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NetTek® YBT100 and YBT100DS3 Backhaul Tester User Manual

www.tektronix.com
071-2070-00

Tektronix

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Warranty 2

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury

Connect and Disconnect Properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

The inputs are not rated for connection to mains or Category II, III, or IV circuits.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Do Not Operate With Suspected Failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Recharge Batteries Properly. Recharge batteries for the recommended charge cycle only.

Use Proper AC Adapter. Use only the AC adapter specified for this product.

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Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Terms in this Manual

These terms may appear in this manual:

WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*

CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Symbols and Terms on the Product

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

The following symbol(s) may appear on the product:



CAUTION
Refer to Manual



WARNING
High Voltage

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Environmental Considerations

This section provides information about the environmental impact of the product.

Product End-of-Life Handling

Observe the following guidelines when recycling an instrument or component:

Battery Recycling. This product contains a lithium ion (Li-ion) rechargeable battery, which must be recycled or disposed of properly. Please properly dispose of or recycle the battery according to local government regulations.

Transporting Batteries

The lithium ion rechargeable battery pack in this product contains less than 8 grams of equivalent lithium content, with individual cells containing less than 1.5 grams of equivalent lithium, as measured by International Civil Aviation Organization (ICAO) standards. Consult your air carrier for applicability and determination of any special lithium ion battery transportation requirements.

Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive. This product complies with the RoHS Directive requirements except for the presence of hexavalent chromium in the surface coating of the aluminum chassis parts, assembly hardware, and 63/37 tin/lead solder used in the fabrication of the circuit boards.

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Preface

Documentation

To read about	Use these documents
Installation and operation (overviews)	*NetTek YBT100 and YBT100DS3 Backhaul Tester User Manual*. The user manual contains general information about how to put your instrument into service, guides to user interface controls, and application examples.
Help using the application	*YBT100 and YBT100DS3 Online Help*. The online help is context sensitive to provide definitions for some instrument settings, and alarm and event definitions. A help button is also available on some dialog boxes to display information about that dialog box.

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Getting Started

Key Features

The NetTek YBT100 and NetTek YBT100DS3 Backhaul Testers are state-of-the-art, comprehensive, test modules for testing DS1 and DS3 services. The functionality and user-friendly design allows you to easily analyze and resolve problems that arise in a network. These lightweight, battery powered instruments combine all the test interfaces needed to test and troubleshoot copper services without the need for plug-in modules. The YBT100 or YBT100DS3 can operate either independently (to log measurements/events) or from a PC or NetTek Y400 Analyzer Platform. Features include:

- Part of the NetTek Toolbox, which provides a portable and full-featured transmitter, antenna, and backhaul testing solution
- Controlled using the NetTek Y400 Analyzer platform, a PC, or a laptop, or can be left on-site to monitor signal events
- Wireless 802.11 b/g connection lets you operate the YBT100 or YBT100DS3 from a laptop without a direct connection, such as from a vehicle in bad weather
- Display elements show all test results on the main screen, with color coding to make pass/fail testing viewable from across a room
- Easy-to-use interface with key settings accessible from the main application screen, or within one or two clicks
- Two fully independent DS1 test interfaces (YBT100 and YBT100DS3), and an optional DS3 test interface (YBT100DS3), with monitoring, error insertion, and loop test capabilities

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Standard Accessories

Accessory	Tektronix part number
NetTek YBT100 Backhaul Tester	YBT100
NetTek YBT100DS3 Backhaul Tester	YBT100DS3
NetTek YBT100 and YBT100DS3 Backhaul Tester User Manual	071-2070-XX
NetTek YBT100 and YBT100DS3 Backhaul Tester Software installation CD	063-3987-XX
Instrument Pouch	016-1992-XX
Accessory Pouch	016-1993-XX
115 VAC Power Adapter	119-7323-XX
802.11 b/g Antenna	119-7330-XX
RS232 Adapter Cable	012-1706-XX
T1 Bantam Test Cables, 2 (Gray)	012-1710-XX
DS3 75 Ohm BNC Cable (Red) (YBT100DS3 only)	012-1704-XX
DS3 75 Ohm BNC Cable (Blue) (YBT100DS3 only)	012-1705-XX
2 BNC to WECo 440 Adapters (YBT100DS3 only)	012-1707-XX

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Installation

Software

Do the following to install the YBT100/YBT100DS3 software on either a PC or NetTek Y400 Analyzer Platform:

1. Insert the **NetTek YBT100 and YBT100DS3 Backhaul Tester** CD into a CD-compatible drive on your PC or laptop. The PC displays the installation screen.
2. Select one of the following:
   - **Install YBT100 Software on Y400** to install software on a NetTek Y400 Analyzer Platform.
   - **Install YBT100 Software on PC** to install software on your PC or laptop.
3. Follow the on-screen instructions.

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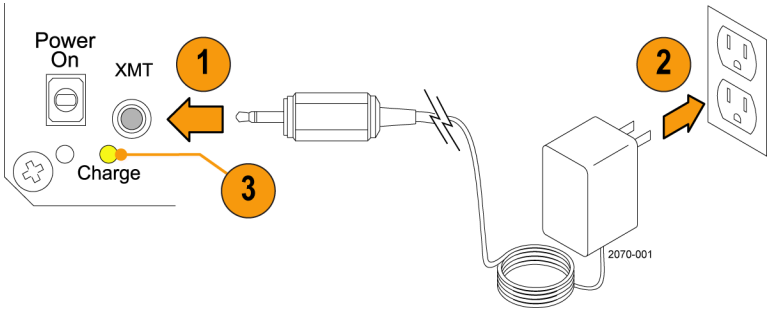
Configuration

NOTE. *Throughout the rest of the manual, the term YBT100 refers to both the NetTek YBT100 and the NetTek YBT100DS3 modules. When instructions or information is specific to a particular model, the specific model is called out in the text.*

Power

Connecting the AC Adapter. Do the following to install the AC power adapter and charge the batteries:

1. Insert the AC power adapter mini-jack into the instrument. See 1 in the next figure.
2. Connect the AC adapter module to an AC power source. The yellow **Charge** LED on the instrument lights to indicate that the instrument battery is charging. The LED turns off when the battery is charged. See 2 and 3 in the next figure.



3. Charge the Lithium-Ion battery for eight hours before using the instrument on battery power for the first time. A full charge from a discharged battery requires approximately six to eight hours.

Powering On and Off the Instrument.

1. Move the **Power On** switch in the up direction to power on the YBT100. The green power LED lights to indicate that the instrument is powered on.
2. To power off the instrument, move the switch in the down direction.

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Running on Battery Power. The following are guidelines for operating the YBT100 from battery power:

- The AC adapter charges the battery pack and supplies power to the module.
- The battery charge circuit is independent of the power state (On/Off) of the instrument.
- A full charge from a discharged battery requires approximately six to eight hours.
- How long the instrument can run on battery power depends on the number of active test interfaces (DS1-A, DS1-B, and DS3) that are running. The battery supports a single test interface for approximately 8 hours of continuous operation. Multiple test interface selections decreases the battery life by about 30% for each active interface.

Setting Up Communications to a PC or NetTek Y400

You must connect the YBT100 module to a PC or NetTek Y400 to configure the YBT100 to monitor or insert signals. You can connect the YBT100 module to a PC using a wireless 802.11 b/g connection, or to a PC or NetTek Y400 Analyzer Platform by using the supplied YBT100 to PC RS-232 adapter cable (Tektronix part number 012-1706-XX).

Setting Up the Wireless 802.11 b/g Connection.

