TTC/T-BERD 1000

ADSL ANALYZER

USER'S MANUAL

October 1998

TTC

Copyright ©1998 TTC®
20400 Observation Drive, Germantown, Maryland 20876
(800) 638-2049 • (301) 353-1550 (MD) • FAX (301) 353-9216
www.ttc.com

Specifications, terms, and conditions are subject to change without notice.

All trademarks and registered trademarks are the property of their respective companies.

Dear TTC Customer,

Thank you for selecting a TTC product from our extensive family of communications test solutions. We appreciate your business and look forward to a continuing relationship with you as your network grows and your networking needs change.

For more than two decades, TTC has designed, manufactured, and marketed industry-leading test products that improve our customers' network performance. TTC's mission is to develop the most technologically advanced, easy-to-use instruments, systems, and software for improved network installation and maintenance.

We stand behind our family of products. To support our products throughout the world, we provide a comprehensive program of full technical support, technology and product training, and professional services. We offer network consulting services, on-site applications assistance, software customization, test procedure development, network management services, technical product support, and much more.

Our team of professionals is ready to assist you with your new product so that it fully meets your network testing demands. Contact us today at one of the numbers found on the attached TTC Contact List or visit our Website at www.ttc.com to learn more about how we may serve you.

Thank you again for choosing a TTC product.

Sincerely,

John Peeler
President and CEO

TTC Worldwide Contacts

Organization	Contact
TTC Headquarters	20400 Observation Drive Germantown, Maryland 20876-4023 USA Toll-free: 1-800-638-2049 In Maryland: 1-301-353-1550 Fax: 1-301-353-0731 Web: www.ttc.com *Technical Assistance Center (TAC), for technical questions* Toll-free: 1-800-638-2049 Phone: 1-301-353-1560, ext. 2300/2301 Fax: 1-301-353-1239 Email: tac@ttc.com *Customer Care Center (CCC), for product repair and orders* Toll-free: 1-800-638-2049 Phone: 1-301-353-1560, ext. 2850 Fax: 1-301-353-9216 Email: isc@ttc.com (instrument repair) custserv@ttc.com (customer service) *Technical Training, for product/technology training* Toll-free: 1-800-638-2049, ext. 2131 (USA East) Phone: 1-714-680-3004, ext. 592 (USA West) Fax: 1-301-353-0731
TTC Asia Pacific Ltd.	Room 4205, Tower II, Metroplaza 223 Hing Fong Road, Kwai Chung New Territories, Hong Kong Phone: 011 852 2892 0990 Fax: 011 852 2892 0770
TTC Australia, Melbourne	41 Stamford Road Oakleigh, 3166 Victoria, Australia Phone: 011 61 3 9563 4800 Fax: 011 61 3 9563 4900

TTC Worldwide Contacts (Continued)

Organization	Contact
TTC Australia, Sydney	Suite 3, Level 12 100 Walker Street North Syndney. 2060 NSW, Australia Phone: 011 61 2 9926 1447 Fax: 011 61 2 9460 0101
TTC Benelux (Belgium)	Battelsesteenweg 455E 2800 Mechelen, Belgium Phone: 011 32 1528 7686 Fax: 011 32 1528 7687
TTC Canada, Toronto Office	234 Matheson Boulevard East Mississauga, Ontario L4Z 1X1, Canada Toll-free: 1-888-689-2165 Phone: 1-905-507-4117 or 4118 Fax: 1-905-507-4126
TTC Canada, Vancouver Office	3665 Kingsway, Unit 300 Vancouver, B.C. V5R 5W2, Canada Phone: 1-604-436-0855 Fax: 1-604-439-6714
TTC Canada, Montreal Office	TTC Canada Ltd. 4150, boul.Saint-Martin Quest Laval, (Quebec), H7T 1C1, Canada Phone: 1-450-688-6069 Fax: 1-450-688-5242
TTC China	TTC Beijing Room 402, Qing Au Building No. 27, Xiao Yun Road Chaoyang District Beijing 100027, China Phone: 011 86 10 6460 5258 Fax: 011 86 10 6460 5256

TTC Worldwide Contacts (Continued)

Organization	Contact
TTC France	Division of Dynatech Communications Batiment GAIA 9, Parc Ariane 78284 Guyancourt Cedex, France Phone: 011 33 1 30 48 83 90 or 00 Fax: 011 33 1 30 48 06 46
TTC Germany, Frankfurt Office	TTC Deutschland Max-Planck-Str. 22 61381 Friedrichsdorf, Germany Phone: 011 49 6172 5911 00 Fax: 011 49 6172 72065
TTC Germany, Munich Office	TTC Deutschland Riemer Str. 358 81829 Muenchen, Germany Phone: 011 49 89 907874 Fax: 011 49 89 907087
TTC United Kingdom	TTC (UK) Ltd. Marlborough House 3-5 Worton Drive Worton Grange Reading, Berks RG2 OTG, United Kingdom Free Phone: 800 TTC UKTAC (800 882 85822), Europe Phone: 011 44 1189 759696 Fax: 011 44 1189 227200 Email: eurotac@ttc.com

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SECTION 1 GETTING STARTED

1.1 WELCOME TO THE TTC/T-BERD 1000

The TTC 1000 (International Unit) and the T-BERD 1000 (North American Unit) are rugged, portable test instruments designed to test the Alcatel 1000 Release 3 ADSL Network and compatible DMT (Discrete Multi-Tone) systems. Hereafter, they will be referred to as TTC/T-BERD 1000 because they operate in the same manner.

With the TTC/T-BERD 1000, you can use a systematic test strategy to eliminate physical layer problems, starting at the customer premises and going through the local loop to the central office/digital loop carrier (CO/DLC). The TTC/T-BERD 1000 validates true system performance. Its capabilities enable you to isolate local loop trouble from customer premises trouble. It sectionalizes local loop physical faults and eliminates other physical layer problems before more complex and time consuming issues are encountered.

The TTC/T-BERD 1000 is designed to:

- **Systematically identify problem devices and areas on the network** — Isolates problems involving the ADSL Transceiver Unit-Remote (ATU-R) for nonsynchronization or below-par throughput in both up/downstream transmissions.

- **Sectionalize local loop problems from customer premises equipment** — Isolates problems in the CO/DLC, local loop, network interface device/POTS splitter, and CPE faults such as customer premises wiring or faulty ATU-Rs.

