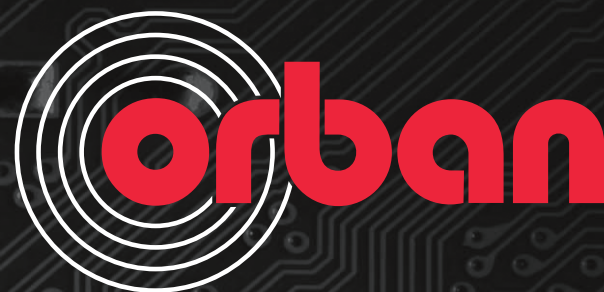
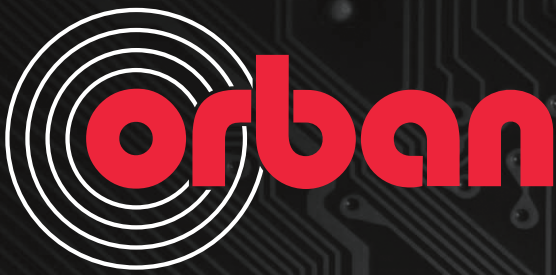


OPTIMOD-FM/HD 8600



Key Features of the OPTIMOD-FM/HD 8600

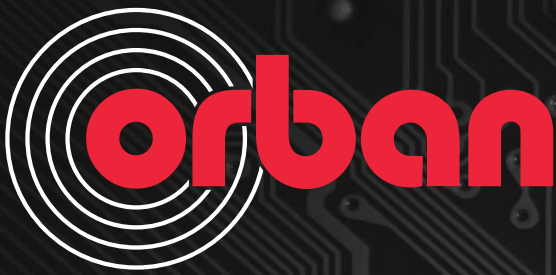
- **MX Limiter**
Orban's MX limiter technology lowers distortion, improves transient punch, and minimizes preemphasis-induced high frequency loss.
- **“Multipath Mitigator” Left/Right Phase Skew Correction**
Exclusive “Multipath Mitigator” phase corrector ensures crisp mono and minimizes stereo subchannel energy without compromising stereo separation.
- **Window-Gated AGC**
Advanced, two-band window-gated AGC controls levels subtly and unobtrusively.
- **“Half-Cosine Interpolation” Composite Limiter**
The “Half-Cosine Interpolation” composite limiter beats composite clippers by preserving stereo imaging while fully protecting the stereo pilot tone, RDS/RBDS, and subcarriers.
- **BS.1770 Loudness Control and Metering**
Built-in BS.1770 loudness meters and controllers for the analog and digital radio processors make it easy to comply with any loudness regulations your country may enforce.
- **Smooth Multiplex Power Controller**
A newly improved BS.412 multiplex power controller controls MPX power smoothly and reliably.



OPTIMOD-FM/HD 8600



- **“True Peak” Limiters in the digital radio path**
“True Peak” limiters predict and control the analog peak level following the radio’s reconstruction filter to prevent clipping in the radio’s analog circuitry.
- **HD Radio Processing**
HD/digital radio/streaming processing is included at no extra cost.
- **Ratings Encoder Loop-Through**
A ratings encoder loop-through can embed the encoder in the audio processing path, maximizing the level applied to the encoder and thus its ability to encode reliably.
- **RDS**
Provides a built-in RDS generator with dynamic PS and ASCII terminal control.
- **Low-Delay DJ Monitor Output**
A dedicated low-delay headphone monitor chain lets you dial in controlled amounts of “FM limiter sound” to match talent preferences.
- **Versatile Remote Control and Monitoring**
Versatile remote control by responsive PC Remote application, Telnet-style ASCII terminal commands, and SNMP. Supports Ethernet and serial connections.
- **The “Optimod Sound”**
Delivers the inimitable “Optimod Sound,” proven to attract and hold audiences worldwide.



