JUSTIN 808

FM/HD1 Alignment Processor

Inovonics' JUSTIN 808 is the one-box solution that guarantees perfect sync, phase and level balance between your analog FM and HD Radio® programming. It uses powerful DSP correlation algorithms to determine time and level offsets from the off-air signal, and then unobtrusively inserts proper delay and gain in the AES digital audio feed to zero-out the offsets. This eliminates, once and for all, the stuttering, echo, and ducking that listeners hear (and complain about!) when their radios crossfade between modes. Operation is fully automatic, and the JUSTIN's Web Interface features SNMP support and dispatches email and SMS alarm messages.

HD) Radio

INOVONICS
BROADCAST

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FEATURE HIGHLIGHTS

- Time-aligns FM and HD Radio audio with ±1 sample accuracy
- Corrects out-of-phase FM/HD Radio audio
- Level-matches HD Radio audio to FM audio
- Web Interface supports PCs, tablets, and mobile devices
- Email/SMS error messaging; SNMP support
- Alarm tallies for out-of-range conditions; error logging
- Easy to install… and then just let it do its thing

TECHNICAL SPECIFICATIONS

CONNECTIVITY

Receiver Input:
75-ohm 'F' connector. Receiver tunes 87.5MHz to 108.0MHz in 100kHz steps. The receiver requires approximately 20dBµV (10µV) to recover analog and digital programs with adequate SNR for autocorrelation.

AES Digital Audio I/O:
The AES3 (XLR) 24-bit stereo audio pass-through operates at sampling rates of 32kHz, 44.1kHz, 48kHz and 96kHz; 44.1kHz preferred.

Networking:
An RJ45 jack accepts TCP/IP network connections for remote setup and operation of the JUSTIN 808 through the Web Interface.

DELAY CORRECTION

Correction Resolution:
Corrects to ±1 sample (±23 µs)

Maximum Delay Error Correction:
16 Seconds

Time Required to Correlate Delay Errors:
Small delay errors (up to 0.4 seconds) require up to 30 seconds to correlate; delay errors of 10 seconds could require as much as 3.5 minutes.

Time Required to Correct Delay Errors:
Correction rate is user-programmable between 1 and 1000 samples per second (23µs/sec to 23ms/sec).

"Catch-Up" Button Feature:
A front-panel menu item, also accessible via the Web Interface, permits a manual time alignment reset to a newly-correlated value instantly.

AUDIO LEVEL & PHASE CORRECTION

Level Correction:
The JUSTIN 808 is able to provide up to ±6dB of automatic r.m.s. level correction in the HD1 program signal path, based on the ITU BS.1770-3 loudness measurement specification.

Absolute Phase Correction:
The JUSTIN 808 offers automatic program phase correction when it senses a phase reversal between the analog FM and digital HD1 channels.

ALARMS AND LOGGING

Alarm Conditions:
1. RSSI (Low RF signal or carrier loss)
2. Audio Loss or Levels Out of Range
   a. AES Loop-Through
   b. Off-air FM Audio
   c. Off-air HD1 Audio
3. Out of Alignment Range (user-specified)

Alarm Indications:
1. Front-panel OLED display
2. Rear-panel ground-closure 'tallies' with selectable logic polarity
3. SMS-text/email notifications via SMTP
4. JUSTIN 808 Web Interface indication

Alarm Logging:
All alarms are logged by the JUSTIN 808; statistics are presented graphically via the Web Interface and may be downloaded for follow-up study.

FAILOVER AUDIO PROTECTION

Relay contacts bypass the AES digital audio pass-through in event of AC mains power loss.

USER INTERFACE

Front-Panel Interface:
A front-panel graphic display and jog wheel allow easy, menu-guided *in-situ* setup and operation of the JUSTIN 808.

Level Metering:
LED "VU" meters display FM, HD1, and AES loop-through program audio levels.

Delay Metering:
A segmented LED display shows FM-HD1 alignment, ≤5 and ≥5 samples. The OLED panel display and the Web Interface give numerical and graphic readouts of delay and correction over time.

Web Interface:
The JUSTIN 808 Web Interface is compatible with desktop/laptop computers, tablets and smart phones, and supports SNMP with a downloadable MIB file. All functions available at the front panel are duplicated by the Web Interface.

PLACEMENT IN AIRCHAIN

In HD1 AES Audio Feed:
  Placed in line with the AES audio feed to the HD Radio exciter, the JUSTIN 808 will automatically correct diversity delay errors and audio level (loudness) errors between the FM and HD1 programs.

