radio

orban

9300 DIGITAL
OPTIMOD-AM

ON AIR: MUSIC MEDIUM
12-APR-10   10:24:30

Next
◀ Prev
Contrast

OPTIMOD-AM
9300

Orban's newest AM processor
is powerful,
user friendly,
and comes with —

an impeccable pedigree.

Orban's all-digital 9300 OPTIMOD-AM audio processor can help you achieve the highest possible audio quality in monophonic AM shortwave, medium wave and long wave broadcasts. OPTIMOD-AM delivers louder, cleaner, brighter, FM-like audio with an open, fatigue-free quality that attracts listeners and holds them. Because all processing is performed by high-speed mathematical calculations within Motorola DSP56367 digital signal processing chips, the processing has cleanliness, quality and stability over time and temperature that is unmatched by analog processors.
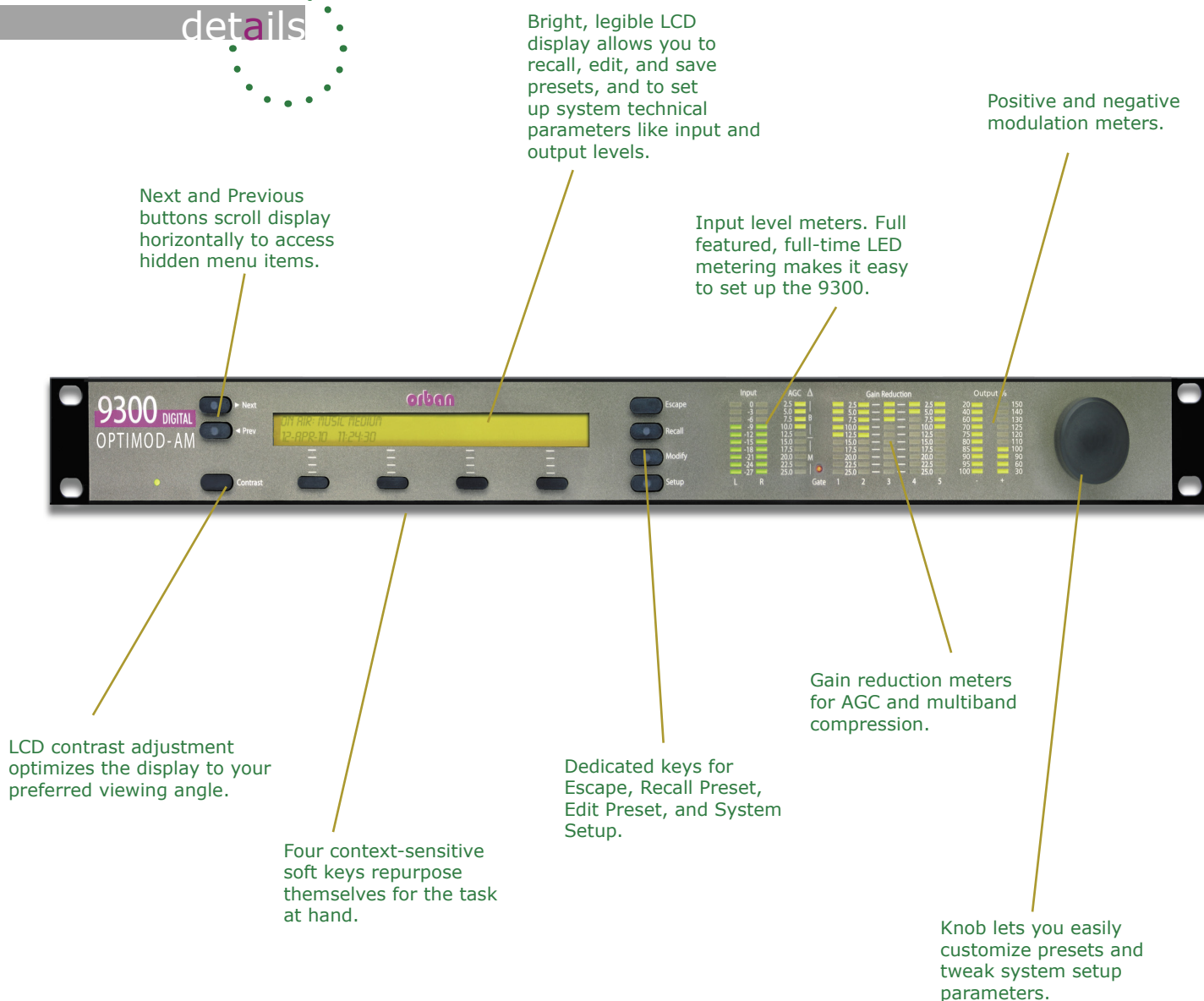
OPTIMOD-AM 9300:
Digital Audio Processor

