

# OPERATING AND MAINTENANCE INSTRUCTION MANUAL



## RDS/RBDS “MINI-ENCODER”

April, 2009  
(Initial Release – Rev. 1 Firmware)

## TABLE OF CONTENTS

Section I - INTRODUCTION .....	1
<b>Product Description • Product Features     Product Specifications</b>	
Section II - THE RADIO DATA SYSTEM .....	5
<b>What is RDS, Anyway? • US vs. Europe</b>	
Section III - INSTALLATION AND SETUP .....	6
<b>Unpacking and Inspection     Warranty Registration • Mounting     AC Mains Power     Radio Frequency Interference (RFI)     The Front-Panel LCD Readout     INJECTION LEVEL Control     Rear Panel Connections     Connecting the Encoder     Stereo Pilot Requirement     Setting the RDS Injection Level</b>	
Section IV - PROGRAMMING THE ENCODER.....	13
<b>Computer Requirements     Installing the Software     Starting the Programming Software     Exploring and Setting Up Menu Bar Options     File Management • Device Selection     Tools • Format • Help • Entering Data     Sending Data to the Encoder     Reading Data From the Encoder</b>	
Section V - TECHNICAL MATTERS .....	24
WARRANTY .....	(inside back cover)

# Section I

## INTRODUCTION

### Product Description

The **INO<sub>mini</sub> 703** is Inovonics' third-generation "Mini-Encoder" for the *Radio Data System*, or RDS. The 703 enables the FM broadcaster to implement many of the important RadioData functions with maximum ease and at a minimum of expense.

When the European Radio Data System was adapted for use in the U.S. it was renamed the *Radio Broadcast Data System*, or "RBDS," to differentiate it from the European standard. Differences between the two versions were gradually reconciled, and the term "RDS" may now be legitimately applied to the system as practiced worldwide.

### Product Features

Features of the Inovonics 703 include:

- Scrolling-PS messaging is automatically 'parsed,' or divided into word groups for proper presentation on radio faceplates.
- IDs, flags, static and scrolling messages are held in non-volatile memory. This allows the encoder to be programmed with any PC, whenever and wherever it's convenient, and then unplugged and relocated to a remote transmitter site.
- Programming software runs under Microsoft Windows® with easy USB connectivity. Software is supplied on a CD-ROM or may be downloaded from the Inovonics Website. All programming may be verified with the front-panel LCD readout.
- The 703 locks to the 19kHz stereo pilot from a composite/MPX sample; a dedicated stereo-gen 'sync' port is not necessary for operation. However, a composite/MPX signal (or 19kHz sample) must be provided for the encoder to generate the 57kHz RDS subcarrier..

### Product Specifications

**Standards Supported:** European CENELEC and United States NRSC.

**RDS Applications Supported:** Groups 0A and 2A, which include the following RDS features:

- PS Program Service Name** - the station identifier actually displayed on the radio faceplate. This may be a fixed display with the station's call letters: *WXYZ-FM* or its 'street name': *LIVE 105*, or a dynamic, 'scrolling' ID of up to 128 characters: *LIVE 105 PLAYING THE GREATEST OLDIES FROM THE PAST AND THE BEST HITS OF TODAY.*
- PI Program Identification** - identifies the station with a unique hexadecimal code, its 'digital ID.' In North America this is mathematically derived from station call letters. The required calculation for US and Canadian stations is done within the Model 703 software. In other countries the PI is assigned by an appropriate radio authority and entered manually.
- PTY Program Type** - PTY identifies the station format from among 30 predefined categories. The PTY code helps a 'smart' radio search for the listener's preferred variety of programming. The PTY code represents the primary difference between the European and American systems, as each system has a different list of station program format varieties. Both lists are supported by the Model 703 and the proper list is presented automatically when the RDS or RBDS operating mode is selected.
- AF Alternative Frequency List** - a utility that can identify up to twenty-five rebroadcast 'translators' or network sources of the identical program that is being broadcast simultaneously at different frequencies. The AF list helps RDS radios automatically re-tune to the strongest signal carrying the programming.
- RT Radio Text** - a 64-character block of plain text that the listener can call up to scroll across the front panel of RDS radios that have a TEXT or INFO button. Radio Text can be used for promos, contests or advertising, and is additional to, and independent of,

“scrolling-PS.” Scrolling-PS is a feature that does not depend on receiver functionality for its message display. Scrolling-PS and Radio Text are simultaneously supported by the Model 703.

**M/S Music/Speech Switch** - this RDS flag indicates either mixed-music programming or all-speech transmissions. The importance of this particular feature eludes even the all-knowing Inovonics technical staff; doubtless rooted in European protocols.

**DI Decoder Identification** - a flag that informs the receiver whether the program is in stereo or mono (as if it didn't already know!).

