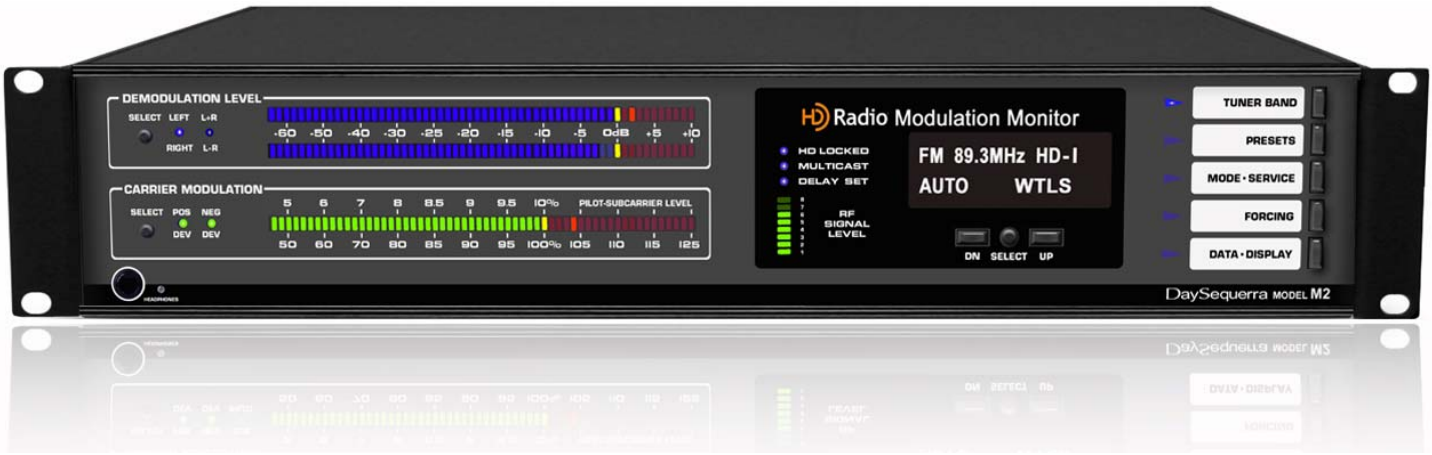
DaySequerra



HD Radio®

Modulation Monitor

M2 | User Manual

Welcome

Thanks for purchasing the DaySequerra M2 HD Radio™ Modulation Monitor. We design and build all of our DaySequerra products to be completely reliable and easy to use, so you can concentrate on producing great sounding broadcasts, not struggling with complicated equipment or difficult to use product manuals.

While the M2 has been designed to be straightforward to use, we do suggest that you spend a few minutes familiarizing yourself with the features and operational functions that are contained in this manual.

DaySequerra has been building broadcast quality products since 1989. The technology developed for the M2, and all of our products, has evolved through a process of user feedback, extensive listening, field-testing and careful refinement.

In the event that you encounter any technical or operational difficulties with this or any DaySequerra product, please feel free to contact us at 856-719-9900. Our office hours are from 9 to 5 ET, Monday through Friday. Or you can email your questions to: **info@daysequerra.com**.

Also, please remember to visit our website **www.daysequerra.com** for warranty registration and the latest DaySequerra product information.

We have worked hard to ensure that your DaySequerra M2 monitor will reliably serve as a flawless link between the transmitter and your monitoring facility, or as the primary broadcast reference source in your studio.

We sincerely hope our products help you achieve a new level of excellence in your work!

David V. Day
and the **DaySequerra Team**

Table of Contents

M2 Firmware v2.0.9 and v2.2.9 - New Features

- Added M2.2R with Performance Loss Monitor (PLM, including 6 dry-contact alarm relay closures), full-time digital audio output, Ethernet remote port and RBDS decoding
- Eliminated “Standby at Turn-on” feature and improved brown-out performance
- Multicast Set feature to keep monitor continuously monitoring selected HD-2 through HD-8 channel
- New “Scrolling Data” mode sequentially displays selected HD Radio™ channel PAD fields
- Displays HD-1 for MPS channel modem lock in VFD
- New DATA-DISPLAY menu with firmware version, scrolling data analog carrier and muting options
- Redesigned user interface for MPS, Multicast and Forced Analog modes

M2.0 Revision J.

Important Safety Information

- Indoor use only. Not for use in wet or damp environments.
- Maximum Relative Humidity: <80%
- Class I Equipment (grounded type)
- Electrical rating: 100-120/220-240V~50-60Hz 18W
- Fuse Rating: 2A 250V 20MM
- AC Mains supply voltage fluctuations are not to exceed ±10% of the nominal voltage
- Operations temperature range -40°C to 70°C
- Maximum altitude: 3000m (9843ft)
- Equipment suitable for continuous operation
- Weight: 3.6kg (8lbs) equipment only; 6.1kg (13.5lbs) shipping

Important Note: Please connect your M2 to an uninterruptible power supply (UPS) to provide other protection against power surges and brownouts.

Service Information

The DaySequerra M2 contains no user serviceable components inside the unit. Please contact DaySequerra for repair and upgrade information. In the event that your unit needs to be returned to the factory, contact us for a return authorization number. The monitor ID and firmware version is momentarily displayed at start-up for your convenience. **Please visit www.daysequerra.com and register your new M2 so we can keep you informed of the latest hardware and software updates.**

Introduction

The DaySequerra M2 HD Radio™ Modulation Monitor is one of the finest broadcast modulation monitors available with built-in multicast capability. The M2 has been designed as the benchmark in sensitivity (< 5.0dBf in FM) and reliability, and at the same time delivers the highest quality, accurate monitoring of existing analog and HD Radio™ AM and FM broadcast signals (THD+N <.005% with stereo separation >90dB for HD Radio™ FM signals).

