



RDS – LED Sign Driver Receiver

Installation & User Guide



June, 2014 - Rev. 1 Firmware



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Section I

INTRODUCTION

Product Description

The INOmini 402 is an off-air data receiver for commercial FM broadcasts that carry accompanying RDS/RBDS (Radio Data System) encoded 'metadata.'

The station PS (Program Service Name), RT (Radio Text) or proprietary IH (In-House) messages are delivered to a scrolling, marquee-style LED advertising sign for easy reading by station staff, or may be displayed to the general public for advertising purposes or at special events.

Product Features

Features of the Inovonics 402 include:

- Optionally provided with a 4" x 24" LED sign; interfaces with a wide variety of other LED sign types and sizes.
- The sensitive and selective DSP-based receiver tunes the entire (extended) FM band.
- Easy system setup uses the front-panel LCD screen and jog-wheel to navigate the receiver's menu tree.
- On-air talent can confirm artist-and-title or other dynamic information sent to listeners.
- Able to display weather and emergency warnings in public places.
- Useful in storefront retail or entertainment venue applications when tied-in with station/merchant or advertiser promotions.

Product Specifications

Tuning Range: 64.0MHz - 108.0MHz in 100kHz steps

Receiver Sensitivity: 10µV for a solid text display

Antenna Input: 75-ohm ('F' connector) input can accept the download from rooftop antenna, a simple

twinlead dipole or a random wire, depending on signal strength and reception conditions.

LED Sign Output: Male and female DB9 serial data connectors; communication baud rate is set automatically when the sign type is selected.

Sign Protocols Supported: Inovonics-supplied; NEOplex Technology; Alpha.

Fonts and Colors: Options are selected via the 402 menus, consistent with capabilities of the sign used.

402 Power Requirement: 12VDC at 125mA. A 'brick-type' (inline) switchmode power supply appropriate to the destination AC mains voltage is provided.

Mounting Options: An optional rack adapter accepts up to three INOmini modules in a 1U, 19-inch rack space, or the 402 may easily 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 402 Sign Driver Receiver and provided sign, 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 cartons 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 our generous 3-year Warranty (see the inside the back cover of this manual), but the user will automatically receive any specific service and modification instructions, including software/ firmware updates. Register online at:

www.inovonicsbroadcast.com/product-registration

Mounting

The Model 402, itself, is packaged in a compact 'clamshell' chassis that defines the standardized Inovonics' 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 402 to be fastened to any flat surface with two #4 screws.

An optional rack-mount kit is available for the 402, which 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 supply.

When the 402 is provided with the optional marquee-style sign from Inovonics, the sign comes with a 15-foot cable,

power supply and mounting hardware that permits limited vertical viewing-angle adjustment.

AC Mains Power

All Inovonics INOmini modules are supplied with an out-board switching-type power supply suited to the destination mains voltage. As the actual power consumed by the receiver is 125mA at 12 volts DC, a second DC connector on the rear panel of the 402 allows the user to 'daisy-chain' INOmini modules. This means that two or more units may be fed from the same AC supply, but always 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.

Radio Frequency Interference (RFI)

Although the 402 is intended for possible use in a broadcast environment, please do practice reasonable care in locating the unit away from *abnormally* high RF fields.

Antenna Notes

The Radio Data System (RDS/RBDS) is a robust channel of digital data on a subcarrier that accompanies the audio portion of an FM broadcast signal. Generally, if the 402 is installed in a location that permits a pocket radio to receive a decent signal, a 3-foot length of insulated wire pushed into the center of the rear-panel ANTENNA connector may be all that you need for solid data copy.

A low signal, interference or FM-multipath effects can garble the receive text and require the use of a better antenna. A simple twin-lead dipole taped or stapled to an interior wall may prove adequate, although a rooftop installation may be necessary when the 402 is used in a steel-reinforced concrete structure or challenging location.

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 describes receiver programming and operating instructions.

Rear Panel Connections

- ANTENNA** The rear-panel 'F' connector has a 75-ohm input characteristic. A short whip or random wire may give acceptable results in a strong-signal situation; other antenna options are noted on the previous page.
- DATA PORTS
1 AND 2** The two DB9 serial data connectors are connected in parallel and present display data from the 402 to either the sign optionally provided with it or to other compatible scrolling marquee-style signs. Depending on the sign selected, a DB9 to 'modular' (RJ-style) adapter may be required. The interconnecting cable may be extended either with a straight-through DB9 cable or an appropriate modular-connector extension cable.
- The DB9 female serial data port is also used to 'bootload' updated firmware to the Inovonics 402. Complete instructions for doing this will accompany any updates.
- +12VDC
POWER I/O** These paralleled connectors allow 'daisy-chaining' INomini modules. One DC supply can power up to three modules mounted in a single rack adapter, providing, of course, that the rating of the supply is not exceeded. Two short 'pigtail' cables are packaged with each rack adapter.
- The Inovonics 402 draws 125mA at 12VDC. Check the rating on the label of the power supply to make sure it delivers sufficient current for all the modules it must support.
- Mating power plugs do pull out rather easily. You can use a Ty-Wrap® to secure the cables to the plastic anchor above the jacks.