**RDS Applications NOT Supported:** Please appreciate that the very simple and inexpensive nature of the Model 703 renders it of limited utility in revenue-generating RDS applications such as Radio Paging (RP), Location and Navigation (LN), Clock Time and Date (CT), In-House (IH) applications, Traffic Announcements (TP/TA) and the Emergency Warning System (EWS). The Inovonics 703 does not support the Universal Encoder Communications Protocol (UECP), nor can it be used for on-line “dynamic” data transmissions such as song title/artist, etc. Other Inovonics RDS encoders do provide these advanced features, so please visit [www.inovon.com](http://www.inovon.com) for additional details on full-function RDS encoders and our other exciting products.

**RDS Output:** The subcarrier level is adjustable between zero and 3 volts p-p from a 75-ohm source. The auxiliary wideband input of the exciter/transmitter should have a ‘bridging’ characteristic.

**MPX Sample Input:** This unbalanced, bridging input only *samples* the composite/MPX output of the stereo generator to acquire and lock to the 19kHz stereo pilot. *Program audio is not looped-thorough the Model 703 encoder.* An MPX level between 0.5 and 5 volts p-p is required, this level with reference to 100% modulation or  $\pm 75$ kHz carrier deviation.

In the event that the stereo generator is incorporated as part of the exciter (i.e.: digital exciter), such that a composite/MPX feed is not available, a 19kHz TTL-level pilot sync signal may also be applied to this input.

**Programming Port:** A rear-panel USB B-type connector cables to the A-type USB port of an IBM-compatible PC. A generous interconnect cable is thoughtfully provided.

**Power Requirement:** 12VDC at 150mA. A ‘wall-outlet transformer’ (WallWart®) switching-type power supply appropriate to the destination AC mains voltage is provided, along with a short DC power cord to allow this 703 to be ‘daisy-chained’ with another **INOmini** module as propriety demands.

**Mounting Options:** The 703 may simply be fastened to any convenient surface with two small screws, although an optional rack adapter is available that may be used to rack-mount up to three **INOmini** modules in a 1U space.

**Size and Weight:** 1.6”H x 55”W x 5.5”D; 4 lbs. shipping weight.

## Section II

### THE RADIO DATA SYSTEM

#### What is RDS, Anyway?

RDS is a digital data channel transmitted as a low-level, double-sideband, suppressed-carrier ‘subcarrier’ at 57kHz. The data transmission rate is a modest 1100 baud, but transmission is quite robust, thanks to data redundancy and error correction algorithms.

It is not within the scope of this Manual to offer a tutorial on RDS coding and modulation details. For this, see either the CENELEC EN50067 or the corresponding United States NRSC Standard. The balance of this Manual deals specifically with RDS implementation afforded by the Inovonics 703 encoder.

#### US vs. Europe

The European Broadcasting Union (EBU) and its member countries developed the concept of transmitting data along with commercial radio broadcasts. The first European RDS specification was published in 1984 and has been revised several times since.

Following its initial introduction, RDS quickly grew in use throughout Europe. By the late 1990s it was hard to find a European FM station *without* a radio data subcarrier.

The popularity of RDS in Europe reflects a ‘network’ approach to broadcasting that is still practiced in many countries. A disposition toward large numbers of lower-power transmitters to blanket a designated service area can be found both at the national network and ‘local radio’ levels.

The European concept of a *service area* equates to a US broadcaster’s *market*. The semantic difference between these designations further delineates broadcasting practices. RDS benefits the European broadcaster through an altruistic endeavor to be of *service* to his listeners. The US broadcaster is *marketing* his programming, and is more concerned in how he can make additional profit from RDS and other subcarriers.

## Section III

### INSTALLATION AND SETUP

#### Unpacking and Inspection

Immediately upon receipt of the equipment, 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 case return for Warranty repair is required. Shipping damage sustained as a result of improper packing for return may invalidate the Warranty!

#### Warranty Registration

It is important to complete and return the Warranty Registration Card included with this Manual, or to register the Warranty online at [www.inovon.com](http://www.inovon.com). Not only does registration assure coverage of the equipment under terms of the Warranty (posted inside the back cover), but the user may automatically receive specific service and modification instructions, including any software or firmware updates.

#### Mounting

The Model 703 RDS encoder is packaged in a compact ‘clamshell’ chassis that represents the standardized Inovonics’ **INO<sub>mini</sub>** module. The 703 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 encoder. Alternatively, a pair of mounting holes on the chassis base allow the 703 to be fastened to the inside of an equipment rack cabinet with two screws.

An optional rack-mount kit is available for the 703, which can house up to three **INO<sub>mini</sub>** modules. The kit comes with blanking panels for unused spaces.

#### AC Mains Power

The Model 703 is supplied with an outboard switching-type power supply suited to the destination mains voltage. As the actual power consumed to the encoder is 12 volts DC at 150mA, a second DC connector on the rear panel of the 703

permits 'daisy-chaining' **INOmini** modules. This gives the option of operating two or more units from the same AC supply. Be sure always to compare the total input power specification of any assortment of **INOmini** modules against the power supply rating so as not to tax the supply.

### Radio Frequency Interference (RFI)

Although we have anticipated 703 installation in the immediate proximity of a broadcast transmitter, please do practice some care in locating the unit away from *abnormally* high RF fields, lest the chassis melt, etc.

