

# 9922-FS-DSP • 3G/HD/SD-SDI Frame Sync with Audio/Video Processing, DSP Audio Support, Audio Embed/De-Embed and CVBS I/O



The Cobalt® 9922-FS-DSP 3G/HD/SD-SDI Frame Sync with Audio/Video Processing, DSP Audio Support, Audio Embed/De-Embed and CVBS I/O provides a high-density card-based solution that offers unprecedented multi-input support and flexibility. The 9922-FS-DSP offers a DSP-based platform that supports multiple audio DSP options. When optioned with various audio processing options, the DSP-based processing core (which supports numerous simultaneous processing engines) uses license “credits” which allows flexible tailoring of multiple proc function instances. The 9922-FS-DSP provides much more flexibility than other audio processors that used fixed processing assets (for example, this flexibility allows “trading” credits for more Dolby encoders while backing out of loudness processors or other engine assets).

Audio proc options include Dolby® Real-Time Loudness Leveling automatic loudness processing, Dolby® encode/decode, and Linear Acoustic® UPMAX™ automatic upmixing. DSP options can be ordered with new-card purchase, or field-installed as software option upgrades without removing the card from its frame. Included as standard features are downmixing, flex mixing, and full AES and balanced analog audio embed/de-embed. Also included standard is bulk and per-channel audio delay controls that easily address lip-sync issues. Option **+TTS** provides high-quality Text-To-Speech synthesis, directly converting EAS text to digital audio speech with no baseband signal breakouts or add-ons. Advanced frame sync features include per-channel audio delay, audio/video offset, and output rate conversion to and from 23.98/29.97/29.94 to 24/30/60 frame rates. Frame sync can select from multiple reference inputs, with failover to alternate selected sources.

A convenient input crosspoint with RP168 clean switching can select from up to four SDI inputs. The input crosspoint allows manual selection of input via remote control or GPIO, or failover to alternate inputs on loss of input conditions. Two discrete character burn strings can be inserted on output video, with each string inserted as static text and/or insert only upon LOS. With option **+T-SLATE**, import of user trouble slate graphics is also supported in addition to standard test pattern insert as an input LOS/quality event marker. A moving-box insertion can serve as a dynamic raster confidence check even when the input video image is static. Included standard is closed captioning absence/presence detection for CEA 608/708 and line 21 SD closed captioning. Quality Check option **+QC** checks for and acts upon user-configurable criteria such as black/frozen frame, audio silence or CC absence.

Preset save/load allows saving custom card settings while allowing one-button revert to factory settings. Layered presets allow invoking changes related only to a specific area of concern (audio routing, for example) while not changing any other processing settings or aspects. Full user Dashboard™ or Remote Control Panel remote control allows full status and control access locally or across a standard Ethernet network. GPIO allows direct input routing control and status monitoring.

## FEATURES

DSP-based platform supports multiple audio DSP options, with multiple instances available using allocatable license “credits” – our largest DSP capacity

Dolby encoding/decoding, Dolby Real-Time Loudness Leveling (RTL) loudness leveling with full parametric control setup, and Linear Acoustic UPMAX™ DSP audio options available

Full audio crosspoint with 5.1-to-stereo downmix (standard) available for all audio outputs

CVBS analog video I/O and analog/AES embed / de-embed available

Moving-box/motion insertion enable serves as a dynamic raster confidence check even in cases where the input video image is static. Dual-string character/timestamp burn-in.

Advanced audio processing allows routing, gain, smooth delay, and flexible mixing as standard features

High-density design

Remote control/monitoring via Dashboard™ software or OGCP-9000 remote control panels

Five year warranty

## OPTIONS

Dolby® Real-Time Loudness Leveling Automatic Loudness Processing Options (+DSP-RTL) – Provides advanced loudness processing with comprehensive parametric controls. Available as surround 5.1 and stereo 2.0. (See Ordering Information for full details)

Dolby® Encoder Options (+DSP-ENCD) – Available as 5.1 and 2.0 Dolby Digital/Digital Plus Encode. (See Ordering Information for full details.)

