

orban

Manual Addendum

8200 Version 3.0 Upgrade

For OPTIMOD-FM 8200 Digital

8200 Version 3.0 Manual Addendum

New Format Presets

Insert the following page, titled “New Format Presets In Version 3.00,” into your 8200 Operation Manual, in Section 3, directly after the blue-tabbed “About Processing Structures” page, at page 3-9.

There are 21 new format-specific presets, each named for a programming format. There are two Urban/Rap presets, for instance, that add bottom-end slam to the sound. Three new Rock presets add punch and sizzle while Adult Contemporary and Country presets balance warmth and clarity, with up-front vocals that stand out. There are also presets for Pop, Classical, Instrumental, Jazz, Folk/Traditional, News, and Sports. There are even two Oldies presets that ensure consistent sound balance with material from different eras. Programmed by Bob Orban and Greg Ogonowski, each preset has full LESS-MORE capability.

Multi-Band Controls

Insert the following “New Multi-Band Features For Version 3.00” pages into your 8200 Operation Manual, in Section 3, at the end of the discussion on “The Multi-Band Structure,” directly preceding the red-tabbed “Screen Displays” page.

New controls include: High Frequency Coupling, Multi-Band Output Mix controls, Bass Clip Threshold, and Phase Rotator In/Out. The range for the existing Final Clip Drive has also been extended.

D-O Status Enable?

[Yes] or [No]

For 8200s equipped with the 8200 D/SRC, the 8200's controls now include a switch that allows you to defeat Orban's special implementation of AES/EBU status bits which are used to control Orban 8208 and 8218 Stereo Encoders. This special implementation may be defeated to accommodate certain digital STLs that misinterpret these status bits.

Beginning with V 1.20 software and revision 3.0 of the 8200D/SRC Digital I/O board, the 8200 set the emphasis bits in the AES/EBU status bits (byte 0, bits 2 through 4) according to an Orban proprietary standard that extends the AES/EBU official definition. The Orban standard allows the 8200 to automatically set the 8218 (and 8208) Stereo Encoder's emphasis/de-emphasis to complement the 8200's emphasis/de-emphasis.

<u>Byte 0 Bits 2-4</u>	<u>AES/EBU Definition</u>	<u>8200 Implementation</u>	<u>8218 Response</u>
000	not indicated	not indicated	applies FM pre-emphasis
001	undefined	undefined	doesn't alter emphasis
010	undefined	undefined	doesn't alter emphasis
011	undefined	undefined	doesn't alter emphasis
100	no emphasis	no emphasis	applies FM pre-emphasis
101	undefined	J.17+FM pre-e*	applies J.17 de-emphasis
110	50/15 μ s	FM pre-e*	doesn't alter emphasis
111	J.17	J.17	applies J.17 de-emphasis and FM pre-emphasis

* FM pre-emphasis is 50 or 75 μ s

Since the implementation of the Orban standard, some digital STLs were released that misinterpret these status bits. Some respond to the AES/EBU emphasis bits (110) by applying an EIAJ (50/15uS) shelving de-emphasis. This will cause an audible (10.5 dB) loss of high frequencies. Version 3.00 software allows the user to enable- or disable the Orban implementation of status bits. When disabled, the 8200 sends status bits identifying that emphasis is "not indicated," which ensures that the affected digital STLs will not inappropriately apply EIAJ de-emphasis.

When these digital STLs are used in combination with an 8200 and 8218 (or 8208), DO STATUS ENABLE must be set to No, and the 8218 (or 8208), cannot utilize the "AES determines emphasis" feature.

PC Security Enable

[On] or [Off]

The OPTIMOD 8200 with software Version 3.00 or higher, can be controlled with a computer utilizing RS-232 and the Orban supplied 8200PC software for Microsoft Windows, or through binary commands.

The Orban 8200PC software offers full access to all 8200 features, while the binary communications method can only recall presets.

When set to On (default), this control allows remote control of the 8200 through RS-232 communications, only with the Orban supplied 8200PC software for Microsoft Windows. Access to the 8200 is the same as under Version 1.2x.

