EN-20

Dual Channel Capable HD/SD MultiCODEC SDI Encoder w/ optional QAM Modulator

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USER GUIDE

2.03.09

Contents

Trademarks & Copyrights

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 on 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 Celcius (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 - Overview

Product Introduction

The EN20 is a High and Standard definition MPEG-2 or H.264 encoder supporting ATSC and DVB tables through ASI and IP transport streams. The EN20 is capable of supporting up to 2 encoder modules and can be ordered with optional QAM modulation for distribution applications.

It inherits Adtec's broadcast quality compression, advanced feature set, service performance and reliability in the new dense two-channel platform targeted towards broadcasters, cable and IP compression applications.

The device automatically detects video and audio from two sources (combination of HD and SD acceptable), encodes, multiplexes and sends them back out as one combined TS via IP, ASI or optional QAM. Closed captioning and support for Emergency Alert (EAS) triggering are standard.

Chapter 2 - Getting Started

Front Panel

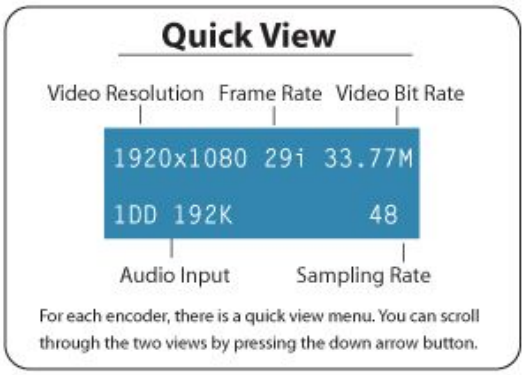
The Function Buttons and Directional Keypad of the EN-20 are used to configure and monitor the signal input and output of the device.

Panel Diagram

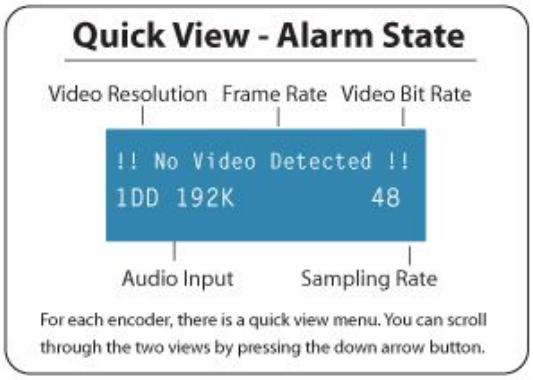
Front Panel LCD

There are 3 states of the front panel LCD.

1) **Encoding State:** When in normal encoding mode, the LCD will display the following information. Since there are can be 2 encoders in the product, you can view the status of each by pressing the down button to toggle between 1 & 2.



2) **Video Loss State:** When video is not detected on the selected input, the LCD will display the following information.



3) **Disabled Product State:** When the product is in a disabled state, the LCD will relay the following information. This state is generally only used when a factory restore is performed. If that is the case, note that all of the configurations have been returned to factory defaults including Network configurations. To reapply network configurations simply press the Down arrow when in this state to navigate through the network menu. In the event that you see a similar message followed by a phone number, this indicates that the Temporary keys on the device have expired and you should contact your sales representative.

Transport LED Indicators - Channel 1 & 2

Indicator	Function
Encode	Off - No activity. Idle State Green - Encoding Yellow - Transitioning
Video	Off - No video (audio only) Green - Video detected. Yellow - Format not supported. Red - No video detected.
SD	Green -SD Resolution Detected
HD	Green - 1080i Resolution Detected Yellow - 720p Resolution Detected
EAS	Green - EAS enabled.

QAM Status Indicator LEDs

Indicator	Function
A/B/C	A = 8 MHz B = 6 MHz
256	Default for Annex B, can be selected for Annex A
128	not currently used
64	Optional for Annex B or Annex A

System/Function Status Indicator LEDs

Indicator	Function
Power	Green - Power is on. Off - Power is off
Alarm	Off - no alarm Yellow - minor alarm Red - major alarm
Link	Off - no link detected Green - link active
Busy	Off - no traffic Green Flashing - traffic
EAS	Green - Active, Audio + Video Yellow - Active, audio only

Programming Function Buttons

Control	Function
Mode	Cycles through the available menus
Select	selects a menu or submenu
Enter	enter a value placed into a menu field
Escape	return one level within a menu or to the main menu

Directional Keypad

- Arrow keys control the cursor on the LCD display and are used to page through the options in a menu/sub-menu and to place entries in fields.

Unit Security

Rules:

- The EN-20 is always logged in on startup.
- If the device has logged out due to accident, or a login duration timer being set (see below), you will need to log back in. To log in from a logged-out status follow the key sequence below.

Step	Action
1	Press **<Select>**
2	Press **<Up>** arrow
3	Press **<Select>**
4	Press **<Enter>**
5	Press **<Right>** arrow
6	Press **<Enter>**

The front panel also has a login duration capability. This setting allows you to specify a time frame in which the unit will automatically log itself out if it receives no control inputs via the front panel or API session.

Possible Values:
0 (Zero): The unit will not auto-logout
1-9: The number of minutes until logout if no input is received.

Services Menu

The following diagram illustrates the structure and flow of the **Services Menu** on the Adtec EN-20 device. TX MUX Rate, Table, and TSID are global configurations, while items under the denoted << >> parallel menu are unique to each encoder :

Control	Function	Options	API Command
TS MUX Rate	Configures the total transport multiplex rate. This rate is configured automatically with optional QAM modulator installed.	1 - 80 Mbit/s *CODEC and Resolution dependant	*.ECMD0 TMR
ASI Mode	Configures the encoder to egress a constant transport stream when video is not present. It is recommended to keep ASI Mode set to Continuous	Continuous Encode Only	*.ECMD0 ASM
Autofill	Video Autofill automatically adjust the Video Bit Rate to occupy the maximum fill of the TS Mux Rate	ON OFF	*.ECMD0 VAF
Tables	selects the table generation standard to be used.	DVB ATSC MPEG	*.ECMD0 TON
TSID	Transport Stream ID is a user-defined value in the PAT packet used to identify individual transport streams.	0x0000 - 0xFFFF	*.ECMD0 TSI
Active	Determines whether or not the Channel is active. It is recommended to set this option OFF for an off-line service. IE. the unit is used as a single channel encoder.	OFF ON	*.ECMD# STU
Service Name	also known as Service Name; name of the program or event, carried in the SDT table of a transport stream	text field; 20-character limit (incl. spaces)	*.ECMD# SNA
Service Provider	also known as Service Provider; name of the party offering the program or event, carried in the SDT table of a transport stream	text field; 20-character limit (incl. spaces)	*.ECMD# SPR
Logical Channel Number	This setting allows you to set the logical channel number that will be used to tune in with a set top box or television. This setting is only valid with DVB table generation.	1 - 9999	*.ECMD# LCN
Major Channel	Configures major channel number for ATSC	text field; 0-999	*.ECMD# MAJ

