radio

orban crl

audio processing

OPTIMOD-FM 8300v2

That big,

consistent OPTIMOD Sound

now in a mid-priced

FM/Digital Radio Processor —

more music for less money.

Ever since Orban introduced OPTIMOD-FM 8400, stations that couldn't afford its admittedly premium price have coveted the loudness, cleanliness, competitiveness, and consistency that only an 8400 could provide. But good things come to those who wait. OPTIMOD-FM 8300 is a mid-priced processor with many of the sound processing features that were previously available only to 8400 owners.

The 8400 has developed a reputation as the FM processor that provides the best consistency and cleanest speech, and the 8300 reflects this sonic legacy. Quality sound is what 8300 is all about — sound that attracts audiences by providing a polished, outstandingly professional presentation regardless of format and source material.

Exceptional versatility allows you to adjust the processor's audio texture to brand your sound, knowing that the resulting signature sound will remain consistent, cut to cut and source to source. Branding builds businesses, and no other processors have the consistency to brand your sound like OPTIMODS.

OPTIMOD-FM 8300 V2:
Advanced FM Processing, Made Affordable

With the 8300, your signature sound is just a preset away. An easy, one-knob Less/More adjustment allows you to customize any factory preset, trading cleanliness against processing artifacts according to the requirements of your market and competitive environment. Full Control gives you the versatility to customize your audio further. And, if you're a hard-core processing expert, you can explore Advanced Control to tweak presets at the same level as Orban's factory programmers.

This versatility makes the 8300 a superb choice for any format. Its five-band processing is ideal for any pop music format (even the most competitive and aggressive CHR), while phase-linear two-band processing yields ultra-transparent sound for classical, classic jazz and fine arts broadcasters. Regardless of your choice, 8300's optimized technology ensures unusually high average modulation and coverage for a given level of subjective quality.

Versatility doesn't stop with sound. The 8300's built-in stereo encoder, AES/EBU digital inputs and outputs, and analog I/O permit hassle-free interfacing to any broadcast plant, whether the 8300 is located at the studio or the transmitter.

details

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

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

Input level meters. Full featured, full-time LED metering makes it easy to set up the 8300.

Composite output meter.

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

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

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

Gain reduction meters for AGC, multiband compression and MPX power controller.

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

Tight band-limiting to 15 kHz means you can use any uncompressed digital STL to pass 8300-processed audio from studio to transmitter without compromising on-air loudness — there's no need to use STLs having 44.1 or 48 kHz sample rates.

If you want to locate the 8300 away from the studio, you'll be pleased by its three separate remote control ports — GPI contact closures, RS232 serial, and built-in Ethernet for TCP/IP networks. The serial and Ethernet ports are supported by the supplied 8300 PC Remote Control application. This highly graphic Windows® application allows you to do even more with the 8300 than you can do through its front panel, making remote control a pleasure.

Built-in clock-based automation lets you automatically daypart the processing. You can control many other 8300 operating parameters too; the 8300's feature set fully exploits the processor's DSP and computer-based control architecture.

If you're concerned about latency because you need to feed live talent headphones off air, be assured that the 8300's low-latency (5 ms delay) processing will keep the most finicky talent happy. Or use optimum latency (15 ms delay) processing for the most competitive sound with delay that's still low enough to satisfy most any talent.

The 8300 now features Version 2.0 software. This is a major upgrade that adds 16 new "MX" maximum performance presets and the DSP features to support them. These features, including compressor look-ahead processing and soft and

