INOmini 633

FM / RDS Monitor Receiver

Installation & User Guide

FREQ: 96.9 FM:S
4A2D KWAV RF

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INOVONICS
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www.inovonicsbroadcast.com

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Section I

INTRODUCTION

Product Description

The INOmini 633 is an FM-only receiver for off-air broadcast monitoring and re-broadcast (translator) service. It receives standard analog FM broadcast transmissions and also decodes the digitized text and 'housekeeping' data that is transmitted to the North American RBDS (Radio Broadcast Data System) and European RDS (Radio Data System) standards. These both will be referred-to simply as 'RDS' in this manual, but differences are defined in a later section.

The front-panel, back-lighted LCD display is host to numerous menu screens, which enable easy setup of the 633, and display both signal quality and RDS RadioData information.

Product Features

Features of the Inovonics 633 include:

- Sensitive and selective DSP-based receiver.
- Receives worldwide-standard FM radio broadcasts and optional associated RDS data.
- Offers 'Extended-Band' coverage down to 76MHz.
- Easy setup using the LCD screen and jog-wheel navigation of the receiver's menu tree.
- Front-panel display of most-essential FM RDS information including RT+ 'tagging' data; USB port sends RDS data to any PC for analysis.
- Analog L/R and AES-digital program line outputs.
- Front-panel alarms with rear-panel 'tallies' for Carrier Loss and Audio Program Loss.

Product Specifications

Tuning Range: 76.0MHz – 108.1MHz in 100kHz steps

Antenna Input: 75-ohm (F)

Receiver Sensitivity: ≤ 10µV for 50dB monaural FM S/N

Audio Frequency Response: 30Hz–15kHz

FM De-Emphasis: 75µs/50µs selectable

RDS Fields Displayed: AF, CT, DI, M/S, PI, PS, PTY, PTYN RT, RT+, TA, TP; Groups Received

Program Audio Output(s): +4dBu balanced Analog Left/Right (XLR), 200-ohm source impedance; AES Digital (XLR), 44.1kHz sampling rate; Front-Panel Headphone Jack (3.5mm TRS)

USB Port: Raw RDS data for external analysis (software provided)

Alarm Tallies: Individual open-collector NPN transistor outputs for Carrier Loss and Audio Loss

Power Requirement: 12VDC at 140mA. A 'wall-outlet transformer' (WallWart®) switching-type 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 633 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 633 receiver, inspect for any 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, including software/ firmware updates. Register online at:

www.inovonicsbroadcast.com/product-registration

Mounting

The Model 633 receiver is packaged in a compact 'clamshell' chassis that defines the standardized Inovonics' INOmini module. The 633 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 633 to be fastened to the inside of an equipment rack cabinet with two #4 screws.

An optional rack-mount kit is available for the 633, 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.

AC Mains Power

All Inovonics INOmini modules are supplied with an outboard switching-type power supply suited to the destination mains voltage. As the actual power consumed by the receiver is 140mA at 12 volts DC, a second DC connector on the rear panel of the 633 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 633 receiver 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 633 receiver will be used in the immediate proximity of broadcast transmitters, 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. Please refer to Section III of this manual for easy setup and receiver programming instructions.

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 at a comfortable level, push the knob to return to the previous menu.

RDS Data Port

The front-panel mini-USB connector delivers raw RDS data to any PC running the supplied analysis software. A con-

necting cable is also included. See Section IV for particulars concerning this feature.

Rear Panel Connections

ANTENNA

The rear-panel 'F' connector should be connected to a good outdoor FM antenna for best reception. Although the antenna input is norminally 75 ohms, experience has shown that 75-ohm and 50-ohm antennas performs equally well without additional impedance-matching efforts.

G +5 A C

These are alarm "tally" outputs for remote indication of reception problems. Designations are also noted on the rear panel and stand for Ground, +5 DC volts, Audio Loss and Carrier Loss.

The two alarm outputs are the collectors of NPN transistors that saturate to ground for an alarm condition. Up to 100mA may be 'sunk' by each of these outputs to operate relays or LED indicators using an external voltage source up to 24VDC, which must be returned to the G (Ground) terminal. The +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.

AES DIGITAL AUDIO OUTPUT

The balanced, transformer-isolated AES digital audio output has a fixed sampling rate of 44.1kHz.

