

**OPERATING AND MAINTENANCE
INSTRUCTION MANUAL**

MODEL 702

RDS/RBDS “MINI-ENCODER”

**Revision 2
(Auto-Parsed Scrolling)
Effective With Serial No. 199
December, 2005**

TABLE OF CONTENTS

Section I - INTRODUCTION	1
Product Description • Product Features Product Specifications	
Section II - THE RADIO DATA SYSTEM	5
What is RDS? • US vs. Europe	
Section III - INSTALLATION AND SETUP	6
Unpacking and Inspection • Mounting AC Mains Power Radio Frequency Interference (RFI) Front Panel Indicators Rear Panel Appointments Connecting the Encoder Stereo Pilot Requirement Setting the RDS Injection Level	
Section IV - PROGRAMMING THE ENCODER.....	11
Computer Requirements Installing the Software Starting the Programming Software Entering Data Sending Data to the Encoder File Management	
Section V - TECHNICAL MATTERS.....	18
WARRANTY	(inside back cover)

Section I

INTRODUCTION

Product Description

The Inovonics Model 702 is a second-generation “Mini-Encoder” for the *Radio Data System*, or RDS. The 702 enables the FM broadcaster to implement most of the important RDS functions with maximum ease and at a minimum of expense.

Originally, the radio data system developed for use in the U.S. was called the *Radio Broadcast Data System*, or “RBDS,” to differentiate it from the European RDS standard. Differences between the two systems were gradually reconciled, and the term “RDS” can be legitimately applied to the system as practiced worldwide.

Product Features

Features of the Inovonics 702 include:

- Stand-alone operation — the encoder does not require a dedicated host computer in normal operation.
- Scrolling-PS messaging is automatically ‘parsed,’ or divided into word groups for proper presentation.
- IDs, flags, static and scrolling messages are held in non-volatile memory. The encoder is programmed with any PC, and then may be relocated to a remote transmitter site.
- Programming software runs under Microsoft Windows® with easy USB connectivity. Software is supplied on a CD-ROM.
- The 702 locks to the 19kHz stereo pilot from a composite/MPX sample. No special stereo-gen ‘sync’ port is necessarily required, although a composite/MPX signal (or 19kHz sample) must be provided for the encoder to operate.

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 a fixed display with the station’s call letters (KXYZ-FM) or its ‘street name’ such as (LIVE 105), or a dynamic, ‘scrolling’ ID of up to 64 characters (LIVE 105 PLAYING THE BEST OLDIES AND HITS OF TODAY).

PI Program Identification – identifies the station with a unique numerical code, or ‘digital ID.’ In the US this is mathematically calculated from station call letters. This calculation for US stations is done within the Model 702 software. In other countries the PI is assigned by an appropriate radio authority.

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 702.

AF Alternative Frequency List – a utility that can identify up to seven rebroadcast ‘translators’ or network sources of the identical program being broadcast simultaneously at different frequencies. The AF list helps the RDS radio automatically re-tune to the strongest signal.

RT RadioText – a 64-character block of plain text that can be called up to scroll across the front panel of RDS radios that have a TEXT or INFO button. RadioText can be used for promos, contests or advertising, and is additional to, and independent of, “Scrolling-PS,” a feature that does not depend on receiver functionality for its scrolling display. Scrolling-PS and RadioText are simultaneously supported by the Model 702.

M/S Music/Speech Switch – this ‘flag’ indicates either music programming or all-speech transmissions. The impor-

tance of this particular feature eludes even the all-knowing Inovonics technical staff.

- DI Decoder Identification** – a flag that informs the receiver whether the program is in stereo or mono (as if it didn't already know?).
- TP Traffic Program** – this is a flag that tells the RDS radio that your station is one that regularly broadcasts traffic and travel information. It also 'preps' the receiver to respond to your TA flag.
- TA Traffic Announcement** – this is a *temporary* flag that is sent *only* while an important traffic announcement is being broadcast. Full-featured RDS radios continually search for TA flags, and will interrupt the listener's choice of programming (another station or even a CD or cassette) to relay critical traffic info.

RDS Applications NOT Supported: Please appreciate that the very simple and inexpensive nature of the Model 702 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 and the Emergency Warning System (EWS). The Inovonics 702 does not support the SPB 490 Universal Encoder Communications Protocol, nor can it be used for on-line "dynamic" data transmissions such as song title/artist, etc. Other Inovonics RDS encoders do provide these features, so please feel at liberty to visit www.inovon.com for additional details on these and our other exciting products.

