

# 525N

## AM Modulation Monitor with Networking

### Installation & User Guide





**PRODUCT REGISTRATION RECORD**

525N – Serial No. \_\_\_\_\_

Purchase Date \_\_\_\_\_

Warranty Registered?  Web

Reg. Date \_\_\_\_\_ By: \_\_\_\_\_

# Installation & Operation User Guide

## 525N

### AM Modulation Monitor with Networking

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# Section I

## INTRODUCTION

### MODEL 525N PRODUCT DESCRIPTION

**General** The Model 525N is an AM Modulation Monitor for monitoring and measuring transmission performance in the medium-wave AM broadcast band. Off-air reception allows measurements to include the antenna and its phasing and tuning circuits.

The 525N is a broadband receiver featuring wide audio response with user-selectable audio-monitor bandwidth characteristics. A phase-locked synchronous detector helps reject adjacent-channel interference and recovers only the amplitude-modulated component of HD Radio™ ‘hybrid-digital’ transmissions, even at the full-bandwidth setting.

AGC response is optimized to yield accurate modulation measurements of transmitters operating in Modulation-Dependent Carrier Level (MDCL) modes.

The 525N is supplied with a large-aperture, outdoor loop antenna. The directionality of this antenna can help reject adjacent- and on-channel signals that could affect measurements.

**Features** Leading features of the Model 525N include:

- Maintains AM measurement accuracy with HD Radio™ hybrid transmissions and power-saving MDCL modes.
- Easy menu-driven front-panel setup and operation.
- An intuitive Web interface yields full remote control, remote listening, email/text-message alarms, error logging and SNMP support.
- A bright LCD readout shows positive and negative modulation peaks simultaneously. Metering can be switched to show RF signal level (RSSI) and asynchronous noise to validate modulation measurement accuracy.
- Audio-monitor bandwidth is menu-programmable in 1kHz steps between 10kHz and 2kHz while maintaining full bandwidth for transmission measurements.
- Two independent sets of peak flashers show user-programmed maximum modulation values in addition to fixed, legal modulation limits.

- Front-panel alarms and rear-panel tally outputs provide local and remote indication of overmodulation, loss of carrier and loss of program audio.
- Supplied with a weatherproof, large-aperture loop antenna.

## MODEL 525N TECHNICAL SPECIFICATIONS

### Receiver Topology:

Single-conversion superheterodyne;  
300kHz IF; phase-locked I/Q synchronous detector.

### RF Inputs:

- The 75-ohm (F) antenna input connects to the supplied broadband loop antenna. Cable is not included, but up to 100 feet of general-purpose RG-6 CATV coax may be used. A short wire antenna may prove adequate in high-signal areas that suffer minimal interference.
- A 50-ohm (BNC) high-level input accepts a direct RF sample between 1V and 7V r.m.s. / 3V to 20V p-p.

### Tuning Range:

Tunable via the front-panel menu or the Web interface:

- 520kHz to 1720kHz in 10kHz steps
- 522kHz to 1719kHz in 9kHz steps

Five station-memory pushbutton/Web presets are provided.

### Signal-to-Noise Performance:

(See Figure 1)

### Measurement Bandwidth:

Carrier amplitude demodulation extends to 10kHz,  $\pm 0.2$ dB. Measurement is not affected by the user-selectable audio cutoff.

### Audio Response:

User-selectable “FLAT” response, or restricted in programmable 1kHz steps between 10kHz and 2kHz. (See Figure 2)

### De-Emphasis:

A menu command switches-in the NRSC ‘truncated’ 75 $\mu$ s de-emphasis characteristic to the program audio outputs with any restricted audio bandwidth selection. (See Figure 3)

### Audio Distortion:

Typically 0.15 THD at 50% carrier modulation; <0.5% at 99% modulation.

### Modulation Display:

The peak-responding front-panel bargraph readout shows positive and negative modulation peaks simultaneously, with extended persistence of the most-recent-highest peak value. Measurement resolution is 1%

between 50% and 100% (negative) and 50% and 140% (positive) modulation, and 2% between 20% and 50% modulation.

### RSSI/Noise Display:

The Modulation Display may be switched to show the dBuV level of the incoming carrier (RSSI) and a relative measurement of asynchronous noise.

### Peak Flashers:

- Absolute-limit flashers are factory-calibrated at -100% and +125% carrier modulation.
- A second set of flashers may be programmed by the user to values between -70% and -100% and +70% and +140%.

### Program Audio Outputs:

- The active-balanced, rear-panel program audio output (XLR) delivers +4dBu from a 200-ohm resistive source.
- Front-panel headphone jack (¼-inch, TRS).

### Alarms:

Open-collector NPN transistor outputs (screw-terminal block) for low signal, program audio loss and overmodulation. Closure polarity is programmable.

### Web Interface:

- RJ45 jack for remote setup and operation via TCP/IP; DHCP or Static IP with local or remote selection.
- Remote Web-based monitoring of off-air audio.
- Comprehensive network configuration utility including dynamic DNS and full SNMP support with downloadable MIB file.
- Supports email and text message services with or without SSL.

### Power Requirements:

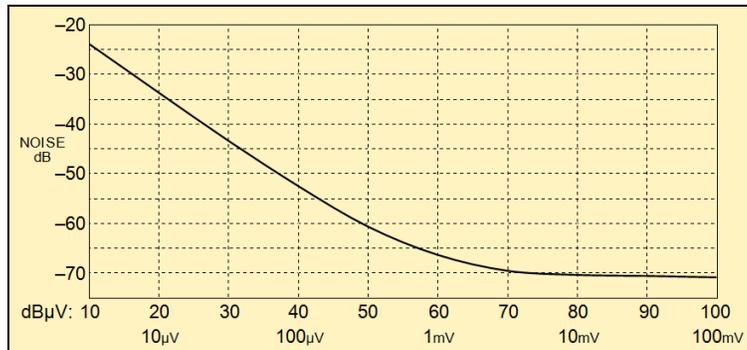
- 105–130VAC (0.250A Fuse)
  - 210–255VAC (0.125A Fuse)
- 50/60Hz; 10W.

### Size and Weight:

1¾”H x 19”W x 7”D (1U);  
9 lbs. (shipping).

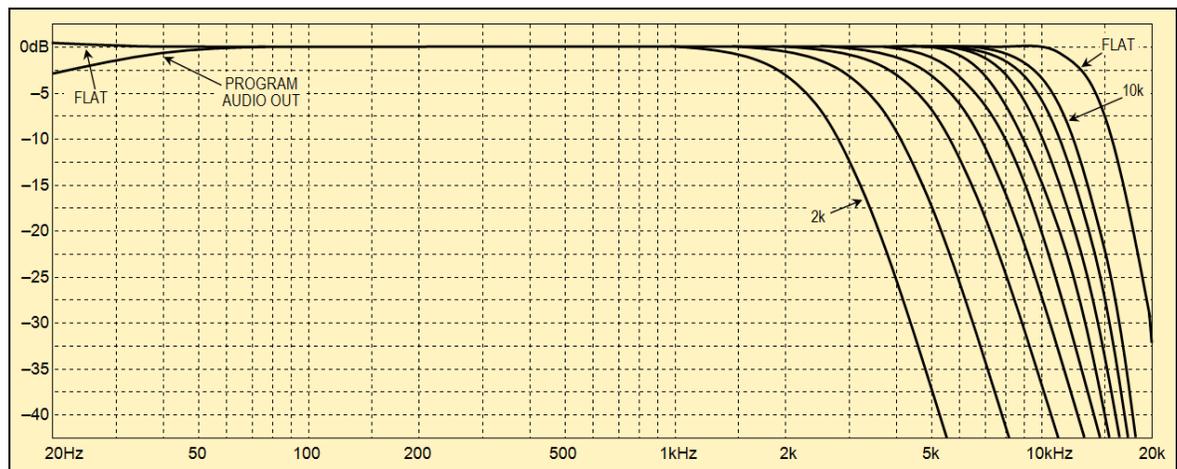
## RECEPTION SNR AND AUDIO RESPONSE GRAPHS

- Figure 1 plots the program audio output noise floor against the RF level at the antenna connector. Signal-to-noise performance of the 525N is a direct function of the incoming RF level. The figures shown reference 100% modulation with 10kHz audio bandwidth and NRSC de-emphasis.



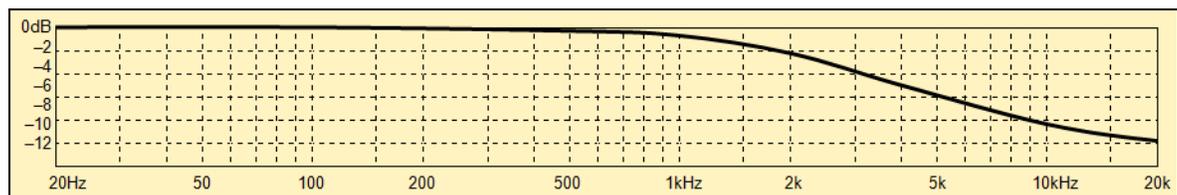
**Figure 1 - Model 525N  
SNR Performance**

- Figure 2 illustrates the effect of the menu-programmable audio-cut filter in the program audio and headphone outputs of the Model 525N. This filter *does not affect* modulation measurements, which always follow the FLAT response noted, regardless of the audio cutoff selected.



**Figure 2 - Model 525N Off-Air Measurement Response (FLAT)  
and Program-Audio Cutoff Options**

- Figure 2, above, does not reflect the 'truncated' 75μs NRSC de-emphasis characteristic graphed below in Figure 3. De-emphasis is a menu option that is normally engaged to compensate for complementary transmission pre-emphasis mandated by the 1985 NRSC Specification.



**Figure 3 - NRSC De-Emphasis Curve for AM Broadcasting**

# BLOCK DIAGRAM

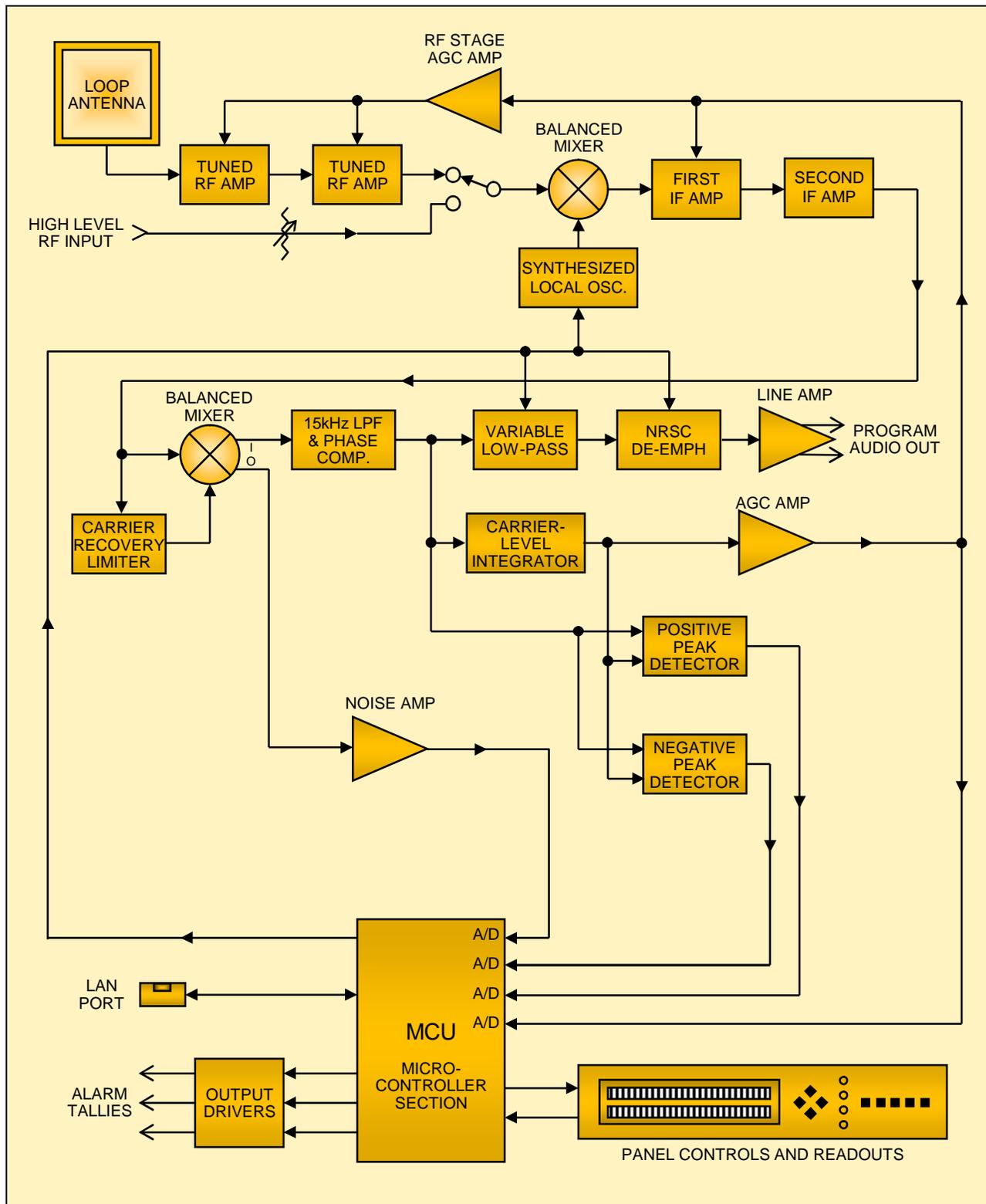


Figure 4 - Block Diagram, Inovonics Model 525N

## Section II

# INSTALLATION

### UNPACKING AND INSPECTION

When your 525N is delivered, inspect for any shipping damage as soon as possible. If damage is suspected, notify the carrier at once, and then contact Inovonics.