OPTIMOD 9300 is descended from the industry-standard 9100 and 9200 OPTIMOD-AM audio processors. Thousands of these processors are on the air all over the world. They have proven that the "OPTIMOD sound" attracts and keeps an audience even in the most competitive commercial environment.

The 9300 is very user-friendly. Its Quick Setup wizard walks you through the setup process. One-knob LESS-MORE control lets you customize the 9300's comprehensive factory presets easily. If you're an audio processing expert, you'll love the new Advanced Control parameters (accessible from 9300 PC Remote software) that allow you to customize the 9300's sound to your exact requirements.

details

Bright, legible LCD display allows you to recall, edit, and save presets, and to set up system technical parameters like input and output levels.

Positive and negative modulation meters.

Next and Previous buttons scroll display horizontally to access hidden menu items.

Input level meters. Full featured, full-time LED metering makes it easy to set up the 9300.

LCD contrast adjustment optimizes the display to your preferred viewing angle.

Gain reduction meters for AGC and multiband compression.

Four context-sensitive soft keys repurpose themselves for the task at hand.

Dedicated keys for Escape, Recall Preset, Edit Preset, and System Setup.

Knob lets you easily customize presets and tweak system setup parameters.

The 9300 was designed to deliver a high-quality FM-like sound to the listener's ear by pre-processing for the limitations of the average car or table radio (while avoiding audible side effects and compromises in loudness and coverage). Except for newly designed parametric low-pass filters, the 9300's five-band compressor and clipper are identical to those in the 9200, but the 9300 adds a more powerful equalizer and advanced two-band AGC with window gating.
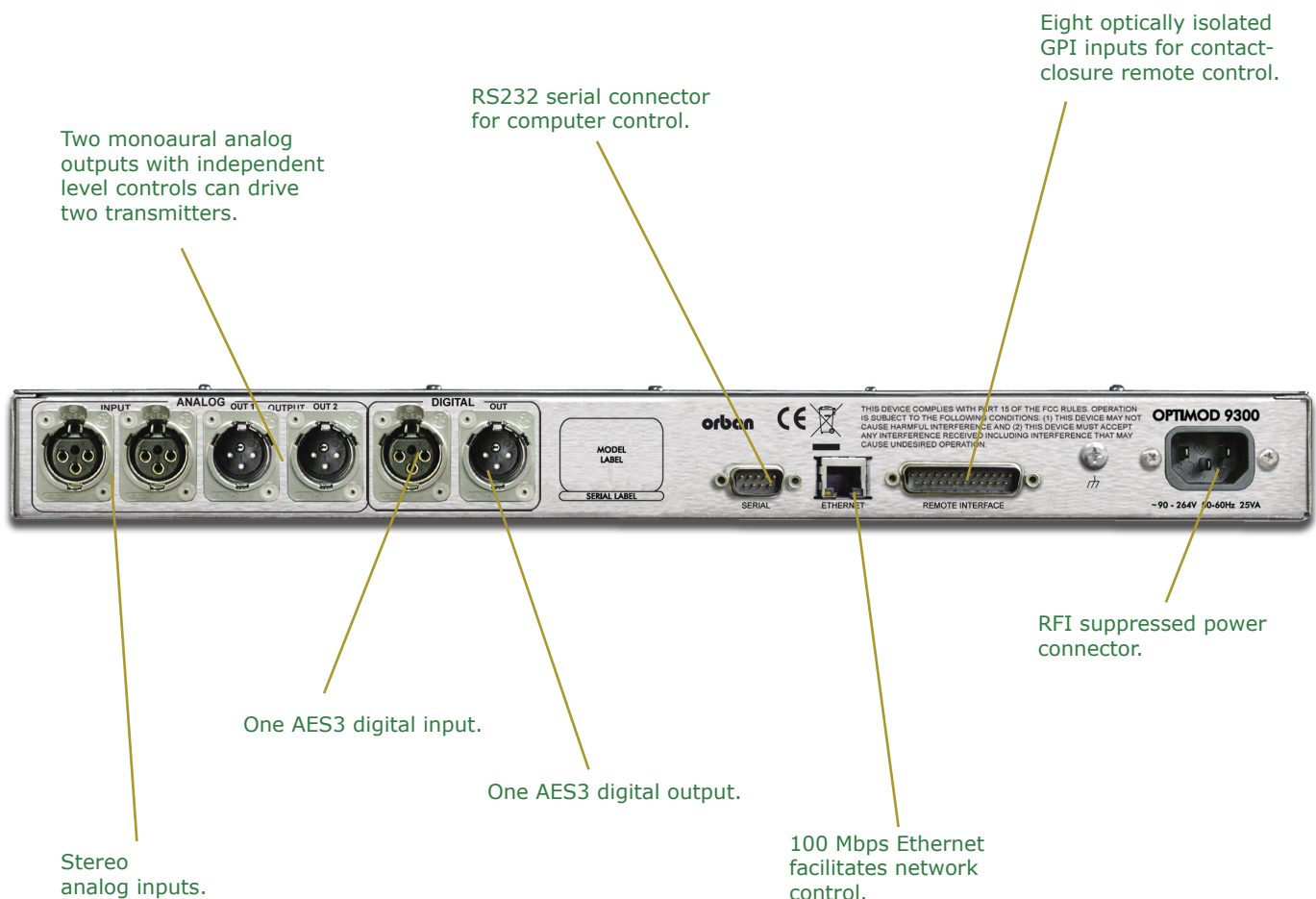
high quality

