INOmini 674

AM Monitor Receiver

Installation & User Guide

June, 2019 - Rev. 1 Firmware

INOVONICS
BROADCAST
www.inovonicsbroadcast.com

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Section I

INTRODUCTION

Product Description

The INOmini 674 is an off-air receiver for standard, medium-wave analog radio broadcasts, specifically targeting professional 'confidence-monitoring' applications.

The front-panel, back-lighted LCD display is host to various menu screens, which facilitate easy setup of the INOmini 674, and also display various parameters of received signal quality.

Product Features

Features of the INOmini 674 include:

- A sensitive and selective DSP-based receiver tunes in either 10kHz (Americas) or 9kHz (European) increments.

- The large, multicolor-backlighted LCD screen and jog-knob facilitate easy setup and navigation of the receiver's intuitive menu trees.

- You get an accurate display of received signal strength and audio levels.

- Simultaneous analog and AES-digital program line outputs have independent audio level controls.

- Programmable front-panel alarms with rear-panel 'tallies' indicate Low Signal and Audio Program Loss conditions.

- 674 firmware is easily updated in the field.

Product Specifications

Tuning Range: Tunes 520kHz-1710kHz in 10kHz steps or 531kHz-1611kHz in 9kHz steps.

Antenna Input: Transformer-isolated 50-0hm (F) input; a passive outdoor loop antenna is optionally available.

Sensitivity/SNR: 10μV for 50dB S/N; 1mV for 60dB S/N.

Audio Bandwidth: Selectable 6kHz, 4kHz, 3kHz, 2kHz (approx. –6dB point); see graph on Page 13.

De-Emphasis: NRSC ('truncated' 75μs) or OFF (flat).

Program Audio Output(s):
    Balanced Analog: (XLR) balanced "dual monaural" Left and Right, 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) with adjustable listening level.

Flashing Panel Alarms:
    Low Signal: Alarm and reset trigger levels are adjustable relative to the RF signal level display.
    Audio Loss: Alarm threshold is adjustable between 0dB and –30dB; delay interval is adjustable between OFF and 120 seconds.

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

USB Port: A front-panel mini-USB port enables easy firmware updates.

Power Requirement: 12VDC at 275mA; a universal 90-240VAC inline switching 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 674 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

Immediately upon receipt of the INOmini 674, 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 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 automatically receives any specific service and modification instructions and firmware updates. Register online at:

www.inovonicsbroadcast.com/productRegistration

Mounting

The INOmini 674 AM 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 674 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. 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

Each Inovonics INOmini module is supplied with an outboard universal, 90-240VAC switching-type power supply. As the actual power consumed by the INOmini 674 is 240mA 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 674 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 674 will be used in a broadcast environment, please do practice reasonable care in locating the unit away from *abnormally* high RF fields, especially as mentioned in the next subheading.

Antenna Considerations

Despite the advanced technology afforded by software-defined DSP receiver architecture, this revolutionary topology is not particularly good at rejecting strong signals close to the target frequency. A strong carrier, even several channels away from the desired signal, may desensitize the INOmini 674 to a certain degree.

The 50-ohm ANTENNA connector is insulated from the rear panel to offer a quasi-balanced antenna input. Connect a whip or wire antenna to the center terminal of the 'F' connector, and provide a ground or second 'counterpoise' connection to the shell.

As a problem-solving option, Inovonics offers a rugged outdoor, untuned loop antenna with a 'figure-eight' pickup pattern that can help null an interfering signal.

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 listening volume with the knob. Once you have set the volume to a comfortable level, push the knob to return to the previous menu.

Rear Panel Connections

ANTENNA
: The rear-panel 'F' connector is a 50-ohm antenna input. See Antenna Considerations on the previous page.

G +5 L A
: These are alarm "tally" outputs for remote indication of reception problems. Designations are noted on the rear panel and stand for Ground, +5 DC volts, Low Signal and Audio Loss.

The two 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 +5VDC supplied on the +5 terminal is current-limited with a 100-ohm series resistor and suitable only for optical couplers, LED indicators or small reed relays.

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 are marked LEFT and RIGHT, but are in fact dual *monaural* outputs. These outputs have a 200-ohm source impedance and provide a program level that may be adjusted between –15dBu and +15dBu, corresponding to 100% AM carrier modulation.

