UNITY™

The Digital Broadcasting Platform
Video • Audio • Data

Instruction Manual

ENVOY™

DIGITAL VIDEO

INTEGRATED TRANSMITTER

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CAUTION

RISK OF ELECTRIC
SHOCK
DO NOT OPEN

**CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER (OR BACK).
NO USER-SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.**

CAUTION

As this unit is intended to interface with other electrical/electronic systems, proper engineering practices must be adhered to during installation and check-out.

All AC power and ground must be installed in accordance with National Electric Code Standards as to conductor size and limitations (see NFPA 70, articles 200-280, as amended, if required), and lightning protection must be provided.

All RF interconnections must be properly shielded to prevent ingression or egression of potential interfering sources to existing services.

Any damage to this unit caused by improper wiring/interconnections will void any warranty extended.

WARRANTY

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ABOUT THIS MANUAL

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SECTION 1
GENERAL INFORMATION

1.1 INTRODUCTION

This manual describes the installation and operation of Wegener Communications ENVOY™ Digital Video Transmitter. The transmitter is a rack-mounted unit, as shown in Figure 1. It is normally used in conjunction with a video receiver in satellite-based digital video broadcast networks to transmit and receive video, audio and data.

1.2 SYSTEM DESCRIPTION

The system uses the MPEG-2 compression technique, with I, B and P frames. At the transmit site (uplink), the transmitter converts analog or digital video and audio signals to compressed digital form and transmits them over a satellite link to the receivers. The high level of compression permits many video signals to be transmitted in the space normally occupied by a single video signal.

At the receive site, a dish antenna with an LNB (low-noise block down-converter) recovers the signal and converts it to the L-band frequency range (950 to 2150 MHz). This L-band signal is carried by coaxial cable (possibly through in-line amplifiers) to the IRD. The receiver automatically tunes to the desired signal and reconstructs the original video and audio signals.

1.2.1 System Capabilities

The user-defined configurations include items such as, Video at either 4:2:0 or 4:2:2 Chroma format. The video-encoding rate can be varied from 0.5 to 15 Mbps for 4:2:0, and from 1.5 to 50 Mbps for 4:2:2. The lower rate would be used for low user-cost applications and the higher rates for sports and entertainment events. Full field/frame compensation is possible, with dual B-frame support and adaptive I-frame insertion. The system handles both NTSC and PAL video, analog or digital audio, and closed captioning.

Multiplexing capability allows the user to insert Async data and/or COMPEL™ control data.

A variable-rate modulator with Viterbi inner error correction and Reed-Solomon outer error correction provides the 70 MHz modulated output.

1.2.2 Transmitter Characteristics

The ENVOY™ Digital Video Transmitter accepts analog video in composite format in NTSC or PAL standards. The unit also accepts D1 video directly.

The encoded multiplexed data is Forward Error Correction (FEC) coded using DVB compliant concatenated coding. This signal is then modulated by a variable rate modulator and output as a 70 MHz IF, tunable in 125 kHz steps. The transmitter parameters are controlled through a front panel keypad, VFD display, and three push button switches.

1.3   TECHNICAL SUPPORT

Should the product fail to perform as described, contact Wegener Communications Customer Service at 770-814-4057.

To return a product for service:

1. Obtain a Return Material Authorization (RMA) by contacting Customer Service by voice at 770-814-4057 or by FAX at 678-624-0294.

2. Plainly write the RMA number on the **OUTSIDE** of the product-shipping container.

NOTE: Writing the RMA number on the outside of the shipping container will help us return your equipment to you sooner. Thank you.

Return the product, freight prepaid, to the address below.

> Service Department RMA# _____
> Wegener Communications, Inc.
> 359 Curie Drive
> Alpharetta, GA 30005

NOTE: All returned material must be shipped freight prepaid. COD shipments will not be accepted.

Please contact Customer Service at the number above if you have any questions regarding service procedures.

1.4   MANUALS

If you have any suggestions concerning this, or any Wegener Manual, please E-mail them to **manuals@wegener.com**. If you would rather mail them, please do so to the address shown below. Our preference is that you copy the page in question, mark it up, and fax or mail us the copy. We do appreciate constructive criticism. The Fax Number is 770-497-0411.

> Attn: Manuals
> Wegener Communications, Inc.
> 11350 Technology Circle
> Duluth, GA 30097

1.5   FACTORY DEFAULT SETTINGS

The ENVOY™ Digital Video Transmitter is set to the following parameters at the factory.

RF	Setting
Transport Rate	8.448 Mbits
FEC Rate	¾
Symbol Rate	6.11 Msps
IF Frequency	70.00 MHz
Carrier Power	-10 dBm
RS Code Mode	204,188
RS Polynomial	DVB
RF Output	ON (This will display OFF when in setup mode)
RF Modulation	ON
RF Carrier	ON
AUDIO	Setting
Number of Audio Channels	1
Channel 1 Input	Analog
Channel 1 audio bit rate	256 kbits
Channel 1 Layer	Layer II
Channel 1 Format	Stereo
Channel 1 Delay	0
Channel 1 Sampling Rate	48 kbits
Channel 1 Emphasis	None
Input Level	0.0 dBV
SERVICES	Setting
TAGS	Disabled
VIDEO	Setting
Video Standard	NTSC
Video Format	Composite
Interbyte Gap	2
Video Resolution	704 x 480
Video MPEG Mode	4:2:0
Closed Caption Type	ATSC
EX-Data	Enabled

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SECTION 2
PHYSICAL DESCRIPTION

2.1 INTRODUCTION

This section describes the physical characteristics of the ENVOY™ Digital Video Transmitter. Front panel controls and displays are defined, and rear panel connectors described. The panels are illustrated in Figure 1.

2.2 FRONT PANEL CONTROLS AND DISPLAYS

The ENVOY™ transmitter may be controlled from the front panel keypad. See Section 5 for details on the control menus.

2.2.1 Main Keypad

The Main keypad has ten number keys, four arrow keys, and several other keys whose functions we will explain in the following sections. These keys are used to enter commands and settings, and are listed in Tables 9 and 10.

2.2.2 Front Panel LED's

There are four LED's on the front of the ENVOY. These are on the Encoder (lower) portion of the unit. They provide some indications of operational status. For more information on these LED's see Table 5.

2.3 REAR PANEL CONNECTORS AND LED'S

There are many connectors and indicators on the ENVOY™ rear panel. The two sections following describe these connectors and LED's, but for more complete information on the connectors see Section 6.2.

2.3.1 Rear Panel Connectors

All connections to the transmitter are made to the rear panel. The connectors and ports are described in the following sections.

> ### C A U T I O N
> This equipment is not intended to be connected to outdoor equipment.

800002-01

Figure 1. ENVOY™ Digital Video Transmitter Front and Rear Panels

CARRIER   MOD   LEVEL

envoy™
DIGITAL VIDEO COURIER

Compel™
Controlled

WEGENER
COMMUNICATIONS

Power
Fault
Local
Tx

115/230VAC
0.8/0.5A
50/60Hz

MAIN

R
F

MO
N

20dB

IN

DVB/ASI

OU
T

RS422
SYNC DATA IN

ALARM
N O
COM
N C

RS485
NETWORK
CONTROL

10 BASE T

RS232
COMPE

RS232

TERMINAL

COMPEL CA

MODUL
E

DVB ASI OUT

FAULT

SERIA
L

10 BASE
T

DIGITAL
AUDIO

ANALOG
AUDIO

C
V
B
S

L
O
O
P

LOC
K
CVBS   D1

D
1

FLASH
CARD

Table 1. ENVOY™ Rear Panel Connections

UPPER PORTION (CONTROLLER, MULTIPLEXER, MODULATOR)		
Signal	**Connector**	**Description**
RF MAIN (Output)	BNC 75-Ohm	70 MHz ±18 MHz
RF MON	BNC 75-Ohm	20 dB below RF Main Output
DVB/ASI IN	BNC	DVB/ASI from encoder is input here.
DVB/ASI OUT	BNC	DVB/ASI Transport Stream. Also goes internally to modulator.
RS-422 SYNC DATA IN	RJ-45	Reserved for future use.
ALARM	Screw Terminal Conn. Receptacle	N/C, N/O, Common, Alarm
RS-485 NETWORK CONTROL	DB-9	Reserved for future use.
10 BASE T (Output)	RJ-45	This output goes to "10 Base T" input below.
RS232 COMPEL™	DB-9 Female	COMPEL™ input for controlling receivers.
RS232 TERMINAL	DB-9 Female	User Interface
RS232 COMPEL-CA™	DB-9 Female	RS232 Pass-Through (PID Assigned at 1028)
Module		Expansion module

