



INO *mini*
661

DAB/DAB+ Monitor Receiver

Installation & User Guide



June, 2019 - Rev. 1.0.0.0 Firmware

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WARRANTY(inside back cover)

Section I

INTRODUCTION

Product Description

The INOmini 661 is Inovonics' second-generation, small form-factor off-air monitoring receiver for EBU-specified DAB and DAB+ digital radio transmissions. It provides high-quality confidence monitoring and delivers a dual audio feed with independently-adjustable analog and AES digital audio outputs.

Text metadata that accompanies the broadcast is presented in multiple menu levels on the front-panel display. The large, lighted LCD screen also shows pertinent signal quality metrics and audio levels. Front-panel and remote alarms indicate transmission problems, and the compact size allows the mounting of three units in a 1U rack space.

Product Features

Features of the INOmini 661 Receiver include:

- Sensitive and selective DSP-based (SDR) receiver for EBU Band III DAB and DAB+ digital broadcasts.
- Easy front-panel setup uses jog-wheel navigation of the receiver's intuitive menu tree.
- Independently adjustable analog L/R and AES-digital program line outputs.
- Front-panel display of program metadata, audio levels, setup parameters and off-air signal metrics.
- Front-panel flashing alarms with rear-panel 'tallies' for DAB Loss, Low Signal and program Audio Loss.
- Front-panel headphone jack with adjustable volume.
- When issued, free firmware updates are easily installed in the field.

Product Specifications

Tuning Range: DAB Band III, Mode 1 (174.928MHz-239.200MHz; all EBU-sanctioned frequency allocations (Blocks 5-12, A-D) plus Block 13 A-F).

Antenna Input: 75-ohm (BNC).

Sensitivity: 10 μ V for error-free reception.

Audio Codecs: MPEG-1, Audio Layer 2 (MP2); HE-AAC (AAC+).

Audio Response: \pm 0.25dB, 20Hz-20kHz.

Signal Parameters Displayed: FQ (FIC Quality), RF (RSSI), SNR, CNR.

Metadata Displayed: Ensemble Label, Component List & ID, Service List & ID, Dynamic Label, PTY, Sample Rate, Bit Rate, Gain Mode, Service Mode, Protection Info, Current CU & Address, Country, Language, Time & Date.

Program Audio Output(s):

Balanced Analog: (XLR) Left and Right outputs are adjustable from -15dBu to +15dBu in 0.1dB steps.

AES Digital: (XLR) output at 44.1kHz is adjustable from -30dBFS to 0dBFS in 0.1dB steps.

Front-Panel Headphone Jack: (3.5mm TRS) has adjustable listening level.

Flashing Panel Alarms:

DAB Loss: Fixed metrics determine loss of digital radio reception.

Low Signal: Alarm and reset trigger levels are independently adjustable relative to the RF signal level display.

Audio Loss: Alarm threshold is adjustable between 0dB and -40dB, and alarm delay interval is adjustable between OFF and 120 seconds.

Alarm Tallies: Individual open-collector NPN transistor outputs for DAB Loss, Low Signal and Audio Loss are programmable for logic polarity.

USB Port: The front-panel mini-USB port enables easy firmware updates when issued.

Power Requirement: 12VDC at 335mA; a universal 90-240VAC inline switching power supply is supplied.

Mounting Options: An optional rack adapter accepts up to three INOmini modules in a 1U, 19-inch rack space. The INOmini 661 may also be fastened to any convenient surface with two small screws.

Size and Weight: 4.6cm H x 14cm W x 14cm D; 1.8kg shipping weight.

Section II

INSTALLATION AND CONNECTION

Unpacking and Inspection

Immediately upon receipt of the INOmini 661, inspect for possible shipping damage. If damage is found or suspected, notify the carrier at once, and then contact Inovonics.

