

526

AM Modulation Monitor

Installation & User Guide



PRODUCT REGISTRATION RECORD

526 – Serial No. _____

Purchase Date _____

Warranty Registered via Web?

Reg. Date _____ By: _____

Installation & Operation User Guide

526

AM Modulation Monitor

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Inovonics, Inc. 5805 Highway 9
Felton, CA 95018
Tel: (831) 458-0552
Register online at www.inovonicsbroadcast.com

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Section I

INTRODUCTION

526 PRODUCT DESCRIPTION

Introduction The 526 is Inovonics' fourth-generation Modulation Monitor for medium-wave commercial AM broadcast service. It delivers a wealth of information about the transmitted RF carrier as well as the audio modulation component that defines program technical quality perceived by the listener.

The all-digital 526 combines detailed DSP signal analysis with a menu-driven touchscreen display, plus Webserver-based total access for remote operation, including measurements, graphical data and Web-browser audio monitoring of the off-air program.

**Product
Features**

Leading features of the Inovonics 526 include:

- Unexcelled off-air broadcast reception with highly-accurate displays of total-modulation and associated measurements, even with on-channel or adjacent-channel HD Radio operation.
- Intuitive, menu-driven setup from the front panel, or remote setup and operation with the built-in Webserver, addressable over any IP network by computer or mobile device. The 526 supports full SNMP remote control and monitoring.
- Graphic front-panel and remote display of signal level metering; FFT spectrum analysis of the IF passband and program audio; oscilloscope display of the modulation envelope and demodulated program audio.
- Monitors, displays and graphically plots both short-term and long-term MDCL action.
- Accurate, program loudness measurement to the human-perception ITU-R BS.1770 ('LU') loudness specification.
- Built-in Scheduler for Day/Night operating conditions.
- Collects and logs a history-over-time of RF and audio signal parameters.
- Analog, AES3-digital, HTTP/UDP Web-streaming and independent AoIP-streaming program audio outputs.
- Alarms for a range of signal faults, with tallies and SMS/text or email message dispatches to specific individuals for various alarm conditions. Alarm settings are unique to each station preset; alarms are also logged chronologically.
- The BandScanner™ utility scans the AM spectrum and displays each station along with its relative signal level.
- Exclusive StationRotation™ mode enables automatic sequential monitoring of multiple station presets.
- Stays on-channel and retains measurement setups through signal and power losses.

526 TECHNICAL SPECIFICATIONS

PLEASE NOTE: Specifications tabulated here are actual, real-world measurements, not optimistic allusions to theoretical ideals. Measurement results should be repeatable when using the appropriate, laboratory-grade test equipment.

RF & RECEPTION

Tuning Range: 530kHz-1710kHz in 100kHz steps or 531kHz-1701kHz in 9kHz steps.

Antenna Input: 50Ω/75Ω (F), 1Vrms max.

High Level RF Inputs: Two selectable 50-ohm (BNC) inputs for day/night scheduling, 5Vrms max.

Off-Air Sensitivity: For 50dB SNR, 5dBμV or better with 10kHz audio bandwidth and NRSC de-emphasis; 15dBμV or better with 15kHz bandwidth, no de-emphasis.

Frequency Response: ±0.25dB, 20Hz-15kHz in full-bandwidth mode.

Distortion (at 99% modulation): <0.01% THD+N; <0.02% IMD (SMPTE, 60Hz/7kHz, 4:1).

De-emphasis: NRSC 'truncated' 75μs (defeatable).

Audio Cutoff Filter: Nth-order low-pass in audio monitor outputs only, programmable between 15kHz and 2kHz in 1kHz steps.

OUTPUTS AND PORTS

Program Audio Outputs: Monaural program audio is delivered to 'Left' and 'Right' outputs for convenience in audio monitoring. The 526 does not support AM-stereo broadcasting.

NOTE: Levels noted apply to symmetrical, ±100% carrier modulation. Consider headroom allowances for +125% program peaks.

Balanced Analog: (XLR) Outputs 1 and 2 ('L/R') are adjustable from -15dBu to +15dBu in 0.1dB steps; 200Ω resistive source.

AES Digital: (XLR) Adjustable from -30dBFS to 0dBFS in 0.1dB steps; user-selected 44.1kHz or 48kHz sample rate; 110Ω transformer-coupled.

Dante/AES67 Compatible AoIP Port: (RJ45) Output at 44.1kHz (Dante-only) or 44.1kHz/48kHz (Dante/AES67). The AoIP utility has independent IP, Audio Format and Transmit Flow settings; level adjustable from -30dBFS to 0dBFS in 0.1dB steps.

UDP Stream: ADTS or ADTS in MPEG-TS transport.

HTTP/Icecast 'Casual' Listening Stream: Web browser remote-listening stream employs HE-AACv2 encoding, 44.1kHz or 48kHz sample rate, bit-rates from 18kbps to 64kbps; accommodates up to 10 simultaneous listeners. HTTP/Icecast and raw UDP streams are available simultaneously.

Headphone Jack: (¼" TRS) Menu-adjustable listening level.

LAN Port: (RJ45) LAN connection to local network or Internet provides remote monitoring, control, listening and full SNMP implementation; user-programmable network setup and streaming parameters.

General Purpose I/Os (Plug-In Barrier Strip):

Inputs: GPIs are ground-seeking logic inputs with internal pull-up to +5Vdc. Programmable to accept momentary or sustained ground to switch functions.

Outputs: Individual open-collector NPN transistor closures to ground are associated with alarm alerts. Each is programmable for GPO assignment and logic polarity. Outputs sink 100mA, 40VDC max.

DISPLAYS AND DISPLAY OPTIONS

Bargraph & Numerical Level Metering: Positive and Negative Carrier Modulation (+150%/-100%) • Demodulated Monaural Audio (dB) • BS.1770 Loudness (LU) • RF SNR (%)

Graphic Displays and History Plots: IF Spectrum • Audio Spectrum • IF/Demod Oscilloscope • Modulation History • RF Metrics History • Loudness History • Audio History • BandScanner.

TIMEKEEPING, SCHEDULER AND ALARMS

Real-Time Clock: Auto-sets to Internet time; auto/manual DST setting; battery backup.

Day/Night Scheduler: Webpage setup utility with link to FCC Sunrise & Sunset Calculator for automatic switchover, or GPI closure to ground for D/N operation.

Local & Remote Alarms: Positive Overmod • Negative Overmod • Audio Loss • Low Signal (Day) • Low Signal (Night). **NOTE:** Alarms have multiple parameter settings. All alarms can send text or email notifications. Alarms are automatically logged daily, weekly and monthly.

POWER, ENVIRONMENTAL, MISCELLANEOUS

Power Requirement:

88-264VAC, Single-Phase; 12W.

Operating Environment: 32°F/0°C-122°F/50°C; 0%-95% non-condensing relative humidity; 10,000ft/3048m.

Size and Weight:

3½"H x 19"W x 9"D; 12 lbs. shipping weight.

Conformances:

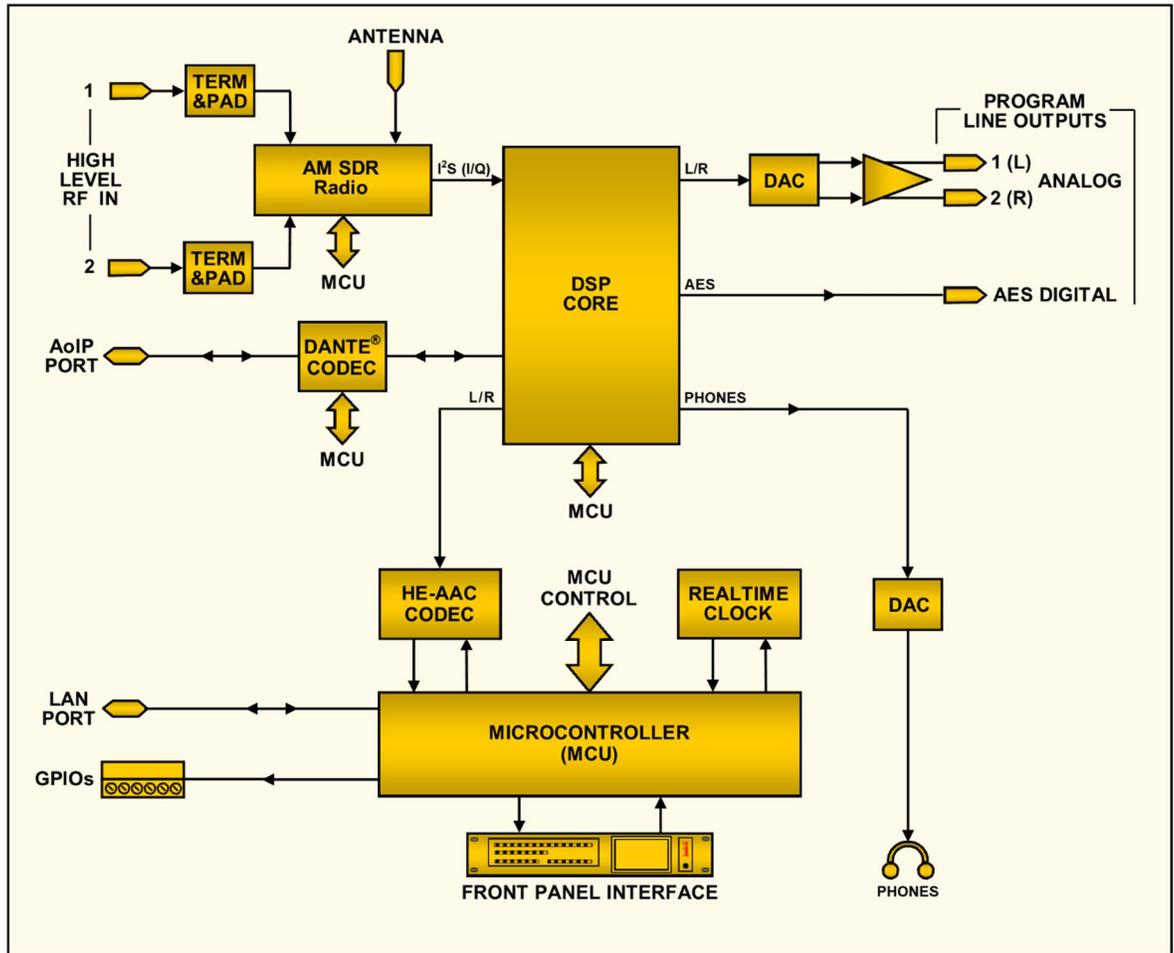


EN50081-1 / EN50082-1
93/68/EEC

2002/95/EC

BLOCK DIAGRAM

The 526 incorporates Software-Defined Radio (SDR) receiver architecture, combined with similar monolithic elements in its design, such that the product is almost entirely DSP-based. Virtually all functionality is provided through firmware coding. The Block Diagram presented below illustrates product basics in an easy-to-follow, 'analog' format, although actual signal paths and logical functions may deviate appreciably from those depicted here.



Block Diagram of the Inovonics 526 AM Modulation Monitor

Section II

INSTALLATION

GENERAL

This section of the manual addresses the physical installation of the 526 at its operating location, the 'nuts and bolts' of connecting the unit. This section also references pages where pertinent setup options and adjustments are discussed.

Unpacking and Inspection

As soon as the equipment is received, inspect carefully for any shipping damage. If damage is found or suspected, notify the carrier at once, and then contact Inovonics.

We recommend that you retain the original shipping carton and packing materials for possible return or transshipment. If returned for Warranty repair, shipping damage sustained as a result of careless packing for return may invalidate the Warranty!

IT IS IMPORTANT to register the Warranty of your 526. This assures coverage of the equipment under Warranty terms, provides a means of tracing lost or stolen gear, and adds the user to a database to receive specific service instructions or software/firmware updates when issued. Register online at:

www.inovonicsbroadcast.com/support/productregistration

NOTE: Many users choose first to familiarize themselves with equipment on the bench or at their desk, in which case you may immediately turn to Section III that describes setup and use of the 526 monitor. When the time comes, do please refer back to this section to confirm proper physical installation and interconnection with other station equipment.

MOUNTING, POWER AND ENVIRONMENT

Rack Requirement

The 526 is a 2U rack-mount package, occupying a nominal 3½ inches of vertical rack space.

Heat Dissipation

As a result of its power-efficient design, the 526 generates little heat, which obviates the noisy internal fan and bothersome filter of many other lab-grade instruments. The unit is specified for operation within an ambient temperature range extending from freezing to 120°F/50°C. Because adjacent, less-efficient gear may radiate substantial heat, be sure that the equipment rack is adequately ventilated to keep internal temperature below the specified maximum ambient.