Dolby® Decoder Options (+DSP-DEC) – Provides Dolby Digital, Digital Plus, and E decode

Linear Acoustic® UPMAX™ Upmixing (+DSP-UPMIX-LA) – Provides automatic 2.0-to-5.1 Linear Acoustic® UPMAX™ upmixing

Quality Check Option (+QC) – Provides failover, alert, or user presets action on criteria such as black/frozen frame, audio silence, and CC absence

Clean & Quiet Switching Option (+CQS) – Provides automatic audio ramp-down and up during input switching events

Text-To-Speech Option (+TTS) – Provides Text-To-Speech synthesis, directly converting EAS text to digital audio speech with no baseband signal breakouts or add-ons. High-quality Text-To-Speech from Acapela Group.

Add Extended Delay Option (+DLY)

Color Correction (+COLOR) – Full RGB color corrector (offset, gain, gamma) with extended YCbCr proc controls with white/black hard clip, white soft clip, and saturation clip

Trouble Slate Import (+T-SLATE) – Allows uploading of up to three different user trouble slate graphic file to card, with automated insertion controlled by GPI or other events

Logo Insertion (+LOGO) – Allows uploading of user logo graphic file to card, with automated insertion controlled by GPI or other events

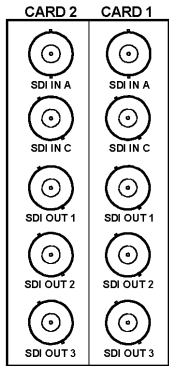
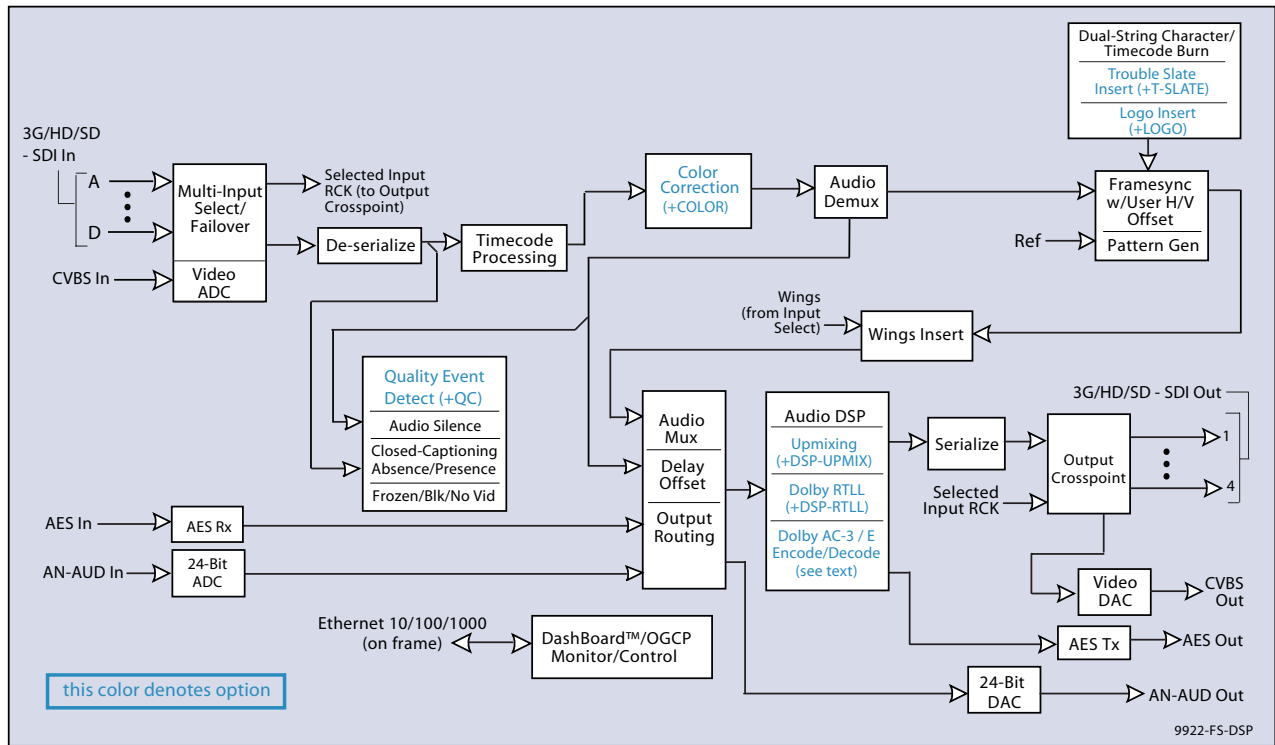
Ancillary Data Processor Option (+ANC) – Provides full user VANC/HANC packet insertion/extraction access to DID/SDID ancillary data, with insert/extract to and from IP and GPIO external interfaces