We recommend that you set aside the original shipping materials should return for Warranty repair become necessary. 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 automatically receives any specific service and modification instructions and firmware updates. Register online at:

www.inovonicsbroadcast.com/productRegistration

Mounting

The INOmini 661 DAB/DAB+ Monitor Receiver is packaged in a compact 'clamshell' chassis that defines Inovonics' standardized INOmini module. The unit 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 receiver. Alternatively, a pair of mounting holes on the chassis base allows the 661 to be fastened to the inside of an equipment rack cabinet with two #4 self-tapping screws.

An available optional rack-mount kit can house up to three INOmini modules in 1U of 19" rack space. The kit 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

Every Inovonics INOmini module is supplied with an out-board universal, 90-240VAC switching-type power supply. As the actual power consumed by the INOmini 661 is 335mA at 12 volts DC, a second DC connector on the rear panel allows the user to ‘daisy-chain’ INOmini modules. This means that two or more units may be fed from the same AC supply, but with the 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 661 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 661 will be used in a broadcast environment, please do practice reasonable care in locating the unit away from *abnormally* high RF fields.

Antenna Considerations

As a software-defined DSP receiver, the INOmini 661 has remarkable sensitivity and freedom from out-of-band interference. The receiver is meant to be used with an appropriate outdoor antenna, which may be aimed to favor the desired signal or to null an interfering one.

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 covers the easy setup and programming instructions.

Headphone Jack

The front-panel mini-phone 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 switch to the HEADPHONE VOL screen where you can adjust the listening volume with the knob. Once you have set this to a comfortable level, push the knob to return to the previous menu.

Rear Panel Connections

ANTENNA The antenna input is a standard 75-ohm BNC connector. Ready-made cables of various lengths are common in this format, and adapters for other RF connector types are readily available.

G D L A These are alarm “tally” outputs for remote indication of reception problems. Designations noted on the rear panel stand for Ground, Digital Loss, Low Signal and Audio Loss.

The three alarm outputs are the collectors of NPN transistors that saturate to ground. The output polarity is programmable for either a ground or an open circuit for an alarm condition. These outputs can sink up to 100mA 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 These are active-balanced analog line outputs with a 200-ohm source impedance. The program audio level is menu-adjustable from -15dBu and +15dBu.

AES DIGITAL AUDIO OUTPUT The balanced, transformer-isolated AES digital audio output has a fixed sample rate of 44.1kHz. The audio level is menu-adjustable between -30dBFS and 0dBFS.

+12VDC
POWER I/O

Two paralleled coaxial power connectors allow 'daisy-chaining' INOmini modules. This allows one DC supply to power up to three modules mounted in a single rack adapter, provided that the rating of the supply is not exceeded. Two short 'pigtail' cables are provided with each rack adapter.

The INOmini 661 draws 335mA. Check the rating on the label of the power supply to make sure it has sufficient capacity for all modules it must support.

These power connectors are not a locking type, and the mating plugs pull out rather easily. A Ty-Wrap® can secure the cables to the plastic anchor above the jacks.

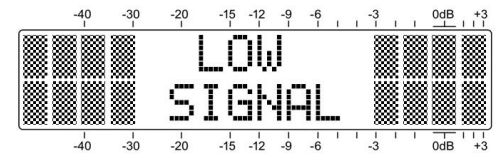
Section III

OPERATING THE INOmini 661

Hey, why is the screen flashing?

The INOmini 661 activates alarms for various reception problems, which are detailed later in this section. But you may encounter an alarm shortly after you power-up the unit. These alarms identify the condition, flashing their warning against a red background, quite visible even across the room.

If you have not yet set-up the unit for use, one or more of the DAB LOSS, LOW SIGNAL and AUDIO LOSS alarms may



begin to flash soon after the receiver is powered up. If you push or turn the knob, you will get a few seconds' breather from the flashing, enough time to navigate to any of the setup menus. Of course, once a station has been tuned-in properly the alarm condition will be reset.