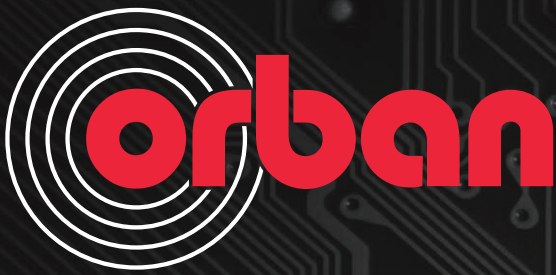
OPTIMOD-FM/HD 8600

Product Overview

Featuring versatile five-band and two-band processing for both analog FM transmission and digital media, the 8600 provides the industry's most consistent sound, track-to-track and source-to-source. This consistency allows you to create a sonic signature for your station with the assurance that your signature will stay locked in, uniquely branding your sound. The 8600 provides stereo enhancement, equalization, AGC, multiband compression, low-IM peak limiting, stereo encoding, and composite limiting — everything that even the most competitive major market station needs to stand out on the dial. More than 20 excellent sounding, format specific factory presets get you started. You'll find all of your favorite 8500 presets, plus "MX" presets designed by Bob Orban and Greg Ogonowski to exploit the exciting possibilities inherent in the 8600's new MX peak limiter technology. Although the factory presets are fully competent "out of the box, you can customize them with easy one-knob LESS-MORE control in Basic Control. 50 parameters are available in Intermediate Control and more than 120 in Advanced Control, whose versatility will satisfy even the most finicky on-air sound designer. The newly added "Multipath Mitigator" phase skew corrector maximizes the quality of a mono mixdown or blend that might occur in a receiver while minimizing the energy in the stereo subchannel, which is the part of the stereo baseband most vulnerable to multipath.

Dramatically improved peak limiter technology decreases distortion while increasing transient punch and high frequency power handling capacity. Compared to the FM-channel peak limiter in OPTIMOD-FM/HD 8500, the new peak limiter typically provides 2.5 to 3 dB more power at high frequencies, which minimizes audible HF loss caused by pre-emphasis limiting. Drums and percussion cut through the mix. Highs are airy. "Problem material" that used to cause audible distortion is handled cleanly. While this design offers about the same loudness as 8500 processing, its main goal is to make FM analog broadcasts more competitive with the cleanliness, punch, and open high frequencies of the digital media against which FM analog transmissions now battle. The FM loudness wars represent 20th-century thinking; the new competition is digital media. Thanks to its fresh, crisp sound, the 8600 helps level the playing field between analog FM and its ever more aggressive digital-only competitors.

The 8600 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 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, RDS/RBDS, and subcarriers. Additionally, the 8600 offers a newly improved, smooth-sounding BS.412 multiplex power controller. The stereo encoder's stereo subchannel modulator can operate in normal double sideband mode and in an experimental compatible single sideband mode that is offered to enable users to compare and assess the two modes.



OPTIMOD-FM/HD 8600

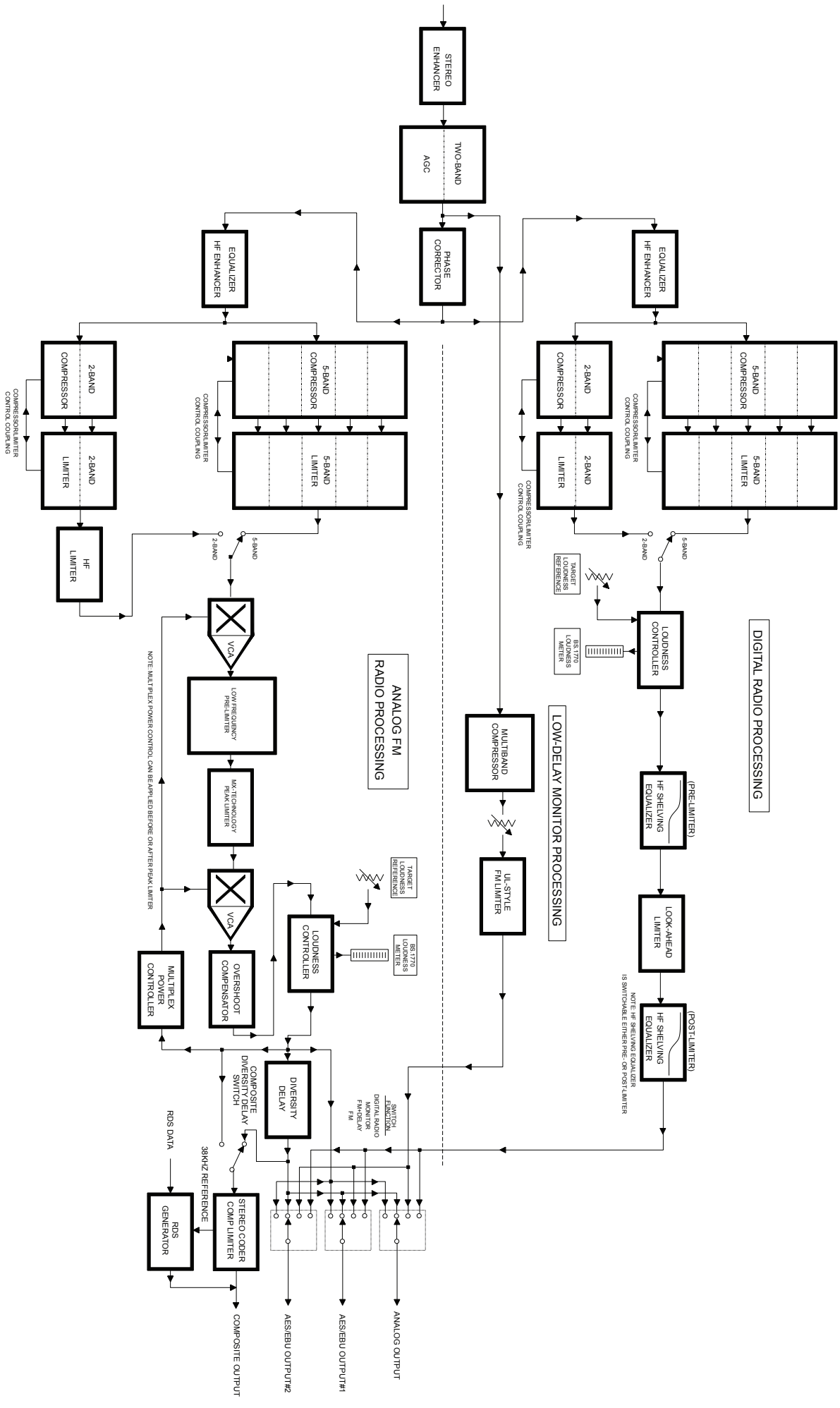
The 8600's built-in delay (up to 12 seconds) improves reliability in HD Radio facilities, by freeing you from the need to use the delay line built into the digital radio exciter. This allows you to use the 8600's built-in stereo encoder and composite limiter to drive the analog FM transmitter, ensuring no-compromise analog-channel loudness. Newly improved, the delay system now permits you to place an "adjustment delay" in the digital radio path, allowing adjustment up to ± 1.3 seconds without touching the analog-path audio.