ANALOG LINE OUTPUTS L/R

The active-balanced analog line outputs provide a program level of +4dBu at 100% modulation (±75kHz deviation of the FM carrier by a monaural, 400Hz tone). These outputs have a 200-ohm source impedance.

+12VDC POWER I/O

These two parallel connecters 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 'pig-tail' cables are provided with each rack adapter.

The Model 633 receiver draws 140mA. Check the rating on the label of the power supply to make sure it has enough oomph for the 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 if this is considered a problem.

Section III

OPERATING THE 633 RECEIVER

Hey, why is the screen flashing?

The 633 has two alarms that indicate reception problems. These are detailed later in this section, but you may encounter one or both as soon as you power up the receiver. These alarms identify a problem and flash lighted blocks on and off, making the alarm quite visible even across the room.

If the 633 has not yet been tuned to a station, the LOW SIGNAL and/or AUDIO LOSS alarms will begin to flash soon after the receiver is turned on.
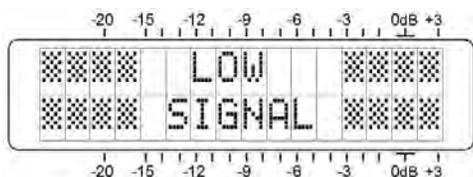
If you push or turn the knob, you will get a few seconds respite from the flashing, enough time to navigate to any of the setup menus. Of course, once a station has been tuned-in properly the alarm condition will be reset.

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 entry is made.

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

NOTE: Flashing alarms are not to be confused with 'blinking' menu callouts that indicate options for editing.

Menu Navigation Basics

By the time you've read this, you've probably already figured out the 633 receiver menu for yourself; it's really quite intuitive. Quite simply: 1) *turn* the knob to navigate from one menu to the next, 2) *push* the knob to enter any menu associated with receiver setup, 3) *turn* the knob to set a value, and then 4) *push* again to accept the selection, send it to 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. Turn the knob to make your choice, and then push once again to transfer that selection to memory.

Each Model 633 menu screen will be discussed separately and in order, except that the last menu is discussed first, as it could be a show-stopper!

Locked Menus (Menu Screen 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 receiver setup parameter, go all the way to Menu Screen 21, 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 were trying to edit.
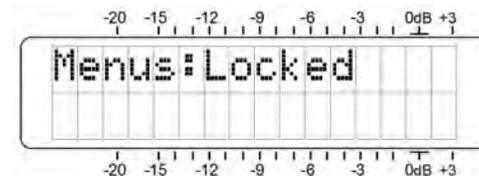
Tuning the Receiver (Menu Screen 1)

When power is applied to the 633 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 as it might appear when the receiver is first powered-up, but before it has been programmed.
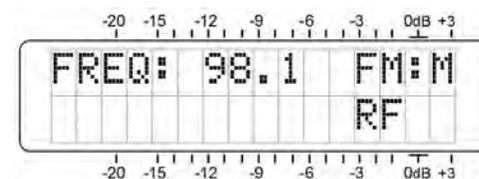
Push the knob and FREQ will begin to blink. Now the receiver may be tuned by turning the knob. When tuned to an FM station, FM:S (stereo), FM:B (blended stereo, see Page 13) or FM:M (monaural) transmissions will be verified in the upper,

right-hand corner. A series of bars to the right of RF will give a rudimentary display of incoming carrier strength.

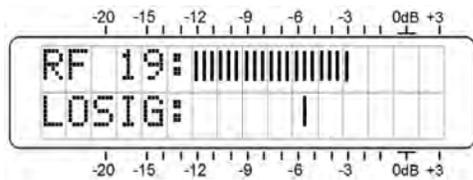If the station is transmit-ting an RDS (Radio Data System) subcarrier, the station PI (Program Iden-tification) hexadecimal code will appear on the LCD screen below FREQ. In North America, where the PI code is actually derived from station call letters, those call letters will be decoded and displayed to the right of the PI hex value.

```
  -20  -15  -12   -9   -6   -3  0dB +3
   |    |    |     |    |    |    |   |
  FREQ:101.1    FM:S
  3ED9 KRTH     RF.ııl
   |    |    |     |    |    |    |   |
  -20  -15  -12   -9   -6   -3  0dB +3
```
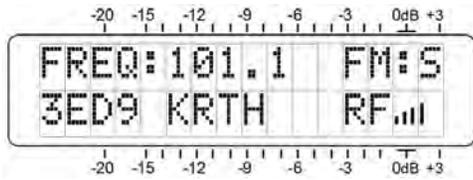
Once the receiver is tuned, push the jog wheel. FREQ will stop blinking and the tuned frequency will be transferred into non-volatile memory. This releases the jog wheel to navigate to other menus.