Whenever you are in the 'edit mode'; that is, you have entered a menu to edit (make a change to) a setup item, the front-panel flashing alarm is inhibited while that parameter is being programmed. The edit mode times out after 30 seconds if no change is made.

The rear-panel tally outputs will always be active for the duration of an alarm, even when front-panel flashing pauses temporarily.

NOTE: Do not confuse flashing alarms with 'blinking' menu callouts, which indicate options for editing.

Menu Navigation Basics

By the time you've read this, you've probably already figured out the INOmini 661 menu for yourself, as intuitive as it is. 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 make a selection or to

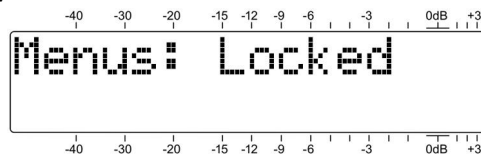
set a value, and then 4) *push* again to accept the selection and lock it into non-volatile memory and to return to normal menu navigation.

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 661 menu screen will be discussed separately and in order, except that the last menu is discussed first, as it could hinder your progress.

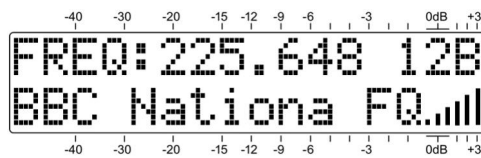
Locked Menus (Menu Screen 21)

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 the menu to change a setup selection, go all the way to the last Menu Screen, shown here. Push the knob and `Menus` will start to blink. You can then turn the knob to select `Menus: Unlocked` and push the knob again to set this selection. From there you may navigate back to whichever screen you wanted to edit.



Tuning the Receiver (Menu Screen 1)

When power is applied to the INOmini 661, a 'splash screen' with the product ID pops up immediately on the LCD. Within a few seconds this will revert to Menu Screen 1, shown here.



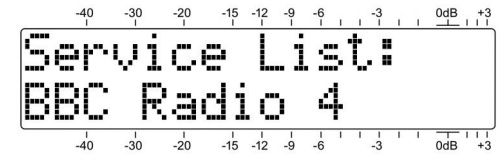
The upper line of Menu Screen 1 displays the frequency of the broadcast and the corresponding DAB block designation. Push the knob and `FREQ` will begin to blink. Turn the knob to tune-in the desired frequency/group.

The second line shows the Ensemble Label, a service name common to all broadcasts sharing this transmission chan-

nel. If the Ensemble Label overruns this 11-character display area it will scroll to reveal the complete text. The `FQ` bargraph gives a rough indication of `FIC` (Fast Information Channel) `Quality`, a representative measure of overall reception integrity.

The Service List (Menu Screen 2)

On Menu Screen 2, push the knob to scroll among the *services* (broadcasters) that share the *ensemble* you are tuned to.



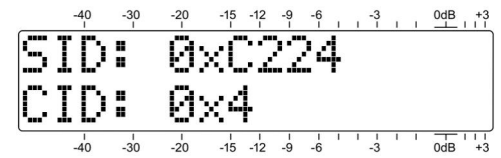
The *label* (name) of the service will show up on the second line. For a particular service you select, the INOmini 661 automatically picks the first, or primary *component* (broadcast) to supply the audio you will hear. The next menu selects other components of that service, if available.

The Component List (Menu Screen 3)

Multiple components of a specific service can carry additional programming by the same broadcaster. This can take the form of another audio program, data or even pictures. The INOmini 661 supports only audio programs, however. On Menu Screen 3, push and turn the knob to scroll among any additional components of the service, if offered. If a component is not an audio program, its name will still appear on the second line of this screen, but no audio will be delivered.

Identifiers (Menu Screen 4)

Ensemble services, along with the individual components within those services, each carry a digital identifier. Menu

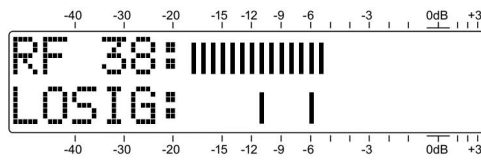


screen 4 displays `SID:` (Service ID) and `CID:` (Component ID) 32-bit or 16-bit hexadecimal codes.

