

EN-100

1080p MPEG4 Encoder

Includes modulator versions - LB & IF

USER GUIDE

03.14

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Trademarks & Copyrights

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Electrical Device Compliance Notices

Safety Warnings and Cautions

For your safety and the proper operation of the device:

- This unit must be installed and serviced by suitably qualified personnel only.
- Do not break the warranty seals on the device or open the lid. Only approved service technicians are permitted to service this equipment.
- Disconnect all power before servicing the unit.
- Do not expose this device to rain or other moisture. Clean only with a dry cloth.
- If not installed in an equipment rack, install the product securely on a stable surface.
- Install the product in a protected location where no one can step or trip over the supply cord, and where the supply cord will not be damaged.
- If a system is installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the room ambient temperature.
- Consideration should be given to installing the unit in an environment compatible with the maximum recommended ambient temperature of 50 degrees Celsius (122 degrees Fahrenheit).
- Install the unit in a rack so that the amount of airflow required for safe operation is not compromised.
 - The recommended clearance on the top and sides of the unit is at least ½ " (one half inch/one centimeter).
- Mounting of the unit in a rack should be such that no hazardous condition is achieved due to uneven mechanical loading.
- Use only a grounded electrical outlet when connecting the unit to a power source.
- Reliable earth grounding of rack-mount equipment should be maintained.
 - Particular attention should be given to supply connection other than direct connections to the branch circuit (e.g., use of power strips).

Compliance Notices

FCC

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning: Changes or modifications to this device not expressly approved by Adtec Digital could void the user's authority to operate the equipment.

Industry Canada

This Class B digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. 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.

Cet appareillage numérique de la classe B répond à toutes les exigences de l'interférence canadienne causant des règlements d'équipement. L'opération est sujette aux deux conditions suivantes: (1) ce dispositif peut ne pas causer l'interférence nocive, et (2) ce dispositif doit accepter n'importe quelle interférence reçue, y compris l'interférence qui peut causer l'opération peu désirée.

European Union EMC Directive Conformance Statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Adtec Digital cannot accept responsibility for any failure to satisfy the protection requirements resulting from a user modification of the product. This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22 / EN 55022.

Chapter 1 - Product Overview

Product Introduction

The EN-100 is Adtec's 6th generation compression platform. This innovative low delay platform boasts AVC 4:2:2 and 4:2:0 compression. The lightweight and nearly silent EN-100 offers amazing features and specifications in its 1 RU chassis, including redundant AC power supplies, enhanced control and monitoring via its front-panel, a browser and SNMP; video support includes SD, 2D-HD, 3D and 4K (Ultra HD) synchronous AVC encoding. The EN-100 boasts sixteen channels of audio, robust VBI support, reliability and ease of use. In addition to encoding MPEG 1 audio, the EN-100 adds support for Dolby Digital Plus, ACC-LC and HE-AAC (v1 and v2) mixed mode audio encoding supporting stereo (2.0) and multi-channel surround (5.1) modes. The EN-100 encodes and concurrently transports services via ASI, IP and DVBS/S2. The DVBS/S2 modulator is available in IF or L-band with modulation modes ranging from QPSK up to 32APSK 5% rolloff based on software licenses.

EN100-02: Base 1080p Encoder Chassis: Supported resolutions include 1080p AVC 420 with installed VE1 video encoder module. Transport interfaces include ASI and IP via UDP/RTP/SMPTE2022. Optional DVB/S2 modulator. Audio support for up to 8 pairs, 16 channels, of MP1, DD, or AAC audio encodes in 1.0,2.0, or 5.1 channel modes.

EN100-02 Hardware Options:

- **EN100-VE1-01:** Video Encoder module for 1080i to D1 AVC 422 8-bit, 1080p to D1 AVC 420. Capable of ultra-low delay and ABR.
- **IF-01:** DVB/S2 IF Modulator
- **LB-01:** DVB/S2 L-band Modulator

EN100-02 VE1 Software Options (field upgradable):

- **EN100-AAC-6.0-AUD-KEY:** AAC 6.0 Audio encode key
- **EN100-AAC-AUD-KEY:** AAC Audio encode key
- **EN100-DD-1-AUD-KEY:** Dolby Digital Audio lower group encode key
- **EN100-DD-2-AUD-KEY:** Dolby Digital Audio upper group encode key
- **EN100-MP1-AUD-KEY:** 8 pair of MPEG1 Layer2 Audio encode key
- **EN100-VE1-M4-420:** High and Standard Definition up to 1080p AVC 420 encoder
- **EN100-VE1-M4-422-8:** High and Standard Definition up to 1080i AVC 422 encoder. Must have EN100-VE1-M4-HD-420 key enabled
- **EN100-VE1-M4-SD:** Standard Definition 420 encoder

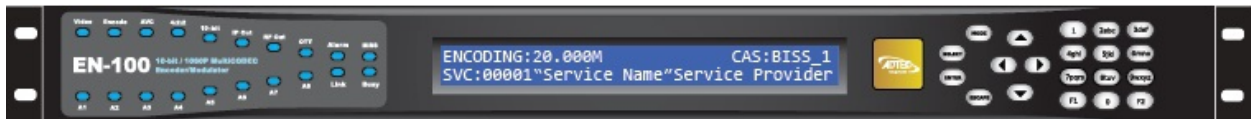
IF-01 & LB-01 Software Options (field upgradable):

- **EN-8PSK-S230-CCT-KEY:** Adds DVB-S/S2, CCT, Q/8PSK, and 30 Mbaud
- **EN-8-16A-CCT-UPG-KEY:** Adds 16APSK to a previously licensed 8PSK unit
- **EN-8-32A-CCT-UPG-KEY:** Adds 32APSK to a previously licensed 8PSK unit
- **EN-45M-CCT-KEY:** Adds CCT and 45Mbaud
- **EN-16APSK-CCT-KEY:** Adds DVB-S/S2, CCT, Q/8PSK 16APSK, 30 Mbaud
- **EN-32APSK-CCT-KEY:** Adds DVB-S/S2, CCT, Q/8PSK 16APSK 32APSK, 30 Mbaud
- **EN-16A-32A-CCT-UPG-KEY:** Adds 32APSK to previously licensed 16APSK unit

Chapter 2 - Getting Started

Front Panel

The Function Buttons and Directional Keypad of the EN-100 are used to configure and monitor the signal input and output of the device.



Front Panel LCD Quick Views

There are 7 Quick Views that can be accessed via the front panel LCD by pressing the up and down arrows.

1) **Service Data:** When in normal encoding mode, the LCD will display the following information: TS Mux Rate, Conditional Access Mode, Service ID Number, Service Name, and Service Provider.

```
ENCODING: 20.000M          CAS: BISS_1
SVC: 00001 "Service Name" Service Provider
```

2) **Encoding Status:** This quick view displays the Input and Output Resolution, Frame Rate, Input interface, SDI interface Mode, and Bars/Tones/ID status.

```
I/RES: 1920x1080 29i INP: SDI MODE: AUTO
O/RES: 1920x1080 29i B/T/ID: OFF/OFF/OFF
```

3) **Video Status:** This quick view displays the Video PID, CODEC, Chroma Type, Bit depth, Video Bitrate, Entropy Coding, and Video Autofill status.

```
VID: 481   COD: H.264   CHR: 422   BITD: 10
VRT: 75489000b/s   ENT: AUTO   A/F: ON
```


4) **Audio Status:** This quick view displays the Audio Codec type, Encode or Pass Through Rate, Encode or Passthrough mode.

```
1:MU 384k 3:MU 192k 5:DD 384k 7:DD 384k
2:MU 192k 4:MU 384k 6:DD 384k 8:MU 192K
```

5) **Audio PIDS:** This quick view displays the Audio PIDs for all 8 pairs of audio.

```
Audio 1:0482 3:0485 5:0487 7:0490
PIDS 2:0483 4:0486 6:0488 8:0491
```

6) **TSoIP State:** This quick view displays the status of IP Transport mode, RTP, FEC mode, and Multicast Connector. Up to 4 destination IP addresses can be sent simultaneously.

```
1:SEND ON LLAT GIG 3:SEND ON OFF GIG
2:SEND OFF OFF GIG 4:OFF OFF OFF GIG
```

7) **Modulator State*:** This quick view displays the RF Tx status if the unit is equipped with optional modulator.

```
TX:ENABLED 32APSK_9/10 Pwr:-30dB RO:25%
Freq:1290MHz DVB-S2 Sym:15Ms Pilot:ON
```

Transport LED Indicators

Indicator	Function
Video	Off - If modulator is installed, an off led indicates that no video is detected on the selected input or that ASI Receive mode is enabled. On - Video is detected on the selected input. Blink - No video is detected and fault mode is active.
Encode	Off - Device is not encoding. Idle State On - Device is encoding.
AVC	Off - Set to MPEG2 Encoding On - Set to H.264 (Advanced Video Coding) Encoding Note: MPEG2 encoding only available with EN100-VE2-01 option
4:2:2	Off - Encoding chroma type 4:2:0. On - Encoding chroma type 4:2:2.
10-bit	Off - Encoding bit depth of 8 On - Encoding bit depth of 10 Note: 10-bit encoding only available with EN100-VE2-01 option and in AVC mode
IP Out	Off - Transport of IP via Ethernet or GigE is idle. On - Transport of IP via Ethernet or GigE is active.
RF Out	Off - Modulator is not transmitting. On - Modulator is transmitting. Blink - Modulator is running in test mode. Note: Making changes to specific modulator parameters can cause the modulator to stop transmitting and you will need to re-enable it. This is by design to prevent transmission with an incorrect power setting.
OTT	Off - Over The Top transmission not enabled On - Over The Top transmission enabled Note: Available on future release

Audio Encode Indicators

Indicator	Function
A1 through A8	Off - Audio encoder configuration is set to off. On - Audio encoder configuration is set to encode or passthru. Note: This product offers optional extended audio encoding of the upper four pairs. If you experience issues engaging the upper pairs, check your feature keys first.

