability is the ability to download some of the translations, e.g., features/button numbers, from the switch for your particular SPID.

VIDEO submenu

Selecting the **Video** sub-menu from the **Auto** menu will result in the following screen being displayed:



Turning the Video Answer/Loop **ON** will automatically answer and loop incoming calls.

NOTE:

Dual Call must be ON (Utility/Modes, Dual Call screen) to answer two calls simultaneously.

When a call is received in this mode, the TPI 550B+ will automatically answer the call (**Off Hook** LED will light) and the TPI 550B+ will enter a loopback state on that channel (if desired, the **TOGGLE LOOPBACKS** screen, in the **Utility/ Config** menu, can be entered to confirm the loopback). If Voice or 3.1K Audio bearer capability is being used, an audible

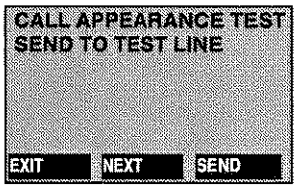
tone will sound 3 times, indicating the TPI 550B+ is entering loopback.

In the Video Answer/Loop mode, outgoing calls cannot be made. (If the **Hook On/Off** key is pressed to initiate a call, a beep will sound and `VIDEO MODE` will be displayed on the hook screen.)

To exit the **2/Auto** menu, select the **EXIT** soft key or the **Setup** key.

Auto CACH detect submenu

Selecting the **Auto CACH detect** sub-menu from the **Auto** menu results in the following screen:



This menu is used to check for Call Appearance Call Handling (CACH). If a line is CACH, it is handled differently by the switch. To find out if the line is CACH, select the **SEND** soft key.

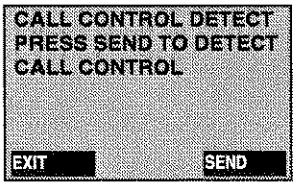
NOTE:

Must have Sync, Act, Ready, and correct SPID.

This will initiate the test, drawing dial tone on call appearances. Once finished, the screen will report the results. If the line is CACH, the screen will report valid call appearances (for example, `VALID CAs 1-8`).

Auto call control submenu

Selecting **Auto Call Control** from the **Auto** menu results in the following screen:



To perform Auto Call Control, select the SEND soft key.

NOTE:

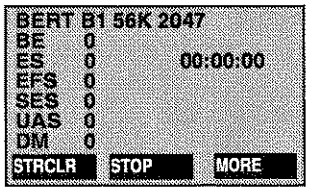
Must have Sync, Act, and Ready.

This will initiate the test, which sends out messages to the switch. The results of the test will be displayed (for example, `DMS-FUNCTIONAL`), based on what we receive back from the switch.

3/BERT menu

This key allows Bit Error Testing on either of the B channels, or both.

If you select item **3/BERT** on the keypad, the following menu will result:



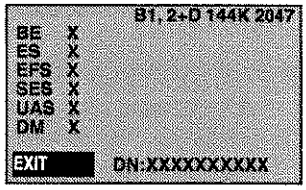
The BERT menu has been enhanced to support IDSL testing. The option of **128K** has been added to run

BER tests on the bandwidth normally used by the B channels. The option of **144K** has been added to run BER test on the full available bandwidth of the BRI line.

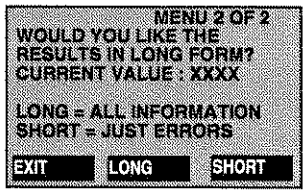
The channel, data rate, and pattern currently selected will be displayed on the first line.

Selection of the **MORE** soft key will result in the following screen:

Selecting the **VIEW** soft key will display the test results on screen before printing. The screen format is as follows:



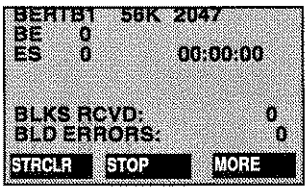
Pressing the **Scroll Menu** button will result in the following menu:



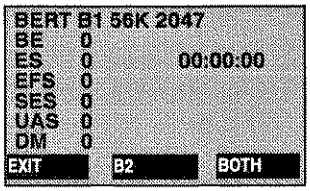
Choose between long and short formats for the printed results by using the **LONG** and **SHORT** soft keys.

Selecting **STORE** will store the current test results in the first available location, shifting out the oldest test results. A total of 10 test results can be stored.

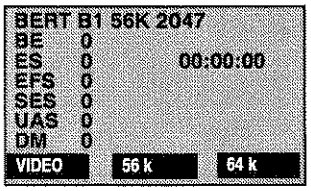
Selecting the **Scroll Menu** key from the main BERT menu will display the following screen. (A Block = 2,000 Bits).



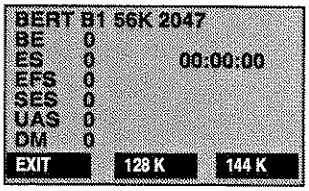
If you are using 56K or 64K, you may select the desired B channel to test by pressing the **Scroll Menu** key. This will display the following menu:



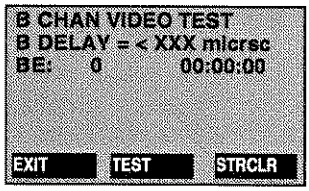
You may then select the desired data rate by pressing the **Scroll Menu** key. If you are using 128K or 144K, **Scroll Menu** will go directly to this menu, and will bypass the above step. The following screen will be displayed:



Pressing the **Scroll Menu** key again will result in the following menu.



Selecting the **VIDEO** soft key from the 56K/64K data rate selection screen will display the following menu:

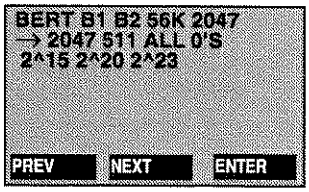


Select **TEST** to measure the B channel delay and start the BERT. The **STRCLR** soft key will re-start the test and clear the counters. The bottom line displays the BERT timer and the combined bit errors (from both channels). Selecting **EXIT** will exit this menu.

NOTE:

If the TEST soft key is selected with no sync, NO SYNC *will be displayed.*

From the data rate selection screen, pressing **Scroll Menu** or selecting a data rate soft key will display the following screen:



Select the **PREV** or **NEXT** soft key to move among the selections. The cursor (→) indicates the currently selected pattern. Select **ENTER** to accept the highlighted pattern and return to the Start/Stop menu.

Pressing **Scroll Menu** returns to the Start/Stop menu.

Testing will begin when you depress the **STRCLR** (start and clear) soft key. Bit Errors and Errored Seconds will be displayed.

NOTE:

It is normal to get a burst of errors when a test is first started. Select STRCLR again to clear the errors.

The **6ERROR** soft key may be used to insert 6 bit errors into the transmitted data (if BERTing on both channels, the errors will be inserted into *both* channels).

NOTE:

Please note that when 6 bit errors are inserted into the transmitted data, they may or may not fall within the same errored second. The use of the 6ERROR soft key might result in two errored seconds.

You may view the G.821 results, change the B Channel, or change the data rate by pressing the **Scroll Menu** key until the proper menu is displayed.

Testing will terminate when you select the **STOP** soft key. Going On Hook will also stop the BERT test.

To exit this menu, use the **Scroll Menu** keypad button until the menu shows a soft key selection of **EXIT**. Select this soft key. You may also press the **Setup** key, then select the **ACCEPT** soft key.

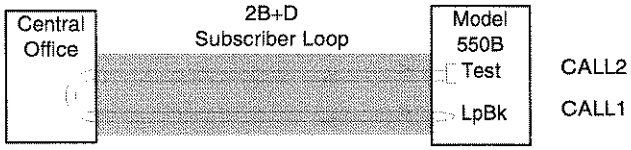
BER Testing To conduct a BERT on one B Channel, perform the following:

1. Press the **#/Utility** key.
2. Select the **DATA** soft key. The BEARER CAP menu is displayed.
3. Select **DATA** then press **Scroll Menu** and select the Speed.
4. Press the **Scroll Menu** key and select the **EXIT** soft key.
5. Place a call:
   a. Go off hook by pressing the **Hook On/Off** key (**Off Hook** LED will light).
   b. Enter the number using the keypad (LCD screen will display number entered and channel connected).
6. Press **2nd Func.** followed by **3/BERT**.
7. Check the Speed and B channel.
   a. B channel should be the B channel shown when the call was connected.
   b. Speed should be 64K for Clear Channel Testing and 56K for Non-Clear.
8. Start the BER Test by selecting the **STRCLR** soft key. There will be a burst of bit errors (BE).
9. Select the **STRCLR** soft key again to clear the initial errors. Select the **6ERROR** soft key to insert 6 bit errors into the transmit pattern.
10. Run the test for a desired amount of time and determine if total errors is acceptable (see your company policy).
11. Select the **STOP** soft key or press **Hook On/Off** twice to end the test.

The dual call feature of the Model 550B+ enables BER tests to be conducted on both B channels simultaneously, thus testing the full 128K bandwidth. This testing can be accomplished in two scenarios.

LOOPBACK SCENARIO:

OPTION 1: Place a call from one B channel to another, place one in loopback and initiate BERT from the other call (B channel).



Under the **Utility, MODES** menus, turn the Dual Call feature ON. You will be asked if you would like to guess the 2nd SPID. Enter SPID #2 and select **SEND**. Verification will be displayed in the upper right.

NOTE:

If you do not want to use a 2nd SPID, select NO, and then select NONE.

Press **Scroll Menu** to enter DN #2, if necessary, then press **SEND**.

Press **Scroll Menu** to the `DO YOU WANT TO CALL YOURSELF LOOP AND BERT?` screen. Select **YES** and enter the Centrex prefix, if needed.

Press the **TEST** soft key. The Model 550B+ will automatically go off hook, dial the number, loopback, and enter BERT.

OPTION 2 - DUAL BERT: This procedure requires a loopback device at the Central Office (e.g., TPI 560).

To test both channels simultaneously, place two calls to a loopback device.

a Go off hook on CALL1 by pressing the **Hook On/Off** key (**Off Hook** LED will light).

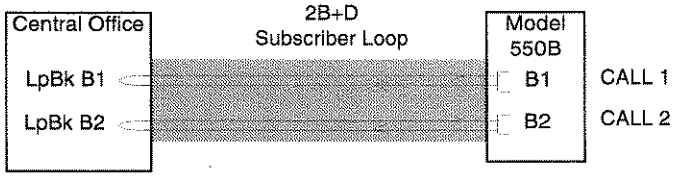
b Enter the number using the keypad (LCD screen will display number entered and channel connected).

c Press **Scroll Menu** to reach the hook screen for CALL2.

d Go off hook on CALL2 by pressing the **Hook On/Off** key (**Off Hook** LED will light).

e Enter the number using the keypad (LCD screen will display number entered and channel connected).

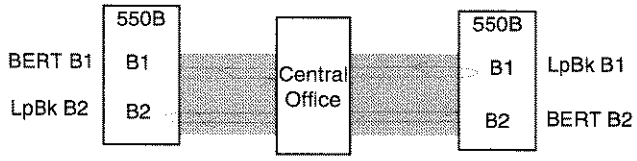
Enter the BERT menu, **Scroll Menu** to the channel select screen, and select BOTH channels.



STRAIGHTAWAY SCENARIO:

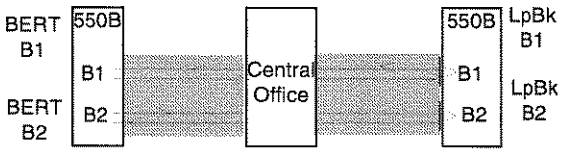
OPTION 1: Two technicians with TPI 550B+'s can call each other. In this scenario, the first technician would call the

second. The second technician would then call the first, using the CALL2 Hook screen.



The called technician would place the incoming B channel in loopback. Each technician would then initiate BER testing over the out-bound B channel.

OPTION 2 - DUAL BERT: To test both channels simultaneously from one end, a similar procedure would be followed, except only one technician would initiate BERT (select BOTH channels in the BERT menu).



The called technician would place the incoming B channel in loopback.

OPTION 3 - DUAL BERT FOR VIDEO: Verify that both TPI 550B+'s are in Dual Call mode (**Utility/MODES**).

Place one TPI 550B+ in Video Auto Answer/Loop mode (**Auto** key, **VIDEO** soft key).

Place two calls to the 550B+ in Auto Answer and Loop mode, using the other TPI 550B+:

a Go off hook on CALL1 by pressing the **Hook On/Off** key (**Off Hook** LED will light).

b Enter the number using the keypad (LCD screen will display number entered and channel connected).

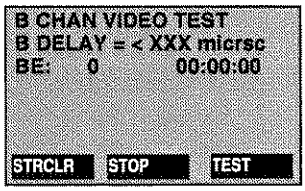
c Press **Scroll Menu** to reach the hook screen for CALL2.

d Go off hook on CALL2 by pressing the **Hook On/Off** key (**Off Hook** LED will light).

e Enter the number using the keypad (LCD screen will display number entered and channel connected).

Enter the BERT menu, **Scroll Menu** to the speed select screen, and select the **VIDEO** soft key.

Press the **TEST** soft key to measure the B channel delay then run dual BERT at 64K.



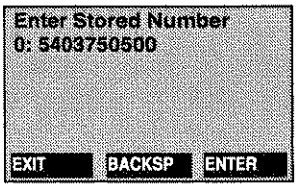
The second line will display the B channel delay (if not connected to an active line NO SYNC will be displayed) and the bottom line will display the combined bit errors (from both channels) and the BERT timer.

To end the test, select the **STOP** soft key.

*/STORE menu

This key allows frequently used numbers to be stored for future speed dial applications.

If you select item ***/Store** on the keypad, the following screen will result:



The last number stored in Position 0 will be displayed. If no number has been stored yet in position 0, the display will read "0:". To save a newly entered number, press the **ENTER** soft key. Up to ten numbers may be stored for future speed dial applications by pressing the **Scroll Menu** key.

The **Scroll Menu** key will increment the stored number counter, allowing you to access all of the stored numbers.

If a mistake is made, the cursor can be backspaced by pressing the **BACKSP** soft key.

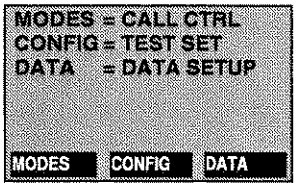
To change a stored number, you may exit and re-enter the **STORE** menu or use the **Scroll Menu** key to step past the end of the list of numbers and back to the desired location - at which time the new number may be entered.

An example of a frequently used number you may want to store would be the local BRITL (BRI Dial-Up Test Line) access number.

To exit the **STORE NUMBER** menu, press the **EXIT** soft key.

#/UTILITY menu

Pressing this key causes the following menu to be displayed, allowing various utility functions to be performed.



MODES submenu

Pressing the **MODES** soft key from the **Utility** menu will allow the following configuration changes to be made:

EBS Station Address—A device's individual address (EBS mode only)

POTS Mode—Tone or Pulse (POTS mode only)

Dual Call—Second Call feature (On/Off)

SPID #2—SPID for second call

DN #2—Directory Number for second call

Self Call—Call yourself, loop, and BERT (Yes/No)

Centrex Prefix—Enter Centrex prefix for self call

Feature—Switch Verification of translation (On/Off)—only for BRITL in 5ESS custom

B Channel Selection—B1, B2, or Any

Dialing Method—Select Enblock or Overlap Dialing

Call Appearance—1 through 254 (specified with keypad, then **ENTER** soft key)

Call Control—5ESS, DMS-F, or optional NAT'L

DMS-S Release #—NTI Stimulus Release # (1-64)

TEI—Auto or Fixed

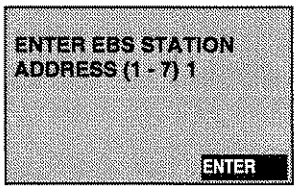
Print Event Options—Layer 1 or BERT Events

NOTE:

The current setup will determine which of the previous menus will be displayed. Not all of these menus will be valid for all setups.

Moving from screen to screen can be accomplished by pressing the **Scroll Menu** keypad button.

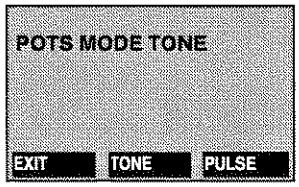
If in EBS mode, pressing the **MODES** soft key from the **Utility** menu will result in the following menu:



The EBS station address is used when more than one device is connected to the EBS line at the customer premise. Each device would have its own address in order to communicate with the switch.

This is the only Utility/Modes screen in EBS mode.

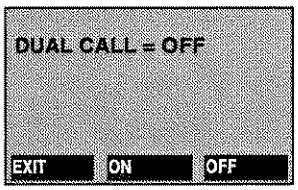
If in POTS mode, pressing the **MODES** soft key from the **Utility** menu will result in the following menu:



This menu selects the dialing method for POTS.

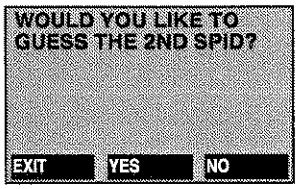
This is the only Utility/Modes screen in POTS mode.

If in ISDN mode, pressing the **MODES** soft key from the **Utility** menu will result in the following menu:

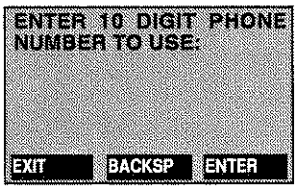


Selecting **ON** enables the test set to allow dual call capability. This allows the Model 550B+ to handle two calls at the same time using both B channels (B1 and B2).

If **ON** is selected, the following menu will be displayed:

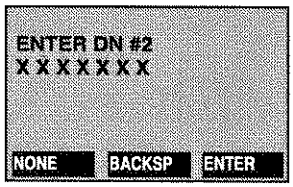


Selecting **YES** will display the following screen:



If testing Dual Call with only one SPID, select the **NO** soft key. If a second SPID is required, enter the SPID for the second call, then press **SEND** to transmit the second SPID to the switch. An `ACCEPTED` or `REJECTED` status message will be displayed in the upper right of the screen.

If a Second SPID was entered, pressing **Scroll Menu** displays the following menu:



Enter the DN for the second call, if required, followed by **ENTER**. The DN is normally seven digits and is automatically populated from the SPID, but may be changed via this menu. In 5ESS Multipoint, the Directory Number is not required.

Two B channel Calls with the 5ESS switch:

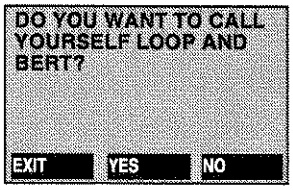
Lines configured as Point-to-Point configuration, custom or National ISDN, use one SPID to establish a dual B channel data call. Dual B channel voice calls are not allowed.

Lines configured as multi-point configuration, custom or National ISDN, use two SPID's. Voice or Data bearer service may be allowed.

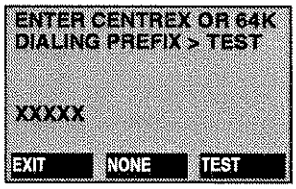
Two B channel Calls with other switches:

All other switches, whether in Custom call control or not, require the use of two SPIDs. Both Voice and Data bearer service may be allowed.

Pressing **Scroll Menu** displays the following menu:



Selecting **YES** will display the following menu:



This menu is used to enter a Centrex dialing prefix, or area code in a ten digit dialing area if needed. This menu is only displayed if **YES** was selected from the `CALL YOURSELF LOOP AND BERT` menu. Enter the prefix using the keypad, or selecting the **NONE** soft key if no prefix is needed. Pressing **TEST** will automatically dial the number, loopback, and enter BERT.

Dual Call procedure:

1. Use the **Setup** key to configure the test set for the line under test.
2. Gain access to the interface.
3. Press the **Utility** key and select the **MODES** soft key.
4. Use the **Scroll Menu** key to move to the `DUAL CALL` screen. The Model 550B+ defaults to OFF. Select **ON**.
5. Press **Scroll Menu** to enter SPID #2 and DN #2, if required.

6 Press **Scroll Menu** to the `CALL YOURSELF LOOP AND BERT` screen.

   a If **YES** is selected, the `ENTER CENTREX PREFIX` menu is displayed. Enter the Centrex or dialing prefix (if needed), followed by **ENTER**. Press **TEST** to start the test. The 550B+ will automatically go off hook, dial the number, loopback, and enter BERT. Proceed to Step 9.

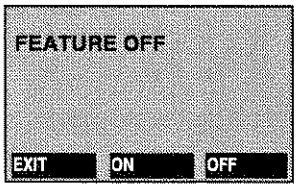
   b If **NO** is selected from the `CALL YOURSELF LOOP AND BERT` screen, select **EXIT**. Press **Hook On/Off** and place the first call (CALL1).

7 Press Scroll Menu to the Hook screen for CALL2. Go Off Hook and enter the number to place a second call.

8 While Off Hook, press Scroll Menu to move between the Hook screens for CALL 1 and CALL2.

9 To end the calls, go On Hook by pressing Hook On/Off.

Pressing **Scroll Menu** moves to the Feature Verification selection display:



This menu allows switch feature verification for AT&T 5ESS switches when using the BRITL capability. This menu will only be displayed if 5ESS Custom call control is used. Feature can only be enabled when a call has been placed to a test line.

When the **ON** soft key is pressed, switch feature verification will be enabled. At this point, any button number may be entered via the keypad, followed by #. The LCD will then display the switch translation for that button number. This procedure may be repeated for other button numbers.

A Basic Rate Interface Dial-Up Test Line (BRITL) feature of AT&T switches provides a means by which the craftsperson can test operation of a BRI (Basic Rate Interface) from the customer side (CPE) of a BRI. By placing a test call to a pre-assigned Directory Number, the craftsperson may gain access to a set of test commands via the CPE keypad, e.g., the Model 550B+ keypad. These commands will allow the Basic Rate Interface to be tested without additional craft support at the Central Office.

To use the Model 550B+ to go off hook and dial the BRI Test Line access code:

1. Press the **Hook On/Off** key to go off hook
2. Upon hearing dial tone, dial the BRI Test Line access code using the keypad
3. A secondary dial tone will be heard and a display message will indicate successful origination of the Test Line
4. BRI Dial-Up Test Line keypad codes may now be used to exercise the set of commands available

NOTE:

The BRITL Access Number may be conveniently stored in one of the speed dial locations for quick recall (access).

Table 16 — *Keypad buttons and functions*

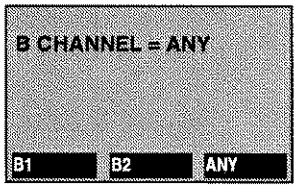
KEYPAD	*Function*
*11X#	Run BER Test on Channel X with Current Parameter
*120#	Display Current Test Termination
*12X#	Set Test Termination
*130#	Display Current Test Duration
*13X#	Set Test Duration
*140#	Display Current Test Data Rate
*14X#	Set Test Data Rate
*2#	Send Alerting Signal to the CPE
*3#	Print LCEN on CPE display
*4#	Print Primary DN/MLHG on CPE display
*0#	Repeat Previous Message (Display/Tone)

As an example, enter ***3#** on the keypad. The Line Card Equipment Number of the BRI will be displayed on the Model 550B+ LCD screen.

Table 17 — *Valid BRI Dial-Up Test Line (BRITL) parameters*

COMMAND SUFFIX X	KEYPAD CODE *11X	KEYPAD CODE *12X	KEYPAD CODE *13X	KEYPAD CODE *14X
1	B1	CPE	20 Sec.	64K Clear
2	B2	NT1	2 Min.	64K Restric.
3		Line Card	20 Min.	56K
41		BRITE CU1		
42		BRITE CU2		
43		BRITE CU3		
44		BRITE CU4		
45		BRITE CU5		
46		BRITE CU6		

Pressing the **Scroll Menu** key at this time will result in the following menu being displayed:



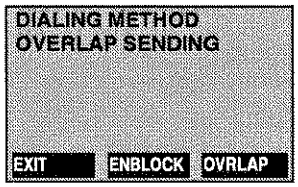
This menu indicates the channel to use for outgoing calls. In the above example, **ANY** indicates outgoing calls will go out on the first available B channel. To select a specific B channel, press the corresponding

soft key. (This is not valid for NTI Stimulus Call Control; B channel selection is not allowed.)

NOTE:

If you choose a B channel not supported by the translation of that line, the request will not function correctly.

Pressing **Scroll Menu** moves to the Call Control selection display:

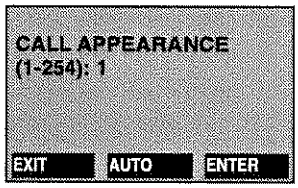


This menu allows selection of the type of dialing for Redial, Speed Dial and Automatic Distant testing. If manually dialing, overlap is used.

In enblock dialing (**ENBLOC**), all the digits are entered via the keypad before the call is attempted. These digits are then included in the Setup message as the called party number and sent to the switch to request the call.

In overlap dialing (**OVRLAP**), the setup message is sent to the switch without the called party number, then the switch returns Dial Tone and the caller enters the number to be called - one digit at a time until the switch has collected enough digits to route the call.