SCTE104 Frame-Accurate SCTE Trigger Insertion Option (+SCTE104-FAST) Provides deterministic, frame-accurate Digital Program Insertion (DPI) message embedding into SDI, optimizing it for automatic dissemination to CDN and VOD systems

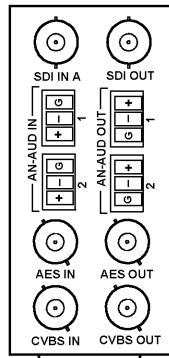
Audio LTC I/O Option (+LTC)



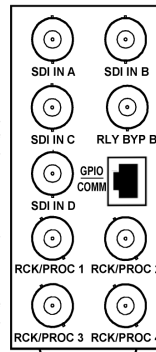
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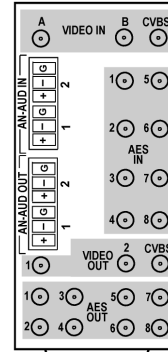
RM20-9922-A/S



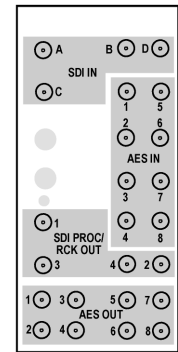
RM20-9922-B



RM20-9922-C



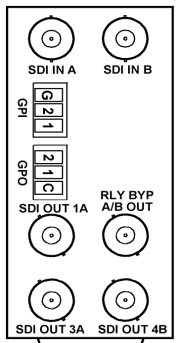
RM20-9922-D-DIN  
RM20-9922-D-HBNC



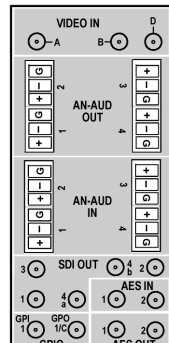
RM20-9922-E-DIN  
RM20-9922-E-HBNC

Note: RCK/PROC 1 thru RCK/PROC 4 are DA outputs which can be individually set as reclocked or processed outputs of the currently-selected input.

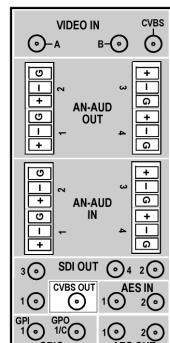
RLY BYP B is a relay-protected path which carries processed SDI out under normal conditions and passive routes SDI IN B to this BNC upon loss of power.