System Indicators

Indicator	Function
Alarm	Off - No system alarms. On - System alarm. (Typically NTP alarm)
BISS	Off - Service is not encrypted "Clear - Free to air" On - Service is Encrypted "Cyphed - Selected BISS mode"
Link	Off - No network detected On - Network communication active
Busy	Off - No network activity On - Network traffic present

Controls

Using the Mode, Select, Enter, Escape, and directional buttons, the user can control the unit via the front panel.

Control	Function
Mode button	Mode will cycle you through top layer menus.
Select	Select will enter you into edit mode.
Enter	Enter submits any edits.
Escape	Escape returns you to the previous menu layer.
Cursor Arrows	Arrows will navigate you within submenus
Programming Keypad	For value entry. F2 functions as a "." decimal or period.

Modulator Lineup

This feature enables the operator to quickly view and/or configure select modulator RF output parameters. The parameters available in this menu are;

1. Carrier Mode: [PURE_CARRIER or ON]
2. Transmit: [ENABLED or DISABLED]
3. Output Power: [in 0.5dB increments]
4. Output Frequency: [in 1.0MHz increments]

To access the menu, press the F1 and F2 keys simultaneously. The front panel will briefly flash "MODULATOR LINEUP" then display the menu.

Note: To use this feature, the front panel display must be illuminated. If the display is dim, press ANY front panel button to illuminate it.

Note: If the unit has been previously configured by the operator and powered OFF and ON, then the display will read the last valid configuration, however, Tx will read DISABLED.

To select the desired Carrier Mode, press the front panel "SELECT" button.

```
Carrier: PURE_CARRIER Power (dBm): -50.0
Tx: DISABLED Mod. Freq. (MHz): 950.0000
```

To set Transmit to ENABLED or DISABLED, press the front panel "ENTER" button.

```
Carrier: ON Power (dBm): -50.0
Tx: ENABLED Mod. Freq. (MHz): 950.0000
```

To set the desired output Power Level, press and hold the front panel ↑ or ↓ button.

```
Carrier: ON Power (dBm): -40.0
Tx: ENABLED Mod. Freq. (MHz): 950.0000
```

To set the desired output Modulator Frequency, press and hold the front panel ← or → button.

```
Carrier: ON Power (dBm): -40.0
Tx: ENABLED Mod. Freq. (MHz): 1350.0000
```

Note: If the Modulator Frequency is reconfigured when Transmit = ENABLED, then Transmit will be automatically set to DISABLED.

Front Panel Menu Structure

Services Menu

Item	Function	Options
TS Mux Rate	Transport Mux Rate is the total transport stream rate. Use this number to match total circuit throughput	1000000 - 100000000 note: The actual lower limit is configuration dependent.
ABR Mode	<p>The Adaptive Bit-rate mode allows the encoder to adjust TMR and Video bit-rate without performing an encoder restart. This mode is useful for dynamic bandwidth based solutions.</p> <p>When this configuration is set to OFF, the default configuration, bit-rate changes to TMR or Video rate will restart the encoder if required. With this configuration set to ON, bit-rate changes to TMR or Video rate will not restart the encoder.</p> <p>Note: With this mode enabled, a transport stream analyzer will show a PCR accuracy error on TMR changes. This is a type of "false alarm" if the error occurs during a bit-rate transition, the decoder adapts dynamically to the change. *This is an optional feature only supported by EN100-VE1-01 model</p>	OFF ON
Program Number	Sets the program number in the PAT (Program Association Table). This value can be set in hexadecimal and decimal format.	1 - 65535 0x0001 - 0xFFFF
Service Name	Identifies the service by name. This value is used to populate either the DVB SDT table, or ATSC VCT table. You are limited to 20 characters in DVB mode and 7 in ATSC mode. When using Bars, Tones and ID overlays, this field is displayed as part of the service information.	1- 20 ascii characters in DVB mode 1-7 ascii characters in ATSC mode
Service Provider	Identified the services provider. This value is used to populate either the DVB SDT table, or ATSC VCT. When using Bars, Tones and ID overlays, this field is displayed as part of the service information.	1-20 ascii characters in DVB mode 1-20 ascii characters in ATSC mode

Tables	Allows the operator to choose which type of Tables the encoder will generate. DVB - includes PMT, PAT, NIT and SDT tables MPEG - includes PAT and PMT tables ATSC - includes PAT, PMT, VCT, RRT, MGT, and STT tables	DVB ATSC MPEG
Splice PID Active	Adds PID (configured in PID menu) to transport stream for carriage of SCTE 35 messages. This option is used in combination with DVC files or the GPIO port for SCTE 35 payload generation.	NO YES
ASI Receive Mode	Routes a external ASI signal from the HD/SDI input in the place of the internally encoded signal.	ON OFF
ASI Mode	Configures the ASI output ports transmit mode. When set to Continuous, Data is transmitted at the configured TMR rate continuously regardless of whether or not there is a valid video source. When set to Encode only, data will only be transmitted if there is a valid video source. Data will not be transmitted if the encoder is idling.	CONTINUOUS ENCODE ONLY
Carrier ID Menu	Carrier ID contains unique information within the transport stream to aid in identifying and troubleshooting satellite sources. Specified by SUIRG and endorsed by the WBU-ISOG, the user will need to complete some fields. The Encoder Manufacturer and Encoder Serial Number fields will automatically be filled.	Provider ID: 5 characters. Phone: 17 Character number (typically operator MCR/POC number. '+','(', and ')'. Longitude: 9 Characters ('+000.0000' to '+/-180.0000') Latitude: 8 Characters ('+00.0000' to '+/-90.0000') User Information: 15 characters.
Bars, Tones, ID Menu	Bars, Tones and Service ID information can be overlaid on top of valid video by selecting the desired combination from this menu.	Bars Mode: ON, OFF Bars Type: BARS, Solid color, FLASH Tones Mode: ON, OFF OSD Mode: ON, OFF, BLINK

RF Tx Menu

Note: This menu is dynamic. It will only appear if you unit has factory installed modulator option.

Item	Function	Options																																
Transmit	Allows the operator to enable or disable the Main RF output. If Transmit is enabled and any value for Type, Frequency, Rolloff, Symbol Rate, or Interface Rate is changed, then Transmit will be automatically disabled. However, the monitor output will remain active.	Disable Enable																																
Type	Allows the selection of the mod type.	DVBS DVBS-2																																
Mode	This control allows the operator to select the desired modulation mode and FEC code rate.	<p>We display all possible ranges available via our device in the Front Panel. This list will differ from the list found in the web UI as it only shows those options available based on the feature keys found.</p> <table> <tbody> <tr><td>QPSK-1/2</td><td>8PSK-5/6</td></tr> <tr><td>QPSK-2/3</td><td>8PSK-8/9</td></tr> <tr><td>QPSK-3/4</td><td>8PSK-9/10</td></tr> <tr><td>QPSK-5/6</td><td>16QAM-3/4</td></tr> <tr><td>QPSK-6/7</td><td>16QAM-7/8</td></tr> <tr><td>QPSK-7/8</td><td>16APSK-2/3</td></tr> <tr><td>QPSK-1/4</td><td>16APSK-3/4</td></tr> <tr><td>QPSK-1/3</td><td>16APSK-4/5</td></tr> <tr><td>QPSK-2/5</td><td>16APSK-5/6</td></tr> <tr><td>QPSK-3/5</td><td>16APSK-8/9</td></tr> <tr><td>QPSK-4/5</td><td>16APSK-9/10</td></tr> <tr><td>QPSK-8/9</td><td>32APSK-3/4</td></tr> <tr><td>QPSK-9/10</td><td>32APSK-4/5</td></tr> <tr><td>8PSK-3/5</td><td>32APSK-5/6</td></tr> <tr><td>8PSK-2/3</td><td>32APSK-8/9</td></tr> <tr><td>8PSK-3/4</td><td>32APSK-9/10</td></tr> </tbody> </table>	QPSK-1/2	8PSK-5/6	QPSK-2/3	8PSK-8/9	QPSK-3/4	8PSK-9/10	QPSK-5/6	16QAM-3/4	QPSK-6/7	16QAM-7/8	QPSK-7/8	16APSK-2/3	QPSK-1/4	16APSK-3/4	QPSK-1/3	16APSK-4/5	QPSK-2/5	16APSK-5/6	QPSK-3/5	16APSK-8/9	QPSK-4/5	16APSK-9/10	QPSK-8/9	32APSK-3/4	QPSK-9/10	32APSK-4/5	8PSK-3/5	32APSK-5/6	8PSK-2/3	32APSK-8/9	8PSK-3/4	32APSK-9/10
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8PSK-2/3	32APSK-8/9																																	
8PSK-3/4	32APSK-9/10																																	
Local Oscillator	<p>Determines the Local Oscillator Frequency (in Mhz) variable in the embedded Uplink Calculator.</p> <p>For Normal (Non-Inverted) Spectrum Mode: $Freq_{Modulator} = Freq_{Uplink} - Freq_{Local\ Oscillator}$</p>	User defined																																

	<p>For Inverted Spectrum Mode: $Freq_{Modulator} = Freq_{Local\ Oscillator} - Freq_{Uplink}$</p> <p><i>Note: This field is provided for convenience purposes only and to aid in the automatic calculation of the Modulator frequency. The actual setting will depend on your external hardware (Block Upconverter), and may differ from the value set in here.</i></p>	
Uplink Frequency	<p>Determines the Uplink Frequency (in Mhz) variable in the embedded Uplink Calculator.</p> <p><i>Note: This field is provided for convenience purposes only and to aid in the automatic calculation of the Modulator frequency. The actual setting will depend on your external hardware (Block Upconverter), and may differ from the value set in here.</i></p>	User Defined
Frequency	<p>Allows the operator to enter the desired output frequency of the main RF output port.</p>	<p>7039: 950MHz - 1.75GHz LBAND 7139: 950MHz - 2.15GHz LBAND 50MHz - 180MHz IF ** The monitor output frequency for the EN-XX IF is fixed at 1.080GHz. The monitor output frequency for the EN-XX L-Band tracks with the main RF output frequency.</p>
Power	<p>Allows the operator to configure the output power of the main RF output port. The monitor output power level for the EN-XX IF and L-Band is fixed at -45dBm. Power is defined as the composite power referenced to an unmodulated (Pure Carrier) carrier.</p>	<p>7039: -50 to -7dBm LBAND 7139: -35 to +5dBm LBAND -30 to +5dBm IF</p>
Spectrum Inversion	<p>The Spectrum Inversion options are either Normal or Invert. If Normal is selected, then spectrum inversion does not occur. Spectral inversion can occur when either the baseband signal is upconverted to an IF frequency or when the IF is upconverted to the desired RF output frequency.</p>	<p>Invert Normal</p>