You may use the knob to enter either of these fields as an alternate means of selecting the Service (Ensemble) and Component (audio program) you want to monitor. Just push the knob to enter the `SID:` and `CID:` hex values, one character at a time.

Carrier Strength and Alarm (Menu Screen 5)

The upper line of this screen displays signal strength of the RF carrier. The RF numerical value is the level at the antenna input in dBuV, and defines a range between 0dBuV (1 microvolt) and 75dBuV (about 5 millivolts). The bargraph readout gives an analog display of levels in the range of 10dBuV to 75dBuV. The signal strength display does not refer to the dB scaling above the display, which is used only for audio level measurements in Menu Screen 7.



The lower line of the screen is labeled LOSIG: and has a pair of tic marks off to the right. Push the knob and LQ, will begin to blink, along with the left-hand tic mark. Turn the knob to position the left tic mark anywhere beneath the RF bargraph. The tic mark level in dBuV is also displayed.

When the RF bargraph falls below this tic mark during normal receiver operation, it initiates a carrier-loss alarm and causes LOW SIGNAL to flash on the LCD screen.

As a starting point, you might set the left, carrier-loss trigger point about half 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 or major transmitter power problem.

Push the knob again. HI and the right-hand tic mark will blink. Turn the knob to set that tic mark to a point that the carrier level must come back up to for the alarm to reset, maybe a few segments above the left tic mark. Push the knob again to set these points in memory and to release the menu.

The alarm flashes LOW SIGNAL on the front-panel LCD and activates the rear-panel L (low signal) terminal. Refer to Pages 8 and 18 for using and programming this terminal.

Signal Quality Readouts (Menu Screen 6)

SN: is a first-order approximation of the signal-to-noise quality of the demodulated program with respect to total channel noise. This measurement takes into account fac-

tors that involve multiple channels and other interference factors. The metered range is 0dB to 20dB.

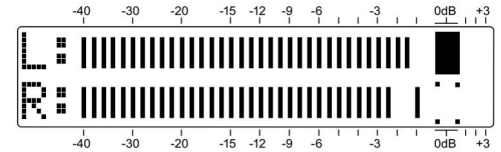
CN: is the OFDM carrier-to-noise ratio. This defines the dynamics of the OFDM subcarrier group signal level between its on and off (null) states. The metered range extends from 0dB to 54dB.

The RF, SN and CN numerical values are handy metrics when installing a rooftop antenna. In locating and aiming the antenna, do everything you can to maximize the numbers.

Program Audio Metering (Menu Screen 7)

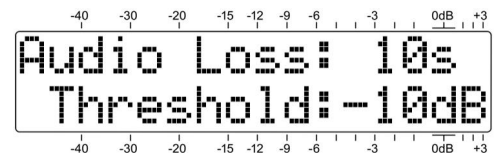
Menu Screen 7 is a left- and right-channel bargraph presentation of the stereo program audio level. Meters are peak-responding with a floating peak-hold function.

The 0dB level of a DAB broadcast corresponds to 0dBFS of the incoming digital audio feed. This is denoted by the large block opposite the 0dB marking on the panel. The meter resolves +1, +2 and +3dB above 0dB. Below 0dB the scale is linear in 0.5dB steps to -6dB, then in 1dB steps to -20dB, and from there in 2dB steps to -40dB.



The Audio Loss Alarm (Menu Screen 8)

Navigate to this Menu Screen and push the knob. Audio Loss will begin blinking. Turn the knob to dial-in a desired alarm delay time; that is, the time in seconds between the onset of 'dead air' and a front-panel indication and rear-panel Audio Loss tally. The delay may be programmed in one-second increments between 1s and 120s (two minutes). Turn the knob completely counterclockwise to Off if you want to deactivate the alarm altogether. After setting this delay time interval, push the knob again to lock-in your setting. This action will cause the word Threshold to blink.



