OPTIMOD-FM
D I G I T A L

orban®

OPTIMOD-FM 8200

Finally, a digital audio processor good enough to be an OPTIMOD.

Bob Orban and his engineering staff worked tirelessly for more than half a decade to design a true successor to the worldwide, industry-standard OPTIMOD-FM 8100A. They refused to settle for less than another breakthrough in audio quality, performance, control and flexibility.

The result. The OPTIMOD-FM 8200 Digital Audio Processor.

The OPTIMOD-FM 8200 Digital Audio Processor provides complete audio processing and transmitter protection for FM broadcast. The 8200 interfaces with all commonly found transmitters and studio-to-transmitter links, and is designed to grow with future advances in digital FM technology.

In the tradition of our analog OPTIMOD-FM 8100A, OPTIMOD-FM 8200 provides a strong, high-quality sound that attracts and holds listeners. Its fully-digital audio processing improves the quality and clarity of the successful "OPTIMOD sound," while adding changeable processing structures, programmability, expandability and a PC interface.

OPTIMOD-FM 8200.
The first FM audio processor to combine the **power** of OPTIMOD with the **power** of digital.

OPTIMOD·FM
DIGITAL

The Power of Digital.

The power of digital propels the 8200 to new levels of performance and functionality. OPTIMOD-FM 8200 is a true digital audio processor—the audio is digitized and all control functions are digital.

Digital audio processing provides the tools for a dramatic improvement in sound quality, and the capability of instant switching between radically different processing structures.

Digital control makes possible a spectrum of system flexibility, programmability and control previously unavailable at any price.

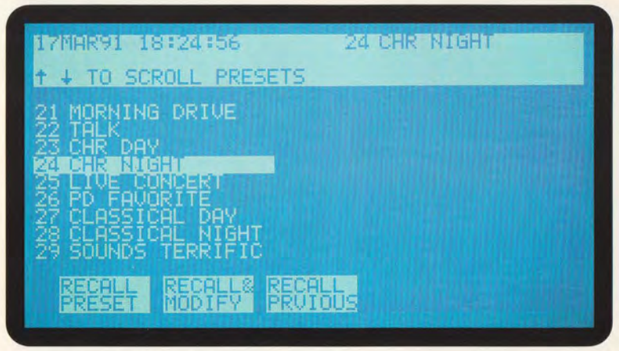
Modular Variable Processing (MVP) Structures.

MVP structures, a flexible processing concept pioneered by Orban and achievable only in digital processing, allow the 8200 to change its sound with the push of a button.

Each MVP structure is the software equivalent of a dedicated processor. In a typical 8200, one MVP acts as a two-band processor, another as a multi-band processor, and a third MVP functions as a transparent protection limiter.

Easy to Adjust.

Versatile processors have many controls. OPTIMOD-FM is no exception. This degree of flexibility is required by some stations to get precisely the sound that they want and need for their competitive market.

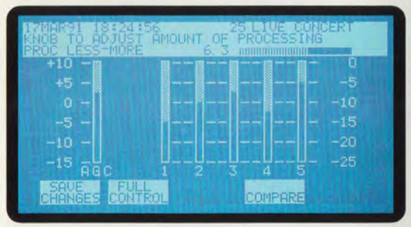


RECALL any one of the factory installed or station installed presets. They can be recalled from the front panel or from a local or remote computer. Or they can be automatically recalled on a programmed schedule.

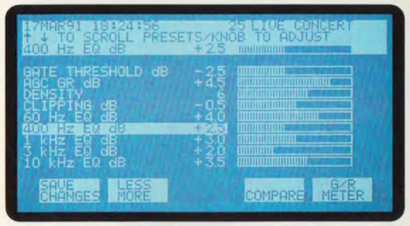
Many stations, however, just set the controls to one of the factory's recommended settings. So with the 8200, the factory recommended settings are built-in. Each MVP structure can be easily adjusted with just one control, LESS<>MORE, to access hundreds of factory recommended settings. Using LESS<>MORE precisely tunes all of the processing parameters together to produce more or less processing, with all parameters ideally set.

Easy to Customize.

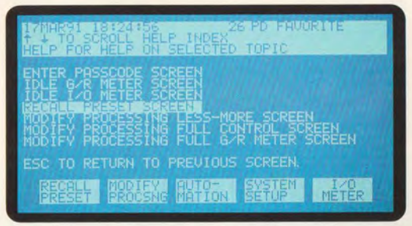
Create a custom sound by using FULL CONTROL to fine-tune each parameter individually. Then store the adjustments for this sound as a Station Installed Preset.



LESS<>MORE: Adjust all audio parameters with one control. Turn toward LESS for a smooth, easy, less-processed sound. Turn toward MORE for a louder, punchier, more-processed sound. LESS<>MORE is like a hundred factory settings. Getting the sound you want is as easy as turning one knob.



FULL CONTROL: For the engineer who wants to customize, FULL CONTROL allows access to every user-adjustable parameter in each MVP structure.



HELP is always available with the push of a button. Push HELP and a message will tell you what you are looking at on the screen, what can be done and how to do it. Or scan the Help Index that will direct you to instructions for any operation. Everything you need is on the screen.

Save up to 32 PRESETS to recall at any time. Recall a PRESET from the front panel, by remote contact closure, or by computer interface.

Automatic Preset Switching.

This feature changes the 8200's processing on a programmed schedule. It is ideal for dayparting—changing the processing to meet the requirements of drive time, mid-day at the office, or serious evening listening. Automatic Preset Switching allows stations that broadcast different formats to optimize the processing to the programming throughout the day.

User-Friendly Interface.

A large Liquid Crystal Display (LCD) makes setup, adjustment and programming of the 8200 easy. The screen clearly shows all metering functions of the Modular Variable Processing structure in use.

Push one of the clearly labeled softkeys to RECALL a preset, to MODIFY processing, to program Automatic Preset Switching, or to access system SETUP.

HELP is always available at the push of a button. If you get lost, ESC will always bring you back home. There is no need to find a complex instruction manual to adjust and program the 8200. Step-by-step instructions are on the screen.

Upgrade and Expand.

MVP structures and the control system program are stored on a plug-in module, making the 8200 easily upgradable.