Number		available see note below table	
Minor Channel Number	Configures minor channel number for ATSC	text field; 0-999 available	*.ECMD# MIN

Important: setting the Major Channel Number to zero (0) will equate to setting a single-part channel number in ATSC applications.

RF Tx Menu

The following diagram illustrates the structure and flow of the QAM **RF Tx Menu** on the Adtec EN-20 device. This menu will not be available on units without the optional QAM modulator.

Control	Function	Options	API Command
Modulator Encoding	encoding standards being applied. Annex A is used world-wide; Annex B is used in North America. None disabled the modulator and allows for manual configuration of the TMR.	Annex A Annex B None	*.ECMD0 QAM MOD_ENCODING
Modulator Mode	rate of data transfer within the encode	64 256	*.ECMD0 QAM MOD_MODE
Modulator Output Format	selects between normal and inverted output	Normal Inverted	*.ECMD0 QAM MOD_INVERT
UpConversion Channel	Congruent with the new EIA (North America) channel plan - valid range is 2 through 135 inclusive.	text field; values are 2-135	*.ECMD0 QAM UPCON_CHANNEL_NUM
UpConversion Power	RF output power in dBmV	45 dBmv to 56 dBmv	*.ECMD0 QAM UPCON_POWER_LVL
UpConversion Frequency	Center frequency of the QAM RF output. Direct entry of center frequency corresponding to the new EIA (North America) channel plan will return a valid channel number in the channel field. Entering frequencies that do not correspond to the EIA (North	57 to 861 MHz	*.ECMD0 QAM UPCON_OUTPUT_FREQ

	America) channel plan will return a value of (-1) in the channel field, however, the RF output frequency will be as entered. Valid range of frequencies is 57 to 861MHz inclusive.		

Note: If using API Commands, you must specify which encoder the command applies to by substituting '0' (for Encoder 1) or '1' (for Encoder 2) in place of the '#' symbol in the commands above. For more information, see the "API Commands" article in this manual. QAM Configurations are global configurations that will automatically be applied when configuration is sent to either encoder.

IP Tx Menu

The following diagram represents the structure of the **IP Tx Menu** Menu:

Control/Setting	Function	Options	API Command
Mode	switches multicast function on and off	Off Send	*.ECMD0 MMO #
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 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.	user-defined; numeric field in format xxx.xxx.xxx.xxx	*.ECMD0 MSI #
Tx Port	Port assignment used for transmitting a multicast	user-defined; numeric field	*.ECMD0 MSP #
DVB per IP	Configures the amount of DVB transport stream packets (188 bytes per DVB packet) per IP packet payload.	1 4 7	*.ECMD0 MSY #
RTP	Allows for sequence numbering and timing for accurate playback.	On Off	*.ECMD0 RTP #

TOS	Type of Service; selects the type of multicast that will forward the packet.	Normal Minimize Cost Maximize Reliability Maximize Throughput Minimize Delay	*.ECMD0 TOS #
TTL	Time to live is a numeric value from 1 to 255 that specifies the number of iterations or transmissions the packet can undergo before it is discarded. The default value is 7.	1 - 255	*.ECMD0 TTL #
Multicast Connector	Sets the physical connector (on the rear of the unit) to use for multicast transmit purposes on the indicated encode channel.	Ethernet !GigE	*.ECMD0 MCN #
FEC Mode	Forward Error 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. The RTP Control (above) must be set to **'on'** to enable FEC.	On Off Available if RTP selected 'on'	*.ECMD0 FEP #
FEC L	affects the maximum burstpacket loss that can be recovered	4-20	*.ECMD0 FEP #
FEC D	defines latency involved in burstrecovery	4-20	*.ECMD0 FEP #
Service Select	Select both services or single service transport stream	MPTS SPTS1 SPTS2	*.ECMD0 MST #

Note: Four IP destinations are available on the product. The '#' denoted in the IP Tx Commands above are relevant to the four destinations indexed 0 - 3.

Video Menu

The following diagram illustrates the structure and flow of the **Video Menu** on the Adtec EN-20 device:

Control	Function	Options	API Command
Input	Video Input designates the type of video signal being received, either SDI or Composite. If the input is SDI, the encoder will automatically detect the resolution and frame rate of the incoming video source.	SDI COMPOSITE	*.ECMD# INP
SDI Mode	This allows automatic or fixed rate detection of SDI video signal.	AUTO SD HD1.4G	*.ECMD# SVM
Chroma	Chromatype is the color information signal used to determine chrominance for the encoded video. 422 is only available in MPEG2 SD encoding. *VE1 option only	420 422	*. ECMD# CHT
Video Rate	Elementary stream video rate. In standard definition encoding mode. (input is composite video, or SDI auto-detected at standard definition) MPEG2 (VE1): 1 - 15 Mb/s H.264 (VE2): 500 kb/s - 10 Mb/s In high definition encoding mode. (SDI input only and auto-detected as 720p or 1080i) MPEG2 (VE1): 7 - 60 Mb/s H.264 (VE2): 2 - 30 Mb/s	MPEG2: 1 - 60 Mb/s H.264: 0.5 - 30 Mb/s	*.ECMD# VRT
SD Video Mode	The SD video mode sets the encoder for NTSC or PAL mode. *This is only affects the incoming SDI feed if it is SD or if the input is Composite.	NTSC PAL	*.ECMD# VID
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.	4x3 16.9 WSS *This is not a scaling option.	*.ECMD# ARA