AC Mains Power	<p>The 526 employs an internal ‘universal’ switchmode power supply that accommodates mains voltages between 88Vac and 264Vac. Certified self-protection circuits have replaced the once-familiar fuseholder.</p> <p>If you need to replace the North-American mains plug with another, you will find that the individual cord conductors are color-coded in one of two ways. US standards specify black for AC ‘hot,’ white for AC neutral and green for earth ground. European CEE standards specify brown for AC ‘hot,’ blue for AC neutral and green with a yellow stripe for earth ground. It is essential that you to follow this coding to ensure product safety.</p>
Radio Frequency Interference (RFI)	<p>Although it is expected that the 526 will be co-located with other station RF equipment, do practice care and common sense in locating the unit away from abnormally high RF fields.</p>
Ground Loops	<p>A mains frequency or RF ground loop could possibly be formed between cable shield grounds and the AC power cord ground. If hum or similar invasive noise is noted in analog outputs, a ‘ground-lifting’ AC adapter may remedy the problem, although the chassis must somehow be returned to earth ground for safety. Rack-mounting the chassis normally satisfies this requirement.</p>

INPUTS, OUTPUTS AND PORTS

Antenna Input and Considerations	<p>The rear-panel ANTENNA connector is a female, 75-ohm F connector. While the F is a common connector in the US, adapters to other connector types are readily available worldwide.</p> <p>Factors guiding your selection of an antenna will include the level and purity of the off-air signal. Selectivity of the 526 is remarkably good, but the ultra-wideband nature of the receiver may still require you to insert an outboard band-pass or band-stop filter in certain situations where the 526 and high-power transmitters are co-located.</p>
High Level Inputs	<p>Two rear-panel HIGH LEVEL RF INPUTS 1 and 2 are 50-ohm-terminating BNC inputs meant to connect directly to transmitters or coupler taps as alternatives to off-air signal reception. Maximum input voltage should not exceed 5Vrms. Input selection is made under the LCD-touchscreen or Webpage Tuner menus, and can be accessed through properly-programmed GPI terminals on the rear panel.</p>
Analog Line Outputs	<p>ANALOG OUTPUTS labeled 1 and 2 on the rear panel deliver monaural program audio and are electronically-balanced. This means that they are ground-referenced and <i>not</i> transformer-isolated. These outputs have a resistive source impedance of 200 ohms. Output levels are expressed in dBu (unloaded) notation next to the adjusting sliders on LCD-touchscreen or Webpage Setup menus.</p>

Although seldom seen in these enlightened times, a legacy 600-ohm-terminating load will drop the actual dBm level 2.5dB below the dBu figure shown beside the associated slider.

An unbalanced output should be taken from the 'hot' or '+' side of any analog output and ground, leaving the 'return' or '-' side of the output floating. The unbalanced output level will be 6dB below the figure shown beside the slider.

Analog levels may be set to any figure between -15dBu and +15dBu, corresponding to $\pm 100\%$ (symmetrical) AM carrier modulation. The default setting is +4dBu. System headroom should be at least 2dB above the level set here to accommodate positive modulation peaks up to +125%.

AES Digital Line Output

The AES DIGITAL OUTPUT delivers balanced, transformer-coupled AES3 digital monaural program audio from a source impedance of 110 ohms. This is a 24-bit output at a selectable sample rate of 44.1kHz or 48kHz.

AES-digital sample rate and levels may be set under LCD-touchscreen or Webpage Setup menus. Levels may be varied between -30dBFS and 0dBFS, corresponding to $\pm 100\%$ (symmetrical) carrier modulation. The default setting is -10dBFS. An output setting any higher than -2dBFS can result in the digital clipping of positive modulation peaks, which can reach +125%.

AoIP Streaming Port and Levels

The Dante-compliant AoIP (Audio over Internet Protocol) outputs appear at the rear-panel RJ45 AoIP PORT. This port is independent of the LAN PORT network connection and its 'casual streaming' utility.

Dante/AoIP streaming first requires basic Dante setup under the Webpage or LCD Dante menus as detailed on Page 42-43. Output levels are adjusted on the Setup / MPX and Audio Outputs / Dante Output Webpage, or under the LCD Setup / Dante Outputs menu. The dB notation beside each slider control corresponds to the level of program peaks at 100% modulation. These are adjustable between 0dBFS and -30dBFS; the default setting is -10dBFS.

LAN Network Port

The RJ45 LAN PORT connects the 526 to a Local Area Network (LAN) or the Internet. Network setup is under the Webpage or LCD Network menu and detailed later in the appropriate section. Networking enables remote control, full SNMP functionality, and the HTTP/UDP Web-browser 'casual listening' utility.

GPIOs

A removable screw-terminal strip on the rear panel accesses four GENERAL PURPOSE INPUTS/OUTPUTS (GPIO) terminals.

GPIOs are control inputs used to switch between input sources (Antenna and High Level 1 or 2), and to switch Day/Night settings. GPIOs have resistor pull-ups to +5Vdc and are toggled by external closures to ground. Polarity may be programmed for active-ground or active-open on the front-panel touchscreen or Webserver interface Setup menus.

GPOs are alarm ‘tally’ outputs that may be assigned to the various reception and program-fault alarms. These are programmed under either front-panel touchscreen or Webpage menu Setup headings and as detailed in the Alarms section of this manual. GPOs are NPN transistors that saturate to ground and can sink up to 100mA at up to 40V.

Section III

PREPARING TO CONNECT

THE 526 FRONT PANEL

Front Panel vs. Web Interface Setup

Setup and operating adjustments of the 526 are under firm-ware control; there are no jumpers, switches or mechanical potentiometers. The unit may be set-up locally through the front-panel LCD-touchscreen, or remotely using the built-in Webserv-er interface and any networked computer, tablet or mobile de-vice with a Web browser.

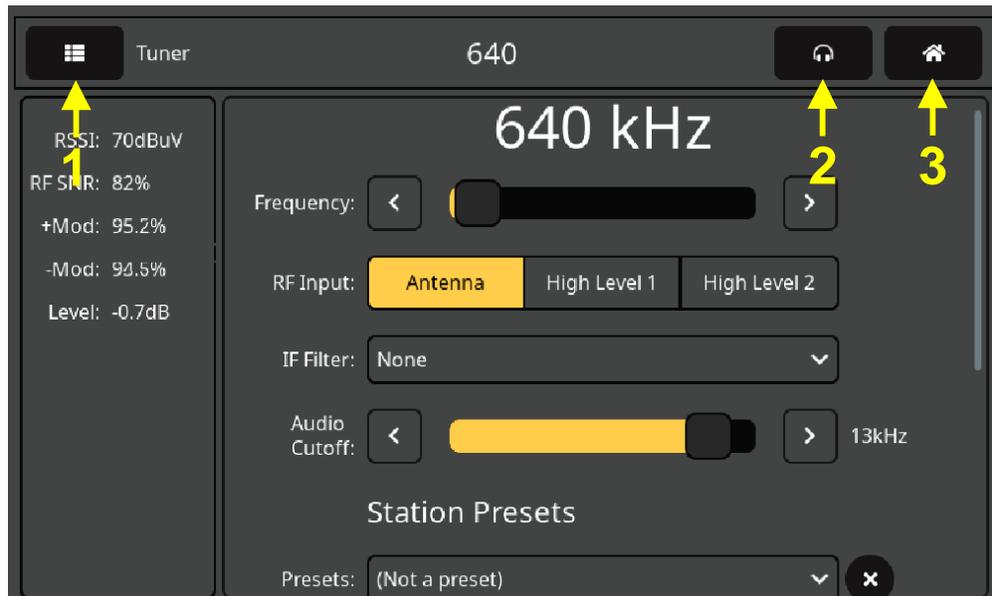
LCD and Web menus follow one another in a reasonably faithful manner, and the few differences are covered in the various dis-cussions that follow. You will at least need to access the LCD-touchscreen to find the unit's IP address, so some familiarity with the front panel is useful.

Powering-Up

'Boot' (startup) time of 526 is under five seconds. When power is first applied, or following a power interruption, the unit is back in full operation quickly. Setup and reception parameters in effect previous to a power glitch are reloaded instantly from non-volatile memory into the processing core.

The LCD-Touchscreen

The LCD-touchscreen has an adjustable timeout feature with a factory default timeout of 5 minutes. Touching the screen will wake it up and reset the timer. Below is an image of what you might see initially with factory-default options. Note the light gray scrollbar on the right; you will have to scroll down (brush up on the screen) to see the rest of this menu.



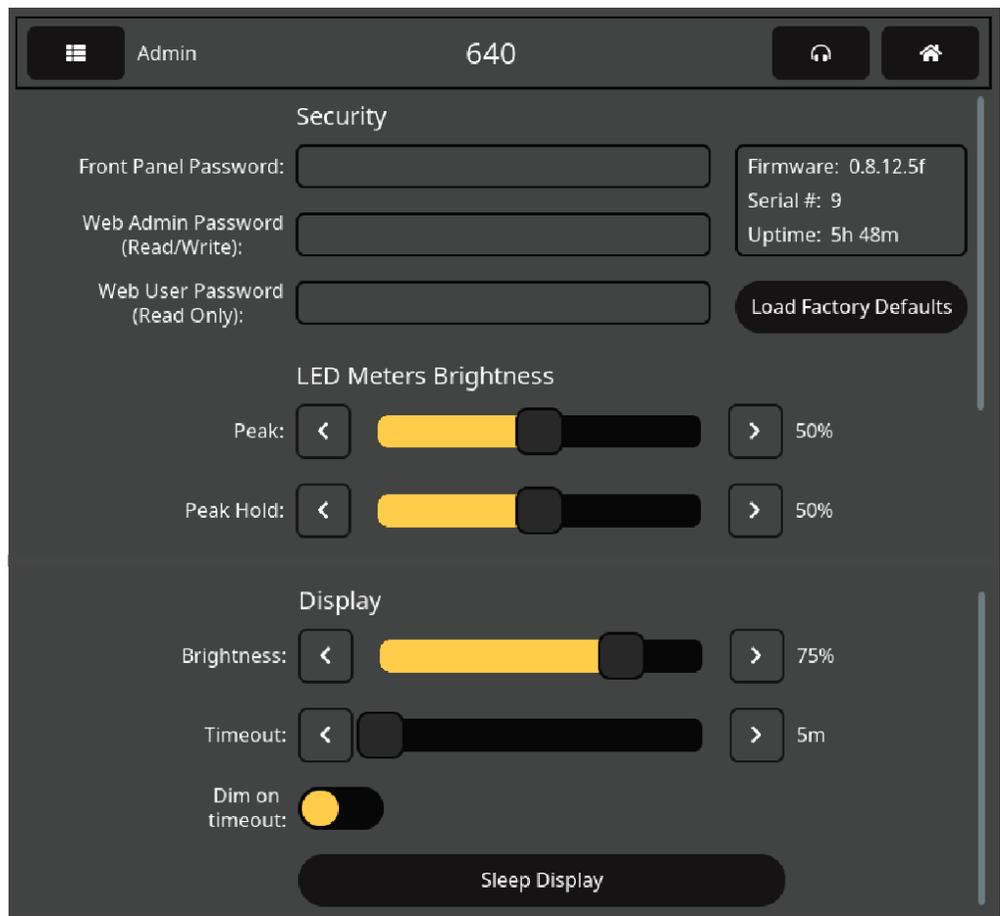
Arrows in the illustration identify items in the LCD screen header. An additional icon will pop up in the header when an alarm is triggered, just to the left of the headphone symbol. Touch that icon to show the alarm panel screen.



Arrow #1 points to the Menu-select tab. Touch the screen here and a list of all 526 LCD menu screens will replace the information in the left section. Scroll down (brush up on the screen) and then touch Admin.

The Admin Menu

This is the Admin menu, which we have “unfolded” to show it completely here.



The Admin menu hosts Security settings. It additionally displays the unit’s current Firmware version and Serial number, and shows Uptime, or how long the 526 has been running since last rebooted or the AC mains power last applied. Housekeeping features that show up here, along with a few more that can be accessed only through the Webpages interface, will be detailed later in the manual. This LCD-touchscreen Admin menu also gives the only access to front-panel display brightness and timeout options.

LED and LCD Display Settings

You may program brightness of the LED-string level meters on the left portion of the front panel with the LED Meters Brightness sliders labeled Peak: and Peak Hold:. Peak: adjusts the bar

brightness and Peak Hold: independently sets brightness of the temporary hanging segment representing the highest peak registered. Use your finger to push the slider left and right or click the < and > buttons to fine-tune your setting.

Similarly, for the LCD display itself, Brightness: controls the back-light. Timeout: sets the time that the display will remain on after you finger leaves the screen. Toggling the Dim on timeout: button will instead just reduce the brightness to a low, yet still visible level rather than turning the backlight off. Touch Sleep Display to preview your timeout action.

**Front-Panel
LED-Bar
Readouts**

PEAK MODULATION + and – LED bargraphs give quasi-peak-responding level displays of the AM modulation envelope. A peak-hold segment hovers above each bar to indicate the highest, most-recent value registered.

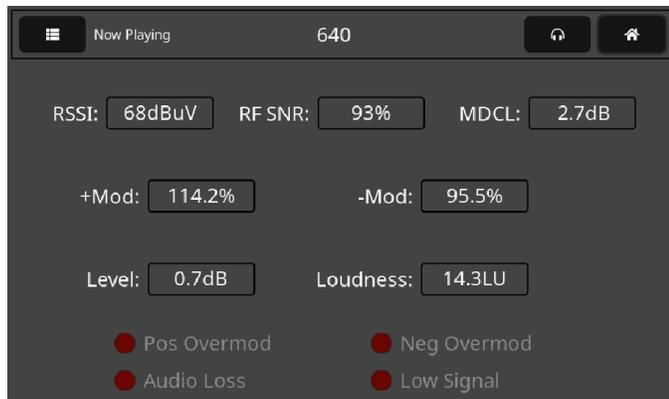
RSSI is a measure of the incoming signal level in dBuV at the rear-panel ANTENNA connector. When high level inputs are used, this readout still has value showing levels in relative terms.

**Headphone
Volume**

Arrow #2 on Page 12 points to the headphone icon. Touching this will bring up a screen where the headphone volume may be adjusted. This screen pops-up automatically when headphones are first plugged in. The program line outputs and their levels may be selected and set here, as well as under the LCD and Webpage Setup menus.

**The ‘Home’
Menu**

Arrow #3 on Page 12 points to the little cottage icon. Touching this will bring the ‘Home’ screen into view, giving an overview of current station RF signal and program modulation figures.