Because the RDS OUT and MPX IN connections are unbalanced, there is a chance that an RF ground loop could be formed during the programming operation while the 703 is temporarily connected to the computer. Always disconnect the computer when programming has been completed.

### The Front-Panel LCD Readout

Two front-panel MENU buttons scroll the LCD up and down through the various viewing options to verify encoder setup.

**NOTE:** When the 703 is *not* connected to a composite/MPX sample or other source of 19kHz stereo pilot sync, a NO PILOT LOCK alarm begins to flash after about 10 seconds. Pressing either button will reset the flashing alarm for another 10 seconds so that menu items may be read easily. This alarm in no way interferes with encoder programming or setup confirmation, but it does serve to indicate that no RDS subcarrier is being delivered to the transmitter.

Presented here is a brief listing of the encoder programming options that may be confirmed as the LCD is cycled through the different display screens with the front-panel buttons. These categories were described beginning on Page 2, and are further detailed in the Programming section of this manual on the indicated pages.

PS This may be either an 8-character static ID (call letters or 'street name'), or a scrolling message (up to 128 characters) that will be displayed on all RDS receivers, as well as on cell phones and MP3 players that are equipped for FM/RDS reception. (Page 20)

DPSS	This number indicates the speed at which the scrolling-PS message is sent to the receiver, 1 being the slowest rate and 9 the fastest. A setting of 5 is the recommended maximum, however, as faster rates have been known to cause display errors on some receivers. (Page 22)
RadioTxt	Radio Text is the separate 64-character message that can be called-up only on those radios equipped with a TEXT or an INFO button. The Radio Text message is usually reserved for the station's Web address or phone number. (Page 20)
PI	The hexadecimal "digital address" of the station. (Page 19)
CALL	Call letters for US and Canadian stations only. (Page 19)
PTY	This identifies the station's program format. (Page 19)
MS	The Music/Speech switch. (Page 17)
DI	Decoder Information; that is, monaural or stereo transmission. (Page 17)
PILOT	The LCD will indicate PILOT IS LOCKED when the 703 is connected to a signal source that includes the 19kHz stereo pilot, and will show PILOT IS MISSING when a valid input is <i>not</i> present.
AF1 through AF25	These are the Alternative Frequencies of network affiliates or rebroadcast translators, where the very same program can be heard synchronously. (Page 21)
PARSE	Scrolling message parsing options: 0 (normal), 1 or 8. (Page 21)
REV	The encoder firmware revision number is displayed here.

## INJECTION LEVEL Control

This 15-turn potentiometer sets the RDS subcarrier output level to any required value between zero and 3 volts p-p. Refer to the measurement notes in the setup procedure on Page 11.

## Rear Panel Connections

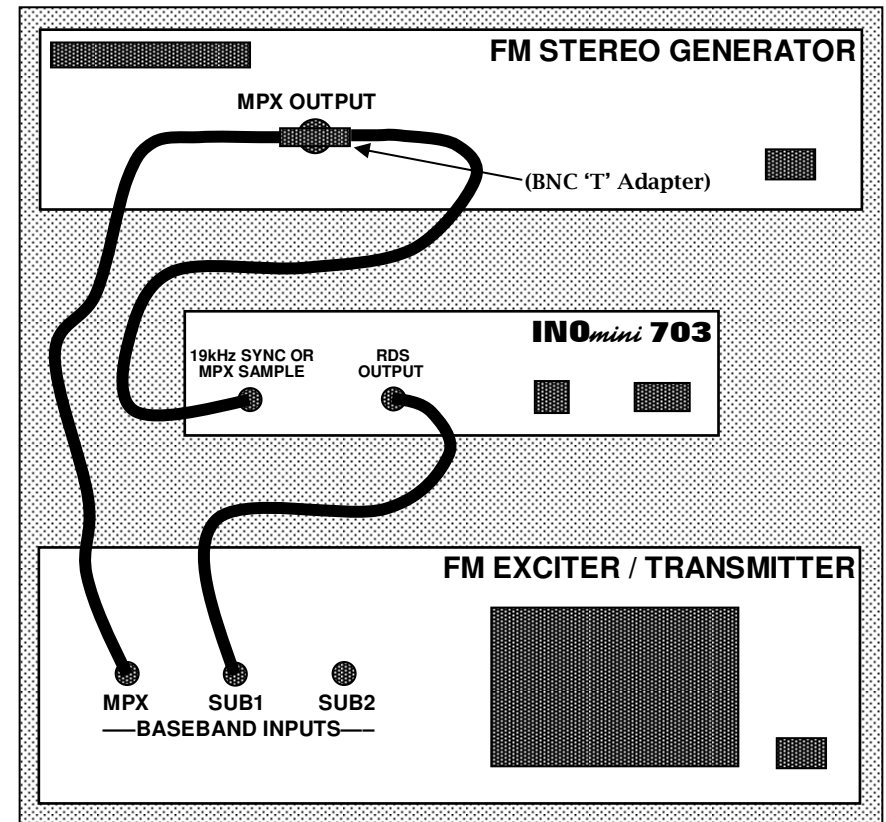
19kHz SYNC OR MPX SAMPLE	The MPX IN BNC connector <i>must</i> receive a sample of the composite/MPX signal from the stereo generator. The encoder will not generate the RDS subcarrier without a composite/MPX sample or 19kHz sync applied to this connector.
RDS OUTPUT	Cable this BNC connector directly to a spare wideband input (SCA or subcarrier input) of the exciter. RDS OUT contains <i>only</i> the RDS subcarrier. Program audio is not looped through the Model 703.
USB PROGRAMMING PORT	This is a B-type USB connector. A proper interconnect cable is supplied to couple the A-type USB port on the computer with this B-type USB connector on the rear panel of the 703.
+12VDC POWER I/O	These two parallel connectors allow <b>INO<sub>mini</sub></b> modules to 'daisy-chain' using just one DC power supply, so long as the rating of the supply is not exceeded.

