INOmini 300

AES3 Distribution Amp *Plus!*

Installation & User Guide

March, 2015 - Rev. 1 Firmware

INOVONICS BROADCAST
www.inovonicsbroadcast.com

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INTRODUCTION

Product Description

The INOmini 300 is 'one-in, three-out' distribution amplifier for digital audio signals conforming to professional AES3 specifications, and with a disclaimer (see Page 2) to the S/PDIF consumer-equipment standard. The unit utilizes digital signal processing (DSP) architecture to offer additional features not commonly found in a simple "DA."

Product Features

Features of the INOmini 300 include:

- Input/output rate conversion for sampling rates between 22.05kHz and 192kHz: any input rate to any standard output rate.
- ±30dB independent adjustment of the program audio levels for each of the three outputs.
- Front-panel L/R peak level metering of the input and of each output.
- Provision for audio channel phase inversion, channel swap, and monaural from left or right.
- Front-panel display of channel status bit information for both professional and consumer formats.
- Front-panel alarms for audio loss and loss of AES signal lock.
- Front-panel headphone jack for monitoring the audio program signal.

Product Specifications

Sampling Rates Supported: 22.05kHz, 24kHz, 32kHz, 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz, 192kHz. The INOmini 300 will generally sync to stable nonstandard intermediate input rates; output rates are restricted to those listed.

Digital Signal Bit Depth: 8-bit through 24-bit word length.

AES3 Input Characteristic: transformer-balanced, 110-ohm-terminating (XLR-F).

AES3 Output Characteristic: transformer-balanced, 110-ohm source impedance (3X XLR-M).

S/PDIF Disclaimer: All features of the INOmini 300 are compatible with S/PDIF-formatted digital audio signals, with the exception of the lower digital signal voltage levels, impedance and connector differences common to consumer audio products.

Latency: ≤2ms at 48kHz sampling rate

Output Level Adjustment: Nominally unity-gain; front-panel control affords ±30dB adjustment over the digital audio program level of each output independently, with gain readout and peak level output metering.

Alarms: Front-panel alarms for loss of AES signal lock and loss of one or both channels of audio.

Front-Panel Headphone Jack (3.5mm TRS)

Power Requirement: 12VDC at 290mA. 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 300 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 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, including software/ firmware updates. Register online at:

www.inovonicsbroadcast.com/product-registration

Mounting

The INOmini 300 is packaged in a compact 'clamshell' chassis that defines the standardized module in this series of Inovonics products. The INOmini 300 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 300 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 300. 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 290mA at 12 volts DC. A second DC connector on the rear panel allows 'daisy-chaining' INOmini 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.

Radio Frequency Interference (RFI)

Although we have anticipated that the distribution amplifier may be used in the vicinity of broadcast transmitting equipment, 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 300.

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 level, pushing the knob again returns the previous menu.

Rear Panel Connections

AES3 DIGITAL AUDIO INPUT	This XLR female connector is a transformer-balanced, terminating input for AES3 digital audio signals. The INOmini 300 conforms to the professional (AES3) Standard, and also to the consumer (S/PDIF) Standard with respect to coding protocols. See Page 2 for a disclaimer.

AES3 OUTPUTS

These XLR male outputs, labeled 1, 2 and 3, are transformer-balanced, 110-ohm outputs. However, output 1 utilizes a different output driver stage from the other two and delivers 3V p-p into a 110-ohm termination, whereas outputs 2 and 3 deliver 4.5V p-p. Nevertheless, all three outputs do meet the requirements of the AES3 Standard.

+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 the rating of the supply is not exceeded. Two short 'pigtail' cables are provided with each rack adapter.

The Model 300 draws 290mA. Check the rating on the label of the power supply to make sure that it is rated for the modules it must support.

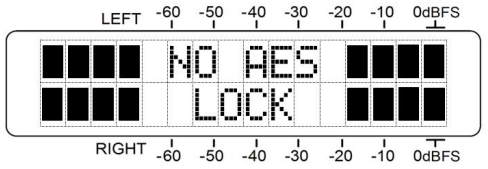
These power connectors are not a locking type, and the mating plugs do pull out rather easily. A Ty-Wrap® will secure the cables to the plastic anchor above the jacks if this is deemed necessary.