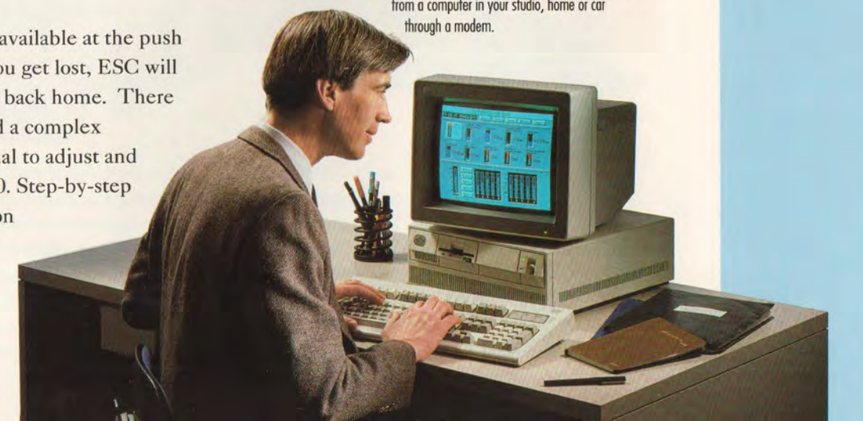
DSP cards can be added as needed when future software upgrades and additional processing structures require more processing power.

Since all processing is accomplished through software, the 8200 will always be upgradable. Change your sound by changing the software, not the audio processor!

Versatile Control.

OPTIMOD-FM 8200 can be easily controlled from the front panel. Connect it to your current transmitter remote control and select up to eight presets. Or connect it to an IBM-compatible PC, using optional software, to get full control with on-screen displays. With a standard computer modem, the 8200 can be controlled from a computer in your studio, your home, or even your car.

Using optional software, OPTIMOD-FM 8200 can be fully operated from an IBM-compatible PC. Anything that can be done from the 8200's front panel can be done from a computer in your studio, home or car through a modem.



The Motorola DSP56001 is a special purpose, programmable digital signal processing chip that handles the most difficult audio calculations at the lightning speed of 13.5 Million Instructions Per Second (MIPS). Six to twelve DSP56001 digital signal processors are used in the 8200, depending upon the configuration.

Modular Variable Processing (MVP) Structures.

With conventional analog processing, multiple structures require multiple boxes. With the MVP architecture, processing structures can be changed with the push of a button! OPTIMOD-FM 8200 can be...

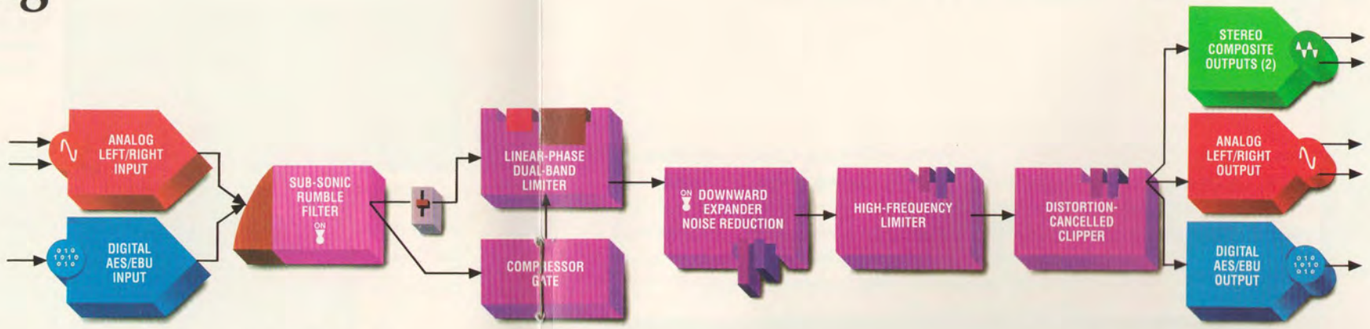
...a protection processor, for extremely effective modulation control that is totally inaudible;

...a two-band processor, for adult-oriented formats requiring a consistent, yet transparent sound;

...a multi-band processor for major market "competitive" processing.

An OPTIMOD 8200 can be purchased with any or all of our currently available MVP structures. MVP preprocessors are now under development for delivery soon.

PROTECTION MVP

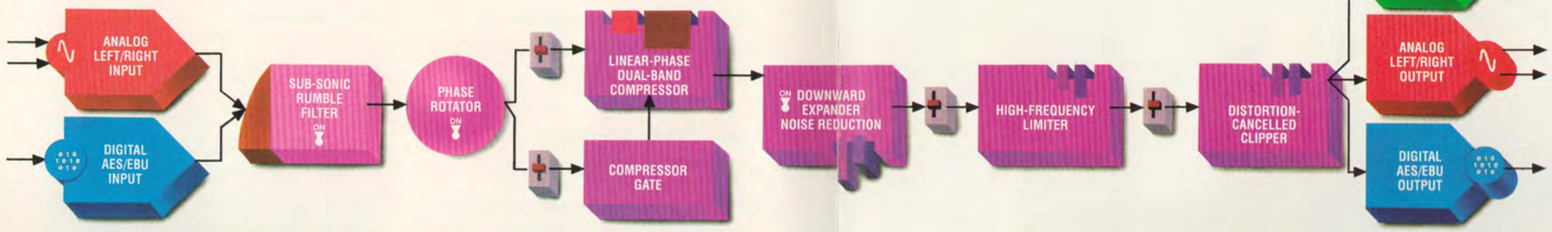


The Protection MVP is similar in operation to the Orban 4000A Transmission Limiter. It is ideal for broadcasting classical music with its full dynamic range, or for any other programming where absolute transparency of processing is desired.

Operate the Protection MVP below the threshold of limiting for all but the crescendos or for reducing dynamic range, and the sound on the air will be virtually indistinguishable from the original.

Of course, the Protection MVP is not true "processing." It will not make the program loud—it prevents overmodulation, and does so without the nasty "artifacts" typical of conventional peak limiters.