BRINGING UP THE WEBPAGE SERVER

**Network
Considerations**

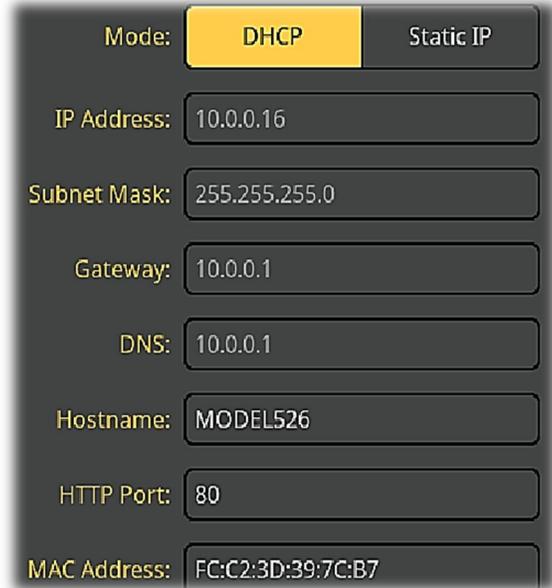
To access the 526 Webserver interface, both the 526 and your computer must be on the same Local Area Network (LAN). As promised, the 526 can be accessed from a computer, tablet or mobile phone anywhere in the world, but your network must first be set up to make this possible. This process is addressed in the Networking section later in the manual.

Finding the 526 IP Address

With both your computer and the 526 plugged into your LAN, and both turned on, go to the 526 LCD-touchscreen and touch the menu icon in the upper-left corner. Then touch Network to open the screen that includes the network setup options shown on the following page.



DHCP is the factory-default network Mode. The IP Address: of your 526 appears in the first box. DHCP should work for you at least initially, but if your 526 needs a static IP address, touch Static IP to unlock the grayed-out boxes underneath. As you then touch each box, an on-screen keyboard pops up permitting you to overwrite the default entries. (Once connected, you may perform this operation more easily using the Webserver interface covered in the next section.)

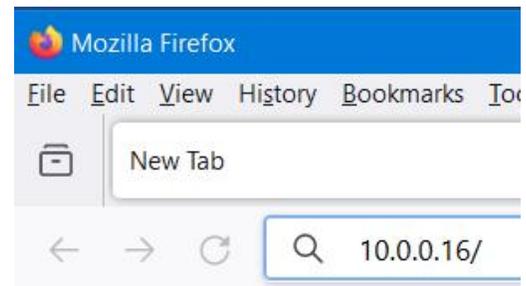


Connecting

Bringing up the Webserver interface is as simple as entering the IP address of the 526 into your browser's address bar and clicking Enter.

Alternatively, a Windows computer is able to locate and connect to the 526 by using the unit's 'Hostname' followed by a forward slash in place of the IP address. Hostname: is shown on the 526 Network menu screen. In the LCD-touchscreen image above, the default Hostname: is MODEL526. This name may be changed to a more convenient or personalized identification of the unit, as may be required to differentiate between multiple units on the same LAN.

Connecting will bring up the Now Playing Webpage. Starting at this point in the manual, most of the setup and operating discussions and instructions will use this Webpage interface utility, mainly because it's easier to navigate and type into. Nevertheless, rest assured that a good deal of setup can be accomplished from the front panel as well.



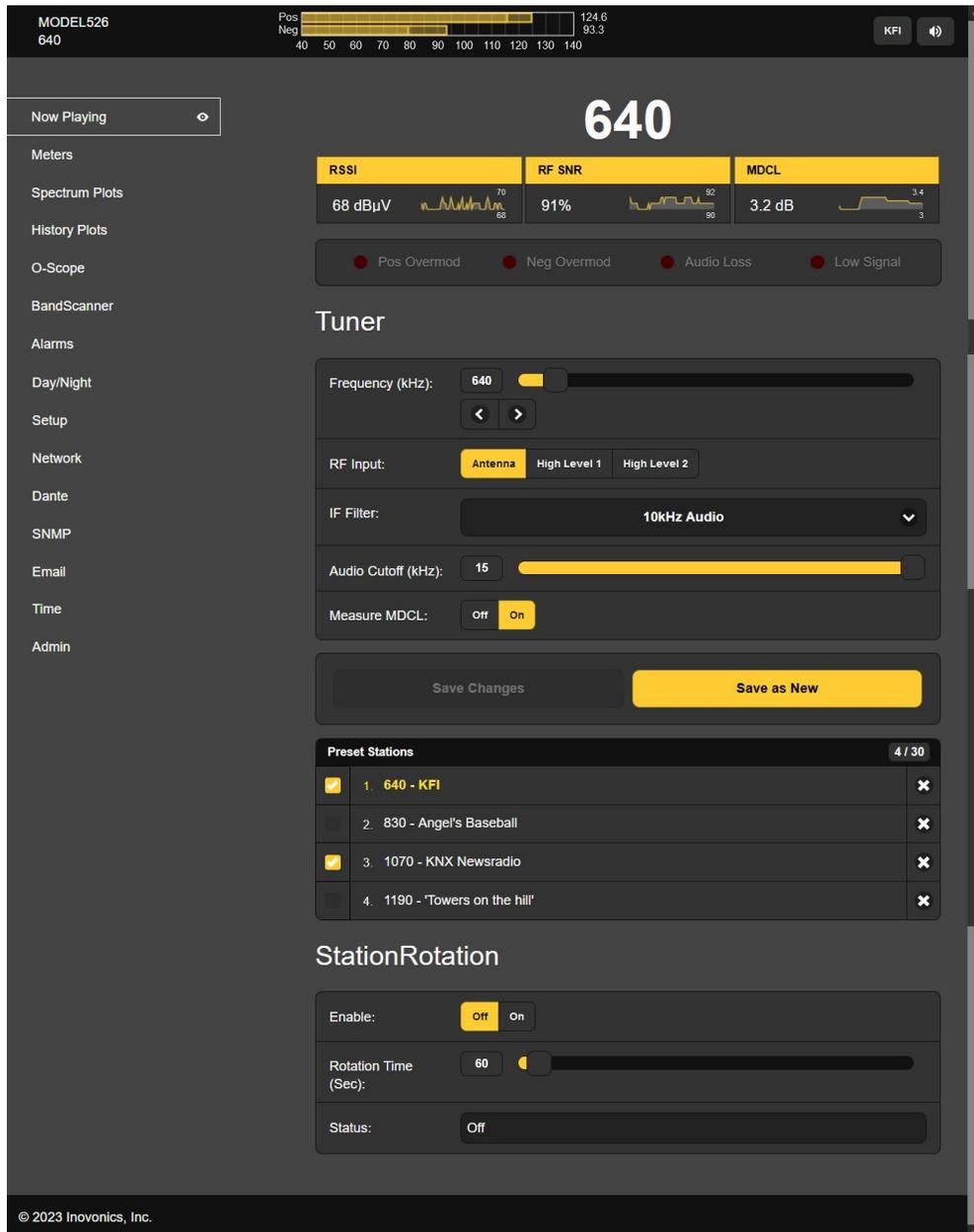
Section IV

USING THE WEB INTERFACE

Internal Webserver

The Inovonics 526 internal Webserver contains multiple interactive Webpage menus for setup and operation of your unit. These pages provide ready and interactive access to all settings, readouts, graphics, audio monitoring and alarms.

Now Playing is the landing, 'home' Webpage, initially presented, and shown completely 'unfurled' below.



The Webpage List

A list of all the Webserver/Webpages (analogous to LCD-touchscreen ‘menus’) can be found at the left edge of any page. Click on any menu heading to go immediately to that Webpage.

Menu Variances

We have made every effort to coordinate the Webpages with the LCD-touchscreen menus, but this is not possible in all cases. This means that you may have to hop around a bit to find corresponding features. For example, the Tuner and StationRotation headings on the Now Playing Webpage are together on the LCD-touchscreen Tuner menu, and the “red LED” alarm indicators near the top of the Now Playing Webpage are found under Alarms on the LCD-touchscreen. The LCD-touch-screen Now Playing menu is accessed by touching the little cottage icon Here you will find alarm “LEDs” along with the more basic incoming signal statistics.



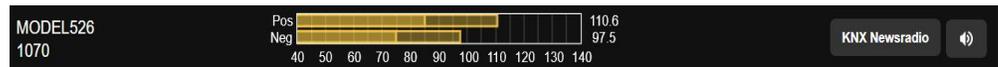
We do apologize for these ‘discrepancies beyond our control,’ but feel confident that your good common sense will guide you on your exciting journey through the 526 learning maze.

‘Responsive’ Webpages

The ‘responsive’ 526 internal Webserver provides an optimal viewing experience across a wide range of devices: desktop computers, tablets and mobile phones. Specific to the device, the Webpage is cleverly and automatically reconfigured to give the best view as the image size and shape varies.

THE WEBPAGE HEADER

Each of the 526 Webpages carries the header shown here:



Monitor ID

At the left, the hostname of the 526 identifies the specific unit connected. You can specify your own unique hostname to differentiate between multiple units on the LAN.

Tuned Frequency

The frequency that the 526 is currently tuned-to is displayed just below the hostname.

Total-Mod Display

Both a bargraph and a numerical readout display positive and negative carrier modulation at the top of each Webpage.

Presets

On the right, the tuned station button lets you change stations from among the presets that have been entered into memory. If the 526 is not currently tuned to a preset station, Not a Preset is displayed in the header. Once stations are entered, clicking on the button will drop down the menu shown at the right. Clicking one of the presets will re-tune the 526 to that station. Entering presets is explained starting on Page 21.



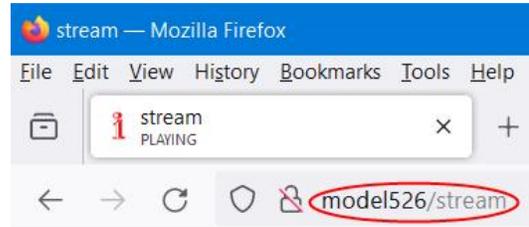
Remote Listening

Click the loudspeaker icon at the top-right of this or any other Webpage to listen to off-air audio through your Web browser. Up to 10 listeners can access this audio stream simultaneously, but listeners may also be restricted, as described on Page 37.



Other Stream-Listening Options

You may wish to allow personnel outside the engineering staff to listen to audio streamed from the 526 without granting them the ability to view 526 Webpages or change any settings. To use this IP-address method, one simply 'points' a computer browser or media player app at the URL of the audio stream, adding /stream as shown here. Of course this isn't a terribly secure privilege as the slash may suggest other suffixes for hacking other functions.



Nighttime Operation Icon

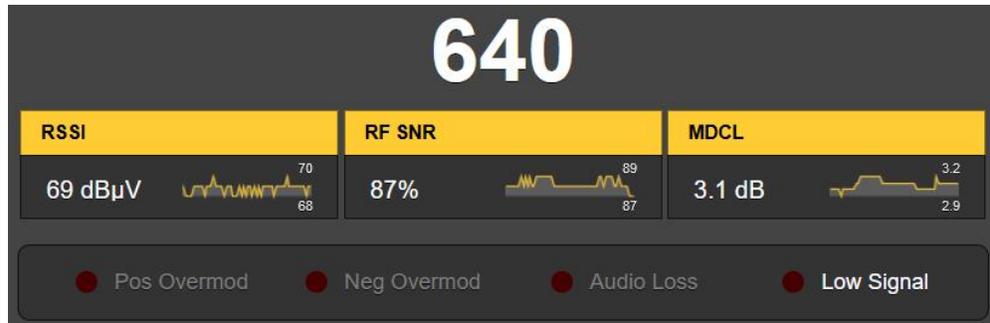
When set up to accommodate stations with day/night power changes, the 526 will insert a nighttime-mode icon into the Webpage headers as shown here. The front-panel LCD presents a similar icon.



NOW PLAYING

The Now Playing Webpage was shown complete on Page 16. That page and some others require you to scroll down to see everything, depending on the device you are using and its browser settings. Pages that require scrolling will be discussed by separate function sections.

Reception Status-In-Brief



Reception frequency is prominent above the signal-quality readouts. Note that the readout boxes contain a tiny scrolling graphic to display the subject parameter over a 30-second history period. Y-axis scaling is automatic with maximum/minimum figures for the 30-second interval. Some reception parameters are displayed graphically with much greater detail and with selectable time scaling on the History Plots Webpage.

RSSI is the incoming AM carrier strength in dB, relative to 1 microvolt at the antenna input. RF SNR is a signal-to-noise meas-

urement in percent and relates to an ‘ideal,’ essentially noiseless incoming signal that would earn a 100% figure.

MDCL Defined

MDCL (Modulation-Dependent Carrier Level) is an energy-saving AM-transmission mode practiced by some stations. The effective resting carrier level is actually reduced when audio modulation is high enough to mask channel noise in poor reception areas. When the modulation level drops, as during pauses in speech, the carrier level quickly returns to full power to mitigate the annoyance of ‘dead air’ background hash.

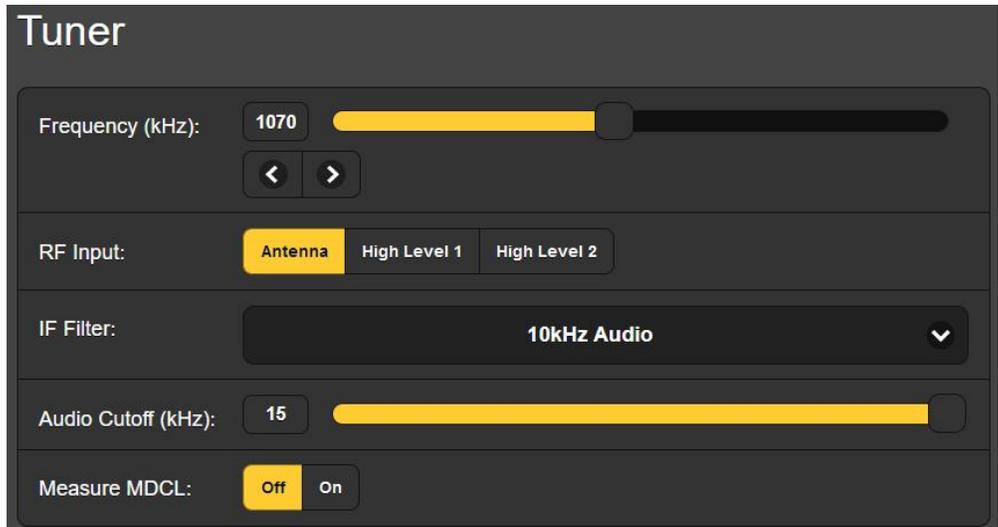
A rolling graph shows short-term MDCL action in real time. The number is the calculated MDCL value at the present moment. Long-term graphing is afforded under History Plots.