## Connecting the Encoder

**NOTE:** Although the procedure for connecting the encoder is given in this section of the manual, we heartily recommend programming the 703 before placing it in the airchain. Default data was loaded into the encoder as part of the final checkout procedure at the factory. This should be updated with user preferences before the encoder goes 'on air.'

The Model 703 operates in a fail-safe, direct-feed 'sidechain' mode, rather than by looping program audio through the

encoder circuitry. The drawing below shows a typical connection in the station airchain.



The 19kHz SYNC OR MPX SAMPLE connector of the 703 *must* bridge the composite signal output from the stereo generator to sync and phase-lock RDS to the 19kHz stereo pilot. A bridging connection is most easily made with a BNC 'T' adapter as shown in the drawing. The high input impedance of the 703 will not load or otherwise compromise the stereo baseband feed to the exciter, even when the encoder is not powered.

Connect the RDS OUTPUT of the 703 to an SCA, RDS or other spare wideband input of the FM exciter. Assuming a short cable run, the low output impedance of the 703 encoder can directly feed the exciter input without regard to impedance matching.

### **Stereo Pilot Requirement**

The 703 encoder does not have an internal clock for free-run operation. This means that it *must* sample the composite baseband signal and lock to the 19kHz stereo pilot. The encoder will not generate the RDS subcarrier without a stereo MPX sample and thus is not suitable for monaural broadcasting. (See *MPX Sample Input Specification* on Page 3.)

### **Setting the RDS Injection Level**

The optimum injection level for the RDS subcarrier is typically 3.5% of total modulation (carrier deviation). Determining a correct setting for the front-panel INJECTION LEVEL control is a necessary routine but not always easy. The 57kHz subcarrier is BPSK-modulated, spreading the spectrum of the waveform and making a precise measurement of frequency and amplitude a difficult proposition. Injection of the RDS subcarrier is always referred to in terms of its instantaneous peak level.

Many FM modulation monitors are not capable of making an independent measurement of RDS subcarrier injection level. In order to do this, the monitor requires a special subcarrier measurement filter centered at 57kHz. The Inovonics Model 531 is representative of top-quality mod-monitors that do have this measurement capability.

In addition to the Model 531 mod-monitor, Inovonics also offers two other products that can prove helpful in monitoring RDS data and making injection measurements. These are the *Model 510 RDS Decoder/Reader* and the *Model 540 Subcarrier Monitor/Demod*. Either product may be used in conjunction with practically any FM mod-monitor in common use. See particulars at: [www.inovon.com](http://www.inovon.com).

Nevertheless, using care and taking certain limitations into account, nearly any conventional mod-monitor may be used to set RDS injection with reasonable accuracy. This does require a temporary interruption of the audio program, however, which is probably best done during a maintenance period. Here is the procedure:

1. With the Model 703 encoder *disconnected* from the exciter, check that the mod-monitor shows total carrier

modulation at the accepted 100% figure for program peaks.

2. *Disconnect* the stereo generator (and any SCA generator) from the exciter. Do make sure, however, that the stereo-gen continues to feed a composite/MPX signal to the 703's rear-panel 19kHz SYNC OR MPX SAMPLE connector.
3. With the front-panel INJECTION LEVEL control turned fully counterclockwise (this is a 15-turn control), connect the RDS OUTPUT of the Model 703 to a spare wideband subcarrier input of the exciter. As the mod-monitor is down-ranged to its most sensitive scale, only system noise should be indicated, hopefully at a negligible level if it is indeed readable at all.
4. Slowly advance the INJECTION LEVEL control clockwise. The mod-monitor will begin to register the RDS subcarrier. Set this to the desired injection level, typically 3.5% of total *peak* modulation.

***NOTE:*** Many mod-monitors change from a *peak* response to an *averaging* response on the more sensitive scales. This presents a steadier and more meaningful measurement of system noise. Check the manufacturer's documentation to verify the measurement response of your mod-monitor on its lower ranges. If low-level readings indeed prove to be average-responding indications, the monitor will indicate an average RDS injection level that is about 4dB lower than the actual peak value. Consequently, set injection for an indicated 2.2% (with *averaging* response), which will equate to the desired *peak* deviation of 3.5%.