TWO-BAND MVP

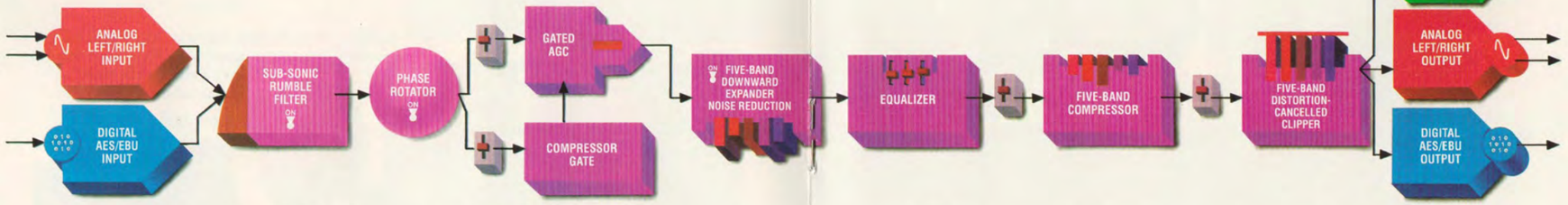


The Two-Band MVP is similar to the Orban 8100A processing that has helped make thousands of stations successful—with the added features of noise reduction and improved high-end transparency.

The dynamic range of modern recordings can be so wide that when listening levels are adjusted for comfortable loudness on loud passages, softer passages are impossible to hear during drive or daytime hours.

The Two-Band MVP produces an open and natural sound, whether used merely for light control over levels, or for the heavier processing often desired for some popular music formats. It can be easily set up to maintain high fidelity to the source material, or to create a sound that is loud and dense.

MULTI-BAND MVP



The new Multi-Band MVP is the ultimate processing for the competitive major market sound. Designed by Bob Orban and Greg Ogonowski, it gives your station more punch, more consistency, more presence, and more brightness, without pumping or voice distortion.

The Multi-Band MVP lets you set the speed limit. FAST creates a synthetic sound, an illusion, a sound that is distinctly different. A sound with lots of punchy dynamic bass, lots of up-front presence, lots of unrestricted transparent bright highs. Vocals stand out. It is the ultimate sound for Contemporary Hits Radio (CHR).

SLOW creates a very open sound with slow adjustment of frequency balance for consistency. There is a distinct improvement in clarity—the sound is very life-like. SLOW produces the effect of a wide dynamic range. But make no mistake, SLOW is a loud sound, competitive in any market. Ideal for adult contemporary, beautiful music and talk formats.

With Multi-Band MVP you can equalize the frequency balance, and control the amount of wideband AGC, multi-band compression (density), clipping and noise reduction.

Upgrade and Expand.

MVP structures and the control system program are stored in a plug-in module, which makes the 8200 easily expandable. Add DSP cards as needed when future software upgrades and additional MVP structures require more processing power.

Since all processing is accomplished through software, the 8200 will always be upgradable. Change your sound by changing the software, not the audio processor.

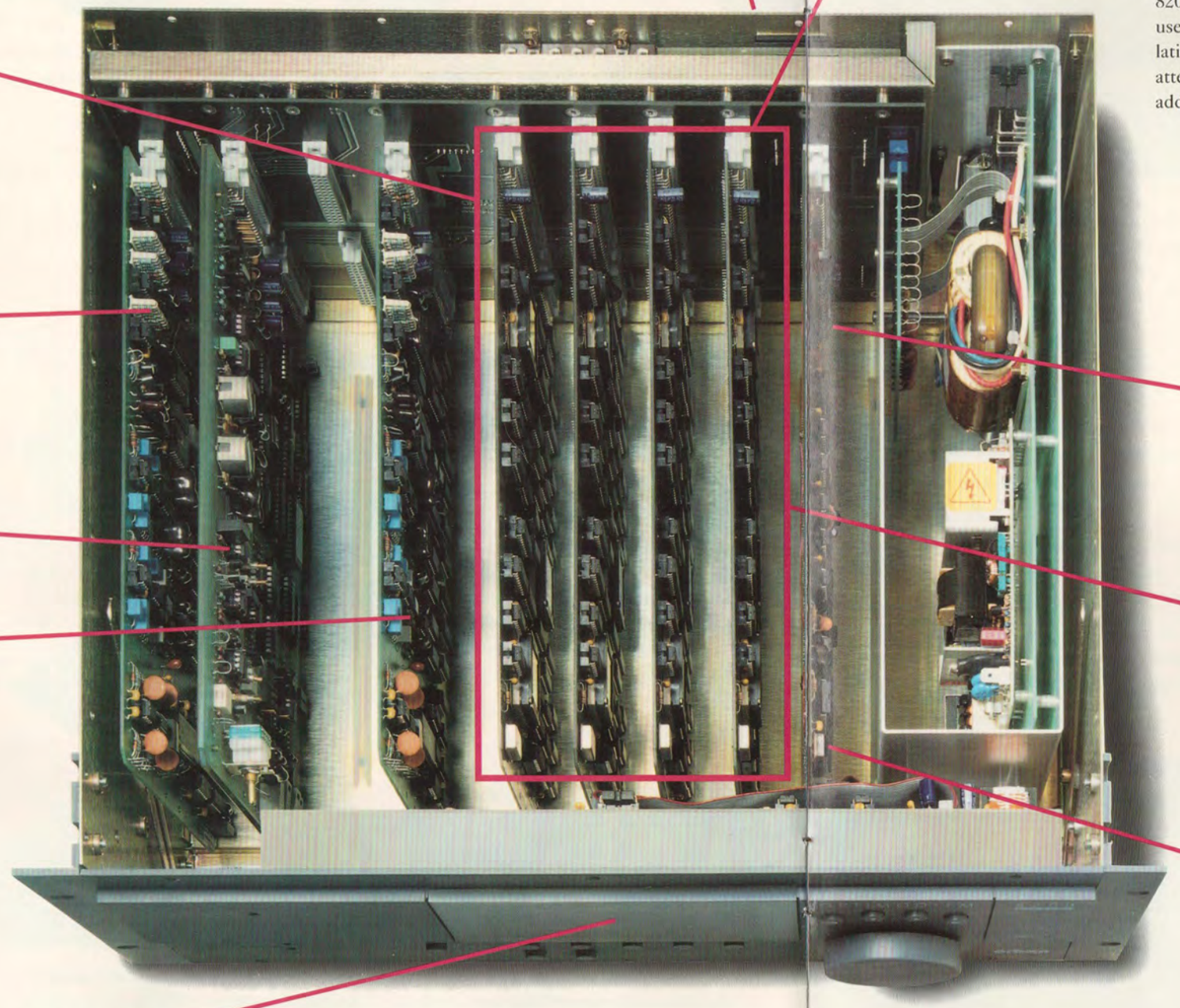
Take a Tour of the OPTIMOD-FM 8200.

