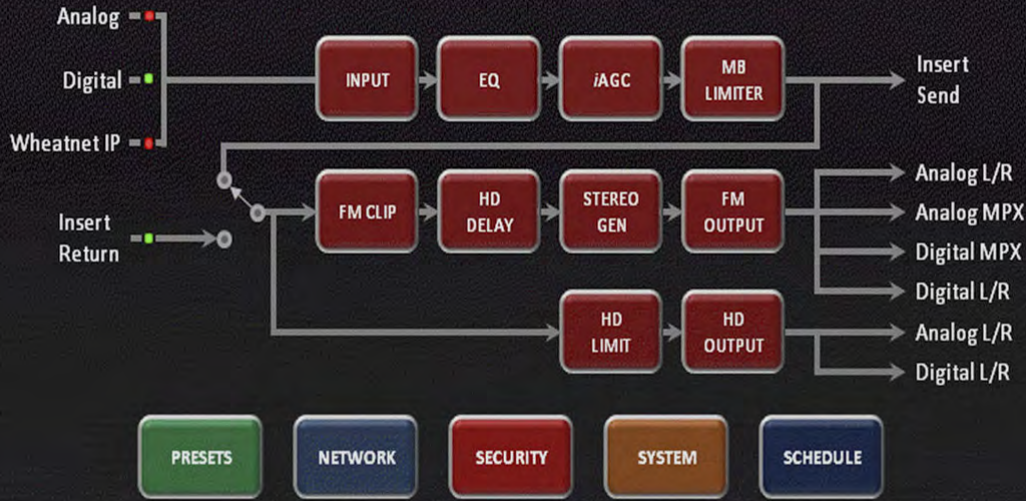


D I G I T A L S P E C T R A L P R O C E S S O R

SYSTEM OVERVIEW



1/22/19 4:37:56 pm

... CHR Balanced Nov 22 Erickson 2.....



BETTER SOUND MORE LISTENERS X5

FM/HD Broadcast Audio Processing and Management



the front panel

dual wide screen displays give you new ways to visualize your sound for incredible control



Wheatstone's new flagship FM and HD audio processor was built from the ground up based on several breakthroughs, including an innovative new approach to dynamics control and pre-emphasis management.

In more traditional audio processing designs, pre-emphasis is either managed by specialized limiting or carefully designed clipping that merely tolerated the pre-emphasis curve. Thinking about this problem, and the fact that it's been over a decade since there has been a major development about dealing with pre-emphasis, Wheatstone set out, through our work with DSP, to come up with the ultimate solution to the problem.

We have seen what the power of DSP can do to restore audio and video over the years. What if we found a way to apply that thinking to FM pre-emphasis and peak control?

Enter LIMITLESS. FM peak control technology that reconstructs the audio after the application of pre-emphasis. No more dull smeary highs or spitty audio. Just clean and clear high end that's perfectly matched to the texture of your HD audio.

X5 also leads the way with Unified Processing®, which allows the processor to share information between ALL stages. In the X5, the iAGC, Dynamics and Limitless Clipper work together no matter which control a user adjusts. Changes are made automatically, in real time, in ways never envisioned before.

The X5 also includes a totally redesigned limiter. As part of the Unified Processing system, this unique limiter, designed as 31 independent filter banks with no crossovers to colorize the audio, works directly with the X5's Limitless clipper, providing an audio blueprint for how the clipper should behave.

The X5 adds a number of other state of the art features, including LIVE LOGGER which documents everything from remote logins to audio failover to preset changes. Our redesigned bass processor and enhancement controls in

the iAGC that allow you to safely equalize your audio for maximum consistency. The days of "maybe it will sound better on the next song" are over. Your audio signature is preserved cut after cut, element after element.

Wheatstone's popular HD/FM audio alignment makes the jump to the X5 with our FM&HD LIVELOCK. The system works either with third-party HD/FM modulation monitors or by itself, using the FM/HD tuner built in to the X5.

Additionally, you can now keep the processor at the studio and still keep HD and FM audio in perfect alignment to the transmitter with our optional SystemLink™ receiver. SystemLink manages multiple audio streams to keep them in perfect sync, preventing any possibility of the FM and HD audio getting out of alignment.