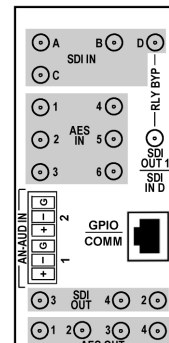
RM20-9922-F



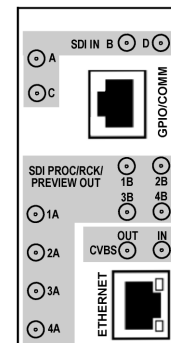
RM20-9922-H-DIN  
RM20-9922-H-HBNC



RM20-9922-J-DIN  
RM20-9922-J-HBNC



RM20-9922-K-DIN  
RM20-9922-K-HBNC

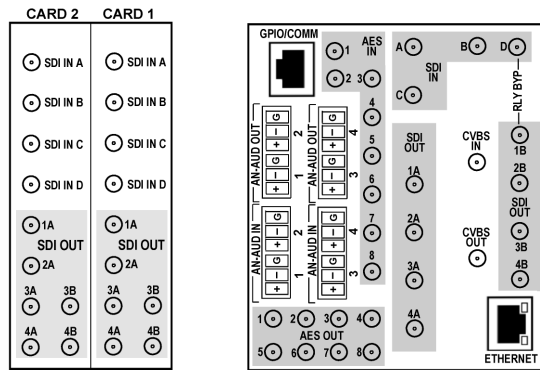


RM20-9922-L-DIN  
RM20-9922-L-HBNC

8 - GND  
7 - COM\_A\_RX  
6 - COM\_A\_TX  
5 - GPIO OUT 2  
4 - GPIO OUT 1  
3 - GPIO RTN  
2 - GPI IN 2  
1 - GPI IN 1

Note: A and B outputs are DA pairs of corresponding outputs 1 thru 4.

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RM20-9922-M/S-DIN  
RM20-9922-M/S-HDBNC

RM20-9922-N-DIN  
RM20-9922-N-HDBNC

## SPECIFICATIONS

Note: Inputs/outputs are a function in some cases of rear I/O module used.

### Power

<24 Watts (includes +DSP options)

### SDI Input/Outputs

Up to (4) 75Ω BNC inputs

Up to (4) 75Ω BNC outputs (selectable as processed SDI IN or IN RCK)

SDI Formats Supported: SMPTE 259M, SMPTE 292M, SMPTE 424M

SDI Receive Cable Length: 3G/HD/SD: 120/180/320 m (Belden 1694A)

SDI Return Loss: >15 dB up to 1.485 GHz; >10 dB up to 2.970 GHz

SDI Alignment Jitter: 3G/HD/SD: < 0.3/0.2/0.2 UI

Timing Jitter: 3G/HD/SD: < 2.0/1.0/0.2 UI

Minimum Latency (frame sync disabled): SD: 127 pixels (9.4 us); 720p: 330 pixels (4.45 us); 1080i: 271 pixels (3.65 us); 1080p: 361 pixels (2.43 us)

Note: SDI Return loss and receive cable length are affected by rear I/O module used. Specifications represent typical performance.

### CVBS Video Input/Outputs

(1) 75Ω BNC input

(1) 75Ω BNC output. CVBS can be upconverted to any supported SDI format; all formats can be downconverted to CVBS.

ADC resolution/sampling: 10-bit; 4x oversampling

DAC resolution/sampling: 10-bit; 16x oversampling

Y/C separation: 4 line Adaptive Comb Filter

Freq. Response: ± 0.25 dB to 5.5 MHz

SNR: > 50 dB to 5.5 MHz (unweighted)

Differential Phase: < 1 degree

Differential Gain: < 1%

Nonlinearity < 1%

### Discrete Audio Input/Outputs

AES-3id 75Ω inputs (8 pair (16-Ch) max)

AES-3id 75Ω outputs (8 pair (16-Ch) max)

Input AES SRC Range: 32 to 96 kHz

Balanced analog audio inputs (4-Ch max)

Balanced analog audio outputs (4-Ch max)

(I/O conforms to 0 dBFS = +24 dBu)

Analog Output Impedance: < 50 Ω

Analog Reference Level: -20 dBFS

Analog Nominal Level: +4 dBu

Analog Max Output Level: +24 dBu (0 dBFS)

Analog Freq. Response: ±0.2 dB (20 Hz to 20 kHz)

Analog SNR: 115 dB (A weighted)

Analog THD+N: -96 dB (20 Hz to 10 kHz)

Analog Crosstalk: -106 dB (20 Hz to 20 kHz)

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## SPECIFICATIONS (cont.)

### Frame Sync Audio/Video Delay

Max offset: 20 frames

Latency (min): 1 frame

Option +DLY Delay (3G/HD/SD): >800 msec / >1580 msec / >9000 msec

### ARC

ARC manually configurable (custom) or automatic triggering in full compliance/conformity with AFD (SMPTE 2016), VI (RP186), and WSS triggering.

### User Audio Delay Offset from Video

Bulk delay control: -33 msec to +3000 msec.

Per-channel delay controls: -800 msec to +800 msec

### Timecode Insertion/Burn-In

Burn-in and embedded video output timecode selected via user controls from input video SMPTE embedded timecode and/or audio LTC. Burn-in enable/disable user controls. Configurable for burn-in string of seconds, seconds:frames, seconds:frames:field. User controls for text size and H/V position.

### Text Burn-In

(2) independent strings supported. Independent insertions controls for enable/disable and enable upon LOS. User controls for text size and H/V position.

### Embedded Audio Output

16-ch embedded. User crosspoint allows routing of any embedded channel to any embedded channel output. Multi-frequency tone generator for each audio output. Master delay control; range of -33 msec to +3000 msec.

### GPIO/COMM

(2) GPI configurable to select input routing. (2) GPO configurable to invoke upon input selected. RS-232/485 comm port. All connections via rear module RJ-45 GPIO/COMM jack.

### Frame Reference Input

(2) reference from frame bus. SMPTE 170M/318M "Black Burst", SMPTE 274M/296M "Tri-Level".

## ORDERING INFORMATION

**9922-FS-DSP** 3G/HD/SD-SDI Frame Sync with Audio/Video Processing, DSP Audio Support, Audio Embed/De-Embed and CVBS I/O

**RM20-9922-A/S** 20-Slot Frame Rear I/O Module (Split; supports 2 cards) (2) 3G/HD/SD-SDI Input BNC, (3) 3G/HD/SD-SDI Processed or Reclocked Output BNCs (connections are per each Card 1 / Card 2 connector bank)

**RM20-9922-B** 20-Slot Frame Rear I/O Module (Standard Width) (1) 3G/HD/SD-SDI Input BNC, (1) CVBS Video Input BNC, (2) Balanced Analog Audio Inputs, (1) AES Input BNC, (1) 3G/HD/SD-SDI Output BNC, (1) CVBS Output BNC, (1) AES Output BNC, (2) Balanced Analog Audio Outputs

**RM20-9922-C** 20-Slot Frame Rear I/O Module (Standard Width) (1) 3G/HD/SD-SDI Input BNC, (8) AES I/O BNCs (I/O switch selectable), (1) 3G/HD/SD-SDI Output BNC

**RM20-9922-D-DIN** 20-Slot Frame Rear I/O Module (Standard Width) (2) 3G/HD/SD-SDI Inputs, (1) CVBS Input, (8) AES Inputs, (2) Balanced Analog Audio Inputs, (2) 3G/HD/SD-SDI Outputs, (1) CVBS Processed Output, (8) AES Outputs, (2) Balanced Analog Audio Outputs (All coaxial connectors DIN1.0/2.3)

**RM20-9922-D-HDBNC** 20-Slot Frame Rear I/O Module (Standard Width) (2) 3G/HD/SD-SDI Inputs, (1) CVBS Input, (8) AES Inputs, (2) Balanced Analog Audio Inputs, (2) 3G/HD/SD-SDI Outputs, (1) CVBS Processed Output, (8) AES Outputs, (2) Balanced Analog Audio Outputs (All coaxial connectors HD-BNC)

**RM20-9922-E-DIN** 20-Slot Frame Rear I/O Module (Standard Width) (4) 3G/HD/SD-SDI Inputs, (8) AES Inputs, (4) 3G/HD/SD-SDI Outputs, (8) AES Outputs (All coaxial connectors DIN1.0/2.3)

