

HDX-1100

Aircraft/Terrestrial High Power HD Video Transmitter



User and Technical Manual

Manual Part No. 400613-1 Rev. 2 March 2010

Copyright © 2010

Part number **400613-1**

Printed in U.S.A.

Authorized EU representative: Vislink PLC

Quality Certification Vislink is certified to ISO 9001:2008.

The Vislink trademark and other trademarks are registered trademarks in the United States and/or other countries.

Microsoft®, Windows®, and Internet Explorer® are registered trademarks of Microsoft Corporation in the United States and/or other countries.

Proprietary Material The information and design contained within this manual was originated by and is the property of Vislink. Vislink reserves all patent proprietary design, manufacturing, reproduction use, and sales rights thereto, and to any articles disclosed therein, except to the extent rights are expressly granted to others. The foregoing does not apply to vendor proprietary parts. Vislink has made every effort to ensure the accuracy of the material contained in this manual at the time of printing. As specifications, equipment, and this manual are subject to change without notice, Vislink assumes no responsibility or liability whatsoever for any errors or inaccuracies that may appear in this manual or for any decisions based on its use. This manual is supplied for information purposes only and should not be construed as a commitment by Vislink. The information in this manual remains the property of Vislink and may not be used, disclosed, or reproduced in any form whatsoever, without the prior written consent of Vislink. Vislink reserves the right to make changes to equipment and specifications of the product described in this manual at any time without notice and without obligation to notify any person of such changes.

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.



WARNING: Risk of Electric Shock.



CAUTION: Electrostatic Discharge.
Possible Damage to Equipment.



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.



Frame or Chassis Ground: Identifies the frame or chassis terminal.



Earth Ground: Identifies the earth ground terminal.



Fuse (either icon):
Identifies fuses or their location.



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 HDX-1100

The HDX-1100 Aircraft/Terrestrial High Power HD Video Transmitter (HDX-1100) (shown) is a lightweight and rugged transmitter that is suited for mobile and aircraft environments; able to withstand constant vibration, shock, temperature swings, and humidity. Common uses include law enforcement surveillance and video collection.

The HDX-1100 supports H.264/MPEG-2 and HD/SD. The HDX-1100 can transmit DVB-T COFDM digital transmission (QPSK, 16QAM, 64QAM) consisting of a standard definition (SD) NTSC or PAL video signals or high-definition (HD) video signal (up to 1080i), plus two audio signals and an RS-232 data channel. The transmitter uses the MPEG-2 video compression format for high-quality imagery.



The amplifier operates at 8W for all bands except 4940-4990 MHz which is limited to 1.0W maximum. Low power mode is typically 3 to 6 dB below the maximum rating.

You can control the HDX-1100 with the touch screen user interface (see [Section 3](#)), or an optional remote control unit (RCU) (see [Section 4](#)). You also can configure the HDX-1100 with a PC using a web browser (see [Section 5](#)).

2 Operating in Safety

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

WARNING *High 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 HDX-1100, operated without an antenna, will not create RF energy exceeding 1.0 mW/cm², the FCC limit for exposure. Connecting an antenna to the unit greatly enhances the potential for harmful exposure, and you must maintain a certain distance from the radiator. The following table shows the Maximum Permissible Exposure (MPE) safe distances from the antenna.

Antenna Gain (dB1)	0	2	3	5	11
Safe Distance (cm)	4	6	6	8	15
Safe Distance (in)	1.57	2.36	2.36	3.15	5.9

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

To perform calculations to understand the safe exposure margin (MPE), use the following formula suggested by OET 65. The calculations provided are for common antennas often utilized in the ENG environment.