The Digital Radio and analog radio processing chains include ITU-R BS.1770 loudness meters and safety limiters for use in countries that enforce a BS.1770 loudness limit on digital and/or analog radio broadcasts. The 8600 implements "true peak" control in the digital radio processing. This allows the 8600 to prevent clipping in a playback device's analog signal path by predicting and controlling the analog peak level follow the playback device's reconstruction filter to an accuracy of better than 0.5 dB. Without true peak control, analog clipping can occur even if all peak values of the digital samples are below 0 dBFS. Thanks to true peak control, sample rate conversion, unless it removes high frequency program energy or introduces group delay distortion, cannot cause sample peaks to increase more than 0.5 dB.

The easy-to-use joystick, knob and button navigation system and a bright, active-matrix color LCD make it easy to program the 8600 from its front panel. Ethernet and RS232 serial connectivity are standard, as is a responsive easy to use PC remote control application (for Windows 7 and higher) that can control multiple 8600s on a TCP/IP network. SNMP support allows you to monitor your Optimod's status and to send Alarm notifications via your Optimod's Ethernet connection to your network. Additionally, programmable contact-closure (GPI) control plus ACSII terminal control via the 8600's RS232 serial and Ethernet ports give you total freedom to interface the 8600 with your facility's remote control infrastructure, whatever it might be.

The 8600 offers 8500-style processing presets too. Because the input/output delay of the MX peak limiter is too long to permit talent to monitor off-air on headphones, 8500-style is useful for remotes and outside broadcasts where off-air headphone monitoring is desired and the 8600's low-delay monitor output cannot be brought to the talent. The low-delay headphone monitor uses a separate processing chain (based on the 8600's Ultra-Low-Latency processing structure) that allows you to dial in the precise amount of "FM clipper sound" that your talent prefers.

8600-FM/HD-STYLE PRESETS: SIMPLIFIED BLOCK DIAGRAM





Key Technical Specifications

Frequency Response (Bypass Mode; Analog Processing Chain):

Follows standard 50 μ s or 75 μ s preemphasis curve \pm 0.10 dB, 2.0 Hz - 15 kHz.

Sample Rate:

64 kHz to 512 kHz, depending on processing being performed.

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 Separation:

> 55 dB, 20 Hz - 15 kHz; 60 dB typical.