Section III

OPERATING THE INOmini 300

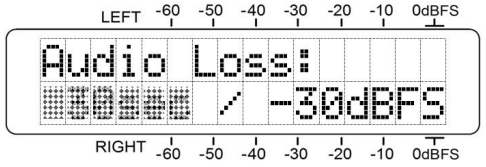
Hey, why is the screen flashing?

The INOmini 300 AES3 Distribution Amplifier *Plus!* has two alarms that indicate 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 300 has not yet been connected to a digital audio source, both the NO AES LOCK and the AUDIO LOSS alarms 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 the alarm conditions will reset.

Whenever you are in the 'edit mode'; that is, you have entered a menu to edit (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 as shown above.



Menu Navigation Basics

By the time you've read this, you've probably already 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 asso-

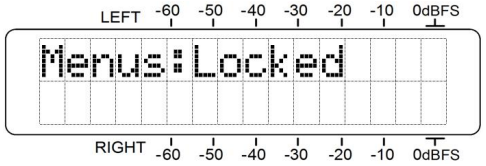
ciated with setup, 3) *turn* the knob to choose an option or to set a value, and then 4) *push* again to accept the selection and send it to non-volatile memory, and return to menu navigation.

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

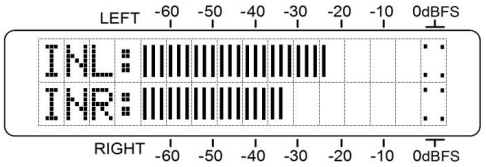
Locked Menus

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 screen you were trying to edit. You can re-lock the menu when you're finished.



Input Level Metering (Menu Screen 1)

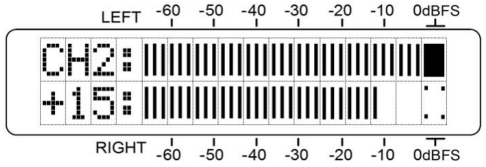
When power is applied to the INOmini 300, a 'splash screen' with the product ID pops up immediately on the LCD. Within a few seconds this will revert to Menu Screen 1, a peak-responding audio level meter that displays left- and right-channel program levels with respect to Digital Full Scale, or 0dBFS. This screen, shown here, does not have any options or adjustments.



Output Level Adjustments (Menu Screens 2, 3 and 4)

These next three menu screens provide user adjustment over the program audio level of each digital stereo audio output independently.

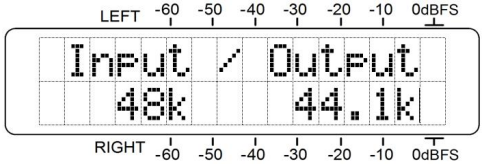
The output channel is identified in the top line, the number here corresponding to the rear-panel XLR male output connector with the same number. Below the channel ID is the gain specified for this output. Normally this is left at the default value of `0dB`, or unity-gain through the distribution amp. Push the knob to enter the level adjustment mode, and turn it to dial-in as much as 30dB of gain or loss for this specific digital audio output.



The metering function of this menu displays the peak levels of the digital stereo output signal with regard to 0dBFS. The above illustration suggests that too much gain has been cranked-in, probably driving the signal into frequent clipping.

Sampling Rate Conversion (Menu Screen 5)

Menu screen 5 shows the sampling rate of the incoming digital audio signal and the output sampling rate, which may be selected by the user. The output rate is common to all three outputs, they cannot be set independently.



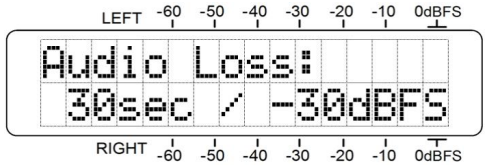
As stated in Product Specifications, the INOmini 300 can lock onto any stable sampling rate between 22.05kHz and 192kHz, even nonstandard in-between rates such as 51kHz.

Push and turn the knob to select the output sampling rate. Only standard rates within the unit's range may be set. The output rate may also be set to `Follow` the input rate.

Nonstandard rates will display under `Input`, but a fixed output rate must be selected. The `Follow` option is not available for nonstandard sampling rates and will display `Error` in conjunction with a nonstandard input rate.

The Audio Loss Alarm (Menu Screen 6)

The INOmini 300 has a silence-sensor that may be programmed to supply a flashing alarm when either channel of a stereo program is lost.