The DaySequerra M2's ultra low noise RF front-end with built-in preselector and double-balanced mixer, low-jitter DAC and Class-A biased audio outputs provide the highest fidelity reception and demodulation of HD Radio™ programs, including display of program applicable data (PAD) for MPS and SPS multicast signals.

Its robust, modular architecture ensures that the M2 will never become obsolete. The rugged M2 chassis houses dedicated hardware RF, audio and power supply modules that, along with firmware updates via flash programmable memory, completely anticipates the growth of new HD Radio™ services and programming. This design approach along with our Factory Product Upgrade program ensures that your investment in a DaySequerra product will continue to pay off well into the future. **Visit www.daysequerra.com for details including the addition of a PLM option to your M2.0X or upgrading to a fully-featured M2.2R.**

Please read this manual thoroughly before operating your M2.

M2 Key Features

SEPARATE AM AND FM ANTENNA INPUTS – Industry standard 75-ohm “F” connectors

AM AND FM HIGH LEVEL INPUTS – Industry standard 50-ohm “BNC” connectors; 7vP-P maximum

ANTENNA - HIGH LEVEL INPUT SELECT – User selected for antenna or high-level inputs

STEREO ANALOG OUTPUTS – Balanced (+4dBm) for 100% analog modulation

DIGITAL AUDIO OUTPUT – 110-ohm transformer isolated for HD Radio™ broadcast audio **IEC320 POWER INLET** – Integrated fuse holder on rear panel

SYNTHESIZED, PUSHBUTTON TUNING – AM and FM bands including multicast channels

PRESETS – 20 preset stations for each AM and FM band

DEMODULATED AUDIO LEVEL METERS – Displays Left and Right or L+R and L–R demodulated audio between +10dB and –64dB Factory preset to display de-emphasized program audio

CARRIER LEVEL METER – Displays positive or negative peaks, or both simultaneously from 46% to 125% with a user programmable measurement integration time Factory preset for 100uSec

HD LOCKED – HD Radio™ audio present, indicates digital carrier SN > 58dB/Hz

DELAY BIT – Indicates active analog diversity delay for HD Radio™ broadcasts

A-D SPLIT MODE – HD Radio™ level, phase and time alignment monitor for analog diversity delay

HEADPHONE OUTPUT – Screwdriver gain control on front panel

PROGRAMMABLE STATUS ALARMS – M2.2R provides 6 dry-contact relays

M2 Technical Specifications

RF TUNING RANGE	AM – 520kHz to 1720kHz in 10kHz increments FM – 87.9MHz to 108.1MHz in 200kHz increments
RF USEABLE SENSITIVITY	AM – 5dBf for SNR –20dB referenced to 30% modulation FM – 5dBf for SNR –30dB referenced to 100% modulation
IF REJECTION	AM – greater than 100dB for SNR –20dB FM – greater than 100dB for SNR –30dB
AF BANDWIDTH	AM – ± 1dB 40Hz to 15kHz FM – ± 1dB 20Hz to 20kHz
AF THD+N	< 0.005% (digital audio)
STEREO CHANNEL SEPARATION	> 90dB (digital audio)
HD Radio™ HYBRID ACQUISITION	< 4.5 seconds
HD Radio™ BLEND LEVEL ACCURACY	< 0.5dB
HD Radio™ PAD DATA DISPLAY	HD Radio™ data fields limited to a total of 1018 bytes per message per iBiquity™ specifications.

Unpacking and Installing the M2

Immediately upon receiving your M2, please make a careful inspection for any shipping damage. If damage is found or suspected, please notify the carrier at once and then contact your dealer. The DaySequerra M2 is shipped in one carton, which contains: the M2 unit, an AC power cable, a Torx™ T-8 L-key and this User Manual.

We strongly encourage you to save the shipping carton and shipping materials supplied with your M2. They are specially designed to properly protect your M2, and in the event that you need to return it for service, only these OEM shipping materials can ensure its safe return to our factory.

We provide a limited 1-year warranty on all of our products, but if you don't register your unit, it's hard for us to contact you when software updates become available. **So please take a few minutes to complete the warranty registration form on our web site, www.daysequerra.com.** Thank you!

Rack Mount Installation. The M2 chassis has four rack mounting holes in its chassis and has been designed to fit in a 19" standard 1RU space. Plastic 'finishing' washers are recommended to protect the painted finish around the mounting holes.

Power Connection. The AC power cable supplied with the M2 must be connected from the M2's IEC320 power entry module to an AC mains outlet with a functional earth ground connection. The M2 has been set at the factory to operate at 120VAC unless otherwise specified on the shipping carton**. Please connect your M2 to an uninterruptible power supply (UPS) to protect against power surges and brownouts.**

Antenna Input Connections. Separate 75ohm F-type connectors are provided on the M2 rear panel for dedicated AM and FM antennas. Rear panel switch selects for antenna or high-level (7VP-P) inputs.

Audio Output Connections. Analog audio left and right outputs are on rear-panel XLR connectors with pin 1 GND, pin 2 + and pin 3 -. The digital audio output is transformer-isolated in S/PDIF format on a rear-panel XLR connector with pin 1 GND, pin 2 XFMR and pin 3 XFMR. The M2 digital audio output is 5.1 surround capable.