RDS Output: The subcarrier level is adjustable between zero and 4 volts p-p from a low source impedance. The auxiliary wideband input of the exciter/transmitter should have a high impedance, '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 702 encoder.* An MPX level between 0.5 and 5 volts p-p is required, this level referenced to 100% modulation ($\pm 75\text{kHz}$ carrier deviation).

In the event that the stereo generator is incorporated as part of the exciter (i.e.: digital exciter), such that a compos-

ite/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: 12VAC at 500mA. A 'wall outlet transformer' power supply is provided, with full regard to the destination AC mains voltage.

Size and Weight: 2"H x 6"W x 8"D; 4 lbs. shipping weight.

Section II

THE RADIO DATA SYSTEM

What is RDS?

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.

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 702 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 introduction, RDS quickly grew in use throughout Europe. By the late 1990s it was nearly universal; that is, it was hard to find a European FM station that did *not* carry 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 at the ‘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 almost 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 and packing materials for possible reuse. In the event of return for Warranty repair, shipping damage sustained as a result of improper packing for return may *invalidate the Warranty!*

IT IS VERY IMPORTANT that you complete and return the Warranty Registration Card included with this Manual. Not only does this assure coverage of the equipment under terms of the Warranty, and provide some means of trace in the case of lost or stolen gear, but also the user will automatically receive specific **SERVICE OR MODIFICATION INSTRUCTIONS** should these been forthcoming from Inovonics.

Mounting

The Model 702 RDS encoder is packaged in a plastic box with rubber feet. No provision has been made for rack-mounting the 702. The unit may simply be set on top of a convenient rack-mounted chassis, so long as at least 2U of panel space *above* the rack-mounted ‘host’ is left open to access the encoder. As the programming port is on the rear panel of the Model 702, interconnect cabling should have sufficient length to permit turning the encoder around to access the rear-panel **USB PORT** connector from the front of the rack for encoder programming.

AC Mains Power

The Model 702 is supplied with a ‘wall-outlet transformer’ type of power supply suited to the destination mains voltage. The actual power delivered to the encoder is 12 volts AC at about 500mA. Though the input power to the encoder is well defined, we recommend that you use the supplied “WallWart™.”

Radio Frequency Interference (RFI)

Although we have anticipated 702 installation in the immediate proximity of broadcast transmitters, please do practice some care in locating the unit away from *abnormally* high RF fields.

Because the RDS OUT and MPX IN connectors are unbalanced, there is a chance that an RF ground loop could be formed during programming, when the 702 is temporarily connected to the computer.

Front Panel Indicators

POWER	This LED lights whenever AC voltage is present.
PILOT LOCK	This indicator shows that the 57kHz RDS subcarrier has phase-locked to the 19kHz stereo pilot tone. When pilot is absent, data output from the 702 encoder is inhibited and the output is muted. <i>The 702 must have stereo pilot present at the MPX IN connector to function.</i>
PRO- GRAM	This LED flashes briefly as new RDS data is uploaded from the computer to the encoder's non-volatile memory. During the few seconds of this data transfer process the encoder output is muted.
RDS DATA	This indicator flashes as RDS data is actually transmitted. The flash rate has intentionally been made much slower than the actual data baud rate so that the indication can easily be seen.