NOTE. *Each PC 802.11 b/g implementation is different (built-in, PCMCIA card wireless adapter, USB-port wireless adapter, PCI card). Use the instructions that come with your PC or WiFi adapter to set up and enable your 802.11 unit. The following instructions use the Microsoft Windows XP Wireless Network Connection utility to configure your PC to use 802.11 b/g to communicate with the YBT100.*

1. Enable the 802.11 communications device on your PC. Consult your PC manual or WiFi adapter manual for instructions.
2. Connect the 802.11 antenna to the YBT100 module antenna connector.
3. Power on the YBT100 module.

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NOTE. *Do not start the YBT100 application on the PC at this time. You must set the PC or laptop wireless communications parameters before running the YBT100 application.*

4. On the PC, click **Start > Settings > Network Connections > Wireless Network Connection**.
5. Click **View Wireless Networks**. The Windows XP operating system scans for wireless connections and displays a list of all detected wireless networks. The list should include LTRX_IBSS. If LTRX_IBSS is not listed, make sure that the YBT100 is powered on and that the LOW BAT indicator LED is not lit.
6. Double-click on **LTRX_IBSS**. Click **Connect Anyway** if the warning message dialog box is displayed. The list should update after a moment to show that the LTRX_IBSS is connected.
7. Select **LTRX_IBSS** in the list and click **Advanced Settings** to open the Wireless Network Connection Properties dialog box.
8. In the **General** tab, scroll down the list and select **Internet Protocol (TCP/IP)**.
9. Click **Properties**.
10. Click the **Use the following IP address** check box and enter the following IP address in the field:

    192.168.10.01

11. Click inside the **Subnet Mask** field to automatically fill in the field (255.255.255.0).
12. Click **OK**, then click **Close**.
13. Double-click the YBT100 icon on the PC. 

14. Click **Port** in the menu bar and select the appropriate 802.11 port for your YBT100 instrument. The YBT100 application should link to your PC after a few moments.

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Disabling the YBT100 Wireless Connection. Use your laptop or PC wireless connectivity tools to disconnect or close the 802.11 b/g wireless connection.

Setting Up the Serial Cable Connection.



CAUTION. *Use only the supplied YBT100-to-RS-232 cable. Do not use a standard USB cable to connect from the YBT100 RS-232 port to a USB port on a PC or other device. The signal on the RS-232 port of the YBT100 is not a USB signal. The YBT100 RS-232 connector pinouts, signal types, and voltage types are not compatible with standard USB connectors and could damage one or both pieces of equipment. If your PC does not have an RS-232 connector, obtain an RS-232 to USB adapter to connect the RS-232 end of the cable to the PC USB port.*

1. Connect the USB-style connector of the supplied YBT100 USB-connector-to-RS-232 cable into the YBT100 **RS232** port on the module rear panel.
2. Connect the DB9 RS-232 connector to the PC or Y400 COM1 RS-232 port.
3. Start the YBT100 application on the PC. The YBT100 application displays **No Comm Link** to the right of the speaker on/off button.
4. Power on the YBT100 module. The YBT100 application automatically recognizes and establishes communications with the YBT100 instrument over the RS-232 cable, and replaces the **No Comm Link** message (adjacent to the **Spkr** on/off button) with **ET: n:n:n**, indicating the time period of the current test run.

   You can also verify that the YBT100 application is communicating with the YBT100 module by looking at the instrument rear panel status LEDs. The **Link Fault** LED will be off, and the **Rx** and **Tx** LEDs will be blinking.

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NOTE. *The YBT100 module uses COM1 as the default serial port on which to search for a communications link. If your PC or laptop is using a port other than COM1, either set the PC to make COM1 available, or change the communications port for the YBT100 application. To change the YBT100 port, click the* ***Port*** *menu and select the appropriate COM port to use.*

The YBT100 application resets the port selection to COM1 when starting the application.

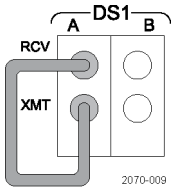
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Functional Verification

You can perform these functional checks to verify that your instrument is operating properly. These procedures assume that you have established communications between the YBT100 instrument and the PC or NetTek Y400 that is running the YBT100 application. (See page 5, *Setting Up Communications to a PC or NetTek Y400*.)

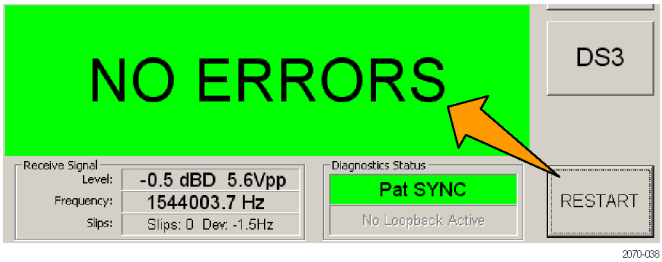
DS1 Functional Verification

1. Connect a bantam cable between the DS1 A **RCV** and **XMT** jacks.

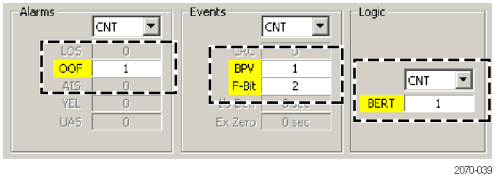


2. On the PC or NetTek Y400, click the **DS1-A** button.
3. Click the **Configuration** tab, and set or confirm the following parameters:
   - Mode = **Term**
   - Framing = **ESF**
   - Circuit Timing = **Internal**
   - Zero Coding = **B8ZS**
4. Click the **Diagnostics** tab, and set or confirm the following parameters:
   - BERT Patterns = **QRSS**
   - Insert Error = **Logic**, **BPV**, and **F-Loss**.
5. Click the **Restart** button. The application Alarms and Events display shows the message **NO ERRORS**, with a frequency reading of approximately 1544000 Hz, and a level readout of approximately 0.0 dB.

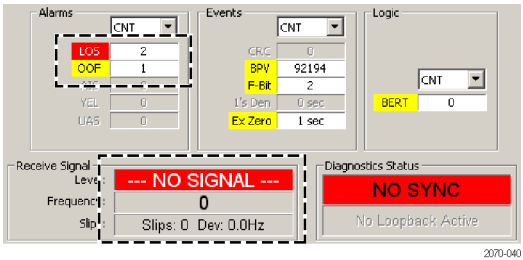
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6. On the **Diagnostics** tab, click **Insert**. The Alarms, Events, and Logic areas show Out Of Frame (OOF), BPV, F-Bit, and BERT errors.

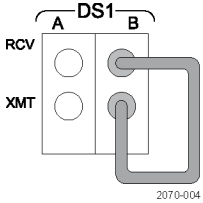


7. Unplug the bantam cable from both DS1 A jacks. The Alarms area shows one or more alarm conditions, with the primary alarm being a loss of signal (LOS). The Receive Signal area also shows a NO SIGNAL message.



8. Connect the bantam cable between the DS1 B **RCV** and **XMT** jacks.

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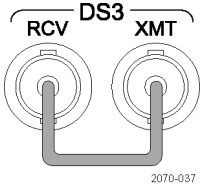
9. Click the **DS1-B** button.

10. Repeat steps 3 through 7 to verify the DS1-B functionality.

DS3 Functional Verification

This procedure presumes that you are continuing from the DS1 functional verification procedure.