The Alarm Panel

Just below the reception status are virtual-LED alarm indicators, duplicates of the ones on the Alarms Webpage. Setup of the alarms and alarm messaging is detailed in that discussion section.

Alarms that have been enabled by the user are noted in white text, grayed-out alarms are not enabled. Once an alarm triggers, based on signal level and on/off delay settings, that alarm is indicated by the simulated red LED.

Tuning the 526



This snapshot shows the Tuner subsection of the Now Playing Webpage. What’s discussed in connection with this image is also found in the LCD-touchscreen Tuner menu.

In this example the 526 is tuned to Los Angeles station KNX at 1070kHz. You may tune the 526 by any of three methods: 1) Grab the tuning slider with your mouse and drag it up and down the dial. 2) Tune in 10kHz (North America) or 9kHz (European) increments by clicking the < and > buttons. 3) Highlight and overtype the frequency display to the left of the slider.

RF Input Selection

The 526 has three rear-panel input connectors labeled ANTENNA and HIGH LEVEL RF INPUTS 1 and 2. The high-level BNC inputs are used when a wired, direct connection to the transmitter is preferred over off-air signal reception.

Under RF Input: you may select Antenna, High Level 1 or High Level 2. This selection becomes a part of the saved Preset Stations data. This would allow, for instance, automatic ‘pushbutton’ high-level input selection for your own station and off-air reception for others.

IF Filter

Implementation of the iBiquity Digital HD Radio™ digital broadcasting system makes measurement of the analog-AM transmission parameters a challenge. The proximity of the HD Radio digital carrier groups to analog-AM sidebands requires stringent filtering in the RF domain for accuracy in the measurement of analog broadcast parameters.

IF filtering is bypassed entirely when None is selected. None is intended for traditional AM-only transmission and gives audio bandwidth extending to 15kHz.



The 10kHz Audio filter may prove the most useful, particularly with off-air listening. Remaining choices are for ‘hybrid mode’ operation, where the AM analog channel is transmitted with one or more HD Radio digital program channels.

MA1 (Reduced Digital Bandwidth) passes the analog program with a flat audio bandwidth extending to 9.4kHz, but requires some restriction in the bandwidth occupied by the accompanying HD Radio program. The other two choices favor the HD Radio digital signal by imposing restrictions on the bandwidth of the AM program channel to 8kHz or 5kHz.

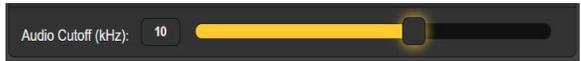
NOTE: These last two choices should only be selected when the audio signal modulating the AM carrier has been curtailed to the values noted. Otherwise, AM total peak modulation readings provided by the 526 may be inaccurate if the transmitted AM audio bandwidth exceeds the nominal 8kHz or 5kHz limits.

It is beyond the scope of this manual to detail the particulars of these transmission modes, but the inquisitive reader can find them explained in the iBiquity Digital Corp. document, *HD Radio™ Air Interface Design Description Layer 1 AM*.

Audio Cutoff

The 526 incorporates an adjustable audio output filter, allowing the broadcaster to hear the off-air program as it might sound with various choices of transmission filtering, or from the perspective of a listener among the wide variety of radios that exist in the marketplace. Modulation measurements, on the other hand, are defined only by the selected IF Filter.

The Audio Cutoff (kHz): “listening” filters have a



fourth-order (24dB/octave) low-pass characteristic, with the noted frequencies representing the -3dB point. Cutoff frequencies may be set between 15kHz and 2kHz in 1kHz steps.

NOTE: User-selected Audio Cutoff (kHz): options pertain *only* to the analog and digital line outputs, the streaming outputs and the headphone jack. Audio cutoff filtering has no effect on modulation measurements, only on what is being *listened to*.

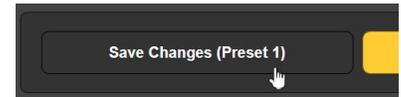
MDCL Measurement

The setting of Measure MDCL: Off/On simply determines whether the 526 will monitor, display and log the history of this parameter for the tuned station.

Station Presets

The 526 offers thirty station-memory presets. Once tuned to a station, click Save as New. This will open a box where you can enter call letters or a short ‘street name’ for the station. Then click Save in that same box and your entry will be entered at the bottom of the Preset Stations list. Presets are cleared from the list by clicking on the **X** at the right of the listing.

Stored Preset Stations data also contains the various setup options and alarms *specific to that station preset* when it was entered into memory. If you make changes to *any* of these ‘inherited’ options, the grayed-out Save Changes bar will immediately come alive as shown here, prompting you to save the changes, assuming that you want them updated, so that those changes will be in-play the next time that station is selected.



Very Important!



- 1) Station presets save not only the frequency, but all setup options associated with each preset as well. These include input selection, IF filtering, audio cutoff, MDCL measurement and alarm setups. If you make changes to any of the setup parameters, you *must* return to the Now Playing Webpage and click the Save Changes bar to permanently associate your option update with that specific station preset.
- 2) Each time you *manually* retune your 526 to another frequency (using the tuning slider, etc.) you ‘drag along’ the setup options from the station that was previously playing. *The 526 does not automatically revert to a set of defaults.* You must reset and program alarms and other inherited parameters for each new frequency, especially important when you enter the new stations into the Preset Stations memories! ***So do please remember*** that input and filter selections, alarm setups, email and text notifications will remain active, *but will be associated with the previously-tuned station*, and thus may generate false alarms for that previous station.

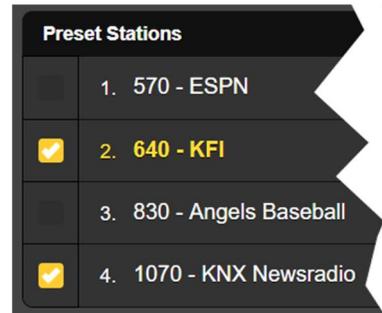
StationRotation™

Historically, a mod-monitor functions as the station’s fulltime measurement utility to alert engineering personnel to out-of-tolerance operation. Although the 526 definitely fulfills this

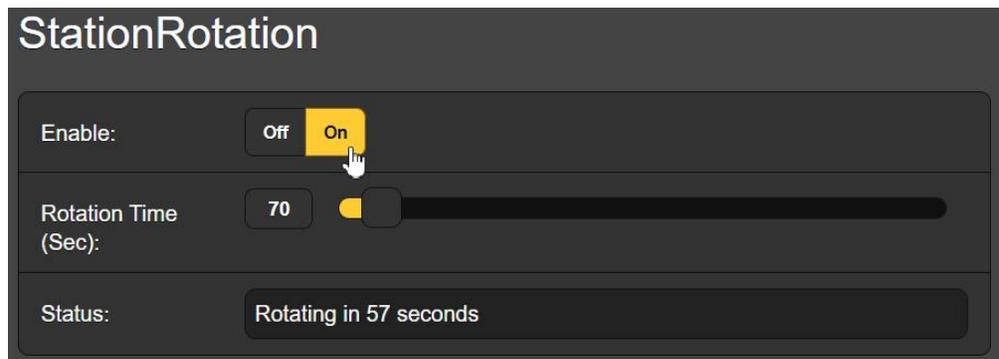
basic qualification, it has the added versatility of being able to ‘ride herd’ over multiple stations in the local market, but not without some restrictions.

The 526 has the built-in capability of sequencing through all the saved Preset Stations entries in the order listed, and at a sequence rate set by the user. This could, for example, allow a contract engineer to receive alarms from any of the stations he might service in a given market.

First, stations in the Preset Stations list must be ‘tagged’ to be included in rotation. Click the checkbox next to the listing to place the station on the rotation schedule.



Next, enable StationRotation by setting Enable: to On, as shown on the next page. This will inhibit manual tuning, actually graying-out the manual Tuner setup section completely. This means you will have to reset Enable: to Off, exiting the StationRotation mode, to manually tune the 526 for updating existing station presets or adding new ones.



Finally, you must program the Rotation Time (Sec):, and this may take careful planning. Many of the 526 alarms have Time On (Sec): and Time Off (Sec): settings that will impact your Rotation Time (Sec): choice. See the Alarms discussion beginning on Page 31.

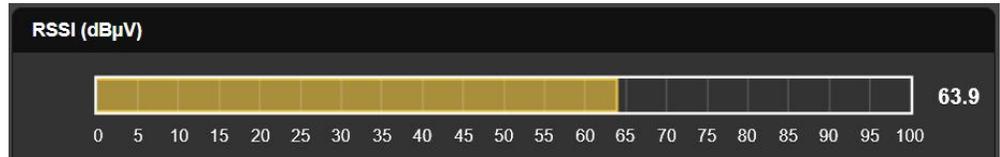
The Status: display gives a second-by-second countdown of rotation time, or otherwise shows that the feature is Off.

Keep in mind that all the audio outputs will reflect StationRotation operation. So ask yourself, “Who is listening to this?”

METERS

The Meters Webpage carries high-resolution graphic and numerical signal measurements. From the front panel, the Meters menu will offer multiple sub-screens to accommodate these several groups of readouts.

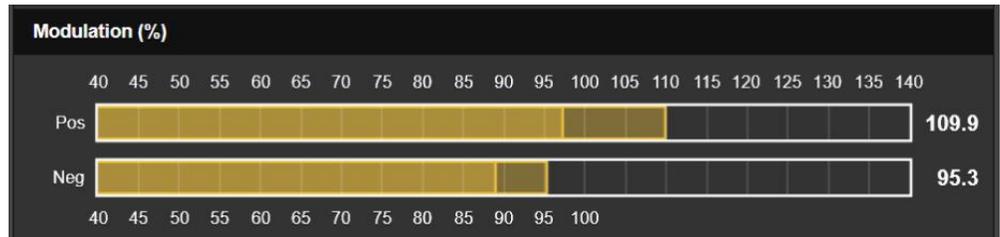
RSSI



The RSSI (dBµV) bar represents the strength of the incoming signal. Level is expressed in dBµV, with 0dBµV equivalent to one microvolt at the rear-panel ANTENNA INPUT. RSSI is shown numerically to the right of the bar.

There is no direct numerical correlation between the HIGH LEVEL RF INPUTS 1 and 2 and this meter, yet readings remain useful for relative level indications.

Modulation

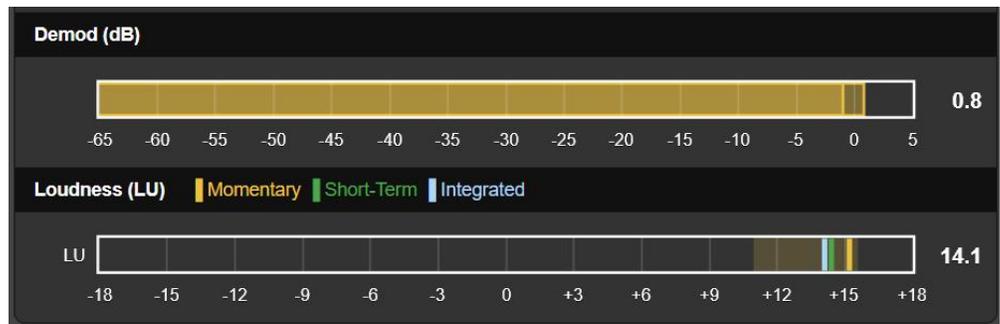


Modulation (%) levels are presented independently for the positive and negative carrier peak values. The most recent peak value is held for a short period as a 'ghost,' hanging momentarily above the constantly-changing modulation level. This held peak value is given numerically to the right of the bar.

Peak integration time for these measurements is set by the Mod Response: buttons on the Webpage and LCD-touchscreen Setup / Radio screens. The default selection is the fastest, $0\mu s$ setting, but more instantaneous-peak-forgiving selections of $20\mu s$, $50\mu s$, and $100\mu s$ are also available. We recommend the conservative, most accurate default value, but make the others available to lessen the effects of impulse noise that may plague certain installations.

With the 10kHz IF filter selected, AM modulation readings should not be affected by second-adjacent market neighbors or by accompanying or neighboring HD Radio programming.

Demodulated Audio and Loudness



This metering area displays the demodulated, monaural program audio. The Demod (dB) meter has quasi-peak response and a rapid fallback to give good visualization of instantaneous vs. average program energy. Bear in mind that these meters in

no way approximate true “VU” ballistics. A floating peak-hold ‘ghost’ hovers briefly above these meters showing the highest peak value recently indicated. This held value is also shown numerically at the right of the bar.

Program Loudness Measurement



This loudness measurement utility adheres to a Standard of European origin that has become a de-facto means of assessing this parameter worldwide, both in radio and in television broadcasting.

The ITU-R BS.1770 Loudness Standard

The ITU-R BS.1770 Standard is ostensibly based on listener perception of audio loudness. Meter readings under this standard are expressed in “LUs” (Loudness Units), one LU increment equivalent to 1dB. In using this function, it’s best to consider LU measurements as ‘locally-relative,’ or most useful in comparing loudness between various audio sources, market companions, music cuts, processing presets, talent voices, etc.

‘Zero-LU’ does not conveniently correlate to a specific modulation percentage because of the Standard’s frequency weighting. However, a 1kHz constant tone at 100% symmetrical carrier modulation would drive the meter to about +22LU.

Loudness metering has a 100ms refresh rate. The ‘LU’ display features three color-coded Loudness (LU) indicator bar-segments labeled Momentary, Short-Term and Integrated, or ‘M,’ ‘S,’ and ‘I.’

The yellow, momentary segment depicts the loudness of a floating 400ms block of audio updated at the 100ms refresh rate, giving a ‘right now’ measurement of program loudness. The yellow ‘wash’ behind the display represents the range of gated ‘M’ within the ‘I’ measurement window, providing a visual representation of program dynamic range.