	- 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.	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 for cropping/letter boxing by downstream devices. The configuration can be set to OFF, WSS for AFD 'passthrough' or manually set.	OFF WSS 2 - 11	*.ECMD# AFD View AFD API documentation for further details of arguments 2-11
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	*.ECMD# GOP
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.	IBBP IBP IP I	*.ECMD# GOP
GOP Size	GOP Size is the distance between two full image frames (I-Frames) in a GOP Structure.	1 - 30	*.ECMD# GOP

Audio Menu

The following diagram illustrates the structure and flow of the **Audio Menu** on the Adtec EN-20 device:

Control	Function	Options	API Command
Input	Determines type of audio input being received	SDI Analog	*.ECMD# AIN
Mode	The Audio Mode can be set to	OFF	*.ECMD# AMO

	ENCODE (compress the audio) or PASSTHRU (accept compressed Dolby or PCM type bitstream on SDI. It will be time-aligned and multiplexed into the transport stream.)	Encode Passthru	SEE AMO in API documentatio n
Type	If the mode is ENCODE, the type can be set to Dolby Digital AC3 or MPEG 1 Layer 2. If the mode is set to PASSTHRU, there is support for Dolby E, Dolby Digital AC3 and 5.1, PCM (302M), and Linear Acoustic E2. Dolby Digital is part of the ATSC A53 spec. with a stream type of 0x81 and required for ATSC applications.	DD 0x81 MU 0x03 DE LP DD 0x06 MU 0x04	*. ECMD# AMO SEE AMO in API documentation
Rate	Mpeg1Layer2 32-384 kbit/s AC3 Encode 56 - 640 kbit/s PASSTHRU - Auto-Detects	32 - 640 kbit/s	*.ECMD# AMO SEE AMO in API documentation
Level	Audio Level can be set in one-decibel increments, with a range of -18 to +8 decibels. Available only in Encode Mode.	-18 - +8 dB	*.ECMD# ALV
Sync	Audio Sync set the audio sync offset. The valid range is +/- 800 milliseconds. Non functional for Musicam Encode	+/- 800 ms	*.ECMD# AUS
Musicam Mode	Mpeg1Layer2 (Musicam) codec configuration	STEREO MONO DUALMONO	*.ECMD# MCM

The same menu options are available for both Channel 1 and Channel 2

Note: If using API Commands, you must specify which encoder the command applies to by substituting '0' (for Encoder 1) or '1' (for Encoder 2) in place of the '#' symbol in the commands above. For more information, see the "API Commands" article in this manual.

PIDs Menu

The following diagram illustrates the structure and flow of the **PIDs Menu** on the Adtec EN-20 device:

Control	Function	Options	API Command
PMT PID	Configures PID marked for	Hex value 0x0020 -	*.ECMD# PPI

	the PMT	0x1FFE	
PCR PID	Configures PID marked for PCR packets	Hex value 0x0020 - 0x1FFE.	*.ECMD# PRP
Video PID	Configures PID marked for the Video PES stream	Hex value 0x0020 - 0x1FFE	*. ECMD# VPI
Aud 1 PID	Configures PID marked for the Audio PES stream	Hex value 0x0020 - 0x1FFE	*.ECMD# API
Tltxt PID	Configures PID marked for Teletext Packets	Hex value 0x0020 - 0x1FFE	*.ECMD# TPI
VITC Mode	Enables VITC Mode Adtec Digital encoders have the ability to process VBI waveform data and Ancillary (SDI non video information), however they can't process both at the same time. If the "VITC PID" option is turned on, waveform closed captions and teletext will not be able to be processed.	OFF ON	*.ECMD# BMO 1
VITC PID	Configures PID marked for ANC / VITC Packets	Hex value 0x0020 - 0x1FFE	*.ECMD# BMI 1
Splice PID Active	Enables Splice PID	OFF ON	*.ECMD# RIT
Splice PID	Configures PID marked for Splicing	Hex value 0x0020 - 0x1FFE	*.ECMD# SPI

Note: No two PID's may be configured for the same value with the exception of VIDEO and PCR with MPEG2 encoder (VE1). The encoder does not accept PID values already assigned to another elementary stream. Use the PDU command to get a 'Program Dump' of all assigned PID's.

VBI Menu

The following diagram illustrates the structure and flow of the VBI Menu on the Adtec EN-20 device:

Control	Function	Options	API Command
VBI Source	VBI Source allows selection of Composite or SDI for as vbi data	SDI Composite	*.ECMD# VBS

	source.		
Mode	Closed Caption support includes waveform caption processing, 608->708 up-converison (composite, SD-SDI), and ancillary 608/708 processing (SD/HD-SDI).	OFF ATSC 608 ATSC 708 ATSC 608-->708 DVS 157	*.ECMD# CLC
Teletext Processing	Teletext Processing Allows for individual line based selection of VANC OP47 and WAVEFORM data. Teletext processing is globally enabled with the mode setting and the desired lines individually selectable. (Currently only WAVEFORM Teletext Processing is supported) **Note:** Teletext is only used when the Frame Rate of the video is 50p or 25.	OFF ON	*. ECMD# BMO

CAS Menu

The following diagram illustrates the structure and flow of the **CAS Menu** on the Adtec EN-20 device:

Control	Function	Options	API Command
Channel 1	Turns Service 1 Encryption ON/OFF	ON OFF	*.ECMD0 ECR
Channel 2	Turns Service 2 Encryption ON/OFF	ON OFF	*.ECMD1 ECR
Mode	Determines whether the encoder will pass the transport stream through the Encryption Block. Only one encryption mode is supported at a time (BISS1 or BISSE), but each channel has individual control.	OFF BISS_1 BISS_E_USER_ID_ONE BISS_E_USER_ID_TWO	*.ECMD# ECR
Clear SW	12-digit hexadecimal Clear Session Word used with BISS1	CSW	*.ECMD# ECR CSW [key]

Encrypt SW	16-digit hexadecimal Encrypted Session Word used with BISSE	ESW	*. ECMD# ECR ESW [key]
User ID 1	14-digit hexadecimal user id 1 used with BISSE	AID1	*.ECMD# ECR AID1 [key]
User ID 2	14-digit hexadecimal user id 2 used with BISSE	AID2	*.ECMD# ECR AID2 [key]

EAS Menu

The following diagram illustrates the structure and flow of the **EAS Menu** on the Adtec EN-20 device:

Control	Function	Options	API Command
Mode	Configure how Emergency Alert System responds when activated	OFF Audio + Video Audio Only Video Only	*.ECMD0 EAS

System Menu

The following diagram illustrates the structure and flow of the **System Menu** on the Adtec EN-20 device:

Login

Control	Function	Options	API Command
Login	If the front panel is in a 'logged out' state, all configurations are read only. User must login to change values.	N/A	N/A
Login Duration	Specifies the time-out value for automatically logging out of the front panel once a user logs in for security purposes. Setting a time of 0 disables automatic logout capabilities	0 - 9 (minutes)	*.SYSD LDR

Network Sub-menu

Control	Function	Options	API Command

Ethernet IP Address	IP address of unit on your network	user-defined using **<left/right arrow>** and **<select>** buttons default is 192.168.10.48	*.SYSD IPA
Ethernet Mask	Defines the unit relative to the rest of your network	user-defined using **<left/right arrow>** and **<select>** buttons default is 255.255.255.0	*.SYSD IPM
Ethernet DHCP	Dynamic Host Configuration Protocol; allows the device to self-locate network Ethernet parameters	**On** (finds own DHCP Address) **Off** (defaults to last entered IP Address) default is OFF	*.SYSD DHCP
GigE IP Address	route of traffic in/out on IPTV	user-defined using **<left/right arrow>** and **<select>** buttons default is 192.168.20.48	*.SYSD IPA eth1
GigE Mask	defines unit relative to the rest of an IPTV network	user-defined using **<left/right arrow>** and **<select>** buttons default is 255.255.255.0	*.SYSD IPM eth1
GigE DHCP	Dynamic Host Configuration Protocol; allows mediaHub to self-locate network GigE parameters	**On** (finds own DHCP Address) **Off** (defaults to last entered IP Address) default is OFF	*.SYSD DHCP eth1
Gateway IP Address	traffic director for off-LAN resources	user-defined using **<left/right arrow>** and **<select>** buttons default is 192.168.10.1	*.SYSD GIP
Stealth IP Address	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 **<left/right arrow>** and **<select>** buttons	*.SYSD SIP

Time Sub-menu

Control	Function	Options	API Command
Time	specifies system time	user-defined using <left/right arrow> and <select> buttons	*.SYSD TIM
Timezone	specifies time zone unit operates in	user-defined using <left/right arrow> and <select> buttons	*.SYSD TIZ

NTP Sub-menu

Control	Function	Options	API Command
NTP Status	Network Transfer Protocol	Defines whether or not your unit is in sync with the designated NTP server	*.SYSD NIP STATUS
NTP IP Address	IP address for Network Transfer Protocol server	user-defined using **<left/right arrow>** and **<select>** buttons; default = 048.130.103.064	*.SYSD NIP

Alarm Sub-menu

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

Com2 Sub-menu

Control	Function	Options	API Command
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	*.SYSD com2

Features Sub-menu

Item	Function	Options	API Command

Permanent ID	Displays units permanent Product ID.		*.SYSD FEA
Temporary ID	Displays units temporary Product ID.		*.SYSD FEA
Product ID	Displays the status of the feature keys		*.SYSD FEA

Name

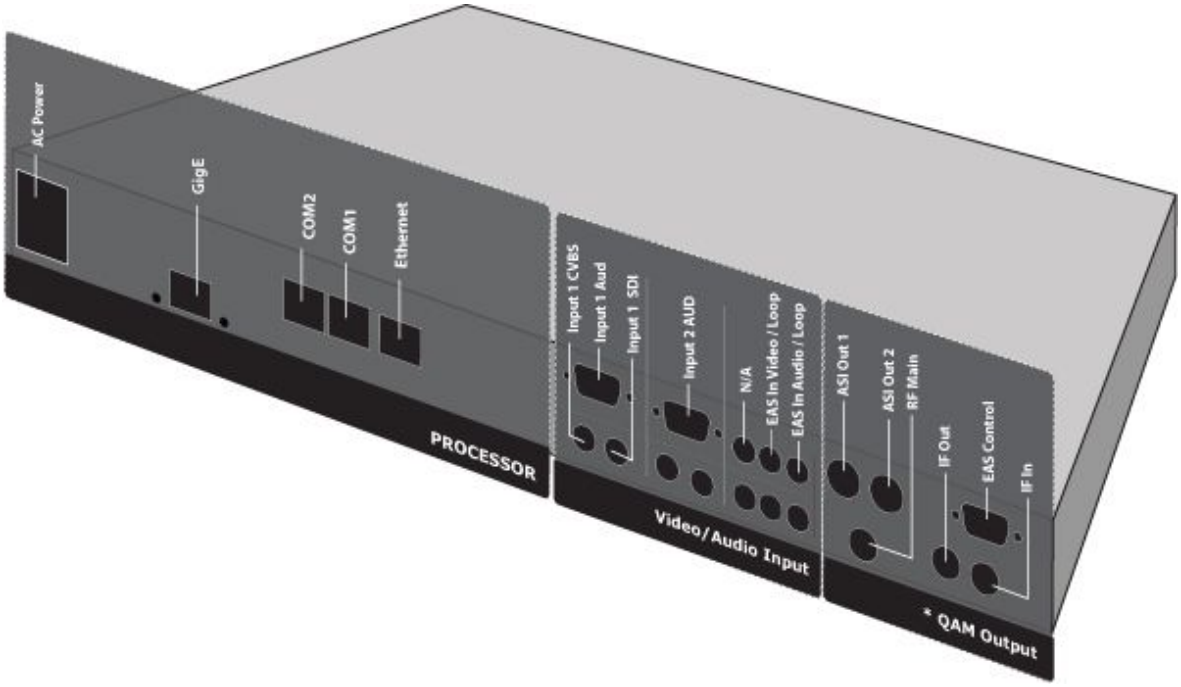
Item	Function	Options	API Command
Name	DIsplays and allows editing of the host name		*.SYSD NAM

Firmware

Item	Function	Options	API Command
Firmware	Displays current version of firmware (read only)		*.SYSD VRN

Back Panel Diagram

The back panel contains the ports and connection points for the device.