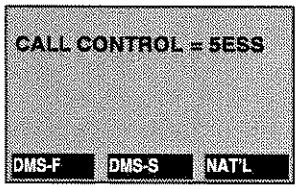
Pressing the **Scroll Menu** key at this time will result in the following menu being displayed:



For 5ESS Custom Call Control, this menu allows the user to place outgoing calls on button numbers selected, other than 1 which is the default setting. **AUTO** may be pressed to automatically search for the first call appearance on the line under test.

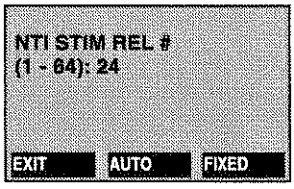
For DMS-F (Northern Functional) or NAT'L (National ISDN) Call Control, this menu allows a selection for a call appearance. The middle soft key, **AUTO**, will be replaced with **NONE**. A Northern Functional Directory Number may also be needed. This number is entered by pressing the **Setup** key, then scrolling to `ENTER DIRECTORY NUMBER`. Enter the number and return to the Hook screen to place a call.

Pressing **Scroll Menu** moves to the Call Control selection display:



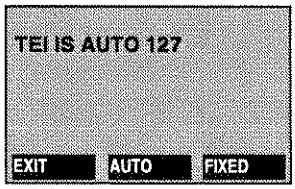
This utility menu allows a specific call control to be selected, including DMS-S (Northern Telecom-Stimulus). The current call control will be displayed. The DMS-S selection is not included in the Setup menu selection since it is seldom used.

Pressing the **Scroll Menu** key at this time will result in the following menu being displayed:



For NIT-Stimulus Call Control (DMS-S), the Release Button Number may need to be selected prior to releasing the call.

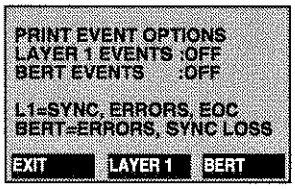
Pressing the **Scroll Menu** key at this time will result in the following menu being displayed:



You may change the TEI by selecting the proper soft key (**FIXED** or **AUTO**). When you change to a fixed TEI, you can enter the new TEI using the keypad. In this way, you may also use this menu to change a previous TEI.

If Dual Call is **ON** and SPID2 has been sent, both TEIs will be displayed.

Pressing the **Scroll Menu** key at this time will result in the following menu being displayed:



This options allows the unit to help track times and events through the serial port for long term testing and to help troubleshoot chronic problems. The two options can be enabled independently or together by using the **LAYER1** and **BERT** soft keys.

Table 18 — *Supported layer 1 events*

LOSS OF FRAME SYNC
GAIN FRAMESYNC
LOSS OF SPAN POWER
GAIN OF SPAN POWER
CPE LOSS OF FRAME SYNC
CPE GAIN FRAME SYNC
CO LOSS OF FRAME SYNC
CO GAIN FRAME SYNC
CRC errors
FEBE errors
FE's
BPV's

Table 19 — *Supported BERT events*

BERT STARTED
BERT STOPPED
BE'S (bit errors)
LOST PATTERN SYNC
GAINED PATTERN SYNC

Pressing **Scroll Menu** will return to the first menu; **EXIT** will exit to the HOOK screen.

CONFIG submenu

Selecting **CONFIG** from the **Utility** menu will allow the following configuration changes to be made:

Firmware revision—This screen reports the revision of firmware that is present in this unit and which interfaces are installed.

U Interface Mode—Select Line Termination or Network Termination mode using soft keys.

EOC Message—(for LT mode) Select the address and message to send.

Battery Level indication—This screen shows the battery charge state.

Volume Level—Adjust the level of the Hands Free volume using soft keys.

LCD Contrast—Adjust the contrast of the LCD Display using soft keys.

Loss Insertion—Increase/decrease the dB loss on the U pad using soft keys.

2B1Q 40 kHz Tone—Turn 40 kHz tone generation on/off when in 2B1Q NT1/TE or 2B1Q NT1. Signal level is 0dBm.

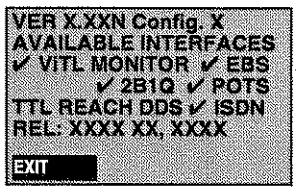
Automatic Power Down—Enable or disable the automatic power down feature

Toggle Loopbacks—Toggle loopbacks on and off for B1, B2, and 2B+D using soft keys.

Moving from screen to screen can be accomplished by pressing the **Scroll Menu** keypad button.

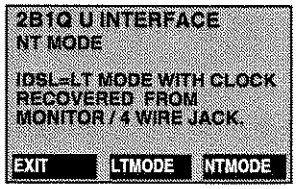
Pressing the **CONFIG** soft key from the **Utility** menu will result in the following screen, showing the

firmware revision (**VER**), release date (**REL**) and available interfaces:



The check mark (✔) will indicate which interfaces are installed. An "N" after the firmware version number indicates National call control is installed.

To setup the TPI 550B+ in **IDSL** mode, press the **Scroll Menu** keypad button. This will result in the following screen:



This menu will only be displayed if in the NT1 or NT1TE mode.

This menu is used to select Line Termination (LT) or Network Termination (NT) mode for the 2B1Q interface; **NTMODE** is the default setting. Press **LTMODE** to change the mode.

One 2B1Q interface on a TPI 550B+ with the U Monitor option installed can be used in NT mode to recover timing (e.g., from CLEC equipment). The other 2B1Q interface is used in LT Emulate mode to test through the SLC.

Once both interfaces are synchronized, pressing **Scroll Menu** will display the "EOC MESSAGE" screen, shown below. This screen can be used to send a 2B+D loopback message to a test set, customer

equipment, or BRITE card. The returned EOC message should be displayed in the CPE>CO message status area to confirm the loopback. For a list of possible messages, please see below. A BERT at 128 K or 144 K can be performed to test through the SLC.

NOTE:

The above enhancement requires the U Monitor option. Adding the U Monitor option to existing units requires a factory hardware upgrade.

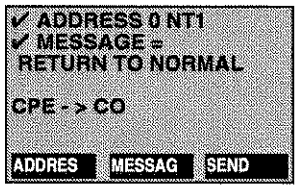
(1, 2)

The SLC is connected to the LINE (2 Wire) jack and the CLEC equipment is connected to the U Monitor jack. The "CLOCK SOURCE STATUS" screen under the **Status/States** menu will show Sync and Active states for both connections.

In the NT mode, the Model 550B+ 2B1Q U Interface operates as it always has, looking like an NT1 to the switch. However, in the LT mode, the Model 550B+ 2B1Q U Interface will act like a Switch Line Card.

The LT mode can be used to do Layer 1 qualification of copper facilities. When a Model 550B+ is in the LT mode on one end of a pair of wires, and another Model 550B+ is in the NT mode on the other end, the Model 550Bs will sync on each other and Layer 1 testing can take place by performing a BERT test on B1 and B2 from each Model 550B+ to the other, or by checking for CRC and FEBE errors on each set under the **Results** menu.

If **NTMODE** is selected, pressing **Scroll Menu** will display the battery status menu. If **LTMODE** is selected, pressing **Scroll Menu** will display:



This menu allows selection of the address (0-7), and allows messages to be sent. The check marks (✔) indicate the last setting. The message may be one of the following:

RETURN TO NORMAL

HOLD STATE

2B+D LOOPBACK

B1 LOOPBACK

B2 LOOPBACK

REQ CORRUPTED CRC

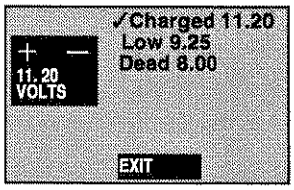
NOTIFY CORRUPT CRC

NOTE:

The NT1 is always address 0. A mid-span repeater may also be controlled for loopbacks

Press **SEND** to send the message.

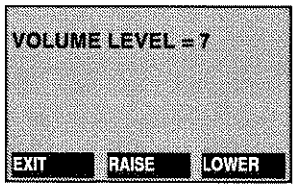
Pressing the **Scroll Menu** keypad button at this time will result in the following screen:



The three numbers on the right screen serve as a guideline in determining the battery charge status. The actual battery voltage appears inside the picture of the battery, on the left side of the screen.

The check mark indicates the status of the internal battery as determined by the voltage compared to the guidelines. In this case, the battery is charged.

Pressing the **Scroll Menu** keypad button at this time will result in the following screen:

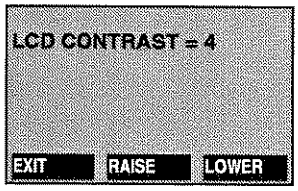


You may adjust the volume level with the **RAISE** and **LOWER** soft keys. The default volume level is "7".

NOTE:

This volume level pertains to the Hands-Free feature only, and does not affect the handset volume level.

Pressing the **Scroll Menu** keypad button at this time will result in the following screen:

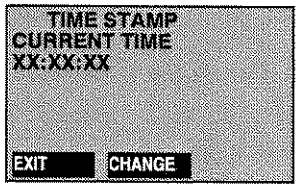


You can change the LCD screen contrast by pressing the **RAISE** and **LOWER** soft keys, to optimize the display's readability for your current lighting conditions.

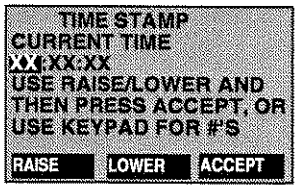
NOTE:

The contrast needed will depend on your current lighting conditions

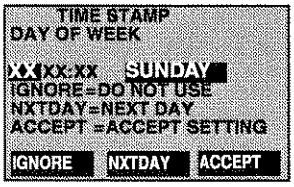
The Time Set menu allows the current time and day of the week to be set for accurate test printouts. The time will reset to zero when you change modes or when the unit is powered down. Pressing **Scroll Menu** will display the following screen:



Selecting the **CHANGE** soft key will result in the following screen:

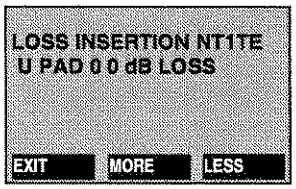


Use the soft keys to change the time values, or simply use the numbers on the keypad. Once the correct time has been entered, select the **ACCEPT** soft key. This will result in the following screen:



Use the **NXTDAY** soft key until the current day of the week is set. **IGNORE** will prevent the day of the week from being used in D CHANNEL or PRINT EVENT time stamping. When the display shows the correct day of the week, select the **ACCEPT** soft key.

Pressing the **Scroll Menu** keypad button at this time will result in the following screen:



Up to 15 dB of loss may be inserted on the U interface by pressing the **MORE** soft key until the desired number is displayed. If a `HIGH VOLTAGE` warning appears, the loss pads cannot be used (for example, message appears when access on the CO side of a repeater).

This menu is only displayed if in NT1 or NT1/TE mode. If in NT1 mode, press **Scroll Menu** to insert

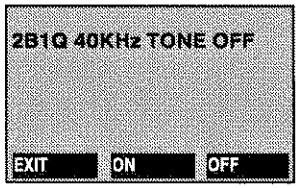
loss on the S/T interface. If operating in TE mode, the loss will be inserted on the S/T interface only.

Table 20 — *Approximate cable length* for dB loss on U interface pads*

DB LOSS	CABLE LENGTH
1 dB	367
2 dB	735
3 dB	1102
4 dB	1470
5 dB	1838
6 dB	2205
7 dB	2573
8 dB	2941
9 dB	3308
10 dB	3676
11 dB	4044
12 dB	4411
13 dB	4779
14 dB	5147
15 dB	5514

***26 GAUGE CABLE**

Pressing the **Scroll Menu** keypad button at this time will result in the following screen:



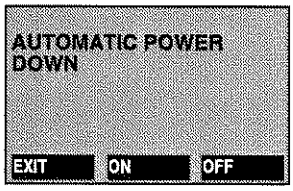
Press the **ON** soft key to generate a 40 kHz tone, at approx. 0dBm, in 2B1Q NT1/TE or 2B1Q NT1 modes (this menu is not displayed if in TE mode).

The 2B1Q (two Binary one Quaternary) line coding is a four level, or quaternary code. Each level is determined from a single combination of two bits. Thus, 160 kb/s (binary) equates to 80 kHz. The lower frequency is desirable for extending the distance over which transmission is possible. An 80 kHz line would be toned at one-half its operating frequency, or 40 kHz.

The Model 550B+ can generate a 40 kHz test tone for the 2B1Q signal at approx. 0dBm. The test tone is a sign wave signal that approximates the Nyquest frequency of the 2B1Q signal. A TIMS set at the far end measuring the tone level can thus measure loop loss.

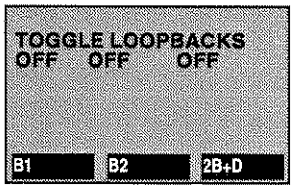
When performed during initial installation, this test will verify that the line loss is correct. The Actual Measured Loss (AML) is compared with the Estimated Measured Loss (EML).

Pressing the **Scroll Menu** keypad button at this time will result in the following display:



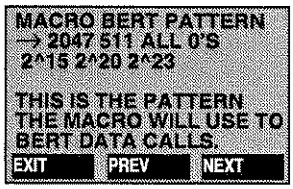
The Auto Power Down feature enables the set to turn itself off to conserve battery life if there is no activity for 5 minutes (10 minutes in EBS/POTS modes). This menu is not applicable if the AC Adapter is used.

Pressing the **Scroll Menu** keypad button at this time will result in the following display:



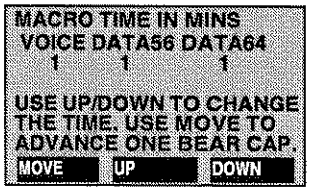
By pressing the soft key under each of these selections, you may toggle them On and Off.

Pressing **Scroll Menu** keypad button at this time will result in the following display:



Use the **PREV** and **NEXT** soft keys to navigate between selections. The arrow (→) indicates the current selection.

Pressing **Scroll Menu** keypad button at this time will result in the following display:



This menu selects the test length, in minutes, for the IT Macro to use for each bear cap.

Pressing **Scroll Menu** will wrap around to the first menu (Firmware ver./interfaces); **EXIT** will exit to the HOOK screen.

DATA submenu

Selecting **DATA** from the **Utility** menu will allow the following data configuration changes to be made:

Bearer Capability–VOICE, 3.1K AUDIO, DATA, or PACKET

Speed–56K, 64K, or SBRATE (only valid for DATA setting)

Packet Type–D PKT, B SVC, or B PVC

TEI–Auto or Fixed

Call User Data–Manually enter the Call User Data for a Data Packet (D Packet) Data call.

Logical Channel No.–Manually enter the LCN (0-15) for a D Packet Data call.

Closed User Group–Manually enter the CUG (0-9999) for a D Packet Data call.

Reverse Charge–Turn On or Off the Reverse Charge option for a D Packet Data call.

RPOA–Manually enter the Registered Private Operating Agency for a D Packet Data call.

D Packet Size.

D Pkt Echo Mode.

D Pkt Calling Address.

EBS Message–Display or Print decoded EBS messages

D Channel Capture has been added as an option to the Utility/Data menu for large screen LCD units that do not have U Monitor capability.

This provides capture of D Channel messages in TE and NT1TE modes. D channel messages can be captured, displayed on the LCD, printed out via the Data port, or stored for later analysis.

D channel Monitoring–Turn On or Off D channel Monitoring.

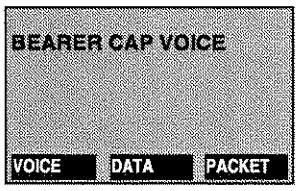
Line Audio Monitor

NOTE:

The large screen LCD is standard in units with serial numbers of 98PTSP1851 and above. Adding the large screen LCD to existing units requires a factory hardware upgrade.

Moving from screen to screen can be accomplished by pressing the **Scroll Menu** keypad button.

Selecting **DATA** from the **Utility** menu will result in the following display:



From this menu, you may change the type of call to place with the soft keys.

This menu allows the user to choose between placing a voice call, circuit-switched data call, or a packet data call (D channel or B channel Packet). The voice/data selection is stored on power down.

Selection of **VOICE** from this menu gives the user access to two types of voice calls: voice and 3.1 kHz audio.

Selection of **DATA** from this menu gives the user access to three types of circuit switched data calls: 56 kb/s, 64 kb/s, and subrate.

Selection of **PACKET** from this menu will prompt for entry of the Packet Type: D channel Packet or B channel Packet.

In D channel Packet Data mode, Call User Data, LCN (Logical Channel Number), CUG (Closed User Group), Reverse Charge, and RPOA (Registered Private Operating Agency), D packet size, Echo Mode, and Calling Address may also be selected.

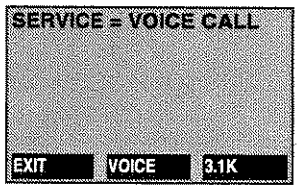
NOTE:

The Model 550B+ supports a window size of three and Modulo 8 for D channel Packet calls.

In Bearer Packet (B-Packet) mode (B SVC or B PVC), the B channel may also be selected.

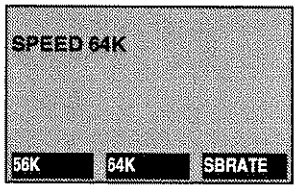
Data calls are placed using the **Hook On/Off** menu, in a process similar to that of placing a voice call. Dial tone may not be audible, but states will be indicated by LCD message on the second line.

If **VOICE** was selected, the following screen will result:



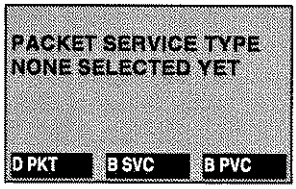
This menu selects the voice service type: Voice or 3.1K Audio. The last setting on power down will be displayed.

If **DATA** was selected, the following screen will result:



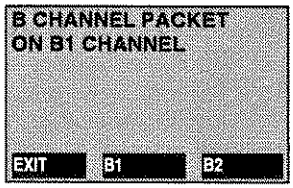
From this menu, you may change the data speed to 56K, 64K, or Subrate. The last setting on power down will be displayed.

If **PACKET** is selected, the following screen will result:



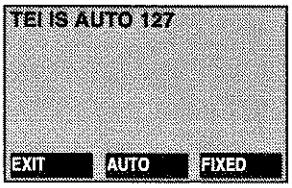
This menu selects the packet service type: D channel Packet, B channel Packet - Switched Virtual Circuit, or B channel Packet - Permanent Virtual Circuit.

If **B SVC** or **B PVC** is selected, the following screen will result:



This menu selects the B channel on which B-Packet calls will be placed.

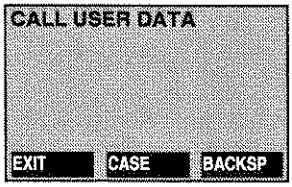
If D PKT is selected, pressing the **Scroll Menu** keypad button at this time will result in the following screen:



This menu reports the current mode (Auto or Fixed) and current assigned Terminal Endpoint Identifier (TEI) number. The TEI may be changed by selecting the proper soft key. When changing to a **FIXED** TEI, enter the new TEI using the keypad.

If DUAL Call is ON, both TEIs will be displayed.

Pressing the **Scroll Menu** keypad button at this time will result in the following screen:



This menu allows input for Call User Data (CUD) when making D-Packet calls; if nothing is entered via

this menu, D-Packet Calls are handled in the normal manner. Use the keypad to make these entries.

Up to twelve (12) characters of CUD can be entered. Once the twelve character CUD limit is reached, no more entries can be made. If a mistake is made, the **BACKSP** key is used to backspace/delete the mistake. After entering data, this menu can be exited by **Scroll Menu**.

On power down, the CUD information is retained and will be present in the menu the next time it is accessed. It is important to note that if there is stored CUD information, any time a D-Packet call is made the CUD will automatically be added. To clear the CUD buffer you must be in the CUD menu and press **BACKSP** to backspace/delete all numbers and CUD information, then exit the menu.

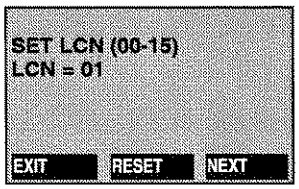
You may enter the Call User Data, which may contain upper and lower case characters, numbers, spaces, equal signs, colons.

To enter a numeric digit, press the corresponding keypad button. Use the keypad to enter letters and numbers by pressing the same key more than once to scroll thought the choices. For example, pressing "5" four times will scroll through 5, J, K, and L. If entering another letter on the same key, pause 2 seconds between each character. To change the case of the letter, select the **CASE** soft key. In the upper right corner of the screen, "CAPS"" or "lowr" will display to report which case will be used for the next character.

When the desired character string is completed, you may store it and exit this set of menus by pressing the **EXIT** soft key or the **Scroll Menu** keypad button.

D-Packet Data call options may be selected as follows:

1 Press **Scroll Menu** to set the LCN (0-15):

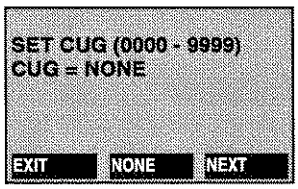


The Logical Channel Number may be selected in a range of 0-15, with 1 being the default setting if no other selection is made.

NOTE:

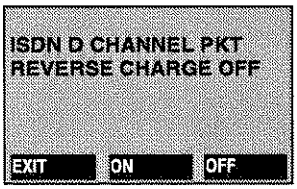
The Model 550B+ uses a LCGN (Logical Channel Group Number) of "0".

2 Press the **NEXT** soft key or **Scroll Menu** to select the CUG (0-9999):



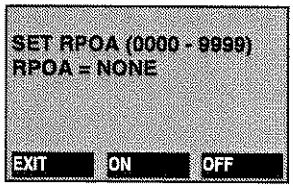
The Closed User Group number may be selected in a range from 0 to 9999. NONE is the default setting.

3 Press the **NEXT** soft key or **Scroll Menu** to select the Reverse Charge option:



The default setting is OFF.

4 Press **Scroll Menu** to select the RPOA (Registered Private Operating Agency) option:



The RPOA code may be entered at this point. The default setting is NONE.

NOTE:

The Model 550B+ supports a window size of three and Modulo 8.

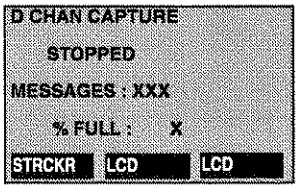
The number of characters in the fox message can be selected from 2, 40 (default), 64, 128, and 256. When **D Packet** is selected from the **Utility/DATA** BEARER CAP menu, an additional menu, after the RPOA screen, will prompt for the Packet size.

D Packet Echo mode allows the test set to act as a echo line. Once the D Packet call is connected, **FOX**, **CLEAR**, and **ECHO** soft keys are displayed. The Echo mode echoes the traffic back to the other end and also displays the information on the screen.

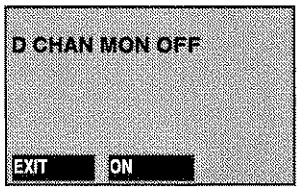
When in D Packet, an additional menu after D Packet Size will allow selection of auto echo for answered incoming D Packet calls.

When in D Packet, an additional menu after ECHO MODE allows entry of the D Packet Calling Address.

Pressing the **Scroll Menu** keypad button at this time will result in the following screen:



Pressing the **Scroll Menu** keypad button at this time will result in the following screen:



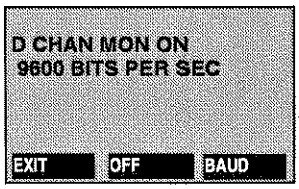
NOTE:

The display will read `SIGNAL CHAN MON OFF` *if operating in the EBS mode. This is the first menu in EBS mode.*

Monitoring of D channel (or Signal channel) packet data in both directions is available with remote equipment via a dB9/RS-232 connector on the interface panel (when optioned).

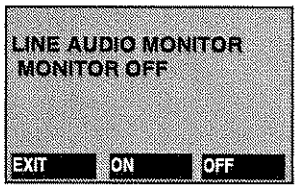
To enable the RS-232 D packet data monitor function (9600,8,N,1,DTE), press the **ON** soft key.

This will start the output of the received messages to the Data port. The following menu will result:



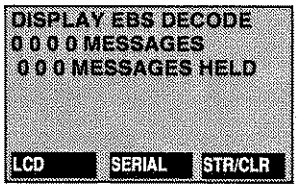
Selecting the **BAUD** soft key will select the baud rate for the output of the D channel monitor. The selections are: 38400, 19200, and 9600 which is the default value.

Pressing **Scroll Menu** will result in the following menu:



This menu is used to enable or disable the Line Audio Monitor.

If in EBS mode, pressing **Scroll Menu** will display the following menu:

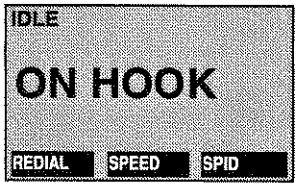


Selecting **LCD** will display the held decoded messages on the screen. **SERIAL** will dump the messages out the **DATA** port. The **STR/CLR** soft key clears the message buffer and starts a new capture.