Section III

PROGRAMMING AND OPERATION

Menu Navigation Basics

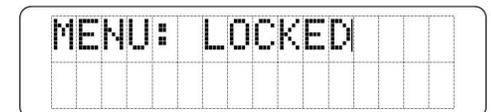
Menu structure of the 402 Sign Driver Receiver is actually quite simple. You: 1) *turn* the knob to navigate from one menu to the next, 2) *push* the knob to enter any menu associated with the receiver or the marquee sign setup, 3) *turn* the knob to set a parameter, and then 4) *push* again to accept the selection, fix the selection in non-volatile memory and return 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 in that menu. Turn the knob to make your choice, and then push once again to transfer that selection to memory.

Each 402 menu screen will be discussed separately and in order, except that the last menu is discussed first, as it might prove a show-stopper at the get-go.

Locked Menus (Menu Screen 10)

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 something, go all the way to Menu Screen 10, shown here. Push the knob and the word MENU will begin blinking. You can then turn the knob to select MENU: UN-LOCKED and push the knob again to set this selection. From there you may navigate back to whichever screen you may have been trying to edit.



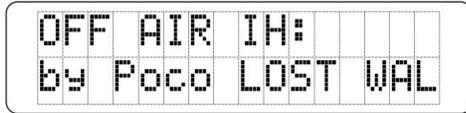
Tuning the Receiver (Menu Screen 1)

When power is applied to the 402, a 'splash screen' with the product ID pops up immediately on the LCD. Within a few

In-House Text (IH) (Menu Screen 5)

In-House text messaging is quite similar to the Radio Text group just described. IH is a second, separate 64-character scrolling message, and can be considered proprietary to the station as consumer radios do not display the IH group.

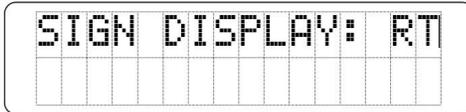
This makes In-House messaging useful for special promotion or advertising purposes. A station could locate an Inovonics 402 and its marquee sign in a participating retail outlet and intersperse the now-playing information from the station with special advertisements or offers tied to the store. Another use might be at a concert venue, where the station could promote itself and perform certain public service functions, such as locating wandering children or a LOST WALLET.



OFF AIR IH:
by Poco LOST WAL

Selecting the Display (Menu Screen 6)

Menu Screen 6 lets you choose which of the three possible RDS messaging groups will be displayed on the sign that is connected to the Inovonics 402. The options are: PS, the 8-character 'flashing' Program Service Name field; RT, the scrolling Radio Text message; or IH, the proprietary In-House scrolling text. Push and turn the knob to select, and then push the knob again to set the selection.



SIGN DISPLAY: RT

Keep in mind that the PS (Program Service Name) group is transmitted quickly and frequently. The RT (Radio Text) and IH (In-House) groups have a longer interval between transmissions and may take several seconds to buffer before they begin scrolling on the sign.

Selecting the Sign (Menu Screen 7)

The SIGN STYLE: menu offers several options, each associated with the serial data protocol of a particular marquee-style sign. These signs are identified by the name of the manufacturer in the list on the next page. The list also gives a representative model number that is known to work with the 402 Sign Driver Receiver. Not all signs from a giv-

en manufacturer may work with the 402. Consult the manufacturer to confirm control compatibility between a sign you wish to use and the model number shown.

1. Inovonics (4" x 24")
2. NEOplex (13-302)
5. Alpha (215, 4120 & others)

To select a sign from the SIGN STYLE: menu, push the front-panel knob to enter the menu, turn the knob to select your sign, and then push again to set the selection. Turn the knob slowly during this process; a lot of internal changes are made to accommodate the various signs.

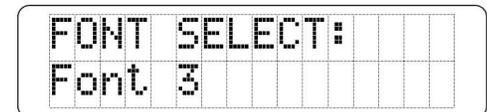
It is quite possible that unlisted signs will respond to one or more of these serial data protocols. Experiment to determine whether an 'oddball' sign can be used. As soon as the proper selection is made, the word Inovonics will show on the sign. When you push the knob to accept this selection, the sign will display either the incoming RDS text, or will say NO RDS if messaging is not being received.

Next you will set the sign display attributes, the font and the color. Note that when a sign is selected (or reselected), these attributes are reset to default values. Thus it is important to select the sign and lock-in that selection before making font or color changes.

Choosing a Font (Menu Screen 8)

Although scrolling marquee-style LED signs are rather crude dot-matrix displays, some limited font variations are possible. You must experiment here to get a bold font, an all-caps font, or simply a 'look' you desire. Different sign styles may or may not support or interpret the data sent from the 402 in the same manner.

Press the knob to enter the FONT SELECT: menu, and then turn the knob to pick a font. The font selection process puts the word Inovonics on the sign until the selection is confirmed. Be sure to examine the sign display carefully to determine that all characters are shown completely and correctly. You will need to press the knob again to set the selected font and return to the actual message. Repeat this sequence for as many of the selections as you care to try.