1. Connect a DS3 75Ω coaxial cable between the DS3 **RCV** and **XMT** connectors.



2. Click the **DS3** button.

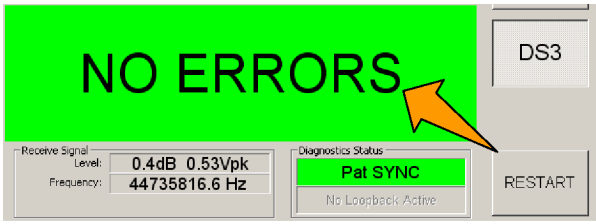
3. Click the **Configuration** tab, and set or confirm the following parameters:
   - Mode = **Term**
   - Framing = **C-Bit**
   - Circuit Timing = **Internal**

4. Click the **Diagnostics** tab, and set or confirm the following parameters:
   - BERT Patterns = **2^23-1**
   - Insert Error = **Logic** and **BPV**

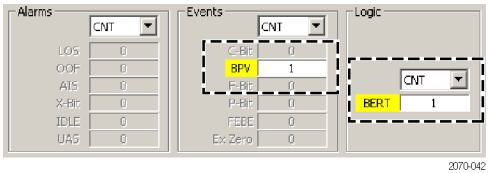
5. Click the **Restart** button. The application Alarms and Events display shows the message **NO ERRORS**, with a signal level

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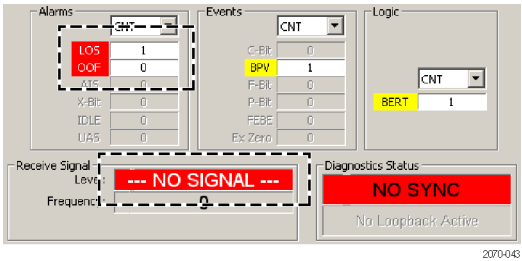
readout of approximately 0.0 dB (0.0 Vpk), and a frequency reading of approximately 44736000 HZ.



6. On the **Diagnostics** tab, click the **Insert** button. The Events and Logic areas show BPV and BERT errors.



7. Unplug the DS3 coaxial cable from both DS3 connectors. The Alarms area shows one or more alarm conditions, with the primary alarm being a loss of signal (LOS). The Receive Signal area also shows a NO SIGNAL message.



You have completed the functional verification.

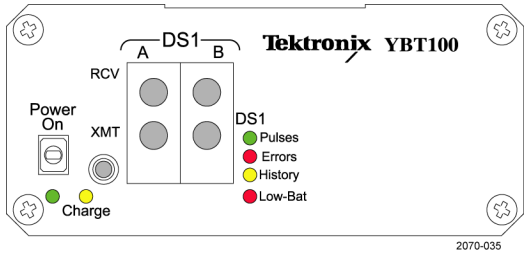
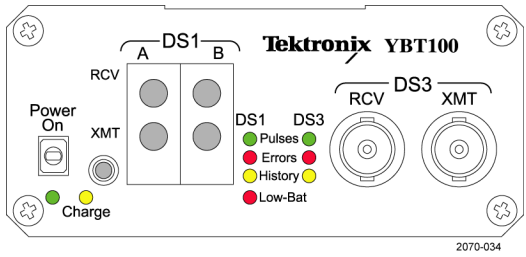
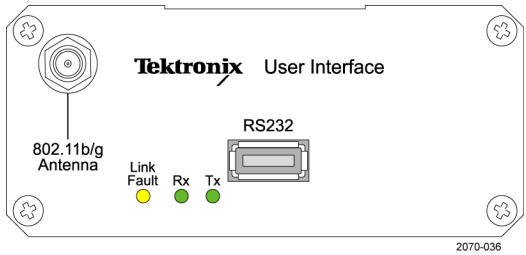
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Operating Basics

The YBT100 and YBT100DS3 Front and Rear Panels

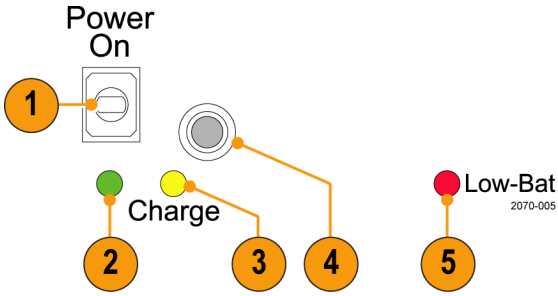
Table 1 shows the YBT100 and YBT100DS3 front and rear panel connectors and indicators. The following sections describe these items.

Table 1: YBT100 and YBT100DS3 connectors and indicators

YBT100 Front panel	
YBT100DS3 Front panel	
Rear panel (both models)	

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Front Panel: Power Connectors and Status LEDs

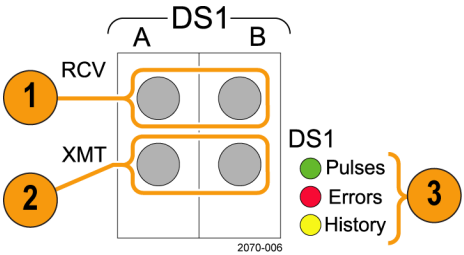


1. **Power** On/Off switch
2. **Power** status LED (green) lights when the instrument is powered on.
3. **Charge** status LED (yellow) lights when the battery pack is being charged.
4. **Power adapter jack** for connecting from AC power adapter.
5. **Low Bat** status LED (red) lights when the battery has approximately 20 minutes of power left.

NOTE. *The YBT100 and YBT100DS3 battery pack is not user-replaceable. Contact Tektronix to obtain information on replacing the battery pack.*

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Front Panel: DS1 Connectors and Status LEDs

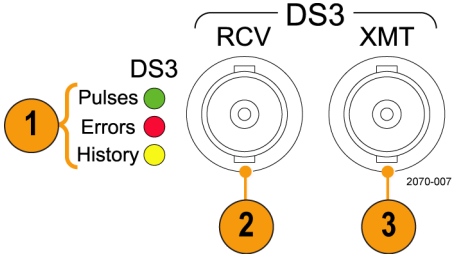


1. **DS1 A, DS1 B RCV**: Bantam-type jacks for test signals entering the instrument (input).
2. **DS1 A, DS1 B XMT**: Bantam-type jacks for test signals leaving the instrument (output).
3. The **DS1** signal status LEDs (valid for DS1-A signals only):
   - The **Pulses** LED (green) lights when the instrument detects valid signal pulses on the DS1 A RCV connector. This LED does not light for DS1 B pulses.
   - The **Errors** LED (red) lights when the instrument detects an alarm or event on the DS1 A RCV connector. Remains lit until the alarm or event stops occurring. This LED does not light for DS1 B errors.
   - The **History** LED (yellow) lights when the instrument has detected a signal alarm or event on the DS1 A RCV connector. The History LED remains lit until the instrument is cleared with the application RESTART button. This LED does not light for DS1 B error history.

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Front Panel: Option DS3

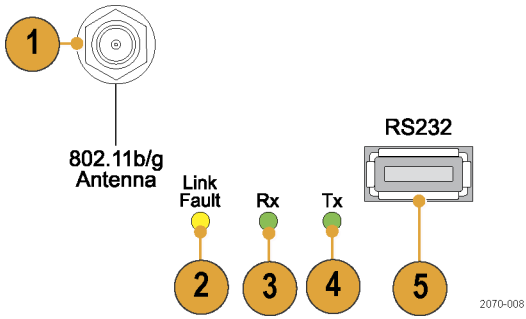
Option DS3 adds the following DS3 features to the standard front panel:



1. **DS3 Signal Status LEDs**: Refer to the descriptions for the DS1 Signal Status LEDs.
2. **RCV**: BNC-type connector for DS3 test signals entering the instrument (input).
3. **XMT**: BNC-type connector for DS3 test signals leaving the instrument (output).