interfaces easily with any facility

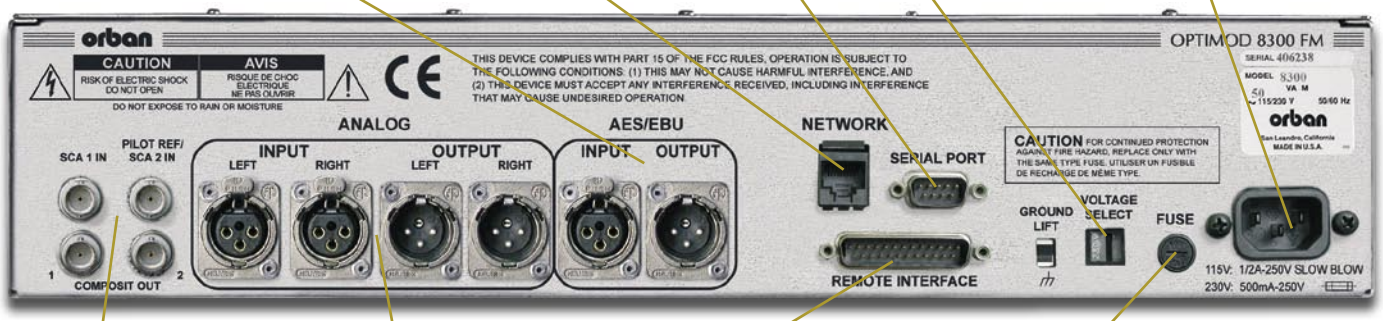
medium bass clipping, were first introduced in OPTIMOD-FM 8400. Compared to the presets in 8300 V1, the new MX presets in V2.0 provide approximately 1 dB more loudness for a given amount of distortion. Like their predecessors (which have been retained in V2.0), the MX presets provide very low speech distortion plus excellent source-to-source consistency.

V2.0 also adds digital radio/netcast processing to the 8300 so it can now provide independently optimized processing for both analog FM and digital channels simultaneously. The AES3 digital output can be switched to emit either a signal processed for the preemphasized analog FM channel or a signal processed for non-preemphasized digital channels, such as digital radio, digital subcarriers (like FMExtra), and netcasts. The analog output and composite output always emit the signal processed for analog FM.

V2 software adds digital radio processing plus 1 dB more loudness

The new digital radio processing takes the output of the 8300's two-band or five-band compressor and applies it to a transparent-sounding look-ahead limiter. Because this limiter does not use clipping for peak control, it does not add clipping distortion products to its output. Such products can waste precious bits when low bit rate codecs, such as those used for netcasting or HD Radio, attempt to encode the distortion.

details



100Mbps Ethernet connector.

VOLTAGE SELECTOR to 115 V (for 90 – 130 V) or 230 V (for 180 – 260 V), 50 or 60 Hz operations.

One AES3 audio input, one AES3 audio output.

RS232 serial connector for computer control.

AC Power passes throgh an IEC-standard main connector and an RF filter designed to meet the standards of all international safety authorities.

Two composite outputs with independently adjustable output levels, plus two SCA inputs with trimmable gains.

High dynamic range analog inputs and outputs.

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

FUSE
1/2-amp 3AG 250 V Slow-Blow for 115 V operation;
1/4-amp "T"-type (250 mA) Slow-Blow for 230 V operation.