When set to Off, this mode disables all password protection entirely. PC access using binary commands is allowed for recalling presets only. Complete control by 8200PC is still allowed, however password protection is

disabled. Please note that in this mode, unauthorized access is possible, so take measures to insure that a secure link is used to the 8200. Concurrent 8200PC and binary communications method is not possible.

The binary communications method is intended to be used primarily by programmers for third-party software development. Orban Customer Service will supply a developer's white paper upon request. We cannot, however, provide any technical support for third-party software.

New Format Presets In Version 3.00

The 21 named format presets in Version 3.00 are entirely new. They exploit new Version 3.00 features, including the OUTPUT MIX controls for the 5-Band Limiter and the HIGH FREQUENCY COUPLING control. They apply appropriate amounts of BASS, PRESENCE, and BRILLIANCE equalization.

Of these 21 presets, five are duplicates because we felt that they were appropriate for more than one format. So there are actually 16 distinct and different presets. Each preset has full LESS-MORE Capability. The table below shows the presets, including the source presets from which they were taken and the nominal LESS-MORE setting of each preset.

Many of the presets come in several “flavors,” like “dense,” “medium,” and “open.” These refer to the density produced by the processing. “Open” uses SLOW multi-band release time, “Medium” uses MEDIUM-SLOW release, and “Dense” uses MEDIUM-FAST. FAST release is only used in the NEWS/TALK and SPORTS presets.

Important! These presets are only suggestions. Try using the LESS-MORE control to trade off loudness against processing artifacts and side effects. Once you have used LESS-MORE, save your edited preset as a USER PRESET.

Do not be afraid to experiment with presets other than the ones named for your format if you think these other presets have a more appropriate sound. Also, if you want to fine-tune the frequency balance of the programming, feel free to enter FULL CONTROL and make small changes to the BASS, PRESENCE, and BRILLIANCE controls. Remember to do this after you have decided on a LESS-MORE setting that's right for you. Once you have edited a preset using FULL CONTROL, LESS-MORE is no longer available for that edited preset. (Of course, LESS-MORE is still available for the unedited preset if you want to go back to it. There is no way you can erase or otherwise damage the factory presets. So feel free to experiment.)

##	PRESET NAME	SOURCE PRESET	NORMAL LESS-MORE
FB	GENERAL-MEDIUM	ADLT CONTEMP-MED	5.0
FC	GENERAL-OPEN	ADLT CONTMP-OPEN	5.0
FD	URBAN/RAP-DENSE	URBAN/RAP-DENSE	7.0
FE	URBAN/RAP-MEDIUM	URBAN/RAP-MEDIUM	7.0
FF	ROCK-DENSE	ROCK-DENSE	7.0
FG	ROCK-MEDIUM	ROCK-MEDIUM	7.0
FH	ROCK-OPEN	ROCK-OPEN	7.0
FI	ADLT CONTEMP-MED	ADLT CONTEMP-MED	5.0
FJ	ADLT CONTMP-OPEN	ADLT CONTMP-OPEN	5.0
FK	COUNTRY-MEDIUM	ADLT CONTEMP-MED	5.0
FL	COUNTRY-OPEN	ADLT CONTMP-OPEN	5.0
FM	POP-DENSE	POP-DENSE	5.0
FN	POP-MEDIUM	POP-MEDIUM	5.0
FO	POP-OPEN	POP-OPEN	5.0
FP	JAZZ	JAZZ	5.0
FQ	INSTRUMENTAL	JAZZ	5.0
FR	OLDIES-DENSE	OLDIES-DENSE	7.0
FS	OLDIES-OPEN	OLDIES-OPEN	7.0
FT	FOLK/TRADITIONAL	POP-MEDIUM	5.0
FU	NEWS/TALK	NEWS/TALK	5.0
FV	SPORTS	SPORTS	5.0

ROCK: The ROCK presets are designed for a bright high end and punchy low end (although not as exaggerated as the URBAN/RAP presets). There is enough presence energy to ensure that vocals stand out. A modest amount of HIGH FREQUENCY COUPLING allows reasonable amounts of automatic HF equalization (to correct dull program material), while still preventing exaggerated frequency balances and excessive HF density. These presets are appropriate for general rock and contemporary programming. For Contemporary Hit Radio (CHR) we recommend the DENSE or MEDIUM versions. For Album-Oriented Rock (AOR) use ROCK-MEDIUM or OPEN, although you might prefer the more conservative Adult Contemporary presets here.