FEC Frame	When operating in DVB-S2, the Frame Type options are either Normal or Short. The Normal 64,800-bit FEC frame provides better protection but introduces more latency compared to the Short 16,200-bit FEC frame. Therefore, the Short FEC frame type should be selected in applications where latency is critical and the longer frame type should be used to optimize protection.	Short Normal
Rolloff	The Rolloff selection will determine the shape of the output filter. The occupied bandwidth of the modulated signal is the symbol rate multiplied by $(1+\alpha)$ where alpha (α) is the rolloff factor. By using a lower alpha, carriers can be spaced closer together on a given transponder or an increased symbol rate can be realized for a given bandwidth.	5 (requires feature key) 10 (requires feature key) 15 (requires feature key) 20 25 30
Pilot	When operating in DVB-S2, the Pilot options are either ON or OFF. When pilots are enabled, the total data throughput is reduced by approximately 3.0%.	On Off
Rate Priority	The Rate Priority control allows the operator to designate which rate will be kept constant. When the Symbol Rate is entered and Rate Priority is Symbol, the symbol rate is held constant and the Interface rate is calculated. When the Interface Rate is entered and Rate Priority is Interface, the interface rate is held constant and the symbol rate is calculated.	Symbol Interface
Symbol Rate	The number of symbols transmitted per second. The amount of data per symbol is dependant upon the modulation type, e.g. QPSK, 8PSK, etc.	Range can be determined by feature key.
Interface Rate	The Interface Rate is the bit rate at the baseband interface.	Range can be determined by feature key.
Carrier Mode	The Carrier Mode control allows the operator to select ON for normal operations or select one of four unmodulated carriers. The Pure Carrier	Pure Carrier On Clock/8 Clock/4

	option will provide an un-modulated output carrier at the desired frequency and output power. Other Carrier Mode options include Clock 4/8/16.	Clock/16
10Mhz Clock	Allows operator to generate or pass a 10Mhz signal. The signal can be generated internally or sourced externally. *** This is a special order option. If your unit does not have the functionality the setting will read "N/A"	OFF ON EXTERNAL
10 Mhz Clock Combined	Allows the operator to choose whether or not to combine the 10Mhz signal with the L-Band output. *** This is a special order option. If your unit does not have the functionality the setting will read "N/A"	UNCOMBINED COMBINED
MODULATOR LINEUP	This feature enables the operator to quickly view and/or configure select modulator RF output parameters.	Carrier Mode: PURE_CARRIER or ON Transmit: ENABLED or DISABLED Output Power: User defined in 0.5dB incr. Output Frequency: User defined in 1.0MHz incr.

IP Tx Menu

Note: this is a parallel menu. It has four index. Use the left or right arrows to navigate to desired index.

Item	Function	Options
Mode	Enables IP Egress.	Off Send
IP Tx Mode	Switches from UDP/RTP and TCP	UDP/RTP TCP
Tx IP Address	The IP Address of which the Multicast or Unicast is broadcast. Multicast addressing supports the transmission of a single IP datagram to multiple receivers. Valid Multicast addressing range is 224.10.XXX.XXX to	user-defined; numeric field in format xxx.xxx.xxx.xxx

	239.XXX.XXX.XXX. Unicast addressing sends a single IP datagram to only one receiver. The Unicast address will be the unique IP of the receiving device.	
Tx Port	port assignment used for transmitting a multicast	user-defined using the numeric keypad
Tx GW Address	The Unicast Gateway automatically handles IP routing for unicast transmissions. This must be configured if the outgoing unicast requires a different gateway from the configured system default gateway. A route is automatically added when the unit is configured for transmit and a Unicast Gateway exists. The route is deleted if set to 0.0.0.0 or Multicast Mode set to OFF.	user-defined; numeric field in format xxx.xxx.xxx.xxx
DVB per IP	Configures the amount of DVB transport stream packets (188 bytes per DVB packet) per IP packet payload	1 4 7
RTP	allows for sequence numbering and timing; editable if Multicast Mode is set to 'Send'	On Off
FEC Mode	Forward Edge Correction; selects on/off. When selected, sends two FEC RTP streams in addition to a source RTP stream enabling a receiver to reconstruct missing packets in the source stream.	OFF ON MAXBURST BURST LOWLATENCY
FEC L	affects the maximum burst packet loss that can be recovered Note: The product of FEC L and FEC D cannot exceed a value of 100	4-20
FEC D	defines latency involved in burst recovery	4-20
TOS	Allows the operator to sets the TOS bits in the IPv4 header of the TSoIP payload	0 = Normal service 2 = Minimize monetary cost 4 = Maximum reliability 8 = Maximize throughput

		16 = Minimize delay
TTL	Time-to-Live; specifies the number of iterations or transmissions the packet can undergo before it is discarded	user-defined using the numeric keypad
Tx Connector	sets the physical connector (on the rear of the unit) to use for multicast transmit purposes on the indicated encode channel.	Ethernet GigE

Video Menu

Note: There are several video encoding options marked by an * that pertain to EN100-VE1 and EN100-VE2 hardware options. EN-100 can be ordered with either VE1 (1080p AVC 8-bit 420) encoder module and/or VE2 (1080i AVC/MPEG2 10-bit 422)

Item	Function	Options
Input	Allows the operator to select which input the video will be sourced from. *depending on installed / selected Video Encoder option Optical may not be listed. Optical SDI input is a feature only supported by EN-100-VE1-01 model.	SDI COMPOSITE OPTICAL
SDI Mode	Allows the operator to force the SDI receiver into a specified mode. *depending on installed / selected Video Encoder option HD3G may not be listed.* HD3G is a feature only supported by EN-100-VE1-01 model.	AUTO SD HD1.4G HD3G
CODEC	Allows the operator to select between available CODECS *MPEG2 and H.264_10bit is a feature only supported by EN100-VE-02-01 model	MPEG2 H264 H264_10BIT
Entropy Coding	Allows the operator to set the entropy coding settings *H.264 encoding only, Auto mode will use CABAC at video	CABAC CAVLC AUTO

	bitrates <= 30Mbits/sec and CAVLC at rates > 30Mbits/sec.	
Chroma	Allows the operator to set the encoder chroma type. *Chroma is forced to 422 when H264_10BIT is the selected codec.	420 422
Deblock Filtering *EN-100-VE2 Only	Allows the operator to turn deblock filtering on and off *H.264 encoding only	ON OFF
Video Field Coding *EN-100-VE2 Only	Allows the operator to choose between different types of video field coding *H.264 encoding only	AUTO FIELD FRAME ADAPTIVE
Video Rate	The rate at which video is being encoded. Video bitrate changes are not dynamic. They take effect at the start of the next encode session.	1000000-100000000 *If video autofill is enabled, this value will change based on other variables.
Autofill	When Video AutoFill is turned ON, the encoder will calculate and use the max video bit rate for the current TransMuxRate setting. This is recommended. If Autofill is set to OFF the encoder will use the manual setting for the video bitrate.	ON OFF
Latency	It is dependent upon the video rate, frame size/rate (NTSC,PAL,HIGH-DEF) and GOP structure. Long IBBP GOPs will produce higher latency over short IP GOPs. Short IP GOPs at lower bit rates produce lower quality video. *1,2, and 3 Frame latency is a feature only supported by EN100-VE2-01 model	LONG: Latency will measure close to 1 second. NORMAL: Should be used for distribution and standard contribution transmissions. Latency is approximately 1/2 second. LOW: Latency is approximately 3 frames less than NORMAL. VERYLOW: Latency is approximately 5 frames less than NORMAL. 3FRAME/2FRAME/1FRAME Feature keyed option that provides super low end-to-end latency when paired with an RD-60/RD-70. GOP settings are ignored. Interoperability with other vendor decoders is not guaranteed in these modes.