Navigate to this screen and push the knob once. Next, turn the knob to enter the number of seconds between loss of program 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 OFF to deactivate the alarm altogether.

Push the knob a second time to set the audio level threshold. This is the level that program peaks must maintain to keep an alarm from triggering. When the program audio peak level falls below the trigger point for the specified number of seconds, the alarm will begin to flash.

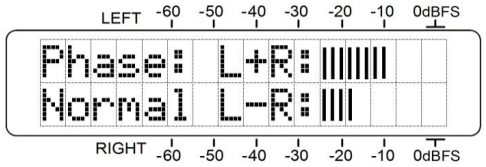
Channel Mode (Menu Screen 7)

Stereo is the normal and default mode of INOmini 300 operation. Alternatives that can be selected on this screen are Stereo L/R Swap, which simply reverses the left and right channels; Mono From Left, which routes the left-channel input to both output channels; and Mono From Right, which does the same thing using the right input channel.

Push and turn the knob to select the alternative operating modes. When any mode other than Stereo is selected, the INOmini 300 will flash a reminder every few seconds that you are in an alternative or nonstandard mode.

Program Phase (Menu Screen 8)

Menu screen 9 presents an elementary display of the average energy in the L+R stereo sum and L–R stereo difference components of the program audio. Again, this is *average* energy and is also a *relative* reading, having no relationship with the meter scaling and 0dBFS.



With nearly all stereo program sources, the sum energy will exceed that of the difference, unless the phase of one channel has inadvertently been flipped somewhere in the program path. If the incoming program does have a phase inversion, push and turn the knob to Invert the phase of the right program channel. This inversion will be reflected in the energy display readout, and will also flash a reminder every few seconds that program phase has been corrected.

Headphone Monitoring (Menu Screen 9)

The front-panel PHONES jack offers a convenient monitoring point to monitor audio quality or confirm a program feed. Whenever headphones are plugged into the jack, the LCD screen automatically goes to Menu Screen 10. Headphone Vol will begin blinking and the panel knob may be adjusted 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.

Channel Status (Menu Screen 10)

With typical stereo program material this screen will display L/R Duplicate, meaning that the channel status bits are the same for the left and right program channels. In the rare event that this is not the case (e.g.: two independent mono programs), L Channel Data or R Channel Data may be selected for display on the Channel Status screens, which are discussed next.

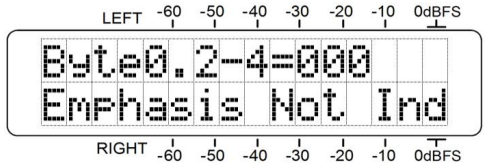
The Channel Status Screens

The INOmini 300 displays digital audio housekeeping and overhead information beginning with Menu screen 11. These data consist of 8-bit bytes, the number and disposition of these bytes depending on whether the digital audio signal is 'professional' (AES3) or 'consumer' (S/PDIF). The INOmini 300 automatically presents the proper screen for either format, but defaults to the S/PDIF display set with no input connected.

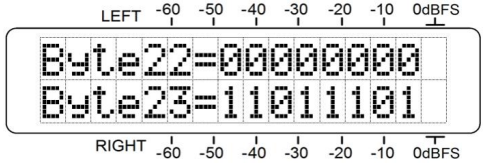
Byte 0 holds the more important information regarding the digital audio stream, and the INOmini 300 decodes these bits to readable text when it is connected to a valid digital

audio signal. What exactly is displayed will depend on whether the stream has AES3 or S/PDIF encoding.

In the AES3 example, shown here, Byte 0, bits 2, 3 and 4, are all set to zero in the incoming digital audio signal. This screen shows that pre-emphasis is not indicated for this particular digital audio feed.



Bytes 1 through 23 (AES 3), or bytes 1 through 5 (S/PDIF), are not decoded to plain text, but are simply shown as a sequence of zeroes and ones. Consult the appropriate Standard for a detailed explanation on what these channel status bits include.



Section V

TECHNICAL MATTERS

Firmware Version

With the INOmini 300 powered-up, hold down the knob for 5 to 10 seconds. The menu screen you have been viewing will be replaced by the FIRMWARE VERSION screen. This shows the version installed in your unit, information that may prove important when communicating with the factory. Push the knob again to return to the normal menu sequence.

'Under the Hood'

The INOmini 300 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 300 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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