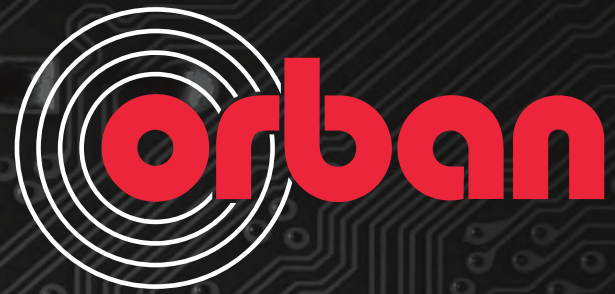
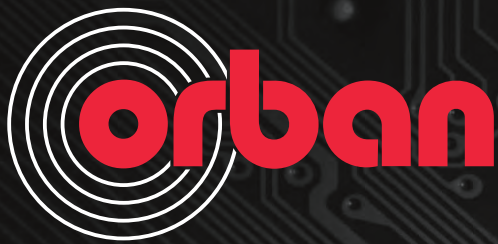


OPTIMOD-FM 8700i



Key Features of the OPTIMOD-FM 8700i

- **Xponential Loudness™ Algorithm**
The Xponential Loudness™ algorithm reduces listening fatigue and actually improves listeners' hearing using adaptive psychoacoustics. It revives music that has been "hypercompressed" in mastering and/or passed through lossy compression, like MP3. It's like an audio magnifying glass that brings out hidden detail, clarifying audio and inspiring audiences to listen longer.
- **Safety Bypass Relays**
Analog and AES3 digital inputs and outputs have hard-wire safety bypass relays in case of hardware or power failures.
- **Dante™ Audio-Over-IP Connectivity**
Dante provides a dual-redundant Ethernet connection for two stereo audio inputs and two stereo outputs, each with a dedicated level control. Sample rate conversion is provided for both the inputs and the outputs. Full AES67 compatibility is coming Fall 2017 via an easy, free software upgrade.
- **Digital MPX**
The 384/192 kHz AES3 digital composite output that is compatible and interoperable with the 192 kHz standard being implemented by several transmitter manufacturers.
- **10 MHz Reference Input**
A 10 MHz reference input allows the stereo pilot tone frequency and digital composite output sample rate to be locked to a 10 MHz reference signal (like GPS), facilitating single-frequency-network (SFN) and near-single-frequency-network (N-SFN) operation.



OPTIMOD-FM 8700i



- **Low-Delay DJ Monitor Output**

The MX limiter, Multipath Mitigator, and subharmonic synthesizer add delay that makes it impractical for talent to monitor all of the processing structures off-air with headphones. A new, dedicated headphone monitor chain (with about 5ms delay) provides a full 5-band FM processor that lets you dial in your preferred amount of “FM clipper sound.”

- **Streaming Monitor Output**

Used with the 8700i's remote control application, the streaming monitor facilitates checking or improving your station's signature sound when you are unable to receive the 8700i processed FM signal off-air. The streaming feature allows you to monitor several points within 8700i. The MP3 and OPUS codecs and the Icecast2 and SHOUTcast2 streaming protocols are supported, allowing streaming directly to the client PC via your LAN or the Internet.

- **Subharmonic Synthesizer**

The Subharmonic Synthesizer creates energy one octave below program energy in the range of 50-90 Hz when such energy is not present at the input and when music is detected. It adds punch and slam to older material while retaining musicality.

- **Dual Power Supplies**

The 8700i's dual power supplies with independent AC line inputs provide redundant operation to ensuring maximum uptime.

- **“Multipath Mitigator” Left/Right Phase Skew Correction**

The phase skew corrector maximizes both FM and Digital Radio processing paths for the quality of a mono mixdown or blend that might occur in a receiver or player device.

- **ITU BS-412 Multiplex Power Control**

An improved BS-412 Multiplex Power Controller provides a new user-adjustable, program-adaptive algorithm to make operation smoother and more subtle.



Product Overview

OPTIMOD-FM 8700i is Orban's flagship processor. Featuring versatile five-band and two-band processing for both analog FM transmission and digital media, the 8700i 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.

Exclusive Xponential Loudness™ processing exploits psychoacoustics to revive music that has been "hypercompressed" in mastering and/or passed through lossy compression, like MP3. It's like an audio magnifying glass that brings out hidden detail, clarifying audio while reducing listening fatigue and inspiring audiences to listen longer.

The 8700i builds on 8600 V4's outstanding reliability and industry-leading sound quality. It adds Dante audio-over-IP connectivity (full AES67 support coming Fall 2017 via free, easy software upgrade) and a hot-swappable, dual-redundant power supply with automatic failover. A digital MPX output using a 192 kHz AES3 connection is now standard, as are two digitized SCA inputs. A new program-adaptive subharmonic synthesizer ensures punchy bass, even with older program material. An important feature is a phase skew corrector/multipath mitigator that prevents high-frequency loss when receivers blend to mono and minimizes energy in the stereo subchannel without compromising separation. The phase skew corrector uses a proprietary multidimensional processing program algorithm that can simultaneously correct several unequal delay errors, such as multiple-microphone pickup of a single instrument in the original recording session combined with left/right gap skew-in an analog mixdown recorder.

In addition to subharmonic synthesis and phase skew correction, the 8700i provides stereo enhancement, HF 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.

Orban's exclusive MX peak limiter technology decreases distortion while increasing transient punch and high frequency power handling capacity. Compared to the 8500's limiter, the MX 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.

The 8700i's 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; in the 21st century, the new competition is digital media. Thanks to its crisp, punchy sound, the 8700i helps level the playing field between analog FM and its ever more aggressive digital-only competitors.

The 8700i 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 8700i's low-delay monitor output cannot be brought to the talent. The low-delay headphone monitor uses a separate processing chain (based on the 8700i Ultra-Low-Latency processing structure) that allows you to dial in the precise amount of "FM clipper sound" that your talent prefers.



REV 3 10/12/2016



Key Technical Specifications

Frequency Response (Bypass Mode; Analog Processing Chain):

Follows standard 50 μ s or 75 μ s preemphasis curve ± 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; 65 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 can be configured so that delay adjustments of less than ± 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.
Subharmonic synthesizer delay = 67.5 ms

Headphone Monitor Processor Delay:

5 ms.

Input/Output/Sync

Analog I/O Configuration:

Stereo on XLR connectors, with relay bypass available. 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. Relay bypass available. Two outputs can be independently set to emit the analog FM processed signal, the digital radio processed signal, or the low-delay monitor signal.

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 to sample-lock lock user-selected AES3 outputs. Hardwire bypass connects this input to AES3 output #2.

**Wordclock Sync Input on BNC Connector:**

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; 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.

Digitized SCA Inputs:

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

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 SCA1 input can be configured to accept the composite output of a backup audio processor or stereo encoder with hardwire bypass to analog comp output #1. The SCA2 input can be configured to supply a 19 kHz pilot reference.

Audio-Over-IP I/O:

Dante (AES67 support coming Fall 2017), supporting two stereo inputs pairs and two stereo output pairs @ 44.1, 48, 88.2 or 96 kHz. Two Ethernet connectors are dedicated to audio-over-IP, supporting main and backup networks.

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 8700i PC Remote application through either a network, or, using a crossover Ethernet cable, directly to a computer.

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, auto-selected, 50–60 Hz, 50 VA, dual-redundant.

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.