features & benefits

USER-FRIENDLY INTERFACE	
	An LCD and full-time LED meters make setup, adjustment and programming of OPTIMOD-FM easy — you can always see the metering while you're adjusting the processor. Navigation is by dedicated buttons, soft buttons (whose function is context-sensitive), and a large rotary knob. The LEDs show all metering functions of the processing structure (Two-Band or Five-Band) in use.
ABSOLUTE CONTROL OF PEAK MODULATION	
	The 8300 provides universal transmitter protection and audio processing for FM broadcast. It can be configured to interface ideally with any commonly found transmission system in the world.
	The 8300 provides pre-emphasis limiting for the two standard pre-emphasis curves of 50 µs and 75 µs. Its pre-emphasis control is seldom audibly apparent, producing a clean, open sound with subjective brightness matching the original program.
	The 8300 achieves extremely tight peak control at all its outputs — analog left/right, AES/EBU left/right, and composite baseband.
	By integrating the stereo encoder with the audio processing, the 8300 eliminates the overshoot problems that waste valuable modulation in traditional external encoders. The stereo encoder has two outputs with independent level controls, each capable of driving 75 Ω in parallel with 47,000 pF, (100 ft / 30 m of RG-59 coaxial cable).
	The 8300 prevents aliasing distortion in subsequent stereo encoders or transmission links by providing bandwidth-limiting and overshoot-compensated 15 kHz low-pass filters ahead of the 8300's audio outputs and stereo encoder.
	Anti-aliased clippers running at 256 kHz sample rate prevent any trace of "digital clipper" sound.
FLEXIBLE CONFIGURATION	
	The 8300 includes analog and AES/EBU digital inputs and outputs. Both digital input and digital output are equipped with sample rate converters and can operate at 32 kHz, 44.1 kHz, 48, 88.2 and 96 kHz sample rates. The pre-emphasis status and output levels are separately adjustable for the analog and digital outputs.
	The 8300 has an internal, DSP-based stereo encoder (with a patented "half-cosine interpolation" composite limiter operating at 512 kHz sample rate) to generate the pilot tone stereo baseband signal and control its peak level. The composite limiter is a unique, "you can only do this in DSP" process that beats composite clippers by preserving stereo imaging while fully protecting the stereo pilot tone, RDS/RBDS, and subcarriers.
	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.
	The 8300 has two independent composite baseband outputs with digitally programmable output levels. Robust line drivers enable them to drive 100 ft / 30 m of RG-59 coaxial cable without audible performance degradation.
	The 8300 has two subcarrier inputs that are mixed with the output of OPTIMOD-FM's stereo encoder before application to the composite output connectors. One input can be re-jumpered to provide a 19 kHz pilot reference output. The other input has an internal level trim to accommodate subcarrier generators with output levels as low as 220 mV.
	The 8300 precisely controls the audio bandwidth to 15 kHz. This prevents overshoots in uncompressed digital links operating at a 32 kHz sample rate and prevents interference to the pilot tone and RDS (or RBDS) subcarrier.
	The 8300 has a defeatable multiplex power limiter that controls the multiplex power to ITU-R BS412 standards. An adjustable threshold allows a station to achieve maximum legal multiplex power even if the downstream transmission system introduces peak overshoots into the 8300-processed signal. Because this limiter closes a feedback loop around the audio processing, it allows the user to adjust the processor's subjective setup controls freely without violating BS412 limits, regardless of program material. The multiplex power limiter acts on all outputs (not just the composite output). It reduces clipper drive when it reduces power, simultaneously reducing clipping distortion.