The green segment represents a short-term-integrated value derived from a 3-second block of audio refreshed every second, a readout primarily indicating the loudest sections of program audio.

The blue segment is a longer-term integrated measurement that is ‘gated’ to ignore speech pauses and similar short periods of silence. This is probably the most useful overall, average-program-loudness reading.

The loudness measurement window has a default value of 120 seconds. This may be user-adjusted under Setup / Radio / Loudness Window: down to 30 seconds, as may be dictated by the station’s programming format.

This metering method reflects the *broadcast* implementation of the BS.1770 Standard, and is explained in further detail in EBU Loudness Standard R-128.

SPECTRUM PLOTS

Spectrum Analyzer The 526 monitor includes an advanced, high-resolution FFT-based spectrum analyzer that delivers a detailed and annotated graphic display.

The spectrum analysis utility may be switched between a display of the IF passband (pre-filtering) and the spectrum of the demodulated program audio as delivered to the line and streaming outputs. Images may be viewed either through the Webpages utility or from the front-panel LCD-touchscreen. Each view carries its own family of graph setup options below the display.

The IF Spectrum The Webpage screenshot below shows the IF spectrum of the 526 monitor. Bandwidth: in this case is set to 50kHz, probably best for viewing a single AM channel. 0kHz represents the carrier frequency of the currently-tuned station.



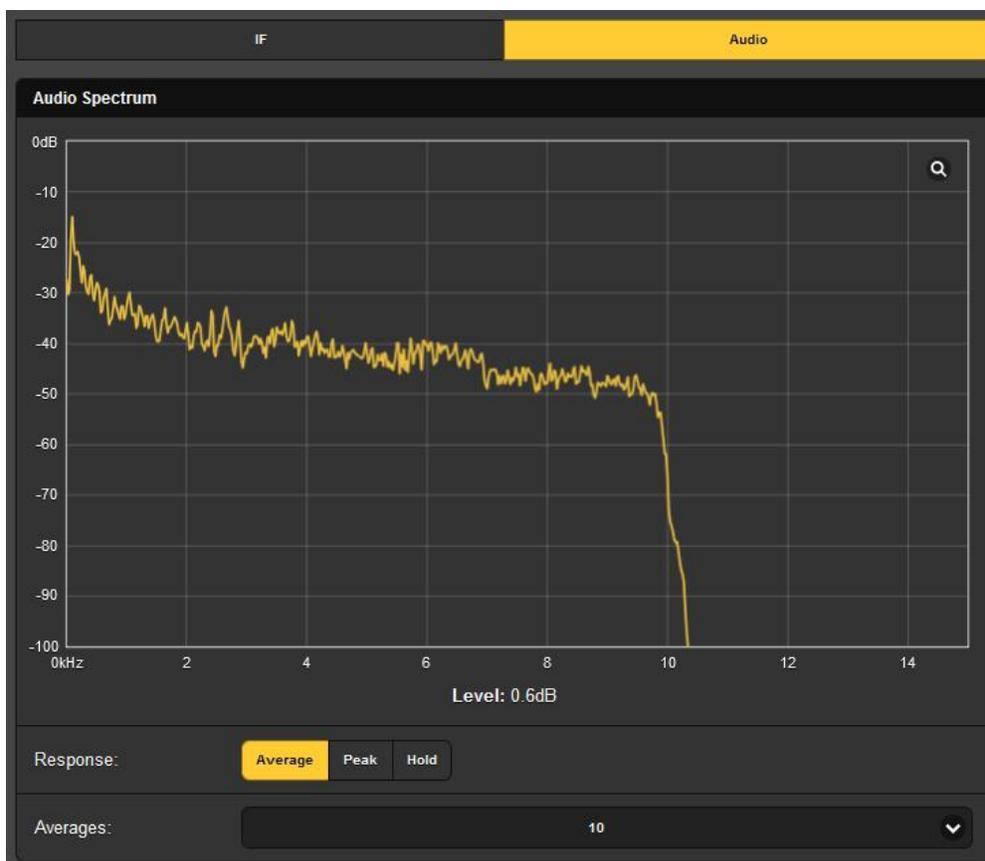
Clicking the magnifying glass in the corner will toggle to a full-screen display, and mousing over the display area brings up a cursor, the white arrow & vertical line shown in the example. The exact frequency and level at that point is noted just below the spectrum.

Under the view-option settings, Normalization: is turned On in the example display. This sets X-axis 0dB at the top to represent the unmodulated carrier level. Response: set to Average is the default display, but Peak, shown in the example, is actually a better view of the carrier vs. AM-sideband relationship. Hold accumulates the highest peak value until the function is deselected.

At the bottom, Averages: lets you bring up a drop-down box where the number of FFT computations may be selected to determine the display data. 200 is the factory default, a lower number, (used here) follows program audio a bit more closely.

The Audio Spectrum

Select Audio to view the spectrum of the demodulated program audio as delivered to the line and streaming outputs. Click the little magnifying glass for a full-screen display.



You will see the effects of NRSC de-emphasis and audio filtering in this spectral plot. The numerical value posted below the plot is the same as the Demod (dB) figure on the Meters menu.

With Response: set to Average, the display is more stable, yet still sufficiently lively. The FFT Averages: default of 10 is a good compromise for a dynamic, easy-to-read plot. Selecting Peak will reveal peak levels of the spectrum components, and Hold accumulates the highest peak value until Hold is deselected.

HISTORY PLOTS

Time Intervals The 526 offers plots of reception and audio parameters that may be viewed over specified time intervals, from the past minute, the past 10 minutes, the past hour, the past six hours, and a full, 24-hour time study.

Although these plots are available through both Webpage and front-panel displays, Webpage presentation provides several extended viewing options covered in this discussion that will be found missing with local front-panel operation.

History Screens Buttons at the top of the screen select the various signal families for study, and your mouse scroll wheel can be used to zoom in and out. The Modulation screen shown in the example below is representative of 526 history display plots.



Modulation The Modulation screen plots an integrated value of instantaneous positive carrier modulation in yellow (Pos), and a held-peak (Pos Peak) value in green. Ditto for negative modulation, in blue and purple, respectively.

Note the Show: buttons below the screen. When all buttons are activated (by default, as pictured), all parameters are displayed simultaneously. If this confuses the view, you can de-select any measurements you don't need to view at the moment.

The Time Span: selected here is 1 Minute. That means that the 'rolling' display shows the past 60 seconds of activity. To study over a longer period, pick a wider window. 24 Hours will give you an entire day of modulation statistics.

Rolling your mouse over this screen drags a cursor over the plot, the white arrow and vertical line in the example. The numerical values below the plot give the multiple parameter levels at the cursor position. The current incoming value is shown when the cursor is not on the screen. With Time Span: set at an hour or more, actual clock time of the event is given.

RF Metrics Reception measurements normally ought to be rock-solid. The station shown in this example does exhibit minor ongoing variation in RSSI, RF SNR and MDCL.



Note the white arrow and line cursor 20-plus seconds-past on the timeline. This cursor will allow you to measure the parameter values anywhere within the displayed timeframe. The nu-

merical values at the cursor are shown below the plot, but otherwise these numbers represent the present moment at the far-right margin when the cursor is not on the screen.

Audio History Program audio level is graphed in this next screenshot. The quasi-peak representation of this measurement provides an especially good visual indication of perceived program dynamics.

In the example here, it would appear that the talk-radio host was at a momentary loss for words some 20 seconds before the picture was taken.



Integrated Loudness History This final screenshot plots the loudness level of program audio, adhering to the ITU-R BS.1770 Standard discussed on Page 24. These readings are integrated, long-term “LU” loudness measurements.

The LU Y-axis scale at the right of the screen actually auto-ranges, always giving the greatest level resolution over the display time period. As you change the Time Span: to cover a longer sampling period, vertical scaling will change to accommodate the level range for the entire selected timeframe.



OSCILLOSCOPE

O-Scope Applications A built-in oscilloscope function lets you view the AM modulation envelope, as well as demodulated program audio, either ‘raw’ from the detector or following de-emphasis and audio filtering, as heard at line and streaming outputs and the headphone jack.

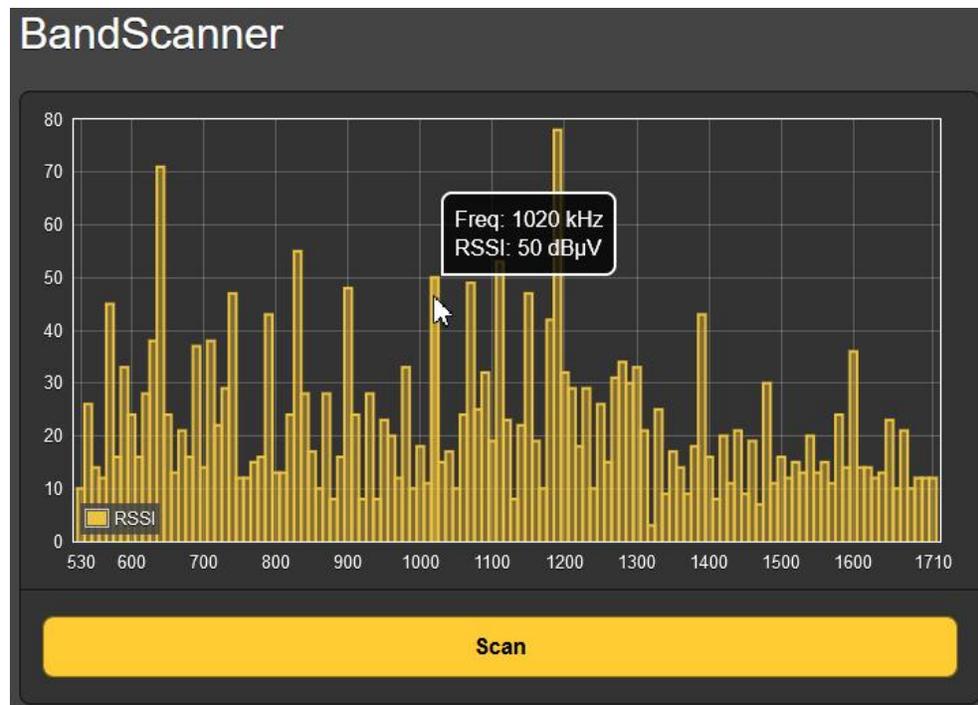
This IF screen image, showing the envelope of the AM carrier, includes any IF filtering that has been assigned to the station as-tuned or as a preset. Demod (Pre) shows the demodulated audio waveform directly from the detector. The Demod (Post) waveform will reflect the effects of assigned de-emphasis and/or audio filtering.



The little magnifying glass in the corner will give you a full-screen display, and the Pause / Unpause bar below the screen freezes the waveform for a more leisurely examination.

THE BANDSCANNER™ UTILITY

The BandScanner The 526 BandScanner is essentially an annotated RF spectrum analyzer that graphically presents the entire AM band. From the front panel touchscreen, BandScanner is found under Graphs at the bottom of the list.



Scanning Setup Prior to a BandScan, go to the Now Playing page and make sure that Tuner / RF Input: is set to Antenna. Also you might want to manually set the IF Filter: to its 10kHz Audio option.

Warnings!



- 1) Band-scanning interrupts all mod-monitor functionality during the scan cycle as it must tune across the band and collect data from every AM channel in the market. Alarms are disabled and program audio outputs muted during this interval, and scanning will temporarily interrupt History Plots data collection.
- 2) Once the spectrum display is presented, clicking on a carrier 'bar' will immediately tune the 526 to that frequency, which you may or may not wish to do. **So do please remember** that input and filter selections, alarm setups, email and text notifications will remain active, *but will be associated with the previously-tuned station* and may generate false alarms for that station.
- 3) When you have finished with the BandScanner function, the 526 will return to the frequency that was being monitored prior to the scan. However, any scan-specific settings that you may have made on the Now Playing page will remain in effect. Re-select the Station Presets channel you were initially monitoring to reinstate its 'inherited' settings.

Start Scanning

To start a band scan, simply click the Scan bar on the Band-Scanner Webpage. An entire AM-band plot of the busy Los Angeles AM market is shown in the previous screenshot. Every carrier found (plus quite a bit of QRN!) is represented by a yellow vertical bar. Bar height indicates signal strength in dB μ V per the annotation along the left edge.

Hovering your mouse over the yellow bars will pop-up a box with the Freq: and RSSI: of that station. Clicking on a bar will tune the 526 to that station (see warning #2 above!).

ALARMS

Alarm Status

The 526 provides alarms for signal or program-related error conditions. Four Alarm Status 'indicator lamps' head the Alarms Webpage, also appear on the Now Playing Webpage, and can be seen on the Home Screen of the front-panel LCD touchscreen.

Set the Clock!

Alarms are logged with time and duration stamps. Be sure to select the time zone and ensure that the 526 is sync'd with Internet time. This is explained shortly.

Important



When you *manually* tune-in a station and then set an alarm or activate an option, that setup information will 'stick' and also apply to any other station subsequently tuned *manually* as well. Individual station memories inherit the unique alarm and other settings as described under Station Presets on Page 21.

To initially include (or to update) any alarm setting, while the station is still tuned-in you must navigate to the Now Playing Webpage and either Save as New or Save Changes under the Tuner heading so that those alarm updates will then associate with

that station. The Save as New or Save Changes procedure must be completed immediately after programming or changing alarm settings, before the 526 is returned to another frequency.

All alarms are able to initiate email or SMS/text messages to selected personnel. All alarms are also logged for later analysis.

Alarms may be assigned to rear-panel GPO ‘tally’ outputs for interface with remote-control equipment or local alert devices. Alarm conditions must first be set-up as described in the remainder of this section, and following that the email/SMS messaging and rear-panel GPO tallies may be programmed. These procedures will be described in the Setup and Email Webpage discussions, respectively.