URBAN/RAP: The URBAN/RAP presets are similar to the ROCK presets, but with more bass. They use the 3-pole (18dB/octave) shape on the bass equalizer. They are appropriate for Urban, Rap, Black, R&B, Dance and other similar formats.

ADLT CONTEMP: The Adult Contemporary presets are a compromise between ROCK and POP. They have a gentle bass and treble lift, along with enough presence energy to help vocals to stand out. This preset is also used for COUNTRY, and is a useful candidate for AOR formats.

POP: POP is a more conservative preset designed for a mellow, open high end. There is substantial HIGH FREQUENCY COUPLING to ensure that the high frequencies do not become dense. This is an ideal preset for formats designed primarily for women listeners (who, by and large, dislike hyped treble) or for any preset designed for long time-spent-listening formats because of its open, clean sound, which leads to very low listener fatigue. Because of its conservative nature, this preset is also used for the FOLK/TRADITIONAL preset.

OLDIES: OLDIES is similar to ROCK except HIGH FREQUENCY COUPLING is less. This allows the preset to do substantially more automatic equalization than ROCK, making recordings of different eras more uniform. OLDIES-OPEN might be a useful alternative to FOLK/TRADITIONAL if the recordings being played are very inconsistent in frequency balance.

JAZZ: JAZZ is quite similar to POP, and is specifically tailored toward stations that play mostly instrumental music. It has a relatively mellow high end and produces very low listening fatigue.

NEWS/TALK: This preset is quite different from the others above. It is based on the FAST 5 Band Release Time setting, so it can quickly perform automatic equalization of substandard program material, including telephone. It is very useful for creating a uniform, intelligible sound from widely varying source material, particularly source material that is “hot from the field” with uncontrolled quality.

SPORTS: Similar to NEWS/TALK except the AGC RELEASE TIME is slower and the GATE THRESHOLD is higher. This recognizes that most sports programming has very low signal-to-noise ratio due to crowd noise and other on-field sounds, so the preset does not pump this up as the NEWS/TALK preset would tend to do.

New Multi-Band Features For Version 3.00

High Frequency Coupling Control (Band 3&4 Coupling)

High Frequency Coupling couples a certain percentage of the Band 3 gain control signal into Bands 4 and 5. This forces Bands 4 and 5 to follow the gain reduction in Band 3 to a user-adjustable extent. Because Band 3 has a slower release time than Bands 4 and 5, this results in a more open high end. It also limits the amount of dynamic HF boost that the processing can produce.

Even with the control at 100%, Bands 4 and 5 are still active and will produce further gain reduction if this is necessary to prevent distortion. So in this mode they are acting as a high frequency limiter.

Multi-Band Mix Controls (Band 1-5 Out Mix dB)

All of the equalization described so far occurs *before* the multi-band limiter. The advantage of this is that the multi-band limiter protects you against overloads or program material with unusual spectral balance, which might otherwise combine with your equalization curve to cause unpleasant distortion or coloration. In particular, it protects the final clipper from being overdriven.

However, the *downside* is that the “automatic equalization” effect of the multi-band limiter tends to fight equalization settings that you made with the various equalizer controls, reducing their effect. We have therefore provided a mix control with a ± 3 dB range at the *output* of each limiter in the five-band limiter.

These act as fixed equalizer controls because no gain reduction occurs after them. They determine the overall target spectral balance of the processing when the multi-band limiter exhibits substantial amounts of gain reduction. In popular music formats this is almost always the case.

