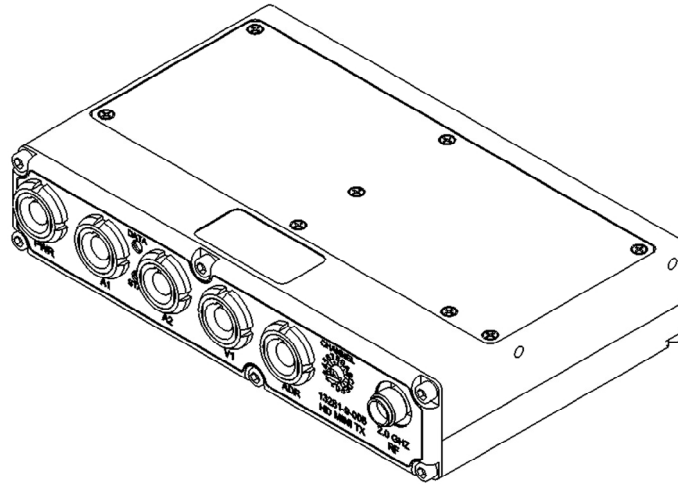# HD MINI TRANSMITTER (2.0 GHz)

USER MANUAL

Approved (Engineering):

Approved (Manufacturing):

Approved (Maintenance):

Revision History

Revision	Date	Author	Comments
U	01/04/11	D. Starsoneck	First draft

WARNINGS

⚠ *No user serviceable parts inside. Warranty void if opened.*
Refer servicing to qualified BSI personnel only

⚠ *Connect the product only to a power source with the specified voltage rating*

⚠ *Case temperature must not exceed 65 C. To prevent risk of overheating, use a heatsink and ventilate appropriately*

⚠ *HD MINI TX will start transmitting as soon as power is applied*

⚠ *To prevent damage it is recommended that only BSI supplied cables and accessories should be used with this product*

NOTES

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.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

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 and, if not installed and used in accordance with the instruction manual, 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.

Table of Contents

1. OVERVIEW

1.1TECHNOLOGY

The HD MINI TX is a miniature HD/SD video and audio microwave transmitter. It has been designed for simple, secure and reliable operation in the field. The latest technology is utilized to provide the perfect combination of high performance, ease of use, small size and low power operation.

1.1.1 Multi-Format Video and Audio Inputs

The transmitter accepts video in either SMPTE-170M, SD-SDI or HD-SDI and ASI format through a single front panel connector. The Transmitter automatically detects the video format in use and decodes the video appropriately.

Two channels of balanced analog audio are accepted on the two Lemo connectors at either microphone (Mic) or line level. The connectors supply 5 Vdc phantom power. Audio gain levels can be adjusted with remote control software.

1.1.2 Video and Audio Encoding

Video is compressed using an H.264 baseline profile encoder ASIC which accepts all standard video formats up to 1080p@60fps. Audio is compressed using a software MPEG encoder running on a floating point DSP.

Video and audio elementary streams are forwarded to the Transport Stream (TS) multiplexer which is implemented in a FPGA. Here the compressed audio and video are packetized and multiplexed with the ancillary data into a standard MPEG-2 TS.

1.1.3 DVB-T Modulator

The OFDM modulator is implemented in FPGA and operates in standard 2K DVB-T mode. The modulator may be set up by the user to operate at various constellations (QPSK, 16-QAM, 64-QAM), Forward Error Correction rates ($\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{7}{8}$), and Guard Intervals ($\frac{1}{32}$, $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$). In addition the signal bandwidth may be selected between 6, 7 and 8 MHz.

1.1.4 Direct RF Up-Conversion

I/Q data from the modulator is passed to an I/Q DAC whose analog output signals are then direct up-converted to RF at the transmit frequency via an I/Q modulator and VCO.

1.1.5 Low Latency

A unique technique is used to provide ultra low latency of 2 video frames when operating with the BSI receiver. In compatibility mode the HD MINI TX can be used with any HD H.264 receiver and can achieve a latency of 4 video frames.

Full technical specifications are available in section 5.1.

1.2 FEATURES

- Multi-Format Video Input
- Auto Detect of Video Format, Resolution and Frame Rate
- Two Balanced Analog Audio Inputs
- Mic / Line level Audio Input
- 200 mW RF Output Power
- End to End Latency < 4 Video Frames
- Storage for 16 Preset Configurations
- Simple Front Panel Control of Preset Select
- Remote Control from Windows PC