Processor Connectors

Connection	Function
AC Power	AC Power, Standard 3 pin computer power plug (Auto range 70-240 VAC Input)
GigE	GigeE Interface- MPTS Output over RTP/UDP
COM2	API Serial Communication Interface
COM1	Serial Port used for Troubleshooting
Ethernet	10/100 base T-Ethernet interface

Video/Audio Inputs

Connection	Function
HD/SD-SDI Input 1	BNC 75- Ohm Input

CVBS Composite Input 1	BNC 75- Ohm Input
Analog Audio Input 1	DB9
HD/SD-SDI Input 1	BNC 75- Ohm Input
CVBS Composite Input 1	BNC 75- Ohm Input
Analog Audio Input 2	DB9
EAS Video In	RCA 75- Ohm
EAS Video Loop Out	RCA 75- Ohm
EAS Audio In	Vertical single RCA jack
EAS Audio Loop Out	Vertical single RCA jack

Output

Connection	Function
ASI Out	BNC 75 ohm, Asynchronous Serial Interface (EN 50083-9)
RF Main	F-style RF female jack; freq. 50 to 862 Mhz, 48 dBmV to 55 dBmV in 2.0 db increments
IF In	F-style RF female jack; freq. 44 Mhz
IF Out	F-style RF female jack; freq. 44 Mhz
EAS Control	9-pin interface- to enable EAS, short pin 5 to pin 7

Chapter 3 - Using the Web Application

Introduction

Adtec Digital has deployed a web-based configuration and control software application for our products. The program is optimized to work with the following browser versions:

- Firefox: 3.5 (recommended)
- MS Internet Explorer: 8.0 and higher
- Safari: 3.0 and higher
- Google Chrome: 5.0 and higher

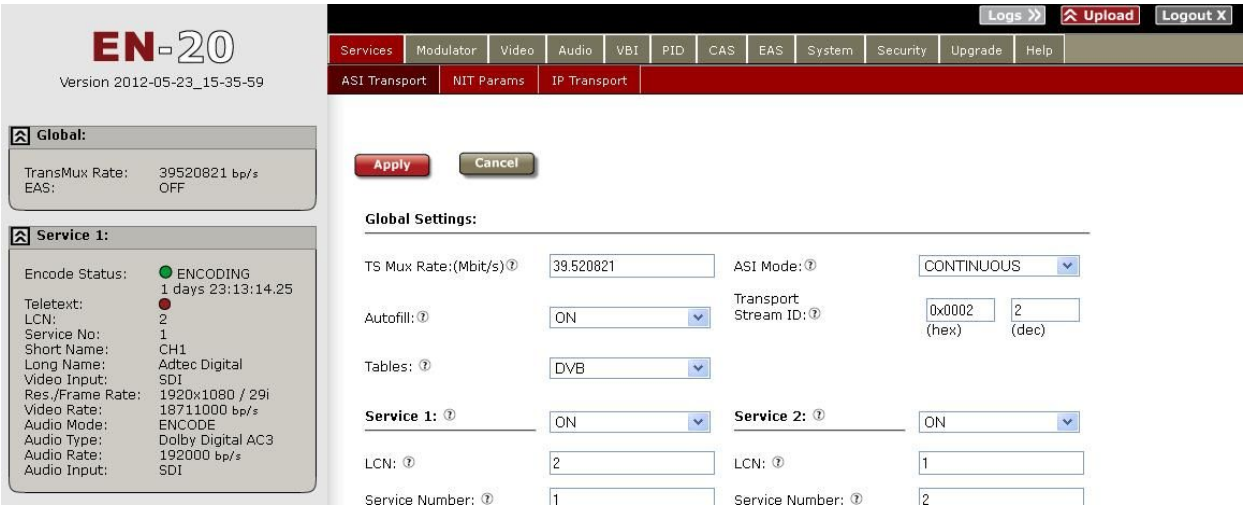
Note for Safari users:

- The program is designed to use the Bonjour Zero Configuration Protocol.
    - When using Safari, click on the " **^^** " symbol to open a networked devices list.
    - Select the device to point the browser to that device's IPA.

Logging In

Access the application by pointing your web browser to the unit's IP address. The following screen (image reduced for clarity) will appear:

Log in to the application by clicking the **"Proceed to Login"** button and typing in the user name **'adtec'** and the password **'none'** in the pop-up box that appears.



The application has two operating windows, the **Status Window** and the **Main Window**:

Status Window: The Status Window is fixed on the left-hand side of the screen- it will display regardless of what function is being displayed in the Main Window. The current status parameters of the unit's are always in view and are updated in real time.

Main Window: The Main Window is used to access the device's configurations and operating settings.

Help Notes: Help blurbs are available for the configurations on each tab; click on the "Question Mark" symbol next to the configuration name for a pop-up screen explaining the control.

Upgrading your device

To upload new firmware versions, click on the **<Upload>** button in the top navigation bar next to Log Out. A pop-up screen will allow you to browse for the firmware file by clicking Upload within the pop-up screen. After the new version is uploaded, its availability on the device will display under "available versions".

After the new version is uploaded, Click **<Install>** to extract the firmware. It will then be available under **Installed Versions**.

Once you have the version you wish to use in the Installed Versions list, you can select into it by clicking the select button. The unit will reboot and come up running in the new version.

Chapter 4 - How-To Guides

How to Complete a Manual Upgrade

You can upgrade your Adtec device's firmware via built-in web-based application, described in the Upgrade Tab section, or via a Telnet/FTP session, described in this article.
To update your Adtec device 's firmware via a Telnet session, perform the following:

Manual Upgrade Process

Step	Action
1	Obtain the desired firmware version file from www.adtecftp.com note*: Firmware releases are found in the Public Folders -> Firmware -> Release -> section of the website, in a folder marked with the product name. username: adtecftp password: adtecftp2231 note**: Windows Internet Explorer renames adtec firmware file extensions to .gz . When saving please add a t within the extension to read .tgz if IE has renamed your file.
2	Using your favorite FTP client to upload the firmware file to the device. If you are unfamiliar with FTP you may use a 'My Computer' window and type in the address bar, ftp://adtec:none@192.168.10.48 where 192.168.10.48 should be replaced with the IP Address of YOUR device. You may then drag and drop the firmware file into the hd0 folder.
3	Open a Telnet session and enter the IP address of the unit you are going to update. note*: If you are unfamiliar with telnet, open a command prompt window (windows: start -> run.., mac: macintosh hd -> applications -> utilities -> terminal) and type: telnet 192.168.10.48
4	Enter the username as ' **adtec** ' and the password as ' **none** '.
5	Enter the following in sequence: *.ecmd stop
6	*.sysd vrn search - from the results, look for the pathname of recently uploaded firmware file
7	*.sysd vrn install [pathname of the .tgz file] ex: *.sysd version install /media/hd0/EN-20-v1.00.12.nfcms.tgz