5. Reconnect the stereo-gen and any SCA or other subcarrier sources to the exciter. You may now see a very slight increase in total modulation on program peaks. To maintain RDS and any other subcarriers at their proper injection relationship, the output of the stereo generator (i.e.: the audio program level) may have to be reduced by 0.5dB or less to ensure that total carrier modulation does not exceed the established limit.

## Section IV

# PROGRAMMING THE ENCODER

### Computer Requirements

Software provided with the Model 703 RDS encoder runs under the Microsoft Windows® 2000, XP and Vista operating systems. This single software program actually serves several encoder models. The computer communicates with the 703 encoder using the *Universal Serial Bus* (USB).

**NOTE:** It is very important to install the software from the CD-ROM before connecting the Model 703 to the computer. Be sure to observe this sequence to ensure proper operation.

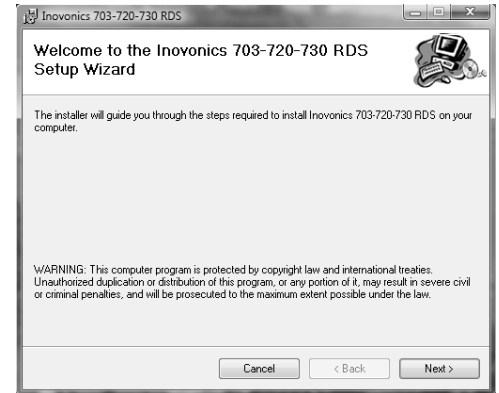
### Installing the Software

1. If upgrading from an earlier installation of the Model 703 encoder, first use the Add or Remove Programs (Programs and Features under Vista) utility under the Windows® Control Panel to fully remove any previous version of Model 703 software.
2. Insert the software CD in the computer. The program does incorporate an autorun utility, but if the installation routine does not automatically begin, click on: Start, then select: Run and manually type: D:setup.exe into the box. (This assumes that the D: drive is your CD drive.)

**NOTE:** This installation makes use of the Microsoft .NET Framework, which should already be resident on any up-to-date PC. In the event that this is not the case, the setup procedure will prompt you to install .NET at this time. .NET installation files are included on the installation CD, but if installation is being made from files downloaded from the Inovonics Website, .NET must be downloaded (at no charge) from the Microsoft downloads page: [www.microsoft.com/downloads](http://www.microsoft.com/downloads).

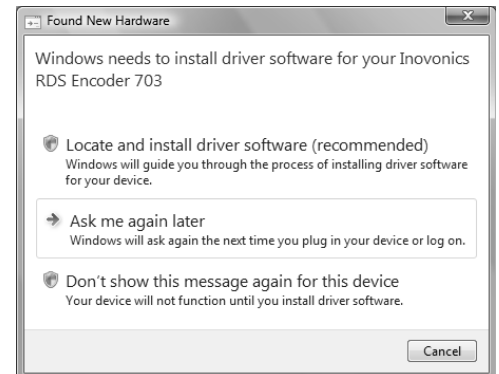
At this point you should have the Setup Wizard shown at the top of the next page on your computer.

3. Click: Next> to begin the software installation. You will be presented with various options, but unless you have a reason (and the know-how!) for doing otherwise, simply continue to click: Next> and, finally: Install>. This will put the Model 703 program in your Program Files directory and create a desktop icon.



4. The final installation screen will prompt you to check for any updates to Microsoft's .NET Framework. Although the setup CD contains the required .NET files, it is important to have any recent Microsoft updates to .NET. These normally come as part of the usual Windows® updating process.
5. Next, apply power to the Model 703 encoder. The front-panel LCD screen should light-up and display the default menu screen. When the encoder is not connected to a stereo generator, a flashing NO PILOT LOCK alarm begins to flash after 10 seconds. This alarm may be reset for 10 seconds by pressing either front-panel button, but the alarm does not interrupt the programming process and may simply be disregarded.

6. Using the USB interconnect cable supplied, connect the Model 703 encoder to the computer. This should bring up a Found New Hardware screen. Some versions of Windows® may require you to first click on a notice in the Taskbar area.

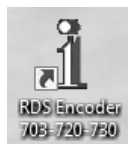


7. Allow Windows® to locate and install the driver, reinserting the installation CD-ROM if directed. The re-

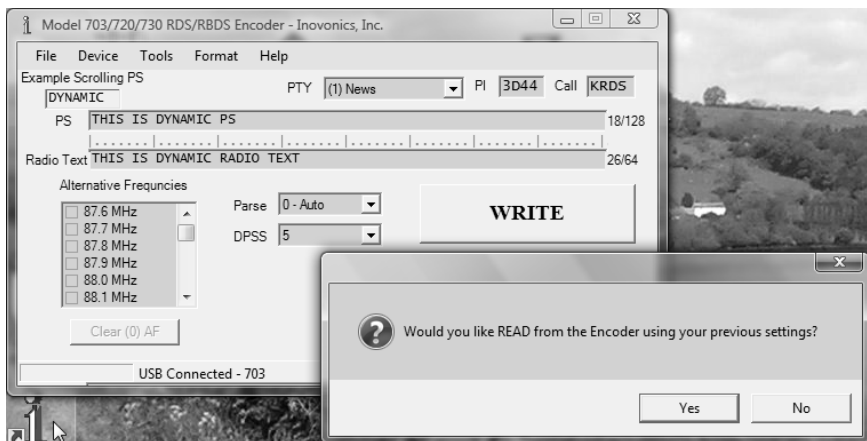


remainder of the driver installation is self-guiding; simply continue to click: Next until installation is complete.