We recommend keeping the original carton and packing materials for possible return or transshipment. If the unit is returned for Warranty repair, shipping damage sustained as a result of improper return packing may invalidate the Warranty.

**IT IS IMPORTANT** to register the Warranty of your 525N. This assures coverage of the equipment under Warranty terms and provides a means of tracking lost or stolen gear. This action also adds the user to a database to receive specific service instructions or software/firmware updates when issued. Register online through the link on our Website:

[www.inovonicsbroadcast.com](http://www.inovonicsbroadcast.com)

### THE LOOP ANTENNA

The untuned loop antenna supplied with the 525N has a 'figure-8' pickup pattern with maximum sensitivity in-line with the loop plane (off the edge). The antenna is cleverly fashioned from common PVC sprinkler pipe to be weatherproof under most circumstances; a specification easily stated by us Californians who don't have much experience with 'real' winters. Your own common sense and experience with wind, ice and other nasties should be factored into location and mounting considerations.

**Cable  
Not Included**

Cable to connect the antenna to the Model 525N is not provided. Cabling can be any ready-made RG-6 CATV coax of 100 feet or less with F connectors on both ends. Look for a cable that has a rubber boot for the outdoor end.

**Mounting  
the Antenna**

The loop antenna is relatively lightweight and may be fastened to any flat surface with the included bracket as shown in the photo on the next page. Other mounting possibilities can easily be accommodated with the broad range of TV antenna mounting hardware available universally.



## MOUNTING THE 525N

**Rack Requirement** The Model 525N mounts in a standard 19-inch equipment rack and requires a meager 1¾ inches (1U) of vertical rack space. We recommend rack screws with built-in plastic washers to protect the painted finish around the mounting holes.

**Heat Dissipation** Consuming far less power than a '60s LavaLite®, the 525N generates negligible heat itself. The unit is specified for operation within an ambient temperature range extending from freezing to 120°F/50°C. Be aware that adjacent, less efficient equipment may radiate substantial second-hand heat, so be sure that the equipment rack is adequately ventilated to keep its internal temperature below the specified maximum ambient.

## AC-MAINS POWER

**Fuseholder** The fuseholder is at the far left of the front panel. Apply downward pressure and pull the cap toward you to access the 5mm mains fuse. Note that the cap has space inside for a spare fuse. The cap is reseated by reversing the removal process. This fuse also functions as a front-panel emergency power disconnect.

**Mains Voltage Selector** Unless specifically ordered for export shipment, the 525N is supplied for operation from 115V, 50/60Hz AC mains. This can be confirmed by checking the designation beneath the

mains connector on the rear panel. The *inappropriate* voltage and fuse value will have been lined-out at the factory with a felt marker pen.

To change the mains voltage, disconnect power and remove the top cover of the unit. A clearly marked slide switch is directly behind the AC mains connector on the circuit board. *With the unit unplugged*, use a small screwdriver to set the switch for 115VAC or 230VAC operation.

Be sure to install the appropriate fuse listed on the rear panel. You can remove the factory fuse indication with solvent, and then cross out the inappropriate fuse value with a felt marker.

**Power Cord** The detachable IEC-type power cord supplied with the 525N is fitted with a North-American-standard male plug. If you need to replace the 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 (return) 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. Please keep these straight.

## RADIO FREQUENCY INTERFERENCE (R F I)

**Location** The Model 525N is a high-performance, wideband AM receiver requiring reasonable caution when using it in the vicinity of high power transmitters. As an off-air *receiver*, the 525N was intended for use at the studio, rather than at the transmitter site.

At the transmitter site, the rear-panel HIGH LEVEL RF input may be connected directly to an appropriate transmitter or feedline monitor tap. With a direct, high-level RF input connection it is doubtful that other stations can be received with the antenna, even if the antenna itself is located away from the tower.

**Ground Loops** The active-balanced program line output of the 525N is not transformer-isolated. A mains frequency or RF ground loop could be formed between output cable shield ground and the AC power cord ground. A 'ground-lifting' AC adapter may well remedy such a situation, although the chassis somehow must be returned to earth ground for safety. Generally, being screwed-down in the equipment rack will satisfy the safety requirement.

## RF INPUT SELECTION

The rear-panel INPUT SELECT switch may be set to accept either ANTENNA or HIGH LEVEL (direct) inputs.

**Antenna Input** The rear-panel F connector is meant to accept the loop antenna supplied with the 525N. This is a low-impedance, current-sensing input that swamps the RF resonance that otherwise would exist as a product of loop inductance and cable capacitance.

If the 525N is co-located with the transmitter, but a direct connection to an appropriate tap is not convenient, chances are that a short length of insulated wire stuck into the center of the F connector will bring sufficient signal into the 525N. This does not maintain the interference-reduction advantage afforded by the loop, however.

**High Level Input** A rear-panel BNC jack can accept a high level RF input directly from an appropriate transmitter or feedline tap. This input terminates the source in a 50-ohm, 1-watt resistor, so the r.m.s. level of the input must be kept at 7 volts or less.

Signals applied to the high level input still must be tuned-in at their operating frequency. This input is not routed through the selective RF amplifier stages, thus it has no rejection of image frequencies. The 525N will tune the signal applied to this input at its normal frequency, and also at an indicated frequency 600kHz above the actual transmission if this is within the tuning range of the 525N.

**High Level Gain Set** A 15-turn potentiometer marked LEVEL SET is adjacent to the BNC connector. Use this to trim the gain of the high level input for the signal applied. This input benefits from a certain degree of AGC action, although not with the same wide range as antenna inputs are afforded. The LEVEL SET pot should be set for an RSSI indication around 60dBuV when the SIGNAL AND NOISE measurement option, Menu No. 2, is selected.

## PROGRAM AUDIO OUTPUT

The rear-panel PROGRAM AUDIO OUT XLR-male connector is an electronically-balanced (transformerless) line output. This is an active-balanced output with a symmetrical resistive source impedance of 200 ohms. The nominal "0VU" output line level is +4dBu.

## ALARM "TALLY" OUTPUTS

The 525N has rear-panel alarm tally outputs for three general fault conditions: 1) OVERMODULATION, 2) LOW SIGNAL and 3) AUDIO LOSS. These tallies are coincident with front-panel flashing alarm indications and Web interface alarm notifications and logging. Alarm setup and monitoring is described for each alarm under the corresponding discussion.

The local alarm tallies are collectors of NPN transistors that saturate to ground. These outputs can sink up to 100mA at source voltages to 30VDC. +5V and GND (ground) are provided on the terminal strip as well. The +5V source is current-limited to about 50mA, which is sufficient to drive an optocoupler or a remote LED indicator.

**Alarm Closure  
Polarity**

Alarms may be programmed independently to either ground when triggered, or can sit normally in a grounded condition and go open when triggered. This is set up from the No. 7 CLOSURE POLARITY menu, or by using the Web interface. The factory default is for these tallies to go from an open circuit to a ground for the alarm condition. The alarm tally barrier strip may be unplugged from the chassis for easy connection.

# Section III

## BASIC SETUP AND OPERATION

### FRONT-PANEL VS. WEB INTERFACE SETUP

Instructions in this Section cover initial setup of the 525N using the front-panel buttons and LCD display.

Anything that can be done from the front panel of the 525N may also be accomplished using the Web interface. Web setup, offers greater convenience, plus a few additional features and measurement options. But as tempted as the user may be to put the 525N on his network right away, we stress the importance of first becoming familiar with the unit from a hardware standpoint, and then investigating remote control capabilities. In a good many installations, the 525N can, and will, be used without a network connection.

We thus recommend starting with front-panel setup, as this method not only gives the immediate gratification of a hands-on experience, but is necessary for initiating network connectivity in the first place.

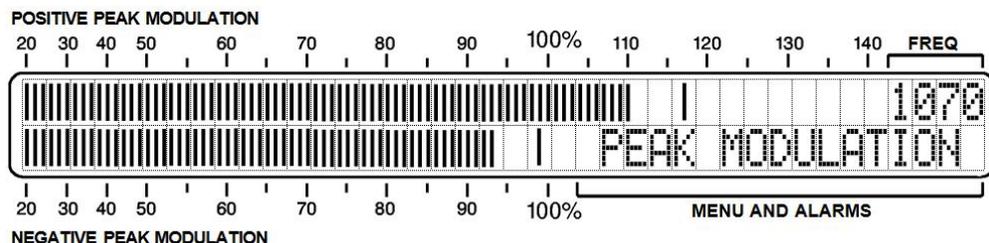
### NAVIGATING THE MENU AND SELECTING OPTIONS

The lower, right-hand side of the LCD display is set aside for MENU AND ALARMS identification, leaving the greater part of the screen area for the high-resolution bargraph display of POSITIVE PEAK MODULATION and NEGATIVE PEAK MODULATION. The receive frequency is always shown beneath FREQ on the upper line of the display.

In the following discussion of the menu, specific LCD-screen callouts will be identified in the manual text with this bit-mapped MENU ITEM font.

#### Display Default

**NOTE:** PEAK MODULATION is the No. 1 screen and the default display of the front-panel LCD.

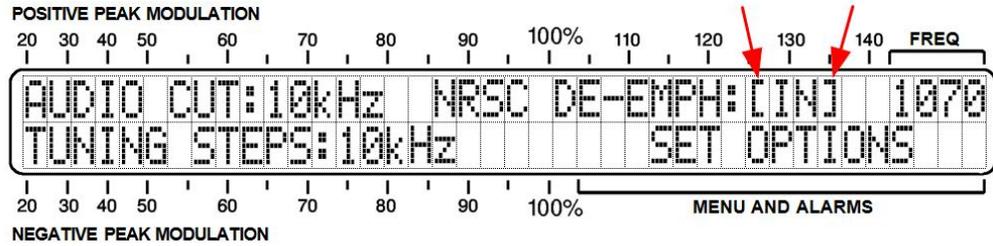


### Using the Front-Panel Buttons

With the exception of the SIGNAL AND NOISE measurement, all menu screens automatically return to show PEAK MODULATION after a 60-second timeout period.

Metering and setup options use the diamond cluster of four pushbuttons in conjunction with the LCD screen.

The MENU/EDIT buttons initially scroll up and down among the display screens and setup menus. In an editable menu (one where changes may be made), the left/right SEL (select) buttons can then highlight a particular option with blinking brackets, as shown here for the NRSC DE-EMPH: selection.



Bracketed options are then be 'edited' (changed) using the MENU/EDIT buttons. When you have finished making changes, push a SEL button until brackets disappear. At that point the MENU/EDIT buttons will again scroll through the screens.

Bracketed options that have been changed are transferred into 525N memory when the brackets are removed, or after a 30-second timeout returns the PEAK MODULATION screen.

### Flashing Alarms

Low signal and audio-loss fault conditions will trigger flashing front-panel indications concurrent with rear-panel tally logic outputs and Web interface notifications. Setup of these alarms is detailed in discussions beginning on Page 21.

**NOTE:** With no station tuned-in a **LOW--SIGNAL** alarm will begin to flash on the LCD screen. **AUDIO--LOSS** may alternately flash as well, depending on the noise floor at the received frequency. Pressing any front-panel button will stop the flashing for 10 seconds, allowing menu items to be selected and programmed. The actual alarm, on the other hand will *not* be suspended during this timeout period, instead requiring the fault condition to be cleared.

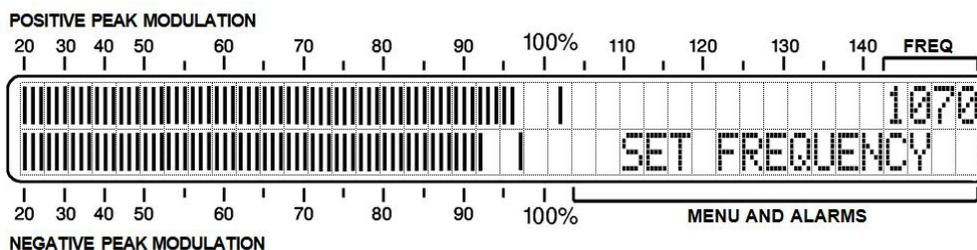
## THE MENU TREE

A listing of the various front-panel menus that are accessed with the up/down MENU/EDIT buttons is shown at the top of the following page. Menus are presented 'top to bottom,' 1 through 15, with the page number given where an explanation of each may be found.

No.	Menu	Page	No.	Menu	Page
1	SET FREQUENCY PEAK MODULATION	16, 17	8	CLOSURE POLARITY	23
2	SIGNAL AND NOISE	17	9	NETWORK: DHCP	25
3	SET OPTIONS	23	10	NETWORK: IP	25
4	SET PEAK FLASH	19	11	NETWORK: GATEWAY	26
5	SET OVERMOD	19	12	NETWORK: SUBNET	26
6	SET LOW SIGNAL	21	13	NETWORK: DNS	26
7	SET AUDIO LOSS	22	14	NETWORK: PORT	29
			15	FIRMWARE UPDATE	43

## TUNING

From the No 1 'home' PEAK MODULATION screen, press the upper MENU/EDIT button so that SET FREQUENCY replaces PEAK MODULATION in the MENU AND ALARMS title area.