Calculating MPE

$$\text{EIRP} = P * (10 ^ { (G / 10)}) = (\text{antilog of } G/10) * P$$

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:

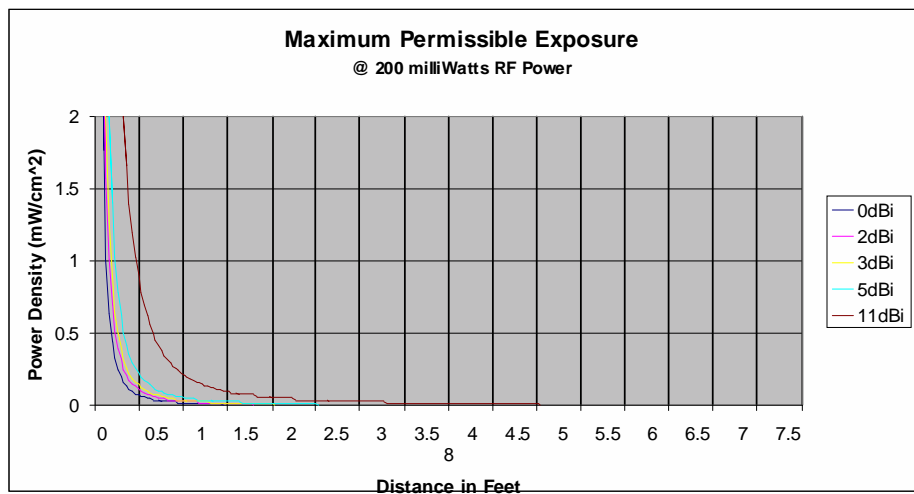
1. [P] RF power input. Watts to milliwatts = Watts * 1000
2. [G] Antenna gain dBi. Numeric gain = Antilog (dBi/10)
3. [EIRP] Multiply P * G
4. [R] Centimeters to feet = Centimeters * .0328
5. Square R
6. Multiply R² * 4π
7. [S] Divide (R² * 4π) into EIRP
S = Power Density in milliwatts per square centimeters.

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 HDX-1100 Transmitter and shows 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.



Vislink, in accordance with the requirements set forth by the FCC, provides this information as a guide to the user and assumes 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.

3 Setting the HDX-1100 With the Touch Panel

The touch panel screen on the front of the unit lets you control the HDX-1100 directly as described in the following sections.

3.1 Selecting a Preset

The HDX-1000 recalls the most recently saved preset when it is powered up. You can select from up to 16 factory or custom preset configurations. To select a preset, do the following:

1. Press the **PRESET** key.
2. Press the up and down arrows to choose the new preset you want.
3. Press the **SAVE** key. 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.

3.2 Selecting the Audio Input Level

The HDX-1100 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.
2. Press **AUDIO 1 MIC/LINE** or **AUDIO 2 MIC/LINE** key to toggle between MIC or LINE level.
3. Press the **SAVE** key. 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.

3.3 Selecting the RF Output Level

The HDX-1100 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.
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.

4 Setting the HDX-1100 with the RCU

You can install the remote control unit (RCU) up to 100 feet from the HDX-1100 using a 3-wire serial interconnection and a power source. The following figure shows the RCU.



Function	Name	Description
Push Buttons	RF PWR	Turns the unit on and off.
	BRIGHTNESS	Sets the display brightness to high (H), low (L), or automatic (A; light sensing).
LED Displays	STBY	Indicates the HDX-1100 is in standby mode (not transmitting).
	XMIT	Indicates the HDX-1100 is in transmit mode.
	DC OK	Indicates DC Power is applied to the Remote Control Panel and transmitting.
	FAULT	Indicates an error condition in the HDX-1100 transmitter.
	HI	Indicates the HDX-1100 is in high RF output power mode.
	LO	Indicates the HDX-1100 is in low RF output power mode.
	DIG	Indicates the HDX-1100 is transmitting a digital signal.
	ANA	Indicates the HDX-1100 is transmitting a analog signal.
Rotary Switches	RF PWR	Sets the HDX-1100 to HI or LO power mode.
	PRESET	Select from 1 to 16 presets.
	CHANNEL	
LCD Display	PRESET	Displays the current preset number.

Use a 9-pin RS-232 null-modem cable to connect the communication path between the RCU and the HDX-1100.

A receptacle at the rear of the controller supplies DC power to the RCU. Vislink provides the 2-pin Weidmuller connector (Part # 52104-2) to connect to the power receptacle at the rear of the controller. The required power range is from +10—+50 Vdc (negative ground only).

If the RCU displays a C in the preset window, the HDX-1100 has lost power or a communication error has occurred. If this happens, check the power and serial cable connections.

5 Setting the HDX-1100 with a PC

To set up your HDX-1100 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 HDX-1100.
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 Settings screen appears.
2. Configure the video and audio parameters as required for the preset and click **Apply**.