FM-like sound

If you wish to place level protection prior to your studio/transmitter link (STL), use an Orban studio level control system expressly designed for this purpose. (At the time of this writing, this is the Orban 6300 Multipurpose Digital Audio Processor.) The 6300 can be set up so that it substitutes for the broadband AGC circuitry in OPTIMOD-AM, which is then defeated.

The 9300 is a monophonic processor. If you need stereo processing and/or digital radio/netcast processing, Orban's state-of-the-art OPTIMOD-AM 9400 is the ideal processor for you.

easy to interface
with any facility

details

Eight optically isolated GPI inputs for contact-closure remote control.

RS232 serial connector for computer control.

Two monoaural analog outputs with independent level controls can drive two transmitters.

RFI suppressed power connector.

One AES3 digital input.

One AES3 digital output.

100 Mbps Ethernet facilitates network control.

Stereo analog inputs.

features & benefits

MAKING THE MOST OF THE AM CHANNEL	
Gain-riding	The 9300 **rides gain** over an adjustable range of up to 25 dB, compressing dynamic range and compensating for operator gain-riding errors and for gain inconsistencies in automated systems.
Multiband Limiting & Multiband Distortion-canceling Clipping	The 9300 **increases the density and loudness of the program material** by multiband limiting and multiband distortion-canceling clipping, improving the consistency of the station's sound and increasing loudness and definition without producing audible side effects.
Peak Control	The 9300 **precisely controls peak levels** to prevent overmodulation.
Program Equalizer	The 9300 **compensates for the high- and low-frequency rolloffs of typical AM receivers** with a fully adjustable program equalizer providing up to 20dB of high-frequency boost (at 5 kHz) without producing the side effects encountered in conventional processors. This equalizer can thus produce extreme pre-emphasis that is appropriate for very narrow-band radios. The 9300's fully parametric low- and mid-frequency equalizers allow you to tailor your air sound to your precise requirements and desires. The 9300 also fully supports the NRSC standard pre-emphasis curve.
CONTROLLABLE AND ADJUSTABLE	
Factory Preset Controls	The 9300 comes with a **wide variety of factory presets** to accommodate almost any user requirement. A single LESS-MORE control easily modifies any factory preset. The user (via FULL MODIFY) can further customize the presets, and these can be stored and recalled on command. Advanced Control (accessible from the PC Remote application) facilitates detailed sound design using the same controls that were available to the factory programmers.
LCD and Full-time LED Meters	An **LCD** and **full-time LED meters** make setup, adjustment and programming of the 9300 easy — you can always see the metering while you're adjusting the processor. Navigation is by dedicated buttons, soft buttons (whose functions are context-sensitive), and a large rotary knob. The LEDs show input levels, output levels, and gain reduction in the AGC and five-band compressor/limiter.
Real-time Clock	The 9300 contains a versatile **real-time clock**, which allows automation of various events (including recalling presets) at pre-programmed times.
Proof of Performance Tests	A Bypass Test Mode can be invoked locally, by remote control (from either the 9300's GPI port or the 9300 PC Remote application), or by automation to permit broadcast system **test and alignment** or "proof of performance" tests.
Software	**The 9300's software can be upgraded** by running Orban-supplied downloadable upgrade software on a PC. The upgrade can occur remotely through the 9300's Ethernet port or serial port (connected to an external modem), or locally (by connecting a Windows® computer to the 9300's serial port through a null modem cable).