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Rear Panel Connectors and LEDs



1. The **802.11 Antenna** connector for the supplied IEEE 802.11 b/g wireless LAN antenna. Connect the antenna if you are communicating with a PC that has an 802.11 b/g wireless interface.

2. The **Link Fault** status LED (yellow) lights when there are data errors in the serial communications between the YBT100 and the connected PC or NetTek Y400.

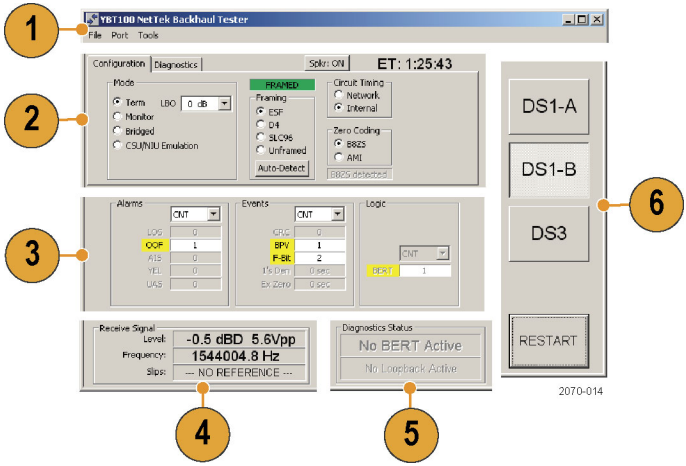
3. The **RX** status LED (green) flashes when the instrument is receiving data from the remote device (PC or NetTek Y400).

4. The **TX** status LED (green) flashes when the instrument is sending data to the remote device (PC or NetTek Y400).

5. The **RS232** USB physical/RS-232 electrical (57.6Kbps, 8N1) interface. This connector is not a USB port. Use this port to connect to the RS-232 serial COM port on your remote device, using only the supplied YBT100 USB/RS232 cable.

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User Interface



1. The **Menu bar** contains the application menu items.
   - The **File** menu lets you export a bitmap image of the current YBT100 screen, and exit the application.
   - The **Port** menu lets you select which port to use to communicate with the YBT100 (RS-232 COM port or 802.11 wireless). (See page 5, *Setting Up Communications to a PC or NetTek Y400*.)
   - The **Tools** menu lets you display information about the YBT100.
2. The **Setup Tabs** configure the test and diagnostic parameters. (See page 43, *Parameter Settings*.) Select a tab to display the associated controls or settings:
   - The **Configuration** tab sets mode, signal framing, circuit timing (clock) source, and zero coding parameters.
   - The **Diagnostics** tab sets BERT patterns, error insertion types, and loopback setup parameters.
3. The **Alarms and Events** area displays NO ERRORS when there are no alarms or events, or lists the alarms and events with error conditions highlighted. (See page 44, *Alarms and Events*.)

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4. The **Received Signal Status** area displays received test signal level in dBD (dBdsx) and Vp-p, and frequency (in Hz), as well as signal slips. Slips compares the DS1 A signal clock or timing to a reference clock (connected to the DS1 B RCV jack), and displays the difference in frequency deviation (Hz) and slips (count).

5. The **Diagnostic Status** area displays BERT pattern lock and Loopback activity status.

6. The **Test Type** buttons select the type of test that you are taking (DS1 or DS3). Note that the DS3 button is only enabled with YBT100 Option DS3.

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Applications

The procedures in this section assume that you have established communications between the YBT100 instrument and the YBT100 application running on a PC or NetTek Y400 Analyzer Platform. (See page 5, *Setting Up Communications to a PC or NetTek Y400*.)

Monitor a Single DS1 Signal at a DSX Panel

The following is an example of how to set up non-intrusive monitoring of a single DS1 signal at a DSX panel.

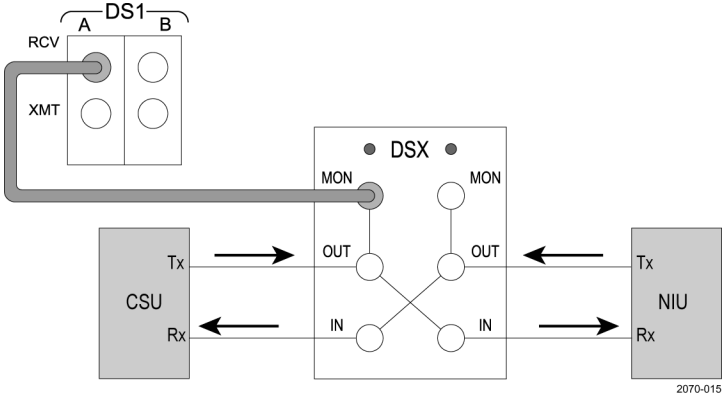


WARNING. *Avoid potential shock hazard. The intra-building interfaces of this product are suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building ports on the equipment must not be metallically connected to interfaces that connect to the outside plant or its wiring.*

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1. On the YBT100 application, click the **DS1-A** button.
2. Click the **Configuration** tab, and set or confirm the following parameters:
   - Mode = **Monitor**
   - Circuit Timing = **Network**
3. Connect the YBT100 DS1 A RCV to a DSX panel **Mon** jack. Making this connection should not cause any alarms.

   Which monitor jack you use depends on the signal that you want to monitor. The illustration shows DS1 A monitoring the CSU transmit signal going to the NIU.



4. Click the **Auto-Detect** button to detect and set the signal framing and zero coding types, and to detect any BERT patterns being transmitted.
5. Click the **Restart** button. The Alarms and Events area displays either NO ERRORS or a list of errors, depending on the received signal.

NOTE. *If you are monitoring live customer traffic, you will probably not be able to establish a pattern sync.*

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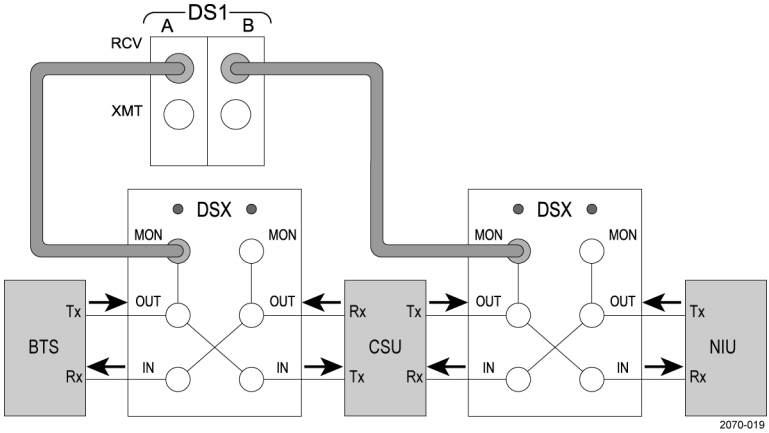
Monitor Two DS1 Signals at a DSX Panel

The YBT100 let you monitor two DS1 signals at the same time. You can use this capability to monitor the same DS1 signal in an attempt to isolate the direction of a fault, or monitor two different DS1 signals. The following example shows how to monitor the DS1 signal on both sides of a CSU device, to verify that the CSU device is working correctly.

1. On the YBT100 application, click the **DS1-A** button.
2. Click the **Configuration** tab, and set or confirm the following parameters:
   - Mode = **Monitor**
   - Circuit Timing = **Network**
   - Click **Auto-Detect** to detect and set the signal framing and zero coding types, and to detect any BERT patterns being transmitted.
3. Click the **DS1-B** button and repeat step 2 to set or confirm the Configuration tab settings.
4. Connect the YBT100 DS1 A and DS1 B RCV jacks to the DSX panel **Mon** jacks. Making these connections should not cause any alarms.