In Analog FM AES Audio Feed:
  Placed in line with the AES audio feed to the analog FM stereo encoder, the JUSTIN 808 is capable of providing the entire diversity delay, if required. It will automatically correct diversity delay errors, but cannot normalize loudness between the two programs in this mode.
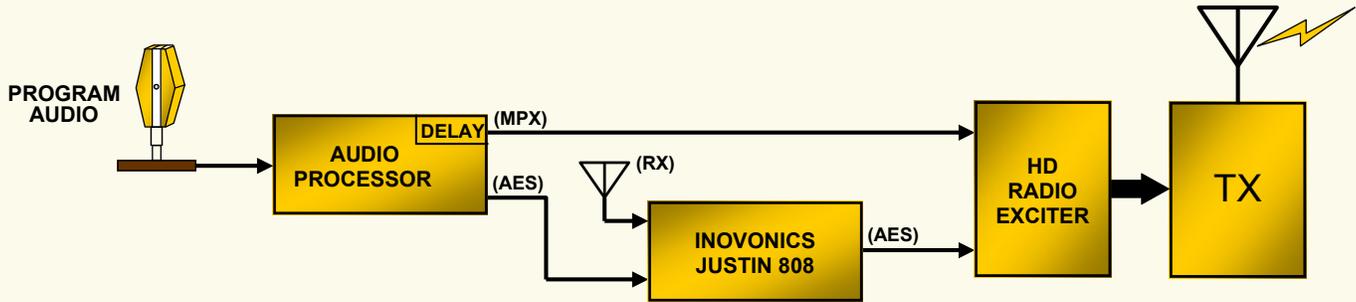
JUSTIN Implementation With Single Audio Processor
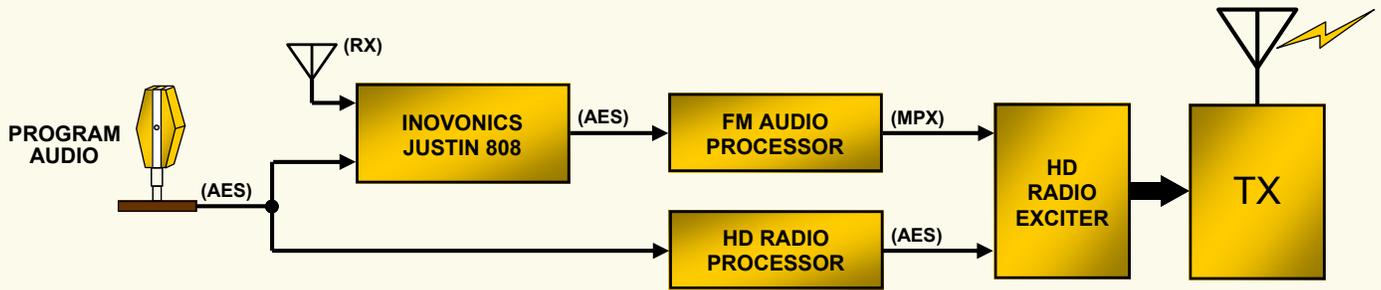
JUSTIN Implementation in FM Air Chain With Dual Audio Processors
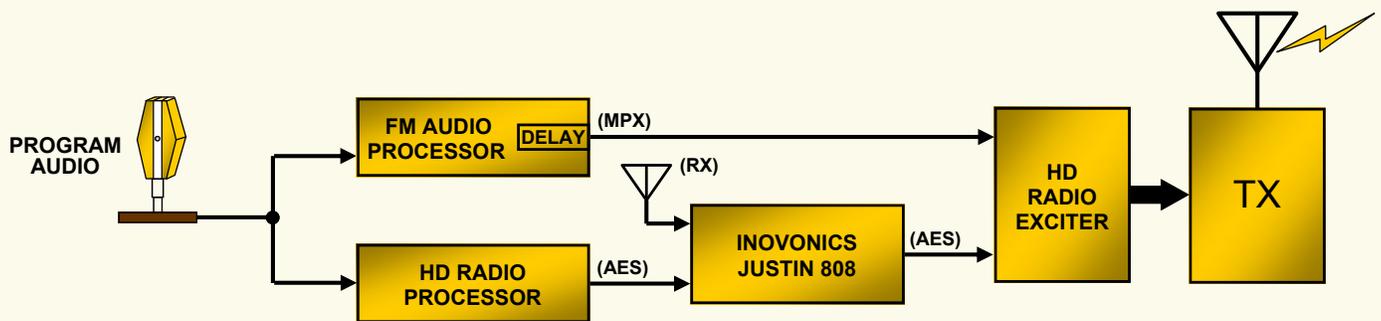
JUSTIN Implementation in HD Radio Air Chain With Dual Audio Processors

MISCELLANEOUS

Headphone Jack:

A front-panel, quarter-inch (TRS) headphone jack allows the user to monitor either the AES digital audio passing through the JUSTIN 808, or the off-air signal in "split mode," with the analog FM signal in the left channel and the HD1 digital signal in the right channel. Headphone volume is a menu item.