Built-in Line-up Tone Generator	The 9300 contains a built-in **line-up tone generator** that offers sine, square, and triangle waves, facilitating quick and accurate level setting in any system.
Remote Control	The 9300 can be **remote-controlled** by 5-12 V pulses applied to eight programmable, optically isolated "general-purpose interface" (GPI) ports.

features & benefits

9300 PC Remote Software	**9300 PC Remote software** runs under Windows 2000 and XP. It communicates with a given 9300 **via TCP/IP over modem, direct serial,** and **Ethernet** connections. You can configure PC Remote to switch between many 9300s via a convenient organizer that supports giving any 9300 an alias and grouping multiple 9300s into folders. Clicking a 9300's icon causes PC Remote to connect to that 9300 through an Ethernet network or initiates a Windows Dial-Up or Direct Cable Connection if appropriate. The PC Remote software allows the user to access all 9300 features (including advanced controls not available from the 9300's front panel) and allows the user to archive and restore presets, automation lists, and system setups (containing I/O levels, digital word lengths, GPI functional assignments, etc.).
VERSATILE INSTALLATION	
Bandwidth Control	OPTIMOD-AM controls the **transmitter bandwidth as necessary to meet government regulations**, regardless of program material or equalization. OPTIMOD-AM's high-frequency bandwidth can be switched instantly in 500 Hz increments between 4.5 kHz and 9.5 kHz. The lower cutoff frequencies meet the output power spectral density requirements of ITU-R 328-5 without further low-pass filtering at the transmitter, while the 9.5 kHz filter meets the requirements of the NRSC-1 standard (North America). The 5.0 kHz filter makes the analog AM bandwidth compatible with HD-AM transmission. The low-pass filters have parametric cutoff shapes, allowing you to trade off filter ringing against frequency response flatness.
Four-parameter Transmitter Equalizer	OPTIMOD-AM **compensates for inaccuracies in the pulse response (tilt, overshoot, ringing) of transmitters and antenna systems** with a powerful four-parameter transmitter equalizer. A built-in square-wave generator makes adjustment easy. Four sets of equalizer parameters can be stored and recalled, allowing you to program day and night variations for two transmitters.
Analog and AES3 Digital Inputs and Outputs	The 9300 includes **analog** and **AES3 digital** inputs and outputs. The analog inputs are **transformerless, balanced 10 kΩ instrumentation-amplifier circuits**, and the analog outputs are transformerless balanced, and floating to ensure highest transparency and accurate pulse response. **Two mono analog outputs** and **one AES3 output** accommodate as many as three transmitters. Both the digital input and output are equipped with samplerate converters and can operate at 32 kHz, 44.1 kHz, 48, 88.2 and 96 kHz samplerates. The pre-emphasis status and output levels are separately adjustable for the analog and digital outputs.
Installation	The 9300 is **usually installed at the transmitter**, replacing all processing normally employed at the transmitter site, including compressor, protection peak limiters, clippers, and high- and low-pass filters normally included within the transmitter. It can also **be installed at the studio** if an uncompressed digital STL is available.
Monitor Rolloff Filter	The 9300 comes with a **Monitor Rolloff Filter** for use in studio monitoring. This filter emulates the frequency response of an average receiver.
RFI Suppression	All input, output, and power connections are **rigorously RFI-suppressed** to Orban's traditional exacting standards, ensuring trouble-free installation.
Safety Standards	The 9300 is designed and certified to meet **all applicable international safety and emissions standards.**