1.3 LOCATION AND FUNCTIONS OF PARTS

1.3.1   CONNECTORS
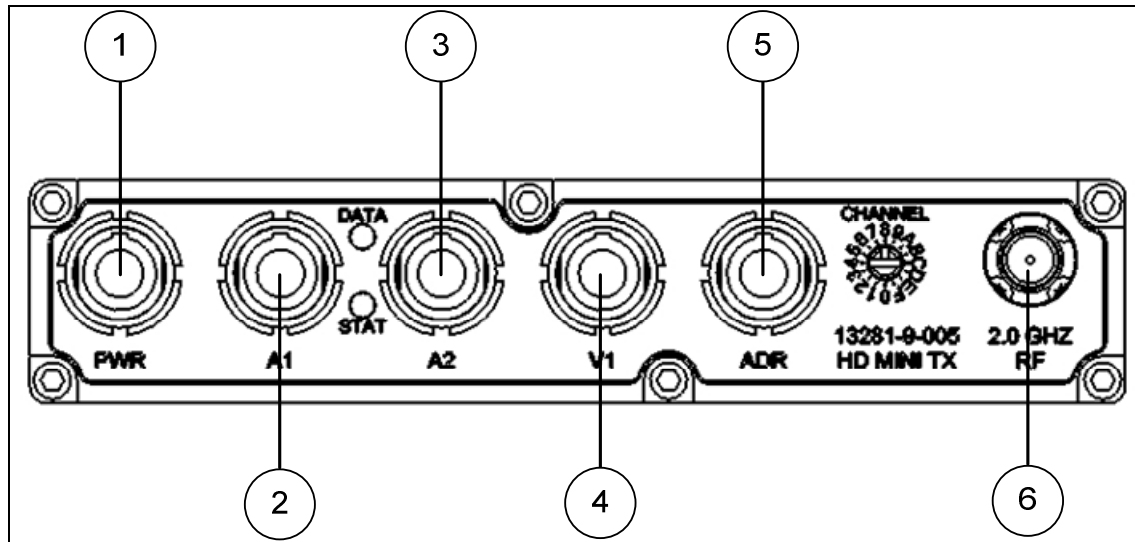
1 – Power (PWR)
A single connector accepts 2 channels of balanced analog audio at Microphone or Line level. Break-out cables are provided for Telocate (Mic) and RCA (Line) connectors.

2 – Audio Connector (A1)
A single connector accepts 2 channels of balanced analog audio at Microphone or Line level. Audio gain level is set from the remote control software.

3 – Audio Connector (A2)
A single connector accepts 2 channels of balanced analog audio at Microphone or Line level. Audio gain level is set from the remote control software.

4 – Video/Ancillary Data Connector (V1)
A 7-pin Lemo connector is used for video input. The Transmitter auto detects the video format (NTSC, SDI, HD-SDI, ASI), resolution and frame rate. Bidirectional ancillary data can also be found on this connector.

5 – Control Connector (ADR)
Connector to provide communications for programming and remote control.

6 – RF Connector (2.0 GHz RF)
The RF output can be connected directly to an antenna.

CONTROLS AND INDICATORS
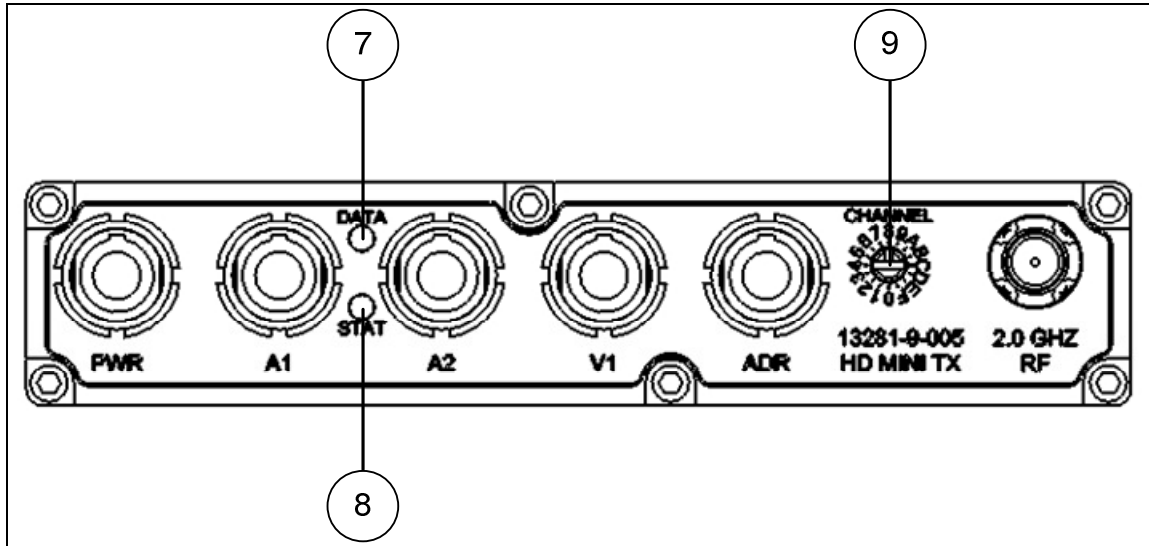
7 – Power/Data Indicator
A red LED indicator that is on (with infrequent flashes off) when in an active powered state, and is off (with infrequent flashes on) when in standby mode.

8 – Built-in Test Indicator
A green LED indicator that is solid when BIT passes, and flashes when BIT fails.

9 – Preset Selector Switch
Rotary switch used to select 1 of 16 preset configurations for the Transmitter. Presets can be configured using a PC connected to the Control connector (5).