Carrier Strength and Alarm (Menu Screen 2)

The RF bargraph at the top of this menu screen shows incoming signal level. There is an RF numerical value given as well, but this number represents only the number of active bargraph segments, which can be used as a comparative reference. This display is simply a *relative* indication of the FM carrier strength and has no association with the dB scale beside the LCD win-dow. The dB scales are used only for audio level measure-ments in Menu Screen 5.

```
  -20  -15  -12   -9   -6   -3  0dB +3
   |    |    |     |    |    |    |   |
  RF 19:|||||||||||||||
  LOSIG:            |
   |    |    |     |    |    |    |   |
  -20  -15  -12   -9   -6   -3  0dB +3
```

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

During normal receiver operation, whenever the RF: bar-graph falls below the tic mark, LOW SIGNAL will flash on the LCD screen and a carrier-loss alarm will be sent to the rear-panel connector. The rear-panel C terminal gives an NPN transistor saturation to ground on this alarm, which may be used to actuate a relay, light a remote LED indicator or tie into a remote control system.

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

Signal-to-Noise and Multipath (Menu Screen 3)

This screen displays two additional signal-quality measure-ments. Numerical values are assigned to each of these readouts as well, but again signify only the number of active bargraph segments.
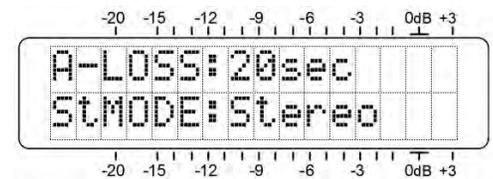
SN is a first-order approximation of the signal-to-noise qual-ity of the tuned signal. This measurement takes several signal quality factors into account, but is strictly a relative indication. No hard-and-fast rule can be derived from this display, except for "more is better."

Similarly, MP gives a relative indication of the multipath (signal reflection) effects that the transmission encounters in its trip to the receiver. Multipath distortion is an im-portant factor in the quality of the recovered audio program with respect to noise and other audible artifacts. The object here is to keep MP as low as possible. Zero would be nice and should be attainable when a good signal is received.

The SN and MP numerical values are handy to keep track of when installing a rooftop or tower-mounted antenna. In lo-cating, orientating and aiming the antenna, do everything you can to maximize SN and minimize MP.

The Audio Loss Alarm (Menu Screen 4A)

Navigate to this Screen and push the knob. A-LOSS: will begin to blink. Turn the knob to dial-in the desired audio loss alarm delay time,

```
  -20  -15  -12   -9   -6   -3  0dB +3
   |    |    |     |    |    |    |   |
  A-LOSS:20sec
  StMODE:Stereo
   |    |    |     |    |    |    |   |
  -20  -15  -12   -9   -6   -3  0dB +3
```

which is the time in seconds between the onset of 'dead air' and a flashing LCD and rear-panel alarm. The delay may be programmed in one-second increments up to 2 minutes.

You may turn the knob completely counterclockwise to OFF to deactivate the alarm altogether.

The trip point of the audio loss alarm is fixed at a program peak level about 15dB below 100% modulation. Even classical music will have peaks that exceed this level regularly. Do consider the dynamics of the broadcast format when setting this delay. For classical music a setting of 60 seconds would probably still exceed most legitimate *pianissimo* passage; Ravel's *Bolero*, unprocessed, a possible exception.

The rear-panel A terminal is an NPN transistor saturation to ground for an audio-loss alarm. This ground may be used to actuate a relay, light an LED at a remote location or tie-in to a remote control system.

FM Reception Modes (Menu Screen 4B)

Once A-LOSS: has been set, push the knob again. StMODE will begin to blink on the lower line of Menu Screen 4. To set the FM mode, turn the knob to select Stereo, generally the normal receiver operating mode, or to select Blend-St (blended stereo) or F-Mono to force monaural FM reception.

With Stereo selected, the receiver will attempt to decode any FM stereo transmission regardless of signal quality. In the Stereo mode, the noise-reducing stereo-to-mono 'blend' feature, common to most modern FM receivers, is *not* engaged. The mode display in Menu 1 will show FM:S for stereo broadcasts and FM:M if the station is transmitting a monaural signal.