Serviceability
The 8200 is fully modular. All electronics, including the power supply, are contained on plug-in cards or modules for ease of service or exchange.

Versatile Remote Control Interface
Use your existing transmitter remote control to activate one of eight pre-assigned processing presets. Or connect an IBM-compatible computer locally, or from your studio via modem.

Outstanding Peak Control to Prevent Over-modulation
Peak limiting is inherently more difficult to do in digital than in analog. It took Orban's experienced DSP engineers more than two years to develop the algorithms that allow the 8200 to achieve its extremely tight peak control. With the 8200, there's no need to use "tricked-up" modulation monitors in an attempt to achieve additional loudness.

DSP Algorithms
Full Digital Signal Processing gave Orban's engineers the opportunity to take a fresh, new approach to audio processing technology. They started with the signal processing qualities that made our analog OPTIMOD-FM so successful, improved upon them using digital design, then added new features and functions not possible in analog.



Stereo Encoder
Orban's Digital Hadamard Transform Baseband Encoder™ produces an extremely well-controlled spectrum, with vanishingly low noise and distortion and outstanding separation.

Analog Input/Output
Stereo analog balanced inputs and outputs are standard.

Digital Input/Output
An optional Digital Input/Output Card provides stereo AES/EBU input and output at the standard sampling rates of 32kHz and 48kHz.

Security Protection
The 8200's controls can be locked out, requiring a passcode for access. Passcodes can be set for varying levels of access—from RECALL PRESET only to full setup and programming.

LCD Screen
A large Liquid Crystal Display (LCD) makes setup, adjustment and programming of the 8200 easy. The screen clearly shows all metering functions of the Modular Variable Processing structure in use. Only those controls related to what you are doing are shown.

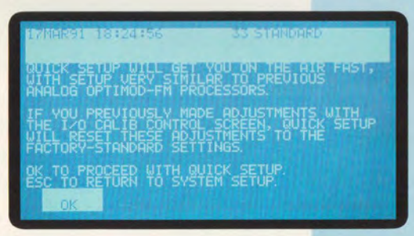
Expandability
The 8200 is expandable. Add more DSP processing power, as needed, to accommodate future software upgrades and new processing structures.

Non-volatile Memory
All user presets and setup information are doubly protected from memory loss by a long-life battery and by simultaneous storage to non-volatile memory. When you install software and/or hardware upgrades, non-volatile memory also safeguards all of your presets.

Tones
The line-up tone generator facilitates quick and accurate calibration of the 8200 for 100% modulation. Or use the Bessel-null tone for extremely accurate calibration of your modulation on a spectrum analyzer. Special presets breeze you through routine transmission system tests and "proofs."

Real-Time Clock
Built into the 8200 is a real-time clock that permits presets to be recalled at programmed times. An ideal feature for day-parting or for the multi-format station. It even adjusts for daylight savings time!

Automatic Preset Switching:
Recall processing presets on a programmed event schedule. This function is ideal for daypart processing or for multi-format stations.



QUICK SETUP
is a guided screen-by-screen walk-through for all required setup adjustments.

The Digital Future Starts Here.

OPTIMOD-FM 8200 is fundamentally better than any other broadcast audio processor. Given the success of the analog OPTIMOD-FM 8100A, that should come as no surprise. The 8200 is to digital broadcast processors what the original OPTIMOD was to every other processor on the market.

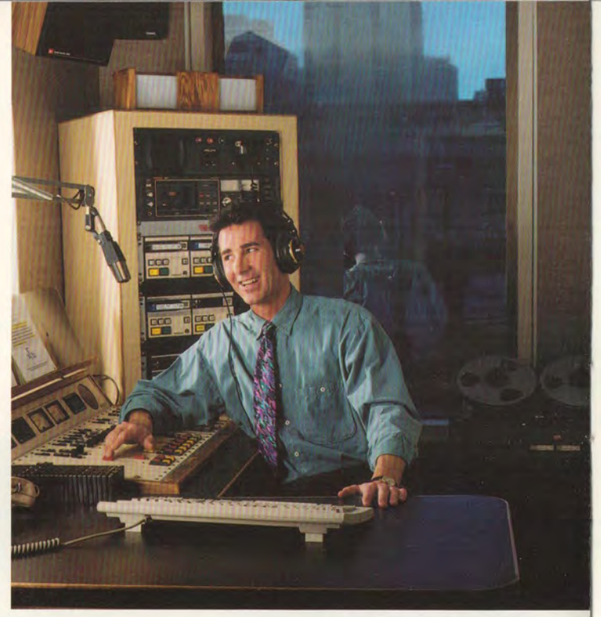
A quantum leap ahead.

The Bigger the Market, the Bigger the Bottom Line.

In the competitive FM market, stations live and die by the ratings. Ratings mean income, and the better the ratings, the better the income. That's a fact of life in the business. And there are three elements to achieving and maintaining high ratings: **programming**, fine-tuned to your target audience and market position; **reach**, to cover the widest geographic area; and **retention**, to hold an audience and get them to tune in again and again.

OPTIMOD-FM 8200 gives station management a powerful competitive weapon—to reach and retain the largest possible audience.

The 8200's fully-digital audio processing improves the quality, clarity and penetration of the successful "OPTIMOD sound" while adding changeable processing structures, programmability, expandability and a PC interface.



With OPTIMOD-FM 8200, your listeners will enjoy a clear, bright, appealing sound that is ideally processed for the format and easy to listen to for long periods of time.

What is the value of true digital processing and control? In addition to improving the quality of the processed signal, digital makes the OPTIMOD-FM more user-friendly, more programmable, more flexible. Simply put, because OPTIMOD-FM is easier to adapt to a station's programming needs, it will produce more benefit, more of the time, than was previously possible.

Limitless Possibilities.

The most important consideration in selecting an audio processor is what it can do for your station today. Nearly as important, however, is the room it allows for future growth. Room for growth means more than additional expansion slots that will accommodate more DSP chips or cards. It means the processor's fundamental ability to absorb and adapt to major technological innovations.

The 8200's digital processing power makes possible a spectrum of system flexibility, programmability, control and ease-of-use features never before available in any audio processor.

K101, San Francisco

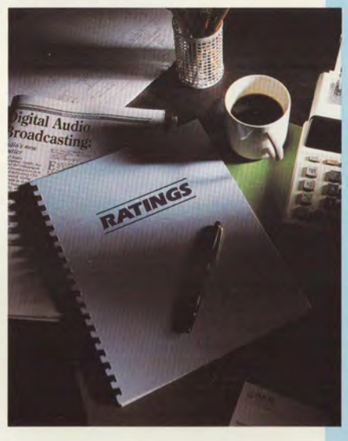
OPTIMOD-FM 8200 is such a machine. You can put it to maximum use today, but it also provides a platform for future breakthroughs in digital signal processing technology. It is an investment in the digital future.

Bottom Line Impact.

OPTIMOD-FM 8200 will have a direct, positive effect on your station's bottom line because:

- It will increase audience size and share with a strong, clear signal that will maximize modulation without risk of over-deviation.
- It will create an open and natural sound, ideally processed for your format or daypart, that will attract more listeners for longer periods of time.
- Its flexibility, programmability and ease of adjustment will cause it to be put to maximum use.

The secret to winning the ratings game is to create a sound that reaches the largest possible area and attracts and holds your desired audience at all times of the day. OPTIMOD-FM 8200 gives station management a powerful competitive weapon that easily and automatically tailors a station's sound to maximize market share.



- It will keep your capital equipment costs down with flexible digital technology that allows you to upgrade and expand.

No other digital signal processor in the world improves upon the sound of the original OPTIMOD-FM or delivers on the promise of digital control and ease-of-use. The 8200 does both.

Don't Be the Last in Your Market...

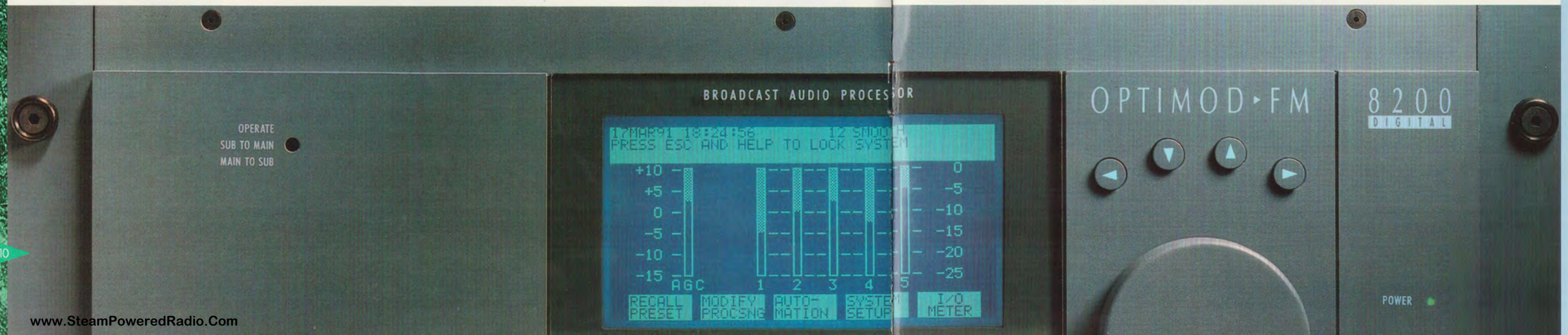
to take advantage of the power, potential and profitability of OPTIMOD-FM 8200. A personal, hands-on demonstration of the 8200 will give you the opportunity to hear, see and touch the future of audio processing.

OPTIMOD-FM 8200. A technological breakthrough with bottom line impact.

AKG stands for "Akustische U. Kino-Geräte." Established in 1947, this Austrian firm was started by two engineers and grew into a multinational company with 103 national representatives and distributors in nearly all countries of the world.

AKG is a major innovator, holding more than 1400 patents worldwide, including over 300 in fundamental areas of audio transduction and processing.

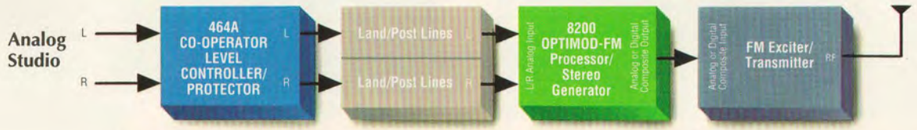
In April 1989, Orban, long known as the industry leader in broadcast audio processors, became an operating division of AKG Acoustics, Inc.



Common System Configurations.

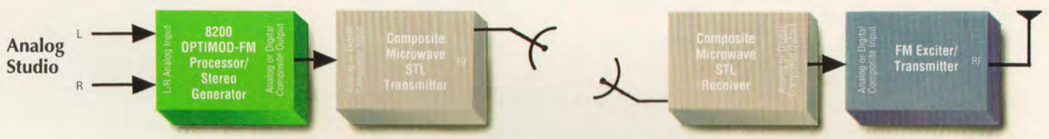
Co-located analog studio and analog or digital transmitter

Co-located digital studio and analog or digital transmitter

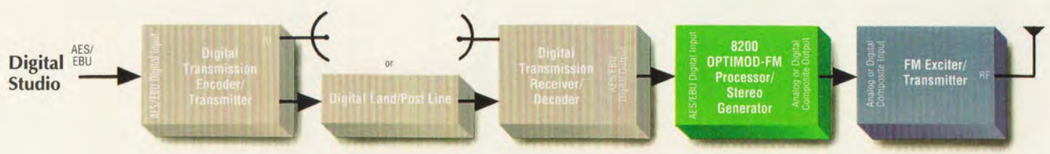


Program feed from analog studio to analog or digital transmitter via discrete analog land/post lines (or digital lines with analog left/right input/output)

Program feed from analog studio to analog or digital transmitter via left/right analog STL (or digital STL with analog left/right input/output)



Program feed from analog studio to analog or digital transmitter via composite analog or digital STL



Program feed from digital studio to analog or digital transmitter via digital microwave or land/post line

TECHNICAL INFORMATION and SPECIFICATIONS

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

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

Some of the specifications are for features that are optional or may not yet be available at the time you place your order. Consult the current price list for details.