Latency Trim	Use this setting in conjunction with the Latency setting to fine tune the latency in order to match various manufacturers latency settings. The setting is rounded down and applied in video frame multiples (a +50 mSec offset would result in the following.. one additional frame delay with 29.97 frame material and two additional frame delays with 59.94 frame material).	Max range is -400 to +200 and is constrained based on the ENCODELATENCY" setting (NORMAL) and current video mode.
Fault Mode	The user can select encoder behavior during video loss. The encoder can stop encoding, encode black, or generate a combination of Black, Bars, Tones and Service ID.	OFF BARS BARSTONES BARSOVERLAY BARSTONESOVERLAY
Fault Resolution	Allows the operator to select what resolution to encode at during fault mode.	480I59.94 576I50 720P59.94 720P50 1080I59.94 1080I50
Aspect Ratio	Aspect Ratio is the ratio of horizontal lines to vertical lines in the encoded image.Options are: - Wide Screen Signaling (WSS) reads incoming WSS flag and adjusts aspect ratio accordingly. - 4 X 3 defaults standard definition to 4 X 3 display. - 16 X 9 defaults standard definition to 16 X 9 display. Aspect Ratio is related to Active Format Descriptor (AFD). It is recommended to set AFD to WSS if Aspect Ratio is WSS.	4x3 16.9 WSS *This is not a scaling option. Output display is completely dependent on input signal
AFD	Active Format Descriptor is data that can be sent in a MPEG video stream that provides information about the aspect ratio and picture characteristics within the stream. AFD compatible display or STB/IRD is required. AFD is related to Aspect Ratio. Aspect Ratio defines pixel aspect ratio as encoded. AFD is used by	OFF WSS BOX16:9_T BOX14:9_T BOX16:9_C AS_CODEDFRAME 4:3_C 16:9_C 14:9_C 4:3_SP_14:9_C

	downstream decoding devices to properly display pixel aspect ratio on displays with differing aspect ratios.	16:9_SP_14:9_C 16:9_SP_4:3_C
GOP Type	GOP Type can be set to open or closed. An OPEN GOP uses referenced pictures from the previous GOP at the current GOP boundary. A CLOSED GOP starts with an I Frame and subsequent B Frames do not rely on I or P frames from the previous GOP.	Open Closed
GOP Structure	GOP Structure sets the format Group-of-Pictures will use; the order of interframes and the various types of picture frames that will be used.	I IP IBP IBBP
GOP Size	GOP Size is the distance between two full image frames (I-Frames) in a GOP Structure.	user-defined using the numeric keypad range = 1-30
SD Video Mode	Configures the encoder for NTSC or PAL video. *This is only affects the incoming SDI feed if it is SD or if the input is Composite.	NTSC PAL PALM PALN
3-D Sync Mode	Enables multiple ADTEC Encoders to be synchronized. One unit is designated as 'master' which is tracked synchronously by units that are designated as 'slave'. The synchronization is transmitted over an ethernet connection using broadcast packets.	OFF GENERIC MASTER MASTER GROUP 1 - 9 GENERIC SLAVE SLAVE GROUP 1 - 9

Audio Menu

Item	Function	Options
	<< 1 - 2 >> Parallel Menus.	
Surround Sound	Determines the surround sound mode	DD,DD-06,AAC-LC,AAC-HEv1,AAC-6,

	<< 1 -8 >> Parallel Menus.	
Input	Selects the audio input to use during encoding.	Analog SDI AES
Mode	Allow you to configure your device to Encode per audio or Passthru	Off Encode Passthru
Type	Defines the type of audio to encode or pass.	DD = Dolby Digital AC3 MU = Musicam Layer II DE = Dolby E LP = Linear PCM DD-06 = Dolby Digital, PMT stream type 0x06 MU-04 = Musicam Layer II, PMT stream type 0x04
Rate	The Audio Rate is the bitrate for audio encoding / transport and depends on mode selected.	user-defined using the numeric keypad If MPEG 1 Layer 2, the available rates are 32, 48, 56, 64, 80, 96, 112, 128, 160, 192*, 224, 256, 320, 384 kBits/sec . If Dolby Digital AC3, the available rates are 56, 64, 80, 96, 112, 128, 160, 192*, 224, 256, 320, 384, 448, 512, 576, 640 kBits/sec. Note: * For MPEG 1 Layer 2 and Dolby Digital AC3, the recommended lowest rate for professional applications is 192 kBits/sec. In Dolby-E mode, do not set this value. The bitrate will be auto-detected.
Level	Controls the volume level in dBs	user-defined using the numeric keypad range = -18 dBs to 8 dBs in increments of 1
Analog Audio Level	Control the volume level -15 to +15 (dBs) in 1 dB increments for AUDIO 1 and 2 only	This trims the level on the analog audio path (only) to accommodate external audio gear variability.
Sync	Audio Sync sets the audio sync offset. This measurement is in milliseconds, and works only on	+/- 800

	analog audios.	
Musicam Mode	Allows the operator to choose how to encode left and right analog audio inputs.	STEREO MONO DUALMONO
IFB	<p>This is a low latency audio path for communications to a remote van or studio using the same distribution path. It requires a special IFB receiver or manual PID selection with a standard IRD.</p> <p>Note: There is no PID reference in the PMT for this functionality. It is considered a ghost PID. It is also not lip-sync aligned with video.</p>	OFF ON GHOST
SDI Pair	Allows the operator to route embedded audio from SDI input to the specified audio encoder.	1-8
SDI Clock Source	The embedded audio clock source configuration determines whether to use the embedded clock phase words or derive from video clock. Default is EMBEDDED. If the SDI source has problem (or non-compliant) embedded audio clock phase words, then choose the video clock as the source. Note that choosing the video clock requires that all audio channels are embedded in a fully synchronous fashion.	EMBEDDED VIDEO
ECC Words	Default is ON. Select OFF if the SDI source has problematic (or non-compliant) ECC words.	OFF ON
Audio Level B	The Level B configuration determines which SDI link to de-embed audio when using 3G-SDI Level B sources.	LINKA LINKB

PIDs Menu

Item	Function	Options
Transport	Sets the Transport Stream ID in PAT and other	0x0001 - 0x1FFE

Stream ID	tables in the egress transport stream. Configure this value in Hex.	
PMT PID	PMT PID refers to the PID of the Program Map Table (PMT). Program Map Tables are used to describe the properties of a single program.	user-defined using the numeric keypad
PCR PID	Programs periodically provide a Program Clock Reference, or PCR, on one of the PIDs in the program. This is also known as the master clock. The PCR PID identifies the packets which contain PCR adaptation fields.	user-defined using the numeric keypad
Video PID	Video PID identifies packets containing the video Packetized Elementary Stream data.	user-defined using the numeric keypad
Audio PID 1-8	Identify packets containing audio content for the specified channels	user-defined using the numeric keypad
Teletext PID	Teletext PID identify packets containing teletext information.	user-defined using the numeric keypad
VITC PID	Sets the Program ID (PID) for the ANC (H & V). ANC Data captured from HD-SDI source is carried per SMPTE-2038. Typically this is used to carry VITC. If VITC and LTC are carried concurrently, LTC is dropped.	user-defined using the numeric keypad
AMOL PID	Automated Measurement of Line Ups; identifies packet which contains AMOL (NTSC) information Only applies to 525 line (NTSC) video.	user-defined using the numeric keypad
Splice PID	Splice PID is used for Cablelabs SCTE 35 Splice Point identification.	user-defined using the numeric keypad

VBI Menu

Item	Function	Options
Source	selects the source of Vertical Blanking Interval spacing	Composite SDI
Closed Caption	activates (or deactivates) closed-captioning and specifies closed-captioning standard to be used	Off DVS157 ASTC ASTC708 ASTCConvert

VITC Mode	Allows the operator to choose to look at Ancillary or waveform data for captions	OFF ON
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Profile Menu

Command	Function
SELECT	The select submenu lists all stored profiles and allows loading
SAVE	The save submenu saves a profile with a user designated name
DELETE	The delete submenu deletes a profile from the available list

CAS Menu

Control	Function
Mode	select between off, BISS-1, and BISS-E encryption. options: OFF, BISS 1, BISS_E_USER_ID_ONE, BISS_E_USER_ID_TWO
Clear Session Word	MODE BISS 1 uses a 12-digit hexadecimal Clear Session Word.
Encrypted Session Word	MODE BISS E XXX uses a 16-digit hexadecimal Encrypted Session Word
User ID 1	used in BISS-E Mode only; the 14-digit hexadecimal User ID used for encryption
User ID 2	used in BISS-E Mode only; the 14-digit hexadecimal User ID used for encryption (secondary)

System Menu

Login

Units ship with the front panel logged in by default. If you become logged out and are prompted for a password, use the following key sequence for access.

Action
Press <Select>
Press <Up> arrow
Press <Select>
Press <Enter>
Press <Right arrow>
Press <Enter>

Duration

The front panel also has a login duration feature. This setting Allows the operator to specify a time frame (in minutes) until the unit will automatically log itself out.

Action
Press mode until you see the System Menu.
Press <Select>
Press the <Down> arrow
Press <Select>
Using the <Up> and <Down> arrows, select the value you wish.
Press <Enter> to save your selection

Possible Configurations:

0 (Zero): The unit will not automatically log out.

1-9: The duration of time, in minutes, before the unit logs out, if no input is received.

Backlight Dim Delay

Action
Press <Select>
Using the <Up> and <Down> arrows, select the value you wish.

Press <Enter> to save your selection

Network Sub Menu

Item	Function	Options
Ethernet IP Address	This is the address of your device on your network specific to the Ethernet Port.	user-defined using the numeric keypad Default is 192.168.10.48
Ethernet IP Mask	Defines the unit relative to the rest of your network.	user-defined using the numeric keypad Default is 255.255.255.0
Ethernet DHCP	The Dynamic Host Configuration Protocol allows your device to self-locate network Ethernet parameters.	On (finds own DHCP Address) Off (defaults to last entered IP Address) Default is OFF
GIGE IP Address	This is the address of your device on your network specific to the GigE Port.	user-defined using the numeric keypad Default is 192.168.20.48
GIGE IP Mask	Defines the unit relative to the rest of your network.	user-defined using the numeric keypad Default is 255.255.255.0
GIGE DHCP	The Dynamic Host Configuration Protocol allows your device to self-locate network GigE parameters.	On (finds own DHCP Address) Off (defaults to last entered IP Address) Default is OFF
Gateway IP Address	The gateway is a routing mechanism that passes traffic between different subnets and networks.	user-defined using the numeric keypad Default is 192.168.10.1
Stealth IP Address	This is a security feature that allows only the designated Stealth IP Address to communicate with the unit for FTP and other services. This control allows one-point override access to the Stealth IP Address.	user-defined using the numeric keypad Default is 0.0.0.0. Using all 0s effectively turns this function off.

Time Sub Menu

Item	Function	Options
Time	Defines system time	user-defined using the numeric keypad
Timezone	Defines the time zone the unit operates in	

NTP Sub Menu

Item	Function	Options
NTP Status	Network Transfer Protocol	Read-only
NTP IP Address	IP address designated for Network Transfer Protocol	user-defined using the numeric keypad Default is 0.0.0.0. Using all 0s effectively turns this function off.

