DAVID IV REV. 3 INTRODUCTION

Inovonics' DAVID IV (Model 719) was introduced in 2011 as a comprehensive, all-digital audio processing solution for FM broadcasting. In 2012, Rev. 2 added independent output programming and optional 'diversity delay' for HD Radio® hybrid-digital broadcasts, as well as improved performance and conformance to European broadcast practices required by Standard ITU-R BS.412-9.

The release of Rev. 3 firmware and software for the DAVID IV represents a major overall 'redesign' of the product, improving performance with new signal-handling techniques and an expanded user interface.

NEW FEATURES

- 'Windowed' AGC
- Expanded compressor and limiter action
- Post-compression EQ
- Adjustable crossovers and time constants
- Improved bass enhancement
- Wider control over the on-air average/peak ratio
- Advanced pre-emphasis protection limiting
- Built-in test tone generator
- Support for Spanish and Portuguese languages

Rev. 3 Manual An updated User's Manual covers the new architecture of the DAVID IV and all the changes. This may be downloaded from the Inovonics Website or ordered as a bound hardcopy.

Version-to-Version Compatibility Although Rev. 3 brings substantial improvements in the functionality and the sonic performance of the DAVID IV, perhaps the one negative is that user presets are not directly interchangeable with earlier firmware versions. *You cannot import Rev. 1 or Rev. 2 presets into a Rev. 3 unit!*

However, every effort has been made to retain the same 'sound' between Rev. 3 and our earlier *factory* presets. So if you are currently using a factory preset, or your own presets are related to factory ones, it should be a relatively easy matter to replicate the sound you now have... if you want to. Nevertheless, when the new firmware and software are loaded you will lose all the 'Profile' (in/out and RDS levels, HD Radio diversity delay) and all 'Preset' (compression, limiting, EQ, etc.) settings. We strongly urge you to

make pencil-and-paper notes of all your settings before installing Rev. 3.

REV. 3 NEW FEATURES AND THEIR BENEFITS

Listed here are the new features and performance improvements of Rev. 3, more or less in signal-path order.

Built-in Tone Generator
A test tone may be inserted either pre- or post-processing. This can prove an aid in system setup, can verify proper pre-emphasis selection, and help troubleshoot airchain problems.

'Windowed' AGC
The fixed-rate AGC of earlier DAVID IV versions was slow to catch up with large variations in the program level. The 'windowed' AGC of Rev. 3 provides dual-rate input gain correction, with quick 'make-up' correction for levels that dip or blast suddenly. The width of the unobtrusive, slow correction window may be selected by the user, along with the rate for quick make-up gain/loss. In addition, the AGC now utilizes both r.m.s. and peak level sensing to provide a more consistent feed to downstream processing stages.

Adjustable Crossovers
The DAVID IV 5-band Multipressor has always utilized bands with equal-octave-based widths. Rev. 3 brings the band crossovers under user control to yield even more flexibility in securing a sound that will complement your station's format.

Multipressor Time Constants
Rev. 3 brings attack and release times for the five bands of compression under user control. Bands can assume peak or average response to the program signal, or even a combination. Adjusting the time constants makes a big difference in how the DAVID IV sounds. Our only advice with respect to this is to head back toward factory preset values for your settings if things don't sound quite right.

Post-Compression Graphic EQ
In earlier versions of the DAVID IV the five bands of graphic equalization adjusted gain going *into* the individual compressors. Instead of providing a direct 1:1 cause and effect in that case, each band got *busier*, not necessarily *louder*. Rev. 3 places the equalization *after* compression, giving a much more predictable and uniform control over the spectrum profile.

Bass Effects
The combination of separate compression, overdrive, clipping, filtering and phase alignment of the very low-bass portion of the spectrum has been simplified to a degree, bringing more 'musicality' to this bass-augmentation section.

Peak Control Enhancements
Inovonics' proprietary PIPP* limiter, as well as the normal limiting and ITU-R BS.412.9 functions, all benefit from new algorithms that better define the ultimate average/peak ratio of the program signal. In other words, the user is now able to control *program density* with greater range and precision.

Redesigned HF Limiter
The DSP routine for the independent HF limiter for FM has been revised to better mask clipping artifacts. Clipping is used in tandem with HF limiting to protect that part of the program subjected to FM pre-emphasis without sacrificing a 'bright' top-end.

INSTALLING THE NEW FIRMWARE

Warning #1   Always use a hard-wired network connection to install new firmware. The DAVID IV manual gives instructions for a couple of ways to do this. A Wi-Fi or other haphazard link for this important update process could cause irrevocable data loss and require factory reinstallation of the firmware.

Warning #2   This firmware update will restore the DAVID IV to Rev. 3 factory defaults. *All level, processing setups and user presets will be overwritten (i.e.: LOST!),* and as mentioned earlier, performing a Profile Save before proceeding with this update will *NOT* protect your level and other setup parameters or any of your processing presets. Trust us that the Rev. 3 upgrade is worth any inconveniences.

