

**INSTRUCTION MANUAL - ADDENDUM**  
**Rev. 3 UPGRADES**

**Ωmega\_FM**

**DIGITAL FM-AIRCHAIN PROCESSOR**



Rev. 3

ADDENDUM – PROVISIONAL - Rev. A

Full manual to follow - summer 2004



# SECTION I

## Changes since Rev. 2

The following is a partial list of the more important changes that were made over Rev. 2 to yield Rev. 3.0.0:

### **Setup Menu:**

**Com Setup: Serial Port - Front panel remote control.** The front panel port runs at 115,200 baud for local control with a 'direct cable connection' to the PC, just as it did in Rev. 2. It now also has an option to run at only 9600 instead. This can be used to establish a remote control path via any 9600-baud serial connection, for example, the 'Auxiliary Data Port' fitted to many STLs and digital audio codecs. As before, remote control via dial-up modem connected to the rear panel RS-232 port will override any control via the front panel port, so Rev. 2's modem remote control functionality is also fully preserved in Rev. 3.

**Installing Firmware.** If the default Directory, or similarly named directory, is used for the Rev. 3 installation, then the new installation will be completely independent of any previous Rev. 2 installation on the same PC. User files stored for Rev 2 are safe, and independent. Install Rev. 3.0.0 with confidence, knowing you can easily and quickly return to Rev. 2 if you encounter a problem.

By the way, don't be fooled by the revision number. 3.0.0 is NOT a beta release. It has undergone extensive testing to ensure it is reliable and fully functional.

Upgrading from Rev. 2 to Rev. 3 need take no more than a few minutes, and audio interruptions are: one of 30 seconds and two of approximately 3 seconds, so if necessary it can even in some cases be done with the processor 'on-air' (albeit at some suitably late hour).

**L/R Input Setup.** Although the AGC algorithm has been extensively redesigned for Rev. 3 and is now primarily RMS responding rather than Peak responding, we carefully reviewed and then tweaked the system levels so that with most types of program material, it will NOT be necessary to change the analogue input gain trims to maintain the AGC '0dB' point.

**MPX Delay.** Here's a great new Rev. 3 feature for anyone implementing IBOC digital radio or other systems which have a time delay difference between the analog and digital paths. The Composite output that feeds the FM exciter can now be delayed anything up to 10 seconds and set in inaudible 1-millisecond increments. This means you can easily, quickly and precisely eliminate the time delay between the analog and digital paths in your IBOC-enhanced plant. And all without looping the FM-bound audio via the IBOC exciter, which maintains the reliability that you had in the FM-only days.

### **Controls Menu:**

**Format.** Format and file management works exactly as it did in Rev. 2. Due to the large number of changes involved in the audio processing architecture and therefore the

controls, formats created under Rev. 2 are not compatible with Rev. 3. If you try to upload a Rev. 2 format into Rev. 3, the action will fail and you will get an error message. To create a Custom (user) Rev. 3 format file, it may be best to start with one of the carefully designed Rev. 3 factory formats. However, we are also here to help you make the transition smoothly. If you wish, please email your Rev. 2 custom format to: [omegarev3@yahoo.co.uk](mailto:omegarev3@yahoo.co.uk) and/or to: [tech@inovon.com](mailto:tech@inovon.com) and one of our audio processing experts will produce a 'Starting Point' Rev. 3 file, based on your Rev. 2 settings. Please note this will normally take around 5 to 7 days.

**AGC.** All the AGC *controls* are the same, apart from one new control for 'slope' (see below). The *operation* of the AGC has been considerably improved in that the primary response is now based on an RMS detector as opposed to a Peak detector. 'Advanced' functions such as 'Fast Attack' are still based on Peaks. This gives much better – sounding AGC, which is able to correct faster AND less obtrusively. In addition, subsequent processing stages such as the leveler are less liable to be upset by level inconsistency at the input than they were in Rev. 2.

**AGC Slope.** This new control is a switch that sets the slope to 'Normal' (infinite ratio) or '2:1'. Note that this control only has any affect when the AGC is into positive gain, i.e. when the incoming program is too quiet. When the input program is too loud and the AGC is in negative gain, the ratio for AGC action is still 'Normal' (near-infinite). Together with the existing 'Advanced' AGC controls such as 'Max Gain', this new function gives you more flexibility in designing a wideband AGC response that adequately controls the incoming program, whilst retaining some musical dynamics. The new Slope control is especially aimed at quality-conscious radio formats such as Classical music and Jazz.