Performance

Specifications for measurements from analog left/right input to stereo composite output and to analog left/right output are as follows:

Frequency Response (all structures, measured below gain reduction and clipping thresholds, high-pass filter off)**:** Follows standard 50µs or 75µs pre-emphasis curve ±0.20dB, 5Hz-15kHz. Analog left/right output and digital AES/EBU output can be user-configured for flat or pre-emphasized output.

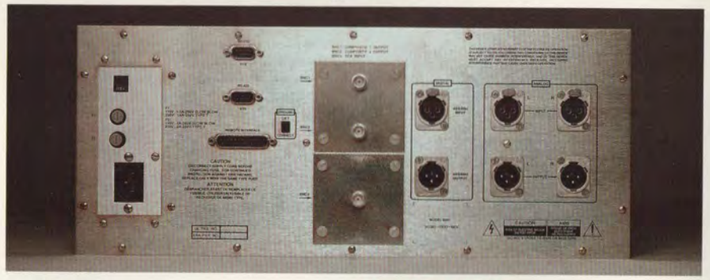
Noise: Output noise floor will depend upon how much gain the processor is set for (AGC and/or DENSITY), gating level, equalization, noise reduction, etc. It is primarily governed by the dynamic range of the A/D Converter, which has a specified overload-to-noise ratio of 97dB. The dynamic range of the digital signal processing is 144dB.

Total System Distortion (de-emphasized, 100% modulation)**:** Less than 0.01% THD, 20Hz-15kHz. Less than 0.01% SMPTE IM Distortion.

Total System Separation: Greater than 60dB, 20Hz-15kHz; 70dB typical.

Polarity (PROTECTION or TEST structure)**:** Absolute polarity maintained. Positive-going signal on input will result in positive-going signal on output.

A Revealing About-face...



Installation

ANALOG AUDIO INPUT

Configuration: Left and right.

Impedance: 600Ω or 10kΩ load impedance, electronically balanced, jumper selectable.

Common Mode Rejection:
Greater than 70dB at 50-60Hz.
Greater than 45dB 60Hz-15kHz.

Sensitivity: -30dBu to +10dBu to produce 10dB gain reduction at 1kHz.

Maximum Input Level: +21dBu.

Connector: XLR-type, female, EMI suppressed. Pin 1 Chassis, Pins 2 and 3 electronically balanced, floating and symmetrical.

ANALOG AUDIO OUTPUT

Configuration: Left and right. Flat or pre-emphasized.

Source Impedance: 30Ω, ±5%, electronically balanced and floating.

Load Impedance: 600Ω or greater, balanced or unbalanced. Termination not required.

Maximum Output Level: +24dBu into 600Ω or greater balanced load.

Connector: XLR-type, male, EMI suppressed. Pin 1 Chassis, Pins 2 and 3 electronically balanced, floating and symmetrical.

DIGITAL INPUT

Configuration: Two-channel AES/EBU-standard.

Sampling Rate: 32kHz or 48kHz, automatically selected.

Connector: XLR-type, female, EMI suppressed. Pin 1 Chassis, Pins 2 and 3 transformer balanced and floating.

DIGITAL OUTPUT

Configuration: Two-channel AES/EBU-standard.

Sampling Rate: 32kHz or 48kHz, automatically selected, following the AES/EBU digital input sampling rate.

Connector: XLR-type, male, EMI suppressed. Pin 1 Chassis, Pins 2 and 3 transformer balanced and floating.

SCA SUBCARRIER INPUT

Configuration: Subcarrier input sums into composite baseband outputs.

Input Impedance: 600Ω.

Sensitivity: 1.0Vp-p for 10% modulation of main carrier.

Connector: BNC, floating over chassis ground. EMI suppressed.

COMPOSITE BASEBAND OUTPUTS

Configuration: Two (2) outputs, each with independent OUTPUT level control, output amplifier and connector.

Source Impedance: 0Ω voltage source or 75Ω, single ended, floating over chassis ground. Jumper selectable.

Load Impedance: 37Ω or greater. Termination not required.

Level (0Ω source impedance, 75Ω or higher load impedance)**:** Adjustable 0-8.0Vp-p with multi-turn OUTPUT LEVEL control.

Connector: BNC, floating over chassis ground. EMI suppressed.

Maximum Recommended Cable Length (0Ω source impedance)**:** 100ft/30m RG-58A/U. Maximum permitted load capacitance 0.047µF.

DIGITAL COMPOSITE OUTPUT

Configuration: To interface directly to digital FM transmitters. Sampling rate, other interface details and connector to be determined.

PILOT REFERENCE OUTPUT

Configuration: Buffered square-wave reference for RDS or other subcarrier services.

Source: HCMOS logic level output, 0-5V peak.

Connector: On Remote Control Interface. DB-25, EMI suppressed.

REMOTE COMPUTER INTERFACE

Configuration: RS232 and RS422 interfaces to connect to IBM PC-compatible computers, directly or via modem, for remote control and metering.

Connector—RS232: DB-9, EMI suppressed.

Connector—RS422: DB-9, EMI suppressed.

REMOTE CONTROL INTERFACE

Configuration: Eight (8) inputs. User programmable to select any eight of: user presets, factory presets, stereo, mono left, mono right, reduction of modulation for SCA 1 ON, reduction of modulation for SCA 2 ON.

Voltage: 6-24VAC or DC, momentary or continuous, optically isolated. 12VDC provided to facilitate use with contact closure.

Connector: DB-25, EMI suppressed.

POWER

Requirements: Switch selectable on the rear panel, 90-130VAC or 200-250VAC, 50-60Hz; 50VA.

Connector: IEC; detachable 3-wire power cord supplied. AC is EMI suppressed.

Ground: Circuit ground is independent of chassis ground; can be isolated or connected with a rear panel switch.

Safety Standards: IEC65, UL, CSA.

DIMENSIONS

19in/48.3cm wide, 7in/17.8cm high, 15in/38.1cm deep. 4 rack units.

ENVIRONMENTAL

Operating temperature range 32-122°F/ 0-50°C Humidity 0-95% RH, non-condensing.

Setup and Operation

HELP Button: Available at all times. Push HELP, and a message will tell you what you are looking at on the screen, what can be done and how to do it.