Pressing **Scroll Menu** will wrap around to the first menu (D Chan Mon On/Off); **EXIT** will exit to the HOOK screen.

Hook On/Off menu

If you select item **Hook On/Off** on the keypad, the following screen will be shown:



The first line represents the 550B+ state. The second line represents the switch state.

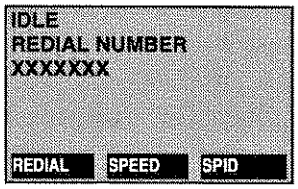
NOTE:

If in EBS mode, the SPID soft key will be replaced with FEATUR.

If the Dual Call feature is ON, this screen will show `CALL1` or `CALL2` in the upper-right corner. Pressing the **Scroll Menu** key moves the display back and forth between the two calls. This screen will also display the calling number of an incoming call.

REDIAL soft key

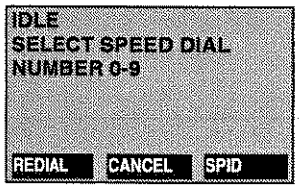
Pressing the **REDIAL** soft key will cause the last number dialed to be redialed. The following screen will appear:



This will allow redial of a number that has been entered via the keypad.

SPEED soft key

If you select the **SPEED** soft key from the **HOOK** menu, the following menu will result:



To use the Speed Dial function, simply select the **Store** menu single digit number under which your number is stored. To store a number for speed dialing, use the ***/Store** key.

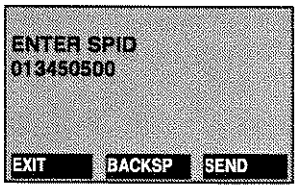
Redial of the last number may be accomplished by pressing the **REDIAL** soft key.

NOTE:

Access to an ISDN line should be made prior to attempting to use the speed dial function. Speed dial will not work unless a number has been stored.

SPID soft key

Selecting the **SPID** soft key from the **HOOK** menu will result in the following screen:



This menu is used to enter or change the SPID. The SPID status is displayed in the upper right corner of the screen.

The message will be one of the following:

SENDING
ACCEPTED
REJECTED

A Service Profile Identifier (SPID) is utilized by Terminal Equipment (TE) to request initialization from the switch on a multipoint circuit. This menu allows that identification number to be set or changed.

At present, for 5ESS, the SPID is formed by adding "01" to the beginning of the 7-digit number and "0" to the end of the number. (For example, 0137505000 is the SPID for Telephone Number 540-375-0500.)

For NTI Functional, the SPID is the 10-digit primary directory number plus an optional two digit SPID suffix. (5403750500 00)

The Terminal ID (TID) is required for National translations and is entered as part of the SPID. The TID is a two-digit number from 00 - 62. (For example, for 5ESS, 013750500011 would be the SPID for the number above, after adding "11" as the TID. For NTI, the SPID would be 54037505000011.)

If the Dual Call feature is ON, then the display will read `ENTER SPID #1`: the second SPID, if needed, is entered under the Dual Call menu.

Press **SEND** to transmit the SPID to the switch.

Testing may now be started by accessing the line by connecting the TPI 550B+ to the appropriate interface. Pressing the **Hook On/Off** key will attempt to establish a call. Dial tone will be heard in voice service if the setup was correct. Please refer to the Hook On/Off section.

Chapter 4

Operation

This chapter provides a basic introduction to the operation of the TPI 550B+ ISDN Test Set. Topics include the following:

Power up

Press the power **ON** switch. This will turn the ISDN Portable Test Set on, and will start the five second Self Test routine. The LCD screen will flash (with all pixels turned on), then clear, and all LED's, except **Charging** (and **Mon** if equipped with U monitor), will light then extinguish.

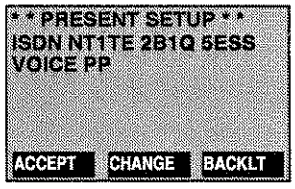
When the self test has concluded, a message will appear on the LCD screen (briefly) with the current software version and a message reporting the results of the Self Test. An "N"" after the firmware version indicates that the National ISDN Call Control option has been installed.

The **MODE** LED's will report the last interface used.

NOTE:

If the power up self test should fail, please contact TTC - TPI Division at 221 S. Yorkshire St., Salem, VA 24153, (540) 375-0500, fax (540) 375-0505.

At the conclusion of the Self Test routine, the LCD will report the last setup used. For example, the following menu would result at the conclusion of the Self Test routine if the last setup application was ISDN, NT1/TE mode, 5ESS call control with Point-to-Point configuration:



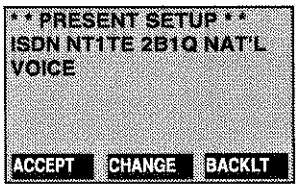
Should this previous setup need to be changed, press the **CHANGE** soft key and the Easy-User-Mode will walk the user through the entire setup routine. If the last setup reported is correct, select **ACCEPT**.

Setup

When the unit is first turned on, it will conduct the Power On Self Test, and the following message will be momentarily displayed:

Upon successful completion of the Power On Self Test another message will be momentarily displayed, stating that the test has been passed.

The unit will then proceed to display the following configuration menu:



NOTE:

The second line of this display (just below Present Setup) will show your previous selection, and may not be as shown in this illustration.

Press the appropriate soft key to either **ACCEPT** the setup shown, or enter a new setup (**CHANGE**).

NOTE:

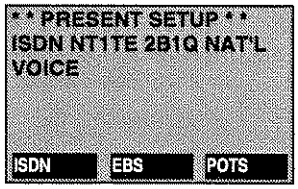
The TPI550B+ Test Set has a variety of option boards that may be purchased to allow additional testing. The following section is for the standard ISDN Test Set or the EBS/POTS option only. Please see Chapter 5 for information about the SDSL and U-Mon options.

The **BACKLT** soft key is used to toggle the LCD backlight on or off.

NOTE:

Battery life will be enhanced if the LCD backlight is turned off when not needed (i.e., when there is sufficient ambient light).

With the EBS/POTS option board installed, selecting **CHANGE** will display the following menu:



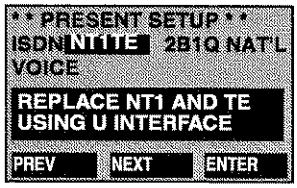
NOTE:

This menu is for selection of a service mode. This menu will only be displayed if the POTS/EBS option is installed. If this option is not installed, the first screen will be the mode of operation screen.

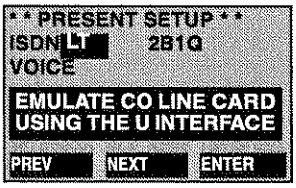
If **POTS** is selected, setup is complete.

If **EBS** is selected, other setup menus will follow (display size, primary set/add on unit, station address).

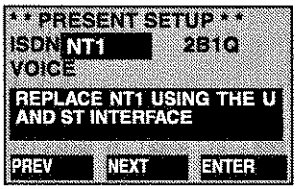
If the EBS/POTS option board is not installed, selecting **CHANGE**, or pressing the **Scroll Menu** keypad button, will display the following menu:



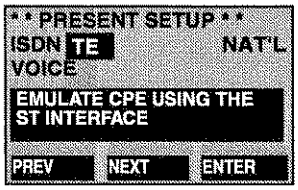
Use the **PREV** and **NEXT** soft keys to move between the different modes. Selecting **NEXT** will result in the following menu:



Selecting **NEXT** will result in the following menu:



Selecting **NEXT** will result in the following menu:



Mode Of Operation:

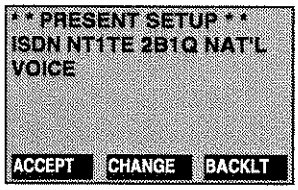
If you wish to use this unit connected in place of the NT1, press the **Scroll Menu** key until the screen shows **NT1** and setup will be complete for your application.

If you wish to use this unit connected in place of the TE, press the **Scroll Menu** key until the screen shows **TE**.

If you wish to use this unit connected in place of both the NT1 and the TE, press the **Scroll Menu** key until the screen shows **NT1TE**.

If you wish to use this unit connected in place of the LT, press the **Scroll Menu** key until the screen shows **LT**.

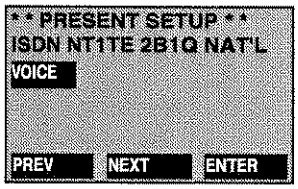
Once the appropriate selection is highlighted, select the **ENTER** soft key. If **LT**, **U-MON**, **IDSL**, or **NT1** was chosen, selecting the **ENTER** soft key will display the following screen:



NOTE:

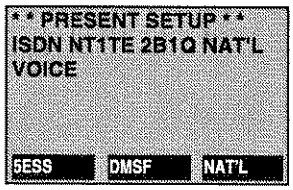
The second line of this screen is mode specific. Therefore, it may not look exactly as above.

If **NT1TE** or **TE** was chosen, the following screen will be displayed:



From this menu, select the desired bearer capability. The current selection will be highlighted on the screen and the soft key selections will be **PREV**, **NEXT**, and **ENTER**. Select **NEXT** to scroll through the selections: Voice, 3.1K Audio, Data 56K, Data 64K, then **ENTER** to select.

Selecting the bearer capability, or pressing the **Scroll Menu** key, will result in the following menu:



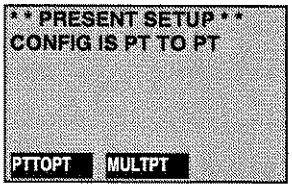
Call Control: This menu selects the current call control. The choices are: 5ESS, DMS-Functional, and National (Includes NI-1, NI-2, and NI-3 support).

NOTE:

The seldom used Northern Stimulus call control may be selected from the CALL CONTROL menu under Utility/MODES.

Other menus will then proceed to ask for information relevant to your particular setup. The information needed to complete the setup will depend on what menu selections you have made up to this point. This may include the SPID, DN (Directory Number), and whether the circuit is point-to-point or multi-point.

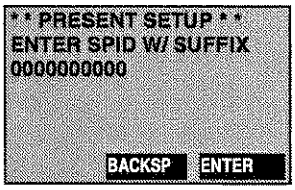
For example, pressing **5ESS** will display:



5ESS Configuration: This menu selects the configuration of the 5ESS line: Point to Point or Multipoint.

Selecting **PTTOPT** completes setup for this application. The ACCEPT/CHANGE screen will be displayed.

Selection of **MULTPT** will display:



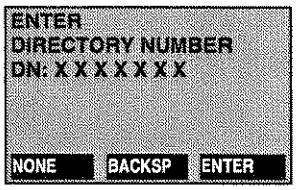
SPID: If 5ESS Multipoint, W/SUFFIX will not be displayed (5ESS doesn't require a TID). (No SPID is required in a PT to PT circuit configuration for 5ESS custom.)

Enter the new SPID (Service Profile Identifier) using the keypad. The TID (Terminal ID), if required for a national line, should be entered at the end of the SPID.

NOTE:

If the Dual Call feature is ON, two SPID's must be entered. If the setup is 5ESS, Pt-to-Pt, and Data call, only one SPID is required.

Pressing **ENTER** will enter the new SPID and display the ENTER DIRECTORY NUMBER screen:

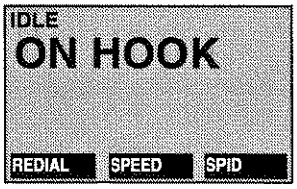


Directory number: A directory number is required for non-CACH translations. The DN is normally seven digits and is automatically populated from the SPID, but may be

changed via this menu. This menu will be displayed if National or DMS-Functional Call Control has been selected; in 5ESS Multipoint, the Directory Number is not required.

When you have entered all of the necessary information, the ACCEPT/CHANGE screen will again be shown.

After accepting the new setup, you will proceed to the **HOOK** screen, which is the default screen:



From this screen, you can also access Last Number Redialing, Speed Dialing, and entry of the SPID.

NOTE:

If the Dual Call feature is ON, the HOOK screen will show `CALL1` *or* `CALL2` *in the upper right-hand corner. Pressing the Scroll Menu key moves the display back and forth between the two calls.* ***SPID*** *soft key will change to SPID1/SPID2.*

If, at any time, you wish to change the unit's setup, press the Setup key. You will then return to the above set of menus.

Placing calls

Voice call

NOTE:

Complete the SETUP menu selections including the correct mode, line code, call control, SPID, and directory number before accessing the line under test.

ISDN switches may take up to a minute to initialize when access is gained and/or when a mode change takes place. If the Hook On/Off key is pressed during this initialization period, a `WAITING FOR RESPONSE` *message may be displayed.*

5 GO OFF HOOK by pressing the **Hook On/Off** key (will hear dial tone).

6 ENTER THE NUMBER using the keypad (LCD screen will display number entered and channel selected).

7 CONVERSATION may now take place using the **Hands Free** feature (an external handset may also be connected).

8 TO END a Voice Call, go *on hook* by pressing the **Hook On/Off** keypad button.

Troubleshooting Tips

1 For most circuits, the SPID must be entered prior to going off hook (use **SPID** soft key on **HOOK** screen).

2 TEI assignment must have been made before a dial tone can be heard. (Check for **Ready** LED or use the **Status/States** menu to verify Layer 2 state).

If TEI *is assigned*, LCD = `MULT FRAME EST`

If TEI is *not assigned*, LCD = `TEI UNASSIGNED`.

The TEI is assigned under the **Utility/DATA** menu.

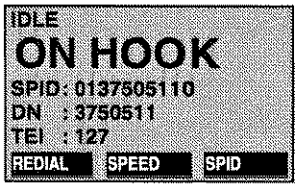
3 If dial tone has not been gained, a cause message will be displayed on the LCD. For more information, the **Status** menu can be accessed to view the cause info, which will give a diagnostic cause message.

4 If set-up needs to be checked, press the **Setup** keypad button, which will prompt the operator to answer several setup related questions that will configure the TPI 550B+ to the circuit and switch being accessed .

NOTE:

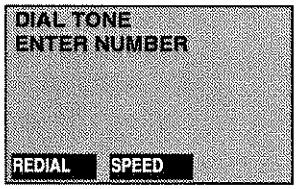
The switch type must be selected, and the TEI (Terminal Endpoint Identifier) may need to be set. Please refer to the Setup menu.

ISDN Switches may take up to a minute to initialize when access is gained and/or when a mode change takes place. If the Hook On/Off key is pressed during this initialization period, a `WAITING FOR RESPONSE` *message may be displayed.*

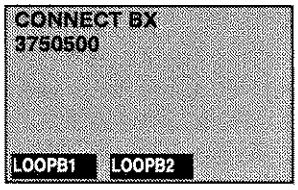


Press **Hook On/Off** to go off hook (**Off Hook** LED will light). The TPI 550B+ will pause to communicate with the switch. You will then hear the dial tone, and

the state (IDLE) will change to DIAL TONE and the following menu will result:



The number may now be redialed, speed dialed, or entered from the keypad. While the number is being dialed, DIALING is displayed, and as the call goes out, RINGBACK or CALL PROCEEDING is displayed. When the other end answers, the following menu will result:



BX reflects the current B channel, while 3750500 reflects a number that was entered.

This menu reflects a successful connection and conversation may take place utilizing an external handset connected or the handsfree feature provided by the Model 550B.

The **LOOPB1** and **LOOPB2** loopback soft keys can be used to place either B channel in a looped state and the soft key will change to **LP OFF** (press to turn the loopback off).

The normal sequence followed by the ISDN 550B+ Portable Test Set when making a voice call will be as indicated below:

1 IDLE

2 DIAL TONE

3 DIALING

4 CALL PROCEEDING

5 CONNECT

6 RELEASING

7 IDLE

NOTE:

During a call, if the other end terminates a call, the TPI 550B+ will automatically go to On Hook status.

The TPI 550B+ will display the normal call sequence messages listed earlier to indicate call status, along with other status messages such as Connect, Ringback, and Ringing. The meaning of these messages is reviewed below:

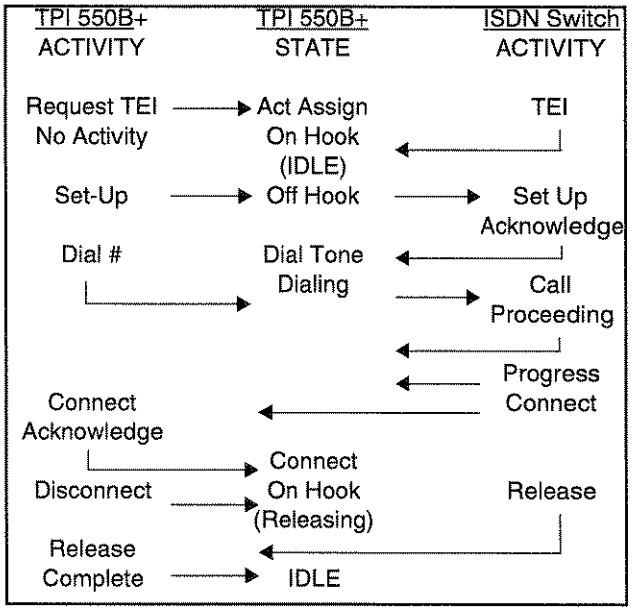
Table 21 — *Possible status messages*

MESSAGE	MEANING
IDLE	Hung up.
DIAL TONE	The switch has sent a message saying we have a dial tone.
DIALING	Dialing digits as entered.

Table 21 — *Possible status messages*

CALL PROCEEDING	Placed a call and the switch is ringing the other end, which has not yet answered.
RELEASING	Sent the disconnect message to the switch.
CONNECT	Received message from switch that call has been put through.
RINGBACK	Placed a call and the switch is ringing the other end, which has not yet answered.
RINGING	Receiving an incoming call (go OFF HOOK to answer).

The following table illustrates a typical call control sequence where the TPI 550B+ originates a call on an ISDN switch:



Once the voice call has been completed, press the **Hook On/Off** key which will leave you in the **HOOK** menu, or you may return to the menu's without hanging up by pressing the **2nd Func.**, then any key.

Dual Call Feature

If the Dual Call feature is ON (**Utility/MODES** menu), then two calls, using both B channels, may be processed. Two calls may be active. The handset and/or speaker phone can access one at a time. Pressing the **Scroll Menu** key will move between the two active calls.

The **HOOK** screen will show CALL1 or CALL2 in the upper right-hand corner as applicable.

Data call

NOTE:

Complete the SETUP menu selections including the correct mode, line code, call control, SPID, and directory number before accessing the line.

*ISDN switches may take up to a minute to initialize when access is gained and/or when a mode change takes place. If the **Hook On/Off** key is pressed during this initialization period, a WAITING FOR RESPONSE message may be displayed.*

If placing a call to an extended DataPath 2 wire or a 4 wire switched 56 circuit, you may need to start BERT at 56K on the appropriate B channel before placing a call. This will keep Bit 8=1 (off hook) so the call won't be disconnected inadvertently due to voice data on the B channel.

If the Dual Call feature is ON, two SPID's must be entered unless the call setup is 5ESS, Pt-to-Pt, Data call. In that case, one SPID only is required.

1 Press the **Setup** key. Select either **DATA56** or **DATA64**. The menu screens will lead you through the appropriate steps.

(1, 2)

2 Connect the test cable to **U (2 wire)** or **S/T (4 wire)** jack.

3 A Circuit Switched Data Call may now be placed, just like a voice call.

   a `GO OFF HOOK`, by pressing the **Hook On/Off** key (may hear dial tone).

   b `ENTER THE NUMBER`, using keypad (LCD screen will display number entered and channel connected).

4 BER Testing may now take place.

   a Press **2nd Func.** followed by **BERT**.

   b Make sure the speed and B channel are correct. The B channel should be the B channel shown when the call was connected. The speed should be 64K for Clear Channel testing and 56K for Non-Clear.

   c Start the BER Test by pressing **STRCLR**. (There will be a burst of bit errors [BE])

   d Press **STRCLR** again to clear the initial errors. Press **6ERROR** to insert 6 bit errors into the transmit pattern.

   e Run the test for a desired amount of time and determine if total errors is acceptable (see your company policy)

   f Press the **STOP** soft key to end the test.

5 To end a data call, go *on hook* by pressing the **Hook On/Off** key.

Troubleshooting Tips

1 It is best to verify that a voice call can be made successfully, prior to attempting a data call.

2 The SPID must be entered prior to going off hook (use **Setup** key).

3 TEI assignment must have been made before going off hook. (Check for the **Ready** LED or use the **Status/States** menu to verify Layer 2 state). If TEI is assigned, LCD = `MULT FRAME EST`. If TEI is not assigned, LCD = `TEI UNASSIGNED`.

   The TEI is assigned under the **Utility/DATA** menu.

4 If dial tone has not been gained, a cause message will be displayed on the LCD. For more information, the **Status** menu can be accessed to

view the cause info, which will give a diagnostic cause message.

5 If set-up needs to be checked, press the **Setup** keypad button, which will prompt the operator to answer several setup related questions that will configure the TPI 550B+ to the circuit and switch being accessed.

The **Utility** menu will allow the user to choose between placing a voice call, and setting up a circuit-switched data call or D channel packet data call.

For circuit-switched data calls, the **Utility** menu gives the user access to two types of calls, relating to choices for data service speed:

1 56000 BPS

2 64000 BPS

Once the **Utility** menu has been used to select Data and speed, a circuit-switched data call may now be placed by using the **Hook On/Off** menu, just like a voice call.

D Channel Packet Call

NOTE:

Complete the SETUP menu selections including the correct mode, line code, call control, SPID, and directory number before accessing the line.

ISDN switches may take up to a minute to initialize when access is gained and/or when a mode change takes place.

1 Press the **#/Utility** keypad button.

2 Press the **Data** soft key. The **BEARER CAPABILITY** sub-menu is displayed. Select **PACKET** then **D PKT**.

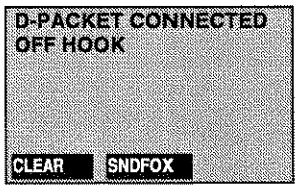

(1, 2)

3 Connect the test cable to **U (2 wire)** or **S/T (4 wire)** jack.

4 Once the **Sync**, **Active**, and **Ready** LED's light, press the **Hook On/Off** key. The LCD will display:

5 Enter the number using the keypad.

6 Press the # (Utility) keypad button to send the call. LCD will display:.



7 Press the **SNDFOX** soft key to send the following message over the D channel "01:The quick brown fox jumped over the lazy dog." Each time **SNDFOX** is pressed, the message will be sent with the number incrementing with each press. Select **CLEAR** to clear the messages on your LCD.

8 The TPI 550B+ will display any information coming to it on the LCD screen.

9 To end a D channel packet data call, go *on hook* by pressing **Hook On/Off**.

Troubleshooting Tips

1. It is best to verify that a voice call can be made successfully, prior to attempting a D-Packet Call.
2. The SPID must be entered prior to going off hook (use **Setup** soft key).
3. TEI assignment must have been made before a dial tone can be heard. (Check for the **Ready** LED or use the **Status/States** menu to verify Layer 2 state).

   If TEI is assigned, LCD=`MULT FRAME EST`. If TEI is not assigned, LCD=`TEI UNASSIGNED`.

   The TEI is assigned under the **Utility/DATA** menu.
4. If the call is not successful, a cause message will be displayed on the LCD. For more information, the **Status** menu can be accessed to view the cause info, which will give a diagnostic cause message.
5. If set-up needs to be checked, press the **Setup** keypad button, which will prompt the operator to answer several setup related questions that will configure the TPI 550B+ to the circuit and switch being accessed.
6. If the upper LCD status line doesn't indicate READY FOR CALL when the Hook On/Off button is pressed, the X.25 link hasn't been made.

   `LINKING PACKET MODE` indicates there is no packet service on this channel.

   `RESTARTING LINK` indicates there is packet service on this line but the X.25 link was not able to be reset in order to request a call or send data (TEI or LCN1 may be invalid).
7. If the LCD top status line doesn't indicate `D-PACKET CONNECTED` when the **#/Utility** key is pressed to send the call, the call was not successful.

8 When Dual Call is ON, the screen will display a `DUAL CALL ON` warning message. Dual Call is intended for Voice or Data calls. D Packet can not be placed when Dual Call is ON.

B Channel Packet Call

Complete the SETUP menu selections including the correct mode, line code, call control, SPID, and directory number **before** accessing the line.

B Channel Packet Calls can only be placed if the B-Packet Capability option is installed.

ISDN switches may take up to a minute to initialize when access is gained and/or when a mode change takes place.

1 Press the **#/Utility** keypad button.

2 Press the **Data** soft key. The **BEARER CAPABILITY** sub-menu is displayed. Select **PACKET**—either **B PVC** or **B SVC**.


(1, 2)

3 Connect test cable to **U (2-wire)** or **S/T (4-wire)** jack.

4 Press the **Hook On/Off** keypad button

- If B PVC was selected, the LCD will display `B-PACKET CONNECTED`. Proceed to step 7.
- If B SVC was selected, the lower line of the LCD will indicate `ENTER NO. W/KEYS`.