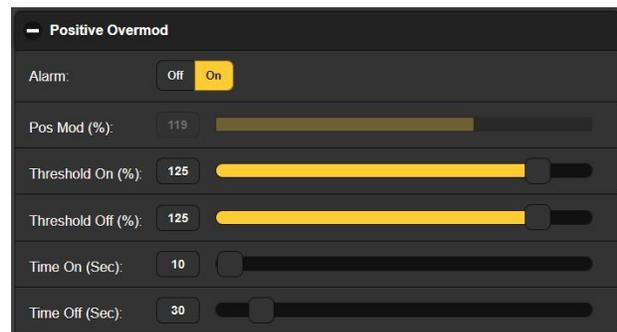
Programming Alarms

NOTE: Do please read the following discussions in their entirety. A setup explained for one alarm that is common (or quite similar) to the setup of others may not be explained in the same initial detail in succeeding setup discussions.

Click any **+** under Alarm Settings to open the setup boxes.

Positive Overmod

Alarm: On ‘arms’ the function in this and all other alarms to be discussed. If the alarm is turned Off, there will be no indicator on the Now Playing or Alarm Webpages, no closure at a rear-panel GPO terminal, nor will the



526 send SMS/text or Email alerts to station personnel or log the alarm. *This applies to all alarms.*

Pos Mod (%): displays the integrated, held-peak value of the total modulation level for the off-air program being received. This is the level represented by the green trace on the History Plots / Modulation / Mod History / Pos Peak screen. This real-time level display is ‘grayed-out’ here, as there is no adjustment that can be made to the displayed value. Levels displayed in grayed-out meters are included to help make alarm setup decisions.

Threshold On (%): is the set point that Pos Mod (%): must reach to trigger an alarm. Moreover, that Pos Mod (%): level must remain at or above this set point for the number of seconds programmed with the Time On (Sec): slider before the alarm will be triggered.

The alarm will reset (clear) when Pos Mod (%): drops to, and remains at or below, the Threshold Off (%): setting for the number of Time Off (Sec): seconds.

In the example shown, Pos Mod (%): must reach 125% and stay at or above that figure for 10 seconds before an alarm is trig-

gered. Then when Pos Mod (%): drops, it must stay below 125% for 30 seconds for the alarm to reset.

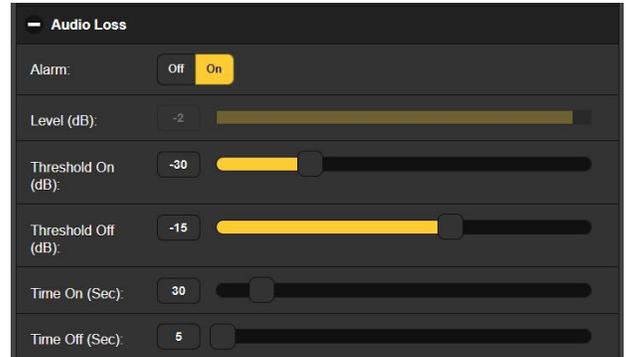
In this case we have determined 125% as a 'drop-dead' alarm figure, and a full 10-second blast of overmod as an alarm condition as well. This example alarm setting has no hysteresis, but provision for this has been included as we'll see shortly.

Negative Overmod

This alarm may be set in similar fashion to the Positive Overmod alarm just discussed, as non-hysteretic and with similar timing adjustments, but with a trip point of 95%, or as you see fit.

Audio Loss

Audio Loss is a good example of how hysteresis can be important in alarm setup. This alarm is, in a way, the reverse of the overmod alarms in that it is looking for levels to be too low, rather than too high.



Alarm: must of course be set On to arm this function. The grayed-out Level (dB): meter shows the current program level for the station being monitored.

As we're looking for a low-level program audio condition, the Threshold On (dB): setting of -30 is what the program level has to fall to, and remain below for the Time On (Sec.) interval of 30 seconds.

For the alarm to reset/clear, Level (dB): must rise back up to the Threshold Off (dB): value of -15, and remain above that figure for the Time Off (Sec): period of 5 seconds.

Low Signal (Day& Night) Settings

For stations that have sunrise/sunset power changes, the 526 offers independent Low Signal alarm setups. Day / Night settings may be selected either with a GPIO closure to ground, or by using the built-in scheduler, which includes a link to the FCC Website for setup assistance. The setup procedure for the two alarms is identical, programming the scheduler is covered separately.

Low Signal alarms are programmed in much the same manner as the Audio Loss alarm, but this alarm does have a Mute: feature that the others in this group don't. With Mute: turned On, program audio is muted when the alarm is active; that is, it has been triggered and not yet reset/cleared.

Audio Muting

This Mute: option affords a couple of advantages. First, it prevents a blast of ‘dead channel noise’ from polluting the station lobby, or wherever the line output of the 526 may be monitored. Secondly, audio muting will ensure that the Audio Loss alarm will trigger if the station leaves the air, that ‘dead channel noise’ won’t prevent that function from triggering.

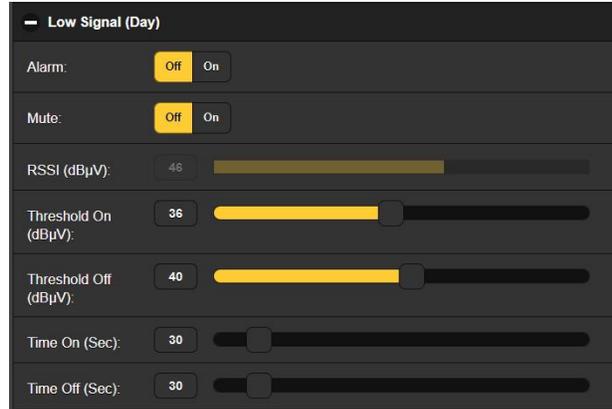
We’ll use Low Signal (Day) setup as our example here. Again, Alarm: must be turned On to trigger, and in this case Mute: may be enabled as discussed above.

RSSI (dB μ V): is a real-time readout of the incoming signal level, which of course will change between day and night operation.

For each of the alarm setups, it’s wise to refer to the History Plots / RF Metrics screen to confirm the signal level trend at changeover time.

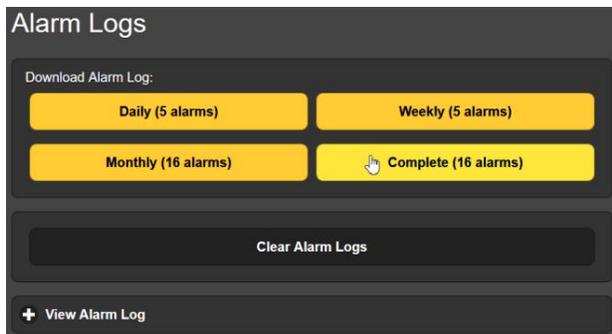
As set up in this example, RSSI (dB μ V): must drop from its present value of 46dB μ V down to 36dB μ V, and remain below that level for 30 seconds to trigger a Low Signal (Day) alarm. Once triggered, for the alarm to reset, RSSI (dB μ V): must return to at least 40dB μ V and remain above the level for 30 seconds.

The symmetrical timing in this setup should be sufficient to allow the new carrier level to settle and stabilize after the abrupt switchover. This can be either a change of transmitter power, in the case of a single transmitter, or switchover to a second transmitter. Antenna patterns frequently have to undergo changes as well, so leaving plenty of leeway in the timing is not a bad idea.



Alarm Logging

In addition to local displays/tallies and SMS or email alerts for signal and programming faults, all alarms are logged and stored. You can click + View Alarm Log at the bottom of the page for a display of all alarms in order of time and date as shown on the following page.



The log holds data on the type of Alarm, which monitored Station it pertains to (important when the StationRotation feature is active), the Time and Date received plus the alarm Duration.

You may download the Alarm Logs for Daily, Weekly, Monthly or Complete (all alarms) time periods. The number of alarms received for these time periods is shown on the right above the listing. Downloads are saved to your computer as small .csv text files.

You may View Alarm Log on your screen and even filter the results by overtyping Filter alarms... with a search term from an appropriate column.

The Alarm Log will continue to accumulate entries indefinitely. Clear it completely at any time by clicking the Clear Alarm Logs bar. This will delete all entries. You'll be asked to confirm this action, at which point you might decide first to download the Complete log of all alarms to be on the safe side.

Alarm	Station	Time	Date	Duration
Signal back RSSI (dBuV): 42 ≥ 33 for 5s	570	05:59:45 PM	03/21/24	00:02:21
Signal loss RSSI (dBuV): 42 < 58 for 1s	570	05:57:24 PM	03/21/24	
Signal back RSSI (dBuV): 42 ≥ 35 for 5s	570	05:56:13 PM	03/21/24	00:01:11
Signal loss RSSI (dBuV): 42 < 45 for 30s	570	05:55:02 PM	03/21/24	
Neg Overmod OK Mod (%): 98.2 < 99 for 1s	570	05:51:46 PM	03/21/24	00:00:15
Neg Overmod Mod (%): 98.1 > 95 for 1s	570	05:51:31 PM	03/21/24	

DAY/NIGHT OPERATION

Options Switching the 526 between a station's day and night power-change requirements may be accomplished either with an incoming contact closure to ground, or by using the built-in Scheduler. Please refer to the Setup/General Purpose Inputs discussion for instructions for GPI programming.

Prior to programming and using the Scheduler, be sure that the 526 real-time clock has been synchronized with Internet time as instructed on Page 44.

The Scheduler The current day/night setting appears at the top of Day/Night Webserver page. In this example, the 526 is currently in daytime mode set by GPI. Once enabled, the Scheduler overrides GPI day/night commands.

Daytime is also the default state of the 526 when GPIs are not assigned and the Scheduler is not enabled. The control mode shows at the top of the page only when the 526 is under GPI command.

It is currently day (set by GPI)

Day/Night Schedule

FCC Sunrise & Sunset Calculator

Enable Schedule: Off On

Sunrise		Sunset	
January	07:00 AM	January	07:00 PM
February	07:00 AM	February	07:00 PM
March	07:00 AM	March	07:00 PM

The 526 is able to follow a power-change schedule, and even provides an Internet link on the Webserver page to access the FCC's *Local Sunrise Sunset Calculations* utility directly. Using this is super-easy, just enter your tower's GPS coordinates into the FCC calculator and transfer the sunrise and sunset times you are given, for each month of the year, into the 526 Day/Night Schedule matrix.

Once the matrix is complete, set Enable Schedule: to On, followed by clicking Save at the bottom of the Webpage. This will upload time and Scheduler command of the function info into non-volatile memory in 526 hardware and inhibit any GPI control of day/night operation. Any changes to the schedule, or simply setting Enable Schedule: to On of Off must be followed by a Save.

To return to 526 default status and GPI control for this feature, set Enable Schedule: to Off and Save.

SETUP

526 setup requires entries on a number of the Webpages, and each is addressed separately. Items specific to the Setup page will be discussed in order here.

Radio Settings

Tune Step: defaults to the North American 10kHz channel spacing standard. You are able to change this to the 9kHz channel spacing used in Europe and some other countries.

NRSC De-Emphasis: also defaults to the US 'truncated-75 μ s' standard. Nearly all AM broadcasters will employ some form of audio pre-emphasis ahead of the transmitter, and you may find that the gentle US characteristic will make any pre-emphasized transmission sound a bit more natural, especially on a wide-band receiver or modulation monitor, like the 526.

Mod Response: is the peak detector integration setting for positive and negative modulation metering. There is no FCC specification for this parameter, implying that instantaneous response to program peaks is obligatory. Integration does mitigate the effect of impulse noise that plagues the AM broadcast band. If you have a good, solid signal into the 526, we recommend the fastest, 0 μ s setting.

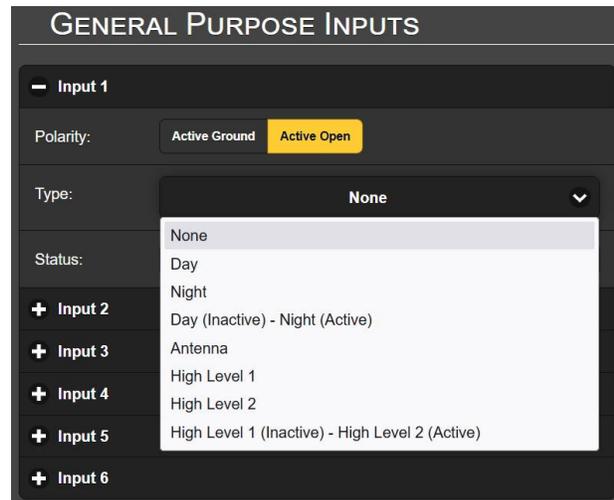
Loudness Window (Sec): settings refer to the long-term-integrated LU loudness bargraph reading under Meters / Loudness (LU), and the time study under History Plots / Loudness / Integrated Loudness History. The range is adjustable by the slider between 30 and 120 seconds. The ITU-R BS.1770 Standard is a bit nebulous with regard to this integration; we recommend the default value of 120 seconds.