Firmware Update Files   The Rev. 3 firmware update is supplied free of charge on a CD-ROM, or may be downloaded as a 'zipped' folder containing the relevant files. The firmware update is 'bootloaded' into the DAVID IV from any computer on the same network.

Please refer to your DAVID IV Users Manual, which details the firmware bootloading (installation) process. This is found on Page 59 of your Rev. 2 manual, and on Page 63 of the new Rev. 3 manual.

RUNNING REV. 3 SOFTWARE

Once the new Rev. 3 firmware is installed in a DAVID IV, the unit *must* be controlled with Rev. 3 software. Rev. 3 software is distributed as an installation routine for any Windows PC, WinXP or later, and may be downloaded from the Inovonics Website.

NOTE: Running the PC installer to put Rev. 3 software on your computer will automatically remove the earlier software version.

TWEAKING THE DAVID IV, REV. 3

The greater part of the Rev. 3 user interface remains quite similar to the earlier versions, but many of the DSP routines that produce the final processing result have been radically changed.

As with previous versions of the DAVID IV, and with audio processing in general, there are no hard-and-fast rules. You have to use your ears and experiment quite a lot to arrive at settings that will satisfy station personnel. Despite your urge to get in and get the job done, do consult with your PD, station manager and others who may not hear things the same way you do.

Here are a few guidelines for setting-up the DAVID IV, with emphasis on the parts that have undergone radical changes.

AGC   AGC correction creeps slowly within the 'window'; small variations in input level will continue to be corrected in a very subtle manner. Once the level is out of the window, however, gain correction is speeded-up. You have control over the *size* of the win-

dow and the gain-makeup *rate* outside the window.

When you evaluate AGC action, be sure to include voice tracks (solo speech), not just your music program sources.

Compressor Drive

The Master Drive control associated with the Multipressor has been given greater range than it had in previous versions. Our rationale was to allow the user to back the Multipressor completely out of compression, even with short attack time constants. The full 30dB range of the control will seldom be used, so please double-check what you've done if your settings are within a few dB of either end of the slider.

Band Crossovers

Beginning with our earliest analog processors, we have always felt that equal-octave-based bands sound the best. Rev. 3 gives you the option to place crossovers at different points, however, and this may work to your advantage with certain formats. If things sound strange after moving the crossovers around, take advantage of the multiple User Presets so that you can A/B between a preset with your choice of crossovers, and a preset that's essentially the same except that it uses the factory-default crossovers of 125Hz, 450Hz, 1450Hz and 5kHz.

Compressor Time Constants

Be careful here… be *very* careful. This is an area where you can really mess-up your sound. We recommend using these controls either to give the compression section a slow, average response (even if you opt for increasingly shorter time constants in the upper bands) OR more of a peak response. Big variations in time constants between bands will not sound good… believe us. Factory Presets have been created after much group critical-listening. Try to keep close to these choices, or at least revert back to them if you run into trouble.

Equalization

As you move the EQ sliders up and down, you are going to notice more of a change than with earlier firmware versions. Previously, equalization was a second-order effect as the band *energy* was altered. Now it's strictly the recombining *level* that is being changed, with more apparent EQ 'action' being the result.

Bass Effects

We've installed an IN/OUT switch here, so you can now quickly A/B the effect of this section on your sound. When making these adjustments, be sure that you have a speaker system that is relatively flat down to 30Hz, otherwise you *will* over-EQ the bass… and that's not good.

Limiter Drive

Along with increasing the range of the Multipressor Master Drive control, we have similarly expanded the Limiter Drive range. Rather than incorporate servo action within the Multipressor block (to keep the output more or less constant), we now trust you to tweak Limiter Drive to adjust for a variable Multipressor output. In other words, if you *increase* Master Drive to the Multipressor, you will probably have to *decrease* Limiter Drive to maintain a specified amount of limiting.

Limiter Density

This control, which strives to establish a fixed average-to-peak ratio of the limited program signal, is now calibrated in dB, with a range of −5dB to +5dB. What this means is, that at a setting of 0dB, you will have more-or-less 'normal' program dynamics.

Running the control up to +3dB will *decrease* the average/peak ratio by that amount, yielding a louder sound. Conversely, lowering the control to –3dB will give you that much *more* dynamic range.

The HF Limiter FM pre-emphasis protection is now adjustable over a range from near-full-clipping to near-full-limiting. As the slider is moved to the right, more limiting is called into play, which gives a 'silkier' top-end, although not as bright-sounding with contemporary music. Pulling the slider to the left increases the limiter attack time, resulting in more HF clipping. The clipper does utilize aggressive distortion reduction techniques, however, so a good deal of clipping may be tolerated in most cases. Try solo female voices with lots of sibilants to arrive at a good setting here.

Again: Use your ears, and the more sets of ears the better!