features & benefits

	All input, output, and power connections are rigorously RFI-suppressed to Orban's traditional exacting standards, ensuring trouble-free installation.
	The 8300 is designed and certified to meet all applicable international safety and emissions standards.
	The 8300's digital output can be switched to emit processed audio suitable for HD Radio, digital radio, and netcasts. Meanwhile, the analog output and composite output continue to emit audio processed for the analog FM channel. To do this, the output of the multiband compressor (5-band or 2-band) splits into two paths. The FM path feeds an advanced, distortion-canceling clipper and overshoot compensator, while the HD path is de-emphasized and then feeds a look-ahead limiter.
ADAPTABILITY THROUGH MULTIPLE AUDIO PROCESSING STRUCTURES	
	A processing structure is a program that operates as a complete audio processing system. Only one processing structure can be on-air at a time. OPTIMOD-FM realizes its processing structures as a series of high-speed mathematical computations made by Digital Signal Processing (DSP) chips.
	The 8300 features three processing structures: Optimum Five-Band (or "Multiband"; 15 ms delay) for a consistent, "processed" sound, free from undesirable side effects, Low-Latency Five-Band (5 ms delay) for environments where talent monitors live off-air and they object to the delay of Optimum Five-Band, and Two-Band for a transparent sound that preserves the frequency balance of the original program material.
	A special Two-Band preset creates a no-compromise "Protect" function that is functionally similar to the "Protect" structures in earlier Orban digital processors.
	The Optimum Five-Band and the Two-Band structures can be switched via a mute-free crossfade; the Low Latency Five-Band structure causes a very brief audio mute when activated.
	The 8300 can increase the density and loudness of the program material by multiband compression, limiting, and clipping. This improves the consistency of the station's sound and increasing loudness and definition remarkably, without producing unpleasant side effects.
	The 8300 rides gain over an adjustable range of up to 25 dB, compressing dynamic range and compensating for both operator gain-riding errors and gain inconsistencies in automated systems.
	The 8300's Two-Band processing structure is phase-linear to maximize audible transparency.
	The 8300 can import and run any 8400 "LL" (Low-Latency) preset via the 8300 PC Remote application. This means that you can use an 8400 to develop presets for 8300, provided you do not use 8400 features not supported by the 8300. (If you try to import an 8400 preset that uses features unsupported by 8300, the 8300 will interpret that preset as best it can by using the available 8300 features.)
CONTROLLABLE	
	The 8300 can be remote-controlled by 5 – 12 V pulses applied to eight programmable, optically isolated "general-purpose interface" (GPI) ports.
	8300 PC Remote software is a highly graphical application that runs under Windows 2000 and XP. It communicates with a given 8300 via TCP/IP over modem, direct serial, and Ethernet connections. You can configure PC Remote to switch between many 8300 units via a convenient organizer that supports giving any 8300 an alias and grouping multiple 8300s into folders. Clicking an 8300's icon causes PC Remote to connect to that 8300 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 8300 features 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.).
	A Bypass Test Mode can be invoked locally or by remote control to permit broadcast system test and alignment or "proof of performance" tests.
	The 8300 contains a versatile real-time clock, which allows automation of various events (including recalling presets) at pre-programmed times.
	The 8300 contains a built-in line-up tone generator, facilitating quick and accurate level setting in any system.
	The 8300 software can be upgraded remotely through its serial port (connected to an external modem), or Ethernet port, or locally (by connecting a Windows® computer to its serial port through the supplied null modem cable) and running Orban-supplied downloadable upgrade software.

about the 8300's audio

The signal flows through the 8300 through the following blocks:

Input Conditioning: The 8300 operates at 32 kHz sample rate and power-of-two multiples thereof (up to 512 kHz in the stereo encoder). No commercial A/D converters or sample rate converter chips convert to 32 kHz while maintaining the standards we demanded for this product. Therefore, to ensure high quality A/D and sample rate conversion, we operate both the SRC and A/D chips at 64 kHz-output sample rate and then downsample to 32 kHz in DSP. By designing and implementing our own downsampler, we can ensure full frequency response to 15 kHz with very low spurious images.

Despite myths circulating in the marketplace regarding the alleged superiority of higher sample rates in FM stereo processors, 32 kHz is, in fact, an efficient and excellent-sounding choice for a basic sample rate. 32 kHz allows us to use DSP cycles more efficiently, adding features that really improve the sound. By strictly limiting the output bandwidth to 16 kHz, it also makes it easier to protect the stereo pilot tone and RDS subcarriers spectrally. Although a 16 kHz bandwidth limitation is more than is strictly needed to protect the pilot tone, the RDS requires protection over a substantially wider bandwidth (±2 kHz), and 16 kHz provides this protection.

The 8300's output spectral control is immaculate, ensuring maximum stereo and RDS coverage. Moreover, the 8300's digital output will pass through any uncompressed digital STL (including those operating at 32 kHz sample rate) without added overshoot and without the need for distortion-producing overshoot compensation schemes.

A defeatable 30 Hz 18 dB/octave high-pass filter and a defeatable phase rotator complete the input-conditioning block. These have both been features in Orban FM processors for many years. Most users will defeat the 30 Hz filter and leave the phase rotator in-circuit, although the choice is always yours.