LOWER PORTION (ENCODER)		
Signal	**Connector**	**Description**
DVB/ASI OUT	Two BNC	Compressed MPEG-2 Audio and Video in DVB/ASI format available at both connectors
FAULT	3-Pin Male	Form-C relay with Normally-Open, Normally-Closed, and Common connections
SERIAL (Out)	DB-9 Male	
10 BASE T (Input)	RJ-45	This input comes from "10 Base T" above.
DIGITAL AUDIO (Input)	BNC	AES/EBU Format
ANALOG AUDIO (Input) Ch 1(L) 2(R)	DB-9	Balanced Signal. Range 0 to 20 dBV in 0.5 dBV increments
FLASH CARD		Accepts a flash-memory card with encoder operating & diagnostics software. Card must be in the slot for the encoder to operate
CVBS	BNC	Composite Video Baseband Signal (Composite Analog Video Input)
LOOP	BNC	Loop through, requires 75-ohm termination
D1	BNC	D1 Input for Video and/or Audio

2.3.2   Rear Panel LED's

The rear panel has Four LED indicators.

The video port LED's (CVBS and D1) steadily illuminate when their signals are locked. They flash to indicate a problem with their signal.

The "Fault" LED, when illuminated, indicates a fault condition in the encoder.

The "10Base-T" LED, when illuminated, indicates an active Ethernet signal.

See Section 6.3.1, Page 44, for more information on these LED's.

SECTION 3
FUNCTIONAL DESCRIPTION

3.1   INTRODUCTION

This section describes the basic signal processing functions of the ENVOY™ Digital Video Transmitter.

3.2   SIGNAL PROCESSING

The following paragraphs explain the signal processing functions of the transmitter circuit boards. Refer to the simplified block diagram in Figure 2.

3.3   DETERMINING OVERALL BANDWIDTH

A transmission system has a specific bandwidth available to carry all the signals input. The rates you set for your transmission plan combine to occupy a specific bandwidth. It is important that the occupied bandwidth be within the bandwidth available in the system.

When you select a data rate on the front of the ENVOY™ encoder, you are actually selecting the total data rate feeding into the modulator section. In addition to the video, audio, and Async data rates, it includes all MPEG transport layer overheads. The actual data rate associated with video can be read from the front panel.

The signal feeding the modulator is at the information rate shown on the encoder. It is then subject to the outer convolutional forward error correction at the rate specified by the user. All standard DVB rates are available, and selection will depend upon link budget variables. Generally if the link is power limited, a lower value of FEC code such as 1/2 or 2/3 will be selected. If the link is bandwidth limited, then higher FEC rates such as 3/4 or 5/6 would most likely be used.

Table 2. FEC Rates and Eb/No Performance

FEC Code	Eb/No QPSK	Eb/No 8PSK	Eb/No 16QAM
Rate ½	4.0 dB		
Rate 2/3	5.0 dB	6.9 dB	
Rate ¾	5.5 dB		9.0 dB
Rate 5/6	6.0 dB	8.9 dB	
Rate 7/8	6.4 dB		10.7 dB
Rate 8/9		9.4 dB	

3.3.1 Occupied Bandwidth (20 dB)

Since the signal is QPSK modulated, the occupied bandwidth can easily be predicted. The formulas below show the maximum occupied bandwidths for the complete range of data rates and FEC codes within the scope of this equipment. Since the modulator operates only between 1.0 and 30 MSymbols/sec., the operator must be careful to avoid invalid combinations of information rate and FEC code that would violate this specification.

The following definitions and formulas apply to the Bandwidth:

1. Symbol Rate = (Transport Stream Rate) x (204/188) x (1/FEC) x (1/2)
2. 20dB Bandwidth = (1 + alpha) x (Symbol Rate)
3. Alpha = 0.13 to 0.50

For example, if alpha = 0.35 (DVB Standard) and Symbol Rate = 30 Msps, then 20 dB Bandwidth = 40.5 MHz. Using equation #2 above, substitute the values.

20 dB Bandwidth = (1 + 0.35) x (30 Msps)
$$= (1.35) (30 \text{ Msps})$$
$$= 40.5 \text{ MHz}$$