- **One-Step Qualification** — Provides comprehensive performance results at the touch of a button on a single screen, including upstream/downstream throughput (physical and ATM layer), line capacity, noise margin, attenuation, and output power.

- **Loop Qualification** — Qualifies local loops that are questionable by ensuring start-up and system requirements are met before installation.

- **Error Tests** — Perform Bit Error Rate Test (BERT) and CLR (Cell Loss Rate) over a variable time period.

- **Span Trouble** — Assists in identifying span problems such as wet sections, bridged taps, opens, and transmission crosstalk influencers.

1.2 MANUAL OVERVIEW

This manual is organized to help you to quickly become familiar with the TTC/T-BERD 1000 and its capabilities. This manual is divided into the following sections:

1. **GETTING STARTED** — includes welcome statement, manual overview, instrument description, and instrument checkout procedure.

2. **USING THE TTC/T-BERD 1000** — provides an explanation of the application module design, graphical user interface, and battery charging and replacement. This section also provides the instrument setup procedures for basic applications.

3. **DATA OUTPUT OPERATION** — presents information on connecting the TTC/T-BERD 1000 to a serial printer or PC to provide test setup and test results.

4. **SPECIFICATIONS** — includes the physical, environmental, and electrical specifications for the instrument.

1.3 INSTRUMENT DESCRIPTION

The TTC/T-BERD 1000 is a portable test instrument designed around a powerful architecture that tests the Alcatel 1000 Release 3 ADSL Network and compatible DMT systems.

The following information can be used as a reference during testing and as a guide to understanding the controls, indicators, and connectors of the test instrument. Figure 1-1 shows the front panel of the TTC/T-BERD 1000 and Table 1-1 follows with a description of those controls.
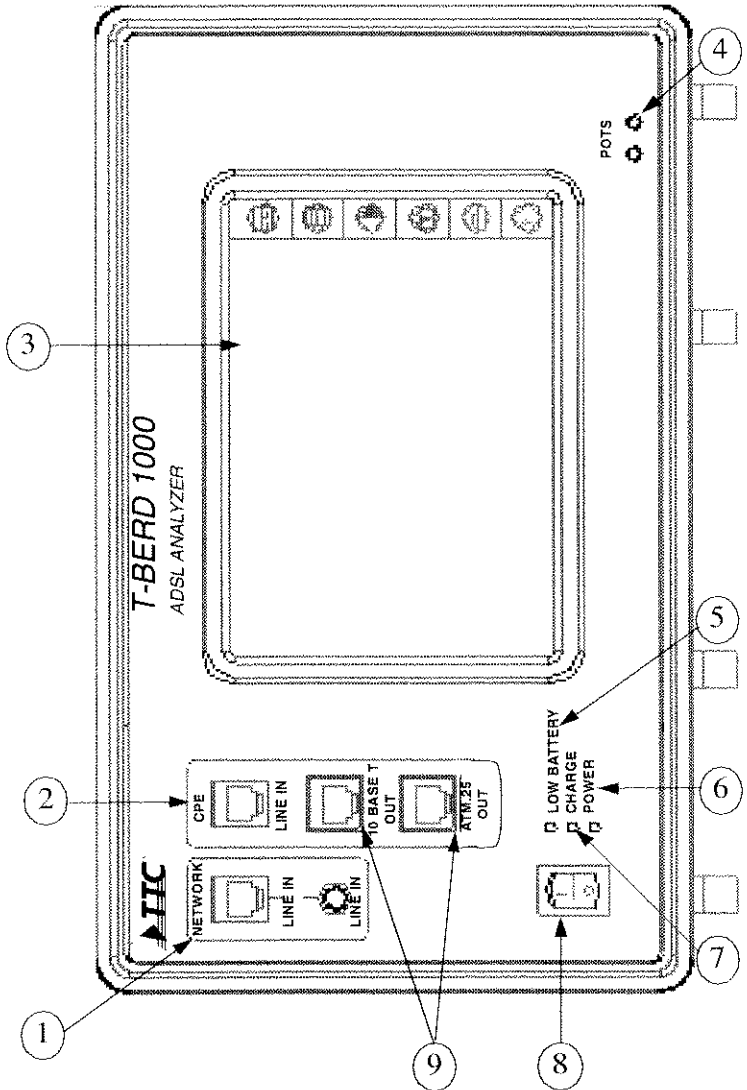
Figure 1-1. TTC/T-BERD 1000 Front Panel

Table 1-1. Front-Panel Features

#	Item	Description
1	Network Line Connectors	The Network Line Connector enables the local loop to transmit data onto the TTC/T-BERD 1000. A Bantam or RJ11 connector is used. The RJ11 Network Line Connector is used on the local loop side where the ADSL signal is on connector pins 3 and 4 in the NID (Network Interface Device [see Figure 1-2]). [1]
2	CPE Line Connector	The Customer Premises Equipment Line Connector is used to test the transmission line inside the residence. An RJ11 connector is used. The RJ11 CPE connector is used when the ADSL signal is on connector pins 2 and 5 (see Figure 1-2).[1]
3	LCD Display	The LCD displays test setups and test results. It is a 4" high x 5 1/2" long touch screen that is divided into separate areas for test configuration and test results display. Section 2 gives a detailed description of the LCD Display and how it is used.
4	POTS Output	Standard POTS Output Connector for use with a technician's telephone handset to verify dial tone.
5	Battery Low LED	Illuminates when only 25% of battery power remains. Use the AC Power Adapter to recharge the battery and continue testing.
6	Power LED	Illuminates when the unit is ON.
7	Charging LED	Illuminates when the battery is charging.
8	Power Switch	The Power toggle switch turns the test set on or off.
9	10 Base-T and ATM.25 Line Connector	The 10Base-T and the ATM.25 connectors allow pass-through testing of ADSL data that transmits to/from the customer's personal computer. It requires a RJ45 connector.

