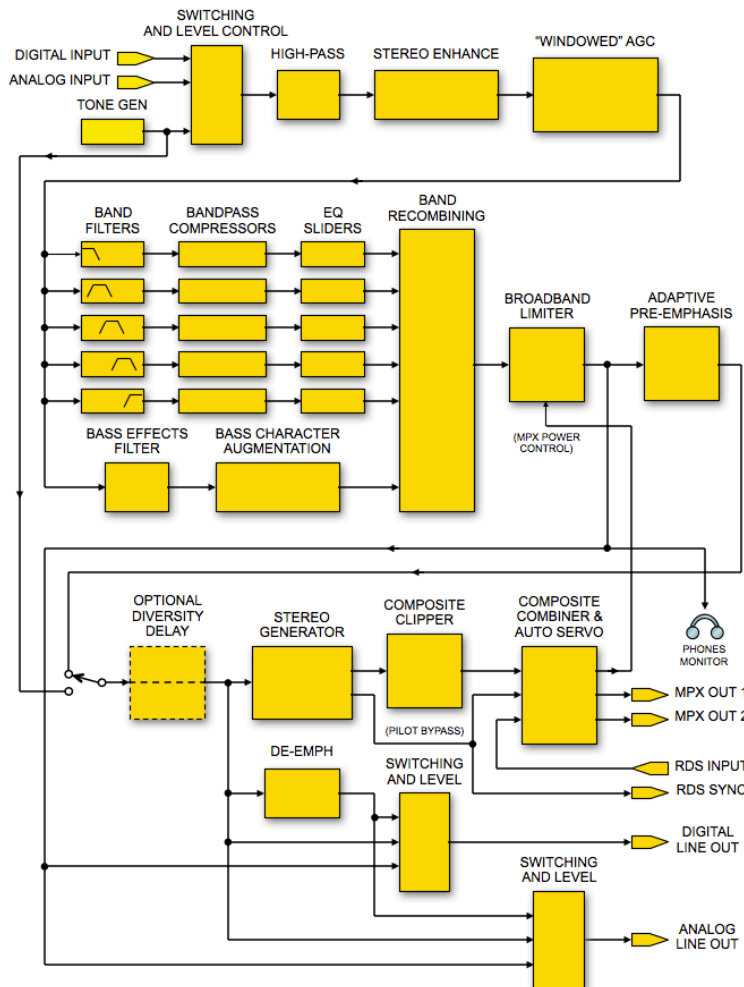# DAVID IV
FM/HD Radio™ Broadcast Audio Processor

DAVID IV is the fourth generation in our DAVID (vs. Goliath) series of competitive FM and digital air-chain processors. This streamlined DSP-based audio processor gives broadcasters total control over the most important sonic 'signature' parameters, and is designed to maximize audio quickly and effortlessly. Comprehensive processing includes 5 bands of compression and equalization, intelligent gain-riding AGC, sub-bass and stereo field enhancements, and our proprietary PIPP™ Limiter for added density. The DAVID IV also includes a precision FM stereo generator with dual outputs and internal metering for your RDS/RBDS subcarrier.

Setup is quick, and operation is intuitive (even for non-engineers!) via the front-panel interface or remote software. Presets are optimized for popular world formats, and user settings can easily be backed-up and shared over station networks. The DAVID IV features TCP/IP connectivity that is virtually automatic and allows full remote control access from anywhere. The rugged closed box design requires no fans or heat sinks for cooling, and extreme low latency allows for direct off-air monitoring and instant boot times.