5 Enter the number using the keypad.

6 Press the **#/Utility** keypad button to send the call. (The screen will read `B-PACKET CONNECTED`).

7 Select the **SNDFOX** soft key to send the following message over the B channel "01:The quick brown

fox jumped over the lazy dog." The message will resend each time **SNDFOX** is selected, and the number will increment each time. Select **CLEAR** to clear the message.

8 The TPI 550B+ will display any information coming to it on the LCD screen.To end a B channel packet data call, go *on hook* by pressing **Hook On/Off**.

Troubleshooting Tips

1 It is best to verify that a voice call can be made successfully, prior to attempting a B-Packet call.

2 If the call is not successful, a cause message will be displayed on the LCD. For more information, the **Status** menu can be accessed to view the cause info, which will give a diagnostic cause message.

3 If set-up needs to be checked, press the **Setup** keypad button, which will prompt the operator to answer several setup related questions that will configure the TPI 550B+ to the circuit and switch being accessed.

4 If the upper LCD status line doesn't indicate `READY FOR CALL` when the Hook On/Off button is pressed, the X.25 link hasn't been made.

`LINKING PACKET MODE` indicates there is no packet service on this channel.

5 `RESTARTING LINK` indicates there is packet service on this line but the X.25 link was not able to be reset in order to request a call or send data.

If the LCD top status line doesn't indicate `B-PACKET CONNECTED` when the #/Utility keypad button is pressed to send the call, the call was not successful

Pre-qualifying cable pairs

Pre-qualification of cable pairs is becoming more popular, so that cable construction personnel can have confidence that the copper plant will handle the service being planned for deployment, prior to the central office and customer premise equipment being connected.

The TPI 550B+ can be used at the customer premise in conjunction with another TPI 550B+ at the central office to pre-qualify cable pairs.

The TPI 550B+ can be used in three different types of pre-qualification.

- Copper Pair (Dry Wire) Pre-Qualification
- Repeatered Line Pre-Qualification
- Subscriber Line Carrier (SLC) Pre-Qualification

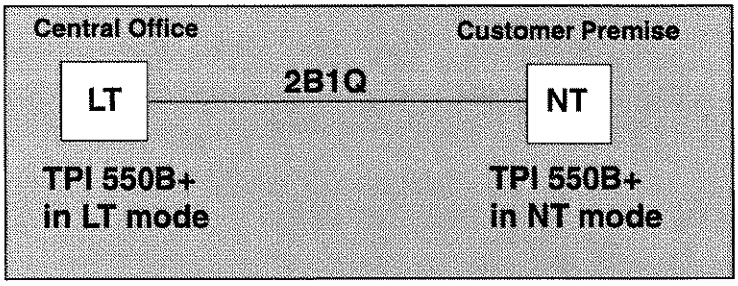


Figure 7 — *Dry wire pre-qualification*

The following procedures are recommended for pre-qualification of dry wire copper pairs:

(1, 2)

1 Gain access to the cable pair under test using the **U (2 wire)** interface jack on both units.

2 Setup the TPI 550B+'s for the line under test.
- The customer premise 550B+ should be in **NT** mode.
- The central office 550B+ should be in **LT** mode.
- The **Sync** and **Active** LED's should light.

NOTE:

The Sealing Current LED will not be lit, nor will the Ready LED be lit on either 550B+. No calls can be placed, but the line can be qualified by testing B1 and B2, and checking for CRC and FEBE errors.

3 B1 and B2 can be tested by performing a BER test in either a straightaway fashion, or by using the central office 550B+ to configure a loopback in the customer premise 550B+ and BERT to that loopback.

Loopback from the central office

1 On the central office 550B+, press the **Utility** key, then the **CONFIG** soft key.

2 Press **Scroll Menu**. The **2B1Q U INTERFACE** menu is displayed.

3 Press the **LTMODE** soft key to select Line Termination mode, then select the **EXIT** soft key.

4 Press the **MESSAG** soft key until `2B+D LOOPBACK` is displayed. Press the **SEND** soft key.

5 Press the **2nd Func.** key then the **BERT** key.

6 Press the **Scroll Menu** key to check the B channel selection.

7 Press the **Scroll Menu** key then the **64K** soft key.

8 Testing will begin when you press the **STRCLR** soft key.

9 Press the **STRCLR** soft key again to clear any errors. The Bit Errors (BE) and Errored Seconds (ES) should stop counting.

10 Run the test for the desired turn-up time and monitor results for acceptable error performance.

11 Testing will terminate when you press the **STOP** soft key.

Testing B2 may be performed in a similar fashion.

NOTE:

When sending an EOC channel command, e.g., B1 Loopback, the NT1 is always address 0 (default setting). A mid-span repeater, address may also be controlled for loopbacks.

Repeatered Line A Basic Rate Interface (BRI) 2B1Q repeater is sometimes used in cases where a BRI line needs to be extended in order to reach a customer site.

For a line with a 2B1Q repeater, the repeater must be powered in order for the whole loop to be tested. The *Model 47 Line Power Module* may be used for this purpose. The following diagram shows the connections when using the Model 47.

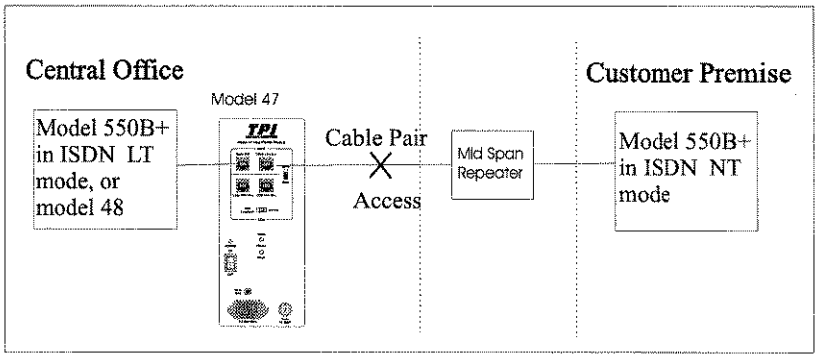


Figure 8 — *Repeatered line pre-qualification*

The switches on the Model 47 should be set to **2B1Q** and **Normal**. Connect the Model 47 **Model 546** jack to the **U (2 wire)** jack on the central office 550B+. The **2B1Q Line Out** jack connects to the line under test.

Once the connections are made, the Model 47 will power the repeater, and testing between the TPI 550B+'s can proceed, as described earlier.

High Voltage Termination

Repeatered Basic Rate Lines, however, present additional testing challenges. Higher than normal voltage and current levels are required to provide power for mid-span repeaters. Normal Basic Rate ISDN levels are 48VDC and 15mA of current; however, a repeater powering module produces 43mA of constant current and up to 120VDC.

The typical DC termination of an NT1, Phone, or Test Set normally cannot tolerate voltages or currents in the ranges noted above for the repeater powering module. As a protective measure then, the NT1, Phone, and Test Set may turn off the termination. This

action serves to protect the termination, but puts the powering module into a Fault condition, since it then appears as though nothing is terminating the line. This fault condition also affects the 2B1Q Basic Rate signal under some conditions, and thus will not allow testing of the Basic Rate line.

Repeater manufacturers normally recommend that the Repeater Power Module be removed and jumpered out of the circuit when testing a repeater line on the central office side of the repeater. When this is not convenient, the high voltage and current issues must be taken into account.

The solution for field units in this situation is the High Voltage Termination Capability, which terminates the repeater voltage like a repeater. High Voltage Termination Capability has been built into all TPI 550B+ test sets. TPI 550B (metal case) test sets produced before August 1995 may need a High Voltage Termination Module Accessory, TPI part number 550-HVT, if access is gained at the Protector Frame (or at any point on the Central Office side of the repeater). If access is gained anywhere on the CPE side of the repeater, High Voltage Termination is not needed.

NOTE:

When a TPI 550B+ encounters High Voltage, the Sealing Current LED will not illuminate, since the termination required to activate it has been removed to protect against high current/voltage. On earlier Model 550s, it is possible to damage the sealing current circuitry by connecting to a high voltage line, because those older units did not remove the termination to protect it.

40KHz test tone If configured in NT1 or NT1TE mode, the TPI 550B+ can generate a 40KHz test tone for the 2B1Q signal at

approx. 0dB. A TIMS set at the far end measuring the tone level can thus measure loop loss.

When performed during initial installation, this test will verify that the line loss is correct. The Actual Measured Loss (AML) is compared with the Estimated Measured Loss (EML).

Subscriber Line Carrier Pre-Qualification

When an ILEC transports a 2B1Q circuit for a CLEC, a Subscriber Line Carrier (SLC) system is often used. This system utilizes a Central Office Terminal (COT) in the serving central office that is externally timed from the CO Building Integrated Timing Supply (BITS) clock. A Remote Terminal (RT) is normally in an equipment cabinet in the field, and is loop timed on the received signal from the COT.

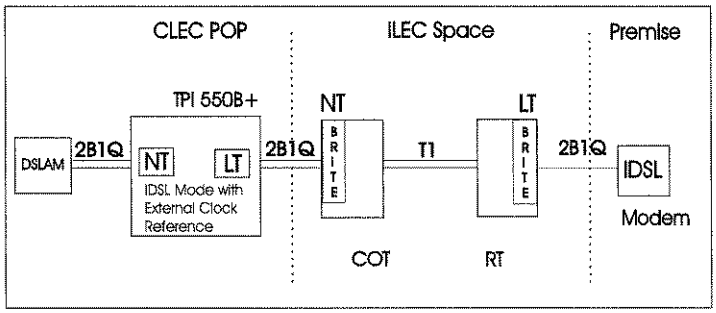


Figure 9 — *Subscriber Line Carrier Pre-Qualification*

The COT would normally have a Basic Rate Interface Transmission Extension (BRITE) card set to the NT mode to face the CLEC equipment, which would be acting in an LT mode. The RT would also have a BRITE card, and would be set to LT mode to face the customer equipment at the premise

In order for the ILEC to transport data from the CLEC correctly, the CLEC'S equipment (co-located in the

serving central office) must have a timing reference traceable to the ILEC timing source. However, the CLEC equipment is generally not timed from the ILEC BITS clock, but loop timed from the CLEC network. The best way, then, to assure data integrity through the carrier system is to perform a test from the 2-wire cross connect using the CLEC equipment as a timing reference. Although T1 signals may be available for timing in some instances, the only signal that will always be there is the 2B1Q output from the CLEC equipment. This 2B1Q output is an LT signal similar to that of an ISDN switch line card.

With the U-Monitor option, the TPI 550B+ has two 2B1Q interfaces. Consequently, one can be used in an NT mode to recover timing and the other can be used in an LT Emulate function to test through the carrier system. This **IDSL** mode has an external clock reference and can be reached from the **Setup** menu.

1 Setup the TPI 550B+ in **IDSL** mode.


(1, 2)

2 Connect the carrier system to the 2-Wire (line) Interface.

3 Connect the CLEC equipment to the 4-Wire (monitor) Interface.

4 Check for "**Sync**" and "**ACT**" status for the CLEC connection.

5 Send "2B+D" EOC command to premise equipment or to BRITE card(s).
[Access may be gained to intermediate circuit elements, such as BRITE cards or mid-span repeaters, by using EOC ADDRESS menus for loopback control and testing.]

6 Conduct BER testing at 128 kbps or 144 kbps to test through the carrier system with one of the longer pseudo-random patterns such as 2^{20-1} or 2^{23-1}.

Should timing problems exist, they would be indicated by bursts of errors periodically and error free conditions in between. The next step would be to borrow a 2B1Q line from an ISDN switch or borrow a spare BRITE card. Set it for LT mode and, using it for the timing reference, repeat the test. If the circuit runs error free, then the CLEC has a timing problem.

Intercom mode: For pre-qualification on the 2B1Q interface, two units (each with 4.10 firmware or higher) can be hooked together, on in LT mode and one in NT mode, to allow conversation over the B1 channel. Once **Sync** and **Active** LEDs light, pressing **Hook On/Off** will light the **Off Hook** LED and the LCD will display `INTERCOM TALK`. The LCD on the unit in LT mode will display a **PAGE** soft key. Selecting this soft key will display `PAGING...` on the LCD, and the unit in NT mode will beep. Pressing **Hook On/Off** will connect the units and conversation can take place.

NOTE:

Only the unit in LT mode can page the other unit.

Testing at the U interface

1 Setup the unit.


(1)

2 Connect to the line, using the U (2 wire) jack.

3 Place A Call.

4 Use the 1/Status key for errored second testing.

5 Perform a network originated loopback test: have another technician place a loopback on the line. The STATUS LED's will indicate loopback status.

6 Use the 3/BERT KEY for BER Testing.

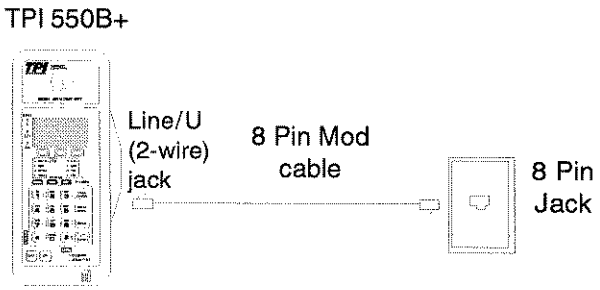


Figure 10 — *Replacing an "NT1" and "TE" with the TPI 550B+*

Testing at the S/T interface

1. Setup the unit using the S/T (4 wire) jack.
2. Place a Call.
3. For errored second testing use **1/Status** key.
4. Perform a network originated loopback test: have another technician place a loopback on the line. The STATUS LED's will indicate loopback status.
5. For BER Testing use 3/BERT key.

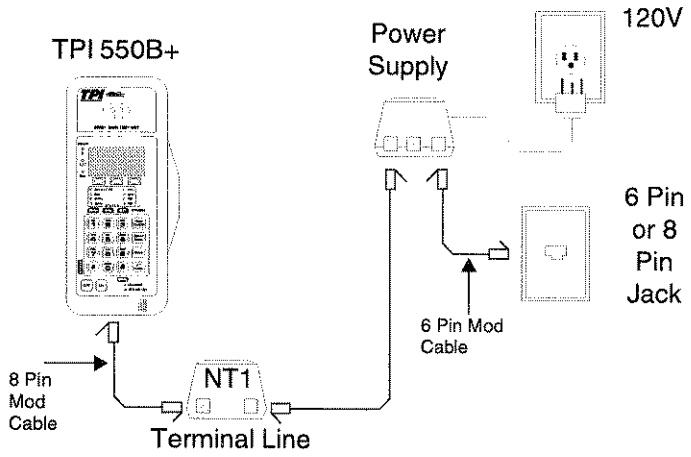


Figure 11 — *Replacing a TE device*

Dual call capability

Overview

The Dual Call feature for the TPI 550B+ allows two circuit switched data calls to be in progress at the same time - two outgoing, two incoming, or one of each. This verifies that both B channels can be used simultaneously. With this dual call feature, the TPI 550B+ also has a selection to automatically call itself, enter a loopback, and BERT.

Although it will work for voice calls in most cases, the dual call feature is intended for simultaneous Data calls. This simulates what happens when a Video Terminal Adapter sets up a call on each B channel and combines the bandwidth, in order to transfer video information at 112 Kbps or 128 Kbps.

NOTE:

For 5ESS custom and National call controls with point-to-point service, dual voice calls are not allowed.

Additional call offering test

If on a call (single or dual call mode) and a second incoming call is detected, INCOMING CALL will be displayed (the call cannot be answered).

Details

1 SETUP

- Set up the TPI 550B+ as normally done prior to connecting to the line under test (e.g., Bearer Capability, Call Control, SPID, etc.).

(1, 2)

- Connect the Line-under-test using either U or S/T jack, and wait for **Sync**, **Active**, and **Ready** indications as you would for a normal setup.
- Choose the **Utility** key, then the **MODES** soft key. The **DUAL CALL** menu is displayed.
- Press the **ON** soft key to enable the dual call mode. Enter SPID #2 or GUESS, if necessary, then press **SEND**. Press **Scroll Menu** to enter DN #2, if needed.
- Press **Scroll Menu** to the **CALL YOURSELF LOOP AND BERT** menu. If **NO** is selected, press the **EXIT** soft key to return to the CALL1 **HOOK** screen. If **YES** is selected, please refer to the loopback scenario in this section.

2 OPERATION

- When dual call mode has been enabled, CALL1 will appear in the upper right corner of the **HOOK** screen.
- Press the **Scroll Menu** key and CALL2 will appear. (In this manner, the screen and keypad are coordinated to operate as two phones.)
- Calls may now be placed or received on either or both B channels using the dual call mode. All call control menus are still valid. (e.g., Call Appearance, B channel selection, and Bearer Capability for each call)

3 TEST SCENARIOS

- DUAL DIAL TONE CHECK
  - CALL1
    - Go **Off Hook** on CALL1 make sure that the message Dial tone appears on the **HOOK**

screen (on 5ESS switches, no dial tone will be heard for data calls).

- CALL2
  - Depress **Scroll Menu** to select CALL2.
  - Go **Off Hook** on CALL2
  - If the Dial Tone message appears on the **Hook** screen, the translations are correct (max B channel) for simultaneous data calls
- Clear the calls
  - Go back **On Hook** for CALL2
  - Depress **Scroll Menu** to select CALL1
  - Go **On Hook**.

The above scenario is all that is necessary to test for simultaneous B channel operation.

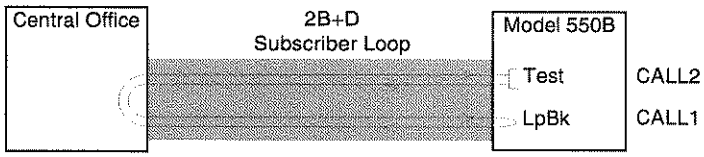
- Dual Call with one SPID
  - In **Utility/MODES** ENTERSPID2 menu, select **NONE**.
  - **Scroll Menu** to CALL YOURSELF LOOP AND BERT and select **YES**.

The dual call feature of the TPI 550B+ enables BER tests to be conducted on both B channels simultaneously, thus testing the full 128K bandwidth. This testing can be accomplished in loopback or straightaway scenarios.

4 LOOPBACK

- OPTION 1:

  This option allows you to place a call from one B channel to another, place one in loopback and initiate BERT from the other call (B channel).

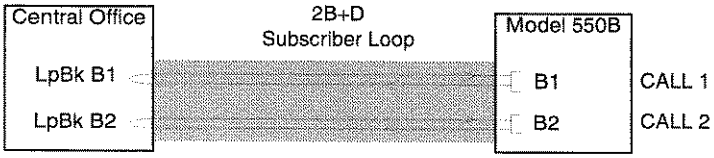


  - Under the **Utility/MODES** menus, turn the Dual Call feature **ON**. Enter SPID #2 and press **SEND**. Verification will be displayed in the upper right. Press **Scroll Menu** to enter DN #2, if necessary, then press **ENTER**.
  - Press **Scroll Menu** to the **DO YOU WANT TO CALL YOURSELF LOOP AND BERT?** screen. Select **YES** and enter the Centrex prefix, if needed.
  - Press the **TEST** soft key. The TPI 550B+ will automatically go off hook, dial the number, loopback, and enter BERT.

- OPTION 2:

  - This procedure requires a loopback device at the central office (e.g., TPI 560). To test both channels simultaneously, place two calls to a loopback device, enter the BERT menu, **Scroll**

Menu to the channel select screen, and select **BOTH** channels.



- OPTION 3:

  Place two calls to a loopback then measure the delay between the two calls (for use in video conferencing applications).

  - This procedure requires a loopback device at the central office (e.g., TPI 560). After placing two calls to a loopback, enter the **Status, Result** menus and **Scroll Menu** to the **INTER B-CHAN DELAY** screen.
  - The one-way differential B channel delay can be measured by pressing the **TEST** soft key.

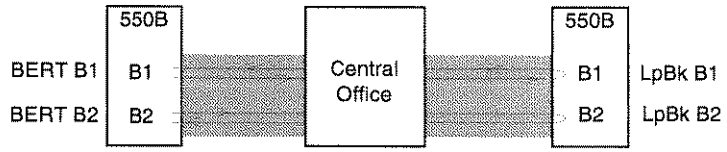
5 STRAIGHTAWAY SCENARIO:

In this scenario two technicians with TPI 550B+'s can call each other.

- OPTION 1:
  - The first technician would call the second, and the second technician would then call the first, using the CALL2 **HOOK** screen.
  - After receiving the call, each technician would place the incoming B channel in loopback.

- Each technician would then initiate BER testing over the out-bound B channel.

- OPTION 2:
  - To test both channels simultaneously, a similar procedure would be followed. However, only one technician would initiate BERT (select **BOTH** channels in the BERT menu).



BRIV

Place a call to a BRIV test line and the 550B+ will display information regarding the physical location of the circuit in the CO switch.

NT1 replacement

Setup Use **Setup** key for EASY-USER-MODE
[Service Mode=ISDN]
[ISDN Mode=NT1]
[Interface=2B1Q or ATT]

Connection  (1, 2)

Use **U (2 wire)** jack

Errored Second Testing Use **1/Status** key

Network Originated Loopback Testing **STATUS** LED's will indicate loopback status

NOTE:

The TPI 550B+ will pass power from the U (2 wire) jack to the S/T (4 wire) jack. If a phone were connected to the S/T Interface jack, the phone must be powered by a separate power supply.

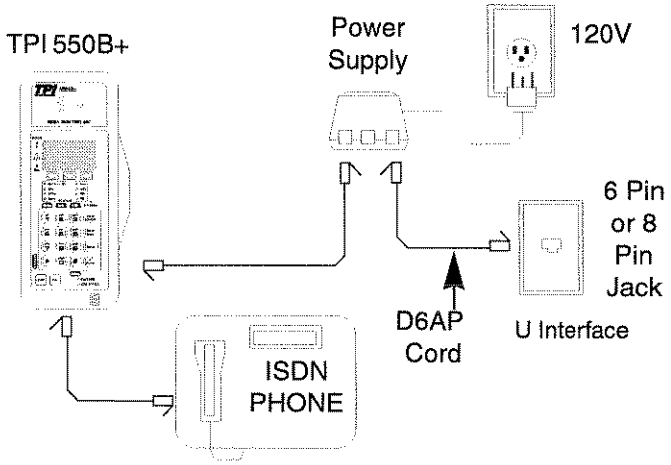


Figure 12 — *Replacing an NT1 device*

Monitor D channel packets (option)

Monitoring of received D channel packets (from both directions) with remote equipment is optionally available, via the DATA DB-9/RS-232 connector located on the interface panel. Enable the D channel Monitor through the Utility/DATA menus. This will start the output of the received messages to the DATA port. Outputted information will be in HEX format and English language.

The communication parameters for the TPI 550B+ are factory pre-set. Consequently, the remote equipment parameters will need to be set to match those of the TPI 550B+. These are 9600 Baud (selectable under the Utility/DATA menu), No Parity, 8 Data Bits, 1 Stop Bit.

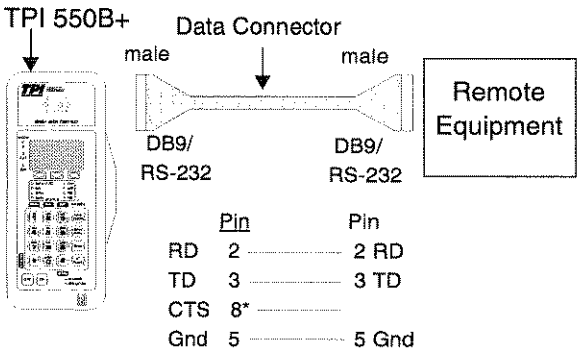


Figure 13 — *Sample D Packet connection*

Table 22 — *Output example*

Setup from TE

```
TE->NT:C SAPI:000 TEI:104 Time00:01:36.9
I Ns=003 Nr=003 P/F=0
PD=08.................Call Reference:001
M 05 SETUP
I 04 BEARER_CAPABILITY............Len= 3
80 Coding Standard.................CCITT
Transfer Capa.....................Speech
90 Transfer Mode..................Circuit
Transfer Rate..................64 kbit/s
A2 Layer 1 Protocol...............u-law
I 18 CHANNEL ID...................Len= 1
8B Indicated Channel..........Exclusive
Channel Selection...................Any
Channel Identifier.............Not D-CH
I 24 TERMINAL CAP.................Len=1
02 Coding Standard..................Any
Capability..............Type 2 stimulus
I 36 SWITCHHOOK...................Len= 1
01 Off-hook
I 96 Shift Locking Codeset=6
I 23 ORIG CALL APPEAR.............Len= 1
01 Off-hook
I 26 ENDPOINT IDENTIFIER..........Len= 2
01 USID..............................001
E8 TID..............................104
Interpreter...........................1
Hex:00 D1 06 06 08 01 01 05 04 03 80 90
A2 18 01 8B 24 01 02 36 01 01 96 23
01 01 26 02 01 E8
```

Network acknowledgement

```
NT->TE:C SAPI:000 TEI:104 Time00:01:37.2
I Ns=003 Nr=004 P/F=0
PD=08.................Call Reference:001
M 0D SETUP ACKNOWLEDGE
I 18 CHANNEL ID...................Len= 1
89 Indicated Channel..........Exclusive
Channel Selection.....................B1
Channel Identifier.............Not D-CH
I 34 SIGNAL.......................Len= 1
00 Dial Tone on
I 96 Shift  Locking Codeset=6
I 3C DISPLAY FIELD................Len= 4
11 Display Mode...................Normal
Submode...........................Direct
01 Field Type.............Call Appear ID
INFO:1
Hex:02 D1 06 08 08 01 81 0D 18 01 89 34
01 00 96 3C 04 11 01 20 31
```

Table 22 — *Output example*

```
TE->NT:C SAPI:000 TEI:104 Time00:01:42.3
I Ns=004 Nr=004 P/F=0
PD=08..........Call Reference:001
M 7B INFORMATION
I 2C KEYPAD.............Len=1
33 Keypad INFO = 3
Hex:00 D1 08 08 08 01 01 7B 2C 01 33
```

TE dialing

D Channel message analysis

Communication direction between the customer (Terminal Equipment) and C.O. (Network Termination) is indicated as follows:

NT->TE	=	C.O. to Customer
TE->NT	=	Customer to C.O.