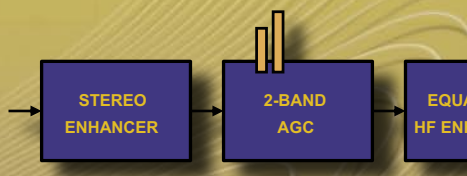
Stereo Enhancement: The 8300 provides a stereo enhancement algorithm based on Orban's patented analog 222 Stereo Enhancer, which increases the energy in the stereo difference signal (L–R) whenever a transient is detected in the stereo sum signal (L+R). By operating only on transients, the 222 increases width, brightness, and punch without unnaturally increasing reverb (which is usually predominantly in the L–R channel).

Gating circuitry detects "mono" material with slight channel or phase imbalances and suppresses enhancement so this built-in imbalance is not exaggerated. It also allows you to set a "width limit" to prevent over-enhancement of material with significant stereo content, and will always limit the ratio of L–R / L+R to unity or less.

Two-Band Gated AGC: The AGC is a two-band device, using Orban's patented "master/bass" band coupling. It has an additional important feature: target-zone gating. If the input program material's level falls within a user-settable window (typically 3 dB), then the release time slows to a user-determined level. It can be slow enough (0.5 dB/second) to effectively freeze the operation of the AGC. This prevents the AGC from applying additional, audible gain control to material that is already well controlled. It also lets you run the AGC with fast release times without adding excessive density to material that is already dense.

The AGC contains a compression ratio control that allows you to vary to ratio between 2:1 and essentially ∞:1. Lower ratios can make gain riding subtler on critical formats like classical and jazz.

Equalization: The 8300 has steep-slope bass shelving equalizer and three bands of fully parametric bell-shaped EQ. You can set the slope of the bass shelving EQ to 6, 12 or 18 dB/octave and adjust the shelving frequency.



processing

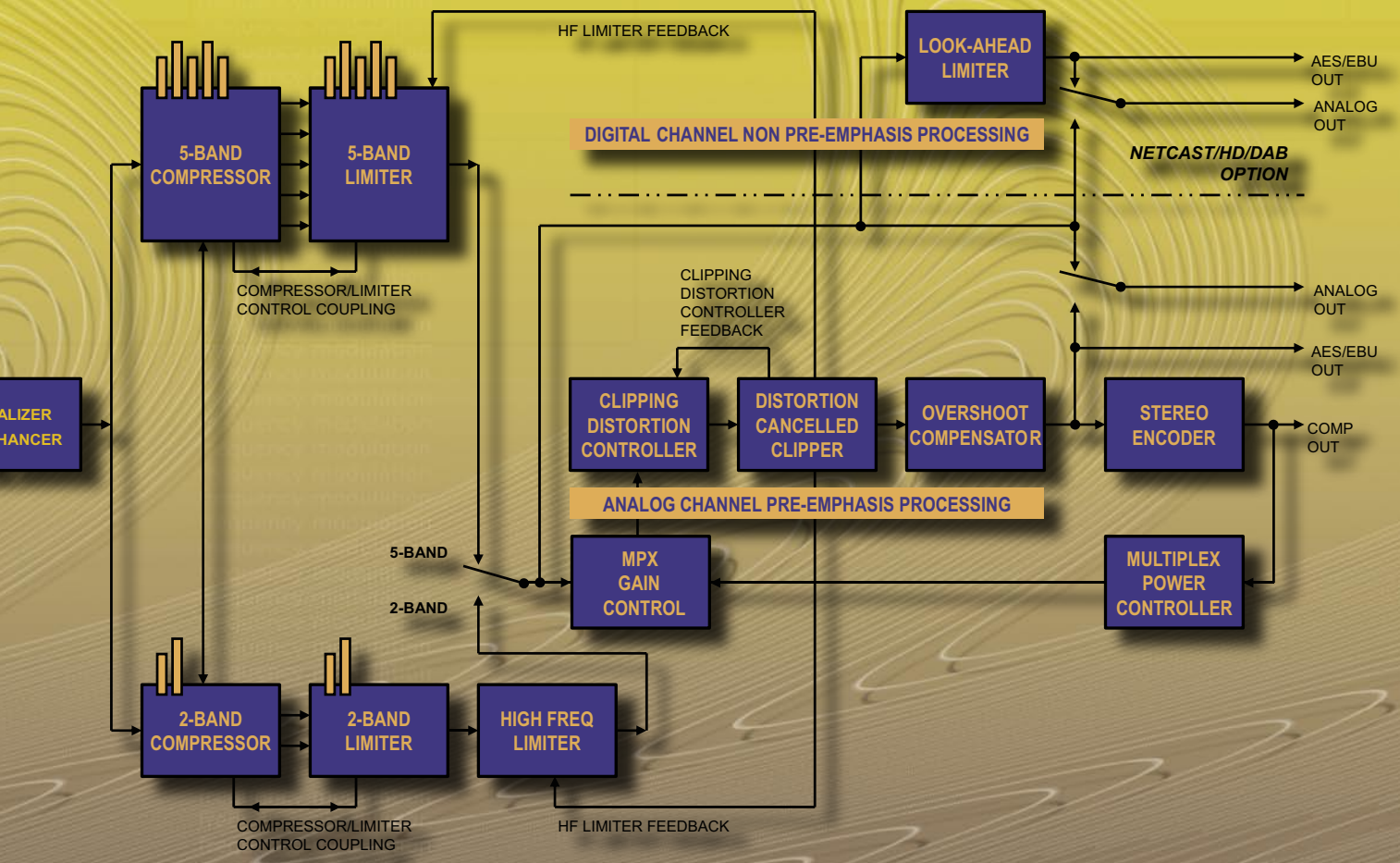
The 8300 HF Enhancer is a program-controlled HF shelving equalizer that was originally introduced in Orban's 2200 OPTIMOD-FM. It intelligently and continuously analyzes the ratio between broadband and HF energy in the input program material, and can equalize excessively dull material without over-enhancing bright material. It interacts synergistically with the five-band compressor to produce sound that is bright and present without being excessively shrill.