The trip point of the Audio Loss alarm is adjustable. The numerical value is the peak level that the program must fall below, and remain below, throughout the programmed de-

lay interval to trigger an Audio Loss alarm. Because the alarm is peak-sensing, even lightly-processed programming will have frequent peaks approaching 0dB. A setting of -10dB will probably suffice for nearly any programming format. Be sure to push the knob after making the selection to store the setting in memory.

Always consider the dynamics of the broadcast format when setting both the delay and the alarm threshold. A phone-in talk format could have occasional long pauses, suggesting an **Audio Loss:** setting of 15 or 20 seconds. Classical music programming may require a lower **Threshold:** setting.

The alarm flashes **AUDIO LOSS** on the front-panel LCD and activates the rear-panel A (audio-loss) terminal. Refer to Pages 8 and 18 for using and programming this terminal.

The DAB Loss Alarm

This alarm has neither settings nor metrics, and is thus totally undeserving of a Menu Screen. Loss of the DAB signal is very much a go/no-go situation. When the OFDM digital signal goes missing, there is an instantaneous front-panel flashing alarm and activation of the rear-panel D terminal. This terminal gives an NPN transistor saturation to ground, the polarity (logic state) of the alarm is set on one of the hidden menu screens that are explained beginning on Page 18.

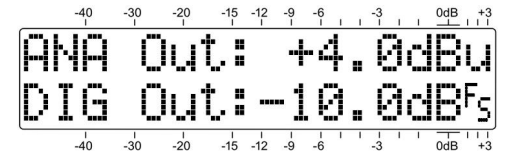
Headphone Volume (Menu Screen 9)

A front-panel mini-phone jack offers a convenient monitoring point for setup and casual listening. Whenever a pair of headphones is plugged into this jack, the LCD screen automatically switches to Menu Screen 9. **Headphone Vol** will blink and the panel knob may be adjusted for a comfortable listening level.

The LCD also shows an arbitrary numerical value and a bargraph representation of the headphone volume. Once volume is set, push the knob to save the preference to memory and to return the LCD to the last menu displayed.

Audio Output Levels (Menu Screen 10)

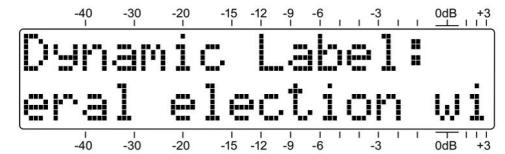
Audio output levels may be set independently for the rear-panel ANALOG OUTPUT (LEFT / RIGHT) and the DIGITAL OUTPUT (AES3). Levels can be set with 0.1dB resolution over a 30dB range. As with other menus, push the knob so that either **ANA Out** or **DIG Out** blinks, and turn the knob to set the level.



The indicated **ANA Out:** (analog output) number is the *average value* of the program waveform expressed in dBu. This will be the balanced, unloaded level at the analog output connectors. The **DIG Out:** (digital output) number, on the other hand, represents the *peak level* of the program signal with reference to dBFS, or digital-full-scale at the AES3 output. If the digital radio broadcaster follows the long-standing analog-era convention of nauseatingly-heavy audio processing, the 'crest factor' (average-to-peak ratio) will be very low, meaning that the average and peak levels will be close to the same figure at both outputs.

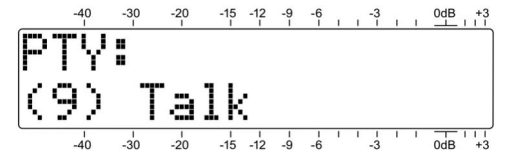
Dynamic Label (Menu Screen 11)

This is a text message associated with the current program content, a message limited to 128 characters. A long message will automatically scroll to describe the programming in detail, or simply identify the source or genre as a static display.