Use SEL buttons to set the receive frequency, which always appears in the upper-right corner of the LCD. Hold the SEL buttons down to scan quickly up or down the band, or push repeatedly to tune in single-channel steps.

### Tuning Lockout

60 seconds after setting the frequency, the SET FREQUENCY screen defaults to show PEAK MODULATION. When the title of this screen changes, the SEL (select) buttons are locked out. To return to SET FREQUENCY, press the upper MENU button.

### Tuning Increments

Tuning steps may be set either to the 10kHz increments common to the Western Hemisphere, or to 9kHz steps for Europe and other areas. Scroll down to Menu No. 3, SET OPTIONS, to set channel spacing for your area.

### Tuning Presets

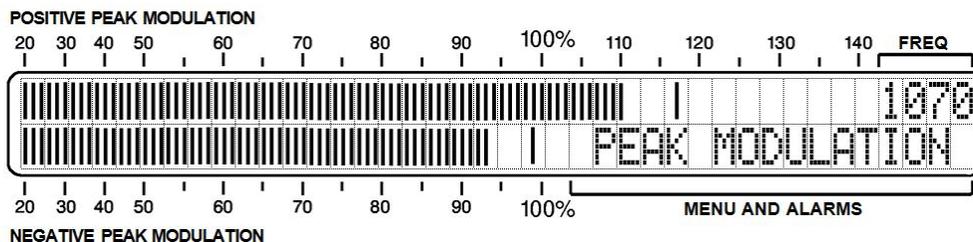
Up to five stations may be entered into non-volatile memory for instant recall. Station preset buttons will tune the 525N regardless of what screen is showing. To set the front-panel buttons, simply tune the 525N to the desired frequency and then hold down one of the buttons in the STATION PRESETS group. After a couple of seconds the frequency readout will 'wink' to indicate that the memory has been set. Repeat the process to enter other frequencies or to update any memory entry.

If staying-tuned to the station's frequency is critical, set all five STATION PRESETS to the same frequency to guard against ac-

cidental retuning by some clumsy person bumping against the rack.

## READING MODULATION

The No. 1 PEAK MODULATION screen displays total carrier modulation in the active display area.



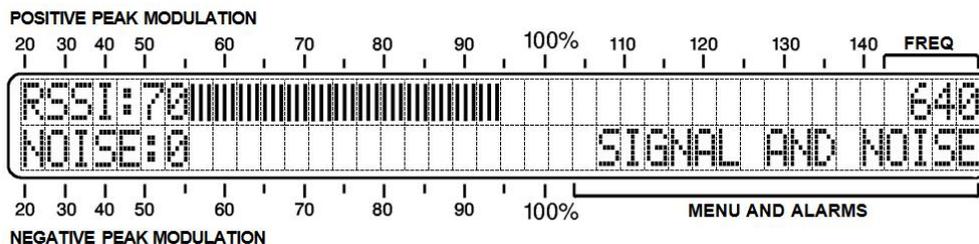
The two bargraphs show positive and negative modulation independently and concurrently. The bargraphs follow the modulation envelope, and single segments representing the highest positive and negative peaks 'hang' above the bars for a second or so to ensure that the highest instantaneous value will be displayed with no ambiguity. Setup of the peak flashers is covered later in this section.

This total-mod display has 1% resolution down to 50%, and 2% steps between 50% and 20%. Indicated modulation will be an accurate measurement, consistent with the signal level and interference factors that are addressed next.

## MONITORING SIGNAL STRENGTH

Cycle the MENU/EDIT buttons to bring up the No. 2 SIGNAL AND NOISE screen.

**NOTE:** This display screen *does not* time out after 60 seconds and default to PEAK MODULATION. This screen may be shown indefinitely to help with antenna alignment or to keep an eye on carrier level.

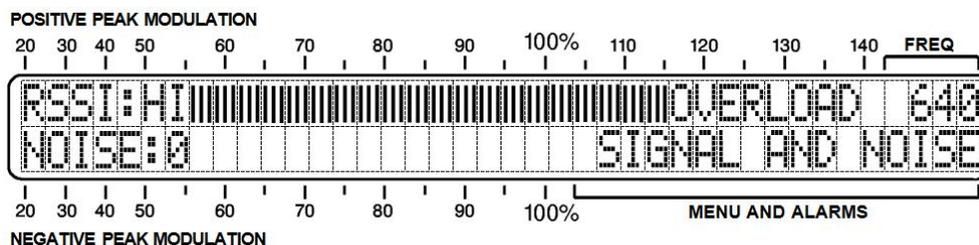


The upper bargraph is a readout of RSSI, or Received Signal Strength Indication. The numerical value is the true carrier level in dBuV at the antenna input, from a low of 10dBuV (3.16µV) to a high of 100dBuV (100mV). Generally a minimum

reading of 40dBuV (100µV) is required to assure measurement accuracy.

The RSSI bargraph responds to the carrier level in linear-dB fashion, but bears no relationship to the panel markings. The bargraph does display carrier level changes and is otherwise useful to represent relative analog level.

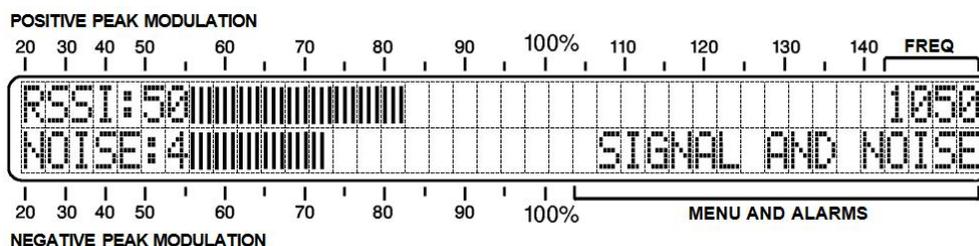
With incoming RF levels below 10dBuV, the LCD displays RSSI:LO. AGC action within the 525N can deal with inputs up to 100dBuV. When the AGC reaches this end of its control range, HI replaces the numerical value and OVERLOAD appears to the right of the bar, as shown here.



Modulation measurements cannot be trusted at very low signal levels or with an overloaded input. When OVERLOAD pops up, either reduce the antenna signal by replacing the loop antenna with a short length of wire, or use a direct, high-level input connection and adjust the rear-panel LEVEL SET pot for an indication of about 60dBuV. Of course the numbers will not represent the actual dBuV level at the high-level input connector in such a case, but the numbers still serve as a relative indicator.

## MONITORING INTERFERENCE

The synchronous detector of the 525N is able to reject input signals that are not coherent in frequency and phase with the AM carrier, including HD Radio digital programming. On the SIGNAL AND NOISE screen, the bottom bargraph gives a relative indication of noise that is in quadrature with the carrier, components that may not be audible but nonetheless compromise the accuracy of modulation measurements.



This noise measurement utility displays a relative level of “stuff that shouldn’t be there,” which may include modulation

splatter or similar spillover from an adjacent station, or even modulation from a distant station on the same frequency.

Noise is quantified on an arbitrary numerical scale of zero to nine with the bargraph scaled proportionally. Anything over a value of 2 gives reason to suspect the accuracy of modulation measurement. Aiming the antenna away from an offending source may help reduce the noise contribution.

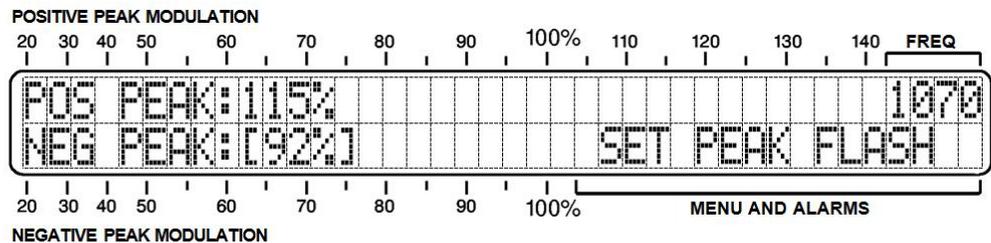
Metered noise is not the only non-program component that can sabotage modulation readings. Impulse noise and other spurious signals that may happen to be in phase with the received carrier at a particular instant may not show up on the **NOISE** scale. Use your ears to identify and qualify this type of interference.

Impulse noise will tend to inflate the reading of positive carrier modulation, while adjacent-channel spillover will cause both positive and negative indications to read high.

## SETTING THE PEAK FLASHERS

The 525N has two sets of front-panel LED peak flashers to show overmodulation. The larger top and bottom red LEDs indicate the absolute US (and some other countries') legal limits of -100% and +125% modulation. The two smaller yellow LEDs may be programmed by the user to show when alternative values are exceeded.

Scroll down to Menu No. 4, **SET PK FLASH**. Use the **SEL** buttons to bracket each flasher trip point, and then the **MENU/EDIT** buttons to set these to any desired value.



Peak flashers are programmed with 1% resolution and settings are held in non-volatile memory. Exit the setup process by pressing **SEL** until neither number is bracketed, and then navigate out of the screen with the **MENU/EDIT** buttons. Do nothing and the screen will revert to the home **PEAK MODULATION** screen after 30 seconds.

## THE OVERMODULATION ALARM

Carrier overmodulation is either a condition of carrier cutoff, or -100% modulation, or positive modulation peaks reaching

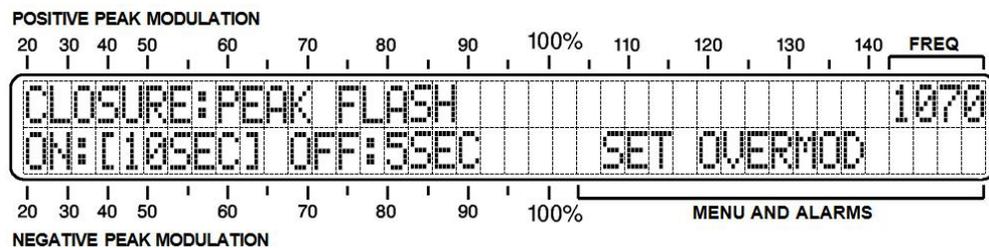
+125% of the resting carrier value. AM broadcasting is unique in supporting a certain degree of asymmetry in the modulating waveform, and the United States FCC, as well as many international broadcast authorities, permit positive peak excursions to reach this +125% limit.

A station is said to overmodulate if negative or positive peaks reach these limits “recurrently,” meaning that every now and then is okay, but don’t make a habit of it.

The 525N has a user-programmable provision for ‘weighting’ overmodulation. Excursions to the the legal limits are *integrated* so that an alarm is not generated instantaneously. The integration time roughly corresponds to a given number of seconds that the limits are repetitively exceeded.

Think of it this way. A driver can keep his car moving along very close to the posted speed limit, sometimes a bit above, most of the time just below. The amount of time he spends driving above the limit determines whether the Highway Patrol will take interest in his behavior. The longer he spends at or above the limit, the more likely he is to be pulled over.

Bring up SET OVERMOD, Menu No. 5 shown below. Use SEL buttons to navigate among the fields that can be edited. As you cycle the SEL buttons, you will see that blinking brackets appear around any item that can be changed. When an item has brackets around it, MENU/EDIT buttons are used to change that item.



In this example, ON: [10SEC] is roughly the number of seconds that peaks may hit the limits without triggering an alarm. This time period has ‘memory,’ actually accumulating peak violations, just as a police officer would make note of the driver’s behavior in the speeding analogy. So the greater the number of seconds set in this spot, the more forgiving the setting is of overmodulation.

Resetting the alarm is the reverse of this. OFF: 5SEC is the number of seconds that modulation must remain below the limit trigger points for the function to reset. Modulation must remain below the limits for 5 seconds in this instance to clear the alarm.

This overmodulation alarm discussion is the basis for the front-panel **OVERMOD** flashing alarm, and for the alarm

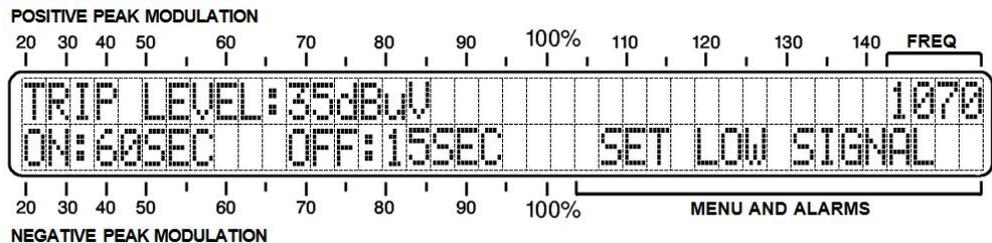
condition used by the Web interface to dispatch text-message or email notifications to specific recipients. (This notification procedure is explained on Page 40.)

The rear-panel tally closure, on the other hand, can either follow the alarm criteria just described, or it can respond instantaneously to either red LED front-panel flasher. (If, for example, you wanted to have a remote flasher in your office.) Use the SEL buttons to bracket CLOSURE:, and then set it either to ALARM or to PEAK FLASHER with the MENU/EDIT buttons.

The polarity of the OVERMODULATION alarm closure (open or ground) is set through Menu No. 8, CLOSURE POLARITY, discussed a bit farther along.