2. INSTALLATION

2.1 Typical System

A typical minimum operational system would include the HD MINI TX, camera, microphone, battery and microwave antenna.
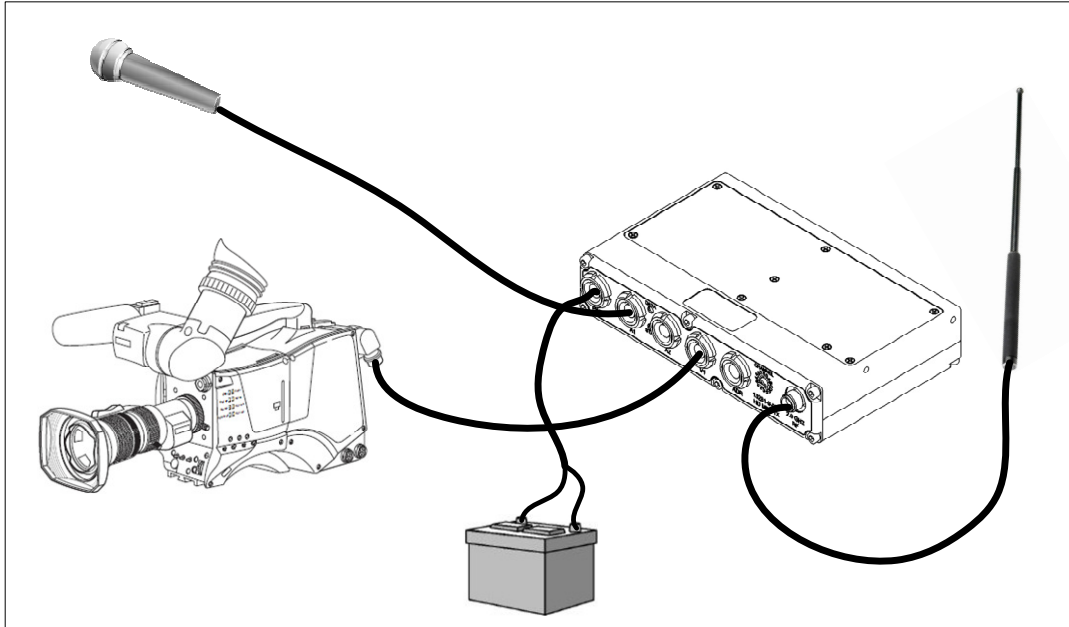
2.2 Connecting a Video Source

The HD MINI TX accepts video in NTSC, SDI and HD-SDI formats. The video source can be any device which outputs video in one of these formats, for example a video camera or VTR. The video input on the HD MINI TX also provides a bidirectional RS-485 connection for camera control, battery status, temperature readings, etc.

To connect the video source:
1. Determine if your video source provides video in one of the supported formats.
2. Connect a cable from your video source to the **VIDEO/ANCILLARY DATA** connector on the HD MINI TX.
3. The video format is automatically detected.

2.3 Connecting an ASI Source

The HD MINI TX can accept an MPEG-2 Transport Stream (TS) in ASI format. Care must be taken to ensure the TS bit-rate is low enough to pass through the modulated RF link.

To connect the ASI source:
1. Determine if your ASI source is in the supported format.
2. Connect a video cable from your ASI source to the **VIDEO/ANCILLARY DATA** connector on the HD MINI TX.
3. The ASI signal is automatically detected.

2.4 Connecting Audio

The HD MINI TX accepts two channels of balanced analog audio at microphone (Mic) or Line level. The audio source can be any device which outputs balanced audio at Mic or Line level, for example a microphone or CD player.

To connect an audio source:
1. Connect an audio cable from your audio source to one of the two HD MINI TX **AUDIO** connectors.
2. The audio gain level can be adjusted from the remote control software.

2.5 Connecting Power

> ⚠️ *CAUTION*
> *HD MINI TX will start transmitting as soon as power is applied*

To connect Power:
1. Ensure your power source outputs between +9 and +18 Vdc.
2. Connect the power supply cable to the **PWR** connector on the HD MINI TX.

> ⚠️ *CAUTION*
> *The power supply must not exceed +18 Vdc*
> *The power leads must be correctly connected*

2.6 Connecting Control/Programming

To connect Remote Control / Programming Data:
1. Connect the DB-9 connector side of the ADR cable to the serial port on your Remote Control / Programming PC
2. Plug the Lemo connector side of the ADR cable to the ADR connector on the HD Mini TX

2.7 Connecting an Antenna

The antenna should be connected to the HD MINI TX with the shortest possible cable in order to minimize losses. If possible, connect the antenna directly to the HD MINI TX.

To connect the antenna:
1. Connect the antenna to your RF cable
2. Connect the RF cable to the RF connector on the HD MINI TX

CAUTION
Do not over-tighten the SMA connector

---

3. OPERATING INSTRUCTIONS

3.1 Turning on the Power

The HD MINI TX does not include a power switch. To turn on the unit simply connect power to the **POWER** connector.

> ⚠️ *CAUTION*
> *HD MINI TX will start transmitting as soon as power is applied*

3.2 Checking Status

3.2.1 Checking for Power Status

The Data LED is used to display the power status. The indicator state is decoded as follows:

LED STATE	MEANING
On, Flashing Off	Power
Off, Flashing On	Standby

3.2.2 Checking for BIT Status

The BIT Status indicator LED is used to indicate PLL lock valid and power supply voltage. The indicator state is decoded as follows:

| LED STATE	MEANING
Flashing	BIT Fail
On	BIT Pass

3.2.3   Detailed Status Information

Detailed status information for the HD MINI TX can be displayed in the Remote Control / Programming GUI. Status information available includes: battery voltage, case temperature, video lock, audio level, synthesizer lock, RF output frequency, modulation scheme, video and audio encoder settings, audio gain, encryption active, DAC lock.