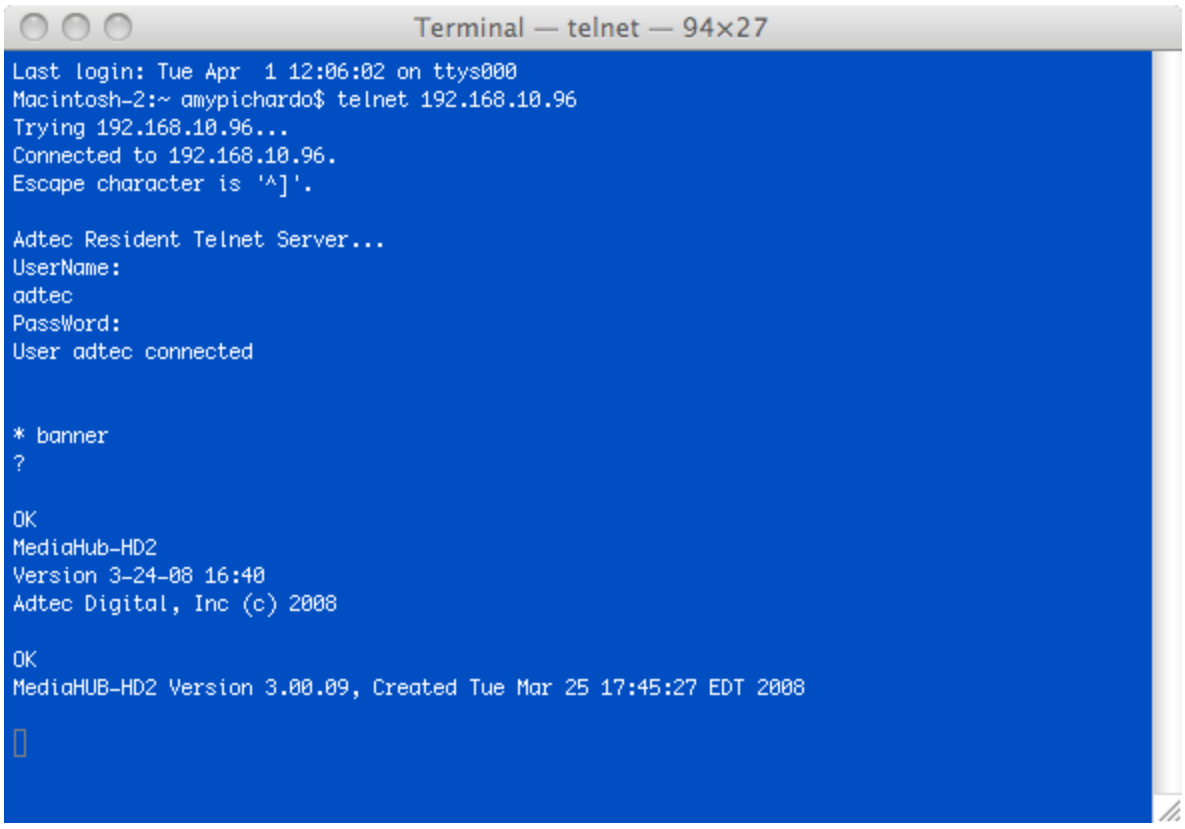
How to Connect via Telnet

* Using Telnet (standard 23 port)* To connect to your device 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.



For the EN-20 device, there are specific commands for the modulator, encoder, and the unit's operating system. Each has a unique way of accepting commands. If using telnet is your preferred method of communication to your device, familiarize yourself with the API commands and their respective command handlers. For more information on this, point your browser to the IPA of your unit and look through the API notes that are described for the device.

How to Connect via 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
FTP is only useful for collecting logs from the device.

How to Use API Commands

The Adtec EN-20 device is unique in that it handles two physical encoders. To accomodate commands for controlling both encoders, you will need to specify which encoder you are working with for each command you issue.
Please make the following adjustments:

- Instead of using *.ecmd as noted the API descriptions, you will need to use.
    - *.ecmd0 to specify the first encoder.
    - *.ecmd1 to specify the second encoder.

Example: (*.ecmd0 TRA) will give you the transport status of the first encoder.

Understanding TMR

TMR is Configured automatically if optional QAM modulator is Installed. If the EN-20 is sold with an optional integrated QAM modulator. TMR is affected differently when the modulator is installed. Below the differences are outlined.

When the QAM modulator is installed and configured for Annex A or Annex B encoding the TMR (Transport Stream Mux Rate) is controlled by the modulator's clock.
When in Annex B mode, the rates listed below will be configured and can not be changed.
Annex B QAM 256 the TMR is set to 38.810671 bps.
Annex B QAM 64 the TMR will be set to 26.970186 bps.
When in Annex A mode, the symbol rates are adjustable and that in turn affects the configured TMR. The higher the symbol rate, the higher the data rate.

When the QAM modulator is configured for None encoding or is not installed, the TMR can be configured via the webUI or from the front panel Services Menu / TS Mux Rate (bit/s). The maximum TMR is 80 Mbps.

How Video Rates are Configured (Example is pertinent to MPEG2 (VE1))

Video rates can be configured manually or automatically. The factory default is to automatically set the video rate based on TMR. This option is referred to as VAF (Video Autofill). VAF determines what the TMR is. It reserves 3.5% for null packets. It detects the video input resolution for each channel. It automatically calculates the required headroom for audio pids. It sets the video bit rate for each channel accordingly to maximise available bandwidth.

SD encode bitrate = 1.00 to 15.00 Mbps
HD encode bit rate = 7.00 to 60.00 Mbps

> **Example:**
> TMR is set to 40 Mbps.
> Channel 1 has a SD 720x480i source.
> Channel 2 has a HD 1920x1080i source.