Stereo-FM suffers a theoretical noise disadvantage of about 20dB when compared with monaural transmission. Selecting the Blend-St reception mode will mitigate this condition substantially by progressively 'blending' the stereo image to mono as the FM signal deteriorates under a low-signal, multipath or other poor reception condition. This mode is identified with FM:B in Menu Screen 1.

The degree of blending is not indicated, nor will the screen indicate FM:M if the station reverts to a monaural transmission. In the FM:B (blended) mode, you may switch among the three options to evaluate the audible differences: either a noise tradeoff between Blend-St and Stereo, or the separation tradeoff between Blend-St and F-Mono. The blending option is included in the 633 to at least offer a feature

common to consumer radios, but it well may be considered "cheating" in a professional environment.

F-Mono, or Forced-Mono, will place the 633 receiver in a monaural-only reception mode. This might be a valid choice when monitoring or relaying a station that never broadcasts in stereo.

Program Audio Levels (Menu Screen 5)

Menu Screen 5 gives a bargraph presentation of program audio levels. This is a peak-responding meter with a floating peak-hold function.
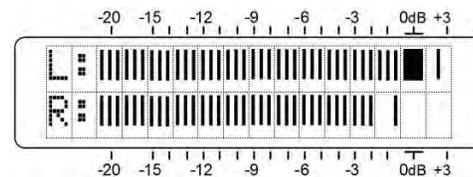
100% modulation is denoted by the large block opposite the 0dB marking on the panel. The meter resolves +1, +2 and +3dB above 0dB. Below 0dB the scale is linear in 0.5dB steps down to –15dB, and then in 1dB steps to –21dB.

0dB represents ±75kHz carrier deviation. A 400Hz monaural test tone would take the meter to the 0dB point. At higher frequencies receiver de-emphasis must necessarily be factored into the reading, and of course with stereo broadcasting the 19kHz pilot consumes the top 1dB of modulation. Aggressively-processed program audio should peak the bargraphs consistently at about –1.5dB.

Headphone Monitoring (Menu Screen 6)

A front-panel PHONES jack offers a convenient monitoring point for 633 setup and casual listening. Whenever a pair of headphones is plugged into the front-panel jack, the LCD screen automatically goes to Menu Screen 6. HEADPHONE VOL will begin blinking and the panel knob may be adjusted for a comfortable listening level.

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

PS and PTY (Menu Screen 7)

The upper line of Menu Screen 7 shows the station's 8-character PS:, or Program Service Name message. This can

be a *static*-PS message, perhaps simply the station's call letters: WREN-FM or a 'street name' like LIVE-95.

Many stations scroll a PS message in 8-character blocks, this is *dynamic*-PS messaging, which can include song title and artist information, program promos or even advertising.

The lower line identifies the decoded PTY: (Program TYpe), which is the station's programming format defined by one of about thirty choices within each of the RDS or RBDS Standards.

These are display fields only, nothing can be edited here.

Radio Text (Menu Screen 8)

Menu Screen 8 displays Radio Text, a 64-character message that is displayed on consumer receivers that have a TEXT or INFO button. The Radio Text message is separate from, and in addition to, the PS field, which is used by many stations to scroll artist and song titles so that they will be visible on all RDS-equipped receivers. The Radio Text field may also present artist and title data, but is often used for static information such as the station's telephone number or web address.
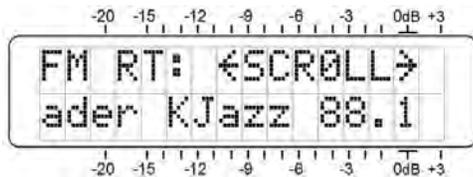
Radio Text automatically scrolls in Menu Screen 8, but by pushing the knob the user can manually scroll back and forth through the 64 characters, rather than having them scroll by themselves.

RT+ "Tagging" (Menu Screens 9 and 10)

"Tagging" is the process of identifying certain data within the Radio Text field, such as song title and artist. The tagged info must appear as plain text within the 64-character message and is 'tagged' with a numerical code that defines its location within the 64-character block. This code is then transmitted in the RT+1 and RT+2 fields. These fields are decoded by the 633 and shown in plain text in Menu Screens 8 and 9. The example here could be a typical Menu 9 display.
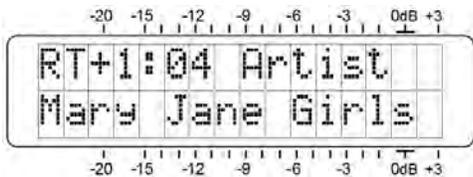
The 04 in this example refers to the RT+ Item Number, which in this case is Artist. The second line names the performer. If the group name overruns the LCD display, simply push and turn the knob to scroll through the full text. Push again to navigate the menus.

