

Appendix

Contents

Parameters, Units, and Ranges A-2

Parameters, Units, and Ranges

Approximately following the FM-10HD's signal path, these are the values and ranges appropriate to each type of processing.

System Level

Headroom:	20dB
Nominal Operating Level:	-20dBFS digital

Analog Line Input

Type:	Electronic Differential
Input Impedance:	> 10Kohm (bridging)
Optimum Source Impedance:	< 1Kohm

Digital Line Input

Data Standard:	AES3 (AES/EBU)
Data Amplitude:	Per AES3-2003 assuming minimum allowable output signal amplitude of 2V and minimum allowable input signal amplitude of 200mV

Input Gain Adjustment Ranges

Gain Adjustment:	+/- 24dB
Gain Adjustment Increments:	0.5dB
Gain Calibration:	A gain control setting of 0.0 aligns an external 0dBFS signal with the FM-10HD's 0dBFS internal reference

Input Failsafe

Type:	Automatic
Analog Fail Cause:	Audio level below -48dBFS.
Response Time:	30 seconds
Digital Fail Cause 1:	Audio level below -48dBFS
Response Time:	30 seconds
Digital Fail Cause 2:	Corrupted or invalid AES data
Response Time:	Immediate

Audio Level Balance

Type:	Common to Analog and Digital inputs
Analog/Digital L/R Balance Range:	+/-12dB
Analog/Digital L/R Balance Increments:	0.5dB

Voice Symmetry Phase Rotation

Operating Modes:	In/Out
Filter Type:	4 th Order Allpass

High-Pass Filter

HPF Filter Class:	24dB/octave Butterworth
Frequency range:	20Hz – 300Hz
HPF Insert Modes:	Off / Stereo L/R / Sum/Difference

Equalization - Two sections of four-band Parametric Equalization

EQ Set 1 – routable to pre or post-five-band AGC.

EQ Set 2 – post-FM multiband limiter.

Frequency:	20Hz – 20 kHz
Bandwidth:	0.2 – 3.0 octaves
Lift / Cut:	+/- 14.0dB pre/post five band AGC +/- 6.0dB post HD/FM multiband limiters

Five-Band AGC/Compressor

Operates in sum/difference, or ‘matrix’ mode with the gain linked at AGC time constants.

Drive Gain:	OFF or -79.0dB to +6.0dB in 0.5dB steps (1dB steps below -60dB)
Makeup Gain Range:	-20.0dB to +48.0dB, 0.5dB steps
AGC/Compressor Thresholds:	- 50dBFS to -80dBFS
AGC Threshold Backoff:	0dB to -12dB
AGC Attack:	50mS – 1500ms (1.5 sec)
AGC Release:	100mS – 7.0 seconds
AGC Band Coupling:	0dB to -30.0dB, 0.5dB steps
Compressor Attack:	3.0mS – 1000mS (1Sec)
Compressor Release:	20mS – 1000mS (1Sec)
Ratio:	1:1 – 20:1
AGC Threshold:	-20.0dB to -79dBFS, plus off
Gate Thresh Trim:	+/- 6dB per band
Gated Modes:	Ooze/Freeze
Gate Delay:	50mS to 500mS

Crossover Frequencies

Super Low to Low Band:	40.5 Hz to 120 Hz
Low to Low Mid Band:	149 Hz to 334 Hz
Low Mid Band to High Mid Band:	817 Hz to 1.59 kHz
High Mid Band to High Band:	2.52 kHz to 7.55 kHz
Band Output Trims, Sum:	+/- 6dB
Band Output Trims, Difference:	+/- 6dB

HD Output Peak Limiter

A zero-overshoot look ahead peak limiter (or clipper for non-CODEC applications) accomplishes precision peak control for the FM-10HD's HD output.

Overall Controls

Lookahead Limiter Threshold Trim:	+/- 6.0dB
Lookahead Limiter Attack:	0.2ms – 100ms
Lookahead Limiter Release:	33ms – 330ms
Lookahead Limiter Delayed Release:	100ms – 1000ms (1Sec)
Clip Style:	Off/Round/Deep (for non-CODEC use)
HD Output Level Trim:	-79.95dB to +12.00dB, or OFF
Phase:	L and R may be phase-reversed. L and R Channels may be swapped.
Output Signal available as:	AES 3-pin XLR (digital) Stereo Analog (pair 3-pin XLR connectors)

10-Band FM Output Peak Limiter

A four band parametric EQ follows the 10-band limiter and feeds the VBMS with multiple operating styles, then an oversampled, zero overshoot lookahead limiter or main clipper with multiple operating styles, and then an FM diversity delay.