Rear Panel Appointments

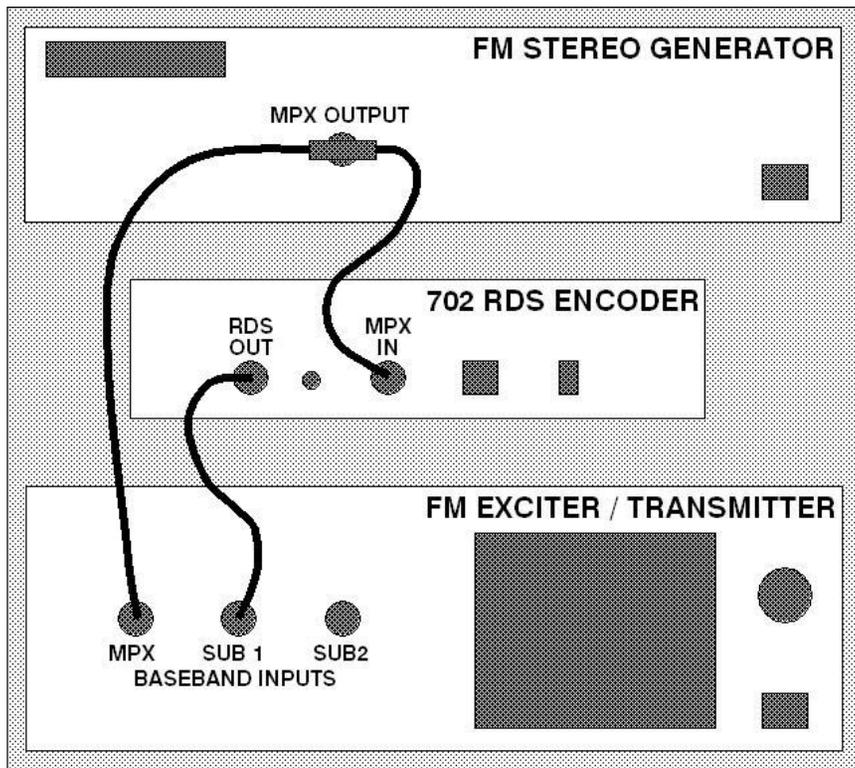
RDS OUT	Cable this BNC connector directly to a spare wide-band input of the exciter. RDS OUT contains <i>only</i> the RDS subcarrier. Program audio is not looped through the Model 702.
RDS LEVEL	This 15-turn adjustment sets the RDS subcarrier output level, which is adjustable between zero and 4 volts p-p. Refer to the setup procedure on Page 9.
MPX IN	The MPX IN BNC connector <i>must</i> receive a feed of the composite/MPX signal from the stereo generator. The encoder <i>will not generate the RDS subcarrier</i> without a composite/MPX sample or 19kHz sync applied to this connector.

USB PORT This is a B-type USB connector. A proper inter-connect cable is supplied to mate with the A-type USB port on the computer used to program the 702.

12 V A.C. The wall-outlet power transformer included with the Model 702 encoder has a cord with a mating plug for this connector. Make sure that the AC mains side of the adapter matches the nominal AC mains voltage. Be particularly suspicious if the transformer's AC mains plug is *not* the same style as the wall outlet. Do not use a 'travel adapter' to plug the power supply into an unfamiliar mains outlet.

Connecting the Encoder

The Model 702 operates in a fail-safe, direct-feed 'sidechain' mode, rather than by looping program audio through the encoder circuitry. This drawing shows the typical connection.



MPX IN of the 702 *must* bridge the composite signal output from the stereo generator to phase-lock RDS to the 19kHz stereo pilot. A bridging connection is most easily made with a BNC ‘T’ connector as shown in the drawing. The high input impedance of the 702 will not load or otherwise compromise the stereo baseband feed to the exciter, even if power to the encoder becomes disconnected.

Connect RDS OUT of the 702 to any auxiliary subcarrier (wideband) input of the FM exciter. Assuming a short cable run, the low output impedance of the 702 encoder can directly feed a ‘bridging’ exciter input without regard to impedance matching.

Stereo Pilot Requirement

The 702 encoder does *not* have an internal clock for free-run operation — 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!** (See *MPX Sample Input* Specification on Page 3.)

Setting the RDS Injection Level

Many FM modulation monitors are not capable of making an independent measurement of RDS subcarrier injection level. For this the monitor requires a special subcarrier measurement filter centered at 57kHz. The Inovonics Model 531 is representative of mod-monitors that *do* possess this capability.

In addition to the fabulous Model 531 mod-monitor, Inovonics also offers two other fine products that can prove helpful in monitoring RDS and making injection measurements: 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.

Taking certain limitations into account, however, nearly any conventional mod-monitor may be used to set RDS injection with reasonable accuracy, although this requires a temporary interruption of the audio program... perhaps best done during a maintenance period. Here is the procedure:

1. With the Model 702 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 or other subcarrier generator from the exciter. Do make sure, however, that the stereo-gen continues to feed a composite/MPX signal to the Model 702 MPX IN connector.
3. Turn the RDS LEVEL control on the rear panel of the Model 702 fully counterclockwise (this is a 15-turn control), and then connect the RDS OUT of the Model 702 to a spare wide-band subcarrier input of the exciter. As the mod-monitor is downranged to its most sensitive scale, only system noise should be indicated, and at a negligible level if at all.
4. Slowly advance the RDS 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 (*see the following note*).