Here, Menu Screen 10 gives a similar display for the RT+2 tag. In this case it's RT+ Item 31, the "short name" of the station. Hot 92.3 is being sent to receivers during a commercial cluster. Again, if the tag is too long for the LCD, push and turn the knob to scroll through the entire text; push again to resume menu navigation.
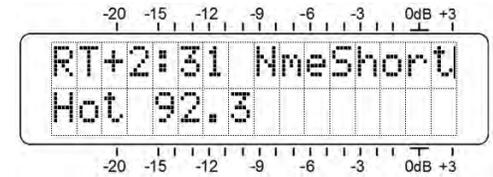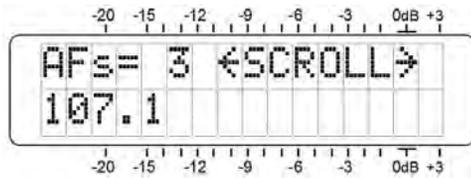
As shown in the RT+2 example above, tagging is not restricted to song information. Telephone numbers, e-mail addresses, station IDs and many other RT+ 'items' may be tagged. With tagging, a listener simply pushes a button on his radio to automate the purchase of a song download or to retain a phone number or Web address in the memory of his portable device. Later, when docked with an Internet connection, his radio can assist in downloading music or allow the user to place a call or find a Website of interest with minimum effort.

The AF List (Menu Screen 11)

A feature of the Radio Data System is its ability to retune the listener's radio to a different frequency where the identical program is available under better reception conditions. This is most useful in Europe, where nationwide networks utilize a number of low-power transmitters to cover the entire country. In the US, "translators" rebroadcast a station's program at another frequency to fill dead spots in the primary coverage area.

This useful feature is managed by the Alternative Frequency List. The main channel and all other appearances of the same program use RDS to send out a listing of all frequencies where the program can be received. The RDS radio constantly monitors these 'alternative' frequencies, decides which one might give better reception, and then seamlessly switches to the better signal.

Menu Screen 12 shows how many Alternative Frequencies carry the identical programming, and in sync of course, with the one being received. The user may scroll through this list to confirm that the proper frequencies have been entered into the RDS encoder.

```
-20  -15   -12    -9    -6    -3   0dB +3
 |  |  |  | | | | | | | | | | |  |  |
AFs= 3 <SCROLL>
107.1
 |  |  |  | | | | | | | | | | |  |  |
-20  -15   -12    -9    -6    -3   0dB +3
```
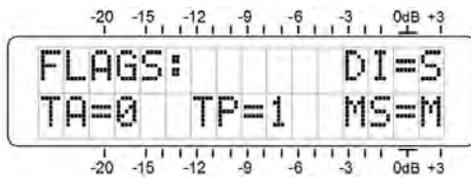
The Clock-Time Function (Menu Screen 12)

Another utility of RDS is to set the listener's radio clock to the current local time. This is a double-edge sword, however, as a change in time zones within the broadcaster's primary coverage area could cause trouble and alienate listeners. For this and other reasons, many broadcasters feel a responsibility *not* to implement the CT utility of RDS.

Nonetheless, the 633 gives the user the option of monitoring the CLOCK (CT) function. Push the knob to activate scrolling and view the current

```
-20  -15   -12    -9    -6    -3   0dB +3
 |  |  |  | | | | | | | | | | |  |  |
CLOCK    <SCROLL>
13:41 UTC-08 Mon
 |  |  |  | | | | | | | | | | |  |  |
-20  -15   -12    -9    -6    -3   0dB +3
```

time, the offset from Universal Coordinated Time, and the day of the week, day, month and year.
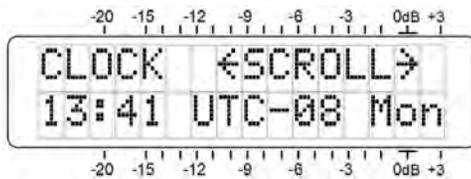
RDS 'Flags' (Menu Screen 13)

The Radio Data System performs certain housekeeping functions to convey simple status information to the receiver. These RDS 'flags' may be observed on this screen. A typical example is shown here and is explained as follows.

```
-20  -15   -12    -9    -6    -3   0dB +3
 |  |  |  | | | | | | | | | | |  |  |
FLAGS:        DI=S
TA=0   TP=1   MS=M
 |  |  |  | | | | | | | | | | |  |  |
-20  -15   -12    -9    -6    -3   0dB +3
```

DI=S signifies this is a 'normal' stereo transmission. There are several, somewhat obscure alternatives; this is what you'll see in any common instance.