1. If other connector pins are used, specialty cables are available to satisfy these circumstances.

Network Line Connector
(Local Loop) ADSL Signal

CPE Line Connector
ADSL Signal

1 2 ③④ 5 6

1② 3 4 ⑤ 6

RJ 11

RJ 11

Frontal View

Frontal View

NOTE: In some applications, pins 2 and 5 may be used on the local loop side at the NID (Network Interface Device). In this case, the CPE RJ11 connector should be used
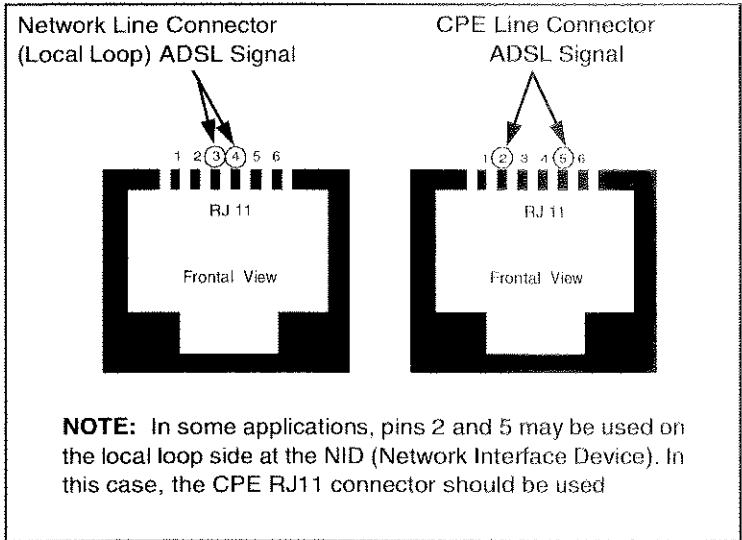
Figure 1-2. ADSL Pinouts for North American Connectors

Network Line Connector
Europe/Latin America ADSL
Signal

Network Line Connector
Asia ADSL Signal

①②3 4 5 6

1 2 ③④ 5 6

RJ 11

RJ 11

Frontal View

Frontal View

POTS   POWER

(Asia does not use pinouts numbers 1, 2, 5, & 6.)
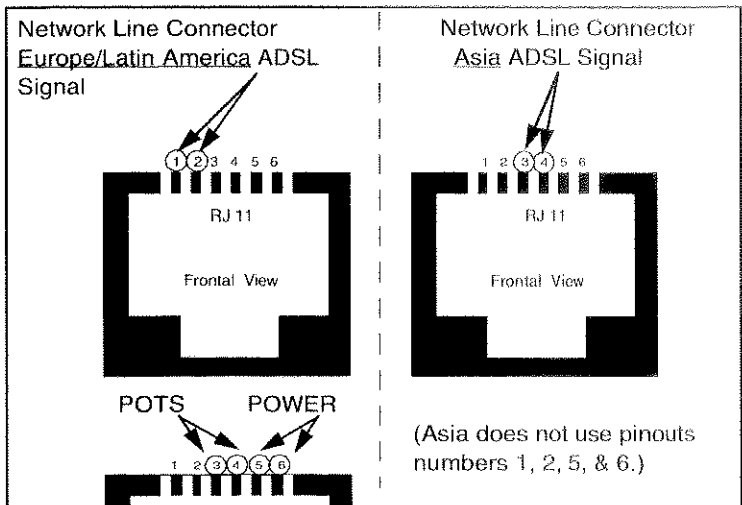
1 2 ③④ ⑤⑥

Figure 1-3. ADSL Pinouts for International Connectors

1.4 INSTRUMENT CHECKOUT PROCEDURE

The following procedure should be used when you first start up the TTC/T-BERD 1000. This procedure verifies that the test instrument is functioning properly when you receive it. If any problems occur during the procedure, contact TTC Technical Assistance Center at (800) 638-2049 to report the problem.

1.4.1 Powering Up The TTC/T-BERD 1000

1. Turn the unit on. The green Power LED should illuminate. At this time, the unit performs its own initialization and diagnostic sequence. Activity on the progress bar indicates proper operation. Figure 1-4 shows the initialization screen. This process should take about one minute.
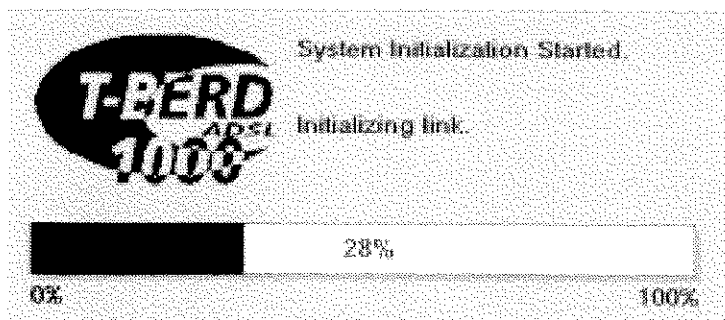

Figure 1-4. TTC/T-BERD 1000 Initialization Screen

2. The ADSL test set contains only one test application screen. The ADSL Icon in the upper left-hand corner of the screen ensures the configurations of the test instrument is ready for ADSL test mode. Figure 1-5 shows the ADSL Test Application Start-Up Screen.
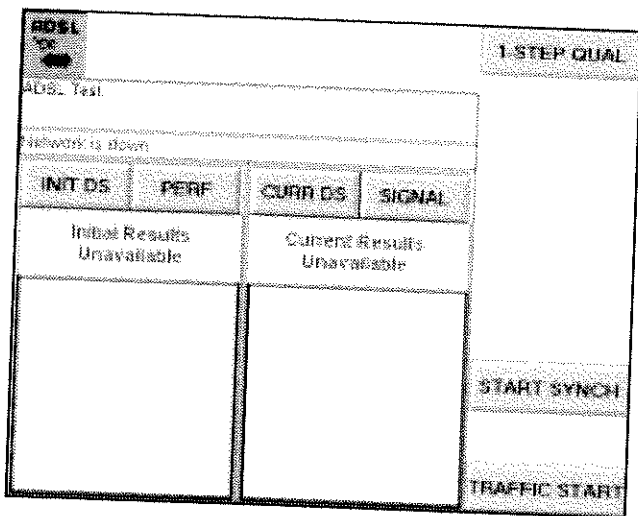
Figure 1-5. ADSL Test Application Start-up Screen

SECTION 2 OPERATION

2.1 USER INTERFACE DESCRIPTION

When you activate the TTC/T-BERD 1000, it displays the main screen (see Figure 2-1) after the initialization process. The main screen provides setup information, configuration data, test-specific action buttons, and displays test results.

Figure 2-1. TTC/T-BERD 1000 Main Screen

The Main Screen is divided into nine areas (see Figure 2-1). Each area has a function, as described in the following paragraphs:

1. **Application Selection** — This area displays the ADSL icon. No action is required.

2. **Test Description** — This area displays the action currently performed by the TTC/T-BERD 1000.

