HDT-1000S2

Compact HD/SD Digital Video Transmitter

User and Technical Manual

VISLINK

MRC

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General Safety Information The following safety requirements, as well as local site requirements and regulations, must be observed by personnel operating and maintaining the equipment covered by this manual to ensure awareness of potential hazards. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

About this Manual This manual is intended for use by qualified operators, installers, and service personnel. Users of this manual should already be familiar with basic concepts of radio, video, and audio. For information about terms in this manual, see *Glossary of Terms and Abbreviations* (Part No. 400576-1). Pay special attention to Notes, Cautions, and Warnings.

Read **Notes** for important information to assist you in using and maintaining the equipment.

Follow **CAUTIONS** to prevent damage to the equipment.

Follow **WARNINGS** to prevent personal injury or death.

Symbols The following symbols may be on the equipment or in this manual:

	WARNING: General Warning. Risk of Danger.		Frame or Chassis Ground: Identifies the frame or chassis terminal.
	WARNING: Risk of Electric Shock.		Earth Ground: Identifies the earth ground terminal.
	CAUTION: Electrostatic Discharge. Possible Damage to Equipment.		Fuse: Identifies fuses or their location.
	Protective Earth Ground: Identifies any terminal intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal on a protective earth electrode.		Waste Electrical and Electronic Equipment (WEEE): The product must not be disposed of with other waste. You must dispose of the waste equipment by handing it over to a designated collection point for recycling.

1   About the HDT-1000S2

The *HDT-1000S2 Compact HD/SD Digital Video Transmitter* is designed for short-range, portable and fixed transmission applications and transmits remote video to a central receive location. The HDT-1000S2 is designed to transmit up to two NTSC (or PAL) standard definition (SD) video signals or one high-definition (HD) video signal (up to 1080i) plus two audio signals and an RS-232 data channel. Common uses include law enforcement surveillance and video collection.

The HDR-1000 can transmit DVB-T COFDM digital transmissions consisting of either standard definition (SD) (NTSC or PAL) or high-definition (HD) video formats. The transmitter uses the H.264 MPEG video compression format for high-quality imagery.

Accessories You can order an RF cable, omni antenna, and encryption license.

2   Band and Frequency of Operation

The HDT-1000S2 covers the following range:

*   HDT-1000S2   S2 band   2.41—2.45 GHz (unlicensed)*

* Unlicensed operation under FCC Part 15 in S Band is factory limited to 2.414 - 2.458 GHz

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

3   Unpacking the HDT-1000S2

Before you install your new equipment, carefully unpack your new equipment to avoid accidental damage.

- Locate all parts and accessories and verify that they are listed on the packing list. DO NOT discard the container or packing material until you have inspected the equipment and are sure there is no shipping damage. The container and packing must be available in case you need to file a damage claim with the shipping carrier.

- Inspect the equipment for damage and that it is clean and dry.

- Inspect the cables, connectors, switches, and displays to ensure that they are not broken, damaged, or loose.

If you discover damage after unpacking the system, report the damage as follows:

- Immediately file a claim with the shipping carrier.

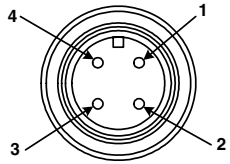- Forward a copy of the damage report to Vislink Customer Service.

Contact Vislink Customer Service to determine the disposition of the equipment.

You can connect the following cables to the HDT-1000S2.

Audio Input	Audio is input to the HDT-1000S2 through the 21-pin front panel connector. Branched cable assemblies are available for either microphone or line level input to the HDT-1000 transmitter.
RS-232 Control	You can control the HDT-1000S2 using an RS-232 command set. A branched cable assembly is available to connect the 21-pin front panel connector to a DB-9M connector.
Auxiliary Data	You can transmit the auxiliary RS-232 data through the HDT-1000. A branched cable assembly is available to connect the 21-pin front panel connector to a DB-9M connector.
Video Input	Video is input to the HDT-1000S2 through the front panel BNC connector. The HDT-1000S2 accepts an NTSC or PAL analog composite signal, as well as an ASI, or HD-SDI digital video signal. You select between analog or digital video input using the web server software.