Call setup messages are shown and include detailed call status information, some of which includes the following information:

A unique call reference number is assigned to each call and included in each message.

```
PD=08.........Call Reference: 02944
```

Multiple calls on the single D channel will generate hundreds of messages intermingled, requiring a careful search or sort of those related to a single call.

Table 23 — *Layer 2 messages and definitions:*

PD	Protocol Discriminator.Used to distinguish the user-to-network call control messages from other messages.
TEI	Terminal Endpoint Identifier.

Table 23 — *Layer 2 messages and definitions:*

I	Information Frame.They contain layer 3 messaging
C	Command.
R	Response.Identifies a frame as a Command frame or a Response frame. Layer 3 messages always are Command messages.
Ns	Number Sent.
Nr	Number Received.
P/F	Poll/Final Bit.Data link poll and response indicator. In a command frame, P/F=1 indicates a response to the poll is required. This is a layer 2 activity.
RR	Receiver Ready.All layer 3 messages are acknowledged by the receiving entity. They are also used in a keep alive function.
SABME	Set Asynchronous Balanced Mode Extended.
UA	Un-numbered Acknowledgment.
SAPI	Service Access Point Identifier.

The SAPI identifies a point at which layer 2 services are provided by a layer 2 entity to a layer 3 entity or a management entity.

The SAPI specifies a layer 2 entity to process a layer 2 frame or a layer 3 or management entity to receive information carried by the layer 2 frame. The SAPI field allows 64 Service Access Points (SAPs) to be specified.

The SAPI values are allocated as follows:

Table 24 — *Allocated SAPI values*

SAPI VALUE	RELATED LAYER 3 OR MANAGEMENT ENTITY
0	Call Control procedures
1	Reserved for packet mode communication using Q.931 call control procedures
16	Packet communication conforming to X.25 level 3 procedures
63	Layer 2 management procedures
All others	Not used

NOTE:

Before point-to-point acknowledgment information transfer can start, an exchange of a SABME frame and a UA frame must take place. This layer 2 activity results in establishment of a multiple frame operation state.

```
M 05 SETUP
I 04 BEARER_CAPABILITY.....Len=3
```

"M" indicates presence of a message type; "05" is the hex value of the message, followed by the message name. "I" indicates an information element, followed by the hex value and the information element name. "Len=3" (length) is the number of bytes the information element contains. For example, "3" indicates three variable length information elements are listed under the "I", each with their own hex value.

One person ISDN BRI turn-up

Equipment

TPI 550B+ ISDN Portable Test Set
Model 560 ISDN Dial Up Test Unit

General Information

The TPI 550B+ ISDN Portable Test Set is used to conduct testing of ISDN circuits at the customer premise or the main distribution frame. The TPI 550B+'s operating modes allow it to function as a Network Termination [NT1], as Terminal Equipment [TE], or as both. It may be connected to either the Digital Subscriber Loop [DSL], or the S/T Interface. Once connected, the TPI 550B+ will allow the technician to perform line quality measurements, place voice and data calls, set up loopbacks, conduct BERT testing, and verify translations.

The TPI Model 560 ISDN Dial Up Test Unit is used for automated assistance in the turning up of new ISDN circuits. The Model 560 is normally installed permanently in the central office [CO] in a 19-inch rack. The CO will assign a number to allow a test technician to dial the Model 560. Once accessed, the Model 560 will allow the technician to test the line that he is calling on by ringing the technician back, setting up loopbacks, and/or allowing BERT testing.

EQUIPMENT SET-UP

TPI 550B+


(1, 2)

Connect to the ISDN line with the **U (2 wire)** jack on the interface panel of the TPI 550B+.

1 When the TPI 550B+ is first used on an ISDN circuit, the technician will have to set the unit up in accordance with the switch and other parameters. For example, upon power up of the TPI 550B+, a screen such as the screen below will be displayed, which reflects the last setup:

2 If the set-up needs to be changed, select **CHANGE** and follow the menu setup prompts.

VOICE TURN-UP PROCEDURE

Once the TPI 550B+ has been set-up properly, the STATUS LED's for **Sync** and **Active** should illuminate.

1 Go **Off Hook** - Dial tone should be heard [if not, check SPID].

2 The TPI 550B+ defaults to voice service.

3 Enter the Model 560 access number.

4 The Model 560 will automatically answer and announce "Hello, TPI 560 Automated Test Line", followed by the service (voice or data), calling party number (repeated), and "Hang up for call back", to the TPI 550B+.

5 Following this message, the technician should hang up, by going **On Hook** with the TPI 550B+.

6 The Model 560 then goes Off Hook and places a call back to the TPI 550B+.

7 When the TPI 550B+ answers, the Model 560 will announce "Hello, TPI 560 Automated Test Line. Entering Loopback", then enter a loopback state on the assigned B channel, allowing BERT testing with the TPI 550B+ to verify the quality of the line.

8 The Model 560 will release automatically if the caller hasn't hung up after 15 minutes.

9 The Model 560 is now ready for the next call.

Circuit Switched Data Turn-up Procedure

Same as voice, except the TPI 550B+ must be configured for **DATA** via the **UTILITY/DATA** menu, prior to connection to the line under test (if optioned with Data).

D-packet Data Turn-up Procedure

NOTE:

The Model 560 must be optioned with D-Packet capability for this procedure.

1 Configure the TPI 550B+ for voice and verify dial tone by going **Off Hook**. Hang up by going **On Hook**. Use the **Utility/DATA** menu to change the bearer capability to **D-PKT**.

2 Using the TPI 550B+, Go **Off Hook** and the display should say `READY/ENTER NUMBER W/KEYS`.

3 Using the TPI 550B+, enter the Model 560 access number, followed by **#**, to send the number.

4 The Model 560 will automatically answer and send the calling party number back in a D-Packet message.

5 The TPI 550B+ should display `D-PACKET CONNECTED`, followed by the calling party number.

6 Using the TPI 550B+, hang up by going **On Hook**.

7 The Model 560 will go **Off Hook** and dial the TPI 550B+.

8 When the TPI 550B+ recognizes the D-Packet call, it will automatically answer.

9 The Model 560 will then send a message to the TPI 550B+ stating "`TPI 560P Automated Test Line. Entering Loopback`". Next, the Model 560 will enter into a Packet Echo mode.

10 The TPI 550B+ can now be used to send the Fox message by selecting the **SNDFOX** soft key.

11 When this message reaches the Model 560, it will be sent back to the TPI 550B+ and displayed on the screen.

12 The TPI 550B+ can clear the screen [**CLEAR** soft key], and resend the message [**SNDFOX**]. If this message is received error free, the quality of the connection is verified.

13 The TPI 550B+ will release the call automatically if the caller hasn't hung up after 15 minutes.

Chapter 5

Options

This chapter provides information available options of the TPI 550B+ Test Set. Topics include the following:

The following options require factory installation. To check for these options, press the **Utility** button, and select the **CONFIG** soft key. This will display the modes available on the unit.

P-PHONE (EBS) option

NOTE:

This capability and the Setup service mode selection menu are only available if the optional EBS interface (550B-23 EBS/POTS Interface) has been installed.

Electronic Business Set (EBS), or P-Phone, is a service provided by Northern Telecom (Nortel) DMS or SL switches. The service provides a user with Centrex-like features that aren't normally available on a conventional POTS line.

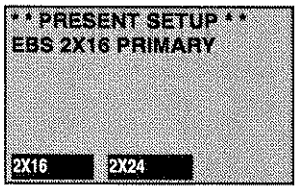
EBS service is provided through a non-loaded subscriber loop pair that carries conventional voice traffic and a secondary above voiceband signaling channel. In addition to Off Hook/On Hook and Dialing information, this secondary channel carries Line Status, Number ID, and Display Information.

There may be several devices connected to an EBS line at the customer premise. Each device would have its own address in order to communicate with the switch. There is always a basic set with address "0" that terminates the line, normally at 900Ω. Add-on devices may include speaker phones or 18-button, 20-button, or 36-button add-on modules. The TPI 550B+ can be configured for any address (0-7). The Primary telephone always uses address 0. Expansion units associated with the Primary telephone use addresses 1, 2, or 3. The Extension Telephone always uses

address 4. Expansion units associated with the Extension telephone use addresses 5, 6, or 7.

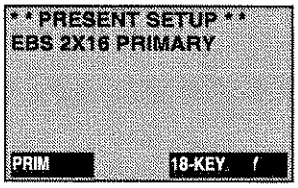
EBS setup

Selecting **EBS** during setup, will display the following menu:

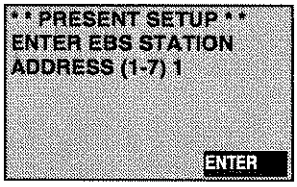


This screen selects the display size which is to be emulated.

Pressing **Scroll Menu** moves to the following screen:



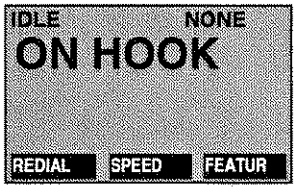
This screen enables a selection for Primary Set or an 18-key or 20-key add-on unit emulation. Upon selection, the display moves to the Station Address selection:



As outlined earlier, the primary set is always address "0", Add-On units for the primary set are "1", "2," or "3", the Extension Set address is "4" and the Add-On units for the extension set are address "5","6", or "7". After entering the station address, press **ENTER**.

Pressing **Scroll Menu** will return to the **PRESENT SETUP** menu.

Press the **ACCEPT** soft key and make the selections for the present setup. The **HOOK** screen will be displayed:



EBS operation

Press the **Hook On/Off** key to answer an inbound call or to place an out-going call. Pressing the **FEATUR** soft key changes the soft key selections to: **HOLD**, **RELEAS**, and **SEND**. The **HOLD** and **RELEAS** keys emulate the same keys on the CPE (telephone). The **SEND** key is used to activate a feature key number and press **SEND** to activate that feature key.

To verify P-Phone/EBS Service:

1 Configure the TPI 550B+ for EBS/P-Phone

- Use the **SETUP** key to gain access to the EASY-USER-MODE Menu
  - If EBS is displayed on line 2 of the LCD, press the **ACCEPT** soft key
  - If anything else is displayed on line 2 of the LCD, press the **CHANGE** soft key.
    - Select the **EBS** soft key
    - Select Display Size (2x16, 2x24)
    - Select Device (Primary, 18-key, 20-key)
    - Select Station Address (0-7)
    - Select the **ACCEPT** soft key.
- After a short recalibration period, the LCD will display the ON HOOK menu.

(1, 2)

2 Verify the connection.

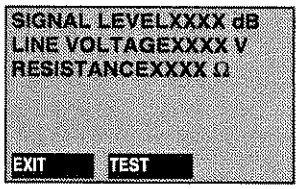
- Use the **U (2 wire)** jack for connection to the EBS/ P-Phone network.
  - Once connected:
    - **Ready** LED indicates that communication is setup with the switch.
    - Voltage & Current presence is indicated when the **Sealing Current** LED is lit.
    - Polarity is indicated on the LCD display in the upper right hand corner:
      None—Not enough Voltage or Current
      Norm—Tip is Ground, Ring is Battery
      Rev—Tip and Ring are reversed

3 A voice call may now be placed using the **Hook On/Off** key

- By going **Off Hook**, the TPI 550B+ will send an Off Hook message on key #1 for address "0". Dial tone should be heard, and a call can then be placed. If a call comes into the TPI 550B+, RINGING will be displayed on the LCD screen, and the sonalert will sound. In order to answer an incoming call, go **Off Hook**. Display Data received from the switch will also appear on the LCD. Conversation can then take place. To end a call, go **On Hook**.
- The key or button number may also be selected for incoming or outgoing calls by selecting the **FEATUR** soft key. For example, by pressing **3** and the **SEND** soft key on the **HOOK** menu, the TPI 550B+ will send an Off Hook message on key "3" for address "0".
- The address the TPI 550B+ sends can also be changed via the **Utility** menu and **MODES** soft

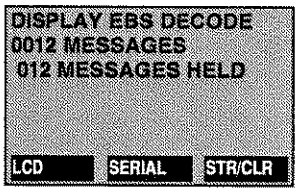
key, and **Scroll Menu** to the **EBS STATION ADDRESS** menu. For example, pressing the desired address number then the **ENTER** soft key, the next message sent to the switch will have the new address.

4 P-Phone measurements are available by pressing the **1/Status** key and the following menu will display:



The signal level displayed is the actual measured loss of the cable plant as if the 8 KHz signal were sent at 0dBm like a TIMS box would. To take another measurement, press the **TEST** soft key.

5 Access messages decoded (in English) from switch communications by pressing the **#/Utility** key, **DATA** soft key, and **Scroll Menu** to display the following screen:

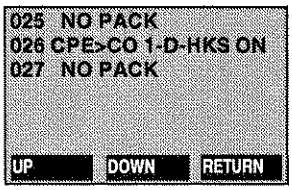


In the above example, the digits `0012` show that there are a total of 12 EBS messages that have occurred and 12 stored EBS messages in the EBS message buffer.

The EBS message buffer has the capability to store up to 128 message decodes. The fourth row of the LCD allows selection of displaying an abbreviated message on the LCD, outputting the detailed message decodes in real time (as they

occur) via the **DATA** connector (**SERIAL** soft key), or clearing the message buffer and starting a new capture by simply pressing the corresponding soft key.

The following is an example of an abbreviated message decode if the LCD is selected for output:



The number `026` represents the sequential message decode number. The `CPE>CO` provides information concerning the direction, in this example the direction is from CPE towards the CO. The next displayed item `1D` is the hexadecimal representation of the message. `HKS On` is an abbreviated message decode stating that the Hook Switch is On (on hook). Pressing the **UP** or **DOWN** soft key, will scroll through the messages. The **RETURN** soft key will step back to the **DISPLAY EBS DECODE** display.

Some of the abbreviations with explanations are in the table below:

Table 25 — *Possible decode messages*

ABBREVIATION	MESSAGE
`Indx OFF`	Indicator *x* (1-9) OFF
`Ind0OFF`	Indicator 10 OFF
`Indx WNK`	Indicator *x* (1-9) WINK
`Ind0WNK`	Indicator 10 WINK

Table 25 — *Possible decode messages*

ABBREVIATION	MESSAGE
Indx FLH	Indicator x (1-9) FLASH
Ind0FLH	Indicator 10 FLASH
Ind x ON	Indicator x (1-9) ON
Ind10ON	Indicator 10 ON
HardRst	Hard Reset
SoftRst	Soft Reset
PwrDown	Power Down Reset
ClsEcho	Close Echo
OpnEcho	Open Echo
AlrtOff	Alert-Off
AlrtOn	Alert-On
VoicOff	Voice-Off
VoiceOn	Voice-On
HSetOff	Handset-Off
HSetOn	Handset-On
BuzzOff	Buzzer-Off
BuzzOn	Buzzer-On
AABkOff	Auto Answer Back-Off
AABkOn	Auto Answer Back-On

For further explanations of specific messages, please refer to BELLCORE document TR73505, Issue B, Section 5.

Pressing the **SERIAL** soft key from the **DISPLAY EBS DECODE** menu will immediately send output of all the stored messages to the **DATA** connector on the interface panel. This will Print the information. The printed messages are not abbreviated and have more detail than the LCD information. An example of the output when **SERIAL** is pressed follows:

```
0026 Direction...CPE->CO Time 12:07:34.2
     Address ..... 0
     command ..... 1D Hookswitch On-Hook

0028 Direction...CO->CPE Time 12:07:35.1
     Address ..... 0
     Command ..... 60  Indicator 1 ON
     Repeat ..... No
     Collision ... No
     Parity ..... Passed
     Hex: C302
```

To summarize, an EBS line may be tested by:

1. Verifying the Voltage & Current - **Sealing Current** LED
2. Verifying the Polarity - LCD screen (Upper right corner)
3. Placing a call from the TPI 550B+ to a test number
4. Receiving a call with the TPI 550B+
5. Measuring signal level (8KHz Carrier/Secondary Channel), voltage, and resistance

Additionally, the TPI 550B+ may be used to change the Address and Call Appearance to activate other desired buttons.

EBS/P-Phone Testing

1 Setup the unit for EBS–Service Mode.

(1, 2)

2 Connect to the line using the U (2 wire) jack.

3 Place a call.

POTS option

POTS setup

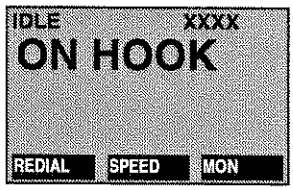
To setup the unit for POTS:

- Use the **Setup** key to gain access to the EASY-USER-MODE Menu
  - If POTS is displayed on the second line of the LCD, press the **ACCEPT** soft key
  - If anything else is displayed on the second line of the LCD, press the **CHANGE** soft key. Select POTS by pressing the **POTS** soft key, then the **ACCEPT** soft key.

NOTE:

The service mode selection menu will only be displayed if the POTS optional interface (550B-23 EBS/POTS Interfaces) has been installed.

- After a short recalibration period, the LCD will display the **HOOK** menu:



POTS operation

From the **HOOK** menu, pressing the **MON** soft key will allow unintrusive monitoring of the POTS line.



(1, 2)

To verify POTS Service:

1 Verify the connection

- Use the **U (2 wire)** jack for connection to the POTS network.
  - Once connected:
    Voltage & Current presence is indicated when the Sealing Current LED is lit.

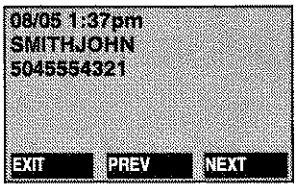
    Polarity is indicated on the LCD display in the upper right hand corner:

    None—Not enough Voltage or Current
    Norm—Tip is Ground, Ring is Battery
    Rev—Tip and Ring are reversed

2 A voice call may now be placed using the **Hook On/Off** key.

3 A voice call may now be received using the **Hook On/Off** key.

  - If available as a service, incoming call line ID (date, time, and number) will be displayed on the second ring (as well as on the CLID screen in the **Status/CAUSE** menu) in the following format:



– The **PREV** and **NEXT** soft keys scroll through the CLID messages. Up to 10 messages can be stored.

To summarize, a POTS line may be tested by:

1 Verifying the Voltage & Current - Sealing Current LED

2 Verifying the Polarity - LCD screen (Upper right corner)

3 Placing a call from the TPI 550B+ to a test number

4 Receiving a call with the TPI 550B+

POTS Testing

1 Setup the unit for POTS Service Mode.

(1, 2)

2 Connect to the line using the U (2 wire) jack.

3 Place a call.

U-Mon option

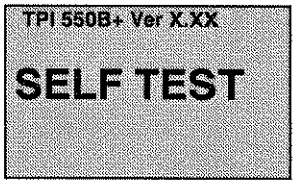
The U interface monitor option allows capture of D-Channel message traffic and can display the messages on the LCD, save them for later reference, or dump them out the **DATA** port for external analysis.

U-Mon setup

NOTE:

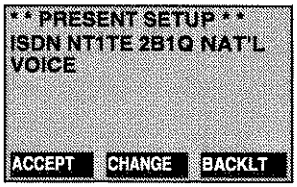
Complete the Setup menu selections before accessing the line.

When the unit is first turned on, it will conduct the Power On Self Test, and the following message will be momentarily displayed:



Upon successful completion of the Power On Self Test another message will be momentarily displayed, stating that the test has been passed.

The unit will then proceed to the **PRESENT SETUP** menu:



NOTE:

The second and third lines of this display will show your previous selection, and may not be as shown in this illustration. To revert to the factory setup, turn off the unit, press and hold the asterisk (*) key and press the ON key.

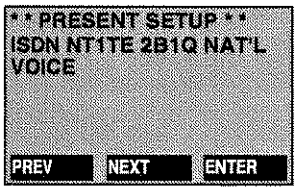
Select the appropriate soft key to either **ACCEPT** the setup shown, or enter a new setup (**CHANGE**).

The **BACKLT** soft key is used to toggle the LCD backlight On or Off.

NOTE:

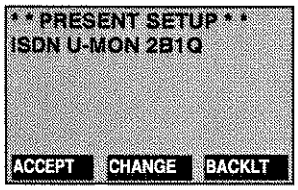
Battery life will be enhanced if the LCD backlight is turned off when not needed (i.e., when there is sufficient ambient light).

Selecting **CHANGE**, or pressing the **Scroll Menu** keypad button, will display the following menu:



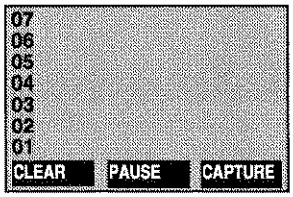
Mode of Operation

To operate in U-MON mode, use the **PREV** and **NEXT** soft keys to select U-MON, and then select the **ENTER** soft key. The following screen will be displayed.

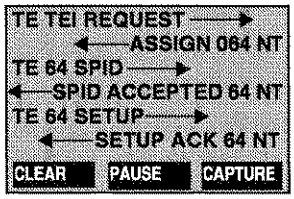


To accept this setup, select the **ACCEPT** soft key.

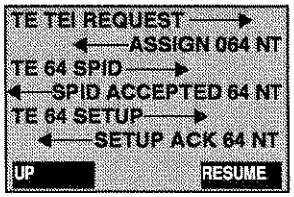
Mini Monitor After accepting the U monitor mode, the following mini monitor screen will be displayed:



The mini monitor is a buffer of messages and will hold the last 20 messages of the test set. It is a representation of the D channel traffic. The above screen will be displayed as long as there is no traffic in the buffer or if the buffer has been cleared out. As messages enter the buffer, the screen will display:



When the **PAUSE** soft key is selected, the screen changes to:



While the Mini Monitor is paused, the monitor freezes traffic and will not assign new messages until the

resume key is pressed. This allows review of previous messages.

NOTE:

These messages are NOT stored on power down. The message buffer will continue to capture messages even if the unit is on another screen. The monitor is active for all call controls.

Table 26 — *Supported mini monitor messages*

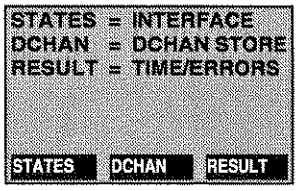
SPID	SPID ACCEPTED	TEI REQUEST	TEI ASSIGN
CHECK ALL TEI	TEI IN USE	REMOVE TEI	ALERTING
PROCEEDING	CONNECT	CONNECT ACK	PROGRESS
SETUP	SETUP ACK	HOLD	HOLD ACK
HOLD REJ	RETREIVE	RETREIVE ACK	RETREIVE REJ
DISCONNECT	RELEASE	REL COMP	RESTART
REST ACK	FACILITY	INFO	NOTIFY
REGISTER	SEGMENT	STATUS	STATUS ENQ
KEY (user is dialing a digit)			

U-Mon menus

In the U monitor mode, the **Auto** and **BERT** function keys are not valid.

The **Store** menus are the same for both modes.

STATUS Pressing **1/STATUS** on the keypad will result in the following menu:



Moving from screen to screen can be accomplished by pressing the soft key corresponding to the choices of **STATES**, **DCHAN**, or **RESULT**.

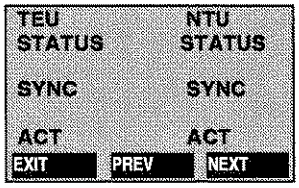
STATES submenu Selecting the **STATES** soft key from the **Status** menu provides several screens to show the status of:

- TE U Status vs. NT U Status
- NT M Channel Activity vs. TE M Channel Activity
- Layer 1 Status (TE side)

NOTE:

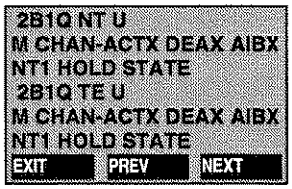
Moving from screen to screen is accomplished by either pressing the Scroll Menu key or the soft key corresponding to EXIT, PREV or NEXT. Menus may vary depending on the mode of operation.