AES insert points are also available via PPMport. Users can now insert their ratings encoder into the processing system instead of placing it in front of the processor. This allows the X5's specialized front end to deliver a steady audio diet to the encoder and increase the instances of watermark embedding. What's more, the sonic transparency of the LIMITLESS clipper preserves the watermark for more reliable detection at the meter.

We've spoken a lot about what's new in X5, but Wheatstone processing users will be happy to know that many of the features we've pioneered in previous models have been incorporated and improved on in the X5, including our legendary Multipath Mitigation algorithm, our composite processing system with selectable look ahead limiting or clipping, baseband192 composite AES connectivity, and a full set of analysis displays.

The X5. Processing for the needs of radio TODAY!

behind the screens

X5 provides a bazillion ways to get in an out with the most intense sound ever



- New iAGC Intelligent Audio Management System reacts to program amplitude and density for perfect leveling
- New Bass Tools system with enhanced tuning features
- New LIMITLESS clipper technology assures open, airy highs with no smearing
- Expanded preset storage for up to 160 processing preset
- Digitized SCA inputs for pristine subcarrier generation and recovery
- Full RDS capabilities supports data import from popular automation systems
- AES insert points provide processed audio to watermark encoder assuring reliable coding under all program conditions
- Analog, digital and WheatNet-IP audio I/O with automatic 'fallback to primary'
- Built-in FM/HD tuner and automatic time alignment correction
- BS412 MPX Power Management assures compliance with European standards
- New look and feel, with an intuitive GUI and dual touch screens on the front panel
- New high performance stereo generator with SSB/DSB encoding methods
- New equalizer offers both parametric and Baxandall-style shelving EQ
- New advanced analysis features for displaying internal and external signals
- New post-processed loudness analysis conforms to BS-1770 standards
- Integrated diversity delay of up to seconds and adjustable in one sample (20uS) steps
- Exclusive stereo multipath controller technology for enhanced stereo coverage
- New comprehensive security features designed for mixed-use sites
- Wheatstone® Baseband192 provides digital MPX over AES to transmitter
- Specialized MPX final processing increases competitiveness without MPX degradation
- Processor shares information between ALL processing stages to optimize program audio for any program format
- Remote processor control via wired Ethernet and Windows based GUI
- Dual front panel touchscreens, one for setup and processing adjustments and one for metering and analysis
- Separate FM and HD processing paths with individual final processing optimizes audio for each medium
- Front Panel headphone output and volume control allows monitoring of before and after processed audio
- Specialized audio analysis functions display characteristics of processed audio, including:
 - 1,024 point FFT
 - Oscilloscope
 - Energy versus Frequency
 - 3-D plot of spectral content vs. time
 - Spectral Dynamic Range shows before and after processing density (a Wheatstone exclusive)
 - Display of the X5's distortion masking clipper activity
- Supports digital FM and HD audio transport over our exclusive SystemLink technology to maintain perfect FM/HD time alignment
- Intuitive front panel signal flow diagram allows access to any processing stage at the touch of a finger
- Front Panel analysis displays scrollable via the familiar cell phone 'swipe' movement
- System logs all processor activity including power ups, preset changes, and logged-in access from a remote GUI
- Optional built-in Nielsen or Kantar watermarking encoder
- Dual analog MPX outputs and twin subcarrier inputs; one MPX output may be selected to provide 19kHz sync to external RDS encoders
- Front Panel touchscreen control with Guru GUI for easy setup and processing adjustments

display gallery

front panel dual display and the GUI offer exceptional control over everything



MB LIMITER

Master Drive: 0.9 dB
 Master Threshold: +0.5 dB
 Master Attack: Auto
 Master Release: Auto
 Multiband Knee: Hard
 Clipper Drive: +0.35 dB
 Bass Enhance: +2.5 dB
 Bass Style: Soft
 Bass Texture: 10.0 %
 Bass Filter Style: Broad
 Bass Filter Frequency: 255 Hz
 Bass Clip Threshold: -3.5 dB

HD DELAY

Diversity Delay: On
 Control Style: Auto Adj
 Whole Seconds: 9.0 S
 Milli Seconds: 25.7 mS
 Extra Samples: 16
 Receiver Frequency: 96.3 MHz
 Correction Speed: Slow
 Received Signal Strength: 56.4 dBuV
 Multipath: 1.23 %
 Total Delay: 9.27333 Seconds
 Uncorrected Delay Error: 444050 Samples