Program Line Outputs	<p>The rear-panel ANALOG OUTPUTS (MONO) 1 and 2 provide convenient 2-channel monitoring, although they are not nominally ‘left’ and ‘right’ as both being fed from the same monaural source. You may set each Analog Level (dBu): independently between –15 and +15; the factory default is +4dBu.</p> <p>By convention, the AES3 DIGITAL OUTPUT would be considered a stereo pair, although it is a dual-mono feed in this case. The Digital Sample Rate: defaults to 48kHz, but can be set to 44.1kHz as may be required. Digital Level (dBFS): is adjustable between –30 and 0; the factory default is -10dBFS.</p>
Dante/AoIP Streams	<p>This section of the Setup Webpage adjusts only the program line levels of the simultaneous Dante/AoIP output streams on the rear-panel RJ45 AoIP Port. As with other digital outputs, the Level (dBFS): may be set between –30 and 0. Other Dante settings are addressed in a separate subsection shortly.</p>
Other Streaming Options	<p>The 526 offers HTTP/Icecast Streams for general ‘tune-in’ listening, and an independent UDP stream that allows the 526 to send raw compressed audio to a specific IP address and port. Both modes are available concurrently and are set-up under the Stream category on the Setup Webpage. The little loudspeaker icon at the top of each 526 Webpage makes use of HTTP/Icecast streaming.</p>
HTTP/Icecast Setup	<p>The streaming Codec: is fixed to HE-AACv2 standards. The streaming Sample Rate: default is 48kHz, but this may be changed to 44.1kHz as required. The streaming Bitrate (kbps): defaults to 64, but may be manually reset all the way down to 18 kbps for a really poor network connection.</p> <p>For the general-listening HTTP/Icecast Stream, a useful 526 feature is the ability to add-in a fixed Audio Latency (Sec): delay to the inevitable delay inherent in transport. This provides more data “ready to go” upon connection, in turn helping the client’s buffer to fill and playback to start faster.</p> <p>Although the 526 can accommodate as many as 10 simultaneous Web listeners, this number can be truncated in the interest of better streaming service to fewer authorized listeners. Set the Max Listeners: slider anywhere between 0 and 10.</p>
UDP Streaming	<p>The 526 can stream over UDP to any IP Address: with a designated Port: Enable: must be set On and a proper Transport: mode selected. Check with the receiving end to confirm these settings.</p>
Save the Settings!	<p>Once streaming parameters have been set-up or modified, settings must be saved by clicking the Save bar at the bottom of the section. This action will reset the streaming utility and disconnect any current Web listeners, who must then log back on.</p>
GPI Basics	<p>Rear-panel GENERAL PURPOSE INPUTS are labeled GPI 1 through 6 and are ground-seeking logic input terminals with internal pull-up resistors to +5VDC. Each may be programmed</p>

as to function and logic; that is, what they control and whether their activation is the application of an external connection to ground, or are normally grounded externally and activate on an open circuit.

Click the **+** to open any GPI options window, and then click the **▼** at the far-right of Type: This presents a drop-down menu listing the application options that may be assigned to any of the GPI terminals.

Polarity: sets your activating command either to Active Ground or Active Open, whether you *apply* a ground, or already have a ground applied and *lift* it (open the circuit) to trigger the function. Type: is your selection of the control options that this GPI will manage.



Day/Night operation may be selected with momentary closures to (or opens from) ground by assigning the Day and Night options on the pull-down list to two separate GPIs. This requires a command to go to daytime operation, and another command to go to nighttime mode.

Day/Night GPI Setup

To control Day/Night with a single GPI, select Day (Inactive) – Night (Active) from the list instead. When that GPI is grounded (or opened), the 526 will switch from daytime to nighttime operation, and when the ground is removed (or reapplied), it will switch back to daytime mode.

WARNING: Do not mix Day/Night command modes! Select just one type or the other to avert possible logic contentions.

GPI Setup for Input Selection

Selecting between the rear-panel ANTENNA F connector and the BNC HIGH LEVEL RF INPUTS 1 and 2 is very similar to the Day/Night setup routine just discussed, which will now be repeated, with only the callouts changed to protect the innocent.

To control input selection with a momentary command, assign the Antenna, the High Level 1 and High Level 2 options on the pull-down list to as many as three separate GPIs. A momentary ground (or open) on the assigned GPI terminal will connect the RF input of the 526 to the source indicated, overriding any current selection based on manual or Preset Stations determination. Bear in mind, however, that manually punching-up another Preset Stations entry will switch the RF input to whatever has been assigned into memory for that preset.

If you are not using the antenna input you may select between the two high level inputs with a single GPI. From the drop-down list, select *only* High Level 1 (Inactive) – High Level 2 (Active). When that GPI is grounded (or opened), the 526 will switch to High Level Input 2. When the ground is released (or reapplied), it will switch back to High Level Input 1.

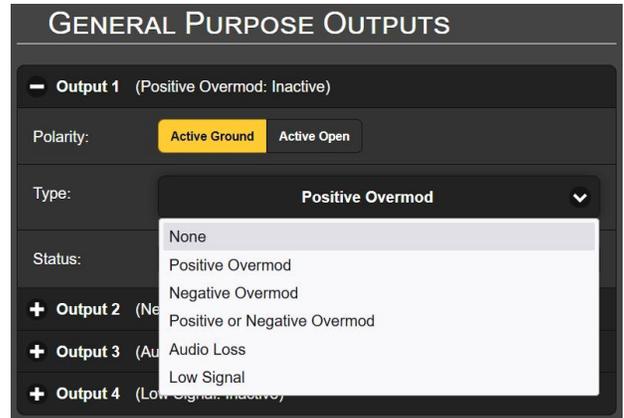
WARNING: Do not mix input selection modes! Select just one type or the other to avert possible logic contentions.

GPO Setup (Alarm ‘Tallies’)

The rear-panel General Purpose Outputs (GPOs) serve as ‘tallies’ for fault alarms.

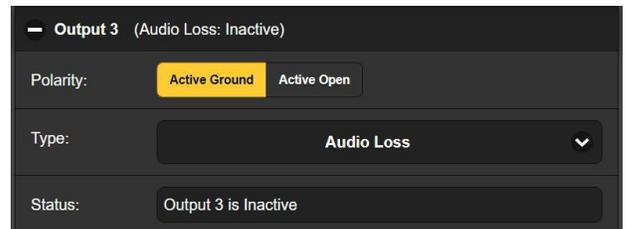
Click the **+** next to a numbered Output to open the assignment window.

Polarity: sets your activating command either to Active Ground or Active Open; that is, whether the GPO *applies* a ground, or normally sits at ground and *goes open-circuit* when an alarm is triggered.



Although the Type: of alarm has been factory-preset, the pull-down menu seen here allows you to reassign any of the possible alarms to any GPO terminal. You can even assign one alarm to two terminals if you need two isolated tallies. Each Output is numbered to match the legend above the rear-panel terminal strip.

In this example, Output 3 has been programmed for Polarity: to deliver an Active Ground to GPO Output 3 for an alarm Type: of Audio Loss. It could as easily have been set to deliver ground on that terminal all the time, and then go Active Open (ungrounded) for an alarm condition

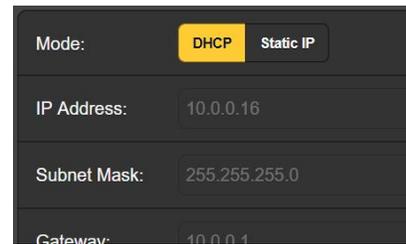


The Status: line in this example shows Output 3 is Inactive, as the assigned Audio Loss alarm has not been triggered. Note that the status is also visible at the top of this box and may be seen when the box is closed.

Individual alarm setup procedures begin on Page 31. GPOs are NPN transistors that saturate to ground and can sink up to 100mA at up to 40V.

NETWORK SETUP AND INTERNET ACCESS

IP Setup With Mode: set to DHCP, your router automatically assigns the 526 an IP Address: and will populate the four associated fields on the Network Webserver page, although they will be 'grayed-out' and you'll not be able to edit those data. If you reset Mode: to Static IP, then you must make the appropriate entries in all four fields and click the Save bar at the bottom.



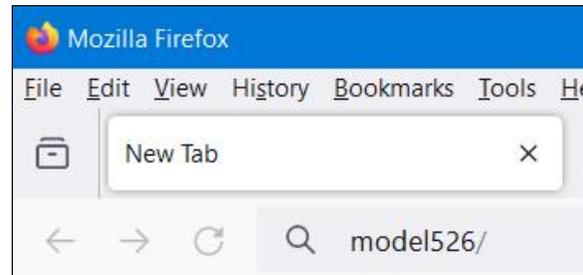
Assigning a Hostname You may change the default name MODEL526 to something else, either to personalize the equipment name or to differentiate between two or more 526 monitors on the same network. Simply overtype the default Hostname: without using spaces. Be sure to click the Save bar once entries are finalized.

HTTP Port The default HTTP Port: 80 is common when accessing networked equipment like the 526 on a local network (LAN). You may change this to another port number as may be required under certain circumstances. Remember to Save your new setting.

MAC Address The MAC Address: (Media Access Control) for your particular 526 is factory-assigned and cannot be changed. You may wish to make note of your unit's MAC Address: to help identify it on your network.

Link Speed Link Speed: is an indication of connection status and the expected bitrate between your 526 and the local network (LAN).

Addressing the 526 Under the Windows operating system, you may access 526 Webpages on a common LAN by typing its Hostname and a forward-slash into the browser address bar as shown here. The entry is not case-sensitive.



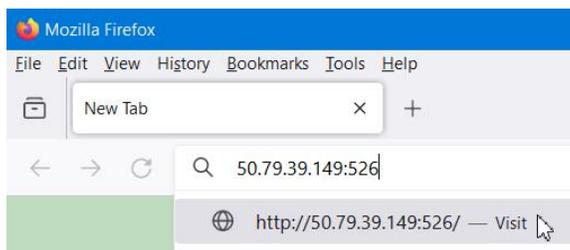
Non-Windows browsers may require you to enter the complete IP address of the unit, which can be found on the Network Webserver page or on the front-panel touchscreen menu.

Incoming Internet Access To access the 526 from the Internet, the unit must be assigned a static IP address. If your router makes DHCP assignments for other equipment on the network, simply assign a static IP that is outside the router's DHCP range. This is a simple matter using the router's Help utility.

You also need to open a specific port for the 526 on the network router. Within the router's Port Forwarding utility you will be able to enter your static IP address for the unit (Internal

IP), followed by a colon and a port number. The port number may be any number in the router's range.

If your Internet Service Provider (ISP) assigns you a static IP address, then it is a simple matter to address the 526 remotely. Just type the IP address and port number into your browser as pictured here.



But if your ISP issues a *dynamic* IP, which is more often the case, this mandates 'Dynamic DNS' operation, using the services of an IP-forwarding provider. This is an operation you should entrust to your IT department. Further explanations and instructions are available from multiple Web resources.

DANTE® AND AoIP STREAMING

- Dante Defined** The term Dante® refers to networking technology developed by the Australian firm, Audinate Pty. Ltd. It enables simple connection with other Dante-equipped devices, and gives AES67 AoIP (Audio over Internet Protocol) compliance and interoperability among a wide range of pro-AV products. It is generally also compatible with proprietary systems from independent manufacturers of AoIP-enabled products.
- IP Settings** The Dante-based AoIP utility of the 526 is quite similar to the product's general networking function. Like the LAN connection, the independent AoIP connection may accept IP address assignments in either a DHCP or Static IP assignment Mode. Static IP operation requires manual entries into the four fields that are grayed-out when your router makes DHCP assignments.
- The AoIP MAC Address** The MAC address: for AoIP streaming is not the same as the one for general Web interactivity of the 526; these are two independent network connections. Like the rear-panel LAN PORT, the AoIP PORT has a unique MAC Address: that is factory-assigned and cannot be changed.
- Link Speed** Link Speed: is a readout showing connection status and the expected networking rate for the AoIP connection.
Remember to click on the Save bar after making or changing Dante setup parameters.
- AES67 Enable** The Dante utility is able to AoIP-stream audio at two sample rates, as discussed shortly. The AES67 Standard specifies a 48kHz sample rate, but 44.1kHz is a rate with wide use in radio and television broadcasting and is the default rate for the 526.

With AES67 Enable: set to Enabled, streaming is forced to a 48kHz sample rate.

Audio Format Encoding: refers to the word length for the PCM-encoded digital audio to be sent as AoIP. PCM 16 , PCM 24 and PCM 32 refer to word length for Dante AoIP flows; AES67 flows are locked to PCM 24 regardless of this setting.

Sample Rate: is forced to 48kHz for AES67 streaming, but 44.1kHz is the 526 default rate unless AES Enable: has been set to Enable.

Transmit Flows The AoIP utility can specify multiple destinations for the audio stream. Flows are individual audio channels, “left and right” (dual mono) program channels in the case of the 526. Any specific flow can be sent to more than one recipient.

An AES67 flow is initiated from the Dante menu. You may start an Auto flow: with the IP: and Port: set automatically. Or you can set a Manual IP Address: and HTTP Port: to send the stream to. Click Start Flow when setup is complete.

The Dante Controller The Dante Controller is a free software utility available from Audinate, Dante’s developer. It is essentially a software means of finding, setting-up and controlling Dante-enabled devices on your network. It may be downloaded for operation under either Windows or Macintosh operating systems from the following link.

<https://www.audinate.com/products/software/dante-controller>

SNMP OPERATION

Overview SNMP (Simple Network Management Protocol) allows other equipment on the same Local Area Network (LAN) to communicate directly with your 526, and for your unit to send alarms and supplementary information to other equipment on the network.

The 526 will interface directly with a network controller, technically known as the SNMP ‘Manager.’ The 526 has an embedded ASCII text file named Management Information Base, or MIB. In setting up for SNMP operation, the MIB file will have to be downloaded from your unit through the Web interface and uploaded to the SNMP Manager. This is detailed later-on.

Mode The SNMP submenu default Mode: setting is Disabled, which inhibits communication between the 526 and the SNMP Manager.

Changing Mode: to Read Only allows the 526 to be interrogated by the SNMP Manager so that programmed setup parameters, alarms, etc. can be integrated with other equipment on the network.

Setting the Mode: to Read & Write allows the SNMP Manager to send commands to your 526 Monitor for remote control of all functions.