Figure 2. ENVOY™ System Block Diagram

Figure 3. ENVOY Block Diagram
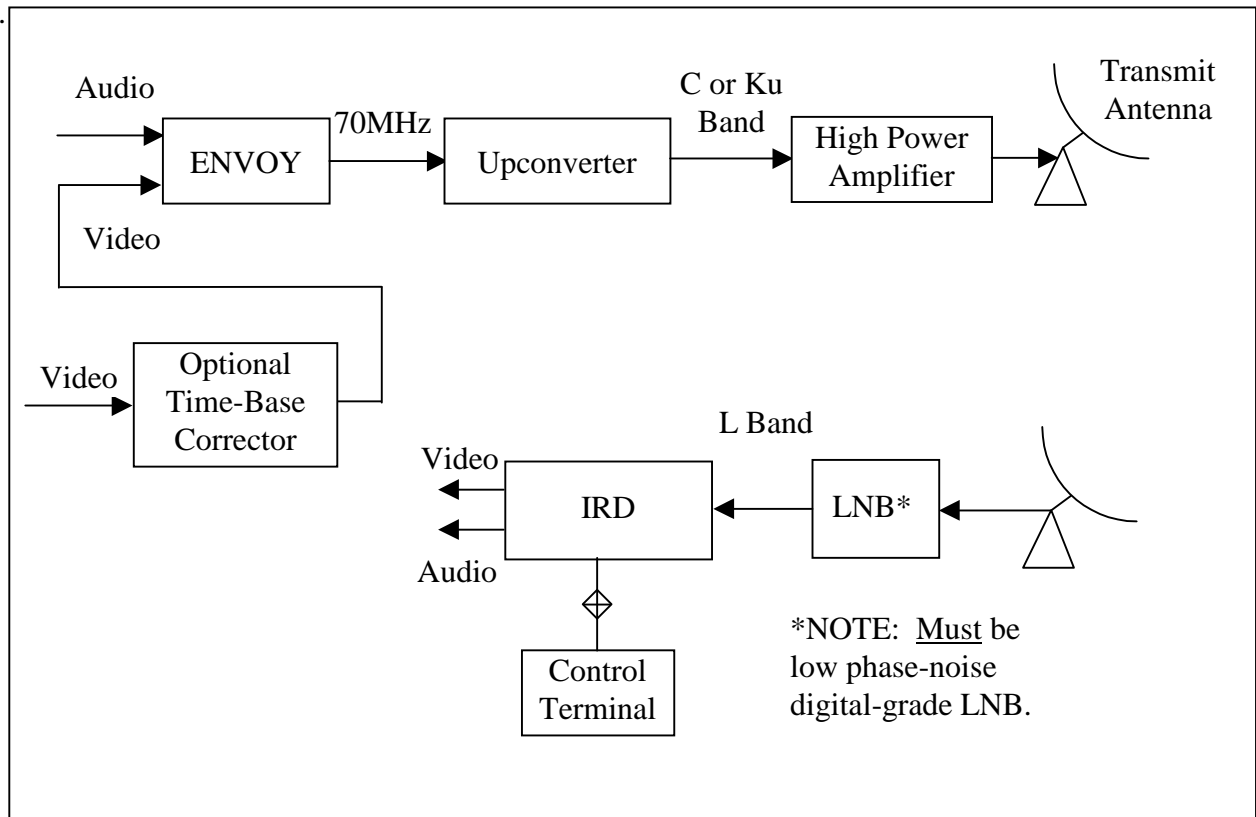
Figure 3. ENVOY Block Diagram
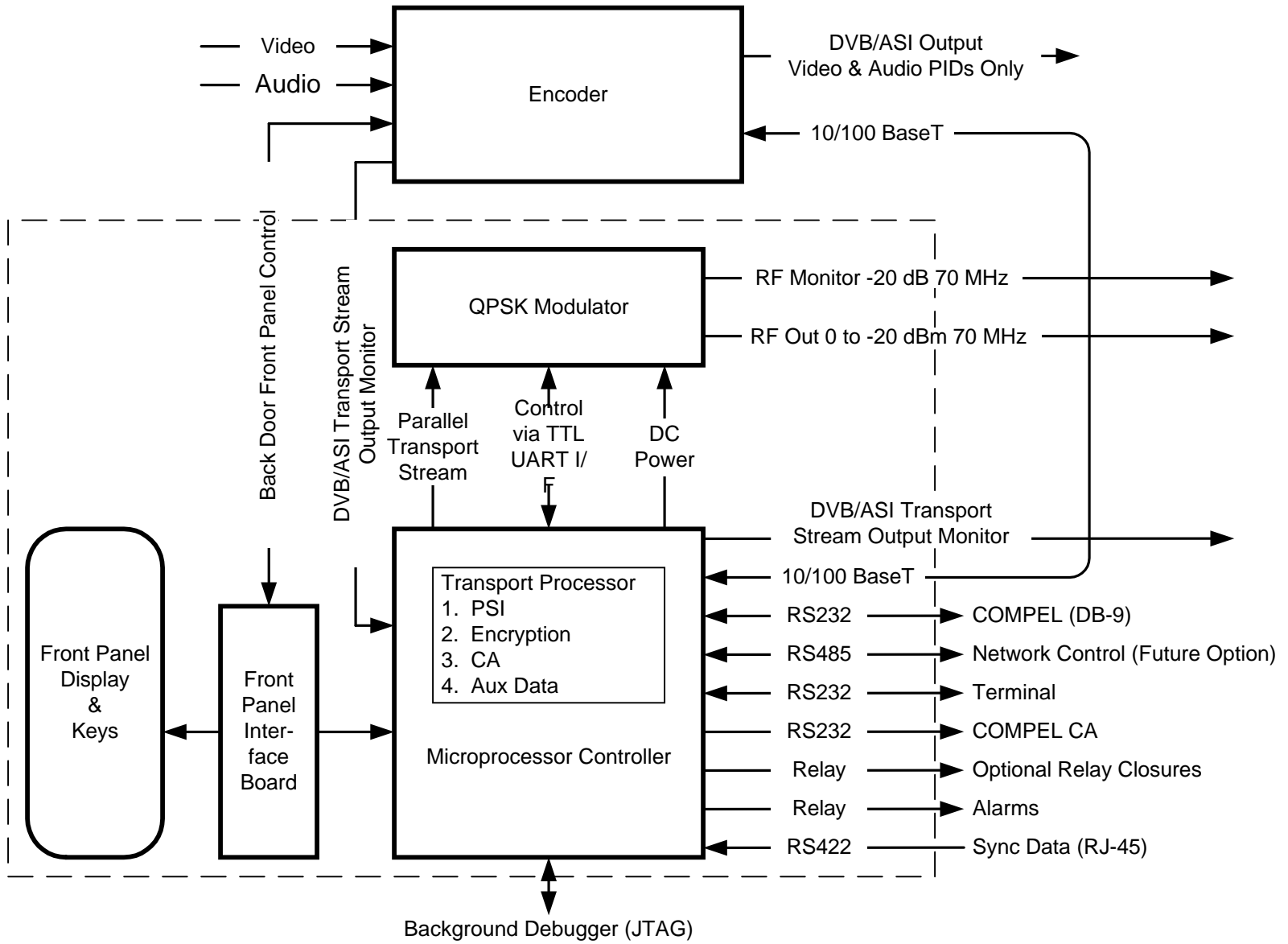
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SECTION 4
INSTALLATION

4.1   INTRODUCTION

This section contains instructions for setting up a transmitting system using the ENVOY™ Transmitter. Be sure you have the Configuration Sheet for the unit available. This document shows all the defaults programmed into the transmitter at the factory.

CAUTION

Please read the following section before beginning installation. Failure to do so could result in damage to the transmitter or the transmitting system.

4.2   SITE REQUIREMENTS

An appropriate antenna system must be installed and pointed toward the desired satellite. Antenna polarization must match the desired satellite transponder. The transmitting antenna system should meet the requirements specified by the program originator for gain and noise temperature. The antenna should be aligned using a spectrum analyzer or some other suitable receiving device.

4.2.1   Equipment Considerations

An appropriate up-converter must be used. The up-converter must meet the following criteria:

Table 3. Up-converter Criteria

Frequency	Phase Noise
100 Hz	63 dBc/Hz
1 kHz	70 dBc/Hz
10 kHz	80 dBc/Hz
100 kHz	90 dBc/Hz
Frequency Stability	$\pm$ 10 PPM

4.3   UNPACKING AND INSPECTION

Carefully unpack the unit and inspect it for obvious signs of physical damage, which might have occurred during shipment. Any damage claims must be reported to the carrier immediately. Be sure to check packing materials carefully for important documents and materials.

Contact Wegener Communications Service Department with questions.

4.3.1   Contents of Shipping Box

There are a number of small items with the ENVOY transmitter, so you should make sure to take the plastic bag containing them from the shipping box. The following list may help you determine any additional parts you may need for your installation. You may also want to use this list to inventory the contents. If you cannot find one or more of these items, contact Wegener Customer Service (See Section 1.3, Page 12) for assistance.

Quantity	Description	See Section
1	Y-Type AC Power Cable	4.7
1	75-Ohm Terminator	4.7
1	BNC – BNC Coaxial Cable, 18"	4.7
1	RJ-45 – RJ-45 Cable, 6"	4.7
1	Flash Memory Card	4.7.1.1

4.4   PHYSICAL ENVIRONMENT

The transmitter may be installed in any reasonably level rack located in a clean, dry environment, and do not place unsupported equipment on the unit. Make sure that total rack power consumption does not exceed the limits of the AC branch circuit, and that a reliable earth safety ground is maintained.

The unit will meet the full 10° to 40^oC operating temperature specification only if adequate clearance around vent-ports is provided. The ventilation ports are on the front and sides of the unit. You should ensure that there is no obstruction, such as rack frame panels, to adequate airflow to these areas. Units may be arranged without empty space above or below them, as long as enough rack ventilation is provided to prevent severe heat buildup. Please note the maximum per-unit power dissipation of 100 watts.

See specific statements in Section 4.5 below.

4.5   INSTALLATION CAUTIONS

To avoid damage to this and other equipment, or personal injury, the following items should be strictly observed.

4.5.1   Elevated Operating Ambient

If equipment is installed in a closed or multi-unit rack assembly, the operating ambient of the rack may be greater than the room ambient. Therefore, considerations should be given to the TMRA, or Temperature inside the Mounting Rack, and not just inside the room. .

4.5.2 Reduced Air Flow

Installation of the equipment in a rack should be such that the amount of airflow required for safe operation of the equipment is not compromised.

4.5.3 Mechanical Loading

Mounting of equipment in a rack should be such that a hazardous condition is not achieved due to uneven loading.

4.5.4 Circuit Overloading

Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits could have on over current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

4.5.5 Reliable Earthing

Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connection to the Branch (use of power strips).

4.5.6 Flash Card Shipping Precautions & Write Protect

Power down the Envoy and remove the PCMCIA flash card before shipping. Failure to do so may result in damage to the Envoy and/or flash card. Verify the flash card slide switch is in the write protect position as shown in Figure 4.5. The flash card is located on the bottom right side of the rear panel as illustrated in Figure 4 of section 4.6 *connections and interfaces.*

Top **Figure 4.5**

Write Protect Position
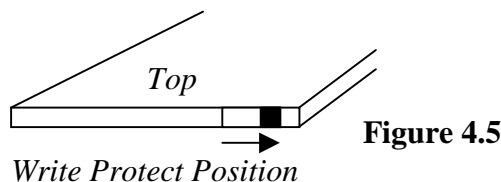
4.6 CONNECTIONS AND INTERFACES

All connections to the transmitter are made to the rear panel. The connectors and ports, and their pin-outs are shown in Section 6.