### **Starting the Programming Software**



A typical software installation will place this icon on the computer Desktop. The icon notes that the software program is common to several Inovonics RDS encoders. Double-click the icon to launch the encoder programming software, bringing this image onto the Windows® Desktop and automatically accommodating to the encoder model found:



Check the notation in the lower-left corner of the main window for a confirmation that the computer has USB connection with the 703 encoder and that software has properly identified the encoder model.

Initially, click No in the secondary dialog box as there is no need at this time to read the factory-default data resident in the encoder.

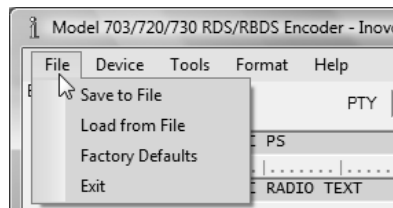
### **Exploring and Setting Up Menu Bar Options**

Many of the 'set-and-forget' encoder programming and housekeeping options are accessed through the Menu Bar at the top of the software screen. These will be discussed first, sequentially as they appear.

### **File Management**

All the RDS programming information that is typed into the data entry screen may optionally be saved as a small file on the computer. This is useful when various programming

segments throughout the broadcast day have program-specific RDS settings or messages, or for changing advertising or station promos without having to manually type the information each time.



Click: File to view the built-in utility for managing and saving encoder setups. Whatever programming has been entered and is showing in the setup screen can be saved as a small file using the usual Windows®

file structure.

Data may be saved as a file before, after, or instead of sending the information to the encoder. Clicking: Save to File will prompt you for a location for the file, which will automatically be assigned a .rds extension. The file may be named in keeping with its content and stored on the computer Desktop or in a dedicated folder of RDS setups.

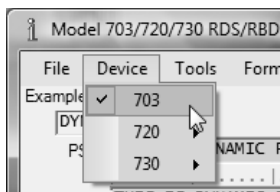
To import a saved .rds file onto the screen, click: File and then: Load from File. Browse to the Desktop or to the folder where the .rds files have been saved, and then double-click the file. This brings the RDS programming data onto the screen where it can then be uploaded to the encoder.

Clicking: Factory Defaults will instantly restore the 703 firmware to as-delivered values without waiting for a WRITE command. The entries that appear on your screen after clicking: Factory Defaults are data that are automatically read-back from the encoder after its restoration.

Clicking: Exit simply closes the program, the same as clicking the X in the top-right corner of the screen.

### **Device Selection**

The software program is common to several Inovonics RDS encoders. With a USB connection, software identifies the connected device.

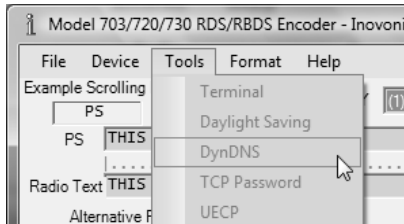


Clicking: Device will open a box for selecting the encoder model manually. This would have application if, for example, the user wished to compile a set of .rds programming setup files without the encoder being connected.

As the data-entry screens change according to which encoder is selected, the intended encoder should be selected prior to data entry.

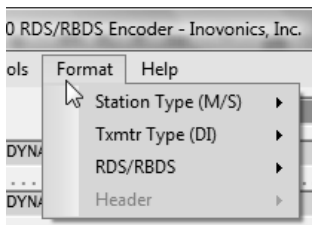
With the 703 encoder disconnected from the computer USB port, you can sample the features of the other Inovonics RDS encoders by clicking on the different models. All encoders are addressed by a uniform protocol, so even if a .rds setup file is sent to the wrong hardware, the connected encoder will accept only those commands that it can use.

## Tools



The Tools menu-bar item selects only those special features that are available in more advanced encoder models. The entries here are grayed-out to show that they are not applicable to the 703.

## Format

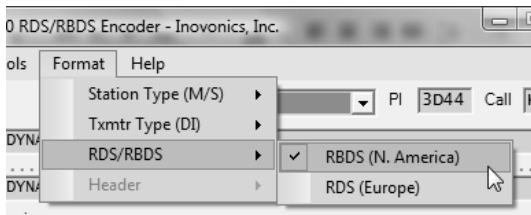


There are three setup selections made in the Format drop-down menu. You can click on each available heading to view and to check the appropriate boxes.

The first selection, Station Type (M/S) sets the RDS 'Music/Speech' switch.

Although this flag is little-used, it is best to check the appropriate box, depending on whether your station "plays the hits," or carries strictly News/Talk programming.