Front Panel Controls and Indicators

TUNER BAND – Selects manual AM and FM tuning with UP and DN controls. Blue arrow LED illuminates when mode is active. See below for multicast tuning.

PRESETS – The M2 has capability to recall 20 preset or stored AM stations and 20 preset or stored FM stations. Blue arrow LED illuminates when monitor is in PRESETS mode. UP and DN controls scroll through stored stations. When in PRESETS mode, second push of PRESETS switch changes tuner band.

UP and **DN** – For manual AM and FM tuning in TUNER BAND mode and scrolling through PRESETS in PRESETS mode.

SELECT – Multi-function switch for storing PRESETS and controlling other monitor functions, as described below.

MODE - SERVICE – Default is Auto mode. Momentary push activates multicast tuning when a multicast signal is present. Holding switch in for 5 seconds when locked to an HD Radio™ station, forces monitor into Analog mode. Blue arrow LED illuminates only when switch is being pushed, or when multicast tuning or Analog mode is active. In any active mode, second push of MODE – SERVICE returns monitor to Auto mode.

FORCING – Activates A-D SPLIT mode for monitoring and display of HD Radio™ analog-to-digital level and time alignment as well as audio phase. The analog left channel is on the M2 left channel while the digital left channel is on the M2 right channel. Blue arrow LED illuminates when mode is active.

DATA - DISPLAY and DATA - DISPLAY Menu – Selects decoded RBDS from analog broadcast (M2.2R only) and PAD data from an HD Radio™ broadcast for display on the second line of the VFD. Momentary push DATA - DISPLAY switch scrolls display through each RBDS and HD Radio™ PAD data field, as described below. Holding DATA - DISPLAY switch in for 5 seconds activates DATA - DISPLAY menu. The firmware version, e.g., "v2.0.9 A3.2.1" is displayed for 5 seconds before displaying the first menu option. The menu's first selection enables or disables "Scrolling Data" mode when tuner displays each RBDS and HD Radio™ PAD data field for approximately 5 seconds before scrolling to the next field. UP or DN switches toggle the setting; pressing "SELECT" saves the setting and increments the menu to the next field. The second menu field enables or disables "Audio Muting." Next press of "SELECT" saves the setting and exits the menu. Blue LED illuminates only when mode is active. Default is AUTO mode with station short name to be displayed in second line of VFD when tuned to an HD Radio™ station.

HD LOCKED – Blue LED indicator illuminates when monitor has acquired OFDM portion of an HD Radio™ signal and digital carrier SN > 58dB/Hz, thereby permitting HD Radio™ digital audio to be valid. HD is displayed in upper right hand corner of VFD when monitor has acquired OFDM portion of an HD Radio™ signal.

MULTICAST – Blue LED indicator illuminates when monitor has acquired OFDM of an HD Radio™ signal and there is at least one multicast SPS signal present.

DELAY SET – Blue LED indicator illuminates when monitor has acquired OFDM of an HD Radio™ MPS signal and the analog diversity delay is active. The LED is off when there is no delay bit set; i.e. "ball game mode" meaning that the analog program has not been delayed to be coincident with the HD Radio™ MPS signal.

DEMODULATION LEVEL METERS – 58-segment multi-colored LED meters display demodulated analog or digital audio levels, as described below. For analog audio programs, either de-emphasized or pre-emphasized audio can be displayed; select pre-emphasized audio by shorting internal **Pre-Emphasis Jumper JP15** (left channel) and **JP16** (right channel). ***Your M2 was shipped with JP15 and JP16 open to display de-emphasized audio. A Torx™ T-8 L-key (included) or driver is required to remove the M2's cover.***

CARRIER MODULATION METER – 58-segment multi-colored LED meter displays the analog AM or FM carrier level, as described below. Meter is normally off when an HD Radio™ broadcast is locked, unless Analog Carrier mode is selected in the Data – Display menu. The meter has a quasi-peak response with a floating peak-hold and displays positive or negative peaks or both simultaneously from 46% to 125% with user programmable measurement integration times of 100, 200, 500 and 1000uSec. The measurement integration times can be changed using internal **Time Integration Jumper JP1**. ***Your M2 was shipped from the factory preset for 100uSec integration time.***

DEMODULATION LEVEL SELECT – Permits user to select Left or L+R demodulated audio level to be displayed on top Demodulation Level meter, and Right or L–R demodulated audio level to be displayed on bottom Demodulation Level meter. Blue LEDs indicate the user selection of display mode.

CARRIER MODULATION SELECT – Permits user to select positive, negative or both deviations to be displayed on the carrier modulation meter. Blue LEDs indicate the user selection of display mode.

RF SIGNAL LEVEL – 8-segment green LED display indicates relative RF signal level received at the antenna connector on the M2 rear panel. **A minimum of 3 RF signal strength segments must be illuminated (indicating >65dBf) for accurate demodulation and carrier level measurements.**

M2 Operating Description

Power-up and Standby. The Power switch is located on the rear panel of the M2; when switched on the hardware and software version of your M2 to be displayed for 3 seconds on the M2's VFD.

In any mode, if the SELECT and DN switches are depressed simultaneously for 5 seconds, monitor goes into Standby mode with all front panel controls and indicators blanked except for SELECT and UP switches; the M2's VFD then indicates the "DaySequerra Standby" message. Holding SELECT together with UP switch in for 5 seconds when in this Standby mode reactivates all front panel controls and indicators and returns monitor to normal operation.

Front Panel Locked. In any mode, if SELECT and MODE – SERVICE switches are depressed simultaneously for 5 seconds, monitor goes into Front Panel Locked mode; i.e., all front panel controls are inhibited except for UP and SELECT switches; analog and digital audio outputs continue. VFD alternates between displaying FRONT PANEL LOCKED and normal display for tuned station. Momentary simultaneous push of SELECT and UP switches in Front Panel Locked mode unblanks all front panel controls and indicators, and returns monitor to normal operation. VFD displays "Exiting Front Panel Locked Mode" message during monitor state transition.

Audio Muting. The M2's audio output can be set to automatically mute for received signals with signal strength less than 45dBf. The audio muting can be enabled using the DATA - DISPLAY menu described previously.

Tuner Band Control. TUNER BAND control toggles between manual AM and FM tuning. TUNER BAND arrow LED illuminates only when mode is active.

Presets Control. In PRESETS tuning mode monitor has capability to store 20 AM stations and 20 FM stations including FM-HD multicast signals.

Preset stations are stored for recall in positions A1 through A20 and F1 through F20 respectively for AM and FM bands. PRESETS Arrow LED illuminates when monitor is in PRESETS tuning mode. UP and DN scroll through the preset stations stored for the band selected. Second momentary push of PRESETS switch changes tuner band.

When monitor has acquired any station in TUNER BAND mode and SELECT switch is held for three seconds, monitor enters PRESETS store mode and PRESETS arrow LED flashes. UP and DN controls then allow user to scroll through A1 through A20 and F1 through F20 dependant on band. When the desired preset location is indicated on VFD, next momentary push of SELECT switch stores selected station in that PRESETS position.

Mode - Service Control. MODE - SERVICE control selects AUTO or ANALOG mode, and activates multicast tuning when an HD Radio™ multicast signal is present. In the AUTO mode, the monitor will receive an HD Radio™ digital broadcast if one is being transmitted; if not, the monitor will receive the analog broadcast. The MODE - SERVICE LED illuminates when only the mode is active or when the switch is being pushed. Default mode is AUTO.

When tuned to an HD Radio™ broadcast and at least one multicast signal is present, momentarily depressing the MODE – SERVICE switch selects the multicast tuning mode; the M4 is automatically tuned to the first multicast broadcast, probably HD-2. The UP and DN controls can then be used to tune to the other multicast stations; i.e., HD-3 through HD-8, available on that RF frequency.

When tuned to an HD Radio™ broadcast and the MODE - SERVICE switch is depressed for 5 seconds, the monitor is forced into ANALOG mode; the audio outputs along with demodulation and carrier modulation level meters process only the analog portion of the HD Radio™ broadcast.

Forcing Control. The FORCING control is used to select A-D SPLIT mode, functional with AM or FM HD Radio™ signals. When locked to an HD Radio™ signal, momentary push of FORCING switch puts monitor in A-D SPLIT mode. In A-D SPLIT mode, the analog audio outputs and headphone jack provide left analog program audio in the M2 left channel and the left HD Radio™ audio program in the M2 right channel. The Left Demodulation Level meter then displays the analog audio signal while the Right Demodulation Level meter displays digital audio signal. This mode provides for audio phase matching as well as audio level and time-alignment of the HD Radio™ broadcast for the correct analog diversity delay. FORCING LED illuminates when monitor is in FORCING mode. Subsequent momentary push of FORCING switch turns FORCING mode and FORCING LED off. Default mode is off.

When tuned to an HD Radio™ broadcast and the FORCING switch is depressed for 5 seconds, the monitor is forced into HD-1 DIGITAL-only mode; the M2 is then locked only to the HD-1 broadcast. There is no DIGITAL-only mode for multicast broadcasts.

Demodulation Level Measurements. The 58-segment demodulation level LED meters display the relative audio levels for the HD Radio™ station MPS, multicast or analog AM / FM signal indicated on monitor's VFD.

For HD Radio™ MPS and multicast digital audio, the Demodulation Level Select switch is inhibited and the Left and Right digital audio levels are displayed; the level meters are calibrated from -64dBfs to 0dBfs, marked as 0dB on the M2 front panel. (Please note this calibration takes into account the 6dB of headroom found in most HD Radio™ exciters.) When an HD Radio™ station is being acquired but prior to an HD Locked LED indication, the analog attributes of the HD Radio™ signal are displayed on the Demodulation Level meters. To measure the analog attributes of an HD Radio™ signal after acquisition, use the MODE - SERVICE control as described above.

For AM analog broadcasts, the Demodulation Level Select switch is inhibited and the monaural audio level is displayed on the Left meter; the level is calibrated from -64dB to +10dB.

For FM analog broadcasts, the Demodulation Level Select switch selects the Left and Right or L+R and L–R demodulated audio levels to be displayed on the corresponding meter; blue LEDs indicate the user selection.

The meters levels are peak responding between +10dB and –30dB, and average responding between –30dB and –64dB. Either de-emphasized or pre-emphasized audio can be displayed; select pre-emphasized audio by shorting internal De-Emphasis Jumper JP15 (left channel) and JP16 (right channel).

Carrier Modulation Level Measurements. The 58-segment Carrier Modulation level LED meter displays the analog carrier modulation for AM or FM signal indicated on monitor's VFD. The Carrier Modulation Select switch permits the user to select positive, negative or both carrier deviations to be displayed on the carrier modulation meter. Blue LEDs indicate the user selection. The meter is calibrated from 46% to 125% (for FM signals; for AM signals the M2.0X meter is calibrated to 105%. The M2.2R Carrier Modulation level is accurate in AM to 125%.) The meter has user programmable measurement integration times of 100, 200, 500 and 1000uSec; measurement integration times can be changed using internal Time Integration Jumper JP1.

When an HD Radio™ station is being acquired but prior to an HD Locked LED indication, the analog attributes of the HD Radio™ signal are displayed on the Demodulation Level meters. The Carrier Modulation meter is blanked and the Carrier Modulation Select switch is inhibited for HD Radio™ MPS and multicast signals after the HD Locked LED indication.

Data – Display Control. The DATA - DISPLAY control provides display of RBDS PI and RT fields (M2.2R only) as well as PAD data for HD Radio™ signals. DATA - DISPLAY arrow LED illuminates when mode is active. DATA - DISPLAY switch selects RBDS from the current analog broadcast or PAD data from the current HD Radio™ MPS (HD-1) or HD-2 through HD-8 multicast signal to be displayed on tuner's VFD. Momentary push scrolls through each PAD field in the following sequence:

- Station long name
- Station program type
- Song title
- Artist
- Album
- Genre
- Comment

Subsequent momentary push of DATA - DISPLAY switch turns DATA - DISPLAY mode and DATA - DISPLAY LED off. VFD display second line scrolls if longer than 16 characters. If there is no data for the selected field, VFD display "NO" plus the data category; e.g., "NO ALBUM DATA."

In the M2.2R, RBDS PI and RT fields are displayed per RBDS specifications. Station long name, station short name and program type are processed as an ID3 tag. In all M2 models, HD Radio™ PAD data; i.e., song title, artist, album, genre and comment fields are limited to 127 bytes each for a total of 1018 bytes per message per iBiquity™ specifications. For more information on ID3 tags and PAD data, please visit www.ibiquity.com and www.id3.org.

UP. Momentary push of UP control tunes frequency up one increment in TUNER BAND mode, when held for three seconds tunes faster. UP selects next stored preset station in PRESETS mode (no faster mode, one push per preset). Audio muting is active while tuning. Selects next item in other menus and is used for other functions as described herein.

DN. Momentary push of DN control tunes frequency down one increment in TUNER BAND mode, when held for three seconds tunes faster. DN selects next stored preset in PRESETS mode (no faster mode, one push per preset). Audio muting is active while tuning. Selects next item in other menus and is used for other functions as described herein.

Select Control. When monitor has acquired any station in TUNER BAND mode and SELECT switch is held for three seconds, monitor goes into PRESETS store mode; PRESETS arrow LED flashes. UP and DN controls then allow user to scroll through A1 through A20 or F1 through F20, dependant on band. HD Radio™ FM multicast stations can be stored as FM Presets. Once user has selected desired PRESETS position, next momentary push of SELECT switch stores selected station in that PRESETS position.

Multicast Tuning. When tuned to an HD Radio™ broadcast with at least one FM multicast signal present, momentarily depressing the MODE – SERVICE switch puts monitor into MULTICAST TUNING mode. Use the UP and DN controls to scroll through each of the multicast stations available. The DATA - DISPLAY switch selects PAD data from the tuned multicast broadcast to be displayed on monitor's VFD, as described above.

Headphones. Recessed screwdriver control adjusts headphone output level on recessed ¼" TRS jack. Default set at the factory is +4dBm.

M2.2R Analog SCA and AM Measurements

Overview. The M2.2R adds extended FM analog monitoring capabilities to the M2.0X including peak-type measurements of the injection level for 19kHz pilot, 38kHz, 57kHz, 67kHz and 92 kHz sub-carriers using the Carrier Modulation LED display with a 0.2% resolution between 4.4% and 10.4%. A rear panel MPX Output for external sub-carrier decoding is also included. The M2.2R also adds a relative indication of the incidental AM noise component of the FM carrier using the top Demodulation Level LED display. During the AM noise and Sub-Pilot measurements, all other M2.0X functions are disabled.

AM Noise Level. A relative measurement of the incidental AM noise component of the FM carrier can be made by first tuning to the FM station of interest and then selecting AMN mode by pressing the Demodulation Level Select switch until the blue AMN LED illuminates. The top Demodulation Level LED meter will indicate the relative level of the incidental AM noise component present in the FM carrier. The 0dB indication is referenced to –50dB.

Pilot and SCA Injection Level. The injection level for 19kHz pilot, 38kHz suppressed stereo subcarrier, 57kHz SCA, 67kHz SCA and 92kHz SCA of an analog FM signal can be accurately measured using the Carrier Modulation LED display by first tuning to the FM station of interest and then selecting the Sub-Pilot mode by pressing the Carrier Modulation Select switch until the blue Sub-Pilot LED illuminates. The received RF signal level of the analog FM signal must be at least 65dBf for the Sub-Pilot mode to be active.

The VFD will now indicate the 19kHz pilot or subcarrier frequency to be measured as illustrated in the following sample:

1	**9**		**k**	**H**	**z**		**P**	**i**	**l**	**o**	**t**				
C	**a**	**r**	**r**	**i**	**e**	**r**		**t**	**o**		**E**	**x**	**i**	**t**	

A momentary push of the SELECT switch located between the DN and UP switches will start the measurement, with the resulting level indicated on Carrier Modulation LED display. The pilot-subcarrier levels are indicated on the top meter legend. The FM stereo pilot level is typically set to 9% injection. During the 19 kHz pilot level measurement the VFD will indicate:

1	**9**		**k**	**H**	**z**		**P**	**i**	**l**	**o**	**t**				
D	**a**	**t**	**a**		**t**	**o**		**E**	**x**	**i**	**t**				

As indicated on the second line of the VFD, a momentary push of the DATA – DISPLAY switch at this point ends the pilot-subcarrier level measurement for the 19kHz pilot. The VFD now displays:

1	**9**		**k**	**H**	**z**		**P**	**i**	**l**	**o**	**t**				
C	**a**	**r**	**r**	**i**	**e**	**r**		**t**	**o**		**E**	**x**	**i**	**t**	

From this point, the UP and DN switches can be used to select another subcarrier frequency to be measured or the Carrier Modulation Select switch can be used to exit the Sub-Pilot injection level measurement mode.

If the UP and DN switches are used to select another subcarrier frequency to be measured, in this case the 57kHz SCA, the process is identical to that described above. In this example, the VFD now indicates the 57 kHz subcarrier frequency is to be measured:

5	**7**		**k**	**H**	**z**		**S**	**C**	**A**						
C	**a**	**r**	**r**	**i**	**e**	**r**		**t**	**o**		**E**	**x**	**i**	**t**	

A momentary push of the SELECT switch located between the DN and UP switches will start the measurement, with the resulting level indicated on Carrier Modulation LED display. The 57kHz subcarrier level is indicated on the top meter legend. During the 57kHz pilot level measurement the VFD will indicate:

5	**7**		**k**	**H**	**z**		**P**	**i**	**l**	**o**	**t**				
D	**a**	**t**	**a**		**t**	**o**		**E**	**x**	**i**	**t**				

As indicated on the second line of the VFD, a momentary push of the DATA – DISPLAY switch at this point ends the pilot-subcarrier level measurement for the 57kHz pilot.

The VFD now displays:

5	7		k	H	z		P	i	l	o	t				
C	a	r	r	i	e	r		t	o		E	x	i	t	

From this point, the UP and DN switches can be used to select the next subcarrier frequency to be measured or the Carrier Modulation Select switch can be used to exit the Sub-Pilot injection level measurement mode.

Sample VFD Displays

HD Radio™ AM - default display for WATT-AM

A	M				5	3	0				H	D	-	1	
A	U	T	O				W	A	T	T	-	A	M		

HD Radio™ AM - WATT-AM stored in preset position A9

A	9				5	3	0				H	D	-	1	
A	U	T	O				W	A	T	T	-	A	M		

HD Radio™ FM - default display for WATT-FM

F	M			1	0	8	.	3			H	D	-	1	
A	U	T	O				W	A	T	T	-	F	M		

HD Radio™ FM - WATT-FM in A-D Split Mode

F	M			1	0	8	.	3			H	D	-	1	
	A	-	D		S	P	L	I	T		M	O	D	E	

HD Radio™ FM - Song title (Nights of Unknown Love) for WATT-FM stored in preset position F9

F	9			1	0	8	.	3			H	D	-	1	
N	I	G	H	T	S		O	F		U	N	K	N	O	W

HD Radio™ FM - Multicast HD-2 channel selected

F	**M**			**1**	**0**	**8**	**.**	**3**			**H**	**D**	**-**	**2**	
S	**P**	**O**	**R**	**T**	**S**										

Performance Loss Monitor

Performance Loss Monitor (PLM) Connections – The PLM (standard on the M2.2R) provides six dry, floating relays with outputs on a rear panel mounted DB15 connector to report selected alarm conditions, including loss of RF carrier, program audio, OFDM lock and PAD data. The following lists the DB15 pin-outs. Relay contacts are rated at 1A @ 24VDC.

Note – RBDS Loss alarm available on M2.2R model only.

Alarm on Loss of	NC Contact	NO Contact	Common
RF Carrier	**3**	**2**	**1**
Audio	**5**	**4**	**1**
OFDM Lock	**8**	**7**	**6**
RBDS – M2.2R and M4.2R only	**10**	**9**	**6**
PAD Data	**13**	**12**	**11**
MC-Avail or Delay	**15**	**14**	**11**

Alarm Configuration Menu – Pressing the SELECT and PRESETS switches for 5 seconds activates the Alarm Configuration Menu. VFD displays ALARM CONFIG with “ENABLE” and “SETUP” options. Select desired option using UP and DN switches to toggle the setting. Select “ENABLE” to arm all alarms as previously configured and exit Alarm Configuration Menu; select “SETUP” to continue with alarm configuration menu. Press “SELECT” to increment the menu to the next alarm function. Exit the Alarm Configuration Menu at any time by pressing PRESETS switch.

		A	**L**	**A**	**R**	**M**		**C**	**O**	**N**	**F**	**I**	**G**		
	E	**N**	**A**	**B**	**L**	**E**			**>**	**S**	**E**	**T**	**U**	**P**	**<**

All Alarms

- Select “ON” to activate all alarms at the minimum threshold with the minimum alarm delay. Select “OFF” to set all alarms to off; select “SETUP” option to continue with alarm configuration menu. Use UP and DN switches to toggle the setting.

Push “SELECT” switch to increment the menu to the next alarm function.