4 Applying Power

Power consumption for the HDT-1000S2 is 10W nominal. The following table shows the pin-out supply voltages for the Lemo (FGGOB304CLAD52) **DC INPUT** connector. Vislink supplies a DC power cable assembly with each HDT-1000S2.

Connector Information	Pin	Description
	1	+11—+32 Vdc
	2	+11—+32 Vdc
	3	Ground
	4	Ground

CAUTION *Ensure that the power being supplied matches the power required by the equipment.*

The following guidelines for safe operation are derived from OET bulletin 65, August 1997, as recommended by the Federal Communications Commission (FCC).

WARNING *Moderate levels of RF power are present in the unit. Exposure to RF or microwave power can cause burns and may be harmful to health. Remove power from the unit before disconnecting any RF cables and before inspecting damaged cables and/or antennas. Avoid standing in front of high gain antennas (such as a dish antenna) and never look into the open end of a waveguide or cable where RF power may be present.*

The HDT-1000S2 is a mobile transmitter. This unit, operated without an antenna, will not create RF energy exceeding 1.0 mW/cm^2, the FCC limit for exposure. Once connected to an antenna, the potential for harmful exposure will be greatly enhanced.

In this situation, a certain distance from the radiator is to be maintained. Calculations need to be performed to understand what that safe margin for exposure is. This is known as the Maximum Permissible Exposure (MPE) limit.

Note Hazardous RF radiation limits and recommended distances may vary by country. Ensure that all applicable state and federal regulations are observed when using this transmitter.

Calculations provided are for common antennas often utilized in the ENG environment. The following formula used is that suggested by OET 65.

Calculating MPE

EIRP = P * (10 ^ (G / 10)) = (antilog of G/10) * P

P = RF power delivered to the antenna in mW
G = Power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna in centimeters
S = MPE in mW/cm² (milliwatts per square centimeters)

Conversions

dBi to numeric gain = Antilog (dBi/10)
Feet to centimeters = Feet * 30.48
Centimeters to Feet = cm * .0328
4 π = 12.57

User Input

RF power delivered to the antenna = Watts
Antenna gain (referenced to isotropic antenna) = dBi
Distance from the center of radiation = Feet

Calculation steps:

1. [P] RF power input. Watts to milliwatts = Watts * 1000
2. [G] Antenna gain dBi. Numeric gain = Antilog (dBi/10)
3. [EIRP] Multiply P * G
4. [R] Centimeters to feet = Centimeters * .0328
5. Square R
6. Multiply R² * 4π
7. [S] Divide (R² * 4π) into EIRP

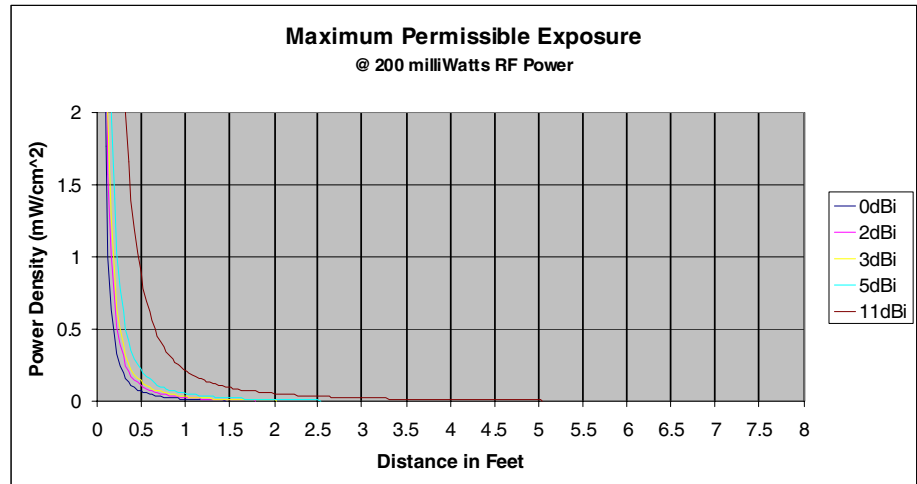   S = Power Density in milliwatts per square centimeters.

Note   At frequencies above 1500 MHz, S must not be greater than 1.