Please note that these controls are *very risky*. The thresholds of OPTIMOD-FM's 5-band limiter and multi-band clippers were tuned at great length to ensure that under virtually no circumstances would program material come along to cause unpleasant clipping distortion in the following clippers. By adjusting the multi-band mix controls, you upset this carefully tuned relationship. Therefore, program material can come along that causes unexpected (and sometimes very nasty-sounding) distortion because the final clippers are being overdriven. This will occur if the program material in question has a significant part of its energy concentrated in a frequency band that is being boosted.

In general, it is safe to turn a given output mix control *down* (in the 0 to -3 dB range) without danger of introducing distortion. However, you will lose loudness. If you turn an output mix control *up* ($+0.5$ to $+3$ dB range), you should listen at great length to a wide variety of program material to make sure that nothing falls apart due to excessive

clipping distortion. If it does, you will need to back off the control in question and/or back off the Final Clip control.

If you turn up the control for Band 1 (below 100 Hz), you may wish to turn down the Bass Clip Thrsh dB control by an equal amount. This will preserve the relationship between the bass multi-band clipper and the final clipper.

Bass Clip Threshold Control (Bass Clip Thrsh dB)

The 8200 uses Orban's patented multi-band distortion-cancelling clipper system to achieve a low peak-to-average ratio without creating audible distortion due to clipping. The bass clipper is part of this system. It is embedded in the multi-band crossover so that harmonics created by clipping are rolled off by part of the crossover filters. The threshold of this clipper is ordinarily set between 4dB and 6dB below the threshold of the final clipper in the processing chain, depending on the setting of the LESS-MORE control in the parent preset upon which you are basing your full control adjustments. This provides headroom for contributions from the other four bands, so that bass transients don't smash against the final clipper and "shut it down," momentarily blocking any other program material and causing a sound similar to very hard pumping. The bass clipper also protects against overt intermodulation distortion between the bass and higher frequency program material.

Some 8200 users feel that the bass clipper unnecessarily reduces bass punch at its factory settings. To accommodate these users, Version 3.00 software makes the threshold of the bass clipper a user-adjustable control. The range (with reference to the final clip threshold) is 0 to -6dB. As you raise the threshold of the clipper you will get more bass but also more distortion and pumping. Be careful when setting this control; do not adjust it casually. Listen to program material with heavy bass combined with spectrally sparse midrange material (like a singer) and listen for IM distortion induced by the bass' pushing the midrange into the final clippers. In general, unless you have a very good reason to set the control elsewhere, we recommend leaving it at the factory settings, which were determined as a result of exhaustive listening tests with many types of critical program material.

Phase Rotator In/Out

The multi-band limiter receives the output of a three-pole phase rotation circuit. This has a flat frequency response but a phase response that is nonlinear with frequency. Its purpose is to make voice waveforms symmetrical, which minimizes clipping distortion and makes voice (particularly live voice from microphone feeds) sound cleaner.

The downside of the phase rotator is that it subtly reduces the clarity and definition of music. While this is unlikely to be heard on the vast majority of consumer radios, many people listening with audiophile-quality gear will be able to perceive it. We therefore have provided the ability to bypass this circuit, leaving only the phase rotation intrinsic to the crossover topology in the multi-band limiter. This residual phase rotation is

approximately 25% of the total phase rotation that occurs when the three-pole phase rotator is active.

When you bypass the phase rotator, many voices sound audibly harsher because more clipping occurs. This can be particularly problematical if you are processing heavily for loudness. If you notice increased harshness on voice, we recommend that you use external phase rotation (three cascaded poles, each tuned to 200Hz) in your live microphone chain and in your production studio mic chain. If this is impractical, we recommend leaving the 8200's built-in phase rotator active because we find the increased voice distortion caused by leaving it off substantially more objectionable than the slight loss of clarity that results when it is active.

Refer to the "Phase Rotator For Microphone Channel" diagram, on the following page.