	A	**L**	**L**						**A**	**L**	**A**	**R**	**M**	**S**	
	O	**N**			**O**	**F**	**F**		**>**	**S**	**E**	**T**	**U**	**P**	**<**

Alarm Output 1 – RF Carrier Loss (alarm based on analog RF signal strength)

- Highlight desired “SET” or “OFF” option using UP and DN switches to toggle the setting. Select “SET” to set this monitor alarm and continue with alarm configuration menu; select “OFF” to set this monitor alarm function to off. Push “SELECT” to continue.

R	**F**		**C**	**A**	**R**	**R**	**I**	**E**	**R**		**L**	**O**	**S**	**S**	
	>	**S**	**E**	**T**	**<**						**O**	**F**	**F**		

- If “SET” is selected, submenu for “Level” threshold with “LOW”, “MED” and “HIGH” options is displayed next. “LOW” option sets RF carrier loss threshold for approximately 10µV (25dBf); “MED” option sets RF carrier loss threshold for approximately 100µV (45dBf); and “HIGH” option sets RF carrier loss threshold for approximately 3KµV (75dBf). Use UP and DN switches to toggle the setting and highlight the desired option.

R	**F**		**C**	**A**	**R**	**R**	**I**	**E**	**R**		**L**	**E**	**V**	**E**	**L**
	L	**O**	**W**		**>**	**M**	**E**	**D**	**<**		**H**	**I**	**G**	**H**	

Push “SELECT” switch to increment the menu to the next alarm function.

- Submenu for “Alarm Delay” with “30”, “60”, “120” and “240” second options is displayed next. Use UP and DN switches to toggle the setting and highlight the desired option.

		A	**L**	**A**	**R**	**M**			**D**	**E**	**L**	**A**	**Y**		
	3	**0**	**>**	**6**	**0**	**<**	**1**	**2**	**0**		**2**	**4**	**0**		**S**

Push “SELECT” switch to increment the menu to the next alarm function.

Alarm Output 2 – Audio Loss (Silence Detect)

- Highlight desired “SET” or “OFF” option using UP and DN switches to toggle the setting. Select “SET” to set this monitor alarm and continue with alarm configuration menu; select “OFF” to set this monitor alarm function to off.

Push “SELECT” to continue.

		A	U	D	I	O			L	O	S	S			
	>	S	E	T	<						O	F	F		

- If “SET” is selected, submenu for “Level” threshold with “LOW”, “MED” and “HIGH” options is displayed next. “LOW” option sets audio loss threshold for approximately -60dB; “MED” option sets audio loss threshold for approximately -40dB; and “HIGH” option sets audio loss threshold for approximately -20dB. Use UP and DN switches to toggle the setting and highlight the desired option. Push “SELECT” switch to continue.

		A	U	D	I	O			L	E	V	E	L		
	L	O	W		>	M	E	D	<		H	I	G	H	

- Submenu for “Alarm Delay” with “30”, “60”, “120” and “240” second options is displayed next. Use UP and DN switches to toggle the setting and highlight the desired option.

		A	L	A	R	M			D	E	L	A	Y		
	3	0	>	6	0	<	1	2	0		2	4	0		S

Push “SELECT” switch to save and increment the menu to the next alarm function.

Alarm Output 3 – OFDM Lock Loss (HD Radio™ modem lock)

- Highlight desired “SET” or “OFF” option using UP and DN switches to toggle the setting. Select “SET” to set this monitor alarm and continue with alarm configuration menu; select “OFF” to set this monitor alarm function to off. Push “SELECT” to continue.

	O	F	D	M		L	O	C	K		L	O	S	S	
	>	S	E	T	<						O	F	F		

- If “SET” is selected, submenu for “Alarm Delay” with “30”, “60”, “120” and “240” second options is displayed next. Use UP and DN switches to toggle the setting and highlight the desired option.

		A	L	A	R	M			D	E	L	A	Y		
	3	0	>	6	0	<	1	2	0		2	4	0		S

Push “SELECT” switch to save and increment the menu to the next alarm function.

Alarm Output 4 – RBDS Data Loss (alarm based on data appearing in Radio Text field; available in M2.2R model only)

Alarm Output 5 – HD Radio™ PAD Loss (alarm based on data appearing song title field only, does not mean data is valid)

- Highlight desired “SET” or “OFF” option using UP and DN switches to toggle the setting. Select “SET” to set this monitor alarm and continue with alarm configuration menu; select “OFF” to set this monitor alarm function to off. Push “SELECT” to continue.

		P	**A**	**D**		**D**	**A**	**T**	**A**		**L**	**O**	**S**	**S**	
	>	**S**	**E**	**T**	**<**						**O**	**F**	**F**		

- If “SET” is selected, submenu for “Alarm Delay” with “30”, “60”, “120” and “240” second options is displayed next. Use UP and DN switches to toggle the setting and highlight the desired option.

		A	**L**	**A**	**R**	**M**			**D**	**E**	**L**	**A**	**Y**		
	3	**0**	**>**	**6**	**0**	**<**	**1**	**2**	**0**		**2**	**4**	**0**		**S**

Push “SELECT” switch to save and increment the menu to the next alarm function.

Alarm Output 6 – User Assignable

Note – Alarm Output 6 can be configured for one of two HD Radio™ parameters, **MC Available Loss** or **Delay Bit Loss**. MC Available Loss triggers whenever the multicast available bit is no longer active, meaning that there was at least one multicast program being broadcast. If two multicast programs are being broadcast and one is interrupted, the MC Available Loss alarm will not activate because of the remaining multicast program. MC Available Loss is an option only in FM.