## SETTING THE LOW SIGNAL ALARM

The 525N gives a front-panel alarm, a rear-panel tally output, and can dispatch email or text messages in a ‘carrier loss’ situation, defined as a drop in carrier level below a preset trip point for a preset number of seconds. Bring up Menu No. 5, SET LOW SIGNAL.



### Alarm Trip Point

With the SET LOW SIGNAL screen up as shown, press SEL buttons to navigate among the fields that can be edited. As you cycle the SEL buttons, you will see that blinking brackets appear around any number that can be changed.

First, position the brackets around the TRIP LEVEL: value, 35dBuV in the example. Next, use MENU/EDIT buttons to set the value to whatever figure you decide. Depending on the incoming carrier level displayed on the SIGNAL AND NOISE screen, you would set the alarm trip point somewhere below the RSSI: value of the carrier. An alarm trip point about 10dB below the RSSI: value might be a good starting point, but you may need to factor-in normal variations in signal strength from propagation and fading effects, depending on the distance between the 525N and your transmitter site. Also, be sure to keep the TRIP LEVEL: above residual noise at the receive frequency when the carrier is off. And, of course, make any allowance for a different nighttime power setting if the station’s power reduces after dark.

## Alarm ON/OFF Timing

Next, using the SEL buttons, move the blinking brackets to highlight the ON# value, 60SEC in our example here. MENU buttons then can set this figure to the delay you want to build into the alarm, the delay between a carrier drop and the actual alarm activation. This time may be set in one-second increments between 1SEC and 120SEC (two minutes).

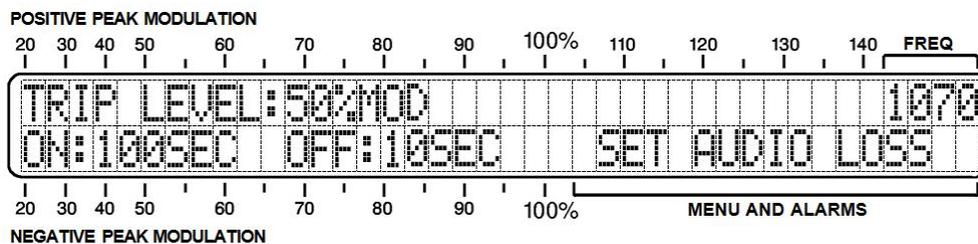
You might wonder, “Why not make this alarm instantaneous?” After all, you want to know immediately when the station leaves the air, right? Keep in mind that text-message or email notifications may optionally be sent simultaneously with this alarm, and without a delay you might receive an Inbox-full of notifications when you are really experiencing just momentary ‘hits’ in off-air reception. This alarm is activated when the received carrier falls below the TRIP LEVEL# and remains below that point beyond the ON# interval.

In like manner you set the alarm’s reset, or OFF# time. This delay guards against ‘false positives’ and a raft of messages while the transmitter tries to cycle itself back into operation. OFF# simply means that the carrier must return to a point above the TRIP LEVEL# and stay there for the duration of the OFF# time before the alarm is reset.

Settings here pertain to the station that is normally monitored and are probably not the right settings for other stations when the 525N is used to monitor market companions. When surfing the band or “DXing,” it may be necessary to temporarily reset alarms to absurd values to keep them from activating unnecessarily. Remember to restore the proper setting afterward.

## SETTING THE PROGRAM AUDIO LOSS ALARM

An audio-loss also triggers a front-panel alarm, a rear-panel tally output, and can dispatch email or text messages when carrier modulation falls below a specified level for a given period.



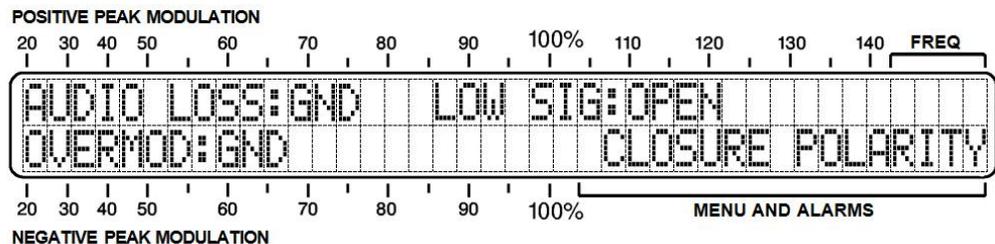
SET AUDIO LOSS uses almost the same setup procedure that was just outlined for the SET LOW SIGNAL procedure, so it will not be repeated in detail here. Please refer to the previous discussion. SEL and MENU/EDIT buttons set the TRIP LEVEL# and ON# and OFF# intervals. The only difference is that instead of setting a carrier trip point in dBuV, you are setting an audio level in percent-modulation.

Choose a TRIP LEVEL: that is exceeded most all the time with program audio modulation. This will be the level that the modulation must drop to and remain below for the duration of the ON: period to activate an alarm. Similarly, audio modulation must be maintained above the TRIP LEVEL: for the duration of the OFF: period to reset the alarm. Although PEAK MODULATION is peak-responding display with a quick fallback, a modest amount of integration has been added to this metric for alarm activation. This filters impulse noise and sets a rate for the ‘syllabic’ nature of speech.

**NOTE:** Audio loss is *not* a reliable indicator of the station going off the air. Receiver AGC will bring up random noise when the carrier fails.

## SETTING ALARM TALLY CLOSURE POLARITY

Navigate to CLOSURE POLARITY, Menu No. 8. This utility sets the logic for the three tally output closures.



With this menu on the LCD screen, use the SEL buttons to bracket the condition [GND] or [OPEN] after each of the three alarm callouts. Once the condition is bracketed, the MENU/EDIT buttons will toggle the rear-panel alarm tally polarity. In the example above, AUDIO LOSS: and OVERMOD: terminals both go to ground for an alarm. LOW SIG:, on the other hand, has been programmed to sit normally at ground and go open-circuit for an alarm.

## AUDIO MONITOR SETTINGS

**Audio Bandwidth Selection** Synchronous detection recovers amplitude modulation by ‘zero-beating.’ The RF (or IF) is sampled at the same rate as the incoming carrier with absolute carrier phase lock. This creates a virtual final IF frequency of zero.

Overall receiver bandwidth is thus defined in large part by audio filtering that follows the detector. The range of 525N audio cutoff characteristics permits listening to the program as it might sound with different transmission audio filtering, or from the perspective of the wide variety of radios that exist in the marketplace. Modulation measurements, on the other hand, are *always* made with full audio bandwidth. User-

selected audio cutoff options have no effect on modulation measurements.

Navigate to the **SET OPTIONS** screen, No. 3. **SEL** buttons will navigate the flashing brackets to the current **AUDIO CUT:** setting, and **MENU/EDIT** buttons may be used to set the audio cutoff to **FLAT**, or in 1kHz increments from 10kHz down to 2kHz. Figure 2 on Page 7 plots the family of cutoff curves. The frequency indicated by the display is the -3dB point of a fourth-order (24dB/octave) low-pass filter. This cutoff applies only to the rear-panel **PROGRAM AUDIO OUT** connector and the front-panel **PHONES** jack. Again, modulation measurement always conforms to the **FLAT** plot shown in Figure 2.

**NRSC  
De-Emphasis**

AM broadcasting in the US employs fixed transmission pre-emphasis defined by the National Radio Systems Committee (NRSC) in their July, 1985 Specification. To obtain flat overall response, the receiver supplies a complementary de-emphasis curve. Figure 3 on Page 7 shows this truncated 75-microsecond NRSC characteristic.

NRSC de-emphasis for AM broadcasting was established in the mid-1980s when 10kHz audio bandwidth was proposed as a quality benchmark in the US. But the full advantage of complementary pre- and de-emphasis has been negated as many broadcasters have voluntarily opted to chop-off high frequencies drastically so as not to 'waste modulation.' Their rationale is that silky highs can't be recovered by AM radios that, themselves, have implemented narrow bandwidths to lessen the effects of manmade RF noise.

The 525N allows de-emphasis to be selected from the front panel for any of the audio cutoff settings, except for the **FLAT** position that automatically defeats de-emphasis.

With the **MENU/EDIT** buttons, bring up Menu No. 3, **SET OPTIONS**. Then use the **SEL** buttons to bracket either **IN** or **OUT** after **NRSC DE-EMPHASIS:**. The selection may then be toggled with the **MENU/EDIT** buttons.

De-emphasis is normally left **IN** for listening, but may be switched **OUT** when making measurements through the rear-panel **PROGRAM AUDIO OUT** connector. Again, de-emphasis is automatically switched-out when **AUDIO CUT:** is set to **FLAT**. Just as with the audio bandwidth selection, de-emphasis affects only the audio outputs and has no effect on modulation measurements.

## RECEPTION AND MEASUREMENT CONSIDERATIONS

Consistent with signal strength and noise concerns already covered, the carrier peak modulation readings will be trustworthy under most all circumstances.

A solid, strong incoming carrier, preferably 40dBuV or more, will usually guarantee adequate SNR for accurate modulation readings. But even a strong signal can be sabotaged by co-channel 'skip' after daylight hours. Watch for a 'beat' on the RSSI display and listen for an intruding program at the received frequency.

A strong adjacent-channel signal can also skew peak modulation readings. The 525N is, after all, a very wideband receiver. Although synchronous detection *should* reject an adjacent channel, the 525N compromises this feature somewhat with its very tight carrier phase lock, which is necessary to reject the effects of incidental phase modulation that might be present in the desired signal.

The front-panel **NOISE** reading will reveal several reception anomalies including adjacent-channel signals that may not be audible in the program audio. Use the signal-nulling capability of the loop antenna to reject an intruder and to optimize the desired signal.

**Performance  
Limitations**

Although the Model 525N carries the name "Reference Receiver," don't be too disappointed if performance seems to fall short of that old Philco console your granddad might have had or, for that matter, a contemporary car radio. This is a very wideband unit that works on a different principle from most AM radios, in that it wants to lock onto a strong, clean carrier, even if that carrier is a channel or more away!

The principal utility of the 525N is its use as a Modulation Monitor, not as a hotshot receiver with razor-sharp tuning. Although the 525N can log some respectable DX on clear channels, there may well be reception limitations even when the 525N is within sight of the transmitting tower.

# Section IV

## NETWORK SETUP

### CONNECTING WITH THE 525N

Up to this point we've used front-panel buttons and the LCD display to get the 525N up and running. Basic mod-monitor functions may always be accessed in this manner, but the Web interface yields convenience, remote operation and monitoring capability, and opens up additional measurement features.

#### Connect the 525N

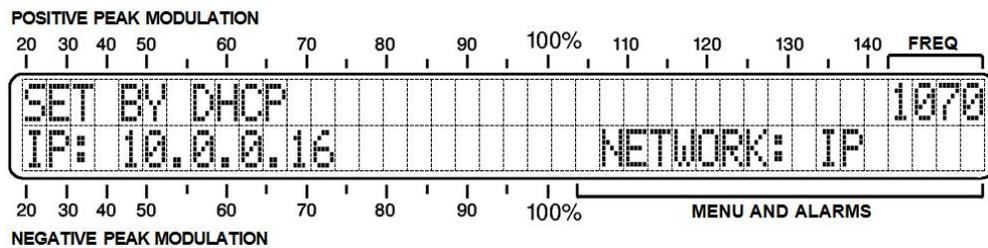
Our first order of business is to get the 525N communicating with your network. Connect the RJ45 NETWORK PORT jack on the back of the 525N to a LAN port of your server or router.

#### DHCP

Use MENU/EDIT buttons to navigate to Menu No. 8, NETWORK: DHCP. SEL buttons will bracket the status of this menu, which then may be toggled between ON and OFF using MENU/EDIT buttons. Unless you need to assign the 525N a fixed IP address, you'll want to have DHCP: ON so that your router will automatically assign connection addresses.

With DHCP: set properly, press a SEL button until the bracket disappears so that you may access the next menu.

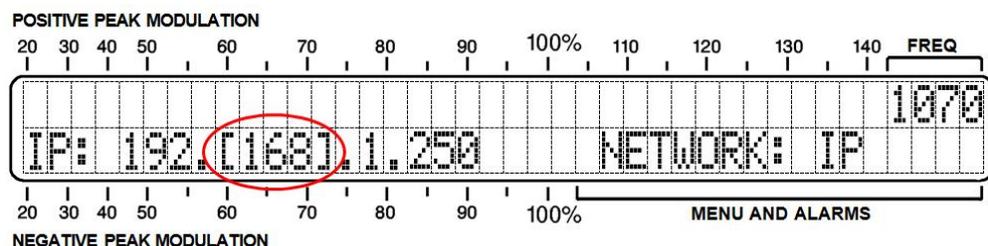
Scroll to Menu No. 9, NETWORK: IP.



In this example, this screen confirms that the IP address is set by DHCP, displaying the IP address on the second line.

#### Entering a Static IP Address

When DHCP: is turned OFF in Menu No. 8, the NETWORK: IP menu, No. 9, permits manual entry of a static IP address. This is shown in the illustration below.