   Which monitor jacks you use depends on the signals that you want to monitor. The illustration shows DS1-A monitoring the BTS to CSU signal, and DS1-B monitoring the CSU to NIU signal. This lets you verify the operation of the CSU.

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5. Click the **Restart** button. The Alarms and Events area either displays the NO ERRORS message, or a list of errors, depending on the received signal.

6. Click between the **DS1-A** and **DS1-B** buttons to monitor each signal.

DS1 Loop Testing

Loop testing is an out-of-service test that creates a loop at a point in the network so that the transmit-side data is returned (or looped) back to the sender at that point. You can then send BERT patterns to evaluate the performance of the looped network. The following table describes common loop test methods:

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Table 2: Loop test methods

Loop test method	Advantage	Disadvantage
Software loop codes sent from a test instrument to enable specific loop-capable devices	Enables a single technician and instrument to test the round-trip traffic performance of the T1 line and network between the current location and a specified loop-capable device or manually-looped signal Quickly identifies if a problem is with the on-site equipment or the T1 network	Cannot determine if a problem is on the transmit or receive signal; tests a signal loop as a unit
Use two test instruments with one set to loop mode (CSU/NIU Emulation)	Tests the round-trip traffic performance of the T1 line and network between the current location and a specified loop-capable device Can identify if a problem is on the transmit or receive signal line	Requires a technician at each site to connect, configure and monitor the test instruments
Manually insert loop plugs at a patch panel	Tests the round-trip T1 network performance between the current location and a manually-looped signal Identify if a problem iswith the on-site equipment or the T1 network	Cannot determine if a problem is on the transmit or receive signal; tests a signal loop as a unit Requires a technician at the remote site to insert loop plugs

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Table 2: Loop test methods, (cont.)

Loop test method	Advantage	Disadvantage
Use the CSU/NIU front panel controls to set the device to loop	Tests the round-trip T1 network performance between the current location and the CSU/NIU loop	Cannot determine if a problem is on the transmit or receive signal; tests a signal loop as a unit Requires a technician at the remote site to enable the CSU/NIU loops
Use the T1 network controls to set a device to loop	Tests the round-trip T1 network performance between the current location and a loop-capable device	Technician may not have access to T1 network control programs Requires network access/permission from a remote site, or coordinating with another technician to enable device loops

The YBT100 Backhaul Tester is capable of sending loop codes and of emulating CSU or NIU equipment in a loop mode.

Loop Codes

A loop code is a binary pattern that causes a loop-capable remote device to activate (loop up) or deactivate (loop down) its loop mode. There are two types of loop codes that are used on T1 networks:

- In-Band loop codes are sent as part of D4/SF and ESF payloads. Most loop-capable devices recognize In-Band codes.
- Out-of-Band loop codes are only sent on ESF-framed systems, and are sent over the Facility Data Link.

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The following table lists common In-Band loop codes:

Table 3: In-Band loop codes

Device	Loop up code	Loop down code
NIU/Smart Jack	11000	11100
CSU	10000	100
Intelligent repeaters	Vendor-specific, typically 16 bits long	

Device Loop Points

It is important to know where in a device a loop is occurring. For example, if a loop device loops the receive signal directly to its transmit output, then enabling a loop on that device does not test the signal through the device itself, only the signal that has gotten to the device.

A loop that sends its input signal directly to its output signal, without passing through the device, is called a front-side loop. In general, NIU and Smart Jack devices provide front-side loops.

Some CSU devices can provide both a front-side loop and a through (or payload) loop. A through loop passes through the device, but does not clear it. For example, a through loop would test the device, but not test the signal connector hardware at the far side of the device.

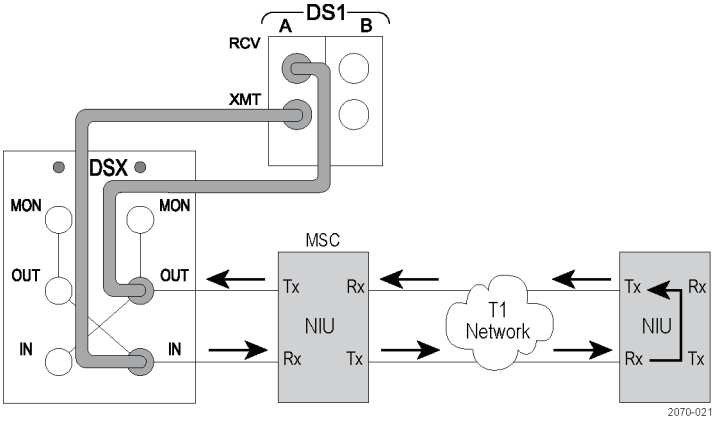
Example DS1 Loop Test

NOTE. *A loop test places the line being tested out of service.*

This example shows how to set up a DS1 loop from a mobile switching center (MSC) to a BTS NIU.

1. Connect the YBT100 DS1 A **RCV** and **XMT** jacks to the DSX panel **OUT** and **IN** jacks, respectively. Making these connections takes that line out of service.

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2. Click the **DS1-A** button.
3. Click the **Configuration** tab, and set or confirm the following parameters:
   - Mode = **TERM**
   - Circuit Timing = **Internal**
   - Framing: Select the appropriate framing for your network
   - Zero Coding: Select the appropriate Zero Coding for your network
4. Click the **Diagnostics** tab and select a BERT pattern to send. (See page 46, *BERT Patterns*.)
5. Select the **Logic** check box in the Insert Error area.
6. Click the **Insert** button to send a logic error. The YBT100 should not show any errors. This step verifies that there are no loopbacks already set up on the network.
7. Click the **Select Loopback** button and select the loop type that is appropriate for your testing.
8. Click the **Loop-Up** button to transmit the loop code and establish a loop at the remote NIU. When the loop is established, the Loop Up button label changes to **Active**. If a loop is not established, you may have a network problem. Verify that you have selected the correct YBT100 parameters and loopback type.

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9. Click the **Restart** button. The Alarms and Events area displays the NO ERRORS message if the looped network has no errors.

10. On the Diagnostics tab, select one or more error types in the Insert Error area. . If you select **Logic**, make sure to also select a BERT pattern.

11. Click the **Insert** button. The Alarms and Events area replaces the NO ERRORS message with a count of the error types that you inserted.

12. Select other BERT patterns and error types to test your network.

13. When done with the loop testing, click the **Loop Down** button to deactivate the remote loop.

14. Click the **Insert** button to send a logic error. The YBT100 should not show any errors. This step verifies that the network loop is down (has been deactivated).

Monitoring a DS3 Signal (YBT100DS3 Only)

The following is an example of how to set up non-intrusive monitoring of a DS3 signal at a DSX-3 panel.

1. Connect a DS3 coaxial cable from the DSX-3 panel **Monitor** jack to the DS3 **RCV** connector.

2. On the YBT100 application, click **DS3**.

3. Click the **Configuration** tab and set/ confirm the following parameters:

   - Mode = **Monitor**
   - Framing: click **Auto**.
   - Circuit Timing = **Network**
   - Zero Coding = **B3ZS**

4. Click **Restart**. The Alarms and Events area displays either the NO ERRORS message or a list of errors, depending on the received signal.