Reference

FCC OET Bulletin 65, August 1997 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields

The figure to the right is a typical graph for a Vislink HDT-1000S2 Transmitter and show the permissible exposure distance for various antennas. Graphs and data will vary, based on the actual transmitter, output power, frequency, and antenna utilized. One plot provides the permissible output of the transmitter for digital modulation, and the other plot for analog modulation.

Maximum Permissible Exposure
@ 200 milliWatts RF Power

Power Density (mW/cm^2) vs *Distance in Feet*

Legend:
- 0dBi
- 2dBi
- 3dBi
- 5dBi
- 11dBi

To comply with FCC's RF radiation exposure limits for general population, the antennas used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be collocated or operated in conjunction with any other antenna or transmitter.

Vislink, in accordance with the requirements set forth by the FCC, provides this information as a guide to the user. It is assumed that the users of this equipment are licensed and qualified to operate the equipment per the guidelines and recommendations contained within the product user guides and in accordance with any FCC rules that may apply.

WARNING *Changes or modifications to this equipment not expressly approved by VISLINK may void the user's authority to operate the equipment.*
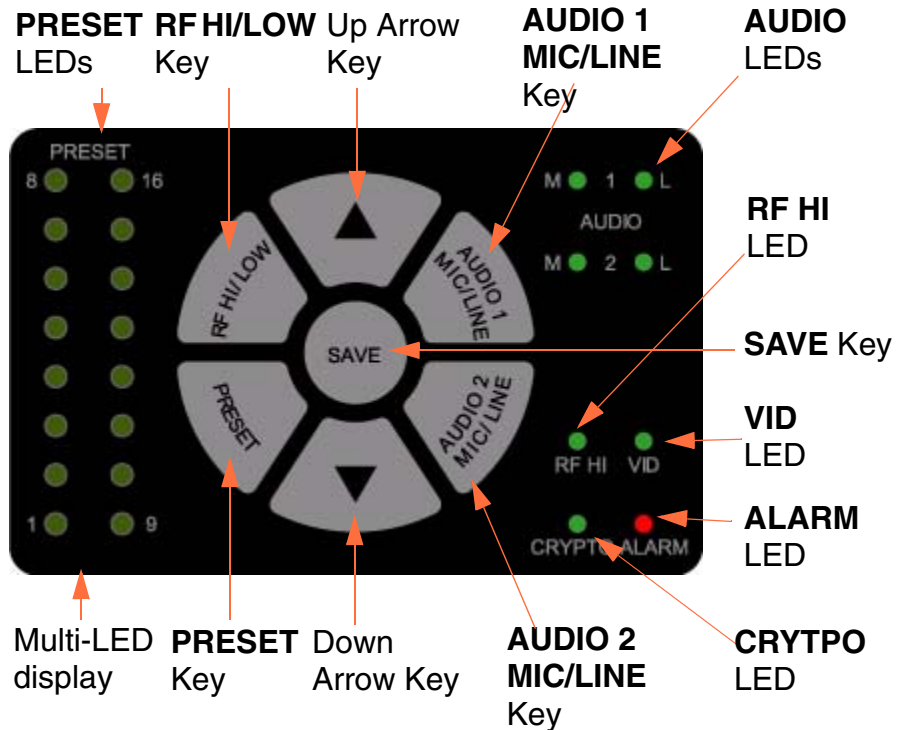
5   Setting Up the HDT-1000S2

You can select presets from the membrane switch control. You can modify preset parameters using a PC with either the Microsoft® Windows XP® or Microsoft® Windows Vista® operating systems. You can configure up to 16 individual preset configurations as follows:

- Select from 16 factory or custom preset configurations
- Configure and save up to 16 custom preset configurations
- Load custom preset configurations from a file on your PC into your HDT-1000S2.
- Apply an encryption key to the presets simultaneously or individually.

The figure to the right and associated table shows the membrane switch control where you select a preset, low or high radio frequency, and audio selections.

The switch control contains a "dark" timer that turns off LEDs after a delay. All LEDs are active for 0.5 seconds after the unit is powered up.