Power Requirements:

90 - 130VAC or 200 - 255VAC, 50/60Hz; 7W

"Boot Time":

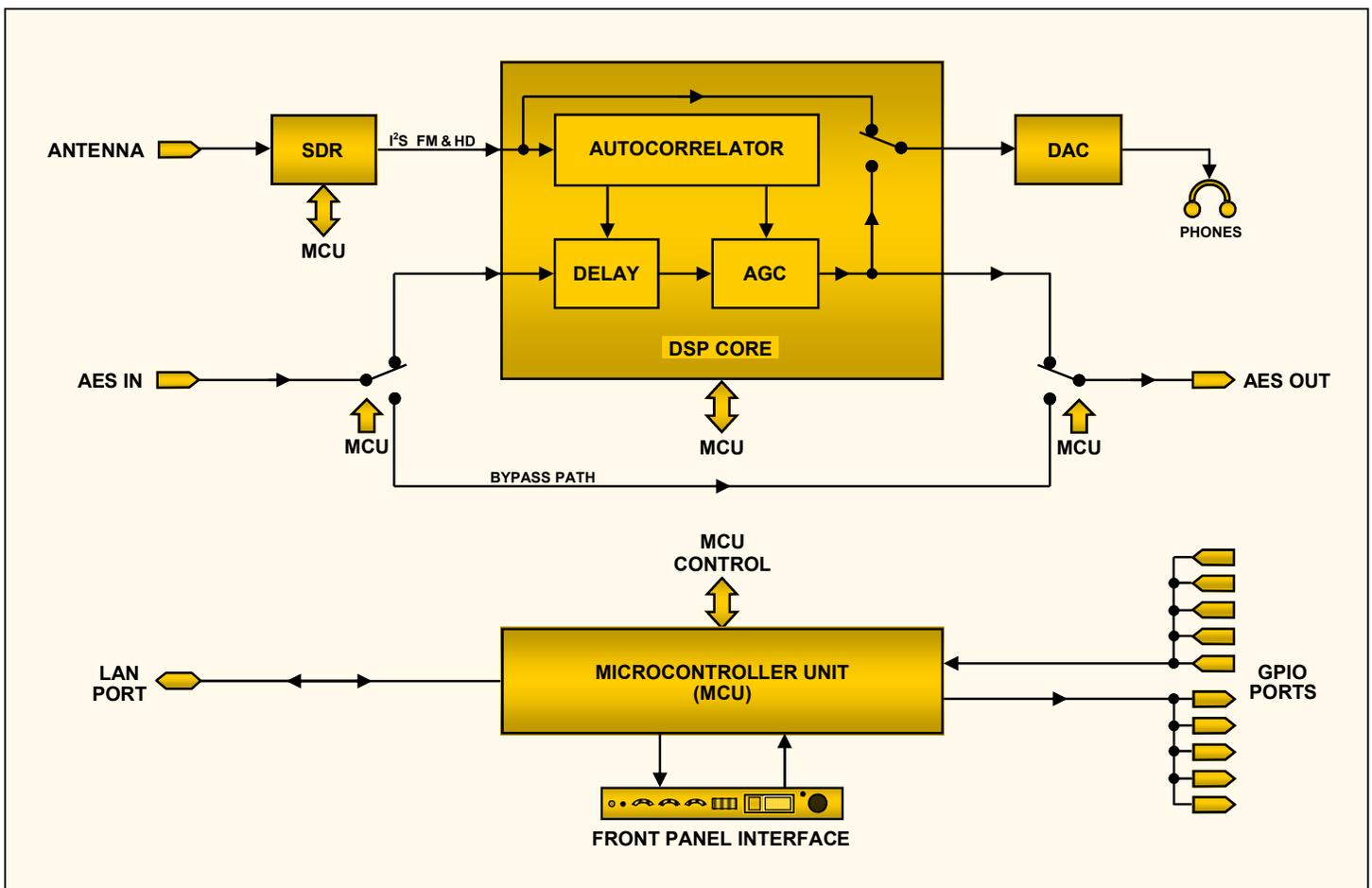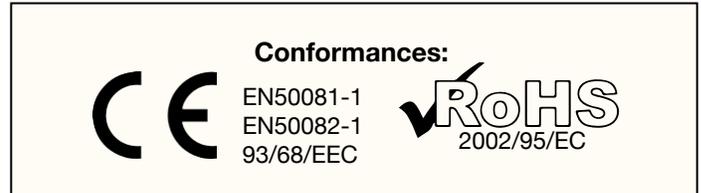≤3 seconds to full operation

Size:

W: 19in/483mm, H: 1¾in/44mm,
D: 9½in/240mm (1U).

Weight:

9lb/4kg (net); 12lbs/5.4kg (shipping)

Environmental:

Continuous operation guaranteed at ambient temperatures between 32°F/0°C and 122°F/50°C; 0-95% relative humidity, non-condensing; altitudes to 10,000ft/3048m.

Conformances:

CE EN50081-1 EN50082-1 93/68/EEC

RoHS 2002/95/EC

Block Diagram – JUSTIN 808 HD Radio™ Time Alignment Processor