15.00 Mbps will be allocated to channel 1 because the source is standard definition. 19.10Mbps will be allocated to channel 2 (this is the available band with after VAFs calculation)

If VAF is set to off the video rate can be manually adjusted for each channel. If you configure a channel at a video rate that would cause a egress overflow the VAF logic will constrain the misconfiguration and reconfigure the video rate for both channels.

> **Example:**

TMR is set to 40 Mbps.
Both channels have a HD1920x1080i source.
Both channels audio = 256 kbps
Video fill is set to off.

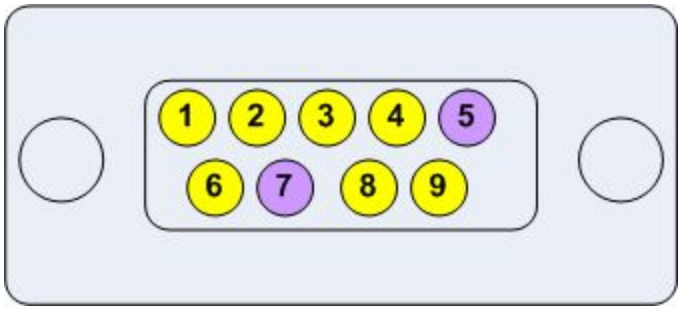
If both encoders are set to 19.10 Mbps and you want to reconfigure them to say 15.00 Mbps for channel 1 and 25.00 Mbps for channel 2. This would cause an egress overflow condition because you have not factored in the 3.5% reserve and bandwidth occupied by audio pids. Even though VAF is set to off it's logic will override the configuration request and constrain the video rates back down to 19.10 Mbps for both channels. To obtain the desired configuration. You would need to recalculate your rates. Then configure channel 1 to 15.00 Mbps then channel 2 to 23.00 Mbps.

How to enable EAS mode

EAS can be enabled from an automation system contact closure or from the webUI EAS tab.

To enable EAS in VIDEO+AUDIO via the 9 Pin GPIO, short pin 5 to pin 7.

EAS GPIO Connector Pinout



To enable EAS mode from the webUI. Click the EAS tab. Select the desired EAS mode, then click the large GO button. To disable EAS mode press the large STOP button.

How to configure Network EAS Triggering

By default the EN-20 is configured to send a trigger over the network to all other dual channel encoders (HDMI2QAM, YUV2QAM, or EN-20) to also enter EAS enabled state. This feature can be disabled by unchecking the box next to "Network EAS Triggering" then pressing the apply button on the EAS tab.

Audio passthru - Dolby E / 5.1 / 2.0, Dolby D, LPCM

The Adtec EN-20 encoder supports one pair of audio encoding or one pair of 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 embedded SDI passed into the egress transport stream (IP, RF, ASI).
To enable Audio passthru for Audio 1:

Step	Action
1	On the Audio -> Encoder 1 subtab in the Web GUI Control Application, configure the **"Audio Mode"** for **<PASSTHRU>.**
2	Configure the **"Audio Input"** for **<SDI>**.
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 bit rate are automatically determined after clicking Apply.
4	On the **"PID"** tab, type in the desired Audio PID for **"Audio 1"**.

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

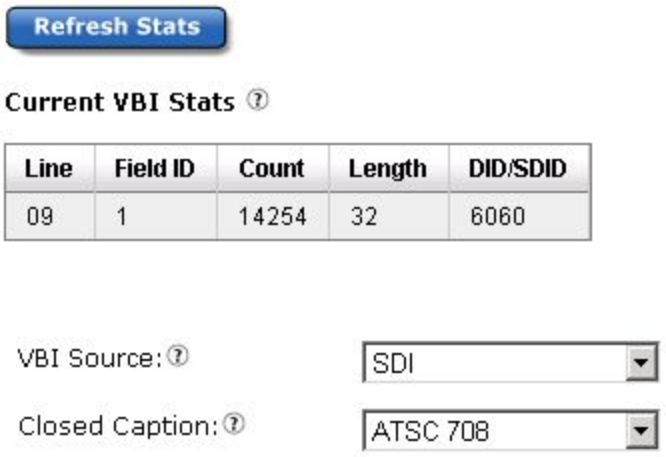
No Detection of Dolby E / Dolby Digital, Front Panel shows "DE ---", "DP ---", "LP ---":
The encoder will automatically detect the bit depth of Dolby E (16 / 20 bit) and the bitrate of Dolby E / Dolby Digital. If Dolby E is selected and Dolby Digital is presented, the encoder will change automatically 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.

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 with an SDI input can pass VITC ancillary data as part of the VITC PID. The VITC 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.



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 "VITC PID Active".

Chapter 5 - Appendix

Appendix A - GNU General Public License

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Appendix B - QAM Channels and Frequencies

CATV QAM Channel Center Frequency Annex B, 6 MHz Channels- 54 to 1002 MHz

Channel Number	Center Frequency MHz	Channel Number	Center Frequency MHz	Channel Number	Center Frequency MHz	Channel Number	Center Frequency MHz
2	57	38	309	79	555	120	771
3	63	39	315	80	561	121	777
4	69	40	321	81	567	122	783
5	79	41	327	82	573	123	789
6	85	42	333	83	579	124	795
95	93	43	339	84	585	125	801
96	99	44	345	85	591	126	807
97	105	45	351	86	597	127	813
98	111	46	357	87	603	128	819
99	117	47	363	88	609	129	825
14	123	48	369	89	615	130	831
15	129	49	375	90	621	131	837
16	135	50	381	91	627	132	843
17	141	51	387	92	633	133	849
18	147	52	393	93	639	134	855
19	153	53	399	94	645	135	861
20	159	54	405	95	651	136	867
21	165	55	411	96	657	137	873
22	171	56	417	97	663	138	879
7	177	57	423	98	669	139	885
8	183	58	429	99	675	140	891
9	189	59	435	100	681	141	897
10	195	60	441	101	687	142	903
11	201	61	447	102	693	143	909
12	207	62	453	103	699	144	915
13	213	63	459	104	705	145	921
23	219	64	465	105	711	146	927
24	225	65	471	106	717	147	933
25	231	66	477	107	723	148	939
26	237	67	483	108	729	149	945
27	243	68	489	109	735	150	951
28	249	69	495	110	741	151	957
29	255	70	501	111	747	152	963
30	261	71	507	112	753	153	969
31	267	72	513	113	759	154	975
32	273	73	519	114	765	155	981
33	279	74	525	115	771	156	987
34	285	75	531	116	777	157	993
35	291	76	537	117	783	158	999
36	297	77	543	118	789		