### Gateway, Subnet Mask and Primary DNS

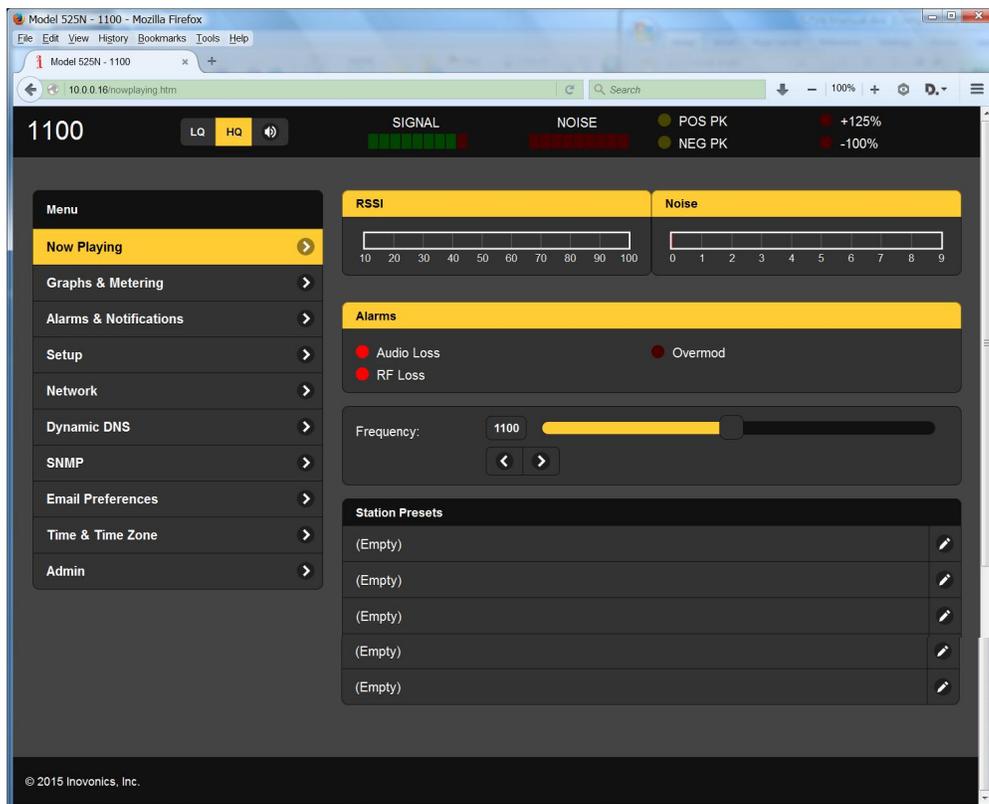
SEL buttons shuffle the brackets among the address number group 'octets.' In the example, the second octet is bracketed. MENU/EDIT buttons can then cycle the entry to any number between 0 and 255. (Holding the button down cycles quickly through the 8-bit sequence.)

The next three menus, Nos. 10, 11 and 12 allow manual setup of NETWORK: GATEWAY, NETWORK: SUBNET and NETWORK: DNS. Just as with entering a static IP address, when the 525N is assigned an IP address, DHCP: ON, these menus are locked out. Only with DHCP: OFF can values for these functions be entered manually, just as described for a static IP address.

Once your 525N is on a network, all this may more easily be programmed using the Web interface, which is detailed in the next section of this manual.

## HOOKING-UP

With both the 525N and a computer connected to a common network (LAN or Internet), bring up a browser window and enter the IP address of your 525N as shown in Menu No. 9. In short order you should see the main Now Playing Webpage on your screen like this:



A header at the top of the page and a Menu list on the left are common to all 525N Web pages. The header displays the tuned

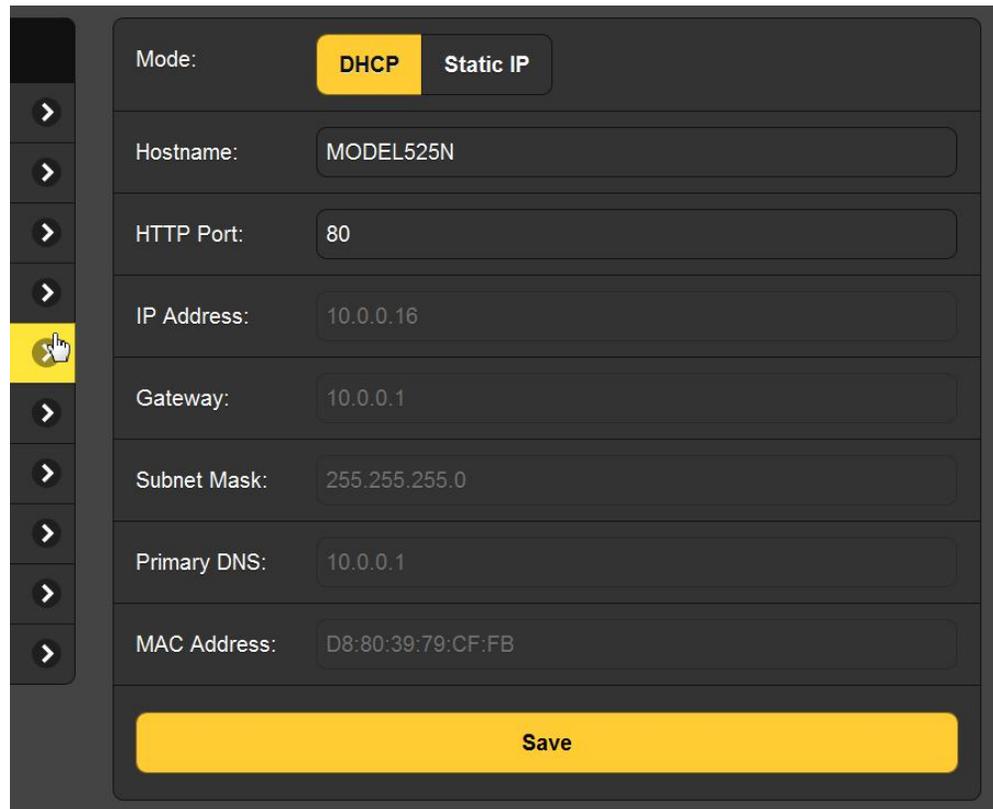
frequency, the remote listening utility, signal quality readouts and all peak flashers.

## COMPLETING THE NETWORK SETUP

Before we get to the useful aspects of the 525N Web interface, let's first finish-up with the remaining networking setup items. These are quite simple under Web interface control.

### The Network Page

Click on Network in the Menu section of the default, Now Playing screen. This will change the Web page with the active window shown below.



The screenshot displays the Network configuration page. On the left is a vertical menu with several items, each preceded by a right-pointing chevron. The fifth item from the top is highlighted in yellow and has a mouse cursor icon over it. The main content area on the right contains the following settings:

- Mode: Two buttons, "DHCP" (highlighted in yellow) and "Static IP".
- Hostname: A text input field containing "MODEL525N".
- HTTP Port: A text input field containing "80".
- IP Address: A text input field containing "10.0.0.16".
- Gateway: A text input field containing "10.0.0.1".
- Subnet Mask: A text input field containing "255.255.255.0".
- Primary DNS: A text input field containing "10.0.0.1".
- MAC Address: A text input field containing "D8:80:39:79:CF:FB".

At the bottom of the configuration area is a large yellow button labeled "Save".

Here is the network setup information that we entered (or confirmed) in painstaking manner with front-panel buttons. Because DHCP is selected, most of the setup values are grayed-out. If operation were toggled to Static IP, however, all these values, with the exception of the MAC Address, could be entered and overwritten right here on the screen. The MAC Address is unique to the particular hardware of your 525N and cannot be changed.

You are free to change the Hostname: from the factory assignment to whatever you wish. The Hostname allows the user to assign a unique ID to the equipment. With a Windows computer, tablet or mobile device, once you are on the same network you may enter just the Hostname into a browser address bar as an alternative to the IP address. The Hostname must be

entered exactly as shown on the Hostname: line, and followed by a forward slash like this: MODEL525N/ so that the browser won't default to a DNS search. Using the Hostname obviates having to check the IP address before connecting, and unique names can help identify and manage multiple 525Ns on a network.

The HTTP Port: has a default value of 80. This is a common assignment, but one reason it might need to change is if you have more than one 525N on your network. Your IT department will know all about this and what to do.

## ACCESSING THE 525N REMOTELY

On a common Local Area Network (LAN), we already have accessed the 525N Web interface by entering its IP address or, under Windows, its Hostname (plus /) into your browser's address bar.

To address the 525N from outside your LAN (from the Internet), the unit needs to have a static IP address. If your router makes DHCP assignments for other equipment on the network, simply assign the 525N a static IP that is outside the router's DHCP range. This should be an easy matter with the aid of the router's Help utility (let your IT department help here).

You also need to open a specific port for the 525N 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 default port number for the 525N is 80, but as we pointed out earlier it may be changed to any reasonable 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 525N from anywhere. Just type the IP address and port number into your browser as shown in this example:

`http://55.76.38.170:2345`

But if your ISP issues you a *dynamic* IP, this mandates 'Dynamic DNS' operation utilizing the services of an IP-forwarding provider.

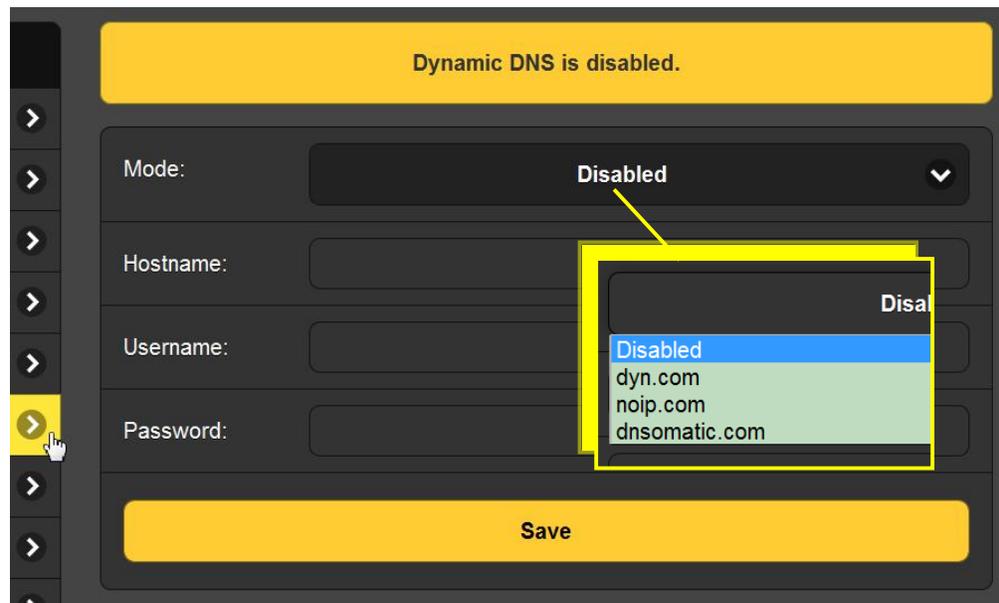
### **Dynamic DNS**

It would not be possible to address equipment behind a dynamic IP address if it were not for IP-forwarding providers available on the Internet. Their services, which are either free or at a very modest cost, will allow the 525N to keep the provider apprised of its reassigned IP address each time that address is updated by the ISP. The IP-forwarding provider intercepts data attempting to connect with the 525N and converts the IP address to the updated one.

Three popular forwarding service providers have been included in the 525N setup routine. Their basic service (all you really

need) are often free of charge, but advanced features may command a nominal annual fee. All services require registration on the appropriate Website.

Click Dynamic DNS on the 525N Menu.



The dynamic DNS function is shown Disabled, but if you click inside that dark area a list of the three popular providers will pop down as shown in the inset.

Jot down these provider names and enter each in your Web browser to learn more about their services, and to register with whichever provider seems best to meet your needs. When you register, the provider will issue you a Hostname, Username and Password. Don't confuse the Hostname in this instance with the Hostname of your 525N; they're different titles entirely.