NOTE: Many mod-monitors change from a *peak* to an *averaging* response on the more sensitive scales in order to present a more meaningful measurement of system noise. Check the manufacturer's documentation to verify the measurement response of your mod-monitor on lower ranges. If response indeed proves to be averaging, the indicated RDS injection will actually be about 4dB lower than the peak value. Consequently, set injection for an indicated 2.2% (with *averaging* response); this 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 note 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 turned down slightly so that total modulation is once again at the desired modulation limit.

NOTE: The 702 encoder will have been programmed with default RDS data at the factory to confirm operation prior to its shipment. Be sure to enter you own RDS data before placing the 702 into actual service. The next section, *Section IV*, guides you through this procedure.

Section IV

PROGRAMMING THE ENCODER

Computer Requirements

Software provided with the Model 702 RDS encoder runs under any version of Microsoft Windows® on IBM-compatible PCs. The computer and encoder communicate via the *Universal Serial Bus* (USB), which is a standard feature on newer machines.

IT IS VERY IMPORTANT to install the software from the CD *before* connecting the Model 702 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 702 encoder, first use the Add or Remove Programs utility under the Windows® Control Panel to fully remove any previous version of Model 702 software.
2. Insert the software CD in the computer. The program incorporates an autostart utility. If the installation routine does *not* automatically begin, click on: Start, then select: Run and manually type into the box: D:setup.exe. You should now have an opening screen like the one shown here.
3. Click: Next> to begin the software installation. You will be presented with several options, and unless you have a reason for doing otherwise, simply continue clicking: Next>, and, finally Install>. This will put the Model 702 program in your Program Files directory and will prompt you to create a desktop icon.

Once the software is resident on your hard drive, a final window will advise that the installation is complete. Decline (check NO) when asked whether to launch the program, then click: Finish to complete the installation. *NOTE:* Leave the CD in the computer as it will be used to download a driver during the second phase of the installation.

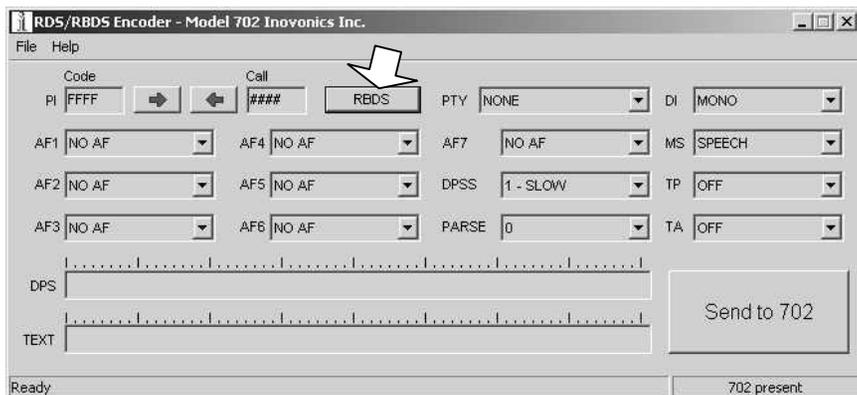
4. Apply AC power to the Model 702 encoder and check that the front-panel POWER indicator is lighted.
5. Using the USB interconnect cable supplied, connect the Model 702 encoder to the computer. A Found New Hardware notice will pop up in the taskbar area, and if the installation CD has been left in the drive, a Welcome to the Found New Hardware Wizard screen should pop up.
6. Check the No, not this time bubble, and then: Next> to load the Model 702 encoder driver from the CD onto the computer. This driver is a separate file from the software, which was installed in steps 1 and 2, and is necessary to configure the USB interface properly. A second Wizard screen will announce when this has completed. Click: Finish to close the window and then remove the installation CD.

Starting the Programming Software



Normal software installation places this icon on the computer Desktop. Double-click it to launch the encoder programming software.

The 702 data-entry screen is shown below. In the lower right corner, the text: 702 present denotes that the encoder is currently cabled to the computer. It is not necessary, however, to have the encoder connected for entering RDS data.