Membrane Switch Control Features

PRESET LED	Displays the selected preset (1-16).
RF HI/LOW	Toggle between high and low power output.
Up arrow	Move up through presets.
AUDIO 1 MIC/LINE	Press to set Audio 1to Mic or Line and press **SAVE** to set.
Audio LEDs	Green when enabled; otherwise dark. M=MIC; L=LINE
RF HI LED	Green when the radio power output is high; dark when low.
SAVE	Sets new preset.
VID LED	Green when a valid NTSC or PAL analog composite video signal, as well as an ASI, or HD-SDI digital video signal is present; otherwise dark
ALARM LED	Red when an alarm occurs; otherwise dark.
CRYPTO LED	Green when encryption is enabled and the transmitter is transmitting the encryption code associated with the preset; dark when disabled.
AUDIO 2 MIC/LINE	Press to set Audio 2 to Mic or Line and press **SAVE** to set.
Down arrow	Move down through presets.
PRESET key	Press to select one of the stored presets (1-16). The PRESET LED indicates the current preset. Use the up or down arrow to select a new preset. Press **SAVE** to select the new setting.
Multi-LED display	Indicates which preset is being used. The LEDs remain lit until another option button is selected or until the dark timer elapses.

5.1   Selecting a Preset

The HDT-1000S2 recalls the most recently saved preset when it is powered up. To select a preset, do the following:

1. Press the **PRESET** key. The currently selected preset LED flashes.
2. Press the up and down arrows to choose the new preset you want.
3. Press the **SAVE** key. The preset LED flashes to indicate the preset was chosen and the LED is illuminated to indicate the operational preset.

If the **SAVE** key is not pressed within 5 seconds, the preset returns to the most recently used value and the selection mode is canceled.

5.2   Selecting the Audio Input Level

The HDT-1000S2 recalls the most recently saved audio input level setting when it is powered up. To select the input level for Audio 1 and Audio 2 between microphone or line level, do the following:

1. Press the **AUDIO 1 MIC/LINE** or **AUDIO 2 MIC/LINE** key. The currently selected audio level LED flashes.
2. Press **AUDIO 1 MIC/LINE** or **AUDIO 2 MIC/LINE** key to toggle between MIC or LINE level.
3. Press the **SAVE** key. The audio level LED flashes to indicate the audio input level was selected and the LED is illuminated to indicate MIC or LINE level setting.

If the **SAVE** key is not pressed within 5 seconds, the audio level returns to the most recently used value and the selection mode is canceled.

5.3   Selecting the RF Output Level

The HDT-1000S2 recalls the most recently saved RF output power level when it is powered up. To select between high or low power for the RF output level, do the following:

1. Press the **RF HI/LOW** key. The currently selected RF Power setting is displayed.
2. Press **RF HI/LOW** key to toggle between HI or LOW RF output level.
3. Press the **SAVE** key to select the new RF Power output setting.

If the **SAVE** key is not pressed within 5 seconds, the RF output level returns to the most recently used value and the selection mode is canceled.

Note	The high power setting is the FCC limit of 0.125W maximum, the low power setting is approximately 0.05W.

5.4 Addressing Alarms

LEDs illuminate when a fault is detected during normal operation of the HDT-1000S2. The following table shows a list of faults and what to do when they appear.

Indicator	Meaning	Suggested Technical Staff Action
RF HI	Illuminates to indicate that the RF Power is set to HI.	Select the power level required to optimize the link.
VID	Illuminates to indicate the presence of a valid NTSC or PAL analog composite video signal, as well as an ASI, or HD-SDI digital video signal.	Check the video camera/source and cabling to ensure the video signal is reaching the transmitter.
CRYPTO	Illuminates to indicate that the transmitter is transmitting the encryption code associated with the preset.	Verify whether encryption is required and properly configured for the selected preset.
ALARM	Illuminates to indicate that there is an alarm or fault detected.	Connect to the ethernet interface to diagnose the source of the alarm.

6   Using a PC to Control the HDT-1000S2

To set up your HDT-1000S2 with a PC, do the following:

1. Connect a LAN cable to the network connection of a router or switch and the ethernet port on the HDT-1000S2.
2. Open a web browser and type 192.168.4.150 into the URL address field and press **Enter**.

To configure the parameters for each preset do the following:

1. Select **Video Settings** from the **Video** drop down menu. The Encoder Setting screen appears.

2. Configure the video and audio parameters as required for the preset and click **Apply**.

3. **Enter**:

   Login =root

   Password = root

Note: The HDT-1000S2 transmit frequency settings may be configured only via the web browser, and only by qualified service personnel when the correct password entered. To avoid unauthorized access, the factory assigned password must be changed immediately, using the procedure outlined in this manual.