FEATURE HIGHLIGHTS

- Ultra low latency, all-digital DSP processing engine.
- 5 bands of adjustable dynamic range compression and 'graphic-EQ'.
- Adjustable gain-riding and windowed AGC with intelligent gating.
- Low-bass enhancements with independent 'Rumble' and 'Punch' adjustments.
- Stereo field processing to adjust the listening sound stage.
- High-pass function to eliminate modulation-robbing sub-bass frequencies.
- Inovonics' proprietary PIPP™ Limiter (Polarity Independent Peak Processing) for more density.
- 25 factory presets and 20 custom, shareable user presets
- AES Digital input and outputs (XLR) at 32kHz, 44.1kHz, 48kHz & 96kHz.
- Balanced L/R Analog and AES Digital outputs are independently set for 20kHz Flat, FM-Pre-emphasized, or FM-Flat.
- L/R Analog inputs and outputs (XLR) and multiple independent Composite MPX outputs.
- 'Adaptive pre-emphasis' high-frequency limiting for FM.
- Remote control and access via TCIP/IP connection.
- HD Radio™ delay of up to 9.999 seconds for the analog FM carrier (optional drop-in board).
- ITU Multiplex Power Control to meet the European Standard ITU-R BS.412-9.
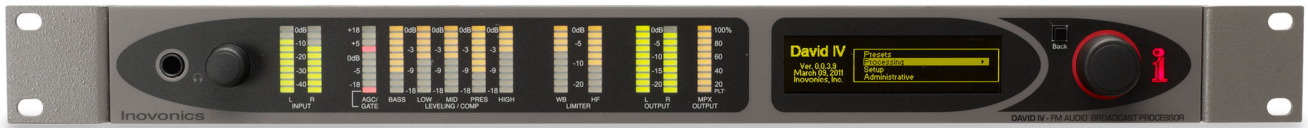- Built in Stereocoder with internal RDS metering and combining.

DAVID IV Signal Path Block Diagram

New Rev 3 Features!

- "Windowed" AGC control
- Adjustable Multiband Crossovers Points
- Adjustable Multiband Attack and Release Times
- Built in Tone Oscillator
- English, Spanish, and Portuguese Language Hardware/Software menus.

Front Panel

PERFORMANCE SPECIFICATIONS

Frequency Response:

Composite/MPX Output: ±0.25dB, 20Hz–15kHz assuming the use of a lab-quality FM-multiplex decoder with the appropriate de-emphasis characteristic.

L/R Analog Line Outputs: ±0.25dB, 20Hz–15kHz through an appropriate de-emphasis network in the FM mode; ±0.25dB, 20Hz–20kHz in the Flat mode.

AES Digital Output (Digital Input): ±0.25dB, 20Hz–15kHz through an appropriate de-emphasis network in the FM mode; ±0.1dB, 20Hz–20kHz in the Flat mode.

Noise (unweighted):

Composite/MPX Output:
SNR >85dB with carrier modulation at maximum output level through an appropriate de-emphasis network.

L/R Analog Line Outputs: Residual noise better than 100dB below the output clipping point (through an appropriate de-emphasis network in the FM mode).

AES Digital Output (Digital Input): Residual noise better than 130dB below 0dBFS (through an appropriate de-emphasis network in the FM mode).

Distortion:

Composite/MPX Output: <0.01% THD using an appropriate de-emphasis network.

Line Outputs: <0.006% THD in digital and analog Line Outputs using an appropriate de-emphasis network when indicated.

Stereo Separation:

Composite/MPX Output: >65dB, 20Hz–15kHz assuming the use of a lab-quality FM-multiplex decoder with the appropriate de-emphasis characteristic. Linear Crosstalk (main/sub or sub/main): >78dB.

L/R Analog Line Outputs: At 1dB below the output clipping level, >100dB through an appropriate de-emphasis network in the FM mode; unweighted in the Flat mode.

AES Digital Output: At 0dBFS, >130dB through an appropriate de-emphasis network in the FM mode; unweighted in the Flat mode (using the Digital Line Input).

Program Signal Latency:
≤5.5 milliseconds, any input to any output in any operating mode. ≤3.9ms from the MPX outputs.

19kHz Stereo Pilot Protection:
>65dB with reference to 9% pilot injection.

38kHz Suppression:
>80dB with reference to 100% carrier modulation.

57kHz RDS Subcarrier Protection:
>65dB with reference to 5% RDS sub-carrier injection.

REAR PANEL APPOINTMENTS

Digital Line Input:
The AES3 stereo input (XLR) accepts program sources at sampling rates of 32kHz, 44.1kHz, 48kHz and 96kHz; 16/24-bit. Input gain is adjustable for average program levels between –5dB and –35dB, re: –20dBFS.

Analog Line Inputs:
L/R active balanced/bridging (XLR) inputs accept average program line levels between –15dBu and +15dBu; +26dBu max peak level.

Line Outputs:
The Digital and Analog Line Outputs may each be configured independently for 20kHz flat response, or for 15kHz 'FM' characteristics, either with pre-emphasis or normalized to flat.

Digital Line Output:
The AES3 (XLR) stereo output may be adjusted between –20dBFS and 0dBFS, corresponding to 100% (peak) carrier modulation. The output sampling rate may be set to follow the Digital Line Input or forced to 32kHz, 44.1kHz, 48kHz or 96kHz. Sampling resolution is 24 bits.