customize

your sound signature with 100% digital programmability
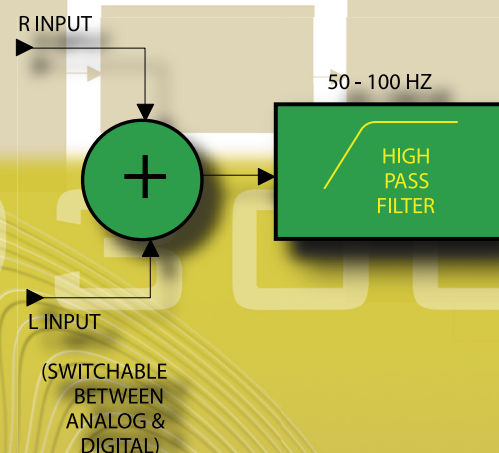
processing

about the 9300's

Input Conditioning Filter: An all pass phase scrambler makes peaks more symmetrical to reduce clipping distortion and to allow better control of loudness. The analog input is buffered and immediately followed by an analog-to-digital converter. All processing takes place in the digital domain.

High-pass Filter: Subsonic information has a negative effect on the processing, the transmiter and the receiver. It causes unnecessary gain reduction in the low frequency band of the limiter, reduces transmitter component life, increases power consumption and causes intermodulation distortion in the receiver's AGC. The 9300's high-pass filter effectively removes this unwanted subsonic information.

Low-pass Filter: Low-pass filtering limits bandwidth as required by the regulating authority. It is adjustable from 4.5 kHz (strict ITU-R Recommendation 328-5) to 9.5 kHz (NRSC) and its shape is parametric, allowing the user to trade off high frequency response against filter ringing. The 9300's output power spectrum is so tightly controlled that stations in Europe are able to operate with filtering as high as 6.0 to 6.5 kHz while still complying with ITU-R/EBU occupied-bandwidth regulation! This greatly improves the received sound as compared to conventional 4.5 kHz filtering.

Two-Band Gated AGC: The automatic gain controller (AGC) compensates for operator gain-riding errors. This provides the five-band limiter with an uniform drive level, to achieve consistent sound on the air. Gating prevents noise rush-up during pauses in program.
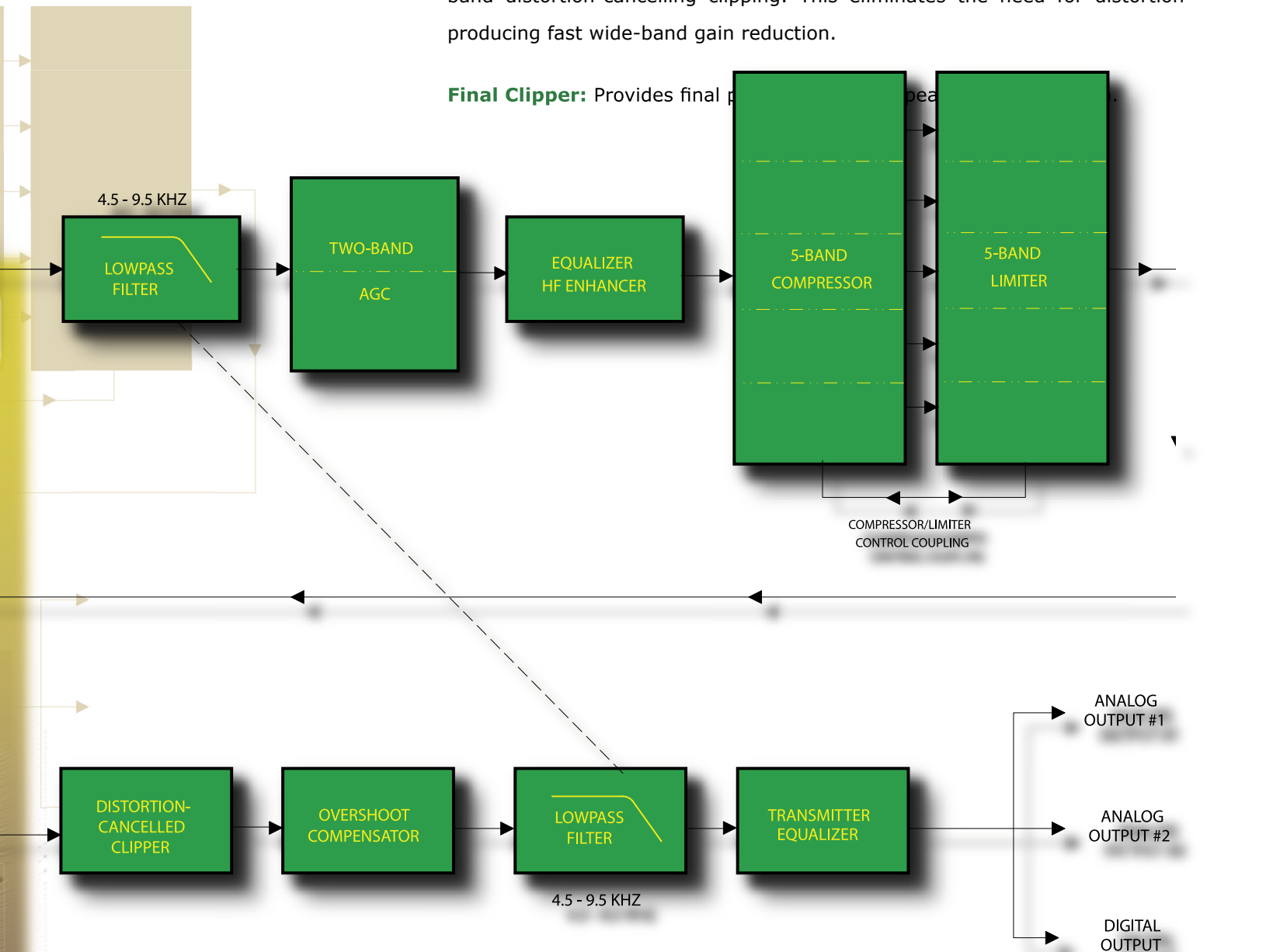
Receiver equalizer: Receiver equalization is a four-stage user-adjustable equalizer that compensates for the narrow bandwidth of receivers. High frequency equalization is necessary to compensate for the high frequency rolloff of receivers, effectively extending the receiver's high frequency response. Receivers often incorporate low frequency rolloff as well. Low frequency equalization provides similar compensation for bass frequencies. Also, the low frequency and midrange equalizers offer and effective tool to create your "signature sound."

R INPUT

L INPUT

(SWITCHABLE
BETWEEN
ANALOG &
DIGITAL)

50 - 100 HZ

HIGH
PASS
FILTER

audio processing

Five-band Limiter with Distortion-cancelling Clippers: Multi-band limiting and clipping are the most powerful techniques to achieve a consistently loud yet still very clean sound on the air. The audio is divided into five bands, then separately compressed and limited. Five-band limiting can operate far more quickly than a wide-band compressor without causing audible side effects. Five-band limiting increases the audio density in the 9300. Most of peak modulation control is performed within the five-band limiter, using Orban's patented multi-band distortion-cancelling clipping. This eliminates the need for distortion-producing fast wide-band gain reduction.

Final Clipper: Provides final pea.