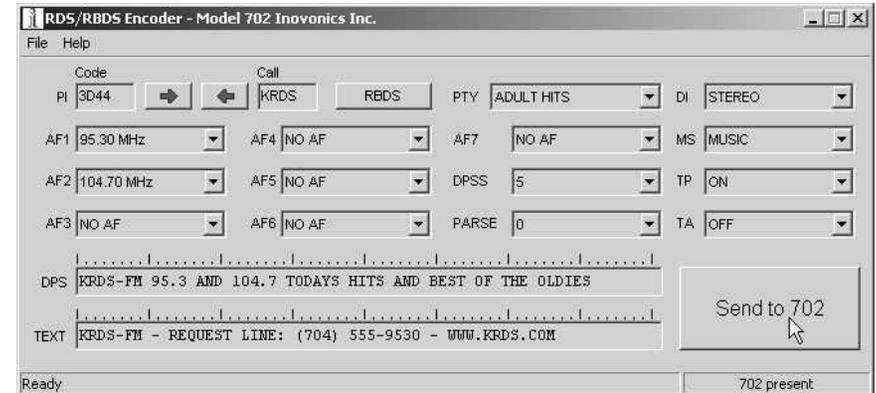


Select the proper encoder operating mode (arrow in photo) before entering data. For North America (US, Canada and Mexico) the button should be toggled to RBDS. For the rest of the world, it should be set to indicate: RDS. This is important, both for setting the PI code and to display the proper PTY list.

Specific entries for dayparting or other programming situations can be entered and saved as files to be uploaded to the 702 at a later time. File management is discussed on Page 17.

Entering Data

The data entry screen is largely self-explanatory. The illustration below depicts a Model 702 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.



PI To use the PI calculator for US callsigns (only!), simply enter station call letters into the Call box and click the left-facing arrow. The hexadecimal PI code will automatically be calculated and entered in the Code box. An appropriate broadcasting authority assigns PI codes in all other countries, which may then be manually typed into the Code box. Consult the published RDS Specification or log onto the primary RDS information Website: www.rds.org.uk for help.

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. With the proper mode selected (RDS / RBDS button), a drop-down menu allows you to choose from the appropriate list.

DI This is generally set for STEREO in the civilized world; a moot point here, in fact, as the Model 702 requires a 19kHz stereo pilot to operate. The only time DI would be set to MONO is for stations running all-monoaural programming, and with an independent 19kHz pilot source applied to the rear-panel MPX IN connector.

AF1-7 Rebroadcast ‘translators,’ and stations that are part of a network, may air identical programming at more than one frequency. Only when the program is heard at the same time (synchronously) at these different dial positions is the associated frequency considered a true “Alternative Frequency.”

To add frequencies, click the arrow to the right of the AF box and select the frequency from the drop-down menu. *NOTE:* As AFs are entered, be sure to add the station’s primary transmission frequency to the list. This is essential for ‘smart’ receivers to utilize this feature properly.

MS The Music/Speech switch is a ‘flag’ that defines the station’s primary programming. An all-talk, all-news or all-sports station might set this to SPEECH, although MUSIC will be the default setting for the majority of FM broadcasters.

TP The Traffic Program flag tells the receiver that this station is one that regularly broadcasts traffic and travel announcements. This flag is tied in with the TA flag, as only TP stations will be able to activate the TA function. Set TP to ON *only* if you carry traffic information throughout your broadcast day and expect to ‘flash’ specific travel warnings in critical situations.

TA When the TA flag is raised, full-featured RDS radios (with two front-ends) will interrupt listener’s selected programming to supply critical road information. This program interruption extends to other stations that the radio might be tuned to, and as CD or cassette playback as well.

The TA flag is to be sent only during *important* traffic-related announcements, and the function activated *only* while an *essential* announcement is being broadcast. Using the TA flag requires a computer connected to the Model 702 during transmission, so that the TA

flag can be turned ON at the start of a vital announcement, and reset to OFF immediately after the announcement is completed.

DPSS The sequencing speed of dynamic PS messaging is set here. Setting the speed at 1 will result in the slowest message block refresh rate, 9 will refresh at the fastest speed. Some radios will skip blocks or display gibberish at high speed settings. The display should be stable on any radio at a speed setting of 7 or lower, but check the display on a couple of representative receivers to make sure. When a simple, 8-character static message is transmitted, set DPSS to 1.