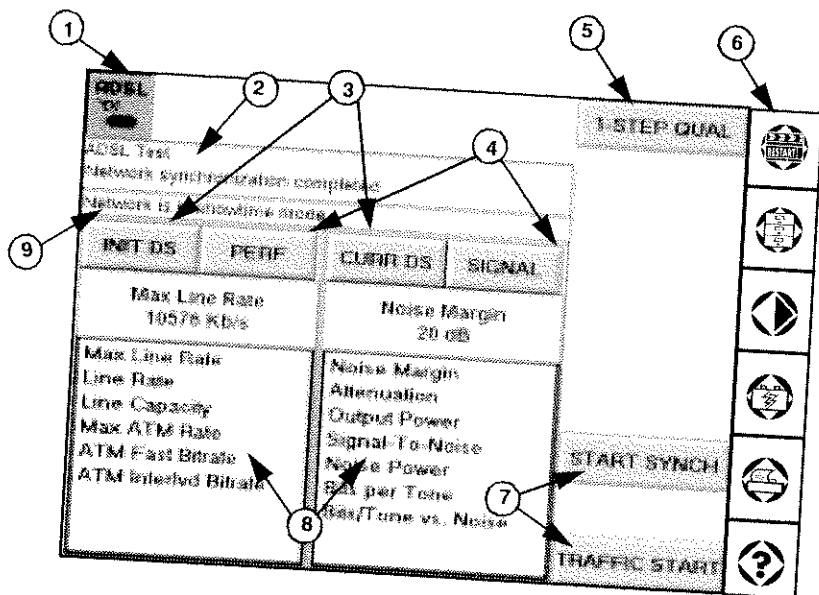3. **Result Display** — The first button in this dual-feature display depicts a drop-down list of the current test results, such as initial or current upstream or downstream data (see Figure 2-2). For example, pressing **INT DS** (initial downstream) or **CURR US** (current upstream) lets you decide what direction to monitor the test, and choose between real-time testing or initial results.
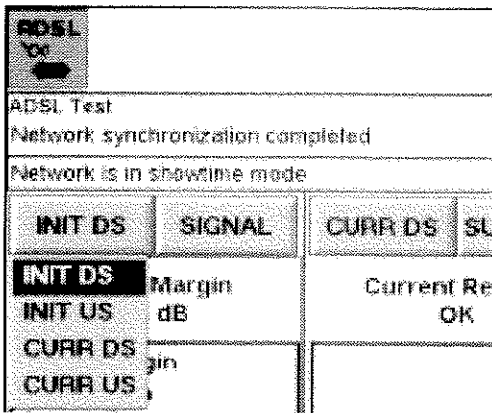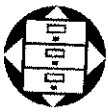
Figure 2-2. Initial/Current Downstream/Upstream Result Types

4. **Category Display** — The second button in this dual-feature display offers a drop-down list allowing you to choose results in SUMMARY, PERFORMANCE, SIGNAL, PARAMETER, SETTING, and ERRORS categories.

5. **One-Step Qualification** — This button pulls up a full-size screen that provides all the results needed to qualify the ADSL service, such as:

   • ADSL: Line Rate and Line Capacity.

   • ATM: Bit Rate Fast and Bit Rate Interleaved.

- Signal: Noise Margin, Attenuation, Output Power, and Maximum Aggregate Power.

6. **Permanent Softkeys** - This area includes six permanent softkeys that provide housekeeping functions for the TTC/T-BERD 1000. These keys perform as shown in Table 2-1.

Table 2-1. Permanent Softkeys

Icon	Description
	RESTART — Performs the test restart function, including resetting the current test result totals and clearing any error alarms. NOTE: not operative.
	AUX Functions — Activates the Auxiliary Functions screen, which allows you to view the software revision level and change installed options, such as Language, Time, Date, and Brightness Control. (See Figure 2-3 for language selection, such as English, German, Spanish, Italian, and French.)
	Screen Contrast — Adjusts the level of detail on the screen display. Pressing the left side lightens the images, and pressing on the right side darkens the images.
	Battery Status — Activates the Battery Status Screen, which displays the current battery strength by bar graph and percentage value.
	Data Output Setup — Activates the Printer Setup Screen, which enables selection of the printer interface parameters (Baud Rate and Parity), and allows you to clear the print buffer, print results, or abort printout.
	Help (?) — Provides contact information for TTC Technical Assistance Center.
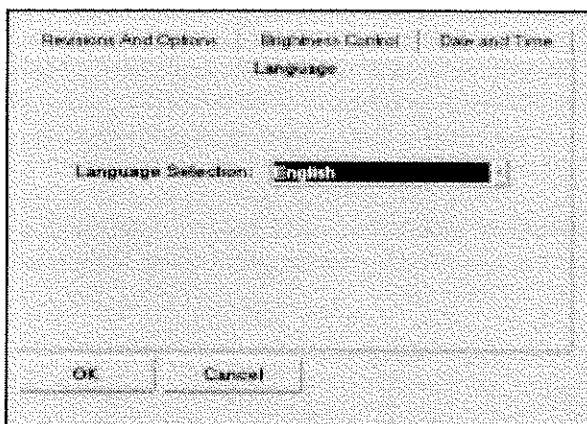
Figure 2-3. Auxiliary Function Language Selection

7. **Action Buttons** — These two test action buttons initiate and measure the ADSL test application.

    START SYNCH is a non-latching button used to start network synchronization. This button is always active regardless of the current state of the network. Pressing this button clears all result buffers and starts (or restarts) network synchronization. The result display windows shows "Results Unavailable" until new data is received from the network at the end of synchronization. Network synchronization returns a report within approximately 30 seconds of the start of synchronization.

    TRAFFIC START is a latching button that toggles between Traffic OFF and Traffic ON. This is a toggle command, enabling/ disabling measurement of bit error and cell loss rates. The default position of the button is Traffic OFF.

8. **Dual Test Results Display** — This area displays two test results windows associated with the current test application. Each window has a button for selecting the result group, a button for selecting the result category, a result value display window, and a result list box.

9. **Message Display** — This area displays messages regarding activity associated with the current test application. Three possible messages depending on the modem status are:

   • **Network is synchronizing, please wait...:** Test set sent a synchronization command. It continues until the network has finished its synchronization process.

   • **Network is in showtime mode**: Network is synchronized and results are available for display.

   • **Network is down:** Network is not synchronized.

2.2 USING THE TTC/T-BERD 1000

2.2.1 Basic Test Setup

1. To operate the TTC/T-BERD 1000, just turn the test set on using the **POWER** switch (Power LED illuminates) and wait for the main screen to appear. The **ADSL** Application Icon automatically engages the test set for the ADSL test mode.