**Multiband – Leveler.** There are several very significant changes here. First is that the Leveler is now purely RMS responding. This should make it more closely follow how the ear perceives the volume in each frequency band – i.e. the overall tonal balance – leading to better consistency between sources and reduced artifacts. The second major change is that the Leveler now operates in 'Relative' mode (as opposed to 'Absolute' mode). The average gain reduction of all the bands is now mostly at a constant 6dB. This clearly separates Leveling from the AGC. All Level control duties are now performed by the AGC, and spectrum-consistency (i.e. tonal) leveling is the *only* job of the Leveler. This makes it easier to set up each function to do the required amount of control, and reduces those occasions on which the processor may change the original tonal balance too much, which is a primary cause of shrillness and muddiness on all other audio processors on the market.

Leveler controls have changed significantly too. Because the leveler is now pure RMS responding, time constants are much less critical than before and the time constant control is now a single, unified time-constant control for all the bands. The overall multi-band drive control of Rev. 2 has now been replaced by individual band drive controls. It may be helpful to think of these drive controls as an additional means of controlling inter-band coupling (see below), or the maximum amount of boost that can be applied in each band. In the factory formats, the frequency extremes are allowed less maximum boost than the midrange, which helps to maintain a solid, clear tonal balance on average, well-produced material. But there is still plenty of power to re-equalize older cuts, so adjust the Leveler Band Drive controls with *caution*, and only when definitely necessary. The remaining new control is a coupling control that sets a limit on the maximum amount of control in the Leveler section. This helps to avoid *over-*

*processing*, particularly on voice. Do audition the results of changes to the Leveler controls on narrow-band material such as ‘dry’ voice as well as old and new music (as appropriate to your station’s format of course). Getting the Leveler right is all about a compromise that sounds good all the time and on a range of receivers!

**Multiband – Compressor.** Major changes in the compressor are immediately apparent from Omega’s Compressor gain reduction meters. Partly because the preceding stages have been made largely RMS responding, and partly to make Omega’s processing more responsive to the existing dynamic range of the input signal, the compressor now has a complicated seven time-constant structure (there are actually eight time-constants per band if one includes instantaneous gain reduction, i.e. look-ahead clipping, which is used for overshoot control in the multi-band). Very complicated, but it gives the best results!

We strongly recommend leaving all the compressor time-constants alone, unless the operator is an audio processing expert with *many* years of experience and with a very specific goal in mind. Because these time constants are all about Omega’s response to program peaks, if they are set wrong the result can be very poor sound quality due to uncontrolled limiting and clipping. Note that these time constants consist of different matched sets for each of the various ‘Signatures’ of Omega’s factory formats, so pick the starting point for crafting your Custom format carefully.

The first time constant pair is a relatively slow function we decided to call ‘Platform’. Due to prior RMS control, program energy will cause gain reduction in the platform only with peaky material that has not been heavily compressed during mixing and mastering, and with naturally peaky sources such as solo voice. This has the very important benefit of causing Omega to process such material *appropriately* - it eliminates the gross distortion associated with over-processing such material that you may hear with other brands of processor! In addition, gating causes the platform to switch to an even slower fixed secondary release time during pauses in the program, again helping to keep voices clean and greatly reduce background noise rush-up. ‘Platform’ has its own set of band drive controls that can be used to determine how much the processor ‘holds back’ on peaky program. When adjusting these controls, be sure to check the results with both peaky and highly compressed program material. The factory defaults have, of course, been carefully judged with a wide range of material! To reduce the effect of the platform, reduce the Platform Drive controls and increase the Peak Drive controls an equivalent amount.

The second time constant pair in the Compressor is the Peak time constants. These are equivalent to the good old ‘Compressor’ time constants in Rev. 2. Because the platform will control the maximum amount of gain-reduction activity in the ‘Peak’ control section, distortion resulting from fast release is thus also controlled. So with the same ‘Peak’ time constants as Rev. 2, the result will be a cleaner sound on peaky material that caused excessive compressor gain reduction in Rev. 2.

**Wideband Limiter.** The wideband limiter is essentially very similar to the Rev. 2 limiter, but it also incorporates a gate. The gate has a single control, for threshold. When the limiter input signal is below the set threshold, the platform release slows from the value set in the ‘Wideband Limiter Time Constants’ (normally 17 or 18) to a much slower value of 21. Thus the operation of the gate is similar to a ‘freeze’ gate. The effect is to reduce the amount of processing on voice and quiet intros.

## SECTION II

### Block Diagram

This block diagram shows the revised processing architecture for Rev. 3 in diagram form:

