INOmini 636

NOAA Weather Radio

Installation & User Guide

May, 2015 - Rev. 1 Firmware

INOVONICS BROADCAST
www.inovonicsbroadcast.com

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Section I

INTRODUCTION

Product Description

The INOmini 636 is a full-function NOAA weather receiver in a small-format package. It tunes US and Canadian weather band frequencies and delivers both balanced analog and AES digital audio with automatic intelligibility enhancement for monitoring and rebroadcast.

The INOmini 636 responds to the 1050Hz Alert Tone and gives an alarm output. Independent alarm outputs are provided for loss of audio and loss of incoming carrier as well.

Product Features

Features of the INOmini 636 include:

- Tunes all seven US weather alert frequencies (which include Canadian frequencies)
- Responds to 1050Hz Alert Tones
- Front-panel metering of RF signal and audio levels
- Balanced analog and AES-digital audio outputs
- Alarm "tally" outputs for low signal, audio loss and 1050Hz alert tone
- Very easy setup and operation
- Front-panel headphone jack

Product Specifications

Tuning Range: 162.400MHz, 162.425MHz, 162.450MHz, 162.475MHz, 162.500MHz, 162.525MHz, 162.550MHz

Antenna Input: 75-ohm (F)

Receiver Sensitivity: ≤10µV for 40dB SNR

Audio Response: Internally tailored to optimize speech intelligibility; –6dB/octave low-cut below 200Hz; –6dB/octave de-emphasis above 200Hz.

Analog Program Line Outputs: Left and Right (XLR) balanced monaural outputs; +4dBu at ±5kHz deviation.

Digital Program Line Output: AES-digital (XLR) dual monaural outputs; 44.1kHz sampling, –7dBFS at ±5kHz deviation

Alarm Tallies: NPN transistor closures or opens to ground for carrier loss, audio loss, and 1050Hz Alert Tone

Front-Panel Headphone Jack (3.5mm TRS)

Power Requirement: 12VDC at 170mA (2.1mm x 5.5mm coaxial); a universal inline switchmode power supply is provided.

Mounting Options: An optional rack adapter accepts up to three INOmini modules in a 1U, 19-inch rack space. The INOmini 636 may also be fastened to any convenient surface with two small screws.

Size and Weight: 1.6"H x 5.5"W x 5.5"D; 4 lbs. shipping weight.

Section II

INSTALLATION AND CONNECTION

Unpacking and Inspection

Inspect for shipping damage immediately upon receipt of the equipment. If damage is found or suspected, notify the carrier at once, and then contact Inovonics.

We recommend setting-aside the original shipping carton in the event that return for Warranty repair is required. Shipping damage sustained as a result of improper packing for return may invalidate the Warranty!

Warranty Registration

Please complete the Warranty Registration process. Not only does registration assure coverage of the equipment under terms of the Warranty (printed inside the back cover of this manual), but the user will receive any specific service and modification instructions, including firmware updates. Register online at:

www.inovonicsbroadcast.com/product-registration

Mounting

The INOmini 636 is packaged in a compact 'clamshell' chassis that defines the standardized module in this series of Inovonics products. The INOmini 636 may simply be set on top of an existing piece of rack-mounted equipment, as long as at least 1U of panel space is left open *above* the rack-mounted 'host' to access the unit. Alternatively, a pair of mounting holes on the chassis base allows the INOmini 636 to be fastened to the inside of an equipment rack cabinet with two #4 screws.

An optional rack-mount kit is available for the INOmini 636. The rack kit can hold up to three INOmini modules and comes with blanking panels for unused spaces and with two 'daisy-chain' power cables so that two or three INOmini modules may share a single power supply.

AC Mains Power

All Inovonics INOmini modules are supplied with an outboard switching-type power supply compatible with any destination mains voltage. The actual power consumed by the distribution amplifier is 170mA at 12 volts DC. A second DC connector on the rear panel allows 'daisy-chaining' these modules. This means that two or more units may be fed from the same AC supply, but with the obvious caution that the total input power specification of a given assortment of INOmini modules must not exceed the current rating noted on the power supply label.

Battery Operation

The INOmini 636 may optionally be powered by either a wet or a sealed (gel) 12-volt lead/acid battery. The nominal input voltage should never exceed 15V, and protection should be afforded against voltage surges from charging circuits.

Radio Frequency Interference (RFI)

Although we have anticipated that the INOmini 636 will be used in broadcast transmitting installations, please do practice reasonable care in locating the unit away from *abnormally* high RF fields.

The Front-Panel Display and Menu Knob

The front-panel MENU knob scrolls the LCD through the various viewing and programming options. Section III of this manual explains the easy setup and various operating options of the INOmini 636.

Headphone Jack

The front-panel PHONES jack will accommodate stereo headphones of virtually any impedance with a 3.5mm stereo plug. When headphones are plugged in, the LCD menu will automatically go to the HEADPHONE VOL: screen, and the front-panel knob will adjust the listening level. When the volume has been set to a comfortable point, push the knob to return to the previous menu.

Rear Panel Connections

ANTENNA

The INOmini 636 antenna input is a US-standard 75-ohm F connector. Inexpensive, ready-made cables of various lengths are common in this format.

G C A T

These are alarm "tally" outputs for remote indication or alarm conditions. Designations are also noted on the rear panel; these stand for Ground, Carrier Loss, Audio Loss and Tone Alert.

Alarm 'tally' outputs are the collectors of NPN transistors that either saturate to ground or go 'open' for an alarm condition (see Menu Screen 5 on Page 11). Up to 100mA may be 'sunk' by these outputs to operate relays or LED indicators using an external voltage source up to 24VDC, which must be returned to the G (Ground) terminal.

The plastic connector body may be unplugged from the chassis to make connection easier and for quick disconnect.

ANALOG LINE OUTPUTS L/R

The active-balanced analog line outputs provide a program level of +4dBu at 100% modulation (±5kHz deviation of the FM carrier by a 200Hz tone). Outputs have a 200-ohm source impedance.

AES DIGITAL AUDIO OUTPUT

The balanced, transformer-isolated AES digital audio output delivers –7dBFS at 100% modulation (±5kHz deviation of the FM carrier by a 200Hz tone), and has a fixed sampling rate of 44.1kHz.

+12VDC POWER I/O

These two connecters are in parallel to allow 'daisy-chaining' INOmini modules. This allows one DC supply to power up to three modules mounted in a single rack adapter, provided that this does not exceed the supply rating. Two short 'pigtail' cables are provided with each rack adapter.

The INOmini 636 draws 170mA. Check the rating on the label of the power supply to make sure that it is rated for all the modules it must support.

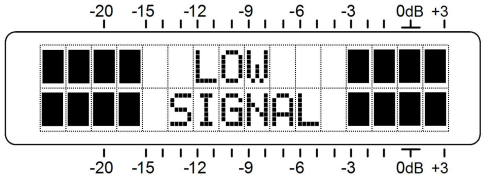
These power connectors are not a locking type, and the mating plugs do pull out rather easily. A Ty-Wrap® will secure the cables to the plastic anchor above the jacks if this is deemed necessary.

Section III

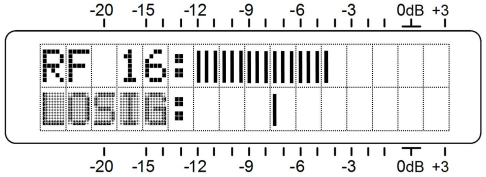
OPERATING THE INOMINI 636

Flashing Alarms

The INOmini 636 has two alarms that signal possible fault conditions. These are detailed later in this section, but you may encounter one or both of these as soon as you power-up the unit. These alarms identify a problem and flash lighted blocks on and off, making the alarm quite visible, even across the room.



If the INOmini 636 has not yet been set up and tuned to an active weather broadcast frequency, the LOW SIGNAL alarm (and perhaps the AUDIO LOSS alarm as well) will begin to flash soon after the unit is powered-up. If you push or turn the knob, you will get a few seconds' respite from the flashing, enough time to navigate to any of the setup menus. Once placed in normal service alarm conditions automatically reset.



Whenever you go into the 'edit mode'; that is, you enter a menu to make a change to a setup item, front-panel flashing alarms are inhibited while that parameter is being programmed. Menu items that can be edited will 'blink' at a quick rate when the knob is pushed. 'Blinking' menu callouts, as illustrated here, are not to be confused with 'flashing' alarms described above.

Menu Navigation Basics

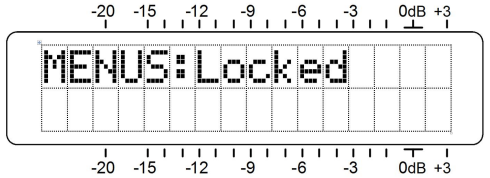
You may already have figured-out the menu tree for yourself; it's really quite intuitive. Quite simply: 1) *turn* the knob to navigate from one menu to the next, 2) *push* the knob to enter any menu associated with setup, 3) *turn* the knob to choose an option or to set a value, and then 4) *push* again to accept the selection and send it to non-volatile memory and return to menu navigation.

To recap: in setup menus, any parameter that can be edited will begin blinking when the knob is pushed. Blinking indicates that a different option or value may be selected. Turn the knob to make your choice, and then push once again to transfer that selection to memory.

Each INOmini 636 menu screen will be discussed separately and in order, except that the last menu is discussed first, as it could be a show-stopper!

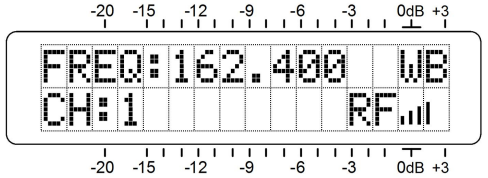
Locked Menus (Menu Screen 7)

To guard against inadvertent menu editing or casual tampering, the very last menu in the sequence lets the user lock-out the knob from the editing mode. If you find that when you push the knob you are unable to enter that menu to change a setup parameter, scroll all the way to very last menu screen, shown here. Push the knob and the word MENUS will begin blinking. You can then turn the knob to select MENUS:Unlocked. Push the knob again to set this selection, and then navigate back to whichever menu screen you were trying to edit. You can re-lock the menu when you're finished.



Tuning the Receiver (Menu Screen 1)

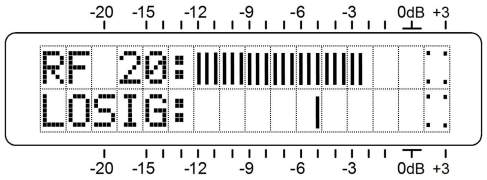
When power is applied to the INOmini 636, a 'splash screen' with the product ID pops up immediately on the LCD. Within a few seconds this will revert to Menu Screen 1 where the receiver may be tuned to any of the seven US NOAA Weather Radio frequencies by pushing and turning the knob.



The first line of the LCD display shows the tuned frequency FREQ: in MHz, along with a fixed notation that you are indeed tuning the Weather Band, WB.

The second line of the display shows the US Weather Band channel number, CH:, and a simple display of RF signal strength.

Carrier Strength and Alarm (Menu Screen 2)



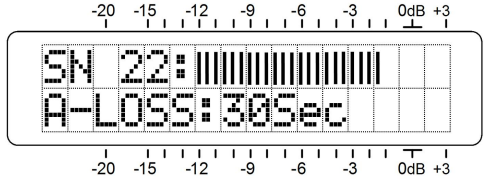
The RF bargraph on the top line of this screen shows incoming signal level (RSSI), and also assigns an RF numerical value. This figure simply represents the number of active bargraph segments, but it may prove useful in comparing weather radio signals or when aiming an outdoor antenna. This display is strictly a *relative* indication of the FM carrier strength and has no association with the dB scale alongside the LCD window. The dB scales are used only for audio level measurements in Menu Screen 4.

The lower LCD scale is labeled LOSIG: and has a single tic mark off to the right. Push the knob and LOSIG will start to blink. As you turn the knob, note that the single tic mark can be positioned anywhere beneath the RF bargraph.

During normal reception, a carrier loss alarm is triggered when the RF: bargraph falls below the tic mark. This will cause LOW SIGNAL to flash on the LCD screen and activate the C terminal of the rear-panel connector. The rear-panel C terminal is the collector of an NPN transistor that either saturates to ground or goes open (see Menu Screen 5). This can actuate a relay, light a remote LED indicator or tie into a remote control system.

As a starting point, you might set the carrier-loss trigger point about a quarter of the way down from the top of the RF bargraph as shown in the illustration. This should allow for typical signal fading over the receive path, but will still alert the user to a valid carrier loss. Your actual setting may need to take additional factors into account, but when the proper trigger point has been determined and set, push the knob again to fix the alarm point in memory and to release the menu. You may also turn the knob completely counterclockwise to LOSIG:OFF to deactivate the alarm altogether.

SNR and the Audio-Loss Alarm (Menu Screen 3)



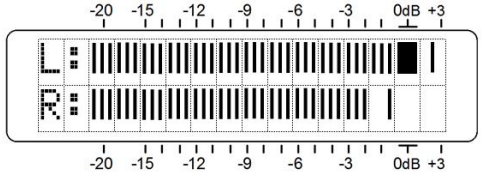
Menu screen 3 serves a dual function. The upper line of the LCD displays a first-order indication of the signal-to-noise ratio (SNR) of the signal being received. This metric is a derived from incoming signal level and residual noise above the audible range. This is a relative, uncalibrated measurement, and the only guideline for its use is 'more is better.' Use this SN figure and the RF one from Menu Screen 2 for aiming your antenna or otherwise optimizing reception.

FM receivers generate a good deal of white noise (hiss) in the absence of a carrier. For this reason, the INOmini 636 audio-loss alarm function is really valid only for an unmodulated carrier… it may or may not be triggered if the weather broadcast transmitter goes off the air. A transmitter failure will give you a low signal alarm, however.

Push the knob and A-LOSS will begin to blink. Turn the knob to set the number of seconds between loss of audio and the alarm trigger. The delay may be programmed in one-second increments up to 2 minutes. You may also turn the knob completely counterclockwise to A-LOSS:OFF to deactivate the alarm altogether.

This alarm will flash AUDIO LOSS on the LCD screen and activate the A terminal of the rear-panel connector. The rear-panel A terminal is the collector of an NPN transistor that either saturates to ground or goes open (see Menu Screen 5). This can actuate a relay, light a remote LED indicator or tie into a remote control system.

Audio Level Metering (Menu Screen 4



Menu Screen 4 is a bargraph readout of weather announcement audio levels. This is a peak-responding meter with a floating peak-hold function.

Although both L: and R: (left/right) bargraphs appear here, of course NOAA Weather Radio broadcasts are strictly mon-

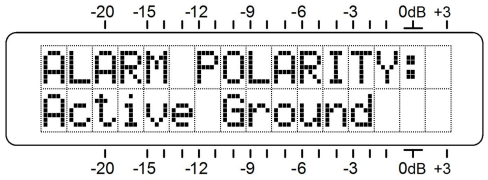
aural. Two mono outputs are convenient when interfacing with commercial broadcast installations that are invariably stereo.

On the weather band, 100% modulation is defined by a carrier deviation of ±5kHz. Because weather radio is a voice-announce system only, frequencies below 200Hz are rolled-off at 6dB/octave. Above 200Hz, receiver de-emphasis rolls-off the highs at 6dB/octave. An incoming carrier deviated ±5kHz by a 200Hz sine wave will bring the L: / R: meters to 0dB. The meter resolves +1, +2 and +3dB above 0dB, and below 0dB the scale is linear in 0.5dB steps down to –15dB, and then in 1dB steps to –21dB.