AES DIGITAL AUDIO OUTPUT
: The balanced, transformer-isolated AES digital audio output has a sample rate of 44.1kHz. The audio level may be adjusted between –30dBFS and 0dBFS, corresponding to 100% AM carrier modulation.

+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 674 draws 275mA. 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® will secure the cables to the plastic anchor above the jacks.
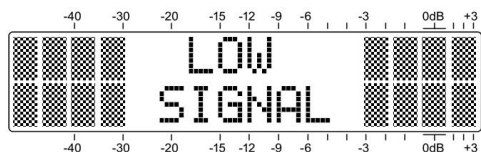
Section III

OPERATING THE INOmini 674

Hey, why is the screen flashing?

The INOmini 674 activates alarms for reception problems. This is 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, the `LOW SIGNAL` and/or the `AUDIO LOSS` alarms will 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 674 menu for yourself, being 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 selec-
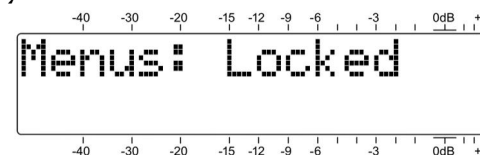
tion and lock it into non-volatile memory, and to be returned to menu navigation.

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 674 menu screen will be discussed separately and in order, except that the last menu is discussed first, as it could hinder your progress.
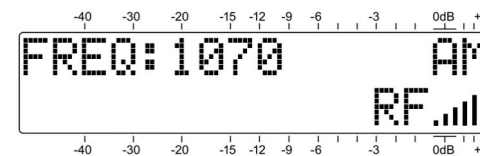
Locked Menus (Menu Screen 11)

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 Menu Screen 11, shown here. Push the knob and the word `Menus` will begin blinking. 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 674 receiver, 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.
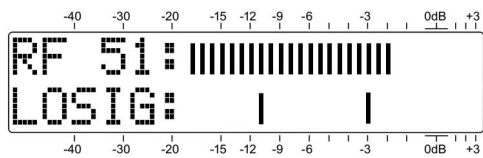
Push the knob and `FREQ` will begin to blink. Tune the receiver by turning the knob. A series of bars to the right of `RF` will give a basic display of incoming carrier strength.

Once the receiver is tuned, push the knob again. `FREQ` will stop blinking and the tuned frequency will be transferred into non-volatile memory. This releases the knob to navigate to other menus.
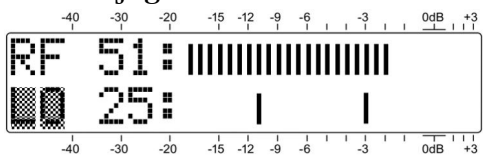
Carrier Strength and Alarm (Menu Screen 2)

The RF bargraph on this menu screen displays the incoming signal level; an RF numerical value given as well. This number

```
   -40    -30    -20   -15 -12 -9  -6     -3    0dB +3
RF 51: |||||||||||||||
LOSIG:          |       |
   -40    -30    -20   -15 -12 -9  -6     -3    0dB +3
```

ber is the incoming carrier level in dBμV. In the illustration, the 51 represents a level 51dB above one microvolt, or about 0.35 millivolts.

The RF display has no association with the dB scaling above and below the LCD window. Those dB scales are used only for audio level measurements in Menu Screen 6.

The lower LCD scale is labeled LOSIG: with a pair of tic marks off to the right. Push the jog wheel and LOSIG will change to a blinking LO, followed by a number. Turn the knob and the leftmost tic mark can be moved to any point be-

```
   -40    -30    -20   -15 -12 -9  -6     -3    0dB +3
RF 51: |||||||||||||||
▓LO 25:        |       |
   -40    -30    -20   -15 -12 -9  -6     -3    0dB +3
```

low the bargraph. This LO setting denotes an RF level that the input must fall *below* to trigger a Low Signal alarm. The alarm comes after a 5-second delay, just to ensure that the level has indeed dropped.

During normal receiver operation, whenever the RF bargraph falls below the left tic mark, LOW SIGNAL will flash on the LCD screen and the L terminal on the rear-panel connector will be activated. Refer to Pages 5 and 14 for using and programming this terminal.