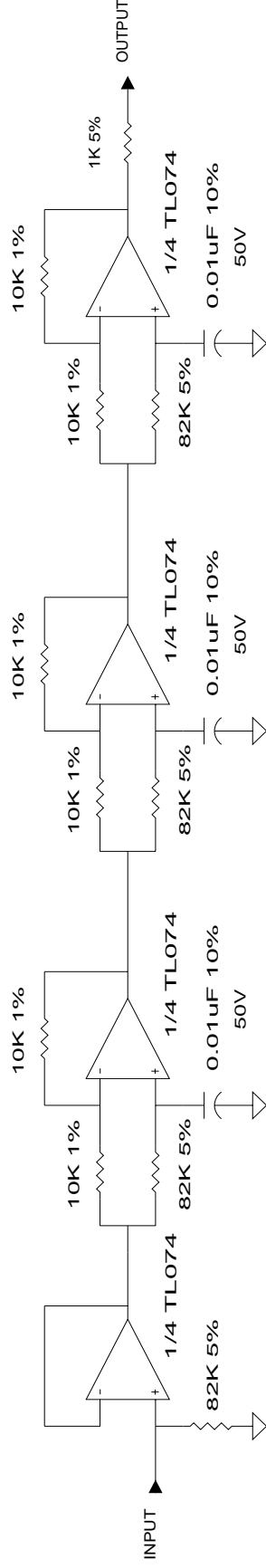


Figure 1: Phase Rotator for Microphone Channel

Notes: Unity Gain, Line Level.

Bypass (+) and (-) Power Leads of TL074 to Ground with 0.1uF 50V monolithic ceramic capacitors.

Operate from +15V and -15V DC power.

Many audio opamps could be substituted for the TL074, like a pair of NE5532s.

If you substitute a high-speed amplifier, layout and power supply bypassing become more critical.

Final Clip Drive Control

Version 3.00 extends the range of the FINAL CLIP DRIVE control by 3dB at the lower end of its range. This means that you can turn down the clipping by 3dB by comparison to earlier versions of 8200 software. The purpose of this extension is to allow users in ITU countries to comply with the requirements of ITU-R Recommendation BS.412-7 if they are required to do so by the regulatory authority in their country.

Based on measurements with a wide variety of program material using the Rundfunk-Betriebstechnik, GMBH Hubmess System MPX-EBENE (a modulation analyzer), we have developed the following formula for ensuring compliance. First, you must start with one of the basic 2-Band or 5-Band factory presets with LESS-MORE at 1.0. You must then edit the preset (using FULL CONTROL) to set the FINAL CLIP DRIVE to the following settings:

Preset	LESS-MORE	Final Clip Drive
DA 5B SLOW	1.0	-1.5
DB 5B-MEDIUM SLOW	1.0	-1.5
DC 5B-MEDIUM FAST	1.0	-3.0
DD 5B-FAST	1.0	-2.5
CA 2B-NOR PROCESSED	1.0	-1.5

To ensure that you meet the requirements, do not increase the settings of these controls beyond the settings provided in LESS-MORE = 1.0: RELEASE TIME, CLIPPING, and MULTI-BAND DRIVE.

Note: The BB (Purist Classical) and BA (Purist Processed) presets will comply with a CLIPPING setting of -2 or lower. There is no need to reset the FINAL CLIP DRIVE control when using these presets.

The Protection Limiter Structure will not comply and cannot be adjusted to do so. However, you can use the BB (Purist Classical) preset instead and set its CLIPPING control to -2.

If you want to use any of the new presets in Version 3.00, you should follow a similar formula. Set them for LESS-MORE = 1.0. Then edit the FINAL CLIP DRIVE control for -1.5, except for “dense” presets (FINAL CLIP DRIVE = -3.0) and News or Sports (FINAL CLIP DRIVE = -2.5). While we have not specifically measured all of the Version 3.00 presets using this formula and therefore cannot guarantee compliance, we believe that compliance is nevertheless very likely.