SYSTEM

Headphone Source

Coprocessor Version
 Bootloader: 0_0-000000-0000
 FPGA:
 DSP:
 Software: 0_0_0
 Built:

Right FP Version
 Software: 0_21_4159
 Built: Mar 14 2018
 19:28:19

Left FP Version
 Software:
 Built:

Status
 Temperature: C
 Date & Time:
 Rmt GLE:
 CoProc IP: 192.168.87.173
 CoProc MAC:
 Left FP IP:
 Left FP MAC:
 Right FP IP:
 Right FP MAC:
 WNIP Host:

Enabled Features
 WheatNet-IP

Input: [Knob]
 Display Timeout: [Knob]
 Set Time: [Knob]

RADIO DATA SYSTEM

Static Settings

Program Type: [Knob]
 Dynamic Prog. Type: [Knob]
 Traffic Advisory: [Knob]
 Traffic Program: [Knob]

RDS "None": [Knob]
 No: [Knob]
 Off: [Knob]
 No: [Knob]

Viewing Data Set: [Knob]
 Music / Speech: [Knob]
 Mono / Stereo: [Knob]
 Compression: [Knob]

STEREO GENERATOR

MPX Proc. Drive: +0.20 dB
 Pilot Injection: 9.2 %
 Multipath Limiter: 65 %
 TX -1 Level: +3.50 V
 TX -2 Level: +3.50 V
 MPX Proc. Type: Clipper
 MPX Mode: Stereo
 ITU-R BS.412: Off
 SCA -1 Level: -2.00 dB
 SCA -2 Level: -0.90 dB
 SCA Input: SCA

FM OUTPUT

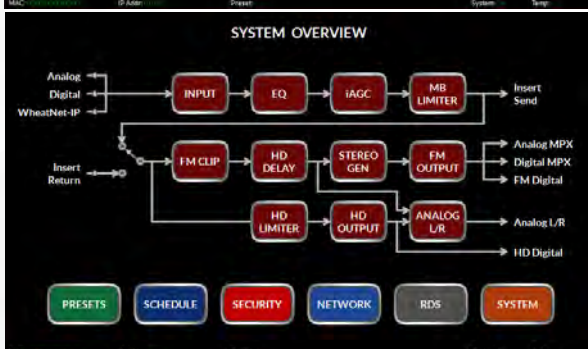
FM Digital Output: 12.00 dB
 FM Digital Type: AES-3
 FM Digital Route: Pre-Dela
 TX -1 Level: +3.50 V
 TX -2 Level: +3.50 V

FM CLIPPER

Clipper Drive: +0.35 dB
 MPX Proc. Drive: +0.20 dB
 Pre-Emphasis: pre-75uS
 Bass Enhance: +2.5 dB
 Bass Style: Soft
 Bass Texture: 10.0 %
 Bass Filter Style: Broad
 Bass Filter Frequency: 255 Hz
 Bass Clip Threshold: -3.5 dB

INPUT

Present On Air: [Knob]
 Input Source: [Knob]
 Analog Gain: 0.0 dB
 Digital Gain: 0.0 dB
 L/R Balance: [Knob]
 Codec Masking: Off
 HPF Frequency: Off



iAGC

Window Size: [Knob]
 Attack Speed: 3.000 S
 Release Speed: 3.000 S
 Return To Zero Speed: 3.000 S
 Adapt Mode: Adaptive
 Band 1: +4.0 dB
 Band 2: [Knob]
 Band 3: [Knob]
 Band 4: [Knob]
 Band 5: [Knob]
 Effects: [Knob]
 Gate Threshold: -45.0 dB
 Pre Proc Fast/Slow: 0
 iAGC Style: Off
 Multiband AGC: Off
 Multiband Compressor: Off

new and cool

tools that can make a chartable difference in your bottom line

PPMport

INSERT LOOP FOR PEOPLE METERS

X5 features an insert loop to interface your ratings encoder AFTER the processing. This delivers a signal with greatly reduced audible artifacts, which ensures you'll be moving all those meters out there.