Alarm

Item	Function	Options
Event Record	Log of events outside of regular operating parameters	scroll up and down to view log items

SNMP Sub Menu

Item	Function	Options
SNMP	Controls the status (ON/OFF) of the Simple Network Management Protocol (SNMP) feature. We support SNMPv2c version.	OFF ON CLEAR
Read-only community	The Simple Network Management Protocol (SNMP) Read-Only Password. Default Value: "adtec"	user-defined
Read-write community	The Simple Network Management Protocol (SNMP) Read-Write Password. Default Value: "none"	user-defined
Trap community	The Simple Network Management Protocol (SNMP) trap community. Default Value: "public"	user-defined

Trap sink	The Simple Network Management Protocol (SNMP) trap sink. Default Value: "127.0.0.1"	Enter the IP address of your SMNP trap sink server.
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Com2

Item	Function	Options
Com2 Settings	RS-232 terminal monitor for communicating with the internal host motherboard for diagnostics.	115200 8 1 NONE 57600 8 1 NONE 38400 8 1 NONE 19200 8 1 NONE 9600 8 1 NONE Default is 38400 8 1 None

Feature Sub Menu

Item	Function	Options
Permanent ID	This is one of the unique IDs for your unit. This number along with your serial number are used to generate permanent feature keys.	read only value
Temporary ID	This is the other unique ID. It along with the permanente ID, and serial number are used to generate temporary feature keys.	read only value
Key status	Depending on what keys you have and if they are temp or permanent they will be listed here.	read only values with countdown for temp keys.

Name

Item	Function	Options
Name	Displays and allows editing of	Enter Ascii characters.

	the units name. This becomes the units host name for networking purposes.	
--	---	--

Firmware

Item	Function	Options
Firmware	Displays the currently running firmware version	Read-Only

Back Panel

Connector	Description
Power 1 & 2	Redundant AC Power, Standard 3 pin computer power plug (Auto range 70-240 VAC Input)
GigE / Gbe	MPEG2 or RTP multicast transport egress port (SMPTE 2022)
(A) Main	RF output, 50 Ohm BNC L-Band Model: Frequency range 950 MHz to 1.750 GHz, Power Level -50 to -7 dBm IF Model: Frequency range 50 MHz to 180 MHz, Power Level -30 to +5 dBm
(B) Monitor	RF output, 50 Ohm BNC L-Band Model: Fixed power level at -45 dBm IF Model: Fixed power level at -45 dBm, fixed frequency at 1.08 GHz
(C) 10MHz Clock	BNC 50 Ohm connector for external 10MHz reference input
COM2	API Serial Communication Interface **
COM1	Serial Port Used for Troubleshooting (Terminal)
ETH0 10/100	10/100 base T ethernet interface (Monitoring/Management)
DVC Parport	9-pin parallel I/O interface for control systems **
RS422 CTRL	Not Currently Supported **
GPIO	Tally and Control Port
Transport Out (ASI) 1-3	75 Ohm source ASI x3 per EN5000839. Up to 100 Mbps.
CVBS In	75 Ohm terminated Standard Definition Composite Video Input

HD/SD SDI In	75 Ohm terminated Input, Video & Audio (SMPTE 259M for SD & SMPTE 292M for HD) BNC ** Use this input for ASI Receive mode
AES Audio In 1-8	75 Ohm AES-3 per AES3-2003
Analog Audio In	Stereo Pairs 1 and 2 (600 Ohm Balanced) **
SFP	SFP slot used for single channel optical receiver module

GPIO and Parport information

The GPIO port allows encoder stop / start control and TTL voltage output for monitoring systems. TTL pin behavior by default is HI (3V) when encoding and LO (0V) when not encoding. Logic of the TTL pin can be configured based upon video detection, encode status, and manual override with the PP9 API command. Please view API details for further configuration information.

The DVC Parport allows custom events to be programmed upon input pin voltage change. It contains 4 available inputs for custom commands. Please contact technical support for advanced usage in programming the parallel port.

GPIO Pinout

PIN	Designation	Function
1	NC	No Connect
2	D3	reserved for future functionality
3	D2	RECORD (start encoder) (input)
4	D1	STOP (stop encoder) (input)
5	D0	reserved for future functionality
6	NC	No Connect
7	5VDC	+5V DC
8	GND	ground
9	TTL Tally	HI (3V) or LO(0V) based upon PP9 logic (output)

Parport Pinout

PIN	Designation	Function
1	NC	No Connect
2	D3	Data bit 3 (input)
3	D2	Data bit 2 (input)
4	D1	Data bit 1 (input)
5	D0	Data bit 0 (input)
6	NC	No Connect
7	5VDC	+5V DC
8	GND	ground
9	NC	No Connect

Chapter 3 - Getting Connected

Introduction to the Control Application

A web-based control software application comes pre-installed on the EN-100.

Compatible browsers

Firefox (recommended)
MS Internet Explorer
Safari
Chrome

Ethernet Access

To begin, you will need to connect to your EN-100 via ethernet directly, or by adding the EN-100 to your local area network. The default address for all Adtec devices is 192.168.10.48.

To connect directly to the device, make sure that your computer and the device have IP addresses within the same IP class range (ex. 192.168.10.48 for the device and 192.168.10.49 for your computer).

If you need to change the IP address of the device, this can be done via the front panel, System > Network menu. Using a CAT5 crossover cable, connect one end to your computer and the other to the Ethernet port found on the processor section of the back panel. (Some computers can auto negotiate the connection and a crossover may not be necessary.)

To add the device to a LAN, connect a standard CAT 5 Ethernet cable to your network router and then to the Ethernet port on the back of the device. If your network is DHCP enabled and you prefer that over a static IP, you can turn on DHCP for the device via the front panel, System > Network menu.

Zero Configuration Access

Adtec Digital has adopted zero-configuration networking technology, streamlining the setup and configuration processes for our products. The use of this technology enables automatic discovery of Adtec devices and services on an IP network. Used in tandem with the web-based control and configuration applications we can now provide 1-click access to any device.

By using the built-in Bonjour locator in Apple's Safari browser or the plug-ins readily available for IE or Firefox browsers, users can locate all of the Adtec devices on a network by referencing the serial number on the back of the device. Clicking on the unit in the Bonjour list will re-route you to a login page. If you do not wish to use Bonjour, you can

reach the device's web application by pointing your browser to the IP Address of the device.
Ex. <http://192.168.10.48/>.

Login

Once you reach the default login page for the web-based application, you will need to login by pressing the login button. You will be prompted for a username and password. The default username is 'adtec'. The default password is 'none'. The left-hand panel of the application will report current status in real-time while the right panel tabs will allow you to configure your device. As you navigate through the web application look for the ? icons associated with each parameter. By clicking on these question marks, you can view additional information about how the parameter is used.

Upgrading Via Web User Interface

Periodically, we will provide firmware updates to our products via our website. (<http://www.adtecdigital.com>) To upgrade your device, download the firmware file from our website and store it locally. Login to the web-based application and navigate to the Upgrade > Firmware tab. Click on the upload button located at the top right of the application. Select the firmware file from your local machine and wait for it to upload. Once it has finished uploading, it will appear in the Available Versions list. Click on the Install button associated with the new file. Wait for it to completely extract and become available in the Installed Versions List. Once available there, simply click on the Select button associated with the new firmware and wait for your device to reboot.

Upgrading Via FTP & Telnet

For those times when using the web user interface is not convenient, you can upload the firmware file via ftp and then extract and select into it via Telnet.

File Transfer Protocol (FTP)

FTP connections can be made to the Adtec device using any ftp client.

Host: <ipa of the unit>

Default Username: adtec

Default Password: none

Port: 21

You will want to drop the firmware file in the media/hd0/media folder.

Telnet (standard 23 port)

To connect to your unit using a terminal session you will need to set the IP address of the unit. See earlier instructions on setting the IP via the front panel.

Using a terminal window, complete the following:

Step	Action
1	Type 'telnet x.x.x.x' in a terminal window, without quotes, where x.x.x.x is the IP address of the unit.
2	Press <Enter>.
3	When prompted for a username, enter adtec.
4	When prompted for a password, enter none.

Once you see "User 'adtec' connected", the session is open and you may issue API commands to the unit.

To extract and select into the new firmware version you have uploaded, issue the following commands.

*.sysd version search

Copy the line designating the location of the new file.

Then type:

*.sysd version extract "copied path to new file"

Wait for the extraction to complete. Once complete, type the following command:

*.sysd version

Copy the line referencing the firmware version you wish to use and then issue the following command.

*.sysd version select "copied new firmware version"

Once you press enter, this will reboot your device into the new version.
See series of commands as they occur during this process below.

```
Last login: Wed Sep 14 12:08:53 on ttys000
Macintosh:~ user$ telnet 192.168.10.143
Trying 192.168.10.143...
Connected to 192.168.10.143.
Escape character is '^]'.
```

```
Adtec Resident Telnet Server...
UserName:
adtec
PassWord:
User adtec connected
```

```
*.sysd version search
OK
/media/hd0/media/EN-80-v1.03.09_RC.nfcms.tgz
```

```
*.sysd version extract /media/hd0/media/EN-80-v1.03.09_RC.nfcms.tgz
OK
Validating Firmware: EN-80-v1.03.09_RC.nfcms.tgz
Firmware file validated.
Extracting firmware: EN-80-v1.03.09_RC.nfcms.tgz.
----- long series of extraction messages -----
Extraction complete.
Moved usr/adtec/EN-80 to /opt/pkg
Extraction successful.
```

```
*.sysd version
OK
adtec/EN-80/1.03.10 (** current selection **)
adtec/EN-80/1.02.17
adtec/EN-80/1.03.09_RC
```

```
*.sysd version select adtec/EN-80/1.03.09_RC
OK
Found Required GNU for adtec/EN-80/1.03.09_RC: gcc-3.4.4-glibc-2.3.5
Updating OEM version to adtec/EN-80/1.03.09_RC.
Updating GNU to gcc-3.4.4-glibc-2.3.5
Updated GNU to gcc-3.4.4-glibc-2.3.5
Set /opt/pkg/var/oem_prev for migrate: /opt/pkg/usr/adtec/EN-80/1.03.10
Current autoboot partition: 2
```

Updating the primary kernel.
Creating a boot partition using the "primary" directory ...
Flushing /dev/hde device buffer, please wait.