Figure 4. ENVOY™ Rear Panel Connections
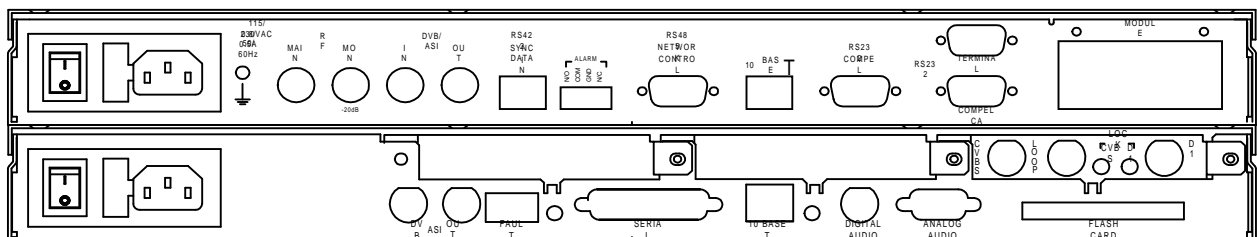
4.7　INSTALLATION INSTRUCTIONS

This section details the instructions for installing the ENVOY transmitter.

4.7.1　Pre-Setup and Rack Installation

There are several items that may be easier to put in place before installing the unit in a rack. However, depending on your situation, some of these can be accomplished after the unit is in place.

4.7.1.1　Memory Card Installation

Inside the plastic bag shipped with the ENVOY you will find a Flash Memory Card inside a plastic "Jewel Case." This card is approximately 2" x 3" and 1/8" thick.

The flash memory card contains the bootup software to initialize the encoder, and it contains the application and diagnostics software to begin operations. The software downloads automatically.

> **CAUTION**
>
> During encoder operation the flash memory card **MUST** be in the flash card slot with the write-protect switch in the **DISABLED** position. The write-protect switch is disabled when it is in the far-left position. It is enabled when it is in the far-right position.

To install the card and follow the steps below.

1. Make sure the power switch on the unit is in the off position.
2. Remove the flash memory card from its jewel case.
3. Confirm that the write-protect tab is set to the DISABLED position. The movable tab should be under the white dot when it is disabled.
4. Insert the card into the rear panel slot with the label up.

Complete the rest of the installation, as shown below.

To install the unit, complete the steps listed in the following table.

> **CAUTION**
>
> When installing the ENVOY in an equipment rack, support the entire unit while attaching the mounting screws. Failure to do so can cause damage to the unit.

Table 4. ENVOY Installation Steps

Step	Connection 1	Connection 2	Description
1.	Flash Card		Install the memory card. See steps above.
2.	Loop		Install the 75-ohm BNC terminator.
3.	10Base T	10Base T	Connect with the RJ-45 to RJ-45 Cable.
4.	Encoder DVB/ASI Out (Either)	Upper DVB/ASI In	Connect with BNC – BNC Coax Cable.
This completes the Unit-Only hookup. The rest of the cabling involves external hookups.			
5.	Sync Data In		Future Option
6.	Alarm		Hook the alarm contacts according to Section 6.2.6.
7.	RS-232 COMPEL	COMPEL Computer output	If COMPEL Control of the field receivers is desired, connect the RS-232 Output from the COMPEL computer to this port. See Section 6.2.9 for pin-outs.
Depending on whether you have digital or analog audio and video, hook the appropriate input to the following connectors.			
8.	CVBS Analog Video In		Accepts Analog Video. See Section 6.3.8.
9.	D1		Accepts D1 Video. See Section 6.3.10.
10.	Digital Audio		Accepts Digital Audio. See Section 6.3.6.
11.	Analog Audio		Accepts Analog Audio. See Section 6.3.7.

4.7.2. INITIAL START-UP PROCEDURE

When power is applied initially to the ENVOY™, default parameters for transmission rates are loaded. The Default parameters are shown in Section 1.5

After approximately three minutes, the unit automatically starts with these parameters.

If you wish to enter other parameters, you must access the desired menu. Refer to Section 5 for instructions on how to set new transmission parameters.

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SECTION 5
OPERATION

5.1   INTRODUCTION

The ENVOY™ is controlled from the front panel. This section describes front panel controls. These controls are further divided into two areas—Unit control and Encoder control. In normal operation, the keypad is in unit control, with the keypad giving setup options, inputs, outputs, and overall control of the unit. See Section 5.2 for explanations of the keypad operation in this mode. For explanations of those circumstances and the operation of the keypad in the Encoder Control Mode, see Section 5.3.

5.2   FRONT PANEL LEDS

There are four front panel LED's that provide indications about the transmitter's condition. The following table shows some basic facts about these LED's.

Table 5. Front Panel LED Indications

Label	Illuminates When:	Color
Power	System is powered on and ready	Green
Fault	Application software detects an alarm	Red
Local	Envoy is operating in local mode	Amber
Tx	Modulator is sending out RF data	Amber

5.3 FRONT PANEL PUSH BUTTONS

The three push buttons are used for modulator control. Table 6 below gives definitions of the push buttons.

Table 6. Definition of the Push Buttons

Label	Definition	Function	Color	Note
MOD	Modulation	ON OFF	Green Red	Modulated Carrier Out CW Carrier Out
LEVEL	Output Level	ON	Green	When this button is ON, the "MOD" LED will be green, and the output level can be set through front panel in the range of –20.0 to 0.0 dBm.
		OFF	Red	When this button is OFF, the "MOD" LED will be red, the output level will decrease 10 dB, and the output level becomes browse-only on the LCD. If this puts the output level below –20 dBm, the output level will go to –20 dBm.
CARRIER	Carrier	ON OFF	Green Red	Carrier On Carrier Off

5.4 KEYPAD

The user interface is implemented through the front panel, which contains a 24-button keypad and three push buttons for user input, a 2-line, 20-character VFD for system output, and four LED's to monitor system operations. The VFD supports local user control and monitor. It displays menus and system messages. Operators can use the keypad to edit the data that the VFD displays.

The keypad, Figure 6, consists of six hot keys, eight function keys, and ten alphanumeric keys.

Hot Keys
(Access to Menus)
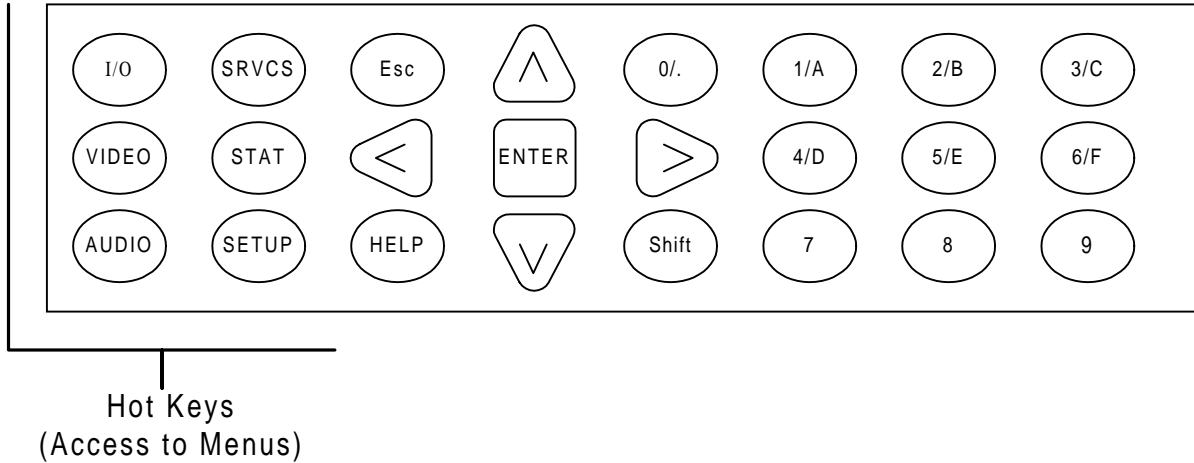
Figure 5. Keypad

The hot keys access menus that contain parameters for supporting the following functions:

Table 7. Keypad Hot Keys

Hot Key	Menu	Function
AUDIO	AUDIO	Configure audio encoding parameters
VIDEO	VIDEO	Configure video encoding parameters
SRVCS	SERVICE	Set PIDs Set Tags Get Sysinfo Set Network Information
STATUS	STATUS	Display status information, error logs and alarms
SETUP	SETUP	Set encryption state Set Encryption Type Set Pin Scrambling Number Set time-out delay for remote and local control Restore factory defaults
I/O	MODULATOR	Configure modulation parameters

The eight function keys are used to move through the menu hierarchy and to access individual parameter settings. Table 8 describes the usage of each function key and how the control keys of the Front Panel Keypad operate.