PTY (Menu Screen 12)

PTY: identifies the Program Type from a list of some 30 predefined categories. Placement on the list is shown numerically, and the programming format or genre is noted in brief.



Sample Rate (Menu Screen 13)

The **Sample Rate:** screen shows the encoding rate for the audio program being monitored.

Bit Rate and Gain (Menu Screen 14)

Bit Rate: of the DAB audio program is shown in kbps on the top line of this screen. The **Gain:** readout relates to a Dynamic Range Control (DRC) function of DAB radio. Using this feature, the receiver may be user-programmed to reduce program dynamic range to favor a noisy listening environment.

Audio Mode (Menu Screen 15)

Mode: describes the disposition of the two DAB audio channels, whether programming is monaural, stereo, bit-rate-reduced 'joint' stereo, or split-channel 'dual' programming for two languages or separate programs.

Service Mode (Menu Screen 16)

This screen defines the type of service being received, whether it is an audio stream, data, data packet, etc.

Protection Info (Menu Screen 17)

This **Protect. Info:** screen identifies the error protection mechanism used in the subchannel coding process. (Very esoteric!)

Capacity Units (Menu Screen 18)

The top line of this screen displays **Current CU:** or the number of capacity units assigned to the service component being received. Below that is the starting **Address:** of the subchannel in the Common Interleaved Frame (CIF).

Country and Language (Menu Screen 19)

Country: identifies the Ensemble origin and **Language:** specifies the language of the selected component. These readouts will be a hexadecimal code. You will need to refer to the appropriate DAB Standard if you need to verify the codes against the lists in each case.

Time and Date (Menu Screen 20)

This screen presents the time and date that is embedded in the transmission, plus the offset from Universal Coordinated Time (UTC) at the transmission location. The INomini 661 does not correct the display to show local time if the reception location is in a different time zone.

HIDDEN MENUS

The INomini 661 also has settings for little-used, set-and-forget functions. On an exclusive need-to-know basis, hold-down the knob for a few seconds to access this top-secret area.

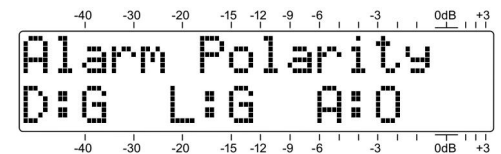
Firmware Version (Hidden Menu Screen 1)

The **661 Firmware** screen will apprise you of what firmware version is installed in your unit.

Alarm Polarity (Hidden Menu Screen 2)

When an alarm is triggered, the rear-panel 'tally' outputs can take the form of either a closure to ground or a fulltime ground that goes open-circuit for the alarm.

Push the knob and **D** (Digital Loss Alarm) will begin blinking. Turn the knob to select **G**, a ground for the alarm or **O**, an open circuit from a normally-grounded condition. Push the knob to save the setting, which will take you to a blinking **L** (Low Signal). Make your selection, push the knob and do the same for **A** (Audio Loss). Push the knob a final time to save settings and release the menu.



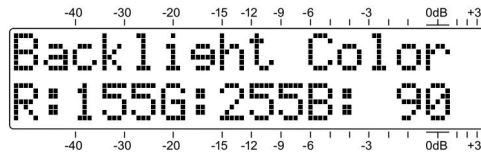
In the example above, the rear-panel **D** and **L** terminals will give closures to ground for their associated alarms, and the **A** terminal will be grounded and go open-circuit for Audio Loss.

Backlight Color (Hidden Menu Screen 3)

The INomini 661 has a large, easy-to-read, backlit LCD display. A Digital Loss Alarm, Low Signal or Audio Loss condition will cause the display to flash the alarm notification

against a red background to further call attention to the matter.

The backlighting has a range of R/G/B color rendering, which can be applied universally to the menu trees, except for the flashing red alarm condition. Menu Screen 4 allows you to set the background to nearly any color you might fancy. Simply push the knob to sequentially access the R: (red), G: (green) and B: (blue) backlights, and set them selectively to any of the 51 brightness levels offered, from 0 to 255 in increments of 5.