Likewise with Txmtr Type (DI) selection, confirm that Stereo is checked. This may seem pointless, as the 703 encoder cannot be used for monaural transmissions, but it's best to play the game by the rules.



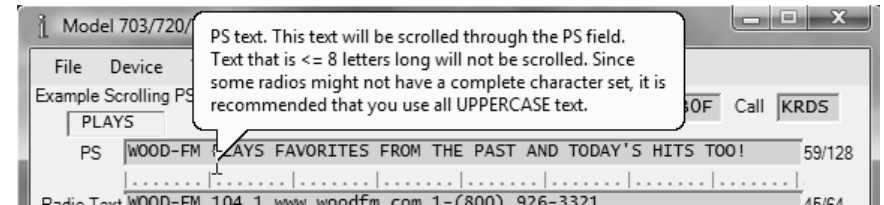
The RDS/RBDS selection is critical as it defines operation of the 703 encoder between the European RDS and the North American RBDS stan-

dards. This must be set correctly before the encoder can be programmed with other options.

For North America (US, Canada and Mexico) the RBDS (N. America) box should be checked, as shown in the illustration. For the rest of the world, check the RDS (Europe) box. Again, this is important, both in consideration of the PI code and with regard to the proper PTY list.

## Help

The Help tab allows the user to turn on and off the 'hover-over' information balloons like the one shown below.



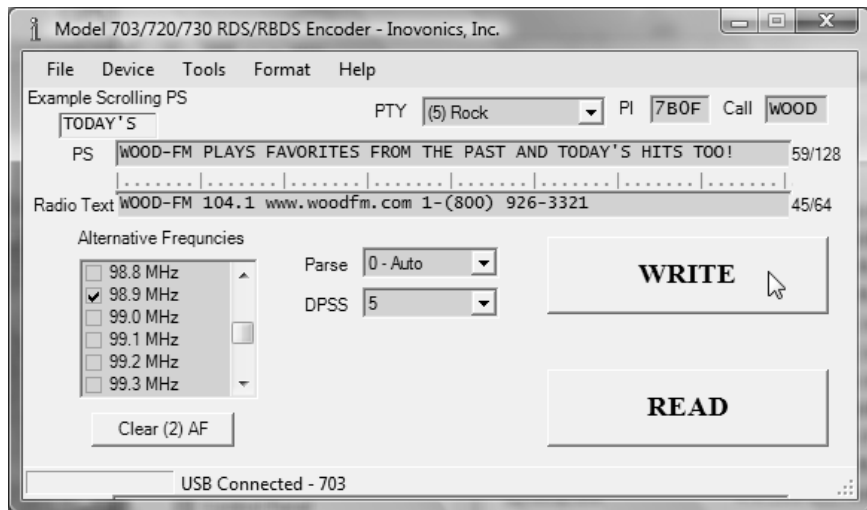
When the Enable Popup Help box is checked, helpful information will appear for several seconds as the mouse pointer is positioned over most data entry fields.

When Read on Startup is checked, 703 software will ask whether data should be downloaded from the encoder as soon as the program is loaded. Particularly if the software program has been used with a different encoder in the interim, it is a good idea to bring what is being transmitted currently onto the data entry screen. This box is checked as a factory default.

A PDF version of this Manual (703) can be found under Help, and information About software and firmware versions can be called up also.

## Entering Data

The data entry screen is largely self-explanatory. The illustration at the top of the next page depicts a Model 703 data entry screen filled-in for a typical US 'Adult-Contemporary' rock station, ready to be uploaded to the encoder. The various RDS features and functions will each be discussed separately.



The individual RDS/RBDS information fields will be discussed next, with guidelines on data entry.

**PTY** Program Type identifies the station format. There are two format lists, one for the European RDS system and one for the American RBDS specification. Select the proper encoder mode (RDS or RBDS) under Format in the menu bar. This will drop down the appropriate list when you click on the arrow to the right of the PTY selection box. Only one PTY code may be chosen, and it should match the genre (format) of your station.

**PI** The PI code is your station's 'digital address' and is unique to each station the world over. This hexadecimal code may be entered directly in the PI box, or US and Canadian stations may use the PI calculator built into the encoder software. Only US and Canadian PI codes are calculated from call letters. Everywhere else the relevant code must be obtained from the Broadcasting Authority and entered manually.

The Call entry field is not available when the 703 encoder is in the RDS mode, it is only active for North American RBDS stations. To use the PI calculator for US and Canadian callsigns, simply enter station call letters into the Call box. The hexadecimal PI code will automatically be calculated and

appear in the PI field.

**PS** The PS entry shows on the faceplate of all RDS radios, and on cell phones and MP3 players that have built-in FM/RDS receivers. Receivers are capable of displaying only 8 alphanumeric characters at a time. If 8 characters or less are entered in this field, then they will display continuously on the radio. If additional text is entered, then it will "scroll" across the radio faceplate in 8-character groups.