4.5 - 9.5 KHZ

LOWPASS FILTER

TWO-BAND AGC

EQUALIZER HF ENHANCER

5-BAND COMPRESSOR

5-BAND LIMITER

COMPRESSOR/LIMITER CONTROL COUPLING

DISTORTION-CANCELLED CLIPPER

OVERSHOOT COMPENSATOR

LOWPASS FILTER

4.5 - 9.5 KHZ

TRANSMITTER EQUALIZER

ANALOG OUTPUT #1

ANALOG OUTPUT #2

DIGITAL OUTPUT

AM AM AM AM AM AM AM

specifications

It is impossible to characterize the listening quality of even the simplest limiter or compressor based on specifications, because such specifications cannot adequately describe the crucial dynamic processes that occur under program conditions. Therefore, the only way to evaluate the sound of an audio processor meaningfully is by subjective listening tests.

Certain specifications are presented here to assure the engineer that they are reasonable, to help plan the installation, and make certain comparisons with other processing equipment.

PERFORMANCE	*Except as noted, specifications apply for measurements from the analog left/right input to the analog left/right output*	
	Frequency Response (Bypass Mode)	±0.2 dB, 50 Hz – 9.5 kHz, or as determined by user-settable high-pass and low-pass filters.
	Noise	Output noise floor will depend upon how much gain the processor is set for (Limit Drive, AGC Drive, Two-Band Drive, and/or Multiband Drive), gating level, equalization, noise reduction, etc. The dynamic range of the A/D Converter, which has a specified overload-to–noise ratio of 110 dB, primarily governs it. The dynamic range of the digital signal processing is 144 dB.
	Total System Distortion (de-emphasized, 100% modulation)	<0.01% THD, 20 Hz – 1 kHz, rising to <0.05% at 9.5 kHz. <0.02% SMPTE IM Distortion.
	Polarity	The processing employs phase rotation to maximize loudness. Therefore, the polarity is frequency-dependent.
	Processing Sample Rate	The 9300 is a "multirate" system, using internal rates from 32 kHz to 128 kHz as appropriate for the processing being performed. Audio clippers operate at 128 kHz.
	Processing Resolution	Internal processing has 24 bit (fixed point) or higher resolution; uses Motorola DSP56367 DSP chips.
	Low-Pass Filter	4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0 or 9.5 (NRSC) kHz as set by user. Unit can be set up to comply easily with ITU-R and NRSC spectrum masks. Lowpass filter shape is parametric and can be set to be -0.1, -3, or -6 dB down at the cutoff frequency. This allows you to trade off brightness against audible filter ringing.
	High-Pass Filter	Constrained by user settable fifth-order "quasi-elliptical" highpass filter to 50, 60, 70, 80, 90, or 100 Hz. All filters have equal-ripple (Chebychev-like) passbands and a 25 Hz notch for transmitter protection.
	Channel Configuration	Processing is monophonic.
INSTALLATION	*Analog Audio Input*	
	Configuration	Stereo (Configurable to drive the processing with mono from left, mono from right, or mono from sum).
	Impedance	>10 kΩ load impedance, electronically balanced. (No jumper selection available for 600 Ω. Through-hole pads are available on I/O module for user-installed 600 Ω termination.)
	Nominal Input Level	Software adjustable from -9.0 to +13.0 dBu (VU).
	Maximum Input Level	+27 dBu.
	Connectors	Two XLR-type, female, EMI-suppressed. Pin 1 chassis ground, Pins 2 (+) and 3 electronically balanced, floating and symmetrical.
	A/D Conversion	24 bit 128x oversampled delta sigma converter with linear-phase anti-aliasing filter. Converter outputs 64 kHz samplerate, which the 9300 then decimates to 32 kHz in DSP using an ultra-high-quality image-free synchronous samplerate converter.
	Filtering	RFI filtered, with high-pass filter at 0.15 Hz (-3 dB).
	Analog Audio Output	
	Configuration	Two monophonic outputs, capable to driving two transmitters. The two outputs have independent level controls.
	Source Impedance	351 Ω (includes the third-order output EMI suppression network), electronically balanced and floating. The user can specify the output load in software to calibrate the output level accurately into a bridging or 600 Ω load.
	Load Impedance	600 Ω or greater, balanced or unbalanced. Termination not required or recommended.
	Output Level (100% peak modulation)	Adjustable from -6 dBu to +20 dBu peak, into 600 Ω or greater load, software-adjustable.
	Signal-to-Noise	≥ 90 dB unweighted (Bypass mode, de-emphasized, 20 Hz – 9.5 kHz bandwidth, referenced to 100% modulation).
	Distortion	≤ 0.01% THD (Bypass mode, de-emphasized) 20 Hz – 9.5 kHz bandwidth.
	Connectors	Two XLR-type, male, EMI-suppressed. Pin 1 chassis ground, Pins 2 (+) and 3 electronically balanced, floating and symmetrical.
	D/A Conversion	24 bit 128x oversampled.
	Filtering	RFI filtered.