FONT SELECT:
Font 3

Color Choices (Menu Screen 9)

Generally, an LED marquee-type sign will employ bi-colored or multicolored LEDs. The possible combinations of the LED elements in each pixel afford a range of colors and brightness levels. The **COLOR SELECT:** menu allows certain variations in the sign presentation, and works in a manner similar to the **FONT SELECT:** menu.

Just as described for Menu Screen 8, above, you will need to experiment with the **COLOR SELECT:** attributes for different sign choices to determine which you prefer for a particular presentation. Use the front-panel knob in the same manner as described for **FONT SELECT:**.

Choices in the **COLOR SELECT:** and **FONT SELECT:** menus are dictated by what the sign supports. We make every effort to offer all possible font and color combinations that a particular sign may feature, but at the same time are limited to the native options included by the sign manufacturers.

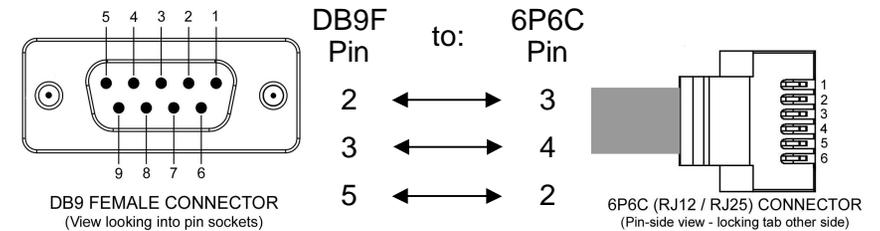
Section IV

TECHNICAL MATTERS

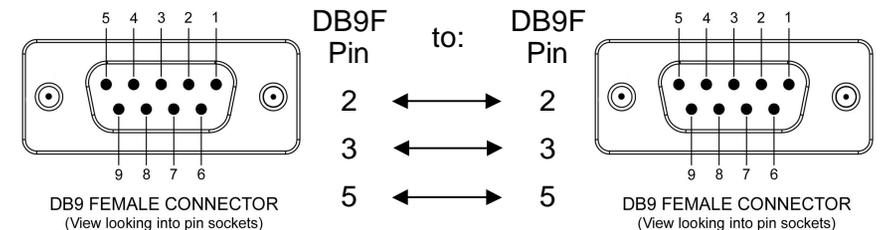
Sign Cable Pinouts and Connections

When the 402 is supplied with the optional sign from Inovonics, a proper cable is provided. Using the 402 with alternative signs shown in Menu Screen 7 will require an appropriate cable, *which will not be the cable provided with the sign*, but you may be able to use it by changing the connector at one end. The pinouts and the interconnections of the connectors are shown in the following diagrams.

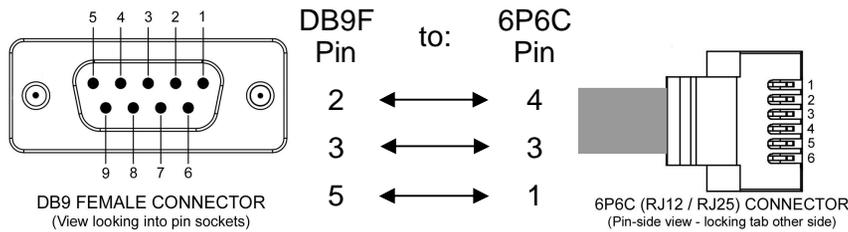
NOTE: It is very important to double- and triple-check the connections with an ohmmeter or buzzer box, making sure that there are no connections between the 402 and the sign that are *not* shown on these diagrams. *Only three wires from the sign should be connected to the DB9 female serial connector that plugs into the 402.*



Cable Connection for the Inovonics-Supplied Sign



Cable Connection for the NEOplex Sign



Cable Connection for Alpha Signs

Although the cable drawings call for a female DB9 connector, a male may be used, although pins 2 and 3 should be swapped at the DB9 end for the male connector.

Firmware Version

With the 402 powered-up and operational, hold down the front-panel knob for 5 to 10 seconds. The menu screen you have been viewing will be replaced by the ~~402~~ Firmware screen. This shows the firmware version installed in your unit, information that may prove important when communicating with the factory. Turning the knob when the 402 firmware version is displayed will reveal the firmware version of the DSP radio chip, another bit of information that might prove useful. Push the knob again to return to normal operation.

Firmware Reset

The 402 can be reset to factory defaults by holding-down the front-panel knob while power-cycling the unit (unplug and replug). All options programmed by the user and held in non-volatile memory will revert to the original factory settings.

'Under the Hood'

The Inovonics 402 Sign Driver Receiver is simple and small, 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, and an ultimate engine for destruction of your self-confidence at worst. 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, Inovonics' policy has always been one of 'full disclosure.' We feel that, unless we are doing something 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 402 for factory servicing or for firmware upgrades 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!

(Notes and Doodles)

(Notes and Doodles)



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 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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5805 Highway 9 • Felton, CA 95018 USA
Tel: (831) 458-0552 • Fax: (831) 458-0554
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Serving the broadcast industry since 1972