NOTE

We recommend using the stylus supplied with the TTC/T-BERD 1000 to activate functions on the touch-sensitive screen. However, any blunt device, including your finger, can be used.

2. Once a proper cable is connected, press the **START SYNCH** button to synchronize the test set to the network.

    ● The TTC/T-BERD 1000 displays **"Network is in Show-time Mode"** in the message display.

3. Press the **1-STEP QUAL** button to view basic test results. Figure 2-4 shows the 1-STEP QUAL Screen display. For more in-depth results, follow Steps 4 and 5 from the main screen.

Figure 2-4. TTC/T-BERD 1000 1-STEP QUAL Screen

4. From the RESULTS and CATEGORY dual-feature buttons, select either **INIT DS** (Initial Downstream) or **CURR DS** (Current Downstream) or **INIT US** (Initial Upstream) or **CURR US** (Current Upstream) by pressing the RESULTS button to select results type (default is Summary at startup).

    Pressing **INIT DS** or **INIT US** selects the operational data available at the time of initialization (successful or failure) termination for the downstream or upstream directions, respectively. Initial results are updated at the end of network synchronization.

Pressing **CURR DS** or **CURR US**, selects the actual operational data for the downstream or upstream directions, respectively. Current results are updated every 10 seconds. The TTC/T-BERD 1000 configures itself for the selected test.

5. Select a category menu item to choose a category for testing. A drop-down list of the categories applicable to the application appears directly below the Category Button. Figure 2-5 shows an Initial Downstream test with the PERF category selected and a Current Downstream test with the SIGNAL category selected.

Figure 2-5. Tests with PERF Categories Selected.

2.3 TEST RESULTS

The TTC/T-BERD 1000 test results appear in the Dual Test Results Display portion of the screen (see Figure 2-6).
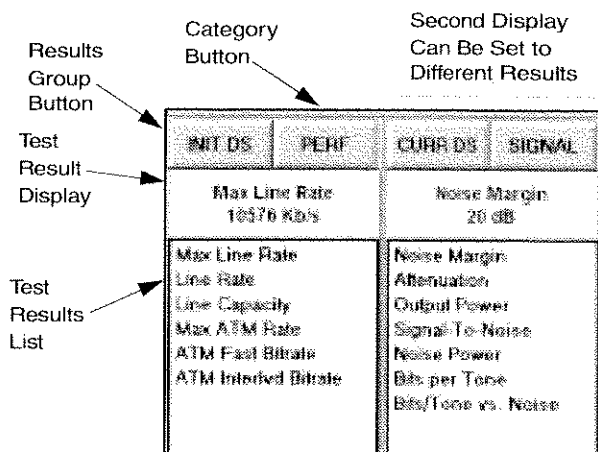
Figure 2-6. Dual Test Results Display

NOTE

As discussed in Sections 2.3 and Section 2.4, test results are available in all the categories listed, and they are defined in the accompanying tables for each category.

2.4 CATEGORY SELECTION

There are six categories available for ADSL testing. The drop-down list in Figure 2-5 enables you to select which application to test in the transmission stream. The following subsections give a detailed description of these selections.

2.4.1 SUMMARY Results Category

Immediately after a Test Restart, the SUMMARY category displays the following message in the Results value display window until the network has been synchronized (started):

Initial Results Unavailable	or	Current Results Unavailable

depending on whether one of the initial or one of the current result groups is currently selected for that Results display window.

NOTE

Results are "Unavailable" until the network is synchronized and it returns a synchronization report. The network returns a synchronization report within approximately 60 seconds of the start of synchronization.

When the network is synchronized and results are available, the following message displays if no critical errors exist:

Initial Results OK	or	Current Results OK

depending on whether one of the initial or one of the current result groups is currently selected for that Results display window. Press **SUMMARY** and then select the test result menu item. Table 2-2 lists the critical error conditions within the SUMMARY Results Category.

Table 2-2. SUMMARY Results Category

Result	Definition for Result
Reason of Failure	Network Initialization Failed — Possible values are: • Bit rate is too high • Message Error • No Modem Found • Protocol Error • Timeout
Phase at Failure	Network Initialization Failed — Possible values are: • Activation • Channel Analysis • Exchange • Pre-Showtime • Showtime • Training
Line Rate Fail	Line Rate Fail — Operational Line Rate is less than the configured minimum bit rate set by the NMS (Network Management System).
Noise Margin	The Noise Margin is less than the Minimum Noise Margin — Shows only a fail status when up/downstream noise margin is less than the configured minimum. Calculation is based on the measurement of the line characteristics per NMS.
Output Power	The Output Power exceeds the Max Aggregate Power — Shows only a pass/fail status when up/downstream operational output power is greater than the configured maximum. Calculation is based on the measurement of the line characteristics per NMS.

NOTE

The unit only displays Result(s) that are   applicable to an actual error condition. If an error does not occur, the Result(s) display window does not list that category.

2.4.2 PERFORMANCE Results Category

The **PERFORMANCE** Category consists of operational parameters related to line throughput and bit rates on the ADSL line. Press **PERF** and then select the test result menu item. Table 2-3 lists the menu selections and definitions in the PERFORMANCE category.

Table 2-3. Performance Results Category

Result	Definition for Result
Max Line Rate	Displays maximum attainable bit rate including overhead, for up/downstream transmission.
Line Rate	Displays bit rate used, including overhead, for up/downstream transmission.
Line Capacity	Displays the relative capacity occupation in percent. (Line Rate/Maximum Line Rate)
Max ATM Rate	Displays maximum attainable ATM rate.
ATM Fast Bitrate	Displays the ATM bit rate using the ATM fast path. The fast ATM path provides a low latency path with less error protection than the ATM bit interleave path.
ATM Interleaved Bitrate	Displays the ATM bit rate using the ATM bit interleave path. The ATM bit interleave path provides a very low error rate path with higher latency than the ATM fast path.

2.4.3 SIGNAL Results Category

The SIGNAL category consists of operational parameters related to line power and noise levels. Press **SIGNAL** and then select the test result menu item. Table 2-4 lists the signal/noise menu conditions within the SIGNAL results category.