Appendix C - Technical Specifications

EN20 Video Specs (MPEG2):

Encoder Video Profiles
MPEG 2 SD Profile 1: Adaptive Field Frame (AFF) ISO13818-2 MP@ML
MPEG 2 SD Profile 2: AFF ISO13818-2 422P@ML
MPEG 2 HD Profile 1: ISO13818-2 MP@HL (1920 x 1080 or 1280 x 720)

Video Encoding Data Rates (Manual)
MPEG 2 MP@ML SD / 1 Mbs-15 Mbs - NTSC and PAL
MPEG 2 422P@ML SD / 1 Mbs-50 Mbs - NTSC and PAL
MPEG 2 MP@HL / 7 Mbs-60 Mbs

EN20 Video Specs (AVC):

Encoder Video Profiles
H.264 SD Profile 1: Adaptive Field Frame (AFF) ISO14496-10 MP@L3.0
H.264 HD Profile 1: ISO14496-10 MP@Level4.0 (1920 x 1080 or 1280 x 720)

Video Encoding Data Rates (Manual)
H.264 MP@L3.0 SD / 0.5 Mbs-10 Mbs - NTSC and PAL
H.264 MP@Level4.0 / 1 Mbs-30 Mbs

General:

Video Encoding Data Rates (Automatic based on QAM Configuration)
720 P: 12-23 Mbs
1080i: 14-25 Mbs
NTSC/PAL: 15Mbs fixed (10Mbs for EN20-VE2-01)
(HD rates are calculated based on video input resolution, video complexity and QAM target)

Video Input:
Connector: BNC 75 Ohm
Interface: SD/HD-SDI Auto frame rate and resolution detection
SD-SDI (SMPTE 259M - 270 Mbit/s) with embedded audio per SMPTE 272M
HD-SDI (SMPTE 272M - 1.485 Gbit/s) with embedded audio per SMPTE 299M
Connector: BNC 75 Ohm
Interface: SD Composite (CVBS) Analog Composite NTSC and PAL

Audio Input:
Connector/Interface:BNC/SDI, RCA/SPDIF (Synchronous to video) and DB9/Analog
*** See "DB9-M Analog Audio input pinout" in this Appendix.
Supported Audio: (single audio pair per video encoder in two-channel mode)
Dolby Digital 2.0 (AC3) encode

MPEG1 Layer 2 encode
Dolby E passthrough
Dolby 5.1 passthrough
Dolby Digital 2.0 (AC3) passthrough
Linear PCM passthrough

Analog Digital/Closed Captions/VBI VANC

Waveform or Analog (Composite or SD-SDI):
Connector: RCA jack 75 Ohm Terminated Input
Closed Captions per CEA-608-C (2005), Closed Captions per DVS-157, Wide Screen Signaling (WSS) per ETSI EN300294 V1.4.1 (2003-04), Teletext per ETSI EN 300 472 V1.3.1 (2003-05)

Ancillary (ANC) per SMPTE 291M (Native via SD/HD-SDI):
Connector: BNC 75 Ohm Terminated Input for HD/SD-SDI
Closed Captions per CEA-708 (SMPTE 291M), Teletext per OP47 and SMPTE 2031, VITC per SMPTE 2038, EBU Teletext/Subtitles, WSS/Teletext/NABTS/CEA-608/TV2GX/AMOL48/96, User Defined (2031-2007) per SMPTE 2031, AFD/Bar Data/Pan Scan per CEA-CEB16 (2006) per SMPTE 2016

Waveform Bridging and Conversion of Video User Data
Connector: BNC 75 Ohm Terminated Input
CEA 608 to CEA 708 up-conversion
Caption Bridging: CEA-608 via Composite merged with SD or HD Video via SDI (Similar frame rates required)
Teletext Bridging: Waveform Teletext via Composite merged with SD or HD Video via SDI
WSS Bridging: Waveform WSS via Composite merged with SD Video via SDI

Transport Stream User Data Carriage
SCTE 127-2007, ETSI EN 301 775, v1.2.1 (2003-05)

Emergency Alert System (EAS) Input:
EAS Video:
Connector: RCA jack 75Ohm
Interface: Terminated NTSC or PAL D1 Composite Input with loop

EAS Audio:
Connector: Vertical single RCA jack
Interface: mono audio channel with loop

EAS Triggering Interface:
GPI
Web UI
XCP
Conditional Access:
BISS 1/E option

Transport Outputs:
All outputs operate concurrently.

ASI
Connector: BNC x2
ISO13818-1 MPEG 2 Transport Stream per EN 50083-9:1997 (188 byte only).
Physical interface 72 Mbit/s.

Transport Over IP (TSoIP)
Connector: RJ45 x1
ISO13818-1 MPEG 2 Transport Stream per EN 50083-9:1997 (188 byte only).
UDP or RTP encapsulated routes *with* SMPTE 2022 (COP3 FEC). MPTS or SPTS user definable.

QAM (optional)
Connector: F-style RF female jack
Frequency: 54 to 862 Mhz
QAM Modulation Schemes supported:
- Annex A (8 Mhz)
- Annex B (6 Mhz)

QAM constellations:
- Annex A: 64, 256
- Annex B: 64, 256

Main Power: 45dBmV to 56dBmV, in 1 dBmV increments
MER: 38.0 dB minimum (average).
IF Output Connector: F-style RF female/jack Frequency: Selectable 44 MHz (USA) and 36.125MHz (Europe)

Physical:
Operating Temp.: 0 to +50 °C/+32 to +122°F
Power Supply (nominal): 100 - 240 VAC
Power Consumption (nominal): 33.6 W (120V @ 280mA)
Weight: 6 lbs
Measurements: (H X W X D) 1.73” X 19” X 13.32”

Managment:
Front Panel Controls
Browser-based Web Interface
SNMP

Appendix D - DB9-M Analog audio input pinout

Pin	Signal
1	Left +
2	Left -
3	Ground
4	Right -
5	Right +
6	No connection
7	No connection
8	No connection
9	No connection

Appendix E - 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, edje1013/1015/2000/2100/2110.
  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