Selection of **STATES** from the **Status** menu will result in the following screen:



This menu indicates sync and active for each direction. A check mark (✓) indicates the unit has achieved sync or active in that direction.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button shows the following screen:



This menu provides maintenance channel information relative to the Activate Bit (ACT), the Deactivate Bit (DEA), the Alarm Indicator Bit (AIB), and the actual EOC messages received (including the address). (This menu will only display values if synced.)

ACT=1 is normal—(0 indicates not transparent to network)

DEA=1 is normal—(0 indicates the network is going to deactivate)

AIB=1 is normal—(0 indicates a problem)

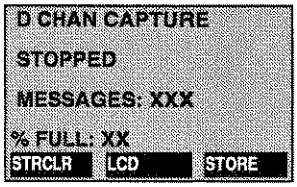
The third line of each display reports the EOC message information. The Actual EOC message received may be one of the following:

Table 27 — *EOC messages*

2B+D LOOPBACK
B1 LOOPBACK
B2 LOOPBACK
REQ CRPT CRC
NOTIFY CRPT CRC
RETURN NORMAL
HOLD STATE

To exit the **STATES** menu, press the **EXIT** soft key.

D CHAN submenu Selecting **DCHAN** form the STATUS menu will move directly to the D CHAN CAPTURE menu.

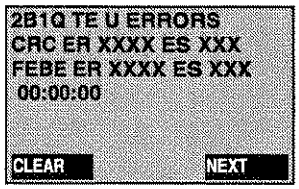


This menu reports the status of the D Channel Capture feature: running or stopped, how many messages captured, how full the 4k buffer is. The D Channel capture feature is used to capture D Channel messages for review and troubleshooting.

RESULT submenu Selecting **RESULT** from the **STATUS** menu will result in the following screen:

This screen displays the errors in the NT direction. The **CLEAR** soft key can be selected to reset the timer and the error counters.

Pressing the **NEXT** soft key or the **Scroll Menu** keypad key results in the following screen:



This screen displays the errors in the TE direction. The **CLEAR** soft key can be selected to reset the timer and the error counters for the U interface.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button at this time results in the following screen:

The first line is the time selected. The second line is the descending counter.

Enter the time desired using the keypad in HH:MM format. When ready to begin timed testing, press the soft key below **START** on this menu.

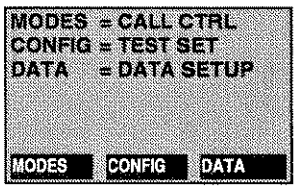
To display errors occurring and time left in the test, press the soft key below **ERRORS**.

NOTE:

Timed tests will freeze the error counters after the time has expired.

To exit the **Results** menu, press any keypad selection, or press the **EXIT** soft key.

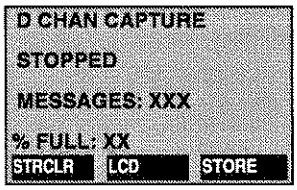
UTILITY Pressing **#/UTILITY** on the keypad will result in the following menu, which allows various utility functions to be performed:



The Modes and Configuration submenus are discussed in Chapter 3.

DATA submenu Moving from screen to screen can be accomplished by pressing the **Scroll Menu** keypad button.

Selecting **DATA** from the **Utility** menu will result in the following display:



This menu reports the status of the D Channel Capture feature: running or stopped, how many messages captured, how full the 4k buffer is. This feature can be used in Terminate or Monitor mode.

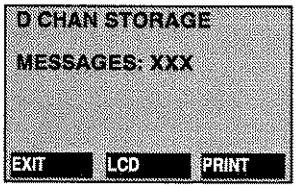
The **STRCLR** soft key clears the messages and starts the capture from that moment. The messages are captured into a 4k (temporary) storage buffer and are not stored on power down, unless the **STORE** soft key is pressed, at which time the messages will be stored in a different 4k (permanent) buffer. The number of messages captured will increase until the storage space is full. When full, the oldest messages are dropped as new messages are captured. The

maximum number of messages will vary due to variations in message length.

Pressing the **LCD** soft key freezes the message capture at that moment and displays the first message `001 of XXX` on the screen in decoded form. The display will show up to 6 lines of a single message. Pressing the **DOWN** soft key will scroll through a long message (a setup message, for example).

Pressing the **NEXT M** or **PREV M** soft keys will scroll between messages. The message number on the title line will show the sequential number of the captured messages. Pressing **Scroll Menu** returns to the capture status display.

Pressing **Scroll Menu** from the main Data screen moves the display to the status of the **Stored** message buffer:

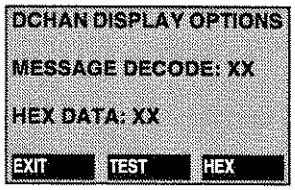


The messages in this capture buffer are stored and can be viewed on the **LCD** or printed via the serial Data port.

NOTE:

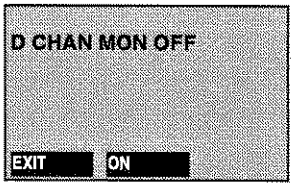
Messages in the capture buffer are separate from those in the storage buffer. However, pressing the STORE soft key on the D Chan Capture menu erases what was in the storage buffer, replacing the data with what is in the capture buffer when the key is pressed.

Pressing the **Scroll Menu** keypad button at this time will result in the following display:



This menu is used to select which elements of the message to display on the screen. If Message Decode is OFF, then the message displayed will be a brief, summary message; however, if ON, the full, expanded message will be displayed. If HEX is OFF, hex data will not be displayed.

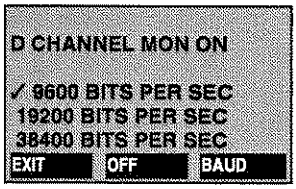
Press **Scroll Menu** and the following screen will be displayed:



Monitoring of D channel packet data in both directions is available with remote equipment via the **DATA** DB9/RS-232 connector on the panel (when optioned).

To enable the RS-232 D packet data monitor function (Default is 9600,8,N,1), press the **ON** soft key.

This will start the output of the received messages to the **DATA** port. The following menu will result:



Select the **BAUD** soft key to change the baud rate for the output of the D-channel monitor. The selections are 38400, 19200, and 9600, which is the default value.

U-Mon operation

(1, 2)

After completing **Setup**, gain access to the line.

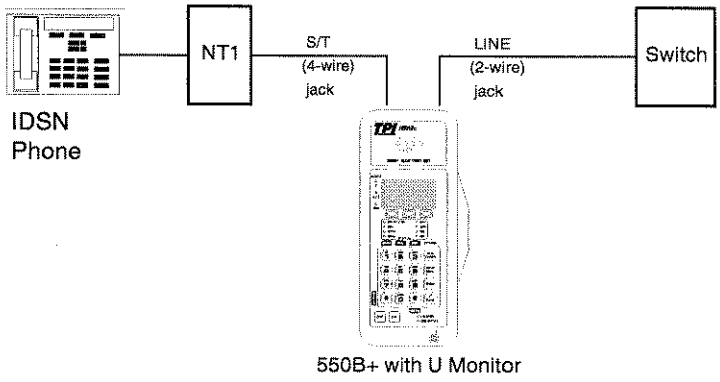
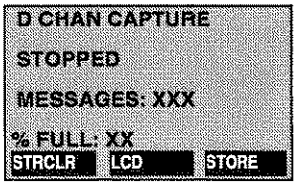


Figure 14 — *U Monitor connection*

Enter the **Utility** menu and select the **DATA** soft key. Press **Scroll Menu** until the D CHAN CAPTURE menu is displayed:



This menu reports the status of the D Channel Capture feature: running or stopped, how many messages captured, how full the 4k buffer is.

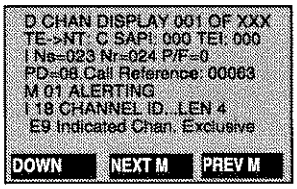
Press the **STRCLR** soft key to clear the messages and start the capture from that moment.

If desired, pressing the **LCD** soft key to view captured messages.

NOTE:

Selecting LCD freezes the message capture at that moment.

The first message, `001 of XXX`, will appear on the screen in decoded form. The display will look like:

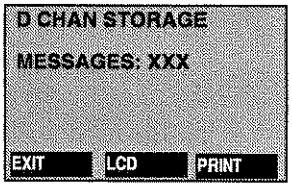


The display will show up to six lines of a single message. Pressing the **DOWN** soft key will scroll through a long message (a setup message, for example).

Pressing the **NEXT M** or **PREV M** soft keys will scroll between messages. The message number on the

title line will show the sequential number of the captured messages. Pressing **Scroll Menu** returns to the capture status display.

Pressing **Scroll Menu** moves the display to the status of the **Stored** message buffer:



The messages in this capture buffer are stored and can be viewed on the **LCD** or dumped out the serial **Data** port.

NOTE:

Messages in the capture buffer are separate from those in the storage buffer. However, pressing the STORE soft key on the D Chan Capture menu erases what was in the storage buffer, replacing the data with what is in the capture buffer when the key is pressed.

SDSL option

The SDSL interface option is for Test Set to Test Set pre-qualification of SDSL lines.

SDSL setup

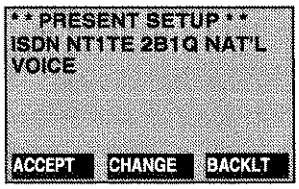
NOTE:

Complete the Setup menu selections before accessing the line.

When the unit is first turned on, it will conduct the Power On Self Test, and the following message will be momentarily displayed:

Upon successful completion of the Power On Self Test another message will be momentarily displayed, stating that the test has been passed.

The unit will then proceed to the **PRESENT SETUP** menu:



NOTE:

*The second and third lines of this display will show your previous selection, and may not be as shown in this illustration. To revert to the factory setup, turn off the unit, press and hold the asterisk (*) key and press the **ON** key.*

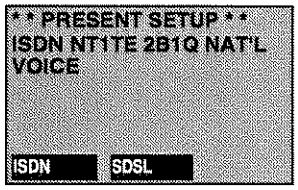
Select the appropriate soft key to either **ACCEPT** the setup shown, or enter a new setup (**CHANGE**).

The **BACKLT** soft key is used to toggle the LCD backlight On or Off.

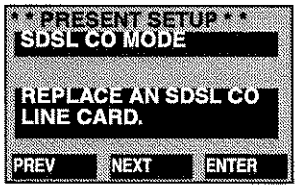
NOTE:

Battery life will be enhanced if the LCD backlight is turned off when not needed (i.e., when there is sufficient ambient light).

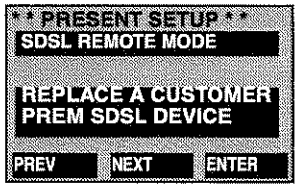
Selecting **CHANGE**, or pressing the **Scroll Menu** keypad button, will display the following menu:



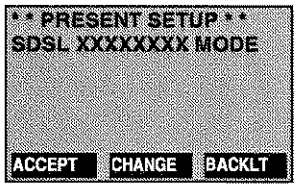
Mode of Operation: To operate in SDSL mode, select the **SDSL** soft key, and the following screen will be displayed:



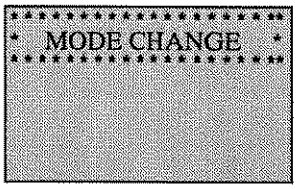
To accept the Central Office mode, select the **ENTER** soft key. To change to Remote mode, select the **PREV** or **NEXT** soft key. The following screen will be displayed.



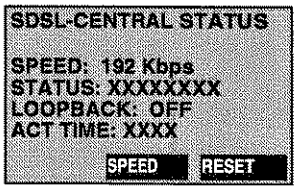
To accept this setup, select the **ENTER** soft key. This will result in the following screen:



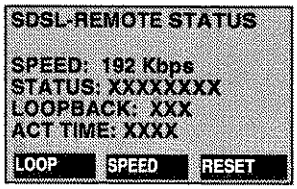
Select the **ACCEPT** soft key if this is the mode you wish to operate in. This will temporarily display the following screen before returning to the "PRESENT SETUP" screen.



Selecting **ACCEPT** will display the hook screen. In Central Office mode, this screen will be the following:



In Remote mode, the hook screen will be the following:



Selecting the **LOOP** soft key will cause the LpBk LCD to light and will turn the LOOPBACK function on.

NOTE:

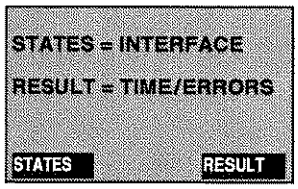
*Selecting the **SPEED** soft key in either mode will allow the rate to be changed. The default is 192 Kbps.*

SDSL menus

In the SDSL mode, the **Auto** and **Store** function keys are not valid.

STATUS

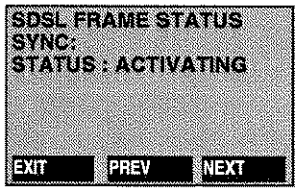
In Central Office mode pressing **1/STATUS** on the keypad will result in the following menu:



Moving from screen to screen can be accomplished by pressing the soft key corresponding to the choices of **STATES**, **REMOTE**, or **RESULT**.

STATES submenu

Selection of **STATES** from the **Status** menu will result in the following screen:

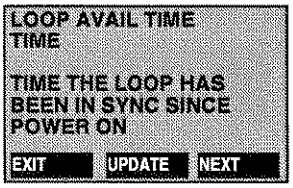


This menu indicates sync and active status.

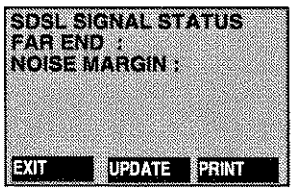
NOTE:

Moving from screen to screen is accomplished by either pressing the Scroll Menu key or the soft key corresponding to EXIT, PREV or NEXT. Menus may vary depending on the mode of operation.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button shows the following screen:

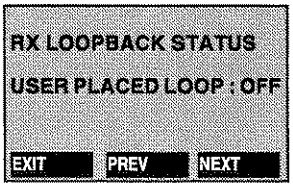


Selection of the **NEXT** soft key or the **Scroll Menu** keypad button shows the following screen:



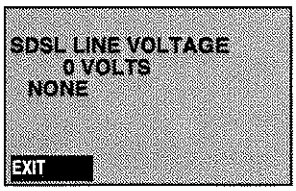
To update or print these results, select the soft key corresponding to that function.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button shows the following screen:



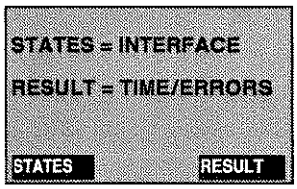
This menu provides status information for loopback commands that have been received from the network. If any of the indicated loopbacks are activated, the **LpBk** LED will light.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button shows the following screen:



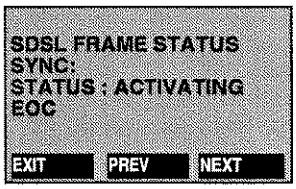
To exit the **STATES** menu and return to the Hook screen, select the **EXIT** soft key.

In Remote mode pressing **1/STATUS** on the keypad will result in the following menu:



Moving from screen to screen can be accomplished by pressing the soft key corresponding to the choices of **STATES** or **RESULT**.

STATES submenu Selection of **STATES** from the **Status** menu will result in the following screen:

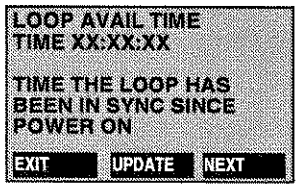


This menu indicates sync and active status.

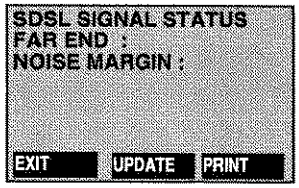
NOTE:

Moving from screen to screen is accomplished by either pressing the Scroll Menu key or the soft key corresponding to EXIT, PREV or NEXT. Menus may vary depending on the mode of operation.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button shows the following screen:

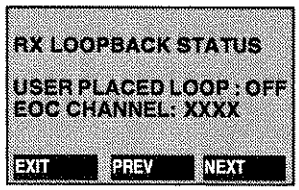


Selection of the **NEXT** soft key or the **Scroll Menu** keypad button shows the following screen:



To update or print these results, select the soft key corresponding to that function.

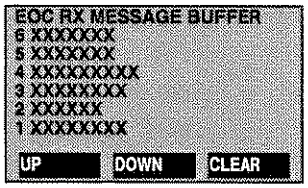
Selection of the **NEXT** soft key or the **Scroll Menu** keypad button shows the following screen:



This menu provides status information for loopback commands that have been received from the network.

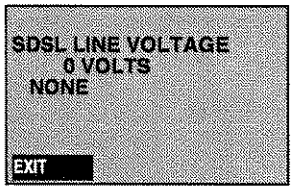
If any of the indicated loopbacks are activated, the **LpBk** LED will light.

Selection of the **NEXT** soft key or the **Scroll Menu** keypad button shows the following screen:



This screen lists the last 20 stored messages. Other messages can be displayed with the **UP** and **DOWN** soft keys.These messages are stored as long as the unit is in use, and are not stored on Power Down.

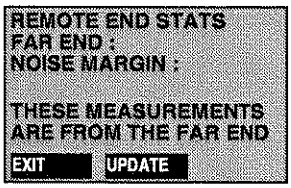
Selection of the **NEXT** soft key or the **Scroll Menu** keypad button shows the following screen:



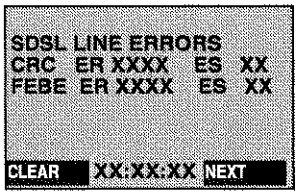
To exit the **STATES** menu and return to the Hook screen, select the **EXIT** soft key.

Remote submenu

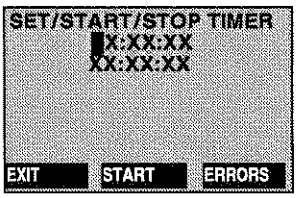
Selecting the **REMOTE** soft key from the **Status** menu screen (in CO mode only) results in the following screen:



Results submenu Selecting the **RESULTS** soft key from the **Status** menu screen in either mode results in the following screen:



Selecting the **NEXT** soft key or pressing the **Scroll Menu** button displays the following screen:



Use this screen to set the testing timers. The first line is the time selected. The second line is the descending counter. Enter the time desired using the keypad in HH:MM format. When ready to begin timed testing, press the soft key below **START** on this menu.

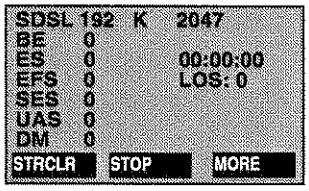
To display errors occurring and time left in the test, press the soft key below **ERRORS**.

NOTE:

Timed tests will freeze the error counters after the time has expired.

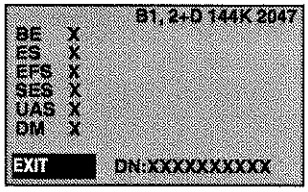
To exit the **Results** menu, press any keypad selection, or press the **EXIT** soft key.

BERT f you select item **3/BERT** on the keypad, the following menu will result:

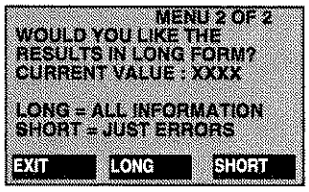


Selection of the **MORE** soft key will result in the following screen:

Selecting the **VIEW** soft key will display the test results on screen before printing. The screen format is as follows:



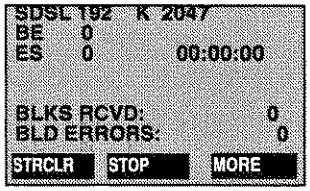
Pressing the **Scroll Menu** button will result in the following menu:



Choose between long and short formats for the printed results by using the **LONG** and **SHORT** soft keys.

Selecting **STORE** will store the current test results in the first available location, shifting out the oldest test results. A total of 10 test results can be stored. Selecting the **EXIT** soft key will return to the main BERT screen.

Selecting the **Scroll Menu** key from the main BERT menu will display the following screen. (A Block = 2,000 Bits).



Testing will begin when you depress the **STRCLR** (start and clear) soft key. Bit Errors and Errored Seconds will be displayed.

NOTE:

It is normal to get a burst of errors when a test is first started. Select STRCLR again to clear the errors.

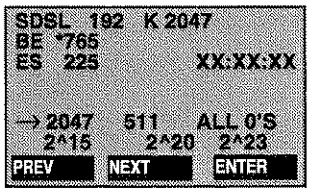
The **6ERROR** soft key may be used to insert 6 bit errors into the transmitted data.

NOTE:

Please note that when 6 bit errors are inserted into the transmitted data, they may or may not fall within the same errored second. The use of the 6ERROR soft key might result in two errored seconds.

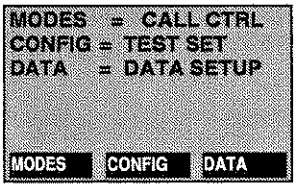
Testing will terminate when you select the **STOP** soft key. Going On Hook will also stop the BERT test.

Pressing the **Scroll Menu** key will display the following screen:

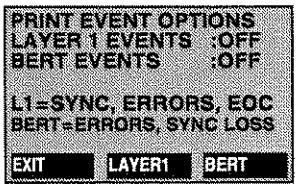


Select the **PREV** or **NEXT** soft key to move among the selections. The cursor (→) indicates the currently selected pattern. Select **ENTER** to accept the highlighted pattern and return to the Start/Stop menu.

UTILITY Pressing **#/UTILITY** on the keypad will result in the following menu, which allows various utility functions to be performed:



MODES submenu Selecting **MODES** from the **Utility** menu will result in the following display:

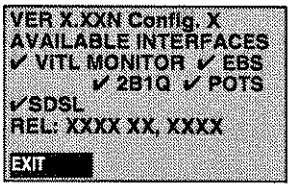


This options allows the unit to help track times and events through the serial port for long term testing and to help troubleshoot chronic problems. The two options can be enabled independently or together by using the **LAYER1** and **BERT** soft keys.

This is the only menu available under the **MODES** submenu in both Remote and Central office modes.

Config submenu

Pressing the **CONFIG** soft key from the **Utility** menu will result in the following screen, showing the firmware revision, and available interfaces:



The check mark (✔) will indicate which interfaces are installed. An "N" after the firmware version number indicates National call control is installed.

Pressing **Scroll Menu** (in Central Office mode only) will display the "EOC MESSAGE" screen, shown below. This screen can be used to send a 2B+D loopback message to a test set, customer equipment, or BRITE card. The returned EOC message should be displayed in the CPE>CO message status area to confirm the loopback.

This menu allows selection of the address (0-7), and allows messages to be sent. The check marks (✔) indicate the last setting. The message may be one of the following:

RETURN TO NORMAL

2B+D LOOPBACK

B1 LOOPBACK

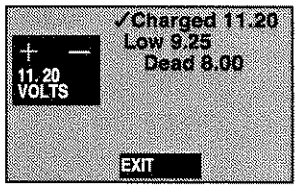
B2 LOOPBACK

REQ CORRUPTED CRC

NOTIFY CORRUPT CRC

Press **SEND** to send the message.

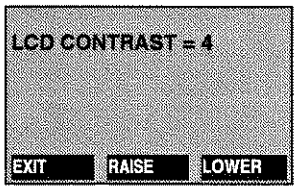
Pressing the **Scroll Menu** keypad button at this time will result in the following screen:



The three numbers on the right screen serve as a guideline in determining the battery charge status. The actual battery voltage appears inside the picture of the battery, on the left side of the screen.

The check mark indicates the status of the internal battery as determined by the voltage compared to the guidelines. In this case, the battery is charged.

Pressing the **Scroll Menu** keypad button at this time will result in the following screen:



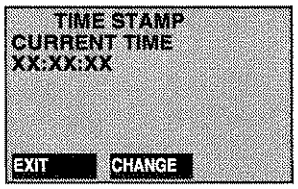
You can change the LCD screen contrast by pressing the **RAISE** and **LOWER** soft keys, to optimize the display's readability for your current lighting conditions.

NOTE:

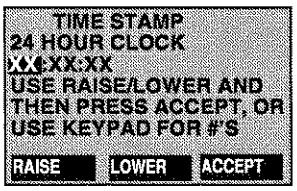
The contrast needed will depend on your current lighting conditions. Four is the default.