Table 2-4. SIGNAL Results Category

Result	Definition for Result
Noise Margin	Displays the amount of increased noise, relative to the measured noise power, that the system is designed to tolerate.
Attenuation	Displays the difference between the total transmitted power for all up/downstream carriers and the total received power.
Output Power	Displays the total transmitted power for all up/downstream carriers.
Impulse Response[1]	Indicates transmission characteristics of the loop. Displays a bar graph of the impulse response in dB for each tone. (Only valid for Initial Downstream result group.)
Signal-To-Noise[1]	Indicates the ratio of the received signal power and the received noise power. Displays the graphical output of the SNR in dB for each tone.
Noise Power[1]	Indicates the received noise power. Displays the graphical output of the noise power in dB for each tone.
Bits per Tone[1]	Displays the number of data bits modulated on each carrier.
Bits/Tone vs. Noise[1]	Displays the Bits per Tone and the Noise Power per Tone graphs simultaneously in a multi-data graph.

1. Graphical displays are available for Impulse Response, Signal-to-Noise, Noise Power, Bits per Tone, and Bits vs. Noise. To display the bar graph, press one of these menu items.

2.4.4   Graphical Results Display

To display graphical results for Impulse Response, Signal-to-Noise, Bits per Tone, Bits/Tone vs. Noise, and Noise Power signals, simply press on their names and the bar graph appears. A sample graphical result for some of these signals is shown in Figure 2-7. (Only one graphic result can be displayed at a time. The specific graphic result chosen covers the user interface display completely.) The graphical results display consists of a title bar, a **RETURN** button, a **ZOOM** button, a graph window, and dual-arrowed scroll buttons.

At first, the graph displayed covers the entire up/downstream spectrum. By selecting a point on the display, the DMT Carrier Number, Frequency, Value, and shared Frequency Zone appear at the bottom.

The Frequency Zone informs you of any other transmission carriers that share that frequency range. This feature helps diagnose possible transmission crosstalk influencers.

The **ZOOM** button enables you to see the individual DMT carriers.
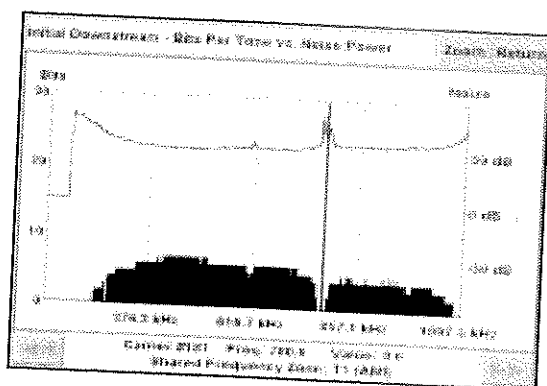
Bits Per Tone vs. Noise Zoom-Out Bar Graphs
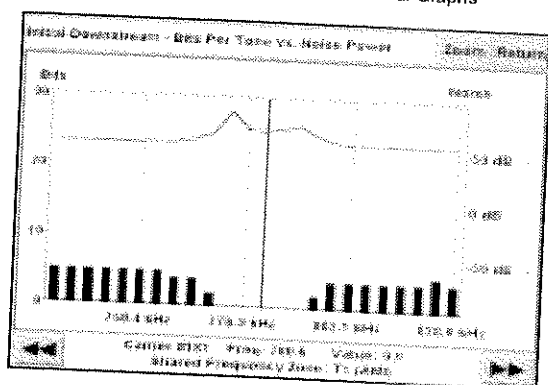
Bits Per Tone vs. Noise Zoom-In Bar Graphs

Figure 2-7. Sample Bar Graphs for Signal Results

2.4.5   PARAMS Results Category

The **PARAMS** category consists of performance parameters that have been configured via the Network Management System. Table 2-5 shows the **PARAMS** results category and definitions.

Table 2-5.   PARAMS Results Category

Result	Definition for Result
Min Fast Bit Rate	Minimum fast bit rate configured by the NMS. The fast bit rate is the data rate using the minimum latency path.
Max Fast Bit Rate	Maximum fast bit rate configured by the NMS. The fast bit rate is the data rate using the minimum latency path.
Min Interleaved Bit Rate	Minimum interleaved bit rate configured by the NMS. The Interleaved bit rate is the data rate using the higher latency, minimum error rate path.
Max Interleaved Bit Rate	Maximum interleaved bit rate configured by the NMS. The Interleaved bit rate is the data rate using the higher latency, minimum error rate path.
Min Noise Margin	Minimum noise margin setting configured by the NMS.
Max Noise Margin	Maximum noise margin setting configured by the NMS.
Max PSD	The maximum configured Power Spectral Density in dBm/Hz.
Max Aggregate Power	The maximum configured total transmit power for all carriers in dBm.
Carrier Mask[1]	Graphical display of carrier usage configuration.

1. A graphical display is used to show the Carrier Mask. To display this bar graph, press Carrier Mask.

2.4.6 SETTINGS Category

The SETTINGS Category consists of configuration parameters that have been configured via the Network Management System. Table 2-6 describes the SETTINGS Category results.

Table 2-6. SETTINGS Results Category

Result	Definition for Result
Rate Adapt Mode	Possible values are: • Operator — Synchronizes to target rate at startup. • Adaptive — Synchronizes to best rate within range and continues to adapt.
Vendor ID	Vendor ID for the ATU-C.
Version Number	Software Version Number for the ATU-C.
Trellis Coding	Trellis coding is ON or OFF.
Echo Canceling	Echo Canceling is ON or OFF.
Framing Mode	The Framing Mode is one of the following: • Full overhead with synchronization control enabled. • Full overhead with synchronization control disabled. • Reduced overhead with separate fast and sync bytes for single and dual latency. • Reduced overhead with merged fast and sync bytes for single and dual latency.
Max Bits Per Tone	The maximum number of bits that can be modulated on each frequency carrier.

2.4.7 ERRORS Results Category

The ERRORS category consists of traffic measurement values that are updated via the **TRAFFIC START** button (see Section 2.1). Table 2-7 shows the following ERRORS results category.

Table 2-7. ERRORS Results Category

Result	Definition for Result
Measured Time	Length of time during which a traffic test was conducted.
Active Cell Fast	Number of ATM cells in the fast channel that carry user data (not idle cells).
Active Cell Inter-leaved	Number of ATM cells in the interleaved channel that carry user data (not idle cells).
CLR Fast	ATM cell loss rate on fast path.
CLR Interleaved	ATM cell loss rate on interleaved path.
BER App Fast	Bit error rate not counting discarded ATM cells payload as bit errors on fast path.
BER App Inter-leaved	Bit error rate not counting discarded ATM cells payload as bit errors on interleaved path.
BER Pipe Fast	Bit error rate not counting discarded ATM cells payload as bit errors on Pipe fast path.
BER Pipe Inter-leaved	Bit error rate not counting discarded ATM cells payload as bit errors on Pipe interleaved path.