The screenshot shows the Vislink web interface for Encoder Settings. At the top, there is a navigation bar with tabs for Info, System, Network, Video, Radio, and Logout. The main heading is "Encoder Settings". Below this, there are two sections: "Video Settings" and "Audio Settings".

Video Settings:

- Input A: Composite
- Input B: Disabled
- Resolution: 720x480i
- Framerate: 29.97 fps
- Encode Mode: H.264
- Entropy Mode: CABAC
- GOP Structure: I/P Frames
- Slices: 1 Slice per Frame
- GOP Length: 60

Audio Settings:

- Mode: Analog
- Level: Line Level
- Samplerate: 48 Khz
- Encode Mode: MPEG Layer II

At the bottom of the settings area, there is an "Apply" button.

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

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

Transport Stream Settings

Transport Stream Information

Transport Stream ID:

Transport Stream Version Number:

Transport Stream Program Number:

PCR PID:

PMT PID:

Video PID:

Video Stream ID:

Audio PID:

Audio Stream ID:

Ancillary Data PID:

DVB Service Information

Network ID:

Original Network ID:

Network Name:

Service Type:

Service Provider Name:

Service Name:

5. Select **RF Settings** from the **Radio** drop down menu. The RF Band Settings screen appears.

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

RF Band Settings

RF Settings

RF Band Configuration:

RF Band Description:

RF Channel Frequency:

Power Output Mode:

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

The screenshot shows the VISLINK web interface with a navigation bar containing 'Info', 'System', 'Network', 'Video', 'Radio', and 'Logout'. The 'Radio' menu is selected, leading to the 'Modulation Settings' page. The page title is 'Modulation Settings'. Below the title is a form with the following fields:

- Type: COFDM-DVB-T (dropdown)
- Modulation: QPSK (dropdown)
- FEC: 1/2 (dropdown)
- Guard Interval: 1/32 (dropdown)
- Bandwidth: 8 MHz (dropdown)
- Variable Bandwidth: 0 (input) and 32768 (input)

An 'Apply' button is located below the form.

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

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

The screenshot shows the VISLINK web interface with a navigation bar containing 'Info', 'System', 'Network', 'Video', 'Radio', and 'Logout'. The 'Radio' menu is selected, leading to the 'Encryption Settings' page. The page title is 'Encryption Settings'. Below the title is a form with the following fields:

- Encryption Mode: Disabled (dropdown)
- Encryption Key: 5678901234567890123456789012345678901234567890123456789012ffff (input)

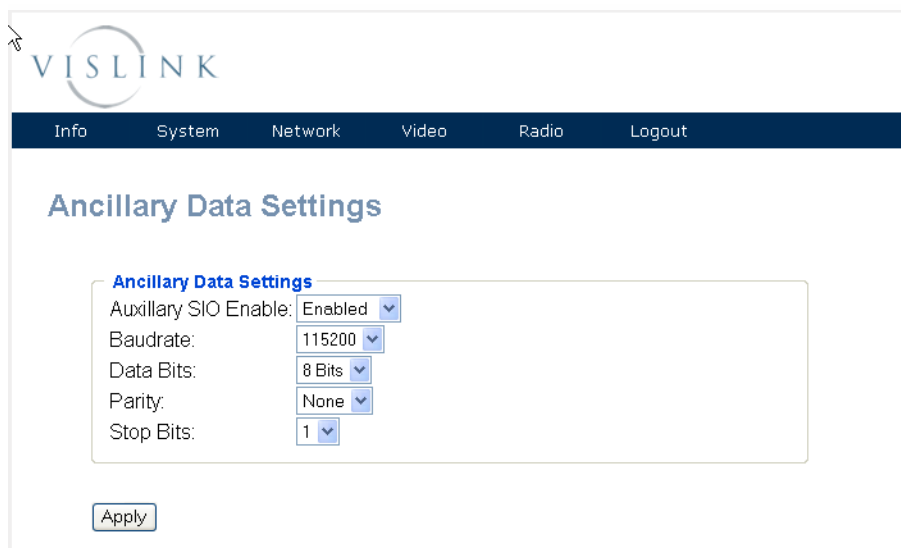
An 'Apply' button is located below the form.