Chapter 4 - Operational How-Tos

How to Use Vertical Interval Time Code

Vertical Interval Time Code (VITC) is typically used in transmissions that require time code from the originating source to be preserved. It was originally developed for analog television recording systems, but has new standards for transmitting in digital systems (SMPTE-12M-1 / SMPTE-12M-2). Preserving time code is beneficial for future editing and playback of captured material.

EN-XX-series devices can pass VITC ancillary data as part of the ANC PID. The ANC PID is a separate PES located in the transport stream. Additionally, time code within the GOP of the video will also be adjusted at encoder start up to match the incoming ancillary VITC.

VITC data packets will contain a DID of 0x60 and an SDID of 0x60. The VBI tab contains an SDI ancillary inspector that allows users to view ANC data present at the input. This tab can be viewed for verification of present ancillary data at the SDI input.

[Refresh Stats](#)

Current VBI Stats [?](#)

Line	Field ID	Count	Length	DID/SDID
09	1	14254	32	6060

VBI Source: [?](#)

Closed Caption: [?](#)

To enable VITC passthrough:

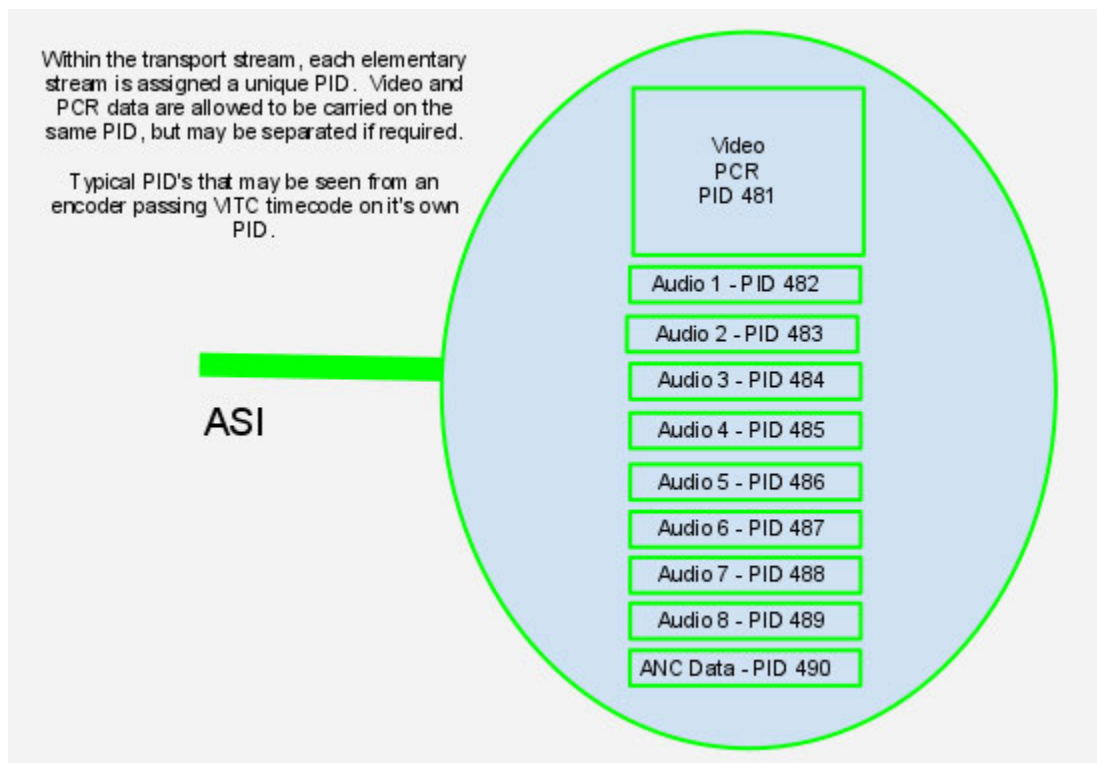
Step	Action
1	On the VBI Tab in the Web GUI Control Application, configure the "VBI Source" for <SDI>.
2	On the PID Tab in the Web GUI Control Application, select the <On> setting for "ANC PID Active".

How to Configure Passthru Audio

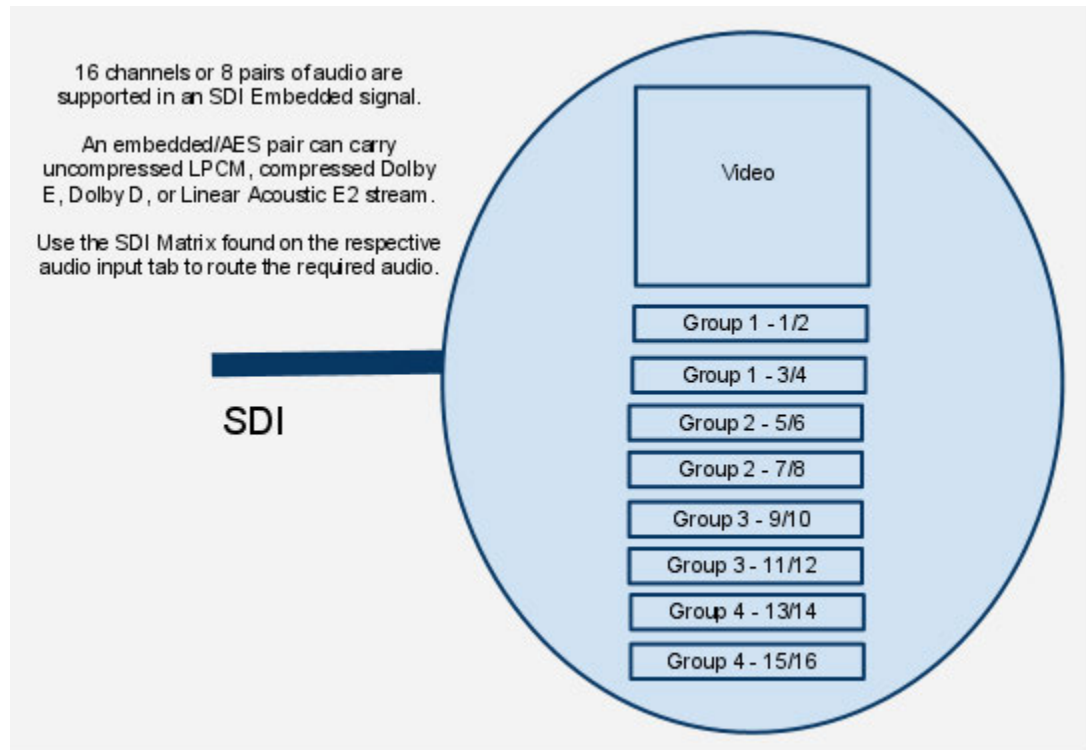
Adtec EN-Series encoders have the flexibility to meet many demanding audio requirements. Each model contains specific encoding options, but every Adtec EN-Series encoder supports two audio passthru. An audio passthru consists of a compressed bitstream (Dolby E 20 Bit / Dolby E 16 Bit / Dolby Digital / Linear Acoustic Stream Stacker 2) or an uncompressed stereo pair (LPCM) from an embedded SDI or AES input passed into the egress transport stream (IP, RF, ASI).

The EN-100 supports four passthru audios on the first four audio inputs. The SDI Matrix and ASI Transport Stream PID configurations allow for custom configurations if required.

Every audio input engine has an internal SDI Matrix to route any audio to one or multiple inputs. Each audio engine output can be assigned a user configurable PID in the transport stream to meet any job requirement.



If the passthru audio is coming in via embedded SDI, the SDI Audio Matrix may be used in conjunction with the 'PID' tab to manipulate the input and output routing.



To enable Audio passthru for Audio 1:

Step	Action
1	On the Audio -> Audio 1 in the Web GUI Control Application, configure the "Audio Mode" for <PASSTHRU>.
2	Configure the "Audio Input" for the desired input <AES> or <SDI>. note: If using SDI, select the proper audio pair from the SDI audio matrix.
3	Select the type of audio from the "Type" drop down. <Dolby Digital>, <Dolby E>, or <Linear PCM / E2>. note: If Dolby E or Dolby Digital is valid at the input, the bit depth and bitrate are automatically determined after clicking Apply.
4	On the "PID" tab, type in the desired Audio PID for "Audio 1".
5	Adjust other audio PID's if necessary.

Common Passthru Problems:

Dolby E Line Placement and/or Dolby E Continuity Count Errors:

Dolby E audio compression technology is designed so that 1 Dolby E audio frame corresponds to 1 Video frame. This 1:1 ratio of video and audio timing was designed to assist in Video editing and seamless cuts without losing audio data. Due to the crucial and

sensitive timing, Dolby E encoders *must* have a reference phase locked to the video. In other words, the SDI video timing feeding the encoder must match the same composite reference timing that is connected to the Dolby E encoder. A simple black burst generator that does not share the same SDI video timing **will not** work to source a Dolby E encoder. A composite video reference that shares the same timing as the video source should be used. Typically, SDI video should be run through a frame synchronizer that is utilizing the same reference as the DE encoder.

The Adtec encoder preserves audio and video timing as it is presented. If the audio timing does not match video timing at the inputs, there will be potential line placement errors and/or CRC errors seen on a decoder.

No Detection of Dolby E / Dolby Digital, Front Panel shows "DE ---", "DP ---", "LP ---":

The encoder will automatically detect the bit depth of Dolby E (16 / 20 bit) and the bitrate of Dolby E / Dolby Digital. If Dolby E is selected and Dolby Digital is presented, the encoder will change automatically and vice versa. If Dolby Digital is selected and Dolby E is presented, the encoder will change the configuration automatically. If the front panel shows dashes for the detected bitrate `---`, Dolby is not being detected. This is most commonly due to a mis-configured SDI Audio Matrix or Dolby not being present on the specified input pair.