Table 8. Keypad Operation

Function Key	Usage
< (LEFT)	Scroll backward to additional menus at the same level. Decrement cursor position. Delete a character: press Shift, then press <.
> (RIGHT)	Scroll forward to additional menus at the same level. Increment cursor position. Insert a space: press Shift, then press >.
∧ (UP)	Scroll up to next choice in list when editing parameters. Wraps when top of list is reached. Toggle a negative sign for a signed value input. Cycle through (forward) alphabetic letters for text input. Toggle upper case alphabetic characters (press Shift, then press ∧). Cap lock: press Shift, then press ∧ twice.
∨ (DOWN)	Scroll down to next choice in list when editing parameters. Wraps when bottom of list is reached. Toggle a negative sign for a signed value input. Cycle through (backward) alphabetic letters for text input. Toggle lower case alphabetic characters (press Shift, then press ∨). Lower-case lock: press Shift, then press ∨ twice.
ENTER	Select menu item for editing or executing. Select submenu entry. Complete editing and accept changes.
Shift	Switch to alphabetic characters. Change the case of a selected character.
Esc	Move back to higher menu level. Cancel changes and exit EDIT mode.
HELP	View technical support information

The keypad provides both alphabetic (upper and lower case) and numeric characters. The 0 (zero) key also has a period. The default display is numeric. Numeric parameters are in either decimal integer or hexadecimal format. Operators can access the entire alphabet (and the period, minus, and @ characters) by pressing the ∧ or ∨ Key.

- To type a decimal number, press a number key.

- To type a negative decimal number. Press the down arrow dolled by the number

- To type a hexadecimal number, use Shift for letters A through F.

- To type a alphabet, press Shift, then type letters A through F or press ∧ or ∨ to cycle through the alphabetic characters.

- To change the case of a selected character: press Shift, then press ∧ or ∨ to convert to upper or lowercase, respectively.

- To return to numeric characters, press Esc.

5.5   MENU STRUCTURE

In normal operation, the Front Panel Menus control almost every function of the unit. Because of that, it is important to understand the menus and how they implement this control.

Figure 6 shows the basic menu structure of the unit, and the subsequent figures show the details of these menus.

Figure 6. ENVOY™ Menu Hierarchy
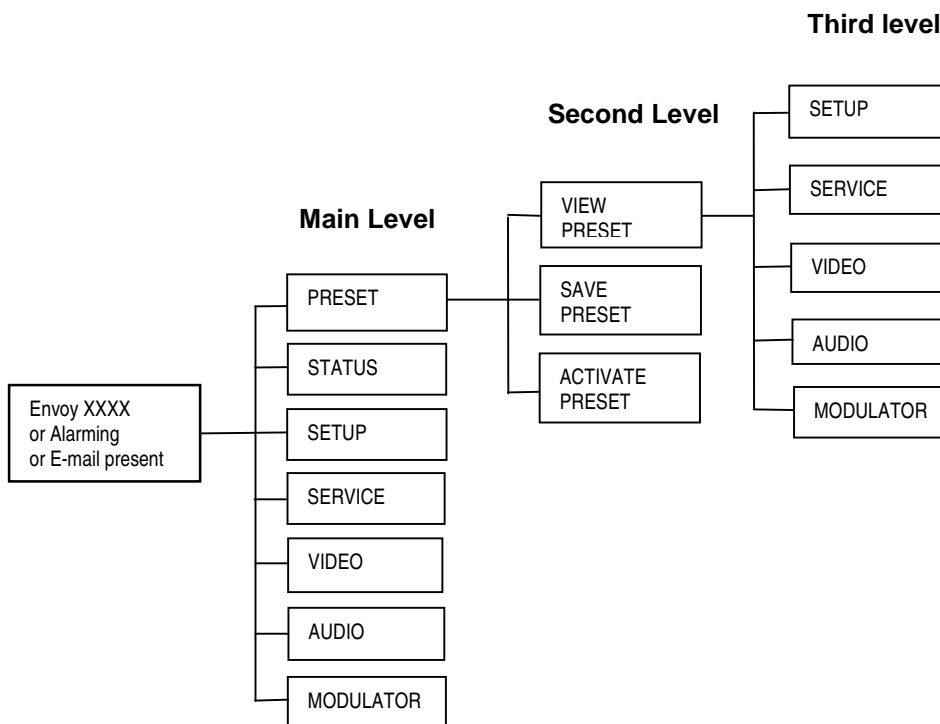
5.5.1 Menus and Parameters Reference

This chapter describes the menus, parameters and options that comprise the encoder user interface. When the encoders operate in local mode, you access the hierarchical menus using the keypad on the local control panel. When an encoder operates in remote mode, you change encoding parameters through the System Controller user interface.

5.5.2 Menu Hierarchy

The encoder has six top-level menus that you access by pressing the associated hot key on the local control panel keypad. The "Preset" menus may also be used, but are reached by pressing <ENTER> from the "Home Screen."

Hot Keys
(Access to Menus)
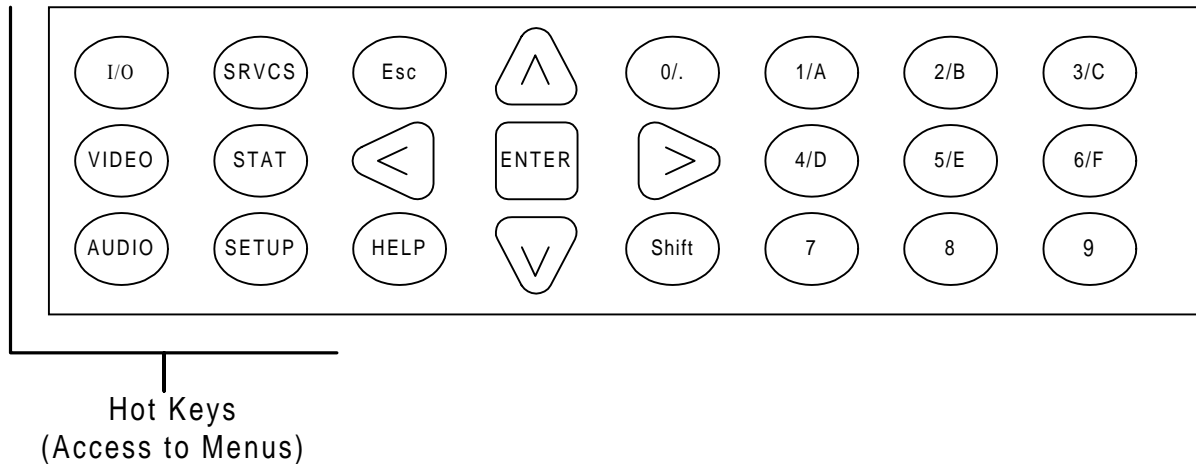
In this chapter, the graphical representations of menus show the hierarchy, parameters and options that are available from each menu. The parameters and options on the Video, 1/0, and Audio menus are similar to those in the System Controller user interface.

5.5.2.1 Preset Menus

The "Preset" menus differ from the other menu headings in that there is no direct key to go to the "Preset" menu. Pressing <ENTER> from the home screen will move the display to "Preset." Also, Presets may NOT be modified from this menu. The unit will disregard any changes made under the "Preset" menu.

To change a preset, make any desired changes to the current settings. Then, make sure those changes are correct, and save the current settings as a Preset. If, in spite of this precaution, the unit is placed in a mode with incorrect or unknown parameters, use "Restore Defaults" under the Setup menu to return to basic settings. After that recovery, make desired changes and save them as a Preset, if desired.