TA=0 means that no Traffic Announcement is currently being broadcast by the station. A Traffic Announcement is a short-duration verbal alert for road hazards, etc. Raising the TA=1 flag automatically tunes all RDS radios to the station broadcasting the alert.

TP=1 indicates that this is a station that carries traffic information as a normal element of its broadcast programming. If the station sends a TP=0 flag, it disregards traffic and thus cannot participate in the TA flag program.

MS=M shows the condition the 'music/speech' switch. This differentiates between broadcasts with mixed music and speech, and all-speech programming. An all-news station might send: MS=S, but this would be very rare.

PTY Name (Menu Screen 14)

The basic RDS PTY (Program TYpe) function identifies 'programming type,' known as 'format' in the US, from a list of thirty or so fixed categories. The station's PTY is shown on Menu Screen 7. Consumer radios can be programmed to search automatically for available programming based on the PTY set(s) of identifiers.

PTYN is an 8-character optional identifier used to further define the Program Type (PTY). It is not used by the receiver to search for a specific

```
-20  -15   -12    -9    -6    -3   0dB +3
 |  |  |  | | | | | | | | | | |  |  |
PTYN:BIG BAND
 |  |  |  | | | | | | | | | | |  |  |
-20  -15   -12    -9    -6    -3   0dB +3
```

format, but once the receiver is tuned to the station, PTYN can further detail the type of programming and display it on the radio faceplate.
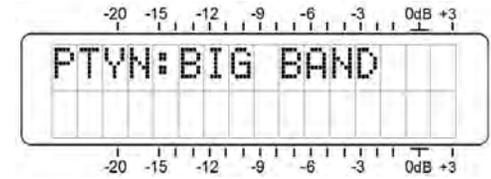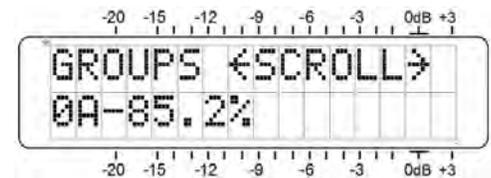
Menu Screen 14 displays the optional PTYN if this information is being sent. In the example above, a jazz station might send BIG BAND during a daypart period that focuses on music of the 1940s.

RDS Groups Received (Menu Screen 15)

This screen will show a listing of the RDS data groups that the station is transmitting. Groups are numbered zero to 15, with an A and a B version in each group. Only the groups being transmitted will show on the list.

Push and turn the knob to scroll through the groups. Active ones will show what percentage of RDS overhead they are using. The bulk of RDS functionality is handled by just a few groups; others may be

```
-20  -15   -12    -9    -6    -3   0dB +3
 |  |  |  | | | | | | | | | | |  |  |
GROUPS <SCROLL>
0A-85.2%
 |  |  |  | | | | | | | | | | |  |  |
-20  -15   -12    -9    -6    -3   0dB +3
```

employed on a sporadic basis. Groups the station transmits will appear on the list, but some may indicate 0.00% activity at the moment.

PTY Type (Menu Screen 16)

The PTY (Program TYpe) function of the RDS system lets a listener put the search for preferred programming entirely into the hands of his radio. Two PTY lists define 'Station Format' (N. America) or 'Program Type' (Europe). The regional/cultural basis for separate lists remains the primary difference between the North American RBDS and the European RDS Standards. An RDS radio will display items from a different list of programming choices depending on what market it has been manufactured for.

The 633 receiver is able to decode PTY from either list and display the proper description of programming in Menu Screen 7. Push the knob on this screen and PTY TYPE will begin to blink. Turn the knob to specify either the North America or the Europe list, and then push the knob again to transfer the choice to memory.