Overall Controls	
Multiband/Drive:	0 – 100%
VBMS Drive:	+/- 10.0dB
VBMS Style:	Off/ Soft/ Hard
VBMS Output:	+/- 10.0dB
VBMS Frequency:	60 - 300Hz
Multiband Knee:	Soft/ Hard
Multiband Threshold:	+/-10dB relative to Drive
Multiband Attack:	0.1ms – 1000ms (1Sec)
Multiband Release:	30ms – 1000ms (1Sec)
Pre-emphasis Modes:	Off/50uS/75uS
Pre-emphasis insert points:	Pre-MB Limiter Pre-lookahead limiter Post-lookahead limiter (pre-clipper)
Lookahead Limiter (Threshold) Trim:	+/- 6.0dB
Lookahead Limiter Attack:	0.2ms – 100ms
Lookahead Limiter Release:	33ms – 330ms
Lookahead Limiter Delayed Release:	100ms – 1000ms (1Sec)
FM Output Level Trim:	-80.00dB to +0.00dB.
Main FM Clipper Styles:	Off/Hard/Firm/Round
De-emphasis:	Complementary as applied in pre-emphasis.
Output Signal available as:	Pre or post diversity delay AES 3-pin XLR (digital), and Stereo Analog (pair 3-pin XLR connectors)

Stereo Encoder

Reference grade stereo encoder with embedded composite processing, test oscillator, SCA digitizer, and balanced and unbalanced composite outputs.

Overall Controls

Stereo Width Limiter:	10% to 100% in 10%. steps, plus off
Stereo Pilot Injection:	0 – 20%, 0.1% steps
Stereo Pilot Phase:	+/- 22.5 degrees reference to 38kHz.
SCA 1 Input:	Analog, 10kohm input impedance, +24dBu max. input level
SCA Input 1 Gain:	-79.95dB to +10.00dB, or OFF
SCA 2 Input:	Analog, 10kohm input impedance, +24dBu max. input level
SCA Input 2 Gain:	-79.95dB to +10.00dB, or OFF
TX 1 Output Level:	-79.95dB to +0.0dB, 0.05dB steps, or OFF
TX 2 Output Level:	-79.95dB to +0.0dB, 0.05dB steps, or OFF May be selected to provide pilot tone only
Composite Processor Modes:	Lookahead Limiter Soft Clipper Hard Clipper
Stereo Encoder Output Operating Modes:	Analog L/R Analog L/R De-emphasized Unbalanced and Balanced Multiplex Outputs
TX 1/TX 2 Output Levels:	Nominal output level range 1V - 4V RMS or balanced from an XLR.

Presets

An advanced preset management system allows the creation, storing, and recall of 80 presets within the FM-10HD itself and an unlimited number on a host PC. All signal-processing parameters are contained in these presets, allowing the preservation of the complete processing ‘environment.’ Optionally, Input and Output settings may be stored and recalled with presets.

Preset Encryption

Presets are encrypted using the FM-10HD internal 32 bit serial number as the encryption key.

Onboard Real-time clock

A highly accurate internal real-time clock allows the automatic recall of presets at pre-determined times. This clock may be set to ‘free-run’ or be synchronized to an external on- or off-site SNTP server, or synchronized to the GUI PC.

Day-Parting and Long-term Scheduling

A ‘weekly’ preset scheduling establishes a weekly cycle of preset changes, allowing for automatic programmed day-by-day exclusions or additions.

Additionally, a separate long-term scheduling table permits the establishment of ‘one-off’ preset changes for *any* future time and date.

General Purpose Input (GPI)

Eight optically isolated inputs are slaved to the first eight preset slots.

Presets may be recalled by providing the appropriate voltage to the associated GPI port to create a “Logic High” and may be either momentary or latching as desired. Voltages are applied between the appropriate GPI pin and Common with the GPI pin being the most positive voltage. Please see manual text for the required current limiting resistor for voltages above 3.3VDC.

Ethernet Interface

The FM-10HD contains a five-port, auto-sensing 10/100BaseT Ethernet switch with one of the ports available on the outside of the unit for field use. Because the switch is auto-sensing it is not necessary to utilize a crossover cable when connecting a PC directly to the FM-10HD.

Software Remote Control

Supplied Windows® Vorsis GUI software affords control of all system and processing parameters via a 10/100BaseT Ethernet interface.