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Monitoring (Dropping) a DS1 Channel from a DS3 Signal (YBT100DS3 Only)

1. Click the **DS3** buton.
2. Click the **Configuration** tab, and set or confirm the following parameters:
   - Mode = **Monitor**
   - Framing = click **Auto-Frame** or select known framing type
3. Click the **DS1 Drop** button, select the T1 channel to monitor (drop), and click the **OK** button.
4. Connect a DS3 coaxial cable from the DSX-3 panel **Monitor** jack to the DS3 **RCV** connector.
5. Click the **Restart** button. The Alarms and Events area displays either the NO ERRORS message or a list of errors, depending on the received signal.

DS3 Loop Testing (YBT100DS3 Only)

NOTE. *A loop test places the line being tested out of service.*

1. Connect the YBT100DS3 DS3**RCV** and **XMT** connectors to the DSX-3 panel **OUT** and **IN** jacks, respectively. Making these connections takes that line out of service.
2. Click the **DS3** button.
3. Click the **Configuration** tab, and set or confirm the following parameters:
   - Mode = **TERM**
   - Circuit Timing = **Internal**
   - Framing: Select the appropriate framing for your network
4. Click the **Diagnostics** tab and select a BERT pattern to send. (See page 46, *BERT Patterns*.)

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5. Select the **Logic** check box in the Insert Error area.

6. Click the **Insert** button to send a logic error. The YBT100 should not show any errors. This step verifies that there are no loopbacks already set up on the network.

7. Click the **Select Loopback** button to open the **DS3 FEAC & Loopbacks** dialog box.

8. Select the loop type that is appropriate for your testing. Click the help button on the dialog box for information on the DS3 loopback settings.

9. Click the **Loop-Up** button to transmit the loop code and establish a loop at the remote NIU. When the loop is established, the Loop Up button label changes to **Active**. If a loop is not established, you may have a network problem. Verify that you have selected the correct YBT100 test parameters and loopback type.

10. Click the **Restart** button. The Alarms and Events area displays the NO ERRORS message if the looped network has no errors.

11. On the Diagnostics tab, select one or more error types in the **Insert Error** area. If you select **Logic**, make sure to also select a BERT pattern.

12. Click the **Insert** button. The Alarms and Events area replaces the NO ERRORS message with a count of the error types that you inserted.

13. Select other BERT patterns and error types to test your network.

14. When done with the loop testing, click the **Loop Down** button to deactivate the remote loop.

15. Click the **Insert** button to send a logic error. The YBT100 should not show any errors. This step verifies that the network loop is down (has been deactivated).

16. Repeat steps 7 through 15 to perform loopback testing or send FEAC codes on the DS3 network.

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Measurement Logs

The YBT100 Circuit-Log function lets you log (save) up to 500 DS1-A measurement results in nonvolatile memory in the YBT100 module, and recall them for viewing.

NOTE. *Measurement logging is not available for DS1-B or DS3 measurements.*

Logging a Measurement

1. Set up and take the measurement for which you want to log (save) results.
2. Click the **DS1-A** button.
3. Click the **Diagnostics** tab.
4. Click the **Circuit-Log** button.
5. Enter the circuit ID of the current measurement, or other label, in the **Current Circuit-ID** field.
6. Enter the name or identifier of the technician taking the measurement in the **Tech-ID** field.

NOTE. *The combination of the Current Circuit-ID and Tech-ID fields identifies a unique location, or folder, in nonvolatile memory that contains measurement results.*

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7. Click the **Save-ID's** button to create a test results storage folder in nonvolatile memory.

8. Click the **Store Test Results** button to store the current results to the folder shown in the Current Circuit-ID and Tech-ID fields. You can continue clicking Store Test Results to save more measurement results.

9. To save measurements to a different folder, enter new values in the **Current Circuit-ID** and **Tech-ID** fields and click the **Save-ID's** button. If the folder already exists, results are stored in that folder. If the folder does not exist, the YBT100 creates a new folder in which to save results.

NOTE. *You must click the Save-ID's button to save results to a new location. Just changing the values in either the Current Circuit-ID or Tech-ID fields does not save test results to a new location.*

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10. Click **EXIT** or **OK** to exit the Test & Results Logs dialog box.

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Viewing a Measurement Log File

1. Click the **DS1-A** button.
2. Click the **Diagnostics** tab.
3. Click the **Circuit-Log** button.
4. Click the **Get Stored Logs** button.
5. Click the **Next** and **Prev** buttons to display the folder in the Log Circuit-ID field from which to view results.
6. Click the **View** button. The YBT100 closes the dialog box and displays the first results log entry in the YBT100 application. A yellow **LOG View** icon at the top of the screen indicates that you are viewing logged measurements.
7. Click the **Prev** or **Next** buttons to select and display other measurement log results on-screen.
8. Click the **Info** button to display information about the displayed measurement log.

   Click the **Circuit-Log** button, then click the **EXIT** button to exit the Test & Results Logs dialog box and stop viewing saved measurement results. The YBT100 restores the measurement and instrument settings that were present before the saved measurement results were viewed.

Deleting Measurement Log Files

1. Click the **DS1-A** button.
2. Click the **Diagnostics** tab.
3. Click the **Circuit-Log** button.
4. Click the **Delete Logs** button. The YBT100 deletes all logged measurements from nonvolatile memory.

Auto Test Logs

The YBT100 application provides a set of predefined tests that automatically run and then log their results to nonvolatile memory.

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1. Click the **DS1-A** button.
2. Click the **Diagnostics** tab.
3. Click the **Auto-Test** button.
4. Click a test type. Select the help button next to a test for information on what that test does and use that information to configure the instrument settings for the test.
5. Click the **START TEST** button. If the test requires more information, the YBT100 application displays a dialog box in which you enter or select the required parameters. The auto test then runs, logging measurement results at the current circuit-ID/Tech-ID folder. The application displays a blinking yellow ACTIVE field above the Auto-Test button while an auto test is running. If the test fails, the instrument displays an error message.

NOTE. *The Log Alarms/Events test does not have a set stop point, but continues to log alarm and event results until either the storage memory is full, or the test is manually stopped. To manually stop an auto test, click the* ***Auto-Test*** *button and then click the* ***STOP TEST*** *button.*

Unattended Signal Event Monitoring and Logging

The YBT100 can be left unattended at a location to monitor and/or log error events. Monitoring refers to using the front-panel status LEDs to see if an event occurred, and viewing the results screen to see cumulative errors count on the events. Logging refers to saving snapshots of the error events to a file at regular intervals, and then viewing the files at a later time. (See page 32, *Measurement Logs*.)

Unattended Signal Event Monitoring

NOTE. *When leaving the YBT100 unattended for more than a few hours, use the AC adapter to power the module.*

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Do the following steps to set up for unattended error event monitoring (for DS1 A and B signals, and DS3 signals on the YBT100DS3):

1. Set up the YBT100 parameters for the signal conditions that you want to monitor.
2. Click the **Restart** button to start the test and verify that you do not have any errors. Also verify that the DS1 and/or DS3 Error and History LEDs on the front panel are not lit.
3. Exit the YBT100 application.
4. Disconnect the communications link from the YT100 (unplug the RS-323 cable from the YBT100, or disconnect the 802.11 b/g wireless communications if necessary).
5. When you return to the YBT100, look at the front-panel status LEDs to see if there have been any events (the History LED is lit).
6. Reestablish communications between the laptop or NetTek Y400 and the YBT100 (RS-232 or 802.11b/g wireless).
7. Start up the YBT100 application on the laptop or NetTek Y400.
8. View the Alarms and Events area to see the current number of alarm, event, and logic errors.

