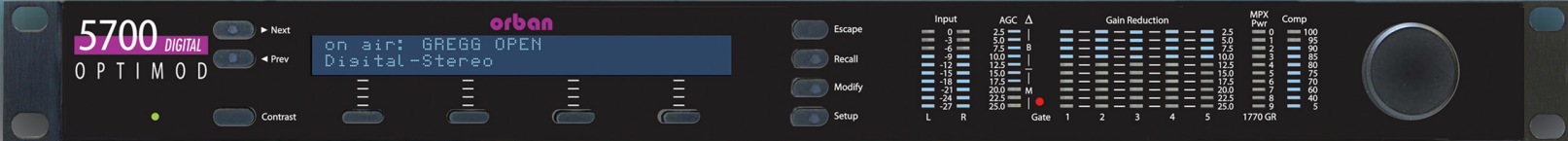




audio processing

OPTIMOD-FM 5700



The 8500 Sound You Trust at a Price You Can Afford.



For years, broadcasters have trusted Optimod-FM 8500 to build audiences and ratings with its big, bold sound. Optimod-FM 5700 now offers the popular 8500 sound in a compact, cool-running 1U package at a more affordable price.

The 5700 provides stereo enhancement, equalization, AGC, multiband compression, low-IM peak limiting, stereo encoding, and composite limiting—everything that you need to compete in your market.

The front-panel display includes a 2x40-character LCD and LED bargraphs that show all metering functions of the processing structure (Two-Band or Five-Band) in use. The metering is always visible while you are adjusting the processor. Navigation is by dedicated buttons, soft buttons (whose functions are context-sensitive), and a large rotary knob.

Ethernet connectivity is standard, as is an easy to use PC remote control application that runs on Windows XP and higher and that can control many 5700 units on a TCP/IP network. Additionally, programmable contact-closure (GPI) control plus ACSII terminal control via the 5700's RS232 serial and Ethernet ports together give you total freedom to interface the 5700 with your facility's remote control infrastructure, whatever it might be. SNMP support offers yet another way to control and monitor the 5700's operation via your network.

The 5700 is available in two versions: an FM-only version (5700FM) and a version (5700HD) that includes simultaneous processing for FM and for digital transmissions like netcasts and HD Radio. Via a purchased upgrade kit, the FM version can be upgraded to the HD version at any time without removing the unit from the rack or disconnecting any wiring. Both versions offer up to 16 seconds of delay in the FM processing chain, which is useful for HD Radio diversity delay or other purposes.

The FM and digital media processing paths split after the 5700's stereo enhancer and AGC. There are two equalizers, multiband compressors, and peak limiters, allowing the

analog FM and digital media processing to be optimized separately. The bottom line? Processing that optimizes the sound of your FM channel while punching remarkably crisp, clean, CD-like audio through to your digital channel audience.

More than 20 excellent sounding, format-specific factory presets get you started. You'll find all of your favorite 8500 presets here. Although the factory presets are fully competent "out of the box," you can customize them with easy one-knob LESS-MORE control or with more than 60 advanced controls whose versatility will satisfy even the most finicky on-air sound designer. If you have created custom presets for Optimod-FM 8500, 8400, 8300, 5500, or 5300, you'll find that they import perfectly into the 5700, retaining your carefully designed sound.

If you choose to use the 5700's superb DSP-based stereo encoder and composite limiter, be assured that they deliver an FM analog signal that is always immaculately clean and perfectly peak limited, with full spectral protection of sub-carriers and RDS/RBDS regardless of the amount of composite limiting.

The 5700 includes a "ratings encoder loop-through" connection. This allows a ratings encoder with an AES3 digital input and output to be inserted between the output of the left/right audio processing and the input of the stereo encoder. This keeps the audio level driving the ratings encoder as high as possible, minimizing the number of "low audio level" alarms that the ratings encoder generates.

For our European customers, a second-generation ITU BS 412 multiplex power controller smoothly and naturally complies with the standard. In addition, the 5700-HD's digital radio processing path offers an ITU-R BS.1770-compliant loudness controller and a 4x-oversampled, "true peak" limiter that prevents clipping from occurring at the output of the D/A converter in a consumer receiver or other playback device.

To protect your investment, the 5700 can be upgraded to full 8600S functionality via a purchased upgrade kit. There's no need to remove the unit from the rack, and you will immediately benefit from Orban's state-of-the-art MX limiter technology.

Processing for HD

The HD Radio™ system generates a digital carrier that shares a given station's allocated bandwidth with the normal analog FM carrier. The receiver crossfades between the analog and digital channels to minimize the effect of RF dropouts. This scheme requires audio processing for the two channels to be closely matched in texture to ensure that the receiver's crossfades are seamless.

Optimum peak limiting for the two channels is very different. The analog channel requires state-of-the-art preemphasis limiting to achieve competitive loudness and minimize preemphasis-induced high frequency loss. This usually implies use of sophisticated distortion-cancelled clipping. The digital channel, on the other hand, has no preemphasis but is heavily bit-reduced with the HDC perceptual codec. The highest available rate is 96 kbps and many broadcasters are now multicasting with two 48 kbps channels.

This limited bit rate creates an entirely different set of requirements: the peak limiting must not use clipping because there is no bit budget available to encode clipping-induced distortion products. However, preemphasis limiting is unnecessary. The best technology for peak limiting the digital channel is look-ahead limiting, which can perform very clean peak reduction on flat channels, but which is unsuitable for pre-emphasized channels.

Optimod-FM 5700 is an excellent solution to this dilemma because its AGC and stereo enhancement are shared between the two channels, while equalization, multiband compression/limiting, and peak limiting are independent.

The analog FM path provides 8500-style distortion-cancelled clipping, overshoot compensation, stereo encoding, and composite limiting using Orban's patented "Half-Cosine Interpolation" algorithm. The limiting is anti-aliased and uses sample rates as high as 512 kHz. Meanwhile, the HD output receives low-IM look-ahead "true-peak" peak limiting. This look-ahead limiting is optimized to make the most of the limited bit-rate codecs used in digital radio and netcasting channels. By eschewing any clipping, the HD processing prevents the codec from wasting precious bits encoding clipping distortion products, allowing the codec to use its entire bit budget to encode the desired program material.

For convenience, it is possible to couple the equalizer, HF enhancer, and multiband compressor/limiter setup controls of the two paths, allowing them to be matched easily. This is convenient in HD Radio installations where the station's goal is to minimize the audibility of analog/digital crossfades at the receiver. However, the ability to adjust the analog FM and digital radio paths separately allows users more latitude to fine-tune their audio. For example, a broadcaster who believes that selling the advantages of HD Radio to the public requires an obvious, audible difference between the analog FM and digital channels can generate this "wow!" factor. Dual-path processing also allows the digital media processing to be independently tuned to minimize artifacts in low bit-rate codecs, like those used in netcasting and HD Radio.

A built-in diversity delay of up to 16 seconds in the analog processing path simplifies installation in HD Radio facilities, freeing you from the need to use the delay line built into the HD Radio exciter. This allows you to use the 5700's built-in stereo encoder and composite limiter to drive the analog FM transmitter, ensuring no-compromise analog-channel loudness. The diversity delay can be applied independently to any output emitting the analog-FM processing signal, so some outputs can be delayed while others are not.

The 5700's 64 kHz base sample rate allows it to provide up to 20 kHz audio bandwidth at its HD output. The HD bandwidth is user-settable between 15 and 20 kHz to optimize the processing for the codec employed in the digital chain. Many low bit rate codecs operate better when fed 15 kHz audio because this enables them to use their available bit bandwidth most efficiently. This is particularly true for low rates, like 32 kbps. However, at higher sample rates, full 20 kHz bandwidth provides the same bandwidth as typical source material, so the user may prefer to use it for these higher rates.

Most HD Radio exciters require 44.1 kHz AES/EBU audio streams for both their analog-FM and digital inputs. The sample rates for both streams must be identical and must be locked to an external reference. This requires two AES/EBU outputs from a single-box processor. Because the output sample rate on either or both of the 5700's AES3 outputs can be locked to either the 5700's sync reference input or to its AES3 input, the 5700 fully meets the requirements. Moreover, because of the 5700's built-in diversity delay on the analog-FM channel, it is possible (and usually desirable) to entirely bypass the analog-FM side of the iBiquity exciter and to use the 5700's built-in stereo encoder and composite limiter to drive the analog FM exciter directly.