3.3Local Control

3.3.1   Selecting a Preset

The HD MINI TX can be pre-programmed with up to 16 preset configurations which can be quickly recalled during field use.
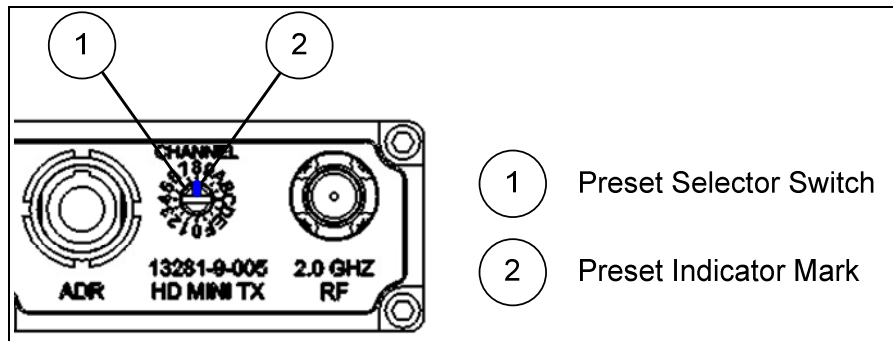
To select a preset:
1. Insert a small flat blade screwdriver into the slot of the Preset Selector Switch
2. Rotate the Preset Selector Switch until the desired preset is indicated by the Preset Indicator Mark
3. The new preset becomes active immediately

3.4 Using the GUI

3.4.1 Connecting

1. Connect the laptop or PC to the HD MINI TX using the Control/Programming cable provided. See section 2.6 for details.

2. Connect an antenna, video and audio sources as required.

A typical system is shown below:
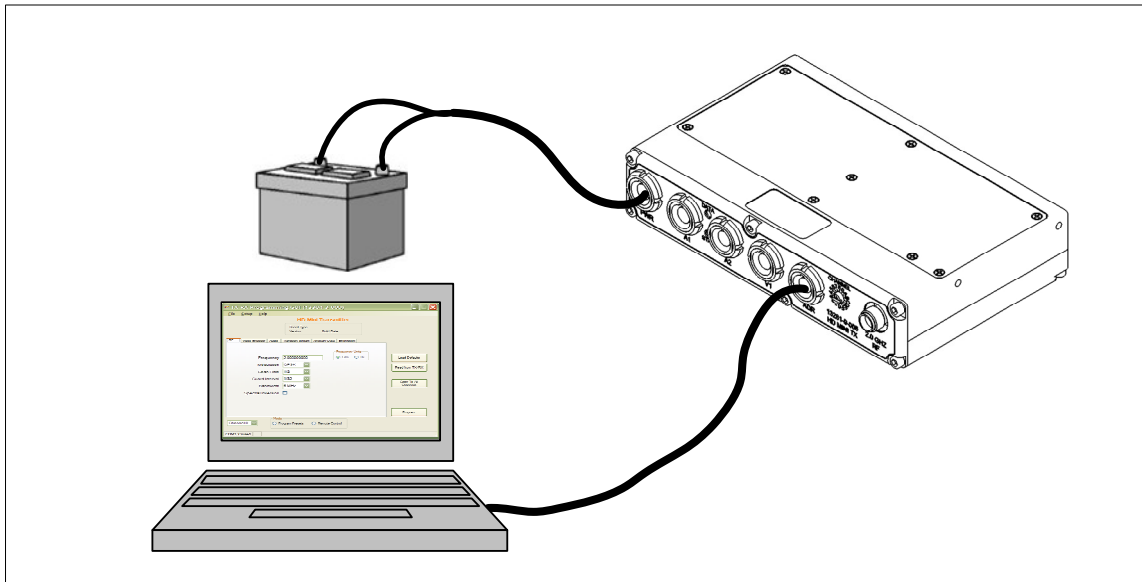
3.4.2   GUI Overview

The key features of the Remote Control / Programming software are shown below:

1 – Main Menu
Used to load and save settings, select the Com port and display help information.

2 – Frequency Selection
Allows selection of the RF carrier frequency in 250 kHz steps (if using the increment/decrement buttons). "Low RF Power" button allows the user to drop output power from 200 mW to 20 mW.

3 – Modulation Selection
Dop-down box selections determine modulation scheme and parameters.

4 – Connection Status Indicator
Displays the current connection status. If the Com port was opened successfully it will display 'COM1: Open'. If the GUI is communicating with the HD MINI TX, it will flash 'RX' in green. The detected video format is displayed on the right.

5 – BIT Status

Displays BIT results of the connected HD MINI TX. Note: "Synth", "DAC", and "Deserializer" will not pass BIT if the unit is in standby mode.

6 – GOP Length Selection and Low Latency Mode
Used to set GOP length as required and toggle low latency mode.

7 – Audio Gain Selection
Used to set audio gain for both of the audio inputs.

8 – Power Mode
Allows user to toggle between Standby and Awake modes.

3.4.3 Setup Menu

The Setup menu gives the user access to COM Port selection and the Calibrate and Program Channels windows.
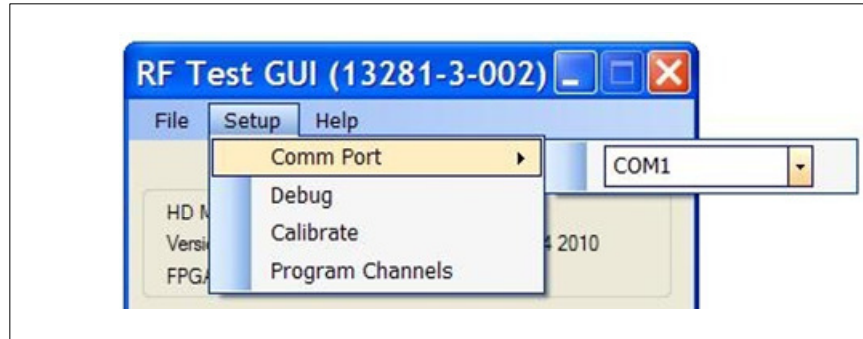
The GUI uses a serial 'Com' port to communicate with the HD MINI TX. On most systems this will be 'Com 1', but some PC's have multiple ports, or use different numbers. You may need to select a different Com port for your PC.