HELP Index: Available at all times from the HELP screens. Complete listing of and access to all help messages.

SYSTEM SETUP

Function: Initial setup.

Controls: Studio chassis yes/no (defeats AGC), Pre-emphasis 50µs or 75µs, line-up (0VU or PPM reference) to clip level, I/O meters indicate reference or clip level at full scale, analog left/right input levels, analog left/right output levels, analog outputs flat or pre-emphasized, modulation compensation for STL or exciter overshoot, reduction of modulation for SCA 1 ON and reduction of modulation for SCA 2 ON.

QUICK SETUP

Function: Guided screen-by-screen setup for all required setup adjustments.

ON-SCREEN METERING

Metering can be switched to indicate gain reduction (G/R) or input/output levels (I/O).

Gain Reduction (G/R): Shows gain reduction of AGC, compressors, high-frequency limiters, and gate on/off, as appropriate to the Modular Variable Processing structure selected.

Input/Output (I/O): Left analog input (dB), right analog input (dB), left analog output (dB), right analog output (dB), composite output (% modulation). If digital I/O board is installed, metering can be switched to indicate digital I/O levels.

Pilot: 7.5-10%, in 0.5% steps.

PRESET PROGRAMMING

Function: Save processing settings for recall from the front panel, by remote control, by remote computer or by Automatic Preset Switching.

Number of User Presets: 32.

TEST PRESETS

BYPASS and G/R DEFEAT Presets: A variety of presets are available to make both US FCC-style Proof of Performance measurements and international system tests.

TONE Preset: Frequency programmable 30Hz-15kHz. Level programmable 0-133% total modulation.

BESSEL NULL TONE Preset: Frequency 13.5868kHz. Level 100% modulation. Produces 75kHz deviation on the second Bessel null.

AUTOMATIC PRESET SWITCHING

Function: Changes presets on a programmed event schedule.

Programming: Date (daily, specific day or days of the week, specific date), time, preset number.

PASSCODE SECURITY

Function: To prevent unauthorized adjustment of controls by persons without passcodes.

Number of Passcodes: 10.

Access: Each Passcode can be programmed to permit or deny access via front panel or computer to RECALL PRESET, MODIFY PROCESSING, AUTOMATION (Automatic Preset Switching) and/or SYSTEM SETUP.

REMOTE CONTROL WITH ORBAN 8200/PC REMOTE CONTROL SOFTWARE

Metering: Same as ON-SCREEN METERING, above.

Control: All user-adjustable processing parameters and Preset functions.

Circuit Characteristics

ANALOG-TO-DIGITAL CONVERTER

A/D Converter subject to change as technology improves.

Device: Crystal 5328 18-bit A/D Converter.

Performance: 97dB dynamic range (overload-to-noise ratio), per manufacturer's specifications.

DIGITAL SIGNAL PROCESSING

Device: Motorola DSP56001.

Performance: 24-bit processing. 144dB internal dynamic range.

DIGITAL INPUT CONDITIONING

Sub-sonic Fiter: Switchable in/out third-order Chebychev with 30Hz cutoff and 0.5dB pass-band ripple; -0.5dB @ 30Hz, -10.5dB @ 20Hz, -31.5dB @10Hz.

Time Dispersion Network: Switchable in/out all-pass network to make speech more symmetrical to reduce processing distortion.

DIGITAL OUTPUT CONDITIONING

Passband Response: Typically +0, -0.1dB to 15kHz.

Stopband Rejection (referenced to 100% modulation)**:** To reduce spectrum in stereo composite baseband above 57kHz to less than -75dB.

DIGITAL-TO-ANALOG CONVERTER

Device: Analog Devices AD1864.

Performance: 18-bit. 4X over-sampled output. Linear-phase reconstruction filters.

PILOT

Frequency: 19kHz.

Stability: ±0.005%. Contact the factory if greater stability is required for special applications.

Injection: Adjustable, 7.5-10%.

STEREO BASEBAND GENERATOR

Noise (de-emphasized, referenced to 100% modulation)**:** Less than -100dB, 20Hz-15kHz.

Distortion (de-emphasized, 100% modulation)**:** Less than 0.005% THD, 20Hz-15kHz; less than 0.005% SMPTE Intermodulation Distortion.

Stereo Separation: Greater than 60dB, 20Hz-15kHz; 70dB typical.

Crosstalk—Linear (referenced to 100% modulation)**:** Less than -75dB, main channel to sub-channel or sub-channel to main channel.

Crosstalk—Non-linear (referenced to 100% modulation)**:** Less than -80dB, main channel to sub-channel or sub-channel to main channel.

38kHz Sub-carrier Suppression (referenced to 100% modulation)**:** Greater than 70dB; 75dB typical.

76kHz and Sideband Suppression (referenced to 100% modulation)**:** Greater than 70dB.

CIT-25 Composite Isolation Transformer

Ground loops are a problem in some transmitter plants. A ground loop among OPTIMOD-FM and one or more exciters may occur, causing an increase in hum and noise. This is especially likely when OPTIMOD-FM is installed some distance from the exciter.

The Composite Isolation Transformer provides the solution. Designed to be installed adjacent to each exciter, it provides ground loop isolation between the OPTIMOD-FM composite output and the exciter, and presents OPTIMOD-FM with a balanced floating load.

Performance

Frequency Response: +0.01, -0.03dB, 30Hz-53kHz.

Group Delay: Deviation from linear phase less than ±0.3°, 30Hz-53kHz.

Separation: Greater than 50dB, 30Hz-10kHz, greater than 45dB, 10kHz-15kHz.

Gain: Adjustable from full attenuation to 0dB.

Installation

LOCATION

As close to FM exciter as practical.

INTERCONNECT BETWEEN OPTIMOD-FM AND TRANSFORMER

Interface at OPTIMOD-FM: Adapter cable, BNC male to 3-pin XLR-type male cable connector supplied.

Cable: Two-conductor foil shielded audio cable, Belden 8451 or equivalent. Maximum length 50ft/15m. 3-pin XLR-type male and female cable connectors supplied.

COMPOSITE BASEBAND INPUT

Connector: 3-pin XLR-type female. Pin 1 capacitively coupled to chassis, Pins 2 and 3 transformer balanced, floating and symmetrical.