Alarm Polarity (Menu Screen 5)

The low signal and audio-loss alarms have already been defined in terms of the rear-panel 'tally' connections; the 1050Hz Alert Tone alarm is discussed below.

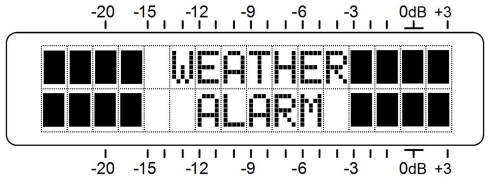
A closure to ground is the customary tally output for most alarm functions; this is the default setting for the INOmini 636. Push the knob and ALARM POLARITY will blink. You may turn the knob to assign either an Active Ground or an Active Open to all alarms. 'Active' in this context signifies what you get when an alarm is triggered. The 'closures' are NPN transistors that saturate to ground (or open from ground) when the alarm triggers.



The 1050Hz Alert Tone

NOAA weather broadcasts include a provision for a blast of 1050Hz tone when broadcasts warn of imminent hazard conditions. Consumer weather radios are able to un-mute the loudspeaker on this tone, and can turn on lights or even sound a local bell or siren.

The INOmini 636 responds to these tones by flashing WEATHER ALARM on the front panel LCD and activating the rear-panel T terminal. As



with the other alarms described previously, the rear-panel T terminal is the collector of an NPN transistor that either saturates to ground or goes open (see Menu Screen 5). This can actuate a relay, light a remote LED indicator or tie into a remote control system.

The Alert Tone WEATHER ALARM is not self-resetting. Once a tone is received, both the LCD flashing alarm and the rear-panel T terminal output remain in the alarm condition until they are reset by pushing the front-panel MENU knob.

Headphone Monitoring (Menu Screen 6)

Whenever headphones are plugged into the front-panel PHONES jack, the LCD screen automatically goes to Menu Screen 6. Headphone Vol will begin blinking and you can adjust the panel knob for a comfortable listening level.

The LCD gives an arbitrary numerical value and a bargraph representation of headphone volume. Once you have set the volume, push the knob to return to the menu that was up before headphones were connected.

Section V

TECHNICAL MATTERS

Firmware Version

With the INOmini 636 powered-up, hold down the knob for 5 to 10 seconds. The menu screen you have been viewing will be replaced by the 636 FIRMWARE screen. This shows the version installed in your unit, information that may prove important when communicating with the factory.

Turn the knob to read the firmware version of the SDR (Software-Defined Radio) front-end chip used in the INOmini 636. This may prove useful in communication with the factory as well. Push the knob again to return to the normal menu sequence.

'Under the Hood'

The INOmini 636 is compact and sophisticated, utilizing mostly surface-mounted (SMD) components. Many of these are application-specific and/or pre-programmed at the factory, but all of them are impossibly tiny. This makes servicing the unit in the field a difficult proposition at best. For these reasons, and also because of the small format of this manual, we have dispensed with schematic diagrams, servicing instructions and a listing of component parts.

Having said that, our policy has always been one of 'full disclosure.' We feel that, unless we are doing something nefarious (or acting in the interest of national security!) there should never be a reason to hide information from the user. With a clear conscience, and upon request, we will cheerfully provide additional documentation and divulge all but the very darkest secrets concerning any Inovonics product.

Because it is so small and lightweight, returning the INOmini 636 for factory servicing, firmware upgrades, etc. is an option that we encourage. Inovonics has never considered factory repair charges a significant source of revenue, and we are confident that you will be astonished at how reasonable our rates actually are!

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 "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 the product *must* be completed and returned to Inovonics, or the Warranty registered online at www.inovonicsbroadcast.com, within 10 days of delivery.

B. The 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. The 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 tag 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 **RETURN OF 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.

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