The "Preset" menus show all other parameters and follow their basic format.

The following figure shows a sample of the hierarchical structure.

Table 9. Envoy Menu Structure

Top Level	Second Level	Third Level	Range
Preset	Preset: View <01-16> (Press arrow keys to scroll thru presets)	Press <ENTER> to view menus showing parameters of preset whose # is shown	01-16
	Preset: Save (Press <ENTER> to save current settings)		Can save current parameters as any Preset 01-16.
	Preset: Activate (Press <ENTER> to activate Preset #xx shown)		Can activate any preset 01-16, which has been saved.
Modulator (Press I/O)	Mod:Modulation Type < >		QPSK, 8PSK, 16QAM
	Mod: Frequency MHz: xx.xxxxxx		52 MHz to 88 MHz
	Mod: Transport Rate Mbps: xx.xxxxxx		Limited by FEC
	Mod: FEC < FEC >		½, 3/4, 2/3, 3/4, 5/6, 7/8, 8/9
	Mod: Spec Inversion < >		Normal, Inverted
	Mod: Alpha < >		0.13 to 0.50
	Mod: Symbol Rate < >		View Only

Top Level	Second Level	Third Level	Range
	Mod: Output Level < >		0 dBm to –20 dBm
Video	Video: Basic	Vid:Bitrate Target: Mbps:	1.5 to 50 Mbps
		Vid:Bitrate Actual: Mbps:	Viewable Field Only
		Vi:Ba:Resolution Horizontal: < >	640, 704, 720 352, 480, 544
		Vi:Basic:Format < >	SDI, Composite
		Vi:Ba:Standard < >	NTSC – 525, PAL – 625
		Vi:Ba: Vertical Res < >	Standard = 4.2.0 Mode Expanded = 4.2.2 Mode
		Vi:Basic:Sync Mode < >	Sync to Video, Internal
		Vi:Basic:CC Type < >	ATSC, Divicom, None
		Vi:Basic:EX-Data < >	Enabled, Disabled
		Vi:Ba:Chroma Format < >	4:2:0, 4:2:2
	Video:Composite	Vi:Co:Luma Rolloff < >	None, Minimum, Medium, Maximum
		Vi:Co:Chroma Roll < >	None, Minimum, Medium, Maximum
		Vi:Co:Luma Gain < >	0 dB to 3 dB
		Vi:Co:Chroma Gain < >	0 dB to 3 dB
		Vi:Co:Comb Mode < >	Field, Frame, Line
		Vi:Composite:RFD < >	On, Off
	Video:Advanced	Vi:Ad:Concealment Motion Vec: < >	On, Off
		Vi:Ad:Aspect Ratio < >	4:3, 16:9
		Vi:Ad:GOP M Frames < >	1, 2, 3
		Vi:Ad:GOP N Frames < >	15 Default Range = 0 to 100

Top Level	Second Level	Third Level	Range
		Vi:Ad:Closed GOP < >	Yes, No
		Vi:Ad:GOP Seq Hdr Frames: < >	1-100
Audio	Audio:Main	Audmain:Bitrate kbps: < >	64, 96, 112, 128, 160, 192, 224, 256, 320, 384
		Audmain:Sample Freq kHz: < >	32, 48, 44.1
		Audmain:Routing < >	Mono, Dual Channel, Joint Stereo, Stereo
		Audmain:Input Format < >	Analog, AES/EBU, SDI-1, SDI-2
		Audmain:Input Level < >	0 to 20 dBV
		Audmain:Language < >	0-9, A-Z
	Audio:Audio 2 Same screens as Audio Main	Audio 2:Bitrate Kbps: < >	Same as Audio Main
	Audio:Audio 3 Same screens as Audio Main	Audio 3:Bitrate Kbps: < >	Same as Audio Main
Services	Srvcs:PID	Sr:PID:Compel/Tag Hex: 0x1026	
		Sr:PID:KMS/Aux Hex: 0x1028	
		Sr:PID:Sync Data TBD	Not Displayed Future Option HW
		Sr:PID:PMT Hex: 0x1021	
		Sr:PID:Video Hex: 0x1022	
		Sr:PID:Main Audio Hex: 0x1023	
		Sr:PID:Audio 2 Hex: 0x1024	
		Sr:PID:Audio 3 Hex: 0x1025	
		Sr:PID:Audio 4 Hex: 0x1030	
		Sr:PID:Audio 5 Hex: 0x1031	
	Svrcs: Sys Info	Sr:Sy:Program II Int: 1	

Top Level	Second Level	Third Level	Range
		Sr: Sy Transport ID INT:1	
		Sr:Sy:Network Name <Name>	
		Sr:Sy: Service Name <Name>	
		Sr:Sy: Srvc Provider <Name>	
	Srvcs: Network	Sr:Ne:Network ID 0x + 4 digits	
		Sr:Ne:Network Type <Satellite> or <Cable>	
		Sr:Ne:Uplink Freq GHz: ff.ffffff	
		Sr:Ne:Orbit Pos Degrees: d.ddd	
		Sr:Ne:Hemisphere <East> or <West>	
		Sr:Ne:Polarization <Polarization>	Linear-Horiz, Linear-Vert, Circular-Left, Circular-right
		Sr:Ne:Xmit Freq MHz: ff.ffffff	
	Srvcs: Tag	Sr:Tag:Tag #0 Tag #0 - #14	Press arrow keys to see tags
Status	St:Current Alarms <No Current Alarms>	Messages	
	St:Encoder Bootfile C:/tftpboot/spike/s ▸ ◂e/s6.37/mb/474d470s6.3	SHIFT, then > or < for more data	
	St:Encoder SW Rev S6.37		
	Status: IP Address 192.168.11.200		
	St:Envoy Mac Adr 08:01:23:45:67:89		
	Status:Boot Code Revision: 3.2G		
	Status:App Code Version: 1.0A9		
Setup	Setup:Scrambling < >	None, PIN Scrambling	On or Off

Top Level	Second Level	Third Level	Range
	Setup:PIN Value 12345678		8 Digits
	Setup:Compel Baud Kbps: 19200		19200
	Setup:KMS/Aux Baud Kbps: 19200		19200
	Setup:Display TMO Secs: time		0 to 3000
	Setup:Serial Control < >		RANGE = Terminal Modem
	Defaults Restore? < >		Yes, No

The menu hierarchies show the parameters on a particular menu and the valid options or ranges for each. Ins some cases, the option is a read-only display in the LED, as indicated by the phrase, "Scrollable text (read only)."

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SECTION 6
REAR PANEL CONNECTORS

6.1   INTRODUCTION

This section lists the rear panel connections, gives a basic explanation of each connector's function, and has a pin-out table for each, with the exception of BNC connectors. Each BNC connector has signal on the center pin, with a grounded shield.

6.2   UPPER PORTION CONNECTORS

This section describes the connectors and pin-outs for the upper section of the ENVOY, which contains the Modulator and Controller.

6.2.1   RF Main

This connector is an output for the RF Signal. It can be set for output level between 0 and –20 dBm in 0.1 dB resolution steps.

6.2.2   RF Monitor

This output is normally used for monitoring the RF output. It is identical to the RF Main output, except it is 20 dB lower than that output.

6.2.3   DVB / ASI IN

The Controller DVB/ASI input has a BNC connector, which accepts an output from the Encoder DVB/ASI Out. This connection is made with the supplied BNC - BNC cable supplied with the unit, and described in Section 4.3.1.

6.2.4   DVB / ASI OUT

This output is a DVB ASI Compliant stream that could used for a redundant RF modulator or for a local uplink encoder monitor.

6.2.5   Sync Data In RS-422
Future Option

Table 10. Sync Data Input Port Pin-outs (Future Option)

Pin	Signal	Description

1	GND	Ground
2	RD+	Data Input (A)
3	RD-	Data Input (B)
4	RS+	Sync Signal (A)
5	RS-	Sync Signal (B)
6	RC+	Clock (A)
7	RC-	Clock (B)
8	GND	Ground

6.2.6 Alarm

The alarm closure is a 4-pin connector. It has one Ground Connection (GND), along with the Relay Common (COM), the Normally Open (N.O.) and the Normally Closed (N.C) contacts. These Relay Contacts are rated at 0.10 amps at 30 VDC maximum.