Look at the SDI signal on an SDI analyzer to verify that Dolby is present on the pair intended. If an SDI analyzer is not available, one troubleshooting tip is to set the mode to ENCODE. If silence or regular audio is heard on the decoder, a compressed bitstream is not being presented on the corresponding input. The SDI matrix can be changed to each pair without restarting the encode session. Once hash is heard, then a compressed bitstream should be present. Set the mode back to Passthru for the automatic detection mechanism to configure the Dolby type and bitrate.

Auto Transport Mux Rate

Auto Transport Mux Rate (TMR) is a feature of Adtec EN-Series built with the optional modulator. This feature will automatically configure the overall data rate of the encoder (its TMR; Transport Mux Rate), based upon its Modulator configuration. In other words, when the modulator Transmit configuration is set to 'ENABLED', the encoder's TMR becomes the Modulator's configured Interface Rate. The TMR is a key configuration for modulator functionality and must match the modulator interface rate.

Please note that the configured video and audio data rates must be lower than the targeted modulation data rate for this feature to work properly. For example, HD Video (3Mbps) + 8 pairs of Mpeg1 Layer2 @ 384Kbps (3.072Mbps) = ~6.2Mbps. The TMR will not fit into a 3MBaud DVB-S QPSK 3/4 modulation configuration (As 3Mbaud with this settings would only support a data rate of 4.14Mbps). In this case, additional audios would need to be turned off or rates adjusted to meet the 4.14Mbps modulation data requirement.

How to Use ASI-Receive

The Adtec EN-Series with optional integrated modulator has been designed with different applications in mind. The encoder / modulator combo supports three different modes of operation.

- 1) They can be used together.
- 2) The modulator only can be used as a stand alone device
- 3) The encoder only can be used as a stand alone device.

The default mode of operation has the 'ASI Receive Mode' configuration turned OFF. In this mode, the SDI input serves as the primary SD/HD-SDI video input into the encoder. The encoder processes the video/audio/ancillary data and places the compressed data into a transport stream. The transport stream is fed concurrently to the ASI output module, IP output module, and internal modulator input. The ASI output will always be enabled, while IP and RF outputs have individual controls.

The second mode of operation has the 'ASI Receive Mode' configuration turned ON. In this mode, the SDI input is changed to an ASI input. This can be useful in situations where the encoder may not meet specific requirements for a job without losing up to 32APSK optional modulation capabilities. The ASI input is routed directly to the ASI output module and to the internal modulator input. All internal paths to and from the encoder module are terminated in this mode with encode functionality disabled. The modulator will be acting as a stand alone device with 3 ASI outputs available for pre-modulation monitoring capability. In this mode, the modulator interface rate must also match the ASI rate coming into the encoder for proper RF modulation. There is no reporting of the ASI input data rate or rate adaptation supported at this time. There is no null packet insertion or null packet dropping support at this time. The ASI input rate must be configured / viewed from the device feeding the EN unit. The third mode can be used by DISABLING modulator transmit.

To enable your Adtec EN-series device for ASI Receive Mode, follow the following steps:

Step	Action
1	On the rear panel of the device, connect your ASI cable to the "ASI-IN" BNC connector. This is a shared connector; it also functions as the SDI-In connector.
2	Access the Web UI for your unit.
3	On the "Video" tab, select <On> as the option for "ASI Receive Mode". This routes the ASI signal to the unit's internal modulator.
4	On the Status Display on the LCD Panel (unit front panel), "ASI Receive/Passthru" should be shown.

Chapter 5 - Appendix

Appendix A - GNU General Public License

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Appendix B - Technical Specifications

Base Model (EN100)

Inputs

SD-SDI / HD-SDI / 3G-SDI

Use: Video & Audio input

Standard: SD - SMPTE 259M-C - 270Mbit/s with embedded audio per SMPTE 272M A, B, and C. HD - SMPTE 292M - 1.485Gbit/s with embedded audio per SMPTE 299M. 3G-SDI Level A and Level B.

Connector: BNC (75 Ohm). Auto Detect SD/HD/3G or manual configuration.

Note: This connector serves as the DVB-ASI input when configured for ASI receive mode. This mode allows for the use of the modulator 'PASSTHROUGH' feature.

SFP Slot

Use: Video & Audio input

Standard: With optional SFP Optical module, supports SD-SDI, HD-SDI, and 3G-SDI (3G-SDI Level A and Level B).

Connector: Open SFP cage for optional SFP optical module.

CVBS

Use: Video input

Standard: SD NTSC or PAL D1 Composite Video Input

Connector: BNC (75 Ohm)

AES Audio

Use: Digital audio input (x8 pairs or x16 channels) for uncompressed LPCM or compressed bit stream processing

Standard: AES3

Connector: Eight BNC (75 Ohm)

SDI Embedded Audio

Use: Digital audio input (x8 pairs or x16 channels) for uncompressed LPCM or compressed bit stream processing

Standard: Digital audio embedded per SMPTE 272M (SD) and SMPTE 299M (HD)

Connector: SFP module or BNC (75 Ohm)

Analog Audio

Use: Analog Balanced Stereo input (x2). Analog audio input via DB15 male connector. Clip level 18dB.

Connector: DB15 (10 kohm)

*** See "DB15-M Analog audio input pinout" in this Appendix.

Outputs

DVB-ASI

Use: Transport Stream output. Physical interface 100Mbit/s. ASI concurrent with TSoIP (GigE) and RF Tx (DVBS/S2).

Standard: ISO13818-1 MPEG 2 Transport Stream per EN 50083-9:1997 (188 byte only)

Connector: Three BNC (75 Ohm)

GigE Transport Over IP (TSoIP)

Use: Transport Stream Output, but may also be used for control. Four (4) unique TCP, UDP, or RTP (RFC 3550) encapsulated routes with SMPTE 2022 (COP3 FEC). TSoIP (GigE) concurrent with ASI and RF Tx (DVBS/S2).

Standard: MPEG 2 RTP v2 transport (RFC 3550)

Output Rates: 1 - 100Mbps (188 byte DVB packet size, 7 per IP packet)*

Standard: MPEG 2 UDP transport

Output Rates: 1 - 100Mbps (188 byte DVB packet size, 7 per IP packet)*

Standard: RTP SMPTE 2022-1 2007 FEC

Output Rates: 1 - 100Mbps (188 byte DVB packet size, 7 per IP packet)*

Standard: TCP Transport

Output Rates: 1 - 25Mbps (188 byte DVB packet size, 7 per IP packet)*

Connection speed: GigE (100/100BaseT)**

*Overall egress supported bandwidth decreases when using multiple TSoIP streams. The sum of all UDP/RTP streams must fall within the IP supported limit of 200Mb/s. TCP does not support high throughput at this time.

**The user has the ability to transmit IP streams via the GigE or 10/100 management port. When transmitting streams via the 10/100 management port, throughput is limited to the physical interface throughput.

Connector: 8 pin RJ45

Communications

COM2 Serial Port

Use: API Serial Communication Interface

Default Baud Configuration: 38,400 bps 8 data bits 1 stop bit no parity

Connector: 8 pin RJ45 (supplied with DB9 to RJ45 adapter)

COM1 Serial Port

Use: Serial Port Used for Troubleshooting (Terminal)

Baud Configuration: 115,200 bps 8 data bits 1 stop bit no parity

Connector: 8 pin RJ45 (supplied with DB9 to RJ45 adapter)

RS422

Use: integration with non-linear editor workstations

Standard: Sony 9 PIN Protocol

Default Baud Configuration: 38,400 bps 8 data bits 1 stop bit no parity

Connector: DB9 Female

Ethernet Port

Use: ethernet port used for network control, but can be used for TSoIP

Format: IPv4 Ethernet 10/100BaseT

Communication Methods: SNMP, FTP, Telnet, HTTP, TSoIP

Connector: 8 pin RJ45

Parallel Port

Use: GPIO DB9 parallel port used for custom triggering / integration

Connector: DB9 Male

GPIO Port

Use: GPIO DB9 parallel port used for Encode, Stop, Status/Alarms, and SCTE 35 generation

Connector: DB9 Male

Video and Audio

Video Encode

H.264 MPEG-4 SD (ITU-T H.264 ISO 14496-10)

Format: Standard Definition D1 NTSC 29.97 fps (480i59.94) and PAL 25 fps video (576i50) Level 3.0 to Level 3.2

4:2:0 Chroma: High Profile, Level 3.0

4:2:2 Chroma: High Profile, Level 3.0*

Pre-Processing

Encoder Filters: Temporal & Spatial (Median)

Time Base Correction (TBC) on Analog and SDI inputs

Data rates: 0.7 - 20Mb/s

*Support for 422 based on feature key

H.264 MPEG-4 HD (ITU-T H.264 ISO 14496-10)

Format: 1080p59.94, 1080p50 (Level 4.2)**

Format: 1080i59.94, 720p59.94, 1080i50, 720p50 (Level 4.1)

420 Chroma: High Profile, Level 4.1

422 Chroma: High Profile, Level 4.1*

Pre-Processing

Encoder Filters: Spatial (Median)

Data Rates: 1.5 - 80Mb/s

*Support for 422 based on feature key.

**Supports 420 Only.

Group of Pictures (GOP)

1-30. I, IP, IBP, IBBP, Adaptive GOP

Interlaced Encoding

Field / Frame / MBAFF / PAFF

Motion Estimation and Precision

Precision : 1, 1/2, 1/4 Pixel

Block Size: 16 X 16, 16 X 8, 8 X 16, 8 X 8, 4 X 4

Entropy Coding

CAVLC, CABAC

Audio Encode

MPEG 1 Layer 2 audio (4 pairs) encode standard. 4 additional pairs are optional for a total of 16 channels.

48 Khz. Bit rates include 32, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320, 384 Kbit/s. Stereo, Mono, Dual Mono. Phase aligned support included.

Audio Passthrough

- Dolby E 5.1/2.0/1.0, AC-3, LPCM, Linear Acoustic

Audio Signal Generation

- MPEG 1 Layer 2 audio tones user selectable frequency per pair from 440 hz to 2.5Khz. Group L/R mute or Pair L/R mute. No audio inputs are required to generate audio tones.