Maximum Level: 4.4Vp-p.

COMPOSITE BASEBAND OUTPUT

Connector: BNC, shell insulated from chassis.

INTERCONNECT BETWEEN TRANSFORMER AND EXCITER

Maximum Recommended Cable Length: 6ft/1.8m RG-58A/U cable or similar, to avoid excessive RF pick-up on cable. Cable supplied.

Exciter Input: 1kΩ or greater; 1000pF or less. Replace 50Ω or 75Ω termination resistor, if present, with 1kΩ resistor, supplied.

DIMENSIONS

7in/17.8cm wide, 3in/7.6cm high, 1.72in/4.4cm deep.

Warranty

AKG Acoustics, Inc. warrants Orban products against defects in material and workmanship for a period of one year from the date of original purchase for use, and agrees to repair or, at our option, replace any defective item without charge for either parts or labor.

This warranty is valid for the original purchaser only.

This warranty does not cover damage resulting from accident, misuse or abuse, lack of reasonable care, the affixing of any attachment not provided with the product, loss of parts or inadequate repairs performed by unauthorized service centers.

Subject to limitations stated in our United States Limited Warranty and Standard International Warranty.

Orban engineers are constantly working to improve the quality of our products. Specifications are, therefore, subject to change without notice.

Your Stand-Alone Stereo Encoder May Be Hurting Your Sound.

OPTIMOD-FM's built-in stereo encoder will give you much more loudness with better peak control than any other encoder.

The analog left/right outputs of OPTIMOD-FM contain a signal that is precisely and absolutely high-frequency and peak-controlled. But this carefully peak-controlled audio is not peak-controlled by the time it reaches the output of a typical encoder. A stand-alone stereo encoder includes pre-emphasis networks, low-pass filters, sometimes high-pass filters, and maybe even input transformers. These networks typically cause overshoots of 35 to 50%. On some program material they can cause overshoots of up to 6dB!

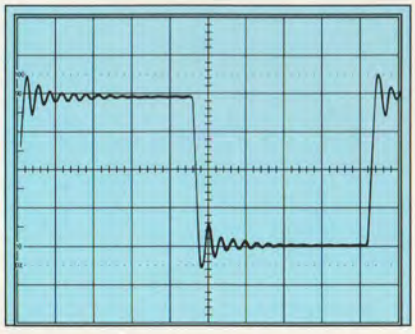


Figure 1: Typical response of uncompensated low-pass filter showing significant overshoot. (1kHz square wave)

To prevent over-modulation by these peaks, the output of the processor must be reduced by a complementary amount, which greatly reduces average loudness.

The external encoder's pre-emphasis network boosts high frequencies to either the 75µs or 50µs standard curve. In OPTIMOD-FM, the audio is pre-emphasized in the high-frequency limiter. When using an external encoder, the left/right output of OPTIMOD-FM is usually de-emphasized to provide the standard flat output. So the audio goes through three networks: pre-emphasis, de-emphasis, pre-emphasis. If they do not *precisely* match in frequency response *and* phase response—and they rarely do—the shape of the program waveform is distorted, producing overshoots.

In an external encoder, low-pass filters protect the 19kHz pilot and prevent distortion caused by aliasing-related non-linear crosstalk. Unfortunately, in most encoders, these filters are not compensated to achieve ideal group delay characteristics. So they too distort the *shape* of the program waveform as it passes through, producing overshoots —3dB is typical!

High-pass filters at 25-30Hz are sometimes included to protect the exciters' AFC. These filters add 35% overshoot! Input transformers add another 5-10% overshoot if their low-frequency response doesn't extend down to 0.3Hz or less. Most do not.

You will not see these overshoots if you measure the encoder with sine waves. But no one listens to sine waves. The overshoots will show up on square waves and program material. And they will cost your station valuable average modulation level.

OPTIMOD-FM's integrated system concept permits a different approach.

The OPTIMOD-FM system integrates the stereo encoder with the audio processor to achieve the highest average *and* peak modulation levels with the least amount of audible compression and peak limiting, compared to any other FM processor/encoder system.

The pre-emphasis networks and low-pass filters in OPTIMOD-FM are placed *before* the final peak protection circuitry. There is nothing between the peak protection circuitry and the stereo encoder to change the shape of the waveform.

The 30Hz high-pass filtering required to protect some exciters is also included.

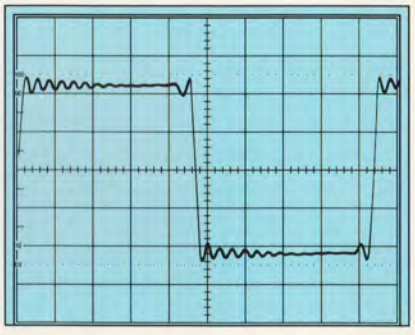


Figure 2: OPTIMOD-FM's overshoot compensated filter showing negligible overshoot. (1kHz square wave)

So by using OPTIMOD-FM's built-in encoder, instead of OPTIMOD-FM's left/right output into an external encoder, your station can be substantially louder—by 35% or more! And usually substantially brighter as well.

orban

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Radio Broadcast Products
USA Suggested Introductory List Prices

Effective April 15, 1991

OPTIMOD®-FM 8200

		USA INTRODUCTORY LIST PRICE
8200/U2S	OPTIMOD-FM 8200 DIGITAL with two DSP cards, stereo coder, Protection Structure, Two-band Purist Structure, Two-band Processing Structure, 120V, switchable 50µ or 75µ.	$7,400.00
8200/E2S	OPTIMOD-FM 8200 DIGITAL with two DSP cards, stereo coder, Protection Structure, Two-band Purist Structure, Two-band Processing Structure, 230V, switchable 50µ or 75µ.	$7,400.00
8200/U3S	OPTIMOD-FM 8200 DIGITAL with three DSP cards, stereo coder, Protection Structure, Two-band Purist Structure, Two-band Processing Structure, Multi-band Structure, 120V, switchable 50µ or 75µ.	$9,820.00
8200/E3S	OPTIMOD-FM 8200 DIGITAL with three DSP cards, stereo coder, Protection Structure, Two-band Purist Structure, Two-band Processing Structure, Multi-band Structure, 230V, switchable 50µ or 75µ.	$9,820.00

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