4. Select **Video Transport Stream** from the **Video** drop down menu. The Transport Stream Settings screen appears.

5. Configure the video and audio parameters as required for the preset and click **Apply**.

Transport Stream Settings

Transport Stream Information

Transport Stream ID:	20
Transport Stream Version Number:	0
Transport Stream Program Number:	256
PCR PID:	259
PMT PID:	3
Video PID:	515
Video Stream ID:	0
Audio PID:	771
Audio Stream ID:	1
Ancillary Data PID:	1027

DVB Service Information

Network ID:	4096
Original Network ID:	4096
Network Name:	PMR COBRA
Service Type:	SD Digital Television
Service Provider Name:	PMR
Service Name:	PMR COBRA 1213

Apply

6. Select **Encryption Settings** from the **Radio** drop down menu. The Encryption Settings screen appears.

Encryption Settings

Encryption Settings

Encryption Mode:	Disabled
Encryption Key:	5678901234567890123456781234567890123456789012345678901 2fffff

Apply

Note For 128-bit encryption, enter 32 hexadecimal characters.
For 256-bit encryption, enter 64 hexadecimal characters.

7. Select **Ancillary Data** from the **Radio** drop down menu. The Ancillary Data Settings screen appears.

8. Select **Preset Settings** from the **Radio** drop down menu. The Presets screen appears.

9. Configure the video and audio parameters as required for the preset and click **Store**.

7 Recalling a Preset Configuration from a PC

1. Select **Preset** from the **Radio** drop down menu.
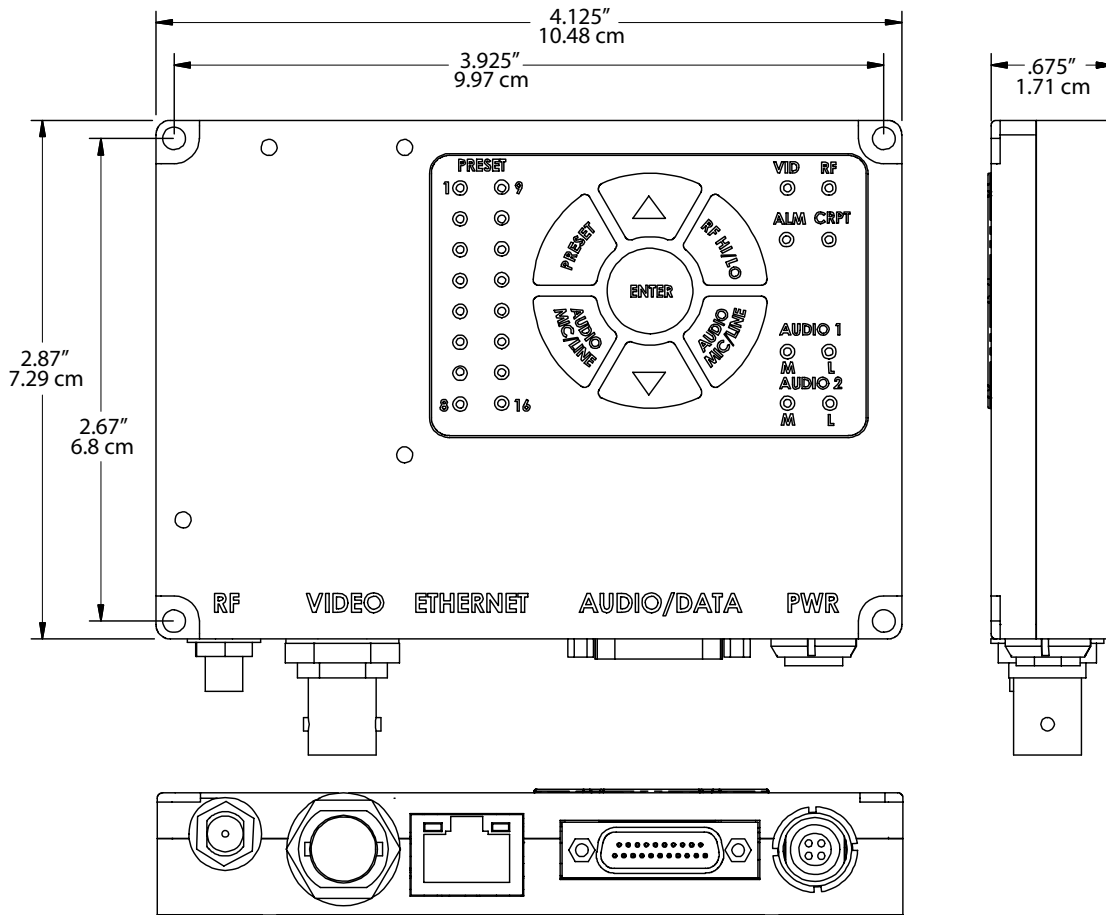2. Select the preset number and click Load. The relevant parameters will be populated under Video and Radio.