Multiband Compression: The multiband compressor can be operated in five-band or two-band mode. In addition to using a special high-frequency limiter, we control high frequencies with distortion-canceled clipping. The clipper in the 8300 operates at 256 kHz sample rate and is full anti-aliased. A clipper, embedded in the crossover, protects bands 1 and 2 from transient overshoot. This clipper has a shape control, allowing you to vary the "knee" of its input/output transfer curve from hard (0) to soft (10).

Digital Radio Processing: After multiband compression, the signal path splits into two branches. The FM analog processing branch applies high frequency limiting and clipping, while the digital radio branch applies look-ahead limiting to the audio. To achieve cleanest sound, the digital radio branch is unaffected by the bass clipper embedded in the multiband limiter's crossover.

"Intelligent" Clipping: The 8300 prevents excess clipping distortion by dynamically reducing the drive level to the clippers as required, using an intelligent analysis of the clipping distortion produced in the final clipper and overshoot compensator.

DSP-derived Stereo Encoder: The 8300's stereo encoder operates at 512 kHz sample rate to ease the performance requirements of the D/A converter's reconstruction filter, making it possible to achieve excellent stereo separation that is stable over time and temperature.



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	*Specifications apply for measurements from analog left/right input to stereo composite output and to FM analog left/right output.*	
	Frequency Response (Bypass Mode)	Follows standard 50 µs or 75 µs pre-emphasis curve ±0.10 dB, 2.0 Hz – 15 kHz. Analog left/right output and digital output can be user-configured for flat or pre-emphasized output. When configured to emit the digital radio processed signal, the digital output is flat.
	Noise	Output noise floor will depend upon how much gain the processor is set for (Limit Drive, AGC Drive, Two-Band Drive, and/or Multi-Band 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 15 kHz. <0.02% SMPTE IM Distortion.
	Total System L/R Channel Separation	>50 dB, 20 Hz – 15 kHz; 60 dB typical.
	Polarity (Two-Band Purist or Bypass Modes)	Absolute polarity maintained. Positive-going signal on input will result in positive-going signal on output.
	Processing Sample Rate	The 8300 is a "multirate" system, using internal rates from 32 kHz to 512 kHz as appropriate for the processing being performed. Audio clippers operate at 256 kHz.
	Processing Resolution	Internal processing has 24 bit (fixed point) or higher resolution; uses Motorola DSP56362 DSP chips.
INSTALLATION	***Analog Audio Input***	
	Configuration	Stereo.
	Impedance	>10 kΩ load impedance, electronically balanced.
	Nominal Input Level	Software adjustable from –4.0 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 sample rate, which the 8300 then decimates to 32 kHz in DSP using an ultra-high-quality image-free synchronous sample rate converter.
	Filtering	RFI filtered, with high-pass filter at 0.15 Hz (–3 dB).
INSTALLATION	***Analog Audio Output***	
	Configuration	Stereo. Flat or pre-emphasized (at 50 µs or 75 µs), software-selectable.
	Source Impedance	50 Ω, electronically balanced and floating.
	Load Impedance	600 Ω or greater, balanced or unbalanced. Termination not required or recommended.
	Output Level (100% peak modulation)	Adjustable from -6 dBu to +24 dBu peak, into 600 Ω or greater load, software-adjustable.
	Signal-to-Noise	≥ 90 dB unweighted (Bypass mode, de-emphasized, 20 Hz – 15 kHz bandwidth, referenced to 100% modulation).
	Crosstalk	≤ -70 dB, 20 Hz – 15 kHz.
	Distortion	≤ 0.01% THD (Bypass mode, de-emphasized) 20 Hz – 15 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, with 64 kHz output sampling rate.
	Filtering	RFI filtered.
INSTALLATION	***Digital Audio Input***	
	Configuration	Stereo per AES/EBU standard, 24 bit resolution, software selection of stereo, mono from left, mono from right or mono from sum.
	Sampling Rate	32, 44.1, 48, 88.1 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	Stereo per AES3 standard. Can emit the analog FM or digital radio processed signal. When emitting the FM analog processing signal, the output can be configured in software as flat or pre-emphasized to the chosen processing pre-emphasis (50 µs or 75 µs), with or without J.17 pre-emphasis.
	Sample Rate	Internal free running at 32, 44.1, 48, 88.1 or 96 kHz, selected in software. Can also be synced to the AES/EBU digital input at 32, 44.1, or 48 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.