INSTALLATION

Digital Audio Input	
Configuration	Stereo per AES3 standard, 24 bit resolution, software processing selection of mono from left, mono from right or mono from sum.
Sampling Rate	32, 44.1, 48, 88.2 or 96 kHz, automatically selected.
Connector	XLR-type, female, EMI-suppressed. Pin 1 chassis ground, pins 2 and 3 transformer balanced and floating, 110 Ω impedance.
Input Reference Level	Variable within the range of -30 dBFS to -10 dBFS.
J.17 De-emphasis	Software-selectable.
Filtering	RFI filtered.
Digital Audio Output	
Configuration	Dual-channel per AES3 standard. Each channel carries an identical monophonic signal.
Sample Rate	Internal free running at 32, 44.1, 48, 88.2 or 96 kHz, selected in software. Can also be synced to the AES3 digital input at 32, 44.1, 48, 88.2 or 96 kHz, as configured in software.
Word Length	Software selected for 24, 20, 18, 16 or 14-bit resolution. First-order highpass noise-shaped dither can be optionally added. Dither level automatically adjusted appropriately for the word length.
Connector	XLR-type, male, EMI-suppressed. Pin 1 chassis ground, pins 2 and 3 transformer balanced and floating,110 Ω impedance.
Output Level (100% peak modulation)	-20.0 to 0.0 dBFS software controlled.
Filtering	RFI filtered.
Remote Computer Interface	
Configuration	TCP/IP protocol via direct cable connect, modem, or Ethernet interface. Modem is not supplied.
Serial Port	115 kbps RS-232 port DB–9 male, EMI-suppressed.
Ethernet Port	10 or 100 Mbit/sec on RJ45 female connector.
Remote Control (GPI) Interface	
Configuration	Four (4) inputs, opto-isolated and floating.
Voltage	6 – 15 V AC or DC, momentary or continuous. 12 VDC provided to facilitate use with contact closure.
Connector	DB–25 male, EMI-suppressed.
Control	User-programmable for any four of user presets, factory presets, bypass, test tone, mono L mode, mono R mode, mono sum mode, analog input, digital input.
Filtering	RFI filtered.
Power	
Voltage	Universal switching power supply, 85 - 264 VAC, 50 - 60 Hz, 15 VA.
Connector	IEC, EMI-suppressed. Detachable 3-wire power cord supplied.
Grounding	Circuit ground is hard-wired to chassis ground.
Safety Standards	ETL listed to UL standards, CE marked.
Environmental	
Operating Temperature	32 ° to 122 °F / 0 ° to 50 °C for all operating voltage ranges.
Humidity	0 – 95% RH, non-condensing.
Dimensions (W x H x D)	19” x 1.875” x 14.25” / 48.3 cm x 4.8 cm x 36.2 cm. One rack unit high.
RFI / EMI	Tested according to Cenelec procedures. FCC Part 15 Class A device.
Shipping Weight	17 lbs / 7.7 kg.
Warranty	
Two Years, Parts and Service	Subject to the limitations set forth in Orban's Standard Warranty Agreement.

Because engineering improvements are ongoing, specifications are subject to change without notice.

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