Program Audio De-Emphasis (Menu Screen 17)

De-emphasis for the program audio is selected here. 75µs (75-microsecond) de-emphasis is standard for the Western Hemisphere, and 50µs for Europe and most of the rest of the world. Push and turn the knob to select, push again to set in memory.
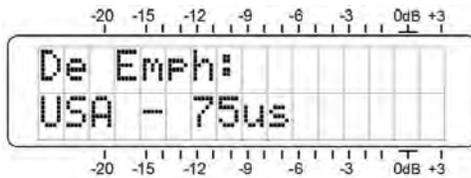
Audio High-Cut Filter (Menu Screen 18)

The 633 receiver incorporates a user-selectable and gentle low-pass filter that may be inserted into both the L/R analog and AES digital line outputs. This filter allows the user to roll off the higher audio

frequencies at his discretion to reduce the audibility of hiss-type noise under poor reception conditions.

The default setting for this filter is Disabled. As may be required, however, it can be set for an HF cutoff of 15kHz, 10kHz, 8kHz, 6kHz, 5kHz and 4kHz.

The cutoff frequency shown in this menu is approximately the -3dB point of the filter. The filter slope is not a straight-line function, becoming steeper as the frequency increases. Before implementing this fixed HF rolloff to reduce noise, you might first try the automatic stereo-to-mono 'blending' option afforded in Menu Screen 4: StMode:Blend-St. This is a program-controlled function that reduces stereo separation (hence, noise) only under poor reception conditions.

IF Bandwidth Control (Menu Screen 19)

This menu is a bit of a misnomer, as this DSP-based receiver really doesn't have an intermediate frequency (IF) as such. But the utility of this menu equates to the same function in a traditional analog receiver.

The maximum reception bandwidth of the 633 receiver is ±110kHz. The default setting, however is Auto (automatic). In this mode receive bandwidth is subject to restriction based on signal reception conditions. The receiver pulls in the band edges as either the high-frequency noise component of the baseband signal increases or as the signal from an adjacent channel encroaches.
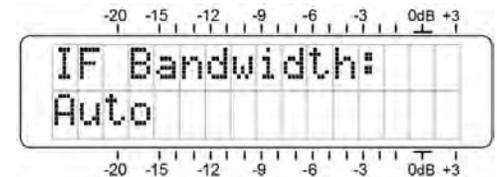
Fixed bandwidth values may be manually selected as well. Push and turn the knob to select: 110kHz, 84kHz, 60kHz or 40kHz. Unlike AM radio, you won't hear the high frequencies roll off as receive bandwidth is reduced. Instead, stereo separation and harmonic distortion performance will be compromised to a greater or lesser extent. If the Auto setting is not effective in lessening 'splatter' from an adjacent channel, try the lower cutoff frequencies to reduce interference. When a setting is selected, push the knob again to set in memory.

USB Baud Rate (Menu Screen 20)

This screen is for setting the UART baud rate for USB communication between the 633 receiver and a PC connected with the provided cable. The

```
-20  -15  -12  -9  -6  -3  0dB +3
BAUD RATE:115200
UART Bits/sec
-20  -15  -12  -9  -6  -3  0dB +3
```

default baud rate for this connection is 115200. With nearly all PCs sporting USB 2.0 ports, and with the relatively short USB cable provided, there should rarely be a reason to run at one of the lower rates. Nevertheless, should communication at 115200 prove dodgy, or if the connected PC cannot run the provided analysis software reliably using that data rate, the baud rate can be reduced to 57600, 38400, 19200 or 9600. Push and turn the knob to change the rate, push again to set in memory.
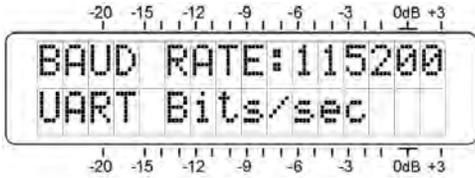
Section IV

USING THE ANALYSIS SOFTWARE

(This section is in preparation.)

TECHNICAL MATTERS

Firmware Version

With the 633 powered-up and operational, hold down the jog wheel knob for 5 to 10 seconds. The menu screen you have been viewing will be replaced by the `633 Firmware` screen. This shows the firmware version installed in your unit, information that may prove important when communicating with the factory. Turning the knob will reveal the version of the DSP radio chip. Push the knob again to return to the Menu Screens.

'Under the Hood'

The Model 633 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. 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 underhanded, 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 light, returning the 633 receiver for factory servicing or 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!

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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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