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

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

For 256-bit encryption, enter 64 hexadecimal characters.

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



VISLINK

Info System Network Video Radio Logout

Ancillary Data Settings

Ancillary Data Settings

Auxiliary SIO Enable: Enabled

Baudrate: 115200

Data Bits: 8 Bits

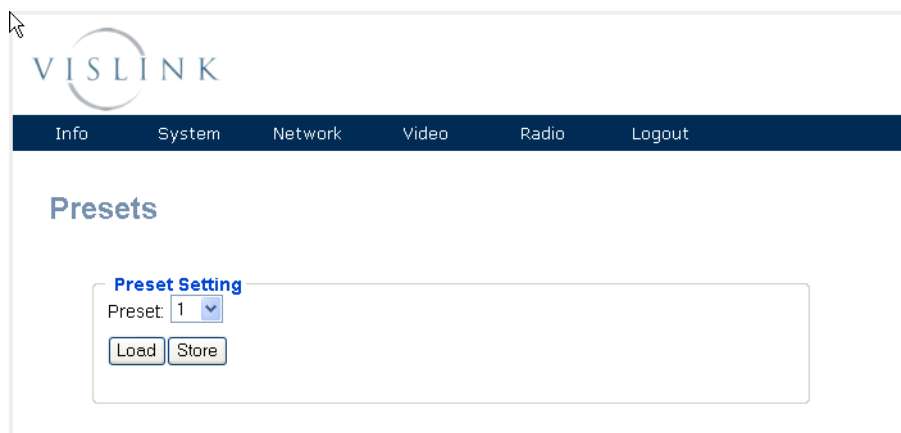
Parity: None

Stop Bits: 1

Apply

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

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



VISLINK

Info System Network Video Radio Logout

Presets

Preset Setting

Preset: 1

Load Store

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

5.1 Recalling a Preset Configuration from a PC

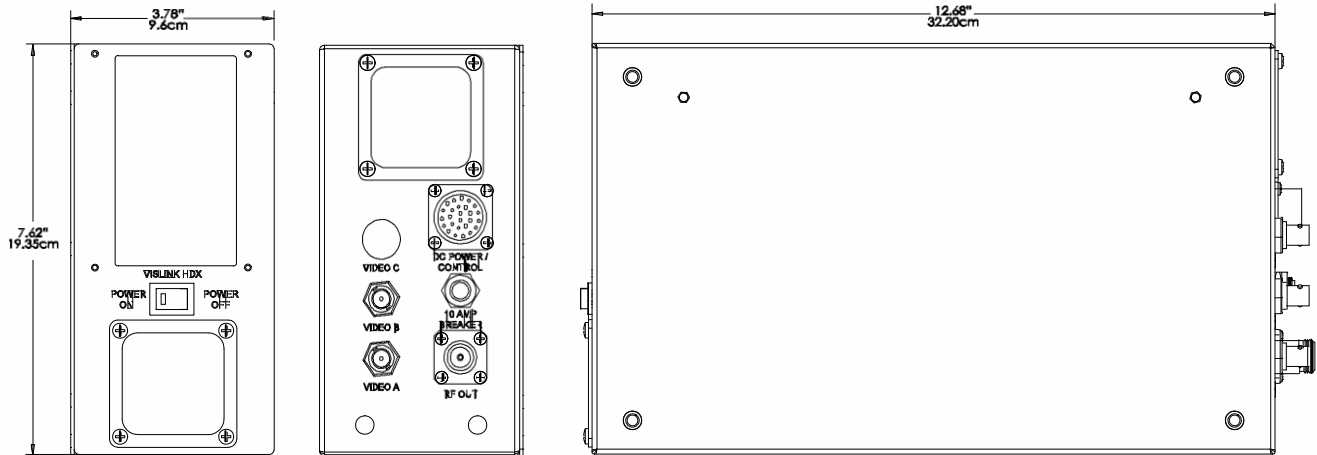
1. Select **Preset** from the **Radio** drop down menu.
2. Select the preset number and click Load. The relevant parameters will be populated under Video and Radio.

Note The Encryption code will not display.

Click **Logout** to finish setting up the HDX-1100.

6 HDX-1100 Specifications

The following figure shows the front, back, top, and side views of the HDX-1100.