The Time Set menu allows the current time and day of the week to be set for accurate test printouts. The time will reset to zero when you change modes or when the

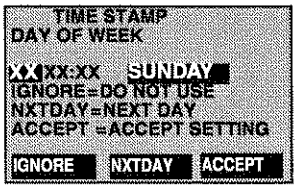
unit is powered down. Pressing **Scroll Menu** will display the following screen:



Selecting the **CHANGE** soft key will result in the following screen:

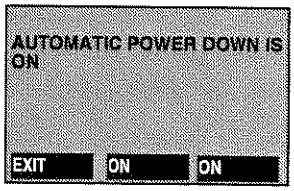


Use the soft keys to change the time values, or simply use the numbers on the keypad. Once the correct time has been entered, select the **ACCEPT** soft key. This will result in the following screen:

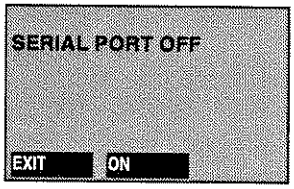


Use the **NXTDAY** soft key until the current day of the week is set. **IGNORE** will prevent the day of the week from being used in D CHANNEL or PRINT EVENT time stamping. When the display shows the correct day of the week, select the **ACCEPT** soft key.

Press **Scroll Menu** and the following screen will be displayed:



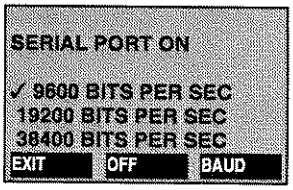
Data submenu Selecting the DATA soft key from the Utility menu will display the following screen:



Monitoring of D channel packet data in both directions is available with remote equipment via the **DATA** DB9/RS-232 connector on the panel (when optioned).

To enable the RS-232 D packet data monitor function (Default is 9600,8,N,1), press the **ON** soft key.

This will start the output of the received messages to the **DATA** serial port. The following menu will result:



Select the BAUD soft key to change the baud rate for the output of the D-channel monitor. The selections are 38400, 19200, and 9600, which is the default value.

SDSL operation

The 550B+ Test Set in SDSL mode can be used at the customer premise in conjunction with another 550B+ in SDSL mode at the central office to pre-qualify an SDSL line.

The following procedures are recommended for pre-qualification:

1 Gain access to the SDSL line under test using the U (2 wire) interface jack on both units.



(1, 2)

2 Setup both units for the line under test.

- The customer premise 550B+ should be in **REMOTE** mode.
- The central office 550B+ should be in **CO** mode.
- The **Sync** and **Active** LEDs should light.

NOTE:

Both units must be manually set to the same speed from the Hook screen.

3 The SDSL line can be tested in either a straightaway fashion, or by using the central office 550B+ to configure a loopback in the remote 550B+ and BERT to that loopback.

LOOPBACK FROM THE CENTRAL OFFICE:

1 On the central office 550B+, press the **Utility** key, then the **CONFIG** soft key.

2 Press **Scroll Menu**. The "`HTU-R (CPE)`" menu is displayed.

3 Press the **MESSAG** soft key until "`LOOP BACK ALL`" is displayed. Press the **SEND** soft key.

4 Press the **2nd Func.** key, then the **BERT** key.

5 Press the **Scroll Menu** key twice to choose the test pattern, then select the **ENTER** soft key.

6 Testing will begin when you press the **STRCLR** soft key.

7 Press the **STRCLR** soft key again to clear any errors. The Bit Errors (BE) and Errored Seconds (ES) should stop counting.

8 Run the test for the desired turn-up time and monitor the results for acceptable error performance.

9 Testing will terminate when you press the **STOP** soft key.

Total Reach DDS option

Total Reach DDS capability has been added as an option to the TPI 550B+ ISDN Test Set. This feature allows testing of the Total Reach span of a DDS circuit with the TPI 550B+ acting as the TR DDS Remote Unit.

Select **TR DDS** in Setup and **ACCEPT**.

NOTE:

TR DDS circuits may take as long as 90 seconds to achieve sync.

The screen that follows reports the RATE (subscriber data rate), dB LOSS (quality of the signal), PRI, SEC, (status of primary and secondary channels), LOOPS (loopback status), and SPAN POWR (condition of the voltage source that is powering the Total Reach circuit).

The **Status/States** menu reports DDS line voltage and polarity and the **Status/Result** menu reports CRC and FEBE errors and errored seconds.

BERT testing can also be done on the DDS line using the **BERT** menu (key 3).

The following LED's are applicable in TR DDS mode:

SEAL CUR/PS1: same function as in U interface mode

SYNC: Total Reach interface is synced and active.

ERROR: lights when FEBE or CRC errors are reported.

NOTE:

The above enhancements are standard in the 550B+ Total Reach DDS option. Adding Total Reach ISDN to existing units requires a factory hardware upgrade.

Total Reach ISDN option

Total Reach ISDN capability has been added as an option to the TPI 550B+ ISDN Test Set. This allows testing of the Total Reach span of an ISDN circuit with the TPI 550B+ acting as the TRISDN Remote Unit, NT1, and Terminal Equipment.

Span power, receive signal loss, and received EOC messages are reported in the **Status/States** menu. CRC and FEBE errors and errored seconds are reported in the **Status/Results** menu.

The TPI 550B+ is able to perform all tests and measurements normally accomplished in 2B1Q NT1TE mode (e.g., placing/receiving one or two calls, running BER tests, etc.).

NOTE:

The above enhancements are standard in the 550B+ Total Reach ISDN option. Adding Total Reach DDS to existing units requires a factory hardware upgrade.

Chapter 6

Customer Services

This chapter describes the customer services available through Acterna, formerly TTC and WWG. Topics discussed in this chapter include the following:

About our services

Acterna offers unmatched services to support purchased equipment, including a wide range of customer care, technical support, instrument maintenance, and training services. Acterna customer service specialists are fully trained to help customers find the answers they are looking for. Call Customer Services for the following:

- Information on products and services, including upgrades, calibration, training, software enhancement agreements (SEAs), and product maintenance agreements. Our representatives can also provide assistance with product returns and repairs.
- Expert technical support, including help with product configuration, circuit qualification, and complete network trouble sectionalization. Acterna is also available on a contractual basis to provide customized application development, network consulting and management services, software customization, and test procedure development.

All Acterna products are backed by an industry-leading warranty that guarantees mainframe repair or replacement for 3 years and all other parts for 1 year.

Customer service locations

For questions regarding Acterna products and services, including return authorizations and repairs, technical support, training, and all other available services, contact your local distributor or Acterna Customer Service.

Instrument services

To maintain your organization's long-term investment, Acterna will structure a service plan to fit your network performance goals and budget. Acterna understands the impact of equipment down time on operations and is staffed to ensure a quick turnaround. Available services include the following:

Product Repair — All equipment returned for service is tested to the same rigorous standards as newly manufactured equipment. This ensures products meet all published specifications, including any applicable product updates.

Calibration — Acterna's calibration methods are ISO 9001 approved and based on NSAI standards. Each calibration comes with a dated certificate, instrument stickers, and a data sheet, when applicable.

Factory Upgrades — Any unit returned for a hardware feature enhancement may also receive applicable product updates (depending on contract agreements) and will be thoroughly tested, ensuring peak performance of the complete feature set.

Software Enhancement Agreements — These agreements assist in keeping equipment up to date with the latest software features, by providing automatic notification of any new software enhancements and changes for Acterna products.

Product Maintenance Agreements — Yearly service and calibration maintenance agreements simplify billing and help ensure the equipment is always operating at optimum levels. Product maintenance agreements can be used to extend a

current warranty or provide protection for out-of-warranty units.

Other Pricing Options — Unless otherwise stated in a contract agreement, Acterna offers two additional pricing options for out-of-warranty repairs: time and material pricing and flat rate pricing. Under time and material pricing, customers are billed for the actual cost of the repair, making this a cost-effective method for minor repairs. Under flat rate pricing, customers pay a fixed service charge to repair unit failures (excluding damage or abuse), resulting in simplified paperwork and easier budgeting.

Product Enhancement Group

The Product Enhancement Group offers one of the broadest and most experienced resource portfolios in the communications testing industry. This team of professionals offers expertise in software development, test procedure development, and network consulting, as well as years of expert test knowledge. Support is available for all core Acterna product lines:

Network Consulting and Management — Provides services such as productivity analysis, test strategy assessment, on-site applications assistance, and specialized training.

Software Customization — Develops scripts for remote and automated testing, statistics, and emulation.

Test Procedure Development — Creates procedures for automated testing, network testing, and compliance testing.

Test systems field engineering and installation

Acterna offers a range of support services for our centralized test systems, designed around the needs of the customer's network. These services help preserve the investment over the life of the equipment. Available services include the following:

Critical Services Program — Provides technical support at any time, 7 days a week, 24 hours a day. Replacement parts are guaranteed to arrive within 48 hours of contacting Acterna.

Maintenance Contracts — Cost-effective management for networks with multiple test systems.

Out-of-Warranty Service Agreement — Covers the test system for failures after the warranty expires, including all time and material costs and return shipping costs to the customer site.

Field Engineering and Installation Service — Provides a variety of options for implementing the test system into the network, including installation, configuration, upgrades, and on-site technical support.

Technical training

By providing both experienced instructors and a hands-on atmosphere, Acterna training is designed to optimize test strategies and employee development requirements. Available services include the following:

Customized Technical Training — Designed to incorporate real-life challenges technicians face daily, while addressing the customer's training

requirements, Acterna provides training at the customer's designated site, so the whole staff is trained at one time. Step-by-step reviews of current technologies and products enable new or experienced technicians to translate theory into practical, hands-on expertise.

Public Courses — Regularly scheduled, in-depth, hands-on product and technology courses are offered worldwide. Public courses provide a learning environment that allows individuals from different companies to share their knowledge and experience with their peers.

Computer-Based Training (CBT) — Acterna's CBT complements our hands-on technical training. With CBT, customers can learn about emerging communications technologies at their own convenience — at work, at home, or while traveling. Acterna's CBT courses cover technology topics such as ATM, frame relay, ISDN, LAN basics, and more.

Customized Multimedia Course Development — Multimedia courseware can be created to customer specifications, making it easier to learn new test instruments or applications. These custom packages provide consistent educational content and training for the entire staff. Students learn at their own pace on their own PC.

Consulting and Needs Analysis Services — Acterna can help identify training needs and develop customized training curricula to maximize learning opportunities, all while providing a measurable return on investment.

Warranty information

The warranties described herein shall apply to all commercially available Acterna products. Any additional or different warranties shall apply only if agreed to by Acterna in writing. These warranties are not transferable without the express written consent of Acterna.

Hardware Warranty — Acterna warrants that Hardware Product sold to customer shall, under normal use and service, be free from defects in materials and workmanship. The warranty period shall be three (3) years for mainframes and options (parts and labor), and (1) one year for accessories and field-replaceable batteries. If installation services have been ordered, the warranty period shall begin on the earlier of (1) completion of installation, or (2) thirty (30) days after shipment to Customer. If Installation Services have not been ordered, the warranty period shall begin upon shipment to Customer. Hereafter these periods of time shall be collectively referred to as the "Initial Warranty Period."

Acterna's obligation and customer's sole remedy under this Hardware Warranty is limited to the repair or replacement, at Acterna's option, of the defective product. Acterna shall have no obligation to remedy any such defect if it can be shown: (a) that the Product was altered, repaired, or reworked by any party other than Acterna without Acterna's written consent; (b) that such defects were the result of customer's improper storage, mishandling, abuse, or misuse of Product; (c) that such defects were the result of customer's use of Product in conjunction with equipment electronically or mechanically incompatible or of

an inferior quality; or (d) that the defect was the result of damage by fire, explosion, power failure, or any act of nature.

Acterna warrants that Products returned to Acterna for repair shall be warranted from defective materials and workmanship for one (1) year for the same repair issue, and ninety (90) days for a different repair issue from date of shipment from Acterna to customer, or until the end of the Initial Warranty Period, whichever is longer. Risk of loss or damage to Product returned to Acterna for repair or replacement shall be borne by customer until delivery to Acterna. Upon delivery of such product, Acterna shall assume the risk of loss or damage until that time that the product being repaired or replaced is returned and delivered to customer. Customer shall pay all transportation costs for equipment or software shipped to Acterna for repair or replacement. Acterna shall pay all transportation costs associated with returning repaired or replaced product to customer.

Software Warranty — Acterna warrants that Software Products licensed to Customer shall, under normal use and service, and for a period of ninety (90) days from the date of shipment of the Software to Licensee (the "Warranty Period"), perform in all material respects in accordance with the published specifications for such Software as established by Acterna. However, Acterna does not warrant that the Software will operate uninterrupted or error free, operate in the combination with other software, meet Customer's requirements, or that its use will be uninterrupted.

Acterna's obligation and Customer's sole and exclusive remedy under this Software Warranty is limited to, at Acterna's option, either (i) correcting

the material errors reported to Acterna in writing by Customer during the Warranty Period and which Acterna is able to reproduce, (ii) replacing such defective Software, provided that Acterna received written notice of such defect within the Warranty Period, or (iii) provided that Acterna received written notice of such defect within the Warranty Period, terminating the License and, upon return to Acterna of the Software, Documentation and all other materials provided by Acterna under the applicable License, providing Customer with a refund of all charges paid with respect thereto. Acterna shall have no warranty obligations hereunder if (a) the Software is altered or modified or is merged with other software by Customer or any third party or (b) all or any part of the Software is installed on any computer equipment other than the Designated Server or used with any operating system for which the Software is not designed.

Services Warranty — Acterna warrants that the Services provided by Acterna, if any, shall be performed promptly, diligently and in a professional manner in accordance with the commercial standards of the industry. Acterna shall not, however, be responsible for any delays that are not due to Acterna's fault or negligence or that could not have reasonably been foreseen or provided against.

WARRANTY DISCLAIMER — FOR HARDWARE, SOFTWARE, AND/OR SERVICES FURNISHED BY ACTERNA, THE FOREGOING WARRANTEES ARE IN LIEU OF ALL OTHER WARRANTEES AND CONDITIONS, EXPRESS OR IMPLIED. ACTERNA SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, ON ANY HARDWARE, SOFTWARE, DOCUMENTATION OR SERVICES INCLUDING

BUT NOT LIMITED TO WARRANTIES RELATING TO QUALITY, PERFORMANCE, NONINFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AS WELL AS THOSE ARISING FROM ANY COURSE OF DEALING, USAGE OR TRADE PRACTICE. UNDER NO CIRCUMSTANCES WILL ACTERNA BE LIABLE FOR ANY INDIRECT OR CONSEQUENTIAL DAMAGES RELATED TO BREACH OF THIS WARRANTY.

Equipment return instructions

For each piece of equipment returned for repair, attach a tag that includes the following information:

- Owner's name, address, and telephone number.
- The serial number, product type, and model.
- Warranty status. (If you are unsure of the warranty status of your instrument, contact Acterna Customer Service.)
- A detailed description of the problem or service requested.
- The name and telephone number of the person to contact regarding questions about the repair.
- The return authorization (RA) number (US customers), or reference number (European customers).

If possible, return the equipment using the original shipping container and material. If the original container is not available, the unit should be carefully packed so that it will not be damaged in transit; when needed, appropriate packing materials can be obtained by contacting Acterna Customer Services. Acterna is not liable for any damage that may occur during shipping. The customer should clearly mark the Acterna-issued RA or reference number on the outside of the package and ship it prepaid and insured to Acterna.

Appendix **A**

Cables and Accessories

This chapter provides an overview of the available cables, accessories, and features of the TPI 550B+ ISDN Test Set. Topics include the following:

Cables and accessories

The TPI 550B+ ISDN Test Set comes equipped with the following cables and accessories.

Table 28 — *Standard Accessories of the 550B+*

Model Number	Part Number	Description
550B+ (1A)	835835	8-Pin Mod to 6-Pin Mod Cable
550B+ (2)	834005	8-Pin Mod to Mod Cable
550B+ (3L)	836175	8-Pin Mod to 2-Clips Cable
550B+ (4)	851555	Battery Charger/A/C Adapter

Optional features

The TPI 550B+ Test Set has several ***options*** which may be ordered as well.

Table 29 — *Optional Features of the 550B+*

Model Number	Part Number	Description
550B+ (UMon)	836716	U-Monitor Interface[S6]
550B+ (16)		RS-232 [S6] (Allows output to a laptop or printer via the data port for D-Channel message decodes or test results; on-screen D-Channel message decodes; and ViTL support)
550B+ (23)	836574	EBS/POTS Interface (not available with U-Monitor configuration)
550B+ (TR-DDS)	836951	Total Reach-DDS Interface
550B+ (TR-ISDN)	836730	Total Reach-ISDN Interface

Table 29 — *Optional Features of the 550B+*

Model Number	Part Number	Description
550B+ (ViTL)	vitl	Virtual Test Link Software (PC-based software program that enables the user to control the TPI 550B+ from the PC screen.)
550B+ (F/W)	550B+FW	3 yr. Firmware Enhancement Agreement
550B+ (UPG1)		Large Screen LCD Upgrade (Replaces 4-line LCD with current standard 8-line LCD)
550B+ (UPG2)		U-Monitor Upgrade (with 8-line LCD upgrade)
550B+ (UPG3)		U-Monitor Upgrade (without 8-line LDC upgrade)

Table 30 — *Optional Accessories of the 550B+*

Model Number	Part Number	Description
550B+ (1A)	835835	Replacement Cable (8-Pin Mod to 6-Pin Mod)
550B+ (2)	834005	Replacement Cable (8-Pin Mod to Mod)
550B+ (3)	834008	8-Pin Mod to 4-Clips Cable
550B+ (3L)	836175	Replacement cable (8-Pin Mod to 2-Clips)
550B+ (3HD)	834008	8-Pin Mod to 4-Clips Cable (heavy duty)

Table 30 — *Optional Accessories of the 550B+*

Model Number	Part Number	Description
550B+ (4)	851555	Replacement Battery Charger/AC Adapter (12vDC, 400 mA)
550B+ (6)	834045	8-Pin Mod to Heat Coil Connector Cable
550B+ (7)	837191	Softpack Carry Case
550B+ (8)	835090	Handset
550B+ (10)	836593	Replacement Battery Pack
550B+ (17)	835075	8-Pin Mod to Bantam Cable
550B+ (18)	835080	8-Pin Mod to Twin Bantams Cable
550B+ (UPD)		Firmware Update

Appendix **B**

Quick Reference

This chapter provides a quick reference of application functions. Topics discussed in this chapter include:

How to make a voice call

NOTE:

Complete the SETUP menu selections including the correct mode, line code, call control, SPID, directory number, and TEI before accessing the line under test.

ISDN switches may take up to a minute to initialize when access is gained and/or when a mode change takes place. If the Hook On/Off key is pressed during this initialization period, a `WAITING FOR RESPONSE` *message may be displayed.*

1. GO OFF HOOK by pressing the **Hook On/Off** keypad button (will hear dial tone).
2. ENTER THE NUMBER_using the keypad (LCD screen will display number entered and channel selected).
3. CONVERSATION may now take place using the Hands Free feature (an external handset may also be connected).
4. TO END a Voice Call, go on hook by pressing the **Hook On/Off** keypad button.

Voice call troubleshooting tips

1 The SPID must be entered and sent to the switch prior to going off hook (use **Setup** key, then **SEND** soft key from the SPID screen).

2 TEI assignment must have been made before a dial tone can be heard. (Check for the **Ready** LED or use the **Status/States** menu to verify Layer 2 state).

- If TEI is assigned, message on second line of LCD=`MULT FRAME EST`
- If TEI is not assigned, message on second line of LCD=`TEI UNASSIGNED`

  The TEI is assigned under the **Utility/DATA** menu.

3 If dial tone has not been gained, a cause message will be displayed on the LCD. For more information, the **Status** menu can be accessed to view the cause info, which will give a diagnostic cause message.

4 If set-up needs to be checked, press the **Setup** keypad button, which will prompt the operator to answer several setup related questions that will configure the TPI 550B+ to the circuit and switch being accessed.

How to make a data call

NOTE:

Complete the SETUP menu selections including the correct mode, line code, call control, SPID, and directory number before accessing the line under test.

ISDN switches may take up to a minute to initialize when access is gained and/or when a mode change takes place. If the ***Hook On/Off*** *key is pressed during this initialization period, a* `WAITING FOR RESPONSE` *message may be displayed.*

1. In Setup, select **DATA56** or **DATA64**. (Subrate Data, available under **Utility/DATA** menu)
2. A Circuit Switched Data Call may now be placed, just like a voice call.

- A - GO OFF HOOK, by pressing the **Hook On/Off** keypad button (may hear dial tone).
- B - ENTER THE NUMBER, using keypad (LCD screen will display number entered and channel selected).
- C - BERT testing may now take place.

3. TO END a Data Call, go on hook by pressing the **Hook On/Off** keypad button.

Data call troubleshooting tips

1. It is best to verify that a voice call can be made successfully, prior to attempting a data call.
2. The SPID must be entered and sent to the switch prior to going off hook (use **Setup** key, then **SEND** soft key from the SPID screen).
3. TEI assignment must have been made before going off hook. (Check for the **Ready** LED or use the **Status/States** menu to verify Layer 2 state).

- If TEI is assigned, message on second line of LCD=`MULT FRAME EST`
- If TEI is not assigned, message on second line=`TEI UNASSIGNED`.

The TEI is assigned under the **Utility/DATA** menu.

4. If dial tone has not been gained, a cause message will be displayed on the LCD. For more information, the **Status** menu can be accessed to view the cause info, which will give a diagnostic cause message.
5. If set-up needs to be checked, press the **Setup** keypad button, which will prompt the operator to answer several setup related questions that will configure the TPI 550B+ to the circuit and switch being accessed.

How to make a dual B channel call

NOTE:

Complete the SETUP menu selections including the correct mode, line code, call control, SPID, and directory number before accessing the line under test.

Complete the selections for dual call, second SPID, and second directory number before accessing CALL2.

ISDN switches may take up to a minute to initialize when access is gained and/or when a mode change takes place.

1. Use the **Setup** key to configure the test set for the line under test.
2. Press the **Utility** key and select the **MODES** soft key. Use the **Scroll Menu** key to move to the DUAL CALL screen. The TPI 550B+ defaults to OFF. Select **ON**.
3. Enter SPID #2, if necessary, followed by the **SEND** soft key. Press **Scroll Menu** to the DN#2 screen. Enter DN#2, if needed, and press **ENTER**.
4. Press **Scroll Menu** to the CALL YOURSELF LOOP AND BERT screen.

- If **YES** is selected, **Scroll Menu** to enter centrex prefix, if needed. Press **TEST** and the Model 550B+ will automatically dial the number, loopback, and enter BERT. Proceed to step 8.
- If **NO** is selected, select the **EXIT** soft key to move to the HOOK screen.

5. Calls may now be placed or received on either B-Channel.
6. Pressing Scroll Menu moves back and forth between the CALL1 and CALL2 **HOOK** screens.

7 Bit Error Testing can be initiated over either of the B-Channels.

8 To end a call from either CALL1 and CALL2 **HOOK** screen, press the **Hook On/Off** key to go on hook.

Dual call troubleshooting tips

1 If a second voice call is attempted and cannot be accomplished, check the **Setup**. Lines with 5ESS Custom and National call controls and Pt-to-Pt service will not allow dual voice calls.

2 Check correct SPID entry. Two required for all setups except 5ESS Pt-to-Pt custom and National ISDN. The SPID must be entered and sent to the switch prior to going off hook (use **Setup** key, then **SEND** soft key from the SPID screen).

3 TEI assignment must have been made before a dial tone can be heard. (Check for the **Ready** LED or use the **Status/States** menu to verify Layer 2 state).

- If TEI is assigned, message on second line of LCD=`MULT FRAME EST`
- If TEI is not assigned, message on second line=`TEI UNASSIGNED`.

The TEI is assigned under the **Utility/DATA** menu.

4 If dial tone has not been gained, a cause message will be displayed on the LCD. For more information, the **Status** menu can be accessed to check the cause info, which will give a diagnostic cause message.

5 If set-up needs to be checked, press the **Setup** keypad button, which will prompt the operator to answer several setup related questions that will configure the TPI 550B+ to the circuit and switch being accessed.

How to make a D-Pkt call

NOTE:

Complete the SETUP menu selections including the correct mode, line code, call control, SPID, and directory number before accessing the line under test.

ISDN switches may take up to a minute to initialize when access is gained and/or when a mode change takes place. If the Hook On/Off key is pressed during this initialization period, a `WAITING FOR RESPONSE` *message may be displayed.*

1 Press the **#/Utility** keypad button.

2 Press the **Data** soft key. The BEARER CAPABILITY sub-menu is gained. Select **PACKET** then **D PKT**.

3 Press the **Hook On/Off** keypad button (the LCD display will indicate `ENTER NO W/KEYS`).

4 Enter the number using the keypad.

5 Press the **#/Utility** keypad button to send the call (lower LCD line=`D-PACKET CONNECTED`).

6 Press the **SNDFOX** soft key to send the following message over the D-Channel `The quick brown fox jumped over the lazy dog 012.`

7 The TPI 550B+ will display any information coming to it on the LCD screen.

8 To end a D channel packet data call, go on hook by pressing **Hook On/Off**.

D-Pkt troubleshooting tips

1 It is best to verify that a voice call can be made successfully, prior to attempting a data call.

2 The SPID must be entered and sent to the switch prior to going off hook (use **Setup** key, then **SEND** soft key from the SPID screen).