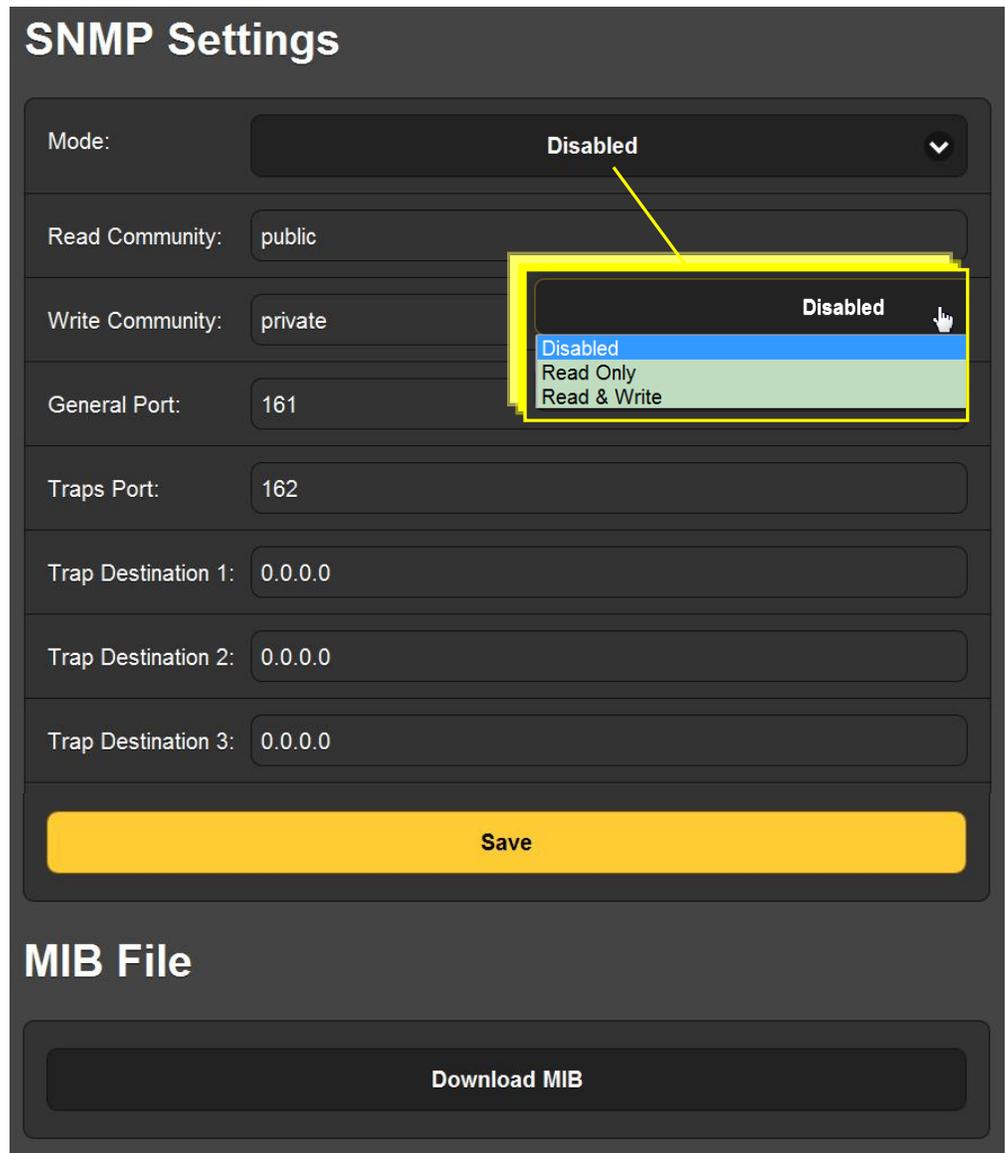
Go back to the box above and click on the provider you have chosen. Then type the setup information right onto the screen and click Save. This will allow you to access your 525N operating under a dynamic IP address.

## SNMP OPERATION

**SNMP Overview** SNMP, or Simple Network Management Protocol, allows other TCP/UDP/IP equipment on the same Local Area Network (LAN) to communicate directly with the 525N, and for the 525N, itself, to initiate an alarm on the network.

The 525N will interface directly with a network controller, which technically is known as the SNMP 'Manager.' The 525N incorporates an embedded ASCII text file called a Management Information Base, or MIB. In setting-up for SNMP operation, the MIB file is downloaded from the 525N's Web pages and uploaded to the SNMP Manager.

On the 525N Menu tree, click SNMP to bring up the window shown here.



The default mode for SNMP is Disabled, which inhibits communication between the 525N and the SNMP Manager. Clicking in the dark Disabled area drops-down the operating choices shown in the inset.

Changing the Mode: to Read Only allows the 525N to be interrogated by the SNMP Manager so that 525N settings, metering and alarms can be integrated with other equipment on the network.

Setting Mode: to Read & Write allows the SNMP Manager to send commands to the 525N. This allows other equipment to change station Presets and adjust 525N setup parameters. Always click: Save after changing any options.

- SNMP Security** SNMP ‘Communities’ serve as passwords for security. Go into the Read Community: and Write Community: boxes to enter text that is specified for the read/write strings on the SNMP Manager monitoring device.
- SNMP Traps** When the 525N initiates an alarm, rather than being queried or polled for one, the alarm is known as a ‘trap.’ You may enter three local network IP addresses as Trap Destinations, each corresponding to other devices on the LAN that want to be apprised of alarms.
- SNMP Ports** The default SNMP Ports, General Port 161 and Trap Port 162, are customary assignments for the majority of SNMP operations. These may be changed as required by typing-in new values.
- Save!** After making any entries into these fields, execute a Save to commit your choices to non-volatile memory.
- Downloading the MIB File** The MIB file is a small text (.txt) file that is read by the network controller (SNMP ‘Manager’). To download and read this file yourself, click: Download MIB. The file may be saved in the usual Windows manner. The MIB file is in plain text and may be read with Windows Notepad.
- Further Study** The foregoing discussion of SNMP operation is purposely abbreviated. SNMP is a complex utility, managed exclusively by whatever SNMP Manager (the monitoring equipment) is employed. Refer to published instructions for the SNMP Manager in setting-up the 525N. Wikipedia has a good overview of SNMP operation.

## EMAIL PREFERENCES

- Mail Server Setup** The email server settings and email addresses for the various recipients of email or SMS text message alerts are entered on the Email Preferences menu page; in other words, ‘who gets it and how.’ However, the alarm preferences for email notifications, or ‘who gets which alarm message’ are set on the Alarms and Notifications menu page and is discussed on Page 40.

An example at the top of the next page shows typical setup for an SMTP mail server. Mail server settings vary, but essentially you create a separate and unique email account for your 525N. The User: name can be anything you like, and will actually be the formal name of the sender, ostensibly the owner of the email account. But with most email clients, when emails from the 525N are received the sender will be identified by the ‘friendly’ name in the From: field, in this case a concise: AM690. If you leave this field blank, then the friendly name defaults to the factory assignment, which is: Model 525N – 690 (or whatever frequency the unit is tuned to when the mail is sent). As usual, assign a Password: to this email account.

SMTP Server:	smtp.office365.com
Port:	465
SSL:	<input checked="" type="checkbox"/> On
From:	AM690
User:	AM_Monitor@wtop.com
Password:	●●●●●●●●
Recipient 1:	3125551212@txt.att.net
Recipient 2:	c.richards@wtop.com
Recipient 3:	t.johns@wtop.com

Recipient 1: and Recipient 2: in this example are the SMS/text message and email addresses, respectively, for the station's Chief Engineer. Other recipients could be a contract engineer firm or station management. How alerts are assigned among these recipients is covered on Page 40.

### **Saving and Testing**

When this utility has been set up, click: **Save** at the bottom of the page to commit this information to memory. You may also click: **Send test Email** to immediately dispatch a confirming test message to all recipients.

## **TIMEKEEPING**

Open the Time & Time Zone Web screen to set up the internal timekeeping function of the 525N. Correct timekeeping is essential for tagging alarm notifications and for useful Alarm Log listings.

Select your offset from Universal Coordinated Time using the Time Zone (Hours): slider. When this is set correctly, local time will show at the top of the window. You may make allowance for Daylight Saving Time here too. Choose either the automatic function, fulltime DST, or disregard DST altogether by leaving both boxes unchecked.

The Time Server defaults to the US Government Web-based time authority, but you may enter an alternative Server: if desired.

Be sure to click: **Save** at the bottom of the window to commit you timekeeping setup to memory.

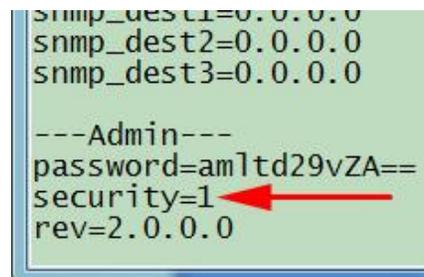
## ADMINISTRATIVE SETTINGS

**Password** The Admin Web screen allows you to set up a password for the 525N. Simply type the password into the Password: field, click: **Save**, and then click: **Enable**. You'll be immediately prompted with a pop-up window asking for a User Name: and Password:. The User Name: is optional and may be left blank; it is not used with any other 525N function at this time. Just enter your new password in the Password: field. This pop-up will greet you each time you launch the 525N Web pages. Again the User Name: is optional.

You'll probably notice that your password remains in plain sight on this page. This is not a security breach, as you can't get to this page without first giving the password in the pop-up window.

**Lost Password** If you lose or forget your password, you must perform a 'hard reset' on the 525N. A hard reset purges all setup and other information from memory. To obviate the inconvenience of ever having to do a complete setup all over again, we recommend periodically downloading and saving a Hardware Profile. This retains all the setup data and can be uploaded back to the 525N. The procedure is described shortly.

Of course the old, lost password is part of the Hardware Profile, so you must edit this file before uploading it, otherwise you'll be right back where you started. The snapshot at the right shows the very bottom of the Hardware Profile where the administrative data is held. Note the numeral '1' marked with the arrow. This shows that the password is enabled. Use MS Notepad or another text editor to change the 1 to a 0.

A screenshot of a text file showing administrative data. The text includes: snmp\_dest1=0.0.0.0, snmp\_dest2=0.0.0.0, snmp\_dest3=0.0.0.0, ---Admin---, password=am1td29vZA==, security=1, and rev=2.0.0.0. A red arrow points to the '1' in the security=1 line.

```
snmp_dest1=0.0.0.0
snmp_dest2=0.0.0.0
snmp_dest3=0.0.0.0

---Admin---
password=am1td29vZA==
security=1
rev=2.0.0.0
```

This turns password protection off. Re-save the edited file. Now do a hard reset of the 525N and then upload the edited Hardware Profile. This will restore your previous settings, and even let you see the old password, which you may use or replace.

**Hard Reset** A hard reset of the 525N will purge all setup information from memory. Please see the Hardware Profile discussion that follows to save settings and restore them to the 525N.

To perform a hard reset, hold down the upper button in the diamond pattern while power-cycling the unit. Remember, this restores the 525N to 'factory-fresh' condition; *you will lose all setup information.*

- The Hardware Profile** The entire 525N setup, which includes the Preset Stations list, receiver setup choices, hardware options, alarm setup and notification preferences and SNMP options, may be saved to your computer as a small text file.
- The Hardware Profile is useful for restoring a previous mod-monitor setup or for ‘cloning’ a loaner or a second unit for backup service. Click: Download Hardware Profile to save the profile to your system. Depending on your browser and version, the file will normally be saved to a Downloads folder unless you are asked for a specific ‘save to’ location. The file has a default name of 525Nsettings.ini.
- To upload a saved Hardware Profile to your 525N, bring up the Admin page and click: Browse... to locate the saved profile on your computer. Then click: Upload Hardware Profile. This will replace all setup parameters currently loaded and running in your unit with the saved Hardware Profile setup particulars.
- Errata** At the bottom of the Admin Web screen, you will find the serial number of your 525N, total ‘up time’ of the unit, and versions of the firmware and Web pages files. Click: Check for Updates to see if new versions are available. Updates to firmware and the interactive Web screens is covered in Section VI, Page 53.

## Section V

# USING THE WEB INTERFACE

This section introduces the Web interface pages used in everyday operation of the 525N monitor. Operational details of the product that were covered in Section III, dealing with front-panel setup of the unit, will not be repeated here in depth. Instead, page numbers from the earlier discussions will be cited in lieu of presenting the detailed information redundantly.

### MISCELLANEOUS SETTINGS

One screen that was not covered in Network Setup, Section IV is simply labeled Setup under the Web interface Menu list. This screen duplicates several front-panel programming options.

**Audio Options** This area gives convenient Web interface control of the audio low-pass characteristics graphed in Figure 2 on Page 7. Again, Audio Cutoff: selections affect only the rear-panel PROGRAM AUDIO OUT and front panel PHONES outputs and do not alter the modulation measurement passband, which is always the full-bandwidth FLAT response shown in the plot.

NRSC De-Emph: may also be switched In or Out here. The NRSC curve is illustrated in Figure 3 on Page 7.

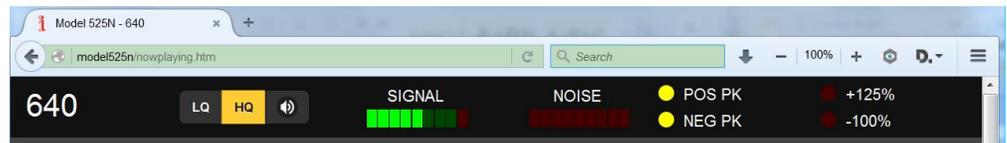
**Secondary Peak Flashers** The programmable peak flashers, the yellow pair that may be set to trip points determined by the user, are programmed with the POS PK Flash (%): and NEG PK Flash (%): sliders. You may grab and drag the sliders with your pointing device, click the slider and then use computer > and < cursor keys, or simply overtype the number in the appropriate box and hit Enter on your keyboard. The red flasher pair is preset to the +125% and -100% maximum limits observed in most countries.

**Channel Spacing** Click the Tune Spacing: button that matches broadcast channel carrier spacing for your area: 10kHz for the Western Hemisphere and, generally 9kHz for the rest of the world.

**Alarm Closure Polarity** These settings control the logic of the rear-panel tally closures for the Audio Loss:, Low Signal: and Overmod: alarms. These terminals may either be normally open and go Ground when activated, or sit at ground and go Open when an alarm is registered.

## THE WEB SCREEN HEADER

All Web interface pages present the common header at the top, shown here:



At the far left is the frequency of the currently-tuned station. To the right of that is the audio streaming utility.

### Remote Listening

Click the loudspeaker icon in the header to listen to the station from a remote location. Two audio quality options are available. LQ has an MP3 data rate of 64kbps, and HQ is 128kbps. With marginal connections, LQ may prove the better choice.