UP

UNIFIED PROCESSING®

Each X5 function in the chain interacts closely with other functions to deliver just the right amount and type of processing needed, letting you create a sound that's as close to the original as possible while still dominating the dial.

LIVE LOGGER

LIKE THE NSA FOR YOUR X5

Live Logger keeps track of everything happening on your X5. Preset takes? Remote login? Audio failover? Every event is date and time stamped so you can review it. X5 takes audio to a whole new level and, with Live Logger, gives you absolute and complete peace of mind.

LIMITLESS CLIPPER

INTELLIGENCE KNOWS ITS PLACE

Limitless Clipper uses proprietary high-frequency distortion canceling technology to pass the highs, but not the overshoot. No more "spitty" highs or pops from clipping; no IM distortion whatsoever. This clipper will take all the highs you can give it and never give you back IMD. This clipper, along with X5's Phase Linear dynamics, gives you the most powerful FM processor on earth.

FM/HD LIVELOCK

FM/HD SIGNAL SYNC

Integrated HD and FM analog signal alignment keeps listeners tuned in to your station even during extreme HD/FM blending conditions. No external boxes needed and no more "dip and skip" in reception that can cause tune out, affecting TSL.

MPX SYSTEMLINK

STUDIO-TRANSMITTER LINK

MPX SystemLink extends the X5 with HD/FM alignment from your studio to your transmitter site. It carefully keeps the HD and FM packets in sync so time alignment done with the processor at the studio is maintained straight through to the receiver.

MULTIPATH MITIGATION

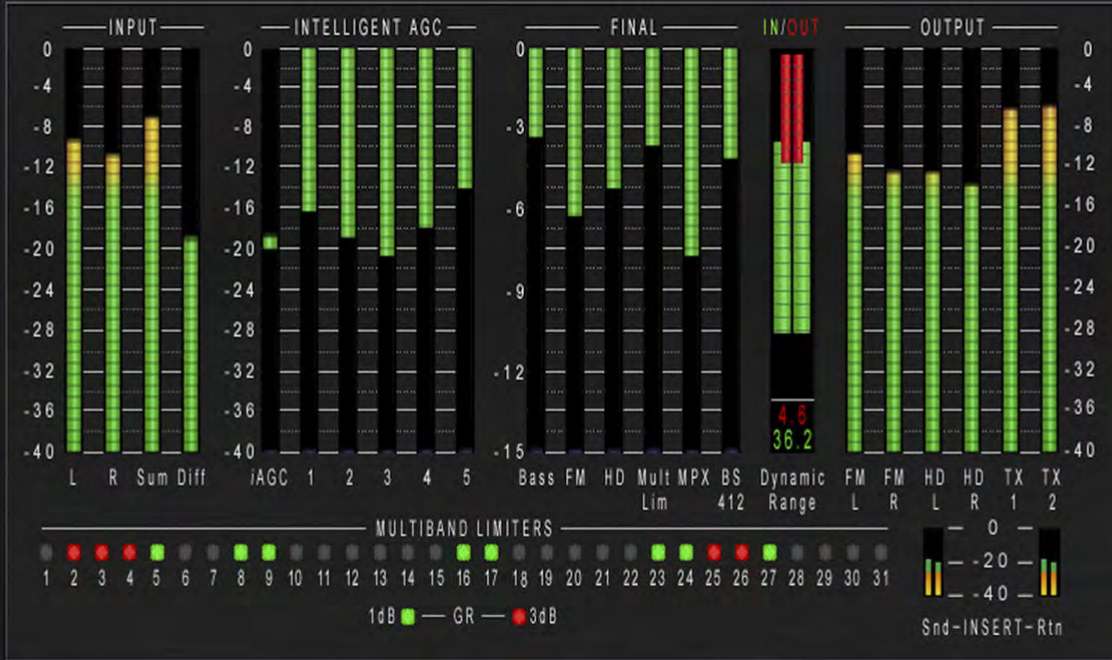
MORE PATH. LESS MULTI.

X5's multipath mitigation delivers your signal to more listeners while PPM Port's smart AES insertion points ensure each and every one of those PPMs register. Better sound delivered to more radios – sound that cuts through and sounds amazing.



BETTER SOUND MORE LISTENERS **X5**

Wheatstone AIRAURA X5



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Wheatstone
 BROADCAST AUDIO PERFECTIONISTS®