To access the setup menu:
1. On the main menu, click on "Setup"

2. From the drop-down, select the desired option

3.5 Remote Control Mode

Remote Control Mode is used for real time control of the HD MINI TX. Any setting changes made in the main window of the GUI are executed immediately by the HD MINI TX. When the Control/Programming cable is removed from the HD MINI TX, the unit reverts to Local Control.

3.6 A Note about Low Latency Mode

Low latency mode provides a very small end-to-end delay for the transmission of video and audio. In order to achieve such a low delay, the encoding technology is modified from the published standard. The practical implication of this is that low latency mode will only work correctly if the HD MINI TX is paired with a BSI receiver. For compatibility with receivers from other manufacturers please disable low latency mode.

MODE	GOP	QUALITY	LATENCY	COMPATIBILITY
Low Latency	N/A	Best	2 frames	BSI Receivers Only
Normal	1	Good	4 frames	Any HD H.264 Receiver
Normal	> 1	Very Good	> 5 frames	Any HD H.264 Receiver

3.7 Program Channels Window

The Program Channels window is used to download up to 16 preset configurations to the HD MINI TX for future use. Setting changes made in the GUI do not affect the operation of the HD MINI TX until they are downloaded. The preset configurations are stored to non-volatile memory in the HD MINI TX, and can be recalled later even if the HD MINI TX is no longer connected to the PC.

3.7.1 Program Channels Controls

1 – Channel Parameter Fields
Used to establish carrier frequency, modulation scheme, and other parameters for the 16 channel presets.

2 – Audio Gain Selection
Sets the gain for each audio input. Gain settings apply to all channel presets.

3 – Verify Button
Verifies the channel preset information displayed on the GUI against the settings saved to the HD MINI TX.

4 – Program HD MINI TX Button
Click this button to load all 16 preset into the local memory on the HD MINI TX.

5 – Read from HD MINI TX Button
Use this button to read back the current presets on the HD MINI TX.

6 – Save Settings to File Button
Click to save channel presets to a file for future use.

7 – Load Settings from File Button
Click to load settings from a previously saved file.

8 –Load Defaults Button
Use this button to load a standard configuration for all controls.

3.7.2 Configuring the Presets

The 16 presets are configured by changing the settings in the text fields, check boxes, and drop down menus of the Program Channels window.

1. For each switch position 1 through F, select frequency, modulation, code rate, guard interval, GOP length, and low latency.
2. Set the desired Audio Gain at the bottom center of the window.
3. Click the Program button to download all 16 presets to the HD MINI TX.

3.8 Calibrate Window

Calibration of each HD MINI TX will be performed at BSI before delivery to the customer. It is not recommended that the customer make adjustments in the Calibrate Window.

4. TROUBLESHOOTING GUIDE

4.1 TROUBLESHOOTING COMMON PROBLEMS

4.1.1 No Video Lock (Deserializer is unlocked and fails BIT)

When the Connection Status Indicator shows "No Video" and the Deserializer BIT fails, it means the HD MINI TX cannot lock to the incoming video.

Symptoms
1. Deserializer BIT Status shows "FAIL"
2. Connection Status Indicator bar shows "No Video"
3. No video is present at the receiver

Possible Causes
1. The video source is not connected to the HD MINI TX **VIDEO** connector
2. The video is in an unsupported format
3. The video source is not turned on
4. Bad video input at HD MINI TX

Troubleshooting Steps
1. Check the video source
   a. Connect the video source to an appropriate video waveform monitor
   b. Confirm that you can see video on the waveform monitor
   c. Confirm that the video is in a supported format
2. Check the video cable
   a. Replace the video cable with a new one and reconnect the video source to the HD MINI TX
   b. Turn on the video source and HD MINI TX and check the Status on the GUI
3. Test the HD MINI TX video input
   a. Connect a video signal generator to the HD MINI TX **VIDEO** connector
   b. Turn on the HD MINI TX and video signal generator
   c. Set the video signal generator for NTSC composite output and select visible test pattern (for example 75% bars)
   d. Check the Status on the GUI
   e. Repeat the test for SDI and HD-SDI signals

4.1.2 No RF at Receiver

Receive problems may be caused by issues at the Transmitter or Receiver in addition to external causes such as interference and path loss. This section does not cover receiver issues. Please see the Operators Manual that came with your receiver.

Symptoms
1. No RF signal at receiver

Possible Causes
1. Transmitter is not turned on
2. No antenna connected to Transmitter
3. Bad antenna cable
4. Bad antenna
5. External interference
6. Path loss

Troubleshooting Steps
1. Check power supply is connected to the HD MINI TX and turned on
2. Check the antenna is properly connected to the **RF** connector
3. Check the antenna and cable are functional
   a. Replace the antenna and RF cable with new ones
   b. Check for RF at the receiver
4. Check for external interference
   a. Turn off the HD MINI TX so it stops transmitting
   b. Use a spectrum analyzer to check that the desired channel is clear from interfering signals. Remember that the HD MINI TX requires up to 8 MHz of clear spectrum
   c. Reprogram the HD MINI TX and your receiver for an alternate, clear channel
   d. Power up the HD MINI TX and check for RF at the receiver.
5. Check for signal path loss (signal level too low)
   a. Move the HD MINI TX and receiver closer together (within the same room) and retest.
   b. If low signal level is suspected, use a directional antenna or use an external PA to extend the transmission range.

4.1.3 No Video at Receiver

Video reception problems may be caused by issues at the Transmitter or Receiver. This section does not cover receiver issues. Please see the operator's manual that came with your receiver.

Symptoms
1. Good RF signal at receiver, but no video is present

Possible Causes
1. Video source is not turned on
2. Video source is not connected to HD MINI TX
3. Video format is unsupported
4. Bad video cable
5. Bad video input at HD MINI TX

Troubleshooting Steps
1. Check the video source
   a. Connect the video source to an appropriate video waveform monitor
   b. Confirm that you can see video on the waveform monitor
   c. Confirm that the video format is supported by the HD MINI TX
2. Check the video cable
   a. Replace the video cable with a new one and reconnect the video source to the HD MINI TX
   b. Turn on the video source and HD MINI TX and check the Status on the GUI
3. Test the HD MINI TX video input
   a. Connect a video signal generator to the HD MINI TX **VIDEO** connector
   b. Turn on the HD MINI TX and video signal generator
   c. Set the video signal generator for NTSC composite output and select a visible test pattern (for example 75% bars)
   d. Check the Status on the GUI
   e. Check that video is present at the receiver
   f. Repeat the test for SDI and HD-SDI signals

4.1.4 No Audio at Receiver

Received audio problems may be caused by issues at the Transmitter or Receiver. This section does not cover receiver issues. Please see the operator's manual that came with your receiver.

Symptoms
1. Good RF signal and video at receiver, but no audio is present

Possible Causes
1. Audio source is not connected
2. Audio source level is incompatible with Transmitter
3. Audio gain is set too low
4. Incompatible audio compression is selected
5. Bad audio cable
6. Bad audio input at HD MINI TX

Troubleshooting Steps
1. Check the audio source
   a. Connect the audio source to an audio test set
   b. Confirm that you have audio at the test set
   c. Confirm that the audio level is either Mic or Line level
2. Check the audio compression type
   a. Connect a PC running the Remote Control / Programming software to the HD MINI TX using the supplied Control cable.
   b. Power up the HD MINI TX and PC. On the PC run the Remote Control / Programming software.
   c. On the PC select "Remote Control" mode
   d. Select the "Audio" tab to display the audio settings
   e. Check that the selected audio compression type selected is compatible with your receiver.
   f. Reprogram presets as necessary.
3. Check the audio gain
   a. Connect a PC running the Remote Control / Programming software to the HD MINI TX using the supplied Control cable.
   b. Power up the HD MINI TX and PC. On the PC run the Remote Control / Programming software.
   c. On the PC select "Remote Control" mode
   d. Select the "Audio" tab to display the audio settings
   e. Increase audio gain settings as needed for your microphone.
   f. Reprogram presets as necessary.
4. Check the audio cable
   a. Replace the Audio Cable with a new one and re-test
5. Test the HD MINI TX audio input
   a. Connect an audio signal generator to the HD MINI TX **AUDIO** connector using the Audio Cable
   b. Turn on the HD MINI TX and audio signal generator
   c. Set the audio signal generator for a 1KHz tone at 0dBm
   d. Check that audio is present at the receiver

4.1.5 No Ancillary Data at Receiver

Data reception problems may be caused by issues at the Transmitter or Receiver. This section does not cover receiver issues. Please see the Operators Manual that came with your receiver.

Symptoms
1. Good RF signal and video at receiver, but no ancillary data is present

Possible Causes
1. Data source is not connected or incompatible with Transmitter
2. Bad Video/Ancillary Data cable
3. Bad ancillary data input at HD MINI TX

Troubleshooting Steps
1. Check the data source
   a. Confirm that the data source is turned on
   b. Confirm that the data source is compatible with the HD MINI TX
2. Check the Video/Ancillary Data Cable
   a. Replace the Video/Ancillary Data Cable with a new one and re-test
3. Test the HD MINI TX video/ancillary data input
   a. Connect a known working data source to the HD MINI TX
   b. Check that the ancillary data is present at the receiver

4.1.6 Remote Control / Programming Software Cannot Connect

Symptoms
1. The Remote Control software cannot connect to the HD MINI TX
2. Control is intermittent or does not work as expected

Possible Causes
1. The HD MINI TX does not have power
2. Remote Control / Programming cable is disconnected from the HD MINI TX or PC
3. The Remote Control / Programming cable is damaged
4. The PC is running an incompatible Operating System

Troubleshooting Steps
1. Check that the HD MINI TX power supply is connected and turned on
2. Check that the Remote Control / Programming cable is correctly connected to the HD MINI TX **ADR** connector and PC serial port
3. Check the Remote Control / Programming cable
   a. Replace the cable with a new one and retest
4. Check PC operating system is Microsoft Windows XP

4.1.7 Remote Control Function Does Not Work

Symptoms

1. Remote Control / Programming software connects to the HD MINI TX, but the unit cannot be remotely controlled
2. Control is intermittent or does not work as expected