NOTE. *The DS1 Error and History LEDs do not light for DS1 B signal errors. However, the YBT100 module does monitor error events that occurred on the DS1 B connector.*

Unattended Signal Event Logging

NOTE. *Logging is not available for DS1 B or DS3 error events.*

When leaving the YBT100 unattended for more than a few hours, use the AC adapter to power the module.

Do the following steps to set up for unattended error event logging on the DS1 A jack:

1. Connect the signal to monitor to the YBT100 DS A RCV jack.
2. Set up the YBT100 parameters for the signal conditions that you want to log.

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3. Click the **Restart** button to start the test and verify that you do not have any errors. Also verify that the DS1 Error and History LEDs on the front panel are not lit.
4. Click the **Diagnostics** tab.
5. Set up the YBT100 to log measurements. (See page 32, *Measurement Logs*.)
6. Click the **Auto-Test** button.
7. Click the **Log Alarms/Events** button.
8. Click the **START TEST** button.
9. Select the time interval for saving logs and click OK. The YBT100 application does a restart and begins logging events at the specified interval.
10. Exit the YBT100 application.
11. Disconnect the communications link from the YT100 (unplug the RS-323 cable from the YBT100, or disconnect the 802.11 b/g wireless communications if necessary).
12. When you return to the YBT100, look at the front-panel status LEDs to see if there have been any DS1 events (the History LED is lit).
13. Reestablish communications between the laptop or NetTek Y400 and the YBT100 (RS-232 cable or 802.11b/g wireless).
14. Start up the YBT100 application on the laptop or NetTek Y400.
15. View the Alarms and Events area to see the current number of alarm, event, and logic errors.
16. View the log files for events. (See page 34, *Viewing a Measurement Log File*.)

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Appendix A: Specifications

Table 4: Electrical characteristics

Characteristic	Description
DS1 Receiver (RCV)	
Modes	Term, Monitor, Bridged, CSU/NIU Emulation
Impedance	Terminate, Monitor, Loopback: ~100 Ω Bridge: >1000 Ω
Sensitivity	Monitor: -15 to -32dB Terminate/Bridged: +6 to -36 dB
Internal clock accuracy	1.544 MHz, ±10 ppm
Network loop frequency accuracy	±300 ppm
Frequency measurement	Resolution: 0.1Hz Accuracy: ±7 ppm (±1.472 Hz)
Sensitivity	Monitor: -15 dB to -32 dB Terminate and Bridged: +6 dB to -36 dBdsx Resolution and Accuracy: -1.0 dB to -39.0 dB; ±1.25 dB
Framing	ESF, D4, SLC96, UnFramed
Line codes	B8ZS, AMI
Detected alarm and error events	LOS, OOF, AIS, YEL, UAS, CRC, BPV, F-bits, 1's D, ExZ
Supported loopback types	NREM, NLOC, NDU1, NDU2, CREM, CLOC, CDU1, CDU2, HTU-R, HTU-C, HRE-1, HRE-2, ARM, CSU, NIU4 fac1, NIU5 fac2, Payload, LINE, Network, Self-loop, Local-NW
BERT patterns	Off | QRSS | 1:7,1in8 | 3 in 24 | All-1's | All-0's | Alt, 1:1 | DALY | B-TAP | 2^15–1 | 2047 | 2 in 8 | 1 in 16 | Auto

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Table 4: Electrical characteristics, (cont.)

Characteristic	Description
DS1 Transmit (XMT)	
Impedance	100 Ω, nominal
Line Buildout (LBO) levels	0 dB, -7.5 dB, -15 dB and -22.5 dB
Clock	Frequency: 1.544 MHz Accuracy: ±10 ppm
Framing	ESF, D4, SLC96, UnFramed
Line codes	B8ZS, AMI
Supported loopback types	NREM, NLOC, NDU1, NDU2, CREM, CLOC, CDU1, CDU2, HTU-R, HTU-C, HRE-1, HRE-2, ARM, CSU, NIU4 fac1, NIU5 fac2, Payload, LINE, Network, Self-loop, Local-NW
BERT patterns	Off | QRSS | 1:7,1in8 | 3 in 24 | All-1's | All-0's | Alt, 1:1 | DALY | B-TAP | 2^15–1 | 2047 | 2 in 8 | 1 in 16 | Auto
DS3 Receive (RCV)	
Modes	Monitor, Terminate, THRU
Framing	C-bit, M13, UnFramed, Auto
Line code	B3ZS
Clock	Frequency: 44.736 MHz Accuracy: ±20 ppm
Impedance	75 Ω nominal
Sensitivity	DSX: up to 26 dB resistive Accuracy: ±1.25 dB
Error insertion	Logic, BPV, F-Loss
Detected alarms and events	Alarms: LOS, OOF, AIS, X_Bit, Idle, UAS Events: C-BIT, BPV, F-Bit, P-Bit, FEBE, Ex Zero Logic: BERT error
BERT patterns	Off | 2^23-1 | 2^20-1 | 2^15-1 | QRSS | 1010 | 1111 | 1100 | Tx IDLE | Tx AIS | Tx RAI | 1000 | 3 in 24
FEAC codes	Display any of 11 received FEAC codes or NONE

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Table 4: Electrical characteristics, (cont.)

Characteristic	Description
Supported loopback types	DS3 Line, DS3 NIU, All DS1 Channels, DS1 channel 1-28, Self-Loop, Local-NW
DS3 Transmit (XMT)	
Modes	TERM, Monitor, THRU, THRU No Generation, DS1 Drop
Framing	C-bit, M13, UnFramed
Line code	B3ZS
Clock	44.736 MHz, ±20 ppm
Impedance	75 Ω nominal
Transmit levels	DSX, DSX-HI, DSX-LO
Error insertion	Logic, F-bit, BPV, C-bit, P-bit, Ex-Zero
BERT patterns	Off | 2^23-1 | 2^20-1 | 2^15-1 | QRSS | 1010 | 1111 | 1100 | Tx IDLE | Tx AIS | Tx RAI | 1000 | 3 in 24
Supported loopback types	DS3 Line, DS3 NIU, All DS1 Channels, DS1 channel 1-28, Self-Loop, Local-NW

Table 5: Environmental characteristics

Characteristic	Description
Temperature range	Operating: 0 to +50 °C (+32 °F to +122 °F) Storage: -20 to +70 °C (-4 °F to +158 °F)
Humidity	Operating: 4% to 90% RH, noncondensing
Altitude	Operating: Up to 3,000 m (9,843 ft.)

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Table 6: Physical characteristics

Characteristic	Description
AC adapter	AC in: 100-120 VAC, 60Hz, 0.18 A DC out: 9 VDC, 1.0 A
Battery	Type: Lithium-Ion Maximum operating time: 8 hours Approximate recharge time (from full discharge): ~8 hours
Dimensions	Height: 4.06 cm. (1.6 in) Width: 9.4 cm. (3.7 in) Depth: 22.9 cm. (9.0 in)
Weight	0.54 kg (1.2 lbs)

Table 7: Standards compliance

Category	Description
T1	AT&T Pub. 62411 ANSI T1.403
T3	ITU-T G.703, G.775 TR-TSY-000009, TR-TSY-000499 ANSI T1.102, T1.107, T1.403

Table 8: Safety compliance

Category	Description
Safety Compliance	UL60950-1:2003 Information Technology Equipment - Safety CSA C22.2 No. 60950-1-03 Information Technology Equipment - Safety

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Appendix B: Parameter Settings

Test Mode Parameters

The test mode parameters are located on the **Configuration** tab.

Term: For intrusive (off-line) testing. Sets the instrument to insert a termination load on the transmit and receive lines, for performing tests such as loop testing, BERT tests, and so on. Use the **LBO** field to set the transmit signal level.