Analog Line Outputs:
Active balanced (XLR) outputs are adjustable between –10dBu and +24dBu (+21.5dBm), corresponding to 100% carrier modulation; source impedance is 200 ohms.

Composite/MPX Output:
Two unbalanced (BNC) outputs are independently adjustable between 0.8V p-p and 8V p-p (+11dBu), corresponding to 100% carrier modulation; source impedance is 75 ohms. Pre-emphasis may be set to 75μs, 50μs or OFF.

RDS Input:
Unbalanced/bridging (BNC) input accepts a 57kHz RDS subcarrier at any level between 0.5V p-p and 5.0V p-p for a typical injection level of 5% of total carrier modulation.

19kHz RDS Sync:
When RDS is enabled, the Sync Output (BNC) delivers a 5V p-p TTL-compatible square wave at the 19kHz pilot frequency; 75-ohm source.

Network Port:
An RJ45 jack accepts TCP/IP network connections for remote setup and operation of the DAVID IV.

Headphone Jack (Front Panel):
A quarter-inch (TRS) headphone jack allows the user to monitor the processed program audio. A volume control next to the jack adjusts the listening level.

AUDIO PROCESSING FEATURES

Program High-Pass:
A user-programmable high-pass filter attenuates sub-audible noise that could compromise modulation efficiency. The filter is adjustable between 20Hz and 65Hz.

Rear Panel

AGC:
Unobtrusive, gated 'gain-riding' AGC is quasi-average-responding with a capture/correction range of ±18dB. Positive AGC gain may be truncated to any value between +18dB and 0dB; the AGC correction rate is programmable.

Stereo Enhancement:
This dual-action utility effectively broadens the soundstage for the stereo program and the center-channel 'solo' component independently.

5-Band 'Multipressor':
Program audio is split into five frequency bands. Each band imparts both dynamic compression and adjustable static gain to afford fixed equalization and other 'signature' control of the program audio.

Bass Augmentation:
Sub-bass program frequencies undergo independent dynamic compression, expansion, selective clipping and filtering for control over both static 'Rumble' and dynamic 'Punch' of bottom-end components.

PIPP™ Peak Limiter:
Inovonics' exclusive Polarity-Independent Peak Processing assures optimum modulation of the FM carrier or other delivery channel.

ITU Multiplex Power Control:
The Peak Limiter section may optionally be configured to control the r.m.s. power of the composite multiplex signal to meet the European Standard ITU-R BS.412.9.

Adaptive Pre-Emphasis:
Fast HF limiting and distortion-cancelled clipping are each utilized to best advantage in providing independent amplitude control of program frequencies subjected to the FM pre-emphasis curve. This helps preserve program brightness and clarity despite power bandwidth constraints native to FM broadcasting.

Composite Clipping:
At the user's discretion, up to 3dB of clipping may be applied to the composite/baseband signal. Clipping is performed before the injection of the stereo pilot and RDS subcarrier.

HD Radio Delay:
The composite/MPX output of the DAVID IV may be delayed between 1ms and 9.999 seconds in 1ms increments, relative to the analog and digital program line outputs when they are set to the 20kHz (Flat) output mode. When set to the FM mode(s), the line outputs are subjected to the programmed delay as well.

THE USER INTERFACE

Front-Panel:
A front-panel graphic display and jog wheel allow easy, menu-guided in-situ setup and operation of the DAVID IV. LED-bar displays indicate in/out levels and audio processing action.

Software Control:
The IP network port and supplied software allow remote setup and operation of the DAVID IV over a local network or the Internet using any Windows® PC (XP or later).

DAVID IV Remote Control Software

Processing Presets:
25 factory presets are provided and optimized for popular world formats, and an additional 20 custom user settings can easily be saved and shared across station networks.

Adult Contemporary	Latin / Salsa
Alternative	New Age
Bollywood	Oldies
Contemporary Christian	Pop
Classic Hits	Reggae / Island
Classic Rock	Rock
Classical	Samba / Brazilian
Country	Talk
Easy Listening	Top 40
Electronic / Dance	Urban
Exitos	Variety
Hip Hop / Rap	Flat
Jazz	

MISCELLANEOUS

AC Mains Requirements:
105–130VAC or 210–255VAC, 50/60Hz; 8 watts.

Size and Weight:
1¾"H x 19"W x 13"D (1U); 9 lbs. (net) / 12 lbs. (shipping).

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