**RM20-9922-E-HDBNC** 20-Slot Frame Rear I/O Module (Standard Width) (4) 3G/HD/SD-SDI Inputs, (8) AES Inputs, (4) 3G/HD/SD-SDI Outputs, (8) AES Outputs (All coaxial connectors HD-BNC)

**RM20-9922-F** 20-Slot Frame Rear I/O Module (Standard Width) (2) 3G/HD/SD-SDI Input BNCs, (1) 3G/HD/SD-SDI Processed Out BNC w/ Latching Input Select/Bypass, (3) 3G/HD/SD-SDI Output BNCs (GUI-selectable as Processed or Reclocked of selected input), (2) GPI, (2) GPO

**RM20-9922-H-DIN** 20-Slot Frame Rear I/O Module (Standard Width) (3) 3G/HD/SD-SDI Inputs, (2) AES Inputs, (4) Balanced Analog Audio Inputs, (5) 3G/HD/SD-SDI Outputs, (2) AES Outputs, (4) Balanced Analog Audio Outputs, (1) Coaxial GPI/6 Hz, (1) Coaxial GPO w/ Isolated Return (All coaxial connectors DIN1.0/2.3)

**RM20-9922-H-HDBNC** 20-Slot Frame Rear I/O Module (Standard Width) (3) 3G/HD/SD-SDI Inputs, (2) AES Inputs, (4) Balanced Analog Audio Inputs, (5) 3G/HD/SD-SDI Outputs, (2) AES Outputs, (4) Balanced Analog Audio Outputs, (1) Coaxial GPI/6 Hz, (1) Coaxial GPO w/ Isolated Return (All coaxial connectors HD-BNC)

**RM20-9922-J-DIN** 20-Slot Frame Rear I/O Module (Standard Width) (2) 3G/HD/SD-SDI Inputs, (1) CVBS Input, (2) AES Inputs, (4) Balanced Analog Audio Inputs, (4) 3G/HD/SD-SDI Outputs, (1) CVBS Output, (2) AES Outputs, (4) Balanced Analog Audio Outputs, (1) Coaxial GPI/6 Hz, (1) Coaxial GPO w/ Isolated Return (All coaxial connectors DIN1.0/2.3)

**RM20-9922-J-HDBNC** 20-Slot Frame Rear I/O Module (Standard Width) (2) 3G/HD/SD-SDI Inputs, (1) CVBS Input, (2) AES Inputs, (4) Balanced Analog Audio Inputs, (4) 3G/HD/SD-SDI Outputs, (1) CVBS Output, (2) AES Outputs, (4) Balanced Analog Audio Outputs, (1) Coaxial GPI/6 Hz, (1) Coaxial GPO w/ Isolated Return (All coaxial connectors HD-BNC)

**RM20-9922-K-DIN** 20-Slot Frame Rear I/O Module (Standard Width) (4) 3G/HD/SD-SDI Inputs, (4) 3G/HD/SD-SDI Outputs (one 3G/HD/SDI Output with relay bypass failover), (6) AES Inputs, (2) Balanced Analog Audio Inputs, (4) AES Outputs, GPIO RJ-45 connector (All coaxial connectors DIN1.0/2.3)

**RM20-9922-K-HDBNC** 20-Slot Frame Rear I/O Module (Standard Width) (4) 3G/HD/SD-SDI Inputs, (8) 3G/HD/SD-SDI Outputs (one 3G/HD/SDI Output with relay bypass failover), (6) AES Inputs, (2) Balanced Analog Audio Inputs, (4) AES Outputs, GPIO RJ-45 connector (All coaxial connectors HD-BNC)

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## ORDERING INFORMATION (cont.)

**RM20-9922-L-DIN** 20-Slot Frame Rear I/O Module (Standard-Width) (4) 3G/HD/SD-SDI Inputs, (1) CVBS Input, (8) 3G/HD/SD-SDI Outputs (1x2 DA output of each crosspoint out), (1) CVBS Output, COMM/GPIO RJ-45 connector, Ethernet Port (All coaxial connectors DIN1.0/2.3)

**RM20-9922-L-HDBNC** 20-Slot Frame Rear I/O Module (Standard-Width) (4) 3G/HD/SD-SDI Inputs, (1) CVBS Input, (8) 3G/HD/SD-SDI Outputs (1x2 DA output of each crosspoint out), (1) CVBS Output, COMM/GPIO RJ-45 connector, Ethernet Port (All coaxial connectors HD-BNC)

**RM20-9922-M/S-DIN** 20-Slot Frame Rear I/O Module (Split; supports 2 cards) (4) 3G/HD/SD-SDI Inputs, (6) 3G/HD/SD-SDI Outputs (Connections are per each Card 1 / Card 2 connector bank (All coaxial connectors DIN1.0/2.3)

**RM20-9922-M/S-HDBNC** 20-Slot Frame Rear I/O Module (Split; supports 2 cards) (4) 3G/HD/SD-SDI Inputs, (6) 3G/HD/SD-SDI Outputs (Connections are per each Card 1 / Card 2 connector bank (All coaxial connectors HD-BNC)

**RM20-9922-N-DIN** 20-Slot Frame Rear I/O Module (Double Width) (4) 3G/HD/SD-SDI Inputs, (1) CVBS Analog Video In, (8) AES Inputs, (4) Balanced Analog Audio Inputs, (8) 3G/HD/SD-SDI Outputs (1 with relay bypass protect), (1) CVBS Analog Video Out, (8) AES Outputs, (4) Balanced Analog Audio Outputs, (1) GPIO RJ-45 connector, 100/1000 BaseT Ethernet Port (All coaxial connectors DIN1.0/2.3)

**RM20-9922-N-HDBNC** 20-Slot Frame Rear I/O Module (Double Width) (4) 3G/HD/SD-SDI Inputs, (1) CVBS Analog Video In, (8) AES Inputs, (4) Balanced Analog Audio Inputs, (8) 3G/HD/SD-SDI Outputs (1 with relay bypass protect), (1) CVBS Analog Video Out, (8) AES Outputs, (4) Balanced Analog Audio Outputs, (1) GPIO RJ-45 connector, 100/1000 BaseT Ethernet Port (All coaxial connectors HD-BNC)

### Options:

**+DSP-RTLL-5.1** Dolby® RTLL™ 5.1-Channel Loudness Processor Option

**+DSP-RTLL-2.0** Dolby® RTLL™ Stereo Loudness Processor Option

**+DSP-ENCD-5.1** Dolby® Digital/Digital Plus 5.1 Encoder

**+DSP-ENCD-2.0** Dolby® Digital/Digital Plus 2.0 Encoder

**+DSP-DEC** Dolby® Decoder

**+DSP-UPMIX-LA** Linear Acoustic® UPMAX™ 2.0-to-5.1 Upmixer

**+ANC** Ancillary Data Processor Option

**+COLOR** Color Correction Option

**+T-SLATE** User Trouble Slate Graphic Import Option

**+LOGO** Logo Insertion Option

**+SCTE104** SCTE 104 Insertion Option

**+SCTE104-FAST** Frame-Accurate SCTE 104 Trigger Insertion Option

**+DLY** Extended Frame Sync Delay Option

**+LTC** Audio LTC I/O Option

**+CQS** Clean & Quiet Switching Option

**+QC** Quality Check Option

**+TTS** Text-To-Speech Option (Acapela Text-To-Speech from Acapela Group™. Installation requires option upload and installation of speech library SD memory card onto host card. Pre-loaded SD card and instructions provided.)

**+2L-SPAN** Add Spanish-language upgrade (add-on to option +TTS; option +TTS required)