Note   The Encryption code will not display.

Click **Logout** to finish setting up the HDT-1000S2.

8   HDT-1000S2 Specifications

The following figure shows a top and end views of the HDT-1000S2.

8.1   RF OUT Connector

The RF TNC female connector attaches the antenna to the unit.

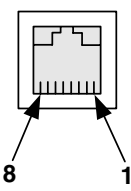| Connector	Pin	Description
Signal / Ground	Pin	Signal
	Ring	Ground

8.2   Video Output Connectors

The BNC female connectors provide HD/SD analog composite video outputs (SMPTE 170M).

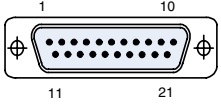| Connector	Pin	Description
Signal / Ground	Pin	Signal
	Ring	Ground

8.3 ETHERNET Connector

The following table shows the pin-out information for the RJ-45 network ethernet connector, which lets you connect the receiver to a computer and use the receiver's web browser interface to control the receiver; also used for the IP streaming data output from the unit.

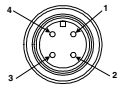| Connector	Pinout	Signal Description	Pinout	Signal Description
	1	TX+	5	not used
	2	TX-	6	RX-
	3	RX+	7	not used
	4	not used	8	not used

8.4 DATA Connector

I/O connector 21-Pin Male D connector pin-outs are shown in the following table:

Connector	Pin	Description	Pin	Description
	1	Video Ground	11	RS232 RXD - Data
	2	GND - Audio 2 Mic	12	Composite Video In
	3	Mic 2 Input	13	GND - Audio 1 Mic
	4	Mic Bias 1	14	Mic 2 Line Input
	5	GND - Mic 1 Shield	15	Mic Bias 2
	6	N/C	16	GND - Mic 2 Shield
	7	N/C	17	N/C
	8	N/C	18	N/C
	9	GND - RS232	19	GND - RS232
	10	RS232 RXD - Control	20	RS232 TXD - Control
			21	RS232 TXD - Data

8.5 DC Power Connection

The following table shows the pin-outs for the Lemo (FGGOB304CLAD52) **POWER IN** 4-pin male power connector. Vislink supplies a DC power cable assembly with each unit.

Connector	Pin	Description
	1	+11—+32 Vdc
	2	+11—+32 Vdc
	3	Ground
	4	Ground

9   Getting Support for Your HDT-1000S2

You can contact the Vislink Technical Support staff as follows:

24-hour Worldwide Technical Support

E-mail: support@mrcbroadcast.com
Telephone: +1 978-671-5929 or
                   888-777-9221

Customer Service

E-mail: customerservice@mrcbroadcast.com
Telephone: +1 978-671-5700 Press **3**
                   Monday-Friday, 8AM-5PM EST USA

When you contact Technical Support, include the following information:

- Model number and serial number of the unit (located on a label on the bottom of each unit).

- Approximate purchase date.

There are no supported field repairs or replacement parts for the HDT-1000S2 system. Return the unit for factory repair.

CAUTION	***If you attempt field repair, you risk damaging your equipment.*** *If your equipment is under warranty, you may also affect your warranty coverage. The HDT-1000S2 requires specialized test equipment and software to calibrate operating characteristics after repair.*

Replacement Parts The only part available is the 21-pin Multi-use (audio, control, data) breakout cable that provides connections to the HDT-1000S2.