Possible Causes
1. The HD MINI TX is in standby mode
2. The PC is running an incompatible Operating System

Troubleshooting Steps
1. Check Remote Control / Programming software is not in standby mode
   a. Open the Remote Control / Programming software
   b. Check that the "Awake" button is depressed, not the "Standby" button
2. Check PC operating system is Microsoft Windows XP

4.1.8 Cannot Program Presets

Symptoms
1. Remote Control / Programming software connects to the HD MINI TX, but the presets cannot be configured
2. Preset programming is intermittent or does not work as expected
3. The Presets do not operate as expected after programming

Possible Causes
1. ???
2. The PC is running an incompatible Operating System

Troubleshooting Steps
1. ???
2. Check PC operating system is Microsoft Windows XP

4.2 RESETTING TO FACTORY DEFAULTS

In some circumstances it may be helpful to return the HD MINI TX to its factory default state. This can especially useful when troubleshooting reception problems.

To Reset To Factory Defaults
1. Connect the HD MINI TX to a PC running the Remote Control / Programming software using the supplied Power / Control cable
2. Power up the HD MINI TX
3. Verify that the Remote Control / Programming software is connected.
4. Open the Program Channels window (Setup → Program Channels)
5. Click on the "Load Defaults" button.
6. Click on the "Program" button.

Default Settings
The default settings are displayed on the Remote Control / Programming software screen. BSI reserves the right to change the default settings in future software releases.

4.3 CONTACTING TECHNICAL SUPPORT

For issues that cannot be solved by following the Troubleshooting Guide, please contact BSI Technical Support for assistance (See APPENDIX B: Technical Support).

4.4 EQUIPMENT REPAIR

Please contact BSI Technical Support for assistance (See APPENDIX B: Technical Support).

5. TECHNICAL DATA

5.1 TECHNICAL SPECIFICATIONS

Video Inputs

Format:	SD-SDI (SMPTE-259M)
	HD-SDI (SMPTE-292M)
	SD Analog Composite (NTSC)
	ASI
	(auto select)
Connector:	Lemo ECG0B307XXN

Video Compression

Standard:	H.264
Profile:	BP@L4
Resolution:	525i @ 29.97 Hz
	480p @ 60 Hz
	720p @ 60/59.94 Hz
	1080i @ 30 / 29.97 Hz
	1080p @ 30 / 29.97 Hz
Latency	< 4 frames end to end

Audio Inputs

Inputs:	2
Format:	Balanced Analog
	Mic or Line level
Connector:	Lemo ECG0B303CLN

Audio Compression

Standard	LPCM
	MPEG-2, Layer I & II (optional)
	Dolby AC3 (optional)

RF Output

Output Power:	200 mW
Connector:	SMA

Frequency Band

Range:	2000MHz to 2500MHz
Tuning Step	250 KHz

Remote Control / Programming

Format:	RS-485
Connector:	Lemo ECG0B305CLN

Modulation

Scheme:	DVB-T
Carriers:	2K
Modes:	QPSK, 16-QAM, 64-QAM
Bandwidth:	6, 7, 8 MHz
FEC:	$\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{7}{8}$
Guard Interval:	1/32, 1/16, 1/8, ¼

Power Requirements

Supply:	9-18VDC, 10W
Connector:	Lemo ECG0B302CLN

Physical

Size:	21.5 x 65.5 x 105.5 mm
Weight:	214 g

Environmental

Temperature:	-10 to +65 C
Humidity:	< 95%

5.2
CONNECTOR PIN-OUTS

5.2.1   Video Input

LEMO ECG0B307CLN
1. Ground
2. +12 Vdc Nominal (+9 Vdc to +18 Vdc)
3. Video
4. Ground
5. Camera Data+
6. Camera Data−
7. Genlock