We have established factory values for a nominally-white background, although there may be variation in these settings from unit-to-unit as the LCDs vary a bit. The color settings shown here are typical of factory settings... just in case you lose your way and want to get back close to the original values.

Loading Factory Defaults (Hidden Menu Screen 4)

With the exception of the backlight color settings, all main and hidden menu selections can be put back to as-shipped, factory values by invoking the Load Defaults? command. With this menu selected, push the knob and turn it from No to Yes. Push the knob again to reboot the INOmini 661 with factory defaults.

Returning to the Menu Tree

To get from hidden menu settings back to the normal, operating menu tree, navigate back to Hidden Menu 1 (showing 661 Firmware) and push the knob.

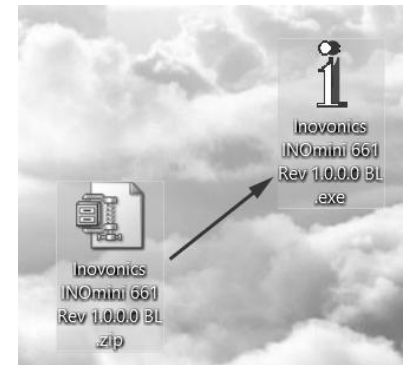
Section IV UPDATING FIRMWARE

Firmware Files

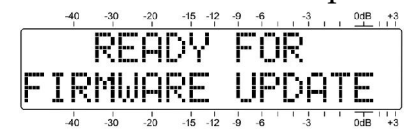
INOmini 661 firmware updates are issued at no charge whenever operating features are changed or added. These are small 'bootloader' files in a 'zipped' format that will be available as downloads on the Inovonics Website.

The first step is to connect your INOmini 661 to your computer with a popular 'USB-A' to 'mini-B' USB cable.

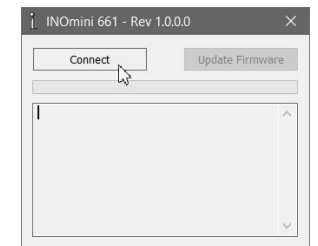
Next, download the zipped file to your Windows Desktop and unzip it in place, as was done here. Simply double-click the zipped BL.zip file and follow the unzip utility's instructions, placing the extracted .exe file on the desktop.



Next, place the INOmini 661 in its ready-state to accept firmware updates. Just unplug the 12VDC power connector from the rear panel, and then hold-down the front-panel knob as you plug the power connector back in. This should bring-up the wording shown at the right.

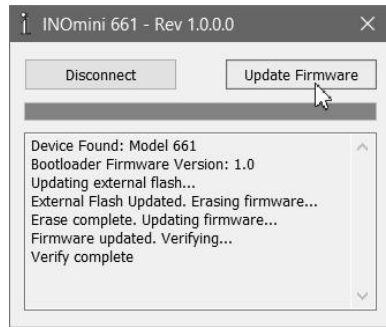


Double-click the extracted BL.exe file, which will include the product model number and firmware version in its full name. This will start the bootloader utility window shown here.



Click Connect and the utility should quickly advise you that it has found your INOmini 661. You can then click Update Firmware and the update process will begin. There are a few phases to this process, and a green bar will advise you of progress.

When the update is complete, the bootloader window will appear as shown in this illustration, and the INOmini 661 will reboot, returning you to whatever menu was showing before the update.



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The firmware update process will retain all the settings from the previous firmware version, unless the update includes new operational features, which may or may not require further setup.

'Under the Hood'

The INOmini 661 DAB/DAB+ Monitor Receiver is very compact, utilizing mostly surface-mounted (SMD) components. Many of these are application-specific and may be 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.

Nevertheless, our policy has always been one of 'full disclosure.' We feel that, unless we are doing something either nefarious or 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 661 for factory servicing 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!

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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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