Push the knob a second time and HI will flash. This lets you to adjust the alarm reset level, the level that the RF carrier must return to for the Low Signal alarm to reset. This setting should be just a bit below the normal carrier level, that way you'll know that the station is back on the air at full power.

In setting the alarm trigger and reset points, take nighttime pattern and power changes into consideration, as well as allowances for typical signal fading as the station's sky wave kicks in at sundown, if you are monitoring at a significant distance.

Background noise level at the receiver location is another factor. Receiver AGC may bring up a distant co-channel

signal or random noise enough to hold-off the LOW SIGNAL alarm. Be sure to verify a proper alarm setting when the station is legitimately off the air.

Once proper trigger and reset points have been determined and set, remember to push the knob again to fix those points in memory.

Mute on Low Signal (Menu Screen 3)

This is actually a 'squelch' function that mutes the audio outputs of the INOmini 674 during a Low Signal alarm condition. As the receiver AGC can introduce a good amount of gain in the absence of a valid carrier, RF noise can be brought up to objectionable levels when the station goes off the air. This function may be toggled between On and Off; be sure to push the knob afterward to commit your choice to memory.

The squelch/muting function has implication with respect to the Audio Loss alarm. This is covered under the The Audio Loss Alarm subheading, below.
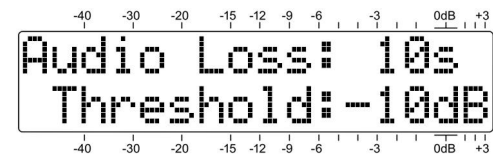
Signal-to-Noise (Menu Screen 4)

SN gives a relative approximation of the signal-to-noise quality of the tuned signal. This measurement takes various signal quality factors into account, but is really valid only when the carrier is unmodulated. Again a numerical value is assigned to the SN readout, but it really only denotes the number of active bargraph segments.

No hard-and-fast rule can be derived from this display, except for "more is better." Remember: this measurement is meaningless when the carrier is modulated by program audio.

The Audio Loss Alarm (Menu Screen 5)

Navigate to this Screen and push the knob. Audio Loss will begin blinking. Turn the knob to dial-in a desired alarm

```
   -40    -30    -20   -15 -12 -9  -6     -3    0dB +3
Audio Loss: 10s
Threshold:-10dB
   -40    -30    -20   -15 -12 -9  -6     -3    0dB +3
```

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` 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.
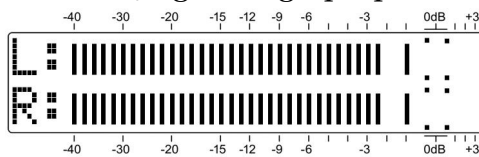
The trip point of the audio loss alarm is adjustable. The numerical value is the peak level that the program must fall below, and remain below, throughout the programmed delay interval to trigger an Audio Loss alarm. Because the alarm is peak-sensing, even lightly-processed programming will have frequent peaks nearly reaching 0dB, or 100% modulation. A setting of `−10dB` will probably suffice for nearly any format. Be sure to push the knob after making the adjustment 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 a setting of 15 or 20 seconds. Most other AM fare (news, sports, syndicated talk programming) will tolerate a shorter timeout.

An alarm flashes `AUDIO LOSS` on the front-panel LCD and activates the rear-panel A (audio-loss) terminal. Refer to Pages 5 and 14 for using and programming this terminal.

Program Audio Metering (Menu Screen 6)

Menu Screen 6 gives redundant left/right bargraph presentations of the *monaural* program audio level. Meters are peak-responding with a floating peak-hold function.

Although both `L:` and `R:` (Left and Right) levels are shown, the "stereo" outputs are provided for connection convenience, as most broadcast plants are wired for stereo whether the programming is or not. The two outputs carry the same audio and the meters will indicate identical levels.

100% carrier modulation 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 1dB steps down to –20dB, and then in 2dB steps to –40dB.

0dB represents 100% *symmetrical* amplitude modulation of the carrier. 400Hz sinewave modulation of the transmitter

to the 100% point would take the meters to 0dB. At higher audio frequencies the receiver audio response (IF bandwidth and de-emphasis) must necessarily be factored into the reading.