3 TEI assignment must have been made before a dial tone can be heard. (Check for the **Ready** LED or use the **Status/States** menu to verify Layer 2 state).

- If TEI is assigned, message on second line of LCD=`MULT FRAME EST`
- If TEI is not assigned, message on second line=`TEI UNASSIGNED.`

The TEI is assigned under the **Utility/DATA** menu.

4 If dial tone has not been gained, a cause message will be displayed on the LCD. For more information, the **Status** menu can be accessed to view the cause info, which will give a diagnostic cause message.

5 If set-up needs to be checked, press the **Setup** keypad button, which will prompt the operator to answer several setup related questions that will configure the TPI 550B+ to the circuit and switch being accessed.

6 If the lower LCD status line doesn't indicate **READY** when the **Hook On/Off** key is pressed, the X.25 link hasn't been made. `LINKING PACKET MODE` indicates there is no packet service on this channel. `RESTARTING LINK` indicates there *is* packet service on this line but the X.25 link was not able to be reset in order to request a call or send data (TEI or LCN1 may be invalid).

7 If the lower LCD status line doesn't indicate `D-PACKET CONNECTED` when the **#/Utility** key is pressed to send the call, the call was not successful.

How to make a B-Pkt call

NOTE:

*Complete the **SETUP** menu selections including the correct mode, line code, call control, SPID, and directory number before accessing the line.*

*ISDN switches may take up to a minute to initialize when access is gained and/or when a mode change takes place. If the **Hook On/Off** key is pressed during this initialization period, a* `WAITING FOR RESPONSE` *message may be displayed.*

1. Press the **#/Utility** keypad button.
2. Press the **Data** soft key. The BEARER CAPABILITY sub-menu is displayed. Select **PACKET** - Select either **B PVC** or **B SVC**.
3. Connect the test cable to LINE or S/T jack.
4. Press the **Hook On/Off** keypad button

- If **B PVC** was selected, the LCD will display `B-PACKET CONNECTED`. Proceed to step 7.
- If **B SVC** was selected, the lower line of the LCD will indicate `ENTER NO. W/KEYS`).

5. Enter the number using the keypad.
6. Press the **#/Utility** keypad button to send the call (LCD=`B-PACKET CONNECTED`).
7. Press the **SNDFOX** soft key to send the following message over the B-Channel `01:The quick brown fox jumped over the lazy dog`. Each time **SNDFOX** is pressed, the message will be sent with the number incrementing with each press. Press **CLEAR** to clear the message.

8 The TPI 550B+ will display any information coming to it on the LCD screen.

9 To end a B channel packet data call, go on hook by pressing **Hook On/Off**.

B-Pkt troubleshooting tips

1 If the call is not successful, a cause message will be displayed on the LCD. For more information, the **Status** menu can be accessed to view the cause info, which will give a diagnostic cause message.

2 If set-up needs to be checked, press the **Setup** keypad button, which will prompt the operator to answer several setup related questions that will configure the TPI 550B+ to the circuit and switch being accessed.

3 If the upper LCD status line doesn't indicate `READY FOR CALL` when the **Hook On/Off** button is pressed, the X.25 link hasn't been made. `LINKING PACKET MODE` indicates there is no packet service on this channel. `RESTARTING LINK` indicates there is packet service on this line but the X.25 link was not able to be reset in order to request a call or send data.

4 If the LCD top status line doesn't indicate `B-PACKET CONNECTED` when the **#/Utility** keypad button is pressed to send the call, the call was not successful.

One person voice turn-up

Once the TPI 550B+ has been set-up properly, the Sync and Active STATUS LED's should illuminate.

1. Go off hook - dial tone should be heard [if not, check SPID].
2. The TPI 550B+ defaults to voice service.
3. Enter the Model 560 access number.
4. The Model 560 will automatically answer and announce `Hello, TPI 560 Automated Test Line`, followed by the Service (Voice or Data), Calling Party Number (repeated), and `Hang Up for call back` to the TPI 550B+.
5. Following this message, the technician should hang up, by going **On Hook** with the TPI 550B+.
6. The Model 560 then goes off hook and places a call back to the TPI 550B+.
7. When the TPI 550B+ answers, the Model 560 will announce: `Hello, TPI 560 Automated Test Line. Entering Loopback`, then enter a loopback state on the assigned B channel, allowing the technician to use the BERT feature of the TPI 550B+ to verify the quality of the connection.
8. The Model 560 allows the user to select a time limit (via the **Utility** menu) before hanging up automatically.
9. The Model 560 is now ready for the next call.

One person circuit-switched data turn-up

The procedure for the one-person circuit-switched data turn-up is the same as for voice, except the TPI 550B+ must be configured for Circuit Switched **DATA** via the **Utility** menu, prior to connection to the line under test.

One person D-Pkt turn-up

1. Configure the TPI 550B+ for voice and verify dial tone, upon going **Off Hook**. Hang up by going **On Hook**. Use the **Utility** menu to change the bearer capability to **D PKT**.
2. Using the TPI 550B+, go **Off Hook** and the display should say `READY/ENTER NUMBER W/KEYS`. Using the TPI 550B+, enter the Model 560 access number, followed by **#**, to send the number.
3. The Model 560 will automatically answer and send the Calling Party Number back in a D-Packet message.
4. The TPI 550B+ should display **Connect D**, followed by the Calling Party Number. Using the TPI 550B+, hang up by going **On Hook**.
5. The Model 560 will go OFF HOOK and dial the TPI 550B+.
6. When the TPI 550B+ sees the D-Packet call come in, it will automatically answer.
7. The Model 560 will then send a message to the TPI 550B+ stating `TPI Automated Test Line. Entering Loopback`. Next, the Model 560 will enter into a Packet Echo mode.

8 The TPI 550B+ can now be used to send the Quick Brown Fox message by selecting the **SNDFOX** soft key. When this message reaches the Model 560, it will be sent back to the TPI 550B+ and displayed on the screen.

9 The TPI 550B+ can clear the screen [**CLEAR** soft key], and resend the message [**SNDFOX**]. If this message is received error free, the quality of the connection has been verified.

10 The TPI 560 will release the call automatically if the caller hasn't hung up after 15 minutes.

One person B-Pkt turn-up

1 Configure the TPI 550B+ for voice and verify dial tone by going Off Hook. Hang up by going On Hook. Use the Utility/ DATA menu to change the bearer capability to either B PVC or B SVC. If B SVC is selected, the procedure is the same as D-Packet. The call will be treated as a D-Packet call by the Model 560. However, if B PVC is selected via the Utility/ DATA menu, the TPI 550B+ should be connected to a B-Packet capable device.

2 Once connected, go **Off Hook**. The TPI 550B+ should display `B-PACKET CONNECTED`.

3 The TPI 550B+ can now be used to send the Fox message by selecting the **SNDFOX** soft key.

4 When this message reaches the far end device, it will be sent back to the TPI 550B+ and displayed on the screen.

5 The TPI 550B+ can clear the screen [**CLEAR** soft key], and resend the message [**SNDFOX**]. If this message is received error free, the quality of the connection has been verified.

6 The TPI 550B+ will release the call automatically if the caller hasn't hung up after 15 minutes.

Testing B channel delay

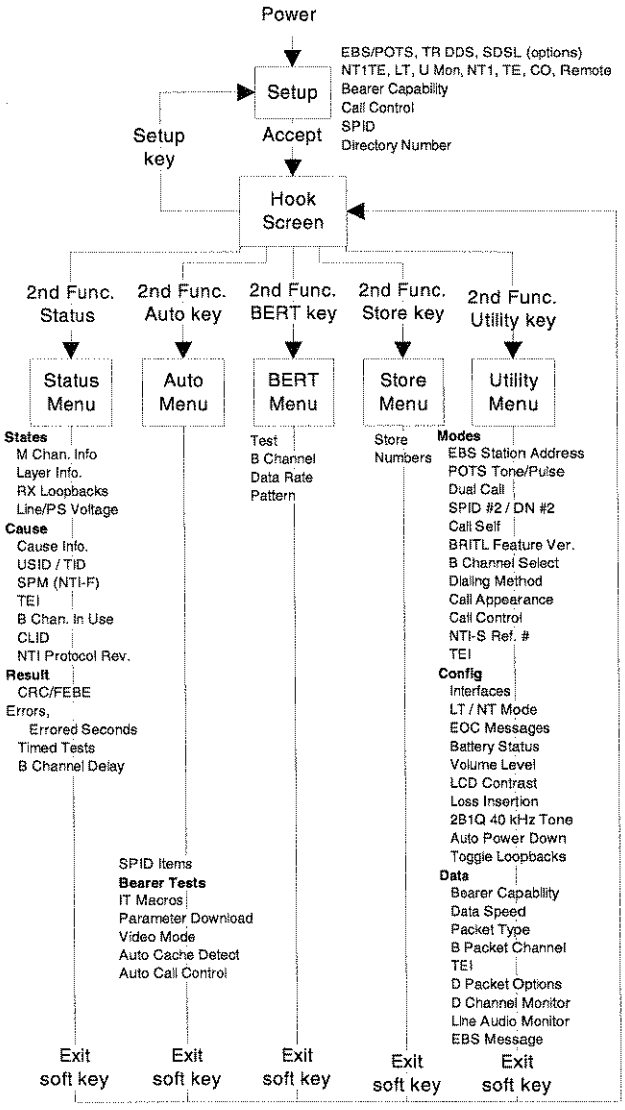
1 The B-Channel differential delay measurement is made after 2 calls are established on the TPI 550B+ (see QUICK REFERENCE - Dual B-Channel Calls). A far end loopback is placed on each B-Channel. This can be accomplished by calling another TPI 550B+ or by calling a 108 test line at the far end. The delay reported is the one-way differential delay between the two B-Channels. This delay can be compared to the maximum allowable delay for the particular CPE.

2 Select **Status** then press the **RESULTS** soft key.

This menu reports the difference in channel delay (in microseconds or milliseconds) between B1 and B2.

3 Since each call placed is routed according to resources available at the time of the call, the differential delay can vary each time a call is made. Therefore, if a problem involving a delay is suspected, this routine (placing two calls and performing this test) should be repeated several times to ensure the delays maintain an acceptable range. Typically CPE can accommodate up to 300 msec, some up to 500 msec of differential delay. Results are accurate to 125 microseconds.

Menu Tree


Power
EBS/POTS, TR DDS, SDSL (options)
NT1TE, LT, U Mon, NT1, TE, CO, Remote
Setup
Bearer Capability
Call Control
SPID
Directory Number
Setup key
Accept
Hook Screen
2nd Func. Status
2nd Func. Auto key
2nd Func. BERT key
2nd Func. Store key
2nd Func. Utility key
Status Menu
Auto Menu
BERT Menu
Store Menu
Utility Menu
States
M Chan. Info
Layer Info.
RX Loopbacks
Line/PS Voltage
Cause
Cause Info.
USID / TID
SPM (NTI-F)
TEI
B Chan. In Use
CLID
NTI Protocol Rev.
Result
CRC/FEBE
Errors,
Errored Seconds
Timed Tests
B Channel Delay
SPID Items
Bearer Tests
IT Macros
Parameter Download
Video Mode
Auto Cache Detect
Auto Call Control
Test
B Channel
Data Rate
Pattern
Store Numbers
Modes
EBS Station Address
POTS Tone/Pulse
Dual Call
SPID #2 / DN #2
Call Self
BRITL Feature Ver.
B Channel Select
Dialing Method
Call Appearance
Call Control
NTI-S Ref. #
TEI
Config
Interfaces
LT / NT Mode
EOC Messages
Battery Status
Volume Level
LCD Contrast
Loss Insertion
2B1Q 40 kHz Tone
Auto Power Down
Toggle Loopbacks
Data
Bearer Capability
Data Speed
Packet Type
B Packet Channel
TEI
D Packet Options
D Channel Monitor
Line Audio Monitor
EBS Message
Exit soft key
Exit soft key
Exit soft key
Exit soft key
Exit soft key

Appendix C

Maintenance

This chapter provides a general description of maintenance procedures for the 550B+. Topics discussed in this chapter include the following:

Maintenance

The only replaceable parts on the ISDN Test Unit are the firmware module (bottom end of unit), battery pack, and external cords. The LED indicators and displays are soldered into the unit and are not field replaceable.

If the Model 550B+ operation should become suspect, the unit may be checked for proper operation by performing a Self Test. This is done by turning the power off then on again, which will initiate a Power-Up Self Test. If this procedure does not operate successfully, contact the factory Customer Service department at 540-375-0500.

Firmware card

The Model 550B+ houses a removable firmware card, located in the bottom end of the unit. This card can be upgraded in the field. Replacement is accomplished through the following steps:

1. Turn the power off and unplug the AC Adapter, if used.
2. With a static discharge wrist strap on, remove the two screws from the firmware door on the bottom end of the unit.
3. Remove the door.

4 Gently pull out the firmware card with the pull tab, as shown below:

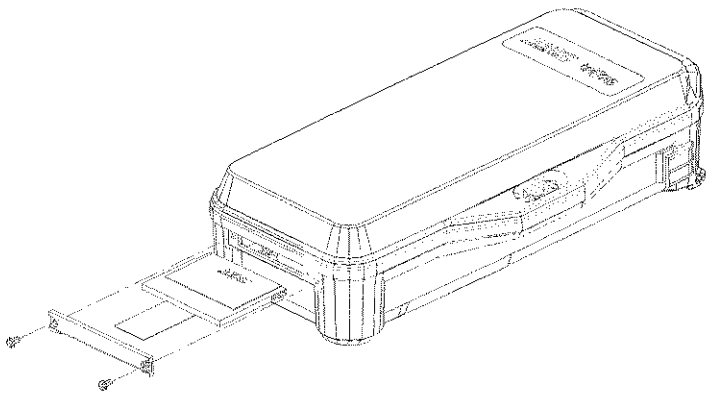


Figure 15 — *Removal of the firmware card*

1 Insert the new card and press it into place.

2 Replace the two screws in the firmware door.

3 Depress and hold the ***/Store** key when powering up the Model 550B+ until the LCD screen reports "RESTORE SYSTEM DEFAULTS" then verify that the Self Test passes.

4 Return the replaced firmware module(s) to TPI Customer Service, with the unit serial number noted.

Battery recharge


(3)

Recharge time is 12 to 14 hours (overnight). Due to battery shelf life, leaving the unit on a shelf for months at a time can drain the battery, and, over an extended length of time, may damage the battery. For proper battery maintenance, TPI recommends that the battery be recharged at least once every two (2) months.

Battery replacement

If the unit's battery fails, it can be replaced in the field, without returning the TPI 550 ISDN Test Set to TPI.


(4)

To replace the old battery:

1. Remove the four (4) screws that secure the battery compartment cover using a # 1 Phillips screwdriver.
2. Lift the battery out of the unit's battery compartment and disconnect it from the unit's wire harness by grasping each of the mating connector housings and pulling straight apart.
3. Observe that the connector is polarized and can go together only one way. Connect the new battery by grasping the mating connector housings and

pushing straight together. A slight snap should be heard, indicating the connector is fully seated.

4 Place the new battery in its compartment and adjust the wire harness to be sure that it will not be pinched when the cover is reinstalled.

5 Reinstall the battery compartment cover and replace and tighten the four (4) screws using the #1 Phillips screwdriver. Do not over-tighten.

6 Dispose of the old battery properly.

Appendix **D**

Specifications

This chapter provides an overview of the specifications of the TPI 550B+ ISDN Test Set. Topics in this chapter include the following:

Physical

LINE INTERFACES (Optional)
2B1Q - per ANSI T1.601 (1988)
EBS (P-Phone) - per Bellcore TR 73505
POTS - per Bellcore TR-TSY-000344
S/T INTERFACE (Standard) - per ANSI T1.605 (1989)

POWER
Internal NiCad Rechargeable Battery
Battery Charger/AC Adapter
Battery Recharge Time = 12 to 14 hours
Recharge at least once every 2 months

WEIGHT
2 $^1/_2$ pounds
(1.4kg)

DIMENSIONS
2 $^1/_2$" deep, 4" wide, 9 $^1/_2$" long
(7 cm D, 12.7 cm W, 25.4 cm L)

OPERATING TEMPERATURE RANGE
32°F to 122°F
(0°C to +50°C)

DATA connector
DB-9 pin connector RS-232: 9600 Baud, 8 Data Bits, No Parity, 1 Stop Bit.

HANDSET
The HANDSET jack is compatible with the optional TPI handset, part number 550B-8 (TPI 835090). Other handsets may have incompatible microphone elements.

Operational

MODES
- TE (Phone Replacement)
- NT1 (NT1 Replacement)
- NT1/TE (Phone and NT1 Replacement)

CALL CONTROLS
- 5ESS per AT&T 5D5-900-321
- NTI-S and NTI-F per NT NIS-S208
- NAT'L per Bellcore Documents for NI-1, NI-2, & NI-3

ATTENUATION
- LINE = 0-15dB, 1dB Steps
- S/T = 0-7dB, 1dB Steps
- 26 AWG Cable Simulators

WARRANTY
- 3 years

TECHNICAL SUPPORT
- Acterna = 800-638-2049, then select "3" for TPI Support
- Factory technical support is available at 540-375-0500 and local field sales support is available across the United States.

Measurements

LCD
4 x 20 Graphics Display

TEST RESULTS
2B1Q

CRC Errors & Errored Seconds
FEBE Errors & Errored Seconds

S/T

FRAME Errors & Errored Seconds
BPV Errors & Errored Seconds

P-PHONE (EBS) MEASUREMENTS
8KHz Carrier/Secondary Channel
Signal Level Range <-22 dB
+ 2 dB

Line Voltage <5V
> 65V

Resistance displayed in approximate ranges of:
>1K Ω
approx. 1K Ω
approx. 700 Ω
approx. 400 Ω
approx. 200 Ω
approx. 100 Ω
< 100 Ω

CALL STATUS
Displayed on LCD

TEST INTERVAL
1 Minute to 99 Hours

LED Indicators

STATUS

Seal Cur/PS1—If operating in NT1/TE mode, indicates that at least 2mA of **Seal**ing **Cur**rent is present on the DSL (in either polarity).

—If operating in TE mode, *green* indicates **P**ower **S**ource **1** has at least 30 volts, *red* indicates the polarity has been reversed.

Sync.—Indicates DSL is Framed (Framing Pattern).

Active—Indicates DSL is Activated (Act bit is set to network).

Ready—Indicates DSL is Ready.

Error—Indicates than an Error has been detected on the DSL.

LpBk—Indicates that the unit is in a **LoopBack** state, i.e., responded to a loop command or the user has initiated a loopback.

PS2—Indicates that **P**ower **S**ource **2** is present and over 30 volts (*green* indicates Correct Polarity/*red* indicates Reversed Polarity).

PS3—Indicates that **P**ower **S**ource **3** is present and over 30 volts (*green* indicates Correct Polarity/*red* indicates Reversed Polarity).

OFF HOOK—Indicates that the Model 550B is in a call state.

LOW BATTERY —Indicates a Battery Low condition, with a maximum of ten minutes of operating time remaining before complete shutdown.

CHARGING—Indicates the AC Adapter is plugged in.

Appendix D

Specifications

Glossary

A

AMI—Alternate Mark Inversion. A switch vendor's proprietary line code (i.e., AT&T AMI, NTI AMI).

ANI—Automatic Number Identification. Ability of the network to notify the called party of the calling party's number.

B

B-Channel—Bearer Service Channel. Operates at 64 Kbps and carries user voice and data.

BERT—Bit Error Testing

BPV—Bipolar Violation

BRI—Basic Rate Interface. One of the access methods to an ISDN circuit. Comprising of either 1B+D or 2B+D channels.

BRITL—Basic Rate Interface Dial Up Test Line. A feature of AT&T switches.

C

Cause Message—Diagnostic messages describing the "cause" of a problem.

CACH—Call Appearance/ Call Handling

CCIS—Common Channel Interoffice Signaling

CCS—Common Channel Signaling. Out of band network signaling whereby several voice trunks share a common signaling channel (i.e., SS6 and SS7).

CLASS—Custom Local Area Signaling Services. A set of services that is offered by telcos that have implemented SS7.

CODEC—Coder/Decoder. Device used to convert analog signals to digital bit streams and vice versa.

CPE—Customer Premise Equipment. Devices or equipment that the customer provides to interface with the telco.

CRC—Cyclic Redundancy Check. A mathematical algorithm used to detect bit errors in data transmission. Indicates you have received bad data.

CUG—Closed User Group. A group of packet data users designated as a specific group; one that can be reached by adding a special code to the call request packet for a packet data call.

D

D-Channel—The out of band signaling channel that carries ISDN network signals. It can also be used to carry packet-mode user data. The D-Channel operates at 16 Kbps in the BRI and 64 Kbps in the PRI.

DCE—Data Circuit-terminating Equipment

DSL—Digital Subscriber Line

DTE—Data Terminal Equipment

E

EBS—Electronic Business Set. Also known as P-Phone, this is a proprietary service provided by Northern Telecom DMS or SL switches.

EOC—Embedded Operations Channel

H

HDLC—*High-level Data Link Control*

I

IEC—Inter-Exchange Carrier. In the U.S. is a long distance telephone company (also abbreviated IC and IXC).

ISDN—Integrated Services Digital Network

ISPBX—Integrated Services Private Branch Exchange. A term describing an ISDN-compatible PBX.

IVDT—Integrated Voice/Data Terminal. An ISDN terminal that allows both voice and data communications.

L

LAPD—Link Access Procedures on the D-Channel. The ISDN data link layer protocol specified for the D-Channel.

LCGN—Logical Channel Group Number

LCN—Logical Channel Number. Used to designate the virtual channel to be used by a packet data call at the network interface.

M

M-Channel—A 4 Kbps maintenance channel for NT1-LE communication over the 2-wire BRI circuit

Modulo—Maximum number of states for a counter. Used to describe several packet-switched network parameters, such as packet number (usually set to modulo 8 - counted from 0 to 7). When the maximum count is exceeded, the counter is reset to 0.

Multi Point— Configuration that supports multiple terminal equipment devices.

N

National ISDN—A standard call control for NI-1, 2, and 3.

NT1—Network Termination type 1. The ISDN device responsible for the termination of the ISDN transmission facility at the customer premises.

NT2—Network Termination type 2. An ISDN device responsible for on premises communications distribution, such as a PBX, LAN, or Host Computer.

O

Octet—An eight (8) bit quantity; used in lieu of the term "Byte".

P

PLP—Packet Layer Protocol. The X.25 Level 3 protocol.

Point to Point—Point to point connection.

POTS—Plain Old Telephone Service

PRI—Primary Rate Interface. One of the access methods to an ISDN circuit. Comprising of 23 B-Channels and one D-Channel (23B+D).

R

Reverse Charge—A call option with a packet data call requesting a reversal of charges to the called party

RPOA—Registered Private Operating Agency. A call option in packet data calls naming a specific network within a country reachable by a specific call through the Public Packet Network.

S

SAPI—Service Access Point Identifier. A subfield in the LAPD address field which indicates the type of Level 3 service being obtained.

Sonalert—An audible "beep" signaling an incoming call.

SPID—Service Profile Identifier. A number used by Terminal Equipment to request identification from the switch on a multipoint circuit.

SPM—Service Profile Management. A service of Nortel switches that provides the user's terminal with the service parameters contained in its network profile. (from NIS S208-5, Issue 10)

SS6—Signaling System No. 6. CCITT version of CCIS, one of the first common channel signaling networks.

SS7—Signaling System No. 7. The high speed, digital common channel signaling network required for ISDN applications.

S/T Interface—The standard 4-wire (2 Rx, 2 Tx) ISDN Interface used by ISDN terminals and is the physical interface on the terminal side of a NT1.

STP—Signal Transfer Point. A SS7 switching point.

T

TE—Terminal Equipment. Any ISDN compatible device that may be placed on the network, such as a telephone, IVDT, PBX, TV, PC, etc.

TE1—Terminal Equipment type 1. ISDN compatible terminal equipment.

TE2—Terminal Equipment type 2. Non-ISDN compatible terminal equipment.

TEI—Terminal Endpoint Identifier. A subfield in the LAPD address field that identifies a given TE device on the ISDN interface.

TID—Terminal Identifier

Transport Layer—Layer 4 of OSI Reference Model. Primarily responsible for error free communication between two hosts across the subnetwork.

2B1Q—Two Binary One Quaternary. A signaling method used across the 2-wire BRI (U reference point). 2B1Q is a four level line code associating 2 bits to each line signal.

U

U Interface—The physical 2-wire echo canceling interface on the network side of a NT1.

USID—User Service Identifier.

W

Window—The number of unacknowledged packets that may be accepted before an error condition is determined.

Index