- **Dimensions:** 3.78 x 7.62 x 12.68 inches
- **Weight:** 7 pounds (3.2 kg)
- **Operating temperature:** $-10\text{ }^{\circ}\text{C}$ to $+65\text{ }^{\circ}\text{C}$; **storage temperature:** $-40\text{ }^{\circ}\text{C}$ to $+75\text{ }^{\circ}\text{C}$
- **Humidity:** up to 95% relative and non-condensing
- **Altitude:** up to 20,000 feet (6,000 m)

6.1 Band and Frequency Options

You can order the HDX-1100 for the following frequency bands.

Model	Band	Frequency	Power Consumption	Frequency Stability	Frequency Step Size
HDX-1100LS	LS	1.7—2.5 GHz	44W	2.5 ppm	250 Khz
HDX-1100S	S	2.4—2.48 GHz	44W	2.5 ppm	250 Khz
HDX-1100C1	C1	3.1—3.5 GHz	46W	2.5 ppm	250 Khz
HDX-1100C2	C2	4.4—5.0 GHz	46W	2.5 ppm	250 Khz
HDX-1100C3	C3	6.4—7.2 GHz	46W	2.5 ppm	250 Khz
HDX-1100X	X	8.1—8.5 GHz	48W	2.5 ppm	250 Khz

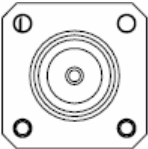
6.2 Video Input Connectors

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

Connector	Pin	Description
	Pin	Signal
	Ring	Ground

6.3 RF OUT Connector

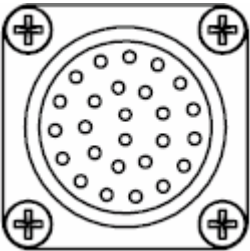
The RF Type N female connector attaches the antenna to the unit.

Connector	Pin	Description
	Pin	Signal
	Ring	Ground

6.4 DC POWER and CONTROL Connector

DC voltage for the HDX-1100 is +10 Vdc to +32 Vdc with reverse voltage protection. Ensure that the power being supplied matches the power required by the equipment.

I/O connector 26-Pin Male D connector pin-outs are shown in the following table:

Connector	Pin	Description	Pin	Description
	A	+Vin	P	Serial CTRL Out
	B	+Vin	R	N/C
	C	N/C	S	N/C
	D	Audio 1 In	T	Reserved
	E	GND	U	Reserved
	F	GND	V	Reserved
	G	Audio 2 In	W	Reserved
	H	N/C	X	Reserved
	J	Data Channel In	Y	Reserved
	K	GND	Z	Reserved
	L	N/C	a	Reserved
	M	Serial CTRL In	b	-Vin
	N	Serial CTRL GND	c	-Vin

6.5 Modulation

- DVB-T
 - COFDM EN300-744
 - COFDM QPSK
 - COFDM 16QAM
 - COFDM 64QAM

6.6 Encryption

Only one encryption scheme is available in a single firmware build.

- AES 128-bit
- AES 256-bit

Note ASI input streams are not encrypted

6.7 RF Output Power

- *High Power Mode*: Enables PA and supplies output power of 10 W.
- *Low Power Mode*: Enables PA supplies output power of 1 W (or 10% of whatever the high power mode is for the PA).
- Impedance: 50 Ohms (with VSWR \leq 1.5:1)
- Protection: Transmitters shall not be damaged by an infinite VSWR at any phase angle at the RF output ports for an indefinite time.

6.8 Audio Characteristics

- Two audio inputs are to be supported which can be both line, both microphone, or one of each.

6.9 Video Input Format

- ASI: 188 byte, EN50083-9
- HD-SDI: SMPTE 292M
 - 1920x1080i@25fps
 - 1920x1080i@30fps
 - 1280x720@50 fps
 - 1280x720@60fps
- Composite: 1 Vpp RS170
 - 720x480 NTSC 525
 - 720x576 PAL 625
- Wayside Data Rate: up to 115.2 kbps
- Video input impedance: 75 Ohm unbalanced

7 Getting Support for Your HDX-1100

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 to the HDX-1100. 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 HDX-1100 requires specialized test equipment and software to calibrate operating characteristics after repair.*