- Security** SNMP ‘Communities’ serve as passwords for this function. In the Read Community: and Write Community: fields, overtype the factory default public and private entries, entering text that is specific to the read/write strings on your SNMP Manager monitoring device. Do a Save after entering your text.
- Ports** The default SNMP Ports, SNMP Port: 161 and Trap Port: 162, are customary for a majority of SNMP operations. Overtyping these defaults to change them, followed by a Save.
- Trap Destinations** When the 526 *initiates* an alarm, rather than being *queried* or *polled* for one, the alarm is known as a ‘trap.’ Three local network IP addresses may be entered in the Trap Destination 1:, 2:, and 3: fields, each corresponding to other devices on the LAN that require alarm notifications. Overtyping the defaults with valid IP addresses of other equipment and Save.
- The MIB File** The MIB File is a small text file required by the SNMP Manager. Click: Download MIB to save this file using the usual Windows methods. The MIB file is in plain text with a .mib extension, and may be read with Windows Notepad.
- NOTE: This is an abbreviated discussion of SNMP operation. SNMP is a somewhat complex utility, managed exclusively by whatever SNMP ‘Manager’ (monitoring equipment) is employed. Refer to all instructions supplied with, and for, the SNMP Manager hardware and/or software in setting-up the 526.

EMAIL AND SMS/TEXT MESSAGING

- Email and Text Notifications** NOTE: The time-stamp feature for email notifications and the Alarm Log depends on a network connection to sync with Internet time, along with setting the proper time zone and other options. This is detailed under the next subheading.
- Connected to the Internet, the 526 can send email or SMS/text notifications of reception and other faults to one or more recipients. Which alarms go to what individual recipient is a separate setup routine.
- SMTP Setup** The 526 must first be properly programmed to send mail under SMTP Settings. You need to set up an actual email account, the elements of which are just like setting up any conventional email account. Information to be entered here depends on the provider you choose. When you apply for the account, much of this information will be assigned to you. Consult your IT professional for help setting up email accounts.
- Under SMTP Server:, enter the provided outgoing mail server info (e.g.: smtp.gmail.com), the required Port: number and whether TLS: is On or Off.
- From: is the ‘friendly’ name that identifies the 526 to the email or SMS/text recipient. You could use station call letters or something like ModMonAlarm. User: is the full email address

(username) of the email account you're using for the 526, and the Password: you chose for this account.

Recipients, (Send To)

Next enter up to ten email recipients, typing-in the full email address. After this you'll decide who gets what alert.

Email addresses typically take the form of the upper example here. If instead you wish to send a text message to a recipient's cell phone, the entry may look like the second image. In this instance the alarm notifications are being directed to a Verizon subscriber's phone. Further information on these naming protocols is available on the Web, or you can check with the wireless carrier to confirm the proper addressing style for Internet texting delivery.

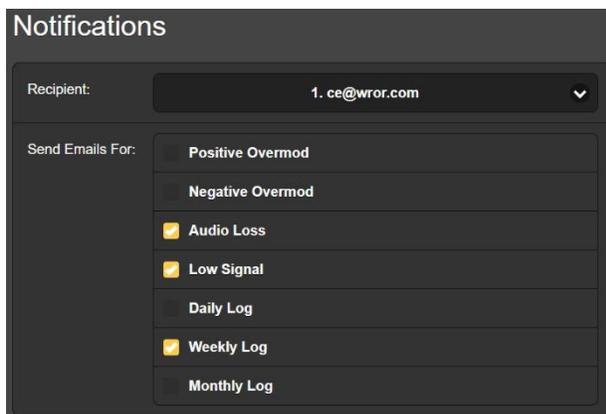


When all recipients have been entered, click Save. You may also click Send Test Email, which will message *all* recipients to confirm proper communications setup. The Status: field will show whether the test message has been properly formatted, dispatched and accepted by the email provider.

Notifications, (Send What)

You may assign any or all alarms to any or all email or text-address Recipient: in the Notifications section.

Referring to the example here, click the down arrow to select Recipient: 1. through 10. With a Recipient: selected, click the Send Emails For: boxes



to choose which alarm condition(s) will be reported (and/or alarm logs dispatched) to that specific individual.

In this abbreviated example, the Chief Engineer will receive an email for Audio Loss and Low Signal alarms, and have the Weekly Log delivered as well.

When you've finished with this Recipient:, proceed to the next. No Save command is necessary in this operation.

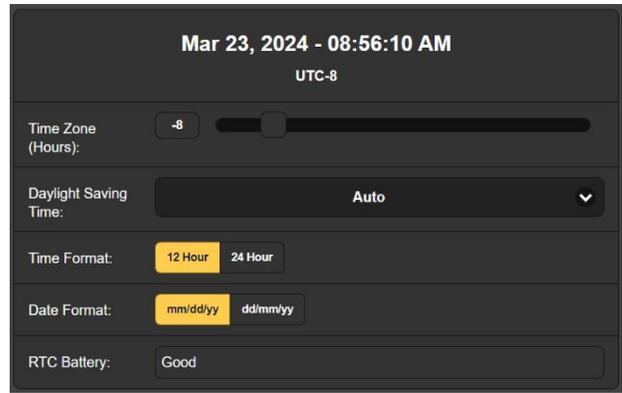
TIME SETUP

Time and DST

The internal Real Time Clock gets daily updates from Internet Time and has sufficient inherent precision to remain accurate between updates.

Grab and drag the Time Zone (Hours): slider for the proper offset from Universal Coordinated Time for your location.

In this example, the -8 represents West Coast US (Pacific) time. The time at the top of the page will update rapidly, so you can simply drag the slider until the time shown here agrees with your Patek Philippe Nautilus, or an even-more-accurate (crystal-controlled) Timex.



Daylight Saving Time: defaults to the Auto mode, though you may either opt for this convenience or click the down arrow to select On or Off for DST.

- Presentation Formats** Time Format: can show either a 12 Hour or a 24 Hour clock, and the Date Format: can reflect either US or European conventions. The date is automatically set by the Internet Time Server.
- RTC Battery** The Real Time Clock has a backup battery located on the main 526 circuit board. This is a 3V CR2032 flat 'coincell' battery with the + side facing up. Replace the battery when RTC Battery: indicates other than Good.
- Time Server** We have provided a reliable default time server, which is 1.inovonics.pool.ntp.org. If you prefer another, overtype the Server: entry with your alternate and click Save.

ADMINISTRATIVE MATTERS

Security and Passwords Access to your 526 may be protected by multilevel passwords, which must then be entered before screens can be viewed or entries changed.

Cautions



- 1) Once the 526 front panel LCD-touchscreen is unlocked, all passwords will appear in clear text on the Admin menu.
- 2) All passwords are hidden on the Admin Webpage when logged-in as a 'Read Only Web User'.

Under the Security heading of the Admin Webpage, type-in the Front Panel: password, which henceforth must be manually entered at the front-panel screen at the equipment site.

There are two Webpages-access passwords. Web Admin Password (Read/Write): is the Administrator password that allows full access to the 526. Web User Password (Read Only): will permit a lower-level user to view all data, but that user cannot retune the receiver or make changes to any settings. Once passwords have

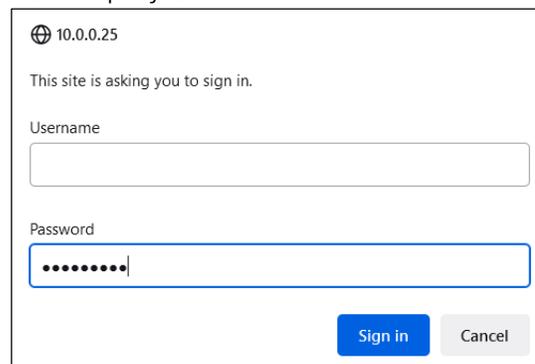
been assigned, click Save to lock them into nonvolatile memory.

Once passwords have been entered and saved, the front-panel Now Playing screen will be the only one visible, and all Web interface screens will be locked out.

Signing In

Once password protection is in place, at the installation site you will be prompted to enter the front panel password through the LCD-touchscreen before any menu other than Now Playing can be accessed. Use the on-screen keyboard to spell-out the password, and then click ✓. This will be necessary each time the unit times out to a dark or dim screen, so you may wish to reset the Admin / Display / Timeout interval while you're working on the unit.

A Webpage password will have to be entered on any connecting device. When this image appears on your screen, ignore Username and enter either the Web Admin or the Web User password into the Password field, then click Sign in.



Lost Password (Hard Reset)

NOTE: A 'hard reset' is required to bypass a local or a Web interface password. *This must be done at the installation site!* A hard reset not only deletes the password, but will also return the 526 to all-factory-default settings. *All User settings will be lost!* This illustrates the importance of maintaining a current Hardware Profile, which is discussed shortly.

If the password is lost, the only way you can recover control of the 526 is at the equipment site following this procedure:

- 1) Disconnect AC mains power.
- 2) Wait 10 seconds and then reapply AC power.
- 3) Immediately when the Inovonics logo 'i' lights, place two or more fingers on the LCD-touchscreen.
- 4) You should see confirmation on the LCD that the 526 is re-booting with factory-default values. If this is NOT the case, if the unit boots starting with the usual Booting Tuner, Booting DSP sequence, perform the sequence again until you see Loaded Factory Default settings heading the boot sequence list.

The Hardware Profile

The entire 526 'setup' may be saved to your computer as a small text file. The Hardware Profile includes user settings, alarm notification preferences, SNMP options, passwords, etc., and is useful for restoring a previous setup or for cloning a second unit for backup service.

To save a profile to your computer, under Configuration click: Download Hardware Profile. With the Firefox browser used in this example,



Windows automatically saves the file to your Windows Downloads folder as a small file with a .json extension. From there you can move it to a location of your choice. Other browsers may ask you to specify a Save as: location. The file carries a default name of 526_settings.json.

To upload (restore) saved settings, first click Select Hardware Profile... under Configuration and navigate to where you have saved the profile. When prompted, Open the file. Then click Upload Hardware Profile. This will replace all setup parameters currently loaded and running in your 526 with the saved ones.

Reboot

Uploading a Hardware Profile automatically reboots the 526. There may be other circumstances under which you might want to reboot the unit manually. This can be done by clicking Reboot in the Configuration area.

A *manual* reboot does not change any settings or purge any data that would not be lost with a power cycle. The 526 will come back tuned to the same station and with all the same settings.

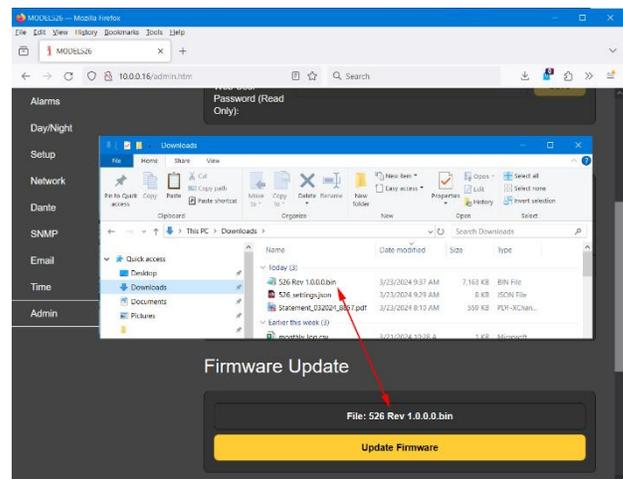
However, at any time you wish to ‘clean house’ and restore all settings and preferences to factory values, click: Load Factory Defaults. In this case you will lose your settings, except for IP settings (to maintain access to the unit), so first downloading a Hardware Profile might be a very smart move.

Updating Firmware

NOTE: Before attempting a firmware update, we do recommend first saving a fresh Hardware Profile, as a firmware update may affect user settings. If there is danger of compromising stored data, the firmware update will include notes to that effect.

526 firmware updates are issued as small .bin files that are downloaded from the Inovonics Website to your computer Desktop or into in a folder set aside for this purpose.

Updates including the Web interface pages and are easily uploaded to your 526. From the Firmware Update utility at the bottom of the Admin screen, click Select Firmware File... and double-click the downloaded .bin file. This will transfer the file to the updater as shown in this screenshot.



With the name of the new .bin showing in File:, Click Update Firmware and follow prompts to complete the process. Updating takes a minute or so and will return you to the new Web interface pages once the operation is complete.

- 526 Manual** A PDF of the 526 manual has been included in the firmware. On the Admin page, click View Model 526 Manual to download the PDF from your 526 and bring it up on your screen.
- 'About' Info** The bottom of the Admin screen shows the Serial Number: of your 526, gives the current Firmware Rev: and displays the Uptime:, or how long your 526 has been running since power was last applied. You also may click Check for Updates to see if a new version of the firmware has been issued, and view Open Source Licenses boilerplate.



INOVONICS WARRANTY

- I TERMS OF SALE:** Inovonics products are sold with an understanding of “full satisfaction”; that is, full credit or refund will be issued for products sold as new if returned to the point of purchase within 30 days following their receipt, provided that they are returned complete and in an “as received” condition.
- II CONDITIONS OF WARRANTY:** The following terms apply unless amended *in writing* by Inovonics, Inc.
- A. Register the Warranty online at www.inovonicsbroadcast.com within 10 days of delivery.
 - B. This Warranty applies only to products sold “as new.” It is extended only to the original end-user and may not be transferred or assigned without prior written approval by Inovonics.
 - C. This Warranty does not apply to damage caused by misuse, abuse, accident or neglect. This Warranty is voided by unauthorized attempts at repair or modification, or if the serial identification label has been removed or altered.
- III TERMS OF WARRANTY:** Inovonics, Inc. products are warranted to be free from defects in materials and workmanship.
- A. Any discrepancies noted within THREE YEARS of the date of delivery will be repaired free of charge, or will be replaced with a new or remanufactured product at Inovonics’ option.
 - B. Parts and labor for factory repair required after the three-year Warranty period will be billed at prevailing prices and rates.
- IV RETURNING GOODS FOR FACTORY REPAIR:**
- A. Equipment will not be accepted for Warranty or other repair without a Return Authorization (RA) number issued by Inovonics prior to its return. An RA number may be obtained by calling the factory. The number should be prominently marked on the outside of the shipping carton.
 - B. Equipment must be shipped prepaid to Inovonics. Shipping charges will be reimbursed for valid Warranty claims. Damage sustained as a result of improper packing for return to the factory is not covered under terms of the Warranty and may occasion additional charges.