The 703 encoder is able to 'parse' long PS entries, up to 128 characters (including spaces) in fact. Parsing refers to the combining of consecutive small words, or centering or breaking larger words for the most meaningful display. Words longer than 8 characters are side-stepped through the display area one character at a time. The Example Scrolling PS display area below the Menu Bar shows how your message will be shown on RDS receivers.

To enter PS data, use your mouse to highlight any text already in this field and delete it. Then type in your message to see how it will show on the listener's radio. A character counter to the right of the message-entry area keeps track of how much space is left.

In the example shown on the previous page, only capital letters were entered in the PS field. This is recommended, as many RDS radios do not support lowercase letters and may display gibberish when uppercase and lowercase letters are mixed.

**Radio Text** Radio Text is a separate message, up to 64 characters long, which is transmitted in addition to the PS message. Only radios equipped with a TEXT or INFO button are able to display Radio Text, so this messaging field is generally relegated to incidental information such as Web addresses and phone numbers, as shown in the example. Because Radio Text is typically supported only by high-end radios, lowercase letters may be used in this field and should be displayed properly.

Radio Text is always side-stepped across the dis-

play area on the receiver faceplate. The text presentation is entirely under control of the receiver; there are no transmission options to change the way Radio Text is presented.

AF Networked stations, and stations with rebroadcast 'translators' to cope with problem coverage areas, broadcast the identical programming at more than one dial position. Only when the program is heard at the same time (synchronously) at these different frequencies is the associated frequency considered a true "Alternative Frequency."

To add or remove frequencies from the AF list, navigate with the slider and buttons at the right of the Alternative Frequencies window. Click a frequency to add or remove a checkmark. There is also a button below the window to clear all checked frequencies from the AF list. The total number of checked frequencies is displayed on this button as well.

*NOTE:* Whenever even a single AF is entered, be sure to add the station's primary transmission frequency to the list as well. This is essential for 'smart' receivers to utilize this feature properly.

Parse As explained under PS, 'parsing' defines how a message longer than 8 characters is broken into 8-character groupings for display on the RDS radio faceplate. The 703 encoder allows for three parsing options, which will drop down when the arrow next to the box is clicked.

0 - Auto is the default setting and represents the most common 'dynamic PS' scrolling option. Small words are combined and larger words are either centered in, or sidestepped across, the receiver display area. Once you have entered a message in the PS field, you will be able to see how it is parsed in the Example Scrolling PS window below the Menu Bar.

1 - Single is Inovonics' "safe-scrolling" mode, whereby messages are marched across the radio's display one character at a time, much like soldiers passing a reviewing stand. This results in much

slower message transmission, but at the same time the driver of a car does not have to avert his eyes from the road as often to capture the entire message. You can click on this option to see the effect in the Example Scrolling PS window.

8 - Block simply takes the incoming message and displays sequential 8-character groups. There is not parsing involved, and the message just breaks every 8 characters. Click on this option to view the effect in the Example Scrolling PS window. This option would be used only when the message is manually parsed. As an aid in manual parsing, a series of tic marks appears below the message entry area in this parsing mode. Characters between major tic marks are what will be shown on the radio faceplate.

DPSS This sets the sequencing speed of dynamic PS messaging. Setting the speed at 1 will result in the slowest message block refresh rate, a setting of 9 will refresh at the fastest speed. Some radios will skip blocks, freeze or display gibberish at high speed settings. The display should be stable on any radio at a speed setting of 5, but check the display on a couple of representative receivers to make sure.

When a simple, 8-character static station ID is transmitted, DPSS still establishes the refresh rate. A setting of 5 is recommended.

### **Sending Data to the Encoder**

Once all information has been entered into the various data fields, click the WRITE button to upload data to the encoder. A status bar at the bottom of the software screen shows the transfer and a Transfer Complete confirmation. Of course the 703 must be connected to the computer during this operation with: USB Connected – 703 displayed at the bottom of the screen.

### **Reading Data from the Encoder**

Clicking the READ button will download the contents of the encoder memory and 'repopulate' the software screen. As mentioned earlier, this is most useful when the encoder is

reconnected to the computer after a time interval. This ensures that the software program does not overwrite registers in the encoder with data that it may have accumulated from programming a different unit in the interim. Software will ask for a READ when the encoder is connected, if that option has been selected under Help.

## Section V TECHNICAL MATTERS

The Model 703 encoder is simple and small, utilizing mostly surface-mounted (SMD) components, some of which are 'application-specific' and pre-programmed at the factory. For all practical purposes this precludes servicing the unit in the field. For these reasons, and also because of the small format of this Manual, we have elected to dispense with the schematic diagram, servicing instructions and a parts listing.

Because it is so small and light (and because it is not in the program signal path!), returning the 703 encoder for factory servicing is the option that we encourage. Inovonics has never considered factory repair charges as a significant source of revenue; you will be astonished at how reasonable our rates actually are!

Having said all that, our policy has always been one of 'full disclosure.' We feel that, unless we are doing something really nefarious, there should be no 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 darkest secrets concerning the Model 703.



# 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 the factory 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 automatically 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 ONE YEAR 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 one-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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