8200 Software History

Version 3.00

- Replaces the original factory “format” presets FB - FO with new format presets FB- FV.
- Adds new Multi-Band Control: High Frequency Coupling.
- Removes EBS Test Mode.

Version 2.00

- **Multi-Band Controls**

New controls include: Multi-Band Output Mix controls, Bass Clip Threshold, and Phase Rotator In/Out. The range for the existing Final Clip Drive has also been extended.

- **D-O Status Enable?**

[Yes] or [No]

For 8200s equipped with the 8200 D/SRC, the 8200's controls now include a switch that allows you to defeat Orban's special implementation of AES/EBU status bits which are used to control Orban 8208 and 8218 Stereo Encoders. This special implementation may be defeated to accommodate certain digital STLs that misinterpret these status bits.

- **PC Security Enable**

[On] or [Off]

When set to Off, password security is disabled, allowing access to 8200 via remote PC, utilizing custom-developed software, and limited to recalling presets only. When set to On, 8200 functions the same as under Version 1.2x, with full password security.

Version 1.20

- 8200PC Remote Control Software for Windows™
- TIME TO SCREEN SAVER default setting is now 1:00 HRS. Removed Off setting.
- AGC IDLE GR (for Two-Band Normal, Two-Band Purist and Five-Band processing) is now a value proportional to the AGC DRIVE, instead of a fixed value of -10dB.
- With Two-Band Normal, LF noise is no longer detectable at low drive levels.
- For Five-Band processing, bass boost at low signal levels has been eliminated.

- A-O 100% LVL dB resolution has been increased for more accurate level adjustment.
- Cleaner Audio When Switching Between Analog and Digital Source Material.
- Pressing DISABLE EBS now eliminates the EBS TEST button from the RECALL PRESET screen.
- AGC DRIVE Control adjustable range changed to -10 to 25; previously 0 to 25.

Version 1.10

- Software to control 8200D/SRC Digital Sampling Rate Converter.
- D-O 100% LVL dB maximum level increased from -2.75dBFS to 0dBFS; resolution has been increased for more accurate level adjustment.

Version 1.00

Calibration Controls

- Adds Transmitter Overshoot and SCA Modulation Compensation.
- Adds control for Stereo Encoder Modulation Type: [STEREO], [MONO FROM L], [MONO FROM R].
- Input Analog or Digital.
- Clock Sync To, for synchronizing the 8200's real-time clock to the AC line frequency (LINE) or to the internal crystal oscillator (XTAL).
- Adds Pilot On/Off control.

Time and Date Controls

- Daylight Savings Time.
- Screen Saver.

Other Changes

- Additional Remote Control Interface functions. Complete list includes: ## PRESET NUMBER AND NAME, ST STEREO, ML MONO FROMLEFT, MR MONO FROM RIGHT, ET EXIT TEST, TX1 MOD COMP %, TX2 MOD COMP %, SC1 MOD COMP %, SC2 MOD COMP %, IA INPUT ANALOG, ID INPUT DIGITAL, RH RESET CLOCK TO HOUR, RM RESET CLOCK TO MIDNIGHT.
- EBS tone preset for use with the USA Emergency Broadcast System.

- Security PASCODE authorized for SYSTEM SETUP.
- Protection Structure pre-emphasis filters are now phase-linear.
- Adds Protection Limiter control: 30 Hz HPF switch to set the 30Hz high-pass filter prior to the limiter in or out of the signal path.
- Adds Two-Band Purist Structures: 2B-PUR PROCESSED, 2B-PUR CLASSICAL.
- Adds Two-Band control: AGC SWITCH.
- Additional Multi-Band Controls, including: AGC SWITCH, HIGH FREQUENCY CLIPPING, PRESENCE, LOW BASS BOOST, MID BASS BOOST, BASS COUPLING, DJ BASS BOOST, NOISE REDUCTION THRESHOLD, 30Hz HPF (Highpass Filter) switch.
- EXIT TEST Test preset now stored as the BACKUP preset.

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