Composite Baseband Output	
Configuration	Two outputs, each with an independent software-controlled output level control, output amplifier and connector.
Source Impedance	0 Ω voltage source or 75 Ω, jumper-selectable. Single-ended, floating over chassis ground.
Load Impedance	37 Ω or greater. Termination not required.
Maximum Output Level	+12.0 dBu (8.72 Vp-p).
Pilot Level	Adjustable from 8.0% to 10.0%, software controlled.
Pilot Stability	19 kHz, ±0.5 Hz (10 to 40 °C).
D/A Conversion	24-bit
Signal-to-Noise Ratio	≤ –85 dB (Bypass mode, de-emphasized, 20 Hz – 15 kHz bandwidth, referenced to 100% modulation, unweighted).
Distortion	≤ 0.02% THD (Bypass mode, de-emphasized, 20 Hz – 15 kHz bandwidth, referenced to 100% modulation, unweighted).
Stereo Separation	At 100% modulation = 3.5 Vp-p, > 70 dB, 30 Hz – 15 kHz. At 100% modulation = 1.0 – 8.0 Vp-p, > 60 dB, 30 Hz – 15 kHz.
Crosstalk-Linear	≤ –80 dB, main channel to sub-channel or sub-channel to main channel (referenced to 100% modulation).
Crosstalk-Non-Linear	≤ –80 dB, main channel to sub-channel or sub-channel to main channel (referenced to 100% modulation).
38 kHz Suppression	≥ 70 dB (referenced to 100% modulation).
76 kHz & Sideband Suppression	≥ 80 dB (referenced to 100% modulation).
Pilot Protection	–60 dB relative to 9% pilot injection, ±250 Hz (up to 2 dB composite processing drive).
Subcarrier Protection (60 – 100 kHz)	≥ 70 dB (referenced to 100% modulation; with up to 2 dB composite limiting drive; measured with 800 line FFT analyzer using "maximum peak hold" display).
57 kHz (RDS/RBDS) Protection	–50 dB relative to 4% subcarrier injection, ±1.0 kHz (no composite processing).
Connectors	Two BNC, floating over chassis ground, EMI suppressed.
Maximum Load Capacitance	0.047 µF (0 Ω source impedance). Maximum cable length of 100 ft / 30 m RG–58A/U.
Filtering	RFI filtered.
Subcarrier (SCA) Inputs	
Configuration	Subcarrier inputs sum into composite baseband outputs before digitally controlled composite attenuator.
Impedance	600 Ω or greater
SCA1 Sensitivity	Variable from 220 mV p-p to >10 V p-p to produce 10% injection. Sensitivity is adjustable by an internal PC-board-mounted trimmer.
SCA2 Sensitivity	Fixed at 772 mV p-p to produce 10% injection.
Connectors	Two BNC, unbalanced and floating over chassis ground, EMI suppressed.
19 kHz Pilot Reference	SCA2 input can be re-jumpered to provide a 19 kHz pilot reference output.
Remote Computer Interface	
Configuration	TCP/IP protocol via direct cable connect, modem, or Ethernet interface. Suitable null modem cable for direct connect is supplied. Modem is not supplied.
Serial Port	115 kbps RS–232 port DB–9 male, EMI-suppressed.
Ethernet Port	100 Mbit/sec on RJ45 female connector.
Remote Control (GPI) Interface	
Configuration	Eight (8) inputs, opto-isolated and floating.
Voltage	6 – 24 V AC or DC, momentary or continuous. 9 V DC provided to facilitate use with contact closure.
Connector	DB-25 male, EMI-suppressed.
Control	User-programmable for any eight of user presets, factory presets, bypass, test tone, stereo or mono modes, analog input, digital input.
Filtering	RFI filtered.
Power	
Voltage	100 – 132 V AC or 200 – 264 V AC, switch-selected on the rear panel, 50 – 60 Hz, 50 VA.
Connector	IEC, EMI-suppressed. Detachable 3-wire power cord supplied.
Grounding	Circuit ground is independent of chassis ground can be isolated or connected with a rear panel switch.
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 3.5" x 14.25" / 48.3 cm x 8.9 cm x 36.2 cm. Two rack units high.
RFI / EMI	Tested according to Cenelec procedures. FCC Part 15 Class A device.
Shipping Weight	19 lbs / 8.7 kg
Warranty	
Two Years, Parts & Service	Subject to the limitations set forth in Orban/CRL's Standard Warranty Agreement.

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

www.orban.com

r14-2009_RO/Lo

Nabro Able LLC Corporate Headquarters
Nabro Able LLC – an Arizona Limited Liability Co.
8350 East Evans, Suite C4 | Scottsdale, AZ. 85260 USA
[p] +1 480.403.8300 | [f] +1 480.403.8301 | www.orban.com

Northern California Design Center Group
14798 Wicks Blvd. | San Leandro CA 94577 USA
[p] +1 480.403.8300 | [f] +1 480.403.8301 | [e] info@orban.com

ORBAN Europe GmbH
Businesspark Monreposstr. 55 | 71634 Ludwigsburg Germany
[p] +49 7141 22 66 0 | [f] +49 7141 22 66 7 | www.orban-europe.eu

ORBAN/CRL Netherlands B. V.
Signaal 74 | 1446 XA Purmerend, Netherlands
[p] +31 299 40 25 77 | [f] +31 299 40 29 04