2.5 BATTERY OPERATION

The TTC/T-BERD 1000 comes equipped with a rechargeable Nickel-Metal Hydride (NiMH) battery. A fully charged battery is good for about 2 hours of continuous use. The recharge time is approximately 1.25 hours with the unit turned OFF. The recharge period begins as soon as an external AC or DC power supply is connected to the unit. Overcharge protection is provided, so continuous operation from an AC power supply is possible. Figure 2-8 depicts the side panel of the TTC/T-BERD 1000.
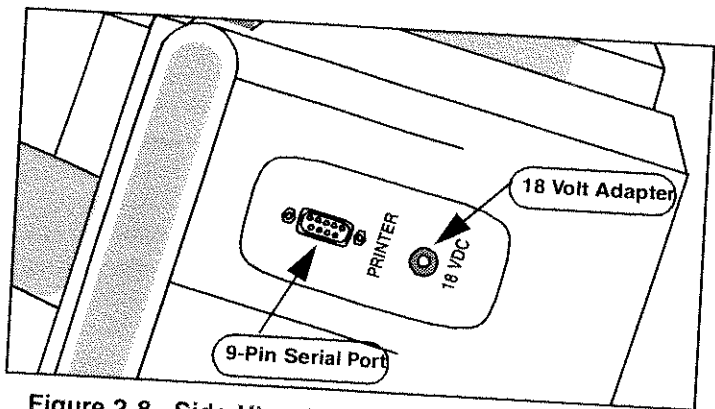
Figure 2-8. Side-View Diagram of TTC/T-BERD 1000

2.5.1 Recharging the Battery

The Low Battery LED illuminates when the battery is at 25% of full charge to indicate the battery needs to be recharged.

To fully charge the battery quickly, turn the unit off, connect the AC Adaptor from the power adaptor plug to a 120 VAC (North American) or 220 VAC (International) power supply and let the TTC/T-BERD 1000 sit for about 1.25 hours, depending on how low the battery was. The battery can also be charged by using the optional DC adapter.

2.5.2 Battery Replacement

The Nickel-Metal Hydride (NiMH) battery is easy to replace.

1. Turn off the TTC/T-BERD 1000.

2. Tilt the unit onto the back panel. (The bottom panel faces user.)

3. Loosen the four screws on the battery cover with a Phillips-head screwdriver, and remove the battery cover.

4. Disconnect and remove the used battery.

5. Install the replacement battery by lining up the contacts and snapping it into place.

6.   Replace and secure the battery cover.

7.   Turn on the TTC/T-BERD 1000 and continue testing.

2.5.3   Power Save Mode

When you use the battery as your power source, the TTC/T-BERD 1000 has an automatic energy saver feature in the Power Save Mode. After one minute of no activity on the touch screen, the backlight on the display turns off. Touching the screen brings the display back.

SECTION 3 DATA OUTPUT OPERATION

3.1 INTRODUCTION

The TTC/T-BERD 1000 provides capability for printing test results (Results Print), as well as downloading test results into a PC. This section describes how to generate the report.

3.2 TTC/T-BERD 1000 PRINTER SETUP

The following connections and controls are used to set up the printer and TTC/T-BERD 1000.

3.2.1 Printer Connection

The Printer connector on the back of the unit is a 9-pin connector used to connect the TTC/T-BERD 1000 to the TTC PR-40A, or compatible, serial printer. The connector is configured as a Data Communications Equipment (DCE) connection, which allows you to connect the TTC/T-BERD 1000 to Data Terminal Equipment (DTE). Use a 9-pin D (male) to a 25-pin D (male) serial cable.

3.2.2 Printer Controls

The TTC/T-BERD 1000 printout generation is controlled through the Printer Screen (see Figure 3-1), which is activated by pressing the Printer Icon on the right side of the Main Display.

There are several action buttons on the Print folder. The functions of these buttons are described in the following numbered paragraphs.
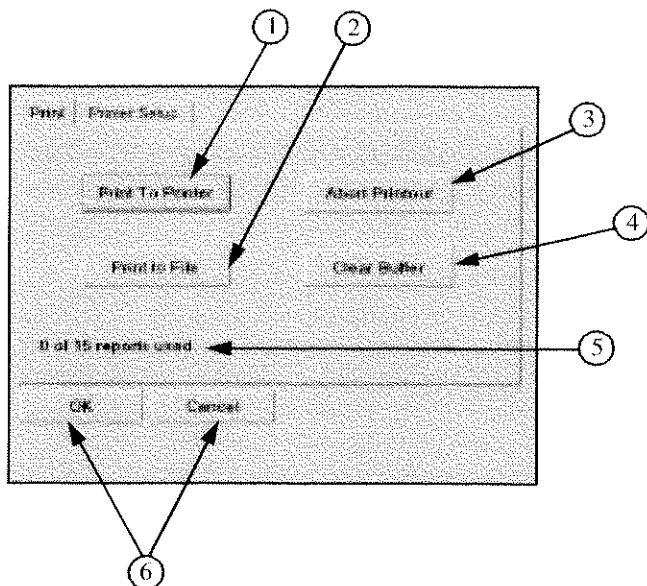
Figure 3-1. Printer Screen

1. **Print to Printer (Type I file)**

    Print to Printer generates a date-and-time stamped printout of the current test results. This output is optimized for the PR-40A or compatible printer with 40-column, wide character spacing.

2. **Print to File (Type II file)**

    Print to File generates a date-and-time stamped printout of the current test results. This output is optimized for a text file with appropriate delimiters. It can easily be converted into a Microsoft® Excel spreadsheet for further data analysis (see Section 3.3.1).

    For both Type I and Type II files, the following conditions result when:

- *The unit is connected to an active printer or PC* — If a printer or PC is connected to the TTC/T-BERD 1000 and online, the report will be printed or sent immediately along with all other reports currently stored in the print buffer.

- *The unit is not connected to any active device* — If an outside data storage device is not available, the TTC/T-BERD 1000 stores the report in an internal print buffer. Each stored report increases the Counter by 1. The unit is capable of storing up to 15 reports. If the print buffer is already full, attempting to generate another report produces a warning (see Figure 3-2). If you disregard the warning screen, the TTC/T-BERD 1000 *will* store the newest report, but it causes the oldest (i.e., the first report) to be deleted from the print buffer.