Monitor: For non-intrusive monitoring at a DSX (–20dB) point or at a monitor port on a Smart Jack (NIU). The YBT100 transmitter is off while in MONITOR mode.

Bridged: For non-intrusive monitoring at a high impedance point. The YBT100 receiver line is placed in a >1k ohm high impedance state for monitoring active T1 lines. The YBT100 transmitter is off while in Bridged mode.

CSU/NIU Emulation: Configures the YBT100 test system to respond to CSU, NIU-4, and NIU-5 (Smart Jack) loop codes. Upon reception of a loop code, the YBT100 system beeps and displays the type and status of the loop signal detected (for example, **NIU-5 loopback activated!**). The YBT100 then loops the RCV data to the TX output. The test mode must be set to TERM, and Circuit Timing set to Network, to use the CSU/NIU emulation mode.

Framing Parameters

The framing parameters are located on the **Configuration** tab.

ESF (Extended SuperFrame): A frame structure containing 24 T1 frames. ESF framing allows a line to be monitored during normal operation and provides room for CRC bits and other diagnostic commands.

D4 (SuperFrame): A frame structure containing 12 T1 frames grouped into a superframe (SF).

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SLC96: A framing type used in traditional telco carrier systems (not used in wireless applications). SLC96 is a complex frame structure that contains 72 T1 frames, and is a variation of standard D4/SF framing.

M13 (Option DS3 only): A frame structure containing seven subframes with eight 85–bit blocks in each subframe.

C-Bit (Option DS3 only): The same structure as M13. The difference is how the C-bits are used for additional data, alarm, and error indication.

Unframed: The signal is not framed.

Network Timing Parameters

The network timing parameters are located on the **Configuration** tab.

Network: Recover clock timing from the received signal.

Internal: Clock timing is from an internal reference clock.

Zero Coding Parameters

The zero coding parameters are located on the **Configuration** tab.

B8ZS: Detect B8ZS coding in the received DS1 signal.

AMI: Detect Alternate Mark Inversion (AMI) coding in the received DS1 signal.

B3ZS (YBT100DS3 only): Detect B3ZS coding in the received DS3 signal.

Alarms and Events

The YBT100 continuously monitors the DS1 or DS3 signal for error conditions. The NO ERRORS message indicates that no alarms, events or bit errors have been received since the last test restart. When the YBT100 detects an alarm or event, the YBT100 replaces the NO ERRORS message with a list of alarms and a count of the events for each alarm.

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Alarm Types

LOS (Loss of Signal): no measurable signal at the instrument.

OOF (Out of Frame): invalid or no framing pattern detected.

AIS (Alarm Indication Signal): An equipment alarm message indicating loss of the originating signal or when the incoming signal is disrupted.

YEL (Yellow alarm): An equipment alarm message that indicates loss of an incoming signal.

UAS (Unavailable Seconds): The number of seconds after 10 consecutive seconds of SES (severe errored seconds).

Click the drop-down list above the Alarms list to select the type of alarm readout:

- CNT (count): The number of alarm events.
- SEC (seconds): The duration of alarm events.

NOTE. *An alarm condition cannot be cleared until the condition goes away. For example, you must receive valid DS1 signal pulses before you can clear a DS1 LOS alarm.*

Event Types

C-Bit: The number of errors in the C-Bit channel.

CRC (Cyclic Redundancy Check): The number of corrupted payloads in ESF frames.

BPV (Bipolar Violation): The number of Bipolar Violations received during the test duration.

F-Bit (Framing Bit): The number of framing bit errors.

P-Bit (Parity Bit): The number of parity bit errors.

FEBE (Far End Block Errors): Sent by terminating device when it receives an C-Bit or F-Bit error.

1's Den (Ones Density): Ones density testing has failed.

Ex Zero (Excessive Zeros): The number of excessive consecutive zeros errors (15 zeros for AMI; 7 zeros for B8ZS).

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Event Readout Units

Click the drop-down list above the Events list to select the type of event readout units:

CNT (count): The number of bits in error.

BER (Bit Error Rate): The bit error rate (number of bits in error/total received bits) since the start of the test.

ES (Errored Seconds): The number of seconds in which one or more errors occurred.

EFS (Error Free Seconds): The number of seconds that a test has run without errors.

%EFS (Percent Error Free Seconds): The ratio of the EFS to the total current test duration.

SES (Severely Errored Seconds): The total number of seconds with an error rate ≥1.0e-3.

%SES (Percent Severely Errored Seconds): The ratio of SES errors to the total current test duration.

BERT Patterns

The BERT pattern parameters are located on the **Diagnostics** tab.

Off: Disable BERT pattern sending or detection.

DS1 and DS3 Patterns

NOTE. *DS3 BERT patterns are only available on the NetTek YBT100DS3 module.*

QRSS: Quasi-random signal formed from 20 bits with a maximum of 14 consecutive zeros.

2^15-1: A quasi-random sequence of 32767 bits which contains up to 14 consecutive zero's.

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3 in 24: Three ones in 24 bits (0100 0100 0000 0000 0000 0100), used to stress AMI lines and clock recovery.

DS1-Only BERT Patterns

1:7, 1in8: Used for stress testing AMI & B8ZS lines (0100 000).

3 in 24: Three ones in 24 bits (0100 0100 0000 0000 0000 0100), used to stress AMI lines.

All-1's: All data content is 1's (1111). In unframed mode this is interpreted as AIS.

All-0's: All data content is 0's 0000.

Alt, 1:1: Alternating 1 and 0 (1010).

Auto: Automatically identifies and synchronizes to the incoming BERT pattern.

Daly: A pattern that obeys pulse density and consecutive zeros rules in both AMI and B8ZS coding.

B-Tap (bridge tap): A sequence of patterns that emulates specific frequencies on a T1 line. DS1 only. The patterns and sequence are all 1's, 1:1, 1:3, 1:5, 1:6, 1:7, 2:8, 2:9, 2:10, 2:11, 2:12, 2:13, 2:14, 3in18, 3in19, 3in20, 3in21, 3in22, 3in23, 3in24, and QRSS.

NOTE. *B-tap is rarely used in loopback scenarios and can not be run end-to-end with another test set.*

2047: A 2,047 Bit sequence commonly used for 64K DS0 channel testing (DDS).

1 in 16: A pattern that violates 1's density but stresses clock recovery circuitry.

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DS3-Only BERT Patterns

NOTE. *DS3 BERT patterns are only available on the NetTek YBT100DS3 module.*

2^23-1: A 23-stage shift register pattern, emulates random data.

2^20-1: A 20-stage shift register pattern, emulates random data.

1010: A pattern that simulates RAI in non-ANSI elements.

1100: A pattern that simulates AIS in non-ANSI elements.

1111: A pattern that simulates IDLE in non-ANSI elements.

Tx Idle: Transmits Idle alarm per ANSI specifications (proper C and X bit).

Tx RAI: Transmits RAI alarm per ANSI specifications (proper C and X bit).

Tx AIS: Transmits AIS alarm per ANSI specifications (proper C and X bit).

1000: A pattern to test B3ZS (1000…1000..1000).

Loopback Settings

The YBT100 can perform both DS1 and DS3 loops. The loopback parameters are accessed by clicking on the **Select Loopback** button on the **Diagnostics** tab. Click the help button on the **DS1 Loopback** or **DS3 FEAC & Loopbacks** dialog box for information on the loop types and controls.

Spkr Button

The Spkr button toggles on or off the emitting of an audio tone when the module detects errors.

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