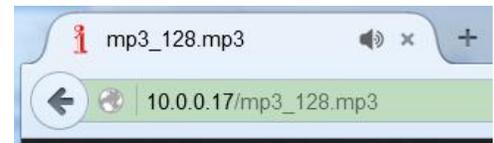


'Latency' (delay) of the received audio is a function of encodings, decoding and buffering, and will depend to some degree on the connection path and network quality. Latency may be several seconds even on a Local Area Network. This listening utility has been included to confirm the presence of audio, not for performing a critical assessment of off-air audio quality. Keep in mind that the audio will lag the total-mod metering.

### Listen-Only Shortcuts

You can listen to the streaming audio from your 525N without bringing Web pages up onto a screen. This involves entering the IP address of the unit into a browser address bar, followed by a unique 'listening utility' extension.

Access streams directly at: (URL)/mp3\_128.mp3, or for the lower data rate: (URL)/mp3\_64.mp3. The entry in your browser address bar should resemble the example at the right. From this point you can even create a Desktop shortcut for quick access to the audio stream.



### Signal Quality

The SIGNAL and NOISE readouts in the header are displays with limited resolution, serving mainly to warn of serious reception errors. High-res, calibrated readouts of these signal parameters are presented at the top of the Now Playing screen.

### Peak Flashers

The first set of yellow peak flashers represent the positive and negative trip levels programmed by the user, as described on Pages 19 and 36. These are generally set to modulation levels that the station regularly attains, perhaps +115% and -95%, depending on how 'tight' the station's audio processing has been adjusted and how accurately the transmitter can follow the audio waveform. These two flashers should be active most of the time.

The two red peak flashers, on the other hand, are factory-calibrated to the absolute maximum modulation permitted by government regulations in the US. These +125% and -100% limits are commonly observed in other countries as well. As these figures correspond to the absolute limits of peak modulation, they should very rarely flash.

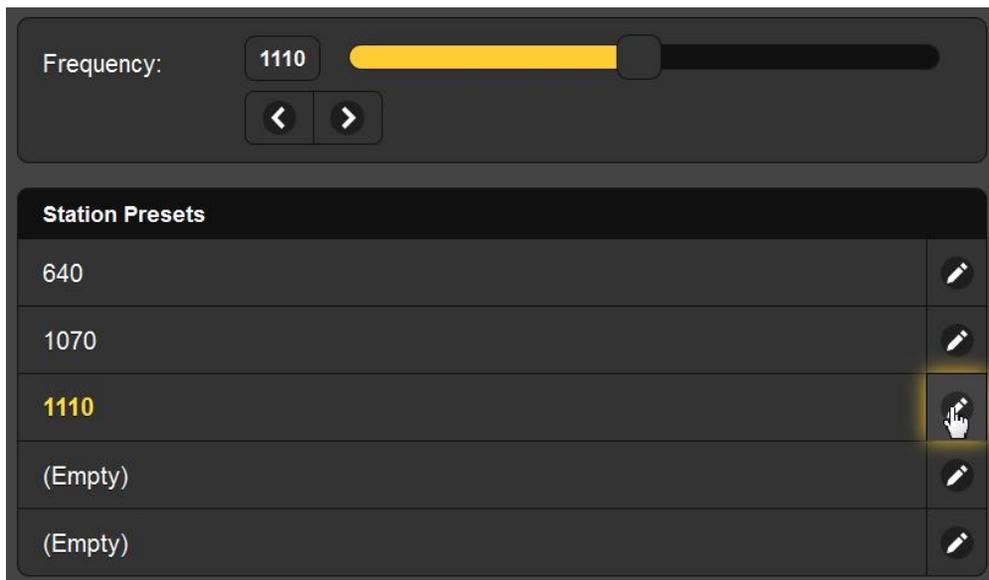
## NOW PLAYING

**RSSI and Noise** Calibrated RSSI (RF signal level) and Noise readouts lead the Now Playing screen. RSSI is annotated in dBuV (dB relative to 1 microvolt at the antenna input), with a presentation range from 10dBuV to 100dBuV, a 3.16uV to 316mV signal voltage range.

Noise relates to asynchronous noise recovered by quadrature output of the 525N's synchronous detector (see Page 18), and is a relative indication only. Arbitrary scaling goes from zero to 9, and any reading over 2 should be considered grounds to suspect the accuracy of the peak modulation readout.

**Alarms** The three alarms here: Audio Loss, Low Signal and Overmod have parameters that are programmed by the user (see Pages 19 - 23). These alarms trigger tally outputs, text-message/email alerts and SNMP traps, and are logged by the 525N. These indicators respond identically to the front-panel flashing alarms.

**Receiver Tuning** The balance of this Web screen is used for receiver tuning and station presets.



The tuned Frequency: is displayed, and different methods of changing it are offered: 1) grab the 'slider' and drag it back and forth; 2) highlight (click on) the slider and then use the computer > and < cursor keys to change frequency; 3) click the on-screen > and < buttons to increment or decrement tuning

channel-by-channel, or 4) clear and re-type a frequency directly into the display window and then hit Enter.

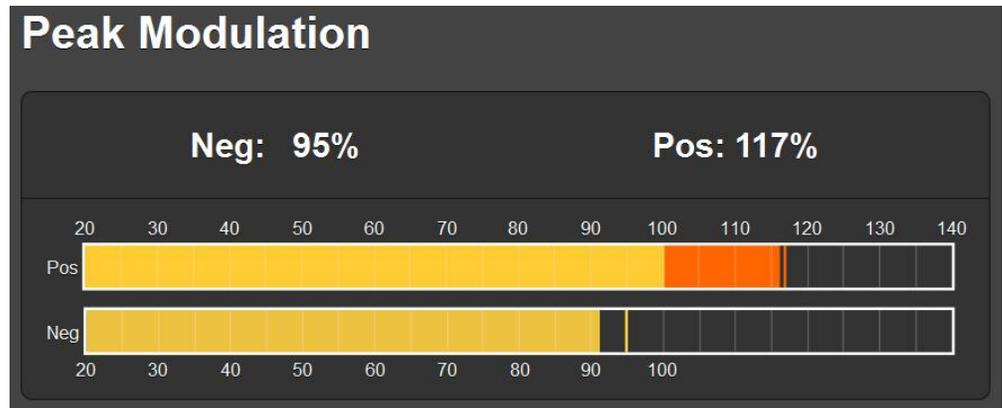
**Station Presets**

Five station frequencies may be programmed into the Station Presets memories. Simply tune the 525N to a desired frequency and then click the little pencil icon on the right in the Station Presets area. This transfers the currently-tuned frequency into that memory, whether the slot is shown as (Empty) or it already has an entry. The Web screen corresponds to the five STATION PRESETS buttons on the front panel. On this Web screen, just click any preset to tune immediately to that frequency.

## GRAPHS AND METERING

**Peak Modulation**

Two bar displays show positive and negative modulation concurrently, with a floating peak-hold segment hanging at the maximum level attained. These meters follow the front-panel LCD display exactly, except that the Web interface meter is linear over the entire range and the LCD is compressed below 50%.

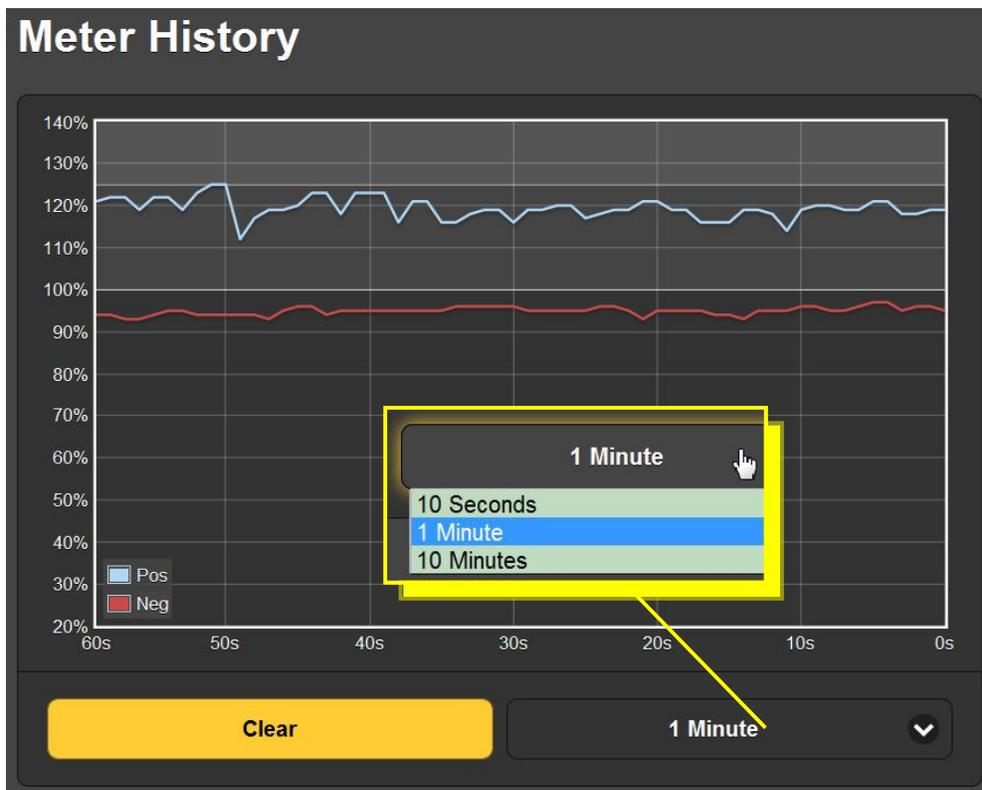


The Pos: and Neg: numbers above the meters are continually updated with the 'held' peak values. They display the highest peak for about one second unless a higher peak replaces it.

**Meter History**

The 525N Meter History utility graphs the positive and negative modulation over a given period of time. An example of this screen is shown at the top of the following page.

This screen gives a first-order measure of program loudness, as the amount of time that program peaks spend at or near the maximum modulation value is a persuasive indication of program audio density.



Click in the dark area at the bottom-right of the window to select history periods of ten seconds, one minute or ten minutes as shown in the inset.

Click Clear at any time to start a fresh graph. The Meter History plot may be saved as an image file using the computer's Prt Scr utility or any popular 'screen snipping' tool.

## ALARMS AND NOTIFICATIONS

### Overmod Alarm

The figure shows the 'Overmod' configuration panel. It has a title 'Overmod' in white text on a dark background. Below the title, there are three rows of controls. The first row is labeled 'Closure:' and has two buttons: 'Peak Flash' (highlighted in yellow) and 'Alarm'. The second row is labeled 'Time On (Sec):' and has a numeric input field with '10' and a slider control. The third row is labeled 'Time Off (Sec):' and has a numeric input field with '5' and a slider control.

The Overmod alarm reflects the trigger criteria described under its local, front-panel setup beginning on Page 19. Closure: relates solely to the 525N rear-panel tally output, assigning it either to follow the 'integrated' Alarm function or the instantaneous maximum-limit (+125% or -100%) Peak Flash trigger

points. Both the Time On (Sec): and Time Off (Sec): affect the alarm trip and reset integration aspects detailed on Page 20.

### Audio Loss and Low Signal Alarms

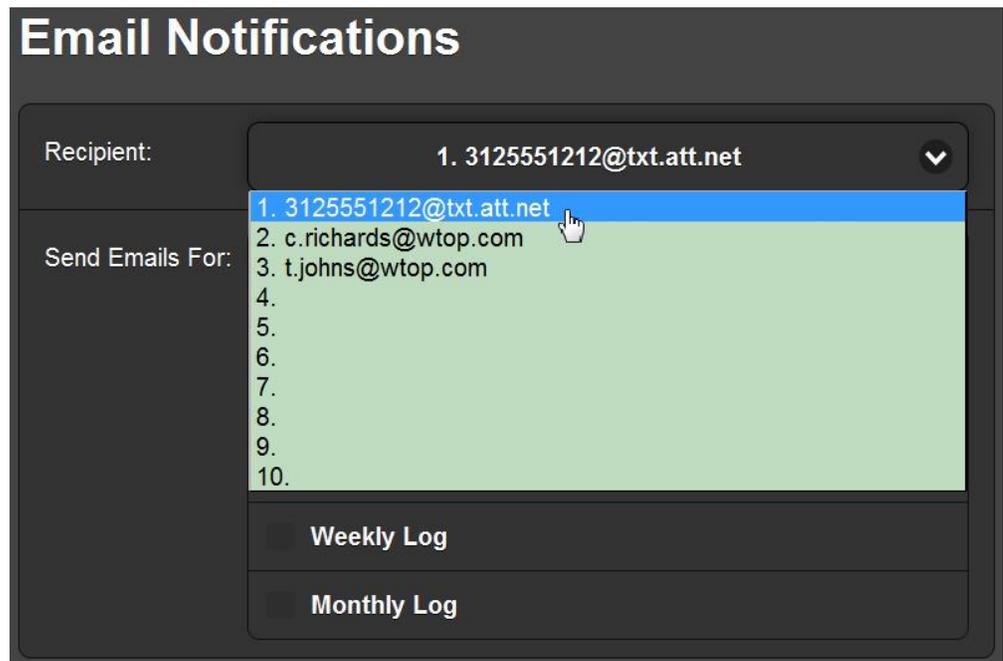
The Web interface setup for both these alarms is exactly as described in the front-panel procedure on Pages 21 through 23. The Web interface makes this operation easier by allowing some of the same methods used for receiver tuning: 1) grab the 'slider' and drag it; 2) highlight (click on) the slider and then use the computer > and < cursor keys to go up or down channel-by-channel; 3) clear and re-type a number directly into the display window and then hit the keyboard Enter key.