NOTE

If the TTC/T-BERD 1000 is turned ON and is connected to an active printer or PC, all reports stored in the print buffer print automatically. You cannot specify which report to print, but you can abort any of the reports as they are outputted.
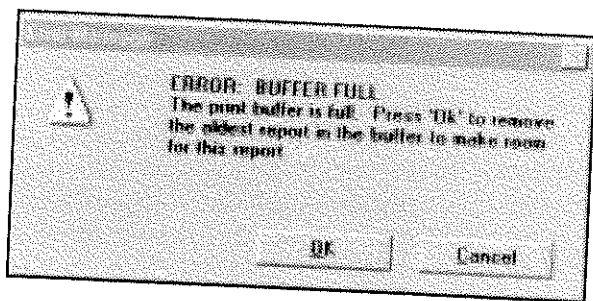

Figure 3-2. Data Output BUFFER FULL Error Screen

3. **Abort Printout**

   Abort Printout cancels the *current* print operation in action. However, if there are more reports stored in the print buffer, it will skip to the next report in the cue and begin printing. All reports print unless aborted, each one separately. Of course, if the printer is not engaged, this button is inert.

4. **Clear Buffer**

   Clear Buffer clears all reports from the print buffer and sets the counter to Zero. If a report is currently printing, this button also aborts the print operation.

5. **Counter**

   The **Counter** readout displays the number of reports currently stored in the print buffer.

6. **OK** and **Cancel**

   Press **OK** if settings are correct and you want to proceed. Press **Cancel** if parameters need to be changed or you want to stop the print operation before it begins.

3.2.3 Printer Setup

Touching the Printer Setup tab displays the Printer Setup folder (see Figure 3-3). This folder allows you to select the baud rate and parity for the printer interface.
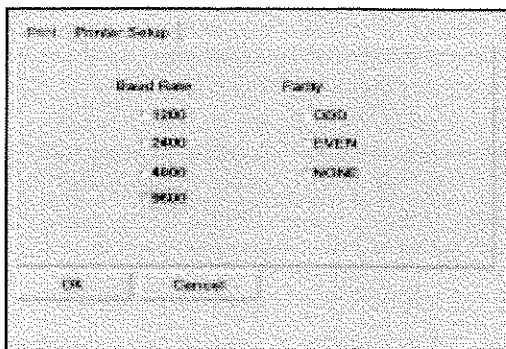

Figure 3-3. Printer Setup Folder

3.3 SERIAL PORT TO PC SETUP

The TTC/T-BERD 1000 is designed to send test results for analysis to a PC. Use the following steps to set up the TTC/T-BERD 1000 to output data.

3.3.1 Report Generation

You may find that the most useful printout to a PC is the **Type II file** because the output is optimized for a text file with appropriate delimiters and because it can easily be converted into a Microsoft® Excel spreadsheet for further data analysis. Report generation is the same as for output to a printer. (see Section 3.2.2)

3.3.2 PC Setup

Use the following procedure to set up your PC:

1. Ensure test results are available for output by checking the buffer counter (see Figure 3-1). Also, ensure the proper cable is available; use a 9-pin D (male) to a 9-pin D female. Set cable aside, for now.

2. Open/run a terminal emulation program on your PC (such as Microsoft® Hyperterm).

3. Ensure setting for the terminal emulation program matches setting in the Printer Setup.

4. Set the test capture option in the terminal emulation program (in PC) to "On."

5. Connect the 9-pin D (female) end of the cable to the PC.

6. Connect the 9-pin D (male) end of the cable to the TTC/T-BERD 1000 serial port. The TTC/T-BERD 1000 begins to download data into the PC.

When the buffered information is sent to the text file on the PC, the embedded deliminiter allows Microsoft® Excel to convert the text file into a concise spreadsheet.

SECTION 4 SPECIFICATIONS

4.1 GENERAL SPECIFICATIONS

The following lists the general specifications for the TTC/T-BERD 1000 (ANSI T1.413 Standard Compatible.).

Physical Characteristics:

Height:	7.00" (17.8 cm)
Width:	11.75" (29.8 cm)
Depth:	8.00" (20.2 cm)
Weight:	10.00 lb. (4.55 kg.), with battery.

Environmental Characteristics:

Temperature:	
Operating:	32°F to 113°F (0° C to 45° C)
Storage:	-13°F to 140°F (-25° C to 60° C)
Humidity:	10% to 90% relative non-condensing

Electrical Characteristics:

Battery Type:	10.8 V Nickel-Metal hydride (NiMH)
Operating Time:	Typically provides up to 1.5 hours of continuous operation on a full charge.
Recharging Period:	1.25 hours from full discharge.
AC Adaptor:	120 VAC to 18 VDC (North America)
	220 VAC to 18 VDC (International)
DC Adaptor:	12 VDC to 18 VDC
Display:	One 6-inch diagonal monochrome transflective graphic LCD

4.1.1 **Input and Output Specifications**

The following lists the input and output specifications necessary for unit operation.

Battery and Charging Circuit:	10.8 V Nickel-Metal Hydride (NiMH) Typically provides up to 2 hours of continuous operation on a full charge.
AC Power Adaptor/Charger:	120 VAC to 18 VDC (North America). 220 VAC to 18 VDC (International). Charge time is approximately 1.25 hours with unit off from full discharge.
DC Power Adaptor/Charger	12 VDC to 18 VDC.

Standard Cables	Input: RJ11 to RJ11
	
	            Bantam to Bantam
	
	            Bantam to Clips
	
	Output: RJ45 to RJ45

Serial/Printer Port:	The RS232 Connector provides the connection for a TTC PR-40A or compatible serial printer for printing hard copies of test results. This Serial port also provides connection to a PC for data download or software upgrade.

SECTION 5 TTC CUSTOMER SERVICES

5.1 INTRODUCTION

TTC offers unmatched services to support purchased equipment, including a wide range of customer care, technical support, instrument maintenance, and training services. TTC customer service specialists are fully trained to help customers find the answers they are looking for. Call Customer Services for:

- 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. TTC is also available on a contractual basis to provide customized application development, network consulting and management services, software customization, and test procedure development.

All TTC products are backed by an industry-leading warranty that guarantees mainframe repair or replacement for 3 years and all other parts for 1 year.

5.2 CUSTOMER SERVICE L