Transport Table Generation

MPEG Program Specific Information (PSI) table compliance:

PAT / CAT / PMT

DVB Service Information (SI) static table compliance: (Dynamic Option)

SDT / NIT / EIT / TDT/TOT

ATSC A65B (PSIP) static table compliance (Dynamic Option)

MGT (TVCT) – Terrestrial / STT / RRT / EIT 0-3

Ancillary and Waveform Data

(V/H) ANC and WSS Video User Data

- Waveform (Composite or SD SDI):

Closed Captions per CEA-608-C (2005), (Carriage per SCTE DVS-157, ATSC-A_72).

Wide Screen Signaling (WSS) per ETSI EN300_294 V1.4.1 (2003-04), (Carriage per ATSC-A_72 AFD).

Teletext per ITU-R BT.653 (Carriage per ETSI EN 300_472 V1.2.1 (2003-01)

AMOL

- (V/H) ANC per SMPTE 291M (Native via SD/HD SDI):

Closed Captions per CEA-708 (Carriage per ATSC-A_72).

Teletext/Subtitles per OP47 (Carriage per ETSI EN 300_472 V1.3.1 (2003-01).

VITC per SMPTE 12M-2-2008 (Carriage per SMPTE 2038-2008, also inserted in GOP headers).

AFD/Bar Data/Pan Scan per CEA-CEB16 (2006) per SMPTE 2016 (Carriage per ATSC-A_72).

Waveform Bridging and Conversion of Video User Data

- CEA 608 to CEA 708 bridging

- Caption Carriage:

CEA-608 via Composite merged with SD or HD Video via SDI (Similar frame rates required)

- Teletext Carriage:

Waveform Teletext via Composite merged with SD or HD Video via SDI

- WSS Carriage:

Waveform WSS via Composite merged with SD Video via SDI

Encryption

DVB Common Scrambling Algorithm Basic Interoperable Scrambling System (BISS). Mode 0 Clear (Free To Air - FTA), Mode 1, and Mode E.

System and Host

Alarms

- Front Panel LED, Web UI, SNMP, GPIO

Physical and Operational

Physical / Environmental

1 RU chassis (19" X 18" X 1.65" / 482mm x 457mm x 44mm)

Weight – 9-14lbs. Dependent on RF Option

Power

Input Voltage: Redundant auto switching dual 100 - 240 VAC 50/60Hz (Standard)

Power Consumption Start-up: 46 Watts

Operational: 45 Watts

(base consumption, actual consumption depends on installed options)

Operational

Ambient operating temperature: -20 C to 40 C.

Ambient storage temperature: -30 C to 80 C.

Non-condensing relative humidity range: 30% to 85%

Safety

CE

Optional SFP module (purchased separately)

Sensitivity: -22dBm

Overload: 0dBm

Exceeds SMPTE 297-2006 specifications

Robust error free reception of signals from 50Mbps to 3Gbps

Supports SD-SDI, HD-SDI and 3G-SDI

Hot-pluggable

RoHS compliant

IF Modulator (option)

Requires factory installation

Modulation Scheme Support: QPSK / 8PSK / 16APSK / 32APSK*

Interface Rate: 50 kbit/s- 216 Mb/s (FEC-& interface dependent)

Baudrate range: 0.06-45/68 Mbaud

Selectable baseband shaping : 20%, 25%, 35%

DVB-S2 compliant per EN 302307

DVB-S compliant per EN 300421

DVB-DSNG compliant per EN301210

Output level: -30 to +5dBm (+/- 2dB)

Frequency: 50 to 180MHz

Connector: Two BNC (50Ohm)**

* software keys are required to unlock full hardware support. Base modulator supports DVB-S QPSK 15 Mbaud.

**MAIN BNC: IF Frequency (50-180MHz), MONITOR BNC: Fixed L-Band 1080MHz -45dBm

L-Band Modulator (option)

Requires factory installation

Modulation Scheme Support: QPSK / 8PSK / 16APSK / 32APSK*

Interface Rate: 50 kbit/s- 216 Mb/s (FEC-& interface dependent)

Baudrate range: 0.06-45/68 Mbaud

Selectable baseband shaping : 20%, 25%, 35%

DVB-S2 compliant per EN 302307

DVB-S compliant per EN 300421

DVB-DSNG compliant per EN301210

Output level: -35 to +5dBm (+/- 2dB)

Frequency: 950 to 2150MHz

Connector: Two BNC (50Ohm)**

* software keys are required to unlock full hardware support. Base modulator supports DVB-S QPSK 15 Mbaud.

**MAIN BNC: L-Band Frequency (950-2150MHz), MONITOR BNC: Fixed Power Level -45dBm

L-Band Modulator + 10MHz (option)

Requires factory installation

Modulation Scheme Support: QPSK / 8PSK / 16APSK / 32APSK*

Interface Rate: 50 kbit/s- 216 Mb/s (FEC-& interface dependent)

Baudrate range: 0.06-45/68 Mbaud

Selectable baseband shaping : 20%, 25%, 35%

DVB-S2 compliant per EN 302307

DVB-S compliant per EN 300421

DVB-DSNG compliant per EN301210

Output level: -35 to +5dBm (+/- 2dB)

Frequency: 950 to 2150MHz

10MHz Option: Adds option to add 10MHz onto L-Band output

Connector: Two BNC (50Ohm)**

* software keys are required to unlock full hardware support. Base modulator supports DVB-S QPSK 15 Mbaud.

**MAIN BNC: L-Band Frequency (950-2150MHz), MONITOR BNC: Fixed Power Level -45dBm

Appendix C - DB15-M Analog audio input pinout

Pin	Signal
1	Channel 0 left +
2	No Connection
3	Channel 0 Right -
4	Channel 1 left +
5	No Connection
6	Channel 1 right -
7	Ground
8	No Connection
9	Channel 0 left -
10	Channel 0 right +
11	No Connection
12	Channel 1 left -
13	Channel 1 right +
14	No Connection
15	Ground

Appendix D - Adtec Digital Support & Service

Technical Support and Customer Service includes troubleshooting product/system functional operations concerning Adtec equipment, embedded systems and single device issues; Service Order generation, processing and tracking; Warranty claim processing; and on-site system evaluation and maintenance. Technical Support plans do not include customer training programs. Programs incorporating customer training are defined in the Training Services Policy. Customer Services technicians provide limited instruction during a support call/email/fax in order to facilitate checking for proper equipment operation.

Telephone and Email Support

- **Telephone:** 615-256-6619 ext. 166
- **Email:** support@adtecinc.com
- **Internet:** <http://adtecdigital.com/support/support-request>

Adtec Digital offers telephone, email and fax support, warranty and service related inquiries during normal business hours: 9:00am to 5:00pm Central Standard Time (CST), Monday through Friday, holidays excepted. Support Requests can also be submitted on-line. All inquiries will be processed in the order in which they are received and by the criteria outlined in the Call Response Order. Inquiries and inquiry responses made after 5:00 PM (CST) weekdays, Saturday, Sunday or on an Adtec-recognized holiday will be processed the next business day in the order received.

Callers on hold and returned calls will be prioritized by the following criteria:

- Priority-24 Subscription Customers
- Standard-Priority Subscription Customers
- All customers that have purchased Installation & Training, within 90 days of the installation.
- Adtec Certified Operators (ACO)
- Limited Level Support, Warranty & Service Requests
- Multi-device system installations that have purchased Installation & Training from Adtec
- Distributors
- System Integrators
- Multi-device systems
- Single device users

Preparing for Support

To help expedite the troubleshooting process, please be prepared to provide the following information to the support representative:

- **Product(s) affected:** Please provide a list of the Adtec Products involved including the Revision Number for each affected product.

- **Description of the Problem:** Please include a detailed description of the problem. Include the approximate time and day the problem occurred, the spot ID of the material being inserted and what the operator reported about the incident. It is also helpful to note any recent changes to the system. More information is always better than too little information.
- **Your Contact Data:** Please include contact information so we can reach you to discuss how to fix the problem, additional troubleshooting steps that are required or to gather more complete information regarding the problem. Please include your facility name (or call letters), your name, title, email address, telephone number, hours of work, and other contact persons if you are not available.

SLA Options

Effective January 1, 2014

For questions, please email slaquestions@adtecinc.com

- **SLA STANDARD***
 Services: Includes initial product orientation
 Technical support M-F 8AM-8PM (EST)
 Firmware and software upgrades
 Includes repair expenses**
 Includes ground shipping within US
 International shipping is extra
 Fees: Free for one year after purchase
- **SLA PRIORITY 24***
 Services: SLA Extended Warranty plus...
 Technical support 24x7x365
 Expedited shipping is extra
 Fees: 10% of the purchase price per year
- **SLA PREMIUM 24***
 Services: SLA Priority 24 plus...
 Next business day advance loaners
 Fees: 15% of the purchase price per year
- **SLA EXTENDED WARRANTY***
 Services: Extends warranty after year one
 Includes repair expenses
 Expedited shipping is extra
 Fees: 5% of the purchase price per year
 of warranty extension
- **SLA LEGACY**
 Services: Includes initial product orientation
 Technical support M-F 8AM - 8PM (EST)
 Firmware and software upgrades
 Includes Duet, Soloist 2/ 2S, Mirage, edge1013/1015/2000/2100/2110.
 Most legacy products cannot be repaired
 Fees: \$400 annual fee
- **SLA SESSION SUPPORT**
 Services: Technical support M-F 8AM - 8PM (EST)
 Includes support for 5 days after first call
 Fees: \$225 per incident

- **SE SUPPORT**

Services: Event based on-site technical representation

Fees: \$850 per day plus travel expenses

*Available for up to three years after purchase for Adtec manufactured products only

**Excludes equipment that has been subject to misuse, negligence, or accident

All SLAs are subject to terms and conditions of sale. For details see
adtecdigital.com/support/terms