Indications above 0dB may be noted when asymmetrical modulation yields higher positive peaks, as allowed by FCC (and other authority) rulings, or by impulse noise riding atop the audio program.
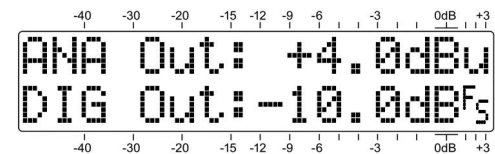
Headphone Monitoring (Menu Screen 7)

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 7. `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 8)

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 the 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. Considering that most AM broadcasters utilize 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 in both cases.
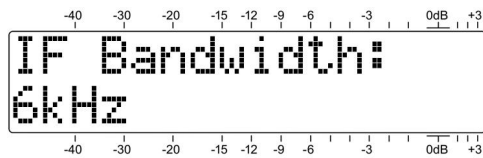
Program De-Emphasis (Menu Screen 9

Back in the 1990s, the National Radio Systems Committee (NRSC) defined a complementary high frequency transmission pre-emphasis and corresponding receiver de-emphasis characteristic for AM broadcasting in the US, similar to what's used for FM. The turnover and slope are loosely based on the 75µs American FM standard, the true NRSC characteristic is referred-to as a 'truncated' 75µs curve.
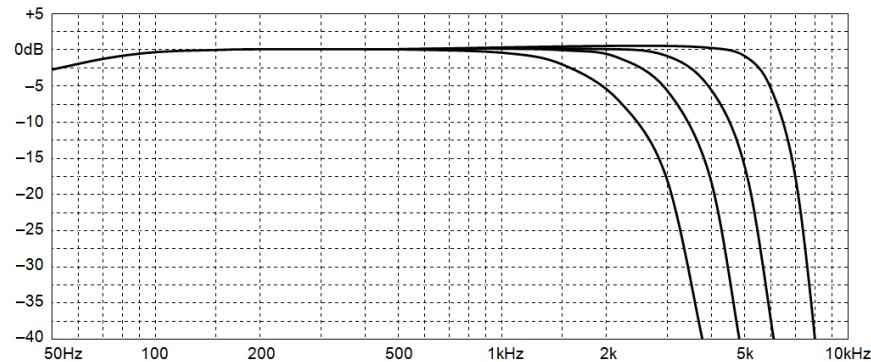
Menu screen 9 is used to set receiver De-Emphasis: to NRSC or to OFF. Your decision here should probably be based on how the audio sounds to you and on the next setting to be discussed, rather than on orthodoxy.

Reception Bandwidth (Menu Screen 10)

Menu Screen 10 selects the receiver's reception bandwidth, which we call IF Bandwidth in deference to the more familiar analog-radio convention.

IF Bandwidth: choices are 6kHz, 4kHz, 3kHz and 2kHz. These are –6dB points in each case, with a very precipitous drop above the turnover frequencies as shown below.

Noise is the bane of AM radio broadcasting, and restricting the reception bandwidth helps to reduce that annoyance. 6kHz is the closest to a "Hi-Fi" setting for the INOmini 674, but the rapid turnover and steep rolloff help preserve voice intelligibility even with the lowest, 2kHz, cutoff frequency.

Locked Menus (Menu Screen 11)

(Discussed on Page 8)

HIDDEN MENUS

The INOmini 674 also has settings for little-used, set-and-forget features. From any normal navigational menu, push and hold-down the knob to access these top-secret settings.

Firmware Version (Hidden Menu Screen 1)

This is simply a display screen that identifies the firmware version currently installed in the INOmini 674.
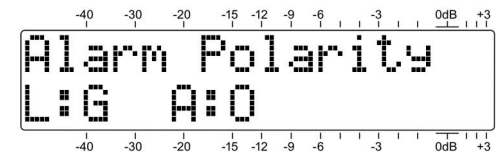
AM Channel Spacing (Hidden Menu Screen 2)

In medium-wave AM broadcasting, transmission frequencies are ordered either at 10kHz intervals (in the Americas) or at 9kHz intervals (the rest of the world). This AM Spacing: Menu Screen selects the 10kHz or 9kHz tuning steps.

Alarm Polarity (Hidden Menu Screen 3)

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 an alarm.