- Highlight desired **MC Available** - “MC-AV”, **Delay Bit** – “DLAY” or “OFF” option using UP and DN switches to toggle the setting. Select desired function to be alarmed and continue with alarm configuration menu; select “OFF” to set this monitor alarm function to off.

Push “SELECT” to continue.

	A	L	A	R	M		O	U	T	P	U	T	6	
>	M	C	-	A	V	<	D	L	A	Y		O	F	F	

- If “MC-AV” or “DLAY” is selected, submenu for “Alarm Delay” with “30”, “60”, “120” and “240” second options is displayed next. Use UP and DN switches to toggle the setting and highlight the desired option.

		A	L	A	R	M			D	E	L	A	Y		
	3	0	>	6	0	<	1	2	0		2	4	0		S

Push “SELECT” switch to save and increment the menu to the next alarm function.

Audible Alarm Buzzer

- Highlight desired “ON” or “OFF” option using UP and DN switches to toggle the setting. Select “ON” for audible alarm to beep during any active alarm condition and continue with alarm configuration menu; select “OFF” for audible alarm to be silent during any active alarm condition.

		A	L	A	R	M		B	U	Z	Z	E	R		
		>	O	N	<					O	F	F			

Push “SELECT” to continue.

Alarm Configuration Enable or Save

- Highlight desired “ENABLE” option to arm selected alarms and save alarm configuration or “SAVE” option to save alarm configuration without arming alarms. Use UP and DN switches to toggle the setting.

		A	L	A	R	M		C	O	N	F	I	G		
	E	N	A	B	L	E			>	S	A	V	E	<	

Push “SELECT” to continue. The alarm configuration settings are saved in non-volatile memory.

Activate Alarm - Activate monitor alarm conditions saved in configuration by holding SELECT and PRESETS buttons both in for 5 seconds to enter ALARM CONFIG menu and selecting "ENABLE" using UP and DN switches to toggle the setting. Pushing "SELECT" arms the alarms; monitor VFD alternates between "ALARM SET" message and normal VFD display for the station. **Front panel of the monitor is locked whenever alarm is armed to prevent false alarm conditions.**

De-activate Alarm - To de-activate the configured alarm functions, hold SELECT and PRESET buttons both in for 5 seconds. Monitor VFD display returns to normal operation and front panel of the monitor is un-locked.

Alarm Notification and Reset - When any alarm is active, audible alarm will sound (modulated beeping, if Alarm Buzzer has been set to "ON") and second line of VFD will scroll an alarm message indicating "ALARM" and the specific alarm that is active, for example "ALARM – RF CARRIER LOSS, PRESS SELECT TO CLEAR". Pressing SELECT and PRESETS buttons will clear all alarms.

If during an alarm active condition the alarm condition is corrected, the monitor will reset to its state before the alarm occurred and the audible alarm will cease. The monitor alarms as configured will remain active until de-activated by the user, as described above.

M2.2R Ethernet Port Set-up

The M2.2R includes DaySequerra's *Remote Dashboard* ™ software, a proprietary PC-based application, and an Ethernet interface to provide remote control monitoring for both AM and FM HD Radio ™ broadcasts as well as a robust alarm panel for HD Radio™ signal and data attributes.

Please email your M2.2R serial number and contact information to **support@daysequerra**.com or register your unit on our website **www.daysequerra.com** to obtain the password for the CD-ROM containing the *Remote Dashboard* ™ software application, supporting firmware and User Guide that came with your M2.2R. Follow the instructions in the *Remote Dashboard* ™ User Guide to change your M2.2R's IP address and complete the software installation before connecting the PC and using your M2.2R for the first time.

In the event that you encounter any difficulties with your DaySequerra *Remote Dashboard* ™, please feel free to contact us at 856-719-9900. Our office hours are from 9 to 5 ET, Monday through Friday. Or you can email your questions to: **info@daysequerra.com**.

DaySequerra – One Year Limited Warranty

DaySequerra warrants this product to be free from defects in materials and workmanship to its original owner for one (1) year from the date of purchase. DaySequerra will repair or replace such product or part thereof that upon inspection by DaySequerra, is found to be defective in materials or workmanship subject to conditions contained herein.

DaySequerra products are sold worldwide, through a network of authorized DaySequerra dealers and distributors. This Warranty is for the sole benefit of the original purchaser of a DaySequerra product, purchased directly from an authorized DaySequerra dealer or distributor, is restricted to such original purchaser, and shall not be transferred to a subsequent purchaser of the product. Proof of purchase in the form of a bill of sale or receipted invoice substantiating that the product was purchased directly from an authorized DaySequerra dealer or distributor and is within the warranty period must be presented to obtain warranty service. Removal or alteration of the original DaySequerra serial number from a product automatically renders that product warranty null and void.

A Return Authorization Number must be obtained from DaySequerra in advance of return. Parts or product for which replacement is made shall become the property of DaySequerra. The customer shall be responsible for all costs of transportation and insurance to and from the DaySequerra factory, and all such costs will be prepaid.

DaySequerra shall use reasonable efforts to repair or replace any product covered by this limited warranty within thirty days of receipt. In the event repair or replacement shall require more than thirty days, DaySequerra shall notify the customer accordingly. DaySequerra reserves the right to replace any product that has been discontinued from its product line with a new product of comparable value and function.

This warranty shall be void in the event a covered product has been damaged, or failure is caused by or attributable to acts of God, abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation or maintenance, alteration, or lightning, power fluctuations and other incidental or environmental conditions. Further, product malfunction or deterioration due to normal wear is not covered by this warranty.

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