The pin-outs for this closure are shown in the table below.

Table 11. Fault Closure Pin-outs

Pin	Description
1	Normally Open (N/O)
2	Common (COM)
3	Ground (GND)
4	Normally Closed (N/C)

6.2.7 Network Control RS-485

Future Option

6.2.8 10 Base T

This input connector receives an output from the Encoder carrying control data. The following table lists the pin-outs for the RJ-45 connector.

Table 12. Controller 10Base-T Connector Pin-outs

Pin	Signal

1	Receive Data (RD)+
2	Receive Data (RD)-
3	Transmit Data (TD)+
4	Not connected
5	Not connected
6	Transmit Data (TD) -
7	Not connected
8	Not connected

6.2.9   COMPEL RS-232

This is an RS-232 port, connected with a DB-9 Female connector. Communication is fixed at 19200, N, 8, 1. There is no handshaking. The pin-outs for the three RS-232 ports are shown in Table 13 below.

Table 13. RS-232 Port Pin Outs

Pin	Direction	Signal
1		Not Connected
2	Output	Transmit Data
3	Input	Receive Data
4		Not Connected
5	Ground	Ground
6		Not Connected
7		Not Connected
8		Not Connected

The Port requirements for all three RS-232 Ports are shown in Table 14 below.

Table 14. RS-232 Port Requirements

Parameter	Specification
Levels	RS-232
Signal Type	8 data bits, 1 stop bit, no parity
Baud Rates	19200 (Fixed)
Pin-outs	DCE to AT-compatible serial port, 3-wire subset (Rxd, Txd, and Ground) without handshake lines.

6.2.10   Terminal RS-232

This is an RS-232 port, connected with a DB-9 Female connector. Communication is fixed at 8 data bits, 1 stop bit, and no parity. There is no handshaking. See the RS-232 Pin-outs in Table 13 and the port requirements in Table 14.

6.2.11   COMPEL CA

This is an RS-232 port, connected with a DB-9 Female connector. Communication is fixed at 8 data bits, 1 stop bit, and no parity. There is no handshaking. See the RS-232 Pin-outs in Table 13 and the port requirements in Table 14.

6.2.12   Module

This feature of the unit is reserved for future options.

6.3   ENCODER CONNECTIONS AND LED'S

6.3.1   Encoder LED's

There are four LED's on the rear of the encoder to provide troubleshooting assistance with the ENVOY's operation. For convenience these LED's are positioned immediately next to the connector carrying the signal being monitored. The following, Table 15, describes their operation.

Table 15. Encoder Rear Panel LED's

LED	INDICATION WHEN ILLUMINATED
Fault (Red)	A fault condition has been sensed in the Encoder.
10Base-T (Green)	The Ethernet signal is active.
CVBS Lock	Steady illumination of this LED indicates the Composite Video Signal is locked. When flashing, this LED indicates a problem locking the Composite Video Signal.
D1 Lock	Steady illumination of this LED indicates the Serial Digital Video Signal is locked. When flashing, this LED indicates a problem locking the Serial Digital Video Signal.

6.3.2   DVB/ASI Out

Two BNC connectors provide redundant MPEG-2 transport stream outputs.

6.3.3   Fault

The fault relay connector is connected to a Form C relay that can switch 0.10 amps at 30 VDC. The following table shows the pin-outs for the fault relay.

Table 16. Fault Relay Connector Pin-outs

Pin	Connection
1	Normally Closed
2	Normally Open
3	Common

6.3.4   Serial DB25

This connector is Not Used.

6.3.5   10 BASE T

The Ethernet connector is a 10Base-T port that uses an RJ-45 connector to provide control communications to the controller. It uses TCP/IP or UDP/IP protocol. The following table lists the pin-outs for the RJ-45 connector.

Table 17. 10Base-T Connector Pin-outs

Pin	Signal
1	Transmit Data (TD) +
2	Transmit Data (TD) -
3	Receive Data (RD) +
4	Not connected
5	Not connected
6	Receive Data (RD) -
7	Not connected
8	Not connected

6.3.6   Digital Audio

A BNC connector supports AES/EBU digital audio.

6.3.7   Analog Audio

A DB-9 female connector supports balanced stereo audio input for the encoder. The following table lists the pin-outs for the connector.

Table 18. Analog Audio Connector Pin-outs

Pin	Signal
1	Left channel differential input +
2	Left channel shield
3	Not connected
4	Right channel shield
5	Right channel differential input -
6	Left channel differential input -
7	Not connected
8	Not connected
9	Right channel differential input +

6.3.8   CVBS

This connection is for a composite video input port, and is made with a BNC connector. This input is also "looped through" to the "Loop" output (See "Loop," below). This input supports both PAL and NTSC video standards.

6.3.9 LOOP

The "Loop" port is a "Loop through" output of the CVBS input above. If this port is not used, the connector must be terminated (75-ohm terminator supplied). This connection is also made with a BNC connector.

6.3.10 D1

A BNC coaxial connector carries the D1 serial digital video input.

6.3.11 Card

The flash card slot on the rear panel accommodates a flash-memory card, which contains the operating and diagnostics software for the encoder. The flash card must be present in the rear panel slot to operate the encoder.

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APPENDIX A
TECHNICAL SPECIFICATIONS

ENVOY™ Digital Video Transmitter Technical Specifications

CHARACTERISTIC	SPECIFICATION
Input	
Video	Analog composite NTSC/PAL; D1
Audio	AES/EBU digital; Analog Stereo
Encoding	
Modulation	QPSK, 8PSK, 16QAM
Channel FEC	Concatenated: Reed-Solomon (204/188) – Convolutional rate 1/2, 2/3, 3/4, 5/6, 7/8, 8/9
Minimum Eb/No @ FEC rate (QPSK)	4.0dB@1/2; 5.0dB@2/3; 5.5dB@3/4; 6.0dB@5/6; 6.4dB@7/8
Video Coding	ISO MPEG-2
Audio Coding	ISO MPEG-1 Layer 2
Channel Spacing	User configurable
Occupied Bandwidth	User configurable
Information Rate	User configurable
Transmit Rate	User configurable
Output	
IF	
Frequency	70MHz $\pm$ 18 MHz; tunable in 125kHz steps
Level	0 dBm to –20 dBm in 0.1 dB steps
Size	19"W X 25"D X 3.5"H
Weight	39 lb.
Power	115 VAC, 2A, 60 Hz / 230VAC, 1A, 50 Hz
Modulator/Controller Fuse (Upper Unit)	250 V, 0.8 A
Encoder Fuse (Lower Unit)	250 V, 2.0 A

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APPENDIX B

service@wegener.com   **RMA REQUEST FORM**   Fax (678) 624-0294

Company Name: _____

Bill-To Address: _____

_____

_____

_____

Ship-To Address: _____

_____

_____

Contact Name: _____

Phone #   (____) - _____   Fax #: (____) - _____

Complete Model #: _____

Serial #: _____

In Warranty: Yes ☐   No ☐

Problem: _____

_____

_____

_____

Additional Comments: _____

_____

_____

_____

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APPENDIX C

ENVOY Terminal Commands

The following discussions apply to both the Terminal and Modem devices. Once a user has fulfilled the password requirement for Modem access, the communication is identical to Terminal control. The terminal port is fixed a 19.2 Kbps (N,8,1) Full duplex.

Overview and Syntax

Commands listed in this section detail command syntax and action taken. Commands consist of a command field and a parameter field. Each command field and parameter field is space delimited. Both commands and parameters may be entered in upper or lower case; the interface is not case-sensitive.

Correct commands result in "OK" being displayed at the terminal. Incorrect or incomplete commands result in "ERR" being displayed at the terminal. Parameter errors on User commands generate Various Control Keys are supported to assist in command line editing. Commands in this section apply to terminal control only during the "run" phase of operation.

Note: The default setting for terminal control of the ENVOY is Modem. Modem mode requires a login and password to access the unit using a standard serial RS232 terminal interface. To configure the ENVOY so that no password is required for access, perform the following steps:

1   Press the **Setup** soft key on the key pad

2   Press the **Enter** key.

3   Use the **Right Arrow** key to move to the terminal control menu.

4   Change the terminal mode from "**Modem**" to "**Terminal**"

Local Control Commands

These commands are available to the user when the unit is running in full operational mode.