Push the knob and L (Low Signal) 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 A (Audio Loss). Make your selection for the Audio Loss alarm and push the knob a final time to save settings and release the menu.

In the example above, the rear-panel L terminal will give a closure to ground for a Low Signal alarm, and the A terminal will be grounded and go open-circuit for an Audio Loss alarm.

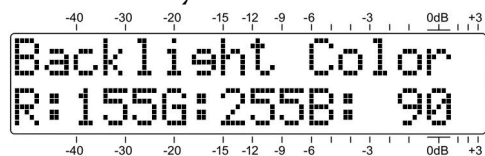**Backlight Color** (Hidden Menu Screen 4)

The INOmini 674 has a large, easy-to-read, backlit LCD display. A Low Signal or an Audio Loss condition will cause

the display to flash with the alarm notification against a red background to further make the alarm visible.

The backlighting has a range of R/G/B color rendering, which can be applied universally to the menu trees, except for the alarm condition. This menu screen allows you to set the background to nearly any color you might wish to have. 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 factory settings, if you lose your way and wish to get back close to the original values.

```
  -40   -30    -20   -15 -12  -9   -6      -3      0dB  +3
 ┌──────────────────────────────────────────────┐
 │ Backlight Color                                │
 │ R:155G:255B:  90                               │
 └──────────────────────────────────────────────┘
  -40   -30    -20   -15 -12  -9  -6      -3      0dB  +3
```

Loading Factory Defaults (Hidden Menu Screen 5)

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 that menu selected, push the knob and turn it from No to Yes. When you then push the knob, the INOmini 674 will reboot with factory defaults.
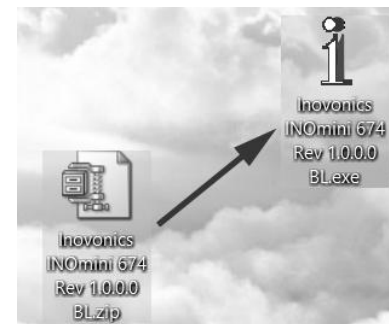
Returning to the Menu Tree

To get from hidden menu settings back to the normal, operating menu tree, navigate back to Hidden Menu 1 (showing 674 Firmware) and push the knob.

Section IV
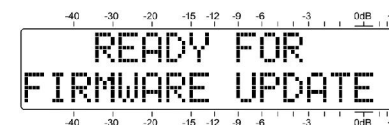
UPDATING FIRMWARE

Firmware Files

INOmini 674 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 674 to your com-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 674 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.
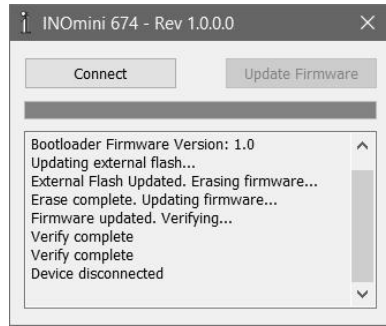
```
  -40   -30    -20   -15 -12  -9   -6      -3      0dB  +3
 ┌──────────────────────────────────────────────┐
 │        READY FOR                               │
 │ FIRMWARE  UPDATE                               │
 └──────────────────────────────────────────────┘
  -40   -30    -20   -15 -12  -9  -6      -3      0dB  +3
```

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 boot-loader utility window shown here.

Click Connect and the utility should quickly advise you that it has found your INOmini 674. 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 674 will reboot, returning you to whatever menu was showing before the update.

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

‘Under the Hood’

The Model 674 AM Monitor Receiver is very compact, 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.

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 674 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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ᵢ INOVONICS WARRANTY

I **TERMS OF SALE:** Inovonics products are sold with an under-standing of "full satisfaction"; that is, full credit or refund will be is-sued for products sold as new if returned to the point of purchase within 30 days following their receipt, provided that they are re-turned 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 regis-tered online at www.inovonicsbroadcast.com, within 10 days of delivery.

B. The Warranty applies only to products sold "as new." It is ex-tended 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 unau-thorized attempts at repair or modification, or if the serial identi-fication 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 Inovon-ics prior to its return. An RA number may be obtained by call-ing 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 fac-tory is not covered under terms of the Warranty and may occa-sion additional charges.

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ᵢ INOVONICS
B R O A D C A S T

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Serving the broadcast industry since 1972