5.2.2   Audio1 Input

LEMO ECG0B303CLN
1. Ground
2. Audio1+
3. Audio1−
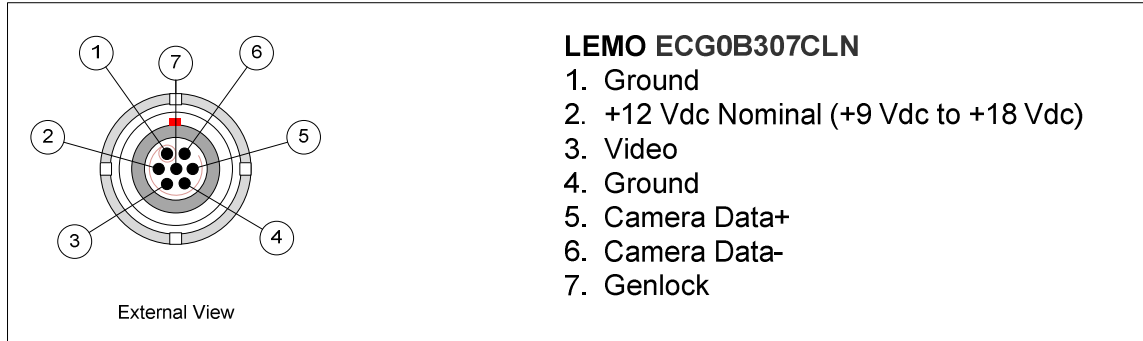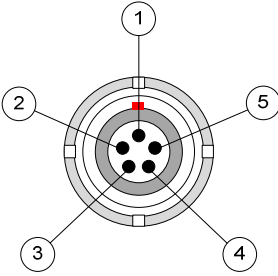
5.2.3   Audio2 Input
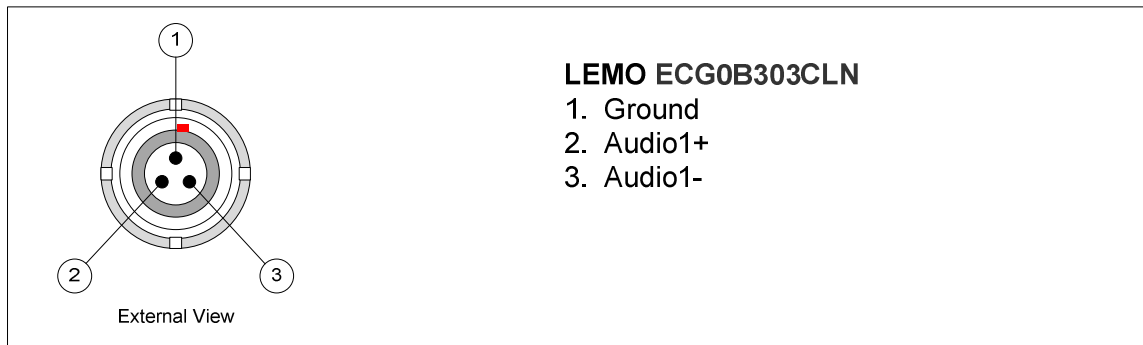
LEMO ECG0B303CLN
1. Ground
2. Audio2+
3. Audio2−
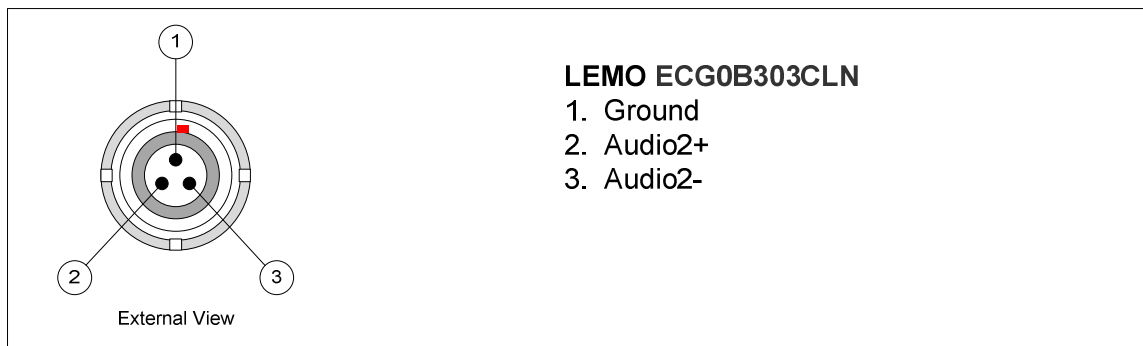
5.2.4   Control
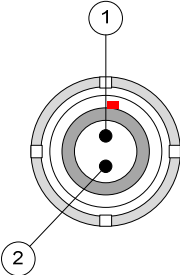
LEMO **ECG0B305CLN**
1. Ground
2. +12 Vdc Nominal (+9 Vdc to +18Vdc)
3. Tx Data
4. Rx Data
5. No Connect

External View
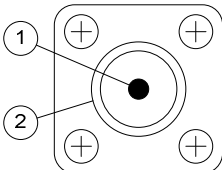
5.2.5   Power

LEMO **ECG0B302CLN**
1. Ground
2. +12 Vdc Nominal (+9 Vdc to +18Vdc)

External View

5.2.6   RF Output

SMA FEMALE
1. RF Out
2. Ground / Sheild

External View

APPENDIX A: Accessory Guide

Available Accessories

Description	Part #
Audio Cable	?
Control/Programming Cable	?
Power Cable	?
Video/Ancillary Data Cable	?
RF Cable	?
User Manual	13281-1-010
Remote Control / Programming Software CD	?
AC Power Supply	TBD
Transport / Flight Case	TBD
Transmit Antenna	TBD

Sales Contact Information:

Beth Cheatham
Contracts Administration
L-3 Communications EO/IR, Inc.
420 Aviation Blvd. Suite 101
Santa Rosa, Ca 95403

Tel: 707-236-1077

Email: Beth.Cheatham@l-3com.com

APPENDIX B: Technical Support

Telephone Support Line
Product technical support is provided via a telephone support line. Trained technicians are available to offer setup and configuration advice and to assist in troubleshooting technical issues. Problems that cannot be resolved on the telephone may require the device to be returned to BSI for repair. In such cases the telephone operator will assist the customer in obtaining an RMA.

Hours of Operation
9am to 5pm (EST), Monday to Friday excluding holidays

Contact Information
Tel: 410 564 2600 ext. 2499

APPENDIX C: Warranty Information

Coverage
All products are warranted to be free from defects in materials or workmanship for a period of 12 months. If returned within the applicable warranty period, BSI will, at its sole discretion and at no cost to the customer, repair or replace the defective product with another unit of the same or equivalent model.

This warranty does not cover failures due to abuse, misuse, accident or unauthorized alterations or repairs.

RMA Procedure
Faulty units may be returned to BSI for repair after obtaining an RMA from the BSI Telephone Support Line (see APPENDIX B: Technical Support)

Warranty repairs will be completed within 30 days of receipt of the faulty unit.