Peak Overshoot at HD Output:

0.5 dB True Peak maximum; 0.15 dBTP typical

Defeatable Analog FM Diversity delay:

0.27 to 12.0 seconds. The diversity delay adjustments of less than \pm 1.3 seconds are applied to the HD path to prevent FM analog artifacts at the expense of longer absolute delay in the HD path.

Minimum Processing Delay:

3.7 ms to 270 ms, processing structure dependent. Multipath Mitigator delay = 146 ms.

Headphone Monitor Processor Delay:

5 ms.

Input/Output/Sync

MPX I/O (optional):

Provides 192 kHz digital composite output, 2 x digitized SCA inputs, and wordclock sync input. Also available separately for retrofit into existing 8600s.

Analog I/O Configuration:

Stereo on XLR connectors. Nominal Input level: -4.0 to +13.0 dBu (VU). Output level = -6 dBu to +24 dBu peak.

AES3 I/O Configuration:

One stereo input on XLR, 24 bit resolution. Two outputs can be independently set to emit the analog FM processed signal, the digital radio processed signal, or the low-delay monitor signal. Output 2 can provide a loop-through drive to a ratings encoder, whose output is returned to the Optimod's AES sync input.

Sampling Rate

32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, and 96 kHz.



AES3/11 Sync Input on XLR Connector:

Accepts AES3/11 sync (32 to 96 kHz) to sample-lock lock user-selected AES3 outputs.
Can accept the output of a ratings encoder.

Wordclock Sync Input on BNC Connector (MPX option only):

Accepts 1x wordclock or 10 MHz reference signals, automatically selected. The DSP master clock can be phase-locked to these signals, which in turn phase-locks the 19 kHz pilot tone frequency, facilitating single-frequency network operation. The digital output sample frequency can also be locked to these signals.

Composite Baseband Outputs:

1 x 192 kHz AES3 (MPX option only); 2 x analog providing -12 dBu (0.55 Vp-p) to +12.0 dBu (8.72 Vp-p) levels for 0.5 dB adjustment resolution.

Stereo Separation:

At 100% modulation = 3.5Vp-p, > 60 dB, 30 Hz - 15 kHz. At 100% modulation = 1.0 - 8.0 Vp-p, > 55 dB, 30 Hz - 15 kHz.

Baseband Spectral Protection:

pilot protection > 60 dB re 9% pilot injection, ± 250 Hz; subcarrier protection > 70 dB;
RDS protection > 50 dB re 4% RDS injection. All specs apply with up to 2 dB composite processing drive.

Non-Digitized SCA Inputs:

2 x non-digitized analog on BNC connectors are summed into the analog composite outputs but do not appear at the digital composite outputs. Sensitivity variable from 220 mV p-p to > 10 V p-p to produce 10% injection. The SCA2 input can be configured to supply a 19 kHz pilot reference.

Digitized SCA Inputs (MPX option only):

2 x digitized analog. These are summed into the digital composite but do not appear on the analog composite outputs.

Remote Interface

PC Remote Software Supported Computer and Operating System:

IBM-compatible PC running Microsoft Windows® 7 or higher.

Configuration:

TCP/IP protocol via direct cable connect, modem, or Ethernet interface.

Serial Connectors

RS-232 port (3) DB-9 male, EMI-suppressed.

Ethernet Connector:

Female RJ45 connector for 10-1000 Mbps TCP/IP networks using CAT5 cabling;
Native rate = 100 Mbps. Provides for connection to the 8600 PC Remote application through either a network, or, using a crossover Ethernet cable, directly to a computer.



OPTIMOD-FM/HD
8600

GPI Interface:

Eight (8) inputs, opto-isolated and floating on DB-25 male connector. 6 - 15V AC or DC, momentary or continuous, provides normal operation. 9VDC provided to facilitate use with contact closure. User-programmable.

Tally Outputs:

2 x NPN open-collector

Power

Voltage:

90–240 VAC 50–60 Hz, 50 VA

Physical & Environmental

Dimensions (W x H x D):

19" x 5.25" x 15.5" / 48.3 cm x 8.9 cm x 39.4 cm. Depth shown indicates rack penetration; overall front-to-back depth is 17.75" / 45.1 cm. Three rack units high.

Operating Temperature:

32° to 122° F / 0° to 50° C for all operating voltage ranges.

RFI / EMI:

Tested according to Cenelec procedures.

Shipping Weight & Dimensions:

30 lbs / 13.6 kg - 25" x 24" x 9"

Warranty

Five 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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