PARSE ‘Parsing,’ in the case of the Model 702, defines how a dynamic message is broken into 8-character groups for display on the RDS radio faceplate. Effective with Revision 2 software, the Model 702 automatically parses Dynamic PS (DPS) messaging. It is no longer necessary to manually parse long messages using the tic marks in the DPS entry field. Furthermore, the parsing function also enables the Inovonics “Safe Scrolling” mode for the Model 702.

The PARSE button drops a menu of numbers. 0 (zero) is the most common deployment of ‘block’ transmission, with short words combined and centered in the RDS radio display. 9 is essentially the same thing, only with left justification of the character groups. In both cases, words longer than 8 characters are ‘sidestepped’ across the 8-character readout for best continuity.

The intermediate numbers, 1 through 8, enable “Safe Scrolling,” where the message is marched across the display one or more characters at a time. This is similar to soldiers passing a reviewing stand. Although a message will take considerably longer to send by this method, the driver of a car will not have to look at the display nearly as often to read the message completely.

A setting on 1 is the normal selection for Safe Scrolling, marching the characters one at a time for easy reading. 2 through 7 march a like number of characters per display update, which has limited utility and would prove useful only in certain situations.

With PARSE set to 8, the entire 8-character screen is updated with each PS field transmission. This would be the setting for manually parsing a PS message, using the tic marks in the DPS entry field to break the message for meaningful reading.

DPS The *intended* display on every RDS radio faceplate is an 8-character Program Service Name, or PS. Originally restricted to fixed call letters, the frequency or the “street name” of the station, the PS field has been adapted to ‘dynamic,’ or scrolling messages. The Model 702 gives the broadcaster the option of transmitting a 64-character text ID, station promo message or even advertising.

TO RECAP (and to simplify): use a PARSE setting of 0 for the ‘block’ method of DPS messaging, and a setting of 1 for Safe Scrolling. This obviates any need for manual formatting.

TEXT RadioText is an entirely separate 64-character message that may be called-up for display on some radios that have a TEXT or INFO button. Many automobile receivers will not display RadioText, hence the popularity of ‘Scrolling-PS’ for messaging despite strict rules and common-sense cautions.

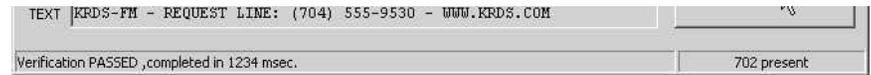
RadioText is transmitted as a single, 64-character ASCII text block. Scrolling RadioText messages across the receiver faceplate is a function of display logic in the receiver and does not depend on encoder programming. Thus no attention need be paid to special message formatting, as is the case with Scrolling PS (DPS).

NOTE: RDS receivers often display lower case letters and fancy symbols very strangely. Although the DPS and TEXT fields will accept mixed-case characters, we strongly recommend using *capital letters* (‘all caps’) in both fields.

Sending Data to the Encoder

Once all information has been entered into the various data fields, click the Send to 702 button to upload the data to the encoder. During this transfer, which takes only a couple of seconds, the encoder PROGRAM indicator LED will blink and the RDS subcarrier output will be muted. In addition, a status bar will display across the bottom of the screen during transfer, and

a confirmation of successful transfer with the elapsed transfer time will be displayed.



File Management

All the RDS programming information that is put into the data entry screen may optionally be saved as a file. 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 at random.

Data on the screen may be saved as a file before, after, or instead of sending the information to the encoder. Clicking on: File, and then: Save As will prompt you for a location for the file, which will automatically be assigned a .ino 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 .ino file onto the screen, click on: File and then: Open. Browse to the Desktop or to a folder where the .ino file has been saved, and then double-click the file. This brings the RDS programming information onto the screen where it then can be sent to the encoder with the Send to 702 button.

Section V

TECHNICAL MATTERS

The Model 702 encoder is simple and small. It utilizes surface-mounted (SMD) components, some of which are ‘application-specific.’ Moreover, certain chips require ‘firmware’ programming. To a large extent 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 a product such as the Model 702 for factory servicing is an option that we encourage. Inovonics has never considered factory repair charges as a significant source of revenue; you would 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 you are doing something nefarious, there should be no reason to hide anything. With a clear conscience we will cheerfully provide additional documentation and divulge any secrets concerning the Model 702 upon request.

NOTES AND DOODLES

DOODLES AND NOTES



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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