HELP
Entering Help at the terminal will display the current supported local control commands to the end user with a brief description of what each command does .

H

Command: Any of the terminal command names

Entering H at the terminal will display the current supported local control commands to the end user with a brief description of what each command does .

If a 'H' or any invalid command beginning with a 'H' is entered and *command* <u>is omitted</u>, the whole help screen will be displayed, consisting of a list of all *currently* available commands and a brief description of each listing.

PERM *MOD, FREQ, DATARATE, FEC, SPECTRUM, ALPHA, IFLEVEL*

This command mutes the carrier, invokes the new parameters and un-mutes the carrier.

MOD: Modulation format, one of the legal modulation formats: Q for QPSK, 8 for 8PSK, or 16 for 16QAM

N*ote: 8PSK and 16QAM are not supported in the ENVOY Lite.*

*FREQ***:** The output carrier frequency in MHz. The carrier frequency range is 52.0 to 88.0 MHz in 0.125 MHz steps.

*DATARATE***:** The 188 byte transport data rate in Mbps (precision to three decimal places OK). The data rate range is 2.500 to 52.000 Mbps.

*FEC***:** The inner FEC ratio. The legal options: QPSK: 1/2, 2/3, ¾, 5/6, and 7/8; 8PSK: 2/3, 5/6, 8/9; and 16QAM: ¾, and 7/8.

SPECTRUM: Sets the modulation spectrum phase. Enter "N" for normal or "I" for inverted.

ALPHA: Carrier filter shape factor. Typically 0.35 is recommended for QPSK and 0.25 is recommended for 8PSK and 16QAM. The range of alpha is 0.1.3 to 0.50 in steps of 0.1.

IFLEVEL: The level of the IF output port. The range of the IF output level is 0 to –20.0 dBm in 0.1 dB steps.

CARRIER *mode*

mode: **Sets the Envoy carrier mode the valid parameter follow:**

"M": This parameter set the carrier to off (muted).

"U": This parameter sets modulation on, carrier on, and normal output level.

"CW": This parameter sets modulation off, carrier on and normal output level.

"CWR": This parameter set modulation off, carrier on and –20.0 dBm output level.

FREQ *Freq*

Freq: This command will save the current carrier state. Muter the carrier. Tune to the new frequency and then restore the carrier the initial carrier status. The carrier frequency range is 52.0 to 88.0 MHz in 0.125 MHz steps.

IFLEVEL L*evel*

Level: This command invokes a new carrier output level. The range of the IF output level is 0 to –20.0 dBm in 0.1 dB steps.

VIDTARGETRATE R*ate*

Rate: Sets the Envoy target video rate. The valid range is 2.0 to 50 Mbps in 1 Kbps steps.

VIDFORMAT F*ormat*

Format: Sets either the Envoy video input and format. Enter "C" for composite or "S" for SDI.

VIDSTANDARD S*tandard*

Standard: Sets the Envoy video format. Enter "N" for NTSC or "P" for PAL.

VIDMODE M*ode*

Mode: Sets the Envoy chroma format. Enter "1" for 4:2:0 or "2" for 4:2:2

note: 4:2:2 video is not supported on the Envoy Lite.

ASPECT *Mode*

Mode: Sets the Envoy video aspect ratio. Enter "S" for 4:3 or "W" for 16:9.

MODEMON
MODEMON is the default setting for the ENVOY terminal interface..

The command sets the Envoy terminal port to function in modem mode. This mode of operation allows the end user to control the ENVOY remotely via a standard modem connection or locally via a RS232 terminal connection. When the Modemon command is invoked a login password is required to gain access to the terminal commands.

The default unit password is PASSWORD.

To gain access to the terminal commands while in modem mode the syntax is.

LOGIN passwd

Where passwd is the default units password or the end user password if the original password was changed by the user.

To end the terminal session, and require the password for terminal entry again, the **OH** command should be issued.

MODEMOFF
This command sets the Envoy to normal terminal mode. No password is necessary for the public commands.

OH
On hook. Disables modem access. Modem access is only re-enabled by successful modem password entry. This command is only active while the Envoy is in modem mode.

PW P*assword*
This command sets the password for password protection when in modem mode.

Password: One to six alphanumeric characters.

Changes the modem password.

R T*ype*
This command request Envoy status reports for carrier, video, audio, and alarms status.

Type: Indicates the type of report as follows:

CAR- Envoy Carrier Status Report

VID- Envoy Video Status Report

AUD- Envoy Audio Status Report

ALR- Envoy Alarm Report

Envoy Carrier Status Report

Carrier Frequency:	70.000 MHz
Carrier Mode:	Unmuted
modulation:	QPSK
FEC:	3/4
Transport Rate:	8.448 Mbps
Symbol Rate:	6.1113 M-Baud
Carrier Level:	-10.0 dBm
Alarm Status:	None

Envoy Video Status Report

Target Rate:	50.000 Mbps
Actual Rate:	7.800 Mbps
Video Input:	Composite
Video Format:	NTSC

Video Mode:	4:2:0
Aspect Ratio:	4:3
Line 21 CC:	ATSC
Line 21 XDS:	ATSC
Alarm Status:	Normal

Envoy Audio Status Report

Main:	Rate 256 Kbps – Sample 48 Kbps – Mode Stereo – Input Analog – Level +20.0 dBV – Disc eng
Aud2:	NA
Aud3:	NA
Aud4:	NA
Aud5:	NA
Alarm Status:	None

Envoy Alarm Status Report

List all current Envoy alarms.

RESET

Resets unit.

SHOW_VER

Displays the Welcome banner and the versions of hardware and software components within the IRD, as given below:

Code	*Description*
Application, current:	*V###.* Application revision.
Boot Loader	*V###.* Boot Loader revision.

SCRON   Enables pin scrambling

SCROFF   Disables pin scrambling

SETPIN   Sets the pin scrambling number used for pin scrambling. The valid range for the pin numbers is 1 to 16777215.

Actual print out of terminal help command presented to the end user.

LOGIN	password (required in MODEM mode)
R	CAR | VID | AUD | ALR>
SHOW_VER	(Display ENVOY SW Versions)
PERM	mod, freq, datarate, fec, spectrum, alpha, iflevel
CARRIER	<M | U | CW | CWR>
FREQ	freq (MHz)
IFLEVEL	level (dBm)
VIDTARGETRATE	rate (Mbps)
VIDFORMAT	<C | S> (C=composite, S=SDI)
VIDSTANDARD	<N | P> (N=NTSC, P=PAL)
VIDMODE	<1 | 2> (1=4:2:0, 2=4:2:2)
ASPECT	<S | W> (S=4:3, W=16:9)
MODEMON	(sets the ENVOY to MODEM mode, requires password)
MODEMOFF	(sets the ENVOY to TERMINAL mode, no password)
OH	(ends the current modem session)
PW	password (sets password for MODEM mode)
SCRON	(turn scrambling on)
SCROFF	(turn scrambling off)
SETPIN	pin (sets the PIN used for scrambling)
RESET	(reset the ENVOY)
HELP	Help

Record of Revisions			
Date of Change	**Rev. Level**	**Page No.**	**Description of Change**
10/31/00	P3		Preliminary Release
05/31/01	A	Multiple	Misc. Cleanup, Default Settings
10/15/01	B	Multiple	Terminal Commands Addition Appendix C
02/12/02	C	36	Updated Video Menu Structure
05/30/02	D	Page 18 & 45	Changed 10Base-T from weak to Active
		Page 32	Corrected spelling of "followed".
01/27/06	E	Page 25	Add Flash Card Shipping Precautions & Verify Switch is in Protected Mode.

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SERVICE RETURN ADDRESS

Service Department RMA# _____
Wegener Communications, Inc.
359 Curie Drive
Alpharetta, GA 30005

CONTACT NUMBERS AND EMAIL ADDRESS

Voice: (770) 814-4057

FAX: (678) 624-0294

E-mail: **service@wegener.com**