Please refer back to the pages noted above for a full explanation of how to set-up up these alarms.

### Email Notifications

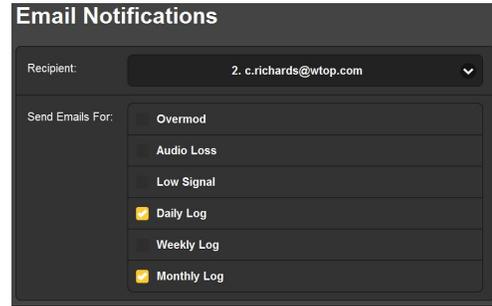
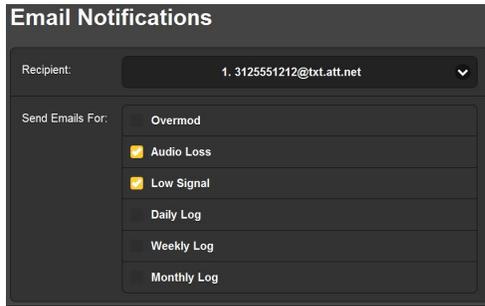
There must be at least one 'Recipient' listed on the Email Preferences Web interface page for the automatic message dispatch utility of the 525N to function. Refer back to Page 32 for instructions on entering personnel into the Recipient: list.

In the Email Notifications section of the Web screen, click the arrow at the right of the Recipient: box. This will display a pull-down list showing all potential recipients of alarm messages. In the example on the next page, we'll select Recipient: 1, the SMS/text-messaging address for Chuck Richards, station Chief Engineer.



Now select the alarm notifications or logs that will be dispatched by text message to Chuck's phone. This is shown in the left-hand illustration on the next page. Chuck has been set up to get only the major failure alarms on his phone.

Next we'll bring up Chuck's email address and determine what to send him there. Since Chuck gets the alarms on his phone, we'll email just the daily and monthly logs (at right).



Repeat this exercise for other potential recipients; each can receive just those alerts or logs pertinent to their responsibilities.

### The Alarm Log

The 525N logs all alarms. Pull-up the Alarm Log by clicking the + next to Alarm Log at the bottom of the screen. A sample log is shown on the next page.

Read the Alarm Log from the bottom-up. Note here that our station at 640kHz seems to have left the air just before 7:30PM on February 27. Chuck received Audio Loss and Low Signal alarms on his phone at that time. But that trusty old Continental must have reset itself, because both the carrier and program audio were back a few minutes later, and Chuck would have seen a text message to that effect too. Something else might still be hosed-up because there was a brief period of Overmod about a minute after the transmitter reset itself. All this would have been shown in the Daily Log emailed to Chuck the next day.

## Alarm Log Settings

Status: 0% full

Email when % full: 75

Clear Alarm Log      Download Alarm Log

— Alarm Log

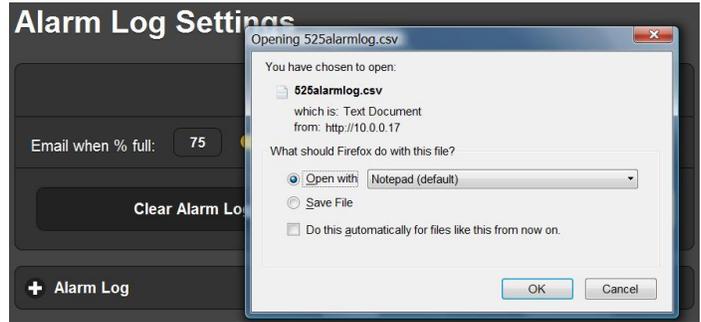
Alarm	Station	Time	Date
Overmod OK	640	7:34:21 PM	2/27/16
Overmod	640	7:34:14 PM	2/27/16
Signal OK	640	7:32:52 PM	2/27/16
Audio back	640	7:32:52 PM	2/27/16
Low Signal	640	7:29:40 PM	2/27/16
Audio loss	640	7:29:40 PM	2/27/16

## Alarm Log Capacity

Status: is a notation of how full the log is at the moment. Although the log is capable of containing a couple of thousand events, it might be important to know when you have accumulated a certain number of entries. So the Email when % full: slider sets-up an independent email notification to everyone when the alarm log reaches the set point. This email notification can be an alert to a frequently-recurring problem, or simply serve as a reminder to download and clear the log.

## Downloading and Clearing the Alarm Log

Clicking: Download Alarm Log opens a browser dialog box where the log either may be opened at once with a default text reader, or the .csv file download for archiving and further analysis if necessary.



# Section VI

## UPDATING THE 525N

### THE FIRMWARE UPDATER

The 525N hosts two operating files that are easily updated in the field. These files are the primary firmware, which controls the functions, memories and Web interface of the unit, and the individual Web pages that comprise the Web interface screens.

The 525N includes a 'bootloader' utility that allows firmware to be updated whenever Inovonics issues changes to add features that improve performance or otherwise expand the usefulness of the product. Inovonics' longstanding policy is to supply firmware updates free of any additional charges.

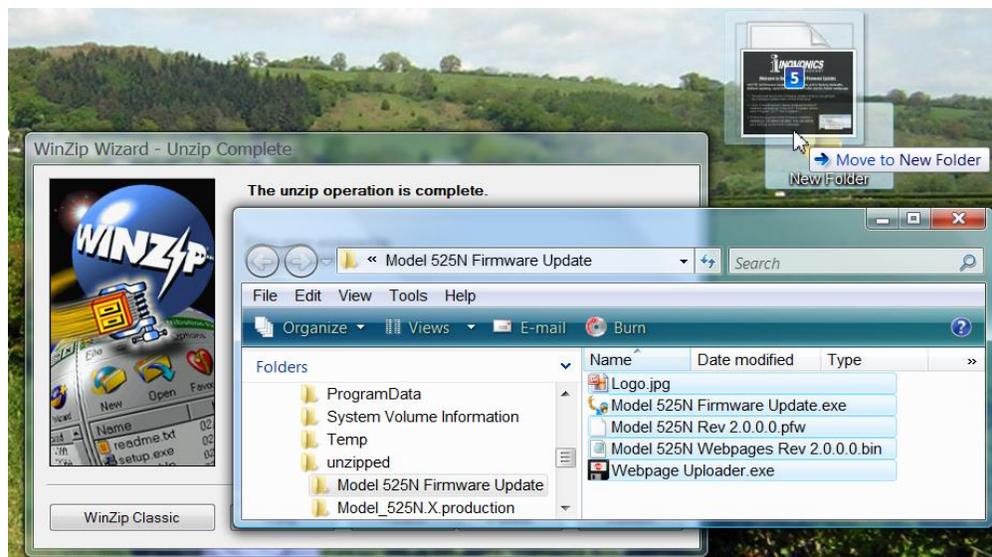
A bootloader is a simple software routine that runs on any PC connected to the same network as the 525N. Refer to Section IV, Page 26, for specifics on assuring a connection between the 525N and your computer. This *must* be a wired, LAN connection for both the PC and for the 525N. Attempts to use a Wi-Fi link are doomed to failure.

#### Warning

A firmware update may, or may not, restore the 525N to factory defaults. If so, *all settings and presets will be overwritten!* Always save a Hardware Profile (Page 35) before proceeding with any update. This will retain all user setup parameters that can be restored to the 525N afterward if required.

#### Firmware Update Files

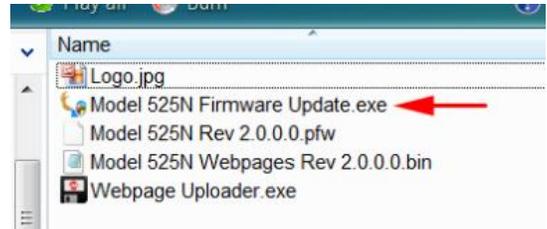
A firmware update will be supplied as a 'zipped' folder containing a number of files. Make a temporary New Folder on your PC Desktop and unzip these files to it as shown below.



One of the supplied files is the third-party bootloader utility, an 'executable' (.exe) file. Because executables are notorious for propagating viruses, many antivirus programs will not allow .exe files to be downloaded and will urge you not to install them. But we insist that you trust us and throw caution to the wind, just this once.

### Running the Firmware Updater

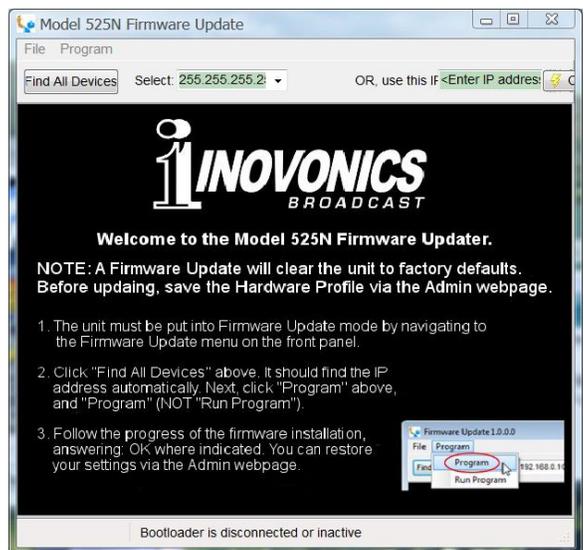
Navigate to your temporary Desktop folder (New Folder) and double-click the Firmware Update (.exe) file. This is the file marked with the arrow in the snapshot on the right.



This will bring up the Information message shown here, advising that the Firmware Updater does not yet find the 525N. Click: OK to start the firmware updating utility and display its main screen.

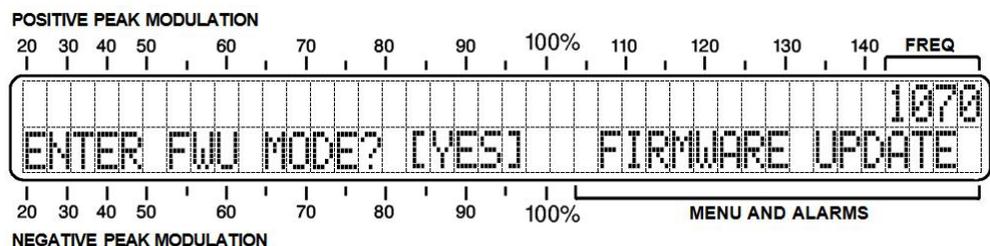


The bootloader window outlines the firmware update process in three easy steps. The first step advises that the 525N must, itself, be in the 'bootloader' (firmware update) mode.



From the front panel of the 525N, navigate down to Menu No. 15, FIRMWARE UPDATE, the last screen in the sequence.

Using the front-panel SEL and MENU/EDIT buttons, bracket and change [NO] to [YES] as shown below. When [YES] is bracketed, press a SEL button to remove the bracket.

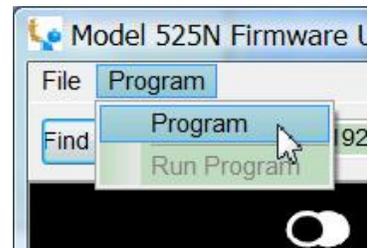


The LCD display will then tell you that the 525N is in the bootloader mode and ready for a firmware update.

Next, click: Find All Devices at the top of the Firmware Update window. The IP address of the 525N should populate the Select: area, and a Confirm box will pop-up on the screen as well.

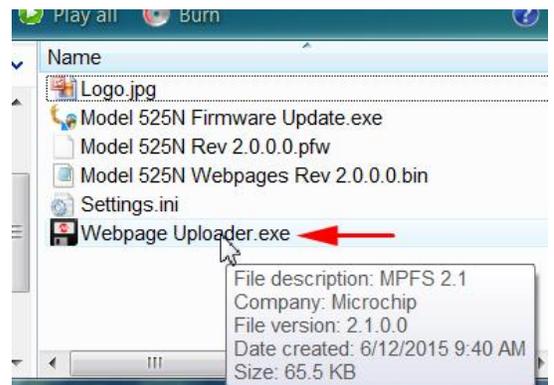
The Confirm box is a 'watchdog' feature included in the third-party bootloader utility, but it is not relevant to the 525N update procedure.

Click: No in the Confirm box to close it, and then click: Program at the top of the window. Finally click: Program in the drop-down list. The update utility will run and then return the 525N to normal operation. If your unit comes back with factory-default values, then upload a Hardware Profile to reclaim all user setup parameters (Page 35).



### Updating the Web Interface Pages

If a new version of firmware calls for an update of the Web interface pages, there will be an extra Webpage Uploader.exe file in the Firmware Update folder. The snapshot at the right identifies this file with an arrow.



Immediately after the firmware update is bootloaded, while the 525N is still in communication with your computer, return to the unzipped bootloader folder and double-click this Webpage Uploader.exe file. The utility will have you confirm or enter the IP address of your 525N. Next click: Update and the existing Webpages will quickly be replaced with updated ones.



# 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. The Warranty Registration Card supplied with this product *must* be completed and returned to Inovonics, or the Warranty registered online at [www.inovon.com](http://www.inovon.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 the equipment 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.